R&S®RTH1002
R&S®RTH1004
Scope Rider
Specifications

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ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 06.00

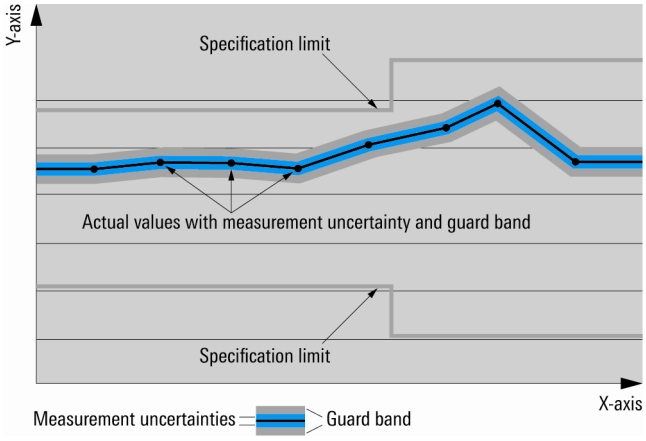
CONTENTS

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
- All internal automatic adjustments performed, if applicable

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 <, ≤, >, ≥, ±, 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.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: “parameter: value”.

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

Base unit

Vertical system

Input channels	R&S®RTH1002	2 oscilloscope channels, 1 multimeter
	R&S®RTH1004	4 oscilloscope channels
	All inputs are floating and fully isolated in line with CAT IV 600 V, CAT III 1000 V safety rating. See figure regarding isolation rating on page 13.	
Input impedance		1 MΩ ± 1 % || 12 pF ± 2 pF (meas.)
Analog bandwidth (–3 dB)	R&S®RTH1002 and R&S®RTH1004	≥ 60 MHz
	R&S®RTH1002 with -B221 option and R&S®RTH1004 with -B241 option	≥ 100 MHz
	R&S®RTH1002 with -B222 option and R&S®RTH1004 with -B242 option	≥ 200 MHz
	R&S®RTH1002 with -B223 option and R&S®RTH1004 with -B243 option	≥ 350 MHz [1]
	R&S®RTH1002 with -B224 option and R&S®RTH1004 with -B244 option	≥ 500 MHz [1]
	Measurement of analog bandwidth at input sensitivities ≥ 20 V/div is limited by input voltage rating versus frequency, see figure “Input rating: Maximum signal voltage at oscilloscope input” on page 13.	
Lower frequency limit (–3 dB) at AC coupling		< 8 Hz (meas.)
Bandwidth limits		1/2/5/10/20/50/100/200/500 kHz, 1/2/5/10/20/50 MHz
	only with R&S®RTH-B222, -B242, -B223, -B243, -B224, -B244 options	100 MHz
	only with R&S®RTH-B223, -B243, -B224, -B244 options	200 MHz
Rise time (calculated)	R&S®RTH1002 and R&S®RTH1004	< 5.8 ns
	R&S®RTH1002 with -B221 option and R&S®RTH1004 with -B241 option	< 3.5 ns
	R&S®RTH1002 with -B222 option and R&S®RTH1004 with -B242 option	< 1.75 ns
	R&S®RTH1002 with -B223 option and R&S®RTH1004 with -B243 option	< 1 ns [2]
	R&S®RTH1002 with -B224 option and R&S®RTH1004 with -B244 option	< 700 ps [2]
Vertical resolution of overall system		9 bit
DC gain accuracy	offset and position set to zero, after self-alignment	
	input sensitivity > 5 mV/div	±1.5 %
	input sensitivity > 2 mV/div to 5 mV/div	±2 %
	input sensitivity 2 mV/div	±2.5 %
Input coupling		DC, AC
Input sensitivity	in steps of 1, 2, 4, 5 in each decade	2 mV/div to 100 V/div
Maximum input voltage	at BNC inputs	CAT IV 300 V (RMS), 424 V (peak), derates at 20 dB/decade to 5 V (RMS) above 500 kHz (see figure “Input rating: Maximum signal voltage at oscilloscope input” on page 13)
	with R&S®RT-ZI10 or R&S®RT-ZI11 probe	CAT IV 600 V, CAT III 1000 V, derating in line with probe specification
Position range		±4 div
Offset range	input sensitivity	
	≥ 40 V/div	0
	≥ 1 V/div to ≤ 20 V/div	±200 V
	≤ 500 mV/div	±4 V
Offset accuracy	after self-alignment	±(0.5 % × |net offset| + 0.1 div × input sensitivity + 1.5 mV) (net offset = offset – (position × input sensitivity))

[1] ≥ 200 MHz (meas.) for input sensitivities ≥ 20 V/div.

[2] < 1.75 ns (calculated) for input sensitivities ≥ 20 V/div.

DC measurement accuracy	after adequate suppression of measurement noise by using high-resolution sampling mode or waveform averaging or a combination of both	±(DC gain accuracy × |reading – net offset| + offset accuracy)
Channel-to-channel isolation (each channel at same input sensitivity)	input frequency < analog bandwidth	> 40 dB (meas.)

Horizontal system

Timebase range		selectable between 1 ns/div and 500 s/div
Channel deskew		±100 ns
Reference position		10 %, 50 % or 90 % of measurement display area
Trigger offset range	max.	at least 2 s or 2000 screen widths at most 100 000 s
	min.	right edge of measurement display area
Modes		normal, roll
Timebase accuracy		±10 ppm

Acquisition system

Maximum realtime sampling rate	R&S®RTH1004	1 channel with 5 Gsample/s
		2 channels with 2.5 Gsample/s
		4 channels with 1.25 Gsample/s
	R&S®RTH1002	1 channel with 5 Gsample/s
		2 channels with 2.5 Gsample/s
Maximum acquisition length	at sampling rate of 5 Gsample/s	500 ksample
	at sampling rate of 2.5 Gsample/s	250 ksample for each channel
	at sampling rate of 1.25 Gsample/s	125 ksample for each channel
Acquisition modes	sample	first sample in decimation interval
	high resolution	average value of samples in decimation interval
	peak detect	largest and smallest sample in decimation interval
	envelope	envelope of acquired waveforms; for timebases requiring decimation, peak-detect is used.
	average	average of acquired waveforms; for timebases requiring decimation, high resolution is used. Number of averaged waveforms can be power of 2 from 2 to 8192.
Realtime waveform acquisition rate	max.	50 000 waveforms/s

Trigger system

(see also R&S®RTH-B1 mixed signal option)

Trigger level	range	±4 div from center of screen
Trigger modes		auto, normal, single
Trigger sources	R&S®RTH1004	CH1, CH2, CH3, CH4
	R&S®RTH1002	CH1, CH2
Hold-off range	time	8 ns to 10 s, fixed and random
	events	1 to 1 000 000 000 events

Trigger types		
Edge	triggers on specified slope (positive, negative or either) and level	
Glitch	triggers on glitches of positive, negative or either polaritiy that are shorter or longer than specified width	
	glitch width	200 ps to 5000 s
Width	triggers on positive or negative pulse of specified width; width can be shorter, longer, inside or outside the interval	
	pulse width	200 ps to 5000 s

TV/video	triggers on baseband analog progressive and interlaced video signals PAL, NTSC, SECAM, PAL-M, SDTV and HDTV broadcast standards (SDTV and HDTV require R&S®RTH-K19 option)	
	trigger events	all fields, odd fields, even fields, all lines, line number
Pattern	triggers when a logical combination (and, nand, or, nor) of the input channels stays true for a period of time shorter, longer, inside or outside a specified range (requires R&S®RTH-K19 option)	
	pattern time	800 ps to 5000 s
State	triggers when a logical combination (and, nand, or, nor) of the input channels stays true at a slope (positive, negative or either) in one selected channel; state values may be high (H), low (L) or don't care (X) (requires R&S®RTH-K19 option)	
Runt	triggers on pulse of positive, negative or either polarity that crosses one threshold but fails to cross a second threshold before crossing the first one again; runt pulse width can be arbitrary, shorter, longer, inside or outside the interval (requires R&S®RTH-K19 option)	
	runt pulse width	200 ps to 5000 s
Slew rate	triggers when the time required by a signal edge to toggle between user-defined upper and lower voltage levels is shorter, longer, inside or outside the interval; edge slope may be positive, negative or either (requires R&S®RTH-K19 option)	
	toggle time	200 ps to 5000 s
Window	triggers when signal enters or exits a specified voltage range; triggers also when signal stays inside or outside the voltage range for a specified period of time (requires R&S®RTH-K19 option)	
	window time	200 ps to 5000 s
Data2clock	triggers on setup time and hold time violations between clock and data present on any two input channels; monitored time interval may be specified by the user with a step size of 800 ps in the range from –124 ns to 124 ns around a clock edge (requires R&S®RTH-K19 option)	
Serial pattern	triggers on serial data pattern up to 32 bit clocked by one input channel; pattern bits may be high (H), low (L) or don't care (X); clock edge slope may be positive, negative or either (requires R&S®RTH-K19 option)	
	max. data rate	< 250 Mbps
Timeout	triggers when signal stays high, low or unchanged for a specified period of time (requires R&S®RTH-K19 option)	
	timeout	200 ps to 5000 s
Interval	triggers when time between two consecutive edges of same slope (positive or negative) is shorter, longer inside or outside a specified range (requires R&S®RTH-K19 option)	
	interval time	200 ps to 5000 s
Protocol	see R&S®RTH-K1 and R&S®RTH-K2 options	

Waveform measurements

(see also R&S®RTH-B1 mixed signal option)

Automatic measurements	total number of active measurements	4
	sources	
	R&S®RTH1004	CH1, CH2, CH3, CH4, math, reference
	R&S®RTH1002	CH1, CH2, math, reference
	time based measurements	period, frequency, rise time, fall time, positive pulse width, negative pulse width, positive duty cycle, negative duty cycle, delay, phase
	amplitude based measurements	mean value, RMS value, crest factor, standard deviation, minimum, maximum, peak-to-peak, base level, top level, amplitude, overshoot, preshoot, AC, DC, AC+DC
	count based measurements	count positive pulses, count negative pulses, count rising edges, count falling edges
	power based measurements	active power, apparent power, reactive power, power factor
Cursor measurements	sources	analog channels, math and reference waveforms
	vertical	2 cursors showing time, time difference and inverse time difference (frequency)
	horizontal	2 cursors showing voltage and voltage difference
	tracking	vertical cursor additionally showing voltage and voltage difference of selected waveform
	measure	defines gate for automatic measurements

Mask testing

Sources	R&S®RTH1004	CH1, CH2, CH3, CH4, math
	R&S®RTH1002	CH1, CH2, math
Mask definition		tolerance tube based on analog input waveform or math waveform
Number of simultaneous mask tests		up to 5
Actions on violation		none, beep, stop

Waveform maths

Number of math waveforms		1
Functions		addition, subtraction, multiplication, square, absolute value, inverse
Sources	R&S®RTH1004	CH1, CH2, CH3, CH4
	R&S®RTH1002	CH1, CH2

Display characteristics

Diagram types	Yt, XY, zoom
XY mode	parallel display of XY diagram, Xt and Yt
Zoom	horizontal zoom with overview bar graph showing location of zoom window
Interpolation	sin(x)/x
Persistence	50 ms to 10 s; infinite
Reference signals	up to 1 reference signal

Protocol and logic

Bus trigger and decode	number of bus signals	1
	bus types	
	R&S®RTH-K1 option	SPI, I^2C
	R&S®RTH-K2 option	UART
	display types	decoded bus, logical signal, event table
	position and size	size and position on screen selectable
	data format of decoded bus	hex, decimal, binary

Data logger

Number of simultaneous logging channels		4
Sources	R&S®RTH1004	
	oscilloscope mode	up to 4 waveform measurements
	digital voltmeter mode	up to 4 digital voltmeter measurements
	R&S®RTH1002	
	oscilloscope mode	up to 4 waveform measurements
	multimeter mode	multimeter measurement
Timebase range		selectable between 5 s/div and 4 days/div
Measurement speed		1/2/5 measurements/s
Memory depth		2 Msample per logging channel
Slot memory		internal memory for up to 10 sets of data logger results; slots results can be reset, loaded and exported.

Digital voltmeter (DVM)

Sources	R&S®RTH1004	CH1, CH2, CH3, CH4
Measurements	voltage	DC, AC, AC+DC with indication of max., min. and average
Number of active measurements		4
Maximum resolution		999 counts, 3 digits

Digital multimeter (DMM)

Sources	R&S®RTH1002	multimeter, 4 mm banana inputs, fully isolated from scope inputs, interfaces and ground
Measurements	voltage	DC, AC, AC+DC
	current	with current clamp or shunt
	resistance	
	continuity test	
	diode test	
	temperature	resistance measurement with PT100, PT500 or PT1000 platinum sensors (recommended accessory R&S®HZ812 PT100 temperature probe)
	frequency	
	capacitance	
Number of active measurements		1
Maximum resolution		10000 counts, 4 digits
Input impedance (voltage DC, AC, AC+DC)	1 V, 10 V	11.11 MΩ (nom.)
	100 V	10.10 MΩ (nom.)
	1000 V	10.01 MΩ (nom.)
Input capacitance		< 100 pF
Common mode rejection ratio (CMRR)	DC and 50 Hz/60 Hz ± 0.1 %	> 100 dB (meas.)

Normal mode rejection ratio (NMRR)	50 Hz/60 Hz ± 0.1 %	> 60 dB (meas.)
Maximum input voltage		CAT III 1000 V (RMS), 1414 V (peak), CAT IV 600 V (RMS), 849 V (peak), derates at 20 dB/decade above 50 kHz (see figure “Input rating: Maximum signal voltage at meter input” on page 13)
Specified accuracy temperature range	rated accuracy applies after 1 h stabilization	+23 °C ± 5 °C
Temperature coefficient	from 0 °C to +18 °C or +28 °C to +50 °C	0.1 × specified accuracy/°C
Voltage ranges	10 % overrange except of 1000 V range	1.0000 V, 10.000 V, 100.00 V, 1000.0 V
DC accuracy	1 V	± (0.05 % + 0.05 % of range)
	10 V, 100 V	± (0.05 % + 0.03 % of range)
	1000 V	± (0.08 % + 0.03 % of range)
AC accuracy (AC coupling)	1 V, 10 V, 100 V	
	10 Hz to 20 kHz	± (0.2 % + 0.05 % of range)
	20 kHz to 100 kHz	± (0.5 % + 0.05 % of range)
	1000 V	
	10 Hz to 10 kHz	± (0.2 % + 0.05 % of range)
Resistance ranges	10 % overrange	1.0000 kΩ, 10.000 kΩ, 100.00 kΩ, 1.0000 MΩ, 10.000 MΩ, 100.00 MΩ
Resistance accuracy	1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ	± (0.08 % + 0.03 % of range)
	10 MΩ	± (0.2 % + 0.05 % of range)
	100 MΩ	± (1.5 % + 0.1 % of range)
Resistance test currents	1 kΩ	1.004 mA (nom.)
	10 kΩ	101.3 µA (nom.)
	100 kΩ	10.13 µA (nom.)
	1 MΩ	1.003 µA (nom.)
	10 MΩ	100.3 nA (nom.)
	100 MΩ	100.3 nA || 11.11 MΩ (nom.)
Continuity range	test current 1.004 mA (nom.), continuous beep when resistance < 10 Ω	1.0000 kΩ
Continuity accuracy		± (0.1 % + 0.5 Ω)
Diode test ranges	test current 1.004 mA	3.000 V
Diode test accuracy		± (0.1 % + 3 mV)
Capacity ranges	10 % overrange	10.000 nF, 100.00 nF, 1.0000 µF, 10.000 µF, 100.00 µF, 1.0000 mF, 10.000 mF
Capacity accuracy		± (1 % + 0.05 % of range)
Temperature (calculated)	with linearization for platinum sensors, in line with EN 60751, range from –200 °C to +850 °C	± (0.13 % + sensor tolerance +1 °C)
Frequency ranges		1000.0 Hz, 10.000 kHz, 100.00 kHz, 1000.0 kHz
Frequency accuracy		± 0.005 %

Miscellaneous

Save/recall	device settings	save and recall on micro SD card or USB memory stick
	reference waveforms	save and recall on micro SD card or USB memory stick
	screenshots	save on micro SD card or USB memory stick
	logger records	export to USB memory stick
	configurable fast setting slots	8 slots, F1 to F8 to easily activate preconfigured settings with a single keystroke
Screenshot	selectable file formats	png, jpg, bmp, tif
	screenshot modes	standard, inverse, black and white
Instrument security		User data and settings are stored on removable micro SD card only.
Menu languages		available menu languages: • English • German • French • Russian • Simplified Chinese • Traditional Chinese • Japanese • Spanish • Italian • Portuguese • Korean • Czech • Polish
Help	online help on the instrument	available language: • English

Inputs and outputs

Channel inputs	R&S®RTH1004	4 BNC oscilloscope inputs
	R&S®RTH1002	2 BNC oscilloscope inputs, 2 banana meter inputs (4-mm type)
Probe compensation output	signal shape	rectangle V_{low} = 0 V, V_{high} = 1 V amplitude 1 V (peak-to-peak) ± 5 %
	frequency	1 kHz ± 5 %
USB host interface		1 port, type A plug, USB 2.0, memory sticks only
USB device port		1 port, mini USB-B, remote control only
LAN interface		RJ-45 connector, supports 10/100BASE-T
Logic probe input		8 logic channels, see R&S®RTH-B1 option
External trigger input	R&S®RTH1002	Meter input can also be used as external trigger input.
Security slot		for standard Kensington style lock
SD card slot	type	micro SD card slot, memory cards only
	capacity	SDHC, min. 4 Gbyte, max. 32 Gbyte

General data

Display		
Type		7.0" LC TFT color display
Resolution		800 × 480 pixel (WVGA)

Temperature		
Temperature loading	operating temperature	
	battery only	0 °C to +50 °C
	power adapter	0 °C to +40 °C
	storage temperature	–20 °C to +50 °C
Climatic loading		+25° C/+55 °C at 95 % rel. humidity cyclic, in line with IEC 60068-2-30

Altitude		
Operating	CAT IV 600 V, CAT III 1000 V	up to 2000 m above sea level
	CAT III 600 V, CAT II 1000 V	up to 3000 m above sea level
Nonoperating		up to 4600 m above sea level

Mechanical resistance		
IP rating		IP51, in line with IEC 60529
Vibration	sinusoidal	5 Hz to 150 Hz, max. 1.8 g at 55 Hz, 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6; MIL-PRF-28800F, 4.5.5.3.2, class 3
	random	8 Hz to 650 Hz, acceleration 1.9 g (RMS), in line with EN 60068-2-64; MIL-PRF-28800F, 4.5.5.3.1 random vibration, class 3
Shock		40 g shock spectrum, in line with MIL-STD-810E, method no. 516.4, procedure I; MIL-PRF-28800F, 4.5.5.4.1, functional shock, 30 g, 11 ms, halfsine

EMC		
RF emission	in line with EN 55011 class A, operation in residential, commercial and business areas or in small-size companies is not covered; therefore the instrument may not be operated in residential, commercial and business areas or in small-size companies unless additional measures are taken to ensure that EN 55011 class B is complied with	in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup); the instrument complies with the emission requirements stipulated by EN 55011, EN 61326-1 and EN 61326-2-1 class A, making the instrument suitable for use in industrial environments.
Immunity		in line with IEC/EN 61326-1 table 2, immunity test requirements for industrial environments [3]

[3] Test criterion is displayed noise level within ±1 div for input sensitivity of 100 mV/div.

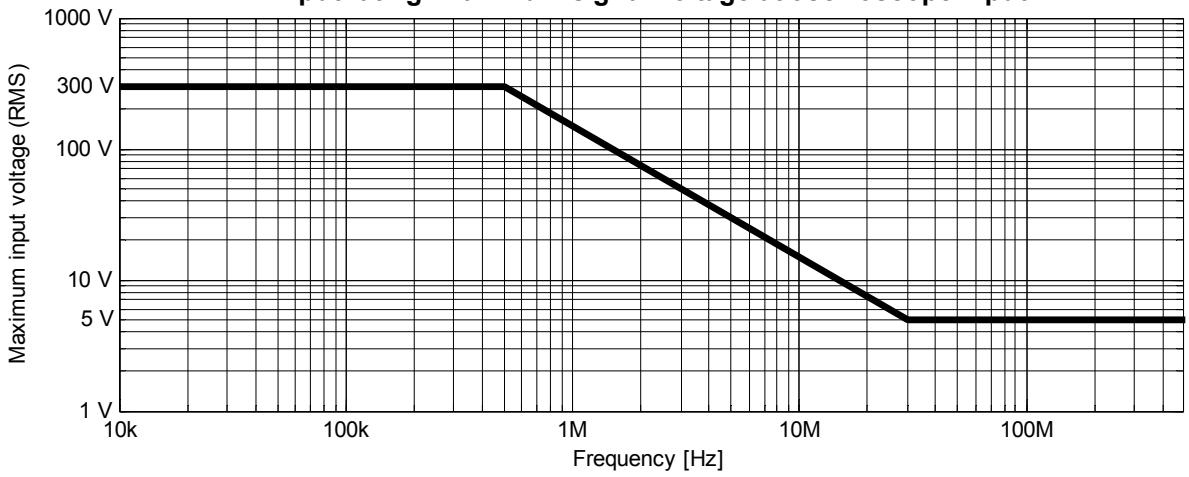
Certifications	VDE, $_{C}CSA_{US,}$ KC

Calibration interval	1 year

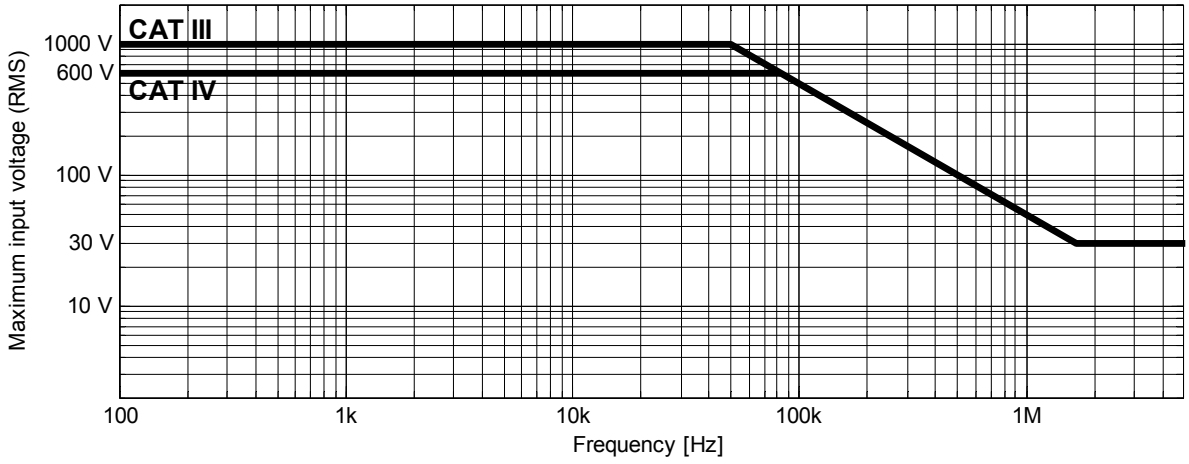
Safety	in line with IEC/EN/DIN EN 61010-1, IEC/EN/DIN EN 61010-2-030, UL/CSA 61010-1, UL/CSA 61010-2-030, IEC/EN/DIN EN 61010-2-033 (R&S®RTH1002), UL/CSA 61010-2-033 (R&S®RTH1002)	
Battery/power supply		
Battery data		Lithium-ion rechargeable smart battery
	operating time	approx. 4 h
	charging time	approx. 4 h while instrument is switched off
	capacity	72 Wh
	voltage	11.25 V
Power adapter	input	100 V to 240 V at 50 Hz to 60 Hz, 1.5 A
	output	+15 V DC, 4.0 A

Mechanical data		
Dimensions	W × H × D	201 mm × 293 mm × 74 mm (7.91 in × 11.54 in × 2.91 in)
Weight	with battery	2.4 kg (5.3 lb) (nom.)

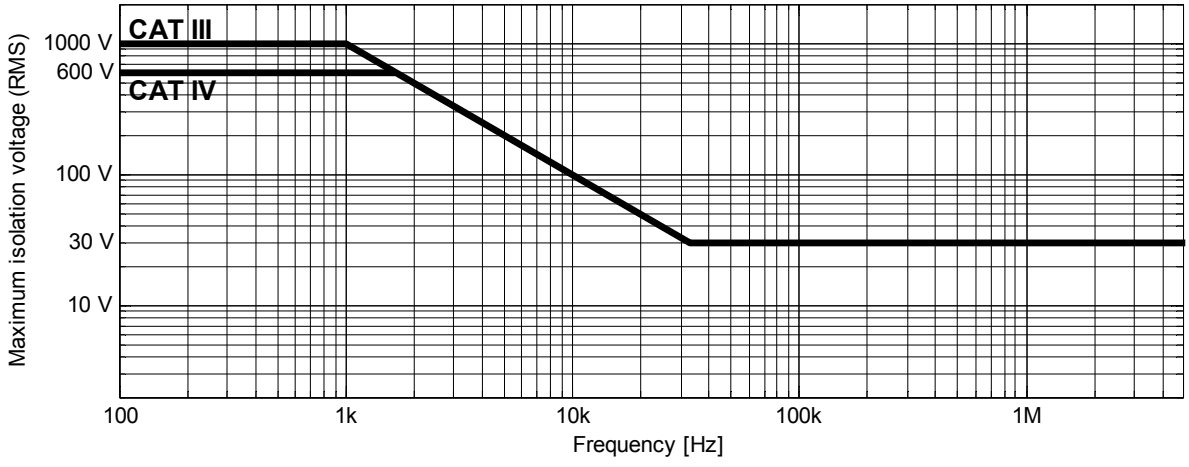
Input rating: Maximum signal voltage at oscilloscope input



Input rating: Maximum signal voltage at meter input



Isolation rating: Maximum voltage between analog inputs and operator potential



Options

R&S®RTH-B1

Mixed signal option, additional 8 logic channels

Vertical system

Input channels		8 logic channels (from D0 to D7)
Input impedance		100 kΩ ± 2 % || ~4 pF (meas.) at probe tips
Maximum input frequency	signal with minimum input voltage swing and hysteresis setting: normal	250 MHz (meas.)
Maximum input voltage		±40 V (peak)
Minimum input voltage swing		500 mV (peak-to-peak) (meas.)
Threshold groups		from D0 to D3, D4 to D7
Threshold level	range	±8 V in 25 mV steps
	predefined	CMOS 5.0 V, CMOS 3.3 V, CMOS 2.5 V, TTL, ECL, PECL, LVPECL
Threshold accuracy		±(100 mV + 3 % of threshold setting)
Comparator hysteresis		normal, robust, maximum

Horizontal system

Channel deskew	range for each channel	±100 ns
Channel-to-channel skew		< 2 ns (meas.)

Acquisition system

Sampling rate		1.25 Gsample/s on each channel
Memory depth		125 ksample for each channel

Trigger system

Trigger level	range	±4 div from center of screen
Trigger modes		auto, normal, single
Trigger sources	R&S®RTH1004	logic channels from D0 to D7 CH1, CH2, CH3, CH4
	R&S®RTH1002	logic channels from D0 to D7 CH1, CH2
Hold off range	time	8 ns to 10 s, fixed and random
	events	1 to 1 000 000 000 events

Trigger types		
Edge	triggers on specified slope (positive, negative or either) and level	
Glitch	triggers on glitches of positive, negative or either polaritiy that are shorter or longer than specified width	
	glitch width	200 ps to 5000 s (CH1, CH2, CH3, CH4)
		800 ps to 5000 s (D0 to D7)
Width	triggers on positive or negative pulse of specified width; width can be shorter, longer, inside or outside the interval	
	pulse width	200 ps to 5000 s (CH1, CH2, CH3, CH4)
		800 ps to 5000 s (D0 to D7)
Pattern	triggers when a logical combination (and, nand, or, nor) of the input channels stays true for a period of time shorter, longer, inside or outside a specified range (requires R&S®RTH-K19 option)	
	pattern time	200 ps to 5000 s (CH1, CH2, CH3, CH4)
		800 ps to 5000 s (D0 to D7)
State	triggers when a logical combination (and, nand, or, nor) of the input channels stays true at a slope (positive, negative or either) in one selected channel; state values may be high (H), low (L) or don't care (X) (requires R&S®RTH-K19 option)	
Data2clock	triggers on setup time and hold time violations between clock and data present on any two input channels; monitored time interval may be specified by the user with a step size of 800 ps in the range from –124 ns to 124 ns around a clock edge (requires R&S®RTH-K19 option)	

Serial pattern	triggers on serial data pattern up to 32 bit clocked by one input channel; pattern bits may be high (H), low (L) or don't care (X); clock edge slope may be positive, negative or either (requires R&S®RTH-K19 option)	
	max. data rate	< 250 Mbps
Timeout	triggers when signal stays high, low or unchanged for a specified period of time (requires R&S®RTH-K19 option)	
	timeout	200 ps to 5000 s (CH1, CH2, CH3, CH4)
		800 ps to 5000 s (D0 to D7)
Interval	triggers when time between two consecutive edges of same slope (positive or negative) is shorter, longer inside or outside a specified range (requires R&S®RTH-K19 option)	
	interval time	200 ps to 5000 s (CH1, CH2, CH3, CH4)
		800 ps to 5000 s (D0 to D7)
Protocol	see R&S®RTH-K1 and R&S®RTH-K2 options	

Waveform measurements

Automatic measurements on	total number of active measurements	4
	sources	logic channels from D0 to D7
	time based measurements	period, frequency, positive pulse width, negative pulse width, positive duty cycle, negative duty cycle, delay, phase
	amplitude based measurements	mean value
	count based measurements	count positive pulses, count negative pulses, count rising edges, count falling edges
Cursor measurements	sources	logic channels from D0 to D7
	vertical	2 cursors showing time, time difference and inverse time difference (frequency)
	tracking	vertical cursor additionally showing logic level and logic level difference of selected channel
	measure	defines gate for automatic measurements

R&S®RTH-K1

I²C serial triggering and decoding		
Protocol configuration	bit rate	up to 3.4 Mbps (auto-detected)
	auto threshold setup	assisted threshold configuration for I²C triggering and decoding (software)
	device list	associate frame address with symbolic ID (software)
Trigger	source (clock and data)	any input channel or logical channel
	trigger event setup	start, stop, restart, missing ACK, address, data, address + data
	address setup	7 bit or 10 bit address (value in hex or binary); read, write or either; condition =, ≠
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠; >, <; offset within frame in range from 0 byte to 4095 byte
Decode	source (clock and data)	any input channel, logical channel
	display type	decoded bus, tabulated list
	color coding	frame, start/restart, address (r/w), data, ACK/NACK, stop, error
	address and data format	hex, decimal, octal, binary, ASCII; symbolic names for user-defined subset of addresses (software)

SPI serial triggering and decoding		
Protocol configuration	type	2-wire, 3-wire and 4-wire SPI
	bit rate	up to 50 Mbps (auto-detected)
	bit order	LSB first, MSB first
	word size	4/8/12/16/20/24/28/32 bit
	frame condition	SS, timeout
	polarity (MOSI, MISO, SS)	active high, active low
	slope (CLK)	rising edge, falling edge
	auto threshold setup	assisted threshold configuration for SPI triggering and decoding (software)
Trigger	source (MOSI, MISO, SS, CLK)	any input channel or logical channel
	trigger event setup	start of frame, end of frame, MOSI, MISO
	data setup	data pattern up to 32 bit (hex or binary); condition =, ≠; offset within frame in range from 0 to 4095 bit
Decode	source (MOSI, MISO, SS, CLK)	any input channel, logical channel
	display type	decoded bus, tabulated list
	color coding	Frame start, frame stop, word, error
	data format	hex, decimal, octal, binary, ASCII (software)

R&S®RTH-K2

UART/RS-232/RS-422/RS-485 serial triggering and decoding		
Protocol configuration	bit rate	300 bps to 20 Mbps
	signal polarity	idle low, idle high
	number of bits	5 bit to 9 bit
	bit order	LSB first, MSB first
	parity	odd, even, none
	stop bits	1, 1.5 or 2
	end of packet	timeout, none
	auto threshold setup	assisted threshold configuration for UART triggering and decoding (software)
Trigger	source	any input channel or logical channel
	trigger event setup	start bit, packet start, data, parity error, stop error, break condition
	data setup	data pattern (hex, decimal, octal, binary or ASCII); condition =, ≠; >, <; offset within packet in range 0 to 4095 words
Decode	source	any input channel, logical channel
	display type	decoded bus, tabulated list
	color coding	start, data payload, parity, stop, start error, parity error, stop error
	data format	hex, decimal, octal, binary, ASCII

R&S®RTH-K19

Advanced triggering
Additional trigger types: TV/video: SDTV and HDTV broadcast standards; pattern, state, runt, slew rate, window, data2clock, serial pattern, timeout, interval and protocol. For more details see Trigger system.

R&S®RTH-K200

Wireless LAN
Interface wireless LAN 802.11 b/g/n 2x2, 2.4 GHz Operating modes: access point and client mode Certifications: CE0682 Certification valid for the following countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom For operation in countries that are not listed, it is the sole responsibility of the user to ensure that the above certification is accepted and in line with the applicable laws of those countries. Rohde & Schwarz does not expressly warrant wireless LAN compliance for countries that are not listed above.

R&S®RTH-K200US

Wireless LAN
Interface wireless LAN 802.11 b/g/n 2x2, 2.4 GHz Operating modes: access point and client mode Certifications: FCC and IC Certification valid for Canada and the United States For operation outside Canada and the US, it is the sole responsibility of the user to ensure that the above certifications are accepted and in line with the applicable laws of that particular country. Rohde & Schwarz does not expressly warrant wireless LAN compliance for countries that are not listed above.

R&S®RTH-K201

Web interface remote control
Remote operation via Ethernet port or wireless LAN (requires R&S®RTH-K200 or R&S®RTH-K200US option in addition). Control of the instrument from the web browser on a PC, laptop or handheld device. Full operation of the instrument's touch interface, keys and multifunction wheel via web browser.

Ordering information

Designation	Type	Order No.
Base unit (including standard accessories: one 500 MHz, 10:1, 600 V CAT IV voltage probe for each oscilloscope input channel; one 600 V CAT IV test lead per meter input; compact manual; Lithium-Ion battery pack; power supply with plugs for EU, CH, UK, US, CAN, China, Australia)		
Handheld Digital Oscilloscope, 60 MHz, 2 channels, DMM	R&S®RTH1002	1317.5000K02
Handheld Digital Oscilloscope, 60 MHz, 4 channels	R&S®RTH1004	1317.5000K04
Hardware options		
Mixed Signal Option, 250 MHz	R&S®RTH-B1	5710.0901.02
Bandwidth upgrades		
Upgrade of R&S®RTH1002 oscilloscopes to 100 MHz bandwidth	R&S®RTH-B221	1325.9717.02
Upgrade of R&S®RTH1004 oscilloscopes to 100 MHz bandwidth	R&S®RTH-B241	1326.0588.02
Upgrade of R&S®RTH1002 oscilloscopes to 200 MHz bandwidth	R&S®RTH-B222	1325.9723.02
Upgrade of R&S®RTH1004 oscilloscopes to 200 MHz bandwidth	R&S®RTH-B242	1326.0594.02
Upgrade of R&S®RTH1002 oscilloscopes to 350 MHz bandwidth	R&S®RTH-B223	1325.9730.02
Upgrade of R&S®RTH1004 oscilloscopes to 350 MHz bandwidth	R&S®RTH-B243	1326.0607.02
Upgrade of R&S®RTH1002 oscilloscopes to 500 MHz bandwidth	R&S®RTH-B224	1326.0571.02
Upgrade of R&S®RTH1004 oscilloscopes to 500 MHz bandwidth	R&S®RTH-B244	1326.0613.02
Hardware bundles Combination of instruments and hardware options into a single order number. This is a more convenient alternative to ordering basic models and hardware options separately.		
R&S®RTH1002 basic instrument, no hardware options	R&S®RTH1002	1317.5000P02
Combination of R&S®RTH1002, R&S®RTH-B221	R&S®RTH1012	1317.5000P12
Combination of R&S®RTH1002, R&S®RTH-B222	R&S®RTH1022	1317.5000P22
Combination of R&S®RTH1002, R&S®RTH-B223	R&S®RTH1032	1317.5000P32
Combination of R&S®RTH1002, R&S®RTH-B224	R&S®RTH1052	1317.5000P52
R&S®RTH1004 basic instrument, no hardware options	R&S®RTH1004	1317.5000P04
Combination of R&S®RTH1004, R&S®RTH-B241	R&S®RTH1014	1317.5000P14
Combination of R&S®RTH1004, R&S®RTH-B242	R&S®RTH1024	1317.5000P24
Combination of R&S®RTH1004, R&S®RTH-B243	R&S®RTH1034	1317.5000P34
Combination of R&S®RTH1004, R&S®RTH-B244	R&S®RTH1054	1317.5000P54
Combination of R&S®RTH1002, R&S®RTH-B1	R&S®RTH1002MSO	1317.5000P03
Combination of R&S®RTH1002, R&S®RTH-B221, R&S®RTH-B1	R&S®RTH1012MSO	1317.5000P13
Combination of R&S®RTH1002, R&S®RTH-B222, R&S®RTH-B1	R&S®RTH1022MSO	1317.5000P23
Combination of R&S®RTH1002, R&S®RTH-B223, R&S®RTH-B1	R&S®RTH1032MSO	1317.5000P33
Combination of R&S®RTH1002, R&S®RTH-B224, R&S®RTH-B1	R&S®RTH1052MSO	1317.5000P53
Combination of R&S®RTH1004, R&S®RTH-B1	R&S®RTH1004MSO	1317.5000P05
Combination of R&S®RTH1004, R&S®RTH-B241, R&S®RTH-B1	R&S®RTH1014MSO	1317.5000P15
Combination of R&S®RTH1004, R&S®RTH-B242, R&S®RTH-B1	R&S®RTH1024MSO	1317.5000P25
Combination of R&S®RTH1004, R&S®RTH-B243, R&S®RTH-B1	R&S®RTH1034MSO	1317.5000P35
Combination of R&S®RTH1004, R&S®RTH-B244, R&S®RTH-B1	R&S®RTH1054MSO	1317.5000P55
Software options		
I^2C/SPI Serial Triggering and Decoding	R&S®RTH-K1	1325.9969.02
UART/RS-232/RS-422/RS-485 Serial Triggering and Decoding	R&S®RTH-K2	1325.9975.02
Advanced Triggering	R&S®RTH-K19	1326.0642.02
Wireless LAN, all countries except US and Canada	R&S®RTH-K200	1326.0620.02
Wireless LAN, for US and Canada only	R&S®RTH-K200US	1332.9890.02
Web Interface Remote Control	R&S®RTH-K201	1326.0636.02
Probes		
Passive Probe, 500 MHz, isolated, 10:1, 10 MΩ, 12 pF, 600 V CAT IV, 1000 V CAT III	R&S®RT-ZI10	1326.1761.02
Passive Probe, 500 MHz, isolated, 100:1, 100 MΩ, 4.6 pF, 600 V CAT IV, 1000 V CAT III	R&S®RT-ZI11	1326.1810.02
AC/DC Current Probe, battery-operated, 30 A, 100 kHz	R&S®HZO50	3594.6476.02
AC/DC Current Probe, battery-operated, 1000 A, 20 kHz	R&S®HZO501	3594.6482.02
PT100 Temperature Probe	R&S®HZ812	3594.4321.02
Probe accessories		
Accessory Replacement Set for R&S®RT-ZI10 and R&S®RT-ZI11	R&S®RT-ZA20	1326.1978.02
Extended Accessory Set for R&S®RT-ZI10	R&S®RT-ZA21	1326.1984.02
Safety Test Leads, red and black, silicone, 600 V CAT IV	R&S®RT-ZA22	1326.0988.02

Designation	Type	Order No.
Accessories		
Soft Carrying Bag	R&S®HA-Z220	1309.6175.00
Ethernet Cable, length: 2 m, crossover	R&S®HA-Z210	1309.6152.00
USB Cable, length: 1.8 m, standard/mini USB connector	R&S®HA-Z211	1309.6169.00
Hard Shell Protective Carrying Case	R&S®RTH-Z4	1326.2774.02
Car Adapter	R&S®HA-Z302	1321.1340.02
Battery Charger for Lithium-Ion Battery	R&S®HA-Z303	1321.1328.02
Replacement Battery	R&S®HA-Z306	1321.1334.02
Spare Power Supply, for R&S®RTH incl. power plugs for EU, CH, UK, US, CAN, China, Australia	R&S®RT-ZA14	1326.2874.02

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

Extended warranty with a term of one or two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [4]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 and CW2)
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 [4] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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

Service that adds value

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries. The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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