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R&S®ZVA-Z75/Z110/Z325 Converters with R&S®ZV-WR15/10/03 Calibration Kits

Network analysis in the frequency range from 50 GHz to 325 GHz

- ◆ Wide frequency range
R&S®ZVA-Z75: 50 GHz to 75 GHz
R&S®ZVA-Z110: 75 GHz to 110 GHz
R&S®ZVA-Z325: 220 GHz to 325 GHz
- ◆ Wide dynamic range
R&S®ZVA-Z75: >90 dB, typ. 110 dB
R&S®ZVA-Z110: >95 dB, typ. >110 dB
R&S®ZVA-Z325: >60 dB
- ◆ Variable output power
◆ Automatic parameter setting
◆ Easy handling



ROHDE & SCHWARZ

Brief description and advantages (example R&S®ZVA-Z110)

Brief description

Millimeter-wave measurements in V, W and J band with the R&S®WR15/10/03 converters

The Rohde & Schwarz converters enable network analysis in the frequency range from 50 GHz to 75 GHz (R&S®ZVA-Z75), 75 GHz to 110 GHz (R&S®ZVA-Z110) and 220 GHz to 325 GHz (R&S®ZVA-Z325) using an R&S®ZVA24, R&S®ZVA40, R&S®ZVA50 or R&S®ZVT20 network analyzer. Featuring a high dynamic range, the converters set new standards. Moreover, they are easy to install, offer high operating convenience and allow fast measurements. For a two-port measurement, you only need a four-port network analyzer and two converters; no external generator is required. When using a two-port network analyzer, you need an external generator to supply the LO signals.



Setup for a two-port measurement showing a through connection. A four-port network analyzer eliminates the need for controlling an external generator that supplies the LO signals.

Advantages

Wide dynamic range

The converters from Rohde & Schwarz expand the limits of technology with their excellent dynamic range :

- R&S®ZVA-Z75: >90 dB (typ. 110 dB)
- R&S®ZVA-Z110: >95 dB (typ. >110 dB)
- R&S®ZVA-Z325: >60 dB

This feature is important particularly for high-blocking filters, for example, but also speeds up measurements in general, as it enables the use of wider bandwidths while maintaining the same excellent performance.

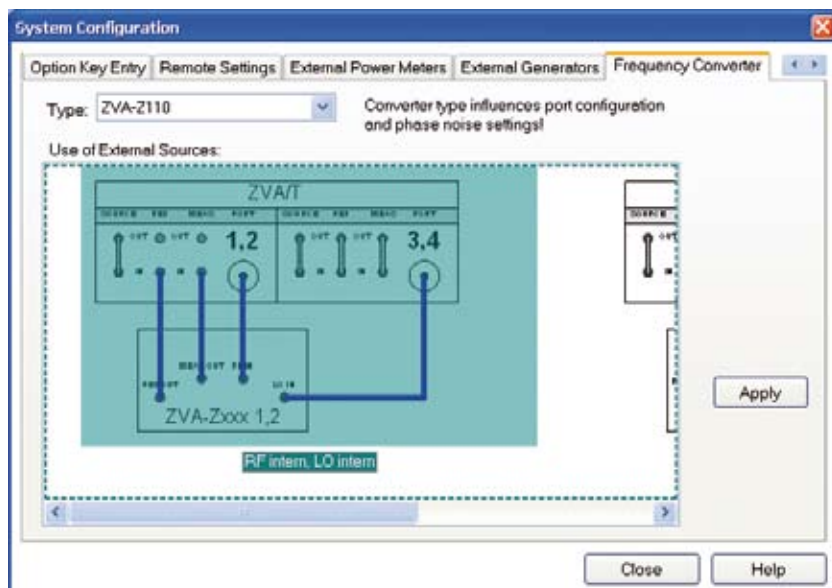
Variable output power

The Rohde & Schwarz converters have an output power of +4 dBm (R&S®ZVA-Z75), +2 dBm (R&S®ZVA-Z110) or typ. -18 dBm (R&S®ZVA-Z325). The power can be manually reduced by means of a control

screw on the upper side of the converters. The output power can thus be continuously reduced by between 0 dB and 25 dB (R&S®ZVA-Z75/Z110) or 0 dB and 20 dB (R&S®ZVA-Z325) to measure low-noise amplifiers, which would be overloaded otherwise.

Automatic parameter setting

The Rohde & Schwarz converters are fully integrated in the R&S®ZVA and R&S®ZVT firmware by means of the R&S®ZVA-K8 converter control option. You simply select the converter type, and the network analyzer will automatically set the frequency limits to the right frequency band and make all the required parameter settings.



Selection of converter type and display of required cabling

Applications

A special output power limiting function of the network analyzer prevents unduly high powers from being applied to the coaxial inputs of the converters. All instrument settings are performed automatically, so that measurements can be started immediately. For calibration, the analyzer automatically offers the calibration kit appropriate for the selected frequency band, i.e. the R&S®ZV-WR15, R&S®ZV-WR10 or R&S®ZV-WR03.

Easy to handle

The converters' waveguide connectors are arranged on a bar extending from the converter, which makes them very easy to handle. The screwed flange joints are easily accessible. This greatly facilitates calibration and connecting the DUT.

The converters can be set up on four or three feet that are adjustable in height. Using three feet makes it significantly easier to align the test port flange.

The converters contain no fans, which is of advantage especially in particle-sensitive environments.

The converters are supplied with test port adapters. This makes it possible to use calibration kits from other manufacturers and effectively protects the converters' waveguide connectors against wear.

Multipoint measurements

Multipoint devices such as couplers can be analyzed by using three or four converters. The setup can be based on a R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 plus external R&S®SMF100A generator and one converter per test port. Alternatively an R&S®ZVT20 can be used. As the R&S®ZVT20 (six-port configuration) has three internal signal sources, up to four converters can be connected without requiring an external signal generator.

Pulsed measurements

The pulsed measurement capabilities of the R&S®ZVA and R&S®ZVT can be used in combination with the converters. This includes average pulse, point-in-pulse and pulse profile measurements.

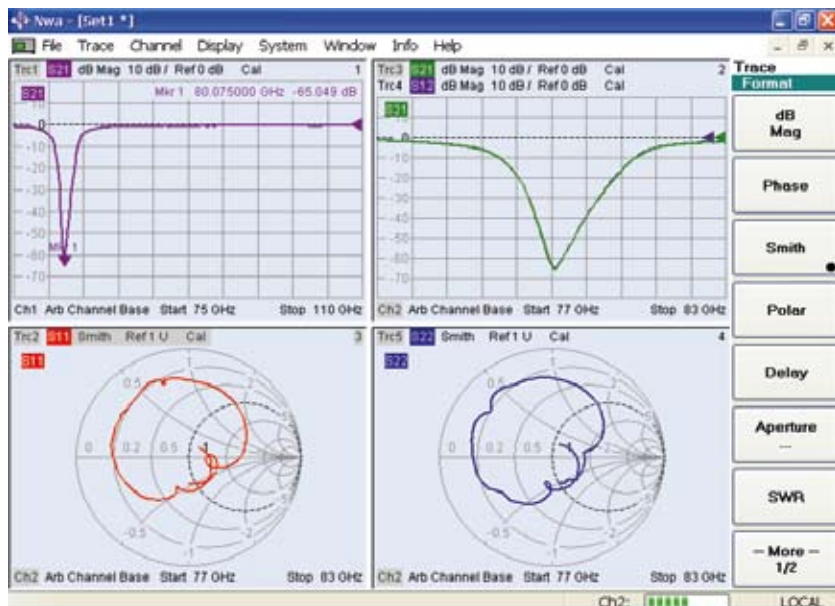
Calibration

Calibration can be performed by means of the R&S®ZV-WR15/10/03 waveguide calibration kits. The calibration data is stored in the analyzer firmware and is loaded automatically. The calibration kits contain the following standards

- ◆ Short
- ◆ Shim
- ◆ Shim 2 (R&S®ZV-WR03 only)
- ◆ Match
- ◆ Sliding match (optional)

The shim and short calibration standards together form an offset short. The through standard is implemented by connecting the two waveguide outputs of the converters directly with each other.

Instead of the match, a sliding match can be used. Rohde & Schwarz therefore offers two versions of the R&S®ZV-WR15/10/03 calibration kits, i.e. with and without sliding match. The example on the left shows the measurement of an 80 GHz notch filter after calibration. The converters are mechanically prepared for use with wafer probers.



Measurement of an 80 GHz notch filter



R&S®ZV-WR10 calibration kit with sliding match

Configuration examples



R&S® ZVA-Z75 – 50 GHz to 75 GHz (V band)



R&S® ZVA-Z110 – 75 GHz to 110 GHz (W band)

Possible configurations with the R&S®ZVA and two converters

Configuration 1 (two-port analyzer) 50 GHz to 75 GHz (V band)	Configuration 2 (four-port analyzer) 50 GHz to 75 GHz (V band)
R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Two-port model	R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Four-port model
R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (two-port)	R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (four-port)
2 × R&S®ZVA-Z75	2 × R&S®ZVA-Z75
R&S®ZVA-K8	R&S®ZVA-K8
4 × R&S®ZV-Z193	4 × R&S®ZV-Z193
Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 adapter 4 × R&S®ZV-Z2918 adapter	Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 adapter 4 × R&S®ZV-Z2918 adapter
R&S®ZV-WR15, with or without sliding match	R&S®ZV-WR15, with or without sliding match
R&S®SMF100A microwave signal generator	
R&S®SMF-B122	
R&S®SMF-B31	
R&S®SMF-B83	
Power Splitter SMA/3.5mm , e.g. Weinschel/Aeroflex model 1579 or 1534	

Configuration 1 (two-port analyzer) 75 GHz to 110 GHz (W band)	Configuration 2 (four-port analyzer) 75 GHz to 110 GHz (W band)
R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Two-port model	R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Four-port model
R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (two-port)	R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (four-port)
2 × R&S®ZVA-Z110	2 × R&S®ZVA-Z110
R&S®ZVA-K8	R&S®ZVA-K8
4 × R&S®ZV-Z193	4 × R&S®ZV-Z193
Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 Adapter 4 × R&S®ZV-Z2918 Adapter	Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 Adapter 4 × R&S®ZV-Z2918 Adapter
R&S®ZV-WR10, with or without sliding match	R&S®ZV-WR10, with or without sliding match
R&S®SMF100A microwave signal generator	
R&S®SMF-B122	
R&S®SMF-B31	
R&S®SMF-B83	
Power splitter SMA/3.5 mm , e.g. Weinschel/Aeroflex model 1579 or 1534	

Configuration 1 (two-port analyzer) 220 GHz to 325 GHz (J band)	Configuration 2 (four-port analyzer) 220 GHz to 325 GHz (J band)
R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Two-port model	R&S®ZVA24, R&S®ZVA40 or R&S®ZVA50 Four-port model
R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (two-port)	R&S®ZVA24-B16, R&S®ZVA40-B16 or R&S®ZVA50-B16 (four-port)
2 × R&S®ZVA-Z325	2 × R&S®ZVA-Z325
R&S®ZVA-K8	R&S®ZVA-K8
4 × R&S®ZV-Z193	4 × R&S®ZV-Z193
Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 adapter 4 × R&S®ZV-Z2918 adapter	Necessary only for the R&S®ZVA50 4 × R&S®ZV-Z1829 adapter 4 × R&S®ZV-Z2918 adapter
R&S®ZV-WR03, with or without sliding match	R&S®ZV-WR03, with or without sliding match
R&S®SMF100A microwave signal generator	
R&S®SMF-B122	
R&S®SMF-B31	
R&S®SMF-B83	
Power splitter SMA/3.5 mm , e.g. Weinschel/Aeroflex model 1579 or 1534	

Setups with the R&S®ZVT20 have to be configured individually depending on how many converters are to be used.

The following accessories are supplied with each Rohde & Schwarz converter as standard:

- 2 × test port adapter (1 × test port adapter with the R&S®ZVA-Z75)
- Hex ball driver
- DC power supply for the R&S®ZVA-Z75/Z110/Z325
- 2 × IF cable for MEAS and REF converter output signals



R&S®ZVA-Z325 – 220 GHz to 325 GHz (J band)

Specifications in brief

R&S®ZVA-Z75

Waveguide designation	Electronic Industries Alliance (EIA)	WR15
Connector type	anti-cocking flange	precision waveguide flange compatible with UG387/U-M
Frequency range		50 GHz to 75 GHz
Output power	at +7 dBm input power from the R&S®ZVA/R&S®ZVT	+4 dBm
Output power attenuation	manually variable attenuator	0 dB to 25 dB
Dynamic range		>90 dB, typ. 110 dB

R&S®ZVA-Z110

Waveguide designation	Electronic Industries Alliance (EIA)	WR10
Connector type	anti-cocking flange	precision waveguide flange compatible with UG387/U-M
Frequency range		75 GHz to 110 GHz
Output power	at +7 dBm input power from the R&S®ZVA/R&S®ZVT	+2 dBm
Output power attenuation	manually variable attenuator	0 dB to 25 dB
Dynamic range		>95 dB, typ. >110 dB

R&S®ZVA-Z325

Waveguide designation	Electronic Industries Alliance (EIA)	WR03
Connector type	anti-cocking flange	precision waveguide flange compatible with UG387/U-M
Frequency range		220 GHz to 325 GHz
Output power	at +7 dBm input power from the R&S®ZVA/R&S®ZVT	typ. -18 dBm
Output power attenuation	manually variable attenuator	typ. 0 dB to 20 dB
Dynamic range		>60 dB

Application notes

1EZ55	Millimeter-wave measurements with the converters of the R&S®ZVA family
1EZ56	Multiport millimeter-wave measurements with the converters of the R&S®ZVA family

Ordering information

Designation	Type	Order No.
Vector Network Analyzer, two ports 10 MHz to 24 GHz	R&S®ZVA24	1145.1110.24
Vector Network Analyzer, four ports 10 MHz to 24 GHz	R&S®ZVA24	1145.1110.26
Vector Network Analyzer, two ports 10 MHz to 40 GHz	R&S®ZVA40	1145.1110.40/43
Vector Network Analyzer, four ports 10 MHz to 40 GHz	R&S®ZVA40	1145.1110.42/45
Vector Network Analyzer, two ports 10 MHz to 50 GHz	R&S®ZVA50	1145.1110.50

Designation	Type	Order No.
Vector Network Analyzer, four ports 10 MHz to 50 GHz	R&S®ZVA50	1145.1110.52
Direct Generator/Receiver Access (for the R&S®ZVA24 two-port model) 10 MHz to 24 GHz	R&S®ZVA24-B16	1164.0209.24
Direct Generator/Receiver Access (for the R&S®ZVA24 four-port model) 10 MHz to 24 GHz	R&S®ZVA24-B16	1164.0209.26
Direct Generator/Receiver Access (for the R&S®ZVA40 two-port model) 10 MHz to 40 GHz	R&S®ZVA40-B16	1164.0209.40
Direct Generator/Receiver Access (for the R&S®ZVA40 four-port model) 10 MHz to 40 GHz	R&S®ZVA40-B16	1164.0209.42
Direct Generator/Receiver Access (for the R&S®ZVA50 two-port model) 10 MHz to 50 GHz	R&S®ZVA50-B16	1164.0209.50
Direct Generator/Receiver Access (for the R&S®ZVA50 four-port model) 10 MHz to 50 GHz	R&S®ZVA50-B16	1164.0209.52
Vector Network Analyzer, two ports 10 MHz to 20 GHz	R&S®ZVT20	1300.0000.20
Additional Port 3 (R&S®ZVT20) 10 MHz to 20 GHz	R&S®ZVT20-B63	1300.1606.03
Additional Port 4 (R&S®ZVT20) 10 MHz to 20 GHz	R&S®ZVT20-B64	1300.1606.04
Additional Port 5 (R&S®ZVT20) 10 MHz to 20 GHz	R&S®ZVT20-B65	1300.1606.05
Additional Port 6 (R&S®ZVT20) 10 MHz to 20 GHz	R&S®ZVT20-B66	1300.1606.06
Direct Generator/Receiver Access (for ports 1/2/3/4/5/6 of the R&S®ZVT20) 10 MHz to 20 GHz	R&S®ZVT20-B16	1300.1635.11/12/13/14/15/16
USB-to-IEC/IEEE Adapter	R&S®ZVAB-B44	1302.5544.02
Converter WR15 50 GHz to 75 GHz	R&S®ZVA-Z75	1307.7400.02
Converter WR10 75 GHz to 110 GHz	R&S®ZVA-Z110	1307.7000.02
Converter WR03 220 GHz to 325 GHz	R&S®ZVA-Z325	1307.7200.02
Converter Control Software	R&S®ZVA-K8	1307.7022.02
Waveguide Calibration Kit WR10 (without sliding match) 50 GHz to 75 GHz	R&S®ZV-WR15	1307.7500.30
Waveguide Calibration Kit WR10 (with sliding match) 50 GHz to 75 GHz	R&S®ZV-WR15	1307.7500.31
Waveguide Calibration Kit WR10 (without sliding match) 75 GHz to 110 GHz	R&S®ZV-WR10	1307.7100.10
Waveguide Calibration Kit WR10 (with sliding match) 75 GHz to 110 GHz	R&S®ZV-WR10	1307.7100.11
Waveguide Calibration Kit WR03 (without sliding match) 220 GHz to 325 GHz	R&S®ZV-WR03	1307.7300.30
Waveguide Calibration Kit WR03 (with sliding match) 220 GHz to 325 GHz	R&S®ZV-WR03	1307.7300.31
Test Cable, 3.5 mm (f)/3.5 mm (m) 0 Hz to 26.5 GHz	R&S®ZV-Z193	1306.4520.36
Adapter, 1.85 mm (f)/2.92 mm (m)	R&S®ZV-Z1829	1307.8212.00
Adapter, 2.92 mm (f)/1.85 mm (m)	R&S®ZV-Z2918	1307.8229.00



For data sheet, see

PD 5214.0730.22 (ZVA-Z75),
PD 5213.8273.22 (ZVA-Z110),
PD 5214.0260.22 (ZVA-Z325),

PD 5214.0276.22 (ZV-WR03),
PD 5213.9240.22 (ZV-WR10),
PD 5214.1172.22 (ZV-WR15),

and www.rohde-schwarz.com



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