

R&S® RT-Zxx

High Bandwidth Probes

Specifications



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Definitions

General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $<$, \leq , $>$, \geq , \pm , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.

Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with $<$, $>$ or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Typical data as well as measured values are not warranted by Rohde & Schwarz.

Probe/oscilloscope chart

Base unit: R&S®	R&S®						R&S®								RT-ZA9	Page
	RTC1000 RTB2000	RTM3000 RTA4000					RTE RTO									
Probe: R&S®		100 MHz	200 MHz	350 MHz	500 MHz	1 GHz	200 MHz	350 MHz	500 MHz	600 MHz	1 GHz	2 GHz	4 GHz	6 GHz		
Passive probes																
RT-ZZ80		○	○	○	●	●	○	○	●	●	●	●	●	●	○	6
Active probes																
RT-ZS10L ¹	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	8
RT-ZS10E		●	●	●	●	○	●	●	●	●	○	○	○	○	●	11
RT-ZS10		●	●	●	●	○	●	●	●	●	○	○	○	○	●	11
RT-ZS20		○	○	○	○	●	○	○	○	○	●	○	○	○	●	11
RT-ZS30		○	○	○	○	○	○	○	○	○	○	●	○	○	●	11
RT-ZS60		○	○	○	○	○	○	○	○	○	○	○	●	●	●	16
Differential probes																
RT-ZD10		●	●	●	●	○	●	●	●	●	○	○	○	○	●	19
RT-ZD20		○	○	○	○	●	○	○	○	○	●	○	○	○	●	19
RT-ZD30		○	○	○	○	○	○	○	○	○	○	●	○	○	●	19
RT-ZD40		○	○	○	○	○	○	○	○	○	○	○	●	●	●	24

¹ The R&S®RT-ZS10L has a BNC interface and requires 50 Ω input coupling. It can be attached to oscilloscopes with 1 MΩ input coupling using a BNC feedthrough termination adapter.

Base unit: R&S®	RTC1000 RTB2000					RTM3000 RTA4000					RTE RTO						RT-ZA9	Page
	100 MHz	200 MHz	350 MHz	500 MHz	1 GHz	200 MHz	350 MHz	500 MHz	600 MHz	1 GHz	2 GHz	4 GHz	6 GHz					
Probe: R&S®																		
Modular probes																		
RT-ZM15					○	○	●	●	●	●	●	○	○	○	○	○	27	
RT-ZM30							○	○	○	○	○	●	○	○	○	○	27	
RT-ZM60							○	○	○	○	○	○	●	○	○	○	27	
RT-ZM90							○	○	○	○	○	○	○	○	●	○	27	
Power rail probes																		
RT-ZPR20		●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	33	
RT-ZPR40		○	○	○	○	○	●	●	●	●	●	●	●	●	●	●	33	

- recommended extra
- possible accessory, with limited functionality of probe or base unit

R&S®RT-ZZ80 transmission line probe

All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZZ80
Step response		
Rise time	10 % to 90 %	< 60 ps
Frequency response		
Bandwidth	starting at DC	8.0 GHz (meas.)
Input impedance		
DC input resistance	system	500 Ω ± 1 %
Input capacitance		0.3 pF (meas.)
DC characteristics		
Attenuation	system	10:1
Attenuation error	probe only, with ideal 50 Ω load impedance	±1 %
Maximum nondestructive input voltage		
Continuous voltage		20 V (RMS)
ESD tolerance	human body model	2 kV (meas.)

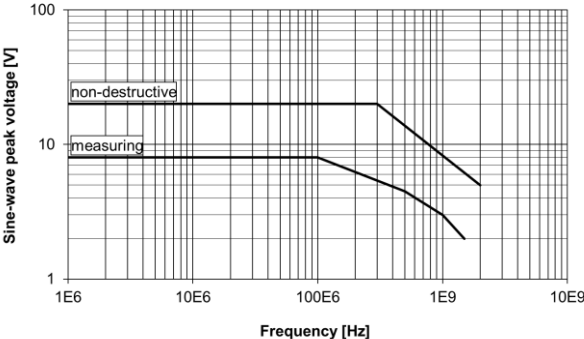
General data

Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative humidity without condensation, in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
Calibration interval		2 years
Safety		in line with IEC/EN 61010-1
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe head (L x W x H)	approx. 68 mm x 12 mm x 7.5 mm (2.68 in x 0.47 in x 0.3 in)
	cable length	approx. 1.1 m (43 in)
	overall length	approx. 1.2 m (48 in)
Weight	probe only	approx. 40 g (0.1 lb)
Probe interface		
Connector		SMA

R&S®RT-ZS10L active probe

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZS10L
Step response		
Rise time	10 % to 90 %, calculated from 0.35/bandwidth	350 ps
Frequency response		
Bandwidth	starting at DC	> 1 GHz (meas.)
Input impedance		
DC input resistance		1 MΩ (meas.)
Input capacitance		0.9 pF (meas.)
DC characteristics		
Dynamic range	derated, see figure on page 9	±8 V
Attenuation		10:1
Attenuation error	probe only, with ideal 50 Ω load impedance	±0.5 % (meas.)
Maximum rated input voltage		
DC		±20 V
AC	derated, see figure on page 9	20 V (V _p)
Base unit		
Input coupling		50 Ω



R&S®RT-ZS10L maximum rated sine-wave peak voltage versus frequency.

General data

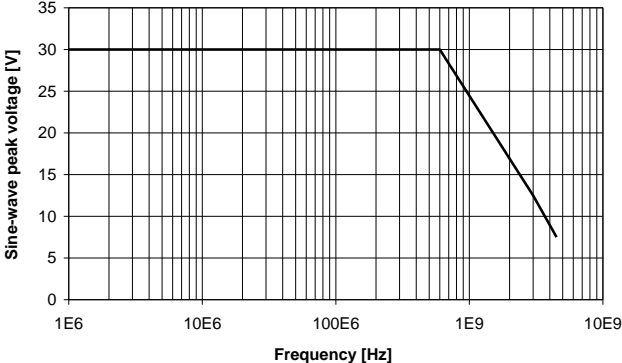
		R&S®RT-ZS10L
Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +50 °C
Altitude	operation	up to 2000 m
	transport	up to 15 000 m
Safety		in line with EN 61010-1
RoHS		in line with EN50581
EMC		in line with EN 61326-1
Calibration interval		2 years
Mechanical data		
Dimensions	probe head (L x W x H)	approx. 111 mm x 22 mm x 14 mm (4.3 in x 0.9 in x 0.6 in)
	length of probe cable	approx. 1.3 m (51 in)
Weight	probe only	approx. 96 g (0.21 lb)
Probe interface		
Connector		BNC
Supply type		use the provided power adaptor only

R&S®RT-ZS10/-ZS10E/-ZS20/-ZS30 active probes

All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZS10/ R&S®RT-ZS10E	R&S®RT-ZS20	R&S®RT-ZS30
Step response				
Rise time	10 % to 90 %	< 350 ps	< 250 ps	< 135 ps
Flatness	starting 2 ns after edge	2 % (meas.)		
Propagation delay		5.5 ns (meas.)		
Frequency response				
Bandwidth	starting at DC, calculated from rise time	1.0 GHz	1.5 GHz	3.0 GHz
Flatness	100 kHz to 100 MHz	0.2 dB (meas.)	0.2 dB (meas.)	0.2 dB (meas.)
	100 MHz to 500 MHz	–	0.5 dB (meas.)	0.5 dB (meas.)
	500 MHz to 1 GHz	–	–	0.5 dB (meas.)
Input impedance				
DC input resistance		1 MΩ		
Input capacitance		0.8 pF (meas.)		
DC characteristics				
Attenuation		10:1		
Attenuation error	after applying digital correction factors	±0.5 %		
Temperature drift, attenuation		±60 ppm/°C		
Zero error	after applying digital correction factors, referenced to probe input			
	+15 °C to +35 °C	±2 mV		
	0 °C to +50 °C	±4 mV		
Temperature drift, zero error	referenced to probe input	±90 µV/°C		

Dynamic range		
DC		± 8 V (+ offset compensation setting)
Offset compensation range	not available with R&S®RT-ZS10E	± 12 V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting \neq 0 V	± 0.2 % of setting ± 2 mV (meas.)
AC	with zero or compensated DC component	16 V (V_{pp})
Total harmonic distortion	16 V (V_{pp}) sine-wave input at 300 MHz for R&S®RT-ZS10/-ZS10E, 1 GHz for R&S®RT-ZS20/-ZS30	-35 dB (meas.)
Noise voltage	referenced to probe input	2 mV (RMS) (meas.)
Maximum nondestructive input voltage		
DC peak voltage		± 30 V
AC peak voltage	derated, see figure	30 V
ESD tolerance	human body model	8 kV (meas.)



Maximum nondestructive sine-wave peak voltage versus frequency.

R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®RT-ZS10E probe is not equipped with an R&S®ProbeMeter.

Measurement error	+15 °C to +35 °C	±0.1 % of reading ± 750 µV
	0 °C to +50 °C	±0.2 % of reading ± 1.5 mV
Temperature drift		±50 ppm/°C of reading ± 40 µV/°C
50/60 Hz rejection		> 87 dB
Integration time		147 ms

General data

Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative humidity without condensation, in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 500 Hz, acceleration 1.9 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E

EMC		in line with EMC Directive 2014/30/EC, IEC/EN 61326-1 (table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011(class B)
Calibration interval		2 years
Safety		in line with IEC/EN 61010-1
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe head (W x H x L)	approx. 12 mm x 7.5 mm x 68 mm (0.47 in x 0.3 in x 2.68 in)
	cable length	approx. 1.1 m (43 in)
	overall length	approx. 1.3 m (51 in)
Weight	probe only	approx. 90 g (0.2 lb)
Probe interface		
Connector		Rohde & Schwarz probe interface

R&S®RT-ZS60 active probe

All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZS60
Step response		
Rise time	10 % to 90 %	< 67 ps
Flatness	starting 2 ns after edge	2 % (meas.)
Propagation delay		5.5 ns (meas.)
Frequency response		
Bandwidth	starting at DC, calculated from rise time	6.0 GHz
Flatness	100 kHz to 100 MHz	0.3 dB (meas.)
	100 MHz to 1 GHz	0.3 dB (meas.)
Input impedance		
DC input resistance		1 MΩ
Input capacitance	see figure on page 18 for input impedance	0.3 pF (meas.)
DC characteristics		
Attenuation		10:1
Attenuation error	after applying digital correction factors	
	0 °C to +50 °C	±0.5 %
Temperature drift, attenuation		±100 ppm/°C
Zero error	after applying digital correction factors, referenced to probe input	
	+15 °C to +35 °C	±2 mV
	0 °C to +50 °C	±4 mV
Temperature drift, zero error	referenced to probe input	±100 μV/°C

Dynamic range		
DC		±8 V (+ offset compensation setting)
Offset compensation range		±10 V
Offset compensation error	not when offset compensation setting = 0 V	±0.2 % of setting ± 2 mV (meas.)
AC	with zero or compensated DC component	16 V (V_{pp})
Total harmonic distortion	16 V (V_{pp}) sine-wave input	-70 dB (meas.)
Noise voltage	referenced to probe input	2 mV (RMS) (meas.)
Maximum nondestructive input voltage		
DC peak voltage		±30 V
AC peak voltage	derated, see figure on page 18	30 V
ESD tolerance	human body model	2 kV (meas.)

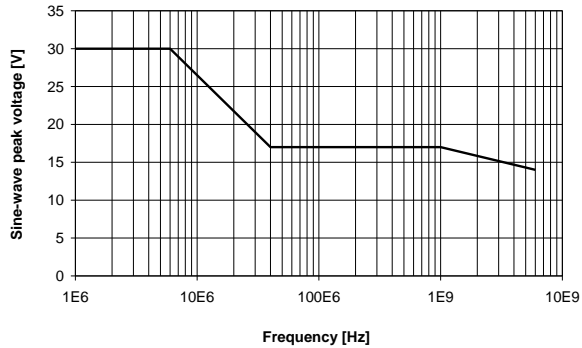
R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V.

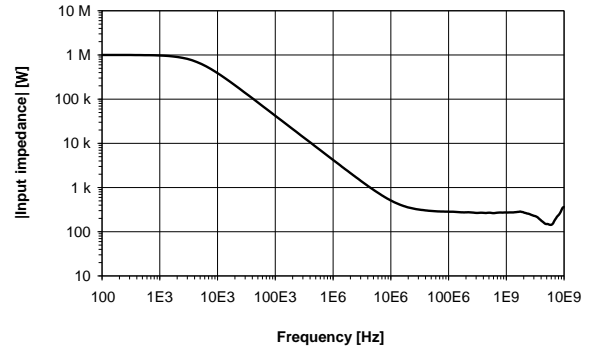
Measurement error	+15 °C to +35 °C	±0.1 % of reading ± 2 mV
	0 °C to +50 °C	±0.2 % of reading ± 4 mV
Temperature drift		±50 ppm/°C of reading ± 100 µV/°C
50/60 Hz rejection		> 87 dB
Integration time		147 ms

General data

See page 14.



Maximum nondestructive sine-wave peak voltage versus frequency.



Input impedance versus frequency.

R&S®RT-ZD10/-ZD20/-ZD30 differential probes

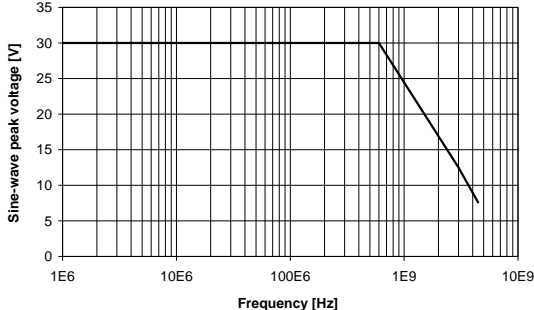
All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZD10	R&S®RT-ZD20	R&S®RT-ZD30
Step response				
Rise time	10 % to 90 %	< 350 ps	< 250 ps	< 135 ps
Flatness	starting 2 ns after edge	2 % (meas.)		
Slew rate	referenced to probe input, see figure on page 21	60 V/ns (meas.)		
Propagation delay		5.5 ns (meas.)		
Frequency response				
Bandwidth	starting at DC, calculated from rise time	1.0 GHz	1.5 GHz	3.0 GHz
Flatness	100 kHz to 100 MHz	0.2 dB (meas.)	0.2 dB (meas.)	0.2 dB (meas.)
	100 MHz to 500 MHz	–	0.5 dB (meas.)	0.5 dB (meas.)
	500 MHz to 1 GHz	–	–	0.5 dB (meas.)
Common mode rejection	DC to 10 kHz	> 50 dB		
	10 kHz to 1 MHz	40 dB (meas.)		
	1 MHz to 1 GHz	30 dB (meas.)		
	> 1 GHz	20 dB (meas.)		
Input impedance				
DC input resistance	between signal sockets	1 MΩ		
	each signal socket to ground	500 kΩ		
Input capacitance	between signal sockets	0.6 pF (meas.)		
	each signal socket to ground	0.8 pF (meas.)		

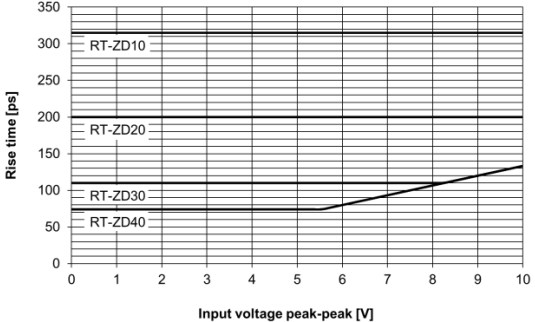
DC characteristics		
Attenuation		10:1
Attenuation error	after applying digital correction factors	±0.5 %
Temperature drift, attenuation		±50 ppm/°C
Zero error	after applying digital correction factors, referenced to probe input	
	+15 °C to +35 °C	±3 mV
	0 °C to +50 °C	±6 mV
Temperature drift, zero error	referenced to probe input	±150 µV/°C
Dynamic range		
Differential input	between signal sockets	±5 V (+ offset compensation setting) ²
Offset compensation range		±5 V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting ≠ 0 V	±0.2 % of setting ± 2 mV (meas.)
Operating voltage window	each signal socket to ground	±8 V (+ cm offset compensation setting) ²
CM offset compensation range ³		±22 V
CM offset compensation error	cm offset compensation setting = 0 V	no additional error
	cm offset compensation setting ≠ 0 V	±0.2 % of setting ± 2 mV (meas.)
Total harmonic distortion	10 V (V_{pp}) sine-wave input at 1 GHz	-35 dB (meas.)
Noise voltage	referenced to probe input	3 mV (RMS) (meas.)
Maximum nondestructive input voltage		
DC peak voltage	each signal socket to ground	±30 V
AC peak voltage	each signal socket to ground, derated, see figure on page 21	30 V
ESD tolerance	human body model, each signal socket to ground	8 kV (meas.)

² Can be extended with the R&S®RT-ZA15 external attenuator (see page 18). For the R&S®RT-ZD10, the R&S®RT-ZA15 is part of delivery. (optional accessory for the R&S®RT-ZD20/-ZD30).

³ Available starting with serial number 200 000. Older probes have ±5 V operating voltage window and no cm offset compensation.



Maximum nondestructive sine-wave peak voltage versus frequency.



Rise time versus input voltage (meas.).

R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®ProbeMeter can be used to measure differential and common mode voltages.

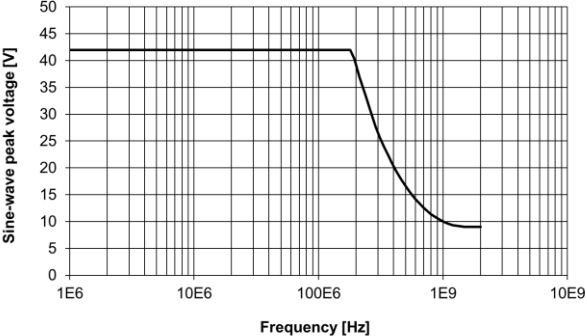
Measurement error, differential mode and common mode	+15 °C to +35 °C	±0.1 % of reading ± 2 mV
	0 °C to +50 °C	±0.2 % of reading ± 4 mV
Temperature drift		±40 ppm/°C of reading ± 100 µV/°C
Common mode rejection	for differential measurement, 0 °C to +50 °C	> 50 dB
50/60 Hz rejection		> 87 dB
Integration time		147 ms

R&S®RT-ZA15 external attenuator

All parameters are valid for the R&S®RT-ZA15 external attenuator when connected to an R&S®RT-ZD10/-ZD20/-ZD30 differential probe.

		R&S®RT-ZA15
Dynamic response		
Rise time	10 % to 90 %	
	with R&S®RT-ZD10	< 350 ps (meas.)
	with R&S®RT-ZD20	< 250 ps (meas.)
	with R&S®RT-ZD30	< 200 ps (meas.)
Bandwidth	starting at DC, calculated from rise time	
	with R&S®RT-ZD10	1.0 GHz
	with R&S®RT-ZD20	1.5 GHz
	with R&S®RT-ZD30	2.0 GHz
Common mode rejection	DC to 10 kHz, after adjustment	80 dB (meas.)
	10 kHz to 1 MHz	40 dB (meas.)
	1 MHz to 100 MHz	30 dB (meas.)
	100 MHz to 1 GHz	20 dB (meas.)
Input impedance		
DC input resistance	between signal sockets	1 MΩ
	each signal socket to ground	500 kΩ
Input capacitance	between signal sockets	1.3 pF (meas.)
	each signal socket to ground	2.1 pF (meas.)
DC characteristics		
System attenuation	probe and attenuator	100:1
External attenuation		10:1
External attenuation error		±0.3 % (nom.)
Dynamic range		
Differential input	between signal sockets	±50 V (+ offset compensation setting)
Offset compensation range		±50 V
Operating voltage window	each signal socket to ground	±60 V

Maximum rated input voltage		
DC voltage	each signal socket to ground	±60 V
AC voltage	each signal socket to ground, derated, see figure	30 V (RMS)
Transient peak voltage	each signal socket to ground	±42 V
ESD tolerance	human body model, each signal socket to ground	8 kV (meas.)



Maximum rated sine-wave peak voltage versus frequency.

General data

See page 14.

R&S®RT-ZD40 differential probe

All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZD40
Step response		
Rise time	10 % to 90 %	< 90 ps, < 73 ps (meas.)
Flatness	starting 2 ns after edge	2 % (meas.)
Slew rate	referenced to probe input, see figure on page 21	60 V/ns (meas.)
Propagation delay		5.5 ns (meas.)
Frequency response		
Bandwidth	starting at DC, calculated from rise time	4.5 GHz, 5.5 GHz (meas.)
Flatness	100 kHz to 100 MHz	0.2 dB (meas.)
	100 MHz to 500 MHz	0.5 dB (meas.)
	500 MHz to 1 GHz	0.5 dB (meas.)
Common mode rejection	DC to 10 kHz	> 50 dB
	10 kHz to 1 MHz	40 dB (meas.)
	1 MHz to 1 GHz	30 dB (meas.)
	> 1 GHz	20 dB (meas.)
Input impedance		
DC input resistance	between signal sockets	1 MΩ
	each signal socket to ground	500 kΩ
Input capacitance	between signal sockets	0.4 pF (meas.)
	each signal socket to ground	0.65 pF (meas.)

DC characteristics		
Attenuation		10:1
Attenuation error	after applying digital correction factors	
	0 °C to +50 °C	±0.5 %
Temperature drift, attenuation		±50 ppm/°C
Zero error	after applying digital correction factors, referenced to probe input	
	+15 °C to +35 °C	±3 mV
	0 °C to +50 °C	±6 mV
Temperature drift, zero error	referenced to probe input	±150 µV/°C
Dynamic range		
Differential input	between signal sockets	±5 V (+ offset compensation setting)
Offset compensation range		±5 V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting ≠ 0 V	±0.2 % of setting ± 2 mV (meas.)
Operating voltage window	each signal socket to ground	±8 V (+ cm offset compensation setting) ⁴
CM offset compensation range ⁴		±22 V
CM offset compensation error	cm offset compensation setting = 0 V	no additional error
	cm offset compensation setting ≠ 0 V	±0.2 % of setting ± 2 mV (meas.)
Total harmonic distortion	10 V (V _{pp}) sine-wave input at 1 GHz	-35 dB (meas.)
Noise voltage	referenced to probe input	3 mV (RMS) (meas.)
Maximum nondestructive input voltage		
DC peak voltage	each signal socket to ground	±30 V
AC peak voltage	each signal socket to ground, see figure on page 21	30 V
ESD tolerance	human body model, each signal socket to ground	8 kV (meas.)

⁴ Available starting from serial number 200 000. Older probes have ±5 V operating voltage window and no cm offset compensation.

Version 22.00, January 2018

R&S®ProbeMeter

See page 21.

General data

See page 14.

R&S®RT-ZM15/30/60/90 modular probes

All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

R&S®RT-ZM15/30/60/90 probe amplifiers

The R&S®RT-ZMxx probe amplifiers support four different measurement modes for differential mode (DM), common mode (CM) and single-ended measurements on the positive (P) and negative (N) signal terminal. The R&S®RT-ZMxx probe amplifiers support two different attenuation settings (10:1 and 2:1).

Step response		
Rise time	10 % to 90 %, calculated from bandwidth	
	R&S®RT-ZM15	< 230 ps
	R&S®RT-ZM30	< 100 ps
	R&S®RT-ZM60	< 75 ps
	R&S®RT-ZM90	< 50 ps
Slew rate	referenced to probe input, 10:1 attenuation	80 V/ns (meas.)
Propagation delay		5.5 ns (meas.)
Frequency response		
Bandwidth	DM mode, 10:1 and 2:1 attenuation	
	R&S®RT-ZM15	> 1.5 GHz
	R&S®RT-ZM30	> 3.0 GHz
	R&S®RT-ZM60	> 6.0 GHz
	R&S®RT-ZM90	> 9.0 GHz
Common mode rejection	DM mode, 10:1 and 2:1 attenuation	
	DC to 1 kHz	> 50 dB
	1 kHz to 1 MHz	40 dB (meas.)
	1 MHz to 3 GHz	35 dB (meas.)
	> 3 GHz	25 dB (meas.)

Input impedance		
DC input resistance	between signal terminals	400 k Ω
	each signal terminal to ground	200 k Ω
DC characteristics		
Attenuation	automatically set by oscilloscope vertical setting	10:1 2:1
Attenuation error	DM, CM, P, N mode, 10:1 and 2:1 attenuation, after applying digital correction factors, 0 °C to +40 °C	± 0.5 %
Temperature drift, attenuation		± 40 ppm/°C (meas.)
Zero error	after applying digital correction factors, referenced to probe input	< 0.5 mV (meas.)
Temperature drift, zero error	referenced to probe input	± 20 μ V/°C (meas.)
Dynamic range		
Input voltage range	DM, CM, P, N mode, 2:1 attenuation	± 0.5 V or 1.0 V (V_{pp})
	DM, CM, P, N mode, 10:1 attenuation	± 2.5 V or 5.0 V (V_{pp})
Operating voltage window	each signal terminal to ground	
	DM mode, 2:1 and 10:1 attenuation, DC to 100 kHz	± 7.0 V
	DM mode, 2:1 attenuation, > 100 kHz	± 1.0 V
	DM mode, 10:1 attenuation, > 100 kHz	± 5.0 V
Offset compensation range	compensation of differential, common mode and single-ended offsets for each measurement mode	± 16 V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting \neq 0 V	± 0.2 % of setting ± 2 mV (meas.)
Total harmonic distortion	DM mode, 5 V (V_{pp}) sine-wave input at 2 GHz	-31 dB (meas.)

Noise voltage	DM mode, 2:1 attenuation, for R&S®RT-ZM90 probe amplifier (9 GHz), referenced to probe input	3.3 mV (RMS) (meas.)
Noise spectral density	referenced to probe input	
	DM, CM, P, N mode, 2:1 attenuation	35 nV/rt(Hz) (meas.)
	DM, CM, P, N mode, 10:1 attenuation	66 nV/rt(Hz) (meas.)
Maximum nondestructive input voltage		
DC peak voltage	at probe tip module, each signal socket to ground	±30 V
AC peak voltage	at probe tip module, each signal socket to ground	±7 V
Termination voltage source		
Compensation range	using VT socket at R&S®RT-ZMxx probe amplifier	±4 V (meas.)
Output current	overcurrent turns termination voltage source off	±40 mA (meas.)

R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®ProbeMeter simultaneously measures differential, common mode, and single-ended DC components independent of the probe amplifier measurement mode setting.

Measurement error	0 °C to +40 °C	±0.2 % of reading ± 5 mV
		±0.05 % of reading ± 0.5 mV (meas.)
Common mode rejection	for differential measurement, 0 °C to +40 °C	> 50 dB

General data

Temperature		
Temperature loading	operating temperature range	0 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative humidity without condensation, in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 500 Hz, acceleration 1.9 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E
EMC		in line with EMC Directive 2014/30/EC, IEC/EN 61326-1 (table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011(class B)
Calibration interval		2 years
Safety		in line with IEC/EN 61010-1
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe amplifier (W x H x L)	approx. 18 mm x 10 mm x 105 mm (0.7 in x 0.4 in x 4.1 in)
	cable length	approx. 1.1 m (43 in)
	overall length	approx. 1.3 m (51 in)
Weight	probe only	approx. 160 g (0.35 lb)
Probe interface		Rohde & Schwarz probe interface

R&S®RT-ZMA probe tip modules

Frequency response				
Bandwidth	with R&S®RT-ZM90 probe amplifier (9 GHz)			
	R&S®RT-ZMA10 tip cable solder-in	9 GHz (meas.)		
	R&S®RT-ZMA15 tip cable quick connect			
	R&S®RT-ZMA30 browser module			
	R&S®RT-ZMA40 SMA module			
	R&S®RT-ZMA50 extreme temperature kit	2.5 GHz (meas.)		
R&S®RT-ZMA12 tip cable square pin	6 GHz (meas.)			
Step response				
Rise time	with R&S®RT-ZM90 probe amplifier (9 GHz), calculated from bandwidth		10 % to 90 %	20 % to 80 %
	R&S®RT-ZMA10 tip cable solder-in	50 ps	30 ps	
	R&S®RT-ZMA15 tip cable quick connect			
	R&S®RT-ZMA30 browser module			
	R&S®RT-ZMA40 SMA module			
	R&S®RT-ZMA50 extreme temperature kit	140 ps	90 ps	
R&S®RT-ZMA12 tip cable square pin	75 ps	45 ps		
Input impedance				
Input capacitance	with R&S®RT-ZMxx probe amplifier		differential	single-ended
	R&S®RT-ZMA10 tip cable solder-in	77 fF (meas.)	96 fF (meas.)	
	R&S®RT-ZMA12 tip cable square pin	279 fF (meas.)	521 fF (meas.)	
	R&S®RT-ZMA15 tip cable quick connect	109 fF (meas.)	150 fF (meas.)	
	R&S®RT-ZMA30 browser module	32 fF (meas.)	52 fF (meas.)	
	R&S®RT-ZMA50 extreme temperature kit	77 fF (meas.)	96 fF (meas.)	

DC input resistance	with R&S®RT-ZMxx probe amplifier	differential	single-ended
	R&S®RT-ZMA10 tip cable solder-in	400 kΩ	200 kΩ
	R&S®RT-ZMA12 tip cable square pin		
	R&S®RT-ZMA15 tip cable quick connect		
	R&S®RT-ZMA50 extreme temperature kit		
	R&S®RT-ZMA30 browser module		
	R&S®RT-ZMA40 SMA module	100 Ω	60 Ω to VT
Input resistance > 3 MHz	with R&S®RT-ZMxx probe amplifier	differential	single-ended
	R&S®RT-ZMA10 tip cable solder-in	764 Ω	382 Ω
	R&S®RT-ZMA12 tip cable square pin		
	R&S®RT-ZMA15 tip cable quick connect		
	R&S®RT-ZMA50 extreme temperature kit		
	R&S®RT-ZMA30 browser module		
	R&S®RT-ZMA40 SMA module	100 Ω	50 Ω (> 3 kHz)
Input return loss	R&S®RT-ZMA40 SMA module, 3 kHz to 9 GHz	> 12 dB (meas.)	> 12 dB (meas.)
Temperature			
Temperature loading	operating temperature range		
	R&S®RT-ZMA10 tip cable solder-in	−30 °C to +80 °C	
	R&S®RT-ZMA12 tip cable square pin	−30 °C to +80 °C	
	R&S®RT-ZMA15 tip cable quick connect	−30 °C to +80 °C	
	R&S®RT-ZMA30 browser module	0 °C to +40 °C	
	R&S®RT-ZMA40 SMA module	0 °C to +40 °C	
	R&S®RT-ZMA50 extreme temperature kit	−55 °C to +125 °C	
RoHS	in line with EN50581		

R&S®RT-ZPR20/-ZPR40 power rail probes

All parameters are valid for the probe only with the supplied SMA extension cable when connected to a host instrument with an input impedance of 50 Ω. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

Step response		
Rise time	10 % to 90 %, calculated from bandwidth	
	R&S®RT-ZPR20	< 175 ps
	R&S®RT-ZPR40	< 120 ps, < 105 ps (meas.)
Propagation delay	R&S®RT-ZPR20	5.5 ns (meas.)
	R&S®RT-ZPR40	5.0 ns (meas.)
Frequency response		
Bandwidth	starting at DC	
	R&S®RT-ZPR20	2.0 GHz
	R&S®RT-ZPR40	3.5 GHz, 4.0 GHz (meas.)
Input impedance		
Input resistance	DC	50 kΩ
	AC	50 Ω
Coupling capacitance	in series with 50 Ω	2 nF
DC characteristics		
Attenuation		1:1
Attenuation error	after applying digital correction factors	±0.5 %
Temperature drift, attenuation		±100 ppm/°C (meas.)
Zero error	after applying digital correction factors, referenced to probe input	±3 mV
Temperature drift, zero error	referenced to probe input	±75 μV/°C

Dynamic range		
DC		±850 mV (+ offset compensation setting)
Offset compensation range		±60 V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting ≠ 0 V	±0.2 % of setting ± 1 mV (meas.)
AC	with zero or compensated DC component	1.7 V (V_{pp})
System noise voltage	referenced to probe input	10 % in addition to oscilloscope noise
Maximum nondestructive input voltage		
DC peak voltage		±60 V
AC peak voltage		±5 V
ESD tolerance	human body model	8 kV (meas.)

R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V.

Measurement error	0 °C to +40 °C	±0.2 % of reading ± 5 mV
		±0.05 % of reading ± 0.1 mV (meas.)

General data

Temperature		
Temperature loading	operating temperature range	0 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative humidity without condensation, in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 500 Hz, acceleration 1.9 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E
EMC		in line with EMC Directive 2014/30/EC, IEC/EN 61326-1 (table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011(class B)
Calibration interval		2 years
Safety		in line with IEC/EN 61010-1
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe box (W x H x L)	approx. 29 mm x 41 mm x 96 mm (1.14 in x 1.61 in x 3.78 in)
Weight	probe box only	approx. 90 g (0.2 lb)
Probe interface		Rohde & Schwarz probe interface

R&S®RT-ZA9 probe box to N/USB adapter

All parameters are valid for the probe box adapter only.

Electrical data		
Impedance		50 Ω
Frequency		DC to 18 GHz (meas.)
Return loss	DC to 12 GHz	≥ 28 dB (meas.)
	12 GHz to 18 GHz	≥ 23 dB (meas.)
Insertion loss	DC to 12 GHz	≤ 0.18 dB (meas.)
	12 GHz to 18 GHz	≤ 0.22 dB (meas.)
Mechanical data		
Mating cycles	RPC-N	≥ 500 (meas.)
	Rohde & Schwarz probe interface	≥ 5000 (meas.)
Interfaces		
Connector 1		Rohde & Schwarz probe interface
Connector 2		RPC-N
RoHS		in line with EN50581

Ordering information

Designation	Type	Order No.
Passive probes		
8.0 GHz Transmission Line Probe, 10:1, 500 Ω, 0.3 pF, 20 V (RMS) Incl. signal pin, solder-in (50); ground pin, solder-in (10); signal pin (2); ground pin, pogo (2); signal adapter, square pin (2); ground adapter, square pin (2); SMA(f) to BNC(m) adapter; marker band kit; accessory box; carrying case; operating manual	R&S®RT-ZZ80	1409.7608.02
Active probes		
1.0 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.9 pF, BNC Incl. spring tip 0.5 mm; solid tip 0.5 mm; marker band kit; ground blade; ground pin; L-adapter; Y-lead adapter; ground lead, 6 cm; ground lead, 12 cm; ground lead, angled, 5 cm; ground lead, angled, 10 cm; micro clip (2); protective cap; power adapter; operating manual	R&S®RT-ZS10L	1333.0815.02
1.0 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.8 pF Incl. R&S®RT-ZA2 accessory set; R&S®ProbeMeter; micro button	R&S®RT-ZS10	1410.4080.02
1.0 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.8 pF Incl. signal pin (5); ground pin, pogo (2); ground pin, solderable, offset (2); marker band kit; mini clip (1); lead 15 cm (5.9 in) (1)	R&S®RT-ZS10E	1418.7007.02
1.5 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.8 pF Incl. R&S®RT-ZA2 accessory set; R&S®ProbeMeter; micro button	R&S®RT-ZS20	1410.3502.02
3.0 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.8 pF Incl. R&S®RT-ZA2 accessory set; R&S®ProbeMeter; micro button	R&S®RT-ZS30	1410.4309.02
6.0 GHz Active Voltage Probe, single-ended, 1 MΩ, 0.3 pF Incl. R&S®ProbeMeter; micro button Incl. signal pin, solder-in (100); ground pin, solder-in (20); signal pin (5); ground pin, pogo (5); signal adapter, square pin (2); ground adapter, square pin (2); marker band kit; mini clip (2); micro clip (2); lead 6 cm (2.4 in) (2); lead 15 cm (5.9 in) (2); accessory box; carrying case; operating manual	R&S®RT-ZS60	1418.7307.02

Designation	Type	Order No.
Differential probes		
1.0 GHz Active Voltage Probe, differential, 1 M Ω , 0.6 pF Incl. R&S [®] ProbeMeter; micro button, R&S [®] RT-ZA15 external attenuator See R&S [®] RT-ZD20 for additional equipment included	R&S [®] RT-ZD10	1410.4715.02
1.5 GHz Active Voltage Probe, differential, 1 M Ω , 0.6 pF Incl. R&S [®] ProbeMeter; micro button Incl. signal pin, solder-in (10); signal pin, variable spacing (4); browser adapter; adapter, square pin (2); flex adapter, solder-in 4 cm (1.6 in) and 10 cm (3.9 in); flex adapter, square pin 4 cm (1.6 in) and 10 cm (3.9 in); lead 6 cm (2.4 in) (2); lead 15 cm (5.9 in) (1); mini clip (2); micro clip (2); marker band kit; carrying case; operating manual	R&S [®] RT-ZD20	1410.4409.02
3.0 GHz Active Voltage Probe, differential, 1 M Ω , 0.6 pF See R&S [®] RT-ZD20 for equipment included	R&S [®] RT-ZD30	1410.4609.02
4.5 GHz Active Voltage Probe, differential, 1 M Ω , 0.4 pF Incl. R&S [®] ProbeMeter; micro button Incl. signal pin, solder-in (100); socket adapter, variable spacing (2); browser adapter, rigid (2); browser adapter, spring loaded (2); lead 6 cm (2.4 in) (2); lead 15 cm (5.9 in) (1); mini clip (2); micro clip (2); marker band kit; carrying case; operating manual	R&S [®] RT-ZD40	1410.5205.02
Power rail probes		
2.0 GHz Power Rail Probe, 1:1, low noise, 50 k Ω , large offset range \pm 60 V, Incl. R&S [®] ProbeMeter; Incl. SMA extension cable, 1 m (39,4 in) (1), R&S [®] RT-ZA26 pigtail cable, 15 cm (5.9 in) (3); R&S [®] RT-ZA25 power rail browser kit (1); solder wire (1); adhesive pads (7); marker band kit; carrying case; operating manual	R&S [®] RT-ZPR20	1800.5006.02
4.0 GHz Power Rail Probe, 1:1, low noise, 50 k Ω , large offset range \pm 60 V, Incl. R&S [®] ProbeMeter; Incl. SMA extension cable low loss, 1.05 m (41.3 in) (1), R&S [®] RT-ZA26 pigtail cable, 15 cm (5.9 in) (3); R&S [®] RT-ZA25 power rail browser kit (1); solder wire (1); adhesive pads (7); marker band kit; carrying case; operating manual	R&S [®] RT-ZPR40	1800.5406.02

Designation	Type	Order No.
Designation	Type	Order No.
Modular probes		
1.5 GHz Modular Probe Amplifier, differential, 400 kΩ, multimode, Incl. R&S®ProbeMeter; micro button Incl. lead 15 cm (5.9 in) (1); Ag plated wire 0.1 mm (0.04 in) (1); Ag plated wire 0.2 mm (0.08 in) (1); solder wire (1); adhesive pads (7); solder-in resistor for R&S®RT-ZMA15 (20); solder lead for R&S®RT-ZMA12/15 (20); marker band kit; carrying case; operating manual	R&S®RT-ZM15	1800.4700.02
3.0 GHz Modular Probe Amplifier, differential, 400 kΩ, multimode Incl. R&S®ProbeMeter; micro button See R&S®RT-ZM15 for additional equipment included	R&S®RT-ZM30	1419.3005.02
6.0 GHz Modular Probe Amplifier, differential, 400 kΩ, multimode Incl. R&S®ProbeMeter; micro button See R&S®RT-ZM15 for additional equipment included	R&S®RT-ZM60	1419.3105.02
9.0 GHz Modular Probe Amplifier, differential, 400 kΩ, multimode Incl. R&S®ProbeMeter; micro button See R&S®RT-ZM15 for additional equipment included	R&S®RT-ZM90	1419.3205.02
Tip Cable, solder in, length: 15 cm, multimode compatible	R&S®RT-ZMA10	1419.4301.02
Tip Cable, solder in, extended temperature, length: 15 cm, multimode compatible	R&S®RT-ZMA11	1419.4318.02
Tip Cable, square pin, for 1.27 mm pin header, length: 15 cm, multimode compatible	R&S®RT-ZMA12	1419.4324.02
Tip Cable, quick connect, for solder in resistor connection, length: 15 cm, multimode compatible	R&S®RT-ZMA15	1419.4224.02
Browser Module, variable span from 0.5 mm to 8 mm, spring-loaded Incl. spring loaded resistor tips (2 pairs)	R&S®RT-ZMA30	1419.4353.02
SMA Module, 2.92 mm/3.5 mm/SMA, differential, 100 Ω, DC termination, multimode compatible; Incl. lead 11 cm (4.3 in) (1)	R&S®RT-ZMA40	1419.4201.02
Extended Temperature Kit, 1 m matched cable pair, multimode compatible, Incl. R&S®RT-ZMA11 (1); Ag plated wire 0.1 mm (0.04 in) (1); Ag plated wire 0.2 mm (0.08 in) (1); solder wire (1)	R&S®RT-ZMA50	1419.4218.02

Designation	Type	Order No.
Accessories and sets		
Spare Accessory Set for R&S®RT-ZS10/-ZS10E/-ZS20/-ZS30 active voltage probes Contains: signal pin (10); ground pin, pogo (5); ground pin, solderable, offset (10); ground adapter, square pin (2); marker band kit; mini clip (2); micro clip (2); lead 6 cm (2.4 in) (2); lead 15 cm (5.9 in) (2); accessory box; carrying case; operating manual	R&S®RT-ZA2	1416.0405.02
Pin Set for R&S®RT-ZS10/-ZS10E/-ZS20/-ZS30 active voltage probes Contains: signal pin (20); ground pin, pogo (5); ground pin, solderable, offset (20); ground adapter, square pin (2); marker band kit	R&S®RT-ZA3	1416.0411.02
Mini Clips, contains: mini clip (10)	R&S®RT-ZA4	1416.0428.02
Micro Clips, contains: micro clip (4)	R&S®RT-ZA5	1416.0434.02
Lead Set, contains: lead 6 cm (2.4 in) (5); lead 15 cm (5.9 in) (5)	R&S®RT-ZA6	1416.0440.02
Differential Pin Set for R&S®RT-ZD20/-ZD30 Contains: signal pin, solder-in (20); signal pin, variable spacing (10); browser adapter (2); adapter, square pin (2)	R&S®RT-ZA7	1417.0609.02
Differential Pin Set for R&S®RT-ZD40 Contains: signal pin, solder-in (100); socket adapter, variable spacing (2); browser adapter, rigid (2); browser adapter, spring loaded (2)	R&S®RT-ZA8	1417.0867.02
Probe Box to N/USB Adapter	R&S®RT-ZA9	1417.0909.02
SMA(f) to BNC(m) Adapter	R&S®RT-ZA10	1416.0457.02
External Attenuator for R&S®RT-ZD10/-ZD20/-ZD30, incl. adjustment tool	R&S®RT-ZA15	1410.4744.02
Power Rail Browser Kit Contains: power rail browser, ground lead with alligator clip, ground spring (5), IC caps (green, blue, gray, brown, black), insulating cap, tips (1 screwed on probe) (5), spring tip (5), sprung hook, micro SMD clip, dual adapter, flexible ground lead with adapter, coding rings (2 yellow, 2 red, 2 green, 2 blue), short tube (screwed on probe), long tube	R&S®RT-ZA25	1800.5329.00
Pigtail Cable, solder-in, length: 15 cm, for R&S®RT-ZPR20	R&S®RT-ZA26	1800.5258.00
3D Probe Positioner	R&S®RT-ZAP	1326.3641.02
Power Deskew Fixture	R&S®RT-ZF20	1800.0004.02

Service options		
Extended Warranty, one year	R&S®WE1	Not available for all products. 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	

Extended warranty with a term of one to four years (WE1 to WE4)

Repairs carried out during the contract term are free of charge ⁵. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration (CW1 to CW4)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs ⁵ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

⁵ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

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- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

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- | Environmental compatibility and eco-footprint
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Certified Environmental Management

ISO 14001

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R&S®RT-Zxx High Bandwidth Probes

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