Meeting your needs
R&S®RTO2000
Digital Oscilloscope

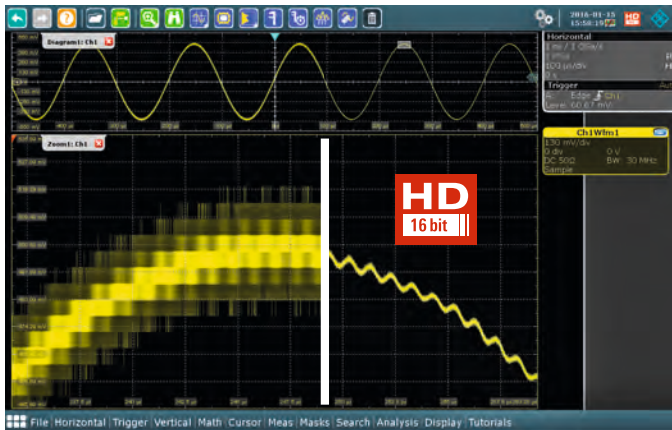**HD** 16 bit

Multi Domain

Turn your signals into success.
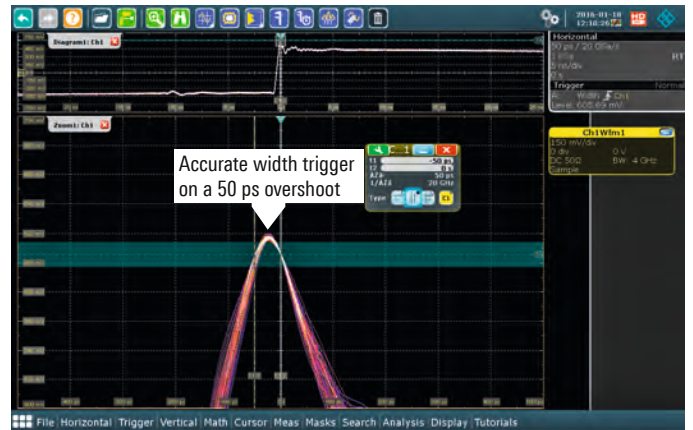
Best oscilloscope performance

Up to 16-bit vertical resolution

The low-noise frontend and 10 GHz single-core A/D converter are the foundation for the extraordinarily high measurement accuracy and dynamic range of the R&S®RTO oscilloscopes. The high definition mode (HD mode) activates configurable lowpass filtering of the signal after the A/D converter, increasing the vertical resolution to up to 16 bit. Since filtering reduces quantizing noise, signal details become visible.

Integrated spectrum analysis

For frequency analysis, the user simply sets the center frequency, span and resolution bandwidth on the R&S®RTO oscilloscopes for up to four analog signals – just like on a spectrum analyzer. Thanks to many years of experience in RF development, the R&S®RTO oscilloscopes offer an outstanding dynamic range. The FFT-based spectrum analyzer is ultrafast, making it ideal for capturing sporadic disturbance signals. For debugging, R&S®RTO oscilloscopes can simultaneously display the spectrum and the associated signal path and correlate events. The spectrogram mode, different detectors (such as max. hold) and mask tests offer further analysis capabilities.

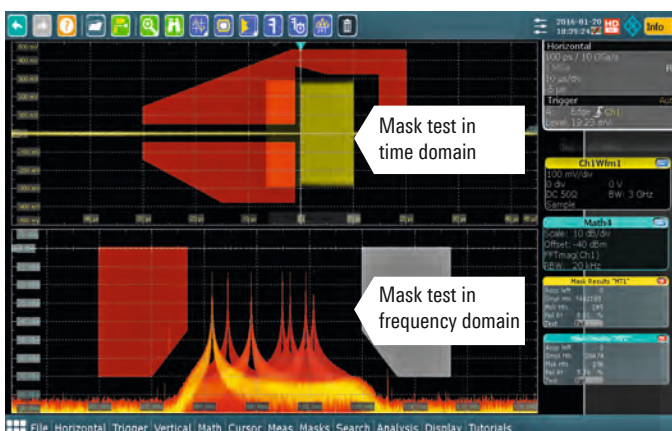Mask test in time domain

Mask test in frequency domain

Trigger on any signal detail you can see

The unique digital trigger system from Rohde&Schwarz uses the sampling points of the A/D converter in the acquisition path so that the trigger system's input data is identical to the displayed signal. The result is minimal trigger jitter without postprocessing correction as well as high sensitivity that can be extended up to 16 bit in HD mode. Users can reliably isolate even the smallest signals.

Accurate width trigger on a 50 ps overshoot

Quickly find signal faults with 1 million waveforms/s

R&S®RTO oscilloscopes display up to 1 million waveforms/s. To make this possible, Rohde&Schwarz developed an ASIC with optimized signal processing. R&S®RTO oscilloscopes enable users to quickly and reliably detect sporadic signal faults. A high acquisition rate is even available when histograms, masks or cursor measurements are active.

Typical acquisition rates

R&S®RTO: 1 million waveforms/s

Widest range of capabilities

Industry-leading 2 Gsample deep memory

In the basic configuration, R&S®RTO oscilloscopes offer 50 Msample acquisition memory per channel. Applications such as seamless acquisition of long pulse or protocol sequences often require even deeper memory. The R&S®RTO oscilloscopes' acquisition memory can be extended up to 2 Gsample. Signal processing in the ASIC ensures a smooth workflow even with deep memory.

R&S®RTO versus conventional oscilloscopes

Legend: ■ R&S®RTO   ▨ Typical oscilloscope

R&S®RTO oscilloscopes enable smooth work, even with deep memory.

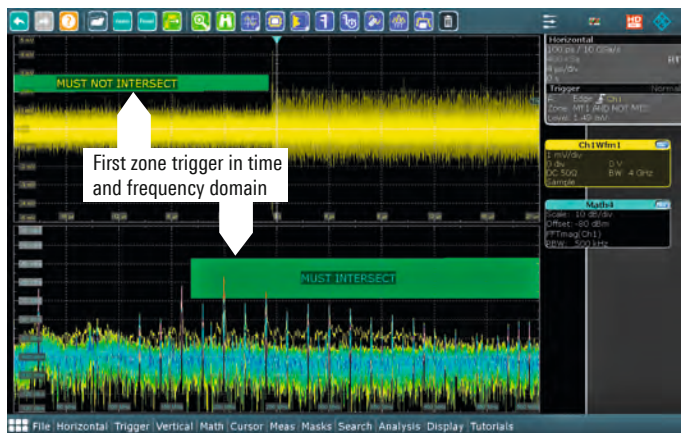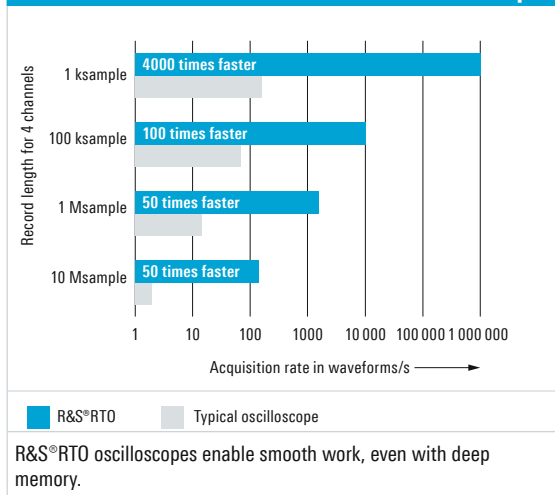## First zone trigger in time and frequency domain

The zone trigger of R&S®RTO oscilloscopes enables the graphical separation of events. The user can define up to eight zones of any shape. These can be logically combined over multiple channels or using math functions. Depending on how the zones are defined, a trigger signal is activated when a signal either intersects or does not intersect the zone. This makes it possible to separate read/write sequences from the memory interfaces in the time domain.

First zone trigger in time and frequency domain

Analyze previous acquisitions – always available in history buffer

The R&S®RTO oscilloscopes' history function ensures that previous waveforms stored in memory can always be accessed. A trigger timestamp allows time correlation. The user can view all saved signals and analyze them with tools such as zoom, measurement, math and spectrum analysis functions.


History player to analyze previous acquisitions

Deep toolset for signal analysis

R&S®RTO oscilloscopes offer over 90 measurement functions. The functions are organized by type into amplitude and time measurements, jitter, eye, histogram and spectral measurements. Statistics, histograms, and trend and track functions facilitate detailed analysis of the measurement results. The measurement results can also be used in math functions.


Histogram

Statistics
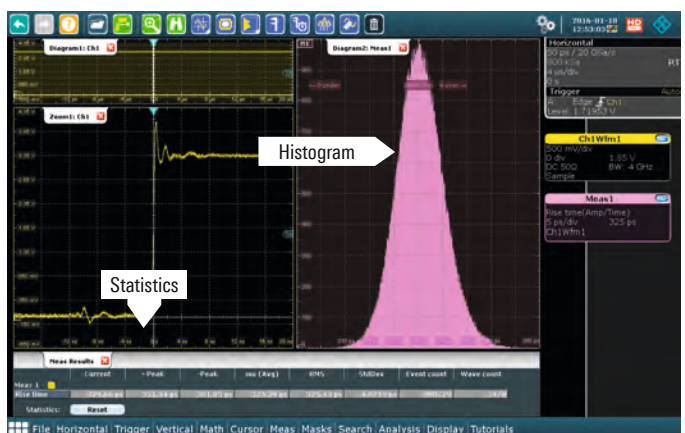
Advanced user interface

Easily customizable waveform display with R&S®SmartGrid technology

❙ Configurable display with R&S®SmartGrid
❙ Superposition of windows in multiple tabs
❙ Scales labeled on all axes

App cockpit to quickly set up analysis functions

❙ Direct access to all analysis functions
❙ Simple adding of user applications
❙ Protocol decoding in seconds
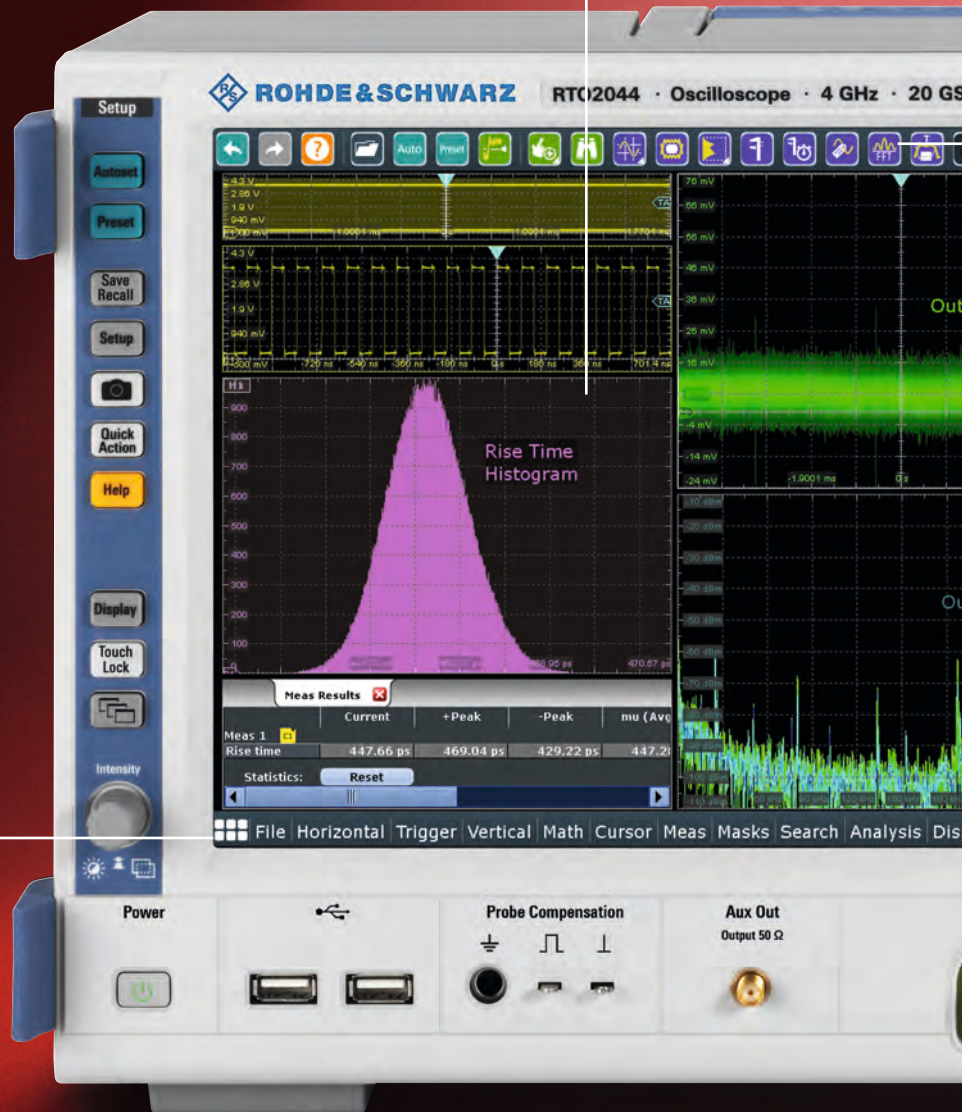
Fast access to important tools
- Toolbar for quick access to functions
- Sidebar for easy configuration of a measurement

High-resolution capacitive touch-screen with gesture support
- Brilliant 12.1" screen
- Capacitive touchscreen
- Drag & drop signal placement
- Use gestures to scale and zoom

Clear orientation thanks to color coding
- Color-coded controls indicate the currently selected channel
- Color coding of trigger source

Engineered for multi-domain challenges

Customer need

New challenges often arise when testing modern embedded designs. Various functional units such as the voltage supply, processor, sensor technology, digital I/Os and radio interfaces are connected with each other at the IC or board level, making them susceptible to mutual interference. Debugging requires time correlation with various signals such as current, voltage, data telegrams, reference clock, sensor and wireless data. Until now, dedicated measuring instruments were used for measurements in the time domain and for spectrum, logic and protocol analysis.

Rohde & Schwarz solution

R&S®RTO oscilloscopes offer a fully integrated multi-domain test solution with frequency, protocol and logic analysis functions. Users appreciate the standardized user interface with consistent, simple operation of all functions and the fact that all analysis functions are time correlated. The following example clearly demonstrates the benefits. Sporadic failures of embedded design functions are often caused by interference from the internal voltage supply. R&S®RTO oscilloscopes can analyze the quality of the voltage supply in the time and frequency domain, depending on processor and interface activity. This one-box solution makes it possible to quickly detect errors even in complex designs.

R&S®RTO oscilloscopes offer a complete multi-domain test solution

Multi

Domain

Analog
- Debugging
- Signal integrity
- Power analysis

Logic
- Debugging
- Data verification
- Bus decoding

Protocol
- Protocol decoding
- Protocol triggering
- Symbol mapping

Frequency
- Spectrum analysis
- EMI debugging
- Signal analysis

Specifications in brief

Specifications in brief

Vertical system

Number of channels	R&S®RTO2002/2012/2022/2032	2	
	R&S®RTO2004/2014/2024/2034/2044/2064	4	
Analog bandwidth (–3 dB) and rise time at 50 Ω	R&S®RTO2002 and R&S®RTO2004	600 MHz	583 ps
	R&S®RTO2012 and R&S®RTO2014	1 GHz	350 ps
	R&S®RTO2022 and R&S®RTO2024	2 GHz	175 ps
	R&S®RTO2032 and R&S®RTO2034	3 GHz	116 ps
	R&S®RTO2044	4 GHz	100 ps
	R&S®RTO2064	on 4 channels: 4 GHz, on 2 channels: 6 GHz	86 ps
All instruments can be extended to up to 6 GHz bandwidth.			
Impedance		50 Ω ± 1.5%, 1 MΩ ± 1% at 15 pF (meas.)	
Input sensitivity	max. bandwidth in all ranges	50 Ω: 1 mV/div to 1 V/div, 500 µV to 1 V (optional); 1 MΩ: 1 mV/div to 10 V/div, 500 µV to 10 V (optional)	
ENOB of A/D converter	full-scale sine wave, < –3 dB frequency bandwidth	> 7 bit (meas.)	

Acquisition system

Realtime sampling rate	R&S®RTO200x/201x/202x/203x	max. 10 Gsample/s on each channel
	R&S®RTO2044/2064	max. 10 Gsample/s on 4 channels, max. 20 Gsample/s on 2 channels
Acquisition memory	standard configuration, per channel/1 channel active	R&S®RTO 2-channel model: 50/100 Msample, R&S®RTO 4-channel model: 50/200 Msample
	max. upgrade (R&S®RTO-B110 option), per channel/1 channel active	R&S®RTO 2-channel model: 1/2 Gsample, R&S®RTO 4-channel model: 1/2 Gsample
Max. acquisition rate	continuous acquisition and display, 10 Gsample/s, 1 ksample	1 000 000 waveforms/s
	ultra-segmented mode	< 300 ns blind time
Decimation mode	any combination of decimation mode and wave-form arithmetics on up to 3 waveforms per channel	sample, peak detect, high resolution, root mean square
Waveform arithmetics		off, envelope, average
Interpolation modes		linear, sin(x)/x, sample & hold

Horizontal system

Timebase range		25 ps/div to 10 000 s/div
Accuracy	after delivery/calibration	±5 ppm
	R&S®RTO-B4 option	±0.02 ppm

Trigger system

Trigger types		edge, glitch, width, runt, window, timeout, interval, slew rate, data2clock, pattern, state, serial pattern, TV/video, serial bus trigger (optional), zone trigger (optional)
Zone trigger (optional)		logical combination of max. 8 polygons, intersect or not intersect source: measurement channels, spectrum, math functions
Sensitivity	definition of trigger hysteresis	automatic or manually adjustable from 0 div to 5 div

General data

Dimensions	W × H × D	427 mm × 249 mm × 204 mm (16.81 in × 9.8 in × 8.03 in)
Weight		9.6 kg (21.2 lb)
Screen		12.1" LC TFT capacitive color touchscreen, 1280 × 800 pixel (XGA)
Interfaces		1 Gbps LAN, type A: 2 × USB 3.1, 2 × USB 2.0, type B: 1 × USB 3.1, GPIB (optional), DVI and display port for external monitor, external trigger, trigger output

For data sheet, see PD 3607.2684.22 and www.rohde-schwarz.com

About Rohde & Schwarz

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

Sustainable product design

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

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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