R&S®RTP
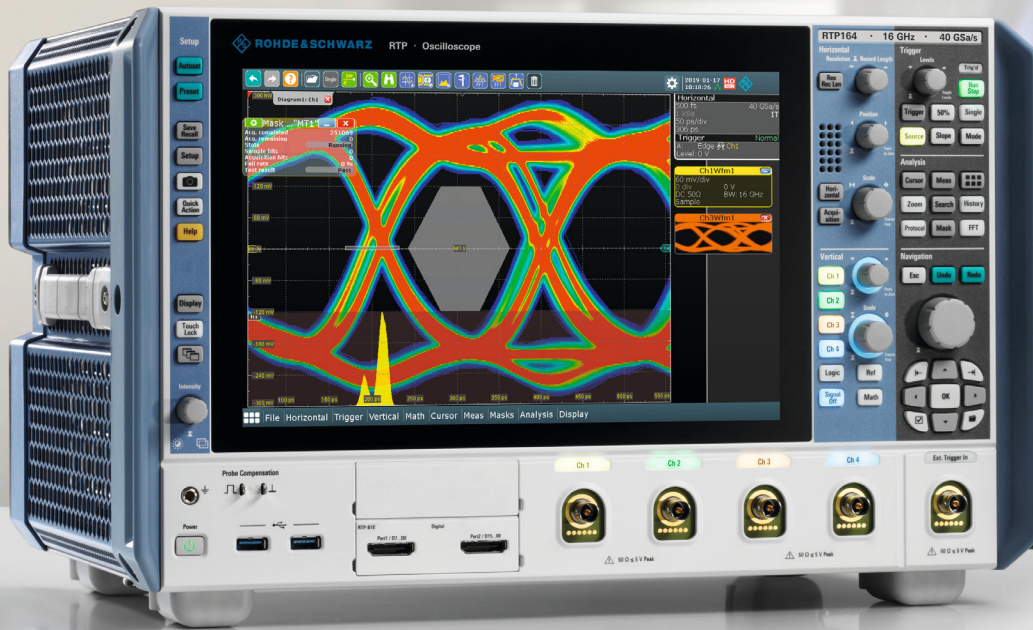# High-Performance
Oscilloscope
Signal integrity
in realtime

Oscilloscope innovation. Measurement confidence.
www.rohde-schwarz.com/RTP

HD 16 bit

3 year warranty

ROHDE & SCHWARZ

R&S®RTP High-Performance Oscilloscope
At a glance

Benefit from the advanced technology in the R&S®RTP oscilloscope. Customized frontend ASICs and realtime processing hardware enable highly accurate measurements up to 16 GHz with unprecedented speed in a compact form factor.

The R&S®RTP high-performance oscilloscope combines high-class signal integrity with fast acquisition and analysis. The Rohde & Schwarz designed frontend components offer an expandable oscilloscope platform from 4 GHz to 16 GHz. Dedicated acquisition and processing ASICs enable an unprecedented high acquisition and processing rate of 750 000 waveforms/s. The high-precision digital trigger catches the smallest signal anomalies and operates with the hardware-based clock data recovery (CDR) on embedded clock signals up to the industry-leading data rate of 16 Gbps.

The R&S®RTP is the world's first oscilloscope to compensate the impairment of the signal contacting in realtime while maintaining the high acquisition rate. Hardware-based compensation filters are configured using user-applied S-parameters. The realtime math module directly after the compensation filters makes it possible to even trigger on deembedded differential and common-mode signals.

The R&S®RTP oscilloscope combines multiple instrument capabilities for time-correlated debugging in one box. Additional integrated test resources such as MSO, arbitrary waveform generator, 16 GHz differential pulse source and multiple 18-bit high-precision voltage and current channels make the R&S®RTP the most powerful debugging tool. With all this in a compact instrument format plus silent operation, the R&S®RTP oscilloscope is the best fit for any lab.

Benefits

Realtime signal integrity

Multi-instrument capability

Compact and configurable

Comprehensive probe portfolio

R&S®RTP oscilloscope models
❙ Bandwidth:
  · **R&S®RTP164:** 16 GHz (2 channels) / 8 GHz (4 channels)
  · **R&S®RTP134:** 13 GHz (2 channels) / 8 GHz (4 channels)
  · **R&S®RTP084:** 8 GHz (4 channels)
  · **R&S®RTP064:** 6 GHz (4 channels)
  · **R&S®RTP044:** 4 GHz (4 channels)
❙ Sampling rate: 40 Gsample (2 channels), 20 Gsample/s per channel
❙ Acquisition memory:
  · 50 Msample per channel
  · max. 2 Gsample
❙ Acquisition rate: 750 000 waveforms/s
❙ Mixed signal analysis (MSO) with 16 digital channels:
  · 400 MHz bandwidth
  · 5 Gsample/s sampling rate
  · 200 Msample memory depth

Oscilloscope innovation.
Measurement confidence.
Enabling technologies

Rohde & Schwarz engineers focus on making oscilloscopes better. They use leading-edge technologies for hardware and software designs and incorporate innovative features such as fastest signal acquisition, an entirely new trigger architecture and the touchscreen-optimized user interface. The new R&S®RTP high-performance oscilloscope family continues this tradition of innovation and offers a true first: high-performance signal integrity in realtime in a compact instrument format.
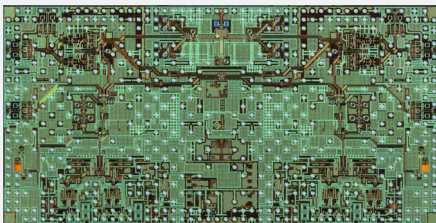

Rohde & Schwarz in-house designed integrated circuits
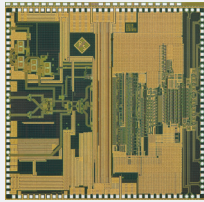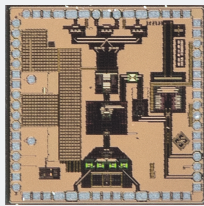
High-performance analog ASICs

Measurement accuracy is highly dependent on the components in the signal path, e.g. amplifiers, samplers and A/D converters. Rohde & Schwarz uses its in-house expertise to design the best analog integrated circuits. Users benefit from low noise, high measurement dynamic range and extremely temperature-stable results.
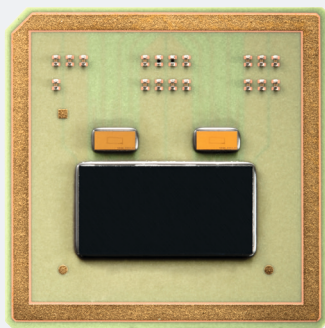

R&S®RTP multi-chip frontend module

Leading-edge multi-chip modules

Rohde & Schwarz uses multi-chip modules to combine the best of the different technologies for excellent frontend performance. As a critical component for both signal integrity and ruggedness, the termination resistor is manufactured with in-house technologies and laser-trimmed for precise input matching.
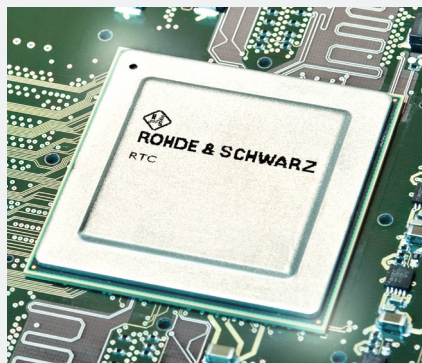

R&S®RTP processing ASIC

Fastest throughput processing – ASIC

A high acquisition and processing rate supports fast detection of rare signal faults and ensures a responsive instrument during operation. The highly integrated Rohde & Schwarz ASIC is capable of running multiple parallel processes, which dramatically reduces blind time.

4

Realtime deembedding and advanced triggering

The R&S®RTP features powerful processing components directly after the A/D converters for realtime correction of the transmission path from the DUT. The unique Rohde & Schwarz digital trigger system follows in the processing path and operates based on the same compensated A/D converter samples. Users benefit from highest acquisition speed even with activated realtime deembedding and precise triggering on compensated signal events up to the full bandwidth.
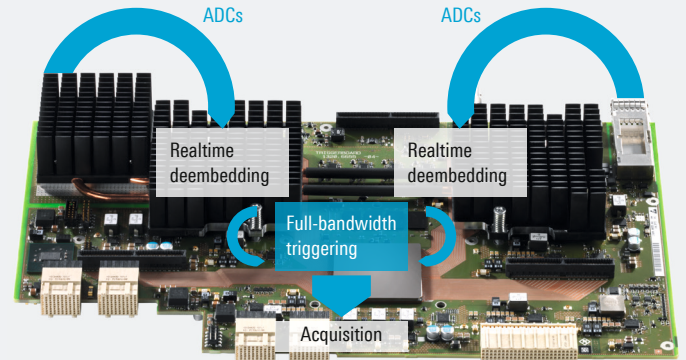
R&S®RTP realtime deembedding and trigger board

Quiet and compact

The R&S®RTP instrument platform is designed for minimal bench space and lowest acoustic noise. Managing power consumption is critical in such a highly integrated instrument. Sophisticated temperature management starts with the hardware design, uses advanced head spreading concepts and includes an optimized air flow design. Users in the lab will enjoy a compact, extremely quiet instrument.
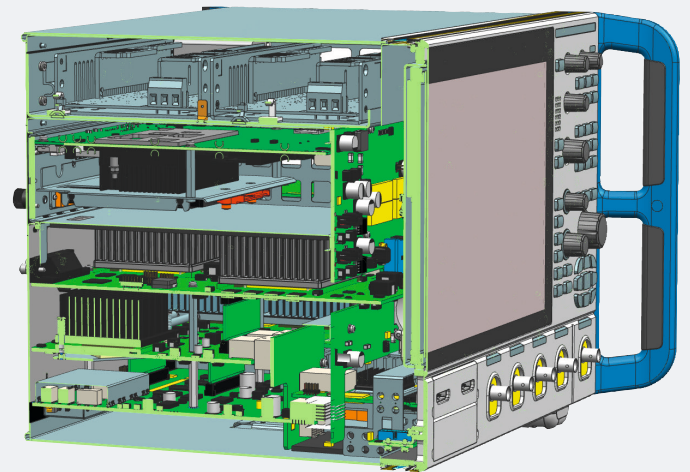
Extremely compact layout of the R&S®RTP

Premium front panel design

The 12.1" high-resolution capacitive touch display is embedded in a precisely milled solid aluminum front panel. This high-quality, long lifetime design supports precise operation of the touchscreen even in the corners. Multicolor LEDs at the channel inputs and on various sections of the front panel guide users intuitively. Key components of the Rohde & Schwarz graphical user interface, such as the multiple diagrams and unit annotation, have become established industry standards.
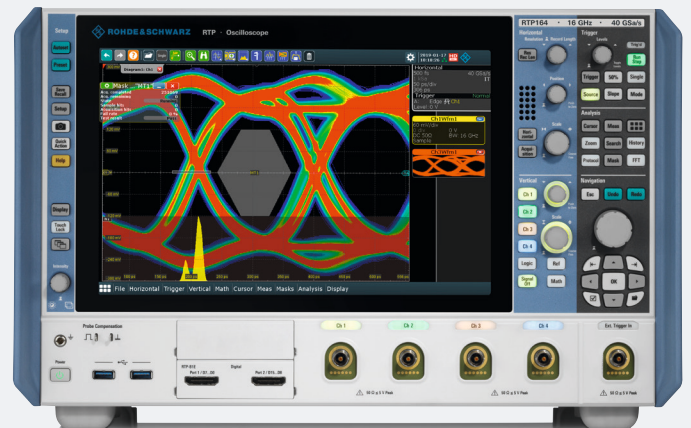
R&S®RTP premium front panel

Realtime signal integrity
High-performance frontend

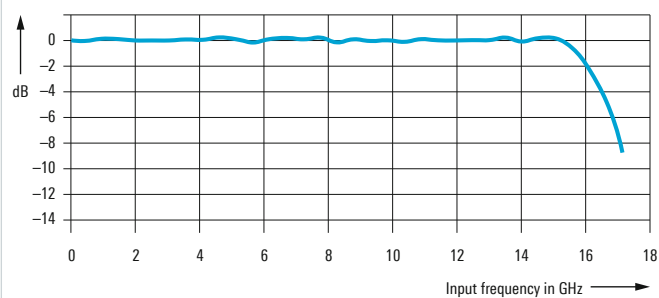## Flat frequency response of the R&S®RTP164

Flat frequency response and high SFDR for precise and fast measurements

The input components of the R&S®RTP assure high measurement fidelity without time-consuming correction during postprocessing. Users benefit from reliable results with the industry-leading acquisition rate of > 750 000 waveforms/s.

The R&S®RTP is ideal for precise measurements on high-speed signals and wideband RF applications due to its flat frequency response, high effective number of bits and large spurious free dynamic range (SFDR excl. harmonics > 60 dBc).

High input sensitivity of 2 mV/div for small signals

The instrument supports measurement of small signals thanks to its high vertical input sensitivity down to 2 mV/div without software magnification or limitations on the maximum measurement bandwidth.

In combination with the sophisticated shielding design, a channel-to-channel isolation of > 50 dB maintains the high measurement accuracy for multichannel measurements.

High temperature stability for consistent results

The design of the R&S®RTP frontend is optimized for almost zero DC drift and high temperature stability. Measure without the interruption of updating calibration steps during the day. The tight temperature control of the R&S®RTP ensures stable results. And the speed-controlled fan keeps the acoustic noise at a whisper level.

Low intrinsic jitter

The sampling clock for the A/D converters is optimized for low intrinsic jitter. It uses an oven-controlled crystal oscillator (OCXO) as a reference. This ensures long-term jitter stability for acquisitions with deep memory up to 2 Gsample.
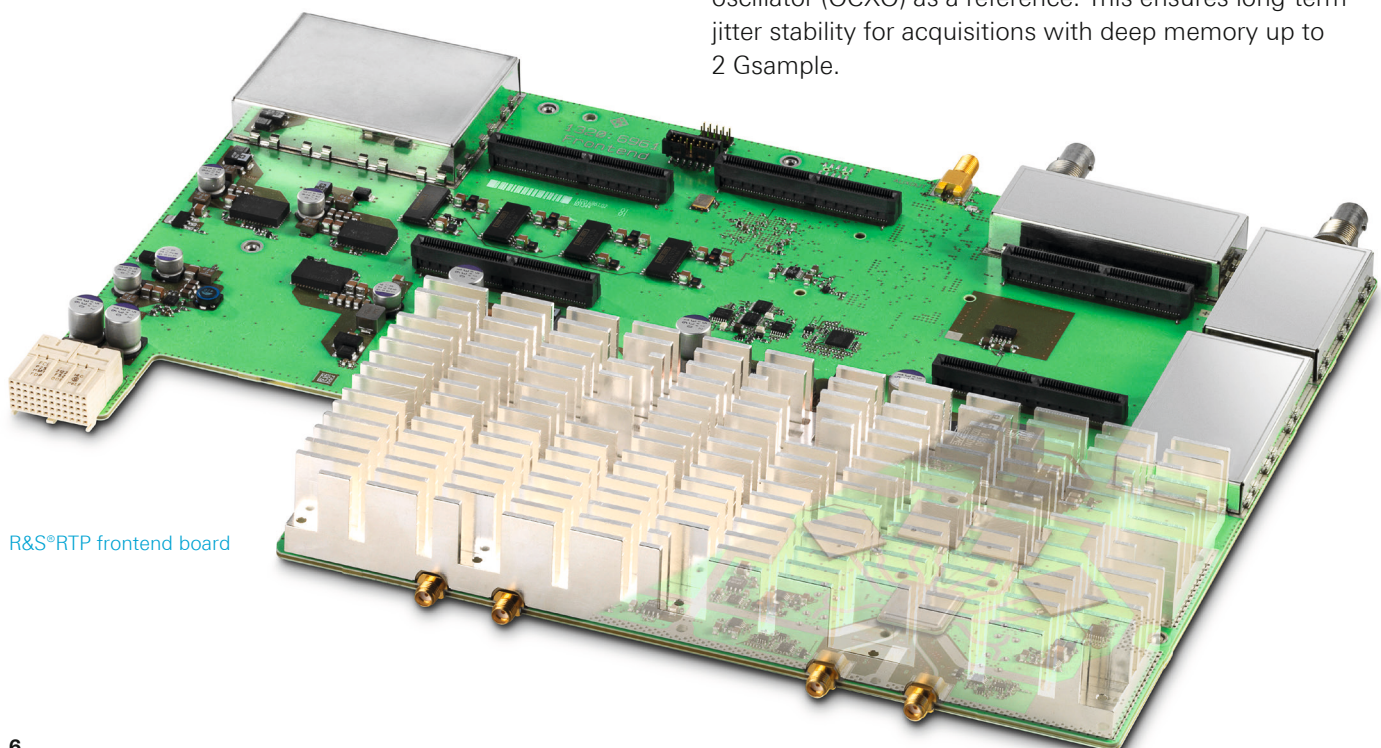
R&S®RTP frontend board

Realtime deembedding

Deembedding in realtime for fast results

The R&S®RTP extends traditional deembedding capabilities with flexible filter structures directly after the A/D converters. This allows waveform correction in realtime. The advantages over deembedding the acquired waveform during postprocessing are the measurement speed and instrument responsiveness.

With realtime deembedding on, the R&S®RTP retains the maximum acquisition rate of > 750000 waveforms/s. Debugging tasks such as searching for sporadic signal faults and eye diagram analysis are achieved in a fraction of time.

Correction of cascaded signal paths

A cascade of signal path blocks can be defined for deembedding. The individual blocks are described by S-parameters that can be derived from simulation or measured with a vector network analyzer. Alternatively, the R&S®RTP-B7 pulse source option can be used to measure the transmission loss of the complete signal path. For both approaches, the deembedding software automatically calculates the correction filter for the overall system response.

Triggering on corrected signals

With the R&S®RTP, for the first time users can trigger on corrected waveforms and focus on debugging the true device characteristics. The unique digital trigger system operates with the sampling points of the A/D converter and the realtime deembedding filters. The trigger evaluates the real device signal since the distortion effects of the measurement path have been removed.

Realtime math for differential signals

The R&S®RTP features a math module directly after the realtime deembedding and before the trigger system. It supports add, subtract and common mode calculation for any two input channels. This enables fast analysis of differential signals, including triggering on the differential or common mode voltage. Additionally, the math module allows inversion of the input signals.

Full bandwidth for all trigger types

The powerful trigger system of the R&S®RTP goes beyond the limits of traditional high-performance oscilloscopes. In addition to the edge trigger, advanced trigger types such as pulse width, runt and setup&hold work up to the full bandwidth of the instrument. This enables fast isolation of high-frequency signal components. The trigger sensitivity is adjustable from 0 div to 5 div and the trigger resolution can be extended up to 16 bit with the high definition mode. Users can reliably trigger on even the smallest signal details.

Realtime deembedding architecture

Distorted waveform

Continuously corrected waveform for trigger, analysis and display

Device — Lossy signal path — Input channel — Realtime deembedding — Realtime math — Trigger — Analysis — Display
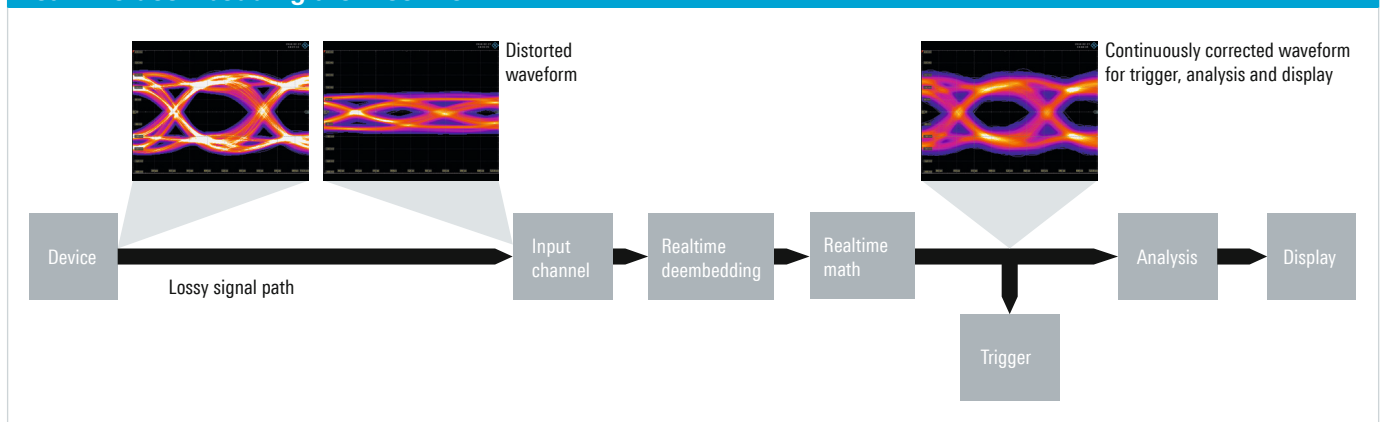
Hardware-accelerated processing for fast results

Quickly find signal faults with > 750 000 waveforms/s
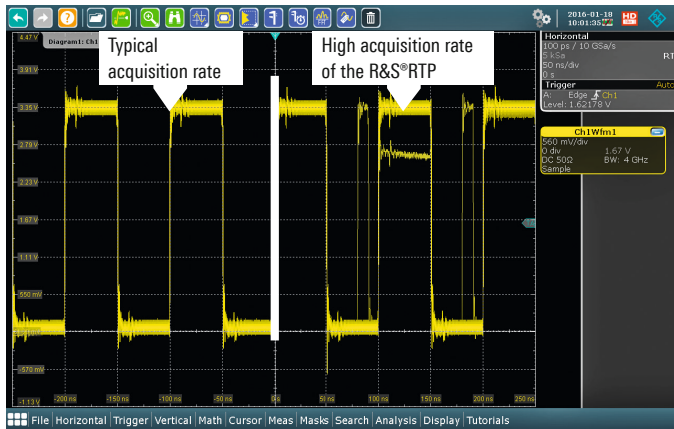
The R&S®RTP oscilloscopes process and display more than 750 000 waveforms/s in standard operating mode. This allows you to detect sporadic signals quickly and reliably. This update rate is unique for high-performance oscilloscopes. A high acquisition rate is even available when zoom or cursor measurements are active.

The high acquisition rate detects sporadic signal faults fast

Increase realtime resolution with 16-bit HD mode

The low-noise frontend and single-core A/D converters are the foundation for the high measurement accuracy and dynamic range of the R&S®RTP oscilloscopes. The high definition (HD) mode activates configurable low-pass filtering of the signal after the A/D converters. The hardware implemented filters reduce the noise in realtime, effectively increasing the signal-to-noise ratio. Users can adjust the filter bandwidth and increase the vertical resolution stepwise. The maximum resolution of 16 bit is achieved at 200 MHz bandwidth.

With the Rohde&Schwarz 16-bit HD mode, even the digital trigger system benefits from the increased resolution, making it possible to trigger on the smallest signal details.
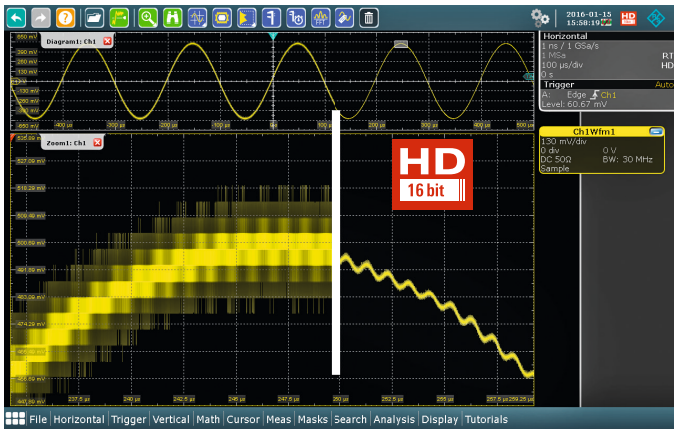
The 16-bit HD mode makes signals details visible that are otherwise hidden in noise

Resolution as a function of the filter bandwidth

Filter	Resolution
Inactive	8 bit
2 GHz	10 bit
1 GHz	11 bit
500 MHz	12 bit
200 MHz to 10 kHz	16 bit

Analyze high-speed serial signals with the serial pattern trigger and 16 Gbps clock data recovery

The R&S®RTP features a high-speed serial pattern trigger that can operate based on the extracted embedded clock of a serial signal. The R&S®RTP accomplishes this with hardware based clock data recovery (CDR) that supports a maximum nominal data rate of 8 Gbps or 16 Gbps, depending on the selected software option.

The CDR can use any of the four analog input channels. This function can be added as an upgrade at any time since the options are license key enabled.

The high-speed serial pattern trigger supports a variety of trigger events, including user-defined bit streams up to 160 bit and various decoding schemes such as 8B/10B or 128B/132B. By triggering on a "1" or a "0", an eye diagram for NRZ data is easily generated. For further signal integrity analysis, eye mask test and histogram functions are available.
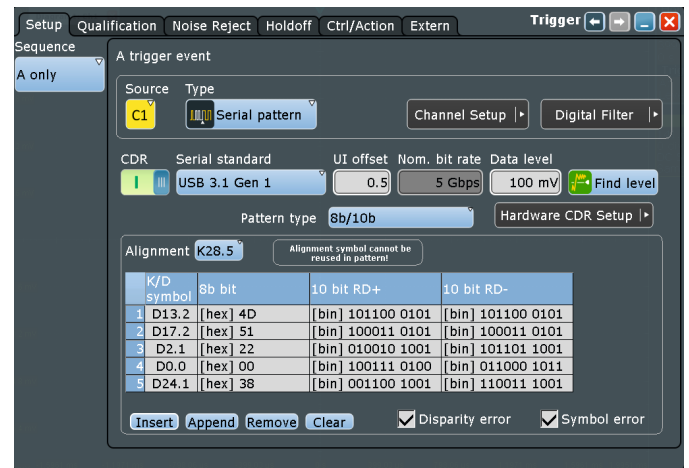
Setup dialog for the high-speed serial pattern trigger

Parameter	Value range
CDR bit rate	
R&S®RTP-K140/-K141 option	21 kbps to 8 Gbps/16 Gbps
Trigger type	
Single-bit pattern	up to 160 bit
Dual-bit pattern	2-bit pattern up to 160 bit
Complex word	frame alignment; up to 4-bit pattern, logical conditions
PRBS error	7, 9, 11, 15, 16,17, 20, 23, 29, 31
Decoding	8B/10B, 128B/130B, 128B/132B

Fast eye mask test and histogram

With the R&S®RTP oscilloscope, mask tests and the histogram display are hardware accelerated and deliver fast results with high statistical confidence. Signal anomalies and unexpected results are quickly identified. You can define a new mask directly on the display in just a few steps. Each mask can consist of up to eight segments.

The histogram on the R&S®RTP oscilloscope is applicable on input signal levels (vertical) or transitions in the timebase (horizontal) to analyze noise and jitter. On each histogram, the statistical data can be displayed together with other measurement functions.
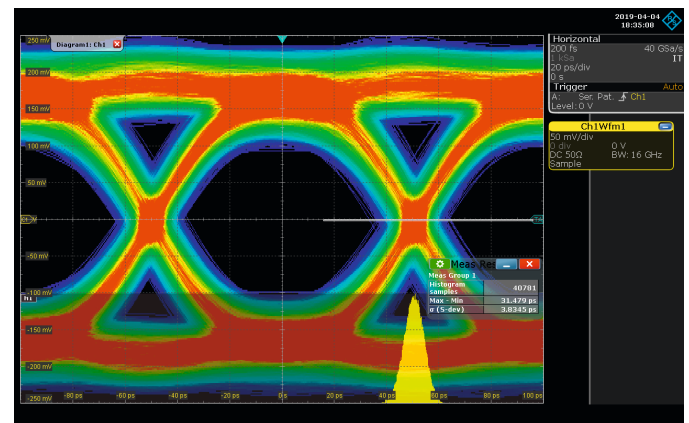
The high-speed serial pattern trigger and the hardware-based CDR enable fastest eye diagram measurements

Comprehensive
analysis tools
Jitter analysis

Powerful jitter analysis functions

R&S®RTP oscilloscopes offer a wide range of jitter analysis functions. You can start with automated jitter measurements like cycle-to-cycle jitter and time interval error (TIE). And then see further signal details with additional tools such as track, long-term trend and FFT on track. As an example, you can determine frequency interference by applying FFT analysis to the cycle-to-cycle jitter measurement track.

The following displays and analysis functions are available:
ı **Long-term trend:** display of measurement results from different acquisitions in a separate figure to detect slowly developing trends, such as thermal changes
ı **Track:** graphic display of multiple measurement results (i.e. TIE) over the entire acquisition period
ı **Histogram:** convolution density of measurement results in a bar graph
ı **FFT on track:** FFT analysis on the measurement result's track curve
ı **Eye diagram:** automated eye diagram measurements and mask tests for data signals with separate clock signals, e.g. DDR interfaces (available as an option)

Jitter measurement functions	
Standard functions	**R&S®RTP-K12 option**
Period	cycle-to-cycle jitter
Frequency	N-cycle jitter
Setup	cycle-to-cycle width
Setup/hold time	cycle-cycle duty cycle
Setup/hold ratio	time interval error
	data rate
	unit interval
	skew delay
	skew phase

Detection of frequency interference within a clock signal: tracking of TIE jitter; histogram and FFT analysis of track curve
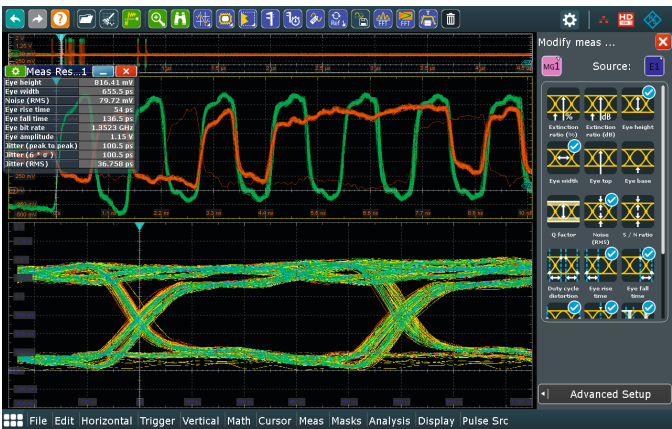
Eye diagram measurements of a DDR memory data signal

Automatic compliance tests

Easy configuration and automatic control with R&S®ScopeSuite

R&S®ScopeSuite is generic compliance test software that runs on the R&S®RTP oscilloscope or on a separate Windows PC. It controls the measurement settings and test sequence on the R&S®RTP and guides you through all selected tests. Detailed, image-based instructions make it easy to correctly connect the oscilloscope, the probes, the test fixture and the device under test. User data, all test setup settings and measurement report definitions are simple to configure. The limit editor lets you individually adjust test limits.

Flexible test execution

For debugging during development or for stability verification, single tests and test sequences can be repeated. Limit lines and other parameters can be adjusted for each test repetition.

Configurable reports for result documentation

Documenting the measurement results is an essential part of compliance tests. The R&S®ScopeSuite offers an extensive range of documentation functions. You can add measurement details and screenshots to the pass/fail results. The available output formats are PDF, DOC and HTML.

Compliance test options

Interface standard	Compliance test option
USB	
USB 1.0/1.1/2.0/HSIC	R&S®RTP-K21
Ethernet	
10/100 Mbit Ethernet	R&S®RTP-K22
1 Gbit Ethernet	R&S®RTP-K22
2.5G/5GBASE-T Ethernet	R&S®RTP-K25
10 Gbit Ethernet	R&S®RTP-K23
10M/100M/1GBASE-T Energy Efficient Ethernet	R&S®RTP-K86
Automotive Ethernet	
100BASE-T1 BroadR-Reach® Ethernet	R&S®RTP-K24
1000BASE-T1 Ethernet	R&S®RTP-K87
PCI Express	
PCIe Express 1.1/2.0 (up to 2.5 GT/s)	R&S®RTP-K81
MIPI	
MIPI D-PHY	R&S®RTP-K26
Memory	
DDR3/DDR3L/LPDDR3	R&S®RTP-K91
DDR4/LPDDR4	R&S®RTP-K93

Automated PCI Express compliance test

Frequency domain analysis

Multichannel frequency analysis

R&S®RTP oscilloscopes feature a fast and responsive FFT on up to four channels in parallel. The low-noise frontend and the A/D converter's high effective number of bits provide an outstanding spurious-free dynamic range, so that even weak signals can be identified.

R&S®RTP multichannel frequency analysis of a WLAN IEEE 802.11n and 11ac MIMO signal

Frequency analysis setup made easy

Configure the frequency analysis function of the R&S®RTP by simply entering typical parameters: center frequency, span and resolution bandwidth (RBW). The RBW is independent of the time/div setting. Parameters such as window type, FFT overlap, gating and scaling parameters can be optionally configured.

Setup of frequency analysis made easy with typical parameters

Zone trigger in frequency display

R&S®RTP oscilloscopes offer a zone trigger that works in the frequency domain. Up to eight zones can be graphically defined in the spectrum display and used to trigger the oscilloscope. Typical applications include fast detection and analysis of unwanted emissions, frequency hopping patterns and radar bursts.
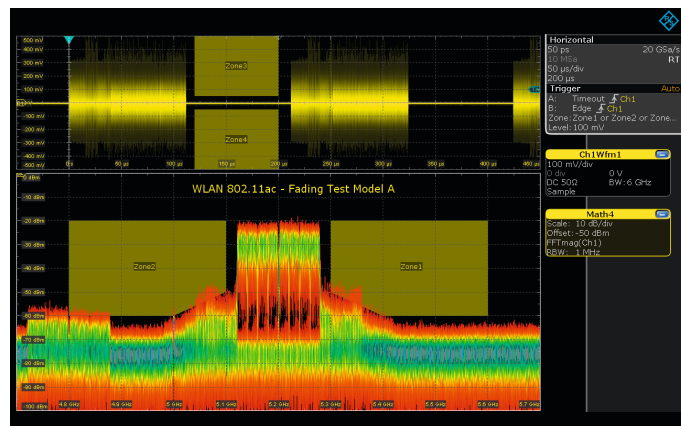
Triggering on a WLAN IEEE 802.11ac signal under fading conditions using the zone trigger

Spectrogram: display changes in power and frequency over time

The R&S®RTP-K37 spectrogram option analyzes time-varying signals in the frequency domain. The spectrogram visualizes the variance of power and frequency versus time. This feature allows you to quickly analyze AM/FM modulated signals as well as signals from radar and frequency hopping systems.

Analysis and display of power and frequency variance of an FM modulated signal versus time using the spectrogram display

Logarithmic display

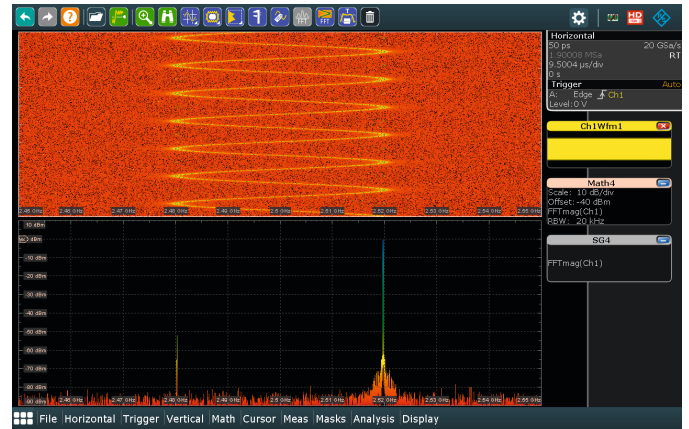For measurements such as EMI debugging, a logarithmic scaling of the frequency axis is useful to better display values of several orders of magnitude. The R&S®RTP-K37 spectrogram option supports this functionality for the frequency and spectrogram display.
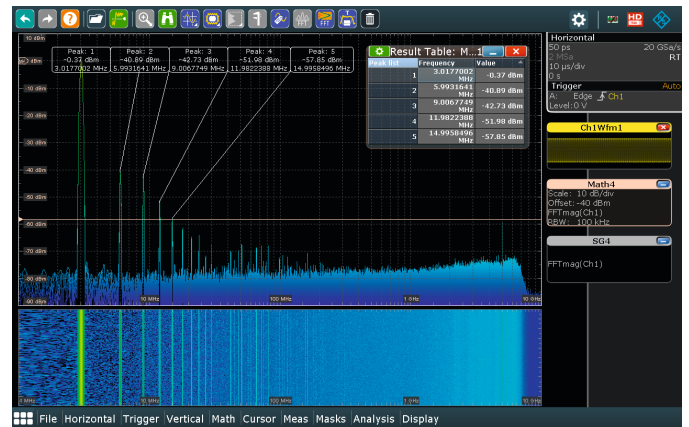
Display of EMI measurement results on a logarithmic y-axis

Automatic peak list measurement

To analyze a device's harmonic and intermodulation products, the power and frequency of each peak has to be measured. With the R&S®RTP-K37 option, the peak list measurement is performed automatically. Each peak is measured individually and displayed directly in the measurement graph and optionally in a table. The peaks are marked in the frequency display. Frequency and power information is also displayed.
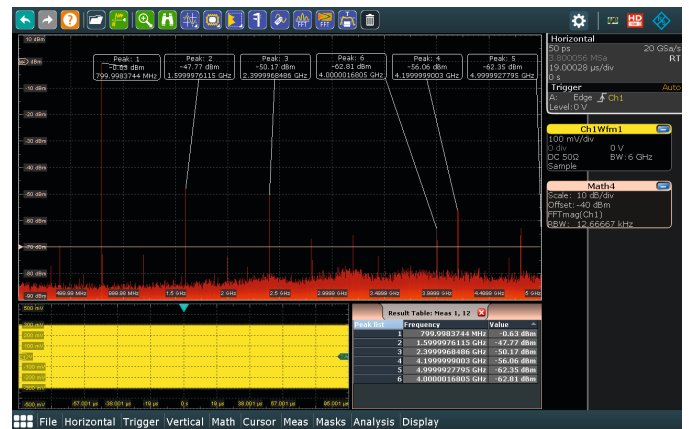
Analysis of harmonic and intermodulation products with the automatic peak list measurement

Wideband
RF signal analysis

Precise wideband RF signal analysis

The R&S®RTP lets you perform precise multichannel wideband RF measurements up to 16 GHz. For measurements with an RF carrier frequency between 16 GHz and 85 GHz, combine the R&S®RTP with an R&S®FSW signal and spectrum analyzer to achieve an effective analysis bandwidth of up to 5 GHz.

The RF characteristic of the R&S®RTP is outstanding. With a sensitivity of −157 dBm (1 Hz) and a dynamic range of 111 dB, the R&S®RTP is qualified to accurately analyze the RF signal.

Generic R&S®RTP oscilloscope functions such as spectrum view, spectrogram and track display of timing measurements in combination with the powerful trigger system allow fast and intuitive analysis of RF signals. To further analyze pulsed and modulated RF signals, combine the R&S®RTP with the R&S®RTP-K11 I/Q interface option and the R&S®VSE vector signal explorer software.

Rohde & Schwarz wideband RF analysis portfolio

Analysis bandwidth

R&S®RTP164
R&S®RTP134
R&S®RTP084
R&S®RTP064
R&S®RTP044

R&S®FSW-B5000 with R&S®RTP064 or R&S®RTP084
5 GHz analysis bandwidth with f_c from 9.5 GHz to 90 GHz
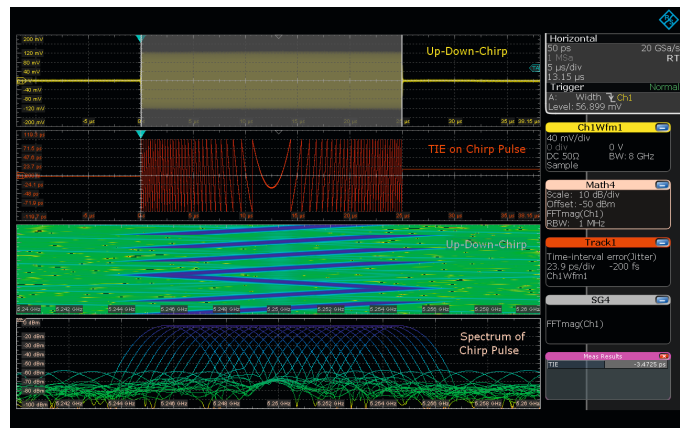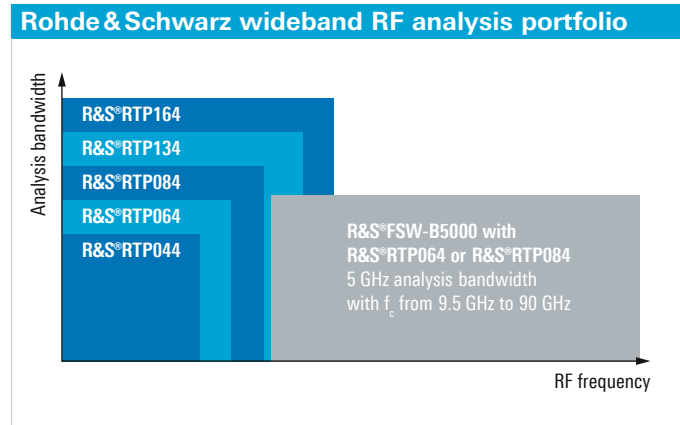
RF frequency

Pulse analysis of up-down chirp in time and frequency domain with generic R&S®RTP oscilloscope functions

Conversion of modulated signals to I/Q data

The R&S®RTP-K11 I/Q interface significantly simplifies analysis of modulated signals. The option converts modulated signals to I/Q data. This saves acquisition memory and extends the maximum acquisition time.

The I/Q data can be processed with the dedicated R&S®VSE vector signal explorer software or with customized implementations, for example in MATLAB®.
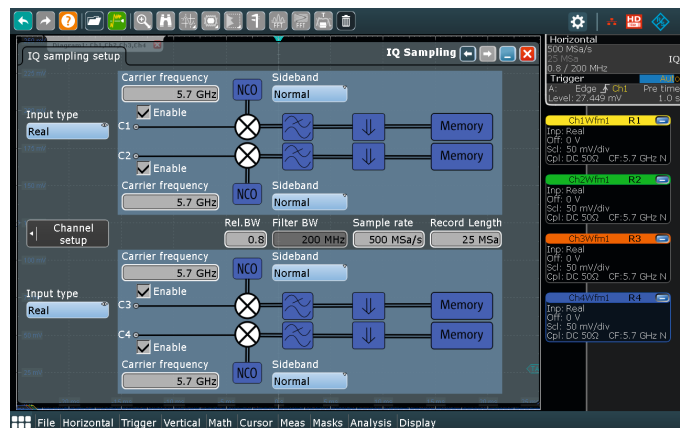
Setup dialog for the R&S®RTP-K11 I/Q interface
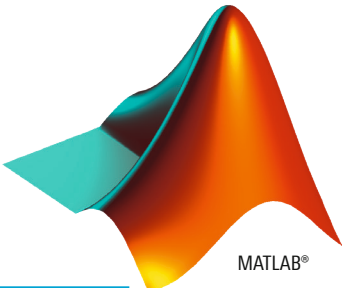
Advanced RF signal analysis

The R&S®VSE vector signal explorer application software analyzes complex signals such as pulsed radar and digitally modulated signals. This software provides a wide range of analysis tools for debugging and optimizing circuit designs. The R&S®VSE offers generic I/Q analysis and analog demodulation capabilities. Additional options such as pulse and transient analysis or a powerful vector signal analysis are available. The R&S®VSE software runs directly on the R&S®RTP or alternatively on an external PC.

The R&S®RTP also works with external analysis tools like MATLAB®. This allows you to analyze proprietary signals based on a customized algorithm with maximum flexibility.

R&S®VSE vector signal explorer software	
Analysis option	**Typical measurements**
R&S®VSE base software I/Q analyzer	▪ Baseband I/Q analysis ▪ Statistical ADP and CCDF analysis ▪ Measurement of ACLR, OBW and SEM
R&S®VSE-K6 Pulse analysis	▪ Pulse parameters ▪ Pulse repetition interval ▪ Point-in-pulse measurement
R&S®VSE-K7 Modulation analysis of AM/FM/PM modulated single carriers	▪ Modulation depth (AM) ▪ Frequency deviation (FM) ▪ Phase deviation (PM)
R&S®VSE-K60 Transient analysis	▪ Frequency hopping signal ▪ Chirp signals ▪ Spectrogram display
R&S®VSE-K70 Vector signal analysis	▪ Analysis of digitally modulated signals ▪ Constellation diagram ▪ EVM and bit error calculation
R&S®VSE-K96 Generic OFDM analysis	▪ Analysis of user-defined OFDM and OFDMA signals ▪ Support of any PSK or QAM (up to 4096QAM)

Advanced RF analysis capabilities with the R&S®RTP oscilloscope

R&S®VSE
Vector signal explorer software

MATLAB®

Multi-instrument capability

Time-correlated analysis of multiple signal types

The R&S®RTP oscilloscope addresses today's and tomorrow's test requirements for highly integrated devices. It combines multiple test instrument capabilities in a single box:

- The high bandwidth **analog channels** offer superior signal fidelity for measurements on fast signals, e.g. high-speed buses and wideband RF transmitters
- General purpose resources, such as the **digital channels** (MSO) or the **arbitrary and pattern generator**, allow logic analysis or protocol-based testing of low-speed serial buses. The R&S®RTP features a unique 16 GHz differential pulse source for device stimulus or signal path characterization.
- The unique **18-bit high-precision voltage and current channels** enable time-correlated analysis of multiple power rails for debugging power consumption and power integrity issues
- The R&S®RTP provides comprehensive tools for detailed signal analysis in the **frequency domain** on up to four channels in parallel
- As a unique tool, the R&S®RTP features a **16 GHz differential pulse source** for device stimulus or signal path characterization

All tools are integrated into a single instrument with a consistent interface, turning the R&S®RTP into the most versatile high-speed debugging instrument.

The R&S®RTP oscilloscope: multiple test instruments in one
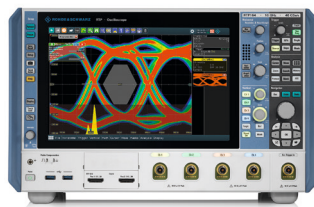
Analog
- Voltage and time measurements

Logic
- Data verification
- Timing verification
- Bus decoding

Protocol
- Protocol decoding
- Protocol triggering
- Symbol mapping

Frequency
- Spectrum analysis
- Signal analysis
- EMI debugging

Power
- Power consumption
- Power sequencing
- Power integrity

Generator
- Reference clock
- Arbitrary waveforms
- Modulated signals
- Protocol pattern

Pulse source
- Input characterization
- Deskew
- TDR/TDT

Serial protocol analysis

Easy configuration

R&S®RTP oscilloscopes offer a broad selection of trigger and decoding options for serial protocol analysis. The configuration for any given protocol is accomplished in just a few steps starting from the app cockpit. Just select the protocol and define the input sources. Autoset functionality supports you wherever possible.

Select from the broad portfolio of serial protocol options

Isolate protocol events with protocol-specific trigger

Protocol-specific triggers support fast isolation of protocol related errors. The R&S®RTP offers triggering on specific protocol content, e.g. address and data, as well as on protocol errors.
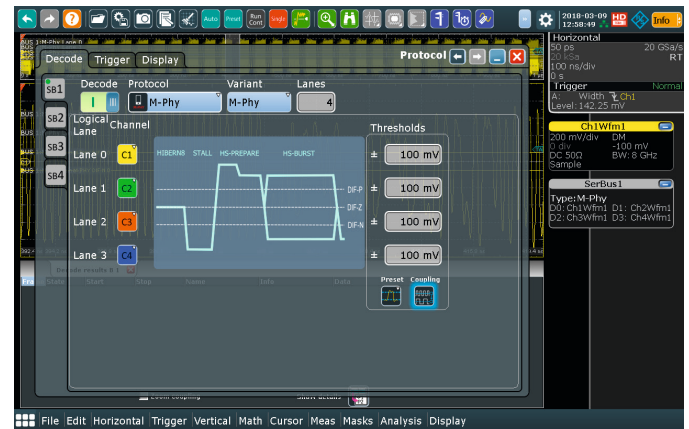
Configuration of the protocol trigger

Clear display of decoded data

For easy readability of the decoded data, the individual protocol areas within the logical signals are color-coded. The data formats hex, bin and ASCII can be selected. The R&S®SmartGrid function supports flexible placement of the signals in a suitable diagram. The protocol data can also be displayed in a decode table.
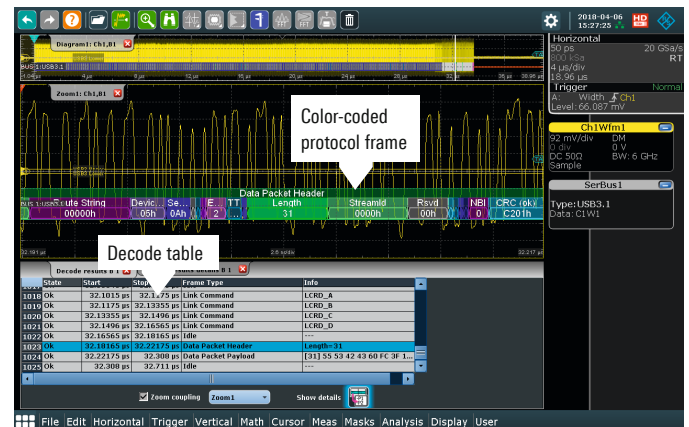
Clear display of decoded data in the waveform and in the decode table

General purpose MSO

Upgrade any R&S®RTP with the mixed signal option

The R&S®RTP-B1 mixed signal option (MSO) adds 16 digital channels to the instrument without compromising other test resources. Thanks to the unique plug & play concept of the R&S®RTP, you can quickly install the hardware option on site without opening the oscilloscope. Simply insert it into an option slot on the front or rear panel. With a sampling rate of 5 Gsample/s, the R&S®RTP-B1 provides high time resolution of 200 ps for all digital channels. This sampling rate is available over the entire memory depth of 200 Msample per channel. The MSO option offers comprehensive trigger capabilities to detect critical events such as narrow glitches or certain pattern combinations.

R&S®RTP-B1 MSO option
❙ 16 digital channels (2 logic probes)
❙ 100 kΩ || 4 pF input impedance
❙ 400 MHz signal frequency
❙ 5 Gsample/s per channel sampling rate
❙ 200 Msample per channel acquisition rate
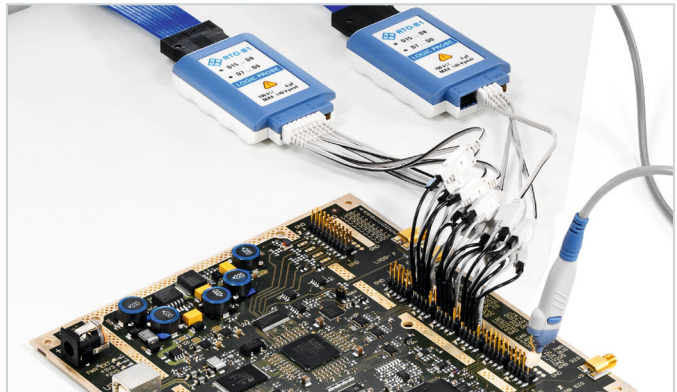
Every R&S®RTP can be upgraded on site with 16 digital channels

Analysis of low-speed serial protocols with digital channels

Today, high-speed interfaces are often combined with low-speed control or programming buses in a single device. Use the digital channels of the R&S®RTP-B1 option to trigger and decode low-speed serial protocols such as SPI and I²C with the appropriate protocol options. All protocol analysis tools for the analog channels, such as decode table and search, are also available for the digital channels. Trigger on protocol details such as start, address and data in order to focus the analysis on dedicated events.

The digital channels are ideal for triggering and decoding low-speed serial interfaces such as SPI

High-precision voltage and current channels

R&S®RT-ZVC multi-channel power probe module

Voltage ranges	
±1.88 V, ±3.75 V, ±7.5 V, ±15 V	
Current ranges	
Low-gain mode	Shunt
▮ ±4.5 µA; ±45 µA	▮ 10 kΩ
▮ ±4.5 mA; ±45 mA	▮ 10 Ω
▮ ±4.5 A; ±10 A	▮ 10 mΩ
▮ ±45 mV [1]; ±450 mV [1]	▮ external

[1] Current range depends on shunt value.

Additional 8 voltage and 8 current channels

The R&S®RTP oscilloscope supports up to two R&S®RT-ZVC multi-channel power probe modules with four current and four voltage channels each. These 16 high-precision measurement channels are usable in parallel with the high-speed analog channel of the R&S®RTP. A key application is time-correlated measurement of a DUT's power consumption during ramp-up, standard operation and sleep mode.

Very high dynamic range with 18-bit resolution

Each of the R&S®RT-ZVC channels operates with an 18-bit 5 Msample/s A/D converter and features a high DC accuracy of 0.1% for voltage measurements and 0.2% for current measurements. The high A/D converter resolution provides the right measurement dynamic range to verify current consumption transitions from µA to A as happens when battery-powered devices switch from or into sleep mode. The high DC accuracy is ideal for precisely monitoring the timing and tolerances of power rail voltages of sophisticated embedded devices.

Full GUI integration

The operation of the R&S®RT-ZVC modules is fully integrated into the R&S®RTP oscilloscope graphical user interface (GUI). The R&S®RT-ZVC channels can be handled like standard oscilloscope channels, including position on the display, vertical scaling and analysis tools like cursors and automated measurements.

Precise current and voltage measurements with the R&S®RT-ZVC module's 18-bit channels

Integrated arbitrary waveform generator

Device stimulus with a two-channel 100 MHz arbitrary waveform generator

The R&S®RTP oscilloscope offers a fully integrated two-channel 100 MHz function and arbitrary waveform generator, including an eight-channel pattern generator, as a retrofitable hardware option. This integrated generator with 500 Msample/s and 14-bit resolution saves space on the test bench and provides both standard and arbitrary stimulus to the DUT. By combining both generator channels, differential device inputs can also be stimulated. Another powerful feature of the generator is that playback of captured waveforms can be manipulated by changing the amplitude and offset level or be superimposed with noise to evaluate a device against design criteria.

Specifications in brief	
Analog output	2 channels
Bandwidth	100 MHz
Sampling rate	500 Msample/s
Resolution	14 bit
Operating modes	❙ Function generator (sine, square, ramp, DC, pulse, cardinal sine, cardiac, Gauss, Lorentz, exponential rise/fall) ❙ Modulation generator (AM, FM, FSK) ❙ Sweep generator ❙ Arbitrary waveform generator
Pattern generator	8 channels
Memory	40 Msample per channel

Protocol based programming with the eight-channel pattern generator

The R&S®RTP-B6 can be used for protocol based programming of devices under test. For instance, an SPI based programming sequence can be used to control the device during the debug and verification process. The generator will control the device and change the configuration while the DUT is being measured with the oscilloscope. This makes it easy to analyze switching effects and timing related parameters.

In addition, for fully automated compliance testing, R&S®ScopeSuite can utilize the integrated R&S®RTP-B6 arbitrary waveform and pattern generator.
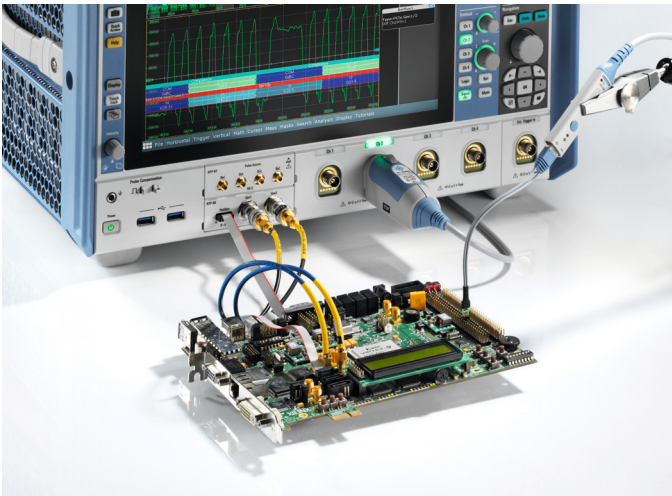
Measurement of LVDS signals using the integrated arbitrary waveform generator as the clock signal and the 8-bit pattern generator to program and control the device

16 GHz differential pulse source

Differential pulse signal with configurable parameters

The R&S®RTP-B7 pulse source provides a highly symmetrical differential pulse signal with a steep rise time of 22 ps.

The key parameters of the pulse source are user adjustable. The output level ranges from –50 mV to –200 mV and can be set in 10 mV steps. The pulse repetition rate and the duty cycle are programmable in the range of 5 Hz to 250 MHz and 10 % to 90 % respectively.

With an output skew of < 0.5 ps, the R&S®RTP-B7 also provides an accurate source for deskewing the measurement setup with multiple channels. Due to its differential nature, the R&S®RTP-B7 is ideal for deskewing cables and probes for differential measurements.

TDR/TDT analysis

The R&S®RTP-K130 option combines the R&S®RTP-B7 pulse source and the analog input channels of the R&S®RTP oscilloscope to create a time domain reflection (TDR) and transmission (TDT) analysis system that supports the characterization and debugging of signal paths, including PCB traces, cables and connectors. The option allows both single-ended and differential measurements. The TDR/TDT software includes a wizard that guides the user through setup, calibration and analysis. The resulting waveforms can be displayed as impedance or reflection coefficient over time or distance. All oscilloscope analysis tools such as cursor and automated measurements can be used.

Parameter	Value range
Analog bandwidth, rise time	> 16.5 GHz, 22 ps
Skew	< 0.5 ps
Output low level	–200 mV to –50 mV, 10 mV steps
Repetition rate	
Locked	5/10/20/50/100/200/500 Hz, 1/5/10/25/50/100/250 MHz
Free running	5/10/20/50/100/200/500 Hz, 1/5/10/25/50 MHz
Duty cycle	
Repetition rate < 5 MHz	10 % to 90 %, 10 % steps
Repetition rate > 5 MHz	50 % (const.)
Clock mode	locked, unlocked/free running
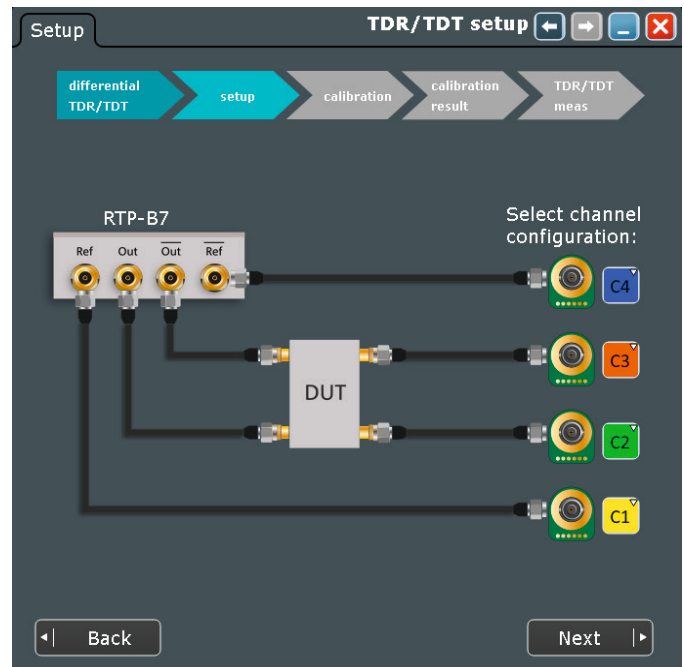
TDR/TDT wizard supports setup, calibration and analysis

Differential test setup with the R&S®RTP-B7 pulse source and the R&S®RTP-K130 TDR/TDT analysis option

Compact and configurable

Setting new industry standards with the R&S®RTP
- Most comprehensive and fastest debugging instrument on the market
- Outstanding realtime signal integrity
- Most compact high-performance oscilloscope up to 16 GHz
- Windows 10 platform

Expand as your requirements grow
- 4 option slots to add hardware such as
  - 16-channel, general purpose MSO
  - Multiple high-precision, 18-bit current and voltage channels
  - Arbitrary waveform generator
  - 16 GHz differential pulse source
- Upgrade path for bandwidth and memory
- Optional realtime deembedding capabilities
- Optional high-speed serial pattern trigger with up to 16 Gbps hardware CDR

Industry's most compact and silent high-performance oscilloscope
- Premium design with high-resolution 12.1" display
- Compact benchtop instrument
- Silent operation without annoying fan noise

Quickly operate the instrument via touchscreen
- Easily customizable waveform display with R&S®SmartGrid technology
- Fast access to important tools via the toolbar
- Fast configuration on the sidebar
- Touchscreen gesture support
- Unique color coding

Use the app cockpit to quickly access applications
- Directly access all analysis functions
- Easily add user applications
- Decode protocols in seconds

Versatile connectivity
- 18 GHz BNC-compatible Rohde & Schwarz probe interface for measurement channels and external trigger
- Comprehensive probe portfolio

Interfaces
- Four USB 3.0 and two USB 2.0 ports
- USB device port
- Removable SSD
- DVI-D and display port
- LAN connector with 1 Gbps support
- GPIB IEEE-4811 interface
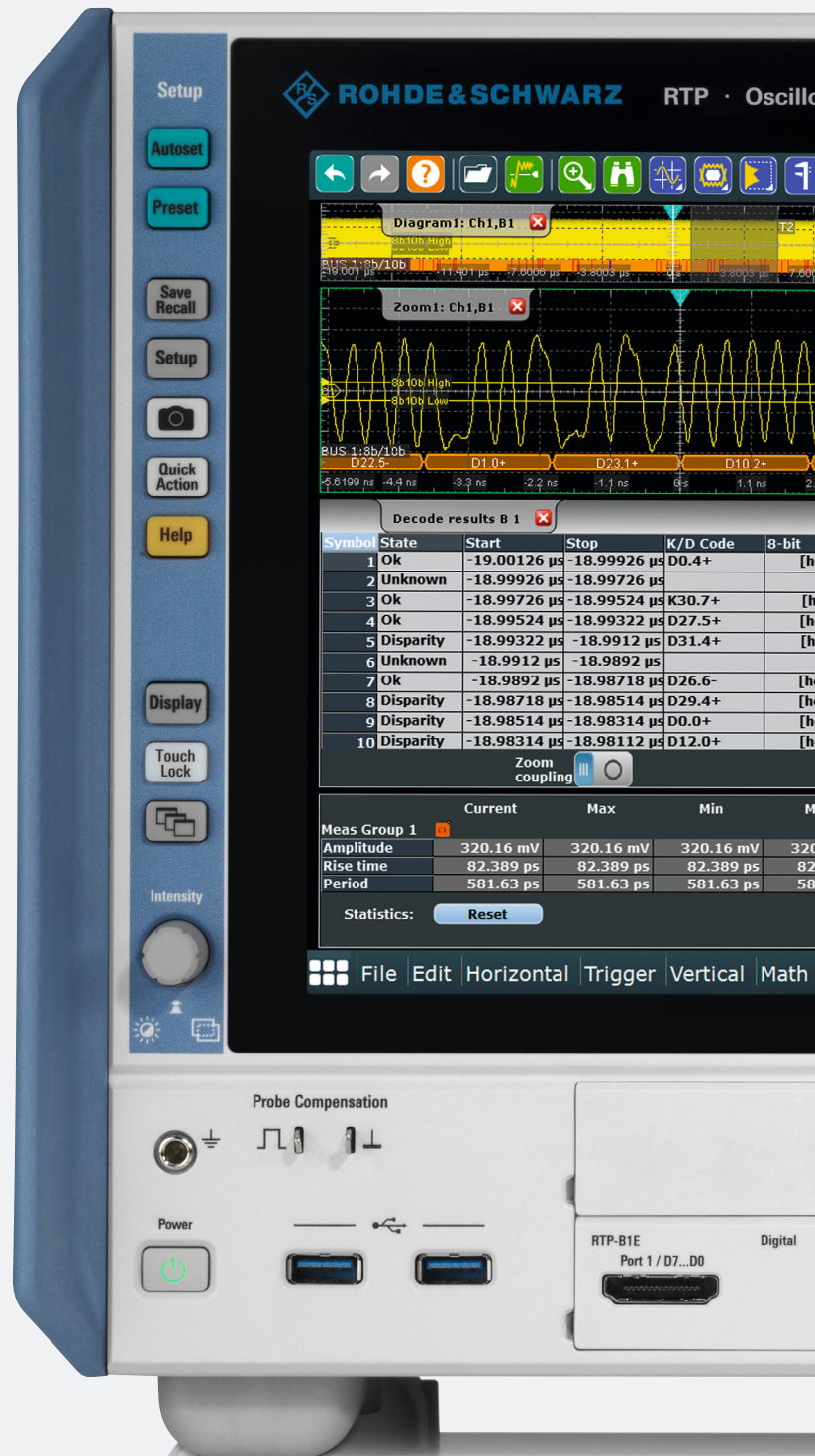
Comprehensive probe portfolio

Diverse probing options

R&S®RTP oscilloscopes support a broad range of probing solutions to address various measurement requirements. The oscilloscope automatically detects Rohde & Schwarz active probes and corrects the frequency response to obtain a flat characteristic. For applications with a 50 Ω SMA connector, R&S®RTP oscilloscopes come with a high-precision BNC to SMA adapter.

Diverse probing options

R&S®RTP	
R&S®Probe Interface	

- Transmission line probe
- SMA adapter
- 1 MΩ adapter
- Current probes
- Passive probes
- High voltage probes
- Modular system
- Single-ended and differential
- Power rail
- EMI near-field
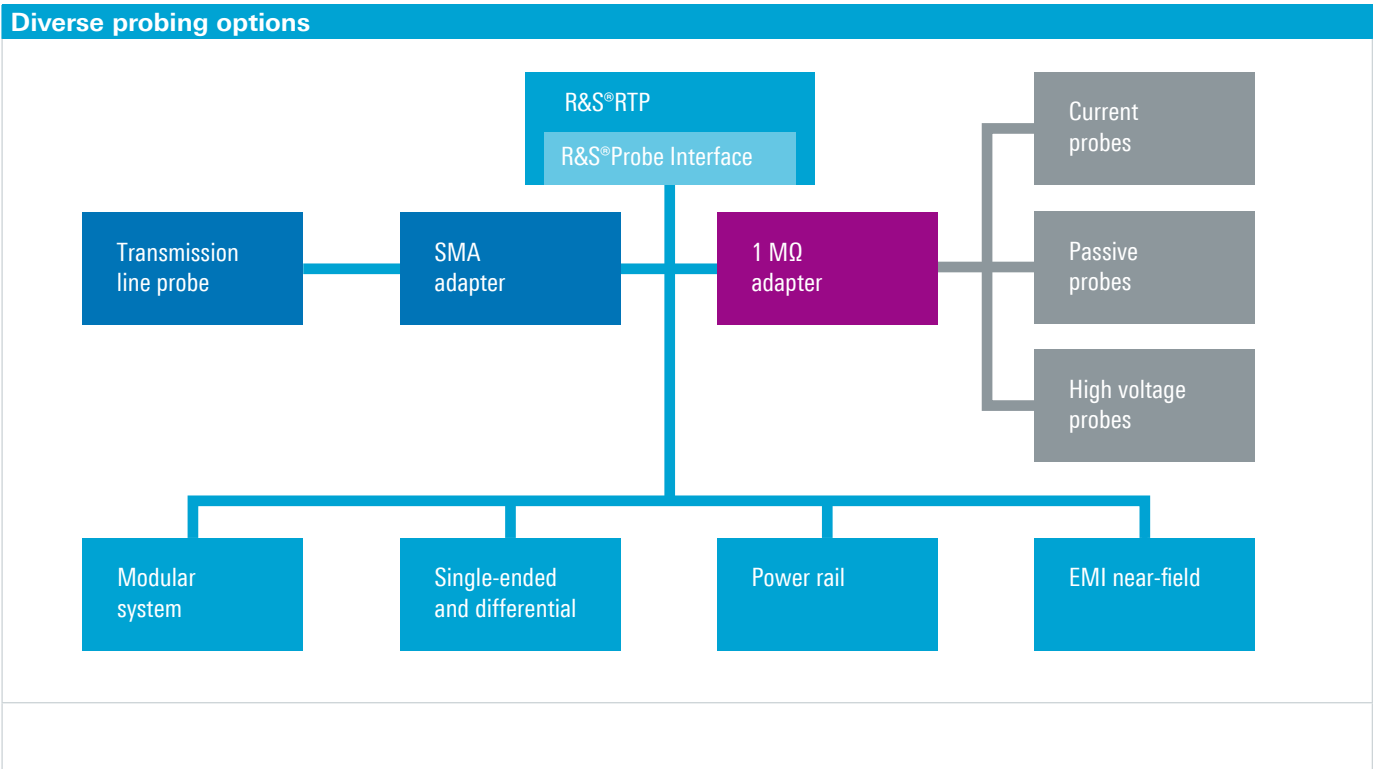
Recommended broadband probes

Oscilloscope	R&S®RTP044	R&S®RTP064	R&S®RTP084	R&S®RTP134	R&S®RTP164
R&S®RT-ZM modular probes					
R&S®RT-ZM160					
R&S®RT-ZM130					
R&S®RT-ZM90					
R&S®RT-ZM60					
R&S®RT-ZZ transmission line probe					
R&S®RT-ZZ80					
R&S®RT-ZS/R&S®RT-ZD single-ended/differential active probes					
R&S®RT-ZS60					
R&S®RT-ZD40					

Variety of general purpose probes

Active broadband probes

High input impedance of 1 MΩ, low input capacitance of < 1 pF and a wide dynamic range are typical characteristics of Rohde & Schwarz active broadband probes. Useful supplemental functions, such as offset compensation in the probe, an integrated, high-precision voltmeter and a micro button for convenient control of the oscilloscope, support users in their daily work.

The Rohde & Schwarz probe interface allows the oscilloscope to automatically detect the probes when they are connected and load the probe-type-specific correction factor for a flat frequency response.

The probes are available as single-ended (R&S®RT-ZSxx) and differential (R&S®RT-ZDxx) models. The probe bandwidth ranges from 1 GHz to 6 GHz for R&S®RT-ZSxx probes and 1 GHz to 4.5 GHz for R&S®RT-ZDxx probes.

R&S®RT-ZS60   R&S®RT-ZD40

Model	Bandwidth	Attenuation factor	Input impedance	Dynamic range	Offset compensation
R&S®RT-ZS60 single-ended	6 GHz	10:1	1 MΩ || 0.3 pF	±8 V	±10 V
R&S®RT-ZD40 differential	4.5 GHz, typ. 5.5 GHz	10:1	1 MΩ || 0.4 pF	±5 V	±5 V

R&S®RT-ZZ80 passive broadband probe

Low noise, high linearity and a purely passive implementation make passive broadband probes an economical solution for measuring controlled impedance lines.
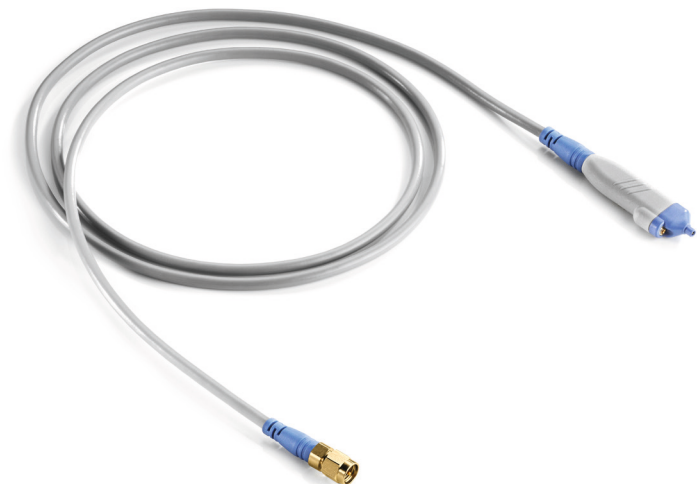
Model	Bandwidth	Attenuation factor	Input impedance	Dynamic range	Comment
R&S®RT-ZZ80	8 GHz	10:1	500 Ω || 0.3 pF	20 V (RMS) max. input voltage	connect with R&S®RT-ZA16 high-precision SMA adapter

Modular probing solutions

Versatile and flexible modular probe system

The R&S®RT-ZM modular probe system addresses today's probing requirements with a technically sophisticated, yet easy-to-handle design. The various probing solutions meet the demands for high probing bandwidth and dynamic range in conjunction with the need for low capacitive load. The R&S®RT-ZM probe system includes probe tip modules for various measurement tasks and conditions. The probe tip modules are connected to the amplifier modules with bandwidths ranging from 1.5 GHz to 16 GHz.

The modular probe system offers multimode functionality and a unique offset compensation range of ±16 V at the tip of the probe. In addition, the integrated R&S®ProbeMeter performs high-precision, 18-bit based DC voltage measurements in parallel and independently of the oscilloscope settings.

R&S®RT-ZM amplifier module with the Rohde & Schwarz probe interface

Probe tip modules for the R&S®RT-ZM

R&S®RT-ZMA50 [1]

R&S®RT-ZMA11 [2]

R&S®RT-ZM

R&S®RT-ZMA10

R&S®RT-ZMA12

R&S®RT-ZMA15

R&S®RT-ZMA14 [3]

R&S®RT-ZMA30
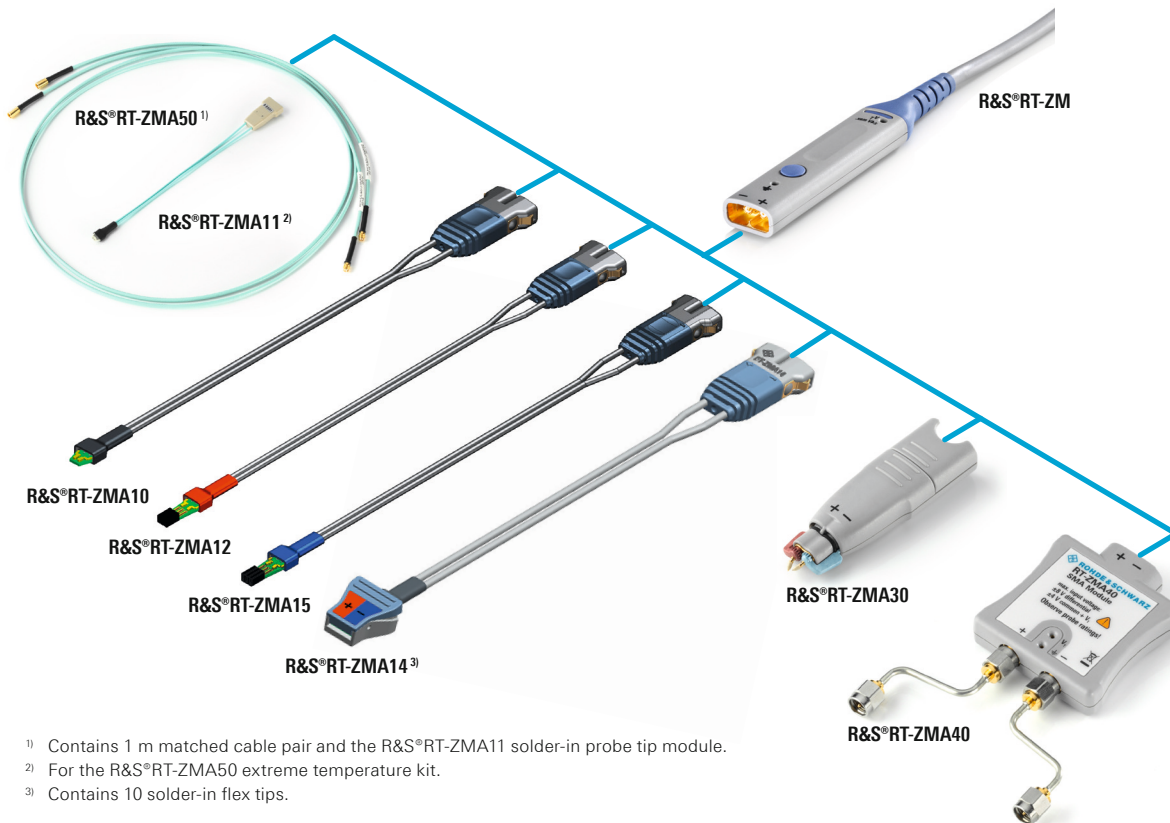
R&S®RT-ZMA40

[1] Contains 1 m matched cable pair and the R&S®RT-ZMA11 solder-in probe tip module.
[2] For the R&S®RT-ZMA50 extreme temperature kit.
[3] Contains 10 solder-in flex tips.

▷ For detailed information, see R&S®RT-ZM flyer PD 3607.5690.32

Multimode: multiple measurements with a single connection

The multimode functionality allows you to switch between single-ended, differential and common mode measurements without reconnecting or resoldering the probe tip.

The multimode functionality is implemented on the company-designed, high-speed R&S®RT-ZM amplifier ASIC and is easily controlled from the oscilloscope GUI.

Offset compensation for maximum resolution

The R&S®RT-ZM modular probe system offers a high off-set compensation range of ±16 V. The DC components of a measured signal can be compensated at the probe tip in order to extend the operating voltage window beyond the dynamic range of the probe amplifier module. The signal components of interest can then be displayed on the oscilloscope with maximum resolution.

Setup dialog with user-configurable parameters of the modular probe

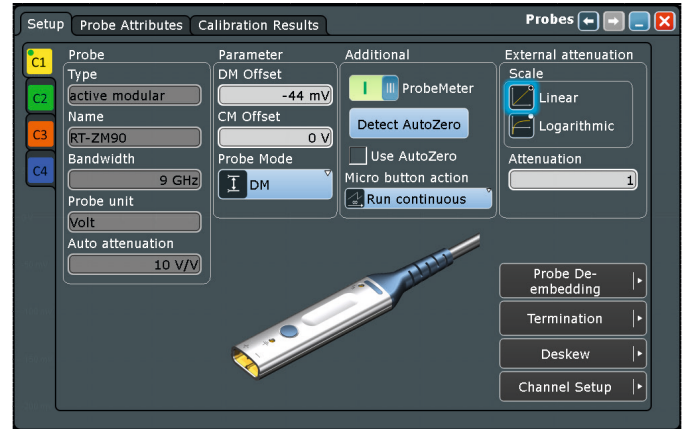| Model	System bandwidth	Rise time (10% to 90%)	Multimode[1]	Comment	Order No.
Probe amplifier modules					
R&S®RT-ZM15	> 1.5 GHz	< 230 ps			1800.4700.02
R&S®RT-ZM30	> 3 GHz	< 100 ps			1419.3005.02
R&S®RT-ZM60	> 6 GHz	< 75 ps			1419.3105.02
R&S®RT-ZM90	> 9 GHz	< 50 ps			1419.3205.02
R&S®RT-ZM130	> 13 GHz	< 35 ps			1800.4500.02
R&S®RT-ZM160	16 GHz	< 28 ps			1800.4600.02
Probe tip modules					
R&S®RT-ZMA10	16 GHz (meas.)	28 ps	P/N/DM/CM	length: 15 cm (5.9 in), suitable for R&S®RT-ZMA50	1419.4301.02
R&S®RT-ZMA10-6				set of 6 R&S®RT-ZMA10 solder-in probe tip modules	1801.4349.02
R&S®RT-ZMA11	16 GHz (meas.)	28 ps	P/N/DM/CM	length: 15 cm (5.9 in)	1419.4318.02
R&S®RT-ZMA12	6 GHz (meas.)	75 ps	P/N/DM/CM	length: 15 cm (5.9 in)	1419.4324.02
R&S®RT-ZMA14	16 GHz (meas.)	28 ps	P/N/DM/CM	length: 15 cm (5.9 in), incl. 10 solder-in flex tips	1338.1010.02
R&S®RT-ZMA15	12 GHz (meas.)	37 ps	P/N/DM/CM	length: 15 cm (5.9 in)	1419.4224.02
R&S®RT-ZMA30	16 GHz (meas.)	28 ps	DM		1419.4353.02
R&S®RT-ZMA40	16 GHz (meas.)	28 ps	P/N/DM/CM	50 Ω/100 Ω, suitable for SMA, 3.5 mm and 2.92 mm systems, termination voltage ±4 V, supplied from R&S®RT-ZM probe amplifier module	1419.4201.02
R&S®RT-ZMA50	12 GHz (meas.)	37 ps	P/N/DM/CM	cable length: 1 m (39.37 in); consists of R&S®RT-ZMA11 and a pair of matched extension cables, temperature range: –55°C to +125°C	1419.4218.02
Accessories					
R&S®RT-ZMA1				for up to 6 R&S®RT-ZMAxx probe tip modules	1419.3928.02
R&S®RT-ZAP				3D probe positioner	1326.3641.02
R&S®RT-ZF30				test fixture for probe characterization with R&S®RTP-B7	1333.2099.02

[1] Multimode:
DM: differential measurement, CM: common mode measurement, P: single-ended measurement on positive pin, N: single-ended measurement on negative pin.

Power integrity probes

Power rail characterization

High bandwidth, high sensitivity, very low noise and an extra-large offset compensation make the R&S®RT-ZPR an excellent probe for characterizing power rails. With a bandwidth of up to 4 GHz, excellent sensitivity due to the 1:1 attenuation ratio and low noise, the R&S®RT-ZPR40 excels at precise ripple measurements. Coupled with the oscilloscope's powerful frequency analysis capabilities, the R&S®RT-ZPR probes can be used to isolate periodic and random disturbances (PARD). An integrated high-precision, 18-bit DC voltmeter provides an instantaneous DC voltage readout in parallel.

Measuring small voltages riding on large DC offsets

With the ±60 V offset compensation range, the R&S®RT-ZPR power rail probes allow you to focus on small ripples on the power rail's DC voltage. Whether you need to zoom in on a 1 V or much higher DC level, the probe provides the required offset while maintaining lowest vertical resolution.

R&S®ProbeMeter: integrated high-precision DC voltmeter

The R&S®RT-ZPR power rail probe incorporates a high-precision DC voltmeter to accurately measure the DC level of a power rail. The integrated 18-bit DC voltmeter with an input voltage range of ±60 V easily and accurately monitors long-term drift of the DC level.

The high bandwidth of the R&S®RT-ZPR power rail probes allows you to capture high-frequency noise components

Accurately verify DC level and power supply load response during initialization of a DDR memory with the R&S®RT-ZPR power rail probe and its integrated high-precision R&S®ProbeMeter

Model	Bandwidth	Attenuation factor	Input impedance	Dynamic range	Comment	Order No.
R&S®RT-ZPR40	4.0 GHz	1:1	50 kΩ	±0.85 V (±60 V offset compensation), optional AC coupling	R&S®ProbeMeter	1800.5406.02

Connectivity

High impedance requirements

To extend the functionality of the R&S®RTP oscilloscope and make use of probes that require a high impedance input, the R&S®RT-Z1M adapter can be used. The 1 MΩ adapter allows you to connect probes such as standard passive and high voltage probes as well as current probes to the oscilloscope.

The integrated R&S®ProbeMeter additionally supports high-precision DC voltage measurements with 0.01% measurement accuracy.

Model	Bandwidth	Input impedance	Offset range	Input coupling	Comment	Order No.
R&S®RT-Z1M	500 MHz	1 MΩ ± 1% ‖ 12 pF	±60 V (max.)	DC, AC, GND	R&S®ProbeMeter	1337.9200.02

Connectivity

R&S®RTP oscilloscopes come with two R&S®RT-ZA16 precision BNC to SMA adapters. The adapter enables a coaxial SMA connection to the R&S®RTP oscilloscope's 18 GHz BNC-compatible probe interface.

R&S®RT-ZA16 precision BNC to SMA adapter

A low-loss and phase-matched cable pair with a length of 1 m (R&S®RT-ZA17) is available for high-precision measurements. The cables are configured with 3.5 mm male connectors on both sides. The specified skew error between the matched cables is below 5 ps.

R&S®RT-ZA17 cable

R&S®RT-ZA17 specification in brief	
Cable length	1 m
Connectors	3.5 mm (m) to 3.5 mm (m)
Frequency	26.5 GHz
Skew error	< 5 ps
Matching	> 15 dB

Oscilloscope portfolio

R&S®	RTH1000	RTC1000	RTB2000	RTM3000
Vertical				
Bandwidth	60/100/200/350/500 MHz [1]	50/70/100/200/300 MHz [1]	70/100/200/300 MHz [1]	100/200/350/500 MHz/1 GHz [1]
Number of channels	2 plus DMM/4	2	2/4	2/4
Resolution	10 bit	8 bit	10 bit	10 bit
V/div 1 MΩ	2 mV to 100 V	1 mV to 10 V	1 mV to 5 V	500 µV to 10 V
V/div 50 Ω	–			500 µV to 1 V
Horizontal				
Sampling rate per channel (in Gsample/s)	1.25 (4-channel model); 2.5 (2-channel model); 5 (all channels interleaved)	1; 2 (2 channels interleaved)	1.25; 2.5 (2 channels interleaved)	2.5; 5 (2 channels interleaved)
Max. memory (per channel/1 channel active)	125 ksample (4-channel model); 250 ksample (2-channel model); 500 ksample (50 Msample in segmented memory mode [2])	1 Msample; 2 Msample	10 Msample; 20 Msample (160 Msample in segmented memory mode [2])	40 Msample; 80 Msample (400 Msample in segmented memory mode [2])
Segmented memory	option	–	option	option
Acquisition rate (in waveforms/s)	50 000	10 000	50 000 (300 000 in fast segmented memory mode [2])	64 000 (2 000 000 in fast segmented memory mode [2])
Trigger				
Options	advanced, digital trigger (14 trigger types) [2]	elementary (5 trigger types)	basic (7 trigger types)	basic (10 trigger types)
Mixed signal option				
No. of digital channels [1]	8	8	16	16
Sampling rate of digital channels (in Gsample/s)	1.25	1	1.25	two logic probes: 2.5 on each channel; one logic probe: 5 on each channel
Memory of digital channels	125 ksample	1 Msample	10 Msample	two logic probes: 40 Msample per channel; one logic probe: 80 Msample per channel
Analysis				
Cursor meas. types	4	13	4	4
Stand. meas. functions	37	31	32	32
Mask test	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)	elementary (tolerance mask around the signal)
Mathematics	elementary	elementary	basic (math on math)	basic (math on math)
Serial protocols triggering and decoding [1]	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, CAN-FD, SENT (7)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN (5)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN (5)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429 (8)
Display functions	data logger	–	–	–
Applications [1], [2]	high-resolution frequency counter, advanced spectrum analysis, harmonics analysis	digital voltmeter (DVM), component tester, fast Fourier transform (FFT)	digital voltmeter (DVM), fast Fourier transform (FFT), frequency response analysis [3]	power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis [3]
Compliance testing [1], [2]	–	–	–	–
Display and operation				
Size and resolution	7", color, 800 × 480 pixel	6.5", color, 640 × 480 pixel	10.1", color, 1280 × 800 pixel	10.1", color, 1280 × 800 pixel
Operation	optimized for touchscreen operation, parallel button operation	optimized for fast button operation	optimized for touchscreen operation, parallel button operation	
General data				
Dimensions in mm (W × H × D)	201 × 293 × 74	285 × 175 × 140	390 × 220 × 152	390 × 220 × 152
Weight in kg	2.4	1.7	2.5	3.3
Battery	lithium-ion, > 4 h	–	–	–

[1] Upgradeable. [2] Requires an option. [3] Available as of Q1 2019.

RTA4000	RTE1000	RTO2000	RTP
200/350/500 MHz/1 GHz[1]	200/350/500 MHz/1/1.5/2 GHz[1]	600 MHz/1/2/3/4/6 GHz[1]	4/6/8/13/16 GHz[1]
4	2/4	2/4 (only 4 channels in 4 GHz and 6 GHz models)	4
10 bit	8 bit (up to 16 bit with HD mode)	8 bit (up to 16 bit with HD mode)[2]	8 bit (up to 16 bit with HD mode)[2]
500 µV to 10 V	500 µV to 10 V	1 mV to 10 V (500 µV to 10 V)[2]	
500 µV to 1 V	500 µV to 1 V	1 mV to 1 V (500 µV to 1 V)[2]	1 mV to 1 V
2.5; 5 (2 channels interleaved)	5	10; 20 (2 channels interleaved in 4 GHz and 6 GHz model)	20; 40 (2 channels interleaved)
100 Msample; 200 Msample (1 Gsample in segmented memory mode)	50 Msample/200 Msample	standard: 50 Msample/200 Msample; max. upgrade: 1 Gsample/2 Gsample	standard: 50 Msample/200 Msample; max. upgrade: 1 Gsample/2 Gsample
standard	standard	standard	standard
64 000 (2 000 000 in fast segmented memory mode)	1 000 000 (1 600 000 in ultra-segmented memory mode)	1 000 000 (2 500 000 in ultra-segmented memory mode)	750 000 (3 200 000 in ultra-segmented memory mode)
basic (10 trigger types)	advanced, digital trigger (13 trigger types)	advanced (includes zone trigger), digital trigger (14 trigger types)[2]	advanced, digital trigger (14 trigger types) with realtime deembedding[2], high-speed serial pattern trigger incl. 8/16 Gbps CDR[2], zone trigger[2]
16	16	16	16
two logic probes: 2.5 on each channel; one logic probe: 5 on each channel	5	5	5
two logic probes: 100 Msample per channel; one logic probe: 200 Msample per channel	100 Msample	200 Msample	200 Msample
4	3	3	3
32	47	47	47
elementary (tolerance mask around the signal)	advanced (user-configurable, hardware based)	advanced (user-configurable, hardware based)	advanced (user-configurable, hardware based)
basic (math on math)	advanced (formula editor)	advanced (formula editor)	advanced (formula editor)
I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429 (8)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429, FlexRay™, CAN-FD, USB 2.0/HSIC, Ethernet, Manchester, NRZ, SENT, SpaceWire, CXPI, USB Power Delivery, automotive Ethernet 100BASE-T1 (19)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429, FlexRay™, CAN-FD, MIPI RFFE, USB 2.0/HSIC, MDIO, 8b10b, Ethernet, Manchester, NRZ, SENT, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, CXPI, USB 3.1 Gen1, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, automotive Ethernet 100BASE-T1 (27)	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, MIL-STD-1553, ARINC 429, CAN-FD, MIPI RFFE, USB 2.0/ HSIC, MDIO, 8b10b, Ethernet, Manchester, NRZ, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, USB 3.1 Gen1/Gen2, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, automotive Ethernet 100BASE-T1 (20)
–	histogram, trend, track[2]	histogram, trend, track[2]	histogram, trend, track
power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis[3]	power, 16-bit high definition mode (standard), advanced spectrum analysis and spectrogram	power, 16-bit high definition mode, advanced spectrum analysis and spectrogram, jitter, clock data recovery, I/Q data, RF analysis, deembedding	16-bit high definition mode, advanced spectrum analysis and spectrogram, jitter, I/Q data, RF analysis, realtime deembedding, TDR/TDT analysis
–	–	various options available (see PD 3607.2684.22)	various options available (see PD 5215.4152.22)
10.1", color, 1280 × 800 pixel	10.4", color, 1024 × 768 pixel	12.1", color, 1280 × 800 pixel	12.1", color, 1280 × 800 pixel
optimized for touchscreen operation, parallel button operation			
390 × 220 × 152	427 × 249 × 204	427 × 249 × 204	441 × 285 × 316
3.3	8.6	9.6	18
–	–	–	–

Specifications in brief

Specifications in brief		
Vertical system		
Number of channels		4
Analog bandwidth (–3 dB)	R&S®RTP044	4 GHz
	R&S®RTP064	6 GHz
	R&S®RTP084	8 GHz
	R&S®RTP134	13 GHz (2 channels interleaved)
	R&S®RTP164	16 GHz (2 channels interleaved)
Impedance		50 Ω
Input sensitivity	max. bandwidth in all ranges	50 Ω: 2 mV/div to 1 V/div
Offset range	> 100 mV/div	±5 V
	≤ 100 mV/div	±(1.5 V – input sensitivity × 5 div)
Resolution		8 bit, up to 16 bit in HD mode
Acquisition system		
Realtime sampling rate	R&S®RTP044/064/084/134/164	40 Gsample/s (2 channels interleaved) 20 Gsample/s on each channel
Acquisition memory	standard configuration	50 Msample on 4 channels; 200 Msample on 1 channel
	max. upgrade (R&S®RTP-B110 option)	1 Gsample on 4 channels; 2 Gsample on 2 channels
Max. acquisition rate	continuous acquisition and display, 40 Gsample/s, 1 ksample	> 750 000 waveforms/s
Deembedding (optional)		realtime deembedding of signal path characteristics based on S-parameters
Horizontal system		
Timebase range		20 ps/div to 10 000 s/div
Accuracy	OCXO as standard, after delivery/calibration	±0.01 ppm
	during calibration interval	±0.1 ppm
Trigger system		
Trigger types	all trigger types up to full bandwidth; based on realtime deembedding (optional)	edge, glitch, width, runt, window, timeout, interval, slew rate, data2clock, pattern, state, TV/video, serial protocol triggers (optional), zone trigger (optional), high-speed serial pattern with 16 Gbps CDR (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	441 mm × 285 mm × 316 mm (17.36 in × 11.22 in × 12.44 in)
Weight		18 kg (39.68 lb)
Screen		12.1" LC TFT capacitive color touchscreen, 1280 × 800 pixel (WXGA)
Option slots	2 slots on front side, 2 slots on rear side for upgrading with various hardware options	MSO (16 channels, 400 MHz), R&S®RT-ZVC (multiple high-precision voltage and current channels), arbitrary waveform generator, 16 GHz differential pulse source
Interfaces		1 Gbps LAN, type A: 4 × USB 3.1, 2 × USB 2.0, type B: 1 × USB 3.1, GPIB (standard), DVI and display port for external monitor, external trigger with active probe interface, trigger output, ref in: 1 MHz to 20 MHz, ref out: 10 MHz

Ordering information

Step 1: Choose needed bandwidth and channels

	4 channels
4 GHz	R&S®RTP044
6 GHz	R&S®RTP064
8 GHz	R&S®RTP084
13 GHz	R&S®RTP134
16 GHz	R&S®RTP164

Step 2: Choose additional test resources

16 digital channels	R&S®RTP-B1
Arbitrary waveform generator	R&S®RTP-B6
16 GHz differential pulse source	R&S®RTP-B7
Multi-channel power probe (4 + 4 channels V/I)	R&S®RTP-ZVC04

Step 3: Choose software options

Technology	Triggering and decoding	Compliance	Test fixture set
Trigger and decode bundle	R&S®RTP-TDBNDL (incl. R&S®RTP-K1/K2/-K3/ -K6/-K7/-K8/-K9/-K50/-K52/ -K55/-K65)		
Embedded			
I²C/SPI	R&S®RTP-K1		
UART/RS-232/422/485	R&S®RTP-K2		
10/100 Mbit Ethernet	R&S®RTP-K8	R&S®RTP-K22	R&S®RT-ZF2
1 Gbit Ethernet		R&S®RTP-K22	R&S®RT-ZF2, R&S®RT-ZF2C
2.5G/5GBASE-T Ethernet		R&S®RTP-K25	R&S®RT-ZF2
10 Gbit Ethernet		R&S®RTP-K23	R&S®RT-ZF2
10M/100M/1GBASE-T Energy Efficient Ethernet		R&S®RTP-K86	R&S®RT-ZF4, R&S®RT-ZF5
8b10b	R&S®RTP-K52		
MDIO	R&S®RTP-K55		
USB 1.0/1.1/2.0/HSIC	R&S®RTP-K60	R&S®RTP-K21	R&S®RT-ZF1
USB-PD	R&S®RTP-K63		
USB-SSIC	R&S®RTP-K64		
USB 3.1 Gen 1	R&S®RTP-K61		
USB 3.1 Gen 2	R&S®RTP-K62		
PCI Express Gen 1/2	R&S®RTP-K72	R&S®RTP-K81	[1]
DDR3		R&S®RTP-K91	[2]
DDR4		R&S®RTP-K93	[2]
Automotive			
CAN/LIN	R&S®RTP-K3		
CAN-FD	R&S®RTP-K9		
100BASE-T1/BroadR-Reach® Ethernet	R&S®RTP-K57	R&S®RTP-K24	R&S®RT-ZF2, R&S®RT-ZF3, R&S®RT-ZF5
1000BASE-T1 Ethernet		R&S®RTP-K87	R&S®RT-ZF2, R&S®RT-ZF6
Aerospace			
MIL-STD-1553	R&S®RTP-K6		
ARINC 429	R&S®RTP-K7		
SpaceWire	R&S®RTP-K65		
Mobile communications			
MIPI RFFE	R&S®RTP-K40		
MIPI D-PHY	R&S®RTP-K42	R&S®RTP-K26	
MIPI M-PHY	R&S®RTP-K44		
Configurable			
Manchester, NRZ	R&S®RTP-K50		
Bus analysis	R&S®RTP-K35		

[1] PCI-SIG CCB/CLB: order from www.pcisig.com
[2] DDR3/DDR4 interposer: order from http://www.nexustechnology.com

Step 3: Choose software options

Analysis

Signal integrity bundle	R&S®RTP-SIBNDL (incl. R&S®RTP-K12/-K19/-K121/-K122/-K141)
16-bit high definition mode	R&S®RTP-K17
Deembedding	R&S®RTP-K121
Deembedding, realtime extension	R&S®RTP-K122
High-speed serial pattern trigger (8 Gbps CDR)	R&S®RTP-K140
High-speed serial pattern trigger (16 Gbps CDR)	R&S®RTP-K141
Jitter analysis	R&S®RTP-K12
Spectrogram	R&S®RTP-K37
TDR/TDT analysis	R&S®RTP-K130
Zone trigger	R&S®RTP-K19
RF signal analysis	
I/Q software interface	R&S®RTP-K11
Vector signal explorer software	R&S®VSE
License dongle	R&S®FSPC
Pulse measurements	R&S®VSE-K6
Analog demodulation analysis	R&S®VSE-K7
Transient analysis	R&S®VSE-K60
Vector signal analysis	R&S®VSE-K70
3GPP FDD measurements	R&S®VSE-K72
OFDM vector signal analysis software	R&S®VSE-K96
Software maintenance	R&S®VSE-SWM

Step 4: Choose hardware options

Replacement SSD (Windows 10)	R&S®RTP-B19
Front handles	R&S®RTP-B20
Adapter, rear option slot	R&S®RTP-B21
Memory upgrade	
100 Msample per channel	R&S®RTP-B101
200 Msample per channel	R&S®RTP-B102
500 Msample per channel	R&S®RTP-B105
1 Gsample per channel	R&S®RTP-B110

Step 5: Choose accessories

1 MΩ adapter	R&S®RT-Z1M
Front cover	R&S®RTP-Z1
Hard case	R&S®RTP-Z4
Precision BNC to SMA adapter	R&S®RT-ZA16
High-precision and low-loss matched cable pair, length: 1 m	R&S®RT-ZA17
Rackmount kit	R&S®ZZA-KN6

Step 6: Choose warranty and services

Warranty		
Base unit		3 years
All other items [3]		1 year
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 with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

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

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.

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	Certified Environmental Management
ISO 9001	ISO 14001

Rohde & Schwarz training

www.training.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