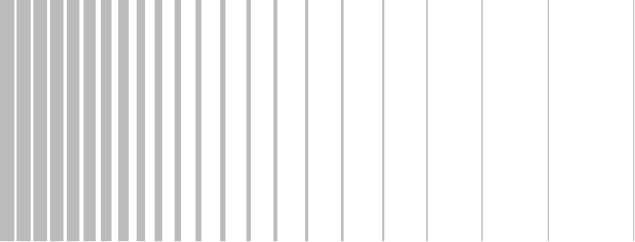


# R&S® RT-Zxx High-Bandwidth Probes Specifications



# CONTENTS

Definitions.....	3
Probe/oscilloscope chart.....	4
R&S®RT-ZZ80 transmission line probe.....	6
R&S®RT-ZS10L active probe.....	8
R&S®RT-ZS10/-ZS10E/-ZS20/-ZS30 active probes.....	11
R&S®RT-ZS60 active probe.....	16
R&S®RT-ZD10/-ZD20/-ZD30 differential probes.....	19
R&S®RT-ZD40 differential probe.....	24
R&S®RT-ZM15/30/60/90 modular probes.....	27
R&S®RT-ZA9 probe box to N/USB adapter.....	33
Ordering information.....	34

## 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®	HMO1000	HMO2000	RTM				RTE/RTO							RT-ZA9	Page	
			200 MHz	350 MHz	500 MHz	1 GHz	200 MHz	350 MHz	500 MHz	600 MHz	1 GHz	2 GHz	4 GHz			
<b>Probe: R&amp;S®</b>																
<b>Passive probes</b>																
RT-ZZ80			○	○	●	●	○	○	●	●	●	●	●	○	6	
<b>Active probes</b>																
RT-ZS10L <sup>1</sup>	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	8
RT-ZS10E			●	●	●	○	●	●	●	●	○	○	○	○	●	11
RT-ZS10			●	●	●	○	●	●	●	●	○	○	○	○	●	11
RT-ZS20			○	○	○	●	○	○	○	○	●	○	○	○	●	11
RT-ZS30			○	○	○	○	○	○	○	○	○	●	○	○	●	11
RT-ZS60			○	○	○	○	○	○	○	○	○	○	○	●	●	16
<b>Differential probes</b>																
RT-ZD10			●	●	●	○	●	●	●	●	○	○	○	○	●	19
RT-ZD20			○	○	○	●	○	○	○	○	○	●	○	○	●	19
RT-ZD30			○	○	○	○	○	○	○	○	○	○	●	○	●	19
RT-ZD40			○	○	○	○	○	○	○	○	○	○	○	●	●	24

<sup>1</sup> 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®	HMO1000	HMO2000	RTM				RTE/RTO							RT-ZA9	Page	
			200 MHz	350 MHz	500 MHz	1 GHz	200 MHz	350 MHz	500 MHz	600 MHz	1 GHz	2 GHz	4 GHz			
Probe: R&S®																
<b>Modular probes</b>																
RT-ZM15							●	●	●	●	●	○	○	●		27
RT-ZM30							○	○	○	○	○	●	○	●		27
RT-ZM60							○	○	○	○	○	○	●	●		27
RT-ZM90							○	○	○	○	○	○	○	●		27

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

**General data**

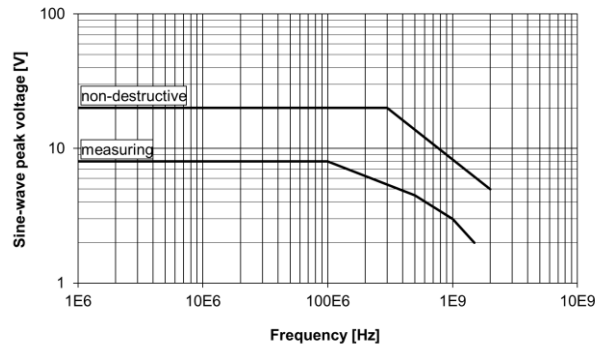
<b>Temperature</b>		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative humidity without condensation, in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
<b>Calibration interval</b>		2 years
<b>Safety</b>		in line with IEC/EN 61010-1
<b>Mechanical data</b>		
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)
<b>Probe interface</b>		
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
<b>Step response</b>		
Rise time	10 % to 90 %, calculated from 0.35/bandwidth	350 ps
<b>Frequency response</b>		
Bandwidth	starting at DC	> 1 GHz (meas.)
<b>Input impedance</b>		
DC input resistance		1 MΩ (meas.)
Input capacitance		0.9 pF (meas.)
<b>DC characteristics</b>		
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.)
<b>Maximum rated input voltage</b>		
DC		±20 V
AC	derated, see figure on page 9	20 V (V <sub>p</sub> )
<b>Base unit</b>		
Input coupling		50 Ω





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

**General data**

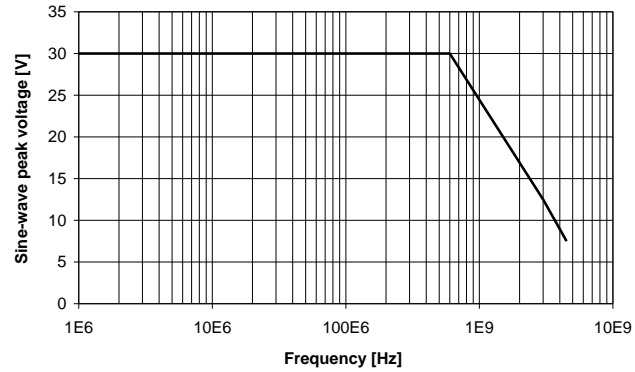
		R&S®RT-ZS10L
<b>Temperature</b>		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +50 °C
Altitude	operation	up to 2000 m
	transport	up to 15 000 m
<b>Safety</b>		in line with EN 61010-1
<b>EMC</b>		in line with EN 61326-1
<b>Calibration interval</b>		2 years
<b>Mechanical data</b>		
Dimensions	probe head (L × W × H)	approx. 111 mm × 22 mm × 14 mm (4.3 in × 0.9 in × 0.6 in)
	length of probe cable	approx. 1.3 m (51 in)
Weight	probe only	approx. 96 g (0.21 lb)
<b>Probe interface</b>		
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
<b>Step response</b>				
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.)		
<b>Frequency response</b>				
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.)
<b>Input impedance</b>				
DC input resistance		1 MΩ		
Input capacitance		0.8 pF (meas.)		
<b>DC characteristics</b>				
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		

<b>Dynamic range</b>		
DC		$\pm 8$ V (+ offset compensation setting)
Offset compensation range	not available with R&S®RT-ZS10E	$\pm 12$ V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting $\neq$ 0 V	$\pm 0.2$ % of setting $\pm 2$ 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.)
<b>Maximum nondestructive input voltage</b>		
DC peak voltage		$\pm 30$ 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. Specifications for input impedance, dynamic range and maximum nondestructive input voltage apply. 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

<b>Temperature</b>		
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
<b>Mechanical resistance</b>		
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

<b>EMC</b>		in line with EMC Directive 2004/108/EC, IEC/EN 61326-1 (table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011(class B)
<b>Calibration interval</b>		2 years
<b>Safety</b>		in line with IEC/EN 61010-1
<b>Mechanical data</b>		
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)
<b>Probe interface</b>		
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
<b>Step response</b>		
Rise time	10 % to 90 %	< 67 ps
Flatness	starting 2 ns after edge	2 % (meas.)
Propagation delay		5.5 ns (meas.)
<b>Frequency response</b>		
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.)
<b>Input impedance</b>		
DC input resistance		1 MΩ
Input capacitance	see figure on page 18 for input impedance	0.3 pF (meas.)
<b>DC characteristics</b>		
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



<b>Dynamic range</b>		
DC		$\pm 8$ V (+ offset compensation setting)
Offset compensation range		$\pm 10$ V
Offset compensation error	not when offset compensation setting = 0 V	$\pm 0.2$ % of setting $\pm 2$ 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.)
<b>Maximum nondestructive input voltage</b>		
DC peak voltage		$\pm 30$ V
AC peak voltage	derated, see figure on page 18	30 V
ESD tolerance	human body model	2 kV (meas.)

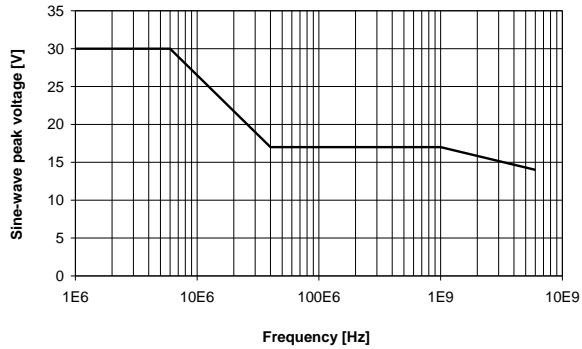
## R&S® ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. Specifications for input impedance, dynamic range and maximum nondestructive input voltage apply.

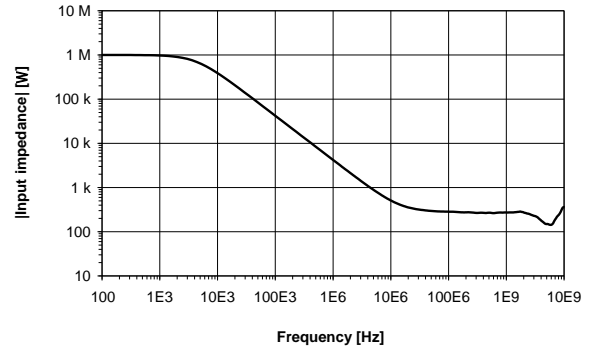
Measurement error	+15 °C to +35 °C	$\pm 0.1$ % of reading $\pm 2$ mV
	0 °C to +50 °C	$\pm 0.2$ % of reading $\pm 4$ mV
Temperature drift		$\pm 50$ ppm/°C of reading $\pm 100$ $\mu$ V/°C
50/60 Hz rejection		> 87 dB
Integration time		147 ms

## 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

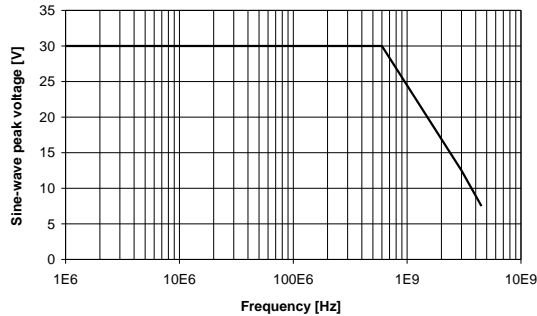
All parameters are valid for the probe only when connected to a host instrument with an input impedance of 50 Ω.  
See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZD10	R&S®RT-ZD20	R&S®RT-ZD30
<b>Step response</b>				
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.)		
<b>Frequency response</b>				
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.)		
<b>Input impedance</b>				
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.)		

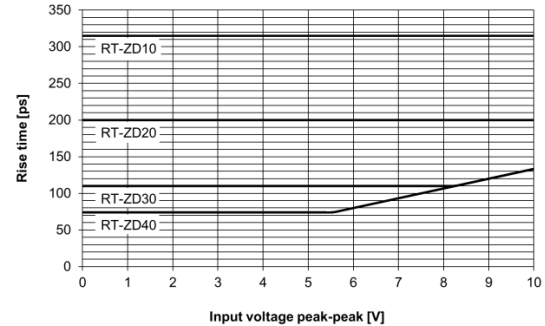
<b>DC characteristics</b>		
Attenuation		10:1
Attenuation error	after applying digital correction factors	±0.5 %
Temperature drift, attenuation		±50 ppm/°C
Zero error	after applying digital correction factors, referenced to probe input	
	+15 °C to +35 °C	±3 mV
	0 °C to +50 °C	±6 mV
Temperature drift, zero error	referenced to probe input	±150 µV/°C
<b>Dynamic range</b>		
Differential input	between signal sockets	±5 V (+ offset compensation setting) <sup>2</sup>
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) <sup>2</sup>
CM offset compensation range <sup>3</sup>		±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.)
<b>Maximum nondestructive input voltage</b>		
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.)

<sup>2</sup> 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).

<sup>3</sup> 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. Specifications for input impedance, dynamic range and maximum nondestructive input voltage apply. The R&S®ProbeMeter can be used to measure differential and common mode voltages.

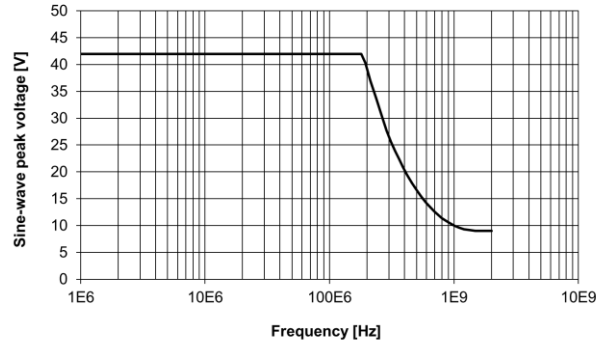
Measurement error, differential mode and common mode	+15 °C to +35 °C 0 °C to +50 °C	±0.1 % of reading ± 2 mV ±0.2 % of reading ± 4 mV
Temperature drift		±40 ppm/°C of reading ± 100 µV/°C
Common mode rejection	for differential measurement, 0 °C to +50 °C	> 50 dB
50/60 Hz rejection		> 87 dB
Integration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

		<b>R&amp;S®RT-ZA15</b>
<b>Dynamic response</b>		
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.)
<b>Input impedance</b>		
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.)
<b>DC characteristics</b>		
System attenuation	probe and attenuator	100:1
External attenuation		10:1
External attenuation error		±0.3 % (nom.)
<b>Dynamic range</b>		
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

<b>Maximum rated input voltage</b>		
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
<b>Step response</b>		
Rise time	10 % to 90 %	< 90 ps, < 73 ps (typ.)
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.)
<b>Frequency response</b>		
Bandwidth	starting at DC, calculated from rise time	4.5 GHz, 5.5 GHz (typ.)
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.)
<b>Input impedance</b>		
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.)



<b>DC characteristics</b>		
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
<b>Dynamic range</b>		
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) <sup>4</sup>
CM offset compensation range <sup>4</sup>		±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.)
<b>Maximum nondestructive input voltage</b>		
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.)

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

**Version 17.00, November 2016**

## **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).

<b>Step response</b>		
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.)
<b>Frequency response</b>		
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.)

<b>Input impedance</b>		
DC input resistance	between signal terminals	400 k $\Omega$
	each signal terminal to ground	200 k $\Omega$
<b>DC characteristics</b>		
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	$\pm 0.5$ %
Temperature drift, attenuation		$\pm 40$ 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	$\pm 20$ $\mu$ V/°C (meas.)
<b>Dynamic range</b>		
Input voltage range	DM, CM, P, N mode, 2:1 attenuation	$\pm 0.5$ V or 1.0 V ( $V_{pp}$ )
	DM, CM, P, N mode, 10:1 attenuation	$\pm 2.5$ 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	$\pm 7.0$ V
	DM mode, 2:1 attenuation, > 100 kHz	$\pm 1.0$ V
	DM mode, 10:1 attenuation, > 100 kHz	$\pm 5.0$ V
Offset compensation range	compensation of differential, common mode and single-ended offsets for each measurement mode	$\pm 16$ V
Offset compensation error	offset compensation setting = 0 V	no additional error
	offset compensation setting $\neq$ 0 V	$\pm 0.2$ % of setting $\pm 2$ 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.)
<b>Maximum nondestructive input voltage</b>		
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
<b>Termination voltage source</b>		
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. Specifications for input impedance, dynamic range, and maximum nondestructive input voltage apply. 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**

<b>Temperature</b>		
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
<b>Mechanical resistance</b>		
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
<b>EMC</b>		in line with EMC Directive 2004/108/EC, IEC/EN 61326-1 (table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011(class B)
<b>Calibration interval</b>		2 years
<b>Safety</b>		in line with IEC/EN 61010-1
<b>Mechanical data</b>		
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)
<b>Probe interface</b>		
Connector		Rohde & Schwarz probe interface

## R&S®RT-ZMA probe tip modules

<b>Frequency response</b>			
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.)		
<b>Step response</b>			
Rise time	with R&S®RT-ZM90 probe amplifier (9 GHz), calculated from bandwidth	<b>10 % to 90 %</b>	<b>20 % to 80 %</b>
	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	
<b>Input impedance</b>			
Input capacitance	with R&S®RT-ZMxx probe amplifier	<b>differential</b>	<b>single-ended</b>
	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	<b>differential</b>	<b>single-ended</b>
	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	<b>differential</b>	<b>single-ended</b>
	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.)
<b>Temperature</b>			
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	



## R&S®RT-ZA9 probe box to N/USB adapter

All parameters are valid for the probe box adapter only.

<b>Electrical data</b>		
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.)
<b>Mechanical data</b>		
Mating cycles	RPC-N	≥ 500 (meas.)
	Rohde & Schwarz probe interface	≥ 5000 (meas.)
<b>Interfaces</b>		
Connector 1		Rohde & Schwarz probe interface
Connector 2		RPC-N

## Ordering information

Designation	Type	Order No.
<b>Passive probes</b>		
8.0 GHz Transmission Line Probe, 10:1, 500 $\Omega$ , 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
<b>Active probes</b>		
1.0 GHz Active Voltage Probe, single-ended, 1 M $\Omega$ , 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 M $\Omega$ , 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 M $\Omega$ , 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 M $\Omega$ , 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 M $\Omega$ , 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 M $\Omega$ , 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.
<b>Differential probes</b>		
1.0 GHz Active Voltage Probe, differential, 1 M $\Omega$ , 0.6 pF Incl. R&S <sup>®</sup> ProbeMeter; micro button, R&S <sup>®</sup> RT-ZA15 external attenuator See R&S <sup>®</sup> RT-ZD20 for additional equipment included	R&S <sup>®</sup> RT-ZD10	1410.4715.02
1.5 GHz Active Voltage Probe, differential, 1 M $\Omega$ , 0.6 pF Incl. R&S <sup>®</sup> 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 <sup>®</sup> RT-ZD20	1410.4409.02
3.0 GHz Active Voltage Probe, differential, 1 M $\Omega$ , 0.6 pF See R&S <sup>®</sup> RT-ZD20 for equipment included	R&S <sup>®</sup> RT-ZD30	1410.4609.02
4.5 GHz Active Voltage Probe, differential, 1 M $\Omega$ , 0.4 pF Incl. R&S <sup>®</sup> 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 <sup>®</sup> RT-ZD40	1410.5205.02

Designation	Type	Order No.
<b>Modular probes</b>		
1.5 GHz Modular Probe Amplifier, differential, 400 k $\Omega$ , 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 k $\Omega$ , 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 k $\Omega$ , 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 k $\Omega$ , 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 $\Omega$ , 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.
<b>Accessories and sets</b>		
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





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R&S®RT-Zxx High-Bandwidth Probes

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