



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Instructions

Improvement of Wideband Modulation Analysis

CMU-Z6

1150.0001.02

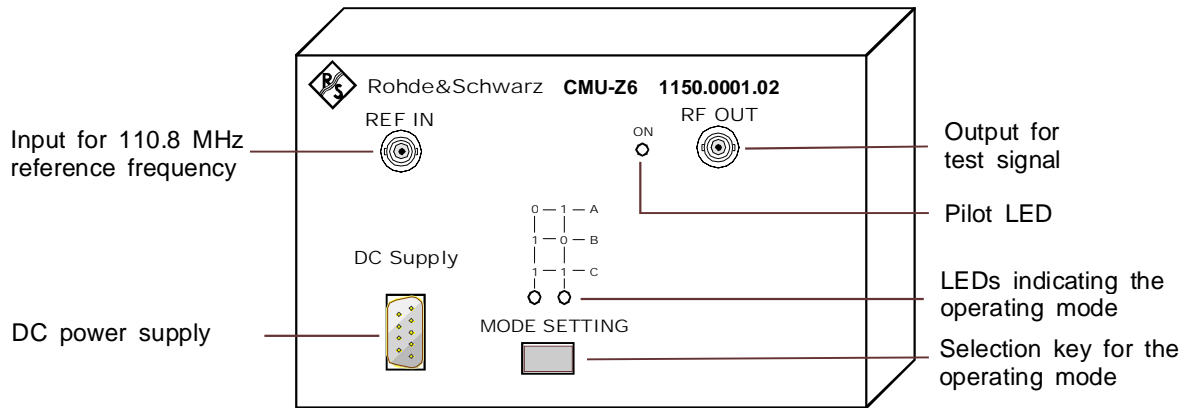
Printed in Germany

Improvement of Wideband Modulation Analysis

CMU-Z6 is a hardware option designed to improve the accuracy of the CMU's wideband modulation analysis. This is achieved by calculating a correction filter from a specific test signal that is applied to the RF analyzer of the instrument. The correction method is appropriate for modulation measurements on both 3.84 Mcps QPSK modulated signals and WCDMA (3GPP standard uplink) signals. After correction, the error of the measured RMS Error Vector Magnitude (EVM) is typically 1.2 %.

Description of CMU-Z6

CMU-Z6 is equipped with two BNC connectors for the input and output of RF test signals, a Sub-D connector for DC power supply, a selection key and three LEDs indicating the operating mode:



CMU-Z6 is supplied with 3 cables for connection to the CMU200 (see below).

Important Note:

The MODE SETTING key is used to select the operating mode of the CMU-Z6. Mode B must be selected to perform a modulation correction. The other modes are intended for further extensions.

Prerequisites for using CMU-Z6

To make use of the improved modulation analysis, the CMU must be able to measure wideband QPSK or WCDMA signals. This requires that:

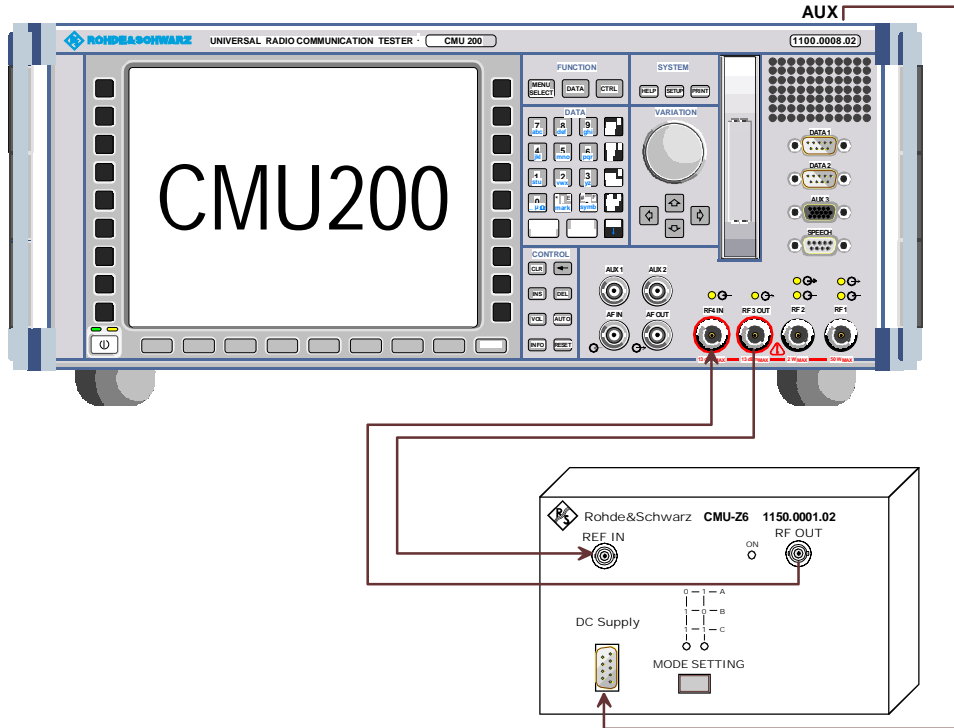
- Software option CMU-K65 or CMU-K0 (for demo units only) is enabled.
- Hardware option CMU-U65 is installed.

With this instrument configuration, the modulation correction can be performed according to the description in the next section. No additional software installation is required.

Performing a Modulation Correction

A modulation correction involves three steps:

1. Connect CMU-Z6 to the CMU200.



- Use the Sub-D extension cable delivered with the device to supply CMU-Z6 with the +5 V DC power from the AUX connector at the rear panel of the CMU.
- Use the two N to BNC cables to provide CMU-Z6 with a 110.8 MHz reference frequency from RF3 OUT and to feed the generated test signal back to RF2^{*)}.

^{*)} Important Note:

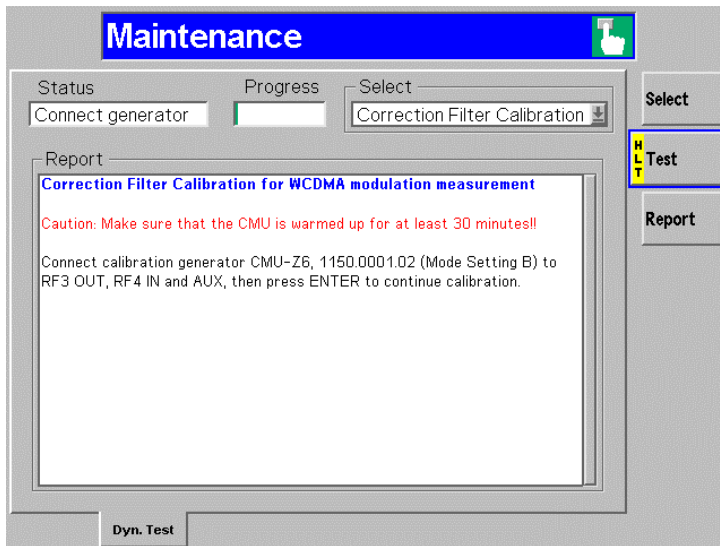
The assignment of RF connectors depends on the firmware version. Some firmware versions require RF4 IN to be used as an input connector. Please follow the directions given in the Maintenance menu (see p. 5).

2. Press the **MODE SETTING** key at the CMU-Z6 to select Mode B.

In mode B the left LED lights, while the right LED is off.

3. Initiate the modulation correction from the CMU200.

- Ensure that the CMU has been warmed up for at least 30 minutes before the modulation correction is started.
- Open the *Menu Select* menu of the CMU and select the *Maintenance* menu in the *Base* system.
- Press the *Select* softkey and use the rollkey to select *Correction Filter Calibration*.
- Press the *Test* softkey and the *ON/OFF* key to start the modulation correction.



The CMU states that the CMU-Z6 must be connected and that Mode B must be selected as described above.

- Press *ENTER* to continue the modulation correction.

The progress of the correction is monitored in the *Status* and *Progress* fields. Once the correction is terminated, the *Test* status indication changes to *HLT* and the CMU is ready to perform an improved wideband modulation analysis.

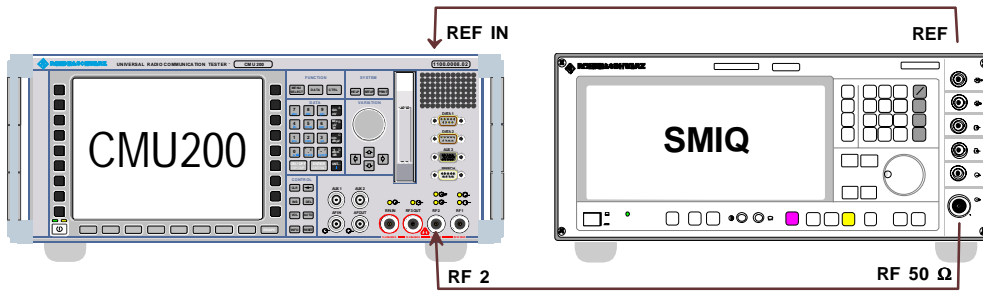
Important Note:

A warm-up time of at least 30 minutes is necessary to reach the normal operating temperature of the CMU; otherwise the correction values might be impaired.

Checking the Corrected Measurement

The accuracy of the corrected modulation measurement can be checked by using a standard QPSK or WCDMA signal from a signal generator. We propose the following equipment and test setup:

Equipment	Properties	Appropriate R&S device	Stock no.	Use
Signal generator	300 kHz to 3.3 GHz QPSK / WCDMA	SMIQ03	1084.8004.03	QPSK
		SMIQ03B with option SMIQ-B47	1125.5555.03	WCDMA
Coax cable	N to N, approx. 1 m length	RF connection cable	0100.7670.10	RF connection SMIQ → CMU
Coax cable	BNC to BNC (50 Ω), approx. 1.8 m length	RF connection cable	0100.6945.20	Synchronize CMU to 10 MHz reference signal from SMIQ



To check the accuracy of the corrected modulation measurement,

➤ Perform a *Preset* of the SMIQ settings and a *Reset* of the CMU.

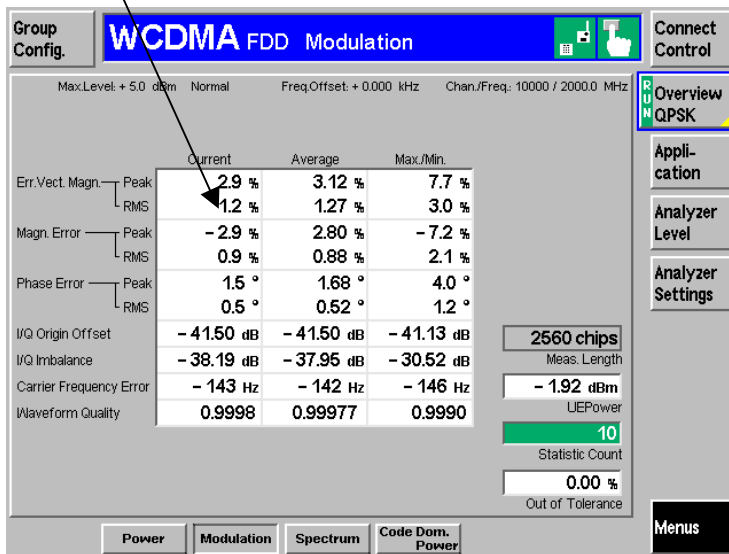
➤ **Set the SMIQ** to comply with the CMU default analyzer settings:

FREQUENCY	1922.4 MHz	LEVEL	0 dBm
DIGITAL MOD	→ STATE	→ ON	
	→ SELECT STANDARD...	→ WCDMA QPSK	
	→ SYMBOL RATE	→ 3.84 Mcps	
	→ Filter	→ FILTER MODE	→ LOW_EVM

➤ **Set the input path of the CMU** and start the modulation measurement:

Group Config.	→ Input Level	→ Max. Level	→ Mode	→ Manual
			→ Manual Level	→ +5 dBm
			→ Attenuation	→ Low Noise
Connect. Control	→ Synch.	→ Reference Frequency	→ Ext. (at REF IN)	10 MHz
WCDMA 1900 FDD	→ Modulation	→ Application	→ Overview	QPSK

The RMS Error Vector Magnitude is shown in the second row of the *Overview QPSK* output table. The result should be approx. 1.2 %:



Please bear in mind that the displayed EVM result also contains a possible inaccuracy of the generator signal.