



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Manual

Software Option:

1xEV-DO

for R&S[®] CMU-B88/-B89

R&S[®] CMU-K88

1150.3998.12

CMU-K839/-K849/-K859/-K869

1200.8300.02/-8400.02/-8500.02/-8600.02

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Dear Customer,

throughout this manual, CMU-K88/-K8x9 is generally used as an abbreviation for software option R&S CMU-K88/-K8x9.
The Universal Radio Communication Tester R&S CMU 200/300 is abbreviated as CMU 200/300.

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Tabbed Divider Overview

Safety Instructions
Certificate of Quality

Manuals for Universal Radio Communication Tester CMU
What's new in this Revision?
Abbreviations
Glossary

Tabbed Divider

1	Chapter 1: Installation
2	Chapter 2: Getting Started
3	Chapter 3: Manual Operation
4	Chapter 4: Functions and their Application
5	Chapter 5: Remote Control – Basics
6	Chapter 6: Remote Control – Commands
7	Chapter 7: Remote Control – Program Example
8	Chapter 8: Maintenance
9	Chapter 9: Error Codes
10	Index

1xEV-DO Functionality of R&S CMU Models

1xEV-DO measurements can be performed with the following R&S CMU 200 models:

- **Universal Radio Communication Tester** R&S CMU 200, stock no. 1100.0008.02. If equipped with the appropriate options (as stated in the relevant sections), this model provides the full 1xEV-DO functionality described in this manual. All 1xEV-DO and 1xEV-DO-related options are supported by this R&S CMU model.
- **Non-Signaling Tester** R&S CMU 200v30, stock no. 1100.0008.30. The functionality of R&S CMU options which are particularly relevant for production (R&S CMU-K14, R&S CMU-K47, R&S CMU-K48) is included in the basic configuration of the non-signaling tester. With options R&S CMU-B83 and R&S CMU-B88 this model supports all 1xEV-DO TX measurements in Non Signaling mode and also provides a 1xEV-DO generator with channel coding in order to perform single-ended RX tests (with AT-assisted BER evaluation). Optional extensions of the non signaling tester are listed below; note that not all 1xEV-DO options described in this manual are supported.

The different R&S CMU 200 models are also described in the product brochures.



The non-signaling tester also supports the WCDMA, GSM, CDMA2000, and AMPS network standards. In addition Rohde & Schwarz offers a high-end service tester, CMU 200v10, stock no. 1100.0008.10. For details refer to the relevant operating manuals.

Table 1 Basic configuration and options for non-signaling tester R&S CMU 200v30

Functionality	Option	Remarks
Basic configuration (included in 1xEV-DO-MS software package for R&S CMU 200v30)		
1xEV-DO non-signaling measurements (all bands)	Corresponding R&S CMU 200 options: R&S CMU-K88	Requires CDMA2000 signaling unit, option R&S CMU-B83 and 1xEV-DO extension for R&S CMU-B83, option R&S CMU-B88
FM stereo transmitter R&S smart alignment I/Q versus slot	R&S CMU-K14 R&S CMU-K47 R&S CMU-K48	Extended functionality, relevant for production tests
Additional options		
CDMA2000 signaling unit	R&S CMU-B83	Required for TX measurements and 1xEV-DO generator with channel coding (e.g. for single-ended BER tests)
1xEV-DO extension for R&S CMU-B83	R&S CMU-B88	Required for TX measurements and 1xEV-DO generator with channel coding (e.g. for single-ended BER tests)
Reference oscillator	R&S CMU-B11 R&S CMU-B12	OXCO, aging $2 \cdot 10^{-7}$ /year OXCO, aging $3.5 \cdot 10^{-8}$ /year

Table of Contents

- 1 Introduction1.1**
 - 1xEV-DO Non-Signaling extension CMU-K88 for units CMU-B88/-B83..... 1.1
 - 1xEV-DO Signaling/Non-Signaling extensions CMU-K839/-K849/-K859/-K869 for units
CMU-B89/-B83..... 1.2
 - 1xEV-DO Non-Signaling extension CMU-K88 for units CMU-B89/-B83..... 1.2
 - Supported CDMA Networks..... 1.3
- Installation Instructions1.3**
- Software Installation or Update1.4**
 - Creating a new Software Configuration 1.7
- Enabling Software Options1.9**
- 2 Getting Started2.1**
 - Connecting an Access Terminal and Startup.....2.2**
 - Non-Signaling Measurements.....2.6**
 - Analyzer/Generator Measurement 2.6
 - Signaling Mode.....2.12**
 - Call Setup and Signaling Parameters 2.12
 - Receiver Quality Measurements 2.16
- 3 Manual Control3.1**
 - Menu Structure3.1**
 - Test Modes 3.1
 - Status Symbols 3.2
 - Non-Signaling Mode 3.2
 - Signaling Mode 3.3
 - Configurations 3.4
 - Measurement Groups 3.4
 - General Settings3.6**
- 4 Functions and their Application 4-1**
 - 1xEV-DO Module Tests - Overview..... 4-2**
 - 1xEV-DO Connection Control (Non-Signaling) 4-3**
 - Connection Control (Non-Signaling) 4-3
 - Network Standard (Connection Control – Standard) 4-3
 - Analyzer Control (Connection Control – Analyzer)..... 4-4

Connection Control – Generator	4-12
RF Connectors (Connection Control – RF).....	4-22
Reference Frequency (Connection Control – Sync.)	4-25
Trigger (Connection Control – Trigger).....	4-27
I/Q-IF Interface (Connection Control – I/Q-IF)	4-30
1xEV-DO Module Tests (Non-Signaling)	4-32
Analyzer/Generator Measurement	4-32
Softkey Selections	4-33
Measurement Results	4-35
Analyzer/Generator Configuration.....	4-36
1xEV-DO Module Tests (Signaling and Non-Signaling)	4-41
Power Measurements	4-41
Softkey Selections	4-42
Measurement Results (NPOWer).....	4-45
Measurement Results (SAPPOWer)	4-46
Power Configuration	4-47
Modulation Measurements.....	4-48
Modulation Parameters	4-48
Softkey Selections	4-51
Measurement Results	4-53
Modulation Configuration	4-63
Spectrum Measurements.....	4-65
Softkey Selections	4-66
Measurement Results	4-67
Spectrum Configuration	4-69
Code Domain Power Measurements	4-71
Softkey Selections	4-71
Measurement Results	4-73
Code Domain Power Configuration	4-78
1xEV-DO Module Tests (Signaling)	4-83
Receiver Quality Measurements	4-83
Forward and Reverse Link Performance	4-83
Main Menu (Receiver Quality).....	4-85
Test Settings	4-87
Measurement Results	4-90
Measurement Configurations (Receiver Quality Configuration)	4-98
Data Application Measurements	4-104
Main Menu – RLP Frame and IP Statistics	4-104
Test Settings	4-105
Measurement Results – RLP Frame & IP Statistics	4-106
Main Menu – Ping Measurement	4-107
Measurement Results – Ping.....	4-108
Ping Configuration	4-109
1xEV-DO Connection Control (Signaling).....	4-111

Connection Control (Signaling)	4-111
Connection Settings (Connection Control – Connection)	4-113
Handoff Settings (Connection Control – Handoff)	4-118
Layer Settings (Connection Control – Layer)	4-119
AN Signal (Connection Control - AN Signal).....	4-140
Network Parameters (Connection Control – Network).....	4-144
RF Connectors (Connection Control – RF).....	4-147
Reference Frequency (Connection Control – Sync.)	4-152
Trigger (Connection Control – Trigger).....	4-156
I/Q-IF Interface (Connection Control – I/Q-IF)	4-158
Analyzer Control (Connection Control – Analyzer).....	4-160
Miscellaneous Settings (Connection Control – Misc.).....	4-166
Marker Control.....	4-168
5 Remote Control – Basics.....	5.1
Structure and Order of Commands	5.1
Measurement Control	5.2
Measurement Groups	5.2
Measurement Statistics.....	5.3
Specifying Limits	5.5
Status Reporting System.....	5.5
Special Terms and Notations	5.7
6 Remote Control – Commands.....	6.1
General Commands	6.1
Option Query	6.1
Partial Reset.....	6.2
Configuration File Management.....	6.2
I/Q-IF Interface	6.3
Symbolic Status Event Register Evaluation	6.6
Connection Control (Non-Signaling Only).....	6.7
Band Class – Network Standard.....	6.7
NETWork Standard	6.7
Analyzer	6.8
Subsystem RFAnalyzer	6.8
Generator	6.15
Subsystem RFGenerator	6.15
RF Input and Output.....	6.37
Subsystem RF Input and Output (External Attenuation at Connectors)	6.37
WPOWER (Wide Band Power)	6.38

Control of Measurement	6.38
Test Configuration.....	6.39
Measured Values	6.40
DM:CLOCK (Synchronization).....	6.40
Trigger.....	6.41
Subsystem TRIGger	6.41
Subsystem RF Selectivity and Rx/Tx Frequency Coupling	6.45
Measurement Command Groups (Non-Signaling Only).....	6.47
MODulation:MQuality (App. Modulation Quality HPSK)	6.47
Control of Measurement	6.47
Test Configuration.....	6.48
Measured Values	6.54
Common Measurements and Command Groups (Signaling and Non-Signaling).....	6.56
NPOWER (Narrow Band Power)	6.56
Control of Measurement	6.56
Test Configuration.....	6.58
Measured Values	6.59
SAPPower (Standby and Access Probe Power).....	6.60
MODulation:OVERview	6.61
Control of Measurement	6.61
Test Configuration.....	6.63
Measured Values	6.68
MODulation:EVMagnitude (Error Vector Magnitude).....	6.69
Control of Measurement	6.69
Test Configuration.....	6.71
Measured Values	6.74
MODulation:MERRor (Appl. Magnitude Error H-PSK).....	6.76
Control of Measurement	6.76
Test Configuration.....	6.77
Measured Values	6.80
MODulation:PERRor (Application Phase Error H-PSK).....	6.82
Control of Measurement	6.82
Test Configuration.....	6.83
Measured Values	6.86
MODulation:IQANalyzer (IQ Analyzer H-PSK).....	6.88
Control of Measurement	6.88
Test Configuration.....	6.89
Measured Values	6.91
SPECtrum:ACP (ACP Spectrum)	6.92
Control of Measurement	6.92
Test Configuration.....	6.93
Measured Values	6.97
CDPower:CDPW (Code Domain Power).....	6.100
Control of Measurement	6.100
Test Configuration.....	6.101

Measured Values	6.106
CDPower:PCDep (Peak Code Domain Error Power)	6.111
Control of Measurement	6.111
Test Configuration.....	6.112
Measured Values	6.115
CDPower:CHPW (Channel Power).....	6.120
Control of measurement	6.120
Test Configuration.....	6.121
Measured Values	6.125
Measurement Command Groups (Signaling Only)	6.133
RxQuality (Receiver Quality)	6.133
Control of Measurement - Common Commands.....	6.133
Test Configuration.....	6.134
Data Applications - RLP Frame / IP Statistics and Ping.....	6.152
Control of Measurement - Common Commands.....	6.152
Subsystem PING:CONTRol	6.154
Connection Control (Signaling Only)	6.157
Subsystem Signaling (Connection Setup and Cleardown).....	6.158
Subsystem AT Information	6.160
Subsystem Handoff.....	6.161
Subsystem Layer.....	6.161
Subsystem Default Signaling Application	6.162
Subsystem Default Test Application	6.163
Subsystem Enhanced Test Application	6.169
Subsystem Default Packet Application	6.172
Subsystem Stream Layer.....	6.179
Subsystem Session Layer	6.180
Subsystem Connection Layer	6.181
Subsystem MAC Layer	6.182
Subsystem Physical Layer	6.192
Subsystem ANSignal.....	6.192
Subsystem Power Control	6.194
Subsystem Sector.....	6.195
Subsystem Access Network Properties.....	6.197
Subsystem AT Forward Packet Activity	6.198
Subsystem Band Class – NETWork Standard	6.198
Subsystem RFANalyzer	6.204
Subsystem LEVel.....	6.205
Subsystem SUBTType.....	6.205
Subsystem CCFilter (Code Channel Filter).....	6.206
Subsystem DCHannel (Data Channel Modulation).....	6.208
External Synchronization.....	6.209
Subsystem ESYNc.....	6.209
Trigger.....	6.211
Subsystem TRIGger	6.211

Subsystem Miscellaneous (User Guidance and RF Selectivity)	6.214
Subsystem User Guidance (Connection Control Behavior).....	6.214
Subsystem RF Selectivity	6.214
Low Spur Mode	6.215
Subsystem WPOWer (Wide Band Power)	6.215
Control of Measurement	6.215
Test Configuration.....	6.216
List of Commands	6.218
7 Remote Control – Program Example.....	7.1
Sample Program (Non-Signaling)	7.1
Sample Programs (Signaling)	7.5
Reverse Test Application Call and Queries for CDPower for different Channels	7.5
Default Packet Application Call and Queries for RLP/IP Statistics	7.8
8 Maintenance	8.1
9 Error Codes	9.1
Index.....	10.1

Contents of Manuals for Universal Radio Communication Tester CMU

The user documentation for the R&S CMU 200/300 is divided into an operating manual for the basic instrument (including options CMU-B41, CMU-B17) and separate manuals for individual software and hardware options. The complete documentation is available on CD-ROM, stock no. PD 0757.7746.2x. The latest revisions of all manuals are also posted on the CMU Customer Web on GLORIS.



For an overview and order information about printed manuals refer to the beginning of the Quick Start Guide. The latest revisions of the manuals are also posted on the CMU Customer Web on GLORIS.

Operating Manual CMU-K88/-K839/-K849/-K859/-K869 (Software Options for CMU-B88/-B89)

The present operating manual describes the application of the CMU for 1xEV-DO mobile tests. It gives comprehensive information about the operating concept and about manual and remote control of the CMU tester. Typical measurement tasks are explained in detail using the functions offered by the graphical user interface and a selection of program examples.

The manual is organized as follows:

- Chapter 1** Describes the steps necessary for installing the software and putting the instrument into operation.
- Chapter 2** Gives an introduction to the application of the CMU for 1xEV-DO mobile tests and presents some typical measurement examples.
- Chapter 3** Gives an overview of the user interface and describes the concepts of measurement control and instrument configuration.
- Chapter 4** Represents the reference chapter providing detailed information on all functions of the user interface and their application.
- Chapter 5** Describes the basics of remote control of the instrument for 1xEV-DO mobile tests.
- Chapter 6** Lists all remote control commands defined for 1xEV-DO mobile tests. At the end of the chapter the commands are grouped according to their function (measurement groups or configurations) and sorted in alphabetical order.
- Chapter 7** Contains program examples.
- Chapter 8** Describes preventive maintenance.
- Chapter 9** Contains a list of error codes
- Chapter 10** Contains an index for the operating manual.

What's new in this Revision...

This operating manual describes version V4.32 of the 1xEV-DO firmware package. The essential new features compared to version V4.20 are listed below and in the supplement for V4.35 and V4.52.

New Features	Description	Refer to...
Support for Network Revision A	The related Configuration Control options and Receiver Quality Measurements (e.g. Reverse Link Performance) were modified to reflect the Network Revision A / phys. signal subtype 2 measurements.	Chapter 4
Data Packet Applications	The new RLP Frame & IP Statistics and Ping applications are introduced. RLP Frame & IP Statistics is an application of options R&S CMU-K8x9 and R&S CMU-K87 which can be used to monitor test scenarios using the Mobile IP protocol type. The Ping menu configures the R&S CMU to send repeated echo requests of configurable size (pings) to the mobile. The application waits for the echo and displays the ping statistics including the possible source of connection errors.	Chapter 4
De-spreading mode for I/Q Analyzer HPSK Modulation Application	The de-spreading mode allows the analysis of the I/Q signal either as the composite signal on the chip level (de-spread set to <i>OFF</i>), or only the data channel on the symbol level (de-spread set to <i>Data Symbols</i>)	Chapter 4
High Power AWGN mode	The <i>AWGN Mode</i> sets the AWGN power level for signaling and non-signaling 1xEV-DO testing. A <i>High Power</i> range allowing an AWGN level range from +11.7 dB to -12.0 dB is introduced.	Chapter 4
Access Probe Sequence enhancements	Additional parameters for access probe sequences on the Access Channel Protocols of the MAC layer were introduced.	Chapter 4
RRI channel gain transition parameters for Sub-type 3 Reverse Traffic Ch. MAC Protocol	The RRI channel gain pre- and post-transition parameters indicate the ratio of the power level of the RRI channel to the power level of the reverse Pilot channel for the transmitted subpackets (0 to 3).	Chapter 4
CDMA system time synchronization parameters	For signaling measurements, e.g. CDMA2000 1xRTT / 1xEV-DO hybrid mode testing, the Connection Control was enhanced to synchronize the CMU and the connected mobile with the CDMA system time of another CMU.	Chapter 4
Low Spur Mode	The <i>Low Spur Mode</i> is introduced to increase the signal-to-noise ratio for the signal analyzer with high Tx levels.	Chapter 4

Frequently Used Abbreviations

3GPP2	3 rd Generation Partnership Project 2
8-PSK	8-Phase Shift Keying
Abs.	Absolute
AN	Access Network
AT	Access Terminal
Avg.	Average
AWGN	Additive White Gaussian Noise
BPSK	Binary Phase Shift Keying
BS	Base Station
CDMA	Code Division Multiple Access
CDP	Code Domain Power
Chan.	Channel
CH	Channel
Channel.	Channelization
CHAP	Challenge-Handshake Authentication Protocol
CRC	Cyclic Redundancy Code
Curr.	Current
Disp.	Display
DRC	Data Rate Control
DRCLock	Data Rate Control Lock
DUT	Device under Test
EIRP	Effective Isotropic Radiated Power
Err.	Error
ESN	Electronic Serial Number
EVM	Error Vector Magnitude
Ext., Extern.	External
FETAP	Forward Enhanced Test Application Protocol
FFT	Fast Fourier Transform
Freq.	Frequency
FTAP	Forward Test Application Protocol
GPIB	General Purpose Interface Bus = IEEE488 Bus
HPSK	Hybrid Phase Shift Keying
I	In-phase
IF	Interface
IF	Intermediate Frequency
Int.	Internal
Lev.	Level
LSB	Least Significant Bits
MAC	Media Access Control
Magn.	Magnitude
Max.	Maximum (e.g. Level)
ME	Magnitude Error
MEID	Mobile Equipment Identifier
Meas.	Measurement
Min.	Minimum
MSB	Most Significant Bits
MIP	Mobile IP
OAT	Other Access Terminals
Ovw	Overview
PAP	Password Authentication Protocol
PCS	Personal Communications Services
PCDE	Peak Code Domain Error
PDSN	Packet Data Serving Node
PE	Phase Error
PER	Packet Error Rate
Pk.	Peak
PPP	Point-to-Point Protocol
Q	Quadrature-phase
QPSK	Quadrature Phase Shift Keying
RA	Reverse Activity
RAB	Reverse Activity Bit
RBW	Resolution Bandwidth
Ref.	Reference
Rel.	Relative
RETAP	Reverse Enhanced Test Application Protocol
RF	Radio Frequency
RLP	Radio Link Protocol
RMS	Root Mean Square
RPC	Reverse Power Control

<i>RRI</i>	<i>Reverse Rate Indicator</i>
<i>RTAP</i>	<i>Reverse Test Application Protocol</i>
<i>RX</i>	<i>Receiver</i>
<i>Scr.</i>	<i>Scrambling</i>
<i>SW</i>	<i>Software</i>
<i>Sym.</i>	<i>Symbol</i>
<i>Sync.</i>	<i>Synchronous</i>
<i>Synch.</i>	<i>Synchronization</i>
<i>TDM</i>	<i>Time Division Multiplexing</i>
<i>Trg.</i>	<i>Trigger</i>
<i>TX</i>	<i>Transmitter</i>
<i>UATI</i>	<i>Unicast Access Terminal Identifier</i>
<i>Vect.</i>	<i>Vector</i>

Glossary of Terms

The following list contains definitions of terms that are often used throughout this manual.

Access channel	A reverse communication channel used by a mobile station to communicate to a base station. The Access Channel is used for short signalling message exchanges, such as call originations, responses to pages, and registrations. The Access Channel is a slotted random access channel.
Carrier feedthrough	Ratio of the I/Q offset vector (i.e. the estimated DC offset of the measured signal) to the average offset-corrected signal vector.
Carrier frequency error	Deviation of the mobile's actually received carrier frequency from the assigned frequency received from the base station.
Chip rate	Product of the symbol rate and the spreading factor, which is equivalent to the spreading rate of the channel. For the CDMA2000 [®] 1xEV-DO system a fixed chip rate of 1.2288 Mcps is specified.
Code domain	The entire set of channelization codes involved in a CDMA2000 [®] 1xEV-DO signal configuration. Measuring a parameter in code domain means to determine its values as a function of the individual channelization codes.
Code domain error	Ratio of the RMS-averaged power of the error vector projected onto the code domain to the RMS-averaged power of the composite reference signal, expressed in dB.
Code domain power	Power in the individual code channels normalized to the power of the composite signal, expressed in dB.
Control Channel cycle	The Control Channel cycle is defined as a 256 slot period, synchronous with CDMA system time; i.e., there is an integer multiple of 256 slots between the beginning of a cycle and the beginning of CDMA system time.
Crest factor	Peak to average ratio: ratio of the peak transmit power in a slot (peak envelope power) to the average transmit power in a slot.
Cyclic redundancy code (CRC)	A class of linear error detecting codes which generate parity check bits by finding the remainder of a polynomial division.
E_b	Average energy per information bit for the Sync Channel, Paging Channel, or Forward Traffic Channel at the mobile station antenna connector.
E_b/N_t	The ratio of the combined received energy per bit to the effective noise power spectral density for the Control Channel, or Forward Traffic Channel at the mobile station antenna connector.
Error vector magnitude	Difference vector connecting the measured and the ideal modulated signal vector. The error vector magnitude (EVM) is the critical quantity to assess the modulation accuracy of the mobile's transmitter.
Forward Test Application Protocol (FTAP)	This protocol specifies the procedures and messages to control the Forward Traffic Channel and to configure reverse channels associated with the Forward Traffic Channel. It specifies generation and transmission of test packets sent on the Forward and Reverse Traffic Channels for the purpose of testing the Forward Traffic Channel. It also specifies statistics collection procedures for certain access terminal statistics.
I/Q imbalance	Difference between the estimated I and Q amplitudes of the measured signal, normalized and expressed in dB units.
MAC	Used in two contexts. 1) The MAC layer is the Media Access Control layer that coordinates the operation of the physical layer with the needs of the traffic and signalling systems in the upper layers. 2) As a region within the forward link 1xEV-DO slot format, that contains Reverse Control bits

and other indicators. This region is repeated four times within a slot.

Magnitude error	Difference in magnitude between the measured and the ideal modulated signal vector, normalized to the magnitude of the ideal vector.
Maximum power	Operating mode where the mobile is set to its maximum power control level.
Minimum power	Operating mode where the mobile is set to its minimum power control level.
Modulation accuracy	Ability of the mobile transmitter to generate an ideally modulated signal.
N_t	The effective noise power spectral density at the mobile station antenna connector.
Peak code domain error	Maximum of the <i>code domain errors</i> for all codes in the domain, expressed in dB.
Phase error	Difference in phase between the measured and the ideal modulated signal vector.
Pilot Channel	The Reverse Traffic Channel consists of a Pilot Channel, an RRI Channel, a DRC Channel, an ACK Channel, and a Data Channel. Per definition, the access terminal transmits unmodulated symbols with a binary value of '0' on the Pilot Channel. The transmission of the Pilot Channel and the RRI Channel are both time multiplexed on the same Walsh channel. The Pilot Channel and the RRI Channel are transmitted at the same power level.
Reverse Power Control bit	A bit sent (within the MAC region) in every slot. Each bit commands the access terminal to raise or lower its transmit power.
RRI (Reverse Rate Indicator)	The Reverse Traffic Channel consists of a Pilot Channel, an RRI Channel, a DRC Channel, an ACK Channel, and a Data Channel. During a connection, the RRI Channel is transmitted over the first 256 chips of every slot. The RRI Channel "punctures" the Pilot Channel and both channels are transmitted at the same power level. The RRI channel power test verifies that the RRI Channel is transmitted at the same power level as the Pilot Channel.
Waveform quality	Normalized correlated power between the actual and the ideal waveform, sampled at the constellation points. The waveform quality (ρ factor) is a measure of the modulation accuracy. For an ideal transmitter (ideal correlation), it is equal to 1, otherwise it is a positive number smaller than 1.

References

- TIA/EIA/IS-856-A, cdma2000® High Rate Packet Data Air Interface Specification
- TIA/EIA/IS-866-A, Recommended Minimum Performance Standards for cdma2000® High Rate Packet Data Access Terminal
- TIA/EIA/IS-890-A, Test Application Specification (TAS) for High Rate Packet Data Air Interface
- TIA-1030-B, Band Class Specification for cdma2000® Spread Spectrum Systems

Supplement to the Operating Manual

Options R&S[®] CMU-K88 / -K839 / ... / -K869

1xEV-DO Software Options for R&S[®] CMU200

New Features in Software V4.35 and V4.52

Dear Customer,

Versions V4.35 and V4.52 of the 1xEV-DO software for the Universal Radio Communication Tester R&S[®] CMU 200 provide an enhanced functionality that could not yet be reported in the current revision of the operating manual, 1150.3998.12.

The following pages give an introduction to the new features and the related remote control commands.

Intra-PDSN Active Data Handoff

A Packet Data Serving Node (PDSN) is a component of a CDMA2000 mobile network which acts as the connection point between the Radio Access and IP networks. This component is responsible for managing PPP sessions between the mobile provider's core IP network and the mobile station. The R&S CMU can act as a PDSN server (performing the PDSN functionality) or a PDSN client.

With a test setup containing two R&S CMU units, one configured as a PDSN server and the other as a PDSN client, it is possible to verify that the mobile under test is able to handoff an active data session from an 1xEV-DO base station to a CDMA2000 base station or vice versa. An intra-PDSN active data handoff is a particular test example in hybrid mode where the mobile is simultaneously monitoring CDMA2000 and 1xEV-DO systems.

For an introduction to hybrid mode testing and a description of possible intra-PDSN handoff tests refer to the application sheet 1CM 65_2 which is posted on the R&S internet.

http://www.rohde-schwarz.com/www/dev_center.nsf/frameset?OpenAgent&website=com&navig=/www/dev_center.nsf/html/nav,10,11&content=/appnote/1CM65.html

The PDSN settings and remote control commands are described below. All PDSN settings are accessible in the *Layer* tab of the *Connection Control* menu.

Note: *Intra-PDSN handoff tests require the two R&S CMU200 units to be equipped with CDMA2000 signalling units R&S CMU-B83 Var 22.*

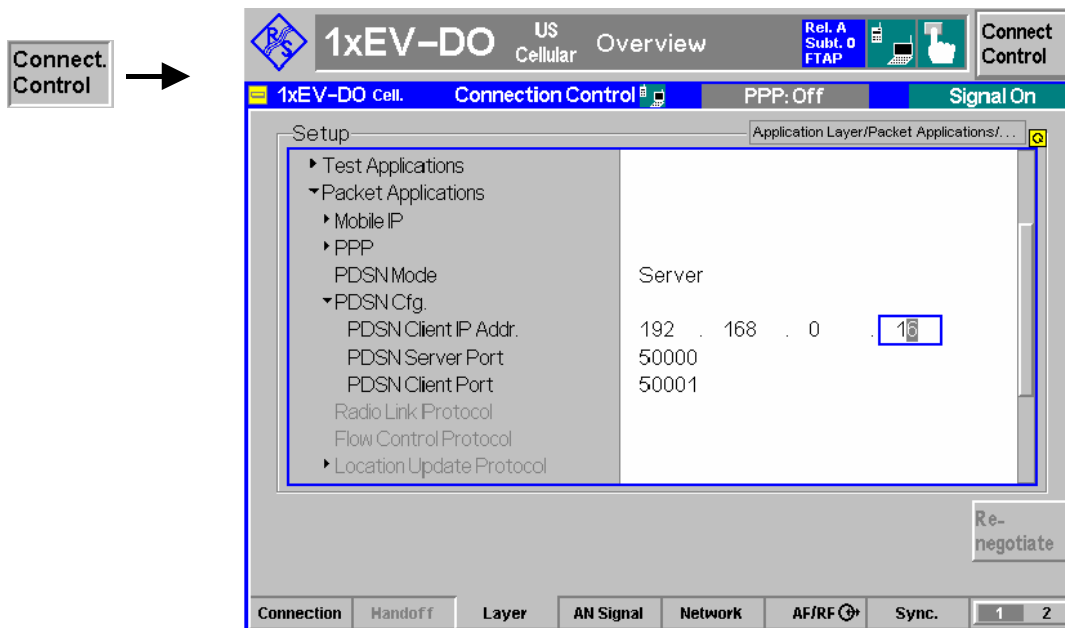


Figure 1: Connection Control – Layer (PDSN Settings)

PDSN Mode

Defines how the R&S CMU acts in a PDSN test setup.

Standalone

The R&S[®] CMU200 performs the PDSN functionality internally (establishes and terminates PPP connections). There is no remote PDSN server or client attached to the CMU in this configuration.

Server

The R&S CMU acts as the PDSN server, performing the PDSN functionality in the network. In particular, it establishes a PPP connection with the mobile and controls where the IP packets are routed. In a PDSN test setup, a PPP connection from the mobile will always terminate at the R&S CMU configured as a server.

Client

The R&S CMU acts as a PDSN client; a second device acting as the PDSN server is required. The PDSN client can route PPP packets between the mobile and the PDSN server.

PDSN Cfg.

Defines the address information for PDSN test setups. The parameters are ignored if *PDSN Mode: Standalone* is selected.

PDSN Client Addr. Available only if the R&S CMU is configured as a PDSN server; defines the IP address of a second connected device acting as a PDSN client. If the PDSN client is a second R&S CMU, then the *PDSN Client Addr.* must be equal to the IP address of the R&S CMU-B83 defined in the client's *Setup – TCP/IP* menu.

PDSN Server Addr. Available only if the R&S CMU is configured as a PDSN client; defines the IP address of a second connected device acting as the PDSN server. If the PDSN server is a second R&S CMU, then the *PDSN Server Addr.* must be equal to the IP address of the R&S CMU-B83 defined in the server's *Setup – TCP/IP* menu.

PDSN Server Port Port number of the PDSN server. The *PDSN Server Port* numbers of different R&S CMU units in a PDSN test setup must be equal. The default settings will be sufficient for many applications.

PDSN Client Port Port number of the PDSN client. The *PDSN Client Port* numbers of different R&S CMU units in a PDSN test setup must be equal. The default settings will be sufficient for many applications.

Remote control `CONFigure:LAYer:APPLication:DPACket:PDSN:MODE`
`CONFigure:LAYer:APPLication:DPACket:PDSN:CLient:IPAddress`
`CONFigure:LAYer:APPLication:DPACket:PDSN:SERVer:IPAddress`
`CONFigure:LAYer:APPLication:DPACket:PDSN:CLient:PORT`
`CONFigure:LAYer:APPLication:DPACket:PDSN:SERVer:PORT`

CONFigure:LAYer:APPLication:DPACket:PDSN:MODE				PDSN Mode
<i><Mode></i>				
<i><Mode></i>	Description of parameter	Def. value	Def. unit	FW vers.
SALone 	Standalone mode	SALone	–	V4.35
CLient 	PDSN client			
SERVer	PDSN server			
Description of command				Sig. State
This command defines how the R&S CMU acts in a PDSN test setup.				all

CONFigure:LAYer:APPLication:DPACket:PDSN:CLient:IPAddress				IP Address, PDSN Client
<i><Addr_1>, <Addr_2>, <Addr_3>, <Addr_4></i>				
<i><Address parts></i>	Range of values	Def. value	Def. unit	FW vers.
<i><Addr_1></i> ,	0 to 255	0	–	V4.35
<i><Addr_2></i> ,	0 to 255	0	–	
<i><Addr_3></i> ,	0 to 255	0	–	
<i><Addr_4></i>	0 to 255	0	–	
Description of command				Sig. State
This command defines the IP address of the PDSN client, to be used in PDSN server mode (<code>CONFigure:LAYer:APPLication:DPACket:PDSN:MODE SERVer</code>).				all

CONFigure:LAYer:APPLication:DPACket:PDSN:SERVer:IPAddress				IP Address, PDSN Server
<i><Addr_1>, <Addr_2>, <Addr_3>, <Addr_4></i>				
<i><Address parts></i>	Range of values	Def. value	Def. unit	FW vers.
<i><Addr_1></i> ,	0 to 255	0	–	V4.35
<i><Addr_2></i> ,	0 to 255	0	–	
<i><Addr_3></i> ,	0 to 255	0	–	
<i><Addr_4></i>	0 to 255	0	–	
Description of command				Sig. State
This command defines the IP address of the PDSN server, to be used in PDSN client mode (<code>CONFigure:LAYer:APPLication:DPACket:PDSN:MODE CLient</code>).				all

CONFigure:LAYer:APPLIcation:DPACket:PDSN:SERVer:PORT <Port_no>				Port, PDSN Server
<Port_no>	Description of parameter	Def. value	Def. unit	FW vers.
49152 to 65535	Server port number	50000	–	V4.35
Description of command				Sig. State
This command defines the PDSN server port number of the R&S CMU.				all

CONFigure:LAYer:APPLIcation:DPACket:PDSN:CLient:PORT <Port_no>				Port, PDSN Client
<Port_no>	Description of parameter	Def. value	Def. unit	FW vers.
49152 to 65535	Client port number	50001	–	V4.35
Description of command				Sig. State
This command defines the PDSN client port number of the R&S CMU.				all

Retain B83 Timing Reference upon Handoff

The 1xEV-DO signal generated by the signalling unit R&S[®] CMU-B83 has a constant phase relationship with the 10 MHz reference frequency, regardless of the internal or external source (see *Connection Control – Sync. – Reference Frequency*). The phase relationship is normally lost during a handoff between different 1xEV-DO networks.

If *Connection Control – Misc. – Retain B83 Timing Reference* is enabled, the R&S[®] CMU 200 will maintain the phase relationship during the whole 1xEV-DO session. This is advantageous e.g. for applications involving an external GPS simulator, where the phase relationship must be known (and re-determined by the R&S[®] CMU every time it is lost).

Note: To retain the B83 timing reference, the R&S[®] CMU200 must reserve part of its hardware resources to the 1xEV-DO function groups (even if the 1xEV-DO session is closed). This causes restrictions for applications involving two different BS signals, in particular for WCDMA → GSM or GSM → WCDMA handovers.

Retain B83 Timing Reference is disabled every time the R&S[®] CMU is switched off. It is not possible to save the current setting to a configuration file (*Data Save / Data Recall*).

SYSTem:MISC:B83Tref <Enable>				Retain B83 Timing Reference
<Enable>	Description of parameter	Def. value	Def. unit	FW vers.
OFF ON	Phase relationship lost during handoff Phase relationship maintained	OFF	–	V4.35
Description of command				Sig. State
This command specifies whether the phase relationship between the 1xEV-DO signal generated by the signalling unit R&S [®] CMU-B83 and the 10 MHz reference frequency is lost during a handoff.				all

Reverse Link Frame Offset

In the *Connection Layer – Route Update Protocol* section of the *Layer* tab, the new parameter *Rev. Link Frame Offset* has been added. This frame offset is used by the access terminal to delay the Reverse

Traffic Data Channel and Reverse Rate Indicator Channel (RRI) transmissions by an integer number of slots with respect to the system time-aligned frame boundary.

This parameter is one of the parameters in the Traffic Channel Assignment message which is built and sent by the Route Update Protocol.

CONFigure:LAYer:CONNEction:RUPRotocol:FROffset <Intervals>			Rev. Link Frame Offset	
<Intervals>	Description of parameter	Def. value	Def. unit	FW vers.
0 to 15	Frame offset	8	1.25 ms	V4.52
Description of command				Sig. State
This command specifies the reverse link frame offset as a multiple of 1.25 ms. The maximum frame offset is 18.75 ms.				all

Open Loop Time Response

The *Open Loop Time Response* application measures the open loop power control time response to an increase or decrease of the total base station power. The power step direction is set with either the *Power Step* softkey or in the *Power Configuration* menu in the *Control* tab. The template used for this measurement meets the requirements set in Standard TIA/EIA-98-D for *Open Loop Time Response* measurements.

Preconditions: The open loop time response measurement is a *Signalling* application. A reverse call (R(E)TAP) is recommended to avoid spurious power variations in the AT signal (see examples below). Generally, a high reverse data rate minimizes the power variations.

Pressing the *ENTER (CONT/HALT)* while the measurement control softkey is selected starts the measurement. The measurement begins using the *Initial BS Power* setting, then steps the power (up or down, depending on the configuration) using the defined *Power Step* parameter. When the measurement is done, the measurement halts and the BS power is returned to the *Initial BS Power* setting. The *Initial BS Power* is given by the *1xEV-DO Power*, to be set in the *Connection Control – AN Signal* tab or via *AN Signal Level – 1xE-DO Power*.

In the forward test applications, the AT can transmit user data and ACK messages etc. with different power. This causes undesirable power variations within the frames. The figure below shows a comparison for subtype 0 signals (RTAP / FTAP).

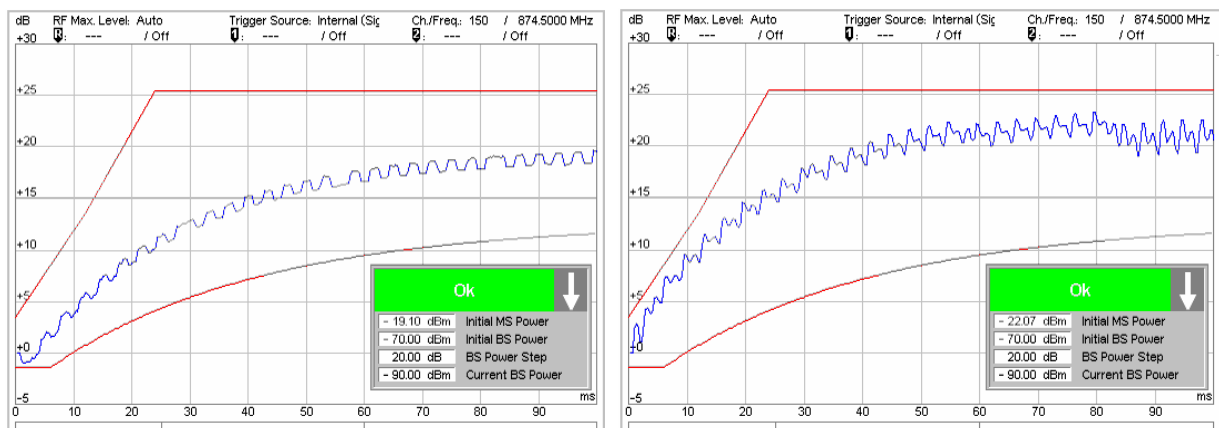


Figure 2 Open loop power results, test application protocols RTAP (left) and FTAP (right)

The figure below shows a comparison for subtype 2 signals (RETAP / FETAP).

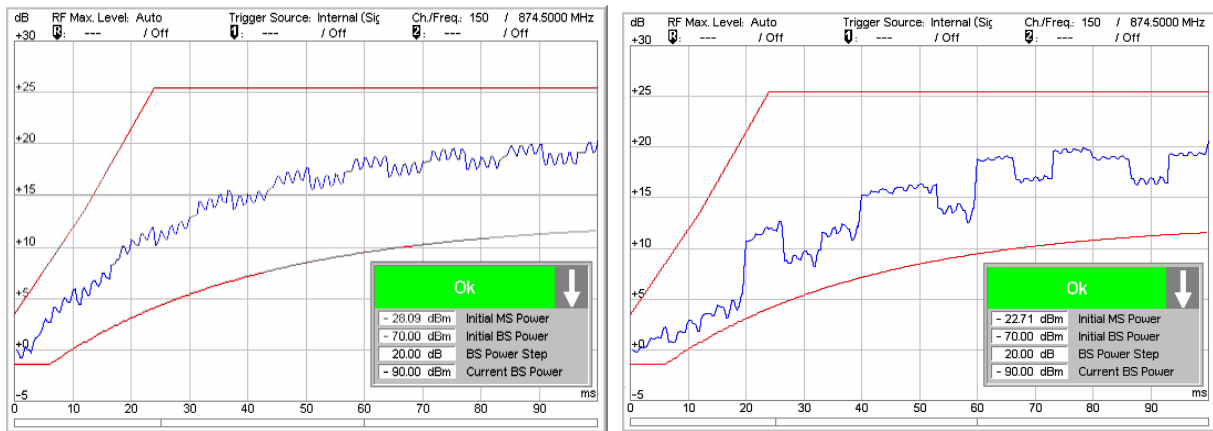
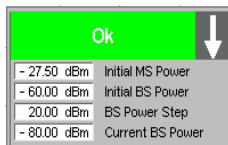


Figure 3 Open loop power results, enhanced protocols RETAP (left) and FETAP (right)

Parameter Lines The two parameter lines above the diagram show the basic *Connection Control* settings and the marker values.

Info Box



The info box contains the following measurement results and settings:

Initial MS Power Measured MS power at time zero (first value of the measurement curve) in dBm.

Initial BS Power BS power setting before the power step

BS Power Step Power step as defined by *Open Loop – Power Step*.

Current BS Power Current BS power, should be equal to *Initial BS Power* or equal to *Initial BS Power ± Power Step*.

The arrow indicates the direction of the next power step. If the curve in the measurement graph exceeds the template, the info box turns red.

Remote control Settings are read out using the query form of the setting command.

Measurement Graph

The measured MS power is displayed as a continuous curve together with all active markers. The fixed template used for this measurement (red lines) meets the requirements set in Standard TIA/EIA-98-D for Open Loop Time Response measurements. All measured power values are relative to the *Initial MS Power* which is displayed in the info box.

Open Loop Time Response: Remote Control

The subsystem *POWER:OLTResponse* measures the MS open loop time response. The subsystem corresponds to the measurement menu *Power*, application *Open Loop Time Response*, and the sections related to this application in the associated popup menu *Power Configuration*.

Control of Measurement – Subsystem POWER:OLTResponse

The subsystem *POWER:OLTResponse* controls the open loop time response measurement.

INITiate:POWER:OLTResponse	Start new measurement	⇒	RUN
ABORt:POWER:OLTResponse	Abort running measurement and switch off	⇒	OFF
STOP:POWER:OLTResponse	Stop measurement after current stat. cycle	⇒	STOP
CONTinue:POWER:OLTResponse	Next measurement step (only stepping mode)	⇒	RUN
Description of command			FW vers.
These commands have no query form. They start and stop the power measurement, setting it to the status indicated in the top right column.			V4.52

CONFigure:POWER:OLTResponse:EREPorting[?]		Event Reporting		
Enable	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.52
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
Description of command				Sig. State
This command defines the events generated when the measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU200 manual).				All

FETCh[:SCALar]:POWER:OLTResponse:STATus?		Measurement Status		
<Meas. Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the <i>OFF</i> state (*RST or ABORt)	OFF	–	V4.52
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
STEP	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V4.52
NONE	No counting mode set			
Description of command				Sig. State
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				All

DEFault:POWer:OLTResponse:CONTRol[?]				Default Settings
<Enable>				
Enable	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V4.52
Description of command				Sig. State
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem POWER:OLTResponse to their default values (the setting <i>OFF</i> results in an error message).				All
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measurement Configuration

The following commands correspond to the *Open Loop* settings in the *Control* tab of the *Power Configuration* menu.

CONFigure:POWer:OLTResponse:PSTep[?]				BS Power Step
<Power Step>				
<Power Step>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 dB to +100.0 dB	BS power step	+20.0	dB	V4.52
Description of command				Sig. State
This command sets the power step of the CMU.				All

CONFigure:POWer:OLTResponse:PSDirection[?]				Power Step Direction
<Power Step Direction>				
<Power Step Direction>	Description of parameters	Def. value	Def. unit	FW vers.
UP DOWN	BS power step direction	DOWN	–	V4.52
Description of command				Sig. State
This command sets the power step direction of the CMU.				All

Measured Values – Subsystem POWER:OLTResponse

The subsystem *POWER:OLTResponse* determines and outputs the results of the Open Loop Time Response measurement. They correspond to the graphical measurement menu *Power*, application *Open Loop Time Response*, with its various display elements.

Returned values		Value range	Def. value	Def. unit	FW vers.
Initial MS Power,		-65.0 dBm to +39.0 dBm	NAN	dBm	V4.52
Initial BS Power,		-120.0 dBm to -16.0 dBm ^{*)}	NAN	dBm	
Current BS Power,		-120.0 dBm to -16.0 dBm ^{*)}	NAN	dBm	
Limit Matching		NMAL NMAU INV MATC	INV	-	
Description of command					Sig. State
These commands are always queries. They start a measurement and output all scalar measurement results.					CONN
The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>display modes</i>).The following messages may be output for <i>Limit Matching</i> :					
NMAU	Tolerance value underflow			<i>not matching, underflow</i>	
NMAL	Tolerance value exceeded			<i>not matching, overflow</i>	
INV	Measurement invalid			<i>invalid</i>	
MATC	Tolerance value matched				
*) Values are for output connector RF2. For the other connectors (RF1, RF3 OUT), the range is -100.0 dBm to +7 dBm.					

Returned values		Description of parameters	Def. value	Def. unit	FW vers.
-20.0 dB... +70.0 dB,		BurstPower[1], 1 st value for burst power	NAN	dB	V4.52
...		
-20.0 dB... +70.0 dB		BurstPower[x], xth value for burst power	NAN	dB	
Description of command					FW vers.
These commands are always queries. They output the burst power versus time at fixed, equidistant test points. The number of measured values is 320. This corresponds to a time interval of 100 milliseconds.					CONN

Miscellaneous Changes in FW V4.52

- Band Class 1, US PSB Band is no longer available.
- The minimum AWGN level has been reduced to -25 dBm. This modification applies to Signaling and Non Signaling mode. The AWGN level range for the high power mode remains unchanged.
- The maximum access probe preamble length has been increased to 7 frames.

1 Introduction

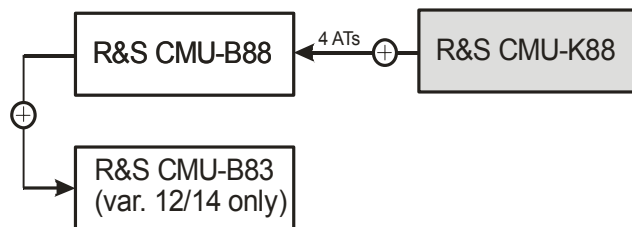
This chapter describes the installation and update of 1xEV-DO-related software options for the Universal Radio Communication Tester R&S CMU 200.

The 1xEV-DO software options (shaded in grey) provide the following functionality:

1xEV-DO Non-Signaling extension CMU-K88 for units CMU-B88/-B83

Using the CMU-B88 (1xEV-DO non-signaling) extension option with the CDMA2000 signaling unit CMU-B83 (var. 12 or 14) enables 1xEV-DO non-signaling measurements for all band classes, including signal generation with channel coding for single-ended BER tests.

The 1xEV-DO generator (option R&S CMU-B88) is designed to provide traffic for up to four different Access Terminals simultaneously, in addition to a limited live control channel. This allows receiver measurements for up to four separate Access Terminals at the same time.



Each of the 4 different traffic channels can be configured independently. The user specific parameter set could contain e.g.

- MAC Index
- MAC Level
- Data Rate
- Data Pattern
- Transmission Interval
- Power Level
- DRC Lock mode
- Reverse Power Control mode, etc.

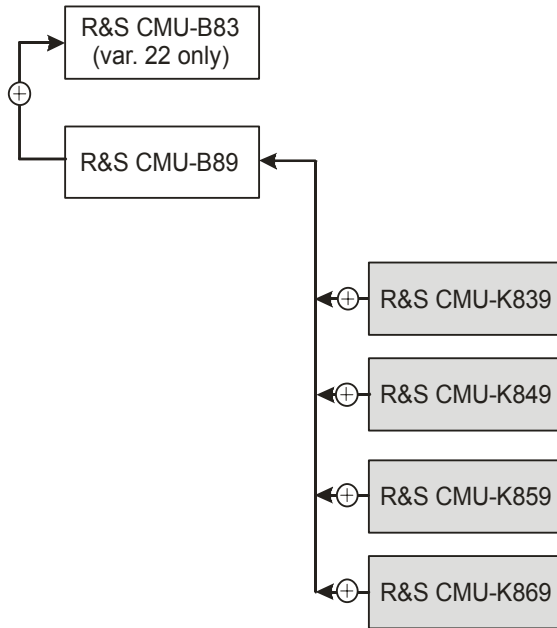
The implemented Reverse Power Control mode perform AT transmitter output power tests (for each AT independently) by sending a series of specific power control bit pattern to the Access Terminal or by using an external power control bit source.

The CMU supports the following AN signal settings: PN Offset, Reverse Activity Bit State, AWGN, Power and Channel configuration.

1xEV-DO Signaling/Non-Signaling extensions CMU-K839/-K849/-K859/-K869 for units CMU-B89/-B83

The existing 1xEV-DO non-signaling solution, developed for the CMU-B88 hardware option as described above, was enhanced for the support of the CMU-B89 (only for CMU-B83 var. 22) hardware option.

The CMU-B89 hardware option (CDMA2000 / 1xEV-DO Signaling Unit / 2nd RF Channel) does not offer the same non-signaling functionality as the CMU-B88, and all differences are marked in chapters 4 and 6 of this manual.



The CMU-B89 has some limitations (e.g. only one AT) in regard to non-signaling. The Tx-measurements are available both for the CMU-B88 and for the CMU-B89 generator. Triggers are handled differently, which results in different commands for the trigger settings.

The CMU-B89 is a prerequisite for the signaling measurements using the band class software options listed below:

CMU-K839: 1xEV-DO 450MHz (1200.8300.02)

CMU-K849: 1xEV-DO cellular band (1200.8400.02)

CMU-K859: 1xEV-DO PCS band (1200.8500.02)

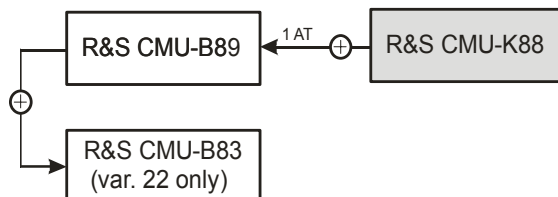
CMU-K869: 1xEV-DO IMT-2000 band (1200.8600.02)

All signaling software options require that hardware options CMU-B83 var. 22, CMU-U65 and CMU-B89 must be fitted. The software prerequisites are the MS Base SW (1100.0314) and the EV-DO SW (1150.3923) version later or equal to V4.20.

The supported CDMA network band classes of the different signaling software options are listed in *Table 1-1* below.

1xEV-DO Non-Signaling extension CMU-K88 for units CMU-B89/-B83

Using the CMU-B89 hardware option (CDMA2000 / 1xEV-DO Signaling Unit / 2nd RF Channel) extension option with the CDMA2000 signaling unit CMU-B83 (var. 22) only with software option CMU-K88 enables 1xEV-DO non-signaling measurements for all band classes as described above for the CMU-B88.



Please note the restriction to a single access terminal instead of four ATs.

Supported CDMA Networks

Table 1-1 lists the 1xEV-DO networks supported when the 1xEV-DO hardware and software option are installed to support 1xEV-DO functionality.

Table 1-1 CDMA networks supported

CMU Options for CDMA 1xEV-DO NSig (Non-Signaling)	CMU Options for CDMA 1xEV-DO Sig (Signaling)	Band Class	Network
CMU-K88	CMU-K849	Band Class 0	US and Korean Cellular
	CMU-K859	Band Class 1	North American PCS
	CMU-K849	Band Class 2	TACS
		Band Class 3	JTACS
	CMU-K859	Band Class 4	Korean PCS
	CMU-K839	Band Class 5	NMT-450
	CMU-K869	Band Class 6	IMT-2000
	CMU-K849	Band Class 7	North American 700 MHz
	CMU-K859	Band Class 8	1800 MHz
	CMU-K849	Band Class 9	900 MHz
		Band Class 10	Secondary 800 MHz
	CMU-K839	Band Class 11	European 400 MHz PAMR
	CMU-K849	Band Class 12	800MHz PAMR
	CMU-K869	Band Class 13	IMT-2000 2.5 GHz Ext.
	CMU-K859	Band Class 14	US PCS 1900 MHz
	CMU-K869	Band Class 15	AWS Band
	CMU-K869	Band Class 16	US 2.5 GHz
CMU-K869	Band Class 17	US 2.5 GHz Forward Link Only	

Installation Instructions

Before performing any of the steps described in this manual, please make sure that the instrument is properly connected and put into operation according to the instructions given in chapter 1 of the CMU 200/300 Operating manual. The hardware and software options available are shown in the *Startup* menu. The *Hardware Option* entry "CMU-B88" indicates the status of the hardware option required for 1xEV-DO mobile tests. The *Software Option* entry CMU-K88 indicates the status of the software option required for 1xEV-DO mobile tests.

- If version number is indicated, the CMU is ready to perform 1xEV-DO mobile tests. In this case you may skip this chapter, except if you wish to update the current software version.
- If `disabled` is indicated, the software option must be enabled using a key code; see section [Creating a new Software Configuration](#) on page 1.7.
- If `not installed` is indicated, the software must be installed via the PCMCIA interface or the floppy disk drive.

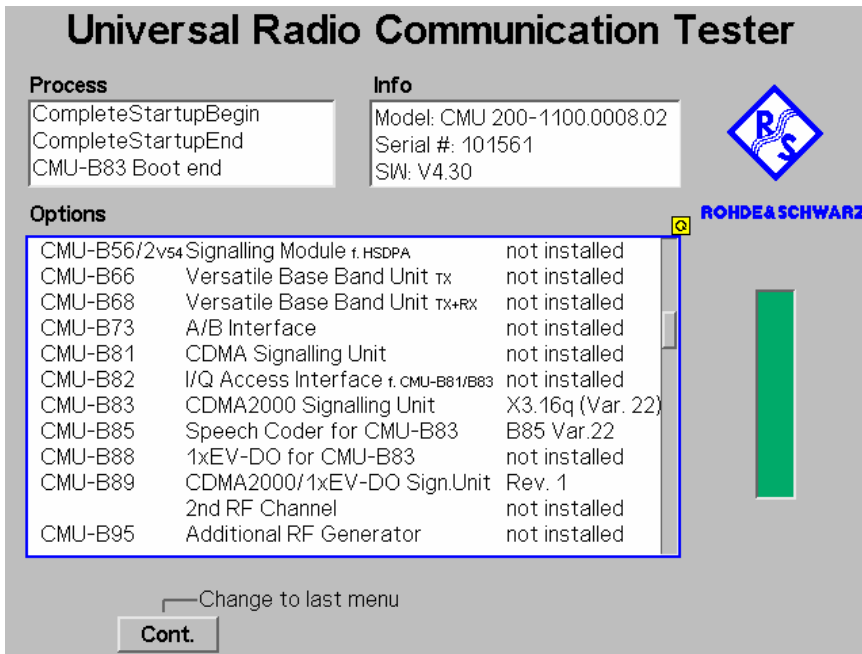


Figure 1-1 Startup – Options menu

Software Installation or Update

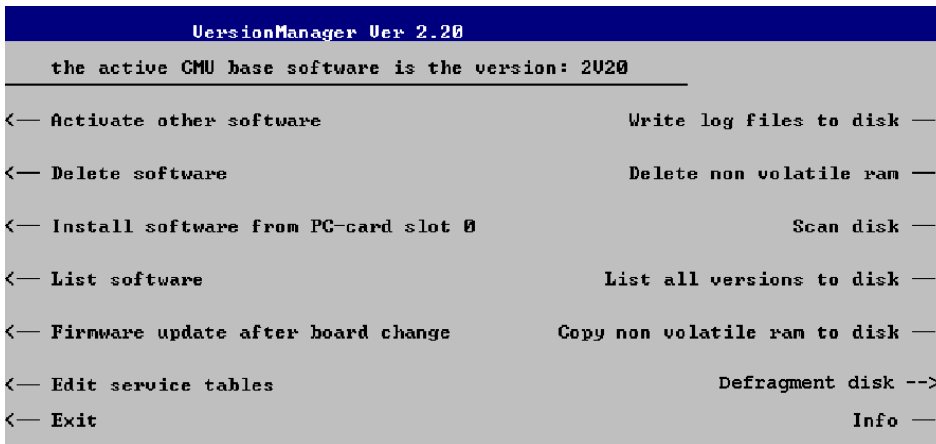
The CMU is always delivered with the latest software version available. New CMU software versions are available for download on the R&S Lotus Notes Service board. To be loaded via the CMU PCMCIA interface, the software must be copied to one or several flash disks/memory cards or PCMCIA hard disks as explained in the instructions supplied with the software download version. An appropriate memory card CMU-Z1, order no. 1100.7490.02, can be obtained from Rohde & Schwarz.

Note: *If your CMU is equipped with a floppy disk drive (option CMU-U61), a set of installation floppy disks must be generated instead of a flash disk. All other steps do not depend on the storage medium.*

To install the software proceed as follows:

- Switch off the CMU.
- Insert the flash disk into one of the two slots of the PCMCIA interface.
- Switch on the CMU.

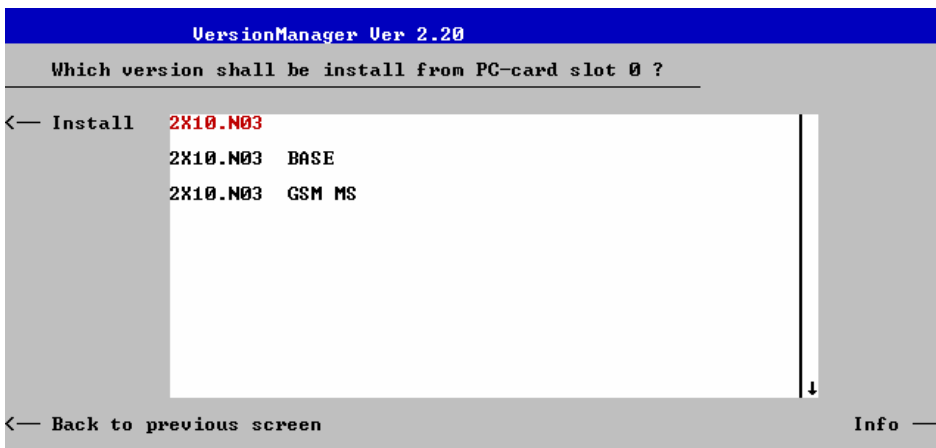
The installation is started automatically while the CMU performs its start-up procedure. When ready to proceed, the *VersionManager* is displayed (for a detailed description of the *VersionManager* refer to chapter 1 of the CMU 200/300 operating manual or to the on-line help accessible via *Info*):



Softkey no. 5 on the left softkey bar, *Install software...*, is used to install new software from an external storage medium. The CMU automatically recognizes the storage medium and indicates the corresponding slot number: Slot 0 or 1 denotes the left or right slot of the PCMCIA interface. If a floppy disk is used, the menu option reads *Install software version <version> from floppy*.

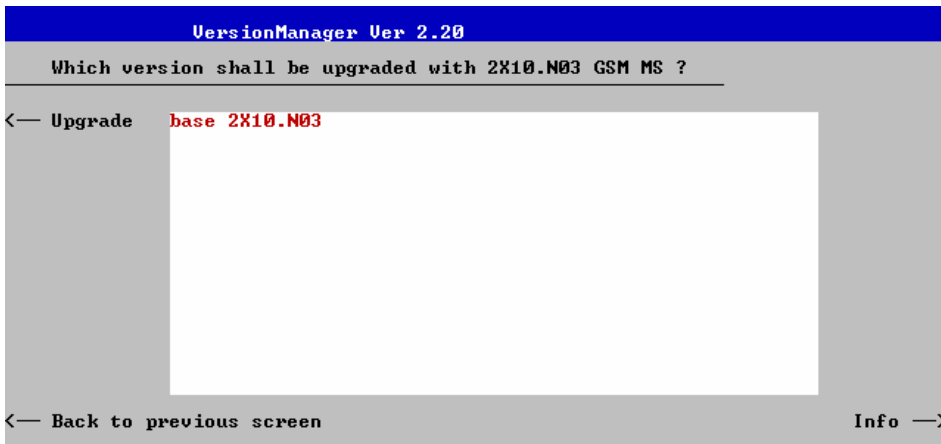
- Press left softkey no. 5 (*Install software...*) to start the installation.

If your storage medium contains several installation versions, the software version selection dialog is opened:



- Use the rotary knob or the cursor keys to scroll the list and select the *Measurements* version you intend to install.
- Press *Install* to start the installation.

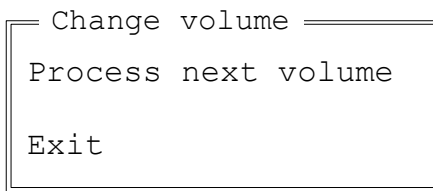
The installation is started. To be operable on your instrument, a network option must be combined with a compatible version of the CMU base software. Any base software version installed on the CMU hard disk can be combined with one or several network options to form an independent software configuration. If none of the configurations is compatible to the new *Measurements* option, the *VersionManager* displays an error message and takes you back to the software selection dialog; see section [Creating a new Software Configuration](#) on page 1.7. Otherwise, the following upgrade selection dialog is opened:



The upgrade selection dialog displays a list of base software versions that can be combined with the new *Measurements* software.

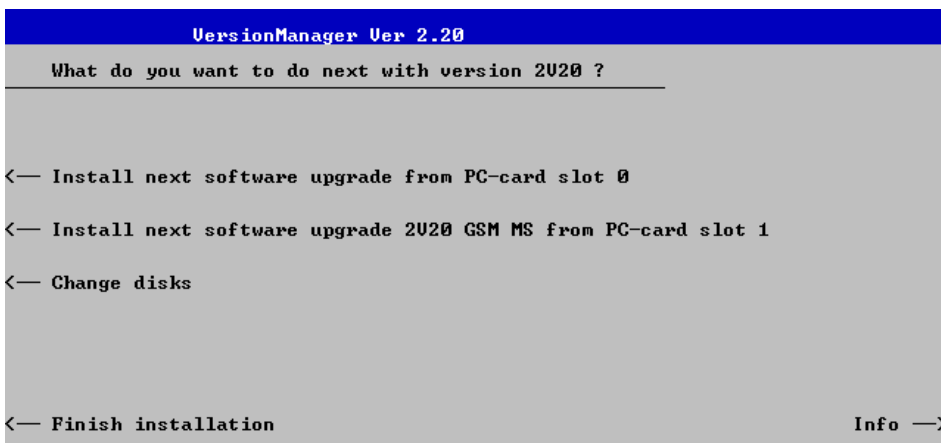
- Select the appropriate base version and press *Upgrade*.

The new *Measurements* option is added to the configuration or updates the previous *Measurements* version of the configuration. To indicate that the storage medium must be changed the CMU issues the *Change volume* message:



- Replace the current disk with the disk requested.
- Use the cursor up/down keys to select “Process next volume” (default setting).
- Press *ENTER* to confirm that the new disk has been inserted and to continue the installation.

After processing the last disk the CMU displays the following screen:



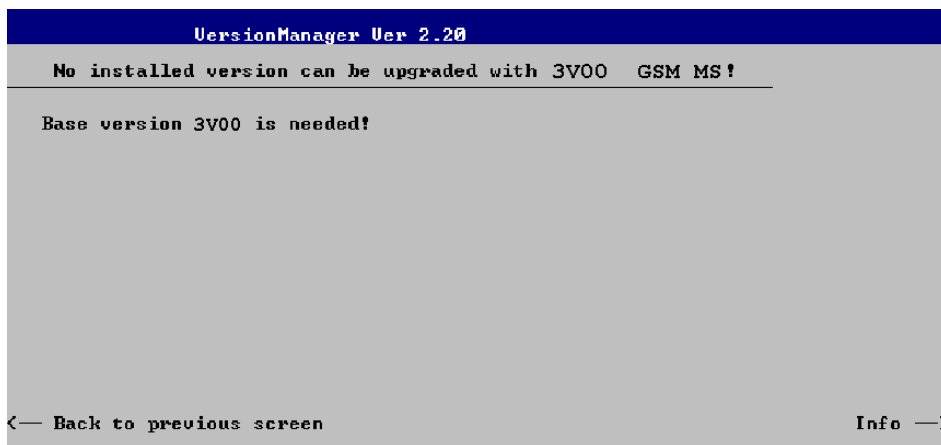
- If you wish to install or upgrade other software versions, press left softkey no. 4 or 5 (*Install next software...*) or insert new storage medium into the PCMCIA slot or floppy disk drive and press *Change disks*.
- To finish the installation, remove all disks from the drive and press *Finish installation*.

The *VersionManager* is closed and the CMU is rebooted. The new firmware options are now operational and listed in the *Menu Select* menu together with their version number. Besides, the last software configuration installed is automatically taken as the active one in the next measurement session.

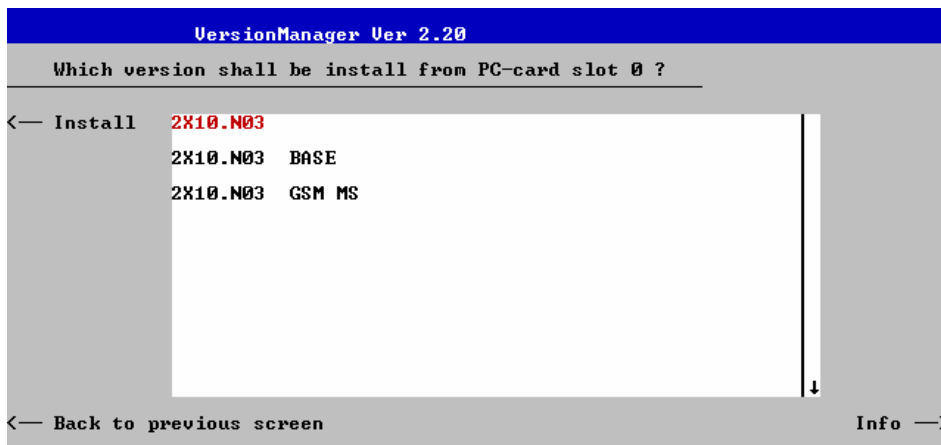
Creating a new Software Configuration

The CMU handles base software versions and network options on a separate basis. Different versions of the base software can be combined with different options to create new firmware configurations. For example, it is possible to update the base software without affecting the associated network options or vice versa. Moreover, the same base software version can be installed several times and combined with different network options (and vice versa), so it may enter into several firmware configurations.

If no compatible base software version can be found on the hard disk, then the CMU will refuse to install a new *Measurements* software option selected in the software selection dialog (see previous section). Instead, it displays the following error message:



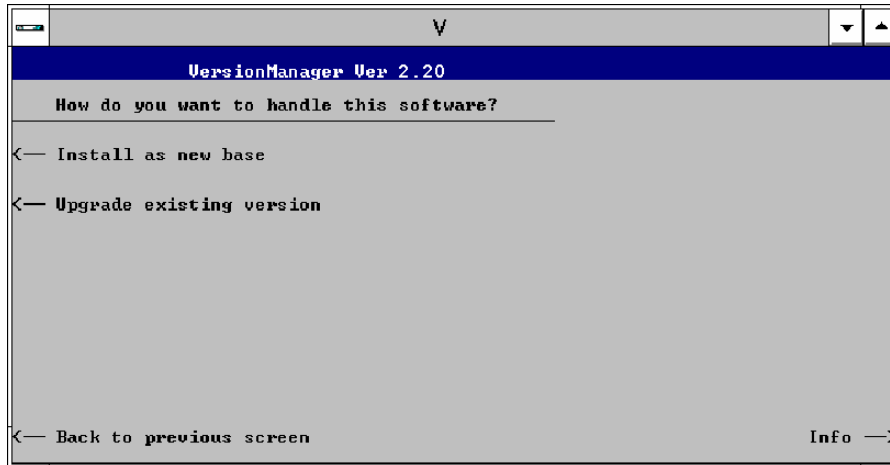
- Press *Back to installation* to return to the software version selection dialog.



- Select a base software version that is compatible to your *Measurements* software option and press *Install*.

Note: As a rule, firmware versions for the base system and for network options are compatible if they differ only in the last digit.

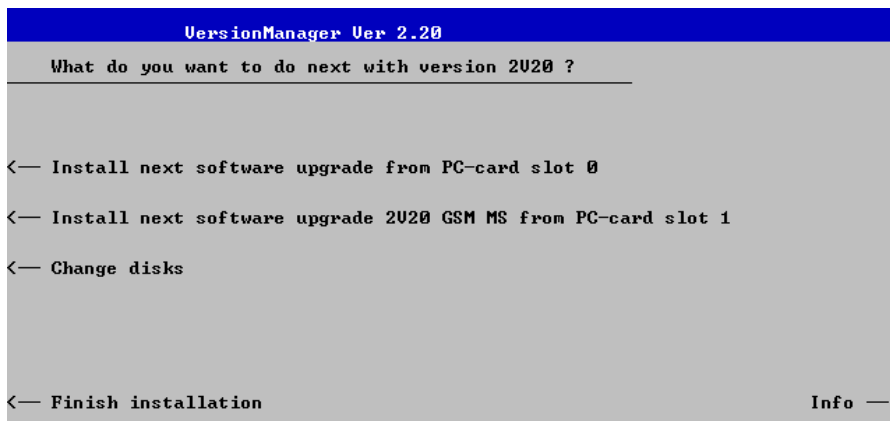
With a new base software version, it is possible to either update an existing configuration or create a new one. A dialog selecting between the two alternatives is opened:



Note: This dialog is skipped if the new base software version is not compatible with any of the existing configurations. An incompatible new base software must be installed as a new base software.

- If you wish to add a new configuration to your hard disk, press *Install as new base*.
- To upgrade an existing configuration with the selected base software version in order to make it compatible to the new *Measurements* software option, press *Upgrade existing version*. The existing version to be upgraded must be selected in an additional dialog.

The installation is performed as described in section [Software Installation or Update](#) on p. 1.1. After adding the new base software as a new configuration or updating the existing configuration, the CMU displays the following screen:



- Press left softkey no. 4 or 5 (*Install next software...*) and proceed as described in section [Software Installation or Update](#) on p.1.4. to install the new *Measurements* version and assign it to the new configuration.

Enabling Software Options

A new CMU software option purchased is ready to operate after it is enabled by means of a key code supplied with the option. This key code is to be entered into the *Option Enable* popup window which in turn can be opened via from the *Setup – Options* menu. For details refer to chapter 4 of the CMU 200/300 operating manual.

Note: *The CMU software is delivered in complete versions containing all software options available. Software installation and enabling of software options are completely independent from each other.*

Contents

2 Getting Started	2.1
Connecting an Access Terminal and Startup.....	2.2
Non-Signaling Measurements.....	2.6
Analyzer/Generator Measurement.....	2.6
Signaling Mode.....	2.12
Call Setup and Signaling Parameters.....	2.12
Receiver Quality Measurements.....	2.16

2 Getting Started

This chapter provides application examples for tests on 1xEV-DO access terminals (ATs). It is intended as a quick and simple introduction to the functionality of the Universal Radio Communication Tester R&S CMU 200 and its basic settings.

Before starting any measurements with the R&S CMU, please note the instructions given in chapter 1 of the CMU 200/300 operating manual for putting the instrument into operation. Chapters 2 through 4 of the CMU 200/300 operating manual contain information on customizing the instrument and display according to your personal preferences. For instructions about activating the 1xEV-DO option, refer to chapter 1 of this manual.

The procedures in this chapter include:

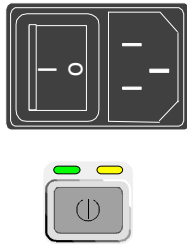
- Connection of an access terminal
- Start-up and reset
- Selection of the function group and measurement
- *Non-Signaling* measurements (example: *Analyzer/Generator*)
- Basic configurations and connection setup in *Signaling* mode
- *Signaling* measurements (example: *Receiver Quality*)

The left side of each double page illustrates the steps and results obtained on the CMU screen. The right column of the page provides additional information on each step. If applicable, alternative settings and related measurements are described as well.

General principles of manual operation are discussed in chapter 3. All menus, functions, and parameters of the 1xEV-DO function groups (including 1xEV-DO background information) are described in chapter 4.

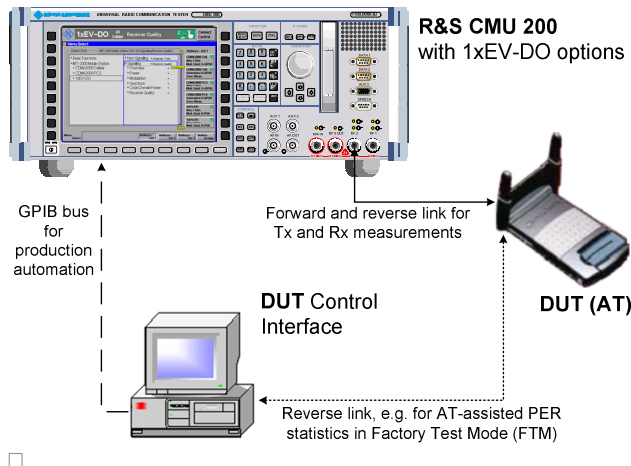
Connecting an Access Terminal and Startup

The following steps are general prerequisites for any 1xEV-DO measurement.



Step 1

- Switch on the CMU using the mains switch on the rear panel.
- Check the status of the ON/STANDBY key on the front panel. The yellow LED should be illuminated indicating that the CMU is in the standby operating mode.



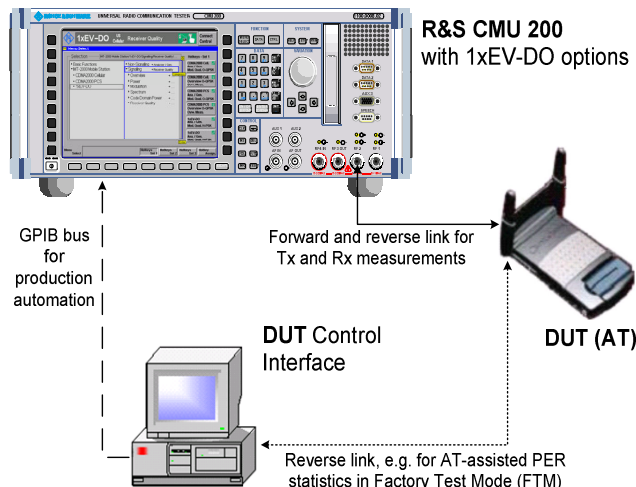
Step 2

- Connect the bi-directional RF connector RF 2 of the CMU to the Rx/Tx connector of the access terminal.
- For some advanced tests the Rx connector of the access terminal can be connected to another RF port on the CMU or another piece of test equipment.
- For GPIB tests connect a controlling workstation with the CMU.
 - Supply the access terminal with the required operating voltage (battery or power supply).



Step 3

- Press the ON/STANDBY front panel key on the CMU.



The startup menu displays while the CMU performs the power-up tests (see also additional information on p. 2.5).

After the power-up tests are complete, the CMU returns to the last menu used in the previous session.

Additional Information...**... on Step 1****Mains switch on the rear panel**

When the mains switch at the rear is set to *OFF*, the instrument is disconnected from the power supply. When the mains switch is set to *ON*, the instrument is in standby mode or in operation, depending on the *ON/STANDBY* key.

ON/STANDBY key on the front panel

The *ON/STANDBY* key determines whether the instrument is in standby mode or in operation.

Standby mode:

Only the reference frequency oscillator is supplied with operating voltage, and the orange LED (*STANDBY*) is illuminated.


Operation:

The green LED (*ON*) is illuminated and all modules of the instrument are voltage-supplied.

... on Step 2**RF connection of the access terminal**

The RF connection is the only connection that is needed for all 1xEV-DO tests.


A high-quality cable should be used for this connection, ideally with an attenuation of less than 0.5 dB.

Input and output connectors can be selected in the *AF/RF*  tab of the *Connect. Control* menu. The tab is also used to report an external input and output attenuation to the CMU.

Ensure that the cable or connector loss is taken into account by the CMU. This is particularly important for *Receiver Quality* tests, where the AT receiver is tested with very low RF signal levels, and even a small attenuation can cause the AT to be failed.

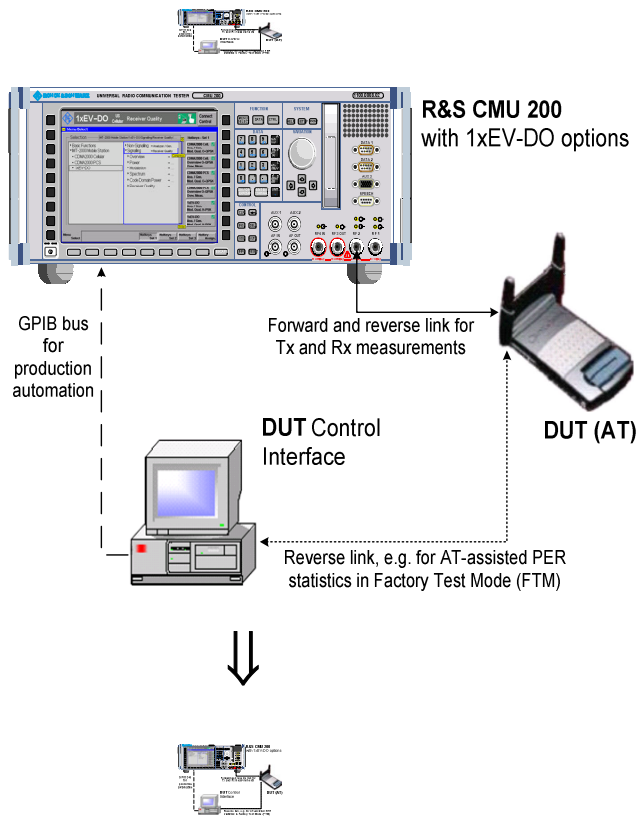
An external signal from a real network may interfere with the signal sent from the CMU to the access terminal. The tests should ideally be performed in a shielded room. However, if this is not possible, the channel(s) used for the test should be changed. If different results are obtained on neighboring channels, the problem is most probably due to external interference.

Alternative Settings and Measurements

 Chapter 1 of the CMU 200/300 operating manual

The CMU provides two bi-directional RF connectors (RF1 and RF2), designed for different input and output levels. RF2 is the recommended connector for 1xEV-DO ATs.

The unidirectional connectors RF4 IN and RF3 OUT are intended for modules which require high input levels or modules with low RF output levels.



Step 4

- Press the *RESET* key to open the *Reset* popup menu.
- Proceed as described in Chapter 4, section *Reset of Instrument Settings*, of the CMU 200/300 operating manual to expand the tree of function groups.
- Select the 1xEV-DO function groups to be reset. The corresponding nodes must be black (as shown).
- Use the cursor keys to activate the *Reset* button and press *ENTER*.
- In the popup window opened (*Are you sure?*), select *Yes* to confirm the instrument reset.

The CMU indicates that it performs a partial reset of the two selected function groups and is then ready to carry out the following steps. The *Reset* popup menu is closed automatically.

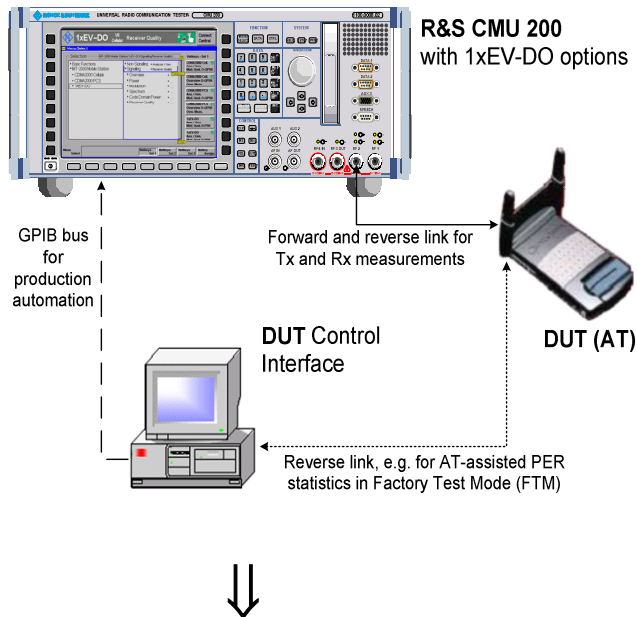
Step 5

- Press the *Menu Select* key to open the *Menu Select* menu.

In the left column the *Menu Select* menu indicates the network test options available. If a test option is selected, the corresponding function groups and measurement menus are indicated.

From this menu, you can select the measurement you want to run.

- Select the *IMT-2000 Mobile Station* header
- Select the 1xEV-DO function group.
- Scroll down to *Analyzer/Gen.* and expand the list.
- Scroll down to *ModQual H-PSK* and press *ENTER*.
- This displays the *Analyzer/Generator* screen and starts the H-PSK modulation quality measurement.



Additional Information...

... on Step 3

Start-up menu

The startup menu displays the following information:

- Status of the start-up test (*Process*),
- Device name, serial number and software version (*Info*),
- Options and equipment installed (*Options*),
- Progress of the start-up test (*Startup* bar graph).

Before starting a measurement, a reset is recommended to put the CMU into a known operating mode.

... on Step 4

Reset

The CMU indicates that it resets all parameters in the selected function group(s). After finishing, the CMU is ready to carry out the remaining steps. The *Reset* popup menu closes automatically.

... on Step 5

Menu Select menu

The *Menu Select* menu shows all network test options (function groups) installed and enabled on the R&S CMU. Function groups and menus that are often needed can be assigned to a softkey/hotkey combination in the *Menu Select* menu, so they can be accessed by a single key stroke.

The 1xEV-DO function group is divided into the two measurement modes *Non-Signaling* and *Signaling*, each containing a number of measurement groups. Most of the measurement groups are subdivided into different applications.

Alternative Settings and Measurements

☞ Chapter 4 of CMU
200/300 operating manual

Chapter 4 also contains information on customizing the CMU.

☞ Chapter 4 of CMU
200/300 operating manual

☞ Chapter 3
Refer to the overview of 1xEV-DO measurements

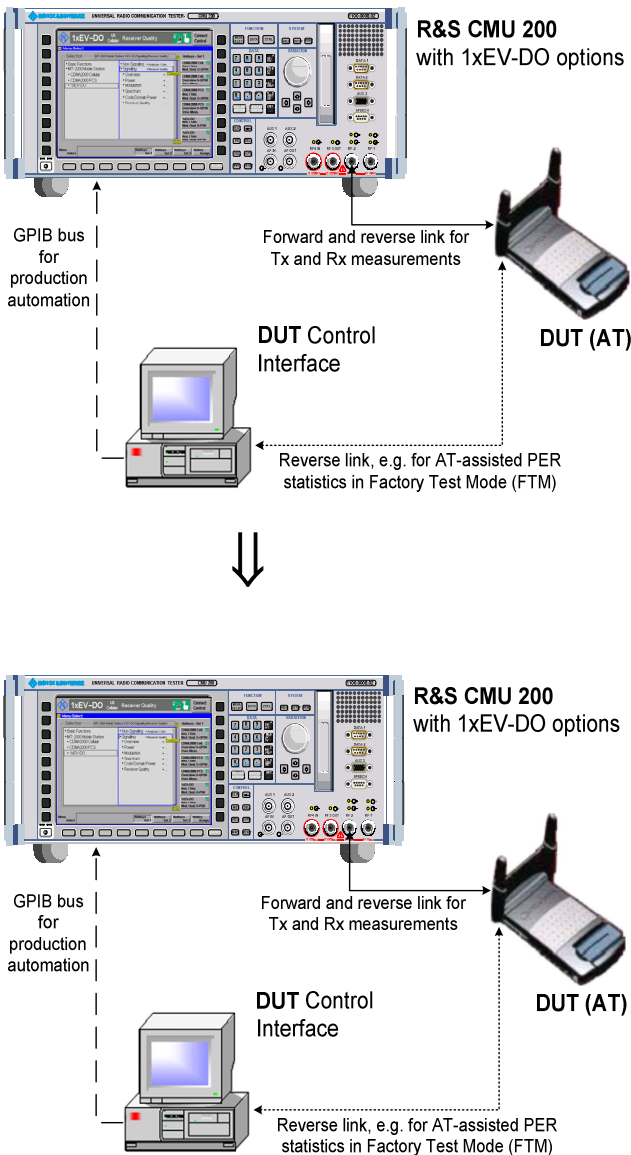
Non-Signaling Measurements

In the *Non-Signaling* mode, the CMU generates a forward 1xEV-DO signal (option R&S CMU-K88) and analyzes the reverse signal transmitted by the DUT. Usually the AT must be placed in a special mode (Factory Test Mode, FTM) in order to transmit a signal. Compared to *Signaling* mode, where a real connection is set up between the R&S CMU and the AT, test times may be reduced considerably. Moreover, the measurements are not restricted to the specified channel and AT output power ranges of the network. The most common application is module test.

The measurements in the two test modes are largely analogous, however, an additional *Receiver Quality* menu is provided in *Signaling* mode (see p. 2.16).

Analyzer/Generator Measurement

As described above, all measurement menus can be called up from the *Menu Select* menu. Once a measurement menu is opened, the hotkeys across the bottom of the menu can be used to switch over to any of the other measurements.



Step 1

The *Analyzer/Generator* screen displays the current power and modulation measurement results and the RF generator and analyzer settings of the CMU. The *Mod. Qual. H-PSK* measurement control softkey indicates the measurement state *RUN*.

All output fields display “---” indicating that no valid measurement results are available. This is because the AT does not transmit a signal. A yellow message box *Signal too low at connector RF 2* displays across the top of the menu.

To obtain valid measurement results in *Non Signaling* mode, the AT must be switched on and placed in its Factory Test Mode. In addition the RF analyzer of the CMU must be set in accordance with the properties of the RF input signal.

Step 2

- Press the *Connect Control* softkey. This displays the *Connection Control* screen.
- Select the *Generator* tab at the bottom of the display.
- Select (press) the *Generator* softkey and press *ON/OFF* to turn on the RF generator.

Press the *Connect Control* softkey again to return to the measurement screen.

Additional Information...

... on Step 1

Measurement state

The state indication of the different measurements is included in the measurement control softkeys (2nd softkey in the right softkey bar of each measurement menu). For ongoing measurements (*RUN* state), the results in the output fields are constantly updated.

A measurement can be switched on and off after selecting the measurement control softkey by means of the toggle key *ON/OFF*.

Analyzer/Generator screen

The *Analyzer/Generator* screen contains two panels of information.

For various reasons, an output field may fail to show a valid measurement result (indication "---" or a red output field, if the results exceeds the tolerances)

... on Step 2

Connection Control menu

The *Connection Control* menu provides general settings that are valid for all 1xEV-DO measurements. Part of the settings can be overwritten in the individual measurement groups.

The *Generator* tab allows you to adjust all generator settings and turn the RF generator on or off. The generator is generally not needed for TX tests, however, it must be switched on for all measurements which require a synchronization between the AT and the R&S CMU (e.g. AT-assisted PER measurements, *Timing Error* measurements).

Additional tabs of the *Connection Control* screen allow the setup and control of other aspects of the CMU. These settings are described in chapter 4 of this manual.

Alternative Settings and Measurements

☞ Chapter 3

The current options for the measurement state are *RUN* (default) and *OFF*. A third state, *HLT*, occurs after a single-shot measurement.

Once selected, each measurement can be switched off and on again by means of the *ON/OFF* key.

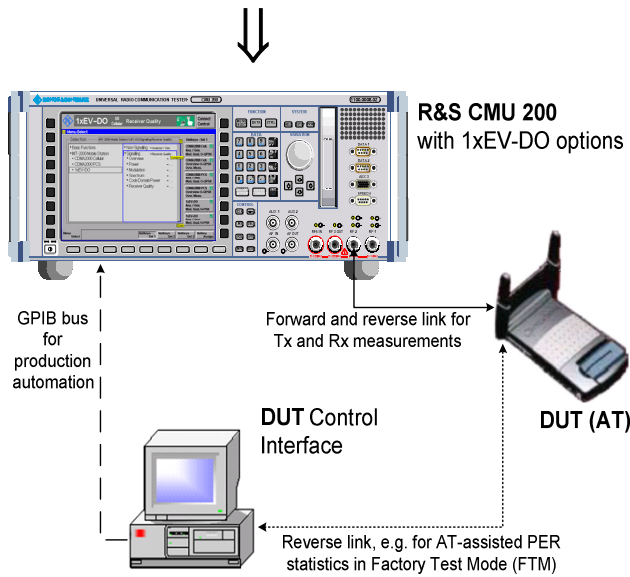
☞ Chapter 4

The chapter 4 of this manual provides detailed information about all measurement settings, measurement results, and a description of all softkey/hotkey menu buttons.

Analyzer/Generator is an overview measurement. The same results are also displayed in the *Power* and *Modulation* menus.

☞ Chapter 4

To facilitate and speed up the operation, many CMU settings are accessible from different menus. The RF analyzer settings can be accessed via the *Analyzer Level* and *Analyzer Settings* softkeys in the *Power* measurement menu as well.

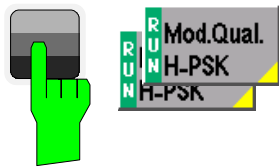


Step 3

- Ensure that your AT is switched on and that it provides an RF signal.
- Press the *Analyzer Set. 1* softkey.

The hotkeys displayed at the bottom of the screen allow you to directly adjust the measurement control settings without opening an additional configuration menu.

- Press the *RF Frequency* softkey and adjust the analyzer frequency to the Tx frequency of the AT.
- Press *Analyzer Set. 1* again and select the *Long Code Mask I* and *Long Code Mask Q* according to your AT signal. Without a valid *Long Code Mask* the measurements will not display any valid results.

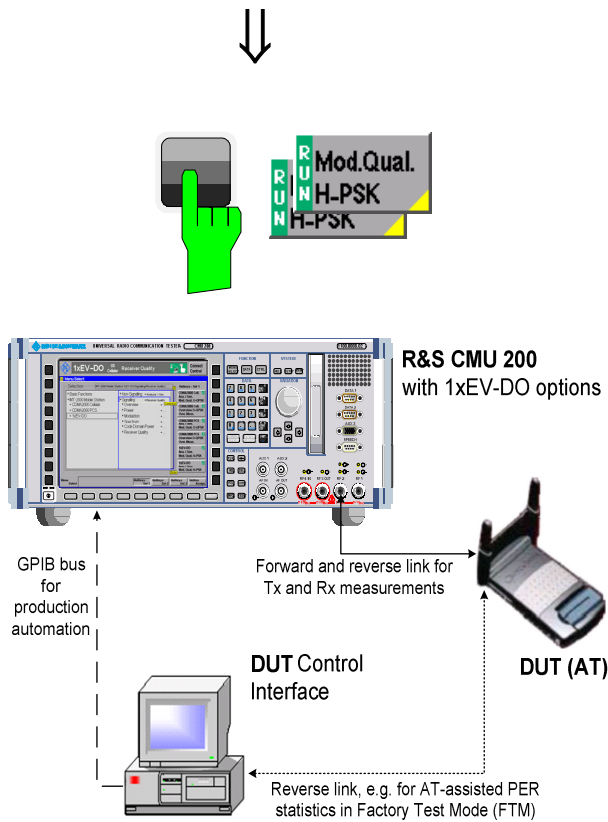


Step 4

- Select (press) the *Mod. Qual. H-PSK* softkey.
- Press the selected *Mod. Qual. H-PSK* softkey again to call up the *Analyzer/Generator Configuration* menu.

The *Control* tab of the *Analyzer/Generator Configuration* menu defines the scope of the *Analyzer/Generator* measurement. To pick just one example of the settings, we limit the number of slots measured and adjust the tolerance limits to the expected properties of our 1xEV-DO signal.

- If necessary, press the *ON/OFF* key to expand the menu tables.
- Select *Repetition: Single Shot*.



Additional Information...

... on Step 3

Analyzer/Generator results

The *Current* results describe the power (*AT Power*), modulation accuracy (*Rho*, *Carrier Frequency Error*, *Carrier Feedthrough*, *I/Q Imbalance*), timing (*Transmit Time Error*), and off-carrier emissions (*Sideband Suppr.*).

If a result exceeds the error tolerances, the corresponding output field turns red, and an arrow pointing upwards/downwards indicates that the result is above/below the limit. In our example, the values for the upper and lower sideband suppression are too high, whereas all other results match the limits.

To obtain the *Transmit Time Error* in *Non Signaling* mode, an appropriate trigger source is needed (*Trigger – Trigger Source: Internal or External*).

... on Step 4

Analyzer/Generator Configuration menu

The Power Configuration menu contains two tabs

Analogous configuration popup menus are available for all measurement groups. Settings pertaining to different measurement applications are grouped together in separate sections of the configuration menus.

User-defined settings are saved for later sessions when the CMU is switched off.

Repetition mode and stop condition

The *Repetition* mode determines whether the measurement is


Continued until it is explicitly stopped (Continuous)

Stopped after one statistic count (Single Shot)

By default, a statistic count comprises 10 basic evaluation periods. In the *Analyzer/Generator* measurement (and in all other TX measurements), an evaluation period corresponds to a waveform interval with a duration of $\frac{1}{2}$ CDMA2000 slot or 833.333 μ s.


In *Receiver Quality* tests, an evaluation period comprises an integer number of packets, control channel cycles or frames, depending on the measured quantities.

Alternative Settings and Measurements

 Chapter 4


Use the code channel filters (*Analyzer Set. 1 – Code Chann. Filter*) in order to filter the measurements results and discard unwanted channels.

Additional filter settings are available if a measurement subtype 2 is selected (*Connection Control – Analyzer*).

 Chapter 3

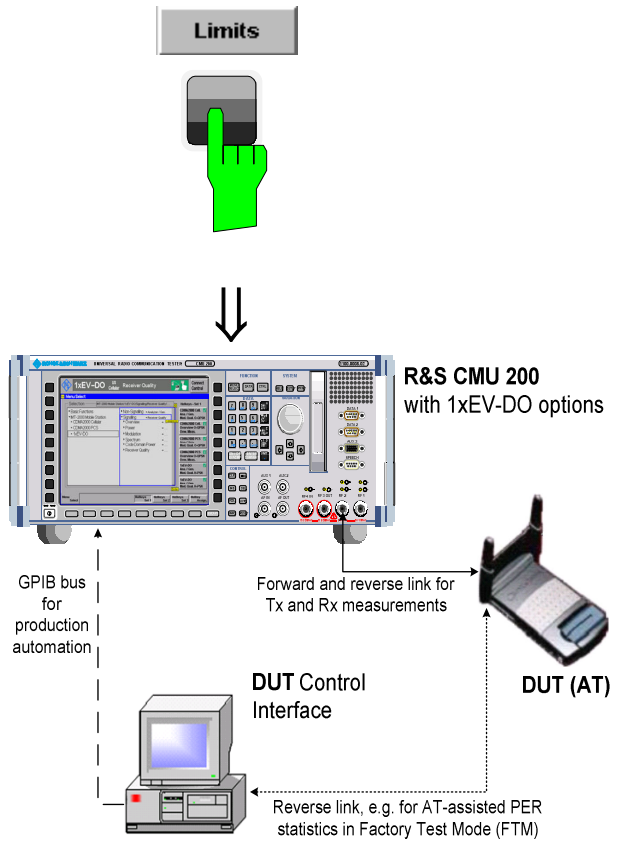
Settings made in the *Analyzer/Generator Configuration* menu apply to the *Analyzer/Generator* measurement only.

Settings made in the *Connect. Control* menus apply to the entire function group (all *Non Signaling* measurements).

 Chapter 3

In addition, the running measurement can be stopped after the first slot which is out of tolerance. To this end, *Stop Condition = On Limit Failure* must be selected.

This is suitable if the limit check represents the main purpose of the measurement.

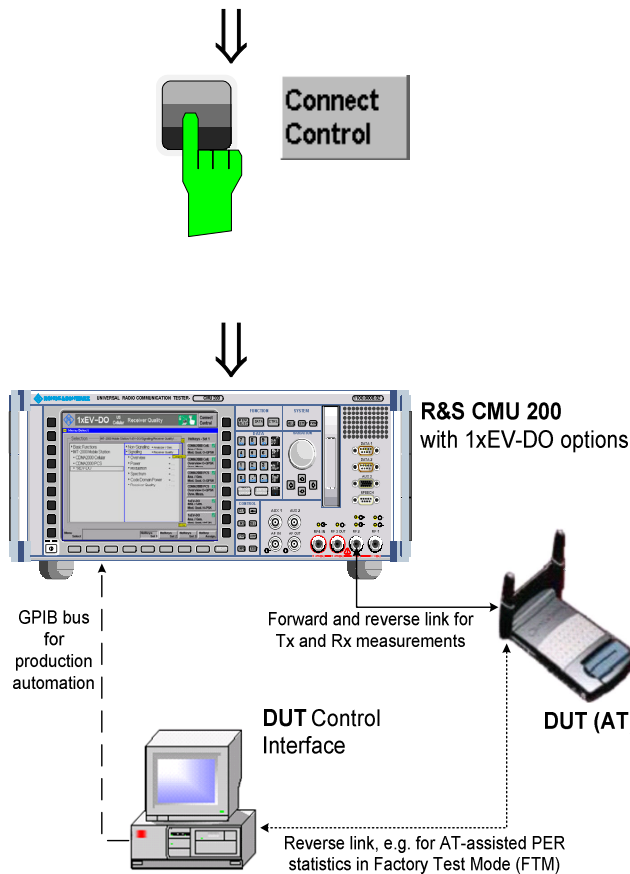


Step 5

- Press the *Limits* key to activate the *Limits* tab of the configuration menu.

The *Limits* tab of the *Analyzer/Generator Configuration* menu defines upper and lower limits for all measurement results. In our example, the *Sideband Suppr.* limit is smaller than the measured off-carrier power (ACP 3).

- If necessary, press the *ON/OFF* key to expand the menu tables.
- Reduce the *Sideband Suppression* limit to e.g. -39 dB.
- Press the *ESCAPE* key to close the *Analyzer/Generator Configuration* menu and return to the main menu.



Step 6

- Press the *Escape* key or the *Connect Control* softkey again to close the *Analyzer/Generator Configuration* popup menu and return to the *Analyzer/Generator* menu.

The *Analyzer/Generator* measurement is stopped after one statistics cycle. The status indication next to the *Power* softkey is set to *HLT*.

In our example the *Sideband Suppr.* measurement also passed the limit check (due to the changed limits), so the output fields are no longer red.

Additional Information...

... on Step 5

Limits and limit check

Limits for most test results (e.g. the *Rho* factor and the *Carrier Frequency Error* in the *Analyzer/Generator* measurement) are defined in the TIA/EIA conformance test specifications. The default limit settings in the R&S CMU are usually equal to the specified limits but can be modified.

The stop condition *On Limit Failure* causes the measurement to be stopped as soon as a result exceeds the limit.

... on Step 6

Measurement in the HLT state

The state indication of the different measurements is included in the measurement control softkeys (2nd softkey in the right softkey bar of each measurement menu). In the single shot mode (i.e. if the *Repetition* mode is set to *Single Shot*) the measurement is stopped after each statistics cycle and assumes the *HLT* state. The next single shot measurement can be initiated by pressing the toggle key *CONT/HLT*.

For measurements that are controlled by a terminal program (remote control), the most common (and default) repetition mode is *Single Shot*, while manual measurements are generally performed in *Continuous* mode.

Alternative Settings and Measurements

☞ Chapter 4

Confidence limit testing for *Receiver Quality* measurements is described in section *Receiver Quality Configuration – Limits*.

☞ CMU 200/300 manual

See the sections on measurement control in chapters 3 and 5.

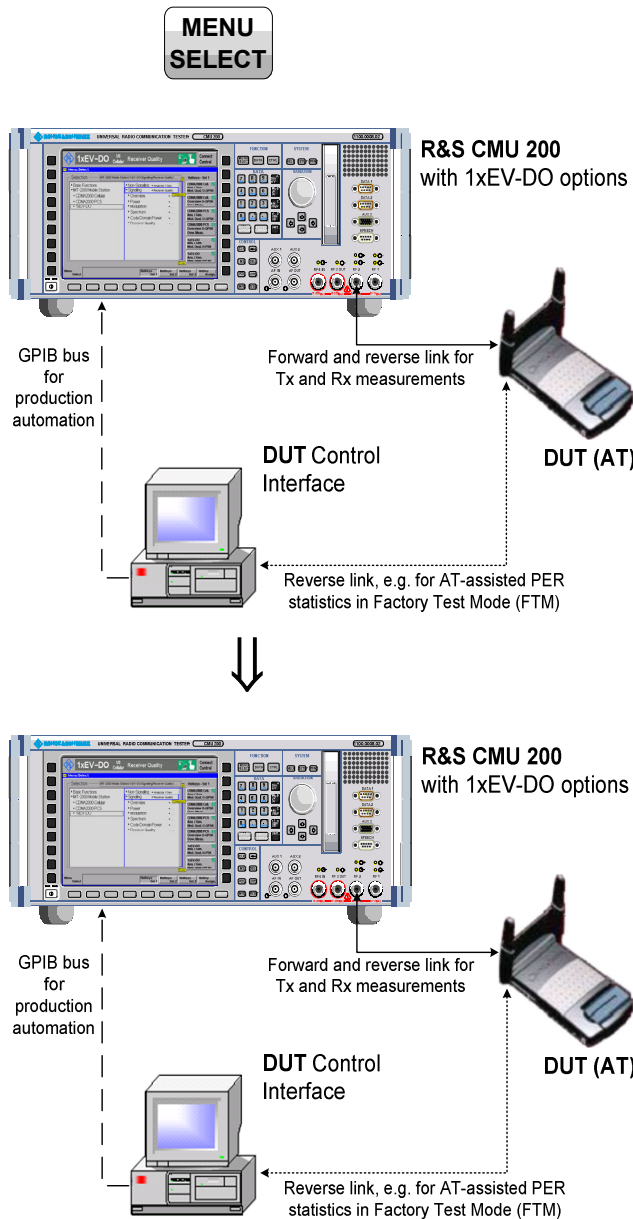
Signaling Mode

In *Signaling* mode the R&S CMU transmits a forward 1xEV-DO signal (AN signal) to which the AT is able to synchronize. On receiving the signal the AT will initiate a session negotiation. When the session is open and all parameters are negotiated a connection can be established from either the R&S CMU or the AT. *Signaling* tests require option R&S CMU-B89 and one of the 1xEV-DO signaling band options R&S CMU-K839, R&S CMU-K849, R&S CMU-K859, or R&S CMU-K869.

All *Non-Signaling* TX measurements are also supported in *Signaling* mode. In addition, the *Signaling* mode provides various *Receiver Quality* tests.

Call Setup and Signaling Parameters

The signaling processes and configurations are controlled via the *Connection Control* popup menu.



Step 1

- Make sure that your AT is connected to the CMU as described in section [Connecting an Access Terminal](#) on p. 2.2 and switched on.
- Press the *MENU SELECT* key to open the *Menu Select* menu.
- Select the *1xEV-DO* network test options.
- Select the *Signaling* test mode and expand the list.
- Scroll to *Overview* and expand the list.
- Scroll to *ModQual H-PSK*.
- Press *Enter* to activate the measurement and display the measurement screen.

The CMU immediately displays the *Connection Control* menu, turns on the AN signal and waits for the AT to initiate a session negotiation.

- If necessary, press *Network Standard* and select a network supported by your AT.
- Wait for the AT to start session negotiation.

Additional Information...

... on Step 1

Signaling Measurements

Since *Signaling* measurements require a connection to the AT, the R&S CMU immediately displays the *Connection Control* screen if a connection is not yet established. The forward 1xEV-DO signal (AN signal) for synchronization and session negotiation is also switched on automatically.

The default configuration of the forward 1xEV-DO signal is usually appropriate for session negotiation, provided that the AT is properly connected.

The 1xEV-DO power of the AN Signal or the external attenuation, especially if the AT is connected via antenna.

Connection Control menu

The *Connection Control* menu provides general settings that are valid for all 1xEV-DO measurements. Part of the settings can be overwritten in the individual measurement groups.


The Connection tab provides fundamental settings for the test session (Application Selection, Network Standard), controls the connection, and displays the parameters of the AT.

Handoff initiates a handoff to another band class.

Layer selects and configures the protocols for the different layers of the 1xEV-DO high rate packet data system.


AN Signal configures the forward 1xEV-DO (AN) signal of the R&S CMU. The AN signal is used for signaling and for data transfer in order to perform Receiver Quality tests.

Network selects the network standard and defines how the R&S CMU will handle access probes from the AT.


RF  selects the RF input/output connectors of the R&S CMU and defines external input/output attenuation factors.

Sync. controls the reference frequency and synchronization signal of the CMU.

Alternative Settings and Measurements

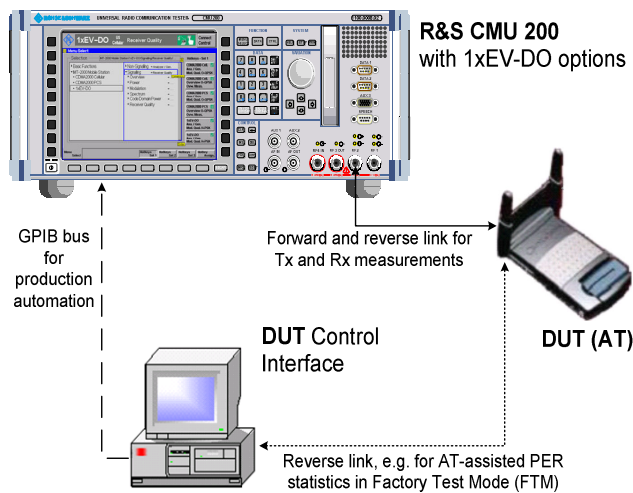
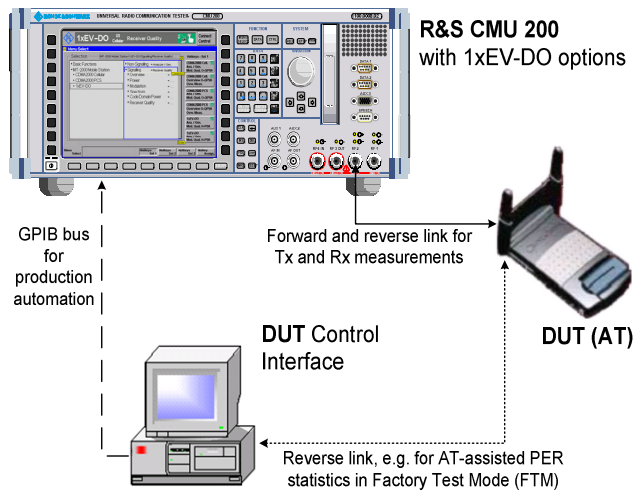
 Chapter 4

The immediate display of the connection control screen can be disabled by deselecting *Auto Open if not connected* under *Connection Control Behavior* in the *Misc.* tab of the *Connection Control* menu.

 Chapter 4

A second level of the *Connection Control* menu (accessible after pressing 1/2) provides additional settings:

- *Trigger* settings
- Configuration of the I/Q-IF interface
- Configuration of the RF input path (*Analyzer*)
- Display settings (*Misc.*)



Step 2

After session negotiation, the *Session Information* area contains important parameters characterizing the access terminal.

If session negotiation fails, there may be configuration settings that don't match the AT. See additional information on step 1.

- Press *Connect AT*.

The R&S CMU displays *Connecting AT...* while initiating a connection to the AT. When the connection is established, the R&S CMU enters the *RL: Connected* state; the *Connection Control* menu is closed automatically. This can only be done if Test Applications are enabled. If the Default Packet Application is enabled, the connection must be initiated from the AT.

Step 3

After the call is established, the CMU displays the *Overview* measurement screen. This was the selection made in the *Menu Select* menu.

- Use the *Analyzer Level ... AN Settings* softkey on the right side to modify the analyzer and generator settings of the R&S CMU.
- Use the *Menus* softkey to change to the other Tx or Rx measurements in *Signaling* mode.

Additional Information...

... on Step 2

RL: Session Open and Connected states

In *Session Open* state the selected applications are assigned to streams and all call parameters have been negotiated. Our example corresponds to the R&S CMU default configuration where the *Default Signaling Application* is assigned to stream 0 (in accordance with the standard), the *Default Test Application* is assigned to stream 1. This configuration is appropriate for all measurements. A session can be open for a long time without any further activity.

In the *Connected* state the traffic channel is active and available for the applications that have previously been assigned to a stream.

In general, part of the TX measurement results are available while the R&S CMU is in *Session Open* state. *Receiver Quality* measurements must be run in the *Connected* state with an active test application

Session Information

The *Session Information* table displays the essential characteristics of the session:

The *AT Information* values must be provided by the AT; they are only available after the R&S CMU has entered the *Session Open* state. The *Streams* values are determined by the CMU, and they are negotiated with the AT during session negotiation. *Streams*-related requests from the AT are ignored. The remaining parameters are R&S CMU settings and always available.

... on Step 3

Overview measurement

The results in the *Overview* measurement describe the power (*AT Power*), modulation accuracy (*Rho*, *Carrier Frequency Error*, *Carrier Feedthrough*, *I/Q Imbalance*), timing (*Transmit Time Error*), and off-carrier emissions (*Sideband Suppr.*).

This measurement corresponds to the *Analyzer/Generator* menu in Signaling mode; see section [Analyzer/Generator Measurement](#) on p. 2.6.

Alternative Settings and Measurements

☞ Chapter 4.

The AT also collects *Receiver Quality* statistics while it is in IDLE (*RL: Session Open*) state. Section *Forward and Reverse Link Performance* in chapter 4 describes how to obtain *Receiver Quality* results based on these statistics.

This is true only if the Test Applications are enabled.

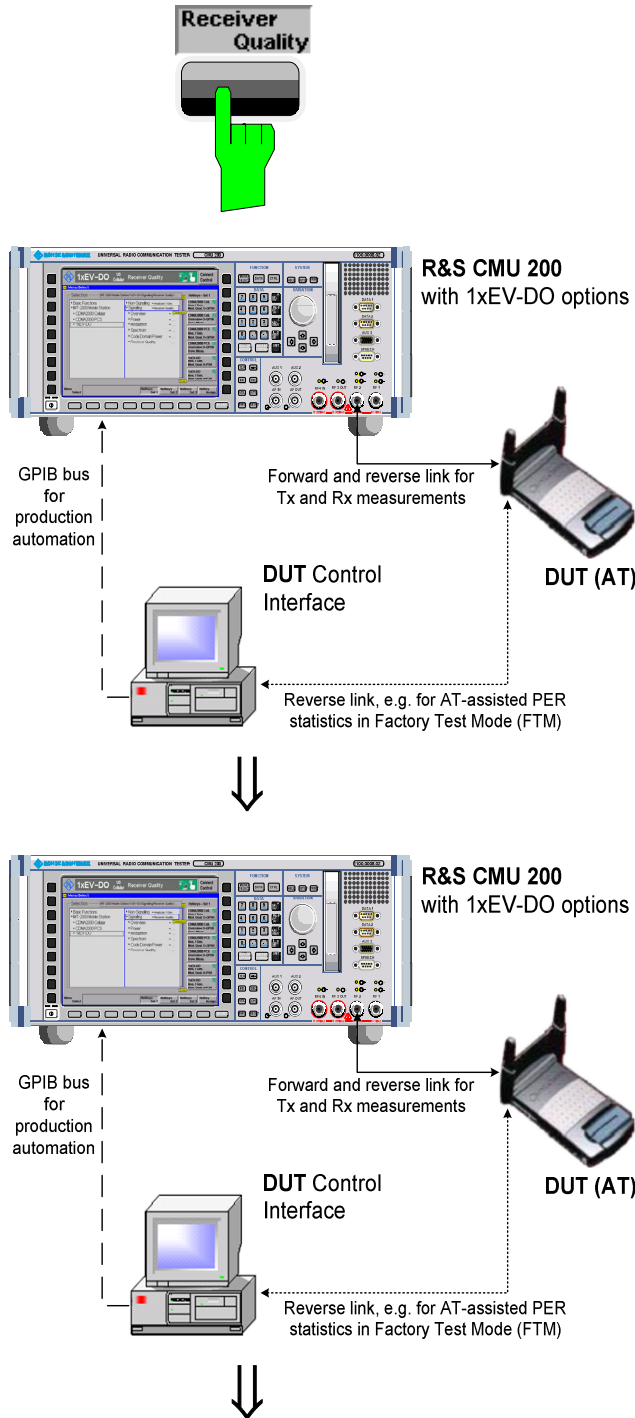
☞ Chapter 4.

The *Overview* measurement can be configured like the *Analyzer/Generator* measurement using softkeys and hotkeys. Pressing the measurement control softkey twice opens the *Overview Configuration* menu.

Receiver Quality Measurements

The *Receiver Quality* measurement provides a wide range of parameters that characterize the connectivity of the forward and reverse link. Forward and reverse link parameters are generally measured with different test applications (FTAP, RTAP). All *Receiver Quality* measurements must be performed in *RL: Connected* state.

In the following we assume that a connection has been established as described the last section; the default test application is assigned to stream 1.



Step 1

- Press the *Menus* softkey and the *Receiver Quality* hotkey to switch over to the *Receiver Quality* menu.

The *Receiver Quality* menu controls the receiver quality tests and displays the measurement results together with the basic settings, especially the test application configuration.

- Press the *Application* softkey to display all applications of the *Receiver Quality* measurement group. Press *Statistics Overview* to select the overview application.
- Press *Statistics Overview – Reset Statistics* to re-start the measurements.

All *Received Packets* counters are reset to zero and the calculation of the results is re-started, discarding all previous results.

- Press the *Application* softkey again and select *Ctrl. Ch. PER*.

The three applications *Control Channel PER*, *Forward Link PER*, and *Reverse Link Quality* are displayed in one common menu. The active application is underlined. All three applications show the packet error rate (*PER*), the *Confidence Level*, and their specific measurement statistics. If a value exceeds the specified limits the output field turns red.

- Press *Ctrl Ch. PER* and the *ON/OFF* key.

The *Control Channel PER* measurement is stopped; the state of the other measurements is not affected.

Additional Information...

... on Step 1

Statistics overview results

The *Statistics Overview* menu gives an overview of all *Receiver Quality* measurements and their statistics.

Control Channel PER is the percentage of first synchronous control channel (CC) MAC layer packets that the access terminal received in error.

Forward Link PER is the percentage of FTAP/FETAP test packets transmitted on the forward traffic channel that the AT failed to receive successfully.

Reverse Link Quality is the percentage of FTAP/FETAP loopback packets from the AT that the R&S CMU failed to receive successfully.

Termination Target PER is the percentage of RTAP RTC MAC packets from the AT that the R&S CMU failed to receive within a definite target transmit duration (not active in the current release of the 1xEV-DO software).

Forward Link Performance / Time is the data rate per unit of time (in kBit/s) of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully.

Forward Link Performance / Slots is the data rate per transmitted slots of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully.

Reverse Link Performance is the data rate per unit of time (in kBit/s) of the RTAP/RETAP RTC MAC packets from the AT that the R&S CMU could receive successfully.

Statistics reset

Starting or stopping an individual *Receiver Quality* application resets the statistics for this application only. This ensures that different *Receiver Quality* measurements can be run in parallel using independent statistics cycles. Use *Reset Statistics* to clear all statistics and re-start all measurements including the calculation of the results in the *Statistics Overview* measurement.

Alternative Settings and Measurements

Chapter 4

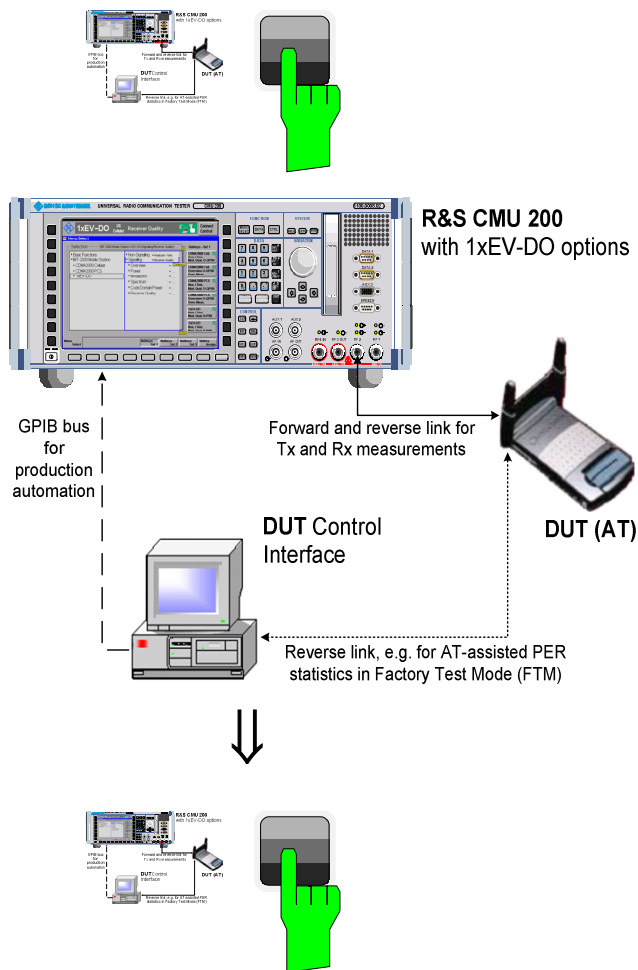
The *Statistics Overview* menu is also useful for retrieving IDLE state statistics; see section *Forward and Reverse Link Performance*.

For limit checks and confidence testing use the other *Receiver Quality* applications.

The results in the *Statistics Overview* menu require different test application protocols, so they are never available altogether. The results in our example rely on the FTAP protocol; the invalid results ('---') require an RTAP protocol; see step 2.

Chapter 4

Like all TX measurements, *Receiver Quality* tests can be performed in *Single Shot* mode (with a configurable statistics cycle) or in *Continuous* mode. The statistics cycle is defined as an integer number of packets, frames or control channel cycles, depending on the application.



Step 2

- Press the *Connection Control* softkey to open the *Connection Control* menu.
- Open the *Connection* tab.
- Press the *Application Selection* softkey and set the *Test Application Select* menu item to *Reverse*. Then *Apply* the change, switch to the *Layer* tab and set the *Application Layer – Test Application – RTAP Cfg. – DRC Rate* to 5 (if desired and supported by the AT).
- Press *Connection Control* again to close the *Connection Control* menu and return to the *Receiver Quality* menu.

The *Control Channel PER*, *Forward Link PER*, and *Reverse Link Quality* applications require an FTAP test application protocol, so they will show invalid results. The *Reverse Link Performance* and the *Reverse Link PER* results rely on the RTAP protocol.

1xEV-DO N.Amer. PCS Receiver Quality Rel. 0 Subt. 0 RTAP

Data Rate	MAC Pkts RXed	Throughput vs. Test Time
0.0	0	0.00 kBIT/s
9.6	44	0.42 kBIT/s
19.2	131	2.49 kBIT/s
38.4	448	17.00 kBIT/s
76.8	380	28.84 kBIT/s
153.6	9	1.37 kBIT/s
Total	1012	50.11 kBIT/s

Test Time 1012 Frames

Statistic Overview Ctrl. Ch. PER Fwd. Link PER Rvrse Link Quality Fwd. Link Perform Rvrse. Link Perform Rvrse. Link PER

Connect Control Rvrse.Link Perf. Application Analyzer Level Trg Analyzer Set. TAP AN Signal Level Imp AN Setting Power Ctrl. Menus (1/2)

- Press the *Application* softkey again and select *Rvrse. Link Perform*.

The results of the *Reverse Link Performance* application appear in a table. The table gives an overview of the reverse link throughput for different data rates.

Additional Information...

... on Step 1

Confidence testing

The idea behind statistical testing is to apply probability theory and predict a range for the PER at an early stage of the measurement. The prediction can be used to stop the measurement if the probability of the DUT to pass or fail the receiver quality test is large enough (early pass or early fail decision). Statistical testing can reduce test times considerably, especially if the exact PER of a receiver is very low or very high.

The *Confidence Level* is the statistical probability for the PER to be below the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu. In our example, the 63.59% confidence level for the *Control Channel PER* result is too small, i.e. the probability for the AT to pass the control channel PER test is not high enough yet so that the test must be continued. This is probably due to the relatively small number of control channel cycles elapsed since the start of the measurement (the duration of a control channel cycle is 426.67 ms, much longer than the test packet length).

... on Step 2

Reverse Link Performance

The table in the *Reverse Link Performance* menu shows the reverse link throughput for all physical packet sizes that the AT used in the reverse channel. Note that the packet errors for packets with size 0 are always set to zero.

Some of the rows or columns in the table may be empty, e.g. if the selected maximum data rate on the reverse link is too small so that the AT does not use all allowed packet sizes.

For physical layer subtype 0, the throughput is given as a function of data rate.

For physical layer subtype 2, the throughput is given as a function of packet size.

Alternative Settings and Measurements

Chapter 4

The *Limits* tab of the *Receiver Quality Configuration* menu also specifies the *Min. Confidence Level* for the *Ctrl. Ch. PER*, *Fwd. Link PER*, *Reverse Link Quality*, and *Reverse Link PER* applications.

Moreover it is possible to stop the measurement if the *Max. PER*, the *Min. Confidence Level*, or either one of them is exceeded (*Receiver Quality Configuration – Control – ... – Stop Condition*).

Chapter 4

The reverse link performance results depend on the physical layer subtype. If a layer subtype 0 or 1 is active, the rates 0, 9.6, 19.2, 38.4, 176.8 and 153.6 (kBit/s) are available. For a physical layer subtype 2, all rates except 9.6 kBit/s are available.

Contents

3 Manual Control	3.1
Menu Structure	3.1
Test Modes	3.1
Status Symbols	3.2
Non-Signaling Mode	3.2
Signaling Mode	3.3
Configurations	3.4
Measurement Groups	3.4
General Settings	3.6

3 Manual Control

This chapter gives a brief overview of the operating concept and structure of the user interface for 1xEV-DO access terminal tests. The CMU is designed for maximum operating convenience and flexibility. All instrument functions are grouped together in menus. Each menu provides configuration settings, displays a group of measured quantities, or a combination of both. Switching between the different menu groups and signaling modes is possible at any time.

In the following sections, the different measurement modes and measured quantities are discussed. Settings and measurement parameters frequently encountered are explained from a general point of view.

The formal aspects of measurement control are discussed in more detail in chapter 5 (*Remote Control – Basics*). For information about the CMU control elements, menu types and dialog elements within the menus refer to chapter 3 of the CMU 200/300 operating manual.

Menu Structure

The menus used to control 1xEV-DO measurements can be arranged in different ways. From a functional point of view, they form the following groups:

- General configurations (*Connection Control*)
- Measurement groups (*Analyzer/Generator, Power, Modulation, Spectrum, Code Domain Power*)
- Configurations specific to the measurement groups

The CMU uses main menus, popup menus, graphical measurement menus and dialog windows of various sizes. Refer to chapter 3 of the CMU 200/300 operating manual for descriptions of menus.

Test Modes

1xEV-DO measurements are performed in the test modes *Non-Signaling* or *Signaling*. The *Non-Signaling* mode is typically used for module tests or test of access terminals in a special "factory test mode".

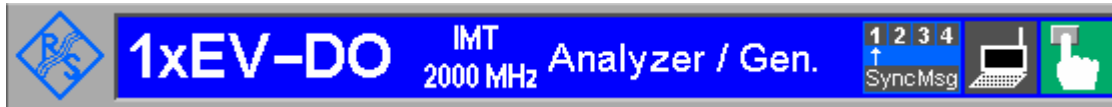
Non-Signaling Mode In the *Non-Signaling* mode, the CMU generates an RF signal conforming to 1xEV-DO specifications and analyzes the signal transmitted by the device under test (DUT).

Signaling Mode In *Signaling* mode, the CMU transmits a downlink RF signal (AN Signal) to which the access terminal can synchronize. The CMU is able to configure a broad range of network parameters, to vary the settings for the different channels in its 1xEV-DO downlink signal. In addition the CMU can establish a packet switched connection for default and enhanced application tests, which provide the receiver quality measurement results.

Status Symbols

The operating mode is displayed in the headline above the measurements. The following symbols define the status of the current settings:

Non-Signaling Mode



AT Channel



The CMU supports directly 4 AT channels for the measurements out of maximum 55 connected ATs

- With option CMU-B88, the numbers represent the four supported AT channels. Active ATs are being highlighted in green color.
- The arrow points to the AT channel that will generate triggers.
- SyncMsg indicates if the Control Channel Sync message has been activated. If the SyncMsg has been activated the field will be highlighted in green color.

Generator



This field indicates the status of the Generator. If the Generator has been switched on this field will be highlighted in green color.

Manual Mode



This field indicates that the CMU is currently in manual mode.

Signaling Mode



Signal / Network Icon



This icon shows a quick indication of the currently active network release (first line: Rel. 0 or A), the physical layer subtype (second line: phys. layer subtype 0 or 2) and the active application (third line: DPA / RTAP / FTAP / R&F TAP / RETAP / FETAP / R&F ETAP).
 If the third line (active application) is highlighted red, as shown, the selected measurement cannot work with the current connection type.
 For example, when a FETAP application is selected and the RLP/IP statistics measurement is active, then a red FETAP line is shown because the RLP/IP measurement requires DPA.
 For such cases, please verify the related measurement settings and controls.

Packet data connections



The connection setup for packet switched connections is shown by an analogous series of symbols. Here the icon for the *Connection established* (CEST) state is shown.



The *Signal Off* (SOFF) state is indicated by this icon.



The *Signal On* (SON) state is indicated by this icon.



This icon indicates a *Session Negotiation* (NEG) in progress.



This icon indicates that a measurement is currently performed.

Manual Mode



This field indicates that the CMU is currently in manual mode.

The current signaling and PPP signaling states of the CMU are shown directly below the headline. For a complete state overview, please consult figures 6-1 and 6-2 in chapter 6.

Configurations

The CMU offers a wide range of settings for the signal generator and analyzer, the signaling procedures, and the individual measurements. Configurations may apply to a whole function group (*Connection Control*) or to a particular measurement.

Connection Control The *Connection Control* softkey is located on the right side of the title bar of each main and measurement menu. Depending on the mode (non-signaling or signaling), it opens a popup menu with tabs configuring the following:

- The signal generators and analyzers of the instrument (*Analyzer* and *Generator*)
- The CMU receiver settings and input path configuration (included in *Analyzer, MS Signal*)
- The trigger settings (included in *Analyzer, MS Signal*)
- The RF connectors to be used and the external attenuation (*RF Input/Output*)
- The reference signal and the system clock (*Sync.*)

All settings made in the *Connection Control* menu apply to the whole function group. Many of them are suspended, however, by measurement-specific parameters while a measurement is active (see section *Measurement Environment* in chapter 4).

Configurations of measurements

A popup menu offering specific settings is assigned to each measurement group (*Power, Modulation, Code Domain Power, and Receiver Quality*). The following parameters can be defined for many measurements:

- The repetition mode, the stop condition, the statistic count and the display mode for the measurement (*Control*)
- Tolerances for the measured quantities (*Limits, Limit Lines*)

These settings are explained in more detail section

[General Settings](#) on page 3.6).

Configuration hotkeys via The softkeys and associated hotkeys in the graphical measurement menus provide the most important configurations for the current measurement (refer to chapters 3 and 4 of the CMU Operating manual). Settings made via hotkeys supersede the corresponding settings found in the measurement configuration menu.

Measurement Groups

Measurement results are indicated in two different ways:

- Discrete values and parameters are displayed in output fields, lists and tables. In remote control, these results are referred to as scalars.
- Measurement curves (traces) are displayed in a Cartesian coordinate system, the time forming the x-axis scale. Relatively small sets of test points are generally viewed in a bar graph. In remote control, results of this type are referred to as arrays.

While the measurement is running in repetition mode *continuous* (see page 3.6), the indicated results are constantly updated. As shown in the table below, some of the measurement groups are different for the two test modes.

Table 3-1 Measurement Groups of 1xEV-DO in *Signaling* and *Non-Signaling Mode*

Non-Signaling	Signaling
<p>Analyzer/Generator</p> <p>Shows the settings for the signals generated and analyzed by the instrument and presents an overview of the basic scalar power and modulation results.</p>	<p>n/a</p>
<p>Power</p> <p>The Narrow Band Power is measured in different statistic modes.</p>	<p>Power</p> <p>Narrow Band Power measurements are performed analogous to the non-signaling measurement group.</p>
<p>Modulation</p> <p>Shows the error vector magnitude, magnitude error and phase error of the transmitted waveform interval as a function of time. The carrier feedthrough, I/Q imbalance, frequency error, transmission time error, waveform quality and MS power error are displayed.</p> <p>The I/Q Analyzer shows the I- and Q-parts of the signal in various diagrams to visualize the quality of the incoming signal.</p>	<p>Modulation</p> <p>Modulation measurements are performed analogous to the non-signaling measurement group.</p>
<p>Spectrum</p> <p>Shows the ACP Spectrum for 4 different frequency offsets in a bar diagram.</p>	<p>Spectrum</p> <p>Spectrum measurements are performed analogous to the non-signaling measurement group.</p>
<p>Code Domain Power</p> <p>The CMU measures the power of the access terminal channels.</p>	<p>Code Domain Power</p> <p>Code Domain Power measurements are performed analogous to the non-signaling measurement group.</p>
<p>n/a</p>	<p>Receiver Quality</p> <p>The <i>Receiver Quality</i> measurements provide a wide range of parameters that characterize the connectivity of the forward and reverse link. The measurements are divided into several applications, each of which provides a specific set of measurement results.</p> <p>Control Channel Packet Error Rates (PER), Forward and Reverse Link PER, Reverse Link Quality, Termination Target PER, Forward and Reverse Link Performance over time and over slots are implemented.</p>

Non-Signaling	Signaling
n/a	<p>RLP Frame & IP Statistics</p> <p>The RLP Frame & IP Statistics menu displays a statistical evaluation of the data flow on the CMU. RLP Frame & IP Statistics is an application of options R&S CMU-K8x9, <i>1xEV-DO Data Testing</i>, and R&S CMU-K87, which can be used to monitor test scenarios using the Mobile IP protocol type.</p>
n/a	<p>Ping</p> <p>The Ping menu configures the R&S CMU to send repeated echo requests of configurable size (pings) to the mobile. The application waits for the echo and displays the ping statistics including the possible source of connection errors. Option R&S CMU-K87 is required for the Ping application.</p>

General Settings

A number of settings can be made in several of the configuration menus assigned to the measurement groups *Analyzer/Generator*, *Power*, *Modulation*, *Spectrum* and *Code Domain Power*. In combination, these settings define the scope of the measurement, i.e. the number of waveform intervals measured and the results displayed. The following brief overview is intended to avoid confusion of terms.

Application *Applications* are different measurements belonging to the same measurement group. They effectively split up a measurement group into various related sub-groups which can be configured separately.

They are selected via the *Application* softkey in the measurement menus.

Statistic Count / Statistics Cycle The statistic count is equal to the integer number of evaluation periods which form one statistics cycle. An evaluation period corresponds to the duration of a waveform interval (all TX measurements). Depending on the *repetition mode* (see below), a measurement may extend over one or several statistics cycles.

The *statistic count* is set in the *Control* tab of the configuration popup menus assigned to each measurement group.

Repetition Mode The *repetition mode* defines how many statistics cycles are measured if the measurement is not stopped by a limit failure (see stop condition *On Limit Failure* below). Two modes are available for all measurements:

Single Shot The measurement is stopped after one statistics cycle

Continuous The measurement is continued until explicitly terminated by the user; the results are periodically updated

A third repetition mode is available in remote control:

Counting Repeated single shot measurement with a fixed number of statistics cycles

The *repetition mode* is set in the *Control* tab of the configuration popup-menus assigned to the individual measurement groups.

Note: *In contrast to other measurement settings, these repetition modes in manual and remote control are independent and do not overwrite each other. In most measurements, the default repetition mode in manual control is Continuous (observe results over an extended period of time), the default mode in remote control is Single Shot (perform one measurement and retrieve results).*

Stop Condition

For all TX measurements, two stop conditions can be selected:

- None* The measurement is performed according to its repetition mode, regardless of the measurement results,
- On Limit Failure* The measurement is stopped as soon as one of the limits is exceeded, regardless of the repetition mode set. If no limit failure occurs, it is performed according to its repetition mode.

The *Stop Condition* is set in the *Control* tab of the configuration popup-menus assigned to each measurement group.

Display Mode

In graphical measurement diagrams, the *Display Mode* defines which of the measured and calculated traces is displayed if the measurement extends over several waveform intervals. In general, traces are evaluated at a set of fixed, equidistant test points (samples). After *n* waveform intervals, *n* measurement results per test point have been taken. After a single shot measurement extending over *c* waveform intervals, *c* measurement results per test point have been taken.

- Current* The current waveform interval, i.e. the last result for all test points, is displayed.
- Minimum* At each test point, the minimum value of all waveform intervals measured is displayed.
- Maximum* At each test point, the maximum value of all waveform intervals measured is displayed.
- Max./Min.* At each test point, the extreme value of all waveform intervals measured is displayed, i.e. the maximum or minimum, whichever has a larger absolute value.
- Average* At each test point, a suitably defined average over all waveform intervals measured is displayed; see paragraph on *Calculation of average quantities* below.

Note the difference in the calculation of *Average* on one hand, *Minimum*, *Maximum* and *Max./Min.* on the other hand, if the measurement extends over more than one statistic count (repetition mode *Continuous*, measurement time longer than one statistic count).

The *Display Mode* is set in the *Control* tab of the configuration popup-menus assigned to the individual measurement groups.

Calculation of average quantities

The *Average* traces in the menus are obtained as follows:

Let c be the number of waveform intervals forming one statistics cycle (one *Statistic Count*) and assume that n waveform intervals have been measured since the start of the measurement. In calculating the *Average* trace, the following two situations are distinguished:

$n \leq c$ Single shot measurement or continuous measurement during the first statistics cycle: At each test point, *Average* trace no. n is calculated from *Average* trace no. $n - 1$ and *Current* trace no. n according to the following recurrence:

$$Avg(n) = \frac{n-1}{n} Avg(n-1) + \frac{1}{n} Curr(n) \quad (n = 1, \dots, c)$$

The *Average* trace represents the arithmetic mean value over all n waveform intervals measured.

$n > c$ Continuous measurement after the first statistics cycle: At each test point, *Average* trace no. n is calculated from *Average* trace no. $n - 1$ and *Current* trace no. n according to:

$$Avg(n) = \frac{c-1}{c} Avg(n-1) + \frac{1}{c} Curr(n) \quad (n > c)$$

Scalar quantities are averaged in analogy to *Average* traces. The formulas hold for $n = 1$ where the average trace becomes equal to the current trace (statistics off).

Calculation of statistical quantities

In *Power* and *Modulation* measurements the statistical functions *Average*, *Minimum*, *Maximum* and *Minimum/Maximum* are applied to a set of test points depending on two independent parameters:

- The time, i.e. the abscissa values t_i , i ranging from 1 to the total number of test points comprising the trace.
- The waveform interval number ranging from 1 to the number n of the current waveform interval.

The result of the statistical operations depends on the parameter range considered and – in the case of statistics functions evaluated over several parameters – on the order of evaluations. This is why the definition of statistical quantities deserves some attention and is explained in the relevant sections in chapter 4. One particular example is:

In the *Modulation* menu quantities such as the *Frequency Error*, *Phase Error RMS*, *Phase Error Peak* etc. are first calculated for the current waveform interval and entered in the *Current* column of the output table. The results in the *Minimum/Maximum* column correspond to the extreme value of the *Current* results calculated over all waveform intervals measured. The results in the *Average* column correspond to the average of the *Current* results calculated according to the prescription in paragraph *Calculation of average quantities* above.

Contents

- 4 Functions and their Application 4-1**
- 1xEV-DO Module Tests - Overview..... 4-2**
- 1xEV-DO Connection Control (Non-Signaling) 4-3**
 - Connection Control (Non-Signaling) 4-3
 - Network Standard (Connection Control – Standard)..... 4-3
 - Analyzer Control (Connection Control – Analyzer)..... 4-4
 - Connection Control – Generator..... 4-12
 - Generator Control (Connection Control – Generator) 4-12
 - Generator Control (Connection Control – Generator – IQ-Access Interface) 4-21
 - RF Connectors (Connection Control – RF) 4-22
 - Reference Frequency (Connection Control – Sync.)..... 4-25
 - Trigger (Connection Control – Trigger)..... 4-27
 - I/Q-IF Interface (Connection Control – I/Q-IF)..... 4-30
- 1xEV-DO Module Tests (Non-Signaling) 4-32**
 - Analyzer/Generator Measurement..... 4-32
 - Softkey Selections 4-33
 - Measurement Control 4-34
 - Common settings 4-34
 - Measurement Results..... 4-35
 - Analyzer/Generator Configuration 4-36
 - Analyzer/Generator Configuration – Control..... 4-37
 - Analyzer/Generator Configuration – Limits..... 4-39
- 1xEV-DO Tests (Signaling and Non-Signaling) 4-41**
 - Power Measurements 4-41
 - Softkey Selections 4-42
 - Measurement Control 4-42
 - Common Settings 4-44
 - Measurement Results..... 4-45
 - Power Configuration 4-47
 - Power Configuration – Control..... 4-47
 - Modulation Measurements..... 4-48
 - Modulation Parameters..... 4-48
 - Softkey Selections 4-51
 - Measurement Control 4-51
 - Common settings 4-53
 - Measurement Results..... 4-53
 - EVM H-PSK, Magn. Err. H-PSK and Phase Err. H-PSK..... 4-53
 - Overview H-PSK..... 4-56
 - I/Q Analyzer 4-57
 - De-spreading Mode 4-61
 - Modulation Configuration..... 4-63
 - Modulation Configuration – Control 4-63
 - Modulation Configuration – Limits 4-64
 - Spectrum Measurements..... 4-65

Softkey Selections	4-66
Measurement Control	4-66
Common Settings	4-66
Measurement Results	4-67
Spectrum Configuration	4-69
Spectrum Configuration – Control	4-69
Spectrum Configuration – Limits	4-70
Code Domain Power Measurements	4-71
Softkey Selections	4-71
Measurement Control	4-72
Common Settings	4-73
Measurement Results	4-73
Code Domain Power	4-74
Peak Code Domain Error Power	4-76
Channel Power	4-76
Code Domain Power Configuration	4-78
Code Domain Power Configuration – Control	4-78
Code Domain Power Configuration – Limits	4-81
1xEV-DO Mobile Tests (Signaling)	4-83
Receiver Quality Measurements	4-83
Forward and Reverse Link Performance	4-83
Main Menu (Receiver Quality)	4-85
Test Settings	4-87
Common Settings	4-89
Measurement Results	4-90
Statistics Overview	4-90
Control Channel PER, Forward Link PER, Reverse Link Quality	4-92
Forward Link Performance	4-94
Reverse Link Performance	4-95
Reverse Link PER	4-97
Measurement Configurations (Receiver Quality Configuration)	4-98
Measurement Control (Receiver Quality Configuration – Control)	4-99
Measurement Limits (Receiver Quality Configuration – Limits)	4-101
Data Application Measurements	4-104
Main Menu – RLP Frame and IP Statistics	4-104
Test Settings	4-105
Measurement Results – RLP Frame & IP Statistics	4-106
Main Menu – Ping Measurement	4-107
Measurement Results – Ping	4-108
Ping Configuration	4-109
1xEV-DO Connection Control (Signaling)	4-111
Connection Control (Signaling)	4-111
Connection Settings (Connection Control – Connection)	4-113
Handoff Settings (Connection Control – Handoff)	4-118
Layer Settings (Connection Control – Layer)	4-119
AN Signal (Connection Control - AN Signal)	4-140
Network Parameters (Connection Control – Network)	4-144
RF Connectors (Connection Control – RF)	4-147
Frequency-Dependent External Attenuation	4-149
Reference Frequency (Connection Control – Sync.)	4-152

Trigger (Connection Control – Trigger).....	4-156
I/Q-IF Interface (Connection Control – I/Q-IF).....	4-158
Analyzer Control (Connection Control – Analyzer).....	4-160
Miscellaneous Settings (Connection Control – Misc.).....	4-166
Marker Control.....	4-168

4 Functions and their Application

This chapter explains in detail all functions for the measurement of access terminals supporting the 1xEV-DO standard. The CMU 200/300 with options K-88/K-89 supports the networks listed in table 1-1 (see chapter 1).

The chapter is structured according to the provided measurements and configurations. Contrary to chapter 6, *Remote Control – Commands*, general measurement configurations are relegated to the end of each section.

The description of each softkey, select or input field is followed by the corresponding remote-control command(s). Similarly, the description of the commands in chapter 6 also contains the corresponding menus of the user interface.

Each menu and each panel is briefly described first and then illustrated together with its call button. The menu functions are explained according to the following scheme:



Short function definition

Designation of select/input field

Definition of function

Further description of the function: purpose, interaction with other settings, notes...

Parameter 1 Description of parameter 1

Parameter 2 Description of parameter 2

Further description of the parameters: purpose, interaction with other settings, notes...

Remote control:

Remote-control command (long form) Parameter1 | Parameter2

...

1xEV-DO Module Tests - Overview

The structure of this section is mainly based on the configuration and measurement groups defined in the function group *IMT-2000 Mobile Station, 1xEV-DO*. The menus are described in the following order:

- Common settings for the Non-Signaling measurements (*Connection Control*)
- Non-Signaling Measurements:
 - Analyzer/Generator
- Signaling and Non-Signaling Measurements:
 - Power
 - Modulation
 - Spectrum
 - Code Domain Power
- Signaling Measurements:
 - Overview
 - Receiver Quality
 - RLP / IP Statistics
 - Ping
- Common settings for the Signaling measurements (*Connection Control*)
- Marker Control

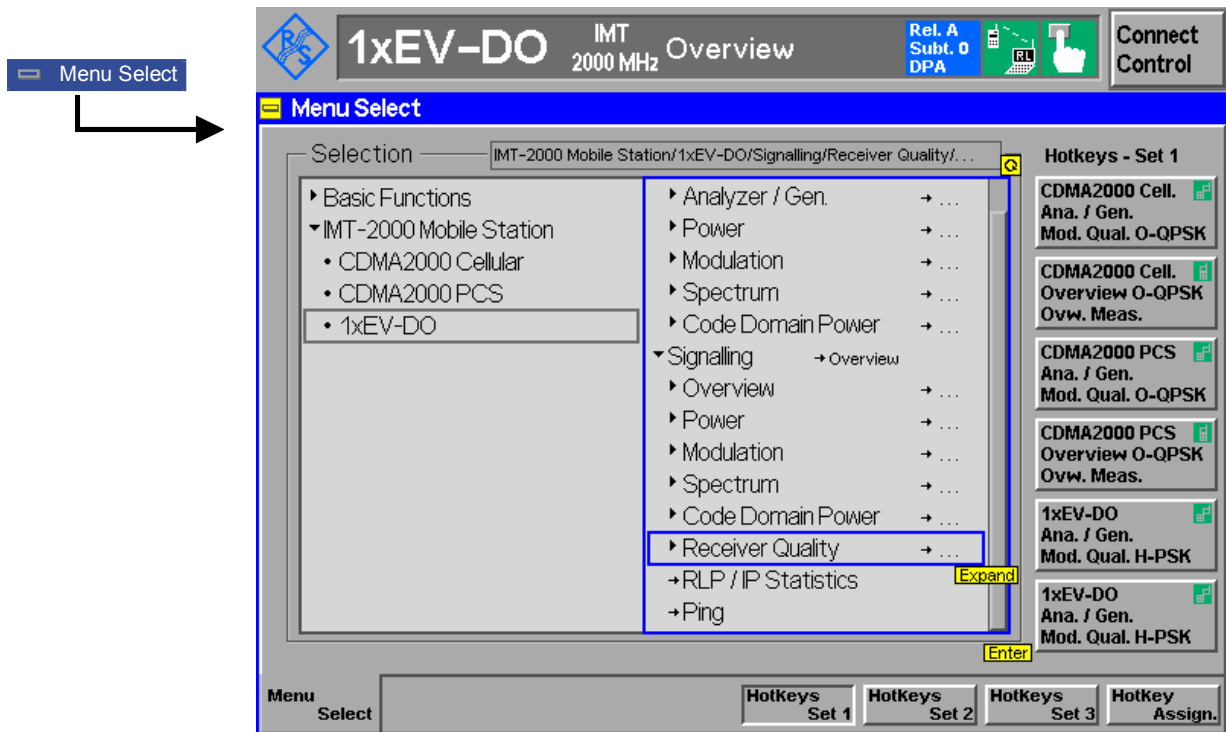


Figure 4-1 1xEV-DO applications

1xEV-DO Connection Control (Non-Signaling)

Connection Control (Non-Signaling)

The *Connection Control* menu consists of tabs to configure the inputs and outputs of the CMU and the respective signals in the function group *1xEV-DO*, define the network standard, the trigger settings and the routing of I/Q and IF signals.

The menu group is activated using the softkey *Connect Control* to the right of the header of the measurement menu. The individual tabs (*Standard, Analyzer, Generator, RF* ↻, *Sync., Trigger, I/Q-IF, Misc.*) can be accessed using the hotkeys at the bottom of the screen.

Network Standard (Connection Control – Standard)

The *Standard* tab defines which network and standard is used for testing.

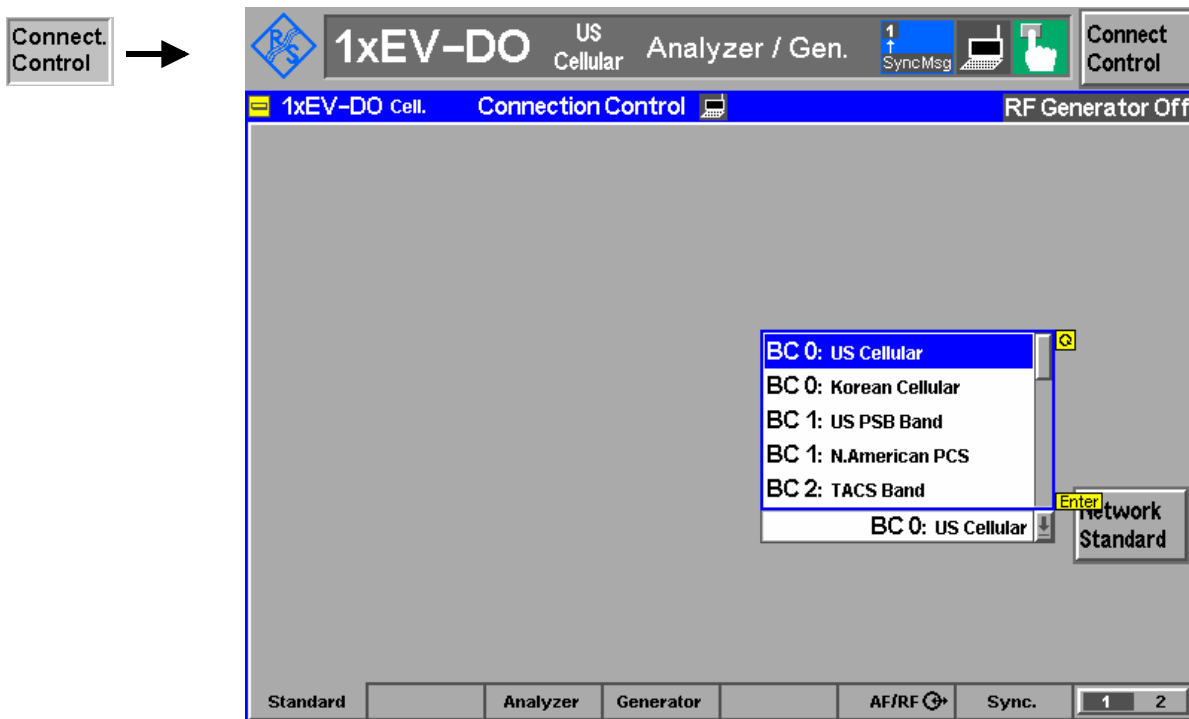


Figure 4-2 Connection Control – Network Standard

Network Standard

The *Network Standard* softkey controls a list field where the band class of the network to be tested is defined. The currently active standard is shown in the headline of the screen.

Refer to table 1-1 in chapter 1 for a list of the supported 1xEV-DO networks.

Remote control:

CONFigure:NETWork:STANdard

Analyzer Control (Connection Control – Analyzer)

The *Analyzer* tab configures the RF input path by defining the analyzer level and frequency.

Some remote commands and parameters are not available for the CMU-B89 signaling unit, which is clearly marked in the applicable remote control paragraphs. Remote control commands without explicit reference to a hardware option are available for both CMU-B88 and CMU-B89. Details on the hardware options CMU-B88 and CMU-B89 are available in chapter 1.

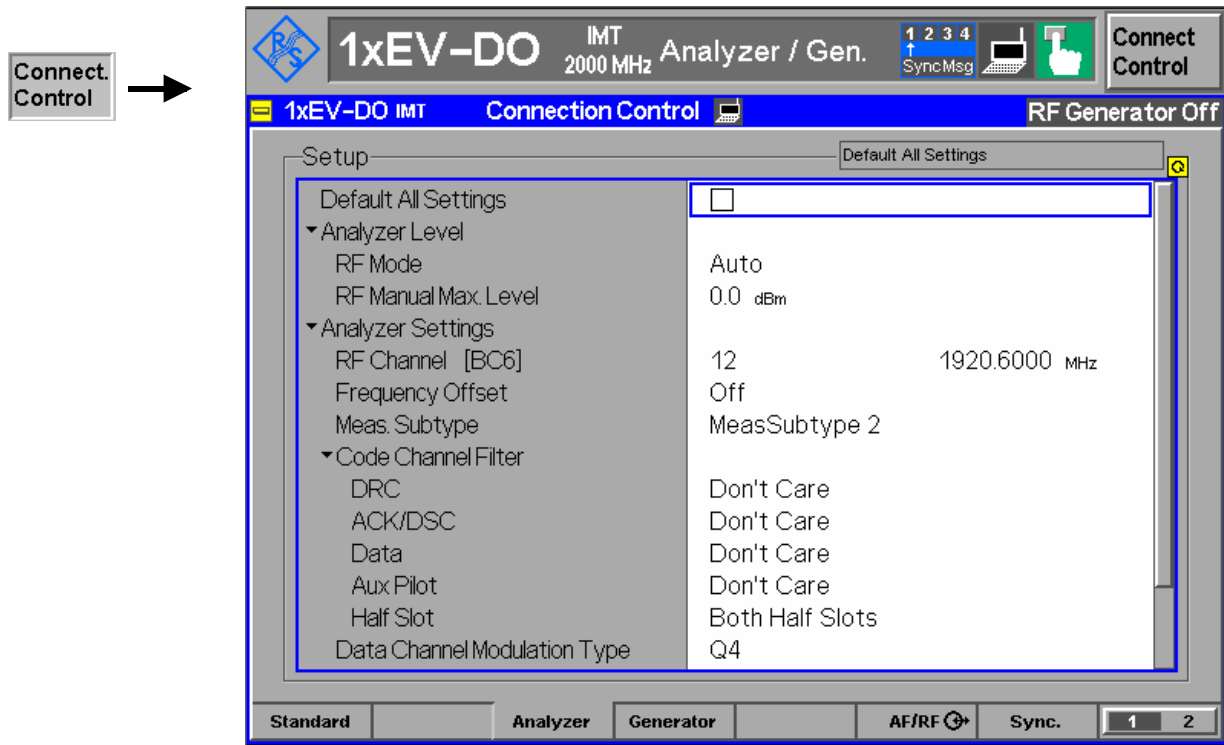


Figure 4-3 Connection Control – Analyzer Settings

Default All Settings The *Default All Settings* switch assigns default values to all settings in the *Analyzer* tab (the default values are quoted in the command description in chapter 6 of this manual).

Remote control:
`DEfault:RFANalyzer`

Analyzer Level – RF Mode The *Analyzer Level* table section sets the maximum input level that can be measured. Two alternative *RF Modes* for defining this value are provided:

Manual Manual input of maximum input level in the *RF Max. Level* field
Auto Automatic setting of maximum input level (*autoranging*) according to the peak power (PEP) of applied signal

Remote control:
`[SENSe:]LEVel:MODE MANual | AUTomatic`

Analyzer Level – RF Manual Max. Level – The maximum expected input level can be entered in the *RF Max. Level* input field. Input levels exceeding the *RF Manual Max. Level* overdrive the input path and cause invalid results (“--”).

Remote control:
`[SENSe:]LEVel:MAXimum <Level>`

External input attenuation – The range of *RF Max. Level* values depends on the RF input used. If an external input attenuation is reported to the instrument to compensate for a known path loss (see section *RF Connectors (Connection Control – RF)* on page 4-22), all levels measured are referenced to the output of the AT and therefore shifted with respect to the actual level at the input connectors of the CMU. The level ranges for the input connectors are shifted as well.

Error messages – If the *RF Max. Level* is too high or too low, a window with the error message “<Max_Level> is out of range. <permissible max. value> is limit.” and three fields will appear:

Accept The permissible max. value is accepted as *RF Max. Level*,
Re-edit *RF Max. Level* is entered once again,
Cancel The last valid input value is maintained.

When switching over to another input, the current value of *RF Max. Level* is automatically adapted, if required:

- Towards lower values to the maximum value of the new input,
- Towards upper values to the minimum value of the new input.

Analyzer Settings – RF Channel [<>] – *RF Channel* defines the base station channel number (and frequency) of the generated RF signal. The brackets contain the current bandclass of the selected network.

The default settings for the channel numbers depend on the network selected. Changing the *RF Channel* also changes the *RF Frequency* setting.

Table 1-1 in chapter 1 lists the networks and standards supported by the CMU with the 1xEV-DO options.

Remote control
`[SENSe:]RFANalyzer:FREQuency:UNIT`
`[SENSe:]RFANalyzer:FREQuency <Frequency>`

Frequency Offset – *Frequency Offset* determines a frequency offset to impair the RF analyzer signal.

Remote control
`[SENSe:]RFANalyzer:FOFFset <Analyzer Freq. Offset>`

**Analyzer
Settings –
Meas. Subtype**

The measurement subtype defines the active physical layer subtypes for the forward and reverse link measurements, where the measurement

- subtype 0 is the original (release "0") physical layer,
- subtype 1 is new (revision "A") physical layer for reverse link with no changes to forward link, and
- subtype 2 is new (revision "A") physical layer for both forward and reverse links.

Measurement subtype 1 implements the following reverse link changes:

- The enhanced Access Channel is implemented to provide higher data rates, which is achieved by decreasing the interleaved symbol repetition interval (19.2 kbps (512 bits) and 38.4 kbps (1024 bits))
- No RRI is transmitted on access channel

Measurement subtype 2 implements the following channel changes:

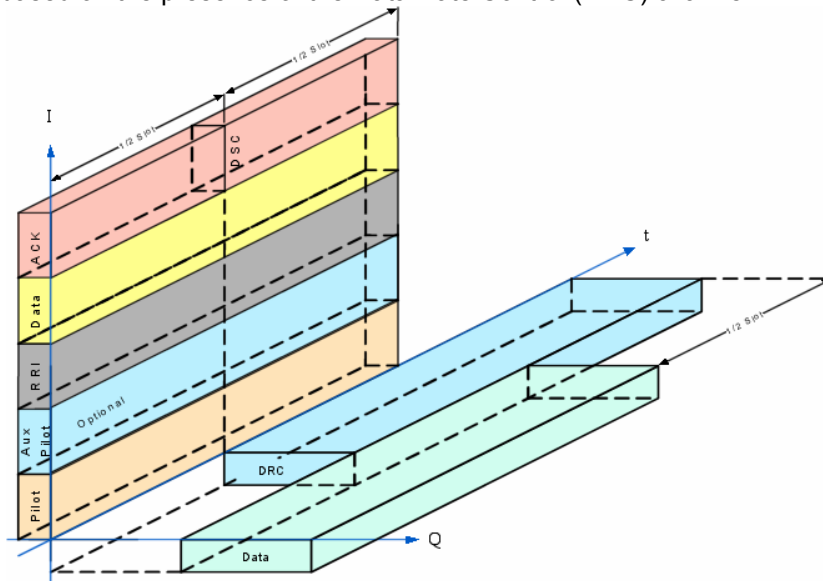
- The Forward Link Traffic channel was enhanced with additional forward traffic packet sizes (128, 256, 512, and 5120 bits) and a larger FCS. All packets now have a 24-bit CRC (increased from 16 bits). The channel interleaving procedure was changed to support Symbol Reordering, Matrix Interleave, and Short Sequence Repetition, and the initialization of turbo interleaver was expanded for additional packet sizes (unchanged for legacy sizes)
- For the option CMU-B89, the Control Channel packet sizes were enhanced by 128, 256, and 512 bit packets with 24-bit CRC. The 128, 256, and 512 bit control channel packet types are not supported by option CMU-B88. New rates are supported on preamble index 71 and legacy packet structure, rates, preamble/MAC indices are unchanged for backward compatibility with Rev. 0 ATs.

Remote control

[SENSe]:RFAnalyzer:SUBType 0 | 1 | 2

Code Channel Filter DRC
(for all measurement subtypes)

Code Channel Filter DRC determines if the Analyzer should analyze the incoming signal based on the presence of the Data Rate Control (DRC) channel.



As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

The supported code channel filters for the measurement subtypes are shown in the table below:

Code Channel Filter	Meas. Subtype 0	Meas. Subtype 2
DRC	✓	✓
ACK	✓	✗
Data	✓	✓
AuxPilot	✗	✓
ACK/DSC	✗	✓
HalfSlot	✗	✓

The following table shows the expected behavior depending on the settings and the real signal for measurement subtype 0.

Code Channel Setting AT	Code Channel Setting CMU	Expected Result
OFF	OFF	Valid result
OFF	DON'T CARE	Valid result
OFF	ON	No result
ON	OFF	No result
ON	DON'T CARE	The I/Q Analyzer will display results from two (or more) different types of waveforms. This can cause the display to appear very confused or erratic (for example it seems to be toggling or blinking).
ON	ON	Valid result

For measurement subtype 2, the presence of the ACK and DSC channels in the first and second half slot has to be considered accordingly when setting the HalfSlot filter.

If the actual setting is unknown, it is a good idea to set all three code channels to "DON'T CARE" and analyze the result using the *I/Q Analyzer* measurement (*I/Q Analyzer* on pg. 4-57) to determine the current setting of the incoming signal.

Remote control:

[SENSe]:RFANalyzer:CCFilter:DRC ON | OFF | DCARe

Code Channel Filter ACK
(for measurement subtype 0)

Code Channel Filter ACK determines if the analyzer should analyze the incoming signal based on the presence of the ACK channel.

As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

Remote control:

[SENSe]:RFANalyzer:CCFilter:ACK ON | OFF | DCARe

Code Channel Filter Data
(for all measurement subtypes)

Code Channel Filter Data determines if the analyzer should analyze the incoming signals based on the presence of the Data channel.

As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

Remote control

[SENSe]:RFANalyzer:CCFilter:DATA ON | OFF | DCARe

Code Channel Filter AuxPilot
(for measurement subtype 2 only)

Code Channel Filter AuxPilot determines if the analyzer should analyze the incoming signals based on the presence of the AuxPilot channel.

Remote control

[SENSe]:RFANalyzer:CCFilter:APILot ON | OFF | DCARe

Code Channel Filter ACK/DSC
(for measurement subtype 2 only)

Code Channel Filter ACK/DSC determines if the analyzer should analyze the incoming signals based on the presence of the ACK / DSC channel.

ACK / DSC are time-multiplexed on Walsh channel W_{12}^{32} , where the DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32} , and the ACK channel bit is transmitted on the first half slot on Walsh channel W_{12}^{32} .

Remote control

[SENSe]:RFANalyzer:CCFilter:ADSC OFF | ACK | DSC | DCARe

Code Channel Filter HalfSlotFilter

Code Channel Filter HalfSlotFilter determines which half slot(s) of the code channel is/are evaluated.

The DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32} , and the ACK channel bit is transmitted on the first half slot on Walsh channel W_{12}^{32} .

(for measurement subtype 2 only)

Remote control

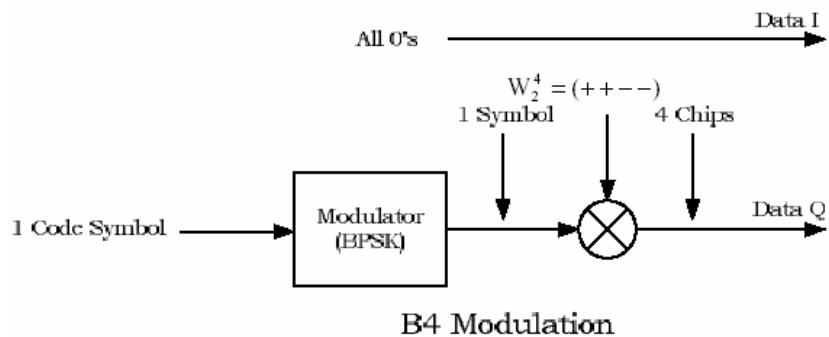
[SENSe]:RFANalyzer:CCFilter:HSLot BOTH | 1 | 2

Data Channel Modulation Type
(for measurement subtype 2 only)

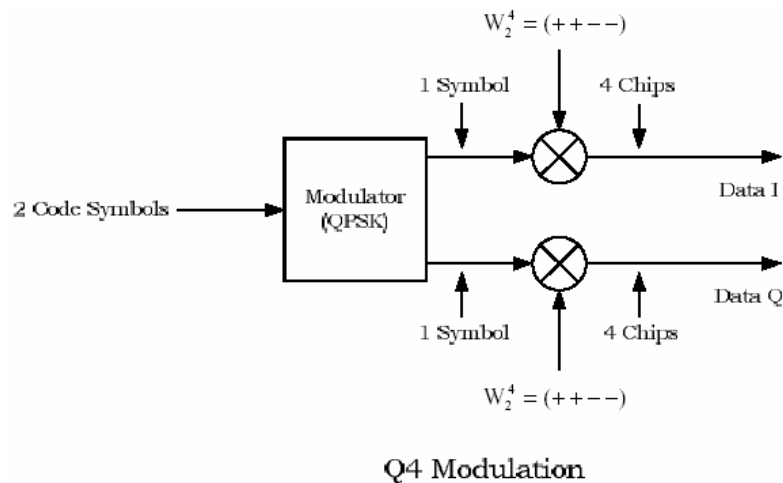
All data transmitted on the Reverse Traffic Channel has to be encoded, block interleaved, sequence repeated, BPSK, QPSK, or 8-PSK modulated and orthogonally spread by Walsh function W_2^4 or Walsh function W_1^2 or both. The Data Channel is modulated as shown below:

AUTO Automatic selection of the data channel modulation type. If AUTO is set, the signal is measured and decoded irrespective of the modulation type. Signals with unrecognized modulation types are ignored. The detected modulation type can be queried using [SENSe]:RFANalyzer:DCHannel:MTYPE?

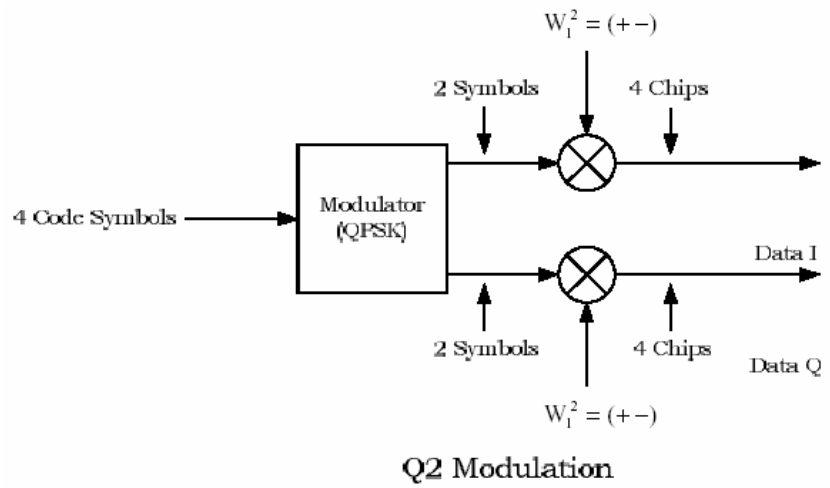
B4 BPSK modulation with 4-ary Walsh cover (W_2^4)



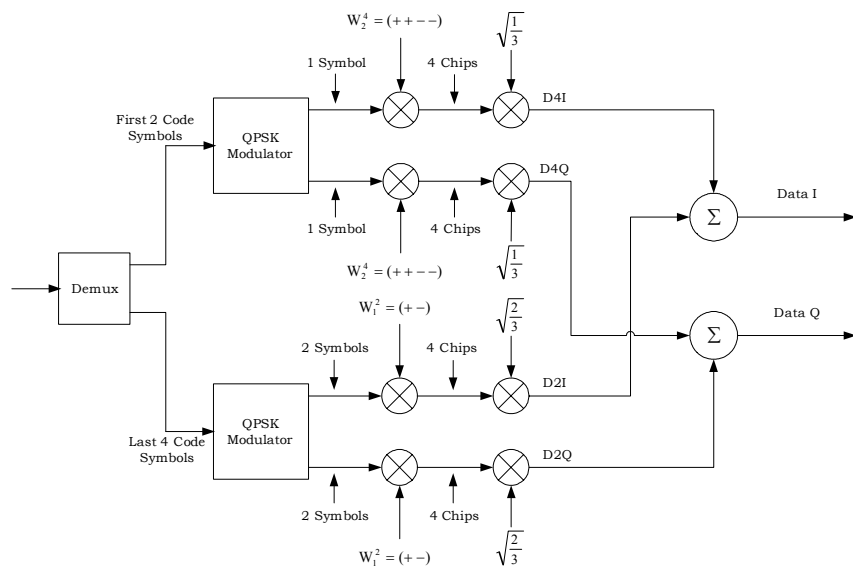
Q4 QPSK modulation with 4-ary Walsh cover (W_2^4)



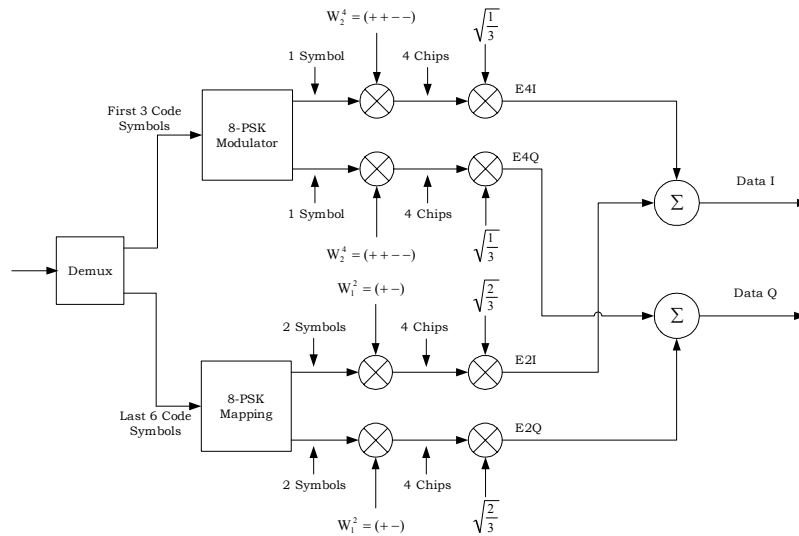
Q2 QPSK modulation with 2-ary Walsh cover (W_1^2)



Q4Q2 (QPSK, W_2^4) + (QPSK, W_1^2)



E4E2 (8-PSK, W_2^4) + (8-PSK, W_1^2)



Remote control:

```
[SENSe]:RFANalyzer:DCHannel:MTYPE:MODE AUTO | B4 | Q4 | Q2 |
Q4Q2 | E4E2
```

Long Code Mask I/Q

Long Code Mask determines the used I/Q-Long Code Masks for the analyzed 1xEV-DO signal. In order of the measurements to work both long code masks have to be set according to the analyzed (reverse) signal from the AT under test.

Remote control

```
[SENSe:]RFANalyzer:LCMask:I:LSB <HexString[8chars]>
[SENSe:]RFANalyzer:LCMask:I:MSB <HexString[3chars]>
[SENSe:]RFANalyzer:LCMask:Q:LSB <HexString[8chars]>
[SENSe:]RFANalyzer:LCMask:Q:MSB <HexString[3chars]>
```

Reverse Link Frame Offset AT1-4

Reverse Link Frame Offset AT1-4 specifies the frame offset timing of the reverse link signal from the specified access terminal. Since the required 1xEV-DO option CMU-B88 does not actually control the access terminal, it is the responsibility of the operator to ensure that the value established by this command matches the frame offset that is used by the access terminal. In addition, this value affects the timing of the *Rev Frame Trigger* for the specific user.

The generator settings for *DRC Lock State*, *DRC Lock Period* and *DRC Lock Length* are displayed in the same line for each access terminal.

Remote control (only for option CMU-B88):

```
[SENSe:]RFANalyzer:AT<nr>:RLINK:FROffset <Value>|MIN|MAX|DEF
```

Connection Control – Generator

The popup menu *Generator* provides the settings for:

- 1xEV-DO Generator [Options CMU-B88 and CMU-B89]
- I/Q-Access Interface Setup [Option CMU-B82]

The generator and the I/Q-access boards can be switched alternately to ON or OFF or both to OFF. In order to switch the I/Q-access board on, the hardware option B-82 has to be installed in the CMU.

Some remote commands and parameters are not available for the CMU-B89 signaling unit, which is clearly marked in the applicable remote control paragraphs. Remote control commands without explicit reference to a hardware option are available for both CMU-B88 and CMU-B89.

Generator Control (Connection Control – Generator)

The Generator control tab allows the setting of all signals generated by the CMU.

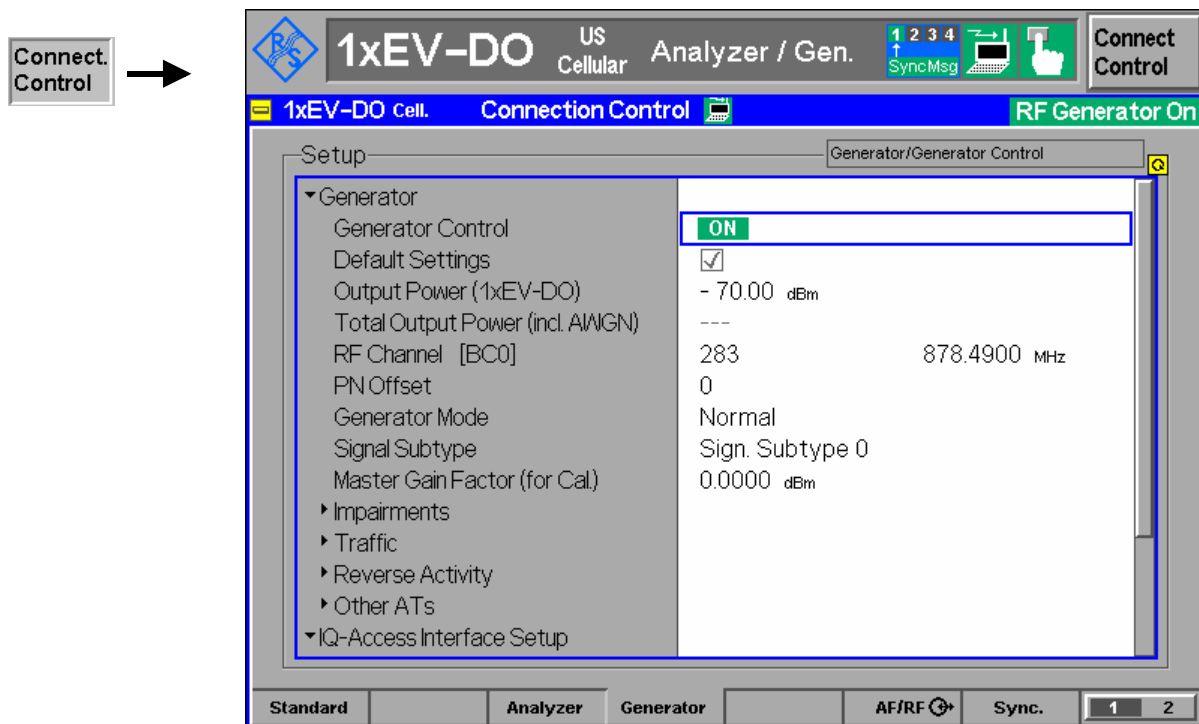


Figure 4-4 Connection Control – Generator

Generator Control

The *Generator Control* switch indicates the operating status of the RF generator (*ON* or *OFF*). Selecting the *Generator* switch and the *ON/OFF* key switches the generator on or off. The *IQ-Access Interface Control* switch (see 4-21) is toggled with the *Generator Control* switch, since both modules cannot operate simultaneously.

Remote control:

```
INITiate:RFGenerator
ABORT:RFGenerator
FETCh:RFGenerator:STATUs?
```

- Default Settings** The *Default Settings* switch assigns default values to all settings in the *Generator* tab (the default values are quoted in the command description in chapter 6 of this manual).
- Remote control:
 DEFault:RFGenerator ON | OFF
- Output Power (1xEV-DO)** *Output Power* sets the 1xEV-DO output power generated by the CMU
- Remote control:
 SOURce:RFGenerator:POWer:OUTPut
- Total Output Power (incl. AWGN)** *Total Output Power* displays the total output power generated by the CMU, including AWGN power.
- Remote control:
 SOURce:RFGenerator:POWer:OUTPut?
- RF Channel [<>]** The *RF Channel* sets the base station channel number (and frequency) of the generated RF signal. Changing the RF channel resets the RF frequency setting and vice versa.
- The default settings for the channel numbers vary with the selected network, which is described in chapter 6 for the given remote control commands.
- Remote control:
 SOURce:RFGenerator:FREQuency [:RF]:UNIT
 SOURce:RFGenerator:FREQuency[:RF]
- PN Offset** *PN Offset* sets the offset of the PN sequence. Changing the PN offset changes the timing of the short code spreading and the contents of the Sync message on the Control Channel.
- Remote control:
 SOURce:RFGenerator:PROPerTy:PNOffset
- Generator Mode** *Generator Mode* sets the operating mode of the generator. Possible values are *Normal* and *Continuous Pilot*.
- In *Continuous Pilot* mode, the 1xEV-DO generator will generate a continuous pilot signal. The pilot signal fills the entire slot and the power of the signal is determined by the *Output Power* setting.
- During this special mode, all other commands will be accepted and processed as normal, but the pending changes to the signal will not occur until this special mode is disabled.
- Remote control
 SOURce:RFGenerator:MODE
- Signal Subtype** This option selects the active physical layer signal subtypes for the RF generator as described on p. 4-161.
- Remote control for installed option CMU-B89:
 SOURce:RFGenerator:SUBType 0 | 1 | 2

Impairments - AWGN Mode The *AWGN Mode* sets the AWGN power level for 1xEV-DO testing. This provides a *Normal* and a *High Power* range that can be selected with this menu item. The range of the *Normal* mode is identical to the original implementation (+4.0 dB to -20 dB), the range of the *High Power* mode is +11.7 dB to -12.0 dB.

Remote Control:

SOURce:IMPairments:LEVel:AWGN:MODE[?] Normal | HPOWer

Impairments- AWGN Level *AWGN Level* turns on or off the Additive White Gaussian Noise generator and sets the level for modulation, depending on the defined *AWGN Mode*. This provides noise to more closely simulate actual operating conditions in the network.

Remote control

SOURce:IMPairments:LEVel:AWGN <AWGN Level>

Impairments- AN Freq. Offset *AN Freq. Offset* modifies the carrier frequency of the RF Generator signal. If the *RF Frequency* is set to a frequency which doesn't correspond to the actual selected *RF Channel*, the setting of *AN Freq. Offset* is disabled.

Remote control:

SOURce:IMPairments:FOFFset[:RF] <Freq. Offset>

Traffic – Control – Sync. Message Enable *Sync. Message Enable* allows the generator to transmit a synchronization message on the control channel. The timing and type of Sync. message is specified with the traffic control parameters described below.

Remote control:

INIT:RFGenerator:SNCMessage
 ABORt:RFGenerator:SNCMessage
 FETCh:RFGenerator:SNCMessage:STATus?

Traffic – Control – Packet Start Offset *Packet Start Offset* defines when the generator should transmit the Sync. message on the control channel. The offset value is measured as the number of slots from the first slot of the control channel cycle, the range of values is 0 to 3, inclusive.

Remote control (for installed option CMU-B88):

SOURce:RFGenerator:SNCMessage:PSOFFset

Traffic – Control – Data Rate *Sync. Message* defines the type of synchronization message on the traffic channel. It specifies a choice between the DRC indexes 1 and 2. Each DRC index corresponds to a fixed data rate and number of slots; see [Table 4-1](#) on page 4-17.

Remote control:

SOURce:RFGenerator:SNCMessage:DRINdex
 SOURce:RFGenerator:SNCMessage:DRATE?

Traffic – AT1..4 – Access Terminal Enable If option R&S CMU-B88 is available, the CMU supports the generation of data for up to 4 access terminals at the same time. *Access Terminal Enable* specifies the ON/OFF state of the each of the four data streams.

Remote control for installed option CMU-B88:
 INIT:RFGenerator:AT<nr>:MAC:INDEX
 ABORT:RFGenerator:AT<nr>:MAC:INDEX
 FETCh:RFGenerator:AT<nr>:MAC:INDEX:STATUS?

Remote control for installed option CMU-B89 (only AT1 per default):
 INIT:RFGenerator:MAC:INDEX
 ABORT:RFGenerator:MAC:INDEX
 FETCh:RFGenerator:MAC:INDEX:STATUS?

Traffic – AT1..4 – MAC Index – *MAC Index* specifies the MAC index of the specified access terminal. MAC index values of 5 to 63, inclusive are permitted. With Network Revision A, the MAC index can also have the additional values 72 to 127. Each of the four access terminals must use a unique MAC index.

Please note that with installed option CMU-B89, the MAC index values can only be modified when *Access Terminal Enable* is set to *OFF*.

Remote control for installed option CMU-B88:
 SOURCE:RFGenerator:AT<nr>:MAC:INDEX

Remote control for installed option CMU-B89:
 SOURCE:RFGenerator:MAC:INDEX[:REV0]
 SOURCE:RFGenerator:MAC:INDEX[:REVA]

Traffic – AT1..4 – MAC AT <nr> Level – *MAC AT <nr> Level* specifies the level relative to the generator output power for each of the AT channels. The range of level values is –7.0 dB to –25.0 dB, inclusive.

Remote control for installed option CMU-B88:
 SOURCE:RFGenerator:AT<nr>:MAC:LEVEL

Traffic – AT1..4 – Send Packets – *Send Packets* enables or disables the transmission of traffic packets to the specified access terminal. The *State* field can have the states OFF, ON and RUN. The *Progress* field shows the progress of transmission. To start the transmission of traffic packets, the *Generator Control* has to be ON, the AT Access Terminal Enable has to be ON, the *Send Packets* has to be ON. For installed option CMU-B89, the *DUT Forward Packet Activity* has to be above 0%. The state of the *Send Packets* is ON when the ability to send packets is enabled. When the packets are actually generated, the *Send Packets* state changes to RUN.

Remote control for installed option CMU-B88:
 INIT:RFGenerator:AT<nr>:PSTReam
 ABORT:RFGenerator:AT<nr>:PSTReam
 FETCh:RFGenerator:AT<nr>:PSTReam:STATUS?

Remote control for installed option CMU-B89:
 INIT:RFGenerator:PSTReam
 ABORT:RFGenerator:PSTReam
 FETCh:RFGenerator:PSTReam:STATUS?

Traffic – AT1..4 – Packet Count – *Packet Count* specifies the number of packets to be sent to the specified access terminal. If “infinite” is selected a continuous stream of packets is sent.

Remote control for installed option CMU-B88:

SOURCE:RFGenerator:AT<nr>:PCOUNT

Remote control for installed option CMU-B89:

SOURCE:RFGenerator:PCOUNT

Traffic – AT1..4 – Packet Start Offset – *Packet Start Offset* specifies the amount of time (in slots) from the end of the last packet (sent to the specified access terminal) to the start of the next packet (sent to the specified access terminal). Values of 0 to 255, inclusive are permitted.

For single slot packets, a value of zero will cause the next packet to be sent in the immediate next slot. For multiple slot packets, a value of zero will cause the next packet transmission to start three slots after the end of the previous packet. The three slot delay is identical to the interleaving delay between slots for multiple slot packets. The offset value is attached to the end of the preceding packet. Therefore, an offset value of zero with a rate change from a single slot packet to a multiple slot packet will cause the first slot of the multiple slot packet to be transmitted in the slot immediately following the single slot packet.

Remote control (only for installed option CMU-B88):

SOURCE:RFGenerator:AT<nr>:PSOFFSET

Traffic – AT1..4 – Interleaving Factor – The *Interleaving Factor* allows an increase of the rate of data packets sent to a specific user (access terminal AT 1 to 4). With the default setting 1, each of the four ATs receives one fourth of the packets. Selecting an interleaving factor 2, 3, or 4 for a particular AT doubles, triples, or quadruples the rate of data packets addressed to this AT; the residual packet rate is distributed among the other ATs. With interleaving factor 4, all packets are addressed to a single AT; which accelerates the AT-assisted packet error rate measurement.

Remote control (only for installed option CMU-B88):

SOURCE:RFGenerator:AT<nr>:IFACTOR

Traffic – AT1..4 – Data – Rate *Rate* specifies the DRC index of the forward traffic for a specific access terminal. The data rate and the number of slots within the packet are specified by the DRC index, as described in the following table:

Table 4-1: Assignment between DRC index, data rates and no. of slots

Index	Rate [kBit/s]	#Slots
1	38.4	16
2	76.8	8
3	153.6	4
4	307.2	2
5	307.2	4
6	614.4	1
7	614.4	2
8	921.6	2
9	1228.8	1
10	1228.8	2
11	1843.2	1
12	2457.6	1

For signal subtype 2, the assignment of the packet type index, which defines an unambiguous assignment of the data rate, packet size, and the slot count can be found in chapter 6 with the `SOURCE:RFGenerator:PTINDEX` description.

Remote control for installed option CMU-B88:
`SOURCE:RFGenerator:AT<nr>:DRINDEX*`
`SOURCE:RFGenerator:AT<nr>:PTINDEX*`
`SOURCE:RFGenerator:AT<nr>:DRATE?`
`SOURCE:RFGenerator:AT<nr>:SCOUNT?`

Remote control for installed option CMU-B89:
`SOURCE:RFGenerator:DRINDEX*`
`SOURCE:RFGenerator:PTINDEX*`
`SOURCE:RFGenerator:PSIZE?`
`SOURCE:RFGenerator:DRATE?`
`SOURCE:RFGenerator:SCOUNT?`

*) Please note that these commands are only queries when the signal subtype is set to 2. For signal subtype 2, use `SOURCE:RFGenerator:AT<nr>:PTINDEX` with CMU-B88, respectively `SOURCE:RFGenerator:PTINDEX` with CMU-B89.

Traffic – AT1..4 – Data - Pattern *Pattern* specifies a data pattern to be used within the forward link packets addressed to a specific access terminal. The data consists of 32 bits, or 4 bytes, expressed as an 8-digit hex number. This pattern is repeated within the packet. The most significant bit is the first bit within the packet.

Remote control for installed option CMU-B88:
`SOURCE:RFGenerator:AT<nr>:PATTERN`

Remote control for installed option CMU-B89:
`SOURCE:RFGenerator:PATTERN`

Traffic – AT1..4 – Power Control – Power Ctrl. Bits *Power Control Bits* define how the power control bits are sent from the CMU to the specified access terminal. The power control bits control the access terminal total output power (when the access terminal is using closed loop power control).

<i>Range Test</i>	The CMU sends a sequence of <i>up</i> power bits followed by a sequence of <i>down</i> power bits. The number of bits up and down is configurable.
<i>All Up</i>	The CMU sends only <i>up</i> power control bits.
<i>All Down</i>	The CMU sends only <i>down</i> power control bits. This may cause the access terminal power level to decrease to a level too low for measurements to be made.
<i>Hold</i>	The CMU sends alternating <i>up/down</i> power control bits.
<i>Pattern</i>	A user defined pattern of power control bits will be sent by the CMU. This pattern is divided in 4 areas of power control bits which are described in the following <i>Pattern</i> parameters below. For each area a user defined number of <i>Up</i> or <i>Down</i> bits can be defined and sent by the CMU.
<i>External (AUX3/4 – Pin 6)</i>	The state of Pin 6 of the CMU AUX3/4 connector is sampled at the start of the slot and used as the power control bit (only for installed option CMU-B88).

Remote control for installed option CMU-B88:
`SOURCE:RFGenerator:AT<nr>:PCBits`

Remote control for installed option CMU-B89:
`SOURCE:RFGenerator:PCBits`

Traffic – AT1..4 – Power Control – Range Test Count *Range Test Count* sets the number of power control bits to be used to perform the Range test. E.g. a value of 100 means that 100 *UP* bits are sent followed by 100 *DOWN* bits.

Remote control (only with option CMU-B88):
`SOURCE:RFGenerator:AT<nr>:PCBits:RTES:NOBits`

Traffic – AT1..4 – Power Control – Pattern – Inject Pattern *Inject Pattern* starts the injection of a power control bit pattern into the power control bit stream. The configuration of the pattern is defined by the configuration fields below. This is the same pattern as may be selected by the pattern mode described above.

After activation, the button *Inject Pattern* remains disabled until the complete pattern has been sent. Only then can another pattern be sent. The injection of the pattern starts only at the end of the current power control sequence.

Remote control (only with option CMU-B88):
`PROCEDURE:RFGenerator:AT<nr>:PCBits:PATTERN <InjectStatus>`

Traffic – AT1..4 – *Number of Bits* defines the number of bits in the area of the user defined pattern for
Power Control – a specific access terminal.
Pattern –
Area 1..4 –
Number of Bits

Remote control (only with option CMU-B88):
 SOURCE:RFGenerator:AT<nr>:PCBits:PATtern:AREA<nr>:NOBits

Traffic – AT1..4 – *Polarity* defines the orientation of all power control bits in this area of the pattern for
Power Control – a specific access terminal.
Pattern – Possible values are *Up* or *Down*.
Area 1..4 –
Polarity

Remote control (only with option CMU-B88):
 SOURCE:RFGenerator:AT<nr>:PCBits:PATtern:AREA<nr>:POLarity

Traffic – AT1..4 – The state of the *DRCLock* indicates to the access terminal the ability of the base
DRCLock – station to receive its DRC channel. If the *DRCLock* state is 0, the access terminal
DRCLock State will not request data from base station. Possible values are 0 and 1. The default
 value is 0. In the same line the current analyzer settings for the *Reverse Link Frame
 Offset* are displayed.

Remote control (only with option CMU-B88):
 SOURCE:RFGenerator:AT<nr>:DRCLock:STATE

Traffic – AT1..4 – *DRCLock Period* defines period of DRCLock bit transmissions, in terms of slots.
DRCLock – Possible values for signal subtype 0 are 8 and 16. For signal subtype 2 the
DRCLock Period *DRCLock Period* parameter is not configurable, it is ignored for the subtype 2
 physical layer user. For the subtype 2 physical layer, the DRC Lock bit is transmitted
 on a separate channel, as opposed to subtype 0 physical layer where it is punctured
 periodically in the RPC channel.

Remote control for installed option CMU-B88:
 SOURCE:RFGenerator:AT<nr>:DRCLock:PERiod

Remote control for installed option CMU-B89 (only for subtype 0):
 SOURCE:RFGenerator:DRCLock:PERiod

Traffic – AT1..4 – *DRCLock Length* defines how often the *DRCLock* bit will be transmitted, before it is
DRCLock – updated with the DRCLock state.
DRCLock Possible values for signal subtypes 0 and 2 are 4, 8, 16, and 32.
Length The values are expressed in terms of DRCLock periods.

Remote control for installed option CMU-B88:
 SOURCE:RFGenerator:AT<nr>:DRCLock:LENGth

Remote control for installed option CMU-B89:
 SOURCE:RFGenerator:DRCLock:LENGth

Traffic – AT1..4 – The H-ARQ is a new channel in 1xEV-DO Network Revision A. The reverse link
H-ARQ – transmission method in subtype 2 physical layer of 1xEV-DO Revision A (Rev. A) is
H-ARQ Mode different from Revision 0 (Rev. 0). The Rev. A reverse link packets are composed
 of 4 subpackets comprising 4 slots each.

The AN is allowed to terminate the transmission of the remainder of the subpackets
 early if it is able to correctly demodulate the packet, which effectively increases the
 transmission rate. This is very similar to the ARQ used on the forward link. To
 support the early termination, a new forward link H-ARQ MAC channel is added in

Rev A. For non-signaling, where the reverse link is not demodulated, it is sufficient to configure the H-ARQ channel to send either all ACK bits or all NAK bits.

For signal subtype 0 this setting is not applicable. The possible values for signal subtype 2 are ACK and NAK.

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:AT<nr>:HARQ:MODE`

Reverse Activity – MAC RAB Level *MAC RAB Level* specifies the level for the reverse activity channel relative to the generator output power. The range of level values is –7.0 dB to –25.0 dB, inclusive.

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:RAB:MAC:LEVEl`

Reverse Activity – RAB State *RAB State* sets the value for the bit within the reverse activity channel. This channel is an indicator to the access terminal from the access network to reduce the transfer rates used on the reverse link. A value of zero indicates normal network conditions, a value of 1 indicates that the access terminal may need to reduce its reverse link transfer rates. Possible values are 0 and 1.

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:RAB:STATe`

Reverse Activity – RAB Offset *RAB Offset* defines the starting position of the reverse activity (RA) bit. The starting position is specified in $RABLength/8$ units. The RA bit starts when the equation $(SystemTime \text{ mod } RABLength = RABOffset)$ is satisfied, with *SystemTime* expressed in units of slots. Possible values are 0 to 7, inclusive.

For signal subtype 2, the RAB offset setting is not applicable.

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:RAB:OFFSet`

Reverse Activity – RAB Length *RAB Length* defines the length (in slots) of a reverse activity (RA) bit. Possible values are 8, 16, 32 and 64.

For signal subtype 2, the RAB length setting is not applicable.

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:RAB:LENGth`

Other ATs – Count *Other ATs – Count* defines the number of additional MAC indexes that are in use within the MAC. No traffic is generated for these MAC indexes, they are used only to construct a realistic MAC.

For signal subtypes 0 and 1, the possible values are 1 to 55, inclusive. For the signal subtype 2 generator, the range of other ATs is doubled (supporting values up to 110).

Remote control (only with option CMU-B88):
`SOURce:RFGenerator:OAT:COUNT`

DUT Forward Packet Activity The *DUT Forward Packet Activity* indicates how much bandwidth is allocated towards the AT during the Default Test Application. If this value is set to 100% (default), it means that all Forward Traffic Packets are directed to the AT. If it is set to 0%, the AT is not scheduled at all. Possible values are 0% to 100% in steps of 1%.

Remote control (only with option CMU-B89):
 SOURCE:RFGenerator:FPACTivity

Generator Control (Connection Control – Generator – IQ-Access Interface)

The Generator control tab – *IQ-Access Interface Setup* allows the setting of all the settings for the I/Q access board. This board is available as option R&S CMU-B82, for which there is a separate manual available (R&S order number 1150.0299.32).

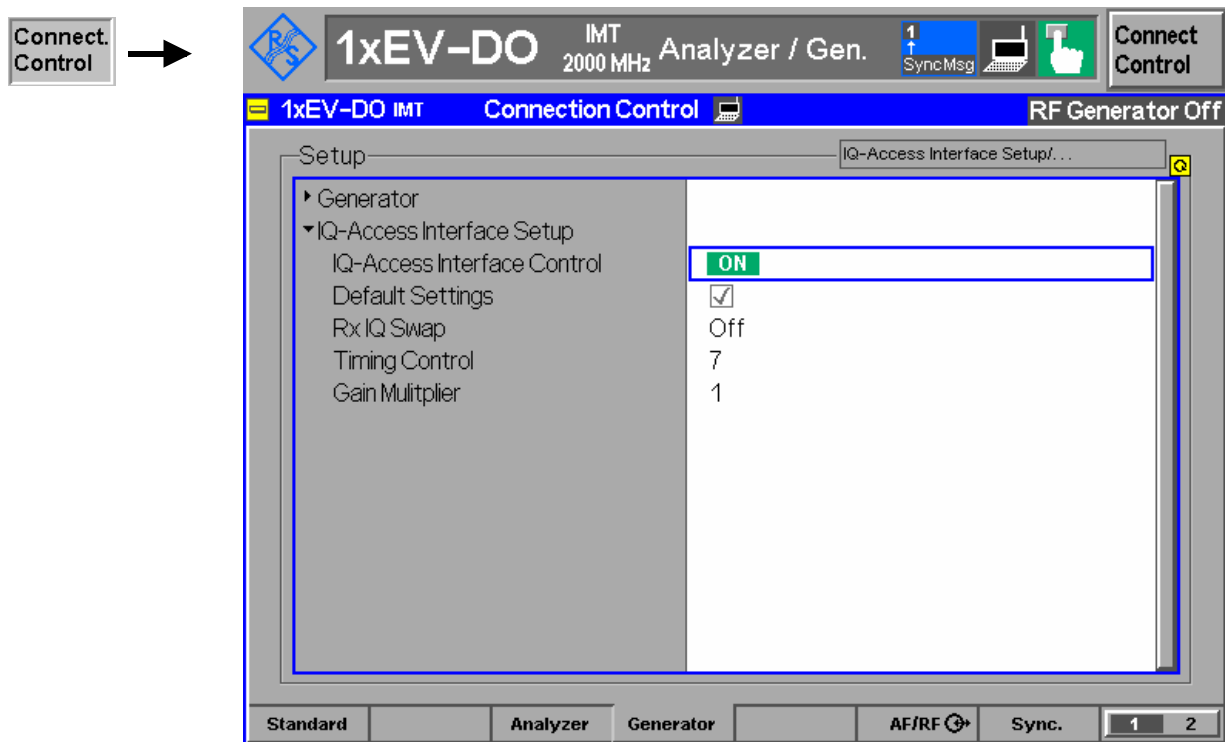


Figure 4-5 Connection Control – IQ-Access Interface Setup

IQ-Access Interface Control The *IQ-Access Interface Control* controls the I/Q-access board operation. Pressing the *IQ-Access Interface Control* softkey switches the I/Q-access board ON or OFF. The *IQ-Access Interface Control* switch is toggled with switching the *Generator Control*.

Remote control:
 INITiate:IQAAccess
 ABORt:IQAAccess
 FETCh:IQAAccess:STATus?

Default Settings The *Default Settings* switch assigns default values to all settings in the *IQ-Access Interface Control* tab (the default values are shown in the command description in chapter 6 of this manual).

Remote control:
`DEfault:IQACcess:CONTRol`

Rx IQ Swap *Rx IQ Swap* allows the swap of the I/Q data paths of the receiver. This is useful if the signaling unit permutes the signals.

Remote control:
`CONFigure:IQACcess:RXSWap`

Timing Control *Timing Control* sets the timing and clock polarity control over Tx I/Q data. Bits 0-2 supply timing information. If bit 3 is set to “1”, external data is clocked on the negative edge of the CHIP16 clock, if set to “0”, then the positive edge of the clock is used.

Remote control:
`CONFigure:IQACcess:TCONTRol`

Gain Multiplier *Gain Multiplier* sets the gain multiplier value for Tx I/Q data supplied to the access board. Possible values are 0, 1, 2, 4, 8 and 16.

Remote control:
`CONFigure:IQACcess:GMULTiplier`

RF Connectors (Connection Control – RF)

The *RF*  tab configures the connectors for RF signals. This includes defining:

- The RF input and output of the CMU (*RF Output*, *RF Input*).
- External attenuation at the connectors (*Ext. Att. Output*, *Ext. Att. Input*).

The tab also controls the wideband peak power measurement (*Wideband Power*) and indicates the result.

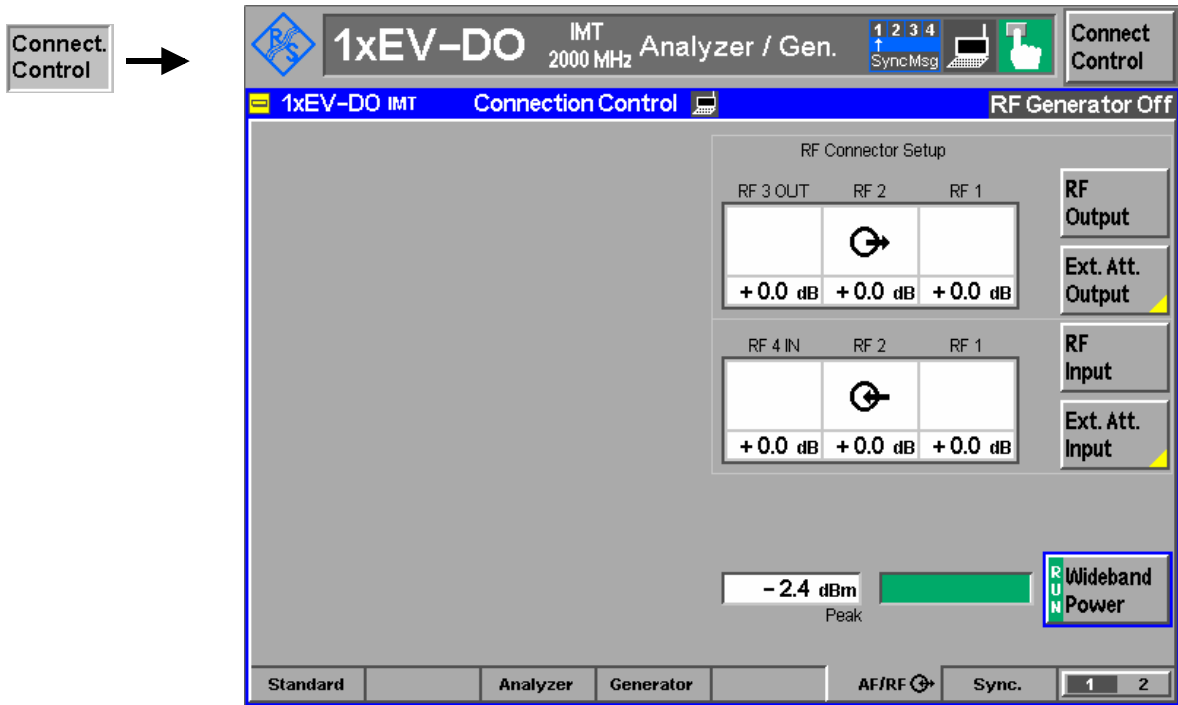


Figure 4-6 Connection Control – RF connectors

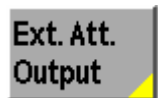


The *RF Output* softkey defines which of the three connectors RF 1, RF 2 and RF 3 OUT is to be used as the RF output connector. The symbol indicates the selected RF output.

~~**Note:** Input and output connectors can be arbitrarily combined. The bi-directional connectors RF 1 and RF 2 can be selected as RF inputs and outputs at the same time. The front panel LEDs are on (lit) if the generator is switched on or the modulation test is started.~~

Remote control:

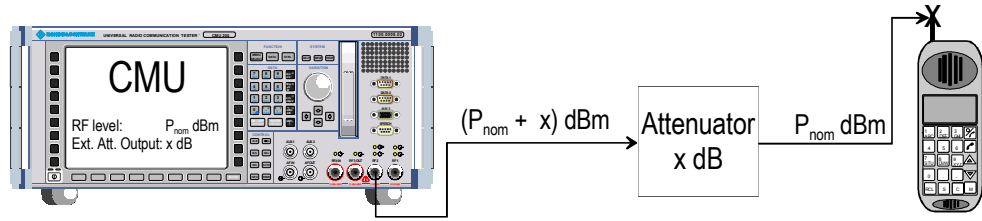
```
OUTPut[:STATe] RF1 | RF2 | RF3
```



The *Ext. Att. Output* softkey defines an external attenuation (or gain, if the value is negative) at the selected RF output.

External attenuation is required if attenuation (such as a cable) is included in the test setup path, which is to be corrected by an increased signal level.


If an external attenuation is defined, the output signal level is referenced to the input of the device under test (DUT), the generator level is therefore shifted with respect to the actual level at the output connector of the CMU. The default value for the generator power and the level ranges for the RF outputs are also shifted provided that the generator can output the required power, compensating for the external attenuation or gain. Otherwise it is adapted to the level closest to the shifted default value.



Remote control:

```
[SENSe:]CORRection:LOSS:OUTPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude]
```



The *RF Input* softkey defines which of the three connectors RF 1, RF 2, or RF 4 IN is to be used as the RF input connector. The symbol  indicates the selected RF input.

~~Note: Input and output connectors can be arbitrarily combined. The bi-directional connectors RF 1 and RF 2 can be selected as RF inputs and outputs at the same time. The front panel LEDs are on (lit) if a measurement is active.~~

Remote control:

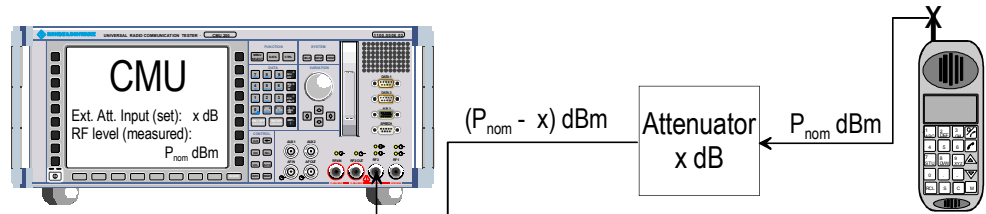
```
INPut[:STATe] RF1 | RF2 | RF4
```



The *Ext. Att. Input* softkey sets the value of the external attenuation (or gain) at the selected RF input.

Input of an external attenuation is required if, for example, external attenuator pads are used for protection of the sensitive RF inputs of the CMU or if path attenuation is included in the test setup.

If an external input attenuation is reported to the instrument, all levels measured are referenced to the output of the DUT and therefore shifted with respect to the actual level at the input connectors of the CMU. The level ranges for the input connectors are shifted as well.



Remote control:

```
[SENSe:]CORRection:LOSS:INPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude]
```




The *Wideband Power* softkey controls the wideband power measurement and indicates its status (*RUN* | *HLT* | *OFF*). The status can be changed after softkey selection (pressing once) by means of the *ON/OFF* key or the *CONT/HALT* key. The measurement result is in units of dBm. The analog bar to the right of the softkey shows the measured power relative to the *RF Max. Level* (see section *RF Connectors (Connection Control – RF)* on page 4-22): The display range is between *RF Max. Level – 10 dB* and *RF Max. Level + 10 dB*.

The wideband power measurement is performed at the RF frontend of the CMU and yields the peak power of the input signal inside a wide frequency range. It is most accurate in the input level range around 0 dBm (typically –10 dBm to +30 dBm on RF2). The main purpose of the wideband power measurement is to indicate whether an input signal is available and whether it is advisable to change the *Max Level* settings.

```
Remote control:
INITiate:WPOWer
FETCh:WPOWer:STATus?
READ[:SCALar]:WPOWer?
FETCh[:SCALar]:WPOWer?
SAMPLe[:SCALar]:WPOWer?
```

Reference Frequency (Connection Control – Sync.)

The popup menu *Sync.* defines the reference signals for synchronization. This includes:

- The internal or external reference frequency
- The output mode for the network-specific system clock (REF OUT 2)

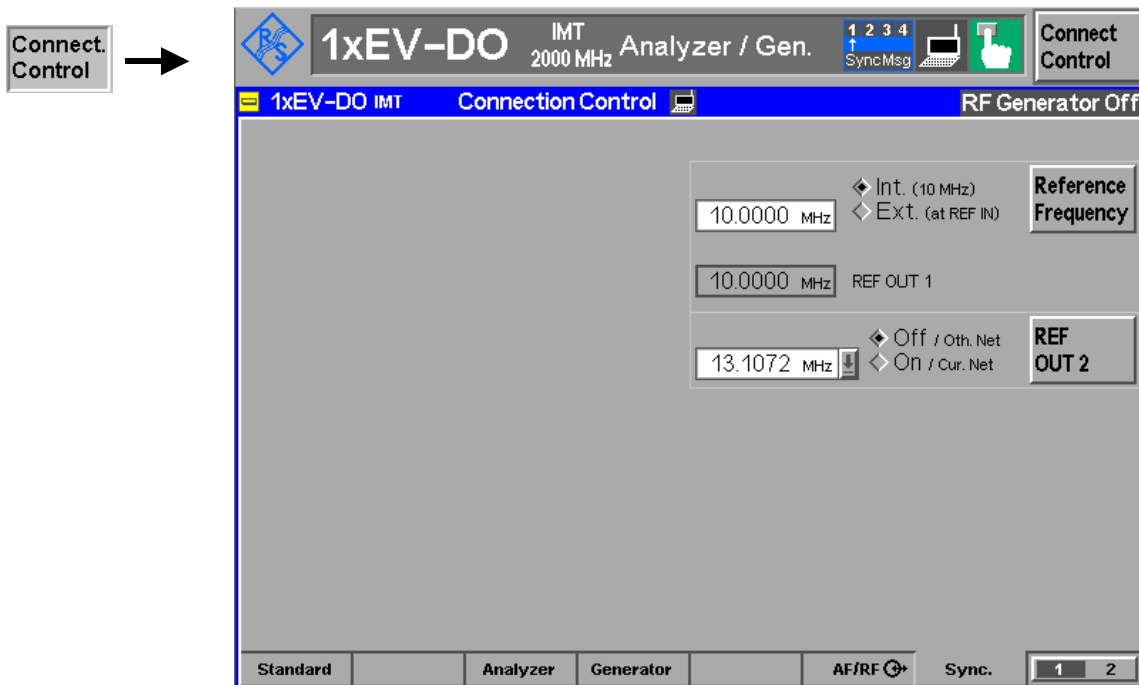
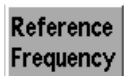


Figure 4-7 Connection Control – Synchronization



The *Reference Frequency* softkey determines the source and the frequency of the reference signal. Two selections are available.

- Int. (10 MHz)* The internal 10 MHz clock signal (TCXO or OCXO, CMU-B11/-B12) is used for synchronization. This signal is available at the REF OUT 1 connector at the rear of the instrument.
- Ext. (at REF IN)* An external reference signal is to be supplied to the REF IN connector. The frequency of the external reference signal must be entered in the input field.

The reference signal used is available at the REF OUT 1 output connector at the rear of the instrument making it available for use by other instruments.

~~Notes: With external synchronization selected, a warning message cycles on and off if no synchronization has been performed e.g. because of missing or faulty input signal. At the same time, bit no. 6 (RFNL, Reference Frequency Not Locked) is set in the STATUS:OPERation:CMU:SUM1:CMU1 sub register associated to the CMU base system and the query [SENSe:]SYNChronize:FREQuency:REFerence:LOCKed? returns the value ON.~~

~~In the case of external synchronization with squarewave signals (TTL) ensure correct signal matching to avoid reflections. Otherwise, resulting overshoots may cause trigger problems at the CMU input. A possible remedy is to use a lowpass filter or an attenuator pad directly at the CMU input. Correct synchronization may be checked by comparing the signal REF OUT 1 or REF OUT 2 with the input signal.~~

~~This configuration is valid in all CMU function groups.~~

Remote control:

The commands for the reference frequency are part of the CMU base system (see CMU 200/300 operating manual):

```
CONFigure:SYNChronize:FREQuency:REFerence:MODE
                                INTERNAL | EXTERNAL
CONFigure:SYNChronize:FREQuency:REFerence <Frequency>
[SENSe:]SYNChronize:FREQuency:REFerence:LOCKed?
```

**REF
OUT 2**

The REF OUT 2 softkey configures a network-specific system clock available at the REF OUT 2 output connector at the rear of the instrument. The associated field allows selection between two settings:

- OFF (other network)* The clock frequency of another active function group is made available at the REF OUT 2 connector instead of the current function group. The REF OUT 2 must be switched on in the other function group.
- On (current network)* The network-specific system clock of the current function group is available at the REF OUT 2 output connector.

The clock frequency can be used to synchronize other instruments.

Remote control:

```
SOURce:DM:CLOCK:STATe ON | OFF
SOURce:DM:CLOCK:FREQuency <Frequency>
```

Trigger (Connection Control – Trigger)

The *Trigger* tab is part of the second group of tabs in the *Connection Control* menu. It is accessible after pressing the 1 / 2 toggle hotkey once. Pressing 1 / 2 again switches back to the first group of tabs described above.

The *Trigger* tab defines the trigger condition for the measurement and the routing of output trigger signals.

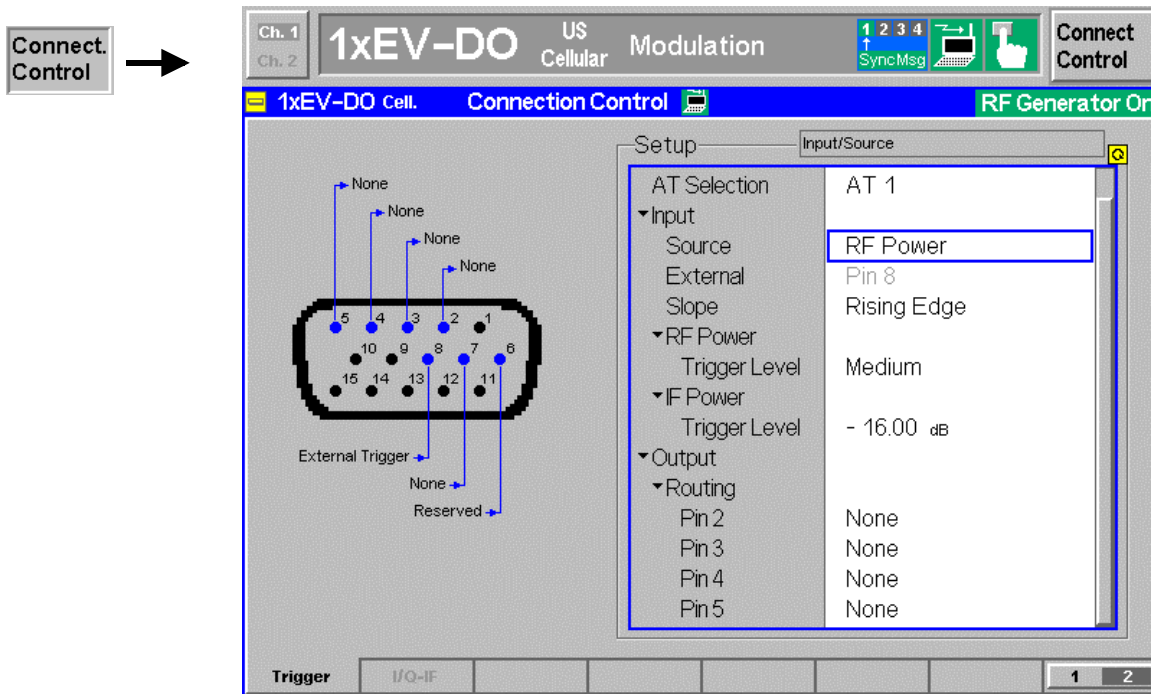


Figure 4-8 Connection Control – Trigger

Default Settings The *Default Settings* checkbox assigns the default setting to all functions in the *Trigger* tab (the default values are quoted in the command description in chapter 6 of this manual).

Remote control:
`DEFault:TRIGger[:SEquence]`

AT Selection Only one access terminal at a time can be supported by the trigger. *AT Selection* allows the choice of one of the four supported access terminals.

Remote control (only for option CMU-B88):
`TRIGger:SElect:AT`

Input – Source *Source* sets the CMU 200 to use its internal signal trigger source or use an external trigger supplied via the AUX 3 connector on the front panel.

The trigger setting affects the results of the *Transmit Time Error* measurement as described here.

- Free Run* No trigger. Timing error results are not available.
- Internal* Timing error results are available when AT is correctly synchronized with the CMU. An output frame trigger signal can be routed to pins 2 to 5 of AUX 3; see below.

External Timing error results are possible if an external trigger signal is provided and the AT is correctly synchronized with the CMU.

RF Power Timing error results are not possible.

IF Power Timing error results are not possible.

Remote control:
 TRIGger [:SEquence] :SOURce

Input – External *External* indicates that the external trigger signal is to be applied to *Pin 8* of the AUX 3 connector. This holds for all three modulation schemes.

Input – Slope Allows the setting of which edge of the trigger signal should be interpreted as the actual trigger. The possible values are “Falling Edge” and “Rising Edge”.

Remote control:
 TRIGger [:SEquence] :SLOPe

Input – RF Power – Trigger Level Sets the RF Power level a signal burst has to reach to be interpreted as an incoming trigger. A setting too high results in no trigger at all, a setting too low does not allow the measurement to identify any trigger. In both cases the measurement results are invalid.

Remote control:
 TRIGger [:SEquence] :THReshold:RFPower

Input – IF Power – Trigger Level Sets the IF Power level a signal burst has to reach to be interpreted as an incoming trigger. A setting too high results in no trigger at all, a setting too low does not allow the measurement to identify any trigger. In both cases the measurement results are invalid.

Remote control:
 TRIGger [:SEquence] :THReshold:IFPower

Output – Routing The *Routing* functions select the type of periodic pulse signal (or no signal, setting *NONE*) to be applied to pins 2, 3, 4, and 5 of the AUX 3 connector. The output frame trigger is available if the *Internal* trigger source is selected and the RF generator is switched on. It consists of a high-pulse TTL signal with its rising edge at the beginning of the frames of the forward signal.

The CMU provides output trigger signals with the following periodicity:

		Available for hardware option ...	
		CMU-B88	CMU-B89
<i>None</i>	---	✓	✓
<i>PP2S</i>	2.00 s	✓	✓
<i>Superframe</i>	80.00 ms	x	✓
<i>Ctrl. Channel</i>	426.67 ms	✓	x
<i>Ctrl. Slot</i>	<variable>	✓	x
<i>AT Rev. Frame</i>	26.67 ms	✓	x
<i>Paging Frame</i>	20.00 ms	x	✓
<i>Sync.Frame</i>	26.67 ms	x	✓
<i>PCFRame</i>	1.25 ms	x	✓
<i>AT Fwd. Slot</i>	<variable>	✓	x
<i>Slot</i>	1.67 ms	✓	✓
<i>PwrCtrlPattern (Cont.)</i>	<variable>	✓	x
<i>PwrCtrlPattern (Inject)</i>	<variable>	✓	x
<i>Event Trigger</i>	<variable>	✓	✓

All signals can be selected for each of the pins 2 to 5, multiple assignments are possible. The current AUX 3 pin assignment (including the external trigger input at pin 8) is shown in the diagram to the left of the trigger *Setup* table.

Remote control:

TRIGger:OUTPut:PIN<nr>:SIGNal <Frame_Period>

I/Q-IF Interface (Connection Control – I/Q-IF)

The *I/Q-IF* tab is part of the second group of tabs in the *Connection Control* menu. It is accessible after pressing the 1 / 2 toggle hotkey once. Pressing 1 / 2 again switches back to the first group of tabs described above.

The *I/Q-IF* tab configures the signal paths for I/Q and IF signals. With option CMU-B17, *I/Q and IF Interfaces*, I/Q and IF signals can be used in the framework of *RF* measurements and in many network tests. For a detailed description of rear panel connectors (for I/Q and IF input/output signals), test scenarios, and application examples refer to the CMU 200/300 operating manual.

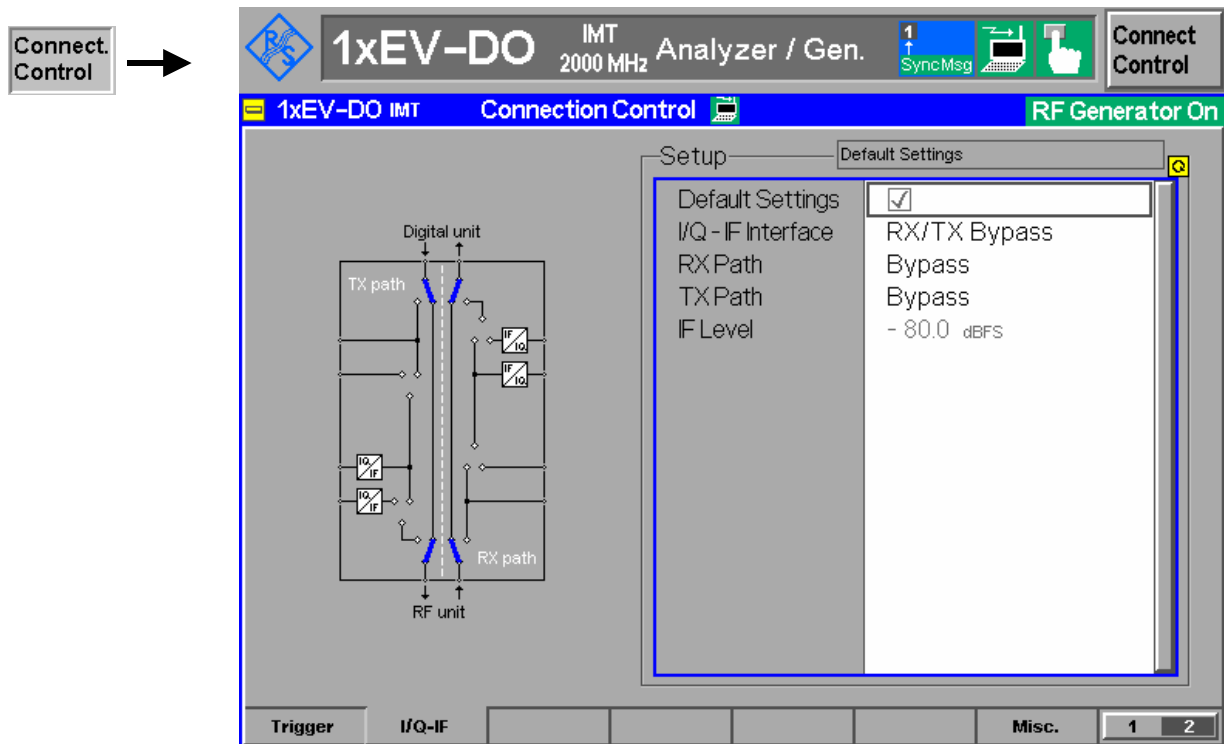


Figure 4-9 Connection Control – I/Q-IF

Default Settings The *Default Settings* checkbox assigns the default setting to all functions in the *I/Q-IF* tab.

Remote control:
IQIF:DEFault ON | OFF

I/Q-IF Selects the I/Q-IF test scenario, overwriting the current *RX Path* and *TX Path* settings. Six different predefined test scenarios with fixed RX and TX path are provided; see *Table 4-2: I/Q-IF scenarios and path settings below*.

Additional scenarios may be defined by selecting any other combination of RX and TX paths. When this is done *I/Q-IF* is set to *User-defined*. The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:
CONFigure:IQIF:RXTXcombined
BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF

RX Path Selects the RX signal path, leaving the *TX Path* unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then *I/Q-IF* is set to the predefined scenario; otherwise it is set to *User-defined*.

The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:

CONFigure:IQIF:RXPath
 BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF

TX Path Selects the TX signal path, leaving the *RX Path* unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then *I/Q-IF* is set to the predefined scenario; otherwise it is set to *User-defined*.

The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:

CONFigure:IQIF:TXPath
 BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF

IF Level Indicates the IF output level in the TX path relative to the maximum IF input/output level (PEP) cited in the data sheet. The value is equal to the I/Q output level in the TX path relative to the maximum I/Q input voltage cited in the data sheet. The result is in dBFS units (dB Full Scale).

~~For 1xEV-DO networks, the value of the IF level is constantly 0 dBFS.~~

Remote control:

[SENSe:]IQIF:LEVel?

Table 4-2: I/Q-IF scenarios and path settings

I/Q-IF	RX Path	TX Path	Remark/Application (see also CMU manual)
RX/TX Bypass	Bypass	Bypass	No I/Q or IF inputs/outputs connected Direct signal analysis and transmission with full measurement accuracy
By. w. I/Q-OF OUT	Bypass w. I/Q-IF OUT	Bypass w. I/Q-IF OUT	No I/Q or IF inputs connected Analysis of received and transmitted signal via I/Q or IF
I/Q IN/OUT	I/Q IN/OUT	I/Q IN/OUT	Insertion of signal to be analyzed and transmitted on I/Q level
IF IN_I/Q IN/OUT	IF IN_I/Q IN/OUT	IF IN_I/Q IN/OUT	Additional processing of received and transmitted signal on IF level (filters etc.) and analysis via I/Q
IF IN/OUT	IF IN/OUT	IF IN/OUT	Insertion of signal to be analyzed and transmitted on IF level
Fading	Bypass	I/Q IN/OUT	Direct analysis of received signal Modification (fading) of transmitted signal by means of an external fading simulator (SMIQ, ABFS)
User-defined	Any combination of RX Path and TX Path not listed above		Any combination of RX and TX test cases listed above

1xEV-DO Module Tests (Non-Signaling)

Analyzer/Generator Measurement

The *Analyzer/Generator* menu provides an overview over the 1xEV-DO function group, the current measurement status and the most important scalar parameters and measurement results.

The *Analyzer/Generator* menu is opened from the *Menu Select* menu (with associated key at the front of the instrument). The hotkeys associated to the *Menus* softkey switch over between the *Analyzer/Generator* menu and the remaining measurement menus of function group 1xEV-DO.

In the softkey bar on the right side, the *Analyzer/Generator* menu provides different types of softkeys:

- The measurement control softkey *Mod. Qual. HPSK* controls the measurement, indicates its status (*RUN* | *HLT* | *OFF*) and opens the configuration menu *Modulation Quality Configuration*. The hotkeys associated to the measurement control softkey define the scope of the *Modulation* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys *RF Max. Level* and *RF Mode* belong to the softkey *Analyzer Level*). The softkey/hotkey combinations provide test settings and switch over between different measurements.

Types of settings The purpose of the *Analyzer/Generator* menu is to provide quick access to the most common *Modulation* measurements and to present the basic measurement results at a glance. All measurements provide two different types of settings:

- Common settings are valid for all applications of function group 1xEV-DO. Changing common settings in any application will have an impact on all measurements and applications of the function group. All common settings are also provided in the [Connection Control](#) menu (see p. 4-3 ff.). Examples of common settings are the RF input level and trigger settings (softkey *Analyzer Level*) and the configuration of the RF generator (softkey *Generator*).
- Specific settings are relevant for one application only, or they can be set independently for several applications. Changing specific settings in an application will not affect the other measurements and applications of the function group. No specific settings are provided in the [Connection Control](#) menu (see p. 4-3 ff.). Examples of specific settings are the *Repetition* mode (to be set independently for all applications providing this mode).

Measurement results The output fields in the left half of the *Analyzer/Generator* menu show the current measurement results. The results depend on the selected application. They are described in detail in section [Measurement Results](#) on p. 4-35 f.

The results displayed in the *Analyzer/Generator* menu represent only a fraction of the modulation results that the CMU is able to acquire. A comprehensive set of test results is displayed in the *Modulation* measurement menus. In particular, the *Modulation* menus show many quantities as functions of time.

Menu Select →

Section	Parameter	Value
Current	AT Power	-47.1 dBm
	Rho	0.9992
	Carrier Frequency Error	-2.2 Hz
	Transmit Time Error	---
	Carrier Feedthrough	-52.0 dB
	I/Q Imbalance	-61.2 dB
	Lower Sideband Suppr. (ACP 3)	-50.1 dB
	Upper Sideband Suppr. (ACP 3)	-51.9 dB
	Statistic Count	100
	Out Of Tolerance	+0.00 %
Settings	Meas. Control	Continuous
	Repetition	None
	Stop Condition	100
	Statistic Count	± 900.00 kHz
	Sideband Freq. Offset	
	Generator Level	
	Output Power	-70.00 dBm
	MAC RAB Level	-12.00 dB
	MAC AT1 Level	-16.00 dB
	MAC AT2 Level	-16.00 dB
	MAC AT3 Level	-16.00 dB
	MAC AT4 Level	-16.00 dB
	Impairments	
	Generator Settings	
	Signal Subtype	0
RF Frequency	878.4900 MHz	
RF Channel [BC0]	283	
PN Offset	0	
Traffic Control		
Sync. Message	On	
Packet Start Offset	0	
Data Rate	38.4 kBit/s	

Trigger Ana. Lvl.	Trigger Source	Trigger Level	Trigger Slope	AT Selection			
Analyzer Level Trg.	RF Max. Level	RF Mode					
Analyzer Set. 1 2	Rev. Link Frame Offs.	RF Channel	RF Frequency	Frequency Offset	Meas. Subtype	Code Chann. Filter	Data Ch. Mod. Type
Analyzer Set. 2 1	Long Code Mask I	Long Code Mask Q					
Generator Level Imp.	Output Power	MAC RAB Level	MAC AT1 Level	MAC AT2 Level	MAC AT3 Level	MAC AT4 Level	
Impairm. Gen. Lvl.	AWGN Level	BS Freq. Offset					
Generator Set. P.Ctrl	PN Offset	RF Channel	RF Frequency	Reverse Activity	Traffic Control	Traffic AT1 & AT3	Traffic AT2 & AT4
Power Ctrl Gen. Set.	Power Ctrl. Bits	Execute AT1 Pattern Inj.	Execute AT2 Pattern Inj.	Execute AT3 Pattern Inj.	Execute AT4 Pattern Inj.	PCB Pattern AT1 & AT3	PCB Pattern AT2 & AT4
Menus	Analyzer Generator	Power	Modulation	Spectrum	Code Dom. Power		

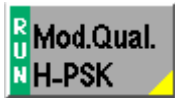
Figure 4-10 Measurement menu Analyzer / Generator

Softkey Selections

The *Analyzer/Generator* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The remaining softkeys select the application and provide application-specific settings.

Measurement Control

The *Analyzer/Generator* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys.



The *Mod. Qual. H-PSK* softkey controls this measurement and indicates its status (*RUN* | *HLT* | *OFF*). To change the status, press the *Modulation* softkey once and then use the front panel keys *ON/OFF* or *CONT/HALT*.

Pressing the *Mod. Qual. H-PSK* softkey twice (once if already selected) opens the *Modulation Configuration* popup menu (see section [Analyzer/Generator Configuration](#) on p. 4-36 ff.).

Remote Control:

```
INITiate:MODulation:OVERview:HPSK
ABORt:MODulation:OVERview:HPSK
STOP:MODulation:OVERview:HPSK
CONTinue:MODulation:OVERview:HPSK
FETCh[:SCALar]:MODulation:OVERview:HPSK:STATus?
```

Measurement configuration

Pressing the *Modulation* softkey twice (once if already selected) opens the *Modulation Configuration* popup menu (see page 4-36). Besides, the measurement control softkey provides hotkeys to define the scope of the measurement. All these settings are also provided in the configuration menu and described in more detail in section [Analyzer/Generator Configuration – Control](#) on page 4-37 ff.

Common settings

As outlined in section [Analyzer/Generator](#) on p. 4-32 ff., some of the hotkey/softkey combinations in the *Analyzer/Generator* menu are valid irrespective of the application. These common settings are also provided in the [Connection Control](#) menu; for a detailed description refer to p. 4-3 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections [Trigger \(Connection Control – Trigger\)](#) on p. 4-27 ff. and [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Analyzer Settings 1/2* softkey defines the center frequency of the RF analyzer. The settings are provided in the *Analyzer* tab of the *Connection Control* menu; see section [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Generator Level/Impairment* softkey defines the levels in all physical channels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.
- The *Generator Settings/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal, its modulation and an offset of the PN sequence. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.

Settings table

The *Settings* table in the right half of the *Analyzer/Generator* menu gives an overview of the measurement settings of the current application as defined by means of the softkey/hotkey combinations or in the configuration menus. It changes when a different application is selected. The roll-key scrolls and expands the *Setup* table.

Measurement Results

The results are displayed in various output fields in the left half of the measurement menu. The display mode (*Current, Min./Max. or Average*) can be selected with the softkey Display Mode which is visible when the Measurement Control softkey has been selected.

Display mode

Output fields

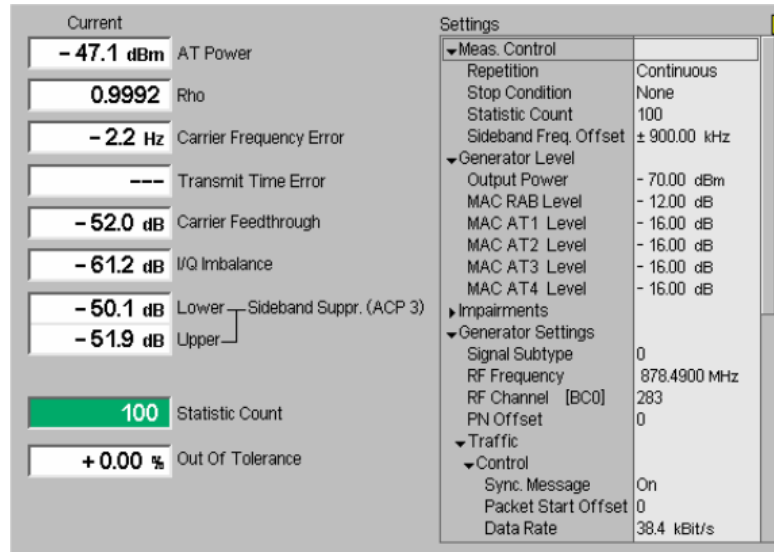


Figure 4-11 Display of results (Analyzer/Generator)

Filter settings for power measurements

The CMU measures and displays different power results, acquired with different measurement methods.

Most of the power measurements are performed using a bandwidth of 4 MHz. In particular, this holds for *AT Power* displayed in the *Analyzer/Generator* menu. The power results listed in the table below are obtained with different measurement filters.

Table 4-3: Filter settings for power measurements

Value	Menu	Filter
AT Power	Analyzer/Generator, see below.	4 MHz bandwidth filter
Sideband Suppression	Analyzer/Generator, see below.	30 kHz (Gaussian) spectrum analyzer filter
Wideband Power	Connection Control, RF \leftrightarrow (see p. 4-25)	Wideband measurement

AT Power

AT Power is the total transmitted power level from the access terminal. The AT power is measured at the analyzer frequency (*RF Frequency*, typically set to the carrier frequency) using the receiver filter specified in standard TIA/EIA/IS-856-2.

In addition to the *AT Power*, the CMU measures the power at an offset frequency from the carrier; see *Sideband Suppression* below.

Rho	<i>Rho</i> is the modulation accuracy of the transmitted signal. Rho is obtained by comparing the transmitted signal to an ideal signal as defined in standard TIA-866.
Carrier Frequency Error	<i>Carrier Frequency Error</i> is the difference between the nominal frequency of the selected channel and the measured frequency.
Transmit Time Error	<i>Transmission Time Error</i> is the time offset between the access terminal signal and the CMU signal.
Carrier Feedthrough	Carrier Feedthrough refers to the origin offset, which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.
I/Q Imbalance	<i>I/Q Imbalance</i> is the amplitude ratio between the in-phase (I) and quadrature (Q) components of the signal.
Sideband Suppression	<p><i>Sideband Suppression</i> is a power measurement at a user-configurable offset frequency used for spurious measurements. In contrast to the <i>AT Power</i> the sideband suppression is measured with a 30 kHz (Gaussian) spectrum analyzer filter. The frequency offset is set via the <i>Side Band Freq. Offset</i> hotkey associated to the measurement control softkey.</p> <p><i>Lower Sideband Suppr.</i> Ratio of the sideband power at <i>RF Frequency – Side Band Freq. Offset</i> to the <i>AT Power</i> in dB</p> <p><i>Upper Sideband Suppr.</i> Ratio of the sideband power at <i>RF Frequency + Side Band Freq. Offset</i> to the <i>AT Power</i> in dB</p> <hr/> <p>Note: In remote control the lower and upper sideband suppression can be measured at up to 4 different frequencies; see keywords ...ACP1 to ...ACP4.</p> <hr/>
Statistic Count	Number of waveform intervals per statistics cycle. The colored bar indicates the relative measurement progress in the statistics cycle.
Out of Tolerance	<p><i>Out of Tolerance</i> is the percentage of waveform intervals that exceed the defined limits.</p> <p>Remote control: READ[:SCALar]:MODulation:MQUality:HPSK? FETCh[:SCALar]:MODulation:MQUality:HPSK? SAMPlE[:SCALar]:MODulation:MQUality:HPSK?</p>

Analyzer/Generator Configuration

The popup menu *Modulation Configuration* contains two tabs to determine the parameters controlling the Modulation measurement including the error tolerances.

The popup menu *Modulation Configuration* is activated by pressing the measurement control softkey at the top right in the graphical measurement menu *Modulation* twice. It is possible to change between the tabs by pressing the associated hotkeys.

Analyzer/Generator Configuration – Control

The *Control* tab controls the Modulation measurement by determining

- The *Repetition* mode
- The *Stop Condition* for the measurement
- The number of waveform intervals/evaluation periods forming a statistics cycle (*Statistic Count*)
- The type of result displayed (*Display Mode*)
- The frequency offset used for the sideband suppress power measurement (*Sideband Freq. Offset*)

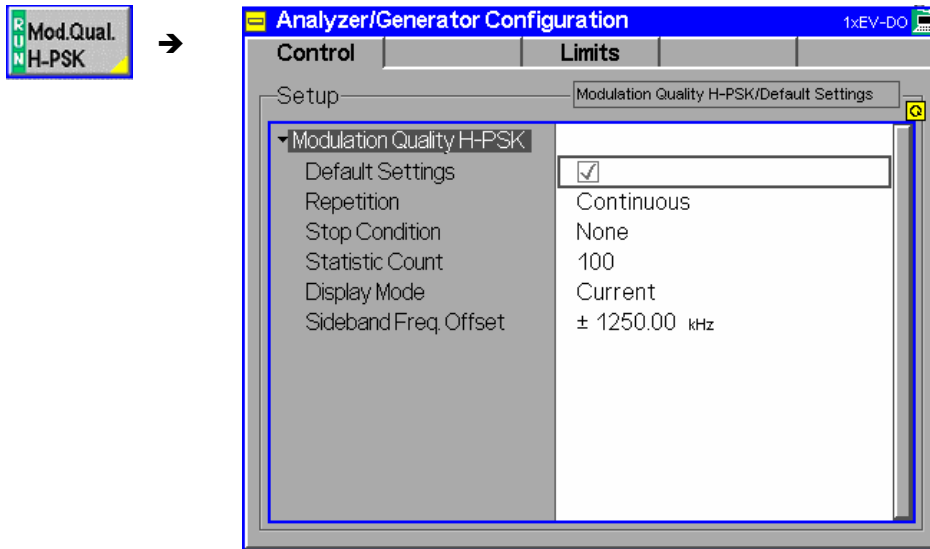


Figure 4-12 Modulation Configuration – Control

Default Settings The *Default All Settings* switch assigns default values to all settings in the *Control* tab (the default values are quoted in the command description in chapter 6 of this manual). In addition, default switches for the individual applications are provided.

Remote control:

DEFault:MODulation:MQuality:HPSK:CONTRol ON | OFF

Repetition

The *Repetition* parameter defines how often the measurement is repeated:

Single Shot

Single-shot measurement: the measurement is stopped after a statistics cycle (or after a stop condition is met, see below). A stopped measurement is indicated by the status display *HLT* in the *Modulation* softkey.

Unless otherwise stated, a statistics cycle corresponds to the number of waveform intervals/evaluation periods set under *Statistic Count*.

Continuous

Continuous measurement: The CMU continues the measurement until it is terminated explicitly (or until the stop condition for the measurement is met, see below). The measurement results are valid after one statistics cycle; however, the measurement is continued, and the output is continuously updated. An ongoing measurement is indicated by the status display *RUN* in the softkey *Mod.Qual.HPSK*.

Single shot should be selected if only a single measurement result is required under fixed conditions. The continuous measurement is suitable for monitoring the

evolution of a measured quantity in time, for example for adjustments.

~~**Note:** In remote mode, the counting Measurement (counting mode) is available as a further measurement mode with a defined number of measurement cycles to be performed, see chapter 6 of this manual. The Stop Condition setting can affect the Single Shot and Continuous repetition modes.~~

Remote control:

```
CONFigure:MODulation:MQuality:HPSK:CONTrol
    CONTInuous | SINGleshot | 1 ... 10000,<StopCondition>,
    <Stepmode> etc.
```

Stop Condition

The *Stop Condition* field defines a stop condition for the measurement:

- NONE* Continue measurement irrespective of the results of the limit check
- On Limit Failure* Stop measurement as soon as the limit check fails (one of the tolerances is exceeded)

The *Stop Condition* setting is valid for both the *Single Shot* and *Continuous* repetition modes.

Remote control:

```
CONFigure:MODulation:MQuality:HPSK:CONTrol
    <Repetition>,<SONerror | NONE, <Stepmode> etc.
```

Display Mode

The *Display Mode* field defines which of the four measured and calculated statistical measurement results is displayed. The measurement results differ in the way the waveform interval Modulation $p(t)$ at a fixed point in time t is calculated if the measurement extends over several waveform intervals; see section *Common Settings* in chapter 3:

- Current* Measured value for current waveform interval
- Minimum/Maximum* Extreme values of a number of waveform intervals
- Average* Average value over a number of waveform intervals

The number of waveform intervals for calculation of the statistical values *Minimum/Maximum* and *Average* – and thus the result – depends on the repetition mode set. In detail, this implies:

- Single shot* Display of minimum/maximum and average value from the performed statistics cycle.
- Continuous* Display of minimum/maximum from all waveform intervals already measured. The average value, however, is calculated according to the rule in chapter 3, section *General Settings*.

Remote control:

no display mode set, the READ..., FETCH... and SAMPLE commands retrieve all values.

Statistic Count

The input field *Statistic Count* defines the length of the statistics cycles in waveform intervals. The settings *1* and *OFF* (press *ON/OFF* key) are equivalent. A statistics cycle determines the duration of single-shot measurements.

Remote control:

```
CONFigure:MODulation:MQuality:HPSK:CONTrol
    <Statistics>, <Repetition>, <Stop Cond>, <Step Mode>
```

Side Band Freq. Offset The *Side Band Freq. Offset* input field sets the frequency offset used for the *Sideband Suppression* power measurement; see section [Measurement Results](#) on p. 4-35 ff. The sideband suppression is measured at the two offset frequencies symmetrical to the *RF Frequency* (lower and upper sideband suppression).

Remote control:

In remote control up to 4 different frequency offsets can be defined so that up to 8 symmetrical sideband suppression values are available:

CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress :ACP<nr>, where <nr> = 1 to 4

Analyzer/Generator Configuration – Limits

The *Limits* tab defines upper and lower error limits for the measured values of all three *Modulation* measurement applications. The limits are set independently for the display modes *Current* and *Max./Min.* on one hand, *Average* on the other hand; see section [Analyzer/Generator Configuration – Control](#) on p. 4-37 ff. All measured values are described in section [Measurement Results](#) on p. 4-35 ff.

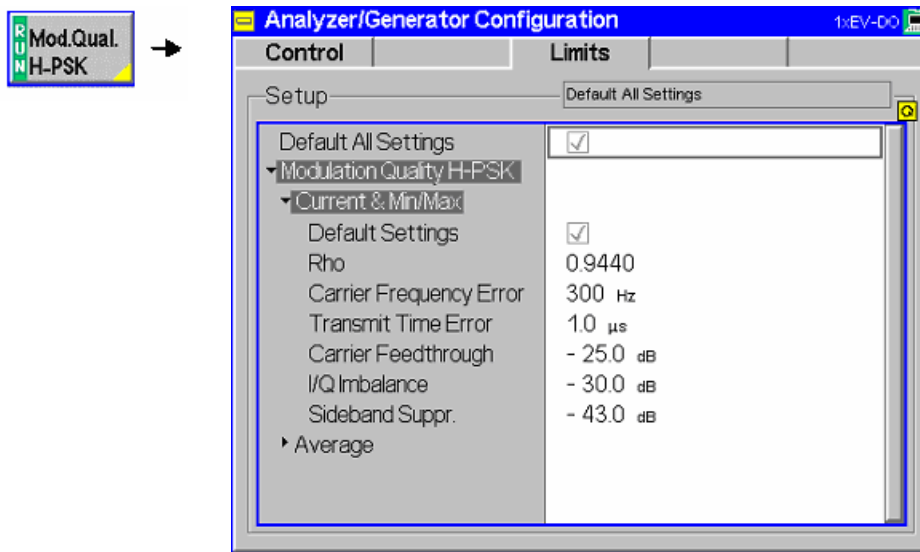


Figure 4-13 Modulation Configuration – Limits

Default All Settings The *Default All Settings* switch assigns default values to all parameters of the *Limits* tab. The default values are quoted in the command description in chapter 6 of this manual. In addition, default switches for the individual applications and statistical modes are provided.

Remote control:

DEFault:MODulation:MQuality:HPSK:CMMax:LIMit ON | OFF
 DEFault:MODulation:MQuality:HPSK:AVErAge:LIMit ON | OFF

Current & Max/Min *Current and Max/Min* sets the limits for the measured values in the current waveform interval or of the extreme values of all measured waveform intervals (*Min/Max*).

Remote control:

CONFigure:MODulation:MQuality:HPSK:CMMax:LIMit

Average

Average sets the limits for the average value of the measured values obtained according to the averaging rules of chapter 3, section *General Settings*.

Remote control:

CONFigure:MODulation:MQuality:HPSK:AVERage:LIMit

1xEV-DO Tests (Signaling and Non-Signaling)

Power Measurements

The *Power* menu provides access to the Narrow Band Power measurement of the 1xEV-DO function group, the current measurement status and the most important scalar parameters and measurement results.

The *Power* menu is opened from the *Menu Select* menu (with associated key at the front of the instrument). The hotkeys associated to the *Menus* softkey switch over between the *Power* menu and the remaining measurement menus of function group 1xEV-DO.

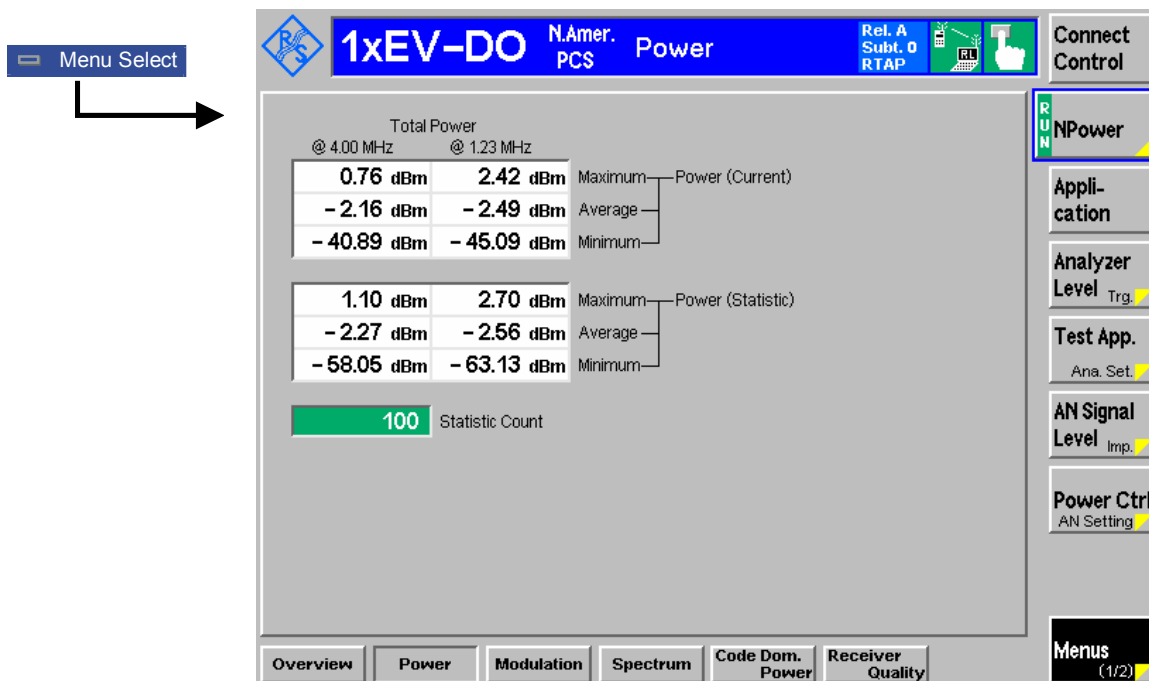
In the softkey bar on the right side, the *Power* menu provides different types of softkeys:

- The measurement control softkey *NPower* controls the measurement, indicates its status (*RUN* | *HLT* | *OFF*) and opens the configuration menu *Power Configuration*. The hotkeys associated to the measurement control softkey define the scope of the *Power* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys RF Channel and Code Channel Filter belong to the softkey Analyzer Settings). The softkey/hotkey combinations provide test settings and switch over between different measurements.

Narrow Band Power

The *NPower* (*Narrow band power*) measurement yields the average, minimum and maximum power of an RF input signal in an evaluation period of variable length plus a statistical evaluation over several periods; see section Measurement Results on p. 4.13 ff. A fixed oversampling rate of 4 is used. The measurement is performed using a bandwidth of 4 MHz and at the frequency specified in the Analyzer Settings.

Measurement results are explained for each application.



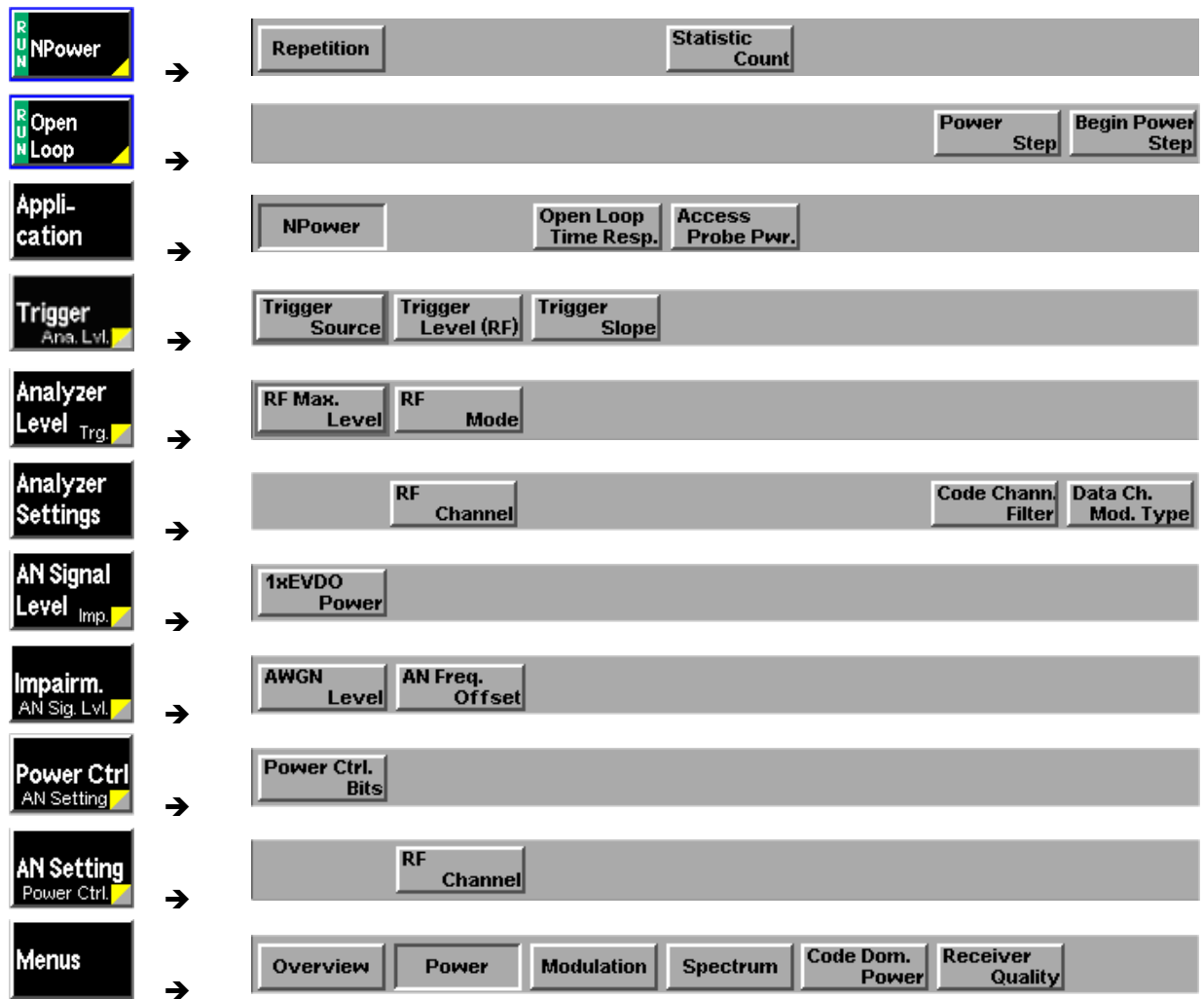


Figure 4-14 Measurement Menu Power

Softkey Selections

The *Power* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The remaining softkeys select the application and provide application-specific settings.

Measurement Control

The *Power-NPower* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The properties of the measurement control softkeys are analogous in all measurements; see section [Analyzer/Generator Configuration – Control](#) on p. 4-37 ff; the hotkey functions are also provided in the *Control* tab of the *Power Configuration* menu; see section [Power Configuration](#) on p. 4-47 ff. The remaining softkeys provide common settings; see section [Common settings](#) below.

**Appli-
cation**

The Power menu provides the the Narrow Band Power (*NPower*) application, which can be selected using the appropriate hotkeys.



The *NPower* hotkey activates the corresponding *NPower* softkey to invoke the narrow band power measurement.

Remote Control:
INITiate:NPOWER



The *NPower* softkey controls the Narrow Band Power measurement and indicates its status (*RUN* | *HLT* | *OFF*). To change the status, press the *NPower* softkey once and then use the front panel keys *ON/OFF* or *CONT/HALT*.

Pressing the *NPower* softkey twice (once if already selected) opens the *NPower Configuration* popup menu (see section [Power Configuration](#) on p. 4-47 ff.).

Remote Control:
INITiate:NPOWER
ABORT:NPOWER
STOP:NPOWER
CONTinue:NPOWER
FETCh[:SCALar]:NPOWER:STATus?

Repetition

The repetition mode defines when the Narrow Band Power measurement will be terminated. Two modes are available for all measurements:

- Single Shot* The measurement is stopped after one statistic count.
- Continuous* The measurement is continued until explicitly terminated by the user; the results are periodically updated.

Remote Control:
CONFigure:NPOWER:CONTrol:REPetition {1...10000} | CONT | SING | DEF

**Statistic
Count**

The statistic count is equal to the integer number of evaluation periods which form one statistics cycle. An evaluation period corresponds to the duration of a waveform interval (all TX measurements) or a frame (measurement group *NPower*). Depending on the repetition mode (see above), a measurement may extend over one or several statistics cycles.

Remote Control:
CONFigure:NPOWER:CONTrol:STATistics {Value} | MIN | MAX | DEF

**Access
Probe Pwr.**

The *Access Probe Pwr.* hotkey activates the corresponding *Access Probe Pwr.* softkey to invoke the standby power and access probe power measurements.

Remote Control:
INITiate:SAPPower



The *Access Probe Pwr.* softkey controls the standby and access probe power measurement and indicates its status (*RUN* | *HLT* | *OFF*). The status can be changed after softkey selection (pressing once) by means of the *ON/OFF* key or the *CONT/HALT* key. The measurement result is in units of dBm. The *Standby*

Power and *Access Probe Power* fields are blank until the mobile station registers.

Remote Control:

INITiate:SAPPower

FETCh:SAPPower:STATus?

Measurement configuration

The measurement control softkey also provides hotkeys to define the scope of the measurement. All these settings are also provided in the configuration menu and described in more detail in section [Analyzer/Generator Configuration – Control](#) on page 4-37 ff.

Common Settings

As outlined in section [Analyzer/Generator](#) on p. 4-32 ff., some of the hotkey/softkey combinations in the *Analyzer/Generator* menu are valid irrespective of the application. These common settings are also provided in the [Connection Control](#) menu; for a detailed description refer to p. 4-3 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections [Trigger \(Connection Control – Trigger\)](#) on p. 4-27 ff. and [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Analyzer Settings* softkey defines the center frequency of the RF analyzer. The settings are provided in the *Analyzer* tab of the *Connection Control* menu; see section [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *AN Signal Level/Impairment* softkey defines the levels in all physical channels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.
- The *AN Setting/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal, its modulation and an offset of the PN sequence. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.

Measurement Results (NPOWer)

The results are displayed in several groups of output fields in the left half of the measurement menu. The statistical evaluation is based on a basic evaluation period which is given by the Capture Buffer Size and a fixed oversampling factor of 4 and on the statistics cycle (Statistic Count) defined in the configuration menu (see section *Power Configuration* on p. 4-47 et.seq.; for a general description of statistical evaluations in the CMU refer to chapter 3, section General Settings). The result fields are grouped in two statistic types (*Current* or *Average*) which are themselves divided in three types of results (*Average*, *Minimum* and *Maximum*).

Display mode

Output fields

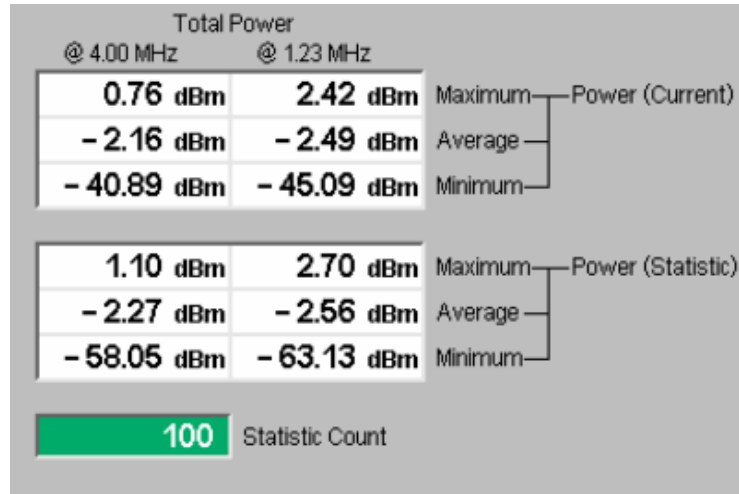


Figure 4-15 Display of results (NPower)

Filter settings for power measurements

The CMU measures and displays different power results, acquired with different measurement methods.

Most of the power measurements are performed using a bandwidth of 4 MHz. In particular, this holds for *AT Power* displayed in the *Analyzer/Generator* menu. The power results listed in the table below are obtained with different measurement filters.

Table 4-4 Filter settings for power measurements

Value	Menu	Filter
AT Power	Analyzer/Generator, see below.	4 MHz bandwidth filter

Power (Current)

The Narrow Band Power is measured over a given capture buffer which by default has a size of 4096 measurement shots.

- **Average** The Average is calculated on the base of the shots in this capture buffer.
- **Minimum** The Minimum Power value shot in the capture buffer.
- **Maximum** The Maximum Power value shot in the capture buffer.

Power (Statistic)

Statistic uses the Statistic Count to calculate the average over several capture buffers, e.g. with a Statistic Count of 100 the average is built over 409600 shots.

- **Average** This is the average of all the shots made in the Statistic Count period.

- **Minimum** The absolute minimum measured power over all the measurement shots in Statistic Count.
 - **Maximum** The absolute maximum measured power over all the measurement shots in Statistic Count.
 - Statistic Count** Number of waveform intervals (evaluation periods) per statistics cycle. The colored bar indicates the relative measurement progress in the statistics cycle.
- Remote control:
 READ[:SCALar]:NPOWer?
 FETCh[:SCALar]:NPOWer?
 SAMPlE[:SCALar]:NPOWer?

Measurement Results (SAPPower)

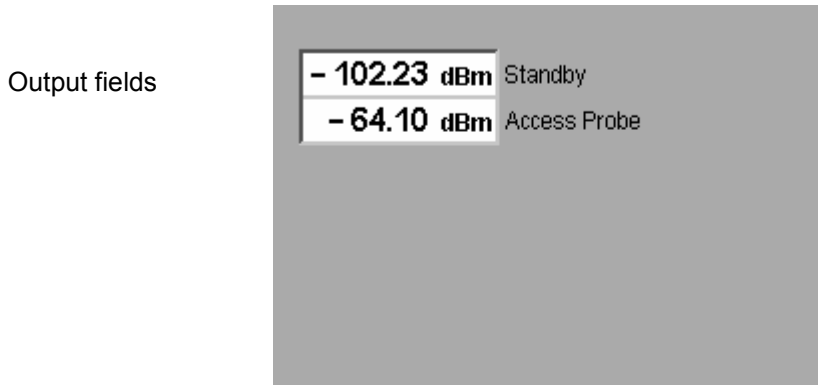


Figure 4-16 Display of results (Standby and Access Probe Power)

- Standby** *Standby Power* is the power of the mobile station while it is not transmitting. The *Standby Power* is measured using a 1 MHz filter (see also standard IA-866-A, section 4.3.6.3).
 - Access Probe** Power of the mobile station access probes. A mobile station transmits access probes to begin session negotiation and when the mobile initiates a call. The *Access Probe Power* is measured using the receiver filter specified in standard TIA-866-A, section 5.5, with mean output power in 1.23 MHz bandwidth.
- Remote control:
 READ[:SCALar]:SAPPower?
 FETCh[:SCALar]:SAPPower?
 SAMPlE[:SCALar]:SAPPower?

Power Configuration

The tab *Power Configuration* contains a tab to determine the parameters controlling the Modulation measurement including the error tolerances.

The popup menu *Power Configuration* is activated by pressing the measurement control softkey at the top right in the graphical measurement menu *NPower* twice. It is possible to change between the tabs by pressing the associated hotkeys.

Power Configuration – Control

The *Control* tab defines the scope of the measurement by determining

- The *Repetition* mode
- The *Stop Condition* for the measurement
- The number of evaluation periods forming a statistics cycle (*Statistic Count*)
- The number of samples per single shot Narrow Band Power measurement (*Capture Buffer Size*)

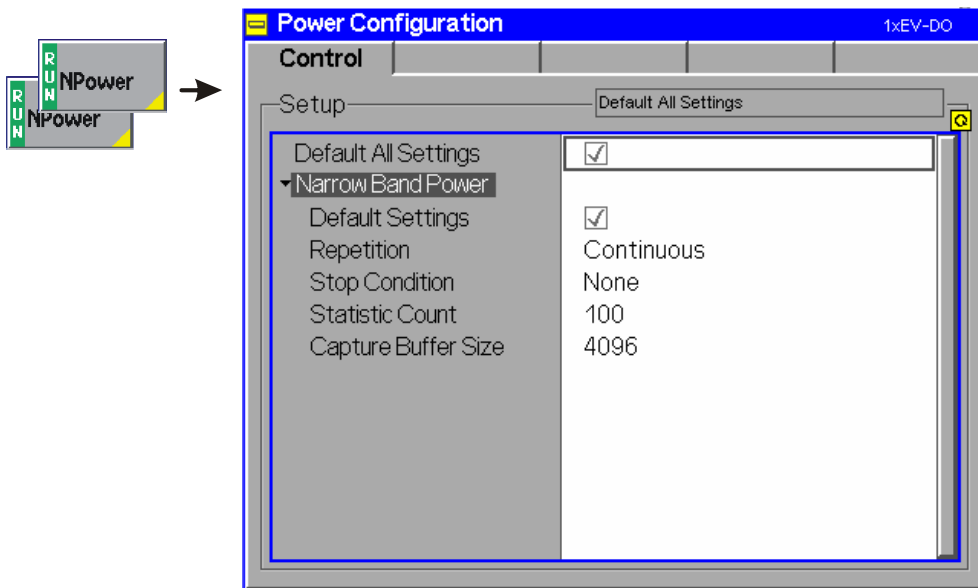


Figure 4-17 Power Configuration – Control

All settings may not be available for all power measurement applications. The statistical settings *Repetition*, *Stop Condition*, *Statistic Count*, and *Display Mode* have the same meaning in all measurements; they are described in section [Analyzer/Generator Configuration – Control](#) on p.4-37 ff. Note that the basic evaluation period for a single-shot narrow band power measurement is given by the number of samples defined via *Capture Buffer Size*.

Default Settings The *Default All Settings* switch assigns default values to all settings in the *Control* tab (the default values are quoted in the command description in chapter 6 of this manual). In addition, default switches for the individual applications are provided.

Remote Control:

Capture Buffer Size *Capture Buffer Size* allows the user to select the buffer size for all measurement shots.

Remote Control:
`CONFigure:NPOWER:CONTrol:CBSize <CaptureBufferSize>`

Modulation Measurements

The menu group *Modulation* contains several applications to measure the modulation parameters such as frequency error, waveform quality of the access terminal, and matching of the respective tolerance limits. Measurement results are displayed with a graph and a table of measurement results. The popup menu *Modulation Configuration* configures the parameters of the modulation measurements.

The *Modulation* menu is opened from the *Menu Select* menu (with associated key at the front of the instrument). The hotkeys associated to the *Menus* softkey switch over between the *Analyzer/Generator* menu and the remaining measurement menus of function group *1xEV-DO*.

- The measurement control softkey *Overview H-PSK* changes to *EVM H-PSK* etc., depending on the application selected. This softkey controls the measurement, indicates its status (*RUN* | *HLT* | *OFF*) and opens the configuration menu *Modulation Configuration*. The hotkeys associated to the measurement control softkey define the scope of the *Modulation* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys *RF Max. Level* and *RF Mode* belong to the softkey *Analyzer Level*). The softkey/hotkey combinations provide test settings and switch over between different measurements.

Modulation Parameters

The purpose of this section is to illustrate the meaning of the physical parameters determined in the *Modulation* measurement. For a discussion of the different averaging procedures involved please refer to chapter 3.

Definition of measured quantities:

The CMU measures the H-PSK modulation accuracy by calculating the Phase Error, Magnitude Error, and Error Vector Magnitude of the modulated signal from the access terminal. [Figure 4-18](#) shows a representation of these signal errors compared to an ideal signal.

Phase Error (PE) is the measured phase difference of the I/Q components of the signal received (from the access terminal) and an ideal reference signal at the detection points.

Magnitude Error (ME) is the normalized magnitude (amplitude) difference of the I/Q components of the signal received from the access terminal and an ideal reference signal at the detection points.

Error Vector Magnitude (EVM) is the normalized magnitude of the calculated vector linking the measured I/Q values to the ideal signal I/Q components at the detection points.

The *Waveform Interval* in a 1xEV-DO context is the length of a half slot, i.e. exactly 1024 chips.

The in-phase and quadrature reference components are based on an H-PSK waveform as specified in the IS-856-2 standards publication.

For a 1xEV-DO signal the composite Phase Error (PE), Magnitude Error (ME), Error Vector Magnitude (EVM), and waveform quality (Rho) are calculated.

The measurement interval for H-PSK modulation accuracy is 616 chip intervals ($\cong 0.5$ ms). The graphical displays represent 616 chips.

The composite Phase Error (PE), Magnitude Error (ME), and Error Vector Magnitude (EVM) in comparison to an ideal signal is shown below:

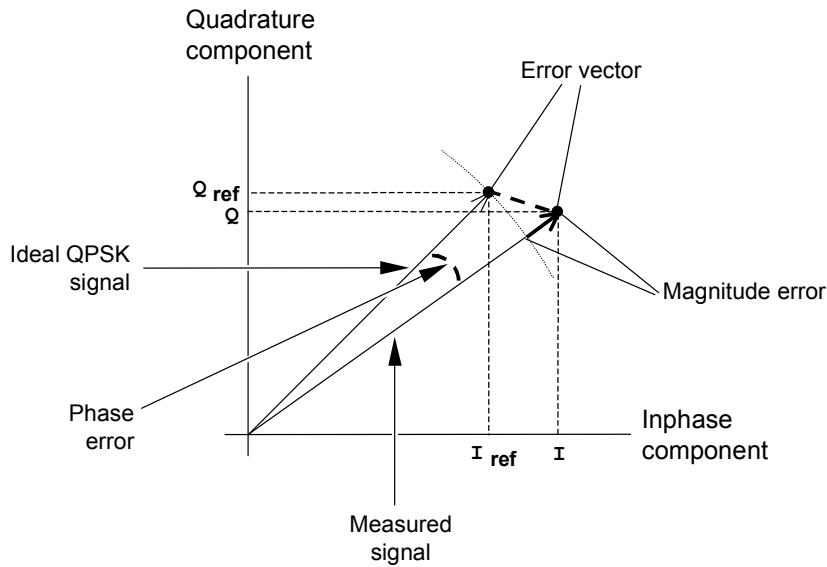


Figure 4-18 Modulation errors

The error vector is calculated as an array at each sample in the measurement interval. From the calculated error vector and the measured signal vector, the magnitude of the error vector (EVM), the phase error, and the magnitude error are calculated.

The *Modulation* measurement diagrams show the relative magnitude error and the relative EVM, i.e. the quantities defined above divided by the magnitude of the ideal modulation vector. In addition to the previous parameters, CMU provides the Carrier Feedthrough (origin offset), the I/Q Imbalance, and the Waveform Quality:

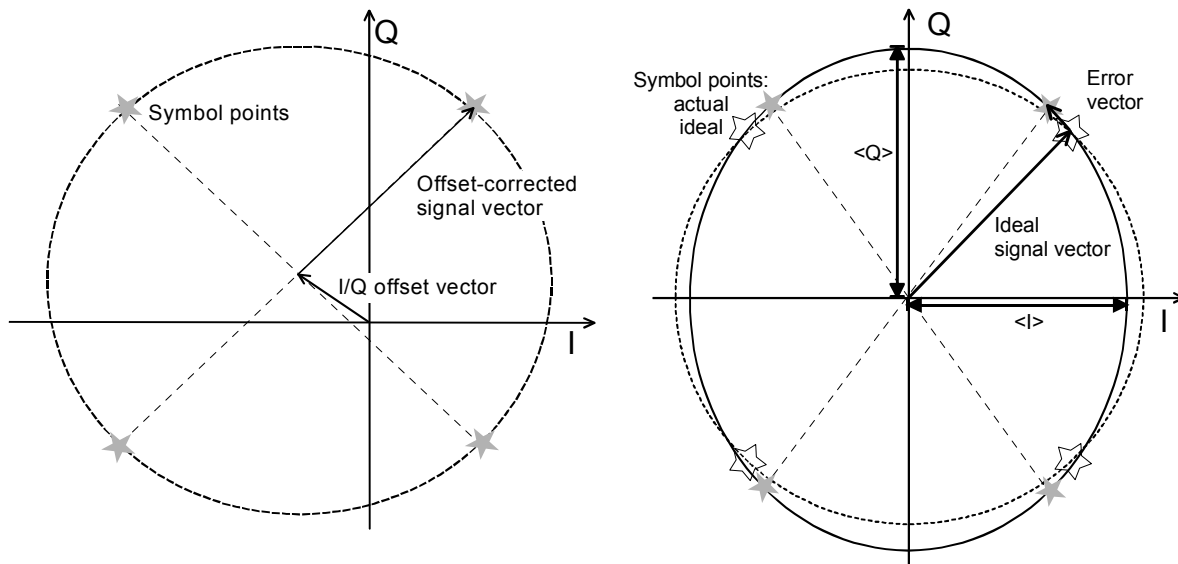


Figure 4-19: Modulation errors in the I/Q constellation diagram

Carrier Feedthrough (origin offset)

Figure 4-19 is an idealized representation of the modulation errors where the effects of a pure origin offset (left diagram) and of a pure I/Q imbalance (right diagram) are completely disentangled. The I/Q offset in dB is the logarithmic ratio of the I/Q offset vector (i.e. the estimated DC-offset of the measured signal) to the average offset-corrected signal vector:

$$\text{Origin Offset} = 20 \log \frac{|\text{I/Q offset vector}|}{|\text{Offset-corrected signal vector}|_{\text{RMS}}} \quad (\text{Equation 4-1}).$$

In equation 4-1, $|\text{Offset-corrected signal vector}|_{\text{RMS}}$ denotes the magnitude of the offset-corrected signal vector that is RMS-averaged over all samples.

I/Q Imbalance

The I/Q imbalance in dB is equal to the difference between the estimated I and Q amplitudes of the measured signal, which are normalized and logarithmized as follows:

$$\text{I/Q Imbalance} = 20 \log \frac{|\langle I \rangle - \langle Q \rangle|}{|\langle I \rangle + \langle Q \rangle|} \quad (\text{Equation 4-2}).$$

Waveform Quality

The waveform quality or Rho factor is a measure for the modulation accuracy and corresponds to the normalized correlated power between the actual waveform and the ideal waveform sampled at the constellation points. According to standard TIA-866-A, the waveform quality r_{Overall} is defined as:

$$r_{\text{Overall}} = \frac{\sum_{j=1}^N \left\{ \frac{\left| \sum_{k=1}^{1024} Z_{j,k} R_{j,k}^* \right|^2}{\sum_{k=1}^{1024} |R_{j,k}|^2} \right\}}{\sum_{j=1}^N \sum_{k=1}^{1024} |Z_{j,k}|^2} \quad (\text{Equation 4-3}),$$

where where $Z_{j,k} = z[1024(j-1)+k]$ is the k^{th} sample in the j^{th} half slot of the measured signal, and $R_{j,k} = r[1024(j-1)+k]$ is the corresponding sample of the ideal signal.

Modulation accuracy is measured by using the 1024N complex-valued samples, $z(t_k)$, over a time interval of N half slots. The first sample, $z(t_1)$, occurs at the first chip of a half slot and the final sample, $z(t_{1024N})$, occurs at the last chip of a half slot.

For an ideal transmitter ($Z_{j,k} = R_{j,k}$ for all k), the waveform quality is equal to 1. For real transmitters, the waveform quality is a positive real number smaller than 1.

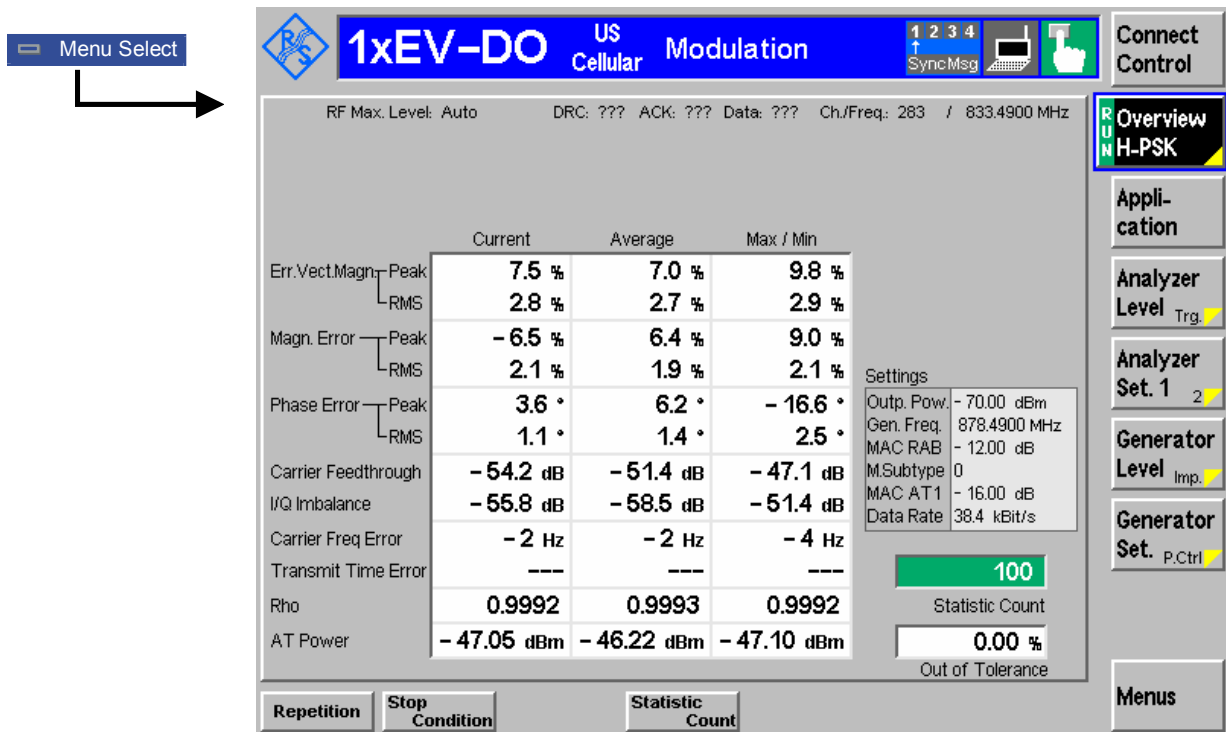


Figure 4-20 Modulation measurement menu

Softkey Selections

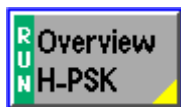
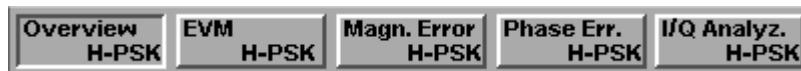
Each *Modulation* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The remaining softkeys select the application and provide application-specific settings.

Measurement Control

Each *Modulation* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys.



The *Application* softkey activates a set of hotkeys to select a modulation application. When an application is selected, the corresponding measurement screen is displayed.



The *Overview H-PSK* hotkey displays the statistics for all modulation measurements. No graphical display is provided.

Remote Control:

```
INITiate:MODulation:MQQuality:HPSK
ABORT:MODulation:MQQuality:HPSK
STOP:MODulation:MQQuality:HPSK
CONTINUE:MODulation:MQQuality:HPSK
FETCh[:SCALar]:MODulation:MQQuality:HPSK:STATus?
```



The *Error Vector Magnitude H-PSK* hotkey displays the error vector magnitude. The error vector magnitude measurement is described in section [Measurement Results](#) on p. 4-53 ff.

Remote Control:

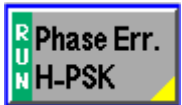
```
INITiate:MODulation:EVMagnitude:HPSK
ABORT:MODulation:EVMagnitude:HPSK
STOP:MODulation:EVMagnitude:HPSK
CONTInue:MODulation:EVMagnitude:HPSK
FETCh[:SCALar]:MODulation:EVMagnitude:HPSK:STATus?
```



The *Magnitude Error H-PSK* hotkey displays the magnitude error measurement. The magnitude error measurement is described in section [Measurement Results](#) on p. 4-53 ff.

Remote Control:

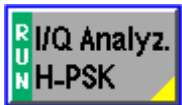
```
INITiate:MODulation:MERRor:HPSK
ABORT:MODulation:MERRor:HPSK
STOP:MODulation:MERRor:HPSK
CONTInue:MODulation:MERRor:HPSK
FETCh[:SCALar]:MODulation:MERRor:HPSK:STATus?
```



The *Phase Error H-PSK* hotkey displays the phase error measurement. The phase error measurement is described in section [Measurement Results](#) on p. 4-53 ff.

Remote Control:

```
INITiate:MODulation:PERRor:HPSK
ABORT:MODulation:PERRor:HPSK
STOP:MODulation:PERRor:HPSK
CONTInue:MODulation:PERRor:HPSK
FETCh[:SCALar]:MODulation:PERRor:HPSK:STATus?
```



The *I/Q Analyz.* hotkey displays the I/Q Analyzer measurement. The I/Q Analyzer measurement is described in section [Measurement Results](#) on p. 4-53 ff.

Remote Control:

```
INITiate:MODulation:IQANalyzer:HPSK
ABORT:MODulation:IQANalyzer:HPSK
STOP:MODulation:IQANalyzer:HPSK
CONTInue:MODulation:IQANalyzer:HPSK
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK:STATus?
```

Measurement configuration

Pressing the *Modulation* softkey twice (once if already selected) opens the *Modulation Configuration* popup menu (see page 4-36). Besides, the measurement control softkey provides hotkeys to define the scope of the measurement. All these settings are also provided in the configuration menu and described in more detail in section [Analyzer/Generator Configuration – Control](#) on page 4-37 ff.



The *Marker* softkey positions up to three markers and a baseline (D-Line) in the test diagram and shows their values. Refer to page 4-111 ff for detailed information about markers.

The softkey is only available for the following applications: *EVM H-PSK*, *Magn. Err H-PSK* and *Phase Err H-PSK*.



The *Display* softkey is available for the application *I/Q Analyz.* only. It allows the selection of the *Zoom* of the diagram, of the displayed *Waveform Type*, and the setting of the de-spreading mode of the output.

Remote Control:

CONFigure:MODulation:IQANalyzer:HPSK:DESPread OFF | DATA

Common settings

As outlined in section [Analyzer/Generator](#) on p. 4-32 ff., some of the hotkey/softkey combinations in the *Analyzer/Generator* menu are valid regardless of the application. These common settings are also provided in the [Connection Control](#) menu; for a detailed description refer to p. 4-3 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections [Trigger \(Connection Control – Trigger\)](#) on p. 4-27 ff. and [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Analyzer Settings 1/2* softkey defines the center frequency of the RF analyzer. The settings are provided in the *Analyzer* tab of the *Connection Control* menu; see section [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Generator Level/Impairment* softkey defines the levels in all physical channels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.
- The *Generator Settings/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal, its modulation and an offset of the PN sequence. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.

Settings table

The *Settings* table on the right side of the *Modulation* menu gives an overview of the measurement settings of the current application as defined by means of the softkey/hotkey combinations or in the configuration menus. It changes when a different application is selected. The roll-key scrolls and expands the *Setup* table.

Measurement Results

The modulation measurement screens are similar for the applications *EVM H-PSK*, *Magn. Err. H-PSK* and *Phase Err. H-PSK*. The *Overview H-PSK* application does not provide a graph. The application *I/Q Analyzer* is described in section [I/Q Analyzer](#) on p. 4-57 ff.

EVM H-PSK, Magn. Err. H-PSK and Phase Err. H-PSK

The description of the graphs and common output data follows below. Information specific to an application is located within the application heading. Limits for all modulation measurements are defined in the *Modulation Control* configuration menu.

The measurement screens can be divided into three groups:

- Scalar measurement results (parameter lines and output tables)
- Graph (a trace plotted as a function of time)
- Settings overview

Parameter lines
1 and 2

Measurement
graph

Output table

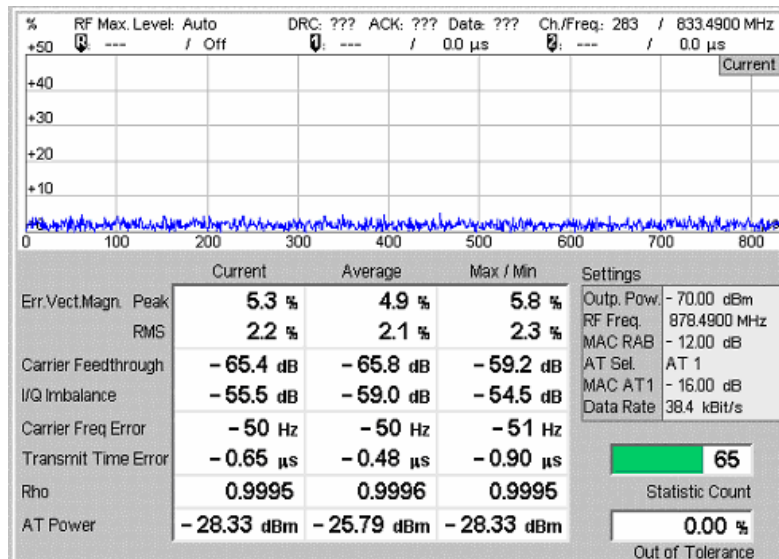


Figure 4-21 Modulation results display

Parameter Lines Scalar measurement results and settings are indicated in the two parameter lines above the test diagram and in the *Settings* table below.

1st Line The first parameter line contains the following settings:

- RF Max. Level* The total output power, either calculated as a function of the RF generator output level (Auto) or set manually.
- DRC* The settings of the DRC channel filter
- ACK* The settings of the ACK channel filter
- Data* The settings of the Data channel filter
- Ch./Freq* Channel and frequency set for the BS signal

2nd Line The second parameter line contains the following marker values:

- Level and time of reference marker
- Level and time of marker 1 (setting *absolute*) and/or difference from reference marker (setting *relative*)
- Level and time of marker 2 (setting *absolute*) and/or difference from reference marker (setting *relative*)

Settings The values shown in the *Settings* table are defined in the *Control* tab of the *Connection Control* menu; see section [Modulation Configuration – Control](#) on p. 4-63 ff.

Measurement Graph The *Measurement Graph* is displayed as a continuous curve together with the limit lines and all active markers.

The graph in each measurement shows the respective measurement error as a function of time. The display mode for the graph (*Current*, *Average*, *Max/Min*) is indicated in the upper right corner of the screen.

Statistic Count	The <i>Statistic Count</i> is the number of intervals since the start of the measurement. The bar graph represents a percentage of intervals measured based on the number of intervals (<i>Statistic Count</i>) set in the configuration menu.						
Output Table	<p>The output table contains a tabular overview of modulation related measurements. The first rows of data are specific to the selected modulation measurement. The remaining rows are identical for each modulation measurement.</p> <p>Three values are given for each row:</p> <table border="0" style="margin-left: 40px;"> <tr> <td style="padding-right: 20px;"><i>Current</i></td> <td>These are the current values of the measurement interval.</td> </tr> <tr> <td><i>Max/Min</i></td> <td>These are the extreme values (and their polarity) of all measurement intervals since the measurement started.</td> </tr> <tr> <td><i>Average</i></td> <td>These are the average values of a number of measurement intervals (defined by the <i>Statistic Count</i> setting; see section <i>General Settings</i> in chapter 3).</td> </tr> </table> <p>Any values exceeding the defined limits appear with a red background. Limit values are set in the Limit tab of the <i>Modulation Configuration</i> menu.</p>	<i>Current</i>	These are the current values of the measurement interval.	<i>Max/Min</i>	These are the extreme values (and their polarity) of all measurement intervals since the measurement started.	<i>Average</i>	These are the average values of a number of measurement intervals (defined by the <i>Statistic Count</i> setting; see section <i>General Settings</i> in chapter 3).
<i>Current</i>	These are the current values of the measurement interval.						
<i>Max/Min</i>	These are the extreme values (and their polarity) of all measurement intervals since the measurement started.						
<i>Average</i>	These are the average values of a number of measurement intervals (defined by the <i>Statistic Count</i> setting; see section <i>General Settings</i> in chapter 3).						
Modulation Error	<p>Refer to the respective measurement type for information about the data reported in these first two rows.</p> <table border="0" style="margin-left: 40px;"> <tr> <td style="padding-right: 20px;"><i>Phase Error</i></td> <td>Measured phase difference of the I/Q components of the signal received (from the access terminal) and an ideal reference signal at the detection points.</td> </tr> <tr> <td><i>Magnitude Error</i></td> <td>Difference in magnitude (in percent) between the received signal waveform and an ideal HPSK signal waveform. The magnitude error is the difference in amplitude between the measured signal from the access terminal transmitter and an ideal signal waveform at the detection points.</td> </tr> <tr> <td><i>Error Vector Magnitude</i></td> <td>Calculated percentage of vector error (at the detection points) between the received signal and an ideal signal.</td> </tr> </table>	<i>Phase Error</i>	Measured phase difference of the I/Q components of the signal received (from the access terminal) and an ideal reference signal at the detection points.	<i>Magnitude Error</i>	Difference in magnitude (in percent) between the received signal waveform and an ideal HPSK signal waveform. The magnitude error is the difference in amplitude between the measured signal from the access terminal transmitter and an ideal signal waveform at the detection points.	<i>Error Vector Magnitude</i>	Calculated percentage of vector error (at the detection points) between the received signal and an ideal signal.
<i>Phase Error</i>	Measured phase difference of the I/Q components of the signal received (from the access terminal) and an ideal reference signal at the detection points.						
<i>Magnitude Error</i>	Difference in magnitude (in percent) between the received signal waveform and an ideal HPSK signal waveform. The magnitude error is the difference in amplitude between the measured signal from the access terminal transmitter and an ideal signal waveform at the detection points.						
<i>Error Vector Magnitude</i>	Calculated percentage of vector error (at the detection points) between the received signal and an ideal signal.						
Carrier Feedthrough	<i>Carrier Feedthrough</i> refers to the origin offset, which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.						
I/Q Imbalance	<i>I/Q Imbalance</i> is the amplitude ratio between the in-phase (I) and quadrature (Q) components of the signal.						
Carrier Freq Error	<i>Carrier Frequency Error</i> is the difference between the nominal frequency of the selected channel and the measured frequency.						
Transmit Time Error	<i>Transmission Time Error</i> is the time offset between the access terminal signal and the CMU signal.						
Rho	<i>Rho</i> is the modulation accuracy of the transmitted signal. The waveform quality is obtained by comparing the transmitted signal to an ideal HPSK signal as defined in standard TIA-866.						
AT Power	<i>AT Power</i> is the total transmitted power level from the access terminal.						

```

Remote      READ[:SCALar]:MODulation:OVERview:HPSK?
Control     FETCh[:SCALar]:MODulation:OVERview:HPSK?
            SAMPlE[:SCALar]:MODulation:OVERview:HPSK?

            READ[:SCALar]:MODulation:EVMagnitude:HPSK?
            FETCh[:SCALar]:MODulation:EVMagnitude:HPSK?
            SAMPlE[:SCALar]:MODulation:EVMagnitude:HPSK?

            READ[:SCALar]:MODulation:MERRor:HPSK?
            FETCh[:SCALar]:MODulation:MERRor:HPSK?
            SAMPlE[:SCALar]:MODulation:MERRor:HPSK?

            READ[:SCALar]:MODulation:PERRor:HPSK?
            FETCh[:SCALar]:MODulation:PERRor:HPSK?
            SAMPlE[:SCALar]:MODulation:PERRor:HPSK?
    
```

Overview H-PSK

The *Overview H-PSK* application allows you to view all modulation measurements in a single output table (no graph of the measurements is provided).

The peak and the RMS values of the current measurement interval are displayed for each modulation application. The average values (positive or negative) are calculated over a user definable number of *Statistic Counts*. The Min/Max. values are the extreme values from the start of the measurement.

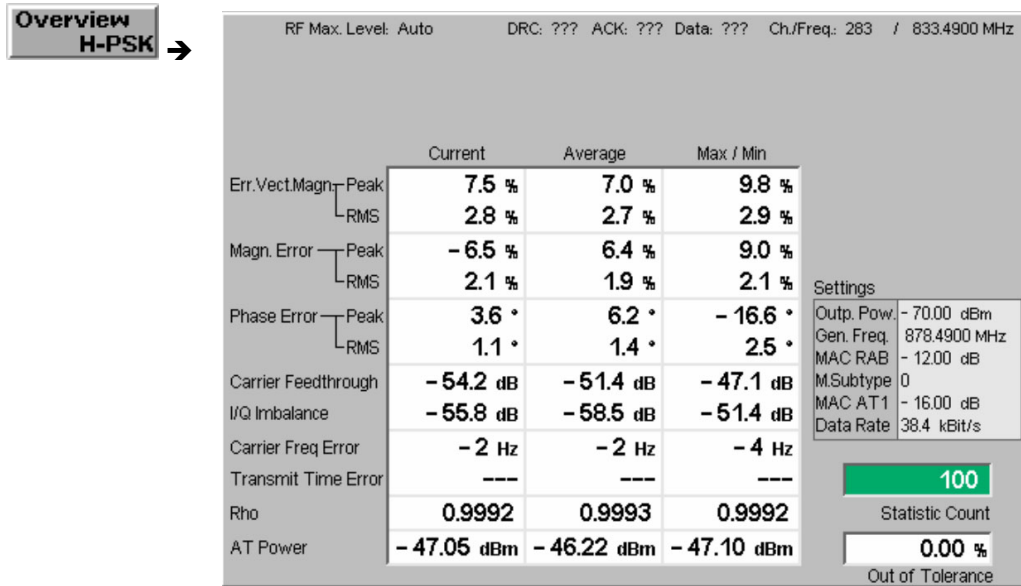


Figure 4-22 Overview display

I/Q Analyzer

The I/Q Analyzer application displays I/Q diagrams to visualize the quality of the received measurements results. The benefit of this measurement is to easily identify issues with the received signals. To achieve this, the application I/Q-Analyzer can display the measurement results in 5 different diagrams:

- Constellation Diagram
- Vector Diagram
- I Phase Diagram
- Q Phase Diagram
- I Phase & Q Phase Diagram

Constellation Diagram and Vector Diagram contain additional scalar information of the current measurement.

The settings of the *Code Channel Filters* (section *Analyzer Control (Connection Control – Analyzer)* on p. 4-4) have a major influence on evaluation and display of the measurement results.

Constellation Diagram

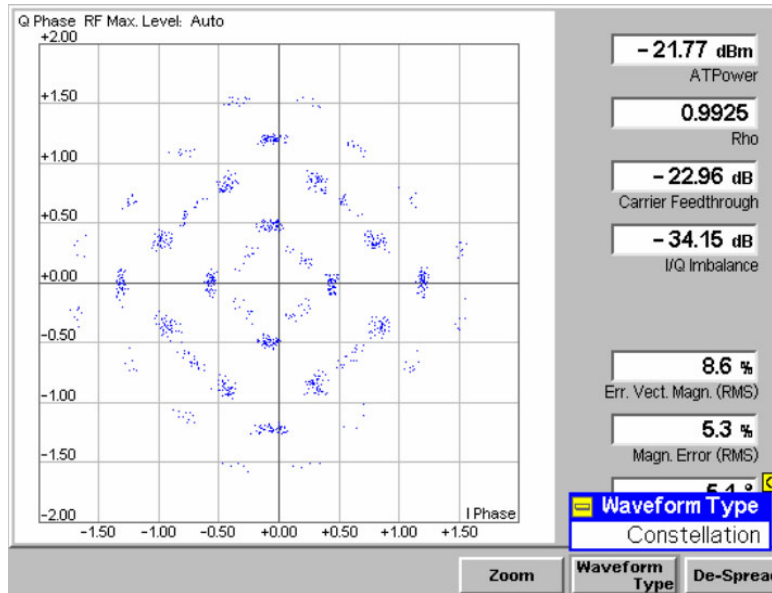


Figure 4-23 Waveform Type Constellation

Vector Diagram

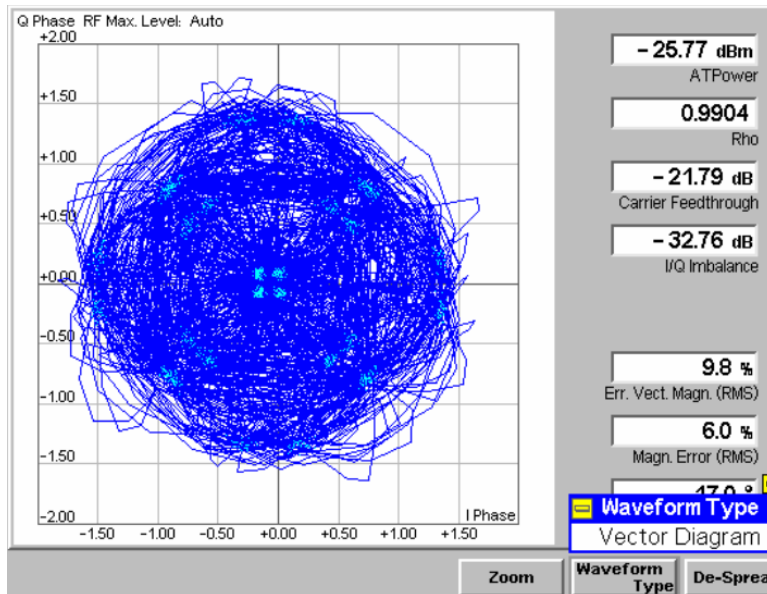


Figure 4-24 Waveform Type Vector Diagram

I Phase Diagram

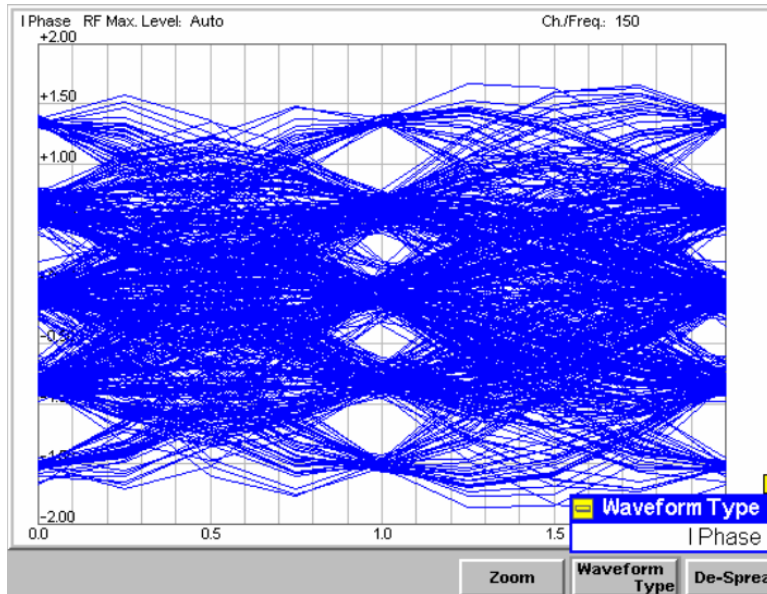


Figure 4-25 Waveform Type I Phase

Q Phase Diagram

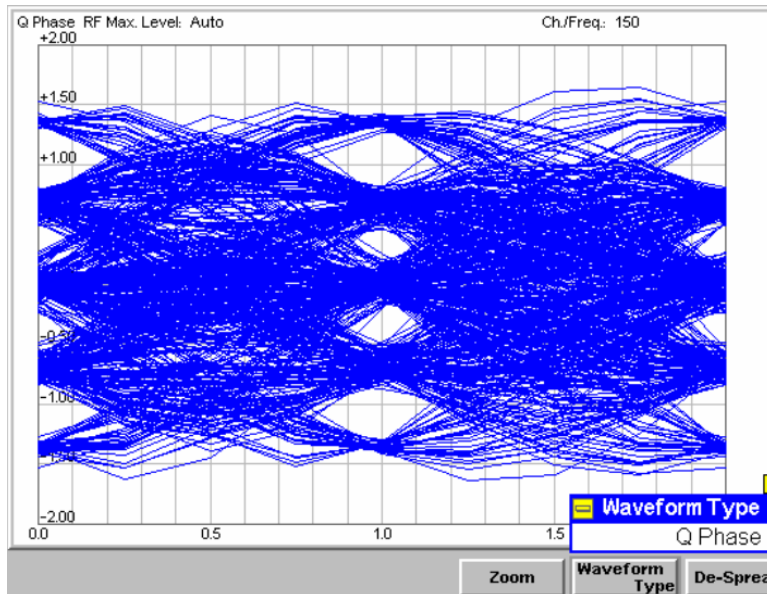


Figure 4-26 Waveform Type Q Phase

I Phase & Q Phase Diagram

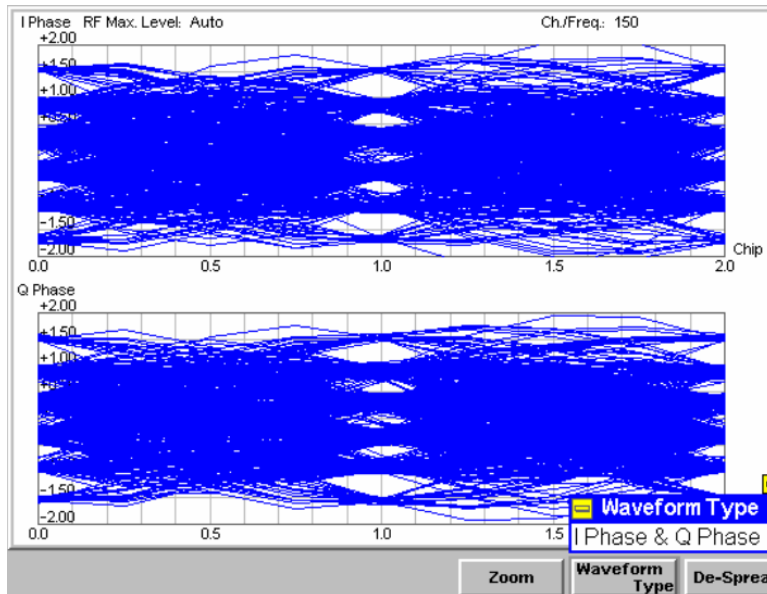


Figure 4-27 Waveform Type I Phase & Q Phase

Diagram

Depending on the setting of Waveform Type, the different diagrams of the I/Q Analyzer are being displayed. The following diagrams can be displayed:

Constellation Diagram In the Constellation diagram the modulation vector is only traced at the constellation points; the diagram shows a dot for each chip symbol. The constellation diagram of an ideal QPSK-modulated signal contains 4 constellation points with distance 1 from the origin and relative angles of $\pi/2$. Large variations of the symbol point positions in the constellation diagram indicate a poor signal quality; see Figure 4-23 on p. 4-57. In the QPSK application the symbol mapping between the logic data and the constellation points is

not evaluated. As a consequence the overall phase of the diagram is random; a logic symbol may correspond to any of the four constellation points. By the symmetry, the position of the measurement shots and their sharpness the quality of the current signal can be analyzed.

Vector Diagram

In the Vector diagram the modulation vector is traced with an oversampling factor of 4; the diagram shows a continuous curve. The vector diagram shows that the modulation scheme allows transitions between each pair of constellation points.

I Phase, Q Phase, I Phase & Q Phase

The I Phase, the Q Phase, and the I Phase & Q Phase diagrams trace the normalized I and Q amplitudes as a function of time. Diagrams of this type are often referred to as "eye" diagrams. The horizontal axis covers a fixed 2-chip time interval, starting at the time of a constellation point, whereas the total duration is given by the Measurement Length. The measurement curve restarts at the left diagram edge after each 2-chip period so that the complete diagram for a measurement length of 640 chips (2560 chips) contains 320 (1280) superimposed curves.

The number of nodes on the vertical axis of the I or Q eye diagram is equal to the number of different I or Q amplitudes in the constellation diagram. The number of eyes is equal to the number of nodes minus one. Smeared-out nodes and small eye apertures indicate a poor signal quality.

The I Phase and Q Phase diagrams are analogous; the combined I Phase & Q Phase diagram displays the I Phase diagram on top of the Q Phase diagram. To customize the graphical representation it is possible to zoom the diagrams in vertical direction, keeping the zero-amplitude reference at fixed position, and to display or remove the grid.

Output Table	The output table in the diagram types Constellation and Vector display the following results:
AT Power	<i>AT Power</i> is the total transmitted power level from the access terminal.
Rho	<i>Rho</i> is the modulation accuracy of the transmitted signal. The waveform quality is obtained by comparing the transmitted signal to an ideal HPSK signal as defined in standard TIA-866.
Carrier Feedthrough	<i>Carrier Feedthrough</i> refers to the origin offset, which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.
I/Q Imbalance	The <i>I/Q Imbalance</i> is the amplitude ratio between the in-phase (I) and quadrature (Q) components of the signal.

Error Vector Magnitude	Calculated percentage of vector error (at the detection points) between the received signal and an ideal signal.
Magnitude Error	Difference in magnitude (in percent) between the received signal waveform and an ideal HPSK signal waveform. The magnitude error is the difference in amplitude between the measured signal from the access terminal transmitter and an ideal signal waveform at the detection points.
Phase Error	Measured phase difference of the I/Q components of the signal received (from the access terminal) and an ideal reference signal at the detection points.

De-spreading Mode

The de-spreading mode allows the analysis of the I/Q signal either as composite signal on the chip level (De-Spread set to OFF, Figure 4-28), or only the data channel on the symbol level (De-Spread set to Data Symbols, Figure 4-29).

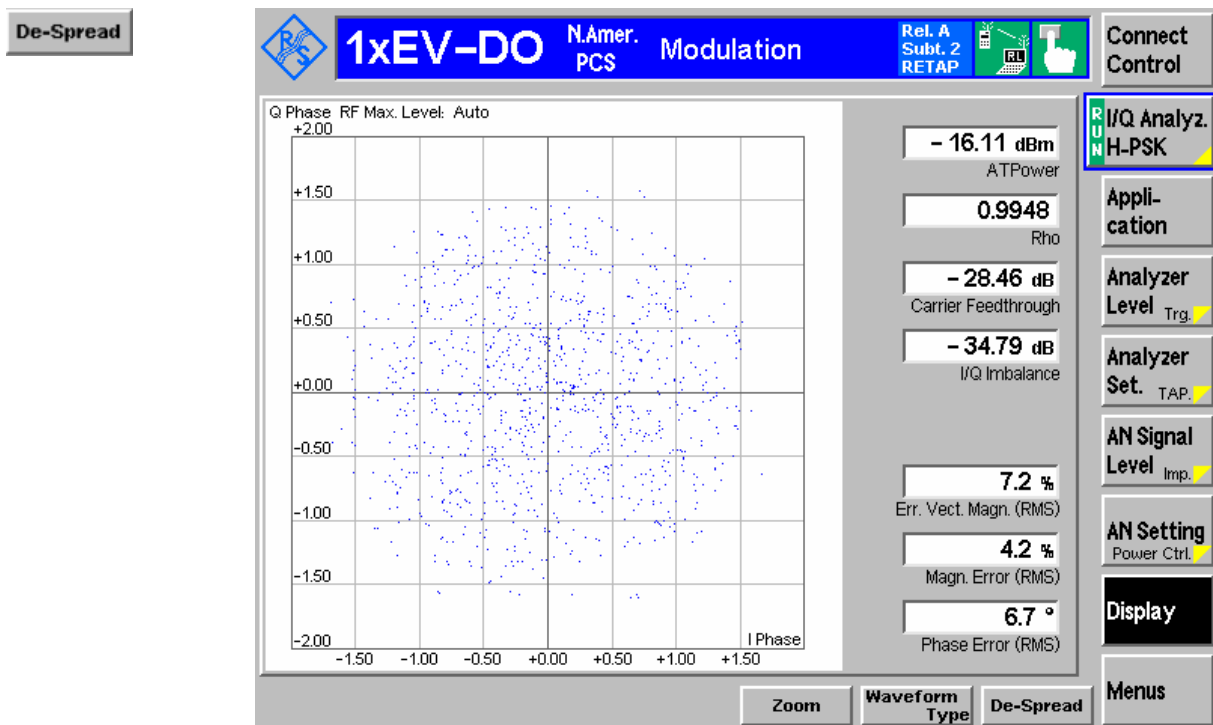


Figure 4-28 Modulation Application I/Q Analyzer HPSK – De-spread OFF

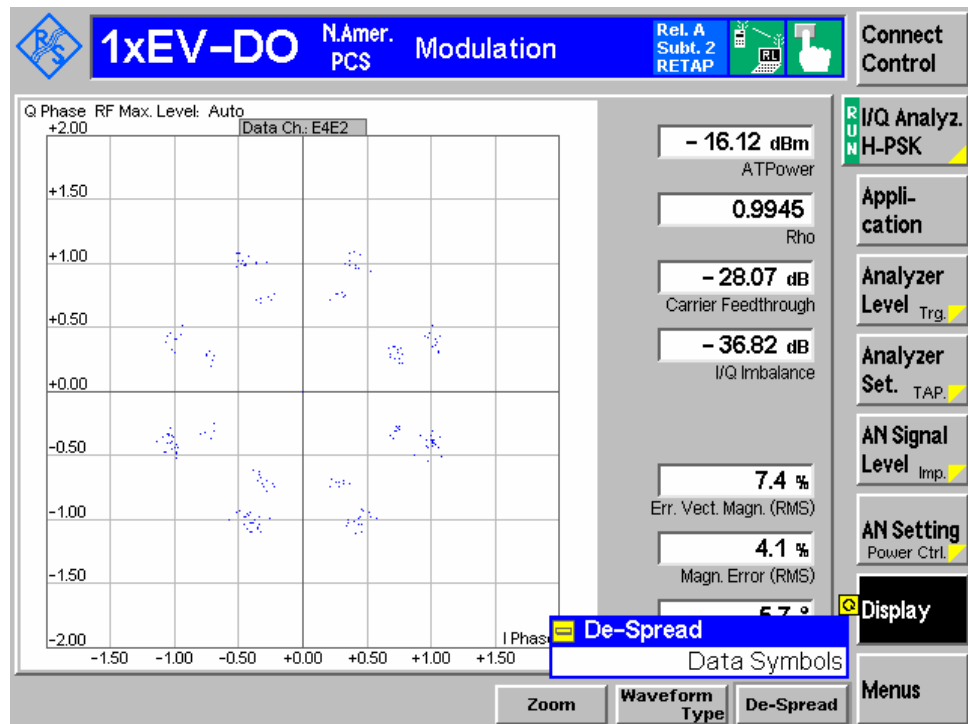


Figure 4-29 Modulation Application I/Q Analyzer HPSK – De-spread DATA

If subtype 2 physical layer is active, the data channel may have different modulation mappings depending on the data rate:

- B4-Modulation (BPSK on Q-branch with W_2^4)
- Q4-Modulation (QPSK with W_2^4)
- Q2-Modulation (QPSK with W_1^2)
- Q4Q2-Modulation (composite QPSK modulation with W_1^2 and W_2^4)
- E4E2-Modulation (composite 8PSK modulation with W_1^2 and W_2^4)

The data channel modulation type is shown for data symbol de-spreading in the small grey box on top of the diagram.

The number of resulting I/Q values from the de-spreading is different for each data channel modulation:

Modulation Type	# of Results
B4	256 IQ values ($l = 0$)
Q4	256 IQ values
Q2	512 IQ values
Q4Q2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)
E4E2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)

The Q4Q2 and E4E2 constellation consists of two orthogonal Walsh codes, hence the result is split into the W_2^4 and W_1^2 parts. By plotting both parts into one pseudo-constellation diagram it shows both parts together (but the timing relation is lost within the pseudo-constellation diagram).

Remote Control

CONFigure:MODulation:IQANalyzer:HPSK:DESPread OFF | DATA

Modulation Configuration

The popup menu *Modulation Configuration* contains two tabs to define the parameters of the modulation measurements including the error tolerances.

Pressing the measurement softkey twice opens the popup menu *Modulation Configuration*. Press the associated hotkeys to change between tabs. Use the roll-key to expand or compress the list of settings displayed.

Modulation Configuration – Control

The *Control* tab controls the modulation measurement applications. The control configuration is divided into settings for the different modulation applications

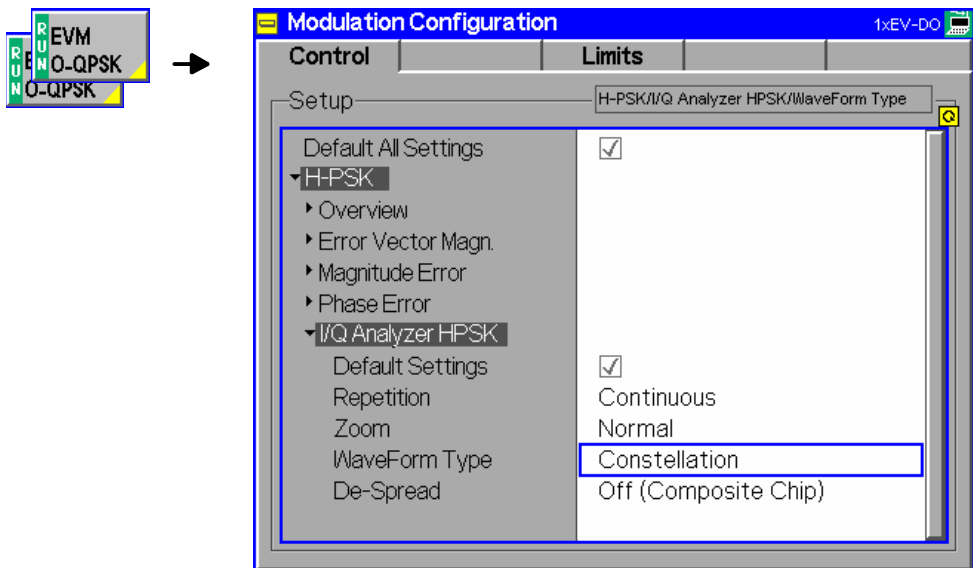


Figure 4-30 Modulation Configuration – Control

All settings may not be available for all modulation measurement applications. The statistical settings *Repetition*, *Stop Condition*, *Statistic Count*, and *Display Mode* have the same meaning in all measurements; they are described in section *Analyzer/Generator Configuration – Control* on p. 4-37 ff. The *Display Mode* is available for measurement curves only.

- Zoom *Zoom* is available for the *I/Q Analyzer H-PSK* only. It can be used to zoom in and out of the diagram to closer study the diagram results.
- WaveForm Type *WaveForm Type* is available for the *I/Q Analyzer H-PSK* only. *WaveForm Type* allows the user to select the different available diagrams of *I/Q Analyzer H-PSK*.
- De-Spread *De-Spread* is available for the *I/Q Analyzer H-PSK* only. It allows the user to analyze the *I/Q* signal either as composite signal on the chip level (*OFF*), or only the data channel on the symbol level (*DATA*).

Modulation Configuration – Limits

The *Limits* tab defines the tolerance limits for each of the *Modulation* measurement applications, except for the *I/Q Analyzer* which has no limit settings. Two sets of limits are configurable for each measurement: the *Current* and *Maximum/Minimum* measurement limits and the *Average* measurement limits.

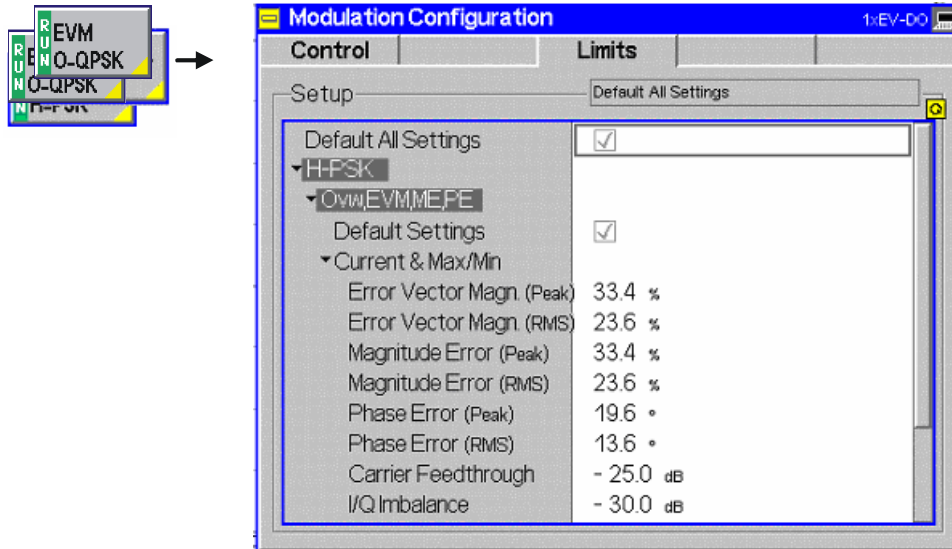


Figure 4-31 Modulation Configuration – Limits

Default All Settings

The *Default All Settings* switch assigns default values to all parameters of the modulation *Limits* tab (the default values are quoted in the command description in chapter 6 of this manual). Additional default switches are provided for the individual applications.

Remote control

```
DEFault:MODulation:<Application>:LIMit ON | OFF
```

Current & Max/Min

Current and Max/Min sets the limits for the measured values in the current waveform interval or of the extreme values of all measured waveform intervals (Min/Max).

Remote control:

```
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:
SYMMetric[:COMBined]:VALue
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:
SYMMetric[:COMBined]:ENABLE
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:
SYMMetric[:COMBined]
```

Average

Average sets the limits for the average value of the measured values derived from the last statistic cycle.

Remote control:

```
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:
SYMMetric[:COMBined]:VALue
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:
SYMMetric[:COMBined]:ENABLE
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:
SYMMetric[:COMBined]
```


Spectrum Measurements

The *Spectrum* menu provides access to the ACP spectrum measurement of 1xEV-DO. The measurement results are also available using the *Analyzer/Generator Measurement* on p. 4-32. This measurement however displays all results in a diagram.

The *Spectrum* menu is opened from the *Menu Select* menu (with associated key at the front of the instrument). The hotkeys associated to the *Menus* softkey switch over between the *Spectrum* menu and the remaining measurement menus of function group 1xEV-DO.

The Spectrum measurement serves to measure the strength of spurious emissions in the vicinity of the designated channel frequency (carrier frequency). An excess amount of off-carrier power increases the interference with adjacent channels and decreases the system capacity.

ACP The off-carrier power is measured at four configurable, symmetrical pairs of offset frequencies from the nominal carrier frequency and displayed as an Adjacent Channel Power (ACP) relative to the carrier power. In contrast to other power measurements, the ACP is measured with a 30 kHz spectrum analyzer filter; see also Table 4-5 on p. 4-67.

The ACP at a single pair of offset frequencies is also available in the Overview menu; see Sideband Suppression on p. 4-36.

In the softkey bar on the right side, the *Spectrum* menu provides different types of softkeys:

- The measurement control softkey *ACP* controls the measurement, indicates its status (*RUN* | *HLT* | *OFF*) and opens the configuration menu *Spectrum Configuration*. The hotkeys associated to the measurement control softkey define the scope of the *Modulation* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys *RF Max. Level* and *RF Mode* belong to the softkey *Analyzer Level*). The softkey/hotkey combinations provide test settings and switch over between different measurements.

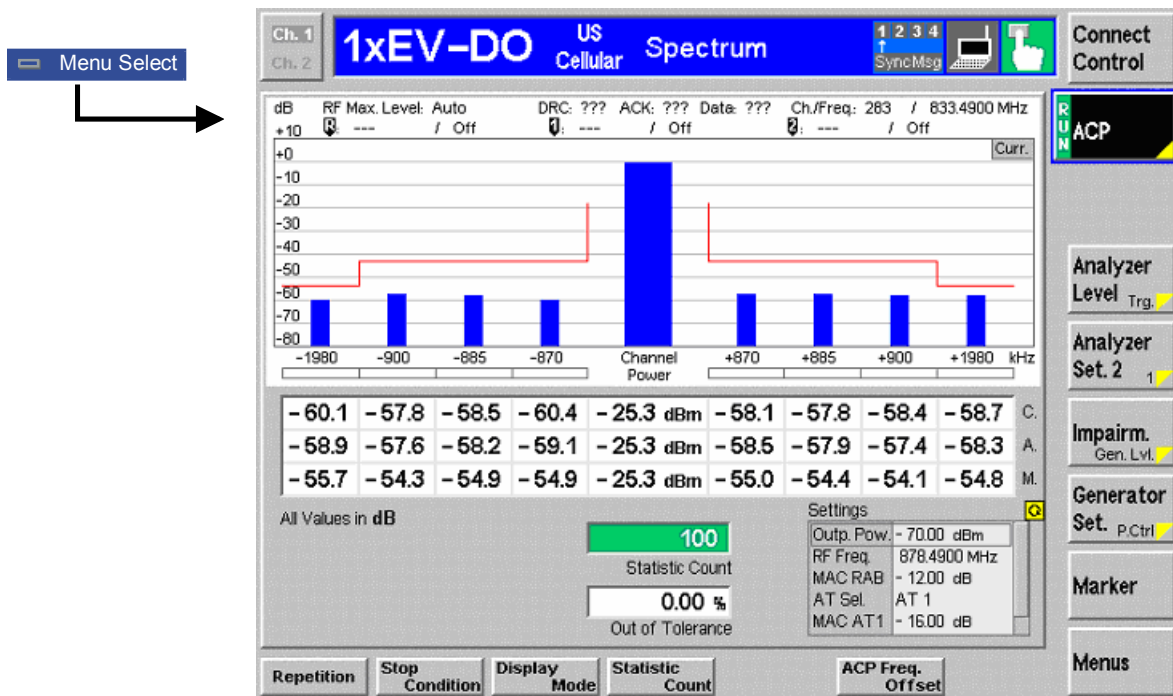


Figure 4-32 Measurement menu – Spectrum

Softkey Selections

The *Spectrum* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The remaining softkeys select the application and provide application-specific settings.

Measurement Control

The *Spectrum* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys.



The *ACP* softkey controls the *ACP* measurement and indicates its status (*RUN* | *HLT* | *OFF*). To change the status, press the *ACP* softkey once and then use the front panel keys *ON/OFF* or *CONT/HALT*.

Pressing the *ACP* softkey twice (once if already selected) opens the *Spectrum Configuration* popup menu (see section [Spectrum Configuration](#) on p. 4-69 ff.).

Remote Control:

```
INITiate:SPECTrum:ACP
ABORt:SPECTrum:ACP
STOP:SPECTrum:ACP
CONTinue:SPECTrum:ACP
FETCh[:SCALar]:SPECTrum:ACP:STATus?
```

Measurement configuration

Pressing the *ACP* softkey twice (once if already selected) opens the *Spectrum Configuration* popup menu (see page 4-69). Besides, the measurement control softkey provides hotkeys to define the scope of the measurement. All these settings are also provided in the configuration menu and described in more detail in section [Spectrum Configuration](#) on p. 4-69 ff.

Common Settings

As outlined in section [Analyzer/Generator](#) on p. 4-32 ff., some of the hotkey/softkey combinations in the *Analyzer/Generator* menu are valid irrespective of the application. These common settings are also provided in the [Connection Control](#) menu; for a detailed description refer to p. 4-3 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections [Trigger \(Connection Control – Trigger\)](#) on p. 4-27 ff. and [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Analyzer Settings 1/2* softkey defines the center frequency of the RF analyzer. The settings are provided in the *Analyzer* tab of the *Connection Control* menu; see section [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-4 ff.
- The *Generator Level/Impairment* softkey defines the levels in all physical channels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.
- The *Generator Settings/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal, its modulation and an offset of the PN sequence. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section [Connection Control – Generator](#) on p. 4-12 ff.

Settings table The *Settings* table on the lower right side of the *Spectrum* menu gives an overview of the measurement settings of the current application as defined by means of the softkey/hotkey combinations or in the configuration menus. It changes when a different application is selected. The roll-key scrolls and expands the *Setup* table.

Measurement Results

The results are displayed in various output fields in the left half of the measurement menu. The display mode (*Current*, *Min./Max.* or *Average*) can be selected with the softkey *Display Mode* that is visible when the Measurement Control softkey has been selected.

Parameter lines 1 and 2

Measurement graph

Sideband Frequency Offset

Output table

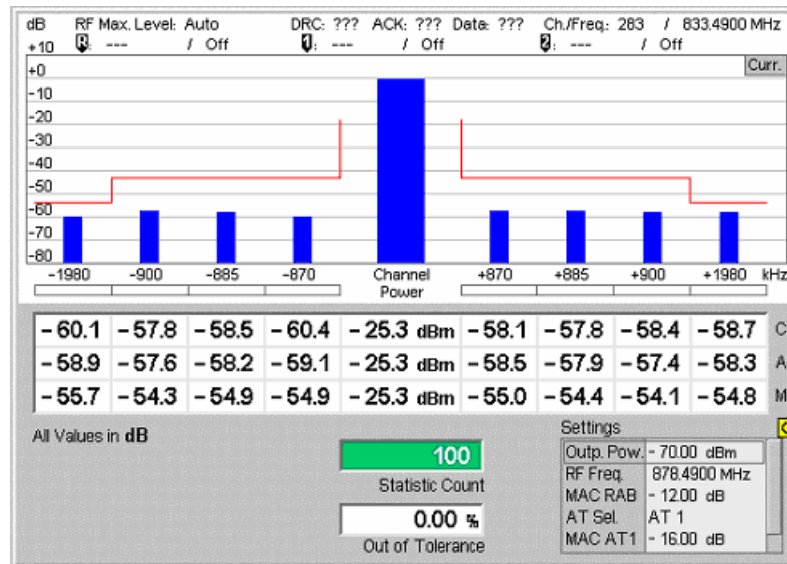


Figure 4-33 Display of results (Analyzer/Generator)

Filter settings for power measurements

The CMU measures and displays different power results, acquired with different measurement methods.

Most of the power measurements are performed using a bandwidth of 4 MHz. In particular, this holds for *AT Power* displayed in the *Analyzer/Generator* menu. The power results listed in the table below are obtained with different measurement filters.

Table 4-5 Filter settings for power measurements

Value	Menu	Filter
AT Power	Analyzer/Generator, see below.	4 MHz bandwidth filter
Sideband Suppression	Analyzer/Generator, see below.	30 kHz (Gaussian) spectrum analyzer filter

Parameter Lines Scalar measurement results and settings are indicated in the two parameter lines above the test diagram and in the *Settings* table below.




1st Line

The first parameter line contains the following settings:

<i>RF Max. Level</i>	The total output power, either calculated in adaption to the signal level (Auto) or set manually.
<i>DRC</i>	The settings of the DRC channel filter
<i>ACK</i>	The settings of the ACK channel filter
<i>Data</i>	The settings of the Data channel filter
<i>Ch./Freq</i>	Channel and frequency set for the BS signal

2nd Line

The second parameter line contains the following marker values:

	Level and time of reference marker
	Level and time of marker 1 (setting <i>absolute</i>) and/or difference from reference marker (setting <i>relative</i>)
	Level and time of marker 2 (setting <i>absolute</i>) and/or difference from reference marker (setting <i>relative</i>)

Measurement Graph

The *Measurement Graph* is displayed as a set of vertical bar diagrams which represent ACP for the given sideband frequency offset.

The display mode for the graph (*Current, Average, Max/Min*) is indicated in the upper right corner of the screen.

Channel Power

As a reference the *Channel Power* is displayed in the middle of the graph. The *Channel Power* is set according to the current settings of the *AT Power*.

Sideband Frequency Offset

This line displays the selected sideband frequency offsets for each graph and table of this measurement. The offset can be configured using the [Spectrum Configuration – Control](#) on pg. 4-69.

Settings

The values shown in the *Settings* table are defined in the *Control* tab of the *Connection Control* menu; see [Modulation Configuration – Control](#) on p. 4-63 ff.

Statistic Count

The *Statistic Count* is the number of intervals since the start of the measurement. The bar graph represents a percentage of intervals measured based on the number of intervals (*Statistic Count*) set in the configuration menu.

Output Table

The output table contains a tabular overview of the measurement results for the selected sideband frequency offset.

Each column contains three different measurement result:

<i>Current</i>	These are the current values of the measurement interval.
<i>Max/Min</i>	These are the extreme values (and their polarity) of all measurement intervals since the measurement started.
<i>Average</i>	These are the average values of a number of measurement intervals (defined by the <i>Statistic Count</i> setting; see section <i>General Settings</i> in chapter 3).

Remote Control:

```

READ[:SCALar]:SPECTrum:ACP?
FETCh[:SCALar]:SPECTrum:ACP?
SAMPle[:SCALar]:SPECTrum:ACP?
XTND:SPECTrum:ACP:STATistics[?] ON | OFF

```

Spectrum Configuration

The popup menu *Spectrum Configuration* contains two tabs to define the parameters of the modulation measurements including the error tolerances.

Pressing the measurement softkey twice opens the popup menu *Spectrum Configuration*. Press the associated hotkeys to change between tabs. Use the roll-key to expand or compress the list of settings displayed.

Spectrum Configuration – Control

The *Control* tab controls the spectrum measurement applications by defining the statistical settings and the four offset frequencies for the ACP measurement.

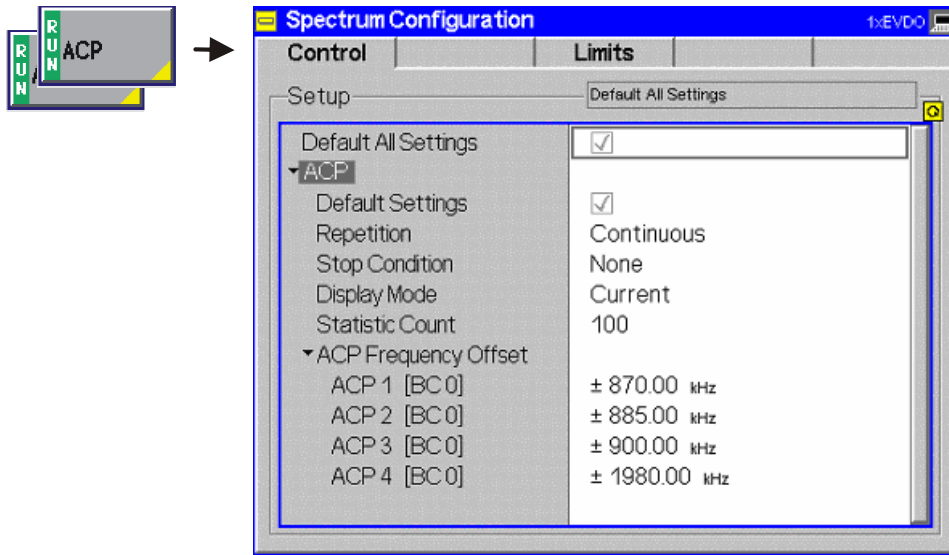


Figure 4-34 Spectrum Configuration – Control

The statistical settings *Repetition*, *Stop Condition*, *Statistic Count*, and *Display Mode* have the same meaning in all measurements; they are described in section [Analyzer/Generator Configuration – Control](#) on pg. 4-37 ff.

ACP Frequency Offset *ACP Frequency Offset* allows the user to select the Frequency Offset from the selected Channel/Frequency. The selected *ACP Frequency Offset* will be displayed in the diagram under the measurement bars.

ACP1...4 *ACP 1...4* are the symmetrical offsets. The measurement supports up to 4 different offsets between 0 kHz and 2000 kHz.

Remote Control:

```

CONFigure:SPECTrum:ACP:CONTrol:FOFFset:ACP1
CONFigure:SPECTrum:ACP:CONTrol:FOFFset:ACP2
CONFigure:SPECTrum:ACP:CONTrol:FOFFset:ACP3
CONFigure:SPECTrum:ACP:CONTrol:FOFFset:ACP4
    
```

Spectrum Configuration – Limits

The *Limits* tab defines the tolerance limits for each of the *Spectrum* measurement application.

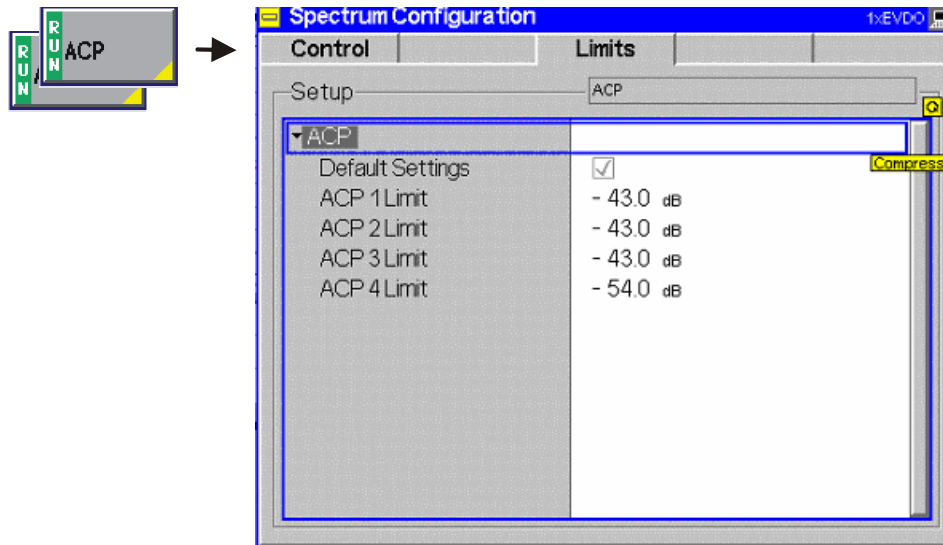


Figure 4-35 Spectrum Configuration – Limits

ACP 1..4 Limit *ACP 1..4 Limit* sets the limit for each ACP Frequency offset. The limits are used symmetrically for the positive and the negative offset.

Remote control:

```
CONFigure:SPECTrum:ACP:LIMit:ACP1
CONFigure:SPECTrum:ACP:LIMit:ACP2
CONFigure:SPECTrum:ACP:LIMit:ACP3
CONFigure:SPECTrum:ACP:LIMit:ACP4
```

Code Domain Power Measurements

The menu group *Code Dom. Power* contains the functions to measure the Code Domain Power (*CDP H-PSK*), Peak Code Domain Error Power (*PCDEP H-PSK*), and Channel Power (*Ch. Power H-PSK*).

The *Code Dom. Power* menu is opened from the *Menu Select* menu or from any other measurement menu in *1xEV-DO* using the hotkey *Menus – Code Domain Power* (see Figure 4-36). The initial screen returns to the *Code Dom. Power* application last accessed.

In the softkey bar on the right side, the *Code Domain Power* menu provides different types of softkeys:

- The measurement control softkey *CDP H-PSK* changes to *PCDEP H-PSK* and *Ch. Power H-PSK*, depending on the application selected. This softkey controls the measurement, indicates its status (*RUN | HLT | OFF*) and opens the configuration menu *Code Dom. Power Configuration*. The hotkeys associated with the measurement control softkey define the scope of the *Code Domain Power* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys *RF Max. Level* and *RF Mode* belong to the softkey *Analyzer Level*). The softkey/hotkey combinations provide test settings and switch over between different measurements.

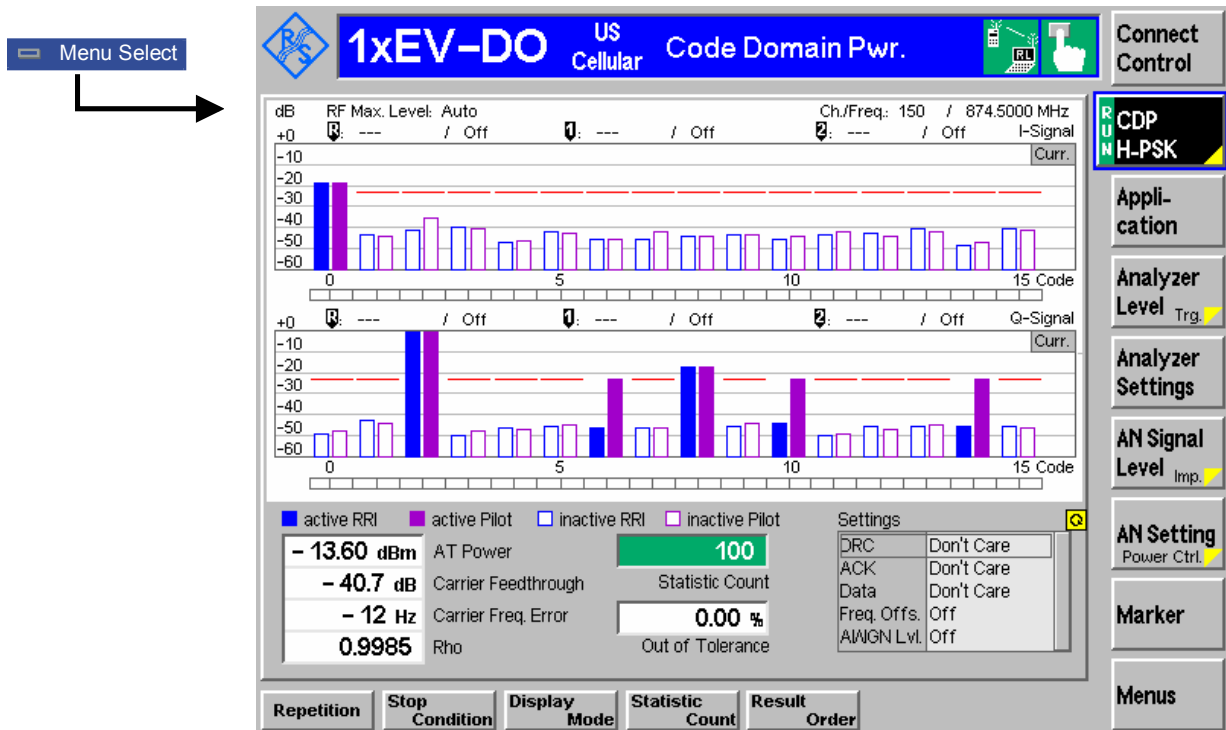


Figure 4-36 Code Domain Power measurement menu

Softkey Selections

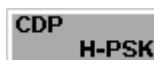
Each *Code Dom. Power* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The remaining softkeys select the application and provide application-specific settings.

Measurement Control

Each *Code Dom. Power* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys. The properties of the measurement control softkey are analogous in all measurements; see section [Analyzer/Generator Measurement](#) in the *Non-Signaling* section. The remaining softkeys select the application and provide application-specific settings.



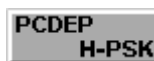
The *Application* softkey activates a set of hotkeys to select a code domain power application. When an application is selected, the corresponding measurement screen is displayed.



The *CDP H-PSK* hotkey changes the CDP measurement application to measure the Code Domain Power of the access terminal.

Remote Control:

```
INITiate:CDPower:CDPW
ABORt:CDPower:CDPW
STOP:CDPower:CDPW
CONTinue:CDPower:CDPW
FETCh[:SCALar]:CDPower:CDPW:STATus?
```



The *PCDEP H-PSK* hotkey changes the CDP measurement application to measure the Peak Code Domain Error Power of the access terminal.

Remote Control:

```
INITiate:CDPower:PCDep
ABORt:CDPower:PCDep
STOP:CDPower:PCDep
CONTinue:CDPower:PCDep
FETCh[:SCALar]:CDPower:PCDep:STATus?
```



The *Ch. Power H-PSK* hotkey changes the CDP measurement application to measure the Channel Power of the access terminal.

Remote Control:

```
INITiate:CDPower:CHPW
ABORt:CDPower:CHPW
STOP:CDPower:CHPW
CONTinue:CDPower:CHPW
FETCh[:SCALar]:CDPower:CHPW:STATus?
```

Measurement configuration

Pressing the *CDP/PCDEP/Ch.Power H-PSK* softkey twice (once if already selected) opens the *Code Dom. Power Configuration* popup menu (see page [4-36](#)). Besides, the measurement control softkey provides hotkeys to define the scope of the measurement. All these settings are also provided in the configuration menu and described in more detail in section [Analyzer/Generator Configuration – Control](#) on page [4-37](#) ff.

Marker

The *Marker* softkey positions up to three markers and a baseline (D-Line) in the test diagram and displays their values. Refer to page 4-111 for detailed information about markers.

The softkey is only available for the following applications: *CDP H-PSK* and *PCDEP H-PSK*.

Common Settings

As outlined in section *Analyzer/Generator* on p. 4-32 ff., some of the hotkey/softkey combinations in the *Analyzer/Generator* menu are valid irrespective of the application. These common settings are also provided in the *Connection Control* menu; for a detailed description refer to p. 4-3 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections *Trigger (Connection Control – Trigger)* on p. 4-27 ff. and *Analyzer Control (Connection Control – Analyzer)* on p. 4-4 ff.
- The *Analyzer Settings 1/2* softkey defines the center frequency of the RF analyzer. The settings are provided in the *Analyzer* tab of the *Connection Control* menu; see section *Analyzer Control (Connection Control – Analyzer)* on p. 4-4 ff.
- The *Generator Level/Impairment* softkey defines the levels in all physical channels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section *Connection Control – Generator* on p. 4-12 ff.
- The *Generator Settings/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal, its modulation and an offset of the PN sequence. The settings are provided in the *Generator* tab of the *Connection Control* menu; see section *Connection Control – Generator* on p. 4-12 ff.

Settings table

The *Settings* table on the lower right side of the *Code Domain Power* menu gives an overview of the measurement settings of the current application as defined by means of the softkey/hotkey combinations or in the configuration menus. It changes when a different application is selected. The roll-key scrolls and expands the *Setup* table.

Measurement Results

The CMU measures the code power of the access terminal physical channels, resulting in the Code Domain Power measurement. Three applications are available for Code Domain Power measurements.

- *Code Domain Power* (CDP) is the power of the individual Walsh code channels of the access terminal. The screen displays a bar graph of the power level of the individual channels. Both I and Q signal power is displayed. The evaluation is done in code class 16.
- *Peak Code Domain Error Power* (PCDEP) is the measured I/Q signal compared to an ideal reference signal.
- *Channel Power* (*Ch. Power H-PSK*) is the power of the reverse physical channels of both I and Q signals.

Each Channel is divided into an *RRI* and a *Pilot* channel using a time slicing mechanism. *RRI* and *Pilot* channels are measured separately and are displayed in independent bars over the corresponding channel number. The structure of the channels is shown in *Figure 4-58: 1xEV-DO Forward and Reverse Channel Structure*.

Measurement results are explained for each application.

Code Domain Power

Code Domain Power measures the individual power level of each code channel and presents the results as bar graphs. Both the I-Signal and Q-Signal power levels are displayed.

The measurement screen for Code Domain Power can be divided into three groups:

- Scalar measurement results (parameter lines)
- Bar graph
- Measurements and settings

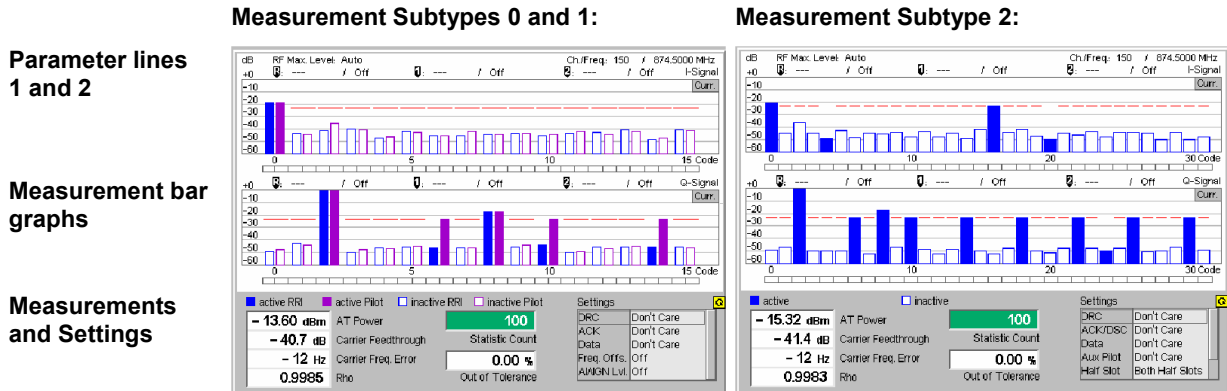


Figure 4-37 Display of measurement results (Code Domain Power screen)

Parameter Lines Scalar measurement results and settings are indicated in the two parameter lines above the test diagram and in the *Settings* table below.

1st Line

The first parameter line contains the following settings:

RF Max. Level The total output power, either calculated in adaption to the signal level (Auto) or set manually.

Ch./Freq Channel and frequency set for the BS Signal

2nd Line

The second parameter line contains the following marker values:

R Level and time of reference marker

1 Level and time of marker 1 (setting *absolute*) and/or difference from reference marker (setting *relative*)

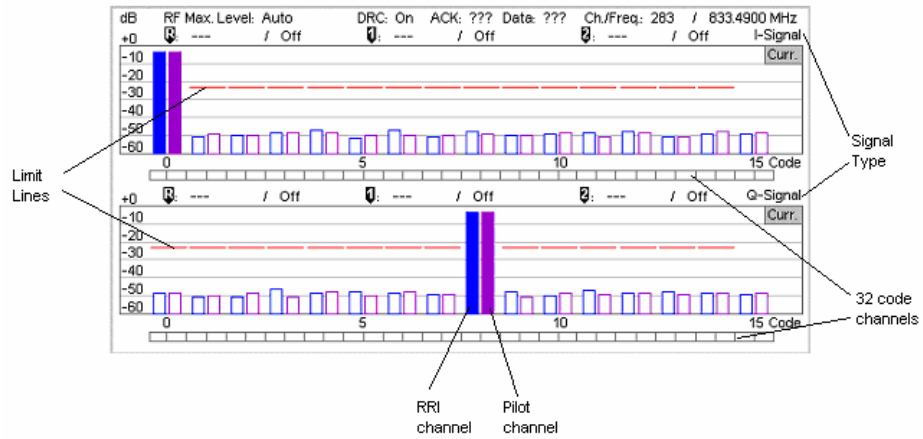
2 Level and time of marker 2 (setting *absolute*) and/or difference from reference marker (setting *relative*)

Measurement Bar Graphs

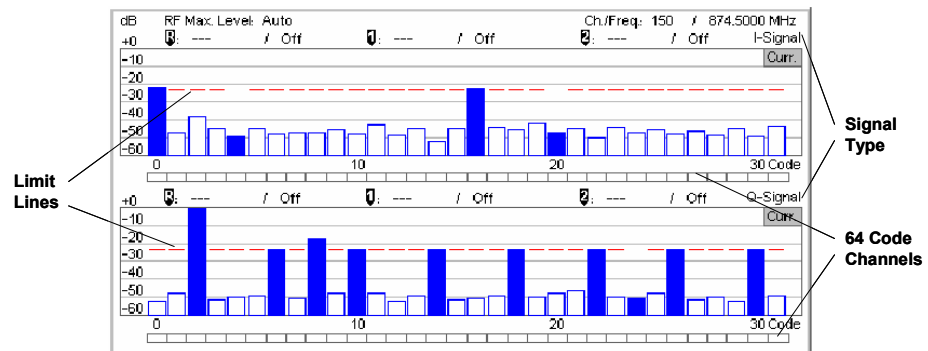
The *Measurement bar graph* displays the power of each channel together with the limit lines and all active markers.

- The bar graph either shows the current, average, or maximum levels as set in the configuration menu.
- The limit lines provide a quick reference point to view channels exceeding set limits. The limit line level is set in the configuration menu.
- The *active* channels are indicated with a solid bar graph while the *inactive* are outlined (see the legend below the diagrams).

Measurement bar graphs for measurement subtypes 0 and 1:



Measurement bar graphs for measurement subtype 2:



Measurements and Settings

The area below the bar graphs displays the results of power and waveform quality measurements. Measurements in red indicate they exceed the limit set in the configuration menu.

- AT Power** *AT Power* is the total transmitted power level from the access terminal.
- Carrier Feedthrough** *Carrier Feedthrough* refers to the origin offset, which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.
- Frequency Error** *Frequency Error* is the difference between the nominal frequency of the selected channel and the measured frequency.
- Rho** Rho is the ratio of the correlated power to the total power. The correlated power is a calculated vector between a corrected signal and an ideal reference. The corrected signal is created by removing phase, frequency, and timing offsets.
- Statistic Count** *Statistic Count* defines the length of the statistic cycles in waveform intervals/evaluation periods.
- Out of Tolerance** *Out of Tolerance* is the percentage of waveform intervals that exceed the defined limits.
- Settings** The Settings window lists the most important settings made in either the Configuration Menu or the hotkeys.

Remote Control:
 READ[:SCALar]:CDPower:CDPW?
 FETCh[:SCALar]:CDPower:CDPW?
 SAMPlE[:SCALar]:CDPower:CDPW?

Peak Code Domain Error Power

Peak Code Domain Error Power (PCDEP) displays the error signal over the code domain channels. The error is the difference between the measured signal and the ideal reference signal.

All other settings and results are analogous the Code Domain Power results described in section Code Domain Power on p. 4-74 ff.

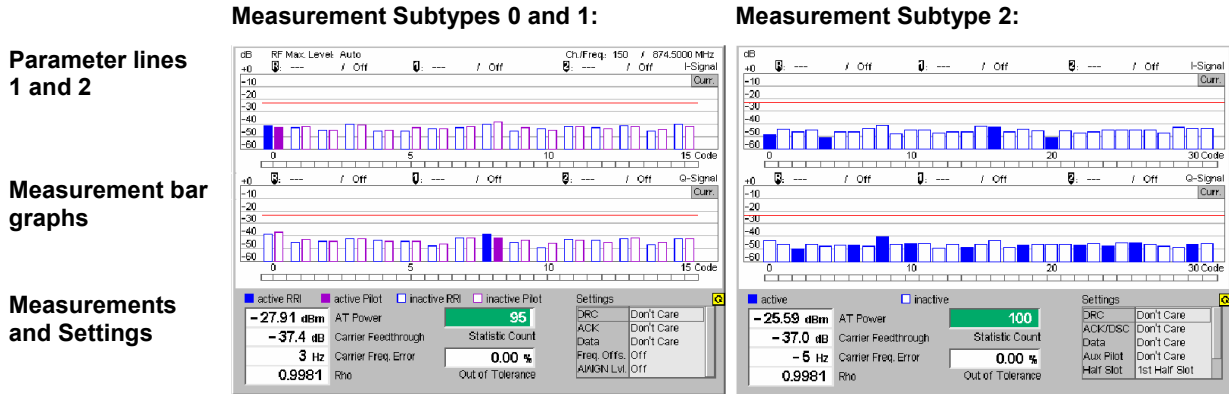


Figure 4-38 Display of measurement results (Peak Code Domain Error Power screen)

Channel Power

Channel Power (Ch. Power H-PSK) is the power of the reverse physical channels of both I and Q signals.

The measurement screen for Code Domain Channel Power can be divided into three groups:

- Scalar measurement results (parameter lines)
- Bar graph
- Measurements and settings

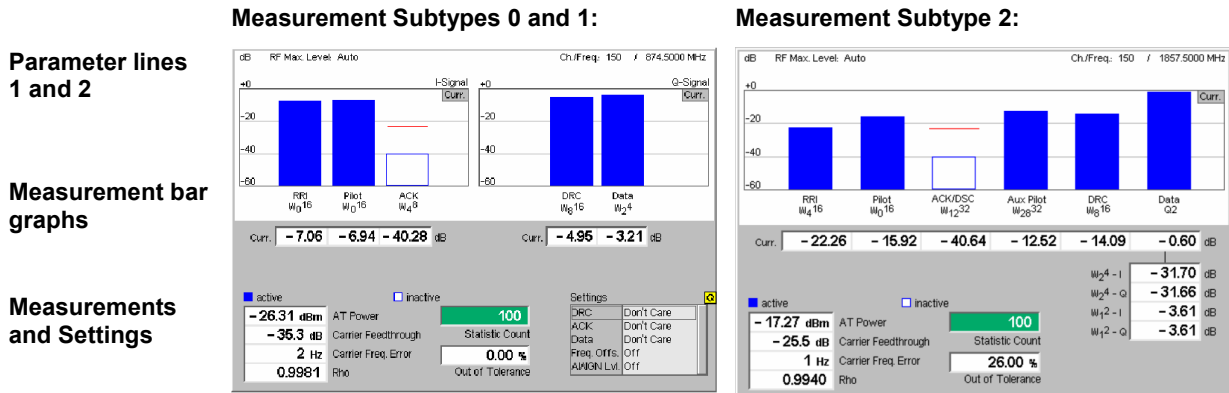


Figure 4-39 Display of measurement results (Channel Power screen)

Parameter Lines and Settings Scalar measurement results and settings are indicated in the parameter line above the test diagram and in the *Settings* table below.

The first parameter line and the *Settings* table is identical to the *Code Domain Power* application; see section *Code Domain Power* on p. 4-74 ff. The second parameter line is omitted as no markers are available.

Measurement Bar Graphs

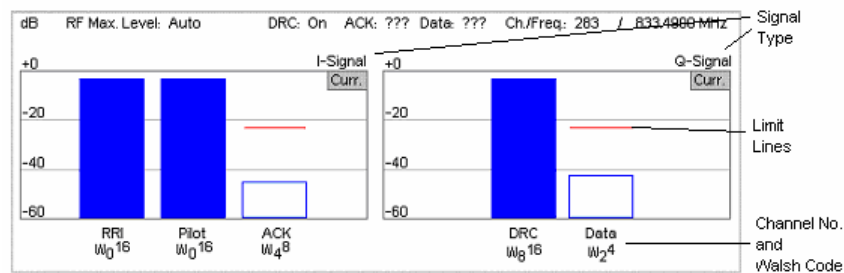
The *Measurement bar graph* displays the power of each channel together with the limit lines.

The bar graph either shows the current, average, or maximum levels as set in the configuration menu.

The limit lines provide a quick reference point to view channels exceeding set limits. The limit line level is set in the Configuration Menu.

The *active* channels are indicated with a solid bar graph while the *inactive* are outlined (see the legend below the diagrams).

Below each bar graph is its measured value.



Measurements and Settings

This area displays the results of power and waveform quality measurements. Measurements in red indicate they exceed the limit set in the Configuration Menu.

The values are identical to the *Code Domain Power* application; see p. 4-74 ff.

For subtype 2 measurements, the Settings table is not shown, instead the measured data channel values of the in-phase and quadrature components of Walsh codes W_1^2 and W_2^4 are displayed:

- $W_2^4 - I$ In-phase component of Walsh code W_2^4 (in dB)
- $W_2^4 - Q$ Quadrature component of Walsh code W_2^4 (in dB)
- $W_1^2 - I$ In-phase component of Walsh code W_1^2 (in dB)
- $W_1^2 - Q$ Quadrature component of Walsh code W_2^4 (in dB)

Remote Control:

```
READ[:SCALar]:POWER:CHPW?
FETCh[:SCALar]:POWER:CHPW?
SAMPlE[:SCALar]:POWER:CHPW?
```

Code Domain Power Configuration

The popup menu *Code Domain Power Configuration* contains tabs to define the parameters of each code domain power application including the error tolerances.

Pressing the measurement softkey twice (once if already selected) opens the popup menu *Code Domain Power Configuration*. Use the hotkeys at the bottom of the screen to change between the tabs. Use the roll-key to expand or compress the list of displayed settings.

Code Domain Power Configuration – Control

The *Control* tab controls each of the measurement applications. Each application lists the available settings for controlling the measurement.

The control settings consist of *Common Settings* (settings that affect all code domain power applications) followed by settings specific to an application.

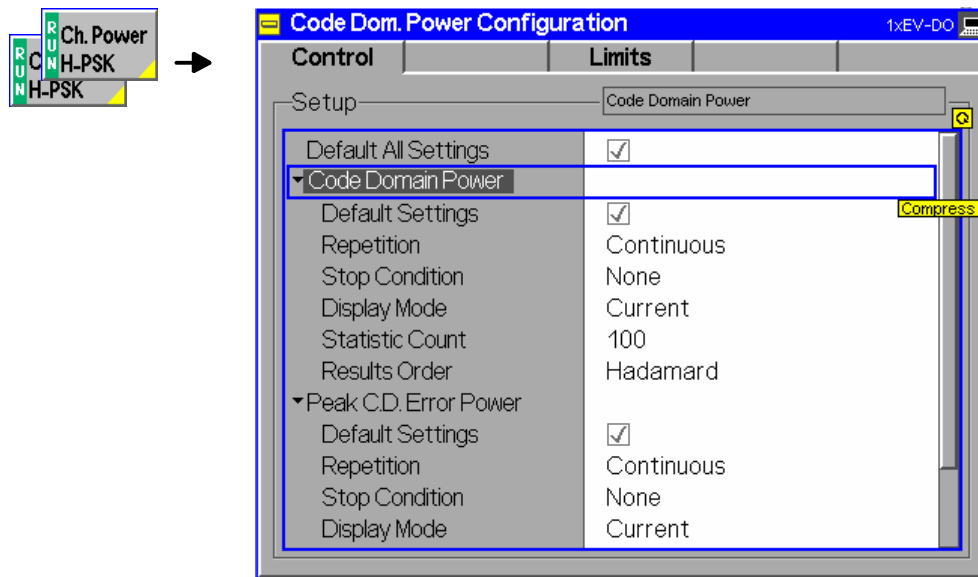


Figure 4-40 Code Domain Power Configuration – Control

All settings may not be available for all CDP measurement applications. The statistical settings *Repetition*, *Stop Condition*, *Statistic Count*, and *Display Mode* have the same meaning in all measurements; they are described in section [Analyzer/Generator Configuration – Control](#) on p. 4-37 ff. The *Display Mode* applies to the values in the bar graphs only.

**Code Domain Power/
Peak C.D. Error Power/**

Results Order

Results Order defines the method used to display the code channels. This setting is only available for *Code Domain* and *Peak Code Domain Error* measurement applications.

Hadamard The code channels are displayed in the order determined by the Hadamard matrix. The codes are numbered as Walsh codes W_n^{SF} , where SF is the *Spreading Factor*; see below.

The reverse 1xEV-DO channels use fixed Walsh codes with SFs ranging from 2 to 32; see standard TIA/EIA/IS-856-2 and [Table 4-6](#) below. The Walsh code numbers n can be read directly from the measurement bar graphs..

Bit reverse The code channels are displayed in the order defined by the Orthogonal Variable Spreading Factor (OVSF) code tree so that related code channels are adjacent to each other.

Remote Control:

CONFigure:CDPower:CDPW:CONTrol:RORDER
CONFigure:CDPower:PCDEP:CONTrol:RORDER
HADamard | BITReverse

Table 4-6 Walsh codes for reverse 1xEV-DO channels

Meas. Subtype	Channel Type	Walsh Function
0 / 1 / 2	RRI	I-Signal W_4^{16}
0 / 1 / 2	Pilot	I-Signal W_0^{16}
0 / 1	ACK	I-Signal W_{12}^{32}
0 / 1 / 2	DRC	Q-Signal W_8^{16}
0 / 1 / 2	Data	Q-Signal W_2^4
2	Data	Q-Signal W_2^4 (B4-Modulation, BPSK)
2	Data	I/Q-Signal W_2^4 (Q4-Modulation, QPSK)
2	Data	I/Q-Signal W_1^2 (Q2-Modulation, QPSK)
2	Data	I/Q-Signal W_1^2 and W_2^4 (Q4Q2-Modulation, composite QPSK)
2	Data	I/Q-Signal W_1^2 and W_2^4 (E4E2-Modulation, composite 8PSK)
2	AuxPilot	I-Signal W_{28}^{32}
2	ACK/DSC	I-Signal W_{12}^{32}

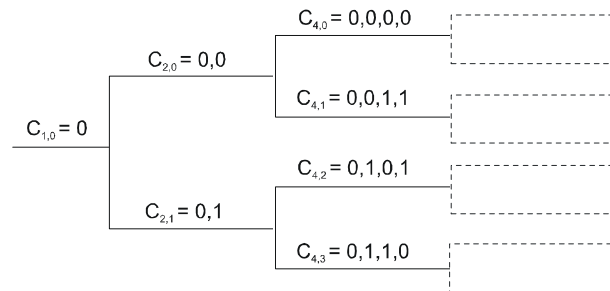
Walsh codes and OVFS codes

According to standard TIA/EIA/IS-856-2, 1xEV-DO channels are spread using orthogonal Walsh functions W_n^{SF} that are serially constructed from a SF x SF Hadamard matrix. Hadamard matrices can be generated by means of the following recursive procedure:

$$H_1 = 0, \quad H_2 = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}, \quad H_{2N} = \begin{bmatrix} H_N & H_N \\ H_N & \overline{H_N} \end{bmatrix};$$

where N is a power of 2 and $\overline{H_N}$ denotes the binary complement of H_N .

Orthogonal Variable Spreading Factor codes provide an alternative scheme of generating codes that preserve orthogonality between channels with different rates and spreading factors. According to standard 3GPP TS 25.213, they are generated using the following code tree:



For a given spreading factor SF, Walsh codes and OVFS codes can be derived from each other by assigning code numbers in binary format. The Walsh code no. n is equal to the OVFS code number m and vice versa, provided that m and n have inverse binary representation (n is converted into m by reversing the order of bits in the binary representation of n). For numbers with symmetrical binary representation (e.g 00 or 1001), the Walsh code and OVFS code numbers are equal.

E.g. for spreading factor SF = 4, the two schemes provide the following codes:

Hadamard (Walsh codes)			Bit reverse (OVFS codes)		
Code (SF = 4)	Code number Dec.	Code number Binary	Code (SF = 4)	Code number Dec.	Code number Binary
0 0 0 0	0	00	0 0 0 0	0	00
0 1 0 1	1	01	0 0 1 1	1	01
0 0 1 1	2	10	0 1 0 1	2	10
0 1 1 0	3	11	0 1 1 0	3	11

To obtain the *Bit reverse* representation from the *Hadamard* representation, the codes no. 01 and 10 (binary) must be interchanged.

Reference Power Mode

The *Ref. Power Mode* hotkey defines whether the reference channel power in the measurement diagram is relative to the pilot power or to the total channel power (AT power). The pilot channel is always present on W_0^{16} .

Remote control:

CONFigure:CDPower:CHPW:CONTRol:PRMode ATP | PPOW

Code Domain Power Configuration – Limits

The *Limits* tab defines tolerance limits for each of the Code Domain Power measurement applications.

The limits settings consist of both Common settings (settings that affect all code domain power applications) and then settings specific to an application.

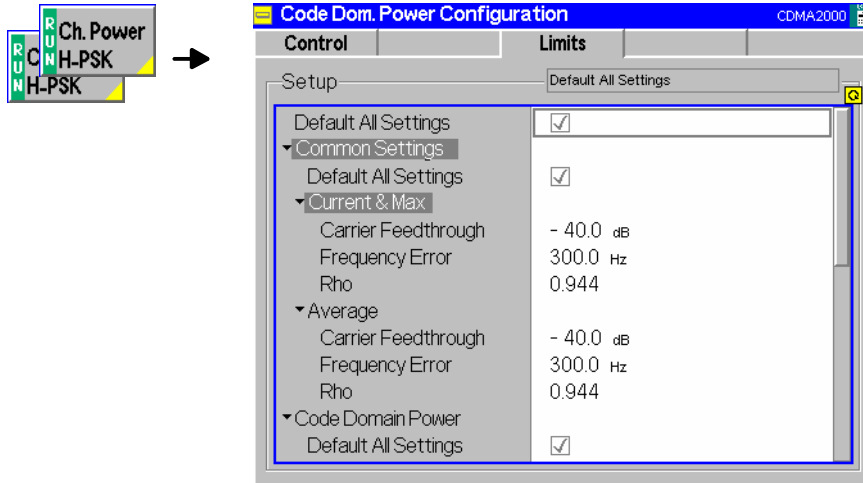


Figure 4-41 Code Domain Power Configuration – Limits

Default All Settings

The *Default All Settings* switch assigns default values to all parameters of the modulation *Limits* tab (the default values are quoted in the command description in chapter 6 of this manual). Additional default switches are provided for common limit settings and for the individual applications.

Remote control:

```
DEFault:CDPower:<Application>:LIMit ON | OFF
```

Common Settings

Common Settings are settings that affect all code domain power applications.

Current & Max Sets the limits used when the display is set to the *Current* or *Min/Max* display mode.

Carrier Feedthr. Upper limit for the difference between magnitude of the RF carrier and the modulated carrier.

Frequency Error Upper limit for the difference between the measured and the expected frequency of the signal.

Rho Limit of the ratio of the correlated power and the total power.

Remote Control:

```
CONFigure:CDPower:CPCCommon:CMAX:LIMit:ASYMmetric  
[:COMBined]  
<Carrier Feedthrough Limit>, <Freq Error Limit>, <Rho Limit>
```

Average Sets the limits used when the display is set to the *Average* display mode. The available settings are the same as described for the *Current & Max* display mode.

Remote Control:

```
CONFigure:CDPower:CPCCommon:AVERage:LIMit:ASYMmetric  
[:COMBined]  
<Carrier Feedthrough Limit>, <Freq Error Limit>, <Rho Limit>
```

CDP	<i>CDP</i> contains the limit settings applicable to the <i>Code Domain Power</i> .
Current & Max	Sets the limits used when the display is set to the Current or Min/Max display mode.
CDP Limit	Value (and placement) of the limit line displayed on the measurement screen.
	Remote Control: CONFigure:CDPower:CDPW:CMax:LIMit:ASYMmetric [:COMBined] <CDP Limit Y>
Average	Sets the limits used when the display is set to the Average display mode. The available settings are the same as described for the Current & Max display mode.
	Remote Control: CONFigure:CDPower:CDPW:AVERage:LIMit:ASYMmetric [:COMBined] <CDP Limit Y>
PCDEP	<i>PCDEP</i> contains the limit settings applicable to the <i>Peak Code Domain Error Power</i> . The available settings are the same as described for the <i>CDP</i> .
	Remote Control: CONFigure:CDPower:PCDEP:CMax:LIMit:ASYMmetric [:COMBined] CONFigure:CDPower:PCDEP:AVERage:LIMit:ASYMmetric [:COMBined] <CDP Limit Y>
ChP	<i>ChP</i> contains the limit settings applicable to the <i>Channel Power</i> . The available settings are the same as described for the <i>CDP</i> .
	Remote Control: CONFigure:CDPower:CHPW:CMax:LIMit:ASYMmetric [:COMBined] CONFigure:CDPower:CHPW:AVERage:LIMit:ASYMmetric [:COMBined] <CDP Limit Y>

1xEV-DO Mobile Tests (Signaling)

The measurements in signaling mode require an installed extension CMU-K839/-K849/-K859/-K869 for the units CMU-B89/-B83 as described in chapter 1.

Receiver Quality Measurements

The *Receiver Quality* measurement provides a wide range of parameters that characterize the connectivity of the forward and reverse link. The parameters are described in the 3GPP2 specification C.S0029-A (chapter 7). The *Receiver Quality* measurements and the results are in accordance with the definitions of the specification.

For a definition of the essential test results refer to section [Forward and Reverse Link Performance](#) on p. 4-83. Note that all *Receiver Quality* measurements can run at the same time, in manual mode as well as in remote mode. This saves time and gives a good overview of different results at the same time.

Forward and Reverse Link Performance

The *Receiver Quality* measurement is divided into several applications, each of them provides a specific set of measurement results (see section [Measurement Results](#) on p. 4-90). The essential results are listed below.

Control Channel PER Percentage of first synchronous control channel (CC) MAC layer packets that the access terminal received in error:

$$CC\ PER = (1 - FirstSyncCCPkt / CCTime) \times 100 \%$$

Where: FirstSyncCCPkt no. of successfully received packets
CCTime elapsed time in CC cycles

The statistics for FirstSyncCCPkt and CCTime are maintained by the AT.

Forward Link PER Percentage of FTAP/FETAP test packets transmitted on the forward traffic channel that the AT failed to receive successfully:

$$FL\ PER = (1 - TestPktRecd / TestPktSent) \times 100 \%$$

Where: TestPktRecd no. of successfully received packets
TestPktSent no. of test packets sent by the R&S CMU

The statistics for TestPktRecd and TestPktSent are maintained by the R&S CMU.

Reverse Link Quality Percentage of FTAP/FETAP loopback packets sent by the AT on the reverse traffic channel that the R&S CMU failed to receive successfully:

$$RL\ Qual = (1 - LbPktRecd / LbPktSent) \times 100 \%$$

Where: LbPktRecd no. of successfully received packets
LbPktSent no. of loopback packets sent by the AT

The statistics for LbPktRecd and LbPktSent is maintained by the R&S CMU. The RL Qual measurement requires an enabled loopback mode. The status of the Loopback mode parameter depends on the FTAP/RTAP configuration (only FTAP -> Loopback is ON, only RTAP -> Loopback is OFF, both FTAP and RTAP -> Loopback is OFF).

Forward Link Performance Data rate per unit of time (in kBit/s) of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully:

$$F_TP / Time = MACPktRecd * PktSize / TestTime * 16^{*5/3}$$

Where: MACPktRecd no. of successfully received MAC layer packets
 PktSize packet size in bits
 Test Time FTAP test time in frames

The factor $16^{*5/3}$ corresponds to the CDMA frame duration in ms. If a physical layer subtype 2 is active, then the R&S CMU can collect throughputs for different packet sizes; the total throughput is then calculated as the sum of the throughputs for all packet sizes.

The forward link performance results strongly depend on the active physical layers (subtype 0, 1, 2).

Forward Link Performance / Slots Data rate per transmitted slots of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully:

$$F_TP / Time = MACPktRecd * PktSize / PktSlots * 5/3$$

Where: MACPktRecd no. of successfully received MAC layer packets
 PktSize packet size in bits
 PktSlots Number of slots during which the packets were received

The factor $5/3$ corresponds to the CDMA slot duration in ms. The statistics for TestPktRecd and PktSlots is maintained by the R&S CMU. All forward link measurements require an enabled loopback mode. With the definition above, the performance / slots is also in kBit/s. If a physical layer subtype 2 is active, then the CMU can collect throughputs for different packet sizes; the total throughput is then calculated as the sum of the throughputs for all packet sizes.

The forward link performance results strongly depend on the active physical layers (subtype 0, 1, 2).

Reverse Link Performance Data rate per unit of time (in kBit/s) of the RTAP RTC MAC packets from the AT that the CMU could receive successfully:

$$R_TP / Time = MACPktRecd * PktSize / TestTimeF * 16 * 5/3$$

The calculation for the successfully received RETAP RTC MAC packets from the AT is slightly different (due to the test time in subframes):

$$R_TP / Time = MACPktRecd * PktSize / TestTimeSF * 4 * 5/3$$

Where: MACPktRecd no. of successfully received MAC layer packets
 PktSize packet size in bits
 TestTimeF RTAP test time in frames
 TestTimeSF RETAP test time in subframes

The factor $16^{*5/3}$ corresponds to the CDMA frame duration in ms. The CMU can collect throughputs for different physical packet sizes; the total throughput is then calculated as the sum of the throughputs for all packet sizes. Note that the packet sizes available depend on the active physical layer (subtype 0 / 1 or subtype 2).

Reverse Link
PER Percentage of RTAP/RETAP RTC MAC packets from the AT that the R&S CMU failed to receive successfully:

$$RL\ PER\ [i] = (1 - RTCMACPktRecd\ [i] / RTCMACPktSent\ [i]) \times 100\ \%$$

Where: RTCMACPktRecd no. of successfully received packets
RTCMACPktSent no. of RTC MAC packets sent by the AT

The statistics for RTCMACPktRecd and RTCMACPktSent is maintained by the R&S CMU. The RL PER is calculated for different data rates, numbered by the data rate index i . In addition, the R&S CMU calculates the overall (total) RL PER (i.e. the RL PER averaged over all data rates), defined as:

$$RL\ PER\ [total] = (1 - \text{Sum}(RTCMACPktRecd\ [i]) / \text{Sum}(RTCMACPktSent\ [i])) \times 100\ \%$$

PER is given as a function of data rate for subtype 0 and as a function of packet size for subtype 2. Subtype 1 is not supported in signaling mode.

Note that the packet sizes available depend on the active physical layer (subtype 0/1 or subtype 2).

Main Menu (Receiver Quality)

The *Receiver Quality* menu is opened from the *Menu Select* menu, or from any other measurement menu in *1xEV-DO*, using the hotkey *Menus 1/2 – Receiver Quality* (see [Figure 4-42 below](#)). The initial screen returns to the *Receiver Quality* application last accessed.

In the softkey bar on the right side, the *Receiver Quality* menu provides different types of softkeys:

- The measurement control softkey *Statistics Overview* changes to *Ctrl. Ch. PER*, *Fwd. Link PER* etc., depending on the application selected. This softkey controls the measurement, indicates its status (*RUN* | *HLT* | *OFF*) and opens the configuration menu *Receiver Quality Configuration*. The hotkeys associated with the measurement control softkey define the scope of the *Receiver Quality* measurement.
- The other softkeys on the right side are combined with various hotkeys (e.g. the hotkeys *RF Max. Level* and *RF Mode* belong to the softkey *Analyzer Level*). The softkey/hotkey combinations provide test settings and switch over between different measurements.

Receiver Quality

1xEV-DO
N.Amer. PCS
Receiver Quality

Rel. A Subt. 2 FETAP

Measurement	Received Packets	Denominator	Result
Control Channel PER	119	119	0.00 %
Forward Link PER	26980	26980	0.00 %
Reverse Link Quality	1908	1908	0.00 %
Reverse Link PER	---	---	---
Termination Target PER	---	---	---
Forward Link Performance	26980	1908	2171.97 kBit/s
Forward Link Perf./Slots	26980	26980	2457.60 kBit/s
Reverse Link Performance	---	---	---

Settings

Network Selection	Release A Forward
LB Enable	<input checked="" type="checkbox"/>
DRC Rate	2457.6 kbps
RETAP Min.P.	128

Update Period Reset Statistics

Connect Control

Statistic Overview

Application

Analyzer Level Trg.

Analyzer Set. TAP.

AN Signal Level Imp.

AN Setting Power Ctrl.

Menus (1/2)

Application

Analyzer Level Trg.

Trigger Ana. Lvl.

Analyzer Set. TAP.

Test App. Ana. Set.

AN Signal Level Imp.

Impairm. AN Sig. Lvl.

AN Setting Power Ctrl.

Power Ctrl AN Setting

Menus (1/2)

Menus (2/2)

Statistics Overview
Ctrl. Ch. PER
Fwd. Link PER
Rvrse Link Quality
Fwd. Link Perform
Rvrse. Link Perform
Rvrse. Link PER

RF Max. Level
RF Mode

Trigger Source
Trigger Level (RF)
Trigger Slope

RF Channel
Code Chann. Filter
Data Ch. Mod. Type

Fwd. DRC Rate
Rev. Rate

1xEVDO Power

AWGN Level
AN Freq. Offset

RF Channel

Power Ctrl. Bits

Overview
Power
Modulation
Spectrum
Code Dom. Power
Receiver Quality

RLP Frame & IP Stats.
Ping

Figure 4-42 Measurement Menu Receiver Quality

Test Settings

Each *Receiver Quality* application is controlled by means of the measurement control softkey below the *Connect. Control* softkey and the associated hotkeys.



The measurement control softkey *Statistics Overview* changes to *Ctrl. Ch. PER*, *Fwd. Link PER* etc., depending on the application selected. This softkey controls the measurement and opens the configuration menu *Receiver Quality Configuration*. To change the status, press the measurement control softkey once and then use the front panel keys *ON/OFF* or *CONT/HALT*.

Remote Control:

```
INITiate:RXQuality:<Applic>:ACP
ABORt:RXQuality:<Applic>:ACP
STOP:RXQuality:<Applic>:ACP
CONTinue:RXQuality:<Applic>:ACP
FETCh[:SCALar]:RXQuality:<Applic>:ACP:STATUS?
Where <Applic> = CCPer | FLPer | RLQuality |
                FLPPerformance | RLPPerformance | RLPer
```

Measurement configuration

Pressing the measurement control softkey twice (once if already selected) opens the *Receiver Quality Configuration* popup menu (see section [Measurement Configurations \(Receiver Quality Configuration\)](#) on p. 4-98). The *Control* settings of the configuration menu are also accessible via hotkeys.

The *Reset Statistics* hotkey has no equivalent in the configuration menu.



Reset Statistics clears all statistics for all applications. Clearing the statistics means that all counters for control channel cycles, test packets etc. are reset to zero, and the calculation of statistical quantities (PER, throughput etc.) is re-started for the new cycles, packets etc.

The reset of all statistics can be achieved by several means:

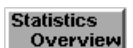
- Explicitly through the user by pressing the *Reset Statistics* button. This will reset ALL statistics for ALL receiver quality measurements.
- Most session renegotiations will trigger a spontaneous reset of the statistics by the collecting AN (linkhandler) and will restart the measurements.
- A statistics overflow will be recognized by the AN (linkhandler) and lead to a complete statistics reset.

Remote Control:

No reset command in the *RXQuality* command group, use
 INITiate:LAYer:APPLication:TEST:STATistics



The *Application* softkey activates a set of hotkeys to select a receiver quality application. When an application is selected, the corresponding measurement screen is displayed.



Statistics Overview gives an overview of all *Receiver Quality* measurements and their statistics; see section [Statistics Overview](#) on p. 4-90.

Remote Control:

Only one command: [SENSe:] [SCALar:]RXQuality:SOVeriew?

**Ctrl. Ch.
PER**

Ctrl. Ch. PER shows the packet error rate on the control channel and its confidence level for a configurable number of control channel cycles; see

[Control Channel PER, Forward Link PER, Reverse Link](#) on p. 4-92.

Remote Control:

The *Ctrl. Ch. PER* application is selected by the keyword `:CCPer` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:CCPer...`

**Fwd. Link
PER**

Fwd. Link PER shows the packet error rate for FTAP test packets transmitted on the forward traffic channel and its confidence level for a configurable number of test packets sent; see

[Control Channel PER, Forward Link PER, Reverse Link](#) on p. 4-92.

Remote Control:

The *Fwd. Link PER* application is selected by the keyword `:FLPer` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:FLPer...`

**Rvrse Link
Quality**

Rvrse Link Quality shows the packet error rate for FTAP loopback packets sent by the AT on the reverse traffic channel and its confidence level for a configurable number of loopback packets sent; see

[Control Channel PER, Forward Link PER, Reverse Link](#) on p. 4-92.

Remote Control:

The *Reverse Link Quality* application is selected by the keyword `:RLQuality` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:RLQuality...`

**Fwd. Link
Perform**

Fwd. Link Perform gives an overview of the forward link throughput for different physical packet sizes; see [Forward Link Performance](#) on p. 4-94.

Remote Control:

The *Forward Link Performance* application is selected by the keyword `:FLPFormance` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:FLPFormance...`

**Rvrse. Link
Perform**

Rvrse. Link Perform gives an overview of the reverse link throughput for different physical packet sizes; see [Reverse Link Performance](#) on p. 4-95.

Remote Control:

The *Reverse Link Performance* application is selected by the keyword `:RLPFormance` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:RLPFormance...`

**Rvrse. Link
PER**

Rvrse. Link PER gives an overview of the reverse link PER results for different data rates; see [Reverse Link PER](#) on p. 4-97.

Remote Control:

The *Reverse Link PER* application is selected by the keyword `:RLPer` in the 3rd level of the `RXQuality` commands, e.g. `CONFigure:RXQuality:RLPer...`

Common Settings

As outlined in section [Analyzer/Generator](#) on p. 4-32 ff., some of the hotkey/softkey combinations in the measurement menus are valid irrespective of the application. These common settings are also provided in the [1xEV-DO Connection Control \(Signaling\)](#) menu; for a detailed description refer to p. 4-111 ff.

Softkeys

- The *Trigger/Analyzer Level* softkey defines the trigger settings for the measurements and controls the level in the RF signal path. The settings are provided in the *Trigger* and *Analyzer* tabs of the *Connection Control* menu; see sections [Trigger \(Connection Control – Trigger\)](#) on p. 4-156 and [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-160.
- The *Analyzer Settings/Test Application* softkey defines the center frequency of the RF analyzer and selects the code channel filter. The *Analyzer Settings* are provided in the *Analyzer* tab of the *Connection Control* menu; see section [Analyzer Control \(Connection Control – Analyzer\)](#) on p. 4-140 ff.
The *Test Application* settings for forward and reverse data rates are provided in the *Layer* tab of the *Connection Control* menu; see section [Layer Settings \(Connection Control – Layer\)](#) on p. 4-119 ff.
- The *AN Signal Level/Impairment* softkey defines the levels of the generated forward 1xEV-DO signal and configures an additive noise signal. The settings are provided in the *AN Signal* tab of the *Connection Control* menu; see section [AN Signal \(Connection Control - AN Signal\)](#) on p. 4-140.
- The *AN Settings/Power Control* softkey defines the frequency of the generated forward 1xEV-DO signal and a power control bit sequence. The settings are provided in the *AN Signal* tab of the *Connection Control* menu; see section [AN Signal \(Connection Control - AN Signal\)](#) on p. 4-140.

Settings table

The *Settings* table on the lower right side of the *Code Domain Power* menu gives an overview of the measurement settings of the current application as defined by means of the softkey/hotkey combinations or in the configuration menus. It changes when a different application is selected. The roll-key scrolls and expands the *Setup* table.

Measurement Results

The *Receiver Quality* measurement results are displayed in several menus corresponding to the different measurement applications.

Statistics Overview

The *Statistics Overview* menu gives an overview of all *Receiver Quality* measurements and their statistics. The most important measurement results appear in a table; settings are shown in a box below. The *Statistics Overview* menu is also useful for retrieving IDLE state statistics; see section [Forward and Reverse Link Performance](#) on p. 4-83. For a limit check use the other *Receiver Quality* applications.

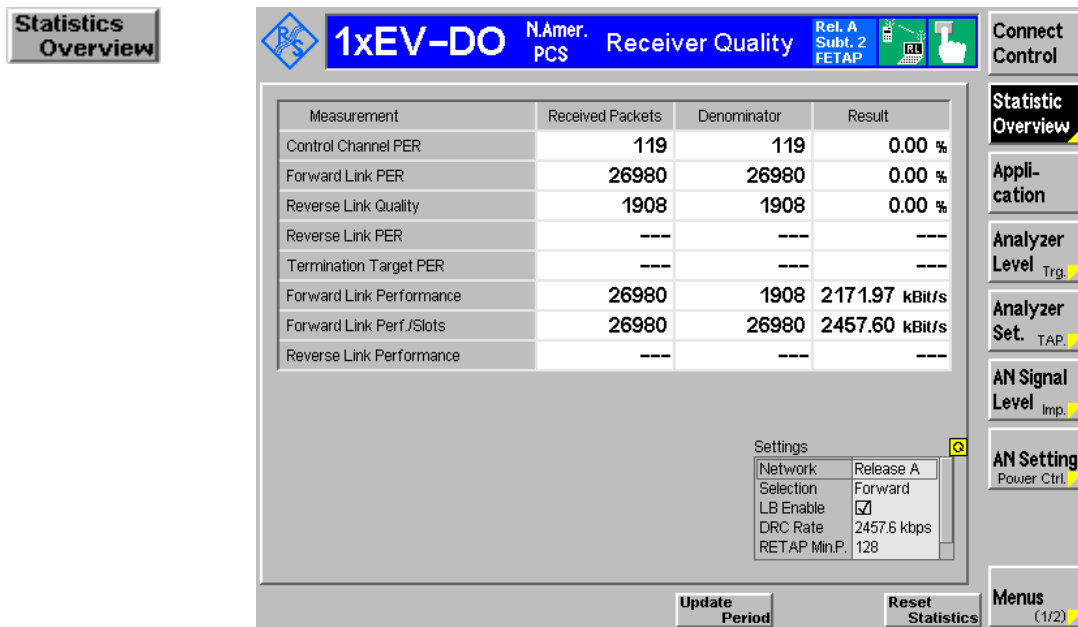


Figure 4-43 Receiver Quality results – Statistics Overview

Measurement Results

The upper table shows consists of the following columns (see also [Table 4-7 below](#)):

- Measurement** Measured quantity in the different *Receiver Quality* applications; for a detailed description see section [Forward and Reverse Link Performance](#) on p. 4-83.
- Received Packets** Total number of packets received since the start of the measurement or since the last [Reset Statistics](#) (see p. 4-87).
- Denominator** Reference for the calculation of the results, no. of packets sent or test time
- Result** Measurement result based on the current statistics

Remote Control:

```
[SENSe:] [SCALar:]RXQuality:SOVerview?
```

Table 4-7 Columns in the *Statistics Overview* result table

Measurement	Received Packets	Denominator	Result
Control Channel PER	FirstSyncCCPkt no. of successfully received packets	CCTime elapsed time in CC cycles	CC PER = $(1 - \text{FirstSyncCCPkt} / \text{CCTime}) \times 100 \%$
Forward Link PER	TestPktRecd no. of successfully received packets	TestPktSent no. of test packets sent by the R&S CMU	FL PER = $(1 - \text{TestPktRecd} / \text{TestPktSent}) \times 100 \%$
Reverse Link Quality	LbPktRecd no. of successfully received packets	LbPktSent no. of loopback packets sent by the AT	RL Qual = $(1 - \text{LbPktRecd} / \text{LbPktSent}) \times 100 \%$
Reverse Link PER	RTCMACPktRecd no. of successfully received packets	RTCMACPktSent no. of RTC MAC packets sent by the AT	RL PER = $(1 - \text{RTCMACPktRecd} / \text{RTCMACPktSent}) \times 100 \%$
Forward Link Performance	TestPktRecd no. of successfully received packets	Test Time FTAP/FETAP test time in frames	$F_TP / \text{Time} = \text{TestPktRecd} * \text{PktSize} / \text{TestTime} * 16^{*5/3}$
Forward Link Perf./Slots	TestPktRecd no. of successfully received packets	PktSlots Number of slots during which the packets were received	$F_TP / \text{Time} = \text{TestPktRecd} * \text{PktSize} / \text{PktSlots} * 5/3$
Reverse Link Performance	PktRecd no. of successfully received packets	Test Time FTAP test time in frames, FETAP test time in subframes	RTAP: $R_TP / \text{Time} = \text{PktRecd} * \text{PktSize} / \text{TestTimeF} * 16^{*5/3}$ RETAP: $R_TP / \text{Time} = \text{PktRecd} * \text{PktSize} / \text{TestTimeSF} * 4^{*5/3}$

Settings box

The settings box gives an overview of the enabled test applications, the loopback mode, and the major minimum or maximum data rates. Some measurements require particular settings (e.g. an enabled loopback mode); refer to section [Forward and Reverse Link Performance](#) on p. 4-83.

Remote Control:

See section [Layer Settings \(Connection Control – Layer\)](#) on p. 4-119.

Measurement configuration

The test settings of the other *Receiver Quality* applications are also valid for the *Statistics Overview* measurement. The measurement control softkey *Statistics Overview* freezes or clears the output (*HLT/OFF*), but does not reset the statistics. *CONT* or *ON* displays the statistics collected since the last [Reset Statistics](#) (see p. 4-87).

Control Channel PER, Forward Link PER, Reverse Link Quality

The results of the three applications *Control Channel PER*, *Forward Link PER*, and *Reverse Link Quality* are displayed in one common menu. The menu is split into two sections for measurement results and settings. In the result section on the right side, the selected application is underlined.

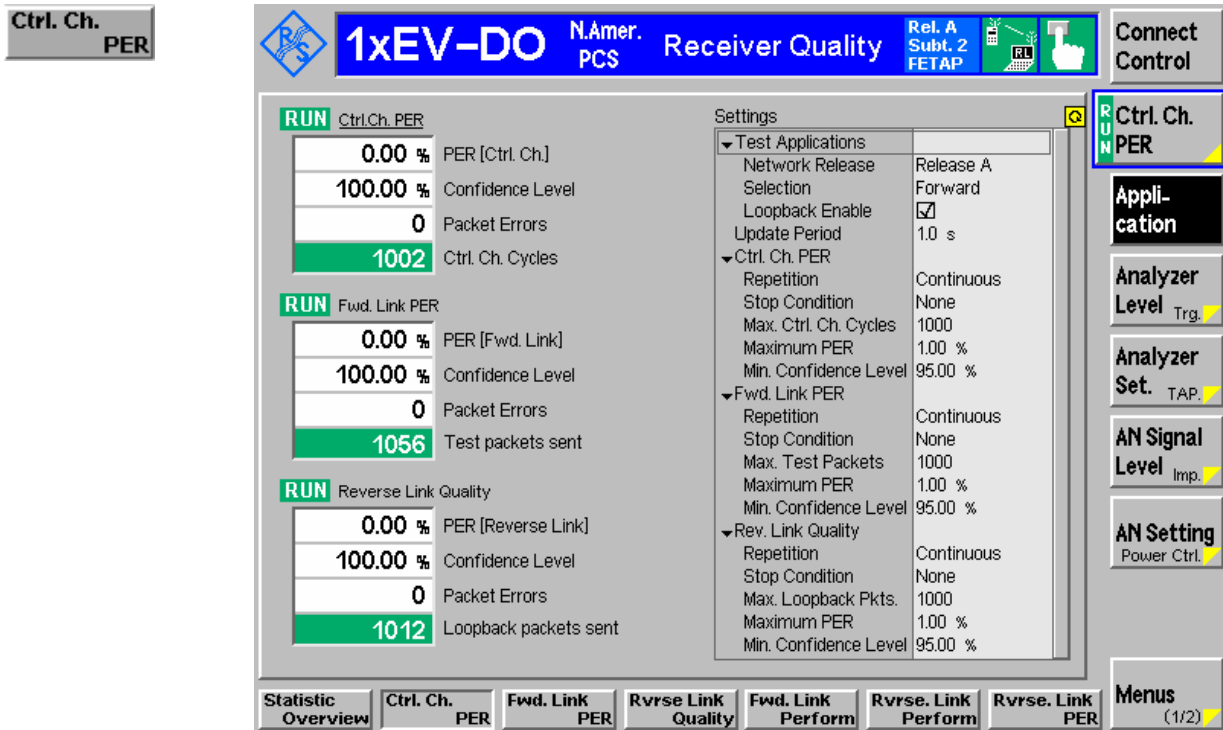


Figure 4-44 Receiver Quality results – Control Ch. and Forward Link PER, Reverse Link Quality

The results in the three applications are analogous.

Ctrl Ch. PER

The following results belong to the *Ctrl. Ch. PER* application:

PER [Ctrl. Ch.] Percentage of first synchronous control channel (CC) MAC layer packets that the access terminal received in error

Confidence Level Statistical probability for the PER to be below the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu (see p. 4-101).

First Sync. Ctrl. Ch. Pkt (Received) No. of successfully received control channel packets

Ctrl Ch. Cycles No. of control channel cycles measured since the last reset or in the current statistics cycle. For continuous measurements, the number remains constant after the first statistics cycle, indicating that the results are referenced to the last statistics cycle.

Remote Control:

```
READ[:SCALar]:RXQuality:CCPer?
FETCh[:SCALar]:RXQuality:CCPer?
SAMPlE[:SCALar]:RXQuality:CCPer?
```

Fwd. Link PER The following results belong to the *Forward Link PER* application:

PER [Fwd. Link] Percentage of FTAP/FETAP test packets transmitted on the forward traffic channel that the AT failed to receive successfully

Confidence Level Statistical probability for the PER to be below the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu (see p. 4-101).

Test Packets Received No. of successfully received test packets

Test Packets Sent No. of test packets sent by the R&S CMU since the last reset or in the current statistics cycle. For continuous measurements, the number remains constant after the first statistics cycle, indicating that the results are referenced to the last statistics cycle.

Remote Control:
 READ[:SCALar]:RXQuality:FLPer?
 FETCh[:SCALar]:RXQuality:FLPer?
 SAMPlE[:SCALar]:RXQuality:FLPer?

Rev. Link Quality The following results belong to the *Reverse Link Quality* application:

PER [Rev. Link] Percentage of FTAP/FETAP loopback packets sent by the AT on the reverse traffic channel that the CMU failed to receive successfully

Confidence Level Statistical probability for the PER to be below the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu (see p. 4-101).

Test Packets Received No. of successfully received loopback packets

Loopback P. Sent No. of loopback packets sent by the AT since the last reset or in the current statistics cycle. For continuous measurements, the number remains constant after the first statistics cycle, indicating that the results are referenced to the last statistics cycle.

Reverse Link Quality results are available only if the loopback mode is activated.

Remote Control:
 READ[:SCALar]:RXQuality:RLQuality?
 FETCh[:SCALar]:RXQuality:RLQuality?
 SAMPlE[:SCALar]:RXQuality:RLQuality?

Limit Check A red *PER* output field and an arrow pointing upwards indicates that the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu (see p. 4-101) has been exceeded.

A red *Confidence Level* output field and an arrow pointing downwards indicates that the *Min. Confidence Level* specified in the *Limits* tab of the *Receiver Quality Configuration* menu was not reached.

Remote Control:
 CALCulate:RXQuality:CCPer:MATChing:LIMit?
 CALCulate:RXQuality:FLPer:MATChing:LIMit?
 CALCulate:RXQuality:RLQuality:MATChing:LIMit?

Forward Link Performance

The *Forward Link Performance* menu gives an overview of the forward link throughput for different physical packet sizes. The measurement results appear in a table; settings are shown in a box below. No limit check is performed.

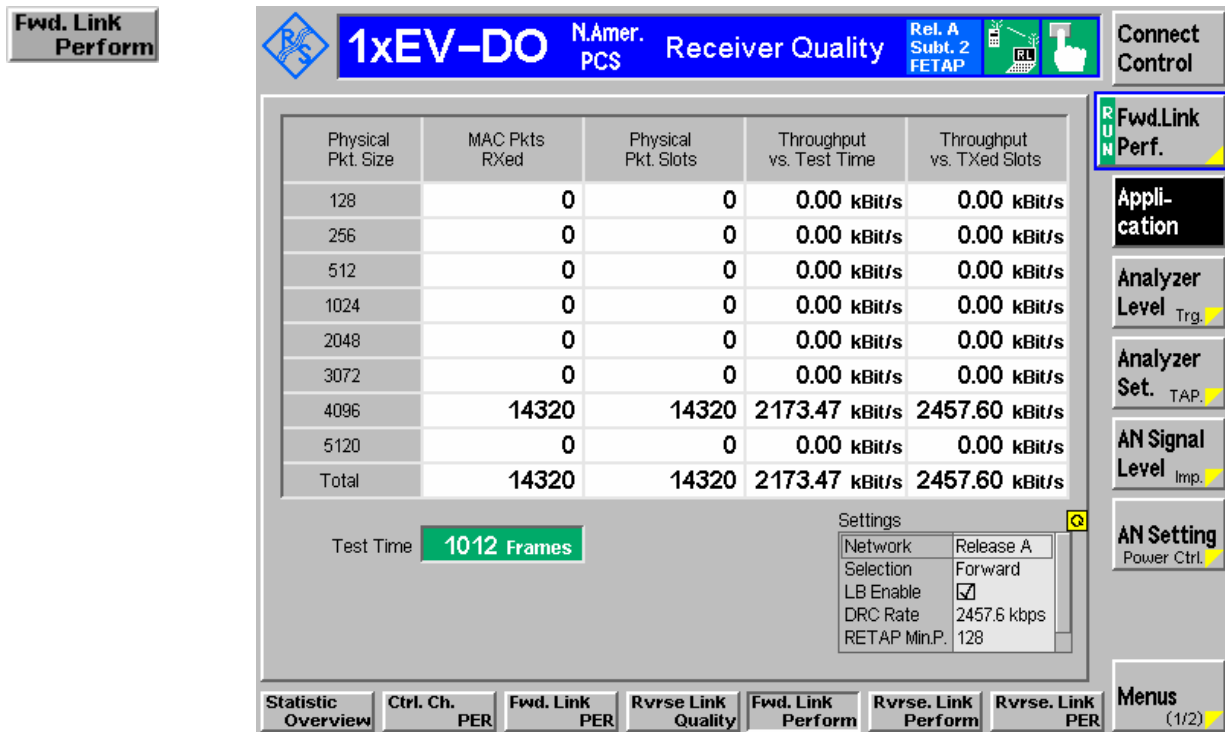


Figure 4-45 Receiver Quality results – Forward Link Performance

Throughput table	The throughput table contains the following columns:
<i>Phys. Pkt. Size</i>	FTAP/FETAP MAC layer packet size in (no. of bits). <i>Total</i> denotes the sum of the throughputs of all packet sizes.
<i>MAC Packets RXed</i>	Number MAC packets received
<i>Physical Pkt. Slots</i>	Number of slots during which the packets were received
<i>Test Time</i>	Time elapsed (no. of 26.66 ms CDMA frames) since the last reset or in the current statistics cycle. For continuous measurements, the number remains constant after the first statistics cycle, indicating that the results are referenced to the last statistics cycle.
<i>Throughput vs. Test Time</i>	Data rate per unit of time (in kBit/s) of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully.
<i>Throughput vs. TXed Slots</i>	Data rate per transmitted slots of the FTAP/FETAP MAC layer packets transmitted on the forward traffic channel that the AT could receive successfully

The results for different packet sizes are only available for a physical layer signal subtype 2. If a layer signal subtype 0 is active, all packets are 1024 bits in size and the row for 1024 bits contains valid results.

Remote Control:

```
READ[:SCALar]:RXQuality:FLPerformance?
FETCh[:SCALar]:RXQuality:FLPerformance?
SAMPle[:SCALar]:RXQuality:FLPerformance?
```

Settings box

The settings box gives an overview of the enabled test applications, the loopback mode, and the major minimum or maximum data rates. Some measurements require particular settings (e.g. an enabled loopback mode); refer to section [Forward and Reverse Link Performance](#) on p. 4-83.

Remote Control:

See sections [Connection Settings \(Connection Control – Connection\)](#) on p. 4-113 and [Layer Settings \(Connection Control – Layer\)](#) on p. 4-119.

Reverse Link Performance

The *Reverse Link Performance* menu gives an overview of the reverse link throughput for different physical packet sizes. The measurement results appear in different tables for signal subtypes 0 and 2. No limit check is performed.

Rvrse. Link Perform
with subtype 0:

Data Rate	MAC Pkts RXed	Throughput vs. Test Time
0.0	0	0.00 kBit/s
9.6	224	6.38 kBit/s
19.2	113	6.44 kBit/s
38.4	0	0.00 kBit/s
76.8	0	0.00 kBit/s
153.6	---	---
Total	0	0.00 kBit/s

Test Time: 337 Frames

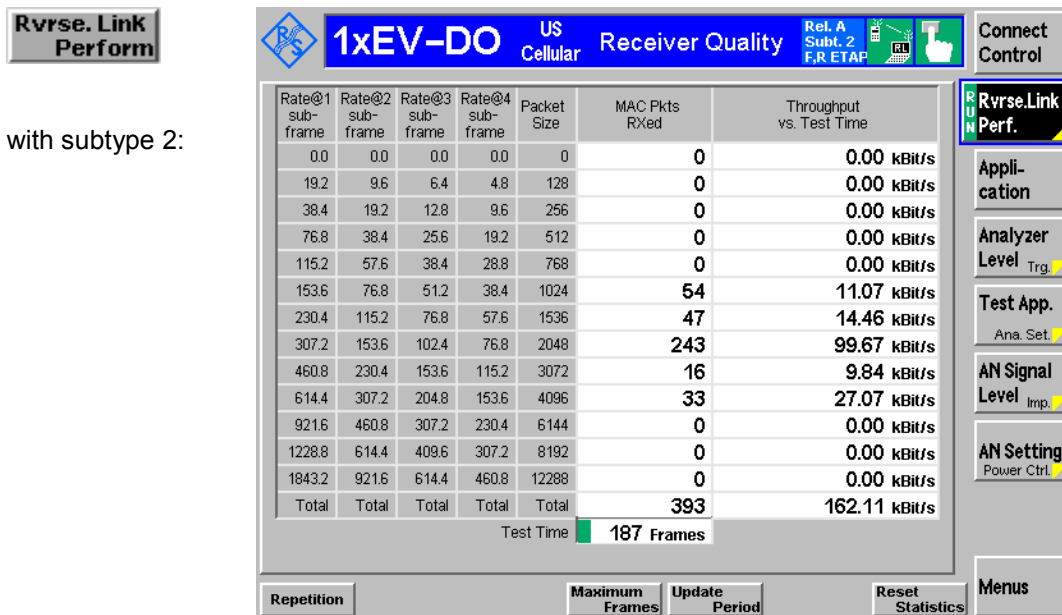


Figure 4-46 Receiver Quality results – Reverse Link Performance

Throughput table The throughput tables for subtypes 0 and 2 contain the following columns:

<i>Data Rate</i> (only subtype 0/4) or <i>Rate@1 subframe</i> (only subtype 2)	Effective data rate after 4 slots (1 subframe), corresponding to the different packet sizes (see standard TIA-856-A). Packets with size 0 are defined in the standard; these packets do not have to be generated by the AT and do not contribute to the PER (the packet errors are set to zero).
<i>Rate@2/3/4 subframe</i> (only subtype 2)	Effective data rates if the data packets are not transmitted in one subframe, but instead in 2, 3 or 4 subframes.
<i>Packet Size</i> (only subtype 2)	RTAP/RETAP MAC layer packet size in (no. of bits). <i>Total</i> denotes the sum of the throughputs of all packet sizes. The packet size is the payload size plus 32 bits of header information.
<i>MAC Pkts. RXd</i>	Number of successfully received RTAP/RETAP RTC MAC layer packets
<i>Throughput vs. Test Time</i>	Data rate per unit of time (in kBit/s) of the RTAP/RETAP RTC MAC packets from the AT that the R&S CMU could receive successfully
<i>Test Time</i>	Time elapsed (no. of 26.66-ms CDMA frames) since the last reset or in the current statistics cycle. For continuous measurements, the number remains constant after the first statistics cycle, indicating that the results are referenced to the last statistics cycle.

If a layer subtype 0 is active, the rates 0, 9.6, 19.2, 38.4, 176.8 and 153.6 (kBit/s) are available. For a physical layer subtype 2, all rates except 9.6 kBit/s are available.

Remote Control:

```

READ[:SCALar]:RXQuality:RLPerformance:DPLProtocol?
FETCh[:SCALar]:RXQuality:RLPerformance:DPLProtocol?
SAMPlE[:SCALar]:RXQuality:RLPerformance:DPLProtocol?

READ[:SCALar]:RXQuality:RLPerformance:S2PL?
FETCh[:SCALar]:RXQuality:RLPerformance:S2PL?
SAMPlE[:SCALar]:RXQuality:RLPerformance:S2PL?
    
```

Reverse Link PER

The Reverse Link PER results are displayed in a table:

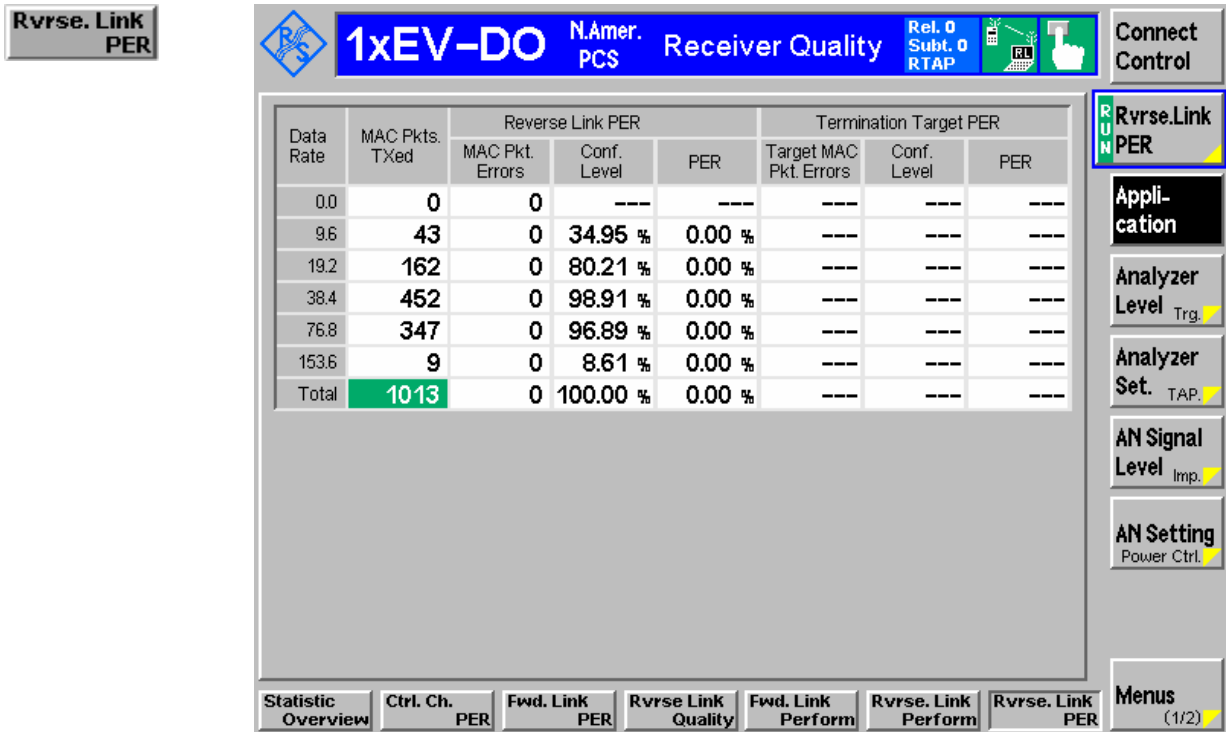


Figure 4-47 Receiver Quality results – Reverse Link PER

PER table The PER table contains the following columns:

<i>Data Rate</i> (only subtype 0/4) or <i>Rate@1 subframe</i> (only subtype 2)	Effective data rate after 4 slots (1 subframe; see standard TIA-856-A). Packets with size 0 leading to an rate 0 are defined in the standard; these packets do not have to be looped back by the AT and do not contribute to the PER (the PER is set to zero).
<i>MAC Pkts. TXed</i>	Number of RTAP/RETAP RTC MAC packets sent by the AT

The following results describe the statistics for the *Reverse Link PER*:

<i>Packet Errors</i>	Number of packets received in error
<i>Conf. Level</i>	Statistical probability for the PER to be below the <i>Maximum PER</i> specified in the <i>Limits</i> tab of the <i>Receiver Quality Configuration</i> menu (see p. 4-101).
<i>PER</i>	Percentage of RTAP/RETAP RTC MAC packets from the AT that the R&S CMU failed to receive successfully

If layer subtype 0 is active, the rates 0, 9.6, 19.2, 38.4, 176.8 and 153.6 (kBit/s) are available, as shown in [Figure 4-47](#) above.

For physical layer subtype 2, all rates except 9.6 kBit/s are available.

Remote Control:

```
READ[:SCALar]:RXQuality:RLPer:DPLProtocol?
FETCh[:SCALar]:RXQuality:RLPer:DPLProtocol?
SAMPlE[:SCALar]:RXQuality:RLPer:DPLProtocol?
```

```
READ[:SCALar]:RXQuality:RLPer:S2PL?
FETCh[:SCALar]:RXQuality:RLPer:S2PL?
SAMPlE[:SCALar]:RXQuality:RLPer:S2PL?
```

Limit Check

A red *PER* output field and an arrow pointing upwards indicates that the *Maximum PER* specified in the *Limits* tab of the *Receiver Quality Configuration* menu (see p. 4-101) has been exceeded.

A red *Confidence Level* output field and an arrow pointing downwards indicates that the *Min. Confidence Level* specified in the *Limits* tab of the *Receiver Quality Configuration* menu was not reached.

Remote Control:

```
CALCulate:RXQuality:RLPer:DPLProtocol:MATChing:LIMit?
CALCulate:RXQuality:RLPer:S2PL:MATChing:LIMit?
```

Measurement Configurations (Receiver Quality Configuration)

The popup menu *Receiver Quality Configuration* contains two tabs to define the parameters for the *Receiver Quality* measurements. It is opened by pressing the measurement control softkey (e.g. *Statistics Overview*) at the top right in the main menu *Receiver Quality* twice. It is possible to change between the tabs by pressing the associated hotkeys.

Measurement Control (Receiver Quality Configuration – Control)

The *Control* tab controls the scope of the *Receiver Quality* measurement by determining

- The common *Update Rate* for control channel, forward link and reverse link receiver quality measurements
- The *Repetition* mode
- The *Stop Condition* for the measurement
- The maximum number of channel cycles, test packets, loopback packets, or frames per measurement cycle

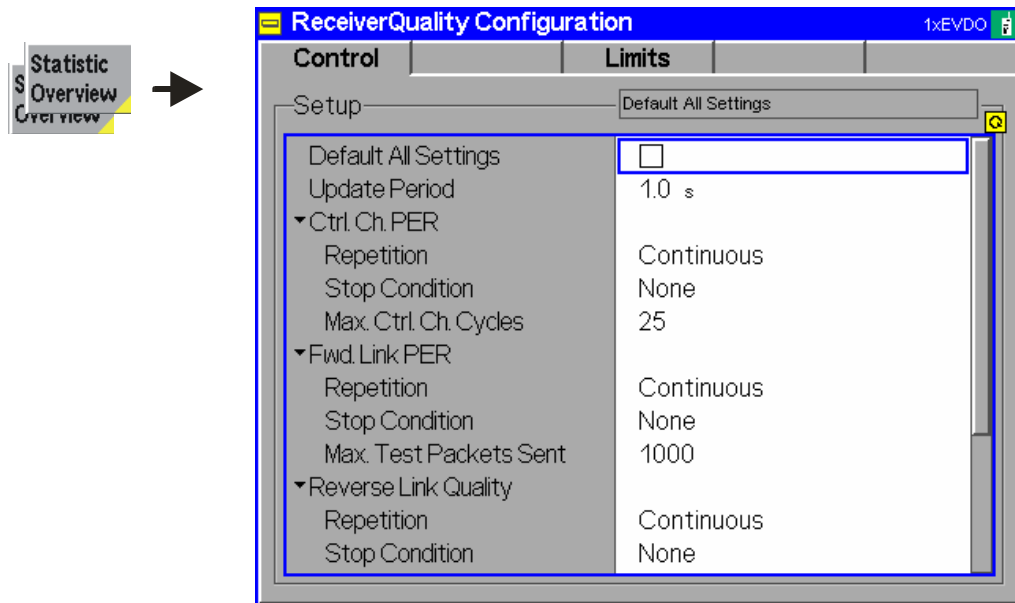


Figure 4-48 Receiver Quality Configuration – Control (Signaling)

The following *Limits* tab settings apply to all *Receiver Quality* applications.

Default All Settings The *Default All Settings* checkbox replaces all settings in the *Control* tab with default values. The default values are shown in the command description in chapter 6 of this manual.

Remote control:
 DEFault:RXQuality:CONTrol ON | OFF

Update Period Evaluation and update period of the displayed results. The results of the *Receiver Quality* menus are statistical quantities, so the CMU must collect data over some period of time to obtain meaningful results.

The update period has no influence on the speed of the measurements, however, it determines the shortest possible measurement time. E.g. with an update period of 1 second, new measurement reports will be available in 1.0 s intervals. The first report is acquired during a 1.0 s period after the start of the measurement. The R&S CMU uses this first report to determine the offset time but discards the information. The first valid results are calculated from the second report, which arrives between 1.0 s and 2.0 s after the start of the measurement.

The example above shows that a single shot measurement with an update period of half the statistics cycle length will always provide valid results. To speed up the single shot measurement, it is recommendable to reduce the statistics cycle length and set the update rate accordingly. See also *Statistics Cycles* below.

Remote control:
CONFigure:UPERiod

The following *Limits* tab settings are application-specific but analogous for all *Receiver Quality* applications.

Repetition The *Repetition* parameter specifies whether the measurement is stopped after one statistics cycle or continued; see [Repetition](#) on p. 4-37. The length of a statistics cycle is specified in terms of a number of packets, frames or control channel cycles; see below.

The measurement can be stopped early if the specified *Stop Condition* is met.

Remote control:
CONFigure:RXQuality:<Applic>:CONTrol:REPetition
CONTinuous | SINGleshot | 1...10000, <StopCondition>
where <Applic> = CCPer | FLPer | RLQuality |
FLPFormance | RLPFormance | RLPer

Stop Condition The *Stop Condition* field defines a stop condition for the measurement:

<i>NONE</i>	Continue measurement irrespective of the results of the limit check
<i>Any Limit Exceeded</i>	Stop measurement as soon as the PER or confidence limit check fails (one of the tolerances is exceeded)

<i>Min. Conf. Lev. Exceeded</i>	Stop measurement only if the confidence limit check fails
<i>Max. PER Exceeded</i>	Stop measurement only if the PER limit check fails

The *Stop Condition* setting is valid for both the *Single Shot* and *Continuous* repetition modes; for an overview refer to [Table 4-8](#) on p. 4-102.

Remote control:
CONFigure:RXQuality:<Applic>:CONTrol:REPetition
CONTinuous | SINGleshot | 1...10000, <StopCondition>
where <Applic> = CCPer | FLPer | RLQuality |
FLPFormance | RLPFormance | RLPer

Statistics Cycles A single shot measurement (statistics cycle) extends over a definite number of packets, frames or control channel cycles. The length of the statistics cycle is application-specific. The measurement can be stopped before the statistics cycle is completed; see *Stop Condition* above.

Max. Ctrl. Ch. Cycles Maximum number of control channel cycles in the *Ctrl. Ch. PER* application. A control channel cycle is a 256 slot period, synchronous with CDMA system time, with a duration of 426.67 ms.

Max. Test Packets Sent Maximum number of test packets sent in the *Fwd. Link PER* application. The number of test packets sent by the CMU depends on the number of slots in the packet, which is determined by the DRC. 75 packets are sent in a 2-second period for 16-slot packets. 600 packets per second are sent for 1-slot packets. Also note that if "ACK Always" is selected, all packets are sent as 1-slot packets.

Max. Loopback Pkts Sent Maximum number of loopback packets sent in the *Reverse Link Quality* application. The AT sends at least one loopback packet per frame (26.7 ms).

Maximum Frames Maximum number of frames (26.7 ms) in the *Fwd. Link Perform* and *Reverse Link Perform* applications.

Max. Packets Received Maximum number of test packets received in the *Reverse Link PER* application. The AT sends 75 test packets within a 2-second period; this is equal to the maximum number of 37.5 packets received per second for Release 0. For Rev. A, a maximum of 150 packets per second can be received.

Control and traffic channel parameters are defined in the *Layer* tab of the *Connection Control* menu, section *MAC Layer*.

Remote control:

```
CONFigure:RXQuality:CCPer:CONTRol:MCCycles
CONFigure:RXQuality:FLPer:CONTRol:MTPSent
CONFigure:RXQuality:RLQuality:CONTRol:MLPSent
CONFigure:RXQuality:FLPFormance:CONTRol:MFRames
CONFigure:RXQuality:RLPFormance:CONTRol:MFRames
CONFigure:RXQuality:RLPer:CONTRol:MPReceived
```

Measurement Limits (Receiver Quality Configuration – Limits)

The *Limits* tab sets the applicable *Receiver Quality* measurement limits including the limits for confidence testing.

Statistical PER Tests (Confidence Testing) In a normal packet error rate test, a fixed number of packets is transmitted, leading to a fixed test time for each PER result. The idea behind statistical testing is to apply probability theory and predict a range for the PER at an early stage of the measurement. The prediction can be used to stop the measurement if the probability of the AT to pass or fail the receiver quality test is large enough (early pass or early fail decision). Statistical testing can reduce test times considerably, especially if the exact PER of a receiver is very low or very high.

Probability distribution	<p>Confidence PER tests are based on the statistical independence of the packet error events: The probability of a packet error is equal for each received packet. The exact packet error rate is given by the limit of the ratio n_e/n_s, where n_e denotes the number of packet errors and n_s the number of received packets, and where the number of received packets tends to infinity. Any real packet error rate test necessarily provides an approximation to the exact packet error rate.</p> <p>Given the statistical independence of the packet error events, the probability p for any number of packet errors n_e at a given exact PER and a given number of received packets n_s can be described by a Poisson distribution or an appropriate approximation such as the chi-squared distribution. The distribution is centered on the exact PER and becomes narrower as n_s increases.</p> <p>Estimates of the exact PER are based on such a distribution. The distribution also provides the probability for the estimated PER to be below any specified <i>Maximum PER</i>.</p>
Min. Confidence Level	<p>A statistical PER test is configured by means of the <i>Maximum PER</i> and the <i>Min. Confidence Level</i>. The test is stopped as soon as the probability for the estimated PER to be below the <i>Maximum PER</i> exceeds the <i>Min. Confidence Level</i>.</p> <p>To activate a statistical PER test, a <i>Min. Confidence Level</i> must be defined and an appropriate <i>Stop Condition</i> must be set; see Table 4-8 below. Note that the confidence check becomes inactive if the limit check is disabled altogether (<i>Maximum PER: Off</i>).</p>

Table 4-8 Limit checks for different *Receiver Quality* settings

Stop Condition	Min. Confidence Level	Stop of single shot PER test ^{*)}	Stop of continuous PER test
None	0% to 100 % or Off	End of statistics cycle	Only manually
Any Limit Exceeded (limit check on)	0% to 100 %	Confidence fail or <i>Max. PER</i> exceeded or end of statistics cycle	Confidence fail or <i>Max. PER</i> exceeded or manually (if no limit exceeded)
	Off	<i>Max. PER</i> exceeded or end of statistics cycle	<i>Max. PER</i> exceeded or manually (if no limit is exceeded)
Min. Conf. Level Exceeded (limit check on)	0% to 100 %	Confidence fail or end of statistics cycle	Confidence fail or manually (if confidence pass)
	Off	End of statistics cycle	Only manually
Max. PER Exceeded (limit check on)	0% to 100 % or Off	<i>Max. PER</i> exceeded or end of statistics cycle	<i>Max. PER</i> is exceeded or manually (if <i>Max. PER</i> is never exceeded)

*) In the *Forward Link Perform*, *Reverse Link Perform*, and *Reverse Link PER* applications, single shot measurements are stopped only if the *Total* results (the sum over all measured packets and data rates) exceed the limits. The reason for this rule is that some data rates may only be used sporadically and therefore never reach the specified confidence level. The rule also ensures that a high PER on a data rate that is rarely used will not stop the entire test.

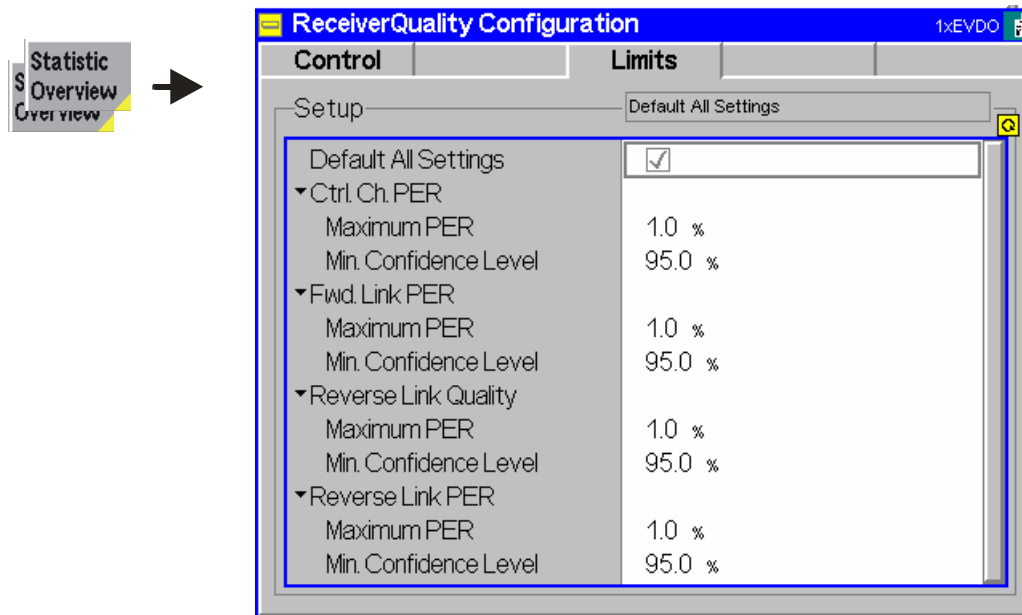


Figure 4-49 Receiver Quality Configuration – Limits (Signaling)

Default All Settings

The *Default All Settings* checkbox replaces all settings in the *Limits* tab with default values. The default values are shown in the command description in chapter 6 of this manual.

Remote control:

```
DEFault:RXQuality:LIMit ON | OFF
```

**Ctrl. Ch. PER /
Fwd. Link PER /
Reverse Link
Quality /
Reverse Link PER**

The limit settings for the four applications *Ctrl. Ch. PER*, *Fwd. Link PER*, *Reverse Link Quality*, *Reverse Link PER* are analogous. No limit check is performed in the remaining *Receiver Quality* applications.

Maximum PER Maximum packet error rate allowed. An error (limit failure) is indicated if the *Maximum PER* is exceeded after the statistics cycle configured in the *Control* tab of the *Connection Control* menu is completed (see *Max. Ctrl. Ch. Cycles*, *Max. Test Packets Sent*, *Max. Loopback Packets Sent*, *Max. Packets Received*). *Off* disables the limit check including the confidence test.

In a confidence test, the AT may pass the limit check before the statistics cycle is completed; see [Table 4-8](#) above.

Min. Confidence Level Min. estimated probability for the PER to be below the *Maximum PER*; see background information on [Statistical PER Tests](#) on p. 4-101. *Off* disables the statistical PER test.

Remote control:

```
CONFigure:RXQuality:<Applic>:LIMit:MPER <Max. Value>  
CONFigure:RXQuality:<Applic>:LIMit:CLEVel <Min. Conf. Level>  
Where <Applic> = CcPer | FLPer | RLQuality | RLPer
```

Data Application Measurements

Currently two data application measurements are implemented, *RLP Frame / IP Statistics* and *Ping*.

- The *RLP Frame / IP Statistics* measurement evaluates the data flow on the CMU.
- The *Ping* measurement provides the ping statistics including the possible source of connection errors.

The data application measurement menus form the second group of measurement menus *Menus (2/2)*. They can be opened from the *Menu Select* menu or from any other measurement menu in *1xEV-DO Signaling* after pressing the *Menus (1/2)/(2/2)* toggle key.

The IP address information for the data application testing is configured in the *Layer* tab of the *Connection Control* menu, see [Packet Applications](#) on p. 4-127.

Main Menu – RLP Frame and IP Statistics

The *RLP / IP Statistics* menu displays a statistical evaluation of the data flow on the CMU. *RLP / IP Statistics* is an application of option R&S CMU-K8x9, *1xEV-DO Data Testing* which can be used to monitor RLP signaling messaging and data throughput.

The *RLP / IP Statistics* results are available while the packet data service option is connected (signalling state *PPP Connected*). The results become invalid as soon the MS enters the *PPP Dormant* state.

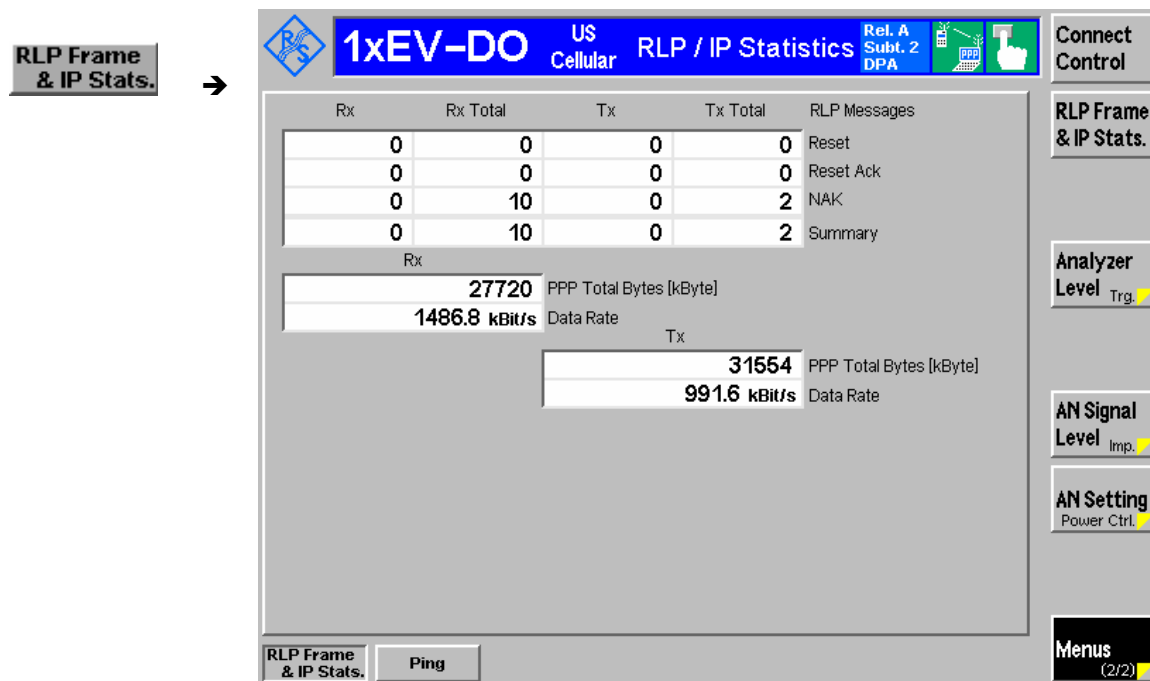


Figure 4-50 Measurement Menu RLP Frame & IP Statistics

Test Settings

Each data application is controlled by means of the measurement control softkey below the *Connect*. *Control* softkey and the associated hotkeys.

Update Period

Evaluation and update period of the displayed results. The results of the *RLP Frame / IP Statistics measurement* are statistical quantities, so the CMU must collect data over some period of time to obtain meaningful results.

The update period has no influence on the speed of the measurements, however, it determines the shortest possible measurement time. E.g. with an update period of 1 second, new measurement reports will be available in 1.0 s intervals. The first report is acquired during a 1.0 s period after the start of the measurement. The R&S CMU uses this first report to determine the offset time but discards the information. The first valid results are calculated from the second report, which arrives between 1.0 s and 2.0 s after the start of the measurement.

The example above shows that a single shot measurement with an update period of half the statistics cycle length will always provide valid results.

Remote control:

CONFigure:UPERiod

Reset Statistics

Reset Statistics clears all statistics for all data applications. Clearing the statistics means that all counters for control channel cycles, test packets etc. are reset to zero, and the calculation of statistical RLP quantities is re-started for the new cycles, packets etc.

The reset of all statistics can be achieved by several means:

- Explicitly through the user by pressing the *Reset Statistics* button. This will reset ALL statistics for RLP measurements.
- Most session renegotiations will trigger a spontaneous reset of the statistics by the collecting AN (linkhandler) and will restart the measurements.

Remote Control:

No reset command in the command group, use:

INITiate:LAYer:APPLication:TEST:STATistics

(as described in the [Layer Settings \(Connection Control – Layer\)](#) subsystem)

Measurement Results – RLP Frame & IP Statistics

The results of the *RLP / IP Statistics* measurement are displayed in the central part of the measurement menu. The results are always available and constantly updated while a PPP connection is active and the measurement is switched on.

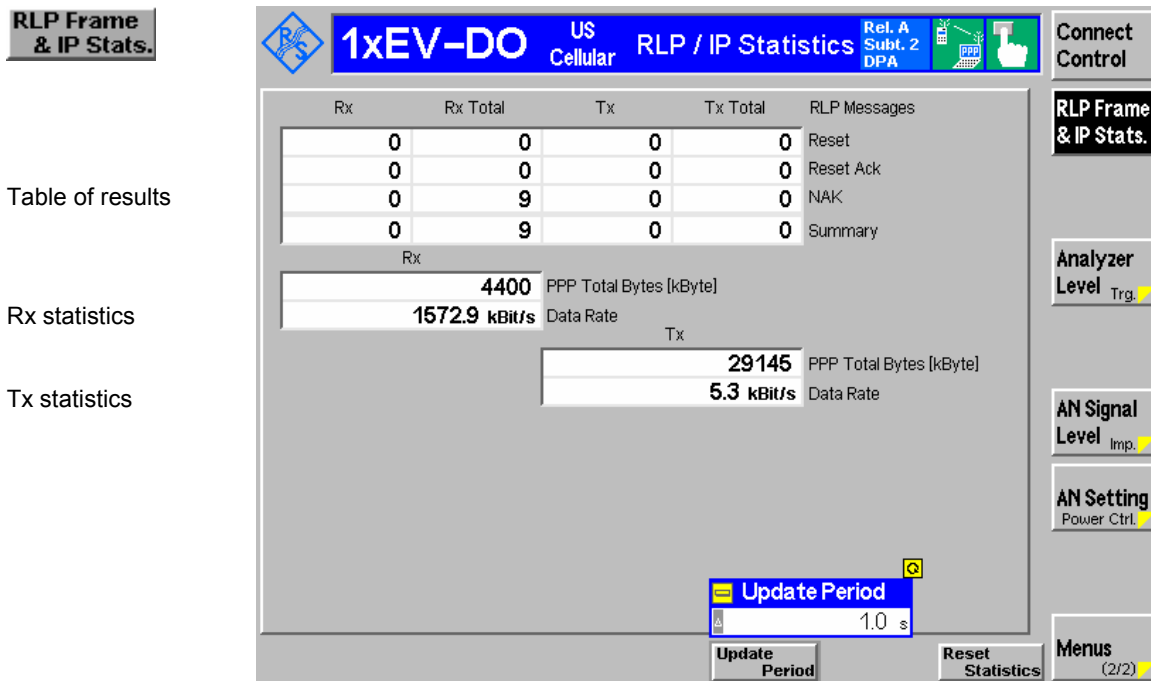


Figure 4-51 Data Application results – RLP Frame / IP Statistics

Table of results

The RLP packets transferred between the CMU and the mobile are monitored in a table with four different columns containing the number of packets that the CMU received:

- Rx* Number of packets received in the last *Update Period (Rx)*
- Rx Total* Total number of packets received since the beginning of the PPP connection (*Rx Total*)
- Tx* Number of packets transmitted in the last *Update Period (Tx)*
- Tx Total* Total number of packets transmitted (*Tx Total*).

The RLP (Radio Link Protocol) provides an octet stream transport service over forward and reverse traffic channels to support 1xEV-DO data services. The RLP procedures and frame types are described in standard 3GPP2 C.S0024. The table rows contain the number of packets from the measured RLP messages:

- Reset* Number of packets associated with RLP Reset messages, which are sent between AT and AN to reset RLP.
- Reset Ack* Number of packets associated with RLP Reset ACK messages, which are sent between AT and AN to complete the RLP reset procedure.
- NAK* Number of NAK control packets, requesting the retransmission of one or more data octets.
- Summary* Total number of packets from the measured RLP messages. As the list contains all packet types, this is equal to the total number of RLP packets received.

Rx	The Rx table contains the following rows:	
	<i>PPP Total Bytes</i>	Total number of bytes that the CMU received since the beginning of the PPP connection.
	<i>Data Rate</i>	Current received data rate in kBit/s, averaged over the <i>Update Period</i> .
Tx	The Tx table contains the following rows:	
	<i>PPP Total Bytes</i>	Total number of bytes that the CMU transmitted since the beginning of the PPP connection.
	<i>Data Rate</i>	Current transmitted data rate in kBit/s, averaged over the <i>Update Period</i> .
	Remote Control:	
	[SENSe] [:SCALar] :RLPStatistic	

Main Menu – Ping Measurement

The *Ping* menu configures the R&S CMU to send repeated echo requests of configurable size (pings) to the mobile, wait for the echo and display the ping statistics including the possible source of connection errors. *Ping* is an application of option R&S CMU-K87 which is used to test IP connectivity with the CMU.

Ping measurements can be performed with a logical IP connection to the MS (signalling states *PPP Connected* or *PPP Dormant*). Sending a ping in *PPP Dormant* state will cause the MS to return to *PPP Connected*. A ping *Repeat Interval* larger than the *Network PPP Inactivity Timer* (see p. 4-127) will prevent the transition from *PPP Connected* to *PPP Dormant*.

Ping can also be used without a logical IP connection to the MS, in order to *Ping* a server connected to the CMU.

The *Ping* measurement is controlled by means of the measurement control softkey below the *Connect*. *Control* softkey. The properties of the measurement control softkey are analogous in all measurements; see section *Analyzer/Generator – Measurement Control* in the *Non-Signaling* section. The hotkeys associated with the measurement control key provide specific measurement settings. These settings are also provided in the configuration menu; see section *Ping Configuration* on p. 4-109 ff.

Remote Control	INITiate:PING
	ABORt:PING
	STOP:PING
	CONTinue:PING
	FETCh [:SCALar] :PING:STATus?

Measurement Results – Ping

The results of the *Ping* measurement are displayed on the central panel of the measurement menu.

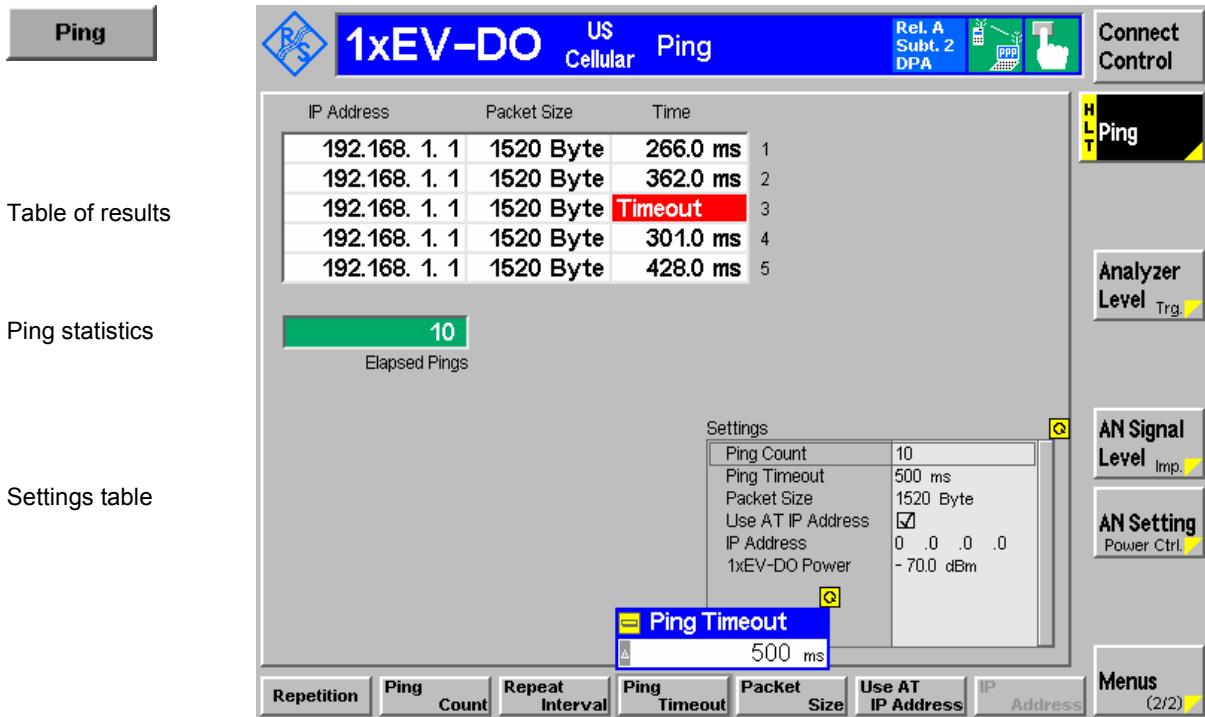


Figure 4-52 Data Application results – Ping

Table of results The table displays the last five ping events of the current statistics cycle together with the used *IP Address*, the size of the send buffer (*Packet Size*) and the *Time* the CMU had to wait for the reply (in ms).

If the *Time* exceeds the *Ping Timeout*, the *Time* column displays one of the following error messages:

- No Host* Host unreachable (e.g. because a wrong IP address was used)
- Inactive Link* Host could be reached but did not reply
- Timeout* Ping timeout exceeded but none of the previous errors occurred

Ping statistics The progress of the measurement is shown in a statistics field with a green bar graph and the current number of elapsed pings. The bar reaches the end of the field each time a statistics cycle (comprising the number of echo requests defined via *Ping Count*) is completed.

Settings table The *Settings* table shows the statistical settings of the ping measurement defined in the configuration menu (see below) and the essential RF signal setting defined with softkey/hotkey combinations.

Remote Control
 READ[:SCALar]:PING?
 FETCh[:SCALar]:PING?
 SAMPlE[:SCALar]:PING?

Measurement configuration hotkeys

Repetition

The *Ping* application softkey is associated with hotkeys which allow the direct configuration of the application:

The repetition mode defines when the Ping measurement will be terminated. Two modes are available for all measurements:

Single Shot The measurement is stopped after one statistic count.

Continuous The measurement is continued until explicitly terminated by the user; the results are periodically updated.

Remote Control:

CONFigure:PING:CONTRol:REPetition CONT | SING

Ping Count

The *Ping Count* setting is also provided in the configuration menu and is described in more detail on page 4-110.

Repeat Interval

The *Repeat Interval* setting is also provided in the configuration menu and is described in more detail on page 4-110.

Ping Timeout

The *Timeout* setting is also provided in the configuration menu and is described in more detail on page 4-110.

Packet Size

The *Packet Size* setting is also provided in the configuration menu and is described in more detail on page 4-110.

Use AT IP Address

The *Use AT IP Address* setting is also provided in the configuration menu and is described in more detail on page 4-110.

IP Address

The *IP Address* setting is also provided in the configuration menu and is described in more detail on page 4-110.

Ping Configuration

The popup menu *Ping Configuration* provides specific settings for the Ping measurement. It is called up by pressing the measurement softkey at the top right in the measurement menu twice (once if it is already selected).

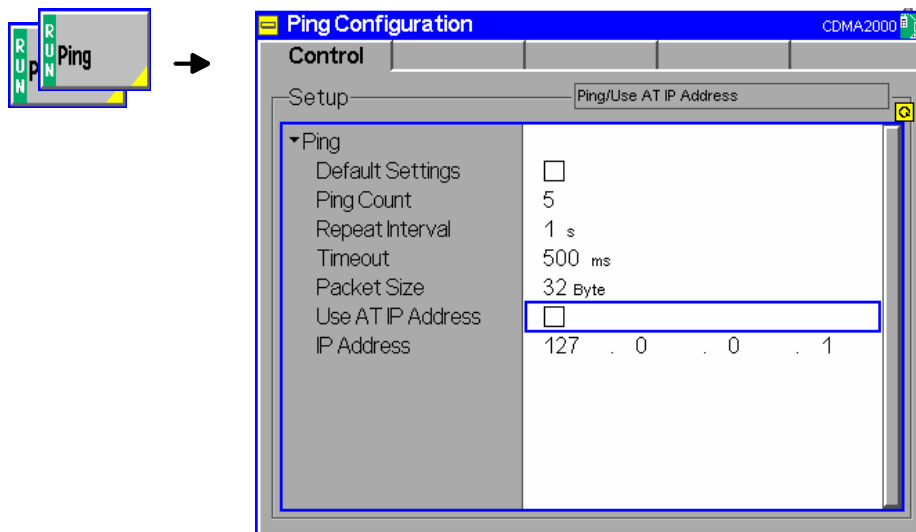


Figure 4-53 Ping Configuration Control

The statistics of *Ping* measurements are based on a statistics cycle comprising the number of echo requests defined via *Ping Count*. The following additional parameters are available:

Default Settings	Assigns default values to all <i>Ping</i> settings.
Ping Count	Defines the number of echo requests to be performed.
Repeat Interval	Time between two consecutive echo requests.
Timeout	Timeout in milliseconds to wait for each reply (number of milliseconds to wait for response).
Packet Size	Number of bytes in the send buffer.
Use AT IP Address	If <i>Use AT IP Address</i> is selected, then the R&S CMU sends pings to the AT IP address defined in in the <i>Layer</i> tab of the <i>Connection Control</i> menu, see Packet Applications on p. 4-127. Note: The TCP/IP settings and setup of the AN, the R&S CMU200 base system, is described in the R&S CMU200/300 operating manual.
IP Address	If <i>Use AT IP Address</i> is not selected, the IP address to be pinged can be entered here.
Remote Control	DEFault:PING:CONTRol CONFigure:PING:EREPorting CONFigure:PING:CONTRol:PCount CONFigure:PING:CONTRol:RINTerval CONFigure:PING:CONTRol:TOUT CONFigure:PING:CONTRol:PSIZE CONFigure:PING:CONTRol:ATIP CONFigure:PING:CONTRol:IPADdress

1xEV-DO Connection Control (Signaling)

Connection Control (Signaling)

The *Connection Control* menu in the Signaling context consists of several tabs to configure the inputs and outputs of the CMU and the respective signals in the function group *1xEV-DO*, to define the network standard, the stream and AN signal settings as well as the reference frequency, external attenuation values, and routing of the RF signals.

The menu group is activated using the softkey *Connect Control* to the right of the header of the measurement menu. The individual tabs (*Connection*, *Handoff*, *Layer*, *AN Signal*, *RF* \oplus , and *Sync.*) can be accessed using the hotkeys at the bottom of the screen.

The term signaling summarizes all procedures necessary for call setup and release and for control of a connection in the mobile radio network. In the case of the 1xEV-DO tests, a distinction is made between five different signaling states (excluding PPP-signaling states, which are controlled by a separate state machine):

<i>Signal Off</i>	AN transmits no signal
<i>Signal On</i>	AN provides a signal and waits for the AT to initiate a session negotiation. From the <i>Signal On</i> state, session negotiations can only be triggered by the AT.
<i>Session Negotiation</i>	A transfer state, where AT and AN (CMU) try to establish a session and negotiate the session parameters. This state may take a considerable amount of time and is the standard way to renegotiate an established session. This state can be reached either by the AT which tries to establish a session with the AN (CMU), or by reconfiguring an already existing session on the AN (CMU).
<i>Session Open</i>	Applications are now assigned to streams and all call parameters are negotiated. A session can be active for a very long time without any further activity.
<i>Connected</i>	This means that the traffic channel is actually up and available for the applications that have previously (during Session Negotiation) been assigned to a stream. In this sense, all these applications are connected at the same time, not just one of the applications.

A number of control commands which can be initiated both by the AN (CMU) and by the AT switch between these states.

Most applications within the function group *1xEV-DO Signaling* are only possible (or useful) in a particular signaling state (for example, handoff between various networks requires an existing connection between the CMU and AT, i.e. it is only possible in the *Connected* state). Functionality of some menus varies depending on the signaling state.

Since the measurements in signaling mode require an existing connection to a AT, the menus for setting up the call (*Connection Control - Connection*) appear immediately after selecting a signaling mode (unless this feature is disabled). The connection control menus can be accessed any time by pressing the *Connect Control* softkey at the top right corner in any measurement menu. The hotkey bar (at the bottom the screen) links the measurement menus together. Pressing the *Escape* key or the *Connect Control* softkey closes the connection control menu and the CMU changes to the measurement mode.

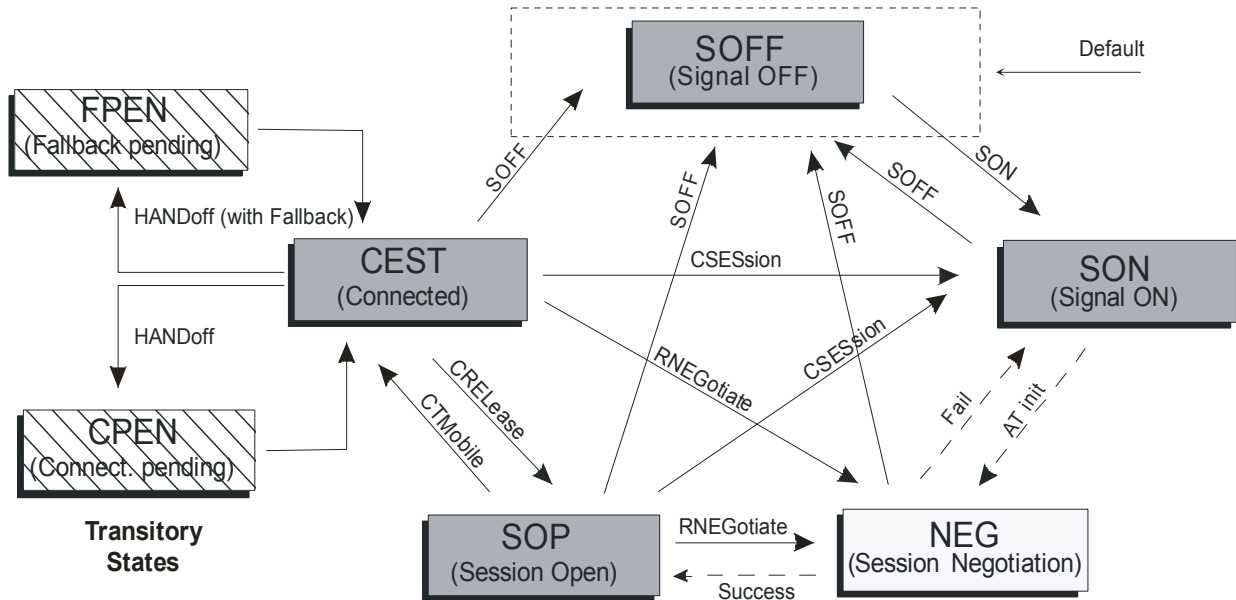


Figure 4-54: Signaling states of the CMU

The selected applications define if a PPP connection has to be established. In the present firmware version, only the “Default Packet Application” will establish a PPP link.

The PPP states are represented by their own state machine, which is dependent on the above signaling states:

<i>PPP Off</i>	No PPP connection has originally been established, or an existing PPP connection has been terminated. Reasons for this termination could be: <ul style="list-style-type: none"> • AT terminated the PPP connection • AN closes the session which should terminate the PPP session • AN renegotiates a session with a non-PPP application
<i>PPP Connected</i>	After a radio link has been established, the AT establishes a PPP connection. If this succeeds, the state <i>PPP Connected</i> is active.
<i>PPP Dormant</i>	A PPP link has been established, but the call has been disconnected. This means that the PPP link is temporarily disabled (dormant) but can be reactivated at any time by establishing a connection. This can also be initiated by the AN via connection of a traffic channel.

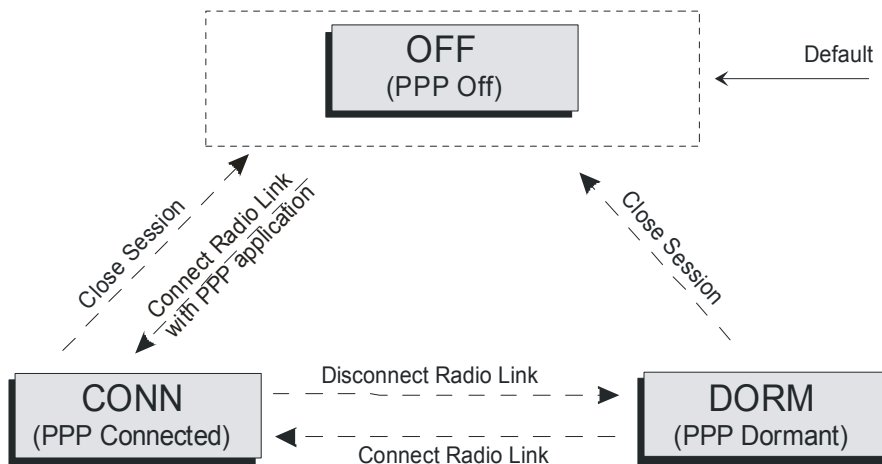


Figure 4-55: PPP states

In the following, the tab *Connection Control – Connection* displayed during the call setup is described.

Connection Settings (Connection Control – Connection)

The *Connection* tab of the *Connection Control* menu provides the basic operations of establishing a session and connecting a call and also controls the signaling setup, test session stream definition, RF channel configuration and the selection of the applicable network standard. The CMU provides a panel oriented version of the *Connection* tab and a table oriented summary of all tabs.

The *Connection* tab controls:

- Signal on/off toggling
- Session control
- Access terminal connection/disconnection
- Selection of signaling applications
- Selection of the applicable network and standard to be used for testing

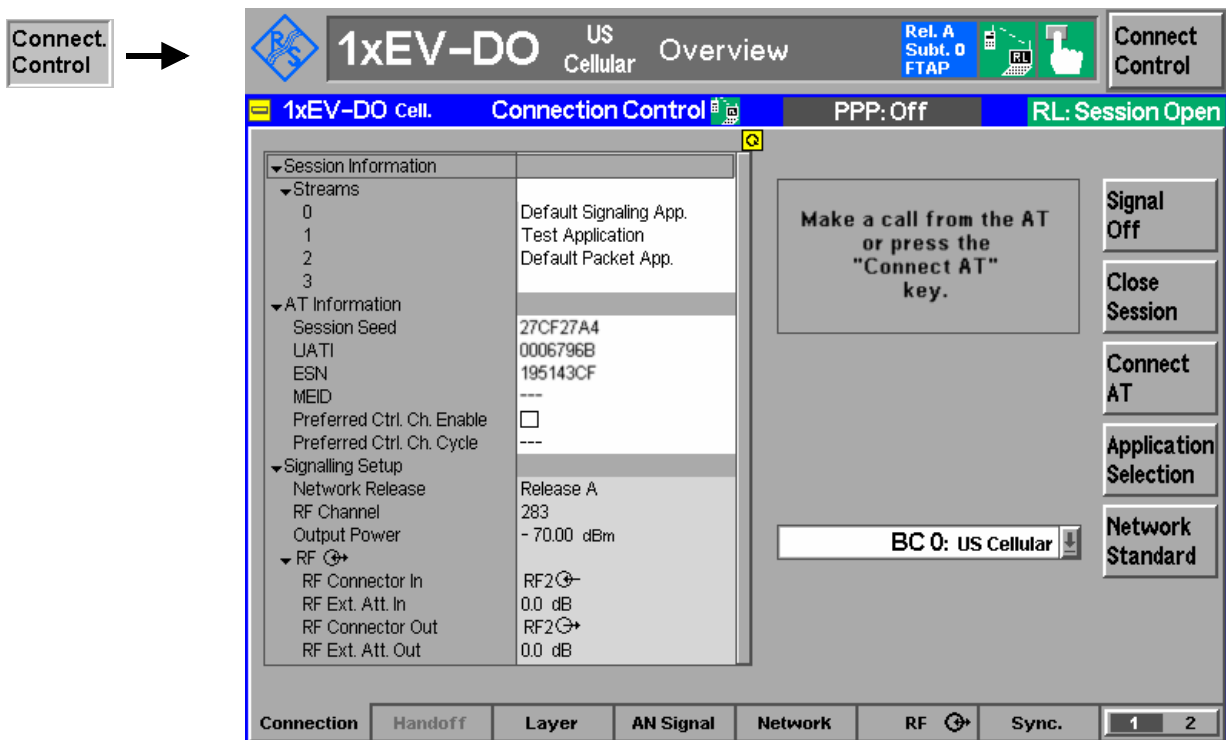


Figure 4-56 Connection Control – Connection (panel)

The parameter overview in the left half of the menu is described below after the softkey descriptions. Some parameters are not always available, depending on the current and previous signaling states and settings. In this case the table shows invalid or unavailable settings ("---").



The *Signal Off* softkey switches the AN signal off so that the AT can no longer negotiate and establish a session. By switching the signal off, the AN changes to the signaling state *Signal Off*. After the toggle, the softkey changes to *Signal On* and the softkeys *Close Session* and *Connect AT* are invisible. In the signaling state *Signal Off* the AN does not provide a signal.

Remote control:
 PROCedure:Signalling:ACTion SOFF

Signal
On

The *Signal On* softkey switches on a control channel signal to which the AT can negotiate and establish a session. By switching on the signal, the AN changes to the signaling state *Signal On*. After the toggle, the softkey changes to *Signal Off* and the softkeys *Close Session* and *Connect AT* are enabled.

The *Close Session* and *Connect AT* softkeys are enabled only in the Session Open state.

In the signaling state *Signal On*, the AN provides a signal and waits for the AT to initiate a session negotiation. From the *Signal On* state, session negotiations can only be triggered by the AT.

Remote control:

PROCEDURE:SIGNALLING:ACTION SON

Close
Session

When the *Signal On* state is reached, the Sector ID is changed. This forces the AT to close its session and to negotiate for a new session. Pressing the "Close session" button does exactly this. The Sector ID changes and the CMU goes back to the *Signal On* state. A "Close session" message is sent to the AT, which results in the negotiation of a new session.

Remote control:

PROCEDURE:SIGNALLING:ACTION CSESSION

Connect
AT

Once a session has been negotiated, and the AT is in the *session open* state (SOP), this button triggers the establishment of the connection with the AN.

Remote control:

PROCEDURE:SIGNALLING:ACTION CTMOBILE

Disconnect
AT

From the *connection established* state (CEST), the connection is released, and the AT falls back into the *session open* state (SOP).

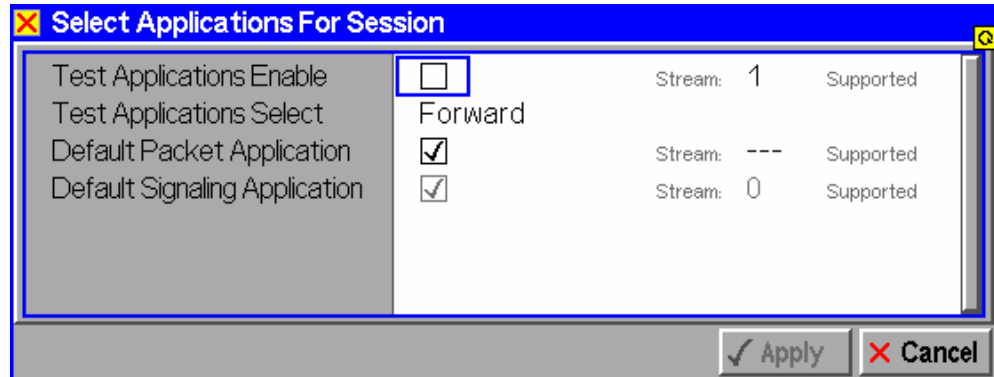
Remote control:

PROCEDURE:SIGNALLING:ACTION CRELEASE

Application Selection

The *Application Selection* button allows the assignment of applications to streams. Several applications can be assigned to different streams simultaneously. The assignment results in a new session negotiation.

Pressing the *Application Selection* softkey opens the *Select Application For Session* popup dialog:



The dialog displays all currently supported applications and allows the assignment to different streams.

These conditions apply:

- The *Default Signaling Application* (DSA) is always active (assigned to stream 0 by default)
- The *Test Application* is mutually exclusive, preventing any other application (except DSA) to be selected at the same time
- All other applications can be selected in any combination.
- No application can be active more than once.

Currently four streams are supported, which that up to four different applications can be selected at any time, including the permanently selected DSA.

The applications DSA, *Default Packet Application* (DPA) and F(E)TAP/R(E)TAP are supported in this release. The applications are assigned (and described) in the *Layer Settings* tab starting on page 4-119.

Remote control:

```

CONFigure:LAYer:APPLication:DSIGNaling:ENABLE ON | OFF
CONFigure:LAYer:APPLication:DTEST:STReam <nr>
CONFigure:LAYer:APPLication:ETEST:STReam <nr>
CONFigure:LAYer:APPLication:TEST:ENABLE ON | OFF
CONFigure:LAYer:APPLication:TEST:SElect OFF | FORW | REV | FR
CONFigure:LAYer:APPLication:TEST:STReam 1 | 2 | 3
CONFigure:LAYer:APPLication:DPACket:STReam <nr>

```

Network Standard

The popup menu *Network Standard* defines which network and standard is used for testing.

Pressing the *Network Standard* softkey allows you to change between the supported band classes for the network. Refer to table 1-1 in chapter 1 for a list of the supported 1xEV-DO network band classes.

Remote control:

```
CONFigure:NETWork:STANdard
N45T | PA4M | USC | KCEL | TACS | JTAC | NA7C | NA9C |
NA8S | PA8M | NAPC | KPCS | B18M | USPC | IM2K | IEXT | AWS |
U25B | U25F
```

The parameter overview in the left half of the *Connection* panel shows the available parameters, provided that the AT under test returns a valid result:

Session Information

The *Session Information* parameter group contains information about the assignment of applications to the available streams, see [Application Selection](#):

<i>Stream 0</i>	Default Signaling Application (fixed value)
<i>Stream 1</i>	<assigned application>
<i>Stream 2</i>	<assigned application>
<i>Stream 3</i>	<assigned application>

Remote control:

```
CONFigure:LAYer:APPLication:DSIGNaling:ENABle?
CONFigure:LAYer:APPLication:DTEST:STReam?
CONFigure:LAYer:APPLication:ETEST:STReam?
CONFigure:LAYer:APPLication:TEST:ENABle ON | OFF
CONFigure:LAYer:APPLication:TEST:SElect OFF | FORW | REV | FR
CONFigure:LAYer:APPLication:TEST:STReam 0 | 1 | 2 | 3
CONFigure:LAYer:APPLication:DPACket:STReam?
```

AT Information

The *AT Information* parameter group contains information about AT session and identification parameters.

<i>Session Seed</i>	The session seed is an 8 char hex number (32 bits), (default "n/a" for session negotiation). The session seed value for the default access channel protocol is not configurable, it is provided by the AT.
<i>UATI</i>	Unicast Access Terminal Identifier, 8 byte hex, default "n/a" (session negotiation). The initial UATI assignment and other AT address parameters are specified in the Address Management Protocol, which is part of the session layer. The AT requests a UATI and the AN assigns it.
<i>ESN</i>	The hardcoded Electronic Serial Number of the connected AT is shown in hexadecimal format.
<i>MEID</i>	Mobile Equipment Identifier, a 56-bit number which allows for a larger number of ATs to be identified than the existing ESN numbering system.
<i>Preferred Ctrl. Ch. Enable</i>	The <i>Preferred Control Channel Enable</i> flag indicates whether or not the AT selects the Preferred Control Channel Cycle. A value of "0" means that AN and AT both use a common hash function to determine which Preferred Control Channel Cycle

to use. A value of "1" means that the AT tells the AN which Preferred Control Channel Cycle is used.

Preferred Ctrl. Ch. Cycle

The channel cycle in which the AT transitions out of the dormant state in order to monitor the Control Channel.

Remote control:

```
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:SSEed?
[SENSe]:ATINfo:UATi?
[SENSe]:ATINfo:ESN?
[SENSe]:ATINfo:MEID?
[SENSe]:ATINfo:PREFerred:CCHannel:CYCLe:ENABle?
[SENSe]:ATINfo:PREFerred:CCHannel:CYCLe?
```

Signaling Setup

The *Signaling Setup* parameter group contains information about the active network release, the RF channel and the Output Power.

Network Release Both network releases support all band classes of the installed hardware options. Network release A expands the system capacity to allow forward data rates up to 3.1 Mbps and reverse data rates up to 1.8 Mbps. Additionally, a Data Source Channel (DSC) was introduced to support fast handoffs with L1 signaling.


RF Channel The *RF Channel* sets the base station channel number (and frequency) of the generated RF signal. Changing the RF Channel resets the RF Frequency setting. The default settings for the channel numbers vary with the selected network.

Output Power *Output Power* displays the total 1xEV-DO output power generated by the CMU

Remote control:

```
CONFigure:NETWork:RELease?
UNIT:ANSignal:CHANnel[:RF]?
CONFigure:ANSignal:CHANnel[:RF]?
CONFigure:ANSignal:POWer:EVDO?
```

RF 

The *RF Connector in/out* parameter group contains information about the connectors for RF signals. These parameters are set in the *RF*  tab and are described there in greater detail (see section [RF Connectors \(Connection Control – RF\)](#) on page 4-22 ff.)

RF Connector In The *RF Input* shows which of the three connectors RF 1, RF 2, or RF 4 IN is to be used as the RF input connector.

RF Ext.Att. In The *Ext. Att. Input* shows the external attenuation (or gain, if the value is negative) at the defined RF input.

RF Connector Out The *RF Connector Out* parameter shows which of the three connectors RF 1, RF 2 and RF 3 OUT is defined as RF output connector.

RF Ext.Att. Out The *Ext. Att. Output* shows the external attenuation (or gain, if the value is negative) at the selected RF output.

Remote control:

```
INPut[:STATe] RF1 | RF2 | RF4
[SENSe:]CORRection:LOSS:INPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude]
OUTPut[:STATe] RF1 | RF2 | RF3
[SENSe:]CORRection:LOSS:OUTPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude]
```

Handoff Settings (Connection Control – Handoff)

The *Handoff* tab of the *Connection Control* menu controls the applicable settings for handoff to another band class, which is described below.

The *Handoff* softkey initiates a handoff of the 1xEV-DO connection to a different 1xEV-DO band class and an RF channel within this target band class. It is therefore only available in the *Connected* state (CEST).

Handoff includes:

1. Selection of the target network band class (Destination Selection softkey).
2. Start of the handoff procedure (Handoff softkey).

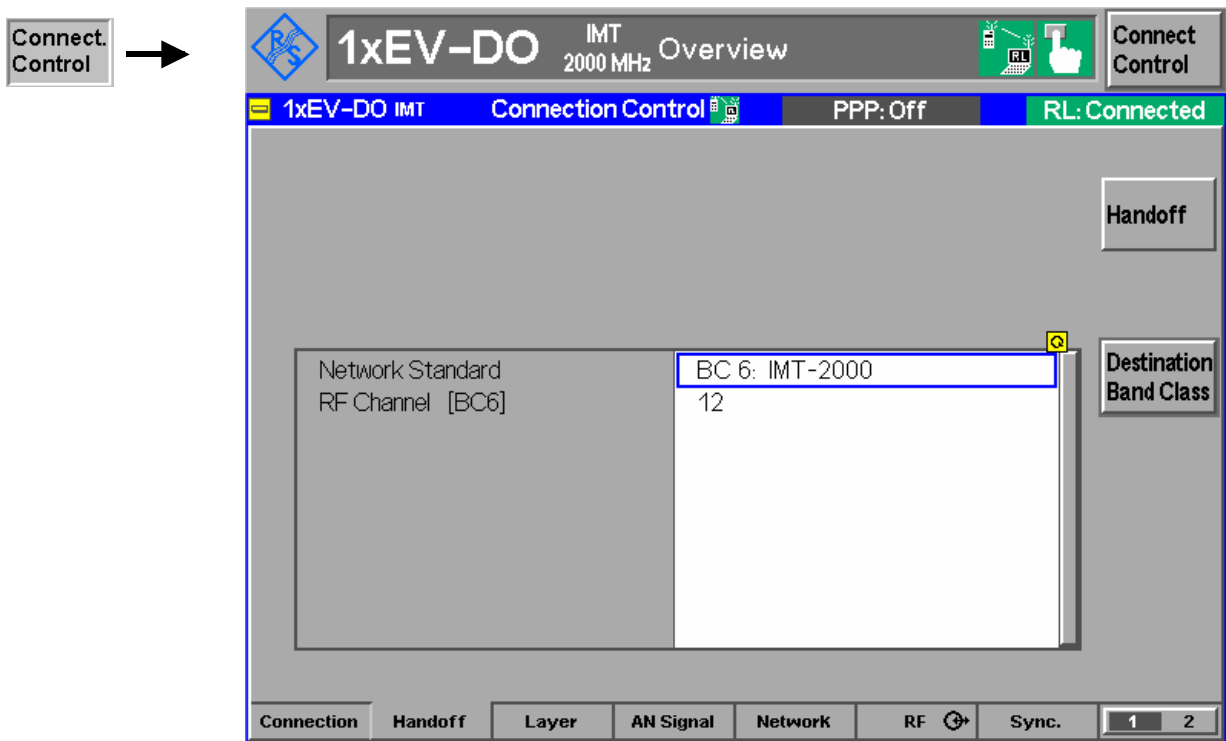


Figure 4-57 Connection Control – Handoff (destination band class)

Handoff

The *Handoff* softkey initiates a handoff to the defined destination band class. After a handoff the *AN Signal* tab no longer shows the current control channel settings but displays "from other network", indicating that the values of the origin band class have been left unchanged. Display of the current values is restored by returning to the target band class or setting up the connection again. When a handoff is initiated, all measurements are turned off.

Remote control:
 PROCEDURE:SIGNALLING:ACTION HANDOFF

Destination Band Class

The *Destination Band Class* softkey sets the target band class parameters that come into effect as soon as the call is handed off.

Network Standard The item Network Standard defines which network and standard is used for handoff. Selecting the Network Standard of the destination band class allows you to change between the supported band classes for the network. Refer to table 1-1 in chapter 1 for a list of the supported 1xEV-DO network band classes.

RF Channel <BC nr> The RF Channel sets the base station channel number (and frequency) of the generated RF signal. Changing the RF Channel resets the RF Frequency setting. The default settings for the channel numbers vary with the selected network.

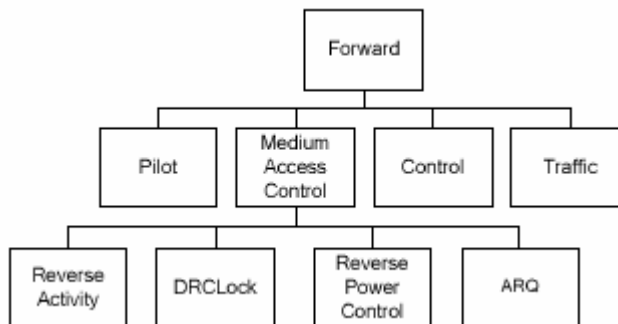
Remote control:
 PROCEDURE:BC:HANDOFF

Layer Settings (Connection Control – Layer)

The air interface for cdma2000® compliant high rate packet data systems has been designed in a layered architecture, with interfaces defined for each layer (and for each protocol within each layer), which allows for future modifications to a layer or to a protocol. It also gives an overview of the current state of the applications (bound to stream, not bound, or not supported).

Since the layer protocols are closely related to the corresponding channels, the forward and reverse channel structure is shown below:

Forward channels:



Reverse channels

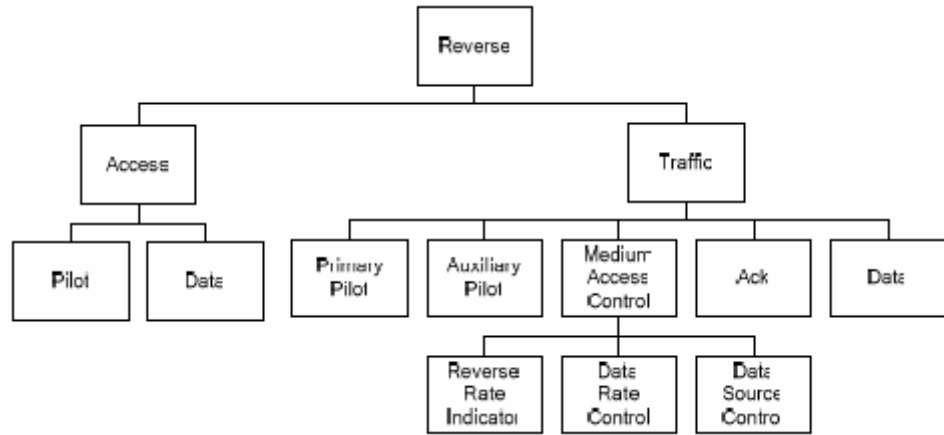


Figure 4-58: 1xEV-DO Forward and Reverse Channel Structure

The forward and reverse link channels between a single access network and a 1xEV-DO access terminal are shown in the next picture:

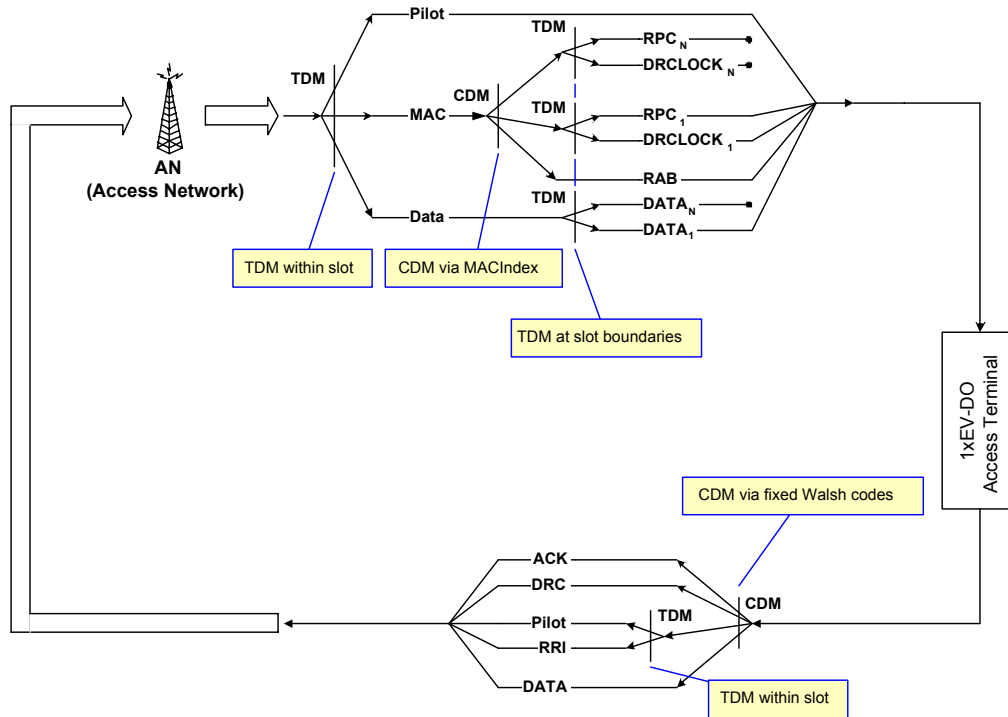


Figure 4-59: Single-AN Link Channels

The forward and reverse link channels between several access networks and a 1xEV-DO access terminal are shown in the next picture:

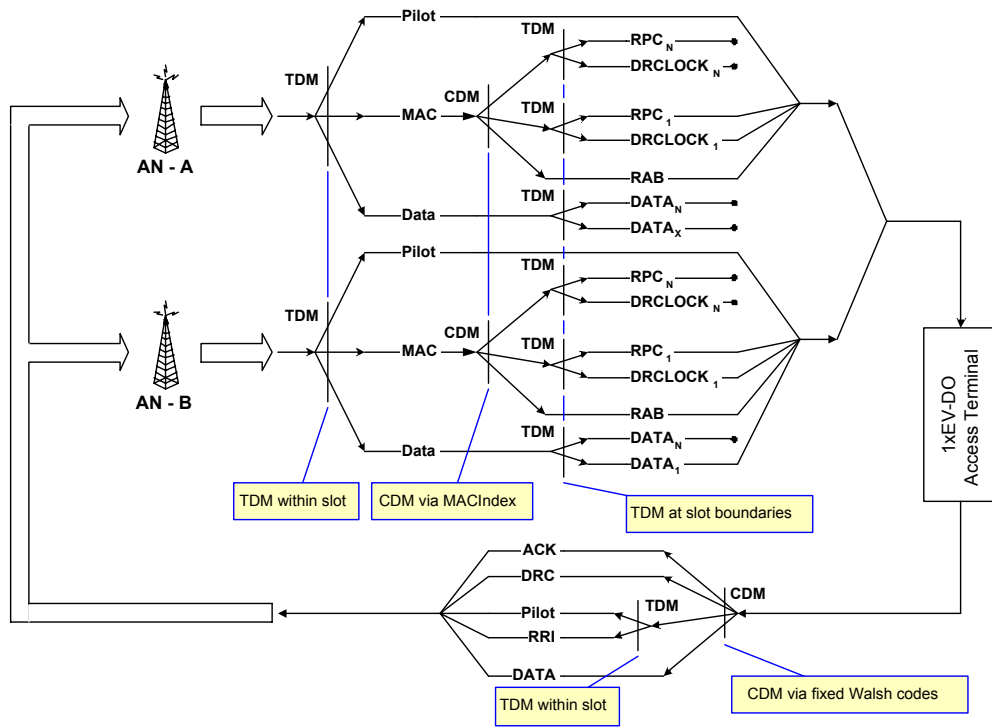


Figure 4-60: Multiple AN Link Channels

The related protocol stack is shown below.

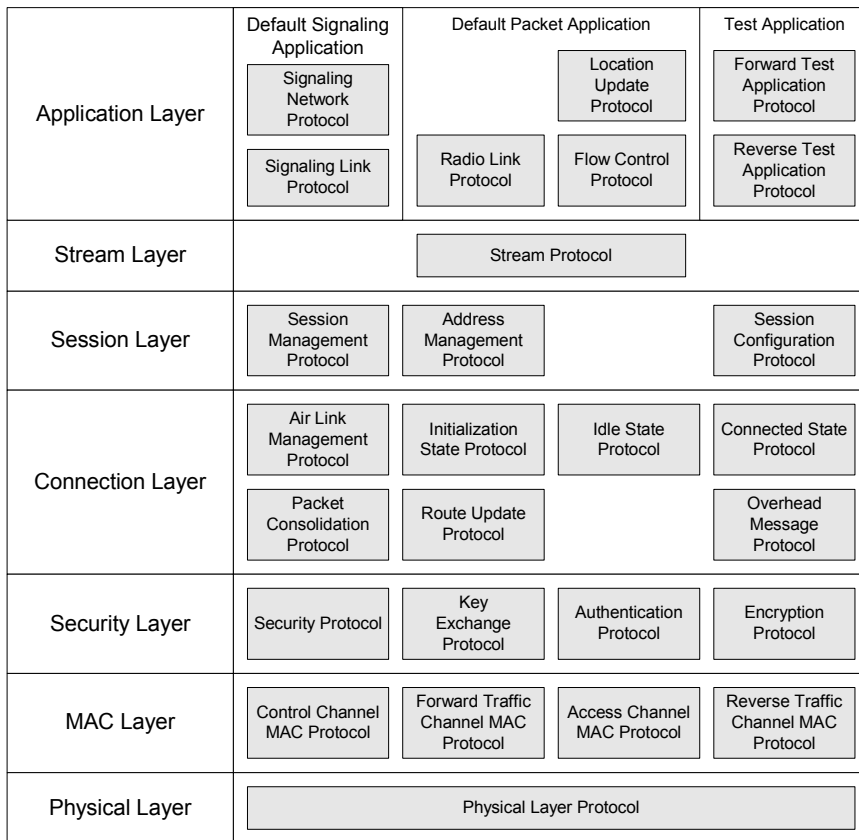


Figure 4-61: 1xEV-DO Protocol Stack

Independent of the state of a protocol or an application (enabled/disabled), all protocol parameters can be configured at any time, unless they are display-only parameters, i.e. changes of non-active protocols in preparation of the next session are accepted.

The *Layer* tab of the *Connection Control* menu controls the applicable settings for the different layers of the packet data system, which are described below.

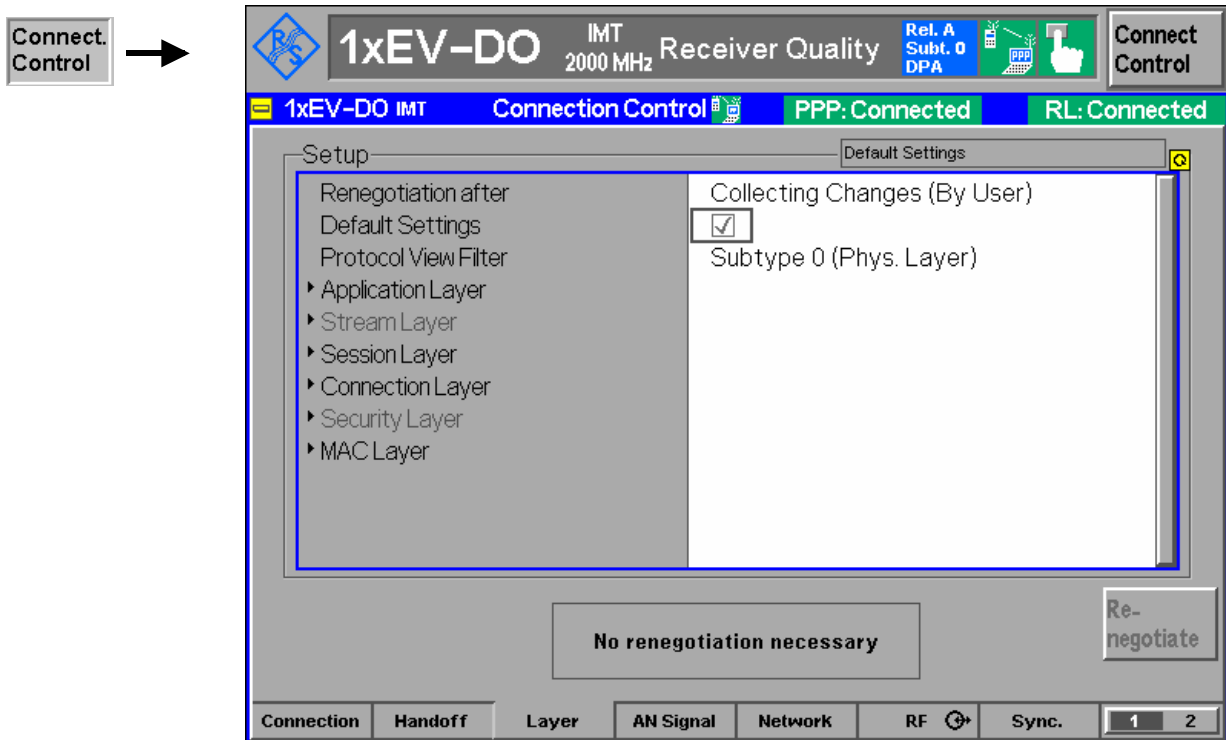
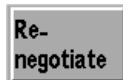


Figure 4-62 Connection Control – Layer



If *Collecting Changes (By User)* is set, the *Renegotiate* softkey activates all stored layer tab setting changes and enforces a session renegotiation.

If the change of layer settings does not require a renegotiation, this is shown in the message box to the left of the softkey (as shown above).

Remote control:
 PROCedure:SIGNalling:ACTion RNEGotate

Renegotiation after

Configuration changes of the parameters in the *Layer* tab generally lead to a session renegotiation. In order to avoid multiple session renegotiations after each parameter change, the following control parameters are implemented:

Each Parameter Change This parameter setting enforces a renegotiation after each change (default).

Collecting Changes (By User) This parameter setting causes changes in this tab to be collected until the user "activates" the changes by pressing the "Renegotiate" softkey.

Remote Control:
 CONFIGure:LAYer:UPDate:MODE IMMEDIATE | USER

Default Settings	<p>The <i>Default Settings</i> switch assigns default values to all settings in the <i>Layer</i> tab (the default values are quoted in the command description in chapter 6 of this manual).</p> <p>Remote Control: <code>DEFault:LAYer ON OFF</code></p>
Protocol View Filter	<p>The Protocol View Filter parameter allows the switching between the two different sets of protocols for configuration purposes. The CMU supports one set of protocols for Release 0 and a different set of protocols for Revision A. Within each protocol, there are various parameters which are configurable (e.g. the DRC Channel Gain in the Forward Traffic Channel MAC protocol).</p> <p>Remote Control: <code>n.a.</code> (Note that both protocol sets can be configured via remote control command <code>CONFigure:NETWork:RELease</code>)</p>
Application Layer	<p>The Application Layer provides multiple applications. It provides the Default Signaling Application for transporting air interface protocol messages. The Application Layer also provides the Default Packet Application for transmitting user data and the Default Test Application for measuring forward and reverse link performance.</p>
Signaling Applications	<p>The Default Signaling Application provides the means to carry messages between a protocol in one entity and the same protocol in the other entity. The Default Signaling Application consists of a messaging protocol (Signaling Network Protocol) and a link layer protocol that provides message fragmentation, retransmission and duplicate detection (Signaling Link Protocol).</p> <p>The air interface can support up to four parallel application streams. The first stream (Stream 0) always carries Signaling, and the other three can be used to carry applications with different Quality of Service (QoS) requirements or other applications. <i>AT Support</i> is ON (Supported) for the Default Signaling application.</p> <p>Remote Control: <code>CONFigure:LAYer:APPLication:DSIGNaling:ENABle?</code> <code>CONFigure:LAYer:APPLication:DSIGNaling:STReam?</code> <code>[SENSe]:ATINfo:APPLication:DSIGNaling:SUPPort?</code></p>
Test Applications	<p>The Default and Enhanced Test Application Protocols provide a set of procedures for the AT and AN used for the measurement of various forward and reverse link performances. The FTAP/FETAP and RTAP/RETAP protocols of the test application allow quick and efficient control of the forward and reverse operation for accurate parametric testing. FTAP/FETAP provides packet error rate (PER) measurement capability for RF connections at variable forward channel data rates. The RTAP/RETAP provides the ability to control the AT reverse link to test parameters such as code domain power and waveform quality using all of the available reverse data rates For more details about measurements with the test application, please see p. 4-83 ff.</p> <p>To make measurements using the Test Application Protocol, it is required to enable the Test Application on a particular stream (1-3) using the <i>Connection Control - Connection Tab</i> via <i>Application Selection</i> softkey (see p. 4-111).</p> <p>The FTAP/FETAP and RTAP/RETAP Configuration (Cfg) parameters described below are used for the corresponding parameter assignment messages.</p>

Reset Statistics **Execute** This button resets the connection statistics for the enabled test application, thus all RxQuality measurements are restarted. This command can be submitted in all signaling states, but useful results will only be obtained in state CEST.

F(E)TAP Cfg The FTAP/FETAP protocols specify the procedures and messages to control the Forward Traffic Channel and to configure the reverse channels associated with the Forward Traffic Channel. They specify generation and transmission of test packets sent on the Forward and Reverse Traffic Channels for the purpose of measurements using the Forward Traffic Channel. For subtype 0 and subtype 2 signals, these items allow the configuration of the forward traffic channel rate for the measurement to be performed.

DRC Rate

Index The data rate index defines an unambiguous assignment of the data rate and the slot count, as described in chapter 6.

DRC Rate The data rate assigned to the data rate index.

Slots The slot count assigned to the data rate index.

Please note that the data rate indices, data rates and number of slots are different for FTAP and FETAP tests, as described for the related remote commands in chapter 6.

Loopback Enable The FTAP/FETAP statistics Get/Clear/Response messaging is used to determine the Control Channel PER. As a prerequisite FTAP/FETAP and Loopback are automatically enabled, where the definition of "Loopback enabled" is slightly different than what is defined in the standard. The standard defines Loopback enable as an indicator to the AT to generate Loopback packets or not. The CMU definition of *Loopback Enable* is that the AT always has the ability to send FTAP/FETAP Get Stats Response Messages. However, a Response Message is sent by the AT only when a request message (FTAP/FETAP Stats Get Request) is received. The CMU only sends request messages when loopback is enabled. The status of the Loopback enable parameter depends on the FTAP/RTAP configuration (only FTAP -> Loopback is *ON*, only RTAP -> Loopback is *OFF*, both FTAP and RTAP -> Loopback is *OFF*).

ACK Channel Fix Mode The access terminal transmits an ACK Channel bit in response to every Forward Traffic Channel slot that is associated with a detected message directed to the access terminal. When "Ack Always" is selected, the AT receives packets as if all the packets were received in one slot. When "Nack. Always" is selected, the AT receives packets as if all the packets were received in the specified number of slots for the DRC being used.

ACK Channel Fix Modulation Type (only subtype 2) For subtype 2 signals, the fixed modulation type of the ACK channel can be set (e.g. BPSK for single-user packets and On/Off Keying for multi-user packets). Currently, the ACK channel fix modulation type is always set to *OFF*.

RTAP Cfg The RTAP protocol specifies the procedures and messages to control and configure the Reverse Traffic Channel. It generates test packets sent on the Reverse Traffic Channel for testing the channel. For subtype 0 signals, these items allow the configuration of the reverse data channel rate for the measurement to be performed.

Data

Min. Index The minimum data rate index for the reverse channel test application protocol.

Data

Max. Index The maximum data rate index for the reverse channel test application protocol.

Min. Rate The data rate assigned to the RTAP min. data rate index.

Max. Rate The data rate assigned to the RTAP max. data rate index.

Please note that the data rate indices, data rates and number of slots are different for RTAP and RETAP tests, as described for the related remote commands in chapter 6.

RETAP Cfg For subtype 2 signals, these items allow the configuration of the reverse data channel rate for the enhanced measurement to be performed.

Min.Packet

Size Index The minimum packet size index for the reverse channel enhanced test application protocol.

Max.Packet

Size Index The maximum packet size index for the reverse channel enhanced test application protocol.

Min. Packet

Size (Bits) The size of the data packet assigned to the RETAP minimum data rate index.

Max. Packet

Size (Bits) The size of the data packet assigned to the RETAP maximum data rate index.

Enh. Access Ch. Rate Mode The enhanced test application itself does not use the access channel. This setting sets the access channel rate that will be used by the AT outside of the test application. The AT uses the access channel only when a call is not connected.

Remote Control:

```
INITiate:LAYer:APPLication:TEST:STATistics
CONFigure:LAYer:APPLication:TEST:...
[SENSe]:ATINfo:APPLication:TEST:SUPPort?
```

```
CONFigure:LAYer:APPLication:DTEST:FTAP:...
CONFigure:LAYer:APPLication:DTEST:RTAP:...
CONFigure:LAYer:APPLication:ETEST:FETap:...
CONFigure:LAYer:APPLication:ETEST:RETap:...
```

Packet Applications

The Default Packet Application is used to test actual IP-based data transfer. It consists of a link layer protocol that provides octet retransmission and duplicate detection (Radio Link Protocol), a location update protocol that provides mobility between data service networks and a flow control protocol that provides flow control of data traffic.

Packet Data Testing in a mobile IP or simple IP environment is described in application note "1xEV-DO Packet Data Testing" (1CM64_1).

Mobile IP

Mobile IP refers to a service in which the user is provided IP routing service to a public IP network and/or secure IP routing service to predefined private IP networks as described in the standard 3GPP2 P.S0001-A. The AT uses PPP as the data link protocol for Mobile IP.

The AT is able to use either a non-zero static IP address or a dynamically assigned IP address belonging to its home IP network Home Agent. The AT shall have a non-zero static Home Agent address assigned regardless of whether the AT has a static or dynamic Home Address. The user is able to maintain a persistent IP address even when handing off between radio networks connected to separate ANs. The Mobile IP authentication protocol defined in RFC 2002 is used rather than the PPP authentication protocols, PAP and CHAP.

MIP Stand Alone Mode Selects the MIP mode that the CMU is configured for.

- On* MIP stand alone mode. In the Stand Alone Mode, the CMU performs all of the functions of the home agent and foreign agent including broadcasting of Agent Advertisements, MD5 authentication and responding to Registration Request messages.
- Off* MIP gateway mode. In the Gateway Mode, the CMU is connected to a foreign agent and behaves like a gateway between the mobile node and foreign agent. All IP messaging is "IP forwarded" to the foreign agent.

Mobile Node Home IP Addr.

The IP address of the mobile in its home network (optional). This address can be defined in MIP stand-alone mode and is used in case the home IP address is not programmed in the mobile (its IP address is set to 0.0.0.0). If a home IP address is programmed in the mobile then the *Mobile Node Home IP Addr.* is overwritten with the value programmed in the phone (when the AT completes the MIP Registration).

Foreign Agent IP Addr.

IP address of the foreign agent (FA), which must be defined in MIP gateway mode. If the CMU is directly connected to the foreign agent, then the default gateway should match the FA address.

However, if the CMU is connected to another gateway that then routes the IP packets to/from the FA, the default gateway is different from the foreign agent address.

AT Home Agent Secret

Secret used by the R&S CMU to do Mobile IP MD5 authentication in MIP stand-alone mode. This value **must** match the programmed AT home agent secret, otherwise, no IP connection can be set up from the AN.

AT Home Agent IP Addr.

IP address of the Home Agent. The address is programmed in the mobile and used for registration and tunneling purposes. It is captured and displayed when a mobile IP call is made.

Care Of Address

IP address that the Foreign Agent uses to decapsulate packets which have been tunneled by the home agent and to deliver them to the mobile node. The address is captured and displayed when a mobile IP call is made.

MIP Agent Advertisements

Enables or disables the R&S CMU to broadcast MIP Agent Advertisements to advertise its presence on the network. This parameter is available in MIP stand alone mode only. With disabled MP Agent Advertisements, no IP connection from the MS can be set up.

Registration Reply Code

Code number sent to the mobile in the CAUSE_CODE field of the *Registration Reply* message. This parameter is available in MIP stand alone mode only where it can be used to test different failure conditions at the network. An MIP call can be set up if the MS is configured with registration reply code 0, *Registration Accepted*. With all other codes, MIP registration will fail.

Registration Reply Lifetime

Number of seconds remaining before the registration is considered expired and the mobile has to re-register. This parameter is sent to the mobile in the *Registration Reply* message in order to govern the time between consecutive registrations from the mobile. It is available in MIP stand alone mode only. The following values have special meanings:

- The minimum value of 0 s indicates that the mobile has to de-register.
- The maximum value of 65535 s indicates infinity: the registration never expires.

MIP Authentication Type

(Authentication type for the Mobile IP MD5 authentication in MIP stand alone mode. The parameter

is used by the R&S CMU200 when encrypting/decrypting the Mobile IP messages. The R&S supports authentication according to standard RFC 2002 or the extended standard RFC 2002 bis, according to which the SPI number must be included as part of the authentication calculation.

The parameter is available in MIP stand-alone mode only.

PPP The *PPP* section provides the addresses for the Point-to-Point Protocol connection between the CMU and the AT, configures authentication procedure and the timers controlling the transition between PPP Dormant and PPP Connected state of the mobile.

PPP - IP Address - Static Definition of the static IP addresses for the R&S CMU (AN) and the mobile node (AT). The addresses are used if the CMU is configured for static IP addressing.

In a *Mobile IP* test environment, the PPP IP addresses are not assigned to a definite connection (the addresses in the *Mobile IP* section are used instead; see above). Still the PPP IP addresses are used internally and should be configured properly (i.e. within the R&S CMU subnet).

PPP - IP Address - Dynamic Display of the dynamically allocated IP addresses for the CMU (AN) and the mobile under test (AT). The addresses are available if the CMU is configured for dynamic IP addressing using DHCP, they are used in the same way as static PPP IP addresses.

PPP - Authentication Selects and configures the PPP authentication algorithm to be used for IP connections. If PPP authentication is set to a value different than *NONE*, Simple IP is used. Refer to document RFC 1334, *PPP authentication protocols*, for details.

PPP Authentication

Type For Mobile IP connections authentication must be disabled (*NONE*).

Username Max. 72-character username for PAP authentication.

Password Max. 72-character password for PAP authentication.

PPP - Inactivity Control Configures the timer to control the transition of the AT from PPP Connected to PPP Dormant. In the dormant state, however, a logical IP connection is maintained. The CMU can transition the AT from PPP Dormant to PPP Connected state by sending data to the AT; for details refer to document TIA/IS-707-A-3.

The AT states *PPP Dormant* and *PPP Connected* correspond to two distinct signalling states of the CMU.

AN PPP

Inactivity Timer Time interval after which the CMU will transition the AT from PPP Connected to PPP Dormant state if there is no data being sent to or received from the AT. Switching the timer *Off* disables the automatic transition to PPP Dormant state so that the AT will remain PPP Connected after a data connection is established.

Remote Control:

```
CONFigure:LAYer:APPLication:DPACket:REVerse[:STATic]:IPADdress
CONFigure:LAYer:APPLication:DPACket:FORWard[:STATic]:IPADdress
CONFigure:LAYer:APPLication:DPACket:DNS[:STATic]:IPADdress
CONFigure:LAYer:APPLication:DPACket:REVerse:DYNamic:IPADdress?
CONFigure:LAYer:APPLication:DPACket:FORWard:DYNamic:IPADdress?
CONFigure:LAYer:APPLication:DPACket:DNS:DYNamic:IPADdress?
```

```
CONFigure:LAYer:APPLication:DPACket:AUTHentic:TYPE
CONFigure:LAYer:APPLication:DPACket:AUTHentic:UNAME
CONFigure:LAYer:APPLication:DPACket:AUTHentic:PWORd
CONFigure:LAYer:APPLication:DPACket:IAControl:NIATimer
```

Stream Layer

The Stream Layer provides multiplexing of distinct application streams. The Default Stream Protocol provides four streams. Stream 0 is dedicated to signaling and defaults to the Default Signaling Application. Stream 1, Stream 2, and Stream 3 are not used by default.

Application instances are created by the Stream Layer protocol. Once the AT and AN agree upon using a new application subtype for a certain stream, an application instance associated with the newly negotiated application (specified by its application subtype) is created, and the existing application instance for that stream is replaced by the newly negotiated one.

Stream protocol

The Stream Protocol adds the stream header in the transmit direction; and removes the stream header and forwards packets to the correct application on the receiving entity. The Default Stream Protocol provides the Stream Layer functionality. This protocol provides the ability to multiplex up to 4 application streams. It uses the Generic Configuration Protocol to define the format and processing of the configuration messages that map applications to streams.

Subtype <select protocol>
(Def.: Default Stream Protocol)

Remote Control:

```
CONFigure:LAYer:STReam:SPRotocol:STYPe
```

Session Layer

The Session Layer provides address management, protocol negotiation, protocol configuration and state maintenance services.

A session refers to a shared state between the access terminal and the access network. This shared state stores the protocols and protocol configurations that were negotiated and are used for communications between the access terminal and the access network. Other than to open a session, an access terminal cannot communicate with an access network without having an open session.

During a single session the access terminal and the access network can open and can close a connection multiple times.

Session Management Protocol

The Session Management Protocol provides means to control the activation and the deactivation of the Address Management Protocol and the Session Configuration Protocol. It also provides a session keep alive mechanism.

The Session Management protocol can be in one of four states:

- Inactive State: This state applies only to the AT. In this state there are no communications between the AT and the AN.
- AMP Setup State: In this state the AT and AN perform exchanges

governed by the Address Management Protocol and the AN assigns a UATI to the AT.

- Open State: In this state a session is open.
- Close State: This state applies only to the AN. In this state the AN waits for the close procedure to complete.

Inactive Session Timeout If the access terminal does not detect any traffic from the access network directed to it for a period of at least *Inactive Session Timeout* minutes, it goes to the *Inactive State*. (default: 3240 min)

Address Management Protocol

The Address Management Protocol specifies procedures for the initial UATI assignment and maintains the access terminal address as the access terminal moves between subnets.

This protocol operates in one of three states:

- Inactive State: In this state there are no communications between the AT and the AN.
- Setup State: In this state the AT and the AN perform a UATI message exchange to assign a UATI to the AT.
- Open State: In this state the AT has been assigned a UATI. The AT and AN may also perform a UATI reassignment so that the AT obtains a new UATI.

Subnet Included If *Subnet Included* is selected, the CMU includes the "ATISubnetMask" field and the "UATI104" field in the UATI Assignment Message. If *Subnet Included* is not selected, the CMU does not include these fields in the UATI Assignment Message.

Session Configuration Protocol

The Session Configuration Protocol specifies the means to negotiate and provide the protocols used during the session, and negotiates the configuration parameters for these protocols. This protocol uses the procedures and attribute-value formats defined by the Generic Configuration Protocol for protocol negotiation.

This protocol operates in one of four states:

- Inactive State: The protocol waits for an Activate command.
- AT Initiated State: Negotiation is performed at the initiative of the AT.
- AN Initiated State: Negotiation is performed at the initiative of the AN.
- Open State: In this state, the AT may initiate the session configuration procedure at any time and the AN may request the AT to initiate the session configuration at any time.

Remote Control:

CONFigure:LAYer:SESSion:...

Connection Layer

The Connection Layer controls the state of the air-link, and it prioritizes the traffic that is sent over it.

The default protocols for the Connection Layer are listed below. With the exception of the Overhead Messages Protocol, each of these protocols can be independently negotiated at the beginning of the session. The AT and the AN

maintain a connection whose state dictates the form in which communications between these entities can take place.

The connection can be either closed or open:

- Closed Connection: When a connection is closed, the access terminal is not assigned any dedicated air-link resources. Communications between the access terminal and the access network are conducted over the Access Channel and the Control Channel.
- Open Connection: When a connection is open, the access terminal can be assigned the Forward Traffic Channel, and is assigned a Reverse Power Control Channel and a Reverse Traffic Channel. Communications between the access terminal and the access network are conducted over these assigned channels, as well as over the Control Channel.

The relationship between the different Connection Layer protocols is illustrated below.

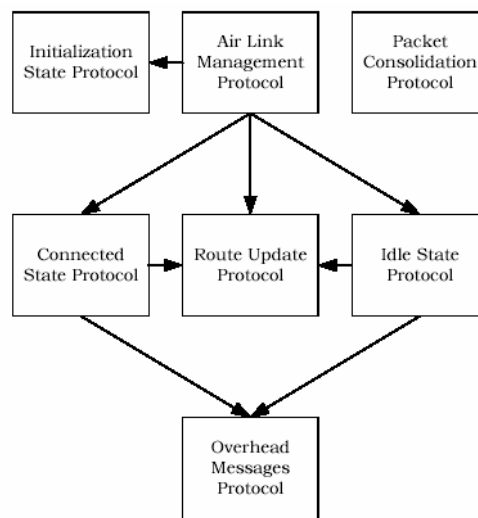


Figure 4-63 Connection Layer Protocols

An arrow between two protocols implies that the source sends commands to the target.



Route Update Protocol

The Route Update Protocol performs the actions associated with keeping track of an AT location and maintaining the radio link between the AT and the AN. This protocol performs supervision on the pilots.

Pilot Drop Threshold
(Def.: -9 dB)

The AT performs pilot channel supervision in the Idle State of the Route Update Protocol. This is done by monitoring the pilot strength of the pilot in its active set, all the pilots in the candidate set and all the pilots in the neighbor set that are on the same frequency. If the strength of all the pilots that the AT is monitoring goes below the value specified by *Pilot Drop Threshold*, the AT shall start a pilot supervision timer. If the strength of at least one of the pilots goes above the value specified by *Pilot Drop Threshold* while the pilot supervision

timer is counting down, the access terminal shall stop the timer. If the pilot supervision timer expires, the access terminal returns a *NetworkLost* indication.

The Default Route Update Protocol provides the procedures and messages used by the AT and the AN to keep track of the AT's approximate location and to maintain the radio link as the AT moves between the coverage areas of different sectors.

This protocol can be in one of three states:

- Inactive State: In this state the protocol waits for an *Activate* command.
- Idle State: This state corresponds to the Air Link Management Protocol Idle State. In this state, the AT autonomously maintains the Active Set. Route update messages from the AT to the AN are based on the distance between the current AT serving sector and the serving sector at the time the AT last sent an update.
- Connected State: In this state the AN dictates the AT Active Set. Route update messages from the AT to the AN are based on changing radio link conditions.

Transitions between states are driven by commands received from Connection Layer protocols and the transmission and reception of the *TrafficChannelAssignment* message. The protocol uses parameters from the Overhead Messages Protocol, such as sector latitude and longitude, route update radius, number of neighbors, the PN of each neighbor, and neighbor channel record data.

Overhead Messages Protocol

For the Overhead Messages Protocol, the AN broadcasts essential parameters over the Control Channel. These parameters are shared by protocols in the Connection Layer as well as protocols in other layers. This protocol also performs supervision on the messages necessary to keep the Connection Layer functioning (the *QuickConfig* message and the *SectorParameters* message).

This protocol can be in one of two states:

- Inactive State: In this state, the protocol waits for an *Activate* command. This state corresponds only to the access terminal and occurs when the access terminal has not acquired an access network or is not required to receive overhead messages.
- Active State: In this state the access network transmits and the access terminal receives overhead messages.

Redirect If *Redirect* is selected, the CMU will set the 'Redirect' field in the *Quick Config* message to "'1'."

Route Update Trigger Code Incl. If *Route Update Trigger Code Incl.* is selected, the CMU will include the *Route Update Trigger Code* field and the *Route Update Trigger Max Age* field in the *Route Update* message. If *Route Update Trigger Code Incl.* is not selected, the CMU will not include these fields in the *Route Update* message.

Route Update Trigger Code The maximum age index of the route update trigger.

Route Update

Trigger Max Age The maximum age of the route update trigger.

Remote Control:

```
CONFigure:LAYer:CONNecTion...
CONFigure:LAYer:CONNecTion:RUPRotocol:PDThreshhold?
CONFigure:LAYer:CONNecTion:OMPRotocol:REDirect
CONFigure:LAYer:CONNecTion:OMPRotocol:RUTRigger:CINCluded?
CONFigure:LAYer:CONNecTion:OMPRotocol:RUTRigger:CODE?
CONFigure:LAYer:CONNecTion:OMPRotocol:RUTRigger:AMAX:INDEX?
CONFigure:LAYer:CONNecTion:OMPRotocol:RUTRigger:AMAX?
```

MAC Layer

The Medium Access Control (MAC) Layer defines the procedures used to receive and to transmit over the Physical Layer. It contains the rules governing operation of the Control Channel, Access Channel, Forward Traffic Channel, and Reverse Traffic Channel.

This section presents the default protocols for the MAC Layer. Each of these protocols can be independently negotiated at the beginning of the session.

Default Control Ch. Protocol (only signal subtype 0)

The Default Control Channel MAC Protocol provides the procedures and messages required for an access network to transmit and for an AT to receive the Control Channel.

This protocol can be in one of two states:

- Inactive State: in this state the protocol waits for an *Activate* command. This state corresponds only to the access terminal and occurs when the access terminal has not acquired an access network or is not monitoring the Control Channel.
- Active State: in this state the access network transmits and the access terminal receives the Control Channel.

Data Rate Currently this setting affects the data rate only for asynchronous control channel messages. Synchronous control channel messages are always sent at 76.8 kbps.

Remote Control:

```
CONFigure:LAYer:MAC:CCMProtocol:DCCProtocol:DRATE R384 | R768
```

Def./Enh. Access Ch. MAC Protocol

The Access Channel MAC Protocols provide the procedures followed by the AT to transmit, and by the AN to receive the Access Channel.

They contain the rules governing access terminal transmission timing and power characteristics for the Access Channel.

Default Access Ch. MAC Protocol (for signal subtype 0)

Enhanced Access Ch. MAC Protocol (for signal subtype 2)

Both Access Channel MAC protocols provide the procedures and messages required for an access terminal to transmit and an access network to receive the Access Channel. The use of the default or enhanced protocols depends on the used physical layer protocols, i.e. physical layer signal subtype 0 requires the *Default Access Ch. MAC Protocol*, and physical layer signal subtype 2 requires the *Enhanced Access Ch. MAC Protocol*.

These protocols can be in one of two states:

- Inactive State: In this state the protocol waits for an Activate command. This state corresponds only to the access terminal and occurs when the access terminal has not acquired an access network or the access terminal has a connection open.
- Active State: In this state the access terminal transmits and the access network receives the Access Channel.

Session Seed

The session seed is a parameter negotiated between AN and AT.

Remote Control:

CONF:LAYer:MAC:ACMProtocol:DACProtocol:SSEed?

Max. Probe Sequences

Maximum number of probe sequences for a single access attempt.

Remote Control:

CONF:LAYer:MAC:ACMProtocol:DACProtocol:PSEQ:MAX
CONF:LAYer:MAC:ACMProtocol:EACProtocol:PSEQ:MAX

Inter-Probe Backoff

The AN sets the inter-probe backoff value to the upper limit of the backoff range (in units of *Access Cycle Duration*, see 4-146) which the AT uses between probes.

Remote Control:

CONF:LAYer:MAC:ACMProtocol:DACProtocol:IPBackoff
CONF:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff

Inter-Probe Sequence Backoff

The AN uses the inter-probe sequence backoff value to set the upper limit of the backoff range (in units of *Access Cycle Duration*, see 4-146) which the AT uses between probe sequences. The AT supports all the valid backoff values.

Remote Control:

CONF:LAYer:MAC:ACMProtocol:DACProtocol:IPBackoff
CONF:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff

Forward Traffic Ch. MAC Protocol

The Forward Traffic Channel MAC Protocol provides the procedures followed by the AN to transmit, and by the AT to receive the Forward Traffic Channel.

It contains the rules governing operation of the Forward Traffic Channel. It dictates the rules the AT follows when transmitting the Data Rate Control Channel, along with the rules the AN uses to interpret this channel. The protocol supports both variable rate and fixed rate operation of the Forward Traffic Channel.

Default and Enhanced Fwd. Traffic Ch. MAC Protocols

The Default and Enhanced Forward Traffic Channel MAC Protocols provide the procedures and messages required for an AN to transmit and an AT to receive the Forward Traffic Channel. Specifically, these protocols address Forward (Enh.) Traffic Channel addressing and Forward (Enh.) Traffic Channel rate control.

The AN maintains an instance of these protocols for every AT.

The protocols operate in one of three states:

- Inactive State: In this state, the AT is not assigned a Forward Traffic Channel.

When the protocol is in this state, it waits for an Activate command.

- Variable Rate State: In this state, the AN transmits the Forward Traffic Channel at a variable rate, as a function of the AT DRC value.
- Fixed Rate State: In this state, the AN transmits the Forward Traffic Channel to the AT from one particular sector, at one particular rate.

The protocol type is determined by the signal subtype. It can be queried using the remote command shown below.

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:STYPe

DRC Cover (all signal subtypes) In the Variable Rate State, the access network transmits at the rate dictated by the Data Rate Control (DRC) Channel transmitted by the access terminal. The access terminal shall use either a DRC cover index 0 or the DRC Cover index (default 2) associated with a sector in its Active Set. The DRC cover index 0 is called the “null cover”. A DRC cover that corresponds to a sector in the access terminal Active Set is called a “sector cover”. The access terminal is said to be pointing the DRC at a sector in its Active Set if the access terminal is using the DRC cover corresponding to that sector.

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:COVer
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:COVer

DRC Length (all signal subtypes) The AT uses DRCLength slots to send a single DRC (default value: 2 slots).

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:LENGth
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:LENGth

DRC Channel Gain (all signal subtypes) The Data Rate Channel gain (default 2.0 dB) represents the ratio of the power level of the Reverse Data Channel to the power level of the Pilot Channel.

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:CGain
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:CGain

ACK Channel Gain (all signal subtypes) The ACK Channel gain represents the ratio of the power level of the ACK Channel to the power level of the Reverse Traffic Pilot Channel in steps of 0.5 dB (default 2.0 dB).

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:ACK:CGain
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:ACK:CGain

DSC Value (only signal subtype 2) The *DSC Value* is the value that the AT is to use on the DSC Channel to select the serving cell represented by the CMU. When a session is open, the modification the *DSC Value* results in a session re-negotiation. The *DSC Value* takes effect one slot after the end of its transmission and stays in effect for DSC Length slots. When the DSC channel is transmitted, its power is controlled by the DSC Channel Gain .

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:VALue

DSC Channel Gain Base (only signal subtype 2) The DSC Channel Gain Base sets the power of the reverse DSC Channel relative to the power of the reverse Pilot Channel (-15.5 to +0.0 dB, in 0.5 dB steps). It is sent to the AT in the Traffic Channel Assignment message when the test mobile is operating with network revision A and the physical layer signal subtype set to 2.

Remote Control:

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:CGain

Def. Reverse Traffic Ch. MAC Protocol (only signal subtype 0)

The Default Reverse Traffic Channel MAC Protocol provides the procedures followed by the AT to transmit, and by the AN to receive the Reverse Traffic Channel.

It contains the rules governing operation of the Reverse Traffic Channel. It dictates the rules the AT follows to assist the AN in acquiring the Reverse Traffic Channel. It also dictates the rules the AT and the AN use to select the transmission rate used over the Reverse Traffic Channel.

This protocol operates in one of three states:

- Inactive State: In this state, the AT is not assigned a Reverse Traffic Channel. When the protocol is in this state, it waits for an Activate command.
- Setup State: In this state, the AT obeys the power control commands that it receives from the AN. Data transmission on the Reverse Traffic Channel is not allowed in this state.
- Open State: In this state, the AT may transmit data and negotiate different transmission rates on the Reverse Traffic Channel.

Remote Control:

CONFigure:LAYer:MAC:RTCPProtocol:STYPe?

The AT delays the Reverse Traffic Data Channel and Reverse Rate Indicator Channel (RRI) transmissions by FrameOffset slots with respect to the system time-aligned frame boundary. The data offset for the different data rates are defined by the parameters:

Data Offset Nom. (Def.: 0.0 dB) Set this item to the nominal offset of the reverse link data channel power to pilot channel power, expressed in steps of 0.5 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCPProtocol:DRCProtocol:DATA:NOFFset

Data 9.6 kbps (Def.: 0.00 dB) Set this item to the ratio of reverse link data channel power at 9.6 kbps to the nominal reverse link data channel power at 9.6 kbps, expressed as steps of 0.25 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R9K

Data 19.2 kbps (Def.: 0.00 dB) Set this item to the ratio of reverse link data channel power at 19.2 kbps to the nominal reverse link data channel power at 19.2 kbps, expressed as steps of 0.25 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R19K

Data 38.4 kbps (Def.: 0.00 dB) Set this item to the ratio of reverse link data channel power at 38.4 kbps to the nominal reverse link data channel power at 38.4 kbps, expressed as steps of 0.25 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K

Data 76.8 kbps (Def.: 0.00 dB) Set this item to the ratio of reverse link data channel power at 76.8 kbps to the nominal reverse link data channel power at 76.8 kbps, expressed as steps of 0.25 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R76K

Data 153.6 kbps (Def.: 0.00 dB) Set this item to the ratio of reverse link data channel power at 153.6 kbps to the nominal reverse link data channel power at 153.6 kbps, expressed as steps of 0.25 dB.

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R15K

Reverse Rate Limit (Def.: 153.6 kbps) The maximum size payload this protocol can support (i.e. the maximum size Security Layer packet that can be carried) is a function of the transmission rate used on the Reverse Traffic Channel. The table below provides the transmission rates and corresponding minimum and maximum payload sizes available on the Reverse Traffic Channel.

Transmission Rate (kbps)	Minimum Payload (bits)	Maximum Payload (bits)
0.0	0	0
9.6	1	232
19.2	233	488
38.4	489	1000
76.8	1001	2024
153.6	2025	4072

Remote Control:

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:RRLimit

Increasing Transition (only signal subtype 0) The probability which the access terminal uses to increase its transmission rate to the next higher data rate. The probability is expressed in units of 1/255. The rate transition probability is one of the rate parameter attributes in the ConfigurationRequest message of the Reverse Traffic Channel MAC Protocol.

With the default command values it is made sure that the AT changes without intermediary steps from one data rate to the other if min = max data rate is configured.

Remote Control:

```
CONFigure:LAYer:MAC:RTCP:DRCP:ITRansition:R9K[?]
CONFigure:LAYer:MAC:RTCP:DRCP:ITRansition:R19K[?]
CONFigure:LAYer:MAC:RTCP:DRCP:ITRansition:R38K[?]
CONFigure:LAYer:MAC:RTCPDRCP1:ITRansition:R76K[?]
```

Decreasing Transition (only signal subtype 0) The probability which the access terminal uses to decrease its transmission rate to the next lower data rate. The probability is expressed in units of 1/255. The rate transition probability is one of the rate parameter attributes in the ConfigurationRequest message of the Reverse Traffic Channel MAC Protocol.

Remote Control:

```
CONFigure:LAYer:MAC:RTCP:DRCP:DTRansition:R19K[?]
CONFigure:LAYer:MAC:RTCP:DRCP:DTRansition:R38K[?]
CONFigure:LAYer:MAC:RTCP:DRCP:DTRansition:R76K[?]
CONFigure:LAYer:MAC:RTCP:DRCP:DTRansition:R15K[?]
```

Subtype 3
Rvrse.
Traffic Ch.
MAC
Protocol
(only signal subtype 2)

For signal subtype 2, the power level of the reverse RRI channel is determined by the RRI channel gain transition parameters.

The reason why the RRI gain for PreTransition3 is the only one currently configurable is because this is the value that the AT uses always, given all of the other settings in the system. The RRI Channel Gain value used by the AT is dependent on the transmission mode (high capacity or low latency) and the T2P Transition Value. The AT is forced into high capacity mode for all payload sizes and the default T2P Transition Value for high capacity packets is set to 3. So, given the current settings in the system, the AT will always be using the PreTransition3 values.

RRI Channel Gain: The RRI channel gain pre- and post-transition parameters indicate the ratio of the power level of the RRI channel relative to the power level of the reverse Pilot channel for the transmitted subpackets (0 to 3).

- Pre-Transition 0
- Post-Transition 0
- Pre-Transition 1
- Post-Transition 1
- Pre-Transition 2
- Post-Transition 2
- Pre-Transition 3

They are negotiated with the AT during Session Negotiation (NEG). When a session is open, changing these settings will result in a session re-negotiation. When a connection is open, changing these settings results in the closing of the connection.

Remote Control:

```
CONFigure:LAYer:MAC:RTCP:Protocol:S3RT:RRIcGain:...
```

AN Signal (Connection Control - AN Signal)

The *AN Signal* tab of the *Connection Control* menu allows the configuration of the access network signaling parameters, which are described below.

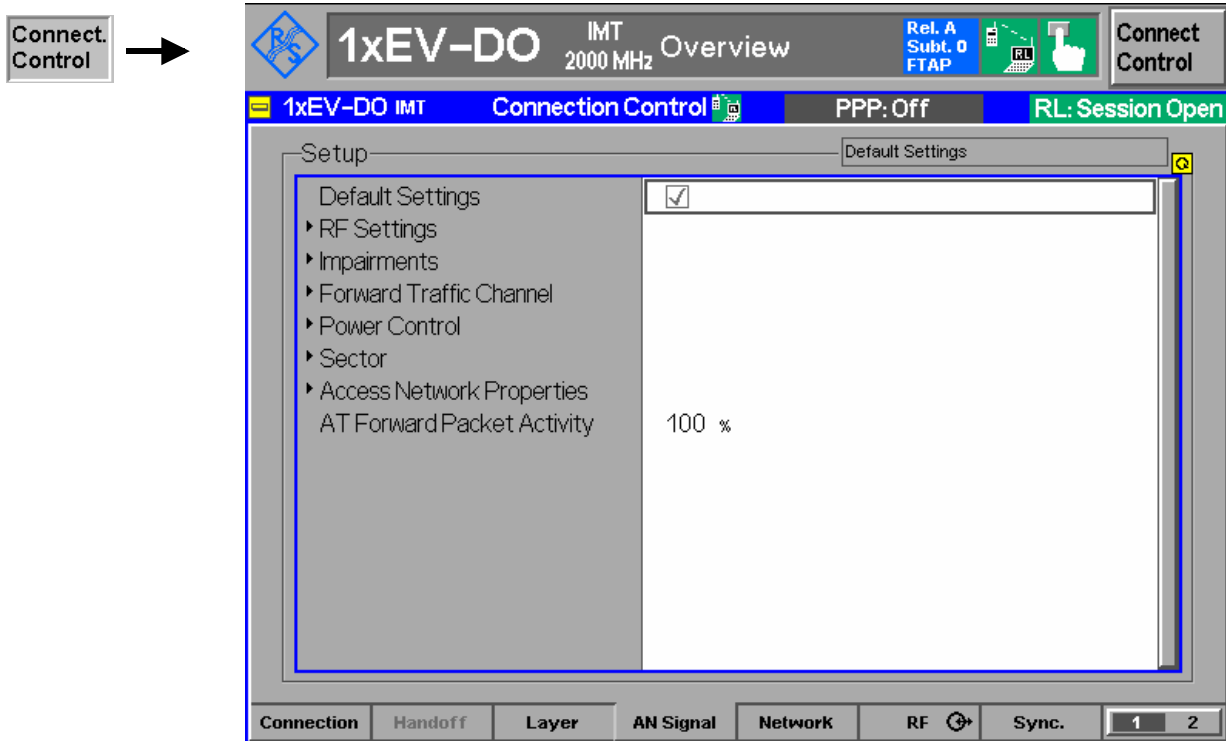


Figure 4-64 Connection Control – AN Signal

Default Settings The *Default Settings* switch assigns default values to all settings in the *AN Signal* tab (the default values are quoted in the command description in chapter 6 of this manual).

RF Settings

RF Channel [BC <>] The *RF Channel* sets the base station channel number (and frequency) of the generated RF signal. Changing the RF Channel resets the RF Frequency setting. The default settings for the channel numbers vary with the selected network. Also the forward and reverse link frequency values for the selected band class are shown (e.g. 12 / 2110.6000 MHz / 1920.6000 MHz for BC6).

Remote Control:
 UNIT:ANSignal:CHANnel[:RF]
 CONFigure:ANSignal:CHANnel[:RF]

RF Power *1xEV-DO Power* Displays the total 1xEV-DO power generated by the CMU in all states, except SOFF (when there is no signal at all).(default: -70.00 dBm)
Output Power Displays the total output power generated by the CMU (default -70.00 dBm)

Remote Control:
 CONFigure:ANSignal:POWer:EVDO

CONFigure:ANSignal:POWer:OUTPut (query only)

Impairments

AN Frequency Offset *AN Freq. Offset* adjusts the carrier frequency of the CMU base station. If the *RF Frequency* has been set to a frequency which doesn't apply to the actual selected *RF Channel*, the setting of *AN Freq. Offset* is disabled.

Remote Control:
CONFigure:IMPairments:FOffset[:RF]

AWGN Mode The *AWGN Mode* sets the AWGN power level for 1xEV-DO testing. This provides a *Normal* and a *High Power* range that can be selected with this menu item. The range of the *Normal* mode is identical to the original implementation (+4.0 dB to -20 dB), the range of the *High Power* mode is +11.7 dB to -12.0 dB.

Remote Control:
CONFigure:IMPairments:LEVel:AWGN:MODE NORMAL | HPOWer

AWGN Level *AWGN Level* turns on or off the Additive White Gaussian Noise generator and sets the level for modulation, depending on the defined *AWGN Mode*. This provides noise to more closely simulate actual operating conditions in the network.

Remote Control:
CONFigure:IMPairments:LEVel:AWGN

Forward Traffic Channel

MAC Settings *MAC Index* *MAC Index* specifies the MAC index of the specified access terminal. MAC index values of 5 to 63, inclusive are permitted (default 8). With signal subtype 2, the MAC index values are enhanced with the values ranging from 72 to 127.

Remote Control:
CONFigure:ANSignal:MAC:INDex (for signal subtype 0)
CONFigure:ANSignal:MAC:INDex[:REV0][?] (for signal subtype 2)
CONFigure:ANSignal:MAC:INDex:REVA[?] (for signal subtype 2)

Power Control

Power Ctrl. Bits *Power Control Bits* define how the power control bits are sent from the CMU to the access terminal. The power control bits control the access terminal total output power (when the access terminal is using closed loop power control). The default value is "Auto".

Remote Control:
CONFigure:ANSignal:PCBits AUT | HOLD | ADOW | AUP

Step Size The power control step size the AN uses for closed loop power control. The step size can either be 0.5 dB or 1.0 dB (default); other values are invalid.

Remote Control:
 CONFigure:ANSignal:PCBits:SSize

Sector The overall Sector ID has the following structure:



where SID is the System ID Number as defined on the [Network Parameters \(Connection Control – Network\)](#) panel.

Color Code This parameter is set to the color code corresponding to the related sector (default 0).

Remote Control:
 CONFigure:ANSignal:SECTor:CLRCode

Format The Sector ID format is assigned according to the ANSI-41 method by default, which is currently the only supported method (other than the assignment of a manual Sector ID). The value 'ANSI-41' is represented by the '00' format bits as shown above.

Remote Control:
 CONFigure:ANSignal:SECTor:ID:FORMat A41N | MANual

Sector ID [0...23] This parameter is the user configurable portion of the Sector ID (bits 0-23). (default 0x0000FF).

Remote Control:
 CONFigure:ANSignal:SECTor:ID:LBITS

Number P-Bits The P bits, which are a run of zero or more 0s followed by one 1, allow for flexible positioning of the unique identifier within the IPv6 address. The number of P bits is less than or equal to 64.

Remote Control:
 CONFigure:ANSignal:SECTor:NPBits

Overall Sector ID [0...63] This 8 byte hex parameter is the first half of the Sector Address Identifier, which is the 128-bit IPv6 address of this sector. The Access Network shall set the SectorID to a “Reserved” (prefix ‘00000000’), a “Link-Local Unicast” (prefix ‘1111111010’), a “Site-Local Unicast” (prefix ‘1111111011’), or an “Aggregatable Global Unicast” (prefix ‘001’) Internet Protocol version 6 (IPv6) address as defined in RFC 2373 by the Internet Engineering Task Force (IETF). Default is 0x00000000000000FF.

Remote Control:
 CONFigure:ANSignal:SECTor:ID?

Overall Sector ID [64...127] This 8 byte hex parameter is the second half of the Sector Address Identifier, which is described above. Default is 0x0000000000000000.

	<p>Remote Control: <code>CONFigure:ANSignal:SECTor:ID?</code></p>
Manual Sector ID [0...127]	<p>This 16 byte hex parameter is the manual definition of the Sector Address Identifier.</p> <p>Remote Control: <code>CONFigure:ANSignal:SECTor:ID:MANual</code></p>
Subnet Mask	<p>The Sector Subnet identifier (default 104). The AN sets this field to the number of consecutive 1's in the subnet mask of the subnet to which this sector belongs.</p> <p>Remote Control: <code>CONFigure:ANSignal:SECTor:SMASK</code></p>
Country Code	<p>This parameter is set to the three-digit BCD (binary coded decimal, default 999) encoded representation of the Mobile Country Code (as specified in ITU-T Recommendation E.212, Identification Plan for Land Mobile Stations, 1988) associated with this sector.</p> <p>Remote Control: <code>CONFigure:ANSignal:SECTor:CNTCode</code></p>

Access Network Properties

PN Offset	<p><i>PN Offset</i> sets the offset of the PN sequence. Changing the PN offset (default 0) changes the timing of the short code spreading, the contents of the Sync message on the Control Channel, and the R&S CMU is returned to the <i>Signal On</i> state.</p> <p>Remote Control: <code>SOURce:RFGenerator:PROPerTy:PNOffset</code></p>
Call Loss Detect Time	<p><i>Call Loss Detect Time</i> sets the value of the call lost detect timer to detect when a call is lost or dropped.</p> <p>Remote Control: <code>CONFigure:ANSignal:PROPerTy:CLDTime</code></p>

AT Forward Packet Activity

The AT Forward Packet Activity is the percentaged of forward packets transmitted by the CMU that are directed to the AT under test.

For tests, the packet activity will generally be set to 0%, 50% or 100%.

Remote Control:
`CONFigure:ANSignal:FPACTivity`

Network Parameters (Connection Control – Network)

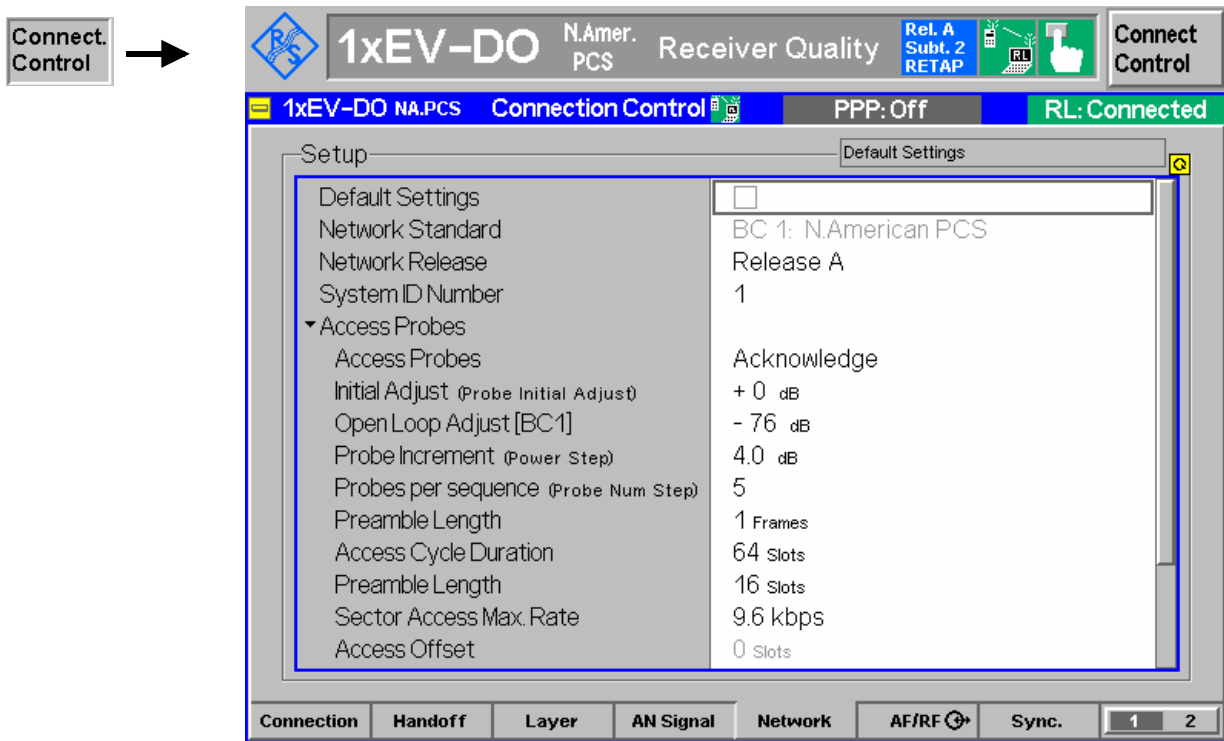


Figure 4-65 Connection Control – Network

Default Settings The *Default Settings* checkbox assigns the default setting to all functions in the *Network* tab.

Remote control:
 DEFault:NETWork ON | OFF

Network Standard The *Network Standard* field shows which network and standard is used for testing. Selecting the *Network Standard* field allows you to change between the supported band classes for the network. Refer to table 1-1 in chapter 1 for a list of the supported 1xEV-DO network band classes.

Remote Control:
 CONFigure:NETWork:STANdard
 N45T | PA4M | USC | KCEL | TACS | JTAC | NA7C | NA9C |
 NA8S | PA8M | NAPC | KPCS | B18M | USPC | IM2K | IEXT | AWS |
 U25B | U25F

Network Release Both network releases support all band classes of the installed hardware options. Network release A expands the system capacity to allow forward data rates up to 3.1 Mbps and reverse data rates up to 1.8 Mbps. Additionally, a Data Source Channel (DSC) is introduced to support fast handoffs with L1 signaling.

Currently, network release 0 and revision A are supported.

Remote Control:
 CONFigure:NETWork:RELease 0 | A

System ID Number A digital identification associated with a cellular system; each system is assigned a unique number. The SID is broadcast to provide support for system discrimination and is defined in TIA/EIA-136-140.

Remote Control:
`Configure:NETWork:SYSTEM:SID`

Access Probes The AT transmits access probes to begin session negotiation, which may occur at times other than the power on cycle (for example, after a session close). It also transmits access probes to initiate a call. The structure of the access probes is shown below:

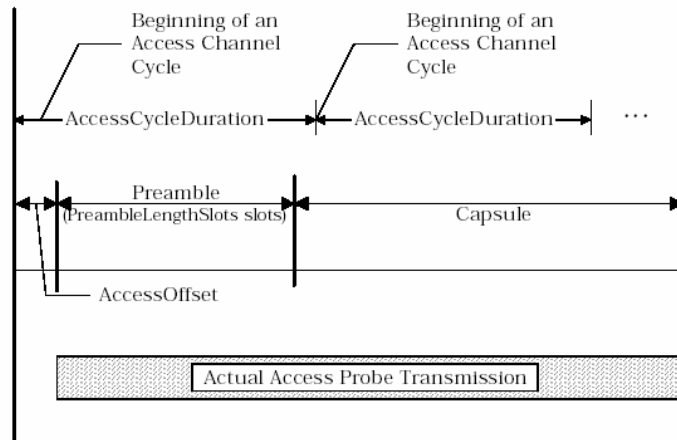


Figure 4-66 Access Probe Structure

Remote Control:
`CONFigure:NETWork:APRobes:MODE`

Initial Adjust (Probe Initial Adjust) The initial access probe power adjustment is expressed in step sizes of 1 dB.

Remote Control:
`CONFigure:NETWork:APRobes:IADJust`

Open Loop Adjust (BC<nr.>) The *Open Loop Adjust* is the nominal power to be used by ATs for the given band class in the open loop power estimate, in steps of 1 dB.

Remote Control:
`CONFigure:NETWork:APRobes:OLADjust`

Probe Increment (Power Step) The *Probe Increment* defines the step size of power increases between consecutive probes with a resolution of 0.5 dB.

Remote Control:
`CONFigure:NETWork:APRobes:PINcrement`

Probes per Sequence (Probe Num Step) *Probes per Sequence* defines the maximum number of access probes which ATs are to transmit in a single access probe sequence.

Remote Control:
`CONFigure:NETWork:APRobes:PPSquence`

Preamble Length The Preamble Length specifies the length in frames of the access probe preamble.

Remote Control:
`CONFigure:NETWork:APRobes:PLENght`

Access Cycle Duration	<p>The <i>Access Cycle Duration</i> is the length in slots of the access cycle. When using the Default Access Channel Protocol, an AT may start to transmit an access probe only at the beginning of an access cycle.</p> <p>With the Enhanced Access Channel Protocol, an AT may start to transmit an access probe only <i>Access Offset</i> slots after the beginning of an access cycle.</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:ACDuration</code></p>
Preamble Length In Slots	<p>The <i>Preamble Length In Slots</i> specifies the length in slots of the access probe preamble. With the Enhanced Access Channel Protocol, the AT uses this value and ignores the value given by the <i>Preamble Length</i> setting.</p> <p>This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:PLENght:SLOTs 4 16</code></p>
Sector Access Max. Rate	<p>The <i>Sector Access Max. Rate</i> specifies the maximum rate at which the AT may transmit on the access channel.</p> <p>This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:SACcEss:RAte:MAX R9K R19K R38K</code></p>
Access Offset	<p>The <i>Access Offset</i> specifies the slot, relative to the start of the Access Cycle, in which the AT may start to transmit an access probe.</p> <p>This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:ACCess:OFFSet?</code></p>
Probe TimeOut Adjust	<p>The <i>Probe TimeOut Adjust</i> affects the interval between access probes.</p> <p>This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:PTIMEout:ADJust?</code></p>
Pilot Strength Nominal	<p>The <i>Pilot Strength Nominal</i> is the expected strength of the CMU pilot channel, referenced to the 1xEVDO output power.</p> <p>This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').</p> <p>Remote Control: <code>CONFigure:NETWork:APRobes:PSTRenght:NOMinal?</code></p>

Pilot Strength Correction Min./Max.

Pilot Strength Correction Min./Max. specify the minimum and maximum correction to be applied to the power the AT uses to transmit the access probe. The correction is based on the difference between the received pilot strength and the nominal pilot strength.

This setting is only applicable when the Enhanced Access Channel Protocol is used (Network Release set to 'Revision A.').

Remote Control:

CONFigure:NETWork:APRobes:PSTrength:CMIN?

CONFigure:NETWork:APRobes:PSTrength:CMAX?

RF Connectors (Connection Control – RF)

The RF  tab configures the connectors for RF signals. This includes defining:

- The RF input and output of the CMU (*RF Output, RF Input*).
- External attenuation at the connectors (*Ext. Att. Output, Ext. Att. Input*).

The tab also controls the wideband peak power measurement (*Wideband Power*) and indicates the result.

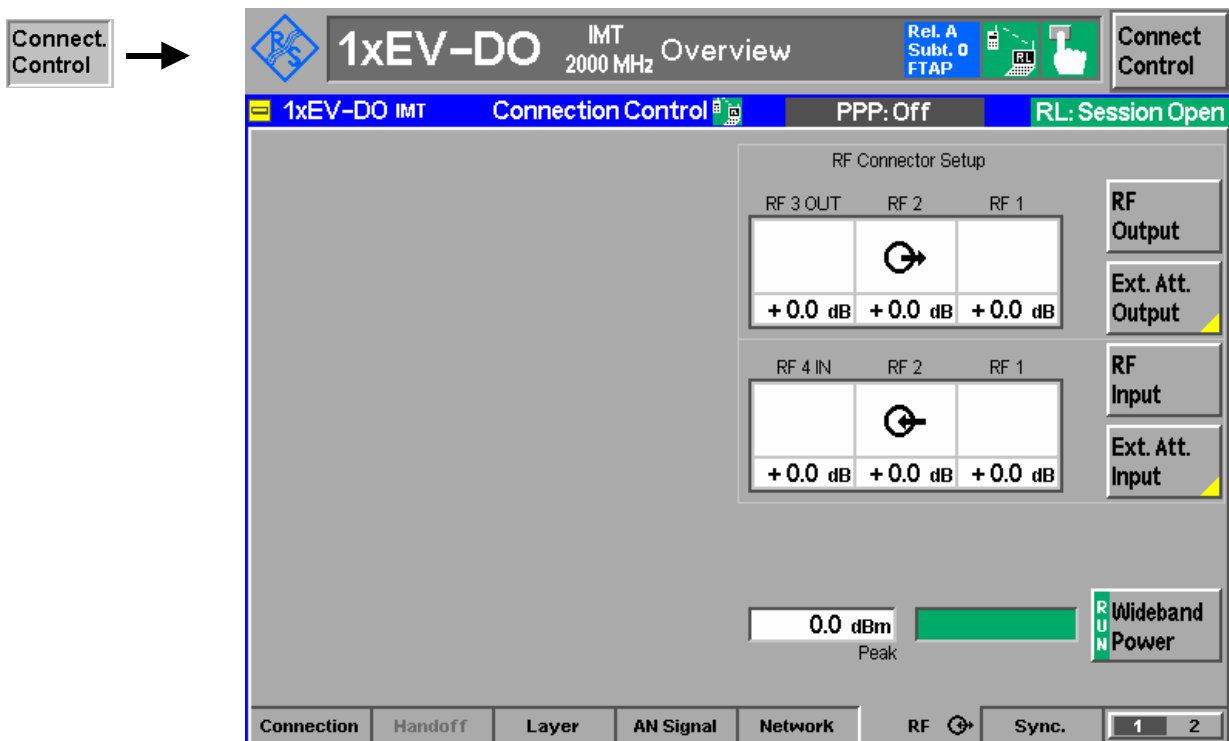



Figure 4-67 Connection Control – RF Connectors

RF Output

The *RF Output* softkey defines which of the three connectors RF 1, RF 2 and RF 3 OUT is to be used as the RF output connector. The symbol  indicates the selected RF output.

Remote control

OUTPut[:STATE] RF1 | RF2 | RF3

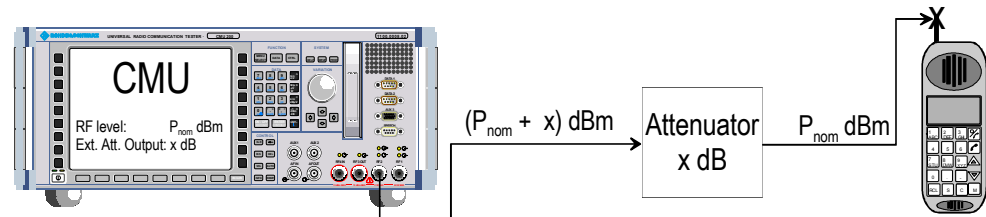


The *Ext. Att. Output* softkey defines an external attenuation (or gain, if the value is negative) at the selected RF output.

External attenuation is required if attenuation (such as a cable) is included in the test setup path, which is to be corrected by an increased signal level.

If an external attenuation is defined, the output signal level is referenced to the input of the device under test (AT). The generator level is therefore shifted with respect to the actual level at the output connector of the CMU. The default value for the generator power and the level ranges for the RF outputs are also shifted provided that the generator can output the required power, compensating for the external attenuation or gain. Otherwise it is adapted to the level closest to the shifted default value.


See also section [Frequency-Dependent External Attenuation](#) on p. 4-149 ff.



Remote control:

```
[SENSe:]CORRection:LOSS:OUTPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude]
```



The *RF Input* softkey defines which of the three connectors RF 1, RF 2, or RF 4 IN is to be used as the RF input connector. The symbol  indicates the selected RF input.

Remote control:

```
INPut[:STATe] RF1 | RF2 | RF4
```

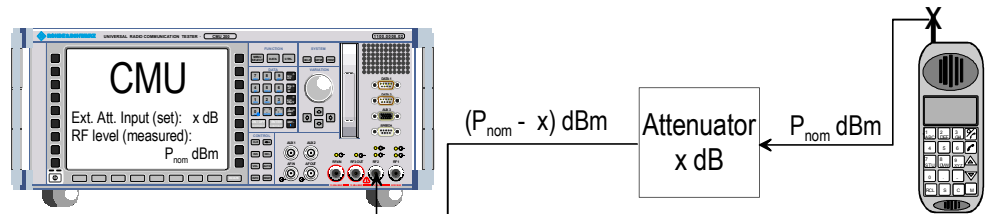


The *Ext. Att. Input* softkey sets the value of the external attenuation (or gain) at the selected RF input.

Input of an external attenuation is required if, for example, external attenuator pads are used for protection of the sensitive RF inputs of the CMU or if path attenuation is included in the test setup.

If an external input attenuation is reported to the instrument, all levels measured are referenced to the output of the AT and therefore shifted with respect to the actual level at the input connectors of the CMU. The level ranges for the input connectors are shifted as well.

See also section [Frequency-Dependent External Attenuation](#) on p. 4-149 ff.



Remote control:

```
[SENSe:]CORRection:LOSS:INPut<nr>[:MAGNitude]
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude]
```




The *Wideband Power* softkey controls the wideband power measurement and indicates its status (*RUN* | *HLT* | *OFF*). The status can be changed after softkey selection (pressing once) by means of the *ON/OFF* key or the *CONT/HALT* key. The measurement result is in units of dBm. The analog bar to the right of the softkey shows the measured power relative to the *RF Max. Level* (see section [RF Connectors \(Connection Control – RF\)](#) on page 4-22): The display range is between *RF Max. Level – 10 dB* and *RF Max. Level + 10 dB*.

The wideband power measurement is performed at the RF Frontend of the CMU and yields the peak power of the input signal inside a wide frequency range. It is most accurate in the input level range around 0 dBm (typically –10 dBm to +30 dBm on RF2). The main purpose of the wideband power measurement is to indicate whether an input signal is available and whether it is advisable to change the *Max Level* settings.

Remote control:

```
INITiate:WPOWer
FETCh:WPOWer:STATus?
READ[:SCALar]:WPOWer?
FETCh[:SCALar]:WPOWer?
SAMPle[:SCALar]:WPOWer?
```

Frequency-Dependent External Attenuation

Toggling the *Ext. Att. Input* and *Ext. Att. Output* softkeys in the *RF*  tab of the *Connection Control* menu opens a popup menu to define the external input and output attenuation factors as a function of the RF input (analyzer) and output (generator) frequency. The frequency-dependent attenuations have the same meaning and effect as the global (frequency-independent) attenuations:

- A positive (negative) output attenuation increases (decreases) the RF generator level so that the generator compensates for the external attenuation or gain.
- A positive (negative) input attenuation increases (decreases) the displayed RF analyzer level so that the displayed result corresponds to the output transmit power of the AT.

Frequency-dependent attenuations replace the global (frequency-independent) attenuations *Ext. Att. Input* and *Ext. Att. Output*. In contrast to the global attenuations, they are valid for all function groups (in remote control, the commands must be addressed in the R&S CMU base system).

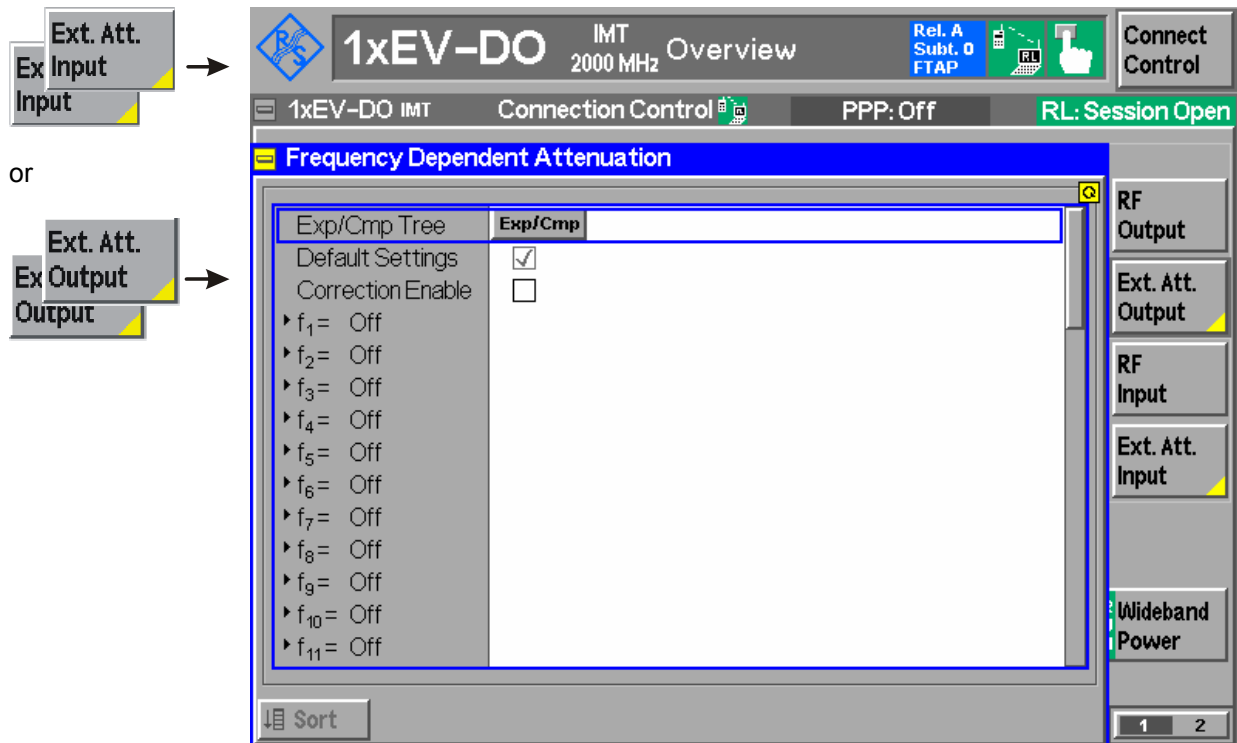


Figure 4-68 Connection Control – Frequency Dependent Attenuation

Figure 4-1 Frequency-dependent attenuation

The frequency-dependent attenuations are defined in a popup menu which is opened by toggling the *Ext. Att. Input* and *Ext. Att. Output* softkeys.

Default Settings Disables the frequency-dependent correction and sets all frequency values and all external attenuation factors to *Off*.

Correction Enable Enables the frequency-dependent attenuations, causing the global input and output attenuation to be replaced. A red status message in the *RF* \oplus tab indicates that the frequency-dependent attenuations are enabled.

f₁ to f₅₀ List of 50 frequency values, to be set to a specific frequency in the RF input/output frequency range of the R&S CMU (see data sheet) or to *Off*, if the frequency point is not used.

Attenuation

External input and output attenuation factors at the frequency point f_n assigned to the four RF connectors *RF1*, *RF2*, *RF3 Out* and *RF4 In*. The values for the bidirectional connectors *RF1* and *RF2* are used as input **and** output attenuations, affecting both the analyzer and the generator. Note that, due to the duplex spacing between downlink and uplink channels, the input and output attenuation for UE tests can still be different. The *RF3 Out* value is an output attenuation, the *RF4 In* value is an input attenuation.

The frequency points don't have to be defined in ascending order. Off the specified frequency points the attenuation factors are calculated as follows:

- In and interval between two adjacent frequency points, the attenuations are linearly interpolated.
- The attenuation at the lowest frequency point is valid for all analyzer and generator frequencies below and up to this frequency.
- The attenuation at the highest frequency point is valid for all analyzer and generator frequencies above this frequency.

Following these rules, it is possible to define attenuation factors for the entire frequency range using an arbitrary number of frequency points between zero (no attenuation) and 50. Using a single frequency point is equivalent to the global (frequency-independent) attenuations *Ext. Att. Input* and *Ext. Att. Output*.

Generator *RF Level* and analyzer *Max. Level* ranges

In analogy to the global attenuation factors *Ext. Att. Input* and *Ext. Att. Output*, the frequency-dependent attenuation factors modify the setting ranges for the generator and analyzer level.

- A positive (negative) output attenuation decreases (increases) the setting range of the RF generator level because the actual generator level must be larger (smaller) than the setting value.
- A positive (negative) input attenuation increases (decreases) the maximum analyzer level (*RF Max. Level*) because the displayed analyzer level result is larger (smaller) than the actual level at the input connectors of the R&S CMU.

To avoid conflicting level settings at varying input and output frequencies, the R&S CMU restricts the generator and analyzer setting ranges according to the maximum and minimum attenuation in the entire downlink and uplink frequency range of the selected operating band. The attenuations in the downlink frequency band define the modification of the generator level, the attenuations in the uplink frequency band define the modification of the maximum analyzer level.

In *Non Signaling* mode the RF generator and analyzer can be set to frequencies outside the downlink and uplink frequency ranges so that conflicting level settings may still occur. If this happens, the R&S CMU displays a notice box:

Some level settings failed due to external attenuation!

Bit 4 of the `STATUS:OPERation:CMU:SUM1|2:CMU<nr>` register (*Measurement Invalid, MINV*) is set at the same time.



Sorts the frequencies f_1 to f_{50} in ascending order.

Remote control: The commands for the frequency-dependent attenuation are part of the CMU base system (see CMU200/300 operating manual):
 DEFault:USER:CORRection:LOSS
 CONFigure:USER:CORRection:LOSS:TABLE:ENABLE
 CONFigure:USER:CORRection:LOSS:TABLE:LINE<nr>
 CONFigure:USER:CORRection:LOSS:TABLE?
 SORT:USER:CORRection:LOSS:TABLE

Reference Frequency (Connection Control – Sync.)

The popup menu *Sync.* defines the reference signals for synchronization. This includes:

- The internal or external reference frequency
- The output mode for the network-specific system clock (REF OUT 2)
- The system time synchronization parameters (for external synchronization, the option R&S CMU-B83 is required)

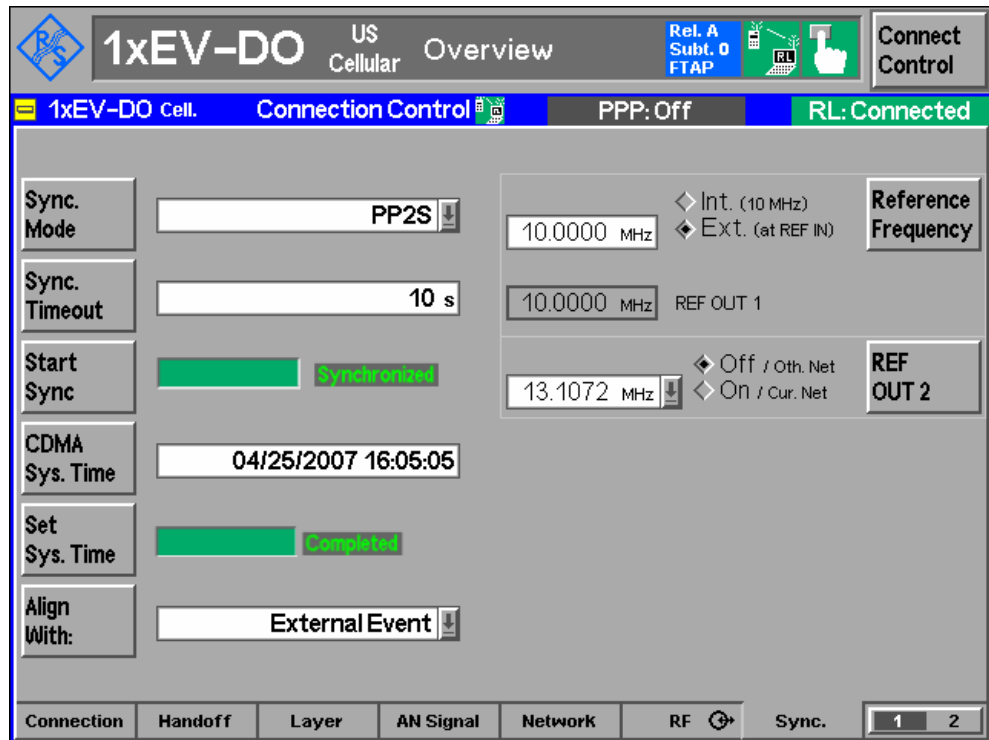


Figure 4-69 Connection Control – Synchronization

Sync.
Mode

The *Sync. Mode* key sets the type of event that the system will synchronize to, e.g. external, if two R&S CMUs are arranged in a master/slave configuration, where the master CMU sends a trigger event for synchronization, or internal, where one CMU synchronizes to an internal event.

External synchronization in this context means that two or more connected R&S CMUs are transmitting at the same system time, which is done by e.g. aligning a periodic pulse with a period 2 of seconds (PP2S) using the trigger output of the master CMU which the slave CMU has to align with.

Remote control:

```
CONFigure:ESYNc:MODE    NONE | PP2S | DEF
```

Sync.
Timeout

The *Sync. Timeout* parameter sets the amount of time the slave system will wait for the synchronization event. The timeout counter starts when the *Start Sync.* key is pressed on the slave instrument.

The *Sync. Timeout* can be specified from 5 to 1200 seconds in steps of 5 s.

Remote control:

```
CONFigure:ESYNc:TOUT[?]
```

Start
Sync

The *Start Sync.* key on the slave instrument initiates the synchronization procedure. This procedure triggers a reset of the link handler signaling module and can take up to 50 seconds to complete. The green progress bar to the right of the *Start Sync.* key indicates the status of the synchronization.

Once the synchronization signal is aligned on both connected R&S CMU instruments, the system time is configured on both instruments using the PP2S signal for proper alignment. At this point, both R&S CMU instruments will be generating the same system time, within a few microseconds.

If the synchronization was successful, a green "Synchronized" is displayed to the right of the *Start Sync.* key of the slave CMU.

Note: When the slave CMU is synchronized, the master CMU still displays "Not Synchronized" since the master has no knowledge of the synchronization. If the R&S CMU master and the CMU slave become unsynchronized (e.g. Ref. Signal disconnected), the CMU slave synchronization will display "Not Synchronized".

Remote control:

```
INITiate:ESYNc  
[SENSe]:ESYNc:SYSTem:TIME:STATE?
```

CDMA
Sys. Time

After the (trigger) event alignment of the CMUs, the common system time string can be entered by pressing the *CDMA Sys. Time* key. The time string must be entered in a special date/time format "mm/dd/yyyy HH:MM:SS" in both the master and the slave CMUs.

If the *Sync. Mode* "PP2S" is used, the number of seconds (SS) must be an even number.

Remote control:

```
CONFigure:ESYNc:SYSTem:TIME
```



When the CMUs are aligned with their common synchronization event and the common Sytem Time string is entered on all connected CMUs, the *Set Sys. Time* key on the master CMU starts the actual time synchronization with the slave(s). Pressing the *Set Sys. Time* key on the master CMU changes the status parameter from "Not Initiated" to "In Progress", which changes to "Completed" when the slave CMU is synchronized.

Once the synchronization is completed, the button caption on the slave CMU changes from "*Set Sys. Time*" to "*Arm Sys. Time*".

The *Set Sys. Time* status parameter display on the slave CMU also shows these transitions and the progress of the synchronization.

When "Completed" is shown on all connected CMUs, the instruments are aligned and system times are synchronized, as shown in [Figure 4-69](#).

Remote control:

INITiate:ESYNc:SYSTem:TIME



The *Align With:* key is used to tell the instrument to ignore external events (*Internal*, the default case) or use the same external input as the external synchronization process.

Please note that an external synchronization requires option CMU-B83v22 or higher. CMUs without the B83 option are only able to synchronize with internal events.

Remote control:

CONFigure:ESYNc:ALIGNment INT | EXT
SENSe:ESYNc:STATe?



The *Reference Frequency* softkey determines the source and the frequency of the reference signal. Two selections are available.

Int. (10 MHz) The internal 10 MHz clock signal (TCXO or OCXO, CMU-B11/-B12) is used for synchronization. This signal is available at the REF OUT 1 connector at the rear of the instrument.

Ext. (at REF IN) An external reference signal is to be supplied to the *REF IN* connector. The frequency of the external reference signal must be entered in the input field.

The reference signal used is available at the *REF OUT 1* output connector at the rear of the instrument making it available for use by other instruments.

Note: With external synchronization selected, a warning message cycles on and off if no synchronization has been performed e.g. because of missing or faulty input signal. At the same time, bit no. 6 (RFNL, Reference Frequency Not Locked) is set in the STATUS:OPERation:CMU:SUM1:CMU1 sub-register associated to the CMU base system and the query [SENSe:]SYNChronize:FREQuency:REFerence:LOCKed? returns the value ON.

Remote control:

The commands for the reference frequency are part of the CMU base system (see CMU 200/300 operating manual):

```
CONFigure:SYNChronize:FREQuency:REFerence:MODE
                                     INTernal | EXTernal
CONFigure:SYNChronize:FREQuency:REFerence <Frequency>
[SENSe:]SYNChronize:FREQuency:REFerence:LOCKed?
```

**REF
OUT 2**

The *REF OUT 2* softkey configures a network-specific system clock available at the *REF OUT 2* output connector at the rear of the instrument. The associated field allows selection between two settings:

Off (other network) The clock frequency of another active function group is made available at the REF OUT 2 connector instead of the current function group. The REF OUT 2 must be switched on in the other function group.

On (current network) The network-specific system clock of the current function group is available at the REF OUT 2 output connector.

The clock frequency can be used to synchronize other instruments.

Remote control:

```
SOURce:DM:CLOCK:STATe ON | OFF
SOURce:DM:CLOCK:FREQuency <Frequency>
```

Trigger (Connection Control – Trigger)

The *Trigger* tab is part of the second group of tabs in the *Connection Control* menu. It is accessible after pressing the 1 / 2 toggle hotkey once. Pressing 1 / 2 again switches back to the first group of tabs described above.

The *Trigger* tab defines the trigger condition for the measurement and the routing of output trigger signals.

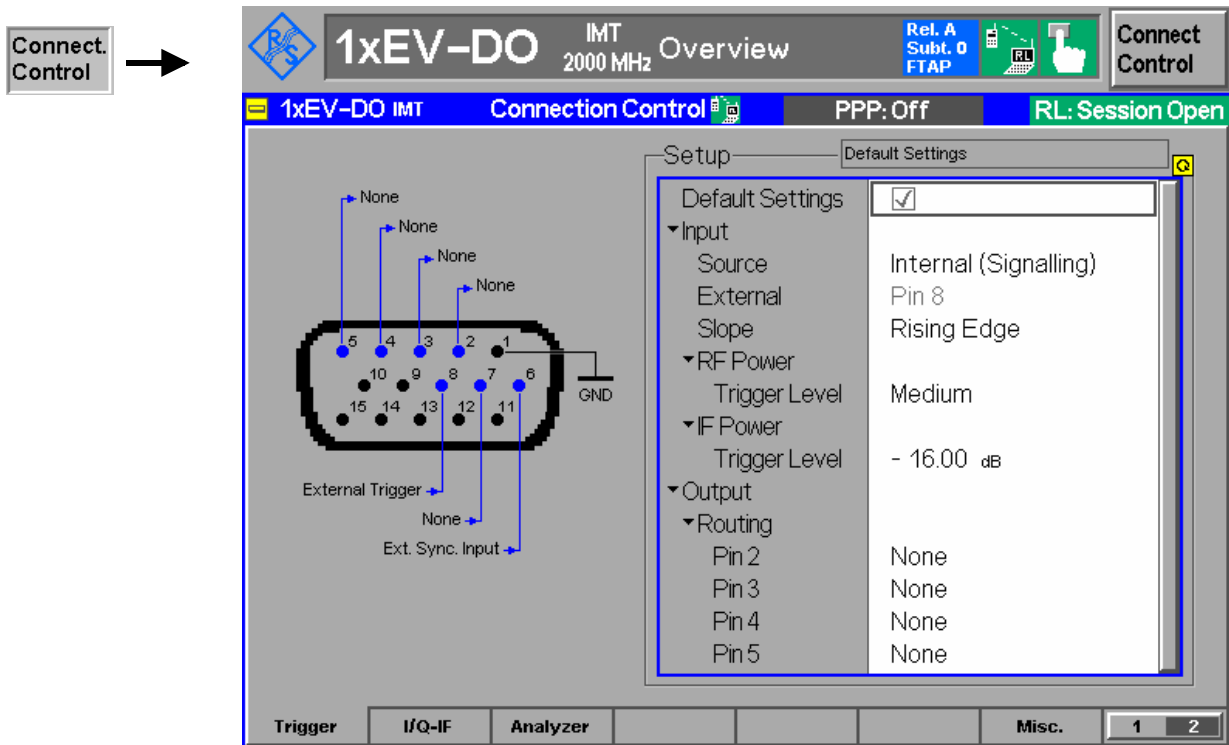


Figure 4-4-70 Connection Control – Trigger

Default Settings The *Default Settings* checkbox assigns the default setting to all functions in the *Trigger* tab (the default values are quoted in the command description in chapter 6 of this manual).

Remote control:
 DEFault:TRIGger[:SEquence]

Input – Source *Source* sets the CMU 200 to use its internal signal trigger source or use an external trigger supplied via the AUX 3 connector on the front panel.

The trigger setting affects the results of the *Transmit Time Error* measurement as described here.

Free Run No trigger. Timing error results are not possible.

Internal Timing error results are possible when AT is correctly synchronized with the CMU. An output frame trigger signal can be routed to pins 2 to 5 of AUX 3; see below.

External Timing error results are possible if an external trigger signal is provided and the AT is correctly synchronized with the CMU.

RF Power Timing error results are not possible.

IF Power Timing error results are not possible.

Remote control:
`TRIGger[:SEquence]:SOURce`

Input – External *External* indicates that the external trigger signal is to be applied to *Pin 8* of the AUX 3 connector. This holds for all three modulation schemes.

Input – Slope Allows the setting of which edge of the trigger signal should be interpreted as the actual trigger. The possible values are “Falling Edge” and “Rising Edge”.

Remote control:
`TRIGger[:SEquence]:SLOPe`

Input – RF Power – Trigger Level Sets the RF Power level a signal burst has to reach to be interpreted as an incoming trigger. A setting too high results in no trigger at all, a setting too low does not allow the measurement to identify any trigger. In both cases the measurement results are invalid.

Remote control:
`TRIGger[:SEquence]:THReshold:RFPower`

Input – IF Power – Trigger Level Sets the IF Power level a signal burst has to reach to be interpreted as an incoming trigger. A setting too high results in no trigger at all, a setting too low does not allow the measurement to identify any trigger. In both cases the measurement results are invalid.

Remote control:
`TRIGger[:SEquence]:THReshold:IFPower`

Output – Routing The *Routing* functions select the type of periodic pulse signal (or no signal, setting *NONE*) to be applied to pins 2, 3, 4, and 5 of the AUX 3 connector. The output frame trigger is available if the *Internal* trigger source is selected and the RF generator is switched on. It consists of a high-pulse TTL signal with its rising edge at the beginning of the frames of the forward signal.

The CMU provides output trigger signals with the following periodicity:

<i>None</i>	---
<i>PP2S</i>	2.00 s
<i>Super Frame</i>	80.00 ms
<i>Paging Frame</i>	20.00 ms
<i>Sync. Frame</i>	26.67 ms
<i>Slot</i>	1.67 ms
<i>Power Control Frame</i>	1.25 ms
<i>Event Trigger</i>	<variable>

All signals can be selected for each of the pins 2 to 5. The current AUX 3 pin assignment (including the external trigger input at pin 8) is shown in the diagram to the left of the trigger *Setup* table.

Remote control
`TRIGger:OUTPut:PIN<nr>:SIGNal <Frame_Period>`

I/Q-IF Interface (Connection Control – I/Q-IF)

The *I/Q-IF* tab is part of the second group of tabs in the *Connection Control* menu. It is accessible after pressing the 1 / 2 toggle hotkey once. Pressing 1 / 2 again switches back to the first group of tabs described above.

The *I/Q-IF* tab configures the signal paths for I/Q and IF signals. With option CMU-B17, *I/Q and IF Interfaces*, I/Q and IF signals can be used in the framework of *RF* measurements and in many network tests. For a detailed description of rear panel connectors (for I/Q and IF input/output signals), test scenarios, and application examples refer to the CMU 200/300 operating manual.

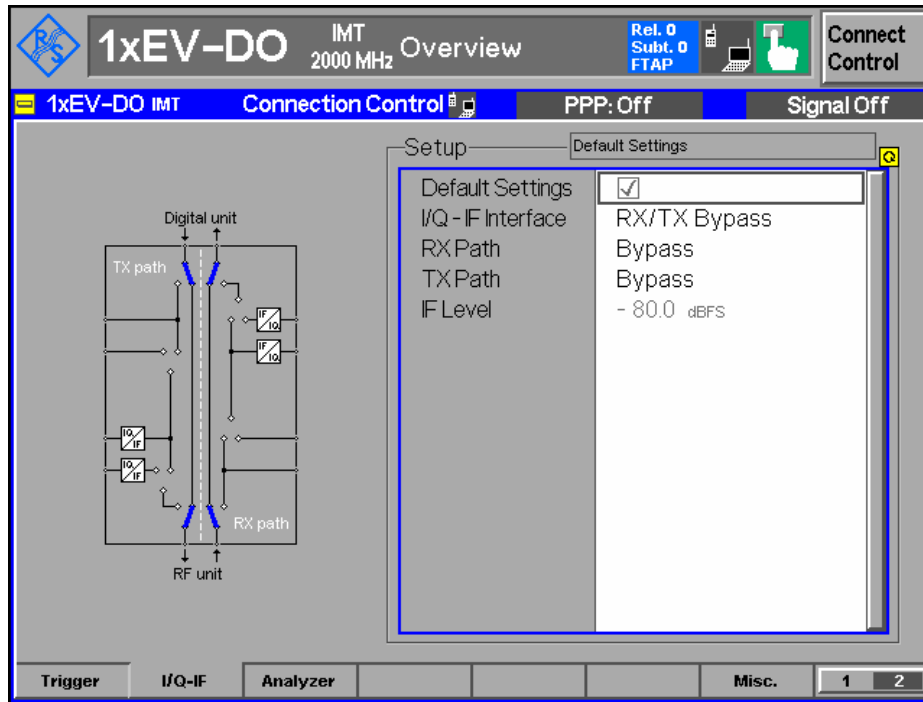


Figure 4-4-71 Connection Control – I/Q-IF

Default Settings The *Default Settings* checkbox assigns the default setting to all functions in the *I/Q-IF* tab.

Remote control:
IQIF:DEfault ON | OFF

I/Q-IF Interface Selects the I/Q-IF test scenario, overwriting the current *RX Path* and *TX Path* settings. Six different predefined test scenarios with fixed RX and TX path are provided; see [Table 4-2: I/Q-IF scenarios and path settings](#) above.

Additional scenarios may be defined by selecting any other combination of RX and TX paths. When this is done *I/Q-IF* is set to *User-defined*. The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:
CONFigure:IQIF:RXTXcombined
BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF

RX Path

Selects the RX signal path, leaving the *TX Path* unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then *I/Q-IF* is set to the predefined scenario; otherwise it is set to *User-defined*.

The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:

```
CONFigure:IQIF:RXPath
    BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF
```

TX Path

Selects the TX signal path, leaving the *RX Path* unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then *I/Q-IF* is set to the predefined scenario; otherwise it is set to *User-defined*.

The circuit diagram to the left of the *Setup* table shows the current RX and TX signal paths.

Remote control:

```
CONFigure:IQIF:TXPath
    BYP | BYIQ | XOIO | IOIO | IOXO | FPAT | UDEF
```

IF Level

This item shows the IF output level in the TX path relative to the maximum IF output level (PEP) quoted in the data sheet. The value is equal to the I/Q output level in the TX path relative to the maximum I/Q output voltage quoted in the data sheet.

Remote control:

```
[SENSe:]IQIF:LEVel?
```

Analyzer Control (Connection Control – Analyzer)

The *Analyzer* tab configures the RF input path by defining the analyzer level and the code channel filters.

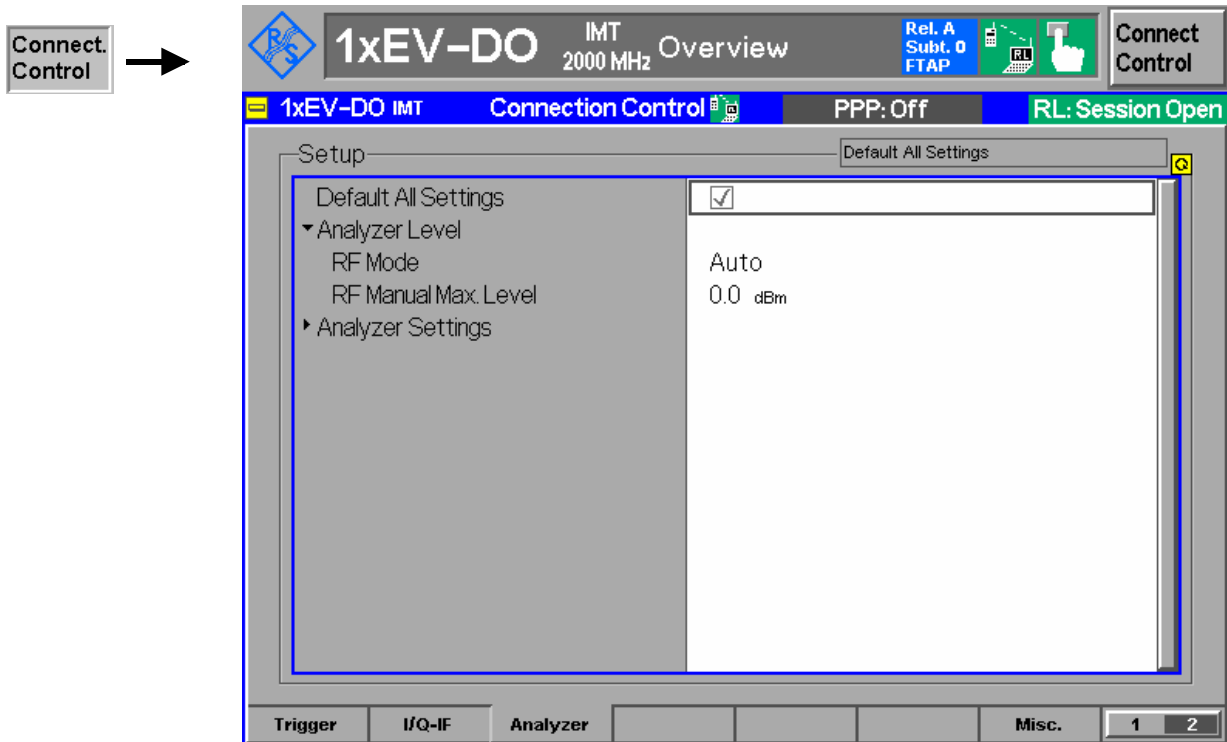


Figure 4-72 Connection Control – Analyzer

Default All Settings The *Default All Settings* checkbox assigns default values to all settings in the *Analyzer* tab (the default values are quoted in the command description in chapter 6 of this manual).

Remote control:
`DEfault:RFANalyzer`

Analyzer Level – RF Mode The *Analyzer Level* table section sets the maximum input level that can be measured. Two alternative *RF Modes* for defining this value are provided:

Manual Manual input of maximum input level, which affects the AT signal level. For example, increasing the maximum level increases the attenuation and thus reduces the signal level to to 1xEVDO driver chip. This causes it to increase the mobile power. The maximum level setting is only reached when the AT is actually transmitting data

Auto Automatic setting of maximum input level according to the expected peak power (PEP) of applied signal

Remote control:
`[SENSe:]LEVel:MODE MANual | AUTomatic`

Analyzer Level – RF Manual Max. Level The maximum expected input level can be entered in the *RF Max. Level* input field. Input levels exceeding the *RF Manual Max. Level* overdrive the input path and cause invalid results (“– – –”). The setting takes effect as when the *RF Mode* is changed to Manual. *RF Max. Level* also determines the expected power at the RF Input connector.

Remote control:

```
[SENSe:]LEVel:MAXimum <Level>
```

Analyzer Settings – Meas. Subtype The measurement subtype defines the active physical layer subtypes for the forward and reverse link measurements, where the measurement

- subtype 0 is the original (release "0") physical layer, and
- subtype 2 is new (revision "A") physical layer for both forward and reverse links.

Measurement subtype 2 implements the following channel changes:

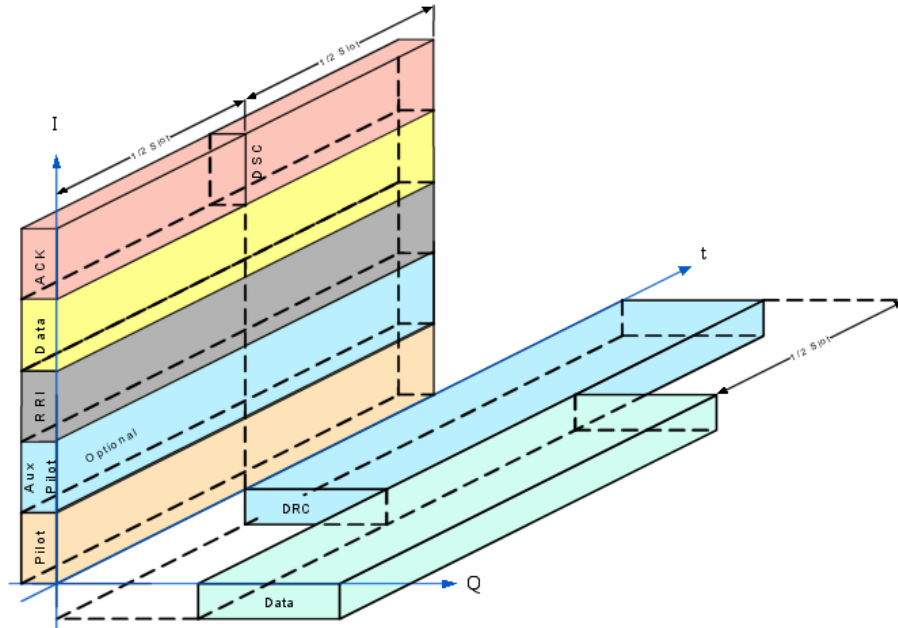
- The Forward Link Traffic channel was enhanced with additional forward traffic packet sizes (128, 256, 512, and 5120 bits) and a larger FCS. All packets now have a 24-bit CRC (increased from 16 bits). The channel interleaving procedure was changed to support Symbol Reordering, Matrix Interleave, and Short Sequence Repetition, and the initialization of turbo interleaver was expanded for additional packet sizes (unchanged for legacy sizes)
- The Control Channel packet sizes were enhanced by 128, 256, and 512 bit packets with 24-bit CRC, new rates are supported on preamble index 71 and legacy packet structure, rates, preamble/MAC indices are unchanged for backward compatibility with Rel. 0 ATs.

Remote control

```
[SENSe]:RFANalyzer:SUBType 0 | 2
```

Analyzer Settings – Code Channel Filter DRC
(for all measurement subtypes)

Code Channel Filter DRC determines if the Analyzer should analyze the incoming signal based on the presence of the DRC channel.



As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

The supported code channel filters for the measurement subtypes are shown in the table below:

Code Channel Filter	Meas. Subtype 0	Meas. Subtype 2
DRC	✓	✓
ACK	✓	✗
Data	✓	✓
AuxPilot	✗	✓
ACK/DSC	✗	✓
HalfSlot	✗	✓

For measurement subtype 2, the presence of the ACK and DSC channels in the first and second half slot has to be considered accordingly when setting the HalfSlot filter.

If the actual setting is unknown, it is a good idea to set all three code channels to "DON'T CARE" and analyze the result using the *I/Q Analyzer* measurement (*I/Q Analyzer* on pg. 4-57) to determine the current setting of the incoming signal.

Remote control:

[SENSE:]RFAnalyzer:CCFilter:DRC ON | OFF | DCare

Analyzer Settings – Code Channel Filter ACK
(for measurement subtype 0)

Code Channel Filter ACK determines if the analyzer should analyze the incoming signal based on the presence of the ACK channel.

As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

Remote control:

[SENSe]:RFANalyzer:CCFilter:ACK ON | OFF | DCARe

Analyzer Settings – Code Channel Filter Data
(for all measurement subtypes)

Code Channel Filter Data determines if the analyzer should analyze the incoming signals based on the presence of the DRC channel.

As the DRC, ACK, and Data code channels are not continuously present, the measurement system allows the user to specify the conditions under which the measurement is performed. If these filters are specified in such a manner that the AT never generates the specified channel configuration, no measurements will be made. On the other hand, if one (or more) filter settings are "Don't care", measurements will be made both when the channel is present and when it is not. This may lead to confusing and/or rapidly changing results.

Remote control

[SENSe]:RFANalyzer:CCFilter:DATA ON | OFF | DCARe

Analyzer Settings – Code Channel Filter AuxPilot
(for measurement subtype 2 only)

Code Channel Filter AuxPilot determines if the analyzer should analyze the incoming signals based on the presence of the AuxPilot channel.

Remote control

[SENSe]:RFANalyzer:CCFilter:APILot ON | OFF | DCARe

Analyzer Settings – Code Channel Filter ACK/DSC
(for measurement subtype 2 only)

Code Channel Filter ACK/DSC determines if the analyzer should analyze the incoming signals based on the presence of the ACK/DSC channel.

ACK / DSC are time-multiplexed on Walsh channel W_{12}^{32} , where the DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32} , and the ACK channel bit is transmitted on the first half slot on Walsh channel W_{12}^{32} .

Remote control

[SENSe]:RFANalyzer:CCFilter:ADSC OFF | ACK | DSC | DCARe

Code Channel Filter HalfSlotFilter
(for measurement subtype 2 only)

Code Channel Filter HalfSlotFilter determines which half slot(s) of the code channel is/are evaluated.

The DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32} , and the ACK channel bit is transmitted on the first half slot on Walsh channel W_{12}^{32} .

Remote control

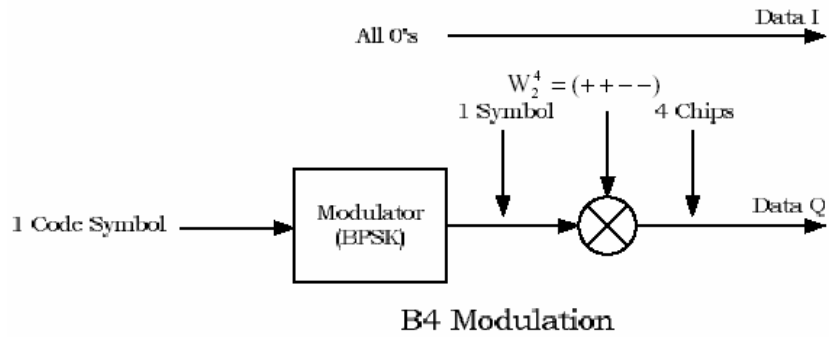
[SENSe]:RFANalyzer:CCFilter:HSLot BOTH | 1 | 2

Analyzer Settings – Data Channel Modulation Type

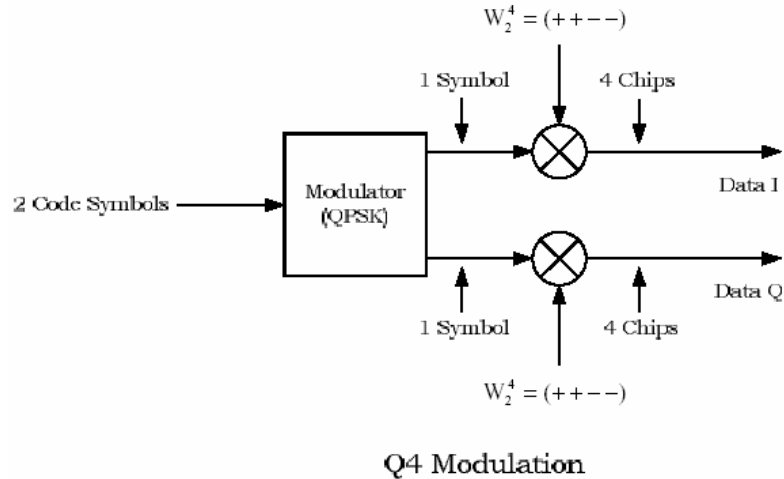
All data transmitted on the Reverse Traffic Channel has to be encoded, block interleaved, sequence repeated, BPSK, QPSK, or 8-PSK modulated and orthogonally spread by Walsh function W_2^4 or Walsh function W_1^2 or both. The Data Channel is modulated as shown below:

AUTO Automatic selection of the data channel modulation type. If AUTO is set, the signal is measured and decoded irrespective of the modulation type. Signals with unrecognized modulation types are ignored. The detected modulation type can be queried using [SENSe]:RFANalyzer:DCHannel:MTYPE?

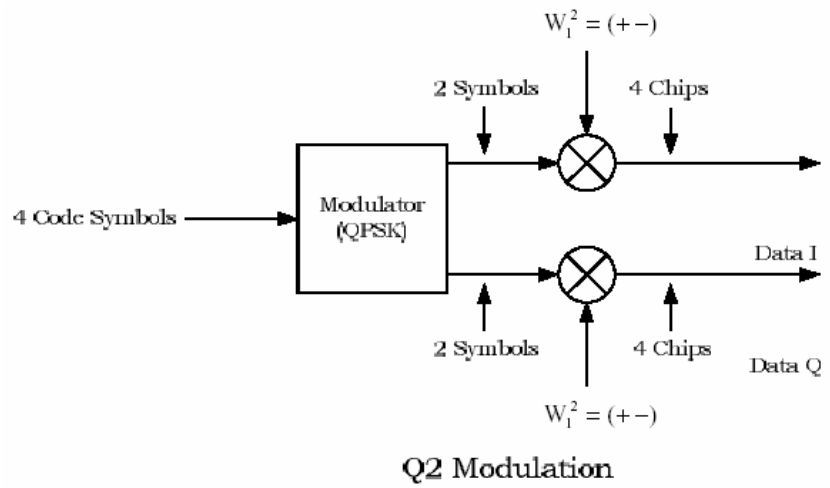
B4 BPSK modulation with 4-ary Walsh cover (W_2^4)



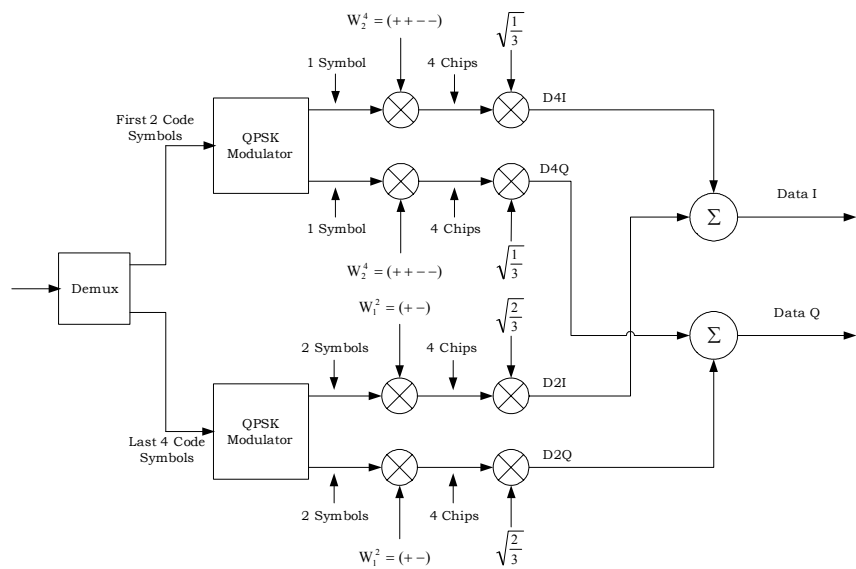
Q4 QPSK modulation with 4-ary Walsh cover (W_2^4)



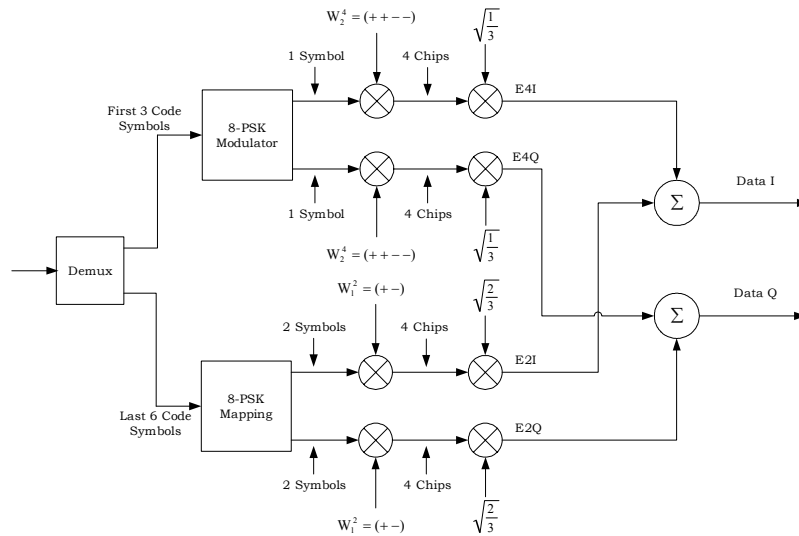
Q2 QPSK modulation with 2-ary Walsh cover (W_1^2)



Q4Q2 (QPSK, W_2^4) + (QPSK, W_1^2)



E4E2 (8-PSK, W_2^4) + (8-PSK, W_1^2)



Remote control:

[SENSe]:RFAnalyzer:DChannel:MTYPE:MODE AUTO | B4 | Q4 | Q2 | Q4Q2 | E4E2

Miscellaneous Settings (Connection Control – Misc.)

The popup menu *Misc.* provides various general settings to control the MMI behavior and the measurements.

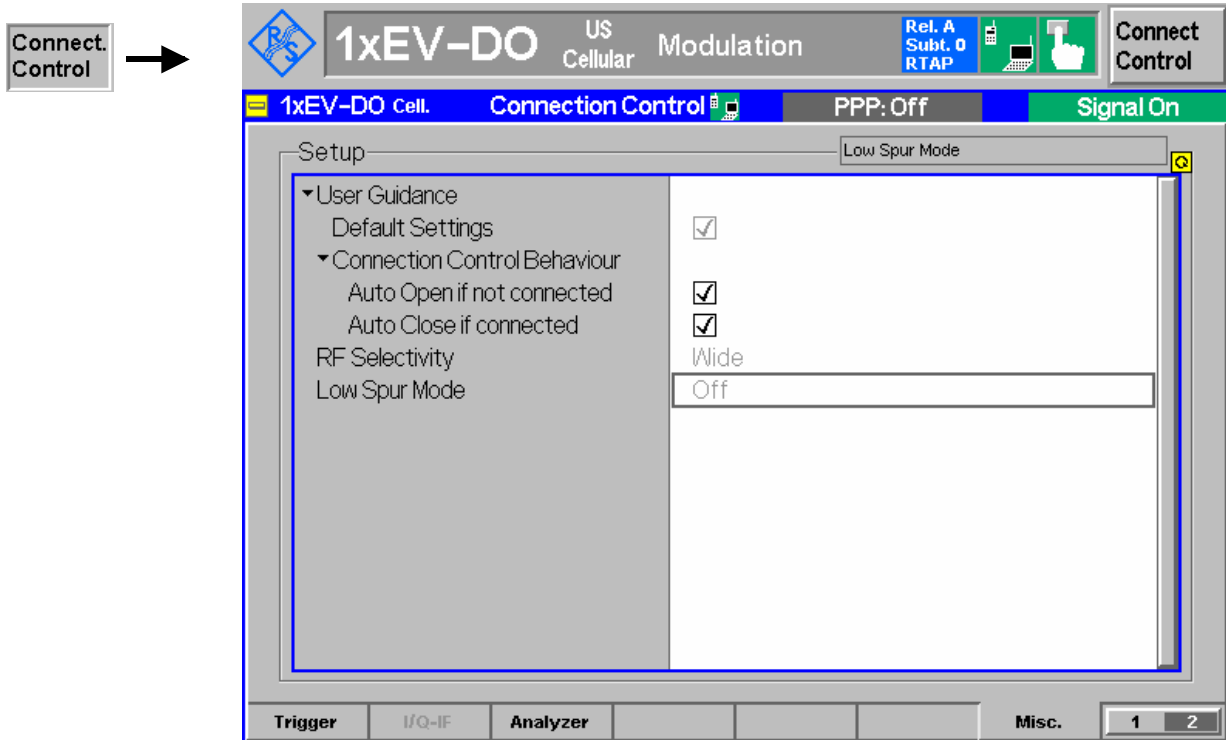


Figure 4-4-73 Connection Control – Miscellaneous

User Guidance The *User Guidance* section provides settings to control the automatic switchover between menus of the user interface and between measurement environments.

Default Settings Returns all *User Guidance* settings to their default values

Remote control:

CONFigure:MENU:CCTRL:...

Connection Control Behaviour Defines in what instances the Connection Control popup menu is automatically opened or closed:

Auto Open if not connected In the *Auto Open* mode, the Connection Control menu is automatically opened each time the 1xEV-DO function group is accessed in Signaling test mode, each time a measurement menu is opened while the AT is not connected and each time a connection is lost. Otherwise the menu must be opened manually.

Auto Close if Connected In the *Auto Close* automatically mode, the Connection Control menu is automatically closed as soon as the CMU reaches the Connected/Call Established state. Otherwise the menu must be closed manually.

Remote control:

CONFigure:MENU:CCTRL:AOPen ON | OFF

CONFigure:MENU:CCTRL:AClose ON | OFF

RF Selectivity Selects the bandwidth of the analog receiver filter (available with RX/TX Board turn 13):

WIDe Normal filter, appropriate for all TX measurements

IFLevel Sets the bandwidth to the IF output level, which is in the TX path relative to the maximum IF input/output level. The IF level value is equal to the I/Q output level in the TX path relative to the maximum I/Q input voltage.

Remote control:

CONFigure:RF:SElectivity WIDE | IFL

Low Spur Mode For the *MinPower* application, the Low Spur Mode reduces the broadband noise of the transmitter if the receiver is on a very low power level:

ON Reduced broadband noise transmission

OFF Normal transmission

Remote control:

CONFigure:LSMode ON | OFF

Marker Control

Markers are references available with any application displaying a graph of the measurement. This section gives a detailed explanation of how to control each marker type. Marker information specific to an application is located with the application.



The *Marker* softkey positions up to three markers and a D-line in the test diagram and reads their values.

Markers

Graphical tools for marking points on the measurement curve and for numerical output of measured values.


The markers are activated by pressing the hotkey and pressing the *ON/OFF* key, or entering a value. Values can be entered directly with the keypad or with the *Variation* knob.


The coordinates of the three markers are indicated in the format *Ordinate value (level)/abscissa value (time)* in a parameter line above the test diagram. The position of the reference marker is expressed in absolute units (level in dBm or percentage and time in symbols). The delta markers are expressed as absolute or relative values (relative position from the reference marker).

D-Line


The D-Line is a horizontal line that can be positioned to mark and read out an arbitrary level in the test diagram.




The *Ref*  hotkey displays the status (On | Off) of the reference marker. Pressing the hotkey displays a popup menu to switch the reference marker on or off (uses the *ON/OFF* key or the *Variation* knob).

The reference marker is represented by the symbol  in the test diagram. The marker position (abscissa) is determined in the input field *Ref. Marker*. The marker can be positioned to arbitrary time values. If its position is outside the diagram area it will be invisible and its coordinates will be "- - - / <abscissa_value>". The marker is switched off in the default setting (*OFF*). The marker level is defined by the measurement curve at the marker position.



The *Marker*  hotkey displays the status (On | Off) of marker 1. Pressing the hotkey displays a popup menu to switch the marker 1 on or off (uses the *ON/OFF* key or the *Variation* knob).

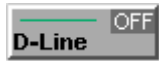
Marker 1 is represented by the symbol  in the test diagram. The marker position (abscissa) is defined in the input field *Marker 1*. The marker can be positioned to arbitrary time values. If its position is outside of the diagram area it will be invisible and its coordinates will be "<abscissa_value> / - - -". The marker is switched off in the default setting (*Off*). The marker level is defined by the trace at the marker position.

Pressing the hotkey twice displays the *Marker 1 Config* popup display. It defines whether the position of delta marker 1 is measured and indicated in *absolute* units (of the horizontal scale) or *relative* to the reference marker.



The *Marker*  hotkey switches the marker 2 on or off (use the *ON/OFF* key).

The functions and control are identical to marker 1.



The *D-Line* hotkey activates and controls the position of the D-Line in the test diagram.

The D-line is a horizontal, colored auxiliary line in the test diagram used for marking a level value and for measuring level differences.

Press the hotkey once to turn the D-Line on or off (using the *ON/OFF* key). The level of the D-line is determined by entering an absolute or relative value with either the keypad or *Variation* knob.

Press the hotkey twice to open the *D-Line Config* popup to set the *absolute* or *relative* D-Line display.

In the *absolute* setting, the D-Line is expressed in the vertical scale units and is limited to the value range of the vertical scale. In the *relative* setting, the D-Line value is relative to the maximum vertical scale.

The default setting is *Off*.

Contents

5 Remote Control – Basics	5.1
Structure and Order of Commands	5.1
Measurement Control	5.2
Measurement Groups	5.2
Measurement Statistics	5.3
Specifying Limits	5.5
Status Reporting System	5.5
Special Terms and Notations	5.7

5 Remote Control – Basics

This chapter gives a summary of the basic features and concepts of 1xEV-DO remote control commands. Remote control can be described in terms analogous to the ones used in chapter 3 for the classification of menus and settings for the graphical user interface. In the following, the similarities and differences between manual and remote control are emphasized.

Structure and Order of Commands

Chapter 6 of this manual gives a description of all 1xEV-DO remote control commands, including their parameters, default values and ranges of all numerical parameters.

Addressing

The CMU 200/300 uses extended addressing. The instrument is assigned a primary address while each function group and test mode is identified via a secondary address. This allows the same remote commands to be used in several function groups and modes:

```
ibwrt(h_EVDO1xAT_NSig, "INITiate:NPOWER")
ibwrt(h_EVDO1xAT_Sig, "INITiate:NPOWER")
```

provided that the variables `h_EVDO1xAT_NSig` and `h_EVDO1xAT_Sig` have been appropriately defined, see program examples in chapter 7 of the CMU Operating manual.

The remote control commands for first (`SYST:COMM:GPIB:ADDR`) and secondary (`SYST:REM:ADDR:SEC`) addressing are described in the CMU operating manual. The `SYST:REM:ADDR:SEC` command uses the following name to address the 1xEV-DO non-signaling network tests described in this manual:

```
EVDO1XAT_NSig
```

Order of commands

The commands are arranged to form groups belonging to the same measurement or to the same type of configurations. These command groups are identified by the second-level keyword (as in `POWER`). Applications belonging to a measurement group (see chapter 5 of the CMU 200/300 base unit operating manual) are identified by the third-level keyword of each command (as in `MODulation: EVMagnitude`). Chapter 6 is organized as follows:

1xEV-DO:

- General purpose commands that are identical or almost identical in every function group (`OPTION`, `STATUS:OPERation`, `RESet`, `MMEMemory`, `IQIF`)
- General configurations that are valid for the entire 1xEV-DO function group (second-level keywords `NETWork`, `LEVEL`, `INTernal`, `EXTernal`, `RFANalyzer`, `RFGenerator`, `INPut`, `OUTPut`, `CORRection:LOSS`, `DM:CLOCK`)
- Measurement groups: (second/third-level keywords `WPOWER`, `NPOWER`, `MODulation:MQuality`, `MODulation:OVERview`, `MODulation:EVMagnitude`, `MODulation:PERRor`, `MODulation:MERRor`, `MODulation:IQANalyzer`, `CDPower:CDPW`, `CDPower:PCDep`, `CDPower:CHPW`, `SPECTrum:ACP`).

The structure of chapter 6 differs from chapter 4 (*Functions and their Application*) where the measurements are presented first and configurations pertaining to the whole function group and test mode are reported at the end of each section.

The menu of the graphical user interface corresponding to a group of commands is quoted at the beginning of each section. A list of all commands is appended to chapter 6.

SCPI Conformity

In view of the particular requirements of 1xEV-DO measurements not all commands could be taken from the SCPI standard. However, the syntax and structure of all commands is based on SCPI conventions. For a detailed description of the SCPI standard refer to chapter 5 of the operating manual for the CMU basic unit.

SPCI confirmed and SPCI approved commands are explicitly marked in chapter 6.

Remote Control

All commands may be used for control of the CMU via the GPIB interface or serial (RS-232) interface.

Measurement Control

The commands in the measurement groups `WPOWer`, `NPOWer`, `POWer...`, `MODulation...`, `CDPOWer...` have an analogous structure and syntax. The measurements are controlled according to common concepts which are explained in detail in chapter 5 of the CMU operating manual. The following sections show how the general concepts are applied to 1xEV-DO measurements.

Measurement Groups

The measurement groups are referred to as *measurement objects* (keyword `<meas_obj>`) in remote control. Most measurement objects correspond to a measurement group or application in manual control. For 1xEV-DO measurements, the following measurement objects are defined:

Table 5-1 Measurement objects in 1xEV-DO.

1xEV-DO	
Meas. Object	Measurement group Application
<code>WPOWer</code>	<i>Wide-band Power measurement.</i>
<code>NPOWer</code>	<i>Narrow-band Power measurement.</i>
<code>MODulation:MQuality</code>	<i>Modulation Quality measurement (H-PSK)</i> AT power, waveform quality, frequency error, transmit time error, carrier feedthrough, I/Q imbalance and sideband suppression. Statistical results and the results of the limit check can be evaluated.
<code>MODulation:OVERview</code>	<i>Modulation Overview measurement (H-PSK)</i> H-PSK scalar modulation results. Summary of phase error, error vector magnitude and magnitude error of the AT transmitter output signal. The frequency error, average and RMS error, statistical results and the results of the limit check can be evaluated.

1xEV-DO	
Meas. Object	Measurement group Application
MODulation:EVMagnitude	<i>Modulation Error Vector Magnitude measurement (H-PSK)</i> Modulation waveform interval as a function of time of the AT transmitter output signal (H-PSK). The frequency error, average and RMS error, statistical results and the results of the limit check can be evaluated.
MODulation:MEError	<i>Modulation Magnitude Error measurement (H-PSK)</i> Modulation waveform interval as a function of time of the AT transmitter output signal (H-PSK). The frequency error, average and RMS error, statistical results and the results of the limit check can be evaluated.
MODulation:PEError	<i>Modulation Phase Error measurement (H-PSK)</i> Modulation waveform interval as a function of time of the AT transmitter output signal (H-PSK). The frequency error, average and RMS error, statistical results and the results of the limit check can be evaluated.
MODulation:IQAnalyzer	<i>Modulation IQ Analyzer (H-PSK)</i> Analysis of the AT signal in the I/Q plane.
CDPower:CDPW	<i>Code Domain Power measurement (H-PSK)</i> Code Domain Power in 16 code domain channels contributing to the reverse link 1xEV-DO signal. The slots for the Pilot and the RRI channel are evaluated within the same measurement shot. The AT power, carrier feedthrough, frequency error and rho factor, statistical results and the results of the limit check can be evaluated.
CDPower:PCDep	<i>Peak Code Domain Error Power measurement (H-PSK)</i> Peak Code Domain Error Power in 16 code domain channels contributing to the reverse link 1xEV-DO signal. The slots for the Pilot and the RRI channel are evaluated within the same measurement shot. The AT power, carrier feedthrough, frequency error and rho factor, statistical results and the results of the limit check can be evaluated.
CDPower:CHPW	<i>Channel Power measurement (H-PSK)</i> Channel Power of the reverse link physical channels of both the I and Q signal. The slots for the Pilot and the RRI channel are evaluated within the same measurement shot. The AT power, carrier feedthrough, frequency error and rho factor, statistical results and the results of the limit check can be evaluated.
SPECTrum:ACP	<i>Adjacent Channel Power Spectrum measurement</i> Power as a function of the offset frequency related to the Channel Power. Statistical results and the results of the limit check can be evaluated.

Measurement Statistics

Together with the *Statistic Count*, the *Repetition Mode* defines how many evaluation periods are measured if the measurement is not stopped explicitly (measurement control commands `STOP...`, `ABORT...`) or by a limit failure. With remote control, the two repetition modes *Single Shot* and *Continuous* are available (*Counting* is not available in manual control, see chapter 3).

Generally four different traces are determined within one measurement:

- The result in the current period
- The maximum result
- The minimum result
- The average result (evaluated over a set number of waveform intervals)

The four results can be queried independently.

Table 5-2 Repetition mode in remote control

Setting	Description	Command
Statistic Count	Integer number of evaluation periods forming one statistics cycle. An evaluation period is equal to a burst.	<pre>CONFigure:<meas_obj>:CONTRol:STATistics 1 ... 1000 NONE (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...)</pre>
Repetition Mode Single Shot	The measurement is stopped after one statistics cycle. All remote control measurements default to single shot.	<pre>CONFigure:<meas_obj>:CONTRol:REPetition SINGLEshot, <StopCondition>, <Stepmode> (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...)</pre>
Continuous	The measurement is continued until stopped explicitly or by a limit failure. Average results are calculated according to the rules described in chapter 3.	<pre>CONFigure:<meas_obj>:CONTRol:REPetition CONTinuous, <StopCondition>, <Stepmode> (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...)</pre>
Counting	Repeated single shot measurement with configured statistics cycles.	<pre>CONFigure:<meas_obj>:CONTRol:REPetition 1 ... 10000, <StopCondition>, <Stepmode> (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...)</pre> <p>A counting measurement with 1 evaluation period is equivalent to a single shot measurement..</p>
Traces	<p>The specifiers CURRent, MMAx, and AVErAge denote the traces for the current evaluation period, the extreme value, and the average of a set of evaluation periods. They correspond to the <i>Display Mode</i> set in the measurement configuration menus.</p> <p>In general all four traces are evaluated during the measurement. They are selected via the specifiers used as last keywords in the READ..., FETCh... or SAMPle... queries.</p>	<p>Measurement results:</p> <pre>READ:ARRay:<meas_obj>:<disp>? READ:SUBarrays:<meas_obj>:<disp>? ...</pre> <p><disp> = CURRent AVErAge MAximum MINimum MMAx (not all modes are available for all measurements)</p> <pre>(<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...)</pre> <p>Limit matching:</p> <pre>CALCULATE[:SCALar]:<meas_obj>:<disp>: MATChing:LIMit? <Response></pre> <p><Response> contains the limit matching identifiers for all three traces</p>

Specifying Limits

The following table gives an overview of the types of limits and possible results of the limit check.

Table 5-3 Limits and limit check

Type	Description	Command
Scalar limits	Limit values for a single (scalar) measured quantity. Depending on the measured quantity, either an upper limit or upper and lower limits can be defined.	<pre> CONFigure:<meas_obj>:<disp>:LIMit [:SCALar]:<symmetry>:<Spec.>:VALue <disp> = CURRent AVERAge MMAX CAMMax where CAMMax denotes a limit valid for all measure- ment curves (current and average and min/maximum) (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...) <symmetry> = SYMMetric ASYMMetric for symmetric or asymmetric upper and lower limits <Spec.> = UPPer LOWer [:COMBined] for upper limits, lower limits, or combined upper and lower limits. </pre>
Limit check	All scalar limits belonging to the same measurement group are read out together with the command on the right side.	<pre> CALCulate:<meas_obj.>:MATChing:LIMit? (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...) </pre>
	Possible results of the scalar limit check are listed on the right side.	<pre> NMAU not matching, underflow NMAL not matching, overflow INV measured value invalid OK no limit failure </pre>
	The result of the limit check depends on the statistics settings (see section Measurement Statistics on page 5.3).	<pre> CALCULATE:ARRay:<meas_obj>:<disp> :MATChing:LIMit? where <disp> = :CURRent :AVERAge :MMAXimum :MAXimum :MINimum (<meas_obj> = NPOwer MODulation:MQuality MODulation:EVMagnitude CDPower:CHPW ...) </pre>

Status Reporting System

A general description of SCPI status registers and of the status reporting system is given in chapter 5 of the CMU 200/300 operating manual. This section is devoted to the particular features concerning 1xEV-DO measurements.

The CMU offers 30 independent `STATUS:OPERation:SUM1|2:CMU<nr>` sub-registers (<nr>=1 ... 15) which are implemented in hierarchical form. The bits of the 30 `STATUS:OPERation` registers are set only after the registers are assigned to a function group and measurement mode.

In the `EVENT` part, the `STATUS:OPERation` register contains information on which actions the instrument has executed since the last readout. All five parts of the registers can be read using one of the commands of the subsystem `STATUS:OPERation:SUM1|2:CMU<nr>:...`

Note: Symbolic status register evaluation by means of the commands `STATUS:OPERation:SYMBOLic:ENABLE` and `STATUS:OPERation:SYMBOLic[:EVENT]?` is a convenient alternative method of retrieving status information. See also section Symbolic Status Event Register Evaluation in chapter 5 of the CMU operating manual and chapter 6 of this manual.

1xEV-DO access terminal tests comprise the *Non-Signaling factory test mode*. The secondary address of the 1xEV-DO function group must be used to access the correct status registers. The bit assignment is as follows:

Table 5-4 1xEV-DO bits used in the STAT:OPER:SUM1|2:CMU<nr> sub-registers (for Non-Signaling)

Bit-No.	Description	Symbol in STAT:OPER:SYMB...	Firmware Version
0	Forward traffic (AT1) packet stream completed This bit is set when all packets specified in the <i>Packet Count</i> parameter are sent to the access terminal ^{°1}	PS1C	V3.40
1	Forward traffic (AT2) packet stream completed This bit is set when all packets specified in the <i>Packet Count</i> parameter are sent to the access terminal ^{°2}	PS2C	V3.40
2	Forward traffic (AT3) packet stream completed This bit is set when all packets specified in the <i>Packet Count</i> parameter are sent to the access terminal ^{°3}	PS3C	V3.40
3	Forward traffic (AT4) packet stream completed This bit is set when all packets specified in the <i>Packet Count</i> parameter are sent to the access terminal ^{°4}	PS4C	V3.40
4	Measurement Invalid This bit is set when a measurement returns invalid results.	MINV	V3.40
11	RF Input Overdriven This bit is set if the RF input level at connector RF1, RF2 or RF 4 IN is larger than the specified RF Max. Level plus an appropriate margin.	RFIO	V3.40
12	RF Input Underdriven This bit is set while the RF input level at connector RF1, RF2 or RF 4 IN falls below the measurement range controlled by the specified RF Max. Level.	RFIU	V3.40

Table 5-5 1xEV-DO bits currently used in the STAT:OPER:SUM1|2:CMU<nr> sub-registers (for Signaling)

Bit-No.	Description	Symbol in STAT:OPER:SYMB...	Firmware Version
4	Measurement Invalid This bit is set when a measurement returns invalid results.	MINV	V4.20
11	RF Input Overdriven This bit is set if the RF input level at connector RF1, RF2 or RF 4 IN is larger than the specified RF Max. Level plus an appropriate margin.	RFIO	V4.20
12	RF Input Underdriven This bit is set while the RF input level at connector RF1, RF2 or RF 4 IN falls below the measurement range controlled by the specified RF Max. Level.	RFIU	V4.20

Special Terms and Notations

Below some particular features in the syntax of the 1xEV-DO commands are listed. The general description of the SCPI command syntax can be found in chapter 5 of the CMU operating manual, section "Structure and Syntax of Device Messages".

Description of commands

The commands are arranged in tables; all of them are described along the same scheme. From top to bottom, the table rows contain the following entries:

1. Complete command syntax including the parameter list and a short description of the command
2. List and description of the parameters with their default values, the default units and unit rings
3. Detailed description of the command, signaling state required for command execution (in Signaling mode), required firmware version

Detailed lists of default values are annexed to the command description.

Order of commands

The commands are arranged according to their function. The general purpose of a command is described by the keyword in the second level. Lower-level keywords define the command in more detail. This means that commands with the same second-level, third-level etc. keywords are generally grouped together in the same sections.

Example:

```
CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics
                                <Statistics>
```

Commands with the keyword *MODulation* in the second level belong to the modulation measurement. The keywords in the third, fourth and fifth level indicate that the command defines the number of bursts forming a statistics cycle in the measurement of the AT phase error.

Combined measurements

To limit the number of remote control commands in an application program, all scalar results of a measurement group are usually measured together and returned in a common list. Arrays (e.g. the traces for *CDPOWer* and *MODulation* measurements) are returned as comma-separated lists of values; it is possible to retrieve either the whole list (see commands *READ:ARRay...* etc.) or the values located in a number of subranges that are part of the total measurement range (see commands *READ:SUBarrays...*; the subarrays are defined via *CONFigure:SUBarrays...*).

Parameters

Many commands are supplemented by a parameter or a list of parameters. Parameters either provide alternative options (setting a or setting b or setting c ..., see special character "|"), or they form a comma-separated list (setting x,y).

<Par_Name>

Alternative settings are described by a common name (literal) written in angle brackets (<>). This literal serves as a description of the parameters only; in an application program it must be replaced by one of the settings given in the detailed parameter description.

Example:

```
CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics
                                <Statistics>
```

with <Statistics> = 1 ... 10000 | NONE

possible command syntax: CONF:MOD:PERR:CONT:STAT NONE

NAN NAN (not a number) is generally used to represent missing data, e.g. if a portion of a trace has not been acquired yet. It is also returned after invalid mathematical operations such as division by zero. As defined in the SCPI standard, NAN is represented as 9.91 E 37.

INV INV (invalid) is returned if a limit check is performed without defining the appropriate tolerance values.

Upper / lower case Upper/lower case characters characterize the long and short form of the keywords in a command. The short form consists of all upper-case characters, the long form of all upper case plus all lower case characters. Either the short form or the long form are allowed; mixed forms are not generally recognized. The instrument itself does not distinguish upper case and lower case characters.

Special characters

| A vertical stroke in the parameter list characterizes alternative parameter settings. Only one of the parameters separated by | must be selected.

Example: The following command has two alternative settings:

```
DEFault:LEVel ON | OFF
```

[] *Key words* in square brackets can be omitted when composing the command header (see chapter 5 of the CMU operating manual, section "Structure of a Command"). The complete command must be recognized by the instrument for reasons of compatibility with the SCPI standard.

Parameters in square brackets are optional as well. They may be entered in the command or omitted.

[?] Remote control commands that can also be used as a query are indicated with [?] at the end of the command. As a query, the "?" (question mark) must be part of the command.

{ } Braces or curly brackets enclose one or more parameters that may be included zero or more times.

<nr> This symbol stands for a numeric suffix, e.g. an enumeration index for input and output connectors.

List of Commands

Command: The *Command* column of the table contains all remote control commands arranged according to their function (configurations or measurement objects).

Parameters: The *Parameter* column lists the parameters of the commands.

Remarks: The *Remarks* column gives additional information about the commands which

- Have no query form (no query)
- Have only a query form (query only)
- Can be used both as setting commands and as queries (with query, this applies to all commands belonging to one of the two preceding categories)

Contents

6 Remote Control – Commands	6.1
General Commands	6.1
Option Query.....	6.1
Partial Reset.....	6.2
Configuration File Management.....	6.2
I/Q-IF Interface.....	6.3
Symbolic Status Event Register Evaluation.....	6.6
Connection Control (Non-Signaling Only)	6.7
Band Class – Network Standard.....	6.7
NETWork Standard.....	6.7
Analyzer.....	6.8
Subsystem RFANalyzer.....	6.8
Subsystem FREQuency.....	6.9
Subsystem SUBType.....	6.11
Subsystem LCMask (Long Code Mask).....	6.11
Subsystem CCFilter (Code Channel Filter).....	6.12
Subsystem AT<nr> (Access Terminal).....	6.14
Subsystem DCHannel (Data Channel Modulation).....	6.14
Generator.....	6.15
Subsystem RFGenerator.....	6.15
Subsystem FREQuency.....	6.16
Subsystem POWer.....	6.18
Subsystem PROPerTy.....	6.18
Subsystem IMPairments.....	6.19
Subsystem SNCMessage (Sync. Message).....	6.20
Subsystem Access Terminal AT<nr> (for CMU-B88) / AT1 (for CMU-B89).....	6.22
Subsystem RAB (Reverse Activity).....	6.32
Subsystem OAT (Other Access Terminals).....	6.34
Subsystem Type.....	6.34
Subsystem I/Q Access Interface Setup.....	6.35
RF Input and Output.....	6.37
Subsystem RF Input and Output (External Attenuation at Connectors).....	6.37
WPOWER (Wide Band Power).....	6.38
Control of Measurement.....	6.38
Test Configuration.....	6.39
Subsystem CONTROL.....	6.39
Measured Values.....	6.40
DM:CLOCK (Synchronization).....	6.40
Trigger.....	6.41
Subsystem TRIGger.....	6.41
Subsystem SElect.....	6.41
Subsystem SLOPe.....	6.41
Subsystem OUTPut.....	6.42
Subsystem THReshold.....	6.43
Subsystem SOURce.....	6.44
Subsystem RF Selectivity and Rx/Tx Frequency Coupling.....	6.45
Subsystem RF Selectivity.....	6.45
Subsystem Rx/Tx Frequency Coupling.....	6.46

Measurement Command Groups (Non-Signaling Only)	6.47
MODulation:MQuality (App. Modulation Quality HPSK).....	6.47
Control of Measurement	6.47
Test Configuration.....	6.48
Subsystem CONTrol.....	6.48
Subsystem LIMit.....	6.51
Measured Values	6.54
Common Measurements and Command Groups (Signaling and Non-Signaling)	6.56
NPOWER (Narrow Band Power)	6.56
Control of Measurement	6.56
Test Configuration.....	6.58
Subsystem CONTrol.....	6.58
Measured Values	6.59
SAPPower (Standby and Access Probe Power)	6.60
MODulation:OVERview.....	6.61
Control of Measurement	6.61
Test Configuration.....	6.62
Subsystem CONTrol.....	6.62
Subsystem LIMit.....	6.65
Measured Values	6.68
MODulation:EVMagnitude (Error Vector Magnitude).....	6.69
Control of Measurement	6.69
Test Configuration.....	6.71
Subsystem CONTrol.....	6.71
Subsystem LIMit.....	6.73
Subsystem SUBarrays	6.73
Measured Values	6.74
MODulation:MERRor (Appl. Magnitude Error H-PSK).....	6.76
Control of Measurement	6.76
Test Configuration.....	6.77
Subsystem CONTrol.....	6.77
Subsystem LIMit.....	6.78
Subsystem SUBarrays	6.79
Measured Values	6.80
MODulation:PERRor (Application Phase Error H-PSK)	6.82
Control of Measurement	6.82
Test Configuration.....	6.83
Subsystem CONTrol.....	6.83
Subsystem LIMit.....	6.85
Subsystem SUBarrays	6.85
Measured Values	6.86
MODulation:IQANalyzer (IQ Analyzer H-PSK)	6.88
Control of Measurement	6.88
Test Configuration.....	6.89
Subsystem CONTrol.....	6.89
Subsystem SUBarrays	6.90
Measured Values	6.91
SPECTrum:ACP (ACP Spectrum)	6.92
Control of Measurement	6.92
Test Configuration.....	6.93
Subsystem CONTrol.....	6.93

Subsystem LIMit	6.97
SPECtrum:ACP:LIMit	6.97
Measured Values	6.97
CDPower:CDPW (Code Domain Power)	6.100
Control of Measurement	6.100
Test Configuration.....	6.101
Subsystem CONTrol.....	6.101
Subsystem LIMit.....	6.103
CDPower:CPCCommon:LIMit.....	6.103
CDPower:CDPW:LIMit	6.105
Measured Values	6.106
CDPower:PCDep (Peak Code Domain Error Power)	6.112
Control of Measurement	6.112
Test Configuration.....	6.113
Subsystem CONTrol.....	6.113
Subsystem LIMit.....	6.115
CDPower:CPCCommon:LIMit.....	6.115
CDPower:PCDep:LIMit	6.115
Measured Values	6.116
CDPower:CHPW (Channel Power).....	6.121
Control of measurement	6.121
Test Configuration.....	6.122
Subsystem CONTrol.....	6.122
Subsystem LIMit.....	6.125
CDPower:CPCCommon:LIMit.....	6.125
CDPower:CHPW:LIMit	6.125
Measured Values	6.126
Measurement Command Groups (Signaling Only)	6.132
RxQuality (Receiver Quality).....	6.132
Control of Measurement - Common Commands.....	6.132
Test Configuration.....	6.133
<i>Statistics Overview Application</i>	6.133
Measured Values	6.133
<i>Control Channel PER Application</i>	6.134
Measured Values	6.136
<i>Forward Link PER Application</i>	6.137
Measured Values	6.139
<i>Reverse Link Quality Application</i>	6.140
Measured Values	6.142
<i>Forward Link Performance Application</i>	6.143
Measured Values	6.145
<i>Reverse Link Performance Application</i>	6.145
Measured Values	6.146
<i>Reverse Link PER Application</i>	6.148
Measured Values	6.150
Data Applications - RLP Frame / IP Statistics and Ping	6.152
Control of Measurement - Common Commands.....	6.152
Test Configuration – RLP Frame / IP Statistics Application.....	6.152
Test Configuration – Ping Application	6.153
Subsystem PING:CONTrol	6.154
Measured Values – RLP Frame / IP Statistics.....	6.156
Measured Values – Ping	6.157
Connection Control (Signaling Only)	6.157

Subsystem Signaling (Connection Setup and Cleardown)	6.158
Subsystem AT Information	6.160
Subsystem Handoff	6.161
Subsystem Layer	6.161
Subsystem Default Signaling Application	6.162
Subsystem Default Test Application	6.163
Subsystem Enhanced Test Application	6.168
Subsystem Default Packet Application	6.172
Subsystem Stream Layer	6.178
Subsystem Session Layer	6.179
Subsystem Connection Layer	6.180
Subsystem MAC Layer	6.181
Subsystem Physical Layer	6.191
Subsystem ANSignal	6.191
Subsystem Power Control	6.193
Subsystem Sector	6.194
Subsystem Access Network Properties	6.196
Subsystem AT Forward Packet Activity	6.197
Subsystem Band Class – NETWork Standard	6.197
Subsystem RFANalyzer	6.203
Subsystem LEVel	6.204
Subsystem SUBType	6.204
Subsystem CCFilter (Code Channel Filter)	6.205
Subsystem DCHannel (Data Channel Modulation)	6.207
External Synchronization	6.208
Subsystem ESYNc	6.208
Trigger	6.210
Subsystem TRIGger	6.210
Subsystem SOURce	6.210
Subsystem THReshold	6.211
Subsystem SLOPe	6.211
Subsystem OUTPut	6.212
Subsystem Miscellaneous (User Guidance and RF Selectivity)	6.212
Subsystem User Guidance (Connection Control Behavior)	6.212
Subsystem RF Selectivity	6.213
Low Spur Mode	6.213
Subsystem WPOWer (Wide Band Power)	6.213
Control of Measurement	6.213
Test Configuration	6.215
Subsystem CONTrol	6.215
Measured Values	6.215
List of Commands	6.214

6 Remote Control – Commands

This chapter contains all remote-control commands for the 1xEV-DO function group. The commands are presented in tabular form with their parameters and the ranges of values. The structure of this chapter is analogous to that of the reference part for manual operation (chapter 4).

- The chapter starts with a summary of general commands, which are global CMU features supported in the 1xEV-DO function group
- The measurement modes *Non-Signaling* and *Signaling* are then presented separately.
- Within the 1xEV-DO function group, the general configurations are presented first and then the individual measurement groups are presented.
- Command and measurement groups that are identical or almost identical in both test modes (*RFANalyzer...*, *TRIGger...*, *WPOWER*, etc.) are presented in a separate section between the two measurement modes.

General notes on remote control in the 1xEV-DO function group can be found in chapter 5. An introduction to remote control according to SCPI standard and the status registers of the CMU is given in chapter 5 of the operating manual for the CMU 200/300 basic instrument.

Note: *Remote control commands that can also be used as a query are indicated with [?] at the end of the command. As a query, the “?” (question mark) must be part of the command.*

Otherwise the command documentation follows SCPI conventions (see also chapter 5): Keywords and parameters enclosed in square brackets are optional and can be omitted without changing the effect of the command.

General Commands

The commands listed in this section describe the global CMU features that are supported in the 1xEV-DO function group. These commands are identical or almost identical in all CMU function groups that support the corresponding feature.

Option Query

The *Options* subsystem contains the commands for querying information on the instrument and the available options. It corresponds to the *Options* tab in the *Setup* menu opened via the *SETUP* key on the front panel.

SYSTem:OPTions:INFO:CURRent?		Device Info	
Response	Def. Value	Default unit	FW vers.
Example: Rohde&Schwarz,CMU 200-1100.0008.02,840675/018, V4.20:SP00 2006-03-10" EVDO1xAT_NSig"	–	–	V3.40
or Rohde&Schwarz,CMU 200-1100.0008.02,840675/018, V4.20:SP00 2006-03-10" EVDO1xAT_Sig"			V4.20
Command description			
This command returns the information on the device comprising the manufacturer, model, serial number and firmware version of the current function group. This command is always a query.			

SYSTem:VERSion:SW:MMI?		MMI Software Version	
Response	Def. Value	Default unit	FW vers.
Example: "1.00C[3.40:SP00]"	–	–	V3.40
Command description			
This command returns the information about the current version of the 1xEV-DO MMI module. This command may be helpful for driver development as the MMI module determines the GPIB command set. This command is always a query.			

Partial Reset

The **RESet** subsystem restores the (factory) default values for the 1xEV-DO function group (unless the secondary address of another function group is used). It corresponds to the 1xEV-DO path in the *Reset* menu opened via the **RESET** key on the front panel.

SYSTem:RESet:CURRent		Partial Reset
Command description		FW vers.
This command sets all parameters of the current function group and test mode to default values. The command is available in all function groups. Unlike the <i>Reset</i> menu the remote command restores the default values defined for remote control operation. In those cases where remote and manual control use distinct settings (e.g. the repetition mode for many measurements), the manual control settings are left unchanged.		V3.40

Configuration File Management

The **MMEMory** system provides mass storage capabilities for the CMU. The functionality of this system is included in the *Data* menu; see CMU 200/300 operating manual.

The mass storage of the CMU may be internal or external. The internal mass storage device is a section on the internal hard disk that is reserved for mass storage (directory `c:\temp`). The external mass storage device is either a floppy disk or a PCMCIA memory card, depending on the instrument configuration. The `<msus>` (mass storage unit specifier) parameter in the **MMEMory** commands denotes the root directory of the *INTernal* or *EXTernal* mass storage device.

The `<FileName>` parameter is a string. The contents of the string may contain characters for specifying subdirectories, e.g. `"\TEMP\TRASH\test.txt"` for the file named *test.txt* in the *TEMP\TRASH* subdirectory of the root directory or `"TEMP\TRASH\test.txt"` for the file named *test.txt* in the *TEMP\TRASH* subdirec-

tory of the current directory, to be queried with the base system command `MMEMemory:DIReCTory[:CURRent]?`. The file name itself may contain the period as a separator for extensions.

MMEMemory:SAVE:CURRent <FileName> [,<msus>]				
Save configurations in current function group and test mode				
Parameters	Parameter description	Def. value	Def. unit	FW vers.
"<FileName>", INTernal EXTernal	Name of the config. file to be created Storage device of the config. file	– INTernal	– –	V3.40
Command description				
This command saves the configuration of the 1xEV-DO function group (unless the secondary address of another function group is used) to a configuration file. A "?" in the specified file name will be replaced by current numbers that are automatically incremented, starting with zero. The auto-increment function overwrites an existing file with a "9" in its file name. For those instrument settings which may be different in manual and remote control (e.g. the repetition mode for many measurements) the manual setting is saved. The command is available in all function groups. This command is CMU-specific.				

MMEMemory:RECall:CURRent <FileName> [,<msus>]				
Recall configurations in current function group and test mode				
Parameters	Parameter description	Def. value	Def. unit	FW vers.
"<FileName>", INTernal EXTernal	Name of the config. file to be recalled Storage device of the config. file	– INTernal	– –	V3.40
Command description				
This command recalls the configuration of the current function group and test mode from a configuration file. The command is available in all function groups. This command is CMU-specific.				

I/Q-IF Interface

The subsystem *IQIF* configures the signal paths for I/Q and IF signals provided by option CMU-B17, *I/Q and IF Interfaces*. It corresponds to the *I/Q-IF* tab in the second plane of the *Connection Control* menu.

Hint: *How to make sense out of parameter names:*

In all path configurations except bypass, both the I/Q and IF output are connected (to either the RF unit, the Digital unit, or one of the I/Q-IF inputs). The paths differ in the connection of the input branches: The qualifier IO denotes a connected input (with connected output), XO denotes a disconnected input (with connected output). Many parameters of the IQIF commands are composed of two IO/XO qualifiers, the first one standing for the IF signal, the second for the I/Q signal.

Example: *The parameter IOXO denotes a connected IF input and a disconnected IF output, while both output branches are connected.*

For more information see chapter 4 and the application examples in the CMU 200/300 operating manual.

CONFigure:IQIF:RXTXcombined[?] <Scenario>				I/Q-IF
<Scenario>	Description of parameters	Def. value	Def. unit	FW vers.
Default	Sets the the I/Q-IF test path configuration to default value	BYP	–	V3.40
BYP	RX/TX Bypass, RXPath = BYP, TXPath = BYP			
BYIQ	Bypass w. I/Q-OF OUT, RXPath = TXPath =BYIQ			
XOIO	I/Q IN/OUT, RXPath = TXPath = XOIO			
IOIO	IF IN_I/Q IN/OUT, RXPath = TXPath = IOIO			
IOXO	IF IN/OUT, RXPath = TXPath = IOXO			
FPAT	Fading Path, RXPath = BYP, TXPath = XOIO			
UDEF	User-defined scenario, can not be set, but may be returned by the query CONF:IQIF:RXTX?			

Description of command

This command selects the I/Q-IF test scenario, overwriting the current RX and TX path settings (see commands CONFigure:IQIF:RXPath and CONFigure:IQIF:TXPath below). Six different predefined test scenarios with fixed RX and TX paths are provided. Additional scenarios may be defined by selecting any other combination of RX and RX paths.

Note: UDEF is not provided as a setting parameter. If the RX/TX path combination defined via CONFigure:IQIF:RXPath and CONFigure:IQIF:TXPath doesn't correspond to any of the predefined scenarios, then a user-defined scenario is set implicitly, i.e. the query CONF:IQIF:RXTX? returns the value UDEF.

CONFigure:IQIF:RXPath[?] <Path>				RX Path
<Path>	Description of parameters	Def. value	Def. unit	FW vers.
Default	Sets the the RX signal path to default value	BYP	–	V3.40
BYP	Bypass			
BYIQ	Bypass w. I/Q-IF OUT			
XOIO	I/Q IN/OUT			
IOIO	IF IN_I/Q IN/OUT			
IOXO	IF IN/OUT			

Description of command

This command selects the RX signal path, leaving the TX path (see command CONFigure:IQIF:TXPath below) unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then CONFigure:IQIF:RXTXcombined is set to the predefined scenario; otherwise it is set to UDEF.

CONFigure:IQIF:TXPath[?] <Path>				TX Path
<Path>	Description of parameters	Def. value	Def. unit	FW vers.
Default	Sets the the TX signal path to default value	BYP	–	V3.40
BYP	Bypass			
BYIQ	Bypass w. I/Q-IF OUT			
XOIO	I/Q IN/OUT			
IOIO	IF IN_I/Q IN/OUT			
IOXO	IF IN/OUT			

Description of command

This command selects the TX signal path, leaving the RX path (see command CONFigure:IQIF:RXPath above) unchanged but adapting the I/Q-IF test scenario to the new RX/TX path combination: If the combination corresponds to a predefined scenario, then CONFigure:IQIF:RXTXcombined is set to the predefined scenario; otherwise it is set to UDEF.

[SENSe:]IQIF:LEVel? <TX Level>				IF Level
<TX Level>	Description of parameters	Def. value	Def. unit	FW vers.
< 0 dB	IF level	-9	dBFS	V3.60
Description of command				
This command is always a query and returns the IF output level in the TX path relative to the maximum IF output level (PEP) quoted in the data sheet. The value is equal to the I/Q output level in the TX path relative to the maximum I/Q output voltage quoted in the data sheet.				

IQIF:DEfault[?] <Enable>				Default Settings
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The I/Q-IF parameters are set to their default values Some or all parameters differ from the default values	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> this command sets all parameters of the subsystem to their default values (the setting <i>OFF</i> causes an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Symbolic Status Event Register Evaluation

The following commands are used to retrieve the events reported in the 1xEV-DO function group. See section *Symbolic Status Event Register Evaluation* in chapter 5 of the CMU operating manual.

STATus:OPERation:SYMBOLic:ENABLE <Event>{,<Event>}		Symbolic status evaluation		
Parameter list	Parameter description	Def. Value ¹	Default Unit	FW vers.
NONE <Event>{,<Event>}	No event reported List of symbols for events to be reported	NONE	–	V3.40
Command description				
This command enables event reporting for one or several events in the 1xEV-DO function group, i.e. it sets the corresponding bits in the STATus:OPERation:CMU:SUM<nr>:CMU<nr_event>:ENABLE register (<nr> = 1 2, <nr_event> denotes the current function group) and in all sum registers up to the status byte. The events and the corresponding symbols for the function group are listed in chapter 5 (see section <i>Status Registers</i>). The symbols may be entered in arbitrary order.				

STATus:OPERation:SYMBOLic[:EVENT]?		Symbolic status evaluation		
Response	Parameter description	Def. Value ²	Default Unit	FW vers.
NONE <Event>{,<Event>}	No event in the 1xEV-DO function group List of reported events	NONE	–	V3.40
Command description				
This command is always a query. It lists the events reported in the 1xEV-DO function group and deletes these events in the STATus:OPERation:CMU:SUM<nr>:CMU<nr_event>:EVENT register as well as in all sum registers.				

¹ The default values quoted in this command are achieved after a STATus:PRESet command. *RST does not overwrite the entries in the status registers; see section *Reset Values of the Status Reporting Systems* in chapter 5.

² The default values quoted in this command are achieved after a *CLS command. *RST does not overwrite the entries in the status registers; see section *Reset Values of the Status Reporting Systems* in chapter 5.

Connection Control (Non-Signaling Only)

The remote-control commands presented in this section determine the RF analyzer settings and the signals generated by the CMU, the inputs and outputs used and the reference frequency. They correspond to the settings in the popup menu of the softkey *Connect.Control*, located at the top right of each main menu.

The *Connection Control* settings are general (global) settings that are valid for the entire function group.

Band Class – Network Standard

NETWork Standard

The *NETWork* subsystem switches between the different 1xEV-DO network standards. The network standard determines the channel/frequency assignment for RF analyzer and generator. Furthermore some measurements provide separate default setups for each of the network standards.

CONFigure:NETWork:STANdard[?] <Standard>		Network Standard		
<Standard>	Description of parameters	Def. value	Def. Unit	FW vers
USC	Band Class 0, US Cellular	USC	–	V3.40
KCEL	Band Class 0, Korean Cellular			
NAPC	Band Class 1, North American PCS			
TACS	Band Class 2, TACS			V3.40
JTAC	Band Class 3, JTACS			
KPCS	Band Class 4, Korean PCS			
N45T	Band Class 5, NMT 450			
IM2K	Band Class 6, IMT-2000			
NA7C	Band Class 7, North American 700 MHz			
B18M	Band Class 8, 1800 MHz			
NA9C	Band Class 9, North American 900 MHz			
NA8S	Band Class 10, Secondary 800 MHz			
PA4M	Band Class 11, European 400 MHz PAMR			
PA8M	Band Class 12, 800 MHz PAMR			
IEXT	Band Class 13, IMT-2000 2.5 GHz Ext.			
USPC	Band Class 14, US PCS 1900 MHz			
AWS	Band Class 15, AWS Band			
U25B	Band Class 16, US 2.5 GHz			
U25F	Band Class 17, US 2.5 GHz Forward Link Only			
Description of command				
This command activates the test mode according to one of the provided 1xEV-DO network standards.				
Note: Changing the network standard will affect the frequency setting of the RF analyzer and the generator as well as the sideband suppression and ACP spectrum measurement. See commands				
[SENSe]:RFANalyzer:FREQuency				
SOURce:RFGenerator:FREQuency[:RF]				
CONFigure:MODulation:MQuality:HPSK:CONTRol:F0FFset:SBSuppress:ACP<nr>				
CONFigure:SPECTrum:ACP:CONTRol:F0FFset:ACP<nr>				

Analyzer

In the 1xEV-DO function group, the signal of a 1xEV-DO access terminal (mobile station) is analyzed. The remote-control commands presented in this section determine the RF analyzer settings. They correspond to the settings in the popup menu of the softkey *Connect Control*, located at the top right of each main menu. The *Analyzer* settings are general (global) settings that are valid for the entire function group.

Subsystem RFAnalyzer

The subsystem *RFAnalyzer* configures the RF input path by defining the analyzer level and frequency. Furthermore it decodes the input signal in order to extract the relevant part of the signal. It corresponds to the table sections *Default All Settings/Analyzer Level* in the *Analyzer* tab in the popup menu *Connection Control*.

DEFault:RFANalyzer[?] <RF Analyzer>		RF Analyzer		
<RF Analyzer>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values The parameters differ from the default values (partially or totally)	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command (re-)sets all parameters of the subsystems <i>RFANalyzer</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

[SENSE]:LEVel:MODE[?] <RF Level Mode>		RF Level Mode		
<RF Level Mode>	Description of parameters	Def. value	Def. unit	FW vers.
AUT omatic MAN ual	Maximum input level mode for RF	AUT	–	V3.40
Description of command				
This command defines whether the maximum expected input level is set manually or set by auto-ranging. Using the default value (auto-ranging) ensures optimized RF input path level settings.				

[SENSE]:LEVel:MAXimum[?] <RF Manual Max Level>		Max. RF Level		
<RF Manual Max Level>	Description of parameters	Def. value	Def. unit	FW vers.
–43 dBm to +44 dBm	Maximum input level for RF 1	0.0	dBm	V3.40
–54 dBm to +30 dBm	Maximum input level for RF 2	0.0	dBm	
–80 dBm to +9 dBm	Maximum input level for RF 4 IN	0.0	dBm	
MIN imum	Sets the minimum input level	–43.0	dBm	
MAX imum	Sets the maximum input level	44.0	dBm	
DEF ault	Sets the default input level	0.0	dBm	
Description of command				
This command defines the maximum expected input level. The value range depends on the RF input used and the external attenuation set (see [SENSE]:CORREction:LOSS:INPut<nr>[:MAGNitude] command).				

Subsystem FREQUENCY

The subsystem *FREQUENCY* controls the frequency in the RF input signal path. It corresponds to the table section *Analyzer Settings* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:FREQUENCY:UNIT[?] <Analyzer Freq. Unit>				Frequency Unit
<Analyzer Freq. Unit>	Description of parameters	Def. Value	Def. unit	FW vers.
HZ KHZ MHZ GHZ CH	Frequency unit or Channel Number	HZ	–	V3.40
Description of command				
This command defines whether the frequency of the RF signal analyzed is specified in frequency units or as a 1xEV-DO channel number. Frequency units must be used to select input signals that are outside the designated channel range.				

[SENSe]:RFANalyzer:FREQUENCY[?] <Frequency>				RF Frequency
<RF Frequency>	Description of parameters	Def. Value	Def. unit	FW vers.
	Input frequency Default input frequency for following standards:		Hz	V3.40
9.990000 MHz to 2700.000000 MHz	Band Class 0, US Cellular	833.4900 MHz CH 283		
9.990000 MHz to 2700.000000 MHz	Band Class 0, Korean Cellular	833.4900 MHz CH 283		
10.000000 MHz to 2700.000000 MHz	Band Class 1, North American PCS	1857.5000 MHz CH 150		V3.40
9.987500 MHz to 2699.987500 MHz	Band Class 2, TACS	891.9625 MHz CH 79		
10.000000 MHz to 2700.000000 MHz	Band Class 3, JTACS	915.9500 MHz CH 76		
10.000000 MHz to 2700.000000 MHz	Band Class 4, Korean PCS	1752.2500 MHz CH 45		
10.000000 MHz to 2700.000000 MHz	Band Class 5, NMT 450	450.6000 MHz CH 25		
10.000000 MHz to 2700.000000 MHz	Band Class 6, IMT-2000	1920.6000 MHz CH 12		
10.000000 MHz to 2700.000000 MHz	Band Class 7, North American 700 MHz	776.7000 MHz CH 14		
10.000000 MHz to 2700.000000 MHz	Band Class 8, 1800 MHz	1710.8000 MHz CH 16		
10.000000 MHz to 2700.000000 MHz	Band Class 9, North American 900 MHz	880.9000 MHz CH 18		
10.000000 MHz to 2700.000000 MHz	Band Class 10, Secondary 800 MHz	807.2500 MHz CH 50		
10.000000 MHz to 2700.000000 MHz	Band Class 11, European 400 MHz PAMR	460.2500 MHz CH 11		V4.20

9.9875 MHz to 2699.987500 MHz 	Band Class 12, 800 MHz PAMR	870.3125 MHz CH 12		
10.000000 MHz to 2700.000000 MHz 	Band Class 13, IMT-2000 2.5 GHz Ext.	2500.6500 MHz CH 13		V4.20
10.000000 MHz to 2700.000000 MHz 	Band Class 14, US PCS 1900 MHz	1850.7000 MHz CH 14		
10.000000 MHz to 2700.000000 MHz 	Band Class 15, AWS Band	1710.7500 MHz CH 15		
10.000000 MHz to 2700.000000 MHz 	Band Class 16, US 2.5 GHz Band	2502.50 MHz CH 150		
10.000000 MHz to 2700.000000 MHz 	Band Class 17, US 2.5 GHz Forward Link Only Band	2502.50 MHz CH 150		
MINimum 	Sets the input frequency to network standard-related minimum	(depends on band class)		
MAXimum 	Sets the input frequency to network standard-related maximum	(depends on band class)		
DEFault	Sets the input frequency to network standard-related default (see above)	(depends on band class)		
Description of command				
<p>This command defines the frequency of the RF signal analyzed. With the command <code>[SENSe]:RFANalyzer:FREQUENCY:UNIT</code>, the default frequency unit can be changed, and even 1xEV-DO channel numbers can be entered instead of frequencies. In the latter case, the assignment of channel numbers and frequencies meets the specification for the reverse channel (signal direction from access terminal to CMU).</p> <p>Note: Changing the network standard with the command <code>CONFigure:NETWork:STANdard</code> will also change the analyzer RF frequency.</p>				

[SENSe]:RFANalyzer:FOFFset[?]		Frequency Offset		
<Analyzer Freq. Offset>				
<Analyzer Freq. Offset>	Description of parameters	Def. value	Def. unit	FW vers.
-50.0 kHz to +50.0 kHz 	Frequency offset setting	OFF	Hz	V3.40
ON 	Frequency offset on, last setting re-activated			
OFF	No frequency offset			
Description of command				
This command determines a frequency offset to the RF signal analyzed.				

Subsystem SUBType

The subsystem *SUBtype* determines the measurement subtype. It corresponds to the table section *Analyzer Settings / Meas. Subtype* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:SUBType[?] <Measurement Subtype>		Measurement Subtype		
<Measurement Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
0 1 2	Measurement subtype (the value "1" is for CMU-B88 only, when 1 is set with CMU-B89, the value is reset to "0")	0	–	V4.20
Description of command				
<p>Protocols are associated with a Type that denotes the type of the protocol (e.g., Access Channel MAC Protocol) and with a Subtype that denotes a specific instance of a protocol (e.g. the Default Access Channel MAC Protocol).</p> <p>The measurement subtype affects the protocol subtype of the involved MAC and/or physical layer protocols.</p> <p>This setting affects the code channel filter settings ([SENSe]:RFANalyzer:CCFilter) and the results of the <i>Code Domain Power</i> measurement (READ:ARRay:CDPower:...). Detailed descriptions of the measurement subtypes are available in chapter 4.</p>				

Subsystem LCMask (Long Code Mask)

The subsystem *LCMask* determines the *Long Code Mask* of the reverse link RF signal. It corresponds to the table section *Analyzer Settings / Long Code Mask* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:LCMask:I:LSB[?] [SENSe]:RFANalyzer:LCMask:Q:LSB[?] <LSB Long Code Mask>		LSB Long Code Mask		
<LSB Long Code Mask>	Description of parameters	Def. value	Def. unit	FW vers.
"00000000" to "FFFFFFF"	Hexadecimal formatted string (8 chars) representing the LSB of the long code mask	"00000000"	–	V3.40
Description of command				
This command defines the least significant bits (0 to 31) of the I and Q signal long code masks.				

[SENSe]:RFANalyzer:LCMask:I:MSB[?] [SENSe]:RFANalyzer:LCMask:Q:MSB[?] <MSB Long Code Mask>		MSB Long Code Mask		
<MSB Long Code Mask>	Description of parameters	Def. value	Def. unit	FW vers.
"000" to "3FF"	Hexadecimal formatted string (3 chars) representing the MSB of the long code mask	"000" for I and for Q	–	V3.40
Description of command				
This command defines the most significant bits (32 to 41) of the I and Q signal long code masks.				

Subsystem CCFilter (Code Channel Filter)

The subsystem *CCFilter* determines the reverse link code channels to be evaluated. It corresponds to the table section *Analyzer Settings / Code Channel Filter* in the *Analyzer* tab of the *Connection Control* menu.

[SENSE]:RFAnalyzer:CCFilter:DRC[?] (for all meas. subtypes) [SENSE]:RFAnalyzer:CCFilter:ACK[?] (only for meas. subtypes 0 1) [SENSE]:RFAnalyzer:CCFilter:DATA[?] (for all meas. subtypes) <Code Channel Filter>		Code Channel Filter		
<Code Channel Filter>	Description of parameters	Def. Value	Def. unit	FW vers.
ON	The code channel will be measured unless it is inactive. For inactive channels the CMU returns invalid results (INV).	DCARe	–	V3.40
OFF	The code channel will not be measured, regardless of whether it is active or not.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
Note: If these filters are specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results (INV).				
These commands determine if the specified reverse link code channel is evaluated. As the DRC, ACK, and Data code channels are not continuously present, the code channel filters allow the user to specify the conditions under which the measurements are performed.				
The referenced measurement subtypes are defined using [SENSE]:RFAnalyzer:SUBType.				

[SENSE]:RFAnalyzer:CCFilter:APILot[?] (for meas. subtype 2 only) <CodeChannelFilter - AuxPilot>		Code Channel Filter		
<CCFilter - AuxPilot>	Description of parameters	Def. Value	Def. unit	FW vers.
ON	The code channel will be measured unless it is inactive. For inactive channels the CMU returns invalid results (INV).	DCARe	–	V4.20
OFF	The code channel will not be measured, regardless of whether it is active or not.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
This command determines if the specified reverse link code channel is evaluated. As the Aux Pilot code channel is not continuously present, the code channel filters allow the user to specify the conditions under which the measurements are performed.				
Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.				

[SENSE]:RFAnalyzer:CCFilter:ADSC[?] (for meas. subtype 2 only) <CodeChannelFilter - ACK/DSC>		Code Channel Filter		
<CCFilter - ACK/DSC>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF	The code channel will not be measured, regardless of whether it is active or not.	DCARe	–	V4.20
ACK	ACK is measured if it is active, no DSC measurements.			
DSC	DSC is measured if it is active, no ACK measurements.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
<p>This command determines if the specified reverse link code channel is evaluated. As the ACK/DSC code channel is not continuously present, the code channel filters allow the user to specify the conditions under which the measurements are performed.</p> <p>Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.</p>				

[SENSE]:RFAnalyzer:CCFilter:HSLot[?] (for meas. subtype 2 only) <CodeChannelFilter - - HalfSlotFilter>		Code Channel Filter		
<CCFilter - - HalfSlotFilter>	Description of parameters	Def. Value	Def. unit	FW vers.
BOTH	The measurement is made over both half slots of the ACK/DSCchannel.	BOTH	–	V4.20
1	The measurement is made over the first half slot of the ACK/DSC channel.			
2	The measurement is made over the second half slot of the ACK/DSC channel.			
Description of command				
<p>This command determines which half slot(s) of the code channel are evaluated.</p> <p>The DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32}, the ACK channel bit is transmitted on the first half slot on Walsh channel W_{12}^{32}.</p> <p>Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.</p>				

Subsystem AT<nr> (Access Terminal)

The subsystem AT<nr> is a container for all analyzer settings that apply separately to one of the four access terminals. It corresponds to the table section *Analyzer Settings / Reverse Link Frame Offset* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:[AT<nr>]:RLINK:FROffset[?] <Reverse Link Frame Offset>		Reverse Link Frame Offset (for option B-88)		
<Reverse Link Frame Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 15 MINimum	Reverse link frame offset Sets the reverse link frame offset timing to maximum value	0	–	V3.40
MAXimum	Sets the reverse link frame offset timing to minimum value			
DEFault	Use default setting			
Description of command				
This command determines the reverse link frame offset timing for the access terminal <nr> = 1 to 4.				
Note: The DataRate Index determines the associated DataRate and the SlotCount.				

Subsystem DCHannel (Data Channel Modulation)

The subsystem DCHannel selects or queries the modulation type (or format) of the data channel. It corresponds to the table section *Analyzer Settings / Reverse Link Frame Offset* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:DCHannel:MTYPE:MODE[?] <Data Channel Modulation Type Mode>		Data Channel Modulation Type		
<Data Ch. Mod. Type Mode>	Description of parameters	Def. value	Def. unit	FW vers.
AUTO	Automatic selection of the data channel modulation type	AUTO	–	V4.20
B4	BPSK modulation with 4-ary Walsh cover (W_2^4)			
Q4	QPSK modulation with 4-ary Walsh cover (W_2^4)			
Q2	QPSK modulation with 2-ary Walsh cover (W_1^2)			
Q4Q2	(QPSK, W_2^4) + (QPSK, W_1^2)			
E4E2	(8-PSK, W_2^4) + (8-PSK, W_1^2)			
Description of command				
This command determines the measurement modulation type (or format) of the data channel. Signals with a different modulation type are not included in the measurement.				
If AUTO is set, the signal is measured and decoded irrespective of the modulation type. The detected modulation type can be queried using [SENSe]:RFANalyzer:DCHannel:MTYPE?				

[SENSe]:RFANalyzer:DCHannel:MTYPE? <Data Channel Modulation Type>		Data Channel Modulation Type		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
B4	BPSK modulation with 4-ary Walsh cover (W_2^4)	–	–	V4.20
Q4	QPSK modulation with 4-ary Walsh cover (W_2^4)			
Q2	QPSK modulation with 2-ary Walsh cover (W_1^2)			
Q4Q2	(QPSK, W_2^4) + (QPSK, W_1^2)			
E4E2	(8-PSK, W_2^4) + (8-PSK, W_1^2)			
Description of command				
This command is always a query. It returns the current data channel modulation type.				

Generator

In the 1xEV-DO non-signaling function group, a 1xEV-DO forward link test signal can be generated. No signaling parameters are transferred. The only *Control Channel* message that is ever sent is the *Sync Message*. Furthermore a packet stream for up to four access terminals can be generated.

The remote-control commands presented in this section determine the signals generated by the CMU. They correspond to the settings in the popup menu of the softkey *Connect. Control*, located at the top right of each main menu.

In the 1xEV-DO function group the generator settings are general (global) settings that are valid for the entire function group.

Subsystem RFGenerator

The subsystem *RFGenerator* configures the RF signals generated by the CMU. It corresponds to the tab *Generator* in the popup menu *Connection Control*.

DEFault:RFGenerator[?] <RF Generator>		RF Generator		
<RF Generator>	Description of parameters	Def. value	Def. unit	FW vers.
ON	The parameters are set to their default values	ON	–	V3.40
OFF	Some or all parameters are not set to default			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>RFGenerator</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

INITiate:RFGenerator	Start RF generator, reserve resources	⇒	<i>RUN</i>
ABORt:RFGenerator	Switch off RF generator, release resources	⇒	<i>OFF</i>
Description of command			FW vers.
These commands have no query form. They start and stop the RF generator, setting it to the status indicated in the top right column.			V3.40

FETCh:RFGenerator:STATus?		Generator Status		
Returned values	Description of parameters	Def. Value	Def. unit	FW vers.
OFF RUN ERR	Generator switched off (ABORT or *RST) Running (INITiate) Switched off (could not be started)	OFF	–	V3.40
Description of command				
This command is always a query. It returns the current generator status.				

Subsystem FREQUENCY

SOURce:RFGenerator:FREQUENCY[:RF]:UNIT[?] <Unit>		Frequency Unit		
<Unit>	Description of parameters	Def. Value	Def. unit	FW vers.
HZ KHZ MHZ GHZ CH	Frequency unit or Channel Number	HZ	-	V3.40
Description of command				
This command defines whether the frequency of the RF signal generated is specified in frequency units or as a 1xEV-DO channel number. Frequency units must be used to select input signals that are outside the designated 1xEV-DO channel range.				

SOURce:RFGenerator:FREQUENCY[:RF][?] <Frequency>		RF Frequency		
<Frequency>	Description of parameters	Def. Value	Def. unit	FW vers.
	RF generator frequency Default frequency for following standards:		Hz	V3.40
9.990000 MHz to 2700.000000 MHz	Band Class 0, US Cellular	878.49 MHz CH 283		
9.990000 MHz to 2700.000000 MHz	Band Class 0, Korean Cellular	878.49 MHz CH 283		
10.000000 MHz to 2700.000000 MHz	Band Class 1, North American PCS	1937.50 MHz CH 150		V3.40
9.987500 MHz to 2699.987500 MHz	Band Class 2, TACS	936.9625 MHz CH 79		
10.000000 MHz to 2700.000000 MHz	Band Class 3, JTACS	860.95 MHz CH 76		
10.000000 MHz to 2700.000000 MHz	Band Class 4, Korean PCS	1842.25 MHz CH 45		
10.000000 MHz to 2700.000000 MHz	Band Class 5, NMT 450	460.60 MHz CH 25		
10.000000 MHz to 2700.000000 MHz	Band Class 6, IMT-2000	2110.60 MHz CH 12		
10.000000 MHz to 2700.000000 MHz	Band Class 7, North American 700 MHz	746.60 MHz CH 14		
10.000000 MHz to 2700.000000 MHz	Band Class 8, 1800 MHz	1805.80 MHz CH 16		

10.000000 MHz to 2700.000000 MHz 	Band Class 9, North American 900 MHz	925.90 MHz CH 18	
10.000000 MHz to 2700.000000 MHz 	Band Class 10, Secondary 800 MHz	852.25 MHz CH 50	V3.40
10.000000 MHz to 2700.000000 MHz 	Band Class 11, European 400 MHz PAMR	460.25 MHz CH 11	V4.20
9.98750 MHz to 2699.987500 MHz 	Band Class 12, 800 MHz PAMR	915.3125 MHz CH 12	
10.000000 MHz to 2700.000000 MHz 	Band Class 13, IMT-2000 2.5 GHz Ext.	2620.65 MHz CH 13	
10.000000 MHz to 2700.000000 MHz 	Band Class 14, US PCS 1900 MHz	1930.70 MHz CH 14	
10.000000 MHz to 2700.000000 MHz 	Band Class 15, AWS Band	2110.75 MHz CH 15	
10.000000 MHz to 2700.000000 MHz 	Band Class 16, US 2.5 GHz Band	2502.50 MHz CH 150	
10.000000 MHz to 2700.000000 MHz 	Band Class 17, US 2.5 GHz Forward Link Only Band	2502.50 MHz CH 150	
MINimum 	Sets the RF generator frequency to network standard-related minimum	(depends on band class)	
MAXimum 	Sets the RF generator frequency to network standard-related maximum	(depends on band class)	
DEFault	Sets the RF generator frequency to network standard-related default (see above)	(depends on band class)	
Description of command			
<p>This command defines the frequency of the RF signal generated. With the command <code>SOURCE:RFGenerator:FREQUENCY:UNIT</code>, the default frequency unit can be changed, and even 1xEV-DO channel numbers can be entered instead of frequencies. In the latter case, the assignment of channel numbers and frequencies meets the specification for the forward channel (signal direction from CMU to the AT under test).</p> <p>Note: Changing the network standard with the command <code>CONFIGURE:NETWORK:STANDARD</code> will also change the generator RF frequency.</p>			

Subsystem POWER

SOURce:RFGenerator:POWER:OUTPut[?] <Output Power>		Output Power		
<Output Power>	Description of parameters	Def. value	Def. unit	FW vers.
-120.0 dBm to -33.0 dBm -120.0 dBm to -16.0 dBm -99.0 dBm to +5.0 dBm MINimum MAXimum DEFault	RF1 OUT, 0 dB ext. atten. RF2 OUT, 0 dB ext. atten. RF3 OUT, 0 dB ext. atten. Sets the output power value to the connector minimum Sets the output power value to the connector maximum Sets the output power value to the connector default	-70.0	dBm	V3.40
Description of command				
This command determines total output power (absolute value, in dBm). The output power value range depends on the RF output used and the external attenuation set (see [SENSe]:CORRection:LOSS:OUTPut<nr>[:MAGNitude] command).				

Subsystem PROPerTy

SOURce:RFGenerator:PROPerTy:PNOffset[?] <PN Offset>		PN Offset		
<PN Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to +511 MINimum MAXimum DEFault	PN offset Sets the PN offset to the minimum value Sets the PN offset to the maximum value Use default settings	0	–	V3.40
Description of command				
This command defines the PN offset.				

SOURce:RFGenerator:MODE[?] <RF Generator Mode>		RF Generator Mode		
<RF Generator Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NORMal CPILot DEFault	Default RF generator mode Continuous pilot signal Sets the RF generator mode to the default value	NORM	–	V3.40
Description of command				
This command determines the RF generator mode. Setting the generator mode to <i>CPILot</i> will generate a continuous pilot signal. The pilot signal will fill the entire slot and the power of the signal is determined by the command: SOURce:RFGenerator:POWER:OUTPut[?]				
All other generator commands will be accepted and processed as normal, but the changes to the signal will not occur until the generator mode is switched back to <i>NORMal</i> .				

SOURCE:RFGenerator:SUBType[?] <RF Generator Signal Subtype>		Generator Signal Subtype		
<Signal Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
0	Default signal subtype	0	–	V4.30
1	Only for CMU-B88, when 1 is set with CMU-B89, the value is reset to 0			
2	Sets the signal subtype to 2			
DEFault	Sets the value to the default setting			
Description of command				
This command determines the RF generator signal subtype.				
The possible subtype values are hardware option dependent (e.g. no subtype 1 supported by CMU-B89), the related installed hardware option can be queried with command <code>SOURCE:RFGenerator:Type?</code> .				

Subsystem IMPairments

The subsystem *IMPairments* configures the settings to impair the generated RF signal. It corresponds to table section *Impairments* in the tab *Generator* of the popup menu *Connection Control*.

SOURCE:IMPairments:LEVel:AWGN:MODE[?] <AWGN Mode>		AWGN Mode		
<AWGN Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NORMal	Normal AWGN power mode (level –25.0 dB to +4.0 dB)	NORM	dB	V4.31
HPOWER	High-power AWGN mode (level –12.0 dB to +11.7 dB)			
DEFault	Sets the value to the default setting			
Description of command				Sig. State
This command determines the power level range for the <i>Additional White Gaussian Noise</i> level to impair the RF generator signal.				All

SOURCE:IMPairments:LEVel:AWGN[?] <AWGN Level>		AWGN Level		
<AWGN Level>	Description of parameters	Def. value	Def. unit	FW vers.
–20.0 dB to +11.7 dB	AWGN level, see below	OFF	dB	V3.40
MINimum	Sets the AWGN level to –25.0 (or –12.0 dB)			
MAXimum	Sets the AWGN level to +4.0 (or +11.7 dB)			
DEFault	Sets the value to the default setting			
ON	AWGN generator on, last setting re-activated			
OFF	AWGN generator off			
Description of command				
This command determines an <i>Additional White Gaussian Noise</i> level to impair the RF generator signal.				
The level range depends on the AWGN power mode defined with command <code>SOURCE:IMPairments:LEVel:AWGN:MODE</code> . If the AWGN is set to <i>Normal</i> , the level range is –25.0 dB to +4.0 dB, for the <i>High Power</i> mode, the range is defined as –12.0 dB to +11.7 dB, with the MAX and MIN settings being the upper and lower values of the respective ranges.				

SOURce:IMPairments:FOFFset[:RF][?] <Freq. Offset>		RF Frequency Offset		
<Freq. Offset>	Description of parameters	Def. value	Def. unit	FW vers.
-50.0 kHz to +50.0 kHz MINimum	BS frequency offset setting Sets the value of the BS frequency offset to -50.0 kHz	OFF	Hz	V3.40
MAXimum	Sets the value of the BS frequency offset to +50.0 kHz			
DEFault ON OFF	Sets the value to the default setting BS frequency offset on, last setting re-activated No frequency offset			
Description of command				
This command defines an offset for the RF generator frequency set with the command [SENSe]:RFGenerator:FREQuency <Number>. The offset frequency must be in multiples of 1 Hz.				

Subsystem SNCMessage (Sync. Message)

The subsystem *SNCMessage* configures the *Sync. Message of the Control Channel* that is required to synchronize access terminals with the CMU. The control channel messages will have the highest priority for placement within the slots. The Sync. Message will be updated constantly, even when the control channel is not enabled.

The subsystem *SNCMessage* corresponds to the *Sync. Message Enable* item on the tab *Generator* in the popup menu *Connection Control* and to other settings related to the transmission of the sync. message.

INITiate:RFGenerator:SNCMessage	Start Sync. message (if possible) Start later (if currently not possible)	⇒ RUN ⇒ ON
Description of command		FW vers.
This command has no query form. It initiates the Sync message of the control channel. If sending the Sync. message is currently not possible, the <code>INITiate</code> will take effect when the generator meets the following preconditions: INIT:RFGenerator FETCh:RFGenerator:STATus? RUN		V3.40

ABORt:RFGenerator:SNCMessage	Abort Sync. Message	⇒ OFF
Description of command		FW vers.
This command has no query form. This aborts the Sync. message. If no Sync. message is in progress due to wrong generator preconditions the <code>ABORt</code> will delete a previous <code>INITiate</code> from the action list.		V3.40

FETCh:RFGenerator:SNCMessage:STATus?		Generator Sync. Message Status		
Returned values	Description of parameters	Def. Value	Def. unit	FW vers.
OFF	No Sync. message initiated	ON	–	V3.40
ON	Sync. message initiated but cannot run. Will be started as soon as possible			
RUN	Sync. message in progress			

Description of command

This command is always a query. It returns the current Sync. Message status.

Note: The default status is ON. Thus the sync. message starts automatically, when the RF generator is initiated. See command FETCh:RFGenerator:STATus?

SOURce:RFGenerator:SNCMessage:PSOffset[?] <Packet Start Offset>		Packet Start Offset		
<Packet Start Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 3	Packet start offset	0	–	V3.40
MINimum	Sets packet start offset to 0 slots			
MAXimum	Sets packet start offset to 3 slots			
DEFault	Sets the value to the default setting			

Description of command

This command establishes the offset (in slots) from the start of the control channel cycle to the start of the synchronous message capsule that contains the Sync. Message.

SOURce:RFGenerator:SNCMessage:DRINdex[?] <Data Rate Index>		Data Rate Index		
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 2	Data rate index	1	–	V3.40
MINimum	Sets the data rate index to 1			
MAXimum	Sets the data rate index to 2			
DEFault	Sets the value to the default setting			

Description of command

This command sets the data rate index for the control channel sync. message. The data rate index defines an unambiguous assignment of the data rate and the slot count:

Data Rate Index:	Data Rate (kBit/s):	SlotCount:
1	38.4	16
2	76.8	8

The data rate can be queried with the command SOURce:RFGenerator:SNCMessage:DRATe?
The slot count can be queried with the command SOURce:RFGenerator:SNCMessage:SCount?

SOURce:RFGenerator:SNCMessage:DRATe? <Data Rate>		Data Rate		
<Data Rate>	Description of parameters	Def. value	Def. unit	FW vers.
38.4 76.8	Data rate	38.4	kBit/s	V3.40

Description of command

This command is always a query. It returns the data rate assigned to the data rate index that can be set with the command SOURce:RFGenerator:SNCMessage:DRINdex

SOURce:RFGenerator:SNcMessage:SCOut?				Slot Count
<Slot Count>				
<Slot Count>	Description of parameters	Def. value	Def. unit	FW vers.
8 16	Slot count	16	–	V3.40
Description of command				
This command is always a query. It returns the slot count assigned to the data rate index that can be set with the command <code>SOURce:RFGenerator:SNcMessage:DRINdex</code>				

Subsystem Access Terminal AT<nr> (for CMU-B88) / AT1 (for CMU-B89)

The subsystem AT<nr>(CMU-B88) resp. AT1 (CMU-B89) is a container for all generator settings that apply separately to one of the four access terminals. It corresponds to the table section *Generator Settings/Traffic/AT<nr>* (CMU-B88) resp. *Generator Settings/Traffic/AT1* (CMU-B89) in the *Generator* tab of the popup menu *Connection Control*.

INITiate:RFGenerator:AT<nr>:MAC:INdex (for CMU-B88)	Place MAC index within MAC channel (if possible)	⇒ RUN
INITiate:RFGenerator:MAC:INdex (for CMU-B89)	Place later (if currently not possible)	⇒ ON
Description of command		FW vers.
This command has no query form. It enables AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89) by placing the proper MAC index within the MAC channel. Packets may then be sent to the AT<nr> with the command <code>INIT:RFGenerator:AT<nr>:PSTReam</code> (for CMU-B88) or <code>INIT:RFGenerator:PSTReam</code> (for CMU-B89).		V3.40 (for B88) V4.20 (for B89)
The RF Generator must <i>RUN</i> to enable the data streams. The remote commands <code>INITiate:RFGenerator:AT<nr>:MAC:INdex</code> and <code>INITiate:RFGenerator:MAC:INdex</code> will only take effect if the generator is running (<code>INITiate:RFGenerator RUN</code> , and <code>FETCh:RFGenerator:STATus?</code> returns <i>RUN</i>).		

ABORt:RFGenerator:AT<nr>:MAC:INdex (for CMU-B88)	Abort MAC Index placement	⇒ OFF
ABORt:RFGenerator:MAC:INdex (for CMU-B89)		
Description of command		FW vers.
This command has no query form. It aborts the placement of the MAC index for AT<nr> (for CMU-B88) or AT1 (for CMU-B89) within the MAC channel. Thus all transfers to the specified AT will be aborted. If currently no MAC index can be placed within the MAC channel (because the generator is not running) the <code>ABORt</code> will delete a previous <code>INITiate</code> from the action list.		V3.40 (for B88) V4.20 (for B89)

FETCh:RFGenerator:AT<nr>:MAC:INdex:STATus? (for CMU-B88)				MAC Index placement Status
FETCh:RFGenerator:MAC:INdex:STATus? (for CMU-B89)				
<MACIndexStatus>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF 	No MAC Index placement initiated	<nr> = 1: ON	–	V3.40 (for B88)
ON 	MAC Index placement initiated but cannot run. The placement will start as soon as possible.	<nr> = 2: OFF		V4.20 (for B89)
RUN	MAC Index placement in progress	<nr> = 3: OFF <nr> = 4: OFF		
Description of command				
This command is always a query. It returns the current MAC index placement status.				
Note: The default status for the first AT is <i>ON</i> . Thus the packets may immediately be sent to AT1, when the RF generator is initiated. See command <code>FETCh:RFGenerator:STATus?</code>				

SOURce:RFGenerator:AT<nr>:MAC:INDeX[?] (for CMU-B88) SOURce:RFGenerator:MAC:INDeX[:REV0][?] SOURce:RFGenerator:MAC:INDeX[:REVA][?] (for CMU-B89) <MAC Index>				MAC Index
<MAC Index>	Description of parameters	Def. Value	Def. Unit	FW vers.
5 to 63 	MAC Index for AT<nr>	<nr> = 1: 8	–	V3.40 (for B88)
72 to 127 	Additional MAC Index range for Network Rel. A	<nr> = 2: 16		V4.20 (for B89)
MINimum 	Sets the MAC Index value for the AT<nr> to 5	<nr> = 3: 25		
MAXimum 	Sets the MAC Index value for the AT<nr> to 63	<nr> = 4: 50		
DEFault	Sets the value to the default setting			
Description of command				
<p>This command determines the MAC index for the AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89). Each access terminal requires an individual MAC index. If the entered MAC index conflicts with another AT it will be corrected to the lowest possible MAC index.</p>				

SOURce:RFGenerator:AT<nr>:MAC:LEVeL[?] (for CMU-B88) SOURce:RFGenerator:MAC:LEVeL? (for CMU-B89) <MAC Level>				MAC Level
<MAC Level>	Description of parameters	Def. value	Def. unit	FW vers.
–25.0 dB to –7.0 dB 	MAC channel level	–16.0	dB	V3.40 (for B88)
MINimum 	Sets the MAC channel level to -25.0 dB			V4.20 (for B89)
MAXimum 	Sets the MAC channel level to –7.0 dB			
DEFault	Sets the value to the default setting			
Description of command				
<p>This command sets the signal level of the MAC channel of the forward 1xEV-DO channel and enables the signal. The individual MAC channel levels for AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89) are in units relative to the total output power.</p> <p>For the CMU-B89, the command is always a query.</p>				

INITiate:RFGenerator:AT<nr>:PSTReam (for CMU-B88) INITiate:RFGenerator:PSTReam (for CMU-B89)		
	Send Packets to AT<nr> (if possible)	⇒ <i>RUN</i>
	Send packets later (if currently not possible)	⇒ <i>ON</i>
Description of command		FW vers.
This command has no query form. It initiates the packet stream to AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89). The number of packets to be sent is determined by the command: <i>SOURce:RFGenerator:AT<nr>:PCount</i> (for CMU-B88) or <i>SOURce:RFGenerator:PCount</i> (for CMU-B89). When the transmission of a finite number of packets is completed the <i>PSTReam:STATus</i> changes to <i>RDY</i> . The RF Generator must <i>RUN</i> to enable the data streams. The remote <i>PSTReam</i> commands will only take effect if the generator is running (<i>INITiate:RFGenerator RUN</i> , <i>FETCh:RFGenerator:STATus?</i> returns <i>RUN</i>), and the MAC index of the AT(s) is set properly (<i>INIT:RFGenerator[:AT<nr>]:MAC:INDeX</i> , and <i>FETCh:RFGenerator[:AT<nr>]:MAC:INDeX:STATus?</i> returns <i>RUN</i>).		V3.40 (for B88) V4.20 (for B89)

ABORt:RFGenerator:AT<nr>:PSTReam (for CMU-B88)		Abort packet transfer ⇒ OFF
ABORt:RFGenerator:PSTReam (for CMU-B89)		
Description of command		FW vers.
This command has no query form. It aborts the packet stream to AT<nr> (AT1 for CMU-B89). If no packet stream is in progress because the generator is not running, the ABORt will delete a previous INITiate from the action list.		V3.40 (for B88) V4.20 (for B89)

FETCh:RFGenerator:AT<nr>:PSTReam:STATUs? (for CMU-B88)		Packet Stream Status		
FETCh:RFGenerator:PSTReam:STATUs? (for CMU-B89)				
<Packet Stream Status>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF ON RUN RDY ,	No packet stream to AT<nr> initiated Packet stream initiated but cannot run. It will be started as soon as possible. Packet stream in progress Ready: All (finite) specified packets have been sent to the AT<nr>	<nr> = 1: ON <nr> = 2: OFF <nr> = 3: OFF <nr> = 4: OFF	–	V3.40 (for B88) V4.20 (for B89)
<# of Sent Packets>	Description of parameter	Def. Value	Def. unit	FW vers.
0 to 65535	Current number of sent packets (progress).	0	–	V3.40 (for B88) V4.20 (for B89)
Description of command				
This command is always a query. It returns the status of the packet streams.				
Note: The default status for the first AT is <i>ON</i> . Thus the packets are immediately sent to AT1, when the RF generator is initiated. See command FETCh:RFGenerator:STATUs?				

SOURce:RFGenerator:AT<nr>:PCOunt[?] (for CMU-B88)		Packet Count		
SOURce:RFGenerator:PCOunt[?] (for CMU-B89)				
<Packet Count>				
<Packet Count>	Description of parameters	Def. Value	Def. unit	FW vers.
0 to 65535 INFinite MINimum MAXimum DEFault	Packet count An unlimited number of packets is sent to AT<nr> Sets the value to the range minimum (not INF) Sets the value to the range maximum Sets the value to the default setting	<nr> = 1: INF <nr> = 2: 100 <nr> = 3: 100 <nr> = 4: 10	–	V3.40 (for B88) V4.20 (for B89)
Description of command				
This command determines the number of packets to be sent to AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89).				
Note: MAXimum will set the packet count to 65535, not to INFinite .				

SOURce:RFGenerator:AT<nr>:PSOffset[?]		Packet Start Offset		
<i><Packet Start Offset></i>				
<Packet Start Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to +255 	Packet start offset	0	–	V3.40
MINimum 	Sets the packet start offset value to minimum			
MAXimum 	Sets the packet start offset value to maximum			
DEFault	Sets the value to the default setting			
Description of command				
<p>This command will establish the minimum number of slots that are inserted between the end of one packet and the beginning of the next.</p> <p>For single slot packets, a value of zero will cause the next packet to be sent in the immediate next slot. For multiple slot packets, a value of zero will cause the next packet transmission to start three slots after the end of the previous packet. The three slot delay is identical to the interleaving delay between slots for multiple slot packets. The offset value is attached to the end of the preceding packet. Therefore, an offset value of zero with a rate change from a single slot packet to a multiple slot packet will cause the first slot of the multiple slot packet to be transmitted in the slot immediately following the single slot packet.</p>				

SOURce:RFGenerator:AT<nr>:IFACTor[?] (for CMU-B88 only)		Interleaving Factor		
SOURce:RFGenerator:IFACTor[?] (for CMU-B89)				
<i><Interleaving Factor></i>				
<Interleaving Factor>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 4 	Interleaving factor for AT <nr>	1	–	V4.20
MINimum 	Sets the Interleaving Factor for the AT<nr> to 1			
MAXimum 	Sets the Interleaving Factor for the AT<nr> to 4			
DEFault	Sets the value to the default setting			
Description of command				
<p>This command specifies the interleaving factor for the access terminals 1 to 4 (<nr> = 1 to 4 for CMU-B88).</p> <p>The interleaving factor allows an increase of the rate of data packets sent to a specific user (AT 1 to 4). With the default setting 1, each of the four ATs receives one fourth of the packets. Selecting an interleaving factor 2, 3, or 4 for a particular AT doubles, triples, or quadruples the rate of data packets addressed to this AT; the residual packet rate is distributed among the other ATs. With interleaving factor 4, all packets are addressed to a single AT; which accelerates the Packet Error Rate measurement.</p>				

SOURce:RFGenerator:AT<nr>:DRIndex[?] (for CMU-B88)		Data Rate Index		
SOURce:RFGenerator:DRIndex[?] (for CMU-B89)				
<Data Rate Index>				
<Data Rate Index>	Description of parameters	Def. Value	Def. unit	FW vers.
1 to 12 (or 14) 	Data rate index	1	–	V3.40 (for B88)
MINimum 	Sets the data rate index for AT<nr> to 1			V4.20 (for B89)
MAXimum 	Sets the data rate index for AT<nr> to 12			
DEFault	Sets the value to the default setting			
Description of command				
This command sets the data rate index for AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89).				
For signal subtype 2, the commands are query only,so use SOURce:RFGenerator:AT<nr>:PTIndex[?] instead.				
The data rate index defines an unambiguous assignment of the data rate and the slot count:				
	Data Rate Index:	Data Rate (kBit/s):	SlotCount:	
	1	38.4	16	
	2	76.8	8	
	3	153.6	4	
	4	307.2	2	
	5	307.2	4	
	6	614.4	1	
	7	614.4	2	
	8	921.6	2	
	9	1,228.8	1	
	10	1,228.8	2	
	11	1,843.2	1	
	12	2,457.6	1	
	13 ^{*)}	1536.0	2	
	14 ^{*)}	3072.0	1	
*) The data rate indices 13 and 14 are only available with signal subtype 2.				
The data rate can be queried with the command SOURce:RFGenerator[:AT<nr>]:DRATe?				
The slot count can be queried with the command SOURce:RFGenerator[:AT<nr>]:SCOUNT?				

SOURce:RFGenerator:AT<nr>:PTIndex[?] (for CMU-B88) Packet Type Index
SOURce:RFGenerator:PTIndex[?] (for CMU-B89)
<Packet Type Index>

<Packet Type Index>	Description of parameters	Def. Value	Def. unit	FW vers.
1 to 37 MINimum MAXimum DEFault	Packet type index (only for signal subtype 2) Sets the data rate index for AT<nr> to 1 Sets the data rate index for AT<nr> to 37 Sets the value to the default setting	1 (AT1)	–	V4.30

Description of command

This command sets the packet type index for AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89). The packet type index defines an unambiguous assignment of the data rate, packet size, and the slot count:

Packet Type	Data Rate Index	Packet Size	Data Rate (kBit/s)	SlotCount
1	1	128	4.8	16
2	1	256	9.6	16
3	1	512	19.2	16
4	1	1024	38.4	16
5	2	128	9.6	8
6	2	256	19.2	8
7	2	512	38.4	8
8	2	1024	76.8	8
9	3	128	19.2	4
10	3	256	38.4	4
11	3	512	76.8	4
12	3	1024	153.6	4
13	4	128	38.4	2
14	4	256	76.8	2
15	4	512	153.6	2
16	4	1024	307.2	2
17	5	512	76.8	4
18	5	1024	153.6	4
19	5	2048	307.2	4
20	6	128	76.8	1
21	6	256	153.6	1
22	6	512	307.2	1
23	6	1024	614.4	1
24	7	512	153.6	2
25	7	1024	307.2	2
26	7	2048	614.4	2
27	8	1024	307.2	2
28	8	3072	921.6	2
29	9	512	307.2	1
30	9	1024	614.4	1
31	9	2048	1228.8	1
32	10	4096	1228.8	2
33	11	1024	614.4	1
34	11	3072	1843.2	1
35	12	4096	2457.6	1
36	13	5120	1536.0	2
37	14	5120	3072.0	1

The packet size can be queried with the command **SOURce:RFGenerator[:AT<nr>]:PSIZE?**
 The data rate can be queried with the command **SOURce:RFGenerator[:AT<nr>]:DRATE?**
 The slot count can be queried with the command **SOURce:RFGenerator[:AT<nr>]:SCOUNT?**

SOURCE:RFGenerator:AT<nr>:PSIZE? (for CMU-B88) SOURCE:RFGenerator:PSIZE? (for CMU-B89) <Packet Size>				Packet Size
<Packet Size>	Description of parameters	Def. value	Def. unit	FW vers.
128 to 5120	Packet Size used for Signal Subtype 2 data transfer	128	bits	V4.30
Description of command				
<p>This command is always a query. It returns the packet size assigned to the packet type index that can be set with the command <code>SOURCE:RFGenerator:AT<nr>:PTINDEX</code> (CMU-B88) or <code>SOURCE:RFGenerator:PTINDEX</code> (CMU-B89).</p> <p>Please note that this command is only applicable for the signal subtype 2 generator.</p>				

SOURCE:RFGenerator:AT<nr>:DRATE? (for CMU-B88) SOURCE:RFGenerator:DRATE? (for CMU-B89) <Data Rate>				Data Rate
<Data Rate>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 2457.6 (for subtype 0) 0.0 to 3072 (for subtype 2)	Data rate	38.4 (B88) 4.8 (B89)	kBit/s	V3.40 (for B88) V4.20 (for B89)
Description of command				
<p>This command is always a query. It returns the data rate assigned to the data rate index that can be set with the command <code>SOURCE:RFGenerator:AT<nr>:DRINDEX</code> (CMU-B88) or <code>SOURCE:RFGenerator:DRINDEX</code> (CMU-B89)</p>				

SOURCE:RFGenerator:AT<nr>:SCOUNT? (for CMU-B88) SOURCE:RFGenerator:SCOUNT? (for CMU-B89) <Slot Count>				Slot Count
<Slot Count>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 16	Slot count	16	–	V3.40(for B88) V4.20 (for B89)
Description of command				
<p>This command is always a query. It returns the slot count assigned to the data rate index that can be set with the command <code>SOURCE:RFGenerator:AT<nr>:DRINDEX</code> (CMU-B88) or <code>SOURCE:RFGenerator:DRINDEX</code> (CMU-B89)</p>				

SOURce:RFGenerator:AT<nr>:PATTern[?] (for CMU-B88)				Pattern
SOURce:RFGenerator:PATTern[?] (for CMU-B89)				
<Pattern>				
<Pattern>	Description of parameters	Def. value	Def. unit	FW vers.
"00000000" to "FFFFFFF"	Hexadecimal formatted string (8 chars) representing a data pattern.	"A5A5A5A5"	–	V3.40 (for B88) V4.20 (for B89)
Description of command				
This command defines the data patterns that are sent to AT<nr> (<nr> = 1 to 4 for CMU-B88, <nr> = 1 for CMU-B89). The MSB of this value is the first bit of the packet and the word is repeated to fill all space within the packet.				

CONFigure:RFGenerator:FPACTivity[?] (only for CMU-B89)				Forward Packet Activity
<Forward Packet Activity>				
<Forward Packet Activity>	Description of parameters	Def. Value	Def. Unit	FW vers.
0 to 100	Sets the forward packet activity (in steps of 1%)	0	%	V4.20
Description of command				
This command determines the forward packet activity. Packet activity is defined as the ratio of the number of active slots to the total number of slots during channel operation.				
If the values are different from the defined percentiles, the values are rounded to the next allowed percentile.				

SOURce:RFGenerator:AT<nr>:DRCLock:STATe[?] (only for CMU-B88)				DRCLock State
<DRCLock State>				
<DRCLock State>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1 MINimum MAXimum DEFault	DRCLock State Sets the the state of the DRCLock bit to 0 Sets the the state of the DRCLock bit to 1 Sets the value to the default setting	1	–	V3.40
Description of command				
This command will set the state of the DRCLock bit for the access terminal specified in <nr> (<nr> = 1 to 4).				

SOURce:RFGenerator:AT<nr>:DRCLock:PERiod[?] (for CMU-B88) SOURce:RFGenerator:DRCLock:PERiod[?] (for CMU-B89) <DRCLock Period>		DRCLock Period		
<DRCLock Period>	Description of parameters	Def. value	Def. unit	FW vers.
0 4 8 16 	DRCLock period (see below)	4 16	Slots	V3.40
MINimum 	Sets the DRCLock period to the minimum value	(see below)		
MAXimum 	Sets the DRCLock period to the maximum value			
DEFault	Sets the value to the default setting			
Description of command				
This command will establish the period (measured in slots) of time between successive transmissions of the DRCLock bit for the access terminal specified in <nr> (<nr> = 1 to 4).				
The following table shows the applicable DRC lock periods in context of the installed options:				
	CMU-B88	CMU-B89		
Signal Subtype 0	0, 8 or 16 (default 16).	8 or 16 (default 16)		
Signal Subtype 2	0 or 4 (default 4)	n.a.		
Any not allowed value within the range is rounded to the nearest allowed value.				

SOURce:RFGenerator:AT<nr>:DRCLock:LENGth[?] (for CMU-B88) SOURce:RFGenerator:DRCLock:LENGth[?] (for CMU-B89) <DRCLock Length>		DRCLock Length		
<DRCLock Length>	Description of parameters	Def. value	Def. unit	FW vers.
1 4 8 16 32 	DRCLock length	1 (B88)	–	V3.40 (for B88)
MINimum 	Sets the DRCLock length to 1 (B88) resp. 4 (B89)	16 (B89)		V4.30 (for B89)
MAXimum 	Sets the DRCLock length to 32			
DEFault	Sets the value to the default setting			
Description of command				
This command determines the DRCLock length for the access terminal specified in <nr> (<nr> = 1 to 4). It will establish the number of DRCLock periods that the state of the DRCLock will be held constant.				
Please note that with the CMU-B89 option, the minimum DRCLock length is 4.				
Any not allowed value within the range is rounded to the nearest allowed value.				

SOURce:RFGenerator:AT<nr>:HARQ:MODE[?] (only for CMU-B88) <H-ARQ Mode>		H-ARQ Mode		
<H-ARQ Mode>	Description of parameters	Def. Value	Def. Unit	FW vers.
ACK 	H-ARQ channel sends only ACK bits	ACK	–	V4.30
NACK 	H-ARQ channel sends only NAK bits			
DEFault	Sets the H-ARQ Mode to its default value			
Description of command				
This command sets the Hybrid Automatic Repeat Request (H-ARQ) channel mode for signals of subtype 2. The mode determines the response for the early termination of the forward link H-ARQ MAC channel packet transmission.				

SOURce:RFGenerator:AT<nr>:PCBits[?] (for CMU-B88)		Power Control Bits		
SOURce:RFGenerator:PCBits[?] (for CMU-B89)				
<Power Control Bits>				
<Power Control Bits>	Description of parameters	Def. value	Def. unit	FW vers.
HOLD 	Alternating up/down control bits	HOLD	–	V3.40
ADOW 	All power control bits down			
AUP 	All power control bits up			
RTES 	Range test mode (CMU-B88 only)			
PATtern 	User specified pattern (continuously repeated, CMU-B88 only)			
EXternal 	External power control bit source supplied (CMU-B88 only)			
DEFault	Sets the value to the default setting			
Description of command				
<p>This command defines the power control bits in the RF generator signal. The state of the power control bit is sampled at the beginning of the slot.</p> <p>The access terminals AT<nr> (<nr> = 1 to 4) can use individual power control bits. A user pattern can be defined with the commands of the :PCBits:PATtern subsystem.</p> <p>The external power control bit source is supplied via pin 8 of the AUX 3 connector on the front panel.</p> <p>Note: Using an external power control bit source will cause routing conflicts with an external trigger source. See also command TRIGger[:SEQUence]:SOURce</p>				

SOURce:RFGenerator:AT<nr>:PCBits:RTES:NOBits[?] (only for CMU-B88)		Number Of Bits		
<Number Of Bits>				
<Number Of Bits>	Description of parameters	Def. Value	Def. Unit	FW vers.
1 to 256 	Number of bits for range test mode.	100	–	V3.40
MINimum 	Sets the Number of bits to 1			
MAXimum 	Sets the Number of bits to 256			
DEFault	Sets the value to the default setting			
Description of command				
<p>This command determines the number of bits for the range test mode (<nr> =1 to 4).</p>				

PROCedure:RFGenerator:AT<nr>:PCBits:PATtern[?] (only for CMU-B88)		Power Control Pattern Injection		
<Power Control Bits>				
<Pwr. Ctrl. Pattern Injection>	Description of parameters	Def. value	Def. unit	FW vers.
INJect 	Injects a single power control bit pattern	RDY	–	V3.40
RDY	Ready: Injection cycle is completed (query only)			
Description of command				
<p>The command injects a user defined power control bit pattern into the PCB bit stream for AT<nr>. RDY is a query only.</p>				

SOURce:RFGenerator:AT<nr1>:PCBits:PATtern:AREA<nr2>:NOBits[?] (only for CMU-B88) Number Of Bits
<Number Of Bits>

<Number Of Bits>	Description of parameters	Def. Value	Def. Unit	FW vers.
1 to 128 DEFault	Number of bits in the first pattern area. Sets the value to the default setting	<nr2> = 1: 32	–	V3.40
1 to 128 DEFault	Number of bits in the second pattern area. Sets the value to the default setting	<nr2> = 2: 100		
1 to 128 DEFault	Number of bits in the third pattern area. Sets the value to the default setting	<nr2> = 3: 100		
1 to 128 DEFault	Number of bits in the fourth pattern area. Sets the value to the default setting	<nr2> = 4: 100		

Description of command

This command determines the number of bits for each of the four areas (<nr2> = 1 to 4). These areas can be configured individually for the AT<nr1> (<nr1> = 1 to 4).

SOURce:RFGenerator:AT<nr2>:PCBits:PATtern:AREA<nr2>:POLarity[?] (only for CMU-B88) Polarity
<Polarity>

<Polarity>	Description of parameters	Def. value	Def. unit	FW vers.
UP DOWN DEFault	Bits up Bits down Sets the value to the default setting	<nr2> = 1: DOWN <nr2> = 2: UP <nr2> = 3: DOWN <nr2> = 4: UP	–	V3.40

Description of command

This command defines the polarity of the bits for the areas<nr2> = 1 to 4. Each of the access terminals <nr1> = 1 to 4 can use individual settings.

Subsystem RAB (Reverse Activity)

The subsystem *RAB* configures the Reverse Activity (RA) channel. The *Reverse Activity Bit* is transmitted on the RA Channel of the Forward MAC Channel to perform flow control of the Reverse Data Channel.

SOURce:RFGenerator:RAB:MAC:LEVel[?] (only for CMU-B88) MAC Level
<MAC Level>

<MAC Level>	Description of parameters	Def. value	Def. unit	FW vers.
–25.0 dB to –7.0 dB MINimum MAXimum DEFault	MAC channel level Sets the MAC channel level to -25.00 dB Sets the MAC channel level to -7.00 dB Sets the value to the default setting	–12.0	dB	V3.40

Description of command

This command will set the amount of power within the MAC channel that is dedicated to the RAB channel. The MAC channel level for the reverse activity bit is in a unit relative to the total output power.

SOURce:RFGenerator:RAB:STATe[?] (only for CMU-B88) <RAB State>		RAB State		
<RAB State>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1 MINimum MAXimum DEFault	RAB State Sets the RAB State to 0 Sets the RAB State to 1 Sets the value to the default setting	0	–	V3.40
Description of command				
This command sets the state of the <i>Reverse Activity Bit</i> .				

SOURce:RFGenerator:RAB:OFFSet[?] (only for CMU-B88) <RAB Offset>		RAB Offset		
<RAB Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 7 MINimum MAXimum DEFault	RAB offset Sets the RAB offset to 0 Sets the RAB offset to 7 Sets the value to the default setting	0	–	V3.40
Description of command				
This command will establish the starting time offset of the RA bit. This command is specified in RABLength/8 units. The RA bit starts when the equation (SystemTime mod RABLength = RABOffset) is satisfied, with SystemTime expressed in units of slots.				
For signal subtype 2, the RAB offset setting is not applicable.				
With CMU-B89 and signal subtype 0, the command is query only and returns the starting time offset of the RA bit .				

SOURce:RFGenerator:RAB:LENGth[?] (only for CMU-B88) SOURce:RFGenerator:RAB:LENGth? (for CMU-B89) <RAB Length>		RAB Length		
<RAB Length>	Description of parameters	Def. value	Def. unit	FW vers.
8 16 32 64 MINimum MAXimum DEFault	RAB length Sets the RAB length to 8 Sets the RAB length to 64 Sets the value to the default setting	8	–	V3.40
Description of command				
This command determines the RAB length. It will establish the duration (in slots) of a RA (Reverse Activity) bit.				
For signal subtype 2, the RAB length setting is not applicable.				
With CMU-B89 and signal subtype 0, the command returns the RAB length as a query only.				
Any not allowed value within the range is rounded to the nearest allowed value.				

Subsystem OAT (Other Access Terminals)

The subsystem *OAT* configures other access terminals (beyond the four defined access terminals). These ATs will never have a packet addressed to them, but are used to provide fill in the MAC channel code domain. These other access terminals are used to evenly distribute the excess power (beyond what is required by the AT<nr> and RAB channels).

SOURCE:RFGenerator:OAT:COUNT[?] (only for CMU-B88) <OtherAccessTerminalCount>		Other Access Terminal Count		
<Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 55 (110) 	Number of additional MAC indexes	5	–	V3.40
MINimum 	Sets the number of additional MAC indexes to 1			
MAXimum 	Sets the number of additional MAC indexes to 55 (or 110)			
DEFault	Sets the value to the default setting			
Description of command				
This command will establish the number of additional access terminals that appear in the MAC Channel.				
For signal subtype 2, the maximum number of MAC indexes is 110, all other signal subtypes have a maximum of 55 MAC indexes.				

Subsystem Type

The subsystem *Type* shows the available 1xEV-DO related hardware options (if installed). The corresponding menu items are available on the tab *Generator* in the popup menu *Connection Control*.

SOURCE:RFGenerator:Type?		Generator Hardware Type		
<Type>	Description of parameters	Def. Value	Def. unit	FW vers.
B88 	Hardware option R&S CMU-B88 installed (1xEV-DO for CMU-B83)	–	–	V4.20
B89	Hardware option R&S CMU-B89 installed (1xEV-DO/CDMA 2000 signaling unit)			
Description of command				
This query command returns the installed generator hardware type.				
The type can be queried in order to write generic GBIP scripts or drivers that work either for option CMU B-88 or CMU B-89.				
The command is a query only.				

Subsystem I/Q Access Interface Setup

The subsystem *I/Q Access Interface Setup* controls the I/Q access board operation (option R&S CMU-B82). The corresponding setup menu items are available on the tab *Generator* in the popup menu *Connection Control*. Please note that the *I/Q Access Interface* operation is toggled with switching the *Generator Control* (Default:RFGenerator). The I/Q access interface and the RF generator cannot be active simultaneously. INITiate:IQACcess aborts the generator (ABORt:RFGenerator), and INITiate:RFGenerator aborts the I/Q access interface (ABORt:IQACcess).

DEFault:IQACcess:CONTRol[?] <Control_Def.Settings>		IQ Access Interface		
<Control_Def.Settings>	Description of parameters	Def. value	Def. unit	FW vers.
ON 	Enables Option CMU-B82	OFF	–	V4.20
OFF	Disables Option CMU-B82			
Description of command				
<p>When set to ON, this command enables the Digital Baseband I/Q Signal Interface providing the Rx I/Q data out and Tx I/Q data in (via the SCSI connector). The values set by the Rx_IQ_Swap and Gain_Multiplier parameters are active. When the Control_Def.Settings parameter is set to OFF, the values set by the Rx_IQ_Swap and Gain_Multiplier parameters are masked and have an effective value of OFF and x0, respectively. The query version of the command is not affected by the Enable setting; the values returned for Rx_IQ Swap and Gain are always non-masked.</p> <p>The parameters set by this command are volatile; i.e. they always return to their default values when the CMU is restarted. This command can only be used in the Non-Signaling mode. This command must be set to OFF before changing to the Signaling mode.</p> <p>Note: Setting Control_Def. Settings to ON disables all code domain channel power settings. Disabling the interface with the OFF command does not re-enable the power settings. You must manually turn the generators off and then back on.</p> <p>The Digital Baseband I/Q Signal Interface option only functions while in the non-signaling mode. Once the option is turned on (via the GPIB command), it must be explicitly set to OFF before switching to the signaling mode.</p> <p>If used as a query the command returns whether all parameters are set to their default values (OFF) or not (ON).</p>				

INITiate:IQACcess	Start I/Q Access Interface, reserve resources	⇒	RUN
ABORt:IQACcess	Switch off I/Q Access Interface, release resources	⇒	OFF
Description of command			FW vers.
These commands have no query form. They start and stop the I/Q Access Interface, setting it to the status indicated in the top right column.			V4.20

FETCh: IQACcess:STATUs?		IQ Access Interface Status		
Returned values	Description of parameters	Def. Value	Def. unit	FW vers.
OFF 	IQ Access Interface switched off (ABORt or *RST)	OFF	–	V4.20
RUN 	Running (INITiate)			
ERR	Switched off (could not be started)			
Description of command				
This command is always a query. It returns the current IQ Access Interface status.				

CONFigure:IQACcess:RXSWap[?] <Rx_IQSwapping_Enab>		Swap I/Q Receiver Channels		
<Rx_IQSwapping_Enab>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF ON DEFault	Swaps the Rx I and Q data paths No swap of I and Q Rx data Sets the value to the default setting	OFF	–	V4.20
Description of command				
<p>The command allows to switch the I/Q channels of the receiver. When the <code>DEFault:IQACcess:CONTRol</code> parameter is set to OFF, the values set by the <code>Rx_IQ_Swap</code> parameter is masked. The query version of the command is not affected by the <code>DEFault:IQACcess:CONTRol</code> parameter setting; the value returned for <code>Rx_IQ_Swap</code> is always non-masked. The parameters set by this command are volatile; i.e. it always returns to its default value when the CMU is restarted.</p> <p>This command can only be used in the Non-Signaling mode. This command must be set to OFF before changing to the Signaling mode.</p>				

CONFigure:IQACcess:GMULTiplier[?] <GainMultiplier>		Gain Multiplier for Tx I/Q Data		
<GainMultiplier>	Description of parameters	Def. Value	Def. unit	FW vers.
0 1 2 4 8 16	Sets the gain multiplier value for Tx I/Q data supplied to the IQ access interface board.	1	–	V4.20
Description of command				
<p>When the <code>DEFault:IQACcess:CONTRol</code> parameter is set to OFF, the values set by the <code>Gain_Multiplier</code> parameter is masked. The query version of the command is not affected by the <code>DEFault:IQACcess:CONTRol</code> setting; the value returned for <code>Gain</code> is always non-masked. The parameters set by this command are volatile; i.e. it always returns to its default value when the CMU is restarted. This command can only be used in the Non-Signaling mode.</p>				

CONFigure:IQACcess:TCONTRol[?] <TimingControl>		Timing and Clock Polarity for Tx I/Q Data		
<TimingControl>	Description of parameters	Def. Value	Def. unit	FW vers.
0 to 15	Sets the timing and clock polarity control over Tx I/Q data.	7	–	V4.20
Description of command				
<p><i>Timing Control</i> sets the timing and clock polarity control over Tx I/Q data. Bits 0-2 supply timing information.</p>				

RF Input and Output

The remote-control commands presented in this section determine the inputs and outputs used and the reference frequency. They correspond to the settings in the popup menu of the softkey *Connect Control*, located at the top right of each main menu.

These are general (global) settings that are valid for the entire function group.

Subsystem RF Input and Output (External Attenuation at Connectors)

The subsystem for input and output configures the input and output RF connectors. The subsystem corresponds to the tab *AF/RF* in the popup menu *Connect Control*.

INPut[:STATe][?]				RF Input
<RFInput Connector>				
<RFInput Connector>	Description of parameters	Def. value	Def. unit	FW vers.
RF1 	Connector RF 1 used as input	RF2	–	V3.40
RF2 	Connector RF 2 used as input			
RF4	Connector RF 4 IN used as input			
Description of command				
This command determines the connector to be used for RF input signals. The bidirectional connectors RF 1 and RF 2 can be used both as input and output connectors in the same measurement (see <code>OUTPut[:STATe]</code>).				
Only one input and one output may be active at the same time, a new RF input setting supersedes the previous one.				

OUTPut[:STATe][?]				RF Output
<RFOutput Connector>				
<RFOutput Connector>	Description of parameters	Def. value	Def. unit	FW vers.
RF1 	Connector RF 1 used as output	RF2	–	V3.40
RF2 	Connector RF 2 used as output			
RF3	Connector RF 3 OUT used as output			
Description of command				
This command determines the connector to be used for RF output signals. The bidirectional connectors RF 1 and RF 2 can be used as input and output connectors in the same measurement (see <code>INPut[:STATe]</code>).				
Only one input and one output may be active at the same time, a new RF output setting supersedes the previous one.				

[SENSe]:CORRection:LOSS:INPut<nr>[:MAGNitude][?]				Ext. Att. Input
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude][?]				
<Attenuation>				
<Attenuation>	Description of parameters	Def. value	Def. unit	FW vers.
–50 dB to +90 dB	Value for external attenuation at the RF input <nr>, where <nr> = 1, 2, 4	0.0	dB	V3.40
Description of command				
This command assigns an external attenuation value to the inputs of the instrument (<i>RF 1, RF 2, RF 4 IN</i>).				

[SENSe]:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?] SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?] <Attenuation>				Ext. Att. Output
<Attenuation>	Description of parameters	Def. value	Def. unit	FW vers.
-50 dB to +90 dB	Value for external attenuation at RF output <nr>, where <nr> = 1, 2, 3	0.0	dB	V3.40
Description of command				
This command assigns an external attenuation value to the outputs of the instrument (<i>RF 1, RF 2, RF 3 OUT</i>).				

WPOWER (Wide Band Power)

The subsystem *WPOWer* measures the power of the signal transmitted by the access terminal using a wideband filter. It corresponds to the softkey *WPower* in the RF connector tab of the *Connection Control* menu. The main purpose of the wideband power measurement is to indicate whether an input signal is available and whether it is advisable to change the *Max Level* settings or not.

Control of Measurement

INITiate:WPOWer	Start new measurement	⇒ <i>RUN</i>
ABORT:WPOWer	Abort measurement and switch off	⇒ <i>OFF</i>
STOP:WPOWer	Stop measurement	⇒ <i>STOP</i>
CONTinue:WPOWer	Next measurement step (only <i>counting mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start or stop the measurement, setting it to the status given in the top right column.		V3.40

CONFigure:WPOWer:EREPorting[?] <Mode>			Event Reporting	
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V3.40
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh:WPOWer:STATus?		Measurement Status		
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF RUN STOP ERR STEP RDY,	Measurement in the <i>OFF</i> state (*RST or ABORT) Running (after INITiate, CONTinue or READ) Stopped (STOP) <i>OFF</i> (could not be started) Stepping mode (<stepmode>=STEP) Stopped according to repetition mode and stop condition	OFF	–	V3.40
< CycleCount>	Description of parameters	Def. value	Def. unit	FW vers.
1 ... 10000 NONE	Counter for current statistics cycle of the current step No counting mode set	NONE	–	V3.40
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5 of the CMU 200/300 operating manual).				

Test Configuration

The commands of the following subsystems configure the *WPOWer* measurement in *RF connector* tab of the *Connect. Control* menu.

Subsystem CONTROL

CONFigure:WPOWer:CONTRol:REPetition[?] <Repetition>,<StopCond>,<Stepmode>		Test cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
CONTinuous SINGleshot 1 ... 10000 DEFault,	Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Multiple measurement (counting, until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<StopCondition>	Description of parameters	Def. value	Def. unit	FW vers.
SONerror NONE,	Stop measurement in case of error (<i>stop on error</i>) Continue measurement even in case of error	NONE	–	V3.40
<Stepmode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE	Interrupt measurement after each statistics cycle Continue measurement according to its rep. mode	NONE	–	V3.40
Description of command				
This command determines the number of statistics cycles, the stop condition and the stepping mode for the measurement.				
Note: In the case of READ commands (READ:...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

Measured Values

The subsystem *WPOWER* retrieves the results of the wideband power measurement.

READ[:SCALar]:WPOWER?		Start single shot measurement and return results		
FETCh[:SCALar]:WPOWER?		Read out measurement results (unsynchronized)		
SAMPle[:SCALar]:WPOWER?		Read out measurement results (synchronized)		
Return	Description of parameters	Def. value	Def. unit	FW vers.
-30.0 dBm to +30.0 dBm	Maximum burst power (not averaged)	NAN	dBm	V3.40
Description of command				
These commands are always queries. They start the measurement of the peak power of the input signal within a wide frequency range and return the result.				

DM:CLOCK (Synchronization)

The subsystem *DM:CLOCK* sets a system clock specific to the network. This frequency is set in the tab *Sync.* in the popup menu *Connect. Control.*

SOURce:DM:CLOCK:STATe[?]		REF OUT 2		
<Mode>				
<Mode>	Description of parameters	Def. Value	Def. unit	FW vers.
ON OFF	Switch on/off system clock	OFF	–	V3.40
Description of command				
This commands switches the system clock specific to the network at the <i>REF OUT 2</i> connector on or off. When set to on, the frequency is set at 13.1072 MHz.				

SOURce:DM:CLOCK:FREQUency[?] <Frequency>		System Clock		
<Frequency>				
<Frequency>	Description of parameters	Def. Value	Def. unit	FW vers.
39.3216 MHz 19.6608 MHz 13.1072 MHz 9.8304 MHz	System Clock Frequency	13.1072 MHz	Hz	V3.40
Description of command				
This command determines the system clock frequency applied to <i>REF OUT 2</i> .				
Any not allowed value within the range is rounded to the nearest allowed value.				

Trigger

The remote-control commands presented in this section determine the RF trigger settings. The *Trigger* settings are general (global) settings that are valid for the entire function group.

Subsystem TRIGger

The subsystem *TRIGger* defines the trigger conditions for the measurements and the routing of output trigger signals. It corresponds to the *Trigger* tab in the second plane of the *Connection Control* menu.

DEFault:TRIGger[:SEQuence][?] <DefaultAllTriggerSet.>		Default All Settings		
<DefaultAllTriggerSet.>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>TRIGger</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem SELEct

TRIGger:SELEct:AT[?] <Select Access Terminal>		Select Access Terminal (for option B-88)		
<Select Access Terminal>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 4 MINimum MAXimum DEFault	Access terminal number Use the lowest access terminal number Use the highest access terminal number Use default settings	1	–	V3.40
Description of command				
This command specifies the access terminal. The trigger output signals (see command <i>TRIGger:OUTPut:PIN<nr>:SIGNal</i>) refer to the selected AT.				

Subsystem SLOPe

TRIGger[:SEQuence]:SLOPe[?] <Trigger Slope>		Trigger Slope		
<Trigger Slope>	Description of parameters	Def. value	Def. unit	FW vers.
NEGative POSitive DEFault	Negative Slope (falling edge) Positive Slope (rising edge) Use default settings	POS	–	V3.40
Description of command				
This command defines whether the trigger event occurs on the <i>Rising Edge</i> or on the <i>Falling Edge</i> of the trigger signal. The setting has no influence on <i>Free Run</i> measurements (see <i>TRIGger[:SEQuence]:SOURce</i>).				

Subsystem OUTPUT

The TRIGger:OUTPut:PIN<nr>:SIGNal[?] command is implemented for both CMU-B88 and CMU-B89 options. However, some parameters are different for these options, the relevant differences are marked in the table below. Parameters without a specified option are the same for both options.

TRIGger:OUTPut:PIN<nr>:SIGNal[?]		Trigger Signal Output Routing		
<Trigger Output Routing>				
<Trigger Output Routing>	Description of parameters	Def. value	Def. unit	FW vers.
NONE 	No output trigger signal	<nr> = 2: NONE <nr> = 3: NONE	–	V3.40
PP2S 	Periodic pulse with period 2 s	<nr> = 4: NONE <nr> = 5: NONE		V3.40
CCHannel 	Control channel, 80 ms (for CMU-B88 only)			V3.40
SFRame 	Super frame, 80 ms (for CMU-B89 only)			V4.20
CSLot 	Control slot, 26.67 ms (for CMU-B88 only)			V3.40
ATRFrame 	Access terminal reverse frame (for CMU-B88 only)			V3.40
PFrame 	Paging frame, 20.00 ms (for CMU-B89 only)			V4.20
SNCFrame 	Sync frame, 26.67 ms (for CMU-B89 only)			V4.20
ATFSlot 	Access terminal forward slot (for CMU-B88 only)			V3.40
SLOT 	Slot (for CMU-B88 only)			V4.20
PCFRame 	Power Control frame, 1.25 ms (for CMU-B89 only)			V3.40
CPCPattern 	Periodic pulse, period is determined by the length of the power control pattern. (for CMU-B88 only)			V3.40
IPCPattern 	Single pulse that will be set as the first bit of the injected pattern being sent. (for CMU-B88 only)			V3.40
ETRigger 	Event trigger			V4.30
DEFault	Default value			V4.20
Description of command				
This command selects the type of periodic pulse signal (or no signal, setting <i>NONE</i>) to be applied to pin <nr> (<nr> = 2 to 5) of the AUX 3 connector.				

Subsystem THReshold

TRIGger[:SEQuence]:THReshold:RFPower[?]		Threshold RF Power		
<Threshold RF Power>				
<Threshold RF Power>	Description of parameters	Def. value	Def. unit	FW vers.
LOW 	Low trigger threshold (-26 dB)	MED	-	V3.40
MEDium 	Medium trigger threshold (-16 dB)			
HIGH 	High trigger threshold (-6 dB)			
DEFault	Use default settings			
Description of command				
This command sets the RF signal level at which the measurement is triggered relative to the maximum RF input level; see [SENSe]:LEVel:MAXimum. The setting has effect for trigger source RFPower only (see TRIGger[:SEQuence]:SOURce).				

TRIGger[:SEQuence]:THReshold:IFPower[?]		Threshold IF Power		
<Threshold IF Power >				
<Threshold IF Power >	Description of parameters	Def. value	Def. unit	FW vers.
-47.0 dB to 0 dB 	IF power trigger threshold	-16.0	dB	V3.40
MINimum 	Set the IF signal level threshold to min. value			
MAXimum 	Set the IF signal level threshold to max. value			
DEFault	Use default settings			
Description of command				
This command sets the IF signal level at which the measurement is triggered. The IF power threshold is defined relative to the maximum RF input level; see [SENSe]:LEVel:MAXimum. The setting has effect for trigger source IFPower only (see TRIGger[:SEQuence]:SOURce).				

Subsystem SOURCE

TRIGger[:SEQuence]:SOURce[?] <Source>		Trigger Source		
<Source>	Description of parameters	Def. Value	Def. unit	FW vers.
INT ernal	Trigger source from internal clock	EXT	–	V3.40
EXT ernal	External trigger source supplied			
FRUN	Trigger set to free run			
RF Power	Trigger set to wide-band RF power			
IF Power	Trigger set to narrow-band IF power			
DEF ault	Use default setting			

Description of command

This command sets the source of the trigger signal.

The external trigger source is supplied via the AUX 3 connector on the front panel. The AUX 3 pin assignments are:

Output trigger signals: See command TRIGger:OUTPut:PIN<nr>:SIGNal [?]
 Input trigger: Pin 8

The trigger setting affects the results of the Transmit Time Error measurement as described here.

Trigger Free Run	No timing error results are possible.
Trigger Internal	Timing error results are possible when DUT is correctly synchronized with the CMU.
IF Power	No timing error results are possible.
RF Power	No timing error results are possible.
Trigger External	Timing error results are possible if an external trigger signal is provided and the DUT is correctly synchronized with the CMU.

Note: Using an external trigger source will cause routing conflicts with an external power control bit supply. See also commands SOURce:RFGenerator:AT<nr>:PCBits and SOURce:RFGenerator:PCBits.

Subsystem RF Selectivity and Rx/Tx Frequency Coupling

Subsystem RF Selectivity

The subsystem *RF Selectivity* defines the RF Selectivity. The parameter is set in the *Misc.* tab of the popup menu *Connection Control*.

[SENSe]:RFANalyzer:SElectivity[?] <RF Selectivity>		RF Selectivity		
<RF Selectivity>	Description of parameters	Def. value	Def. unit	FW vers.
WIDE	Normal filter, appropriate for all TX measurements	WIDE	–	V4.20
IFLevel	Sets the bandwidth to the IF output level, which is in the TX path relative to the maximum IF input/output level. The IF level value is equal to the I/Q output level in the TX path relative to the maximum I/Q input voltage.			
DEFault	Use default setting			
Description of command				
The command selects the bandwidth of the analog receiver filter.				

Subsystem Rx/Tx Frequency Coupling

In Non-Signaling mode, it is possible to couple the RF analyzer (Rx) and generator (Tx) frequencies of the R&S CMU. Coupling the frequencies means that the RF Channel [BC<nr.>] numbers in the Analyzer and in the Generator tab of the Connection Control menu are always equal. Rx/Tx Frequency Coupling is controlled in the Misc. tab of the Connection Control menu. If coupling is enabled while the Rx and Tx channels are different, the RF analyzer (Rx) channel is adjusted.

CONFigure:FREquency:COUPling:RXTX		Rx/Tx Frequency Coupling		
<Enable>				
<RF Selectivity>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Enable or disable coupling	OFF	–	V4.20
Description of command				
<p>This command enables or disables Rx/Tx Frequency Coupling. If coupling is enabled while the Rx channels ([SENSe]:RFANalyzer:FREquency) and Tx channels (SOURce:RFGenerator:FREquency[:RF]) are different, the RF analyzer (Rx) channel is adjusted.</p> <p>Frequency coupling is not limited to valid channel numbers, it works for all entered Rx frequencies. When the RF analyzer is set to a frequency, the RF generator frequency is adjusted automatically using the predefined duplex distances of the respective band classes:</p>				
<p>Table 6-1: Duplex distances of band classes</p>				
		Duplex Distance (MHz)		
Band Class		(AN – AT)		
BC 0, US Cellular BC 0, Korean Cellular		45.0		
BC 1, North American PCS		80.0		
BC 2, TACS		45.0		
BC 3, JTACS		–55.0		
BC 4, Korean PCS		90.0		
BC 5, NMT 450		10.0		
BC 6, IMT-2000		190.0		
BC 7, North American 700 MHz		–30.0		
BC 8, 1800 MHz		95.0		
BC 9, North American 900 MHz		45.0		
BC 10, Secondary 800 MHz		45.0 / 39.0 ^{*)}		
BC 11, European 400 MHz PAMR		10.0		
BC 12, 800 MHz PAMR		45.0		
BC 13, IMT-2000 2.5 GHz Ext.		120.0		
BC 14, US PCS 1900 MHz		80.0		
BC 15, AWS Band		400.0		
BC 16, US 2.5 GHz		158.0		
BC 17, US 2.5 GHz Forward Link Only		158.0		
<p>^{*)} BC 10 uses 45.0 MHz for CH <= 719 and 39.0 MHz for CH > 719</p>				

Measurement Command Groups (Non-Signaling Only)

This section describes the measurements that are provided by the 1xEV-DO function group. Please note that both, the specific measurement setup and the general (global) settings from the [RF Analyzer](#) section, have an effect on the measurement results.

In the *Non-Signaling* mode, an RF test signal can be generated and an RF signal with 1xEV-DO characteristics is analyzed. No signaling parameters are transferred.

MODulation:MQQuality (App. Modulation Quality HPSK)

The subsystem *MODulation:MQQuality* measures general scalar modulation parameters. The subsystem corresponds to the *Analyzer/Generator* menu and the popup menu *Modulation Quality Configuration*.

Control of Measurement

The subsystem *MODulation:MQQuality* controls the modulation quality measurement. It corresponds to the softkey *Mod. Qual.* in the measurement menu *Analyzer/Generator*.

INITiate:MODulation:MQQuality:HPSK	Start new measurement	⇒ <i>RUN</i>
ABORT:MODulation:MQQuality:HPSK	Abort running measurement and switch off	⇒ <i>OFF</i>
STOP:MODulation:MQQuality:HPSK	Stop measurement after current stat. Cycle	⇒ <i>STOP</i>
CONTinue:MODulation:MQQuality:HPSK	Next measurement step (<i>stepping mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start and stop the modulation measurement, setting it to the status indicated in the top right column.		V3.40

CONFigure:MODulation:MQQuality:HPSK:EREPorting[?]		Event Reporting		
<EventReporting>				
<EventReporting>	Description of parameters	Def. Value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see chapter 5 of the CMU 200/300 operating manual about event reporting).				

FETCh[:SCALar]:MODulation:MQuality:HPSK:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<MeasurementStatus>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF RUN STOP ERR STEP RDY,	Measurement in the OFF state (*RST or ABORT) Running (after INITiate, CONTInue or READ) Stopped (STOP) OFF (could not be started) Stepping mode (<stepmode>=STEP) Stopped according to repetition mode and stop condition	OFF	–	V3.40
<Curr.Step.CycleCount>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 NONE,	Counter for current statistics cycle No counting mode set	NONE	–	V3.40
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000 NONE	Counter for current evaluation period within a cycle Statistic count set to off	NONE	–	V3.40
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Modulation Quality* measurement in the *Analyzer/Generator* menu. They correspond to the *Modulation Quality Configuration* menu.

Subsystem CONTROL

The subsystem *MODulation:MQuality:HPSK:CONTROL* configures the modulation quality measurement. It corresponds to the *Control* tab in the popup menu *Modulation Quality Configuration*.

DEFault:MODulation:MQuality:HPSK:CONTROL[?]		Default Settings		
<Control_DefaultSettings>				
<Control_DefaultSettings>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the <i>MODulation:MQuality:HPSK:CONTROL</i> subsystem to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

CMU-K88/-K839/.../-K869 MODulation:MQuality (App. Modulation Quality HPSK)

CONFigure:MODulation:MQuality:HPSK:CONTRol[?]		Scope of Measurement		
<Statistics>, <Repetition>, <Stop Cond>, <Step Mode>				
<Statistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000,	Number of bursts within a statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONT SING DEF,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEF,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE STEP DEF	Continue measurement according to its rep. mode Interrupt measurement after each statistics cycle Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command sets all measurement control parameters. It combines the ...CONTRol:STATistics and the ...CONTRol:REPetition commands.				

CONFigure:MODulation:MQuality:HPSK:CONTRol:STATistics[?]		Statistic Count		
<Statistics>				
<Statistics>	Description of parameters	Def. Value	Def. unit	FW vers.
1 to 1000	Number of bursts within a statistics cycle	100	–	V3.40
Description of command				
This command selects the type of measured values and determines the number of bursts forming one statistics cycle.				

CONFigure:MODulation:MQuality:HPSK:CONTRol:REPetition[?]				Test Cycles
<Repetition>, <Stop Cond>, <Step Mode>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = STEP RDY)	SING	–	V3.40
CONT SING DEF,	Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting			
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEF,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE STEP DEF	Continue measurement according to its rep. mode Interrupt measurement after each statistics cycle Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the number of statistics cycles, the stop condition and the stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>[?]				Sideband Frequency Offset
<Freq. Offset>				
<Freq. Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 2 MHz DEFault OFF ON MINimum MAXimum	Sideband frequency offset Sets the value to the default setting Measurement disabled, result INV Enable measurement, last setting re-activated Sets the value to the minimum setting Sets the value to the maximum setting	see below	Hz	V3.40
Description of command				
The sideband suppression measurement yields 4 pairs of results corresponding to the symmetrical frequency offsets of the RF frequency (command [SENSE]:RFANalyzer:FREQUENCY[?]) using a Gaussian filter with a bandwidth of 30 kHz.				
This command determines these four frequency offset values (<nr> = 1 to 4). The sideband suppression frequency offset depends on the network standard (CONFigure:NETWork:STANdard). The default values are the same as listed in the command: CONFigure:SPECTrum:ACP:CONTRol:FOFFset:ACP<nr>[?]				

Subsystem LIMit

The subsystem *MODulation:MQuality:....:LIMit* defines tolerance values for the *Modulation* measurement. The subsystem corresponds to the *Limits* tab in the popup menu *Modulation Configuration*.

CONFigure:MODulation:MQuality:HPSK:CMMax:LIMit[?]				Limits
<Limit_WaveformQuality>, <Limit_CarrierFreq>, <Limit_TransmitTimeError>, <Limit_CarrierFeedthrough>, <Limit_IQ-Imbalance>, <Limit_CMMax_SidebandSupprACP1>, <Limit_CMMax_SidebandSupprACP2>, <Limit_CMMax_SidebandSupprACP3>, <Limit_CMMax_SidebandSupprACP4>				
<Limit_WaveformQuality>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 1.0 OFF ON MINimum MAXimum DEFault,	Limit for modulation accuracy (Rho) No Rho limit check Limit check on, last setting re-activated Sets the Rho limit to minimum value Sets the Rho limit to maximum value Sets the Rho limit to default value	0.944	–	V3.40
<Limit_CarrierFreq>	Description of parameters	Def. value	Def. unit	FW vers.
0 Hz to 1000 Hz OFF ON MINimum MAXimum DEFault,	Upper limit for carrier frequency error No carrier frequency error limit check Limit check on, last setting re-activated Sets the frequency error limit to minimum value Sets the frequency error limit to maximum value Sets the frequency error limit to default value	300	Hz	V3.40
<Limit_TransmitTimeError>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 s to 0.00001 s OFF ON MINimum MAXimum DEFault,	Upper limit for transmit time error No transmit time error limit Limit check on, last setting re-activated Sets the transmit time error limit to minimum value Sets the transmit time error limit to maximum value Sets the transmit time error limit to default value	0.000001	s	V3.40
<Limit_CarrierFeedthrough>	Description of parameters	Def. value	Def. unit	FW vers.
–120 dB to –20 dB OFF ON MINimum MAXimum DEFault,	Upper limit for carrier feedthrough No carrier feedthrough limit check Limit check on, last setting re-activated Sets the carrier feedthrough limit to minimum value Sets the carrier feedthrough limit to maximum value Sets the carrier feedthrough limit to default value	–25	dB	V3.40
<Limit_IQ-Imbalance>	Description of parameters	Def. value	Def. unit	FW vers.
–120.0 dB to –20.0 dB OFF ON MINimum MAXimum DEFault,	Upper limit for I/Q imbalance No I/Q imbalance limit check Limit check on, last setting re-activated Sets the I/Q imbalance limit to minimum value Sets the I/Q imbalance limit to maximum value Sets the I/Q imbalance limit to default value	–30	dB	V3.40
<Sideband Suppr. 1 to 3>	Description of parameters	Def. value	Def. unit	FW vers.
–128 dB to 0 dB OFF ON MINimum MAXimum DEFault,	Limit for sideband suppression at freq. offset 1, 2, or 3 No sideband suppression limit check Limit check on, last setting re-activated Sets the sideband suppression limit to min. value Sets the sideband suppression limit to max. value Sets the sideband suppression limit to default value	–43	dB	V3.40

MODulation:MQuality (App. Modulation Quality HPSK) CMU-K88/-K839/.../-K869

<Sideband Suppr. 4>	Description of parameters	Def. value	Def. unit	FW vers.
-128 dB to 0 dB OFF ON MINimum MAXimum DEFault	Limit for sideband suppression at freq. offset 4 No sideband suppres limit check Limit check on, last setting re-activated Sets the sideband suppression limit to min. value Sets the sideband suppression limit to max. value Sets the sideband suppression limit to default value	-54	dB	V3.40
Description of command				
This command defines limits for <i>Current</i> and <i>Max/Min</i> quantities describing the modulation quality.				

CONFigure:MODulation:MQuality:HPSK:AVERage:LIMit[?]				Limits
<Limit_Average_WaveformQuality>, <Limit_Average_CarrierFreq>, <Limit_Average_TransmitTimeError>, <Limit_Average_CarrierFeedthrough>, <Limit_IQ-Imbalance>, <Limit_Average_SidebandSupprACP1>, <Limit_Average_SidebandSupprACP2>, <Limit_Average_SidebandSupprACP3>, <Limit_Average_SidebandSupprACP4>				
<Limit_Av._WaveformQuality>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 1.0 OFF ON MINimum MAXimum DEFault,	Limit for modulation accuracy (Rho) No Rho limit check Limit check on, last setting re-activated Sets the Rho limit to minimum value Sets the Rho limit to maximum value Sets the Rho limit to default value	0.944	–	V3.40
<Limit_Average_CarrierFreq>	Description of parameters	Def. value	Def. unit	FW vers.
0 Hz to 1000 Hz OFF ON MINimum MAXimum DEFault,	Upper limit for carrier frequency error No carrier frequency error limit check Limit check on, last setting re-activated Sets the frequency error limit to minimum value Sets the frequency error limit to maximum value Sets the frequency error limit to default value	300	Hz	V3.40
<Lim_Avg_Trans TimeError>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 s to 0.00001 s OFF ON MINimum MAXimum DEFault,	Upper limit for transmit time error No transmit time error limit Limit check on, last setting re-activated Sets the transmit time error limit to min. value Sets the transmit time error limit to max. value Sets the transmit time error limit to default value	0.000001	s	V3.40
<Lim_Avg_Carr Feedthrough>	Description of parameters	Def. value	Def. unit	FW vers.
-120 dB to -20 dB OFF ON MINimum MAXimum DEFault,	Upper limit for carrier feedthrough No carrier feedthrough limit check Limit check on, last setting re-activated Sets the carrier feedthrough limit to mini. value Sets the carrier feedthrough limit to max. value Sets the carrier feedthrough limit to default value	-25	DB	V3.40
<Limit_IQ-Imbalance>	Description of parameters	Def. value	Def. unit	FW vers.
-120.0 dB to -20.0 dB OFF ON MINimum MAXimum DEFault,	Upper limit for IQ Imbalance No I/Q imbalance limit check Limit check on, last setting re-activated Sets the I/Q imbalance limit to minimum value Sets the I/Q imbalance limit to maximum value Sets the I/Q imbalance limit to default value	-30	dB	V3.40

CMU-K88/-K839/.../-K869 MODulation:MQuality (App. Modulation Quality HPSK)

<Avg. Sideband Suppr. 1 to 3>	Description of parameters	Def. value	Def. unit	FW vers.
-128 dB to 0 dB OFF ON MINimum MAXimum DEFault,	Limit for sideband suppression at freq. offset 1, 2, or 3 No sideband suppression limit check Limit check on, last setting re-activated Sets the sideband suppression limit to min. value Sets the sideband suppression limit to max. value Sets the sideband suppression limit to default value	-43	dB	V3.40
< Avg. Sideband Suppr. 4>	Description of parameters	Def. value	Def. unit	FW vers.
-128 dB to 0 dB OFF ON MINimum MAXimum DEFault	Limit for sideband suppression at freq. offset 4 No sideband suppression limit check Limit check on, last setting re-activated Sets the sideband suppression limit to min. value Sets the sideband suppression limit to max. value Sets the sideband suppression limit to default value	-54	dB	V3.40
Description of command				
This command defines limits for the <i>Average</i> quantities describing the modulation quality.				

DEFault:MODulation:MQuality:HPSK:CMMax:LIMit[?]		Default Settings		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the MODulation:MQuality*:LIMit subsystem to their default values (the setting <i>OFF</i> results in an error message). The length of the parameter lists in the CONFIGure:MODulation:MQuality...CMMax:LIMit commands is not affected.				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				
The keyword <i>CMMax</i> refers to the <i>Current</i> and <i>Max./Min.</i> limits.				

DEFault:MODulation:MQuality:HPSK:AVERage:LIMit[?]		Default Settings		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the MODulation:MQuality*:LIMit subsystem to their default values (the setting <i>OFF</i> results in an error message). The length of the parameter lists in the CONFIGure:MODulation:MQuality...AVERage:LIMit commands is not affected.				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem *MODulation* measures and returns the modulation parameters and compares them with the tolerance values. The subsystem corresponds to the various output elements in the measurement menu *Analyzer/Generator*.

READ[:SCALar]:MODulation:MQuality:HPSK?		Start single shot measurement and return results		
FETCh[:SCALar]:MODulation:MQuality:HPSK?		Read out measurement results (unsynchronized)		
SAMPlE[:SCALar]:MODulation:MQuality:HPSK?		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
AT Power (x3),	-120.0 dBm to -33.0 dBm	NAN	dBm	V3.40
Waveform Quality (Rho) (x3),	0.0 to +1.0	NAN	-	
Carrier Frequency Error (x3),	-3000.0 Hz to +3000.0 Hz	NAN	Hz	
Transmit Time Error (x3),	0.0 to 0.00001	NAN	s	
Carrier Feedthrough (x3),	-120.0 dB to -20.0 dB	NAN	dB	
I/Q Imbalance (x3),	-120.0 dB to -20.0 dB	NAN	dB	
Lower Sideband Supp. 1 (x3),	-120 dB to 10 dB	NAN	dB	
Upper Sideband Supp. 1 (x3)	-120 dB to 10 dB	NAN	dB	
Lower Sideband Supp. 2 (x3),	-120 dB to 10 dB	NAN	dB	
Upper Sideband Supp. 2 (x3)	-120 dB to 10 dB	NAN	dB	
Lower Sideband Supp. 3 (x3),	-120 dB to 10 dB	NAN	dB	
Upper Sideband Supp. 3 (x3)	-120 dB to 10 dB	NAN	dB	
Lower Sideband Supp. 4 (x3),	-120 dB to 10 dB	NAN	dB	
Upper Sideband Supp. 4 (x3),	-120 dB to 10 dB	NAN	dB	
Bursts Out of Tolerance	0% to 100 %	NAN	%	
Description of command				
<p>These commands are always queries. They start a modulation measurement and output all scalar measurement results (see Chapter 4). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i>, the <i>Average</i>, and the <i>MMax</i> value. Sideband Supp. 1 to Sideband Supp. 4 denotes the sideband suppression at offset frequencies 1 to 4; see command <code>CONFig-ure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>[?]</code>.</p>				

CALCulate[:SCALar]:MODulation:MQQuality:HPSK:MATChing:LIMIt?		Limit Matching														
Returned values	Value range	Def. value	Def. unit	FW vers.												
Waveform Quality (Rho) (x3), Carrier Frequency Error (x3), Transmit Time Error (x3), Carrier Feedthrough (x3), IQ Imbalance (x3), Lower Sideband Supp. 1 (x3), Upper Sideband Supp. 1 (x3), Lower Sideband Supp. 2 (x3), Upper Sideband Supp. 2 (x3), Lower Sideband Supp. 3 (x3), Upper Sideband Supp. 3 (x3), Lower Sideband Supp. 4 (x3), Upper Sideband Supp. 4 (x3)	For all measured values: NMAU NMAL INV OK	INV INV INV INV INV INV INV INV INV INV INV INV	– – – – – – – – – – – –	V3.40												
Description of command																
<p>This command is always a query. It indicates whether and in which way the error limits for the scalar measured values (see above command) have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i>, the <i>Average</i>, and the <i>MMax</i> value. Sideband Supp. 1 to Sideband Supp. 4 denotes the sideband suppression at offset frequencies 1 to 4; see command <code>CONFigure:MODulation:MQQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>[?]</code>.</p> <p>The following messages may be output for all measured values:</p> <table border="0"> <tr> <td>NMAU</td> <td>Underflow of tolerance value</td> <td><i>not matching, underflow</i></td> </tr> <tr> <td>NMAL</td> <td>Tolerance value exceeded</td> <td><i>not matching, overflow</i></td> </tr> <tr> <td>INV</td> <td>Measurement invalid</td> <td><i>invalid</i></td> </tr> <tr> <td>OK</td> <td>all tolerances matched</td> <td></td> </tr> </table>					NMAU	Underflow of tolerance value	<i>not matching, underflow</i>	NMAL	Tolerance value exceeded	<i>not matching, overflow</i>	INV	Measurement invalid	<i>invalid</i>	OK	all tolerances matched	
NMAU	Underflow of tolerance value	<i>not matching, underflow</i>														
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>														
INV	Measurement invalid	<i>invalid</i>														
OK	all tolerances matched															

Common Measurements and Command Groups (Signaling and Non-Signaling)

The commands for the measurement groups in this section are identical or almost identical in both test modes. Minor differences between *Non-Signaling* and *Signaling* commands are possible; they will be pointed out throughout the section.

Note: **Measurements and signaling states**

To perform any kind of measurement and obtain a meaningful result, an appropriate test setup is required (see application examples in chapter 2 of this manual). Consequently, if the measurements reported in this section are performed in Signaling mode, the Connected (CEST) signaling state must be reached before any of the commands retrieving test results (READ...?, FETCh...?, SAMPlE...?, or CALCulate...LIMit?) can be used. Test configurations, however, can be defined any time.

NPOWer (Narrow Band Power)

The subsystem *NPOWer* measures the *Narrow Band Power* using the 1xEV-DO receiver filter (according to IS-856-1). The subsystem corresponds to the *NPower* menu and the popup menu *Power Configuration* in the front panel menus.

Control of Measurement

The subsystem *NPower* controls the narrow band power measurement. It corresponds to the softkey *NPower* in the measurement menu *Power*.

INITiate:NPOWer	Start new measurement	⇒	<i>RUN</i>
ABORt:NPOWer	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:NPOWer	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTInue:NPOWer	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the power measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:NPOWer:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the reporting mode to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:NPOWER:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<MeasurementStatus>	Description of parameters	Def. value	Def. unit	FW vers.
OFF RUN STOP ERR STEP RDY	Measurement in the OFF state (*RST or ABORT) Running (after INITiate, CONTInue or READ) Stopped (STOP) OFF (could not be started) Stepping mode (<stepmode>=STEP) Stopped according to repetition mode and stop condition	OFF	–	V3.40
<Curr.Step.CycleCount>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 NONE	Counter for current statistics cycle No counting mode set	NONE	–	V3.40
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000 NONE	Counter for current evaluation period within a cycle Statistic count set to off	NONE	–	V3.40
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *NPower* measurement in the *Power* menu. They correspond to the *Power Configuration* menu.

Subsystem CONTROL

The subsystem *NPOWER:CONTROL* defines the repetition mode and statistic count of the measurement.

CONFigure:NPOWer:CONTRol[?]		Scope of Measurement		
<Statistics>, <Repetition>, <Stop Condition>, <Step Mode>				
<Statistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000 MINimum MAXimum DEF,	Number of bursts per statistics cycle Sets the value to the range minimum Sets the value to the range maximum Sets the value to the default setting	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTinuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SON,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>)	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE STEP	Continue measurement according to its rep. mode Interrupt measurement after each statistics cycle	NONE	–	V3.40
Description of command				
This command combines the ...CONTRol:STATistics and the ...CONTRol:REPetition commands				

CONFigure:NPOWer:CONTRol:STATistics[?]		Statistic Count		
<Statistics>				
<Statistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000 MINimum MAXimum DEF	Number of bursts per statistics cycle Sets the value to the range minimum Sets the value to the range maximum Sets the value to the default setting	100	–	V3.40
Description of command				
This command specifies the type of measured values and defines the number of bursts forming a statistics cycle.				

CONFigure:NPOWER:CONTRol:REPetition[?] <Repetition>, <Stop Condition>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Default value	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE STEP DEFault	Continue measurement according to its rep. mode Interrupt measurement after each statistics cycle Default value	NONE	–	V3.40
Description of command				
This command determines the number of statistics cycles for the measurement.				
Note: In the case of <i>READ</i> commands (<i>READ:...</i>), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

Measured Values

The subsystem *NPOWER* determines and returns the results of the Narrow Band Power measurements.

XTND:NPOWER:RESult:NBAND[?] <Enable> <Static results extension>		Scope of scalar results		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF DEFault	Statistical results returned No statistical results returned The scalar narrow band power results are set to default	OFF	–	V3.40
Description of command				
This command qualifies whether or not <i>READ[:SCALar]:NPOWER?</i> , <i>FETCh...?</i> , <i>SAMPlE...?</i> return the statistical power results for 1.23 MHz.				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Returned values		Description	Def. value	Def. unit	FW vers.
READ[:SCALar]:NPOWer? FEtCh[:SCALar]:NPOWer? SAMPlE[:SCALar]:NPOWer?		Scalar results: Start single shot measurement and return results Read out measurement results (unsynchronized) Read out measurement results (synchronized)			
Avg. Power of Current evaluation period, Min. Power of Current evaluation period, Max. Power of Current evaluation period, Avg. Power referenced to a stat. cycle, Min. Power of the entire measurement, Max. Power of the entire measurement		-137 dBm to +53 dBm	NAN	dBm	V3.40
Avg. Power of curr. eval. period @1.23 MHz, Min. Power of curr. eval. period @1.23 MHz, Max. Power of curr.eval. period @1.23 MHz, Avg. Power ref.to a stat. cycle @1.23 MHz, Min. Power of the entire meas. @1.23 MHz, Max. Power of the entire meas. @1.23 MHz		-137 dBm to +53 dBm		dBm	V4.31
Description of command					
These commands are always queries. They start a measurement and output all scalar measurement results.					
Note: The @1.23 MHz values are returned only if XTND:NPOWer:RESUlt:NBANd is set to ON.					

SAPPower (Standby and Access Probe Power)

The subsystem *SAPPower* contains the commands for measuring the standby and access probe power. It corresponds to the softkey *Power* of the tab *Connection* in the menu group *Connect. Control*.

INITiate:SAPPower	Start new measurement	⇒	RUN
ABORt:SAPPower	Abort running measurement and switch off	⇒	OFF
STOP:SAPPower	Stop measurement after current stat. cycle	⇒	STOP
CONTinue:SAPPower	Next measurement step (<i>stepping mode</i>)	⇒	RUN
Description of command			Sig. State
These commands have no query form. They start or stop the measurement, setting it to the status given in the top right column.			FW vers.
			SON / SOP
			V4.31

CONFigure:SAPPower:EREPorting[?] <Report Mode>		Event Reporting		
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.31
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
Description of command				Sig. State
This command defines the events generated when the measurement is terminated or stopped (<i>event reporting</i> , see chapter 5).				all

FETCh[:SCALar]:SAPPower:STATus? <Measurement Status>, <Statistic Count>				
<Measurement Status>	Description of parameters	Def. value	Def. unit	
OFF RUN STOP ERR STEP RDY	Measurement in the OFF state (*RST or ABORT) Running (after INITiate, CONTInue or READ) Stopped (STOP) OFF (could not be started) Stepping mode (<stepmode>=STEP) Stopped according to repetition mode and stop condition	OFF	–	
<Statistic Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 NONE	Counter for current statistics cycle No counting mode set	OFF		V4.31
Description of command				Sig. State
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				SON / SOP

READ[:SCALar]:SAPPower? FETCh[:SCALar]:SAPPower? SAMPle[:SCALar]:SAPPower? <Standby Power>, <Access Probe Power>				
<Standby Power>	Description of parameters	Def. value	Def. unit	FW vers.
–137 dBm to +44 dBm	Standby power	NAN	dBm	V4.31
<Access Probe Power>	Description of parameters	Def. value	Def. unit	
–137 dBm to +44 dBm	Access probe power	NAN	dBm	
Description of command				Sig. State
These commands are always queries. They start the measurement of the standby and access probe power and output the result.				SON / SOP

Scalar Results:
Start single shot measurement and return results
Read out measurement results (unsynchronized)
Read out measurement results (synchronized)

MODulation:OVERview

The subsystem *MODulation:OVERview* measures general scalar modulation parameters of the AT transmitter output signal. The subsystem corresponds to the measurement menu *Modulation* and the associated popup menu *Modulation Configuration*.

Control of Measurement

The subsystem *MODulation:OVERview* controls the modulation overview measurement. It corresponds to the softkey *Overview HPSK* in the measurement menu *Modulation*.

INITiate:MODulation:OVERview:HPSK	Start new measurement	⇒ RUN
ABORt:MODulation:OVERview:HPSK	Abort running measurement and switch off	⇒ OFF
STOP:MODulation:OVERview:HPSK	Stop measurement after current stat. cycle	⇒ STOP
CONTInue:MODulation:OVERview:HPSK	Next measurement step (<i>stepping mode</i>)	⇒ RUN
Description of command		FW vers.
These commands have no query form. They start and stop the modulation overview measurement, setting it to the status indicated in the top right column.		V3.40

CONFigure:MODulation:OVERview:HPSK:EREPorting[?] <Report Mode>		Event Reporting		
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V3.40
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:MODulation:OVERview:HPSK:STATus? <HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>		Measurement Status		
<HPSK_Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
STEP	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Curr.Step.CycleCnt>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V3.40
NONE,	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Modulation Overview* measurement in the *Modulation* menu. They correspond to the *Modulation Overview Configuration* menu.

Subsystem CONTROL

The subsystem *MODulation:OVERview:CONTROL* configures the modulation overview measurement. It corresponds to the *Control* tab in the popup menu *Modulation Configuration*.

DEFault:MODulation:OVERview:HPSK:CONTROL[?] <Enable>		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>MODulation:OVERview:...:CONTROL</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

CONFigure:MODulation:OVERview:HPSK:CONTROL[?] <Statistic Count>, <Repetition>, <Stop Cond>, <Step Mode>		Scope of Measurement		
<Statistic Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the <i>...CONTROL:STATistics</i> and the <i>...CONTROL:REPetition</i> commands, see below.				

CONFigure:MODulation:OVERview:HPSK:CONTRol:STATistics[?] <Statistic Count>				Statistic Count
<Statistic Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command specifies the type of measured values and defines the number of bursts forming a statistics cycle.				

CONFigure:MODulation:OVERview:HPSK:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>				Test Cycles
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTinuous SINGleshot DEFault	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

Subsystem LIMit

The subsystem *MODulation:OEMP:...:LIMit* defines the tolerance values for the scalar results of the following modulation measurements (*OEMP*):

- Overview
- Error Vector Magnitude
- Magnitude Error
- Phase Error.

The subsystem corresponds to the *Limits* tab in the popup menu *Modulation Quality Configuration*. Different limits can be configured for the the *Current* and *Max./Min.* traces.

CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined][?]				Limits
<Limit_Peak_EVM>, <Enable>, <Limit_RMS_EVM>, <Enable>, <Limit_Peak_ME>, <Enable>, <Limit_RMS_ME>, <Enable>, <Limit_Peak_PE>, <Enable>, <Limit_RMS_PE>, <Enable>, <Carrier_Feedthrough_Limit>, <Enable>, <IQ_Imbalance_Limit>, <Enable>, <Carrier_Freq_Error_Limit>, <Enable>, <Tx_Time_Error_Limit>, <Enable>, <WFM_Quality_Limit>, <Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Switch limit check for parameter preceding <Enable> on or off	ON	–	V3.40
Parameters	Description of parameters	Def. value	Def. unit	FW vers.
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error Peak	33.4	%	V3.40
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error RMS	23.6	%	
0.0 % to +100.0 %,	(ME) Magnitude Error Peak	33.4	%	
0.0 % to +100.0 %,	(ME) Magnitude Error RMS	23.6	%	
0.0 deg to 180.0 deg,	(PE) Phase Error Peak	OFF	deg	
0.0 deg to 180.0 deg,	(PE) Phase Error RMS	OFF	deg	
–120.0 dB to –20.0 dB,	Carrier Feedthrough	–25.0	dB	
–120.0 dB to –20.0 dB,	I/Q Imbalance	–30.0	dB	
0 Hz to 1000 Hz,	Carrier Frequency Error	300	Hz	
0.0 μs to 10.0 μs,	Transmit Time Error	0.000001	s	
0.0 to 1.0	Limit for waveform quality (modulation accuracy, Rho)	0.944	–	
Description of command				
This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keyword <i>CMMax</i> refers to the <i>Current</i> and <i>Max./Min.</i> traces. After each parameter definition, the limit check for this parameter can be enabled or disabled.				
Limit definition and enabling of the limit check can be done separately.				

CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined][?]				Limits
<Limit_Peak_EVM>, <Enable>, <Limit_RMS_EVM>, <Enable>, <Limit_Peak_ME>, <Enable>, <Limit_RMS_ME>, <Enable>, <Limit_Peak_PE>, <Enable>, <Limit_RMS_PE>, <Enable>, <Carrier_Feedthrough_Limit>, <Enable>, <IQ_Imbalance_Limit>, <Enable>, <Carrier_Freq_Error_Limit>, <Enable>, <Tx_Time_Error_Limit>, <Enable>, <WFM_Quality_Limit>, <Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF,	Switch limit check for parameter preceding <Enable> on or off	ON	–	V3.40
Parameters	Description of parameters	Def. value	Def. unit	FW vers.
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error Peak	33.4	%	V3.40
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error RMS	23.6	%	
0.0 % to +100.0 %,	(ME) Magnitude Error Peak	33.4	%	
0.0 % to +100.0 %,	(ME) Magnitude Error RMS	23.6	%	
0.0 deg to 180.0 deg,	(PE) Phase Error Peak	19.6	deg	
0.0 deg to 180.0 deg,	(PE) Phase Error RMS	13.6	deg	
–120.0 dB to –20.0 dB,	Carrier Feedthrough	–25.0	dB	
–120.0 dB to –20.0 dB,	I/Q Imbalance	–30.0	dB	
0 Hz to 1000 Hz,	Carrier Frequency Error	300	Hz	
0.0 μs to 10.0 μs,	Transmit Time Error	0.000001	s	
0.0 to 1.0	Limit for waveform quality (modulation accuracy, Rho)	0.944	–	
Description of command				
This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keyword AVERAge refers to the Average trace. After each parameter definition, the limit check for this parameter can be enabled or disabled.				
Limit definition and enabling of the limit check can be done separately.				

CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]				Limit values
<Limit_Peak_EVM>, <Limit_RMS_EVM>, <Limit_Peak_ME>, <Limit_RMS_ME>, <Limit_Peak_PE>, <Limit_RMS_PE>, <Carrier_Feedthrough_Limit>, <IQ_Imbalance_Limit>, <Carrier_Freq_Error_Limit>, <Tx_Time_Error_Limit>, <WFM_Quality_Limit>				
Parameter	Description of parameters	Def. value	Def. unit	FW vers.
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error Peak	33.4	%	V3.40
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error RMS	23.6	%	
0.0 % to +100.0 %,	(ME) Magnitude Error Peak	33.4	%	
0.0 % to +100.0 %,	(ME) Magnitude Error RMS	23.6	%	
0.0 deg to 180.0 deg,	(PE) Phase Error Peak	OFF	deg	
0.0 deg to 180.0 deg,	(PE) Phase Error RMS	OFF	deg	
–120.0 dB to –20.0 dB,	Carrier Feedthrough	–25.0	dB	
–120.0 dB to –20.0 dB,	I/Q Imbalance	–30.0	dB	
0 Hz to 1000 Hz,	Carrier Frequency Error	300	Hz	
0.0 μs to 10.0 μs,	Transmit Time Error	0.000001	s	
0.0 to 1.0	Limit for waveform quality (modulation accuracy, Rho)	0.944	–	
Description of command				
This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keyword CMMaX refers to the Current and Max./Min. traces.				

Limit values

CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]
<Limit_Peak_EVM>, <Limit_RMS_EVM>, <Limit_Peak_ME>, <Limit_RMS_ME>, <Limit_Peak_PE>, <Limit_RMS_PE>, <Carrier_Feedthrough_Limit>, <IQ_Imbalance_Limit>, <Carrier_Freq_Error_Limit>, <Tx_Time_Error_Limit>, <WFM_Quality_Limit>

Parameter	Description of parameters	Def. value	Def. unit	FW vers.
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error Peak	33.4	%	V3.40
0.0 % to +100.0 %,	(EVM) Error Vector Magnitude Error RMS	23.6	%	
0.0 % to +100.0 %,	(ME) Magnitude Error Peak	33.4	%	
0.0 % to +100.0 %,	(ME) Magnitude Error RMS	23.6	%	
0.0 deg to +45.0 deg,	(PE) Phase Error Peak	19.6	deg	
0.0 deg to +45.0 deg,	(PE) Phase Error RMS	13.6	deg	
-120.0 dB to -20.0 dB,	Carrier Feedthrough	-25.0	dB	
-120.0 dB to -20.0 dB,	I/Q Imbalance	-30.0	dB	
0 Hz to 1000 Hz,	Carrier Frequency Error	300	Hz	
0.0 μs to 10.0 μs,	Transmit Time Error	0.000001	s	
0.0 to 1.0	Limit for waveform quality (modulation accuracy, Rho)	0.944	-	

Description of command

This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keyword *AVERAge* refers to the *Average* trace.

Limit Enable

CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABLE[?]
<Limit_Peak_EVM>, <Limit_RMS_EVM>, <Limit_Peak_ME>, <Limit_RMS_ME>, <Limit_Peak_PE>, <Limit_RMS_PE>, <Carrier_Feedthrough_Limit>, <IQ_Imbalance_Limit>, <Carrier_Freq_Error_Limit>, <Tx_Time_Error_Limit>, <WFM_Quality_Limit>

<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Switch limit check for corresponding parameter on or off.	ON (see below)	-	V3.40

Description of command

This command enables or disables the limit check for the different traces and for the scalar modulation parameters derived from them. The keyword *CMMax* refers to the *Current* and *Max./Min.* traces.

Note: The default value is *ON* for all limits except the phase error limits (Def. Value = *OFF*).

Limit Enable

CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABLE[?]
<Limit_Peak_EVM>, <Limit_RMS_EVM>, <Limit_Peak_ME>, <Limit_RMS_ME>, <Limit_Peak_PE>, <Limit_RMS_PE>, <Carrier_Feedthrough_Limit>, <IQ_Imbalance_Limit>, <Carrier_Freq_Error_Limit>, <Tx_Time_Error_Limit>, <WFM_Quality_Limit>

<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Switch limit check for corresponding parameter on or off.	ON	-	V3.40

Description of command

This command enables or disables the limit check for the different traces and for the scalar modulation parameters derived from them. The keyword *AVERAge* refers to the *Average* trace.

DEFault:MODulation:OEMP:HPSK:LIMit[?]		Default Settings		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON 	The parameters are set to their default values	ON	–	V3.40
OFF	Some or all parameters differ from their default values			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>MODulation:OEMP:LIMit</i> to their default values (the setting <i>OFF</i> results in an error message). If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem *MODulation:OVERview* measures and returns the modulation overview parameters and compares them with the tolerance values. The subsystem corresponds to the various output elements in the measurement menu *MODulation*, application *Overview*.

READ[:SCALar]:MODulation:OVERview:HPSK?		Scalar Results		
FETCh[:SCALar]:MODulation:OVERview:HPSK?		Start single shot measurement and return results		
SAMPle[:SCALar]:MODulation:OVERview:HPSK?		Read out meas. results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
EVM Peak (x3),	0.0 % to 100.0 %	NAN	%	V3.40
EVM RMS (x3),	0.0 % to 100.0 %	NAN	%	
Magn. Error Peak (x3),	0.0 % to 100.0 %	NAN	%	
Magn. Error RMS (x3),	0.0 % to 100.0 %	NAN	%	
Phase Error Peak (x3),	0.0 deg to +45.0 deg	NAN	deg	
Phase Error RMS (x3),	0.0 deg to +45.0 deg	NAN	deg	
Carrier Feedthrough (x3),	–120.0 dB to –20.0 dB	NAN	dB	
I/Q Imbalance (x3),	–120.0 dB to –20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 Hz to 1000 Hz	NAN	Hz	
Tx Time Error (x3),	0 μs to 10 μs	NAN	μs	
Waveform Quality (Rho) (x3),	0 to 1	NAN	–	
AT Power (x3),	–133.0 dBm to +19.0 dBm	NAN	dB	
Current Statistics,	1 to 1000	NAN	–	
Bursts Out Of Tolerance	0.0 % to 100.0 %	NAN	%	
Description of command				
These commands are always queries. They start a modulation overview measurement and output all scalar measurement results (see chapter 4). The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>calculation of statistical quantities</i>). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:MODulation:OVERview:HPSK:MATChing:LIMit?		Limit Matching														
Returned values	Value range	Def. value	Def. unit	FW vers.												
EVM Peak (x3),	For all measured values: NMAU NMAL INV OK	INV	—	V3.40												
EVM RMS (x3),		INV	—													
Magn. Error Peak (x3),		INV	—													
Magn. Error RMS (x3),		INV	—													
Phase Error Peak (x3),		INV	—													
Phase Error RMS (x3),		INV	—													
Carrier Feedthrough (x3),		INV	—													
I/Q Imbalance (x3),		INV	—													
Carrier Freq. Error (x3),		INV	—													
Tx Time Error (x3),		INV	—													
Waveform Quality (Rho) (x3),		INV	—													
AT Power (x3)		INV	—													
Description of command																
<p>This command is always a query. It indicates whether and in which way the error limits for the scalar measured values (see above command) have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i>, the <i>Average</i>, and the <i>MMax</i> value.</p> <p>The following messages may be output for all measured values:</p> <table border="0"> <tr> <td>NMAU</td> <td>Underflow of tolerance value</td> <td><i>not matching, underflow</i></td> </tr> <tr> <td>NMAL</td> <td>Tolerance value exceeded</td> <td><i>not matching, overflow</i></td> </tr> <tr> <td>INV</td> <td>Measurement invalid</td> <td><i>invalid</i></td> </tr> <tr> <td>OK</td> <td>all tolerances matched</td> <td></td> </tr> </table>					NMAU	Underflow of tolerance value	<i>not matching, underflow</i>	NMAL	Tolerance value exceeded	<i>not matching, overflow</i>	INV	Measurement invalid	<i>invalid</i>	OK	all tolerances matched	
NMAU	Underflow of tolerance value	<i>not matching, underflow</i>														
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>														
INV	Measurement invalid	<i>invalid</i>														
OK	all tolerances matched															

MODulation:EVMagnitude (Error Vector Magnitude)

The subsystem *MODulation:EVMagnitude* measures the error vector magnitude as well as general scalar modulation parameters. The subsystem corresponds to the measurement menu *Modulation*, application *EVM H-PSK*, and the associated popup menu *Modulation Configuration*.

Control of Measurement

The subsystem *MODulation:EVMagnitude* controls the error vector magnitude measurement. It corresponds to the softkey *EVM H-PSK* in the measurement menu *Modulation*.

INITiate:MODulation:EVMagnitude:HPSK	Start new measurement	⇒ <i>RUN</i>
ABORt:MODulation:EVMagnitude:HPSK	Abort running measurement and switch off	⇒ <i>OFF</i>
STOP:MODulation:EVMagnitude:HPSK	Stop measurement after current stat. cycle	⇒ <i>STOP</i>
CONTinue:MODulation:EVMagnitude:HPSK	Next measurement step (<i>stepping mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start and stop the error vector magnitude measurement, setting it to the status indicated in the top right column.		V3.40

CONFigure:MODulation:EVMagnitude:HPSK:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:MODulation:EVMagnitude:HPSK:STATus?		Measurement Status		
<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas. Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTinue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000 	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Error Vector Magnitude* measurement in the *Modulation* menu. They correspond to the *Modulation Configuration* menu.

Subsystem CONTROL

The subsystem *MODulation:EVMagnitude:CONTROL* configures the error vector magnitude measurement. It corresponds to the *Control* tab in the popup menu *Modulation Configuration*.

CONFigure:MODulation:EVMagnitude:HPSK:CONTROL[?] <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>		Scope of Measurement		
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTROL:STATistics and ...CONTROL:REPetition commands, see below.				

CONFigure:MODulation:EVMagnitude:HPSK:CONTROL:RMODE[?] <Result Mode>		Result mode		
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

CONFigure:MODulation:EVMagnitude:HPSK:CONTROL:STATistics[?] <Statistics Count>		Statistics Count		
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command specifies the type of measured values and defines the number of bursts forming a statistics cycle.				

CONFigure:MODulation:EVMagnitude:HPSK:CONTRol:REPetition[?]		Test Cycles		
<Repetition> , <Stop Cond>, <Step Mode>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Multiple measurement (counting, until Status = STEP RDY)	SING	–	V3.40
CONTinuous 	Continuous measurement (until STOP or ABORT)			
SINGleshot 	Single shot measurement (until Status = RDY)			
DEFault,	Sets the value to the default setting			
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE 	Continue measurement even in case of error	NONE	–	V3.40
SONerror 	Stop measurement in case of error (<i>stop on error</i>)			
DEFault,	Sets the value to the default setting			
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP 	Interrupt measurement after each statistics cycle	NONE	–	V3.40
NONE 	Continue measurement according to its rep. mode			
DEFault	Sets the value to the default setting			
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

DEFault:MODulation:EVMagnitude:HPSK:CONTRol[?]		Default Settings		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON 	The parameters are set to their default values	ON	–	V3.40
OFF	Some or all parameters are not set to default			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem MODulation:EVMagnitude:...:CONTRol to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

The subsystem *MODulation:OEMP:...:LIMit* (refer to page 6.65) defines the tolerance values for the *OEMP* modulation measurements. The subsystem corresponds to the *Modulation* section in the *Limits* tab in the popup menu *Modulation Configuration*.

Subsystem SUBarrays

The subsystem *SUBarrays:MODulation* defines the measurement range and the type of output values.

CONFigure:SUBarrays:MODulation:EVMagnitude:HPSK[?] <Mode>, <Start>, <Samples>		Definition of Subarrays		
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
ALL	Return all measurement values	ALL	–	V3.40
ARITHmetical	Return arithm. mean value in every range			
MINimum	Return minimum value in every range			
MAXimum	Return maximum value in every range			
<Start>	Description of parameters	Def. value	Def. unit	FW vers.
0 μs to 833 μs	Start time in current range	NAN	s	V3.40
<Samples>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1024	Number of samples in current range	NAN	–	V3.40
Description of command				
<p>This command configures the <code>READ:SUBarrays...</code>, <code>FETCh:SUBarrays...</code>, and <code>SAMPle:SUBarrays:MODulation:EVMagnitude</code> commands. It restricts the measurement to up to 32 subranges where either all measurement results (the number of which is given by the second numerical parameter) or a single statistical value is returned. The subranges are defined by the start time and the number of test points which are located on a fixed, equidistant grid with a step width of 1 symbol period.</p> <p>The subranges may overlap but must be within the total range of the <i>Modulation</i> measurement. Test points outside this range are not measured (result <i>NAN</i>) and do not enter into the <i>ARITHmetical</i>, <i>MINimum</i> and <i>MAXimum</i> values.</p> <p>By default, only one range corresponding to the total measurement range is used and all measurement values are returned.</p>				

Measured Values

The subsystem *MODulation:EVMagnitude* measures and returns the error vector magnitude results and compares them with the tolerance values. The subsystem corresponds to the various output elements in the measurement menu *MODulation*, application *Error Vector Magnitude*.

READ[:SCALar]:MODulation:EVMagnitude:HPSK? FETCh[:SCALar]:MODulation:EVMagnitude:HPSK? SAMPlE[:SCALar]:MODulation:EVMagnitude:HPSK?		Scalar Results		
		Start single shot measurement and return results		
		Read out meas. results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
EVM Peak (x3),	0.0 % to 100.0 %	NAN	%	V3.40
EVM RMS (x3),	0.0 % to 100.0 %	NAN	%	
Carrier Feedthrough (x3),	-120.0 dB to -20.0 dB	NAN	dB	
I/Q Imbalance (x3),	-120.0 dB to -20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 Hz to 1000 Hz	NAN	Hz	
Tx Time Error (x3),	0 μs to 10 μs	NAN	μs	
Waveform Quality (Rho) (x3),	0 to 1	NAN	-	
AT Power (x3),	-133.0 dBm to +19.0 dBm	NAN	dB	
Current Statistics,	1 to 1000	NAN	-	
Bursts Out Of Tolerance	0.0 % to 100.0 %	NAN	%	
Description of command				
These commands are always queries. They start a EVM measurement and output the scalar measurement results (see chapter 4). The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>calculation of statistical quantities</i>). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:MODulation:EVMagnitude:HPSK:MATCHing:LIMit?		Out of Tolerance		
Returned values	Value range	Def. value	Def. unit	FW vers.
EVM Peak (x3),	For all measured values: NMAU NMAL INV OK	INV	-	V3.40
EVM RMS (x3),		INV	-	
Carrier Feedthrough (x3),		INV	-	
I/Q Imbalance (x3),		INV	-	
Carrier Freq. Error (x3),		INV	-	
Tx Time Error (x3),		INV	-	
Waveform Quality (Rho) (x3),		INV	-	
AT Power (x3)		INV	-	
Description of command				
This command is always a query. It indicates whether and in which way the error limits for the scalar measured values (see above command) have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value. The limits are defined with the <i>CONFigure:MODulation:OEMP...</i> commands.				
The following messages may be output for all measured values:				
NMAU	Underflow of tolerance value	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	all tolerances matched			

EVM in Evaluation Period				
READ:ARRay:MODulation:EVMagnitude:HPSK:CURRent? READ:ARRay:MODulation:EVMagnitude:HPSK:AVERAge? READ:ARRay:MODulation:EVMagnitude:HPSK:MMAx?				
Start single shot measurement and return results				
FETCh:ARRay:MODulation:EVMagnitude:HPSK:CURRent? FETCh:ARRay:MODulation:EVMagnitude:HPSK:AVERAge? FETCh:ARRay:MODulation:EVMagnitude:HPSK:MMAx?				
Read measurement results (unsynchronized)				
SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:CURRent? SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:AVERAge? SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:MMAx?				
Read measurement results (synchronized)				
Returned values	Value range	Def. value	Def. unit	FW vers.
1 st value for error vector magnitude,	0.0 % to + 100.0 %,	NAN	%	V3.40
x th value for error vector magnitude	0.0 % to + 100.0 %	NAN	%	
Description of command				
These commands are always queries. They return the error vector magnitude vs. time at fixed, equidistant test points. The number of measured values is 1024, corresponding to a time range of 0 symbols to 833 microseconds.				
The calculation of <i>current</i> , <i>average</i> , and <i>mmax</i> (Min./Max.) results is explained in chapter 3 (see <i>display mode</i>).				

Subarray Results				
READ:SUBarrays:MODulation:EVMagnitude:HPSK:CURRent? READ:SUBarrays:MODulation:EVMagnitude:HPSK:AVERAge? READ:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?				
Start measurement and wait for end ⇒ RUN				
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:CURRent? FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:AVERAge? FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?				
Read meas. results (unsynchronized) ⇒ RUN				
SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:CURRent? SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:AVERAge? SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?				
Read results (synchronized) ⇒ RUN				
Returned values	Value range	Def. value	Def. unit	FW vers.
1 st value for error vector magnitude	0.0 % to + 100.0 %,	NAN	%	V3.40
x th value for error vector magnitude	0.0 % to + 100.0 %	NAN	%	
Description of command				
These commands are always queries. They measure and return the error vector magnitude versus time in the subranges defined by means of the <code>CONFigure:SUBarrays:MODulation:EVMagnitude</code> command.				
The <code>CONFigure:SUBarrays:MODulation:EVMagnitude</code> command defines a maximum of 32 subranges. If one of the statistical modes (<code>ARITHmetical</code> , <code>MINimum</code> , <code>MAXimum</code>) is set, only one value is returned per subrange.				
The calculation of <i>current</i> , <i>average</i> , <i>minimum</i> , and <i>maximum</i> results is explained in chapter 3 (see <i>display mode</i>).				

MODulation:MERRor (Appl. Magnitude Error H-PSK)

The subsystem *MODulation:MERRor* measures the magnitude error as well as general scalar modulation parameters. The subsystem corresponds to the measurement menu *Modulation*, application *Magnitude Error*, and the associated popup menu *Modulation Configuration*.

Control of Measurement

The subsystem *MODulation:MERRor* controls the magnitude error measurement. It corresponds to the softkey *Magn. Error* in the measurement menu *Modulation*.

INITiate:MODulation:MERRor:HPSK	Start new measurement	⇒	<i>RUN</i>
ABORT:MODulation:MERRor:HPSK	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:MODulation:MERRor:HPSK	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTinue:MODulation:MERRor:HPSK	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the magnitude error measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:MODulation:MERRor:HPSK:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:MODulation:MERRor:HPSK:STATus?		Measurement Status		
<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTinue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Curr.Step.CycleCnt>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE,	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Magnitude Error* measurement in the *Modulation* menu. They correspond to the *Modulation Configuration* menu.

Subsystem CONTROL

The subsystem *MODulation:MERRor:CONTRol* configures the magnitude error measurement. It corresponds to the tab *Control* in the popup menu *Modulation Configuration*.

CONFigure:MODulation:MERRor:HPSK:CONTRol[?]		Scope of Measurement		
<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the <code>...CONTRol:RMODE</code> , <code>...CONTRol:STATistics</code> , and <code>...CONTRol:REPetition</code> commands, see below.				

CONFigure:MODulation:MERRor:HPSK:CONTRol:RMODE[?]		Result mode		
<Result Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

CONFigure:MODulation:MERRor:HPSK:CONTRol:STATistics[?] <Statistics Count>		Statistics Count		
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command specifies the type of measured values and defines the number of bursts forming a statistics cycle.				

CONFigure:MODulation:MERRor:HPSK:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

DEFault:MODulation:MERRor:HPSK:CONTRol[?] <Enable>		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem MODulation:MERRor:...:CONTRol to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

The subsystem *MODulation:OEMP:...:LIMit* (refer to page 6.65) defines the tolerance values for the *OEMP* modulation measurements. The subsystem corresponds to the *Modulation* section in the *Limits* tab in the popup menu *Modulation Configuration*.

Subsystem SUBarrays

The subsystem *SUBarrays:MODulation:MERRor* defines the measurement range and the type of output values.

CONFigure:SUBarrays:MODulation:MERRor:HPSK[?] <Mode>, <Start>, <Samples>		Definition of Subarrays		
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
ALL 	Return all measurement values	ALL	–	V3.40
ARITHmetical 	Return arithm. mean value in every range			
MINimum 	Return minimum value in every range			
MAXimum,	Return maximum value in every range			
<Start>	Description of parameters	Def. value	Def. unit	FW vers.
0 μs to	Start time in current range	0	s	V3.40
833 μs,				
<Samples>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1024	Number of samples in current range	50	–	V3.40
Description of command				
<p>This command configures the <code>READ:SUBarrays...</code>, <code>FETCh:SUBarrays...</code>, and <code>SAMPlE:SUBarrays:MODulation:MERRor</code> commands. It restricts the measurement to up to 32 subranges where either all measurement results (the number of which is given by the second numerical parameter) or a single statistical value is returned. The subranges are defined by the start time and the number of test points which are located on a fixed, equidistant grid with a step width of 1 symbol period.</p> <p>The subranges may overlap but must be within the total range of the <i>Modulation</i> measurement. Test points outside this range are not measured (result <i>NAN</i>) and do not enter into the <i>ARITHmetical</i>, <i>MINimum</i> and <i>MAXimum</i> values.</p> <p>By default, only one range corresponding to the total measurement range is used and all measurement values are returned.</p>				

Measured Values

The subsystem *MODulation:MERRor* measures and returns the magnitude error results and compares them with the tolerance values. The subsystem corresponds to the various output elements in the measurement menu *MODulation*, application *Magnitude Error*.

		Scalar Results		
READ[:SCALar]:MODulation:MERRor:HPSK?		Start single shot measurement and return result		
FETCh[:SCALar]:MODulation:MERRor:HPSK?		Read out meas. results (unsynchronized)		
SAMPlE[:SCALar]:MODulation:MERRor:HPSK?		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
ME Peak (x3),	0.0 % to 100.0 %	NAN	%	V3.40
ME RMS (x3),	0.0 % to 100.0 %	NAN	%	
Carrier Feedthrough (x3),	-120.0 dB to -20.0 dB	NAN	dB	
I/Q Imbalance (x3),	-120.0 dB to -20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 Hz to 1000 Hz	NAN	Hz	
Transmit Time Error (x3),	0 μs to 10 μs	NAN	μs	
Waveform Quality (Rho) (x3),	0 to 1	NAN	—	
AT Power (x3),	-133.0 dBm to +19.0 dBm	NAN	dB	
Current Statistics,	1 to 1000	NAN	—	
Bursts Out Of Tolerance	0.0 % to 100.0 %	NAN	%	
Description of command				
These commands are always queries. They start a magnitude error measurement and output the scalar measurement results (see chapter 4). The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>calculation of statistical quantities</i>). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MaxMin</i> value.				

CALCulate[:SCALar]:MODulation:MERRor:HPSK:MATChing:LIMit?		Out of Tolerance		
Returned values	Value range	Def. value	Def. unit	FW vers.
ME Peak (x3),	For all measured values: NMAU NMAL INV OK	INV	—	V3.40
ME RMS (x3),		INV	—	
Carrier Feedthrough (x3),		INV	—	
I/Q Imbalance (x3),		INV	—	
Carrier Freq. Error (x3),		INV	—	
Transmit Time Error (x3),		INV	—	
Waveform Quality (Rho) (x3),		INV	—	
AT Power (x3)		INV	—	
Description of command				
This command is always a query. It indicates whether and in which way the error limits for the scalar measured values (see above command) have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MaxMin</i> value. The limits are defined with the <i>CONFigure:MODulation:OEMP...</i> commands.				
The following messages may be output for all measured values:				
NMAU	Underflow of tolerance value	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	all tolerances matched			

		Magnitude Error in Evaluation Period		
READ:ARRay:MODulation:MERRor:HPSK:CURRent? READ:ARRay:MODulation:MERRor:HPSK:AVERAge? READ:ARRay:MODulation:MERRor:HPSK:MMAx?		Start single shot measurement and return results		
FETCh:ARRay:MODulation:MERRor:HPSK:CURRent? FETCh:ARRay:MODulation:MERRor:HPSK:AVERAge? FETCh:ARRay:MODulation:MERRor:HPSK:MMAx?		Read measurement results (unsynchronized)		
SAMPlE:ARRay:MODulation:MERRor:HPSK:CURRent? SAMPlE:ARRay:MODulation:MERRor:HPSK:AVERAge? SAMPlE:ARRay:MODulation:MERRor:HPSK:MMAx?		Read measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
1 st value for magnitude error,	0.0 % to + 100.0 %,	NAN	%	V3.40
x th value for magnitude error	0.0 % to + 100.0 %	NAN	%	
Description of command				
These commands are always queries. They return the magnitude error vs. time at fixed, equidistant test points. The number of measured values is 1024, corresponding to a time range of 0 symbols to 833 microseconds.				
The calculation of <i>current</i> , <i>average</i> , and <i>mmax</i> (Min./Max.) results is explained in chapter 3 (see <i>display mode</i>).				

		Subarray Results		
READ:SUBarrays:MODulation:MERRor:HPSK:CURRent? READ:SUBarrays:MODulation:MERRor:HPSK:AVERAge? READ:SUBarrays:MODulation:MERRor:HPSK:MMAx?		Start measurement and wait for end ⇒ RUN		
FETCh:SUBarrays:MODulation:MERRor:HPSK:CURRent? FETCh:SUBarrays:MODulation:MERRor:HPSK:AVERAge? FETCh:SUBarrays:MODulation:MERRor:HPSK:MMAx?		Read meas. results (unsynchronized) ⇒ RUN		
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:CURRent? SAMPlE:SUBarrays:MODulation:MERRor:HPSK:AVERAge? SAMPlE:SUBarrays:MODulation:MERRor:HPSK:MMAx?		Read results (synchronized) ⇒ RUN		
Returned values	Description of parameters	Def. value	Def. unit	FW vers.
1 st value for magnitude error	0.0 % to + 100.0 %,	NAN	%	V3.40
x th value for magnitude error	0.0 % to + 100.0 %	NAN	%	
Description of command				
These commands are always queries. They measure and return the magnitude error versus time in the subranges defined by means of the <code>CONFigure:SUBarrays:MODulation:MERRor</code> command.				
The <code>CONFigure:SUBarrays:MODulation:MERRor</code> command defines a maximum of 32 subranges. If one of the statistical modes (<code>ARITHmetical</code> , <code>MINimum</code> , <code>MAXimum</code>) is set, only one value is returned per subrange.				
The calculation of <i>current</i> , <i>average</i> , <i>minimum</i> , and <i>maximum</i> results is explained in chapter 3 (see <i>display mode</i>).				

MODulation:PERRor (Application Phase Error H-PSK)

The subsystem *MODulation:PERRor* measures the phase error as well as general scalar modulation parameters. The subsystem corresponds to the measurement menu *Modulation*, application *Phase Error*, and the associated popup menu *Modulation Configuration*.

Control of Measurement

The subsystem *MODulation:PERRor* controls the phase error measurement. It corresponds to the softkey *Phase Error* in the measurement menu *Modulation*.

INITiate:MODulation:PERRor:HPSK	Start new measurement	⇒ <i>RUN</i>
ABORt:MODulation:PERRor:HPSK	Abort running measurement and switch off	⇒ <i>OFF</i>
STOP:MODulation:PERRor:HPSK	Stop measurement after current stat. cycle	⇒ <i>STOP</i>
CONTInue:MODulation:PERRor:HPSK	Next measurement step (<i>stepping mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start and stop the phase error measurement, setting it to the status indicated in the top right column.		V3.40

CONFigure:MODulation:PERRor:HPSK:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:MODulation:PERRor:HPSK:STATus?		Measurement Status		
<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORt)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTInue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY	Stopped according to repetition mode and stop condition			
<Cur.Step.CycleCnt>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Phase Error* measurement in the *Modulation* menu. They correspond to the *Modulation Configuration* menu.

Subsystem CONTROL

The subsystem *MODulation:PERRor:CONTRol* configures the phase error measurement. It corresponds to the tab *Control* in the popup menu *Modulation Configuration*.

CONFigure:MODulation:PERRor:HPSK:CONTRol[?]		Scope of Measurement		
<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTRol:STATistics, ...CONTRol:REPetition and ...CONTRol:RMode commands.				

CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics[?]		Statistics Count		
<Statistics Count>				
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command specifies the type of measured values and defines the number of bursts forming a statistics cycle.				

MODulation:PERRor (Application Phase Error H-PSK) CMU-K88/-K839/.../-K869

CONFigure:MODulation:PERRor:HPSK:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Multiple measurement (counting, until Status = STEP RDY)	SING	–	V3.40
CONTInuous SINGleshot DEFault,	Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting			
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the number of statistics cycles, the stop condition and the stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

CONFigure:MODulation:PERRor:HPSK:CONTRol:RMODE[?] <Result Mode>		Result Mode		
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRy	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

DEFault:MODulation:PERRor:HPSK:CONTRol[?] <Enable>		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem MODulation:PERRor:...:CONTRol to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

The subsystem *MODulation:OEMP:...:LIMit* (refer to page 6.65) defines the tolerance values for the *OEMP* modulation measurements. The subsystem corresponds to the *Modulation* section in the *Limits* tab in the popup menu *Modulation Configuration*.

Subsystem SUBarrays

The subsystem *SUBarrays:MODulation:PERRor* defines the measurement range and the type of output values.

CONFigure:SUBarrays:MODulation:PERRor:HPSK[?] <Mode>, <Start>, <Samples>		Definition of Subarrays		
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
ALL 	Return all measurement values	ALL	–	V3.40
ARITHmetical 	Return arithm. mean value in every range			
MINimum 	Return minimum value in every range			
MAXimum,	Return maximum value in every range			
<Start>	Description of parameters	Def. value	Def. unit	FW vers.
0 μs to 833 μs,	Start time in current range	0	s	V3.40
<Samples>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1024	Number of samples in current range	50	–	V3.40
Description of command				
<p>This command configures the <code>READ:SUBarrays...</code>, <code>FETCh:SUBarrays...</code>, and <code>SAMPlE:SUBarrays:MODulation:PERRor</code> commands. It restricts the measurement to up to 32 subranges where either all measurement results (the number of which is given by the second numerical parameter) or a single statistical value is returned. The subranges are defined by the start time and the number of test points which are located on a fixed, equidistant grid with a step width of 1 symbol period.</p> <p>The subranges may overlap but must be within the total range of the <i>Modulation</i> measurement. Test points outside this range are not measured (result <i>NAN</i>) and do not enter into the <i>ARITHmetical</i>, <i>MINimum</i> and <i>MAXimum</i> values.</p> <p>By default, only one range corresponding to the total measurement range is used and all measurement values are returned.</p>				

Measured Values

The subsystem *MODulation:PERRor* measures and returns the phase error results and compares them with the tolerance values. The subsystem corresponds to the various output elements in the measurement menu *MODulation*, application *Phase Error*.

READ[:SCALar]:MODulation:PERRor:HPSK? FETCh[:SCALar]:MODulation:PERRor:HPSK? SAMPle[:SCALar]:MODulation:PERRor:HPSK?		Scalar Results:		
		Start single shot measurement and return results		
		Read out meas. Results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
PE Peak (x3), PE RMS (x3),	0.0 deg to +45.0 deg 0.0 deg to +45.0 deg	NAN NAN	% %	V3.40
Carrier Feedthrough (x3), I/Q Imbalance (x3), Carrier Freq. Error (x3), Tx Time Error (x3), Waveform Quality (Rho) (x3), AT Power (x3),	-120.0 dB to -20.0 dB -120.0 dB to -20.0 dB 0 Hz to 1000 Hz 0 μs to 10 μs 0 to 1 -133.0 dBm to -19.0 dBm	NAN NAN NAN NAN NAN NAN	dB dB Hz μs - dBm	
Current Statistics, Bursts Out Of Tolerance	1 to 1000 0.0 % to 100.0 %	NAN NAN	- %	
Description of command				
These commands are always queries. They start a phase error measurement and output the scalar measurement results (see chapter 4). The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>calculation of statistical quantities</i>). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:MODulation:PERRor:HPSK:MATCHing:LIMit?		Out of Tolerance		
Returned values	Value range	Def. value	Def. unit	FW vers.
PE Peak (x3), PE RMS (x3),	For all measured values: NMAU NMAL INV OK	INV INV	- -	V3.40
Carrier Feedthrough (x3), I/Q Imbalance (x3), Carrier Freq. Error (x3), Tx Time Error (x3), Waveform Quality (Rho) (x3), AT Power (x3)		INV INV INV INV INV INV	- - - - - -	
Description of command				
This command is always a query. It indicates whether and in which way the error limits for the scalar measured values (see above command) have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value. The limits are defined with the <i>CONFigure:MODulation:OEMP...</i> commands.				
The following messages may be output for all measured values:				
NMAU	Underflow of tolerance value	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	all tolerances matched			

CMU-K88/-K839/.../-K869 MODulation:PERRor (Application Phase Error H-PSK)

		Phase Error in Burst		
READ:ARRay:MODulation:PERRor:HPSK:CURRent? READ:ARRay:MODulation:PERRor:HPSK:AVERAge? READ:ARRay:MODulation:PERRor:HPSK:MMAx?		Start single shot measurement and return results		
FETCh:ARRay:MODulation:PERRor:HPSK:CURRent? FETCh:ARRay:MODulation:PERRor:HPSK:AVERAge? FETCh:ARRay:MODulation:PERRor:HPSK:MMAx?		Read measurement results (unsynchronized)		
SAMPlE:ARRay:MODulation:PERRor:HPSK:CURRent? SAMPlE:ARRay:MODulation:PERRor:HPSK:AVERAge? SAMPlE:ARRay:MODulation:PERRor:HPSK:MMAx?		Read measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
1 st value for phase error	-100.0 deg to + 100.0 deg,	NAN	deg	V3.40
x th value for phase error	-100.0 deg to + 100.0 deg	NAN	deg	
Description of command				
These commands are always queries. They return the phase error vs. time at fixed, equidistant test points. The number of measured values is 1024, corresponding to a time range of 0 symbols to 833 microseconds.				
The calculation of <i>current</i> , <i>average</i> , and <i>mmax</i> (Min./Max.) results is explained in chapter 3 (see <i>display mode</i>).				

		Subarray Results		
READ:SUBarrays:MODulation:PERRor:HPSK:CURRent? READ:SUBarrays:MODulation:PERRor:HPSK:AVERAge? READ:SUBarrays:MODulation:PERRor:HPSK:MMAx?		Start measurement and wait for end ⇒ RUN		
FETCh:SUBarrays:MODulation:PERRor:HPSK:CURRent? FETCh:SUBarrays:MODulation:PERRor:HPSK:AVERAge? FETCh:SUBarrays:MODulation:PERRor:HPSK:MMAx?		Read meas. results (unsynchronized) ⇒ RUN		
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:CURRent? SAMPlE:SUBarrays:MODulation:PERRor:HPSK:AVERAge? SAMPlE:SUBarrays:MODulation:PERRor:HPSK:MMAx?		Read results (synchronized) ⇒ RUN		
Returned values	Value range	Def. value	Def. unit	FW vers.
1 st value for phase error	100.0 deg to + 100.0 deg,	NAN	deg	V3.40
x th value for phase error	-100.0 deg to + 100.0 deg	NAN	deg	
Description of command				
These commands are always queries. They measure and return the phase error versus time in the subranges defined by means of the <code>CONFigure:SUBarrays:MODulation:PERRor</code> command.				
The <code>CONFigure:SUBarrays:MODulation:PERRor</code> command defines a maximum of 32 subranges. If one of the statistical modes (<code>ARITHmetical</code> , <code>MINimum</code> , <code>MAXimum</code>) is set, only one value is returned per subrange.				
The calculation of <i>current</i> , <i>average</i> , <i>minimum</i> , and <i>maximum</i> results is explained in chapter 3 (see <i>display mode</i>).				

MODulation:IQANalyzer (IQ Analyzer H-PSK)

The subsystem *MODulation:IQANalyzer* measures the I and Q amplitudes of the received HPSK signal as a function of time. The subsystem corresponds to the measurement menu *Modulation*, application *I/Q Analyzer HPSK*, and the sections in the popup menu *Modulation Configuration* that are related to the *I/Q Analyzer* application.

Control of Measurement

The subsystem *MODulation:IQANalyzer* controls the measurement. It corresponds to the softkey *I/Q Analyzer* in the measurement menu *Modulation*.

INITiate:MODulation: IQANalyzer:HPSK	Start new measurement	⇒	<i>RUN</i>
ABORT:MODulation:IQANalyzer:HPSK	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:MODulation:IQANalyzer:HPSK	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTinue:MODulation:IQANalyzer:HPSK	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the I/Q Analyzer measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:MODulation:IQANalyzer:HPSK:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
OFF 	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:MODulation:IQANalyzer:HPSK:STATus?		Measurement Status		
<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTinue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY	Stopped according to repetition mode and stop condition			
<Curr.Step.CycleCnt>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *I/Q Analyzer* measurement in the *Modulation* menu. They correspond to the sections in the *Modulation Configuration* menu that are related to the *I/Q Analyzer* application.

Subsystem CONTROL

The subsystem *MODulation:IQANalyzer:CONTROL* configures the measurement. It corresponds to the tab *Control* in the popup menu *Modulation Configuration*.

CONFigure:MODulation:IQANalyzer:HPSK:CONTROL:REPetition[?]				Test Cycles	
<Repetition>, <Stop Cond>, <Step Mode>					
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.	
1 to 10000	Multiple measurement (counting, until Status = STEP RDY)	SING	–	V3.40	
CONTInuous	Continuous measurement (until STOP or ABORT)				
SINGleshot	Single shot measurement (until Status = RDY)				
DEFault,	Sets the value to the default setting				
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.	
NONE	Continue measurement even in case of error	NONE	–	V3.40	
SONerror	Stop measurement in case of error (<i>stop on error</i>)				
DEFault,	Sets the value to the default setting				
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.	
STEP	Interrupt measurement after each statistics cycle	NONE	–	V3.40	
NONE	Continue measurement according to its rep. Mode				
DEFault	Sets the value to the default setting				
Description of command					
This command determines the repetition mode, stop condition, and stepping mode for the measurement.					
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.					

CONFigure:MODulation:IQANalyzer:HPSK:CONTROL:RMODE[?]				Result mode	
<Result Mode>					
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.	
SCALar	Scalar values only	ARR	–	V3.40	
ARRay	Scalar measured values and arrays				
Description of command					
This command specifies the type of measured values.					

DEFault:MODulation:IQANalyzer:HPSK:CONTROL[?]				Default Settings	
<Enable>					
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.	
ON	The parameters are set to their default values	ON	–	V3.40	
OFF	Some or all parameters are not set to default				
Description of command					
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>MODulation:IQANalyzer:...:CONTROL</i> to their default values (the setting <i>OFF</i> results in an error message).					
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).					

CONFigure:MODulation:IQANalyzer:HPSK:DESPread[?] <Despreading Mode>		Despreading Mode														
<Despr. Mode>	Description of parameters	Def. value	Def. unit	FW vers.												
OFF DATA	Single demodulation/despreading of the signal per chip De-spreading only with symbols from the data channel	OFF	–	V4.31												
Description of command																
<p>If used as a setting command with the parameter <i>OFF</i>, this command sets the single demodulation/despreading of the signal per chip. With parameter <i>DATA</i>, only the signal symbols from the data channel are despread over the capture interval. The number of resulting I/Q values from the <i>DATA</i> de-spreading is different for each data channel modulation:</p> <table border="1"> <thead> <tr> <th>Modulation Type</th> <th># of Results</th> </tr> </thead> <tbody> <tr> <td>B4</td> <td>256 IQ values ($l = 0$)</td> </tr> <tr> <td>Q4</td> <td>256 IQ values</td> </tr> <tr> <td>Q2</td> <td>512 IQ values</td> </tr> <tr> <td>Q4Q2</td> <td>256 IQ values (W_2^4) + 512 IQ values (W_1^2)</td> </tr> <tr> <td>E4E2</td> <td>256 IQ values (W_2^4) + 512 IQ values (W_1^2)</td> </tr> </tbody> </table> <p>The Q4Q2 and E4E2 constellation consists of two orthogonal walsh codes, hence the result is split into the W_2^4 and W_1^2 parts.</p> <p>If used as a query, the command returns whether despreading is active per chip for all channels (<i>OFF</i>) or with data symbols (<i>DATA</i>).</p>					Modulation Type	# of Results	B4	256 IQ values ($l = 0$)	Q4	256 IQ values	Q2	512 IQ values	Q4Q2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)	E4E2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)
Modulation Type	# of Results															
B4	256 IQ values ($l = 0$)															
Q4	256 IQ values															
Q2	512 IQ values															
Q4Q2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)															
E4E2	256 IQ values (W_2^4) + 512 IQ values (W_1^2)															

Subsystem SUBarrays

The subsystem *SUBarrays:MODulation:IQANalyzer* defines the measurement range and the type of output values.

CONFigure:SUBarrays:MODulation:IQANalyzer:HPSK[?] <Mode>, <Start>, <Samples>		Definition of Subarrays		
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
ALL	Return all measurement values	ALL	–	V3.40
<Start>	Description of parameters	Def. value	Def. unit	FW vers.
0 μs to 833 μs	Start time in current range	NAN	s	V3.40
<Samples>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 4096	Number of samples in current range	NAN	–	V3.40
Description of command				
<p>This command configures the <i>READ:SUBarrays...</i>, <i>FETCh:SUBarrays...</i>, and <i>SAMPle:SUBarrays:MODulation:IQANalyzer</i> commands. It restricts the measurement to up to 32 subranges where either all measurement results (the number of which is given by the second numerical parameter) or a single statistical value is returned. The subranges are defined by the start time and the number of test points which are located on a fixed, equidistant grid with a step width of 1 symbol period.</p> <p>The subranges may overlap but must be within the total range of the <i>I/Q Analyzer</i> measurement. Test points outside this range are not measured (result <i>NAN</i>).</p> <p>By default, only one range corresponding to the total measurement range is used and all measurement values are returned.</p>				

Measured Values

The subsystem *MODulation:IQANalyzer* measures and returns the I/Q Analyzer results. No limit check is performed. The subsystem corresponds to the various output elements in the measurement menu *MODulation*, application *I/Q Analyzer*.

		Scalar Results		
READ[:SCALar]:MODulation:IQANalyzer:HPSK?		Start single shot measurement and return results		
FETCh[:SCALar]:MODulation: IQANalyzer:HPSK?		Read out meas. results (unsynchronized)		
SAMPlE[:SCALar]:MODulation: IQANalyzer:HPSK?		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
IQ Peak (x3),	0.0 % to 100.0 %	NAN	%	V3.40
IQ RMS (x3),	0.0 % to 100.0 %	NAN	%	
Carrier Feedthrough (x3),	-120.0 dB to -20.0 dB	NAN	dB	
I/Q Imbalance (x3),	-120.0 dB to -20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 Hz to 1000 Hz	NAN	Hz	
Transmit Time Error (x3),	0 μs to 10 μs	NAN	μs	
Waveform Quality (Rho) (x3),	0 to 1	NAN	-	
AT Power (x3),	-133.0 dBm to +19.0 dBm	NAN	dB	
Description of command				
These commands are always queries. They start a modulation measurement and output the scalar measurement results (see chapter 4). The calculation of results in an <i>average</i> or <i>peak</i> measurement is described in chapter 3 (see <i>calculation of statistical quantities</i>). The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MaxMin</i> value.				

		Normalized I phase amplitude		
READ:ARRAy:MODulation:IQANalyzer:HPSK:IPHase?		Start single shot measurement and return results		
FETCh:ARRAy:MODulation:IQANalyzer:HPSK:IPHase?		Read measurement results (unsynchronized)		
SAMPlE:ARRAy:MODulation:IQANalyzer:HPSK:IPHase?		Read measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
-2.0 to +2.0,	1 st value for normalized I amplitude,	NAN	-	V3.40
....				
-2.0 to +2.0	4096 th value for normalized I amplitude	NAN	-	
Description of command				
These commands are always queries. They return the normalized I amplitude. The number of measured values is 4096. This corresponds to an oversampling factor of four compared to the <i>OEMP</i> modulation measurements. The time range of 0 symbols to 833 microseconds.				

		Normalized Q phase amplitude		
READ:ARRAy:MODulation:IQANalyzer:HPSK:QPHase?		Start single shot measurement and return results		
FETCh:ARRAy:MODulation:IQANalyzer:HPSK:QPHase?		Read measurement results (unsynchronized)		
SAMPlE:ARRAy:MODulation:IQANalyzer:HPSK:QPHase?		Read measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
-2.0 to +2.0,	1 st value for normalized Q amplitude,	NAN	-	V3.40
....				
-2.0 to +2.0	4096 th value for normalized Q amplitude	NAN	-	
Description of command				
These commands are always queries. They return the normalized Q amplitude. The number of measured values is 4096. This corresponds to an oversampling factor of four compared to the <i>OEMP</i> modulation measurements. The time range of 0 symbols to 833 microseconds.				

SPECTrum:ACP (ACP Spectrum)

The subsystem *SPECTrum:ACP* measures the power of four adjacent channel pairs. These four pairs correspond to symmetrical frequency offsets to the RF frequency (command [*SENSE*]:*RFANalyzer:FREQuency*[?]). The subsystem corresponds to the measurement menu *Spectrum* and the associated popup menu *Spectrum Configuration*.

Control of Measurement

The subsystem *SPECTrum:ACP* controls the adjacent channel power spectrum measurement. It corresponds to the softkey *ACP* in the measurement menu *Spectrum*.

INITiate:SPECTrum:ACP	Start new measurement	⇒ <i>RUN</i>
ABORT:SPECTrum:ACP	Abort running measurement and switch off	⇒ <i>OFF</i>
STOP:SPECTrum:ACP	Stop measurement after current stat. cycle	⇒ <i>STOP</i>
CONTinue:SPECTrum:ACP	Next measurement step (<i>stepping mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start and stop the ACP spectrum measurement, setting it to the status indicated in the top right column.		V3.40

CONFigure:SPECTrum:ACP:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
DEFault 	Sets the value to the default setting			
OFF	No reporting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:SPECTrum:ACP:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTinue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Curr.Step.CycleCnt>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE,	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *ACP Spectrum* measurement in the *Spectrum* menu. They correspond to the *Spectrum Configuration* popup menu.

Subsystem CONTROL

The subsystem *SPECTrum:ACP:CONTROL* configures the ACP Spectrum measurement. It defines the repetition mode, statistic count, stop condition and the offset frequencies of the measurement. It corresponds to the tab *Control* in the popup menu *Spectrum Configuration*.

CONFigure:SPECTrum:ACP:CONTROL[?] <StatisticCount>, <Repetition>, <Stop Cond>, <Step Mode>		Scope of Measurement		
<StatisticCount>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (<i>counting</i> , until <i>Status = STEP RDY</i>) Continuous measurement (until <i>STOP</i> or <i>ABORT</i>) Single shot measurement (until <i>Status = RDY</i>) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on e</i> <i>READ[:SCALar]:SPECTrum:ACP?rror</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTROL:RMODE, ...CONTROL:STATISTICS and the ...CONTROL:REPETITION commands, see below.				

CONFigure:SPECTrum:ACP:CONTROL:STATISTICS[?] <Statistics Count >		Statistic Count		
<Statistics Count>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command defines the number of bursts forming a statistics cycle.				

CONFigure:SPECTrum:ACP:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Multiple measurement (<i>counting</i> , until <i>Status = STEP RDY</i>)	SING	–	V3.40
CONTInuous 	Continuous measurement (until <i>STOP</i> or <i>ABORT</i>)			
SINGleshot 	Single shot measurement (until <i>Status = RDY</i>)			
DEFault,	Sets the value to the default setting			
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE 	Continue measurement even in case of error	NONE	–	V3.40
SONerror 	Stop measurement in case of error (<i>stop on error</i>)			
DEFault,	Sets the value to the default setting			
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP 	Interrupt measurement after each statistics cycle	NONE	–	V3.40
NONE 	Continue measurement according to its rep. Mode			
DEFault	Sets the value to the default setting			
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (<i>READ:...</i>), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

DEFault:SPECTrum:ACP:CONTRol[?] <Enable>		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON 	The parameters are set to their default values	ON	–	V3.40
OFF	Some or all parameters are not set to default			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>SPECTrum:ACP:CONTRol</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

CONFigure:SPECTrum:ACP:CONTRol:FOFFset:ACP<nr>[?] <Freq. Offset>		ACP Frequency Offset		
<Freq. Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 2 MHz OFF ON	The ACP frequency offset depends on the network standard: Band Class 0, US Cellular Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz	Hz	V3.40
0 to 2 MHz OFF ON	Band Class 0, Korean Cellular Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 1, North American PCS Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz		V3.40
0 to 2 MHz OFF ON	Band Class 2, TACS Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 3, JTACS Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 4, Korean PCS Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 5, NMT 450 Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 6, IMT-2000 Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 7, North American 700 MHz Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 8, 1800 MHz Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 9, North American 900 MHz Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		
0 to 2 MHz OFF ON	Band Class 10, Secondary 800 MHz Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz		

0 to 2 MHz OFF ON	Band Class 11, European 400 MHz PAMR Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 12, 800 MHz PAMR Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 870.00 kHz <nr> = 2: 885.00 kHz <nr> = 3: 900.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 13, IMT-2000 2.5 GHz Ext. Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 14, US PCS 1900 MHz Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 15, AWS Band Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 16, US 2.5 GHz Band Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
0 to 2 MHz OFF ON	Band Class 17, US 2.5 GHz Forward Link Only Band Measurement disabled, result INV Enable measurement, last setting re-activated	<nr> = 1: 1150.00 kHz <nr> = 2: 1200.00 kHz <nr> = 3: 1250.00 kHz <nr> = 4: 1980.00 kHz	V4.20						
Description of command									
<p>This command determines four frequency offset values (<nr> = 1 to 4) which define the four adjacent channel pairs. <i>OFF</i> will disable the measurement on the specified frequency pair and <i>INV</i> will be returned as result. See also the command <code>CONFigure:NETWork:STANdard</code>.</p> <p>For all of the above frequency offsets, the following parameters may also be used:</p> <table border="0"> <tr> <td>MINimum</td> <td>Sets the frequency offset value to the respective minimum value</td> </tr> <tr> <td>MAXimum</td> <td>Sets the frequency offset value to the respective maximum value</td> </tr> <tr> <td>DEFault</td> <td>Sets the frequency offset value to the respective default value</td> </tr> </table>				MINimum	Sets the frequency offset value to the respective minimum value	MAXimum	Sets the frequency offset value to the respective maximum value	DEFault	Sets the frequency offset value to the respective default value
MINimum	Sets the frequency offset value to the respective minimum value								
MAXimum	Sets the frequency offset value to the respective maximum value								
DEFault	Sets the frequency offset value to the respective default value								

Subsystem LIMit

SPECTrum:ACP:LIMit

The subsystem *SPECTrum:ACP:LIMit* defines tolerance values for the ACP Spectrum measurement.

CONFigure:SPECTrum:ACP:LIMit:ACP<nr>[?] <ACP Limit>				Limits
<ACP Limit>	Description of parameters	Def. value	Def. unit	FW vers.
-80.0 to +10.0	Power limit for ACP<nr>	<nr> = 1: -43 dB	dB	V3.40
ON	Enables the tolerance check for ACP<nr>	<nr> = 2: -43 dB		
OFF	Disables the tolerance check for ACP<nr>	<nr> = 3: -43 dB		
MINimum	Sets the power limit for ACP<nr> to range minimum	<nr> = 4: -43 dB		
MAXimum	Sets the power limit for ACP<nr> to range maximum			
DEFault	Sets the power limit for ACP<nr> to default value			
Description of command				
This command defines the upper power limits for the adjacent channel pairs <nr> = 1 to 4. These limits apply to any of the statistic evaluation modes (<i>Current</i> , <i>Average</i> and <i>Maximum</i>).				

DEFault:SPECTrum:ACP:LIMit[?] <Enable>				Default Settings
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	The parameters are set to their default values	ON	–	V3.40
OFF	Some or all parameters are not set to default			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>SPECTrum:ACP:LIMit</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem *SPECTrum:ACP* determines and outputs the results of the ACP Spectrum measurement.

XTND:SPECTrum:ACP:STATistics[?] <Enable> <Static results extension>				Scope of scalar results
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	Statistical results returned	OFF	–	V3.40
OFF	No statistical results returned			
DEFault	The scalar ACP Spectrum results are set to default			
Description of command				
This command qualifies whether or not READ[:SCALar]:SPECTrum:ACP?, FETCh...?, SAMPlE...? return the statistical results <i>Out of Tolerance</i> and <i>Current Statistics</i> .				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Returned values		Value range	Def. value	Def. unit	FW vers.
Scalar results:					
READ[:SCALar]:SPECTrum:ACP?		Start single shot measurement and return results			
FETCh[:SCALar]:SPECTrum:ACP?		Read out measurement results (unsynchronized)			
SAMPle[:SCALar]:SPECTrum:ACP?		Read out measurement results (synchronized)			
Power of adj. Channel -4	(Current),	-80.0 dB to 0.0 dB	NAN	dB	V3.40
Power of adj. Channel -3	(Current),		NAN		
Power of adj. Channel -2	(Current),		NAN		
Power of adj. Channel -1	(Current),		NAN		
Power of adj. Channel +1	(Current),		NAN		
Power of adj. Channel +2	(Current),		NAN		
Power of adj. Channel +3	(Current),		NAN		
Power of adj. Channel +4	(Current),		NAN		
Power of adj. Channel -4	(Average),	-80.0 dB to 0.0 dB	NAN	dB	
Power of adj. Channel -3	(Average),		NAN		
Power of adj. Channel -2	(Average),		NAN		
Power of adj. Channel -1	(Average),		NAN		
Power of adj. Channel +1	(Average),		NAN		
Power of adj. Channel +2	(Average),		NAN		
Power of adj. Channel +3	(Average),		NAN		
Power of adj. Channel +4	(Average),		NAN		
Power of adj. Channel -4	(Maximum),	-80.0 dB to 0.0 dB	NAN	dB	
Power of adj. Channel -3	(Maximum),		NAN		
Power of adj. Channel -2	(Maximum),		NAN		
Power of adj. Channel -1	(Maximum),		NAN		
Power of adj. Channel +1	(Maximum),		NAN		
Power of adj. Channel +2	(Maximum),		NAN		
Power of adj. Channel +3	(Maximum),		NAN		
Power of adj. Channel +4	(Maximum),		NAN		
Channel Power	(Current),	-80.0 dBm to 0.0 dBm	NAN	dBm	
Channel Power	(Average),		NAN		
Channel Power	(Maximum),		NAN		
Out of Tolerance,		0 to 100 %	NAN	-	
Current Statistics		1 to 10000	NAN	-	
Description of command					
These commands are always queries. They start a measurement and output all scalar measurement results.					
Note: <OutOfTolerance> and <CurrentStatistics> are returned only if XTND:SPECTrum:ACP:STATistics[?] is set to ON.					

CALCulate[:SCALar]:SPECTrum:ACP:MATCHing:LIMit? <Limit>			Matching		
Returned values		Value range	Def. value	Def. unit	FW vers.
Tolerance Channel -4	(Current),	NMAU NMAL INV OK	INV	-	V3.40
Tolerance Channel -3	(Current),				
Tolerance Channel -2	(Current),				
Tolerance Channel -1	(Current),				
Tolerance Channel +1	(Current),				
Tolerance Channel +2	(Current),				
Tolerance Channel +3	(Current),				
Tolerance Channel +4	(Current),				
Tolerance Channel -4	(Average),	NMAU NMAL INV OK	INV	-	
Tolerance Channel -3	(Average),				
Tolerance Channel -2	(Average),				
Tolerance Channel -1	(Average),				
Tolerance Channel +1	(Average),				
Tolerance Channel +2	(Average),				
Tolerance Channel +3	(Average),				
Tolerance Channel +4	(Average),				
Tolerance Channel -4	(Maximum),	NMAU NMAL INV OK	INV	-	
Tolerance Channel -3	(Maximum),				
Tolerance Channel -2	(Maximum),				
Tolerance Channel -1	(Maximum),				
Tolerance Channel +1	(Maximum),				
Tolerance Channel +2	(Maximum),				
Tolerance Channel +3	(Maximum),				
Tolerance Channel +4	(Maximum),				
Description of command					
This command is always a query. It indicates whether and in which way the (fixed) limit has been exceeded. The following messages may be generated:					
NMAU	Tolerance value underflow	<i>not matching, underflow</i>			
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>			
INV	Measurement invalid	<i>invalid</i>			
OK	Tolerance value matched				

CDPower:CDPW (Code Domain Power)

The subsystem *CDPower:CDPW* measures the Code Domain Power output of the access terminal. Both the *RRI* and the *Pilot* time slot are evaluated in the same measurement shot. The *CDPower:CDPW* subsystem corresponds to the measurement menu *Code Domain Power*, application *CDP* and the sections related to this application in the associated popup menu *Code Domain Power Configuration*.

Control of Measurement

The subsystem *CDPower:CDPW* controls the code domain power measurement. It corresponds to the softkey *CDP* in the measurement menu *Code Domain Power*.

INITiate:CDPower:CDPW	Start new measurement	⇒	<i>RUN</i>
ABORt:CDPower:CDPW	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:CDPower:CDPW	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTInue:CDPower:CDPW	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the code domain power measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:CDPower:CDPW:EREPorting[?]		Event Reporting		
<EventReporting>				
<EventReporting>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
DEFault 	Sets the value to the default setting			
OFF	No reporting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:CDPower:CDPW:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTInue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE,	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Code Domain Power* measurement in the *Code Domain Power* menu. They correspond to the *Code Domain Power Configuration* popup menu.

Subsystem CONTROL

The subsystem *CDPower:CDPW:CONTROL* configures the Code Domain Power measurement. It defines the result mode, result order, repetition mode, statistic count and stop condition of the measurement. It corresponds to the tab *Control* in the popup menu *Code Domain Power Configuration*.

CONFigure:CDPower:CDPW:CONTROL[?]		Scope of Measurement		
<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SCALar ARRay,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Current Statistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (<i>counting</i> , until <i>Status = STEP RDY</i>) Continuous measurement (until <i>STOP</i> or <i>ABORT</i>) Single shot measurement (until <i>Status = RDY</i>) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTROL:RMODE, ...CONTROL:STATISTICS and the ...CONTROL:REPETITION commands, see below.				

CONFigure:CDPower:CDPW:CONTROL:RMODE[?]		Result mode		
<Result Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

CONFigure:CDPower:CDPW:CONTRol:STATistics[?] <Current Statistics>		Statistic Count		
<Current Statistics >	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command defines the number of bursts forming a statistics cycle.				

CONFigure:CDPower:CDPW:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTinuous SINGleshot DEFault,	Multiple measurement (<i>counting</i> , until <i>Status = STEP RDY</i>) Continuous measurement (until <i>STOP</i> or <i>ABORT</i>) Single shot measurement (until <i>Status = RDY</i>) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (<i>READ: ...</i>), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

CONFigure:CDPower:CDPW:CONTRol:RORder[?] <Result Order>		Result Order		
<Result Order>	Description of parameters	Def. value	Def. unit	FW vers.
HADamard BITReverse	Walsh code channels returned using Hadamard matrix Walsh code channels returned at MSB to LSB	HAD	–	V3.40
Description of command				
This command defines the method used to display the code channels. <i>HADamard</i> displays the code channels in order determined by the Hadamard matrix. <i>BITReverse</i> displays the code channels so that the related code channels are adjacent to each other.				
This setting is only available for Code Domain and Peak Code Domain Error measurement applications.				

DEFault:CDPower:CDPW:CONTRol[?] <Enable>		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>CDPower:CDPW:CONTRol</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

CDPower:CPCCommon:LIMit

The subsystem *CDPower:CPCCommon:LIMit* defines common tolerance values for the scalar results of the following Code Domain Power applications (*CPCCommon*):

- Code Domain Power (*CDP*)
- Peak Code Domain Error Power (*PCDep*)
- Channel Power (*CHPW*)

CONFigure:CDPower:CPCCommon:CMAx:LIMit:ASYMmetric[:COMBined][?] <Carrier Feedthrough Limit>, <Carrier Freq. Error Limit>, <Rho Limit>				Limits
<Carrier Feedthrough Limit>	Description of parameters	Def. value	Def. unit	FW vers.
-120.0 to -20.0 DEFault MINimum MAXimum OFF,	Carrier feedthrough limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-40.0	dB	V3.40
<Carrier Freq. Error Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1000.0 Hz DEFault MINimum MAXimum OFF,	Carrier frequency error limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	300.0	Hz	V3.40
<Rho Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 1.0 DEFault MINimum MAXimum OFF	Correlated power to the total power ratio limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	0.944	-	V3.40
Description of command				
This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

CONFigure:CDPower:CPCCommon:AVERage:LIMit:ASYMmetric[:COMBined][?] <Carrier Feedthrough Limit Average>, <Carrier Freq. Error Limit Average>, <Rho Limit Average>				Limits
<Carrier Feedthrough Limit>	Description of parameters	Def. value	Def. unit	FW vers.
-120.0 to -20.0 DEFault MINimum MAXimum OFF,	Carrier feedthrough limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-40.0	dB	V3.40
<Carrier Freq. Error Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 1000.0 Hz DEFault MINimum MAXimum OFF,	Carrier frequency error limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	300.0	Hz	V3.40
<Rho Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 1.0 DEFault MINimum MAXimum OFF	Correlated power to the total power ratio limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	0.944	–	V3.40
Description of command				
This command defines upper limits for the different traces and for the scalar modulation parameters derived from them. The keywords C MAX and A VERage refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

DEFault:CDPower:CPCCommon:LIMit[?] <Enable>				Default Settings
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The common CDP parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter ON , this command sets all parameters of the subsystem CDPower:CPCCommon:LIMit to their default values (the setting OFF results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (ON) or not (OFF).				

CDPower:CDPW:LIMit

The subsystem *CDPower:CDPW:LIMIT* defines the tolerance values that apply to the Code Domain Power application only.

CONFigure:CDPower:CDPW:CMAx:LIMit:ASyMmetric[:COMBined][?] <CDP Limit Y>				Limits
<CDP Limit Y>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 	Peak code domain power Y limit	-23.0	dB	V3.40
DEFault 	Sets the value to the default setting			
MINimum 	Sets the value to the minimum range value			
MAXimum 	Sets the value to the maximum range value			
OFF	Disables the tolerance check			
Description of command				
This command defines the upper limit for the code domain power of the inactive channels (I and Q signal). The active channels are not checked. The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

CONFigure:CDPower:CDPW:AVERage:LIMit:ASyMmetric[:COMBined][?] <CDP Limit Y Average>				Limits
<CDP Limit Y Average>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 	Peak code domain power Y limit	-23.0	dB	V3.40
DEFault 	Sets the value to the default setting			
MINimum 	Sets the value to the minimum range value			
MAXimum 	Sets the value to the maximum range value			
OFF	Disables the tolerance check			
Description of command				
This command defines the upper limit for the code domain power of the inactive channels (I and Q signal). The active channels are not checked. The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

CONFigure:CDPower:CDPW:LIMit:IQLCheck[?] <IQ Leakage Check>				I/Q Leakage Check
<IQ Leakage Check>	Description of parameters	Def. value	Def. unit	FW vers.
DEFault 	Sets the value to the default setting	ON	-	V3.40
OFF 	I/Q Leakage Check disabled			
ON	I/Q Leakage Check enabled			
Description of command				
This command enables or disables the I/Q leakage check. When enabled, the tolerance check will be performed for all inactive channels regardless of whether the corresponding channel on the opposite signal phase is active or not. Disabling the I/Q leakage check will only indicate tolerance violations of those inactive channels that have no active correspondance on the opposite signal phase.				

DEFault:CDPower:CDPW:LIMit[?]		Default Settings		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <code>CDPower:CDPW:LIMit</code> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem `CDPower:CDPW` determines and outputs the results of the Code Domain Power measurement.

READ[:SCALar]:CDPower:CDPW?		Scalar results:		
FETCh[:SCALar]:CDPower:CDPW?		Start single shot measurement and return results		
SAMPle[:SCALar]:CDPower:CDPW?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
AT Power (x3),	–100.0 dBm to –50.0 dBm	NAN	dBm	V4.20
Carrier Feedthrough (x3),	–120.0 dB to –20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 to 1000.0 Hz	NAN	Hz	
Rho (x3),	0.0 to 1.0	NAN	–	
Out of Tolerance,	0.0% to 100.0%	NAN	–	
Current Statistics	1 to 10000	NAN	–	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:CDPower:CDPW:MATCHing:LIMit?		Limit Matching		
Returned values	Value range	Def. value	Def. unit	FW vers.
Carrier Feedthrough (x3),	For all values	INV	–	V3.40
Carrier Freq. Error (x3)	NMAU NMAL INV OK	INV	–	
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limit have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

		I/Q Signal Measurement		
READ:ARRay:CDPower:CDPW[:VALue]:CURRent?		Start single shot meas. and return results		
FETCh:ARRay:CDPower:CDPW[:VALue]:CURRent?		Read meas. results (unsynchronized)		
SAMPlE:ARRay:CDPower:CDPW[:VALue]:CURRent?		Read results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W₀¹⁶ Pilot time,	...,			
...,	...,			
W₁₅¹⁶ RRI time,	...,			
W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB			
Description of command				
<p>These commands are always queries. They start a measurement and output the levels of the Walsh Code of the in-phase signal path (I-signal) and of the quadrature signal path (Q-signal). 32 values are returned for each signal representing the alternating results of the RRI and the Pilot time. The calculation of <i>Current</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in <code>FETCh:ARRay:CDPower:CDPW:STATe?</code>.</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 they can be used instead of the legacy commands <code>READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent?</code>, <code>READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent?</code>, <code>FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent?</code>, <code>FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent?</code>, <code>SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent?</code>, and <code>SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

		I/Q Signal Measurement		
READ:ARRay:CDPower:CDPW[:VALue]:AVERAge?		Start single shot meas. and return results		
FETCh:ARRay:CDPower:CDPW[:VALue]:AVERAge?		Read meas. results (unsynchronized)		
SAMPlE:ARRay:CDPower:CDPW[:VALue]:AVERAge?		Read results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W₀¹⁶ Pilot time,	...			
...	...			
W₁₅¹⁶ RRI time,	...			
W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB			
Description of command				
<p>These commands are always queries. They start a measurement and output the levels of the Walsh Code of the in-phase signal path (I signal) and of the quadrature signal path (Q signal). 32 values are returned for each signal representing the alternating results of the RRI and the Pilot time. The calculation of <i>Average</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in <code>FETCh:ARRay:CDPower:CDPW:STATe?</code>.</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 they can be used instead of the legacy commands <code>READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge?</code>, <code>READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge?</code>, <code>FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge?</code>, <code>FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge?</code>, <code>SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge?</code>, and <code>SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

		I/Q Signal Measurement		
READ:ARRay:CDPower:CDPW[:VALue]:MAXimum?		Start single shot meas. and return results		
FETCh:ARRay:CDPower:CDPW[:VALue]:MAXimum?		Read meas. results (unsynchronized)		
SAMPlE:ARRay:CDPower:CDPW[:VALue]:MAXimum?		Read results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W₀¹⁶ Pilot time,	...			
...	...			
W₁₅¹⁶ RRI time,	...			
W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB			
Description of command				
<p>These commands are always queries. They start a measurement and output the levels of the Walsh Code of the in-phase signal path (I-signal) and of the quadrature signal path (Q-signal). 32 values are returned for each signal representing the alternating results of the RRI and the Pilot time. The calculation of <i>Maximum</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in <code>FETCh:ARRay:CDPower:CDPW:STATe?</code>.</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 they can be used instead of the legacy commands <code>READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum?</code>, <code>READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum?</code>, <code>FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum?</code>, <code>FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum?</code>, <code>SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum?</code>, and <code>SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

FETCh:ARRay:CDPower:CDPW:STATe?		I/Q Signal State		
Returned value	Description	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI state (0 1), W₀¹⁶ Pilot state (0 1),, W₁₅¹⁶ RRI state (0 1), W₁₅¹⁶ Pilot state (0 1)	Indicator for the I and Q signal states in code channels W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (I signal state) and in code channels W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (Q signal state)	0	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned comma-delimited value list, the I and Q signal states in the corresponding code channels are inactive, else the signal state is active. For subtypes 0 and 1 the result order is: 16 * (<ISignal_RRI>, <ISignal_Pilot>) = 32 for the I-Signal plus 16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the Q-Signal = 64 in total For subtype 2 there is no time mux: (32 * I-Signal) plus (32 * Q-Signal) = 64 in total Note: Please note that for measurement subtype 0 and 1, the comma-delimited return value list contains 5 values (e.g. 0, 1, 1, 1, 0), for measurement subtype 2 the list contains 6 values (e.g. 0, 1, 0, 1, 0, 1). This command works for all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands FETCh:ARRay:CDPower:CDPW:ISIGnal:STATe? and FETCh:ARRay:CDPower:CDPW:QSIGnal:STATe?. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CALCulate:ARRay:CDPower:CDPW:CURRENT[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (I signal) or in code channel W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value, the I (or Q) signal limit in the corresponding code channel is exceeded. The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in FETCh:ARRay:CDPower:CDPW:STATe?. Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands CALCulate:ARRay:CDPower:CDPW:ISIGnal:CURRENT[:RESult]:MATChing:LIMit? and CALCulate:ARRay:CDPower:CDPW:QSIGnal:CURRENT[:RESult]:MATChing:LIMit?. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CALCulate:ARRay:CDPower:CDPW:AVERAge[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (I signal) or in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in <code>FETCh:ARRay:CDPower:CDPW:STATe?</code> .				
Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands <code>CALCulate:ARRay:CDPower:CDPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit?</code> and <code>CALCulate:ARRay:CDPower:CDPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit?</code> . For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CALCulate:ARRay:CDPower:CDPW:MAXimum[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (I signal) or in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
The returned values are structured as before in the legacy commands, there are just two subsequent 32-value resultsets returned for the I and Q signals. The result order for the different measurement subtypes is shown in <code>FETCh:ARRay:CDPower:CDPW:STATe?</code> .				
Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands <code>CALCulate:ARRay:CDPower:CDPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit?</code> and <code>CALCulate:ARRay:CDPower:CDPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit?</code> . For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CDPower:PCDep (Peak Code Domain Error Power)

The subsystem *CDPower:PCDep* measures the Peak Code Domain Error Power output of the access terminal. Both the *RRI* and the *Pilot* time slot are evaluated in the same measurement shot. The subsystem corresponds to the measurement menu *Code Domain Power*, application *PCDep*, and the sections related to this application in the associated popup menu *Code Domain Power Configuration*.

Control of Measurement

The subsystem *CDPower:PCDep* controls the peak code domain error power measurement. It corresponds to the softkey *PCDEP* in the measurement menu *Code Domain Power*.

INITiate:CDPower:PCDep	Start new measurement	⇒	<i>RUN</i>
ABORt:CDPower:PCDep	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:CDPower:PCDep	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTInue:CDPower:PCDep	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the peak code domain error power measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:CDPower:PCDep:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ 	Service request	OFF	–	V3.40
SOPC 	Single operation complete			
SRSQ 	SRQ and SOPC			
DEFault 	Sets the value to the default setting			
OFF	No reporting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:CDPower:PCDep:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF 	Measurement in the OFF state (*RST or ABORt)	OFF	–	V3.40
RUN 	Running (after INITiate, CONTInue or READ)			
STOP 	Stopped (STOP)			
ERR 	OFF (could not be started)			
STEP 	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 	Counter for current statistics cycle	NONE	–	V3.40
NONE,	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Peak Code Domain Error Power* measurement in the *Code Domain Power* menu. They correspond to the *Code Domain Power Configuration* popup menu.

Subsystem CONTROL

The subsystem *CDPower:PCDep:CONTROL* defines the result mode, result order, repetition mode, statistic count and stop condition of the measurement. These settings are provided in the *Control* tab in the popup menu *Code Domain Power Configuration*.

CONFigure:CDPower:PCDep:CONTROL[?]		Scope of Measurement		
<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALAr ARRAy,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Current Statistics>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTROL:RMODE, ...CONTROL:STATISTICS and the ...CONTROL:REPETITION commands, see below.				

CONFigure:CDPower:PCDep:CONTROL:RMODE[?]		Result Mode		
<Result Mode>				
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALAr ARRAy	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

CONFigure:CDPower:PCDep:CONTRol:RORder[?] <Result Order>				Result Order
<Result Order>	Description of parameters	Def. value	Def. unit	FW-Vers.
HADamard BITReverse	Walsh code channels returned using Hadamard matrix Walsh code channels returned at MSB to LSB	HAD	–	V3.40
Description of command				
This command defines the method used to display the code channels. <i>HADamard</i> displays the code channels in order determined by the Hadamard matrix. <i>BITReverse</i> displays the code channels so that the related code channels are adjacent to each other.				
This setting is only available for Code Domain and Peak Code Domain Error measurement applications.				

CONFigure:CDPower:PCDep:CONTRol:STATistics[?] <Current Statistics>				Statistic Count
<Current Statistics>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command defines the number of bursts forming a statistics cycle.				

CONFigure:CDPower:PCDep:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>				Test Cycles
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

DEFault:CDPower:PCDep:CONTRol[?] <Enable>				Default Settings
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>CDPower:PCDep:CONTRol</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

CDPower:CPCCommon:LIMit

The subsystem *CDPower:CPCCommon:LIMit* defines common tolerance values for the scalar results of the *CPCCommon* Code Domain Power applications. These commands are described in on page 6.103.

CDPower:PCDep:LIMit

The subsystem *CDPower:PCDep:LIMit* defines the tolerance values that apply to the Peak Code Domain Error Power application only.

CONFigure:CDPower:PCDep:CMAx:LIMit:ASyMmetric[:COMBined][?] <PCDep Limit Y>				Limits
<PCDep Limit Y>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 DEFAult MINimum MAXimum OFF	Peak code domain error power limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-23.0	dB	V3.40
Description of command				
This command defines the upper limit for the peak code domain error power. The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

CONFigure:CDPower:PCDep:AVERage:LIMit:ASyMmetric[:COMBined][?] <PCD Limit Y Average>				Limits
<PCDep Limit Y>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 DEFAult MINimum MAXimum OFF	Peak code domain error power limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-23.0	dB	V3.40
Description of command				
This command defines the upper limit for the peak code domain error power. The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

DEFault:CDPower:PCDep:LIMit[?] <Enable>				Default Settings
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	-	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>DEFault:CDPower:PCDep:LIMit</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem *CDPower:PCDep* determines and outputs the results of the Peak Code Domain Error Power measurement. The peak code domain error power is the difference between the ideal code domain power and the measured signal.

READ[:SCALar]:CDPower:PCDep? FETCh[:SCALar]:CDPower:PCDep? SAMPlE[:SCALar]:CDPower:PCDep?		Scalar results: Start single shot measurement and return results Read out measurement results (unsynchronized) Read out measurement results (synchronized)		
Returned values	Description	Def. value	Def. unit	FW vers.
AT Power (x3),	-100.0 dBm to -50.0 dBm	NAN	dBm	V3.40
Carrier Feedthrough (x3),	-120.0 dB to -20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 to 1000.0 Hz	NAN	Hz	
Rho (x3),	0.0 to 1.0	NAN	-	
Out of Tolerance,	0.0% to 100.0%	NAN	-	
Current Statistics	1 to 10000	NAN	-	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:CDPower:PCDep:MATChing:LIMit?		Limit Matching		
Returned values	Description	Def. value	Def. unit	FW vers.
Carrier Feedthrough (x3),	For all values	NAN	-	V3.40
Carrier Freq. Error (x3),			-	
Rho (x3)	NMAU NMAL INV OK		-	
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

		I/Q Signal Measurement		
READ:ARRay:CDPower:PCDep[:VALue]:CURRENT?		Start single shot meas. and return results		
FETCh:ARRay:CDPower:PCDep[:VALue]:CURRENT?		Read meas. results (unsynchronized)		
SAMPlE:ARRay:CDPower:PCDep[:VALue]:CURRENT?		Read results (synchronized)		
Returned values	Description of parameters	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W₀¹⁶ Pilot time,	...,			
...,	...,			
W₁₅¹⁶ RRI time,	...,			
W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB			
Description of command				
<p>These commands are always queries. They start a measurement and output the code domain error power of the Walsh Code of the in-phase signal path (I-signal) or of the quadrature signal path (Q-signal). 64 values are returned representing the alternating results of the RRI and the Pilot time. The calculation of <i>Current</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>For subtypes 0 and 1 the result order is:</p> <p>16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the I-Signal</p> <p>plus</p> <p>16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the Q-Signal</p> <p>= 64 in total</p> <p>For subtype 2 there is no time mux:</p> <p>(32 * I-Signal) plus (32 * Q-Signal) = 64 in total</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 they can be used instead of the legacy commands</p> <p>READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRENT?,</p> <p>READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRENT?,</p> <p>FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRENT?,</p> <p>FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRENT?,</p> <p>SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRENT?, and</p> <p>SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRENT?.</p> <p>For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

		I/Q Signal Measurement		
READ:ARRay:CDPower:PCDep[:VALue]:AVERage?		Start single shot meas. and return results		
FETCh:ARRay:CDPower:PCDep[:VALue]:AVERage?		Read meas. results (unsynchronized)		
SAMPlE:ARRay:CDPower:PCDep[:VALue]:AVERage?		Read results (synchronized)		
Returned values	Description of parameters	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time, W₀¹⁶ Pilot time, ..., ..., W₁₅¹⁶ RRI time, W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB, ..., ..., ..., -60.0 dB to +10.0 dB	NAN	dB	V4.20
Description of command				
<p>These commands are always queries. They start a measurement and output the code domain error power of the Walsh Code of the in-phase signal path (I-signal) or of the quadrature signal path (Q-signal). 64 values are returned representing the alternating results of the RRI and the Pilot time. The calculation of <i>Average</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>For subtypes 0 and 1 the result order is:</p> <p style="padding-left: 40px;">16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the I-Signal</p> <p style="padding-left: 40px;">plus</p> <p style="padding-left: 40px;">16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the Q-Signal</p> <p style="padding-left: 40px;">= 64 in total</p> <p>For subtype 2 there is no time mux:</p> <p style="padding-left: 40px;">(32 * I-Signal) plus (32 * Q-Signal) =64 in total</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands</p> <pre>READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERage?, READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERage?, FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERage?, FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERage?, SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERage?, and SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERage?.</pre> <p>For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

		I/Q Signal Measurement		
READ:ARRAY:CDPower:PCDep[:VALue]:MAXimum?		Start single shot meas. and return results		
FETCh:ARRAY:CDPower:PCDep[:VALue]:MAXimum?		Read meas. results (unsynchronized)		
SAMPlE:ARRAY:CDPower:PCDep[:VALue]:MAXimum?		Read results (synchronized)		
Returned values	Description of parameters	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI time,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W₀¹⁶ Pilot time,	...			
...	...			
W₁₅¹⁶ RRI time,	...			
W₁₅¹⁶ Pilot time	-60.0 dB to +10.0 dB			
Description of command				
<p>These commands are always queries. They start a measurement and output the code domain error power of the Walsh Code of the in-phase signal path (I-signal) or of the quadrature signal path (Q-signal). 64 values are returned representing the alternating results of the RRI and the Pilot time. The calculation of <i>Maximum</i> is explained in chapter 3 (see <i>display mode</i>).</p> <p>For subtypes 0 and 1 the result order is:</p> <p style="padding-left: 40px;">16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the I-Signal</p> <p style="padding-left: 40px;">plus</p> <p style="padding-left: 40px;">16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the Q-Signal</p> <p style="padding-left: 40px;">= 64 in total</p> <p>For subtype 2 there is no time mux:</p> <p style="padding-left: 40px;">(32 * I-Signal) plus (32 * Q-Signal) = 64 in total</p> <p>Note: These new commands work with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands</p> <pre>READ:ARRAY:CDPower:PCDep:ISIGNAL[:VALue]:MAXimum?, READ:ARRAY:CDPower:PCDep:QSIGNAL[:VALue]:MAXimum?, FETCh:ARRAY:CDPower:PCDep:ISIGNAL[:VALue]:MAXimum?, FETCh:ARRAY:CDPower:PCDep:QSIGNAL[:VALue]:MAXimum?, SAMPlE:ARRAY:CDPower:PCDep:ISIGNAL[:VALue]:MAXimum?, and SAMPlE:ARRAY:CDPower:PCDep:QSIGNAL[:VALue]:MAXimum?.</pre> <p>For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

FETCh:ARRay:CDPower:PCDep:STATE?		I/Q Signal State		
Returned value	Description	Def. value	Def. unit	FW vers.
W₀¹⁶ RRI state (0 1), W₀¹⁶ Pilot state (0 1), W₁₅¹⁶ RRI state (0 1), W₁₅¹⁶ Pilot state (0 1)	Indicator for the signal state in code channel W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot	0	–	V3.40
Description of command				
This command is always a query. If a bit is set in the returned value, the I (or Q) signal state in the corresponding code channel is inactive (1), else the signal state is active (0). For subtypes 0 and 1 the result order is: 16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the I-Signal plus 16 * (<QSignal_RRI>, <Qsignal_Pilot>) = 32 for the Q-Signal = 64 in total For subtype 2 there is no time mux: 32 * I-Signal plus 32 * Q-Signal = 64 in total Note: This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands FETCh:ARRay:CDPower:PCDep:ISIGnal:STATE? and FETCh:ARRay:CDPower:PCDep:QSIGnal:STATE?. For backward compatiblity reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CALCulate:ARRay:CDPower:PCDep:CURRENT[:RESult]:MATCHing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (I signal) or in code channel W ₀ ¹⁶ RRI (least significant bit) to W ₁₅ ¹⁶ Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded. Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands CALCulate:ARRay:CDPower:PCDep:ISIGnal:CURRENT[:RESult]:MATCHing:LIMit? and CALCulate:ARRay:CDPower:PCDep:QSIGnal:CURRENT[:RESult]:MATCHing:LIMit?. For backward compatiblity reasons the legacy commands remain valid for measurement subtypes 0 and 1.				

CALCulate:ARRay:CDPower:PCDep:AVERage[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (I signal) or in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
<p>Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands CALCulate:ARRay:CDPower:PCDep:ISIGnal:AVERage[:RESult]:MATChing:LIMit? and CALCulate:ARRay:CDPower:PCDep:QSIGnal:AVERage[:RESult]:MATChing:LIMit?. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

CALCulate:ARRay:CDPower:PCDep:MAXimum[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
64 bit value	Indicator for limit matching in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (I signal) or in code channel W_0^{16} RRI (least significant bit) to W_{15}^{16} Pilot (Q signal)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
<p>Note: Even bits are assigned to the RRI time slot and odd bits are assigned to the pilot time slot. This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands CALCulate:ARRay:CDPower:PCDep:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? and CALCulate:ARRay:CDPower:PCDep:QSIGnal:MAXimum[:RESult]:MATChing:LIMit?. For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.</p>				

CDPower:CHPW (Channel Power)

The subsystem *CDPower:CHPW* measures the Channel Power output. The subsystem corresponds to the measurement menu *Code Domain Power*, application *Channel Power*, and the sections related to this application in the associated popup menu *Code Domain Power Configuration*.

Control of measurement

The subsystem *CDPower:CHPW* controls the channel power measurement. It corresponds to the softkey *ChP* in the measurement menu *Code Domain Power*.

INITiate:CDPower:CHPW	Start new measurement	⇒	<i>RUN</i>
ABORt:CDPower:CHPW	Abort running measurement and switch off	⇒	<i>OFF</i>
STOP:CDPower:CHPW	Stop measurement after current stat. cycle	⇒	<i>STOP</i>
CONTinue:CDPower:CHPW	Next measurement step (<i>stepping mode</i>)	⇒	<i>RUN</i>
Description of command			FW vers.
These commands have no query form. They start and stop the channel power measurement, setting it to the status indicated in the top right column.			V3.40

CONFigure:CDPower:CHPW:EREPorting[?] <Report Mode>		Event Reporting		
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V3.40
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEfault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (see <i>Event Reporting</i> in chapter 5 of the CMU 200/300 manual).				

FETCh[:SCALar]:CDPower:CHPW:STATus? <MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>		Measurement Status		
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V3.40
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
STEP	Stepping mode (<stepmode>=STEP)			
RDY	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V3.40
NONE	No counting mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V3.40
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

Test Configuration

The commands of the following subsystems configure the *Channel Power* measurement in the *Code Domain Power* menu. They correspond to the *Code Domain Power Configuration* popup menu.

Subsystem CONTROL

The subsystem *CDPower:CHPW:CONTROL* defines the result mode, repetition mode, statistic count and stop condition of the measurement. These settings are provided in the *Control* tab in the popup menu *Code Domain Power Configuration*.

CONFigure:CDPower:CHPW:CONTRol[?] <Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>		Scope of Measurement		
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay,	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
<Current Statistics>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000,	Number of bursts per statistics cycle	100	–	V3.40
<Repetition>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 10000 CONTInuous SINGleshot DEFault,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW-Vers.
NONE SONerror DEFault,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command combines the ...CONTRol:RMODE, ...CONTRol:STATistics and the ...CONTRol:REPetition commands, see below.				

CONFigure:CDPower:CHPW:CONTRol:RMODE[?] <Result Mode>		Result Mode		
<Result Mode>	Description of parameters	Def. value	Def. unit	FW-Vers.
SCALar ARRay	Scalar values only (incl. ramp matching) Scalar measured values and arrays	ARR	–	V3.40
Description of command				
This command specifies the type of measured values.				

CONFigure:CDPower:CHPW:CONTRol:STATistics[?] <Current Statistics >		Statistic Count		
<Current Statistics>	Description of parameters	Def. value	Def. unit	FW-Vers.
1 to 1000	Number of bursts per statistics cycle	100	–	V3.40
Description of command				
This command defines the number of bursts forming a statistics cycle.				

CONFigure:CDPower:CHPW:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>		Test Cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 CONTInuous SINGleshot DEFault ,	Multiple measurement (counting, until Status = STEP RDY) Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Sets the value to the default setting	SING	–	V3.40
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE SONerror DEFault ,	Continue measurement even in case of error Stop measurement in case of error (<i>stop on error</i>) Sets the value to the default setting	NONE	–	V3.40
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE DEFault	Interrupt measurement after each statistics cycle Continue measurement according to its rep. Mode Sets the value to the default setting	NONE	–	V3.40
Description of command				
This command determines the repetition mode, stop condition, and stepping mode for the measurement.				
Note: In the case of READ commands (READ: ...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

CONFigure:CDPower:CHPW:CONTRol:PRMode[?] <ReferencePowerMode>		Reference Power Mode		
<Ref.PowerMode>	Description of parameters	Def. value	Def. unit	FW vers.
ATPower PPOWER	Activate the AT power mode Activate the pilot power mode	ATP	–	V4.20
Description of command				
This command sets the reference power mode for the measurement, either pilot power or AT power measurement mode.				
If used as a query the command returns the currently set reference power mode.				

DEFault:CDPower:CHPW:CONTRol[?]		Default Settings		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem CDPower:CHPW:CONTRol to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LIMit

CDPower:CPCCommon:LIMit

The subsystem *CDPower:CPCCommon:LIMit* defines common tolerance values for the scalar results of the *CPCCommon* Code Domain Power applications. These commands are described in on page 6.103.

CDPower:CHPW:LIMit

The subsystem *CDPower:CHPW:LIMIT* defines the tolerance values that apply to the Channel Power application only.

CONFigure:CDPower:CHPW:CMAx:LIMit:ASYMmetric[:COMBined][?] <CHPW Limit Y>				Limits
<CHPW Limit Y>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 DEFault MINimum MAXimum OFF	Channel power Y limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-23.0	dB	V3.40
Description of command				
This command defines the upper limit for the channel power (Y value). The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

CONFigure:CDPower:CHPW:AVERage:LIMit:ASYMmetric[:COMBined][?] <CHPW Limit Y Average>				Limits
<CHPW Limit Y Average>	Description of parameters	Def. value	Def. unit	FW vers.
-60.0 to 0 DEFault MINimum MAXimum OFF	Channel power Y limit Sets the value to the default setting Sets the value to the minimum range value Sets the value to the maximum range value Disables the tolerance check	-23.0	dB	V3.40
Description of command				
This command defines the upper limit for the channel power (Y value). The keywords <i>CMAx</i> and <i>AVERage</i> refer to the <i>Current</i> and <i>Max.</i> display and for the <i>Average</i> display, respectively.				

DEFault:CDPower:CHPW:LIMit[?] <Enable>				Default Settings
Enable	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V3.40
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>CDPower:CHPW:LIMit</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query, the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Measured Values

The subsystem *CDPower:CHPW* determines and outputs the results of the Channel Power measurement.

XTND:CDPower:CHPW:RESult:DATA[?]		Data Channel Result Extension		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON 	Data Channel Result Extension enabled	OFF	–	V4.31
OFF 	Data Channel Result Extension disabled			
DEFault	Result Extension is set to default value			
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command defines the result set of the <i>READ</i> (or <i>FETCH</i> or <i>SAMPle</i>): <i>ARRAy</i> : <i>CDPower:CHPW</i> [: <i>VALue</i>] : <i>CURRent</i> (or <i>AVERAge</i> or <i>MAXimum</i>) command responses. The different result sets are described below.				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

READ[:SCALar]:CDPower:CHPW?		Scalar results:		
FETCh[:SCALar]:CDPower:CHPW?		Start single shot measurement and return results		
SAMPle[:SCALar]:CDPower:CHPW?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Value range	Def. value	Def. unit	FW vers.
AT Power (x3),	–100.0 dBm to –50.0 dBm	NAN	dBm	V3.40
Carrier Feedthrough (x3),	–120.0 dB to –20.0 dB	NAN	dB	
Carrier Freq. Error (x3),	0 to 1000.0 Hz	NAN	Hz	
Rho (x3),	0.0 to 1.0	NAN	–	
Out of Tolerance,	0.0% to 100.0%	NAN	%	
Current Statistics	1 to 1000	NAN	–	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value.				

CALCulate[:SCALar]:CDPower:CHPW:MATChing:LIMit?		Limit Matching		
Returned values	Value range	Def. value	Def. unit	FW vers.
Carrier Feedthrough (x3),	For all values	INV	–	V3.40
Carrier Freq. Error (x3),		INV	–	
Rho (x3)	NMAU NMAL INV OK	INV	–	
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limit lines have been exceeded. The symbol (x3) behind a value indicates that the list contains three results corresponding to the <i>Current</i> , the <i>Average</i> , and the <i>MMax</i> value. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

Returned values		Value range	Def. value	Def. unit	FW vers.			
I/Q Signal Measurement								
READ:ARRAY:CDPower:CHPW[:VALue]:CURRENT?			Start single shot meas. and return results					
FETCh:ARRAY:CDPower:CHPW[:VALue]:CURRENT?			Read meas. results (unsynchronized)					
SAMPle:ARRAY:CDPower:CHPW[:VALue]:CURRENT?			Read results (synchronized)					
For measurement subtypes 0:								
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20			
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,						
W_{12}^{32}	ACK,	-60.0 dB to +10.0 dB,						
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,						
W_2^4	Data	-60.0 dB to +10.0 dB						
For measurement subtype 2:								
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20			
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,						
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),						
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,						
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,						
W_2^4	Data Channel	-60.0 dB to +10.0 dB						
For measurement subtype 2 with extended result list (XTND:CDPower:CHPW:RESult:DATA ON):								
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.31			
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,						
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),						
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,						
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,						
W_2^4	Data Channel,	-60.0 dB to +10.0 dB,						
W_2^4-I	Data Channel,	-60.0 dB to +10.0 dB,						
W_2^4-Q	Data Channel,	-60.0 dB to +10.0 dB,						
W_1^4-I	Data Channel,	-60.0 dB to +10.0 dB,						
W_1^4-Q	Data Channel,	-60.0 dB to +10.0 dB						
Reserved,		NAN						
Reserved		NAN						
Description of command								
These commands are always queries.								
In the context of measurement subtype 0, they start a measurement and return the five levels of the RRI, Pilot, ACK, DRC, and Data channels.								
In the context of measurement subtype 2, they start a measurement and return the six levels of the RRI, Pilot, ACK/DSC (depending on Code Channel Filter), AuxPilot, DRC, and Data channels.								
If XTND:CDPower:CHPW:RESult:DATA is enabled, the subtype 2 result is extended by the W_2^4 and W_1^4 I/Q values of the Data channel.								
The calculation of <i>Current</i> is explained in chapter 3 (see <i>display mode</i>).								
Note: These new commands work with all measurement subtypes as described above.								
Starting with firmware V4.20 it can be used instead of the legacy commands								
READ:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:CURRENT?,								
READ:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:CURRENT?,								
FETCh:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:CURRENT?,								
FETCh:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:CURRENT?,								
SAMPle:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:CURRENT?, and								
SAMPle:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:CURRENT?.								
For backward compatibility reasons the legacy commands remain valid for measurement subtypes 0 and 1.								

Returned values		Value range	Def. value	Def. unit	FW vers.
I/Q Signal Measurement					
READ:ARRay:CDPower:CHPW[:VALue]:AVERAge?			Start single shot meas. and return results		
FETCh:ARRay:CDPower:CHPW[:VALue]:AVERAge?			Read meas. results (unsynchronized)		
SAMPle:ARRay:CDPower:CHPW[:VALue]:AVERAge?			Read results (synchronized)		
For measurement subtype 0:					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_{12}^{32}	ACK,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data	-60.0 dB to +10.0 dB			
For measurement subtype 2:					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),			
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data Channel	-60.0 dB to +10.0 dB			
For measurement subtype 2 with extended result list (XTND:CDPower:CHPW:RESult:DATA ON):					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.31
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),			
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data Channel,	-60.0 dB to +10.0 dB,			
W_2^4-I	Data Channel,	-60.0 dB to +10.0 dB,			
W_2^4-Q	Data Channel,	-60.0 dB to +10.0 dB,			
W_1^4-I	Data Channel,	-60.0 dB to +10.0 dB,			
W_1^4-Q	Data Channel,	-60.0 dB to +10.0 dB			
Reserved,		NAN			
Reserved		NAN			
Description of command					
These commands are always queries.					
In the context of measurement subtypes 0, they start a measurement and return the five levels of the RRI, Pilot, ACK, DRC, and Data channels.					
In the context of measurement subtype 2, they start a measurement and return the six levels of the RRI, Pilot, ACK/DSC (depending on Code Channel Filter), AuxPilot, DRC, and Data channels.					
If XTND:CDPower:CHPW:RESult:DATA is enabled, the subtype 2 result is extended by the W_2^4 and W_1^4 I/Q values of the Data channel.					
The calculation of <i>Average</i> is explained in chapter 3 (see <i>display mode</i>).					
Note: These new commands work with all measurement subtypes as described above.					
Starting with firmware V4.20 it can be used instead of the legacy commands					
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge?,					
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge?,					
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge?,					
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge?,					
SAMPle:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge?, and					
SAMPle:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge?.					
For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.					

Returned values		Value range	Def. value	Def. unit	FW vers.
<p style="text-align: right;">I/Q Signal Measurement</p> <p>READ:ARRAY:CDPower:CHPW[:VALue]:MAXimum? Start single shot meas. and return results FETCH:ARRAY:CDPower:CHPW[:VALue]:MAXimum? Read meas. results (unsynchronized) SAMPLE:ARRAY:CDPower:CHPW[:VALue]:MAXimum? Read results (synchronized)</p>					
For measurement subtype 0:					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_4^8	ACK,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data	-60.0 dB to +10.0 dB			
For measurement subtype 2:					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.20
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),			
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data Channel	-60.0 dB to +10.0 dB			
For measurement subtype 2 with extended result list (XTND:CDPower:CHPW:RESult:DATA ON):					
W_4^{16}	RRI,	-60.0 dB to +10.0 dB,	NAN	dB	V4.31
W_0^{16}	Pilot,	-60.0 dB to +10.0 dB,			
W_{12}^{32}	ACK/DSC,	-60.0 dB to +10.0 dB (depending on Code Channel Filter setting),			
W_{28}^{32}	AuxPilot,	-60.0 dB to +10.0 dB,			
W_8^{16}	DRC,	-60.0 dB to +10.0 dB,			
W_2^4	Data Channel,	-60.0 dB to +10.0 dB,			
W_2^4-I	Data Channel,	-60.0 dB to +10.0 dB,			
W_2^4-Q	Data Channel,	-60.0 dB to +10.0 dB,			
W_1^4-I	Data Channel,	-60.0 dB to +10.0 dB,			
W_1^4-Q	Data Channel,	-60.0 dB to +10.0 dB,			
Reserved,		NAN,			
Reserved		NAN			
Description of command					
These commands are always queries.					
In the context of measurement subtype 0, they start a measurement and return the five levels of the RRI, Pilot, ACK, DRC, and Data channels.					
In the context of measurement subtype 2, they start a measurement and return the six levels of the RRI, Pilot, ACK/DSC (depending on Code Channel Filter), AuxPilot, DRC, and Data channels.					
If XTND:CDPower:CHPW:RESult:DATA is enabled, the subtype 2 result is extended by the W_2^4 and W_1^4 I/Q values of the Data channel.					
The calculation of <i>Maximum</i> is explained in chapter 3 (see <i>display mode</i>).					
Note: These new commands work with all measurement subtypes as described above.					
Starting with firmware V4.20 it can be used instead of the legacy commands					
READ:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:MAXimum?,					
READ:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:MAXimum?,					
FETCH:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:MAXimum?,					
FETCH:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:MAXimum?,					
SAMPLE:ARRAY:CDPower:CHPW:ISIGnal[:VALue]:MAXimum?, and					
SAMPLE:ARRAY:CDPower:CHPW:QSIGnal[:VALue]:MAXimum?.					
For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.					

FETCh:ARRay:CDPower:CHPW:STATe?		I/Q Signal State		
Returned value	Description	Def. value	Def. unit	FW vers.
For measurement subtype 0:				
	Indicator for state in:	NAN	–	V4.20
RRI state	W_4^{16} RRI bit 0			
Pilot state	W_0^{16} Pilot bit 1			
ACK state	W_{12}^{32} ACK bit 2			
DRC state	W_8^{16} DRC bit 0			
Data state	W_2^4 Data bit 1 (bit 0 is the least significant)			
For measurement subtype 2:				
	Indicator for state in:	NAN	–	V4.20
RRI state	W_4^{16} RRI bit 0			
Pilot state	W_0^{16} Pilot bit 1			
ACK/DSC state	W_{12}^{32} ACK/DSC bit 2			
AuxPilot state	W_{28}^{32} AuxPilot			
DRC state	W_8^{16} DRC bit 0			
Data state	W_2^4 Data bit 1 (bit 0 is the least significant)			
Description of command				
<p>This command is always a query. If a bit is set in the returned value, the I (or Q) signal state in the corresponding code channel is inactive, else the signal state is active.</p> <p>Note: This new command works with all measurement subtypes. Starting with firmware V4.20 it can be used instead of the legacy commands <code>FETCh:ARRay:CDPower:CHPW:ISIGnal:STATe?</code>, and <code>FETCh:ARRay:CDPower:CHPW:QSIGnal:STATe?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.</p>				

CALCulate:ARRay:CDPower:CHPW:CURRENT[:RESult]:MATCHing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
For measurement subtype 0:				
64 bit value	ToleranceBitField for I signal W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK bit 2 ToleranceBitField for Q signal W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
For measurement subtype 2:				
64 bit value	ToleranceBitField for all channels W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK/DSC bit 2 (depending on Code Channel Filter setting) W_{28}^{32} AuxPilot W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
Description of command				
<p>This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.</p> <p>Note: This new command works with all measurement subtypes as described above. Starting with firmware V4.20 it can be used instead of the legacy commands <code>CALCulate:ARRay:CDPower:CHPW:ISIGnal:CURRENT[:RESult]:MATCHing:LIMit?</code>, and <code>CALCulate:ARRay:CDPower:CHPW:QSIGnal:CURRENT[:RESult]:MATCHing:LIMit?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.</p>				

CALCulate:ARRay:CDPower:CHPW:AVERage[:RESult]:MATChing:LIMit?		I/Q Signal Tolerance		
Returned value	Description	Def. value	Def. unit	FW vers.
For measurement subtypes 0:				
64 bit value	ToleranceBitField for I signal W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK bit 2 ToleranceBitField for Q signal W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
For measurement subtype 2:				
64 bit value	ToleranceBitField for all channels W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK/DSC bit 2 (depending on Code Channel Filter setting) W_{28}^{32} AuxPilot W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
<p>Note: This new command works with all measurement subtypes as described above. Starting with firmware V4.20 it can be used instead of the legacy commands <code>CALCulate:ARRay:CDPower:CHPW:ISIGnal:AVERage[:RESult]:MATChing:LIMit?</code>, and <code>CALCulate:ARRay:CDPower:CHPW:QSIGnal:AVERage[:RESult]:MATChing:LIMit?</code>. For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.</p>				

CALCulate:ARRay:CDPower:CHPW:MAXimum[:RESult]:MATChing:LIMit?			I/Q Signal Tolerance	
Returned value	Description	Def. value	Def. unit	FW vers.
For measurement subtypes 0:				
64 bit value	ToleranceBitField for I signal W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK bit 2 ToleranceBitField for Q signal W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
For measurement subtype 2:				
64 bit value	ToleranceBitField for all channels W_0^{16} RRI bit 0 W_0^{16} Pilot bit 1 W_4^8 ACK/DSC bit 2 (depending on Code Channel Filter setting) W_{28}^{32} AuxPilot W_8^{16} DRC bit 0 W_2^4 Data bit 1 (bit 0 is the least significant)	NAN	–	V4.20
Description of command				
This command is always a query. If a bit is set in the returned value the I (or Q) signal limit in the corresponding code channel is exceeded.				
Note: This new command works with all measurement subtypes as described above. Starting with firmware V4.20 it can be used instead of the legacy commands <code>CALCulate:ARRay:CDPower:CHPW:ISignal:MAXimum[:RESult]:MATChing:LIMit?</code> , and <code>CALCulate:ARRay:CDPower:CHPW:QSignal:MAXimum[:RESult]:MATChing:LIMit?</code> . For backward compatibility reasons the legacy commands remain valid for measurement subtype 0.				

Measurement Command Groups (Signaling Only)

In the *Signaling* mode, the CMU is able to generate control and traffic channel signals and to set up a call to the Access Terminal. A broad range of signaling parameters can be configured and measurements may be performed with a call connection established.

RxQuality (Receiver Quality)

Receiver Quality measurements provide a wide range of parameters to characterize the connectivity of the forward and reverse link. The parameters are described in the specification C.S0029-A. The *Receiver Quality* measurements and the results are in accordance with the definitions of the specification.

The subsystem RXQuality comprises the commands for all receiver quality measurements. The subsystem corresponds to the main menu *Receiver Quality* and the associated popup menu *Receiver Quality Configuration*.

Control of Measurement - Common Commands

Here the common settings for all *Receiver Quality* measurement applications are described.

CONFigure:UPERiod[?]		Update Period		
<Update Period>				
<Update Rate>	Description of parameters	Def. value	Def. unit	FW vers.
0.2 s to 2.0 s MINimum MAXimum DEFault	Update period of the receiver quality test applications Sets the minimum update period Sets the maximum update period Use default settings	1.0	s	V4.20
Description of command				
This command determines the update period of the receiver quality test applications (absolute value, in seconds).				
Note: To reset the statics of the RXQ measurements, send the command: <code>INITiate:LAYer:APPLication:TEST:STATistics</code> (from the <i>Sign. - LAYer</i> subsystem)				
Note: This command replaces the legacy command <code>CONFigure:RXQuality:UPERiod[?]</code> , but the old syntax can still be used for compatibility reasons. The command is identical with the one described on p. 6.152.				

DEFault:RXQuality:CONTRol[?]		RxQuality Control		
<Enable>				
<Enable>	Description of parameters	Def. Value	Def. unit	FW vers.
ON OFF	The <code>CONF:RXQ:<Application>:Control:<...></code> and <code>CONF:RXQ:URATe</code> commands are set to their default values Query whether or not the RxQuality test application parameters are set to their default values (query only)	ON	–	V4.20
Description of command				
This command resets all values for the receiver quality test applications to default. <i>OFF</i> is a query only.				

DEFault:RXQuality:LIMit[?] <Default RxQuality LIMit subsystem>		RxQuality Limits		
<Enable>	Description of parameters	Def. Value	Def. unit	FW vers.
ON	The CONF:RXQ:<Application>:Limit:<...> commands are set to their default values Query whether or not the RxQuality test application limit parameters are set to their default values (query only)	ON	–	V4.20
OFF				
Description of command				
This command resets all limit values for the receiver quality test applications to default. OFF is a query only.				

Test Configuration

Statistics Overview Application

The *Statistics Overview* measurement gives an overview of all *Receiver Quality* measurements and their statistics. In remote control, only a single command retrieving all results is needed.

Measured Values

The subsystem *RXQuality:SOVeriew* determines and outputs the results of the Receiver Quality statistics measurement.

[SENSe:][SCALar:]RXQuality:SOVeriew?		Statistics overview results		
Returned values:	Value range	Def. value	Def. unit	FW vers.
<Received Packets for ...>				
Control Channel PER,	0 to 1,000 (packets)	NAN	–	V4.20
Forward Link PER,	0 to 100,000 (packets)		–	
Reverse Link Quality,	0 to 100,000 (packets)		–	
Reverse Link PER,	0 to 10,000 (packets)		–	
Forward Link Performance,	0 to 10,000 (frames)		–	
Forward Link Perf. vs. Slot,			–	
Reverse Link Performance,	0 to 10,000 (frames)		–	
<Denominators for ...>				
Control Channel PER,	1 to 1,000 (packets)	NAN	–	V4.20
Forward Link PER,	1 to 100,000 (packets)		–	
Reverse Link Quality,	1 to 100,000 (packets)		–	
Reverse Link PER,	1 to 10,000 (packets)		–	
Forward Link Performance,	1 to 10,000 (frames)		–	
Forward Link Perf. vs. Slot,			–	
Reverse Link Performance,	1 to 10,000 (frames)		–	
<Results for ...>				
Control Channel PER,	0.0 to 100.0 %	NAN	%	V4.20
Forward Link PER,	0.0 to 100.0 %		%	
Reverse Link Quality,	0.0 to 100.0 %		%	
Reverse Link PER,	0.0 to 100.0 %		%	
Forward Link Performance,	0.0 to 3072.0 kBit/s		kBit/s	
Forward Link Perf. vs. Slot,	0.0 to 1843.6 kBit/s		kBit/s	
Reverse Link Performance,	0.0 to 153.6 kBit/s		kBit/s	
Description of command				
This commands is always a query. It returns all current <i>Statistics Overview</i> results.				

Control Channel PER Application

INITiate:RXQuality:CCPer	Start new measurement	⇒ RUN
ABORT:RXQuality:CCPer	Abort measurement and switch off	⇒ OFF
STOP:RXQuality:CCPer	Stop measurement	⇒ STOP
Description of command		FW vers.
These commands have no query form. They start or stop the receiver quality control channel PER measurements.		V4.20

CONFigure:RXQuality:CCPer:EREporting[?]				Event Reporting
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the control channel PER measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh[:SCALar]:RXQuality:CCPer:STATus?				Measurement Status
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V4.20
NONE,	No step mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle (max. depending on maximum control channel cycles defined by CONF:RXQ:CCP:CONT:MCCC)	NONE	–	V4.20
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:CCPer:CONTRol:REPetition[?]		Scope of Measurement		
<Repetition>, <Stop Condition>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault,	Sets the value to the default setting			
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE	No stop condition, continue measurement even in case of error	NONE	–	V4.20
CLEX	Meas. is stopped when confidence level is exceeded			
PLEX	Meas. is stopped when <i>Max. PER Limit</i> is exceeded			
ALEX	Meas. is stopped when any limit is exceeded			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:CCPer:CONTRol:MCCycles[?]		Max. Control Channel Cycles		
<Max Control Ch. Cycles>				
<Max CCCycles>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Number of control channel cycles	25	–	V4.20
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEF	Sets the value to the default setting			
Description of command				
This command specifies the number of control channel cycles for the Control Channel PER receiver quality measurement.				

CONFigure:RXQuality:CCPer:LIMit:MPER[?]		Maximum PER		
<Max PER Limit>				
<Max PER Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	PER limit	1	%	V4.20
ON	Limit value check is re-enabled (after OFF)			
OFF	Limit value check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the limit for the measured control channel PER.				

CONFigure:RXQuality:CCPer:LIMit:CLEVel[?]		Min. Confidence Level		
<Confidence Level Limit>				
<Conf. Level>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Minimum confidence level	95	%	V4.20
ON	Confidence level limit check is re-enabled (after OFF)			
OFF	Confidence level limit check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the confidence level limit for the control channel PER receiver quality measurement.				

Measured Values

READ[:SCALar]:RXQuality:CCPer?		Start single shot measurement and return results		
FETCH[:SCALar]:RXQuality:CCPer?		Read out measurement results (unsynchronized)		
SAMPLE[:SCALar]:RXQuality:CCPer?		Read out measurement results (synchronized)		
Returned Values	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 100.0 %	Control Channel PER	–	%	V4.20
0.0 to 100.0 %	Confidence Level	–	%	
	Packet Errors	–	–	
1 to 1000	Control Channel Cycles (max. depending on maximum control channel cycles defined by CONF : RXQ : CCP : CONT : MCCC)	–	–	
Description of command				
These commands are always queries. They start the measurement of the control channel PER measurements and return the result.				

CALCulate:RXQuality:CCPer:MATCHing:LIMit?		Limit Matching		
Returned values	Value range	Def. value	Def. unit	FW vers.
<CCPER>, <ConfidenceLevel>	For all values NMAU NMAL INV OK	INV INV	– –	V4.20
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

Forward Link PER Application

INITiate:RXQuality:FLPer	Start new measurement	⇒ RUN
ABORT:RXQuality:FLPer	Abort measurement and switch off	⇒ OFF
STOP:RXQuality:FLPer	Stop measurement	⇒ STOP
Description of command		FW vers.
These commands have no query form. They start or stop the receiver quality forward link PER measurements.		V4.20

CONFigure:RXQuality:FLPer:EREPorting[?]				Event Reporting
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the forward link PER measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh[:SCALar]:RXQuality:FLPer:STATus?				Measurement Status
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 100000	Counter for current statistics cycle	NONE	–	V4.20
NONE,	No step mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V4.20
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:FLPer:CONTRol:REPetition[?] <Repetition>, <Stop Condition>		Scope of Measurement		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault,	Sets the value to the default setting			
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE	No stop condition, continue measurement even in case of error	NONE	–	V4.20
CLEX	Meas. is stopped when confidence level is exceeded			
PLEX	Meas. is stopped when <i>Max. PER Limit</i> is exceeded			
ALEX	Meas. is stopped when any limit is exceeded			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:FLPer:CONTRol:MTPSent[?] <Max Test Packets Sent>		Max. Test Packets Sent		
<Max Test P.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 100000	Max. number of test packets to be sent	1000	–	V4.20
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the maximum number of test packets to be sent for the forward link PER measurement.				

CONFigure:RXQuality:FLPer:LIMit:MPER[?] <Max PER Limit>		Maximum PER Limit		
<Max PER Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	PER limit	1	%	V4.20
ON	The PER limit value check is re-enabled (after OFF)			
OFF	PER limit value check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the limit for the measured forward link PER for the corresponding receiver quality measurement.				

CONFigure:RXQuality:FLPer:LIMit:CLEVel[?]		Min. Confidence Level		
<Confidence Level Limit>				
<Conf. Level>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Confidence level limit	95	%	V4.20
ON	The confidence level limit check is re-enabled (after OFF)			
OFF	Confidence level limit check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the minimum confidence level limit for the forward link PER receiver quality measurement.				

Measured Values

READ[:SCALar]:RXQuality:FLPer?		Scalar results:		
FETCh[:SCALar]:RXQuality:FLPer?		Start statistics measurement and return results		
SAMPlE[:SCALar]:RXQuality:FLPer?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values:	Value range	Def. value	Def. unit	FW vers.
Forward Link PER	0.0 to 100.0 %	–	%	V4.20
Confidence Level	0.0 to 100.0 %	–	%	
Packet Errors	0 to 100,000	–	–	
Test Packets Sent	1 to 100,000	–	–	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results.				

CALCulate:RXQuality:FLPer:MATCHing:LIMit?		Limit Matching		
Returned values	Value range	Def. value	Def. unit	FW vers.
<FLPER>, <ConfidenceLevel>	For all values NMAU NMAL INV OK	INV INV	– –	V4.20
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

Reverse Link Quality Application

INITiate:RXQuality:RLQuality	Start new measurement	⇒ <i>RUN</i>
ABORT:RXQuality:RLQuality	Abort measurement and switch off	⇒ <i>OFF</i>
STOP:RXQuality:RLQuality	Stop measurement	⇒ <i>STOP</i>
Description of command		FW vers.
These commands have no query form. They start or stop the receiver quality reverse link quality measurements.		V4.20

CONFigure:RXQuality:RLQuality:EREPorting[?]				Event Reporting
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the reverse link quality measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh[:SCALar]:RXQuality:RLQuality:STATus?				Measurement Status
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 100000	Counter for current statistics cycle	NONE	–	V4.20
NONE,	No step mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V4.20
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:RLQuality:CONTRol:REPetition[?]		Scope of Measurement		
<Repetition>, <Stop Condition>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault,	Sets the value to the default setting			
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE	No stop condition, continue measurement even in case of error	NONE	–	V4.20
CLEX	Meas. is stopped when confidence level is exceeded			
PLEX	Meas. is stopped when <i>Max. PER Limit</i> is exceeded			
ALEX	Meas. is stopped when any limit is exceeded			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:RLQuality:CONTRol:MLPSent[?]		Loopback Packets		
<Max Loopback Packets Sent>				
<Max Loopb. P.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 100000	Number of loopback packets to be sent	1000	–	V4.20
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the number of loopback packets to be sent for the reverse link quality measurement.				

CONFigure:RXQuality:RLQuality:LIMit:MPER[?]		Reverse Link Quality PER Limit		
<Max PER Limit>				
<Max PER Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Maximum PER limit	1	%	V4.20
ON	The PER value check is re-enabled (after OFF)			
OFF	PER limit value check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the PER limit for the measured reverse link quality measurement.				

CONFigure:RXQuality:RLQuality:LIMit:CLEVel[?]		Reverse Link Quality Confidence Level Limit		
<Confidence Level Limit>				
<Conf. Level>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Confidence level limit	95	%	V4.20
ON	The confidence level limit check is re-enabled (after OFF)			
OFF	Confidence level limit check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the confidence level limit for the reverse link quality measurement.				

Measured Values

READ[:SCALar]:RXQuality:RLQuality?		Scalar results:		
FETCh[:SCALar]:RXQuality:RLQuality?		Start statistics measurement and return results		
SAMPle[:SCALar]:RXQuality:RLQuality?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values:	Value range	Def. value	Def. unit	FW vers.
PER (Fwd. Link)	0.0 to 100.0 %	–	%	V4.20
Confidence Level	0.0 to 100.0 %	–	%	
Packet Errors	0 to 100,000	–	–	
Test Packets Sent	1 to 100,000	–	–	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results.				

CALCulate:RXQuality:RLQuality:MATCHing:LIMit?		Limit Matching		
Returned values	Value range	Def. value	Def. unit	FW vers.
<PER (Fwd. Link)>, <ConfidenceLevel>	For all values NMAU NMAL INV OK	INV INV	– –	V4.20
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			

Forward Link Performance Application

INITiate:RXQuality:FLPFormance	Start new measurement	⇒ RUN
ABORT:RXQuality:FLPFormance	Abort measurement and switch off	⇒ OFF
STOP:RXQuality:FLPFormance	Stop measurement	⇒ STOP
Description of command		FW vers.
These commands have no query form. They start or stop the forward link performance measurements.		V4.20

CONFigure:RXQuality:FLPFormance:EREPorting[?]		Event Reporting		
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the forward link performance measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCH[:SCALar]:RXQuality:FLPFormance:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V4.20
NONE,	No step mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current evaluation period within a cycle	NONE	–	V4.20
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:FLPFormance:CONTrol:REPetition[?]		Scope of Measurement		
<Repetition>, <Stop Condition>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:FLPFormance:CONTrol:MFRames[?]		Frames		
<Maximum Frames>				
<Max. Frames>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Number of frames	1000	–	V4.20
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the number of frames for the duration of the forward link performance measurement.				

Measured Values

READ[:SCALar]:RXQuality:FLPFormance?		Scalar results:		
FETCh[:SCALar]:RXQuality:FLPFormance?		Start single shot measurement and return results		
SAMPle[:SCALar]:RXQuality:FLPFormance?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Description	Def. value	Def. unit	FW vers.
MAC packets received in error (9x),	≥ 0		–	V4.20
Physical packet slots (9x),	≥ 0		–	
Throughput vs. test time (9x),	≥ 0.0		kBit/s	
Throughput vs. transmitted slots (9x),	≥ 0.0		kBit/s	
Test time (1x)	1 to 10000		Frames	
Description of command				
These commands are always queries. They start a measurement for eight packet sizes (128, 256, 512, 1024, 2048, 3072, 4096, and 5120) and output all scalar measurement results and one total for each result.				

Reverse Link Performance Application

INITiate:RXQuality:RLPFormance	Start new measurement	⇒ RUN
ABORt:RXQuality:RLPFormance	Abort measurement and switch off	⇒ OFF
STOP:RXQuality:RLPFormance	Stop measurement	⇒ STOP
Description of command		FW vers.
These commands have no query form. They start or stop the reverse link performance measurements.		V4.20

CONFigure:RXQuality:RLPFormance:EREPorting[?]		Event Reporting		
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the reverse link performance measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh[:SCALar]:RXQuality:RLPFormance:STATus?		Measurement Status		
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:RLPFormance:CONTRol:REPetition[?]		Scope of Measurement		
<Repetition>, <Stop Condition>				
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:RLPFormance:CONTrol:MFRames[?]				Frames
<Maximum Frames>				
<Max. Frames>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000 MINimum MAXimum DEFault	Number of frames Sets the value to the range minimum Sets the value to the range maximum Sets the value to the default setting	1000	–	V4.20
Description of command				
This command specifies the number of frames for the duration of the reverse link performance measurement.				

Measured Values

The measurement results for the Reverse Link Performance measurements depend on the used physical layer protocol. To determine which READ/FETCH command applies, the result (DPLProtocol or S2PL) from [SENse]:LAYer:PHYSical:PLPProtocol:STYPe? can be used.

READ[:SCALar]:RXQuality:RLPFormance:DPLProtocol?				Scalar results:
FETCh[:SCALar]:RXQuality:RLPFormance:DPLProtocol?				Start single shot measurement and return results
SAMPle[:SCALar]:RXQuality:RLPFormance:DPLProtocol?				Read out measurement results (unsynchronized)
				Read out measurement results (synchronized)
Returned values	Description	Def. value	Def. unit	FW vers.
MAC packets received in error (6x),	≥ 0		–	V4.31
MAC packets received in error total (1x),,	≥ 0		–	
Throughput vs. test time (6x),	≥ 0.0 ≥ 0.0		kBit/s	
Throughput vs. test time total (1x)	1 to 10000		kBit/s	
Test time (1x)			Frames	
Description of command				
These commands are always queries. They start a measurement for subtype 0 and output all scalar measurement results. They start a subtype 0 measurement for 6 data rates (0, 9.6, 19.2, 38.4, 76.8, and 153.6 kBit/s) and output all scalar measurement results and one total for each result, as well as the test time in frames.				

READ[:SCALar]:RXQuality:RLPFormance:S2PL?				Scalar results:
FETCh[:SCALar]:RXQuality:RLPFormance:S2PL?				Start single shot measurement and return results
SAMPle[:SCALar]:RXQuality:RLPFormance:S2PL?				Read out measurement results (unsynchronized)
				Read out measurement results (synchronized)
Returned values	Description	Def. value	Def. unit	FW vers.
MAC packets received in error (13x),	≥ 0		–	V4.31
MAC packets received in error total (1x),,	≥ 0		–	
Throughput vs. test time (13x),	≥ 0.0		kBit/s	
Throughput vs. test time total (1x)	≥ 0.0		kBit/s	
Test time (1x)	1 to 10000		Frames	
Description of command				
These commands are always queries. They start a measurement for subtype 2 and output all scalar measurement results. They start a subtype 2 measurement for 13 packet sizes (0, 128, 256, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144, 8192, and 12288) and output all scalar measurement results and one total for each result, as well as the test time in frames.				

Reverse Link PER Application

INITiate:RXQuality:RLPer	Start new measurement	⇒ RUN
ABORT:RXQuality:RLPer	Abort measurement and switch off	⇒ OFF
STOP:RXQuality:RLPer	Stop measurement	⇒ STOP
CONTinue:RXQuality:RLPer	Next measurement step (only <i>step mode</i>)	⇒ RUN
Description of command		FW vers.
These commands have no query form. They start or stop the reverse link PER measurements.		V4.20

CONFigure:RXQuality:RLPer:EREporting[?]				Event Reporting
<ReportMode>				
<ReportMode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the reverse link PER measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCH[:SCALar]:RXQuality:RLPer:STATus?				Measurement Status
<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>				
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.20
RUN	Running (after INITiate, CONTinue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
RDY,	Stopped according to repetition mode and stop condition			
<Cycle Count>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Counter for current statistics cycle	NONE	–	V4.20
NONE,	No step mode set			
<ElapsedStatistics>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Counter for current evaluation period within a cycle	NONE	–	V4.20
NONE	Statistic count set to off			
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5).				

CONFigure:RXQuality:RLPer:CONTRol:REPetition[?] <Repetition>, <Stop Condition>		Scope of Measurement		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = RDY)	SING	–	V4.20
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault,	Sets the value to the default setting			
<Stop Condition>	Description of parameters	Def. value	Def. unit	FW vers.
NONE	No stop condition, continue measurement even in case of error	NONE	–	V4.20
CLEX	Meas. is stopped when confidence level is exceeded			
PLEX	Meas. is stopped when <i>Max. PER Limit</i> is exceeded			
ALEX	Meas. is stopped when any limit is exceeded			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the scope of the measurement and sets the stop condition.				

CONFigure:RXQuality:RLPer:CONTRol:MPReceived[?] <Max Packets Received>		Max. Packets Received		
<Max Packets R.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 1000	Number of packets to be received	1000	–	V4.20
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEF	Sets the value to the default setting			
Description of command				
This command specifies the maximum number of packets for the Reverse Link PER receiver quality measurement.				

CONFigure:RXQuality:RLPer:LIMit:MPER[?] <Max PER Limit>		Reverse Link PER Limit		
<Max PER Limit>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Maximum PER limit	1	%	V4.20
ON	The PER value check is re-enabled (after OFF)			
OFF	PER limit value check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the limit for the measured reverse link PER for the corresponding receiver quality measurement.				

CONFigure:RXQuality:RLPer:LIMit:CLEVel[?] <Confidence Level Limit>		Reverse Link Confidence Level Limit		
<Conf. Level>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 100	Confidence level limit	95	%	V4.20
ON	The confidence level limit check is re-enabled (after OFF)			
OFF	Confidence level limit check is disabled			
MINimum	Sets the value to the range minimum			
MAXimum	Sets the value to the range maximum			
DEFault	Sets the value to the default setting			
Description of command				
This command specifies the confidence level limit for the reverse link PER receiver quality measurement.				

Measured Values

The measurement results for the Reverse Link PER measurements depend on the used physical layer protocol. To determine which READ/FETCH command applies, the result (DPLProtocol or S2PL) from [SENse]:LAYer:PHYSical:PLPRotocol:STYPe? can be used.

READ[:SCALar]:RXQuality:RLPer:DPLProtocol?		Scalar results:		
FETCH[:SCALar]:RXQuality:RLPer:DPLProtocol?		Start single shot measurement and return results		
SAMPLE[:SCALar]:RXQuality:RLPer:DPLProtocol?		Read out measurement results (unsynchronized)		
		Read out measurement results (synchronized)		
Returned values	Description	Def. value	Def. unit	FW vers.
MAC packets transmitted (6x + 1 total),	1 to 1000	NAN	–	V4.31
Rev. link MAC packet errors (6x + 1 total),	0 to 1000	NAN	–	
Rev. link confidence level (6x + 1 total),	0 to 100%	NAN	%	
Rev. link PER (6x + 1 total),	0 to 100%	NAN	%	
Termination target MAC packet errors (6x + 1 totalx)	0 to 1000	NAN	–	
Termination target Conf. level (6x + 1 total),	0 to 100%	NAN	%	
Termination target PER (6x + 1 total)	0 to 100%	NAN	%	
Description of command				
These commands are always queries. They start a measurement and output all scalar measurement results. They start a measurement for 6 data rates (0, 9.6, 19.2, 38.4, 76.8, and 153.6 kBit/s) and output all scalar measurement results and one total for each result.				
To determine the correct READ/FETCH/SAMPLE[:SCALar]:RXQuality:RLPer:... command, use the result from [SENse]:LAYer:PHYSical:PLPRotocol:STYPe?, which returns DPLProtocol S2PL.				

CALCulate:RXQuality:RLPer:DPLProtocol:MATChing:LIMit?				Limit Matching
Returned values	Value range	Def. value	Def. unit	FW vers.
Rev. link PER (6x + 1 total), Rev. link PERConfidence Level (6x + 1 total), Termination target PER (6x + 1 total), Termination target PER Confidence Level (6x + 1 total)	For all values NMAU NMAL INV OK	INV	–	V4.31
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			
The measurement is started for 6 data rates (0, 9.6, 19.2, 38.4, 76.8, and 153.6 kBit/s) and it outputs all scalar measurement results and one total for each result.				

READ[:SCALar]:RXQuality:RLPer:S2PL? FETCh[:SCALar]:RXQuality:RLPer:S2PL? SAMPlE[:SCALar]:RXQuality:RLPer:S2PL?				Scalar results:
Returned values	Description	Def. value	Def. unit	FW vers.
MAC packets transmitted (13x + 1 total), Rev. link MAC packet errors (13x + 1 total), Rev. link confidence level (13x + 1 total), Rev. link PER (13x + 1 total), Termination target MAC packet errors (13x + 1 total), Termination target Conf. level (13x + 1 total), Termination target PER (13x + 1 total)	1 to 1000 0 to 1000 0 to 100% 0 to 100% 0 to 1000 0 to 100% 0 to 100%	NAN NAN NAN NAN NAN NAN NAN	– – % % – % %	V4.31
Description of command				
Start single shot measurement and return results Read out measurement results (unsynchronized) Read out measurement results (synchronized)				
These commands are always queries. They start a measurement and output all scalar measurement results. They start a measurement for 13 data rates (0.0, 19.2, 38.4, 76.8, 115.2, 153.6, 230.4, 307.2, 460.8, 614.4, 921.6, 1228.8, and 1843.2 kBit/s) and output all scalar measurement results and one total for each result.				
To determine the correct READ/FETCh/SAMPlE[:SCALar]:RXQuality:RLPer:... command, use the result from [SENse]:LAYer:PHYSical:PLPProtocol:STYPe?, which returns DPLProtocol S2PL.				

CALCulate:RXQuality:RLPer:S2PL:MATChing:LIMit?			Limit Matching	
Returned values	Value range	Def. value	Def. unit	FW vers.
Rev. link PER (13x + 1 total), Rev. link PERConfidence Level (13x + 1 total), Termination target PER (13x + 1 total), Termination target PER Confidence Level (13x + 1 total)	For all values NMAU NMAL INV OK	INV	–	V4.30
Description of command				
This command is always a query. It indicates whether and in which way the (fixed) limits have been exceeded. The following messages may be generated:				
NMAU	Tolerance value underflow	<i>not matching, underflow</i>		
NMAL	Tolerance value exceeded	<i>not matching, overflow</i>		
INV	Measurement invalid	<i>invalid</i>		
OK	Tolerance value matched			
The measurement is started for 13 data rates (0.0, 19.2, 38.4, 76.8, 115.2, 153.6, 230.4, 307.2, 460.8, 614.4, 921.6, 1228.8, and 1843.2 kBit/s) and it outputs all scalar measurement results and one total for each result.				

Data Applications - RLP Frame / IP Statistics and Ping

The data applications currently comprise the *RLP Frame / IP Statistics* measurement which determines the data flow on the CMU, and the *Ping* Measurement, which verifies the availability of a device with a given IP address in the IP-based network. All commands require the R&S CMU-B89 and the R&S CMU-K87 options.

Control of Measurement - Common Commands

Here the common commands for all *data application* measurements are described.

To reset the statics of the *RLP Frame / IP Statistics* or *Ping* measurements, send the command: `INITiate:LAYer:APPLication:TEST:STATistics` (from the *Signaling - LAYer* subsystem)

Test Configuration – RLP Frame / IP Statistics Application

CONFigure:UPERiod[?] <Update Period>			Update Period	
<Update Rate>	Description of parameters	Def. value	Def. unit	FW vers.
0.2 s to 2.0 s MINimum MAXimum DEFault	Update period of the RLP Frame / IP Statistics application Sets the minimum update period Sets the maximum update period Use default settings	1.0	s	V4.30
Description of command				Sig. State
This command determines the update period of the RLP Frame / IP Statistics application (absolute value, in seconds).				All
Note:	To reset the statics of the RLP measurement, send the command: <code>INITiate:LAYer:APPLication:TEST:STATistics</code> (from the <i>Sign. - LAYer</i> subsystem).			
Note:	This command replaces the legacy command <code>CONFigure:RXQuality:UPERiod[?]</code> , but the old syntax can still be used for compatibility reasons. The command is identical with the one described on p. 6.133.			

Test Configuration – Ping Application

The subsystem *PING* controls the *Ping* measurement. All commands require options R&S CMU-B89 and R&S CMU-K87.

INITiate:PING	Start new measurement	⇒	RUN
ABORT:PING	Abort running measurement and switch off	⇒	OFF
STOP:PING	Stop measurement after current stat. cycle	⇒	STOP
CONTInue:PING	Next measurement step (<i>stepping mode</i>)	⇒	RUN
Description of command		Sig. State	FW vers.
These commands have no query form. They start or stop the measurement, setting it to the status given in the top right column.		DORM, CONN	V4.30
Please note that the Signaling State is only relevant for AT pings. A server connected to the CMU (via ethernet port) can be pinged in any signaling state.			

CONFigure:PING:EREPorting[?]		Event Reporting		
<Report Mode>				
<Report Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.30
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
Description of command				Sig. State
This command defines the events generated when the measurement is terminated or stopped (<i>event reporting</i> , see chapter 5).				all

FETCh[:SCALar]:PING:STATus?		Ping Measurement Status		
<Stat. Results>				
<Stat. Results>	Description of parameters	Def. value	Def. unit	FW vers.
OFF	Measurement in the OFF state (*RST or ABORT)	OFF	–	V4.30
RUN	Running (after INITiate, CONTInue or READ)			
STOP	Stopped (STOP)			
ERR	OFF (could not be started)			
STEP	Stepping mode (<stepmode>=STEP)			
RDY,	Stopped according to repetition mode and stop condition			
1 to 10000	Counter for current statistics cycle	NONE	–	
NONE,	No counting mode set			
1 to 1000	Counter for current ping within a cycle	NONE	–	
NONE	Statistic count set to off			
Description of command				Sig. State
This command is always a query. It returns the status of the measurement (see chapters 3 and 5) and the statistical results. A statistics cycle comprises the number of pings defined by means of <code>CONFigure:PING:CONTrol:PCount</code> .				all

Subsystem PING:CONTRol

The subsystem *PING:CONTRol* provides specific settings for the *PING* measurement. These settings are provided in the *Control* tab of the popup menu *Ping Configuration*.

DEFault:PING:CONTRol[?] <Enable>			Default Settings	
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	The parameters are set to their default values	ON	–	V4.30
OFF	The parameters differ from the default values (partially or totally)			
Description of command				Sig. State
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystems to their default values (the setting <i>OFF</i> results in an error message).				all
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

CONFigure:PING:CONTRol:REPetition[?] <Repetition>, <Stop Cond>, <Step Mode>			Test Cycles	
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 10000	Multiple measurement (counting, until Status = STEP RDY)	SING	–	V4.30
CONTInuous	Continuous measurement (until STOP or ABORT)			
SINGleshot	Single shot measurement (until Status = RDY)			
DEFault,	Default value			
<Stop Cond>	Description of parameters	Def. value	Def. unit	FW vers.
NONE,	Continue measurement even in case of error	NONE	–	V4.30
<Step Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE	Continue measurement according to its rep. mode	NONE	–	V4.30
Description of command				Sig. State
This command determines the repetition mode for the ping measurement. Stop condition, and stepping mode are not used and must be set to NONE.				all
Note: <i>In the case of READ commands (READ:...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.</i>				

CONFigure:PING:CONTRol:PCOunt[?] <Pings>			Ping Count	
<Pings>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 255	Ping count	5	–	V4.30
Description of command				Sig. State
This command defines the number of pings in a statistics cycle.				all

CONFigure:PING:CONTRol:RINterval[?]				Repeat Interval
<Time>				
<Time>	Description of parameters	Def. value	Def. unit	FW vers.
1 s to 100 s	Repeat interval	1	s	V4.30
Description of command				Sig. State
This command defines the time between two consecutive echo requests.				all

CONFigure:PING:CONTRol:TOUT[?]				Timeout
<Time>				
<Time>	Description of parameters	Def. value	Def. unit	FW vers.
0.001 s to 10 s	Ping timeout	0.5	s	V4.30
Description of command				Sig. State
This command defines the timeout to wait for each reply.				all

CONFigure:PING:CONTRol:PSIZe[?]				Packet Size
<Bytes>				
<Bytes>	Description of parameters	Def. value	Def. unit	FW vers.
1 byte to 1520 bytes	Packet size	32	bytes	V4.30
Description of command				Sig. State
This command defines the number of bytes in the send buffer.				all

CONFigure:PING:CONTRol:ATIP[?]				Use AT IP Address
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Use MS IP Address Use address def. via CONFigure:PING:CONTRol:IPAdDress	ON	–	V4.30
Description of command				Sig. State
This command qualifies whether the pings are sent to the AT IP address used for establishing the MIP/PPP connection or to a different address reserved for pings.				all

CONFigure:PING:CONTRol:IPAdDress[?]				IP Address, Ping
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
<Address parts>	Range of values	Def. value	Def. unit	FW vers.
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	0 to 255	0	–	V4.30
Description of command				Sig. State
This command defines the IP address used for the ping measurement if CONFigure:PING:CONTRol:ATIP is set to OFF.				all

Measured Values – RLP Frame / IP Statistics

The subsystem *RLP Frame / IP Statistics* determines and outputs the results of the *RLP Frame / IP Statistics* measurement.

[SENSe][:SCALar]:RLPStatistic?		RLP Frame / IP Statistics results		
Returned values:	Value range	Def. value	Def. unit	FW vers.
<RLP Reset Msgs Tx/Rx>				
ResetMsgs (Rx),	0 to 2^32 (messages)	NAN,	–	V4.30
ResetMsgs (RxTotal),	0 to 2^32 (messages)	NAN,	–	
ResetMsgs (Tx),	0 to 2^32 (messages)	NAN,	–	
ResetMsgs (TxTotal),	0 to 2^32 (messages)	NAN	–	
<RLP ResetAck Msgs Tx/Rx>				
ResetAckMsgs (Rx),	0 to 2^32 (messages)	NAN,	–	V4.30
ResetAckMsgs (RxTotal),	0 to 2^32 (messages)	NAN,	–	
ResetAckMsgs (Tx),	0 to 2^32 (messages)	NAN,	–	
ResetAckMsgs (TxTotal),	0 to 2^32 (messages)	NAN	–	
<RLP Nak Msgs Tx/Rx>				
ResetNakMsgs (Rx),	0 to 2^32 (messages)	NAN,	–	V4.30
ResetNakMsgs (RxTotal),	0 to 2^32 (messages)	NAN,	–	
ResetNakMsgs (Tx),	0 to 2^32 (messages)	NAN,	–	
ResetNakMsgs (TxTotal),	0 to 2^32 (messages)	NAN	–	
<RLP Msgs Summary Tx/Rx>				
Summary (Rx),	0 to 2^32 (messages)	NAN,	–	V4.30
Summary (RxTotal),	0 to 2^32 (messages)	NAN,	–	
Summary (Tx),	0 to 2^32 (messages)	NAN,	–	
Summary (TxTotal),	0 to 2^32 (messages)	NAN	–	
<Total Rx>				
TotalRx_PPPBytes,	0 to 2^32 (kBytes)	NAN,	–	V4.30
TotalRx_DataRate,	0 to 3072 (kBit/s)	NAN	–	
<Total Tx>				
TotalTx_PPPBytes,	0 to 2^32 (kBytes)	NAN,	–	V4.30
TotalTx_DataRate	0 to 3072 (kBit/s)	NAN	–	
Description of command				
This commands is always a query. It returns all current RLP Frame and IP statistics measurement results.				

Measured Values – Ping

The following commands return the results of the PING measurement.

		Ping Results:		
READ[:SCALAr]:PING?		Start single shot measurement and return results		
FETCh[:SCALAr]:PING?		Read out measurement results (unsynchronized)		
SAMPlE[:SCALAr]:PING?		Read out measurement results (synchronized)		
<Results>	Description of parameters	Def. value	Def. unit	FW vers.
'0.0.0.0' to '255.255.255.255',	IP address 1 (16-character string)	NAN	–	V4.30
1 byte to 1520 bytes,	Packet size 1	NAN	–	
0.0 s to 10.0 s NHOS TOUT ILNK,	Ping time; time to wait for the reply 1	NAN	–	
...	
0.0 s to 10.0 s NHOS TOUT ILNK	Time to wait for the reply 5	NAN	–	
Description of command				Sig. State
These commands are always queries. They start the ping measurement (READ...) and return the results. If a ping count (CONFigure:PING:CONTRol:PCOunt) larger than 5 is set, the last 5 results in the statistics cycle are returned. If the ping timeout (CONFigure:PING:CONTRol:TOUT) is exceeded, one of the following error conditions is returned instead of the ping time:				DORM, CONN
NHOS	No host			
ILNK	Inactive link			
TOUT	Timeout			
Please note that the Signaling State is only relevant for AT pings. A server connected to the CMU (via ethernet port) can be pinged in any signaling state.				

Connection Control (Signaling Only)

The remote-control commands presented in this section control the signaling (call setup and release, services, signaling parameters), determine the inputs and outputs as well as the reference frequency. They correspond to the settings in the popup menu of the softkey *Connect Control* located at the top right of each main menu.

Note: *Some parameters of the CMU can take on several independent values: The default value is used to set up a call; most default values can be modified in the signaling states Signal Off, Signal On and Registered. The current value during the call (signaling states Connected) can still be changed, however, modifying this current value does not alter the default value. The handoff value comes into effect after a handoff from another to the current network; most handoff values can be set in all signaling states.*

Note: *Many of the default and current parameters in 1xEV-DO occur in the Signaling and in the ANSignal subsystems.*

Default values are set with a CONFigure ... command, current values are set with the corresponding PROCedure ... command.

Subsystem Signaling (Connection Setup and Cleardown)

The subsystem *Signaling* controls the call setup and cleardown from the CMU to the access terminal and determines the signaling parameters. It corresponds to the tab *Connection* (for different signaling states, see command `PROCEDURE:SIGNalling:ACTion`) in the popup menu *Connection Control*.

PROCEDURE:SIGNalling:ACTion		Signaling Control		
<Action>	Description of parameters	Def. value	Def. unit	FW vers.
SOFF	Switch off RF signal (<i>Signal Off</i>)	SOFF	–	V4.20
SON	Switch on RF signal (<i>Signal On</i>)			
CSESSion	Close Session			
RNEGotate	Renegotiate			
CTMobile	Call to mobile (not for <code>CONF:SCON:SCL1:SERV WMT</code>)			
CRELease	Call release			
HANDoff	Handoff (only in signaling state CEST)			
Description of command				Sig. State
This command has no query form. It changes between the different signaling states of the CMU. The current state can be queried via <code>SIGN:STAT?</code>				See below

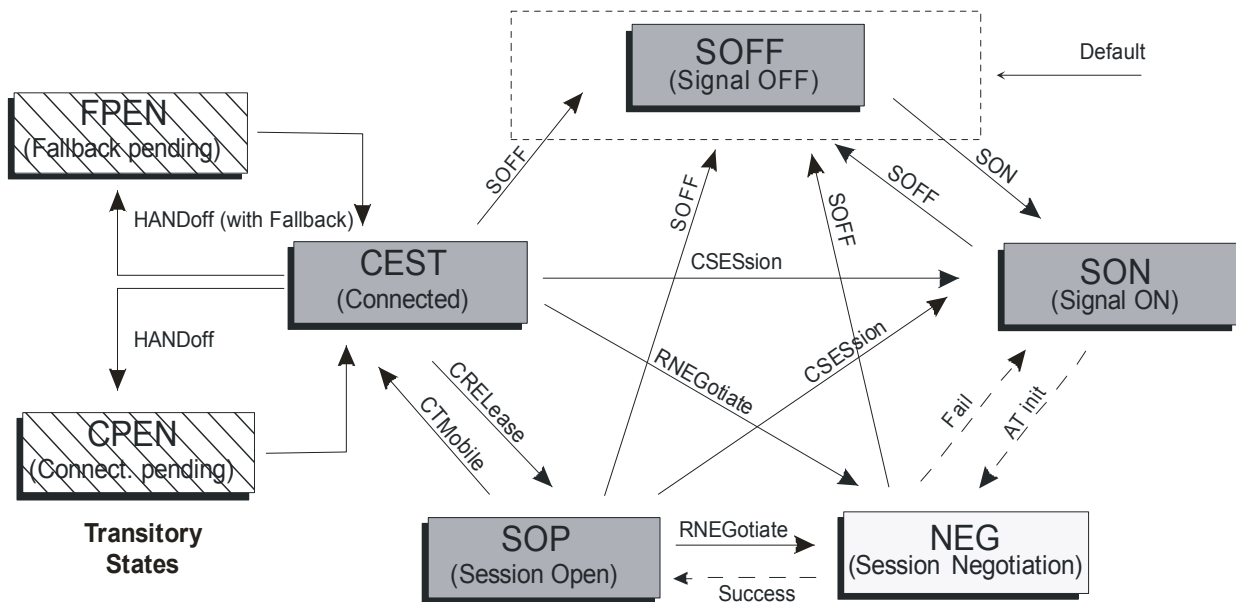


Figure 6-1: Signaling states of the CMU

Signaling states:

See description of command `[SENSe:]SIGNalling:STATe?`

Actions (initiated from the CMU):

See description of command `[PROCEDURE:]SIGNalling:ACTion`

Further transitions between the signaling states (not shown in figure 6-1) may occur, e.g. in case of errors.

[SENSe:]SIGNalling:STATe?			Signaling State	
Return	Description of parameters	Def. value	Def. unit	FW vers.
SOFF	Signal for synchronization switched off (<i>Signal Off</i>)	SOFF	-	V4.20
SON	Signal for synchronization switched on (<i>Signal On</i>)			
NEG	Session Negotiation			
SOP	Session Open			
CEST	Connection Established (<i>Connected</i>)			
CPEN	Connection pending			
FPEN	Fallback pending			
Description of command				Sig. State
This command is always a query. It returns the current signaling state.				All

All PPP-related states must be triggered externally, there is no corresponding remote command to set these states.

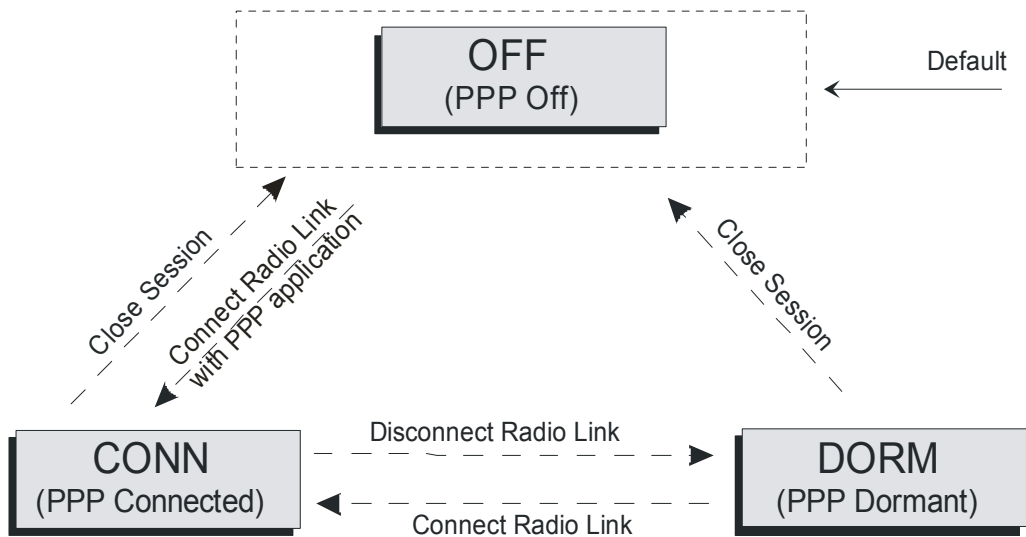


Figure 6-2: PPP Signaling states of the CMU

[SENSe:]SIGNalling:STATe:PPP?			PPP Signaling State	
Returns	Description of parameters	Def. value	Def. unit	FW vers.
OFF	PPP off	OFF	-	V4.20
DORM	PPP dormant			
CONN	PPP connected			
Description of command				Sig. State
This command is always a query. It returns the current signaling state.				All

Subsystem AT Information

[SENSe]:ATInfo:UATi?				UATI
<UATI>				
<UATI>	Description of parameter	Def. value	Def. unit	FW vers.
'<17 characters>'	UATI (Unicast Access Terminal Identifier), string parameter	'---'	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the Unicast Access Terminal Identifier of the AT.				All

[SENSe]:ATInfo:ESN?				ESN
<ESN>				
<ESN>	Description of parameter	Def. value	Def. unit	FW vers.
'<9 characters>'	ESN (Electronic Serial Number), string parameter	'---'	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the hardcoded Electronic Serial Number of the AT.				All

[SENSe]:ATInfo:MEID?				MEID
<MEID>				
<MEID>	Description of parameter	Def. value	Def. unit	FW vers.
'<15 characters>'	MEID (Mobile Equipment Identifier), string parameter	'---'	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the Mobile Equipment Identifier of the AT.				All

[SENSe]:ATInfo:PREFerred:CCHannel:CYCLE:ENABLE?				Preferred Control Ch. Enable
<Preferred Control Ch. Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Preferred control channel is enabled or disabled	OFF	–	V4.31
Description of command				Sig. State
This command returns whether or not the AT is providing the AN with the preferred control channel cycle or not. If the value indicates disabled (OFF), that means the AN and AT both use a common hash function to derive the preferred control channel cycle. If the value indicates enabled (ON), the AT determines the preferred control channel cycle and tells the AN to use this value.				All

[SENSe]:ATInfo:PREFerred:CCHannel:CYCLE?				Preferred Control Ch. Cycle
<Preferred Control Ch. Cycle>				
<PCCCycle>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 32767	Number of preferred control channel cycles	255	–	V4.31
Description of command				Sig. State
This command is always a query. It returns which preferred control channel cycle is being used by the AT and AN.				All

Subsystem Handoff

The subsystem *Handoff* controls the parameters relevant to the network handoff. It corresponds to the tab *Handoff* in the popup menu *Connection Control*.

PROCEDURE:BC:HANDOFF[?]		Network Standard / Channel		
<Target Network BC/CH>	Description of parameters	Def. value	Def. unit	FW vers.
<Standard>, <value> CH HZ KHZ MHZ GHZ	Network Standard (see CONFigure:NETWork:STANdard[?]), RF Channel number or frequency unit	0 CH	– –	V4.20
Description of command				Sig. State
This command is used to set and trigger or to return the band class and RF channel for handoff, e.g. PROC:BC:HAND KCEL, 150 CH. The default values (def, min, max) depend on the target network standard.				CEST
Note: The handoff between different networks requires an existing connection between the CMU and AT, i.e. it is only possible in the <i>Connected</i> state (see Figure 6-1) within the same band class.				

Subsystem Layer

The subsystem *Layer* controls the parameters relevant to the network layers. It corresponds to the tab *Layer* in the popup menu *Connection Control*.

DEFAULT:LAYER[?]		Layer		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
OFF ON	The layer parameters are set to their default values The layer parameters differ from the default values (partially or totally)	ON	–	V4.20
Description of command				Sig. State
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the sub-systems <i>LEVEL</i> to their default values (the setting <i>OFF</i> results in an error message).				All
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				
Note: CONFigure:LAYER:UPDate:MODE[?] is not affected by this command.				

CONFigure:LAYer:UPDate:MODE[?] <Layer Parameter Update Mode>		Renegotiation after Layer Update Mode		
<Layer Par. Update Mode>	Description of parameters	Def. value	Def. unit	FW vers.
IMMEDIATE 	Layer parameter updates are processed immediately, which causes a renegotiation between AT and AN.	IMM	–	V4.20
USER 	Layer parameter updates are collected and updated when the user triggers the update (see below)			
DEFAULT	Sets the update mode to the default value			
Description of command				Sig. State
<p>This command determines the Layer Update Mode and it applies to all commands of the <i>LAYer</i> subsystem. By default, every command updates the appropriate parameters <i>IMMEDIATEly</i>. However this will cause a new time-consuming renegotiation between AccessTerminal and Access Network for each individual command.</p> <p>For better performance the user can decide when he wants to trigger a renegotiation by setting this update mode to <i>USER</i>. In this case, all settings which are done in the <i>LAYer</i> subsystem do not take effect until the user triggers a renegotiation by sending PROCedure:SIGNalling:ACTion RNEGotiate.</p> <p>When the user resets this parameter from <i>USER</i> to <i>IMMEDIATE</i> an automatic renegotiation is triggered.</p> <p>This parameter is not affected by <code>DEFAULT:RFANalyzer[?]</code>.</p> <p>In order to reset this a <code>SYSTEM:RESet:CURRent</code> or <code>*rst</code> is required.</p>				All

Subsystem Default Signaling Application

The Default Signaling Application provides the means to carry messages between a protocol in one entity and the same protocol in the other entity. The Default Signaling Application consists of a messaging protocol (Signaling Network Protocol) and a link layer protocol that provides message fragmentation, retransmission and duplicate detection (Signaling Link Protocol).

CONFigure:LAYer:APPLication:DSIGNaling:ENABLE? <Default Signaling App - Enable>		Default Signaling Application Enable		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
ON 	The application layer default signaling application is enabled	ON	–	V4.20
OFF	The application layer default signaling application is disabled			
Description of command				Sig. State
This command is always a query. It returns the default signaling application status.				All

CONFigure:LAYer:APPLication:DSIGNaling:STReam? <Default Signaling App - Stream no.>		Default Signaling Application Cfg.		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0 1	The stream number of the default signaling application	0	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the stream number of the default signaling application.				All

[Sense]:ATInfo:APPLication:DSIGNaling:Support? <Default Signaling App - AT Support>		Default Signaling Application AT Support		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The default signaling application is supported The default signaling application is not supported	ON	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the support status of the default signaling application.				All

Subsystem Default Test Application

The Default Test Application (or Default Packet Application) consists of a link layer protocol that provides octet retransmission and duplicate detection (Radio Link Protocol), a location update protocol that provides mobility between data service networks and a flow control protocol that provides flow control of data traffic.

INITiate:LAYer:APPLication:TEST:STATistics		Reset statistics test application	
Description of command		Sig. State	FW vers.
This commands has no query form. It resets the connection statistics for the enabled test application, thus all RxQuality measurements are restarted.		CEST/All (see Note)	V4.20
Note: This command can be submitted in all signalling states, but useful results will only be obtained in state CEST.			

CONFigure:LAYer:APPLication:TEST:ENABLE[?] <Test App - Enable>		Test	Application	Enable
<TA Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF DEFault	The application layer default test application is enabled The application layer default test application is disabled Sets the test application to the default value	OFF	–	V4.20
Description of command				Sig. State
This command sets or returns the selected test application status.				All

CONFigure:LAYer:APPLication:TEST:SELEct[?] <Test App - Select>		Test Application Select		
<TA Select>	Description of parameters	Def. value	Def. unit	FW vers.
OFF FORWard REVerse FR DEFault	The application layer test application is disabled Selects the forward link test application Selects the reverse link test application Selects the forward & reverse link test application Sets the test application default value	FORWard	–	V4.30
Description of command				Sig. State
This command sets or returns the selected test application.				All

CONFigure:LAYer:APPLiCation:TEST:STReam[?]		Default Test Application Stream		
<Default Test App - Stream No.>				
<Stream No.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 3 MINimum MAXimum DEFault INValid	The test application stream number Sets the stream number to the minimum setting (0) Sets the stream number to the maximum setting (3) Sets the stream number to the default setting Returns NAN for an invalid or no stream assignment (query only)	1	–	V4.20
Description of command				Sig. State
This command sets or returns the stream number assigned to the default test application. Per default, stream 0 may only be used for the Default Signalling Application.				All

[SENSe]:ATINfo:APPLiCation:TEST:SUPPort?		Default Test Application AT Support		
<Default Test App - AT Support>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The AT supports the default test application. The AT supports the configured test application.	ON	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the AT support status of the test application, which is related to the selected FTAP/RTAP parameters used to determine the application performance.				All

CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRINdex[?]		Data Rate Configuration (DRC)																																												
<Data Rate Index>																																														
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.																																										
0 to 12 MINimum MAXimum OFF ON DEFault	Data rate index Sets the data rate index to 0 Sets the data rate index to 12 With the data rate index set to OFF, the mobile determines the DRC rate based on internal algorithms. With the data rate index set to ON, the mobile uses the last stored value of the data rate index Sets the value to the default setting	1	–	V4.20																																										
Description of command				Sig. State																																										
This command sets the data rate index for the control channel sync. message. The data rate index defines an unambiguous assignment of the data rate and the slot count, as shown below:				All																																										
<table border="1"> <thead> <tr> <th>Index</th> <th>Rate [kBit/s]</th> <th>#Slots</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.0</td><td>n/a</td></tr> <tr><td>1</td><td>38.4</td><td>16</td></tr> <tr><td>2</td><td>76.8</td><td>8</td></tr> <tr><td>3</td><td>153.6</td><td>4</td></tr> <tr><td>4</td><td>307.2</td><td>2</td></tr> <tr><td>5</td><td>307.2</td><td>4</td></tr> <tr><td>6</td><td>614.4</td><td>1</td></tr> <tr><td>7</td><td>614.4</td><td>2</td></tr> <tr><td>8</td><td>921.6</td><td>2</td></tr> <tr><td>9</td><td>1228.8</td><td>1</td></tr> <tr><td>10</td><td>1228.8</td><td>2</td></tr> <tr><td>11</td><td>1843.2</td><td>1</td></tr> <tr><td>12</td><td>2457.6</td><td>1</td></tr> </tbody> </table>					Index	Rate [kBit/s]	#Slots	0	0.0	n/a	1	38.4	16	2	76.8	8	3	153.6	4	4	307.2	2	5	307.2	4	6	614.4	1	7	614.4	2	8	921.6	2	9	1228.8	1	10	1228.8	2	11	1843.2	1	12	2457.6	1
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Please note that a data rate index of "0" stops all FTAP packets going to the mobile.																																														
The data rate can be queried with the command CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRATe? The slot count can be queried using CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:SCOut?																																														

CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRATe?		DRC Rate		
<Data Rate>				
<Data Rate>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 2457.6	Data rate	38.4	kBit/s	V4.20
Description of command				Sig. State
This command is always a query. It returns the data rate assigned to the data rate index that can be set with the command CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRINdex				All

CONFigure:LAYer:APPLiCation:DTESt:FTAP:DRC:SCOut?				DRC Slot Count
<Slot Count>				
<Slot Count>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 16	Slot count	16	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the slot count assigned to the data rate index that can be set with the command <code>CONFigure:LAYer:APPLiCation:DTESt:FTAP:DRC:DRINdex</code>				All

CONFigure:LAYer:APPLiCation:DTESt:FTAP:LBACK:ENABLE?				Loopback Enable Status
<Loopback Enable>				
<Loopback>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF DEfault	The FTAP loopback is enabled The FTAP loopback is disabled Sets the FTAP loopback to the default value	ON	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the status of the Loopback parameter. If the FTAP loopback is enabled, the AT sends a record for every packet that it successfully decodes. From this, the CMU calculates the percentage of faulty packets.				All
The status of the Loopback parameter depends on the FTAP/RTAP configuration (only FTAP -> Loopback is <i>ON</i> , only RTAP -> Loopback is <i>OFF</i> , both FTAP and RTAP -> Loopback is <i>OFF</i>).				

CONFigure:LAYer:APPLiCation:DTESt:FTAP:ACK:FMODE[?]				ACK Channel Fix Mode
<ACK Channel Fix Mode>				
<Ch. Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NUSed AALWays NAALways	The AT decides when to ACK or NAK the packets ACK Always NAK Always	NAAL	–	V4.20
Description of command				Sig. State
This command controls the ACK channel in the reverse signal. The ACK channel is used by the AT to inform the AN whether or not the physical layer packet transmitted on the Forward Traffic Channel has been received successfully.				All

CONFigure:LAYer:APPLication:DTESt:RTAP:DATa:RMIN:INDEX[?]				Data Min. Rate														
<RTAP Min. Data Rate Index>																		
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.														
0 to 5 MINimum MAXimum DEFault	RTAP minimum data rate index Sets the data rate index to 0 Sets the data rate index to 5 Sets the value to the default setting	1	–	V4.20														
Description of command				Sig. State														
<p>This command sets the minimum data rate index for the reverse channel test application protocol. The data rate index defines an unambiguous assignment of the data rate, as shown for CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRINDEX[?].</p> <p>If the entered value is greater than the setting of CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMAX:INDEX[?] then the CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMAX:INDEX[?] will be adapted to the entered value.</p> <p>The data rates for RTAP are:</p> <table border="1" data-bbox="464 736 999 1066"> <thead> <tr> <th>Data Rate Index</th> <th>Data Rate (kBit/s)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.0</td></tr> <tr><td>1</td><td>9.6</td></tr> <tr><td>2</td><td>19.2</td></tr> <tr><td>3</td><td>38.4</td></tr> <tr><td>4</td><td>76.8</td></tr> <tr><td>5</td><td>153.6</td></tr> </tbody> </table>				Data Rate Index	Data Rate (kBit/s)	0	0.0	1	9.6	2	19.2	3	38.4	4	76.8	5	153.6	All
Data Rate Index	Data Rate (kBit/s)																	
0	0.0																	
1	9.6																	
2	19.2																	
3	38.4																	
4	76.8																	
5	153.6																	
<p>The data rate can be queried with the command CONFigure:LAYer:APPLication:DTESt:RTAP:DATa:RMIN:VALue?</p>																		

CONFigure:LAYer:APPLication:DTESt:RTAP:DATa:RMAX:INDEX[?]				Data Max. Rate
<RTAP Max. Data Rate Index>				
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 5 MINimum MAXimum DEFault	RTAP maximum data rate index Sets the data rate index to 1 Sets the data rate index to 5 Sets the value to the default setting	1	–	V4.20
Description of command				Sig. State
<p>This command sets the maximum data rate index for the reverse channel test application protocol. The data rate index defines an unambiguous assignment of the data rate, as shown for CONFigure:LAYer:APPLication:DTESt:FTAP:DRC:DRINDEX[?].</p> <p>If the entered value is less than the setting of CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMIN:INDEX[?] then the CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMIN:INDEX[?] will be adapted to the entered value.</p> <p>The data rate can be queried with the command CONFigure:LAYer:APPLication:DTESt:RTAP:DATa:RMAX:VALue?</p>				All

CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMIN:VALue? <RTAP Min Data Rate>				Data - Min. Rate
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 153.6	Data rate	9.6	kBit/s	V4.20
Description of command				Sig. State
This command is always a query. It returns the data rate assigned to the RTAP min. data rate index that can be set with the command				All
CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMIN:INDEX				

CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMAX:VALue? <RTAP Max. Data Rate>				Data - Max. Rate
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0.0 to 153.6	Data rate	9.6	kBit/s	V4.20
Description of command				Sig. State
This command is always a query. It returns the data rate assigned to the RTAP max. data rate index that can be set with the command				All
CONFigure:LAYer:APPLication:DTESt:RTAP:DATA:RMAX:INDEX				

Subsystem Enhanced Test Application

The functionality of the Enhanced Test Application is similar to the Default Test Application except that the enhanced application provides support for different data rates and enhanced statistics. The Enhanced Test Application is only available for Network Release A (see also chapter 4, section Network Parameters (Connection Control – Network)).

CONFigure:LAYer:APPLiCation:ETEST:FETap:DRC:DRIndex[?]		FETAP Data Rate Configuration (DRC)																																																		
<Data Rate Index>																																																				
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.																																																
0 to 14 MINimum MAXimum OFF ON DEFault	Data rate index Sets the data rate index to 0 Sets the data rate index to 14 With the data rate index set to OFF, the mobile determines the DRC rate based on internal algorithms. With the data rate index set to ON, the mobile uses the last stored value of the data rate index Sets the value to the default setting	1	–	V4.30																																																
Description of command				Sig. State																																																
This command sets the data rate index for the control channel sync. message. The data rate index defines an unambiguous assignment of the data rate and the slot count, as shown below:				All																																																
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Index	Rate [kBit/s]	#Slots																																																		
0	0.0	n/a																																																		
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12	2457.6	1																																																		
13	1536.0	2																																																		
14	3072.0	1																																																		
Please note that a data rate index of "0" stops all FETAP packets going to the mobile. When the AT requests data rate "0," data may be sent to it at data rate "1."																																																				
The data rate can be queried with the command CONFigure:LAYer:APPLiCation:ETEST:FETap:DRC:DRATE?																																																				
The slot count can be queried using CONFigure:LAYer:APPLiCation:ETEST:FETap:DRC:SCOUNT?																																																				

CONFigure:LAYer:APPLication:ETESt:FETap:DRC:DRate?				FETAP DRC Rate
<Data Rate>				
<FETAP Data Rate>	Description of parameters	Def. value	Def. unit	FW vers.
38.4 to 3072.0	FETAP Data rate	38.4	kBit/s	V4.30
Description of command				Sig. State
This command is always a query. It returns the data rate assigned to the FETAP data rate index that can be set with the command <code>CONFigure:LAYer:APPLication:ETESt:FETap:DRC:DRIndex</code>				All

CONFigure:LAYer:APPLication:ETESt:FETap:DRC:SCout?				FETAP DRC Slot Count
<FETAP Slot Count>				
<FETAP Slot Count>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 16	Slot count	16	–	V4.30
Description of command				Sig. State
This command is always a query. It returns the slot count assigned to the data rate index that can be set with the command <code>CONFigure:LAYer:APPLication:ETESt:FETap:DRC:DRIndex</code>				All

CONFigure:LAYer:APPLication:ETESt:FETap:LBAck:ENABle?				FETAP Loopback Enable Status
<Loopback Enable>				
<Loopback>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF Default	The FETAP loopback is enabled The FETAP loopback is disabled Sets the FETAP loopback to the default value	ON	–	V4.31
Description of command				Sig. State
This command is always a query. It returns the status of the FETAP Loopback parameter. If the FETAP loopback is enabled, the bits sent to the access terminal are looped back to the CMU. The CMU compares the bits received with those sent and can thus calculate the percentage of faulty bits.				All
The status of the FETAP Loopback parameter depends on the FETAP/RETAP configuration (only FETAP -> Loopback is ON, only RETAP -> Loopback is OFF, both FETAP and RETAP -> Loopback is OFF).				

CONFigure:LAYer:APPLication:ETESt:FETap:ACK:FMODE[?]				FETAP ACK Channel Fix Mode
<ACK Channel Fix Mode>				
<Ch. Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NUSed AALWays NAALWays	A value of NUSed means that the AT decides when to ACK or NAK the packets. It is no longer predetermined by the AN. ACK always NAK always	NUSed	–	V4.31
Description of command				Sig. State
This command controls the ACK channel in the reverse signal. The ACK channel is used by the AT to inform the AN whether or not the physical layer packet transmitted on the Forward Enhanced Traffic Channel has been received successfully.				All

CONFigure:LAYer:APPLication:ETEST:FETap:ACK:MTYPE? <ACK Channel Modulation Type>		ACK Channel Modulation Type		
<ACK Ch. Mod. Type>	Description of parameters	Def. value	Def. unit	FW vers.
BPSK OOK OFF ON DEFault	BPSK modulation (for single-user packets) On-Off Keying modulation (for multi-user packets) The channel modulation type is not decided by the CMU, it is determined by the AT. The command is reactivated at the last used setting. Sets default ACK channel modulation	BPSK	–	V4.31
Description of command				
This command sets or returns the current ACK channel modulation type for FETAP testing purposes. For technical reasons, the setting currently defaults to OFF and the command is restricted to be query only.				

CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMIN:INDEX[?] <RETAP Min. Packet Size Index>		RETAP Data Min. Rate		
<Packet Size Index>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 12 ¹⁾ MINimum MAXimum DEFault	RETAP minimum packet size index Sets the packet size index to 0 Sets the packet size index to 12 ¹⁾ Sets the value to the default setting	1	–	V4.30
Description of command				Sig. State
This command sets the minimum data rate index for the reverse channel test application protocol. The data rate index defines an unambiguous assignment of the payload sizes, as shown for CONFigure:LAYer:APPLication:ETEST:FETap:DRC:DRINDEX[?]. If the entered value is greater than the setting of CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMAX:INDEX[?] then the CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMAX:INDEX[?] will be adapted to the entered value. The data rate can be queried with the command CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMIN:VALue? Note: If the entered value is greater than the setting defined with CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMAX:INDEX[?] then CONFigure:LAYer:APPLication:DETEST:RETap:DATA:RMAX:INDEX[?] will be adapted to the entered value ¹⁾ 12 is the absolute maximum. The current max. is restricted to the setting of: CONFigure:LAYer:APPLication:ETEST:RETap:DATA:RMAX:INDEX[?]				All

CONFigure:LAYer:APPLication:ETESst:RETap:DATa:RMAX:INDeX[?]		RETAP Data Max. Rate		
<RETAP Max. Data Rate Index>				
<Data Rate Index>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 12 MINimum MAXimum DEFault	RETAP maximum data rate index Sets the data rate index to 1 Sets the data rate index to 12 Sets the value to the default setting	1	–	V4.31
Description of command				Sig. State
This command sets the maximum data rate index for the reverse enhanced channel test application protocol. The data rate index defines an unambiguous assignment of the data rate, as shown for <code>CONFigure:LAYer:APPLication:ETESst:FETap:DRC:DRINdeX[?]</code> .				All
If the entered value is less than the setting of <code>CONFigure:LAYer:APPLication:ETESst:RETap:DATA:RMIN:INDeX[?]</code> then the <code>CONFigure:LAYer:APPLication:ETESst:RETap:DATA:RMIN:INDeX[?]</code> will be adapted to the entered value.				
The data rate can be queried with the command <code>CONFigure:LAYer:APPLication:ETESst:RETap:DATa:RMAX:VALue?</code>				

CONFigure:LAYer:APPLication:ETESst:RETap:ACHannel:RMODE[?]		Enhanced Channel Rate Mode		
<Rate Mode>				
<Rate Mode>	Description of parameters	Def. value	Def. unit	FW vers.
R9K R19K R38K DEFault	The default access channel data rate is 9600 bps The default access channel data rate is 19200 bps The default access channel data rate is 38400 bps Sets the default access channel data rate to default	R9K	–	V4.31
Description of command				Sig. State
This command sets or returns the access channel data rate.				All

Subsystem Default Packet Application

The Default Packet Application consists of the link layer protocol that provides octet retransmission and duplicate detection (Radio Link Protocol), the location update protocol that provides mobility between data service networks and the flow control protocol that provides flow control of data traffic.

CONFigure:LAYer:APPLication:DPACket:ENABle[?]		Default Packet Application Enable		
<Default Packet App - Enable>				
<DPA Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The application layer default packet application is enabled The application layer default packet application is disabled	OFF	–	V4.20
Description of command				Sig. State
This command sets or returns the default packet application status.				All

CONFigure:LAYer:APPLiCation:DPACket:STReam[?] <Default Packet App - Stream No.>		Default Packet Application Stream		
<Stream No.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 3 MINimum MAXimum DEFault INValid	The default packet application stream number Sets the stream number to the minimum setting (1) Sets the stream number to the maximum setting (3) Sets the stream number to the default setting Return code for an invalid or no stream assignment (query only)	INV	–	V4.20
Description of command				Sig. State
This command sets or returns the stream number of the default packet application. Stream 0 is reserved for the Default Signaling Application.				All

[SENSe]:ATInfo:APPLiCation:DPACket:SUPPort? <Default Packet App - AT Support>		Default Packet Application AT Support		
Returns	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The default packet application is supported. The default packet application is not supported.	ON	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the AT support status of the default packet application.				All

CONFigure:LAYer:APPLiCation:DPACket:MIP:SAMode[?] <Enable>		Mobile IP Stand Alone Mode		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Mobile IP stand alone mode Mobile IP gateway mode	ON	–	V4.21
Description of command				Sig. State
This command sets or returns the MIP mode that the CMU is configured for.				All ¹

¹ This command cannot be used while a packet data connection is active.

CONFigure:LAYer:APPLication:DPACket:MIP:MHIP[?]				Mobile Node Home IP Address
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
Address parts	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	0 to 255 0 to 255 0 to 255 0 to 255	10 10 10 10	– – – –	V4.21
Description of command				Sig. State
This command defines the IP address of the mobile in its home network.				All ²

CONFigure:LAYer:APPLication:DPACket:MIP:FAIP[?]				Foreign Agent Home IP Address
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
<Address parts>	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	0 to 255 0 to 255 0 to 255 0 to 255	NAN NAN NAN NAN	– – – –	V4.21
Description of command				Sig. State
This command defines the IP address of the of the Foreign Agent. The command is only available in MIP gateway mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode OFF).				All ³

CONFigure:LAYer:APPLication:DPACket:MIP:HASecret[?]				AT Node Home Agent Secret
<Secret>				
<Secret>	Description of parameters	Def. value	Def. unit	FW vers.
'<max 20 characters>'	0 to 255	'cmu'	–	V4.21
Description of command				Sig. State
This command defines the secret used by the R&S CMU to do Mobile IP MD5 authentication in MIP stand-alone mode.				All ⁴

CONFigure:LAYer:APPLication:DPACket:MIP:HAIP?				AT Node Home Agent IP Address
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
<Address parts>	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	0 to 255 0 to 255 0 to 255 0 to 255	NAN NAN NAN NAN	– – – –	V4.21
Description of command				Sig. State
This commands queries the IP address of the Home Agent. This address is programmed in the mobile and used for registration and tunneling purposes. It is captured and displayed when a mobile IP call is made.				All

2 This command cannot be used while a packet data connection is active.

3 This command cannot be used while a packet data connection is active and while the CMU is configured for MIP gateway mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode OFF).

4 This command cannot be used while a packet data connection is active and while the CMU is configured for MIP stand-alone mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode ON).

CONFigure:LAYer:APPLication:DPACket:MIP:COAddress?				Care of Address
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
<Address parts>	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>,	0 to 255	NAN	–	V4.21
<Addr_2>,	0 to 255	NAN	–	
<Addr_3>,	0 to 255	NAN	–	
<Addr_4>	0 to 255	NAN	–	
Description of command				Sig. State
This commands queries the IP address that the Foreign Agent uses to decapsulate packets which have been tunneled by the home agent and to deliver them to the mobile node. The address is captured and displayed when a mobile IP call is made.				All

CONFigure:LAYer:APPLication:DPACket:MIP:AAADV[?]				MIP Agent Advertisements
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	Enable or disable advertisements	ON	–	V4.21
Description of command				Sig. State
This command enables or disables the R&S CMU to broadcast MIP Agent Advertisements to advertise its presence on the network. The command is only available in MIP stand alone mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode OFF).				All

CONFigure:LAYer:APPLication:DPACket:MIP:RRCode[?]		Registration Reply Code		
<Code No>				
<Code No>	Description of parameters	Def. value	Def. unit	FW vers.
0	Registration accepted	0	–	V4.21
1	Registration accepted, no simultaneous bindings			
64	Reason unspecified			
65	Administratively prohibited			
66	Insufficient resources			
67	MS node failed authentication			
68	Home agent failed authentication			
69	Requested lifetime too long			
70	Poorly formed request			
71	Poorly formed reply			
72	Requested encapsulation unavailable			
73	Van Jacobson compression unavailable			
80	Home network unreachable (ICMP error)			
81	Home agent host unreachable (ICMP error)			
82	Home agent port unreachable (ICMP error)			
88	Home agent unreachable (ICMP error)			
128	Reason unspecified			
129	Administratively prohibited			
130	Insufficient resources			
131	AT node failed authentication			
132	Foreign agent failed authentication			
133	Reg. identification mismatch			
134	Poorly formed request			
135	Too many simultaneous mobility bindings			
136	Unknown home agent address			
Description of command				Sig. State
This command defines a code number sent to the mobile in the CAUSE_CODE field of the <i>Registration Reply</i> message. Any number different from the values listed above will be automatically corrected. The command is only available in MIP stand-alone mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode ON).				All

CONFigure:LAYer:APPLication:DPACket:MIP:RRLTime[?]		Registration Reply Lifetime		
<Time>				
<Time>	Description of parameters	Def. value	Def. unit	FW vers.
0 s to 65535 s	Time remaining before the Access Terminal has to re-register	600	s	V4.21
Description of command				Sig. State
This command defines the number of seconds remaining before the registration is considered expired. The command is only available in MIP stand-alone mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode ON). A value of 0 s means that the mobile has to de-register; a value of 65535 s means infinity.				All

CONFigure:LAYer:APPLication:DPACket:MIP:AUTHentic:TYPE[?]				MIP Authentication Type
<Type>				
<Type>	Description of parameters	Def. value	Def. unit	FW vers.
R02 R02B	Authentication according to RFC 2002 or RFC 2002bis	R02	–	V4.21
Description of command				Sig. State
This command selects the authentication protocol for Mobile IP connections. The command is only available in MIP stand alone mode (CONFigure:LAYer:APPLication:DPACket:MIP:SAMode ON).				All

CONFigure:LAYer:APPLication:DPACket:REVerse[:STATic]:IPADdress[?]				AT PPP IP Address, Static
CONFigure:LAYer:APPLication:DPACket:FORWard[:STATic]:IPADdress[?]				AN PPP IP Address, Static
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
Address parts	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1> MIN MAX DEF,	0 to 255	192	–	V4.20
<Addr_2> MIN MAX DEF,	0 to 255	168	–	
<Addr_3> MIN MAX DEF,	0 to 255	1	–	
<Addr_4> MIN MAX DEF	0 to 255	1 (for reverse address, AT) 2 (for forward address, AN)	– –	
Description of command				Sig. State
These commands define the static PPP IP addresses of the AT (:REVerse) and the AN/CMU (:FORWard). The addresses are used if the CMU is configured for static IP addressing (CONFigure:IPADdress:MODE STATic).				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:DNS[:STATic]:IPADdress[?]				DNS IP Address, Static
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
Address parts	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1> ,	0 to 255	192	–	V4.20
<Addr_2> ,	0 to 255	168	–	
<Addr_3> ,	0 to 255	1	–	
<Addr_4>	0 to 255	3	–	
Description of command				Sig. State
This command defines the static IP address of the DNS used for the packet testing applications with PPP.				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:REVerse:DYNamic:IPADdress?		AT PPP IP Address, Dynamic		
CONFigure:LAYer:APPLication:DPACket:FORWard:DYNamic:IPADdress?		AN PPP IP Address, Dynamic		
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
Address parts	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>,	0 to 255	NAN	–	V4.20
<Addr_2>,	0 to 255	NAN	–	
<Addr_3>,	0 to 255	NAN	–	
<Addr_4>	0 to 255	NAN (for reverse address) NAN (for forward address)	–	
Description of command				Sig. State
These commands query the dynamically allocated PPP IP addresses of the AT (:REVerse) and the AT/CMU (:FORWard). The addresses are available if the CMU is configured for dynamic IP addressing using DHCP (CONFigure:IPADdress:MODE DYNamic)				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:DNS:DYNamic:IPADdress?		DNS IP Address, Dynamic		
<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>				
Address parts	Ranges of values	Def. value	Def. unit	FW vers.
<Addr_1>,	0 to 255	NAN	–	V4.20
<Addr_2>,	0 to 255	NAN	–	
<Addr_3>,	0 to 255	NAN	–	
<Addr_4>	0 to 255	NAN	–	
Description of command				Sig. State
This command queries the dynamic IP address of the DNS used for the packet testing applications with PPP.				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:AUTHentic:TYPE[?]		PPP Authentication Type		
<Authentication Type>				
<Auth. Type>	Description of parameters	Def. value	Def. unit	FW vers.
NONE CHAP PAP	PPP authentication is disabled Challenge-Handshake Authentication Protocol enabled Password Authentication Protocol enabled	NONE	–	V4.20
Description of command				Sig. State
This command selects the authentication protocol for IP connections. If PPP authentication is set to a value different than NONE, Simple IP is used.				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:AUTHentic:UNAME[?] <Username>		User name (PPP Authentication)		
<Name>	Description of parameters	Def. value	Def. unit	FW vers.
'<max. 72 characters>'	User name, string parameter	**	–	V4.20
Description of command				Sig. State
This command selects the user name for PAP authentication (CONFigure:LAYer:APPLication:DPACket:AUTHentic:TYPE). This command may only be modified while no packet data call is active.				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:AUTHentic:PWOrd[?] <Password>		Password (PPP Authentication)		
<Password>	Description of parameters	Def. value	Def. unit	FW vers.
'<max. 72 characters>'	Password, string parameter	**	–	V4.20
Description of command				Sig. State
This command selects the password for PAP authentication (CONFigure:LAYer:APPLication:DPACket:AUTHentic:TYPE). This command may only be modified while no packet data call is active.				All (except CEST or DORM)

CONFigure:LAYer:APPLication:DPACket:IAControl:NIATimer[?] <Network PPP Inactivity Timer>		Network PPP Inactivity Timer		
<Time>	Description of parameters	Def. value	Def. unit	FW vers.
5 s to 60 s MINimum MAXimum DEFault ON OFF	Network PPP inactivity timer Sets the Network PPP inactivity timer to the minimum value Sets the Network PPP inactivity timer to the maximum value Sets the Network PPP inactivity timer to the default value Enables the Network PPP inactivity timer No timer used, AT remains in the <i>PPP Connected</i> state	OFF	s	V4.20
Description of command				Sig. State
This command defines the time interval after which the CMU will transition the AT from <i>PPP Connected</i> to <i>PPP DORMant</i> state if there is no data being sent to the AT. The timer is used to timeout the PPP connection between the AN and the AT.				All (except CEST or DORM)

Subsystem Stream Layer

The Stream Layer provides multiplexing of distinct streams. Stream 0 is dedicated to signaling and defaults to the default signaling stream (Signaling Network Protocol / Signaling Link Protocol) and Stream 1 defaults to the default packet service (Radio Link Protocol). Stream 2 and Stream 3 are not used by default.

The Default Stream Protocol of the Stream Layer adds the stream header to application packets prior to transmission; and, after reception, removes the stream header and forwards application packets to the correct application.

CONFigure:LAYer:Stream:SPRotocol:STYPe?				Stream Protocol Subtype
<Subtype>				
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
DSPRotocol	The Default Stream Protocol is enabled	DSPRotocol	–	V4.20
GVSProtocol	The Generic Virtual Stream Protocol is enabled			
IDEFault	Sets the Stream Protocol subtype to the default value			
Description of command				Sig. State
This command is a query only. It returns the Stream Protocol subtype.				All

Subsystem Session Layer

The Session Layer consists of the Session Management Protocol, which provides means to control the activation and the deactivation of the Address Management Protocol and the Session Configuration Protocol, of the Address Management Protocol, which provides the access terminal identifier (ATI) management, and of the Session Configuration Protocol, which provides negotiation and configuration of the protocols used in the session.

CONFigure:LAYer:SESSion:SMPRotocol:ISTimeout[?]				Inactive Session Timeout
<Inactive Session Timeout>				
<Timeout>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 65535	Inactive session timeout in minutes	3240	minute	V4.20
MINimum	Sets the Inactive session timeout to the minimum value			
MAXimum	Sets the Inactive session timeout to the maximum value			
DEFault	Sets the Inactive session timeout to the default value			
Description of command				Sig. State
This command sets or returns the inactive session timeout. This command may only be modified while no packet data call is active.				All

CONFigure:LAYer:SESSion:AMPRotocol:SNIncluded[?]				AMP Subnet Included
<Subnet Included>				
<Subnet>	Description of parameters	Def. value	Def. unit	FW vers.
ON	The Address Management Protocol (AMP) subnet is included	OFF	–	V4.20
OFF	The Address Management Protocol subnet is not included			
DEFault	Sets the AMP subnet inclusion to the default value			
Description of command				Sig. State
This command sets or returns the Subnet Include parameter for the Address Management Protocol.				All

CONFigure:LAYer:SESSion:SCPRotocol:GSUPport?				AMP Subnet Included
<Subnet Included>				
<Subnet>	Description of parameters	Def. value	Def. unit	FW vers.
ON	GAUP support is enabled	OFF	–	V4.20
OFF	No GAUP support in the session configuration protocol			
Description of command				Sig. State
This command is always a query. It returns the GAUP for the session configuration protocol.				All

Subsystem Connection Layer

The Connection Layer consists of the following protocols:

- Air Link Management Protocol, which provides the overall state machine management that an access terminal and an access network follow during a connection.
- Initialization State Protocol, which provides the procedures that an access terminal follows to acquire a network and that an access network follows to support network acquisition.
- Idle State Protocol, which provides the procedures that an access terminal and an access network follow when a connection is not open.
- Connected State Protocol, which provides the procedures that an access terminal and an access network follow when a connection is open.
- Route Update Protocol, which provides the means to maintain the route between the access terminal and the access network.
- Overhead Messages Protocol, which provides broadcast messages containing information that is mostly used by Connection Layer protocols.
- Packet Consolidation Protocol, which provides transmit prioritization and packet encapsulation for the Connection Layer.

CONFigure:LAYer:CONNectio:n:RUPRotocol:PDThresho:ld[?]				Pilot Drop Threshold
<Pilot Drop Threshold>				
<Pilot Drop Thr.>	Description of parameters	Def. value	Def. unit	FW vers.
-31.5 dB to 0 dB MINimum MAXimum DEFault	Pilot drop threshold level Sets the Pilot drop threshold to the minimum value Sets the Pilot drop threshold to the maximum value Sets the Pilot drop threshold level to the default value	-9	dB	V4.30
Description of command				Sig. State
This command sets or returns the pilot power drop threshold for the route update protocol. Pilot drop is used by the access terminal to start a pilot drop timer for a pilot in the active set. If the pilot strength falls below the pilot drop threshold and remains there until the pilot drop timer expires, the access terminal sends a Route Update message in the connected state.				All

CONFigure:LAYer:CONNectio:n:OMPRotocol:REDirect[?]				OMP Redirect
<Redirect>				
<Redirect>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF DEFault	The Overhead Messages Protocol redirect is enabled The Overhead Messages Protocol redirect is disabled Sets the OMP redirect to the default value	OFF	-	V4.20
Description of command				Sig. State
This command sets or returns the redirect parameter for the overhead messages protocol.				All

CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:CIIncluded?		Route Update Trigger Code Incl.		
<Route Update Trigger Code Incl.>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The route update trigger code is included The route update trigger code is not included	OFF	–	V4.20
Description of command				Sig. State
This command is always a query. It returns whether or not the route update trigger code is included for the overhead messages protocol.				All

CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:CODE?		Route Update Trigger Code		
<Route Update Trigger Code Incl.>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0 to 2^12	The route update trigger code	0	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the 12 bit route update trigger code of the overhead messages protocol.				All

CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX:INDEX?		Route Update Trigger Max. Age Index		
<Route Update Trigger Max-Age Index>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0 to 15	The route update trigger max. age index	0	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the maximum age index for the route update trigger of the overhead messages protocol.				All

CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX?		Route Update Trigger Max. Age		
<Route Update Trigger Max. Age>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
0.00 to 15.00	The route update trigger max. age	10.24	s	V4.20
Description of command				Sig. State
This command It returns the maximum age for the route update trigger of the overhead messages protocol.				All

Subsystem MAC Layer

The MAC Layer defines the procedures used to receive and to transmit over the Physical Layer. For this, the MAC Layer contains the following protocols:

- Control Channel MAC Protocol, which provides the procedures followed by the access network to transmit, and by the access terminal to receive the Control Channel.
- Access Channel MAC Protocol, which provides the procedures followed by the access terminal to transmit, and by the access network to receive the Access Channel.
- Forward Traffic Channel MAC Protocol, which provides the procedures followed by the access network to transmit, and by the access terminal to receive the Forward Traffic Channel.

- Reverse Traffic Channel MAC Protocol, which provides the procedures followed by the access terminal to transmit, and by the access network to receive the Reverse Traffic Channel.

CONFigure:LAYer:MAC:CCMProtocol:STYPe?		Control Channel MAC Protocol Subtype		
<Subtype>				
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
DCCProtocol	The default control channel protocol is enabled	DCCPRotocol	–	V4.20
ECCProtocol	The enhanced control channel protocol is enabled			
DEFAult	Sets the control channel protocol to the default value			
Description of command				Sig. State
This command is a query. It returns the MAC layer control channel protocol subtype.				All

CONFigure:LAYer:MAC:CCMProtocol:DCCProtocol:DRATe[?]		Data Rate		
<Data Rate>				
<Data Rate>	Description of parameters	Def. value	Def. unit	FW vers.
R384	The default control ch. protocol data rate is 38400 bps (MAC 3)	R384	–	V4.20
R768	The default control ch. protocol data rate is 76800 bps			
Description of command				Sig. State
This command sets or returns the MAC layer default control channel protocol data rate. Currently, this command only sets the data rate for asynchronous control channel messages. Synchronous control channel messages are always sent at 76800 bps.				All

CONFigure:LAYer:MAC:ACMProtocol:STYPe?		Access Channel MAC Protocol Subtype		
<Subtype>				
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
DACProtocol	The default access channel protocol is enabled	DACPRotocol	–	V4.20
EACProtocol	The enhanced access channel protocol is enabled			
DEFAult	Sets the control access protocol to the default value			
Description of command				Sig. State
This command is always a query. It returns the MAC layer access channel protocol subtype.				All

CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:SSEed?		Session Seed		
<Session Seed>				
Returns	Description of parameters	Def. value	Def. unit	FW vers.
8 chars (hex) (32 bits)	The session seed value for the default access channel protocol	---	–	V4.20
Description of command				Sig. State
This command is always a query. It returns the session seed value for the default access channel protocol which is not configurable, it is provided by the AT.				All

CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:PSEquence:MAXimum[?] Max. Probe Sequences <P. Seq. Max.>				
<P. Seq. Max.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15 MINimum MAXimum DEFault	Maximum number of probe sequences Sets the max. # of probe sequences to the minimum value Sets the max. # of probe sequences to the maximum value Sets the max. # of probe sequences to the default value	3	–	V4.31
Description of command				Sig. State
This command sets or returns the value for the Probe Sequence Maximum, which is one of the initial configuration attributes of the Default Access Channel MAC Protocol. It is used in access probe output power measurements to specify the maximum number of probe sequences in an access attempt.				All

CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPBackoff[?] Inter-Probe Backoff <IPBackoff>				
<IPBackoff>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15 MINimum MAXimum DEFault	Limit for the backoff range between probes Sets the backoff range to the minimum value Sets the backoff range to the maximum value Sets the backoff range to the default value	4	–	V4.31
Description of command				Sig. State
This command sets or returns the the upper limit of the backoff range (in units of access cycle duration) that the access terminal is to use between probes.				All

CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPSBbackoff[?] Inter-Probe Sequence Backoff <IPSBbackoff>				
<IPSBbackoff>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15 MINimum MAXimum DEFault	Limit for the backoff range between probe sequences Sets the backoff range to the minimum value Sets the backoff range to the maximum value Sets the backoff range to the default value	8	–	V4.31
Description of command				Sig. State
This command sets or returns the the upper limit of the backoff range (in units of access cycle duration) that the access terminal is to use between probe sequences.				All

CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:PSEquence:MAXimum[?] Max. Probe Sequences <P. Seq. Max.>				
<P. Seq. Max.>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15 MINimum MAXimum DEFault	Maximum number of probe sequences Sets the max. # of probe sequences to the minimum value Sets the max. # of probe sequences to the maximum value Sets the max. # of probe sequences to the default value	3	–	V4.31
Description of command				Sig. State
This command sets or returns the value for the Probe Sequence Maximum, which is one of the initial configuration attributes of the Enhanced Access Channel MAC Protocol. It is used in access probe output power measurements to specify the maximum number of probe sequences in an access attempt.				All

CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff[?]				Inter-Probe Backoff
<IPBackoff>				
<IPBackoff>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15	Limit for the backoff range between probes	4	–	V4.31
MINimum	Sets the backoff range to the minimum value			
MAXimum	Sets the backoff range to the maximum value			
DEFault	Sets the backoff range to the default value			
Description of command				Sig. State
This command sets or returns the the upper limit of the backoff range (in units of access cycle duration) that the access terminal is to use between probes.				All

CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPSBbackoff[?]				Inter-Probe Sequence Backoff
<IPSBbackoff>				
<IPSBbackoff>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15	Limit for the backoff range between probe sequences	8	–	V4.31
MINimum	Sets the backoff range to the minimum value			
MAXimum	Sets the backoff range to the maximum value			
DEFault	Sets the backoff range to the default value			
Description of command				Sig. State
This command sets or returns the the upper limit of the backoff range (in units of access cycle duration) that the access terminal is to use between probe sequences.				All

CONFigure:LAYer:MAC:FTCProtocol:STYPe?				Forward Traffic Channel MAC Protocol Subtype
<Subtype>				
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
DFTPProtocol	The default forward traffic channel protocol is enabled	DFTPProtocol	–	V4.20
EFTPProtocol	The enhanced forward traffic channel protocol is enabled			
DEFault	Sets the control access protocol to the default value			
Description of command				Sig. State
This command is always a query. It returns the forward traffic channel MAC protocol subtype.				All

CONFigure:LAYer:MAC:FTCProtocol:DFTPProtocol:DRC:COVer[?]				DRC Cover
<DRC Cover>				
<DRC Cover>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 6	The DRC cover value	2	–	V4.20
MINimum	Sets the DRC cover to the minimum value			
MAXimum	Sets the DRC cover to the maximum value			
DEFault	Sets the DRC cover to the default value			
Description of command				Sig. State
This command sets or returns the cover value for the Data Rate Channel.				All
The access terminal uses the DRC cover to specify the transmitting sector (the access terminal is said to point the DRC at that sector). The access terminal uses the DRC value to specify the requested transmission rate.				

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:LENGth[?]				DRC Length
<DRC Length>				
<DRC Length>	Description of parameters	Def. value	Def. unit	FW vers.
1 2 4 8	The DRC length value	2	Slots	V4.20
MINimum	Sets the DRC length to the minimum value			
MAXimum	Sets the DRC length to the maximum value			
DEFault	Sets the DRC length to the default value			
Description of command				Sig. State
This command sets or returns the number of slots the AT shall use to transmit a single DRC value for the Data Rate Channel.				All

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:CGAin[?]				DRC Channel Gain
<DRC Channel Gain>				
<DRC Ch. Gain>	Description of parameters	Def. value	Def. unit	FW vers.
-9.0 dB to +6.0 dB	The DRC channel gain	+2.0	dB	V4.20
MINimum	Sets the DRC channel gain to the minimum value			
MAXimum	Sets the DRC channel gain to the maximum value			
DEFault	Sets the DRC channel gain to the default value			
Description of command				Sig. State
This command sets or returns the channel gain for the Data Rate Channel, which represents the ratio of the power level of the Reverse Data Channel to the power level of the Pilot Channel.				All

CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:ACK:CGAin[?]				ACK Channel Gain
<ACK Channel Gain>				
<ACK Ch. Gain>	Description of parameters	Def. value	Def. unit	FW vers.
-3.0 dB to +6.0 dB	The ACK channel gain (in increments of 0.5 dB)	+2.0	dB	V4.20
MINimum	Sets the ACK channel gain to the minimum value			
MAXimum	Sets the ACK channel gain to the maximum value			
DEFault	Sets the ACK channel gain to the default value			
Description of command				Sig. State
This command sets or returns the channel gain for the Ack Channel, which represents the ratio of the power level of the Ack Channel to the power level of the Reverse Traffic Pilot Channel expressed as 2's complement value in steps of 0.5 dB.				All

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:COVer[?]				DRC Cover
<DRC Cover>				
<DRC Cover>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 6 MINimum MAXimum DEFault	The DRC cover value Sets the DRC cover to the minimum value Sets the DRC cover to the maximum value Sets the DRC cover to the default value	2	–	V4.30
Description of command				Sig. State
This command sets or returns the cover value for the Data Rate Channel in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL).				All
The access terminal uses the DRC cover to specify the transmitting sector (the access terminal is said to point the DRC at that sector). The access terminal uses the DRC value to specify the requested transmission rate.				

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:LENGth[?]				DRC Length
<DRC Length>				
<DRC Length>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 3 MINimum MAXimum DEFault	The DRC length value Sets the DRC length to the minimum value Sets the DRC length to the maximum value Sets the DRC length to the default value	1	Slots	V4.30
Description of command				Sig. State
This command sets or returns the number of slots the AT shall use to transmit a single DRC value for the Data Rate Channel in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL).				All

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:CGain[?]				DRC Channel Gain
<DRC Channel Gain>				
<DRC Ch. Gain>	Description of parameters	Def. value	Def. unit	FW vers.
–9.0 dB to +6.0 dB MINimum MAXimum DEFault	The DRC channel gain Sets the DRC channel gain to the minimum value Sets the DRC channel gain to the maximum value Sets the DRC channel gain to the default value	+2.0	dB	V4.20
Description of command				Sig. State
This command sets or returns the channel gain for the Data Rate Channel in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL). It represents the ratio of the power level of the Reverse Data Channel to the power level of the Pilot Channel.				All

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:ACK:CGain[?] <ACK Channel Gain>				ACK Channel Gain
<ACK Ch. Gain>	Description of parameters	Def. value	Def. unit	FW vers.
-3.0 dB to +6.0 dB MINimum MAXimum DEFault	The ACK channel gain (in increments of 0.5 dB) Sets the ACK channel gain to the minimum value Sets the ACK channel gain to the maximum value Sets the ACK channel gain to the default value	+1.5	dB	V4.30
Description of command				Sig. State
This command sets or returns the channel gain for the ACK Channel in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL). It represents the ratio of the power level of the ACKChannel to the power level of the Reverse Traffic Pilot Channel expressed as 2's complement value in steps of 0.5 dB.				All

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:VALue[?] <DSC Value>				DSC Value
<DSC Value>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 7	DSC value	4	-	V4.30
Description of command				Sig. State
This command sets or returns the the DSC value in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL).				All
The <i>DSC Value</i> parameter is sent down as part of the Traffic Channel Assignment and therefore does not trigger a session renegotiation.				

CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:CGain[?] <DSC Channel Gain>				DSC Channel Gain Base
<DSC Ch. Gain>	Description of parameters	Def. value	Def. unit	FW vers.
-15.5 dB to 0.0 dB MINimum MAXimum DEFault	The DSC channel gain (in increments of 0.5 dB) Sets the DSC channel gain to the minimum value Sets the DSC channel gain to the maximum value Sets the DSC channel gain to the default value	0.0	dB	V4.30
Description of command				Sig. State
This command sets or returns the channel gain for the DSC Channel in an enhanced forward traffic channel MAC protocol context ([SENSe]:LAYer:PHYSical:PLPProtocol:STYPe S2PL). It represents the ratio of the power level of the DSC Channel to the power level of the Reverse Traffic Pilot Channel expressed as 2's complement value in steps of 0.5 dB.				All

CONFigure:LAYer:MAC:RTCProtocol:STYPe? <Subtype>				Reverse Traffic Channel MAC Protocol Subtype
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
DRTProtocol S1RT S2RT S3RT	The default reverse traffic channel protocol is enabled The subtype 1 reverse traffic ch. protocol is enabled The subtype 2 reverse traffic ch. protocol is enabled The subtype 3 reverse traffic ch. protocol is enabled	DRTProtocol	-	V4.20
Description of command				Sig. State
This command is always a query. It returns the reverse traffic channel MAC protocol subtype.				All

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:NOFFset?				Nominal Data Offset
<Data Offset Nom.>				
<Data Offset Nom.>	Description of parameters	Def. value	Def. unit	FW vers.
-4.0 to +3.5 MINimum MAXimum DEFault	The nominal DRC data offset (in increments of 0.5 dB) Sets the nominal DRC data offset to the minimum value Sets the nominal DRC data offset to the maximum value Sets the nominal DRC data offset to the default value	0.0	dB	V4.20
Description of command				Sig. State
This command is always a query. It returns the nominal data offset for the Data Rate Channel. The nominal data offset is used to specify the nominal offset of the reverse data and reverse access data channels to the reverse pilot channel.				All

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R9K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R19K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R76K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R15K[?] <DRC Data Offsets>				Data Offsets
<Data Offset>	Description of parameters	Def. value	Def. unit	FW vers.
-2.0 to +1.75 MINimum MAXimum DEFault	The DRC data offset for the specified rate (in increments of 0.25 dB) Sets the DRC data offset <Rate> to the minimum value Sets the DRC data offset <Rate> to the maximum value Sets the DRC data offset <Rate> to the default value	+0.0	dB	V4.20
Description of command				Sig. State
These command set or return the data offset for the Data Rate Channel at the specified rates, which correspond to the RTAP rates. The data offset parameters are used to specify a rate-specific offset of the reverse data and reverse access data channels to the reverse pilot channel.				All

CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:RRLimit[?]				Reverse Rate Limit
<Reverse Rate Limit>				
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
R0K R9K R19K R38K R76K R15K DEFault	The traffic channel is disabled The reverse rate limit is set to 9,600 bps The reverse rate limit is set to 19,200 bps The reverse rate limit is set to 38,400 bps The reverse rate limit is set to 76,800 bps The reverse rate limit is set to 153,600 bps Sets the reverse rate limit to the default value	R15K	–	V4.20
Description of command				Sig. State
This command sets or returns the reverse traffic channel MAC protocol subtype. The Reverse Rate Limit is used by the test set to RTAP rate control the transmission rate on the reverse link for a particular access terminal. The rate limit indicates the highest data rate that the access terminal is allowed to use on the Reverse Traffic Channel.				All

				Increasing / Decreasing Transition																		
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R9K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R19K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R38K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R76K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R19K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R38K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R76K[?] CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R15K[?] <Transition Probability>																						
<Transition Prob.>	Description of parameters	Def. value	Def. unit	FW vers.																		
0x00 to 0xFF	The rate transition probability in units of 1/255	see below	–	V4.31																		
MINimum	Sets the rate transition probability to the minimum value																					
MAXimum	Sets the rate transition probability to the maximum value																					
DEFault	Sets the rate transition probability to the default value																					
Description of command				Sig. State																		
These commands set or return the probability which the access terminal uses to increase/decrease its transmission rate to the next higher/lower data rate. The probability is expressed in units of 1/255. The rate transition probability is one of the rate parameter attributes in the ConfigurationRequest message of the Reverse Traffic Channel MAC Protocol. The default values for the rate transition probabilities are:				All																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Data Rate</th> <th style="width: 40%;">Increasing</th> <th style="width: 45%;">Decreasing</th> </tr> </thead> <tbody> <tr> <td>R9K</td> <td>9.6 -> 19.2 kbps: 0x30 (18.9 %)</td> <td>n.a.</td> </tr> <tr> <td>R19K</td> <td>19.2 -> 38.4 kbps: 0x10 (6.3%)</td> <td>19.2 -> 9.6 kbps: 0x10 (6.3%)</td> </tr> <tr> <td>R38K</td> <td>38.4 -> 76.8 kbps: 0x08 (3.1%)</td> <td>38.4 -> 19.2 kbps: 0x10 (6.3%)</td> </tr> <tr> <td>R76</td> <td>76.8 -> 153.6 kbps: 0x08 (3.1%)</td> <td>76.8 -> 38.4 kbps: 0x20 (12.5%)</td> </tr> <tr> <td>R15K</td> <td>n.a.</td> <td>153.6 -> 76.8 kbps: 0xFF (100%)</td> </tr> </tbody> </table>					Data Rate	Increasing	Decreasing	R9K	9.6 -> 19.2 kbps: 0x30 (18.9 %)	n.a.	R19K	19.2 -> 38.4 kbps: 0x10 (6.3%)	19.2 -> 9.6 kbps: 0x10 (6.3%)	R38K	38.4 -> 76.8 kbps: 0x08 (3.1%)	38.4 -> 19.2 kbps: 0x10 (6.3%)	R76	76.8 -> 153.6 kbps: 0x08 (3.1%)	76.8 -> 38.4 kbps: 0x20 (12.5%)	R15K	n.a.	153.6 -> 76.8 kbps: 0xFF (100%)
Data Rate	Increasing	Decreasing																				
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R76	76.8 -> 153.6 kbps: 0x08 (3.1%)	76.8 -> 38.4 kbps: 0x20 (12.5%)																				
R15K	n.a.	153.6 -> 76.8 kbps: 0xFF (100%)																				
Note that these commands are only applicable for physical layer signal subtype 0.																						

				RPC Step Size
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:RPCControl:SSize[?] <Reverse Power Ctrl. Step Size>				
<Data Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0.5 dB 1.0 dB	The value for the RPC step size	1.0	dB	V4.20
MINimum	Sets the RPC step size to the minimum value			
MAXimum	Sets the RPC step size to the maximum value			
DEFault	Sets the RPC step size to the default value			
Description of command				Sig. State
This command sets or returns the step size for the power of the reverse power control channel.				All
This command is legacy, but it is still included for compatibility reasons.				

RRI Channel Gain Pre-/Post-Transition																			
CONFigure:LAYer:MAC:RTCProtocol:S3RT:RRIgain:TPRE<nr>[?] CONFigure:LAYer:MAC:RTCProtocol:S3RT:RRIgain:TPOST<nr>? <Pre-/Post-Transition>																			
<Transition Prob.>	Description of parameters	Def. value	Def. unit	FW vers.															
-8 dB to +7 dB	The RRI Channel Gain Pre-/Post-Transition value	-6 0 (see below)	dB	V4.31															
MINimum	Sets the Pre-/Post-Transition to the minimum value																		
MAXimum	Sets the Pre-/Post-Transition to the maximum value																		
DEFault	Sets the Pre-/Post-Transition to the default value																		
Description of command				Sig. State															
<p>These commands set or return the gain of the RRI Channel at the specified data rates in steps of 1 dB. Only the "Pre-Transition 4" value can be set, all others are query only.</p> <p>The RRI channel gain pre/post-transition "<nr>" indicates the ratio of the power level of the RRI channel relative to the power level of the reverse pilot channel for those subpackets transmitted prior to the T2P transition when T2P transition value is "<nr>" subpacket(s).</p> <p>For an active cell, the RRI channel gain parameters are "configurable attributes" for the Subtype 3 Reverse Traffic Channel MAC Protocol. They are negotiated with the AT in the RRI channel power parameters attribute during Session Negotiation. When a session is open, changing these settings will result in a session re-negotiation. When a connection is open, changing these settings will result in the connection to be closed. The connection then has to be re-opened.</p> <p>The default values for the RRI channel gain transitions are:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th><nr></th> <th>Pre-Transition (TPRE)..</th> <th>Post-Transition (TPOST)..</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0 dB</td> <td>-6 dB</td> </tr> <tr> <td>1</td> <td>0 dB</td> <td>-6 dB</td> </tr> <tr> <td>2</td> <td>-6 dB</td> <td>-6 dB</td> </tr> <tr> <td>3</td> <td>-6 dB</td> <td>n.a.</td> </tr> </tbody> </table>				<nr>	Pre-Transition (TPRE)..	Post-Transition (TPOST)..	0	0 dB	-6 dB	1	0 dB	-6 dB	2	-6 dB	-6 dB	3	-6 dB	n.a.	All
<nr>	Pre-Transition (TPRE)..	Post-Transition (TPOST)..																	
0	0 dB	-6 dB																	
1	0 dB	-6 dB																	
2	-6 dB	-6 dB																	
3	-6 dB	n.a.																	
<p>Note that these commands are only applicable for physical layer signal subtype 2.</p>																			

Subsystem Physical Layer

The Physical Layer provides the channel structure, frequency, power output, modulation, and encoding specifications for the forward and reverse links using the Physical Layer Protocol.

Physical layer packets can be of subtype 0 (default) or 2.

[SENSe]:LAYer:PHYSical:PLPProtocol:STYPe[?]				Physical Layer Protocol Subtype	
<Subtype>					
<Subtype>	Description of parameters	Def. value	Def. unit	FW vers.	
DPLProtocol S2PL DEFault	The default physical layer protocol is enabled The physical layer subtype 2 protocol is enabled Sets the control access protocol to the default value	DPLProtocol	–	V4.30	
Description of command					Sig. State
This command sets or returns the physical layer protocol subtype. It replaces the former command <code>CONFigure:LAYer:PHYSical:PLPProtocol:STYPe</code> .					All
This command reflects the current negotiated phys. layer protocol subtype, which is important to read the appropriate results in related measurements, e.g. <code>READ[:SCALar]:RXQuality:RLPFormance:DPLProtocol?</code> and <code>READ[:SCALar]:RXQuality:RLPFormance:S2PL?</code> , or <code>READ[:SCALar]:RXQuality:RLPer:DPLProtocol?</code> and <code>READ[:SCALar]:RXQuality:RLPer:S2PL?</code>					

Subsystem ANSignal

The subsystem *ANSignal* configures the RF signal parameters of the CMU. It corresponds to the tab *AN Signal* in the popup menu *Connection Control*.

DEFault:ANSignal[?]				Default Settings	
<Default Settings>					
<Power Mode>	Description of parameters	Def. value	Def. unit	FW vers.	
ON OFF DEFault	AN Signal default settings enabled AN Signal default settings disabled Sets the values to the default setting	ON	–	V4.20	
Description of command					Sig. State
This command sets or determines the AN signal default settings.					All

UNIT:ANSignal:CHANnel[:RF][?]				RF Channel Frequency Unit	
<RFChannel_Unit>					
<RFChannel_Unit>	Description of parameters	Def. Value	Def. unit	FW vers.	
CH HZ KHZ MHZ GHZ	Channel number or frequency unit	CH	–	V4.20	
Description of command					Sig. State
This command defines whether the frequency of the AN signal analyzed is specified in frequency units or as a 1xEV-DO channel number.					All

CONFigure:ANSignal:CHANnel[:RF][?]				RF Channel/Frequency
<RFChannel/Freq>				
<RFChannel/Freq>	Description of parameters	Def. Value	Def. unit	FW vers.
{Value}	Channel number (CH) or frequency unit (Hz, MHz, KHz, GHz) as described in the table for [SENSe]:RFANalyzer:FREQUENCY.	-	-	V4.20
Description of command				Sig. State
This command sets the frequency of the AN signal to be analyzed and can be specified in frequency units or as a 1xEV-DO channel number.				All

CONFigure:ANSignal:POWER:EVDO[?]				1xEV-DO Power
<1xEVDO Power>				
<1xEVDO Power>	Description of parameters	Def. value	Def. unit	FW vers.
-150.0 dBm to +50.0 dBm MINimum MAXimum DEFault	1xEV-DO Power Sets 1xEV-DO Power to the minimum value Sets 1xEV-DO Power to the maximum value Sets the value to the default setting	-70.0	dBm	V4.20
Description of command				Sig. State
This command determines total 1xEV-DO power, which includes all physical channels for the forward 1xEV-DO signal (absolute value, in dBm), but excluding AWGN. The output power value range depends on the RF input used and the external attenuation set (see [SENSe]:CORrection:LOSS:OUTPut<nr>[:MAGNitude] command).				All (except CEST)

CONFigure:ANSignal:POWER:OUTPut?				Output Power
<Output Power>				
<Output Power>	Description of parameters	Def. value	Def. unit	FW vers.
-3000 dBm to +3000 dBm	Power output	NAN	dBm	V4.20
Description of command				Sig. State
This command returns total output power (absolute value, in dBm) on the RF out, which includes the 1xEV-DO power and the AWGN.				All

CONFigure:IMPairments:FOFFset[:RF][?]				AN Frequency Offset
<Freq. Offset>				
<Freq. Offset>	Description of parameters	Def. value	Def. unit	FW vers.
-3.0 kHz to +3.0 kHz MINimum MAXimum DEFault ON OFF	AN frequency offset setting Sets the value of the AN frequency offset to -3.0 kHz Sets the value of the AN frequency offset to +3.0 kHz Sets the value to the default setting AN frequency offset on, last setting re-activated No frequency offset	OFF	Hz	V4.20
Description of command				Sig. State
This command defines an offset for the AN frequency set with the command [SENSe]:RFGenerator:FREQUENCY <Number>. The offset frequency must be in multiples of 1 Hz.				All

CONFigure:IMPairments:LEVel:AWGN:MODE[?] <AWGN Mode>				AWGN Mode
<AWGN Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NORMal	Normal AWGN power mode (level –25.0 dB to +4.0 dB)	NORM	dB	V4.31
HPOWER	High-power AWGN mode (level –12.0 dB to +11.7 dB)			
Description of command				Sig. State
This command determines the power level range for the <i>Additional White Gaussian Noise</i> level to impair the RF generator signal.				All

CONFigure:IMPairments:LEVel:AWGN[?] <AWGN Level>				AWGN Level
<AWGN Level>	Description of parameters	Def. value	Def. unit	FW vers.
–25.0 dB to +11.7 dB MINimum MAXimum DEFault ON OFF	AWGN level, see below Sets the AWGN level range to –25.0 or –12.0 dB Sets the AWGN level range to +4.0 or +11.7 dB Sets the value to the default setting AWGN generator on, last setting re-activated AWGN generator off	OFF	dB	V4.20
Description of command				Sig. State
This command determines an <i>Additional White Gaussian Noise</i> level to impair the RF generator signal.				All
The level range depends on the AWGN power mode defined with command CONFigure:IMPairments:LEVel:AWGN:MODE[?]. If the AWGN is set to <i>Normal</i> , the level range is –25.0 dB to +4.0 dB, for the <i>High Power</i> mode, the range is defined as –12.0 dB to +11.7 dB, with the MAX and MIN settings being the upper and lower values of the respective ranges.				

Subsystem Power Control

CONFigure:ANSignal:PCBits[?] <Power Control Bits>				Power Control Bits
<Power Control Bits>	Description of parameters	Def. value	Def. unit	FW vers.
AUTomatic HOLD ADOWN AUP DEFault	Auto mode, closed-loop operation Alternating up/down control bits All power control bits down All power control bits up Sets the value to the default setting	AUT	–	V4.20
Description of command				Sig. State
This command defines the power control bits in the RF generator signal. The state of the power control bit is sampled at the beginning of the slot.				All

CONFigure:ANSignal:PCBits:SSIZe[?]				Step Size
<PC Bits Step Size>				
<Step Size>	Description of parameters	Def. Value	Def. Unit	FW vers.
0.5 1.0 MINimum MAXimum DEFault	Step size for power control bits. Sets the Number of bits to 0.5 dB Sets the Number of bits to 1.0 dB Sets the value to the default setting	0.5	dB	V4.20
Description of command				Sig. State
This command determines the step size for the power control bits. Allowed values are 0.50 dB and 1.00 dB, other values are rounded to the next valid step size value.				All
This command is legacy, but it is still included for compatibility reasons.				

Configure:ANSignal:MAC:INDEX[:REV0][?]				MAC Index
<MAC Index>				
<MAC Index>	Description of parameters	Def. Value	Def. Unit	FW vers.
5 to 63 MINimum MAXimum DEFault	MAC Index for AT1 Sets the MAC Index value for the AT1 to 5 Sets the MAC Index value for the AT1 to 63 Sets the value to the default setting	8	–	V4.30
Description of command				Sig. State
This command determines the MAC index for the AT1 in a network release 0 context.				All

Configure:ANSignal:MAC:INDEX:REVA[?]				MAC Index
<MAC Index>				
<MAC Index>	Description of parameters	Def. Value	Def. Unit	FW vers.
5 to 127 ¹⁾ MINimum MAXimum DEFault	MAC Index for AT1 Sets the MAC Index value for the AT1 to 5 Sets the MAC Index value for the AT1 to 127 ¹⁾ Sets the value to the default setting	8	–	V4.30
Description of command				Sig. State
This command determines the MAC index for the AT1 in a network release A context.				All
¹⁾ The range is actually confined to "5 through 63" and to "72 though 127", i.e. entered values from 64 to 71 are auto-corrected to the index value of 63.				

Subsystem Sector

Configure:ANSignal:SECTOR:CLRCode[?]				Color Code
<Color Code>				
<Color Code>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 255 MINimum MAXimum DEFault	Sector color code Sets the sector color code to 0 Sets the sector color code to 255 Sets the color code to the default setting	0	–	V4.20
Description of command				Sig. State
This command sets the color code for the test set sector.				All

Configure:ANSIGNAL:SECTOR:ID:FORMAT[?]		Format of SectorID		
<SectorID Format>				
<Sector ID format>	Description of parameters	Def. value	Def. unit	FW vers.
A41N MANual	Sector ID format as defined in standard ANSI 41 Sector ID is defined manually (see p. 6.197)	A41N	–	V4.30
Description of command				
This command sets the format code for the test set sector.				

Configure:ANSIGNAL:SECTOR:ID:LBITS[?]		Sector ID [0..23]		
<Sector ID Low Bits>				
<Sector ID LBits>	Description of parameters	Def. value	Def. unit	FW vers.
0x000000 to 0xFFFFFFFF DEFault	Hexadecimally formatted string (6 chars) Sets the sector ID low bits to the default setting	0x0000FF	–	V4.20
Description of command				
This command sets the user configurable portion of the test set sector ID. The command is only useful if <code>Configure:ANSIGNAL:SECTOR:ID:FORMAT</code> is set to "A41N" (ANSI 41).				

Configure:ANSIGNAL:SECTOR:NPBITS[?]		Number P Bits		
<Number P Bits>				
<Number P Bits>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 64 MINimum MAXimum DEFault	Hexadecimally formatted string (1 - 64 bits) Sets the number P bits to 1 bit length Sets the number P bits to 64 bit length Sets the number P bits to the default setting	9	–	V4.20
Description of command				
This command sets the number P bits of the test set sector ID as defined in standard 3GPP2 C.S0024-V4.0. The command is only useful if <code>Configure:ANSIGNAL:SECTOR:ID:FORMAT</code> is set to "A41N" (ANSI 41). Additional information on the structure of the sector ID is available in chapter 4.				

[SENSe]:ANSIGNAL:SECTOR:ID?		Sector ID [0..127]		
<Overall Sector ID>				
<Overall Sector ID>	Description of parameters	Def. value	Def. unit	FW vers.
<Sector ID 0..63> <Sector ID 64..127>	Hexadecimally formatted string (17 chars) Hexadecimally formatted string (17 chars)	–	–	V4.20
Description of command				
This command is always a query. It returns the overall test set sector ID.				

[SENSe]:ANSignal:SECTor:ID:MANual[?]		Manual Sector ID [0..127]		
<Overall Sector ID>				
<Overall Sector ID>	Description of parameters	Def. value	Def. unit	FW vers.
<Sector ID 0..127>	Hexadecimally formatted string (34 chars)	FEA0000000000000 0000000000000001	–	V4.30
Description of command				
This command sets or returns the overall test set sector ID as entered manually (only when <code>Configure:ANSignal:SECTor:ID:FORMat[?]</code> is set to "Manual".				

Configure:ANSignal:SECTor:SMASk[?]		Subnet Mask		
<Subnet Mask>				
<Subnet Mask>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 128 MINimum MAXimum DEFault	Sector subnet mask Sets the sector subnet mask to 0 Sets the sector subnet mask to 128 Sets the subnet mask to the default setting	104	–	V4.20
Description of command				
This command sets the subnet mask for the AN signal test sector.				

Configure:ANSignal:SECTor:CNTCode[?]		Country Code		
<Country Code>				
<Country Code>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 999 MINimum MAXimum DEFault	Sector country code Sets the sector country code to 0 Sets the sector country code to 999 Sets the country code to the default setting	999	–	V4.20
Description of command				
This command sets the country code for the AN signal test sector.				

Subsystem Access Network Properties

Configure:ANSignal:PROPerty:PNOffset[?]		PN Offset		
<PN Offset>				
<PN Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 Hz to 511 Hz MINimum MAXimum DEFault	PN frequency offset setting Sets the PN offset to the minimum value Sets the PN offset to the maximum value Use default settings	0	Hz	V4.20
Description of command				
This command sets or returns the PN frequency offset to the analyzed AN signal.				

Configure:ANSignal:PROPerTy:CLDTime[?]		Call Loss Detect Time		
<CLD Time>				
<CLD Time>	Description of parameters	Def. value	Def. unit	FW vers.
2.0 s to 6.0 s DEFAult MINimum MAXimum ON OFF	Call lost detection timer Sets the value to the default setting Sets the timer value to the minimum value Sets the timer value to the maximum value Enables the call lost detection timer Disables the call lost detection timer	2.0	s	V4.31
Description of command				
This command sets the timeout value of the call lost detect timer (in increments of 0.1 seconds) to detect when a call is lost or dropped.				

Subsystem AT Forward Packet Activity

CONFigure:ANSignal:FPActivity[?]		Forward Packet Activity		
<Forward Packet Activity>				
<Forward Packet Activity>	Description of parameters	Def. Value	Def. Unit	FW vers.
0% to 100%	Sets the forward packet activity (in steps of 1%)	100	%	V4.20
Description of command				
This command determines the forward packet activity ratio, the number of active slots over the total number of slots during channel operation.				

Subsystem Band Class – NETWORK Standard

The *NETWork* subsystem switches between the different 1xEV-DO network standards. The network standard determines the channel/frequency assignment for RF analyzer and generator. Furthermore some measurements provide separate default setups for each of the network standards.

DEFAult:NETWork[?]		Network		
<Network>				
<Network>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values The parameters differ from the default values (partially or totally)	ON	–	V4.20
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystems <i>NETWork</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

CONFigure:NETWork:STANdard[?] <Standard>				Network Standard	
<Standard>	Description of parameters	Def. value	Def. Unit	FW vers	
CMU-K839					
N45T PA4M	Band Class 5, NMT 450 Band Class 11, European 400 MHz PAMR.	–	–	V3.40 "	
CMU-K849					
USC KCEL	Band Class 0, US Cellular Band Class 0, Korean Cellular	USC	–	V3.40 "	
TACS JTAC	Band Class 2, TACS Band Class 3, JTACS			V3.40 "	
NA7C	Band Class 7, North American 700 MHz			"	
NA9C	Band Class 9, North American 900 MHz			"	
NA8S	Band Class 10, Secondary 800 MHz			"	
PA8M	Band Class 12, 800 MHz PAMR,			V4.20	
CMU-K859					
NAPC KPCS B18M USPC	Band Class 1, North American PCS Band Class 4, Korean PCS Band Class 8, 1800 MHz Band Class 14, US PCS 1900 MHz	–	–	V3.40 " " V4.20	
CMU-K869					
IM2K IEXT AWS U25B U25F	Band Class 6, IMT-2000 Band Class 13, IMT-2000 2.5 GHz Ext. Band Class 15, AWS Band Band Class 16, US 2.5 GHz Band Band Class 17, US 2.5 GHz Forward Link Only Band	–	–	V3.40 V4.20 " " "	
Description of command					
This command activates the test mode according to one of the provided 1xEV-DO network standards.					
Note: Changing the network standard will affect the frequency setting of the RF analyzer and the generator as well as the sideband suppression and ACP spectrum measurement. See commands					
[SENSe]:RFANalyzer:FREQuency					
SOURce:RFGenerator:FREQuency[:RF]					
CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>					
CONFigure:SPECTrum:ACP:CONTRol:FOFFset:ACP<nr>					

CONFigure:NETWork:RELease[?] <Network Release>				Network Release	
<Network Release>	Description of parameters	Def. value	Def. unit	FW vers.	
0 A DEFault	Support for Network release 0 parameters Support for Network release A parameters Sets the value to the default setting	A	–	V4.20 V4.30	
Description of command					
This command sets or returns the network release parameters. The available network releases are described in chapter 4 in the "Network Parameters (Connection Control – Network)" section.					

Configure:NETWork:SYSTem:SID[?] <System ID Number>		Network System ID		
<System ID>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 32767 MINimum MAXimum DEFault	Network system ID Sets the network system ID to 0 Sets the network system ID to 32767 Sets the network system ID to the default setting	1	–	V4.20
Description of command				
This command defines the network system ID for the AN signal test sector.				

CONFigure:NETWork:APRobes:MODE[?] <AccessProbes Mode>		Access Probes		
<AccessProbes Mode>	Description of parameters	Def. value	Def. unit	FW vers.
ACKnowledge IGNore DEFault	Acknowledge or ignore access probes Sets the value to the default setting	ACKN	–	V4.20
Description of command				Sig. State
This command instructs the CMU to acknowledge or ignore the access probes from the AT. This parameter is applicable for both network releases 0 and A.				All

CONFigure:NETWork:APRobes:IADJust[?] <Initial Adjust>		Initial Adjust		
<Initial Adjust>	Description of parameters	Def. value	Def. unit	FW vers.
–16 dB to 15 dB MINimum MAXimum DEFault	Initial Adjustment of the access probe Sets the initial adjustment to –16 dB Sets the initial adjustment to +15 dB Sets the initial adjustment to the default setting	0	dB	V4.30
Description of command				
The access probe initial adjustment is expressed as a two's complement value in units of 1 dB. This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:OLADjust[?] <Nominal Offset>		Open Loop Adjust (BC<Nr.>)		
<Nominal Offset>	Description of parameters	Def. value	Def. unit	FW vers.
-100 dB to - 66 dB	Open loop power (OLP) adjustment (see below)	-73 -76 (see below)	dB	V4.30
MINimum	Sets the OLP adjustment to the minimum range value for the given BC (see below)			
MAXimum	Sets the OLP adjustment to the minimum range value for the given BC (see below)			
DEFault	Sets the OLP adjustment to the default value			
Description of command				
This command defines the value of the negative of the nominal power to be used by ATs in the open loop power estimate, expressed as an unsigned value in units of 1 dB. The value used by the AT is -1 times the value of this field.				
The ranges and default values depend on the band class:				
Band Class		Range	Default value	
BC 0, 2, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17		-81 to -66 dB	-73 dB	
BC 1, 4, 6, 8		-100 to -69 dB	-76 dB	
This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:PINCrement[?] <Probe Increment>		Probe Increment		
<Probe Increment>	Description of parameters	Def. value	Def. unit	FW vers.
0.0 dB to 7.5 dB	Probe power increment	4.0	dB	V4.30
MINimum	Sets the probe power increment to 0.0 (no power increase)			
MAXimum	Sets the probe power increment to 7.5			
DEFault	Sets the probe power increment to the default setting			
Description of command				
This command defines the step size of power increases between consecutive probes with a resolution of 0.5 dB.				
This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:PPSQuence[?] <Probes per Sequence>		Probes per Sequence		
<Probes per Sequence>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 15	Number of access probes per sequence	5	-	V4.30
MINimum	Sets the number of access probes to 1			
MAXimum	Sets the number of access probes to 15			
DEFault	Sets the number of access probes to the default value			
Description of command				
This command defines the maximum number of access probes which access terminals are to transmit in a single access probe sequence. This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:PLENght[?]		Preamble Length		
<Preamble Length>				
<Preamble Length>	Description of parameters	Def. value	Def. unit	FW vers.
1 to 7 MINimum MAXimum DEFault	Access probe preamble length Sets the probe preamble length to 1 Sets the probe preamble length to 6 Sets the probe preamble length to the default value	1	Frames	V4.30
Description of command				
This command defines the length of the access probe preamble (in frames). This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:ACDuration[?]		Access Cycle Duration		
<Access Cycle Duration>				
<Access Cycle Dur.>	Description of parameters	Def. value	Def. unit	FW vers.
16 32 64 128 MINimum MAXimum DEFault	Access Cycle Duration Sets the Access Cycle Duration to 16 Sets the Access Cycle Duration to 128 Sets the Access Cycle Duration to the default setting	64	Slots	V4.30
Description of command				
This command defines the duration of the access cycle (in slots).				
With the Default Access Channel Protocol, an AT may start to transmit an access probe only at the beginning of an access cycle.				
With the Enhanced Access Channel Protocol, an AT may start to transmit an access probe only <i>Access Offset</i> slots after the beginning of an access cycle. This parameter is applicable for both network releases 0 and A.				

CONFigure:NETWork:APRobes:PLENght:SLOTs[?]		Preamble Length (in Slots)		
<Preamble Length Slots>				
<Preamble Length Slots>	Description of parameters	Def. value	Def. unit	FW vers.
4 or 16 MINimum MAXimum DEFault	Access probe preamble length Sets the probe preamble length to 4 Sets the probe preamble length to 16 Sets the probe preamble length to the default value	16	Slots	V4.31
Description of command				
This command defines the length of the access probe preamble (in slots).				
This parameter is only applicable for network revision A.				

CONFigure:NETWork:APRobes:SACcess:RATE:MAX[?] <Sector Access Max. Rate>		Sector Access Max. Rate		
<Sector Access Max. Rate>	Description of parameters	Def. value	Def. unit	FW vers.
R9K R19K R38K	Sets the max. sector access rate to 9.6 kBit/s Sets the max. sector access rate to 19.2 kBit/s Sets the max. sector access rate to 38.4 kBit/s	R9K	kBit/s	V4.31
Description of command				
This command defines the maximum data rate of the sector access at which the AT may transmit on the access channel.				
This parameter is only applicable for network release A.				

CONFigure:NETWork:APRobes:ACCess:OFFSet? <Access Offset>		Access Offset		
<Access Offset>	Description of parameters	Def. value	Def. unit	FW vers.
0 4 8 12	Value of the access offset	0	Slots	V4.31
Description of command				
This command is always a query. It returns the the slot, relative to the start of the access cycle, in which the AT may start to transmit an access probe.				
This query is only applicable for network release A.				

CONFigure:NETWork:APRobes:PTIMEout:ADJust? <Probe Timeout Adjust>		ProbeTimeout Adjust		
<Probe Timeout Adjust>	Description of parameters	Def. value	Def. unit	FW vers.
0 16 32 48 64 80 96 112	Value of the access probe timeout adjustment	0	Slots	V4.31
Description of command				
This command is always a query. It returns the value of the timeout adjustment, which affects the interval between access probes, in slots.				
This query is only applicable for network release A.				

CONFigure:NETWork:APRobes:PSTrength:NOMinal? <Pilot Strength Nom.>		Pilot Strength Nominal		
<Pilot Strength Nom.>	Description of parameters	Def. value	Def. unit	FW vers.
-4.0 dB to +3.0 dB	Nominal strength of the pilot channel	0	dB	V4.31
Description of command				
This command is always a query. It returns the expected strength of the CMU pilot channel, referenced to the 1xEVDO output power.				
This query is only applicable for network release A.				

CONFigure:NETWork:APRobes:PSTReNght:CMIN?		Pilot Strength Correction Min.		
<Pilot Strength Corr. Min>				
<Pilot Str. Corr. Min.>	Description of parameters	Def. value	Def. unit	FW vers.
-5.0 dB to +0.0 dB	Minimum pilot channel strength correction	0	dB	V4.31
Description of command				
This command is always a query. It returns the minimum correction to be applied to the power the AT uses to transmit the access probe. The correction is based on the difference between the received pilot strength and the nominal pilot strength.				
This query is only applicable for network release A.				

CONFigure:NETWork:APRobes:PSTReNght:CMAX?		Pilot Strength Correction Max.		
<Pilot Strength Corr. Max>				
<Pilot Str. Corr. Max.>	Description of parameters	Def. value	Def. unit	FW vers.
+0.0 dB to +5.0 dB	Maximum pilot channel strength correction	0	dB	V4.31
Description of command				
This command is always a query. It returns the maximum correction to be applied to the power the AT uses to transmit the access probe. The correction is based on the difference between the received pilot strength and the nominal pilot strength.				
This query is only applicable for network release A.				

Subsystem RFAnalyzer

The subsystems *RFAnalyzer* and *LEVel* define and specify how the R&S CMU decodes the reverse signal. Furthermore they decode the input signal in order to extract the relevant part of the signal. These commands correspond to the *Analyzer* tab in the popup menu *Connection Control*.

DEFault:RFANalyzer[?]		RF Analyzer		
<RF Analyzer>				
<RF Analyzer>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values The parameters differ from the default values (partially or totally)	ON	–	V4.20
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystems <i>RFANalyzer</i> and <i>LEVel</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem LEVEL

The subsystem *LEVEL* controls the level in the RF input signal path. It corresponds to the table section *Analyzer Level* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:LEVel:MODE[?] <RF Level Mode>		RF Level Mode		
<RF Level Mode>	Description of parameters	Def. value	Def. unit	FW vers.
AUTomatic MANual	Maximum input level mode for RF	AUT	–	V4.20
Description of command				
This command defines whether the maximum expected input level is set manually or set by auto-ranging. Using the default value (auto-ranging) ensures optimized RF input path level settings.				

[SENSe]:LEVel:MAXimum[?] <RF Manual Max Level>		Max. RF Level		
<RF Manual Max Level>	Description of parameters	Def. value	Def. unit	FW vers.
–43.0 dBm to +44.0 dBm	Maximum input level for RF1	0.0	dBm	V4.20
MINimum	Sets the minimum input level for RF1	–43.0	dBm	
MAXimum	Sets the maximum input level for RF1	44.0	dBm	
DEFault	Sets the default input level for RF1	0.0	dBm	
Description of command				
This command defines the maximum expected input level. The value range depends on the RF input used and the external attenuation set (see [SENSe]:CORREction:LOSS:INPut<nr>[:MAGNitude] command).				
For RF2, the level range is –54.0 dBm to +39.0 dBm, for RF4, the level range is –77.0 dBm to 0.0 dBm.				

Subsystem SUBType

The subsystem *SUBType* determines the measurement subtype. It corresponds to the table section *Analyzer Settings / Meas. Subtype* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:SUBType[?] <Measurement Subtype>		Measurement Subtype		
<Measurement Subtype>	Description of parameters	Def. value	Def. unit	FW vers.
0 to 2	Measurement subtype	0	–	V4.20
Description of command				
Protocols are associated with a type that denotes the type of the protocol (e.g., Access Channel MAC Protocol) and with a Subtype that denotes a specific instance of a protocol (e.g. the Default Access Channel MAC Protocol).				
The measurement subtype specifies the protocol subtype of the involved MAC and physical layer protocols.				
This setting affects the code channel filter settings ([SENSe]:RFANalyzer:CCFilter) and the results of the Code Domain Power measurement (READ:ARRay:CDPower:...). Detailed descriptions of the measurement subtypes are available in chapter 4.				

Subsystem CCFilter (Code Channel Filter)

The subsystem *CCFilter* determines the reverse link code channels to be evaluated. It corresponds to the table section *Analyzer Settings / Code Channel Filter* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:CCFilter:DRC[?] (for all meas. subtypes) [SENSe]:RFANalyzer:CCFilter:ACK[?] (for meas. subtype 0) [SENSe]:RFANalyzer:CCFilter:DATA[?] (for all meas. subtypes) <Code Channel Filter>		Code Channel Filter		
<Code Channel Filter>	Description of parameters	Def. Value	Def. unit	FW vers.
ON	The code channel will be measured unless it is inactive. If the code channel is inactive, the appropriate results will return INV.	DCARe	–	V4.20
OFF	The code channel will not be measured, regardless of whether it is active or not.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
<p>Note: If these filters are specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results (INV).</p> <p>These commands determine if the specified reverse link code channel is evaluated. As the DRC, ACK, and Data code channels are not continuously present, the code channel filters allow the user to specify the conditions under which the measurements are performed.</p> <p>The referenced measurement subtypes are defined using <code>[SENSe]:RFANalyzer:SUBType</code>.</p>				

[SENSe]:RFANalyzer:CCFilter:APILot[?] (for meas. subtype 2 only) <CodeChannelFilter - AuxPilot>		Code Channel Filter		
<CCFilter - AuxPilot>	Description of parameters	Def. Value	Def. unit	FW vers.
ON	The code channel will be measured unless it is inactive. For inactive channels the CMU returns invalid results (INV).	DCARe	–	V4.20
OFF	The code channel will not be measured, regardless of whether it is active or not.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
<p>This command determines if the specified reverse link code channel is evaluated. As the Aux Pilot code channel is not continuously present, the code channel filter allows the user to specify the conditions under which the measurements are performed.</p> <p>Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.</p>				

[SENSE]:RFAnalyzer:CCFilter:ADSC[?] (for meas. subtype 2 only) <CodeChannelFilter - ACK/DSC>		Code Channel Filter		
<CCFilter - ACK/DSC>	Description of parameters	Def. Value	Def. unit	FW vers.
OFF	The code channel will not be measured, regardless of whether it is active or not.	DCARe	–	V4.20
ACK	ACK is measured if it is active, no DSC measurements.			
DSC	DSC is measured if it is active, no ACK measurements.			
DCARe	Do not care. The measurement will be made when the code channel is not active, which may lead to confusing or rapidly changing results.			
Description of command				
This command determines if the specified reverse link code channel is evaluated. As the ACK/DSC code channel is not continuously present, the code channel filter allows the user to specify the conditions under which the measurements are performed.				
Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.				

[SENSE]:RFAnalyzer:CCFilter:HSLot[?] (for meas. subtype 2 only) <CodeChannelFilter - - HalfSlotFilter>		Code Channel Filter		
<CCFilter - - HalfSlotFilter>	Description of parameters	Def. Value	Def. unit	FW vers.
BOTH	The measurement is made over both half slots of the ACK/DSC channel.	BOTH	–	V4.20
1	The measurement is made over the first half slot of the ACK/DSC channel.			
2	The measurement is made over the second half slot of the ACK/DSC channel.			
Description of command				
This command determines which half slot(s) of the code channel are evaluated.				
The DSC channel is transmitted on the second half slot on Walsh channel W_{12}^{32} , the ACK channel bit is transmitted, it is transmitted on the first half slot on Walsh channel W_4^8 .				
Note: If this filter is specified in such a manner that the AT never generates the specified channel configuration, the measurements will return invalid results.				

Subsystem DCHannel (Data Channel Modulation)

The subsystem DCHannel is a container for all analyzer settings that apply separately to one of the four access terminals. It corresponds to the table section *Analyzer Settings / Reverse Link Frame Offset* in the *Analyzer* tab of the *Connection Control* menu.

[SENSe]:RFANalyzer:DCHannel:MTYPE[?]		Data Channel Modulation Type Mode		
<Data Channel Modulation Type Mode>				
<Data Ch. Mod. Type Mode>	Description of parameters	Def. value	Def. unit	FW vers.
AUTO	Automatic selection of the data channel modulation type	AUTO	–	V4.20
B4	BPSK modulation with 4-ary Walsh cover (W_2^4)			
Q4	QPSK modulation with 4-ary Walsh cover (W_2^4)			
Q2	QPSK modulation with 2-ary Walsh cover (W_1^2)			
Q4Q2	(QPSK, W_2^4) + (QPSK, W_1^2)			
E4E2	(8-PSK, W_2^4) + (8-PSK, W_1^2)			
Description of command				
This command determines the measurement modulation type (or format) of the data channel. Signals with a different modulation type are not included in the measurement.				
If AUTO is set, the signal is measured and decoded irrespective of the modulation type. The detected modulation type can be queried using [SENSe]:RFANalyzer:DCHannel:MTYPE?				

[SENSe]:RFANalyzer:DCHannel:MTYPE?		Data Channel Modulation Type		
<Data Channel Modulation Type>				
<Data Ch. Mod. Type>	Description of parameters	Def. value	Def. unit	FW vers.
B4	BPSK modulation with 4-ary Walsh cover (W_2^4)	–	–	V4.20
Q4	QPSK modulation with 4-ary Walsh cover (W_2^4)			
Q2	QPSK modulation with 2-ary Walsh cover (W_1^2)			
Q4Q2	(QPSK, W_2^4) + (QPSK, W_1^2)			
E4E2	(8-PSK, W_2^4) + (8-PSK, W_1^2)			
Description of command				
This command is always a query. It returns the current data channel modulation type.				

External Synchronization

The remote-control commands presented in this section determine the system time synchronization settings. The *Sync.* settings are general (global) settings that are valid for the entire function group.

Subsystem ESYNc

The subsystem *ESYNc* defines the time synchronization for the measurements. It corresponds to the left half of the *Sync.* tab in the *Connection Control* menu.

CONFigure:ESYNc:MODE[?]				Ext. Sync. Mode
<Synchronization Mode>				
<Sync. Mode>	Description of parameters	Def. value	Def. unit	FW vers.
NONE PP2S DEFault	The system does not synchronize to external events. Synchronization with periodic trigger pulse (period 2 s) Synchronization with default external event.	PP2S	–	V4.30
Description of command				Sig. State
This command sets the type of external event that the the system will align with before the system time is synchronized.				all

CONFigure:ESYNc:TOUT[?]				Ext. Sync. timeout
<External Synchronization Timeout>				
<Ext. Sync. Timeout>	Description of parameters	Def. value	Def. unit	FW vers.
5 s to 1200 s MINimum MAXimum DEFault	Value for the synchronization timeout period Sets the synchronization timeout period to 5 s Sets the synchronization timeout period to 1200 s Use default setting	10	s	V4.30
Description of command				Sig. State
This command sets the amount of time the system will wait for the external synchronization event in steps of 5 seconds. Values that do not match the resolution grid are rounded to the next valid value.				all

INITiate:ESYNc	Start new synchronization	⇒ RUN
Description of command		FW vers.
This command has no query form.It starts the system time synchronization process.		V4.30
The reset of the system time drops any existing call, removes the current session, and triggers re-initialization of the system. The re-initialization takes approximately 50-65 seconds to complete.		
Please note that all RC commands are blocked during this time. Appendix B of the Application Note <i>CDMA2000 1xRTT / 1xEV-DO Hybrid Mode Testing</i> contains a sample GBIP sequence with a loop that waits for the completion of the synchronization in a hybrid mode environment.		

[SENSE]:ESYNc:SYSTem:TIME:STATE?				System Time State
<Sys. Time State>				
<Sys. Time State>	Description of parameters	Def. value	Def. unit	FW vers.
NINI IPRG RDY FAIL	Synchronization not initiated Synchronization in progress Synchronization ready Synchronization failed	–	–	V4.32
Description of command				Sig. State
This command is always a query. It returns the result of the <code>INITiate:ESYNc:SYSTem:TIME</code> command.				All

CONFigure:ESYNc:SYSTem:TIME[?]				System Time
<System Time>				
<System Time>	Description of parameters	Def. value	Def. unit	FW vers.
'<19 characters>'	System time, string parameter	***	–	V4.20
Description of command				Sig. State
This command sets the current system time. The time string must use a special date/time format: "mm/dd/yyyy HH:MM:SS" where mm = 2 month digits, dd = 2 day digits, yyyy = 4 year digits, followed by one white space, HH = 2 hour digits, MM = 2 month digits, and SS = 2 second digits (exactly as shown above with an even second value - for PP2S), resulting in exactly 19 characters. Used as a query, the command returns the last set system time. The command replaces the former command <code>CONFigure:MFLow:SYSTem:TIME[?]</code> , which remains valid for compatibility reasons.				All

INITiate:ESYNc:SYSTem:TIME			Set System Time	⇒ RUN
Description of command				FW vers.
This command has no query form. It arms the system time for synchronization.				V4.31
Please note that using the <code>*OPC?</code> command with the <code>INITiate:ESYNc:SYSTem:TIME</code> command causes the hybrid mode configuration script to fail. The reason is that this command is issued on both the Slave and Master CMUs and the Slave command completion is dependent on the completion of the same command executed on the Master CMU. So, if the <code>*OPC?</code> is added to the command issued on the Slave CMU, the command will never complete because the script will not proceed to the next GPIB command, which is needed in turn for the Slave CMU command execution to complete.				

CONFigure:ESYNc:ALIGNment[?]				Align with Event
<Synchronization Alignment>				
<Align with...>	Description of parameters	Def. value	Def. unit	FW vers.
INTernal EXTernal DEFault	Synchronize to internal events Synchronize to external events Use default setting	INT	–	V4.31
Description of command				Sig. State
This command sets or returns the type of event the synchronization aligns with (see also <code>CONFigure:ESYNc:MODE[?]</code>).				all

[SENSe]:ESYNc:STATe? <Synch.Status>				Synch. Status
<Synch. Status.>	Description of parameters	Def. value	Def. unit	FW vers.
INTernal	INITiate:ESYNc was not succesful, internal synchronization	INT	–	V4.30
EXTernal	INITiate:ESYNc was succesful, external synchronization			
Description of command				Sig. State
This command is always a query. It returns the result of the INITiate:ESYNc command.				All

Trigger

The remote-control commands presented in this section determine the RF trigger settings. The *Trigger* settings are general (global) settings that are valid for the entire function group.

Subsystem TRIGger

The subsystem *TRIGger* defines the trigger conditions for the measurements and the routing of output trigger signals. It corresponds to the *Trigger* tab in the second plane of the *Connection Control* menu.

DEFault:TRIGger[:SEQUence][?] <DefaultAllTriggerSet.>				Default All Settings
<DefaultAllTriggerSet.>	Description of parameters	Def. value	Def. unit	FW vers.
ON OFF	The parameters are set to their default values Some or all parameters are not set to default	ON	–	V4.20
Description of command				
If used as a setting command with the parameter <i>ON</i> , this command sets all parameters of the subsystem <i>TRIGger</i> to their default values (the setting <i>OFF</i> results in an error message).				
If used as a query the command returns whether all parameters are set to their default values (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem SOURCE

TRIGger[:SEQUence]:SOURCE[?] <Source>				Trigger Source
<Source>	Description of parameters	Def. Value	Def. unit	FW vers.
INTernal	Trigger source from internal clock	EXT	–	V4.20
EXTernal	External Trigger source supplied			
FRUN	Trigger set to free run			
RFPower	Trigger set to wide-band IF Power			
IFPower	Trigger set to narrow-band RF Power			
DEFault	Use default setting			
Description of command				
This command sets the source of the trigger signal. The evaluation of the Transmit Time Error is active only when the trigger input for the measurement DSP is a wired trigger (i.e. signaling or external). The trigger determines the start of the transmit slot, where the timing error is the begin of the real transmission for this slot.				
The external trigger source is supplied via the AUX 3 connector on the front panel. The AUX 3 pin assignments are:				
Output trigger signals: See command TRIGger:OUTPut:PIN<nr>:SIGNal [?] Input trigger: Pin 8				

The trigger setting affects the results of the Transmit Time Error measurement as described here.

Trigger Free Run	No timing error results are possible.
Trigger Internal	Timing error results are possible when AT is correctly synchronized with the CMU.
IF Power	No timing error results are possible.
RF Power	No timing error results are possible.
Trigger External	Timing error results are possible if an external trigger signal is provided and the AT is correctly synchronized with the CMU.

Note: Using an external trigger source will cause routing conflicts with an external power control bit supply. See also command `SOURCE:RFGenerator:AT<nr>:PCBits`

Subsystem THReshold

TRIGger[:SEquence]:THReshold:RFPower[?] <Threshold RF Power>		Threshold RF Power		
<Threshold RF Power>	Description of parameters	Def. value	Def. unit	FW vers.
LOW MEDium HIGH DEfault	Low trigger threshold (-26 dB) Medium trigger threshold (-16 dB) High trigger threshold (-6 dB) Use default settings	MED	–	V4.20
Description of command				
This command sets the RF signal level at which the measurement is triggered relative to the maximum RF input level; see [SENSe]:LEVel:MAXimum. The setting has effect for trigger source RFPower only (see TRIGger[:SEquence]:SOURCE).				

TRIGger[:SEquence]:THReshold:IFPower[?] <Threshold IF Power>		Threshold IF Power		
<Threshold RF Power>	Description of parameters	Def. value	Def. unit	FW vers.
-47.0 dB to 0 dB MINimum MAXimum DEfault	IF power trigger threshold Set the IF signal level threshold to min. value Set the IF signal level threshold to max. value Use default settings	-16.0	dB	V4.20
Description of command				
This command sets the IF signal level at which the measurement is triggered. The IF power threshold is defined relative to the maximum RF input level; see [SENSe]:LEVel:MAXimum. The setting has effect for trigger source IFPower only (see TRIGger[:SEquence]:SOURCE).				

Subsystem SLOPe

TRIGger[:SEQuence]:SLOPe[?] <Trigger Slope>		Trigger Slope		
<Trigger Slope>	Description of parameters	Def. value	Def. unit	FW vers.
NEGative	Negative Slope (falling edge)	POS	-	V4.20
POSitive	Positive Slope (rising edge)			
DEFault	Use default settings			
Description of command				
This command defines whether the trigger event occurs on the <i>Rising Edge</i> or on the <i>Falling Edge</i> of the trigger signal. The setting has no influence on <i>Free Run</i> measurements (see TRIGger[:SEQuence]:SOURce).				

Subsystem OUTPut

TRIGger:OUTPut:PIN<nr>:SIGNaI[?] <Trigger Output Routing>		Trigger Signal Output Routing			
<Trg.Outp.Routing>	Description of parameters	Def. value	Def. unit	FW vers.	
NONE	No output trigger signal	<nr> = 2: NONE	-	V4.20	
PP2S	Periodic pulse with period 2 s	<nr> = 3: NONE			
SFRame	Super frame, 80 ms	<nr> = 4: NONE			
PFRame	Paging frame, 20 ms	<nr> = 5: NONE			
SNCFrame	Sync frame, 26.67 ms				
PCFRame	Power control frame				
ETRigger	Event trigger				V4.30
DEFault	Default value				V4.20
Description of command					
This command selects the type of periodic pulse signal (or no signal, setting <i>NONE</i>) to be applied to pin <nr> (<nr> = 2 to 5) of the AUX 3 connector.					

Subsystem Miscellaneous (User Guidance and RF Selectivity)

Subsystem User Guidance (Connection Control Behavior)

The subsystem *User Guidance* defines in what instances the *Connection Control* popup menu is automatically opened or closed. The parameters are set in the Misc. tab of the popup menu *Connection Control*.

CONFigure:MENU:CCTRI:AOPen[?]		Auto Open if not connected		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	Open <i>Connection Control</i> menu automatically if change of signaling state is required	ON	–	V4.20
OFF	<i>Connection Control</i> menu must be opened manually			
Description of command				Sig. State
The command qualifies whether the <i>Connection Control</i> menu is automatically opened.				All

CONFigure:MENU:CCTRI:AClose[?]		Auto Close if connected		
<Enable>				
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	Close <i>Connection Control</i> menu automatically as soon as the R&S CMU enters the <i>Connected</i> state	ON	–	V4.20
OFF	<i>Connection Control</i> menu must be closed manually			
Description of command				Sig. State
The command qualifies whether the <i>Connection Control</i> menu is automatically closed.				All

Subsystem RF Selectivity

[SENSe]:RFANalyzer:SElectivity[?]		RF Selectivity		
<RF Selectivity>				
<RF Selectivity>	Description of parameters	Def. value	Def. unit	FW vers.
WIDE	Normal filter, appropriate for all TX measurements	WIDE	–	V4.20
IFLevel	Sets the bandwidth to the IF output level, which is in the TX path relative to the maximum IF input/output level. The IF level value is equal to the I/Q output level in the TX path relative to the maximum I/Q input voltage.			
Description of command				Sig. State
The command selects the bandwidth of the analog receiver filter.				All

Low Spur Mode

The *Low Spur Mode* is used to increase the signal-to-noise ratio for the signal analyzer with high Tx levels.

CONFigure:LSMode[?] <Enable>		Low Spur Mode		
<Enable>	Description of parameters	Def. value	Def. unit	FW vers.
ON	The Low Spur mode is active	OFF	–	V4.32
OFF	Low Spur mode is deactivated			
DEFault	The LSMMode is set to its default setting			
Description of command				
If used as a setting command with the parameter <i>ON</i> this command activates the <i>Low Spur Mode</i> .				
If used as a query the command returns whether the LS mode is set to its default value (<i>ON</i>) or not (<i>OFF</i>).				

Subsystem WPOWer (Wide Band Power)

The subsystem *WPOWer* measures the power of the signal transmitted by the access terminal using a wideband filter. It corresponds to the softkey *WPower* in RF connector tab of the *Connection Control* menu. The main purpose of the wideband power measurement is to indicate whether an input signal is available and whether it is advisable to change the *Max Level* settings or not.

Control of Measurement

INITiate:WPOWer	Start new measurement	⇒ <i>RUN</i>
ABORT:WPOWer	Abort measurement and switch off	⇒ <i>OFF</i>
STOP:WPOWer	Stop measurement	⇒ <i>STOP</i>
CONTinue:WPOWer	Next measurement step (only <i>step mode</i>)	⇒ <i>RUN</i>
Description of command		FW vers.
These commands have no query form. They start or stop the measurement, setting it to the status given in the top right column.		V4.20

CONFigure:WPOWer:EREPorting[?] <Mode>		Event Reporting		
<Mode>	Description of parameters	Def. value	Def. unit	FW vers.
SRQ	Service request	OFF	–	V4.20
SOPC	Single operation complete			
SRSQ	SRQ and SOPC			
OFF	No reporting			
DEFault	Sets the value to the default setting			
Description of command				
This command defines the events generated when the measurement is terminated or stopped (<i>event reporting</i> , see chapter 5 of CMU 200/300 operating manual).				

FETCh:WPOWer:STATus? <Measurement Status>, <Curr. Step Cycle Count>		Measurement		
<Meas.Status>	Description of parameters	Def. value	Def. unit	FW vers.
OFF RUN STOP ERR STEP RDY,	Measurement in the <i>OFF</i> state (*RST or ABORT) Running (after INITiate, CONTinue or READ) Stopped (STOP) <i>OFF</i> (could not be started) Stepping mode (<stepmode>=STEP) Stopped according to repetition mode and stop condition	OFF	–	V4.20
<CycleCount>	Description of parameters	Def. value	Def. unit	FW vers.
1 ... 10000 NONE	Counter for current statistics cycle of the current step No step mode set	NONE	–	V4.20
Description of command				
This command is always a query. It returns the status of the measurement (see chapters 3 and 5 of the CMU 200/300 operating manual).				

Test Configuration

The commands of the following subsystems configure the *WPOWer* measurement in *RF connector* tab of the *Connect. Control* menu.

Subsystem CONTROL

CONFigure:WPOWer:CONTRol:REPetition[?] <Repetition>, <StopCond>, <Stepmode>		Test cycles		
<Repetition>	Description of parameters	Def. value	Def. unit	FW vers.
CONTinuous SINGleshot 1 ... 10000 DEFault,	Continuous measurement (until STOP or ABORT) Single shot measurement (until Status = RDY) Multiple measurement (<i>counting</i> , until Status = STEP RDY) Sets the value to the default setting	SING	–	V4.20
<StopCond>	Description of parameters	Def. value	Def. unit	FW vers.
SONerror NONE,	Start measurement in case of error (<i>stop on error</i>) Continue measurement even in case of error	NONE	–	V4.20
<Stepmode>	Description of parameters	Def. value	Def. unit	FW vers.
STEP NONE	Interrupt measurement after each statistics cycle Continue measurement according to its rep. mode	NONE	–	V4.20
Description of command				
This command determines the number of statistics cycles, the stop condition and the stepping mode for the measurement.				
Note: In the case of READ commands (READ:...), the <Repetition> parameter has no effect; the measurement is always stopped after a single shot.				

Measured Values

The subsystem *WPOWER?* retrieves the results of the wideband power measurement.

READ[:SCALar]:WPOWER?				Start single shot measurement and return results
FETCh[:SCALar]:WPOWER?				Read out measurement results (unsynchronized)
SAMPlE[:SCALar]:WPOWER?				Read out measurement results (synchronized)
Return	Description of parameters	Def. value	Def. unit	FW vers.
-30.0 dBm to +30.0 dBm	Maximum wideband burst power (not averaged)	NAN	dBm	V4.20
Description of command				
These commands are always queries. They start the measurement of the peak power of the input signal within a wide frequency range and return the result.				

List of Commands

In the following, all remote-control commands of the 1xEVDO function groups are listed in alphabetical order, with their parameters and page numbers.

They are arranged alphabetically according to the **second** keyword of the command so that related commands belong to the same group. The commands for the two test modes *Non Signaling* and *Signaling* are listed separately.

Table 6-1 Remote-control commands available in Non-Signaling

Commands for Non-Signaling	Parameters	Remark	Page
Code Domain Power			
INITiate:CDPower:CDPW	RUN	no query	6.100
ABORt:CDPower:CDPW	OFF	no query	6.100
STOP:CDPower:CDPW	STOP	no query	6.100
CONTInue:CDPower:CDPW	RUN	no query	6.100
CONFigure:CDPower:CDPW:AVERAge:LIMit:ASYMmetric[:COMBined][?]	<CDP Limit Y Average>	with query	6.105
CALCulate:ARRay:CDPower:CDPW:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.110
CONFigure:CDPower:CDPW:CMAX:LIMit:ASYMmetric[:COMBined][?]	<CDP Limit Y>	with query	6.105
CONFigure:CDPower:CDPW:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.102
CONFigure:CDPower:CDPW:CONTRol:RMODE[?]	SCAL ARR	with query	6.101
CONFigure:CDPower:CDPW:CONTRol:RORDER[?]	HAD BITR	with query	6.102
CONFigure:CDPower:CDPW:CONTRol:STATistics[?]	1 to 1000	with query	6.102
CONFigure:CDPower:CDPW:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.101
DEFault:CDPower:CDPW:CONTRol[?]	ON OFF	with query	6.102
CALCulate:ARRay:CDPower:CDPW:CURREnt[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.109
CONFigure:CDPower:CDPW:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.100
CALCulate:ARRay:CDPower:CDPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.110
CALCulate:ARRay:CDPower:CDPW:ISIGnal:CURREnt[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.109
CALCulate:ARRay:CDPower:CDPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.110
FETCh:ARRay:CDPower:CDPW:ISIGnal:STATe? ^(*)	0 1	query only	6.109
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPle:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
SAMPle:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108

Commands for Non-Signaling	Parameters	Remark	Page
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
CONFigure:CDPower:CDPW:LIMit:IQLCheck[?]	DEfault OFF ON	with query	6.105
DEfault:CDPower:CDPW:LIMit[?]	ON OFF	with query	6.106
CALCulate[:SCALar]:CDPower:CDPW:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.106
CALCulate:ARRay:CDPower:CDPW:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.110
CALCulate:ARRay:CDPower:CDPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.110
CALCulate:ARRay:CDPower:CDPW:QSIGnal:CURREnt[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.109
CALCulate:ARRay:CDPower:CDPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.110
FETCh:ARRay:CDPower:CDPW:QSIGnal:STATe? ^(*)	0 1	query only	6.109
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURREnt? ^(*)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:STATe?	0 1	query only	6.109
FETCh[:SCALar]:CDPower:CDPW:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.100
SAMPlE[:SCALar]:CDPower:CDPW?	-	query only	6.106
READ[:SCALar]:CDPower:CDPW?	-	query only	6.106
FETCh[:SCALar]:CDPower:CDPW?	-	query only	6.106
READ:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:CURREnt?	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW[:VALue]:CURREnt?	-60.0 dB to +10.0 dB	query only	6.107
SAMPlE:ARRay:CDPower:CDPW[:VALue]:CURREnt?	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
Channel Power			
INITiate:CDPower:CHPW	RUN	no query	6.120
ABORt:CDPower:CHPW	OFF	no query	6.120
STOP:CDPower:CHPW	STOP	no query	6.120
CONTinue:CDPower:CHPW	RUN	no query	6.120

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:CDPower:CHPW:AVERAge:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.124
CALCulate:ARRay:CDPower:CHPW:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.131
CONFigure:CDPower:CHPW:CMAx:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.124
CONFigure:CDPower:CHPW:CONTRol:PRMode[?]	ATP PPOW	with query	6.123
CONFigure:CDPower:CHPW:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.123
CONFigure:CDPower:CHPW:CONTRol:RMODE[?]	SCAL ARR	with query	6.122
CONFigure:CDPower:CHPW:CONTRol:STATistics[?]	1 to 1000	with query	6.122
CONFigure:CDPower:CHPW:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.122
DEFault:CDPower:CHPW:CONTRol[?]	ON OFF	with query	6.123
CALCulate:ARRay:CDPower:CHPW:CURREnt[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.130
CONFigure:CDPower:CHPW:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.121
CALCulate:ARRay:CDPower:CHPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.131
CALCulate:ARRay:CDPower:CHPW:ISIGnal:CURREnt[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.130
CALCulate:ARRay:CDPower:CHPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.132
FETCh:ARRay:CDPower:CHPW:ISIGnal:STATe? ⁽¹⁾	returns RRI, Pilot, and ACK states	query only	6.129
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.127
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURREnt? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURREnt? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURREnt? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.126
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.128
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.128
DEFault:CDPower:CHPW:LIMit[?]	ON OFF	with query	6.124
CALCulate[:SCALar]:CDPower:CHPW:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.125
CALCulate:ARRay:CDPower:CHPW:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.132
CALCulate:ARRay:CDPower:CHPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.131
CALCulate:ARRay:CDPower:CHPW:QSIGnal:CURREnt[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.130
CALCulate:ARRay:CDPower:CHPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ⁽¹⁾	returns 32 bit limit indicator	query only	6.132
FETCh:ARRay:CDPower:CHPW:QSIGnal:STATe? ⁽¹⁾	returns DRC and Data states	query only	6.129
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ⁽¹⁾	-60.0 dB to +10.0 dB	query only	6.127

Commands for Non-Signaling	Parameters	Remark	Page
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
XTND:CDPower:CHPW:RESult:DATA[?]	ON OFF	with query	6.125
FETCh:ARRay:CDPower:CHPW:STATE?	returns RRI, Pilot, and ACK states	query only	6.129
READ[:SCALar]:CDPower:CHPW?	-	query only	6.125
FETCh[:SCALar]:CDPower:CHPW?	-	query only	6.125
SAMPlE[:SCALar]:CDPower:CHPW?	-	query only	6.125
FETCh:ARRay:CDPower:CHPW[:VALue]:AVERAge	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW[:VALue]:MAXimum	-60.0 dB to +10.0 dB	query only	6.128
READ:ARRay:CDPower:CHPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.128
CONFigure:CDPower:CPCCommon:AVERAge:LIMit:ASYMmetric[:COMBined][?]	<Carrier Feedthrough Limit Average>, <Carrier Freq. Error Limit Average>, <Rho Limit Average>	with query	6.104
CONFigure:CDPower:CPCCommon:CMAX:LIMit:ASYMmetric[:COMBined][?]	<Carrier Feedthrough Limit>, <Carrier Freq. Error Limit>, <Rho Limit>	with query	6.103
DEFault:CDPower:CPCCommon:LIMit[?]	ON OFF	with query	6.104
Peak Code Domain Error Power			
ABORt:CDPower:PCDep	OFF	no query	6.111
CONTInue:CDPower:PCDep	RUN	no query	6.111
INITiate:CDPower:PCDep	RUN	no query	6.111
STOP:CDPower:PCDep	STOP	no query	6.111
READ:ARRay:CDPower:PCDep[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.116
CONFigure:CDPower:PCDep:AVERAge:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.114
CALCulate:ARRay:CDPower:PCDep:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.120
CONFigure:CDPower:PCDep:CMAX:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.114
CONFigure:CDPower:PCDep:CONTrol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.113
CONFigure:CDPower:PCDep:CONTrol:RMODE[?]	SCAL ARR	with query	6.112

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:CDPower:PCDep:CONTRol:RORDer[?]	HAD BITR	with query	6.113
CONFigure:CDPower:PCDep:CONTRol:STATistics[?]	1 to 1000	with query	6.113
CONFigure:CDPower:PCDep:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.112
INITiate:CDPower:PCDep	RUN	no query	6.111
STOP:CDPower:PCDep	RUN	no query	6.111
DEFault:CDPower:PCDep:CONTRol[?]	ON OFF	with query	6.113
CALCulate:ARRay:CDPower:PCDep:CURRent[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.119
CONFigure:CDPower:PCDep:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.111
CALCulate:ARRay:CDPower:PCDep:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.119
CALCulate:ARRay:CDPower:PCDep:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.120
FETCh:ARRay:CDPower:PCDep:ISIGnal:STATe? ^(t)	0 1	query only	6.119
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.118
DEFault:CDPower:PCDep:LIMit[?]	ON OFF	with query	6.114
CALCulate[:SCALar]:CDPower:PCDep:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.115
CALCulate:ARRay:CDPower:PCDep:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.119
CALCulate:ARRay:CDPower:PCDep:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.120
FETCh:ARRay:CDPower:PCDep:QSIGnal:STATe? ^(t)	0 1	query only	6.119
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.117
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(t)	-60.0 dB to +10.0 dB	query only	6.116

Commands for Non-Signaling	Parameters	Remark	Page
READ:ARRay:CDPower:PCDep:QSiGnal[:VALue]:MAXimum?^(*)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:QSiGnal[:VALue]:MAXimum?^(*)	-60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep:QSiGnal[:VALue]:MAXimum?^(*)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:STATe?	0 1	query only	6.119
FETCh[:SCALar]:CDPower:PCDep:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.111
SAMPlE[:SCALar]:CDPower:PCDep?	-	query only	6.115
READ[:SCALar]:CDPower:PCDep?	-	query only	6.115
FETCh[:SCALar]:CDPower:PCDep?	-	query only	6.115
READ:ARRay:CDPower:PCDep[:VALue]:AVERage?	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep[:VALue]:AVERage?	-60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep[:VALue]:AVERage?	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.116
READ:ARRay:CDPower:PCDep[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.118
RF Input and Output (External Attenuation at Connectors)			
INPut[:STATe][?]	RF1 RF2 RF4	with query	6.37
OUTPut[:STATe][?]	RF1 RF2 RF3	with query	6.37
[SENSe]:CORRection:LOSS:INPut<nr>[:MAGNitude][?]	-50 dB to +90 dB	with query	6.37
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude][?]	-50 dB to +90 dB	with query	6.37
[SENSe]:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?]	-50 dB to +90 dB	with query	6.38
SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?]	-50 dB to +90 dB	with query	6.38
CONFigure:FREQuency:COUPling:RXTX[?]	ON OFF	no query	6.46
RFGenerator - Impairments			
SOURce:IMPairments:FOFFset[:RF][?]	-50.0 kHz to +50.0 kHz	with query	6.20
SOURce:IMPairments:LEVel:AWGN[?]	-20.0 dB to +11.7 dB	with query	6.19
RFGenerator - IQ Access Interface Setup			
INITiate:IQACcess	-	no query	6.35
ABORt:IQACcess	-	no query	6.35
DEFault:IQACcess:CONTRol[?]	ON OFF	with query	6.35
CONFigure:IQACcess:GMULTiplier[?]	0 1 2 4 8 16	with query	6.36
CONFigure:IQACcess:RXSWap[?]	OFF ON DEF	with query	6.36
FETCh:IQACcess:STATus?	returns OFF RUN ERR	query only	6.35
CONFigure:IQACcess:TCONTRol[?]	0 to 15	with query	6.36
Modulation Measurements - IQ Analyzer			
INITiate:MODulation:IQANalyzer:HPSK	RUN	no query	6.88
ABORt:MODulation:IQANalyzer:HPSK	OFF	no query	6.88
STOP:MODulation:IQANalyzer:HPSK	STOP	no query	6.88
CONTinue:MODulation:IQANalyzer:HPSK	RUN	no query	6.88

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.89
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:RMODe[?]	SCAL ARR	with query	6.89
DEFault:MODulation:IQANalyzer:HPSK:CONTRol[?]	ON OFF	with query	6.89
CONFigure:MODulation:IQANalyzer:HPSK:DESPread[?]	OFF DATA	with query	6.90
CONFigure:MODulation:IQANalyzer:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.88
READ:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	-2.0 to +2.0	query only	6.91
FETCh:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	-2.0 to +2.0	query only	6.91
SAMPlE:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	-2.0 to +2.0	query only	6.91
READ:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	-2.0 to +2.0	query only	6.91
FETCh:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	-2.0 to +2.0	query only	6.91
SAMPlE:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	-2.0 to +2.0	query only	6.91
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.88
READ[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
SAMPlE[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
CONFigure:SUBarrays:MODulation:IQANalyzer:HPSK[?]	ALL 0 μ s to 833 μ s 0 to 4096	with query	6.90
General - I/Q-IF Interface			
IQIF:DEFault[?]	ON OFF	with query	6.5
[SENSe]:IQIF:LEVel?	<Value>	query only	6.5
CONFigure:IQIF:RXPath[?]	DEFault BYP BYIQ XOIO IOIO IOXO	with query	6.4
CONFigure:IQIF:RXTXcombined[?]	DEFault BYP BYIQ XOIO IOIO IOXO FPAT UDEF	with query	6.4
CONFigure:IQIF:TXPath[?]	DEFault BYP BYIQ XOIO IOIO IOXO	with query	6.4
[SENSe]:LEVel:MAXimum[?]	-80 dBm to +44 dBm	with query	6.8
[SENSe]:LEVel:MODE[?]	AUT MAN	with query	6.8
Configuration File Management			
MMEMory:RECall:CURRent<FileName> [,<msus>]	<FileName>, INTernal EXTernal	no query	6.3
MMEMory:SAVE:CURRent<FileName> [,<msus>]	<FileName>, INTernal EXTernal	no query	6.3
Modulation Measurements - Error Vector Magnitude			
INITiate:MODulation:EVMagnitude:HPSK	RUN	no query	6.69
ABORt:MODulation:EVMagnitude:HPSK	OFF	no query	6.69
STOP:MODulation:EVMagnitude:HPSK	STOP	no query	6.69
CONTinue:MODulation:EVMagnitude:HPSK	RUN	no query	6.69
READ:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75

Commands for Non-Signaling	Parameters	Remark	Page
SAMPlE:ARRAy:MODUlation:EVMAgnitude:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBArRays:MODUlation:EVMAgnitude:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBArRays:MODUlation:EVMAgnitude:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBArRays:MODUlation:EVMAgnitude:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.75
CONFIgure:MODUlation:EVMAgnitude:HPSK:CONTRol:REPetition[?]	<Repetition> , <Stop Cond>, <Step Mode>	with query	6.72
CONFIgure:MODUlation:EVMAgnitude:HPSK:CONTRol:RMODE[?]	SCAL ARR	with query	6.71
CONFIgure:MODUlation:EVMAgnitude:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.71
CONFIgure:MODUlation:EVMAgnitude:HPSK:CONTRol[?]	<Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.72
DEFault:MODUlation:EVMAgnitude:HPSK:CONTRol[?]	ON OFF	with query	6.72
READ:ARRAy:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRAy:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:ARRAy:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBArRays:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBArRays:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBArRays:MODUlation:EVMAgnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
CONFIgure:MODUlation:EVMAgnitude:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.70
CALCulate[:SCALar]:MODUlation:EVMAgnitude:HPSK:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.74
READ:ARRAy:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRAy:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:ARRAy:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBArRays:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBArRays:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBArRays:MODUlation:EVMAgnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh[:SCALar]:MODUlation:EVMAgnitude:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.70
READ[:SCALar]:MODUlation:EVMAgnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
FETCh[:SCALar]:MODUlation:EVMAgnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
SAMPlE[:SCALar]:MODUlation:EVMAgnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
CONFIgure:SUBArRays:MODUlation:EVMAgnitude:HPSK[?]	<Mode>, <Start>, <Samples>	with query	6.73
Modulation - Magnitude Error H-PSK			
INITiate:MODUlation:MERRor:HPSK	RUN	no query	6.76
ABORt:MODUlation:MERRor:HPSK	OFF	no query	6.76
STOP:MODUlation:MERRor:HPSK	STOP	no query	6.76
CONTinue:MODUlation:MERRor:HPSK	RUN	no query	6.76
READ:ARRAy:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRAy:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81

Commands for Non-Signaling	Parameters	Remark	Page
SAMPlE:ARRAy:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBArrays:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBArrays:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBArrays:MODUlation:MERRor:HPSK:AVERAge?	returns 0.0 % to + 100.0 %	query only	6.81
CONFIgure:MODUlation:MERRor:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.78
CONFIgure:MODUlation:MERRor:HPSK:CONTRol:RMODe[?]	SCAL ARR	with query	6.77
CONFIgure:MODUlation:MERRor:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.78
CONFIgure:MODUlation:MERRor:HPSK:CONTRol[?]	<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.77
DEFault:MODUlation:MERRor:HPSK:CONTRol[?]	ON OFF	with query	6.78
READ:ARRAy:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRAy:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:ARRAy:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBArrays:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBArrays:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBArrays:MODUlation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
CONFIgure:MODUlation:MERRor:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.76
CALCulate[:SCALar]:MODUlation:MERRor:HPSK:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.80
READ:ARRAy:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRAy:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:ARRAy:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBArrays:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBArrays:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBArrays:MODUlation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh[:SCALar]:MODUlation:MERRor:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.76
READ[:SCALar]:MODUlation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
FETCh[:SCALar]:MODUlation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
SAMPlE[:SCALar]:MODUlation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
CONFIgure:SUBArrays:MODUlation:MERRor:HPSK[?]	ALL ARIT MIN MAX 0 μ s to 833 μ s 0 to 1024	with query	6.79
CONFIgure:MODUlation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetriC[:COMBined]:VALue[?]	<Average_HPSK_Limit_Set>	with query	6.67
CONFIgure:MODUlation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetriC[:COMBined]:ENABle[?]	ON OFF	with query	6.67
CONFIgure:MODUlation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetriC	<Average_OQPSK_Limits_	with query	6.66

Commands for Non-Signaling	Parameters	Remark	Page
c[:COMBined][?]	DefaultSettings>		
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABle[?]	ON OFF	with query	6.67
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]	<CMMAX_OQPSK_Limits_DefaultSettings>	with query	6.66
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined][?]	<CMMAX_OQPSK_Limits_DefaultSettings>	with query	6.65
DEFault:MODulation:OEMP:HPSK:LIMit[?]	ON OFF	with query	6.68
INITiate:MODulation:OVERview:HPSK	RUN	no query	6.61
ABORt:MODulation:OVERview:HPSK	OFF	no query	6.61
CONTinue:MODulation:OVERview:HPSK	RUN	no query	6.61
STOP:MODulation:OVERview:HPSK	STOP	no query	6.61
CONFigure:MODulation:OVERview:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.64
CONFigure:MODulation:OVERview:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.64
DEFault:MODulation:OVERview:HPSK:CONTRol[?]	ON OFF	with query	6.63
CONFigure:MODulation:OVERview:HPSK:CONTRol[?]	<Statistic Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.63
CONFigure:MODulation:OVERview:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.62
CALCulate[:SCALar]:MODulation:OVERview:HPSK:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.69
FETCh[:SCALar]:MODulation:OVERview:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.62
READ[:SCALar]:MODulation:OVERview:HPSK?	<OvwHPSK_MeasValues_Set>	query only	6.68
FETCh[:SCALar]:MODulation:OVERview:HPSK?	<OvwHPSK_MeasValues_Set>	query only	6.68
SAMPlE[:SCALar]:MODulation:OVERview:HPSK?	<OvwHPSK_MeasValues_Set>	query only	6.68
Modulation Phase Error			
INITiate:MODulation:PERRor:HPSK	RUN	no query	6.82
ABORt:MODulation:PERRor:HPSK	OFF	no query	6.82
STOP:MODulation:PERRor:HPSK	STOP	no query	6.82
CONTinue:MODulation:PERRor:HPSK	RUN	no query	6.82
READ:ARRay:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:ARRay:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:AVERage?	-100.0 deg to + 100.0 deg	query only	6.87
CONFigure:MODulation:PERRor:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:RMODE[?]	SCAL ARR	with query	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.83

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:MODulation:PERRor:HPSK:CONTRol[?]	<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.83
DEFault:MODulation:PERRor:HPSK:CONTRol[?]	ON OFF	with query	6.84
READ:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
CONFigure:MODulation:PERRor:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.82
CALCulate[:SCALar]:MODulation:PERRor:HPSK:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.86
READ:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh[:SCALar]:MODulation:PERRor:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.82
READ[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
FETCh[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
SAMPlE[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
CONFigure:SUBarrays:MODulation:PERRor:HPSK[?]	ALL ARIT MIN MAX 0 μ s to 833 μ s 0 to 1024	with query	6.85
Modulation Quality			
INITiate:MODulation:MQUALity:HPSK	RUN	no query	6.47
ABORt:MODulation:MQUALity:HPSK	OFF	no query	6.47
STOP:MODulation:MQUALity:HPSK	STOP	no query	6.47
CONTinue:MODulation:MQUALity:HPSK	RUN	no query	6.47
CONFigure:MODulation:MQUALity:HPSK:AVERAge:LIMit[?]	<Average modulation quality limits>	with query	6.52
DEFault:MODulation:MQUALity:HPSK:AVERAge:LIMit[?]	ON OFF	with query	6.53
CONFigure:MODulation:MQUALity:HPSK:CMMax:LIMit[?]	<Curr. and max. modulation quality limits>	with query	6.51
DEFault:MODulation:MQUALity:HPSK:CMMax:LIMit[?]	ON OFF	with query	6.53
CONFigure:MODulation:MQUALity:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>[?]	0 to 2 MHz	with query	6.52

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:MODulation:MQuality:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.50
CONFigure:MODulation:MQuality:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.49
DEFault:MODulation:MQuality:HPSK:CONTRol[?]	ON OFF	with query	6.48
CONFigure:MODulation:MQuality:HPSK:CONTRol[?]	<Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.49
CONFigure:MODulation:MQuality:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.47
CALCulate[:SCALar]:MODulation:MQuality:HPSK:MATChing:LIMIt?	<OQPSK_MeasValues_Set >	query only	6.55
FETCh[:SCALar]:MODulation:MQuality:HPSK:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.48
READ[:SCALar]:MODulation:MQuality:HPSK?	<OQPSK_MeasValues_Set >	query only	6.54
FETCh[:SCALar]:MODulation:MQuality:HPSK?	<OQPSK_MeasValues_Set >	query only	6.54
SAMPlE[:SCALar]:MODulation:MQuality:HPSK?	<OQPSK_MeasValues_Set >	query only	6.54
Network			
CONFigure:NETWork:STANdard[?]	USC KCEL NAPC TACS JTAC KPCS N45T IM2K NA7C B18M NA9C NA8S PA4M PA8M IEXT USPC AWS	with query	6.7
Narrow Band Power			
INITiate:NPOWer	RUN	no query	6.56
ABORt:NPOWer	OFF	no query	6.56
STOP:NPOWer	STOP	no query	6.56
CONTinue:NPOWer	RUN	no query	6.56
CONFigure:NPOWer:CONTRol:REPetition[?]	<Repetition>, <Stop Condition>, <Step Mode>	with query	6.59
CONFigure:NPOWer:CONTRol:STATistics[?]	1 to 1000	with query	6.58
CONFigure:NPOWer:CONTRol[?]	<Statistics>, <Repetition>, <Stop Condition>, <Step Mode>	with query	6.58
CONFigure:NPOWer:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.56
FETCh[:SCALar]:NPOWer:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.57
READ[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
FETCh[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
SAMPlE[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
ABORt:CDPower:PCDep	OFF	no query	6.111
CONTinue:CDPower:PCDep	STOP	no query	6.111
Reset			
SYSTem:RESet:CURRent	-	no query	6.2

Commands for Non-Signaling	Parameters	Remark	Page
Analyzer			
DEFault:RFANalyzer[?]	ON OFF	with query	6.8
[SENSe]:RFANalyzer: [AT<nr>]:RLINK:FROffset[?]	0 to 15	with query	6.14
[SENSe]:RFANalyzer:CCFilter:ACK[?]	ON OFF DCARe	with query	6.12
[SENSe]:RFANalyzer:CCFilter:ADSC[?]	OFF ACK DSC DCARe	with query	6.12
[SENSe]:RFANalyzer:CCFilter:APILot[?]	ON OFF DCARe	with query	6.12
[SENSe]:RFANalyzer:CCFilter:DATA[?]	ON OFF DCARe	with query	6.12
[SENSe]:RFANalyzer:CCFilter:DRC[?]	ON OFF DCARe	with query	6.12
[SENSe]:RFANalyzer:CCFilter:HSLot[?]	BOTH 1 2	with query	6.13
[SENSe]:RFANalyzer:DCHannel:MTYPe:MODE[?]	AUTO B4 Q4 Q2 Q4Q2 E4E2	with query	6.14
[SENSe]:RFANalyzer:DCHannel:MTYPe?	B4 Q4 Q2 Q4Q2 E4E2	query only	6.15
[SENSe]:RFANalyzer:FOFFset[?]	-50.0 kHz to +50.0 kHz ON OFF	with query	6.10
[SENSe]:RFANalyzer:FREQuency:UNIT[?]	HZ KHZ MHZ GHZ CH	with query	6.9
[SENSe]:RFANalyzer:FREQuency[?]	9.98 MHz to 2700.00 MHz	with query	6.9
[SENSe]:RFANalyzer:LcMask:l:LSB[?]	00000000 to FFFFFFFF	with query	6.11
[SENSe]:RFANalyzer:LcMask:l:MSB[?]	000 to 3FF	with query	6.11
[SENSe]:RFANalyzer:LcMask:Q:LSB[?]	00000000 to FFFFFFFF	with query	6.11
[SENSe]:RFANalyzer:LcMask:Q:MSB[?]	000 to 3FF	with query	6.11
[SENSe]:RFANalyzer:Selectivity[?]	WIDE IFL DEF	with query	6.45
[SENSe]:RFANalyzer:Subtype[?]	0 to 2	with query	6.11
Generator			
INITiate:RFGenerator	–	no query	6.15
ABORt:RFGenerator	–	no query	6.15
INITiate:RFGenerator: SNcMessage	RUN ON	no query	6.20
SOURce:RFGenerator:AT<nr>:DRATe?	0.0 to 2457.6 kBit/s	query only	6.28
SOURce:RFGenerator:AT<nr>:DRcLock:LENGTh[?]	1 4 8 16 32 MIN MAX DEF	with query	6.28
SOURce:RFGenerator:AT<nr>:DRcLock:PERiod[?]	0 4 8 16 MIN MAX DEF	with query	6.29
SOURce:RFGenerator:AT<nr>:DRcLock:STATe[?]	0 to 1 MIN MAX DEF	with query	6.29
SOURce:RFGenerator:AT<nr>:DRINdex[?]	1 to 12 MIN MAX DEF	with query	6.26
SOURce:RFGenerator:AT<nr>:HARQ:MODE[?]	ACK NACK	with query	6.30
SOURce:RFGenerator:AT<nr>:IFACTor	1 to 4 MIN MAX DEF	no query	6.25
INITiate:RFGenerator:AT<nr>:MAC:INDeX	RUN ON	no query	6.22
ABORt:RFGenerator:AT<nr>:MAC:INDeX	OFF	no query	6.22
SOURce:RFGenerator:AT<nr>:MAC:INDeX[?]	5 to 63	with query	6.23
SOURce:RFGenerator:AT<nr>:MAC:LEVel[?]	–25.0 dB to –7.0 dB	with query	6.23
SOURce:RFGenerator:AT<nr>:PATTern[?]	00000000 to FFFFFFFF	with query	6.29
PROcEDURE:RFGenerator:AT<nr>:PCBits:PATTern[?]	INJ RDY	with query	6.30
SOURce:RFGenerator:AT<nr>:PCBits:RTES:NOBits[?]	1 to 256 MIN MAX DEF	with query	6.31

Commands for Non-Signaling	Parameters	Remark	Page
SOURce:RFGenerator:AT<nr>:PCBits[?]	HOLD ADOW AUP RTES PATT DEF	with query	6.31
SOURce:RFGenerator:AT<nr>:PCOut[?]	0 to 65535 INF MIN MAX DEF	with query	6.24
SOURce:RFGenerator:AT<nr>:PSIZe?	128 to 5120 bits	query only	6.28
SOURce:RFGenerator:AT<nr>:PSOFset[?]	0 to +255 MIN MAX DEF	with query	6.25
INITiate:RFGenerator:AT<nr>:PSTReam	RUN ON	no query	6.23
ABORt:RFGenerator:AT<nr>:PSTReam	OFF	no query	6.24
FETCh:RFGenerator:AT<nr>:PSTReam:STATus?	returns OFF ON RUN RDY 0 to 65535	query only	6.24
SOURce:RFGenerator:AT<nr>:PTINdex[?]	1 to 37 MIN MAX DEF	with query	6.27
SOURce:RFGenerator:AT<nr>:SCOut?	0 to 16	query only	6.28
SOURce:RFGenerator:AT<nr1>:PCBits:PATTern:AREA<nr2>:NOBits[?]	1 to 128 DEF	with query	6.32
SOURce:RFGenerator:AT<nr1>:PCBits:PATTern:AREA<nr2>:POLarity[?]	UP DOWN	with query	6.32
SOURce:RFGenerator:DRATe?	0.0 to 3072 kBit/s	query only	6.28
SOURce:RFGenerator:DRCLock:LENGth[?]	4 8 16 32 MIN MAX DEF	with query	6.30
SOURce:RFGenerator:DRCLock:PERiod[?]	8 16 MIN MAX DEF	with query	6.30
SOURce:RFGenerator:DRINdex[?]	1 to 12 (or 14) MIN MAX DEF	with query	6.26
CONFigure:RFGenerator:FPACTivity[?]	0% to 100%	with query	6.29
SOURce:RFGenerator:FREQuency[:RF]:UNIT[?]	HZ KHZ MHZ GHZ CH	with query	6.16
SOURce:RFGenerator:FREQuency[:RF][?]	9.98 MHz to 2700.00 MHz	with query	6.16
INITiate:RFGenerator:MAC:INDEx	RUN ON	no query	6.22
ABORt:RFGenerator:MAC:INDEx	OFF	no query	6.22
FETCh:RFGenerator:MAC:INDEx:STATus?	returns OFF ON RUN	query only	6.22
SOURce:RFGenerator:MAC:INDEx[:REV0][?]	5 to 63	with query	6.23
SOURce:RFGenerator:MAC:INDEx[:REVA][?]	5 to 63 72 to 127	with query	6.23
SOURce:RFGenerator:MAC:LEVel[?]	-25.0 dB to -7.0 dB	query only	6.23
SOURce:RFGenerator:MODE[?]	NORM CPIL DEF	with query	6.18
SOURce:RFGenerator:OAT:COUNt[?]	1 to 55 (or 110)	with query	6.34
SOURce:RFGenerator:PATTern[?]	00000000 to FFFFFFFF	with query	6.29
SOURce:RFGenerator:PCBits[?]	HOLD ADOW AUP EXT DEF	with query	6.31
SOURce:RFGenerator:PCOut[?]	0 to 65535 INF MIN MAX DEF	with query	6.24
SOURce:RFGenerator:POWer:OUTPut[?]	-120.0 dBm to +5.0 dBm	with query	6.18
SOURce:RFGenerator:PROPerty:PNOFset[?]	0 to +511	with query	6.18
SOURce:RFGenerator:PSIZe?	128 to 5120 bits	query only	6.28
INITiate:RFGenerator:PSTReam	RUN ON	no query	6.23
ABORt:RFGenerator:PSTReam	OFF	no query	6.24
FETCh:RFGenerator:PSTReam:STATus?	returns OFF ON RUN RDY 0 to 65535	query only	6.24
SOURce:RFGenerator:PTINdex[?]	1 to 37 MIN MAX DEF	with query	6.27

Commands for Non-Signaling	Parameters	Remark	Page
SOURce:RFGenerator:RAB:LENGth[?]	8 16 32 64	with query	6.33
SOURce:RFGenerator:RAB:MAC:LEVel[?]	-25.0 dB to -7.0 dB	with query	6.32
SOURce:RFGenerator:RAB:OFFSet[?]	0 to 7	with query	6.33
SOURce:RFGenerator:RAB:STATe[?]	0 1	with query	6.33
SOURce:RFGenerator:SCOUnt?	0 to 16	query only	6.28
ABORt:RFGenerator:SNCMessAge	OFF	no query	6.20
SOURce:RFGenerator:SNCMessAge:DRATe?	38.4 to 76.8 kBit/s	query only	6.21
SOURce:RFGenerator:SNCMessAge:DRINdex[?]	1 to 2	with query	6.21
SOURce:RFGenerator:SNCMessAge:PSOFFset[?]	0 to 3	with query	6.21
SOURce:RFGenerator:SNCMessAge:SCOUnt?	8 to 16	query only	6.22
FETCh:RFGenerator:SNCMessAge:STATUs?	returns OFF ON RUN	query only	6.21
FETCh:RFGenerator:STATUs?	returns OFF RUN ERR	query only	6.16
SOURce:RFGenerator:SUBType[?]	0 1 2 DEF	with query	6.19
SOURce:RFGenerator:Type?	B88 B89	query only	6.34
DEFault:RFGenerator[?]	ON OFF	with query	6.15
Standby Power / Access Probe Power			
INITiate:SAPPower	RUN	no query	6.60
ABORt:SAPPower	OFF	no query	6.60
STOP:SAPPower	STOP	no query	6.60
CONTinue:SAPPower	RUN	no query	6.60
CONFigure:SAPPower:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.60
FETCh[:SCALar]:SAPPower:STATUs?	OFF RUN STOP ERR STEP RDY	query only	6.61
READ[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
FETCh[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
SAMPlE[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
DM:Clock			
SOURce:DM:CLOCK:FREQUency[?]	39.3216 MHz 19.6608 MHz 13.1072 MHz 9.8304 MHz	with query	6.40
SOURce:DM:CLOCK:STATe[?]	ON OFF	with query	6.40
ACP Spectrum			
INITiate:SPECTrum:ACP	RUN	no query	6.92
ABORt:SPECTrum:ACP	OFF	no query	6.92
STOP:SPECTrum:ACP	STOP	no query	6.92
CONTinue:SPECTrum:ACP	RUN	no query	6.92
CONFigure:SPECTrum:ACP:CONTRol:FOFFset:ACP<nr>[?]	0 to 2 MHz OFF ON	with query	6.95
CONFigure:SPECTrum:ACP:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.94
CONFigure:SPECTrum:ACP:CONTRol:STATistics[?]	1 to 1000	with query	6.93

Commands for Non-Signaling	Parameters	Remark	Page
CONFigure:SPEctrum:ACP:CONTRol[?]	<StatisticCount>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.93
DEFault:SPEctrum:ACP:CONTRol[?]	ON OFF	with query	6.94
CONFigure:SPEctrum:ACP:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.92
CONFigure:SPEctrum:ACP:LIMit:ACP1[?]	-80.0 to +10.0 ON OFF MIN MAX DEF	with query	6.97
XTND:SPEctrum:ACP:LIMit[?]	ON OFF DEF	with query	6.59
DEFault:SPEctrum:ACP:LIMit[?]	ON OFF	with query	6.97
CALCulate[:SCALar]:SPEctrum:ACP:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.99
XTND:SPEctrum:ACP:STATistics[?]	ON OFF DEF	with query	6.97
FETCh[:SCALar]:SPEctrum:ACP:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.92
READ[:SCALar]:SPEctrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
FETCh[:SCALar]:SPEctrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
SAMPlE[:SCALar]:SPEctrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
Symbolic Status Event Register Evaluation			
STATus:OPERation:SYMBOLic:ENABLE[?] <Event>{,<Event>}	NONE <Event>{,<Event>}	no query	6.6
STATus:OPERation:SYMBOLic:EVENT[?]	<Event>{,<Event>} NONE <Event>{,<Event>}	with query	6.6
General			
SYSTem:OPTions:INFO:CURRent?	-	query only	6.2
SYSTem:VERsion:SW:MMI?	-	query only	6.2
Trigger			
TRIGger:OUTPut:PIN<nr>:SIGNal[?]	NONE PP2S CCH SFH CSL ATRF ATFS SLOT CPCP IPCP DEF	with query	6.42
TRIGger:SElect:AT[?]	1 to 4	with query	6.41
TRIGger[:SEquence]:SLOPe[?]	NEG POS DEF	with query	6.41
TRIGger[:SEquence]:SOURce[?]	INT EXT FRUN RFP IFP DEF	with query	6.41
TRIGger[:SEquence]:THReshold:IFPower[?]	-47.0 dB to 0 dB	with query	6.43
TRIGger[:SEquence]:THReshold:RFPower[?]	LOW MED HIGH	with query	6.43
DEFault:TRIGger[:SEquence][?]	ON OFF	with query	6.41
Wide Band Power			
INITiate:WPOWER	RUN	no query	6.38
ABORt:WPOWER	OFF	no query	6.38
STOP:WPOWER	STOP	no query	6.38
CONTinue:WPOWER	RUN	no query	6.38
CONFigure:WPOWER:CONTRol:REPetition[?]	<Repetition>,<StopCond>, <Stepmode>	with query	6.39
CONFigure:WPOWER:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.38

Commands for Non-Signaling	Parameters	Remark	Page
FETCh:WPOWer:STATus?	returns <Measurement Status> and <Curr. Step Cycle Count>	query only	6.39
READ[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.40
FETCh[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.40
SAMPlE[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.40

Table 6-2 Remote-control commands available in Signaling

Commands for Signaling	Parameters	Remark	Page
Access Network Signal			
DEFault:ANSigNal[?]	ON OFF DEF	with query	6.192
UNIT:ANSigNal:CHANnel[:RF][?]	CH HZ MHZ KHZ GHZ	with query	6.192
CONFigure:ANSigNal:CHANnel[:RF][?]	\{Value\}	with query	6.193
CONFigure:ANSigNal:FPACTivity[?]	0% to 100%	with query	6.198
CONFigure:ANSigNal:MAC:INDEx:REVA[?]	5 to 127	with query	6.195
CONFigure:ANSigNal:MAC:INDEx[:REV0][?]	5 to 63	with query	6.195
CONFigure:ANSigNal:PCBits:SSIZE[?]	0.5 dB 1.0 dB MIN MAX DEF	with query	6.195
CONFigure:ANSigNal:PCBits[?]	AUT HOLD ADOW AUP DEF	with query	6.194
CONFigure:ANSigNal:POWer:EVDO[?]	-150.0 dBm to +50.0 dBm	with query	6.193
CONFigure:ANSigNal:POWer:OUTPut?	-150.0 dBm to +50.0 dBm	query only	6.193
ConfiguRe:ANSigNal:PROPerTy:PNOFFset?	.s to .s ON OFF	with query	6.198
ConfiguRe:ANSigNal:PROPerTy:PNOFFset[?]	0 Hz to 511 Hz	with query	6.197
CONFigure:ANSigNal:SECTor:CLRCODE[?]	0 to 255	with query	6.195
CONFigure:ANSigNal:SECTor:CNTRCODE[?]	0 to 999	with query	6.197
ConfiguRe:ANSigNal:SECTor:ID:FORMAt[?]	A41N Manual	with query	6.196
CONFigure:ANSigNal:SECTor:ID:LBITS[?]	<7 char hex>	with query	6.196
[SENSe]:ANSigNal:SECTor:ID:MANual[?]	<34 char hex>	with query	6.197
[SENSe]:ANSigNal:SECTor:ID?	<34 char hex>	query only	6.196
CONFigure:ANSigNal:SECTor:NPBITS[?]	<16 char hex>	with query	6.196
CONFigure:ANSigNal:SECTor:SMASK[?]	0 to 128	with query	6.197
Packet Application AT Support			
[Sense]:ATINfo:APPLication:DPACket:Support?	ON OFF	query only	6.173
AT Info			
[SENSe]:ATINfo:ESN?	<9 characters>	query only	6.160
[SENSe]:ATINfo:MEID?	<15 characters>	query only	6.160
[SENSE]:ATINfo:PREFferred:CCHannel:CYCLE:ENABLE?	ON OFF	query only	6.160
[SENSE]:ATINfo:PREFferred:CCHannel:CYCLE?	0 to 32767	query only	6.160
[SENSe]:ATINfo:UATI?	<17 characters>	query only	6.160

Commands for Signaling	Parameters	Remark	Page
Handoff			
PROCedure:BC:HANDoff[?]	<Standard>, CH HZ KHZ MHZ GHZ	with query	6.161
Code Domain Power			
INITiate:CDPower:CDPW	RUN	no query	6.100
ABORt:CDPower:CDPW	OFF	no query	6.100
STOP:CDPower:CDPW	STOP	no query	6.100
CONTInue:CDPower:CDPW	RUN	no query	6.100
CONFigure:CDPower:CDPW:AVERAge:LIMit:ASYMmetric[:COMBined][?]	<CDP Limit Y Average>	with query	6.105
CALCulate:ARRay:CDPower:CDPW:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.110
CONFigure:CDPower:CDPW:CMAx:LIMit:ASYMmetric[:COMBined][?]	<CDP Limit Y>	with query	6.105
CONFigure:CDPower:CDPW:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.102
CONFigure:CDPower:CDPW:CONTRol:RMODE[?]	SCAL ARR	with query	6.101
CONFigure:CDPower:CDPW:CONTRol:RORDER[?]	HAD BITR	with query	6.102
CONFigure:CDPower:CDPW:CONTRol:STATistics[?]	1 to 1000	with query	6.102
CONFigure:CDPower:CDPW:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.101
DEFault:CDPower:CDPW:CONTRol[?]	ON OFF	with query	6.102
CALCulate:ARRay:CDPower:CDPW:CURREnt[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.109
CONFigure:CDPower:CDPW:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.100
CALCulate:ARRay:CDPower:CDPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.110
CALCulate:ARRay:CDPower:CDPW:ISIGnal:CURREnt[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.109
CALCulate:ARRay:CDPower:CDPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(t)	returns 32 bit limit indicator	query only	6.110
FETCh:ARRay:CDPower:CDPW:ISIGnal:STATE? ^(t)	0 1	query only	6.109
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(t)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(t)	-60.0 dB to +10.0 dB	query only	6.107
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURREnt? ^(t)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(t)	-60.0 dB to +10.0 dB	query only	6.108
CONFigure:CDPower:CDPW:LIMit:IQLCheck[?]	DEFault OFF ON	with query	6.105
DEFault:CDPower:CDPW:LIMit[?]	ON OFF	with query	6.106
CALCulate[:SCALar]:CDPower:CDPW:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.106
CALCulate:ARRay:CDPower:CDPW:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.110

Commands for Signaling	Parameters	Remark	Page
CALCulate:ARRay:CDPower:CDPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit ^(*)	returns 32 bit limit indicator	query only	6.110
CALCulate:ARRay:CDPower:CDPW:QSIGnal:CURRent[:RESult]:MATChing:LIMit ^(*)	returns 32 bit limit indicator	query only	6.109
CALCulate:ARRay:CDPower:CDPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit ^(*)	returns 32 bit limit indicator	query only	6.110
FETCh:ARRay:CDPower:CDPW:QSIGnal:STATe ^(*)	0 1	query only	6.109
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge ^(*)	-60.0 dB to +10.0 dB	query only	6.108
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent ^(*)	-60.0 dB to +10.0 dB	query only	6.107
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent ^(*)	-60.0 dB to +10.0 dB	query only	6.107
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent ^(*)	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum ^(*)	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum ^(*)	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW:STATe?	0 1	query only	6.109
FETCh[:SCALar]:CDPower:CDPW:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.100
SAMPlE[:SCALar]:CDPower:CDPW?	-	query only	6.106
READ[:SCALar]:CDPower:CDPW?	-	query only	6.106
FETCh[:SCALar]:CDPower:CDPW?	-	query only	6.106
READ:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.107
SAMPlE:ARRay:CDPower:CDPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.107
READ:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.108
Channel Power			
INITiate:CDPower:CHPW	RUN	no query	6.120
ABORt:CDPower:CHPW	OFF	no query	6.120
STOP:CDPower:CHPW	STOP	no query	6.120
CONTinue:CDPower:CHPW	RUN	no query	6.120
CONFigure:CDPower:CHPW:AVERAge:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.124
CALCulate:ARRay:CDPower:CHPW:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.131
CONFigure:CDPower:CHPW:CMAx:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.124
CONFigure:CDPower:CHPW:CONTrOl:PRMode[?]	ATP PPOW	with query	6.123

Commands for Signaling	Parameters	Remark	Page
CONFigure:CDPower:CHPW:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.123
CONFigure:CDPower:CHPW:CONTRol:RMODe[?]	SCAL ARR	with query	6.122
CONFigure:CDPower:CHPW:CONTRol:STATistics[?]	1 to 1000	with query	6.122
CONFigure:CDPower:CHPW:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.122
DEFault:CDPower:CHPW:CONTRol[?]	ON OFF	with query	6.123
CALCulate:ARRay:CDPower:CHPW:CURRent[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.130
CONFigure:CDPower:CHPW:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.121
CALCulate:ARRay:CDPower:CHPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.131
CALCulate:ARRay:CDPower:CHPW:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.130
CALCulate:ARRay:CDPower:CHPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.132
FETCh:ARRay:CDPower:CHPW:ISIGnal:STATe? ^(*)	returns RRI, Pilot, and ACK states	query only	6.129
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.128
DEFault:CDPower:CHPW:LIMit[?]	ON OFF	with query	6.124
CALCulate[:SCALar]:CDPower:CHPW:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.125
CALCulate:ARRay:CDPower:CHPW:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.132
CALCulate:ARRay:CDPower:CHPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.131
CALCulate:ARRay:CDPower:CHPW:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.130
CALCulate:ARRay:CDPower:CHPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.132
FETCh:ARRay:CDPower:CHPW:QSIGnal:STATe? ^(*)	returns DRC and Data states	query only	6.129
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.126

Commands for Signaling	Parameters	Remark	Page
READ:ARRay:CDPower:CHPW:QSiGnal[:VALue]:MAXimum?(*)	-60.0 dB to +10.0 dB	query only	6.128
FETCh:ARRay:CDPower:CHPW:QSiGnal[:VALue]:MAXimum?(*)	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW:QSiGnal[:VALue]:MAXimum?(*)	-60.0 dB to +10.0 dB	query only	6.128
XTND:CDPower:CHPW:RESult:DATA[?]	ON OFF	with query	6.125
FETCh:ARRay:CDPower:CHPW:STATe?	returns RRI, Pilot, and ACK states	query only	6.129
FETCh[:SCALar]:CDPower:CHPW:STATus?	OFF RUN STOP ERR STEP RDY	query only	6.121
READ[:SCALar]:CDPower:CHPW?	-	query only	6.125
FETCh[:SCALar]:CDPower:CHPW?	-	query only	6.125
SAMPlE[:SCALar]:CDPower:CHPW?	-	query only	6.125
FETCh:ARRay:CDPower:CHPW[:VALue]:AVERAge	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.127
SAMPlE:ARRay:CDPower:CHPW[:VALue]:AVERAge?	-60.0 dB to +10.0 dB	query only	6.127
READ:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
SAMPlE:ARRay:CDPower:CHPW[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.126
FETCh:ARRay:CDPower:CHPW[:VALue]:MAXimum	-60.0 dB to +10.0 dB	query only	6.128
READ:ARRay:CDPower:CHPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.128
SAMPlE:ARRay:CDPower:CHPW[:VALue]:MAXimum?	-60.0 dB to +10.0 dB	query only	6.128
CONFigure:CDPower:CPCCCommon:AVERAge:LIMit:ASYMmetric[:COMBined][?]	<Carrier Feedthrough Limit Average>, <Carrier Freq. Error Limit Average>, <Rho Limit Average>	with query	6.104
CONFigure:CDPower:CPCCCommon:CMAX:LIMit:ASYMmetric[:COMBined][?]	<Carrier Feedthrough Limit>, <Carrier Freq. Error Limit>, <Rho Limit>	with query	6.103
DEFault:CDPower:CPCCCommon:LIMit[?]	ON OFF	with query	6.104
Peak Code Domain Error Power			
ABORt:CDPower:PCDep	OFF	no query	6.111
CONTInue:CDPower:PCDep	RUN	no query	6.111
INITiate:CDPower:PCDep	RUN	no query	6.111
STOP:CDPower:PCDep	STOP	no query	6.111
READ:ARRay:CDPower:PCDep[:VALue]:CURRent?	-60.0 dB to +10.0 dB	query only	6.116
CONFigure:CDPower:PCDep:AVERAge:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.114
CALCulate:ARRay:CDPower:PCDep:AVERAge[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.120
CONFigure:CDPower:PCDep:CMAX:LIMit:ASYMmetric[:COMBined][?]	-60.0 to 0 DEF MIN MAX OFF	with query	6.114
CONFigure:CDPower:PCDep:CONTrol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.113
CONFigure:CDPower:PCDep:CONTrol:RMODE[?]	SCAL ARR	with query	6.112
CONFigure:CDPower:PCDep:CONTrol:RORDER[?]	HAD BITR	with query	6.113
CONFigure:CDPower:PCDep:CONTrol:STATistics[?]	1 to 1000	with query	6.113

Commands for Signaling	Parameters	Remark	Page
CONFigure:CDPower:PCDep:CONTRol[?]	<Result Mode>, <Current Statistics>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.112
DEFault:CDPower:PCDep:CONTRol[?]	ON OFF	with query	6.113
CALCulate:ARRay:CDPower:PCDep:CURRent[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.119
CONFigure:CDPower:PCDep:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.111
CALCulate:ARRay:CDPower:PCDep:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.119
CALCulate:ARRay:CDPower:PCDep:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.120
FETCh:ARRay:CDPower:PCDep:ISIGnal:STATE? ^(*)	0 1	query only	6.119
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
DEFault:CDPower:PCDep:LIMit[?]	ON OFF	with query	6.114
CALCulate[:SCALar]:CDPower:PCDep:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.115
CALCulate:ARRay:CDPower:PCDep:MAXimum[:RESult]:MATChing:LIMit?	returns 64 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.119
CALCulate:ARRay:CDPower:PCDep:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	returns 32 bit limit indicator	query only	6.120
FETCh:ARRay:CDPower:PCDep:QSIGnal:STATE? ^(*)	0 1	query only	6.119
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(*)	-60.0 dB to +10.0 dB	query only	6.117
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(*)	-60.0 dB to +10.0 dB	query only	6.116
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(*)	-60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep:STATE?	0 1	query only	6.119

Commands for Signaling	Parameters	Remark	Page
FETCh[:SCALar]:CDPower:PCDep:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.111
SAMPlE[:SCALar]:CDPower:PCDep?	–	query only	6.115
READ[:SCALar]:CDPower:PCDep?	–	query only	6.115
FETCh[:SCALar]:CDPower:PCDep?	–	query only	6.115
READ:ARRay:CDPower:PCDep[:VALue]:AVERAge?	–60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep[:VALue]:AVERAge?	–60.0 dB to +10.0 dB	query only	6.117
SAMPlE:ARRay:CDPower:PCDep[:VALue]:AVERAge?	–60.0 dB to +10.0 dB	query only	6.117
FETCh:ARRay:CDPower:PCDep[:VALue]:CURRent?	–60.0 dB to +10.0 dB	query only	6.116
SAMPlE:ARRay:CDPower:PCDep[:VALue]:CURRent?	–60.0 dB to +10.0 dB	query only	6.116
READ:ARRay:CDPower:PCDep[:VALue]:MAXimum?	–60.0 dB to +10.0 dB	query only	6.118
FETCh:ARRay:CDPower:PCDep[:VALue]:MAXimum?	–60.0 dB to +10.0 dB	query only	6.118
SAMPlE:ARRay:CDPower:PCDep[:VALue]:MAXimum?	–60.0 dB to +10.0 dB	query only	6.118
External Synchronization			
INITiate:ESYNc	RUN	no query	6.209
CONFigure:ESYNc:ALIGNment[?]	INT EXT DEF	with query	6.210
CONFigure:ESYNc:MODE[?]	NONE PP2S	with query	6.209
[SENSe]:ESYNc:STATe?	INT EXT	query only	6.211
[SENSe]:ESYNc:SYSTem:TIME:STATe?	NINI IPRG RDY FAIL	query only	6.210
CONFigure:ESYNc:SYSTem:Time[?]	<mm/dd/yyyy HH:MM:SS>	with query	6.210
CONFigure:ESYNc:TOUT[?]	5 s to 1200 s	with query	6.209
INITiate:ESynch:SYSTem:TIME	RUN	no query	6.210
RFGenerator - Impairments			
CONFigure:IMPairments:LEVel:AWGN:MODE[?]	NORM HPOW DEF	with query	6.194
CONFigure:IMPairments:LEVel:AWGN[?]	–20.0 dB to +11.7 dB	with query	6.194
SOURce:IMPairments:FOFFset[:RF][?]	–3.0 kHz to +3.0 kHz	with query	6.193
Modulation Measurements - IQ Analyzer			
INITiate:MODulation:IQANalyzer:HPSK	RUN	no query	6.88
ABORt:MODulation:IQANalyzer:HPSK	OFF	no query	6.88
STOP:MODulation:IQANalyzer:HPSK	STOP	no query	6.88
CONTinue:MODulation:IQANalyzer:HPSK	RUN	no query	6.88
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.89
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:RMODE[?]	SCAL ARR	with query	6.89
DEFault:MODulation:IQANalyzer:HPSK:CONTRol[?]	ON OFF	with query	6.89
CONFigure:MODulation:IQANalyzer:HPSK:DESPread[?]	OFF DATA	with query	6.90
CONFigure:MODulation:IQANalyzer:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.88
READ:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	–2.0 to +2.0	query only	6.91
FETCh:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	–2.0 to +2.0	query only	6.91
SAMPlE:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	–2.0 to +2.0	query only	6.91
READ:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	–2.0 to +2.0	query only	6.91

Commands for Signaling	Parameters	Remark	Page
FETCh:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	-2.0 to +2.0	query only	6.91
SAMPlE:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	-2.0 to +2.0	query only	6.91
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK:STATus?	<HPSK_MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.88
READ[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
SAMPlE[:SCALar]:MODulation:IQANalyzer:HPSK?	-	query only	6.91
CONFigure:SUBarrays:MODulation:IQANalyzer:HPSK[?]	ALL 0 μs to 833 μs 0 to 4096	with query	6.90
Default Packet Application			
CONFigure:LAYer:APPLication:DPACket:AUTHeNtic:PWORd[?]	<max. 72 characters>	with query	6.179
CONFigure:LAYer:APPLication:DPACket:AUTHeNtic:TYPe[?]	NONE PAP	with query	6.178
CONFigure:LAYer:APPLication:DPACket:AUTHeNtic:UNAMe[?]	<max. 72 characters>	with query	6.179
CONFigure:LAYer:APPLication:DPACket:DNS:DYNamic:IPAdDress?	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.178
CONFigure:LAYer:APPLication:DPACket:DNS[:STATic]:IPAdDress[?]	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.177
CONFigure:LAYer:APPLication:DPACket:ENABle[?]	ON OFF	query only	6.172
CONFigure:LAYer:APPLication:DPACket:FORWard:DYNamic:IPAdDress?	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.178
CONFigure:LAYer:APPLication:DPACket:FORWard[:STATic]:IPAdDress[?]	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.177
CONFigure:LAYer:APPLication:DPACket:IAControl:NIATimer[?]	5 s to 60 s MIN MAX ON OFF	query only	6.179
CONFigure:LAYer:APPLication:DPACket:MIP:AADV[?]	ON OFF	with query	6.175
CONFigure:LAYer:APPLication:DPACket:MIP:AUTHeNtic:TYPe[?]	0 s to 65535 s	with query	6.177
CONFigure:LAYer:APPLication:DPACket:MIP:COAdDress?	<Addr_1>,<Addr_2>, <Addr_3>,<Addr_4>	query only	6.175
CONFigure:LAYer:APPLication:DPACket:MIP:FAIP[?]	<Addr_1>,<Addr_2>, <Addr_3>,<Addr_4>	with query	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:HAIP[?]	<Addr_1>,<Addr_2>, <Addr_3>,<Addr_4>	query only	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:HASecret[?]	<string>	with query	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:MHIP[?]	<Addr_1>,<Addr_2>, <Addr_3>,<Addr_4>	with query	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:RRCode[?]	<Code No>	with query	6.176
CONFigure:LAYer:APPLication:DPACket:MIP:RRLTime[?]	0 s to 65535 s	with query	6.176
CONFigure:LAYer:APPLication:DPACket:MIP:SAMode[?]	ON OFF	with query	6.173
CONFigure:LAYer:APPLication:DPACket:REVerse:DYNamic:IPAdDress?	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.178
CONFigure:LAYer:APPLication:DPACket:REVerse[:STATic]:IPAdDress[?]	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.177
CONFigure:LAYer:APPLication:DPACket:STReam[?]	0 to 3 MIN MAX DEF INV	with query	6.173
Default Signaling Application			
CONFigure:LAYer:APPLication:DSIGNALing:ENABle?	ON OFF	query only	6.162

Commands for Signaling	Parameters	Remark	Page
CONFigure:LAYer:APPLIcation:DSIGNaling:STReam?	0 1	query only	6.162
CONFigure:LAYer:APPLIcation:DSIGNaling:Support?	ON OFF	query only	6.163
Default Test Application			
CONFigure:LAYer:APPLIcation:DTEST:FTAP:ACK:FMODE[?]	NUSed AALWays NAALWays	query only	6.166
CONFigure:LAYer:APPLIcation:DTEST:FTAP:DRC:DRATE?	0.0 to 2457.6 kBit/s	query only	6.165
CONFigure:LAYer:APPLIcation:DTEST:FTAP:DRC:DRINDEX[?]	0 to 12	with query	6.165
CONFigure:LAYer:APPLIcation:DTEST:FTAP:DRC:SCOUNT?	0 to 16	query only	6.166
CONFigure:LAYer:APPLIcation:DTEST:FTAP:LBACK:ENABLE?	ON OFF DEF	query only	6.166
CONFigure:LAYer:APPLIcation:DTEST:RTAP:DATA:RMAX:INDEX[?]	0 to 5	with query	6.167
CONFigure:LAYer:APPLIcation:DTEST:RTAP:DATA:RMAX:VALUE?	0.0 to 2457.6 kBit/s	query only	6.168
CONFigure:LAYer:APPLIcation:DTEST:RTAP:DATA:RMIN:INDEX[?]	0 to 5	with query	6.167
CONFigure:LAYer:APPLIcation:DTEST:RTAP:DATA:RMIN:VALUE?	0.0 to 2457.6 kBit/s	query only	6.168
Enhanced Test Application			
CONFigure:LAYer:APPLIcation:ETEST:FETap:ACK:FMODE[?]	NUSed AALWays NAALWays	query only	6.170
CONFigure:LAYer:APPLIcation:ETEST:FETap:ACK:MTYPE[?]	BPSK OOK OFF ON DEF	with query	6.171
CONFigure:LAYer:APPLIcation:ETEST:FETap:DRC:DRATE?	38.4 to 3072.0 kBit/s	query only	6.170
CONFigure:LAYer:APPLIcation:ETEST:FETap:DRC:DRINDEX[?]	0 to 14	with query	6.169
CONFigure:LAYer:APPLIcation:ETEST:FETap:DRC:SCOUNT?	0 to 16	query only	6.170
CONFigure:LAYer:APPLIcation:ETEST:FETap:LBACK:ENABLE?	ON OFF DEF	query only	6.170
CONFigure:LAYer:APPLIcation:ETEST:RETap:ACHannel:RMODE[?]	R9K R19K R38K DEF	with query	6.172
CONFigure:LAYer:APPLIcation:ETEST:RETap:DATA:RMAX:INDEX[?]	0 to 12	with query	6.172
CONFigure:LAYer:APPLIcation:ETEST:RETap:DATA:RMIN:INDEX[?]	0 to 12	with query	6.171
Test Statistics Overview			
CONFigure:LAYer:APPLIcation:TEST:ENABLE[?]	ON OFF DEF	query only	6.163
CONFigure:LAYer:APPLIcation:TEST:SELECT[?]	ON OFF DEF	query only	6.163
INITiate:LAYer:APPLIcation:TEST:STATISTICS	RUN	no query	6.163
CONFigure:LAYer:APPLIcation:TEST:STReam[?]	0 to 3 MIN MAX DEF INV	with query	6.164
CONFigure:LAYer:APPLIcation:TEST:Support?	ON OFF	query only	6.164
Connection Layer			
CONFigure:LAYer:CONNection:OMPRotocol:REDirect[?]	ON OFF DEF	with query	6.181
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX:INDEX?	?? to ??	query only	6.182
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX?	?? to ??	query only	6.182
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:CINCluded?	ON OFF	with query	6.182
CONFigure:LAYer:CONNection:RUPRotocol:PDTHreshold?	-31.5 dB to 0 dB MIN MAX DEF	with query	6.181
Media Access Control Layer			
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPBackoff[?]	1 to 15 MIN MAX DEF	with query	6.184
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPSBBackoff[?]	1 to 15 MIN MAX DEF	with query	6.184
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:PSEQUence:MAXImum	1 to 15 MIN MAX DEF	with query	6.184

Commands for Signaling	Parameters	Remark	Page
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:SSEed?	<Seed value>	query only	6.183
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff[?]	1 to 15 MIN MAX DEF	with query	6.185
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff[?]	1 to 15 MIN MAX DEF	with query	6.185
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:PSEquence:MAXimu m[?]	1 to 15 MIN MAX DEF	with query	6.184
CONFigure:LAYer:MAC:ACMProtocol:STYPe?	DACP DEF	query only	6.183
CONFigure:LAYer:MAC:CCMProtocol:DCCProtocol:DRATE[?]	R384 R768	with query	6.183
CONFigure:LAYer:MAC:CCMProtocol:STYPe[?]	DCCP ECCP DEF	query only	6.183
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:ACK:CGAin[?]	-3 to +6 dB MIN MAX DEF	with query	6.186
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:CGAin[?]	-9 to +6 dB MIN MAX DEF	with query	6.186
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:COVer[?]	1 to 6 MIN MAX DEF	with query	6.185
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:LENGth[?]	1 2 4 8 MIN MAX DEF	with query	6.186
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:ACK:CGAin[?]	-3 to +6 dB MIN MAX DEF	with query	6.188
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:CGAin[?]	-9 to +6 dB MIN MAX DEF	with query	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:COVer[?]	1 to 6 MIN MAX DEF	with query	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:LENGth[?]	0 to 3 MIN MAX DEF	with query	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:CGAin[?]	-15.5 to 0.0 dB MIN MAX DEF	with query	6.188
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:VALue[?]	1 to 7	with query	6.188
CONFigure:LAYer:MAC:FTCProtocol:STYPe?	DFT EFT DEF	query only	6.185
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:NOFFset?	-4.0 dB to +3.5 dB MIN MAX DEF	query only	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R15K[?]	-2.0 to +1.75 dB MIN MAX DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R19K[?]	-2.0 to +1.75 dB MIN MAX DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K[?]	-2.0 to +1.75 dB MIN MAX DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R76K[?]	-2.0 to +1.75 dB MIN MAX DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R9K[?]	-2.0 to +1.75 dB MIN MAX DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:RRLimit[?]	R0K R9K R19K R38K R76K R15K DEF	with query	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R15K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R38K[?]	-0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R76K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R9K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190

Commands for Signaling	Parameters	Remark	Page
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R19K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R76K[?]	-0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R9K[?]	0x00 to 0xFF MIN MAX DEF	with query	6.190
CONFigure:LAYer:MAC:RTCProtocol:S3RT:RRICgain:TPRE<nr>[?]?	-8 dB to +7 dB MIN MAX DEF	query only	6.191
CONFigure:LAYer:MAC:RTCProtocol:S3RT?	-8 dB to +7 dB MIN MAX DEF	query only	6.191
CONFigure:LAYer:MAC:RTCProtocol:STYPe?	DRT S1RT S2RT S3RT	query only	6.188
Physical Layer			
[SENSe]:LAYer:PHYSical:PLPProtocol:STYPe[?]	DPLP S2PL DEF	with query	6.192
CONFigure:LAYer:PHYSical:PLPProtocol:STYPe[?] ^(*)	DPLP S1PL S2PL DEF	with query	6.192
Session Layer			
CONFigure:LAYer:SESSion:AMPProtocol:SNINcluded[?]	ON OFF DEF	with query	6.180
CONFigure:LAYer:SESSion:SCPProtocol:GSUPport?	ON OFF DEF	query only	6.180
CONFigure:LAYer:SESSion:SMPPProtocol:ISTimeout[?]	0 to 65535 min MIN MAX DEF	with query	6.180
Stream Layer			
CONFigure:LAYer:Stream:SPProtocol:STYPe?	DSPR GVSP DEF	query only	6.180
CONFigure:LAYer:UPDate:MODE[?]	IMM USER DEF	with query	6.162
DEFault:LAYer[?]	ON OFF	with query	6.161
Analyzer			
[SENSe]:LEVel:MAXimum[?]	-43 dBm to +44 dBm	with query	6.205
[SENSe]:LEVel:MODE[?]	AUT MAN	with query	6.205
Low Spur Mode			
CONFigure:LSMode[?]	ON OFF	with query	6.215
Connection Control Menu			
CONFigure:MENU:CCTRI:AClose[?]	ON OFF	with query	6.214
CONFigure:MENU:CCTRI:AOPen[?]	ON OFF	with query	6.214
Modulation Measurements - Error Vector Magnitude			
INITiate:MODulation:EVMagnitude:HPSK	RUN	no query	6.69
ABORt:MODulation:EVMagnitude:HPSK	OFF	no query	6.69
STOP:MODulation:EVMagnitude:HPSK	STOP	no query	6.69
CONTinue:MODulation:EVMagnitude:HPSK	RUN	no query	6.69
READ:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBarrays:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.75
CONFigure:MODulation:EVMagnitude:HPSK:CONTrol:REPetition[?]	<Repetition> , <Stop Cond> , <Step Mode>	with query	6.72

Commands for Signaling	Parameters	Remark	Page
CONFigure:MODulation:EVMagnitude:HPSK:CONTRol:RMODE[?]	SCAL ARR	with query	6.71
CONFigure:MODulation:EVMagnitude:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.71
CONFigure:MODulation:EVMagnitude:HPSK:CONTRol[?]	<Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.72
DEFault:MODulation:EVMagnitude:HPSK:CONTRol[?]	ON OFF	with query	6.72
READ:ARRay:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRay:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBarrays:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.75
CONFigure:MODulation:EVMagnitude:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.70
CALCulate[:SCALar]:MODulation:EVMagnitude:HPSK:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.74
READ:ARRay:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:ARRay:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:ARRay:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
READ:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
SAMPlE:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.75
FETCh[:SCALar]:MODulation:EVMagnitude:HPSK:STATus?	<HPSK_Measurement Status>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.70
READ[:SCALar]:MODulation:EVMagnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
FETCh[:SCALar]:MODulation:EVMagnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
SAMPlE[:SCALar]:MODulation:EVMagnitude:HPSK?	<HPSK_EVM_MeasValues_Set>	query only	6.74
CONFigure:SUBarrays:MODulation:EVMagnitude:HPSK[?]	<Mode>, <Start>, <Samples>	with query	6.73
Modulation - Magnitude Error H-PSK			
INITiate:MODulation:MERRor:HPSK	RUN	no query	6.76
ABORt:MODulation:MERRor:HPSK	OFF	no query	6.76
STOP:MODulation:MERRor:HPSK	STOP	no query	6.76
CONTinue:MODulation:MERRor:HPSK	RUN	no query	6.76
READ:ARRay:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRay:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:ARRay:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBarrays:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBarrays:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:AVERage?	returns 0.0 % to + 100.0 %	query only	6.81
CONFigure:MODulation:MERRor:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop	with query	6.78

Commands for Signaling	Parameters	Remark	Page
	Cond>, <Step Mode>		
CONFigure:MODulation:MERRor:HPSK:CONTRol:RMODe[?]	SCAL ARR	with query	6.77
CONFigure:MODulation:MERRor:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.78
CONFigure:MODulation:MERRor:HPSK:CONTRol[?]	<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.77
DEFault:MODulation:MERRor:HPSK:CONTRol[?]	ON OFF	with query	6.78
READ:ARRay:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRay:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:ARRay:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBarrays:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBarrays:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:CURREnt?	returns 0.0 % to + 100.0 %	query only	6.81
CONFigure:MODulation:MERRor:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.76
CALCulate[:SCALar]:MODulation:MERRor:HPSK:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.80
READ:ARRay:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:ARRay:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:ARRay:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
READ:SUBarrays:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh:SUBarrays:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:MMAx?	returns 0.0 % to + 100.0 %	query only	6.81
FETCh[:SCALar]:MODulation:MERRor:HPSK:STATus?	<HPSK_Measurement Status>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.76
READ[:SCALar]:MODulation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
FETCh[:SCALar]:MODulation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
SAMPlE[:SCALar]:MODulation:MERRor:HPSK?	returns <HPSK_ME_MeasValues_Set>	query only	6.80
CONFigure:SUBarrays:MODulation:MERRor:HPSK[?]	ALL ARIT MIN MAX 0 μ s to 833 μ s 0 to 1024	with query	6.79
CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]	<Average_HPSK_Limit_Set >	with query	6.67
CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABle[?]	ON OFF	with query	6.67
CONFigure:MODulation:OEMP:HPSK:AVERAge:LIMit[:SCALar]:SYMMetric[:COMBined][?]	<Average_OQPSK_Limits_DefaultSettings>	with query	6.66
CONFigure:SUBarrays:MODulation:MERRor:HPSK[?]	ALL ARIT MIN MAX 0 μ s to 833 μ s 0 to 1024	with query	6.79
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABle[?]	ON OFF	with query	6.67

Commands for Signaling	Parameters	Remark	Page
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]	<CMMAX_OQPSK_Limits_DefaultSettings>	with query	6.66
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined][?]	<CMMAX_OQPSK_Limits_DefaultSettings>	with query	6.65
DEFault:MODulation:OEMP:HPSK:LIMit[?]	ON OFF	with query	6.68
INITiate:MODulation:OVERview:HPSK	RUN	no query	6.61
ABORt:MODulation:OVERview:HPSK	OFF	no query	6.61
CONTinue:MODulation:OVERview:HPSK	RUN	no query	6.61
STOP:MODulation:OVERview:HPSK	STOP	no query	6.61
CONFigure:MODulation:OVERview:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.64
CONFigure:MODulation:OVERview:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.64
DEFault:MODulation:OVERview:HPSK:CONTRol[?]	ON OFF	with query	6.63
CONFigure:MODulation:OVERview:HPSK:CONTRol[?]	<Statistic Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.63
CONFigure:MODulation:OVERview:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.62
CALCulate[:SCALar]:MODulation:OVERview:HPSK:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.69
FETCH[:SCALar]:MODulation:OVERview:HPSK:STATus?	<HPSK_Measurement Status>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.62
READ[:SCALar]:MODulation:OVERview:HPSK?	<OwHPSK_MeasValues_Set>	query only	6.68
FETCH[:SCALar]:MODulation:OVERview:HPSK?	<OwHPSK_MeasValues_Set>	query only	6.68
SAMPLE[:SCALar]:MODulation:OVERview:HPSK?	<OwHPSK_MeasValues_Set>	query only	6.68
Modulation Phase Error			
INITiate:MODulation:PERRor:HPSK	RUN	no query	6.82
ABORt:MODulation:PERRor:HPSK	OFF	no query	6.82
STOP:MODulation:PERRor:HPSK	STOP	no query	6.82
CONTinue:MODulation:PERRor:HPSK	RUN	no query	6.82
READ:ARRay:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
FETCH:ARRay:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPLE:ARRay:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
FETCH:SUBarrays:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPLE:SUBarrays:MODulation:PERRor:HPSK:AVERAge?	-100.0 deg to + 100.0 deg	query only	6.87
CONFigure:MODulation:PERRor:HPSK:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:RMODE[?]	SCAL ARR	with query	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics[?]	1 to 1000	with query	6.83
CONFigure:MODulation:PERRor:HPSK:CONTRol[?]	<Result Mode>, <Statistics Count>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.83

Commands for Signaling	Parameters	Remark	Page
DEFault:MODulation:PERRor:HPSK:CONTrol[?]	ON OFF	with query	6.84
READ:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:ARRay:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:CURREnt?	-100.0 deg to + 100.0 deg	query only	6.87
CONFigure:MODulation:PERRor:HPSK:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.82
CALCulate[:SCALar]:MODulation:PERRor:HPSK:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.86
READ:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:ARRay:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:MMAx?	-100.0 deg to + 100.0 deg	query only	6.87
FETCh[:SCALar]:MODulation:PERRor:HPSK:STATus?	<HPSK_Measurement Status>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.82
READ[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
FETCh[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
SAMPlE[:SCALar]:MODulation:PERRor:HPSK?	returns <HPSK_EVM_MeasValues_Set>	query only	6.86
CONFigure:SUBarrays:MODulation:PERRor:HPSK[?]	ALL ARIT MIN MAX 0 μ s to 833 μ s 0 to 1024	with query	6.85
Network			
CONFigure:NETWork:APRobes:ACCess:OFFSet?	<34 char hex>	query only	6.203
CONFigure:NETWork:APRobes:ACDuration[?]	16 32 64 128	with query	6.202
CONFigure:NETWork:APRobes:ADJust?	0 16 32 48 64 80 96 112	query only	6.203
CONFigure:NETWork:APRobes:IADjust[?]	-16 dB to 15 dB	with query	6.200
CONFigure:NETWork:APRobes:MODE[?]	ACKN IGN DEF	with query	6.200
CONFigure:NETWork:APRobes:OLADjust[?]	-100 dB to 66 dB	with query	6.201
CONFigure:NETWork:APRobes:PINCrement[?]	0.0 dB to 7.5 dB	with query	6.201
CONFigure:NETWork:APRobes:PLENght:SLOTs[?]	4 16	with query	6.202
CONFigure:NETWork:APRobes:PLENght[?]	1 to 15	with query	6.202
CONFigure:NETWork:APRobes:PPSQuence[?]	1 to 15	with query	6.201
CONFigure:NETWork:APRobes:PSTRenght:CMAX?	+0.0 dB to +5.0 dB	query only	6.204
CONFigure:NETWork:APRobes:PSTRenght:CMIN?	-5.0 dB to +0.0 dB	query only	6.204
CONFigure:NETWork:APRobes:PSTRenght:NOMinal?	-4.0 dB to +3.0 dB	query only	6.203

Commands for Signaling	Parameters	Remark	Page
CONFigure:NETWork:APRobes:SACcEss:RAte:MAX[?]	R9K R19K R38K	with query	6.203
CONFigure:NETWork:RELease[?]	0 A DEF	with query	6.199
CONFigure:NETWork:STANdard[?]	USC KCEL NAPC TACS JTAC KPCS N45T IM2K NA7C B18M NA9C NA8S PA4M PA8M IEXT USPC AWS	with query	6.199
CONFigure:NETWork:SYSTem:SID[?]	0 to 32767	with query	6.200
DEFault:NETWork[?]	ON OFF	with query	6.198
Narrow Band Power			
INITiate:NPOWer	RUN	no query	6.56
ABORt:NPOWer	OFF	no query	6.56
STOP:NPOWer	STOP	no query	6.56
CONTinue:NPOWer	RUN	no query	6.56
CONFigure:NPOWer:CONTRol:REPetition[?]	<Repetition>, <Stop Condition>, <Step Mode>	with query	6.59
CONFigure:NPOWer:CONTRol:STATistics[?]	1 to 1000	with query	6.58
CONFigure:NPOWer:CONTRol[?]	<Statistics>, <Repetition>, <Stop Condition>, <Step Mode>	with query	6.58
CONFigure:NPOWer:EREPorting[?]	SRQ SOPC SRSQ OFF DEF	with query	6.56
FETCh[:SCALar]:NPOWer:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.57
READ[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
FETCh[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
SAMPle[:SCALar]:NPOWer?	-137 dBm to +53 dBm	query only	6.60
Ping Measurements			
INITiate:PING	-	no query	6.153
ABORt:PING	-	no query	6.153
STOP:PING	-	no query	6.153
CONTinue:PING	-	no query	6.153
CONFigure:PING:CONTRol:ATIP[?]	ON OFF	with query	6.155
CONFigure:PING:CONTRol:IPAdDress	<Addr_1>, <Addr_2>, <Addr_3>, <Addr_4>	with query	6.155
CONFigure:PING:CONTRol:PCOunt[?]	1 to 255	with query	6.154
CONFigure:PING:CONTRol:PSIZe[?]	1 byte to 1520 bytes	with query	6.155
CONFigure:PING:CONTRol:REPetition[?]	<Repetition>,<StopCond>, <Stepmode>	with query	6.154
CONFigure:PING:CONTRol:RINTerval[?]	1 s to 100 s	with query	6.155
CONFigure:PING:CONTRol:TOUT[?]	0.001 s to 10 s	with query	6.155
DEFault:PING:CONTRol[?]	ON OFF	with query	6.154
CONFigure:PING:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.153

Commands for Signaling	Parameters	Remark	Page
FETCh[:SCALar]:PING:STATus	OFF RUN STOP ERR STEP RDY, 1 to 10000 NONE, 1 to 1000 NONE	with query	6.153
READ[:SCALar]:PING?	<IP address>, <packet size>, <reply time>	query only	6.157
FETCh[:SCALar]:PING?	<IP address>, <packet size>, <reply time>	query only	6.157
SAMPlE[:SCALar]:PING?	<IP address>, <packet size>, <reply time>	query only	6.157
RF Analyzer			
DEFault:RFANalyzer[?]	ON OFF	with query	6.204
[SENSe]:RFANalyzer:CCFilter:ACK[?]	ON OFF DCARe	with query	6.206
[SENSe]:RFANalyzer:CCFilter:ADSC[?]	OFF ACK DSC DCARe	with query	6.206
[SENSe]:RFANalyzer:CCFilter:APILot[?]	ON OFF DCARe	with query	6.206
[SENSe]:RFANalyzer:CCFilter:DATA[?]	ON OFF DCARe	with query	6.206
[SENSe]:RFANalyzer:CCFilter:DRC[?]	ON OFF DCARe	with query	6.206
[SENSe]:RFANalyzer:CCFilter:HSLot[?]	BOTH 1 2	with query	6.207
[SENSe]:RFANalyzer:DCHannel:MTYPE:MODE[?]	AUTO B4 Q4 Q2 Q4Q2 E4E2	with query	6.208
[SENSe]:RFANalyzer:DCHannel:MTYPE?	B4 Q4 Q2 Q4Q2 E4E2	query only	6.208
[SENSe]:RFANalyzer:Selectivity[?]	WIDE IFL DEF	with query	6.214
[SENSe]:RFANalyzer:Subtype[?]	0 ... 2	with query	6.205
RLP Statistics			
[SENSe:][:SCALar]:RLPStatistic?	<return values>	query only	6.156
Receiver Quality			
INITiate:RXQuality:CCPer	RUN	no query	6.135
ABORt:RXQuality:CCPer	OFF	no query	6.135
STOP:RXQuality:CCPer	STOP	no query	6.135
CONFigure:RXQuality:CCPer:CONTRol:MCCCYcles[?]	1 to 1000	with query	6.136
CONFigure:RXQuality:CCPer:CONTRol:REPetition[?]	<Repetition>, <Stop Condition>	with query	6.136
CONFigure:RXQuality:CCPer:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.135
CONFigure:RXQuality:CCPer:LIMit:CLEVel[?]	0 to 100%	with query	6.137
CONFigure:RXQuality:CCPer:LIMit:MPER[?]	0 to 100%	with query	6.136
CALCulate:RXQuality:CCPer:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.137
FETCh[:SCALar]:RXQuality:CCPer:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.135
READ[:SCALar]:RXQuality:CCPer?	-30.0 dBm to +30.0 dBm	query only	6.137
FETCh[:SCALar]:RXQuality:CCPer?	-30.0 dBm to +30.0 dBm	query only	6.137
SAMPlE[:SCALar]:RXQuality:CCPer?	-30.0 dBm to +30.0 dBm	query only	6.137
DEFault:RXQuality:CONTRol[?]	ON OFF	with query	6.133
INITiate:RXQuality:FLPer	RUN	no query	6.138
ABORt:RXQuality:FLPer	OFF	no query	6.138
STOP:RXQuality:FLPer	STOP	no query	6.138

Commands for Signaling	Parameters	Remark	Page
CONFigure:RXQuality:FLPer:CONTrol:MTPSent[?]	1 to 100000	with query	6.139
CONFigure:RXQuality:FLPer:CONTrol:REPetition[?]	<Repetition>, <Stop Condition>	with query	6.139
CONFigure:RXQuality:FLPer:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.138
CONFigure:RXQuality:FLPer:LIMit:CLEVel[?]	0 to 100%	with query	6.140
CONFigure:RXQuality:FLPer:LIMit:MPER[?]	0 to 100%	with query	6.139
CALCulate:RXQuality:FLPer:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.140
FETCh[:SCALar]:RXQuality:FLPer:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.138
SAMPlE[:SCALar]:RXQuality:FLPer?	–	query only	6.140
READ[:SCALar]:RXQuality:FLPer?	–	query only	6.140
FETCh[:SCALar]:RXQuality:FLPer?	–	query only	6.140
INITiate:RXQuality:FLPFOrmance	RUN	no query	6.144
ABORt:RXQuality:FLPFOrmance	OFF	no query	6.144
STOP:RXQuality:FLPFOrmance	STOP	no query	6.144
CONFigure:RXQuality:FLPFOrmance:CONTrol:MFRames[?]	1 to 10000	with query	6.145
CONFigure:RXQuality:FLPFOrmance:CONTrol:REPetition[?]	<Repetition>	with query	6.145
CONFigure:RXQuality:FLPFOrmance:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.144
FETCh[:SCALar]:RXQuality:FLPFOrmance:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.144
READ[:SCALar]:RXQuality:FLPFOrmance?	<MAC Packets Received>, <Physical Pkt. Slots>, <Throughput vs. TestTime>, <Throughput vs.transmitted slots>, <Test Time>	query only	6.145
FETCh[:SCALar]:RXQuality:FLPFOrmance?	<MAC Packets Received>, <Physical Pkt. Slots>, <Throughput vs. TestTime>, <Throughput vs.transmitted slots>, <Test Time>	query only	6.145
SAMPlE[:SCALar]:RXQuality:FLPFOrmance?	<MAC Packets Received>, <Physical Pkt. Slots>, <Throughput vs. TestTime>, <Throughput vs.transmitted slots>, <Test Time>	query only	6.145
DEFault:RXQuality:LIMit[?]	ON OFF	with query	6.134
INITiate:RXQuality:RLPer	RUN	no query	6.148
ABORt:RXQuality:RLPer	OFF	no query	6.148
STOP:RXQuality:RLPer	STOP	no query	6.148
CONFigure:RXQuality:RLPer:CONTrol:MPReiceived[?]	1 to 1000	with query	6.149
CONFigure:RXQuality:RLPer:CONTrol:REPetition[?]	<Repetition>, <Stop Condition>	with query	6.149
CALCulate:RXQuality:RLPer:DPLProtocol:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.151

Commands for Signaling	Parameters	Remark	Page
READ[:SCALar]:RXQuality:RLPer:DPLProtocol?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.150
FETCh[:SCALar]:RXQuality:RLPer:DPLProtocol?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.150
SAMPlE[:SCALar]:RXQuality:RLPer:DPLProtocol?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.150
CONFigure:RXQuality:RLPer:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.148
CONFigure:RXQuality:RLPer:LIMit:CLEVel[?]	0 to 100%	with query	6.150
CONFigure:RXQuality:RLPer:LIMit:MPER[?]	0 to 100%	with query	6.149
CALCulate:RXQuality:RLPer:S2PL:MATChing:LIMit?	NMAU NMAL INV OK	query only	6.152
READ[:SCALar]:RXQuality:RLPer:S2PL?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.151
FETCh[:SCALar]:RXQuality:RLPer:S2PL?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.151
SAMPlE[:SCALar]:RXQuality:RLPer:S2PL?	<MAC Pkts Transmitted>, <Rev. Link PER MAC Pkts Received>, <Rev Link PER Conf. Level>, <Rev. Link PER>, <Term. Target PER Target MAC Pkts Rec.>, <Term. Target PER Conf. Level>, <Term. Target PER>	query only	6.151
FETCh[:SCALar]:RXQuality:RLPer:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.148
INITiate:RXQuality:RLPFormance	RUN	no query	6.145

Commands for Signaling	Parameters	Remark	Page
ABORt:RXQuality:RLPFormance	OFF	no query	6.145
STOP:RXQuality:RLPFormance	STOP	no query	6.145
CONFigure:RXQuality:RLPFormance:CONTRol:MFRames[?]	1 to 10000	with query	6.147
CONFigure:RXQuality:RLPFormance:CONTRol:REPetition[?]	<Repetition>	with query	6.146
READ[:SCALar]:RXQuality:RLPFormance:DPLProtocol?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
FETCh[:SCALar]:RXQuality:RLPFormance:DPLProtocol?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
SAMPlE[:SCALar]:RXQuality:RLPFormance:DPLProtocol?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
CONFigure:RXQuality:RLPFormance:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.146
READ[:SCALar]:RXQuality:RLPFormance:S2PL?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
FETCh[:SCALar]:RXQuality:RLPFormance:S2PL?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
SAMPlE[:SCALar]:RXQuality:RLPFormance:S2PL?	<MAC Packets Received>, <Throughput vs. TestTime>, <Test Time>	query only	6.147
FETCh[:SCALar]:RXQuality:RLPFormance:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.146
INITiate:RXQuality:RLQuality	RUN	no query	6.141
ABORt:RXQuality:RLQuality	OFF	no query	6.141
STOP:RXQuality:RLQuality	STOP	no query	6.141
CONFigure:RXQuality:RLQuality:CONTRol:MLPSent[?]	1 to 100000	with query	6.142
CONFigure:RXQuality:RLQuality:CONTRol:REPetition[?]	<Repetition>, <Stop Condition>	with query	6.142
CONFigure:RXQuality:RLQuality:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.141
CONFigure:RXQuality:RLQuality:LIMit:CLEVel[?]	0 to 100%	with query	6.143
CONFigure:RXQuality:RLQuality:LIMit:MPER[?]	0 to 100%	with query	6.142
CALCulate:RXQuality:RLQuality:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.143
FETCh[:SCALar]:RXQuality:RLQuality:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.141
SAMPlE[:SCALar]:RXQuality:RLQuality?	–	query only	6.143
READ[:SCALar]:RXQuality:RLQuality?	–	query only	6.143
FETCh[:SCALar]:RXQuality:RLQuality?	–	query only	6.143
[SENSe:][SCALar:]:RXQuality:SOVerview?	–	query only	6.134
Standby Power / Access Probe Power			
INITiate:SAPPower	RUN	no query	6.60
ABORt:SAPPower	OFF	no query	6.60
STOP:SAPPower	STOP	no query	6.60
CONTinue:SAPPower	RUN	no query	6.60

Commands for Signaling	Parameters	Remark	Page
CONFigure:SAPPower:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.60
FETCh[:SCALar]:SAPPower:STATus?	OFF RUN STOP ERR STEP RDY	query only	6.61
READ[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
FETCh[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
SAMPlE[:SCALar]:SAPPower?	<Standby Power>, <Access Probe Power>	query only	6.61
Signaling State Control			
PROcEDURE:SIGNalling:ACTion	SOFF SON CSEssion RNEgotiate CTMobile CREL HANDoff	no query	6.158
[SENSe]:SIGNalling:STATe:PPP?	OFF DORM CONN	query only	6.159
[SENSe]:SIGNalling:STATe?	SOFF SON NEG SOP CEST CPEN FPEN	query only	6.159
ACP Spectrum			
INITiate:SPECTrum:ACP	RUN	no query	6.92
ABORt:SPECTrum:ACP	OFF	no query	6.92
STOP:SPECTrum:ACP	STOP	no query	6.92
CONTinue:SPECTrum:ACP	RUN	no query	6.92
CONFigure:SPECTrum:ACP:CONTRol:FOFFset:ACP<nr>[?]	0 to 2 MHz OFF ON	with query	6.95
CONFigure:SPECTrum:ACP:CONTRol:REPetition[?]	<Repetition>, <Stop Cond>, <Step Mode>	with query	6.94
CONFigure:SPECTrum:ACP:CONTRol:STATistics[?]	1 to 1000	with query	6.93
CONFigure:SPECTrum:ACP:CONTRol[?]	<StatisticCount>, <Repetition>, <Stop Cond>, <Step Mode>	with query	6.93
DEFault:SPECTrum:ACP:CONTRol[?]	ON OFF	with query	6.94
CONFigure:SPECTrum:ACP:EREPorting[?]	SRQ SOPC SRSQ DEF OFF	with query	6.92
CONFigure:SPECTrum:ACP:LIMit:ACP1[?]	-80.0 to +10.0 ON OFF MIN MAX DEF	with query	6.97
XTND:SPECTrum:ACP:LIMit[?]	ON OFF DEF	with query	6.59
DEFault:SPECTrum:ACP:LIMit[?]	ON OFF	with query	6.97
CALCulate[:SCALar]:SPECTrum:ACP:MATCHing:LIMit?	NMAU NMAL INV OK	query only	6.99
XTND:SPECTrum:ACP:STATistics[?]	ON OFF DEF	with query	6.97
FETCh[:SCALar]:SPECTrum:ACP:STATus?	<MeasurementStatus>, <Curr.Step.CycleCount>, <ElapsedStatistics>	query only	6.92
READ[:SCALar]:SPECTrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
FETCh[:SCALar]:SPECTrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
SAMPlE[:SCALar]:SPECTrum:ACP?	-80.0 dB to 0.0 dB	query only	6.98
Trigger			
TRIGger:OUTPut:PIN<nr>:SIGNal[?]	NONE PP2S SFR PFR SNCF ETR DEF	with query	6.213
TRIGger[:SEQuence]:SLOPe[?]	NEG POS DEF	with query	6.213

Commands for Signaling	Parameters	Remark	Page
TRIGger[:SEquence]:SOURce[?]	INT EXT FRUN RFP IFP DEF	with query	6.213
TRIGger[:SEquence]:THReshold:IFPower[?]	-47.0 dB to 0 dB	with query	6.212
TRIGger[:SEquence]:THReshold:RFPower[?]	LOW MED HIGH	with query	6.212
DEFault:TRIGger[:SEquence][?]	ON OFF	with query	6.211
Update Period			
CONFigure:UPERiod[?]	0.2 s to 2.0 s	with query	6.133
CONFigure:UPERiod[?]	0.2 s to 2.0 s	with query	6.152
Wide Band Power			
INITiate:WPOWer	RUN	no query	6.215
ABORt:WPOWer	OFF	no query	6.215
STOP:WPOWer	STOP	no query	6.215
CONTinue:WPOWer	RUN	no query	6.215
CONFigure:WPOWer:CONTRol:REPetition[?]	<Repetition>, <StopCond>, <Stepmode>	with query	6.216
CONFigure:WPOWer:EREPorting[?]	SRQ SOPC SRSQ OFF	with query	6.215
FETCh:WPOWer:STATus?	returns <Measurement Status> and <Curr. Step Cycle Count>	query only	6.216
READ[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.217
FETCh[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.217
SAMPle[:SCALar]:WPOWer?	-30.0 dBm to +30.0 dBm	query only	6.217

Table 6-3 Remote-control commands, alphabetical list (both Signaling and Non-Signaling)

Command (both Signaling and Non-Signaling)	Page
ABORt:CDPower:CDPW	6.100
ABORt:CDPower:CHPW	6.120
ABORt:CDPower:PCDep	6.111
ABORt:IQAcess	6.35
ABORt:MODulation:EVMagnitude:HPSK	6.69
ABORt:MODulation:IQANalyzer:HPSK	6.88
ABORt:MODulation:MERRor:HPSK	6.76
ABORt:MODulation:MQUality:HPSK	6.47
ABORt:MODulation:OVERview:HPSK	6.61
ABORt:MODulation:PERRor:HPSK	6.82
ABORt:NPOWer	6.56
ABORt:PING	6.153
ABORt:RFGenerator	6.15
ABORt:RFGenerator:AT<nr>:MAC:INDEX	6.22
ABORt:RFGenerator:AT<nr>:PSTReam	6.24
ABORt:RFGenerator:MAC:INDEX	6.22
ABORt:RFGenerator:PSTReam	6.24
ABORt:RFGenerator:SNCMessage	6.20
ABORt:RXQuality:CCPer	6.135
ABORt:RXQuality:FLPer	6.138
ABORt:RXQuality:FLPFormance	6.144

Command (both Signaling and Non-Signaling)	Page
ABORT:RXQuality:RLPer	6.148
ABORT:RXQuality:RLPFormance	6.145
ABORT:RXQuality:RLQuality	6.141
ABORT:SAPPower	6.60
ABORT:SPECTrum:ACP	6.92
ABORT:WPOWer	6.38
ABORT:WPOWer	6.215
CALCulate:ARRay:CDPower:CDPW:AVERAge[:RESult]:MATChing:LIMit?	6.110
CALCulate:ARRay:CDPower:CDPW:CURRent[:RESult]:MATChing:LIMit?	6.109
CALCulate:ARRay:CDPower:CDPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.110
CALCulate:ARRay:CDPower:CDPW:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.109
CALCulate:ARRay:CDPower:CDPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.110
CALCulate:ARRay:CDPower:CDPW:MAXimum[:RESult]:MATChing:LIMit?	6.110
CALCulate:ARRay:CDPower:CDPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.110
CALCulate:ARRay:CDPower:CDPW:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.109
CALCulate:ARRay:CDPower:CDPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.110
CALCulate:ARRay:CDPower:CHPW:AVERAge[:RESult]:MATChing:LIMit?	6.131
CALCulate:ARRay:CDPower:CHPW:CURRent[:RESult]:MATChing:LIMit?	6.130
CALCulate:ARRay:CDPower:CHPW:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.131
CALCulate:ARRay:CDPower:CHPW:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.130
CALCulate:ARRay:CDPower:CHPW:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.132
CALCulate:ARRay:CDPower:CHPW:MAXimum[:RESult]:MATChing:LIMit?	6.132
CALCulate:ARRay:CDPower:CHPW:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.131
CALCulate:ARRay:CDPower:CHPW:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.130
CALCulate:ARRay:CDPower:CHPW:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.132
CALCulate:ARRay:CDPower:PCDep:AVERAge[:RESult]:MATChing:LIMit?	6.120
CALCulate:ARRay:CDPower:PCDep:CURRent[:RESult]:MATChing:LIMit?	6.119
CALCulate:ARRay:CDPower:PCDep:ISIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.120
CALCulate:ARRay:CDPower:PCDep:ISIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.119
CALCulate:ARRay:CDPower:PCDep:ISIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.120
CALCulate:ARRay:CDPower:PCDep:MAXimum[:RESult]:MATChing:LIMit?	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:AVERAge[:RESult]:MATChing:LIMit? ^(*)	6.120
CALCulate:ARRay:CDPower:PCDep:QSIGnal:CURRent[:RESult]:MATChing:LIMit? ^(*)	6.119
CALCulate:ARRay:CDPower:PCDep:QSIGnal:MAXimum[:RESult]:MATChing:LIMit? ^(*)	6.120
CALCulate:RXQuality:CCPer:MATChing:LIMit?	6.137
CALCulate:RXQuality:FLPer:MATChing:LIMit?	6.140
CALCulate:RXQuality:RLPer:DPLProtocol:MATChing:LIMit?	6.151
CALCulate:RXQuality:RLPer:S2PL:MATChing:LIMit?	6.152
CALCulate:RXQuality:RLQuality:MATChing:LIMit?	6.143
CALCulate[:SCALar]:CDPower:CDPW:MATChing:LIMit?	6.106
CALCulate[:SCALar]:CDPower:CHPW:MATChing:LIMit?	6.125
CALCulate[:SCALar]:CDPower:PCDep:MATChing:LIMit?	6.115
CALCulate[:SCALar]:MODulation:EVMagnitude:HPSK:MATChing:LIMit?	6.74
CALCulate[:SCALar]:MODulation:MERRor:HPSK:MATChing:LIMit?	6.80
CALCulate[:SCALar]:MODulation:MQQuality:HPSK:MATChing:LIMit?	6.55
CALCulate[:SCALar]:MODulation:OVERview:HPSK:MATChing:LIMit?	6.69
CALCulate[:SCALar]:MODulation:PERRor:HPSK:MATChing:LIMit?	6.86
CALCulate[:SCALar]:SPECTrum:ACP:MATChing:LIMit?	6.99
CONFigure:ANSignal:CHANnel[:RF][?]	6.193
CONFigure:ANSignal:FPACTivity[?]	6.198

Command (both Signaling and Non-Signaling)	Page
CONFigure:ANSignal:MAC:INDEX:REVA[?]	6.195
CONFigure:ANSignal:MAC:INDEX:REV0[?]	6.195
CONFigure:ANSignal:PCBits:SSize[?]	6.195
CONFigure:ANSignal:PCBits[?]	6.194
CONFigure:ANSignal:POWer:EVDO[?]	6.193
CONFigure:ANSignal:POWer:OUTPut?	6.193
Configure:ANSignal:PROPerTy:PNOFfset?	6.198
Configure:ANSignal:PROPerTy:PNOFfset[?]	6.197
CONFigure:ANSignal:SECTor:CLRCode[?]	6.195
CONFigure:ANSignal:SECTor:CNTCode[?]	6.197
Configure:ANSignal:SECTor:ID:FORMat[?]	6.196
CONFigure:ANSignal:SECTor:ID:LBITs[?]	6.196
CONFigure:ANSignal:SECTor:NPBits[?]	6.196
CONFigure:ANSignal:SECTor:SMASK[?]	6.197
CONFigure:CDPower:CDPW:AVERAge:LIMit:ASYMmetric:COMBined][?]	6.105
CONFigure:CDPower:CDPW:CMAX:LIMit:ASYMmetric:COMBined][?]	6.105
CONFigure:CDPower:CDPW:CONTRol:REPetition[?]	6.102
CONFigure:CDPower:CDPW:CONTRol:RMODE[?]	6.101
CONFigure:CDPower:CDPW:CONTRol:RORDER[?]	6.102
CONFigure:CDPower:CDPW:CONTRol:STATistics[?]	6.102
CONFigure:CDPower:CDPW:CONTRol[?]	6.101
CONFigure:CDPower:CDPW:EREPorting[?]	6.100
CONFigure:CDPower:CDPW:LIMit:IQLCheck[?]	6.105
CONFigure:CDPower:CHPW:AVERAge:LIMit:ASYMmetric:COMBined][?]	6.124
CONFigure:CDPower:CHPW:CMAX:LIMit:ASYMmetric:COMBined][?]	6.124
CONFigure:CDPower:CHPW:CONTRol:PRMode[?]	6.123
CONFigure:CDPower:CHPW:CONTRol:REPetition[?]	6.123
CONFigure:CDPower:CHPW:CONTRol:RMODE[?]	6.122
CONFigure:CDPower:CHPW:CONTRol:STATistics[?]	6.122
CONFigure:CDPower:CHPW:CONTRol[?]	6.122
CONFigure:CDPower:CHPW:EREPorting[?]	6.121
CONFigure:CDPower:CPCCCommon:AVERAge:LIMit:ASYMmetric:COMBined][?]	6.104
CONFigure:CDPower:CPCCCommon:CMAX:LIMit:ASYMmetric:COMBined][?]	6.103
CONFigure:CDPower:PCDep:AVERAge:LIMit:ASYMmetric:COMBined][?]	6.114
CONFigure:CDPower:PCDep:CMAX:LIMit:ASYMmetric:COMBined][?]	6.114
CONFigure:CDPower:PCDep:CONTRol:REPetition[?]	6.113
CONFigure:CDPower:PCDep:CONTRol:RMODE[?]	6.112
CONFigure:CDPower:PCDep:CONTRol:RORDER[?]	6.113
CONFigure:CDPower:PCDep:CONTRol:STATistics[?]	6.113
CONFigure:CDPower:PCDep:CONTRol[?]	6.112
CONFigure:CDPower:PCDep:EREPorting[?]	6.111
CONFigure:ESYNc:ALIGNment[?]	6.210
CONFigure:ESYNc:MODE[?]	6.209
CONFigure:ESYNc:SYSTem:TIME[?]	6.210
CONFigure:ESYNc:TOUT[?]	6.209
CONFigure:FREQuency:COUPLing:RXTX[?]	6.46
CONFigure:IMPairments:LEVel:AWGN:MODE[?]	6.194
CONFigure:IMPairments:LEVel:AWGN[?]	6.194
CONFigure:IQACcess:GMULTiplier[?]	6.36
CONFigure:IQACcess:RXSWap[?]	6.36

Command (both Signaling and Non-Signaling)	Page
CONFigure:IQACcess:TCONtrol[?]	6.36
CONFigure:IQIF:RXPath[?]	6.4
CONFigure:IQIF:RXTXcombined[?]	6.4
CONFigure:IQIF:TXPath[?]	6.4
CONFigure:LAYer:APPLication:DPACket:AUTHentic:PWORd[?]	6.179
CONFigure:LAYer:APPLication:DPACket:AUTHentic:TYPe[?]	6.178
CONFigure:LAYer:APPLication:DPACket:AUTHentic:UNAMe[?]	6.179
CONFigure:LAYer:APPLication:DPACket:DNS:DYNamic:IPADdress?	6.178
CONFigure:LAYer:APPLication:DPACket:DNS[:STATic]:IPADdress[?]	6.177
CONFigure:LAYer:APPLication:DPACket:ENABle[?]	6.172
CONFigure:LAYer:APPLication:DPACket:FORWard:DYNamic:IPADdress?	6.178
CONFigure:LAYer:APPLication:DPACket:FORWard[:STATic]:IPADdress[?]	6.177
CONFigure:LAYer:APPLication:DPACket:IAControl:NIATimer[?]	6.179
CONFigure:LAYer:APPLication:DPACket:MIP:AADV[?]	6.175
CONFigure:LAYer:APPLication:DPACket:MIP:AUTHentic:TYPe[?]	6.177
CONFigure:LAYer:APPLication:DPACket:MIP:COADdress?	6.175
CONFigure:LAYer:APPLication:DPACket:MIP:FAIP[?]	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:HAIP[?]	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:HASecret[?]	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:MHIP[?]	6.174
CONFigure:LAYer:APPLication:DPACket:MIP:RRCode[?]	6.176
CONFigure:LAYer:APPLication:DPACket:MIP:RRLTime[?]	6.176
CONFigure:LAYer:APPLication:DPACket:MIP:SAMode[?]	6.173
CONFigure:LAYer:APPLication:DPACket:REVerse:DYNamic:IPADdress?	6.178
CONFigure:LAYer:APPLication:DPACket:REVerse[:STATic]:IPADdress[?]	6.177
CONFigure:LAYer:APPLication:DPACket:STReam[?]	6.173
CONFigure:LAYer:APPLication:DSIGNaling:ENABle?	6.162
CONFigure:LAYer:APPLication:DSIGNaling:STReam?	6.162
CONFigure:LAYer:APPLication:DSIGNaling:Support?	6.163
CONFigure:LAYer:APPLication:DTEST:FTAP:ACK:FMODE[?]	6.166
CONFigure:LAYer:APPLication:DTEST:FTAP:DRC:DRATe?	6.165
CONFigure:LAYer:APPLication:DTEST:FTAP:DRC:DRINdex[?]	6.165
CONFigure:LAYer:APPLication:DTEST:FTAP:DRC:SCOunt?	6.166
CONFigure:LAYer:APPLication:DTEST:FTAP:LBACK:ENABle?	6.166
CONFigure:LAYer:APPLication:DTEST:RTAP:DATa:RMAX:INDex[?]	6.167
CONFigure:LAYer:APPLication:DTEST:RTAP:DATA:RMAX:VALue?	6.168
CONFigure:LAYer:APPLication:DTEST:RTAP:DATa:RMIN:INDex[?]	6.167
CONFigure:LAYer:APPLication:DTEST:RTAP:DATA:RMIN:VALue?	6.168
CONFigure:LAYer:APPLication:ETEST:FETap:ACK:FMODE[?]	6.170
CONFigure:LAYer:APPLication:ETEST:FETap:ACK:MTYPE[?]	6.171
CONFigure:LAYer:APPLication:ETEST:FETap:DRC:DRATe?	6.170
CONFigure:LAYer:APPLication:ETEST:FETap:DRC:DRINdex[?]	6.169
CONFigure:LAYer:APPLication:ETEST:FETap:DRC:SCOunt?	6.170
CONFigure:LAYer:APPLication:ETEST:FETap:LBACK:ENABle?	6.170
CONFigure:LAYer:APPLication:ETEST:RETAP:ACHannel:RMODE[?]	6.172
CONFigure:LAYer:APPLication:ETEST:RETAP:DATa:RMAX:INDex[?]	6.172
CONFigure:LAYer:APPLication:ETEST:RETAP:DATa:RMIN:INDex[?]	6.171
CONFigure:LAYer:APPLication:TEST:ENABle[?]	6.163
CONFigure:LAYer:APPLication:TEST:SElect[?]	6.163
CONFigure:LAYer:APPLication:TEST:STReam[?]	6.164

Command (both Signaling and Non-Signaling)	Page
CONFigure:LAYer:APPLication:TESt:Support?	6.164
CONFigure:LAYer:CONNection:OMPRotocol:REDirect[?]	6.181
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX:INDex?	6.182
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:AMAX?	6.182
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:CINCluded?	6.182
CONFigure:LAYer:CONNection:OMPRotocol:RUTRigger:CINCluded?	6.182
CONFigure:LAYer:CONNection:RUPRotocol:PDTHreshold?	6.181
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPBackoff[?]	6.184
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:IPSBbackoff[?]	6.184
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:PSEquence:MAXimum	6.184
CONFigure:LAYer:MAC:ACMProtocol:DACProtocol:SSEed?	6.183
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPBackoff[?]	6.185
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:IPSBbackoff[?]	6.185
CONFigure:LAYer:MAC:ACMProtocol:EACProtocol:PSEquence:MAXimum[?]	6.184
CONFigure:LAYer:MAC:ACMProtocol:STYPe?	6.183
CONFigure:LAYer:MAC:CCMProtocol:DCCProtocol:DRATe[?]	6.183
CONFigure:LAYer:MAC:CCMProtocol:STYPe[?]	6.183
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:ACK:CGAin[?]	6.186
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:CGAin[?]	6.186
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:COVer[?]	6.185
CONFigure:LAYer:MAC:FTCProtocol:DFTProtocol:DRC:LENGth[?]	6.186
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:ACK:CGAin[?]	6.188
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:CGAin[?]	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:COVer[?]	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DRC:LENGth[?]	6.187
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:CGAin[?]	6.188
CONFigure:LAYer:MAC:FTCProtocol:EFTProtocol:DSC:VALue[?]	6.188
CONFigure:LAYer:MAC:FTCProtocol:STYPe?	6.185
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:NOFFset?	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R15K[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R19K[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R38K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R76K[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:R9K[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DATA:RRLimit[?]	6.189
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R15K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R38K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R76K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:DTRansition:R9K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R19K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R76K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:ITRansition:R9K[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:DRCProtocol:RPControl:SSIZe[?]	6.190
CONFigure:LAYer:MAC:RTCProtocol:S3RT:...?	6.191
CONFigure:LAYer:MAC:RTCProtocol:S3RT:RRICgain:TPRE<nr>[?]	6.191
CONFigure:LAYer:MAC:RTCProtocol:STYPe?	6.188
CONFigure:LAYer:PHYSical:PLPRotocol:STYPe[?] ^(*)	6.192
CONFigure:LAYer:SESSion:AMPRotocol:SNINCluded[?]	6.180
CONFigure:LAYer:SESSion:SCPRotocol:GSUPport?	6.180

Command (both Signaling and Non-Signaling)	Page
CONFigure:LAYer:SESSion:SMPProtocol:ISTimeOut[?]	6.180
CONFigure:LAYer:Stream:SPRrotocol:STYPe?	6.180
CONFigure:LAYer:UPDate:MODE[?]	6.162
CONFigure:LSMode[?]	6.215
CONFigure:MENU:CCTRI:ACLOSE[?]	6.214
CONFigure:MENU:CCTRI:AOPEN[?]	6.214
CONFigure:MODulation:EVMAgnitude:HPSK:CONTRol:REPetition[?]	6.72
CONFigure:MODulation:EVMAgnitude:HPSK:CONTRol:RMODE[?]	6.71
CONFigure:MODulation:EVMAgnitude:HPSK:CONTRol:STATistics[?]	6.71
CONFigure:MODulation:EVMAgnitude:HPSK:CONTRol[?]	6.71
CONFigure:MODulation:EVMAgnitude:HPSK:EREPorting[?]	6.70
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:REPetition[?]	6.89
CONFigure:MODulation:IQANalyzer:HPSK:CONTRol:RMODE[?]	6.89
CONFigure:MODulation:IQANalyzer:HPSK:DESPread[?]	6.90
CONFigure:MODulation:IQANalyzer:HPSK:EREPorting[?]	6.88
CONFigure:MODulation:MERRor:HPSK:CONTRol:REPetition[?]	6.78
CONFigure:MODulation:MERRor:HPSK:CONTRol:RMODE[?]	6.77
CONFigure:MODulation:MERRor:HPSK:CONTRol:STATistics[?]	6.78
CONFigure:MODulation:MERRor:HPSK:CONTRol[?]	6.77
CONFigure:MODulation:MERRor:HPSK:EREPorting[?]	6.76
CONFigure:MODulation:MQUality:HPSK:AVERage:LIMit[?]	6.52
CONFigure:MODulation:MQUality:HPSK:CMMax:LIMit[?]	6.51
CONFigure:MODulation:MQUality:HPSK:CONTRol:FOFFset:SBSuppress:ACP<nr>[?]	6.53
CONFigure:MODulation:MQUality:HPSK:CONTRol:REPetition[?]	6.50
CONFigure:MODulation:MQUality:HPSK:CONTRol:STATistics[?]	6.49
CONFigure:MODulation:MQUality:HPSK:CONTRol[?]	6.49
CONFigure:MODulation:MQUality:HPSK:EREPorting[?]	6.47
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]	6.67
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABLE[?]	6.67
CONFigure:MODulation:OEMP:HPSK:AVERage:LIMit[:SCALar]:SYMMetric[:COMBined][?]	6.66
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:ENABLE[?]	6.67
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined]:VALue[?]	6.66
CONFigure:MODulation:OEMP:HPSK:CMMax:LIMit[:SCALar]:SYMMetric[:COMBined][?]	6.65
CONFigure:MODulation:OVERview:HPSK:CONTRol:REPetition[?]	6.64
CONFigure:MODulation:OVERview:HPSK:CONTRol:STATistics[?]	6.64
CONFigure:MODulation:OVERview:HPSK:CONTRol[?]	6.63
CONFigure:MODulation:OVERview:HPSK:EREPorting[?]	6.62
CONFigure:MODulation:PERRor:HPSK:CONTRol:REPetition[?]	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:RMODE[?]	6.84
CONFigure:MODulation:PERRor:HPSK:CONTRol:STATistics[?]	6.83
CONFigure:MODulation:PERRor:HPSK:CONTRol[?]	6.83
CONFigure:MODulation:PERRor:HPSK:EREPorting[?]	6.82
CONFigure:NETWork:APRobes:ACCess:OFFSet?	6.203
CONFigure:NETWork:APRobes:ACDuration[?]	6.202
CONFigure:NETWork:APRobes:ADJust?	6.203
CONFigure:NETWork:APRobes:IADjust[?]	6.200
CONFigure:NETWork:APRobes:MODE[?]	6.200
CONFigure:NETWork:APRobes:OLADjust[?]	6.201
CONFigure:NETWork:APRobes:PINCrement[?]	6.201
CONFigure:NETWork:APRobes:PLENght:SLOTs[?]	6.202

Command (both Signaling and Non-Signaling)	Page
CONFigure:NETWork:APRobes:PLENght[?]	6.202
CONFigure:NETWork:APRobes:PPSQuence[?]	6.201
CONFigure:NETWork:APRobes:PSTRength:CMAX?	6.204
CONFigure:NETWork:APRobes:PSTRength:CMIN?	6.204
CONFigure:NETWork:APRobes:PSTRength:NOMinal?	6.203
CONFigure:NETWork:APRobes:SACCess:RATE:MAX[?]	6.203
CONFigure:NETWork:RELease[?]	6.199
CONFigure:NETWork:STANdard[?]	6.7
CONFigure:NETWork:STANdard[?]	6.199
CONFigure:NETWork:SYSTem:SID[?]	6.200
CONFigure:NPOWer:CONTRol:REPetition[?]	6.59
CONFigure:NPOWer:CONTRol:STATistics[?]	6.58
CONFigure:NPOWer:CONTRol[?]	6.58
CONFigure:NPOWer:EREPorting[?]	6.56
CONFigure:PING:CONTRol:ATIP[?]	6.155
CONFigure:PING:CONTRol:IPADdress	6.155
CONFigure:PING:CONTRol:PCOunt[?]	6.154
CONFigure:PING:CONTRol:PSIZe[?]	6.155
CONFigure:PING:CONTRol:REPetition[?]	6.154
CONFigure:PING:CONTRol:RINTerval[?]	6.155
CONFigure:PING:CONTRol:TOUT[?]	6.155
CONFigure:PING:EREPorting[?]	6.153
CONFigure:RFGenerator:FPACTivity[?]	6.29
CONFigure:RXQuality:CCPer:CONTRol:MCCCYcles[?]	6.136
CONFigure:RXQuality:CCPer:CONTRol:REPetition[?]	6.136
CONFigure:RXQuality:CCPer:EREPorting[?]	6.135
CONFigure:RXQuality:CCPer:LIMit:CLEVel[?]	6.137
CONFigure:RXQuality:CCPer:LIMit:MPER[?]	6.136
CONFigure:RXQuality:FLPer:CONTRol:MTPSent?	6.139
CONFigure:RXQuality:FLPer:CONTRol:REPetition[?]	6.139
CONFigure:RXQuality:FLPer:EREPorting[?]	6.138
CONFigure:RXQuality:FLPer:LIMit:CLEVel[?]	6.140
CONFigure:RXQuality:FLPer:LIMit:MPER[?]	6.139
CONFigure:RXQuality:FLPFormance:CONTRol:MFRames?	6.145
CONFigure:RXQuality:FLPFormance:CONTRol:REPetition[?]	6.145
CONFigure:RXQuality:FLPFormance:EREPorting[?]	6.144
CONFigure:RXQuality:RLPer:CONTRol:MPReiceived[?]	6.149
CONFigure:RXQuality:RLPer:CONTRol:REPetition[?]	6.149
CONFigure:RXQuality:RLPer:EREPorting[?]	6.148
CONFigure:RXQuality:RLPer:LIMit:CLEVel[?]	6.150
CONFigure:RXQuality:RLPer:LIMit:MPER[?]	6.149
CONFigure:RXQuality:RLPFormance:CONTRol:MFRames?	6.147
CONFigure:RXQuality:RLPFormance:CONTRol:REPetition[?]	6.146
CONFigure:RXQuality:RLPFormance:EREPorting[?]	6.146
CONFigure:RXQuality:RLQuality:CONTRol:MLPSent?	6.142
CONFigure:RXQuality:RLQuality:CONTRol:REPetition[?]	6.142
CONFigure:RXQuality:RLQuality:EREPorting[?]	6.141
CONFigure:RXQuality:RLQuality:LIMit:CLEVel[?]	6.143
CONFigure:RXQuality:RLQuality:LIMit:MPER[?]	6.142
CONFigure:SAPPower:EREPorting[?]	6.60

Command (both Signaling and Non-Signaling)	Page
CONFigure:SPECtrum:ACP:CONTRol:FOFFset:ACP<nr>[?]	6.95
CONFigure:SPECtrum:ACP:CONTRol:REPetition[?]	6.94
CONFigure:SPECtrum:ACP:CONTRol:STATistics[?]	6.93
CONFigure:SPECtrum:ACP:CONTRol[?]	6.93
CONFigure:SPECtrum:ACP:EREPorting[?]	6.92
CONFigure:SPECtrum:ACP:LIMit:ACP1[?]	6.97
CONFigure:SUBarrays:MODulation:EVMagnitude:HPSK[?]	6.73
CONFigure:SUBarrays:MODulation:IQANalyzer:HPSK[?]	6.90
CONFigure:SUBarrays:MODulation:MERRor:HPSK[?]	6.79
CONFigure:SUBarrays:MODulation:PERRor:HPSK[?]	6.85
CONFigure:UPERiod[?]	6.133
CONFigure:UPERiod[?]	6.133
CONFigure:UPERiod[?]	6.152
CONFigure:WPOWER:CONTRol:REPetition[?]	6.39
CONFigure:WPOWER:CONTRol:REPetition[?]	6.216
CONFigure:WPOWER:EREPorting[?]	6.38
CONFigure:WPOWER:EREPorting[?]	6.215
CONTInue:CDPower:CDPW	6.100
CONTInue:CDPower:CHPW	6.120
CONTInue:CDPower:PCDep	6.111
CONTInue:MODulation:EVMagnitude:HPSK	6.69
CONTInue:MODulation:IQANalyzer:HPSK	6.88
CONTInue:MODulation:MERRor:HPSK	6.76
CONTInue:MODulation:MQuality:HPSK	6.47
CONTInue:MODulation:OVERview:HPSK	6.61
CONTInue:MODulation:PERRor:HPSK	6.82
CONTInue:NPOWER	6.56
CONTInue:PING	6.153
CONTInue:SAPPower	6.60
CONTInue:SPECtrum:ACP	6.92
CONTInue:WPOWER	6.38
CONTInue:WPOWER	6.215
DEFault:ANSignal[?]	6.192
DEFault:CDPower:CDPW:CONTRol[?]	6.102
DEFault:CDPower:CDPW:LIMit[?]	6.106
DEFault:CDPower:CHPW:CONTRol[?]	6.123
DEFault:CDPower:CHPW:LIMit[?]	6.124
DEFault:CDPower:CPCCommon:LIMit[?]	6.104
DEFault:CDPower:PCDep:CONTRol[?]	6.113
DEFault:CDPower:PCDep:LIMit[?]	6.114
DEFault:IQACcess:CONTRol[?]	6.35
DEFault:LAYer[?]	6.161
DEFault:MODulation:EVMagnitude:HPSK:CONTRol[?]	6.72
DEFault:MODulation:IQANalyzer:HPSK:CONTRol[?]	6.89
DEFault:MODulation:MERRor:HPSK:CONTRol[?]	6.78
DEFault:MODulation:MQuality:HPSK:AVERage:LIMit[?]	6.53
DEFault:MODulation:MQuality:HPSK:CMMax:LIMit[?]	6.53
DEFault:MODulation:MQuality:HPSK:CONTRol[?]	6.48
DEFault:MODulation:OEMP:HPSK:LIMit[?]	6.68
DEFault:MODulation:OVERview:HPSK:CONTRol[?]	6.63

Command (both Signaling and Non-Signaling)	Page
DEFault:MODulation:PERRor:HPSK:CONTRol[?]	6.84
DEFault:NETWork[?]	6.198
DEFault:PING:CONTRol[?]	6.154
DEFault:RFANalyzer[?]	6.8
DEFault:RFANalyzer[?]	6.204
DEFault:RFGenerator[?]	6.15
DEFault:RXQuality:CONTRol[?]	6.133
DEFault:RXQuality:LIMit[?]	6.134
DEFault:SPECtrum:ACP:CONTRol[?]	6.94
DEFault:SPECtrum:ACP:LIMit[?]	6.97
DEFault:TRIGger[:SEQuence][?]	6.41
DEFault:TRIGger[:SEQuence][?]	6.211
FETCh:ARRay:CDPower:CDPW:ISIGnal:STATe? ^(t)	6.109
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERAge? ^(t)	6.108
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent? ^(t)	6.107
FETCh:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(t)	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal:STATe? ^(t)	6.109
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERAge? ^(t)	6.108
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent? ^(t)	6.107
FETCh:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(t)	6.108
FETCh:ARRay:CDPower:CDPW:STATe?	6.109
FETCh:ARRay:CDPower:CDPW[:VALue]:AVERAge?	6.108
FETCh:ARRay:CDPower:CDPW[:VALue]:CURRent?	6.107
FETCh:ARRay:CDPower:CDPW[:VALue]:MAXimum?	6.108
FETCh:ARRay:CDPower:CHPW:ISIGnal:STATe? ^(t)	6.129
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERAge? ^(t)	6.127
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(t)	6.126
FETCh:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(t)	6.128
FETCh:ARRay:CDPower:CHPW:QSIGnal:STATe? ^(t)	6.129
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERAge? ^(t)	6.127
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(t)	6.126
FETCh:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(t)	6.128
FETCh:ARRay:CDPower:CHPW:STATe?	6.129
FETCh:ARRay:CDPower:CHPW[:VALue]:AVERAge	6.127
FETCh:ARRay:CDPower:CHPW[:VALue]:CURRent?	6.126
FETCh:ARRay:CDPower:CHPW[:VALue]:MAXimum	6.128
FETCh:ARRay:CDPower:PCDep:ISIGnal:STATe? ^(t)	6.119
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERAge? ^(t)	6.117
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(t)	6.116
FETCh:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(t)	6.118
FETCh:ARRay:CDPower:PCDep:QSIGnal:STATe? ^(t)	6.119
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERAge? ^(t)	6.117
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(t)	6.116
FETCh:ARRay:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(t)	6.118
FETCh:ARRay:CDPower:PCDep:STATe?	6.119
FETCh:ARRay:CDPower:PCDep[:VALue]:AVERAge?	6.117
FETCh:ARRay:CDPower:PCDep[:VALue]:CURRent?	6.116
FETCh:ARRay:CDPower:PCDep[:VALue]:MAXimum?	6.118
FETCh:ARRay:MODulation:EVMagnitude:HPSK:AVERAge?	6.75
FETCh:ARRay:MODulation:EVMagnitude:HPSK:CURRent?	6.75

Command (both Signaling and Non-Signaling)	Page
FETCh:ARRay:MODulation:EVMagnitude:HPSK:MMAx?	6.75
FETCh:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	6.91
FETCh:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	6.91
FETCh:ARRay:MODulation:MERRor:HPSK:AVERage?	6.81
FETCh:ARRay:MODulation:MERRor:HPSK:CURRent?	6.81
FETCh:ARRay:MODulation:MERRor:HPSK:MMAx?	6.81
FETCh:ARRay:MODulation:PERRor:HPSK:AVERage?	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:CURRent?	6.87
FETCh:ARRay:MODulation:PERRor:HPSK:MMAx?	6.87
FETCh:IQAcess:STATus?	6.35
FETCh:RFGenerator:AT<nr>:MAC:INDEx:STATus?	6.22
FETCh:RFGenerator:AT<nr>:PSTReam:STATus?	6.24
FETCh:RFGenerator:MAC:INDEx:STATus?	6.22
FETCh:RFGenerator:PSTReam:STATus?	6.24
FETCh:RFGenerator:SNcMessage:STATus?	6.21
FETCh:RFGenerator:STATus?	6.16
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:AVERage?	6.75
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:CURRent?	6.75
FETCh:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?	6.75
FETCh:SUBarrays:MODulation:MERRor:HPSK:AVERage?	6.81
FETCh:SUBarrays:MODulation:MERRor:HPSK:CURRent?	6.81
FETCh:SUBarrays:MODulation:MERRor:HPSK:MMAx?	6.81
FETCh:SUBarrays:MODulation:PERRor:HPSK:AVERage?	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:CURRent?	6.87
FETCh:SUBarrays:MODulation:PERRor:HPSK:MMAx?	6.87
FETCh:WPOWer:STATus?	6.39
FETCh:WPOWer:STATus?	6.216
FETCh[:SCALar]:CDPower:CDPW:STATus?	6.100
FETCh[:SCALar]:CDPower:CDPW?	6.106
FETCh[:SCALar]:CDPower:CHPW:STATus?	6.121
FETCh[:SCALar]:CDPower:CHPW?	6.125
FETCh[:SCALar]:CDPower:PCDep:STATus?	6.111
FETCh[:SCALar]:CDPower:PCDep?	6.115
FETCh[:SCALar]:MODulation:EVMagnitude:HPSK:STATus?	6.70
FETCh[:SCALar]:MODulation:EVMagnitude:HPSK?	6.74
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK:STATus?	6.88
FETCh[:SCALar]:MODulation:IQANalyzer:HPSK?	6.91
FETCh[:SCALar]:MODulation:MERRor:HPSK:STATus?	6.76
FETCh[:SCALar]:MODulation:MERRor:HPSK?	6.80
FETCh[:SCALar]:MODulation:MQUality:HPSK:STATus?	6.48
FETCh[:SCALar]:MODulation:MQUality:HPSK?	6.54
FETCh[:SCALar]:MODulation:OVERview:HPSK:STATus?	6.62
FETCh[:SCALar]:MODulation:OVERview:HPSK?	6.68
FETCh[:SCALar]:MODulation:PERRor:HPSK:STATus?	6.82
FETCh[:SCALar]:MODulation:PERRor:HPSK?	6.86
FETCh[:SCALar]:NPOWer:STATus?	6.57
FETCh[:SCALar]:NPOWer?	6.60
FETCh[:SCALar]:PING:STATus	6.153
FETCh[:SCALar]:PING?	6.157
FETCh[:SCALar]:RXQuality:CCPer:STATus?	6.135

Command (both Signaling and Non-Signaling)	Page
FETCh[:SCALar]:RXQuality:CCPer?	6.137
FETCh[:SCALar]:RXQuality:FLPer:STATus?	6.138
FETCh[:SCALar]:RXQuality:FLPer?	6.140
FETCh[:SCALar]:RXQuality:FLPFormance:STATus?	6.144
FETCh[:SCALar]:RXQuality:FLPFormance?	6.145
FETCh[:SCALar]:RXQuality:RLPer:DPLProtocol?	6.150
FETCh[:SCALar]:RXQuality:RLPer:S2PL?	6.151
FETCh[:SCALar]:RXQuality:RLPer:STATus?	6.148
FETCh[:SCALar]:RXQuality:RLPFormance:DPLProtocol?	6.147
FETCh[:SCALar]:RXQuality:RLPFormance:S2PL?	6.147
FETCh[:SCALar]:RXQuality:RLPFormance:STATus?	6.146
FETCh[:SCALar]:RXQuality:RLQuality:STATus?	6.141
FETCh[:SCALar]:RXQuality:RLQuality?	6.143
FETCh[:SCALar]:SAPPower:STATus?	6.61
FETCh[:SCALar]:SAPPower?	6.61
FETCh[:SCALar]:SPECtrum:ACP:STATus?	6.92
FETCh[:SCALar]:SPECtrum:ACP?	6.98
FETCh[:SCALar]:WPOWER?	6.40
FETCh[:SCALar]:WPOWER?	6.217
INITiate:CDPower:CDPW	6.100
INITiate:CDPower:CHPW	6.120
INITiate:CDPower:PCDep	6.111
INITiate:ESYNc	6.209
INITiate:ESynch:SYSTEM:TIME	6.210
INITiate:IQACcess	6.35
INITiate:LAYer:APPLication:TEST:STATistics	6.163
INITiate:MODulation:EVMagnitude:HPSK	6.69
INITiate:MODulation:IQANalyzer:HPSK	6.88
INITiate:MODulation:MERRor:HPSK	6.76
INITiate:MODulation:MQuality:HPSK	6.47
INITiate:MODulation:OVERview:HPSK	6.61
INITiate:MODulation:PERRor:HPSK	6.82
INITiate:NPOWER	6.56
INITiate:PING	6.153
INITiate:RFGenerator	6.15
INITiate:RFGenerator: SNCMessage	6.20
INITiate:RFGenerator:AT<nr>:MAC:INDEX	6.22
INITiate:RFGenerator:AT<nr>:PSTReam	6.23
INITiate:RFGenerator:MAC:INDEX	6.22
INITiate:RFGenerator:PSTReam	6.23
INITiate:RXQuality:CCPer	6.135
INITiate:RXQuality:FLPer	6.138
INITiate:RXQuality:FLPFormance	6.144
INITiate:RXQuality:RLPer	6.148
INITiate:RXQuality:RLPFormance	6.145
INITiate:RXQuality:RLQuality	6.141
INITiate:SAPPower	6.60
INITiate:SPECtrum:ACP	6.92
INITiate:WPOWER	6.38
INITiate:WPOWER	6.215

Command (both Signaling and Non-Signaling)	Page
INPut[:STATe][?]	6.37
IQIF:DEFault[?]	6.5
MMEMory:RECall:CURRent<FileName> [,<msus>]	6.3
MMEMory:SAVE:CURRent<FileName> [,<msus>]	6.3
OUTPut[:STATe][?]	6.37
PROCedure:BC:HANDoff[?]	6.161
PROCedure:RFGenerator:AT<nr>:PCBits:PATtern[?]	6.29
PROCedure:SIGNalling:ACTion	6.158
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERage? ^(*)	6.108
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent? ^(*)	6.107
READ:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(*)	6.108
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERage? ^(*)	6.108
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent? ^(*)	6.107
READ:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(*)	6.108
READ:ARRay:CDPower:CDPW[:VALue]:AVERage?	6.108
READ:ARRay:CDPower:CDPW[:VALue]:CURRent?	6.107
READ:ARRay:CDPower:CDPW[:VALue]:MAXimum?	6.108
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERage? ^(*)	6.127
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(*)	6.126
READ:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(*)	6.128
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERage? ^(*)	6.127
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(*)	6.126
READ:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(*)	6.128
READ:ARRay:CDPower:CHPW[:VALue]:AVERage?	6.127
READ:ARRay:CDPower:CHPW[:VALue]:CURRent?	6.126
READ:ARRay:CDPower:CHPW[:VALue]:MAXimum?	6.128
READ:ARRay:CDPower:PCDep[:VALue]:CURRent?	6.116
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERage? ^(*)	6.117
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(*)	6.116
READ:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(*)	6.118
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERage? ^(*)	6.117
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(*)	6.116
READ:ARRay:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(*)	6.118
READ:ARRay:CDPower:PCDep[:VALue]:AVERage?	6.117
READ:ARRay:CDPower:PCDep[:VALue]:MAXimum?	6.118
READ:ARRay:MODulation:EVMagnitude:HPSK:AVERage?	6.75
READ:ARRay:MODulation:EVMagnitude:HPSK:CURRent?	6.75
READ:ARRay:MODulation:EVMagnitude:HPSK:MMAx?	6.75
READ:ARRay:MODulation:IQANalyzer:HPSK:IPHase?	6.91
READ:ARRay:MODulation:IQANalyzer:HPSK:QPHase?	6.91
READ:ARRay:MODulation:MERRor:HPSK:AVERage?	6.81
READ:ARRay:MODulation:MERRor:HPSK:CURRent?	6.81
READ:ARRay:MODulation:MERRor:HPSK:MMAx?	6.81
READ:ARRay:MODulation:PERRor:HPSK:AVERage?	6.87
READ:ARRay:MODulation:PERRor:HPSK:CURRent?	6.87
READ:ARRay:MODulation:PERRor:HPSK:MMAx?	6.87
READ:SUBarrays:MODulation:EVMagnitude:HPSK:AVERage?	6.75
READ:SUBarrays:MODulation:EVMagnitude:HPSK:CURRent?	6.75
READ:SUBarrays:MODulation:EVMagnitude:HPSK:MMAx?	6.75
READ:SUBarrays:MODulation:MERRor:HPSK:AVERage?	6.81

Command (both Signaling and Non-Signaling)	Page
READ:SUBarrays:MODulation:MERRor:HPSK:CURRent?	6.81
READ:SUBarrays:MODulation:MERRor:HPSK:MMAx?	6.81
READ:SUBarrays:MODulation:PERRor:HPSK:AVERage?	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:CURRent?	6.87
READ:SUBarrays:MODulation:PERRor:HPSK:MMAx?	6.87
READ[:SCALar]:CDPower:CDPW?	6.106
READ[:SCALar]:CDPower:CHPW?	6.125
READ[:SCALar]:CDPower:PCDep?	6.115
READ[:SCALar]:MODulation:EVMagnitude:HPSK?	6.74
READ[:SCALar]:MODulation:IQANalyzer:HPSK?	6.91
READ[:SCALar]:MODulation:MERRor:HPSK?	6.80
READ[:SCALar]:MODulation:MQUality:HPSK?	6.54
READ[:SCALar]:MODulation:OVERview:HPSK?	6.68
READ[:SCALar]:MODulation:PERRor:HPSK?	6.86
READ[:SCALar]:NPOWER?	6.60
READ[:SCALar]:PING?	6.157
READ[:SCALar]:RXQuality:CCPer?	6.137
READ[:SCALar]:RXQuality:FLPer?	6.140
READ[:SCALar]:RXQuality:FLPFormance?	6.145
READ[:SCALar]:RXQuality:RLPer:DPLProtocol?	6.150
READ[:SCALar]:RXQuality:RLPer:S2PL?	6.151
READ[:SCALar]:RXQuality:RLPFormance:DPLProtocol?	6.147
READ[:SCALar]:RXQuality:RLPFormance:S2PL?	6.147
READ[:SCALar]:RXQuality:RLQuality?	6.143
READ[:SCALar]:SAPPower?	6.61
READ[:SCALar]:SPECTrum:ACP?	6.98
READ[:SCALar]:WPOWER?	6.40
READ[:SCALar]:WPOWER?	6.217
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:AVERage? ^(t)	6.108
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:CURRent? ^(t)	6.107
SAMPlE:ARRay:CDPower:CDPW:ISIGnal[:VALue]:MAXimum? ^(t)	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:AVERage? ^(t)	6.108
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:CURRent? ^(t)	6.107
SAMPlE:ARRay:CDPower:CDPW:QSIGnal[:VALue]:MAXimum? ^(t)	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:AVERage?	6.108
SAMPlE:ARRay:CDPower:CDPW[:VALue]:CURRent?	6.107
SAMPlE:ARRay:CDPower:CDPW[:VALue]:MAXimum?	6.108
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:AVERage? ^(t)	6.127
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:CURRent? ^(t)	6.126
SAMPlE:ARRay:CDPower:CHPW:ISIGnal[:VALue]:MAXimum? ^(t)	6.128
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:AVERage? ^(t)	6.127
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:CURRent? ^(t)	6.126
SAMPlE:ARRay:CDPower:CHPW:QSIGnal[:VALue]:MAXimum? ^(t)	6.128
SAMPlE:ARRay:CDPower:CHPW[:VALue]:AVERage?	6.127
SAMPlE:ARRay:CDPower:CHPW[:VALue]:CURRent?	6.126
SAMPlE:ARRay:CDPower:CHPW[:VALue]:MAXimum?	6.128
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:AVERage? ^(t)	6.117
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:CURRent? ^(t)	6.116
SAMPlE:ARRay:CDPower:PCDep:ISIGnal[:VALue]:MAXimum? ^(t)	6.118
SAMPlE:ARRay:CDPower:PCDep:QSIGnal[:VALue]:AVERage? ^(t)	6.117

Command (both Signaling and Non-Signaling)	Page
SAMPlE:ARRAy:CDPower:PCDep:QSIGnal[:VALue]:CURRent? ^(*)	6.116
SAMPlE:ARRAy:CDPower:PCDep:QSIGnal[:VALue]:MAXimum? ^(*)	6.118
SAMPlE:ARRAy:CDPower:PCDep[:VALue]:AVERAge?	6.117
SAMPlE:ARRAy:CDPower:PCDep[:VALue]:CURRent?	6.116
SAMPlE:ARRAy:CDPower:PCDep[:VALue]:MAXimum?	6.118
SAMPlE:ARRAy:MODulation:EVMAgnitude:HPSK:AVERAge?	6.75
SAMPlE:ARRAy:MODulation:EVMAgnitude:HPSK:CURRent?	6.75
SAMPlE:ARRAy:MODulation:EVMAgnitude:HPSK:MMAx?	6.75
SAMPlE:ARRAy:MODulation:IQANalyzer:HPSK:IPHase?	6.91
SAMPlE:ARRAy:MODulation:IQANalyzer:HPSK:QPHase?	6.91
SAMPlE:ARRAy:MODulation:MERRor:HPSK:AVERAge?	6.81
SAMPlE:ARRAy:MODulation:MERRor:HPSK:CURRent?	6.81
SAMPlE:ARRAy:MODulation:MERRor:HPSK:MMAx?	6.81
SAMPlE:ARRAy:MODulation:PERRor:HPSK:AVERAge?	6.87
SAMPlE:ARRAy:MODulation:PERRor:HPSK:CURRent?	6.87
SAMPlE:ARRAy:MODulation:PERRor:HPSK:MMAx?	6.87
SAMPlE:SUBarrays:MODulation:EVMAgnitude:HPSK:AVERAge?	6.75
SAMPlE:SUBarrays:MODulation:EVMAgnitude:HPSK:CURRent?	6.75
SAMPlE:SUBarrays:MODulation:EVMAgnitude:HPSK:MMAx?	6.75
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:AVERAge?	6.81
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:CURRent?	6.81
SAMPlE:SUBarrays:MODulation:MERRor:HPSK:MMAx?	6.81
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:AVERAge?	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:CURRent?	6.87
SAMPlE:SUBarrays:MODulation:PERRor:HPSK:MMAx?	6.87
SAMPlE[:SCALar]:CDPower:CDPW?	6.106
SAMPlE[:SCALar]:CDPower:CHPW?	6.125
SAMPlE[:SCALar]:CDPower:PCDep?	6.115
SAMPlE[:SCALar]:MODulation:EVMAgnitude:HPSK?	6.74
SAMPlE[:SCALar]:MODulation:IQANalyzer:HPSK?	6.91
SAMPlE[:SCALar]:MODulation:MERRor:HPSK?	6.80
SAMPlE[:SCALar]:MODulation:MQuality:HPSK?	6.54
SAMPlE[:SCALar]:MODulation:OVERview:HPSK?	6.68
SAMPlE[:SCALar]:MODulation:PERRor:HPSK?	6.86
SAMPlE[:SCALar]:NPOWER?	6.60
SAMPlE[:SCALar]:PING?	6.157
SAMPlE[:SCALar]:RXQuality:CCPer?	6.137
SAMPlE[:SCALar]:RXQuality:FLPer?	6.140
SAMPlE[:SCALar]:RXQuality:FLPFornance?	6.145
SAMPlE[:SCALar]:RXQuality:RLPer:DPLProtocol?	6.150
SAMPlE[:SCALar]:RXQuality:RLPer:S2PL?	6.151
SAMPlE[:SCALar]:RXQuality:RLPFornance:DPLProtocol?	6.147
SAMPlE[:SCALar]:RXQuality:RLPFornance:S2PL?	6.147
SAMPlE[:SCALar]:RXQuality:RLQuality?	6.143
SAMPlE[:SCALar]:SAPPower?	6.61
SAMPlE[:SCALar]:SPECTrum:ACP?	6.98
SAMPlE[:SCALar]:WPOWER?	6.40
SAMPlE[:SCALar]:WPOWER?	6.217
[SENSe:]:IQIF:LEVel?	6.5
[SENSe:][SCALar:]:RLPStatistic?	6.156

Command (both Signaling and Non-Signaling)	Page
[SENSe:][SCALar:]:RXQuality:SOVerview?	6.134
[SENSe:]SIGNalling:STATe?	6.159
[SENSe]:ANSignal:SECTor:ID:MANual[?]	6.197
[SENSe]:ANSignal:SECTor:ID?	6.196
[Sense]:ATINfo:APPLication:DPACket:Support?	6.173
[SENSe]:ATINfo:ESN?	6.160
[SENSe]:ATINfo:MEID?	6.160
[SENSE]:ATINfo:PREFferred:CCHannel:CYCLe:ENABLE?	6.160
[SENSE]:ATINfo:PREFferred:CCHannel:CYCLe?	6.160
[SENSe]:ATINfo:UATi?	6.160
[SENSe]:CORRection:LOSS:INPut<nr>[:MAGNitude][?]	6.37
[SENSe]:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?]	6.38
[SENSe]:ESYNc:STATe?	6.211
[SENSe]:ESYNc:SYSTem:TIME:STATe?	6.210
[SENSe]:LAYer:PHYsical:PLPRotocol:STYPe[?]	6.192
[SENSe]:LEVel:MAXimum[?]	6.8
[SENSe]:LEVel:MAXimum[?]	6.205
[SENSe]:LEVel:MODE[?]	6.8
[SENSe]:LEVel:MODE[?]	6.205
[SENSe]:RFANalyzer: [AT<nr>]:>:RLINK:FROFFset[?]	6.14
[SENSe]:RFANalyzer:CCFilter:ACK[?]	6.12
[SENSe]:RFANalyzer:CCFilter:ACK[?]	6.206
[SENSe]:RFANalyzer:CCFilter:ADSC[?]	6.12
[SENSe]:RFANalyzer:CCFilter:ADSC[?]	6.206
[SENSe]:RFANalyzer:CCFilter:APILot[?]	6.12
[SENSe]:RFANalyzer:CCFilter:APILot[?]	6.206
[SENSe]:RFANalyzer:CCFilter:DATA[?]	6.12
[SENSe]:RFANalyzer:CCFilter:DATA[?]	6.206
[SENSe]:RFANalyzer:CCFilter:DRC[?]	6.12
[SENSe]:RFANalyzer:CCFilter:DRC[?]	6.206
[SENSe]:RFANalyzer:CCFilter:HSLot[?]	6.13
[SENSe]:RFANalyzer:CCFilter:HSLot[?]	6.207
[SENSe]:RFANalyzer:DCHannel:MTYPe:MODE[?]	6.14
[SENSe]:RFANalyzer:DCHannel:MTYPe:MODE[?]	6.208
[SENSe]:RFANalyzer:DCHannel:MTYPe?	6.15
[SENSe]:RFANalyzer:DCHannel:MTYPe?	6.208
[SENSe]:RFANalyzer:FOFFset[?]	6.10
[SENSe]:RFANalyzer:FREQuency:UNIT[?]	6.9
[SENSe]:RFANalyzer:FREQuency[?]	6.9
[SENSe]:RFANalyzer:LCMask:I:LSB[?]	6.11
[SENSe]:RFANalyzer:LCMask:I:MSB[?]	6.11
[SENSe]:RFANalyzer:LCMask:Q:LSB[?]	6.11
[SENSe]:RFANalyzer:LCMask:Q:MSB[?]	6.11
[SENSe]:RFANalyzer:Selectivity[?]	6.45
[SENSe]:RFANalyzer:Selectivity[?]	6.214
[SENSe]:RFANalyzer:Subtype[?]	6.11
[SENSe]:RFANalyzer:Subtype[?]	6.205
[SENSe:]SIGNalling:STATe:PPP?	6.159
SOURce:CORRection:LOSS:INPut<nr>[:MAGNitude][?]	6.37
SOURce:CORRection:LOSS:OUTPut<nr>[:MAGNitude][?]	6.38

Command (both Signaling and Non-Signaling)	Page
SOURce:DM:CLOCK:FREQuency[?]	6.40
SOURce:DM:CLOCK:STATe[?]	6.40
SOURce:IMPairments:FOFFset[:RF][?]	6.20
SOURce:IMPairments:FOFFset[:RF][?]	6.193
SOURce:IMPairments:LEVel:AWGN[?]	6.19
SOURce:IMPairments:LEVel:AWGN[?]	6.19
SOURce:RFGenerator:AT<nr>:DRATe?	6.28
SOURce:RFGenerator:AT<nr>:DRCLock:LENGth[?]	6.28
SOURce:RFGenerator:AT<nr>:DRCLock:PERiod[?]	6.28
SOURce:RFGenerator:AT<nr>:DRCLock:STATe[?]	6.29
SOURce:RFGenerator:AT<nr>:DRINdex[?]	6.26
SOURce:RFGenerator:AT<nr>:HARQ:MODE[?]	6.30
SOURce:RFGenerator:AT<nr>:IFACTor	6.25
SOURce:RFGenerator:AT<nr>:MAC:INDex[?]	6.23
SOURce:RFGenerator:AT<nr>:MAC:LEVel[?]	6.23
SOURce:RFGenerator:AT<nr>:PATtern[?]	6.29
SOURce:RFGenerator:AT<nr>:PCBits:RTES:NOBits[?]	6.31
SOURce:RFGenerator:AT<nr>:PCBits[?]	6.31
SOURce:RFGenerator:AT<nr>:PCOut[?]	6.24
SOURce:RFGenerator:AT<nr>:PSIZe?	6.28
SOURce:RFGenerator:AT<nr>:PSOFFset[?]	6.25
SOURce:RFGenerator:AT<nr>:PTINdex[?]	6.27
SOURce:RFGenerator:AT<nr>:SCOunt?	6.28
SOURce:RFGenerator:AT<nr1>:PCBits:PATtern:AREA<nr2>:NOBits[?]	6.32
SOURce:RFGenerator:AT<nr1>:PCBits:PATtern:AREA<nr2>:POLarity[?]	6.32
SOURce:RFGenerator:DRATe?	6.28
SOURce:RFGenerator:DRCLock:LENGth[?]	6.30
SOURce:RFGenerator:DRCLock:PERiod[?]	6.30
SOURce:RFGenerator:DRINdex[?]	6.26
SOURce:RFGenerator:FREQuency[:RF]:UNIT[?]	6.16
SOURce:RFGenerator:FREQuency[:RF][?]	6.16
SOURce:RFGenerator:MAC:INDex[:REV0][?]	6.23
SOURce:RFGenerator:MAC:INDex[:REVA][?]	6.23
SOURce:RFGenerator:MAC:LEVel[?]	6.23
SOURce:RFGenerator:MODE[?]	6.18
SOURce:RFGenerator:OAT:COUNt[?]	6.34
SOURce:RFGenerator:PATtern[?]	6.29
SOURce:RFGenerator:PCBits[?]	6.31
SOURce:RFGenerator:PCOut[?]	6.24
SOURce:RFGenerator:POWER:OUTPut[?]	6.18
SOURce:RFGenerator:PROPerTy:PNOFFset[?]	6.18
SOURce:RFGenerator:PSIZe?	6.28
SOURce:RFGenerator:PTINdex[?]	6.27
SOURce:RFGenerator:RAB:LENGth[?]	6.33
SOURce:RFGenerator:RAB:MAC:LEVel[?]	6.32
SOURce:RFGenerator:RAB:OFFSet[?]	6.33
SOURce:RFGenerator:RAB:STATe[?]	6.33
SOURce:RFGenerator:SCOunt?	6.28
SOURce:RFGenerator:SNCMessAge:DRATe?	6.21
SOURce:RFGenerator:SNCMessAge:DRINdex[?]	6.21

Command (both Signaling and Non-Signaling)	Page
SOURce:RFGenerator:SNCMessAge:PSOffset[?]	6.21
SOURce:RFGenerator:SNCMessAge:SCOunt?	6.22
SOURce:RFGenerator:SUBType[?]	6.19
SOURce:RFGenerator:Type?	6.34
STATus:OPERation:SYMBOLic:ENABLE[?] <Event>{,<Event>}	6.6
STATus:OPERation:SYMBOLic[:EVENT]?	6.6
STOP:CDPower:CDPW	6.100
STOP:CDPower:CHPW	6.120
STOP:CDPower:PCDep	6.111
STOP:MODulation:EVMagnitude:HPSK	6.69
STOP:MODulation:IQANalyzer:HPSK	6.88
STOP:MODulation:MERRor:HPSK	6.76
STOP:MODulation:MQUality:HPSK	6.47
STOP:MODulation:OVERview:HPSK	6.61
STOP:MODulation:PERRor:HPSK	6.82
STOP:NPOWER	6.56
STOP:PING	6.153
STOP:RXQuality:CCPer	6.135
STOP:RXQuality:FLPer	6.138
STOP:RXQuality:FLPFormance	6.144
STOP:RXQuality:RLPer	6.148
STOP:RXQuality:RLPFormance	6.145
STOP:RXQuality:RLQuality	6.141
STOP:SAPPower	6.60
STOP:SPECTrum:ACP	6.92
STOP:WPOWER	6.38
STOP:WPOWER	6.215
SYSTem:OPTions:INFO:CURRent?	6.2
SYSTem:RESet:CURRent	6.2
SYSTem:VERSion:SW:MMI?	6.2
TRIGger:OUTPut:PIN<nr>:SIGNal[?]	6.42
TRIGger:OUTPut:PIN<nr>:SIGNal[?]	6.213
TRIGger:SElect:AT[?]	6.41
TRIGger[:SEquence]:SLOPe[?]	6.41
TRIGger[:SEquence]:SLOPe[?]	6.213
TRIGger[:SEquence]:SOURce[?]	6.41
TRIGger[:SEquence]:SOURce[?]	6.211
TRIGger[:SEquence]:THReshold:IFPower[?]	6.43
TRIGger[:SEquence]:THReshold:IFPower[?]	6.212
TRIGger[:SEquence]:THReshold:RFPower[?]	6.43
TRIGger[:SEquence]:THReshold:RFPower[?]	6.212
UNIT:ANSignal:CHANnel[:RF][?]	6.192
XTND:CDPower:CHPW:RESult:DATA[?]	6.125
XTND:SPECTrum:ACP:LIMit[?]	6.59
XTND:SPECTrum:ACP:STATistics[?]	6.97

(*) Please note that the commands marked with an asterisk are legacy commands. They still work, but they eventually should be replaced by the new successor commands. The page reference points to the location of the new command description.

7 Remote Control – Program Example

The following example program illustrates primary and secondary addressing by setting up a call and performing simple measurements with the CMU. In the example, remote control via GPIB bus and the programming language *Winbatch* is used.

A large variety of additional GPIB examples can be found on the CMU customer web.

Winbatch uses device names such as *CMUBASE*, *1xEV-DO-N* which are previously defined and assigned to the primary address, secondary address, and some general device settings.

With these device names, a complete command line reads:

```
CMUBASE: <CMU_Command>
```

where <CMU_Command> may be any of the commands (setting commands or queries) specified within the function group and mode identified by the device name *CMUBASE*. Program sequences consisting of commands that are defined in several function groups and modes can be re-used with an exchanged device name.

In addition to these data transfer commands, *Winbatch* provides *WHILE*, *GOTO*, and *IF* statements to express conditions and define loops.

With the statement:

```
WHILE 1xEV-DO-N: FETC:SPEC:ACP:STAT? <> RDY
```

the instrument waits until the spectrum measurement has finished before it executes the following commands.

For a C program assigning secondary addresses, refer to chapter 7 of the CMU operating manual.

Sample Program (Non-Signaling)

In the program example preliminary configurations for different measurements are defined, and the network parameters are set before performing actual measurements.

Before running the program, configure your *Winbatch* settings such that *CMUBASE* is the device name for the CMU *BASE* system and *1xEV-DO-N* denote the function group *1xEV-DO Non-Signaling*.

```
ECHO ON

FPRINT -----
FPRINT INITIALISATION ROUTINE:
FPRINT ASK FOR THE IDENTIFIER OF THE CMU, RESET THE INSTRUMENT,
FPRINT DEFINE THE SECONDARY ADDRESSES FOR ALL AVAILABLE FUNCTION GROUPS
FPRINT -----

CMUBASE: *IDN?
CMUBASE: *RST;*OPC?
CMUBASE: *CLS

CMUBASE: TRAC:REM:MODE:DISP ON

; Get primary and secondary addresses
CMUBASE: SYSTEM:REMOTE:ADDR:PRIM?
```

```

CMUBASE: SYST:REM:ADDR:SEC?

; Set the secondary address of the functional groups
CMUBASE: SYST:REM:ADDR:SEC?

CMUBASE: SYST:REM:ADDR:SEC 1,"CDMA2K450MS_Sig"
CMUBASE: SYST:REM:ADDR:SEC 2,"CDMA2K450MS_NSig"
CMUBASE: SYST:REM:ADDR:SEC 3,"CDMA2KCellMS_Sig"
CMUBASE: SYST:REM:ADDR:SEC 4,"CDMA2KCellMS_NSig"
CMUBASE: SYST:REM:ADDR:SEC 5,"CDMA2KPCSMS_Sig"
CMUBASE: SYST:REM:ADDR:SEC 6,"CDMA2KPCSMS_NSig"
CMUBASE: SYST:REM:ADDR:SEC 7,"CDMA2KIMT2KMS_Sig"
CMUBASE: SYST:REM:ADDR:SEC 8,"CDMA2KIMT2KMS_NSig"
CMUBASE: SYST:REM:ADDR:SEC 10,"EVDO1XAT_NSig"

CMUBASE: SYST:REM:ADDR:SEC?

FPRINT -----
FPRINT Configure the connector
FPRINT -----

1xEV-DO-N: INP:STAT RF2
1xEV-DO-N: OUTP:STAT RF2
1xEV-DO-N: SENS:CORR:LOSS:INP2 1.0
1xEV-DO-N: SENS:CORR:LOSS:OUTP2 1.0

FPRINT -----
FPRINT Network configuration
FPRINT -----

1xEV-DO-N: CONFigure:NETWork:STANDard USC
1xEV-DO-N: CONFigure:NETWork:STANDard?

FPRINT -----
FPRINT Analyzer configuration
FPRINT -----

1xEV-DO-N: RFANalyzer:FREQuency:UNIT CH

1xEV-DO-N: RFANalyzer:FOFFset 0

1xEV-DO-N: RFANalyzer:LCMask:I:LSB "00000000"
1xEV-DO-N: RFANalyzer:LCMask:I:MSB "000"

1xEV-DO-N: RFANalyzer:LCMask:Q:LSB "00000000"
1xEV-DO-N: RFANalyzer:LCMask:Q:MSB "000"

1xEV-DO-N: RFANalyzer:CCFilter:DRC DCAR
1xEV-DO-N: RFANalyzer:CCFilter:ACK DCAR
1xEV-DO-N: RFANalyzer:CCFilter:DATA DCAR

FPRINT -----
FPRINT Measurement configuration
FPRINT -----

1xEV-DO-N: TRIGger:SOURce FRUN

; Ana/Gen

1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:STATistics 10

1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP1
ON
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP2
ON

```

```

1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP3
ON
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP4
ON

1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP1?
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP2?
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP3?
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CONTRol:FOFFset:SBSuppress:ACP4?

1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:CMMax:LIMit?
1xEV-DO-N: CONFigure:MODulation:MQuality:HPSK:AVERage:LIMit?

; NarrowBandPower

1xEV-DO-N: CONFigure:NPOwer:CONTRol:STATistics 10
1xEV-DO-N: CONFigure:NPOwer:CONTRol:CBSize?

; Code Domain Power (Channel Power)

1xEV-DO-N: CONFigure:CDPower:CPCCCommon:CMAX:LIMit:ASYMmetric?
1xEV-DO-N: CONFigure:CDPower:CPCCCommon:AVERage:LIMit:ASYMmetric?

1xEV-DO-N: CONFigure:CDPower:CHPW:CONTRol:RMODE?

1xEV-DO-N: CONFigure:CDPower:CHPW:CONTRol:STATistics 10

1xEV-DO-N: CONFigure:CDPower:CHPW:CMAX:LIMit:ASYMmetric?
1xEV-DO-N: CONFigure:CDPower:CHPW:AVERage:LIMit:ASYMmetric?

FPRINT -----
FPRINT Generator configuration
FPRINT -----

1xEV-DO-N: SOURce:RFGenerator:MODE NORM

1xEV-DO-N: SOURce:RFGenerator:FREQuency:UNIT CH

1xEV-DO-N: SOURce:IMPairments:LEVel:AWGN OFF
1xEV-DO-N: SOURce:IMPairments:FOFFset OFF

1xEV-DO-N: SOURce:RFGenerator:PROPerTy:PNOFFset 0

; Sync Message
1xEV-DO-N: SOURce:RFGenerator:SNCMessage:PSOFFset 0
1xEV-DO-N: SOURce:RFGenerator:SNCMessage:DRINDEX 1
1xEV-DO-N: SOURce:RFGenerator:SNCMessage:DRATE?
1xEV-DO-N: SOURce:RFGenerator:SNCMessage:SCOUNT?

; Configuration Access Terminal 1

1xEV-DO-N: SOURce:RFGenerator:AT1:MAC:INDEX 63
1xEV-DO-N: SOURce:RFGenerator:AT1:MAC:LEVel -15
1xEV-DO-N: SOURce:RFGenerator:AT1:PCOUNT INF
1xEV-DO-N: SOURce:RFGenerator:AT1:PSOFFset 8
1xEV-DO-N: SOURce:RFGenerator:AT1:DRINDEX 12
1xEV-DO-N: SOURce:RFGenerator:AT1:DRATE?
1xEV-DO-N: SOURce:RFGenerator:AT1:SCOUNT?
1xEV-DO-N: SOURce:RFGenerator:AT1:PATtern "B4B4B4B4"
1xEV-DO-N: SOURce:RFGenerator:AT1:DRCLock:STATE 1
1xEV-DO-N: SOURce:RFGenerator:AT1:DRCLock:PERiod 16
1xEV-DO-N: SOURce:RFGenerator:AT1:DRCLock:LENGth 16

; Reverse Activity
1xEV-DO-N: SOURce:RFGenerator:RAB:MAC:LEVel -10

```

```
1xEV-DO-N: SOURce:RFGenerator:RAB:STATe 1
1xEV-DO-N: SOURce:RFGenerator:RAB:OFFSet 3
1xEV-DO-N: SOURce:RFGenerator:RAB:LENGth 8
```

```
1xEV-DO-N: SOURce:RFGenerator:OAT:COUNT 10
```

```
1xEV-DO-N: INIT:RFGenerator;*OPC?
```

```
1xEV-DO-N: INIT:RFGenerator:AT1:MAC:INDEX
1xEV-DO-N: INIT:RFGenerator:AT1:PSTReam
```

```
1xEV-DO-N: SOURce:RFGenerator:POWER:OUTPut -50
1xEV-DO-N: SOURce:RFGenerator:FREQuency 300
```

```
1xEV-DO-N: SOURce:RFGenerator:AT1:PCBits HOLD
```

```
FPRINT -----
FPRINT Maximum Output Power Measurement
FPRINT -----
```

```
1xEV-DO-N: LEVel:MODE MAN
1xEV-DO-N: LEVel:MAXimum 25dBm
1xEV-DO-N: RFANalyzer:FREQuency 300
```

```
1xEV-DO-N: SOURce:RFGenerator:POWER:OUTPut -105.5
1xEV-DO-N: SOURce:RFGenerator:FREQuency 300
```

```
1xEV-DO-N: SOURce:RFGenerator:AT1:PCBits AUP
```

```
1xEV-DO-N: INIT:MODulation:MQuality:HPSK
1xEV-DO-N: FETCh:MODulation:MQuality:HPSK?
```

```
1xEV-DO-N: INITiate:CDPower:CHPW
1xEV-DO-N: FETCh:CDPower:CHPW?
```

```
FPRINT -----
FPRINT Minimum Output Power Measurement
FPRINT -----
```

```
1xEV-DO-N: LEVel:MODE MAN
1xEV-DO-N: LEVel:MAXimum -50dBm
1xEV-DO-N: RFANalyzer:FREQuency 300
```

```
1xEV-DO-N: SOURce:RFGenerator:POWER:OUTPut -25
1xEV-DO-N: SOURce:RFGenerator:FREQuency 300
```

```
1xEV-DO-N: SOURce:RFGenerator:AT1:PCBits ADOW
```

```
1xEV-DO-N: INIT:MODulation:MQuality:HPSK
1xEV-DO-N: FETCh:MODulation:MQuality:HPSK?
```

```
1xEV-DO-N: INITiate:NPOWER
1xEV-DO-N: FETCh:NPOWER?
```

```
1xEV-DO-N: INITiate:CDPower:CHPW
1xEV-DO-N: FETCh:CDPower:CHPW?
```

Sample Programs (Signaling)

Reverse Test Application Call and Queries for CDPower for different Channels

The following example GPIB sequence configures the CMU for a 1xEV-DO Reverse Test Application call and queries for Code Domain Power measurement results for each of the channels:

```

ECHO ON
FPRINT -----
FPRINT INITIALISATION ROUTINE:
FPRINT ASK FOR THE IDENTIFIER OF THE CMU, RESET THE INSTRUMENT,
FPRINT DEFINE THE SECONDARY ADDRESSES FOR ALL AVAILABLE FUNCTION GROUPS
FPRINT -----
CMUBASE: *IDN?
CMUBASE: *RST;*OPC?
CMUBASE: *CLS
CMUBASE: TRAC:REM:MODE:DISP ON

; Get primary and secondary addresses
CMUBASE: SYSTEM:REMOTE:ADDR:PRIM?
CMUBASE: SYST:REM:ADDR:SEC?

; Set the secondary address of the functional groups
CMUBASE: SYST:REM:ADDR:SEC 10,"EVD01XAT_Sig"

EVDOSIG: CONF:CDP:CHPW:CONT ARR,10,SING,NONE,NONE

; Configure Network for 1xEVDO Rel 0; USCell; SID 1
; Chan 150; Power -50dBm
EVDOSIG: CONF:NETW:REL 0
EVDOSIG: CONF:NETW:STAN USC
EVDOSIG: CONF:NETW:SYST:SID 1
EVDOSIG: CONF:ANS:CHAN 150
EVDOSIG: CONF:ANS:POW:EVDO -50.00

; Configure Power Control
EVDOSIG: CONF:ANS:PCB AUTO

; Configure Foward Packet Activity
EVDOSIG: CONF:ANS:FPAC 100

; Collect all layer tab changes first
EVDOSIG: CONF:LAY:UPD:MODE USER

; Setup Reverse TAP on Stream 1
EVDOSIG: CONF:LAY:APPL:DTES:STR 1
EVDOSIG: CONF:LAY:APPL:TEST:SEL REV; *OPC?

; Configure Rate Parameters with probability of 1
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R9K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R19K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R38K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R76K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R19K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R38K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R76K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R15K 255

; Set Data Channel Gains to 0 dB for all rates
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R9K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R19K 0.0

```

```

EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R38K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R76K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R15K 0.0

; Configure the DRC and ACK Channel gains to 0 dB
EVDOSIG: CONF:LAY:MAC:FTCP:DFTP:DRC:CGA 0.0
EVDOSIG: CONF:LAY:MAC:FTCP:DFTP:ACK:CGA 0.0

; Now send all of the above layer parameter updates to the AT
EVDOSIG: PROC:SIGN:ACT RNEG;*OPC?

; Ready for test
; Turn the signal on
EVDOSIG: PROC:SIGN:ACT SON;*OPC?

; Wait for Session to open
REPORT OFF
[Wait_SOP]
IF EVDOSIG: SIGN:STAT? = SOP GOTO SOP_OK
PAUSE 100
GOTO Wait_SOP

[SOP_OK]
REPORT ON

; Connect TAP call
EVDOSIG: PROC:SIGN:ACT CTM;*OPC?
[Wait_CALL]
IF EVDOSIG: SIGN:STAT? = CEST GOTO CALL_OK
PAUSE 100
GOTO Wait_CALL

[CALL_OK]

FPRINT -----
FPRINT Tx Code Domain Power, reverse: 9.6 - 153.6kbps, AN power: -75.0
FPRINT -----
;Set Code channel filters
EVDOSIG: RFAN:CCF:DATA ON
EVDOSIG: RFAN:CCF:DRC ON
EVDOSIG: RFAN:CCF:ACK ON

; Set reference power to pilot power
EVDOSIG: CONF:CDP:CHPW:CONT:PRM PPOW
PAUSE 2000

; AN power set to -75dBm
EVDOSIG: CONF:ANS:POW:EVDO -75.0;*OPC?
EVDOSIG: READ:ARR:CDP:CHPW:AVER?

FPRINT -----
FPRINT Tx Code Domain Power, reverse: 9.6
FPRINT -----
; Configure RTAP with 9.6K data rate
EVDOSIG: CONF:LAY:APPL:DTES:RTAP:DATA:RMIN:IND 1
EVDOSIG: CONF:LAY:APPL:DTES:RTAP:DATA:RMAX:IND 1
EVDOSIG: PROC:SIGN:ACT RNEG;*OPC?
; Wait for data rate change to take effect
PAUSE 1000

; Query for Code Domain Power Results for each Channel
EVDOSIG: INIT:CDP:CHPW
EVDOSIG: FETC:ARR:CDP:CHPW:AVER?
EVDOSIG: ABOR:CDP:CHPW;*OPC?
EVDOSIG: READ:ARR:CDP:CHPW:AVER?

```

```
FPRINT -----
FPRINT Tx Code Domain Power, reverse: 19.2
FPRINT -----
; Configure RTAP with 19.2K data rate
EVDOSIG: CONF:LAY:APPL:DTES:RTAP:DATA:RMIN:IND 2
EVDOSIG: CONF:LAY:APPL:DTES:RTAP:DATA:RMAX:IND 2
EVDOSIG: PROC:SIGN:ACT RNEG;*OPC?
; Wait for data rate change to take effect
PAUSE 1000

; Query for Code Domain Power Results for each Channel
EVDOSIG: INIT:CDP:CHPW
EVDOSIG: FETC:ARR:CDP:CHPW:AVER?
EVDOSIG: ABOR:CDP:CHPW;*OPC?
EVDOSIG: READ:ARR:CDP:CHPW:AVER?

; Repeat for other data rates (38.4, 76.8, 153.6)

EVDOSIG: ABOR:CDP:CHPW
CLOSEDATA
EVDOSIG: PROC:SIGN:ACT CREL
```

Default Packet Application Call and Queries for RLP/IP Statistics

The following example GPIB sequence configures the CMU for a 1xEV-DO Default Packet Application call and queries for RLP/IP Statistics.

```

ECHO ON
FPRINT -----
FPRINT INITIALISATION ROUTINE:
FPRINT ASK FOR THE IDENTIFIER OF THE CMU, RESET THE INSTRUMENT,
FPRINT DEFINE THE SECONDARY ADDRESSES FOR ALL AVAILABLE FUNCTION GROUPS
FPRINT -----
CMUBASE: *IDN?
CMUBASE: *RST;*OPC?
CMUBASE: *CLS
CMUBASE: TRAC:REM:MODE:DISP ON

; Get primary and secondary addresses
CMUBASE: SYSTEM:REMOTE:ADDR:PRIM?
CMUBASE: SYST:REM:ADDR:SEC?

; Set the secondary address of the functional groups
CMUBASE: SYST:REM:ADDR:SEC 10,"EVD01XAT_Sig"

EVDOSIG: CONF:CDP:CHPW:CONT ARR,10,SING,NONE,NONE

; Configure Network for 1xEVDO Rel 0; USCell; SID 1
; Chan 150; Power -50dBm
EVDOSIG: CONF:NETW:REL 0
EVDOSIG: CONF:NETW:STAN USC
EVDOSIG: CONF:NETW:SYST:SID 1
EVDOSIG: CONF:ANS:CHAN 150
EVDOSIG: CONF:ANS:POW:EVDO -50.00

; Configure Power Control
EVDOSIG: CONF:ANS:PCB AUTO

; Configure Foward Packet Activity
EVDOSIG: CONF:ANS:FPAC 100

; Collect all layer tab changes first
EVDOSIG: CONF:LAY:UPD:MODE USER

; Setup Default Packet Application on Stream 1
EVDOSIG: CONF:LAY:APPL:DPAC:ENAB ON
EVDOSIG: CONF:LAY:APPL:DPAC:STR 1;*OPC?

; Configure Rate Parameters with probability of 1
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R9K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R19K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R38K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:ITR:R76K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R19K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R38K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R76K 255
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DTR:R15K 255

; Set Data Channel Gains to 0 dB for all rates
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R9K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R19K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R38K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R76K 0.0
EVDOSIG: CONF:LAY:MAC:RTCP:DRCP:DATA:R15K 0.0

```



```

; Configure the DRC and ACK Channel gains to 0 dB
EVDOSIG: CONF:LAY:MAC:FTCP:DFTP:DRC:CGA 0.0
EVDOSIG: CONF:LAY:MAC:FTCP:DFTP:ACK:CGA 0.0

; Now send all of the above layer parameter updates to the AT
EVDOSIG: PROC:SIGN:ACT RNEG;*OPC?
PAUSE 1000

; Ready for test
; Turn the signal on
EVDOSIG: PROC:SIGN:ACT SON;*OPC?

; Wait for Session to open
REPORT OFF
[Wait_SOP]
IF EVDOSIG: SIGN:STAT? = SOP GOTO SOP_OK
PAUSE 100
GOTO Wait_SOP

[SOP_OK]
REPORT ON

FPRINT -----
FPRINT Establish Data Call from Access Terminal and then press any key to
continue
FPRINT -----
waitkey

; Wait for traffic channel connection
[Wait_CALL]
IF EVDOSIG: SIGN:STAT? = CEST GOTO CALL_OK
PAUSE 100
GOTO Wait_CALL
[CALL_OK]

; Wait for connection of PPP link
[Wait_PPP]
IF EVDOSIG: SIGN:STAT:PPP? = CONN GOTO PPP_CONN
PAUSE 100
GOTO Wait_PPP
[PPP_CONN]

; AN power set to -75dBm
EVDOSIG: CONF:ANS:POW:EVDO -75.0;*OPC?

EVDOSIG: PROC:SIGN:ACT RNEG;*OPC?
PAUSE 2000

FPRINT -----
FPRINT Start Data Transfer from the Access Terminal (FTP, Web browsing, etc)
and
FPRINT press any key to start collecting RLP/IP Statistics
FPRINT -----
waitkey

FPRINT -----
FPRINT Periodically Query for RLP STATS during the entire data session
FPRINT -----

[Wait_DATA]
; Once the PPP transitions out of Connected, stop the RLP stats collection
IF EVDOSIG: SIGN:STAT:PPP? <> CONN GOTO DATA_DONE
PAUSE 1000

```

```
; Query for RLP Stats (Tx/Rx IP Packets, Tx/Rx Data Rate)
EVDOSIG: RLPS?
GOTO Wait_DATA
[DATA_DONE]

EVDOSIG: ABOR:CDP:CHPW
CLOSEDATA
EVDOSIG: PROC:SIGN:ACT CREL
```

8 Maintenance

The CMU does not require any special maintenance. Remove any contamination on the instrument by means of a soft cloth. Make sure that the air vents are not obstructed.

Refer to the CMU operating manual detailed maintenance, storage, and packing procedures. The CMU operating manual also contains a list of support and service centers.

Refer to the CMU Service manual for information on troubleshooting, repair, and calibration.

9 Error Codes

Table 9-1 lists the error codes and associated messages that may occur when you are using the remote control commands.

Table 9-1 Error Codes

Error Code	Message
0	No error
-100	Command error
-101	Invalid character
-102	Syntax error
-103	Invalid separator
-104	Data type error
-105	GET not allowed
-108	Parameter not allowed
-109	Missing parameter
-111	Header separator error
-112	Program mnemonic too long
-113	Undefined header
-113	Undefined header
-114	Header suffix out of range
-120	Numeric data error
-121	Invalid character in number
-123	Exponent too large
-124	Too many digits
-128	Numeric data not allowed
-131	Invalid suffix
-134	Suffix too long
-138	Suffix not allowed
-141	Invalid character data
-144	Character data too long
-148	Character data not allowed
-151	Invalid string data
-158	String data not allowed
-161	Invalid block data
-168	Block data not allowed
-171	Invalid expression
-178	Expression data not allowed
-180	Macro error
-200	Execution error
-211	Trigger ignored
-221	Setting conflict

-222	Data out of range
-223	Too much data
-224	Illegal parameter value
-230	Data corrupt or stale
-240	Hardware error
-241	Hardware missing
-250	Mass storage error
-251	Missing mass storage
-252	Missing media
-253	Corrupt media
-254	Media full
-255	Directory full
-256	File name not found
-257	File name error
-258	Media protected
-300	Device-specific error
-310	System error
-311	Memory error
-313	Calibration memory lost
-314	Save/recall memory lost
-315	Configuration memory lost
-330	Self test failed
-350	Queue overflow
-360	Communication error
-361	Parity error in program message
-362	Framing error in program message
-363	Input buffer overrun
-400	Query error
-410	Query INTERRUPTED
-420	Query UNTERMINATED
-430	Query DEADLOCKED
-440	Query UNTERMINATED after indefinite response

Index

1

1xEV-DO Power..... 4-140, 6.193

A

Access Cycle Duration 6.202
 Access network signal
 Call loss detection time 4-143
 Access Offset..... 6.203
 Access probe power..... 4-44
 Access Probe Power
 Signalling 4-43
 Access probes mode..... 6.200
 Access Terminal
 Connection..... 2.2
 SElect 6.41
 Subsystem, Analyzer 6.14
 Subsystem, Generator..... 6.22
 ACK 6.12, 6.126, 6.127, 6.128, 6.206
 ACK Channel Fix Mode..... 6.166
 ACK Channel Fix Mode - FETAP 6.170
 ACK Channel Modulation Type 6.171
 ACP 6.92
 ACP Spectrum 6.92
 Remote Control..... 6.92
 ACP Spectrum measurement (control)
 Remote control 6.93
 AN frequency offset 4-141
 AN frequency offset 4-14
 AN PPP Inactivity Timer..... 4-129
 AN signal
 Call loss timer 4-143, 6.198
 AN Signal..... 6.192
 AN Signal Default Settings..... 6.192
 AN Signal frequency 4-117, 4-140
 Analyzer..... 4-4
 Analyzer Level..... 4-4, 4-160
 Analyzer/Generator 4-32
 Any Limit Exceeded 4-100, 4-101
 Application 3.6
 Modulation 4-51, 4-72
 Receiver Quality 4-87
 Application layer..... 6.162, 6.163, 6.164, 6.179
 Authentication..... 6.178, 6.179
 AT Home Agent IP Addr..... 4-128
 AT Information 4-116
 ESN..... 6.160
 MEID 6.160
 UATI 6.160
 Attenuation..... 4-23, 4-117, 4-148
 frequency-dependent 4-149
 Authentication (PPP)..... 4-129
 Autoranging..... 4-4
 Average 4-38
 Average values (calculation) 3.8
 AWGN..... 6.19, 6.194
 AWGN Level 4-14, 4-141
 AWGN Power Mode..... 4-14, 4-141

B

Band class 6.7, 6.198
 Bit reverse..... 4-79
 Code domain power..... 4-79

C

Call established 4-111
 Call Loss Detection..... 6.198
 Call loss detection time 4-143
 Call loss timer..... 4-143, 6.198
 Call setup 2.12
 Care of Address..... 4-128, 6.175
 Carrier feedthrough..... 4-36
 Carrier Feedthrough 4-50
 Carrier frequency error..... 4-36
 CDPower
 CHPW Measurement 6.120
 Channel power 4-76
 Remote control..... 6.120
 Statistic count..... 6.122
 Channel power control
 Remote control 6.121
 Clock
 Frequency 6.40
 Clock frequency..... 6.40
 Clock state..... 6.40
 Closed loop power control 4-18, 4-141
 Code Channel
 ACK..... 6.12, 6.126, 6.127, 6.128, 6.206
 Data 6.126, 6.127, 6.128
 DATA 6.12, 6.206
 DRC 6.12, 6.126, 6.127, 6.128, 6.206
 DSC 6.126, 6.127, 6.128
 Pilot..... 6.126, 6.127, 6.128
 RRI..... 6.126, 6.127, 6.128
 Code Channel Filter
 Remote Control 6.12, 6.206
 Code domain error power
 Remote control 6.100, 6.111
 Code domain power..... 4-74
 Remote control 6.100
 Code Domain Power
 Remote control 6.101, 6.112
 Remote control 6.121
 Code domain power configuration 4-78
 Code domain power measurement (control) 4-78
 Code Domain Power measurement (control)
 Remote control 6.101
 Code Domain Power, I/Q Leakage Check 6.105
 Color Code 6.195
 Command
 Order..... 5.7
 Structure..... 5.1
 Tables (description) 5.7
 Command Set..... 6.2
 Confidence Testing..... 4-101
 Configurations 3.4
 Connected 4-111
 Connection Control
 Handoff..... 6.161
 Layer 6.161
 Connection control (NSig)..... 4-3
 Connection control (Sig) 4-111
 Connection layer..... 6.181
 Connectors (RF)..... 2.3
 Continuous 5.4
 Continuous measurement..... 4-37
 Control Channel power 6.123
 Control Channel..... 6.15, 6.20
 Control Channel PER 4-83

Counting 5.4
 Country Code 6.197
 Current 4-38
 Current values (parameters) 6.157

D

DATA 6.12, 6.206
 Data Channel Modulation Type 6.14, 6.15, 6.208
 Data Channel Modulation, Analyzer 6.14, 6.208
 Data Rate 6.21, 6.28, 6.165, 6.170
 Data Rate Index 6.21, 6.26, 6.165
 Default
 Modulation configuration 4-64
 Default Settings 4-37, 4-47, 4-124, 4-140
 Default values (parameters) 6.157
 Delta marker 4-168
 Display mode 3.7
 Display Mode
 Modulation 4-38
 D-Line 4-169
 DRC 6.12, 6.126, 6.127, 6.128, 6.206
 DRCLock Length 6.30
 DRCLock Period 6.30
 DRCLock State 6.29
 DSC 6.126, 6.127, 6.128
 DSC value 6.188

E

Enable software 1.9
 Error codes 9.1
 ESN 4-116
 External (Trigger) 4-28, 4-157
 Ext. att. input 4-24, 4-117, 4-148, 6.37
 Ext. att. output 4-23, 4-117, 4-148, 6.38
 External attenuation 4-23, 4-117, 4-148
 frequency-dependent 4-149
 Remote control 6.37
 External Synchronization
 System Time 6.210
 External triggering 4-28, 4-156

F

Factory test mode 5.6
 FETAP Data Rate Index 6.169
 Filter
 Code Channel 6.12, 6.206
 Foreign Agent Home IP Addr. 4-128, 6.174
 Forward Link PER 4-83
 Forward Link Performance 4-84
 Forward Packet Activity 6.29, 6.198
 Frame Period 6.42, 6.213
 Frequency offset 6.20, 6.193
 Analyzer 6.10
 PN 6.197
 Frequency unit 6.9, 6.16
 Frequency-dependent external attenuation 4-149

G

Gain 4-23, 4-148
 Generator 4-12, 4-21
 Generator frequency 4-5, 4-13
 Getting started 2.1
 GPIB Command Set Version 6.2
 GPIB commands 6.1
 GPIB error codes 9.1
 Graph
 Error 4-54

H

Hadamard matrix 4-79
 Code domain power 4-79
 HANDoff
 Network Standard 6.161
 RF channel 6.161
 H-ARQ Mode 6.30
 HLT state 2.11
 Home Agent IP Address
 AT Node 6.174
 Home Agent Secret 4-128
 AT Node 6.174
 Hotkeys 3.4

I

I signal
 Channel power 6.126
 Long Code Mask 6.11
 I/Q Analyzer
 Remote control 6.88
 I/Q imbalance 4-50
 I/Q origin offset 4-50
 I/Q signal
 Channel power 6.126, 6.127, 6.128
 Code domain power 6.107, 6.108
 Peak code domain error power 6.116
 I/Q-IF 4-30, 4-158, 6.4, 6.132
 I/Q-IF Interface
 remote control 6.3, 6.132
 IF Level 4-31, 6.5, 6.132
 Impairments
 Analyzer 4-5, 4-8, 4-11, 4-162, 4-163
 Inactivity Control (PPP) 4-129
 Info 6.2, 6.132
 Initial Adjustment 6.200
 Installation 1.3
 Installing software 1.4
 Flash disk 1.4
 Floppy disks 1.4
 Interference (external) 2.3
 Interleaving Factor 6.25
 IP address
 DNS, dynamic 6.178
 DNS, static 6.177
 Ping 4-110
 PPP, dynamic 4-129
 PPP, dynamic (AN and AT) 6.178
 PPP, static 4-129
 PPP, static (AN and AT) 6.177
 IQ Access Interface 6.35
 IQ Leakage Check 6.105
 IQ/IF Level 4-159

L

Layer parameter update mode 6.162
 Limit
 Check 5.5
 Specify 5.5
 Limit matching
 Modulation, overview 6.69
 Limitmatching
 Modulation 6.55
 Limits
 Channel Power, CHPW 6.124
 Code Domain Power 6.97, 6.103, 6.105, 6.114
 Code Domain Power 6.124
 Code domain power measurement 4-81
 Code Domain Power, CDPW 6.97, 6.105

Code Domain Power, CPCCommon6.103, 6.114, 6.124
 I/Q Leakage Check 6.105
 Modulation 6.51, 6.65
 Modulation measurement, signaling 4-39, 4-64
 Modulation, OEMP 6.65, 6.66, 6.67
 Peak Code Domain Error Power 6.114
 Peak Code Domain Error Power, PCDep 6.114
 Spectrum measurement, signaling 4-70
 Limits (Modulation) 4-39
 List of Commands 6.214
 Literal 5.7
 Long Code Mask 6.11
 I signal 6.11
 LSB 6.11
 MSB 6.11
 Q signal 6.11
 Loopback
 FETAP 6.170
 FTAP 6.166
 LSB Long Code Mask 6.11

M

MAC Index 6.23, 6.195
 MAC layer 6.183, 6.189
 MAC Level 6.23, 6.32
 Main power switch 2.2
 Maintenance 8.1
 Manual control 3.1
 Markers 4-168
 Max. PER Exceeded 4-100
 Maximum PER 4-103
 Measurement
 Control 5.2
 Measurement groups 3.4
 Measurement object 5.2
 Measurement Subtype 6.11, 6.205
 MEID 4-116
 Menu select 2.4
 Menu structure 3.1
 Messages, error 9.1
 Min. Conf. Lev. Exceeded 4-100
 Min. Confidence Level 4-103
 MIP Authentication Type 4-128, 6.177
 MIP Stand Alone Mode 4-127
 Mobile Node Home IP Addr 4-127, 6.174
 Modulation
 Analyzer/Generator 4-34, 4-66
 Narrow Band Power 4-43
 Remote control 6.71, 6.77, 6.83
 Remote control 6.61
 MODulation
 OEMP, limits 6.65, 6.67
 Modulation configuration 4-36, 4-47
 Modulation configuration 4-63
 Modulation measurement 4-48
 Remote control 6.47, 6.61, 6.69, 6.76, 6.82
 Modulation measurement (control) 4-37, 4-47
 Remote control 6.47, 6.61, 6.69, 6.76, 6.82, 6.88
 Remote control 6.48, 6.71
 Modulation Overview configuration
 Remote control 6.63
 Modulation quality configuration
 Remote control 6.48
 Modulation measurement (control)
 Remote control 6.63, 6.77, 6.83, 6.89
 MP Agent Advertisements 4-128, 6.175
 MSB Long Code Mask 6.11

N

Narrow band
 Statistics 6.58
 Narrow Band Power 6.56
 Network release 6.199
 Network Standard 6.7, 6.198, 6.199
 Networks Supported 1.3
 Nominal Offset 6.201
 Notation
 Remote control 5.7
 NPower
 Repetition 6.59
 NPOWer 6.56
 Remote control 6.58
 NPower measurement (control)
 Remote control 6.58
 Number of Bits 6.31, 6.32
 Number P Bits 6.196

O

OEMP 6.91
 OEMP measurements 6.91
 OEMP Modulation 6.91
 On Limit Failure 4-38
 Operating concept 3.1
 Options (Setup)
 remote control 6.1, 6.132
 Orthogonal Variable Spreading Factor 4-79
 Other Access Terminal Count 6.34
 Out of tolerance 4-36
 Out of Tolerance
 Modulation, EVM 6.74
 Modulation, magnitude error 6.80
 Modulation, phase error 6.86
 Output power 6.18
 Output Power 4-13, 4-117, 4-140
 Output Routing 6.42, 6.213
 Overall Sector ID 6.196, 6.197
 OVSF 4-79

P

Packet Count 6.24
 Packet Size 6.28
 Packet Size (ping) 6.155
 Packet Size (Ping) 4-110
 Packet Start Offset 6.21, 6.25, 6.33
 Packet Type Index 6.27
 Packing 8.1
 Parameter
 command 5.7
 Current vs. default 6.157
 Partial reset 6.2, 6.132
 Password (PPP authentication) 4-129
 Pattern 6.29
 Peak code domain error power 4-76
 Peak Code Domain Error Power
 PCDep 6.111
 Remote control 6.111
 Peak code domain power measurement (control)
 Remote control 6.112
 Physical layer 6.192
 Pilot 6.100, 6.107, 6.108, 6.111, 6.116, 6.117, 6.118
 Pilot Strength
 Correction Max 6.204
 Correction Min 6.204
 Nominal 6.203
 Ping Configuration 4-109
 remote control 6.154

- Ping Count 4-110, 6.154
 Ping measurement
 remote control 6.153
 Ping measurement 4-107
 PN Offset 6.18
 Polarity 6.32
 Power (wide band) 4-24, 4-149
 Remote control (Sig) 6.60, 6.153
 Power (wideband)
 remote control 6.38, **6.215**
 Power control bits 4-18, 4-141
 Power Control Bits 6.31, 6.194
 Power measurements 6.132
 example 2.6
 Power switch 2.3
 PPP 4-129
 PPP Authentication Type 4-129
 PPP Connected 4-112
 PPP off 4-112
 Preamble Length 6.202
 Preamble Length (Slots) 6.202
 Primary address 5.1
 Probe Increment 6.201
 Probe Timeout Adjust 6.203
 Probes per Sequence 6.201
 Program example 7.1
- Q**
- Q signal
 Code domain power 6.107, 6.108
 Long Code Mask 6.11
- R**
- RAB Length 6.33
 RAB State 6.33
 range test 6.31
 Recall
 current 6.3, 6.132
 Receiver quality
 remote control 6.135, 6.138, 6.141, 6.144, 6.145, 6.148
 Receiver Quality 2.16, 4-83
 Receiver Quality (control) 4-99
 Receiver Quality (limits) 4-101
 Receiver Quality Configuration 4-98
 Ref. 4-168
 Reference frequency 4-25
 Remote control 6.40
 Reference line 4-169
 Reference marker 4-168
 Registration Reply Code 4-128, 6.176
 Registration Reply Lifetime 4-128, 6.176
 Rel. 2 4-168
 Remote control
 basics 5.1
 Commands 6.1
 Notation 5.7
 Program example 7.1
 Repeat Interval 4-110, 6.155
 Repetition
 ACP Spectrum 6.94
 Channel power 6.123
 Code domain power 6.102
 Modulation 6.50, 6.132
 Modulation 4-37, 4-100
 Modulation, EVM 6.72
 Modulation, IQ Analyzer 6.89
 Modulation, magnitude error 6.78
 Modulation, overview 6.64
 Modulation, phase error 6.84
 NPower 6.59
 Peak code domain 6.113
 Ping 6.154
 Repetition mode 3.6, 5.4
 Report mode 6.56
 Reset 2.4, 2.5
 Result
 ACP Spectrum 6.97
 Channel power 6.125
 Code domain power 6.106
 Error vector magnitude 6.74
 IQ Analyzer 6.91
 Magnitude error 6.80
 Modulation overview 6.68
 Modulation quality 6.54
 Narrow band power 6.59
 Peak code domain error power 6.115
 Phase error 6.86
 Receiver quality statistics overview 6.134, 6.156
 Wide band power 6.40, 6.217
 Result (power) 4-73
 Result mode
 Channel power 6.122
 Code domain power 6.101
 Modulation, EVM 6.71
 Modulation, IQ Analyzer 6.89
 Modulation, magnitude error 6.77
 Modulation, phase error 6.84
 Peak code domain 6.112
 Result order
 Code domain power 6.102
 Peak code domain 6.113
 RETAP Max. Data Rate Index 6.172
 RETAP Min. Data Rate Index 6.171
 Reverse Activity Bit 6.33
 Reverse Link Frame Offset 6.14
 Reverse Link PER 4-85
 Reverse Link Performance 4-84
 Reverse Link Quality 4-83
 RF channel
 AN Signal 4-117, 4-140
 Generator 4-5, 4-13
 RF Channel unit 6.192
 RF Channel/Frequency 6.193
 RF connector 2.2
 RF Connector in/out 4-117
 RF Connector Out 4-117
 RF connectors 2.3, 4-22, 4-147, 6.37
 RF frequency 4-5, 6.9, 6.16
 RF generator 6.15
 mode 6.18
 Remote control 6.15
 signal subtype 6.19
 RF input 4-23, 4-117, 4-148, 6.37
 RF level, mode 6.8, 6.205
 RF Max. Level 4-4, 4-160, 6.8, 6.205
 RF Mode 4-4, 4-160
 RF output 4-23, 4-147, 6.37
 RFAnalyzer
 Remote control 6.8, 6.204
 Rho factor 4-50
 RLP / IP Statistics measurement 4-104
 remote control 6.152
 Routing (Trigger) 4-28, 4-157
 RRI 6.126, 6.127, 6.128
 RRI 6.100, 6.107, 6.108, 6.111, 6.116, 6.117, 6.118
 RTAP Max. Data Rate 6.168
 RTAP Max. Data Rate Index 6.167
 RTAP Min Data Rate 6.168
 RTAP Min. Data Rate Index 6.167
 RX Path 4-31, 4-159, 6.4, 6.132

S

Save
 current 6.3, 6.132
 SCPI standard 5.2
 Secondary address 5.1, 5.6
 Sector Access Rate (Max.) 6.203
 Sector ID Low Bits 6.196
 SectorID
 Format 6.196
 Select Access Terminal 6.41
 Session Info 4-116
 Session layer 6.180
 Session negotiation 4-111
 Session Open 4-111
 Sideband frequency offset
 Modulation 4-39, 6.50
 Signal off 4-111
 Signal on 4-111
 Signaling 4-111
 Remote control 6.158
 Signaling layer 6.161
 Signaling Setup 4-117
 Signaling state 6.159
 Signaling State 6.159
 Signaling states 6.158
 Single shot 5.4
 Single-shot measurement 4-37
 Slot Count 6.22, 6.28, 6.166, 6.170
 Softkeys 3.4
 Software
 Update and installation 1.1
 Software (enable) 1.9
 Software configuration 1.7
 Special character 5.8
 Spectrum 6.92
 Remote control 6.93
 Spectrum configuration 4-69
 Standby and Access Probe power
 Remote control (Sig) 6.60
 Standby mode 2.3
 Standby power 4-44
 Startup menu 1.3, 2.2
 Statistic count 4-75, 5.4
 ACP Spectrum 6.93
 Channel power 6.122
 Code domain power 6.101
 Modulation 6.49
 Modulation, EVM 6.71
 Modulation, magnitude error 6.78
 Modulation, overview 6.64
 Modulation, phase error 6.83
 Peak code domain 6.112, 6.113
 Statistic count 4-36, 4-46
 Statistic Count 3.6
 Modulation 4-38
 Statistical PER Tests 4-101
 Statistical quantities 3.8
 Statistics
 NPower 6.58
 Remote control 5.3
 Statistics cycle 3.6
 STATus
 OPERation register 6.6
 OPERation register - Symbolic evaluation 6.6
 Status indication 2.7, 2.11
 Status reporting system 5.5
 Status symbols 3.2
 Stepping mode
 ACP Spectrum 6.94
 Channel power 6.123

Code domain power 6.102
 Modulation 6.50
 Modulation, EVM 6.72
 Modulation, IQ Analyzer 6.89
 Modulation, magnitude error 6.78
 Modulation, overview 6.64
 Modulation, phase error 6.84
 Peak code domain 6.113
 Ping 6.154
 Stop condition
 ACP Spectrum 6.94
 Channel power 6.123
 Code domain power 6.102
 Modulation 6.50
 Modulation, EVM 6.72
 Modulation, IQ Analyzer 6.89
 Modulation, magnitude error 6.78
 Modulation, overview 6.64
 Modulation, phase error 6.84
 Peak code domain 6.113
 Ping 6.154
 Stop Condition 3.7
 Modulation 4-38, 4-100
 Storing 8.1
 Stream layer 6.180
 Subarrays
 Modulation, EVM 6.73
 Modulation, IQ Analyzer 6.90
 Modulation, magnitude error 6.79
 Modulation, phase error 6.85
 Subnet Mask 6.197
 Symbolic evaluation of status register 5.5, 6.6
 Sync. Message 6.15, 6.20
 Synchronization
 Remote control 6.40
 system time 6.209
 System ID Number 6.200

T

Test mode 2.6
 Test modes 3.1
 Tests
 1xEV-DO 4-2
 1xEV-DO Non-Signaling 4-32
 1xEV-DO Non-Signaling and Signaling 4-41
 1xEV-DO Signaling 4-83
 Threshold IF Power 6.43, 6.212
 Threshold RF Power 6.43, 6.212
 Time synchronization
 remote control 6.209
 Timeout (ping) 4-110, 6.155
 Trace 5.4
 Transmit time error 4-36
 Trigger 4-27, 4-156
 remote control 6.41, 6.211
 Trigger IF power level 4-157
 Trigger Output 6.42, 6.213
 Trigger output routing 4-157
 Trigger RF power level 4-157
 Trigger slope 4-157
 Trigger Slope 6.41, 6.213
 Trigger source 6.44, 6.211
 Trigger source 4-28, 4-29, 4-157
 Triggering
 External 4-28, 4-156
 TX Path 4-31, 4-159, 6.4, 6.132

U

UATI 4-116
Update period 6.133, 6.152
Update Period (Receiver Quality) 4-100, 4-105
Updating software 1.4
Use AT IP Address (Ping) 4-110, 6.155
Username (PPP authentication) 4-129

V

Version 6.2

Version manager 1.4

W

Waveform quality 4-50
 Modulation 4-55, 4-60
Waveform quality 4-36
White noise 6.19, 6.194
White noise, Gaussian 6.19, 6.194
Wideband power
 remote control 6.38, 6.215
Wideband Power 4-24, 4-149