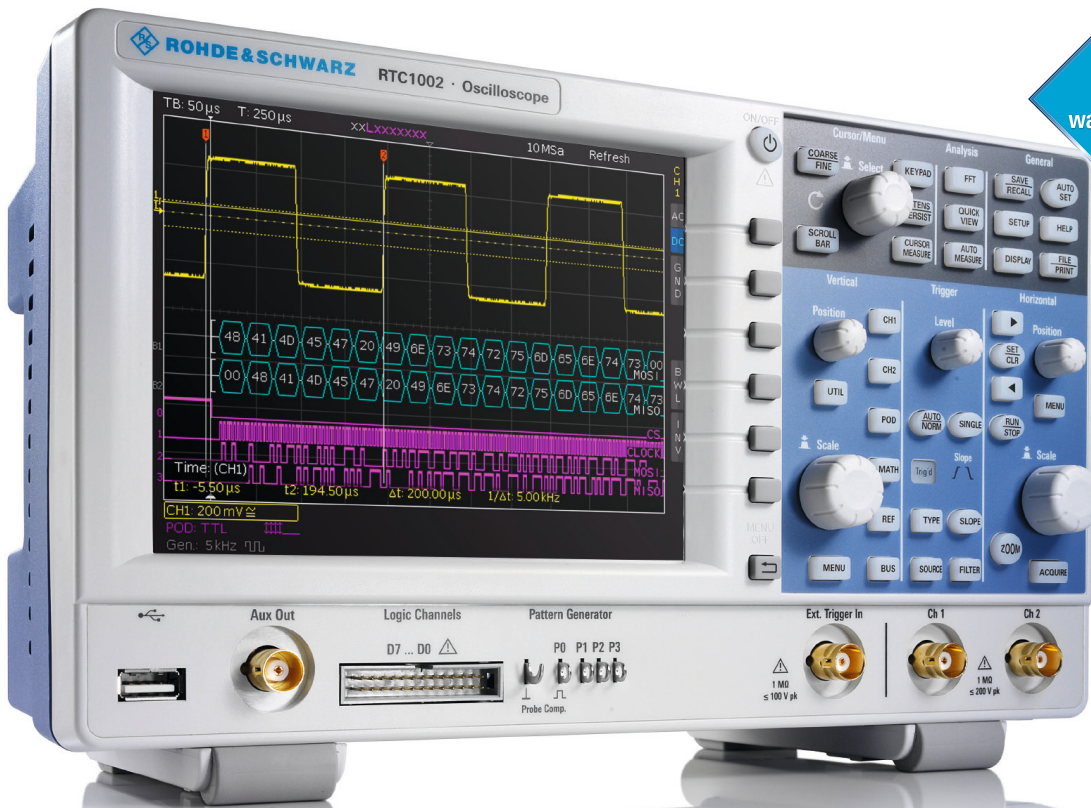


# R&S® RTC1000

## Digital Oscilloscope

### Great value

1 50 MHz to 300 MHz  
1 Two channels



**3** year  
warranty

# R&S®RTC1000

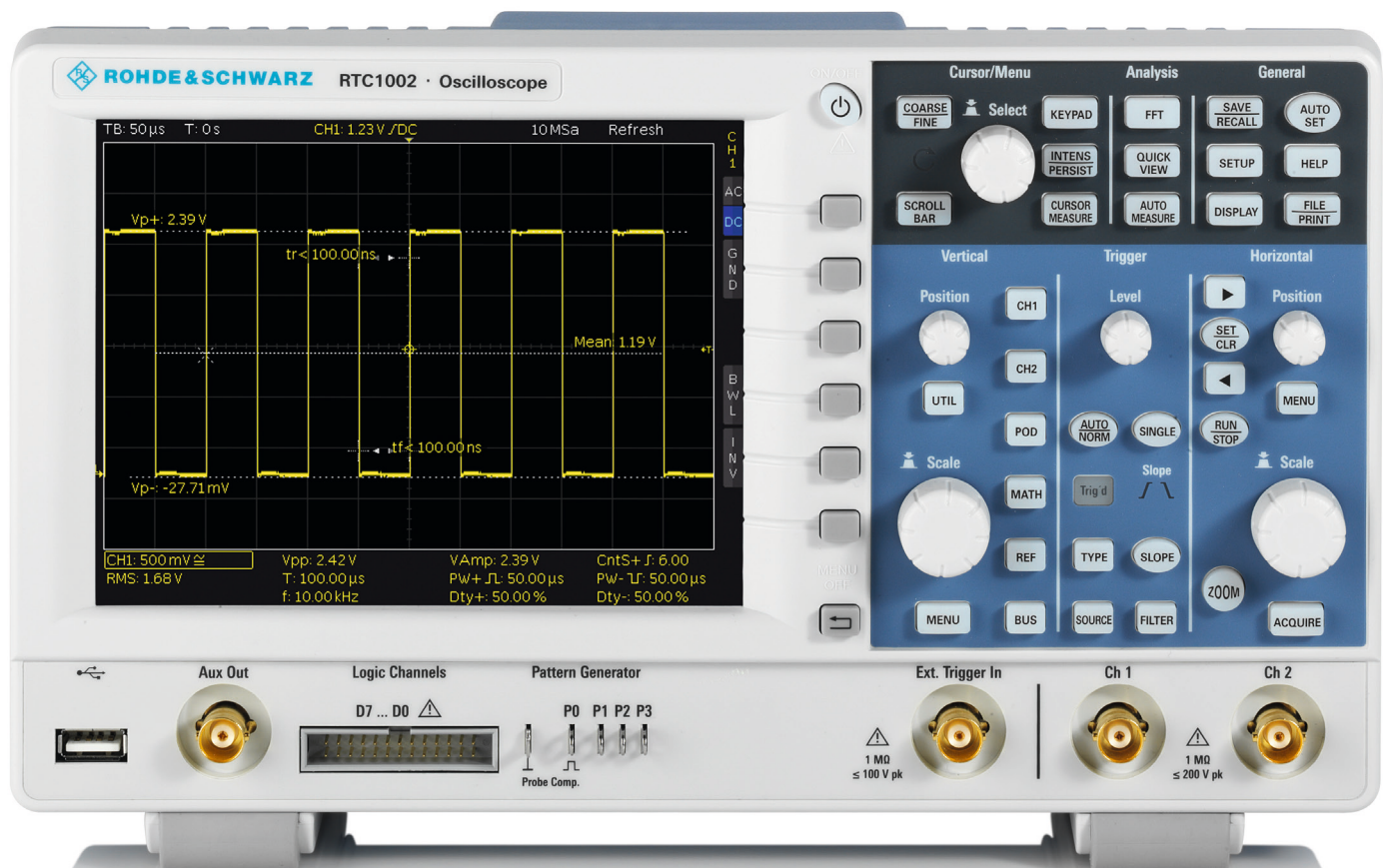
## Digital Oscilloscope

### At a glance

High sensitivity, multifunctionality and a great price – that is what makes the R&S®RTC1000 digital oscilloscope so special.

From embedded developers to service technicians to educators – the wide range of functions address a broad group of users. State-of-the-art, high-performance technology in an extremely silent design meets the high requirements of today's customers. These digital oscilloscopes include a wide range of upgrade options, providing true investment protection for the future.

The R&S®RTC1000 is an X-in-one instrument that offers the functionality of an oscilloscope, logic analyzer, protocol analyzer, frequency analyzer, pattern generator, function generator, digital voltmeter and component tester in a single instrument.



# R&S® RTC1000

## Digital Oscilloscope

### Benefits and key features

#### Top-class hardware-based acquisition for precise measurement results

- ▮ Up to 2 Gsample sampling rate
- ▮ 2 Msample memory depth
- ▮ Low-noise measurement due to state-of-the-art A/D converters

#### Versatile measurement functions and fast results

- ▮ Wide selection of automatic measurement functions
- ▮ QuickView: key results at the press of a button
- ▮ Mask test: easy creation of a new mask with just a few keystrokes
- ▮ FFT: the easy way to analyze the signal spectrum

#### X-in-1 oscilloscope

- ▮ Oscilloscope
- ▮ Logic analyzer
- ▮ Protocol analyzer
- ▮ Waveform and pattern generator
- ▮ Digital voltmeter
- ▮ Component tester
- ▮ Frequency analysis mode
- ▮ Mask test mode

▷ [page 6](#)

#### Future-ready investment and scalability

- ▮ Free firmware updates
- ▮ Bandwidth upgrades as required
- ▮ Serial bus analysis options via software licenses

Choose your Rohde & Schwarz embedded oscilloscope			
	R&S® RTC1000	R&S® RTB2000	R&S® RTM3000
Bandwidth in MHz	50, 70, 100, 200, 300	70, 100, 200, 300	100, 200, 350, 500, 1000
Number of scope channels	2	2/4	2/4
Max. sampling rate in Gsample/s	1/channel, 2 interleaved	1.25/channel, 2.5 interleaved	2.5/5 (interleaved)
Probe interface	BNC	BNC	Rohde & Schwarz probe interface
Max. memory depth in Msample	1/channel, 2 interleaved	10/channel, 20 interleaved	40/channel, 80 interleaved
Vertical bits (ADC)	8	10	10
Minimum input sensitivity	1 mV/div	1 mV/div	500 µV/div
Display	6.5", 640 × 480 pixel	10" capacitive touchscreen, 1280 × 800 pixel	10" capacitive touchscreen, 1280 × 800 pixel
Update rate	10 000 waveforms/s	50 000 waveforms/s	64 000 waveforms/s
MSO	8 channels, 1 Gsample/s	16 channels, 1.25 Gsample/s	16 channels, 2.5 Gsample/s
Protocol (optional)	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/ RS-485, CAN, LIN	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/ RS-485, CAN, LIN	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/ RS-485, CAN, LIN, Audio (I <sup>2</sup> S), ARINC249, MIL-STD-1553
Generator(s)	1 ARB, 4-bit pattern generator	1 ARB, 4-bit pattern generator	1 ARB, 4-bit pattern generator
Math	+, -, *, /	+, -, *, /	+, -, *, /, 21 advanced functions
RF capability	FFT (128k point)	FFT (128k point)	FFT (128k point), spectrum analysis

# Excellent features

## Two displays instead of one

- 20 vertical divisions with virtual screen for straightforward display of up to 13 signals
- Minimizable soft menus to enlarge horizontal waveform viewing area

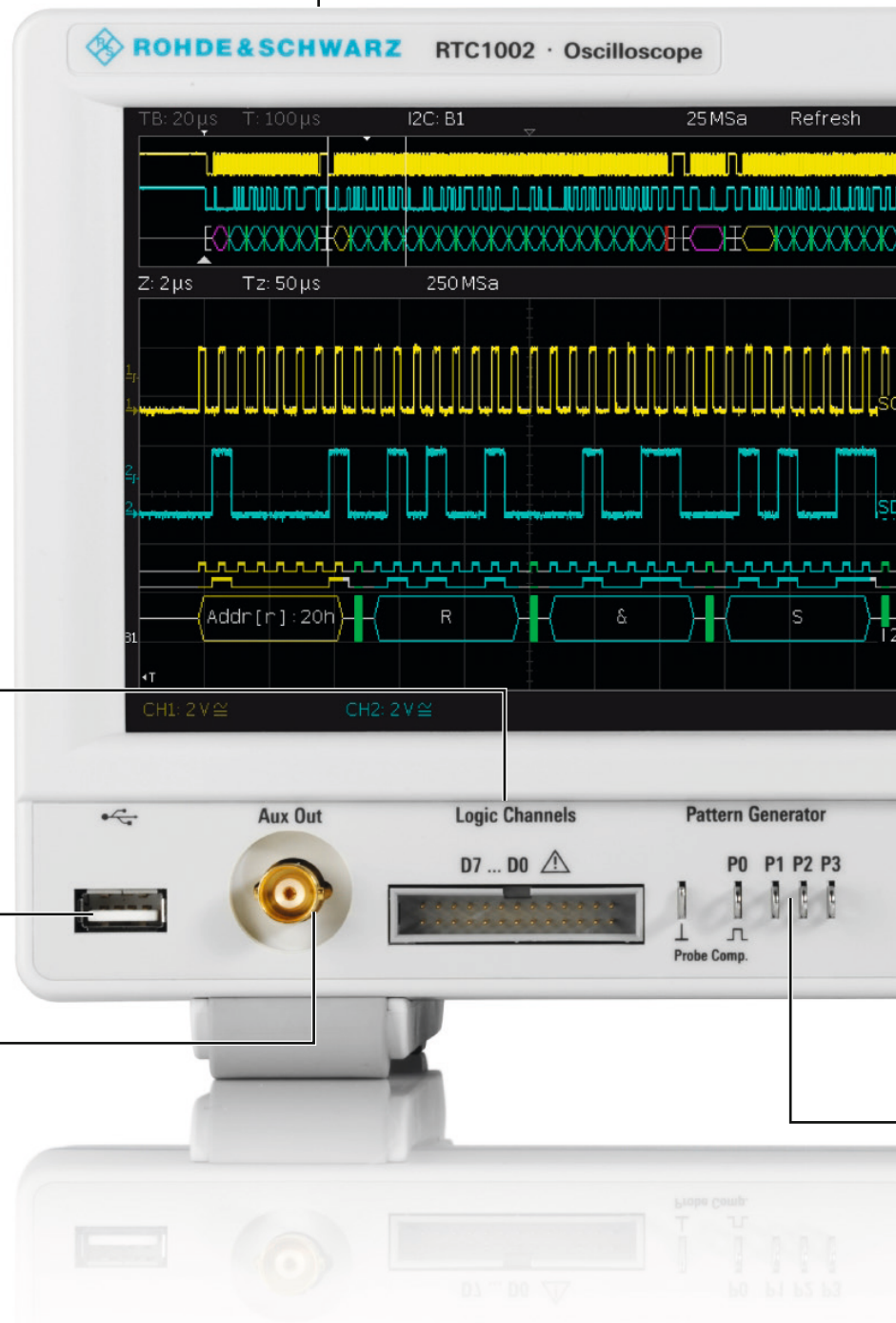
## Integrated logic analyzer (MSO)

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

## Standard LAN and USB interface

- Seamless integration via MTP
- Remote display over LAN

## Standard component tester



7 second boot time

### FFT frequency analysis

- Standard, 128k point

### QuickView: results at the push of a button

- Graphical display of key measurement results for the active signal

### Autoset function

- Automatic selection of vertical, horizontal and trigger settings for optimal viewing of active signals

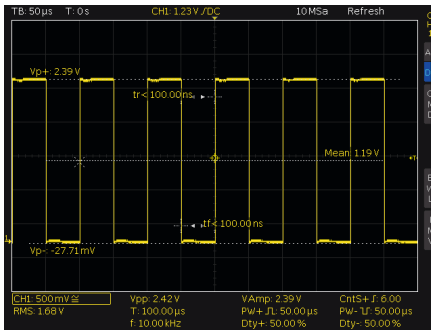
### Documentation of results at the push of a button

### 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 patterns

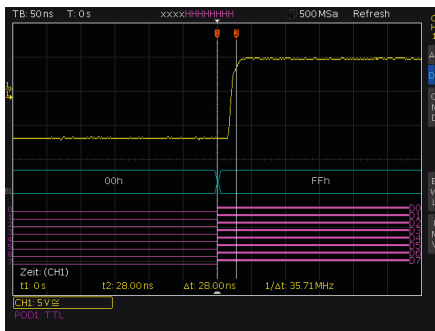


# X-in-1 oscilloscope



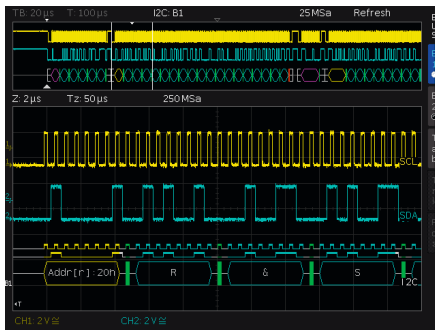
## Oscilloscope

With a sampling rate of up to 2 Gsample/s and a memory depth of up to 2 Msample, the R&S®RTC1000 oscilloscope excels in its class. A waveform update rate of more than 10000 waveforms/s ensures a responsive instrument that reliably catches signal faults. Included standard tools provide quick results, e.g. QuickView, mask tests, FFT, math, cursors and automatic measurements, including statistics.



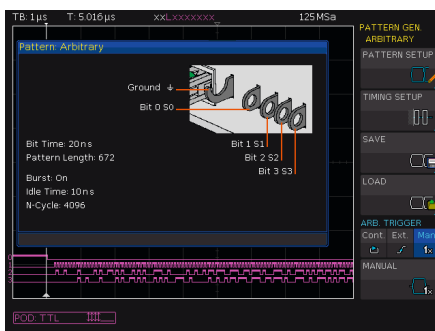
## Logic analyzer

The R&S®RTC-B1 option turns every R&S®RTC1000 into an intuitive-to-use MSO with 8 additional digital channels. The oscilloscope captures and analyzes signals from analog and digital components in an embedded design – synchronously and time-correlated to each other. For example, the delay between the input and output of an A/D converter can be conveniently determined using the cursor measurements.



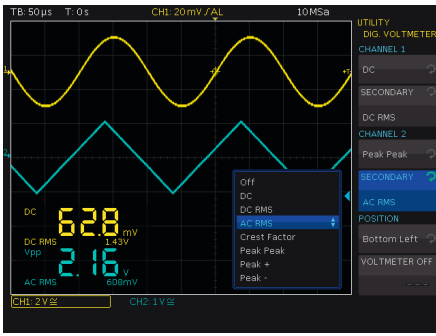
## Protocol analyzer

Protocols such as I<sup>2</sup>C, SPI and CAN/LIN frequently transfer control messages between integrated circuits. The R&S®RTC1000 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.



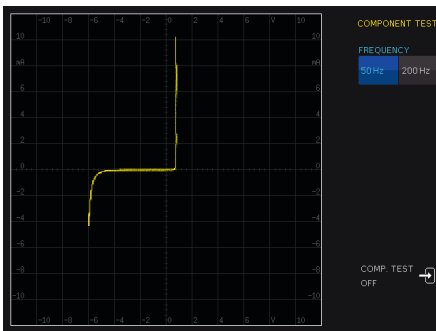
## Waveform and pattern generator

The integrated R&S®RTC-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 patterns. Waveforms and patterns can be imported as CSV files or copied from oscilloscope waveforms. Before playing signals back, the user can preview them to quickly check signal correctness. Predefined patterns for e.g. I<sup>2</sup>C, SPI, UART and CAN/LIN are provided.



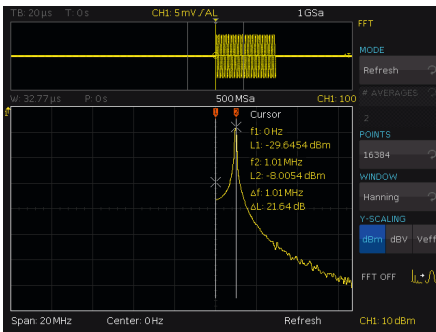
### Digital voltmeter

The R&S®RTC1000 features a three-digit digital voltmeter (DVM) and six-digit frequency counter on each channel for simultaneous measurements. Provided measurement functions include DC, AC +DC RMS and AC RMS.



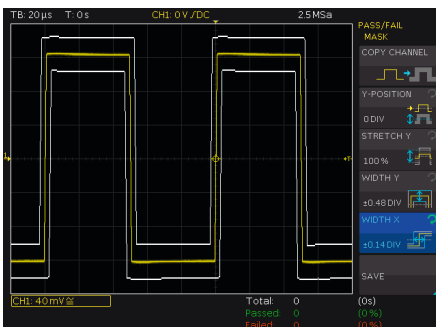
### Component tester

The included component tester will also be at your side. A 50 Hz and a 200 Hz measuring frequency are provided to support your potentially tedious search for faulty components. And since a picture says more than a thousand words – or rather a thousand values – you will be able to tell at a glance if your error analysis is on track.



### Frequency analysis mode

Difficult-to-find faults often result from the interaction between time and frequency signals. The FFT function of the R&S®RTC1000 is activated by simply pushing a button and entering the center frequency and span. Due to the high-performance FFT functionality of the R&S®RTC1000 oscilloscopes, signals can be analyzed with up to 128k point. Other practical 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. They use statistical pass/fail evaluation to assess the quality and stability of a DUT. Signal anomalies and unexpected results are quickly identified. When the mask is violated, the measurement stops. Each violation generates a pulse output at the AUX-OUT connector of the R&S®RTC1000. This pulse output can be used to trigger actions in the measurement setup.

# Specifications in brief

Specifications in brief		
<b>Vertical system</b>		
Number of channels	R&S®RTC1002	2
Bandwidth (-3 dB)	R&S®RTC1002 (with R&S®RTC-B220/-B221/-B222/-B223)	50/70/100/200/300 MHz
Rise time (calculated)	R&S®RTC1002 (with R&S®RTC-B220/-B221/-B222/-B223)	7/5/3.5/1.75/1.15 ns
Input impedance		1 M $\Omega$ $\pm$ 2% with 14 pF $\pm$ 2 pF
Input sensitivity	max. bandwidth in all ranges	1 mV/div to 10 V/div
DC gain accuracy	offset and position = 0, maximum operating temperature change of $\pm$ 5°C after self-alignment	
	input sensitivity all ranges	3%
<b>Acquisition system</b>		
Maximum realtime sampling rate	R&S®RTC1002	1 Gsample/s, 2 Gsample interleaved
Acquisition memory	R&S®RTC1002	1 Msample, 2 Msample interleaved
<b>Horizontal system</b>		
Timebase range	R&S®RTC1002	2 ns/div to 50 s/div
<b>Trigger system</b>		
Trigger types	standard	edge, width, video (PAL, SECAM, PAL-M, SDTV, HDTV), pattern, timeout
	option	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN
<b>Analysis and measurement functions</b>		
QuickView	at the push of a button, internal measurement values are written directly onto the waveform and updated continuously	peak-to-peak voltage, pos./neg. peak, rise/fall time, mean value, RMS value, time, frequency
Automated measurements		burst width, count positive/negative pulses, count falling/rising edges, mean value, RMS cycle, RMS, mean cycle, peak $\pm$ , frequency, period, amplitude, base level, pos./neg. overshoot, pulse width, duty cycle $\pm$ , rise/time, delay, phase
Waveform mathematics		addition, subtraction, multiplication, division, FFT
<b>MSO option</b>		
Digital channels		8 (1 logic probe)
Sampling rate		1 Gsample/s
Acquisition memory		1 Msample
<b>Waveform generator option</b>		
Resolution, sampling rate		8 bit, 978 ksample/s
Amplitude	high-Z; 50 $\Omega$	60 mV to 6 V ( $V_{pp}$ ); 30 mV to 3 V ( $V_{pp}$ )
DC offset	sine	0.1 Hz to 50 kHz
	pulse/rectangle and ramp/triangle	0.1 Hz to 10 kHz
<b>4-bit pattern generator option</b>		
Programmable pattern	sample time	20 ns to 42 s, up/down
	memory depth	2048 sample
4-bit counter	frequency	100 mHz to 50 MHz
Square wave	frequency	1 mHz to 500 kHz
<b>Digital voltmeter</b>		
Measurements	DC, AC + DC RMS, AC RMS resolution	up to 3 digits
<b>Frequency counter</b>		
Resolution		6 digits
<b>General data</b>		
Screen		6.5" VGA color display (640 $\times$ 480 pixel)
Interfaces		1 $\times$ USB host, USB device, LAN, GPIB (optional), DVI-D for external monitor
Audible noise	maximum sound pressure level at a distance of 1.0 m	28.3 dB(A)
Dimensions	W $\times$ H $\times$ D	285 mm $\times$ 175 mm $\times$ 140 mm (11.22 in $\times$ 6.89 in $\times$ 5.51 in)
Weight		1.7 kg (3.75 lb)



# Ordering information

Designation	Type	Order No.
<b>R&amp;S®RTC1000 base model</b>		
Digital Oscilloscope, 50 MHz, 2 channels	R&S®RTC1002	1335.7500.02
Base unit (including standard accessories: R&S®RT-ZP03 passive probe per channel, power cord, getting started manual and safety instructions)		
<b>Choose your bandwidth upgrade</b>		
Upgrade of R&S®RTC1002 to 70 MHz bandwidth	R&S®RTC-B220	1335.7300.02
Upgrade of R&S®RTC1002 to 100 MHz bandwidth	R&S®RTC-B221	1335.7317.02
Upgrade of R&S®RTC1002 to 200 MHz bandwidth	R&S®RTC-B222	1335.7275.02
Upgrade of R&S®RTC1002 to 300 MHz bandwidth	R&S®RTC-B223	1335.7323.02
<b>Choose your options</b>		
Mixed Signal Upgrade for non-MSO models, 250 MHz	R&S®RTC-B1	1335.7281.02
Arbitrary Waveform Generator	R&S®RTC-B6	1335.7298.02
I <sup>2</sup> C/SPI Serial Triggering and Decoding	R&S®RTC-K1	1335.7230.02
UART/RS-232/RS-422/RS-485 Serial Triggering and Decoding	R&S®RTC-K2	1335.7246.02
CAN/LIN Serial Triggering and Decoding	R&S®RTC-K3	1335.7252.02
Application Bundle	R&S®RTC-PK1	1335.7330.02
<b>Choose your additional probes</b>		
<b>Single-ended passive probes</b>		
300 MHz, 10 MHz, 10:1/1:1, 10 MΩ/1 MΩ, 400 V, 12 pF/82 pF	R&S®RT-ZP03	3622.2817.02
500 MHz, 500 MHz, 10:1, 300 V (RMS), 10 pF	R&S®RT-ZP05	3623.2927.02
500 MHz, 10 MΩ, 10:1, 400 V, 9.5 pF	R&S®RTM-ZP10	1409.7708.02
38 MHz, 1 MΩ, 1:1, 55 V, 39 pF	R&S®RT-ZP1X	1333.1370.02
<b>High-voltage single-ended passive probes</b>		
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
<b>Current probes</b>		
20 kHz, AC/DC, 10 A/1000 A	R&S®RT-ZC02	1333.0850.02
100 kHz, AC/DC, 30 A	R&S®RT-ZC03	1333.0844.02
10 MHz, AC/DC, 150 A	R&S®RT-ZC10	1409.7750.02
100 MHz, AC/DC, 30 A	R&S®RT-ZC20	1409.7766.02
120 MHz, AC/DC, 5 A	R&S®RT-ZC30	1409.7772.02
Power Supply for current probes	R&S®RT-ZA13	1409.7789.02
<b>Active differential probes</b>		
100 MHz, 1000:1/100:1, 8 MΩ, 1000 V (RMS), 3.5 pF	R&S®RT-ZD01	1422.0703.02
200 MHz, 10:1, 1 MΩ, 20 V diff., 3.5 pF	R&S®RT-ZD02	1333.0821.02
<b>Logic probes</b>		
Active 8 Channel Logic Probe	R&S®RT-ZL03	1333.0715.02
<b>Probe accessories</b>		
Feedthrough Termination 50 Ω	R&S®HZ22	3594.4015.02
Adapter, BNC to 4 mm dual banana	R&S®RT-ZA11	1333.0796.02
<b>Choose your accessories</b>		
Soft Case, for R&S®RTC1002 digital oscilloscope and accessories	R&S®RTC-Z3	1333.0867.02
Rackmount Kit	R&S®ZZA-RTC1K	1333.0967.02

# Oscilloscope portfolio



Multi  
Domain



Multi  
Domain

R&S® family	RTH1000	RTC1000	RTB2000	RTM3000
<b>Vertical</b>				
Bandwidth	60/100/200/350/500 MHz <sup>1)</sup>	50/70/100/200/300 MHz <sup>1)</sup>	70/100//200/300 MHz <sup>1)</sup>	100/200/350/500 MHz/1 GHz <sup>1)</sup>
Number of channels	2 plus DMM/4	2	2/4	2/4
V/div 1 M $\Omega$	2 mV to 100 V	1 mV to 10 V	1 mV to 5 V	500 $\mu$ V to 10 V
V/div 50 $\Omega$	–			500 $\mu$ V to 1 V
<b>Horizontal</b>				
Sampling rate	1.25 Gsample/s per channel (4-channel model); 2.5 Gsample/s per channel (2-channel model); 5 Gsample/s (all channels interleaved)	1 Gsample/s per channel 2 Gsample/s (2 channels interleaved)	1.25 Gsample/s per channel; 2.5 Gsample/s (2 channels interleaved)	2.5 Gsample/s per channel; 5 Gsample/s (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 <sup>2)</sup> )	1 Msample; 2 Msample	10 Msample; 20 Msample (160 Msample in segmented memory mode <sup>2)</sup> )	40 Msample; 80 Msample (400 Msample in segmented memory mode <sup>2)</sup> )
Segmented memory	option	–	option	
Acquisition rate	50 000 waveforms/s	10 000 waveforms/s	50 000 waveforms/s	10 000 waveforms/s (750 000 waveforms/s in segmented memory mode <sup>2)</sup> )
<b>Trigger</b>				
Options	advanced, digital trigger (14 trigger types) <sup>2)</sup>	elementary (5 trigger types)	basic (6 trigger types)	basic (7 trigger types)
<b>Mixed signal option</b>				
No. of digital channels <sup>1)</sup>	8		16	16
Sampling rate of digital channels	1.25 Gsample/s	1 Gsample/s	1.25 Gsample/s	2.5 Gsample/s
Max. memory of digital channels	125 ksample	1 Msample	10 Msample	40 Msample; 80 Msample
<b>Analysis</b>				
Cursor meas. types	4	13	4	4
Stand. meas. functions	35	31		
Mask test	elementary (tolerance mask around the signal)			
Mathematics	elementary			basic (math on math)
Serial protocols triggering and decoding <sup>1)</sup>	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN (4)			I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN, MIL-STD-1553, ARINC429
Display functions	data logger	–	–	–
Applications <sup>1)</sup>	high resolution frequency counter, advanced spectrum analysis, harmonics analysis	–	digital voltmeter (DVM)	power, digital voltmeter (DVM), spectrum analysis and spectrogram
Compliance testing <sup>1)</sup>	–	–	–	–
<b>Display and operation</b>				
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	
<b>General data</b>				
Size in mm (W × H × D)	201 × 293 × 74	285 × 175 × 140	403 × 189 × 142	403 × 189 × 142
Weight in kg	2.4	1.7	2.5	3.3
Battery	lithium-ion, > 4 h	–	–	–

<sup>1)</sup> Upgradeable.

<sup>2)</sup> Requires an option.



RTA4000	RTE1000	RTO2000
200/350/500 MHz/1 GHz <sup>1)</sup>	200/350/500 MHz/1/1.5/2 GHz <sup>1)</sup>	600 MHz/1/2/3/4/6 GHz <sup>1)</sup>
4	2/4	2/4 (only 4 channels in 4 GHz and 6 GHz model)
500 µV to 10 V	500 µV to 10 V	1 mV to 10 V (500 µV to 10 V) <sup>2)</sup>
500 µV to 1 V	500 µV to 5 V	1 mV to 1 V (500 µV to 1 V) <sup>2)</sup>
2.5 Gsample/s per channel; 5 Gsample/s (2 channels interleaved)	5 Gsample/s per channel	10 Gsample/s per channel; 20 Gsample/s (2 channels interleaved in 4 GHz and 6 GHz model)
100 Msample; 200 Msample (1 Gsample in segmented memory mode <sup>2)</sup> )	50 Msample/200 Msample	standard: 50 Msample/200 Msample; max. upgrade: 1 Gsample/2 Gsample
option	standard	
10 000 waveforms/s (750 000 waveforms/s in segmented memory mode <sup>2)</sup> )	1 000 000 waveforms/s (2 000 000 waveforms/s in ultra-segmented memory mode)	1 000 000 waveforms/s (3 000 000 waveforms/s in ultra-segmented memory mode)
basic (7 trigger types)	advanced, digital trigger (13 trigger types)	advanced including zone trigger, digital trigger (14 trigger types) <sup>2)</sup>
16	16	16
2.5 Gsample/s	5 Gsample/s	5 Gsample/s
100 Msample; 200 Msample	100 Msample	200 Msample
4	3	3
31	47	47
elementary (tolerance mask around the signal)	advanced (freely configurable, hardware-based)	
basic (math on math)	advanced (formula editor)	advanced (formula editor)
I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN, MIL-STD-1553, ARINC 429	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN, I <sup>2</sup> S, MIL-STD-1553, ARINC 429, FlexRay™, CAN FD, USB 2.0/HSIC, Ethernet, Manchester, NRZ, SENT, SpaceWire, CXPI, USB Power Delivery (17)	I <sup>2</sup> C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN, I <sup>2</sup> S, MIL-STD-1553, ARINC 429, FlexRay™, CAN FD, MIPI RFFE, USB 2.0/HSIC, MDIO, 8b 10b, Ethernet, Manchester, NRZ, SENT, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, CXPI, USB 3.1 Gen1, PCIe 1.1/2.0, USB Power Delivery (25)
–	histogram, trend, track <sup>2)</sup>	
power, digital voltmeter (DVM), spectrum analysis and spectrogram	R&S®RTM applications + 16-bit high definition, advanced spectrum analysis and spectrogram	R&S®RTE applications + jitter, clock data recovery, I/Q data, RF analysis
–	–	various options available, for details see data sheet (PD 3607.2684.22)
10.1", color, 1280 × 800 pixel	10.4", color, 1024 × 768 pixel	12.1", color, 1280 × 800 pixel
optimized for touchscreen operation, parallel button operation		
403 × 189 × 142	427 × 249 × 204	427 × 249 × 204
3.3	8.6	9.6
–	–	–

## Service that adds value

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

## Rohde & Schwarz

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

## Sustainable product design

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

Certified Quality Management

**ISO 9001**

Certified Environmental Management

**ISO 14001**

## Rohde & Schwarz GmbH & Co. KG

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Rohde & Schwarz training

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R&S®RTC1000 Digital Oscilloscope

Data without tolerance limits is not binding | Subject to change

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