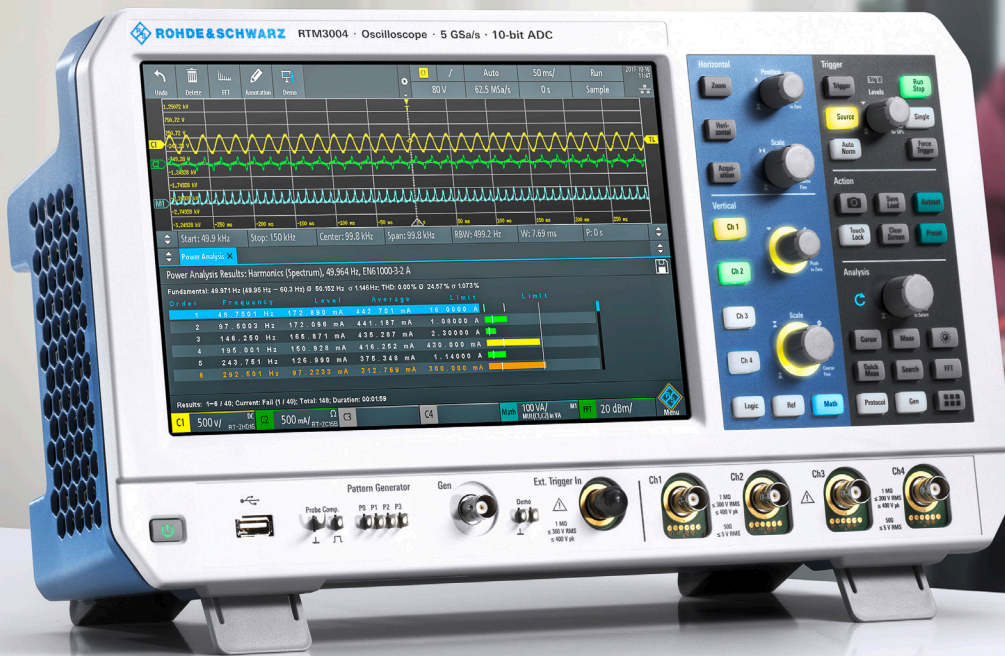# R&S®RTM3000 OSCILLOSCOPE

Power of ten

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

3 year warranty

Product Brochure
Version 07.01

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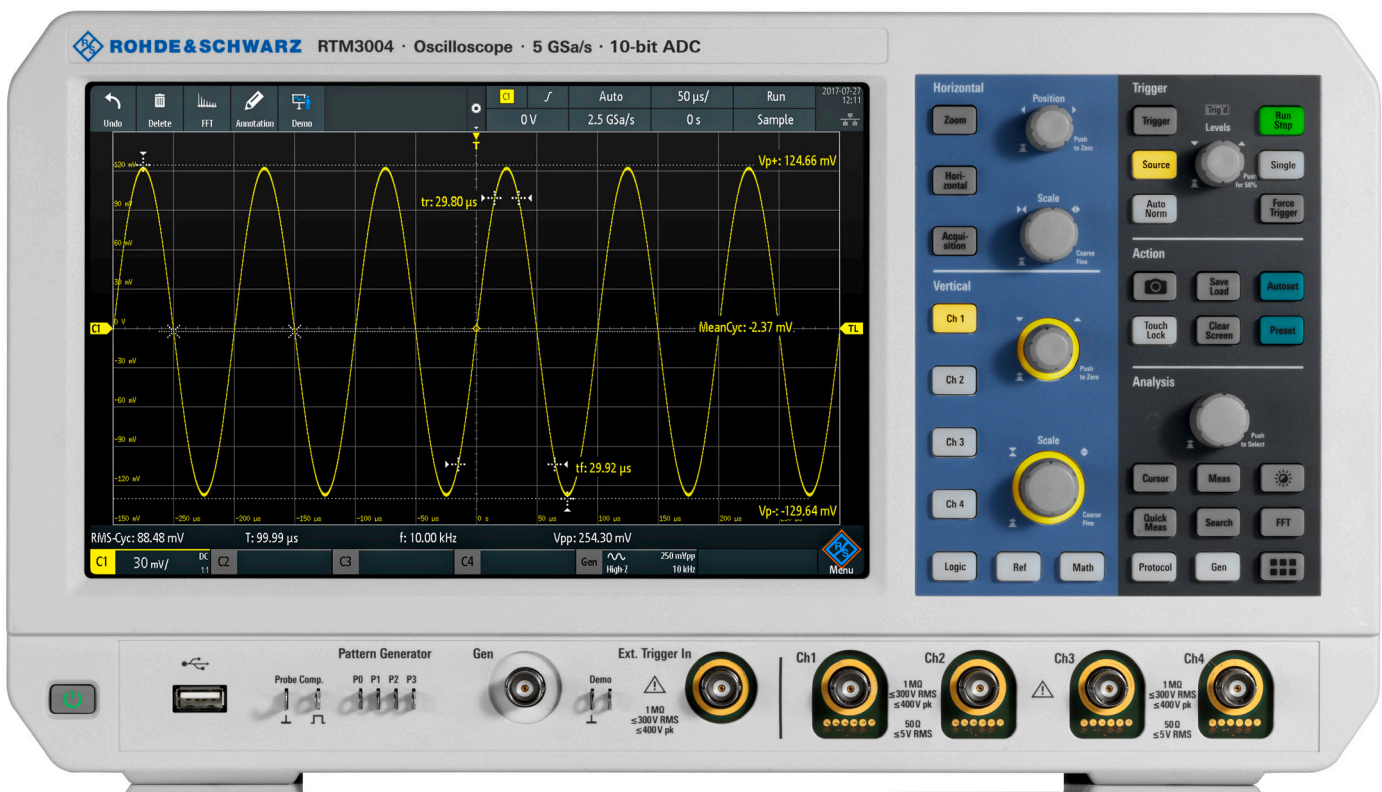
The 10-bit A/D converter yields up to a fourfold improvement over conventional 8-bit A/D converters. You get sharper waveforms with more signal details.

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	10 000 waveforms/s	300 000 waveforms/s in fast segmentated memory mode	2 000 000 waveforms/s in fast segmentated memory mode	2 000 000 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.
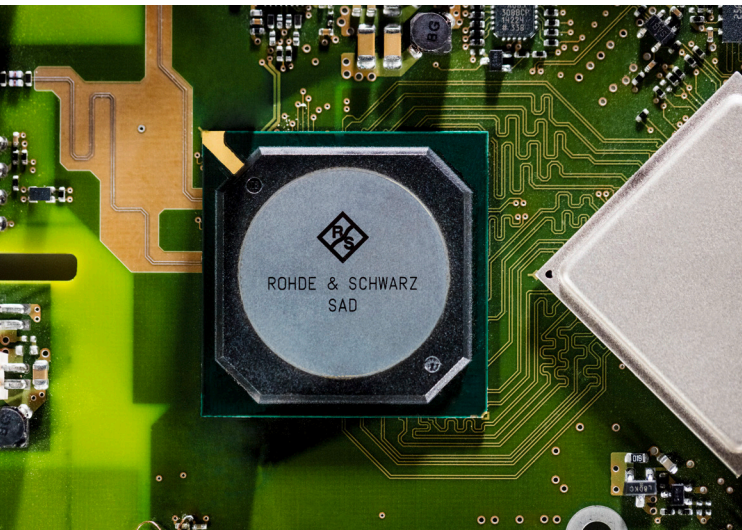
The increased resolution results in sharper waveforms with more signal details that would otherwise be missed. One example is the characterization of switched-mode power supplies. The voltages across the switching device must be determined during the on/off times within the same acquisition. For precise 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

Traditional oscilloscope	R&S®RTM3000
▶ 8-bit vertical resolution	▶ 10-bit vertical resolution

Finest resolution for a 1 V signal

4 mV

1 mV
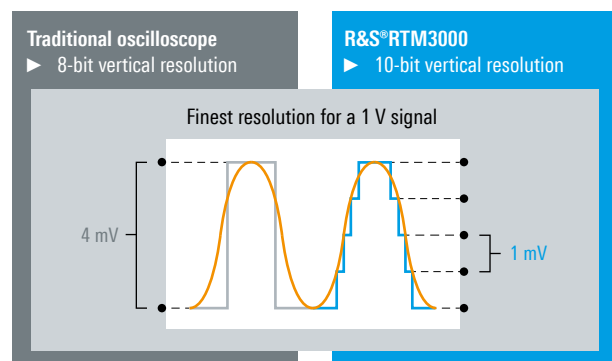
CAPTURE MORE TIME AT FULL BANDWIDTH

▶ **80 Msample:** standard acquisition memory 8 to 40 times better

▶ **5 Gsample:** fast sampling rate
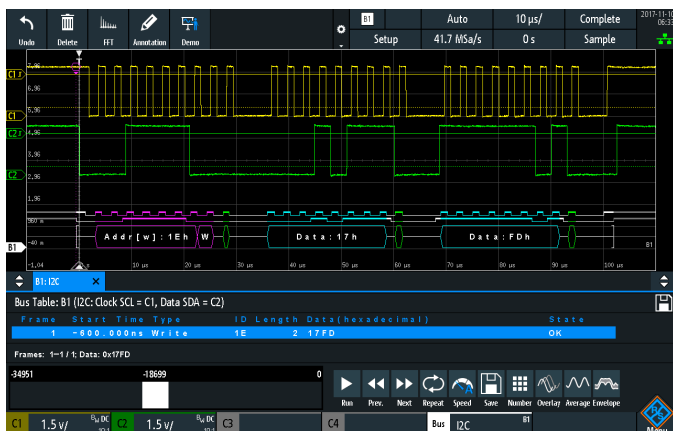
▶ **400 Msample:** segmented memory

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 I^2C 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.
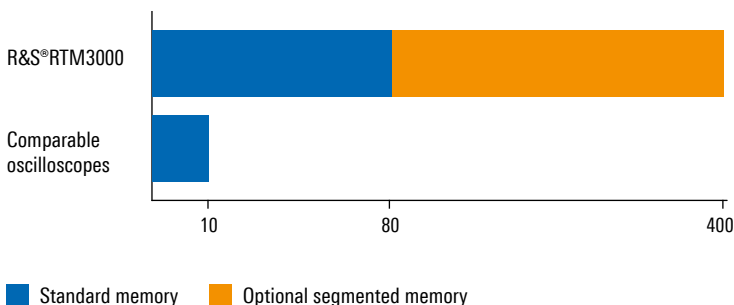
In history mode, previous acquisitions to the maximum segmented memory depth of 400 Msample are available for further analysis. Functions such as mask tests, QuickMeas and FFT can be used for further analysis.

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

■ Standard memory ■ Optional segmented memory

Quick access to important tools
ı Drag & drop to use analysis tools
ı Toolbar to access functions
ı Sidebar to intuitively configure functions

Easily customizable waveform display with R&S®SmartGrid technology
ı Configurable display
ı Resizable waveform areas
ı Scales labeled on all axes

10 second boot time

Integrated waveform and pattern generator up to 50 Mbit/s
ı Output of sine, square/pulse, ramp and noise waveforms
ı Output of arbitrary waveform files and 4-bit signal patterns
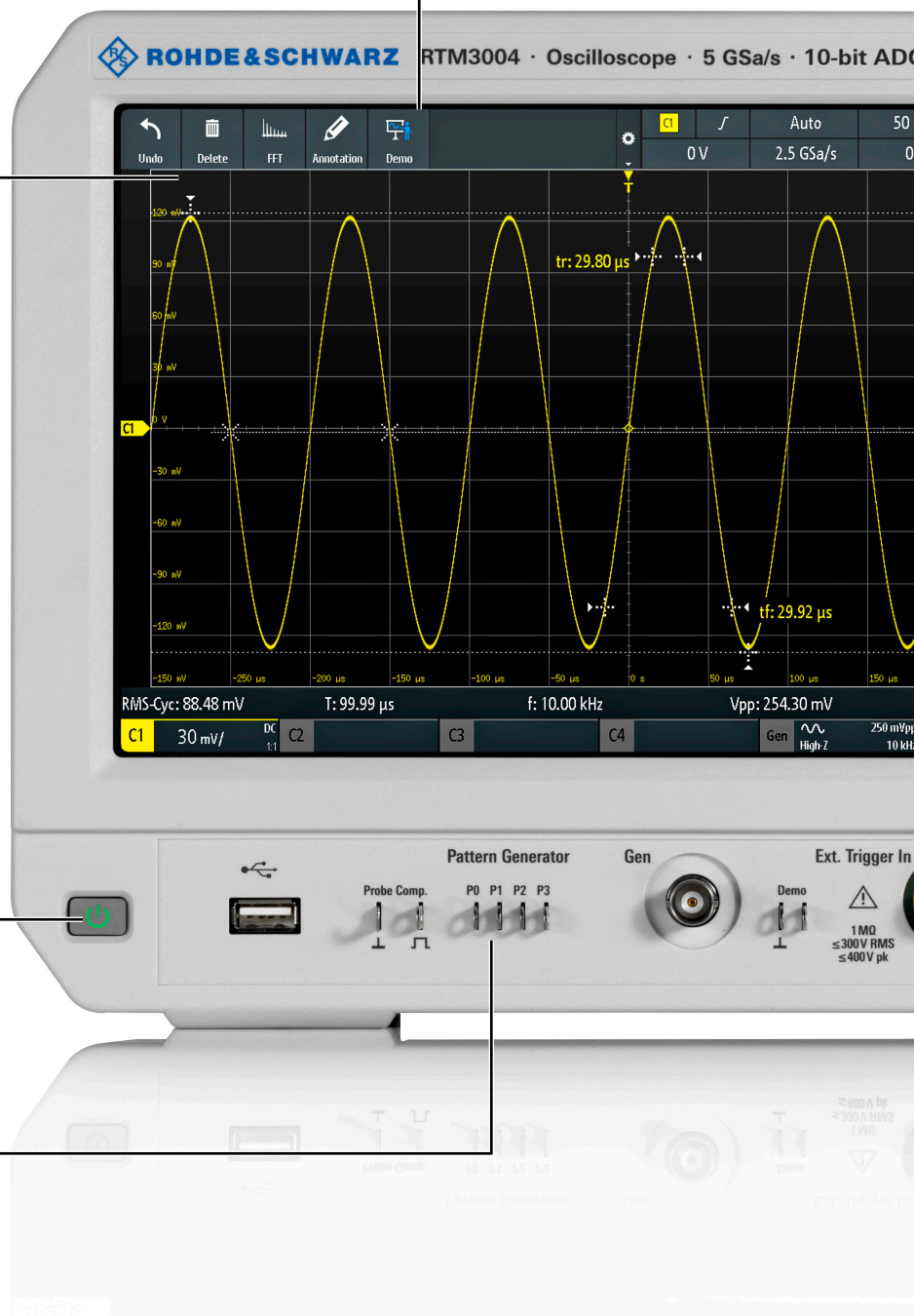
10.1" high-resolution capacitive touchscreen with gesture support
ı Gesture support for scaling and zooming
ı High resolution: 1280 × 800 pixel
ı 12 horizontal grid lines for more signal details

Documentation of results at the push of a button
ı Documentation as a screenshot or of instrument settings

Integrated logic analyzer (MSO)
ı 16 additional digital channels
ı Synchronous and time-correlated analysis of analog and digital components of embedded designs
ı Fully retrofittable

Color-coded controls indicate the selected channel

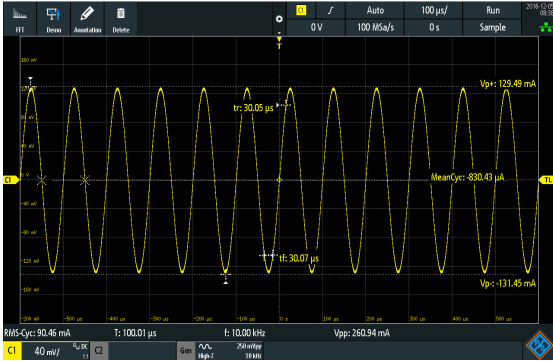**QuickMeas: results at the push of a button**
ı Graphical display of key measurement results for the active signal

Active probe interface
ı Automatically detects and powers probes
ı Rohde & Schwarz probes with probe interface
ı 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).
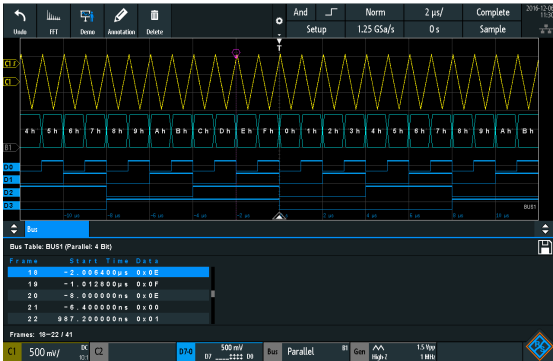

Logic analyzer

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.
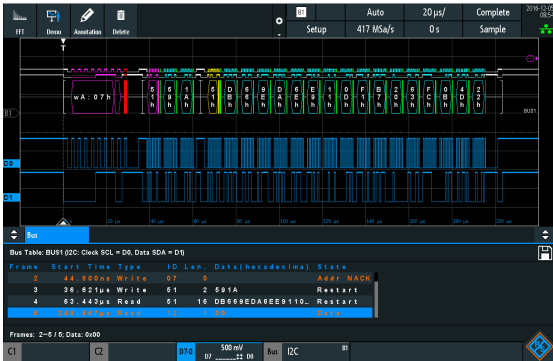
Protocol analyzer

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.
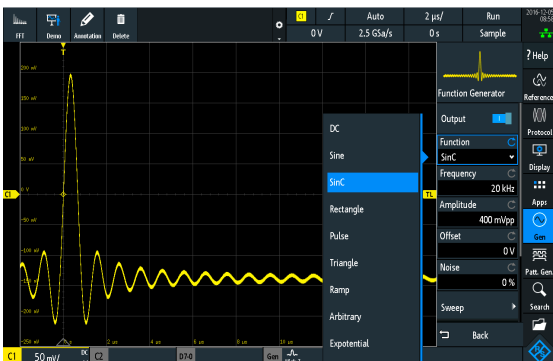
Waveform and pattern generator

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.
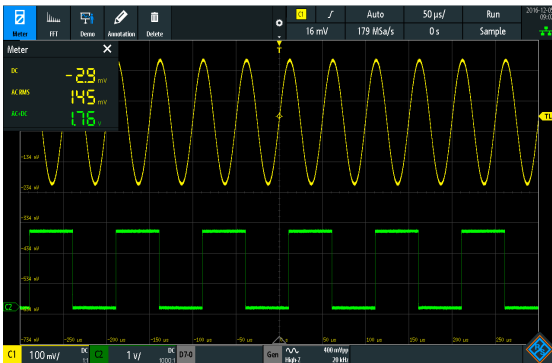
Digital voltmeter

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.
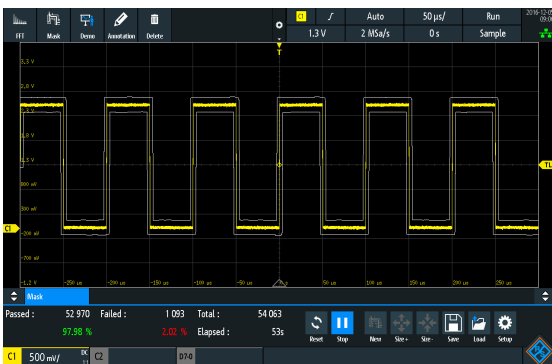
Mask test mode

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.
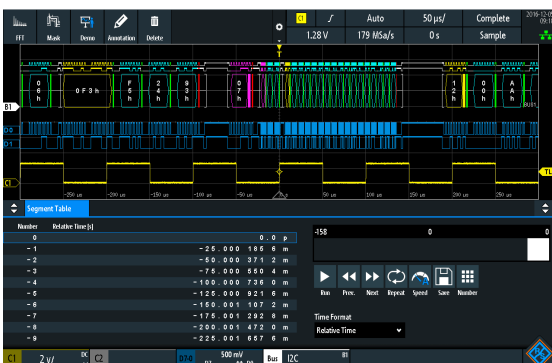
History and segmented memory mode

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.
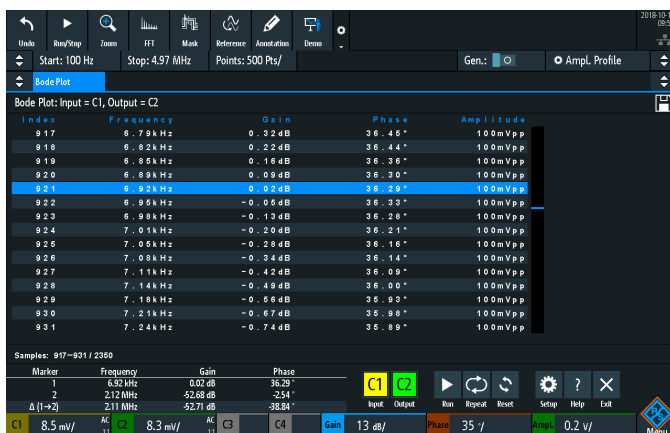
Measurement table

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
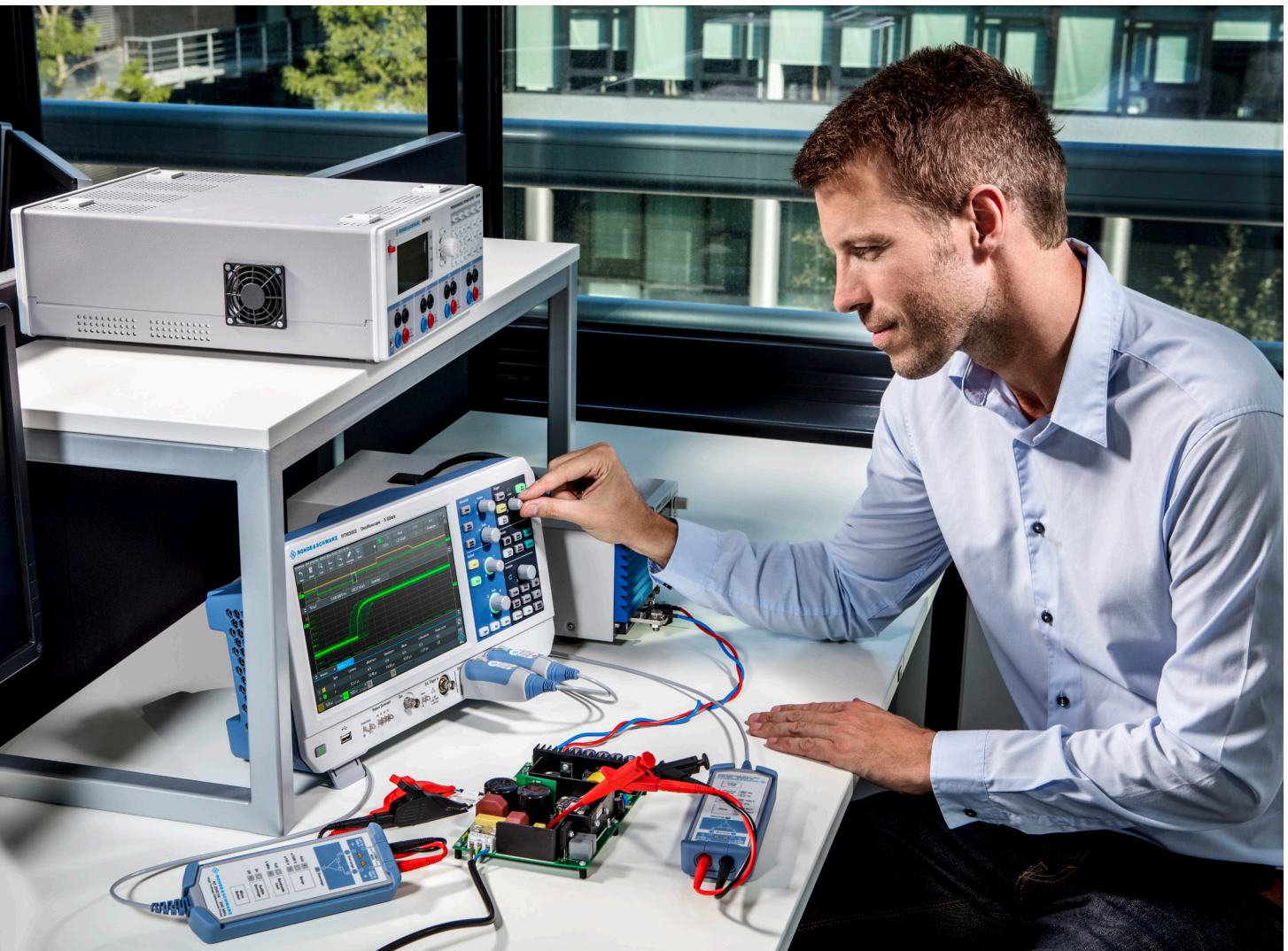
Specialized measurement functions for characterizing power electronics

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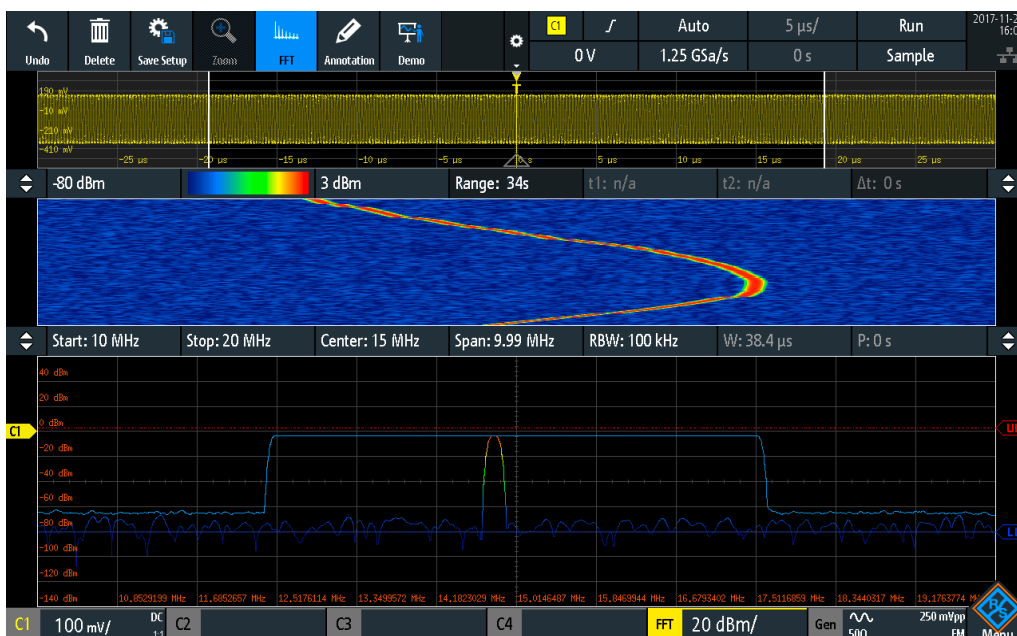
Test signal from three different perspectives: time domain (top), spectrogram (center) and frequency domain (bottom)

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
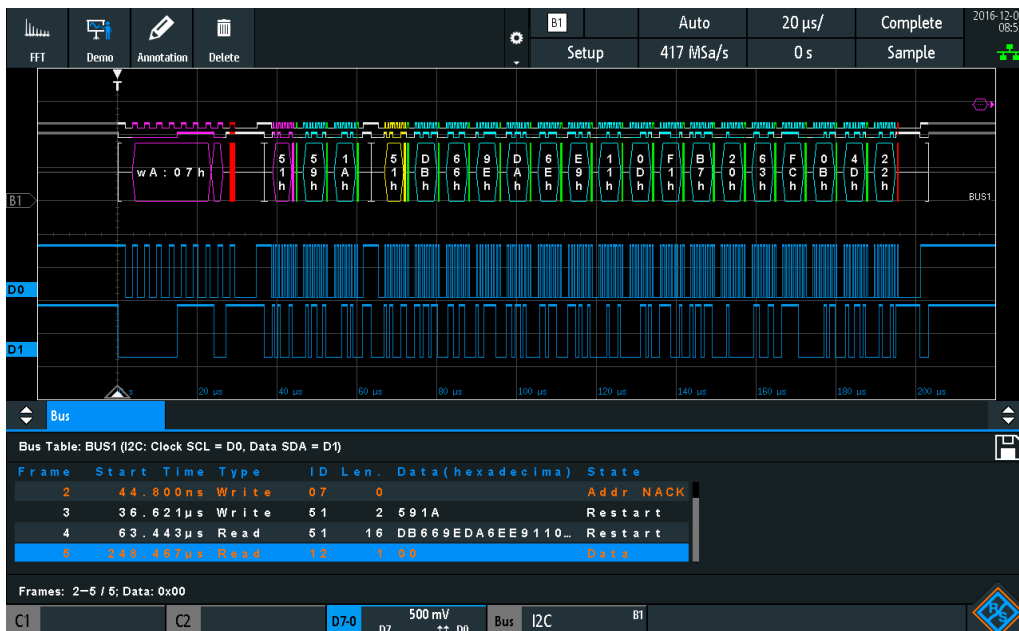
Decoded hexadecimal I²C message shown in honeycomb format and in table

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
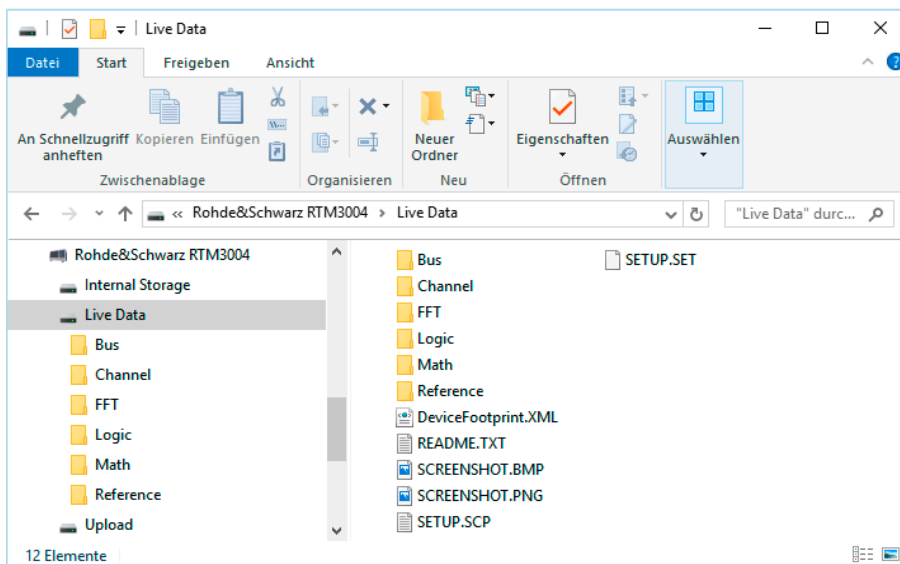
OSCILLOSCOPE PORTFOLIO

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)	50 000	10 000	50 000 (300 000 in fast segmented memory mode [2])	64 000 (2 000 000 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.

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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
–	–	–	–

SPECIFICATIONS IN BRIEF

Specifications in brief		
Vertical system		
Number of channels	R&S®RTM3002; R&S®RTM3004	2; 4
Bandwidth (–3 dB) at 50 Ω	R&S®RTM3002/3004 (with R&S®RTM-B2x2/-B2x3/-B2x5/-B2x10 options)	100 MHz, 200 MHz, 350 MHz, 500 MHz, 1 GHz
Rise time (calculated)	R&S®RTM3002/3004 (with R&S®RTM-B2x2/-B2x3/-B2x5/-B2x10 options)	3.5 ns, 1.75 ns, 1 ns, 700 ps, 350 ps
Input impedance		50 Ω ± 1.5% (meas.), 1 MΩ ± 1% (meas.) ‖ 14 pF ± 1 pF (meas.)
Input sensitivity	max. bandwidth in all ranges	
	at 1 MΩ	500 µV/div to 10 V/div
	at 50 Ω	500 µV/div to 1 V/div
DC gain accuracy	offset and position = 0, maximum operating temperature change of ±5°C after self-alignment	
	input sensitivity > 5 mV/div	±1.5% of full scale
	input sensitivity ≤ 5 mV/div	±2% of full scale
ADC resolution		10 bit, up to 16 bit with high resolution decimation
Acquisition system		
Maximum realtime sampling rate		2.5 Gsample/s; 5 Gsample/s, interleaved
Acquisition memory	standard; with R&S®RTM-K15 option	40 Msample (80 Msample interleaved); 400 Msample segmented memory
Horizontal system		
Timebase range		selectable between 0.5 ns/div and 500 s/div
Trigger system		
Trigger types	standard	edge, width, video (PAL, NTSC, SECAM, PAL-M, SDTV 576i, HDTV 720p, HDTV 1080i, HDTV 1080p), pattern, line, serial bus, timeout
	option	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN, ARINC 429, MIL-STD-1553
MSO option		
Digital channels		16 (2 logic probes)
Sampling rate		1.25 Gsample/s
Acquisition memory	standard; with R&S®RTM-K15 option	40 Msample (80 Msample interleaved); 400 Msample segmented memory
Waveform generator		
Resolution, sample rate		14 bit, 250 Msample/s
Amplitude	high Z; 50 Ω	20 mV to 5 V (V_{pp}); 10 mV to 2.5 V (V_{pp})
DC offset	high Z; 50 Ω	±5 V; ±2.5 V
Signal forms frequency ranges	sine	0.1 Hz to 25 MHz
	pulse/rectangle	0.1 Hz to 10 MHz
	ramp/triangle	0.1 Hz to 1 MHz
	noise	max. 25 MHz
Arbitrary	sampling rate; memory depth	max. 10 Msample/s; 32k points
General data		
Screen		10.1" WXGA TFT color display (1280 × 800 pixel)
Interfaces		USB host with MTP, USB device, LAN, powerful web server for remote display and operation
Audible noise	maximum sound pressure level at a distance of 1.0 m	28.3 dB(A)
Dimensions	W × H × D	390 mm × 220 mm × 152 mm (15.4 in × 8.66 in × 5.98 in)
Weight		3.3 kg (7.27 lb)

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
I²C/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 (I²S, 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 [1], 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 [2], 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, including 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

[1] The R&S®RTM-PK1 option is not distributed in North America.
[2] 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, 10:1/100:1, 4 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	1335.7875.02
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	1333.1711.02

Warranty		
Base unit		3 years
All other items [3]		1 year
Options		
Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	Please contact your local Rohde & Schwarz sales office.
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	

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

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