R&S®RTE
Digital Oscilloscope
Scope of the art

HD 16bit
Time Domain Analysis
Frequency Analysis

ROHDE & SCHWARZ

R&S®RTE
Digital Oscilloscope
At a glance

Truly uncompromised in performance and impressively user-friendly – that's the R&S®RTE oscilloscope.

With bandwidths from 200 MHz to 2 GHz and top performance parameters, the R&S®RTE oscilloscopes set standards in their class:
❙ Highest sampling rate of 5 Gsample/s and deepest memory of 200 Msample for accurate acquisition of long signal sequences
❙ Acquisition rate of more than one million waveforms/s for finding signal faults quickly
❙ Extremely low-noise frontends and 16-bit vertical resolution in high definition mode for precise results
❙ Highly accurate digital trigger system with virtually no jitter for triggering on smallest signal details in realtime

Tools such as QuickMeas, fast mask tests, powerful spectrum analysis, history function and 77 automatic measurement functions are supplied as standard. Results are available fast thanks to hardware-assisted implementation of the measurement tools in the Rohde & Schwarz ASIC. The results are based on a large number of waveforms to provide statistically conclusive information.

R&S®RTE oscilloscopes support dedicated application solutions for complex analyses, including trigger and decoding options for serial protocols and a power analysis option. The mixed signal option provides 16 digital channels for analyzing logical components in embedded designs.

The powerful R&S®RTE is impressively easy to use thanks to its high-resolution 10.4" XGA touchscreen.

From embedded design development to power electronics analysis to general debugging, the R&S®RTE handles everyday T & M challenges quickly, accurately and easily. The R&S®RTE is a member of the Rohde & Schwarz family of scope-of-the-art oscilloscopes, offering time domain, logic, protocol and frequency analysis in a single box.

R&S®RTE Digital Oscilloscope
Benefits and key features

More confidence in measurement results
▮ Precise measurements due to very low inherent noise
▮ High dynamic range due to single-core A/D converter
▮ Full measurement bandwidth, even at 500 µV/div
▮ High time resolution combined with deep memory
▮ Finding rare signal faults quickly thanks to one million waveforms/s
▮ Accurate triggering with a digital trigger system
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More fun to use
▮ High-resolution touchscreen
▮ Fully customizable display
▮ Fast access to important tools
▮ Signal details at your fingertip
▮ Fast access to instrument setups
▮ Documentation at the push of a button
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More functions and faster results
▮ Automatic measurements: 77 functions available
▮ QuickMeas: key measurement results at the push of a button
▮ History function: looking back in time
▮ Mask test: settings in only seconds
▮ FFT function: the easy way to analyze the signal spectrum
▮ Search and navigation: focus on details
▮ Math functions: calculations made easy
▮ Reference waveforms: fast comparisons
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Extensible: more application power
▮ Logic analysis: fast and precise testing of embedded designs
▮ Serial protocols: easy triggering and decoding
▮ Power analysis: current and voltage in detail
▮ High definition: see more with 16-bit vertical resolution
▮ EMI debugging: testing during development
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Probes: excellent contacting
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Wide range of accessories
▷ page 27

Models							
Base unit	**Bandwidth**	**Channels**		**Sampling rate**	**Acquisition memory**	**Acquisition rate**	**Mixed signal analysis (MSO)**
		analog	digital				
R&S®RTE1022	200 MHz	2	16	5 Gsample/s	10 Msample per channel, max. 200 Msample	1 million waveforms/s	400 MHz, 5 Gsample/s, 100 Msample, > 200 000 waveforms/s
R&S®RTE1024		4					
R&S®RTE1032	350 MHz	2					
R&S®RTE1034		4					
R&S®RTE1052	500 MHz	2					
R&S®RTE1054		4					
R&S®RTE1102	1 GHz	2					
R&S®RTE1104		4					
R&S®RTE1152	1.5 GHz	2					
R&S®RTE1154		4					
R&S®RTE1202	2 GHz	2					
R&S®RTE1204		4					

More confidence in measurement results

- One million waveforms/s
- Very low inherent noise of 100 μV at 1 mV/div and 1 GHz
- Full measurement bandwidth up to 2 GHz, even at 500 μV/div
- High definition mode for up to 16-bit vertical resolution
- Memory up to 200 Msample
- Minimal trigger jitter < 1 ps
- Trigger hysteresis can be adjusted to signal quality

Precise measurements due to very low inherent noise

The R&S®RTE was developed with the objective of minimizing noise, from matched BNC-compatible inputs with 18 GHz bandwidth to high-precision A/D converters and extremely low-noise frontends. At 1 GHz bandwidth and 1 mV/div input sensitivity, the R&S®RTE oscilloscopes have a very low RMS noise of 100 μV, allowing precise measurements even at the smallest vertical resolutions.

High dynamic range due to single-core A/D converter

Rohde & Schwarz developed a monolithic A/D converter for the R&S®RTE oscilloscopes. The chip's single-core architecture minimizes signal distortion and achieves more than seven effective bits over the entire frequency range. This provides a solid foundation for precise analysis of slow signals using the high definition mode (R&S®RTE-K17 option). In this mode, digital postprocessing enables acquisition with up to 16-bit vertical resolution.

Full measurement bandwidth, even at 500 μV/div

Thanks to very low-noise frontends, the R&S®RTE oscilloscopes offer an input sensitivity down to 500 μV/div. This is unmatched on the market. Other oscilloscopes attain 1 mV/div sensitivity only by employing software-based zooming or by limiting the bandwidth. R&S®RTE oscilloscopes, however, show a signal's real sampling points over the full measurement bandwidth, even at 500 μV/div sensitivity. This high measurement accuracy is particularly beneficial when measuring small signal amplitudes.

Due to the high acquisition rate of one million waveforms per second, R&S®RTE oscilloscopes find rare signal faults very quickly.

High time resolution combined with deep memory

The R&S®RTE offers a combination of sampling rate and memory depth that is unique in this class. A sampling rate of 5 Gsample/s at a memory depth of 10 Msample is available per channel (can be optionally expanded to 50 Msample per channel). This ensures high time resolution and excellent signal fidelity, even for long acquisition sequences, e.g. when analyzing transients of switched-mode power supplies.

Finding rare signal faults quickly thanks to one million waveforms/s
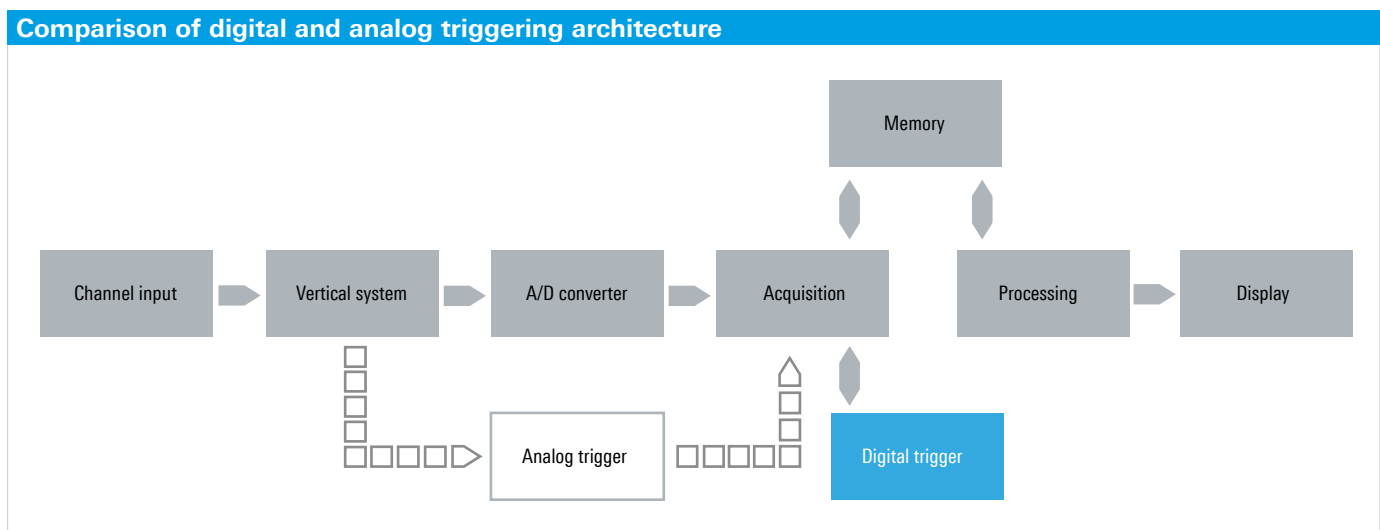
The acquisition cycle of a digital oscilloscope consists of two steps. First, the oscilloscope samples the signal and stores the samples. In a second step, it processes these samples and displays the waveform on the screen. During this period, the oscilloscope is "blind" to the signal. Signal faults that occur during this blind time remain hidden to the user. Fast detection of rare signal faults requires an oscilloscope with short blind time and a high acquisition rate. The core of R&S®RTE oscilloscopes is an ASIC that was especially designed for parallel processing. As a result, the R&S®RTE can acquire, analyze and display more than one million waveforms per second without a special acquisition mode. The high acquisition rate makes it possible to find signal faults faster and more reliably, effectively shortening debugging time.

Accurate triggering with a digital trigger system

The unique Rohde & Schwarz digital trigger system is also used in the R&S®RTE oscilloscopes. It consists of one common path for acquisition signal and trigger signal. The instruments determine if the trigger condition has been met by directly analyzing the digitized signal independently of the current sampling rate. This is why Rohde & Schwarz oscilloscopes have extremely low trigger jitter, very high trigger sensitivity and high measurement accuracy.

Precise fault detection with diverse trigger modes

R&S®RTE oscilloscopes have 14 different trigger modes for precisely isolating relevant signal events. In addition to simple trigger conditions such as edge, pulse width and runt, it also supports complex conditions such as logical combination of channels, a bit pattern trigger and a video trigger (NTSC, PAL, PAL-M, SECAM, EDTV, HDTV). A wide range of serial protocol trigger options are also available.

Comparison of digital and analog triggering architecture

Memory

Channel input → Vertical system → A/D converter → Acquisition → Processing → Display

Analog trigger

Digital trigger

More fun to use

- **High-resolution 10.4" XGA touchscreen**
- **Optimized for touchscreen operation**
- **Drag & drop signals and measurement results flexibly on the screen**
- **Results are only two clicks away thanks to powerful toolbar**
- **Convenient tools such as QuickMeas, fingertip zoom and undo/redo**

High-resolution touchscreen

The high-resolution 10.4" XGA touchscreen is one of the highlights of the R&S®RTE. The oscilloscope is optimized for touchscreen operation:
- Drag & drop signals and measurement results where you want on the screen
- Define zoom and measurement ranges with your finger
- Scale and position dialog boxes on the screen as required
- Activate and configure measurements, histograms and FFT analyses by touch
- Adjust cursors, offsets and the trigger level by touching the lines
- Create masks in only seconds

Fully customizable display

When working with multiple signals, the screen becomes easily cluttered. R&S®RTE oscilloscopes are different. They display waveforms, buses and measurement results in realtime in the form of signal icons on the edge of the screen. These miniature views can be dragged and dropped onto the main screen. When multiple waveforms need to be displayed simultaneously, the Rohde & Schwarz SmartGrid function helps the user to keep the screen well organized by flexibly dividing it into several diagrams or tabs. Individual waveforms can be displayed in a clear, well-structured manner. The A/D converter range is optimally used for highest accuracy.

Fast access to important tools

A toolbar at the upper edge of the screen provides access to frequently used functions such as measurements, zoom, FFT and the recycle bin. The toolbar can be customized to contain the user's favorite tools. Related tools are clearly organized in groups. There are just two steps involved in using a function: selecting the tool and applying it to the waveform.

Semi-transparent dialog boxes with signal flow diagrams

Signal flow diagrams in the dialog boxes visualize the signal processing, making it easier to configure measurements. Crosslinks take you directly to logically related settings. Forward/back buttons help to navigate quickly between dialog boxes. Semi-transparent dialog boxes are an elegant way of keeping everything in view. The measurement diagrams always maintain their original size. The level of transparency can be set via the intensity button. Users can scale the dialog boxes and position them anywhere on the screen.

R&S®RTE toolbar	
	undo
	redo
	context-sensitive help
	device setups
	activate/deactivate signalbar
	selection tool
	zoom
	cursor
	mask test
	histogram
	automatic measurements
	QuickMeas
	FFT analysis
	search
	recycle bin
	trigger level to 50%

Signal details at your fingertip

Zoom is a standard digital oscilloscope tool for analyzing the details of a captured signal. R&S®RTE oscilloscopes also offer other useful features:

I Easy definition of zoom ranges with a finger
I Hardware zoom: automatic adjustment of settings for vertical and horizontal scaling to display a selected range
I Fingertip zoom: open a horizontal zoom range in the signal (view signal characteristics by using a finger or the mouse to drag the zoom window along the signal; click the keep function to open the normal zoom)

Fast access to instrument setups

Digital oscilloscopes allow users to save instrument settings and recall them at any time. R&S®RTE oscilloscopes make it very easy to select the right setup: just click the instrument setup icon on the toolbar to open a dialog box with all of the saved configurations. Each configuration has a screenshot that shows the screen at the time at which it was saved. The user can take advantage of these screenshots to quickly scroll through the possible choices.

Remote control access

R&S®RTE oscilloscopes can also be remote controlled using a PC or other device via remote desktop or VNC. The user sees the same user interface and uses the same functions as on the oscilloscope itself.

Documentation at the push of a button

R&S®RTE oscilloscopes help you document measurements:

I Print or save screenshots of the waveforms and results
I Easily read signal characteristics thanks to clear grid annotations
I Mark and label anomalies directly in the diagram
I Save waveforms, histograms and measurement results in different formats (e.g. binary or csv file) for in-depth data analysis using PC software

Selection of languages

The R&S®RTE oscilloscopes' user interface supports multiple languages. The language can be changed in just a few seconds – while the instrument is running. The R&S®RTE is a true international instrument.
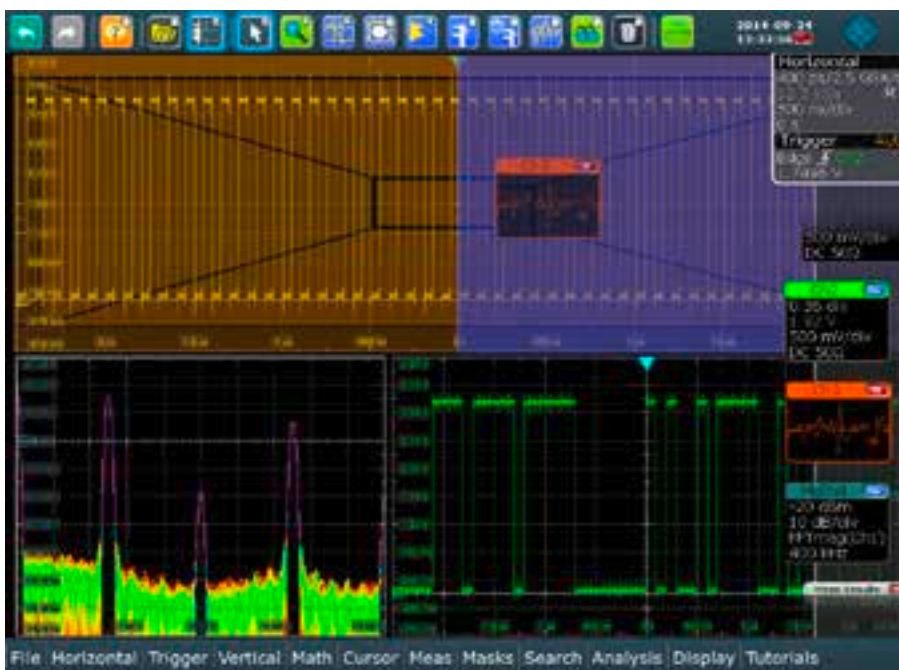
The user can drag & drop waveforms and result windows on the screen. The Rohde & Schwarz SmartGrid function helps users arrange multiple diagrams or tabs on the screen. The size of individual diagrams can be further optimized by dragging the edges of the windows.

Overview of the R&S®RTE oscilloscope

Control elements

Tools that have a similar function are grouped together

Toolbar for fast access to frequently used functions

Preset to return to default or user-defined settings

Clear grid annotation for easy reading of measured values

Print or save results at the push of a button

Knob for setting the level of transparency of the dialog boxes or the intensity of the waveforms

Menu bar on the bottom edge of the screen – even visible during touch operation

USB interfaces for mouse, keyboard, data exchange, documentation or firmware updates

Fingertip zoom: move the finger along the signal to get a quick overview of signal details
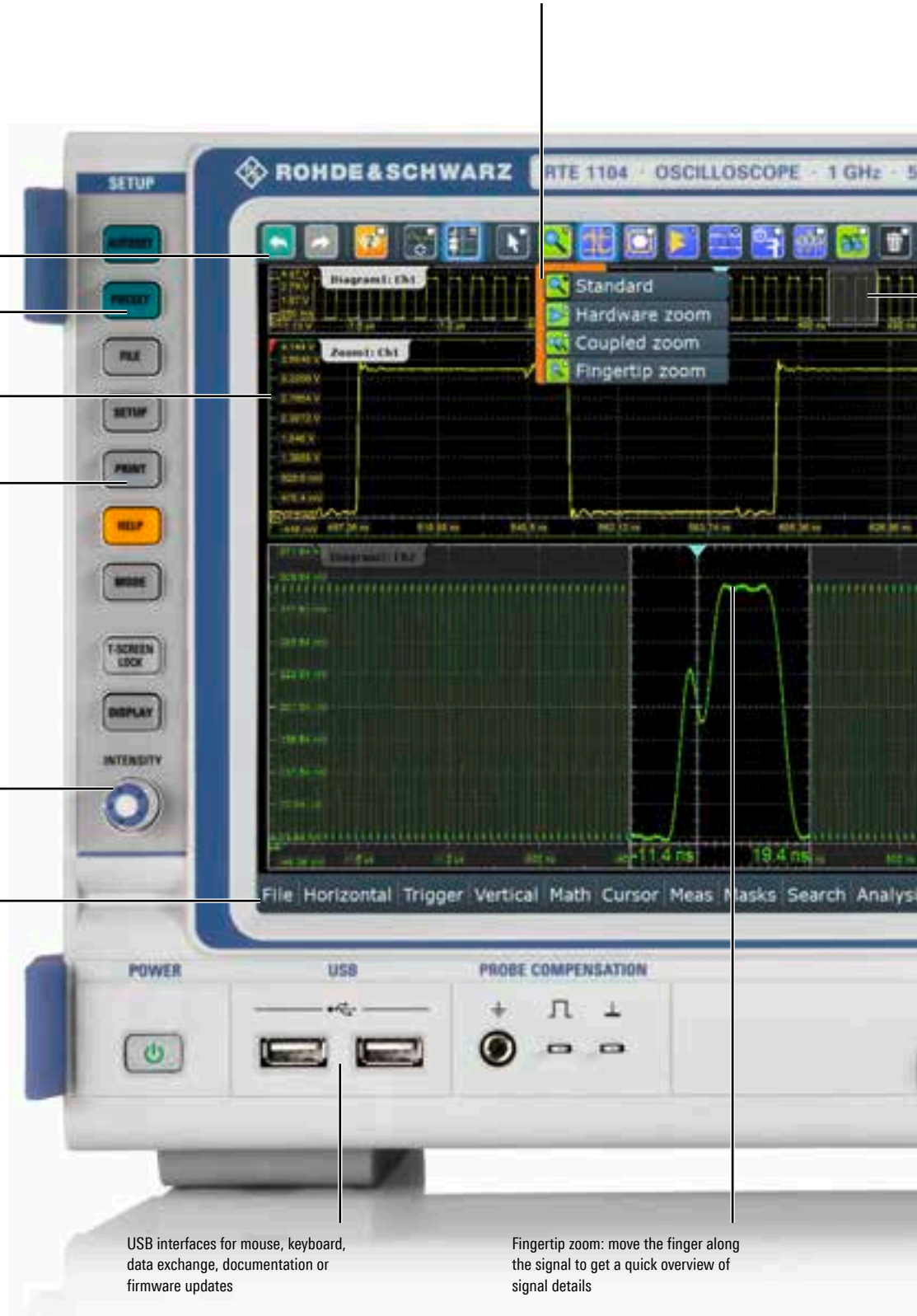
Standard zoom for horizontal and vertical zooming

GSa/s

2011-01-24
09:12:52

Horizontal
200 ps / 5 GSa/s
20 kSa   RT
400 ns/div
0 s

Trigger
Auto
Edge ⌐ Ch1
1.905 V

0 div
0 V
50 mV/div
DC 1MΩ

Ch1

Ch3

Math4
-19.5 dBm
9.9 dB/div
FFT mv²/Ch...

s Display Tutorials

HORIZONTAL

RESOLUTION 🔒 RECORD LENGTH

RES
REC LEN

POSITION 🔒 REF POINT

SCALE

HORI-
ZONTAL

ACQUI-
SITION

TRIGGER

LEVELS 🔒

TRIGGER

RUN
CONT

SOURCE   SLOPE   MODE   RUN Nx
SINGLE

ANALYSIS

CURSOR   MEAS   MASKS   SEARCH

ZOOM   PROTOCOL   LOGIC   HISTORY

VERTICAL

POSITION 🔒 OFFSET

CH 1

CH 2

SCALE

CH 3

CH 4

SIGNAL
OFF   REF   MATH

NAVIGATION

🔒

ESC   UNDO

ENTER   REDO

FIELD   FIELD

Direct access to frequently required analysis functions

Signal icons show important settings or a miniature view of the real signal

Multilevel undo/redo function to easily restore previous settings

Color-coded controls indicate the currently selected channel

CH 1   CH 2   CH 3   CH 4   EXT TRIG IN

1 MΩ
≤ 150 V RMS
≤ 200 V pk

50 Ω
≤ 5 V RMS

1 MΩ
≤ 150 V RMS
≤ 200 V pk

50 Ω
≤ 5 V RMS

1 MΩ
≤ 30 V RMS
≤ 42 V pk

50 Ω
≤ 5 V RMS

Tutorials to learn how to operate the oscilloscope

Probe interface for automatic probe detection

More functions and faster results

Even in its basic configuration, the R&S®RTE offers a decisive edge when performing everyday measurement tasks:
ı **77 automatic measurement functions including statistical evaluation**
ı **QuickMeas for eight results at the push of a button**
ı **History function for looking back in time**
ı **Powerful FFT-based spectrum analysis**
ı **Mask test for identifying signal anomalies**

High measurement speed: even for complex analysis functions

Many of the measurement functions in the R&S®RTE are hardware-implemented:
ı Histogram
ı Spectrum display
ı Mask test
ı Cursor measurements
ı Select automatic measurement functions
ı Select mathematical operations

As a result, the acquisition and processing rate remains high even when analysis functions are active. The oscilloscope enables smooth operation, and even complex test sequences are available quickly, making statistically meaningful analysis possible.

Automatic measurements: 77 functions available

A key feature of digital oscilloscopes is automatic measurements. They make it possible to rapidly characterize a signal of interest. This can be simple measurement of signal characteristics such as frequency and rise and fall times or complex analysis such as determining the switching loss of a switched-mode power supply. The R&S®RTE displays the results of up to eight measurements simultaneously. Automatic measurements are divided into four different categories: amplitude and time measurements, histogram measurements, eye diagram measurements and spectral measurements. A total of 77 measurement functions are available. The results are presented in a table, with optional statistical evaluation. The gating function can be used to limit the measurements to a specific signal range if required. The user can easily define this range on the screen using a finger or the mouse, or link it to existing cursor or zoom ranges.

QuickMeas: key measurement results at the push of a button

The QuickMeas function offered by the R&S®RTE oscilloscopes is unique in this class. The results of multiple measurement functions for the currently active signal are simultaneously displayed. The set of functions can be individually defined with up to eight measurements and saved for later analysis. The QuickMeas function is quickly and easily accessed via the toolbar.

In the R&S®RTE oscilloscopes, up to eight automatic measurements can be configured and activated simultaneously.

History function: looking back in time

The R&S®RTE history function provides access to previously acquired waveforms – for analog or digital channels, reference or math signals and serial buses. Users can immediately analyze the measurement data stored in memory. They can scroll through the individual acquisitions with the history player or use the persistence mode to display them superimposed. One timestamp per waveform clearly identifies when events took place. Various analysis tools such as automatic measurements, FFT, mask tests and a search function are available for analyzing past acquisitions.

The history function can also be used in ultra-segmented mode. The oscilloscope captures a predefined number of acquisitions without interruption. The waveforms are displayed on the screen only after the last acquisition has been captured. The history player can be used to analyze the individual acquisitions. This mode has the advantage of even shorter blind time (< 300 ns) between the individual acquisitions.

R&S®RTE masks consist of up to eight segments. Hardware implementation keeps the acquisition rate high, and mask violations are quickly found.
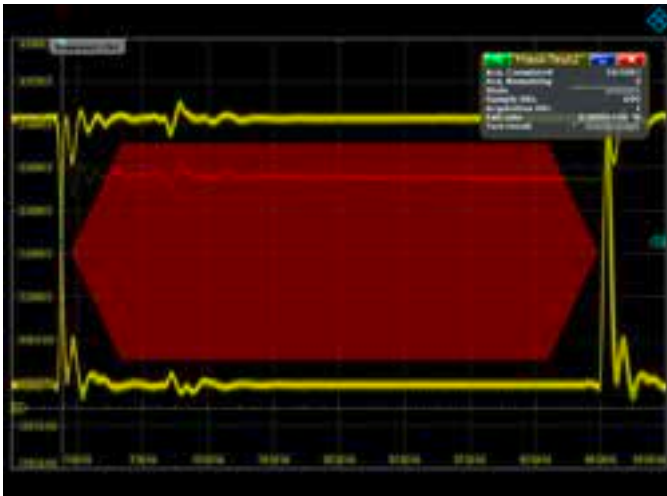
The R&S®RTE FFT function offers accuracy, speed, functionality and ease of use.
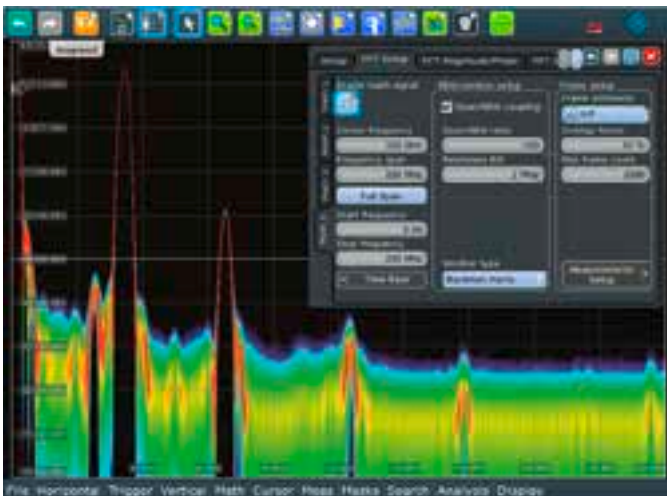
Mask test: settings in only seconds

Mask tests quickly reveal if a signal lies within defined tolerance limits. This makes it easy to identify signal anomalies and unexpected results. Defining masks is easy and flexible with the R&S®RTE. With just a few keystrokes, the user can generate a mask from a reference signal or define masks consisting of up to eight segments. To get started quickly, the mask segments can be generated on the screen using the mouse or a finger. The positions of the mask points can be optimized later in the mask test dialog box.

FFT function: the easy way to analyze the signal spectrum

Thanks to the hardware implementation, the FFT in the R&S®RTE is very fast. It conveys the impression of a live spectrum. Using the persistence mode, rapid signal changes, signal interferers and weak superimposed signals can easily be made visible. The low-noise frontend and the A/D converter's high effective number of bits (> 7) provide an outstanding dynamic range. The ability to overlap FFT frames enables the R&S®RTE to detect intermittent signals such as pulsed interferers.

Like in spectrum analyzers, FFT operation is based on entering the center frequency, span and resolution bandwidth. The grid annotation is especially user-friendly. Measurements that were previously available only with spectrum analyzers, such as total harmonic distortion (THD) and power spectrum density (PSD), are now possible with an oscilloscope. The ability to perform a mask test in the spectrum is unique. This is useful for finding rare events such as sporadic EMI interferers and correlating them to the time domain signal.

Search and navigation: focus on details

The search and navigation function helps users to maintain an overview when dealing with long acquisition times. Available search criteria include simple signal characteristics (such as edge or pulse width), complex bit sequences and protocol content. Users can search on analog or digital channels, on reference or math waveforms and on serial buses. All events are summarized in a table for easy navigation between different events. Events can be zoomed for detailed analysis.

Math functions: calculations made easy

R&S®RTE oscilloscopes provide four math waveforms that make it easy to solve particularly challenging measurement problems. For example, with just a few keystrokes users can square the voltage waveform and divide it by the resistance in order to display power over time. In addition to basic math functions, advanced functions such as derivatives, logic operations and filters are available. Math waveforms as well as measurement results can be used as arguments for other math functions.

Reference waveforms: fast comparisons

When analyzing faults, it is useful to compare the waveforms with a reference. R&S®RTE oscilloscopes provide four reference waveforms for this purpose. The waveforms are easy to generate using a dedicated key. They can be scaled as well as stored and reloaded internally or externally.
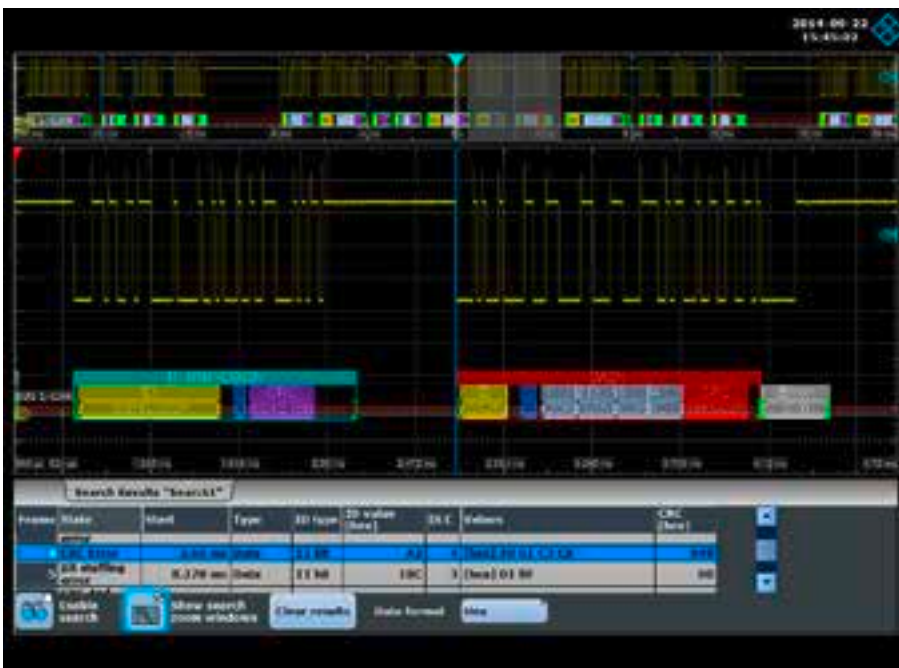
Identifying errors within a serial protocol with the R&S®RTE search function. All events are summarized in a table for easy navigation between different events. Selected events can be zoomed for detailed analysis.

Extensible: more application power

ı **Logic analysis, memory upgrades and hardware/
  software options can be installed on site**
ı **Regular free firmware updates for enhanced
  functionality**
ı **Bandwidth upgrades up to 2 GHz**

On-site installation of hardware options

R&S®RTE oscilloscopes can be quickly adapted to new requirements. The unique plug & play concept makes upgrading and retrofitting of options easy. All hardware options, such as the digital channels or the GPIB interface, can be inserted into the slot on the rear panel without opening the oscilloscope. This approach has significant advantages:
ı Simple and fast setup
ı Instrument immediately ready for continued use
ı No need for alignment or recalibration after installation of options

Software applications on demand

The base unit features all functions of a state-of-the-art oscilloscope for general applications. For special requirements, the base unit can be extended with software options at any time:
ı Triggering and decoding of serial protocols
ı Power analysis on switched-mode power supplies
ı High definition mode with up to 16-bit vertical resolution
ı Memory upgrades to up to 200 Msample for long acquisition times

Always up-to-date

Rohde & Schwarz continually offers regular firmware updates to add new functions to the R&S®RTE oscilloscopes. The oscilloscope's firmware can be updated using a USB storage device or the LAN port. Free updates can be simply downloaded from the Internet at www.rohde-schwarz.com.

Hard disk replacement without any tools

The R&S®RTE hard disk can be exchanged without any tools. Confidential data can be protected in this manner. Depending on the particular application, either a conventional hard disk drive (HDD) or a solid state disk (SSD) can be chosen.

Higher bandwidth: upgrade including calibration

Options are available for upgrading the bandwidth of all R&S®RTE oscilloscopes. An R&S®RTE1024 oscilloscope with 200 MHz bandwidth, for example, can be upgraded to 2 GHz. The upgrade option includes a complete check of the instrument and calibration at a Rohde & Schwarz service center.

Logic analysis: fast and precise testing of embedded designs

ı **Every R&S®RTE can be turned into a mixed signal oscilloscope**
ı **16 digital channels**
ı **400 MHz, 5 Gsample/s sampling rate and 100 Msample memory**
ı **More than 200 000 waveforms/s**
ı **Wide range of trigger capabilities with 200 ps resolution**
ı **Many analysis tools such as history function and bus display as analog waveform**

More signal details thanks to high time resolution over the entire memory depth

With a sampling rate of 5 Gsample/s, the R&S®RTE-B1 option provides a maximum time resolution of 200 ps for all digital channels. This sampling rate is available over the entire memory depth of 100 Msample per channel. As a result, the MSO option is capable of detecting critical events such as narrow or widely separated glitches.

High acquisition and analysis rate for fast fault finding

Signal processing of the digital waveforms is done in hardware. This extends from acquisition and triggering to analysis functions such as cursor functions and measurements, and even includes the visualization of the results. This enables an acquisition and analysis rate of more than 200 000 waveforms per second, ensuring that rare events are detected quickly and reliably.

Straightforward display of digital signals

The R&S®RTE-B1 option supports 16 digital channels and simultaneous decoding of up to 4 parallel buses. Each bus is represented by an icon on the edge of the screen. The icons can be dragged and dropped onto the screen. The SmartGrid function is then used to place the corresponding signals in a suitable diagram. To provide a quick overview of the bus activity, the icon shows the current status of all activated logic channels (high, low, toggle) regardless of the other oscilloscope settings.

The user configures the parallel buses according to the actual bus topology and defines which digital channels are part of the bus, where the binarization decision threshold is placed and whether the bus is clocked or unclocked. The decoded buses are displayed in a bus format or as an analog waveform. For clocked buses, the decoded contents can also be displayed in a table.
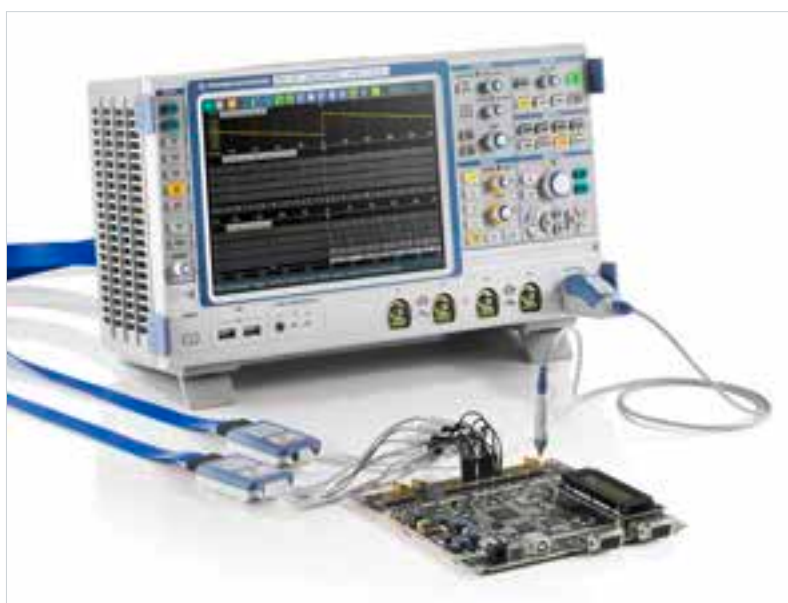
Upgrade to mixed signal oscilloscope using R&S®RTE-B1. The logic button provides direct access to the digital channels.

Processing and analysis functions

For efficient analysis of measurement waveforms, the MSO option offers a wide selection of automatic time measurements, including statistical evaluation. Automatic measurements can be performed on all digital channels and their logical combinations.

In addition to time measurements, the cursor also shows the decoded bus value at the cursor position. The history function enables users to access and analyze specific measurement waveforms in the acquisition memory.

Analysis of serial protocols with digital channels

The protocols of serial interfaces such as I²C, SPI and CAN can also be triggered and decoded using the digital channels of the R&S®RTE-B1 option and the appropriate serial protocol options.

The signal activity of the digital channels is displayed in the signal icon independently of the oscilloscope settings.
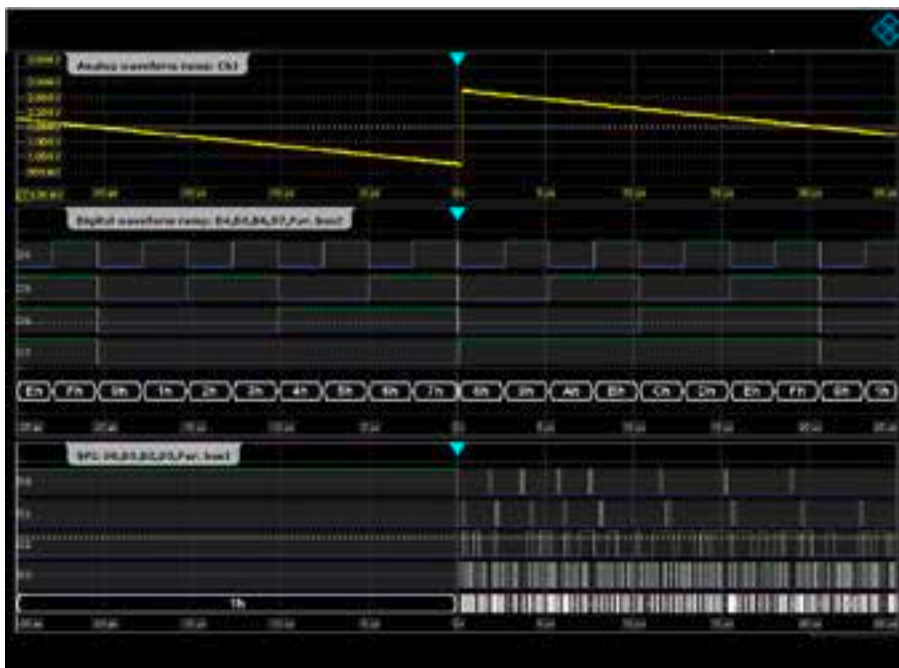
Ramp signal of a 4-bit ADC with analog and digital channels, and an SPI bus signal with digital channels.

MSO option	Digital channels	Input impedance	Max. signal frequency	Max. sampling rate	Max. acquisition memory
R&S®RTE-B1	16 channels (2 logic probes)	100 kΩ || 4 pF	400 MHz	5 Gsample/s per channel	100 Msample per channel

Serial protocols: easy triggering and decoding

ı Hardware-assisted triggering and decoding
ı Color-coded telegram data display in honeycomb diagram or in a table
ı Support of standard CAN-dbc and FIBEX formats
ı Triggering on protocol content (addresses, data) and error states
ı Simultaneous decoding of up to four serial buses
ı Comprehensive search functions for easy analysis of long signal sequences

Tools for analyzing serial buses

The software options for analyzing serial interfaces allow users to configure the buses according to the actual protocol topology. Protocol-specific definition of the trigger conditions is important for tracking down protocol errors. The R&S®RTE enables triggering on specific protocol content, e.g. addresses or data, as well as on protocol errors.

Clear presentation of protocol data

When displaying decoded data, the individual protocol areas within the logical signals are color-coded. Address and data content can be displayed in hex, bin or ASCII format. Label lists can be loaded to simplify the interpretation process. They represent IDs and addresses in the data stream with symbolic aliases such as "Engine Speed" instead of a numerical format. The decoded data is provided in a table as well as in the usual honeycomb diagram.

R&S®RTE oscilloscopes support simultaneous decoding of up to four serial buses. Each bus is represented by an icon on the edge of the screen. The icons can be dragged and dropped onto the screen. The SmartGrid function is then used to place the corresponding signals in a suitable diagram.

The user conveniently configures the serial buses according to the actual protocol topology.
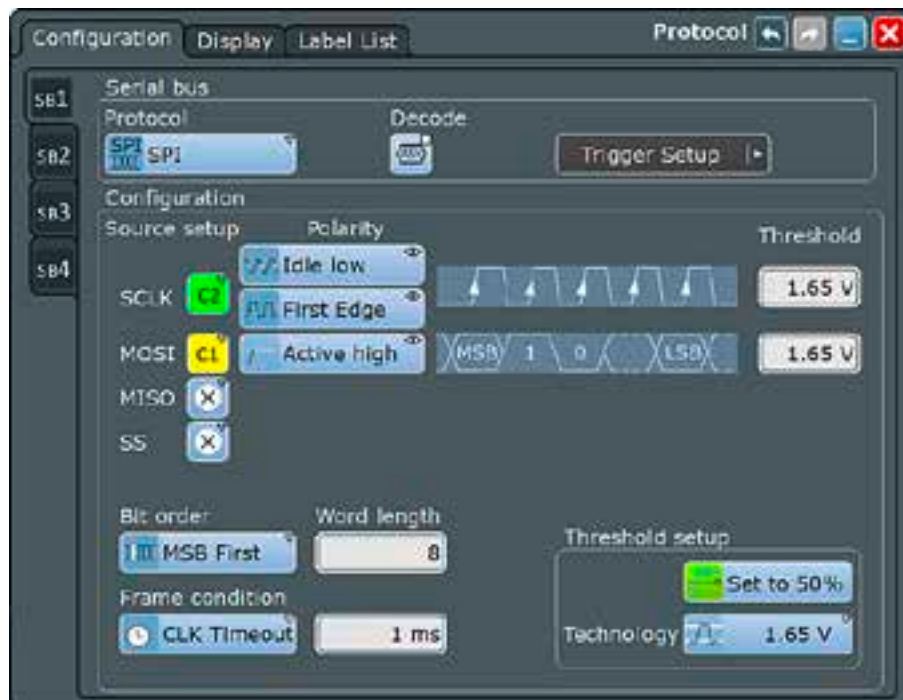
High acquisition rate for finding errors quickly

Data errors at serial interfaces are frequently the result of sporadic signal faults caused by timing of logic components at the limits. High acquisition rates are a key prerequisite for detecting such faults quickly. Rohde & Schwarz oscilloscopes are ideal for these tasks because they decode protocol-specific trigger results, allowing fast and reliable debugging.

Intuitive search and navigation

Comprehensive search functions simplify analysis of long signal sequences. Specific message types, content and errors can be quickly isolated. All detected events are shown in a table with timestamps. The user can then examine the individual events in a zoom window with the proper timing correlation and navigate between the events.

Options for triggering and decoding		
Application	**Serial standard**	**Option**
Embedded	I²C/SPI	R&S®RTE-K1
	UART/RS-232/422/485	R&S®RTE-K2
	Ethernet	R&S®RTE-K8
	MDIO	R&S®RTE-K55
Automotive, industrial	CAN/LIN	R&S®RTE-K3
Automotive	CAN-FD	R&S®RTE-K9
	FlexRay™	R&S®RTE-K4
Audio	I²S/LJ/RJ/TDM	R&S®RTE-K5
Aerospace and defense	MIL-STD-1553	R&S®RTE-K6
	ARINC 429	R&S®RTE-K7

The individual areas of the decoded protocol frame are color-coded to provide a clear overview.

Power analysis: current and voltage in detail

After a measurement function is selected, a measurement wizard guides the user through the test setup. Detailed illustrations simplify the correct contacting of voltage and current probes. The oscilloscope then configures itself automatically based on the selected measurement function and delivers quick results. The configuration can be modified or the oscilloscope can be fully manually configured in order to document specific signal details.

❙ **Analysis of input and output as well as the transfer function of switched-mode power supplies**
❙ **Measurement wizard for fast results**
❙ **Documentation of results at the push of a button**
❙ **Harmonic current analysis in line with conventional EN, MIL and RTCA standards**

Special measurement functions and measurement wizard for fast results

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

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

Measurement wizard for fast and easy testing.
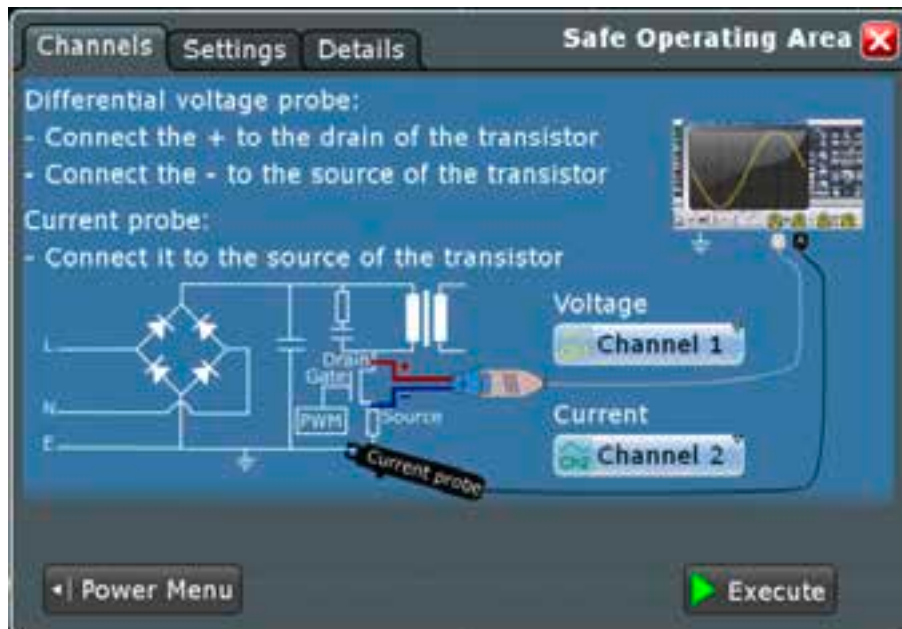
Standards for limiting the harmonic current

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

Simple and clear documentation of measurement results

Each result can be added to the test report simply by pressing a button. The test report documents the setup and configuration. Users can flexibly define the level of detail for the report and customize the layout, for example, by adding a company logo. The available output formats are PDF and RTF.

Extensive accessories for contacting and delay compensation

A wide range of passive and active probes permits measurements in common voltage and current ranges. The R&S®RT-ZF20 deskew fixture for power measurements can be used to time-synchronize the measurement signals from the current and voltage probes. The R&S®RTE-K31 automatically deskews the current probe and voltage probe signals at the push of a button.

Extensive result documentation.

Harmonics

Measurement setup:

Settings:

Standard:	EN61000-3-2 Class D
Frequency:	50Hz
Autoscale signal:	Yes

Vertical setup:

Probes:	Source	Name	Unit	Gain/Att.		
	Voltage Channel 1	None	Volt	10V/V		
	Current Channel 3	RT-ZC20	Ampere	10A/V		

Channels:	Source	Scale	Offset	Coupling	Deskew	Bandwidth
	Voltage Channel 1	82V/div	0V	1MOhm DC	0s	Full
	Current Channel 3	130mA/div	0A	1MOhm DC	-8.8ns	Full

Trigger setup:

Type	Source	Level	Slope
Edge	Channel 3	-1300mV	Positive

Horizontal setup:

Time scale	Record length	Resolution	Reference	ADC rate	Acq. time	Sample rate
400ms/div	5MSa	800ns	50%	10GHz	4s	1.25MSa/s

Measured signals:

Results:

Harmonic order n	Frequency	Harmonic current	Maximum permissible harmonic current	
2	100.3Hz	603µA	166.85mA	Pass
3	150.4Hz	112.97mA	88.83mA	Fail
4	200.5Hz	1393µA	166.85mA	Pass
5	250.6Hz	62.36mA	49.64mA	Fail
6	300.8Hz	1025µA	166.85mA	Pass
7	350.90Hz	9200µA	26.13mA	Pass
8	401Hz	932µA	166.85mA	Pass

High definition: see more with 16-bit vertical resolution

ı **Every R&S®RTE can be turned into a high definition oscilloscope**
ı **16-bit vertical resolution**
ı **Sharper waveforms for more signal details and even more precise analysis results**
ı **Realtime triggering on smallest signal details**

Increased resolution for precise measurement of small signal amplitudes

High definition describes the capability of R&S®RTE oscilloscopes to work with applications for which a high vertical resolution is essential. This is especially the case when low-voltage components on a signal that also exhibits high-voltage components need to be analyzed in detail. One example is the characterization of switched-mode power supplies. The voltages across the switching device must be determined during the off and on times within the same acquisition. Because the voltage variations can be several hundred volts, a high resolution of more than 8 bit is essential for precise measurement of small voltage components. Another example is amplitude modulated signals with low modulation index as can be found in radar applications.

16-bit vertical resolution available

The R&S®RTE-K17 software option increases the vertical resolution of the R&S®RTE oscilloscopes to up to 16 bit – a 256-fold improvement over 8-bit resolution. To achieve this higher resolution, the signal is lowpass filtered after the A/D converter. The filter reduces the noise, thereby increasing the signal-to-noise ratio. Users can adjust the bandwidth of the lowpass filter from 10 kHz to 500 MHz as needed to match the characteristics of the applied signal. The lower the filter bandwidth, the higher the resolution.

The increase in resolution leads to sharper waveforms, showing signal details that would otherwise be masked by noise. At an input sensitivity of 500 µV/div, these signals can be analyzed in detail. Thanks to the low-noise frontend and highly accurate single-core A/D converter, R&S®RTE oscilloscopes have an excellent dynamic range and measurement accuracy. Switching on high definition mode allows users to benefit from even more precise measurement results.

The high definition mode offers crucial advantages over high resolution decimation (also supported by the R&S®RTE oscilloscopes). First, the user knows exactly what signal bandwidth is available due to explicit lowpass filtering. Second, there are no unexpected aliasing effects. Since the high definition mode is not based on decimation, the increase in resolution is not accompanied by a reduction in the sampling rate. When the high definition mode is switched on, the full sampling rate can be used, ensuring the best possible time resolution. Moreover, the high definition mode permits users to trigger on the signals with increased resolution, whereas high resolution decimation only takes place after the trigger unit.

Resolution as a function of the filter bandwidth

Filter	Resolution
Inactive	8 bit
500 MHz	10 bit
300 MHz	11 bit
200 MHz	12 bit
100 MHz	13 bit
50 MHz	14 bit
30 MHz to 10 kHz	16 bit
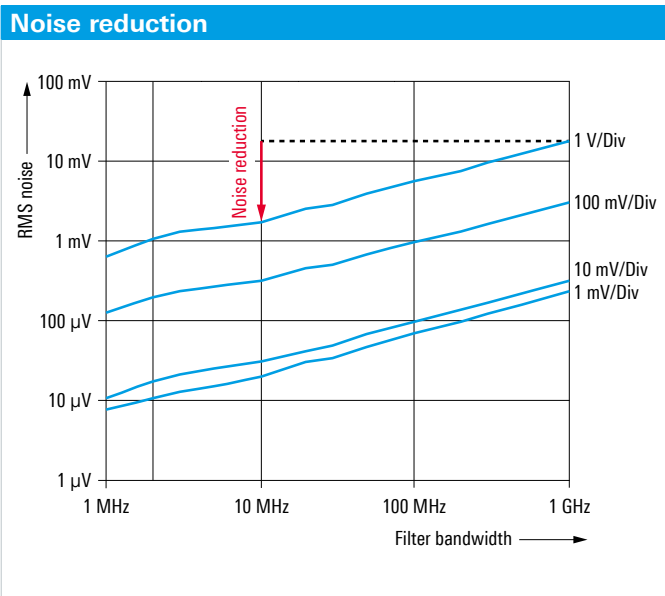
Noise reduction

Noise of the R&S®RTE110x oscilloscope (1 GHz model) as a function of the set filter bandwidth of the R&S®RTE-K17 high definition option. Reducing the noise increases the signal-to-noise ratio, which improves resolution.
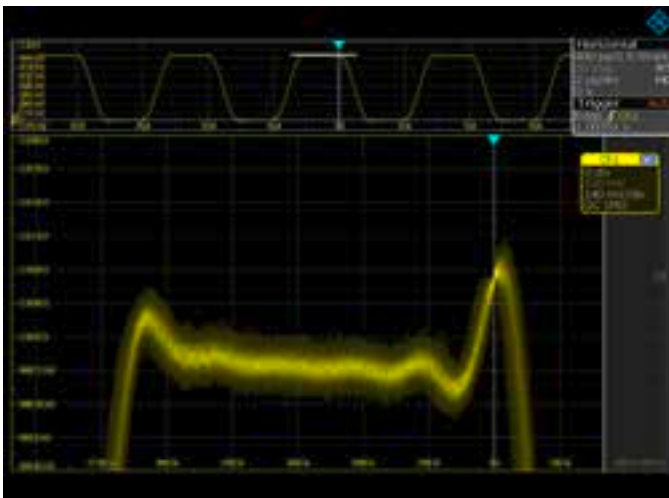
Realtime triggering on smallest signal details

The increased resolution in high definition mode makes it possible to reveal even the smallest signal details. The next step in the debugging process is to trigger on these details for in-depth analysis. Whether this is possible depends greatly on the capabilities of the trigger system. Is it sensitive enough to benefit from the high-resolution signal? The unique Rohde & Schwarz digital trigger system offers the required sensitivity. Each of the up to 16-bit samples is checked against the trigger condition and can initiate a trigger. This means that R&S®RTE oscilloscopes are able to trigger on even the smallest signal amplitudes and isolate relevant signal events.

High acquisition rate and full functionality for fast measurement results

Switching on the high definition mode does not compromise measurement speed or functions. Since the lowpass filtering, which improves resolution and noise suppression, is implemented in realtime in the oscilloscope's ASIC, the acquisition and processing rates remain high. The oscilloscope enables smooth operation and measurement results are available quickly.

All analysis tools, such as automatic measurements, FFT and the history mode, can also be used in high definition mode.

The high sensitivity of the Rohde & Schwarz digital trigger makes it possible to trigger on signal overshoots of less than 9 mV, as can be seen in the example below. At a vertical scale of 140 mV/div, this corresponds to only a fraction of one display division.

Zoomed-in peak of a sine wave: the high definition mode is not activated. Only the quantization levels can be seen in the zoom window.
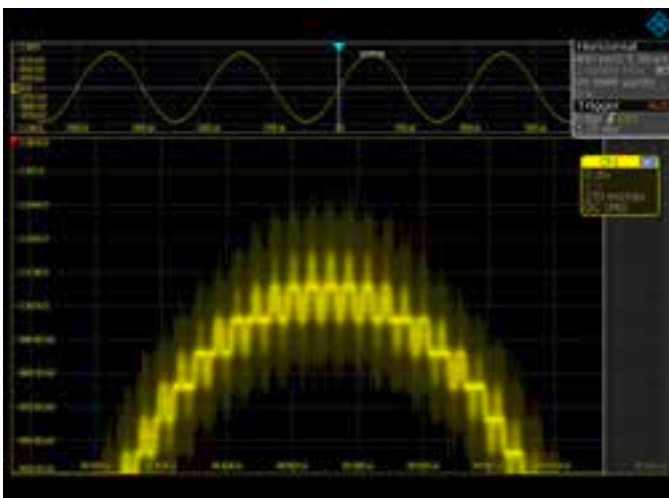
When the high definition mode is switched on, the zoom window shows that another very low-amplitude sine wave is superimposed on the signal.

EMI debugging: testing during development

❙ **High input sensitivity and dynamic range for reliable detection of unwanted emissions**
❙ **Powerful FFT function with information on the frequency of occurrence of spectral components**
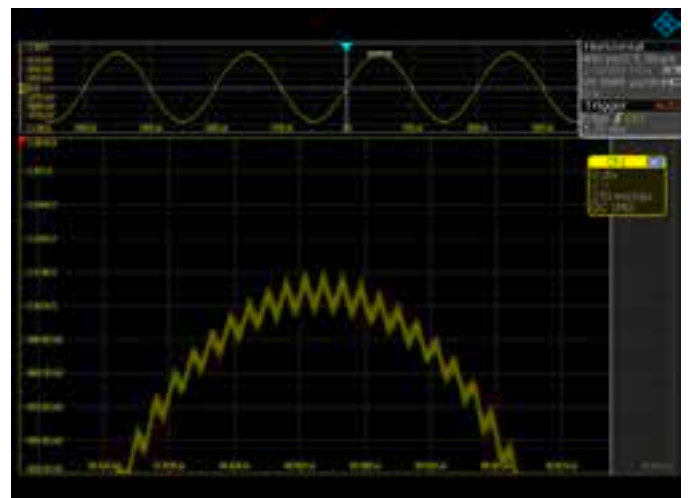❙ **Gated FFT for easy correlation between frequency and time**
❙ **Mask test in the frequency range for targeted analysis of sporadic emissions**

Together with the R&S®HZ-15 near-field probe set, R&S®RTE oscilloscopes are ideal for EMI tests during development.

EMI tests during development
When debugging EMI problems in electronic circuits, development engineers face the challenging problem of identifying and eliminating the sources of unwanted emissions quickly and accurately. One of the most important test instruments during circuit development is the oscilloscope. Many problems can be eliminated during development by using oscilloscopes for EMI debugging.

High dynamic range and sensitivity
The R&S®RTE oscilloscope is a powerful tool for EMI debugging. Its high dynamic range and input sensitivity of 500 µV/div at full measurement bandwidth make it possible to detect even weak emissions. The powerful FFT implementation is ideal for the required analysis in the frequency domain thanks to its easy operation, high acquisition rate and functions such as color coding of the spectral display according to the frequency of occurrence. In combination with a near-field probe, EMI problems can be quickly located and analyzed.

Visualizing sporadic emissions
One special feature is overlap FFT. The oscilloscope splits the captured time domain signal into overlapping segments and calculates an individual spectrum for each segment. These spectra are then color-coded according to their frequency of occurrence and combined to a complete spectrum. The complete spectrum provides a good overview of the type and frequency of occurrence of EMI emissions. Even sporadic signals are visible.

Another highlight is the flexible definition of masks in the frequency domain using the mask function. The stop-on-violation condition stops the acquisition exactly at the signal that violated the frequency mask. This solves the most challenging EMI problem – detecting and analyzing sporadic emissions.

Correlation between frequency and time

The gated FFT function of the R&S®RTE oscilloscopes makes it possible to restrict FFT analysis to a user-defined region of the acquired time domain signal. Users can move this time window across the entire signal to determine which segments of the time domain signal correlate to which events in the spectrum. This makes it possible, for example, to correlate unwanted emissions from switched-mode power supplies with overshoots from the switching transistor.

Overlap FFT processing

Conventional, nonoverlapping FFT processing without pulse peaks that cause broadband interference

The R&S®RTE overlaps the FFT, captures small pulse peaks and uses color-coding to display them
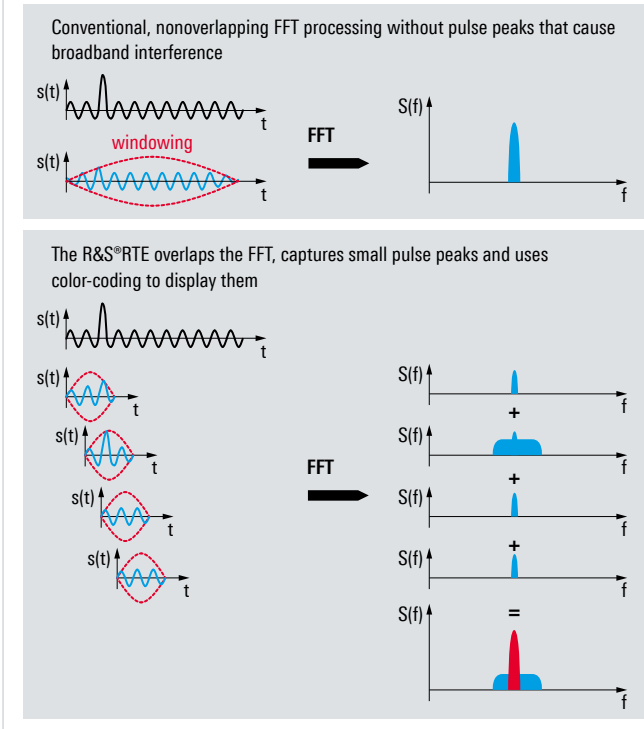
Gated FFT displays the spectrum for defined time segments of the acquired signal. The two time segments that have undergone FFT processing are highlighted in gray (the resulting spectra are displayed on the left and right below). Gated FFT makes it possible to correlate intermittent EMI emissions to the time domain signal. The red box shows the part of the spectrum caused by an unwanted emission, and the green boxes show a part of the spectrum that is constant and therefore present in both spectra.
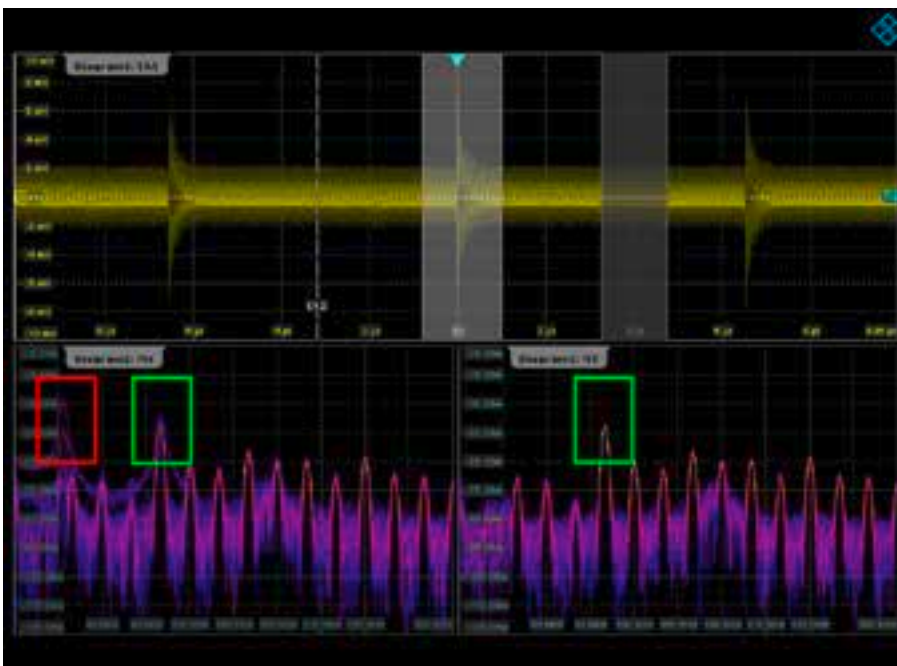
Probes: excellent contacting

ı **Comprehensive probe portfolio for any measurement task**
ı **High signal fidelity due to excellent specifications**
ı **R&S®ProbeMeter with 0.01 % measurement accuracy**
ı **Active probes with micro button for instrument control**

Practical design: micro button for convenient control of the instrument. Diverse probe tips and ground cables are included as standard accessories.

The Rohde & Schwarz probe family

Passive probes are suited for general measurements on low-frequency signals with less stringent accuracy requirements. The R&S®RTE comes with one passive probe per oscilloscope channel. The R&S®RT-ZH10/-ZH11 passive high-voltage probes are used for voltages over 400 V.

Active probes are used whenever the load on the device under test must be low, or when the measurement signal contains high-frequency components that must not be distorted. Even signals in the kilohertz range can contain high-frequency components of well over 100 MHz on their edges. Rohde & Schwarz offers an entire family of high-end active probes, both single-ended and differential. The table on page 26 shows the specifications of the probes that work best with the R&S®RTE.

High signal fidelity due to excellent specifications

Besides bandwidth, the crucial parameters for probes are input impedance and dynamic range. With their high input impedance, the active probes put only a minimal load on a signal source. The very large vertical dynamic range prevents signal distortion especially at high frequencies. Measurements are not interrupted for compensation processes since the probes' offset and gain errors are nearly independent of temperature (e.g. zero drift < 90 µV/°C for single-ended probes).

Micro button for convenient instrument control

The situation is all too familiar: the user has carefully positioned the probes on the device under test and now wants to start the measurements – but does not have a hand free. This will not happen with the Rohde & Schwarz active probes. The micro button is situated on the probe tip, and different functions such as run/stop, autoset or adjust offset can be assigned to this button.

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

Menu for configuring the micro button.

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

Is the supply voltage correct? Is DC voltage superimposed? These questions from everyday practice are answered by the active probes' integrated voltmeter (R&S®ProbeMeter). It always shows the DC value of a measurement signal with the full dynamic range – regardless of the other instrument settings. The R&S®ProbeMeter offers a much higher DC measurement accuracy than a traditional oscilloscope channel. The following advantages simplify everyday measurement tasks:

❙ Fast verification of supply voltages and signal levels without changing the oscilloscope settings
❙ Automatic compensation of the DC component for AC measurements with optimal dynamic range
❙ DC value of a measurement signal as a reference for trigger level setting

R&S®ProbeMeter: high DC measurement accuracy, independent of the instrument settings and in parallel with the measurement channel.

R&S®RT-ZC20B current probe (100 MHz, 30 A (RMS)).

R&S®RT-ZD01 high-voltage differential probe (100 MHz, 1 kV (RMS)).

Rohde & Schwarz active probes.

R&S®RT-ZD10/20/30.

R&S®RT-ZS10/20/30.

Probe	Bandwidth	Attenuation factor	Input impedance	Input capacitance	Dynamic range	Extras
Passive probes						
R&S®RT-ZP10	500 MHz	10:1	10 MΩ	≈ 10 pF	400 V (RMS)	
R&S®RT-ZH10	400 MHz	100:1	50 MΩ	7.5 pF	1 kV (RMS)	
R&S®RT-ZH11	400 MHz	1000:1				
Active probes						
R&S®RT-ZS10E	1.0 GHz	10:1	1 MΩ	0.8 pF	±8 V	
R&S®RT-ZS10	1.0 GHz					R&S®ProbeMeter and micro button for instrument control
R&S®RT-ZS20	1.5 GHz					
R&S®RT-ZS30	3.0 GHz					
Differential probes						
R&S®RT-ZD01	100 MHz	100:1/1000:1	8 MΩ	3.5 pF	±140 V/±1400 V	
R&S®RT-ZD10	1.0 GHz	10:1	1 MΩ	0.6 pF	±5 V	R&S®ProbeMeter and micro button for instrument control
		100:1		1.3 pF	70 V DC, 46 V AC (peak)	
R&S®RT-ZD20	1.5 GHz	10:1		0.6 pF	±5 V	
R&S®RT-ZD30	3.0 GHz					

Probe	Bandwidth	Max. current (RMS/peak)	Rise time	Sensitivity error	Max. input voltage	Extras
Current probes						
R&S®RT-ZC10	10 MHz	150 A/±300 A	35 ns	±1 % up to 150 A (RMS)	600 V (CAT II), 300 V (CAT III)	external power supply required, e.g. R&S®RT-ZA13
R&S®RT-ZC20	100 MHz	30 A/±50 A	3.5 ns	±1 % up to 30 A (RMS)	300 V (CAT I)	
R&S®RT-ZC20B						Rohde & Schwarz probe interface for probe detection and power supply

Wide range of accessories

Safe transport and easy rackmounting

Thanks to an extensive selection of storage and transportation accessories, the R&S®RTE is always fully protected and easy to transport. The rackmount kit allows easy installation of the oscilloscope in integrated environments. Active, passive and logic probes can be stored in a special pouch on the rear panel of the R&S®RTE for easy accessibility.

Accessories	
Front cover, for R&S®RTO/RTE digital oscilloscopes	R&S®RTO-Z1
Soft case, for R&S®RTO/RTE digital oscilloscopes and accessories	R&S®RTO-Z3
Transit case, with trolley function, for R&S®RTO/RTE digital oscilloscopes and accessories	R&S®RTO-Z4
Probe pouch, for R&S®RTO/RTE digital oscilloscopes	R&S®RTO-Z5
19" rackmount kit, for R&S®RTO/RTE digital oscilloscopes with 6 HU	R&S®ZZA-RTO

Specifications in brief

Specifications in brief		
Vertical system		
Number of channels	R&S®RTE1022/RTE1032/RTE1052/RTE1102/RTE1152/RTE1202	2
	R&S®RTE1024/RTE1034/RTE1054/RTE1104/RTE1154/RTE1204	4
Analog bandwidth (–3 dB) at 50 Ω	R&S®RTE1022/RTE1024	≥ 200 MHz
	R&S®RTE1032/RTE1034	≥ 350 MHz
	R&S®RTE1052/RTE1054	≥ 500 MHz
	R&S®RTE1102/RTE1104	≥ 1 GHz
	R&S®RTE1152/RTE1154	≥ 1.5 GHz
	R&S®RTE1202/RTE1204	≥ 2 GHz
Rise time	R&S®RTE1022/RTE1024	< 1.75 ns
	R&S®RTE1032/RTE1034	< 1 ns
	R&S®RTE1052/RTE1054	< 700 ps
	R&S®RTE1102/RTE1104	< 350 ps
	R&S®RTE1152/RTE1154	< 233 ps
	R&S®RTE1202/RTE1204	< 175 ps
Impedance		50 Ω ± 1.5%, 1 MΩ ± 1% ‖ 16 pF ± 1 pF (meas.)
Input sensitivity	max. bandwidth in all ranges	50 Ω: 500 µV/div to 1 V/div
		1 MΩ: 500 µV/div to 10 V/div
Resolution		8 bit (7-bit ENOB)
	with high resolution decimation (sampling rate reduction)	16 bit
	with R&S®RTE-K17 high definition option (no sampling rate reduction)	16 bit
Acquisition system		
Realtime sampling rate		max. 5 Gsample/s on each channel
Acquisition memory	standard configuration, per channel/1 channel active	R&S®RTE 2-channel model: 10/20 Msample R&S®RTE 4-channel model: 10/40 Msample
	max. upgrade (R&S®RTE-B102 option), per channel/1 channel active	R&S®RTE 2-channel model: 50/100 Msample R&S®RTE 4-channel model: 50/200 Msample
Acquisition rate		> 1 000 000 waveforms/s
Decimation modes	any combination of decimation mode and waveform arithmetics	sample, peak detect, high resolution, root mean square
Waveform arithmetics		off, envelope, average
Horizontal system		
Timebase range		50 ps/div to 50 s/div
Timebase accuracy	after delivery/calibration	±5 ppm
Channel deskew		±100 ns
Trigger system		
Trigger types		edge, glitch, width, runt, window, timeout, interval, slew rate, data2clock, pattern, state, serial pattern, TV/video, serial bus trigger (optional)
Sensitivity	definition of trigger hysteresis	can be set automatically or manually from 0 div to 5 div
Analysis and measurement functions		
Automatic measurements		77 measurement functions
Cursor measurements		2 cursor sets, each consisting of two horizontal and two vertical cursors
Waveform mathematics		4 math waveforms; mathematics, logical operations, comparison, FIR filter, FFT

Specifications in brief

MSO option		
Digital channels		16 (2 logic probes)
Input impedance		100 k ‖ 4 pF
Sampling rate		5 Gsample/s per channel
Acquisition memory		100 Msample per channel
Parallel buses		up to 4
General data		
Dimensions	W × H × D	427 mm × 249 mm × 204 mm (16.81 in × 9.8 in × 8.03 in)
Weight	without options, nominal	8.6 kg (18.96 lb)
Screen		10.4" LC TFT color touchscreen, 1024 × 728 pixel (XGA)
Interfaces		1 Gbit/s LAN, 4 × USB 2.0, GPIB (optional), DVI for external monitor, external trigger, trigger output

For data sheet, see PD 3606.9033.22 and www.rohde-schwarz.com

Ordering information

Designation	Type	Order No.
Base unit (including standard accessories: per channel: R&S®RT-ZP10, accessories bag, quick start guide, CD with manual, power cord)		
Digital Oscilloscope		
200 MHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1022	1326.2000.22
200 MHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1024	1326.2000.24
350 MHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1032	1326.2000.32
350 MHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1034	1326.2000.34
500 MHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1052	1326.2000.52
500 MHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1054	1326.2000.54
1 GHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1102	1326.2000.62
1 GHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1104	1326.2000.64
1.5 GHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1152	1326.2000.72
1.5 GHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1154	1326.2000.74
2 GHz, 5 Gsample/s, 10/20 Msample, 2 channels	R&S®RTE1202	1326.2000.82
2 GHz, 5 Gsample/s, 10/40 Msample, 4 channels	R&S®RTE1204	1326.2000.84
Hardware options (plug-in)		
Mixed Signal, 400 MHz, 5 Gsample/s, 16 channels, 100 Msample per channel	R&S®RTE-B1	1317.4961.02
GPIB Interface	R&S®RTE-B10	1317.4978.02
Replacement SSD Hard Disk, incl. firmware	R&S®RTE-B18	1317.7002.02
Replacement Hard Disk, incl. firmware	R&S®RTE-B19	1317.7019.02
Memory Upgrade, 20 Msample per channel	R&S®RTE-B101	1326.1155.02
Memory Upgrade, 50 Msample per channel	R&S®RTE-B102	1326.1161.02
Bandwidth upgrades [1]		
Upgrade of the R&S®RTE1022/4 to 350 MHz bandwidth	R&S®RTE-B200	1326.1384.02
Upgrade of the R&S®RTE1022/4 to 500 MHz bandwidth	R&S®RTE-B201	1326.1390.02
Upgrade of the R&S®RTE1022/4 to 1 GHz bandwidth	R&S®RTE-B202	1326.1403.02
Upgrade of the R&S®RTE1022/4 to 1.5 GHz bandwidth	R&S®RTE-B203	1326.1410.02
Upgrade of the R&S®RTE1032/4 to 500 MHz bandwidth	R&S®RTE-B204	1326.1426.02
Upgrade of the R&S®RTE1032/4 to 1 GHz bandwidth	R&S®RTE-B205	1326.1432.02
Upgrade of the R&S®RTE1032/4 to 1 GHz bandwidth	R&S®RTE-B206	1326.1449.02
Upgrade of the R&S®RTE1052/4 to 1 GHz bandwidth	R&S®RTE-B207	1326.1455.02
Upgrade of the R&S®RTE1032/4 to 2 GHz bandwidth	R&S®RTE-B208	1326.1461.02
Upgrade of the R&S®RTE1052/4 to 1 GHz bandwidth	R&S®RTE-B209	1326.1478.02
Upgrade of the R&S®RTE1052/4 to 1.5 GHz bandwidth	R&S®RTE-B210	1326.1484.02
Upgrade of the R&S®RTE1052/4 to 2 GHz bandwidth	R&S®RTE-B211	1326.1490.02
Upgrade of the R&S®RTE1102/4 to 1.5 GHz bandwidth	R&S®RTE-B212	1326.1503.02
Upgrade of the R&S®RTE1102/4 to 2 GHz bandwidth	R&S®RTE-B213	1326.1510.02
Upgrade of the R&S®RTE1152/4 to 2 GHz bandwidth	R&S®RTE-B214	1326.1526.02
Software options		
I²C/SPI Serial Triggering and Decoding	R&S®RTE-K1	1326.1178.02
UART/RS-232/RS-422/RS-485 Serial Triggering and Decoding	R&S®RTE-K2	1326.1184.02
CAN/LIN Serial Triggering and Decoding	R&S®RTE-K3	1326.1190.02
FlexRay™ Serial Triggering and Decoding	R&S®RTE-K4	1326.1203.02
I²S/LJ/RJ/TDM Serial Triggering and Decoding	R&S®RTE-K5	1326.1210.02
MIL-STD-1553 Serial Triggering and Decoding	R&S®RTE-K6	1326.1226.02
ARINC 429 Serial Triggering and Decoding	R&S®RTE-K7	1326.1232.02
10/100BASE-T Ethernet Serial Decoding	R&S®RTE-K8	1326.1332.02
CAN-FD Serial Triggering and Decoding	R&S®RTE-K9	1326.1249.02
MDIO Serial Triggering and Decoding	R&S®RTE-K55	1326.1255.02
High Definition Mode, vertical resolution up to 16 bit	R&S®RTE-K17	1326.1261.02
Power Analysis	R&S®RTE-K31	1326.1278.02

Designation	Type	Order No.
Probes		
500 MHz, passive, 10:1, 10 MΩ || 9.5 pF, max. 400 V	R&S®RT-ZP10	1409.7550.00
400 MHz, passive, high-voltage, 100:1, 50 MΩ || 7.5 pF, 1 kV (RMS)	R&S®RT-ZH10	1409.7720.02
400 MHz, passive, high-voltage, 1000:1, 50 MΩ || 7.5 pF, 1 kV (RMS)	R&S®RT-ZH11	1409.7737.02
1.0 GHz, active, 1 MΩ || 0.8 pF	R&S®RT-ZS10E	1418.7007.02
1.0 GHz, active, 1 MΩ || 0.8 pF, R&S®ProbeMeter, micro button	R&S®RT-ZS10	1410.4080.02
1.5 GHz, active, 1 MΩ || 0.8 pF, R&S®ProbeMeter, micro button	R&S®RT-ZS20	1410.3502.02
3.0 GHz, active, 1 MΩ || 0.8 pF, R&S®ProbeMeter, micro button	R&S®RT-ZS30	1410.4309.02
100 MHz, high-voltage, active, differential, 8 MΩ || 3.5 pF, 1 kV (RMS) (CAT III)	R&S®RT-ZD01	1422.0703.02
1.0 GHz, active, differential, 1 MΩ || 0.6 pF, R&S®ProbeMeter, micro button, incl. 10:1 external attenuator, 1.3 pF, 70 V DC, 46 V AC (peak)	R&S®RT-ZD10	1410.4715.02
1.5 GHz, active, differential, 1 MΩ || 0.6 pF, R&S®ProbeMeter, micro button	R&S®RT-ZD20	1410.4409.02
3.0 GHz, active, differential, 1 MΩ || 0.6 pF, R&S®ProbeMeter, micro button	R&S®RT-ZD30	1410.4609.02
10 MHz, current, AC/DC, 0.01 V/A, 150 A (RMS), BNC	R&S®RT-ZC10	1409.7750.02
100 MHz, current, AC/DC, 0.1 V/A, 30 A (RMS), BNC	R&S®RT-ZC20	1409.7766.02
100 MHz, current, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC20B	1409.8233.02
Probe accessories		
Accessory Set for R&S®RT-ZP10 passive probe (2.5 mm probe tip)	R&S®RT-ZA1	1409.7566.00
Spare Accessory Set for R&S®RT-ZS10/10E/20	R&S®RT-ZA2	1416.0405.02
Pin Set for R&S®RT-ZS10/10E/20	R&S®RT-ZA3	1416.0411.02
Mini Clips	R&S®RT-ZA4	1416.0428.02
Micro Clips	R&S®RT-ZA5	1416.0434.02
Lead Set	R&S®RT-ZA6	1416.0440.02
Pin Set for R&S®RT-ZD10/20/30	R&S®RT-ZA7	1417.0609.02
SMA Adapter	R&S®RT-ZA10	1416.0457.02
Power Supply for R&S®RT-ZC10/20 probes	R&S®RT-ZA13	1409.7789.02
External Attenuator, 10:1, 2.0 GHz, 70 V DC, 46 V AC (peak)	R&S®RT-ZA15	1410.4744.02
Accessories		
Front Cover, for R&S®RTO/RTE digital oscilloscopes	R&S®RTO-Z1	1317.6970.02
Soft Case, for R&S®RTO/RTE digital oscilloscopes and accessories	R&S®RTO-Z3	1304.9118.02
Transit Case, with trolley function, for R&S®RTO/RTE digital oscilloscopes and accessories	R&S®RTO-Z4	1317.7025.02
Probe Pouch, for R&S®RTO/RTE digital oscilloscopes	R&S®RTO-Z5	1317.7031.02
Probe Deskew and Calibration Test Fixture	R&S®RT-ZF20	1800.0004.02
19" Rackmount Kit, for R&S®RTO/RTE digital oscilloscopes with 6 HU	R&S®ZZA-RTO	1304.8286.00

[1] The bandwidth upgrade is performed at a Rohde & Schwarz service center, where the oscilloscope will also be calibrated.

Service options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales representative.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.
To find your nearest Rohde & Schwarz representative, visit
www.sales.rohde-schwarz.com

Service that adds value

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

About Rohde & Schwarz

The Rohde & Schwarz electronics group is a leading supplier of solutions in the fields of test and measurement, broadcast and media, secure communications, cyber-security, and radiomonitoring and radiolocation. Founded more than 80 years ago, this independent global company has an extensive sales network and is present in more than 70 countries. The company is headquartered in Munich, Germany.

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

Regional contact

▪ Europe, Africa, Middle East | +49 89 4129 12345
customersupport@rohde-schwarz.com
▪ North America | 1 888 TEST RSA (1 888 837 87 72)
customer.support@rsa.rohde-schwarz.com
▪ Latin America | +1 410 910 79 88
customersupport.la@rohde-schwarz.com
▪ Asia Pacific | +65 65 13 04 88
customersupport.asia@rohde-schwarz.com
▪ China | +86 800 810 82 28 | +86 400 650 58 96
customersupport.china@rohde-schwarz.com

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