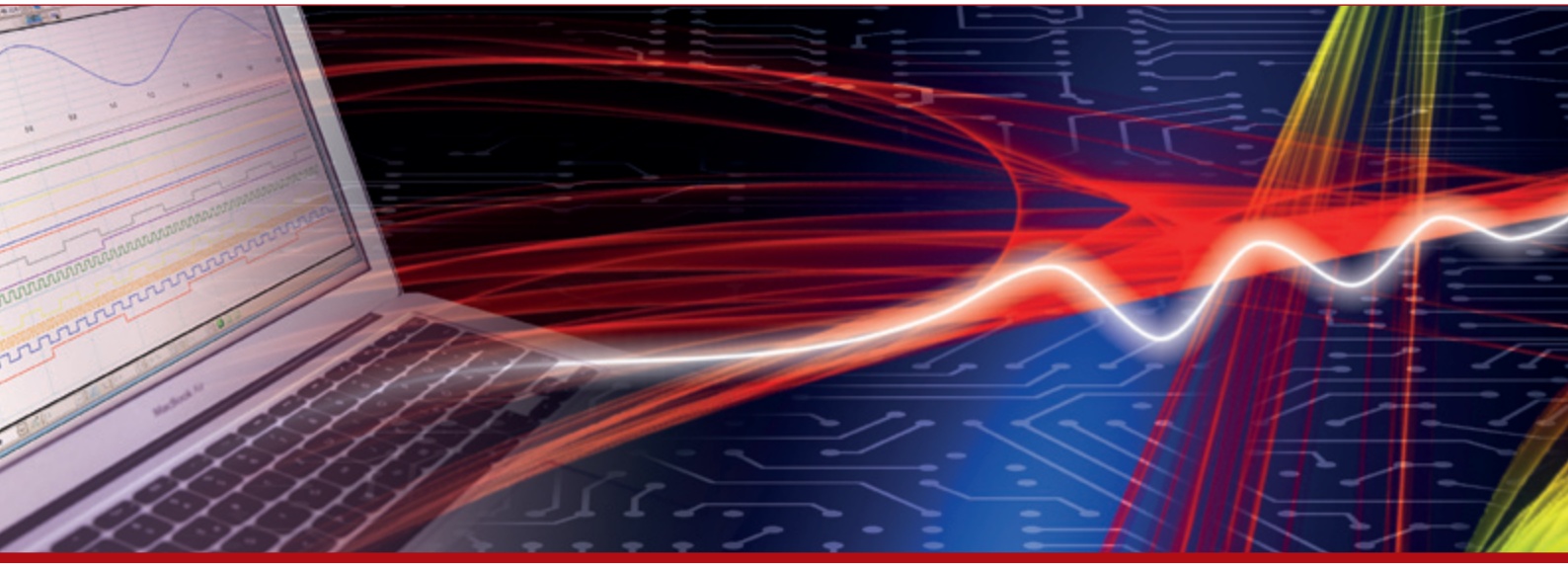
Product Datasheet - Technical Specifications



More information in our Web-Shop at ▸ **www.meilhaus.com**

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R&S®RTM3000 OSCILLOSCOPE

Power of ten

- ► 100 MHz to 1 GHz
- ► 10-bit ADC
- ► 80 Msample standard memory
- ► 10.1" capacitive touchscreen

3 year warranty

Data Sheet
Version 07.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

Designed as an everyday problem solving tool, the R&S®RTM3000 combines the power of ten (10-bit ADC, 10 times the memory and 10.1" touchscreen) with a Rohde&Schwarz probe interface for use with all Rohde&Schwarz probes.

The display, which is the largest capacitive display (10.1") with the highest resolution (1280 × 800 pixel) in its class, works just like your smartphone. Simply touch the screen to quickly navigate in pop-up menus and use gesturing to easily scale, zoom and move a waveform.

The 10-bit A/D converter yields up to a fourfold improvement over conventional 8-bit A/D converters. You get sharper waveforms with more signal details.

40 Msample memory depth is available on each channel as soon as all channels are active. When interleaved, 80 Msample are available to capture longer signal sequences for more analysis results.

With the Rohde&Schwarz probe interface, all Rohde&Schwarz probing solutions can be used – for perfect connections to any DUT.

The R&S®RTM3000 provides users with more than just an oscilloscope. It includes a logic analyzer, protocol analyzer, waveform and pattern generator and digital voltmeter. Dedicated operating modes for frequency analysis, mask tests and long data acquisitions are integrated. You can quickly and efficiently debug all kinds of electronic systems – and the R&S®RTM3000 satisfies the all-important rule of investment protection at a very attractive price.

Rohde&Schwarz stands for quality, precision and innovation in all fields of wireless communications. As an independent, family-owned company, Rohde&Schwarz finances its growth from its own funds. The company plans for the long term to the benefit of its customers. Purchasing Rohde&Schwarz products is an investment for the future.

BENEFITS

Choose your Rohde&Schwarz oscilloscope

	R&S®RTC1000	R&S®RTB2000	R&S®RTM3000	R&S®RTA4000
Number of oscilloscope channels	2	2/4	2/4	4
Bandwidth in MHz	50, 70, 100, 200, 300	70, 100, 200, 300	100, 200, 350, 500, 1000	200, 350, 500, 1000
Max. sampling rate in Gsample/s	1/channel, 2 interleaved	1.25/channel, 2.5 interleaved	2.5/channel, 5 interleaved	2.5/channel, 5 interleaved
Max. memory depth in Msample	1/channel, 2 interleaved	10/channel, 20 interleaved; 160 Msample (optional) segmented memory	40/channel, 80 interleaved; 400 Msample (optional) segmented memory	100/channel, 200 interleaved; 1 Gsample (standard) segmented memory
Timebase accuracy in ppm	50	2.5	2.5	0.5
Vertical bits (ADC)	8	10	10	10
Min. input sensitivity	1 mV/div	1 mV/div	500 µV/div	500 µV/div
Display	6.5", 640 × 480 pixel	10" capacitive touch, 1280 × 800 pixel	10" capacitive touch, 1280 × 800 pixel	10" capacitive touch, 1280 × 800 pixel
Update rate	10000 waveforms/s	300000 waveforms/s in fast segmentated memory mode	2000000 waveforms/s in fast segmentated memory mode	2000000 waveforms/s in fast segmentated memory mode
MSO	8 channels, 1 Gsample/s	16 channels, 2.5 Gsample/s	16 channels, 5 Gsample/s	16 channels, 5 Gsample/s
Protocol (optional)	I²C, SPI, UART/RS-232/ RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/ RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/ RS-485, CAN, LIN, audio (I²S/ LJ/RJ/TDM), ARINC, MIL	I²C, SPI, UART/RS-232/ RS-422/RS-485, CAN, LIN, audio (I²S), ARINC, MIL
Generator(s)	1 generator, 4-bit pattern generator	1 ARB, 4-bit pattern generator	1 ARB, 4-bit pattern generator	1 ARB, 4-bit pattern generator
Math	+, –, *, /, FFT (128k points)	+, –, *, /, FFT (128k points)	+, –, *, /, FFT (128k points), 21 advanced functions	+, –, *, /, FFT (128k points), 21 advanced functions
Rohde&Schwarz probe interface	–	–	standard	standard
RF capability	FFT	FFT	spectrum analysis	spectrum analysis

SEE SMALL SIGNAL DETAILS IN THE PRESENCE OF LARGE SIGNALS

- 10-bit ADC: 1024 levels, 4 times more than 8-bit ADC
- 500 µV/div: full bandwidth, no software magnification

10-bit vertical resolution

The R&S®RTM3000 features a customized Rohde&Schwarz designed 10-bit A/D converter that delivers a fourfold improvement over conventional 8-bit A/D converters.

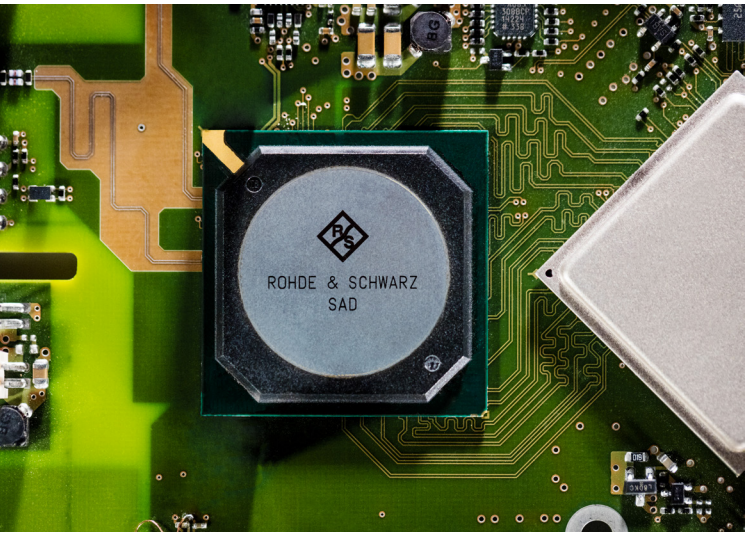
The increased resolution results in sharper waveforms with more signal details that would otherwise be missed. One example is the characterization of switched-mode power supplies. The voltages across the switching device must be determined during the on/off times within the same acquisition. For precise measurements of small voltage components, a high resolution of more than 8 bit is essential.

500 µV/div: full measurement bandwidth and low noise

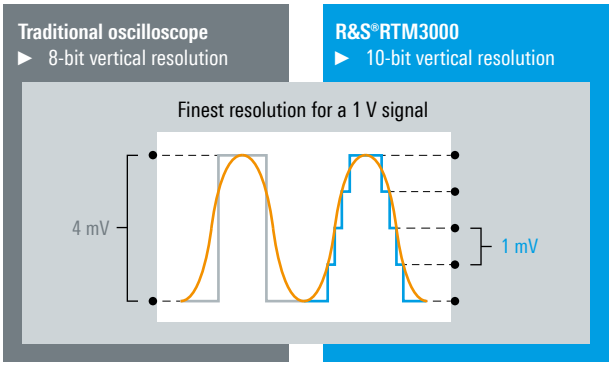
The R&S®RTM3000 oscilloscope offers outstanding sensitivity down to 500 µV/div. Traditional oscilloscopes can only reach this level of input sensitivity by employing software-based magnification or by limiting the bandwidth. The R&S®RTM3000 oscilloscope shows the signal's real sampling points over the full measurement bandwidth – even at 500 µV/div. This ensures high measurement accuracy.

The accuracy of the signal displayed on the screen depends on the oscilloscope's inherent noise. The R&S®RTM3000 oscilloscope precisely measures even at the smallest vertical resolution by using low-noise frontends and state-of-the-art A/D converters.

The Rohde&Schwarz designed 10-bit A/D converter ensures highest signal fidelity at highest resolution



10-bit A/D converter: uncovers even small signal details



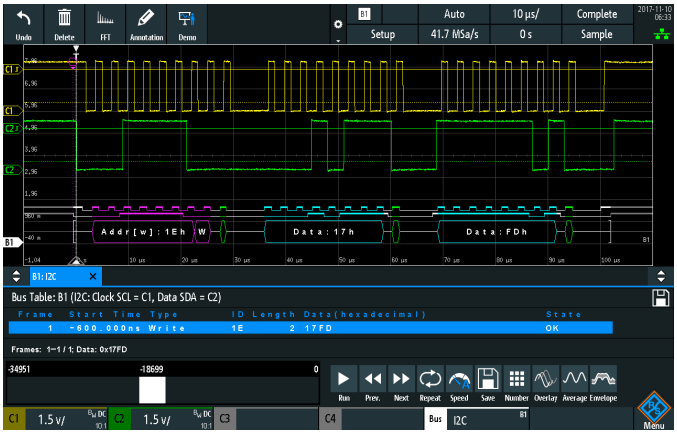
CAPTURE MORE TIME AT FULL BANDWIDTH

- 80 Msample: standard acquisition memory 8 to 40 times better
- 5 Gsample: fast sampling rate
- 400 Msample: segmented memory

40 Msample standard and 80 Msample interleaved

The R&S®RTM3000 offers a class-leading memory depth: 40 Msample per channel, and even 80 Msample in interleaved mode. This is eight times more than similar oscilloscopes in the same instrument class. It captures longer acquisition sequences even at high sampling rates for more analysis results, e.g. when analyzing transients of switched-mode power supplies.

Capture and analyze pulsed and burst signals over a long period; 400 Msample deep segmented memory is unique in this class



Segmented memory: 400 Msample with history function

The R&S®RTM-K15 option with deep, segmented memory analyzes signal sequences over a long observation period. For example, protocol-based signals with communications gaps, such as I²C and SPI, can be captured over several seconds or minutes. Thanks to the variable segment size from 10 ksample to 80 Msample, the 400 Msample memory is optimally utilized; more than 34 000 cohesive individual recordings are possible.

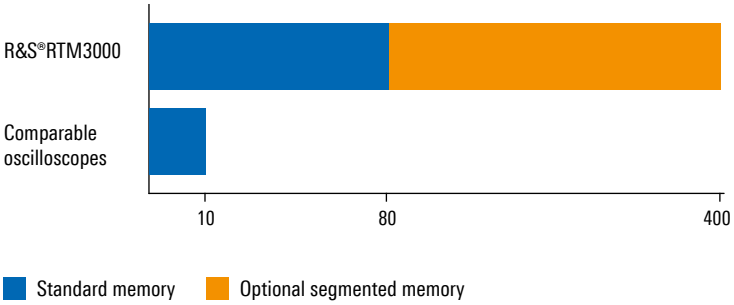
In history mode, previous acquisitions to the maximum segmented memory depth of 400 Msample are available for further analysis. Functions such as mask tests, QuickMeas and FFT can be used for further analysis.

Maintains fast sampling rates at all times

Signal faults and important events are detected better with an oscilloscope that offers a high sampling rate. Many applications require long acquisition cycles, for instance when analyzing serial protocols. With a sampling rate of up to 5 Gsample/s and a memory depth of up to 80 Msample, the R&S®RTM3000 oscilloscopes really excel here. They accurately display signals, right down to the details, over long sequences.

8 to 40 times more memory depth than traditional oscilloscopes in the same instrument class

Capture the longest time periods with class-leading 400 Msample memory



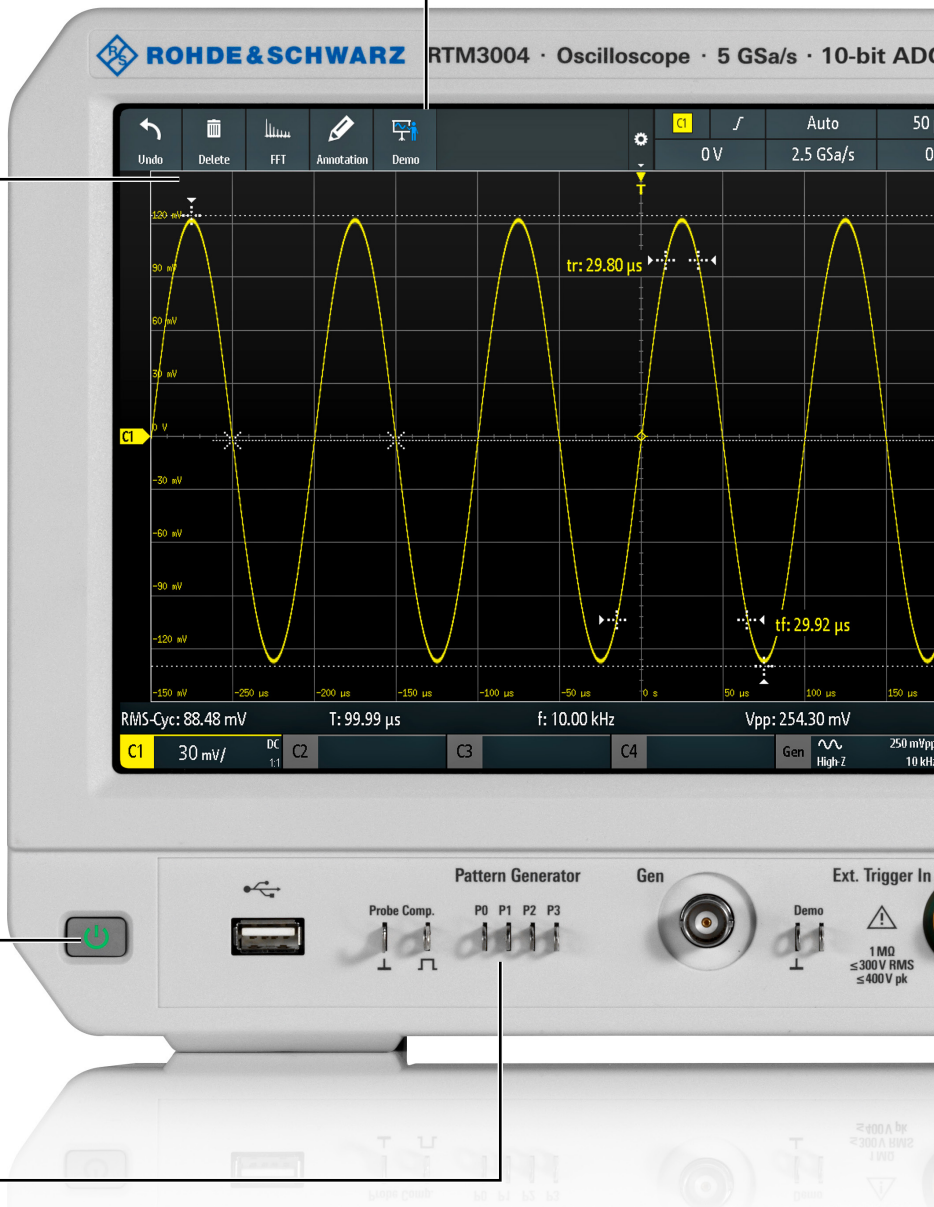
10.1" HIGH-RESOLUTION CAPACITIVE TOU

Quick access to important tools

- Drag & drop to use analysis tools
- Toolbar to access functions
- Sidebar to intuitively configure functions

Easily customizable waveform display with R&S®SmartGrid technology

- Configurable display
- Resizable waveform areas
- Scales labeled on all axes



10 second boot time

Integrated waveform and pattern generator up to 50 Mbit/s

- Output of sine, square/pulse, ramp and noise waveforms
- Output of arbitrary waveform files and 4-bit signal patterns

UCHSCREEN WITH GESTURE SUPPORT

10.1" high-resolution capacitive touchscreen with gesture support

- Gesture support for scaling and zooming
- High resolution: 1280 × 800 pixel
- 12 horizontal grid lines for more signal details

Documentation of results at the push of a button

- Documentation as a screenshot or of instrument settings

Integrated logic analyzer (MSO)

- 16 additional digital channels
- Synchronous and time-correlated analysis of analog and digital components of embedded designs
- Fully retrofittable

Color-coded controls indicate the selected channel

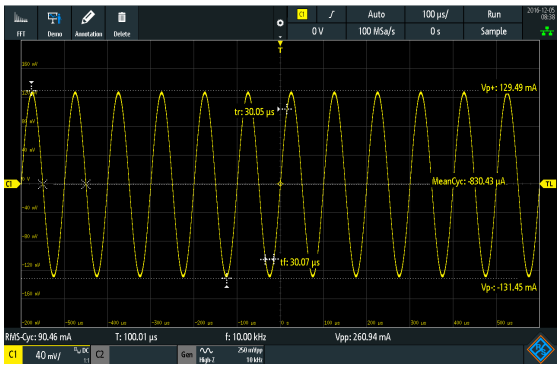
QuickMeas: results at the push of a button

- Graphical display of key measurement results for the active signal

Active probe interface

- Automatically detects and powers probes
- Rohde & Schwarz probes with probe interface
- More than 30 available probes

X-IN-1 OSCILLOSCOPE



Oscilloscope

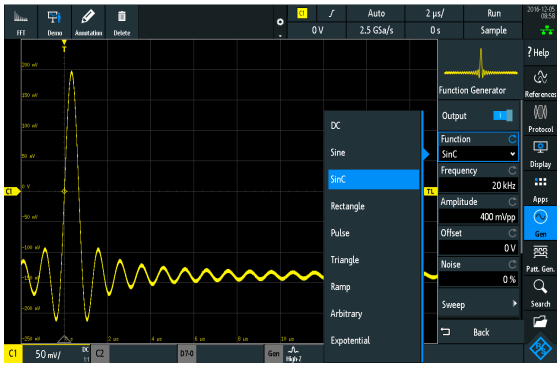
With a sampling rate of up to 5 Gsample/s and a memory depth of up to 80 Msample, the R&S®RTM3000 oscilloscope excels in its class. A waveform update rate of more than 64 000 waveforms/s ensures a responsive instrument that reliably catches signal faults. Included tools provide quick results, e.g. QuickMeas, mask tests, FFT, math, cursors and automatic measurements (including statistics).

Logic analyzer

The R&S®RTM-B1 option turns every R&S®RTM3000 into an intuitive-to-use MSO with 16 additional digital channels. The oscilloscope captures and analyzes signals from analog and digital components of an embedded design – synchronously and time-correlated to each other. For example, the delay between input and output of an A/D converter can conveniently be determined using the cursor measurements.

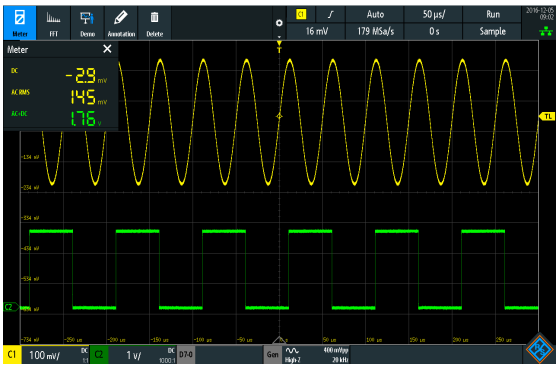
Protocol analyzer

Protocols such as I²C, SPI and CAN/LIN frequently transfer control messages between integrated circuits. The R&S®RTM3000 has versatile options for protocol-specific triggering and decoding of serial interfaces. Selective acquisition and analysis of relevant events and data is possible. With the hardware-based implementation, smooth operation and a high update rate are ensured even for long acquisitions. This is advantageous, for example, for capturing multiple packetized serial bus signals.



Waveform and pattern generator

The integrated R&S®RTM-B6 waveform and pattern generator (up to 50 Mbit/s) is useful for educational purposes and for implementing prototype hardware. In addition to common sine, square/pulse, ramp and noise waveforms, it outputs arbitrary waveforms and 4-bit signal patterns. Waveforms and patterns can be imported as CSV files or copied from oscilloscope waveforms. You can preview signals before playing them back to quickly check signal correctness. Predefined patterns for e.g. I²C, SPI, UART and CAN/LIN are provided.

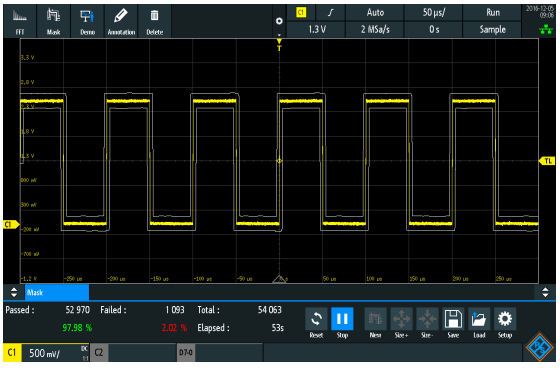


Digital voltmeter

For simultaneous measurements, the R&S®RTM3000 features a 3-digit voltmeter (DVM) and 6-digit frequency counter on each channel. Measurement functions include DC, AC + DC (RMS) and AC (RMS).

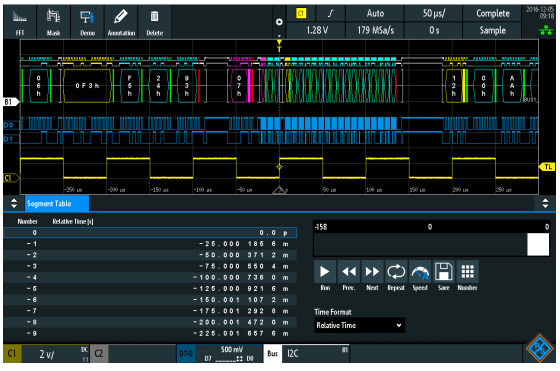
Frequency analysis mode

Difficult-to-find faults often result from the interaction between time and frequency signals. The FFT function of the R&S®RTM3000 is activated at the push of a button and by entering center frequency and span. Thanks to the R&S®RTM3000 oscilloscopes' high-performance FFT functionality, signals can be analyzed with up to 128k points. Other tools include cursor measurements and autoset in the frequency domain.



Mask test mode

Mask tests quickly reveal whether a specific signal lies within defined tolerance limits. Masks assess the quality and stability of a DUT based on statistical pass/fail evaluation. Signal anomalies and unexpected results are quickly identified. When the mask is violated, the measurement stops. Each violation can generate a pulse output at the AUX-OUT connector on the R&S®RTM3000. This pulse output can be used to trigger actions in the measurement setup.



History and segmented memory mode

The R&S®RTM-K15 history and segmented memory option increases the memory from 40 Msample to 400 Msample. You can scroll through past acquisitions and analyze the data using the oscilloscope tools, e.g. protocol decode and logic channels. Serial protocol and pulse sequences are recorded practically without interruptions.

FREQUENCY RESPONSE ANALYSIS (BODE PLOT)

- Analyze the frequency response of passive filters and amplifier circuits
- Perform control loop response measurements
- Perform power supply rejection ratio measurements
- Simple and fast documentation

Perform low-frequency response analysis with an oscilloscope

The R&S®RTM-K36 frequency response analysis (Bode plot) option lets you perform low-frequency response analysis on your oscilloscope easily and quickly. It characterizes the frequency response of a variety of electronic devices, including passive filters and amplifier circuits. For switch mode power supplies, it measures the control loop response and power supply rejection ratio.

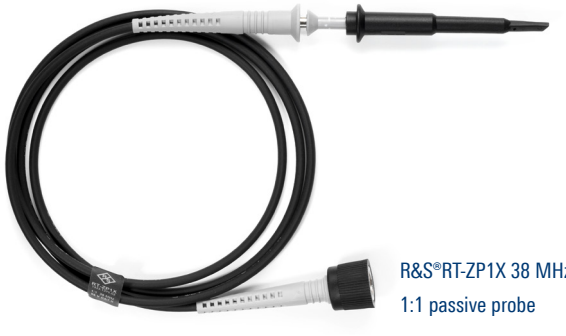
The frequency response analysis option uses the oscilloscope's built-in waveform generator to create stimulus signals ranging from 10 Hz to 25 MHz. Measuring the ratio of the stimulus signal and the output signal of the DUT at each test frequency, the oscilloscope plots gain and phase logarithmically.

The R&S®RTM-K36 frequency response analysis (Bode plot) option characterizes the frequency response of a variety of electronic devices, including passive filters and amplifier circuits

The amplitude output level of the generator signal can be varied during the measurement to suppress the noise behavior of the DUT

The measurement resolution can be varied by changing the points per decade

A table of measurement results provides detailed information about each measurement point, consisting of frequency, gain and phase shift



R&S®RT-ZP1X 38 MHz bandwidth 1:1 passive probe

Features and functionalities

Amplitude profile

The R&S®RTM-K36 frequency response analysis (Bode plot) option allows users to profile the amplitude output level of the generator. This helps to suppress the noise behavior of the DUT when performing a control loop response or power supply rejection ratio and to improve signal-to-noise ratio (SNR). It is possible to define up to 16 steps.

Improve resolution and markers support

You can choose the points per decade to set up and modify the resolution of your plot. The oscilloscope supports up to 500 points per decade. Markers can be dragged to the desired position, directly on the plotted trace. A legend displays the corresponding coordinates of the markers. To determine the crossover frequency, set one marker to 0 dB and the second marker to –180° phase shift. Now you can easily determine the phase and gain margin.

Measurement table

Furthermore, you can view the results in a table. The table of measurement results details information about each measured point, consisting of frequency, gain and phase shift. In case you use cursors, for ease of use, the associated row of the result table is highlighted. For reporting, screenshots, table results or both can be quickly saved to a USB device.

Broad probe portfolio

Accurate control loop response or power supply rejection ratio characterization highly depends on choosing the right probes, since peak-to-peak amplitudes of both V_{in} and V_{out} can be very low at some test frequencies. These values would be buried in the oscilloscope's noise floor and/or in the switching noise of the DUT itself. We recommend the low-noise R&S®RT-ZP1X 38 MHz bandwidth 1:1 passive probes. These reduce measurement noise and provide the best SNR.

THE BEST CHOICE FOR POWER

- Analyze the input, output and transfer function of switched-mode power supplies
- Measurement wizard for fast results
- Simple and fast documentation
- Analyze harmonic current in line with conventional EN, MIL and RTCA standards

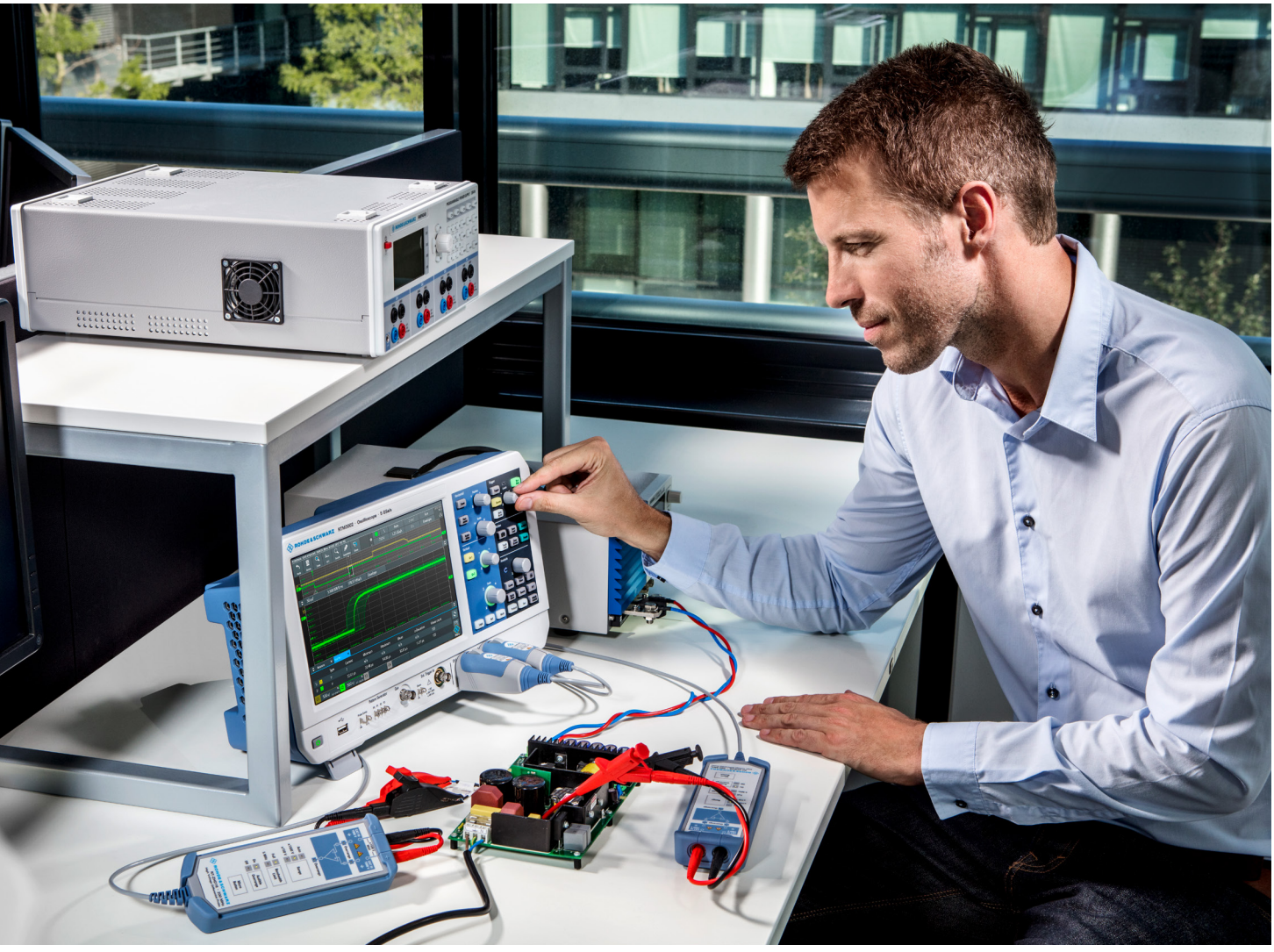
See power signal details with up to 10-bit resolution

Even the smallest signal details of a high dynamic signal matter for power measurements. Verification of $R_{DS(on)}$ of a MOSFET is one example. The high ADC resolution of the R&S®RTM3000 oscilloscopes increases the vertical resolution up to 10 bit. Previously unseen signal details become visible and measurable. In the $R_{DS(on)}$ example, this makes it possible to measure the slope of the drain-to-source-voltage while the switch is closed.

Complete probe portfolio for power measurements

Accurate voltage and current probes with a suitable measurement range are critical for power measurements. Rohde&Schwarz offers a complete probe portfolio for different power measurement applications – ranging from µA to kA and from µV to kV.

Perfect instruments for power measurements thanks to diverse functionality, rugged design and small footprint



Specialized measurement functions for characterizing power electronics

Analysis tools support verification and debugging when developing current and voltage supply circuits. The R&S®RTM-K31 power analysis option facilitates analysis of the turn on/off behavior, the internal transfer function of the overall circuit, the safe operating area (SOA), the output signal quality and any loss.

Standards for limiting the harmonic current

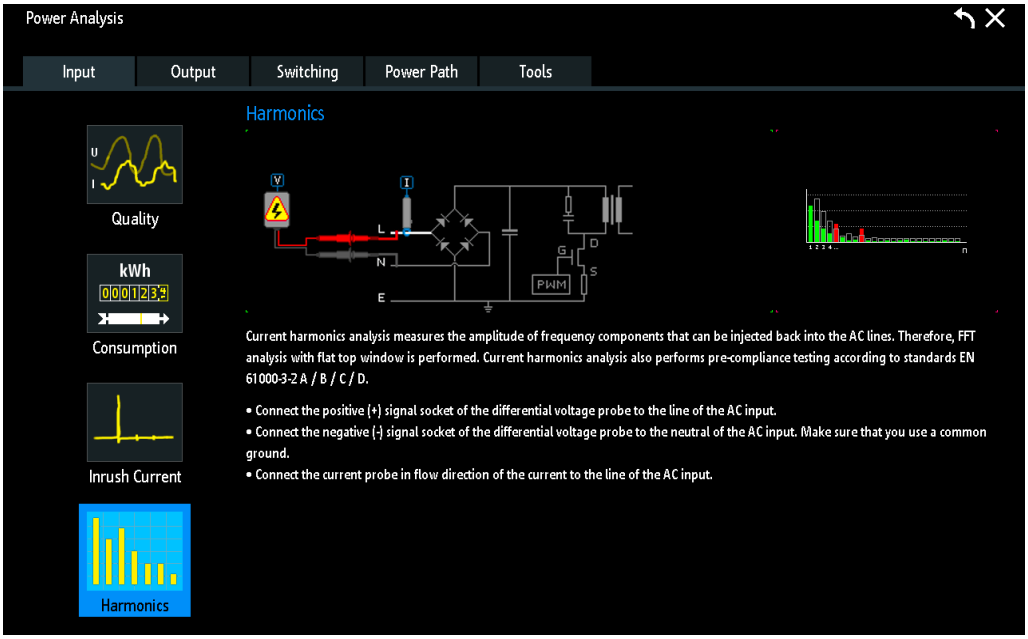
Depending on the application, different standards for limiting the harmonic current must be met when developing switched-mode power supplies. The R&S®RTM-K31 option supports the user during testing of all conventional standards: EN 61000-3-2 classes A, B, C, D, MIL-STD-1399 and RTCA DO-160.

Easy, clear documentation of power analysis

Results can be added to the test report simply by pressing a button. This report documents the current setup and configuration. The R&S®Oscilloscope Report Creator is used to generate a report (available free of charge on the Rohde&Schwarz website). You can define the level of detail for the report and customize the layout, for example, by adding a company logo. The output format is .pdf.

Measurement functions of the R&S®RTM-K31 option

Measurement	Measurement functions
Current harmonics	► EN 61000-3-2 class A, B, C, D ► MIL-STD-1399 ► RTCA DO-160
Input	► inrush current ► power quality ► power consumption
Power converter control	► modulation analysis ► slew rate ► dynamic on-resistance
Power path	► safe operating area (SOA mask editor) ► turn on/off ► switching loss ► power efficiency
Output	► output ripple ► transient response ► output spectrum



Online help facilitates quick and easy testing

SPECTRUM ANALYSIS: IDENTIFY INTERACTIONS BETWEEN TIME AND FREQUENCY

- Spectrogram: evolution over time
- Peak markers: automatic positioning

Fast and precise analysis

Difficult-to-find faults often result from the interaction between time and frequency signals. The R&S®RTM-K37 spectrum analysis and spectrogram option quickly finds such errors. Like on a spectrum analyzer, parameters such as center frequency and resolution bandwidth can be adapted to the specific measurement task. The oscilloscope automatically selects the relevant time domain settings. Optimum performance ensures the fastest multi-domain analysis in this oscilloscope class.

Parallel operation: correlation between frequency and time

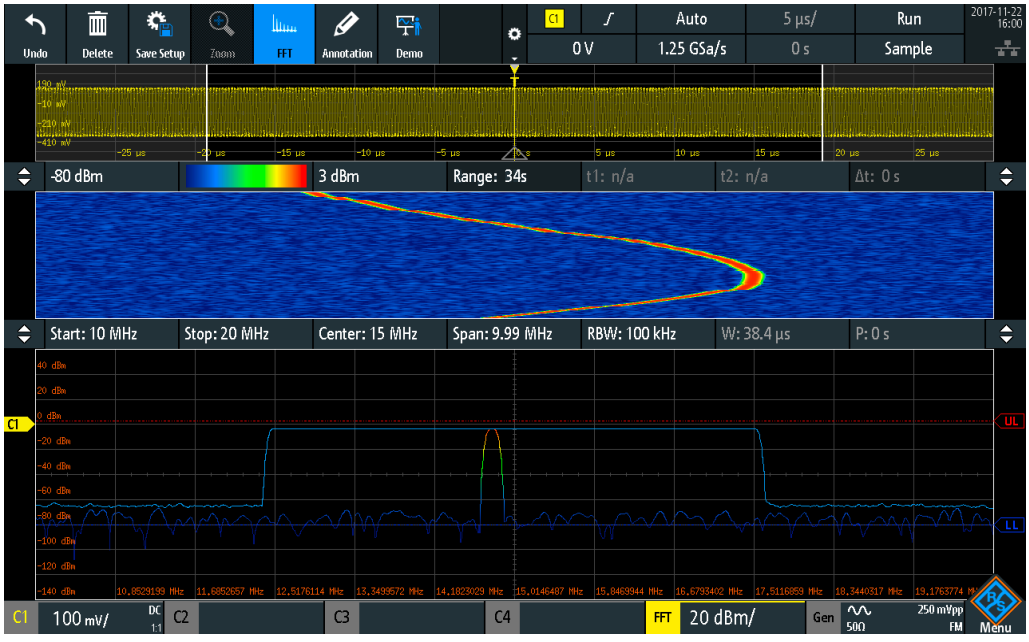
Advanced electronics is based on the seamless interaction between protocol-based interfaces, digital, analog and frequency components. Simultaneous analysis of all components is a must. Time, frequency and protocol information are correlated, and time references can be quickly recognized. Measurement windows help you select specific areas of the recording, which can simplify, for example, the acquisition of frequency switching operations.

Spectrogram: display of frequency over time

A spectrogram displays the spectrum of frequencies as they vary over time. For easy interpretation, the magnitude can be color-coded. Thanks to the high FFT rate, even fast frequency changes can be displayed. When used in combination with the R&S®RTM-K15 history and segmented memory option, the spectrogram marker shows the time of the acquisition and makes it possible to load the corresponding time and frequency waveforms onto the screen. All R&S®RTM3000 tools can be used to analyze the loaded waveforms.

Markers: find peaks automatically

Markers can be automatically positioned on the frequency peaks for fast analysis. An adaptable threshold defines the peaks. Parameters such as excursion and maximum peak width can be adjusted for in-depth analysis. Results can be compiled in a table (absolute or relative to a specific reference marker). Selectable delta measurements make it easy to adjust the distances between signal peaks.



Test signal from three different perspectives: time domain (top), spectrogram (center) and frequency domain (bottom)

PROTOCOL ANALYSIS: EFFICIENTLY DEBUG SERIAL BUSES

Protocol aware triggering and decoding for serial buses

Counting 1s and 0s to decode a serial bus is tedious and error-prone. The R&S®RTM3000 automates this process by decoding the waveforms into a specific protocol. In addition, protocol aware triggering directly triggers on specific parts of a packet or frame.

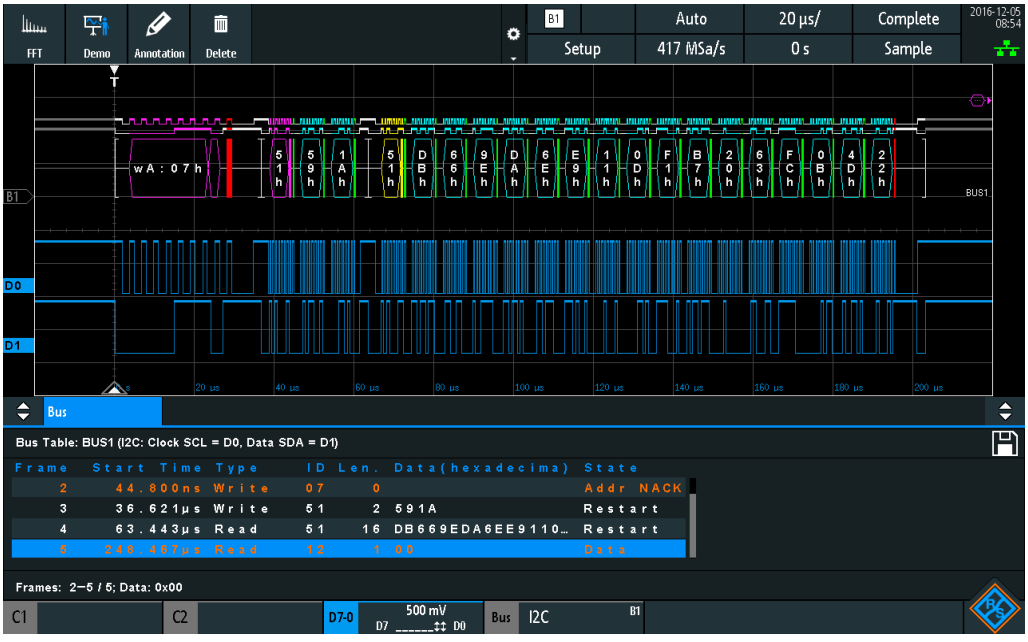
Segmented memory for long time captures

Standard segmented memory is ideal for serial protocols. It allows you to capture only relevant packets/frames and ignore the long idle time in between packets. With more than 400 Msample of segmented memory available, you can capture more than 34 000 timestamped packets/frames.

Table view of packets/frames

A table view allows you to see a high-level representation of all captured packets. You can also export the table.

Supported buses	
Embedded	► I²C ► UART/RS-232/RS-422/RS-485 ► SPI (2/3/4-wire)
Aerospace	► MIL-STD-1553 ► ARINC 429
Automotive, industrial	► CAN ► LIN
Audio	► I²S/LJ/RJ/TDM



Decoded hexadecimal I²C message shown in honeycomb format and in table

THE RIGHT PROBE FOR THE BEST MEASUREMENT

- More than 30: dedicated probes
- Micro button: for convenient instrument control
- 0.01 % accuracy: with R&S®ProbeMeter

Extensive probe range for all measurement tasks

A complete portfolio of high-quality passive and active probes covers all measurement tasks. With an input impedance of 1 MΩ, the active probes put only a minimum load on a signal source's operating point. The very large dynamic range, even at high frequencies, prevents signal distortion – for example: 60 V (V_{pp}) at 1 GHz for the active single-ended probes.

Complete portfolio for power measurements

The portfolio of dedicated probes for power measurements includes active and passive probes for the different voltage and current ranges – from µA to kA and from µV to kV. Dedicated power rail probes detect even small and sporadic distortions on DC power rails.

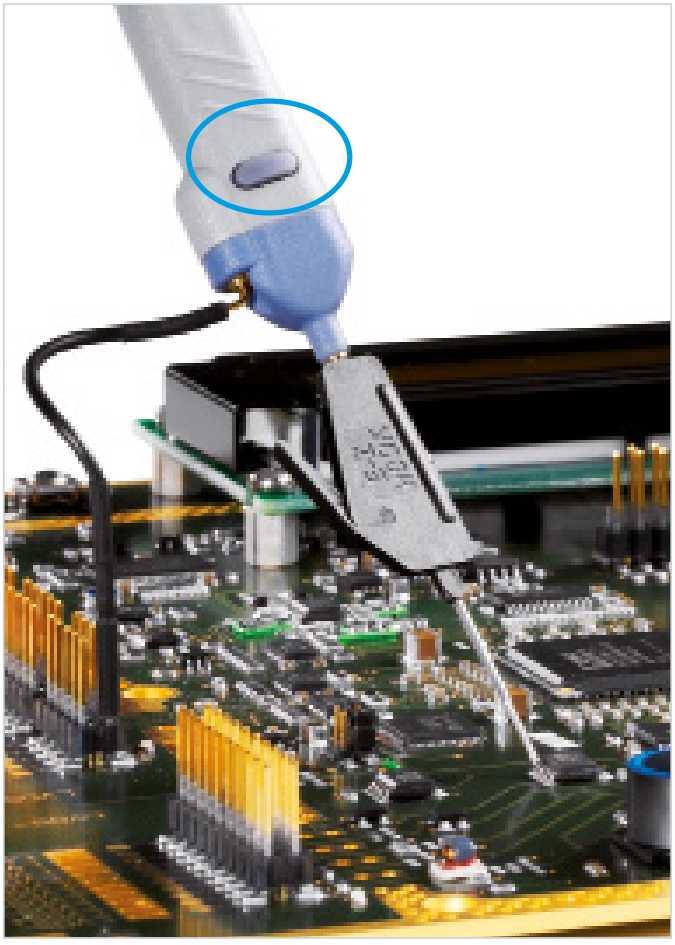
Micro button for convenient instrument control

The situation is all too familiar. You've carefully positioned the probe on the device under test and want to start measurements – but you don't have a free hand. The micro button on Rohde&Schwarz active probes solves this problem. It is conveniently situated on the probe tip, and you can assign it different functions, such as run/stop, autoset and adjust offset.

R&S®ProbeMeter: integrated voltmeter for precise DC measurements

One connection lets you see the oscilloscope waveform and gives you access to a highly accurate voltmeter that shows the DC value regardless of other instrument settings.

- For more information, see the product brochure: Probes and accessories for Rohde&Schwarz oscilloscopes (PD 3606.8866.12).



Practical design: micro button for convenient instrument control; diverse probe tips and ground cables are included as standard accessories

Probe type	Ideal for measuring	Recommended probes
Standard passive probe	Single-ended voltages, max. bandwidth of 500 MHz	R&S®RT-ZP05S comes as standard with the R&S®RTM3000
Active broadband probe	Singled-ended voltages, up to 8 GHz bandwidth	R&S®RT-ZS10E, R&S®RT-ZS10, R&S®RT-ZS20
Power integrity probe	Disturbances on power rails with high offsets, greater than 2 GHz bandwidth	R&S®RT-ZPR20
High voltage probe	High single-ended and differential voltages, up to 6 kV	R&S®RT-ZHD007, R&S®RT-ZHD15, R&S®RT-ZHD16, R&S®RT-ZHD60
Current probe	Currents from µAs to kAs	R&S®RT-ZC05B, R&S®RT-ZC10B, R&S®RT-ZC15B, R&S®RT-ZC20B, R&S®RT-ZC30
EMC near-field probe	EMI debugging up to 3 GHz	R&S®HZ-15

AND THERE IS SO MUCH MORE ...

- Efficient reporting capabilities
- Localized GUI and online help
- Fully upgradeable via software licenses
- Web server functionality for instrument access
- Extensive range of probes and accessories

Grows with your needs

The R&S®RTM3000 oscilloscopes flexibly adapt to needed project updates. You simply install the necessary software licenses, e.g. triggering and decoding of serial protocols or the history and segmented memory mode. The waveform and pattern generator and MSO capabilities [1] are built-in and just need to be activated. The bandwidth can be upgraded up to 1 GHz via keycode. All this makes retrofitting really easy.

Multilingual support: choose among thirteen languages

The R&S®RTM3000 oscilloscope's user interface and online help support thirteen languages (English, German, French, Spanish, Italian, Portuguese, Czech, Polish, Russian, simplified and traditional Chinese, Korean and Japanese). You can change the language in just a few seconds while the instrument is running.

[1] The R&S®RTM-B1 MSO option additionally contains two logic probes with 16 digital channels.

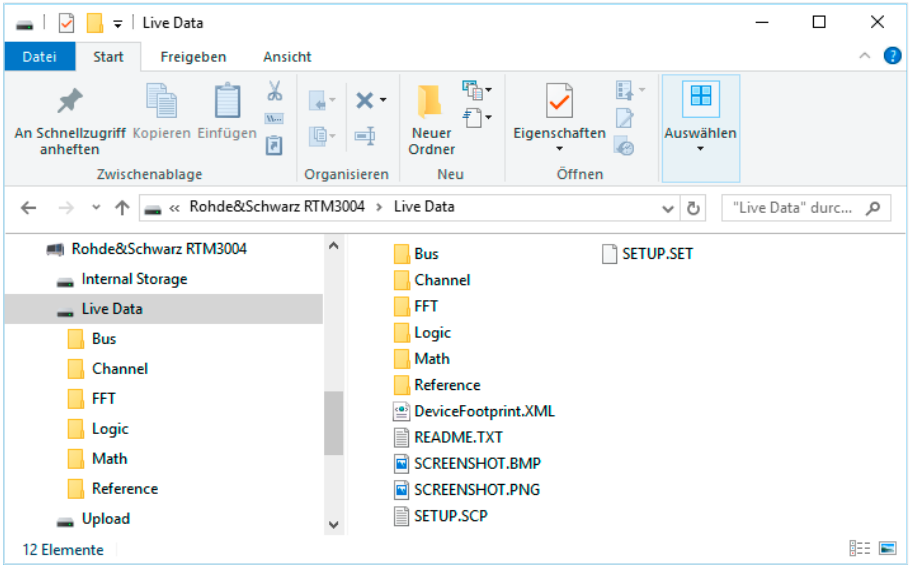
Protection of data

The secure erase function protects sensitive data. This function removes all user data and settings, including device setups and reference waveforms.

Connectivity

The R&S®RTM3000 can be directly connected to a PC via the built-in USB host and USB device ports. The USB host transfers screenshots and instrument settings to a USB stick. Media transfer protocol (MTP) implementation ensures seamless integration. The USB device port and the LAN interface enable remote control. The built-in web server functionality allows you to control the oscilloscope and display your screen content to an audience. Data and programming interfaces are included, e.g. for seamless MATLAB® integration.

With the USB MTP implementation, you can easily access live channel data and screenshots and integrate the oscilloscope into your computing environment



OSCILLOSCOPE PORTFOLIO

R&S®	RTH1000	RTC1000	RTB2000	RTM3000
Vertical				
Bandwidth	60/100/200/350/500 MHz [1]	50/70/100/200/300 MHz [1]	70/100/200/300 MHz [1]	100/200/350/500 MHz/1 GHz [1]
Number of channels	2 plus DMM/4	2	2/4	2/4
Resolution	10 bit	8 bit	10 bit	10 bit
V/div 1 MΩ	2 mV to 100 V	1 mV to 10 V	1 mV to 5 V	500 µV to 10 V
V/div 50 Ω	–			500 µV to 1 V
Horizontal				
Sampling rate per channel (in Gsample/s)	1.25 (4-channel model); 2.5 (2-channel model); 5 (all channels interleaved)	1; 2 (2 channels interleaved)	1.25; 2.5 (2 channels interleaved)	2.5; 5 (2 channels interleaved)
Max. memory (per channel/1 channel active)	125 ksample (4-channel model); 250 ksample (2-channel model); 500 ksample (50 Msample in segmented memory mode [2])	1 Msample; 2 Msample	10 Msample; 20 Msample (160 Msample in segmented memory mode [2])	40 Msample; 80 Msample (400 Msample in segmented memory mode [2])
Segmented memory	option	–	option	option
Acquisition rate (in waveforms/s)	50000	10000	50000 (300000 in fast segmented memory mode [2])	64000 (2000000 in fast segmented memory mode [2])
Trigger				
Options	advanced, digital trigger (14 trigger types) [2]	elementary (5 trigger types)	basic (7 trigger types)	basic (10 trigger types)
Mixed signal option				
No. of digital channels [1]	8	8	16	16
Sampling rate of digital channels (in Gsample/s)	1.25	1	1.25	two logic probes: 2.5 on each channel; one logic probe: 5 on each channel
Memory of digital channels	125 ksample	1 Msample	10 Msample	two logic probes: 40 Msample per channel; one logic probe: 80 Msample per channel
Analysis				
Cursor meas. types	4	13	4	4
Stand. meas. functions	37	31	32	32
Mask test	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)
Mathematics	elementary	elementary	basic (math on math)	basic (math on math)
Serial protocols triggering and decoding [1]	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, CAN-FD, SENT	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429
Display functions	data logger	–	–	–
Applications [1, 2]	high-resolution frequency counter, advanced spectrum analysis, harmonics analysis, user scripting	digital voltmeter (DVM), component tester, fast Fourier transform (FFT)	digital voltmeter (DVM), fast Fourier transform (FFT), frequency response analysis	power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis
Compliance testing [1, 2]	–	–	–	–
Display and operation				
Size and resolution	7", color, 800 × 480 pixel	6.5", color, 640 × 480 pixel	10.1", color, 1280 × 800 pixel	10.1", color, 1280 × 800 pixel
Operation	optimized for touchscreen operation, parallel button operation	optimized for fast button operation	optimized for touchscreen operation, parallel button operation	
General data				
Dimensions in mm (W × H × D)	201 × 293 × 74	285 × 175 × 140	390 × 220 × 152	390 × 220 × 152
Weight in kg	2.4	1.7	2.5	3.3
Battery	lithium-ion, > 4 h	–	–	–

[1] Upgradeable. [2] Requires an option.

RTA4000	RTE1000	RTO2000	RTP
200/350/500 MHz/1 GHz [1]	200/350/500 MHz/1/1.5/2 GHz [1]	600 MHz/1/2/3/4/6 GHz [1]	4/6/8/13/16 GHz [1]
4	2/4	2/4 (only 4 channels in 4 GHz and 6 GHz models)	4
10 bit	8 bit (up to 16 bit with HD mode)	8 bit (up to 16 bit with HD mode) [2]	8 bit (up to 16 bit with HD mode) [2]
500 µV to 10 V	500 µV to 10 V	1 mV to 10 V (500 µV to 10 V) [2]	
500 µV to 1 V	500 µV to 1 V	1 mV to 1 V (500 µV to 1 V) [2]	1 mV to 1 V
2.5; 5 (2 channels interleaved)	5	10; 20 (2 channels interleaved in 4 GHz and 6 GHz model)	20; 40 (2 channels interleaved)
100 Msample; 200 Msample (1 Gsample in segmented memory mode)	50 Msample/200 Msample	standard: 50 Msample/200 Msample; max. upgrade: 1 Gsample/2 Gsample	standard: 50 Msample/200 Msample; max. upgrade: 1 Gsample/2 Gsample
standard	standard	standard	standard
64 000 (2 000 000 in fast segmented memory mode)	1 000 000 (1 600 000 in ultra-segmented memory mode)	1 000 000 (2 500 000 in ultra-segmented memory mode)	750 000 (3 200 000 in ultra-segmented memory mode)
basic (10 trigger types)	advanced, digital trigger (13 trigger types)	advanced (includes zone trigger), digital trigger (14 trigger types) [2]	advanced, digital trigger (14 trigger types) with realtime deembedding [2], high-speed serial pattern trigger incl. 8/16 Gbps CDR [2], zone trigger [2]
16	16	16	16
two logic probes: 2.5 on each channel; one logic probe: 5 on each channel	5	5	5
two logic probes: 100 Msample per channel; one logic probe: 200 Msample per channel	100 Msample	200 Msample	200 Msample
4	3	3	3
32	47	47	47
elementary (tolerance mask around the signal)	advanced (user-configurable, hardware based)	advanced (user-configurable, hardware based)	advanced (user-configurable, hardware based)
basic (math on math)	advanced (formula editor)	advanced (formula editor)	advanced (formula editor)
I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429, FlexRay™, CAN-FD, USB 2.0/HSIC, Ethernet, Manchester, NRZ, SENT, SpaceWire, CXPI, USB Power Delivery, automotive Ethernet 100BASE-T1	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429, FlexRay™, CAN-FD, MIPI RFFE, USB 2.0/HSIC, MDIO, 8b10b, Ethernet, Manchester, NRZ, SENT, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, CXPI, USB 3.1 Gen1, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, automotive Ethernet 100BASE-T1	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, MIL-STD-1553, ARINC 429, CAN-FD, MIPI RFFE, USB 2.0/ HSIC, MDIO, 8b10b, Ethernet, Manchester, NRZ, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, USB 3.1 Gen1/Gen2, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, automotive Ethernet 100BASE-T1
–	histogram, trend, track [2]	histogram, trend, track [2]	histogram, trend, track
power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis	power, 16-bit high definition mode (standard), advanced spectrum analysis and spectrogram	power, 16-bit high definition mode, advanced spectrum analysis and spectrogram, jitter/jitter decomposition, clock data recovery, I/Q data, RF analysis, deembedding	16-bit high definition mode, advanced spectrum analysis and spectrogram, jitter/jitter decomposition, I/Q data, RF analysis, realtime deembedding, TDR/TDT analysis
–	–	various options available (see PD 3607.2684.22)	various options available (see PD 5215.4152.22)
10.1", color, 1280 × 800 pixel	10.4", color, 1024 × 768 pixel	12.1", color, 1280 × 800 pixel	12.1", color, 1280 × 800 pixel
optimized for touchscreen operation, parallel button operation			
390 × 220 × 152	427 × 249 × 204	427 × 249 × 204	441 × 285 × 316
3.3	8.6	9.6	18
–	–	–	–

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
Invert signal		yes
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
Delta time accuracy	corresponds to time error between to edges on same acquisition and channel; waveform sample rate Fs can be obtained via SCPI command "`ACQ:SRAT?";` signal amplitude greater than 5 divisions, measurement threshold set to 50 %, vertical gain 10 mV/div or greater; rise time lower than 4/Fs; waveform acquired in sample mode	±(1.34/Fs + timebase accuracy × |reading|) (peak) (meas.)

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 (400 ps detection)
	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
	actions on trigger	pulse, sound, screenshot, save waveform, save reference waveform
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, peak+, peak–, frequency, period, amplitude, top level, base level, positive overshoot, negative overshoot, pulse width+, pulse width-, duty cycle+, duty cycle–, rise time, fall time, delay, phase, crest factor, slew rate+, slew rate–, σ.std. deviation, σ.std. deviation cycle, delay to trigger
	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, two sources selectable
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
Bandwidth		1 MHz

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 oscilloscope (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, square, square root, absolute value, reciprocal, inverse, log10, ln, derivation, integration, low pass, high pass, track period, track frequency, track pulse width, track duty cycle
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 transform (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)
Scaling		dBm, dBV, dBµV, V (RMS)

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, I²C (R&S®RTM-K1 option) • UART/RS-232/RS-422/RS-485 (R&S®RTM-K2 option) • CAN, LIN (R&S®RTM-K3 option) • I²S, 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 device interface		1 port, type B 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 oscilloscope 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
Sine	frequency	0.1 Hz to 25 MHz
	SFDR	> 40 dBc (meas.)
	THD	> 40 dBc (meas.)
Rectangle	frequency	0.1 Hz to 10 MHz
Pulse	frequency	0.1 Hz to 10 MHz
	edge time	adjustable
	duty cycle	1 % to 99 %
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, triangle
Burst	number of cycle	1 to 1024
	idle time	28 ns to 17 s
	start phase	0° to 360°
	trigger	continuous, manually
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, audio, PWM
	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 2 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
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
	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
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
	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 200 ns (up to 2 000 000 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-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.	

R&S®RTM-K36

Frequency response analysis – Bode plot (does not require R&S®RTM-B6 option)		
Stimulus	frequency mode	single sweep or repeated sweep
	frequency range	10 Hz to 25 MHz
	amplitude mode	fixed or amplitude profile
	amplitude level	20 mV to 10 V into high Z
		10 mV to 5 V into 50 Ω
Input and output sources	R&S®RTM3002	channel 1, channel 2
	R&S®RTM3004	channel 1, channel 2, channel 3, channel 4
Number of test points		10 points to 500 points per decade
Dynamic range		typ. > 70 dB based on 0 dBm (630 mV (V_{pp}) into 50 Ω, gain noise < 1 dB, phase noise < 5°)
Measurement		dual pair of tracking gain and phase cursors
Diagram types	manually changeable vertical window size	parallel display of result window and input and output signal view
Result table		navigation and export functions
Scaling	during and after test	auto-scale and manual scaling and positioning

R&S®RTM-K37

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
	scaling	dBm, dBµV, dBV, V (RMS)
	span	0.2 Hz to 1.2 GHz
	resolution bandwidth	span/10 ≥ RBW ≥ span/1000
	windows	flat top, Hanning, Hamming, Blackman, rectangular
	trace types	normal, max. hold, min. hold, average (selectable from 2 to 1024)
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

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
Power analysis	R&S®RTM-K31	1335.8920.02
Frequency response analysis (Bode plot)	R&S®RTM-K36	1335.9178.02
Spectrum analysis and spectrogram	R&S®RTM-K37	1335.9184.02
Application bundle [4], consists of the following options: R&S®RTM-K1, R&S®RTM-K2, R&S®RTM-K3, R&S®RTM-K5, R&S®RTM-K6, R&S®RTM-K7, R&S®RTM-K15, R&S®RTM-K31, R&S®RTM-K36, R&S®RTM-K37, R&S®RTM-B6	R&S®RTM-PK1	1335.8942.02
Application bundle [5], consists of the following options: R&S®RTM-K1, R&S®RTM-K2, R&S®RTM-K3, R&S®RTM-K5, R&S®RTM-K6, R&S®RTM-K7, R&S®RTM-K15, R&S®RTM-K31, R&S®RTM-K36, R&S®RTM-K37, R&S®RTM-B6	R&S®RTM-PK1US	1335.9190.02
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®RT-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

[4] The R&S®RTM-PK1 option is not distributed in North America.

[5] The R&S®RTM-PK1US option is only distributed in North America.

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
Transit case	R&S®RTB-Z4	1335.9290.02
Rackmount kit	R&S®ZZA-RTB2K	1333.1728.02

Warranty		
Base unit		3 years
All other items [6]		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 [7]. 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 [7] 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 [7] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

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

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