ROHDE&SCHWARZ

Test and Measurement
Division

Operating Manual

VECTOR NETWORK ANALYZER

ZVR / ZVRE / ZVRL

1127.8551.61/.62
1127.8551.51/.52
1127.8551.41

ZVC / ZVCE

1127.8600.60/.61/.62
1127.8600.50/.51/.52

ZVM

1127.8500.60

ZVK

1127.8651.60

Volume 2
Operating Manual consists of 2 volumes

Printed in the Federal
Republic of Germany

Volume 1	Volume 2
Contents	Contents
Index	Index
Data Sheet	
Supplements	
Safety Instructions	Safety Instructions
Certificate of Quality	Certificate of Quality
EC-Certificate of Conformity	EC-Certificate of Conformity
Support Center Address	Support Center Address
List of R&S Representatives	List of R&S Representatives

Tabbed Divider	Tabbed Divider
1 Preparation for Use	1 Remote Control
2 Manual Operation	2 Maintenance and Troubleshooting
	3 Testing the Rated Specifications
	4 Annex A: Interfaces
	5 Annex B: List of Error Messages
	6 Annex C: List of Commands
	7 Annex D: Programming Examples
	8 Annex E: Emulations

Contents

Contents

Figures

Tables

ZVR, ZVRE, ZVRL, ZVC, ZVCE

ZVK, ZVM

Index

Note: *All softkeys are listed with their names. The page numbers 2.xxx refer to the detailed description of the softkeys in chapter 2. Generally, the number of the page in chapter 3 containing the equivalent remote control command is given in addition.*

A list of softkeys and equivalent remote control commands or command sequences is given in section 3.9.

Annex C contains a list of all remote control commands.

E

F

G

T

U

V

W

X

Y

Z

Δ

μ

Important Hints before Operation:

For all instruments:

- The directory C:\R_S\INSTR and its subdirectories are reserved for system software. Never modify this directory in any way, otherwise the functioning of the instrument will be impaired.
- Aborting a hardcopy is not possible when printout is in progress. Print jobs in the queue can be deleted before printout has been started by pressing the HARDCOPY START key until the message "Hardcopy in progress. Abort?" is displayed. The length of the queue is two jobs.
- To avoid damage of electronic components of the DUT and the analyzer, the operational site must be protected against electrostatic discharge.

Windows NT

Caution:

The drivers and programs used under Windows NT are adapted to the measuring instrument. In order to prevent the instrument functions from damage, the settings should only be modified as described below. Existing software may only be modified using update software released by Rohde&Schwarz. Additionally only programs authorized by Rohde&Schwarz for use on the ZVx *may be run on the instrument.*

Do not power down during booting. *Such a switch-off may lead to corruption of the hard disk files.*

Removable Harddisk FSE-B18

When using the *Removable Harddisk*, *FSE-B18*, please observe the following:

- Always keep your *Removable Harddisk* in the plastic case included in this package.
- Do not drop your *Removable Harddisk*.
- Do not expose it to moisture, to extreme temperatures, or to a strong magnetic field.
- Do not squeeze the external cover of the *Removable Harddisk*.
- Do not affix additional labels.
- Do not remove the existing label or write anything on to it.

Patent Information

This product contains technology licensed by Marconi Instruments LTD. under US patents 4609881 and 4870384 and under corresponding patents in Germany and elsewhere.

Please note the safety instructions on the next sheet !

Before putting the product into operation for the first time, make sure to read the following

Safety Instructions

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

Supply voltage ON/OFF	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double/reinforced insulation

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

Tags and their meaning

DANGER	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
WARNING	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
CAUTION	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist. It is therefore essential to make sure that the tags described here are always used only in connection with the associated documentation and the associated product. The use of tags in connection with unassociated products or unassociated documentation can result in misinterpretations and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
   prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m. Unless specified otherwise in the data sheet, a tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

4. If products/components are mechanically and/or thermically processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.

5. If handling the product yields hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation.

6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.

8. Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.

9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.

10. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

11. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.

12. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.

13. The product may be operated only from TN/TT supply networks fused with max. 16 A.

14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.

15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

16. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.

18. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.

19. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a skilled electrician.
20. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.
21. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
22. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.
23. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
24. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
25. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
26. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
27. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
28. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.
29. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
30. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves).
31. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.
32. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
33. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad

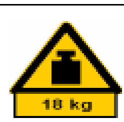
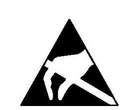
Informaciones de seguridad

Es el principio de Rohde & Schwarz de tener a sus productos siempre al día con los estandards de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. Rohde&Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto solamente fue elaborado para ser utilizado en la indústria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimiento del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

							
Ver manual de instrucciones del uso	Informaciones para maquinaria con uns peso de > 18kg	Peligro de golpe de corriente	¡Advertencia! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construción con peligro de carga electroestática

					
potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en otro capítulo de esta documentación y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por Rohde&Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO	Indica un punto de peligro con gran potencial de riesgo para el ususario.Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un protencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas .
ATENCIÓN	Indica un punto de peligro con un protencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas
CUIDADO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el ámbito de la comunidad económica europea. Pueden existir definiciones diferentes a esta definición. Por eso se debera tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue:
   como posición de funcionamiento se define principialmente la posición con el suelo de la caja para abajo , modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar.
   A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de ±10% sobre el voltaje nominal y de ±5% sobre la frecuencia nominal.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de

seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).

3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se producieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averigurar los motivos de estas reacciones.

4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.

5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberan ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.

6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.

7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.

8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.

9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.

10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.

11. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

12. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.
14. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
16. En las mediciones en circuitos de corriente con una tensión de entrada de Ueff > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
17. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
18. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efecutadas por un electricista especializado.
20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.
21. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.
22. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.
23. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.
24. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
25. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
26. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.

27. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son deshechos problemáticos. Por favor tirenlos en los recipientes especiales para este fín. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de deshechos. Nunca sometan las baterías o acumuladores a un corto circuito.

28. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.

29. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.

30. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).

31. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujecion en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean tenidas en cuenta. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.

32. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.

33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

CE

Certificate No.: 2000-05, page 1

This is to certify that:

Equipment type	Stock No.	Designation
ZVC	1127.8600.60/.61/.62	Vector Network Analyzer
ZVCE	1127.8600.50/.51/.52	
ZVK	1127.8651.60	
ZVM	1127.8500.60	
ZVR	1127.8551.61/.62	
ZVRE	1127.8551.51/.52/.55	
ZVRL	1127.8551.41	

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits
  (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility
  (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 1993 + A2 : 1995
EN55011 : 1998 + A1 : 1999, Klasse B
EN61000-3-2 : 1995 + A1 : 1998 + A2 : 1998 + A14 : 2000
EN61000-3-3 : 1995
EN50082-2 : 1995

Affixing the EC conformity mark as from 2000

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München

Munich, 2001-01-30

Central Quality Management FS-QZ / Becker

ROHDE&SCHWARZ
EC Certificate of Conformity

CE

Certificate No.: 2000-05, page 2

This is to certify that:

Equipment type	Stock No.	Designation
ZVK-B21	1128.1409.11	Attenuator for Generator Port 1
ZVK-B22	1128.1409.21	Attenuator for Generator Port 2
ZVK-B23	1128.1409.12	Attenuator for Receiver Port 1
ZVK-B24	1128.1409.22	Attenuator for Receiver Port 2
ZVM-B21	1128.1009.11	Attenuator for Generator Port 1
ZVM-B22	1128.1009.21	Attenuator for Generator Port 2
ZVM-B23	1128.1009.12	Attenuator for Receiver Port 1
ZVM-B24	1128.1009.22	Attenuator for Receiver Port 2
ZVR-B1	1044.0625.02	Autokal, Automatic Calibration System
ZVR-B2	1044.1009.02	Time Domain
ZVR-B8	1086.0000.02	3-Port Adapter
ZVR-B10	1106.6495.xx	Increased Output Power at Port 1
ZVR-B14	1106.7510.02/.03	4-Port Adapter
ZVR-B21	1044.0025.11	Attenuator for Generator Port 1
ZVR-B22	1044.0025.21	Attenuator for Generator Port 2
ZVR-B23	1044.0025.12/.31	Attenuator for Receiver Port 1
ZVR-B24	1044.0025.22/.42	Attenuator for Receiver Port 2
ZVR-B26	1106.8600.07	Extra Inputs 4 Port
FSE-B16	1073.5973.02/.03	Ethernet Interface
FSE-B17	1066.4017.02	Second IEC BUS Interface

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 1993 + A2 : 1995
EN55011 : 1998 + A1 : 1999, Klasse B
EN61000-3-2 : 1995 + A1 : 1998 + A2 : 1998 + A14 : 2000
EN61000-3-3 : 1995
EN50082-2 : 1995

Affixing the EC conformity mark as from 2000

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München

Munich, 2001-01-30

Central Quality Management FS-QZ / Becker

3 Remote Control

3.1 Introduction

The instrument is equipped with two IEC/IEEE bus interfaces according to standard IEC 625.1/IEEE 488.1 and two RS-232 interfaces.

Either the connector labeled SCPI IEC625 (the upper IEC/IEEE bus interface) or both of the RS-232 interfaces can be used for remote control of the instrument. In addition, the instrument is equipped with an RSIB interface that allows instrument control by Visual C++ and Visual Basic programs

In certain operating modes (e.g. frequency conversion measurements), the instrument can control other instruments which are connected to it as part of an IEC/IEEE bus chain via the connector labeled SCPI SYSTEM BUS (the lower IEC/IEEE bus interface). The usage of this IEC/IEEE bus interface is described in further detail in the relevant sections of the operating manual.

The instrument supports the SCPI version 1994.0 (**S**tandard **C**ommands for **P**rogrammable **I**nstruments). The SCPI standard is based on standard IEEE 488.2 and aims at the standardization of device-specific commands, error handling and the status registers (see Section 3.5.1, SCPI Introduction).

This section assumes basic knowledge of IEC-bus programming and operation of the controller. A description of the interface commands is to be obtained from the relevant manuals. The RSIB interface functions are matched to the function interface for IEC/IEEE-bus programming from National Instruments. The functions supported by the DLLs are listed in annex A.

The requirements of the SCPI standard placed on command syntax, error handling and configuration of the status registers are explained in detail in the respective sections. Tables provide a fast overview of the commands implemented in the instrument and the bit assignment in the status registers. The tables are supplemented by a comprehensive description of every command and the status registers.

The program examples for IEC/IEEE bus programming are all written in Quick BASIC.

3.2 Brief Instructions

The short and simple operating sequence given below permits fast putting into operation of the instrument and setting of its basic functions. As a prerequisite, the IEC/IEEE bus address, which is factory-set to 20, must not have been changed.

1. Connect instrument and controller using IEC/IEEE bus cable.
2. Write and start the following program on the controller:

```
CALL IBFIND("DEV1", analyzer%)                 'Open port to the instrument
CALL IBPAD(analyzer%, 20)                      'Inform controller about instrument
'address
CALL IBWRT(analyzer%, "*RST;*CLS")             'Reset instrument
CALL IBWRT(analyzer%, "FREQ:CENT 100MHz")      'Set center frequency to 100 MHz
CALL IBWRT(analyzer%, "FREQ:SPAN 10MHz")       'Set span to 10 MHz
```

The instrument now performs a sweep in the frequency range of 95 MHz to 105 MHz.

3. To return to manual control, press the *LOCAL* key at the front panel

3.3 Switchover to Remote Control

On power-on, the instrument is always in the manual operating state ("LOCAL" state) and can be operated via the front panel.
It is switched to remote control ("REMOTE" state)

IEC/IEEE bus	as soon as it receives an addressed command from a controller.
RS-232	as soon as it receives the command "@REM" from a controller.
RSIB	as soon as it receives an addressed command from a controller.

During remote control, operation via the front panel is disabled. The instrument remains in the remote state until it is reset to the manual state via the front panel or via remote control interfaces. Switching from manual operation to remote control and vice versa does not affect the remaining instrument settings.
3.3.1

3.3.1 Remote Control via IEC Bus

3.3.1.1 Setting the Device Address

In order to operate the instrument via the IEC/IEEE bus I, it must be addressed using the set IEC/IEEE bus address. The IEC/IEEE bus address of the instrument is factory-set to 20. It can be changed manually in the *SETUP - GENERAL SETUP* menu or via IEC bus. Addresses 0 to 30 are permissible.

Manually:

- ➢ Call *SETUP - GENERAL SETUP* menu
- ➢ Enter desired address in table *GPIB ADDRESS*
- ➢ Terminate input using one of the unit keys (=ENTER).

Via IEC bus:

```
CALL IBFIND("DEV1", analyzer%)                    'Open port to the instrument
CALL IBPAD(analyzer%, 20)                         'Inform controller about old address
CALL IBWRT(analyzer%, "SYST:COMM:GPIB:ADDR 18")   'Set instrument to new address
CALL IBPAD(analyzer%, 18)                         'Inform controller about new address
```

3.3.1.2 Indications during Remote Control

Remote control mode is indicated by the LED "REMOTE" "on the instrument’s front panel. In this mode the softkeys on the display are not shown.

3.3.1.3 Return to Manual Operation

Return to manual operation is possible via the front panel or the IEC bus.

Manually:

➢ Press the *LOCAL* key.

***Note*:**
– *Before switchover, command processing must be completed as otherwise switchover to remote control is effected immediately.*
– *The LOCAL key can be disabled by the universal command LLO (see annex A) in order to prevent unintentional switchover. In this case, switchover to manual mode is only possible via the IEC bus.*
– *The LOCAL key can be enabled again by deactivating the REN line of the IEC bus (see annex A).*

Via IEC bus:

```
...
CALL IBLOC(analyzer%)          'Set instrument to manual operation.
...
```

3.3.2 Remote Control via RS-232-Interface

3.3.2.1 Setting the Transmission Parameters

To enable an error-free and correct data transmission, the parameters of the unit and the controller should have the same setting. Parameters can be manually changed in menu *SETUP-GENERAL SETUP* in table *COM PORT 1/2* or via remote control using the command `SYSTem:COMMunicate:SERial1|2:....`

The transmission parameters of the interfaces COM1 and COM2 are factory-set to the following values: baudrate = 9600, data bits = 8, stop bits = 1, parity = NONE and protocoll = NONE.

Manually: Setting interface COM1|2

➢ Call *SETUP-GENERAL SETUP* menu

➢ Select desired baudrate, bits, stopbit, parity and protocoll in table *COM PORT 1/2*.

➢ Terminate input using one of the unit keys (=ENTER).

3.3.2.2 Indications during Remote Control

See Section 3.3.1.2.

3.3.2.3 Return to Manual Operation

Return to manual operation is possible via the front panel or via RS-232 interface.

Manually: ➢ Press the *LOCAL* key.

Note:
- *Before switchover, command processing must be completed as otherwise switchover to remote control is effected immediately.*
- *The LOCAL key can be disabled by the universal command LLO (see annex A) in order to prevent unintentional switchover. In this case, switchover to manual mode is only possible via the IEC bus.*
- *The LOCAL key can be enabled again by sending the command "@LOC" via RS-232 (see annex A).*

Via RS-232:

```
...
V24puts(port, "@LOC");          Set instrument to manual operation.
...
```

3.3.3 Remote Control via RSIB Interface

3.3.3.1 Windows Environment

To access the measuring instruments via the RSIB interface the DLLs should be installed in the corresponding directories:

- `RSIB.DLL` in Windows NT `system` directory or control application directory.
- `RSIB32.DLL` in Windows NT `system32` directory or control application directory.

On the measuring instrument the DLL is already installed in the corresponding directory.
The control is performed with Visual C++ or Visual Basic programs. The local link to the internal controller is established with the name '@local'.If a remote controller is used, the instrument IP address is to be indicated here.

Via VisualBasic: internal controller: ud = RSDLLibfind ('@local', ibsta, iberr, ibcntl)

remote controller:ud = RSDLLibfind ('82.1.1.200', ibsta, iberr, ibcntl)

3.3.3.2 Unix Environment

In order to access the measuring equipment via the RSIB interface, copy the `librsib.so.X.Y` file to a directory for which the control application has read rights. `X.Y` in the file name indicates the version number of the library, for example `1.0`.

The `librsib.so.X.Y` library is created as a *shared library*. The applications using the library have nothing to do with versions. They simply link the library with the `lrsib` option. The following instructions have to be observed so that linking can be successfully performed and the library can be found during the program run:

File link:

- Use the operating system command *ln* to create a file with the link name `librsib.so` and pointing to `librsib.so.X.Y` in a directory for which the control application has read rights. Example:

  `$ ln –s /usr/lib/librsib.so.1.0 /usr/lib/librsib.so`

Linker options for creating applications:

- `-lrsib` : import library
- `-Lxxx` : path information where the import library can be found. This is where the above file link has been created. Example: `-L/usr/lib`.

Additional linker options for creating applications (only under Solaris):

- `-Rxxx`: path information where the library is searched for during the program run: `-R/usr/lib`.

Run-time environment:

- Set environment variable `LD_RUN_PATH` to the directory in which the file link has been created. This is necessary only if `librsib.so` cannot be found in the standard search path of the operating system and the `-R` linker option (only Solaris) was not specified.

For C/C++ programming, the declarations of the library functions and the definition of error codes are contained in:

C/C++: `'RSIB.H'` `(D:\R_S\Instr\RSIB)`

3.3.3.3 Indications during Remote Control

See Section 3.3.1.2.

3.3.3.4 Return to Manual Operation

The return to manual operation can be performed via the front panel (*LOCAL* key) or the RSIB interface.

Manually: ➢ Press the *LOCAL* key.

Note: *Before switchover, command processing must be completed as otherwise switchover to remote control is effected immediately.*

Via RSIB:

```
...
ud = RSDLLibloc (ud, ibsta, iberr, ibcntl);
...
```

3.4 Messages

The messages transferred via the data lines of the IEC bus or via the RSIB Interface (see annex A) can be divided into two groups:

– **interface messages and**
– **device messages.**

For the RS-232 interface, no interface messages are defined.

3.4.1 IEC/IEEE bus Interface Messages

Interface messages are transferred on the data lines of the IEC bus, the "ATN" control line being active. They are used for communication between controller and instrument and can only be sent by a controller which has the IEC/IEEE bus control. Interface commands can be subdivided into

– **universal commands and**
– **addressed commands.**

Universal commands act on all devices connected to the IEC bus without previous addressing, addressed commands only act on devices previously addressed as listeners. The interface messages relevant to the instrument are listed in annex A.

Some control characters are defined for the control of the RS-232-interface (see annex A).

3.4.2 RSIB Interface Messages

The RSIB interface enables the instrument to be controlled by Windows applications. The interface functions are matched to the function interface for IEC/IEEE-bus programming from National Instruments.
The functions supported by interface are listed in annex A.

3.4.3 Device Messages (Commands and Device Responses)

Device messages are transferred on the data lines of the IEC bus, the "ATN" control line not being active. ASCII code is used. The device messages are more or less equal for the 2 interfaces (IEC/IEEE bus and RS-232).
A distinction is made according to the direction in which they are sent on the IEC bus:

– **Commands** are messages the controller sends to the instrument. They operate the device functions and request informations.
The commands are subdivided according to two criteria::

1. According to the effect they have on the instrument:

   Setting commands cause instrument settings such as reset of the instrument or setting the center frequency.

   Queries cause data to be provided for output on the IEC/IEEE bus, e.g. for identification of the device or polling the marker.

2. According to their definition in standard IEEE 488.2:

   Common Commands are exactly defined as to their function and notation in standard IEEE 488.2. They refer to functions such as management of the standar-dized status registers, reset and selftest.

   Device-specific commands refer to functions depending on the features of the instrument such as frequency setting. A majority of these commands has also been standardized by the SCPI committee (cf. Section 3.5.1).

– **Device responses** are messages the instrument sends to the controller after a query. They can contain measurement results, instrument settings and information on the instrument status (cf. Section 3.5.4).

Structure and syntax of the device messages are described in Section 3.5. The commands are listed and explained in detail in Section 3.6.

3.5 Structure and Syntax of the Device Messages

3.5.1 SCPI Introduction

SCPI (Standard Commands for Programmable Instruments) describes a standard command set for programming instruments, irrespective of the type of instrument or manufacturer. The goal of the SCPI consortium is to standardize the device-specific commands to a large extent. For this purpose, a model was developed which defines the same functions inside a device or for different devices. Command systems were generated which are assigned to these functions. Thus it is possible to address the same functions with identical commands. The command systems are of a hierarchical structure.
Fig. 3-1 illustrates this tree structure using a section of command system SENSe, which controls device-specific settings. The other examples concerning syntax and structure of the commands are derived from this command system.
SCPI is based on standard IEEE 488.2, i.e. it uses the same syntactic basic elements as well as the common commands defined in this standard. Part of the syntax of the device responses is defined with greater restrictions than in standard IEEE 488.2 (see Section "Responses to Queries").

3.5.2 Structure of a Command

The commands consist of a so-called header and, in most cases, one or more parameters. Header and parameter are separated by a "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank). The headers may consist of several key words. Queries are formed by directly appending a question mark to the header.

Note: *The commands used in the following examples are not in every case implemented in the instrument.*

Common commands

Common commands consist of a header preceded by an asterisk "*" and one or several parameters, if any.

Examples:	`*RST`	RESET, resets the device
	`*ESE 253`	EVENT STATUS ENABLE, sets the bits of the event status enable register
	`*ESR?`	EVENT STATUS QUERY, queries the contents of the event status register.

Device-specific commands

Hierarchy: Device-specific commands are of hierarchical structure (see Fig. 3-1). The different levels are represented by combined headers. Headers of the highest level (root level) have only one key word. This key word denotes a complete command system.

Example: `SENSe` This key word denotes the command system `SENSe`.

For commands of lower levels, the complete path has to be specified, starting on the left with the highest level, the individual key words being separated by a colon ":".

Example: `SENSe:FREQuency:SPAN 100E6`

This command lies in the fourth level of the SENSe system. It determines which parameter remains unchanged when the span is changed. If LINK is set to STARt, the values of CENTer and STOP are adjusted when the span is changed.

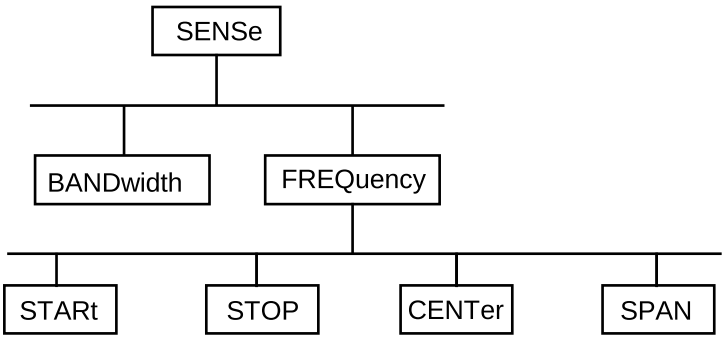


Fig. 3-1Tree structure of the SCPI command systems: The SENSe system

Some key words occur in several levels within one command system. Their effect depends on the structure of the command, that is to say, at which position in the header of a command they are inserted.

Example: `SOURce:FM:POLarity NORMal`
This command contains key word POLarity in the third command level. It defines the polarity between modulator and modulation signal.

`SOURce:FM:EXTernal:POLarity NORMal`
This command contains key word POLarity in the fourth command level. It defines the polarity between modulation voltage and the resulting direction of the modulation only for the external signal source indicated.

Optional key words: Some command systems permit certain key words to be optionally inserted into the header or omitted. These key words are marked by square brackets in the description. The full command length must be recognized by the instrument for reasons of compatibility with the SCPI standard. Some commands are considerably shortened by omitting these optional key words.

Example: `[SENSe]:BANDwidth[:RESolution]:AUTO`
This command couples the resolution bandwidth of the instrument to other parameters. The following command has the same effect:
BANDwidth`:AUTO`

Note: *An optional key word must not be omitted if its effect is specified in detail by a numeric suffix.*

Long and short form: The key words feature a long form and a short form. Either the short form or the long form can be entered, other abbreviations are not permissible.

Beispiel: `STATus:QUEStionable:ENABle 1= STAT:QUES:ENAB 1`

Note: *The short form is marked by upper-case letters, the long form corresponds to the complete word. Upper-case and lower-case notation only serve the above purpose, the instrument itself does not make any difference between upper-case and lower-case letters.*

Parameters: The parameter must be separated from the header by a "white space". If several parameters are specified in a command, they are separated by a comma ",". A few queries permit the parameters MINimum, MAXimum and DEFault to be entered. For a description of the types of parameter, refer to Section 3.5.5.

Example: `SENSe:FREQuency:STOP? MAXimum` Response: 3.5E9
This query requests the maximal value for the stop frequency.

Numeric suffix: If a device features several functions or features of the same kind, e.g. inputs, the desired function can be selected by a suffix added to the command. Entries without suffix are interpreted like entries with the suffix 1.

Example:. `SYSTem:COMMunicate:SERial2:BAUD 9600`
This command sets the baudrate of the second serial interface.

3.5.3 Structure of a Command Line

A command line may consist of one or several commands. It is terminated by a <New Line>, a <New Line> with EOI or an EOI together with the last data byte. Quick BASIC automatically produces an EOI together with the last data byte.

Several commands in a command line are separated by a semicolon ";". If the next command belongs to a different command system, the semicolon is followed by a colon.

Example:
```
CALL IBWRT(analyzer%, "SENSe:FREQuency:CENTer 100MHz;:INPut:ATTenuation 10")
```

This command line contains two commands. The first command is part of the SENSe system and is used to specify the center frequency of the analyzer. The second command is part of the INPut system and sets the attenuation of the input signal.

If the successive commands belong to the same system, having one or several levels in common, the command line can be abbreviated. To this end, the second command after the semicolon starts with the level that lies below the common levels (see also Fig. 3-1). The colon following the semicolon must be omitted in this case.

Example:
```
CALL IBWRT(analyzer%, "SENSe:FREQuency:STARt 1E6;:SENSe:FREQuency:STOP 1E9")
```

This command line is represented in its full length and contains two commands separated from each other by the semicolon. Both commands are part of the SENSe command system, subsystem FREQuency, i.e. they have two common levels.
When abbreviating the command line, the second command begins with the level below SENSe:FREQuency. The colon after the semicolon is omitted.

The abbreviated form of the command line reads as follows:

```
CALL IBWRT(analyzer%,  "SENSe:FREQuency:STARt 1E6;STOP 1E9")
```

However, a new command line always begins with the complete path.

Example:
```
CALL IBWRT(analyzer%,  "SENSe:FREQuency:STARt 1E6")
CALL IBWRT(analyzer%,  "SENSe:FREQuency:STOP 1E9")
```

3.5.4 Responses to Queries

A query is defined for each setting command unless explicitly specified otherwise. It is formed by adding a question mark to the associated setting command. According to SCPI, the responses to queries are partly subject to stricter rules than in standard IEEE 488.2.

1 The requested parameter is transmitted without header.
   Example: `DISPlay:FORMat:TRAce:Y:SPACing?` Response: `LIN`

2. Maximum values, minimum values and all further quantities, which are requested via a special text parameter are returned as numerical values.
   Example: `SENSe:FREQuency:STOP? MAX` Response: `4E9`

3. Numerical values are output without a unit. Physical quantities are referred to the basic units or to the units set using the Unit command.
   Example: `SENSe:FREQuency:CENTer?` Response: `1E6` for 1 MHz

4. Truth values <Boolean values> are returned as 0 (for OFF) and 1 (for ON).
   Example: `SENSe:BANDwidth:AUTO?` Response: `1` for ON

5. Text (character data) is returned in a short form (see also Section 3.5.5).
   Example: `SYSTem:COMMunicate:SERial:CONTrol:RTS?` Response(for standard): `STAN`

3.5.5 Parameters

Most commands require a parameter to be specified. The parameters must be separated from the header by a "white space". Permissible parameters are numerical values, Boolean parameters, text, character strings and block data. The type of parameter required for the respective command and the permissible range of values are specified in the command description (see Section 3.6).

Numerical values Numerical values can be entered in any form, i.e. with sign, decimal point and exponent. Values exceeding the resolution of the instrument are rounded up or down. The allowed range is –9.9E37 to +9.9E37. The exponent is introduced by an "E" or "e". Entry of the exponent alone is not permissible. In the case of physical quantities, the unit can be entered. Permissible unit prefixes are G (giga), MA (mega), MOHM and MHZ are also permissible), K (kilo), M (milli), U (micro) and N (nano). It the unit is missing, the basic unit is used.

Example:
`SENSe:FREQuency:STOP 1.5GHz = SENSe:FREQuency:STOP 1.5E9`

Special numerical The texts MINimum, MAXimum, DEFault, UP and DOWN are interpreted as valuesspecial numerical values.

In the case of a query, the numerical value is provided.

Example: Setting command: `SENSe:FREQuency:STOP MAXimum`
Query: `SENSe:FREQuency:STOP?` Response: `3.5E9`

MIN/MAX MINimum and MAXimum denote the minimum and maximum value.

DEF DEFault denotes a preset value which has been stored in the EPROM. This value conforms to the default setting, as it is called by the *RST command

UP/DOWN UP, DOWN increases or reduces the numerical value by one step. The step width can be specified via an allocated step command (see annex C, List of Commands) for each parameter which can be set via UP, DOWN.

INF/NINF INFinity, Negative INFinity (NINF) Negative INFinity (NINF) represent the numerical values -9.9E37 or 9.9E37, respectively. INF and NINF are only sent as device reponses.

NAN Not A Number (NAN) represents the value 9.91E37. NAN is only sent as device response. This value is not defined. Possible causes are the division of zero by zero, the subtraction of infinite from infinite and the representation of missing values.

Boolean Parameters Boolean parameters represent two states. The ON state (logically true) is represented by ON or a numerical value unequal to 0. The OFF state (logically untrue) is represented by OFF or the numerical value 0. 0 or 1 is provided in a query.

Example:
Setting command: `DISPlay:WINDow:TRACe:STATe ON`
Query: `DISPlay:WINDow:TRACe:STATe?` Response: `1`

Text

Text parameters observe the syntactic rules for key words, i.e. they can be entered using a short or long form. Like any parameter, they have to be separated from the header by a white space. In the case of a query, the short form of the text is provided.

Example: Setting command: `INPut:COUPling GROund`
Query: `INPut:COUPling?` Response `GRO`

Strings

Strings must always be entered in quotation marks (' or ").

Example: `SYSTem:LANGuage "SCPI"` or
`SYSTem:LANGuage 'SCPI'`

Block data

Block data are a transmission format which is suitable for the transmission of large amounts of data. A command using a block data parameter has the following structure:

Example: `HEADer:HEADer #45168xxxxxxxx`

ASCII character # introduces the data block. The next number indicates how many of the following digits describe the length of the data block. In the example the 4 following digits indicate the length to be 5168 bytes. The data bytes follow. During the transmission of these data bytes all End or other control signs are ignored until all bytes are transmitted. Data elements comprising more than one byte are transmitted with the byte being the first which was specified by SCPI command "FORMat:BORDer".

3.5.6 Overview of Syntax Elements

The following survey offers an overview of the syntax elements.

:	The colon separates the key words of a command. In a command line the separating semicolon marks the uppermost command level.
;	The semicolon separates two commands of a command line. It does not alter the path.
,	The comma separates several parameters of a command.
?	The question mark forms a query.
*	The asterisk marks a common command.
" '	Double or single quotation marks introduce a string and terminate it.
#	The double dagger # introduces block data.
	A "white space" (ASCII-Code 0 to 9, 11 to 32 decimal, e.g. blank) separates header and parameter.

3.6 Description of Commands

3.6.1 Notation

In the following sections, all commands implemented in the instrument are first listed in tables and then described in detail, separated according to the command system. The notation corresponds to the one of the SCPI standards to a large extent. The SCPI conformity information can be taken from the individual description of the commands.

Table of Commands

Command: In the command column, the table provides an overview of the commands and their hierarchical arrangement (see indentations).

Parameter: In the parameter column the requested parameters are indicated together with their specified range.

Unit: The unit column indicates the basic unit of the physical parameters.

Remark: In the remark column an indication is made on:
– whether the command does not have a query form,
– whether the command has only one query form,
– whether this command is implemented only with a certain option of the instrument.

Indentations The different levels of the SCPI command hierarchy are represented in the table by means of indentations to the right. The lower the level is, the farther the indentation to the right is. Please observe that the complete notation of the command always includes the higher levels as well.

Example: `SENSe:FREQuency:CENTer` is represented in the table as follows:

`SENSe`	first level
`  :FREQuency`	second level
`    :CENTer`	third level

In the individual description, the hierarchy is represented in the corresponding way. That is to say, for each command all key words above up to the left-hand margin must be considered. An example for each command is written out at the end of the individual description.

Upper/lower case notation Upper/lower case letters serve to mark the long or short form of the key words of a command in the description (see Section 3.5.2). The instrument itself does not distinguish between upper and lower case letters.

Special characters **|** A selection of key words with an identical effect exists for several commands. These key words are indicated in the same line, they are separated by a vertical stroke. Only one of these key words has to be indicated in the header of the command. The effect of the command is independent of which of the key words is indicated.

Example: `SENSe:FREQuency:CW|:FIXed`

The two following commands of identical meaning can be formed. They set the frequency of the constantly frequent signal to 1 kHz:

`SENSe:FREQuency:CW 1E3` = `SENSe:FREQuency:FIXed 1E3`

A vertical stroke in indicating the parameters marks alternative possibilities in the sense of "or". The effect of the command is different, depending on which parameter is entered.

Example: Selection of the parameters for the command

`CALC:FORM  MAGN | PHAS`

MAGN: Level values will be indicated
PHAS: Phase values will be indicated

[ ] Key words in square brackets can be omitted when composing the header (cf. Section 3.5.2, Optional Keywords). The full command length must be accepted by the instrument for reasons of compatibility with the SCPI standards.
Parameters in square brackets can optionally be incorporated in the command or omitted as well.

{ } Parameters in braces can optionally be incorporated in the command either not at all, once or several times.

Description of parameters Due to the standardization, the parameter section of SCPI commands consists always of the same syntactical elements. SCPI has specified a series of definitions therefore, which are used in the tables of commands. In the tables, these established definitions are indicated in angled brackets (<...>) and will be briefly explained in the following (see also Section 3.5.5, "Parameters").

<Boolean> This indication refers to parameters which can adopt two states, "on" and "off". The "off" state may either be indicated by the keyword **OFF** or by the numeric value 0, the "on" state is indicated by **ON** or any numeric value other than zero. Parameter queries are always returned the numeric value 0 or 1.

<numeric_value>
<num>

These indications mark parameters which may be entered as numeric values or be set using specific keywords (character data).

The keywords given below are permitted:

MINimum	This keyword sets the parameter to the smallest possible value.
MAXimum	This keyword sets the parameter to the largest possible value.
DEFault	This keyword is used to reset the parameter to its default value.
UP	This keyword increments the parameter value.
DOWN	This keyword decrements the parameter.

The numeric values associated to MAXimum/MINimum/DEFault can be queried by adding the corresponding keywords to the command. They must be entered following the quotation mark.

Example: `SENSe:FREQuency:CENTer? MAXimum`

returns the maximum possible numeric value of the center frequency as result.

<arbitrary block program data>

This keyword is provided for commands the parameters of which consist of a binary data block.

3.6.2 Common Commands

The common commands are taken from the IEEE 488.1 (IEC 625-2) standard. Same commands have the same effect on different devices. The headers of these commands consist of an asterisk "*" followed by three letters. Many common commands refer to the status reporting system which is described in detail in Section 3.8.

Command	Designation	Parameter	Remark
*CAL?	Calibration Query		query only
*CLS	Clear Status		no query
*ESE	Event Status Enable	0 to 255	
*ESR?	Standard Event Status Query		query only
*IDN?	Identification Query	<string>	query only
*IST?	Individual Status Query		query only
*OPC	Operation Complete		
*OPT?	Option Identification Query		query only
*PCB	Pass Control Back	0 to 30	no query
*PRE	Parallel Poll Register Enable	0 to 255	
*PSC	Power On Status Clear	0 | 1	
*RST	Reset		no query
*SRE	Service Request Enable	0 to 255	
*STB?	Status Byte Query		query only
*TRG	Trigger		no query
*TST?	Self Test Query		query only
*WAI	Wait to continue		no query

***CAL?**

CALIBRATION QUERY triggers a calibration of the instrument and subsequently query the calibration status. Any responses > 0 indicate errors.

***CLS**

CLEAR STATUS sets the status byte (STB), the standard event register (ESR) and the EVENt-part of the QUEStionable and the OPERation register to zero. The command does not alter the mask and transition parts of the registers. It clears the output buffer.

***ESE 0...255**

EVENT STATUS ENABLE sets the event status enable register to the value indicated. Query *ESE? returns the contents of the event status enable register in decimal form.

***ESR?**

STANDARD EVENT STATUS QUERY returns the contents of the event status register in decimal form (0 to 255) and subsequently sets the register to zero.

***IDN?**

IDENTIFICATION QUERY queries the instrument identification.

The device response is for example: "Rohde&Schwarz, ZVxx, 123456/001, 1.03"

ZVxx	= Device
123456/001	= serial number
1.03	= Firmware versions number

***IST?**

INDIVIDUAL STATUS QUERY returns the contents of the IST flag in decimal form (0 **|** 1). The IST flag is the status bit which is sent during a parallel poll (cf. Section 3.8.3.2).

***OPC**

OPERATION COMPLETE sets bit 0 in the event status register when all preceding commands have been executed. This bit can be used to initiate a service request (cf. Section 3.7).

***OPC?**

OPERATION COMPLETE QUERY writes message "1" into the output buffer as soon as all preceding commands have been executed (cf. Section 3.7).

***OPT?**

OPTION IDENTIFICATION QUERY queries the options included in the instrument and returns a list of the options installed. The options are separated from each other by means of commas.

***PCB 0 to 30**

PASS CONTROL BACK indicates the controller address which the IEC-bus control is to be returned to after termination of the triggered action.

***PRE 0 to 255**

PARALLEL POLL REGISTER ENABLE sets parallel poll enable register to the value indicated. Query *PRE? returns the contents of the parallel poll enable register in decimal form.

*PSC 0 | 1**

POWER ON STATUS CLEAR determines whether the contents of the ENABle registers is maintained or reset in switching on.

*PSC = 0 causes the contents of the status registers to be maintained. Thus a service request can be triggered in switching on in the case of a corresponding configuration of status registers ESE and SRE.

*PSC $\neq$ 0 resets the registers.

Query *PSC? reads out the contents of the power-on-status-clear flag. The response can be 0 or 1.

***RST**

RESET sets the instrument to a defined default status. The command essentially corresponds to pressing the [PRESET] key. The default setting is indicated in the description of the commands.

***SRE 0 to 255**

SERVICE REQUEST ENABLE sets the service request enable register to the value indicated. Bit 6 (MSS mask bit) remains 0. This command determines under which conditions a service request is triggered. Query *SRE? reads the contents of the service request enable register in decimal form. Bit 6 is always 0.

***STB?**

READ STATUS BYTE QUERY reads out the contents of the status byte in decimal form.

***TRG**

TRIGGER triggers all actions waiting for a trigger event (cf. Section "TRIGger subsystem", as well).

***TST?**

SELF TEST QUERY triggers all self tests of the instrument and outputs an error code in decimal form.

***WAI**

WAIT-to-CONTINUE only permits the servicing of the subsequent commands after all preceding commands have been executed and all signals have settled (cf. Section 3.7 and "*OPC" as well).

3.6.3 CALCulate Subsystem

The CALCulate subsystem contains commands for converting instrument data, transforming and carrying out corrections. These functions are carried out subsequent to data acquisition, i.e., following the SENSe subsystem.
CALCulate1...4 selects the corresponding channel CH1...CH4.

3.6.3.1 CALCulate:FILTer - Subsystem

The CALCulate:FILTer subsystem defines how filter functions are applied to the measured data sets.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:FILTer			
[:GATE]			
:TIME			
:STATe	<Boolean>		
:STARt	<numeric_value>	s | m	
:STOP	<numeric_value>	s | m	
:SPAN	<numeric_value>	s | m	
:CENTer	<numeric_value>	s | m	
:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebyshev		
:DCHebyshev	<numeric_value>	dB	

CALCulate[1...4]:FILTer[:GATE]:TIME:STATe

This command switches on and off the time domain gate.

Syntax: CALCulate[1...4]:FILTer[:GATE]:TIME:STATe ON **|** OFF

Example: `"CALC:FILT:TIME:STATe ON"`

Features: *RST-Wert: OFF
SCPI: conforming

CALCulate[1...4]:FILTer[:GATE]:TIME:STARt

This command defines the start time for the gate.

Syntax: CALCulate[1...4]:FILTer[:GATE]:TIME:STARt <numeric_value>

Example: `"CALC:FILT:TIME:STARt 10ms"`

Features: *RST-Wert: - 500 ps
SCPI: conforming

CALCulate[1...4]:FILTer[:GATE]:TIME:STOP

This command defines the stop time for the gate.

Syntax: CALCulate[1...4]:FILTer[:GATE]:TIME:STOP <numeric_value>

Example: `"CALC:FILT:TIME:STARt 60ms"`

Features: *RST-Wert: + 500 ps
SCPI: conforming

CALCulate[1...4]:FILTer[:GATE]:TIME:SPAN

This command defines the span of the gate.

Syntax:	CALCulate[1...4]:FILTer[:GATE]:TIME:SPAN	<numeric_value>
Example:	`"CALC:FILT:TIME:SPAN 50ms"`	
Features:	*RST-Wert: 1 ns SCPI: conforming	

CALCulate[1...4]:FILTer[:GATE]:TIME:CENTer

This command defines the center value for the gate.

Syntax:	CALCulate[1...4]:FILTer[:GATE]:TIME:CENTer	<numeric_value>
Example:	`"CALC:FILT:TIME:CENT 35ms"`	
Features:	*RST-Wert: 0 s SCPI: conforming	

CALCulate[1...4]:FILTer[:GATE]:TIME:WINDow

This command selects the type of time domain gate (gate function) to be used.

Syntax:	CALCulate[1...4]:FILTer[:GATE]:TIME:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebyshev
Example:	`"CALC:FILT:TIME:WIND RECT"`	
Features:	*RST-Wert: HANNing SCPI: conforming	

CALCulate[1...4]:FILTer[:GATE]:TIME:DCHebyshev

This command defines the sidelobe suppression for a Dolph-Chebishev gate function.

Syntax:	CALCulate[1...4]:FILTer[:GATE]:TIME:DCHebyshev	<numeric_value>
Example:	`"CALC:FILT:TIME:DCH 30dB"`	
Features:	*RST-Wert: 40 dB SCPI: device-specific	

3.6.3.2 CALCulate:FORMat Subsystem

The CALCulate:FORMat subsystem specifies the display format of the measured data.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1...4> :FORMat	COMPlex|MAGNitude|PHASe| UPHase|REAL|IMAGinary|SWR| GDELay|L|C		

CALCulate[1 to 4]:FORMat

This command defines in which format the complex measured quantity is displayed.

Syntax: CALCulate[1...4]:FORMat COMPlex | MAGNitude | PHASe | UPHase | REAL | IMAGinary | SWR | GDELay | SWR | GDELay | L | C

Example: `"CALC:FORM IMAG"`

Features: *RST value:
SCPI: conforming

3.6.3.3 CALCulate:GDAPerture Subsystem

The CALCulate:GDAPerture - subsystem defines the parameters for the group delay and the aperture.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
GDAPerture			
:MODE	STEP | FREQuency		
[:SPAN]	<numeric_value>	HZ	
:SCOunt	<numeric_value>		

CALCulate[1...4]:GDAPerture:MODE

This command switches between the aperture defined as a number of points (STEP) or as a fixed frequency value..

Syntax: CALCulate[1...4]:GDAPerture:MODE

Example: `"CALC:GDAP:MODE STEP"`

Features: *RST value: STEP
SCPI: device-specific

CALCulate[1...4]:GDAPerture[:SPAN]

This command defines the aperture as a fixed frequency value..

Syntax: CALCulate[1...4]:GDAPerture[:SPAN] <numeric_value>

Example: `"CALC:GDAP 0.5"`

Features: *RST value: -
SCPI: conforming

CALCulate[1...4]:GDAPerture:SCOunt

This command defines the aperture as a number of points..

Syntax: CALCulate[1...4]:GDAPerture:SCOunt <numeric_value>

Example: `"CALC:GDAP:SCO 12"`

Features: *RST value: 10
SCPI: device-specific

3.6.3.4 CALCulate:LIMit Subsystem

The CALCulate:LIMit subsystem comprises the limit lines and the corresponding limit checks.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:LIMit<1...8>			
:STATe	<Boolean>	--	
:RDOMain			
:COMPlex	S | SINV | Y | Z | YREL | ZREL		
:FORMat	COMPlex | MAGNitude | PHASe | REAL | IMAGinary | SWR | GDELay | L | C		
:SPACing	LINear | LOGarithmic | DB | SIC		
:CONTrol			
[:DATA]	<numeric_value>,<numeric_value>..	HZ | S | DBM	
:DOMain	FLIN | FLOG | FSEG | FSINgle | TLIN | TLOG | PLIN | PLOG | PSINgle		
:SHIFt	<numeric_value>	HZ | S | DB	no query
:CENTer	<numeric_value>,<numeric_value>	DB | OHM | SIE | UNIT	
:SHIFt	<numeric_value>,<numeric_value>	UNIT	no query
:UPPer			
[:DATA]	<numeric_value>,<numeric_value>..	DB | DEG | S | H | F | OHM | SIE | UNIT	
:SHIFt	<numeric_value>	DB | DEG | S | H | F | OHM | SIE | UNIT	valid for UPPer and LOWer no query
:STATe	<Boolean>	--	
:RADius	<numeric_value>	DB | OHM | SIE | UNIT	
:LOWer			
[:DATA]	<numeric_value>,<numeric_value>..	DB | DEG | S | H | F | OHM | SIE | UNIT	
:SHIFt	<numeric_value>	DB | DEG | S | H | F | OHM | SIE | UNIT	valid for UPPer and LOWer no query
:STATe	<Boolean>	--	
:FAIL?	--	--	query only
:CLEar			
[:IMMediate]	--	--	no query

CALCulate[1...4]:LIMit[1...8]:STATe

This command switches on and off the limit check..

Syntax: CALCulate[1...4]:LIMit[1...8]:STATe ON | OFF

Example: `"CALC:LIM:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

CALCulate[1...4]:LIMit[1...8]: RDOMain:COMPlex

This command defines the complex conversion of the measured value belonging to the limit line.

Syntax:	CALCulate[1...4]:LIMit[1...8]: RDOMain:COMPlex	S | SINV | Y | Z | YREL | ZREL
Example:	`"CALC:LIM:RDOM:COMP Y"`	
Features:	*RST value: – SCPI: device-specific	

CALCulate[1...4]:LIMit[1...8]: RDOMain:FORMat

This command defines the formatting of the measured value belonging to the limit line.

Syntax:	CALCulate[1...4]:LIMit[1...8]: RDOMain:FORMat	COMPlex | MAGNitude | PHASe | REAL | IMAGinary | SWR | GDELay
Example:	`"CALC:LIM:RDOM:FORM REAL"`	
Features:	*RST value: COMPlex SCPI: device-specific	

CALCulate[1...4]:LIMit[1...8]: RDOMain:SPACing

This command defines the scaling of the axis belonging to the limit line. For Smith, inverted Smith and charter diagrams, SIC must be specified.

Syntax:	CALCulate[1...4]:LIMit[1...8]: RDOMain:SPACing	LINear | LOGarithmic | DB | SIC
Example:	`"CALC:LIM:RDOM:SPAC LOG"`	
Features:	*RST value: LINear SCPI: device-specific	

CALCulate[1...4]:LIMit[1...8]:CONTrol[:DATA]

This command defines the x-axis values of the limit line.

Syntax:	CALCulate[1...4]:LIMit[1...8]:CONTrol[:DATA]	<numeric_value>, <numeric_value>..
Example:	`"CALC:LIM:CONT 1MHz,30MHz,300MHz,1GHz"`	
Features:	*RST value: - SCPI: conforming	

CALCulate[1...4]:LIMit[1...8]:CONTrol:DOMain

This command defines the x-axis representation in the frequency (F), time (T) and level (P) domains.

Syntax:	CALCulate[1...4]:LIMit[1...8]:CONTrol:DOMain	FLIN | FLOG | FSEG | FSINgle | TLIN | TLOG | PLIN |PLOG | PSINgle
Example:	`"CALC:LIM:CONT:DOM FLOG"`	
Features:	*RST value: FLIN SCPI: device-specific	

CALCulate[1..4]:LIMit[1...8]:CONTrol:SHIFt

This command shifts a limit line along the x-axis direction by the value specified.

Syntax: CALCulate<1|2>:LIMit<1...8>:CONTrol:SHIFt <numeric_value>

Example: `"CALC:LIM2:CONTrol:SHIFT 50KHZ"`

Features: *RST value: --
SCPI: device-specific

The command is an "event",, which is why it is not assigned an *RST value.

CALCulate[1...4]:LIMit[1...8]:CENTer

This command defines the coordinates of the center of the tolerance circle. .

Syntax: CALCulate[1...4]:LIMit[1...8]:CENTer <numeric_value>,<numeric_value>

Example: `"CALC:LIM:CENT 0,0"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:LIMit[1...8]:CENTer:SHIFt

This command shifts the tolerance circle center.

Syntax: CALCulate[1...4]:LIMit[1...8]:CENTer:SHIFt <numeric_value>,<numeric_value>

Example: `"CALC:LIM:CENT:SHIFt 0.5,0.5"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:LIMit[1...8]:UPPer[:DATA]

This command defines the values for the upper limit lines.

Syntax: CALCulate[1...4]:LIMit[1...8]:UPPer[:DATA <numeric_value>,
<numeric_value>..

Example: `"CALC:LIM:UPP -10,0,0,-10"`

Features: *RST value: -
SCPI: conforming

The number of values for the CONTrol-axis and the corresponding UPPer limit line must be identical. If the measured values exceed the UPPer limit line, the limit test reports an error.

CALCulate[1...4]:LIMit[1...8]:UPPer:SHIFt

This command shifts the tolerance band along the y-axis direction.

Syntax: CALCulate[1...4]:LIMit[1...8]:UPPer:SHIFt <numeric_value>

Example: `"CALC:LIM:UPPer:SHIFt 3dB"`

Features: *RST value: -
SCPI: device-specific

The LOWer limit is shifted together with the UPPer limit by the same distance.

CALCulate[1...4]:LIMit[1...8]:UPPer:STATe

This command switches on and off the limit check with an upper limit line.

Syntax:	CALCulate[1...4]:LIMit[1...8]:UPPer:STATe	ON | OFF
Example:	`"CALC:LIM:UPPer:STAT ON"`	
Features:	*RST value: - SCPI: conforming	

The result of the limit check can be queried with the command CALCulate:LIMit<1...8>:FAIL?

CALCulate[1...4]:LIMit[1...8]:UPPer:RADius

This command defines the radius of the limit line in a circle diagram.

Syntax:	CALCulate[1...4]:LIMit[1...8]:UPPer:STATe	ON | OFF
Example:	`"CALC:LIM:UPPer:RAD "`	
Features:	*RST value: - SCPI: device-specific	

CALCulate[1...4]:LIMit[1...8]:LOWer[:DATA]

This command defines the values of the lower limit lines.

Syntax:	CALCulate[1...4]:LIMit[1...8]:LOWer[:DATA]	<numeric_value>, <numeric_value>..
Example:	`"CALC:LIM:LOW -40,-30,-30,-40"`	
Features:	*RST value: - SCPI: conforming	

CALCulate[1...4]:LIMit[1...8]:LOWer:SHIFt

This command shifts the tolerance band along the y-axis direction.

Syntax:	CALCulate[1...4]:LIMit[1...8]:LOWer:SHIFt	<numeric_value>
Example:	`"CALC:LIM:LOWer:SHIFt 3dB"`	
Features:	*RST value: - SCPI: Gerätespezifisch	

The UPPer limit is shifted together with the LOWer limit by the same distance.

CALCulate[1...4]:LIMit[1...8]:LOWer:STATe

This command switches on and off the limit test with a lower limit line.

Syntax:	CALCulate[1...4]:LIMit[1...8]:LOWer:STATe	ON | OFF
Example:	`"CALC:LIM:STAT ON"`	
Features:	*RST value: OFF SCPI: device-specific	

CALCulate[1...4]:LIMit[1...8]:FAIL?

This command queries the result of the limit check.

Syntax:	CALCulate[1...4]:LIMit[1...8]:FAIL?	
Example:	`"CALC:LIM:FAIL?"`	
Features:	*RST value:	-
	SCPI:	conforming

CALCulate[1...4]:LIMit[1...8]:CLEar[:IMMediate]

This command deletes the result of the current limit check.

Syntax:	CALCulate[1...4]:LIMit[1...8]:CLEar[:IMMediate]	
Example:	`"CALC:LIM:CLE"`	
Features:	*RST value:	-
	SCPI:	conforming

This command is an event,, which is why it is not assigned an *RST value and has no query.

3.6.3.5 CALCulate:MARKer Subsystem

The CALCulate:MARKer subsystem controls the marker functions.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:MARKer<1...8>			
[:STATe]	<Boolean>	--	
:AOFF			no query
:MODE	CONTinuous | DISCrete	--	
:COUPled			
[:STATe]	<Boolean>		
:X	<numeric_value>	HZ | S | DBM	
:MODE	ABS | REL		
:Y?	--	--	query only
:FORMat	MLINear | MDB | PHASe | REAL | IMAGinary | SWR | GDELay | MLPHase | MDPHase | COMPlex | L | C | RLC	--	
:TRANsform			
:COMPlex	S | SINV | Z | ZREL | Y | YREL		
:TRACe	CHDATA | CHMEM		
:SEARch			
[:IMMediate]	--	--	no query
:NEXT	--	--	no query
:RIGHt	--	--	no query
:LEFT	--	--	no query
:TRACking	<Boolean>	--	--
:MAXimum	--	--	no query
:MINimum	--	--	no query
:FUNCtion			
[:SELect]	MAXimum | MINimum | TARGet | BFILter		
:BWIDth	<numeric_value>	DB	
:MODE	BPASs | BSTop	--	
:QFACtor	--	--	
:SFACtor	<numeric_value>,<numeric_value>	--	
:TARGet	<numeric_value>	DBM|DB	
:RESULT?			query only
:EDELay	TIME | DISTance | ELENgth | OFF		
:VALue?		--	query only
:DELTa			
:STATe	<Boolean>	--	
:REFerence	MARKER1 | MARKER2 | MARKER3 | MARKER4 | MARKER5 | MARKER6 | MARKER7 | MARKER8 | FIXed		
:RPOSition			
[:CARTesian]	<numeric_value>,<numeric_value>	HZ | S | DBM,DB	
POLar	<numeric_value>,<numeric_value>, <numeric_value>	HZ | S | DBM,DB, DB	
:PTPeak			
:STATe	<Boolean>	--	
:RESult?	[ALL]		query only
:CENTer			no query
:STARt			no query
:STOP			no query
:REFerence			no query

CALCulate[1 to 4]:MARKer[1 to 8][:STATe]

This command switches on or off the selected marker (1 to 8). If no indication is made, marker 1 is selected automatically.

Syntax: CALCulate[1 to 4]:MARKer[1 to 8][:STATe] ON | OFF

Example: "CALC:MARK3 ON"

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1 to 4]:MARKer[1 to 8]:AOFF

This command switches off all active markers.

Syntax: CALCulate[1 to 4]:MARKer[1 to 8]:AOFF

Example: "CALC:MARK:AOFF"

Features: *RST value: -
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST value and has no query.

CALCulate[1 to 4]:MARKer[1 to 8]:MODE

This command switches over between mode continuous and discrete for the selected marker.

Syntax: CALCulate[1 to 4]:MARKer[1 to 8]MODE CONTinuous | DISCrete

Example: "CALC:MARK3:MODE DISC"

Features: *RST value: CONTinuous
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:COUPled[:STATe]

This command couples/decouples the markers. It is valid for all markers; the CALC and MARK suffixes have no influence.

Syntax: CALCulate[1...4]:MARKer[1...8]:COUPled[:STATe] ON | OFF

Example: "CALC:MARK:COUP ON"

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:X:MODE

This command switches over between absolute and relative positioning in relation to the reference marker when delta markers are used.

Syntax: CALCulate[1...4]:MARKer[1...8]:X:MODE ABS | REL

Example: "CALC:MARK:X:MODE REL"

Features: *RST value: ABS
SCPI: device-specific

CALCulate[1 to 4]:MARKer[1 to 8]:X

This command positions the selected marker to the indicated stimulus value. If the marker is a delta marker, the position can be specified either absolutely, or relative relation to the reference marker.

Syntax: CALCulate[1 to 4]:MARKer[1 to 8]:X <numeric value>
<numeric value> ::= 0 to MAX (frequency) | MAX (sweep time)

Example: `"CALC:MARK:X 10.7MHz"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1 to 4]:MARKer[1 to 8]:Y?

This command queries the selected marker value. If the selected marker is a delta marker the query returns the difference to the reference marker.

Syntax: CALCulate[1 to 4]:MARKer[1 to 8]:Y?

Example: `"CALC:MARK:Y?"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FORMat

This command defines the formatting of the marker value.

Syntax: CALCulate[1...4]:MARKer[1...8]:FORMat MLINear | MDB | PHASe | REAL | IMAGinary | SWR | GDELay | MLPHase | MDPHase | COMPlex | L | C | RLC

Example: `"CALC:MARK:FORM MLIN"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:TRANsform:COMPlex

This command defines the conversion of the marker value.

Syntax: CALCulate[1...4]:MARKer[1...8]:TRANsform:COMPlex S | SINV | Z | ZREL | Y | YREL

Example: `"CALC:MARK:TRAN:COMP SINV"`

Features: *RST value:
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:TRACe

This command changes the marker between the active and the memory trace.

Syntax: CALCulate[1...4]:MARKer[1...8]:TRACe CHDATA | CHMEM

Example: `"CALC:MARK:TRAC CHMEM"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:SEARch[:IMMediate]

This command triggers a search for absolute extreme values for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:SEARch[:IMMediate]

Example: `"CALC:MARK:SEAR"`

Features: *RST value: -
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:SEARch:NEXT

This command triggers the search for the next local extreme value for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:SEARch:NEXT

Example: `"CALC:MARK:SEAR:NEXT"`

Features: *RST value: -
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:SEARch:RIGHt

This command triggers the search for the next target point with a larger stimulus value for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:SEARch:RIGHt

Example: `"CALC:MARK:SEAR:RIGH"`

Features: *RST value: -
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:SEARch:LEFT

This command triggers the search for the next target point with a smaller stimulus value for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:SEARch:LEFT

Example: `"CALC:MARK:SEAR:LEFT"`

Features: *RST value: -
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:SEARch:TRACking

This command switches the permanent (i. e. renewed after each sweep) search for extreme values on and off.

Syntax: CALCulate[1...4]:MARKer[1...8]:SEARch:TRACking ON | OFF

Example: `"CALC:MARK:SEAR:TRACK ON"`

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:MAXimum

This command triggers the search for the maximum of the trace for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:MAXimum

Example: "CALC:MARK:MAX"

Features: *RST value: –
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:MINimum

This command triggers the search for the minimum of the trace for the active marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:MINimum

Example: "CALC:MARK:MIN"

Features: *RST value: –
SCPI: device-specific

This command is an event,, which is why it is not assigned an *RST-value and has no query.

CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect]

This command selects the marker search function.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect] MAXimum | MINimum | TARGet | BFILter

Example: "CALC:MARK:FUNC TARG"

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth

This command defines the difference of the bandwidth points which are searched starting from an extreme value (e.g. the 3dB-bandwidth).

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth <numeric_value>

Example: "CALC:MARK:FUNC:BWID 6dB"

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth:MODE

This command selects the filter type (bandpass or bandstop) for the search of the bandwidth.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth:MODE BPASs | BSTOp

Example: "CALC:MARK:FUNC:BWID:MODE BSTOP"

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:QFACtor

This command defines the quality factor for the marker search function.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:QFACtor

Example: `"CALC:MARK:FUNC:QFAC 100"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:SFACtor

This command defines the form factor for the marker search function.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:SFACtor <numeric_value>, <numeric_value>

Example: `"CALC:MARK:FUNC:SFAC 60dB,3dB"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:TARGet

This command defines the target value for the fixed-value search mode.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:TARGet <numeric_value>

Example: `"CALC:MARK:FUNC:TARG 1.75"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:RESULT?

This command queries the result of the marker search function.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:RESULT?

Example: `"CALC:MARK:FUNC:RES?"`

Features: *RST value: -
SCPI: device-specific

This command is a query,, which is why it is not assigned an *RST value.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay

This command switches on or off the display of the electrical or the mechanical length or the phase delay. The suffix of MARKer has no meaning. The parameter information means the following:

ELENgth = electrical length
DISTance = mechanical length
TIME = phase delay
OFF = display switched off

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay TIME | DISTance | ELENgth | OFF

Example: `"CALC:MARK:FUNC:EDEL TIME"`

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay:VALue?

This command queries the value of the electrical or the mechanical length or the phase delay. The format of the return value must be selected beforehand with CALC:MARK:FUNC:EDEL. The suffix of MARKer has no meaning.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay:VALue?

Example: `"CALC:MARK:FUNC:EDEL:VAL?"`

Features: *RST value: --
SCPI: device-specific

This command is a query only and therefore has no *RST value.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:STATe

This command switches the delta marker mode on or off.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:STATe ON | OFF

Example: `"CALC:MARK:FUNC:DELT:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence

This command defines the reference marker for the delta marker mode.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion :DELTa:REFerence MARKER1 | MARKER2 | MARKER3 | MARKER4 | MARKER5 | MARKER6 | MARKER7 | MARKER8 | FIXed

Example: `"CALC:MARK:FUNC:DELT:REF MARKER1"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence:RPOSition[:CARTesian]

This command defines the reference value for the delta marker mode “FIXED” in Cartesian diagrams.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion :DELTa:REFerence:RPOSition[:CARTesian] <numeric_value>

Example: `"CALC:MARK:FUNC:DELT:REF:RPOS 1"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence:RPOSition:POLar

This command defines the reference value for the delta marker mode “FIXED” in polar diagrams.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion :DELTa:REFerence:RPOSition:POLar <numeric_value>, <numeric_value>

Example: `"CALC:MARK:FUNC:DELT:REF:RPOS:POL 1,2"`

Features: *RST value: -
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:PTPeak:STATe

This command switches the determination of the maximum and minimum measured value (peak-to-peak value) on or off.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:PTPeak:STATe ON | OFF

Example: `"CALC:MARK:FUNC:PTP:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

CALCulate[1...4]:MARKer[1...8]:FUNCtion:PTPeak:RESult?

This command queries the result of the peak-to-peak value search.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:PTPeak:RESult? [ALL]

Example: `"CALC:MARK:FUNC:PTP:RES?"`

Features: *RST value: -
SCPI: device-specific

This command is a query,, which is why it is not assigned an *RST value.

By default, the analyzer will return the peak-to-peak and the average value. If the optional parameter *ALL* is specified the analyzer will return the peak-to-peak, average, minimum, maximum values and the standard deviation.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:CENTer

This command sets the center frequency to the current marker frequency.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:CENTer

Example: `"CALC:MARK:FUNC:CENT"`

Features: *RST value: _
SCPI: device-specific

This command is an "event",, which is why it is not assigned an *RST value and has no query.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:STARt

This command sets the start frequency to the frequency of the specified marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:STARt

Example: `"CALC:MARK:FUNC:STAR"`

Features: *RST value: -
SCPI: device-specific

This command is an "event",, which is why it is not assigned an *RST value and has no query.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:STOP

This command sets the stop frequency to the frequency of the specified marker.

Syntax: CALCulate[1...4]:MARKer[1...8]:FUNCtion:STOP

Example: `"CALC:MARK:FUNC:STOP"`

Features: *RST value: -
SCPI: device-specific

This command is an "event",, which is why it is not assigned an *RST value and has no query.

CALCulate[1...4]:MARKer[1...8]:FUNCtion:REFerence

This command sets the reference level to the current marker level.

Syntax:	CALCulate[1...4]:MARKer[1...8]:FUNCtion:REFerence
Example:	`"CALC:MARK:FUNC:REF"`
Features:	*RST value: _ SCPI: device-specific

This command is an "event",, which is why it is not assigned an *RST value and has no query.

3.6.3.6 CALCulate:MATH Subsystem

The CALCulate:MATH - Subsystem allows to process data from the SENSe-subsystem with numerical expressions.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate[1 to 4]			
:MATH			
[:EXPRession]			
[:DEFine]	<expr>	--	
:STATe	<Boolean>	--	

CALCulate[1...4]:MATH[:EXPression][:DEFine]

This command defines the mathematical expression for data processing.

Syntax: CALCulate[1...4]:MATH[:EXPRession][:DEFine] <expr>

<expr>::= (OP1 op OP2 [op OP3])
OP1..OP3 ::= CH1DATA..CH4DATA | MDATA1 ... MDATA8
op ::= + | - | * | /

Example: "CALC:MATH (CH1DATA / MDATa1)"

Features: *RST value:
SCPI: conforming

CALCulate[1 to **4]:MATH:STATe**

This command switches mathematical data processing on or off.

Syntax: CALCulate[1 to 4]:MATH:STATe ON|OFF

Example: "CALC:MATH:STAT ON"

Features: *RST value: OFF
SCPI: conforming

3.6.3.7 CALCulate:SMOothing Subsystem

The CALCulate:SMOothing - Subsystem allows to smooth a data set point-by-point taking into account the values at adjacent points.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:SMOOthing			
[:STATe]	<Boolean>	--	
:APERture	<numeric_value>	--	

CALCulate[1...4]:SMOothing[:STATe]

This command determines the type of transformation of the data sets.

Syntax: CALCulate[1...4]:SMOothing[:STATe] ON | OFF

Example: `"CALC:SMO ON"`

Features: *RST value: OFF
SCPI: conforming

CALCulate[1...4]:SMOothing:APERture

This command defines the number of neighbor values used for smoothing relative to the number of points contained in the whole data set.

Syntax: CALCulate[1...4]:SMOothing:APERture <numeric_value>

Example: `"CALC:SMO:APER 0.2"`

Features: *RST value: 0
SCPI: conforming

3.6.3.8 CALCulate:TRANsform Subsystem

The CALCulate:TRANsform subsystem defines the transformation of data sets into other representations.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:TRANsform			
:COMPlex	S | SINV | Y | Z | YREL | ZREL		
ZREFerence	<numeric_value>	OHM	
:TIME			
:STATe	<Boolean>		
:METHod	FFT | CHIRp		
[:TYPE]	BPASs | LPASs		
:LPASs	KFSTop | KDFRequency | MINStep		
:DCSParam	<numeric_value>		
:STIMulus	IMPulse | STEP		
:STARt	<numeric_value>	s | m	
:STOP	<numeric_value>	s | m	
:SPAN	<numeric_value>	s | m	
:CENTer	<numeric_value>	s | m	
:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebyshev		
:DCHebyshev	<numeric_value>	dB	
:XAXis	TIME | DISTance | HDIStance		

CALCulate[1...4]:TRANsform:COMPlex

This command defines the transformation of data sets.

Syntax: CALCulate[1...4]:TRANsform:COMPlexS | SINV | Y | Z | YREL | ZREL

Example: `"CALC:TRAN:COMP SINV"`

Features: *RST value: –
SCPI: device-specific

CALCulate[1...4]:TRANsform:COMPlex:ZREFerence

This command defines the reference impedance for the normalized measured quantities.

Syntax: CALCulate[1...4]:TRANsform:COMPlex:ZREFerence <numeric_value>

Example: `"CALC:TRAN:COMP:ZREF 30 Ohm"`

Features: *RST value: 50 Ω
SCPI: device-specific

CALCulate[1...4]:TRANsform:TIME:STATe

This command switches ON or OFF the time domain transformation.)

Syntax: CALCulate[1...4]:TRANsform:TIME:STATe ON | OFF

Example: `"CALC:TRAN:TIME:STATe ON"`

Features: *RST-Wert: OFF
SCPI: conforming

CALCulate[1...4]:TRANsform:TIME:METHod

This command selects the transformation method (fast Fourier or chirp transformation) to be used.

Syntax:	CALCulate[1...4]:TRANsform:TIME:METHod FFT | CHIRp	
Example:	`"CALC:TRAN:TIME:METH FFT"`	
Features:	*RST-Wert:	CHIRp
	SCPI:	device-specific

CALCulate[1...4]:TRANsform:TIME[:TYPE]

This command selects the time domain transformation mode (lowpass or bandpass).

Syntax:	CALCulate[1...4]:TRANsform:TIME:TYPE BPASs | LPASs	
Example:	`"CALC:TRAN:TIME LPAS"`	
Features:	*RST-Wert:	BPASs
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:LPASs

This command defines the type of grid to be used in the lowpass mode.

Syntax:	CALCulate[1...4]:TRANsform:TIME:LPASs KFSTop | KDFRequency | MINStep	
Example:	`"CALC:TRAN:TIME:LPAS KFST"`	
Features:	*RST-Wert:	--
	SCPI:	device-specific

CALCulate[1...4]:TRANsform:TIME:LPASs:DCSParam

This command sets the S-parameter at 0 Hz for a lowpass transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:LPASs:DCSParam <numeric_value>	
Example:	`"CALC:TRAN:TIME:LPAS:DCSP 2"`	
Features:	*RST-Wert:	1
	SCPI:	device-specific

CALCulate[1...4]:TRANsform:TIME:STIMulus

This command selects the type of input signal to be used for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:STIMulus IMPulse | STEP	
Example:	`"CALC:TRAN:TIME:STIMulus STEP"`	
Features:	*RST-Wert:	IMPulse
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:STARt

This command defines the start time for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:STARt <numeric_value>	
Example:	`"CALC:TRAN:TIME:STARt 10ms"`	
Features:	*RST-Wert:	- 500 ps
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:STOP

This command defines the stop time for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:STOP	<numeric_value>
Example:	`"CALC:TRAN:TIME:STARt 60ms"`	
Features:	*RST-Wert:	+ 500 ps
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:SPAN

This command defines the start time for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:SPAN	<numeric_value>
Example:	`"CALC:TRAN:TIME:SPAN 50ms"`	
Features:	*RST-Wert:	1 ns
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:CENTer

This command defines the center time value for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANsform:TIME:CENTer	<numeric_value>
Example:	`"CALC:TRAN:TIME:CENT 35ms"`	
Features:	*RST-Wert:	0 s
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:WINDow

This command defines the filter function for the time domain transformation.

Syntax:	CALCulate[1...4]:TRANSform:TIME:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebyshev
Example:	`"CALC:TRAN:TIME:WIND RECT"`	
Features:	*RST-Wert:	HANNing
	SCPI:	conforming

CALCulate[1...4]:TRANsform:TIME:DCHebyshev

This command defines the sidelobe suppression for a Dolph-Chebyshev-type time domain transformation.

Syntax:	CALCulate[1...4]:TRANSform:TIME:DCHebyshev	<numeric_value>
Example:	`"CALC:TRAN:TIME:DCH 30dB"`	
Features:	*RST-Wert:	40 dB
	SCPI:	device-specific

CALCulate[1...4]:TRANsform:TIME:XAXis

This command defines the x-axis scaling of the transform. The parameters time, distance and half of the distance can be selected.

Syntax:	CALCulate[1...4]:TRANSform:TIME:XAXis	TIME | DISTance | HDIStance
Example:	`"CALC:TRAN:TIME:XAX DIST"`	
Features:	*RST-Wert:	TIME
	SCPI:	device-specific

3.6.3.9 CALCulate:UNIT Subsystem

The CALCulate:UNIT - subsystem defines the physical units to be used for the measured values.

COMMAND	PARAMETER	UNIT	COMMENT
CALCulate<1..4>			
:UNIT			
:POWer			
:A1	MW | W | UV | MV | V | DBM | DBW | DBUV | DBMV | DBV		
:A2	MW | W | UV | MV | V | DBM | DBW | DBUV | DBMV | DBV		
:B1	MW | W | UV | MV | V | DBM | DBW | DBUV | DBMV | DBV		
:B2	MW | W | UV | MV | V | DBM | DBW | DBUV | DBMV | DBV		

CALCulate[1...4]:UNIT:POWer:A1|A2|B1|B2

This command defines the physical units for the direct measured wave quantities.

Syntax: CALCulate[1...4]:UNIT:POWer:A1|A2|B1|B2 MW **|** W **|** UV **|** MV **|** V **|** DBM **|** DBW **|** DBUV **|** DBMV **|** DBV

Example: `"CALC:UNIT:POW:A2 DBUV"`

Features: *RST value: –
SCPI: device-specific

3.6.4 DIAGnostic Subsystem

The DIAGnostic subsystem contains the commands which support instrument diagnostics for maintenance, service and repair. In accordance with the SCPI standard, all of these commands are device-specific.

COMMAND	PARAMETER	UNIT	COMMENT
DIAGnostic			
:SERVice			
:FUNCtion	<numeric_value>,<numeric_value>..		no query
:RFPower	<Boolean>		

DIAGnostic:SERVice:FUNCtion

This command activates a service function.

Syntax: DIAGnostic:SERVice:FUNCtion <numeric_value>,<numeric_value>...

Example: `"DIAG:SERV:FUNC 2,0,2,12,1"`

Features: *RST value: -
SCPI: device-specific

The service function is selected via five parameters: functional group number, board number, function number, parameter 1 and parameter 2.

See service manual

DIAGnostic:SERVice:RFPower

This command switches the stimulus signal on and off.

Syntax: DIAGnostic:SERVice:RFPower ON | OFF

Example: `"DIAG:SERV:RFP OFF"`

Features: *RST value: -
SCPI: device-specific

3.6.5 DISPlay Subsystem

The DISPLay subsystem controls the selection and presentation of textual and graphic information and of trace data on the display.
The commands for TRACe1 refer to the active measured value memory, the commands for TRACe2 to the memory trace.

COMMAND	PARAMETER	UNIT	COMMENT
DISPlay			
:FORMat	SINGle | DOVerlay | QOVerlay | DSPLit | QDSPlit | QQSPlit		
:EXPand	<Boolean>		
:PROgram			
[:MODE]	<Boolean>		
:PSAVe			
[:STATe]	<Boolean>		
:HOLDoff	<numeric_value>		
[:WINDow<1...4>]			
:DIAGram	CLIN | CLOG | CDB | CSEG | PLIN | PLOG | PDB | PSEG | CHARter | SMITh | ISMith		
:SEGMented			
:X			
[:STATe]	<Boolean>		
:R	<numeric_value> ...		
:Y	<numeric_value> ...		
:TRACe<1|2>			
:X			
:OFFSet	<numeric_value>	HZ	
:SPACing	LINear | LOGarithmic	--	
:Y			
[:SCALe]			
:AUTO	ONCE	--	no query
:RLEVel	<numeric_value>	DBM|DB	
:PDIVision	<numeric_value>	DBM|DB	
:RPOSition	<numeric_value>	PCT	
:BOTTom	<numeric_value>	DBM|DB	
:TOP	<numeric_value>	DBM|DB	
:OFFSet	<numeric_value>	DBM|DB	
:SPACing	LINear | LOGarithmic | DB	--	
:R			
[:SCALe]			
:CPOint	<numeric value>	DBM|DB	
:OEDGe	<numeric value>	DBM|DB	
:SPACing	LINear | LOGarithmic | DB	--	
[:STATe]	<Boolean>		

DISPlay:FORMat

This command switches the display format of the measurement results between one, two and four diagrams.

Syntax: DISPlay:FORMat SINGle | DOVerlay | QOVerlay | DSPLit | QDSPlit | QQSPlit

Example: `"DISP:FORM DSPL"`

Features: *RST value: SINGle
SCPI: device-specific

DISPlay:FORMat:EXPand

This command switches the expanded representation on or off.

Syntax: DISPlay:FORMat:EXPand ON | OFF

Example: `"DISP:FORM:EXP ON"`

Features: *RST value: OFF
SCPI: device-specific

DISPlay:PROGram[:MODE]

This command switches the screen between the measuring instrument and the controller function.

Syntax: DISPlay:PROGram:[MODE] ON | OFF

Example: `"DISP:PROG ON"`

Features: *RST value: OFF
SCPI: device-specific

DISPlay:PSAVe[:STATe]

This command switches the screen saver of the unit's LCD display on or off.

Syntax: DISPlay:PSAVe:[STATe] ON | OFF

Example: `"DISP:PSAV ON"`

Characteristics: *RST value: OFF
SCPI: device-specific

DISPlay:PSAVe:HOLDoff

This command sets the time after which the unit's LCD display is switched off. The range is 1 to 100 minutes.

Syntax: DISPlay:PSAVe:[STATe] <numeric_value>

Example: `"DISP:PSAV:HOLD 7"`

Characteristics: *RST value: 5
SCPI: device-specific

DISPlay[:WINDow[1...4]]:DIAGram

This command selects the diagram type for representation.

Syntax: DISPlay[:WINDow[1...4]]:DIAGram CLIN | CLOG | CDB | CSEG |PLIN | PLOG | PDB | PSEG |CHARter | SMITh | ISMith

Example: `"DISP:DIAG SMIT`

Features: *RST value: CLOG
SCPI: device-specific

DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:X[:STATe]

This command switches on and off the list sweep with a segmented x-axis.

Syntax: DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:X:[STATe] ON | OFF

Example: `"DISP:DIAG:SEGM:X ON"`

Features: *RST value: OFF
SCPI: device-specific

DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:R

This command defines the segment limits for polar diagrams. A maximum of 3 segments can be defined. The separation line between two segments is common, i.e. there are neither gaps nor overlaps. The numeric values refer to the unit used in the diagram and are sorted in descending order.

Syntax: DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:R <numeric_value> ...

Example: `"DISP:DIAG:SEGM:R 20,-30,-70,-120"`

Features: *RST value: -
SCPI: device-specific

DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:Y

This command defines the segment limits for Cartesian diagrams. A maximum of 3 segments can be defined. The separation line between two segments is common, i.e. there are neither gaps nor overlaps. The numeric values refer to the unit used in the diagram and are sorted in descending order.

Syntax: DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:Y <numeric_value> ...

Example: `"DISP:DIAG:SEGM:Y 20,-30,-70,-120"`

Features: *RST value: -
SCPI: device-specific

DISPlay[:WINDow[1...4]]:TRACe2:X:OFFSet

This command sets the stimulus offset of a memory trace. It is therefore only available for TRAC2.

Syntax: DISPlay[:WINDow[1...4]]:TRACe2:X:OFFSet <numeric_value>

Example: `"DISP:TRAC2:X:OFFs 10MHZ"`

Features: *RST value: 0 Hz
SCPI: device-specific

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:X:SPACing

This command toggles between linear and logarithmic display of the X-axis.

Syntax: DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:X:SPACing LINear | LOGarithmic | dB

Example: `"DISP:TRAC:X:SPAC LOG"`

Features: *RST value: LINear
SCPI: conforming

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:AUTO

This command performs a single rescaling of the y-axis or the radial axis, respectively.

Syntax: DISPlay[:WINDow[1 to 4]:TRACe[1|2]:Y[:SCALe]:AUTO ONCE

Example: `"DISP:TRAC:Y:AUTO ONCE"`

Features: *RST value: –
SCPI: conforming

This command is an "event", which is why it is not assigned an *RST value and has no query.

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:RLEVel

This command defines the reference level. In addition to the units given in the table, the following units and prefixes are permitted for the individual measured quantities:

Power:	DBM, DB, DBW, W, MW, UW, NW, PW
Voltage:	V, MV, UV, NV, PV, DBV, DBMV, DBUV
Phase:	DEG, KDEG, MDEG, UDEG, NDEG, PDEG
Group delay:	S, MS, US, NS, PS
Impedance:	OHM, GOHM, MOHM, KOHM
Admittance:	SIE, MSIE, USIE, NSIE
Inductivity:	H, MH, UH, NH, PH, FH
Capacity:	F, MF, UF, NF, PF, FF
Dimensionless:	UNIT, MUNIT, UUNIT, NUNIT, PUNIT, FUNIT

Syntax: DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:RLEVel <numeric_value>

Example: `"DISP:TRAC:Y:RLEV -60dBm"`

Features: *RST value: –
SCPI: conforming

The specification of the reference level depends on the unit currently selected.

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:PDIVision

This command defines the distance between two grid lines. In addition to the units given in the table, the following units and prefixes are permitted for the individual measured quantities:

Power:	DBM, DBW, MW, UW, NW, PW
Voltage:	V, MV, UV, NV, PV, DBV,
Phase:	DEG, KDEG, MDEG, UDEG, NDEG, PDEG
Group delay:	S, MS, US, NS, PS
Impedance:	OHM, GOHM, MOHM, KOHM
Admittance:	SIE, MSIE, USIE, NSIE
Inductivity:	H, MH, UH, NH, PH, FH
Capacity:	F, MF, UF, NF, PF, FF
Dimensionless:	UNIT, MUNIT, UUNIT, NUNIT, PUNIT, FUNIT

Syntax: DISPlay[:WINDow[1 to 4]]:TRACe[1 to 4]:Y[:SCALe]:PDIVision numeric_value>
<numeric_value>::=

Example: `"DISP:TRAC:Y:PDIV  10dB"`

Features: *RST value: 10 dB
SCPI: conforming

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:RPOSition

This command defines the reference position in percent.

Syntax: DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:RPOSition <numeric_value>
<numeric_value>::=

Example: `"DISP:TRAC:Y:RPOS 50 PCT"`

Features: *RST value: 100PCT
SCPI: device-specific

Value 100% corresponds to the reference level (TOP), value 0% corresponds to the bottom of the grid (BOTTom).

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:BOTTom

This command defines the lower edge of the grid. In addition to the units given in the table, the following units and prefixes are permitted for the individual measured quantities:

Power:	DBM, DB, DBW, W, MW, UW, NW, PW
Voltage:	V, MV, UV, NV, PV, DBV, DBMV, DBUV
Phase:	DEG, KDEG, MDEG, UDEG, NDEG, PDEG
Group delay:	S, MS, US, NS, PS
Impedance:	OHM, GOHM, MOHM, KOHM
Admittance:	SIE, MSIE, USIE, NSIE
Inductivity:	H, MH, UH, NH, PH, FH
Capacity:	F, MF, UF, NF, PF, FF
Dimensionless:	UNIT, MUNIT, UUNIT, NUNIT, PUNIT, FUNIT

Syntax: DISPlay[:WINDow[1 to 4]:TRACe[1|2]:Y[:SCALe]:BOTTom <numeric_value>

Example: `"DISP:TRAC:Y:BOTT -60dBm"`

Features: *RST value: –
SCPI: conforming

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:TOP

This command defines the upper edge of the grid. In addition to the units given in the table, the following units and prefixes are permitted for the individual measured quantities:

Power:	DBM, DB, DBW, W, MW, UW, NW, PW
Voltage:	V, MV, UV, NV, PV, DBV, DBMV, DBUV
Phase:	DEG, KDEG, MDEG, UDEG, NDEG, PDEG
Group delay:	S, MS, US, NS, PS
Impedance:	OHM, GOHM, MOHM, KOHM
Admittance:	SIE, MSIE, USIE, NSIE
Inductivity:	H, MH, UH, NH, PH, FH
Capacity:	F, MF, UF, NF, PF, FF
Dimensionless:	UNIT, MUNIT, UUNIT, NUNIT, PUNIT, FUNIT

Syntax: DISPlay[:WINDow[1 to 4]:TRACe[1|2]:Y[:SCALe]:TOP <numeric_value>

Example: `"DISP:TRAC:Y:TOP 10dBm"`

Features: *RST value: –
SCPI: conforming

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y[:SCALe]:OFFSet

This command defines an offset value to be added to the output values. In addition to the units given in the table, the following units and prefixes are permitted for the individual measured quantities:

Power:	DBM, DBW, MW, UW, NW, PW
Voltage:	V, MV, UV, NV, PV,
Phase:	DEG, KDEG, MDEG, UDEG, NDEG, PDEG
Group delay:	S, MS, US, NS, PS
Impedance:	OHM, GOHM, MOHM, KOHM
Admittance:	SIE, MSIE, USIE, NSIE
Inductivity:	H, MH, UH, NH, PH, FH
Capacitance:	F, MF, UF, NF, PF, FF
Dimensionless:	UNIT, MUNIT, UUNIT, NUNIT, PUNIT, FUNIT

Syntax: DISPlay[:WINDow[1 to 4]:TRACe[1|2]:Y[:SCALe]:OFFSet <numeric_value>

Example: `"DISP:TRAC:Y:OFFS -6dBm"`

Features: *RST value: 0dB
SCPI: device-specific

DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y:SPACing

This command toggles between linear and logarithmic scaling of the Y-axis.

Syntax: DISPlay[:WINDow[1 to 4]]:TRACe[1|2]:Y:SPACing LINear | LOGarithmic | dB

Example: `"DISP:TRAC:Y:SPAC LIN"`

Features: *RST value: LOGarithmic
SCPI: conforming

DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:CPOint

This command defines the center value of the polar diagram.

Syntax: DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:CPOint <numeric_value>

Example: `"DISP:TRAC:R:CPO"`

Features: *RST value:
SCPI: conforming

DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:OEDGe

This command defines the radius of the polar diagram.

Syntax: DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:OEDGe <numeric_value>

Example: `"DISP:TRAC:R:OEDG"`

Features: *RST value:
SCPI: conforming

DISPlay[:WINDow[1...4]]:TRACe[1|2]:R:SPACing

This command switches between linear and logarithmic representation.

Syntax: DISPlay[:WINDow[1...4]]:TRACe[1|2]:R:SPACing LINear | LOGarithmic | dB

Example: `"DISP:TRAC:R:SPAC LIN"`

Features: *RST value: LOGarithmic
SCPI: conforming

DISPlay[:WINDow[1 to 4]:TRACe[1|2][:STATe]

This command switches the display of the current trace on or off.

Syntax:	DISPlay[:WINDow[1 to 4]]:TRACe[1|2][:STATe] ON | OFF	
Example:	`"DISP:TRAC2 ON"`	
Features:	*RST value: SCPI:	ON for TRACe1, OFF for TRACe2 conforming

3.6.6 FORMat Subsystem

The FORMat subsystem specifies the format of the data transmitted from and to the analyzer.

COMMAND	PARAMETER	UNIT	COMMENT
FORMat			
[:DATA]	ASCii|REAL[,<numeric_value>]		
:DEXPort	ASCii | TOUChstone | SCOMpact		
:FORMat	COMPlex | MLPHase | MDPHase		
:MODe	NEW | APPend		
:DSEParator	POINt | COMMa		
:SOURce	CDATa | CVData | TDATa | FDATa | MDATa | DDATa		

FORMat[:DATA]

This command defines the data format for transmission from and to the analyzer.

Syntax: FORMat[:DATA] ASCII **|** REAL [,<numeric_value>]

Example:
```
"FORM REAL,32"
"FORM REAL,64"
"FORM ASC "
```

Characteristics: *RST value: ASCII
SCPI: conforming

Either the ASCII or REAL data format can be selected. ASCII data are transmitted in plain text with commas used as separators. REAL data are transmitted as 32- or 64-bit IEEE 754 floating-point numbers using definite length blocks.

Results are transmitted as S-parameters or ratios of wave quantities in real and imaginary part representation. For a sweep with 401 test points, therefore, 802 values are transmitted separated by commas.

If the format ”`FORM REAL, 32`” is selected for the above example, the data stream from the analyzer to the controller is as follows:

```
#432085334.....
↑↑↑    ↑
|||    |
|||    From here follow the data bytes of the data block, here 5334
||Number of bytes of data block stated in ASCII plain text, here 3208
|ASCII byte stating the length of the subsequent length counter, here 4
Head marker of binary data stream
```

For this example, the number of transmitted data bytes is as follows:

Number	=	number of test points	* bytes/value	* 2
3208	=	401	* 4	* 2

The factor of two takes into account that the result is represented as a complex variable.

FORMat:DEXPort

This command defines the format of the file to be generated.

Syntax: FORMat:DEXPort ASCii | TOUChstone | SCOMpact

Example: `"FORM:DEXP ASCII"`

Features: *RST value: ASCii
SCPI: conforming

The file format can be compatible to ASCII (can be imported into arbitrary applications), TOUCHSTONE or SUPERCOMPACT

FORMat:DEXPort:FORMat

This command defines the format for representing the measurement values.

Syntax: FORMat:DEXPort:FORMat COMPlex | MLPHase | MDPHase

Example: `"FORM:DEXP:FORM COMP"`

Features: *RST value: ASCii
SCPI: conforming

FORMat:DEXPort:MODe

This command defines whether the output data are written into a new file or appended to an existing file.

Syntax: FORMat:DEXPort:MODe NEW | APPend

Example: `"FORM:DEXP:MODE NEW"`

Features: *RST value: NEW
SCPI: conforming

FORMat:DEXPort:DSEParator

This command defines the decimal separator to be used (for ASCII files only).

Syntax: FORMat:DEXPort:DSEParator POINt | COMMa

Example: `"FORM:DEXP:DSEP POINT"`

Features: *RST value: COMMa
SCPI: conforming

FORMat:DEXPort:SOURce

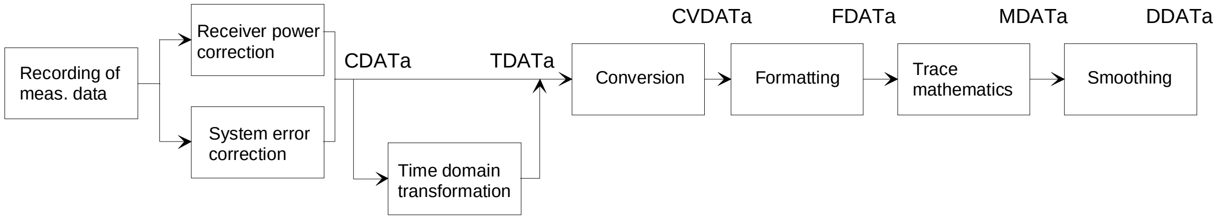
This command defines the source of measurement data.

Syntax: FORMat:DEXPort:SOURce CDATa | CVData | TDATa | FDATa | MDATa | DDATa

Example: `"FORM:DEXP:SOUR CDAT"`

Features: *RST value: DDATa
SCPI: conforming

The possible sources correspond to different stages in the flow of measurement data:



3.6.7 HCOPy Subsystem

The HCOPy subsystem controls the output of screen information to output devices or files for documentation purposes.

<table>
<tr><th>COMMAND</th><th>PARAMETER</th><th>UNIT</th><th>COMMENT</th></tr>
<tr><td>HCOPy</td><td></td><td></td><td></td></tr>
<tr><td>:ABORt</td><td>--</td><td>--</td><td>no query</td></tr>
<tr><td>:DESTination<1|2></td><td><string></td><td></td><td>no query</td></tr>
<tr><td>:DEVice</td><td></td><td></td><td></td></tr>
<tr><td>:COLor</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:LANGuage<1|2></td><td>HPGL | PCL4 | PCL4_C | PCL4_C3 | PCL5 | LASerj | DESKJ | DESKJ_C | DESKJ_C3 | POSTscript | EPSON24 | EPSON24C | WMF | PCX | HP7470 | HP7470LS</td><td></td><td></td></tr>
<tr><td>:PRESet<1|2></td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:RESolution<1|2></td><td><numeric_value></td><td></td><td></td></tr>
<tr><td>[:IMMediate<1|2>]</td><td>--</td><td>--</td><td>no query</td></tr>
<tr><td>:ITEM</td><td></td><td></td><td></td></tr>
<tr><td>:ALL</td><td></td><td></td><td>no query</td></tr>
<tr><td>:FFEed<1|2></td><td></td><td></td><td></td></tr>
<tr><td>:STATe</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:LABEL</td><td></td><td></td><td></td></tr>
<tr><td>:TEXT</td><td><string></td><td></td><td></td></tr>
<tr><td>:PFEed<1|2></td><td></td><td></td><td></td></tr>
<tr><td>:STATe</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:WINDow<1...4></td><td></td><td></td><td></td></tr>
<tr><td>:TABLe</td><td></td><td></td><td></td></tr>
<tr><td>:STATe</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:TEXT</td><td><string></td><td></td><td></td></tr>
<tr><td>:TRACe<1|2></td><td></td><td></td><td></td></tr>
<tr><td>:STATe</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:CAINcrement</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:LTYPe</td><td>SOLid |
STYLe0 |
STYLe1 |
STYLe2 |
STYLe3 |
STYLe4 |
STYLe5 |
STYLe6 |
STYLe7</td><td></td><td></td></tr>
<tr><td>:STATe</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:AINCrement</td><td><Boolean></td><td></td><td></td></tr>
<tr><td>:PAGE</td><td></td><td></td><td></td></tr>
<tr><td>:DIMensions</td><td></td><td></td><td></td></tr>
<tr><td>:QUADrant<1...4></td><td></td><td></td><td>no query</td></tr>
<tr><td>:FULL</td><td></td><td></td><td>no query</td></tr>
<tr><td>:ORIentation<1|2></td><td>LANDscape|PORTrait</td><td></td><td></td></tr>
</table>

HCOPy:ABORt

This command aborts an active print job.

Syntax: HCOPy:ABORt

Example: `"HCOP:ABOR"`

Features: *RST value: –
SCPI: conforming

This command is an "event", which is why it is not assigned an *RST value and has no query.

HCOPy:DESTination<1|2> <string>

This command selects the device for outputting the hardcopy.

Syntax: HCOPy:DESTination[1|2] <string>

<string>::= 'SYST:COMM:PRIN' |
'SYST:COMM:CLIP' |
'MMEM'

Example: `"HCOP:DEST2 'SYST:COMM:SER2'"`

Features: *RST value: -
SCPI: conforming

This command is an event, which is why it is not assigned an *RST value and has no query.

`'MMEM'` creates a file for the hardcopy output. Command `MMEM:NAME <file_name>` defines the file name. All formats can be selected with `HCOPy:DEVice: LANGuage`.

`'SYST:COMM:PRIN'` directs the hardcopy to the printer. The printer is selected with command `SYSTEM:COMMunicate:PRINter:SELect`.
`GDI` should be selected for `HCOPy:DEVice:LANGuage`.

`'SYST:COMM:CLIP'` directs the hardcopy to the clipboard. `EWMF` should be selected for `HCOPy:DEVice:LANGuage`.

HCOPy:DEVice:COLor

This command selects between color and monochrome printout of the screen display.

Syntax: HCOPy:DEVice:COLor ON|OFF

Example: `"HCOP:DEV:COL ON"`

Features: *RST value: OFF
SCPI: conforming

HCOPy:DEVice:LANGuage<1|2>

This command determines the data format of the printout.

Syntax:	HCOPy:DEVice:LANGuage	HPGL | PCL4 | PCL4_C | PCL4_C3 | PCL5 | LASERJ | DESKJ | DESKJ_C | DESKJ_C3 | POSTscript | EPSON24 |EPSON24C | WMF | PCX
Example:	"HCOP:DEV:LANG WMF"	
Features:	*RST value: - SCPI: conforming	
HPGL and HP7470	Data format for a plotter output in HPGL, special output for plotter hp7470 (reduced HPGL format)	
HPGL_LS and HP7470LS	Special HPGL/HP7470 format with output of traces with different line styles (Linestyles)	
PCL4... and PCL5	Generic data formats for laser and ink-jet printers, with PCL4: Black/white PCL4_C: Colour (3 colour cartridges + black cartridge) PCL4_C3: Colour (only 3 colour cartridges) PCL5: Black/white with 300-DPI resolution, new language version.	
LASERJ	Data format for HP Laserjet as of series III	
DESKJ...	Data formats for printers of the HP Deskjet series, with DESKJ: Black/white DESKJ_C: Colour (3 colour cartridges + black cartridge, e.g. Deskjet 560) DESKJ_C3: Colour (only 3 colour cartridges, e.g. Deskjet 500)	
POSTscript	Postscript language,	
EPSON24	Data format for Epson-compatible 24-pin matrix printers, black/white, e.g. Epson LQ series, R&S PDN	
EPSON24C	Data format for Epson-compatible 24-pin dot matrix printers with colour, e.g. Epson Stylus Color, R&S PDN Color	
WMF and PCX	(WINDOWS Metafile Format) and (pixel graphics) data formats for output to files, which can later be directly inserted in appropriate programs for documentation.	

HCOPy[:IMMediate]

This command starts a print job.

Syntax:	HCOPy[:IMMediate]
Example:	"HCOP"
Features:	*RST value: – SCPI: conforming

HCOPy:IMM[1] starts the hardcopy output at device no. 1 (default),
HCOPy:IMM2 starts the hardcopy output at device no. 2.
This command is an "event", which is why it is not assigned an *RST value and has no query.

HCOPy:ITEM:ALL

This command selects the complete screen to be output.

Syntax: HCOPy:ITEM:ALL

Example: `"HCOP:ITEM:ALL"`

Features: *RST value: OFF
SCPI: conforming

The hardcopy output is always provided with comments, title, time and date.

As an alternative to the whole screen, only traces (commands 'HCOPy:DEVice:WINDow:TRACe:STATe ON') or tables (command 'HCOPy:DEVice:WINDow:TABLe:STATe ON') can be output.

HCOPy:ITEM:FFEed[1|2]:STATe

The command adds a form feed command to the hardcopy output of the screen.

Syntax: HCOPy:ITEM:FFEed[1|2]:STATe ON|OFF

Example: `"HCOP:ITEM:FFE2:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

HCOPy:ITEM:LABel:TEXT

This command defines the title of the hardcopy output..

Syntax: HCOPy:ITEM:LABel:TEXT <string>

Example: `"HCOP:ITEM:LAB:TEXT 'My Title'"`

Features: *RST value: OFF
SCPI: conforming

HCOPy:ITEM:PFEed[1|2]:STATe

This command adds a paper feed command to the hardcopy output.

Syntax: HCOPy:ITEM:PFEed[1|2]:STATe ON|OFF

Example: `"HCOP:ITEM:PFE2:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

HCOPy:ITEM:WINDow<1...4>:TABLe:STATe

This command prints the currently displayed tables..

Syntax: HCOPy:ITEM:WINDow<1...4>:TABLe:STATe ON | OFF

Example: `"HCOP:ITEM:WIND2:TABL:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

The command HCOPy:ITEM:WINDow<1...4>:TABLe:STATe OFF selects the whole screen for output, in analogy to the command HCOPy:ITEM:ALL

HCOPy:ITEM:WINDow<1...4>:TEXT

This command selects the comment text for printout to trace 1 or 2.

Syntax: HCOPy:ITEM:WINDow<1...4>:TEXT <string>

Example: `"HCOP:ITEM:WIND2:TEXT ‘Comment’"`

Features: *RST value: –
SCPI: device-specific

HCOPy:ITEM:WINDow<1...4>:TRACe:STATe

This command selects the currently displayed trace for output.

Syntax: HCOPy:ITEM:WINDow<1...4>:TRACe:STATe ON | OFF

Example: `"HCOP:ITEM:WIND2:TRACe:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

The command HCOPy:ITEM:WINDow<1...4>:TABle:STATe OFF selects the whole screen for output, in analogy to the command HCOPy:ITEM:ALL.

HCOPy:ITEM:WINDow<1...4>:TRACe:CAINcrement

The command automatically changes the color of the currently displayed trace after printout.

Syntax: HCOPy:ITEM:WINDow<1...4>:TRACe:CAINcrement ON | OFF

Example: `"HCOP:ITEM:WIND2:TRACe:CAIN ON"`

Features: *RST value: OFF
SCPI: device-specific

The automatic change of color of the trace allows to plot several traces of the same diagram. For a better distinction, the color of the trace is changed each time (”Color Auto Increment”).

HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:STATe

This command switches the line configuration function on or off for data output to a plotter. With OFF, all test traces of a plot are in the form of continuous lines. This command is available only if a plotter is selected as an output device.

Syntax: HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:STATe ON | OFF

Example: `"HCOP:ITEM:WIND:TRAC:LTYPe:STAT ON"`

Characteristics: *RST value: OFF
SCPI: device-specific

HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe

This command enables editing of the line style of a selected test trace. TRACe2 stands for memory traces.

This command is available only if a plotter is selected as an output device. Permissible values are SOLid (continuous line) and STYLE0 to STYLE7. STYLE7 is equivalent to SOLid, the other values are for dashed, dash-dotted and other line styles.

Syntax: HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe SOLid | STYLe<n>

Example: `"HCOP:ITEM:WIND:TRACe:LTYPe STYLe5"`

Characteristics: *RST value: channel-specific
SCPI: device-specific

HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:AINCrement

This command causes automatic incrementation of the line style of the active-channel test trace after each hardcopy generated. The command is available only if a plotter is selected as an output device. The command has no effect on the memory traces. In automatic incrementation, line styles STYLe7 to STYLe3 are activated one after the other.

Syntax: HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:AINCrement ON | OFF

Example: `"HCOP:ITEM:WIND:TRAC:LTYP:AINC ON"`

Characteristics: *RST value channel-specific
SCPI: device-specific

HCOPy:PAGE:DIMensions:QUADrant

The command defines the quadrant which is allocated to the screen output.

Syntax: HCOPy:PAGE:DIMensions:QUADrant[1...4]

Example: `"HCOP:PAGE:DIM:QUAD1"`

Features: *RST value: –
SCPI: conforming

The quadrants are defined as QUAD1 at the top right, QUAD2 at the top left, QUAD3 at the bottom left and QUAD4 at the bottom right. This command is an event, which is why it is not assigned an *RST value and has no query.

HCOPy:PAGE:DIMensions:FULL

This command defines that the full screen is to be printed out.

Syntax: HCOPy:PAGE:DIMensions:FULL

Example: `"HCOP:PAGE:DIM:FULL"`

Features: *RST value: –
SCPI: device-specific

This command is an event, which is why it is not assigned and *RST value and has no query.

HCOPy:PAGE:ORIentation

The command selects the format of the output (portrait and landscape).

Syntax: HCOPy:PAGE:ORIentation LANDscape | PORTrait

Example: `"HCOP:PAGE:ORI LAND"`

Features: *RST value: –
SCPI: conforming

3.6.8 INITiate Subsystem

The INITiate subsystem controls the initialization of the trigger subsystem.

COMMAND	PARAMETER	UNIT	COMMENT
INITiate			
:CONTinuous	<boolean>	--	
[:IMMediate]	--	--	no query

INITiate:CONTinuous

This command determines if the trigger system is continuously initiated ("Free Run")..

Syntax: INITiate:CONTinuous ON | OFF

Example: `"INIT:CONT OFF"`

Features: *RST value: ON
SCPI: conforming

Setting "INITiate:CONTinuous ON" corresponds to the CONTINUOUS SWEEP, i.e. the sweep is cyclically repeated. The setting "INITiate:CONTinuous OFF" corresponds to the function SINGLE SWEEP.

INITiate[:IMMediate]

The command initiates a new sweep or starts a single sweep.

Syntax: INITiate[:IMMediate]

Example: `"INIT"`

Features: *RST value: -
SCPI: conforming

This command is an event, which is why it is not assigned an *RST value and has no query.

3.6.9 INPut Subsystem

The INPut subsystem controls the features of the input of the instrument.

COMMAND	PARAMETER	UNIT	COMMENT
INPut			
:ATTenuation	<numeric_value>	DB	
:BRIDge	INTernal | BYPass | FPORt		
:UPORt<1|2>			
[:VALue?]	--		
:STATe	<Boolean>		

INPut[1|2]:ATTenuation

This command determines the attenuation of the attenuator in the signal path of the incident wave b1 or b2.

Syntax: INPut[1|2]:ATTenuation <numeric_value>

<numeric_value>::= 0dB..70dB

Example: `"INP:ATT 40dB"`

Features: *RST value: 0 dB
SCPI: conforming

INPut:BRIDge

This command defines the type of measurement performed with the test set (internal, external or full-port) .

Syntax: INPut[1|2]:BRIDge INTernal | BYPass | FPORt

Example: `"INP:BRID BYP"`

Features: *RST value: INTernal
SCPI: device-specific

INPut:UPORt<1|2>[:VALue]?

This command queries the control lines of the user Ports.

Syntax: INPut:UPORt<1|2>[:VALue]?

Example: `"INP:UPOR2?"`

Features: *RST value: –
SCPI: device-specific

This command is a query and therefore is not assigned an *RST value.

INPut:UPORt<1|2>:STATe

This command switches the control lines of the user ports between INPut and OUTPut.

Syntax: INPut:UPORt<1|2>:STATe ON | OFF

Example: `"INP:UPOR2:STAT ON"`

Features: *RST value: ON
SCPI: device-specific

ON switches the User-Port to INPut, OFF switches to OUTPut.

3.6.10 INSTrument Subsystem

The INSTrument subsystem selects the measuring mode of the instrument either via text parameters or via assigned default numbers.

COMMAND	PARAMETER	UNIT	COMMENT
INSTrument			
:COUPle	ALL | NONE		
[:SELect]	CHANNEL1 | CHANNEL2 | CHANNEL3 | CHANNEL4		
:NSELect	<numeric_value>		

INSTrument:COUPle

This command switches the coupling of the display channels of the analyzer on or off.

Syntax: INSTrument:COUPle ALL | NONE

Example: `"INST:COUP NONE"`

Features: *RST value: ALL
SCPI: conforming

INSTrument[:SELect]

This command selects the active channel of the analyzer.

Syntax: INSTrument[:SELect] CHANNEL<1..4>

Example: `"INST CHANNEL2"`

Features: *RST value: CHANNEL1, coupled channels
SCPI: conforming

INSTrument:NSELect

This command switches between the channels of the analyzer. The channel number is directly entered.

Syntax: INSTrument:NSELect <numeric_value>
<numeric_value>::= 1 to 4

Example: `"INST:NSEL 2"`

Features: *RST value: 1, coupled channels
SCPI: conforming

The value 1 corresponds to CHANNEL1 etc. of the command INSTrument[:SELect].

3.6.11 MMEMory Subsystem

The MMEMory (mass memory) subsystem provides the commands which allow for access to the storage media of the instrument and for storing and loading various instrument settings.

The NAMe command stores the HCOPy outputs in a file.

The various drives can be addressed via the mass storage unit specifier <msus> using the conventional DOS syntax. The internal hard disk is addressed by "C:", the floppy-disk drive installed by "A:".

The file names <file_name> are specified as string parameters with the commands being enclosed in quotation marks. They are written according to the ordinary DOS conventions:

DOS file names consist of max. 8 ASCII characters and an extension of up to three characters separated from the file name by a colon "." Both the colon and the extension are optional. The colon is not part of the file name. DOS file names do not differ between uppercase and lowercase notation. All letters and digits are permitted as well as the special characters "_", "^", "$", "~", "!", "#", "%", "&", "-", "{", "}", "(", ")", "@" and "‘". Reserved file names are CLOCK$, CON, AUX, COM1 to COM4, LPT1 to LPT3, NUL and PRN.

The two characters "*" and "?" have the function of so-called "wildcards", i.e., they are variables for selection of several files. The question mark "?" replaces exactly one character which may be any, the asterisk means any of the remaining characters in the file name. "*.*" thus means all files in a directory.

COMMAND	PARAMETER	UNIT	COMMENT
MMEMory			
:CATalog?			query only
:CDIRectory	<directory_name>	--	
:COPY	<file_name>,<file_name>	--	no query
:DATA	<file_name>[,<block>]	--	
:DELete	<file_name>	--	no query
:INITialize	<msus>	--	no query
:LOAD			
:AUTO	1,<file_name>	--	
:STATe	1,<file_name>	--	no query
:MDIRectory	<directory_name>	--	no query
:MOVE	<file_name>,<file_name>	--	no query
:MSIS	<msus>	--	
:NAME	<file_name>	--	
:RDIRectory	<directory_name>	--	no query
:STORe			
:STATe	1,<file_name>	--	no query
:CLEar			
:STATe	1,<file_name>	--	no query
:ALL			no query

COMMAND	PARAMETER	UNIT	COMMENT
:SELect			
[:ITEM]			
:GSETup	<Boolean>		
:HWSettings	<Boolean>		
:LINes			
[:ALL]	<Boolean>		
:CSETup	<Boolean>		
:CDATa	<Boolean>		
:CKData	<Boolean>		
:HCOPy	<Boolean>		
:MACRos	<Boolean>		
:MTRace<1...8>	<Boolean>		
:AFILes	<Boolean>		
:ALL	--		no query
:NONE	--		no query
:DEFault	--		no query
:COMMent	<string>		

MMEMory:CATalog?

This command queries the contents of the current directory.

Syntax: MMEMory:CATalog?

Example: `"MMEM:CAT?"`

Features: *RST value: –
SCPI: conforming

MMEMory:CDIRectory

This command changes the current directory.

Syntax: MMEMory:CDIRectory <directory_name>
<directory_name>::= DOS path name

Example: `"MMEM:CDIR 'C:\USER\DATA'"`

Features: *RST value: -
SCPI: conforming

In addition to the path name, the indication of the directory may contain the drive name. The path name complies with the DOS conventions.

MMEMory:COPY

This command copies the files indicated.

Syntax: MMEMory:COPY <file_source>,<file_of destination>
<file_source>,<file_of destination> ::= <file_name>
<file_name> ::= DOS file name

Example: `"MMEM:COPY 'C:\USER\DATA\SETUP.CFG','A:'"`

Features: *RST value: –
SCPI: conforming

The indication of the file name may include the path and the drive. The file names and path information must be in accordance with the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:DATA

This command writes block data to a specified file.

Syntax: MMEMory:DATA <file_name>,<block>
MMEMory:DATA? <file_name>

<file_name> ::= DOS file name

<block> ::= binary data block

Example: `"MMEM:DATA? 'TEST01.HCP'"`

Features: *RST value: –
SCPI: conforming

The delimiter must be set to EOI in order to obtain a perfect data transfer.

MMEMory:DELete

This command deletes the files indicated.

Syntax: MMEMory:DELete <file_name>
<file_name> ::= DOS file name

Example: `"MMEM:DEL 'TEST01.HCP'"`

Features: *RST value: –
SCPI: conforming

The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:INITialize

This command formats the disk in drive A.

Syntax: MMEMory:INITialize <msus>
<msus> ::= 'A:'

Example: `"MMEM:INIT 'A:'"`

Features: *RST value: –
SCPI: conforming

Formatting deletes all data stored on the floppy disk. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:LOAD:AUTO

This command defines the device settings to be automatically loaded upon switching on the device.

Syntax: MMEMory:LOAD:AUTO 1,<file_name>

<file_name> ::= DOS file name
FACTORY means the data last set in the unit

Example: `"MMEM:LOAD:AUTO 1,'A:TEST.CFG'"`

Characteristics: *RST value: –
SCPI: conforming

The file contents are read after switching on the device and activated as the new device setup. In addition to the file name, the drive designation and the path name may be specified. The path name should be in conformance with DOS conventions. This command is an event and therefore includes neither an *RST value nor a query.

MMEMory:LOAD:STATe

This command loads instrument settings from files.

Syntax: MMEMory:LOAD:STATe 1,<file_name>
<file_name> ::= DOS file name

Example: `"MMEM:LOAD:STAT 1,'A:TEST.CFG'"`

Features: *RST value: –
SCPI: conforming

The contents of the file are loaded and determine the new state of the instrument. The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:MDIRectory

This command creates a new directory.

Syntax: MMEMory:MDIRectory <directory_name>
<directory_name>::= DOS path name

Example: `"MMEM:MDIR 'C:\USER\DATA'"`

Features: *RST value: -
SCPI: device-specific

The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:MOVE

This command renames existing files.

Syntax: MMEMory:MOVE <file_source>,<file_of destination>
<file_source>,<file_of destination> ::= <file_name>
<file_name> ::= DOS file name

Example: `"MMEM:MOVE 'TEST01.CFG','SETUP.CFG'"`

Features: *RST value: -
SCPI: conforming

The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:MSIS

This command changes to the drive indicated.

Syntax: MMEMory:MSIS <device>
<device>::= 'A:' | 'C:'

Example: `"MMEM:MSIS 'A:'"`

Features: *RST value: "C:'
SCPI: conforming

The drive may be the internal hard disk C: or the floppy-disk drive A:. The drive is indicated according to the DOS conventions.

MMEMory:NAME

This command specifies a file which is printed or plotted.

Syntax: MMEMory:NAME <file_name>
<file_name> ::= DOS filename

Example: `"MMEM:NAME 'PLOT1.HPG'"`

Features: *RST value: -
SCPI: conforming

The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. The output to the printer is routed into a file using the command "HCOP:DEST 'MMEM'".

MMEMory:RDIRectory

This command deletes the directory indicated.

Syntax: MMEMory:RDIRectory <directory_name>
<directory_name>::= DOS path name

Example: `"MMEM:RDIR 'C:\TEST'"`

Features: *RST value: -
SCPI: device-specific

The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:STORe:STATe

This command stores the current instrument setting in a file.

Syntax: MMEMory:STORe:STATe 1,<file_name>
<file_name> ::= DOS file name

Example: `"MMEM:STOR:STAT 1,'TEST.CFG'"`

Features: *RST value: -
SCPI: conforming

The current instrument state is stored as a file. The file name may comprise the specification of the path and, eventually, the name of the drive. Indication of the path is according to the DOS conventions. This command is an event, which is why it is not assigned an *RST value and has no query.

MMEMory:CLEar:STATe

This command deletes the instrument setting stored in file <file_name>.

Syntax: MMEMory:CLEar:STATe 1,<file_name>
<file_name> ::= DOS-file name without extension

Example: `"MMEM:CLE:STAT 1,'TEST'"`

Features: *RST value: -
SCPI: device-specific

The selected device dataset is deleted. <file_name> may contain the full path and the name of the drive, all specified according to DOS-conventions. This command is an "event", which is why it is not assigned an *RST-value and has no query.

MMEMory:CLEar:ALL

This command deletes all device settings in the current directory.

Syntax: MMEMory:CLEar:ALL

Example: "MMEM:CLE:ALL"

Features: *RST value: -
SCPI: device-specific

This command is an "event", which is why it is not assigned an *RST-value and has no query.

MMEMory:SELect[:ITEM]:GSETup

This command includes the general setup data in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:GSETup ON|OFF

Example: "MMEM:SEL:GSET ON"

Features: *RST value: OFF
SCPI: device-specific

MMEMory:SELect[:ITEM]:HWSettings

This command includes the hardware settings in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:HWSettings ON|OFF

Example: "MMEM:SEL:HWS ON"

Features: *RST value: ON
SCPI: device-specific

MMEMory:SELect[:ITEM]:MTRace<1...8>

This command includes the selected memory trace data in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:MTRace<1...8> ON|OFF

Example: "MMEM:SEL:MTR3 ON"

Features: *RST value: OFF für alle Memory Traces
SCPI: device-specific

MMEMory:SELect[:ITEM]:LINes[:ALL]

This command includes all limit lines in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:LINes[:ALL] ON|OFF

Example: "MMEM:SEL:LIN ON"

Features: *RST value: ON
SCPI: device-specific

At the same time, this command selects all active limit lines.

MMEMory:SELect[:ITEM]:CSETup

This command includes the current screen color settings in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:CSETup ON|OFF

Example: `"MMEM:SEL:CSET ON"`

Features: *RST value: ON
SCPI: device-specific

MMEMory:SELect[:ITEM]:CDATa

This command includes the current calibration data in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:CDATa ON|OFF

Example: `"MMEM:SEL:CDAT ON"`

Features: *RST value: ON
SCPI: device-specific

MMEMory:SELect[:ITEM]:CKData

This command includes the current cal-kit data in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:CKData ON|OFF

Example: `"MMEM:SEL:CKD ON"`

Features: *RST value: OFF
SCPI: device-specific

MMEMory:SELect[:ITEM]:HCOPy

This command includes the hardware data in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:HCOPy ON|OFF

Example: `"MMEM:SEL:HCOPy ON"`

Features: *RST value: ON
SCPI: device-specific

MMEMory:SELect[:ITEM]:MACRos

This command includes the keyboard macros in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:MACRos ON|OFF

Example: `"MMEM:SEL:MACRos ON"`

Features: *RST value: OFF
SCPI: device-specific

MMEMory:SELect[:ITEM]:AFILes

This command includes the ASCII data sets generated in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:AFILes ON|OFF

Example: `"MMEM:SEL:AFILes ON"`

Features: *RST value: OFF
SCPI: device-specific

MMEMory:SELect[:ITEM]:ALL

This command includes all partial data sets in the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:ALL

Example: `"MMEM:SEL:ALL"`

Features: *RST value: --
SCPI: device-specific
This command is an "event", which is why it is not assigned an *RST value.

MMEMory:SELect[:ITEM]:NONE

This command removes all partial data sets from the list of partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:NONE

Example: `"MMEM:SEL:NONE"`

Features: *RST value: --
SCPI: device-specific
This command is an "event", which is why it is not assigned an *RST value.

MMEMory:SELect[:ITEM]:DEFault

This command sets the default list of the partial data sets of a device setting which are to be stored/loaded.

Syntax: MMEMory:SELect[:ITEM]:DEFault

Example: `"MMEM:SEL:DEFault"`

Features: *RST value: --
SCPI: device-specific

This command is an "event", which is why it is not assigned an *RST value.

MMEMory:COMMent

This command defines a comment for a device setting to be stored.

Syntax: MMEMory:COMMent <string>

Example: `"MMEM:COMM ’Setup for GSM measurement’"`

Features: *RST value: blank comment
SCPI: device-specific

3.6.12 OUTPut Subsystem

The OUTPut subsystem controls the output features of the analyzer.

COMMAND	PARAMETER	UNIT	COMMENT
OUTPut<1|2>			
:ATTenuation	<numeric_value>	DB	
:DPORt	PORT1 | PORT2		
:POWer	NORMal | HIGH		
:RMIXer			
[:STATe]	<Boolean>		
:UPORt<1|2>			
[:VALue]	<Binary>		
:STATe	<Boolean>		

OUTPut[1|2]:ATTenuation

This command determines the attenuation of the attenuator located in the signal path of the wave a1 or a2 propagating towards the DUT.

Syntax: OUTPut:ATTenuation <numeric_value>
<numeric_value>::= 0dB .. 70dB

Example: `"OUTP:ATT 40dB"`

Features: *RST value: –
SCPI: conforming

OUTPut:DPORt

This command defines the setting of the signal path switch in the test set (drive port).

Syntax: OUTPut:DPORt PORT1 | PORT2

Example: `"OUTP:DPOR PORT2"`

Features: *RST value: PORT1
SCPI: device-specific

OUTPut[1|2]:POWer

This command switches an additional attenuator on and off in the generator signal path. This can increase the output power to the detriment of matching.

Syntax: OUTPut[1|2]:POWer NORMal | HIGH

Example: `"OUTP:POW HIGH"`

Features: *RST value: NORM
SCPI: device-specific

OUTPut:RMIXer

This command defines whether the reference wave a1 is to be applied internally or via rear-panel connectors a1 EXT OUT and a1 EXT IN.

Syntax: OUTPut:RMIXer[:STATe] ON | OFF

Example: `"OUTP:RMIX ON"`

Features: *RST value: OFF
SCPI: device-specific

OUTPut:UPORt<1|2>[:VALue]

This command sets the control lines of the user port. If the user port was set to INPut previously, the output value is stored intermediately.

Syntax: OUTPut:UPORt<1|2>[:VALue] <Binary>
<Binary>::= 00000000 ... 11111111

Example: `"OUTP:UPOR2 #B10100101"`

Features: *RST value: –
SCPI: device-specific

OUTPut:UPORt<1|2>:STATe

This command toggles the control lines of the user ports between INPut and OUTPut.

Syntax: OUTPut:UPORt<1|2>:STATe ON | OFF

Example: `"OUTP:UPOR:STAT ON"`

Features: *RST value: OFF
SCPI: device-specific

ON switches the user port to OUTPut, OFF switches to INPut.

3.6.13 PROGram - Subsystem

The PROGram-subsystem contains commands used to start and control application programs on the instrument.

COMMAND	PARAMETER	UNIT	COMMENT
PROGram			
[:SELected]			
:NAME	ZVR_K9 | PROG		
:STRing	<varname>[,<string>]		
:EXECute	<cmdname>		no query

PROGram[:SELected]:NAME

This command specifies the name of the application to be selected.

Syntax: PROGram[:SELected]:NAME ZVR_K9 | PROG

Example: `"PROG:NAME ZVR_K9"`

Features: *RST value: PROG
SCPI: conforming

, The application ZVR-K9 or, for PROG, any program running under Windows NT is controlled via the PROGram subsystem. For Windows applications, there is no backsignalling of results to the instrument software.

PROGram[:SELected]:STRing

This command assigns values to the variables in the application selected or queries the values of variables.

Syntax: PROGram[:SELected]:STRing <varname>,<string>

PROGram[:SELected]:STRing? <varname>

<varname> ::= ’EMBED_CAL_IN’ |
’EMBED_TNW’ |
’EMBED_CAL_OUT’ |
’CMDLINE’ |
’FILE’

Example:
```
"PROG:STR     ’EMBED_CAL_IN’,’c:\user\config\user.ca1’"
"PROG:STR?    ’EMBED_CAL_IN’"
```

Features: *RST value: -
SCPI: conforming

’EMBED_CAL_IN’ defines the file name for the calibration file to be processed.
’EMBED_CAL_OUT’ defines the file name for the output file.
’EMBED_TNW’ specifies the file describing the transformation network.
Command line parameters for applications can be specified in <string> with <varname>=’CMDLINE’.
With <varname>=’FILE’, the file name is specified in <string> (optionally with path).

PROGram[:SELected]:EXECute

This command executes the specified command in the selected application.

Syntax: PROGram[:SELected]:EXECute <cmdname>

<cmdname> ::= 'EMBED' |
'DEEMBED' |
'RUN'

Example: `"PROG:EXEC 'EMBED'"`

Features: *RST value: -
SCPI: conforming

The commands 'EMBED' and 'DEEMBED' enable the calculation of input files (previously indicated by PROG:STR) in the ZVR_K9 application. The 'RUN' command starts an application at the operation system level.

3.6.14 SENSe Subsystem

The SENSe subsystem is divided up into several subsystems. The commands of these subsystems directly control device-specific settings, they do not refer to the signal characteristics of the measurement signal.

3.6.14.1 SENSe:AVERage Subsystem

The SENSe:AVERage subsystem calculates the average of the data acquired: Various successive measurements are combined in order to obtain a new test result. The number of test points and the abscissa of the new result correspond to those of the original measurements.

COMMAND	PARAMETER	UNIT	COMMENT
[:SENSe[1 to 4]]			
:AVERage			
: COUNt	<numeric_value>	--	
[:STATe]	<Boolean>	--	
:CLEar	--	--	no query
:MODE	SWEep| POINt	--	

[:SENSe[1 to 4]:]AVERage:COUNt

The command specifies the number of measurements combined.

Syntax: [:SENSe[1 to 4]:]AVERage:COUNt <numeric_value>
<numeric value> ::= 0 to 256

Example: "AVER:COUN 16"

Features: ***RST value:** 0
SCPI: conforming

[:SENSe[1 to 4]:]AVERage[:STATe]

The command switches on or off the average function.

Syntax: [:SENSe[1 to 4]:]AVERage[:STATe] ON | OFF

Example: "AVER OFF"

Features: ***RST value:** OFF
SCPI: conforming

[:SENSe[1 to 4]:]AVERage:CLEar

The command resets the result of the average function and restarts the measurement.

Syntax: [:SENSe[1 to 4]:]AVERage:CLEar

Example: "AVER:CLE"

Features: ***RST value:** -
SCPI: device-specific

This command is an event, which is why it is not assigned an *RST value and has no query.

[:SENSe[1 to 4]:]AVERage:MODE

The command selects the type of the average function.

Syntax: [:SENSe[1 to 4]:]AVERage:MODE SWEep | POINt

Example: `"AVER:MODE POIN"`

Features: *RST value: NORMal
SCPI: device-specific

3.6.14.2 SENSe:BANDwidth Subsystem

This subsystem controls the setting of the analyzer’s filter bandwidths. The commands BANDwidth and BWIDth have the same effect.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:BANDwidth			
[:RESolution]	<numeric_value>	HZ	
:BWIDth			
[:RESolution]	<numeric_value>	HZ	

[SENSe[1 to 4]:]BANDwidth|BWIDth[:RESolution]

This command defines the analyzer’s resolution bandwidth.

Syntax: [SENSe[1 to 4]:]BANDwidth|BWIDth[:RESolution] <numeric_value>
<numeric_value>::= 1kHz...26kHz; "MAX" must be entered instead of 26 kHz.

Example: `"BAND 10kHz"`

Features: *RST value: –
SCPI: conforming

3.6.14.3 SENSe:CORRection Subsystem

The SENSe:CORRection subsystem controls the system error correction and the recording of the individual correction values.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
[:STATe]	<Boolean>		
:DATA	<string>,<block> | <numeric_value>...		
:DATE?			query only
:INTerpolate			
[:STATe]	<Boolean>		
:AKAL			
:SELect	<string>		
:EXPort	<string>		no query
:IMPort	<string>		no query
:CLEar	<string>		no query
:REName	<string>,<string>		no query
:COLLect			
[:ACQuire]	THRough | OPEN1 | OPEN2 | OPEN12 | SHORT1 | SHORT2 | MATCH1 | MATCH2 | MATCH12 | NET | ATT | IMATCH12 | REFL1 | REFL2 | SLIDE1 | SLIDE2 | SLIDE12 | LINE1 | LINE2 | M1O2 | O1M2 | AKAL		no query
:METHod	FTRans | RTRans | FRTRans | TOM | TRM | TRL | TNA | TOMX | TOSM | FUNDAMENTAL | FOPORT1 | FOPORT2 | FOPORT12 | FOPTport | ROPTport | REFL1 | REFL2 | REFL12 | TPORT | FTREF1 | RTREF2		
:SAVE			no query
:CONNection<1|2>	N50FEMALE | N50MALE | N75FEMALE | N75MALE | PC7 | SMAFEMALE | SMAMALE | PC35FEMALE | PC35MALE | PC292FEMALE | PC292MALE | UFEMALE1 | UMALE1 | UFEMALE2 | UMALE2		
:CKIT	N50 | N75 | SMA | PC7 | PC35 | PC292 | USER1 | USER2		
:INSTall	<string>		
:N<50|75>	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPen | FOPen | MSHort | FSHort | MREFlect | FREFlect | MMTCh | FMTCh | MSMatch | FSMatch[,<string>]		
:SELect	<string>		

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:N<50|75>			
:MMTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MMSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , , ,	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:N<50|75>			
:MFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:FFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:FOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:MSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:FSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:N<50|75>			
:MREFlect	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:FREFlect	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MMTCh	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FMTCh	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MSMatch	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FSMatch	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:SMA	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPen | FOPen | MSHort | FSHort | MREFlect | FREFlect | MMTCh | FMTCh | MSMatch | FSMatch[,<string>]		
:SELect	<string>		
:MMTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:SMA			
:MMSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	,, , HZ, HZ, m, , , , ,	
:FFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:FOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:MSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:SMA			
:FSHort	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>		
:MREFlect	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	OPEN | SHORT		
:FREFlect	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	<numeric_value>,	,	
	OPEN | SHORT		
:MMTCh	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	
:FMTCh	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	
:MSMatch	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	
:FSMatch	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:PC<7|35|292>	MMTHrough | MFTHrough | FFTHrough |		
	MMLINE1 | MFLINE1 | FFLINE1 |		
	MMLINE2 | MFLINE2 | FFLINE2 |		
	MMATten | MFATten | FFATten |		
	MMSNetwork | MFSNetwork |		
	FFSNetwork |		
	MOPen | FOPen |		
	MSHort | FSHort |		
	MREFlect | FREFlect |		
	MMTCh | FMTCh |		
	MSMatch | FSMatch[,<string>]		
:SELect	<string>		
:MMTHrough	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:MFTHrough	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:FFTHrough	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:MMLINE<1|2>	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:MFLINE<1|2>	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:FFLINE<1|2>	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>,	HZ,	
	<numeric_value>,	m,	
	<numeric_value>		
:MMATten	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	
:MFATten	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	
:FFATten	<string>,	,	
	<string>,	,	
	<numeric_value>,	HZ,	
	<numeric_value>	HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>] :CORRection :CKIT :PC<7|35|292>			
:MMSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	,, , HZ, HZ, m, , , , ,	
:FFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:FOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:MSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	

<table>
<tr><th>COMMAND</th><th>PARAMETER</th><th>UNIT</th><th>COMMENT</th></tr>
<tr><td>[SENSe<1...4>]
:CORRection
:CKIT
:PC<7|35|292></td><td></td><td></td><td></td></tr>
<tr><td>:FSHort</td><td><string>,
<string>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value></td><td>,
,
HZ,
HZ,
m,
,
,
,
,</td><td></td></tr>
<tr><td>:MREFlect</td><td><string>,
<string>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
OPEN | SHORT</td><td>,
,
HZ,
HZ,
m,
,
,
,
,</td><td></td></tr>
<tr><td>:FREFlect</td><td><string>,
<string>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
<numeric_value>,
OPEN | SHORT</td><td>,
,
HZ,
HZ,
m,
,
,
,
,</td><td></td></tr>
<tr><td>:MMTCh</td><td><string>,
<string>,
<numeric_value>,
<numeric_value></td><td>,
,
HZ,
HZ</td><td></td></tr>
<tr><td>:FMTCh</td><td><string>,
<string>,
<numeric_value>,
<numeric_value></td><td>,
,
HZ,
HZ</td><td></td></tr>
<tr><td>:MSMatch</td><td><string>,
<string>,
<numeric_value>,
<numeric_value></td><td>,
,
HZ,
HZ</td><td></td></tr>
<tr><td>:FSMatch</td><td><string>,
<string>,
<numeric_value>,
<numeric_value></td><td>,
,
HZ,
HZ</td><td></td></tr>
</table>

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:USER<1|2>	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPen | FOPen | MSHort | FSHort | MREFlect | FREFlect | MMTCh | FMTCh | MSMatch | FSMatch[,<string>]		
:SELect	<string>		
:IMPedance	<numeric_value>	OHM	
:WGUide			
[:STATe]	<Boolean>		
:CFRequency	<numeric_value>	HZ	
:MMTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFTHrough	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:FFLINE<1|2>	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m,	
:MMATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FFATten	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:USER<1|2>			
:MMSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	,, , HZ, HZ, m, , , , ,	
:FFSNetwork	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:FOPen	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:MSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:CKIT			
:USER<1|2>			
:FSHort	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>	, , HZ, HZ, m, , , , ,	
:MREFlect	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:FREFlect	<string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT	, , HZ, HZ, m, , , , ,	
:MMTCh	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FMTCh	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:MSMatch	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	
:FSMatch	<string>, <string>, <numeric_value>, <numeric_value>	, , HZ, HZ	

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1...4>]			
:CORRection			
:EDELay<1|2>			
[:TIME]	<numeric_value>	s	
:DISTance	<numeric_value>	m	
:ELENgth	<numeric_value>	m	
:DIELectric	<numeric_value>		
:AUTO	ONCE		no query
:STATe	<Boolean>		
:OFFSet<1|2>			
:STATe	<Boolean>		
:MAGNitude	<numeric_value>	DB	
:PHASe	<numeric_value>	DEG	
:POWer			
[:STATe]	<Boolean>		
:DATE?			only query
:ACQuire	B1 | B2 | IFRef		no query

[SENSe[1...4]:]CORRection:AKAL:SELect

This command selects an active data set for the AutoKal box. The suffix of SENSe is not significant.

Syntax: [SENSe[1...4]:]CORREction:AKAL:SELect <string>

Example: `"CORR:AKAL:SEL ‘AK1’"`

Features: *RST value: `‘<NONE>’`
SCPI: device-specific

[SENSe[1...4]:]CORRection:AKAL:EXPort

This command exports the selected data set for the AutoKal box. The suffix of SENSe is not significant.

Syntax: [SENSe[1...4]:]CORREction:AKAL:EXPort <string>

Example: `"CORR:AKAL:EXP ‘AK1’"`

Features: *RST value: -
SCPI: device-specific

The command is an "event",, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:AKAL:IMPort

This command imports the selected data set for the AutoKal box. The suffix of SENSe is not significant.

Syntax: [SENSe[1...4]:]CORREction:AKAL:IMPort <string>

Example: `"CORR:AKAL:IMP ‘AK1’"`

Features: *RST value: -
SCPI: device-specific

The command is an "event",, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:AKAL:CLEar

This command clears the selected data set for the AutoKal box. The suffix of SENSe is not significant.

Syntax:	[SENSe[1...4]:]CORREction:AKAL:CLEar	<string>
Example:	"CORR:AKAL:CLE ‘AK1’"	
Features:	*RST value:	-
	SCPI:	device-specific

The command is an "event",, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:AKAL:REName

This command names a data set for the AutoKal box, the first parameter indicating the target name and the second one the source name. The suffix of SENSe is not significant.

Syntax:	[SENSe[1...4]:]CORREction:AKAL:REName	<string>,<string>
Example:	"CORR:AKAL:REN ‘AK2’,‘AK1’"	
Features:	*RST value:	-
	SCPI:	device-specific

The command is an "event",, which is why it is not assigned an *RST value.

[SENSe[1...4]:]CORRection:INTerpolate[:STATe]

This command switches the interpolation for system error correction on and off.

Syntax:	[SENSe[1...4]:]CORRection:INTerpolate[:STATe]	ON | OFF
Example:	"CORR:INT ON"	
Properties:	*RST value:	ON
	SCPI:	device-specific

[SENSe[1...4]:]CORRection:COLLect[:AQUire]

This command performs a measurement and stores internally the result for the selected standard.

Syntax:	[SENSe[1...4]:]CORRection:COLLect[:ACQuire]	THRough | OPEN1 | OPEN 2 | SHORT1 | SHORT2 | SHORT12 | MATCH1 | MATCH2 | MATCH12 | NET | ATT | IMATCH12 | REFL1 | REFL2 | SLIDE1 | SLIDE2 | SLIDE12 | LINE1 | LINE2 | M1O2 | O1M2 | M1S2 | S1M2
Example:	"CORR:COLL OPEN1"	
Features**:**	*RST value:	–
	SCPI:	conforming

This command is an event, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:COLLect:METHod

This command defines the calibration method.

Syntax: [SENSe[1...4]:]CORRection:COLLect:METHod FTRans | RTRans | FRTRans | TOM | TRM | TRL | TNA | TOMX| TOSM | FUNDamental | FOPORT1 | FOPORT2 | FOPORT12 | FOPTport | ROPTport | REFL1 | REFL2 | REFL12 | TPORT | FTREF1 | RTREF2

Example: `"CORR:COLL:METH TOM"`

Features: *RST value: –
SCPI: conforming

[SENSe[1...4]:]CORRection:COLLect:SAVE

This command calculates the calibration data according to the calibration method currently selected from the previously performed measurements of the standards and stores them internally.

Syntax: [SENSe[1...4]:]CORRection:COLLect:SAVE

Example: `"CORR:COLL:SAV"`

Features: *RST value: –
SCPI: conforming

This command is an event,, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2]

This command selects a connector family for the port between connector and socket.

Syntax: [SENSe[1...4]:]CORRection :COLLect:CONNection[1|2] N50FEMALE | N50MALE | N75FEMALE | N75MALE | PC7 | SMAFEMALE | SMAMALE | PC35FEMALE | PC35MALE | PC292FEMALE | PC292MALE | UFEMALE1 | UMALE1 | UFEMALE2 | UMALE2

Example: `"CORR:COLL:CONN2 SMAM"`

Features: *RST value: –
SCPI: device-specific

[SENSe[1...4]:]CORRection:CKIT

This command determines the connector system of the calibration standards.

Syntax: [SENSe[1...4]:]CORRection:CKIT N50 | N75 | SMA | PC7 | PC35 | PC292 | USER1 | USER2

Example: `"CORR:CKIT SMA"`

Features: *RST value: –
SCPI: device-specific

[SENSe[1...4]:]CORRection:CKIT:INSTall

The command installs a calibration kit data set from a file.

Syntax:	[SENSe[1...4]:]CORREction:CKIT:INSTall	<filename>
Example:	`"CORR:CKIT:INST ‘A:\mykit.ck’"`	
Features:	*RST value: - SCPI: device-specific	

[SENSe[1...4]:]CORRection:CKIT:<CAL-Kit-Typ>:<Standard>

The command configures the parameters of the different standards.

Syntax:	[SENSe[1...4]:]CORREction:CKIT: <CAL-Kit-Typ>:<Standard>	string>, <string>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, OPEN | SHORT
Example:	`"CORR:CKIT:N50:MOP ‘ZCAN’,‘123456/001’,0Hz,3GHz,5mm,0.002,24,1.8,0.1,0"`	
Features:	*RST value: - SCPI: device-specific	

Depending on the standard, not all values are used in the list. Their meaning in the given sequence is as follows:

string>:	CAL kit name max. 10 characters
<string>:	Serial number max. 15 characters
<numeric_value>:	Lower frequency limit of the standard, unit Hz
<numeric_value>:	Upper frequency limit of the standard, unit Hz
<numeric_value>:	Electrical length of the standard, unit m
<numeric_value>:	Loss
<numeric_value>:	Polynomial coefficient C0/L0 for parasitic capacitance / inductance, no unit
<numeric_value>:	Polynomial coefficient C1/L1 for parasitic capacitance / inductance, no unit
<numeric_value>:	Polynomial coefficient C2/L2 for parasitic capacitance / inductance, no unit
<numeric_value>:	Polynomial coefficient C3/L3 for parasitic capacitance / inductance, no unit
OPEN | SHORT:	Approximate modelling

[SENSe[1...4]:]CORRection:CKIT:<CAL-Kit-Typ>:SELect

This command selects a defined calibration kit from the specified connector family.

Syntax:	[SENSe[1...4]:]CORREction:CKIT:<CAL-Kit-Typ>:SELect	<string>
Example:	`"CORR:CKIT:N50:SEL 'ZCAN'`	
Features:	*RST value: - SCPI: device-specific	

[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:IMPedance

This command sets the impedance of the USER calibration kit.

Syntax:	[SENSe[1...4]:]CORREction:CKIT:USER<1|2>:IMPedance	<numeric_value>
Example:	`"CORR:CKIT:USER2:IMP 40 OHM`	
Features:	*RST value: 50 Ω SCPI: device-specific	

[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:WGUIde[:STATe]

This command switches on or off waveguide calibration for the respective calibration kit.
The suffix of SENSe has no meaning.

Syntax:	[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:WGUide[:STATe]	ON | OFF
Example:	`"CORR:CKIT:USER:WGU ON"`	
Features:	*RST value: OFF SCPI: device-specific	

[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:CFRequency

This command sets the cutoff frequency for the USER calibration kit.

Syntax:	[SENSe[1...4]:]CORREction:CKIT:USER<1|2>: CFRequency	<numeric_value>
Example:	`"CORR:CKIT:USER2:CFR 1 GHz`	
Features:	*RST value: 0 Hz SCPI: device-specific	

[SENSe[1...4]:]CORRection:CKIT:N50|N75

This command selects a standard from the N-calibration kit (N50 or N75).

Syntax:	[SENSe[1...4]:]CORRection:CKIT:N50|N75	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPEn | FOPEn | MSHort | FSHort | MREFlect | FREFlect | MMATch | FMATch | MSMatch | FSMatch [,<string>]
Example:	`"CORR:CKIT:N50 FFTH"`	
Features:	*RST value: – SCPI: device-specific	

Two-port standards are either MM = connector/connector, FF = socket/socket or MF = connector/socket, one-port standards are either M = connector or F = socket.
The following standards are available:

THRough	Through connection
LINE1	Line 1 for TRL-procedure (ZVR and ZVC only)
LINE2	Line 2 for TRL-procedure (ZVR and ZVC only)
ATTenuation	matched attenuator pad (ZVR and ZVC only)
SNETwork	reflection symmetric network (ZVR and ZVC only)
OPEN	open
SHORt	short circuit
REFLect	unknown one-port standard (ZVR and ZVC only)
MATCh	broadband termination
SMATch	sliding load

In case of a query, the first parameter must be specified, not the second.

[SENSe[1...4]:]CORRection:CKIT:SMA

This command selects a standard from the SMA-calibration set.

Syntax: [SENSe[1...4]:]CORRection:CKIT:SMA

Example: `"CORR:CKIT:SMA MFLINE1"`

Features: *RST value: -
SCPI: device-specific

The definition of the abbreviations is analogous to the definition in the N-calibration set. In case of a query, the first parameter must be specified, not the second.

[SENSe[1...4]:]CORRection:CKIT:PC[7|35]

This command selects a standard from the PC7-, PC3.5 or 2.92 mm-calibration set.

Syntax: [SENSe[1..4]:]CORRection:CKIT:

Example: `"CORR:CKIT:PC35 FMAT"`

Features: *RST value: -
SCPI: device-specific

The definition of the abbreviations is analogous to the definition in the N-calibration set. In case of a query, the first parameter must be specified, not the second.

[SENSe[1...4]:]CORRection:EDELay[1|2][:TIME]

This command defines the length offset as a delay time.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2][:TIME] <numeric value>

Example: `"CORR:EDEL2 10ns"`

Features: *RST value: 0
SCPI: conforming

[SENSe[1...4]:]CORRection:EDELay[1|2]:DISTance

This command defines the length offset as a mechanical length.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2]:DISTance <numeric value>

Example: `"CORR:EDEL:DIST 10mm"`

Features: *RST value: 0
SCPI: conforming

[SENSe[1...4]:]CORRection:EDELay[1|2]:ELENgth

This command defines the length offset as an electrical length.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2]:ELENgth <numeric value>

Example: `"CORR:EDEL:ELEN 12.32mm"`

Features: *RST value: 0
SCPI: device-specific

[SENSe[1...4]:]CORRection:EDELay[1|2]:DIELectric

This command defines the value of the dielectric corresponding to the length specified via EDELay:DISTance.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2]:DIELectric <numeric value>

Example: `"CORR:EDEL2:DIEL 1.2"`

Features: *RST value: 1
SCPI: device-specific

[SENSe[1...4]:]CORRection:EDELay[1|2]:AUTO

This command sets the length offset such that the phase offset of the quantity measured in the active channel is minimized over the current sweep.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2]:AUTO ONCE

Example: `"CORR:EDEL2:AUTO ONCE"`

Features: *RST value: –
SCPI: device-specific

This command is an event, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]CORRection:EDELay[1|2]:STATe

This command switches the correction of the length offset on or off.

Syntax: [SENSe[1...4]:]CORRection:EDELay[1|2]:State ON | OFF

Example: `"CORR:EDEL:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

[SENSe[1...4]:]CORRection:OFFSet[1|2]:STATe

This command switches the correction of the amplitude, phase and length offset on and off.

Syntax: [SENSe[1...4]:]CORRection:OFFSet[1|2]:STATe ON | OFF

Example: `"CORR:OFFS:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

[SENSe[1...4]:]CORRection:OFFSet[1|2]:MAGNitude

This command defines the amplitude offset.

Syntax: [SENSe[1...4]:]CORRection:OFFSet[1|2]:MAGNitude

Example: `"CORR:OFFS:MAGN 3"`

Features: *RST value: 0
SCPI: conforming

[SENSe[1...4]:]CORRection:OFFSet[1|2]:PHASe

This command defines the phase offset.

Syntax: [SENSe[1...4]:]CORRection:OFFSet[1|2]:PHASe

Example: `"CORR:OFFS:PHAS 23"`

Features: *RST value: 0
SCPI: conforming

[SENSe[1...4]:]CORRection:STATe

This command switches the system error correction of the current channel on or off.

Syntax: [SENSe[1...4]:]CORRection:STATe

Example: `"CORR:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

[SENSe[1...4]:]CORRection:DATA

This command is used for reading and writing system error correction values. The data set contains a complex value (real and imaginary component) for each test point. Data can be transferred in ASCII or binary format.

The <string> parameter may assume the following values:

"SCORR1"	Directivity, port 1
"SCORR2"	Source match, port 1
"SCORR3"	Reflection tracking, port 1
"SCORR4"	Forward isolation
"SCORR5"	Load match, port 1
"SCORR6"	Forward transmission tracking
"SCORR7"	Directivity, port 2
"SCORR8"	Source match, port 2
"SCORR9"	Reflection tracking, port 2
"SCORR10"	Reverse isolation
"SCORR11"	Load match, port 2
"SCORR12"	Reverse transmission tracking
"E11" to "E22"	Elements of E matrix (15-term method)
"G11" to "G22"	Elements of G matrix (7-term and 15-term methods)
"H11" to "H22"	Elements of H matrix (7-term and 15-term methods)
"F11", "F21", "F12"	Elements of F matrix (15-term method)

Syntax: [SENSe[1...4]:]CORRection:DATA <string>,<block> | <numeric_value>...

Example: `"CORR:DATA "SCORR1",<block_data>"`

Features: *RST value: -
SCPI: device-specific

The table below shows the correction terms available for the calibration methods:

Calibration Method	Available Correction Terms
Trans Norm Forward Trans Norm Reverse	SCORR6 SCORR12
Trans Norm both Directions	SCORR6, SCORR12
Refl Norm P1 Refl Norm P2	SCORR3 SCORR9
Refl Norm both Ports	SCORR3, SCORR9
Trans+Refl Norm Forward Trans+Refl Norm Reverse	SCORR3, SCORR6 SCORR9, SCORR12
Trans+Refl Norm both Ports	SCORR3, SCORR6, SCORR9, SCORR12
Full One Port P1 Full One Port P2	SCORR1 to SCORR3 SCORR7 to SCORR9
Full One Port both Ports	SCORR1 to SCORR3, SCORR7 to SCORR9
One Path Two Port Forward One Path Two Port Reverse	SCORR1 to SCORR3, SCORR6 SCORR7 to SCORR9, SCORR12
TOM, TRM, TNA, TRL	G11 to G22 and H11, H12, H22 (H21 = 1); Gxx is normalized to H21
TOSM	SCORR1 to SCORR12
TOM-X	E11 to E22, G11 to G22, H11 to H22, F11, F21, F12

[SENSe[1...4]:]CORRection:DATE?

This command queries the date at which the active system error correction was recorded.

Syntax: [SENSe[1...4]:]CORRection:DATE?

Example: `"CORR:DATE?"`

Features: *RST value: -
SCPI: device-specific

[SENSe[1...4]:]CORRection:POWer:ACQuire

This command is used to acquire a receiver power calibration.

Syntax: [SENSe[1...4]:]CORRection:POWer:ACQuire B1 | B2 | IFRef

Example: `"CORR:POW:ACQ B1"`

Features: *RST value:
SCPI: conforming

[SENSe[1...4]:]CORRection:POWer[:STATe]

This command switches on or off the power calibration in the specified channel.

Syntax: [SENSe[1...4]:]CORRection:POWer[:STATe]

Example: `"CORR:POW:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

[SENSe[1...4]:]CORRection:POWer:DATA

This command is used for reading and writing power correction values for a receiver channel.

The <string> parameter may assume the following values:

"B1"	Correction data for wave b1 at port 1
"INPUTB1"	Correction data for wave b1 at input b1
"B2"	Correction data for wave b2 at port 2
"INPUTB2"	Correction data for wave b2 at input b2
"IFREF"	Correction data for reference input a1 on rear panel
"A1REF"	Correction data for reference input a1 (ZVM and ZVK only)
"A2REF"	Correction data for reference input a2 (ZVM and ZVK only)

Syntax: [SENSe[1...4]:]CORRection:POWer:DATA <string>,<block> | <numeric_value>...

Example: `"CORR:POW:DATA "B1",<block>"`

Features: *RST value: -
SCPI: device-specific

[SENSe[1...4]:]CORRection:POWer:DATE?

This command queries the date at which the active power calibration was recorded.

Syntax: [SENSe[1...4]:]CORRection:POWer:DATE?

Example: `"CORR:POW:DATE?"`

Features: *RST value: -
SCPI: device-specific

3.6.14.4 SENSe:DETector Subsystem

Das SENSe:DETector-subsystem controls how the analyzer takes measurement data.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1..4>]			
:DETector			
[:FUNCtion]	FAST | NORMal		

[SENSe[1...4]:]DETector[:FUNCtion]

This command switches the fast measurement mode on and off.

Syntax: [SENSe[1...4]:]DETector[:FUNCtion]

Example: `"DET FAST"`

Features: *RST value: NORMal
SCPI: device-specific

3.6.14.5 SENSe:FREQuency Subsystem

The SENSe:FREQuency subsystem controls the frequency abscissa of the active display. The frequency abscissa can either be defined via the start/stop frequency or via the center frequency and span.

The following frequency ranges apply to the different instrument models.

SENSe:FREQuency:	**ZVR,**	**ZVRE,**	**ZVRL**	**ZVC, ZVCE**
SOURce:FREQuency:	internal mode		external mode	
	passive test set	active test set		
STARt, STOP, CW|FIXed	9 kHz to 4 GHz	300 kHz to 4 GHz	10 Hz to 4 GHz	20 kHz to 8 GHz
CENTer	> 9 kHz to < 4 GHz	> 300 kHz to < 4 GHz	> 9 kHz to < 4 GHz	> 20 kHz to < 8 GHz
SPAN	10 mHz to 3,999991 GHz	10 mHz to 3,9997 GHz	10 mHz to 3,99999999 GHz	10 mHz to 3,99998 GHz

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe[1..4]]			
:FREQuency			
:CENTer	<numeric_value>	Hz	
:SPAN	<numeric_value>	Hz	
:STARt	<numeric_value>	Hz	
:STOP	<numeric_value>	Hz	
:MODE	CW | FIXed | SWEep | SEGMent		
[:CW]	<numeric_value>	Hz	
:FIXED	<numeric_value>	Hz	
:CONVersion	FUNDamental | SHARmonic | THARmonic | MIXer | ARBitrary		
:ARBitrary	<numeric_value>, <numeric_value>, <numeric_value>, CW | FIXed | SWEep	, , Hz,	
:MIXer			
:FUNDamental	RF | LO | IF		
:LOEXternal	SOURCE1 | SOURCE2		
:RFFixed	<numeric_value>	Hz	
:LOFixed	<numeric_value>	Hz	
:IFFixed	<numeric_value>	Hz	
:TFRequency	BAND1 | BAND2		
:NLINear			
:COMP			
:STIMe	<numeric_value>	s	
SOI:			
:STIMe	<numeric_value>	s	
:TOI			
:STIMe	<numeric_value>	s	

[SENSe[1 to 4]:]FREQuency:CENTer

This command defines the center frequency of the analyzer.

Syntax:	[SENSe[1 to 4]:]FREQuency:CENTer <numeric_value>	
	<numeric value> ::=	model-dependent range (see table at the beginning of this subsystem)
Example:	`"FREQ:CENT 100MHz"`	
Features:	*RST value:	–
	SCPI:	conforming

[SENSe:]FREQuency:SPAN

This command defines the frequency span of the analyzer.

Syntax:	[SENSe:]FREQuency:SPAN <numeric_value>	
	<numeric value> ::=	model-dependent range (see table at the beginning of this subsystem)
Example:	`"FREQ:SPAN 10MHz"`	
Features:	*RST value:	MAXimum
	SCPI:	conforming

[SENSe:]FREQuency:STARt

This command defines the start frequency of the analyzer.

Syntax:	[SENSe:]FREQuency:STARt <numeric_value>	
	<numeric value> ::=	model-dependent range (see table at the beginning of this subsystem)
Example:	`"FREQ:STAR 20MHz"`	
Features:	*RST value:	9kHz or 300kHz (passive or active test set)
	SCPI:	conforming

[SENSe:]FREQuency:STOP

This command defines the stop frequency of the analyzer.

Syntax:	[SENSe:]FREQuency:STOP <numeric_value>	
	<numeric value> ::=	model-dependent range (see table at the beginning of this subsystem)
Example:	`"FREQ:STOP 2000MHz"`	
Features:	*RST value:	model-dependent (see table at the beginning of this subsystem)
	SCPI:	conforming

[SENSe[1...4]:]FREQuency:MODE

This command determines which command groups are used for setting the frequency of the analyzer.

Syntax: [SENSe[1...4]:]FREQuency:MODE CW **|** FIXed **|** SWEep **|** SEGMent

Example: `"FREQ:MODE SWE"`

Features: *RST value: SWE
SCPI: conforming

For CW and FIXed, the frequency setting is via command FREQuency:CW. In the SWEep mode, the setting is via the commands FREQuency:STARt, STOP, CENTer and SPAN.

[SENSe[1 to 4]:]FREQuency:CW|FIXed

This command sets the frequency of the analyzer for CW operation.

Syntax: [SENSe[1 to 4]:]FREQuency:CW|FIXed <numeric_value>
<numeric value> ::= model-dependent range (see table at the beginning of this subsystem)

Example: `"FREQ:CW 100MHz"`

Features: *RST value: –
SCPI: conforming

The commands FREQuency:CW and FREQuency:FIXed are equivalent.

[SENSe[1...4]:]FREQuency:CONVersion

This command selects frequency-converting measurement modes (second harmonic, third harmonic, mixer measurements or arbitrary frequency-converting modes).)

Syntax: [SENSe[1...4]:]FREQuency:CONVersion FUNDamental **|** SHARmonic **|** THARmonic **|** MIXer **|** ARBitrary

Example: `"FREQ:CONV THAR"`

Features: *RST value: FUNDamental
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:ARBitrary

This command defines the frequency range of the receiver for a frequency-converting measurement mode.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:ARBitrary <numeric_value>,<numeric_value>, <numeric_value>, CW **|** FIXed **|** SWEep"

Example: `"FREQ:CONV:ARB 1,1,10MHz,SWE"`

Features: *RST value: 1,1,0
SCPI: device-specific

The parameters are sorted as follows (see Section 2.4.1.2.3, "General Frequency Configurations"):
numerator,
denominator,
offset,
sweep or fixed frequency.

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:FUNDamental

For mixer measurements, this command selects the fundamental frequency out of the three mixer frequencies. .

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:FUNDamental RF | LO | IF

Example: `"FREQ:CONV:MIX:FUND RF"`

Features: *RST value: LO
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOEXternal

This command selects one of the two external signal sources as a local oscillator.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOEXternal SOURCE1 | SOURCE2

Example: `"FREQ:CONV:MIX:LOEX SOURCE2"`

Features: *RST value: SOURCE1
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:RFFixed

This command defines the RF mixer frequency as a fixed value.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:RFFixed <numeric_value>

Example: `"FREQ:CONV:MIX:RFF 2.5GHz"`

Features: *RST value: 0
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOFixed

This command defines the LO mixer frequency as a fixed value.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOFixed <numeric_value>

Example: `"FREQ:CONV:MIX:LOF 1.8GHz"`

Features: *RST value: 0
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:IFFixed

This command defines the IF mixer frequency as a fixed value.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:IFFixed <numeric_value>

Example: `"FREQ:CONV:MIX:IFF 21.4MHz"`

Features: *RST value: 0
SCPI: device-specific

[SENSe[1...4]:]FREQuency:CONVersion:MIXer:TFRequency.

This command determines the sign of the third mixer frequency by selecting either the lower or upper band.

Syntax: [SENSe[1...4]:]FREQuency:CONVersion:MIXer:TFRequency BAND1 | BAND2

Example: `"FREQ:CONV:MIX:TFR BAND2"`

Features: *RST value: BAND1
SCPI: device-specific

[SENSe[1...4]:]FREQuency:NLINear:COMP:STIMe

This command defines a settling time to be inserted between the generator setting and the start of data aquisition for a compression point measurement.

Syntax: [SENSe[1...4]:]FREQuency:NLINear:COMP:STIMe <numeric_value>

<numeric_value>::= 0s...1000s

Example: `"FREQ:NLIN:COMP:STIMe 1s"`

Features: *RST value: 0s
SCPI: device-specific

[SENSe[1...4]:]FREQuency:NLINear:SOI:STIMe

This command defines a settling time to be inserted between the generator setting and the start of data aquisition for a 2nd order intercept point measurement.

Syntax: [SENSe[1...4]:]FREQuency:NLINear:SOI:STIMe <numeric_value>

<numeric_value>::= 0s...1000s

Example: `"FREQ:NLIN:SOI:STIMe 1s"`

Features: *RST value: 0s
SCPI: device-specific

[SENSe[1...4]:]FREQuency:NLINear:TOI:STIMe

This command defines a settling time to be inserted between the generator setting and the start of data aquisition for a 2nd order intercept point measurement.

Syntax: [SENSe[1...4]:]FREQuency:NLINear:TOI:STIMe <numeric_value>

<numeric_value>::= 0s...1000s

Example: `"FREQ:NLIN:TOI:STIMe 1s"`

Features: *RST value: 0s
SCPI: device-specific

3.6.14.6 SENSe:FUNCtion Subsystem

The SENSe:FUNCtion-Subsystem defines the measurement function performed by the analyzer.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1..4>] :FUNCtion [:ON]	<string>		

[SENSe[1...4]:]FUNCtion[:ON]

This command defines the measurement function performed by the analyzer in one string.

Syntax: [SENSe[1...4]:]FUNCtion[:ON] <string>

<string> ::=
"XFRequency:POWer:A<1|2>"
"XFRequency:POWer:B<1|2>"
"XFRequency:POWer:S<11..22>"
"XFRequency:POWer:S<11..22>:DEFine B1 | B2 | A1,
A1 | B1 | B2"

"XFRequency:POWer:Z<11..22>"
"XFRequency:POWer:Y<11..22>"
"XFRequency:POWer:ZREL<11..22>"
"XFRequency:POWer:YREL<11..22>"

"XFRequency:POWer:RATio B1 | B2 | A1 | A2 | ABSA1 | ABSA2,
A1 | A2 | B1 | B2 | ABSA1 | ABSA2"

"XFRequency:POWer:KFACtor
"XFRequency:POWer:MUFactor<1|2>
"XFRequency:POWer:EFFiciency
"XFRequency:VOLTage[:DC] DCIN1 | DCIN2"

"XFRequency:NLINear COMP | SOI | TOI | OFF"
"XFRequency:NLINear:COMP:LEVel <numeric_value>"
"XFRequency:NLINear:COMP:CPOint INP | OUTP"
"XFRequency:NLINear:COMP:CHECk[:ALL] ON | OFF"
"XFRequency:NLINear:COMP:CHECk:MAXPwr ON | OFF"
"XFRequency:NLINear:COMP:CHECk:MINPwr ON | OFF"
"XFRequency:NLINear:COMP:CHECk:ITERations ON | OFF"
"XFRequency:NLINear:COMP:CHECk:RCOMpress ON | OFF"
"XFRequency:NLINear:COMP:CHECk:ESRC ON | OFF"
"XFRequency:NLINear:SOI:IPOint INP | OUTP "
"XFRequency:NLINear:SOI:FREQuency SUM | DIFF"
"XFRequency:NLINear:SOI:CHECk[:ALL] ON | OFF"
"XFRequency:NLINear:SOI:CHECk:MAXPwr ON | OFF"
"XFRequency:NLINear:SOI:CHECk:MINPwr ON | OFF"
"XFRequency:NLINear:SOI:CHECk:LEVel ON | OFF"
"XFRequency:NLINear:SOI:CHECk:IPNoise ON | OFF"
"XFRequency:NLINear:SOI:CHECk:SQR ON | OFF"
"XFRequency:NLINear:SOI:CHECk:RIMod ON | OFF"
"XFRequency:NLINear:SOI:CHECk:COMP ON | OFF"
"XFRequency:NLINear:SOI:CHECk:ESRC ON | OFF"
"XFRequency:NLINear:TOI:IPOint INP | OUTP "
"XFRequency:NLINear:TOI:SIDeband LSB | USB"
"XFRequency:NLINear:TOI:CHECk[:ALL] ON | OFF"
"XFRequency:NLINear:TOI:CHECk:MAXPwr ON | OFF"
"XFRequency:NLINear:TOI:CHECk:MINPwr ON | OFF"

"XFRequency:NLINear:TOI:CHECk:LEVel ON | OFF"
"XFRequency:NLINear:TOI:CHECk:IPNoise ON | OFF"
"XFRequency:NLINear:TOI:CHECk:CUBic ON | OFF"
"XFRequency:NLINear:TOI:CHECk:RIMod ON | OFF"
"XFRequency:NLINear:TOI:CHECk:COMP ON | OFF"
"XFRequency:NLINear:TOI:CHECk:ESRC ON | OFF"

"XPOWer:POWer:A<1|2>"
"XPOWer:POWer:B<1|2>"
"XPOWer:POWer:S<11..22>"
"XPOWer:POWer:S<11..22>:DEFine B1 | B2 | A1,
A1 | B1 | B2"

"XPOWer:POWer:Z<11..22>"
"XPOWer:POWer:Y<11..22>"
"XPOWer:POWer:ZREL<11..22>"
"XPOWer:POWer:YREL<11..22>"

"XPOWer:POWer:RATio B1 | B2 | A1 | A2 | ABSA1 | ABSA2,
A1 | A2 | B1 | B2 | ABSA1 | ABSA2"

"XPOWer:POWer:KFACtor
"XPOWer:POWer:MUFactor<1|2>
"XPOWer:POWer:EFFiciency
"XPOWer:VOLTage[:DC] DCIN1 | DCIN2"

"XTIMe:POWer:A<1|2>"
"XTIMe:POWer:B<1|2>"
"XTIMe:POWer:S<11..22>"
"XTIMe:POWer:S<11..22>:DEFine B1 | B2 | A1,
A1 | B1 | B2"

"XTIMe:POWer:Z<11..22>"
"XTIMe:POWer:Y<11..22>"
"XTIMe:POWer:ZREL<11..22>"
"XTIMe:POWer:YREL<11..22>"

"XTIMe:POWer:RATio B1 | B2 | A1 | A2 | ABSA1 | ABSA2,
A1 | A2 | B1 | B2 | ABSA1 | ABSA2"

"XTIMe:POWer:KFACtor
"XTIMe:POWer:MUFactor<1|2>
"XTIMe:POWer:EFFiciency
"XTIMe:VOLTage[:DC] DCIN1 | DCIN2"

Example: `"FUNC 'XFR:POW:RAT B1,A1'"`

Features: *RST value: –
SCPI: conforming

3.6.14.7 SENSe:ROSCillator - Subsystem

Dieses Subsystem controls the reference oscillator.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe]			
:ROSCillator			
[:SOURce]	INTernal | EXTernal	--	
:EXTernal			
FREQuency	<numeric_value>	HZ	

[SENSe:]ROSCillator[:SOURce]

This command selects the reference oscillator..

Syntax: [SENSe:]ROSCillator[:SOURce] INTernal **|** EXTernal

Example: `"ROSC:SOUR EXT"`

Features: *RST value: -
SCPI: conforming

If EXT is selected, the external reference signal mut be applied to the rear panel of the instrument.

[SENSe:]ROSCillator:EXTernal:FREQuency.

This command defines the external reference frequency.

Syntax: [SENSe:]ROSCillator:EXTernal:FREQuency <numeric_value>

<numeric_value> ::= 1 MHz ..15 MHz

Example: `"ROSC:EXT:FREQ 5MHZ"`

Features: *RST value: 10MHz
SCPI: conforming

The value of the external reference frequency (1 MHz to 15 MHz) is rounded in steps of 1 MHz.

3.6.14.8 SENSe:SEGMent Subsystem

The SENSe:SEGMent-Subsystem defines the parameter for a segmented sweep.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1..4>]			
:SEGMent			
:DEFine<1...50>	<numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value> | AUTO, <numeric_value>, <numeric_value>, [POSitive | NEGative]	Hz, Hz, , dBm, s, , Hz,	
:CLEar			no query
:INSert<1...50>	<numeric_value>, <numeric_value>, <numeric_value>, <numeric_value>, <numeric_value> | AUTO, <numeric_value>, <numeric_value>, [POSitive | NEGative]	Hz, Hz, , dBm, s, , Hz,	
:DELete<1...50>			
:COUNT?			query only
:OVERlap	<Boolean>		

[SENSe[1...4]:]SEGMent:DEFine[1...50]

This command defines a sweep segment. .

Syntax: [SENSe[1...4]:]SEGMent:DEFine[1...50] <numeric_value>,<numeric_value>, <numeric_value>,<numeric_value>, <numeric_value> | AUTO, <numeric_value>,<numeric_value>, [POSitive | NEGative]"

Example: `"SEG:DEF3 100kHz,300kHz,401,-20dBm,AUTO,1,10kHz"`

Features: *RST value: –
SCPI: device-specific

The ordered parameters are:

START
STOP
POINTS
SOURCE POWER
SWEEP TIME
AVERAGE FACTOR
IF BANDWIDTH
LO to RF

[SENSe[1...4]:]SEGMent:CLEar

This command deletes all segments

Syntax:	[SENSe[1...4]:]SEGMent:CLEar	
Example:	`"SEG:CLE"`	
Features:	*RST value:	-
	SCPI:	device-specific

This command is an event, which is why it is not assigned an *RST value and has no query.

[SENSe[1...4]:]SEGMent:INSert[1...50]

This command inserts a segment into an existing list.

Syntax:	[SENSe[1...4]:]SEGMent:INSert[1...50]	numeric_value>,<numeric_value>, <numeric_value>,<numeric_value>, <numeric_value> | AUTO, <numeric_value>,<numeric_value>, [POSitive | NEGative]"
Example:	`"SEG:INS12 9kHz,100kHz,201,-10dBm,AUTO,1,10kHz"`	
Features:	*RST value:	-
	SCPI:	device-specific

[SENSe[1...4]:]SEGMent:DELete[1...50]

This command deletes a segment from a previously defined segment list.

Syntax:	[SENSe[1...4]:]SEGMent:DELete[1...50]	
Example:	`"SEG:DEL2"`	
Features:	*RST value:	–
	SCPI:	device-specific

[SENSe[1...4]:]SEGMent:COUNt?

This command returns the number of segments previously defined for a sweep.

Syntax:	[SENSe[1...4]:]SEGMent:COUNt?	
Example:	`"SEG:COUN?"`	
Features:	*RST value:	–
	SCPI:	device-specific

[SENSe[1...4]:]SEGMent:OVERlap

This command activates/deactivates the segmented sweep mode with overlapping segments.

Syntax:	[SENSe[1...4]:]SEGMent:OVERlap	ON | OFF
Example:	`"SWE:SEGM:OVER ON"`	
Features:	*RST value:	OFF
	SCPI:	device-specific

3.6.14.9 SENSe:SWEep Subsystem

This subsystem controls the sweep parameters.

COMMAND	PARAMETER	UNIT	COMMENT
[SENSe<1..4>]			
:SWEep			
:TIME	<numeric_value>	S	
:AUTO	<Boolean>	--	
:COUNt	<numeric_value>	--	
:POINts	<numeric_value>	--	
:SPACing	LINear | LOGarithmic	--	
:STEP	<numeric_value>	HZ	
:PDECade	<numeric_value>	--	
:DIRection	UP | DOWN		

[SENSe[1 to 4]:]SWEep:TIME

This command defines the duration of the sweep.

Syntax: [SENSe[1 to 4]:]SWEep:TIME <numeric_value>
<numeric_value>::= 5ms to 1000s

Example: `"SWE:TIME 10s"`

Features: *RST value **-** (AUTO is set to ON)
SCPI: conforming

If SWEep:TIME is directly programmed, the automatic coupling is switched off.

[SENSe[1 to 4]:]SWEep:TIME:AUTO

This command controls the automatic coupling of the sweep time to the frequency span or to the bandwidth settings.

Syntax: [SENSe[1 to 4]:]SWEep:TIME:AUTO ON | OFF

Example: `"SWE:TIME:AUTO ON"`

Features: *RST value: ON
SCPI: conforming

If SWEep:TIME is directly programmed, the automatic coupling is switched off.

[SENSe[1 to 4]:]SWEep:COUNt

This command defines the number of sweeps started by "single sweep".

Syntax: [SENSe[1 to 4]:]SWEep:COUNt <numeric_value>
<numeric_value>::= 0 to 32767

Example: `"SWE:COUNT 64"`

Features: *RST value: 0
SCPI: conforming

This parameter defines the number of sweeps or the number of averagings. In the average mode, the value 0 defines a running averaging of the measured data over 10 sweeps.

[SENSe[1 to 4]:]SWEep:POINts

This command defines the number of measured points in one sweep.

Syntax: [SENSe[1 to 4]:]SWEep:POINts <numeric_value>
<numeric_value>::= 1... 2001

Example: `"SWE:POIN 10"`

Features: *RST value: 400
SCPI: conforming

[SENSe[1 to 4]:]SWEep:SPACing

This command switches over between linear and logarithmic sweep.

Syntax: [SENSe[1 to 4]:]SWEep:SPACing LINear **|** LOGarithmic

Example: `"SWE:SPAC LOG"`

Features: *RST value: LIN
SCPI: conforming

[SENSe[1 to 4]:]SWEep:STEP

This command defines the step width of the linear sweep.

Syntax: [SENSe[1 to 4]:]SWEep:STEP <numeric_value>

Example: `"SWE:STEP 200kHz"`

Features: *RST value: –
SCPI: conforming

[SENSe[1 to 4]:]SWEep:PDECade

This command defines the number of steps per decade for the linear sweep.

Syntax: [SENSe[1 to 4]:]SWEep:PDECade <numeric_value>

Example: `"SWE:PDEC 100kHz"`

Features: *RST value: –
SCPI: device-specific

[SENSe[1...4]:]SWEep:DIRection

This command defines the direction of the sweep.

Syntax: [SENSe[1...4]]SWEep:DIRection UP **|** DOWN

Example: `"SWE:DIR DOWN"`

Features: *RST value: UP
SCPI: conforming

3.6.15 SOURce Subsystem

The SOURce subsystem directly controls device-specific settings which are necessary for signal generation.

The following value ranges apply to the different instrument models:

SOURce:POWer:	**ZVR,**	**ZVRE,**	**ZVRL**	**ZVC,**	**ZVCE**
	internal mode		external mode	internal mode	external mode
	50 Ω - test set	75 Ω - test set			
STARt, STOP, LEVel:IMMediate: AMPLitude	–25 dBm to 0 dBm	–27 dBm to –6 dBm	–18 dBm to 7 dBm	–25 dBm to 0 dBm	–23 dBm to 3 dBm
CENTer	–24,9 dBm to –0,1 dBm	–26,9 dBm to –6,1 dBm	–17,9 dBm to 6,9 dBm	–24,9 dBm to –0,1 dBm	–22,9 dBm to 2,9 dBm
SPAN	0,1 dB to25 dB	0,1 dB to21 dB	0,1 dB to25 dB	0,1 dB to25 dB	0,1 dB to23 dB

COMMAND	**PARAMETER**	**UNIT**	**COMMENT**
SOURce<1...4>			
:POWer			
[:LEVel]			
[:IMMediate]			
[:AMPLitude]	<numeric_value>	DBM	
:CAMPlitude			
:A<1|2>	<numeric_value>	DBM	
:ESRC<1|2>	<numeric_value>	DBM	
:SLOPe	<numeric_value>	DB/GHZ	
:EXTernal<1|2>			
[:AMPLitude]	<numeric_value>	DBM	
:SLOPe	<numeric_value>	DB/GHZ	
:ALC			
[:STATe]	<Boolean>		
:NLINear			
:COMP			
:RANGe			
:UPPer	<numeric_value>	dBm	
:LOWer	<numeric_value>	dBm	
:SOI			
:RANGe			
:UPPer	<numeric_value>	dBm	
:LOWer	<numeric_value>	dBm	
:TOI			
:RANGe			
:UPPer	<numeric_value>	dBm	
:LOWer	<numeric_value>	dBm	

COMMAND	PARAMETER	UNIT	COMMENT
SOURce<1...4>			
:POWer			
:CENTer	<numeric_value>	dBm	
:SPAN	<numeric_value>	dB	
:STARt	<numeric_value>	dBm	
:STOP	<numeric_value>	dBm	
:CORRection			
:DATA	<string>, <block> | <numeric_value>...		
:EXT<1|2>			
:SWEep	<numeric_value>, <numeric_value>, <numeric_value>, LIN | LOG	HZ, HZ, ,	
:NREadings	<numeric_value>		
[:ACQuire]	A1 | A2 | ESRC1 | ESRC2		no query
:LLISt	<numeric_value>, <numeric_value>, <numeric_value> ...	, HZ, dB	
:STATE	<Boolean>		
:FREQuency			
[:CW]	<numeric_value>	HZ	
:FIXED	<numeric_value>	HZ	
:CONVersion			
:ARBitrary			
:IFRequency	<numeric_value>, <numeric_value>, <numeric_value>, CW | FIXed | SWEep	, , HZ,	
:EFRequency<1|2>	<Boolean>, <numeric_value>, <numeric_value>, <numeric_value>, CW | FIXed | SWEep	, , , HZ,	
:NLINear			
:COMP	INT | ESRC1 | ESRC2		
:SOI	IESRC1 | IESRC2 | ESRC12		
:OFFSet	<numeric_value>	HZ	
:TOI	IESRC1 | IESRC2 | ESRC12		
:OFFSet	<numeric_value>	HZ	

SOURce<1...4>:POWer[:LEVel]][:IMMediate][:AMPLitude]

This command defines the level of the output signal.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value>
<numeric_value>::= –25dBm...0dBm (model-dependent, see table at the beginning of this section)

Example: `"SOUR2:POW -20dBm"`

Features: *RST value: –10 dBm
SCPI: conforming

SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:A<1|2>

This command defines the level of the output signal a1 / a2 when the power correction is switched on or when a power calibration is started.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:A<1|2> <numeric_value>

<numeric_value>::= -300dBm...+200dBm

Example: `"SOUR:POW:CAMP:A1 -10dBm"`

Features: *RST value: 0 dBm
SCPI: conforming

SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:ESRC<1|2>

This command defines the level of the external generator 1 / 2 when the power correction is switched on or when a power calibration is started.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:ESRC<1|2> <numeric_value>

<numeric_value>::= -300dBm...+200dBm

Example: `"SOUR:POW:CAMP:ESRC2 -10dBm"`

Features: *RST value: 0 dBm
SCPI: conforming

SOURce<1...4>:POWer[:LEVel]][:IMMediate]:SLOPe

This command defines the variation of the output signal level during a sweep.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate]:SLOPe

<numeric_value>::= 0dBm to 20 dB/GHz

Example: `"SOUR2:POW:SLOP 6dB/GHz"`

Features: *RST value: 0dB/Hz
SCPI: device-specific

SOURce<1...4>:POWer[:LEVel>][:IMMediate]:EXTernal[1|2]:AMPLitude

This command defines the level of the output signal when an external generator is used.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate]:EXTernal[1|2]:AMPLitude <numeric_value>

Example: `"SOUR2:POW:EXT:AMP -20dBm"`

Features: *RST value: -
SCPI: device-specific

SOURce<1...4>:POWer[:LEVel>][:IMMediate]:EXTernal[1|2]:SLOPe

This command defines the variation of the output signal level when an external generator is used.

Syntax: SOURce<1...4>:POWer[:LEVel][:IMMediate]:EXTernal[1|2]:SLOPe <numeric_value>

Example: `"SOURC2:POW:EXT:SLOP 6dB/GHz"`

Features: *RST value: 0dB/Hz
SCPI: device-specific

SOURce[1...4]: POWer:ALC[:STATe]

This command is for controlling the ALC loop of the analyzer. With ON the internal ALC loop is closed, with OFF an external control signal fed via a rear-panel connector is used. The channel specification (1 to 4) is of no importance here since this is a global setting.

Syntax: SOURce[1...4]: POWer:ALC[:STATe] ON | OFF

Example: `"SOUR:POW:ALC ON"`

Characteristics: *RST value: ON
SCPI: conforming

SOURce[1...4]:POWer:NLINear:COMP:RANGe:UPPer

This command defines an upper limit for the power of the signal source for a compression point measurement. The value set must not exceed the maximum level of the selected source.

With power calibration, the upper limit is +200 dBm, regardless of the selected signal source.

Syntax: SOURce[1...4]: POWer:NLINear:COMP:RANGe:UPPer <numeric_value>

Example: `"SOUR:POW:NLIN:COMP:RANG:UPP 0dBm"`

Features: *RST value: 0 dBm
SCPI: device-specific

SOURce[1...4]:POWer:NLINear:COMP:RANGe:LOWer

This command defines a lower limit for the power of the signal source for a compression point measurement. The value set must not fall below the minimum level of the selected source.

With power calibration, the lower limit is -300 dBm, regardless of the selected signal source.

Syntax: SOURce[1...4]: POWer:NLINear:COMP:RANGe:LOWer <numeric_value>

Example: `"SOUR:POW:NLIN:COMP:RANG:LOW -25dBm"`

Features: *RST value: -25 dBm
SCPI: device-specific

SOURce[1...4]:POWer:NLINear:SOI:RANGe:UPPer

This command defines an upper limit for the power of the signal sources for a 2^{nd} order intercept point measurement. The allowed range of upper limits depends on the power of the signal sources.

With power calibration, the upper limit must be set such that it can be reached by both signal sources.

Syntax: SOURce[1...4]: POWer:NLINear:SOI:RANGe:UPPer <numeric_value>

Example: `"SOUR:POW:NLIN:SOI:RANG:UPP 0dBm"`

Features: *RST value: 0 dBm
SCPI: device-specific

SOURce[1...4]:POWer:NLINear:SOI:RANGe:LOWer

This command defines a lower limit for the power of the signal sources for a 2nd order intercept point measurement. The allowed range of lower limits depends on the power of the signal sources.

With power calibration, the lower limit must be set such that it can be reached by both signal sources.

Syntax: SOURce[1...4]: POWer:NLINear:SOI:RANGe:LOWer <numeric_value>

Example: `"SOUR:POW:NLIN:SOI:RANG:LOW -25dBm"`

Features: *RST value: -25 dBm
SCPI: device-specific

SOURce[1...4]:POWer:NLINear:TOI:RANGe:UPPer

This command defines an upper limit for the power of the signal sources for a 3rd order intercept point measurement. The allowed range of upper limits depends on the power of the signal sources.

With power calibration, the upper limit must be set such that it can be reached by both signal sources.

Syntax: SOURce[1...4]: POWer:NLINear:TOI:RANGe:UPPer <numeric_value>

Example: `"SOUR:POW:NLIN:TOI:RANG:UPP 0dBm"`

Features: *RST value: 0 dBm
SCPI: device-specific

SOURce[1...4]:POWer:NLINear:TOI:RANGe:LOWer

This command defines a lower limit for the power of the signal sources for a 3rd order intercept point measurement. The allowed range of lower limits depends on the power of the signal sources.

With power calibration, the lower limit must be set such that it can be reached by both signal sources.

Syntax: SOURce[1...4]: POWer:NLINear:TOI:RANGe:LOWer <numeric_value>

Example: `"SOUR:POW:NLIN:TOI:RANG:LOW -25dBm"`

Features: *RST value: -25 dBm
SCPI: device-specific

SOURce<1...4>: POWer:CENTer

This command defines the center level of the analyzer in the level sweep mode.

Syntax: SOURce<1...4>: POWer:CENTer <numeric_value>

<numeric value> ::= -25dBm to 0 dBm (device-specific)

Example: `"SOUR:POW:CENT -10dBm"`

Features: *RST value:
SCPI: conforming

SOURce<1...4>: POWer:SPAN

This command defines the level display range of the analyzer in the level sweep mode.

Syntax:	SOURce<1...4>: POWer:SPAN	<numeric_value>
	<numeric value> ::= 0dBm to 25 dB (device-specific)	
Example:	`"SOUR:POW:SPAN 10dB"`	
Features:	*RST value:	MAXimum
	SCPI:	conforming

SOURce<1...4>: POWer:STARt

This command defines the start level in the level sweep mode.

Syntax:	SOURce<1...4>: POWer:STARt	<numeric_value>
	<numeric value> ::= –25dBm to 0dBm (device-specific)	
Example:	`"SOUR:POW:STARt -10dBm"`	
Features:	*RST value:	
	SCPI:	conforming

SOURce<1...4>: POWer:STOP

This command defines the stop level in the level sweep mode.

Syntax:	SOURce<1...4>: POWer:STOP	<numeric_value>
	<numeric value> ::= –25dBm to 0dBm (device-specific)	
Example:	`"SOUR:POW:STOP -10dBm"`	
Features:	*RST value:	
	SCPI:	conforming

[SENSe[1...4]:]CORRection:POWer:DATA

This command is used for reading and writing power correction values for a receiver channel.

The <string> parameter may assume the following values:

"B1"	Correction data for wave b1 at port 1
"INPUTB1"	Correction data for wave b1 at input b1
"B2"	Correction data for wave b2 at port 2
"INPUTB2"	Correction data for wave b2 at input b2
"IFREF"	Correction data for reference input a1 on rear panel
"A1REF"	Correction data for reference input a1 (ZVM and ZVK only)
"A2REF"	Correction data for reference input a2 (ZVM and ZVK only)

Syntax:	[SENSe[1...4]:]CORRection:POWer:DATA	<string>,<block> | <numeric_value>...
Example:	`"CORR:POW:DATA "B1",<block>"`	
Features:	*RST value:	-
	SCPI:	device-specific

SOURce<1...4>: POWer:CORRection:EXT<1|2>:SWEep

This command defines the sweep parameters to be used when an external generator power calibration is started.

Syntax: SOURce<1...4>:POWer:CORRection:EXT<1|2>:SWEep <numeric_value>,<numeric_value>,<numeric_value>, LIN | LOG

Example: "SOUR:POW:CORR:EXT1:SWE 10MHZ,1GHZ,101,LOG"

Features: *RST value: .., .., 101, LIN (Start / Stop depending on external generator)
SCPI: conforming

The parameters are sorted as follows:

start frequency (range depending on external generator)
stop frequency (range depending on external generator)
number of frequency points (1 .. 2001)
sweep mode (LIN, LOG)

If the number of points is set equal to 1, the start and stop frequencies must be the same

SOURce<1...4>: POWer:CORRection:NREadings

This command defines the number of power measurements at one frequency point when a power calibration is started.

Syntax: SOURce<1...4>:POWer:CORRection:NREadings <numeric_value>

<numeric value> ::= 1 .. 100

Example: "SOUR:POW:CORR:NRE 2"

Features: *RST value: 1
SCPI: conforming

SOURce<1...4>: POWer:CORRection:[:ACQuire]

This command is used to perform a generator power calibration (internal, external).

Syntax: SOURce<1...4>:POWer:CORRection[:ACQuire] A1 | A2 | ESRC1 | ESRC2

Example: "SOUR:POW:CORR:ACQ A1"

Features: *RST value:
SCPI: conforming

SOURce<1...4>: POWer:CORRection:LLISt

This command defines the power loss list which may be used for a power calibration.

Syntax: SOURce<1...4>:POWer:CORRection:LLISt <numeric_value>,
<numeric_value>,
<numeric_value> ...

Example: "SOUR:POW:CORR:LLIS 2,10HZ,1DB,4GHZ,2DB"

Features: *RST value: 0 (i.e. power loss list empty)
SCPI: conforming

The parameters are sorted as follows:

number of following (frequency, attenuation) pairs (0 to 20)
frequency 1 (10 Hz to 4 GHz)
attenuation for frequency 1 (-100 dB to 1000 dB)
...
The frequencies must be sorted in **ascending** order.

SOURce<1...4>: POWer:CORRection:LLISt:STATe

This command defines whether the power loss list should be used for a power calibration.

Syntax: SOURce<1...4>:POWer:CORRection:LLISt:STATe ON | OFF

Example: `"SOUR:POW:CORR:LLIS:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

SOURce<1...4>:FREQuency[:CW|FIXed]

This command defines the CW-frequency for the POWER SWEEP and TIME SWEEP modes.

Syntax: SOURce<1...4>: FREQuency[:CW|FIXed] <numeric_value>

<numeric_value>::=9kHz...4GHz

Example: `"SOURC2:FREQ 1GHz"`

Features: *RST value: -
SCPI: conforming

SOURce<1...4>:FREQuency:CONVersion:ARBitrary:IFRequency

This command defines the frequency range of the internal generator for frequency-converting modes.

Syntax: SOURce<1...4>:FREQuency:CONVersion:ARBitrary:IFRequency <numeric_value>,<numeric_value>, <numeric_value>, CW | FIXed | SWEep"

Example: `"SOUR:FREQ:CONV:ARB:IFR 1,1,10MHz"`

Features: *RST-value: 1,1,0
SCPI: device-specific

The parameters are sorted as follows (see. Section 2.4.1.2.3, “General Frequency Configurations”):

Numerator
Denominator
Offset
Sweep mode or fixed frequency

SOURce<1...4>:FREQuency:CONVersion:ARBitrary:EFRequency<1|2>

This command defines the frequency range of the external generator for frequency-converting modes.

Syntax: SOURce<1...4>:FREQuency:CONVersion:ARBitrary:EFRequency<1|2> <ON|OFF>,<numeric_value>, <numeric_value>,<numeric_value>, CW | FIXed | SWEep "

Example: `"SOUR:FREQ:CONV:ARB:EFR ON,1,1,10MHz"`

Features: *RST-value: 0
SCPI: device-specific

The parameters are sorted as follows (see. Section 2.4.1.2.3, “General Frequency Configurations”):

Numerator
Denominator
Offset
Sweep mode or fixed frequency

SOURce[1...4]:FREQuency:NLINear:COMP

This command specifies whether the internal signal source or one of the two external sources is to be used for the compression point measurement.

Syntax:	SOURce[1...4]:FREQuency:NLINear:COMP	INT **|** ESRC1 **|** ESRC2
Example:	`"SOUR:FREQ:NLIN:COMP INT"`	
Features:	*RST value: INT SCPI: device-specific	

SOURce[1...4]:FREQuency:NLINear:SOI

This command specifies whether the internal signal source plus one of the two external sources or both external sources are to be used for the 2nd order intercept point measurement.

Syntax:	SOURce[1...4]:FREQuency:NLINear:SOI	IESRC1 **|** IESRC2 **|** ESRC12
Example:	`"SOUR:FREQ:NLIN:SOI ESRC12"`	
Features:	*RST value: IESRC1 SCPI: device-specific	

SOURce[1...4]:FREQuency:NLINear:SOI:OFFSet

This command defines a frequency offset for the second signal source relative to the first one used in a 2nd order intercept point measurement.

Syntax:	SOURce[1...4]:FREQuency:NLINear:SOI	<numeric_value>
	<numeric_value>::=0 GHz...4 GHz	
Example:	`"SOUR:FREQ:NLIN:SOI:OFFS 1MHz"`	
Features:	*RST value: 3 MHz SCPI: device-specific	

SOURce[1...4]:FREQuency:NLINear:TOI

This command specifies whether the internal signal source plus one of the two external sources or both external sources are to be used for the 3rd order intercept point measurement.

Syntax:	SOURce[1...4]:FREQuency:NLINear:TOI	IESRC1 **|** IESRC2 **|** ESRC12
Example:	`"SOUR:FREQ:NLIN:TOI ESRC12"`	
Features:	*RST value: IESRC1 SCPI: device-specific	

SOURce[1...4]:FREQuency:NLINear:TOI:OFFSet

This command defines a frequency offset for the second signal source relative to the first one used in a 3rd order intercept point measurement.

Syntax:	SOURce[1...4]:FREQuency:NLINear:TOI	<numeric_value>
	<numeric_value>::=0 GHz...4 GHz	
Example:	`"SOUR:FREQ:NLIN:TOI:OFFS 1MHz"`	
Features:	*RST value: 3 MHz SCPI: device-specific	

3.6.16 STATus Subsystem

The STATus subsystem contains the commands for the status-reporting system (see Section 3.8, Status Reporting System"). *RST does not influence the status registers.

COMMAND	PARAMETER	UNIT	COMMENT
STATus			
:OPERation			
[:EVENt?]	--	--	
:CONDition?	--	--	
:ENABle	0...65535	--	
:PTRansition	0...65535	--	
:NTRansition	0...65535	--	
:PRESet	--	--	
:QUEStionable			
[:EVENt?]	--	--	
:CONDition?	--	--	
:ENABle	0...65535	--	
:PTRansition	0...65535	--	
:NTRansition	0...65535	--	
:FREQuency			
[:EVENt?]	--	--	
:CONDition?	--	--	
:ENABle	0...65535	--	
:PTRansition	0...65535	--	
:NTRansition	0...65535	--	
:LIMit			
[:EVENt?]	--	--	
:CONDition?	--	--	
:ENABle	0...65535	--	
:PTRansition	0...65535	--	
:NTRansition	0...65535	--	
:POWer			
[:EVENt?]	--	--	
:CONDition?	--	--	
:ENABle	0...65535	--	
:PTRansition	0...65535	--	
:NTRansition	0...65535	--	
:QUEue		--	
[:NEXT?]	--	--	

STATus:OPERation[:EVENt?]

This command queries the contents of the EVENt section of the STATus:OPERation register.

Syntax: STATus:OPERation[:EVENt?]

Example: `"STAT:OPER?"`

Features: *RST value: –
SCPI: conforming

Readout deletes the contents of the EVENt section.

STATus:OPERation:CONDition?

This command queries the CONDition section of the STATus:OPERation register.

Syntax: STATus:OPERation:CONDition?

Example: `"STAT:OPER:COND?"`

Features: *RST value: –
SCPI: conforming

Readout does not delete the contents of the CONDition section. The value returned reflects the current hardware status.

STATus:OPERation:ENABle

This command sets the bits of the ENABle section of the STATus:QUEStionable register.

Syntax: STATus:OPERation:ENABle 0 to 65535

Example: `"STAT:OPER:ENAB 65535"`

Features: *RST value: –
SCPI: conforming

The ENABle register selectively enables the individual events of the associated EVENt section for the sum bit in the status byte.

STATus:OPERation:PTRansition

This command sets the edge detectors of all bits of the STATus:OPERation register from 0 to 1 for the transitions of the CONDition bit.

Syntax: STATus:OPERation:PTRansition 0 to 65535

Example: `"STAT:OPER:PTR 65535"`

Features: *RST value: –
SCPI: conforming

STATus:OPERation:NTRansition

This command sets the edge detectors of all bits of the STATus:OPERation register from 1 to 0 for the transitions of the CONDition bit.

Syntax: STATus:OPERation:NTRansition 0 to 65535

Example: `"STAT:OPER:NTR 65535"`

Features: *RST value: –
SCPI: conforming

STATus:PRESet

This command resets the edge detectors and ENABle parts of all registers to a defined value. All PTRansition parts are set to FFFFh, i.e., all transitions from 0 to 1 are detected. All NTRansition parts are set to 0, i.e., a transition from 1 to 0 in a CONDition bit is not detected. The ENABle part of the STATus:OPERation and STATus:QUEStionable registers are set to 0, i.e., all events in these registers are not passed on.

Syntax: STATus:PRESet

Example: `"STAT:PRES"`

Features: *RST value: –
SCPI: conforming

STATus:QUEStionable[:EVENt?]

This command queries the contents of the EVENt section of the STATus:QUEStionable register.

Syntax: STATus:QUEStionable[:EVENt?]

Example: `"STAT:QUES?"`

Features: *RST value: –
SCPI: conforming

Readout deletes the contents of the EVENt section.

STATus:QUEStionable:CONDition?

This command queries the CONDition section of the STATus:QUEStionable register.

Syntax: STATus:QUEStionable:CONDition?

Example: `"STAT:QUES:COND?"`

Features: *RST value: –
SCPI: conforming

Readout does not delete the contents of the CONDition section.

STATus:QUEStionable:ENABle

This command sets the bits of the ENABle section of the STATus-QUEStionable register.

Syntax: STATus:QUEStionable:ENABle 0 to 65535

Example: `"STAT:QUES:ENAB 65535"`

Features: *RST value: –
SCPI: conforming

The ENABle register selectively enables the individual events of the associated EVENt section for the sum bit in the status byte.

STATus:QUEStionable:PTRansition

This command sets the edge detectors of all bits of the STATus:OPERation register from 0 to 1 for the transitions of the CONDition bit.

Syntax: STATus:QUEStionable:PTRansition 0 to 65535

Example: `"STAT:QUES:PTR 65535"`

Features: *RST value: –
SCPI: conforming

STATus:QUEStionable:NTRansition

This command sets the edge detectors of all bits of the STATus:OPERation register from 1 to 0 for the transitions of the CONDition bit.

Syntax: STATus:QUEStionable:NTRansition 0 to 65535

Example: `"STAT:QUES:NTR 65535"`

Features: *RST value: –
SCPI: conforming

STATus:QUEStionable:FREQuency[:EVENt?]

This command queries the contents of the EVENt section of the STATus:QUEStionable:FREQuency register.

Syntax: STATus:QUEStionable:FREQuency[:EVENt?]

Example: `"STAT:QUES:FREQ?"`

Characteristics: *RST value: -
SCPI: device-specific

The contents of the EVENt section are cleared on reading out.

STATus:QUEStionable:FREQuency:CONDition?

This command queries the CONDition section of the STATus:QUEStionable:FREQuency register.

Syntax: STATus:QUEStionable:FREQuency:CONDition?

Example: `"STAT:QUES:FREQ:COND?"`

Characteristics: *RST value: –
SCPI: device-specific

The contents of the CONDition section are not cleared on reading out.

STATus:QUEStionable:FREQuency:ENABle

This command sets the bits of the ENABle section of the STATus:QUEStionable:FREQuency register.

Syntax: STATus: QUEStionable:FREQuency:ENABle 0 to 65535

Example: `"STAT:QUES:FREQ:ENAB 65535"`

Characteristics: *RST value: –
SCPI: device-specific

The ENABle register enables the events of the corresponding EVENt section selectively for the sum bit in the status byte.

STATus:QUEStionable:FREQuency:PTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:FREQuency register for the transitions of the CONDition bit from 0 to 1.

Syntax: STATus: QUEStionable:FREQuency:PTRansition 0 to 65535

Example: `"STAT:QUES:FREQ:PTR 65535"`

Characteristics: *RST value: –
SCPI: device-specific

STATus:QUEStionable:FREQuency:NTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:FREQuency register for the transitions of the CONDition bit from 1 to 0.

Syntax: STATus: QUEStionable:FREQuency:NTRansition 0 to 65535

Example: `"STAT:QUES:FREQ:NTR 65535"`

Characteristics: *RST value: –
SCPI: device-specific

STATus:QUEStionable:LIMit[:EVENt?]

This command queries the contents of the EVENt-section of the STATus:QUEStionable:LIMit-register.

Syntax: STATus:QUEStionable:LIMit[:EVENt?]

Example: `"STAT:QUES:LIM?"`

Features: *RST value: –
SCPI: device-specific

Readout deletes the contents of the EVENt section.

STATus:QUEStionable:LIMit:CONDition?

This command queries the CONDition-section of the STATus:QUEStionable:LIMit-register.

Syntax: STATus:QUEStionable:LIMit:CONDition?

Example: `"STAT:QUES:LIM:COND?"`

Features: *RST value: –
SCPI: device-specific

Readout does not delete the contents of the CONDition section.

STATus:QUEStionable:LIMit:ENABle

This command sets the Bits of the ENABle-section of the STATus:QUEStionable:LIMit-register.

Syntax: STATus: QUEStionable:LIMit:ENABle 0...65535

Example: `"STAT:QUES:LIM:ENAB 65535"`

Features: *RST value: –
SCPI: device-specific

The ENABle register selectively enables the individual events of the associated EVENt section for the sum bit in the status byte.

STATus:QUEStionable:LIMit:PTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:LIMit-registers for the transitions of the CONDition-Bits from 0 to 1.

Syntax: STATus: QUEStionable:LIMit:PTRansition 0...65535

Example: `"STAT:QUES:LIM:PTR 65535"`

Features: *RST value: –
SCPI: device-specific

STATus:QUEStionable:LIMit:NTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:LIMit-registers for the transitions of the CONDition-Bits from 1 to 0.

Syntax: STATus:QUEStionable:LIMit:NTRansition 0...65535

Example: `"STAT:QUES:LIM:NTR 65535"`

Features: *RST value: –
SCPI: device-specific

STATus:QUEStionable:POWer[:EVENt?]

This command queries the contents of the EVENt section of the STATus:QUEStionable:POWer-register.

Syntax:	STATus:QUEStionable:POWer[:EVENt?]	
Example:	`"STAT:QUES:POW?"`	
Characteristics:	*RST value:	–
	SCPI:	device-specific

The contents of the EVENt section are cleared on reading out.

STATus:QUEStionable:POWer:CONDition?

This command queries the CONDition section of the STATus:QUEStionable:POWer register.

Syntax:	STATus:QUEStionable:POWer:CONDition?	
Example:	`"STAT:QUES:POW:COND?"`	
Characteristics:	*RST value:	–
	SCPI:	device-specific

STATus:QUEStionable:POWer:ENABle

This command sets the bits of the ENABle section of the STATus:QUEStionable:POWer register.

Syntax:	STATus: QUEStionable:POWer:ENABle	0 to 65535
Example:	`"STAT:QUES:POW:ENAB 65535"`	
Characteristics:	*RST value:	–
	SCPI:	device-specific

The ENABle register enables the events of the corresponding EVENt section selectively for the sum bit in the status byte.

STATus:QUEStionable:POWer:PTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:POWer register for the transitions of the CONDition bit from 0 to 1.

Syntax:	STATus: QUEStionable:POWer:PTRansition	0 to 65535
Example:	`"STAT:QUES:POW:PTR 65535"`	
Characteristics:	*RST value:	–
	SCPI:	device-specific

STATus:QUEStionable:POWer:NTRansition

This command sets the edge detectors of all bits of the STATus:QUEStionable:POWer register for the transitions of the CONDition bit from 1 to 0.

Syntax:	STATus: QUEStionable:POWer:NTRansition	0 to 65535
Example:	`"STAT:QUES:POW:NTR 65535"`	
Characteristics:	*RST value:	–
	SCPI:	device-specific

STATus:QUEue[:NEXT?]

This command queries the earliest entry to the error queue, thus deleting it.

Syntax: STATus:QUEue[:NEXT?]

Example: `"STAT:QUE?"`

Features: *RST value: –
SCPI: conforming

Positive error numbers indicate device-specific errors, negative error numbers are error messages defined by SCPI (cf. Appendix B). If the error queue is empty, the error number 0, "no error", is returned. This command is identical with the command `SYSTem:ERRor`.

3.6.17 SYSTem Subsystem

The SYSTem subsystem lists commands for general functions.

COMMAND	PARAMETER	UNIT	COMMENT
SYSTem			
:COMMunicate			
:AKAL			
[:STATe]	<Boolean>		
:GPIB			
[:SELF]			
:ADDRess	0...30	--	
:RTERminator	LFEoi | EOI		
:RDEVice			
[:PRINter<1|2>]			
:ADDRess	0...30	--	
:GENerator<1|2>			
:ADDRess	0...30	--	
:PMETer			
:ADDRess	0...30	--	
:RDEVice			
:GENerator<1|2>			
:CONTrol	REMote | LOCal		
:LINK	GPIB | TTL		
:TYPE	<name>		
:PMETer			
:CFACtor			
[:SELect]	ASENsor | BSENsor		
:ASENsor	<numeric_value>, <numeric_value>, <numeric_value> ...	, Hz, PCT	
:BSENsor	<numeric_value>, <numeric_value>, <numeric_value> ...	, Hz, PCT	
:AZERo			
[:STATe]	<Boolean>		
:TYPE	<name>		
:SERial<1|2>			
:CONTrol			
:DTR	IBFull | OFF		
:RTS	IBFull | OFF		
[:RECeive]			
:BAUD	<numeric_value>	--	
:BITS	7 | 8		
:PARity			
[:TYPE]	EVEN | ODD | NONE		
:SBITs	1 | 2		
:PACE	XON | NONE		
:DATE	<num>, <num>, <num>	--	
:DISPlay			
:UPDate	<Boolean> | ONCE		
:ERRor?			
[:NEXT]?			query only
:ALL?			query only
:FIRMware			
:UPDate	<string>		no query
:PASSword			
[:CENable]	<string>		no query

COMMAND	PARAMETER	UNIT	COMMENT
:PRESet	--		
:SET	<block>		
:TIME	0...23, 0...59, 0...59	--	
:VERSion?			query only

SYSTem:COMMunicate:AKAL[:STATe]

This command switches the control of the AutoKal box on and off.

Syntax: SYSTem:COMMunicate:AKAL[:STATe] ON | OFF

Example: `"SYST:COMM:AKAL ON"`

Features: *RST value: – (no influence on this parameter)
SCPI: device-specific

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess

This command changes the IEC/IEEE-bus address of the unit.

Syntax: SYSTem:COMMunicate:GPIB[:SELF]:ADDRess 0 to 30

Example: `"SYST:COMM:GPIB:ADDR 18"`

Features: *RST value: - (no influence on this parameter)
SCPI: conforming

SYSTem:COMMunicate:GPIB[:SELF]:RTERminator

This command changes the receive terminator of the device.

Syntax: SYSTem:COMMunicate:GPIB[:SELF]:RTERminator LFEOI | EOI

Example: `"SYST:COMM:GPIB:RTERM EOI"`

Features: *RST value: LFEOI
SCPI: device-specific

The analyzer features a DME-channel for communication via IEC/IEEE-bus. This guarantees maximum speed for the transfer of commands and data. The parser for command decoding integrated in the device is activated by the terminator only after the command is completely transferred. In order to make this possible for the transfer of binary data as well , the terminator recognition has to be reset to the EOI signal before transfer starts. Readout of binary data does not require such a reset.

SYSTem:COMMunicate:GPIB: RDEVice[:PRINter<1|2>]:ADDRess

This command changes the IEC/IEEE-bus address of the unit which is selected as hardcopy device 1 or 2, provided that the IEC/IEEE-bus interface of this unit is activated.

Syntax: SYSTem:COMMunicate:GPIB:RDEVice:PRINter<1|2>:ADDRess 0 to 30

Example: `"SYST:COMM:GPIB:RDEV2:ADDR 5"`

Features: *RST value: 4
SCPI: conforming

SYSTem:COMMunicate:GPIB:RDEVice:GENerator<1|2>:ADDRess

This command changes the IEC-bus address of the device selected as generator no. 1 or 2.

Syntax: SYSTem:COMMunicate:GPIB:RDEVice:GENerator<1|2>: ADDRess 0...30

Example: `"SYST:COMM:GPIB:RDEV:GENerator1:ADDR 19"`

Features: *RST value:
SCPI: device-specific

SYSTem:COMMunicate:GPIB:RDEVice:PMETer:ADDRess

This command changes the IEC-bus address of the device selected as power meter.

Syntax: SYSTem:COMMunicate:GPIB:RDEVice:PMETer:ADDRess 0...30

Example: `"SYST:COMM:GPIB:RDEV:PMETer:ADDR 5"`

Features: *RST value:
SCPI: device-specific

SYSTem:COMMunicate:PRINter<1|2>:ENUMerate:FIRSt?

This command queries the name of the first printer (in the list of printers) under Windows NT. The numeric suffix in `PRINter<1|2>` is not significant.

The names of other installed printers can be queried with command `SYSTem:COMMunicate:PRINter:ENUMerate:NEXT?`.

If no printer is configured an empty string is output.

Example: `"SYST:COMM:PRIN:ENUM:FIRS?"`

Features: *RST value: -
SCPI: device-specific

SYSTem:COMMunicate:PRINter<1|2>:ENUMerate:NEXT?

This command queries the name of the next printer installed under Windows NT. The numeric suffix in `PRINter<1|2>` is not significant.

This command can only be sent after command `SYSTem:COMMunicate:PRINter:ENUMerate:FIRSt?`.

An empty string is output after all printer names have been output.

Example: `"SYST:COMM:PRIN:ENUM:NEXT?"`

Features: *RST value: -
SCPI: device-specific

SYSTem:COMMunicate:PRINter<1|2>:SELect <printer_name>

This command selects one of the printers installed under Windows NT. The numeric suffix in `PRINter<1|2>` selects the device.

The name of the first printer is queried with `FIRSt?.` After that the names of other installed printers can be queried with `NEXT?`.

Parameter:	<printer_name> ::=	string which has been queried with commands `SYSTem:COMMunicate:PRINter:ENUMerate:FIRSt?` and `NEXT?.`

Example: `"SYST:COMM:PRIN:SEL 'HP_DESKJET660'"`

Features:
*RST value: -
SCPI: device-specific

SYSTem:COMMunicate:RDEVice:GENerator<1|2>:CONTrol

This command switches the external generator between remote and manual control.

Syntax: SYSTem:COMMunicate:RDEVice:GENerator<1|2>:CONTrol REMote | LOCal

Example: `"SYST:COMM:RDEV:GEN:CONT REM"`

Features:
*RST value: LOC
SCPI: device-specific

SYSTem:COMMunicate:RDEVice:GENerator<1|2>:LINK

This command selects the interface type of the external generator.

Syntax: SYSTem:COMMunicate:RDEVice:GENerator<1|2>:LINK GPIB | TTL

Example: `"SYST:COMM:RDEV:GEN:LINK GPIB"`

Features:
*RST value: -
SCPI: device-specific

SYSTem:COMMunicate:RDEVice:GENerator<1|2>:TYPE

This command selects the type of external generator.

Syntax: SYSTem:COMMunicate:RDEVice:GENerator<1|2>:TYPE <name>

<name>::= 'HP8340A' |
'HP_ESG' |
'HP_ESG_B' |
'SME02' |
'SME03' |
'SME06' |
'SMG' |
'SMGL' |
'SMGU' |
'SMH' |
'SMHU' |
'SMIQ02' |
'SMIQ02E' |
'SMIQ03' |
'SMIQ03E' |
'SMP02' |
'SMP03' |
'SMP04' |
'SMP22' |
'SMR20' |
'SMR20B11' |
'SMR27' |
'SMR27B11' |
'SMR40' |
'SMR40B11' |
'SMT02' |
'SMT03' |
'SMT06' |
'SMY01' |
'SMY02'

Example: `"SYST:COMM:RDEV:GEN:TYPE 'SME02'"`

Features: *RST value: -
SCPI: device-specific

SYSTem:COMMunicate:RDEVice:PMETer:CFACtor[:SELect]

This command defines the sensor factor list to be used for a power calibration (unless the internal list of the power meter is used)..

Syntax: SYSTem:COMMunicate:RDEVice:PMETer:CFACtor[:SELect] ASENsor | BSENsor

Example: `"SYST:COMM:RDEV:PMET:CFAC:SEL ASEN"`

Features: *RST value: ASENsor
SCPI: conforming

SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:ASENsor

This command defines the sensor factor list for sensor A which can be active for a power calibration.

Syntax: SYSTem:COMMunicate: RDEVice:PMETer:CFACtor:ASENsor <numeric_value>,<numeric_value>, <numeric_value> ...

Example: `"SYST:COMM:RDEV:PMET:CFAC:ASEN 2,10HZ,99PCT,4GHZ,98PCT"`

Features: *RST value: 0 (i.e. sensor factor list empty)
SCPI: conforming

The parameters are sorted as follows:
number of following (frequency, factor) pairs (0 .. 20)
frequency 1 (10 Hz .. 4 GHz)
faktor for frequency 1 (0 PCT .. 100 PCT)
...
The frequencies must be sorted in **ascending** order.

SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:BSENsor

This command defines the sensor factor list for sensor B which can be active for a power calibration.

Syntax: SYSTem:COMMunicate: RDEVice:PMETer:CFACtor:BSENsor <numeric_value>,<numeric_value>, <numeric_value> ...

Example: `"SYST:COMM:RDEV:PMET:CFAC:BSEN 2,10HZ,99PCT,4GHZ,98PCT"`

Features: *RST value: 0 (d.h leere Sensor-Faktor-Liste)
SCPI: conforming

The parameters are sorted as follows:
number of following (frequency, factor) pairs (0 .. 20)
frequency 1 (10 Hz .. 4 GHz)
faktor for frequency 1 (0 PCT .. 100 PCT)
...
The frequencies must be sorted in **ascending** order.

SYSTem:COMMunicate:RDEVice:PMETer:AZERo[:STATe]

This command defines whether the automatic zeroing of the power meter is performed for a power calibration.

Syntax: SYSTem:COMMunicate:RDEVice:PMETer:AZERo[:STATe] ON | OFF

Example: `"SYST:COMM:RDEV:PMET:AZER:STAT ON"`

Features: *RST value: OFF
SCPI: conforming

SYSTem:COMMunicate:RDEVice:PMETer:TYPE

This command selects the external power meter type.

Syntax: SYSTem:COMMunicate:RDEVice:PMETer:TYPE <name>

<name>::= 'NRVD'

Example: `"SYST:COMM:RDEV:PMET:TYPE 'NRVD'"`

Features: *RST value: -
SCPI: device-specific

SYSTem:COMMunicate:SERial<1|2>:CONTrol:DTR
SYSTem:COMMunicate:SERial<1|2>:CONTrol:RTS

These commands switch the hardware handshake procedure for the given serial interface off (OFF) or on (IBFull).

Syntax:	SYSTem:COMMunicate:SERial<1|2>:CONTrol:DTR IBFull | OFF SYSTem:COMMunicate:SERial<1|2>:CONTrol:RTS IBFull | OFF	
Examples:	`"SYST:COMM:SER:CONT:DTR OFF"` `"SYST:COMM:SER2:CONT:RTS IBF"`	
Features:	*RST value: SCPI:	OFF conforming

The two commands have the same meaning. SERial1 and SERial 2 correspond to device COM1and COM2, respectively.

SYSTem:COMMunicate:SERial<1|2>[:RECeive]:BAUD

This command sets the transmission speed for the given serial interface.

Syntax:	SYSTem:COMMunicate:SERial<1|2>[:RECeive:]BAUD <numeric_value> <numeric_value>::= 75 | 150 | 300 | 600 | 1200 | 2400 | 9600	
Example:	`"SYST:COMM:SER:BAUD 2400"`	
Features:	*RST value: SCPI:	9600 conforming

SERial1 and SERial 2 correspond to device interface COM1 and COM2, respectively.

SYSTem:COMMunicate:SERial<1|2>[:RECeive]:BITS

This command defines the number of data bits per data word for the given serial interface.

Syntax:	SYSTem:COMMunicate:SERial<1|2>[:RECeive]:BITS 7 | 8	
Example:	`"SYST:COMM:SER2:BITS 7"`	
Features:	*RST value: SCPI:	8 conforming

SERial1 and SERial 2 correspond to device interface COM1 and COM2, respectively.

SYSTem:COMMunicate:SERial<1|2>[:RECeive]:PARity[:TYPE]

This command defines the parity check for the given serial interface.

Syntax:	SYSTem:COMMunicate:SERial<1|2>:RECeive:PARity[:TYPE] EVEN | ODD | NONE	
Example:	`"SYST:COMM:SER:PAR EVEN"`	
Features:	*RST value: SCPI:	NONE conforming

SERial1 and SERial 2 correspond to device interface COM1 and COM2, respectively. Permissible values are:

EVEN	even Parity
ODD	odd Parity
NONE	no parity check.

SYSTem:COMMunicate:SERial<1|2>[:RECeive]:SBITs

This command defines the number of stopbits per data word for the given serial interface.

Syntax: SYSTem:COMMunicate:SERial<1|2>[:RECeive]:SBITs 1|2

Example: `"SYST:COMM:SER:SBITs 2"`

Features: *RST value: 1
SCPI: conforming

SERial1 and SERial 2 correspond to device interface COM1 and COM2, respectively.

SYSTem:COMMunicate:SERial<1|2>[:RECeive]:PACE

This command switches on or off the software handshake for the given serial interface.

Syntax: SYSTem:COMMunicate:SERial<1|2>[:RECeive]:PACE XON **|** NONE

Examplel: `"SYST:COMM:SER:PACE XON"`

features: *RST value: NONE
SCPI: conforming

SERial1 and SERial 2 correspond to device interface COM1 and COM2, respectively.

SYSTem:DATE

This command is used to enter the date for the internal calendar.

Syntax: SYSTem:DATE <num>,<num>,<num>
<num>,<num>,<num> ::= 1980 to 2099, 1 to 12, 1 to 31

Example: `" SYST:DATE 1994,12,1"`

Features: *RST value: –
SCPI: conforming

The entry format is year, month, day.

SYSTem:DISPlay:UPDate

This command causes all display elements to be regularly updated / prevents their update.

Syntax: SYSTem:DISPlay:UPDate ON **|** OFF **|** ONCE

Example: `"SYST:DISP:UPD ON"`

Features: *RST value: OFF
SCPI: device-specific

SYSTem:DISPlay:UPDate ONCE causes a single update of all display elements.

SYSTem:ERRor[:NEXT]?

This command queries and at the same time deletes the oldest entry in the error queue.

Syntax:	SYSTem:ERRor?	
Example:	`"SYST:ERR?"`	
Features:	*RST value:	–
	SCPI:	conforming

Positive error numbers indicate device-specific errors, negative error numbers are error messages defined by SCPI (cf. Appendix B). If the error queue is empty, the error number 0, "no error", is returned. This command is identical with the command `STATus:QUEue:NEXT?`. This command is a query, which is why it is not assigned an *RST value.

SYSTem:ERRor:ALL?

This command queries and at the same time deletes all entries in the error queue.

Syntax:	SYSTem:ERRor:ALL?	
Beispiel:	`"SYST:ERR:ALL?"`	
Eigenschaften:	*RST-Wert:	-
	SCPI:	konform

Positive error numbers indicate device-specific errors, negative error numbers are error messages defined by SCPI (cf. Appendix B). If the error queue is empty, the error number 0, "no error", is returned. This command is a query, which is why it is not assigned an *RST value.

SYSTem:FIRMware:UPDate

This command starts a firmware update with the data set from the indicated directory.

Syntax:	SYSTem:FIRMware:UPDate <string>	
Example:	`"SYST:FIRM:UPD ‘C:\V4.32’"`	
Features:	*RST value:	-
	SCPI:	device-specific

SYSTem:PASSword[:CENable]

This command gives access to the service functions upon entry of the password.

Syntax:	SYSTem:PASSword[:CENable] password	
Example:	`"SYST:PASS 'XXXX'"`	
Features:	*RST value:	-
	SCPI:	conforming

The command has no query.

SYSTem:PRESet

This command triggers an instrument reset.

Syntax: SYSTem:PRESet

Example: `"SYST:PRES"`

Features: *RST value: –
SCPI: conforming

The effect of this command corresponds to that of the *PRESET* key for manual control or to the *RST command.

SYSTem:SET

This command loads the instrument setting previously stored via SYSTem:SET?.

Syntax: SYSTem:SET

Example: `"SYST:SET"`

Features: *RST value: –
SCPI: conforming

The delimiter must be set to EOI in order to achieve a perfect data transfer.

SYSTem:TIME

This command sets the internal clock.

Syntax: SYSTem:TIME 0 to 23, 0 to 59, 0 to 59

Example: `"SYST:TIME 12,30,30"`

Features: *RST value: –
SCPI: conforming

The entry format is hour, minute, second.

SYSTem:VERSion?

This command queries the number of the SCPI version relevant for the instrument.

Syntax: SYSTem:VERSion?

Example: "SYST:VERS?"

Features: *RST value: –
SCPI: conforming

This command is a query, which is why it is not assigned an *RST value.

3.6.18 TRACe Subsystem

The TRACe subsystem controls access to the instrument's internal trace memory.

COMMAND	PARAMETER	UNIT	COMMENT
TRACe			
:COPY	MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8, CH1DATA | CH2DATA | CH3DATA | CH4DATA		no query
:CLEar	MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		no query
[:DATA]			
[:RESPonse]			
[:ALL]?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:PREamble?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:BODY?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:STIMulus			
[:ALL]?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:PREamble?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:BODY?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8		query only
:FEED	CH1MEM | CH2MEM | CH3MEM | CH4MEM [, MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8]		

TRACe:COPY

This command copies the trace data of the active channel to one of the 8 memory traces.

Syntax: TRACe:COPY <memory_name>,<trace_name>
<memory_name>::= MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8
<trace_name>::= CH1DATA | CH2DATA | CH3DATA | CH4DATA

Examples: `"TRAC:COPY MDATA5,CH1DATA"`

Features: *RST value: -
SCPI: conforming

TRACe:CLEar

This command clears the corresponding memory trace.

Syntax: TRACe:CLEar MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8

Example: `"TRAC:CLE MDATA5"`

Features: *RST value: –
SCPI: device-specific

The command is an "event", which is why it is not assigned an *RST value and has no query.

TRACe[:DATA][:RESPonse][:ALL]?

This query reads the response values of the trace data from the instrument. Binary data are transferred as SCPI block data.

Syntax: TRACe[:DATA][:RESPonse][:ALL]? CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8

Example: `"TRAC? CH1DATA"`

Features: *RST value: –
SCPI: conforming

TRACe[:DATA][:RESPonse]:PREamble?

This query command reads the preamble of the response values of the trace data from the device. With binary data transmission (setting: `FORMat[:DATA] REAL, 32` or `FORMat[:DATA] REAL, 64`**)**, this is the length of the useful data in bytes. With ASCII data transmission (setting: `FORMat[:DATA] ASCii`), “0“ is returned.

Syntax: TRACe[:DATA][:RESPonse]:PREamble? CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8

Example: `"TRAC:PRE? CH1DATA"`

Characteristics: *RST value: –
SCPI: device-specific

TRACe[:DATA][:RESPonse]:BODY?

This query command reads the response values of the trace data from the device. With binary data transmission, these are only the useful data without the SCPI block data header.

Syntax:	TRACe[:DATA][:RESPonse]:BODY?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8
Example:	`"TRAC:BODY? CH1DATA"`	
Characteristics:	*RST value: – SCPI: device-specific	

TRACe[:DATA]:STIMulus[:ALL]?

This query reads the stimulus values of the trace data from the instrument. Binary data are transferred as SCPI block data.

Syntax:	TRACe[:DATA]:STIMulus [:ALL]?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8
Example:	`"TRAC:STIM? CH1DATA"`	
Features:	*RST value: – SCPI: device-specific	

TRACe[:DATA]:STIMulus:PREamble?

This query command reads the preamble of the stimulus values of the trace data from the device. With binary data transmission (setting: `FORMat[:DATA] REAL, 32` or `FORMat[:DATA] REAL, 64`**)**, this is the length of the useful data in bytes. With ASCII data transmission (setting: `FORMat[:DATA] ASCii`), “0“ is returned.

Syntax:	TRACe[:DATA]:STIMulus:PREamble?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8
Example:	`"TRAC:STIM:PRE? CH1DATA"`	
Characteristics:	*RST value: – SCPI: device-specific	

TRACe[:DATA]:STIMulus:BODY?

This query command reads the stimulus values of the trace data from the device. With binary data transmission, these are only the useful data without the SCPI block data header.

Syntax:	TRACe[:DATA]:STIMulus:BODY?	CH1DATA | CH2DATA | CH3DATA | CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8
Example:	`"TRAC:STIM:BODY? CH1DATA"`	
Characteristics:	*RST value: – SCPI: device-specific	

TRACe:FEED

This command transfers data from the internal memory traces to the channel specific memories for measured values.

Syntax: TRACe:FEED CH1MEM | CH2MEM | CH3MEM | CH4MEM
[, MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 |
MDATA6 | MDATA7 | MDATA8]

Example: `"TRAC:COPY CH1MEM,MDAT5"`

Features: *RST value: –
SCPI: conforming

3.6.19 TRIGger-Subsystem

The TRIGger subsystem is used to synchronize tasks performed by the instrument and events. This allows to control and synchronize the start of a sweep. An external trigger signal can be applied to the rear panel connector.

COMMAND	PARAMETER	UNIT	COMMENT
TRIGger			
[:SEQuence]			
:SOURce	IMMediate | EXTernal | LINE | TIMer | MANual | RTCLock		
:TIMer	<numeric_value>	S	
:RTCLock	0...23, 0...59, 0...59	--	
:HOLDoff	<numeric_value>	S	
:SLOPe	POSitive | NEGative	--	
:LINK	<string>	--	

TRIGger[:SEQuence]:SOURce

This command selects the trigger source for starting a sweep..

Syntax: TRIGger[:SEQuence]:SOURce IMMediate | EXTernal | LINE | TIMer | MANual | RTCLock

Example: `"TRIG:SOUR EXT"`

Features: *RST value: IMMediate
SCPI: conforming

TRIGger[:SEQuence]:TIMer

This command selects the internal trigger with a specified time interval.

Syntax: TRIGger[:SEQuence]:TIMer <numeric value>

<numeric_value> ::= 0 .. 1000s

Example: `"TRIG:TIM 2s"`

Features: *RST value: -
SCPI: conforming

TRIGger[:SEQuence]:RTCLock

This command selects the internal clock with a specified time as a trigger signal.

Syntax: TRIGger[:SEQuence]:RTCLock 0...23, 0...59, 0...59

Example: `"TRIG:RTCL 13,30,0"`

Features: *RST value: -
SCPI: device-specific

TRIGger[:SEQuence]:HOLDoff

This command defines the length of the trigger delay.

Syntax:	TRIGger[:SEQuence]:HOLDoff	<numeric value>
	<numeric_value> ::= 0...100s.	
Example:	`"TRIG:HOLD 500us"`	
Features:	*RST value:	0s
	SCPI:	conforming

TRIGger[:SEQuence]:SLOPe

This command selects the edge of the trigger signal.

Syntax:	TRIGger[:SEQuence]:SLOPe	POSitive | NEGative
Example:	`"TRIG:SLOP NEG"`	
Features:	*RST value:	POSitive
	SCPI:	conforming

TRIGger[:SEQuence]:LINK

This command selects whether the triggered measurement will be a single point measurement or a sweep.

Syntax:	TRIGger[:SEQuence]:LINK	<string>
	<string> ::=	`'POINT'` `'SWEEP'`
Example:	`"TRIG:LINK 'POINT'"`	
Features:	*RST value:	`'SWEEP'`
	SCPI:	conforming

3.7 Instrument Model and Command Processing

The model shown in Fig. 3-2 visualizes the instrument from the point of view of servicing IEC-bus commands. The individual components work independent of each other and simultaneously. They communicate with each other by means of so-called "messages".

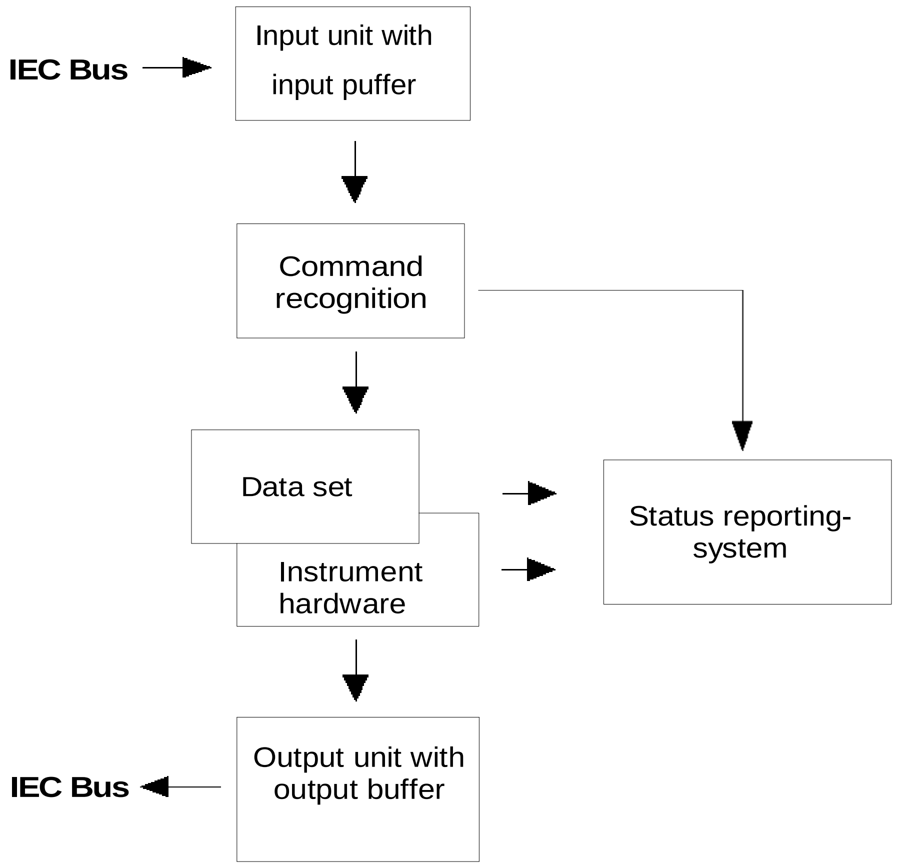


Fig. 3-2 Model of the instrument in the case of remote control by means of the IEC bus

3.7.1 Input Unit

The input unit receives commands character by character from the IEC bus and collects them in the input buffer. The input buffer has a size of 256 characters. The input unit sends a message to the command recognition as soon as the input buffer is full or as soon as it receives a delimiter, <PROGRAM MESSAGE TERMINATOR>, as defined in IEEE 488.2, or the interface message DCL.

If the input buffer is full, the IEC-bus traffic is stopped and the data received up to then are processed. Subsequently the IEC-bus traffic is continued. If, however, the buffer is not yet full when receiving the delimiter, the input unit can already receive the next command during command recognition and execution. The receipt of a DCL clears the input buffer and immediately initiates a message to the command recognition.

3.7.2 Command Recognition

The command recognition analyses the data received from the input unit. It proceeds in the order in which it receives the data. Only a DCL is serviced with priority, a GET (Group Execute Trigger), e.g., is only executed after the commands received before as well. Each recognized command is immediately transferred to the data set but without being executed there at once.

Syntactical errors in the command are recognized here and supplied to the status reporting system. The rest of a command line after a syntax error is analysed further if possible and serviced.

If the command recognition recognizes a delimiter or a DCL, it requests the data set to set the commands in the instrument hardware as well now. Subsequently it is immediately prepared to process commands again. This means for the command servicing that further commands can already be serviced while the hardware is still being set ("overlapping execution").

3.7.3 Data Set and Instrument Hardware

Here the expression "instrument hardware" Hdenotes the part of the instrument fulfilling the actual instrument function - signal generation, measurement etc. The controller is not included.

The data set is a detailed reproduction of the instrument hardware in the software.

IEC-bus setting commands lead to an alteration in the data set. The data set management enters the new values (e.g. frequency) into the data set, however, only passes them on to the hardware when requested by the command recognition. As this is always only effected at the end of a command line, the order of the setting commands in the command line is not relevant.

The data are only checked for their compatibility among each other and with the instrument hardware immediately before they are transmitted to the instrument hardware. If the detection is made that an execution is not possible, an "execution error" is signalled to the status reporting system. All alterations of the data set are cancelled, the instrument hardware is not reset. Due to the delayed checking and hardware setting, however, it is permissible to set impermissible instrument states within one command line for a short period of time without this leading to an error message. At the end of the command line, however, a permissible instrument state must have been reached again.

Before passing on the data to the hardware, the settling bit in the STATus:OPERation register is set (cf. Section 3.8.3.4). The hardware executes the settings and resets the bit again as soon as the new state has settled. This fact can be used to synchronize command servicing.

IEC-bus queries induce the data set management to send the desired data to the output unit.

3.7.4 Status Reporting System

The status reporting system collects information on the instrument state and makes it available to the output unit on request. The exact structure and function are described in Section 3.8

3.7.5 Output Unit

The output unit collects the information requested by the controller, which it receives from the data set management. It processes it according to the SCPI rules and makes it available in the output buffer. The output buffer has a size of 4096 characters. If the information requested is longer, it is made available "in portions" without this being recognized by the controller.

If the instrument is addressed as a talker without the output buffer containing data or awaiting data from the data set management, the output unit sends error message "Query UNTERMINATED" to the status reporting system. No data are sent on the IEC bus, the controller waits until it has reached its time limit. This behaviour is specified by SCPI.

3.7.6 Command Sequence and Command Synchronization

According to what was said above, overlapping execution is possible for all commands. Equally, setting commands within one command line are not necessarily serviced in the order in which they were received.

In order to make sure that commands are actually carried out in a definite order, each command must be sent in a separate command line, that is to say, with a separate IBWRT()-call.

In order to prevent an overlapping execution of commands, one of commands *OPC, *OPC? or *WAI must be used. All three commands cause a certain action only to be carried out after the hardware has been set and has settled. By a suitable programming, the contoller can be forced to wait for the respective action to occur (cf. Table 3-1).

Table 3-1 Synchronisation using *OPC *OPC? and *WAI

Commnd	**Action after the hardware has settled**	**Programming the controller**
*OPC	Setting the opteration-complete bit in the ESR	- Setting bit 0 in the ESE - Setting bit 5 in the SRE - Waiting for service request (SRQ)
*OPC?	Writing a "1" into the output buffer	Addressing the instrument as a talker
*WAI	Continuing the IEC-bus handshake	Sending the next command

3.8 Status Reporting System

The status reporting system (cf. Fig. 3-4) stores all information on the present operating state of the instrument, e.g. that the instrument presently carries out an AUTORANGE and on errors which have occurred. This information is stored in the status registers and in the error queue. The status registers and the error queue can be queried via IEC bus.

The information is of a hierarchical structure. The register status byte (STB) defined in IEEE 488.2 and its associated mask register service request enable (SRE) form the uppermost level. The STB receives its information from the standard event status register (ESR) which is also defined in IEEE 488.2 with the associated mask register standard event status enable (ESE) and registers STATus:OPERation and STATus:QUEStionable which are defined by SCPI and contain detailed information on the instrument.

The IST flag ("Individual STatus") and the parallel poll enable register (PPE) allocated to it are also part of the status reporting system. The IST flag, like the SRQ, combines the entire instrument status in a single bit. The PPE fulfills an analog function for the IST flag as the SRE for the service request.

he output buffer contains the messages the instrument returns to the controller. It is not part of the status reporting system but determines the value of the MAV bit in the STB and thus is represented in Fig. 3-4.

3.8.1 Structure of an SCPI Status Register

Each SCPI register consists of 5 parts which each have a width of 16 bits and have different functions (cf. Fig. 3-3). The individual bits are independent of each other, i.e. each hardware status is assigned a bit number which is valid for all five parts. For example, bit 3 of the STATus:OPERation register is assigned to the hardware status "wait for trigger" in all five parts. Bit 15 (the most significant bit) is set to zero for all parts. Thus the contents of the register parts can be processed by the controller as positive integer.

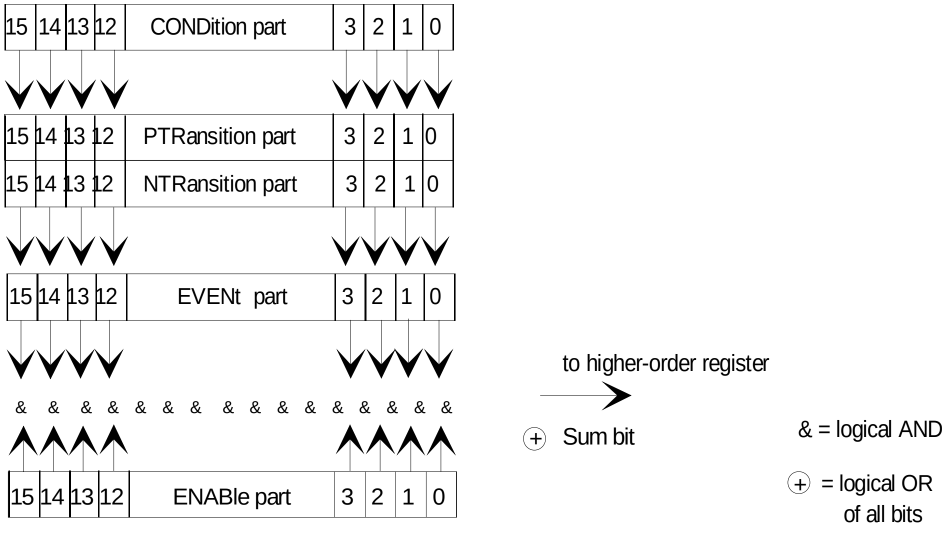


Fig. 3-3 The status register model

CONDition part The CONDition part is directly written into by the hardware or the sum bit of the next lower register. Its contents reflects the current instrument status. This register part can only be read, but not written into or cleared. Its contents is not affected by reading.

PTRansition part The Positive-TRansition part acts as an edge detector. When a bit of the CONDition part is changed from 0 to 1, the associated PTR bit decides whether the EVENt bit is set to 1.
PTR bit =1: the EVENt bit is set.
PTR bit =0: the EVENt bit is not set.
This part can be written into and read at will. Its contents is not affected by reading.

NTRansition part The Negative-TRansition part also acts as an edge detector. When a bit of the CONDition part is changed from 1 to 0, the associated NTR bit decides whether the EVENt bit is set to 1.
NTR-Bit = 1: the EVENt bit is set.
NTR-Bit = 0: the EVENt bit is not set.
This part can be written into and read at will. Its contents is not affected by reading.

With these two edge register parts the user can define which state transition of the condition part (none, 0 to 1, 1 to 0 or both) is stored in the EVENt part.

EVENt part The EVENt part indicates whether an event has occurred since the last reading, it is the "memory" of the condition part. It only indicates events passed on by the edge filters. It is permanently updated by the instrument. This part can only be read by the user. During reading, its contents is set to zero. In linguistic usage this part is often equated with the entire register.

ENABle part The ENABle part determines whether the associated EVENt bit contributes to the sum bit (cf. below). Each bit of the EVENt part is ANDed with the associated ENABle bit (symbol '&'). The results of all logical operations of this part are passed on to the sum bit via an OR function (symbol '+').
ENABle-Bit = 0: the associated EVENt bit does not contribute to the sum bit
ENABle-Bit = 1: if the associated EVENT bit is "1", the sum bit is set to "1" as well.
This part can be written into and read by the user at will. Its contents is not affected by reading.

Sum bit As indicated above, the sum bit is obtained from the EVENt and ENABle part for each register. The result is then entered into a bit of the CONDition part of the higher-order register.
The instrument automatically generates the sum bit for each register. Thus an event, e.g. a PLL that has not locked, can lead to a service request throughout all levels of the hierarchy.

Note: *The service request enable register SRE defined in IEEE 488.2 can be taken as ENABle part of the STB if the STB is structured according to SCPI. By analogy, the ESE can be taken as the ENABle part of the ESR.*

3.8.2 Overview of the Status Registers

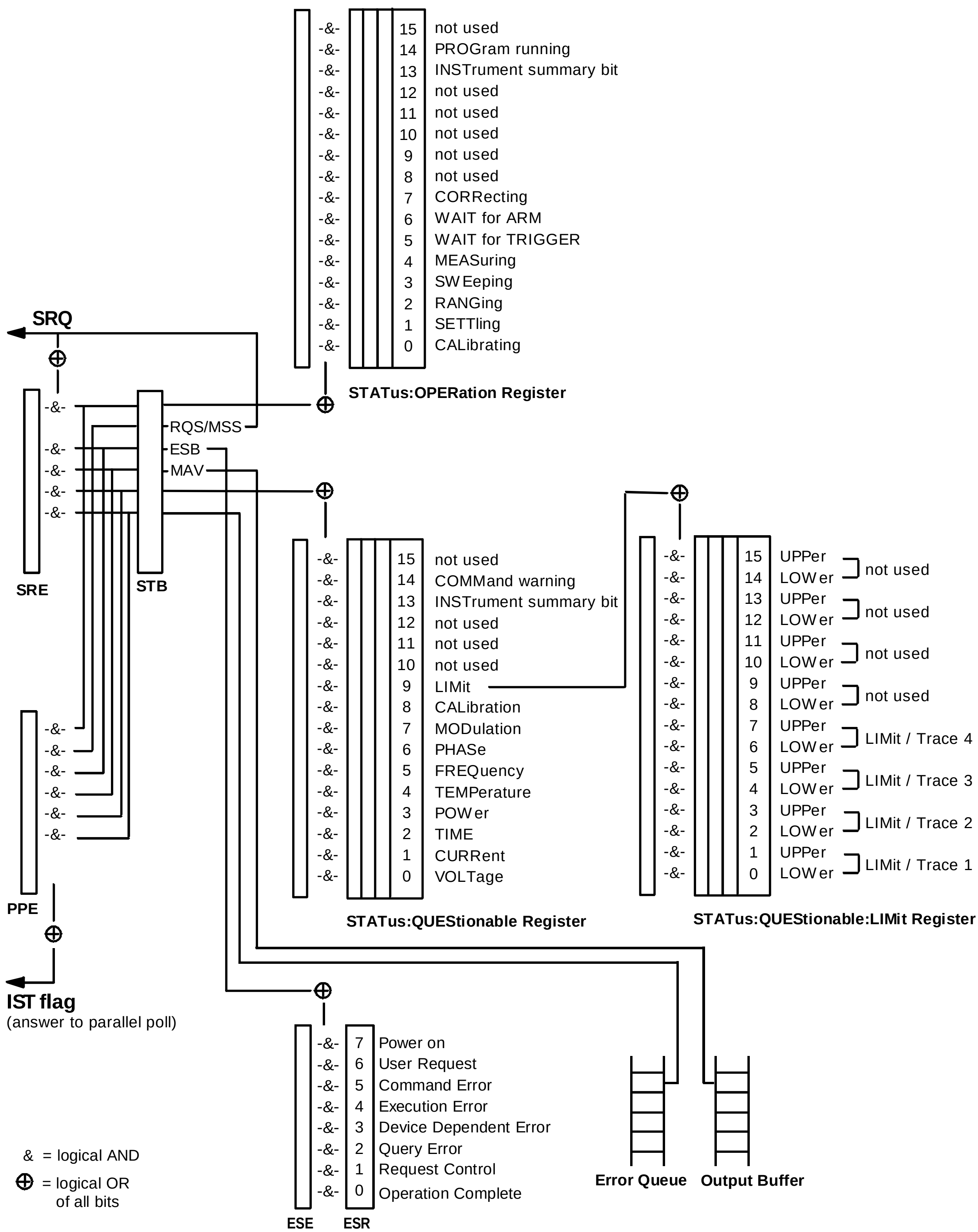


Fig. 3-4 Overview over the status registers

3.8.3 Description of the Status Registers

3.8.3.1 Status Byte (STB) and Service Request Enable Register (SRE)

The STB is already defined in IEEE 488.2. It provides a rough overview of the instrument status by collecting the pieces of information of the lower registers. It can thus be compared with the CONDition part of an SCPI register and assumes the highest level within the SCPI hierarchy. A special feature is that bit 6 acts as the sum bit of the remaining bits of the status byte.

The STATUS BYTE is read out using the command "*STB?" or a serial poll.

The STB implies the SRE. It corresponds to the ENABle part of the SCPI registers as to its function. Each bit of the STB is assigned a bit in the SRE. Bit 6 of the SRE is ignored. If a bit is set in the SRE and the associated bit in the STB changes from 0 to 1, a Service Request (SRQ) is generated on the IEC bus, which triggers an interrupt in the controller if this is appropriately configured and can be further processed there.

The SRE can be set using command "*SRE" and read using "*SRE?".

Table 3-2 Meaning of the bits used in the status byte

Bit No.	Meaning
2	**Error Queue not empty** The bit is set when an entry is made in the error queue. If this bit is enabled by the SRE, each entry of the error queue generates a Service Request. Thus an error can be recognized and specified in greater detail by polling the error queue. The poll provides an informative error message. This procedure is to be recommended since it considerably reduces the problems involved with IEC-bus control.
3	**QUEStionable status sum bit** The bit is set if an EVENt bit is set in the QUEStionable-Status register and the associated ENABle bit is set to 1. A set bit indicates a questionable instrument status, which can be specified in greater detail by polling the QUEStionable-Status register.
4	**MAV bit** (message available) The bit is set if a message is available in the output buffer which can be read. This bit can be used to enable data to be automatically read from the instrument to the controller.
5	**ESB bit** Sum bit of the event status register. It is set if one of the bits in the event status register is set and enabled in the event status enable register. Setting of this bit implies an error or an event which can be specified in greater detail by polling the event status register.
6	**MSS bit** (master status smmary bit) The bit is set if the instrument triggers a service request. This is the case if one of the other bits of this registers is set together with its mask bit in the service request enable register SRE.
7	**OPERation status register sum bit** The bit is set if an EVENt bit is set in the OPERation-Status register and the associated ENABle bit is set to 1. A set bit indicates that the instrument is just performing an action. The type of action can be determined by polling the OPERation-status register.

3.8.3.2 IST Flag and Parallel Poll Enable Register (PPE)

By analogy with the SRQ, the IST flag combines the entire status information in a single bit. It can be queried by means of a parallel poll (cf. Section 3.8.4.3) or using command "*IST?".

The parallel poll enable register (PPE) determines which bits of the STB contribute to the IST flag. The bits of the STB are ANDed with the corresponding bits of the PPE, with bit 6 being used as well in contrast to the SRE. The Ist flag results from the ORing of all results. The PPE can be set using commands "*PRE" and read using command "*PRE?".

3.8.3.3 Event-Status Register (ESR) and Event-Status-Enable Register (ESE)

The ESR is already defined in IEEE 488.2. It can be compared with the EVENt part of an SCPI register. The event status register can be read out using command "*ESR?".

The ESE is the associated ENABle part. It can be set using command "*ESE" and read using command "*ESE?".

Table 3-3 Meaning of the bits used in the event status register

Bit No.	Meaning
0	**Operation Complete** This bit is set on receipt of the command *OPC exactly when all previous commands have been executed.
1	**Request Control** This bit is set if the instrument requests the controller function. This is the case when hardcopy is outputted to a printer or a plotter via the IEC-bus.
2	**Query Error** This bit is set if either the controller wants to read data from the instrument without having send a query, or if it does not fetch requested data and sends new instructions to the instrument instead. The cause is often a query which is faulty and hence cannot be executed.
3	**Device-dependent Error** This bit is set if a device-dependent error occurs. An error message with a number between -300 and -399 or a positive error number, which denotes the error in greater detail, is entered into the error queue (cf. annex B, Error Messages).
4	**Execution Error** This bit is set if a received command is syntactically correct, however, cannot be performed for other reasons. An error message with a number between -200 and -300, which denotes the error in greater detail, is entered into the error queue (cf. annex B, Error Messages).
5	**Command Error** This bit is set if a command which is undefined or syntactically incorrect is received. An error message with a number between -100 and -200, which denotes the error in greater detail, is entered into the rror queue (cf. annex B, -Error Messages).
6	**User Request** This bit is set on pressing the *LOCAL* key, i. e., when the instrument is switched over to manual control.
7	**Power On** (supply voltage on) This bit is set on switching on the instrument.

3.8.3.4 STATus:OPERation Register

In the CONDition part, this register contains information on which actions the instrument is being executing or, in the EVENt part, information on which actions the instrument has executed since the last reading. It can be read using commands `"STATus:OPERation:CONDition?"` or `"STATus:OPERation[:EVENt]?"`.

Table 3-4 Meaning of the bits used in the STATus.OPERation register

Bit No.	Meaning
0	**CALibrating** This bit is set as long as the instrument is performing a calibration.
1	**SETTling** This bit is set as long as the new status is settling after a setting command. It is only set if the settling time is longer than the command processing time.
2	**RANGing** This bit is set as long as the instrument is changing a range (e.g. Autorange).
3	**SWEeping** This bit is set while the instrument is performing a sweep.
4	**MEASuring** This bit is set while the instrument is performing a measurement.
5	**WAIT for TRIGGER** This bit is set as long as the instrument is waiting for a trigger event.
6	**WAIT for ARM** This bit is set as long as the instrument is waiting for an arming event.
7	**CORRecting** This bit is set while the instrument is performing a correction.
8 - 12	Device dependent
13	**INSTrument Summary Bit** This bit is set when one or more logical instruments is reporting a status message.
14	**PROGram running** This bit is set while the instrument is performing a program.
15	This bit is always 0

The network analyzer does not support the STATus:OPERation register.

3.8.3.5 STATus:QUEStionable-Register

This register contains information on questionable instrument states. Such states can occur, e.g. if the instrument is operated outside its specifications. It can be read using commands `STATus:QUEStionable:CONDition?` or `STATus:QUEStionable[:EVENt]?`

Table 3-5 Meaning of the bits used in the STATus:QUEStionable register

Bit No.	Meaning
0	**VOLTage** This bit is set if a questionable voltage occurs.
1	**CURRent** This bit is set if a questionable current occurs.
2	**TIME** This bit is set if a questionable time occurs.
3	**POWer** This bit is set if a questionable power occurs.
4	**TEMPerature** This bit is set if a questionable temperature occurs.
5	**FREQuency** The bit is set if a frequency is questionable.
6	**PHASe** The bit is set if a phase value is questionable.
7	**MODulation** The bit is set if a modulation is performed questionably.
8	**CALibration** The bit is set if a calibration is not performed properly.
9	**LIMiit** The bit is set if one of the limit values is exceeded (see also Section 3.8.3.6, STATus:QUEStionable:LIMit-Register)
10-12	Not used.
13	**INSTrument Summary Bit** This bit is set when one or more logical instruments is reporting a message.
14	**COMMand Warning** This bit is set if the instrument ignores parameters when executing a command.
15	This bit is always 0.

The network analyzer supports bits 5 and 9.

3.8.3.6 STATus:QUEStionable:LIMit Register

This register provides information about whether a limit value (upper limit, lower limit) for one of the memory traces (Trace 1, ... Trace 4) is exceeded. The register can be queried with the commands `STATus:QUEStionable:LIMit[:EVENt?]` and `STATus:QUEStionable:LIMit:CONDition?`.

Table 3-6 Meaning of the bits used in the STATus:QUEStionable:LIMit register

Bit-Nr	Meaning
0	This bit is set if trace 1 falls below the associated limit line.
1	This bit is set if trace 1 exceeds the associated limit line.
2	This bit is set if trace 2 falls below the associated limit line.
3	This bit is set if trace 2 exceeds the associated limit line.
4	This bit is set if trace 3 falls below the associated limit line.
5	This bit is set if trace 3 exceeds the associated limit line.
6	This bit is set if trace 4 falls below the associated limit line.
7	This bit is set if trace 4 exceeds the associated limit line.
8	not used
9	not used
10	not used
11	not used
12	not used
13	not used
14	not used
15	not used

3.8.4 Application of the Status Reporting System

In order to be able to effectively use the status reporting system, the information contained there must be transmitted to the controller and further processed there. There are several methods which are represented in the following.

3.8.4.1 Service Request, Making Use of the Hierarchy Structure

Under certain circumstances, the instrument can send a service request (SRQ) to the controller. Usually this service request initiates an interrupt at the controller, to which the control program can react with corresponding actions. As evident from Fig. 3-4 (Section 3.8.2), an SRQ is always initiated if one or several of bits 2, 3, 4, 5 or 7 of the status byte are set and enabled in the SRE. Each of these bits combines the information of a further register, the error queue or the output buffer. The corresponding setting of the ENABle parts of the status registers can achieve that arbitrary bits in an arbitrary status register initiate an SRQ. In order to make use of the possibilities of the service request, all bits should be set to "1" in enable registers SRE and ESE.

Examples (cf. Fig. 3-4 as well):

Use of command "*OPC" to generate an SRQ at the end of a sweep.

- Set bit 0 in the ESE (Operation Complete)
- Set bit 5 in the SRE (ESB)?

  After its settings have been completed, the instrument generates an SRQ.

The SRQ is the only possibility for the instrument to become active on its own. Each controller program should set the instrument such that a service request is initiated in the case of malfunction. The program should react appropriately to the service request.

3.8.4.2 Serial Poll

In a serial poll, just as with command "*STB", the status byte of an instrument is queried. However, the query is realized via interface messages and is thus clearly faster. The serial-poll method has already been defined in IEEE 488.1 and used to be the only standard possibility for different instruments to poll the status byte. The method also works with instruments which do not adhere to SCPI or IEEE 488.2.

The quick-BASIC command for executing a serial poll is "IBRSP()". Serial poll is mainly used to obtain a fast overview of the state of several instruments connected to the IEC bus.

3.8.4.3 Parallel Poll

In a parallel poll, up to eight instruments are simultaneously requested by the controller by means of a single command to transmit 1 bit of information each on the data lines, i.e., to set the data line allocated to each instrument to logically "0" or "1". By analogy to the SRE register which determines under which conditions an SRQ is generated, there is a parallel poll enable register (PPE) which is ANDed with the STB bit by bit as well considering bit 6. The results are ORed, the result is then sent (possibly inverted) as a response in the parallel poll of the controller. The result can also be queried without parallel poll by means of command "*IST".

The instrument first has to be set for the parallel poll using quick-BASIC command "IBPPC()". This command allocates a data line to the instrument and determines whether the response is to be inverted. The parallel poll itself is executed using "IBRPP()".

The parallel-poll method is mainly used in order to quickly find out after an SRQ which instrument has sent the service request if there are many instruments connected to the IEC bus. To this effect, SRE and PPE must be set to the same value.

3.8.4.4 Query by Means of Commands

Each part of every status register can be read by means of queries. The individual commands are indicated in the detailed description of the registers in Section 3.8.3. What is returned is always a number which represents the bit pattern of the register queried. Evaluating this number is effected by the controller program.

Queries are usually used after an SRQ in order to obtain more detailed information on the cause of the SRQ.

3.8.4.5 Error-Queue Query

Each error state in the instrument leads to an entry in the error queue. The entries of the error queue are detailed plain-text error messages which can be looked at in the ERROR menu via manual control or queried via the IEC bus using command "SYSTem:ERRor?". Each call of "SYSTem:ERRor?" provides an entry from the error queue. If no error messages are stored there any more, the instrument responds with 0, "No error".

The error queue should be queried after every SRQ in the controller program as the entries describe the cause of an error more precisely than the status registers. Especially in the test phase of a controller program the error queue should be queried regularly since faulty commands from the controller to the instrument are recorded there as well.

3.8.5 Reset Values of the Status Reporting System

Table 3-7 comprises the different commands and events causing the status reporting system to be reset. None of the commands, except for *RST and SYSTem:PRESet influences the functional instrument settings. In particular, DCL does not change the instrument settings.

Table 3-7 Resettting instrument functions

Event	**Switching on supply voltage**		**DCL,SDC**			
	Power-On-Status-Clear		**(Device Clear, Selected Device Clear)**	***RST or SYSTem:PRESet**	**STATus:PRESet**	***CLS**
Effect	**0**	**1**				
Clear STB,ESR	—	yes	—	—	—	yes
Clear SRE,ESE	—	yes	—	—	—	—
Clear PPE	—	yes	—	—	—	—
Clear EVENTt parts of the registers	—	yes	—	—	—	yes
Clear Enable parts of all OPERation and QUEStionable registers, Fill Enable parts of all other registers with "1".	—	yes	—	—	yes	—
Fill PTRansition parts with "1" , Clear NTRansition parts	—	yes	—	—	yes	—
Clear error queue	yes	yes	—	—	—	yes
Clear output buffer	yes	yes	yes	1)	1)	1)
Clear command processing and input buffer	yes	yes	yes	—	—	—

1) Every command being the first in a command line, i.e., immediately following a <PROGRAM MESSAGE TERMINATOR> clears the output buffer.

3.9 Softkeys and Related IEC/IEEE BUS Commands

The following list contains the IEC/IEEE-bus commands of the ZVR arranged according to the softkey menu structure (Section 2.2). Submenus are visualized by indentations. The function of the softkeys is described in Chapter 2, Manual Operation (for page numbers refer to the alphabetical softkey list – keyword "Softkey" – in the index). The remote control commands are listed in Section 3.6 (see Annex C).

3.9.1 *SYSTEM* Key Group

MODE	--
TIME DOMAIN	--
DOMAIN TIME FREQUENCY	CALCulate:TRANsform:TIME:STATe ON
TIME GATE	CALCulate:FILTer[:GATE]:TIME:STATe ON | OFF
DEF. TIME GATE	--
STEEPEST EDGES	CALCulate:FILTer[:GATE]:TIME:WINDow RECT
STEEP EDGES	CALCulate:FILTer[:GATE]:TIME:WINDow HAMMing
NORMAL GATE	CALCulate:FILTer[:GATE]:TIME:WINDow HANNing
MAXIMUM FLATNESS	CALCulate:FILTer[:GATE]:TIME:WINDow BOHMan
ARBITRARY GATE SHAPE	CALCulate:FILTer[:GATE]:TIME:WINDow DCHebychev CALCulate:FILTer[:GATE]:TIME:DCHebychev <numeric_value>
GATE START	CALCulate:FILTer[:GATE]:TIME:STARt <numeric_value>
GATE STOP	CALCulate:FILTer[:GATE]:TIME:STOP <numeric_value>
GATE CENTER	CALCulate:FILTer[:GATE]:TIME:CENTer <numeric_value>
GATE SPAN	CALCulate:FILTer[:GATE]:TIME:SPAN <numeric_value>
DEF. TRANSF TYPE	--
FFT CHIRP	CALCulate:TRANsform:TIME:METHod FFT | CHIRp
IMPULSE STEP	CALCulate:TRANsform:TIME:STIMulus IMPulse | STEP
BANDPASS LOWPASS	CALCulate:TRANsform:TIME[:TYPE] BPASs | LPASs
SET FREQS LOWPASS	--

KEEP STOP FREQ	CALCulate:TRANsform:TIME:LPASs KFSTop
KEEP FREQ STEP WIDTH	CALCulate:TRANsform:TIME:LPASs KDFRequency
USE MIN STEP WIDTH	CALCulate:TRANsform:TIME:LPASs MINStep
LOWPASS DC S-PARAM	CALCulate:TRANsform:TIME:LPASs:DCSPara <numeric_value>
NO PROFILING	CALCulate:TRANsform:TIME:WINDow RECT
LOW FIRST SIDELOBE	CALCulate:TRANsform:TIME:WINDow HAMMing
NORMAL PROFILE	CALCulate:TRANsform:TIME:WINDow HANNing
STEEP FALLOFF	CALCulate:TRANsform:TIME:WINDow BOHMan
ARBITRARY SIDELOBES	CALCulate:TRANsform:TIME:WINDow DCHebychev CALCulate:TRANsform:TIME:DCHebychev <numeric_value>
DEF X-AXIS	--
X-AXIS TIME	CALCulate:TRANsform:TIME:XAXis TIME
X-AXIS DISTANCE	CALCulate:TRANsform:TIME:XAXis DISTance
X-AXIS DISTANCE/2	CALCulate:TRANsform:TIME:XAXis HDIStance
GATE START	CALCulate:FILTer[:GATE]:TIME:STARt <numeric_value>
GATE STOP	CALCulate:FILTer[:GATE]:TIME:STOP <numeric_value>
GATE CENTER	CALCulate:FILTer[:GATE]:TIME:CENTer <numeric_value>
GATE SPAN	CALCulate:FILTer[:GATE]:TIME:SPAN <numeric_value>
EXTERNAL	INPut[1|2]:BRIDge BYPass | INT
FREQUENCY CONVERS	--
SECOND HARMONIC	SENSe[1..4]:FREQuency:CONVersion SHARmonic
THIRD HARMONIC	SENSe[1..4]:FREQuency:CONVersion THARmonic
MIXER MEAS	SENSe[1..4]:FREQuency:CONVersion MIXer

DEF MIXER MEAS	--
RF= BASE FREQ	SENSe[1...4]:FREQuency:CONVersion:MIXer:FUNDamental RF
LO= BASE FREQ	SENSe[1...4]:FREQuency:CONVersion:MIXer:FUNDamental LO
IF= BASE FREQ	SENSe[1...4]:FREQuency:CONVersion:MIXer:FUNDamental IF
LO EXT SRC1/SRC2	SENSe[1...4]:FREQuency:CONVersion:MIXer:LOEXternal SOURce1|SOURce2
FIXED RF	SENSe[1...4]:FREQuency:CONVersion:MIXer:RFFixed <numeric_value>
FIXED LO	SENSe[1...4]:FREQuency:CONVersion:MIXer:LOFixed <numeric_value>
FIXED IF	SENSe[1...4]:FREQuency:CONVersion:MIXer:IFFixed <numeric_value>
SEL BAND – +	SENSe[1...4]:FREQuency:CONVersion:MIXer:TFRequency BAND1|BAND2
ARBITRARY	SENSe[1..4]:FREQuency:CONVersion ARBitrary
DEF ARBITRARY	--
ARBITRARY SYST FREQ	SENSe[1..4]:FREQuency:CONVersion:ARBitrary <numeric_value>,<numeric_value>,<numeric_value>, CW | FIXed |SWEep SOURce[1..4]:FREQuency:CONVersion:ARBitrary:IFRequency <numeric_value>, <numeric_value>, <numeric_value>, CW | FIXed | SWEep SOURce[1..4]:FREQuency:CONVersion:ARBitrary:EFRequency<1|2> <Boolean>, <numeric_value>, <numeric_value>, <numeric_value>, CW | FIXed | SWEep
EXT SRC CONFIG	SYSTem:COMMunicate:GPIB:RDEVice:GENerator<1|2>:ADDRess 0...30 SYSTem:COMMunicate:RDEVice:GENerator<1|2>:LINK GPIB | TTL SYSTem:COMMunicate:RDEVice:GENerator<1|2>:TYPE <name>
COMPRESS SOI TOI	--
COMPRESS POINT	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear COMP'
DEF COMP PNT MEAS	--
SRC POWER MAX LIMIT	SOURce[1..4]:POWer:NLINear:COMP:RANGe:UPPer <numeric_value>
SRC POWER MIN LIMIT	SOURce[1..4]:POWer:NLINear:COMP:RANGe:LOWer <numeric_value>
SETTLING TIME	SENSe[1..4]:FREQuency:NLINear:COMP:STIMe <numeric_value>
COMP POINT INP/OUTP	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:COMP:CPOint INP|OUTP'
X DB COMP POINT	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:COMP:LEVel <num_value>'

INT SRC	SOURce[1..4]:FREQuency:NLINear:COMP INT
EXT SRC1	SOURce[1..4]:FREQuency:NLINear:COMP ESRC1
EXT SRC2	SOURce[1..4]:FREQuency:NLINear:COMP ESRC2
SOI	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear SOI'
DEF SOI MEAS	--
SRC POWER MAX LIMIT	SOURce[1..4]:POWer:NLINear:SOI:RANGe:UPPer <numeric_value>
SRC POWER MIN LIMIT	SOURce[1..4]:POWer:NLINear:SOI:RANGe:LOWer <numeric_value>
SETTLING TIME	SENSe[1..4]:FREQuency:NLINear:SOI:STIMe <numeric_value>
INTC POINT INP/OUTP	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:SOI:IPOint INP | OUTP'
FREQ OFF OF 2ND SRC	SOURce[1..4]:FREQuency:NLINear:SOI:OFFSet <numeric_value>
MEAS FREQ SUM/DIFF	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:SOI:FREQuency SUM|DIFF'
INT SRC EXT SRC1	SOURce[1..4]:FREQuency:NLINear:SOI IESRc1
INT SRC EXT SRC2	SOURce[1..4]:FREQuency:NLINear:SOI IESRc2
EXT SRC1 EXT SRC2	SOURce[1..4]:FREQuency:NLINear:SOI ESRC12
TOI	SENSe[1..4]:FUNCtion[:ON] 'XFR:NLINear TOI'
DEF TOI MEAS	--
SRC POWER MAX LIMIT	SOURce[1..4]:POWer:NLINear:TOI:RANGe:UPPer <numeric_value>
SRC POWER MIN LIMIT	SOURce[1..4]:POWer:NLINear:TOI:RANGe:LOWer <numeric_value>
SETTLING TIME	SENSe[1..4]:FREQuency:NLINear:TOI:STIMe <numeric_value>
INTC POINT INP/OUTP	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:TOI:IPOint INP | OUTP'
FREQ OFFS OF 2ND SRC	SOURce[1..4]:FREQuency:NLINear:TOI:OFFSet <numeric_value>
MEAS SIDEB LSB USB	SENSe[1..4]:FUNCtion[:ON] 'XFRequency:NLINear:TOI:SIDeband LSB | USB'
INT SRC EXT SRC1	SOURce[1..4]:FREQuency:NLINear:TOI IESRc1
INT SRC EXT SRC2	SOURce[1..4]:FREQuency:NLINear:TOI IESRc2
EXT SRC1 EXT SRC2	SOURce[1..4]:FREQuency:NLINear:TOI ESRC12

SWEEP MODE	--
FREQUENCY SWEEP	SENSe[1..4]:FUNCtion[:ON] 'XFR:POW:...'
TIME SWEEP	SENSe[1..4]:FUNCtion[:ON] 'XTIM:POW:...'
POWER SWEEP	SENSe[1..4]:FUNCtion[:ON] 'XPOW:POW:...'
FAST MODE	SENSe[1..4]:DETector:[FUNCtion] FAST | NORMAL
SETUP	--
GENERAL SETUP	--
GPIB ADDRESS	SYSTem:COMMunicate:GPIB[:SELF]:ADDRess 0...30
USER PORT A	INPut:UPORt<1|2>[:VALue]? INPut:UPORt<1|2>:STATe ON | OFF OUTPut[:STATe] ON | OFF OUTPut:UPORt<1|2>[:VALue] <Binary>
USER PORT B	INPut:UPORt<1|2>[:VALue]? INPut:UPORt<1|2>:STATe ON | OFF OUTPut[:STATe] ON | OFF OUTPut:UPORt<1|2>[:VALue] <Binary>
COM PORT 1	SYSTem:COMMunicate:SERial:CONTrol:DTR IBFull | OFF SYSTem:COMMunicate:SERial:CONTrol:RTS IBFull | OFF SYSTem:COMMunicate:SERial[:RECeive]:BAUD <numeric_value> SYSTem:COMMunicate:SERial[:RECeive]:BITS 7 | 8 SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE] EVEN | ODD | NONE SYSTem:COMMunicate:SERial[:RECeive]:SBITs 1|2 SYSTem:COMMunicate:SERial[:RECeive]:PACE XON | NONE
COM PORT 2	SYSTem:COMMunicate:SERial2:CONTrol:DTR IBFull | OFF SYSTem:COMMunicate:SERial2:CONTrol:RTS IBFull | OFF SYSTem:COMMunicate:SERial2[:RECeive]:BAUD <numeric_value> SYSTem:COMMunicate:SERial2[:RECeive]:BITS 7 | 8 SYSTem:COMMunicate:SERial2[:RECeive]:PARity[:TYPE] EVEN | ODD | NONE SYSTem:COMMunicate:SERial2[:RECeive]:SBITs 1|2 SYSTem:COMMunicate:SERial2[:RECeive]:PACE XON | NONE
TIME	SYSTem:TIME 0...23, 0...59, 0...59
DATE	SYSTem:DATE <num>,<num>,<num>
REFERENCE EXT/INT	SENSe[1..4]:ROSCillator[:SOURce] EXTernal | INTernal
EXT REF FREQUENCY	SENSe[1..4]:ROSCillator:EXTernal:FREQency <numeric_value>
SERVICE	--
RF OFF	DIAGnostic:SERVice:RFPower ON | OFF
DETECTOR CORRECTION	

SERVICE FUNCTION	`DIAGnostic:SERVice:FUNCtion <num>,<num>,<num>,<num>,<num>`
ENTER PASSWORD	`SYSTem:PASSword[:CENable]   <string>`
INFO	--
FIRMWARE VERSIONS	**IDN?*
HARDWARE + OPTIONS	**OPT?*

3.9.2 *COPY* Key Group

COPY	HCOPy[:IMMediate<1|2>]
SETTINGS	--
COPY SCREEN	HCOPy:ITEM:ALL
COPY TRACE	HCOPy:ITEM:WINDow<1...4><1|2>:TRACe:STATe ON | OFF
COPY MEM TRACE	
COPY TABLE	HCOPy:ITEM:WINDow<1...4><1|2>:TABle:STATe ON | OFF
SELECT QUADRANT	--
UPPER LEFT	HCOPy:PAGE:DIMensions:QUADrant 1
LOWER LEFT	HCOPy:PAGE:DIMensions:QUADrant 2
UPPER RIGHT	HCOPy:PAGE:DIMensions:QUADrant 3
LOWER RIGHT	HCOPy:PAGE:DIMensions:QUADrant 4
FULL PAGE	HCOPy:PAGE:DIMensions:FULL
ENTER TEXT	HCOPy:ITEM:LABel:TEXT <string>
COMMENT CHANNEL 1	HCOPy:ITEM:WINDow<1...4><1|2>:TEXT <string>
HARDCOPY DEVICE	HCOPy:DEVice:LANGuage HPGL | PCL4 | PCL5 | POSTscript | ESCP | WMF|PCX | HP7470
COLOR ON / OFF	HCOPy:DEVice:COLor ON|OFF
TRC COLOR AUTO INC	HCOPy:ITEM:WINDow<1...4>:TRACe:CAINcrement ON | OFF

3.9.3 *MEMORY* Key Group

Softkey	IEC/IEEE-bus command
CONFIG	
EDIT PATH	MMEMory:MSIS <device> MMEMory:CDIRectory <directory_name>
COPY	MMEMory:COPY <file_source>,<file_destination>
DELETE	MMEMory:DELete <file_name> MMEMory:RDIRectory <directory_name>
RENAME	MMEMory:MOVE <file_source>,<file_destination>
MAKE DIRECTORY	MMEMory:MDIRectory <directory_name>
FORMAT DISK	MMEMory:INITialize <msus>
SAVE	--
EDIT NAME	MMEMory:STORe:STATe 1,<file_name>
EDIT PATH	MMEMory:CDIRectory <string>
SET PATH A:\	MMEMory:CDIRectory ‘A:\’
SET PATH C:\..	MMEMory:CDIRectory ‘C:\’
SEL ITEMS TO SAVE	--
SELECT ITEMS	MMEMory:SELect[:ITEM]:GSETup ON|OFF MMEMory:SELect[:ITEM]:HWSettings ON|OFF MMEMory:SELect[:ITEM]:TRACe<1...4> ON|OFF MMEMory:SELect[:ITEM]:MTRace<1...8> ON|OFF MMEMory:SELect[:ITEM]:LINes[:ALL] ON|OFF MMEMory:SELect[:ITEM]:CSETup ON|OFF MMEMory:SELect[:ITEM]:HCOPy ON|OFF MMEMory:SELect[:ITEM]:CDATa ON|OFF MMEMory:SELect[:ITEM]:CKDATa ON|OFF MMEMory:SELect[:ITEM]:MACRos ON|OFF MMEMory:SELect[:ITEM]:AFILes ON|OFF MMEMory:SELect[:ITEM]:SCData ON|OFF
ENABLE ALL ITEMS	MMEMory:SELect[:ITEM]:ALL
DISABLE ALL ITEMS	MMEMory:SELect[:ITEM]:NONE
DEFAULT CONFIG	MMEMory:SELect[:ITEM]:DEFault
DATA SET CLEAR	MMEMory:CLEAR:STATe 1,<file_name>
DATA SET CLEAR ALL	MMEMory:CLEAR:ALL

PAGE UP	--
PAGE DOWN	--
EDIT COMMENT	MMEMory:COMMent <string>
ASCII FILE	--
ASCII	FORMat:DEXport ASCii
TOUCHSTONE	FORMat:DEXport TOUChstone
SUPER COMPACT	FORMat:DEXport SCOMpact
REAL AND IMAGINARY	FORMat:DEXport:FORMat COMPlex
LIN MAG AND PHASE	FORMat:DEXport:FORMat MLPHase
dB MAG AND PHASE	FORMat:DEXport:FORMat MDPHase
APEND NEW	FORMat:DEXport:MODe NEW | APPend
DEC SEP . DEC SEP ,	FORMat:DEXport:DSEParator POINt | COMMa
DISPLAYED DATA	FORMat:DEXport:SOURce DDATa
MATH	FORMat:DEXport:SOURce MDATa
FORMAT	FORMat:DEXport:SOURce FDATa
TIME DOMAIN	FORMat:DEXport:SOURce TDATa
COMPLEX CONVERS	FORMat:DEXport:SOURce CVData
CAL	FORMat:DEXport:SOURce CDATa

Key	IEC/IEEE-bus command
RECALL	--
EDIT NAME	MMEMory:LOAD:STATe 1,<file_name>
SET PATH A:\...	MMEMory:CDIRectory ‘A:\’
SET PATH C:\...	MMEMory:CDIRectory ‘C:\’
SEL ITEMS TO RECALL	--
ENABLE ALL ITEMS	MMEMory:SELect[:ITEM]:ALL
DISABLE ALL ITEMS	MMEMory:SELect[:ITEM]:NONE
DEFAULT CONFIG	MMEMory:SELect[:ITEM]:DEFault
AUTO RECALL	MMEMory:LOAD:AUTO 1,<file_name>

3.9.4 *STATUS* Key Group

Key	IEC/IEEE-bus command
LOCAL	Gerätenachricht "Go to LOCAL (GTL)"
PRESET	*RST
USER	--

3.9.5 *STIMULUS* Key Group

START	SENSe[1..4]:FREQuency:STARt <numeric_value> SOURCe[1..4]:POWer:STARt <numeric_value>	(Frequenzsweep) (Leistungssweep)
STOP	SENSe[1..4]:FREQuency:STOP <numeric_value> SOURCe[1..4]:POWer:STOP <numeric_value>	(Frequenzsweep) (Leistungssweep)
CENTER	SENSe[1..4]:FREQuency:CENTer <numeric_value> SOURCe[1..4]:POWer:CENTer <numeric_value>	(Frequenzsweep) (Leistungssweep)
SPAN	SENSe[1..4]:FREQuency:SPAN <numeric_value> SOURCe[1..4]:POWer:SPAN <numeric_value>	(Frequenzsweep) (Leistungssweep)

3.9.6 *SWEEP* Key Group

SWEEP	--
SINGLE POINT	SENSe[1..4]:FREQuency:MODE CW|FIXED
LIN SWEEP	SENSe[1..4]:FREQuency:MODE SWEEP SENSe[1..4]:SWEep:SPACing LIN
LOG SWEEP	SENSe[1..4]:FREQuency:MODE SWEEP SENSe[1..4]:SWEep:SPACing LOG
SEG SWEEP	SENSe[1..4]:FREQuency:MODE SEGMent
DEF SWEEP SEGMENTS	SENSe[1..4]:SEGMent:DEFine[1..50] <numeric_value>, ...
DEL ALL SEGMENTS	SENSe[1..4]:SEGMent:CLEar
DEL ACTIVE SEGMENT	SENSe[1..4]:SEGMent:DELete[1..50]
INS NEW SEGMENT	SENSe[1..4]:SEGMent:INSert[1..50] <numeric_value>, ...
DIVIDED X AXIS	DISPlay[:WINDow[1...4]]:DIAGram:SEGMented:X[:STATe] ON | OFF
X GRID LIN/LOG	SENSe[1..4]:SWEep:SPACing LIN | LOG
NUMBER OF POINTS	--
ARBITRARY	SENSe[1..4]:SWEep:POINts <numeric_value>
STEP SIZE	SENSe[1..4]:SWEep:STEP <numeric_value>
POINTS/DEC	SENSe[1..4]:SWEep:PDECade <numeric_value>

Softkey	IEC/IEEE-bus command
DEF TRIGGER	--
IMMEDIATE	TRIGger[:SEQuence]:SOURce IMMediate
EXTERNAL	TRIGger[:SEQuence]:SOURce EXTernal
LINE	TRIGger[:SEQuence]:SOURce LINE
PERIODIC TIMER	TRIGger[:SEQuence]:SOURce TIMer
REAL TIME CLOCK	TRIGger[:SEQuence]:SOURce RTCLock
MANUAL	TRIGger[:SEQuence]:SOURce MANual
MANUAL TRIGGER	*TRG
TRIGGER DELAY	TRIGger[:SEQuence]:HOLDoff <numeric_value>
TRIGGER SWEEP/POINT	TRIGger[:SEQuence]:LINK 'SWEEP' ,POINt'
SLOPE POS/NEG	TRIGger[:SEQuence]:SLOPe POSitive|NEGative
EDIT TIMER PERIOD	TRIGger[:SEQuence]:TIMer <numeric_value>
EDIT RTC TRIG TIME	TRIGger[:SEQuence]:RTCLock <numeric_value>
SWEEP TIME AUTO/MAN	SENSe[1..4]:SWEep:TIME AUTO
EDIT SWEEP TIME	[SENSe[1...4]:]SWEep:TIME <numeric_value>
COUPLED CHANNELS	INSTrument:COUPle ALL | NONE
SWEEP DIR FWD/REV	SENSe[1..4]:SWEep:DIRection UP | DOWN
SWEEP START/HOLD	--
CONTINUOUS SWEEP	INITiate:CONTinuous ON
NUMBER OF SWEEPS	[SENSe[1...4]:]SWEep:COUNt <numeric_value>
SINGLE SWEEP	INITiate:CONTinuous OFF INITiate:IMMediate
RESTART	INITiate:IMMediate

SOURCE	--
POWER	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value>
SLOPE	SOURce:POWer[:LEVel][:IMMediate]:SLOPe <numeric_value>
CAL a1 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:A1 <numeric_value>
CAL a2 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:A2 <numeric_value>
STEP ATT a1	OUTPut1:ATTenuation <numeric_value>
STEP ATT b1	INPut1:ATTenuation <numeric_value>
STEP ATT b2	INPut2:ATTenuation <numeric_value>
STEP ATT a2	OUTPut2:ATTenuation <numeric_value>
STEP ATT a1 AND a2	OUTPut1:ATTenuation <numeric_value>
FREQUENCY	SOURce:FREQuency[:CW|FIXed] <numeric_value>
EXT SRC 1 POWER	SOURce:POWer[:LEVel][:IMMediate]:EXTernal1 [:AMPLitude] <numeric_value>
EXT SRC 1 SLOPE	SOURce:POWer[:LEVel][:IMMediate]:EXTernal1 :SLOPe <numeric_value>
CAL EXT SRC 1 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:ESRC1 <numeric_value>
EXT SRC 2 POWER	SOURce:POWer[:LEVel][:IMMediate]:EXTernal2 [:AMPLitude] <numeric_value>
EXT SRC 2 SLOPE	SOURce:POWer[:LEVel][:IMMediate]:EXTernal2 :SLOPe <numeric_value>
CAL EXT SRC 2 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:ESRC2 <numeric_value>
AVG	--
AVERAGE	SENSe[1..4]:AVERage[:STATe] ON | OFF
AVG FACTOR	[SENSe[1..4]:]AVERage:COUNt <numeric_value>
AVG TYPE SWEEP POINT	[SENSe[1..4]:]AVERage:MODE SWEEP | POINt

Softkey	IEC/IEEE-bus command
AVERAGE RESTART	`SENSe[1..4]:AVERage:CLEar`
IF BANDWIDTH	`[SENSe[1...4]:]BANDwidth|BWIDth[:RESolution] <numeric_value>`

3.9.7 *MARKER* Key Group

Softkey	IEC/IEEE-bus command
MARKER	--
MARKER 1..8	`CALCulate[1..4]:MARKer[1..8]:X <numeric_value>`
MARKER DATA/MEM	`CALCulate[1..4]:MARKer[1..8]:TRACe CHDATA|CHMEM`
COUPLED MARKERS	`CALCulate[1..4]:MARKer[1..8]:COUPled[:STATe] ON | OFF`
MARKER CONVERS	--
S	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex S`
1/S	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex SINV`
Z	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex Z`
Z/Z0	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex ZREL`
Y	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex Y`
Y/Y0	`CALCulate[1..4]:MARKer[1..8]:TRANsform:COMPlex YREL`
MARKER FORMAT	--
LIN MAGNITUDE	`CALCulate[1..4]:MARKer[1..8]:FORMat MLINear`
dB MAGNITUDE	`CALCulate[1..4]:MARKer[1..8]:FORMat MDB`
PHASE	`CALCulate[1..4]:MARKer[1..8]:FORMat PHASe`
REAL	`CALCulate[1..4]:MARKer[1..8]:FORMat REAL`
IMAGINARY	`CALCulate[1..4]:MARKer[1..8]:FORMat IMAGinary`
SWR	`CALCulate[1..4]:MARKer[1..8]:FORMat SWR`

Softkey	Command
GROUP DELAY	`CALCulate[1..4]:MARKer[1..8]:FORMat GDELay`
LIN MAG AND PHASE	`CALCulate[1..4]:MARKer[1..8]:FORMat MLPHase`
dB MAG AND PHASE	`CALCulate[1..4]:MARKer[1..8]:FORMat MDPHase`
REAL AND IMAGINARY	`CALCulate[1..4]:MARKer[1..8]:FORMat COMPlex`
L	`CALCulate[1..4]:MARKer[1..8]:FORMat L`
C	`CALCulate[1..4]:MARKer[1..8]:FORMat C`
RLC ELEMENTS	`CALCulate[1..4]:MARKer[1..8]:FORMat RLC`
ALL MARKER OFF	`CALCulate[1..4]:MARKer[1..8]:AOFF`
MARKER CONT/DISCR	`CALCulate[1..4]:MARKer[1..8]:MODE CONTinuous|DISCrete`
SEARCH	--
SEARCH	`CALCulate[1...4]:MARKer[1...8]:SEARch [:IMMediate]`
SEARCH NEXT	`CALCulate[1...4]:MARKer[1...8]:SEARch:NEXT`
TRACKING	`CALCulate[1...4]:MARKer[1...8]:SEARch:TRACking ON | OFF`
MAX MODE	`CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect] MAXimum`
MIN MODE	`CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect] MINimum`
TARGET MODE	`CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect] TARGet` `CALCulate[1...4]:MARKer[1...8]:FUNCtion:TARGet <numeric_value>`
BANDFILTER MODE	`CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect] BFILter`

DEFINE B'DFILTER	--
BANDPASS	CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth:MODE BPASs
BANDSTOP	CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth:MODE BSTOp
WIDTH	CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth <numeric_value>
QUALITY FACTOR	CALCulate[1...4]:MARKer[1...8]:FUNCtion:QFACtor
SHAPE FACT 60dB / 3dB	CALCulate[1...4]:MARKer[1...8]:FUNCtion:SFACtor <numeric_value>,<numeric_value>
SHAPE FACT 60dB / 6dB	CALCulate[1...4]:MARKer[1...8]:FUNCtion:SFACtor <numeric_value>,<numeric_value>
DELTA	--
Δ REF= MARKER 1	CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence MARKer1
Δ REF= FIXED POS	CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence FIXed
FIXED POS X VAL	CALCulate[1...4]:MARKer[1...8]:FUNCtion: DELTa:REFerence:RPOSition[:CARTesian] <numeric_value>,<numeric_value>
FIXED POS Y VAL	
PEAK TO PEAK	CALCulate[1...4]:MARKer[1...8]:FUNCtion: PTPeak:STATe ON | OFF
DELTA OFF	CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa :STATe OFF
= MKR	
START =MARKER	CALCulate[1...4]:MARKer[1...8]:FUNCtion:STARt
STOP =MARKER	CALCulate[1...4]:MARKer[1...8]:FUNCtion:STOP
CENTER =MARKER	CALCulate[1...4]:MARKer[1...8]:FUNCtion:CENTer
REF VAL =MARKER	CALCulate[1...4]:MARKer[1...8]:FUNCtion:REFerence

3.9.8 *CHANNEL* Key Group

CH1..CH4

```
INSTrument[:SELect]  CHANNEL<1..4>
```

3.9.9 *RESPONSE* Key Group

MEAS

--

S11 REFL PORT1

```
[SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:S11"
[SENSe[1...4]:]FUNCtion[:ON]   "XPOW:POW:S11"
[SENSe[1...4]:]FUNCtion[:ON]   "XTIM:POW:S11"
```

S21 TRANS FWD

```
[SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:S21"
[SENSe[1...4]:]FUNCtion[:ON]   "XPOW:POW:S21"
[SENSe[1...4]:]FUNCtion[:ON]   "XTIM:POW:S21"
```

S12 TRANS REV

```
[SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:S12"
[SENSe[1...4]:]FUNCtion[:ON]   "XPOW:POW:S12"
[SENSe[1...4]:]FUNCtion[:ON]   "XTIM:POW:S12"
```

S22 REFL PORT2

```
[SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:S22"
[SENSe[1...4]:]FUNCtion[:ON]   "XPOW:POW:S22"
[SENSe[1...4]:]FUNCtion[:ON]   "XTIM:POW:S22"
```

WAVE QUANTITY

--

- a1, ... , b2

  ```
  [SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:A1|A2|B1|B2"
  ```

- DRIVE PORT PORT1/PORT2

  ```
  OUTPut:DPORt  PORT1 | PORT2
  ```

RATIO

--

- DEFINE RATIO

  --

- CONV GAIN |b1/a1|

  ```
  [SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:RAT B1,ABSA1"
  ```

- CONV GAIN |b2/a1|

  ```
  [SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:RAT B2,ABSA1"
  ```

- b1/a1, ... b2/a2

  ```
  [SENSe[1...4]:]FUNCtion[:ON]   "XFR:POW:RAT B1,A1"
  ```

- DRIVE PORT PORT1/PORT2

  ```
  OUTPut:DPORt  PORT1 | PORT2
  ```

COMPLEX CONVERS	
S	CALCulate[1...4]:TRANsform:COMPlex S
1/S	CALCulate[1...4]:TRANsform:COMPlex SINV
Z/Z0	CALCulate[1...4]:TRANsform:COMPlex ZREL
Z	CALCulate[1...4]:TRANsform:COMPlex Z
Y/Y0	CALCulate[1...4]:TRANsform:COMPlex YREL
Y	CALCulate[1...4]:TRANsform:COMPlex Y
K-FACTOR	[SENSe[1...4]:]FUNCtion[:ON] "XFRequency:POWer:KFACtor" [SENSe[1...4]:]FUNCtion[:ON] "XPOWer:POWer:KFACtor" [SENSe[1...4]:]FUNCtion[:ON] "XTIMe:POWer:KFACtor"
µ1-FACTOR	[SENSe[1...4]:]FUNCtion[:ON] "XFRequency:POWer:MUFactor1" [SENSe[1...4]:]FUNCtion[:ON] "XPOWer:POWer:MUFactor1" [SENSe[1...4]:]FUNCtion[:ON] "XTIMe:POWer:MUFactor1"
µ2-FACTOR	[SENSe[1...4]:]FUNCtion[:ON] "XFRequency:POWer:MUFactor2" [SENSe[1...4]:]FUNCtion[:ON] "XPOWer:POWer:MUFactor2" [SENSe[1...4]:]FUNCtion[:ON] "XTIMe:POWer:MUFactor2"
FORMAT	--
COMPLEX	CALCulate[1...4]:FORMat COMPlex
MAGNITUDE	CALCulate[1...4]:FORMat MAGNitude
PHASE	CALCulate[1...4]:FORMat PHASe
REAL	CALCulate[1...4]:FORMat REAL
IMAGINARY	CALCulate[1...4]:FORMat IMAGinary
SWR	CALCulate[1...4]:FORMat SWR
GROUP DELAY	CALCulate[1...4]:FORMat GDELay CALCulate[1...4]:GDAPerture:MODE STEP | FREQuency
STEP APERTURE	CALCulate[1...4]:GDAPerture:SCOunt <numeric_value>
FREQUENCY APERTURE	CALCulate[1...4]:GDAPerture[:SPAN] <numeric_value>

L	`CALCulate[1...4]:FORMat L`
C	`CALCulate[1...4]:FORMat C`
PHASE UNWRAP	`CALCulate[1...4]:FORMat UPHase`
SCALE	--
AUTOSCALE	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :AUTO ONCE`
SCALE/DIV	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :PDIVision <numeric_value>`
REFERENCE VALUE	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :RLEVel <numeric_value>`
REFERENCE POSITION	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :RPOSition 0...100 PCT`
MAX VALUE	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :TOP <numeric_value>`
MIN VALUE	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :BOTTom <numeric_value>`
ADD CONSTANT	`DISPlay[:WINDow[1...4]]:TRACe[1...4]:Y[:SCALe] :OFFSet <numeric_value>`
DIAGRAM	--
LIN CARTESIAN	`DISPlay[:WINDow<1...4>]:DIAGram CLIN`
LOG CARTESIAN	`DISPlay[:WINDow<1...4>]:DIAGram CLOG`
DB CARTESIAN	`DISPlay[:WINDow<1...4>]:DIAGram CDB`
SEGMENTED CARTESIAN	`DISPlay[:WINDow<1...4>]:DIAGram CSEG`
LIN POLAR	`DISPlay[:WINDow<1...4>]:DIAGram PLIN`
LOG POLAR	`DISPlay[:WINDow<1...4>]:DIAGram PLOG`
DB POLAR	`DISPlay[:WINDow<1...4>]:DIAGram PDB`
SEGMENTED POLAR	`DISPlay[:WINDow<1...4>]:DIAGram PSEG`
SMITH	`DISPlay[:WINDow<1...4>]:DIAGram SMITh`
INVERTED SMITH	`DISPlay[:WINDow<1...4>]:DIAGram ISMith`

Softkey	IEC/IEEE-bus command
CHARTER	DISPlay[:WINDow<1...4>]:DIAGram CHARter
DISPLAY	--
SINGLE CHANNEL	DISPlay:FORMat SINGle
DUAL CHAN OVERLAY	DISPlay:FORMat DOVerlay
DUAL CHAN SPLIT	DISPlay:FORMat DSPLit
QUAD CHAN OVERLAY	DISPlay:FORMat QOVerlay
QUAD CHAN DUAL SPLIT	DISPlay:FORMat QDSPlit
QUAD CHAN QUAD SPLIT	DISPlay:FORMat QQSPlit
EXPAND	DISPlay:FORMat:EXPand ON|OFF
TRACE	--
DATA TO MEMORY	TRACe:COPY MDATa1 | MDATa2 | MDATa3 | MDATa4 |MDATa5 | MDATa6 | MDATa7 | MDATa8,CH1DATA | CH2DATA | CH3DATA |CH4DATA
SHOW DATA	DISPlay[:WINDow<1...4>]:TRACe1:STATe ON | OFF
SHOW MEM	DISPlay[:WINDow<1...4>]:TRACe2:STATe ON | OFF
SHOW MATH	CALCulate[1...4]:MATH:STATe ON | OFF
SMOOTHING	CALCulate[1...4]:SMOothing[:STATe] ON | OFF
SMOOTHING APERTURE	CALCulate[1...4]:SMOothing:APERture <numeric_value>
DEFINE MATH	CALCulate[1...4]:MATH[:EXPRession][:DEFine] <expr>

3.9.10 *CAL* Key Group

Softkey	IEC/IEEE-bus command
CAL	--
START NEW CAL	--
FULL TWO PORT	--
PORT 1 CONNECTOR	--
N 50 Ω FEMALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] N50FEMALE
N 50 Ω MALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] N50MALE
N 75 Ω FEMALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] N75FEMALE
N 75 Ω MALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] N75MALE
SMA FEMALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] SMAFEMALE
SMA MALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] SMAMALE
PC 3.5 FEMALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] PC35FEMALE
PC 3.5 MALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] PC35MALE
USR CONN 2 FEMALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] UFEMALE2
USR CONN 2 MALE	[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2] UMALE2
PORT 2 CONNECTOR	--
TOM	[SENSe[1...4]:]CORRection:COLLect:METHod TOM
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
OPEN PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1

MATCH PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
SLIDE PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
TRM	[SENSe[1...4]:]CORRection:COLLect:METHod TRM
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
REFLECT PORT 1	[SENSe[1...4]:]CORRection:COLLect: ACQuire REFL1
REFLECT PORT 2	[SENSe[1...4]:]CORRection:COLLect: ACQuire REFL2
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
MATCH PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
SLIDE PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
TRL	[SENSe[1...4]:]CORRection:COLLect:METHod TRL
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
REFLECT PORT 1	[SENSe[1...4]:]CORRection:COLLect: ACQuire REFL1
REFLECT PORT 2	[SENSe[1...4]:]CORRection:COLLect: ACQuire REFL2
LINE 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] LINE1
LINE 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] LINE2
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
MATCH PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE

TNA	`[SENSe[1...4]:]CORRection:COLLect:METHod TNA`
THROUGH (TNA)	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire]   THRough`
ATTEN	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] ATT`
APPLY CAL	`[SENSe[1...4]:]CORRection:COLLect:SAVE`
TOSM	`[SENSe[1...4]:]CORRection:COLLect:METHod TOSM`
THROUGH	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire]   THRough`
OPEN PORT 1	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1`
OPEN PORT 2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2`
SHORT PORT 1	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT1`
SHORT PORT 2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT2`
MATCH PORT 1	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1`
MATCH PORT 2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2`
SLIDE PORT 1	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire]  SLIDE1`
SLIDE PORT 2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire]  SLIDE2`
MATCH BOTH PORTS	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH12`
APPLY CAL	`[SENSe[1...4]:]CORRection:COLLect:SAVE`
TOM-X	`[SENSe[1...4]:]CORRection:COLLect:METHod TOMX`
THROUGH	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire]   THRough`
MATCH BOTH PORTS	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH12`
OPEN BOTH PORTS	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN12`
MATCH P1 OPEN P2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] M1O2`
OPEN P1 MATCH P2	`[SENSe[1...4]:]CORRection:COLLect[:ACQuire] O1M2`
APPLY CAL	`[SENSe[1...4]:]CORRection:COLLect:SAVE`

AUTOKAL FUNDAM´TAL	[SENSe[1...4]:]CORRection:COLLect:METHod FUNDamental
FULL ONE PORT	-- (ZVR, ZVRE, ZVC, ZVCE)
BOTH PORTS	[SENSe[1...4]:]CORRection:COLLect:METHod FOPORT12
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
SHORT PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT1
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
OPEN PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2
SHORT PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT2
MATCH PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
SLIDE PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
PORT 1	[SENSe[1...4]:]CORRection:COLLect:METHod FOPORT1
PORT 2	[SENSe[1...4]:]CORRection:COLLect:METHod FOPORT2
FULL ONE PORT	[SENSe[1...4]:]CORRection:COLLect:METHod FOPORT1 (ZVRL)
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
SHORT PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT1
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE

ONE PATH TWO PORT	(ZVR, ZVRE, ZVC, ZVCE)
FORWARD	[SENSe[1...4]:]CORRection:COLLect:METHod FOPTport
REVERSE	[SENSe[1...4]:]CORRection:COLLect:METHod ROPTport
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
SHORT PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT1
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
OPEN PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2
SHORT PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT2
MATCH PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH2
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
SLIDE PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
ONE PATH TWO PORT	[SENSe[1...4]:]CORRection:COLLect:METHod FOPTport (ZVRL)
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
SHORT PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SHORT1
MATCH PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] MATCH1
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
SLIDE PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] SLIDE1
AUTOKAL FUNDAM´TAL	[SENSe[1...4]:]CORRection:COLLect:METHod FUNDamental
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE

Softkey	IEC/IEEE-bus command
TRANS NORM	
FORWARD	[SENSe[1...4]:]CORRection:COLLect:METHod FTRANS
REVERSE	[SENSe[1...4]:]CORRection:COLLect:METHod RTRANS
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
REFL NORM	--(ZVR, ZVRE, ZVC, ZVCE)
BOTH PORTS	[SENSe[1...4]:]CORRection:COLLect:METHod REFL12
PORT 1	[SENSe[1...4]:]CORRection:COLLect:METHod REFL1
PORT 2	[SENSe[1...4]:]CORRection:COLLect:METHod REFL2
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
OPEN PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
TRANS AND REFL NORM	(ZVR, ZVRE, ZVC, ZVCE)
TWO PORT NORM	[SENSe[1...4]:]CORRection:COLLect:METHod TPORT
TRANS FWD REFL P1	[SENSe[1...4]:]CORRection:COLLect:METHod FTREF1
TRANS REV REFL P2	[SENSe[1...4]:]CORRection:COLLect:METHod RTREF2
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
OPEN PORT 2	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN2
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE

TRANS NORM	[SENSe[1...4]:]CORRection:COLLect:METHod FTRans (ZVRL)
FORWARD	[SENSe[1...4]:]CORRection:COLLect:METHod FOPTport
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
REFL NORM	[SENSe[1...4]:]CORRection:COLLect:METHod REFL1 (ZVRL)
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
TRANS AND REFL NORM	[SENSe[1...4]:]CORRection:COLLect:METHod FTREF1 (ZVRL)
OPEN PORT 1	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] OPEN1
THROUGH	[SENSe[1...4]:]CORRection:COLLect[:ACQuire] THRough
APPLY CAL	[SENSe[1...4]:]CORRection:COLLect:SAVE
UNCAL	[SENSe[1...4]:]CORRection:STATe ON | OFF
CAL INTERPOL	[SENSe[1...4]:]CORRection:INTerpolate[:STATe] ON | OFF
CAL KITS	--
SELECT KIT	[SENSe[1...4]:]CORRection:CKIT N50 | N75 | SMA | PC7 | PC35
N 50 Ω	[SENSe[1...4]:]CORRection:CKIT N50
N 75 Ω	[SENSe[1...4]:]CORRection:CKIT N75
PC 7	[SENSe[1...4]:]CORRection:CKIT PC7
SMA	[SENSe[1...4]:]CORRection:CKIT SMA
PC 3.5	[SENSe[1...4]:]CORRection:CKIT PC35
MODIFY STANDARD	[SENSe[1...4]:]CORRection:CKIT:N50|N75 MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPEn | FOPEn | MSHort | FSHort | MREFlect | FREFlect | MMATch | FMATch | MSMatch | FSMatch[,<string>]
POWER UNCAL	[SENSe[1...4]:]CORRection:POWer[:STATe] ON | OFF

START NEW POWER CAL	--
CAL a1 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:A1 <numeric_value>
CAL a2 POWER	SOURce:POWer[:LEVel][:IMMediate]:CAMPlitude:A2 <numeric_value>
CAL b1 POWER	[SENSe[1...4]:]CORRection:POWer:ACQuire B1
CAL b2 POWER	[SENSe[1...4]:]CORRection:POWer:ACQuire B2
POWER MTR CONFIG	SYSTem:COMMunicate:RDEVice:PMETer:TYPe <string> SYSTem:COMMunicate:GPIB:RDEVice:PMETer:ADDRess <numeric_value> SYSTem:COMMunicate:RDEVice:PMETer:AZERo:STATe ON | OFF
SENSOR CAL FACTOR	--
USE SENSOR A/B	SYSTem:COMMunicate:RDEVice:PMETer:CFACtor[:SELect] ASENsor | BSENsor
NUMBER OF READINGS	SOURCe[1...4]:POWer:CORRection:NREadings <numeric_value>
TAKE CAL SWEEP	SOURCe[1...4]:POWer:CORRection[:ACQuire] A1 | A2 | ESRC1 | ESRC2
USE POWER LOSS LIST	SOURCe[1...4]:POWer:CORRection:LLISt:STATe ON | OFF
EDIT POWER LOSS LIST	SOURCe[1...4]:POWer:CORRection:LLISt <numeric_value>, <numeric_value>, ...
INS NEW POINT	SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:ASENsor <numeric_value>, <numeric_value>, ... SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:BSENsor <numeric_value>, <numeric_value>, ...
OFFSET	--
MAGNITUDE	[SENSe[1...4]:]CORRection:OFFSet[1|2]:MAGNitude <numeric value>
PHASE	[SENSe[1...4]:]CORRection:OFFSet[1|2:PHASe <numeric value>
DELAY TIME	[SENSe[1...4]:]CORRection:EDELay[1|2][:TIME] <numeric value>
ELECTRICAL LENGTH	[SENSe[1...4]:]CORRection:EDELay[1|2]:ELENgth <numeric value>
MECHANICAL LENGTH	[SENSe[1...4]:]CORRection:EDELay[1|2]:DISTance <numeric value>
SET DIELECTRIC	[SENSe[1...4]:]CORRection:EDELay[1|2]: DIELectric <numeric value>
AUTO LENGTH	[SENSe[1...4]:]CORRection:EDELay[1|2]:AUTO ONCE

4 Maintenance and Troubleshooting

4.1 Maintenance

4.1.1 Mechanical Maintenance

The network analyzer does not require any mechanical maintenance. The front panel should be cleaned occasionally using a soft humid cloth.

4.1.2 Electrical Maintenance

4.1.2.1 Testing the Generator Level

It is recommended to check the accuracy according to section 5 every two years. If tolerances are exceeded, new recording of the detector characteristics or the level correction data is required (see Service Manual).

4.1.2.2 Testing the Receiver Accuracy

It is recommended to check the accuracy according to section 5 every two years. If tolerances are exceeded, new recording of the correction data is required (see Service Manual).

4.1.2.3 Testing the Frequency Accuracy

The accuracy of the reference oscillator is to be checked at least every two years according to section 5 (or even earlier depending on the requirements placed on the frequency accuracy of the instrument). If the instrument is permanently operated from an external reference, this test may be omitted.

Test equipment:	Frequency counter, accuracy $1*10^{-9}$
Test setup:	➢ Connect frequency counter to the connector REF OUT at the rear of the instrument.
Setting at the network analyzer:	SETUP FREQUENCY REF INT

4.1.2.4 Verifying the Measuring Accuracy

It is recommended to check the system accuracy of the instrument according to section 5 every 12 months using a Verification Kit.

4.2 Monitoring the Function

4.2.1 Switch-on Test

After the instrument has been switched on, a self test of the processor functions is performed first. This is followed by initialization of the transputer network, which then controls the analog modules.

4.2.2 Monitoring the Synthesizers and the Level Control

Note: *The current firmware version doesn't contain the error messages described below. If errors occur in the syntesizers or in the level control, default values are set instead of the respective measured values.*

The network analyzer contains a monitoring circuit of the respective phase-locked loop for each synthesizer and for the reference oscillator. Likewise, the phase-locked loop is monitored. Both the static status and the dynamic response are monitored. If an error occurs, a message is output on the screen.

Table 4-1 Possible error messages

Message	**Meaning**	**see section**
REF UNLOCK	50-MHz reference oscillator not synchronized	4.2.3, Synthesizer Error Messages
SO UNLOCK	Source oscillator not synchronized	4.2.3, Synthesizer Error Messages
LO1 UNLOCK	First LO oscillator not synchronized	4.2.3, Synthesizer Error Messages
LO2 UNLOCK	Second LO oscillator not synchronized	4.2.3, Synthesizer Error Messages
AUX UNLOCK	Auxiliary oscillator not synchronized	4.2.3, Synthesizer Error Messages
LEVCTRL UNLOCK	Generator level control not locked in	4.2.3, Synthesizer Error Messages
a1b1a2b2 OVLD	Input signal in channel R1 (a1) and/or channel A (b1) and/or channel R2 (a2, ZVR only and/or channel B (b2) too large	4.2.5, Overload Displays

4.2.3 Synthesizer Error Messages

All phase-locked loops are monitored during operation in order to determine whether the tuning voltages of the oscillators are within the permissible tolerance after a defined settling time (ready signals).

4.2.4 Error Message of Level Control

A check is made to determine whether the level control voltage lies within a permissible tolerance after a defined period of time (level ready signal).

4.2.5 Overload Displays

A comparator is used on Converter A or Converter B, respectively, to determine whether the maximum permissible test voltage is exceeded. A respective message is output either at the end of a sweep or, with a sweep time > 5 s, immediately after the overload has occurred.

4.3 Function Description of the Complete Instrument

The members of the ZVR/ZVC families are vector network analyzers with three measurement channels (ZVRE, ZVRL, ZVCE) or four measurement channels (ZVR, ZVC).

- A **Test Set** with SWR bridges, power splitters, RF switches and level detectors makes for separation of the test signal, feeding-in and switchover of the generator signal and measurement of the generator level.
- Generation of the test signal is accomplished in three modules, i.e. **Synthesizer, Source** and **Output Stage**.
- Signal processing is performed by several RF, IF and **evaluation modules,** a **Measurement Control Unit**, which carries out both signal evaluation and control of generator, reception and evaluation unit, and a **processor unit**, consisting of a 586 PC, I/O board with interfaces and a graphics card.

The instruments can be upgraded to meet future requirements by retrofitting options in the analog, digital and software area.

4.3.1 Description of the Analog Modules

4.3.1.1 Test Set

The test set mainly consists of an electronic switch, two SWR bridges or couplers (ZVC, ZVCE) with integrated signal attenuator and level detector as well as the test set interface which permits control of the test set by means of the MCU (Measurement Control Unit).

Signal path

The amplified RF signal coming from the output stage is taken via the electronic switch and, depending on the measurement mode (switch position), via one of the two power splitters into the associated SWR bridge (coupler) and thus to the input or output of the DUT connected to the network analyzer. The second path of the respective power splitter feeds the associated reference channel.

The SWR bridges (couplers) separate the signal reflected by the DUT from the signal fed into the DUT (reflection measurement) or transmit the signal coming out of the DUT (transmission measurement) to one of the reception channels.

Extensions/ options

- Up to four independent attenuators can be integrated in the test set. They permit to attenuate both the RF signals fed to the DUT (i.e. test ports port1 or port2) and those transmitted from the DUT in steps of 10 dB up to max. 70 dB.
- The option External Measurements enables additional test applications that avoid the internal SWR bridges (couplers).
- The option Reference Mixer Ports permits to route the RF reference signal for port1 via an RF relay and an externally connected reference mixer to the front end in the case of frequency-converting measurements. This allows for phase and group delay measurements during frequency conversion.

Instrument versions

The function of the test sets of models ZVRE, ZVRE and ZVRL mainly corresponds to that of the test set described above. A main difference is the lower number of reception channels: Whereas the ZVR and ZVC are equipped with four channels, the ZVRE, ZVCE and ZVRL feature only three channels. Like the ZVR and ZVC, the ZVRE and ZVCE are bidirectional network analyzers, the test sets of which contain two SWR bridges (couplers) and an RF switch. Thus, all four S-parameters of a DUT can be measured in both directions.

The ZVRL, on the other hand, is a unidirectional network analyzer with only one SWR bridge without RF switch. Therefore, the ZVRL only permits measurement of the forward S-parameters (S11 and S21). In order to determine the reverse S-parameters (S22 and S12) as well, it is necessary to turn round the DUT when using the ZVRL.

4.3.1.2 Front End

The front end of the ZVR and ZVC consists of four identical reception channels (two measurement channels and two reference channels), that of models ZVRE, ZVRL and ZVCE features only three channels (two measurement channels and one reference channel). The models of the ZVR(x) family cover an input frequency range from 10 Hz to 4 GHz, whereas ZVC and ZVCE cover the frequency range from 20 kHz to 8 GHz.

Every channel contains:

- Buffer amplifier for de-coupling the input from the 1st mixer,
- LO driver amplifier,
- Mixer converting the input signal to the 1st IF of 21.0244 MHz (for the ZVR(x) models, operating mode mixer for frequencies >20 kHz, signals below 20 kHz are taken via a diplexer directly to the IF path without being converted, see section "Converter" below),
- Booster amplifier and bandpass filter,
- 2nd mixer converting to 24.4 kHz (exactly: 25 MHz / 1024).

4.3.1.3 Converter

The converter module filters the signal coming from the front end (24.414 kHz in the frequency range 20 kHz to 8 GHz, 10 Hz to 20 kHz in the frequency range < 20 kHz for the ZVR(x) models), automatically selects the optimal gain for the test level (except for FAST MODE) and converts the analog test signals into digital data which are then passed further to the Measurement Control Unit. Two different converter versions are used, i.e. one with two measurement channels and one with only one measurement channel. The four-channel analyzer ZVR uses two two-channel converters, the three-channel analyzers ZVRE and ZVRL each use a two-channel and a one-channel converter.

4.3.1.4 Synthesizer

The synthesizer module contains three independent synthesizers providing the basic signal for generation of the local1 signal (Local module) and of the generator signal (Source module). The local synthesizer uses the frequency range from 1 GHz to 2.015 GHz, the source synthesizer 0.989 GHz to 2 GHz and the auxiliary synthesizer, which is used for frequency conversion in the Source module for frequency ranges below 1 GHz, operates at 1.00 GHz and 1.01 GHz.

4.3.1.5 Local

The Local module provides the LO signals for the two mixers in the front end channels (LO1 signal for the 1st mixer, LO2 signal for the 2nd mixer). In addition, it contains the reference frequency source from which it generates the reference signal for the synthesizers (Synthesizer modules) and the signal for generation of the sampling signals in the converter modules.

- The LO1 signal is derived from the local synthesizer signal by frequency doubling, direct use and frequency division.
- The LO2 signal is generated from a synthesizer from 200 MHz to 210 MHz and by means of frequency division by 10.

4.3.1.6 Source

The source module delivers the generator signal (frequency range 10 Hz to 4 GHz). This signal is amplified in the output stage and applied to the DUT. The source synthesizer signal (0.989 GHz to 2 GHz) is processed by means of frequency doubling, direct use, mixing and frequency division. For frequencies below 2 MHz, the generator level control is performed in the source module (for the frequency range >2 MHz, in the output stage module with level detector in the SWR bridges).

4.3.1.7 Output Stage

The output stage amplifies the signals RFLOW (10 Hz to 10 MHz) and RFHIGH (10 MHz and 4 GHz) coming from the source module to the given nominal output level. For this purpose, it comprises an amplifier and a level control, for the ZVC-models in addition a frequency doubler. The associated level detectors are accommodated on the source module (frequency range 10 Hz to 2 MHz) or in the SWR bridges in the test set (frequency range >2 MHz). For the range 10 Hz to 150 MHz, the control element is also to be found on the source module, for the range > 150 MHz, it is located on the high-band amplifier of the output stage.

4.3.2 Modules of the Digital Unit

The digital unit consists of the following modules:

- Main processor
- Graphics board
- I/O board (contains the interface drivers such as IEC bus, LPT and COM)
- Hard disk
- Floppy disk
- LC display
- Keyboard
- VGA card (option controller function)
- 2nd IEC bus (option for option controller function)
- LAN interface (option)

4.3.3 Processor Structure

In addition to a 586 CPU, the network analyzer also comprises three 32-bit transputers T805 and one 16-bit transputer T225. Two DSPs are provided for digital signal processing.

The 586 CPU handles the complete data exchange with the peripheral devices, such as e.g. keyboard entry, display of the softkeys and operation via IEC bus. Irrespective of this, the transputers control the measurement run, consider correction factors and represent the trace on the display. For this purpose, the transputers receive the current instrument settings from the 586 CPU via a link adapter, which constitutes the connection between the ISA bus of the CPU board and a transputer link of the T805 on the graphics board (in the following referred to as GTP = graphics transputer). The T225 on the graphics and the two T805 on the Measurement Control Unit (MCU) are coupled to the GTP via further transputer links. The T225 exclusively serves as interface between the GTP and the chip set for the graphics.

4.3.3.1 Measurement Control Unit

The Measurement Control Unit (MCU) performs the following tasks:

Control of the analog modules:

- Via the IBUS (serial bus), the settings of the ZVR that are not critical with respect to time are made by the setting transputer and the self test signals on the modules are selected.
- The FRNBUS is a parallel setting bus for the synthesizer module.
- The GSC(Global Sequence Control) performs the time-critical settings in the network analyzer.

Processing of the measured values:

- The stream of measured data coming from the converters is preprocessed by two DSPs (digital filtering and digital mixer).
- The measurement transputer is intended for further processing, in particular for system error correction.

Recording of selftest signals:

- The selftest signals selected via multiplexer are converted by an A/D converter.

4.4 Self test

The current firmware version does not support an automatic self test yet.

However, the necessary hardware facilities are provided and can be used for troubleshooting with the aid of service functions (see Service Manual).

Each synthesizer and signal module contains one or two 1-out-of-8 analog multiplexer which selects up to 16 test voltages via buffer amplifier and applies them to the common test channel. In order to locate an error, various functions can be monitored:

- Internally generated supply voltages,
- operating points of amplifiers,
- tuning voltages of oscillators,
- signal level,
- signal level with the aid of level detectors.

The test channel is selected via the serial module control. An extra A/D converter on the MCU module enables display of the test signals even during normal measurement mode.

5 Testing the Rated Specifications

5.1 Measuring Instruments and Accessories (R&S ZVR, R&S ZVRE, R&S ZVRL)

Item	Type of Instrument	Required Specifications	Appropriate Device	R&S Order No.	Use
1	Modulation analyzer	1 MHz to 4 GHz	R&S FMB Opt. R&S FMA-B8 Opt.R&S FMA-B10	856.5005.52 855.9007.55 856.3502.52	5.2.1.1 5.2.1.4 5.2.1.5
2	Power meter	10 Hz to 4 GHz	R&S NRVD with power sensor R&S NRV-Z51	857.8008.02 828.3818.02	5.2.1.6 5.2.1.7
3	Attenuator	DC to 4 GHz	R&S RSG	1009.4505.02	5.2.1.2 5.2.1.3 5.2.2.2
4	Matching pad 50/75 Ω (2 pieces)		R&S RAM	358.5424.02	Test Set 75 Ω
5	Calibration kit		R&S ZV-Z21 (50 Ω) R&S ZV-Z22 (75Ω)	1085.7099.02 1085.7182.02	5.2.1.8 5.2.2.4 5.2.3.1 5.2.3.2 5.2.3.4
6	Pair of test port cables		R&S ZV-Z11 (50 Ω) R&S ZV-Z12 (75 Ω)	1085.6505.02 1085.6570.02	

5.2 Test Sequence (R&S ZVR, R&S ZVRE, R&S ZVRL)

The rated specifications of the network analyzer are checked after a warm-up time of at least 30 minutes. This makes sure that the guaranteed data are observed.

The values given in the following sections are not guaranteed, only the technical data of the data sheet are binding.

5.2.1 Testing the Generator Specifications

5.2.1.1 Frequency Accuracy

Test equipment: FMB with option FMA-B10, matching pad RAM for 75 Ω test set

Test setup:

- Connect FMB (operating mode COUNTER) to PORT1 of the network analyzer (RAM to FMB for 75 Ω).

Settings at the network analyzer:

PRESET	
CENTER	Test frequency
SWEEP	SINGLE POINT
SWEEP TIME	500 s
SOURCE POWER	Maximum level
MEAS	INPUT a1

Measurement:

- Set test frequencies according to test report.

Deviation:	Frequency value displayed on the FMB minus setting value.
Permissible deviation	< 2ppm + 1ppm*time/year

5.2.1.2 Harmonics Suppression

Test equipment: Test cable, option R&S ZVR-B4, attenuator RSG, 2 matching pads RAM for 75 Ω test set

Test setup:

- Connect RSG via test cable between PORT1 and PORT2 (for 75 Ω 1 RAM at the input and output of the attenuator, respectively).

Settings at the RSG: 30 dB (20 dB for 75 Ω)

Settings at the network analyzer:

PRESET	
MODE	FREQUENCY CONVERSION, SECOND HARMONIC, THIRD HARMONIC
MARKER	Test frequency
SOURCE POWER	50 Ω: 0 dBm and -10 dBm (+13 dBm and +3 dBm with Opt. B10) 75 Ω: -6 dBm and -10 dBm (+7 dBm and -3 dBm with Opt. B10)
MEAS	INPUT b2, DRIVE PORT 1

Calibration: Power Cal

Measurement
- Set test frequencies according to test report.
- Measure at twice and three times the test frequency and calculate the difference from the measured value at the test frequency, report the worse of the two values.

Test frequency range	Harmonics suppression at 0 dBm	-10 dBm
(10Hz)9kHz to 40kHz	----------	-35dBc
40kHz to 70MHz	-22dBc	-35dBc
70MHz to 400MHz	-25dBc	-35dBc
400MHz to 600MHz	-30dBc	-35dBc
600MHz to 4000MHz	-30dBc	-40dBc

With option R&S ZVR-B10:

	+13 dBm	+3 dBm
(10Hz)9kHz to 40kHz	---------	-30dBc
40kHz to 10MHz	-22dBc	-30dBc
10MHz to to 70MHz	-22dBc	-35dBc
70MHz to 2000MHz	-25dBc	-35dBc
2000MHz to 4000MHz	-20dBc	-35dBc

When the ZVx is used, the 2nd harmonic can be measured only up to 1330 MHz fundamental and the 1st harmonic only up to 2000 MHz fundamental. Due to the large gain drop of the output stage above 4 GHz, no measurement is required above these frequencies.

5.2.1.3 Spurious Suppression

Test equipment: Test cable, option R&S ZVR-B4, attenuator RSG, 2 matching pads RAM for 75 Ω test set.

Test setup:
- Connect RSG via test cable between PORT1 and PORT2 of the network analyzer (for 75 Ω 1 RAM at the input and output of the attenuator, respectively).

Setting RSG: 30 dB

Settings at the network analyzer:

SWEEP	SINGLE POINT
MODE	FREQUENCY CONVERSION, ARBITRARY
CENTER	Test frequency = INT SRC
	REC = spurious wave, see measurement
SOURCE POWER	Maximum level
MEAS	INPUT b2, DRIVE PORT 1

Reference measurement:
- Record measured values at the test frequencies.

Measurement:

- Set test frequencies according to test report.

Mixer range up to 750 MHz:	LO=RF+fo (fo = test frequency)
For fo < 50 MHz	RF = 63.125 MHz
fo = 50 MHz to < 150 MHz	RF = 252.5 MHz
fo = 150 MHz to 750 MHz	RF = 1010 MHz

- Perform measurements for f = 2∗RF - LO and f = 3∗RF - 2∗LO.

Permissible spurious suppression < – 40 dBc

Doubled range > 2000 MHz to 4000 MHz:

- Perform measurements for f = fo/2 and f = 3fo/2

Permissible spurious suppression < -40 dBc

5.2.1.4 Phase Noise

Test equipment: Modulation Meter FMB with Option FMA-B8, matching pad RAM for 75 Ω test set

Test setup:

- Connect modulation meter (operating mode DEMOD PM PHASENOISE 10 kHz) to PORT1 of the network analyzer (RAM to FMB for 75 Ω).

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	Maximum level
SWEEP TIME	200 s
MEAS	INPUT a1

Measurement

- Set test frequencies according to test report, read the phase noise value on the modulation meter.

Permissible phase noise values:

9 kHz to 10 MHz	< -110 dBc
10 MHz to 150 MHz	< -100 dBc
150 MHz to 1 GHz	< -90 dBc
1 GHz to 4 GHz	< -90 dBc + 20∗log(f / GHz)
	(< -78 dBc at 4 GHz)

5.2.1.5 Residual FM

Test equipment: Modulation meter FMB, matching pad RAM for 75 Ω test set

Test setup:

- Connect modulation meter (operating mode DEMOD FM DET RMS 10 Hz to 3 kHz) to PORT1 of the network analyzer (RAM to FMB for 75 Ω).

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	Maximum level
SWEEP TIME	200s
MEAS	INPUT a1

Measurement

- Set test frequencies according to test report, read the residual FM values on the modulation meter.

Permissible residual FM:

9 kHz to 10 MHz	<1 Hz
10 MHz to 150 MHz	<2 Hz
150 MHz to 1 GHz	<5 Hz
1 GHz to 2 GHz	<10 Hz
2 GHz to 4 GHz	<20 Hz

5.2.1.6 Level Accuracy

Test equipment: Power meter NRVD with power sensor NRV-Z51 (50 Ω) or NRV-Z51 with matching pad RAM (75 Ω).

Test setup 50 Ω:

- Connect power sensor to PORT1, PORT2 (only R&S ZVR and R&S ZVRE) or OUTPUTa1 (only with option R&S ZVR-B25, Ext. Measurements) of the network analyzer.

Test setup 75 Ω:

- Connect power sensor with RAM to PORT1 or PORT2 (only R&S ZVR and R&S ZVRE) of the network analyzer, Option R&S ZVR-B25, External Measurements, as with 50 Ω.

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	-10 dBm on PORT 1 and PORT 2 +3 dBm with option R&S ZVR-B10 on PORT 1
SWEEP TIME	200 s
MEAS	INPUT a1 (PORT1), INPUT a2 (PORT2)

Reference measurement:

			with Opt. B10
CENTER 100MHz	Port 1:	-10 dBm ±0,5 dB	3 dBm ±0,5 dB
	Port 2:	-10 dBm ±0,5 dB	-10dBm±0,5dB
	OUTPUT a1:	-10 dBm ±0,5 dB	3 dBm ±0,5 dB

➢ Read the level on power meter.

Measurement:

➢ Set test frequencies according to test report, read the level on power meter.
➢ Calculate the difference between the measured level and the reference level.

With 75 Ω, 5,75 dB must be added to the display of the power meter (since the measurement is made with the 50 Ω power sensor).

Frequency	Attenuation
9 kHz	5,75 dB
1 GHz	5,75 dB
3 GHz	5,8 dB
4 GHz	5,85 dB

Permissible deviations at PORT1/PORT2 at -10 dBm (+3 dBm with Opt. R&S ZVR-B10):

20 kHz to 2 MHz	-1/+1 dB
2 MHz to 4 GHz	-0.5/+0.5 dB

Measurement R&S ZVR-B25:

Permissible deviations at output a1 at -10 dBm (+3 dBm with Opt. R&S ZVR-B10):

10 Hz to 2 MHz	-1/+1 dB
2 MHz to 4 GHz	-0.5/+0.5 dB

5.2.1.7 Level Linearity

Test equipment: Power meter NRVD with power sensor NRV-Z51 (50 Ω) or NRV-Z51 with matching pad RAM (75 Ω).

Test setup 50 Ω: ➢ Connect power sensor to PORT1 of the network analyzer.

Test setup 75 Ω: ➢ Connect power sensor with RAM to PORT1 of the network analyzer.

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	Maximum value to minimum value
SWEEP TIME	200 s
MEAS	INPUT a1 (R&S ZVR, R&S ZVRE, R&S ZVRL) INPUT a2 (R&S ZVR)

Measurement:

- Set test frequencies and levels according to test report, read the level on the power meter.

Permissible deviations referred to the value at -10 dBm (+3 dBm at PORT 1 with Opt. R&S ZVR-B10):

f = 40 kHz to 4 GHz

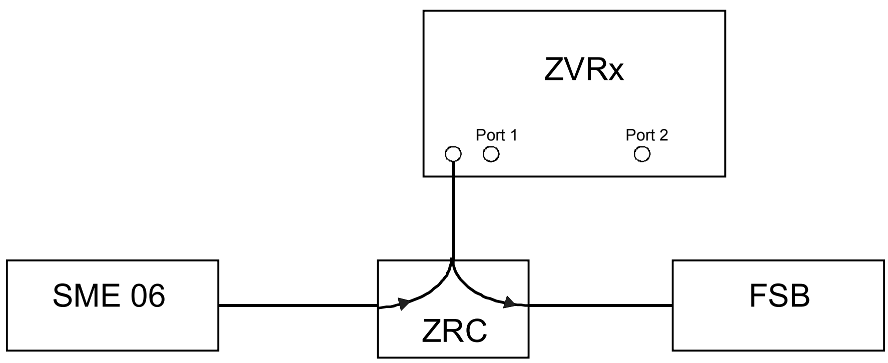
+10 to –5 dB	< 0.4 dB
–5 dB to –15 dB	< 0.6 dB

5.2.1.7.1 Matching to Output a1

(Only with option R&S ZVR-B25, External Measurements)

Test equipment: Signal generator SME 06, Spectrum Analyzer FSB, VSWR–bridge ZRC

Test setup:



Settings at the network analyzer:

SWEEP	SINGLE POINT
CENTER	Test frequency + Δf
SWEEP TIME	500 s
SOURCE POWER	–10 dB
MODE	EXTERNAL

Reference measurement:

- Use FSB to record measured values with open circuit and short circuit at the test port of the SWR bridge and take the average.

Measurement:

Test frequency (FSB):	Δf:	Return loss:
400 kHz[1)] to 4000 MHz	– 100 kHz	> 8 dB

Alternative Measurement for R&S ZVR (firmware version 1.50 and higher)**:**

Test equipment:	Test cable ZV-Z11, Calibration kit ZV-Z21, for 75 Ω test set: Calibration kit ZCAN-75 and matching pad RAM
Test setup:	Connect test cable between PORT2 and Output a1 (for 75Ω: screw 75 Ω through male, RAM and 50 Ω through female to PORT2)

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	S22
SERVICE FUNCTION	2.13.1.1.2 (reset after the measurement according to 2.13.0)
MARKER	Test frequency

Calibration:
- ➢ Perform one-port calibration at the end of the test cable (towards output-a1).

Measurement:

R&S ZVR, R&S ZVRE, R&S ZVRL

Test frequency [1]:	Return loss:
400 kHz to 4 GHz	> 8 dB

1) Measurement below 300 kHz not required because the matching value is uniquely determined by the design at low frequencies. A possible fault is recognized when the level accuracy is measured.

5.2.2 Testing the Receiver Specifications

5.2.2.1 Absolute Accuracy

Test equipment: Test cable ZV-Z11 (50 Ω) or ZV-Z12 (75 Ω)

Calibration:
- ➢ Perform POWER CAL a1, a2

Test setup:
- ➢ Connect PORT1 to PORT2 or Output a1 to Input b1 or Input b2 via the test cable.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	INPUT a1, INPUT a2
MARKER	MARKER CONT
MARKER	Test frequency
CAL	POWER UNCAL off
MEAS	INPUT b1, DRIVE PORT2
	INPUT b2, DRIVE PORT1
MODE EXTERNAL	INPUT b1
	INPUT b2
MARKER	Marker frequency = test frequency

Measurement:
- Set test frequencies according to test report.
- Read out marker value on the ZVx

Permissible deviation from the applied nominal level (–10 dBm) at PORT1 or PORT2, respectively:

Passive test set: **Active test set:**

Frequency range	R&S ZVR/E/L 50/75Ω	Frequency range	R&S ZVR/E/L 50/75Ω
9 kHz to 100 kHz	+2 dB –2 dB	300 kHz to 1 MHz	+2 dB –2 dB
100 kHz to 4 GHz	+1 dB –1 dB	1 MHz to 4 GHz	+1 dB –1 dB

Measurement R&S ZVR-B25: Permissible deviation from the applied nominal level (–10 dBm) at Input b1 or Input b2:

10Hz to 100 kHz	+1 dB/ -1 dB
100 kHz to 100 MHz	+1 dB/ -1 dB
100 MHz to 4 GHz	+1 dB/ -1 dB

5.2.2.2 Linearity

Test equipment: Attenuator RSG (alternatively one 10 dB plus two 20 dB attenuation pads), 2 matching pads RAM for 75-Ω test set.

Test setup: Connect RSG between PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
CAL	POWER UNCAL off
MODE	SWEEP MODE : POWER SWEEP
SWEEP	NUMBER OF POINTS = 51
SOURCE	Test frequency
START	-25 dBm
STOP	Max
SWEEP TIME	Auto
IF BANDWIDTH	10 Hz
MEAS	S12 (Lin. PORT1), S21 (Lin. PORT2)
FORMAT	MAGNITUDE,PHASE
MARKER	MARKER CONT
MARKER1	= -10 dBm
DELTA MARKER	REF MARKER1
MARKER2	Test level

Reference measurement:
- Set RSG to 20 dB (for 75 Ω to 10 dB), set test frequencies and levels according to the performance test report and record measurement results.

Measurement:
- ➢ Set test frequencies and levels according to test report, report measurement results and subtract the reference values.

	Deviation from reference value (-10 dBm):	Permissible deviation:
20 kHz to 200 kHz	+10 dB to +3 dB	<1 dB
	+ 3 dB .to -15 dB	<0.2 dB
≥ 200 kHz	+10 dB to +3 dB	<1 dB
	+ 3 dB to -5 dB	<0.2 dB
	- 5 dB to -60 dB	<0.05 dB

5.2.2.3 Noise Level

Test equipment: Test cable ZV-Z11 (ZV-Z12 for 75 Ω test set) MATCH from calibration kit ZV-Z21 (ZCAN for 75 Ω test set).

Calibration:
- ➢ Connect PORT1 to PORT2 via test cable.
- ➢ MEAS : INPUT b1, INPUT b2
- ➢ TRACE : DATA TO MEMORY : SHOW MATH

Test setup:
- ➢ MATCH at PORT1 or PORT2.

Settings at the network analyzer:

PRESET	
SOURCE POWER	-25 dBm
MEAS	INPUT b1, INPUT b2
AVG	SWEEP AVG 10
MARKER	MARKER CONT
MARKER	Marker frequency = test frequency

Measurement:
- ➢ Set test frequencies according to test report.
- ➢ Read marker value on the network analyzer taking the SOURCE POWER into account (–10 dB for 50 Ω test set, –4 dB for 75 Ω test set).

Permissible noise values:

	Test set 50 Ω, passive	Test set 75 Ω, passive
9 kHz to 200 kHz	≤ -65 dBm	≤ -50 dBm
200 kHz to 20 MHz	≤ -85 dBm	≤ -70 dBm
20 MHz to 3 GHz	≤ -95 dBm	≤ -80 dBm
3 GHz to 4 GHz	≤ -85 dBm	≤ -80 dBm

	Test set 50 Ω, active	Test set 75 Ω, active
300 kHz to 1 MHz	≤ -82 dBm	≤ -70 dBm
1 MHz to 20 MHz	≤ -85 dBm	≤ -80 dBm
20 MHz to 3 GHz	≤ -95 dBm	≤ -75 dBm
3 GHz to 4 GHz	≤ -85 dBm	≤ -75 dBm

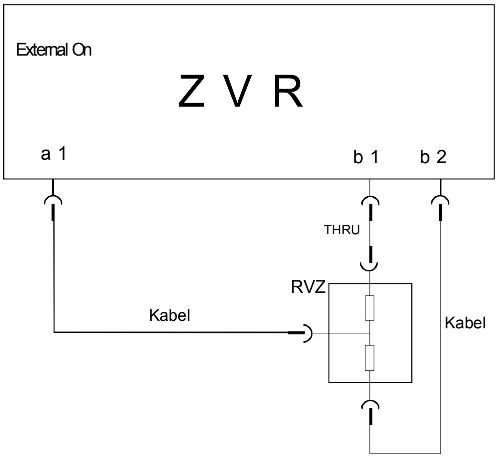
5.2.2.4 Matching Input b1 and Input b2

(Only with Option External Measurements R&S ZVR-B25)

Test equipment, test set 50 Ω: Power Splitter RVZ, Calibration Kit ZV-Z21, Test Port Cable pair ZV-Z11

Test equipment, test set 75 Ω: Power Splitter RVZ, Calibration Kit ZV-Z22, Test Port Cable pair ZV-Z12, 2 N-adapters 50/75 Ω

Test setup:



Block diagram for measuring the matching of input b1. For measurement of input b2, the connections from RVZ to Input b1/b2 are reversed.

Settings at the network analyzer:

PRESET	
MODE	EXTERNAL
START	10 Hz
SWEEP	LOG SWEEP
MARKER	test frequency
MEAS	S11/S22

Reference measurement: One-port calibration including THRU over the complete frequency range (for measurement at b1 and b2 an extra calibration each).

Measurement:

- Set test frequencies according to test report, measure b1 and b2.
- Record return loss values.

Return loss: > 8 dB

Alternative Measurement (firmware version 1.50 and higher):

Test equipment, test set 50 Ω:	Calibration kit ZV-Z21, pair of test cables ZV-Z11.
Test equipment, test set 75 Ω:	Calibration kit ZV-Z21, pair of test cables ZV-Z11, matching pad RAM, calibration kit ZCAN-75.
Test setup:	Connect test cable between PORT2 and Input b1 or between PORT1 and Input b2 (for 75 Ω: screw 75 Ω through male, RAM and 50 Ω through female to PORT2 or PORT1)

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MARKER	Test frequency
MEAS	S22 for measurement Input b1 S11 for measurement Input b2
SERVICE FUNCTION	2.13.1.2.2 for measurement Input b1 (reset: 2.13.0) 2.13.1.4.2 for measurement Input b2 (reset: 2.13.0)

Calibration:

- Perform one-port calibration at the end of the test cable (towards Input b1 or Input b2).

Measurement:

- Set test frequencies according to test report, measure b1 and b2.
- Take return loss values.

Test frequency [1)]:	Return loss:
300 kHz to 4 GHz	> 8 dB

1) Measurement below 300 kHz not required because the matching value is uniquely determined by the design at low frequencies. A possible fault is recognized when the level accuracy is measured.

5.2.3 Testing the Test Set Specifications

5.2.3.1 Matching to PORT1 and PORT2

- **R&S ZVR, R&S ZVRE**

Test equipment test set 50 Ω: Calibration Kit ZV-Z21, Test Port Cable pair ZV-Z11

Test equipment test set 75 Ω: Calibration Kit ZV-Z22, Test Port Cable pair ZV-Z12

Test setup: Test cable between PORT1 and PORT2.

Settings at the R&S ZVR or R&S ZVRE, respectively:

PRESET	
MEAS	S22 for matching PORT1 S11 for matching PORT2
MARKER	test frequency

Reference measurement: Perform one-port calibration at the end of the cable over the complete frequency range (measurement PORT1: loosen cable from PORT1 and calibrate; measurement PORT2: loosen cable from PORT2 and calibrate).

Measurement:

- Set marker to test frequencies according to test report.
- Record return loss values.

Passive test set:

Test frequency:	Return loss 50Ω:	75Ω:
40 kHz to 100 kHz	> 10 dB	> 6 dB
100 kHz to 100 MHz	> 16 dB	> 12 dB
100 MHz to 3000 MHz	> 18 dB	> 18 dB
3000 MHz to 4000 MHz	> 16 dB	> 15 dB

Active test set:

Test frequency:	Return loss 50Ω:	75Ω:
300 kHz to 1 MHz	> 6 dB	> 4 dB
1 MHz to 100 MHz	> 16 dB	> 12 dB
100 MHz to 3000 MHz	> 18 dB	> 18 dB
3000 MHz to 4000 MHz	> 16 dB	> 10 dB

- **R&S ZVRL**

Measurement PORT2: As with R&S ZVR and R&S ZVRE

Measurement PORT1 With further network analyzer ZVx as with R&S ZVR and R&S ZVRE.

Measurement:
- Set test frequencies according to test report.
- Record return loss values.

Test frequency:	Return loss PORT1 50 Ω:	PORT1 75 Ω:	PORT2:
40 kHz to 100 kHz	> 10 dB	> 6 dB	> 18 dB
100 kHz to 100 MHz	> 16 dB	>12 dB	> 18 dB
100 MHz to 3000 MHz	> 18 dB	>18 dB	> 18 dB
3000 MHz to 4000 MHz	> 16 dB	>15 dB	> 18 dB

5.2.3.2 Directivity

Test equipment MATCH from calibration kit

Test setup: Connect MATCH at PORT1 or PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	S11 S22 (R&S ZVR, R&S ZVRE only)
MARKER	test frequency

Measurement:

Passive test set:

Test frequency:	**50 Ω** Directivity:	**75 Ω** Directivity:
9 kHz to 40 kHz	≥ 25 dB	≥ 25 dB
40 kHz to 3 GHz	≥ 33 dB	≥ 33 dB
3 GHz to 4 GHz	≥ 29 dB	≥ 20 dB

Active test set:

Test frequency:	Directivity:	Directivity:
300 kHz to 1 MHz	≥ 5 dB	≥ 5 dB
1 MHz to 5 MHz	≥ 15 dB	≥ 15 dB
1 MHz to 3 GHz	≥ 33 dB	≥ 33 dB
3 GHz to 4 GHz	≥ 29 dB	≥ 20 dB

5.2.3.3 Testing the Attenuators

Test equipment: Connecting cable ZV-Z11 (50 Ω) or ZV-Z12 (75 Ω)

Test setup: Connect cable between PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	-20 dBm for ATT xx ≤ 30 dB Maximum level for ATT xx > 30 dB
SOURCE	ATTxx
IF BANDWIDTH	10 Hz
MEAS	S21 for measurement STEP ATT a1 and STEP ATT b2 S12 for measurement STEP ATT a2 and STEP ATT b1
FORMAT	MAGNITUDE
MARKER	Marker frequency = test frequency

Reference measurement:

- Perform reference measurements at the test frequencies and with an attenuation value of 10 dB.

Reference value = marker value

Measurement:

- Set test frequencies according to test report.
- Set ATT xx to 0 dB and SOURCE POWER to –20 dBm. Increase the attenuation in steps of 10 dB up to 30 dB and read out the respective marker value.

Attenuation error = (marker value – reference value)

- Set ATT xx to 30 dB and SOURCE POWER to maximum value. Determine the difference from the measurement with SOURCE POWER –20 dBm.
- Increase the attenuation in steps of 10 dB up to 70 dB and read out the respective marker value.

Attenuation error = (marker value – reference value – difference value)

Permissible deviations:	ATT a1, a2	ATT b1, b2
	< 2 dB	< 2 dB

5.2.3.4 Crosstalk

Test equipment: 2 N-short-circuits (SHORT male and SHORT female with THRU male from calibration kit ZV-Z21 or ZV-Z22)

Test setup: Connect N-short-circuits to PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
SOURCE POWER	Maximum value
IF BANDWIDTH	1 Hz
AVERAGE	POINT AVG 5
MEAS	RATIO b1/b2, DRIVE PORT 2 (crosstalk port 1, R&S ZVR, R&S ZVRE)
	RATIO b2/b1, DRIVE PORT 1 (crosstalk port 2, R&S ZVR, R&S ZVRE, R&S ZVRL)
MARKER	Marker frequency = test frequency

Measurement:

- ➢ Read out marker value on the network analyzer.

Permissible crosstalk values:

	R&S ZVR	R&S ZVRE, R&S ZVRL
Test Set 50Ω		
20 kHz to 200 kHz	≤ –90 dB	≤ –90 dB
200 kHz to 5 MHz	≤ –120 dB	≤ –120 dB
5MHz to 1 GHz	≤ –130 dB	≤ –125 dB
1 GHz to 3 GHz	≤ –120 dB	≤ –115 dB
3 GHz to 4 GHz	≤ –110 dB	≤ –105 dB
Test Set 75Ω		
20 kHz to 200 kHz	≤ –84 dB	≤ –84 dB
200 kHz to 5 MHz	≤ –114 dB	≤ –114 dB
5MHz to 1 GHz	≤ –124 dB	≤ –119 dB
1 GHz to 3 GHz	≤ –114 dB	≤ –109 dB
3 GHz to 4 GHz	≤ –104 dB	≤ –99 dB

	R&S ZVR, R&S ZVRE with Option R&S ZVR-B10
20 kHz to 200 kHz	≤ –75 dB
200 kHz to 5 MHz	≤ –100 dB
5MHz to 1 GHz	≤ –110 dB
1 GHz to 3 GHz	≤ –100 dB
3 GHz to 4 GHz	≤ –90 dB

5.3 Performance Test Report (R&S ZVR, R&S ZVRE, R&S ZVRL)

Table 5-1: Performance Test Report – Generator Specifications

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
1	**Frequency accuracy**					
	500 MHz	5.2.1.1	-0.98	__________	0.98	kHz
	800 MHz		–1.58	__________	1.58	kHz
	1500 MHz		–2.89	__________	2.89	kHz
	2300 MHz		–4.58	__________	4.58	kHz
	3000 MHz		–5.98	__________	5.98	kHz
	3999 MHz		–7.98	__________	7.98	kHz
2	**Harmonics suppression**					
Test set passive	Source Level: Max. value	5.2.1.2				
	40 kHz		22	__________	-	dB
	100 kHz		22	__________	-	dB
Test set active/passive	300 kHz		22	__________	-	dB
	1 MHz		22	__________	-	dB
	5 MHz		22	__________	-	dB
	10 MHz		22	__________	-	dB
	50 MHz		22	__________	-	dB
	100 MHz		25	__________	-	dB
	151 MHz		25	__________	-	dB
	200 MHz		25	__________	-	dB
	400 MHz		30	__________	-	dB
	751 MHz		30	__________	-	dB
	1001 MHz		30	__________	-	dB
	1501 MHz		30	__________	-	dB
	2000 MHz		30	__________		
	Source Level: Max. value –10dB					
Test set passive	10 kHz		35	__________	-	dB
	100 kHz		35	__________	-	dB
Test set active/passive	300 kHz		35	__________	-	dB
	1 MHz		35	__________	-	dB
	5 MHz		35	__________	-	dB
	10 MHz		35	__________	-	dB
	50 MHz		35	__________	-	dB
	100 MHz		35	__________	-	dB
	151 MHz		35	__________	-	dB
	200 MHz		35	__________	-	dB
	400 MHz		35	__________	-	dB
	751 MHz		40	__________	-	dB
	1001 MHz		40	__________	-	dB
	1501 MHz		40	__________	-	dB
	2000 MHz		40	__________	-	dB

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
2	**Harmonics suppression with Opt. R&S ZVR-B10**	5.2.1.2				
	Source Level: Max. value					
Test set passive	40 kHz		22	___________	-	dB
	100 kHz		22	___________	-	dB
Test set active/passive	300 kHz		22	___________	-	dB
	1 MHz		22	___________	-	dB
	5 MHz		22	___________	-	dB
	10 MHz		22	___________	-	dB
	50 MHz		22	___________	-	dB
	100 MHz		25	___________	-	dB
	151 MHz		25	___________	-	dB
	200 MHz		25	___________	-	dB
	400 MHz		25	___________	-	dB
	751 MHz		25	___________	-	dB
	1001 MHz		25	___________	-	dB
	1501 MHz		25	___________	-	dB
	2000 MHz		25	___________	-	dB
	Source Level: Max. value –10dB					
Test set passive	10 kHz		30	___________	-	dB
	100 kHz		30	___________	-	dB
Test set active/passive	300 kHz		30	___________	-	dB
	1 MHz		30	___________	-	dB
	5 MHz		30	___________	-	dB
	10 MHz		35	___________	-	dB
	50 MHz		35	___________	-	dB
	100 MHz		35	___________	-	dB
	151 MHz		35	___________	-	dB
	200 MHz		35	___________	-	dB
	400 MHz		35	___________	-	dB
	751 MHz		35	___________	-	dB
	1001 MHz		35	___________	-	dB
	1501 MHz		35	___________	-	dB
	2000 MHz		35	___________	-	dB

Item No.	Characteristic		Measure according to section	Min. value	Actual value	Max. value	Unit
3	**Spurious suppression**						
R&S ZVRL	ZVx frequ.:	Spurious:	5.2.1.3				
R&S ZVR	10 kHz	63.115 MHz		40	________	-	dB
R&S ZVRE		63.105 MHz		40	________	-	dB
passive test	100 kHz	63.025 MHz		40	________	-	dB
set		62.925 MHz		40	________	-	dB
	300 kHz	62.825 MHz		40	________	-	dB
Active test set		62.525 MHz		40	________	-	dB
	1 MHz	62.125 MHz		40	________	-	dB
Test set		61.125 MHz		40	________	-	dB
active/passive	10 MHz	53.125 MHz		40	________	-	dB
		43.125 MHz		40	________	-	dB
	50 MHz	202.5 MHz		40	________	-	dB
		152.5 MHz		40	________	-	dB
	100 MHz	152.5 MHz		40	________	-	dB
		52.5 MHz		40	________	-	dB
	149 MHz	103.5 MHz		40	________	-	dB
		45.5 MHz		40	________	-	dB
	150 MHz	860 MHz		40	________	-	dB
		710 MHz		40	________	-	dB
	250 MHz	760 MHz		40	________	-	dB
		510 MHz		40	________	-	dB
	350 MHz	660 MHz		40	________	-	dB
		310 MHz		40	________	-	dB
	450 MHz	560 MHz		40	________	-	dB
		110 MHz		40	________	-	dB
	550 MHz	460 MHz		40	________	-	dB
		90 MHz		40	________	-	dB
	650 MHz	360 MHz		40	________	-	dB
		290 MHz		40	________	-	dB
	749 MHz	261 MHz		40	________	-	dB
		488 MHz		40	________	-	dB
	2000 MHz	1000 MHz		40	________	-	dB
		3000 MHz		40	________	-	dB
	2200 MHz	1100 MHz		40	________	-	dB
		3300 MHz		40	________	-	dB
	2400 MHz	1200 MHz		40	________	-	dB
		3600 MHz		40	________	-	dB
	2600 MHz	1300 MHz		40	________	-	dB
		3900 MHz		40	________	-	dB
	2610 MHz	1305 MHz		40	________	-	dB
		3915 MHz		40	________	-	dB
	2800 MHz	1400 MHz		40	________	-	dB
	3000 MHz	1500 MHz		40	________	-	dB
	3200 MHz	1600 MHz		40	________	-	dB
	3310 MHz	1655 MHz		40	________	-	dB
	3400 MHz	1700 MHz		40	________	-	dB
	3600 MHz	1800 MHz		40	________	-	dB
	3800 MHz	1900 MHz		40	________	-	dB
	4000 MHz	2000 MHz		40	________	-	dB
4	**Phase noise**		5.2.1.4				
	9.99 MHz			-	________	– 110	dBc
	149.9 MHz			-	________	– 100	dBc
	1000 MHz			-	________	– 90	dBc
	2000 MHz			-	________	– 84	dBc
	3000 MHz			-	________	– 80.5	dBc
	4000 MHz			-	________	– 78	dBc

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
5	**Residual FM**	5.2.1.5				
	1 MHz		-	________	1	Hz
	9.99 MHz		-	________	1	Hz
	149.9 MHz		-	________	2	Hz
	750 MHz		-	________	5	Hz
	1000 MHz		-	________	5	Hz
	2000 MHz		-	________	10	Hz
	3000 MHz		-	________	20	Hz
	4000 MHz		-	________	20	Hz
6	**Level accuracy**					
Port 1 test set passive	Level: –10 dBm w. Opt. ZVR-B10: +3 dBm	5.2.1.6				
	9 kHz		–1	________	1	dB
	20 kHz		–1	________	1	dB
	40 kHz		–1	________	1	dB
	100 kHz		–1	________	1	dB
	1 MHz		–1	________	1	dB
	2.1 MHz		–0.5	________	0.5	dB
	3 MHz		–0.5	________	0.5	dB
	10 MHz		–0.5	________	0.5	dB
	50 MHz		–0.5	________	0.5	dB
	200 MHz		–0.5	________	0.5	dB
	500 MHz		–0.5	________	0.5	dB
	1000 MHz		–0.5	________	0.5	dB
	1500 MHz		–0.5	________	0.5	dB
	2000 MHz		–0.5	________	0.5	dB
	2500 MHz		–0.5	________	0.5	dB
	3000 MHz		–0.5	________	0.5	dB
	3500 MHz		–0.5	________	0.5	dB
	4000 MHz		–0.5	________	0.5	dB

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
6	**Level accuracy**					
Port 2 test set passive	Level: –10 dBm	5.2.1.6				
	9 kHz		–1	________	1	dB
	20 kHz		–1	________	1	dB
	40 kHz		–1	________	1	dB
	100 kHz		–1	________	1	dB
	1 MHz		–1	________	1	dB
	2.1 MHz		–0.5	________	0.5	dB
	3 MHz		–0.5	________	0.5	dB
	10 MHz		–0.5	________	0.5	dB
	50 MHz		–0.5	________	0.5	dB
	200 MHz		–0.5	________	0.5	dB
	500 MHz		–0.5	________	0.5	dB
	1000 MHz		–0.5	________	0.5	dB
	1500 MHz		–0.5	________	0.5	dB
	2000 MHz		–0.5	________	0.5	dB
	2500 MHz		–0.5	________	0.5	dB
	3000 MHz		–0.5	________	0.5	dB
	3500 MHz		–0.5	________	0.5	dB
	4000 MHz		–0.5	________	0.5	dB
6	**Level accuracy**					
Port 1 test set active	Level: –10 dBm w. Opt. ZVR-B10: +3 dBm	5.2.1.6				
	300 kHz		–1	________	1	dB
	1 MHz		–1	________	1	dB
	2.1 MHz		–0.5	________	0.5	dB
	3 MHz		–0.5	________	0.5	dB
	10 MHz		–0.5	________	0.5	dB
	50 MHz		–0.5	________	0.5	dB
	200 MHz		–0.5	________	0.5	dB
	500 MHz		–0.5	________	0.5	dB
	1000 MHz		–0.5	________	0.5	dB
	1500 MHz		–0.5	________	0.5	dB
	2000 MHz		–0.5	________	0.5	dB
	2500 MHz		–0.5	________	0.5	dB
	3000 MHz		–0.5	________	0.5	dB
	3500 MHz		–0.5	________	0.5	dB
	4000 MHz		–0.5	________	0.5	dB

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
6	**Level accuracy**					
Port 2 test set active	Level: –10 dBm	5.2.1.6				
	300 kHz		–1	________	1	dB
	1 MHz		–1	________	1	dB
	2.1 MHz		–0.5	________	0.5	dB
	3 MHz		–0.5	________	0.5	dB
	10 MHz		–0.5	________	0.5	dB
	50 MHz		–0.5	________	0.5	dB
	200 MHz		–0.5	________	0.5	dB
	500 MHz		–0.5	________	0.5	dB
	1000 MHz		–0.5	________	0.5	dB
	1500 MHz		–0.5	________	0.5	dB
	2000 MHz		–0.5	________	0.5	dB
	2500 MHz		–0.5	________	0.5	dB
	3000 MHz		–0.5	________	0.5	dB
	3500 MHz		–0.5	________	0.5	dB
	4000 MHz		–0.5	________	0.5	dB
6	**Level accuracy**					
Option External Measurements	Level: –10 dBm w. Opt. ZVR-B10: +3 dBm	5.2.1.6				
	10Hz		–1	________	1	dB
	20 kHz		–1	________	1	dB
	40 kHz		–1	________	1	dB
	100 kHz		–1	________	1	dB
	1 MHz		–1	________	1	dB
	2.1 MHz		–0.5	________	0.5	dB
	3 MHz		–0.5	________	0.5	dB
	10 MHz		–0.5	________	0.5	dB
	50 MHz		–0.5	________	0.5	dB
	200 MHz		–0.5	________	0.5	dB
	500 MHz		–0.5	________	0.5	dB
	1000 MHz		–0.5	________	0.5	dB
	1500 MHz		–0.5	________	0.5	dB
	2000 MHz		–0.5	________	0.5	dB
	2500 MHz		–0.5	________	0.5	dB
	3000 MHz		–0.5	________	0.5	dB
	3500 MHz		–0.5	________	0.5	dB
	4000 MHz		–0.5	________	0.5	dB

Item No.	Characteristic	Measure according to section	Min. value	Actual value	Max. value	Unit
7	**Level linearity**	5.2.1.7				
R&S ZVR R&S ZVRE R&S ZVRL	Ref. level: –10dBm +3 dBm with Opt. ZVR-B10					
test set passive	f = 40 kHz					
	10dB		10.4	________	9.6	dB
	5dB		5.4	________	4.6	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
test set active/passive	f = 300 kHz					
	10dB		10.4	________	9.6	dB
	5dB		5.4	________	4.6	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
	f = 1 MHz					
	10dB		10.4	________	9.6	dB
	5dB		5.4	________	4.6	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
	f = 100 MHz					
	10dB		10.4	________	9.6	dB
	5dB		5.4	________	4.6	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
	f = 4000 MHz	5.2.1.7				
	10dB		10.4	________	9.6	dB
	5dB		5.4	________	4.6	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
8	**Matching Output a1**	5.2.1.8				
Option External Measurements only	400 kHz		8	________	–	dB
	2 MHz		8	________	–	dB
	100 MHz		8	________	–	dB
	300 MHz		8	________	–	dB
	1000 MHz		8	________	–	dB
	2000 MHz		8	________	–	dB
	3000 MHz		8	________	–	dB
	3500 MHz		8	________	–	dB
	4000 MHz		8	________	–	dB

Table 5-2 Performance Test Report: Receiver specifications

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Absolute accuracy PORT1**					
		5.2.2.1				
	INPUT a1:					
Test Set passive	100 MHz		–11	________	–9	dBm
	INPUT b1:					
	9 kHz		–12	________	–8	dBm
	19 kHz		–12	________	–8	dBm
	20 kHz		–12	________	–8	dBm
	40 kHz		–12	________	–8	dBm
	100 kHz		–11	________	–9	dBm
	500 kHz		–11	________	–9	dBm
	1 MHz		–11	________	–9	dBm
	10 MHz		–11	________	–9	dBm
	100 MHz		–11	________	–9	dBm
	500 MHz		–11	________	–9	dBm
	1000 MHz		–11	________	–9	dBm
	1500 MHz		–11	________	–9	dBm
	2000 MHz		–11	________	–9	dBm
	2500 MHz		–11	________	–9	dBm
	3000 MHz		–11	________	–9	dBm
	3500 MHz		–11	________	–9	dBm
	4000 MHz		–11	________	–9	dBm
1	**Absolute accuracy PORT2**					
		5.2.2.1				
	INPUT a2:					
Test Set passive	100 MHz		–11	________	–9	dBm
	INPUT b2:					
	9 kHz		–12	________	–8	dBm
	19 kHz		–12	________	–8	dBm
	20 kHz		–12	________	–8	dBm
	40 kHz		–12	________	–8	dBm
	100 kHz		–11	________	–9	dBm
	500 kHz		–11	________	–9	dBm
	1 MHz		–11	________	–9	dBm
	10 MHz		–11	________	–9	dBm
	100 MHz		–11	________	–9	dBm
	500 MHz		–11	________	–9	dBm
	1000 MHz		–11	________	–9	dBm
	1500 MHz		–11	________	–9	dBm
	2000 MHz		–11	________	–9	dBm
	2500 MHz		–11	________	–9	dBm
	3000 MHz		–11	________	–9	dBm
	3500 MHz		–11	________	–9	dBm
	4000 MHz		–11	________	–9	dBm

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Absolute accuracy PORT1**					
		5.2.2.1				
	INPUT a1:					
Test Set active	100 MHz		–11	__________	–9	dBm
	INPUT b1:			__________		dBm
	300 kHz		–12	__________	–8	dBm
	1 MHz		–11	__________	–9	dBm
	10 MHz		–11	__________	–9	dBm
	100 MHz		–11	__________	–9	dBm
	500 MHz		–11	__________	–9	dBm
	1000 MHz		–11	__________	–9	dBm
	1500 MHz		–11	__________	–9	dBm
	2000 MHz		–11	__________	–9	dBm
	2500 MHz		–11	__________	–9	dBm
	3000 MHz		–11	__________	–9	dBm
	3500 MHz		–11	__________	–9	dBm
	4000 MHz		–11	__________	–9	dBm
1	**Absolute accuracy PORT2**					
		5.2.2.1				
	INPUT a2:					
Test Set active	100 MHz		–11	__________	–9	dBm
	INPUT b2:			__________		dBm
	300 kHz		–12	__________	–8	dBm
	1 MHz		–11	__________	–9	dBm
	10 MHz		–11	__________	–9	dBm
	100 MHz		–11	__________	–9	dBm
	500 MHz		–11	__________	–9	dBm
	1000 MHz		–11	__________	–9	dBm
	1500 MHz		–11	__________	–9	dBm
	2000 MHz		–11	__________	–9	dBm
	2500 MHz		–11	__________	–9	dBm
	3000 MHz		–11	__________	–9	dBm
	3500 MHz		–11	__________	–9	dBm
	4000 MHz		–11	__________	–9	dBm

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Absolute accuracy INPUT b1**					
		5.2.2.1				
Option External Measure-ments	INPUT a1: 100 MHz		–11	________	–9	dBm
	INPUT b1: 10Hz		–12	________	–8	dBm
	1kHz		–12	________	–8	dBm
	9 kHz		–12	________	–8	dBm
	19 kHz		–12	________	–8	dBm
	20 kHz		–12	________	–8	dBm
	40 kHz		–12	________	–8	dBm
	100 kHz		–12	________	–8	dBm
	500 kHz		–12	________	–8	dBm
	1 MHz		–11	________	–9	dBm
	10 MHz		–11	________	–9	dBm
	100 MHz		–11	________	–9	dBm
	500 MHz		–11	________	–9	dBm
	1000 MHz		–11	________	–9	dBm
	1500 MHz		–11	________	–9	dBm
	2000 MHz		–11	________	–9	dBm
	2500 MHz		–11	________	–9	dBm
	3000 MHz		–11	________	–9	dBm
	3500 MHz		–11	________	–9	dBm
	4000 MHz		–11	________	–9	dBm
1	**Absolute accuracy INPUT b2**					
		5.2.2.1				
Option External Measure-ments	INPUT a2: 100 MHz		–11	________	–9	dBm
	INPUT b2: 10 Hz		–12	________	–8	dBm
	1 kHz		–12	________	–8	dBm
	9 kHz		–12	________	–8	dBm
	19 kHz		–12	________	–8	dBm
	20 kHz		–12	________	–8	dBm
	40 kHz		–12	________	–8	dBm
	100 kHz		–12	________	–8	dBm
	500 kHz		–12	________	–8	dBm
	1 MHz		–11	________	–9	dBm
	10 MHz		–11	________	–9	dBm
	100 MHz		–11	________	–9	dBm
	500 MHz		–11	________	–9	dBm
	1000 MHz		–11	________	–9	dBm
	1500 MHz		–11	________	–9	dBm
	2000 MHz		–11	________	–9	dBm
	2500 MHz		–11	________	–9	dBm
	3000 MHz		–11	________	–9	dBm
	3500 MHz		–11	________	–9	dBm
	4000 MHz		–11	________	–9	dBm
2	**Linearity PORT1** **Magnitude** Reference: -10 dBm f = 1.5 MHz	5.2.2.2				
	10 dB		–1	________	1	dB
	3 dB		–0.2	________	0.2	dB
	–5 dB		–0.05	________	0.05	dB
	–15 dB		–0.05	________	0.05	dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
2	**Linearity PORT1** **Phase** Reference: -10 dBm f = 1.5MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	 –6 –1 –0.4 –0.4	 ________ ________ ________ ________	 6 1 0.4 0.4	 degrees degrees degrees degrees
2	**Linearity PORT1** **Magnitude** Reference: -10 dBm f = 4000 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	 –1 –0.2 –0.05 –0.05	 ________ ________ ________ ________	 1 0.2 0.05 0.05	 dB dB dB dB
2	**Linearity PORT1** **Phase** Reference: -10 dBm f = 4000 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	 –6 –1 –0.4 –0.4	 ________ ________ ________ ________	 6 1 0.4 0.4	 degrees degrees degrees degrees
2	**Linearity PORT2** **Magnitude** Reference: -10 dBm f = 1.5 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	 –1 –0.2 –0.05 –0.05	 ________ ________ ________ ________	 1 0.2 0.05 0.05	 dB dB dB dB
2	**Linearity PORT2** **Phase** Reference: -10 dBm f = 1.5 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	 –6 –1 –0.4 –0.4	 ________ ________ ________ ________	 6 1 0.4 0.4	 degrees degrees degrees degrees

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
2	**Linearity PORT2** **Magnitude** Reference: -10 dBm f = 4000 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	–1 –0.2 –0.05 –0.05	________ ________ ________ ________	1 0.2 0.05 0.05	dB dB dB dB
2	**Linearity PORT2** **Phase** Reference: -10 dBm f = 4000 MHz 10 dB 3 dB –5 dB –15 dB	5.2.2.2	–6 –1 –0.4 –0.4	________ ________ ________ ________	6 1 0.4 0.4	degrees degrees degrees degrees
3 R&S ZVR 50Ω R&S ZVRE 50Ω Test Set passive R&S ZVRL R&S ZVR 50Ω R&S ZVRE 50Ω Test Set active/passive R&S ZVRL	**Noise level PORT1** 10 kHz 20 kHz 150 kHz 220 kHz 300 kHz 2 MHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz	5.2.2.3	– – – – – – – – – – – – – – –	________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	–65 –65 –65 –85 –85 –85 –85 –95 –95 –95 –95 –95 –95 –95 –85	dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm
3 ZVR 50Ω ZVRE 50Ω Test Set passive ZVRL ZVR 50Ω ZVRE 50Ω Test Set active/passive ZVRL	**Noise level PORT2** 10 kHz 20 kHz 150 kHz 220 kHz 300 kHz 2 MHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz	5.2.2.3	– – – – – – – – – – – – – – –	________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	–65 –65 –65 –85 –85 –85 –85 –95 –95 –95 –95 –95 –95 –95 –85	dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
3 R&S R&S ZVR 75Ω R&S ZVRE 75Ω Test Set passive	**Noise level PORT1** 10 kHz 20 kHz 150 kHz 220 kHz 300 kHz 2 MHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz	5.2.2.3	 – – – – – – – – – – – – – – –	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 –50 –50 –50 –70 –70 –70 –70 –80 –80 –80 –80 –80 –80 –80 –80	 dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm
3 R&S ZVR 75Ω R&S ZVRE 75Ω Test Set passive	**Noise level PORT2** 10 kHz 20 kHz 150 kHz 220 kHz 300 kHz 2 MHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz	5.2.2.3	 – – – – – – – – – – – – – – –	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 –50 –50 –50 –70 –70 –70 –70 –80 –80 –80 –80 –80 –80 –80 –80	 dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm
3 R&S ZVR 75Ω R&S ZVRE 75Ω Test Set active	**Noise level PORT1** 300 kHz 1 MHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz	5.2.2.3	 – – – – – – – – – – –	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 –70 –80 –80 –80 –75 –75 –75 –75 –75 –75 –75	 dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
3	**Noise level PORT2**	5.2.2.3				
R&S	300 kHz		–	________	–70	dBm
ZVR 75Ω	1 MHz		–	________	–80	dBm
R&S	19 MHz		–	________	–80	dBm
ZVRE 75Ω	20 MHz		–	________	–80	dBm
Test Set	100 MHz		–	________	–75	dBm
active	200 MHz		–	________	–75	dBm
	700 MHz		–	________	–75	dBm
	1000 MHz		–	________	–75	dBm
	2000 MHz		–	________	–75	dBm
	3000 MHz		–	________	–75	dBm
	4000 MHz		–	________	–75	dBm
4	**Matching Input b1**	5.2.2.4				
R&S	400 kHz		8	________	–	dB
ZVR	1.9 MHz		8	________	–	dB
R&S	2 MHz		8	________	–	dB
ZVRE	100 MHz		8	________	–	dB
	1000 MHz		8	________	–	dB
Option	2000 MHz		8	________	–	dB
External	3000 MHz		8	________	–	dB
Measure-	3500 MHz		8	________	–	dB
ments	4000 MHz		8	________	–	dB
4	**Matching Input b2**	5.2.2.4				
R&S	400 kHz		8	________	–	dB
ZVR	1.9 MHz		8	________	–	dB
R&S	2 MHz		8	________	–	dB
R&S	100 MHz		8	________	–	dB
ZVRE	1000 MHz		8	________	–	dB
	2000 MHz		8	________	–	dB
Option	3000 MHz		8	________	–	dB
External	3500 MHz		8	________	–	dB
Measure-	4000 MHz		8	________	–	dB
ments						

Table 5-3 Performance Test Report: Test Set Specifications

Item No.	**Characteristics**	**Measurement according to section**	**Min. value**	**Actual value**	**Max. value**	**Unit**
1	**Matching PORT1**	5.2.3.1				
R&S						
ZVR 50 Ω	40 kHz		10	__________	–	dB
R&S	100 kHz		16	__________	–	dB
ZVRE 50 Ω	100 MHz		18	__________	–	dB
test set	500 MHz		18	__________	–	dB
passive	1000 MHz		18	__________	–	dB
	1500 MHz		18	__________	–	dB
	2000 MHz		18	__________	–	dB
R&S	2500 MHz		18	__________	–	dB
ZVRL 50 Ω	3000 MHz		18	__________	–	dB
	3500 MHz		16	__________	–	dB
	4000 MHz		16	__________	–	dB
1	**Matching PORT2**	5.2.3.1				
R&S						dB
ZVR 50 Ω	40 kHz		10	__________	–	dB
R&S	100 kHz		16	__________	–	dB
ZVRE 50 Ω	100 MHz		18	__________	–	dB
test set	500 MHz		18	__________	–	dB
passive	1000 MHz		18	__________	–	dB
	1500 MHz		18	__________	–	dB
	2000 MHz		18	__________	–	dB
	2500 MHz		18	__________	–	dB
	3000 MHz		18	__________	–	dB
	3500 MHz		16	__________	–	dB
	4000 MHz		16	__________	–	dB
1	**Matching PORT2**	5.2.3.1				
R&S	40 kHz		18	__________	–	dB
ZVRL 50 Ω	100 kHz		18	__________	–	dB
	100 MHz		18	__________	–	dB
	500 MHz		18	__________	–	dB
	1000 MHz		18	__________	–	dB
	1500 MHz		18	__________	–	dB
	2000 MHz		18	__________	–	dB
	2500 MHz		18	__________	–	dB
	3000 MHz		18	__________	–	dB
	3500 MHz		18	__________	–	dB
	4000 MHz		18	__________	–	dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Matching PORT1**	5.2.3.1				
R&S	300 kHz		6	________	–	dB
ZVR 50 Ω	1 MHz		16	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 50 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
active	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		16	________	–	dB
	4000 MHz		16	________	–	dB
1	**Matching PORT2**	5.2.3.1				
R&S	300 kHz		6	________	–	dB
ZVR 50 Ω	1 MHz		16	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 50 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
active	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		16	________	–	dB
	4000 MHz		16	________	–	dB
1	**Matching PORT1**	5.2.3.1				
R&S	40 kHz		6	________	–	dB
ZVR 75 Ω	100 kHz		12	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 75 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
passive	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
R&S	3000 MHz		18	________	–	dB
ZVRL 75 Ω	3500 MHz		15	________	–	dB
	4000 MHz		15	________	–	dB
1	**Matching PORT2**	5.2.3.1				
R&S	40 kHz		6	________	–	dB
ZVR 75 Ω	100 kHz		12	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 75 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
passive	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		15	________	–	dB
	4000 MHz		15	________	–	dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Matching PORT2**	5.2.3.1				
	40 kHz		18	________	–	dB
R&S	100 kHz		18	________	–	dB
ZVRL 75 Ω	100 MHz		18	________	–	dB
	500 MHz		18	________	–	dB
	1000 MHz		18	________	–	dB
	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		18	________	–	dB
	4000 MHz		18	________	–	dB
1	**Matching PORT1**	5.2.3.1				
R&S	300 kHz		4	________	–	dB
ZVR 75 Ω	1 MHz		12	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 75 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
active	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		10	________	–	dB
	4000 MHz		10	________	–	dB
1	**Matching PORT2**	5.2.3.1				
R&S	300 kHz		4	________	–	dB
ZVR 75 Ω	1 MHz		12	________	–	dB
R&S	100 MHz		18	________	–	dB
ZVRE 75 Ω	500 MHz		18	________	–	dB
test set	1000 MHz		18	________	–	dB
active	1500 MHz		18	________	–	dB
	2000 MHz		18	________	–	dB
	2500 MHz		18	________	–	dB
	3000 MHz		18	________	–	dB
	3500 MHz		10	________	–	dB
	4000 MHz		10	________	–	dB
2	**Directivity PORT1**	5.2.3.2				
R&S	9 kHz		25	________	–	dB
ZVR 50 Ω	40 kHz		33	________	–	dB
R&S	1 MHz		33	________	–	dB
ZVRE 50 Ω	100 MHz		33	________	–	dB
test set	500 MHz		33	________	–	dB
passive	1000 MHz		33	________	–	dB
	1500 MHz		33	________	–	dB
	2000 MHz		33	________	–	dB
R&S	2500 MHz		33	________	–	dB
ZVRL 50 Ω	3000 MHz		33	________	–	dB
	3500 MHz		29	________	–	dB
	4000 MHz		29	________	–	dB

Item No.	**Characteristics**	**Measurement according to section**	**Min. value**	**Actual value**	**Max. value**	**Unit**
2	**Directivity PORT2**	5.2.3.2				
R&S ZVR 50 Ω R&S ZVRE 50 Ω test set passive	9 kHz		25	________	–	dB
	40 kHz		33	________	–	dB
	1 MHz		33	________	–	dB
	100 MHz		33	________	–	dB
	500 MHz		33	________	–	dB
	1000 MHz		33	________	–	dB
	1500 MHz		33	________	–	dB
	2000 MHz		33	________	–	dB
	2500 MHz		33	________	–	dB
	3000 MHz		33	________	–	dB
	3500 MHz		29	________	–	dB
	4000 MHz		29	________	–	dB
2	**Directivity PORT1**	5.2.3.2				
R&S ZVR 50 Ω R&S ZVRE 50 Ω test set active	300 kHz		5	________	–	dB
	1 MHz		15	________	–	dB
	5 MHz		33	________	–	dB
	500 MHz		33	________	–	dB
	1000 MHz		33	________	–	dB
	1500 MHz		33	________	–	dB
	2000 MHz		33	________	–	dB
	2500 MHz		33	________	–	dB
	3000 MHz		33	________	–	dB
	3500 MHz		29	________	–	dB
	4000 MHz		29	________	–	dB
2	**Directivity PORT2**	5.2.3.2				
R&S ZVR 50 Ω R&S ZVRE 50 Ω test set active	300 kHz		5	________	–	dB
	1 MHz		15	________	–	dB
	5 MHz		33	________	–	dB
	500 MHz		33	________	–	dB
	1000 MHz		33	________	–	dB
	1500 MHz		33	________	–	dB
	2000 MHz		33	________	–	dB
	2500 MHz		33	________	–	dB
	3000 MHz		33	________	–	dB
	3500 MHz		29	________	–	dB
	4000 MHz		29	________	–	dB
2	**Directivity PORT1**	5.2.3.2				
R&S ZVR 75 Ω R&S ZVRE 75 Ω test set passive	9 kHz		25	________	–	dB
	40 kHz		33	________	–	dB
	1 MHz		33	________	–	dB
	100 MHz		33	________	–	dB
	500 MHz		33	________	–	dB
	1000 MHz		33	________	–	dB
	1500 MHz		33	________	–	dB
	2000 MHz		33	________	–	dB
R&S ZVRL 75 Ω	2500 MHz		33	________	–	dB
	3000 MHz		33	________	–	dB
	3500 MHz		20	________	–	dB
	4000 MHz		20	________	–	dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
2 R&S ZVR 75 Ω R&S ZVRE 75 Ω test set passive	**Directivity PORT2** 9 kHz 40 kHz 1 MHz 100 MHz 500 MHz 1000 MHz 1500 MHz 2000 MHz 2500 MHz 3000 MHz 3500 MHz 4000 MHz	5.2.3.2	 25 33 33 33 33 33 33 33 33 33 20 20	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 – – – – – – – – – – – –	 dB dB dB dB dB dB dB dB dB dB dB dB
2 R&S ZVR 75 Ω R&S ZVRE 75 Ω test set active	**Directivity PORT1** 300 kHz 1 MHz 5 MHz 500 MHz 1000 MHz 1500 MHz 2000 MHz 2500 MHz 3000 MHz 3500 MHz 4000 MHz	5.2.3.2	 5 15 33 33 33 33 33 33 33 20 20	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 – – – – – – – – – – –	 dB dB dB dB dB dB dB dB dB dB dB
2 R&S ZVR 75 Ω R&S ZVRE 75 Ω test set active	**Directivity PORT2** 300 kHz 1 MHz 5 MHz 500 MHz 1000 MHz 1500 MHz 2000 MHz 2500 MHz 3000 MHz 3500 MHz 4000 MHz	5.3.2.2	 5 15 33 33 33 33 33 33 33 20 20	 ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	 – – – – – – – – – – –	 dB dB dB dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B21	**Attenuators** ATT a1 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
3 Option R&S ZVR–B21	**Attenuators** ATT a1 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B21	**Attenuators** ATT a1 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B22	**Attenuators** ATT a2 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B22	**Attenuators** ATT a2 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
3 Option R&S ZVR–B22	**Attenuators** ATT a2 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	–2 –0.1 –2 –2 –2 –2 –2 –2	________ ________ ________ ________ ________ ________ ________ ________	2 0.1 2 2 2 2 2 2	dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B23	**Attenuators** ATT b1 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	–2 –0.1 –2 –2 –2 –2 –2 –2	________ ________ ________ ________ ________ ________ ________ ________	2 0.1 2 2 2 2 2 2	dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B23	**Attenuators** ATT b1 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	–2 –0.1 –2 –2 –2 –2 –2 –2	________ ________ ________ ________ ________ ________ ________ ________	2 0.1 2 2 2 2 2 2	dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B23	**Attenuators** ATT b1 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	–2 –0.1 –2 –2 –2 –2 –2 –2	________ ________ ________ ________ ________ ________ ________ ________	2 0.1 2 2 2 2 2 2	dB dB dB dB dB dB dB dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
3 Option R&S ZVR–B24	**Attenuators** ATT b2 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B24	**Attenuators** ATT b2 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B24	**Attenuators** ATT b2 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB

Table 5-4 Performance Test Report: Crosstalk

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1**					
		5.2.3.4				
R&S ZVR						
test set	20 kHz		–	___________	–90	dB
passive	201 kHz		–	___________	–120	dB
test set	300 kHz		–	___________	–120	dB
active/passive	2.5 MHz		–	___________	–120	dB
	5.1 MHz		–	___________	–130	dB
	500 MHz		–	___________	–130	dB
	1000 MHz		–	___________	–130	dB
	2200 MHz		–	___________	–120	dB
	2700 MHz		–	___________	–120	dB
	3000 MHz		–	___________	–120	dB
	3300 MHz		–	___________	–110	dB
	3600 MHz		–	___________	–110	dB
	3900 MHz		–	___________	–110	dB
	4000 MHz		–	___________	–110	dB
1	**Crosstalk PORT2**					
		5.2.3.4				
R&S ZVR	9 kHz		–	___________	–90	dB
test set	201 kHz		–	___________	–120	dB
passive						
	300 kHz		–	___________	–120	dB
	2.5 MHz		–	___________	–120	dB
test set	5.1 MHz		–	___________	–130	dB
active/passive	500 MHz		–	___________	–130	dB
	1000 MHz		–	___________	–130	dB
	2200 MHz		–	___________	–120	dB
	2700 MHz		–	___________	–120	dB
	3000 MHz		–	___________	–120	dB
	3300 MHz		–	___________	–110	dB
	3600 MHz		–	___________	–110	dB
	3900 MHz		–	___________	–110	dB
	4000 MHz		–	___________	–110	dB
1	**Crosstalk PORT1**					
		5.2.3.4				
R&S ZVRE	9 kHz		–	___________	–90	dB
test set	201 kHz		–	___________	–120	dB
passive						
R&S ZVRL	300 kHz		–	___________	–120	dB
	2.5 MHz		–	___________	–120	dB
	5.1 MHz		–	___________	–125	dB
	500 MHz		–	___________	–125	dB
test set	1000 MHz		–	___________	–125	dB
active/passive	2200 MHz		–	___________	–115	dB
	2700 MHz		–	___________	–115	dB
R&S ZVRL	3000 MHz		–	___________	–115	dB
	3300 MHz		–	___________	–105	dB
	3600 MHz		–	___________	–105	dB
	3900 MHz		–	___________	–105	dB
	4000 MHz		–	___________	–105	dB

Item No.	Characteristics	Measurement according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT2**	5.2.3.4				
R&S ZVR	9 kHz		–	___________	–90	dB
test set	201 kHz		–	___________	–120	dB
passive						
R&S ZVRL	300 kHz		–	___________	–120	dB
	2.5 MHz		–	___________	–120	dB
	5.1 MHz		–	___________	–125	dB
	500 MHz		–	___________	–125	dB
test set	1000 MHz		–	___________	–125	dB
active/passive	2200 MHz		–	___________	–115	dB
	2700 MHz		–	___________	–115	dB
R&S ZVRL	3000 MHz		–	___________	–115	dB
	3300 MHz		–	___________	–105	dB
	3600 MHz		–	___________	–105	dB
	3900 MHz		–	___________	–105	dB
	4000 MHz		–	___________	–105	dB
1	**Crosstalk PORT1**	5.2.3.4				
ZVR, ZVRE with Opt. ZVR-B10						
test set	20 kHz		–	___________	–75	dB
passive	201 kHz		–	___________	–100	dB
test set	300 kHz		–	___________	–100	dB
active/passive	2.5 MHz		–	___________	–100	dB
	5.1 MHz		–	___________	–110	dB
	500 MHz		–	___________	–110	dB
	1000 MHz		–	___________	–110	dB
	2200 MHz		–	___________	–100	dB
	2700 MHz		–	___________	–100	dB
	3000 MHz		–	___________	–100	dB
	3300 MHz		–	___________	–90	dB
	3600 MHz		–	___________	–90	dB
	3900 MHz		–	___________	–90	dB
	4000 MHz		–	___________	–90	dB

5.4 Measuring Instruments and Accessories (ZVC, ZVCE)

Item	Type of Instrument	Required Specifications	Appropriate Device	R&S Order No.	Use
1	Modulation analyzer	1 MHz to 5.2 GHz	R&S FMB Opt. R&S FMA-B8 Opt. R&S FMA-B10	0856.5005.52 0855.9007.55 0856.3502.52	5.2.1.1 5.2.1.4 5.2.1.5
2	Power meter	20 kHz to 8 GHz	R&S NRVD or R&S NRVS with sensor R&S NRV-Z51 R&S NRV-Z5	0857.8008.02 1020.1809.02 0857.9004.02 0828.3818.02	5.2.1.6 5.2.1.7
3	Attenuator	DC to 5.2 GHz	R&S RSG *) or R&S RSM	1009.4505.02 1060.3990.02	5.2.1.2 5.2.1.3 5.2.2.3
4	Calibration kit		R&S ZV-Z21 (50 Ω)	1085.7099.02	5.2.1.8 5.2.2.4 5.2.2.5 5.2.3.1 5.2.3.2 5.2.3.4
5	Pair of test port cables		R&S ZV-Z11 (50 Ω)	1085.6505.02	

*) The attenuator is only used for roughly reducing the level of harmonics and spuriae and for linearity measurements. Therefore the attenuation and matching accuracy up to 8 GHz is not important (the attenuation error at 8 GHz and 30 dB is typically <2 dB)

5.5 Test Sequence (R&S ZVC, R&S ZVCE)

The rated specifications of the network analyzer are checked after a warm-up time of at least 30 minutes and after performing the reference oscillator adjustment, recording of detector characteristics and factory calibration. This makes sure that the guaranteed data are observed. The device settings quoted are *PRESET* settings.

The values given in the following sections are not guaranteed, only the technical data of the data sheet are binding.

5.5.1 Testing the Generator Specifications

5.5.1.1 Frequency Accuracy

Test equipment: R&S FMB with Option R&S FMA-B10

Test setup:

➢ Connect FMB (operating mode COUNTER) to PORT1 of the network analyzer.

Settings at the network analyzer:

PRESET	
CENTER	Test frequency
SWEEP	SINGLE POINT
SWEEP TIME	500 s
SOURCE POWER	Maximum level
MEAS	INPUT a1

Measurement:

➢ Set test frequencies according to test report.

Deviation:	Frequency value displayed on the FMB minus setting value.
Permissible deviation	< 2ppm + 1ppm/year

5.5.1.2 Harmonics Suppression

Test equipment: Test cable, option R&S ZVR-B4, attenuator RSG or RSM

Test setup:

➢ Connect RSG (RSM) via test cable between PORT1 and PORT2.

Settings of the attenuator: 30 dB

Settings at the network analyzer:

PRESET	
MODE	FREQUENCY CONVERSION : SECOND HARMONIC, THIRD HARMONIC
MARKER	Test frequency
SOURCE POWER	Pmax and –10 dBm (Pmax and 0 dBm with option R&S ZVR-B10)
MEAS	INPUT b2, DRIVE PORT 1

Measurement

- Set test frequencies according to test report.
- Measure at twice and three times the test frequency and calculate the difference from the measured value at the test frequency, report the worse of the two values.

Test frequency range	Harmonics suppression at	
	-10 dBm	Pmax
40 kHz to 8 GHz	-35 dBc	-25 dBc

With option R&S ZVR-B10:

	0 dBm	Pmax
20 kHz to 40 kHz	-30 dBc	-20 dBc
40 kHz to 20 MHz	-30 dBc	-22 dBc
20 MHz to 70 MHz	-35 dBc	-22 dBc
70 MHz to 2 GHz	-35 dBc	-25 dBc
2 GHz to 8 GHz	-32 dBc	-20 dBc

If a network analyzer ZVx is used the 2^{nd} harmonic wave can be measured up to 4000 MHz fundamental only. Due to the strong reduction of the Output Stage amplification in the range above 8 GHz, a measurement at higher frequencies is not necessary.

5.5.1.3 Spurious Suppression

Test equipment: Test cable, option R&S ZVR-B4, attenuator RSG or RSM

Test setup:

- Connect RSG (RSM) via test cable between PORT1 and PORT2.

Settings of the attenuator: 30 dB

Settings at the network analyzer:

PRESET	
MODE	FREQUENCY CONVERSION : ARBITRARY Meas. frequency = INT SRC REC = spurious wave
SOURCE POWER	0 dBm and –10 dBm -3 dBm and –10 dBm at f > 6GHz
MEAS	INPUT b2, DRIVE PORT 1

Reference measurement:

- Record measured values at the test frequencies.

Measurement: ➢ Set test frequencies according to test report.

Mixer range up to 750 MHz: LO=RF+fo (fo = test frequency)

For fo < 50 MHz	RF = 63.125 MHz
fo = 50 MHz to < 150 MHz	RF = 252.5 MHz
fo = 150 MHz to 750 MHz	RF = 1010 MHz

➢ Perform measurements for f = 2∗RF – LO and f = 3∗RF – 2∗LO.

Permissible spurious suppression < – 40 dBc

Doubled range > 2000 MHz to 4000 MHz:

➢ Perform measurements for f = fo/2 and f = 3fo/2

Permissible spurious suppression < -40 dBc

Quadrupled range > 4000 MHz to 8000 MHz:

➢ Perform measurements for f = fo/4, f = fo/2, f = 3fo/4 and f = 3fo/2

Permissible spurious suppression < -40 dBc

5.5.1.4 Phase Noise

Test equipment: Modulation meter FMB with Option B8

Test setup: ➢ Connect modulation meter (operating mode DEMOD PM PHASENOISE 10 kHz) to PORT1 of the spectrum analyzer.

Settings at the network analyzer:

SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	Maximum level
SWEEP TIME	200 s
MEAS	INPUT a1

Measurement ➢ Set test frequencies according to test report, read the phase noise value on the modulation meter.

Permissible phase noise values:

20 kHz to 10 MHz	< -110 dBc
10 MHz to 150 MHz	< -100 dBc
150 MHz to 1 GHz	< -90 dBc
1 GHz to 8 GHz	< -90 dBc + 20∗log(f / GHz)
	(< -78 dBc at 4 GHz, <-72 dBc at 8 GHz)

5.5.1.5 Residual FM

est equipment: Modulation meter FMB

Test setup:

- ➢ Connect modulation meter (operating mode DEMOD FM DET RMS 10 Hz to 3 kHz) to PORT1 of the spectrum analyzer.

Settings at the network analyzer:

SWEEP	SINGLE POINT	
CENTER	Test frequency	
SOURCE POWER	Maximum level	
SWEEP TIME	200 s	
MEAS	INPUT	a1

Measurement

- ➢ Set test frequencies according to test report, read the residual FM values on the modulation meter.

Permissible residual FM:

20 kHz to 10 MHz	< 1 Hz
10 MHz to 150 MHz	< 2 Hz
150 MHz to 1 GHz	< 5 Hz
1 GHz to 2 GHz	< 10 Hz
2 GHz to 4 GHz	< 20 Hz
4 GHz to 8 GHz	< 40 Hz

5.5.1.6 Level Accuracy

Test equipment: Power meter NRVD with power sensor NRV-Z51 (50 Ω) or NRV-Z51 with adapter 50/75 Ω (75 Ω).

Test setup

- ➢ Connect power sensor to PORT1, PORT2 or OUTPUT a1 (only with Option R&S ZVR-B25 Ext. Measurements) of the network analyzer.

Settings at the network analyzer:

SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	-10 dBm on Port 1 and Port 2 0 dBm with option ZVR-B10 on Port 1
SWEEP TIME	500 s
MEAS	INPUT a1/a2

Measurement:

- ➢ Set test frequencies according to test report, read the level on power meter.

Permissible deviations at PORT1/PORT2:

20 kHz to 2 MHz	< 1 dB
2 MHz to 8 GHz	< 0.5 dB

Permissible deviations at output a1 (Option ZVR-B25, External Measurements):

20 kHz to 2 MHz	< 1 dB
2 MHz to 8 GHz	< 0.5 dB

5.5.1.7 Level Linearity

Test equipment: Power meter NRVD with power sensor NRV-Z5

Test setup:

- Connect power sensor to PORT1 or PORT2 of the network analyzer.

Settings at the network analyzer:

SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	Maximum value to minimum value
SWEEP TIME	200 s
MEAS	INPUT a1 INPUT a2

Measurement:

- Set test frequencies according to test report, read the level on the power meter.

Permissible deviations referred to the value at -10 dBm:

f = 40 kHz to 8 GHz

+10 to –5 dB	< 0.4 dB
–5 dB to –15 dB	< 0.8 dB

With option ZVR-B10 referred to the value at 0 dBm on PORT 1:

Var. 51, 52, 61, 62

20 kHz to 8 GHz

+6 dB to -9 dB	< 0.4 dB
-9 dB to -17 dB	< 0.6 dB

Var. 50, 60

20 kHz to 8 GHz

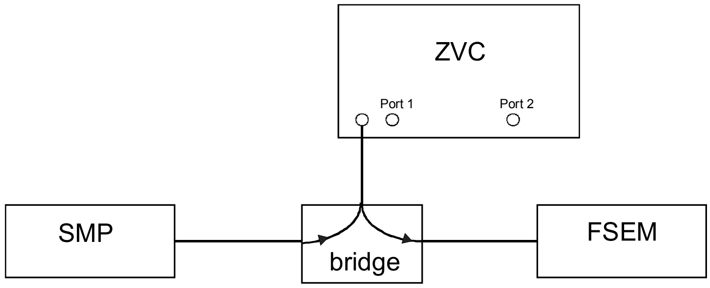
+10 dB to -5 dB	< 0.4 dB
-5 dB to -15 dB	< 0.6 dB

5.5.1.8 Matching to Output a1

(Only with Option R&S ZVR-B25, External Measurements)

Test equipment: Signal generator SMP, Spectrum Analyzer FSEM, VSWR–bridge

Test setup:



Settings at the network analyzer:

SWEEP	SINGLE POINT
CENTER	Test frequency + Δf
SWEEP TIME	500 s
NUMBER OF POINTS	3
SOURCE POWER	–10 dBm
MODE	EXTERNAL

Reference measurement:
- Use FSEM to record measured values with open circuit and short circuit at the test port of the SWR bridge and take the average.

Measurement:

Test frequency (SMP, FSEM):	Δf:	Return loss:
40 kHz to 8000 MHz	– 100 kHz	> 8 dB

Alternative Measurement for ZVC (firmware version 1.50 and higher)**:**

Test equipment: Test cable ZV-Z11, calibration kit ZV-Z21

Test setup:
- Connect test cable between PORT2 and Output a1 .

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	S22
SERVICE FUNCTION	2.13.1.1.2 (reset after the measurement via 2.13.0)
MARKER	Test frequency

Calibration:
- Perform one-port calibration at the end of the test cable (towards Output a1).

5.5.2 Testing the Receiver Specifications

5.5.2.1 Absolute Accuracy

Test equipment: Test cable ZV-Z11

Calibration:
- Perform POWER CAL a1, a2.

Test setup:
- Connect PORT1 to PORT 2 or Output a1 to INPUT b1 or to INPUT b2 via test cable.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	INPUT a1, INPUT a2
MARKER	MARKER CONT
MARKER	Test frequency
CAL	POWER UNCAL off
MEAS	INPUT b1, DRIVE PORT2
	INPUT b2, DRIVE PORT1
MODE EXTERNAL	INPUT b1
	INPUT b2
MARKER	Marker frequency = test frequency

Reference measurement:
- Record output power of signal generator at the test frequencies using a power meter.

Measurement:
- Set test frequencies according to test report.
- Read out marker value on the ZVx, take into account reference value.

Permissible deviation from the applied nominal level (–10 dBm) at PORT 1 or PORT 2, respectively:

20 kHz to 8 GHz < 2 dB

Measurement: Permissible deviation from the applied nominal level (–10 dBm) at INPUT b1 or INPUT b2, respectively:

20 kHz to 8 GHz < 2 dB

5.5.2.2 Linearity

Test equipment: Attenuator RSM

Test setup: Connect RSM between PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
CAL	POWER UNCAL off
MODE	SWEEP MODE : POWER SWEEP
SWEEP	NUMBER OF POINTS = 51
SOURCE	Test frequency
START	-25 dBm
STOP	Max
IF BANDWIDTH	10 Hz
MEAS	S12 (Linearity PORT1), S21 (Linearity PORT2)
FORMAT	MAGNITUDE, PHASE
MARKER	MARKER CONT
MARKER1	= -20 dBm

Measurement:

- Set test frequencies according to test report.
- Perform reference measurement at a level of –20 dBm at the test frequency.

SOURCE POWER max. value to min. value
(0 dBm to –25 dBm at f = 20 kHz to 6 GHz,
– 3 dBm to –25 dBm at f = 6 GHz to 8 GHz)

- Read the marker values (magnitude and phase) on the network analyzer, take into account the reference value.

Values < source power min.:

RSM	10 dB
SOURCE POWER	–15 dBm
New reference value	Marker value + deviation of the previous measurement

New measurement:

SOURCE POWER	–25 dBm
New measured value	Marker value – new reference value
RSM	Increase attenuation by 10 dB,etc.

Model 50 and 60:	Deviation from reference value (–20 dBm):	Permissible deviation:	
20 kHz to 10 MHz	+10 dB to +3 dB	<1 dB	<6°
	+ 3 dB to –20 dB	<0.2 dB	<2°
	-20 dB to –30 dB	<0.5 dB	<4°
	-30 dB to –45 dB	<1 dB	<6°
10 MHz to 4 GHz	+10 dB to +3 dB	<1 dB	<6°
	+ 3 dB to –50 dB	<0.2 dB	<1°
	– 50 dB to –60 dB	<0.5 dB	<4°

	–60 dB to –70 dB (ZVCE)	<1 dB	<6°
	–60 dB to –75 dB (ZVC)	<1 dB	<6°
4 GHz to 8 GHz	+10 dB to +3 dB	<1 dB	<6°
	+ 3 dB to –45 dB	<0.2 dB	<2°
	– 45 dB to –55 dB (ZVCE)	<1 dB	<6°
	–45 dB to –60 dB (ZVC)	<1 dB	<6°

Model 51, 52, 61, 62:	Deviation from reference value (–10 dBm):	Permissible deviation:	
300 kHz to 4 GHz	+ 3 dB to –70 dB	<0.2 dB	<1°
	–70 dB to –80 dB (ZVCE)	<1 dB	<6°
	–70 dB to –85 dB (ZVC)	<1 dB	<6°
4 GHz to 8 GHz	+3 dB to -35 dB	<0.2 dB	<2°
	–35 dB to –45 dB (ZVCE)	<1 dB	<6°
	–35 dB to –50 dB (ZVC)	<1 dB	<6°

Note: *Obtaining the linearity is made easier by using a set of Excel files available from Rohde & Schwarz. If the measured values are entered in the tables of these files, the linearity deviation is calculated automatically. Please consult our central service department (5SMF).*

5.5.2.3 Noise Level

Test equipment: Test cable ZV-Z21, attenuator RSM

Calibration:

- Connect PORT1 to PORT2 via test cable and attenuator
  Attenuator 0 dB, SOURCE POWER -10 dBm
  MEAS : INPUT b1 (INPUT b2)
- TRACE : DATA TO MEMORY : SHOW MATH

Test setup:

- Connect PORT1 to PORT2 via test cable and attenuator. Attenuator 110 dB.

Settings at the network analyzer:

PRESET	
SOURCE POWER	-25 dBm
MEAS	INPUT b1, INPUT b2
IF BANDWIDTH	3 kHz
AVG	SWEEP AVG 10
MARKER	MARKER CONT
MARKER	Marker frequency = test frequency

Measurement:
- ➢ Set test frequencies according to test report.
- ➢ Read marker value on the network analyzer taking the SOURCE POWER (-10 dB) into account.

Permissible noise values:

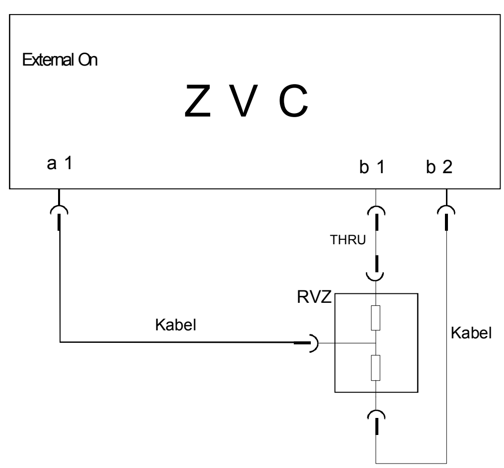
	Model 50, 60	Model 51, 52, 61, 62
20 kHz to 200 kHz	≤ -70 dBm	≤ -64 dBm
200 kHz to 20 MHz	≤ -90 dBm	≤ -84 dBm
20 MHz to 3 GHz	≤ -100 dBm	≤ -94 dBm
3 GHz to 4 GHz	≤ -90 dBm	≤ -84 dBm
4 GHz to 8 GHz	≤ -80 dBm	≤ -74 dBm

5.5.2.4 Matching Input b1 and Input b2

(Only with Option R&S ZVR-B25, External Measurements)

Test equipment, test set 50 Ω: Power Splitter RVZ, Calibration Kit ZV-Z21, Test Port Cable pair ZV-Z11

Test setup:



Block diagram for measuring the matching of input b1. For measurement of input b2, the connections from RVZ to Input b1/b2 are reversed.

Settings at the network analyzer:

MODE	EXTERNAL
SWEEP	LOG SWEEP
CENTER	Test frequency
MEAS	S11/S22
MARKER	= Measured frequency

Reference measurement: One-port calibration including THRU over the complete frequency range (for measurement at b1 and b2 an extra calibration each).

Measurement:

- Set marker frequencies according to test report, measure b1 and b2.
- Record return loss values.

Return loss: > 8 dB

Alternative Measurement (firmware version 1.50 and higher)**:**

Test equipment, test set 50 Ω: Calibration kit R&S ZV-Z21, pair of test cables R&S ZV-Z11

Test setup:

- Connect test PORT2 to Input b1 or PORT1 to Input b2 via test cable.

PRESET	
SWEEP	LOG SWEEP
MARKER	Test frequency
MEAS	S22 for measurement Input b1 S11 for measurement Input b2
SERVICE FUNCTION	2.13.1.2.2 for measurement Input b1 (reset: 2.13.0) 2.13.1.4.2 for measurement Input b2 (reset: 2.13.0)

Calibration: Perform one-port calibration at the end of the test cable (towards Input b1 or Input b2).

Measurement:

- Set test frequencies according to test report, measure b1 and b2.
- Take return loss values.

Return loss 20 kHz[1)] to 8 GHz: > 8 dB

[1)] Measurement below 20 kHz not required because the matching value is uniquely determined by the design at low frequencies. A possible fault is recognized when the level accuracy is measured.

5.5.3 Testing the Test Set Specifications

5.5.3.1 Matching to PORT1 and PORT2

Test equipment: Calibration Kit ZV-Z21, Test Port Cable pair ZV-Z11

Test setup: Test cable between PORT1 and PORT2.

Settings at the ZVC or ZVCE, respectively:

PRESET	
SWEEP	LOG SWEEP
MEAS	S22 for matching PORT1
	S11 for matching PORT2
MARKER	Test frequency

Reference measurement: Perform one-port calibration at the end of the cable over the complete frequency range (measurement PORT1: loosen cable from PORT1 and calibrate; measurement PORT2: loosen cable from PORT2 and calibrate).

Measurement:

- ➢ Set marker to test frequencies according to test report.
- ➢ Record return loss values.

Test frequency:	Return loss:		
	Mod. 51, 61	Mod. 52, 62	Mod. 50, 60
20 kHz to 40 kHz	> 10 dB	-----------	> 6 dB
40 kHz to 300 kHz	> 10 dB	-----------	> 6 dB
300 kHz to 5 MHz	> 10 dB	> 6 dB	> 6 dB
5 MHz to 10 MHz	> 10 dB	> 16 dB	> 6 dB
10 MHz to 100 MHz	> 16 dB	> 16 dB	> 6 dB
100 MHz to 1 GHz	> 18 dB	> 18 dB	> 6 dB
1 GHz to 3 GHz	> 18 dB	> 18 dB	> 10 dB
3 GHz to 4 GHz	> 16 dB	> 16 dB	> 10 dB
4 GHz to 8 GHz	> 6 dB	> 6 dB	> 10 dB

5.5.3.2 Directivity

Test equipment: MATCH (male) from calibration kit ZV-Z21

Test setup: Connect MATCH from calibration kit at PORT1 or PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
MEAS	S11 or S22
FORMAT	MAGNITUDE
MARKER	marker frequency = test frequency

Reference measurement: Perform reflection normalization (*CAL* menu) at PORT1 or PORT2, respectively.

Measurement:
- ➢ Set marker to test frequencies according to test report.
- ➢ Record directivity values.

Test frequency:	Directivity:		
	Mod. 50, 60	Mod. 52, 62	Mod. 51, 61
40 kHz to 5 MHz	----------	-----------	> 30 dB
5 MHz to 1.5 GHz	----------	> 30 dB	> 30 dB
1.5 GHz to 4 GHz	> 16 dB	> 30 dB	> 30 dB
4 GHz to 8 GHz	> 16 dB	> 8 dB	> 8 dB

5.5.3.3 Testing the Attenuators

Test equipment: Connecting cable ZV-Z11

Test setup: Connect cable between PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Test frequency
SOURCE POWER	-20 dBm for ATT xx ≤ 30 dB
	Maximum level for ATT xx > 30 dB
SOURCE	ATTxx
IF BANDWIDTH	10 Hz
MEAS	S21 for measurement STEP ATT a1 and STEP ATT b2
	S12 for measurement STEP ATT a2 and STEP ATT b1
FORMAT	MAGNITUDE
MARKER	Marker frequency = test frequency

Reference measurement:
- ➢ Perform reference measurements at the test frequencies and with an attenuation value of 10 dB.

Reference value = marker value

Measurement:
- ➢ Set test frequencies according to test report.
- ➢ Set ATT xx to 0 dB and SOURCE POWER to –20 dBm. Increase the attenuation in steps of 10 dB up to 30 dB and read out the respective marker value.

Attenuation error = (marker value – reference value)

- ➢ Set ATT xx to 30 dB and SOURCE POWER to maximum value. Determine the difference from the measurement with SOURCE POWER –20 dBm.
- ➢ Increase the attenuation in steps of 10 dB up to 70 dB and read out the respective marker value.

Attenuation error = (marker value – reference value – difference value)

Permissible deviations:

ATT a1, a2	ATT b1, b2
< 2 dB	< 2 dB

5.5.3.4 Crosstalk

Test equipment: 2 N-short-circuits

Test setup: Connect N-short-circuits to PORT1 and PORT2.

Settings at the network analyzer:

PRESET	
SWEEP	LOG SWEEP
SOURCE POWER	Maximum value
IF BANDWIDTH	1 Hz
AVERAGE	POINT AVG 5
MEAS	RATIO b1/b2, DRIVE PORT 2 (crosstalk port 1)
	RATIO b2/b1, DRIVE PORT 1 (crosstalk port 2)
MARKER	Marker frequency = test frequency

Reference measurement: None

Measurement:
- ➢ Read out marker value on the network analyzer.

Permissible crosstalk values:

	Mod. 60	Mod. 50	Mod. 61, 62	Mod. 51, 52	Port2 to Port1 w. opt. ZVR-B10
20 kHz to 200 kHz	≤ –90 dB	≤ –90 dB	≤ –84 dB	≤ –84 dB	≤ –75 dB
200 kHz to 5 MHz	≤ –120 dB	≤ –120 dB	≤ –114 dB	≤ –114 dB	≤ –105 dB
5 MHz to 1 GHz	≤ –130 dB	≤ –125 dB	≤ –124 dB	≤ –119 dB	≤ –110 dB
1 GHz to 3 GHz	≤ –120 dB	≤ –115 dB	≤ –114 dB	≤ –109 dB	≤ –100 dB
3 GHz to 4 GHz	≤ –110 dB	≤ –105 dB	≤ –104 dB	≤ –99 dB	≤ –90 dB
4 GHz to 6 GHz	≤ –105 dB	≤ –100 dB	≤ –99 dB	≤ –94 dB	≤ –90 dB
6 GHz to 8 GHz	≤ –100 dB	≤ –95 dB	≤ –94 dB	≤ –89 dB	≤ –85 dB

5.6 Performance Test Report (ZVC, ZVCE)

Table 5-5: Performance Test Report – Generator Specifications

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Frequency accuracy**					
		5.2.1.1				
	500 MHz		-0.98	______	0.98	MHz
	800 MHz		-1.58	______	1.58	MHz
	1500 MHz		-2.89	______	2.89	MHz
	2300 MHz		-4.58	______	4.58	MHz
	3000 MHz		-5.98	______	5.98	MHz
	3999 MHz		-7.98	______	7.98	MHz
	4999 MHz		-9.98	______	9.98	MHz
2	**Harmon. suppression**					
	Source Level: max. value	5.2.1.2				
	40 kHz		25	______	-	dB
	100 kHz		25	______	-	dB
	300 kHz		25	______	-	dB
	1 MHz		25	______	-	dB
	5 MHz		25	______	-	dB
	10 MHz		25	______	-	dB
	50 MHz		25	______	-	dB
	100 MHz		25	______	-	dB
	151 MHz		25	______	-	dB
	200 MHz		25	______	-	dB
	400 MHz		25	______	-	dB
	751 MHz		25	______	-	dB
	1001 MHz		25	______	-	dB
	1501 MHz		25	______	-	dB
	2001 MHz		25	______	-	dB
	2500 MHz		25	______	-	dB
	3000 MHz		25	______	-	dB
	3500 MHz		25	______	-	dB
	4000 MHz		25	______	-	dB
	4010 MHz		25	______	-	dB
	5000 MHz		25	______	-	dB
	6000 MHz		25	______	-	dB
	7000 MHz		25	______	-	dB
	8000 MHz		25	______	-	dB
	Source Level -10 dBm					
	20 kHz		35	______	-	dB
	100 kHz		35	______	-	dB
	300 kHz		35	______	-	dB
	1 MHz		35	______	-	dB
	5 MHz		35	______	-	dB
	10 MHz		35	______	-	dB
	50 MHz		35	______	-	dB
	100 MHz		35	______	-	dB
	151 MHz		35	______	-	dB
	200 MHz		35	______	-	dB
	400 MHz		35	______	-	dB
	751 MHz		35	______	-	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
	1001 MHz		35	_________	-	dB
	1501 MHz		35	_________	-	dB
	2001 MHz		35	_________	-	dB
	2500 MHz		35	_________	-	dB
	3000 MHz		35	_________	-	dB
	3500 MHz		35	_________	-	dB
	4000 MHz		35	_________	-	dB
	4010 MHz		35	_________	-	dB
	5000 MHz		35	_________	-	dB
	6000 NHz		35	_________	-	dB
	7000 MHz		35	_________	-	dB
	8000 MHz		35	_________	-	dB
2	**Harmon. Suppression with option ZVR-B10**	5.2.1.2				
	Source Level: max. value					
	20 kHz		20	_________	-	dB
	40 kHz		22	_________	-	dB
	300 kHz		22	_________	-	dB
	1 MHz		22	_________	-	dB
	5 MHz		22	_________	-	dB
	10 MHz		22	_________	-	dB
	20 MHz		22	_________	-	dB
	70 MHz		25	_________	-	dB
	151 MHz		25	_________	-	dB
	200 MHz		25	_________	-	dB
	400 MHz		25	_________	-	dB
	751 MHz		25	_________	-	dB
	1001 MHz		25	_________	-	dB
	1501 MHz		25	_________	-	dB
	2000 MHz		25	_________	-	dB
	2500 MHz		20	_________	-	dB
	3000 MHz		20	_________	-	dB
	3500 MHz		20	_________	-	dB
	4000 MHz		20	_________	-	dB
	4010 MHz		20	_________	-	dB
	5000 MHz		20	_________	-	dB
	6000 MHz		20	_________	-	dB
	7000 MHz		20	_________	-	dB
	8000 MHz		20	_________	-	dB
	Source Level 0 dBm					
	20 kHz		30	_________	-	dB
	40 kHz		30	_________	-	dB
	300 kHz		30	_________	-	dB
	1 MHz		30	_________	-	dB
	5 MHz		30	_________	-	dB
	10 MHz		30	_________	-	dB
	20 MHz		35	_________	-	dB
	70 MHz		35	_________	-	dB
	151 MHz		35	_________	-	dB
	200 MHz		35	_________	-	dB
	400 MHz		35	_________	-	dB
	751 MHz		35	_________	-	dB

Item No.	Characteristics		Measuremt. according to section	Min. value	Actual value	Max. value	Unit
	1001 MHz			35	________	-	dB
	1501 MHz			35	________	-	dB
	2000 MHz			35	________	-	dB
	2500 MHz			32	________	-	dB
	3000 MHz			32	________	-	dB
	3500 MHz			32	________	-	dB
	4000 MHz			32	________	-	dB
	4010 MHz			32	________	-	dB
	5000 MHz			32	________	-	dB
	6000 NHz			32	________	-	dB
	7000 MHz			32	________	-	dB
	8000 MHz			32	________	-	dB
3	**Spurious suppression**						
	ZVx-frequ.:	spur. wave:	5.2.1.3				
	20 kHz	63.105 MHz		40	________	-	dB
		63.855 MHz		40	________	-	dB
	100 kHz	63.025 MHz		40	________	-	dB
		62.925 MHz		40	________	-	dB
	1 MHz	62.125 MHz		40	________	-	dB
		61.125 MHz		40	________	-	dB
	10 MHz	53.125 MHz		40	________	-	dB
		43.125 MHz		40	________	-	dB
	50 MHz	202.5 MHz		40	________	-	dB
		152.5 MHz		40	________	-	dB
	100 MHz	152.5 MHz		40	________	-	dB
		52.5 MHz		40	________	-	dB
	149 MHz	103.5 MHz		40	________	-	dB
		45.5 MHz		40	________	-	dB
	150 MHz	860 MHz		40	________	-	dB
		710 MHz		40	________	-	dB
	250 MHz	760 MHz		40	________	-	dB
		510 MHz		40	________	-	dB
	350 MHz	660 MHz		40	________	-	dB
		310 MHz		40	________	-	dB
	450 MHz	560 MHz		40	________	-	dB
		110 MHz		40	________	-	dB
	550 MHz	460 MHz		40	________	-	dB
		90 MHz		40	________	-	dB
	650 MHz	360 MHz		40	________	-	dB
		290 MHz		40	________	-	dB
	749 MHz	261 MHz		40	________	-	dB
		488 MHz		40	________	-	dB
	2000 MHz	1000 MHz		40	________	-	dB
		3000 MHz		40	________	-	dB
	2200 MHz	1100 MHz		40	________	-	dB
		3300 MHz		40	________	-	dB
	2400 MHz	1200 MHz		40	________	-	dB
		3600 MHz		40	________	-	dB
	2600 MHz	1300 MHz		40	________	-	dB
		3900 MHz		40	________	-	dB
	2610 MHz	1305 MHz		40	________	-	dB
		3915 MHz		40	________	-	dB
	2800 MHz	1400 MHz		40	________	-	dB
		4200 MHz		40	________	-	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
	3000 MHz 1500 MHz		40	__________	-	dB
	4500 MHz		40	__________	-	dB
	3200 MHz 1600 MHz		40	__________	-	dB
	4800 MHz		40	__________	-	dB
	3310 MHz 1655 MHz		40	__________	-	dB
	4965 MHz		40	__________	-	dB
	3400 MHz 1700 MHz		40	__________	-	dB
	5100 MHz		40	__________	-	dB
	3600 MHz 1800 MHz		40	__________	-	dB
	5400 MHz		40	__________	-	dB
	3800 MHz 1900 MHz		40	__________	-	dB
	5700 MHz		40	__________	-	dB
	4000 MHz 2000 MHz		40	__________	-	dB
	6000 MHz		40	__________	-	dB
	4100 MHz 1025 MHz		40	__________	-	dB
	2050 MHz		40	__________	-	dB
	3075 MHz		40	__________	-	dB
	6150 MHz		40	__________	-	dB
	4500 MHz 1125 MHz		40	__________	-	dB
	2250 MHz		40	__________	-	dB
	3375 MHz		40	__________	-	dB
	6750 MHz		40	__________	-	dB
	5000 MHz 1250 MHz		40	__________	-	dB
	2500 MHz		40	__________	-	dB
	3750 MHz		40	__________	-	dB
	7500 MHz		40	__________	-	dB
	5100 MHz 1275 MHz		40	__________	-	dB
	2550 MHz		40	__________	-	dB
	3825 MHz		40	__________	-	dB
	7650 MHz		40	__________	-	dB
	5700 MHz 1425 MHz		40	__________	-	dB
	2850 MHz		40	__________	-	dB
	4275 MHz		40	__________	-	dB
	6300 MHz 1575 MHz		40	__________	-	dB
	3150 MHz		40	__________	-	dB
	4725 MHz		40	__________	-	dB
	6400 MHz 1600 MHz		40	__________	-	dB
	3200 MHz		40	__________	-	dB
	4800 MHz		40	__________	-	dB
	7200 MHz 1800 MHz		40	__________	-	dB
	3600 MHz		40	__________	-	dB
	5400 MHz		40	__________	-	dB
	8000 MHz 2000 MHz		40	__________	-	dB
	4000 MHz		40	__________	-	dB
	6000 MHz		40	__________	-	dB
4	**Phase noise**	5.2.1.4				
	10 MHz		-	__________	– 110	dBc
	150 MHz		-	__________	– 100	dBc
	1000 MHz		-	__________	– 90	dBc
	1970 MHz		-	__________	– 84	dBc
	3000 MHz		-	__________	– 80.5	dBc
	4000 MHz		-	__________	– 78	dBc
	8000 MHz		-	__________	– 72	dBc

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
5	**Residual FM**	5.2.1.5				
	1 MHz		-	___________	1	Hz
	9.99 MHz		-	___________	1	Hz
	149.9 MHz		-	___________	2	Hz
	750 MHz		-	___________	5	Hz
	1000 MHz		-	___________	5	Hz
	2000 MHz		-	___________	10	Hz
	3000 MHz		-	___________	20	Hz
	4000 MHz		-	___________	20	Hz
	8000 MHz		-	___________	40	Hz
6	**Level accuracy OUTPUT a1**	5.2.1.6				
Option External Measurements	**Level:** –10 dBm 0 dBm w. opt. ZVR-B10					
	20 kHz		–1	___________	1	dB
	40 kHz		–1	___________	1	dB
	100 kHz		–1	___________	1	dB
	1 MHz		–1	___________	1	dB
	2 MHz		–0.5	___________	0.5	dB
	3 MHz		–0.5	___________	0.5	dB
	10 MHz		–0.5	___________	0.5	dB
	50 MHz		–0.5	___________	0.5	dB
	200 MHz		–0.5	___________	0.5	dB
	500 MHz		–0.5	___________	0.5	dB
	1000 MHz		–0.5	___________	0.5	dB
	1500 MHz		–0.5	___________	0.5	dB
	2000 MHz		–0.5	___________	0.5	dB
	2500 MHz		–0.5	___________	0.5	dB
	3000 MHz		–0.5	___________	0.5	dB
	3500 MHz		–0-5	___________	0.5	dB
	4000 MHz		–0.5	___________	0.5	dB
	4500 MHz		–0.5	___________	0.5	dB
	5000 MHz		–0.5	___________	0.5	dB
	5500 MHz		–0.5	___________	0.5	dB
	6000 MHz		–0.5	___________	0.5	dB
	6500 MHz		–0.5	___________	0.5	dB
	7000 MHz		–0.5	___________	0.5	dB
	7500 MHz		–0.5	___________	0.5	dB
	8000 MHz		–0.5	___________	0.5	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
6	**Level accuracy PORT1**	5.2.1.6				
	Level: –10 dBm 0 dBm w. opt. ZVR-B10					
	20 kHz		–1		1	dB
	40 kHz		–1		1	dB
	100 kHz		–1		1	dB
	1 MHz		–1		1	dB
	2 MHz		–0.5		0.5	dB
	3 MHz		–0.5		0.5	dB
	10 MHz		–0.5		0.5	dB
	50 MHz		–0.5		0.5	dB
	200 MHz		–0.5		0.5	dB
	500 MHz		–0.5		0.5	dB
	1000 MHz		–0.5		0.5	dB
	1500 MHz		–0.5		0.5	dB
	2000 MHz		–0.5		0.5	dB
	2500 MHz		–0.5		0.5	dB
	3000 MHz		–0.5		0.5	dB
	3500 MHz		–0.5		0.5	dB
	4000 MHz		–0.5		0.5	dB
	4500 MHz		–0.5		0.5	dB
	5000 MHz		–0.5		0.5	dB
	5500 MHz		–0.5		0.5	dB
	6000 MHz		–0.5		0.5	dB
	6500 MHz		–0.5		0.5	dB
	7000 MHz		–0.5		0.5	dB
	7500 MHz		–0.5		0.5	dB
	8000 MHz		–0.5		0.5	dB
6	**Level accuracy PORT2**	5.2.1.6				
	Level: –10 dBm					
	20 kHz		–1		1	dB
	40 kHz		–1		1	dB
	100 kHz		–1		1	dB
	1 MHz		–1		1	dB
	2 MHz		–0.5		0.5	dB
	3 MHz		–0.5		0.5	dB
	10 MHz		–0.5		0.5	dB
	50 MHz		–0.5		0.5	dB
	200 MHz		–0.5		0.5	dB
	500 MHz		–0.5		0.5	dB
	1000 MHz		–0.5		0.5	dB
	1500 MHz		–0.5		0.5	dB
	2000 MHz		–0.5		0.5	dB
	2500 MHz		–0.5		0.5	dB
	3000 MHz		–0.5		0.5	dB
	3500 MHz		–0.5		0.5	dB
	4000 MHz		–0.5		0.5	dB
	4500 MHz		–0.5		0.5	dB
	5000 MHz		–0.5		0.5	dB
	5500 MHz		–0.5		0.5	dB
	6000 MHz		–0.5		0.5	dB
	6500 MHz		–0.5		0.5	dB
	7000 MHz		–0.5		0.5	dB
	7500 MHz		–0.5		0.5	dB
	8000 MHz		–0.5		0.5	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
7	**Level linearity** Reference: –10 dBm	5.2.1.7				
	f = 40 kHz					
	10dB 5dB –5dB –10dB –15dB		9.6 4.6 –5.4 –10.8 –15.8	________ ________ ________ ________ ________	10.4 5.4 –4.6 –9.2 –14.2	dB dB dB dB dB
	f = 1 MHz					
	10dB 5dB –5dB –10dB –15dB		9.6 4.6 –5.4 –10.8 –15.8	________ ________ ________ ________ ________	10.4 5.4 –4.6 –9.2 –14.2	dB dB dB dB dB
	f = 100 MHz					
	10 dB 5 dB –5 dB –10 dB –15 dB		9.6 4.6 –5.4 –10.8 –15.8	________ ________ ________ ________ ________	10.4 5.4 –4.6 –9.2 –14.2	dB dB dB dB dB
	f = 4000 MHz					
	10 dB 5 dB –5 dB –10 dB –15 dB		9.6 4.6 –5.4 –10.8 –15.8	________ ________ ________ ________ ________	10.4 5.4 –4.6 –9.2 –14.2	dB dB dB dB dB
	f = 8000 MHz					
	7 dB 5 dB –5 dB –10 dB –15 dB		6.6 4.6 –5.4 –10.8 –15.8	________ ________ ________ ________ ________	7.4 5.4 –4.6 –9.2 –14.2	dB dB dB dB dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
7	**Level linearity Model 50 and 60 w. opt. ZVR-B10** Reference: 0 dBm	5.2.1.7				
	f = 20 kHz					
	10dB		9.6	________	10.4	dB
	5dB		4.6	________	5.4	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
	f = 1 MHz					
	10dB		9.6	________	10.4	dB
	5dB		4.6	________	5.4	dB
	–5dB		–5.4	________	–4.6	dB
	–10dB		–10.6	________	–9.4	dB
	–15dB		–15.6	________	–14.4	dB
	f = 100 MHz					
	10 dB		9.6	________	10.4	dB
	5 dB		4.6	________	5.4	dB
	–5 dB		–5.4	________	–4.6	dB
	–10 dB		–10.6	________	–9.2	dB
	–15 dB		–15.6	________	–14.2	dB
	f = 4000 MHz					
	10 dB		9.6	________	10.4	dB
	5 dB		4.6	________	5.4	dB
	–5 dB		–5.4	________	–4.6	dB
	–10 dB		–10.8	________	–9.4	dB
	–15 dB		–15.8	________	–14.4	dB
	f = 8000 MHz					
	7 dB		6.6	________	7.4	dB
	5 dB		4.6	________	5.4	dB
	–5 dB		–5.4	________	–4.6	dB
	–10 dB		–10.6	________	–9.4	dB
	–15 dB		–15.6	________	–14.4	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
7	**Level linearity Model 51 and 61 w. opt. ZVR-B10** Reference: 0 dBm	5.2.1.7				
	f = 20 kHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 1 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 100 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 6000 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 8000 MHz					
	3 dB		2.6	________	3.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
7	**Level linearity Model 52 and 62 w. opt. ZVR-B10** Reference: 0 dBm	5.2.1.7				
	f = 300 kHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 1 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 100 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 6000 MHz					
	6 dB		5.6	________	6.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB
	f = 8000 MHz					
	3 dB		2.6	________	3.4	dB
	–4 dB		–4.4	________	–3.6	dB
	–9 dB		–9.4	________	–8.6	dB
	–14 dB		–14.6	________	–13.4	dB
	–17 dB		–17.6	________	–16.4	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
8	**Matching Output a1**	5.2.1.8				
Only Option External Measurements	400 kHz		-	________	–8	dB
	2 MHz		-	________	–8	dB
	100 MHz		-	________	–8	dB
	300 MHz		-	________	–8	dB
	1000 MHz		-	________	–8	dB
	2000 MHz		-	________	–8	dB
	3000 MHz		-	________	–8	dB
	3500 MHz		-	________	–8	dB
	4000 MHz		-	________	–8	dB
	4500 MHz		-	________	–8	dB
	5000 MHz		-	________	–8	dB
	5500 MHz		-	________	–8	dB
	6000 MHz		-	________	–8	dB
	6500 MHz		-	________	–8	dB
	7000 MHz		-	________	–8	dB
	7500 MHz		-	________	–8	dB
	8000 MHz		-	________	–8	dB

Table 5-6 Performance Test Report: Receiver Specifications

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Absolute Accuracy PORT1** **Level:** –10 dBm	5.2.2.1				
Model	20 kHz		–8	__________	-12	dBm
50,	40 kHz		–8	__________	-12	dBm
51,60,61	100 kHz		–8	__________	-12	dBm
	300 kHz		–8	__________	-12	dBm
All models	1 MHz		–8	__________	-12	dBm
	10 MHz		–8	__________	-12	dBm
	100 MHz		–8	__________	-12	dBm
	500 MHz		–8	__________	-12	dBm
	1000 MHz		–8	__________	-12	dBm
	1500 MHz		–8	__________	-12	dBm
	2000 MHz		–8	__________	-12	dBm
	2500 MHz		–8	__________	-12	dBm
	3000 MHz		–8	__________	-12	dBm
	3500 MHz		–8	__________	-12	dBm
	4000 MHz		–8	__________	-12	dBm
	4500 MHz		–8	__________	-12	dBm
	5000 MHz		–8	__________	-12	dBm
	5500 MHz		–8	__________	-12	dBm
	6000 MHz		–8	__________	-12	dBm
	6500 MHz		–8	__________	-12	dBm
	7000 MHz		–8	__________	-12	dBm
	7500 MHz		–8	__________	-12	dBm
	8000 MHz		–8	__________	-12	dBm
1	**Absolute Accuracy PORT2** **Level:** –10 dBm	5.2.2.1				
Model	20 kHz		–8	__________	-12	dBm
50,	40 kHz		–8	__________	-12	dBm
51,60,61	100 kHz		–8	__________	-12	dBm
	300 kHz		–8	__________	-12	dBm
All models	1 MHz		–8	__________	-12	dBm
	10 MHz		–8	__________	-12	dBm
	100 MHz		–8	__________	-12	dBm
	500 MHz		–8	__________	-12	dBm
	1000 MHz		–8	__________	-12	dBm
	1500 MHz		–8	__________	-12	dBm
	2000 MHz		–8	__________	-12	dBm
	2500 MHz		–8	__________	-12	dBm
	3000 MHz		–8	__________	-12	dBm
	3500 MHz		–8	__________	-12	dBm
	4000 MHz		–8	__________	-12	dBm
	4500 MHz		–8	__________	-12	dBm
	5000 MHz		–8	__________	-12	dBm
	5500 MHz		–8	__________	-12	dBm
	6000 MHz		–8	__________	-12	dBm
	6500 MHz		–8	__________	-12	dBm
	7000 MHz		–8	__________	-12	dBm
	7500 MHz		–8	__________	-12	dBm
	8000 MHz		–8	__________	-12	dBm

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Absolute Accuracy Input b1**					
	Level: –10 dBm	5.2.2.1				
Option Ext. Measurements						
	20 kHz		–8	________	-12	dBm
	40 kHz		–8	________	-12	dBm
	100 kHz		–8	________	-12	dBm
	500 kHz		–8	________	-12	dBm
	1 MHz		–8	________	-12	dBm
	10 MHz		–8	________	-12	dBm
	100 MHz		–8	________	-12	dBm
	500 MHz		–8	________	-12	dBm
	1000 MHz		–8	________	-12	dBm
	1500 MHz		–8	________	-12	dBm
	2000 MHz		–8	________	-12	dBm
	2500 MHz		–8	________	-12	dBm
	3000 MHz		–8	________	-12	dBm
	3500 MHz		–8	________	-12	dBm
	4000 MHz		–8	________	-12	dBm
	4500 MHz		–8	________	-12	dBm
	5000 MHz		–8	________	-12	dBm
	5500 MHz		–8	________	-12	dBm
	6000 MHz		–8	________	-12	dBm
	6500 MHz		–8	________	-12	dBm
	7000 MHz		–8	________	-12	dBm
	7500 MHz		–8	________	-12	dBm
	8000 MHz		–8	________	-12	dBm
1	**Absolute Accuracy Input b2**					
	Level: –10 dBm	5.2.2.1				
Option Ext. Measure-ments						
	20 kHz		–8	________	-12	dBm
	40 kHz		–8	________	-12	dBm
	100 kHz		–8	________	-12	dBm
	500 kHz		–8	________	-12	dBm
	1 MHz		–8	________	-12	dBm
	10 MHz		–8	________	-12	dBm
	100 MHz		–8	________	-12	dBm
	500 MHz		–8	________	-12	dBm
	1000 MHz		–8	________	-12	dBm
	1500 MHz		–8	________	-12	dBm
	2000 MHz		–8	________	-12	dBm
	2500 MHz		–8	________	-12	dBm
	3000 MHz		–8	________	-12	dBm
	3500 MHz		–8	________	-12	dBm
	4000 MHz		–8	________	-12	dBm
	4500 MHz		–8	________	-12	dBm
	5000 MHz		–8	________	-12	dBm
	5500 MHz		–8	________	-12	dBm
	6000 MHz		–8	________	-12	dBm
	6500 MHz		–8	________	-12	dBm
	7000 MHz		–8	________	-12	dBm
	7500 MHz		–8	________	-12	dBm
	8000 MHz		–8	________	-12	dBm

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3	**Linearity model 50 and 60 Magnitude** Reference: -20 dBm f = 1.5 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –1 –0.2 –0.2	 ________ ________ ________	 1 0.2 0.2	 dB dB dB
3	**Linearity model 50 and 60 Phase** f = 1.5 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –6 –2 –2	 ________ ________ ________	 6 2 2	 degrees degrees degrees
3	**Linearity model 50 and 60 Magnitude** f = 4000 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –1 –0.2 –0.2	 ________ ________ ________	 1 0.2 0.2	 dB dB dB
3	**Linearity model 50 and 60 Phase** f = 4000 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –6 –1 –1	 ________ ________ ________	 6 1 1	 degrees degrees degrees
3	**Linearity model 50 and 60 Magnitude** f = 8000 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –1 –0.2 –0.2	 ________ ________ ________	 1 0.2 0.2	 dB dB dB
3	**Linearity model 50 and 60 Phase** f = 8000 MHz 10 dB 3 dB –5 dB	5.2.2.2	 –6 –1 –1	 ________ ________ ________	 6 1 1	 degrees degrees degrees

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3	**Linearity model 51, 52, 61, 62** **Magnitude** Reference: -10 dBm f = 1.5 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –0.2 –0.2 –0.2	 ________ ________ ________	 0.2 0.2 0.2	 dB dB dB
3	**Linearity model 51, 52, 61, 62** **Phase** f = 1.5 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –1 –1 –1	 ________ ________ ________	 1 1 1	 degrees degrees degrees
3	**Linearity model 51, 52, 61, 62** **Magnitude** f = 4000 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –0.2 –0.2 –0.2	 ________ ________ ________	 0.2 0.2 0.2	 dB dB dB
3	**Linearity model 51, 52, 61, 62** **Phase** f = 4000 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –1 –1 –1	 ________ ________ ________	 1 1 1	 degrees degrees degrees
3	**Linearity model 51, 52, 61, 62** **Magnitude** f = 8000 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –0.2 –0.2 –0.2	 ________ ________ ________	 0.2 0.2 0.2	 dB dB dB
3	**Linearity model 51, 52, 61, 62** **Phase** f = 8000 MHz 3 dB –5 dB –15 dB	5.2.2.2	 –2 –2 –2	 ________ ________ ________	 2 2 2	 degrees degrees degrees

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
4	**Noise level b1**					
	Model 50 and 60	5.2.2.3				
	21 kHz		–	________	–70	dBm
	150 kHz		–	________	–70	dBm
	200 kHz		–	________	–90	dBm
	300 kHz		–	________	–90	dBm
	19 MHz		–	________	–90	dBm
	20 MHz		–	________	–100	dBm
	100 MHz		–	________	–100	dBm
	200 MHz		–	________	–100	dBm
	700 MHz		–	________	–100	dBm
	1000 MHz		–	________	–100	dBm
	2000 MHz		–	________	–100	dBm
	3000 MHz		–	________	–100	dBm
	4000 MHz		–	________	–90	dBm
	5000 MHz		–	________	–80	dBm
	6000 MHz		–	________	–80	dBm
	7000 MHz		–	________	–80	dBm
	8000 MHz		–	________	–80	dBm
4	**Noise level b2**	5.2.2.3				
	Model 50 and 60					
	21 kHz		–	________	–70	dBm
	150 kHz		–	________	–70	dBm
	200 kHz		–	________	–90	dBm
	300 kHz		–	________	–90	dBm
	19 MHz		–	________	–90	dBm
	20 MHz		–	________	–100	dBm
	100 MHz		–	________	–100	dBm
	200 MHz		–	________	–100	dBm
	700 MHz		–	________	–100	dBm
	1000 MHz		–	________	–100	dBm
	2000 MHz		–	________	–100	dBm
	3000 MHz		–	________	–100	dBm
	4000 MHz		–	________	–90	dBm
	5000 MHz		–	________	–80	dBm
	6000 MHz		–	________	–80	dBm
	7000 MHz		–	________	–80	dBm
	8000 MHz		–	________	–80	dBm
4	**Noise level b1**					
	Model 51, 52, 61, 62	5.2.2.3				
Model	21 kHz		–	________	–64	dBm
51 and 61	150 kHz		–	________	–64	dBm
	200 kHz		–	________	–84	dBm
All models	300 kHz		–	________	–84	dBm
	19 MHz		–	________	–84	dBm
	20 MHz		–	________	–94	dBm
	100 MHz		–	________	–94	dBm
	200 MHz		–	________	–94	dBm
	700 MHz		–	________	–94	dBm
	1000 MHz		–	________	–94	dBm
	2000 MHz		–	________	–94	dBm
	3000 MHz		–	________	–94	dBm
	4000 MHz		–	________	–84	dBm
	5000 MHz		–	________	–74	dBm
	6000 MHz		–	________	–74	dBm
	7000 MHz		–	________	–74	dBm
	8000 MHz		–	________	–74	dBm

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
4	**Noise level b2** **Model 51, 52, 61, 62**	5.2.2.3				
Model **51 and 61**	21 kHz 150 kHz 200 kHz		– – –	________ ________ ________	–64 –64 –84	dBm dBm dBm
All models	300 kHz 19 MHz 20 MHz 100 MHz 200 MHz 700 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz 5000 MHz 6000 MHz 7000 MHz 8000 MHz		– – – – – – – – – – – – – –	________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	–84 –84 –94 –94 –94 –94 –94 –94 –94 –84 –74 –74 –74 –74	dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm
5	**Matching Input b1**	5.2.2.4				
Option External Measure-ments	20 kHz 1.9 MHz 2 MHz 100 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz 5000 MHz 6000 MHz 7000 MHz 8000 MHz		– – – – – – – – – – – –	________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	–8 –8 –8 –8 –8 –8 –8 –8 –8 –8 –8 –8	dB dB dB dB dB dB dB dB dB dB dB dB
5	**Matching Input b2**	5.2.2.4				
Option External Measure-ments	20 kHz 1.9 MHz 2 MHz 100 MHz 1000 MHz 2000 MHz 3000 MHz 4000 MHz 5000 MHz 6000 MHz 7000 MHz 8000 MHz		– – – – – – – – – – – –	________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________ ________	–8 –8 –8 –8 –8 –8 –8 –8 –8 –8 –8 –8	dB dB dB dB dB dB dB dB dB dB dB dB

Table 5-7 Performance Test Report: Test Set Specifications

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Matching PORT1 Model 50 and 60**	5.2.3.1				
	20 kHz		–	________	–6	dB
	40 kHz		–	________	–6	dB
	100 kHz		–	________	–6	dB
	10 MHz		–	________	–6	dB
	100 MHz		–	________	–6	dB
	500 MHz		–	________	–6	dB
	1000 MHz		–	________	–10	dB
	1500 MHz		–	________	–10	dB
	2000 MHz		–	________	–10	dB
	2500 MHz		–	________	–10	dB
	3000 MHz		–	________	–10	dB
	3500 MHz		–	________	–10	dB
	4000 MHz		–	________	–10	dB
	4500 MHz		–	________	–10	dB
	5000 MHz		–	________	–10	dB
	5500 MHz		–	________	–10	dB
	6000 MHz		–	________	–10	dB
	6500 MHz		–	________	–10	dB
	7000 MHz		–	________	–10	dB
	7500 MHz		–	________	–10	dB
	8000 MHz		–	________	–10	dB
1	**Matching PORT2 Model 50 and 60**	5.2.3.1				
	20 kHz		–	________	–6	dB
	40 kHz		–	________	–6	dB
	100 kHz		–	________	–6	dB
	10 MHz		–	________	–6	dB
	100 MHz		–	________	–6	dB
	500 MHz		–	________	–6	dB
	1000 MHz		–	________	–10	dB
	1500 MHz		–	________	–10	dB
	2000 MHz		–	________	–10	dB
	2500 MHz		–	________	–10	dB
	3000 MHz		–	________	–10	dB
	3500 MHz		–	________	–10	dB
	4000 MHz		–	________	–10	dB
	4500 MHz		–	________	–10	dB
	5000 MHz		–	________	–10	dB
	5500 MHz		–	________	–10	dB
	6000 MHz		–	________	–10	dB
	6500 MHz		–	________	–10	dB
	7000 MHz		–	________	–10	dB
	7500 MHz		–	________	–10	dB
	8000 MHz		–	________	–10	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Matching PORT1 Model 51 and 61**	5.2.3.1				
	40 kHz		–	________	–10	dB
	100 kHz		–	________	–10	dB
	10 MHz		–	________	–16	dB
	100 MHz		–	________	–18	dB
	500 MHz		–	________	–18	dB
	1000 MHz		–	________	–18	dB
	1500 MHz		–	________	–18	dB
	2000 MHz		–	________	–18	dB
	2500 MHz		–	________	–18	dB
	3000 MHz		–	________	–18	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–6	dB
	5000 MHz		–	________	–6	dB
	5500 MHz		–	________	–6	dB
	6000 MHz		–	________	–6	dB
	6500 MHz		–	________	–6	dB
	7000 MHz		–	________	–6	dB
	7500 MHz		–	________	–6	dB
	8000 MHz		–	________	–6	dB
1	**Matching PORT2 Model 51 and 61**	5.2.3.1				
	40 kHz		–	________	–10	dB
	100 kHz		–	________	–10	dB
	10 MHz		–	________	–16	dB
	100 MHz		–	________	–18	dB
	500 MHz		–	________	–18	dB
	1000 MHz		–	________	–18	dB
	1500 MHz		–	________	–18	dB
	2000 MHz		–	________	–18	dB
	2500 MHz		–	________	–18	dB
	3000 MHz		–	________	–18	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–6	dB
	5000 MHz		–	________	–6	dB
	5500 MHz		–	________	–6	dB
	6000 MHz		–	________	–6	dB
	6500 MHz		–	________	–6	dB
	7000 MHz		–	________	–6	dB
	7500 MHz		–	________	–6	dB
	8000 MHz		–	________	–6	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Matching PORT1 Model 52 and 62**	5.2.3.1				
	300 kHz		–	________	–6	dB
	5 MHz		–	________	–16	dB
	100 MHz		–	________	–18	dB
	500 MHz		–	________	–18	dB
	1000 MHz		–	________	–18	dB
	1500 MHz		–	________	–18	dB
	2000 MHz		–	________	–18	dB
	2500 MHz		–	________	–18	dB
	3000 MHz		–	________	–18	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–6	dB
	5000 MHz		–	________	–6	dB
	5500 MHz		–	________	–6	dB
	6000 MHz		–	________	–6	dB
	6500 MHz		–	________	–6	dB
	7000 MHz		–	________	–6	dB
	7500 MHz		–	________	–6	dB
	8000 MHz		–	________	–6	dB
1	**Matching PORT2 Model 52 and 62**	5.2.3.1				
	300 kHz		–	________	–6	dB
	5 MHz		–	________	–16	dB
	100 MHz		–	________	–18	dB
	500 MHz		–	________	–18	dB
	1000 MHz		–	________	–18	dB
	1500 MHz		–	________	–18	dB
	2000 MHz		–	________	–18	dB
	2500 MHz		–	________	–18	dB
	3000 MHz		–	________	–18	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–6	dB
	5000 MHz		–	________	–6	dB
	5500 MHz		–	________	–6	dB
	6000 MHz		–	________	–6	dB
	6500 MHz		–	________	–6	dB
	7000 MHz		–	________	–6	dB
	7500 MHz		–	________	–6	dB
	8000 MHz		–	________	–6	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
2	**Directivity PORT1 Model 50 and 60**	5.2.3.2				
	1500 MHz		–	________	–16	dB
	2000 MHz		–	________	–16	dB
	2500 MHz		–	________	–16	dB
	3000 MHz		–	________	–16	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–16	dB
	5000 MHz		–	________	–16	dB
	5500 MHz		–	________	–16	dB
	6000 MHz		–	________	–16	dB
	6500 MHz		–	________	–16	dB
	7000 MHz		–	________	–16	dB
	7500 MHz		–	________	–16	dB
	8000 MHz		–	________	–16	dB
2	**Directivity PORT2 Model 50 and 60**	5.2.3.2				
	1500 MHz		–	________	–16	dB
	2000 MHz		–	________	–16	dB
	2500 MHz		–	________	–16	dB
	3000 MHz		–	________	–16	dB
	3500 MHz		–	________	–16	dB
	4000 MHz		–	________	–16	dB
	4500 MHz		–	________	–16	dB
	5000 MHz		–	________	–16	dB
	5500 MHz		–	________	–16	dB
	6000 MHz		–	________	–16	dB
	6500 MHz		–	________	–16	dB
	7000 MHz		–	________	–16	dB
	7500 MHz		–	________	–16	dB
	8000 MHz		–	________	–16	dB
2	**Directivity PORT1 Model 51, 52, 61, 62**	5.2.3.2				
Model 51 and 61	40 kHz		–	________	–30	dB
Model 51, 52, 61, 62	5 MHz		–	________	–30	dB
	500 MHz		–	________	–30	dB
	1000 MHz		–	________	–30	dB
	1500 MHz		–	________	–30	dB
	2000 MHz		–	________	–30	dB
	2500 MHz		–	________	–30	dB
	3000 MHz		–	________	–30	dB
	3500 MHz		–	________	–30	dB
	4000 MHz		–	________	–30	dB
	4500 MHz		–	________	–8	dB
	5000 MHz		–	________	–8	dB
	5500 MHz		–	________	–8	dB
	6000 MHz		–	________	–8	dB
	6500 MHz		–	________	–8	dB
	7000 MHz		–	________	–8	dB
	7500 MHz		–	________	–8	dB
	8000 MHz		–	________	–8	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
2	**Directivity PORT2 Model 51, 52, 61, 62**	5.2.3.2				
Model 51 and 61	40 kHz		–	________	–30	dB
Model 51, 52, 61, 62	5 MHz		–	________	–30	dB
	500 MHz		–	________	–30	dB
	1000 MHz		–	________	–30	dB
	1500 MHz		–	________	–30	dB
	2000 MHz		–	________	–30	dB
	2500 MHz		–	________	–30	dB
	3000 MHz		–	________	–30	dB
	3500 MHz		–	________	–30	dB
	4000 MHz		–	________	–30	dB
	4500 MHz		–	________	–8	dB
	5000 MHz		–	________	–8	dB
	5500 MHz		–	________	–8	dB
	6000 MHz		–	________	–8	dB
	6500 MHz		–	________	–8	dB
	7000 MHz		–	________	–8	dB
	7500 MHz		–	________	–8	dB
	8000 MHz		–	________	–8	dB
3	**Attenuators**	5.2.3.3				
Option ZVR–B21	ATT a1 f = 1 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB
3	**Attenuators**	5.2.3.3				
Option ZVR–B21	ATT a1 f = 2000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3 Option R&S ZVR–B21	**Attenuators** ATT a1 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B21	**Attenuators** ATT a1 f = 8000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B22	**Attenuators** ATT a2 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B22	**Attenuators** ATT a2 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B22	ATT a2 f = 4000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B22	ATT a2 f = 8000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B23	ATT b1 f = 1 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B23	ATT b1 f = 2000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3 Option R&S ZVR–B23	**Attenuators** ATT b1 f = 4000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B23	**Attenuators** ATT b1 f = 8000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B24	**Attenuators** ATT b2 f = 1 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB
3 Option R&S ZVR–B24	**Attenuators** ATT b2 f = 2000 MHz 0 dB 10 dB 20 dB 30 dB 40 dB 50 dB 60 dB 70 dB	5.2.3.3	 –2 –0.1 –2 –2 –2 –2 –2 –2	 ________ ________ ________ ________ ________ ________ ________ ________	 2 0.1 2 2 2 2 2 2	 dB dB dB dB dB dB dB dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B24	ATT b2 f = 4000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB
3	**Attenuators**	5.2.3.3				
Option R&S ZVR–B24	ATT b2 f = 8000 MHz					
	0 dB		–2	________	2	dB
	10 dB		–0.1	________	0.1	dB
	20 dB		–2	________	2	dB
	30 dB		–2	________	2	dB
	40 dB		–2	________	2	dB
	50 dB		–2	________	2	dB
	60 dB		–2	________	2	dB
	70 dB		–2	________	2	dB

Table 5-8 Performance Test Report: Crosstalk

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1 Model 50**	5.2.4				
	20 kHz		–	___________	–90	dB
	201 kHz		–	___________	–120	dB
	2.5 MHz		–	___________	–120	dB
	5.1 MHz		–	___________	–125	dB
	500 MHz		–	___________	–125	dB
	1000 MHz		–	___________	–125	dB
	2200 MHz		–	___________	–115	dB
	2700 MHz		–	___________	–115	dB
	3000 MHz		–	___________	–115	dB
	3300 MHz		–	___________	–105	dB
	3600 MHz		–	___________	–105	dB
	3900 MHz		–	___________	–105	dB
	4000 MHz		–	___________	–105	dB
	4500 MHz		–	___________	–100	dB
	5000 MHz		–	___________	–100	dB
	5500 MHz		–	___________	–100	dB
	6000 MHz		–	___________	–100	dB
	6500 MHz		–	___________	–95	dB
	7000 MHz		–	___________	–95	dB
	7500 MHz		–	___________	–95	dB
	8000 MHz		–	___________	–95	dB
1	**Crosstalk PORT2 Model 50**	5.2.4				
	20 kHz		–	___________	–90	dB
	201 kHz		–	___________	–120	dB
	2.5 MHz		–	___________	–120	dB
	5.1 MHz		–	___________	–125	dB
	500 MHz		–	___________	–125	dB
	1000 MHz		–	___________	–125	dB
	2200 MHz		–	___________	–115	dB
	2700 MHz		–	___________	–115	dB
	3000 MHz		–	___________	–115	dB
	3300 MHz		–	___________	–105	dB
	3600 MHz		–	___________	–105	dB
	3900 MHz		–	___________	–105	dB
	4000 MHz		–	___________	–105	dB
	4500 MHz		–	___________	–100	dB
	5000 MHz		–	___________	–100	dB
	5500 MHz		–	___________	–100	dB
	6000 MHz		–	___________	–100	dB
	6500 MHz		–	___________	–95	dB
	7000 MHz		–	___________	–95	dB
	7500 MHz		–	___________	–95	dB
	8000 MHz		–	___________	–95	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1 Model 60**	5.2.4				
	20 kHz		–	________	–90	dB
	201 kHz		–	________	–120	dB
	2.5 MHz		–	________	–120	dB
	5.1 MHz		–	________	–130	dB
	500 MHz		–	________	–130	dB
	1000 MHz		–	________	–130	dB
	2200 MHz		–	________	–120	dB
	2700 MHz		–	________	–120	dB
	3000 MHz		–	________	–120	dB
	3300 MHz		–	________	–110	dB
	3600 MHz		–	________	–110	dB
	3900 MHz		–	________	–110	dB
	4000 MHz		–	________	–110	dB
	4500 MHz		–	________	–105	dB
	5000 MHz		–	________	–105	dB
	5500 MHz		–	________	–105	dB
	6000 MHz		–	________	–105	dB
	6500 MHz		–	________	–100	dB
	7000 MHz		–	________	–100	dB
	7500 MHz		–	________	–100	dB
	8000 MHz		–	________	–100	dB
1	**Crosstalk PORT2 Model 60**	5.2.4				
	20 kHz		–	________	–90	dB
	201 kHz		–	________	–120	dB
	2.5 MHz		–	________	–120	dB
	5.1 MHz		–	________	–130	dB
	500 MHz		–	________	–130	dB
	1000 MHz		–	________	–130	dB
	2200 MHz		–	________	–120	dB
	2700 MHz		–	________	–120	dB
	3000 MHz		–	________	–120	dB
	3300 MHz		–	________	–110	dB
	3600 MHz		–	________	–110	dB
	3900 MHz		–	________	–110	dB
	4000 MHz		–	________	–110	dB
	4500 MHz		–	________	–105	dB
	5000 MHz		–	________	–105	dB
	5500 MHz		–	________	–105	dB
	6000 MHz		–	________	–105	dB
	6500 MHz		–	________	–100	dB
	7000 MHz		–	________	–100	dB
	7500 MHz		–	________	–100	dB
	8000 MHz		–	________	–100	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1 Model 51 and 52**	5.2.4				
Model 51	20 kHz		–	________	–84	dB
Model 51 and 52	300 kHz		–	________	–114	dB
	2.5 MHz		–	________	–114	dB
	5.1 MHz		–	________	–119	dB
	500 MHz		–	________	–119	dB
	1000 MHz		–	________	–119	dB
	2200 MHz		–	________	–109	dB
	2700 MHz		–	________	–109	dB
	3000 MHz		–	________	–109	dB
	3300 MHz		–	________	–99	dB
	3600 MHz		–	________	–99	dB
	3900 MHz		–	________	–99	dB
	4000 MHz		–	________	–99	dB
	4500 MHz		–	________	–94	dB
	5000 MHz		–	________	–94	dB
	5500 MHz		–	________	–94	dB
	6000 MHz		–	________	–94	dB
	6500 MHz		–	________	–89	dB
	7000 MHz		–	________	–89	dB
	7500 MHz		–	________	–89	dB
	8000 MHz		–	________	–89	dB
1	**Crosstalk PORT2 Model 51 and 52**	5.2.4				
Model 51	20 kHz		–	________	–84	dB
Model 51 and 52	300 kHz		–	________	–114	dB
	2.5 MHz		–	________	–114	dB
	5.1 MHz		–	________	–119	dB
	500 MHz		–	________	–119	dB
	1000 MHz		–	________	–119	dB
	2200 MHz		–	________	–109	dB
	2700 MHz		–	________	–109	dB
	3000 MHz		–	________	–109	dB
	3300 MHz		–	________	–99	dB
	3600 MHz		–	________	–99	dB
	3900 MHz		–	________	–99	dB
	4000 MHz		–	________	–99	dB
	4500 MHz		–	________	–94	dB
	5000 MHz		–	________	–94	dB
	5500 MHz		–	________	–94	dB
	6000 MHz		–	________	–94	dB
	6500 MHz		–	________	–89	dB
	7000 MHz		–	________	–89	dB
	7500 MHz		–	________	–89	dB
	8000 MHz		–	________	–89	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1 Model 61 and 62**	5.2.4				
Model 61	20 kHz		–	________	–84	dB
Model61 and 62	300 kHz		–	________	–114	dB
	2.5 MHz		–	________	–114	dB
	5.1 MHz		–	________	–124	dB
	500 MHz		–	________	–124	dB
	1000 MHz		–	________	–124	dB
	2200 MHz		–	________	–114	dB
	2700 MHz		–	________	–114	dB
	3000 MHz		–	________	–114	dB
	3300 MHz		–	________	–104	dB
	3600 MHz		–	________	–104	dB
	3900 MHz		–	________	–104	dB
	4000 MHz		–	________	–104	dB
	4500 MHz		–	________	–99	dB
	5000 MHz		–	________	–99	dB
	5500 MHz		–	________	–99	dB
	6000 MHz		–	________	–99	dB
	6500 MHz		–	________	–94	dB
	7000 MHz		–	________	–94	dB
	7500 MHz		–	________	–94	dB
	8000 MHz		–	________	–94	dB
1	**Crosstalk PORT2 Model 61 and 62**	5.2.4				
Model 61	20 kHz		–	________	–84	dB
Model 61 and 62	300 kHz		–	________	–114	dB
	2.5 MHz		–	________	–114	dB
	5.1 MHz		–	________	–124	dB
	500 MHz		–	________	–124	dB
	1000 MHz		–	________	–124	dB
	2200 MHz		–	________	–114	dB
	2700 MHz		–	________	–114	dB
	3000 MHz		–	________	–114	dB
	3300 MHz		–	________	–104	dB
	3600 MHz		–	________	–104	dB
	3900 MHz		–	________	–104	dB
	4000 MHz		–	________	–104	dB
	4500 MHz		–	________	–99	dB
	5000 MHz		–	________	–99	dB
	5500 MHz		–	________	–99	dB
	6000 MHz		–	________	–99	dB
	6500 MHz		–	________	–94	dB
	7000 MHz		–	________	–94	dB
	7500 MHz		–	________	–94	dB
	8000 MHz		–	________	–94	dB

Item No.	Characteristics	Measuremt. according to section	Min. value	Actual value	Max. value	Unit
1	**Crosstalk PORT1 w. option ZVR-B10**	5.2.4				
Model 50, 51, 60, 61	20 kHz		–	___________	–75	dB
All Models	300 kHz		–	___________	–105	dB
	2.5 MHz		–	___________	–105	dB
	5.1 MHz		–	___________	–110	dB
	500 MHz		–	___________	–110	dB
	1000 MHz		–	___________	–110	dB
	2200 MHz		–	___________	–100	dB
	2700 MHz		–	___________	–100	dB
	3000 MHz		–	___________	–100	dB
	3300 MHz		–	___________	–90	dB
	3600 MHz		–	___________	–90	dB
	3900 MHz		–	___________	–90	dB
	4000 MHz		–	___________	–90	dB
	4500 MHz		–	___________	–90	dB
	5000 MHz		–	___________	–90	dB
	5500 MHz		–	___________	–90	dB
	6000 MHz		–	___________	–90	dB
	6500 MHz		–	___________	–85	dB
	7000 MHz		–	___________	–85	dB
	7500 MHz		–	___________	–85	dB
	8000 MHz		–	___________	–85	dB

5 Checking of Rated Specifications

5.1 Measuring Equipment and Accessories (ZVM, ZVK)

Item	Instrument type	Required specifications	Suitable instru-ment	R&S Order No.	Application
1	Spectrum analyzer	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK), IF output	FSEK30 with FSE-B22	1088.3494.35 1106.3480.02	5.2.1.1 5.2.1.2 5.2.1.3 5.2.1.4 5.2.1.5 5.2.1.7
2	Modulation analyzer	10 MHz to 5.2 GHz	FMB with opt. FMA-B8	856.5005.52 855.9007.55	5.2.1.4 5.2.1.5
3	Power meter	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	NRVD + sensor NRV-Z52 (ZVM), NRV-Z55 (ZVK)	857.8008.02 857.9204.02 1081.2005.02	5.2.1.6 5.2.2.1
4	Signal generator	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	SMR40 with option SMR-B11	1104.0002.40 1104.4250.02	5.2.2.1
5	Power splitter	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	Agilent 11667B Weinschel 1534		5.2.2.1
6	Attenuator pad 20 dB PC2.92mm or SMA	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	Weinschel 54-20		5.2.2.2
7	Calibration kit	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	ZV-Z32 (ZVM) ZV-Z34 (ZVK)	1128.3501.02 1128.3530.02	5.2.2.3 5.2.2.4 5.2.3.1 5.2.3.2 5.2.3.3 5.2.3.5
8	Pair of test cables	10 MHz to 20 GHz (ZVM) 10 MHz to 40 GHz (ZVK)	ZV-Z14 (ZVM) ZV-Z15 (ZVK)	1134.4093.02 1134.4193.02	5.2.2.2 5.2.2.3 5.2.2.4 5.2.3.1 5.2.3.2 5.2.3.4

5.2 Test Procedure (ZVM & ZVK)

The rated specifications of the network analyzer are checked after a warm-up time of at least one hour. Only this warmup ensures that the specifications are complied with.

The values stated in the following are not guaranteed. Only the data sheet specifications shall be binding.

In order to guarantee the specified data, the measured value has to be < specification - expanded uncertainty (k = 2, confidence level of 95%).

The expanded uncertainty (k = 2) obtained with the proposed measuring equipment / test procedures is given in the test record. Influences, which are exclusively within the user's responsibility (e.g. cable attenuation in harmonics measurements), are not taken into account in the specified measurement uncertainty and should be at least estimated by the user.

In case of a deviating test configuration, the user has to calculate the corresponding measurement uncertainties.

5.2.1 Checking the Generator Specifications

5.2.1.1 Frequency Deviation

Test equipment: FSEK30, test cable

Test setup:

- Connect FSEK30 (Marker COUNTER mode, resolution 1 Hz) to PORT1 of the network analyzer.

Settings on network analyzer:

PRESET	
CENTER	Measurement frequency
SWEEP	SINGLE POINT
SWEEP TIME	255 s
SOURCE POWER	Level: -10 dBm
MEAS	INPUT a1

Measurement:

- Set measurement frequencies according to test record.

Deviation: Frequency value displayed on FSEK30 minus setting value.

5.2.1.2 Harmonics

Test equipment: FSEK30, test cable

Test setup:

- Connect FSEK30 (delta-marker mode) to PORT1 (PORT2) of the network analyzer.

Settings on network analyzer:

PRESET	
CENTER	Measurement frequency
SWEEP	SINGLE POINT
SWEEP TIME	255 s
SOURCE POWER	ZVM:-10 dBm or maximum level (5 dBm / 2 dBm)
	ZVK:-10 dBm or maximum level (0 dBm /-5 dBm)
MEAS	INPUT a1 (INPUT a2)

Reference measurement:

- Set marker 1 to generator frequency (fundamental)

Measurement:

- Set delta-marker frequency according to test record.
- Measure at double or triple measurement frequency, enter the poorer of the two values in the record.

5.2.1.3 Spurious

Test equipment: FSEK30, test cable

Test setup:
- Connect FSEK30 (delta-marker mode) to PORT1 of the network analyzer.

Settings on network analyzer:

PRESET	
CENTER	Measurement frequency
SWEEP	SINGLE POINT
SWEEP TIME	255 s
SOURCE POWER	-20 dBm (minimum level)
MEAS	INPUT a1

Reference measurement:
- Set marker 1 to generator frequency (fundamental)

Measurement:
- Set measurement frequencies according to test record.

Mixing range up to 750 MHz:	LO = RF + fo (fo = measurement frequency)
For fo < 50 MHz	RF = 63.125 MHz
fo = 50 MHz to < 150 MHz	RF = 252.5 MHz
fo = 150 MHz to 750 MHz	RF = 1010 MHz

- Perform measurements for f = 2 x RF - LO and f = 3 x RF - 2 x LO.

Double range > 2 GHz to 4 GHz:
- Perform measurements for f = fo/2 and f = 3fo/2

Quadruple range > 4 GHz to 8 GHz:
- Perform measurements for f = n x fo/4, n = 1,2,3,5,6,7

Eightfold range > 8 GHz to 16 GHz:
- Perform measurements for f = n x fo/8, n = 1,2,3 to 7, 9 to 15

Tenfold range > 16 GHz to 20 GHz (ZVM), to 32 GHZ (ZVK):
- Perform measurements for f = n x fo/16, n = 1,2,3 to 15, 17 to 31

Thirtytwofold range > 32 GHz to 40 GHz (ZVK):
- Perform measurements for f = n x fo/32, n = 1,2,3 to 31, 33 to 40

5.2.1.4 Phase Noise

Test equipment: Modulation meter FMB with option FMA-B8, FSEK30, BNC connecting cable

Test setup:

- Connect modulation meter (mode DEMOD PM PHASENOISE 10 kHz) to PORT1 of the network analyzer.

Settings on network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Measurement frequency
SOURCE POWER	2 dBm (ZVM), -9 dBm (ZVK)
SWEEP TIME	255 s
MEAS	INPUT a1

Measurement: Set measurement frequencies according to test record, read phase noise on modulation meter.

5.2.1.5 Residual FM

Test equipment: Modulation meter FMB with option FMA-B8, FSEK30, BNC connecting cable

Test setup:
- Connect modulation meter (mode DEMOD FM DET RMS 10 Hz to 3 kHz) to PORT1 of the network analyzer

Settings on network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Measurement frequency
SOURCE POWER	Maximum level: -2 dBm (ZVM), -9 dBm (ZVK)
SWEEP TIME	255 s
MEAS	INPUT a1

Measurement: Set measurement frequencies according to test record, read residual FM values on modulation meter.

5.2.1.6 Level Accuracy

Test equipment: Power Meter NRVD with sensor NRV-Z52 (ZVM), NRV-Z55 (ZVK), Female-female adapter from calibration kit ZV-Z32 (ZVM) or ZV-Z34 (ZVK)

Test setup:
- ➢ Connect power sensor to PORT1, PORT2 of the network analyzer.

Settings on network analyzer:

PRESET
(corresponds to a set generator level of –10 dBm)

SWEEP	SINGLE POINT
CENTER	Measurement frequency
SWEEP TIME	255 s
MEAS	INPUT a1 (PORT1), INPUT a2 (PORT2)

Measurement: Set measurement frequencies according to test record, read level on power meter. Add the correction value associated with the measurement frequency to the measured value (typ. attenuation of adapter).

Correction value:

Frequency in GHz	Correction value ZVM in dB	Correction value ZVK in dB
0.010	0.003	0.002
0.100	0.009	0.008
0.150	0.011	0.009
0.500	0.021	0.017
1.000	0.029	0.024
1.500	0.036	0.029
2.000	0.041	0.034
3.000	0.050	0.041
4.000	0.058	0.047
5.000	0.065	0.053
6.000	0.071	0.058
7.000	0.077	0.063
8.000	0.082	0.067
9.000	0.087	0.071
10.00	0.092	0.075
11.00	0.097	0.079
12.00	0.101	0.082
13.00	0.105	0.086
14.00	0.109	0.089
15.00	0.113	0.092
16.00	0.117	0.095
17.00	0.120	0.098
18.00	0.124	0.101
19.00	0.127	0.103
20.00	0.130	0.106
22.00		0.111
24.00		0.116
26.00		0.121
28.00		0.125
30.00		0.130
32.00		0.134
34.00		0.138
36.00		0.142
38.00		0.146
40.00		0.150

5.2.1.7 Level Linearity

Test equipment: FSEK30, test cable, BNC cable for reference frequency

Test setup 50Ω:

- Connect FSEK30 to PORT1 (PORT2) of the network analyzer. Synchronize FSEK30 with network analyzer.
- **Important:** IF BW on FSEK30 < 1 kHz (digital bandwidths)

Settings on network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Measurement frequency
SOURCE POWER	Min. to max. value -20 dBm to -2/2/5 dBm, ZVM
	Min. to max. value -20 dBm to -9/-5/-3/0dBm, ZVK
SWEEP TIME	255 s
MEAS	INPUT a1 INPUT a2

Measurement:

- Set measurement frequencies and levels according to test record, read level on spectrum analyzer.

5.2.2 Checking the Receiver Specifications

5.2.2.1 Absolute Accuracy

Test equipment: Signal Generator SMR40 with option SMR-B11
Power Splitter PC 3.5 (ZVM) or Power Splitter PC 2.92 (ZVK)
NRVD with sensor NRV-Z52 (ZVM), NRV-Z55 (ZVK)
Connecting cable SMR40 => power splitter
BNC cable to frequency synchronization.

Test setup:

- Synchronize SMR40 with network analyzer.
- SMR40 frequency = measurement frequency.
- Connect SMR40 to power-splitter input.
- Connect an output branch of the power splitter to PORT1 or PORT2 (INPUT B1, INPUT B2 if a suitable receiver step attenuator is installed).
- Connect sensor to second output branch of power splitter.

Settings on network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Measurement frequency
AVG IF BW	100 Hz
MEAS	INPUT b1, DRIVE PORT2
	INPUT b2, DRIVE PORT1
MODE EXTERNAL	INPUT b1
	INPUT b2
MARKER	Marker

Measurement:

- Set measurement frequencies (SMR, ZVM/K) according to test record.
- Set level to -2 dBm on SMR.
- Read marker value on ZVM/K.
- Read measured value on NRVD.

Permissible deviation from nominal level (approx. -10 dBm, "exact" value = measured value on NRVD) applied to PORT1 or PORT2 (INPUT B1, INPUT B2 if a suitable receiver step attenuator is installed).

Deviation = marker value ZVM/K - measured value NRVD

5.2.2.2 Linearity

Test equipment: 20 dB attenuator PC 3.5, SMA (ZVM) or PC 2.92 (ZVM, ZVK),
Test Cable ZV-Z14 (ZVM) or ZV-Z15 (ZVK),
Female-female adapter from ZV-Z32 (ZVM) or ZV-Z34 (ZVK)

Test setup: Connect test cable with 20 dB attenuator between PORT1 and PORT2.

Settings on network analyzer:

PRESET	
CAL	POWER UNCAL off
MODE	SWEEP MODE : POWER SWEEP
SWEEP	NUMBER OF POINTS = 26 (ZVM), 21 (ZVK)
SOURCE	STEP ATT A1 or STEP ATT A2 to 0 dB
SOURCE	Measurement frequency
START	-20 dBm
STOP	5 dBm (ZVM), 0 dBm (ZVK)
IF BANDWIDTH	10 Hz
MEAS	RATIO B1/A2 (Lin. PORT1)
MEAS	RATIO B2/A1 (Lin. PORT2)
FORMAT	MAGNITUDE, PHASE (Phase unwrap)
MARKER	MARKER CONT
MARKER1	= -10 dBm
DELTA MARKER	REF MARKER1
MARKER2	Measurement level

Reference measurement:

- Store trace and use it for normalization:
  Magnitude: TRACE : DATA TO MEMORY : SHOW MATH (/)
  Phase: TRACE : DATA TO MEMORY : SHOW MATH (-)

Measurement:

- Remove attenuator, connect test cable directly to port.
- Set reference value to 20 dB if required (better representation).
- Record marker value at measurement level according to test record.
- Repeat procedure for the other measurement frequencies.

5.2.2.3 Noise Level

Test equipment: MATCH female from Calibration Kit ZV-Z32 (ZVM) or ZV-Z34 (ZVK)

Calibration:
- PRESET
- SOURCE Level –20 dBm
- Terminate Port 1 and Port 2 with match from ZV-Z32 or ZV-Z34.
- MEAS : INPUT b1, DRIVE PORT 2 or INPUT b2, DRIVE PORT1
- Set all receiver step attenuators to 0 dB
- IF bandwidth 10 Hz : AVG IF BW: 10 Hz

Measurement: Settings on network analyzer:

MARKER	MARKER CONT
MARKER	Marker frequency = measurement frequency

5.2.2.4 Match Input b1 and Input b2

(only with option ZVM-B23 / ZVK-B23 or ZVM-B24 / ZVK-B24)

Test equipment: Calibration Kit ZV-Z32, pair of Test Cables ZV-Z14 (ZVM);
Calibration Kit ZV-Z34, pair of Test Cables ZV-Z15 (ZVK)

Test setup: Description for INPUT B2 (for INPUT B1 analogously)

Connect test cable to PORT1,
connect female-female adapter to male end.

Settings on network analyzer:

PRESET	
AVG	IF BW 100 Hz

Record one-port calibration (OSM) at PORT1 including THRU female-female over the whole frequency range.
Connect test cables (incl. adapter) with INPUT B2.

MODE	EXTERNAL, INPUT B2
MARKER	Measurement frequency
MEAS	S11 (S22)

Measurement:

- Set measurement frequencies according to test record, measure S11 (or S22 for INPUT B2).
- Record return loss values.

5.2.3 Checking the Test Set Specifications

5.2.3.1 Match at PORT1 and PORT2

Test equipment: Calibration Kit ZV-Z32, pair of Test Cables ZV-Z14 (ZVM);
Calibration Kit ZV-Z34, pair of Test Cables ZV-Z15 (ZVK)

Test setup: Description for PORT2 (for PORT1 analogously)

Connect test cable to PORT1,
connect female-female adapter to male end.

Settings on network analyzer:

PRESET	
AVG	IF BW 100 Hz

Record one-port calibration (OSM) at PORT1 including THRU female-female over the whole frequency range.
Connect test cables (incl. adapter) with PORT2.

MARKER	Measurement frequency
MEAS	S11 (S22)

Measurement:

- Set measurement frequencies according to test record, measure S11 (or S22 for INPUT B2).
- Record match values.

5.2.3.2 Matching Reference Channel Inputs R1 and R2 Channel IN

Test equipment: Calibration Kit ZV-Z32, pair of Test Cables ZV-Z14 (ZVM);
Calibration Kit ZV-Z34, pair of Test Cables ZV-Z15 (ZVK)

Test setup: Description for R2 Channel IN (for R1 Channel IN analogously)

Connect test cable to PORT1.

Settings on network analyzer:

PRESET	
AVG	IF BW 100 Hz

Record one-port calibration (OSM) at PORT1 over the whole frequency range.
Connect test cables (incl. adapter) with R2 Channel IN.

MARKER	Measurement frequency
MEAS	S11 (S22)

Measurement:

- ➢ Set measurement frequencies according to test record, measure S11 (or S22 for R1 Channel IN).
- ➢ Record match values

5.2.3.3 Raw Directivity

Test equipment: OPEN, SHORT, MATCH female from Calibration Kit ZV-Z32 (ZVM), ZV-Z34 (ZVK)

A broadband termination, e.g. from ZV-Z34, must be used for ZVK.

Reference measurement:

PRESET
Connect OPEN female to Port1 (or Port2).
MEAS: RATIO: WAVE QUANTITY: b1/a1 (Port1), b2/a2 (Port2)
Normalizing: TRACE, DATA TO MEM, SHOW MATH (/)

Connect MATCH to Port1 (or Port2).
MARKER Measurement frequency
Read measurement results and write them down.

Connect SHORT female to Port1 (or Port2).
MEAS: RATIO: WAVE QUANTITY: b1/a1 (Port1), b2/a2 (Port2)
Normalize: TRACE, DATA TO MEM, SHOW MATH (/)
Connect MATCH to Port1 (or Port2).
MARKER Measurement frequency
Read measurement results and write them down.

Calculation of raw directivity

Test record value : average of OPEN and SHORT measurement .

5.2.3.4 Checking the Attenuators

Test equipment: Test Cable ZV-Z14, female-female adapter PC 3.5 from ZV-Z32;
Test Cable ZV-Z15, female-female adapter PC 2.92 from ZV-Z34

Test setup: Connect cable between PORT1 and PORT2.

Settings on network analyzer:

PRESET	
SWEEP	SINGLE POINT
CENTER	Measurement frequency
SOURCE POWER	0 dBm
SOURCE	ATTxx
IF BANDWIDTH	10 Hz
MEAS	S21 for measurement STEP ATT a1 and STEP ATT b2
	S12 for measurement STEP ATT a2 and STEP ATT b1
FORMAT	MAGNITUDE
MARKER	Marker frequency = measurement frequency

Reference measurement:

- Perform reference measurements at the measurement frequencies and an attenuation value of 10 dB.

Reference value = marker value

Measurement:

- Set measurement frequencies according to test record.
- Increase ATT xx attenuation in 10 dB steps from 0 to 70 dB and read out marker value obtained with each step.

Attenuation error = (marker value - reference value)

5.2.3.5 Dynamic Range

Test equipment: ZVM: 2 PC 3.5 SHORT (e.g. SHORT male and SHORT female with THRU male from Calibration Kit ZV-Z32);
ZVK: 2 PC 2.92 SHORT (e.g. SHORT male and SHORT female with THRU male from Calibration Kit ZV-Z34)

Test setup: Connect short-circuits to PORT1 and PORT2.

Settings on network analyzer:

PRESET	
SWEEP	LIN SWEEP
FORMAT	MAGNITUDE
SOURCE POWER	Maximum value acc. Data Sheet
	Note: For the maximum value, check if the instrument is fitted with a generator step attenuator which may be different for the two channels.
	ZVM 5 dBm to -2 dBm, ZVK 0 dBm to -9 dBm
IF BANDWIDTH	10 Hz or 10 kHz
AVERAGE	POINT AVG 5
SMOOTHING	1%
MEAS	RATIO b1/b2, DRIVE PORT 2 (dyn. range Port 1)
	RATIO b2/b1, DRIVE PORT 1 (dyn. range Port 2)
MARKER	Marker frequency = measurement frequency

Measurement:
- Read marker value on network analyzer.

5.3 Performance Test Record (ZVM)

The indicated uncertainties refer to the proposed test setup / test procedure.
The expanded measurement uncertainty amounts to k = 2 (confidence level of 95%, Gauss distribution).
Additional measurement uncertainties, which are within the user's responsibility, have not been taken into account (e.g. cable attenuation in harmonics measurements).
We recommend performing a measurement uncertainty analysis for the test setup in question so that the values specified in the data sheet can be reliably checked.

The measurement uncertainties specified for SSB phase noise and matching of inputs are to be regarded as measurement limits.

Table 5-1: Performance Test Record – Generator Specifications

Item	Characteristic	Measurement acc. to section	Specification min. value/Hz	Measured value/Hz	Specification max. value/Hz	Uncertainty / Hz
1	**Frequency deviation**	5.2.1.1				
	0.010 GHz		-40	____________	+40	2.6
	0.100 GHz		-400	____________	+400	25.7
	0.5 GHz		-2000	____________	+2000	129
	1.5 GHz		-6000	____________	+6000	386
	1.998 GHz		-7992	____________	+7992	514
	3 GHz		-12000	____________	+12000	772
	5 GHz		-20000	____________	+20000	1286
	8 GHz		-32000	____________	+32000	2057
	15 GHz		-60000	____________	+60000	3858
	20 GHz		-80000	____________	+80000	5143

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics**		5.2.1.2				
	PORT1 Measurement at source level 5 dBm (2 dBm with ZVM-B21)						
	ZVM frq.	Harmonic:					
	10 MHz	20 MHz		23	___________		1.5
		30 MHz		23	___________		1.5
	100 MHz	200 MHz		23	___________		1.3
		300 MHz		23	___________		1.3
	500 MHz	1000 MHz		23	___________		1.3
		1500 MHz		23	___________		1.3
	1 GHz	2 GHz		23	___________		1.3
		3 GHz		23	___________		1.6
	1.5 GHz	3 GHz		23	___________		1.6
		4.5 GHz		23	___________		1.7
	1.998 GHz	3.996 GHz		23	___________		1.7
		5.994 GHz		23	___________		1.7
	2 GHz	4 GHz		23	___________		1.7
		6 GHz		23	___________		1.7
	2.5 GHz	5 GHz		23	___________		2.0
		7.5 GHz		23	___________		2.9
	2.8 GHz	5.6 GHz		23	___________		2.0
		8.4 GHz		23	___________		2.9
	3.2 GHz	6.4 GHz		23	___________		2.0
		9.6 GHz		23	___________		2.9
	3.8 GHz	7.6 GHz		23	___________		2.9
		11.4 GHz		23	___________		3.0
	5 GHz	10 GHz		23	___________		3.0
		15 GHz		23	___________		3.0
	5.1 GHz	10.2 GHz		23	___________		3.0
		15.3 GHz		23	___________		3.0
	5.5 GHz	11 GHz		23	___________		3.0
		16.5 GHz		23	___________		3.0
	6 GHz	12 GHz		23	___________		3.0
		18 GHz		23	___________		3.0
	6.5 GHz	13 GHz		23	___________		3.0
		19.5 GHz		23	___________		3.4
	7 GHz	14 GHz		23	___________		3.0
	8 GHz	16 GHz		23	___________		3.6
	10 GHz	20 GHz		23	___________		4.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics**		5.2.1.2				
	PORT2 Measurement at source level 5 dBm (2 dBm with ZVM-B22)						
	ZVM frq.	Harmonic:					
	10 MHz	20 MHz		23	___________		1.5
		30 MHz		23	___________		1.5
	100 MHz	200 MHz		23	___________		1.3
		300 MHz		23	___________		1.3
	500 MHz	1000 MHz		23	___________		1.3
		1500 MHz		23	___________		1.3
	1 GHz	2 GHz		23	___________		1.3
		3 GHz		23	___________		1.6
	1.5 GHz	3 GHz		23	___________		1.6
		4.5 GHz		23	___________		1.7
	1.998 GHz	3.996 GHz		23	___________		1.7
		5.994 GHz		23	___________		1.7
	2 GHz	4 GHz		23	___________		1.7
		6 GHz		23	___________		1.7
	2.5 GHz	5 GHz		23	___________		2.0
		7.5 GHz		23	___________		2.9
	2.8 GHz	5.6 GHz		23	___________		2.0
		8.4 GHz		23	___________		2.9
	3.2 GHz	6.4 GHz		23	___________		2.0
		9.6 GHz		23	___________		2.9
	3.8 GHz	7.6 GHz		23	___________		2.9
		11.4 GHz		23	___________		3.0
	5 GHz	10 GHz		23	___________		3.0
		15 GHz		23	___________		3.0
	5.1 GHz	10.2 GHz		23	___________		3.0
		15.3 GHz		23	___________		3.0
	5.5 GHz	11 GHz		23	___________		3.0
		16.5 GHz		23	___________		3.0
	6 GHz	12 GHz		23	___________		3.0
		18 GHz		23	___________		3.0
	6.5 GHz	13 GHz		23	___________		3.0
		19.5 GHz		23	___________		3.4
	7 GHz	14 GHz		23	___________		3.0
	8 GHz	16 GHz		23	___________		3.6
	10 GHz	20 GHz		23	___________		4.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics**		5.2.1.2				
	PORT 1 Measurement at source level –10 dBm						
	ZVM frq.	Harmonic:					
	10 MHz	20 MHz		30	__________		1.5
		30 MHz		30	__________		1.5
	100 MHz	200 MHz		30	__________		1.3
		300 MHz		30	__________		1.3
	500 MHz	1000 MHz		30	__________		1.3
		1500 MHz		30	__________		1.3
	1 GHz	2 GHz		30	__________		1.3
		3 GHz		30	__________		1.6
	1.5 GHz	3 GHz		30	__________		1.6
		4.5 GHz		30	__________		1.7
	1.998 GHz	3.996 GHz		30	__________		1.7
		5.994 GHz		30	__________		1.7
	2 GHz	4 GHz		30	__________		1.7
		6 GHz		30	__________		1.7
	2.5 GHz	5 GHz		30	__________		2.0
		7.5 GHz		30	__________		2.9
	2.8 GHz	5.6 GHz		30	__________		2.0
		8.4 GHz		30	__________		2.9
	3.2 GHz	6.4 GHz		30	__________		2.0
		9.6 GHz		30	__________		2.9
	3.8 GHz	7.6 GHz		30	__________		2.9
		11.4 GHz		30	__________		3.0
	5 GHz	10 GHz		30	__________		3.0
		15 GHz		30	__________		3.0
	5.1 GHz	10.2 GHz		30	__________		3.0
		15.3 GHz		30	__________		3.0
	5.5 GHz	11 GHz		30	__________		3.0
		16.5 GHz		30	__________		3.0
	6 GHz	12 GHz		30	__________		3.0
		18 GHz		30	__________		3.0
	6.5 GHz	13 GHz		30	__________		3.0
		19.5 GHz		30	__________		3.0
	7 GHz	14 GHz		30	__________		3.0
	8 GHz	16 GHz		30	__________		3.4
	10 GHz	20 GHz		30	__________		3.0 3.6 4.0

Item	**Characteristic**		**Measure-ment acc. to section**	**Specification min. value/dBc**	**Measured value/dBc**		**Uncer-tainty / dB**
2	**Harmonics**		5.2.1.2				
	PORT 2						
	Measurement at source level –10 dBm ZVM frq. Harmonic:						
	10 MHz	20 MHz		30	__________		1.5
		30 MHz		30	__________		1.5
	100 MHz	200 MHz		30	__________		1.3
		300 MHz		30	__________		1.3
	500 MHz	1000 MHz		30	__________		1.3
		1500 MHz		30	__________		1.3
	1 GHz	2 GHz		30	__________		1.3
		3 GHz		30	__________		1.6
	1.5 GHz	3 GHz		30	__________		1.6
		4.5 GHz		30	__________		1.7
	1.998 GHz	3.996 GHz		30	__________		1.7
		5.994 GHz		30	__________		1.7
	2 GHz	4 GHz		30	__________		1.7
		6 GHz		30	__________		1.7
	2.5 GHz	5 GHz		30	__________		2.0
		7.5 GHz		30	__________		2.9
	2.8 GHz	5.6 GHz		30	__________		2.0
		8.4 GHz		30	__________		2.9
	3.2 GHz	6.4 GHz		30	__________		2.0
		9.6 GHz		30	__________		2.9
	3.8 GHz	7.6 GHz		30	__________		2.9
		11.4 GHz		30	__________		3.0
	5 GHz	10 GHz		30	__________		3.0
		15 GHz		30	__________		3.0
	5.1 GHz	10.2 GHz		30	__________		3.0
		15.3 GHz		30	__________		3.0
	5.5 GHz	11 GHz		30	__________		3.0
		16.5 GHz		30	__________		3.0
	6 GHz	12 GHz		30	__________		3.0
		18 GHz		30	__________		3.0
	6.5 GHz	13 GHz		30	__________		3.0
		19.5 GHz		30	__________		3.4
	7 GHz	14 GHz		30	__________		3.0
	8 GHz	16 GHz		30	__________		3.6
	10 GHz	20 GHz		30	__________		4.0

Item	Characteristic		Measurement acc. to section	Specification min. value/dBc	Measured value/dBc		Uncertainty / dB
3	**Spurious**		5.2.1.3				
	Measurement at source level –20 dBm						
	ZVM frq.	Spurious:					
	10 MHz	53.125 MHz		35	___________		1.4
		43.125 MHz		35	___________		1.5
	50 MHz	202.5 MHz		35	___________		1.3
		152.5 MHz		35	___________		1.3
	100 MHz	152.5 MHz		35	___________		1.3
		52.5 MHz		35	___________		1.3
	149 MHz	103.5 MHz		35	___________		1.3
		45.5 MHz		35	___________		1.4
	150 MHz	860 MHz		35	___________		1.3
		710 MHz		35	___________		1.3
	250 MHz	760 MHz		35	___________		1.3
		510 MHz		35	___________		1.3
	350 MHz	660 MHz		35	___________		1.3
		310 MHz		35	___________		1.4
	450 MHz	560 MHz		35	___________		1.3
		110 MHz		35	___________		1.3
	550 MHz	460 MHz		35	___________		1.3
		90 MHz		35	___________		1.3
	650 MHz	360 MHz		35	___________		1.3
		290 MHz		35	___________		1.3
	749 MHz	261 MHz		35	___________		1.3
		488 MHz		35	___________		1.3
	2.0 GHz	1.0 GHz		35	___________		1.3
		3.0 GHz		35	___________		1.6
	2.2 GHz	1.1 GHz		35	___________		1.3
		3.0 GHz		35	___________		1.6
	2.4 GHz	1.2 GHz		35	___________		1.6
		3.6 GHz		35	___________		2.0
	2.6 GHz	1.3 GHz		35	___________		1.6
		3.9 GHz		35	___________		2.0
	2.61 GHz	1.305 GHz		35	___________		1.6
		3.915 GHz		35	___________		2.0
	2.8 GHz	1.4 GHz		35	___________		1.6
		4.2 GHz		35	___________		2.0
	3.0 GHz	1.5 GHz		35	___________		1.6
		4.5 GHz		35	___________		2.0
	3.2 GHz	1.6 GHz		35	___________		1.6
		4.8 GHz		35	___________		2.0
	3.31 GHz	1.655 GHz		35	___________		1.6
		4.965 GHz		35	___________		2.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	3.4 GHz	1.7 GHz		35	___________		1.6
		5.1 GHz		35	___________		2.0
	3.6 GHz	1.8 GHz		35	___________		1.7
		5.4 GHz		35	___________		2.1
	3.8 GHz	1.9 GHz		35	___________		1.7
		5.7 GHz		35	___________		2.1
	4.0 GHz	2.0 GHz		35	___________		1.7
		6.0 GHz		35	___________		2.1
	5 GHz	1.250 GHz		35	___________		1.7
		2.500 GHz		35	___________		2.1
		3.750 GHz		35	___________		2.1
		6.250 GHz		35	___________		2.1
		7.500 GHz		35	___________		2.9
		8.750 GHz		35	___________		3.0
	5.1 GHz	1.275 GHz		35	___________		1.7
		2.550 GHz		35	___________		2.0
		3.825 GHz		35	___________		2.1
		6.375 GHz		35	___________		2.1
		7.650 GHz		35	___________		2.9
		8.925 GHz		35	___________		3.0
	5.5 GHz	1.375 GHz		35	___________		1.7
		2.750 GHz		35	___________		2.0
		4.125 GHz		35	___________		2.1
		6.875 GHz		35	___________		2.1
		8.250 GHz		35	___________		3.0
		9.625 GHz		35	___________		3.0
	6.0 GHz	1.500 GHz		35	___________		1.7
		3.000 GHz		35	___________		2.0
		4.500 GHz		35	___________		2.1
		7.500 GHz		35	___________		2.9
		9.000 GHz		35	___________		3.0
		10.50 GHz		35	___________		3.0
	6.5 GHz	1.625 GHz		35	___________		1.7
		3.250 GHz		35	___________		2.0
		4.875 GHz		35	___________		2.1
		8.125 GHz		35	___________		2.9
		9.750 GHz		35	___________		3.0
		11.375 GHz		35	___________		3.0
	7.0 GHz	1.750 GHz		35	___________		1.7
		3.500 GHz		35	___________		2.0
		5.250 GHz		35	___________		2.1
		8.750 GHz		35	___________		3.0
		10.50 GHz		35	___________		3.0
		12.25 GHz		35	___________		3.0
	7.8 GHz	1.950 GHz		35	___________		2.6
		3.900 GHz		35	___________		2.9
		5.850 GHz		35	___________		2.9
		9.750 GHz		35	___________		3.6
		11.70 GHz		35	___________		3.6
		13.65 GHz		35	___________		3.6

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	8 GHz	1.00 GHz		35	________		2.6
		2.00 GHz		35	________		2.6
		3.00 GHz		35	________		2.8
		4.00 GHz		35	________		2.9
		5.00 GHz		35	________		2.9
		6.00 GHz		35	________		2.9
		7.00 GHz		35	________		2.9
		9.00 GHz		35	________		3.6
		10.00 GHz		35	________		3.6
		11.00 GHz		35	________		3.6
		12.00 GHz		35	________		3.6
		13.00 GHz		35	________		3.6
		14.00 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
	10 GHz	1.25 GHz		35	________		2.7
		2.50 GHz		35	________		2.8
		3.75 GHz		35	________		2.9
		5.00 GHz		35	________		2.9
		6.25 GHz		35	________		2.9
		7.50 GHz		35	________		3.6
		8.75 GHz		35	________		3.6
		11.25 GHz		35	________		3.6
		12.50 GHz		35	________		3.6
		13.75 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
		16.25 GHz		35	________		3.6
		17.50 GHz		35	________		3.6
		18.75 GHz		35	________		4.0
	10.2 GHz	1.275 GHz		35	________		2.7
		2.550 GHz		35	________		2.9
		3.825 GHz		35	________		2.9
		5.100 GHz		35	________		2.9
		6.375 GHz		35	________		2.9
		7.650 GHz		35	________		3.6
		8.925 GHz		35	________		3.6
		11.475 GHz		35	________		3.6
		12.750 GHz		35	________		3.6
		14.025 GHz		35	________		3.6
		15.300 GHz		35	________		3.6
		16.575 GHz		35	________		3.6
		17.850 GHz		35	________		3.6
		19.125 GHz		35	________		4.0
	12 GHz	1.50 GHz		35	________		2.7
		3.00 GHz		35	________		2.9
		4.50 GHz		35	________		2.9
		6.00 GHz		35	________		2.9
		7.50 GHz		35	________		3.6
		9.00 GHz		35	________		3.6
		10.50 GHz		35	________		3.6
		13.50 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
		16.50 GHz		35	________		3.6
		18.00 GHz		35	________		3.6
		19.50 GHz		35	________		4.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	13.8 GHz	1.7250 GHz		35	________		2.6
		3.4500 GHz		35	________		2.8
		5.1750 GHz		35	________		2.9
		6.9000 GHz		35	________		2.9
		8.6250 GHz		35	________		3.6
		10.350 GHz		35	________		3.6
		12.075 GHz		35	________		3.6
		15.525 GHz		35	________		3.6
		17.250 GHz		35	________		3.6
		18.975 GHz		35	________		4.0
	15.8 GHz	1.975 GHz		35	________		2.6
		3.950 GHz		35	________		2.9
		5.925 GHz		35	________		2.9
		7.900 GHz		35	________		3.5
		9.875 GHz		35	________		3.6
		11.850 GHz		35	________		3.6
		13.825 GHz		35	________		3.6
		17.775 GHz		35	________		3.6
		19.750 GHz		35	________		4.0
	16.2 GHz	1.0125 GHz		30	________		2.6
		2.0250 GHz		30	________		2.6
		3.0375 GHz		30	________		2.8
		4.0500 GHz		30	________		2.9
		5.0625 GHz		30	________		2.9
		6.0750 GHz		30	________		2.9
		7.0875 GHz		30	________		3.6
		8.1000 GHz		30	________		3.6
		9.1125 GHz		30	________		3.6
		10.125 GHz		30	________		3.6
		11.1375GHz		30	________		3.6
		12.150 GHz		30	________		3.6
		13.1625GHz		30	________		3.6
		14.175 GHz		30	________		3.6
		15.1875GHz		30	________		3.6
		17.2125GHz		30	________		3.6
		18.225 GHz		30	________		4.0
		19.2375GHz		30	________		4.0
	19 GHz	1.1875 GHz		30	________		3.2
		2.3750 GHz		30	________		3.3
		3.5625 GHz		30	________		3.4
		4.7500 GHz		30	________		3.4
		5.9375 GHz		30	________		3.4
		7.1250 GHz		30	________		4.0
		8.3125 GHz		30	________		4.0
		9.5000 GHz		30	________		4.0
		10.6875GHz		30	________		4.0
		11.875 GHz		30	________		4.0
		13.0625GHz		30	________		4.0
		14.250 GHz		30	________		4.0
		15.4375GHz		30	________		4.0
		16.625 GHz		30	________		4.0
		17.8125GHz		30	________		4.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3		5.2.1.3				
	20 GHz 1.250 GHz		30			3.1
	2.500 GHz		30			3.3
	3.750 GHz		30			3.4
	5.000 GHz		30			3.4
	6.250 GHz		30			3.4
	7.500 GHz		30			4.0
	8.750 GHz		30			4.0
	10.00 GHz		30			4.0
	11.25 GHz		30			4.0
	12.50 GHz		30			4.0
	13.75 GHz		30			4.0
	15.00 GHz		30			4.0
	16.25 GHz		30			4.0
	17.50 GHz		30			4.0
	18.75 GHz		30			4.3
4	**SSB phase noise**	5.2.1.4				
	0.010 GHz		100.0			3.0
	0.100 GHz		100.0			3.0
	0.500 GHz		90.00			1.5
	1.000 GHz		90.00			1.5
	1.500 GHz		86.50			1.5
	1.998 GHz		84.10			1.5
	2.000 GHz		84.00			1.5
	2.500 GHz		82.10			1.5
	2.800 GHz		81.10			1.5
	3.200 GHz		79.90			1.5
	3.800 GHz		78.50			1.5
	5.000 GHz		76.10			1.5
	5.100 GHz		75.90			1.5
	5.500 GHz		75.20			1.5
	6.000 GHz		74.50			1.5
	6.500 GHz		73.80			1.5
	7.000 GHz		73.10			1.5
	8.000 GHz		72.00			1.5
	10.00 GHz		70.00			1.5
	10.20 GHz		69.90			1.5
	12.00 GHz		68.50			1.5
	13.00 GHz		67.80			1.5
	15.00 GHz		66.50			1.5
	20.00 GHz		63.40			1.5

Item	Characteristic	Measure-ment acc. to section		Measured value/Hz	Specification max. value/Hz	Uncer-tainty / Hz
5	**Residual FM**	5.2.1.5				
	0.010 GHz			____________	2.0	0.71
	0.100 GHz			____________	2.0	0.73
	0.500 GHz			____________	5.0	0.83
	1.000 GHz			____________	5.0	0.97
	1.500 GHz			____________	10.0	1.2
	1.998 GHz			____________	10.0	1.3
	2.000 GHz			____________	10.0	1.3
	2.500 GHz			____________	20.0	1.6
	2.800 GHz			____________	20.0	1.7
	3.200 GHz			____________	20.0	1.9
	3.800 GHz			____________	20.0	2.1
	5.000 GHz			____________	40.0	2.5
	5.100 GHz			____________	40.0	2.5
	5.500 GHz			____________	40.0	2.7
	6.000 GHz			____________	40.0	2.8
	6.500 GHz			____________	40.0	3.0
	7.000 GHz			____________	40.0	3.2
	8.000 GHz			____________	40.0	3.5
	10.00 GHz			____________	80.0	4.2
	10.20 GHz			____________	80.0	4.3
	12.00 GHz			____________	80.0	4.9
	13.00 GHz			____________	80.0	5.3
	15.00 GHz			____________	80.0	6.0
	20.00 GHz			____________	80.0	7.8

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBm	Measured value/dBm	Specification max. value/dBm	Uncer-tainty / dB
6	**Level accuracy PORT1**	5.2.1.6				
	0.010 GHz		–12.0	________	–8.0	0.22
	0.100 GHz		–12.0	________	–8.0	0.17
	0.150 GHz		–11.0	________	–9.0	0.17
	0.500 GHz		–11.0	________	–9.0	0.17
	1.000 GHz		–11.0	________	–9.0	0.17
	1.500 GHz		–11.0	________	–9.0	0.17
	2.000 GHz		–11.0	________	–9.0	0.18
	3.000 GHz		–11.0	________	–9.0	0.24
	4.000 GHz		–11.0	________	–9.0	0.24
	5.000 GHz		–11.0	________	–9.0	0.26
	6.000 GHz		–11.0	________	–9.0	0.26
	7.000 GHz		–11.0	________	–9.0	0.26
	8.000 GHz		–11.0	________	–9.0	0.26
	9.000 GHz		–11.0	________	–9.0	0.33
	10.00 GHz		–11.0	________	–9.0	0.33
	11.00 GHz		–11.0	________	–9.0	0.33
	12.00 GHz		–11.0	________	–9.0	0.33
	13.00 GHz		–11.0	________	–9.0	0.40
	14.00 GHz		–11.0	________	–9.0	0.40
	15.00 GHz		–11.0	________	–9.0	0.40
	16.00 GHz		–11.0	________	–9.0	0.40
	17.00 GHz		–12.0	________	–8.0	0.41
	18.00 GHz		–12.0	________	–8.0	0.41
	19.00 GHz		–12.0	________	–8.0	0.47
	20.00 GHz		–12.0	________	–8.0	0.47
6	**Level accuracy PORT2**	5.2.1.6				
	0.010 GHz		–12.0	________	–8.0	0.22
	0.100 GHz		–12.0	________	–8.0	0.17
	0.150 GHz		–11.0	________	–9.0	0.17
	0.500 GHz		–11.0	________	–9.0	0.17
	1.000 GHz		–11.0	________	–9.0	0.17
	1.500 GHz		–11.0	________	–9.0	0.17
	2.000 GHz		–11.0	________	–9.0	0.18
	3.000 GHz		–11.0	________	–9.0	0.24
	4.000 GHz		–11.0	________	–9.0	0.24
	5.000 GHz		–11.0	________	–9.0	0.26
	6.000 GHz		–11.0	________	–9.0	0.26
	7.000 GHz		–11.0	________	–9.0	0.26
	8.000 GHz		–11.0	________	–9.0	0.26
	9.000 GHz		–11.0	________	–9.0	0.33
	10.00 GHz		–11.0	________	–9.0	0.33
	11.00 GHz		–11.0	________	–9.0	0.33
	12.00 GHz		–11.0	________	–9.0	0.33
	13.00 GHz		–11.0	________	–9.0	0.40
	14.00 GHz		–11.0	________	–9.0	0.40
	15.00 GHz		–11.0	________	–9.0	0.40
	16.00 GHz		–11.0	________	–9.0	0.40
	17.00 GHz		–12.0	________	–8.0	0.41
	18.00 GHz		–12.0	________	–8.0	0.41
	19.00 GHz		–12.0	________	–8.0	0.47
	20.00 GHz		–12.0	________	–8.0	0.47

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT1 Reference: –10 dBm without** option ZVM-B21	5.2.1.7				
	f = 0.0101 GHz					
	15 dB		14.0	________	16.0	0.051
	10 dB		9.0	________	11.0	0.051
	5 dB		4.0	________	6.0	0.051
	-5 dB		-6.0	________	-4.0	0.051
	-10 dB		–11.0	________	–9.0	0.051
	f = 0.100 GHz					
	15 dB		14.0	________	16.0	0.051
	10 dB		9.0	________	11.0	0.051
	5 dB		4.0	________	6.0	0.051
	-5 dB		-6.0	________	-4.0	0.051
	-10 dB		–11.0	________	–9.0	0.051
	f = 0.150 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 0.500 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 1.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 2.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 4.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 8.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT1** **Reference: –10 dBm** **without** option ZVM-B21	5.2.1.7				
	f = 10.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.200 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT2 Reference: –10 dBm without** opt. ZVM-B22:	5.2.1.7				
	f = 0.0101 GHz					
	15 dB		14.0	________	16.0	0.051
	10 dB		9.0	________	11.0	0.051
	5 dB		4.0	________	6.0	0.051
	-5 dB		-6.0	________	-4.0	0.051
	-10 dB		–11.0	________	–9.0	0.051
	f = 0.100 GHz					
	15 dB		14.0	________	16.0	0.051
	10 dB		9.0	________	11.0	0.051
	5 dB		4.0	________	6.0	0.051
	-5 dB		-6.0	________	-4.0	0.051
	-10 dB		–11.0	________	–9.0	0.051
	f = 0.150 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 0.500 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 1.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 2.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 4.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 8.000 GHz					
	15 dB		14.6	________	15.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT2 Reference: –10 dBm without** opt. ZVM-B22:	5.2.1.7				
	f = 10.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.200 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	15 dB		14.6	___________	15.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT1 Reference: –10 dBm with** option ZVM-B21	5.2.1.7				
	f = 0.0101 GHz					
	12 dB		12.0	___________	13.0	0.051
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.100 GHz					
	12 dB		12.0	___________	13.0	0.051
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.150 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 0.500 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 1.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 2.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 4.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 8.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT1** **Reference: –10 dBm** **with** option ZVM-B21	5.2.1.7				
	f = 10.000 GHz					
	12 dB		11.6	________	12.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 10.200 GHz					
	12 dB		11.6	________	12.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 12.000 GHz					
	12 dB		11.6	________	12.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 14.000 GHz					
	12 dB		11.6	________	12.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 16.000 GHz					
	12 dB		11.6	________	12.4	0.051
	10 dB		9.6	________	10.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 18.000 GHz					
	8 dB		7.6	________	8.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051
	f = 20.000 GHz					
	8 dB		7.6	________	8.4	0.051
	5 dB		4.6	________	5.4	0.051
	-5 dB		-5.4	________	-4.6	0.051
	-10 dB		–10.4	________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT2 Reference: –10 dBm with** option ZVM-B22	5.2.1.7				
	f = 0.0101 GHz					
	12 dB		12.0		13.0	0.051
	10 dB		9.0		11.0	0.051
	5 dB		4.0		6.0	0.051
	-5 dB		-6.0		-4.0	0.051
	-10 dB		–11.0		–9.0	0.051
	f = 0.100 GHz					
	12 dB		12.0		13.0	0.051
	10 dB		9.0		11.0	0.051
	5 dB		4.0		6.0	0.051
	-5 dB		-6.0		-4.0	0.051
	-10 dB		–11.0		–9.0	0.051
	f = 0.150 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051
	f = 0.500 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051
	f = 1.000 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051
	f = 2.000 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051
	f = 4.000 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051
	f = 8.000 GHz					
	12 dB		11.6		12.4	0.051
	10 dB		9.6		10.4	0.051
	5 dB		4.6		5.4	0.051
	-5 dB		-5.4		-4.6	0.051
	-10 dB		–10.4		–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity PORT2 Reference: –10 dBm with** option ZVM-B22	5.2.1.7				
	f = 10.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.200 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	12 dB		11.6	___________	12.4	0.051
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	8 dB		7.6	___________	8.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	8 dB		7.6	___________	8.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	**Characteristic**	**Measure-ment acc. to section**	**Specification min. value/dB**	**Measured value/dB**	**Specification max. value/dB**	**Uncer-tainty / dB**
9	**Absolute accuracy PORT1**	5.2.2.1				
	Input level –10 dBm Difference from –10 dBm:					
			–2.0	____________	2.0	0.50
	0.010 GHz		–2.0	____________	2.0	0.43
	0.100 GHz		–2.0	____________	2.0	0.43
	0.150 GHz		–2.0	____________	2.0	0.43
	0.500 GHz		–2.0	____________	2.0	0.43
	1.000 GHz		–2.0	____________	2.0	0.43
	1.500 GHz		–2.0	____________	2.0	0.43
	2.000 GHz		–2.0	____________	2.0	0.44
	3.000 GHz		–2.0	____________	2.0	0.44
	4.000 GHz		–2.0	____________	2.0	0.44
	5.000 GHz		–2.0	____________	2.0	0.44
	6.000 GHz		–2.0	____________	2.0	0.44
	7.000 GHz		–2.0	____________	2.0	0.44
	8.000 GHz		–2.0	____________	2.0	0.50
	9.000 GHz		–2.0	____________	2.0	0.50
	10.00 GHz		–2.0	____________	2.0	0.50
	11.00 GHz		–2.0	____________	2.0	0.50
	12.00 GHz		–2.0	____________	2.0	0.51
	13.00 GHz		–2.0	____________	2.0	0.51
	14.00 GHz		–2.0	____________	2.0	0.51
	15.00 GHz		–2.0	____________	2.0	0.51
	16.00 GHz		–2.0	____________	2.0	0.51
	16.10 GHz		–2.0	____________	2.0	0.51
	17.00 GHz		–2.0	____________	2.0	0.51
	18.00 GHz		–2.0	____________	2.0	0.62
	19.00 GHz		–2.0	____________	2.0	0.62
	20.00 GHz					

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy PORT2**	5.2.2.1				
	Input level –10 dBm Difference from –10 dBm:					
	0.010 GHz		–2.0	________	2.0	0.50
	0.100 GHz		–2.0	________	2.0	0.43
	0.150 GHz		–2.0	________	2.0	0.43
	0.500 GHz		–2.0	________	2.0	0.43
	1.000 GHz		–2.0	________	2.0	0.43
	1.500 GHz		–2.0	________	2.0	0.43
	2.000 GHz		–2.0	________	2.0	0.43
	3.000 GHz		–2.0	________	2.0	0.44
	4.000 GHz		–2.0	________	2.0	0.44
	5.000 GHz		–2.0	________	2.0	0.44
	6.000 GHz		–2.0	________	2.0	0.44
	7.000 GHz		–2.0	________	2.0	0.44
	8.000 GHz		–2.0	________	2.0	0.44
	9.000 GHz		–2.0	________	2.0	0.50
	10.00 GHz		–2.0	________	2.0	0.50
	11.00 GHz		–2.0	________	2.0	0.50
	12.00 GHz		–2.0	________	2.0	0.50
	13.00 GHz		–2.0	________	2.0	0.51
	14.00 GHz		–2.0	________	2.0	0.51
	15.00 GHz		–2.0	________	2.0	0.51
	16.00 GHz		–2.0	________	2.0	0.51
	16.10 GHz		–2.0	________	2.0	0.51
	17.00 GHz		–2.0	________	2.0	0.51
	18.00 GHz		–2.0	________	2.0	0.51
	19.00 GHz		–2.0	________	2.0	0.62
	20.00 GHz		–2.0	________	2.0	0.62

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy INPUT B1**	5.2.2.1				
	Input level –10 dBm Difference from –10 dBm:					
	0.010 GHz		–2.0	______	2.0	0.50
	0.100 GHz		–2.0	______	2.0	0.50
	0.150 GHz		–2.0	______	2.0	0.50
	0.500 GHz		–2.0	______	2.0	0.50
	1.000 GHz		–2.0	______	2.0	0.50
	1.500 GHz		–2.0	______	2.0	0.50
	2.000 GHz		–2.0	______	2.0	0.50
	3.000 GHz		–2.0	______	2.0	0.50
	4.000 GHz		–2.0	______	2.0	0.50
	5.000 GHz		–2.0	______	2.0	0.50
	6.000 GHz		–2.0	______	2.0	0.50
	7.000 GHz		–2.0	______	2.0	0.50
	8.000 GHz		–2.0	______	2.0	0.50
	9.000 GHz		–2.0	______	2.0	0.50
	10.00 GHz		–2.0	______	2.0	0.50
	11.00 GHz		–2.0	______	2.0	0.50
	12.00 GHz		–2.0	______	2.0	0.50
	13.00 GHz		–2.0	______	2.0	0.51
	14.00 GHz		–2.0	______	2.0	0.51
	15.00 GHz		–2.0	______	2.0	0.51
	16.00 GHz		–2.0	______	2.0	0.51
	16.10 GHz		–2.0	______	2.0	0.51
	17.00 GHz		–2.0	______	2.0	0.51
	18.00 GHz		–2.0	______	2.0	0.51
	19.00 GHz		–2.0	______	2.0	0.62
	20.00 GHz		–2.0	______	2.0	0.62

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy INPUT B2**	5.2.2.1				
	Input level –10 dBm Difference from –10 dBm:					
	0.010 GHz		–2.0	____________	2.0	0.50
	0.100 GHz		–2.0	____________	2.0	0.50
	0.150 GHz		–2.0	____________	2.0	0.50
	0.500 GHz		–2.0	____________	2.0	0.50
	1.000 GHz		–2.0	____________	2.0	0.50
	1.500 GHz		–2.0	____________	2.0	0.50
	2.000 GHz		–2.0	____________	2.0	0.50
	3.000 GHz		–2.0	____________	2.0	0.50
	4.000 GHz		–2.0	____________	2.0	0.50
	5.000 GHz		–2.0	____________	2.0	0.50
	6.000 GHz		–2.0	____________	2.0	0.50
	7.000 GHz		–2.0	____________	2.0	0.50
	8.000 GHz		–2.0	____________	2.0	0.50
	9.000 GHz		–2.0	____________	2.0	0.50
	10.00 GHz		–2.0	____________	2.0	0.50
	11.00 GHz		–2.0	____________	2.0	0.50
	12.00 GHz		–2.0	____________	2.0	0.50
	13.00 GHz		–2.0	____________	2.0	0.51
	14.00 GHz		–2.0	____________	2.0	0.51
	15.00 GHz		–2.0	____________	2.0	0.51
	16.00 GHz		–2.0	____________	2.0	0.51
	16.10 GHz		–2.0	____________	2.0	0.51
	17.00 GHz		–2.0	____________	2.0	0.51
	18.00 GHz		–2.0	____________	2.0	0.51
	19.00 GHz		–2.0	____________	2.0	0.62
	20.00 GHz		–2.0	____________	2.0	0.62

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm**	5.2.2.2				
	f = 0.0101 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 0.500 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 1.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 2.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 4.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 8.00 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 10.00 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm**	5.2.2.2				
	f = 10.20 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 16.00 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 20.00 GHz					
	12 dB		-0.3	___________	0.3	0.086
	10 dB		-0.3	___________	0.3	0.086
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measurement acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncertainty / °
10	**Linearity B1** **Reference: –10 dBm**	5.2.2.2				
	f = 0.0101 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-2	___________	2	0.58
	-5 dB		-2	___________	2	0.58
	-10 dB		-2	___________	2	0.58
	f = 0.500 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 1.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 2.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 4.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 8.00 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 10.00 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-2	___________	2	0.58
	-5 dB		-2	___________	2	0.58
	-10 dB		-2	___________	2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B1** **Reference: –10 dBm**	5.2.2.2				
	f = 10.20 GHz					
	15 dB		-2	________	2	0.58
	10 dB		-2	________	2	0.58
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58
	f = 16.00 GHz					
	15 dB		-2	________	2	0.58
	10 dB		-2	________	2	0.58
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58
	f = 20.00 GHz					
	12 dB		-3	________	3	0.86
	10 dB		-3	________	3	0.86
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. va-lue/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm**	5.2.2.2				
	f = 0.0101 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 0.500 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 1.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 2.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 4.000 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 8.00 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 10.00 GHz					
	15 dB		-0.2	___________	0.2	0.058
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. va-lue/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm**	5.2.2.2				
	f = 10.20 GHz					
	15 dB		-0.2	________	0.2	0.058
	10 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 16.00 GHz					
	15 dB		-0.2	________	0.2	0.058
	10 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 20.00 GHz					
	12 dB		-0.3	________	0.3	0.086
	10 dB		-0.3	________	0.3	0.086
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm**	5.2.2.2				
	f = 0.0101 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-2	___________	2	0.58
	-5 dB		-2	___________	2	0.58
	-10 dB		-2	___________	2	0.58
	f = 0.500 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 1.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 2.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 4.000 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 8.00 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-1	___________	1	0.29
	-5 dB		-1	___________	1	0.29
	-10 dB		-1	___________	1	0.29
	f = 10.00 GHz					
	15 dB		-2	___________	2	0.58
	10 dB		-2	___________	2	0.58
	5 dB		-2	___________	2	0.58
	-5 dB		-2	___________	2	0.58
	-10 dB		-2	___________	2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm**	5.2.2.2				
	f = 10.20 GHz					
	15 dB		-2	________	2	0.58
	10 dB		-2	________	2	0.58
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58
	f = 16.00 GHz					
	15 dB		-2	________	2	0.58
	10 dB		-2	________	2	0.58
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58
	f = 20.00 GHz					
	12 dB		-3	________	3	0.86
	10 dB		-3	________	3	0.86
	5 dB		-2	________	2	0.58
	-5 dB		-2	________	2	0.58
	-10 dB		-2	________	2	0.58

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
11	**Noise level PORT1**	5.2.2.3				
	IF BW 10 Hz:					
	0.010 GHz			____________	-70.0	2.5
	0.100 GHz			____________	-70.0	2.5
	0.150 GHz			____________	-70.0	2.5
	0.500 GHz			____________	-110.0	2.5
	1.000 GHz			____________	-110.0	2.5
	1.500 GHz			____________	-110.0	2.5
	2.000 GHz			____________	-110.0	2.5
	3.000 GHz			____________	-110.0	2.5
	4.000 GHz			____________	-110.0	2.5
	5.000 GHz			____________	-110.0	2.5
	6.000 GHz			____________	-110.0	2.5
	7.000 GHz			____________	-110.0	2.5
	8.000 GHz			____________	-110.0	2.5
	9.000 GHz			____________	-105.0	2.5
	10.00 GHz			____________	-105.0	2.5
	11.00 GHz			____________	-105.0	2.5
	12.00 GHz			____________	-105.0	2.5
	13.00 GHz			____________	-105.0	2.5
	14.00 GHz			____________	-105.0	2.5
	15.00 GHz			____________	-105.0	2.5
	16.00 GHz			____________	-105.0	2.5
	16.10 GHz			____________	-95.0	2.5
	17.00 GHz			____________	-95.0	2.5
	18.00 GHz			____________	-95.0	2.5
	19.00 GHz			____________	-95.0	2.5
	20.00 GHz			____________	-95.0	2.5

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
11	**Noise level PORT2**	5.2.2.3				
	IF BW 10 Hz:					
	0.010 GHz			______	-70.0	2.5
	0.100 GHz			______	-70.0	2.5
	0.150 GHz			______	-70.0	2.5
	0.500 GHz			______	-110.0	2.5
	1.000 GHz			______	-110.0	2.5
	1.500 GHz			______	-110.0	2.5
	2.000 GHz			______	-110.0	2.5
	3.000 GHz			______	-110.0	2.5
	4.000 GHz			______	-110.0	2.5
	5.000 GHz			______	-110.0	2.5
	6.000 GHz			______	-110.0	2.5
	7.000 GHz			______	-110.0	2.5
	8.000 GHz			______	-110.0	2.5
	9.000 GHz			______	-105.0	2.5
	10.00 GHz			______	-105.0	2.5
	11.00 GHz			______	-105.0	2.5
	12.00 GHz			______	-105.0	2.5
	13.00 GHz			______	-105.0	2.5
	14.00 GHz			______	-105.0	2.5
	15.00 GHz			______	-105.0	2.5
	16.00 GHz			______	-105.0	2.5
	16.10 GHz			______	-95.0	2.5
	17.00 GHz			______	-95.0	2.5
	18.00 GHz			______	-95.0	2.5
	19.00 GHz			______	-95.0	2.5
	20.00 GHz			______	-95.0	2.5

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
12	**Match INPUT B1**	5.2.2.4				
	With ZVM-B23 installed:					
	0.050 GHz		10.0	________		0.3
	0.100 GHz		10.0	________		0.3
	0.150 GHz		10.0	________		0.3
	0.500 GHz		10.0	________		0.3
	1.000 GHz		10.0	________		0.3
	1.500 GHz		10.0	________		0.3
	2.000 GHz		10.0	________		0.3
	3.000 GHz		10.0	________		0.3
	4.000 GHz		10.0	________		0.45
	5.000 GHz		10.0	________		0.45
	6.000 GHz		10.0	________		0.45
	7.000 GHz		10.0	________		0.75
	8.000 GHz		10.0	________		0.75
	9.000 GHz		10.0	________		0.75
	10.00 GHz		10.0	________		0.75
	11.00 GHz		10.0	________		0.75
	12.00 GHz		10.0	________		0.75
	13.00 GHz		10.0	________		0.75
	14.00 GHz		10.0	________		0.75
	15.00 GHz		10.0	________		0.75
	16.00 GHz		10.0	________		0.75
	16.10 GHz		10.0	________		0.75
	17.00 GHz		10.0	________		0.75
	18.00 GHz		10.0	________		0.75
	19.00 GHz		10.0	________		0.75
	20.00 GHz		10.0	________		0.75

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
12	**Match INPUT B2**	5.2.2.4				
	With ZVM-B24 installed:					
	0.050 GHz		10.0	________		0.3
	0.100 GHz		10.0	________		0.3
	0.150 GHz		10.0	________		0.3
	0.500 GHz		10.0	________		0.3
	1.000 GHz		10.0	________		0.3
	1.500 GHz		10.0	________		0.3
	2.000 GHz		10.0	________		0.3
	3.000 GHz		10.0	________		0.3
	4.000 GHz		10.0	________		0.45
	5.000 GHz		10.0	________		0.45
	6.000 GHz		10.0	________		0.45
	7.000 GHz		10.0	________		0.75
	8.000 GHz		10.0	________		0.75
	9.000 GHz		10.0	________		0.75
	10.00 GHz		10.0	________		0.75
	11.00 GHz		10.0	________		0.75
	12.00 GHz		10.0	________		0.75
	13.00 GHz		10.0	________		0.75
	14.00 GHz		10.0	________		0.75
	15.00 GHz		10.0	________		0.75
	16.00 GHz		10.0	________		0.75
	16.10 GHz		10.0	________		0.75
	17.00 GHz		10.0	________		0.75
	18.00 GHz		10.0	________		0.75
	19.00 GHz		10.0	________		0.75
	20.00 GHz		10.0	________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
13	**Match PORT 1**	5.2.3.1				
	0.010 GHz		10.0	______		0.3
	0.050 GHz		12.0	______		0.3
	0.100 GHz		12.0	______		0.3
	0.500 GHz		12.0	______		0.3
	1.000 GHz		12.0	______		0.3
	1.500 GHz		12.0	______		0.3
	2.000 GHz		12.0	______		0.3
	3.000 GHz		12.0	______		0.3
	4.000 GHz		12.0	______		0.45
	5.000 GHz		12.0	______		0.45
	6.000 GHz		12.0	______		0.45
	7.000 GHz		12.0	______		0.75
	8.000 GHz		12.0	______		0.75
	9.000 GHz		10.0	______		0.75
	10.00 GHz		10.0	______		0.75
	11.00 GHz		10.0	______		0.75
	12.00 GHz		10.0	______		0.75
	13.00 GHz		10.0	______		0.75
	14.00 GHz		10.0	______		0.75
	15.00 GHz		10.0	______		0.75
	16.00 GHz		10.0	______		0.75
	16.10 GHz		10.0	______		0.75
	17.00 GHz		10.0	______		0.75
	18.00 GHz		10.0	______		0.75
	19.00 GHz		10.0	______		0.75
	20.00 GHz		10.0	______		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
13	**Match PORT 2**	5.2.3.1				
	0.010 GHz		10.0	____________		0.3
	0.050 GHz		12.0	____________		0.3
	0.100 GHz		12.0	____________		0.3
	0.500 GHz		12.0	____________		0.3
	1.000 GHz		12.0	____________		0.3
	1.500 GHz		12.0	____________		0.3
	2.000 GHz		12.0	____________		0.3
	3.000 GHz		12.0	____________		0.3
	4.000 GHz		12.0	____________		0.45
	5.000 GHz		12.0	____________		0.45
	6.000 GHz		12.0	____________		0.45
	7.000 GHz		12.0	____________		0.75
	8.000 GHz		12.0	____________		0.75
	9.000 GHz		10.0	____________		0.75
	10.00 GHz		10.0	____________		0.75
	11.00 GHz		10.0	____________		0.75
	12.00 GHz		10.0	____________		0.75
	13.00 GHz		10.0	____________		0.75
	14.00 GHz		10.0	____________		0.75
	15.00 GHz		10.0	____________		0.75
	16.00 GHz		10.0	____________		0.75
	16.10 GHz		10.0	____________		0.75
	17.00 GHz		10.0	____________		0.75
	18.00 GHz		10.0	____________		0.75
	19.00 GHz		10.0	____________		0.75
	20.00 GHz		10.0	____________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
14	**Match R1 CHANNEL IN**	5.2.3.2				
	0.010 GHz		12.0	____________		0.3
	0.100 GHz		12.0	____________		0.3
	0.150 GHz		12.0	____________		0.3
	0.500 GHz		12.0	____________		0.3
	1.000 GHz		12.0	____________		0.3
	1.500 GHz		12.0	____________		0.3
	2.000 GHz		12.0	____________		0.3
	3.000 GHz		12.0	____________		0.3
	4.000 GHz		12.0	____________		0.45
	5.000 GHz		12.0	____________		0.45
	6.000 GHz		12.0	____________		0.45
	7.000 GHz		12.0	____________		0.75
	8.000 GHz		12.0	____________		0.75
	9.000 GHz		12.0	____________		0.75
	10.00 GHz		12.0	____________		0.75
	11.00 GHz		12.0	____________		0.75
	12.00 GHz		12.0	____________		0.75
	13.00 GHz		12.0	____________		0.75
	14.00 GHz		12.0	____________		0.75
	15.00 GHz		12.0	____________		0.75
	16.00 GHz		12.0	____________		0.75
	16.10 GHz		12.0	____________		0.75
	17.00 GHz		12.0	____________		0.75
	18.00 GHz		12.0	____________		0.75
	19.00 GHz		12.0	____________		0.75
	20.00 GHz		12.0	____________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
14	**Match R2 CHANNEL IN**	5.2.3.2				
	0.010 GHz		12.0	____________		0.3
	0.100 GHz		12.0	____________		0.3
	0.150 GHz		12.0	____________		0.3
	0.500 GHz		12.0	____________		0.3
	1.000 GHz		12.0	____________		0.3
	1.500 GHz		12.0	____________		0.3
	2.000 GHz		12.0	____________		0.3
	3.000 GHz		12.0	____________		0.3
	4.000 GHz		12.0	____________		0.45
	5.000 GHz		12.0	____________		0.45
	6.000 GHz		12.0	____________		0.45
	7.000 GHz		12.0	____________		0.75
	8.000 GHz		12.0	____________		0.75
	9.000 GHz		12.0	____________		0.75
	10.00 GHz		12.0	____________		0.75
	11.00 GHz		12.0	____________		0.75
	12.00 GHz		12.0	____________		0.75
	13.00 GHz		12.0	____________		0.75
	14.00 GHz		12.0	____________		0.75
	15.00 GHz		12.0	____________		0.75
	16.00 GHz		12.0	____________		0.75
	16.10 GHz		12.0	____________		0.75
	17.00 GHz		12.0	____________		0.75
	18.00 GHz		12.0	____________		0.75
	19.00 GHz		12.0	____________		0.75
	20.00 GHz		12.0	____________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
15	**Raw directivity PORT1**	5.2.3.3				
	0.010 GHz		8.0	____________		0.3
	0.100 GHz		8.0	____________		0.3
	0.150 GHz		8.0	____________		0.3
	0.500 GHz		8.0	____________		0.3
	1.000 GHz		8.0	____________		0.3
	1.500 GHz		8.0	____________		0.3
	2.000 GHz		8.0	____________		0.3
	3.000 GHz		8.0	____________		0.3
	4.000 GHz		8.0	____________		0.45
	5.000 GHz		8.0	____________		0.45
	6.000 GHz		8.0	____________		0.45
	7.000 GHz		8.0	____________		0.75
	8.000 GHz		8.0	____________		0.75
	9.000 GHz		8.0	____________		0.75
	10.00 GHz		8.0	____________		0.75
	11.00 GHz		8.0	____________		0.75
	12.00 GHz		8.0	____________		0.75
	13.00 GHz		8.0	____________		0.75
	14.00 GHz		8.0	____________		0.75
	15.00 GHz		8.0	____________		0.75
	16.00 GHz		8.0	____________		0.75
	16.10 GHz		8.0	____________		0.75
	17.00 GHz		8.0	____________		0.75
	18.00 GHz		8.0	____________		0.75
	19.00 GHz		8.0	____________		0.75
	20.00 GHz		8.0	____________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
15	**Raw directivity PORT2**	5.2.3.3				
	0.010 GHz		8.0	________		0.3
	0.100 GHz		8.0	________		0.3
	0.150 GHz		8.0	________		0.3
	0.500 GHz		8.0	________		0.3
	1.000 GHz		8.0	________		0.3
	1.500 GHz		8.0	________		0.3
	2.000 GHz		8.0	________		0.3
	3.000 GHz		8.0	________		0.3
	4.000 GHz		8.0	________		0.45
	5.000 GHz		8.0	________		0.45
	6.000 GHz		8.0	________		0.45
	7.000 GHz		8.0	________		0.75
	8.000 GHz		8.0	________		0.75
	9.000 GHz		8.0	________		0.75
	10.00 GHz		8.0	________		0.75
	11.00 GHz		8.0	________		0.75
	12.00 GHz		8.0	________		0.75
	13.00 GHz		8.0	________		0.75
	14.00 GHz		8.0	________		0.75
	15.00 GHz		8.0	________		0.75
	16.00 GHz		8.0	________		0.75
	16.10 GHz		8.0	________		0.75
	17.00 GHz		8.0	________		0.75
	18.00 GHz		8.0	________		0.75
	19.00 GHz		8.0	________		0.75
	20.00 GHz		8.0	________		0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
16	**Generator step attenu-ator A1**	5.2.3.4				
	With ZVM-B21 installed:					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
16	**Generator step attenuator A2**	5.2.3.4				
	With ZVM-B22 stalled:					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
16	**Receiver step attenu-ator B1**	5.2.3.4				
	With ZVM-B23 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
16	**Receiver step attenu-ator B2**	5.2.3.4				
	With ZVM-B24 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 1**	5.2.3.5				
	IF BW 10 Hz:					
	0.010 GHz		75.0	________		
	0.100 GHz		75.0	________		
	0.500 GHz		115.0	________		
	1.000 GHz		115.0	________		
	2.000 GHz		115.0	________		
	4.000 GHz		115.0	________		
	6.000 GHz		115.0	________		
	8.000 GHz		115.0	________		
	10.00 GHz		110.0	________		
	12.00 GHz		110.0	________		
	14.00 GHz		110.0	________		
	16.00 GHz		110.0	________		
	16.10 GHz		100.0	________		
	17.00 GHz		100.0	________		
	18.00 GHz		100.0	________		
	19.00 GHz		100.0	________		
	20.00 GHz		100.0	________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 1**	5.2.3.5				
	With option ZVM-Z2x installed.					
	IF BW 10 Hz:					
	0.010 GHz		75.0	______		
	0.100 GHz		75.0	______		
	0.500 GHz		115.0	______		
	1.000 GHz		115.0	______		
	2.000 GHz		115.0	______		
	4.000 GHz		115.0	______		
	6.000 GHz		115.0	______		
	8.000 GHz		115.0	______		
	10.00 GHz		110.0	______		
	12.00 GHz		105.0	______		
	14.00 GHz		105.0	______		
	16.00 GHz		105.0	______		
	16.10 GHz		100.0	______		
	17.00 GHz		100.0	______		
	18.00 GHz		100.0	______		
	19.00 GHz		100.0	______		
	20.00 GHz		100.0	______		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 1**	5.2.3.5				
	IF BW 10 kHz:					
	0.010 GHz		45.0	________		
	0.100 GHz		45.0	________		
	0.500 GHz		85.0	________		
	1.000 GHz		85.0	________		
	2.000 GHz		85.0	________		
	4.000 GHz		85.0	________		
	6.000 GHz		85.0	________		
	8.000 GHz		85.0	________		
	10.00 GHz		80.0	________		
	12.00 GHz		80.0	________		
	14.00 GHz		80.0	________		
	16.00 GHz		80.0	________		
	16.10 GHz		70.0	________		
	17.00 GHz		70.0	________		
	18.00 GHz		70.0	________		
	19.00 GHz		70.0	________		
	20.00 GHz		70.0	________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 2**	5.2.3.5				
	IF BW 10 Hz:					
	0.010 GHz		75.0	____________		
	0.100 GHz		75.0	____________		
	0.500 GHz		115.0	____________		
	1.000 GHz		115.0	____________		
	2.000 GHz		115.0	____________		
	4.000 GHz		115.0	____________		
	6.000 GHz		115.0	____________		
	8.000 GHz		115.0	____________		
	10.00 GHz		110.0	____________		
	12.00 GHz		110.0	____________		
	14.00 GHz		110.0	____________		
	16.00 GHz		110.0	____________		
	16.10 GHz		100.0	____________		
	17.00 GHz		100.0	____________		
	18.00 GHz		100.0	____________		
	19.00 GHz		100.0	____________		
	20.00 GHz		100.0	____________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 2**	5.2.3.5				
	With option ZVM-Z2x installed.					
	IF BW 10 Hz:					
	0.010 GHz		75.0	________		
	0.100 GHz		75.0	________		
	0.500 GHz		115.0	________		
	1.000 GHz		115.0	________		
	2.000 GHz		115.0	________		
	4.000 GHz		115.0	________		
	6.000 GHz		115.0	________		
	8.000 GHz		115.0	________		
	10.00 GHz		110.0	________		
	12.00 GHz		105.0	________		
	14.00 GHz		105.0	________		
	16.00 GHz		105.0	________		
	16.10 GHz		100.0	________		
	17.00 GHz		100.0	________		
	18.00 GHz		100.0	________		
	19.00 GHz		100.0	________		
	20.00 GHz		100.0	________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 2**	5.2.3.5				
	IF BW 10 kHz:					
	0.010 GHz		45.0	____________		
	0.100 GHz		45.0	____________		
	0.500 GHz		85.0	____________		
	1.000 GHz		85.0	____________		
	2.000 GHz		85.0	____________		
	4.000 GHz		85.0	____________		
	6.000 GHz		85.0	____________		
	8.000 GHz		85.0	____________		
	10.00 GHz		80.0	____________		
	12.00 GHz		80.0	____________		
	14.00 GHz		80.0	____________		
	16.00 GHz		80.0	____________		
	16.10 GHz		70.0	____________		
	17.00 GHz		70.0	____________		
	18.00 GHz		70.0	____________		
	19.00 GHz		70.0	____________		
	20.00 GHz		70.0	____________		

5.4 Performance Test Record (ZVK)

The indicated uncertainties refer to the proposed test setup / test procedure.
The expanded measurement uncertainty amounts to k = 2 (confidence level of 95%, Gauss distribution).
Additional measurement uncertainties, which are within the user's responsibility, have not been taken into account (e.g. cable attenuation in harmonics measurements).
We recommend performing a measurement uncertainty analysis for the test setup in question so that the values specified in the data sheet can be reliably checked.

Table 5-2: Performance Test Record – Generator Specifications

Item	Characteristic	Measure-ment acc. to section	Specification min. value/Hz	Measured value/Hz	Specification max. value/Hz	Uncer-tainty / Hz
1	**Frequency accuracy**	5.2.1.1				
	0.010 GHz		-40	____________	+40	3
	0.100 GHz		-400	____________	+400	26
	0.5 GHz		-2000	____________	+2000	129
	1.5 GHz		-6000	____________	+6000	386
	1.998 GHz		-7992	____________	+7992	514
	3 GHz		-12000	____________	+12000	772
	5 GHz		-20000	____________	+20000	1286
	8 GHz		-32000	____________	+32000	2058
	15 GHz		-60000	____________	+60000	3858
	20 GHz		-80000	____________	+80000	5143
	25 GHz		-100000	____________	+100000	6429
	30 GHz		-120000	____________	+120000	7715
	36 GHz		-144000	____________	+144000	9258
	40 GHz		-160000	____________	+160000	10287

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT1**		5.2.1.2				
	Measurement at source level 0 dBm (-3 dBm with ZVK-B21)						
	ZVK frq.	Harmonic:					
	10 MHz	20 MHz		20	__________		1.5
		30 MHz		20	__________		1.5
	100 MHz	200 MHz		20	__________		1.3
		300 MHz		20	__________		1.3
	500 MHz	1000 MHz		20	__________		1.3
		1500 MHz		20	__________		1.3
	1 GHz	2 GHz		20	__________		1.2
		3 GHz		20	__________		1.6
	1.5 GHz	3 GHz		20	__________		1.6
		4.5 GHz		20	__________		1.7
	1.998 GHz	3.996 GHz		20	__________		1.7
		5.994 GHz		20	__________		1.7
	2 GHz	4 GHz		20	__________		1.7
		6 GHz		20	__________		1.7
	2.5 GHz	5 GHz		20	__________		2.0
		7.5 GHz		20	__________		2.9
	2.8 GHz	5.6 GHz		20	__________		2.0
		8.4 GHz		20	__________		2.9
	3.2 GHz	6.4 GHz		20	__________		2.0
		9.6 GHz		20	__________		2.9
	3.8 GHz	7.6 GHz		20	__________		2.9
		11.4 GHz		20	__________		3.0
	5 GHz	10 GHz		20	__________		3.0
		15 GHz		20	__________		3.0
	5.1 GHz	10.2 GHz		20	__________		3.0
		15.3 GHz		20	__________		3.0
	5.5 GHz	11 GHz		20	__________		3.0
		16.5 GHz		20	__________		3.0
	6 GHz	12 GHz		20	__________		3.0
		18 GHz		20	__________		3.0
	6.5 GHz	13 GHz		20	__________		3.0
		19.5 GHz		20	__________		3.4
	7.0 GHz	14 GHz		20	__________		3.0
		21 GHz		20	__________		3.5
	8 GHz	16 GHz		20	__________		3.6
		24 GHz		20	__________		4.0
	10 GHz	20 GHz		20	__________		4.0
		30 GHz		20	__________		4.5

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT1**	5.2.1.2				
	Measurement at source level 0 dBm (-3 dBm with ZVK-B21)					
	ZVK frq. Harmonic:					
	10.2 GHz 20.4 GHz		15	___________		4.1
	30.6 GHz		15	___________		4.5
	12 GHz 24 GHz		15	___________		4.1
	36 GHz		15	___________		4.5
	13.8 GHz 27.6 GHz		15	___________		4.5
	15.8 GHz 31.6 GHz		15	___________		4.5
	16 GHz 32 GHz		15	___________		4.5
	Measurement at source level –5 dBm (-9 dBm with ZVK-B21)					
	16.8 GHz 33.6 GHz		15	___________		4.5
	19 GHz 38 GHz		15	___________		4.5
	20 GHz 40 GHz		25	___________		4.5

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT2**		5.2.1.2				
	Measurement at source level 0 dBm (-3 dBm with ZVK-B21)						
	ZVK frq.	Harmonic:					
	10 MHz	20 MHz		20	___________		1.5
		30 MHz		20	___________		1.5
	100 MHz	200 MHz		20	___________		1.3
		300 MHz		20	___________		1.3
	500 MHz	1000 MHz		20	___________		1.3
		1500 MHz		20	___________		1.3
	1 GHz	2 GHz		20	___________		1.2
		3 GHz		20	___________		1.6
	1.5 GHz	3 GHz		20	___________		1.6
		4.5 GHz		20	___________		1.7
	1.998 GHz	3.996 GHz		20	___________		1.7
		5.994 GHz		20	___________		1.7
	2 GHz	4 GHz		20	___________		1.7
		6 GHz		20	___________		1.7
	2.5 GHz	5 GHz		20	___________		2.0
		7.5 GHz		20	___________		2.9
	2.8 GHz	5.6 GHz		20	___________		2.0
		8.4 GHz		20	___________		2.9
	3.2 GHz	6.4 GHz		20	___________		2.0
		9.6 GHz		20	___________		2.9
	3.8 GHz	7.6 GHz		20	___________		2.9
		11.4 GHz		20	___________		3.0
	5 GHz	10 GHz		20	___________		3.0
		15 GHz		20	___________		3.0
	5.1 GHz	10.2 GHz		20	___________		3.0
		15.3 GHz		20	___________		3.0
	5.5 GHz	11 GHz		20	___________		3.0
		16.5 GHz		20	___________		3.0
	6 GHz	12 GHz		20	___________		3.0
		18 GHz		20	___________		3.0
	6.5 GHz	13 GHz		20	___________		3.0
		19.5 GHz		20	___________		3.4
	7.0 GHz	14 GHz		20	___________		3.0
		21 GHz		20	___________		3.5
	8 GHz	16 GHz		20	___________		3.6
		24 GHz		20	___________		4.0
	10 GHz	20 GHz		20	___________		4.0
		30 GHz		20	___________		4.5

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT2**		5.2.1.2				
	Measurement at source level 0 dBm (-3 dBm with ZVK-B21)						
	ZVK frq.	Harmonic:					
	10.2 GHz	20.4 GHz		15	__________		4.1
		30.6 GHz		15	__________		4.5
	12 GHz	24 GHz		15	__________		4.1
		36 GHz		15	__________		4.5
	13.8 GHz	27.6 GHz		15	__________		4.5
	15.8 GHz	31.6 GHz		15	__________		4.5
	16 GHz	32 GHz		15	__________		4.5
	Measurement at source level –5 dBm (-9 dBm with ZVK-B21)						
	16.8 GHz	33.6 GHz		15	__________		4.5
	19 GHz	38 GHz		15	__________		4.5
	20 GHz	40 GHz		25	__________		4.5

Item	Characteristic		Measurement acc. to section	Specification min. value/dBc	Measured value/dBc		Uncertainty / dB
2	**Harmonics PORT1**		5.2.1.2				
	Measurement at source level –10 dBm						
	ZVK frq.	Harmonic:					
	10 MHz	20 MHz		30	__________		1.5
		30 MHz		30	__________		1.5
	100 MHz	200 MHz		30	__________		1.3
		300 MHz		30	__________		1.3
	500 MHz	1000 MHz		30	__________		1.3
		1500 MHz		30	__________		1.3
	1 GHz	2 GHz		30	__________		1.2
		3 GHz		30	__________		1.6
	1.5 GHz	3 GHz		30	__________		1.6
		4.5 GHz		30	__________		1.7
	1.998 GHz	3.996 GHz		30	__________		1.7
		5.994 GHz		30	__________		1.7
	2 GHz	4 GHz		30	__________		1.7
		6 GHz		30	__________		1.7
	2.5 GHz	5 GHz		30	__________		2.0
		7.5 GHz		30	__________		2.9
	2.8 GHz	5.6 GHz		30	__________		2.0
		8.4 GHz		30	__________		2.9
	3.2 GHz	6.4 GHz		30	__________		2.0
		9.6 GHz		30	__________		2.9
	3.8 GHz	7.6 GHz		30	__________		2.9
		11.4 GHz		30	__________		3.0
	5 GHz	10 GHz		30	__________		3.0
		15 GHz		30	__________		3.0
	5.1 GHz	10.2 GHz		30	__________		3.0
		15.3 GHz		30	__________		3.0
	5.5 GHz	11 GHz		30	__________		3.0
		16.5 GHz		30	__________		3.0
	6 GHz	12 GHz		30	__________		3.0
		18 GHz		30	__________		3.0
	6.5 GHz	13 GHz		30	__________		3.0
		19.5 GHz		30	__________		3.4
	7.0 GHz	14 GHz		30	__________		3.0
		21 GHz		30	__________		3.5
	8 GHz	16 GHz		30	__________		3.6
		24 GHz		30	__________		4.0
	10 GHz	20 GHz		30	__________		4.0
		30 GHz		30	__________		4.5

Item	Characteristic		Measurement acc. to section	Specification min. value/dBc	Measured value/dBc		Uncertainty / dB
2	**Harmonics PORT1**		5.2.1.2				
	Measurement at source level –10 dBm						
	ZVK frq.	Harmonic:					
	10.2 GHz	20.4 GHz		25	________		4.1
		30.6 GHz		25	________		4.5
	12 GHz	24 GHz		25	________		4.1
		36 GHz		25	________		4.5
	13.8 GHz	27.6 GHz		25	________		4.5
	15.8 GHz	31.6 GHz		25	________		4.5
	16 GHz	32 GHz		25	________		4.5
	16.8 GHz	33.6 GHz		25	________		4.5
	19 GHz	38 GHz		25	________		4.5
	20 GHz	40 GHz		25	________		4.5

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT2**		5.2.1.2				
	Measurement at source level –10 dBm						
	ZVK frq.	Harmonic:					
	10 MHz	20 MHz		30	___________		1.5
		30 MHz		30	___________		1.5
	100 MHz	200 MHz		30	___________		1.3
		300 MHz		30	___________		1.3
	500 MHz	1000 MHz		30	___________		1.3
		1500 MHz		30	___________		1.3
	1 GHz	2 GHz		30	___________		1.2
		3 GHz		30	___________		1.6
	1.5 GHz	3 GHz		30	___________		1.6
		4.5 GHz		30	___________		1.7
	1.998 GHz	3.996 GHz		30	___________		1.7
		5.994 GHz		30	___________		1.7
	2 GHz	4 GHz		30	___________		1.7
		6 GHz		30	___________		1.7
	2.5 GHz	5 GHz		30	___________		2.0
		7.5 GHz		30	___________		2.9
	2.8 GHz	5.6 GHz		30	___________		2.0
		8.4 GHz		30	___________		2.9
	3.2 GHz	6.4 GHz		30	___________		2.0
		9.6 GHz		30	___________		2.9
	3.8 GHz	7.6 GHz		30	___________		2.9
		11.4 GHz		30	___________		3.0
	5 GHz	10 GHz		30	___________		3.0
		15 GHz		30	___________		3.0
	5.1 GHz	10.2 GHz		30	___________		3.0
		15.3 GHz		30	___________		3.0
	5.5 GHz	11 GHz		30	___________		3.0
		16.5 GHz		30	___________		3.0
	6 GHz	12 GHz		30	___________		3.0
		18 GHz		30	___________		3.0
	6.5 GHz	13 GHz		30	___________		3.0
		19.5 GHz		30	___________		3.4
	7.0 GHz	14 GHz		30	___________		3.0
		21 GHz		30	___________		3.5
	8 GHz	16 GHz		30	___________		3.6
		24 GHz		30	___________		4.0
	10 GHz	20 GHz		30	___________		4.0
		30 GHz		30	___________		4.5

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
2	**Harmonics PORT2**		5.2.1.2				
	Measurement at source level –10 dBm						
	ZVK frq.	Harmonic:					
	10.2 GHz	20.4 GHz		25	___________		4.1
		30.6 GHz		25	___________		4.5
	12 GHz	24 GHz		25	___________		4.1
		36 GHz		25	___________		4.5
	13.8 GHz	27.6 GHz		25	___________		4.5
	15.8 GHz	31.6 GHz		25	___________		4.5
	16 GHz	32 GHz		25	___________		4.5
	16.8 GHz	33.6 GHz		25	___________		4.5
	19 GHz	38 GHz		25	___________		4.5
	20 GHz	40 GHz		25	___________		4.5

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3	**Spurious**		5.2.1.3				
	Measurement at source level –20 dBm						
	ZVK frq.	Spurious:					
	10 MHz	53.125 MHz		35	___________		1.4
		43.125 MHz		35	___________		1.5
	50 MHz	202.5 MHz		35	___________		1.3
		152.5 MHz		35	___________		1.3
	100 MHz	152.5 MHz		35	___________		1.3
		52.5 MHz		35	___________		1.3
	149 MHz	103.5 MHz		35	___________		1.3
		45.5 MHz		35	___________		1.4
	150 MHz	860 MHz		35	___________		1.3
		710 MHz		35	___________		1.3
	250 MHz	760 MHz		35	___________		1.3
		510 MHz		35	___________		1.3
	350 MHz	660 MHz		35	___________		1.3
		310 MHz		35	___________		1.4
	450 MHz	560 MHz		35	___________		1.3
		110 MHz		35	___________		1.3
	550 MHz	460 MHz		35	___________		1.3
		90 MHz		35	___________		1.3
	650 MHz	360 MHz		35	___________		1.3
		290 MHz		35	___________		1.3
	749 MHz	261 MHz		35	___________		1.3
		488 MHz		35	___________		1.3
	2.0 GHz	1.0 GHz		35	___________		1.3
		3.0 GHz		35	___________		1.6
	2.2 GHz	1.1 GHz		35	___________		1.3
		3.0 GHz		35	___________		1.6
	2.4 GHz	1.2 GHz		35	___________		1.6
		3.6 GHz		35	___________		2.0
	2.6 GHz	1.3 GHz		35	___________		1.6
		3.9 GHz		35	___________		2.0
	2.61 GHz	1.305 GHz		35	___________		1.6
		3.915 GHz		35	___________		2.0
	2.8 GHz	1.4 GHz		35	___________		1.6
		4.2 GHz		35	___________		2.0
	3.0 GHz	1.5 GHz		35	___________		1.6
		4.5 GHz		35	___________		2.0
	3.2 GHz	1.6 GHz		35	___________		1.6
		4.8 GHz		35	___________		2.0
	3.31 GHz	1.655 GHz		35	___________		1.6
		4.965 GHz		35	___________		2.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	3.4 GHz	1.7 GHz		35	________		1.6
		5.1 GHz		35	________		2.0
	3.6 GHz	1.8 GHz		35	________		1.7
		5.4 GHz		35	________		2.0
	3.8 GHz	1.9 GHz		35	________		1.7
		5.7 GHz		35	________		2.1
	4.0 GHz	2.0 GHz		35	________		1.7
		6.0 GHz		35	________		2.1
	5 GHz	1.250 GHz		35	________		1.7
		2.500 GHz		35	________		2.1
		3.750 GHz		35	________		2.1
		6.250 GHz		35	________		2.1
		7.500 GHz		35	________		2.9
		8.750 GHz		35	________		3.0
	5.1 GHz	1.275 GHz		35	________		1.7
		2.550 GHz		35	________		2.0
		3.825 GHz		35	________		2.0
		6.375 GHz		35	________		2.0
		7.650 GHz		35	________		2.9
		8.925 GHz		35	________		3.0
	5.5 GHz	1.375 GHz		35	________		1.7
		2.750 GHz		35	________		2.0
		4.125 GHz		35	________		2.1
		6.875 GHz		35	________		2.1
		8.250 GHz		35	________		3.0
		9.625 GHz		35	________		3.0
	6.0 GHz	1.500 GHz		35	________		1.7
		3.000 GHz		35	________		2.0
		4.500 GHz		35	________		2.1
		7.500 GHz		35	________		2.9
		9.000 GHz		35	________		3.0
		10.50 GHz		35	________		3.0
	6.5 GHz	1.625 GHz		35	________		1.7
		3.250 GHz		35	________		2.0
		4.875 GHz		35	________		2.1
		8.125 GHz		35	________		2.9
		9.750 GHz		35	________		3.0
		11.375 GHz		35	________		3.0
	7.0 GHz	1.750 GHz		35	________		1.7
		3.500 GHz		35	________		2.0
		5.250 GHz		35	________		2.0
		8.750 GHz		35	________		3.0
		10.50 GHz		35	________		3.0
		12.25 GHz		35	________		3.0
	7.8 GHz	1.950 GHz		35	________		2.6
		3.900 GHz		35	________		2.9
		5.850 GHz		35	________		2.9
		9.750 GHz		35	________		3.6
		11.70 GHz		35	________		3.6
		13.65 GHz		35	________		3.6

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	8 GHz	1.00 GHz		35	________		2.6
		2.00 GHz		35	________		2.6
		3.00 GHz		35	________		2.8
		4.00 GHz		35	________		2.9
		5.00 GHz		35	________		2.9
		6.00 GHz		35	________		2.9
		7.00 GHz		35	________		2.9
		9.00 GHz		35	________		3.6
		10.00 GHz		35	________		3.6
		11.00 GHz		35	________		3.6
		12.00 GHz		35	________		3.6
		13.00 GHz		35	________		3.6
		14.00 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
	10 GHz	1.25 GHz		35	________		2.7
		2.50 GHz		35	________		2.8
		3.75 GHz		35	________		2.9
		5.00 GHz		35	________		2.9
		6.25 GHz		35	________		2.9
		7.50 GHz		35	________		3.6
		8.75 GHz		35	________		3.6
		11.25 GHz		35	________		3.6
		12.50 GHz		35	________		3.6
		13.75 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
		16.25 GHz		35	________		3.6
		17.50 GHz		35	________		3.6
		18.75 GHz		35	________		4.0
	10.2 GHz	1.275 GHz		35	________		2.7
		2.550 GHz		35	________		2.8
		3.825 GHz		35	________		2.9
		5.100 GHz		35	________		2.9
		6.375 GHz		35	________		2.9
		7.650 GHz		35	________		3.6
		8.925 GHz		35	________		3.6
		11.475 GHz		35	________		3.6
		12.750 GHz		35	________		3.6
		14.025 GHz		35	________		3.6
		15.300 GHz		35	________		3.6
		16.575 GHz		35	________		3.6
		17.850 GHz		35	________		3.6
		19.125 GHz		35	________		4.0
	12 GHz	1.50 GHz		35	________		2.7
		3.00 GHz		35	________		2.8
		4.50 GHz		35	________		2.9
		6.00 GHz		35	________		2.9
		7.50 GHz		35	________		3.6
		9.00 GHz		35	________		3.6
		10.50 GHz		35	________		3.6
		13.50 GHz		35	________		3.6
		15.00 GHz		35	________		3.6
		16.50 GHz		35	________		3.6
		18.00 GHz		35	________		3.6
		19.50 GHz		35	________		4.0
		21.00 GHz		35	________		4.0
		22.50 GHz		35	________		4.0

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	13.8 GHz	1.7250 GHz		35	________		2.6
		3.4500 GHz		35	________		2.8
		5.1750 GHz		35	________		2.9
		6.9000 GHz		35	________		2.9
		8.6250 GHz		35	________		3.6
		10.350 GHz		35	________		3.6
		12.075 GHz		35	________		3.6
		15.525 GHz		35	________		3.6
		17.250 GHz		35	________		3.6
		18.975 GHz		35	________		4.0
		20.700 GHz		35	________		4.0
		22.425 GHz		35	________		4.0
		24.150 GHz		35	________		4.0
		25.875 GHz		35	________		4.0
	15.8 GHz	1.975 GHz		35	________		2.6
		3.950 GHz		35	________		2.9
		5.925 GHz		35	________		2.9
		7.900 GHz		35	________		3.6
		9.875 GHz		35	________		3.6
		11.850 GHz		35	________		3.6
		13.825 GHz		35	________		3.6
		17.775 GHz		35	________		3.6
		19.750 GHz		35	________		4.0
		21.725 GHz		35	________		4.0
		23.700 GHz		35	________		4.0
		25.675 GHz		35	________		4.0
		27.650 GHz		35	________		4.0
		29.625 GHz		35	________		4.0
	16.2 GHz	1.0125 GHz		30	________		2.6
		2.0250 GHz		30	________		2.6
		3.0375 GHz		30	________		2.9
		4.0500 GHz		30	________		2.9
		5.0625 GHz		30	________		2.9
		6.0750 GHz		30	________		2.9
		7.0875 GHz		30	________		3.6
		8.1000 GHz		30	________		3.6
		9.1125 GHz		30	________		3.6
		10.125 GHz		30	________		3.6
		11.1375GHz		30	________		3.6
		12.150 GHz		30	________		3.6
		13.1625GHz		30	________		3.6
		14.175 GHz		30	________		3.6
		15.1875GHz		30	________		3.6
		17.2125GHz		30	________		3.6
		18.225 GHz		30	________		4.0
		19.2375GHz		30	________		4.0
		20.250 GHz		30	________		4.0
		21.2625GHz		30	________		4.0
		22.275 GHz		30	________		4.0
		23.2875GHz		30	________		4.0
		24.300 GHz		30	________		4.0
		25.3125GHz		30	________		4.0
		26.325 GHz		30	________		4.0
		27.3375GHz		30	________		4.9
		28.350 GHz		30	________		4.9
		29.3625GHz		30	________		4.9
		30.375 GHz		30	________		4.9
		31.3875GHz		30	________		4.9

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	20 GHz	1.25 GHz		30	___________		3.1
		2.50 GHz		30	___________		3.3
		3.75 GHz		30	___________		3.4
		5.00 GHz		30	___________		3.4
		6.25 GHz		30	___________		3.4
		7.50 GHz		30	___________		4.0
		8.75 GHz		30	___________		4.0
		10.00 GHz		30	___________		4.0
		11.25 GHz		30	___________		4.0
		12.50 GHz		30	___________		4.0
		13.75 GHz		30	___________		4.0
		15.00 GHz		30	___________		4.0
		16.25 GHz		30	___________		4.0
		17.50 GHz		30	___________		4.0
		18.75 GHz		30	___________		4.4
		21.25 GHz		30	___________		4.4
		22.50 GHz		30	___________		4.4
		23.75 GHz		30	___________		4.4
		25.00 GHz		30	___________		4.4
		26.25 GHz		30	___________		4.4
		27.50 GHz		30	___________		5.2
		28.75 GHz		30	___________		5.2
		30.00 GHz		30	___________		5.2
		31.25 GHz		30	___________		5.2
		32.50 GHz		30	___________		5.2
		33.75 GHz		30	___________		5.2
		35.00 GHz		30	___________		5.2
		36.25 GHz		30	___________		5.2
		37.50 GHz		30	___________		5.2
		38.75 GHz		30	___________		5.2
3			5.2.1.3				
	26 GHz	1.625 GHz		30	___________		3.2
		3.250 GHz		30	___________		3.3
		4.875 GHz		30	___________		3.4
		6.500 GHz		30	___________		3.4
		8.125 GHz		30	___________		4.0
		9.750 GHz		30	___________		4.0
		11.375 GHz		30	___________		4.0
		13.000 GHz		30	___________		4.0
		14.625 GHz		30	___________		4.0
		16.250 GHz		30	___________		4.0
		17.875 GHz		30	___________		4.0
		19.500 GHz		30	___________		4.4
		21.125 GHz		30	___________		4.4
		22.750 GHz		30	___________		4.4
		24.375 GHz		30	___________		4.4
		27.625 GHz		30	___________		5.2
		29.250 GHz		30	___________		5.2
		30.875 GHz		30	___________		5.2
		32.500 GHz		30	___________		5.2
		34.125 GHz		30	___________		5.2
		35.750 GHz		30	___________		5.2
		37.375 GHz		30	___________		5.2
		39.000 GHz		30	___________		5.2

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	36 GHz	1.125 GHz		30	________		3.8
		2.250 GHz		30	________		3.9
		3.375 GHz		30	________		3.9
		4.500 GHz		30	________		4.0
		5.625 GHz		30	________		4.0
		6.750 GHz		30	________		4.0
		7.875 GHz		30	________		4.5
		9.000 GHz		30	________		4.5
		10.125 GHz		30	________		4.5
		11.250 GHz		30	________		4.5
		12.375 GHz		30	________		4.5
		13.500 GHz		30	________		4.5
		14.625 GHz		30	________		4.5
		15.750 GHz		30	________		4.5
		16.875 GHz		30	________		4.5
		18.000 GHz		30	________		4.5
		19.125 GHz		30	________		4.8
		20.250 GHz		30	________		4.9
		21.375 GHz		30	________		4.9
		22.500 GHz		30	________		4.9
		23.625 GHz		30	________		4.9
		24.750 GHz		30	________		4.9
		25.875 GHz		30	________		4.9
		27.000 GHz		30	________		5.6
		28.125 GHz		30	________		5.6
		29.250 GHz		30	________		5.6
		30.375 GHz		30	________		5.6
		31.500 GHz		30	________		5.6
		32.625 GHz		30	________		5.6
		33.750 GHz		30	________		5.6
		34.875 GHz		30	________		5.6
		37.125 GHz		30	________		5.6
		38.250 GHz		30	________		5.6
		39.375 GHz		30	________		5.6

Item	Characteristic		Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
3			5.2.1.3				
	40 GHz	1.25 GHz		30	___________		3.8
		2.50 GHz		30	___________		3.9
		3.75 GHz		30	___________		4.0
		5.00 GHz		30	___________		4.0
		6.25 GHz		30	___________		4.0
		7.50 GHz		30	___________		4.5
		8.75 GHz		30	___________		4.5
		10.00 GHz		30	___________		4.5
		11.25 GHz		30	___________		4.5
		12.50 GHz		30	___________		4.5
		13.75 GHz		30	___________		4.5
		15.00 GHz		30	___________		4.5
		16.25 GHz		30	___________		4.5
		17.50 GHz		30	___________		4.5
		18.75 GHz		30	___________		4.8
		20.00 GHz		30	___________		4.8
		21.25 GHz		30	___________		4.9
		22.50 GHz		30	___________		4.9
		23.75 GHz		30	___________		4.9
		25.00 GHz		30	___________		4.9
		26.25 GHz		30	___________		4.9
		27.50 GHz		30	___________		5.6
		28.75 GHz		30	___________		5.6
		30.00 GHz		30	___________		5.6
		31.25 GHz		30	___________		5.6
		32.50 GHz		30	___________		5.6
		33.75 GHz		30	___________		5.6
		35.00 GHz		30	___________		5.6
		36.25 GHz		30	___________		5.6
		37.50 GHz		30	___________		5.6
		38.75 GHz		30	___________		5.6

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBc	Measured value/dBc		Uncer-tainty / dB
4	**SSB phase noise**	5.2.1.4				
	0.010 GHz		100.0	________		2.0
	0.100 GHz		100.0	________		2.0
	0.500 GHz		90.00	________		1.5
	1.000 GHz		90.00	________		1.5
	1.500 GHz		86.50	________		1.5
	1.998 GHz		84.10	________		1.0
	2.000 GHz		84.00	________		1.0
	2.500 GHz		82.10	________		1.0
	2.800 GHz		81.10	________		1.0
	3.200 GHz		79.90	________		1.0
	3.800 GHz		78.50	________		1.0
	5.000 GHz		76.10	________		1.0
	5.100 GHz		75.90	________		1.0
	5.500 GHz		75.20	________		1.0
	6.000 GHz		74.50	________		0.5
	6.500 GHz		73.80	________		0.5
	7.000 GHz		73.10	________		0.5
	8.000 GHz		72.00	________		0.5
	10.00 GHz		70.00	________		0.5
	10.20 GHz		69.90	________		0.5
	12.00 GHz		68.50	________		0.5
	13.00 GHz		67.80	________		0.5
	15.00 GHz		66.50	________		0.5
	20.00 GHz		64.00	________		0.5
	20.10 GHz		63.90	________		0.5
	21.00 GHz		63.60	________		0.5
	25.00 GHz		62.00	________		0.5
	26.00 GHz		61.70	________		0.5
	30.00 GHz		60.40	________		0.5
	36.00 GHz		58.90	________		0.5
	40.00 GHz		58.00	________		0.5

Item	Characteristic	Measure-ment acc. to section		Measured value/Hz	Specification max. value Hz	Uncer-tainty / Hz
5	**Residual FM**	5.2.1.5				
	0.010 GHz			________	2.0	0.7
	0.100 GHz			________	2.0	0.7
	0.500 GHz			________	5.0	0.8
	1.000 GHz			________	5.0	1.0
	1.500 GHz			________	10.0	1.1
	1.998 GHz			________	10.0	1.3
	2.000 GHz			________	10.0	1.3
	2.500 GHz			________	20.0	1.5
	2.800 GHz			________	20.0	1.7
	3.200 GHz			________	20.0	1.8
	3.800 GHz			________	20.0	2.1
	5.000 GHz			________	40.0	2.5
	5.100 GHz			________	40.0	2.5
	5.500 GHz			________	40.0	2.7
	6.000 GHz			________	40.0	2.8
	6.500 GHz			________	40.0	3.0
	7.000 GHz			________	40.0	3.2
	8.000 GHz			________	40.0	3.5
	10.00 GHz			________	80.0	4.2
	10.20 GHz			________	80.0	4.3
	12.00 GHz			________	80.0	4.9
	13.00 GHz			________	80.0	5.3
	15.00 GHz			________	80.0	6.0
	20.00 GHz			________	80.0	7.8
	20.10 GHz			________	160.0	7.8
	21.00 GHz			________	160.0	8.1
	25.00 GHz			________	160.0	9.6
	26.00 GHz			________	160.0	9.9
	30.00 GHz			________	160.0	13.3
	36.00 GHz			________	160.0	18.9
	40.00 GHz			________	160.0	22.6

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBm	Measured value/dBm	Specification max. value/dBm	Uncer-tainty / dB
6	**Level accuracy Port1**	5.2.1.6				
	0.010 GHz		–12.0	___________	–8.0	0.23
	0.100 GHz		–12.0	___________	–8.0	0.18
	0.150 GHz		–11.0	___________	–9.0	0.18
	0.500 GHz		–11.0	___________	–9.0	0.18
	1.000 GHz		–11.0	___________	–9.0	0.18
	1.500 GHz		–11.0	___________	–9.0	0.18
	2.000 GHz		–11.0	___________	–9.0	0.18
	3.000 GHz		–11.0	___________	–9.0	0.24
	4.000 GHz		–11.0	___________	–9.0	0.24
	5.000 GHz		–11.0	___________	–9.0	0.32
	6.000 GHz		–11.0	___________	–9.0	0.32
	7.000 GHz		–11.0	___________	–9.0	0.32
	8.000 GHz		–11.0	___________	–9.0	0.32
	9.000 GHz		–11.0	___________	–9.0	0.40
	10.00 GHz		–11.0	___________	–9.0	0.40
	11.00 GHz		–11.0	___________	–9.0	0.40
	12.00 GHz		–11.0	___________	–9.0	0.40
	13.00 GHz		–11.0	___________	–9.0	0.46
	14.00 GHz		–11.0	___________	–9.0	0.46
	15.00 GHz		–11.0	___________	–9.0	0.46
	16.00 GHz		–11.0	___________	–9.0	0.46
	17.00 GHz		–12.0	___________	–8.0	0.47
	18.00 GHz		–12.0	___________	–8.0	0.47
	19.00 GHz		–12.0	___________	–8.0	0.52
	20.00 GHz		–12.0	___________	–8.0	0.52
	22.00 GHz		–12.0	___________	–8.0	0.66
	24.00 GHz		–12.0	___________	–8.0	0.66
	26.00 GHz		–12.0	___________	–8.0	0.66
	28.00 GHz		–12.0	___________	–8.0	0.75
	30.00 GHz		–12.0	___________	–8.0	0.75
	32.00 GHz		–12.0	___________	–8.0	0.75
	34.00 GHz		–12.0	___________	–8.0	0.75
	36.00 GHz		–12.0	___________	–8.0	0.75
	38.00 GHz		–12.0	___________	–8.0	0.75
	40.00 GHz		–12.0	___________	–8.0	0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dBm	Measured value/dBm	Specification max. value/dBm	Uncer-tainty / dB
6	**Level accuracy Port2**	5.2.1.6				
	0.010 GHz		–12.0	____________	–8.0	0.23
	0.100 GHz		–12.0	____________	–8.0	0.18
	0.150 GHz		–11.0	____________	–9.0	0.18
	0.500 GHz		–11.0	____________	–9.0	0.18
	1.000 GHz		–11.0	____________	–9.0	0.18
	1.500 GHz		–11.0	____________	–9.0	0.18
	2.000 GHz		–11.0	____________	–9.0	0.18
	3.000 GHz		–11.0	____________	–9.0	0.24
	4.000 GHz		–11.0	____________	–9.0	0.24
	5.000 GHz		–11.0	____________	–9.0	0.32
	6.000 GHz		–11.0	____________	–9.0	0.32
	7.000 GHz		–11.0	____________	–9.0	0.32
	8.000 GHz		–11.0	____________	–9.0	0.32
	9.000 GHz		–11.0	____________	–9.0	0.40
	10.00 GHz		–11.0	____________	–9.0	0.40
	11.00 GHz		–11.0	____________	–9.0	0.40
	12.00 GHz		–11.0	____________	–9.0	0.40
	13.00 GHz		–11.0	____________	–9.0	0.46
	14.00 GHz		–11.0	____________	–9.0	0.46
	15.00 GHz		–11.0	____________	–9.0	0.46
	16.00 GHz		–11.0	____________	–9.0	0.46
	17.00 GHz		–12.0	____________	–8.0	0.47
	18.00 GHz		–12.0	____________	–8.0	0.47
	19.00 GHz		–12.0	____________	–8.0	0.52
	20.00 GHz		–12.0	____________	–8.0	0.52
	22.00 GHz		–12.0	____________	–8.0	0.66
	24.00 GHz		–12.0	____________	–8.0	0.66
	26.00 GHz		–12.0	____________	–8.0	0.66
	28.00 GHz		–12.0	____________	–8.0	0.75
	30.00 GHz		–12.0	____________	–8.0	0.75
	32.00 GHz		–12.0	____________	–8.0	0.75
	34.00 GHz		–12.0	____________	–8.0	0.75
	36.00 GHz		–12.0	____________	–8.0	0.75
	38.00 GHz		–12.0	____________	–8.0	0.75
	40.00 GHz		–12.0	____________	–8.0	0.75

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port1** **Reference: –10 dBm** Without option ZVK-B21:	5.2.1.7				
	f = 0.010 GHz					
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.100 GHz					
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.150 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 0.500 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 1.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 2.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 4.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 8.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port1** **Reference: –10 dBm** Without option ZVK-B21:	5.2.1.7				
	f = 10.200 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 25.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 30.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 36.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 40.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port1** **Reference: –10 dBm** Without option ZVK-B21:	5.2.1.7				
	f = 0.010 GHz					
	7 dB		6.0	___________	8.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.100 GHz					
	7 dB		6.0	___________	8.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.150 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 0.500 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 1.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 2.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 4.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 8.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port1** **Reference: –10 dBm** With option ZVK-B21:	**5.2.1.7**				
	f = 10.200 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 25.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 30.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 36.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 40.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port2** **Reference: –10 dBm** Without option ZVK-B22:	5.2.1.7				
	f = 0.010 GHz					
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.100 GHz					
	10 dB		9.0	___________	11.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.150 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 0.500 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 1.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 2.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 4.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 8.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port2** **Reference: –10 dBm** Without option ZVK-B22:	5.2.1.7				
	f = 10.200 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	10 dB		9.6	___________	10.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 25.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 30.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 36.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 40.000 GHz					
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port2** **Reference: –10 dBm** With option ZVK-B22:	5.2.1.7				
	f = 0.010 GHz					
	7 dB		6.0	___________	8.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.100 GHz					
	7 dB		6.0	___________	8.0	0.051
	5 dB		4.0	___________	6.0	0.051
	-5 dB		-6.0	___________	-4.0	0.051
	-10 dB		–11.0	___________	–9.0	0.051
	f = 0.150 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 0.500 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 1.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 2.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 4.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 8.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 10.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
8	**Level linearity Port2** **Reference: –10 dBm** With option ZVK-B22:	**5.2.1.7**				
	f = 10.200 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 12.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 14.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 16.000 GHz					
	7 dB		6.6	___________	7.4	0.051
	5 dB		4.6	___________	5.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 18.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 20.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 25.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 30.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 36.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051
	f = 40.000 GHz					
	1 dB		0.6	___________	1.4	0.051
	-5 dB		-5.4	___________	-4.6	0.051
	-10 dB		–10.4	___________	–9.6	0.051

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy PORT1**	5.2.2.1				
	Input level –10 dBm Difference from -10 dBm:					
			–2.0	____________	2.0	0.70
	0.010 GHz		–2.0	____________	2.0	0.70
	0.100 GHz		–2.0	____________	2.0	0.70
	0.150 GHz		–2.0	____________	2.0	0.70
	0.500 GHz		–2.0	____________	2.0	0.70
	1.000 GHz		–2.0	____________	2.0	0.70
	1.500 GHz		–2.0	____________	2.0	0.70
	2.000 GHz		–2.0	____________	2.0	0.70
	3.000 GHz		–2.0	____________	2.0	0.70
	4.000 GHz		–2.0	____________	2.0	0.70
	5.000 GHz		–2.0	____________	2.0	0.70
	6.000 GHz		–2.0	____________	2.0	0.70
	7.000 GHz		–2.0	____________	2.0	0.70
	8.000 GHz		–2.0	____________	2.0	0.70
	9.000 GHz		–2.0	____________	2.0	0.70
	10.00 GHz		–2.0	____________	2.0	0.70
	11.00 GHz		–2.0	____________	2.0	0.70
	12.00 GHz		–2.0	____________	2.0	0.70
	13.00 GHz		–2.0	____________	2.0	0.70
	14.00 GHz		–2.0	____________	2.0	0.70
	15.00 GHz		–2.0	____________	2.0	0.70
	16.00 GHz		–2.0	____________	2.0	0.70
	16.10 GHz		–2.0	____________	2.0	0.71
	17.00 GHz		–2.0	____________	2.0	0.71
	18.00 GHz		–2.0	____________	2.0	0.75
	19.00 GHz		–2.0	____________	2.0	0.75
	20.00 GHz		–3.0	____________	3.0	0.75
	20.10 GHz		–3.0	____________	3.0	0.75
	21.00 GHz		–3.0	____________	3.0	0.75
	25.00 GHz		–3.0	____________	3.0	0.75
	26.00 GHz		–3.0	____________	3.0	1.42
	28.00 GHz		–4.0	____________	4.0	1.42
	30.00 GHz		–4.0	____________	4.0	1.42
	35.00 GHz		–4.0	____________	4.0	1.42
	36.00 GHz		–4.0	____________	4.0	1.42
	40.00 GHz					

Item	**Characteristic**	**Measure-ment acc. to section**	**Specification min. value/dB**	**Measured value/dB**	**Specification max. value/dB**	**Uncer-tainty / dB**
9	**Absolute accuracy PORT2**	5.2.2.1				
	Input level –10 dBm Difference from -10 dBm:					
			–2.0	______	2.0	0.70
	0.010 GHz		–2.0	______	2.0	0.70
	0.100 GHz		–2.0	______	2.0	0.70
	0.150 GHz		–2.0	______	2.0	0.70
	0.500 GHz		–2.0	______	2.0	0.70
	1.000 GHz		–2.0	______	2.0	0.70
	1.500 GHz		–2.0	______	2.0	0.70
	2.000 GHz		–2.0	______	2.0	0.70
	3.000 GHz		–2.0	______	2.0	0.70
	4.000 GHz		–2.0	______	2.0	0.70
	5.000 GHz		–2.0	______	2.0	0.70
	6.000 GHz		–2.0	______	2.0	0.70
	7.000 GHz		–2.0	______	2.0	0.70
	8.000 GHz		–2.0	______	2.0	0.70
	9.000 GHz		–2.0	______	2.0	0.70
	10.00 GHz		–2.0	______	2.0	0.70
	11.00 GHz		–2.0	______	2.0	0.70
	12.00 GHz		–2.0	______	2.0	0.70
	13.00 GHz		–2.0	______	2.0	0.70
	14.00 GHz		–2.0	______	2.0	0.70
	15.00 GHz		–2.0	______	2.0	0.70
	16.00 GHz		–2.0	______	2.0	0.70
	16.10 GHz		–2.0	______	2.0	0.71
	17.00 GHz		–2.0	______	2.0	0.71
	18.00 GHz		–2.0	______	2.0	0.75
	19.00 GHz		–2.0	______	2.0	0.75
	20.00 GHz		–3.0	______	3.0	0.75
	20.10 GHz		–3.0	______	3.0	0.75
	21.00 GHz		–3.0	______	3.0	0.75
	25.00 GHz		–3.0	______	3.0	0.75
	26.00 GHz		–3.0	______	3.0	1.42
	28.00 GHz		–4.0	______	4.0	1.42
	30.00 GHz		–4.0	______	4.0	1.42
	35.00 GHz		–4.0	______	4.0	1.42
	36.00 GHz		–4.0	______	4.0	1.42
	40.00 GHz					

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy INPUT B1**	5.2.2.1				
	With receiver step at-tenuator ZVK-B23 in-stalled Input level –10 dBm Difference from –10 dBm:		–2.0	______	2.0	0.70
			–2.0	______	2.0	0.70
	0.010 GHz		–2.0	______	2.0	0.70
	0.100 GHz		–2.0	______	2.0	0.70
	0.150 GHz		–2.0	______	2.0	0.70
	0.500 GHz		–2.0	______	2.0	0.70
	1.000 GHz		–2.0	______	2.0	0.70
	1.500 GHz		–2.0	______	2.0	0.70
	2.000 GHz		–2.0	______	2.0	0.70
	3.000 GHz		–2.0	______	2.0	0.70
	4.000 GHz		–2.0	______	2.0	0.70
	5.000 GHz		–2.0	______	2.0	0.70
	6.000 GHz		–2.0	______	2.0	0.70
	7.000 GHz		–2.0	______	2.0	0.70
	8.000 GHz		–2.0	______	2.0	0.70
	9.000 GHz		–2.0	______	2.0	0.70
	10.00 GHz		–2.0	______	2.0	0.70
	11.00 GHz		–2.0	______	2.0	0.70
	12.00 GHz		–2.0	______	2.0	0.70
	13.00 GHz		–2.0	______	2.0	0.70
	14.00 GHz		–2.0	______	2.0	0.70
	15.00 GHz		–2.0	______	2.0	0.70
	16.00 GHz		–2.0	______	2.0	0.71
	16.10 GHz		–2.0	______	2.0	0.71
	17.00 GHz		–2.0	______	2.0	0.75
	18.00 GHz		–2.0	______	2.0	0.75
	19.00 GHz		–3.0	______	3.0	0.75
	20.00 GHz		–3.0	______	3.0	0.75
	20.10 GHz		–3.0	______	3.0	0.75
	21.00 GHz		–3.0	______	3.0	0.75
	25.00 GHz		–3.0	______	3.0	1.42
	26.00 GHz		–4.0	______	4.0	1.42
	28.00 GHz		–4.0	______	4.0	1.42
	30.00 GHz		–4.0	______	4.0	1.42
	35.00 GHz		–4.0	______	4.0	1.42
	36.00 GHz					
	40.00 GHz					

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
9	**Absolute accuracy INPUT B2**	5.2.2.1				
	With receiver step attenuator ZVK-B24 installed Input level –10 dBm Difference from –10 dBm:		–2.0	____________	2.0	0.70
			–2.0	____________	2.0	0.70
	0.010 GHz		–2.0	____________	2.0	0.70
	0.100 GHz		–2.0	____________	2.0	0.70
	0.150 GHz		–2.0	____________	2.0	0.70
	0.500 GHz		–2.0	____________	2.0	0.70
	1.000 GHz		–2.0	____________	2.0	0.70
	1.500 GHz		–2.0	____________	2.0	0.70
	2.000 GHz		–2.0	____________	2.0	0.70
	3.000 GHz		–2.0	____________	2.0	0.70
	4.000 GHz		–2.0	____________	2.0	0.70
	5.000 GHz		–2.0	____________	2.0	0.70
	6.000 GHz		–2.0	____________	2.0	0.70
	7.000 GHz		–2.0	____________	2.0	0.70
	8.000 GHz		–2.0	____________	2.0	0.70
	9.000 GHz		–2.0	____________	2.0	0.70
	10.00 GHz		–2.0	____________	2.0	0.70
	11.00 GHz		–2.0	____________	2.0	0.70
	12.00 GHz		–2.0	____________	2.0	0.70
	13.00 GHz		–2.0	____________	2.0	0.70
	14.00 GHz		–2.0	____________	2.0	0.70
	15.00 GHz		–2.0	____________	2.0	0.70
	16.00 GHz		–2.0	____________	2.0	0.71
	16.10 GHz		–2.0	____________	2.0	0.71
	17.00 GHz		–2.0	____________	2.0	0.75
	18.00 GHz		–2.0	____________	2.0	0.75
	19.00 GHz		–3.0	____________	3.0	0.75
	20.00 GHz		–3.0	____________	3.0	0.75
	20.10 GHz		–3.0	____________	3.0	0.75
	21.00 GHz		–3.0	____________	3.0	0.75
	25.00 GHz		–3.0	____________	3.0	1.42
	26.00 GHz		–4.0	____________	4.0	1.42
	28.00 GHz		–4.0	____________	4.0	1.42
	30.00 GHz		–4.0	____________	4.0	1.42
	35.00 GHz		–4.0	____________	4.0	1.42
	36.00 GHz					
	40.00 GHz					

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm** **Without** opt. ZVK-B22	5.2.2.2				
	f = 0.010 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.2	____	0.2	0.058
	-5 dB		-0.2	____	0.2	0.058
	-10 dB		-0.2	____	0.2	0.058
	f = 0.500 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.1	____	0.1	0.029
	-5 dB		-0.1	____	0.1	0.029
	-10 dB		-0.1	____	0.1	0.020
	f = 1.000 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.1	____	0.1	0.029
	-5 dB		-0.1	____	0.1	0.029
	-10 dB		-0.1	____	0.1	0.020
	f = 2.000 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.1	____	0.1	0.029
	-5 dB		-0.1	____	0.1	0.029
	-10 dB		-0.1	____	0.1	0.020
	f = 4.000 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.1	____	0.1	0.029
	-5 dB		-0.1	____	0.1	0.029
	-10 dB		-0.1	____	0.1	0.020
	f = 8.00 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.1	____	0.1	0.029
	-5 dB		-0.1	____	0.1	0.029
	-10 dB		-0.1	____	0.1	0.020
	f = 10.00 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.2	____	0.2	0.058
	-5 dB		-0.2	____	0.2	0.058
	-10 dB		-0.2	____	0.2	0.058
	f = 10.20 GHz					
	10 dB		-0.2	____	0.2	0.058
	5 dB		-0.2	____	0.2	0.058
	-5 dB		-0.2	____	0.2	0.058
	-10 dB		-0.2	____	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm** **Without** opt. ZVK-B22	5.2.2.2				
	f = 16.00 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 20.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 28.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 36.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 40.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm** **With** option ZVK-B22	5.2.2.2				
	f = 0.010 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 0.500 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 1.000 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 2.000 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 4.000 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 8.00 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.029
	f = 10.00 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 10.20 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B1** **Reference: –10 dBm** **with** option ZVK-B22	5.2.2.2				
	f = 16.00 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 20.00 GHz					
	1 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 28.00 GHz					
	1 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 36.00 GHz					
	1 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 40.00 GHz					
	1 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B1** **Reference: –10 dBm** **Without** opt. ZVK-B22	5.2.2.2				
	f = 0.010 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 0.500 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 1.000 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 2.000 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 4.000 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 8.00 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 10.00 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 10.20 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B1** **Reference: –10 dBm** **Without** opt. ZVK-B22	5.2.2.2				
	f = 16.00 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 20.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 28.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 36.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 40.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B1** **Reference: –10 dBm** **With** option ZVK-B22	5.2.2.2				
	f = 0.010 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-2	________	+2	0.58
	-5 dB		-2	________	+2	0.58
	-10 dB		-2	________	+2	0.58
	f = 0.500 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 1.000 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 2.000 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 4.000 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 8.00 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 10.00 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29
	f = 10.20 GHz					
	7 dB		-2	________	+2	0.58
	5 dB		-1	________	+1	0.29
	-5 dB		-1	________	+1	0.29
	-10 dB		-1	________	+1	0.29

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B1** **Reference: –10 dBm** **With** option ZVK-B22	5.2.2.2				
	f = 16.00 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 20.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 28.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 36.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 40.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm** **Without** opt. ZVK-B21	5.2.2.2				
	f = 0.010 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 0.500 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.020
	f = 1.000 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.020
	f = 2.000 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.020
	f = 4.000 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.020
	f = 8.00 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.1	___________	0.1	0.029
	-5 dB		-0.1	___________	0.1	0.029
	-10 dB		-0.1	___________	0.1	0.020
	f = 10.00 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 10.20 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm** **Without** opt. ZVK-B21	5.2.2.2				
	f = 16.00 GHz					
	10 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 20.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 28.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 36.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 40.00 GHz					
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm** **With** opt. ZVK-B21	5.2.2.2				
	f = 0.010 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 0.500 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.1	________	0.1	0.029
	-5 dB		-0.1	________	0.1	0.029
	-10 dB		-0.1	________	0.1	0.029
	f = 1.000 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.1	________	0.1	0.029
	-5 dB		-0.1	________	0.1	0.029
	-10 dB		-0.1	________	0.1	0.029
	f = 2.000 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.1	________	0.1	0.029
	-5 dB		-0.1	________	0.1	0.029
	-10 dB		-0.1	________	0.1	0.029
	f = 4.000 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.1	________	0.1	0.029
	-5 dB		-0.1	________	0.1	0.029
	-10 dB		-0.1	________	0.1	0.029
	f = 8.00 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.1	________	0.1	0.029
	-5 dB		-0.1	________	0.1	0.029
	-10 dB		-0.1	________	0.1	0.029
	f = 10.00 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058
	f = 10.20 GHz					
	7 dB		-0.2	________	0.2	0.058
	5 dB		-0.2	________	0.2	0.058
	-5 dB		-0.2	________	0.2	0.058
	-10 dB		-0.2	________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
10	**Linearity B2** **Reference: –10 dBm** **With** option ZVK-B21	5.2.2.2				
	f = 16.00 GHz					
	7 dB		-0.2	___________	0.2	0.058
	5 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 20.00 GHz					
	1 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 28.00 GHz					
	1 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 36.00 GHz					
	1 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058
	f = 40.00 GHz					
	1 dB		-0.2	___________	0.2	0.058
	-5 dB		-0.2	___________	0.2	0.058
	-10 dB		-0.2	___________	0.2	0.058

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm** **Without** option ZVK-B21	5.2.2.2				
	f = 0.010 GHz		-2	___________	+2	0.58
	10 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB					
	f = 0.500 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 1.000 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 2.000 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 4.000 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 8.00 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 10.00 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					
	f = 10.20 GHz		-2	___________	+2	0.58
	10 dB		-1	___________	+1	0.29
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB					

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm** **Without** opt. ZVK-B21	5.2.2.2				
	f = 16.00 GHz					
	10 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 20.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 28.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 36.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 40.00 GHz					
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm** **With** option ZVK-B21	5.2.2.2				
	f = 0.010 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 0.500 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 1.000 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 2.000 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 4.000 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 8.00 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 10.00 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29
	f = 10.20 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-1	___________	+1	0.29
	-5 dB		-1	___________	+1	0.29
	-10 dB		-1	___________	+1	0.29

Item	Characteristic	Measure-ment acc. to section	Specification min. value/°	Measured value/°	Specification max. value/°	Uncer-tainty / °
10	**Linearity B2** **Reference: –10 dBm** **With** option ZVK-B21	5.2.2.2				
	f = 16.00 GHz					
	7 dB		-2	___________	+2	0.58
	5 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 20.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 28.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 36.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58
	f = 40.00 GHz					
	1 dB		-2	___________	+2	0.58
	-5 dB		-2	___________	+2	0.58
	-10 dB		-2	___________	+2	0.58

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dBm	Uncer-tainty / dB
11	**Noise level PORT1**	5.2.2.3				
	IF BW 10 Hz:					
	0.010 GHz			________	-70.0	2.5
	0.100 GHz			________	-70.0	2.5
	0.150 GHz			________	-70.0	2.5
	0.500 GHz			________	-110.0	2.5
	1.000 GHz			________	-110.0	2.5
	1.500 GHz			________	-110.0	2.5
	2.000 GHz			________	-110.0	2.5
	3.000 GHz			________	-110.0	2.5
	4.000 GHz			________	-110.0	2.5
	5.000 GHz			________	-110.0	2.5
	6.000 GHz			________	-110.0	2.5
	7.000 GHz			________	-110.0	2.5
	8.000 GHz			________	-110.0	2.5
	9.000 GHz			________	-105.0	2.5
	10.00 GHz			________	-105.0	2.5
	11.00 GHz			________	-105.0	2.5
	12.00 GHz			________	-105.0	2.5
	13.00 GHz			________	-105.0	2.5
	14.00 GHz			________	-105.0	2.5
	15.00 GHz			________	-105.0	2.5
	16.00 GHz			________	-105.0	2.5
	16.10 GHz			________	-95.0	2.5
	17.00 GHz			________	-95.0	2.5
	18.00 GHz			________	-95.0	2.5
	19.00 GHz			________	-95.0	2.5
	20.00 GHz			________	-95.0	2.5
	20.10 GHz			________	-95.0	3.16
	21.00 GHz			________	-95.0	3.16
	25.00 GHz			________	-95.0	3.16
	26.00 GHz			________	-95.0	3.16
	28.00 GHz			________	-95.0	3.16
	30.00 GHz			________	-85.0	4.12
	35.00 GHz			________	-85.0	4.12
	36.00 GHz			________	-85.0	4.12
	40.00 GHz			________	-85.0	4.12

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dBm	Uncer-tainty / dB
11	**Noise level PORT2**	5.2.2.3				
	IF BW 10 Hz:					
	0.010 GHz			____________	-70.0	2.5
	0.100 GHz			____________	-70.0	2.5
	0.150 GHz			____________	-70.0	2.5
	0.500 GHz			____________	-110.0	2.5
	1.000 GHz			____________	-110.0	2.5
	1.500 GHz			____________	-110.0	2.5
	2.000 GHz			____________	-110.0	2.5
	3.000 GHz			____________	-110.0	2.5
	4.000 GHz			____________	-110.0	2.5
	5.000 GHz			____________	-110.0	2.5
	6.000 GHz			____________	-110.0	2.5
	7.000 GHz			____________	-110.0	2.5
	8.000 GHz			____________	-110.0	2.5
	9.000 GHz			____________	-105.0	2.5
	10.00 GHz			____________	-105.0	2.5
	11.00 GHz			____________	-105.0	2.5
	12.00 GHz			____________	-105.0	2.5
	13.00 GHz			____________	-105.0	2.5
	14.00 GHz			____________	-105.0	2.5
	15.00 GHz			____________	-105.0	2.5
	16.00 GHz			____________	-105.0	2.5
	16.10 GHz			____________	-95.0	2.5
	17.00 GHz			____________	-95.0	2.5
	18.00 GHz			____________	-95.0	2.5
	19.00 GHz			____________	-95.0	2.5
	20.00 GHz			____________	-95.0	2.5
	20.10 GHz			____________	-95.0	3.16
	21.00 GHz			____________	-95.0	3.16
	25.00 GHz			____________	-95.0	3.16
	26.00 GHz			____________	-95.0	3.16
	28.00 GHz			____________	-95.0	3.16
	30.00 GHz			____________	-85.0	4.12
	35.00 GHz			____________	-85.0	4.12
	36.00 GHz			____________	-85.0	4.12
	40.00 GHz			____________	-85.0	4.12

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
12	**Match INPUT B1**	5.2.2.4				
	With ZVK-B23 installed					
	0.050 GHz		8.0	____________		0.5
	0.100 GHz		8.0	____________		0.5
	0.150 GHz		8.0	____________		0.5
	0.500 GHz		8.0	____________		0.5
	1.000 GHz		8.0	____________		0.5
	2.000 GHz		8.0	____________		0.5
	4.000 GHz		8.0	____________		0.5
	6.000 GHz		8.0	____________		1.0
	8.000 GHz		8.0	____________		1.0
	10.00 GHz		8.0	____________		1.0
	12.00 GHz		8.0	____________		1.0
	14.00 GHz		8.0	____________		1.0
	16.00 GHz		8.0	____________		1.0
	16.10 GHz		8.0	____________		1.0
	18.00 GHz		8.0	____________		1.0
	20.00 GHz		8.0	____________		1.0
	22.00 GHz		8.0	____________		1.0
	24.00 GHz		8.0	____________		1.0
	26.00 GHz		8.0	____________		1.0
	28.00 GHz		8.0	____________		1.0
	30.00 GHz		8.0	____________		1.0
	32.00 GHz		8.0	____________		1.0
	34.00 GHz		8.0	____________		1.0
	36.00 GHz		8.0	____________		1.0
	38.00 GHz		8.0	____________		1.0
	40.00 GHz		8.0	____________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
12	**Match INPUT B2**	5.2.2.4				
	With ZVK-B24 installed					
	0.050 GHz		8.0	________		0.5
	0.100 GHz		8.0	________		0.5
	0.150 GHz		8.0	________		0.5
	0.500 GHz		8.0	________		0.5
	1.000 GHz		8.0	________		0.5
	2.000 GHz		8.0	________		0.5
	4.000 GHz		8.0	________		0.5
	6.000 GHz		8.0	________		1.0
	8.000 GHz		8.0	________		1.0
	10.00 GHz		8.0	________		1.0
	12.00 GHz		8.0	________		1.0
	14.00 GHz		8.0	________		1.0
	16.00 GHz		8.0	________		1.0
	16.10 GHz		8.0	________		1.0
	18.00 GHz		8.0	________		1.0
	20.00 GHz		8.0	________		1.0
	22.00 GHz		8.0	________		1.0
	24.00 GHz		8.0	________		1.0
	26.00 GHz		8.0	________		1.0
	28.00 GHz		8.0	________		1.0
	30.00 GHz		8.0	________		1.0
	32.00 GHz		8.0	________		1.0
	34.00 GHz		8.0	________		1.0
	36.00 GHz		8.0	________		1.0
	38.00 GHz		8.0	________		1.0
	40.00 GHz		8.0	________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
13	**Match PORT1**	5.2.3.1				
	0.010 GHz		10.0	____________		0.5
	0.050 GHz		12.0	____________		0.5
	0.100 GHz		12.0	____________		0.5
	0.150 GHz		12.0	____________		0.5
	0.500 GHz		12.0	____________		0.5
	1.000 GHz		12.0	____________		0.5
	2.000 GHz		12.0	____________		0.5
	4.000 GHz		12.0	____________		0.5
	6.000 GHz		12.0	____________		1.0
	8.000 GHz		12.0	____________		1.0
	10.00 GHz		10.0	____________		1.0
	12.00 GHz		10.0	____________		1.0
	14.00 GHz		10.0	____________		1.0
	16.00 GHz		10.0	____________		1.0
	16.10 GHz		10.0	____________		1.0
	18.00 GHz		10.0	____________		1.0
	20.00 GHz		10.0	____________		1.0
	22.00 GHz		8.0	____________		1.0
	24.00 GHz		8.0	____________		1.0
	26.00 GHz		8.0	____________		1.0
	28.00 GHz		8.0	____________		1.0
	30.00 GHz		8.0	____________		1.0
	32.00 GHz		8.0	____________		1.0
	34.00 GHz		8.0	____________		1.0
	36.00 GHz		8.0	____________		1.0
	38.00 GHz		8.0	____________		1.0
	40.00 GHz		8.0	____________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
13	**Match PORT2**	5.2.3.1				
	0.010 GHz		10.0	____________		0.5
	0.050 GHz		12.0	____________		0.5
	0.100 GHz		12.0	____________		0.5
	0.150 GHz		12.0	____________		0.5
	0.500 GHz		12.0	____________		0.5
	1.000 GHz		12.0	____________		0.5
	2.000 GHz		12.0	____________		0.5
	4.000 GHz		12.0	____________		0.5
	6.000 GHz		12.0	____________		1.0
	8.000 GHz		12.0	____________		1.0
	10.00 GHz		10.0	____________		1.0
	12.00 GHz		10.0	____________		1.0
	14.00 GHz		10.0	____________		1.0
	16.00 GHz		10.0	____________		1.0
	16.10 GHz		10.0	____________		1.0
	18.00 GHz		10.0	____________		1.0
	20.00 GHz		10.0	____________		1.0
	22.00 GHz		8.0	____________		1.0
	24.00 GHz		8.0	____________		1.0
	26.00 GHz		8.0	____________		1.0
	28.00 GHz		8.0	____________		1.0
	30.00 GHz		8.0	____________		1.0
	32.00 GHz		8.0	____________		1.0
	34.00 GHz		8.0	____________		1.0
	36.00 GHz		8.0	____________		1.0
	38.00 GHz		8.0	____________		1.0
	40.00 GHz		8.0	____________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
14	**Match R1 CHANNEL IN**	5.2.3.2				
	0.010 GHz					
	0.050 GHz		8.0	________		0.5
	0.100 GHz		8.0	________		0.5
	0.150 GHz		8.0	________		0.5
	0.500 GHz		8.0	________		0.5
	1.000 GHz		8.0	________		0.5
	2.000 GHz		8.0	________		0.5
	4.000 GHz		8.0	________		0.5
	6.000 GHz		8.0	________		0.5
	8.000 GHz		8.0	________		1.0
	10.00 GHz		8.0	________		1.0
	12.00 GHz		8.0	________		1.0
	14.00 GHz		8.0	________		1.0
	16.00 GHz		8.0	________		1.0
	16.10 GHz		8.0	________		1.0
	18.00 GHz		8.0	________		1.0
	20.00 GHz		8.0	________		1.0
	22.00 GHz		8.0	________		1.0
	24.00 GHz		8.0	________		1.0
	26.00 GHz		8.0	________		1.0
	28.00 GHz		8.0	________		1.0
	30.00 GHz		8.0	________		1.0
	32.00 GHz		8.0	________		1.0
	34.00 GHz		8.0	________		1.0
	36.00 GHz		8.0	________		1.0
	38.00 GHz		8.0	________		1.0
	40.00 GHz		8.0	________		1.0
			8.0	________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
14	**Match R2 CHANNEL IN**	5.2.3.2				
	0.010 GHz					
	0.050 GHz		8.0	________		0.5
	0.100 GHz		8.0	________		0.5
	0.150 GHz		8.0	________		0.5
	0.500 GHz		8.0	________		0.5
	1.000 GHz		8.0	________		0.5
	2.000 GHz		8.0	________		0.5
	4.000 GHz		8.0	________		0.5
	6.000 GHz		8.0	________		0.5
	8.000 GHz		8.0	________		1.0
	10.00 GHz		8.0	________		1.0
	12.00 GHz		8.0	________		1.0
	14.00 GHz		8.0	________		1.0
	16.00 GHz		8.0	________		1.0
	16.10 GHz		8.0	________		1.0
	18.00 GHz		8.0	________		1.0
	20.00 GHz		8.0	________		1.0
	22.00 GHz		8.0	________		1.0
	24.00 GHz		8.0	________		1.0
	26.00 GHz		8.0	________		1.0
	28.00 GHz		8.0	________		1.0
	30.00 GHz		8.0	________		1.0
	32.00 GHz		8.0	________		1.0
	34.00 GHz		8.0	________		1.0
	36.00 GHz		8.0	________		1.0
	38.00 GHz		8.0	________		1.0
	40.00 GHz		8.0	________		1.0
			8.0	________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
15	**Raw directivity PORT1**	5.2.3.3				
	0.010 GHz		8.0	____________		0.5
	0.100 GHz		8.0	____________		0.5
	0.150 GHz		8.0	____________		0.5
	0.500 GHz		8.0	____________		0.5
	1.000 GHz		8.0	____________		0.5
	1.500 GHz		8.0	____________		0.5
	2.000 GHz		8.0	____________		0.5
	3.000 GHz		8.0	____________		0.5
	4.000 GHz		8.0	____________		0.5
	5.000 GHz		8.0	____________		1.0
	6.000 GHz		8.0	____________		1.0
	7.000 GHz		8.0	____________		1.0
	8.000 GHz		8.0	____________		1.0
	9.000 GHz		8.0	____________		1.0
	10.00 GHz		8.0	____________		1.0
	11.00 GHz		8.0	____________		1.0
	12.00 GHz		8.0	____________		1.0
	13.00 GHz		8.0	____________		1.0
	14.00 GHz		8.0	____________		1.0
	15.00 GHz		8.0	____________		1.0
	16.00 GHz		8.0	____________		1.0
	16.10 GHz		8.0	____________		1.0
	17.00 GHz		8.0	____________		1.0
	18.00 GHz		8.0	____________		1.0
	19.00 GHz		8.0	____________		1.0
	20.00 GHz		8.0	____________		1.0
	22.00 GHz		6.0	____________		1.0
	24.00 GHz		6.0	____________		1.0
	26.00 GHz		6.0	____________		1.0
	28.00 GHz		6.0	____________		1.0
	30.00 GHz		6.0	____________		1.0
	32.00 GHz		6.0	____________		1.0
	34.00 GHz		6.0	____________		1.0
	36.00 GHz		6.0	____________		1.0
	38.00 GHz		6.0	____________		1.0
	40.00 GHz		6.0	____________		1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
15	**Raw directivity PORT2**	5.2.3.3				
	0.010 GHz		8.0	____________		0.5
	0.100 GHz		8.0	____________		0.5
	0.150 GHz		8.0	____________		0.5
	0.500 GHz		8.0	____________		0.5
	1.000 GHz		8.0	____________		0.5
	1.500 GHz		8.0	____________		0.5
	2.000 GHz		8.0	____________		0.5
	3.000 GHz		8.0	____________		0.5
	4.000 GHz		8.0	____________		0.5
	5.000 GHz		8.0	____________		1.0
	6.000 GHz		8.0	____________		1.0
	7.000 GHz		8.0	____________		1.0
	8.000 GHz		8.0	____________		1.0
	9.000 GHz		8.0	____________		1.0
	10.00 GHz		8.0	____________		1.0
	11.00 GHz		8.0	____________		1.0
	12.00 GHz		8.0	____________		1.0
	13.00 GHz		8.0	____________		1.0
	14.00 GHz		8.0	____________		1.0
	15.00 GHz		8.0	____________		1.0
	16.00 GHz		8.0	____________		1.0
	16.10 GHz		8.0	____________		1.0
	17.00 GHz		8.0	____________		1.0
	18.00 GHz		8.0	____________		1.0
	19.00 GHz		8.0	____________		1.0
	20.00 GHz		8.0	____________		1.0
	22.00 GHz		6.0	____________		1.0
	24.00 GHz		6.0	____________		1.0
	26.00 GHz		6.0	____________		1.0
	28.00 GHz		6.0	____________		1.0
	30.00 GHz		6.0	____________		1.0
	32.00 GHz		6.0	____________		1.0
	34.00 GHz		6.0	____________		1.0
	36.00 GHz		6.0	____________		1.0
	38.00 GHz		6.0	____________		1.0
	40.00 GHz		6.0	____________		1.0

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
16	**Generator step attenuator A1**	5.2.3.4				
	With ZVK-B21 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0

Item	Characteristic	Measurement acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncertainty / dB
16	**Generator step attenuator A2**	5.2.3.4				
	with ZVK-B22 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
16	**Receiver step attenu-ator B1**	5.2.3.4				
	With ZVK-B23 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	____________	3.0	1.0
	10 dB		-0.2	____________	0.2	Reference
	20 dB		-3.0	____________	3.0	1.0
	30 dB		-3.0	____________	3.0	1.0
	40 dB		-3.0	____________	3.0	1.0
	50 dB		-3.0	____________	3.0	1.0
	60 dB		-3.0	____________	3.0	1.0
	70 dB		-3.0	____________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
16	**Receiver step attenu-ator B2**	5.2.3.4				
	With ZVK-B24 installed					
	f = 1.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0
	f = 15.0 GHz, reference value 10 dB					
	0 dB		-3.0	________	3.0	1.0
	10 dB		-0.2	________	0.2	Reference
	20 dB		-3.0	________	3.0	1.0
	30 dB		-3.0	________	3.0	1.0
	40 dB		-3.0	________	3.0	1.0
	50 dB		-3.0	________	3.0	1.0
	60 dB		-3.0	________	3.0	1.0
	70 dB		-3.0	________	3.0	1.0

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 1** IF BW 10 Hz:	5.2.3.5				
	0.010 GHz		70.0	____________		
	0.100 GHz		70.0	____________		
	0.500 GHz		110.0	____________		
	1.000 GHz		110.0	____________		
	2.000 GHz		110.0	____________		
	4.000 GHz		110.0	____________		
	6.000 GHz		110.0	____________		
	8.000 GHz		110.0	____________		
	10.00 GHz		105.0	____________		
	12.00 GHz		105.0	____________		
	14.00 GHz		105.0	____________		
	16.00 GHz		105.0	____________		
	16.10 GHz		90.0	____________		
	17.00 GHz		90.0	____________		
	18.00 GHz		90.0	____________		
	19.00 GHz		90.0	____________		
	20.00 GHz		90.0	____________		
	22.00 GHz		90.0	____________		
	24.00 GHz		90.0	____________		
	26.00 GHz		90.0	____________		
	28.00 GHz		90.0	____________		
	30.00 GHz		80.0	____________		
	32.00 GHz		80.0	____________		
	34.00 GHz		80.0	____________		
	36.00 GHz		80.0	____________		
	38.00 GHz		80.0	____________		
	40.00 GHz		80.0	____________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 1**	5.2.3.5				
	IF BW 10 kHz:					
	0.010 GHz		40.0	________		
	0.100 GHz		40.0	________		
	0.500 GHz		80.0	________		
	1.000 GHz		80.0	________		
	2.000 GHz		80.0	________		
	4.000 GHz		80.0	________		
	6.000 GHz		80.0	________		
	8.000 GHz		80.0	________		
	10.00 GHz		75.0	________		
	12.00 GHz		75.0	________		
	14.00 GHz		75.0	________		
	16.00 GHz		75.0	________		
	16.10 GHz		60.0	________		
	17.00 GHz		60.0	________		
	18.00 GHz		60.0	________		
	19.00 GHz		60.0	________		
	20.00 GHz		60.0	________		
	22.00 GHz		60.0	________		
	24.00 GHz		60.0	________		
	26.00 GHz		60.0	________		
	28.00 GHz		60.0	________		
	30.00 GHz		50.0	________		
	32.00 GHz		50.0	________		
	34.00 GHz		50.0	________		
	36.00 GHz		50.0	________		
	38.00 GHz		50.0	________		
	40.00 GHz		50.0	________		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 2**	5.2.3.5				
	IF BW 10 Hz:					
	0.010 GHz		70.0	______		
	0.100 GHz		70.0	______		
	0.500 GHz		110.0	______		
	1.000 GHz		110.0	______		
	2.000 GHz		110.0	______		
	4.000 GHz		110.0	______		
	6.000 GHz		110.0	______		
	8.000 GHz		110.0	______		
	10.00 GHz		105.0	______		
	12.00 GHz		105.0	______		
	14.00 GHz		105.0	______		
	16.00 GHz		105.0	______		
	16.10 GHz		90.0	______		
	17.00 GHz		90.0	______		
	18.00 GHz		90.0	______		
	19.00 GHz		90.0	______		
	20.00 GHz		90.0	______		
	22.00 GHz		90.0	______		
	24.00 GHz		90.0	______		
	26.00 GHz		90.0	______		
	28.00 GHz		90.0	______		
	30.00 GHz		80.0	______		
	32.00 GHz		80.0	______		
	34.00 GHz		80.0	______		
	36.00 GHz		80.0	______		
	38.00 GHz		80.0	______		
	40.00 GHz		80.0	______		

Item	Characteristic	Measure-ment acc. to section	Specification min. value/dB	Measured value/dB	Specification max. value/dB	Uncer-tainty / dB
17	**Dynamic range PORT 2**	5.2.3.5				
	IF BW 10 kHz:					
	0.010 GHz		40.0	________		
	0.100 GHz		40.0	________		
	0.500 GHz		80.0	________		
	1.000 GHz		80.0	________		
	2.000 GHz		80.0	________		
	4.000 GHz		80.0	________		
	6.000 GHz		80.0	________		
	8.000 GHz		80.0	________		
	10.00 GHz		75.0	________		
	12.00 GHz		75.0	________		
	14.00 GHz		75.0	________		
	16.00 GHz		75.0	________		
	16.10 GHz		60.0	________		
	17.00 GHz		60.0	________		
	18.00 GHz		60.0	________		
	19.00 GHz		60.0	________		
	20.00 GHz		60.0	________		
	22.00 GHz		60.0	________		
	24.00 GHz		60.0	________		
	26.00 GHz		60.0	________		
	28.00 GHz		60.0	________		
	30.00 GHz		50.0	________		
	32.00 GHz		50.0	________		
	34.00 GHz		50.0	________		
	36.00 GHz		50.0	________		
	38.00 GHz		50.0	________		
	40.00 GHz		50.0	________		

Annex A - Interfaces

A.1 IEC Bus Interface (SCPI IEC625, SYSTEM BUS)

The standard network analyzer is equipped with twp IEC/IEEE bus connectors. The IEEE 488 interface connector is located on the rear panel of the instrument. An external controller for remote control of the networkanalyzer can be connected via the IEEE 488 interface connector using a shielded cable.

The third IEC Bus interface is assigned to the MS-DOS processor, with an installed processor option. This interface can be controlled by standard software (R&S-Basic, QUICK-Basic, etc.) under MS-DOS as well as under WINDOWS (VISUAL BASIC, etc.) with the delivered driver software. The IEC Bus interface allows the remote control of the network analyzer via an external connection to both IEC Bus interfaces and, in addition, the control of other instruments via the IEC Bus interface located on the rear panel (e.g., control of a complete measurement system).

The following section describes the first IEC Bus interface over which the network analyzer can be remotely controlled. The characteristics of the PC2A/PC-AT controller interface depend upon the user-installed software running on the MS-DOS processor and is, therefore, not described here.

Interface Characteristics

- 8-bit parallel data transfer
- bidirectional data transfer
- three-line handshake
- high data transfer rate of max. 350 kbyte/s
- up to 15 instruments can be connected
- maximal length of the interconnecting cables 15 m (single connection, 2m)
- wired-OR connection if several instruments are connected in parallel.

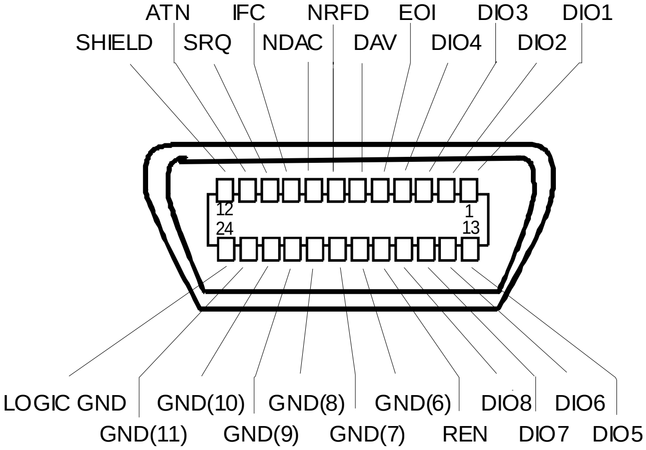


Fig. A-1 Pin assignment of IEC-Bus interface

Bus Lines

1. Data bus with 8 lines DIO 1 to DIO 8.
The transmission is bit-parallel and byte-serial in the ASCII/ISO code. DIO1 is the least significant, DIO8 the most significant bit.

2. Control bus with 5 lines.
IFC (Interface Clear),
active low resets the interfaces of the devices connected to the default setting.

ATN (Attention),
active low signals the transmission of interface messages
inactive high signals the transmission of device messages.

SRQ (Service Request),
active low enables a device connected to send a service request to the controller.

REN (Remote Enable),
active low permits the switch over to remote control.

EOI (End or Identify),
has two functions in connection with ATN:
active low marks the end of data transmission when ATN=high
active low triggers a parallel poll when ATN=low.

3. Handshake bus with three lines.
DAV (Data Valid),
active low signals a valid data byte on the data bus.

NRFD (Not Ready For Data),
active low signals that one of the devices connected is not ready for data transfer .

NDAC (Not Data Accepted),
active low as long as the device connected is accepting the data present on the data bus.

Interface Functions

Instruments which can be remote controlled via the IEC bus can be equipped with different interface functions. Table A-1 lists the interface functions appropriate for the instrument.

Table A-1 Interface functions

Control character	Interface function
SH1	Handshake source function (source handshake), full capability
AH1	Handshake sink function (acceptor handshake), full capability
L4	Listener function, full capability, deaddressed by MTA.
T6	Talker function, full capability, ability to respond to serial poll, deaddressed by MLA
SR1	Service request function (Service Request), full capability
PP1	Parallel poll function, full capability
RL1	Remote/Local switch over function, full capability
DC1	Reset function (Device Clear), full capability
DT1	Trigger function (Device Trigger), full capability
C12	Controller function, capability to send interface messages, to accept or relinquish the controller function

IEC Bus Messages

The messages transferred via the data lines of the IEC bus can be divided into two groups:

– **interface messages**
and
– **instrument messages.**

Interface Messages

Interface messages are transferred on the data lines of the IEC Bus when the "ATN" control line is active (LOW). They are used for communication between controller and instruments and can only be sent by the controller which currently has control of the IEC Bus.

Universal Commands

The universal commands are encoded 10 - 1F hex. They affect all instruments connected to the bus without addressing.

Table A-2 Universal Commands

Command	QuickBASIC command	Effect on the instrument
DCL (Device Clear)	IBCMD (controller%, CHR$(20))	Aborts the processing of the commands just received and sets the command processing software to a defined initial state. Does not change the instrument settings.
IFC (Interface Clear)	IBSIC (controller%)	Resets the interfaces to the default setting.
LLO (Local Lockout)	IBCMD (controller%, CHR$(17))	The LOC/IEC ADDR key is disabled.
SPE (Serial Poll Enable)	IBCMD (controller%, CHR$(24))	Ready for serial poll.
SPD (Serial Poll Disable)	IBCMD (controller%, CHR$(25))	End of serial poll.
PPU (Parallel Poll Unconfigure)	IBCMD (controller%, CHR$(21))	End of the parallel-poll state.

Addressed Commands

The addressed commands are encoded 00 - 0F hex. They are only effective for instruments addressed as listeners.

Table A-3 Addressed Commands

Command	QuickBASIC command	Effect on the instrument
SDC (Selected Device Clear)	IBCLR (device%)	Aborts the processing of the commands just received and sets the command processing software to a defined initial state. Does not change the instrument setting.
GTL (Go to Local)	IBLOC (device%)	Transition to the "Local" state (manual control).
PPC (Parallel Poll Configure)	IBPPC (device%, data%)	Configure instrument for parallel poll. Additionally, the QuickBASIC command executes PPE/PPD.

Instrument Messages

Instrument messages are transferred on the data lines of the IEC bus when the "ATN" control line is not active. ASCII code is used.
Structure and syntax of the instrument messages are described in Chapter 3, Section 3.5. The commands are listed and explained in detail in Chapter 3, Section 3.6.

A.2 RS-232-C Interface (COM1, COM2)

The standard instrument is equipped with two serial interfaces (RS-232-C). The RS-232-C interfaces are two independent, remote-control channels, both of which may be active at the same time. The programming and interrogation commands affect the same instrument hardware. The interfaces can be set up manually in the *SETUP-GENERAL SETUP* menu in the *COM PORT1/2* table or, via remote control, switched on/off with the command SYSTem:COMMunication:SERial1|2:STATe.

Each of the active RS-232-C interfaces is assigned to one of the 9-pin connectors located on the rear panel. Interface 1 is assigned to the connector COM1 and Interface 2 is assigned to the connector COM2.

Interface Characteristics

- Serial data transmission in asynchronous mode
- Bidirectional data transfer via two separate lines
- Transmission rate selectable from 110 to 19200 baud
- Logic ’0’ signal from+3 V to +15 V
- Logic ’1’ signal from -15 V to -3 V
- An external instrument (controller) can be connected.
- Software handshake (XON, XOFF)
- Hardware handshake

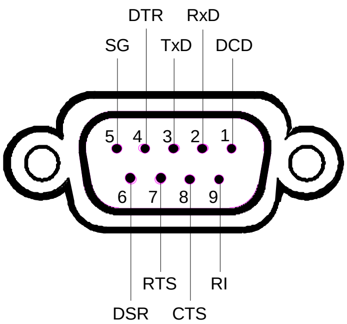


Fig. A-2 Pin assignment of the RS-232-C interface

Signal Lines

1. Data lines

The data transmission is bit-serial in ASCII code starting with the LSB. Two lines, **RxD** and **TxD** are necessary as the minimum requirement for transmission; however, no hardware handshake is possible. For handshaking, only the XON/XOFF software handshake protocol can be used .

RxD (Receive Data)
Input, LOW = logic ’1’, HIGH = logic ’0’.
Data line, local terminal receives data from remote station.

TxD (Transmit Data)
Output, LOW = logic ’1’, HIGH = logic ’0’.
Data line, local terminal transmits data to remote station.

2. Control lines

DCD (Data Carrier Detect),
Not used in this instrument.
Input; active LOW.
Using this signal, the local terminal recognises that the modem of the remote station receives valid signals with sufficient level. DCD is used to disable the receiver in the local terminal and prevent reading of false data if the modem cannot interpret the signals of the remote station.

DTR (Data Terminal Ready),
Output, active LOW,
Indicates that the local terminal is ready to receive data.

DSR (Data Set Ready),
Input, active LOW,
Indicates that the remote station is ready to receive data.

RTS (Request To Send),
Output, active LOW.
Indicates that the local terminal wants to transmit data.

CTS (Clear To Send),
Input, active LOW.
Used to tell the local terminal that the remote station is ready to receive data.

RI (Ring Indicator),
Not used in this instrument.
Input, active LOW.
Used by a modem to indicate that a remote station wants to establish a connection.

Transmission Parameters

To ensure error-free data transmission, the parameters of the instrument and the controller must have the same settings. The parameters are defined in the *SETUP-GENERAL SETUP* menu.

Transmission rate (baud rate)
the following transmission rates can be set in the analyzer:
110, 300, 600, 1200, 2400, 4800, 9600, 19200.

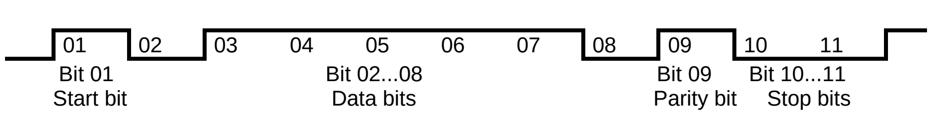
Data bits
Data transmission is in 7- or 8-bit ASCII code. The first bit transmitted is the LSB (least significant bit).

Start bit
Each data byte starts with a start bit. The falling edge of the start bit indicates the beginning of the data byte.

Parity bit
In order to detect errors, a parity bit may be transmitted. No parity, even parity or odd parity may be selected. In addition, the parity bit can be set to logic '0' or to logic '1'.

Stop bits
The transmission of a data byte is terminated by 1, 1,5 or 2 stop bits.

Example:
Transmission of character 'A' (41 hex) in 7-bit ASCII code,
with even parity and 2 stop bits:



Interface Functions

For interface control, several strings are defined and control characters are reserved which are based upon IEC Bus control.

Table A-4 Control strings or control characters of the RS-232 interface

Control string or character	Function
"@REM"	Switch over to remote
"@LOC"	Switch over to local
"@SRQ"	Service Request SRQ (SRQ is sent by the instrument)
"@GET"	Group Execute Trigger (GET)
"@DCL"	Reset instrument (Device Clear DCL)
<Ctrl Q> 11 Hex	Enables character output
<Ctrl S> 13 Hex	Inhibits character output
0D Hex, 0A Hex	Terminator <CR>, <LF>

Handshake

Software handshake

In the software handshake mode of operation, the data transfer is controlled using the two control characters XON / XOFF.

The instrument uses the control character XON to indicate that it is ready to receive data. If the receive buffer is full, it sends the XOFF character via the interface to the controller. The controller then interrupts the data output until it receives another XON from the instrument. The controller indicates to the instrument that it is ready to receive data in the same way.

Cable required for software handshake

The connection of the instrument with a controller for software handshake is made by crossing the data lines. The following wiring diagram applies to a controller with a 9-pin or 25-pin configuration.

Instrument 9-pin		Controller 9-pin
1		1
2	------------RxD / TxD---------------	3
3	------------TxD / RxD---------------	2
4		6
5	------------GND / GND-------------	5
6		4
7		8
8		7
9		9

Instrument 9-pin		Controller 25-pin
1		8
2	------------RxD / TxD---------------	2
3	------------TxD / RxD---------------	3
4		6
5	------------GND / GND-------------	7
6		20
7		5
8		4
9		22

Fig. A-3 Wiring of the data lines for software handshake

Hardware handshake

For hardware handshake, the instrument indicates that it is ready to receive data via the lines DTR and RTS. A logic ’0’ on both lines means "ready" and a logic ’1’ means "not ready". The RTS line is always active (logic ’0’) as long as the serial interface is switched on. The DTR line thus controls the readiness of the instrument to receive data.

The readiness of the remote station to receive data is reported to the instrument via the CTS and DSR line. A logic ’0’ on both lines activates the data output and a logic ’1’ on both lines stops the data output of the instrument. The data output takes place via the TxD line.

Cable for hardware handshake

The connection of the instrument to a controller is made with a so-called zero modem cable. Here, the data, control and acknowledge lines must be crossed. The following wiring diagram applies to a controller with a 9-pin or 25-pin configuration.

Instrument 9-pin		Controller 9-pin
1		1
2	------------RxD / TxD---------------	3
3	------------TxD / RxD---------------	2
4	------------DTR /DSR---------------	6
5	------------GND / GND-------------	5
6	------------DSR / DTR-------------	4
7	------------RTS / CTS-------------	8
8	------------CTS / RTS-------------	7
9		9

Instrument 9-pin		Controller 25-pin
1		8
2	------------RxD / TxD---------------	2
3	------------TxD / RxD---------------	3
4	------------DTR /DSR---------------	6
5	------------GND / GND-------------	7
6	------------DSR / DTR-------------	20
7	------------RTS / CTS-------------	5
8	------------CTS / RTS-------------	4
9		22

Fig. A-4 Wiring of the data, control and acknowledge lines for hardware handshake

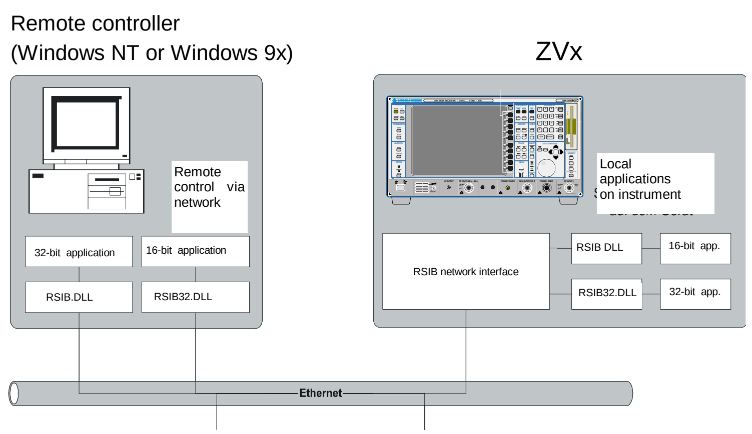
A.3 RSIB Interface

The instrument is equipped with an RSIB interface as standard, which enables controlling of the instrument by means of Visual C++ and Visual Basic programs. The control applications run on an external computer in the network.

A Unix operating system can be installed on an external computer in addition to a Windows operating system. In this case, the control applications are created either in C or C++. The supported Unix operating systems include:

- Sun Solaris 2.6 Sparc Station
- Sun Solaris 2.6 Intel Platform
- Red Hat Linux 6.2 x86 Processors

With local control, the name `’@local’` is specified for link setup by means of function `RSDLLibfind()`. If `’@local’` is not specified, the `RSIB.DLL` interprets the name as an IP address and attempts to set up a link to the device via the Winsock interface.



Windows Environment

In order to be able to access the measuring instruments via the RSIB interface, the file `RSIB32.DLL` must be copied into the Windows `system32` directory or into the directory of the control applications. For 16-bit applications, the file `RSIB.DLL` must be additionally copied into the directories mentioned.

The DLLs are already installed in the corresponding directories on the measuring instruments.

For the different programming languages there are files available that contain the declarations of the DLL functions and the definition of the error codes.

Visual Basic (16 bit):	`’RSIB.BAS’`	`(C:\R_S\Instr\RSIB)`
Visual Basic (32 bit):	`’RSIB32.BAS’`	`(C:\R_S\Instr\RSIB)`
C:	`’RSIB.H’`	`(C:\R_S\Instr\RSIB)`

The RSIB directory also contains the program RSIBCNTR.EXE with which SCPI commands can be sent to the instrument via the RSIB interface. This program can be used to test the function of the interface. Required for the test is delay module VBRUN300.DLL in the path or in the Windows directory.

The control is performed with Visual C++ or Visual Basic programs. The local link to the internal controller is established with the name '@local'. If a remote controller is used, the instrument IP address is to be indicated here.

Via VisualBasic:	internal controller:	ud = RSDLLibfind ("@local", ibsta, iberr, ibcntl)
	remote controller:	ud = RSDLLibfind ("82.1.1.200", ibsta, iberr, ibcntl)

The return to manual operation can be performed via the front panel (*LOCAL* key) or the RSIB interface.

Via RSIB:

```
...
ud = RSDLLibloc (ud, ibsta, iberr, ibcntl);
...
```

Unix Environment

In order to access the measuring equipment via the RSIB interface, copy the `librsib.so.X.Y` file to a directory for which the control application has read rights. `X.Y` in the file name indicates the version number of the library, for example `1.0`.

The `librsib.so.X.Y` library is created as a *shared library*. The applications using the library have nothing to do with versions. They simply link the library with the `lrsib` option. The following instructions have to be observed so that linking can be successfully performed and the library can be found during the program run:

File link:

- Use the operating system command *ln* to create a file with the link name `librsib.so` and pointing to `librsib.so.X.Y` in a directory for which the control application has read rights. Example:

  `$ ln –s /usr/lib/librsib.so.1.0 /usr/lib/librsib.so`

Linker options for creating applications:

- `-lrsib` : import library
- `-Lxxx` : path information where the import library can be found. This is where the above file link has been created. Example: `-L/usr/lib`.

Additional linker options for creating applications (only under Solaris):

- `-Rxxx`: path information where the library is searched for during the program run: `-R/usr/lib`.

Run-time environment:

- Set environment variable `LD_RUN_PATH` to the directory in which the file link has been created. This is necessary only if `librsib.so` cannot be found in the standard search path of the operating system and the `-R` linker option (only Solaris) was not specified.

For C/C++ programming, the declarations of the library functions and the definition of error codes are contained in:

C/C++: `'RSIB.H' (C:\R_S\Instr\RSIB)`

RSIB Interface Functions

This chapter lists all functions of the DLL "RSIB.DLL" or "RSIB32.DLL" or "librsib.so", which allow to produce control applications.

Variables ibsta, iberr, ibcntl

Same as with the National Instruments interface, successful execution of a command can be checked by means of the variables ibsta, iberr and ibcntl. To this end, references to the three variables are transferred to all RSIB functions. In addition, the status word ibsta is returned as a function value by all functions.

Status word ibsta
All functions send back a status word that provides information on the status of the RSIB interface. The following bits are defined:

Bit name	Bit	Hex code	Description
ERR	15	8000	This bit is set if an error occurs during a function call. If this bit is set, iberr contains an error code which specifies the error.
TIMO	14	4000	This bit is set if a timeout occurs during a function call. A timeout may occur in the following situations: • while waiting for an SRQ with the function RSDLLWaitSrq(). • if no acknowledgment is received for data sent to an instrument with RSDLLibwrt() or RSDLLilwrt(). • if no response from server to a data request with function RSDLLibrd() or RSDLLilrd().
CMPL	8	0100	This bit is set if the reply of the IEC/IEEE-bus parser is completely read. If a reply of the parser is read with the function RSDLLilrd() and the buffer length is not sufficient, the bit is cleared.

Error variable iberr
If the ERR bit (8000h) is set in the status word, iberr contains an error code that specifies the error. The RSIB has error codes of its own independent of the National Instrument interface.

Error	Error code	Description
IBERR_DEVICE_REGISTER	1	RSIB.DLL cannot register any new device.
IBERR_CONNECT	2	Link to the device has failed.
IBERR_NO_DEVICE	3	An interface function was called with an invalid device handle.
IBERR_MEM	4	No free memory available.
IBERR_TIMEOUT	5	Timeout has occurred.
IBERR_BUSY	6	The RSIB interface is blocked by a function not yet completed. Windows is not blocked, for example, by function RSDLLibrd() if data are still to be transmitted in response to this function. In this case a new call is possible. Further calls are however rejected by RSIB.DLL with error code IBERR_BUSY.
IBERR_FILE	7	Error in reading from or writing to a file.
IBERR_SEMA	8	Error upon creating or assigning a semaphore (only under Unix)

Count variable - ibcntl
The variable ibcntl is updated with the number of bytes transmitted on every read and write function call.

Overview of Interface Functions

The library functions are adapted to the interface functions of National Instruments for GPIB programming. The functions supported by the libraries are listed in the following table.

Function	Description
RSDLLibfind()	Provides a handle for access to a device.
RSDLLibwrt()	Sends a zero-terminated string to a device.
RSDLLilwrt()	Sends a certain number of bytes to a device.
RSDLLibwrtf()	Sends the contents of a file to a device.
RSDLLibrd()	Reads data from a device into a string.
RSDLLilrd()	Reads a certain number of bytes from a device.
RSDLLibrdf()	Reads data from a device into a file.
RSDLLibtmo()	Sets timeout for RSIB functions
RSDLLibsre()	Switches a device into the local or remote state
RSDLLibloc()	Temporarily switches a device into the local state
RSDLLibeot()	Enables/disables the END message for write operations.
RSDLLibrsp()	Performs a serial poll and provides the status byte.
RSDLLibclr	Sends the command SDC (Device Clear) to the instrument.
RSDLLibonl()	Sets the device On/Offlline.
RSDLLTestSrq()	Checks whether a device has generated an SRQ.
RSDLLWaitSrq()	Waits until a device generates an SRQ.
RSDLLSwapBytes	Swaps the byte sequence for binary numeric display (only required for non-Intel platforms)

Description of Interface Functions

RSDLLibfind()

The function provides a handle for access to the device with the name `udName`.

VB format: `Function RSDLLibfind (ByVal udName$, ibsta%, iberr%, ibcntl&) As Integer`

C-format: `short WINAPI RSDLLibfind( char far *udName, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibfind( char *udName, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter: `udName` IP address of device

Example: `ud = RSDLLibfind ("89.10.38.97", ibsta, iberr, ibcntl)`

The function must be called prior to all other functions of the interface.

As return value, the function provides a handle that must be indicated in all functions for access to the device. If the device with the name `udName` is not found, the handle has a negative value.

RSDLLibwrt

This function sends data to the device with the handle `ud`.

VB format: `Function RSDLLibwrt (ByVal ud%, ByVal Wrt$, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibwrt( short ud, char far *Wrt, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLibwrt( short ud, char *Wrt, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

`ud` Device handle

`Wrt` String sent to the device.

Example: `RSDLLibwrt(ud, "SENS:FREQ:STAR?", ibsta, iberr, ibcntl)`

This function allows to send setting and query commands to the measuring instruments. Whether the data is interpreted as a complete command can be set using the function `RSDLLibeot()`.

RSDLLilwrt

This function sends `Cnt` bytes to a device with the handle `ud`.

VB format: `Function RSDLLilwrt (ByVal ud%, ByVal Wrt$, ByVal Cnt&, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLilwrt( short ud, char far *Wrt, unsigned long Cnt, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLilwrt( short ud, char *Wrt, unsigned long Cnt, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

`ud`	Device handle
`Wrt`	String sent to the GPIB parser.
`Cnt`	Number of bytes sent to the device.

Example: `RSDLLilwrt (ud, '......', 100, ibsta, iberr, ibcntl)`

Like `RSDLLibwrt()` this function sends data to a device. The only difference is that binary data can be sent as well. The length of the data is not determined by a zero-terminated string, but by the indication of `Cnt` bytes. If the data is to be terminated with EOS (0Ah), the EOS byte must be appended to the string.

RSDLLibwrtf

This function sends the contents of a file `file$` to the device with the handle `ud`.

VB format: `Function RSDLLibwrtf (ByVal ud%, ByVal file$, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibwrt( short ud, char far *Wrt, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLibwrt( short ud, char *Wrt, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

`ud`	Device handle
`file`	File the contents of which are sent to the device.

Example: `RSDLLibwrtf(ud, "C:\db.sav", ibsta, iberr, ibcntl)`

This function allows to send setting and query commands to the measuring instruments. Whether the data is interpreted as complete command can be set using the function `RSDLLibeot()`.

RSDLLibrd()

The function reads data from the device with the handle ud into the string Rd.

VB format: `Function RSDLLibrd (ByVal ud%, ByVal Rd$, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibrd( short ud, char far *Rd, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLibrd( short ud, char *Rd, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

ud	Device handle
Rd	String into which the read data is copied.

Example: `RSDLLibrd (ud, Rd, ibsta, iberr, ibcntl)`

This function fetches the responses of the GPIB parser to a query.

In the case of Visual Basic programming, a string of sufficient length must be generated before. This can be done during the definition of the string or using the command `Space$()`.

Generation of a string of the length 100:

```
- Dim Rd as String * 100
- Dim Rd as String
  Rd = Space$(100)
```

RSDLLilrd

This function reads `Cnt` bytes from the device with the handle ud.

VB format: `Function RSDLLilrd (ByVal ud%, ByVal Rd$, ByVal Cnt&, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLilrd( short ud, char far *Rd, unsigned long Cnt, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLilrd( short ud, char *Rd, unsigned long Cnt, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

ud	Device handle
`cnt`	Maximum number of bytes copied from the DLL into the target string Rd.

Example: `RSDLLilrd (ud, RD, 100, ibsta, iberr, ibcntl)`

Like the function `RSDLLibrd()`, this function reads data from a device. The only difference is that in this case the maximum number of bytes to be copied into the target string Rd can be indicated by means of `Cnt`. This function prevents writing beyond the end of the string.

RSDLLibrdf()

Reads data from the device with the handle ud into the file `file`.

VB format: `Function RSDLLibrdf (ByVal ud%, ByVal file$, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibrd( short ud, char far *file, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLibrd( short ud, char *file, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

`ud`	Device handle
`file`	File into which the read data is written.

Example: `RSDLLibrdf (ud, "c:\db.sav", ibsta, iberr, ibcntl)`

The file name may as well include a drive or path specification.

RSDLLibtmo

This function defines the timeout for a device. The default value for the timeout is set to 5 seconds.

VB format: `Function RSDLLibtmo (ByVal ud%, ByVal tmo%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibtmo( short ud, short tmo, short far *ibsta, short far *iberr, unsigned long far *ibcntl )`

C format (Unix): `short RSDLLibtmo( short ud, short tmo, short *ibsta, short *iberr, unsigned long *ibcntl )`

Parameter:

`ud`	Device handle
`tmo`	Timeout in seconds

Example: `RSDLLibtmo (ud, 10, ibsta, iberr, ibcntl)`

RSDLLibsre

This function sets the device to the 'LOCAL' or 'REMOTE' state.

VB format: `Function RSDLLibsre (ByVal ud%, ByVal v%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibsre( short ud, short v, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibsre( short ud, short v, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

ud Device handle
v State of device

0 - local

1 - remote

Example: `RSDLLibsre (ud, 0, ibsta, iberr, ibcntl)`

RSDLLibloc

This function temporarily switches the device to the 'LOCAL' state.

VB format: `Function RSDLLibloc (ByVal ud%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibloc( short ud, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibloc( short ud, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter: ud Device handle

Example: `RSDLLibloc (ud, ibsta, iberr, ibcntl)`

After switchover to LOCAL state, the instrument can be manually operated via the front panel. On the next access to the instrument by means of one of the functions of the library the instrument is switched again to the REMOTE state.

RSDLLibeot

This function enables or disables the END message after write operations.

VB format: `Function RSDLLibeot (ByVal ud%, ByVal v%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibsre( short ud, short v, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibsre( short ud, short v, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

ud Device handle.
v 0 - no END message
1 – send END message

Example: `RSDLLibeot (ud, 1, ibsta, iberr, ibcntl)`

If the END message is disabled, the data of a command can be sent with several successive calls of write functions. The END message must be enabled again before sending the last data block.

RSDLLibrsp

This function performs a serial poll and provides the status byte of the device.

VB format: `Function RSDLLibrsp(ByVal ud%, spr%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibrsp( short ud, char far* spr, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibrsp( short ud, char *spr, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

	ud	Device handle
	spr	Pointer to status byte

Example: `RSDLLibrsp(ud, spr, ibsta, iberr, ibcntl)`

RSDLLibclr

Sends the command SDC (Device Clear) to the instrument.

VB format: `Function RSDLLibclr(ByVal ud%, spr%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibclr( short ud, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLibclr( short ud, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter: ud — Device handle

Example: `RSDLLibclr(ud, ibsta, iberr, ibcntl)`

RSDLLibonl

This function switches the device to 'online' or 'offline' mode. When it is switched to ‘offline’ mode, the interface is released and the device handle becomes invalid. By calling RSDLLibfind again, the communication is set up again.

VB format: `Function RSDLLibonl (ByVal ud%, ByVal v%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLibonl( short ud, short v, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format: `short RSDLLibonl( short ud, short v, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

	ud	Device handle
	v	Device state 0 - local 1 - remote

Example: `RSDLLibonl(ud, 0, ibsta, iberr, ibcntl)`

RSDLLTestSRQ

This function checks the status of the SRQ bit.

VB format: `Function RSDLLTestSrq (ByVal ud%, Result%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLTestSrq( short ud, short far *result, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLTestSrq( short ud, short *result, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

`ud` Device handle

`result` Reference to an integer value in which the library returns the status of the SRQ bit.

0 - no SRQ
1 - SRQ active, device requests service

Example: `RSDLLTestSrq (ud, result%, ibsta, iberr, ibcntl)`

This function corresponds to the function `RSDLLWaitSrq`. The only difference is that `RSDLLTestSRQ` immediately returns the current status of the SRQ bit, whereas `RSDLLWaitSrq` waits for an SRQ to occur.

RSDLLWaitSrq

This function waits until the device triggers an SRQ with the handle `ud`.

VB format: `Function RSDLLWaitSrq (ByVal ud%, Result%, ibsta%, iberr%, ibcntl&) As Integer`

C format: `short WINAPI RSDLLWaitSrq( short ud, short far *result, short far *ibsta, short far *iberr, unsigned long far *ibcntl)`

C format (Unix): `short RSDLLWaitSrq( short ud, short *result, short *ibsta, short *iberr, unsigned long *ibcntl)`

Parameter:

`ud` Device handle

`result` Reference to an integer value in which the library returns the status of the SRQ bit.

0 - No SRQ has occurred during the timeout

1 - SRQ has occurred during the timeout

Beispiel: `RSDLLWaitSrq( ud, result, ibsta, iberr, ibcntl );`

The function waits until one of the following two events occurs.

- The measuring instrument triggers an SRQ
- No SRQ occurs during the timeout defined with `RSDLLibtmo()`

RSDLLSwapBytes

This function changes the display of binary numbers on non-Intel platforms.

VB format: Not provided at present since it is required only on non-Intel platforms.

C format: `void WINAPI RSDLLSwapBytes( void far *pArray, const long size, const long count)`

C format (Unix): `void RSDLLSwapBytes( void *pArray, const long size, const long count)`

Parameter:

`pArray`	Array in which modifications are made
`size`	Size of a single element in `pArray`
`count`	Number of elements in `pArray`

Example: `RSDLLSwapBytes( Buffer, sizeof(float), ibcntl/sizeof(float))`

This function swaps the display of various elements from *Big Endian* to *Little Endian* and vice versa. It is expected that a coherent storage area of elements of the same file type (`size` byte) is transferred to `pArray`. This function has no effect on Intel platforms.

Different types of processor architecture store data in different byte sequences. For example, Intel processors store data in the reverse order of Motorola processors. Comparison of byte sequences:

Byte sequence	Use in	Display in memory	Description
Big Endian	Motorola processors, network standard	Most significant byte at least significant address	The *most significant* byte is at the left end of the word.
Little Endian	Intel processors	Least significant byte at least significant address	The *most significant* byte is at the right end of the word.

A.4 User Interface (USER)

The user interface, located on the rear panel of the ZVx, is a 25 pin Cannon connector which provides access to the two user ports (Port A and Port B). Each port is 8 bits wide (A0 - A7 and B0 -B7) and can be configured either as output or as input. The voltage levels are TTL levels (Low < 0,4 V, High > 2 V).

In addition, an internal +5 V power supply voltage is provided. The maximum load current is 100 mA.

In addition, two supply voltages are provided:

- + 5 V Max. current 100mA, protected by multifuse.
- + 28 V Max. current 100mA, the voltage is applied to pin 25 only if pin 22 and pin 24 are connected.

The pin assignments for the USER connector can be seen in the following diagram:
The configuration of the user ports takes place in the *SETUP* menu (SETUP key) in the *GENERAL SETUP* sub-menu.

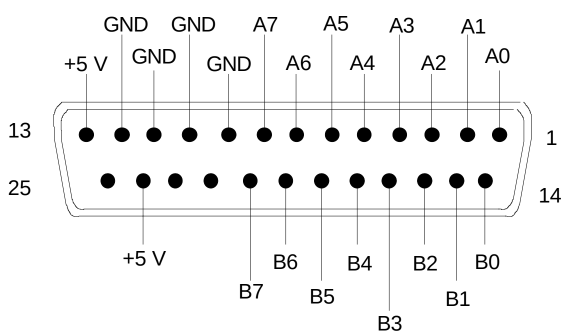
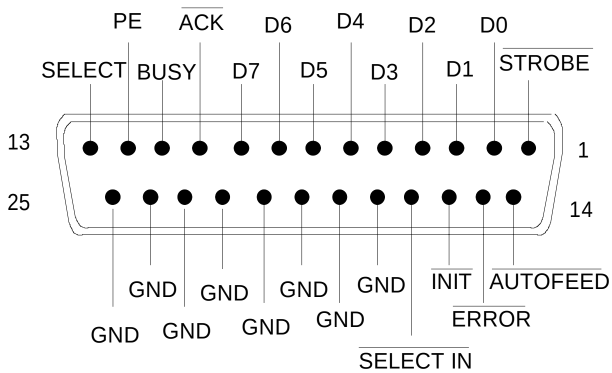


Fig. A-5 Pin assignments for the USER connector

A.5 Printer Interface (LPT)

The 25-pin LPT connector on the rear panel of the ZVx is provided for the connection of a printer. The LPT interface is compatible with the CENTRONICS printer interface.



Pin	**Signal**	**Input (I) Output (O)**	**Description**
1	STROBE	O	Pulse for transmitting a data byte, min. 1µs pulse width (active LOW)
2	D0	O	Data Line 0
3	D1	O	Data Line 1
4	D2	O	Data Line 2
5	D3	O	Data Line 3
6	D4	O	Data Line 4
7	D5	O	Data Line 5
8	D6	O	Data Line 6
9	D7	O	Data Line 7
10	ACK	I	Indicates that the printer is ready to receive the next byte. (active LOW)
11	BUSY	I	Signal is active when the printer cannot accept data. (active HIGH)
12	PE	I	Signal is active when the paper tray is empty. (active HIGH)
13	SELECT	I	Signal is active when the printer is selected. (active HIGH)
14	AUTOFEED	O	When signal is active, the printer automatically performs a linefeed after each line. (active LOW)
15	ERROR	I	This signal is high when the printer has no paper, is not selected or has an error status. (active LOW)
16	INIT	O	Initialise the printer. (active LOW)
17	SELECT IN	O	If signal is active, the codes DC1/DC3 are ignored by the printer. (active LOW).
18 - 25	GND		Ground connection.

Fig. A-6 Pin assignments for the LPT connector.

A.6 Probe Connectors (PROBE 1, PROBE 2)

To allow the connection of probes, the ZVx has the supply voltage connectors PROBE 1 and PROBE 2. They deliver the power supply voltages +15 V, -12 V and ground.

The connectors are also suited for powering the high-impedance probes from Hewlett Packard.

A.7 Reference Input (REF IN)

A high-precision external reference oscillator, used to increase the frequency accuracy and to improve the stability of the internal reference, can be connected here. The internal reference oscillator synchronizes to the frequency of the external oscillator when the frequency is n · 1 MHz, with n being an integer between 1 and 15. The permissable frequency error of the external reference oscillator is 6 ppm. It must be able to supply between 0.1 V und 3 V at 1 kΩ. Switching between internal and external reference is accomplished in the SETUP menu.

A.8 Reference Output (REF OUT)

When the ZVx is operated with its internal reference, the 10-MHz reference signal is available at the REF OUT connector and thus provides the capability of, e.g., synchronisation of external instruments to the ZVx. The signal is a sinewave with a level of 12 dBm ± 3 dB when connected to 50 Ω.

A.9 External Trigger Input (EXT TRIGGER)

The EXT TRIGGER connector is used for controlling the measurement via an external TTL signal. The edge of the signal is used for triggering, whereby either the positive or negative edge can be selected. The pulse width of the external trigger signal must be at least 1 µs.

A.10 External Level Control Input (LEVEL)

Frequency range:	0 to 100 kHz
Voltage range:	0 to 10 V
Input impedance:	> 10 kΩ

A.11 DC Voltage Input for PORT 1 and PORT 2 (PORT BIAS 1 / 2)

Optional rear panel interfaces (only by active test sets). < 200 mA or < 30 V

A.12 Connectors for Controlling an External Generator of the R&S Family SME / SMP and other (BLANK, TRIGGER)

A special feature for of the signal generators of the Rohde & Schwarz SME and SMP families is the so-called "list mode" which serves to accelerate the sweep in the case of external control. In this mode a list containing a series of frequency points with the corresponding level is transmitted to the generator, e.g. via IEC-bus. During the sweep, the generator switches from one frequency point to the next via hardware handshake using the TRIGGER and BLANK signals: By means of a HIGH pulse of the TRIGGER signal the network analyzer causes the generator to go to the next frequency. During the switchover procedure, the generator intermediately sets the BLANK signal to HIGH level. After this signal has returned to LOW, an additional delay time is inserted and the measurement starts.

TRIGGER (output) TTL signal
BLANK (input) TTL signal

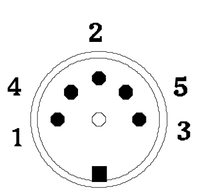
A.13 External Reference Mixer Connector (a1 EXT OUT, a1 EXT IN)

The sockets a1 EXT OUT and a1 EXT IN belong to option ZVR-B6, "Reference Channel Ports". This option is used, e.g., for comparing two mixers in a vector measurement. See the description of the *REFERENCE MIXER* softkey in chapter 2.

a1 EXT OUT (output)
a1 EXT IN (input)

A.14 External Keyboard (KEYBOARD)

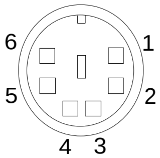
A 5-pin DIN connector is provided to allow connecting an external keyboard. Because of its low interference radiation, the PSA-Z1 keyboard is recommended (Order No. 1009.5001.31). However, any other multi-function keyboard may also be used.



Pin	Signal
1	Keyboard Clock
2	Data
3	Free
4	Ground
5	+5-V-Power Supply

Fig. A-7 Pin assignments of the KEYBOARD connector.

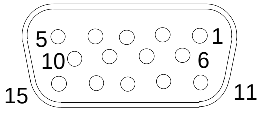
A.15 Mouse Connector (MOUSE)



Pin	Signal
1	MOUSEDATA
2	NC
3	MOUSEGND
4	MOUSEVD5
5	MOUSECLK
6	NC

Fig A-8 Pin assignments for the MOUSE connector.

A.16 Monitor Connectors (PC MONITOR, ANALYZER MONITOR)



Pin	Signal
1	R
2	G
3	B
4	MID2
5	NC
6	R-GND
7	G-GND
8	B-GND
9	NC
10	GND
11	MID0
12	MID1
13	HSYNC
14	VSYNC
15	NC

Fig. A-9 Pin assignments of the MONITOR connector.

Annex B – List of Error Messages

The following list contains all error messages for errors occurring in the instrument. The meaning of negative error codes is defined in SCPI, positive error codes mark errors specific of the instrument.

The table contains the error code in the left-hand column. In the right-hand column the error text being entered into the error/event queue or being displayed is printed in bold face. Below the error text, there is an explanation as to the respective error.

B.1 SCPI-Specific Error Messages

No Error

Error code	**Error text in the case of queue poll** Error explanation
0	**No error** This message is output if the error queue does not contain any entries.

Command Error - Faulty command; sets bit 5 in the ESR register.

Error code	**Error text in the case of queue poll** Error explanation
-100	**Command Error** The command is faulty or invalid.
-101	**Invalid Character** The command contains an invalid sign. Example: A header contains an ampersand, "`SENSe&`".
-102	**Syntax error** The command is invalid. Example: The command contains block data the instrument does not accept.
-103	**Invalid separator** The command contains an impermissible sign instead of a separator. Example: A semicolon is missing after the command.
-104	**Data type error** The command contains an invalid value indication. Example: ON is indicated instead of a numeric value for frequency setting.
-105	**GET not allowed** A Group Execute Trigger (GET) is within a command line.
-108	**Parameter not allowed** The command contains too many parameters. Example: Command `SENSe:FREQuency:CENTer` permits only one frequency indication.

Continuation: Command Error

Error code	**Error text in the case of queue poll** Error explanation
-109	**Missing parameter** The command contains too few parameters. Example: The command `SENSe:FREQuency:CENTer` requires a frequency indication.
-110	**Command header error** The header of the command is faulty.
-111	**Header separator error** The header contains an impermissible separator. Example: the header is not followed by a "White Space", "`*ESE255`"
-112	**Program mnemonic too long** The header contains more than 12 characters.
-113	**Undefined header** The header is not defined for the instrument. Example: `*XYZ` is undefined for every instrument.
-114	**Header suffix out of range** The header contains an impermissible numeric suffix. Example: `SENSe3` does not exist in the instrument.
-120	**Numeric data error** The command contains a faulty numeric parameter.
-121	**Invalid character in number** A number contains an invalid character. Example: An "A" in a decimal number or a "9" in an octal number.
-123	**Exponent too large** The absolute value of the exponent is greater than 32000.
-124	**Too many digits** The number includes too many digits.
-128	**Numeric data not allowed** The command includes a number which is not allowed at this position. Example: The command `INPut:COUPling` requires indication of a text parameter.
-130	**Suffix error** The command contains a faulty suffix.
-131	**Invalid suffix** The suffix is invalid for this instrument. Example: nHz is not defined.
-134	**Suffix too long** The suffix contains more than 12 characters.
-138	**Suffix not allowed** A suffix is not allowed for this command or at this position of the command. Example: The command `*RCL` does not permit a suffix to be indicated.
-140	**Character data error** The command contains a faulty text parameter
-141	**Invalid character data** The text parameter either contains an invalid character or it is invalid for this command. Example: Write error with parameter indication;`INPut:COUPling XC.`

Continuation: Command Error

Error code	**Error text in the case of queue poll** Error explanation
-144	**Character data too long** The text parameter contains more than 12 characters.
-148	**Character data not allowed** The text parameter is not allowed for this command or at this position of the command. Example: The command `*RCL` requires a number to be indicated.
-150	**String data error** The command contains a faulty string.
-151	**Invalid string data** The command contains a faulty string. Example: An END message has been received prior to the terminating apostrophe.
-158	**String data not allowed** The command contains a valid string at a position which is not allowed. Example: A text parameter is set in quotation marks, `INPut:COUPling "DC"`
-160	**Block data error** The command contains faulty block data.
-161	**Invalid block data** The command contains faulty block data. Example: An END message was received prior to reception of the expected number of data.
-168	**Block data not allowed** The command contains valid block data at an impermissible position. Example: The command `*RCL` requires a number to be indicated.
-170	**Expression error** The command contains an invalid mathematical expression.
-171	**Invalid expression** The command contains an invalid mathematical expression. Example: The expression contains mismatching parentheses.
-178	**Expression data not allowed** The command contains a mathematical expression at an impermissible position.
-180	**Macro error** A faulty macro has been defined, or an error has occurred during execution of a macro.
-181	**Invalid outside macro definition** A macro parameter placeholder was encountered outside of a macro definition.
-183	**Invalid inside macro definition** A macro definition is syntactically wrong.
-184	**Macro parameter error** A command inside the macro definition has the wrong number or type of parameters.

Execution Error - Error on execution of a command; sets bit 4 in the ESR register

Error code	**Error text in the case of queue poll** Error explanation
-200	**Execution error** Error on execution of the command.
-201	**Invalid while in local** The command is not executable while the device is in local due to a hard local control. Example: The device receives a command which would change the rotary knob state, but the device is in local so the command can not be executed.
-202	**Settings lost due to rtl** A setting associated with hard local control was lost when the device changed to LOCS from REMS or to LWLS from RWLS.
-210	**Trigger error** Error on triggering the device.
-211	**Trigger ignored** The trigger (GET, *TRG or trigger signal) was ignored because of device timing considerations. Example: The device was not ready to respond.
-212	**Arm ignored** An arming signal was ignored by the device.
-213	**Init ignored** Measurement initialisation was ignored as another measurement was already in progress.
-214	**Trigger deadlock** The trigger source for the initiation of measurement is set to GET and subsequent measurement is received. The measurement cannot be started until a GET is received, but the GET would cause an interrupted-error)
-215	**Arm deadlock** The trigger source for the initiation of measurement is set to GET and subsequent measurement is received. The measurement cannot be started until a GET is received, but the GET would cause an interrupted-error.
-220	**Parameter error** The command contains a faulty or invalid parameter.
-221	**Settings conflict** There is a conflict between setting of parameter value and instrument state.
-222	**Data out of range** The parameter value lies out of the permissible range of the instrument.
-223	**Too much data** The command contains too many data. Example: The instrument does not have sufficient storage space.
-224	**Illegal parameter value** The parameter value is invalid. Example: The text parameter is invalid , `TRIGger:SWEep:SOURce TASTe`

Continuation: Execution Error

Error code	**Error text in the case of queue poll** Error explanation
-230	**Data corrupt or stale** The data are incomplete or invalid. Example: The instrument has aborted a measurement.
-231	**Data questionable** The measurement accuracy is suspect.
-240	**Hardware error** The command cannot be executed due to problems with the instrument hardware.
-241	**Hardware missing** Hardware is missing. Example: An option is not fitted.
-250	**Mass storage error** A mass storage error occured.
-251	**Missing mass storage** The mass storage is missing. Example: An option is not installed.
-252	**Missing media** The media is missing. Example: There is no floppy in the floppy disk drive.
-253	**Corrupt media** The media is corrupt. Example: The floppy is bad or has the wrong format.
-254	**Media full** The media is full. Example: There is no room on the floppy.
-255	**Directory full** The media directory is full.
-256	**File name not found** The file name cannot be found on the media.
-257	**File name error** The file name is wrong. Example: An attempt is made to copy to a duplicate file name.
-258	**Media protected** The media is protected. Example: The write-protect tab on the floppy is present.
-260	**Expression error** The expression contains an error.
-261	**Math error in expression** The expression contains a math error. Example: Divide-by-zero.

Continuation: Execution Error

Error code	**Error text in the case of queue poll** Error explanation
-270	**Macro error** Error on the execution of a macro.
-271	**Macro syntax error** The macro definition contains a syntax error.
-272	**Macro execution error** The macro definition contains an error.
-273	**illegal macro label** An illegal macro label is defined in the *DMC command. Example: The label is too long. The label is identical with the common command header or contains an invalid header syntax.
-274	**Macro parameter error** The macro definition improperly uses a macro parameter placeholder.
-275	**Macro definition too long** The macro definition is too long.
-276	**Macro recursion error** The command sequence defined by the macro is trapped in a program loop. Example: The event that would allow the loop to be exited does not occur.
-277	**Macro redefinition not allowed** The macro label defined in the *DMC command is already defined elsewhere.
-278	**Macro header not found** The macro label in the *GMC? query is not yet defined.
-280	**Program error** Error on the execution of a down-loaded program.
-281	**Cannot create program** The program cannot be created.
-282	**illegal program name** The name of the programm is illegal. Example: The name relates to a non-existing program.
-283	**illegal variable name** The inputted variable does not exist in the program.
-284	**Program currently running** The desired operation is not possible while the program is running. Example: A running program cannot be deleted.
-285	**Program syntax error** The down-loaded program contains a syntax error.
-286	**Program runtime error**

Device Specific Error; sets bit 3 in the ESR register

Error code	**Error test in the case of queue poll** Error explanation
-300	**Device-specific error** FSE-specific error not defined in greater detail.
-310	**System error** This error message suggests an error within the instrument. Please inform the R&S Service.
-311	**Memory error** Error in the instrument memory.
-312	**PUD memory lost** Loss of the protected user data stored using the *PUD command.
-313	**Calibration memory lost** Loss of the non-volatile calibration data stored using the *CAL? command.
-314	**Save/recall memory lost** Loss of the non-volatile data stored using the *SAV command.
-315	**Configuration memory lost** Loss of the non-volatile configuration data stored by the instrument.
-330	**Self-test failed** The selftest could not be executed.
-350	**Queue overflow** This error code is entered in the queue instead of the actual error code if the queue is full. It indicates that an error has occurred but not been accepted. The queue can accept 5 entries.

Query Error - Error in data request; sets bit 2 in the ESR register

Error code	**Error text in the case of queue poll** Error explanation
-400	**Query error** General error occurring when data are requested by a query.
-410	**Query INTERRUPTED** The query has been interrupted. Example: After a query, the instrument receives new data before the response has been sent completely.
-420	**Query UNTERMINATED** The query is incomplete. Example: The instrument is addressed as a talker and receives incomplete data.
-430	**Query DEADLOCKED** The query cannot be processed. Example: The input and output buffers are full, the instrument cannot continue operation.
-440	**Query UNTERMINATED after indefinite response** A query is in the same command line after a query which requests an indefinite response.

Annex C – List of Commands

Command	Parameters	Page
CALCulate[1...4]: FILTer[:GATE]:TIME:STARt	<numeric_value>	3.20
CALCulate[1...4]: FILTer[:GATE]:TIME:STATe	<Boolean>	3.20
CALCulate[1...4]:FILTer[:GATE]:TIME:CENTer	<numeric_value>	3.21
CALCulate[1...4]:FILTer[:GATE]:TIME:DCHebyshev	<numeric_value>	3.21
CALCulate[1...4]:FILTer[:GATE]:TIME:SPAN	<numeric_value>	3.21
CALCulate[1...4]:FILTer[:GATE]:TIME:STOP	<numeric_value>	3.20
CALCulate[1...4]:FILTer[:GATE]:TIME:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebyshev	3.21
CALCulate[1...4]:FORMat	COMPlex | MAGNitude | PHASe | UPHase | REAL | IMAGinary | SWR | GDELay | SWR	3.22
CALCulate[1...4]:GDAPerture:MODE	STEP | FREQuency	3.23
CALCulate[1...4]:GDAPerture:SCOunt	<numeric_value>	3.23
CALCulate[1...4]:GDAPerture[:SPAN]	<numeric_value>	3.23
CALCulate[1...4]:LIMit[1...8]: RDOMain:COMPlex	S | SINV | Y | Z | YREL | ZREL	3.25
CALCulate[1...4]:LIMit[1...8]:CENTer	<numeric_value>,<numeric_value>	3.26
CALCulate[1...4]:LIMit[1...8]:CENTer:SHIFt	<numeric_value>,<numeric_value>	3.26
CALCulate[1...4]:LIMit[1...8]:CLEar		3.28
CALCulate[1...4]:LIMit[1...8]:CONTrol:DOMain	FLIN | FLOG | TLIN | TLOG | PLIN |PLOG	3.25
CALCulate[1...4]:LIMit[1...8]:CONTrol:SHIFt	<numeric_value>	3.26
CALCulate[1...4]:LIMit[1...8]:CONTrol[:DATA]	<numeric_value>,<numeric_value>..	3.25
CALCulate[1...4]:LIMit[1...8]:FAIL?		3.28
CALCulate[1...4]:LIMit[1...8]:LOWer:SHIFt	<numeric_value>	3.27
CALCulate[1...4]:LIMit[1...8]:LOWer:STATe	ON | OFF	3.27
CALCulate[1...4]:LIMit[1...8]:LOWer[:DATA]	<numeric_value>,<numeric_value>	3.27
CALCulate[1...4]:LIMit[1...8]:RDOMain:FORMat	COMPlex | MAGNitude | PHASe | REAL | IMAGinary | SWR | GDELay	3.25
CALCulate[1...4]:LIMit[1...8]:RDOMain:SPACing	LINear | LOGarithmic | DB	3.25
CALCulate[1...4]:LIMit[1...8]:STATe	ON | OFF	3.24
CALCulate[1...4]:LIMit[1...8]:UPPer:RADius	<numeric_value>	3.27
CALCulate[1...4]:LIMit[1...8]:UPPer:SHIFt	<numeric_value>	3.26
CALCulate[1...4]:LIMit[1...8]:UPPer:STATe	ON | OFF	3.27
CALCulate[1...4]:LIMit[1...8]:UPPer[:DATA]	<numeric_value>,<numeric_value>	3.26
CALCulate[1...4]:MARKer[1...8]:AOFF		3.30
CALCulate[1...4]:MARKer[1...8]:COUPled[:STATe]	ON | OFF	3.30
CALCulate[1...4]:MARKer[1...8]:FORMat	MLOGarithmic | MLINear | PHASe | IMAGinary | REAL | SWR | GDELay	3.31
CALCulate[1...4]:MARKer[1...8]:FUNCtion: PTPeak:STATe	ON | OFF	3.36
CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth	<numeric_value>	3.33
CALCulate[1...4]:MARKer[1...8]:FUNCtion:BWIDth:MODE	BPASs | BSTOp	3.33
CALCulate[1...4]:MARKer[1...8]:FUNCtion:CENTer	–	3.36
CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence	MARKer1 | MARKer2 | MARKer3 | MARKer4 | MARKer5 | MARKer6 | MARKer7 | MARKer8 | FIXed	3.35
CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence: RPOSition[:CARTesian	<numeric_value>,<numeric_value>	3.35

Command	Parameters	Page
CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:REFerence: RPOSition:POLar	<numeric_value>,<numeric_value>,<numeric_value>	3.35
CALCulate[1...4]:MARKer[1...8]:FUNCtion:DELTa:STATe	ON | OFF	3.35
CALCulate[1...4]:MARKer[1...8]:FUNCtion:PTPeak:RESult?		3.36
CALCulate[1...4]:MARKer[1...8]:FUNCtion:QFACtor		3.34
CALCulate[1...4]:MARKer[1...8]:FUNCtion:REFerence	–	3.37
CALCulate[1...4]:MARKer[1...8]:FUNCtion:RESULT?		3.34
CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay	TIME | DISTance | ELENgth | OFF	3.34
CALCulate[1...4]:MARKer[1...8]:FUNCtion:EDELay:VALue?		3.35
CALCulate[1...4]:MARKer[1...8]:FUNCtion:SFACtor	<numeric_value>,<numeric_value>	3.34
CALCulate[1...4]:MARKer[1...8]:FUNCtion:STARt	–	3.36
CALCulate[1...4]:MARKer[1...8]:FUNCtion:STOP	–	3.36
CALCulate[1...4]:MARKer[1...8]:FUNCtion:TARGet	<numeric_value>	3.34
CALCulate[1...4]:MARKer[1...8]:FUNCtion[:SELect]	MAXimum | MINimum | TARGet | BFILter	3.33
CALCulate[1...4]:MARKer[1...8]:MAXimum		3.33
CALCulate[1...4]:MARKer[1...8]:MINimum		3.33
CALCulate[1...4]:MARKer[1...8]:MODE	CONTinuous|DISCrete	3.30
CALCulate[1...4]:MARKer[1...8]:SEARch:LEFT		3.32
CALCulate[1...4]:MARKer[1...8]:SEARch:NEXT		3.32
CALCulate[1...4]:MARKer[1...8]:SEARch:RIGHt		3.32
CALCulate[1...4]:MARKer[1...8]:SEARch:TRACking	ON | OFF	3.32
CALCulate[1...4]:MARKer[1...8]:SEARch[:IMMediate]		3.32
CALCulate[1...4]:MARKer[1...8]:TRACe	CHDATA | CHMEM	3.31
CALCulate[1...4]:MARKer[1...8]:TRANsform:COMPlex	S | INVS | Z | ZREL | Y | YREL	3.31
CALCulate[1...4]:MARKer[1...8]:X:MODE	ABS | REL	3.30
CALCulate[1...4]:MARKer[1...8]:X	0 ... MAX (Frequenz) | MAX (Sweepzeit)	3.31
CALCulate[1...4]:MARKer[1...8]:Y?		3.31
CALCulate[1...4]:MARKer[1...8][:STATe]	ON | OFF	3.30
CALCulate[1...4]:MATH:STATe	ON | OFF	3.38
CALCulate[1...4]:MATH[:EXPRession][:DEFine]	<expr>	3.38
CALCulate[1...4]:SMOothing:APERture	<numeric_value>	3.39
CALCulate[1...4]:SMOothing[:STATe]	ON | OFF	3.39
CALCulate[1...4]:TRANsform:COMPlex	S | SINV | Y | Z | YREL | ZREL	3.40
CALCulate[1...4]:TRANsform:COMPlex:ZREFerence	<numeric_value>	3.40
CALCulate[1...4]:TRANsform:TIME: SPAN	<numeric_value>	3.42
CALCulate[1...4]:TRANsform:TIME:CENTer	<numeric_value>	3.42
CALCulate[1...4]:TRANSform:TIME:DCHebychev	<numeric_value>	3.42
CALCulate[1...4]:TRANsform:TIME:LPASs	KFSTop | KDFRequency | MINStep	3.41
CALCulate[1...4]:TRANsform:TIME:LPASs:DCSParam	<numeric_value>	3.41
CALCulate[1...4]:TRANsform:TIME:METHod	FFT | CHIRp	3.41
CALCulate[1...4]:TRANsform:TIME:STARt	<numeric_value>	3.41
CALCulate[1...4]:TRANsform:TIME:STATe	<Boolean>	3.40
CALCulate[1...4]:TRANsform:TIME:STIMulus	IMPulse | STEP	3.41
CALCulate[1...4]:TRANsform:TIME:STOP	<numeric_value>	3.42
CALCulate[1...4]:TRANSform:TIME:WINDow	RECT | HAMMing | HANNing | BOHMan | DCHebychev	3.42

Command	Parameters	Page
CALCulate[1...4]:TRANSform:TIME:XAXis	TIME | DISTance | HDIStance	3.42
CALCulate[1...4]:TRANsform:TIME[:TYPE]	BPASs | LPASs	3.41
CALCulate[1...4]:UNIT:POWer:A1|A2|B1|B2	MW | W | UV | MV | V | DBM | DBW | DBUV | DBMV | DBV	3.43
DIAGnostic:SERVice:FUNCtion	<numeric_value>,<numeric_value>...	3.44
DIAGnostic:SERVice:RFPower	ON | OFF	3.44
DISPlay:FORmat	SINGle | DOVerlay | QOVerlay | DSPLit | QDSPlit | QQSPlit	3.45
DISPlay:FORmat:EXPand	ON | OFF	3.46
DISPlay:PROGram[:MODE]	ON | OFF	3.46
DISPlay:PSAVe:HOLDoff	<numeric_value>	3.46
DISPlay:PSAVe[:STATe]	ON | OFF	3.46
DISPlay[:WINDow[1...4]]:TRACe[1|2]:R:SPACing	LINear | LOGarithmic | dB	3.50
DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:CPOint	<numeric_value>	3.50
DISPlay[:WINDow[1...4]]:TRACe[1|2]:R[:SCALe]:OEDGe	<numeric_value>	3.50
DISPlay[:WINDow[1...4]]:TRACe[1|2]:X:SPACing	LINear | LOGarithmic	3.47
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y:SPACing	LINear | LOGarithmic | dB	3.50
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:AUTO	ONCE	3.47
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:BOTTom	<numeric_value>	3.49
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:OFFSet	<numeric_value>	3.50
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:PDIVision	<numeric_value>	3.48
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:RLEVel	<numeric_value>	3.48
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:RPOSition	0...100 PCT	3.48
DISPlay[:WINDow[1...4]]:TRACe[1|2]:Y[:SCALe]:TOP	<numeric_value>	3.49
DISPlay[:WINDow[1...4]]:TRACe[1|2][:STATe]	ON | OFF	3.51
DISPlay[:WINDow<1...4>]:DIAGram	CLIN | CLOG | CDB | CSEG |PLIN | PLOG | PDB | PSEG |CHARter | SMITh | ISMith	3.46
DISPlay[:WINDow<1..4>]:DIAGram:SEGMented:X[:STATe]	ON | OFF	3.46
DISPlay[:WINDow<1..4>]:DIAGram:SEGMented:R	<numeric_value>	3.47
DISPlay[:WINDow<1..4>]:DIAGram:SEGMented:Y	<numeric_value>	3.47
DISPlay[:WINDow<1..4>]:TRACe2:X:OFFSet	<numeric_value>	3.47
FORMat:DEXPort	ASCii | TOUChstone | SCOMpact	3.53
FORMat:DEXPort:DSEParator	POINt | COMMa	3.53
FORMat:DEXPort:FORMat	COMPlex | MLPHase | MDPHase	3.53
FORMat:DEXPort:MODe	NEW | APPend	3.53
FORMat:DEXPort:SOURce	CDATa | DDATa | SDATa | FDATa	3.54
FORMat[:DATA]	ASCii | REAL[,32]	3.52
HCOPy:ABORt		3.56
HCOPy:DESTination[1|2]	‘SYST:COMM:PRIN’ | ’SYST:COMM:CLIP’ | ’MMEM’	3.56
HCOPy:DEVice:COLor	ON | OFF	3.56
HCOPy:DEVice:LANGuage[1|2]	HPGL | PCL4 | PCL4_C | PCL4_C3 | PCL5 | LASERJ | DESKJ | DESKJ_C | DESKJ_C3 | POSTscript | EPSON24 | EPSON24C | WMF | PCX	3.57
HCOPy:ITEM:ALL		3.58
HCOPy:ITEM:FFEed[1|2]:STATe	ON | OFF	3.58
HCOPy:ITEM:LABel:TEXT	<string>	3.58

Command	Parameters	Page
HCOPy:ITEM:PFEed[1|2]:STATe	ON | OFF	3.58
HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe	SOLid | STYLe<n>	3.59
HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:AINCrement	ON | OFF	3.60
HCOPy:ITEM:WINDow[1...4]:TRACe[1|2]:LTYPe:STATe	ON | OFF	3.59
HCOPy:ITEM:WINDow<1|2>:TABLe:STATe	ON | OFF	3.58
HCOPy:ITEM:WINDow<1|2>:TEXT	<string>	3.59
HCOPy:ITEM:WINDow<1|2>:TRACe:CAINcrement	ON | OFF	3.59
HCOPy:ITEM:WINDow<1|2>:TRACe:STATe	ON | OFF	3.59
HCOPy:PAGE:DIMensions:FULL		3.60
HCOPy:PAGE:DIMensions:QUADrant[1...4]		3.60
HCOPy:PAGE:ORIentation[1|2]	LANDscape | PORTrait	3.60
HCOPy[:IMMediate]		3.57
INITiate:CONTinuous	ON | OFF	3.61
INITiate[:IMMediate]		3.61
INPut:BRIDge	INTernal | BYPass | FPORt	3.62
INPut:UPORt<1|2>:STATe	ON | OFF	3.62
INPut:UPORt<1|2>[:VALue]?		3.62
INPut[1|2]:ATTenuation	<numeric_value>	3.62
INSTrument:COUPle	ALL | NONE	3.63
INSTrument:NSELect	1.|.2	3.63
INSTrument[:SELect]	CHANNEL<1..4>	3.63
MMEMory:CATalog?	–	3.65
MMEMory:CDIRectory	directory name	3.65
MMEMory:CLear:ALL		3.69
MMEMory:CLear:STATe	1, path	3.68
MMEMory:COMMent	<string>	3.71
MMEMory:COPY	path, file name	3.65
MMEMory:DATA	path, file name	3.66
MMEMory:DELete	path, file name	3.66
MMEMory:INITialize	'A:'	3.66
MMEMory:LOAD:AUTO	1,path	3.66
MMEMory:LOAD:STATe	1,path	3.67
MMEMory:MDIRectory	path	3.67
MMEMory:MOVE	path	3.67
MMEMory:MSIS	'A:' | 'C:'	3.67
MMEMory:NAME	path, file name	3.68
MMEMory:RDIRectory	directory name	3.68
MMEMory:SELect[:ITEM]:AFILes	ON|OFF	3.71
MMEMory:SELect[:ITEM]:ALL		3.71
MMEMory:SELect[:ITEM]:CDATa	ON|OFF	3.70
MMEMory:SELect[:ITEM]:CKData	ON|OFF	3.70
MMEMory:SELect[:ITEM]:CSETup	ON|OFF	3.70
MMEMory:SELect[:ITEM]:DEFault		3.71
MMEMory:SELect[:ITEM]:GSETup	ON|OFF	3.69
MMEMory:SELect[:ITEM]:HCOPy	ON|OFF	3.70

Command	Parameters	Page
MMEMory:SELect[:ITEM]:HWSettings	ON|OFF	3.69
MMEMory:SELect[:ITEM]:LINes[:ALL]	ON|OFF	3.69
MMEMory:SELect[:ITEM]:MACRos	ON|OFF	3.70
MMEMory:SELect[:ITEM]:MTRace<1...8>	ON|OFF	3.69
MMEMory:SELect[:ITEM]:NONE		3.71
MMEMory:STORe:STATe	1, path	3.68
OUTPut:DPORt	PORT1 | PORT2	3.72
OUTPut[1|2]:POWer	NORMal | HIGH	3.72
OUTPut:RMIXer	ON | OFF	3.72
OUTPut:UPORt<1|2>:STATe	ON | OFF	3.73
OUTPut:UPORt<1|2>[:VALue]	binary data	3.73
OUTPut[1|2]:ATTenuation	<numeric_value>	3.72
PROGram[:SELected]:EXECute	<cmdname>	3.75
PROGram[:SELected]:NAME	ZVR_K9 | PROG	3.74
PROGram[:SELected]:STRing	<varname>,<string>	3.74
[SENSe:]ROSCillator[:SOURce]	INTernal | EXTernal	3.109
[SENSe:]ROSCillatorEXTernal:FREQuency	<numeric_value>	3.109
[SENSe[1...4]:]AVERage:CLEar		3.76
[SENSe[1...4]:]AVERage:COUNt	0...32767	3.76
[SENSe[1...4]:]AVERage:MODE	SWEep | POINt	3.77
[SENSe[1...4]:]AVERage[:STATe]	ON | OFF	3.76
[SENSe[1...4]:]BANDwidth|BWIDth[:RESolution]		3.77
[SENSe[1...4]:]CORRection: STATe	ON | OFF	3.98
[SENSe[1...4]:]CORRection: DATA	<string>,<block> | <numeric_value>	3.98
[SENSe[1...4]:]CORRection: DATE?		3.99
[SENSe[1...4]:]CORRection:AKAL:SELect	<string>	3.91
[SENSe[1...4]:]CORRection:AKAL:EXPort	<string>	3.91
[SENSe[1...4]:]CORRection:AKAL:IMPort	<string>	3.91
[SENSe[1...4]:]CORRection:AKAL:CLEar	<string>	3.92
[SENSe[1...4]:]CORRection:AKAL:REName	<string>,<string>	3.92
[SENSe[1...4]:]CORRection:CKIT	N50 | N75 | SMA | PC7 | PC35 | USER1 | USER2	3.93
[SENSe[1...4]:]CORRection:CKIT:INSTall	<filename>	3.94
[SENSe[1...4]:]CORRection:CKIT:<CAL-Kit-Typ>:<Standard>	<string>, <numeric_value>	3.94
[SENSe[1...4]:]CORRection:CKIT:<CAL-Kit-Typ>:SELect	<string>	3.95
[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:IMPedance	<numeric_value>	3.95
[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:WGUIde[:STATe]	ON | OFF	3.95
[SENSe[1...4]:]CORRection:CKIT:USER<1|2>:CFRequency	<numeric_value>	3.95
[SENSe[1...4]:]CORRection:CKIT:N50|75	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPEn | FOPEn | MSHort | FSHort | MREFlect | FREFlect | MMATch | FMATch | MSMatch | FSMatch[,<string>]	3.95

Command	Parameters	Page
[SENSe[1...4]:]CORRection:CKIT:PC[7|35]	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | FLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPEn | FOPEn | MSHort | FSHort | MREFlect | FREFlect | MMATch | FMATch | MSMatch | FSMatch[,<string>]	3.96
[SENSe[1...4]:]CORRection:CKIT:SMA	MMTHrough | MFTHrough | FFTHrough | MMLINE1 | MFLINE1 | FFLINE1 | MMLINE2 | MFLINE2 | FFLINE2 | MMATten | MFATten | FFATten | MMSNetwork | MFSNetwork | FFSNetwork | MOPEn | FOPEn | MSHort | FSHort | MREFlect | REFlect | MMATch | FMATch | MSMatch | FSMatch[,<string>]	3.96
[SENSe[1...4]:]CORRection:COLLect:CONNection[1|2]	N50FEMALE | N50MALE | N75FEMALE |N75MALE | PC7 | SMAFEMALE | SMAMALE | PC35FEMALE | PC35MALE | UFEMALE1 | UMALE1 | UFEMALE2 | UMALE2	3.93
[SENSe[1...4]:]CORRection:COLLect:METHod	FTRans | RTRans | FRTRans | TOM | TRM | TRL | TNA | TOMX | TOSM | FUNDamental | FOPORT1 | FOPORT2 | FOPORT12 | FOPTport | ROPTport | REFL1 | REFL2 | REFL12 | TPORT | FTREF1 | RTREF2	3.93
[SENSe[1...4]:]CORRection:COLLect:SAVE		3.93
[SENSe[1...4]:]CORRection:COLLect[:ACQuire]	THRough | OPEN1 | OPEN 2 | SHORT1 | SHORT2 | SHORT12 | MATCH1 | MATCH2 | MATCH12 | NET | ATT | IMATCH12 | SLIDE1 | SLIDE2 | SLIDE12 | LINE1 | LINE2 | M1S2 | S1M2	3.92
[SENSe[1...4]:]CORRection:EDELay[1|2]:AUTO	ONCE	3.97
[SENSe[1...4]:]CORRection:EDELay[1|2]:DIELectric	<numeric value>	3.97
[SENSe[1...4]:]CORRection:EDELay[1|2]:DISTance	<numeric value>	3.96
[SENSe[1...4]:]CORRection:EDELay[1|2]:ELENgth	<numeric value>	3.97
[SENSe[1...4]:]CORRection:EDELay[1|2]:STATe	ON | OFF	3.97
[SENSe[1...4]:]CORRection:EDELay[1|2][:TIME]	<numeric value>	3.96
[SENSe[1...4]:]CORRection:INTerpolate[:STATe]	ON | OFF	3.92
[SENSe[1...4]:]CORRection:OFFSet[1|2:PHASe	<numeric value>	3.98
[SENSe[1...4]:]CORRection:OFFSet[1|2]:MAGNitude	<numeric value>	3.98
[SENSe[1...4]:]CORRection:OFFSet[1|2]:STATe	ON | OFF	3.97
[SENSe[1...4]:]CORRection:POWer:ACQuire	B1 | B2 | IFRef	3.99
[SENSe[1...4]:]CORRection:POWer[:STATe]	ON | OFF	3.99
[SENSe[1...4]:]CORRection:POWer:DATA	<string>,<block> | <numeric_value>	3.100
[SENSe[1...4]:]CORRection:POWer:DATE?		3.100
[SENSe[1...4]:]DETector[:FUNCtion]	FAST | NORMal	3.101
[SENSe[1...4]:]FREQuency:CENTer	<numeric_value>	3.103
[SENSe[1...4]:]FREQuency:CONVersion	FUNDamental | SHARmonic | THARmonic | MIXer	3.104
[SENSe[1...4]:]FREQuency:CONVersion:ARBitrary	<numeric_value>,<numeric_value>,<numeric_value> , CW | FIXed |SWEep	3.104
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:FUNDamental	RF | LO | IF	3.105
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:IFFixed		3.105
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOEXternal	SOURCE1 | SOURCE2	3.105
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:LOFixed		3.105
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:RFFixed		3.105
[SENSe[1...4]:]FREQuency:CONVersion:MIXer:TFRequency		3.106
[SENSe[1...4]:]FREQuency:CW | FIXed	<numeric_value>	3.104
[SENSe[1...4]:]FREQuency:MODE	CW | FIXed | SWEep | SEGMent	3.104

<table>
<tr><th>Command</th><th>Parameters</th><th>Page</th></tr>
<tr><td>[SENSe[1...4]:]FREQuency:NLINear:COMP:STIMe</td><td><numeric_value></td><td>3.106</td></tr>
<tr><td>[SENSe[1...4]:]FREQuency:NLINear:SOI:STIMe</td><td><numeric_value></td><td>3.106</td></tr>
<tr><td>[SENSe[1...4]:]FREQuency:NLINear:TOI:STIMe</td><td><numeric_value></td><td>3.106</td></tr>
<tr><td>[SENSe[1...4]:]FREQuency:SPAN</td><td><numeric_value></td><td>3.103</td></tr>
<tr><td>[SENSe[1...4]:]FREQuency:STARt</td><td><numeric_value></td><td>3.103</td></tr>
<tr><td>[SENSe[1...4]:]FREQuency:STOP</td><td><numeric_value></td><td>3.103</td></tr>
<tr><td>[SENSe[1...4]:]FUNCtion[:ON]</td><td><string></td><td>3.107</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent: CLEar</td><td></td><td>3.111</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent:COUNt?</td><td></td><td>3.111</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent:DEFine[1...50]</td><td><numeric_value>,<numeric_value>,<numeric_value>
,<numeric_value>,<numeric_value> |
AUTO,<numeric_value>,<numeric_value>,<numeric_
value></td><td>3.110</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent:DELete [1...50]</td><td></td><td>3.111</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent:INSert [1...50]</td><td><numeric_value>,<numeric_value>,<numeric_value>
,<numeric_value>,<numeric_value> |
AUTO,<numeric_value>,<numeric_value>,<numeric_
value></td><td>3.111</td></tr>
<tr><td>[SENSe[1...4]:]SEGMent:OVERlap</td><td>ON | OFF</td><td>3.111</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:COUNt</td><td>0 ... 32767</td><td>3.112</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:DIRection</td><td>UP | DOWN</td><td>3.113</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:PDECade</td><td><numeric_value></td><td>3.113</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:POINts</td><td>0 ... 32767</td><td>3.113</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:SPACing</td><td>LINear | LOGarithmic</td><td>3.113</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:STEP</td><td><numeric_value></td><td>3.113</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:TIME</td><td>5ms ... 1000s</td><td>3.112</td></tr>
<tr><td>[SENSe[1...4]:]SWEep:TIME:AUTO</td><td>ON | OFF</td><td>3.112</td></tr>
<tr><td>SOURce[1...4]: POWer:ALC[:STATe]</td><td>ON | OFF</td><td>3.117</td></tr>
<tr><td>SOURce[1...4]:FREQuency:NLINear:COMP</td><td>INT | ESRC1 | ESRC2</td><td>3.122</td></tr>
<tr><td>SOURce[1...4]:FREQuency:NLINear:SOI</td><td>IESRC1 | IESRC2 | ESRC12</td><td>3.122</td></tr>
<tr><td>SOURce[1...4]:FREQuency:NLINear:SOI:OFFSet</td><td><numeric_value></td><td>3.122</td></tr>
<tr><td>SOURce[1...4]:FREQuency:NLINear:TOI</td><td>IESRC1 | IESRC2 | ESRC12</td><td>3.122</td></tr>
<tr><td>SOURce[1...4]:FREQuency:NLINear:TOI:OFFSet</td><td><numeric_value></td><td>3.122</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:COMP:RANGe:LOWer</td><td><numeric_value></td><td>3.117</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:COMP:RANGe:UPPer</td><td><numeric_value></td><td>3.117</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:SOI:RANGe:LOWer</td><td><numeric_value></td><td>3.118</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:SOI:RANGe:UPPer</td><td><numeric_value></td><td>3.117</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:TOI:RANGe:LOWer</td><td><numeric_value></td><td>3.118</td></tr>
<tr><td>SOURce[1...4]:POWer:NLINear:TOI:RANGe:UPPer</td><td><numeric_value></td><td>3.118</td></tr>
<tr><td>SOURce<1...4>: POWer:CENTer</td><td><numeric_value></td><td>3.118</td></tr>
<tr><td>SOURce<1...4>: POWer:SPAN</td><td><numeric_value></td><td>3.119</td></tr>
<tr><td>SOURce<1...4>:FREQuency:CONVersion:ARBitrary:EFReque
ncy<1|2></td><td><numeric_value>,<numeric_value>,<numeric_value>
, CW | FIXed | SWEep</td><td>3.121</td></tr>
<tr><td>SOURce<1...4>:FREQuency:CONVersion:ARBitrary:IFRequen
cy</td><td><numeric_value>,<numeric_value>,<numeric_value>
, CW | FIXed | SWEep</td><td>3.121</td></tr>
<tr><td>SOURce<1...4>:FREQuency[:CW|FIXed]</td><td><numeric_value></td><td>3.121</td></tr>
<tr><td>SOURce<1...4>:POWer:CORRection:DATA</td><td><string>,<block> | <numeric_value></td><td>3.119</td></tr>
<tr><td>SOURce<1...4>:POWer:CORRection:EXT<1|2>:SWEep</td><td><numeric_value>,<numeric_value>,<numeric_value>
, LIN | LOG</td><td>3.120</td></tr>
</table>

Command	Parameters	Page
SOURce<1...4>:POWer:CORRection:LLISt	<numeric_value>,<numeric_value>,<numeric_value> ...	3.120
SOURce<1...4>:POWer:CORRection:LLISt:STATe	ON | OFF	3.121
SOURce<1...4>:POWer:CORRection:NREadings	<numeric_value>.	3.120
SOURce<1...4>:POWer:CORRection[:ACQuire]	A1 | A2 | ESRC1 | ESRC2	3.120
SOURce<1...4>:POWer:STARt	<numeric_value>	3.119
SOURce<1...4>:POWer:STOP	<numeric_value>	3.119
SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:A<1|2>	<numeric_value>	3.116
SOURce<1...4>:POWer[:LEVel][:IMMediate]:CAMPlitude:ESRC<1|2>	<numeric_value>	3.116
SOURce<1...4>:POWer[:LEVel][:IMMediate]:EXTernal<1|2>:AMPLitude	<numeric_value>	3.116
SOURce<1...4>:POWer[:LEVel][:IMMediate]:EXTernal<1|2>:SLOPe	<numeric_value>	3.116
SOURce<1...4>:POWer[:LEVel][:IMMediate]:SLOPe	<numeric_value>	3.116
SOURce<1...4>:POWer[:LEVel][:IMMediate][:AMPLitude]	<numeric_value>	3.115
STATus:OPERation:CONDition?		3.124
STATus:OPERation:ENABle	0...65535	3.124
STATus:OPERation:NTRansition	0...65535	3.124
STATus:OPERation:PTRansition	0...65535	3.124
STATus:OPERation[:EVENt?]		3.123
STATus:PRESet		3.124
STATus:QUEStionable:CONDition?		3.125
STATus:QUEStionable:ENABle	0...65535	3.125
STATus:QUEStionable:FREQuency:CONDition?		3.126
STATus:QUEStionable:FREQuency:ENABle	0...65535	3.126
STATus:QUEStionable:FREQuency:NTRansition	0...65535	3.126
STATus:QUEStionable:FREQuency:PTRansition	0...65535	3.126
STATus:QUEStionable:FREQuency[:EVENt?]		3.126
STATus:QUEStionable:LIMit:CONDition?		3.127
STATus:QUEStionable:LIMit:ENABle	0...65535	3.127
STATus:QUEStionable:LIMit:NTRansition	0...65535	3.127
STATus:QUEStionable:LIMit:PTRansition	0...65535	3.127
STATus:QUEStionable:LIMit[:EVENt?]		3.127
STATus:QUEStionable:NTRansition	0...65535	3.125
STATus:QUEStionable:POWer:CONDition?		3.128
STATus:QUEStionable:POWer:ENABle	0...65535	3.128
STATus:QUEStionable:POWer:NTRansition	0...65535	3.128
STATus:QUEStionable:POWer:PTRansition	0...65535	3.128
STATus:QUEStionable:POWer[:EVENt?]		3.128
STATus:QUEStionable:PTRansition	0...65535	3.125
STATus:QUEStionable[:EVENt?]		3.125
STATus:QUEue[:NEXT?]		3.129
SYSTem:COMMunicate:AKAL[:STATe]	ON | OFF	3.131
SYSTem:COMMunicate:GPIB:RDEVice:GENerator<1|2>:ADDRess	0...30	3.132

Command	Parameters	Page
SYSTem:COMMunicate:GPIB:RDEVice:PMETer:ADDRess	0...30	3.132
SYSTem:COMMunicate:GPIB:RDEVice<1|2>:ADDRess	0...30	3.131
SYSTem:COMMunicate:GPIB[:SELF]:ADDRess	0...30	3.131
SYSTem:COMMunicate:GPIB[:SELF]:RTERminator	LFEOI | EOI	3.131
SYSTem:COMMunicate:PRINter<1|2>:ENUMerate:FIRSt?		3.132
SYSTem:COMMunicate:PRINter<1|2>:ENUMerate:NEXT?		3.132
SYSTem:COMMunicate:PRINter<1|2>:SELect <printer_name>	<printer_name>	3.133
SYSTem:COMMunicate:RDEVice:GENerator<1|2>:CONTrol	REMote | LOCal	3.133
SYSTem:COMMunicate:RDEVice:GENerator<1|2>:LINK	GPIB | TTL	3.133
SYSTem:COMMunicate:RDEVice:GENerator<1|2>:TYPE	HP8340A | HP_ESG | HP_ESG_B | SME02 | SME03 | SME06 | SMG | SMGL | SMGU | SMH | SMHU | SMIQ02 | SMIQ02E | SMIQ03 | SMIQ03E | SMP02 | SMP03 | SMP04 | SMP22 | SMR20 | SMR20B11 | SMR27 | SMR27B11 | SMR40 | SMR40B11 | SMT02 | SMT03 | SMT06 | SMY01 | SMY02	3.134
SYSTem:COMMunicate:RDEVice:PMETer :TYPE	NRVD	3.135
SYSTem:COMMunicate:RDEVice:PMETer:AZERo[:STATe]	ON | OFF	3.135
SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:ASENsor	<numeric_value>,<numeric_value>,<numeric_value> ...	3.135
SYSTem:COMMunicate:RDEVice:PMETer:CFACtor:BSENsor	<numeric_value>,<numeric_value>,<numeric_value> ...	3.135
SYSTem:COMMunicate:RDEVice:PMETer:CFACtor[:SELect]	ASENsor | BSENsor	3.134
SYSTem:COMMunicate:SERial<1|2>:CONTrol:DTR	IBFull | OFF	3.136
SYSTem:COMMunicate:SERial<1|2>:CONTrol:RTS	IBFull | OFF	3.136
SYSTem:COMMunicate:SERial<1|2>[:RECeive]:BAUD	<numeric_value>	3.136
SYSTem:COMMunicate:SERial<1|2>[:RECeive]:BITS	7 | 8	3.136
SYSTem:COMMunicate:SERial<1|2>[:RECeive]:PACE	XON | NONE	3.137
SYSTem:COMMunicate:SERial<1|2>[:RECeive]:PARity[:TYPE]	EVEN | ODD | NONE	3.136
SYSTem:COMMunicate:SERial<1|2>[:RECeive]:SBITs	1 | 2	3.137
SYSTem:DATE	0000...9999, 1...12, 1...31	3.137
SYSTem:DISPlay:UPDate	ON | OFF | ONCE	3.137
SYSTem:ERRor:ALL?		3.138
SYSTem:ERRor[:NEXT]?		3.138
SYSTem:FIRMware:UPDate	<string>	3.138
SYSTem:PASSword[:CENable]	'Passwort'	3.138
SYSTem:PRESet		3.139
SYSTem:SET		3.139
SYSTem:TIME	0...23, 0...59, 0...59	3.139
SYSTem:VERSion?		3.139
TRACe:CLEar	MDATA1 | MDATA2 | MDATA3 | MDATA4 |MDATA5 | MDATA6 | MDATA7 | MDATA8	3.141
TRACe:COPY	MDATA1 | MDATA2 | MDATA3 | MDATA4 |MDATA5 | MDATA6 | MDATA7 | MDATA8,CH1DATA | CH2DATA | CH3DATA |CH4DATA	3.141
TRACe:FEED	CH1MEM | CH2MEM | CH3MEM |CH4MEM[, MDATA1 | MDATA2 | MDATA3 | MDATA4 |MDATA5 | MDATA6 | MDATA7 | MDATA8]	3.143

Command	Parameters	Page
TRACe[:DATA]:STIMulus:BODY?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.142
TRACe[:DATA]:STIMulus:PREamble?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.142
TRACe[:DATA]:STIMulus[:ALL]?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.142
TRACe[:DATA][:RESPonse]:BODY?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.142
TRACe[:DATA][:RESPonse]:PREamble?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.141
TRACe[:DATA][:RESPonse][:ALL]?	CH1DATA | CH2DATA | CH3DATA |CH4DATA | CH1MEM | CH2MEM | CH3MEM | CH4MEM | MDATA1 | MDATA2 | MDATA3 | MDATA4 | MDATA5 | MDATA6 | MDATA7 | MDATA8	3.141
TRIGger[:SEQuence]:HOLDoff	<numeric value>	3.145
TRIGger[:SEQuence]:LINK	<string>	3.145
TRIGger[:SEQuence]:RTCLock	0...23, 0...59, 0...59	3.144
TRIGger[:SEQuence]:SLOPe	POSitive | NEGative	3.145
TRIGger[:SEQuence]:SOURce	IMMediate | EXTernal | LINE | TIMer | MANual | RTCLock	3.144
TRIGger[:SEQuence]:TIMer	<numeric value>	3.144

Annex D – Programming Examples

The following examples explain the programming of the instrument and can serve as a basis to solve more complex programming tasks.

QuickBASIC has been used as programming language. However, the programs can be translated into other languages.

D.1 Including IEC-Bus Library for QuickBasic

```
REM --- Include IEC-bus library for quickbasic -.Example for path definition
'$INCLUDE: 'c:\qbasic\qbdecl4.bas'
```

D.2 Initialization and Default Status

The IEC bus as well as the settings of the instrument are brought into a defined default status at the beginning of every program. Subroutines "InitController" and "InitDevice" are used to this effect.

D.2.1 Initiate Controller

```
REM ------------ Initiate controller -----------
REM InitController
iecaddress% = 20                          'IEC-bus address of the
                                          'instrument
CALL IBFIND("DEV1", analyzer%)            'Open port to the instrument
CALL IBPAD(analyzer%, iecaddress%)        'Inform controller on instrument
                                          'address
CALL IBTMO(analyzer%, 11)                 'Response time to 1 sec
REM **********************************************************************
```

D.2.2 Initiate Instrument

The IEC-bus status registers and instrument settings of the analyzer are brought into the default status.

```
REM ------------ Initiate instrument --------------
REM InitDevice
CALL IBWRT(analyzer%, "*CLS")           'Reset status register
CALL IBWRT(analyzer%, "*RST")           'Reset instrument
REM**********************************************************************
```

D.3 Transmission of Instrument Setting Commands

Center frequency, span, and reference level of the analyzer are set in this example.

```
REM -------- Instrument setting commands -------------
CALL IBWRT(analyzer%, "FREQUENCY:CENTER 120MHz")   'Center frequency 120 MHz
CALL IBWRT(analyzer%, "FREQUENCY:SPAN 10MHZ")      'Span 10 MHz
CALL IBWRT(analyzer%, "DISPLAY:TRACE:Y:SPACING LINear")
                                                   'Linear scaling
REM ***********************************************************************
```

D.4 Switchover to Manual Control

```
REM -------- Switch instrument over to manual control -----------
CALL IBLOC(analyzer%)                         'Set instrument to Local state
REM ***********************************************************************
```

D.5 Reading out Instrument Settings

The settings made in example 3 are read out here. The abbreviated commands are used.

```
REM --------- Reading out instrument settings ---------
CFfrequency$ = SPACE$(20)            'Provide text variables (20 characters)
CALL IBWRT(analyzer%, "FREQ:CENT?")  'Request center frequency
CALL IBRD(analyzer%, CFfrequency$)   'Read value

CFspan$ = SPACE$(20)                 'Provide text variables (20 characters)
CALL IBWRT(analyzer%, "FREQ:SPAN?")  'Request span
CALL IBRD(analyzer%, CFspan$)        'Read value

RLevel$ = SPACE$(20)                 'Provide text variables (20 characters)
CALL IBWRT(analyzer%, "DISP:TRAC:Y:RLEV?")
                                     'Request reference level
CALL IBRD(analyzer%, RLevel$)        'Read value

REM -------- Display values on the screen -----------
PRINT "Center frequency: "; CFfrequency$,
PRINT "Span:             "; CFspan$,
PRINT "Scaling:  "; RLspace$,
REM************************************************************************
```

D.6 Positioning a Marker and Displaying Values

```
REM -------- Examples of marker functions -----------
CALL IBWRT(analyzer%, "CALC:MARKER ON;MARKER:MAX")
                                  'Activate marker1 and start peak search
MKmark$ = SPACE$(30)              'Provide text variables (30 characters)
CALL IBWRT(analyzer%, "CALC:MARK:X?;Y?")    'Request frequency and level
CALL IBRD(analyzer%, MKmark$)               'Read value

REM -------- Display values on the screen -----------
PRINT "Center frequency / level "; MKmark$,
REM **********************************************************************
```

D.7 Command synchronization

The possibilities for synchronization implemented in the following example are described in Section 3.7.6, Command Order and Command Synchronization.

```
REM -------- Examples of command synchronization ---------
REM The command INITiate[:IMMediate] starts a single sweep if the command
REM INIT:CONT OFF was previously sent. It should be ensured that the next
REM command is only then executed when the entire sweep is complete.

CALL IBWRT(analyzer%, "INIT:CONT OFF")

REM -------- First possibility: Use of *WAI ---------
CALL IBWRT(analyzer%, "ABOR;INIT:IMM; *WAI")

REM -------- Second possibility: Use of *OPC? ---------
OpcOk$ = SPACE$(2)                  'Space for *OPC? - Provide response
CALL IBWRT(analyzer%, "ABOR;INIT:IMM; *OPC?")
REM -------- here the controller can service other instruments ---------
CALL IBRD(analyzer%, OpcOk$)        'Wait for "1" from *OPC?

REM -------- Third possibility: Use of *OPC ---------
REM In order to be able touse the service request function in conjugation
REM with a National Instruments GPIB driver, the setting "Disable
REM Auto Serial Poll" must be changed to "yes" by means of IBCONF!

CALL IBWRT(analyzer%, "*SRE 32")     'Permit service request for ESR
CALL IBWRT(analyzer%, "*ESE 1")      'Set event-enable bit for
                                     'operation-complete bit
ON PEN GOSUB OpcReady                'Initialization of the
                                     'service request routine
PEN ON
CALL IBWRT(analyzer%, "ABOR;INIT:IMM; *OPC")

REM Continue main program here
STOP                                 'End of program

OpcReady:
REM As soon as the sweep has ended, this subroutine is activated
REM Program suitable reaction to the OPC service request.
ON PEN GOSUB OpcReady                'Enable service request routine again
RETURN
REM ***********************************************************************
```

D.8 Service Request

The service request routine requires an extended initialization of the instrument in which the respective bits of the transition and enable registers are set.
In order to use the service request function in conjugation with National Instruments GPIB driver, the setting "Disable Auto Serial Poll" must be changed to "yes" by means of IBCONF!

```
REM ---- Example of initialization of the SRQ in the case of errors  ------
CALL IBWRT(analyzer%, "*CLS")                    'Reset Status Reporting System
CALL IBWRT(analyzer%,"*SRE 168")                 'Permit service request for
                                                 'STAT:OPER,STAT:QUES and ESR
                                                 'register
CALL IBWRT(analyzer%,"*ESE 60")                  'Set event-enable bit for
                                                 'command, execution, device-
                                                 'dependent and query error
CALL IBWRT(analyzer%,"STAT:OPER:ENAB 32767")     'Set OPERation enable bit for
                                                 'all events
CALL IBWRT(analyzer%,"STAT:OPER:PTR 32767")      'Set appropriate OPERation
                                                 'Ptransition bits
CALL IBWRT(analyzer%,"STAT:QUES:ENAB 32767")     'Set questionable enable bits
                                                 'for all events
CALL IBWRT(analyzer%,"STAT:QUES:PTR 32767")      'Set appropriate questionable
                                                 'Ptransition bits
ON PEN GOSUB Srq                                 'Initialization of the service
                                                 'request routine
PEN ON
REM Continue main program here
STOP
```

A service request is then processed in the service request routine.
Note: the variables userN% and userM% must be pre-assigned usefully!

```
Srq:
REM ------------ Service request routine -----------
DO
  SRQFOUND% = 0
  FOR I% = userN% TO userM%                     'Poll all bus users
      ON ERROR GOTO nouser                      'No user existing
      CALL IBRSP(I%, STB%)                      'Serial poll, read status byte
      IF STB% > 0 THEN                          'This instrument has bits set
                                                'in the STB
        SRQFOUND% = 1
        IF (STB% AND 16)  > 0 THEN GOSUB Outputqueue
        IF (STB% AND 4)   > 0 THEN GOSUB Failure
        IF (STB% AND 8)   > 0 THEN GOSUB Questionablestatus
        IF (STB% AND 128) > 0 THEN GOSUB Operationstatus
        IF (STB% AND 32)  > 0 THEN GOSUB Esrread
      END IF
nouser:
  NEXT I%
LOOP UNTIL SRQFOUND% = 0
ON ERROR GOTO error handling
ON PEN GOSUB Srq: RETURN                        'Enable SRQ routine again
                                                'End of SRQ routine
```

Reading out the status event registers, the output buffer and the error/event queue is effected in subroutines.

```
REM -------- Subroutines for the individual STB bits ------
Outputqueue:                                  'Reading the output buffer
Message$ = SPACE$(100)                        'Make space for response
CALL IBRD(analyzer%, Message$)
PRINT "Message in output buffer :"; Message$
RETURN

Failure:                                      'Read error queue
ERROR$ = SPACE$(100)                          'Make space for error variable
CALL IBWRT(analyzer%, "SYSTEM:ERROR?")
CALL IBRD(analyzer%, ERROR$)
PRINT " Error text :"; ERROR$
RETURN


Questionablestatus:                      'Read questionable status register
Ques$ = SPACE$(20)                       'Preallocate blanks to text variable
CALL IBWRT(analyzer%, "STATus:QUEStionable:EVENt?")
CALL IBRD(analyzer%, Ques$)
PRINT "Questionable Status:"; Ques$
RETURN

Operationstatus:                         'Read operation status register
Oper$ = SPACE$(20)                       'Preallocate blanks to text variable
CALL IBWRT(analyzer%, "STATus:OPERation:EVENt?")
CALL IBRD(analyzer%, Oper$)
PRINT "Operation Status:"; Oper$
RETURN


Esrread:                                 'Read event status register
Esr$ = SPACE$(20)                        'Preallocate blanks to text variable
CALL IBWRT(analyzer%, "*ESR?")           'Read ESR
CALL IBRD(analyzer%, Esr$)
IF (VAL(Esr$) AND 1) > 0 THEN PRINT "Operation complete"
IF (VAL(Esr$) AND 4) > 0 THEN GOTO Failure
IF (VAL(Esr$) AND 8) > 0 THEN PRINT "Device dependent error"
IF (VAL(Esr$) AND 16) > 0 THEN GOTO Failure
IF (VAL(Esr$) AND 32) > 0 THEN GOTO Failure
IF (VAL(Esr$) AND 64) > 0 THEN PRINT "User request"
IF (VAL(Esr$) AND 128) > 0 THEN PRINT "Power on"
RETURN
REM **********************************************************************

REM ------------ Error routine ----------------
Error handling:
PRINT "ERROR                                    'Output error message
STOP                                            'Stop software
```

D.9 Programming via the RSIB Interface

The following hints apply to both the 16-bit and the 32-bit DLL versions (RSIB.DLL and RSIB32.DLL) unless an explicit distinction is made.

The RSIB interface supports links to max. 16 measuring instruments at the same time.

D.9.1 Visual Basic

Programming hints:

- Access to the functions of the RSIB.DLL

  To create Visual Basic control applications, the file RSIB.BAS must be added to a project for 16-bit Basic programs and the file RSIB32.BAS for 32-bit Basic programs (C:\R_S\INSTR\RSIB) so that the functions of the RSIB.DLL or RSIB32.DLL can be accessed.

- Generating a response buffer

  Prior to calling the functions `RSDLLibrd()` and `RSDLLilrd()`, a string of sufficient length must be generated. This is possible either by defining the string or using the command `Space$()`.

  Generating a string of the length 100:

  ```
  - Dim Response as String * 100

  - Dim Response as String
    Response = Space$(100)
  ```

  If a response is to be output as a string from the measuring instrument, the appended blanks can be removed using the Visual Basic Function RTrim().

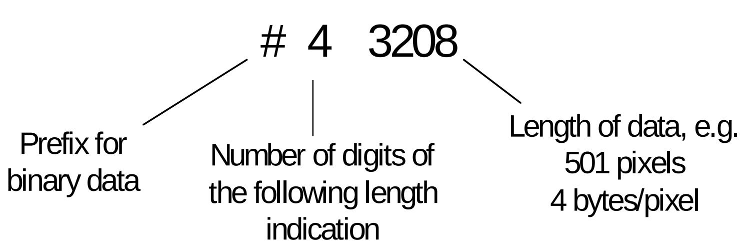
  Example:

  ```
  Response = Space$(100)
  Call RSDLLibrd(ud, Response, ibsta, iberr, ibcntl)
  Response = RTrim(Response)
  ’ Output of Response
  ```

- Reading out trace data in real format

  Using the function declarations in the file RSIB.BAS or RSIB32.BAS the responses of the device can be assigned to one string only. If the data are to be read into an array with float values, the header and the useful data must be read out with separate function calls.

  Example of a header



  In order to enable the trace data to be directly read into a float array, a special function declaration must be created.

  ```
  Declare Function RSDLLilrdTraceReal Lib "rsib32.dll" Alias "RSDLLilrd"
  (ByVal ud%, Rd As Single, ByVal Cnt&, ibsta%, iberr%, ibcntl&) As Integer
  ```

Example:

```
Dim ibsta As Integer            ’ Status variable
Dim iberr As Integer            ’ Error variable
Dim ibcntl As Long              ’ Count variable
Dim ud As Integer               ’ Handle for measuring instrument
Dim Result As String            ’ Buffer for simple results
Dim Digits As Byte              ’ Number of digits of length indication
Dim TraceBytes As Long          ’ Length of trace data in bytes
Dim TraceData(401) As Single    ’ Buffer for floating point
                                ’ Binary data

’ Set up connection to instrument
ud = RSDLLibfind("89.10.38.97", ibsta, iberr, ibcntl)

’ Query trace data in real format
Call RSDLLibwrt(ud, "FORM:DATA REAL,32", ibsta, iberr, ibcntl)
Call RSDLLibwrt(ud, "TRACE? CH1DATA", ibsta, iberr, ibcntl)

’Read number of digits of length indication
Result = Space$(20)
Call RSDLLilrd(ud, Result, 2, ibsta, iberr, ibcntl)
Digits = Val(Mid$(Result, 2, 1))

’Read length indication
Result = Space$(20)
Call RSDLLilrd(ud, Result, Digits, ibsta, iberr, ibcntl)
TraceBytes = Val(Left$(Result, Digits))    ’and store

’ Read out trace data
Call RSDLLilrdTraceReal(ud, TraceData(0), TraceBytes, ibsta, iberr,ibcntl)
```

Programming examples:

- In this example, the start frequency of the instrument is queried.

```
Dim ibsta As Integer    ’ Status variable
Dim iberr As Integer    ’ Error variable
Dim ibcntl As Long      ’ Count variable
Dim ud As Integer       ’ Handle for measuring instrument
Dim Response As String  ’ Response string

’ Set up connection to measuring instrument
ud = RSDLLibfind("89.10.38.97", ibsta, iberr, ibcntl)
If (ud < 0) Then
   ’ Error treatment
End If

’ Send query command
Call RSDLLibwrt(ud, "FREQ:START?", ibsta, iberr, ibcntl)

’ Provide space for response
Response = Space$(100)

’ Read response from measuring instrument
Call RSDLLibrd(ud, Response, ibsta, iberr, ibcntl)
```

- In this example, a Save/Recall of the instrument setups is performed.

```
Dim ibsta As Integer    ’ Status variable
Dim iberr As Integer    ’ Error variable
Dim ibcntl As Long      ’ Count variable
Dim ud As Integer       ’ Handle for measuring instrument
Dim Cmd As String       ’ Command string

’ Set up connection to measuring instrument
ud = RSDLLibfind("89.10.38.97", ibsta, iberr, ibcntl)
If (ud < 0) Then
   ’ Error treatment
End If

’ Request instrument settings
Cmd = "SYST:SET?"
Call RSDLLibwrt(ud, Cmd, ibsta, iberr, ibcntl)

’ Store instrument response in file
Call RSDLLibrdf(ud, "C:\db.sav", ibsta, iberr, ibcntl)

’ Reset instrument
Call RSDLLibwrt(ud, "*RST", ibsta, iberr, ibcntl)

’ and restore the previous settings
’ to this end disable the END message
Call RSDLLibeot(ud, 0, ibsta, iberr, ibcntl)
’ first send off command
Call RSDLLibwrt(ud, "SYST:SET ", ibsta, iberr, ibcntl)
’ enable the END message again
Call RSDLLibeot(ud, 1, ibsta, iberr, ibcntl)
’ and send the data
Call RSDLLibwrtf(ud, "C:\db.sav", ibsta, iberr, ibcntl)
```

D.9.2 Visual Basic for Applications (Winword and Excel)

Programming hints:

The programming language Visual Basic for Applications (VBA) is supported as a macro language by various manufacturers. The programs Winword and Excel use this language for the versions Winword 97 or Excel 5.0 and higher.
For macros created with Visual Basic for Applications, the same hints are valid as for Visual Basic Applications.

Programming example:

- Using the macro `QueryMaxPeak` a single sweep with subsequent query of the maximum peak is performed. The result is entered in a Winword or Excel document.

```
Sub QueryMaxPeak()

    Dim ibsta As Integer      ' Status variable
    Dim iberr As Integer      ' Error variable
    Dim ibcntl As Long        ' transferred characters
    Dim ud As Integer         ' Unit Descriptor (handle)for instrument
    Dim Response As String    ' Response string

    ' Set up connection to measuring instrument
    ud = RSDLLibfind("89.10.38.97", ibsta, iberr, ibcntl)
    If (ud < 0) Then
      Call MsgBox("Device with address 89.10.38.97 could" & _
                  "not be found", vbExclamation)
      End
    End If

    ' Determine maximum peak in the range 1-2MHZ
    Call RSDLLibwrt(ud, "*RST", ibsta, iberr, ibcntl)
    Call RSDLLibwrt(ud, "INIT:CONT OFF", ibsta, iberr, ibcntl)
    Call RSDLLibwrt(ud, "FREQ:START 1MHZ", ibsta, iberr, ibcntl)
    Call RSDLLibwrt(ud, "FREQ:STOP 2MHZ", ibsta, iberr, ibcntl)
    Call RSDLLibwrt(ud, "INIT:IMM;*WAI", ibsta, iberr, ibcntl)
    Call RSDLLibwrt(ud, "CALC:MARK:MAX;Y?", ibsta, iberr, ibcntl)
    Response = Space$(100)
    Call RSDLLibrd(ud, Response, ibsta, iberr, ibcntl)
    Response = RTrim(Response) ' Cut off space

    ' Insert value in current document (Winword)
    Selection.InsertBefore (Response)
    Selection.Collapse (wdCollapseEnd)

    ' Terminate connection to measuring instrument
    Call RSDLLibonl(ud, 0, ibsta, iberr, ibcntl)

End Sub
```

The entry of the peak value in the Winword document can be replaced as follows for Excel:

```
    ' Insert value in current document (Excel)
    ActiveCell.FormulaR1C1 = Response
```

D.9.3 C / C++

Programming hints:

- Access to the functions of the RSIB32.DLL (Windows platforms)

  The functions of the `RSIB32.DLL` are declared in the header file `RSIB.H`. The DLL functions can be linked to a C/C++ program in different ways.

  1. Enter one of the supplied import libraries (`RSIB.LIB or RSIB32.LIB`) into the linker options.
  2. Load the library using the function `LoadLibrary()` during runtime and determine the function pointers of the DLL functions using `GetProcAddress()`. Before the end of the program, the `RSIB.DLL` must be unloaded again using the function `FreeLibrary()`.

  When import libraries are used, the DLL is automatically loaded immediately before the application is started. At the end of the program, the DLL is unloaded again unless it is still used by other applications.

- Access to librsib.so functions (Unix platforms)

  The functions of `librsib.so` are declared in the header file `RSIB.H`. Upper/lower case characters for file names are typically observed under Unix. The library functions are linked to a C/C++ program by entering the `-lrsib` linker option.

  The *shared library* `librsib.so` is automatically loaded on starting the application. The accessibility (for example via standard path) of the library must be ensured. Refer to the beginning of this main chapter under „Unix Environment“.

- Query of strings

  If instrument responses are to be further processed as strings, a zero termination must be appended.

  Example:

  ```
  char buffer[100];
  ...
  RSDLLibrd( ud, buffer, &ibsta, &iberr, &ibcntl );
  buffer[ibcntl] = 0;
  ```

Programming example:

In the following C program example, a single sweep is started on the device with the IP address 89.10.38.97 and subsequently a marker is set to maximum level. Prior to the search for maximum, a synchronization to the end of the sweep is performed. For this purpose the command `"*OPC"` (Operation complete) is used to create a service request at the end of the sweep, for which the control program waits with the function `RSDLLWaitSrq()`. Then the maximum is determined (`"CALC:MARK:MAX"`) and the level read out (`"Y?"`).

```
#define MAX_RESP_LEN  100

short           ibsta, iberr;
unsigned long   ibcntl;
short           ud;
short           srq;
char            MaxPegel[MAX_RESP_LEN];
char            spr;

// Determine handle for instrument
ud = RSDLLibfind( "89.10.38.97", &ibsta, &iberr, &ibcntl );

// if instrument exists
if ( ud >= 0 )
{
  // Set timeout for RSDLLWaitSrq() to 10 seconds
  RSDLLibtmo( ud, 10, &ibsta, &iberr, &ibcntl );

  // Activate SRQ generation via event status register (ESR)
  // and enable ESB bit in SRE register
  RSDLLibwrt( ud, "*ESE 1;*SRE 32", &ibsta, &iberr, &ibcntl );

  // Set single sweep, trigger sweep and use "*OPC" to cause
  // the generation of a service request at the end of the sweep
  RSDLLibwrt( ud, "INIT:CONT off;INIT;*OPC", &ibsta, &iberr, &ibcntl );

  // Wait for SRQ (end of sweep)
  RSDLLWaitSrq( ud, &srq, &ibsta, &iberr, &ibcntl );

  // Clear RQS/MSS bit
  RSDLLibrsp( ud, &spr, &ibsta, &iberr, &ibcntl );

  // if sweep is terminated
  if (srq)
  {
    // then set marker to first maximum and query the level
    RSDLLibwrt( ud, "CALC:MARK:MAX;Y?", &ibsta, &iberr, &ibcntl );
    RSDLLilrd( ud, MaxPegel, MAX_RESP_LEN, &ibsta, &iberr, &ibcntl );
    MaxPegel[ibcntl] = 0;
  }
  // End connection to instrument
  RSDLLibonl (ud, 0, &ibsta, &iberr, &ibcntl ) ;
}
else
{
  ; // Error Instrument not found
}
```

Annex E - Emulations

E.1 Mouse Control of Display Elements

The network analyzer can be optionally equipped with a mouse (see Chapter 1 "Connecting a Mouse").

All display and control elements (enhancement labels, softkeys, function fields, display and limit lines) which can be displayed on the display screen can also be controlled by the mouse. Each softkey or key is assigned to a display element.

The following table lists the controllable display elements and the assigned keys

Display element for mouse control	**Assigned soft key or key**
Display field for Softkey 1 to Softkey 10	Softkey 1 to Softkey 10
Display field for menu arrow: right/center/left	Key right/center/left supplementary menu
Enhancement labels	
*	--
MAC	*USER* key
GAT	--
WND	--
EXT	*MODE* key
H=2	*FREQUENCY CONVERS* softkey (*MODE* menu)
H=3	*FREQUENCY CONVERS* softkey (*MODE* menu)
MIX	*DEF MIXER MEAS* sk. (*MODE - FREQUENCY CONVERS*)
ARB	*FREQUENCY CONVERS* softkey (*MODE* menu)
CMP	*COMPRESS SOI TOI* softkey (*MODE* menu)
SOI	*COMPRESS SOI TOI* softkey (*MODE* menu)
TOI	*COMPRESS SOI TOI* softkey (*MODE* menu)
FST	*MODE* key
CAL	*CAL* key
CAI	*CAL* key
CA?	*CAL* key
OFS	*OFFSET* key
PC	*CAL* key
PCO	*CAL* key
PCI	*CAL* key
PC?	*CAL* key
CPL	*SWEEP* key
HLD	*SWEEP* key
TRG	*DEF TRIGGER* softkey (*SWEEP* menu)
AVG	*AVG* key
FIL	*IF BANDWIDTH* softkey (*AVG* menu)
MAC	*USER* key
SMO	*TRACE* key
Display fields above the diagram	
CH1...4	--
S11/S21/S12/S22	*MEAS* key
Z/Z_0, Y/Y_0	*COMPLEX CONVERS* key (*MEAS* menu)
LIN/LOG	*DIAGRAM* key
MAG, ϕ, Re, Im, SWR, L, C, DLY	*FORMAT* key
/DIV	*SCALE* key
Reference	*SCALE* key
Marker	--
Display fields below the diagram	
Start	*START* key
Stop	*STOP* key
Center	*CENTER* key
Span	*SPAN* key
/Div	--

E.2 Front Panel Keyboard Emulation

The network analyzer can be equipped with an optional external keyboard (see Chapter 1 "Connecting an External Keyboard"). The following table shows the external keyboard key combinations through which the functions of the front panel keys can be emulated. In addition, the keys which are only available on the external keyboard are shown.

Note:
- *The key combination <ALT><S-Abf> (German keyboard) or <ALT> <SYSREQ> (English keyboard) switches between the instrument display screen and the DOS display screen.(for an installed processor option ZVR-B15).*
- *In instrument mode, the key combination <ALT> <F1> switches the keyboard between the US-American language and the language selected in the GENERAL SETUP* menu.
- *The tab key and the insert key on the external keyboard have no function*.

Front panel keys		Key assignments for the external keyboard
Soft keys:	SK1	F1
	SK2	F2
	SK3	F3
	SK4	F4
	SK5	F5
	SK6	F6
	SK7	F7
	SK8	F8
	SK9	F9
	SK10	F10
Menu select:	Menu left	CTRL ←
	Menu right	CTRL →
	Menu up	CTRL ↑
Cursor control:	Cursor left	←
	Cursor right	→
	Cursor up	↑
	Cursor down—	↓
	—	Home
	—	End
Roll-key:	Turn left	Shift ↑
	Turn right	Shift ↓
Numeric keys:	0	0
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9
Alphabetic and special characters		A to Z
	—	a to z
	—	Spec. characters
Units keys:	GHz...	ALT-G
	MHz...	ALT-M
	kHz...	ALT-K
	×1	<ENTER>
Edit keys:	Clear	<ESC>
	Backspace	BACK
	—	Del

Front panel keys		Key assignments for the external keyboard
Misc. data entry keys:		
	Exponent "Exp"	ALT-E
	Sign "+/-"	-
	Decimal point"."	.
Hold key:	HOLD	SHIFT-F1
Step key:	STEP	SHIFT-F7
User menu:	USER	SHIFT-F2
System key group:	MODE	ALT-F2
	SETUP	SHIFT-F8
	INFO	SHIFT-F5
Copy key group:	COPY	SHIFT-F9
	SETTINGS	SHIFT-F6
Memory key group:	SAVE	SHIFT-F10
	RECALL	SHIFT-F11
	CONFIG	SHIFT-F12
Status key group:	LOCAL	SHIFT-F3
	PRESET	SHIFT-F4
Channel key group:	1	ALT-1
	2	ALT-2
	3	ALT-3
	4	ALT-4
Stimulus key group:	START	CTRL-F7
	STOP	CTRL-F8
	CENTER	CTRL-F9
	SPAN	CTRL-F10
Sweep key group:	SWEEP	CTRL-F11
	RESTART	CTRL-F12
	SOURCE	ALT-F11
	AVG	ALT-F12
Marker key group:	MARKER	CTRL-F1
	SEARCH	CTRL-F2
	DELTA	CTRL-F3
	→ MKR	CTRL-F4
Lines key group:	DISPLAY	CTRL-F5
	LIMIT	CTRL-F6
Response key group:	MEAS	ALT-F3
	FORMAT	ALT-F4
	SCALE	ALT-F5
	DIAGRAM	ALT-F6
	DISPLAY	ALT-F7
	TRACE	ALT-F8
Cal key group:	CAL	ALT-F9
	OFFSET	ALT-F10