

# R&S® ZCxxx

## Millimeter-Wave Converters

### Network analysis up to 330 GHz



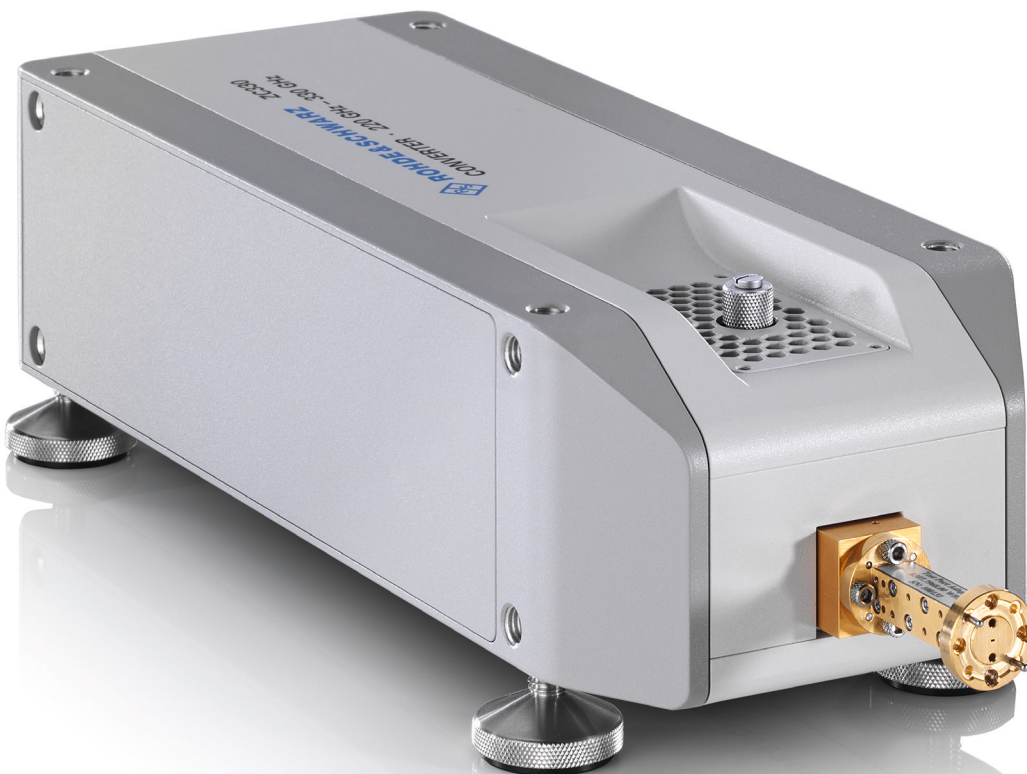
# R&S®ZCxxx Millimeter-Wave Converters At a glance

The R&S®ZCxxx millimeter-wave converters allow millimeter-wave measurements in the frequency range from 140 GHz to 330 GHz (IEEE standard 1785, WM-1295 and WM-864). They feature a wide dynamic range and high output power. Plus, they offer high operating convenience and allow highly stable measurements.

The converters' wide dynamic range is particularly beneficial for measurements on high-blocking filters and for on-wafer amplifier measurements, for example. It also speeds up measurements in general, as it enables the use of wider bandwidths while maintaining the same excellent performance.

## Key facts

- Wide frequency range
  - 140 GHz to 220 GHz (R&S®ZC220)
  - 220 GHz to 330 GHz (R&S®ZC330)
- For use with an R&S®ZVA24, R&S®ZVA40, R&S®ZVA50, R&S®ZVA67 or R&S®ZVT20 network analyzer
- Wide dynamic range
  - > 100 dB, typ. 110 dB (R&S®ZC220)
  - > 100 dB, typ. 115 dB (R&S®ZC330)
- Variable output power
- Automatic parameter setting
- Easy handling
- Highly stable measurements



# R&S®ZCxxx Millimeter-Wave Converters

## Benefits and key features

### Maximum performance and operating ease

- ▮ Variable output power
- ▮ Automatic parameter setting
- ▮ Convenient handling
- ▮ Multiport measurements
- ▮ Pulsed measurements
- ▮ Vector error correction

▷ [page 4](#)

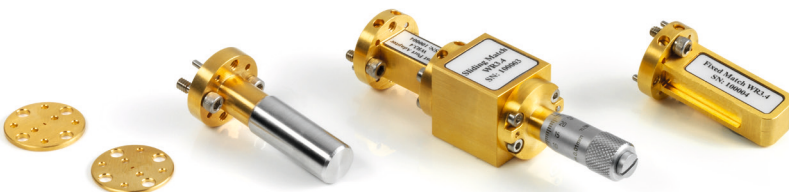
### Versatile amplifier characterization and easy configuration

- ▮ On-wafer device characterization
- ▮ Wide power sweep range
- ▮ Possible configurations with the R&S®ZVA or R&S®ZVT

▷ [page 5](#)



Setup for a two-port measurement in WM-864 band with an R&S®ZVA24 vector network analyzer.



R&S®ZV-WR03 waveguide calibration kit for calibration up to 330 GHz.

# Maximum performance and operating ease

## Variable output power

The R&S®ZCxxx converters deliver typical output powers of +1 dBm (R&S®ZC220) and –8 dBm (R&S®ZC330). A mechanical attenuator, accessible via the control screw on top of the converters, allows the power level to be manually controlled in a 40 dB range. This feature helps to avoid overloading the device under test (DUT) when performing measurements on low-noise amplifiers, for example. In addition, the output power can be controlled by varying the RF input power.

## Automatic parameter setting

The R&S®ZVA and R&S®ZVT firmware allows the R&S®ZCxxx converters to be operated if the R&S®ZVA-K8 converter control option is installed. The network analyzer automatically sets the right frequency band and configures the required parameters when an R&S®ZCxxx is selected. For calibration, the analyzer automatically offers the calibration kit appropriate for that frequency band. The network analyzer also protects the converters by limiting the output power applied to their coaxial inputs.

## Convenient handling

For ease of use and to protect the waveguide port, the converters are supplied with a test port adapter for the waveguide connector. The adapter's screwed flange joints are easily accessible, facilitating calibration and connection

of the DUT. The converters can be set up on four height-adjustable feet that can be screwed to the bottom, top or either side depending on the DUT's waveguide port orientation.

## Multipoint measurements

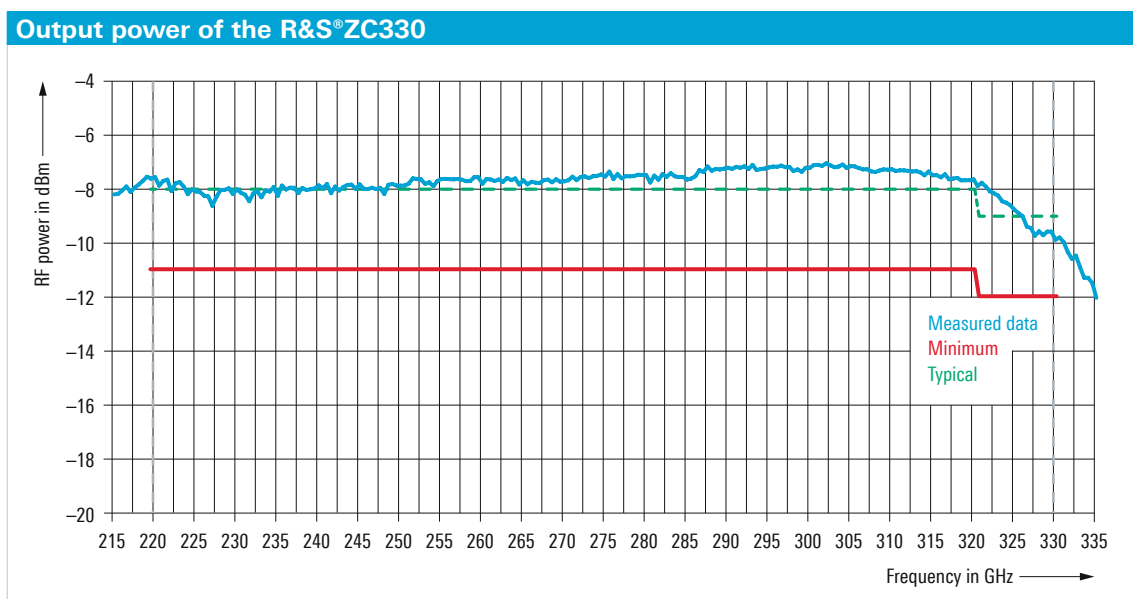
Multipoint devices such as couplers can be analyzed by using three or four converters. The test setup can be configured with an R&S®ZVA24, R&S®ZVA40, R&S®ZVA50 or R&S®ZVA67 network analyzer and an R&S®SMF100A microwave generator, plus one converter per test port. Alternatively, an R&S®ZVT20 can be used. The R&S®ZVT20 in six-port configuration has three internal sources that allow up to four converters to be connected without requiring an external signal generator.

## Pulsed measurements

The converters are also suitable for pulsed mode operation to characterize pulsed amplifiers, for example. This applies to both measurements versus frequency (average pulse and point-in-pulse) and pulse profile measurements.

## Vector error correction

Calibration can be performed using the appropriate R&S®ZV-WRxx waveguide calibration kit. The characteristic data of the calibration kit standards is stored in the analyzer firmware and is automatically loaded when an R&S®ZV-WRxx is selected. The calibration kit contains the following standards: short, shim, shim 2, fixed match and, optionally, sliding match. When connected together, the shim and short calibration standards form an offset short. The through standard is implemented by connecting the two waveguide outputs of the converters with each other. A sliding match can be used instead of the fixed match. Rohde&Schwarz offers two versions of the calibration kit – with and without a sliding match.



# Versatile amplifier characterization and easy configuration

## On-wafer device characterization

The R&S®ZCxxx millimeter-wave converters can be combined with wafer probers from all established prober manufacturers to perform on-wafer measurements. The R&S®ZVA/ R&S®ZVT vector network analyzer and the R&S®ZCxxx millimeter-wave converters are supported by software such as WinCalXE™ (Cascade Microtech) and QAlibria™ (MPI Corporation).

## Wide power sweep range

The output power of the converters can be varied by 40 dB using the control screw on top of the converters. The output power can also be controlled by varying the RF input power. A total power sweep range of up to 70 dB is advantageous for amplifier compression point measurements.

## Possible configurations with the R&S®ZVA or R&S®ZVT

For a two-port configuration the following options are required:

- R&S®ZVaxx-B16 direct generator/receiver access
- R&S®ZVA-K8 converter control software
- R&S®ZCPS converter power supply (supplies two R&S®ZCxxx)
- R&S®ZV-WRxx waveguide calibration kit

In addition, diverse accessories are required for the various analyzer models as specified in the tables below.

The following accessories are supplied as standard with the R&S®ZCxxx millimeter-wave converters:

- One test port adapter per converter
- Hex ball driver
- Spare screws and alignment pins
- Two IF cables for measurement and reference converter output signals

The R&S®ZCSTC converter set transport case is available as an option.

R&S®ZC220 or R&S®ZC330, two-port test setup		
Vector network analyzer type and model, order no.	Required accessories, order no.	Description
R&S®ZVA24, 1145.1110.26	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
R&S®ZVA24, 1145.1110.28	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	1 × R&S®ZCAK, 1323.7746.24	adapter kit (power divider, two right angle SMA (m/m) adapters)
R&S®ZVA40, 1145.1110.42	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
R&S®ZVA40, 1145.1110.45	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	1 × R&S®ZCAK, 1323.7746.50	adapter kit (four 1.85 mm (f) to 2.92 mm (m) adapters and four 1.85 mm (m) to 2.92 mm (f) adapters)
R&S®ZVA40, 1145.1110.48	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	1 × R&S®ZCAK, 1323.7746.24	adapter kit (power divider, two right angle SMA (m/m) adapters)
R&S®ZVA50, 1145.1110.52	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	1 × R&S®ZCAK, 1323.7746.50	adapter kit (four 1.85 mm (f) to 2.92 mm (m) adapters and four 1.85 mm (m) to 2.92 mm (f) adapters)
R&S®ZVA67, 1305.7002.04	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	1 × R&S®ZCAK, 1323.7746.67	adapter kit (power divider, two right angle SMA (m/m) adapters, three 1.85 mm (f) to 2.92 mm (m) adapters, four 1.85 mm (m) to 2.92 mm (f) adapters)
R&S®ZVT20, 1300.0000.20	4 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")

R&S®ZC220 or R&S®ZC330, four-port test setup		
Vector network analyzer type and model, order no.	Required accessories, order no.	Description
R&S®ZVT20, 1300.0000.20	8 × R&S®ZV-Z193, 1306.4520.36	3.5 mm cables, length: 910 mm (36")
	2 × R&S®ZCAK, 1323.7746.24	adapter kit (power divider, two right angle SMA (m/m) adapters)



# Specifications in brief

## Specifications in brief

R&S®ZC220 millimeter-wave converter		
Frequency range		140 GHz to 220 GHz
Waveguide designator	IEEE 1785	WM-1295
Connector type	anti-cocking flange	precision waveguide flange, compatible with UG-387/U-M
Output power at +7 dBm input power from the R&S®ZVA/R&S®ZVT	140 GHz to 145 GHz	> -5 dBm (n. trc.), typ. 0 dBm
	145 GHz to 200 GHz	> -3 dBm (n. trc.), typ. +1 dBm
	200 GHz to 220 GHz	> -9 dBm (n. trc.), typ. -4 dBm
Output power attenuation	manually adjustable	0 dB to 40 dB
Dynamic range		> 100 dB, typ. 110 dB
R&S®ZC330 millimeter-wave converter		
Frequency range		220 GHz to 330 GHz
Waveguide designator	IEEE 1785	WM-864
Connector type	anti-cocking flange	precision waveguide flange, compatible with UG-387/U-M
Output power at +7 dBm input power from the R&S®ZVA/R&S®ZVT	220 GHz to 320 GHz	> -11 dBm (n. trc.), typ. -8 dBm
	320 GHz to 330 GHz	> -12 dBm (n. trc.), typ. -9 dBm
Output power attenuation	manually adjustable	0 dB to 40 dB
Dynamic range		> 100 dB, typ. 115 dB

For data sheet, see PD 3607.1471.22 and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

# 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, Four Ports, Four Sources, 10 MHz to 24 GHz	R&S®ZVA24	1145.1110.28
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, Four Ports, Four Sources, 10 MHz to 40 GHz	R&S®ZVA40	1145.1110.48
Vector Network Analyzer, Two Ports, 10 MHz to 50 GHz	R&S®ZVA50	1145.1110.50
Vector Network Analyzer, Four Ports, 10 MHz to 50 GHz	R&S®ZVA50	1145.1110.52
Vector Network Analyzer, Two Ports, 10 MHz to 67 GHz	R&S®ZVA67	1305.7002.02
Vector Network Analyzer, Four Ports, 10 MHz to 67 GHz	R&S®ZVA67	1305.7002.04
Direct Generator/Receiver Access for two-port R&S®ZVA24, 10 MHz to 24 GHz	R&S®ZVA24-B16	1164.0209.24
Direct Generator/Receiver Access for four-port R&S®ZVA24, 10 MHz to 24 GHz	R&S®ZVA24-B16	1164.0209.26
Direct Generator/Receiver Access for two-port R&S®ZVA40, 10 MHz to 40 GHz	R&S®ZVA40-B16	1164.0209.40
Direct Generator/Receiver Access for four-port R&S®ZVA40, 10 MHz to 40 GHz	R&S®ZVA40-B16	1164.0209.42
Direct Generator/Receiver Access for two-port R&S®ZVA50, 10 MHz to 50 GHz	R&S®ZVA50-B16	1164.0209.50
Direct Generator/Receiver Access for four-port R&S®ZVA50, 10 MHz to 50 GHz	R&S®ZVA50-B16	1164.0209.52

Designation	Type	Order No.
Direct Generator/Receiver Access for two-port R&S®ZVA67, 10 MHz to 67 GHz	R&S®ZVA67-B16	1164.0209.67
Direct Generator/Receiver Access for four-port R&S®ZVA67, 10 MHz to 67 GHz	R&S®ZVA67-B16	1164.0209.69
Vector Network Analyzer, Two Ports, 10 MHz to 20 GHz	R&S®ZVT20	1300.0000.20
Additional Port 3 for R&S®ZVT20, 10 MHz to 20 GHz	R&S®ZVT20-B63	1300.1606.03
Additional Port 4 for R&S®ZVT20, 10 MHz to 20 GHz	R&S®ZVT20-B64	1300.1606.04
Additional Port 5 for R&S®ZVT20, 10 MHz to 20 GHz	R&S®ZVT20-B65	1300.1606.05
Additional Port 6 for 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 WM-1295	R&S®ZC220	1323.7646.02
Converter WM-864	R&S®ZC330	1323.7669.02
Converter Set Transport Case	R&S®ZCSTC	1323.7730.00
Converter Power Supply (supplies up to two converters)	R&S®ZCPS	1325.6101.02
Test Cable, 3.5 mm (f) to 3.5 mm (m), length: 910 mm (two cables per converter required)	R&S®ZV-Z193	1306.4520.36
Test Cable, 2.92 mm (f) to 2.92 mm (m), length: 910 mm (two cables per converter required)	R&S®ZV-Z195	1306.4536.36
Waveguide Calibration Kit WR05 (without sliding match), compatible with converter WM-1295	R&S®ZV-WR05	1307.8106.10
Waveguide Calibration Kit WR05 (with sliding match), compatible with converter WM-1295	R&S®ZV-WR05	1307.8106.11
Waveguide Calibration Kit WR03 (without sliding match), compatible with converter WM-864	R&S®ZV-WR03	1307.7300.30
Waveguide Calibration Kit WR03 (with sliding match), compatible with converter WM-864	R&S®ZV-WR03	1307.7300.31
Converter Control Software	R&S®ZVA-K8	1307.7022.02
Adapter Kit, including a power divider and two right angle SMA (m/m) adapters (required if R&S®ZVA24 var. 28 or R&S®ZVA40 var. 48 (VNAs with four sources) is used)	R&S®ZCAK	1323.7746.24
Adapter Kit, including four 1.85 mm (f) to 2.92 mm (m) adapters and four 1.85 mm (m) to 2.92 mm (f) adapters (required if R&S®ZVA50 is used)	R&S®ZCAK	1323.7746.50
Adapter Kit, including a power divider, two right angle SMA (m/m) adapters, three 1.85 mm (f) to 2.92 mm (m) adapters and four 1.85 mm (m) to 2.92 mm (f) adapters (required if R&S®ZVA67 is used)	R&S®ZCAK	1323.7746.67
Torque Wrench, for waveguide flange screws	R&S®ZV-Z1000	1314.5467.02
Angled Wrench, for waveguide flange screws	R&S®ZCAW	1175.1960.00

Service options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

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- | Local and personalized
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- | Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

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