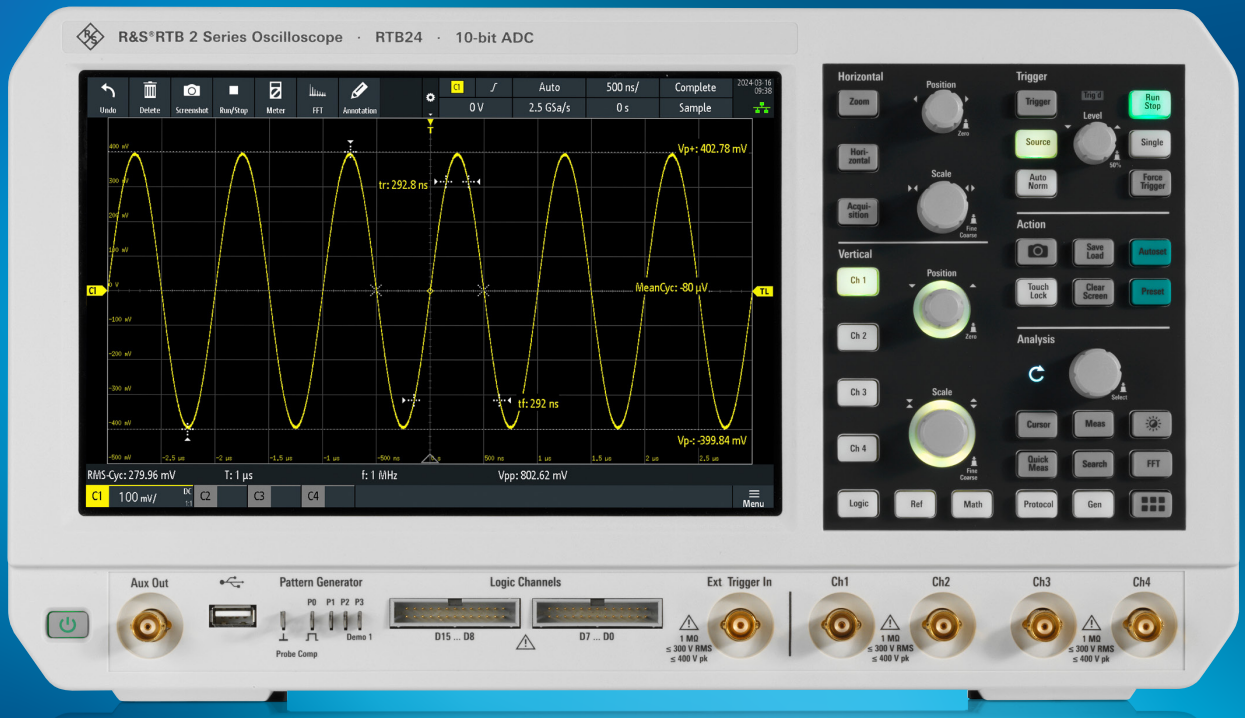
R&S®ESSENTIALS

R&S®RTB 2 SERIES OSCILLOSCOPE

Power of ten for every task, everyday



Product Brochure
Version 01.01

Oscilloscope innovation. Measurement confidence.
www.rohde-schwarz.com/product/RTB2

ROHDE&SCHWARZ
Make ideas real

POWER OF TEN FOR EVERY TASK, EVERYDAY

R&S®RTB 2 series oscilloscopes combine the power of ten with smart operating concepts to make them a perfect general-purpose tool for students, hobbyists, technicians and engineers. The R&S®RTB 2 series is the follow up to the high-performance R&S®RTB2000 oscilloscope. Try one in the lab and see the difference.

Power of ten:

- ▶ 10-bit ADC
- ▶ 10 Mpoints memory
- ▶ 10.1" capacitive touchscreen
- ▶ 10 s boot time
- ▶ 10-in-1 instruments

2-channel model

4-channel model

70/100/200/300 MHz bandwidth

Up to 2.5 Gsample/s sample rate

Up to 260 Mpoints in segmented mode

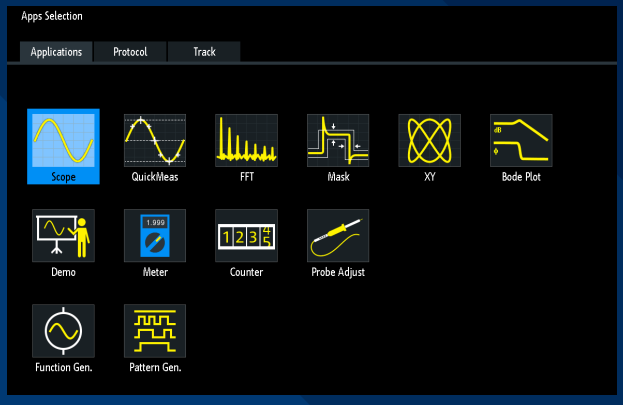
MSO-ready

WHY ENGINEERS LOVE ROHDE&SCHWARZ OSCILLOSCOPES

- ▶ A trusted, global company with a long-standing commitment to customers, quality and continuous innovation
- ▶ The newest oscilloscope portfolio from 60 MHz to 16 GHz
- ▶ Superior intuitive user interface and front panel to increase productivity
- ▶ Best-in-class time-domain and frequency-domain measurements

WHY THE R&S®RTB 2 SERIES

- ▶ **10-in-1 instrument:** oscilloscope, protocol analyzer, logic analyzer, waveform and pattern generator, digital multimeter, frequency response analyzer, spectrum analyzer, counter and mask tester



SEE SIGNAL DETAILS

IN THE PRESENCE OF LARGE SIGNALS

10-bit vertical resolution

The R&S®RTB 2 includes a customized Rohde&Schwarz 10-bit A/D converter and is a four-fold improvement over conventional 8-bit A/D converters. The higher resolution generates sharper waveforms and reveals more details that would otherwise be missed.

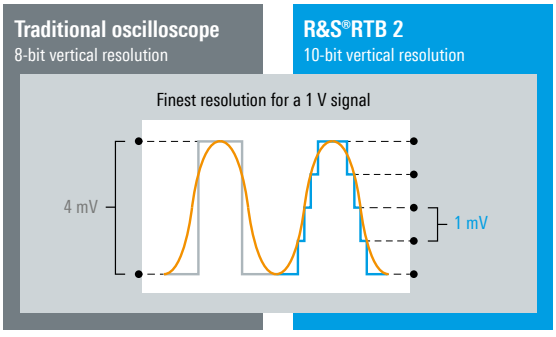
The R&S®RTB 2 oscilloscope incorporates low-noise frontends and state-of-the-art A/D converters. High-resolution mode further reduces noise by applying a filter across contiguous samples.

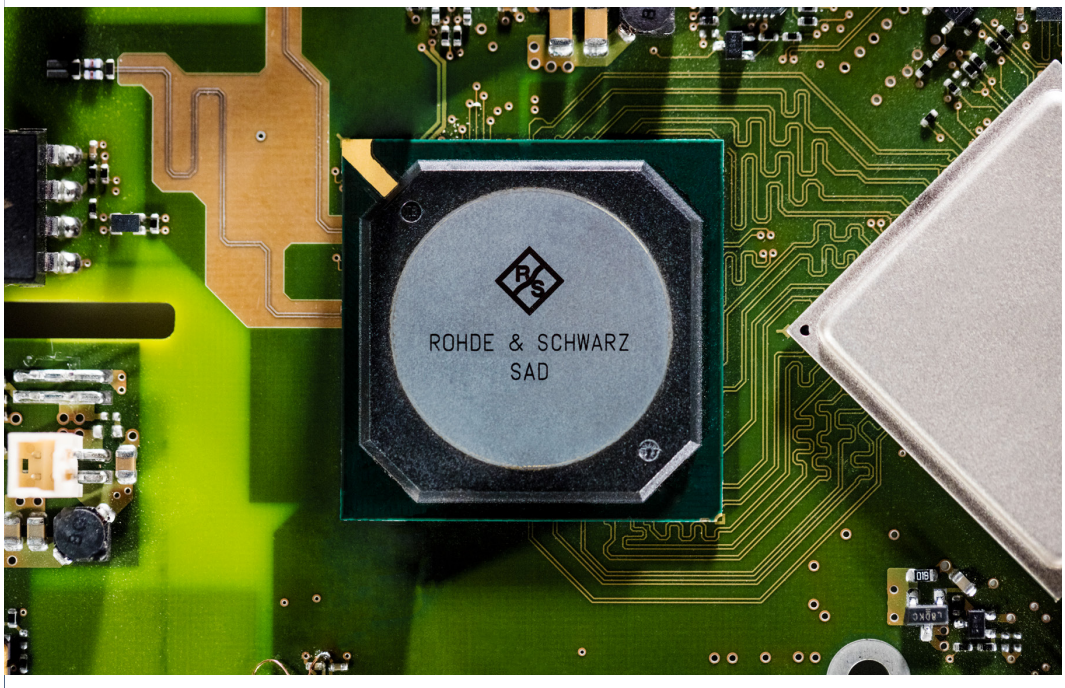
Low noise: full measurement bandwidth down to 1 mV/div

The R&S®RTB 2 oscilloscope has excellent sensitivity down to 1 mV/div. Traditional oscilloscopes can only have such input sensitivity with software based magnification or limiting bandwidth.

Need to see large signals? The variable gain amplifier accepts up to 5 V/div. Use a 10:1, 100:1 or even higher attenuation probe to safely measure larger signals.

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





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

CAPTURE MORE TIME

DEEP STANDARD MEMORY

Deep memory as an insurance policy

Along with bandwidth and sample rates, memory depth is the most important factor when determining oscilloscope troubleshooting capacity. More acquisition memory lets oscilloscopes capture more time. More memory lets oscilloscopes retain the maximum sample rate and bandwidth even with slower timebase settings.

Time captured = (memory depth)/(sample rate)

Maintain fast sample rates with slow timebase settings

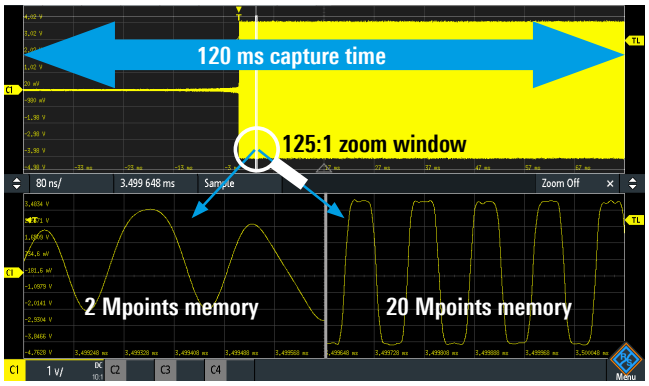
Ever adjusted your oscilloscope timebase to capture longer periods of time, pressed stop, then zoomed in to find the signal details are not quite right? This is the aliasing problem common to oscilloscopes with shallow memory capacity. The deep R&S®RTB 2 memory enables longer time captures at full sample rates.

Standard segmented memory

Use segmented memory to capture signals separated by inactivity. Examples include laser pulses, serial bus activity and RF pulses. R&S®RTB 2 series oscilloscopes have a segmented memory to capture signals over long observation periods of up to 13000 segments and up to 260 Mpoints total (13000 segments × 20 kpoints per segment).

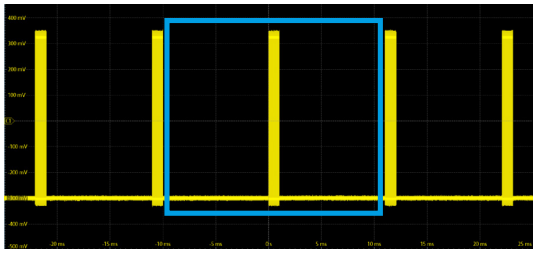
Standard history capability

Press stop and use the history mode to see previously captured acquisitions. All measurement and analysis tools are available in the history mode, including the serial bus decoding and automatic measurements. Turn on persistence to see a waveform overlay of all captured events. Turn on measurements with statistics to see measurement progression across the entire history.

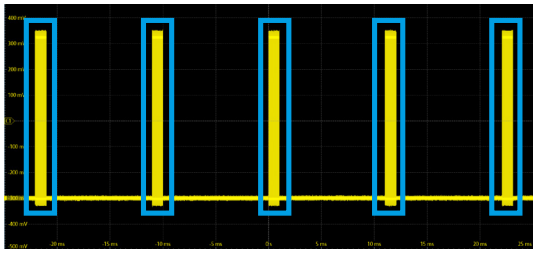


Traditional single-shot acquisition

Total acquisition time = memory depth/sample rate



#1 #2 #3 #4 #5 Segment



Segmented memory acquisition

Acquisition time per segment = memory depth/# of segments

FREQUENCY RESPONSE ANALYSIS

CREATING BODE PLOTS

Low-frequency response analysis

Use the R&S®RTB-K36 frequency response analysis option (Bode plot) for quick and easy low-frequency response analyses with your oscilloscope.

Characterize the frequency response for several electronic devices, including passive filters and amplifier circuits. The control loop response and power supply rejection ratio for switch mode power supplies can also be measured. The stimulus can be generated with a standard built-in waveform generator.

The frequency response analysis option turns on the integrated waveform generator to create stimulus signals ranging from 10 Hz to 25 MHz. Measuring the ratio of the stimulus signal to the DUT output signal at each test frequency, the oscilloscope also logarithmically plots gain and phase.

The R&S®RT-ZP1X 38 MHz bandwidth 1:1 passive probe reduces probe noise for the best signal-to-noise ratio (SNR) for weak signals.

Features and functions

Create up to 16 generator amplitude output level steps to optimize the SNR at different frequencies when measuring CLR and PSRR.

Define the number of points per decade to trade off measurement speed versus resolution.

The oscilloscope display shows analog waveforms and the resulting Bode plots in parallel.

The table of measurement results displays the gain and phase for each frequency tested. Analyze with markers and the result table. Save screenshots, result tables or both to a USB drive.

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

THE BEST CHOICE FOR EDUCATION

Ready for the teaching lab

Let students prepare for the working world with an oscilloscope used by companies in the industry. Use the password-protected education mode to disable automatic functions, such as autoset, so students can learn the fundamental concepts. On your PC, type in the IP address and use the built-in web server to easily show the oscilloscope display in a classroom or over a network.

X-in-1 integration saves space and money

The R&S®RTB 2 gives students and educators an oscilloscope plus logic and protocol analyzer, waveform and pattern generator, Bode analysis, digital voltmeter, spectrum analyzer and counter. The compact design, quiet operation and small footprint save precious bench space in the lab.

Perfect instruments for everyday educational with broad functionality, rugged design, quiet operation and small footprint

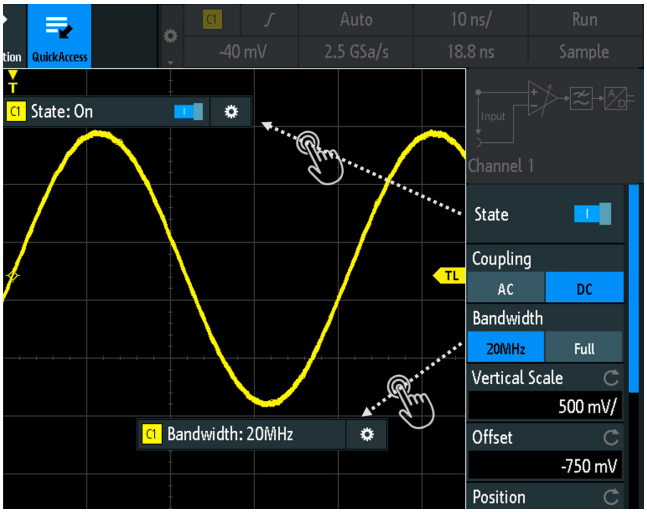
FUN TO DRIVE

15-MINUTE LEARNING CURVE, INTUITIVE NAVIGATION

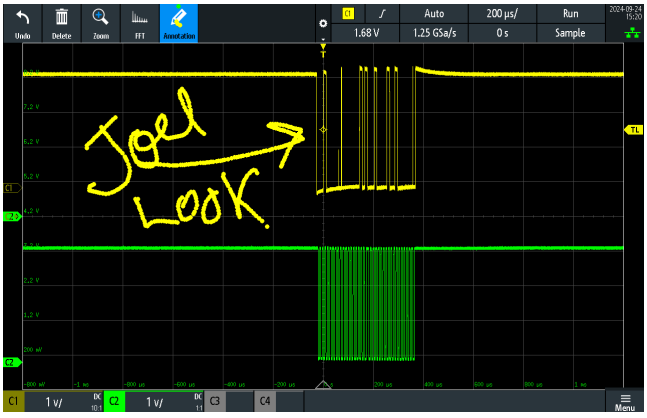
Multilingual support: choose among thirteen languages
Choose from English, German, French, Spanish, Italian, Portuguese, Czech, Polish, Russian, simplified and traditional Chinese, Korean and Japanese.

Touch any signal icons to bring up a short menu of common settings.

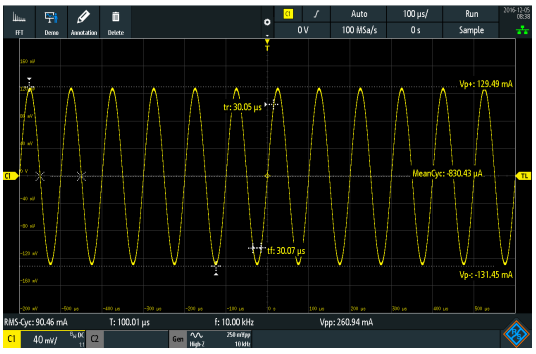
Drag & drop key settings on the display for fast access without having to navigate in the menu.



Add annotations to document screenshots including hand-drawn graphics.



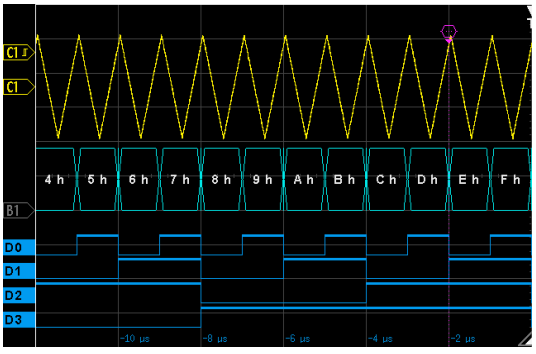
X-IN-1 OSCILLOSCOPE



Oscilloscope

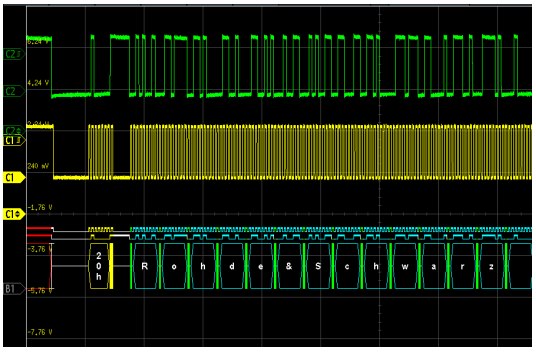
Get quick insight with the intuitive and powerful oscilloscope function. The superior sample rate, memory, depth and ADC resolution, make the R&S®RTB 2 oscilloscope a leader in its class.

Standard tools are included for quick results, such as QuickMeas, mask tests, FFT, math, cursors and automatic measurements, including statistics.



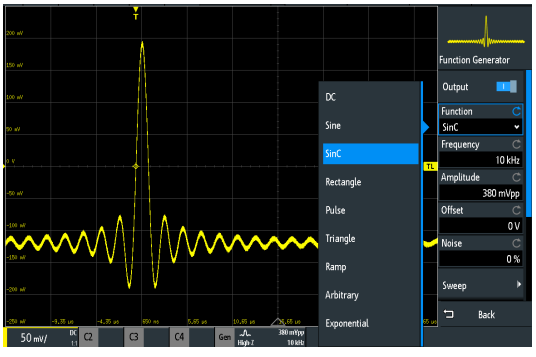
Logic analyzer

Every R&S®RTB 2 oscilloscope is MSO-ready and can connect two logic probes to turn every R&S®RTB 2 into an intuitive MSO with 16 additional digital channels. The oscilloscope captures and analyzes signals from analog and embedded digital design components – synchronously and time-correlated.



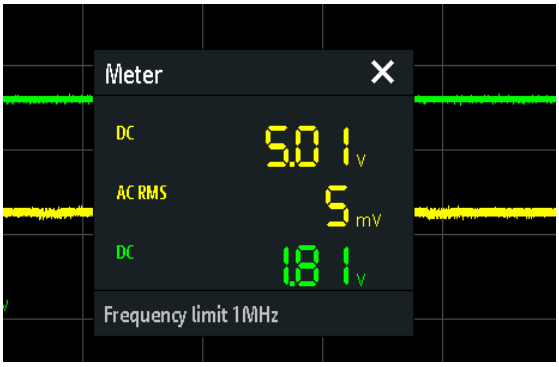
Serial bus protocol analyzer

Protocols such as I²C, SPI, UART/RS-232, CAN and LIN frequently transfer control messages between integrated circuits. The R&S®RTB 2 has versatile options for protocol-specific triggering and decoding of serial interfaces.



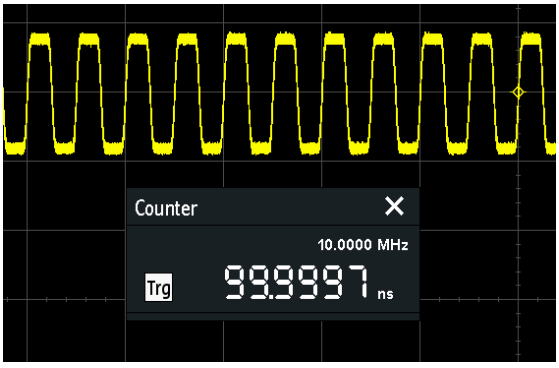
Waveform and pattern generator

Standard on all R&S®RTB 2 instruments, the integrated waveform (25 MHz) and pattern generator (up to 50 Mbit/s) provides circuit stimulus to emulate missing circuits. Or take advantage of educational opportunities for waveform and pattern generation. Waveforms and patterns can be imported as CSV files or copied from oscilloscope waveforms. Add noise to generated waveforms to simulate unfriendly environments. Predefined I²C, SPI, UART and CAN/LIN patterns are available for pattern generation. Select a pattern or enter patterns manually.



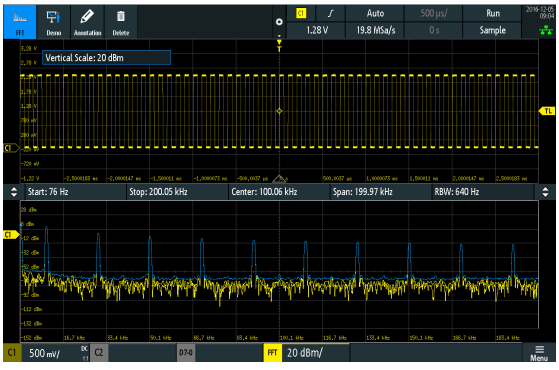
Digital voltmeter

The R&S®RTB 2 features a three-digit digital voltmeter (DVM). Choose from DC, AC + DC (RMS) and AC (RMS).



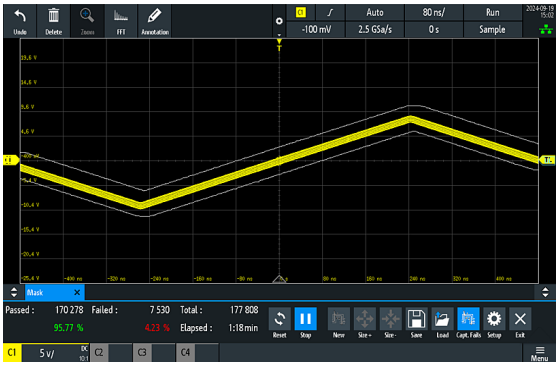
Counter

Use the standard integrated counter to measure frequencies, such as the trigger rate.



FFT (spectrum analyzer)

The FFT function on the R&S®RTB 2 is activated at the push of a button. Use it as a spectrum analyzer by entering center frequency and span. Autoset and cursor measurements can be used to measure the fast frequency-domain measurements.



Mask test mode

Use mask tests to quickly reveal whether a specific signal is within defined tolerance limits. Mask testing provides statistical pass/fail evaluations. Quickly identify violations and gather pass/fail statistics. Each violation can generate a pulse output at the AUX-OUT connector.

LAN AND USB CONNECTIVITY

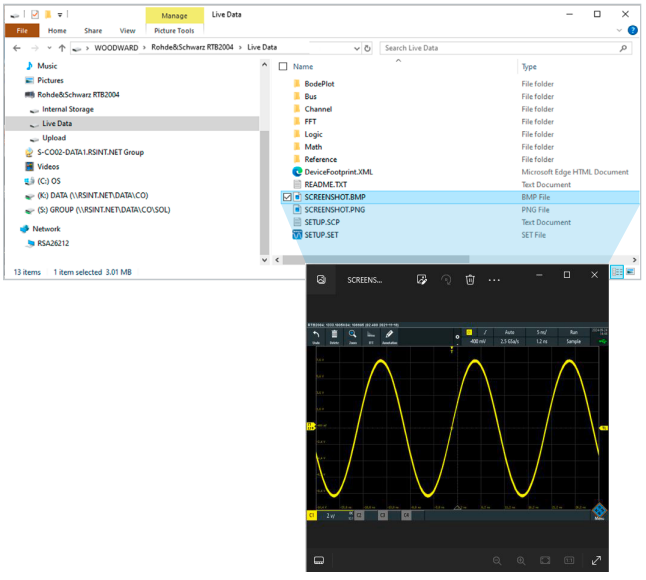
USB and LAN I/O

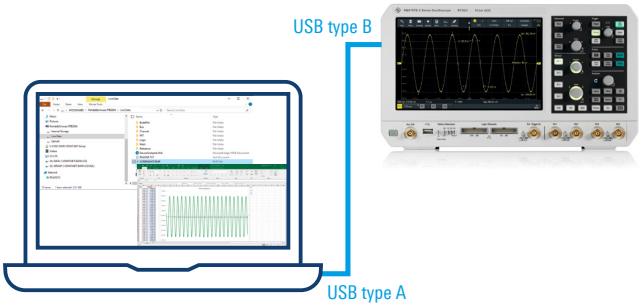
All R&S®RTB 2 oscilloscopes come with both LAN and USB type B ports located on the rear panel (see area outlined in blue in the photo) for versatile control and data management options. The USB type B port simplifies file sharing with the easy transfer of saved waveforms, screenshots and measurement data directly to a connected PC. The connection eliminates the need for additional software and makes it easier to work with captured data and have it readily available for analysis and documentation. The combination of USB and LAN I/O on the R&S®RTB 2 series is a powerful, flexible and user-friendly interface for both local and remote oscilloscope control.

MTP connectivity

The R&S®RTB 2 oscilloscopes have seamless media transfer protocol (MTP) connectivity to PCs via the USB host port. File sharing and data management are exceptionally easy. Once connected, the oscilloscope appears on your PC as an additional drive, like a USB flash drive. This intuitive function lets users directly access files stored on an oscilloscope without additional drivers or complex setup procedures.

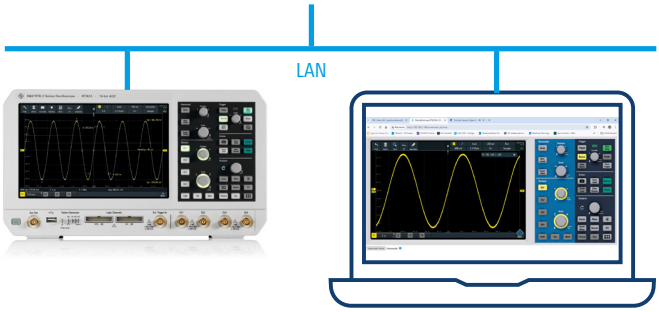
Transferring data is a simple drag&drop process with MTP. Screenshots can be quickly opened in popular applications such as PowerPoint or Word, streamlining report generation by eliminating the need to manually save and import images. Similarly, waveform data can be easily transferred into Excel or other data analysis tools for immediate processing and quick post-measurement analysis. Extra steps are eliminated and workflows sped up so that captured data is instantly ready for further use. The R&S®RTB 2 oscilloscope MTP function makes users much more efficient by simplifying the handling of measurement data and screenshots, The oscilloscope is vital tool for both quick documentation and in-depth analysis.





LAN connectivity

The R&S®RTB 2 oscilloscopes are engineered for a very efficient and user-friendly remote control experience through advanced LAN connectivity. By simply entering the IP address for an oscilloscope into any web browser, users can immediately access the complete instrument interface. Oscilloscope parameters can be adjusted and monitored in real time with a virtual front panel, effectively eliminating the need for physical interaction with the instrument. The virtual front panel is very useful in remote testing scenarios where physical access to the oscilloscope is limited or impractical.



The LAN interface supports standard commands for programmable instruments (SCPI) for robust program control that integrates seamlessly with automated test setups. Using SCPI commands is critical for incorporating the oscilloscope into larger automated systems or when precise, remote instrument operation is required. The built-in web interface helps both with comprehensive controls but also simplifies data management. Users can capture screenshots and transfer measurement data directly to a PC without additional software or manual data entry. Streamlining data sharing and reporting enhances productivity and makes it easy to swiftly document and analyze results from a remote location. The combination of intuitive web based controls, versatile programming capabilities and efficient data entry with an LAN connection makes the R&S®RTB 2 series a powerful and adaptable solution for any laboratory.

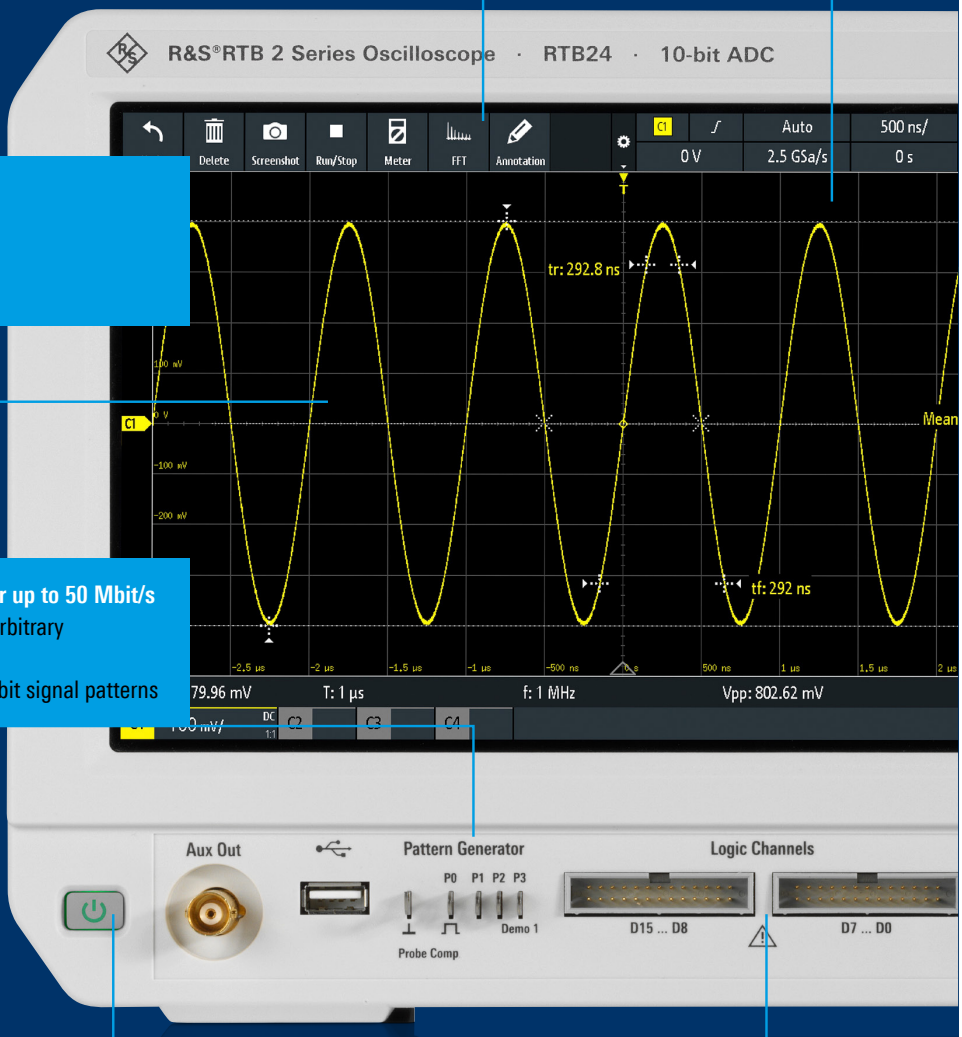
10.1" HIGH-RESOLUTION CAPACITIVE TOU

Quick access to important tools
- Drag & drop use of analysis tools
- Toolbar for access to functions
- Sidebar for intuitive configuration of functions

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

Integrated waveform and pattern generator up to 50 Mbit/s
- Output of sine, square/pulse, ramp and arbitrary waveforms
- Output of arbitrary waveform files and 4-bit signal patterns

10-second boot-up time



UCHSCREEN WITH GESTURE SUPPORT

10.1" high-resolution capacitive touchscreen with gesture support
- ► Gesture support for scaling and zooming
- ► More display area than similar oscilloscopes
- ► See a sharper image with more pixels: 1280 × 800 pixel resolution

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

Autoset function
- ► Automatic selection of vertical, horizontal and trigger settings for optimal viewing of active signals
- ► Setting of FFT parameters

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

Integrated logic analyzer (MSO-ready)
- ► Add 16 additional digital channels
- ► Get time-correlated analysis of analog and digital signals

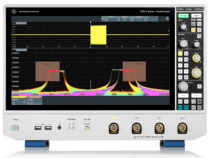
OSCILLOSCOPE PORTFOLIO




	R&S®RTH1000	R&S®RTC1000	R&S®RTB 2	R&S®RTM3000
Vertical system				
Bandwidth [1]	60/100/200/350/500 MHz	50/70/100/200/300 MHz	70/100/200/300 MHz	100/200/350/500 MHz/1 GHz
Number of channels	2 plus DMM/4	2	2/4	2/4
Vertical resolution; system architecture	10 bit; 16 bit	8 bit; 16 bit	10 bit; 16 bit	10 bit; 16 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
Digital channels	8	8	16	16
Horizontal system				
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)
Maximum memory (per channel; 1 channel active)	125 kpoints (4-channel model); 250 kpoints (2-channel model); 500 kpoints	1 Mpoints; 2 Mpoints	10 Mpoints; 20 Mpoints	40 Mpoints; 80 Mpoints
Segmented memory	standard, 50 Mpoints	–	standard, 260 Mpoints	option, 400 Mpoints
Acquisition rate (in waveforms/s)	50 000	10 000	50 000 (300 000 in fast segmented memory mode)	64 000 (2 000 000 in fast segmented memory mode [2])
Trigger				
Types	digital	analog	analog	analog
Sensitivity	–	–	at 1 mV/div: > 2 div	at 1 mV/div: > 2 div
Analysis				
Mask test	tolerance mask	tolerance mask	tolerance mask	tolerance mask
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
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" touchscreen, 800 × 480 pixel	6.5", 640 × 480 pixel	10.1" touchscreen, 1280 × 800 pixel	10.1" touchscreen, 1280 × 800 pixel
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.






	MXO 4	MXO 5/MXO 5C	R&S®RTO6	R&S®RTP
	200/350/500 MHz/1/1.5 GHz	100/200/350/500 MHz/1/2 GHz	600 MHz/1/2/3/4/6 GHz	4/6/8/13/16 GHz
	4	4/8	4	4
	12 bit; 18 bit	12 bit; 18 bit	8 bit; 16 bit	8 bit; 16 bit
	500 µV to 10 V	500 µV to 10 V	1 mV to 10 V (HD mode: 500 µV to 10 V)	
	500 µV to 1 V	500 µV to 1 V	1 mV to 1 V (HD mode: 500 µV to 1 V)	2 mV to 1 V (HD mode: 1 mV to 1 V)
	16	16	16	16
	2.5; 5 (2 channels interleaved)	5 on 4 channels; 2.5 on 8 channels (2 channels interleaved)	10; 20 (2 channels interleaved in 4 GHz and 6 GHz model)	20; 40 (2 channels interleaved)
	standard: 400 Mpoints; max. upgrade: 800 Mpoints[2)]	standard: 500 Mpoints max. upgrade: 1 Gpoints[2)]	standard: 200 Mpoints/800 Mpoints; max. upgrade: 1 Gpoints/2 Gpoints	standard: 100 Mpoints/400 Mpoints; max. upgrade: 3 Gpoints
	standard: 10000 segments; option: 1000000 segments	standard: 10000 segments; option: 1000000 segments	standard	standard
	> 4500000	> 4500000 on 4 channels	1000000 (2500000 in ultra-segmented memory mode)	750000 (> 3000000 in ultra-segmented memory mode)
	advanced (includes zone trigger), digital trigger (15 trigger types)	advanced (includes zone trigger), digital trigger (15 trigger types)	advanced (includes zone trigger), digital trigger (15 trigger types), high speed serial pattern trigger including 5 Gbps clock data recovery (CDR)[2)]	advanced (includes zone trigger), digital trigger (14 trigger types) with real-time deembedding[2)], high speed serial pattern trigger including 8/16 Gbps clock data recovery (CDR)[2)]
	0.0001 div, across full bandwidth, user controllable	0.0001 div, across full bandwidth, user controllable	0.0001 div, across full bandwidth, user controllable	0.0001 div, across full bandwidth, user controllable
			user configurable, hardware based	user configurable, hardware based
	advanced (formula editor)	advanced (formula editor)	advanced (formula editor, Python interface)	advanced (formula editor, Python interface)
	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, ARINC, QUAD-SPI	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, 100BASE-T1, ARINC, QUAD-SPI	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 Gen 1, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, Automotive Ethernet 100/1000BASE-T1	I²C, SPI, UART/RS-232/RS-422/RS-485, SENT, CAN, LIN, CAN FD, MIL-STD-1553, ARINC 429, SpaceWire, USB 2.0/HSIC/PD, USB 3.1 Gen 1/Gen 2/SSIC, PCIe 1.1/2.0/3.0, 8b10b, MIPI RFFE, MIPI D/M-PHY/UniPro, Automotive Ethernet 100/1000BASE-T1, Ethernet 10/100BASE-TX, MDIO, Manchester, NRZ
	power, digital voltmeter (DVM), frequency response analysis	power, digital voltmeter (DVM), frequency response analysis	power, advanced spectrum analysis and spectrogram, jitter and noise decomposition, clock data recovery (CDR), I/Q data and RF analysis (R&S®VSE), deembedding, embedding, equalization, PAM-N, TDR/TDT analysis, advanced eye diagram	advanced spectrum analysis and spectrogram, jitter and noise decomposition, real-time deembedding, embedding, equalization, PAM-N, TDR/TDT analysis, I/Q data and RF analysis (R&S®VSE), advanced eye diagram
	–		see specifications (PD 5216.1640.22)	see specifications (PD 3683.5616.22)
	13.3" touchscreen, 1920 × 1080 pixel (Full HD)	for MXO 5 only: 15.6" touchscreen, 1920 × 1080 pixel (Full HD)	15.6" touchscreen, 1920 × 1080 pixel (Full HD)	13.3" touchscreen, 1920 × 1080 pixel (Full HD)
	414 × 279 × 162	MXO 5: 445 × 314 × 154 MXO 5C: 445 × 105 × 405	450 × 315 × 204	441 × 285 × 316
	6	MXO 5: 9 MXO 5C: 8.7	10.7	18
	–	–	–	–

SPECIFICATIONS IN BRIEF

Specifications in brief		
Vertical system		
Number of channels	R&S®RTB22, R&S®RTB24	2, 4
Bandwidth (–3 dB)	R&S®RTB22/24 (with R&S®RTB-B2x1, R&S®RTB-B2x2 and R&S®RTB-B2x3 options)	70 MHz, 100 MHz, 200 MHz, 300 MHz
Rise time (calculated)	70 MHz, 100 MHz, 200 MHz, 300 MHz	5 ns, 3.5 ns, 1.75 ns, 1.15 ns
Input impedance		1 MΩ ± 2% with 9 pF ± 2 pF (meas.)
Input sensitivity	max. bandwidth in all ranges	1 mV/div to 5 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 mode
Acquisition system		
Maximum sampling rate		1.25 Gsample/s, 2.5 Gsample/s in interleaved mode
Acquisition memory		10 Mpoints, 20 Mpoints in interleaved mode
	with segmented memory	max. 260 Mpoints
Horizontal system		
Timebase range		1 ns/div to 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, runt, rise time, fall time, serial bus, timeout, line
	included with serial bus options	I^2C, SPI, UART/RS-232/RS-422/RS-485, CAN/LIN
Analysis and measurement functions		
QuickMeas	at the push of a button, measurement values are continuously written onto the waveform	peak-to-peak voltage, pos. peak, neg. peak, rise time, fall time, mean value, RMS value, time, period, frequency
Waveform mathematics		addition, subtraction, multiplication, division, FFT
MSO option (R&S®RTB2-B1)		
Digital channels		16 (2 logic probes)
Maximum sample rate		1.25 Gsample/s
Acquisition memory		10 Msample
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	±2.5 V, ±1.25 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, 16 kpoints
General data		
Screen		10.1" WXGA TFT color display (1280 × 800 pixel)
Interfaces		USB host with MTP, USB device, LAN, web server for remote display and operation
Audible noise	maximum sound 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		2.5 kg (5.5 lb)

► For more information, see the R&S®RTB 2 specification document (PD 3673.0734.22) available under www.rohde-schwarz.com.

Service at Rohde & Schwarz

YOU'RE IN GREAT HANDS

	SERVICE PLANS	ON DEMAND
Calibration	Up to five years [1]	Pay per calibration
Warranty and repair	Up to five years [1]	Standard price repair

[1] For extended periods, contact your Rohde & Schwarz sales office.

Instrument management made easy

The R&S®InstrumentManager makes it easy to register and manage your instruments. It lets you schedule calibration dates and book services.

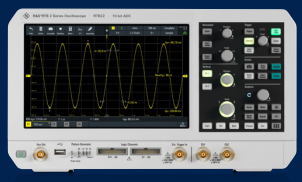
Find out more about our service portfolio under:

ORDERING INFORMATION

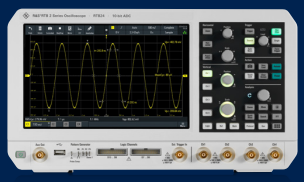
1 Choose 2-channel or 4-channel instrument

The base model is MSO-ready with 70 MHz bandwidth and the R&S®RTB-B6 arbitrary waveform generator, the R&S®RTB-K15 history and segmented memory option and power cord.

2-channel model



4-channel model



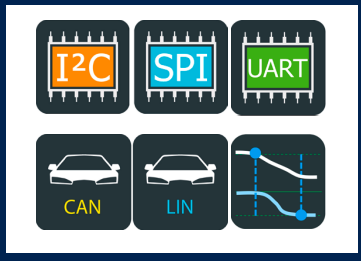
2 Add additional bandwidth

- 70 MHz (included in base model)
- 100 MHz
- 200 MHz
- 300 MHz

3 Add desired applications/options

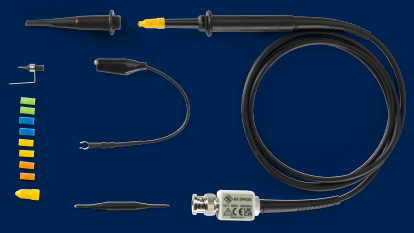
Options and applications can be purchased individually or as a bundle.

R&S®RTB2-PK1 bundle
Includes I²C, SPI, UART, RS-232, CAN and LIN serial triggering and decoding and R&S®RTB-K36 frequency response analysis (Bode plot) option



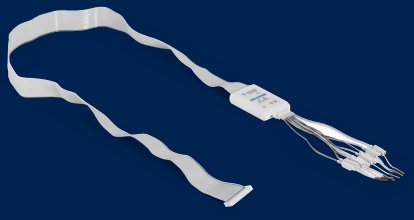
Choose from the oscilloscope probes

Each R&S®RTB 2 comes standard with one R&S®RT-ZP03S passive probe per channel. The instrument is compatible with other Rohde&Schwarz and third-party probes that connect to a BNC interface.



Add logic probes (MSO)

R&S®RTB 2 is MSO-ready, which makes mixed signal capability a standard functionality of the oscilloscope. Just add R&S®RTB2-B1 option (two logic probes (MSO)) to use up to 16 digital channels.



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

Designation	Type	Order No.
Choose your oscilloscope base model		
Oscilloscope, 70 MHz, 2 channels	R&S®RTB22	1333.1005.02
Oscilloscope, 70 MHz, 4 channels	R&S®RTB24	1333.1005.04
Base unit [1], includes: R&S®RTB-B6 arbitrary waveform generator, R&S®RTB-K15 history and segmented memory Standard accessories: 300 MHz passive probe per channel, power cord, getting started manual and safety instructions		
Choose your bandwidth upgrade		
Upgrade of R&S®RTB22 oscilloscopes to 100 MHz bandwidth	R&S®RTB-B221	1333.1163.02
Upgrade of R&S®RTB22 oscilloscopes to 200 MHz bandwidth	R&S®RTB-B222	1333.1170.02
Upgrade of R&S®RTB22 oscilloscopes to 300 MHz bandwidth	R&S®RTB-B223	1333.1186.02
Upgrade of R&S®RTB24 oscilloscopes to 100 MHz bandwidth	R&S®RTB-B241	1333.1257.02
Upgrade of R&S®RTB24 oscilloscopes to 200 MHz bandwidth	R&S®RTB-B242	1333.1263.02
Upgrade of R&S®RTB24 oscilloscopes to 300 MHz bandwidth	R&S®RTB-B243	1333.1270.02
Choose your options		
MSO, set of 2 logic probes, 300 MHz (+ 16 digital channels)	R&S®RTB2-B1	1801.8421.02
I^2C/SPI serial triggering and decoding	R&S®RTB-K1	part of R&S®RTB2-PK1
UART/RS-232/RS-422/RS-485 serial triggering and decoding	R&S®RTB-K2	part of R&S®RTB2-PK1
CAN/LIN serial triggering and decoding	R&S®RTB-K3	part of R&S®RTB2-PK1
Frequency response analysis (Bode plot)	R&S®RTB-K36	part of R&S®RTB2-PK1
Application bundle, consists of the following options: R&S®RTB-K1, R&S®RTB-K2, R&S®RTB-K3, R&S®RTB-K36	R&S®RTB2-PK1	1801.8438.02
Choose your additional probes		
Single-ended passive probes		
300 MHz, 10:1, 10 MΩ, 400 V, 12 pF	R&S®RT-ZP03S	1803.1001.02
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	R&S®RT-ZP10	1409.7550.00
38 MHz, 1 MΩ, 1:1, 55 V, 39 pF	R&S®RT-ZP1X	1333.1370.02
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
High voltage probes: passive		
400 MHz, 1000:1, 50 MΩ, 1000 V, 7.5 pF	R&S®RT-ZH11	1409.7737.02
Current probes		
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
Logic probe (MSO)		
Active 8-channel logic probe	R&S®RT-ZL03	1333.0715.02
Probe accessories		
50 Ω feedthrough termination	R&S®HZ22	3594.4015.02
Probe pouch	R&S®RT-ZA19	1335.7875.02
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

[1] Oscilloscope is MSO-ready.

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You're in great hands

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

Rohde&Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

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 training
www.training.rohde-schwarz.com

Rohde&Schwarz customer support
www.rohde-schwarz.com/support

PD 3673.0734.12 | Version 01.01 | November 2024 (sk)
R&S®RTB 2 Series Oscilloscope
Data without tolerance limits is not binding | Subject to change

R&S®RTB 2 SERIES OSCILLOSCOPE

Specifications

Specifications
Version 01.01

ROHDE&SCHWARZ
Make ideas real

Version 01.01, November 2024

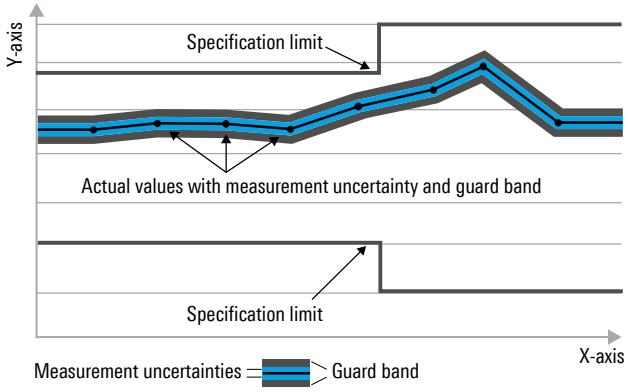
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ± or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Non-traceable specifications with limits (n. trc.)
Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value, e.g. dimensions or resolution of a setting parameter. Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

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

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

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

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Version 01.01, November 2024

Base unit

Vertical system

Input channels	R&S®RTB22	2 channels
	R&S®RTB24	4 channels
Input impedance	R&S®RTB22, R&S®RTB24	1 MΩ ± 2 % with 9 pF ± 2 pF (meas.)
Analog bandwidth (–3 dB)	R&S®RTB22 and R&S®RTB24	> 70 MHz
	R&S®RTB22 with -B221 option and R&S®RTB24 with -B241 option	> 100 MHz
	R&S®RTB22 with -B222 option and R&S®RTB24 with -B242 option	> 200 MHz
	R&S®RTB22 with -B223 option and R&S®RTB24 with -B243 option	> 300 MHz
Lower frequency limit (–3 dB)	at AC coupling	< 2 Hz (meas.)
Analog bandwidth limits (max. –1.8 dB, min. –3.5 dB)	R&S®RTB22 and R&S®RTB24	20 MHz
Rise time (10 % to 90 %, calculated)	R&S®RTB22 and R&S®RTB24	< 5 ns
	R&S®RTB22 with -B221 option and R&S®RTB24 with -B241 option	< 3.5 ns
	R&S®RTB22 with -B222 option and R&S®RTB24 with -B242 option	< 1.75 ns
	R&S®RTB22 with -B223 option and R&S®RTB24 with -B243 option	< 1.15 ns
Vertical resolution		10 bit, up to 16 bit with high-resolution decimation mode
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 % of full scale
	input sensitivity ≤ 5 mV/div	±2 % of full scale
Offset accuracy		±(0.5 % × |offset| + 0.1 div × input sensitivity + 1 mV)
DC measurement accuracy	after adequate suppression of measurement noise by using high-resolution sampling mode or waveform averaging	±(DC gain accuracy + offset accuracy)
Input coupling		DC, AC (> 7 Hz)
Input sensitivity		1 mV/div to 5 V/div
Maximum input voltage		300 V (RMS), max. 400 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
Position range		±5 div (depends on offset)
Offset range [1]	input sensitivity	
	200 mV/div to ≤ 5 V/div	±(40 V – position × input sensitivity)
	1 mV/div to < 200 mV/div	±(1.2 V – position × input sensitivity)
Channel-to-channel isolation (each channel at same input sensitivity)	input frequency < analog bandwidth	> 50 dB

Horizontal system

Timebase range		selectable between 1 ns/div and 500 s/div
Channel deskew		±500 ns
Trigger offset range	min.	memory depth/actual sampling rate
	max.	2^{33}/actual sampling rate
Modes		normal, roll ≥ 50 ms/div
Timebase accuracy	after delivery/calibration, at +23 °C	±2.5 ppm
	during calibration interval	±3.5 ppm

[1] Signals with non-destructive DC components that overdrive the ADC continually for long periods of time are not recommended, and may result in instrument damage.

Delta time accuracy	corresponds to time error between two 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	±(1.19/Fs + timebase accuracy × |reading|) (peak) (meas.)

Acquisition system

Maximum realtime sampling rate	normal mode	1.25 Gsample/s
	interleaved mode, if following channels are not used simultaneously: • channel 1 and channel 2 • channel 3 and channel 4 • logic probe	2.5 Gsample/s
Memory depth per channel	normal mode	10 Msample per channel
	interleave mode, if following channels are not used simultaneously: • channel 1 and channel 2 • channel 3 and channel 4 • D7 to D0 and D15 to D8 (logic probes)	20 Msample per channel
Acquisition modes	sample	first sample in decimation interval
	peak detect	largest and smallest sample in decimation interval (800 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
Number of averaged waveforms		2 to 100 000
Waveform acquisition rate	dot display, single channel, auto record length	up to 50 000 waveforms/s

Trigger system

Trigger level	range (min)	±5 div from center of screen
Trigger modes		auto, normal, single, n single with R&S®RTB-K15 option
Hold-off range	time	inactive or 50 ns to 10 s
Trigger types		edge, width, video, pattern, runt, rise time, fall time, serial bus, timeout, line
	actions on trigger	pulse, sound, screenshot, save waveform, save reference waveform
Edge trigger	trigger events	rising edge, falling edge, both edges
	sources	
	R&S®RTB22	channel 1, channel 2, logic channels from D0 to D15, external trigger input
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15, external trigger input
	coupling (analog channels, external trigger input)	DC, AC, HF reject (attenuates > 50 kHz (meas.)), LF reject (attenuates < 50 kHz (meas.)), noise reject (enlarges trigger hysteresis)

Width trigger	trigger events	pulse width is smaller, greater, equal, unequal, inside interval, outside interval
	min. pulse width	6.4 ns
	max. pulse width	13.5 s
	polarity	positive, negative
	sources	
	R&S®RTB22	channel 1, channel 2, logic channels from D0 to D15
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
Video trigger	trigger events	selectable line, all lines, even frame, odd frame, all frames
	supported standards	PAL, NTSC, SECAM, PAL-M, SDTV 576i
	sources	
	R&S®RTB22	channel 1, channel 2, external trigger input
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, external trigger input
	sync pulse polarity	positive, negative
Pattern trigger	trigger events	logic condition between active channels
	sources	
	R&S®RTB22	channel 1, channel 2, logic channels from D0 to D15
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	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
	min. duration time	6.4 ns
	max. duration time	13.5 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 lower, greater, equal, not equal
	minimum rise time	6.4 ns
	maximum rise time	13.5 s
	polarity	rising edge, falling edge, both edges
	sources	
	R&S®RTB22	channel 1, channel 2
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4
Timeout trigger	trigger events	greater than timeout
	minimum timeout	6.4 ns
	maximum timeout	13.5 s
	polarity	stays high, stays low
	sources	
	R&S®RTB22	channel 1, channel 2, logic channels from D15 to D0
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, logic channels from D15 to D0
	selectable trigger hysteresis	small, medium, large
Serial bus trigger	supported standards	
	R&S®RTB-K1 option	I^2C/SPI (two- and three-wire)
	R&S®RTB-K2 option	UART/RS-232/RS-422/RS-485
	R&S®RTB-K3 option	CAN/LIN

Trigger sensitivity	with DC, AC, LF reject	
	input sensitivity > 5 mV/div	< 0.8 div (meas.)
	2 mV/div ≤ input sensitivity < 5 mV/div	< 1.5 div (meas.)
	input sensitivity < 2 mV/div	< 2 div (meas.)
	with HF reject	
	all input sensitivities	< 1 div (meas.)
External trigger input	input impedance	
	R&S®RTB22/R&S®RTB24	1 MΩ ± 2 % with 9 pF ± 2 pF (meas.)
	maximum input voltage at 1 mΩ	300 V (RMS), max. 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})
	input coupling	DC, AC, LF reject, HF reject
Trigger output (AUX OUT connector)	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
	output delay	depends on trigger settings

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
	measurements on trigger signal	trigger period, trigger frequency implemented by means of six-digit hardware counter
	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	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®RTB22	channel 1, channel 2
	R&S®RTB24	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®RTB22	channel 1, channel 2
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4
Number of measurements		up to 4
Resolution		up to 3 digits
Bandwidth		1 MHz

Frequency counter

Measurements		frequency, period
Sources	R&S®RTB22	trigger signal source (edge, video): line, channel 1, channel 2, external trigger in
	R&S®RTB24	trigger signal source (edge, video): line, channel 1, channel 2, channel 3, channel 4, external trigger in
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®RTB22	channel 1, channel 2
	R&S®RTB24	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)

Waveform maths

Number of math waveforms		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®RTB22	channel 1, channel 2, math waveforms 1 to 4
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, math waveforms 1 to 4
FFT	sources	
	R&S®RTB22	channel 1, channel 2, math waveforms, reference waveform
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, math waveforms, reference waveform
	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, protocol (available with R&S®RTB-K3 option)
	configuration	manual level setting, adjustable hysteresis
	display of search events	in diagram (markers) and in result table
Sources	R&S®RTB22	channel 1, channel 2, math waveform, D0 to D15
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4, math waveform, D0 to D15

Display characteristics

Diagram types	manually changeable vertical window size	Yt, XY, zoom, FFT
XY mode		parallel display of XY diagram and Yt diagrams of input signals for X, Y
Zoom		horizontal zoom with fast navigation, split screen with overview signal and zoomed signal
FFT mode		split screen with Yt diagrams and dedicated frequency diagram
Interpolation		sin(x)/x, linear, sample & hold
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
Sources		analog and digital channels, math, reference, spectrum

Protocol and logic

Bus decode	number of bus signals	2 [2]
	bus types	parallel, parallel clocked
	R&S®RTB-K1 option	SPI (2-wire, 3-wire, 4-wire [2]), I^2C
	R&S®RTB-K2 option	UART/RS-232/RS-422/RS-485
	R&S®RTB-K3 option	CAN, LIN
	display types	decoded bus, logical signal, frame table (depends on decoded bus)
	data format of decoded bus	hex, decimal, binary

Miscellaneous

Save/recall	device settings	save and recall on internal file system or USB flash drive or on a PC via web interface or USB-MTP (media transfer protocol)
	reference waveforms	save and recall on internal file system or USB flash drive or on a PC via web interface or USB-MTP
	waveforms	save on USB flash drive 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 flash drive or download and save on a PC via web interface or USB-MTP; available file formats: BMP, PNG

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

Camera button (one touch)		configurable button, actions on press: • save device settings (setup) • save waveforms • save screenshot • search/bus/statistic results
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		undo/redo function

Input and outputs

Front		
Channel inputs		BNC, for details see Vertical system
External trigger input		BNC, for details see Trigger system
AUX OUT (BNC)	trigger out	for details see Trigger system
	reference frequency	10 MHz ± 3.5 ppm (meas.)
	mask violation	pulse
	waveform generator (with R&S®RTB-B6 option only)	for details see Waveform generator
Probe compensation output	signal shape rectangle	V_{low} = 0 V, V_{high} = 2.5 V (meas.)
	frequency	1 kHz during probe adjust setup or manual configurable
Pattern source (with R&S®RTB-B6 option only)	P3 to P0 (with R&S®RTB-B6 option only)	4 lugs, for details see 4-bit pattern generator
Digital channel inputs	D15 to D8, D7 to D0	with R&S®RTB2-B1 option only
Ground lug		connected to ground
USB host interface		1 port, type A plug, version 2.0, USB drives only, FAT32 formatting required
Rear		
USB device interface		1 port, type B plug, version 2.0
Ethernet interface		1 port, 1 Gbit
Security slot		for standard Kensington style lock
Fixation loop		for securing the instrument with a cable

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
Maximum of sound pressure level		28.3 dB/30.2 dB (A) at 1.0 m/0.8 m distance (at +23 °C, 947 mbar (hPa), 20 % rel. humidity), in line with ISO EN 3744
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 [3]
Certifications		VDE, $_{C}$CSA$_{US}$
Calibration interval		1 year
Power supply		
AC supply		100 V to 240 V at 50 Hz to 400 Hz, 0.95 A to 0.5 A
Power consumption		max. 60 W
Safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1
Power consumption in stand-by		0.5 W (meas.)
Mechanical data		
Dimensions	W × H × D	390 mm × 220 mm × 152 mm (15.4 in × 8.66 in × 5.98 in)
Weight (nom.)		2.5 kg (5.5 lb)

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

Version 01.01, November 2024

Options

R&S®RTB2-B1 mixed signal option

Mixed signal capability is a standard functionality of the R&S®RTB 2 series oscilloscopes. The R&S®RTB2-B1 mixed signal option provides 16 digital channels with two R&S®RT-ZL03 logic probes.		
Vertical system		
Input channels		16 logic channels (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	300 MHz (meas.)
Maximum input voltage		±40 V (V_p)
Minimum input voltage swing	hysteresis small	300 mV (V_{pp}) (meas.)
	hysteresis medium	800 mV (V_{pp}) (meas.)
	hysteresis large	1500 mV (V_{pp}) (meas.)
Threshold groups		D15 to D8 and D7 to D0
Threshold level	range	–2 V to 8 V in 10 mV steps
	predefined	CMOS 5.0 V, CMOS 3.3 V, CMOS 2.5 V, TTL, ECL
Threshold accuracy		±(100 mV + 3 % of threshold setting) (meas.)
Comparator hysteresis		small, medium, large
Horizontal system		
Channel-to-channel skew		max. 800 ps (meas.)
Acquisition system		
Sampling rate		1.25 Gsample/s for every channel
Memory depth	two logic probes (normal mode)	10 Msample for every channel
	one logic probe (interleave mode)	20 Msample for every channel
Trigger system		see Trigger system
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, value at the cursor position
Additional cursor function		display of decoded parallel bus value at the cursor position
Display characteristics		
Channel activity display		independent of the scope acquisition, the state (stays low, stays high or toggles) of the channels from D15 to D0 is displayed

R&S®RTB-B6 waveform generator and 4-bit pattern generator

This is a standard functionality of the R&S®RTB 2 series oscilloscopes.		
Waveform generator		
Resolution		14 bit
Sample rate		250 Msample/s
Amplitude	level	
	high Z	20 mV to 5 V (V_{pp})
	50 Ω	10 mV to 2.5 V (V_{pp})
	accuracy (frequency ≤ 100 kHz)	3 %
DC offset	level	
	high Z	±2.5 V
	50 Ω	±1.25 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	frequency	0.1 Hz to 10 MHz
	memory depth	16 kpoints
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
Probe adjust		1 kHz/1 MHz square wave signal approx. 2.5 V (V_{pp}) (tr < 4 ns)
Bus signal source		SPI, I^2C, UART, CAN, LIN
	bandwidth	9600 bit/s to 1 Mbit/s
4-bit counter	frequency	1 mHz to 25 MHz
Programmable pattern	sample rate	20 ns to 1 s, up/down
	memory depth	2048 bit
	pattern idle time	50 ns to 1 s

Version 01.01, November 2024

R&S®RTB-Bxx bandwidth upgrades

Option	Model	Analog bandwidth upgrade from 70 MHz to
R&S®RTB-B221	R&S®RTB22	100 MHz
R&S®RTB-B222	R&S®RTB22	200 MHz
R&S®RTB-B223	R&S®RTB22	300 MHz
R&S®RTB-B241	R&S®RTB24	100 MHz
R&S®RTB-B242	R&S®RTB24	200 MHz
R&S®RTB-B243	R&S®RTB24	300 MHz

R&S®RTB-K1

I²C triggering and decoding		
Bus configuration	sources for SCL and SDA	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	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 and trigger event are displayed in different colors
	displayed format of address	hex
	displayed format of data	ASCII, binary, decimal or hex
SPI triggering and decoding		
Bus configuration	sources for CS, CLK, MOSI and MISO	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	bit rate	up to 25 Mbps
	chip select (CS)	active low, active high or missing (two-wire SPI)
	clock (CLK) slope	rise or fall
	data symbol size	1 bit to 32 bit
	idle time for two-wire SPI	< 1 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 and trigger event are displayed in different colors
	displayed format of data	ASCII, binary, decimal or hex
	data decoding	MSB or LSB first

R&S®RTB-K2

UART/RS-232/RS-422/RS-485 triggering and decoding		
Bus configuration	source for RX and TX	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	bit rate	300/600/1200/2400/4800/9600/19200/ 38400/57600/115200 bps or user-selectable up to 3 Mbps
	end of frame	timeout, none
	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
Trigger	trigger events	start bit, start of frame, symbol number, any symbol, pattern of symbols, parity error, frame 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 and trigger event are displayed in different colors
	displayed format of data	ASCII, binary, decimal or hex

R&S®RTB-K3

CAN triggering and decoding		
Bus configuration	signal type	CAN_H, CAN_L
	sources	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	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; three table positions (top, bottom, full screen); 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 J2602; 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 1 kbps to 2.5 Mbps
	polarity	active high or active low
	label list	associate frame identifier with symbolic ID
Trigger	source	any input channel
	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; three table positions (top, bottom, full screen); 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®RTB-K15 history and segmented memory

This is a standard functionality of the R&S®RTB 2 series oscilloscopes.				
Memory segmentation	function	additional memory segments for the acquisition		
	number of segments [4]	record length	segments (up to)	total memory (per channel)
		10 ksample	13 107	131 Msample
		20 ksample	13 107	262 Msample
		50 ksample	4 369	218 Msample
		100 ksample	2 621	262 Msample
		200 ksample	1 456	291 Msample
		500 ksample	624	312 Msample
		1 Msample	319	319 Msample
		2 Msample	159	318 Msample
		5 Msample	64	320 Msample
		10 Msample	32	320 Msample
		20 Msample	16	320 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 2.5 µs (up to 300 000 waveforms/s)			
History mode	function	The history mode always provides access to past acquisitions in the segmented memory.		
	timestamp resolution	6.4 ns		
	history player	replays the recorded waveforms; start and stop waveform could be set; repetition possible		

R&S®RTB-K36

Frequency response analysis (Bode plot)		
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 5 V into high Z
		10 mV to 2.5 V into 50 Ω
Input and output sources	R&S®RTB22	channel 1, channel 2
	R&S®RTB24	channel 1, channel 2, channel 3, channel 4
Number of test points		10 points to 500 points per decade
Dynamic range		> 70 dB (typ.) 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

[4] In interleaved mode.

Version 01.01, November 2024

Ordering information

Designation	Type	Order No.
Choose your oscilloscope base model		
Oscilloscope, 70 MHz, 2 channels	R&S®RTB22	1333.1005.02
Oscilloscope, 70 MHz, 4 channels	R&S®RTB24	1333.1005.04
Base unit, includes: R&S®RTB-B6 arbitrary waveform generator; R&S®RTB-K15 history and segmented memory, Standard accessories: 300 MHz passive probe per channel, power cord, getting started manual and safety instructions		
Choose your bandwidth upgrade		
Upgrade of R&S®RTB22 oscilloscopes to 100 MHz bandwidth	R&S®RTB-B221	1333.1163.02
Upgrade of R&S®RTB22 oscilloscopes to 200 MHz bandwidth	R&S®RTB-B222	1333.1170.02
Upgrade of R&S®RTB22 oscilloscopes to 300 MHz bandwidth	R&S®RTB-B223	1333.1186.02
Upgrade of R&S®RTB24 oscilloscopes to 100 MHz bandwidth	R&S®RTB-B241	1333.1257.02
Upgrade of R&S®RTB24 oscilloscopes to 200 MHz bandwidth	R&S®RTB-B242	1333.1263.02
Upgrade of R&S®RTB24 oscilloscopes to 300 MHz bandwidth	R&S®RTB-B243	1333.1270.02
Choose your options		
MSO, set of 2 logic probes, 300 MHz	R&S®RTB2-B1	1801.8421.02
I^2C/SPI serial triggering and decoding	R&S®RTB-K1	part of R&S®RTB2-PK1
UART/RS-232/RS-422/RS-485 serial triggering and decoding	R&S®RTB-K2	part of R&S®RTB2-PK1
CAN/LIN serial triggering and decoding	R&S®RTB-K3	part of R&S®RTB2-PK1
Frequency response analysis (Bode plot)	R&S®RTB-K36	part of R&S®RTB2-PK1
Application bundle, consists of the following options: R&S®RTB-K1, R&S®RTB-K2, R&S®RTB-K3, R&S®RTB-K36	R&S®RTB2-PK1	1801.8438.02
Choose your additional probes		
Single-ended passive probes		
300 MHz, 10:1, 10 MΩ, 400 V (RMS), 12 pF	R&S®RT-ZP03S	1803.1001.02
500 MHz, 10:1, 10 MΩ, 300 V (RMS), 10 pF	R&S®RT-ZP05S	1333.2401.02
500 MHz, 10 MΩ, 10:1, 400 V, 9.5 pF	R&S®RT-ZP10	1409.7550.00
38 MHz, 1 MΩ, 1:1, 55 V, 39 pF	R&S®RT-ZP1X	1333.1370.02
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
Current probes		
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
Logic probe (MSO)		
Active 8 channel logic probe	R&S®RT-ZL03	1333.0715.02
Probe accessories		
50 Ω feedthrough termination	R&S®HZ22	3594.4015.02
Probe pouch	R&S®RT-ZA19	1335.7875.02
Choose your accessories		
Front cover	R&S®RTB-Z1	1333.1728.02
Soft case	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 and service

Warranty		
Base unit		3 years
All other items		1 year
Service options		
	Service plans	**On demand**
Calibration	up to five years [5]	pay per calibration
Warranty and repair	up to five years [5]	standard price repair
Contact your Rohde & Schwarz sales office for further details.		

[5] For extended periods, contact your Rohde & Schwarz sales office.

Service at Rohde&Schwarz
You're in great hands

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

Rohde&Schwarz

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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 training
www.training.rohde-schwarz.com

Rohde&Schwarz customer support
www.rohde-schwarz.com/support

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R&S®RTB 2 Series Oscilloscope
Data without tolerance limits is not binding | Subject to change