R&S®RTM3000
Oscilloscope
Specifications

ROHDE&SCHWARZ

Data Sheet | Version 05.00

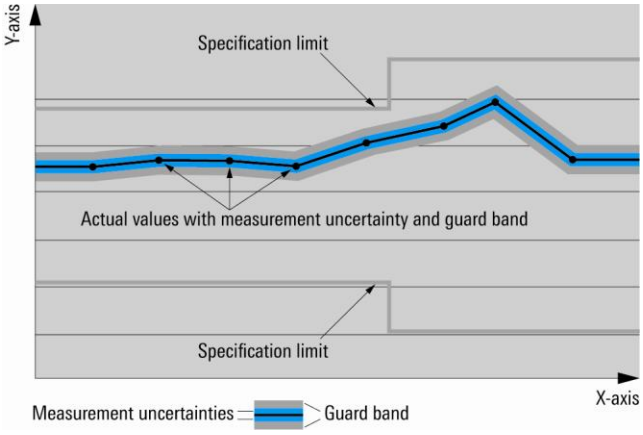
CONTENTS

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®RTM3002	2 channels
	R&S®RTM3004	4 channels
Input impedance		50 Ω ± 1.5 % (meas.) 1 MΩ ± 1 % || 14 pF ± 1 pF (meas.)
Analog bandwidth (–3 dB)	at 50 Ω input impedance	
	R&S®RTM3002 and R&S®RTM3004	> 100 MHz
	R&S®RTM3002 with -B222 option and R&S®RTM3004 with -B242 option	> 200 MHz
	R&S®RTM3002 with -B223 option and R&S®RTM3004 with -B243 option	> 350 MHz
	R&S®RTM3002 with -B225 option and R&S®RTM3004 with -B245 option	> 500 MHz
	R&S®RTM3002 with -B2210 option and R&S®RTM3004 with -B2410 option	> 1 GHz
	at 1 MΩ input impedance	
	R&S®RTM3002 and R&S®RTM3004	> 100 MHz (meas.)
	R&S®RTM3002 with -B222 option and R&S®RTM3004 with -B242 option	> 200 MHz (meas.)
	R&S®RTM3002 with -B223 option and R&S®RTM3004 with -B243 option	> 350 MHz (meas.)
	R&S®RTM3002 with -B225 option and R&S®RTM3004 with -B245 option	> 500 MHz (meas.)
	R&S®RTM3002 with -B2210 option and R&S®RTM3004 with -B2410 option	> 500 MHz (meas.)
Lower frequency limit (–3 dB)	at AC coupling	< 5 Hz (meas.)
Analog bandwidth limits	at 50 Ω input impedance	
	R&S®RTM3002 and R&S®RTM3004	20 MHz
	R&S®RTM3002 with -B222 option and R&S®RTM3004 with -B242 option	20 MHz, 100 MHz
	R&S®RTM3002 with -B223 option and R&S®RTM3004 with -B243 option	20 MHz, 100 MHz, 200 MHz
	R&S®RTM3002 with -B225 option and R&S®RTM3004 with -B245 option	20 MHz, 100 MHz, 200 MHz, 350 MHz
	R&S®RTM3002 with -B2210 option and R&S®RTM3004 with -B2410 option	20 MHz, 100 MHz, 200 MHz, 350 MHz, 500 MHz
	at 1 MΩ input impedance	
	R&S®RTM3002 and R&S®RTM3004	20 MHz
	R&S®RTM3002 with -B222 option and R&S®RTM3004 with -B242 option	20 MHz, 100 MHz
	R&S®RTM3002 with -B223 option and R&S®RTM3004 with -B243 option	20 MHz, 100 MHz, 200 MHz
	R&S®RTM3002 with -B225 option, R&S®RTM3004 with -B245 option, R&S®RTM3002 with -B2210 option and R&S®RTM3004 with -B2410 option	20 MHz, 100 MHz, 200 MHz, 350 MHz
Rise time (calculated)	R&S®RTM3002 and R&S®RTM3004	< 3.5 ns
	R&S®RTM3002 with -B222 option and R&S®RTM3004 with -B242 option	< 1.75 ns
	R&S®RTM3002 with -B223 option and R&S®RTM3004 with -B243 option	< 1 ns
	R&S®RTM3002 with -B225 option and R&S®RTM3004 with -B245 option	< 700 ps
	R&S®RTM3002 with -B2210 option and R&S®RTM3004 with -B2410 option	< 350 ps

Vertical resolution		10-bit, up to 16-bit with high resolution decimation
DC gain accuracy	offset and position = 0 maximum operating temperature change of ±5 °C after self-alignment	
	input sensitivity > 5 mV/div	±1.5 %
	input sensitivity ≤ 5 mV/div to ≥ 1 mV/div	±2 %
	input sensitivity < 1 mV/div	±3 %
Input coupling		DC, AC, GND
Input sensitivity	at 50 Ω	0.5 mV/div to 1 V/div
	at 1 MΩ	0.5 mV/div to 10 V/div
Maximum input voltage	at 50 Ω	5 V (RMS), max. 30 V (V_p)
	at 1 MΩ	300 V (RMS), 400 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
Position range		±5 div
Offset range at 50 Ω	input sensitivity	
	≥ 112 mV/div to 1 V/div	±(30 V – 5 div × input sensitivity)
	≥ 33.8 mV/div to 111 mV/div	±(10 V – 5 div × input sensitivity)
	0.5 mV/div to 33.6 mV/div	±(2 V – 5 div × input sensitivity)
Offset range at 1 MΩ	input sensitivity	
	≥ 515 mV/div to 10 V/div	±(250 V – 5 div × input sensitivity)
	≥ 50.5 mV/div to 510 mV/div	±(25 V – 5 div × input sensitivity)
	0.5 mV/div to 50 mV/div	±(2 V – 5 div × input sensitivity)
Offset accuracy		±(0.5 % × |offset| + 0.1 div × input sensitivity + 0.5 mV)
DC measurement accuracy	after adequate suppression of measurement noise by using either 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	> 50 dB

Horizontal system

Timebase range		selectable between 0.5 ns/div and 500 s/div
Channel deskew		±500 ns
Trigger offset range	minimum	$\frac{memory\ depth}{actual\ sampling\ rate}$
	maximum	$\frac{2^{33}}{actual\ sampling\ rate}$
Modes		normal, roll
Channel-to-channel skew		< 200 ps (meas.)
Timebase accuracy	after delivery/calibration, at +23 °C	±2.5 ppm
	during calibration interval	±3.5 ppm

Acquisition system

Maximum realtime sampling rate	normal mode	2.5 Gsample/s
	interleaved mode, if following channels are not used simultaneously: • channel 1 and channel 2 • channel 3 and channel 4 • logic channels	5 Gsample/s
Memory depth per channel	normal mode	40 Msample per channel
	interleaved mode, if following channels are not used simultaneously: • channel 1 and channel 2 • channel 3 and channel 4 • logic channels	80 Msample per channel
Acquisition modes	sample	first sample in decimation interval
	peak detect	largest and smallest sample in decimation interval
	high resolution	average value of all samples in decimation interval
	envelope	envelope of acquired waveforms
	average	average over a series of acquired waveforms
	envelope + peak detect	envelope of acquired waveforms with active peak detect
	envelope + high resolution	envelope of acquired waveforms with active high resolution
	average + high resolution	average over a series of acquired high resolution waveforms
Number of averaged waveforms		2 to 100 000
Waveform acquisition rate	dot display, single channel, auto record length	up to 64 000 waveforms/s

Trigger system

Trigger level	range	±5 div from center of screen
Trigger modes		auto, normal, single, n single with R&S®RTM-K15 option
Hold-off range	time	inactive or 51.2 ns to 13.7 s
Trigger types		edge, width, video, pattern, runt, rise time, fall time, serial bus, line, timeout
Edge trigger A	trigger events	rising edge, falling edge, both edges
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option), external trigger input
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option), external trigger input
	trigger coupling	DC, AC (attenuates < 10 Hz (meas.)), LF reject (attenuates < 10 kHz (meas.))
	trigger filter	HF reject (attenuates > 100 kHz (meas.)), noise reject (attenuates > 100 MHz (meas.))
	selectable trigger hysteresis	automatic, small, medium, large

Trigger A sensitivity hysteresis mode automatic	with DC, AC, LF reject, noise reject	
	1 GHz, 500 MHz, 350 MHz	$> \frac{2.2\,mV_{pp}}{input\ sensitivity} + 1\,div\ (nom.)$ (input sensitivity: [mV/div])
	200 MHz, 100 MHz	$> \frac{1.5\,mV_{pp}}{input\ sensitivity} + 0.8\,div\ (nom.)$ (input sensitivity: [mV/div])
	20 MHz	$> \frac{0.6\,mV_{pp}}{input\ sensitivity} + 0.4\,div\ (nom.)$ (input sensitivity: [mV/div])
	with HF reject	
	all input sensitivities	1 div (meas.)
Edge trigger A and B	trigger events	rising edge, falling edge, both edges
	sources for A trigger	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	trigger coupling of A trigger	DC
	sources for B trigger	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	trigger coupling of B trigger	DC
	selectable trigger hysteresis for A and B trigger	small, medium, large
	trigger B mode	after time or after events
	trigger B minimum time	3.2 ns
	trigger B maximum time	100 s
	trigger B events	1 to 65535
Width trigger	trigger events	pulse width is smaller, greater, equal, unequal, inside interval, outside interval
	minimum pulse width	3.2 ns
	maximum pulse width	6.8 s
	polarity	positive, negative
	sources	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	selectable trigger hysteresis	small, medium, large
Timeout trigger	trigger events	greater than timeout
	minimum timeout	3.2 ns
	maximum timeout	6.8 s
	polarity	stays high, stays low, stays high or low
	sources	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	selectable trigger hysteresis	small, medium, large
Video trigger	trigger events	selectable line, all lines, even frame, odd frame, all frames
	supported standards	PAL, NTSC, SECAM, PAL-M, SDTV 576i, HDTV 720p, HDTV 1080i, HDTV 1080p
	sources	
	R&S®RTM3002	channel 1, channel 2, ext. trigger input
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, ext. trigger input
	sync pulse polarity	positive, negative

Pattern trigger	trigger events	logic condition between active channels
	sources	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	state of channels	high, low, don't care
	logic between channels	and/or
	condition	true, false
	duration condition	smaller, greater, equal, unequal, inside interval, outside interval, timeout
	minimum duration time	3.2 ns
	maximum duration time	6.8 s
Runt trigger		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
Rise time, fall time	trigger events	time between the crossing of two selectable levels is smaller, greater, equal, unequal, inside interval, outside interval
	minimum rise time	3.2 ns
	maximum rise time	6.8 s
	polarity	rising edge, falling edge, both edges
	sources	
	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
Serial bus trigger	supported standards	
	R&S®RTM-K1 option	I^2C, SSPI (two-wire, MOSI/MISO), SPI (three-wire, MOSI/MISO)
	R&S®RTM-K2 option	UART/RS-232/RS-422/RS-485 (RX/TX)
	R&S®RTM-K3 option	CAN/LIN
	R&S®RTM-K5 option	audio (I^2S, LJ, RJ, TDM)
	R&S®RTM-K6 option	MIL-STD-1553
	R&S®RTM-K7 option	ARINC 429
External trigger input	input impedance	1 MΩ ± 1 % with 14 pF ± 2 pF (meas.)
	maximum input voltage at 1 MΩ	300 V (RMS), 400 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
	trigger level	±5 V
	sensitivity	> 300 mV (V_{pp})
	coupling	DC, AC, LF reject
Trigger output	functionality	A pulse is generated for every acquisition trigger event.
	output voltage	
	at high impedance	0 V to 4.8 V
	at 50 Ω	0 V to 2.4 V
	pulse polarity	high active

Waveform measurements

Automatic measurements	measurements on channels, math waveforms, reference waveforms	burst width, count positive pulses, count negative pulses, count falling edges, count rising edges, mean value, RMS cycle, RMS, mean cycle, peak+, peak–, frequency, period, amplitude, base level, positive overshoot, negative overshoot, pulse width, duty cycle+, duty cycle–, rise time, fall time, delay, phase, crest factor, slew rate+, slew rate–
	reference levels	lower, middle and upper level in percentage
	statistics	maximum, minimum, mean, standard deviation and measurement count for each automatic measurement
	number of active measurements	8
Cursor measurements	type	vertical, horizontal, vertical and horizontal, V-marker
	functions	x and y tracking, coupling of cursors, set to trace, set to screen
Quick measurements	function	fast overview of measurements from one channel, some measurements displayed with result lines in diagram
	sources	
	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
	measurements displayed in diagram	mean, max. peak, min. peak, rise time, fall time
	numerically displayed measurements	RMS cycle, peak-to-peak voltage, period, frequency

Digital voltmeter

Accuracy		related to channel settings of voltmeter source
Measurements		DC, AC+DC RMS, AC RMS
Sources	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
Number of measurements		up to 4
Resolution		up to 3 digits

Counter

Measurements		frequency, period
Sources	R&S®RTM3002	channel 1, channel 2, trigger signal source
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, trigger signal source
Number of measurements		2
Resolution		6 digits
Frequency range		0. 05 Hz to bandwidth of scope (limited by bandwidth of trigger filter)

Mask testing

Sources	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
Mask definition		acquired waveform with user-defined tolerance, can be stored and restored
Result statistics		completed acquisitions, passed and failed acquisitions (absolute and in percent), test duration
Actions on mask violation		sound, acquisition stop, screenshot, save waveform, pulse out (AUX OUT connector)
Captured segments	with R&S®RTM-K15 option	all segments, failed segments

Waveform maths

Number of math equations		up to 5
Functions		addition, subtraction, multiplication, division, maximum, minimum, square, square root, absolute value, positive wave, negative wave, reciprocal, inverse, log10, ln, derivation, integration
Sources	R&S®RTM3002	channel 1, channel 2, math waveforms 1 to 4
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, math waveforms 1 to 4

Fast Fourier transformation (FFT)

Sources	R&S®RTM3002	channel 1, channel 2, math waveforms, references
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, math waveforms, references
Setup parameters		start frequency, stop frequency, center frequency, frequency span, vertical scale, vertical position, resolution bandwidth, gate (time range and position)
Windows		Hanning, Hamming, Blackman, rectangular, flat top
Waveform arithmetic		none, min. hold, max. hold, average (selectable from 2 to 1024)

Search function

Functions	search types	edge, width, peak, rise/fall time, runt, data2clock, pattern, window, protocol (available with R&S®RTM-K3, R&S®RTM-K6 and R&S®RTM-K7 options)
	configuration	manual level setting on screen, level with selectable hysteresis
	display of search events	up to 10 000 events in diagram and in result table
	markers on search events	up to 32 markers
	navigation in search events (stop mode)	knob (if result table is active)
Sources	R&S®RTM3002	channel 1, channel 2, math waveforms from 1 to 5, D15 to D0 (with R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, math waveforms from 1 to 5, D15 to D0 (with R&S®RTM-B1 option)

Display characteristics

Diagram types	manually changeable vertical window size	Yt, XY, zoom, FFT, spectrogram (with R&S®RTM-K18 option)
XY mode		parallel display of XY diagram and Yt diagrams of input signals for X, Y

Zoom		horizontal and vertical zoom, split screen with overview signal and zoomed signal
Interpolation		sin(x)/x, linear, sample & hold
FFT mode		split screen with Yt diagrams and dedicated frequency diagram, spectrogram (with R&S®RTM-K18 option)
Waveform display		lines, dots only
Persistence		50 ms to 12.8 s; infinite
Special display mode		inverse brightness, waveform color modes for analog channels (temperature, fire, rainbow)
Diagram grid		lines, reticle, none, with annotation, track grid
Reference signals		up to 4 reference signals

Protocol and logic

Bus decode	number of bus signals	4 [1]
	bus types	parallel, parallel clocked • SSPI, SPI, I^2C (R&S®RTM-K1 option) • UART/RS-232/RS-422/RS-485 (R&S®RTM-K2 option) • CAN, LIN (R&S®RTM-K3 option) • I^2S, LJ, RJ, TDM (R&S®RTM-K5 option) • MIL-STD-1553 (R&S®RTM-K6 option) • ARINC 429 (R&S®RTM-K7 option)
	display types	decoded bus, logical signal, frame table (depends on decoded bus)
	position and size	size and position on screen selectable
	data format of decoded bus	hex, decimal, binary, octal, ASCII

[1] If a bidirectional bus is used (e.g. UART RX/TX or SPI MOSI/MISO), two bus decoders are occupied.

Miscellaneous

Save/recall	device settings	save and recall on internal file system or USB memory stick or on a PC via web interface or USB-MTP
	reference waveforms	save and recall on internal file system or USB memory stick or on a PC via web interface or USB-MTP
	waveforms	save on USB memory stick or download and save on a PC via web interface or USB-MTP, available file formats: BIN, CSV, TXT float (MSB/LSB first)
	screenshots	save on USB memory stick or download and save on a PC via web interface or USB-MTP, available file formats: BMP, PNG
	device settings	save and recall on internal file system or USB memory stick or on a PC via web interface or USB-MTP
Camera key		configurable camera key, actions on press: • save screenshot • one-touch
	save screenshot	one-touch off
	one-touch	one or more from the list: • setup • screenshots (PNG, color) • waveforms (BIN-MSB, CI, display data) • references • search event table • bus table • statistics
Instrument security		secure erasure of internal file system and all settings
Menu languages		available menu languages: • English • German • French • Spanish • Italian • Portuguese • Czech • Polish • Russian • Simplified Chinese • Traditional Chinese • Korean • Japanese
Help		online help, available languages: • English
Undo/redo		deep undo/redo function

Input and outputs

Front		
Channel inputs		BNC, for details see Vertical system
	probe interface	auto detection of passive probes, Rohde & Schwarz active probe interface
External trigger input		BNC, for details see Trigger system
	probe interface	auto detection of passive probes
Waveform generator (requires R&S®RTM-B6 option)		BNC, for details see R&S®RTM-B6, waveform generator, demo lug and GND lug
Probe compensation output	signal shape	rectangle
	frequency	1 kHz
	voltage	V_{low} = 0 V, V_{high} = 1.5 V to 3.3 V (meas.)
Pattern source (requires R&S®RTM-B6 option)	P3 to P0	4 lugs, for details see R&S®RTM-B6, 4-bit pattern generator
	frequency	1 mHz to 25 MHz
	voltage	V_{low} = 0 V, V_{high} = 1.5 V to 3.3 V (meas.)
Ground lug		connected to ground
USB host interface		1 port, type A plug, version 2.0, flash drives only
Rear		
Ethernet interface		1 port, 1 Gbit
AUX OUT (BNC)	trigger out,	for details see Trigger system
	reference frequency	10 MHz ±3.5 ppm (meas.)
	mask violation	pulse
USB host interface		1 port, type A plug, version 2.0
Fixation loop		for securing the instrument with a cable
Security slot		for standard Kensington style lock
Right side		
Digital channel inputs	D15 to D8, D7 to D0	requires R&S®RTM-B1 option

General data

Display		
Type		10.1" WXGA display with capacitive touch
Resolution		1280 × 800 pixel (WXGA)
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 at 85 % rel. humidity cyclic, in line with IEC 60068-2-30
Altitude		
Operating		up to 3000 m above sea level
Nonoperating		up to 4600 m above sea level
Mechanical resistance		
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 sinusoidal vibration, class 3 and 4
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64, MIL-PRF-28800F, 4.5.5.3.1 random vibration, class 3 and 4
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 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 [2]
Certifications		VDE, $_{C}$CSA$_{US}$, KC
Calibration interval		1 year
Power supply		
AC supply		100 V to 240 V at 50 Hz to 60 Hz 1.6 A to 0.7 A
Power consumption		max. 160 W
Safety		in line with • IEC 61010-1, IEC 61010-2-030 • EN 61010-1, EN 61010-2-030 • CAN/CSA-C22.2 No. 61010-1 • CAN/CSA-C22.2 No. 61010-2-030 • UL 61010-1, UL 61010-2-030
Mechanical data		
Dimensions	W × H × D	390 mm × 220 mm × 152 mm (15.35 in × 8.66 in × 5.98 in)
Weight	without options (nom.)	3.3 kg (7.275 lb)
Audible noise	maximum sound pressure level at a distance of 1.0 m	28.3 dB(A)

[2] Test criterion is displayed noise level within ±1 div for input sensitivity of 5 mV/div.

Options

R&S®RTM-B1

Mixed signal option, additional 16 logic channels		
Vertical system		
Input channels		16 logic channels (from D15 to D0)
Arrangement of input channels		arranged in two logic probes with 8 channels each, assignment of the logic probes to the channels D15 to D8 and D7 to D0
Input impedance		100 kΩ ± 2 % || ~4 pF (meas.) at probe tips
Maximum input frequency	signal with minimum input voltage swing and hysteresis setting: normal	400 MHz (meas.)
Maximum input voltage		±40 V (V_p)
Minimum input voltage swing		500 mV (V_{pp}) (meas.)
Threshold groups		from D15 to D12, D11 to D8, D7 to D4 and D3 to D0
Threshold level	user range	±8 V in 25 mV steps
	predefined	CMOS 2.5 V, TTL 1.4 V, ECL -1.3 V
Threshold accuracy		±(100 mV + 3 % of threshold setting)
Comparator hysteresis		small, medium, large
Horizontal system		
Channel deskew	range for each channel	±500 ns
Channel-to-channel skew		< 200 ps (meas.) for same vertical settings on the channels
Acquisition system		
Sampling rate	two logic probes	2.5 Gsample/s on each channel
	one logic probe	5 Gsample/s on each channel
Memory depth	two logic probes	40 Msample for every channel
	one logic probe	80 Msample for every channel
Trigger system		see chapter Trigger system of the base unit
Waveform measurements		
Measurement sources		all channels from D15 to D0
Automatic measurements		positive pulse width, negative pulse width, period, frequency, burst width, delay, phase, positive duty cycle, negative duty cycle, positive pulse count, negative pulse count, rising edge count, falling edge count
Additional cursor function		display of hex value at the cursor position
Display characteristics		
Channel activity display		independent of the scope acquisition, the state (stays low, stays high or toggles) of the channels from D15 to D0 is displayed

R&S®RTM-B6

Waveform generator and 4-bit pattern generator		
Waveform generator		
Resolution		14-bit
Sample rate		250 Msample/s
Amplitude	level	
	high Z	20 mV to 10 V (V_{pp})
	50 Ω	10 mV to 5 V (V_{pp})
	accuracy	3 %
DC offset	level	
	high Z	± 5 V
	50 Ω	± 2.5 V
	accuracy	3 % or ± 5 mV whatever is greater
DC		
Sine	frequency	0.1 Hz to 25 MHz
	SFDR	> 40 dBc (meas.)
	THD	> 40 dBc (meas.)
Pulse, rectangle	frequency	0.1 Hz to 10 MHz
Ramp, triangle, sinc, exponential	frequency	0.1 Hz to 1 MHz
Arbitrary	sample rate	max. 10 Msample/s
	memory depth	32k point
Noise	bandwidth	max. 25 MHz
	level	0 to 100 % of signal amplitude
Modulation	AM	
	function	sine, rectangle, triangle, ramp
	frequency	0.1 Hz to 1 MHz
	depth	0 to 100 %
	FM	
	function	sine, rectangle, triangle, ramp
	frequency	0.1 Hz to 1 MHz
	deviation	depends on modulation frequency
	ASK	
	function	sine, rectangle, triangle, ramp
	frequency	0.1 Hz to 1 MHz
	ASK depth	0 to 100 %
	FSK	
	function	sine, rectangle, triangle, ramp
	frequency	0.1 Hz to 1 MHz
	FSK rate	0.1 Hz to carrier frequency/2
Sweep	start frequency	1 Hz to 25 MHz
	stop frequency	1 Hz to 25 MHz
	sweep time	1 ms to 10 s
	sweep type	linear, logarithmic
4-bit pattern generator		
Functions		probe adjust/square wave, bus signal source 4-bit counter, programmable 4-bit pattern
Bus signal source		SPI, I^2C, UART, CAN, LIN
	bandwidth	9600 bit/s to 1 Mbit/s
4-bit counter	frequency	25 mHz to 50 MHz
Programmable pattern	sample rate	20 ns to 1 s, up/down
	square wave frequency	1 mHz to 500 kHz
	memory depth	8096 bit per channel
	pattern idle time	50 ns to 1 s
	amplitude	V_{low} = 0 V, V_{high} = 1.5 V to 3.3 V (meas.)

R&S®RTM-K1

I²C triggering and decoding		
Bus configuration	sources for SCL and SDA	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	bit rate	up to 10 Mbps
	size of address	7 bit or 10 bit
	size of data	8 bit
	label list	associate frame identifier with symbolic ID
Trigger	trigger events	start, stop, restart, missing acknowledge, address (7 bit or 10 bit), data, address and data
	offset for trigger on data	0 data byte to 4095 data byte
	data pattern width	up to 3 sequential data byte
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	address, data, start, stop, ACK, NACK, error
	displayed format of address	hex, symbolic ID (label list)
	displayed format of data	ASCII, binary, decimal or hex
SPI triggering and decoding		
Bus configuration	sources for CS, CLK, MOSI and MISO	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	bit rate	up to 25 Mbps
	chip select (CS)	active low, active high or missing (SSPI)
	clock (CLK) slope	rise or fall
	data symbol size	1 bit to 32 bit
	idle time for SSPI	12.8 ns to 26.8 ms
Trigger	trigger events	start of frame, end of frame, bit number, data pattern
	selectable bit number	0 to 4095
	offset for trigger on data pattern	0 to 4095 bit
	data pattern size	1 bit to 32 bit
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	data, start, stop, error
	displayed format of data	ASCII, binary, decimal or hex
	data decoding	MSB or LSB first

R&S®RTM-K2

UART/RS-232/RS-422/RS-485 triggering and decoding		
Bus configuration	source for RX and TX	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	bit rate	300 bps to 1 Mbps or user-selectable up to 6 Mbps
	end of frame	timeout
	signal polarity	idle low, idle high
	data symbol size	5 bit to 9 bit
	parity	none, even or odd
	stop bits	1, 1.5 or 2
	Idle time	up to 26.8 ms
Trigger	trigger events	start bit, start of frame, symbol number, any symbol, pattern of symbols, parity error, stop bit error, break
	offset for trigger on data symbol	0 to 4095 symbols
	data symbol pattern width	1 to floor (32/symbol size) symbols
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	data, start, stop, error, parity
	displayed format of data	ASCII, binary, decimal or hex

R&S®RTM-K3

CAN triggering and decoding		
Bus configuration	signal type	CAN_H, CAN_L
	bit rate	10/20/33.3/50/83.3/100/125/250/500/ 1000 kbps or user-selectable in range from 100 bps to 5 Mbps
	sampling point	10 % to 90 % within bit period
	label list	associate frame identifier with symbolic ID
Trigger	trigger events	start of frame, frame type, identifier, identifier + data, error condition (any combination of CRC error, bit stuffing error, form error and ACK error)
	identifier setup	frame type (data, remote or both), identifier type (11 bit or 29 bit); condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	start of frame, identifier, DLC, data payload, CRC, ACK, end of frame, error frame, overload frame, CRC error, bit stuffing error, ACK error
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; frame navigation; data export as CSV file
Search	search events	frame, error, identifier, identifier + data, identifier + error
	frame event setup	start of frame, end of frame, overload frame, error frame, data ID 11 bit, data ID 29 bit, remote ID 11 bit, remote ID 29 bit
	error event setup	any combination of CRC error, bit stuffing error, form error and ACK error
	identifier setup	frame type (data, remote or both), identifier type (11 bit or 29 bit); condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
	event table	search results displayed as tabulated list; event navigation
LIN triggering and decoding		
Bus configuration	version	1.3, 2.x or SAE J602; mixed traffic is supported
	bit rate	1.2/2.4/4.8/9.6/10.417/19.2 kbps or user-selectable in range from 100 bps to 5 Mbps
	polarity	active high or active low
	label list	associate frame identifier with symbolic ID
Trigger	source	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	trigger events	start of frame (sync break), identifier, identifier + data, wakeup frame, error condition (any combination of checksum error, parity error and sync field error)
	identifier setup	range from 0d to 63d; condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <

Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	frame, frame identifier, parity, data payload, checksum, error condition
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; frame navigation; data export as CSV file
Search	search events	frame, error, identifier, identifier + data, identifier + error
	frame event setup	start of frame, wake up
	error event setup	any combination of checksum error, parity error and sync field error
	identifier setup	range from 0d to 63d; condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
	event table	search results displayed as tabulated list; event navigation

R&S®RTM-K5

Audio (I^2S, LJ, RJ, TDM) triggering and decoding		
Bus configuration	source (data, clock, word/sync)	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	thresholds	per-channel threshold (analog channels), per-group threshold (logic channels), assisted threshold configuration (find level)
	bit rate	up to 30 Mbps
	signal type	I^2S standard, left justified, right justified, TDM
	polarity	data: active high, active low
		clock: rising edge, falling edge
		word/sync: normal, inverted
	word length	2 to 32 bit
	bit order	most significant bit first (MSBF)
		least significant bit first (LSBF)
	I^2S specific setup	
	first channel	left, right
	LJ/RJ specific setup	
	first channel	left, right
	channel offset	0 to 31 bit
	TDM specific setup	
	number of channels	1 to 8
	channel length	2 bit to 32 bit
	channel offset	0 to (channel length – word length) bits
	channel delay	0 to 31 bit
Trigger	trigger events	data, window, word/sync, error condition
	data setup	define individual value and condition for each audio channel; condition =, ≠, >, <, inside range, outside range, don't care; trigger when "all" or "any" audio channel conditions are met in single audio frame
	window setup	audio channel setup same as data setup; user-defined window length up to 4 000 000 000 frames
	word/sync setup	rising edge, falling edge
Decode	displayed signals	bus signal, stacked bus signal, logic signal
	color coding of bus signal	color-coded audio channels
	displayed format of data	hex, signed decimal, binary, ASCII
	frame table	decode results displayed as tabulated list with timestamp; frame navigation; data export as CSV file
	track of audio waveform	displays audio channel content as a waveform that is time-correlated to the source signals; user can activate, scale and position each audio channel individually

R&S®RTM-K6

MIL-STD-1553 triggering and decoding		
Protocol configuration	source	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	bit rate	standard bit rate (1 Mbit/s)
	polarity	normal, inverted
	label list	associate frame identifier with symbolic ID
	auto threshold setup	assisted threshold configuration
	timing	max response (4 µs to 200 µs)
Trigger	trigger event setup	sync, word, command word, status word, command and data word, error condition
	sync setup	all words, command/status word, data word
	word setup	all words, command word, status word, data word
	command word setup (type: address/word)	RT address (condition =, ≠, ≥, ≤, in range, out of range); direction (T/R); subaddress (condition =, ≠, ≥, ≤, in range, out of range); data word count (condition =, ≠, ≥, ≤, in range, out of range)
	command word setup (type: mode code)	RT address (condition =, ≠, ≥, ≤, in range, out of range); subaddress (0, 31 or either); mode code from labeled dropdown list
	status word setup	RT address; status flags (message error, instrumentation, service request, broadcast command, busy, subsystem flag, dynamic bus control, terminal flag) individually configurable (1, 0, don't care)
	command and data word setup	transmission type (BC-RT, RT-BC, BC-BC, mode code); RT address (condition =, ≠, ≥, ≤, in range, out of range); subaddress (condition =, ≠, ≥, ≤, in range, out of range); data word count (condition =, ≠, ≥, ≤, in range, out of range); data pattern up to 4 words long (condition =, ≠, ≥, ≤, in range, out of range); payload data index (condition =)
	error condition setup	any combination of sync error, Manchester error, parity error, timing error (see protocol configuration)
Decode	display signals	bus signal; symbolic ID in bus signal when label list in use
	color coding	sync, RT address, subaddress, mode code, status bit field, data, error condition
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; frame navigation; data export as CSV file; column with symbolic ID when label list in use
Search	search events	word, command word, mode code, status word, command and data word, error
	word setup	command, status, data
	command word setup	see trigger settings for "command word setup (type: address/word)"
	mode code setup	see trigger settings for "command word setup (type: mode code)"
	status word setup	see trigger settings for "status word setup"
	command and data word setup	see trigger settings for "command and data word setup"
	error condition setup	all, sync, parity, manchester, timing

R&S®RTM-K7

ARINC 429 triggering and decoding		
Protocol configuration	source	
	R&S®RTM3002	channel 1, channel 2, logic channels from D15 to D0 (requires R&S®RTM-B1 option)
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0 (with R&S®RTM-B1 option)
	bit rate	high (100 kbit/s), low (12.5 kbit/s), or user-defined in range 10 kbit/s to 1 Mbit/s
	polarity	A leg, B leg, normal, inverted
	label list	associate numeric label with symbolic ID; optional definition of ARINC word format in terms of availability of label-specific SDI and SSM fields
	auto threshold setup	assisted threshold configuration
Trigger	trigger event setup	word, label, label and data, error condition, transmission interval
	word setup	word start, word stop
	label setup	label (condition =, ≠, ≥, ≤, in range, out of range)
	data setup	data pattern up to 23 bit long (condition =, ≠, ≥, ≤, in range, out of range); data bit offset; SDI (00,01,10,11); SSM (00,01,10,11); label list can be used to determine availability of trigger properties SSM and SDI for given label value
	error condition setup	any combination of coding error, parity error, gap error
	transmission interval setup	label (condition =); SDI (optional); time interval (condition >, <, in range, out of range)
Decode	display signals	bus signal, logic signal or both; symbolic ID in bus signal when label list in use
	color coding	word begin, word end, label, SDI, data, SSM, parity, error
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; frame navigation; data export as CSV file; column with symbolic ID when label list in use
Search	search events	word, label, label and data, error condition
	word setup	word start, word stop
	label setup	see trigger settings for “label setup”
	data setup	see trigger settings for “data setup”
	error condition setup	coding error, parity error, gap error, any

R&S®RTM-K15

History and segmented memory				
Acquisition memory		automatic, predefined, manual		
	automatic	automatic segment size and numbers		
	predefined	defined size and automatic numbers		
	manual	user-defined size and numbers		
Memory segmentation	function	memory segments for the acquisition		
	number of segments [3]	record length	segments (up to)	total memory (per channel)
		5 ksample	34 952	174.8 Msample
		10 ksample	34 952	349.5 Msample
		20 ksample	17 476	349.5 Msample
		50 ksample	6 990	349.5 Msample
		100 ksample	3 883	388.3 Msample
		200 ksample	2 056	411.2 Msample
		500 ksample	852	426 Msample
		1 Msample	426	426 Msample
		2 Msample	214	428 Msample
		5 Msample	85	425 Msample
		10 Msample	42	420 Msample
		20 Msample	21	420 Msample
		40 Msample	10	400 Msample
		80 Msample	5	400 Msample
	segmentation is active on all analog and logic channels, protocol decoding and spectrum analysis			
Fast-segmented mode	continuous recording of waveforms in acquisition memory without interruption due to visualization; blind time between consecutive acquisitions less than 1.5 µs (up to 700 000 waveforms/s)			
History mode	function	The history mode always provides access to past acquisitions in the segmented memory.		
	timestamp resolution	3.2 ns		
	history player	replays the recorded waveforms; repetition possible; adjustable speed; manual next / previous segment; numerical segment number input		
	analyze options	overlay all segments, average all segments, envelope all segments		

[3] At interleaved mode.

R&S®RTM-K18

Spectrum analysis and spectrogram		
General	additional displays	spectrum traces and/or spectrogram
Spectrum	sources	
	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
	setup parameters	center frequency, frequency span, automatic RBW, resolution bandwidth, gate position, gate width, vertical scale, vertical position, spectrum mode
	scaling	dBm, dBV, V (RMS)
	span	1 kHz to 1.25 GHz
	resolution bandwidth	span/10 ⩾ RBW ⩾ span/1000
	windows	flat top, Hanning, Hamming, Blackman, rectangular
	trace types	normal, max. hold, min. hold, average
	spectrum mode	optimized for dynamic range of frequency domain (disables time domain for the same channel)
Spectrogram	color	rainbow, temp. color, monochrome
Marker	peak marker search	standard search parameter: min. level
		advanced search parameter: min. level, excursion, maximum width, distance to next peak
	reference marker	selection via index or frequency range
	markers on peak	up to 100 markers
	sources	any spectrum trace
	table	frequency and magnitude, absolute or relative to reference marker
	marker result display	indicated at wave form: level, frequency
Cursor	measurements on spectrum traces	level, frequency, level and frequency, V-marker
	additional actions for cursor	coupling of cursors, set to trace, set to screen, track scaling, set next and previous peak
Spectrogram measurements	two time cursor	t1, t2, delta t, total time, relative time between segments

R&S®RTM-K31

Power analysis		
General description	The R&S®RTM-K31 power analysis option extends the R&S®RTM firmware with measurement functionality focused on switched mode power supplies (SMPS) and DC/DC converters.	
Input	quality	evaluation of power quality at an AC input; measures real power, apparent power, reactive power, power factor and phase angle of power, frequency, crest factor, RMS of voltage and current
	harmonics	measures up to the 334th harmonic of the incoming line frequency; precompliance checking for IEC 61000-3-2 (A, B, C, D), RTCA DO-160, MIL-STD-1399, max. limit checks
	inrush current	measures peak inrush current and electrical charge within up to 3 configurable measurement zones to analyze the inrush and post-inrush behavior
	consumption	long term measurement of consumed power and energy to analyze nonperiodical signals of e.g. standby devices
Switching/control loop	slew rate	The minimum and maximum slew rate of current or voltage is measured at start and end of the switching cycle.
	modulation	measures modulation of switching frequency, duty cycle (±) and pulse width
	dynamic on-resistance	measures resistance of the switching transistor(s) in active state
Power path	efficiency	measures input and output power to calculate the efficiency of a power device
	switching loss	measures switching loss and conduction loss of a power device
	safe operating area (SOA)	checks violation of voltage and current limits in which a power device can operate without damage; current versus voltage view (linear or log); violation mask is user-defined and editable in linear and log-log views; save/load of masks; export of mask violation data
	turn on/off time	measures relationship between AC and DC current, when turning SMPS off and on
Output	ripple	measures AC components of output voltage or current, AC RMS, mean, period, frequency, duty cycles, min./max./peak-to-peak amplitude
	spectrum	FFT analysis of output, measurement of frequency peaks
	transient response	This measurement captures the device behavior between the event of load changes and stabilization; includes peak (voltage, time), settling time, rise time, overshoot and delay
Deskew	automated	By using the R&S®RT-ZF20 probe deskew and calibration test fixture and Rohde & Schwarz voltage and current probes, the skew between the signals is compensated automatically.
Zero offset	automated	automatic compensation of input offset
Reporting	Report data can be saved for every measurement. Report generation using user-selected test results from historical and current tests. Put repeated and/or different measurements in one report. R&S®Oscilloscope Report Creator can be downloaded from Rohde & Schwarz website free-of-charge.	

Ordering information

Designation	Type	Order No.
Choose your R&S®RTM3000 base model		
Oscilloscope, 100 MHz, 2 channels	R&S®RTM3002	1335.8794.02
Oscilloscope, 100 MHz, 4 channels	R&S®RTM3004	1335.8794.04
Base unit (including standard accessories: 500 MHz passive probe per channel, power cord)		
Choose your bandwidth upgrade		
Upgrade of R&S®RTM3002 oscilloscopes to 200 MHz bandwidth	R&S®RTM-B222	1335.9003.02
Upgrade of R&S®RTM3002 oscilloscopes to 350 MHz bandwidth	R&S®RTM-B223	1335.9010.02
Upgrade of R&S®RTM3002 oscilloscopes to 500 MHz bandwidth	R&S®RTM-B225	1335.9026.02
Upgrade of R&S®RTM3002 oscilloscopes to 1 GHz bandwidth	R&S®RTM-B2210	1335.9032.02
Upgrade of R&S®RTM3004 oscilloscopes to 200 MHz bandwidth	R&S®RTM-B242	1335.9049.02
Upgrade of R&S®RTM3004 oscilloscopes to 350 MHz bandwidth	R&S®RTM-B243	1335.9055.02
Upgrade of R&S®RTM3004 oscilloscopes to 500 MHz bandwidth	R&S®RTM-B245	1335.9061.02
Upgrade of R&S®RTM3004 oscilloscopes to 1 GHz bandwidth	R&S®RTM-B2410	1335.9078.02
Choose your options		
Mixed Signal Upgrade for non-MSO models, 400 MHz	R&S®RTM-B1	1335.8988.02
Arbitrary Waveform and 4-bit Pattern Generator	R&S®RTM-B6	1335.8994.02
I^2C/SPI Serial Triggering and Decoding	R&S®RTM-K1	1335.8807.02
UART/RS-232/RS-422/RS-485 Serial Triggering and Decoding	R&S®RTM-K2	1335.8813.02
CAN/LIN Serial Triggering and Decoding	R&S®RTM-K3	1335.8820.02
Audio (I^2S, LJ, RJ, TDM) Triggering and Decoding	R&S®RTM-K5	1335.8842.02
MIL-STD-1553 Serial Triggering and Decoding	R&S®RTM-K6	1335.8859.02
ARINC 429 Serial Triggering and Decoding	R&S®RTM-K7	1335.8865.02
History and Segmented Memory	R&S®RTM-K15	1335.8907.02
Spectrum Analysis and Spectrogram	R&S®RTM-K18	1335.8913.02
Power Analysis	R&S®RTM-K31	1335.8920.02
Application Bundle, consists of the following options: R&S®RTM-K1, R&S®RTM-K2, R&S®RTM-K3, R&S®RTM-K6, R&S®RTM-K7, R&S®RTM-K15, R&S®RTM-K18, R&S®RTM-K31, R&S®RTM-B6	R&S®RTM-PK1	1335.8942.02
Choose your additional probes		
Single-ended passive probes		
500 MHz, 10 MΩ, 10:1, 300 V, 10 pF, 5 mm	R&S®RT-ZP05S	1333.2401.02
500 MHz, 10 MΩ, 10:1, 400 V, 9.5 pF, 2.5 mm	R&S®RTM-ZP10	1409.7550.00
38 MHz, 1 MΩ, 1:1, 55 V, 39 pF, 2.5 mm	R&S®RT-ZP1X	1333.1370.02
Active broadband probes: single-ended		
1.0 GHz, 10:1, 1 MΩ, BNC interface	R&S®RT-ZS10L	1333.0815.02
1.0 GHz, active, 1 MΩ, Rohde & Schwarz probe interface	R&S®RT-ZS10E	1418.7007.02
1.0 GHz, active, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZS10	1410.4080.02
1.5 GHz, active, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZS20	1410.3502.02
Active broadband probes: differential		
1.0 GHz, active, differential, 1 MΩ, R&S®ProbeMeter, micro button, incl. 10:1 external attenuator, 1 MΩ, 70 V DC, 46 V AC (peak), Rohde & Schwarz probe interface	R&S®RT-ZD10	1410.4715.02
1.5 GHz, active, differential, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZD20	1410.4409.02
Power rail probe		
2.0 GHz, 1:1, 50 kΩ, ±0.85 V, ±60 V offset, Rohde & Schwarz probe interface	R&S®RT-ZPR20	1800.5006.02
High voltage single-ended passive probes		
250 MHz, 100:1, 100 MΩ, 850 V, 6.5 pF	R&S®RT-ZH03	1333.0873.02
400 MHz, 100:1, 50 MΩ, 1000 V, 7.5 pF	R&S®RT-ZH10	1409.7720.02
400 MHz, 1000:1, 50 MΩ, 1000 V, 7.5 pF	R&S®RT-ZH11	1409.7737.02

Designation	Type	Order No.
High voltage probes: differential		
25 MHz, 20:1/200:1, 4 MΩ, 1.4 kV (CAT III), BNC interface	R&S®RT-ZD002	1337.9700.02
25 MHz, 10:1/100:14 MΩ, 700 V (CAT II), BNC interface	R&S®RT-ZD003	1337.9800.02
100 MHz, 8 MΩ, 1 kV (RMS) (CAT III), BNC interface	R&S®RT-ZD01	1422.0703.02
200 MHz, 10:1, ±20 V, BNC interface	R&S®RT-ZD02	1333.0821.02
800 MHz, 10:1, 200 kΩ, ±15 V, BNC interface	R&S®RT-ZD08	1333.0838.02
200 MHz, 250:1/25:1, 5 MΩ, 750 V (peak), 300 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD07	1800.2307.02
100 MHz, 500:1/50:1, 10 MΩ, 1500 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD15	1800.2107.02
200 MHz, 500:1/50:1, 10 MΩ, 1500 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD16	1800.2207.02
100 MHz, 1000:1/100:1, 40 MΩ, 6000 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD60	1800.2007.02
Current probes		
20 kHz, AC/DC, 0.01 V/A and 0.001 V/A, ±200 A and ±2000 A, BNC interface	R&S®RT-ZC02	1333.0850.02
100 kHz, AC/DC, 0.1 V/A, 30 A, BNC interface	R&S®RT-ZC03	1333.0844.02
2 MHz, AC/DC, 0.01 V/A, 500 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC05B	1409.8204.02
10 MHz, AC/DC, 0.01 V/A, 150 A (RMS), BNC interface	R&S®RT-ZC10	1409.7750K02
10 MHz, AC/DC, 0.01 V/A, 150 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC10B	1409.8210.02
50 MHz, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC15B	1409.8227.02
100 MHz, AC/DC, 0.1 V/A, 30 A (RMS), BNC interface	R&S®RT-ZC20	1409.7766K02
100 MHz, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC20B	1409.8233.02
120 MHz, AC/DC, 1 V/A, 5 A (RMS), BNC interface	R&S®RT-ZC30	1409.7772K02
EMC near-field probes		
Probe Set for E and H Near-Field Measurements, 30 MHz to 3 GHz	R&S®HZ-15	1147.2736.02
Logic probes		
400 MHz Logic Probe, 8 channels	R&S®RT-ZL04	1333.0721.02
Probe accessories		
Probe Power Supply for R&S®RT-ZC10/20/30	R&S®RT-ZA13	1409.7789.02
External Attenuator 10:1, 2.0 GHz, 1.3 pF, 60 V DC, 42.4 V AC (peak) for R&S®RT-ZD20/30 probes	R&S®RT-ZA15	1410.4744.02
Probe Pouch	R&S®RT-ZA19	
Power Deskew and Calibration Test Fixture	R&S®RT-ZF20	1800.0004.02
3D Positioner with central tensioning knob for easy clamping and positioning of probes (span width: 200 mm, clamping range: 15 mm)	R&S®RT-ZA1P	1326.3641.02
Choose your accessories		
Front Cover	R&S®RTB-Z1	1333.1728.02
Soft Bag	R&S®RTB-Z3	1333.1734.02
Rackmount Kit	R&S®ZZA-RTB2K	1333.1728.02

Warranty		
Base unit		3 years
All other items [5]		1 year
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 Accredited Calibration Coverage, one year	R&S®AW1	
Extended Warranty with Accredited Calibration Coverage, two years	R&S®AW2	

Extended warranty with a term of one and two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [6]. Necessary calibration and adjustments carried out during repairs are also covered.

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 [6] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

Extended warranty with accredited calibration (AW1 and AW2)
Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs [6] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

[5] For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

[6] 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

Rohde&Schwarz

The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

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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www.training.rohde-schwarz.com

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PD 5214.9144.22 | Version 05.00 | December 2017 (sk)
R&S®RTM3000 Oscilloscope

5214914422

5214.9144.22 05.00 PDP 1 en

R&S®FPC1000
Spectrum Analyzer
Unexpected performance in entry class

3 year warranty

ROHDE&SCHWARZ

Product Brochure | Version 03.00

R&S®FPC1000 Spectrum Analyzer At a glance

Outstanding quality and innovation does not have to come with a high price tag. The R&S®FPC1000 spectrum analyzer delivers unexpected performance at a budget-friendly price. Engineered in Germany and designed to the same quality standards as high-end instruments. Measure with solid RF performance and benefit from a future-ready, software-upgradeable feature set. The R&S®FPC1000 has the best display in its class. The R&S®FPC1000 can be controlled via smart wireless remote control software. Excel with these features when using spectrum analysis in education, production, service or basic research.

Investment protection, high resolution and easy virtual control. These characteristics make the R&S®FPC1000 spectrum analyzer the perfect tool for university laboratories, basic research as well as production and service facilities. Investment protection through software upgrade capability. The R&S®FPC1000 base instrument has a frequency range of 5 kHz to 1 GHz.

Keycode options unlock higher frequency ranges up to 3 GHz or enable other features when required.

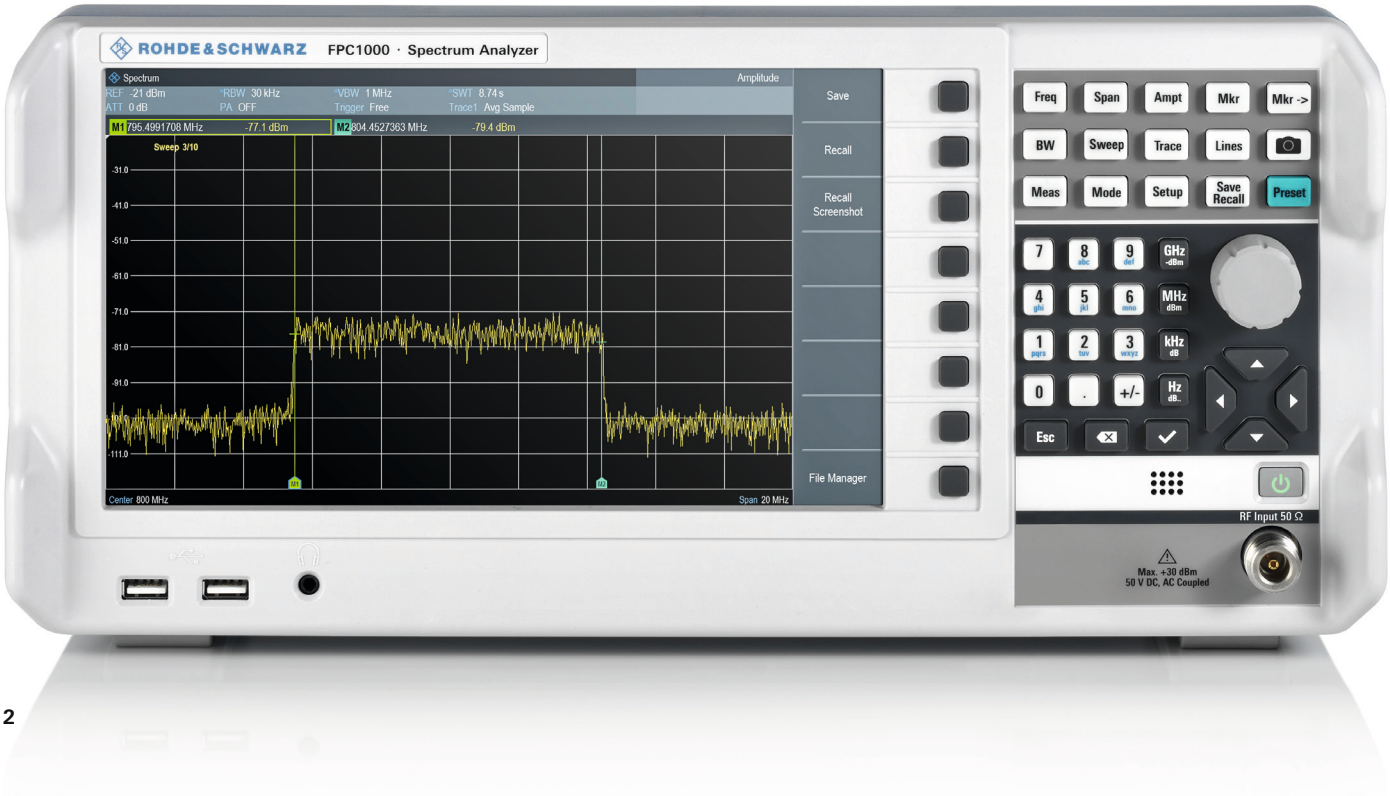
Class-leading RF performance engineered in Germany. Extraordinarily low noise floor and high max. input power combine to provide for the best dynamic range in its class. Resolution bandwidth settings to 1 Hz resolve finer spectral details than any other spectrum analyzer in this class.

See more details with high resolution. The R&S®FPC1000 features the largest and most detailed display in its class at 10.1", WXGA (1366 × 768 pixel) resolution. The display is 26% larger and has a 160% higher resolution than other instruments.

Virtual control enables remote control and measurement. The R&S®FPC1000 supports wired Ethernet and wireless Wi-Fi connectivity. R&S®InstrumentView for Windows as well as the iOS/Android app-based R&S®MobileView platforms enable remote control and measurement anytime, anywhere.

Key facts

- RF performance engineered in Germany
- 10.1" WXGA (1366 × 768 pixel) display
- Frequency range from 5 kHz to 1 GHz, upgradable to 2 Ghz or 3 GHz with keycode
- Resolution bandwidth settings down to 1 Hz
- Wi-Fi-enabled, supported by included remote control and measurement software
- Three-year standard warranty



R&S®FPC1000 Spectrum Analyzer

Benefits and key features

Investment protection

- Fully frequency-upgradeable
- 100 % software-upgradeable
- No downtime – instant option availability

▷ page 6

Unexpected RF performance

- Low noise floor
- High max. input power

▷ page 6

High resolution

- 160 % higher display resolution
- 26 % larger display
- 1 Hz resolution bandwidth

▷ page 7

Easy virtual control

- First Wi-Fi-enabled spectrum analyzer in its class
- Innovative control – fast and easy with iOS/Android/PC software
- Lab feature in R&S®InstrumentView – set up a wireless remote lab in minutes
- Virtual classroom concept – flexible deployment of classrooms anywhere, anytime

▷ page 8

Software applications and features

- Receiver mode
- Modulation analysis
- Advanced measurements

▷ page 10

10.1" high-resolution display

10.1" high-resolution display

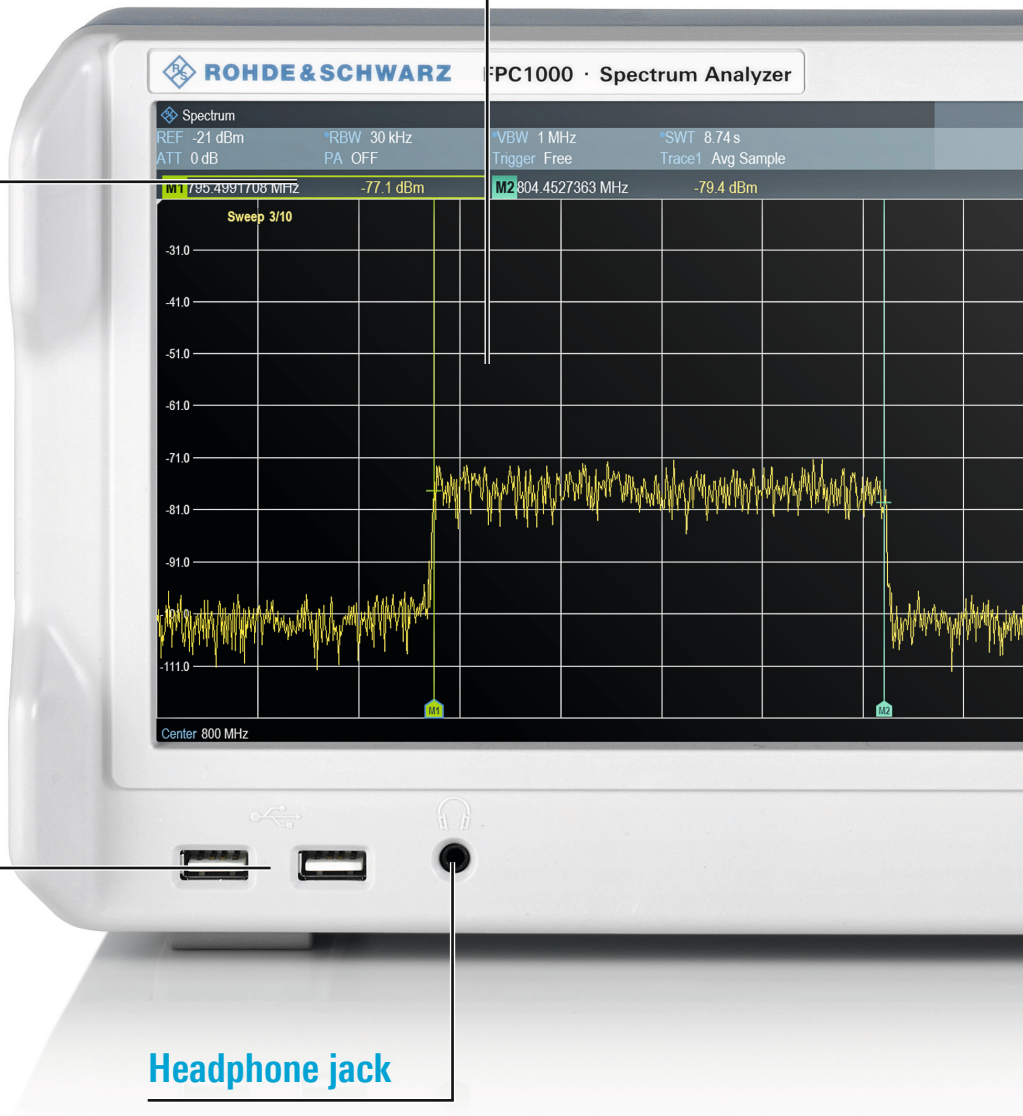
- 1366 × 768 pixel resolution

6 markers

- Shown vividly in different colors

Two USB 2.0 ports

- For storage media
- For connecting accessories



Headphone jack

Soft menu selection

- Quick access to key tools

Measurement setup buttons

Documentation of results

- Documentation as a screenshot or of instrument settings

Control knob

Power key: approx. 15 sec. boot time

Audio speaker

RF input

Investment protection

- Frequency-upgradeable
- 100% software-upgradeable
- No downtime – instant option availability

Fully frequency-upgradeable

Buy only what is needed. The R&S®FPC1000 is future-viable thanks to the unique Rohde&Schwarz upgrade path. The base unit covers a frequency range from 5 kHz to 1 GHz, with keycode-activated upgrades available. Effortlessly step up to higher frequency applications with upgrades to 2 GHz or even 3 GHz without additional calibration.

100% software-upgradeable

Buy as needed. Shipping instruments for feature upgrade is inconvenient for rack-integrated measurement setups. The R&S®FPC1000 can be upgraded by simply entering a software keycode. All options are in place and can be enabled by the user. Upgrade effortlessly and conveniently.

No downtime – instant option availability

Buy when needed. The unique Rohde&Schwarz upgrade path eliminates the need for additional upgrade calibration. Avoid delays and downtime and instantly access additionally required functionality.

Buy only what is needed – invest when needed – upgrade as needed.

Unexpected RF performance

- Low noise floor
- High max. input power

Low noise floor

High sensitivity is critical in many applications, e.g. when measuring extremely weak signals. The R&S®FPC1000 provides an extraordinarily low noise floor of –150 dBm (typ.). Add the optional R&S®FPC1000-B22 preamplifier to increase sensitivity even further down to –165 dBm (typ.).

High max. input power

Measure 10 times more power with the R&S®FPC1000. Most entry level spectrum analyzers can measure up to +20 dBm (100 mW). The R&S®FPC1000 is capable of measuring high power signals of up to +30 dBm (1 W).

The combination of low noise floor and high max. input power provides exceptionally wide measurement dynamic range in the R&S®FPC1000.

High resolution

- 160% more display resolution (> 2.6 times)
- 26% larger display
- 1 Hz resolution bandwidth

160% higher display resolution

Higher resolution. The WXGA panel (1366 × 768 pixel) exceeds the VGA resolution (640 × 480 pixel) that had been standard among entry level spectrum analyzers by 160%. Inspect measured signals in unprecedented clarity and razor-sharp detail.

26% larger display

See more. The R&S®FPC1000 has the largest display of any entry level spectrum analyzer. The new 26 cm (10.1") panel is 26% larger than the display of other entry class spectrum analyzers (20 cm or 8"). The combination of high display resolution and a large display creates extraordinary user experience. Examine more measured signal on the instrument screen.

1 Hz resolution bandwidth

More details. The quality of RF measurements strongly depends on suitable resolution bandwidth settings. Finer resolution bandwidth means more spectral details. The R&S®FPC1000 is the only entry level spectrum analyzer with resolution bandwidth settings down to 1 Hz. Identify RF signal details with class-unprecedented measurement frequency resolution.

Innovate with a large, high-resolution display and fine resolution bandwidth. Experience unexpected performance in the entry class.

The high dynamic range of the R&S®FPC1000 fully utilizes the 10.1" WXGA display.

Easy virtual control

- First Wi-Fi-enabled spectrum analyzer in its class
- Innovative remote control – fast and easy with iOS/Android/PC software
- Lab feature in R&S®InstrumentView software – set up a wireless remote lab in minutes
- Virtual classroom concept – flexible deployment of classrooms anywhere, anytime

First Wi-Fi-enabled spectrum analyzer in its class

Eliminate network cables with integrated wireless technology. The R&S®FPC1000 is Wi-Fi enabled [1] and wirelessly connects to Wi-Fi access points. This renders Ethernet cables, plugs, hubs and installation superfluous.

Innovative control – fast and easy with iOS/Android/PC software

User in focus. Simple and intuitive controls are game-changing trends in industry. The R&S®FPC1000 connects to R&S®InstrumentView as well as to R&S®MobileView remote control platforms via USB [2], Ethernet or Wi-Fi.

R&S®InstrumentView (PC software) and R&S®MobileView (iOS/Android app) are powerful all-in-one remote control applications that come bundled with the R&S®FPC1000 [3].

Take control, read measurements, save and transfer measurement settings – quickly and easily via a PC, laptop, mobile phone or tablet from any network location.

1) Wi-Fi feature not available in some countries due to local certification requirements.
2) R&S®InstrumentView only.
3) Incorporates R&S®FPH, R&S®ZPH, R&S®FSH and R&S®ZVH interfaces.

R&S®InstrumentView remote control software.

Lab feature in R&S®InstrumentView – set up a wireless remote lab in minutes

R&S®InstrumentView supports a specific feature called Lab that can help instructors use the R&S®FPC1000 Wi-Fi capabilities to set up a wireless student lab in minutes. They can then use the R&S®InstrumentView Lab feature to simultaneously control, synchronize and view multiple instruments.

Professors can conveniently manage, assist and monitor student measurements from a central or remote location using the R&S®InstrumentView Lab feature. This feature is also beneficial in any scenario where remote monitoring of multiple instruments is required.

Virtual classroom concept – flexible deployment of classrooms anywhere, anytime

Student benefit. In a globalized world, education breaks geographic barriers. The R&S®FPC1000 with its wireless connectivity combined with the R&S®InstrumentView Lab feature is a unique tool for virtual classroom concepts and location-independent teaching.

Students can easily connect to a common network domain from anywhere in the world to participate in lab classes or online lab assessments. Experience teaching anywhere, anytime.

R&S®InstrumentView and R&S®MobileView features

	R&S®InstrumentView	R&S®MobileView
Easy and fast exchange of screenshots and configurations between the instrument and a PC	●	–
Remote control of the instrument from any network location	●	●
Easy creation of test reports in PDF, HTML and RTF formats	●	–
Easy processing of measurement results	●	–
Editing of measuring results by displaying/hiding/shifting markers and limit lines, etc	●	–
PC (MS Windows) compatible	●	–
iOS/Android compatible	–	●
Bundled with R&S®FPC1000 at no extra charge	●	●

Virtual classroom with the R&S®FPC1000 spectrum analyzer and other measurement devices from Rohde&Schwarz.

Software applications and features

Receiver mode

The R&S®FPC1000 offers the optional R&S®FPC-K43 receiver mode for EMI debugging on circuit boards, integrated circuits, cable shielding and more. The R&S®FPC-B22 preamplifier compensates for coupling loss of probes and increases sensitivity to detect small interfering signals.

Use the R&S®FPC1000 as a cost-effective yet powerful tool to analyze and locate disturbance sources during development.

R&S®FPC1000 spectrum analyzer with the R&S®HZ-15 probe set and DUT.

Modulation analysis

The R&S®FPC-K7 converts the R&S®FPC1000 into a modulation analyzer for measuring the modulation quality of amplitude or frequency-modulated signals.

The analog demodulation display shows the waveform as well as a summary of measurement parameters such as carrier power, carrier offset, modulation index (depth) for AM signals, frequency deviation for FM signals, SINAD, THD, etc. The modulation summary display provides user-definable limits for each measurement. Demodulated audio is supported via the built-in speaker or the headphone jack.

Basic digital modulation formats are used with many applications, e.g. near-field communications. The R&S®FPC1000 supports both ASK and FSK analysis. The digital modulation displays include trace, eye diagram, modulation error and symbol analysis. [1)]

Easily verify the quality of the basic modulated signals with the R&S®FPC-K7 software option.

[1)] Analog modulation analysis available at product launch. Digital modulation analysis will follow via firmware update at a later stage.

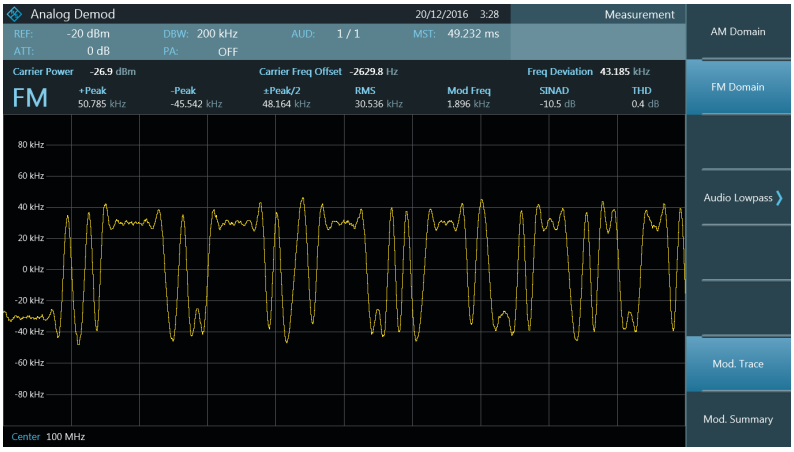
Advanced measurements

Step up measurements. The R&S®FPC-K55 adds functions for measuring channel power, occupied bandwidth, adjacent channel leakage ratio (ACLR), spectral emission mask (SEM), spurious emissions and third order intercept (TOI). It even provides a spectrogram display to provide easy insight into spectrum occupancy and time-varying signals. [2)]

Experience advanced measurements on an entry level instrument.

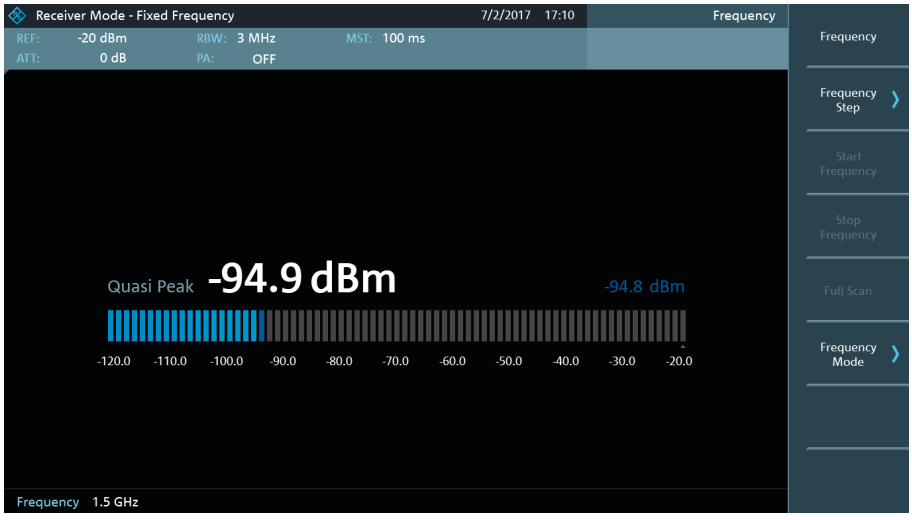
[2)] Channel power, occupied bandwidth and spectrogram available at product launch. ACLR, SEM, spurious emissions and TOI will follow via firmware update at a later stage.

R&S®FPC-B22: high sensitivity with 1 Hz resolution bandwidth.

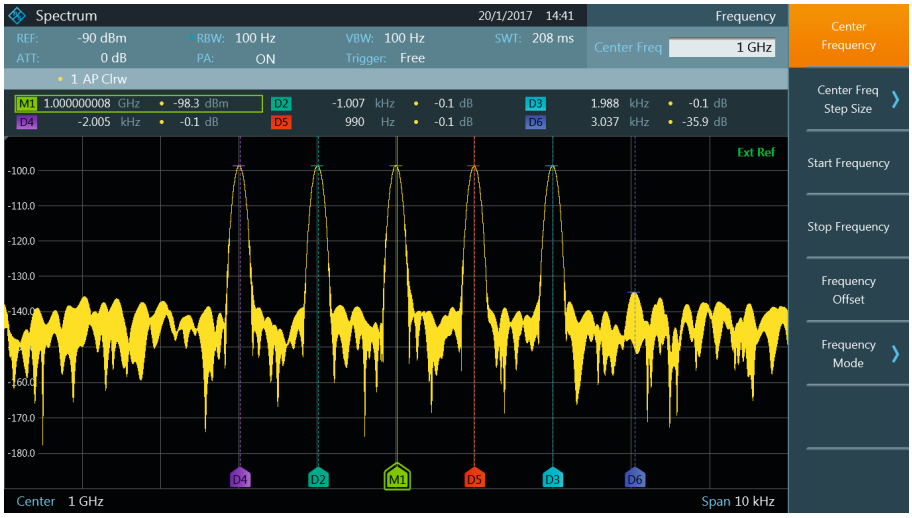


R&S®FPC-K7: FM trace.

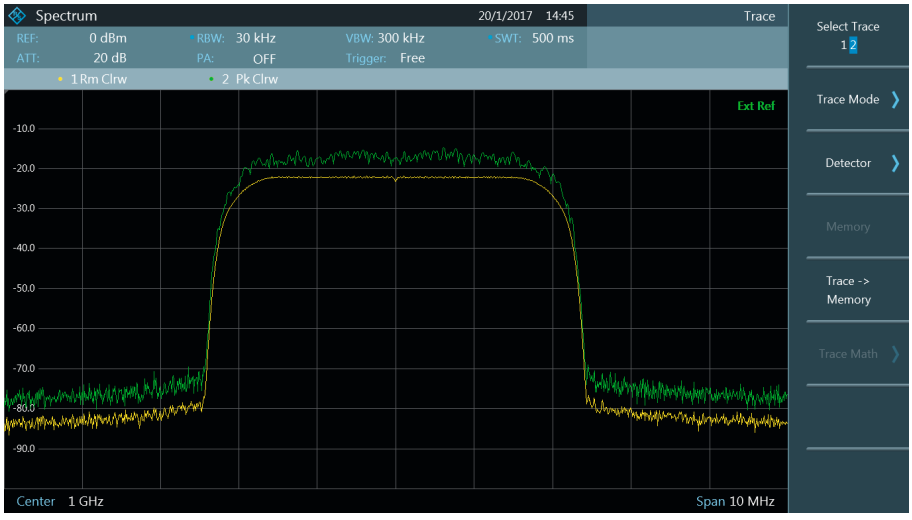
Software applications and features



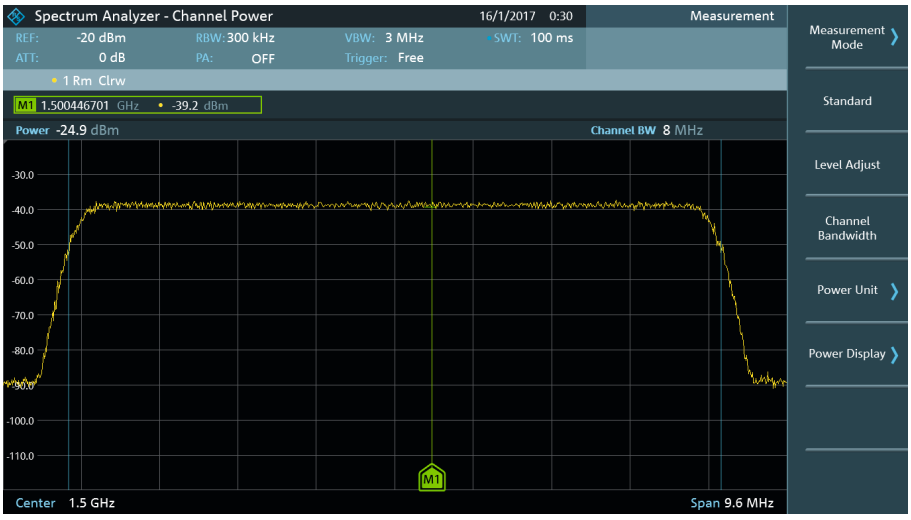
R&S®FPC-K43: receiver mode.



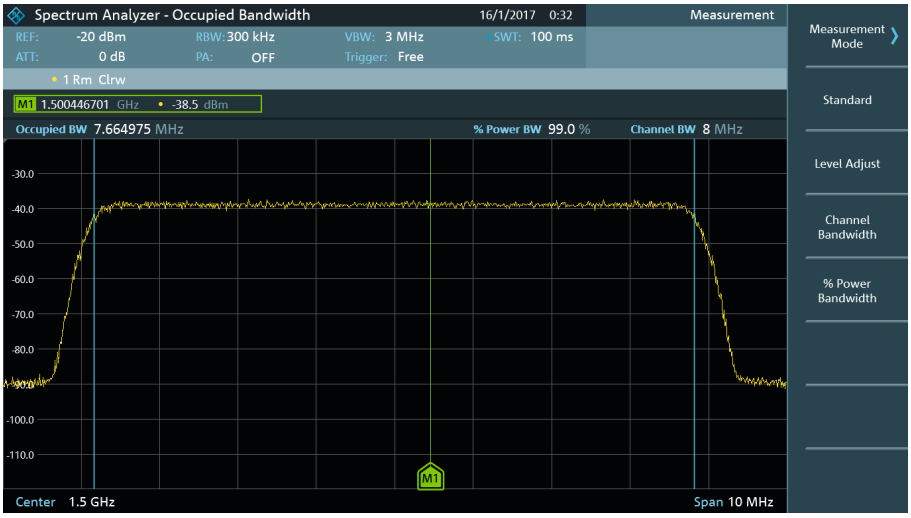
Standard feature: up to six markers.



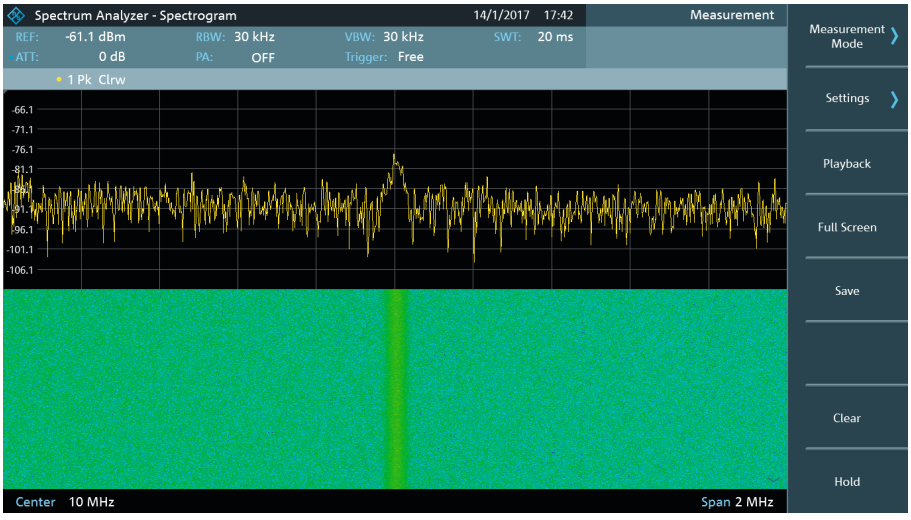
Standard feature: two traces available.



R&S®FPC-K55: channel power.



R&S®FPC-K55: occupied bandwidth.



R&S®FPC-K55: spectrogram.

Specifications in brief

Specifications in brief		
Frequency range	R&S®FPC1000	5 kHz to 1 GHz
	with R&S®FPC-B2 option	5 kHz to 2 GHz
	with R&S®FPC-B3 option	5 kHz to 3 GHz
Frequency resolution		1 Hz
Resolution bandwidth		1 Hz to 3 MHz in 1/3 sequence
Displayed average noise level	0 dB RF attenuation, 50 Ω termination, RBW = 100 Hz, VBW = 10 Hz, sample detector, log scaling, normalized to 1 Hz	± 1.5 % of full scale
	frequency	R&S®FPC1000 preamplifier = off
	1 MHz to 10 MHz	< –127 dBm, –135 dBm (typ.)
	10 MHz to 1 GHz	< –142 dBm, –150 dBm (typ.)
	1 GHz to 3 GHz	< –138 dBm, –147 dBm (typ.)
	frequency	R&S®FPC1000 preamplifier = on
	1 MHz to 10 MHz	< –147 dBm, –157 dBm (typ.)
	10 MHz to 2 GHz	< –158 dBm, –165 dBm (typ.)
	2 GHz to 3 GHz	< –155 dBm, –163 dBm (typ.)
Third-order intercept (IP3)	intermodulation-free dynamic range, signal level of 2 × –20 dBm, RF attenuation = 0 dB, RF preamplifier = off	+7 dBm (meas.)
Level measurement uncertainty		
Absolute frequency uncertainty at 100 MHz	+20 °C to +30 °C	< 0.3 dB
Frequency response (+20 °C to +30 °C)	100 kHz ≤ f < 10 MHz	< 1.5 dB (nom.)
	10 MHz ≤ f ≤ 3 GHz	< 1 dB

For data sheet, see PD 5214.7112.22 and www.rohde-schwarz.com

Ordering information

Designation	Type	Order No.
R&S®FPC1000 Spectrum Analyzer, 5 kHz to 1 GHz	R&S®FPC1000	1328.6660.02
Spectrum Analyzer Frequency Upgrade, 1 GHz to 2 GHz	R&S®FPC-B2	1328.6677.02
Spectrum Analyzer Frequency Upgrade, 2 GHz to 3 GHz	R&S®FPC-B3	1328.6683.02
Spectrum Analyzer Preamplifier	R&S®FPC-B22	1328.6690.02
Wi-Fi Connection Support	R&S®FPC-B200	1328.6990.02
Modulation Analysis	R&S®FPC-K7	1328.6748.02
Receiver Mode	R&S®FPC-K43	1328.6754.02
Advanced Measurements	R&S®FPC-K55	1328.6760.02
Accessories		
19" Rackmount Kit	R&S®ZZA-FPC1	1328.7080.02
Near-Field Probe Set, 30 MHz to 3 GHz	R&S®HZ-15	1147.2736.02
Amplifier, 100 kHz to 3 GHz	R&S®HZ-16	1147.2720.02
Carrying Case	R&S®RTB-Z3	1333.1734.02

Warranty		
Base unit		3 years
All other items		1 year
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	

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- 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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PD 5214.7112.12 | Version 03.00 | March 2017 (as)
R&S®FPC1000 Spectrum Analyzer

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