

R&S® RT-Zxx Oscilloscope 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

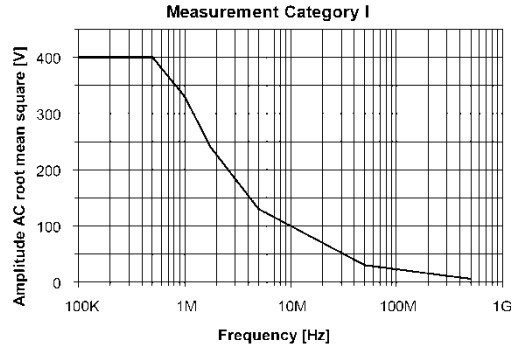
| Probe: R&S® | Base unit: R&S® | | | | | RT-ZA9 | Page |
|----------------------------|-----------------|---------|-------|-------|-------|--------|------|
| | RTM | RTO | | | | | |
| | | 600 MHz | 1 GHz | 2 GHz | 4 GHz | | |
| Passive probes | | | | | | | |
| RT-ZP10 | | ● | ● | ● | ● | | 5 |
| RTM-ZP10 | ● | | | | | | |
| RT-ZH10 | ● | ● | ● | ● | ● | | 8 |
| RT-ZH11 | ● | ● | ● | ● | ● | | |
| RT-ZZ80 | ○ | ● | ● | ● | ● | ○ | 11 |
| Active probes | | | | | | | |
| RT-ZS10E | ● | ● | ○ | ○ | ○ | ● | 13 |
| RT-ZS10 | ● | ● | ○ | ○ | ○ | ● | |
| RT-ZS20 | ○ | ○ | ● | ○ | ○ | ● | |
| RT-ZS30 | ○ | ○ | ○ | ● | ○ | ● | |
| RT-ZS60 | ○ | ○ | ○ | ○ | ● | ● | |
| Differential probes | | | | | | | |
| RT-ZD01 | ● | ● | ● | ● | ● | | 20 |
| RT-ZD10 | ● | ● | ○ | ○ | ○ | ● | 23 |
| RT-ZD20 | ○ | ○ | ● | ○ | ○ | ● | |
| RT-ZD30 | ○ | ○ | ○ | ● | ○ | ● | |
| RT-ZD40 | ○ | ○ | ○ | ○ | ● | ● | 30 |
| Current probes | | | | | | | |
| RT-ZC10 | ● | ● | ● | ● | ● | | 33 |
| RT-ZC20 | ● | ● | ● | ● | ● | | |

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

R&S[®]RT-ZP10, R&S[®]RTM-ZP10 passive probes

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1 M Ω . See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

| | | R&S [®] RT-ZP10 | R&S [®] RTM-ZP10 |
|------------------------------------|--|---|---------------------------|
| Step response | | | |
| Rise time | system, 10 % to 90 % | 700 ps (meas.) | |
| Frequency response | | | |
| Bandwidth | system, -3 dB, starting at DC | > 500 MHz | |
| Input impedance | | | |
| DC input resistance | system | 10 M Ω \pm 1 % | |
| Input capacitance | system | 9.5 pF (meas.) | |
| DC characteristics | | | |
| Attenuation | system, automatically corrected on base unit display | 10:1 | |
| Attenuation error | probe only, with ideal 1 M Ω load impedance | \pm 2 % | |
| Attenuation voltage coefficient | | \pm 0.0025 %/V (meas.) | |
| Maximum rated input voltage | | | |
| Continuous voltage | derated, see figure on page 6 | 400 V (RMS), CAT I 300 V (RMS), CAT II | |
| Transient overvoltage | | \pm 1250 V | |
| Base unit | | | |
| Use with | | R&S [®] RTO | R&S [®] RTM |
| Input capacitance | must be compensated by probe's LF compensation | 5 pF to 20 pF | |
| Input coupling | | 1 M Ω AC/DC | |



R&S®RT-ZP10, R&S®RTM-ZP10 maximum rated sine-wave root mean square voltage versus frequency.

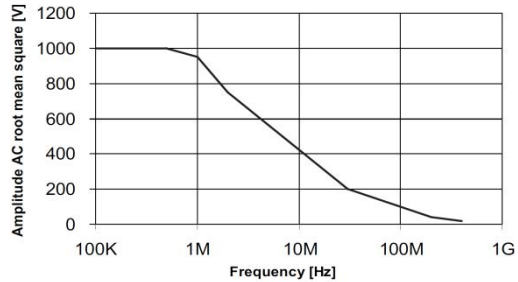
General data

| | | |
|------------------------|-----------------------------|---|
| 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 15000 m |
| Safety | | in line with Low Voltage Directive 2006/95/EC, IEC/EN 61010-31 (pollution degree 2) |
| Mechanical data | | |
| Dimensions | diameter of probe tip | 2.5 mm (0.1 in) |
| | cable length | approx. 1.3 m (51 in) |
| Weight | probe only | approx. 48 g (0.1 lb) |

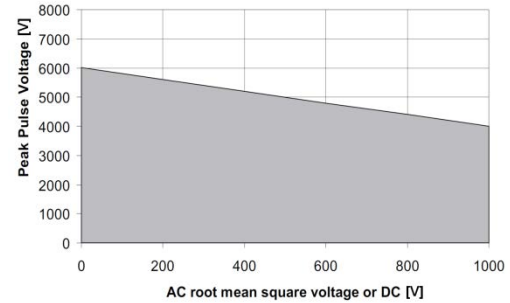
R&S[®]RT-ZH10/-ZH11 high-voltage probes

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1 M Ω . See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

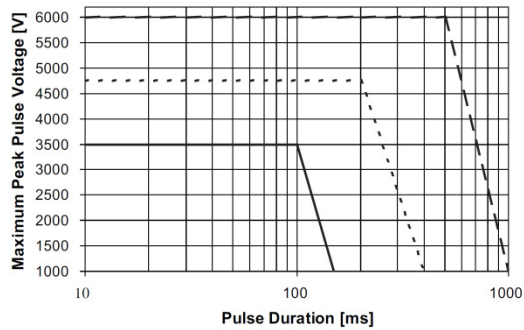
| | | R&S [®] RT-ZH10 | R&S [®] RT-ZH11 |
|------------------------------------|--|--------------------------|--------------------------|
| Step response | | | |
| Rise time | system, 10 % to 90 % | 900 ps (meas.) | |
| Frequency response | | | |
| Bandwidth | system, -3 dB, starting at DC | > 400 MHz | |
| Input impedance | | | |
| DC input resistance | system | 50 M Ω \pm 1 % | |
| Input capacitance | system | 7.5 pF (meas.) | |
| DC characteristics | | | |
| Attenuation | system, automatically corrected on base unit display | 100:1 | 1000:1 |
| Attenuation error | probe only, with ideal 1 M Ω load impedance | \pm 2 % | |
| Attenuation voltage coefficient | | \pm 0.0005 %/V (meas.) | |
| Maximum rated input voltage | | | |
| Continuous voltage | derated, see figures on page 9 | 1000 V (RMS), CAT II | |
| Transient overvoltage | | \pm 4000 V | |
| Base unit | | | |
| Input capacitance | must be compensated by probe's LF compensation | 5 pF to 20 pF | |
| Input coupling | | 1 M Ω AC/DC | |



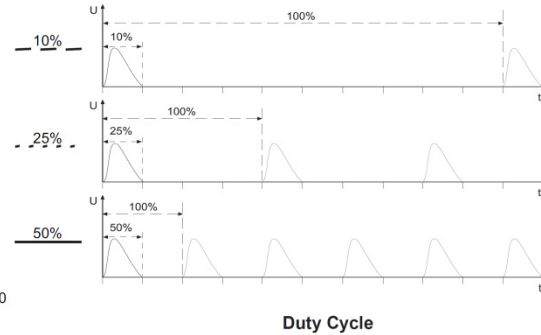
R&S® RT-ZH10/-ZH11 maximum rated sine-wave root mean square voltage versus frequency, CAT I.



R&S® RT-ZH10/-ZH11 maximum root mean square voltage versus peak pulse voltage, CAT I.



R&S® RT-ZH10/-ZH11 maximum pulse derating, CAT I.



General data

| | | |
|------------------------|-----------------------------|---|
| 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 15000 m |
| Safety | | in line with Low Voltage Directive 2006/95/EC, IEC/EN 61010-31 (pollution degree 2) |
| Mechanical data | | |
| Dimensions | diameter of probe tip | 5 mm (0.2 in) |
| | cable length | approx. 2 m (79 in) |
| Weight | probe only | approx. 67 g (0.15 lb) |

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 $\Omega \pm 1 \%$ |
| Input capacitance | | 0.3 pF (meas.) |
| DC characteristics | | |
| Attenuation | system | 10:1 |
| Attenuation error | probe only, with ideal 50 Ω load impedance | $\pm 1 \%$ |
| Maximum nondestructive input voltage | | |
| Continuous voltage | | 20 V (RMS) |
| ESD tolerance | human body model | 2 kV (meas.) |

General data

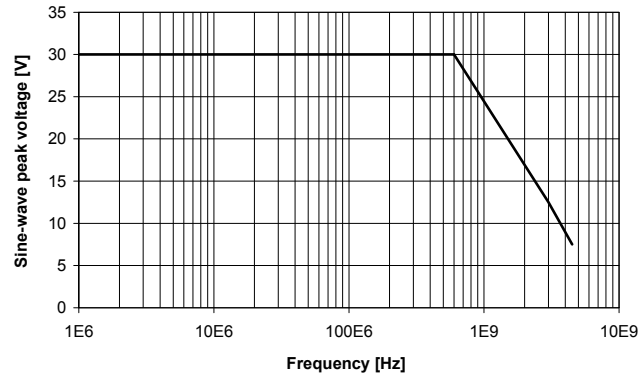
| | | |
|-----------------------------|-----------------------------|--|
| Temperature | | |
| Temperature loading | operating temperature range | 0 °C to +50 °C |
| | storage temperature range | -40 °C to +70 °C |
| Climatic loading | | +25 °C/+40 °C cyclic at 95 % relative humidity without condensation, 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 |
| Mechanical data | | |
| Dimensions | probe head (L × W × H) | approx. 68 mm × 12 mm × 7.5 mm (2.68 in × 0.47 in × 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) |

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 ≠ 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 on page 15 | 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

| | | |
|------------------------------|-----------------------------|--|
| 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 2004/108/EC, IEC/EN 61326-1 (class B, table 2), IEC/EN 61326-2-1, CISPR 11/EN 55011 |
| Calibration interval | | 2 years |
| Safety | | in line with IEC/EN 61010-1 |
| Mechanical data | | |
| Dimensions | probe head (W × H × L) | approx. 12 mm × 7.5 mm × 68 mm (0.47 in × 0.3 in × 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) |

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 19 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 19 | 30 V |
| ESD tolerance | human body model | 2 kV (meas.) |

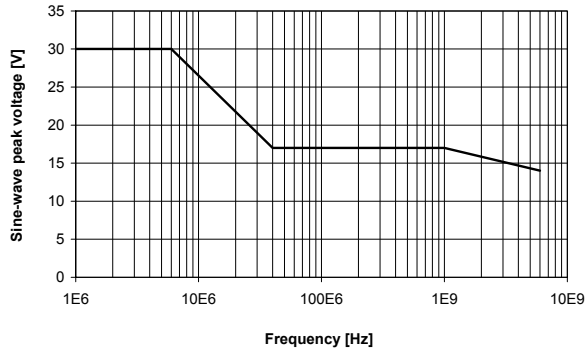
R&S® ProbeMeter

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. The R&S®RT-ZS60 probe is not equipped with an R&S®ProbeMeter.

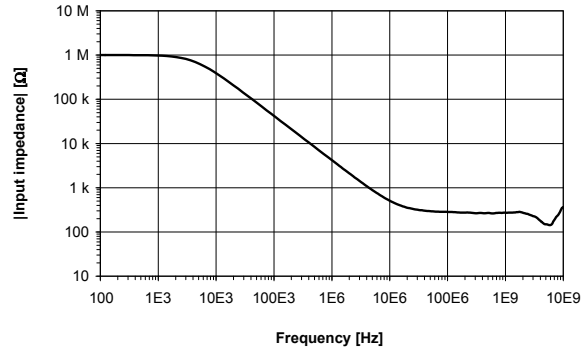
| | | |
|--------------------|------------------|-----------------------------------|
| Measurement error | +15 °C to +35 °C | ±0.1 % of reading ± 2 mV |
| | 0 °C to +50 °C | ±0.2 % of reading ± 4 mV |
| Temperature drift | | ±50 ppm/°C of reading ± 100 µV/°C |
| 50/60 Hz rejection | | > 87 dB |
| Integration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

General data

See page 16.



Maximum nondestructive sine-wave peak voltage versus frequency.



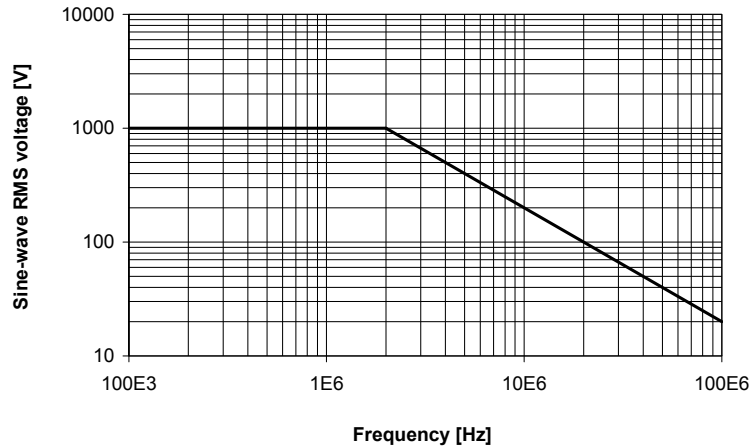
Input impedance versus frequency.

R&S[®] RT-ZD01 high-voltage differential probe

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1 M Ω . See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

| | | R&S[®] RT-ZD01 | |
|----------------------------|--|------------------------------------|------------------------|
| Attenuation setting | | 100:1 | 1000:1 |
| Step response | | | |
| Rise time | 10 % to 90 % | < 3.5 ns (meas.) | |
| Frequency response | | | |
| Bandwidth | starting at DC, calculated from 0.35/rise time | 100 MHz | |
| Common mode rejection | DC to 100 Hz | 80 dB (meas.) | |
| | 100 Hz to 1 MHz | 50 dB (meas.) | |
| Input impedance | | | |
| DC input resistance | differential (between signal sockets) | 8 M Ω | |
| | single-ended (each signal socket to ground) | 4 M Ω | |
| Input capacitance | differential (between signal sockets) | 3.5 pF (meas.) | |
| | single-ended (each signal socket to ground) | 7 pF (meas.) | |
| DC characteristics | | | |
| Attenuation error | | ± 2 % | |
| Zero error | | ± 0.5 V (meas.) | ± 5 V (meas.) |
| Dynamic range | | | |
| Differential input | between signal sockets | ± 140 V | ± 1400 V |
| Operating voltage window | each signal socket to ground | ± 1400 V | |
| Noise voltage | referenced to probe input | 90 mV (RMS) (meas.) | 0.9 V (RMS) (meas.) |

| Maximum rated input voltage | | |
|------------------------------------|---|-----------------------|
| Continuous voltage | derated, see figure on page 21, each signal socket to ground | 1000 V (RMS), CAT III |
| Base unit | | |
| Input coupling | | 1 M Ω AC/DC |



Maximum rated sine-wave root mean square voltage versus frequency.

General data

| | | |
|-----------------------------|-----------------------------|---|
| Temperature | | |
| Temperature loading | operating temperature range | 0 °C to +40 °C |
| | storage temperature range | -30 °C to +70 °C |
| Climatic loading | | 85 % relative humidity |
| Altitude | operation | up to 2000 m |
| | transport | up to 4600 m |
| EMC | | in line with EMC Directive 2004/108/EC, IEC/EN 61326-1, IEC/EN 61326-2-2 |
| Calibration interval | | 2 years |
| Safety | | in line with Low Voltage Directive 2006/95/EC, IEC/EN 61010-31 (pollution degree 2) |
| Mechanical data | | |
| Dimensions | probe head (L × W × H) | approx. 207 mm × 83 mm × 38 mm (8.1 in × 3.2 in × 1.5 in) |
| | length of input leads | approx. 30 cm (12 in) |
| | length of probe cable | approx. 90 cm (35 in) |
| Weight | probe only | approx. 500 g (1.1 lb) |

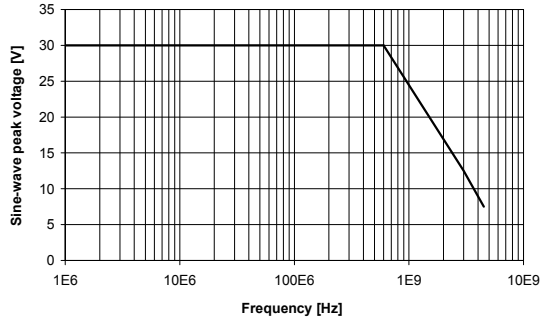
R&S® RT-ZD10/-ZD20/-ZD30 differential probes

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.

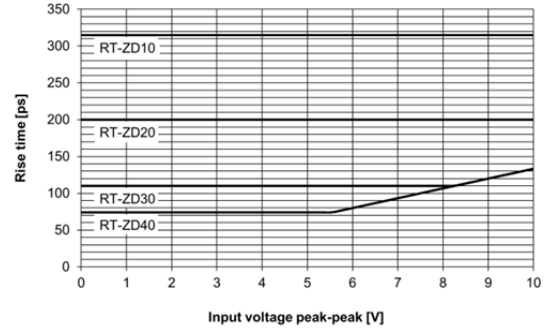
| | | R&S® RT-ZD10 | R&S® RT-ZD20 | R&S® RT-ZD30 |
|---------------------------|---|-----------------|----------------|----------------|
| Step response | | | | |
| Rise time | 10 % to 90 % | < 350 ps | < 250 ps | < 135 ps |
| Flatness | starting 2 ns after edge | 2 % (meas.) | | |
| Slew rate | referenced to probe input, see figure on page 25 | 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) |
| 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) ¹ |
| CM offset compensation range ¹ | | ±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 25 | 30 V |
| ESD tolerance | human body model, each signal socket to ground | 8 kV (meas.) |

¹ Available starting with serial number 200000. 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.

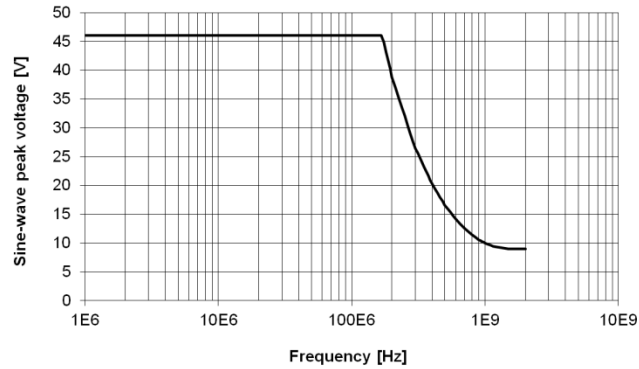
| | | |
|---|---|-----------------------------------|
| Measurement error, differential mode and common mode | +15 °C to +35 °C | ±0.1 % of reading ± 2 mV |
| | 0 °C to +50 °C | ±0.2 % of reading ± 4 mV |
| Temperature drift | | ±40 ppm/°C of reading ± 100 µV/°C |
| Common mode rejection | for differential 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 | | |
| 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 | ±70 V |
| Maximum rated input voltage | | |
| DC voltage | each signal socket to ground | ±70 V |
| AC voltage | each signal socket to ground, derated, see figure on page 29 | 33 V (RMS) |
| Transient peak voltage | each signal socket to ground | ±46 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 16.

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 (typ.) |
| Flatness | starting 2 ns after edge | 2 % (meas.) |
| Slew rate | referenced to probe input, see figure on page 25 | 60 V/ns (meas.) |
| Propagation delay | | 5.5 ns (meas.) |
| Frequency response | | |
| Bandwidth | starting at DC, calculated from rise time system bandwidth with R&S [®] RTO1044 | 4.5 GHz, 5.5 GHz (typ.) 4.0 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) ¹ |
| CM offset compensation range ¹ | | ±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 25 | 30 V |
| ESD tolerance | human body model, each signal socket to ground | 8 kV (meas.) |

¹ Available starting from serial number 200000. Older probes have ±5 V operating voltage window and no cm offset compensation.

Version 10.00, August 2013

R&S® ProbeMeter

See page 26.

General data

See page 16.

R&S® RT-ZC10/-ZC20 current probes

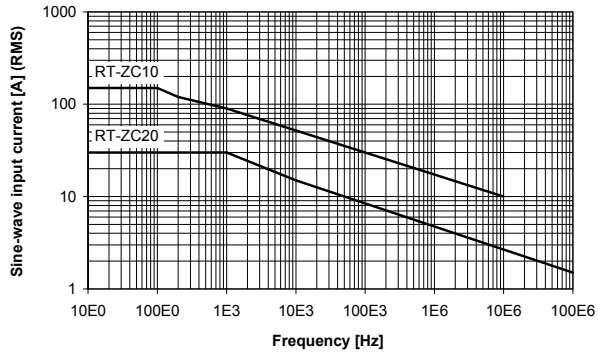
All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1 MΩ. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

| | | R&S® RT-ZC10 | R&S® RT-ZC20 |
|---|---|---|--------------------|
| Step response | | | |
| Rise time | 10 % to 90 % | 35 ns (meas.) | 3.5 ns (meas.) |
| Frequency response | | | |
| Bandwidth | –3 dB, starting at DC | 10 MHz (meas.) | 100 MHz (meas.) |
| Input impedance | | see figure on page 35 | |
| DC characteristics | | | |
| Sensitivity | | 0.01 V/A | 0.1 V/A |
| Sensitivity error (at +23 °C ± 5 °C) | up to 150 A (RMS) | ±1 % | |
| | up to ±300 A | ±2 % (meas.) | |
| | up to 30 A (RMS) | | ±1 % |
| | up to ±50 A | | ±2 % (meas.) |
| Temperature drift, sensitivity | 0 °C to +40 °C | ±2 % (meas.) | |
| Zero error | referenced to probe input after demagnetizing and zero adjustment | ±100 mA (meas.) | ±10 mA (meas.) |
| Measurement due to external magnetic fields | 400 A/m magnetic field, DC or 60 Hz, referenced to probe input | < 150 mA (meas.) | < 5 mA (meas.) |
| Maximum rated input | | | |
| Maximum continuous current | derated, see figures on page 35 | 150 A (RMS) | 30 A (RMS) |
| Maximum transient current | peak (within max. continuous current) | ±300 A | ±50 A |
| | single pulse, pulse width < 30 µs | ±500 A | ±50 A |
| Maximum circuit voltage | insulated conductor, voltage to earth | 600 V (RMS), CAT II 300 V (RMS), CAT III | 300 V (RMS), CAT I |

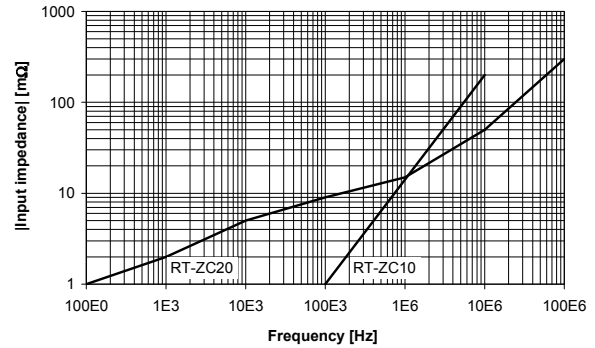
| | | | |
|----------------|---|---------------|--------------|
| Other | | | |
| Noise | 20 MHz measurement bandwidth, referenced to probe input | 25 mA (RMS) | 2.5 mA (RMS) |
| Supply voltage | external power supply necessary, e.g. R&S®RT-ZA13 | ±12 V ± 0.5 V | |
| Maximum power | | 5.5 W | 5.3 W |
| Interface | | BNC | BNC |

General data

| | | R&S® RT-ZC10 | R&S® RT-ZC20 |
|-----------------------------|-----------------------------|--|--|
| Temperature | | | |
| Temperature loading | operating temperature range | 0 °C to +40 °C | |
| | storage temperature range | -10 °C to +50 °C | |
| Climatic loading | | 80 % relative humidity | |
| Altitude | operation | up to 2000 m | |
| Safety | | in line with EN 61010-2-032 | |
| EMC | | in line with EN 61326-1 (class B equipment) | |
| Calibration interval | | 2 years | |
| Mechanical data | | | |
| Dimensions | max. conductor diameter | 20 mm (0.79 in) | 5 mm (0.2 in) |
| | cable length, probe | approx. 2 m (78.7 in) | approx. 1.5 m (59 in) |
| | cable length, power supply | approx. 1 m (39.4 in) | approx. 1 m (39.4 in) |
| | probe head (W × H × L) | approx. 69 mm × 27 mm × 176 mm (2.72 in × 1.06 in × 6.93 in) | approx. 18 mm × 40 mm × 175 mm (0.71 in × 1.57 in × 6.89 in) |
| Weight | probe only | approx. 500 g (1.1 lb) | approx. 240 g (0.53 lb) |



Maximum rated sine-wave root mean square input current versus frequency.



Insertion impedance (meas.).

R&S[®] RT-ZA13 probe power supply

| Electrical data | | |
|---------------------------|---------------------------|--------------------------------------|
| Number of channels | | 4 |
| Output voltage | | $\pm 12 \text{ V} \pm 0.5 \text{ V}$ |
| Maximum output current | sum total of all channels | 2.5 A |
| Power requirements | | 100 V to 240 V, 50/60 Hz |
| Maximum rated input power | | 170 W |

General data

| | | |
|------------------------|-----------|--|
| Safety | | in line with EN 61010-1 |
| EMC | | in line with EN 61326-1 (class B equipment), EN 61000-3-2, EN 61000-3-3 |
| Mechanical data | | |
| Dimensions | W × H × L | approx. 80 mm × 119 mm × 200 mm (3.1 in × 4.7 in × 7.9 in) |
| Weight | | approx. 1.1 kg (2.4 lb) |
| Connector | | LEMO FFA.OS.304.CLAC44Z |

Ordering information

| Designation | Type | Order No. |
|---|---------------------------|--------------|
| Passive probes | | |
| 500 MHz Passive Voltage Probe, 10:1, 10 M Ω , 9.5 pF, 400 V (RMS) Incl. adjustment tool; coding rings (set) 3 \times 4 colors; ground lead 15 cm; ground spring 2.5; solid tip CuBe 0.5 mm; sprung hook 2.5; spring tip gold-plated 0.5 mm; operating manual | R&S [®] RT-ZP10 | 1409.7550.00 |
| 500 MHz Passive Voltage Probe, 10:1, 10 M Ω , 9.5 pF, 400 V (RMS) See R&S [®] RT-ZH10 for equipment included | R&S [®] RTM-ZP10 | 1409.7708.02 |
| 400 MHz High-Voltage Probe, passive, 100:1, 50 M Ω , 7.5 pF, 1 kV (RMS) Incl. adjustment tool; BNC adapter 5.0-L; coding rings (set) 3 \times 4 colors; flexible adapter 5.0-L; ground lead 22 cm (2); ground lead 22 cm to 4 mm banana plug; insulating cap 5.0-L; operating manual; protection cap 5.0-L; safety alligator clip (2); solid tip 0.8 mm (5); spring tip 0.8 mm (5); sprung hook 5.0-L (2) | R&S [®] RT-ZH10 | 1409.7720.02 |
| 400 MHz High-Voltage Probe, passive, 1000:1, 50 M Ω , 7.5 pF, 1 kV (RMS) See R&S [®] RT-ZH10 for equipment included | R&S [®] RT-ZH11 | 1409.7737.02 |
| 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 |

| Designation | Type | Order No. |
|--|---------------------------|--------------|
| Active probes | | |
| 1.0 GHz Active Voltage Probe, single-ended, 1 M Ω , 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 Ω , 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 Ω , 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 Ω , 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 Ω , 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 | | |
| 100 MHz, 1.4 kV High-Voltage Probe, differential, 1 kV RMS (CAT III) Incl. sprung hook 4 mm (2); USB power cord; carrying case; operating manual | R&S®RT-ZD01 | 1422.0703.02 |
| 1.0 GHz Active Voltage Probe, differential, 1 M Ω , 0.6 pF Incl. R&S®ProbeMeter; micro button, 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 |
| Current probes | | |
| 10 MHz Current Probe, AC/DC, 0.01 V/A, 150 A (RMS) | R&S®RT-ZC10 | 1409.7750.02 |
| 100 MHz Current Probe, AC/DC, 0.1 V/A, 30 A (RMS) | R&S®RT-ZC20 | 1409.7766.02 |

| Designation | Type | Order No. |
|--|------------|--------------|
| Accessories and sets | | |
| Accessory Kit for R&S®RT-ZP10, R&S®RTM-ZP10 passive voltage probes Contains: adjustment tool; BNC adapter 2.5; coding rings (set) 3 × 4 colors; dual adapter 2.5 mm to 0.8 mm sockets; ground blade 2.5; copper pad, self adhesive (2 cm × 2 cm) (0.79 in × 0.79 in) (2); ground lead 15 cm; ground spring 2.5 (5); IC-cap 2.5 0.5 mm pitch green; IC-cap 2.5 0.65 mm pitch blue; IC-cap 2.5 0.8 mm pitch grey; IC-cap 2.5 1.0 mm pitch brown; IC-cap 2.5 01.27 mm pitch black; insulating cap 2.5; solid tip CuBe 0.5 mm (5); sprung hook 2.5; spring tip gold-plated 0.5 mm (5) | R&S®RT-ZA1 | 1409.7566.02 |
| 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 |

| Designation | Type | Order No. |
|--|--------------------------|------------------|
| 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 |
| Probe Power Supply | R&S [®] RT-ZA13 | 1409.7789.02 |
| External Attenuator Incl. adjustment tool | R&S [®] RT-ZA15 | 1410.4744.02 |

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