R&S®MXO 4 SERIES OSCILLOSCOPE

Next generation oscilloscope for accelerated insight

3 **year warranty**

Product Brochure
Version 04.01

Oscilloscope innovation. Measurement confidence.
www.rohde-schwarz.com/product/MXO4

ROHDE&SCHWARZ

Make ideas real

NEXT GENERATION TECHNOLOGY
R&S®MXO 4 SERIES OSCILLOSCOPES

The R&S®MXO 4 series is the first of a new generation of oscilloscopes that excels in both performance and value. The instruments deliver a once-in-a-decade engineering breakthrough for accelerated insight.

A touch above other oscilloscopes in its segment, the R&S®MXO 4 series oscilloscope sports an impressive 13.3" Full HD capacitive touchscreen and an intuitive user interface with a learning curve of less than 15 minutes.

WHY ENGINEERS CONTINUE TO UPGRADE TO ROHDE & SCHWARZ OSCILLOSCOPES?

► Trusted, global high-quality company with long-term customer commitment and technology innovation
► Industry's newest oscilloscope portfolio from 60 MHz to 16 GHz
► ASIC investments enable world's most responsive oscilloscopes
► Frontend technology developments offer pristine signal integrity
► 16 bit and 18 bit architectures with HD mode provide highest resolution
► Digital triggering delivers world's most sensitive event isolation
► Superior user interface and front panel experience

WHY USE THE R&S®MXO 4?

► World's first oscilloscope with update rate exceeding 4.5 million waveforms per second
► Industry-leading 12 bit ADC at all sample rates
► Industry-best 18 bit architecture
► Fastest and most accurate spectrum analysis in its class
► Industry's deepest standard memory of 400 Mpoints per channel
► Industry's fastest trigger rearm time of 21 ns
► First in class to incorporate newer digital triggering technology
► Industry's most sensitive trigger of 1/10 000 div
► Best in class trigger jitter of < 1 ps
► First oscilloscope with dual-path protocol analysis
► First in class with R&S®SmartGrid user interface

CONTENTS

FEATURES AND BENEFITS

APPLICATIONS

CONFIGURATION

► 200 MHz to 1.5 GHz bandwidth

► Up to 5 Gsample/s sample rate

► 400 Mpoints per channel standard memory

► 12 bit ADC at all sample rates

► 18 bit architecture with HD mode

► Precise digital trigger

ENABLING TECHNOLOGY BLOCKS

THAT HELP GIVE YOU ACCELERATED INSIGHT

The R&S®MXO 4 series oscilloscopes utilize leading-edge technologies to achieve fast and accurate results. Custom technology and innovative features in our oscilloscopes quickly boost your understanding of circuit behaviors.
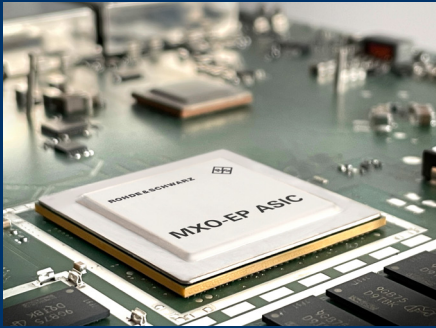
MXO-EP processing ASIC
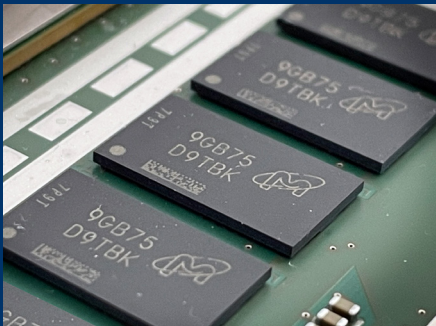See more of your signals, faster.
At the heart of each R&S®MXO 4 series oscilloscope is a Rohde & Schwarz developed application specific integrated circuit (ASIC): MXO-EP (extreme performance). MXO-EP processes 200 Gbit/s to deliver the world's fastest update rate of up to 4.5 million acquisitions/s. See and capture more of your signal, faster. Find rare signal anomalies quickly. Experience the most responsive oscilloscope in the industry.
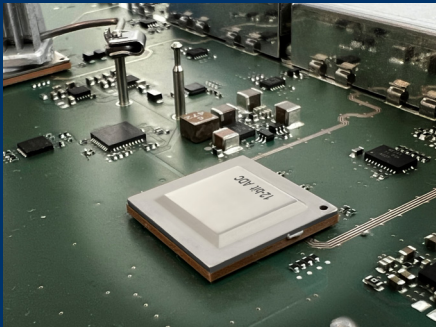
12 bit ADC, 18 bit vertical architecture
Measure your signals accurately.
Measurement accuracy is highly dependent on the components in the signal path, e.g. amplifiers, samplers and A/D converters. The workhorse of the R&S®MXO 4 series is an extremely low noise signal path including a 12 bit ADC. High definition mode (HD) increases vertical resolution to industry best 18 bit architecture. Get accurate measurements all the time.

Responsive deep memory
Capture more of your signals.
R&S®MXO 4 series oscilloscopes come equipped with the industry's deepest standard acquisition memory of 400 Mpoints per channel. Capture up to 80 ms of power up or power down sequences with the highest sample resolution of 200 ps. The memory controller in the MXO-EP ASIC ensures the oscilloscope stays responsive with deep memory.
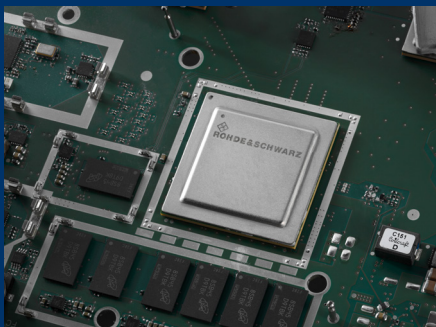
Advanced digital triggering system
Easily isolate subtle signal variations
MXO-EP ASICs incorporate advanced digital triggering that evaluates the A/D converter samples in the acquisition path in real time. Trigger on small events of less than 1/10 000 vertical division that no other oscilloscope can isolate. Choose your own trigger hysteresis. Apply digital filters to suppress noise to get the most precise triggering available.

FIND SIGNAL ANOMALIES QUICKLY
WITH UNPARALLELED UPDATE RATES

▶ World's fastest acquisition rate of up to > 4.5 million waveforms/s shows infrequent anomalies instantly
▶ Up to 90 % real-time signal capture and display ensures instant display of all signal detail
▶ MXO-EP based processing ASIC ensures responsive deep memory

World's fastest update rate

The R&S®MXO 4 oscilloscope processing path implements a dedicated ASIC: the MXO-EP (extreme performance). With optimized signal processing, the R&S®MXO 4 oscilloscopes reach an exceptional update rate. The unique architecture allows the R&S®MXO 4 to acquire, process and display up to 4.5 million waveforms/s.

Real-time acquisition rate
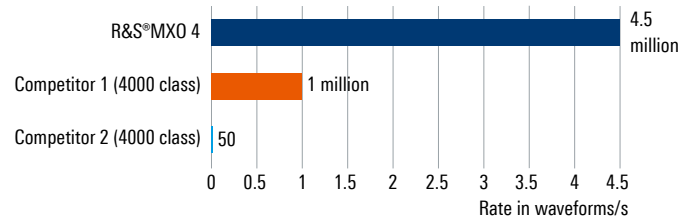
Available with active automatic measurements, FFT or cursor measurements

The R&S®MXO 4 oscilloscopes have a high update rate even when FFTs, automatic measurement or cursor measurements are active. Also when performing analysis with deep memory acquisitions, the ASIC based signal processing paths ensure smooth workflows.
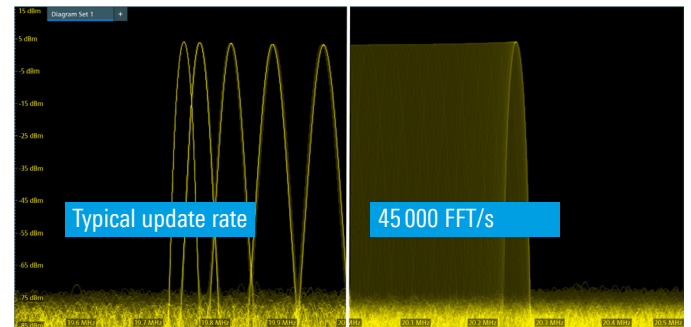
Quickly and reliably detect sporadic signal faults

The statistical confidence in results is higher the more waveforms are acquired. A high update rate increases the likelihood of detecting and displaying signal faults and including them in analysis. The high update rate enables the R&S®MXO 4 to generate trustworthy statistical results based on a high number of waveforms in a short time. This is crucial for quickly understanding electronic circuits.
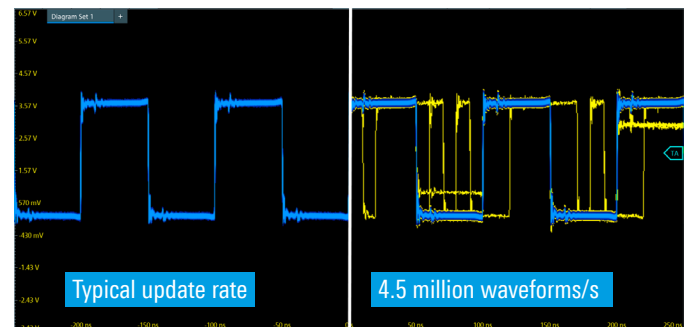
SEE YOUR SIGNALS ACCURATELY
LOWEST MEASUREMENT NOISE AND HIGHEST VERTICAL RESOLUTION

▶ 12 bit ADC vertical resolution at all sample rates without tradeoffs

▶ 18 bit architecture with HD mode

▶ Low noise of 50 Ω (1 mV/div setting)
  − 104 mV (at 1 GHz normal mode)
  − 56 µV (at 500 MHz HD mode, 14 bit)

▶ Vertical scaling down to 500 µV/div at full bandwidth

▶ Industry's highest available offset range of ±5 V at 500 µV/div

12 bit ADC: all the time

All R&S®MXO 4 series oscilloscopes incorporate a 12 bit A/D converter. 12 bit vertical resolution delivers 4096 quantization levels for precise vertical sampling. This is a 16x improvement over 8 bit ADCs. The ADC stays in 12 bit mode all the time, even at the fastest sample rates.
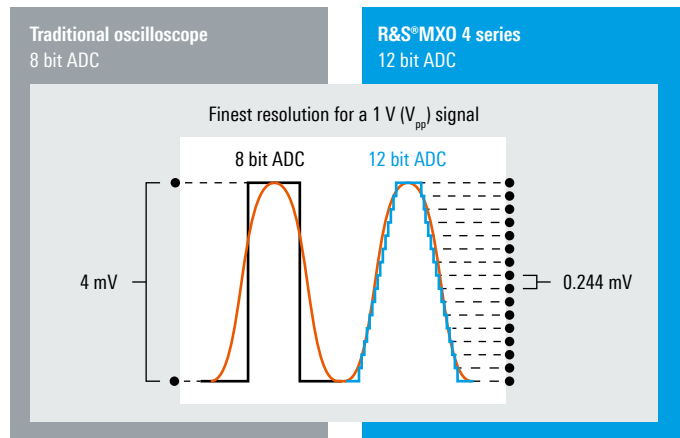

18 bit architecture with HD mode

Offering a user tradeoff between bandwidth and bits of resolution, HD mode, implemented in hardware for fast speed, achieves up to 18 bit vertical resolution. This allows you to see sharper waveforms with more signal details that would otherwise be masked by noise. In addition to superior vertical resolution, R&S®MXO 4 oscilloscopes are engineered with the lowest-in-industry system measurement noise of just 22 µV AC (RMS) at 1 mV/div.
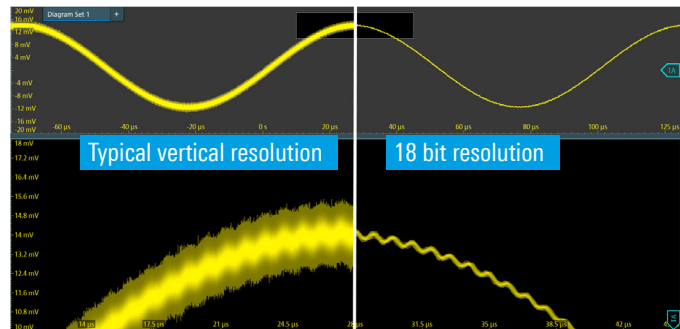
Vertical sensitivity to 500 µV/div with ±5 V offset range

The R&S®MXO 4 series oscilloscope offers an outstanding sensitivity down to 500 µV/div without any unexpected reduction in bandwidth. With offset of ±5 V at higher sensitivity vertical scale, you can easily place the signal at the center of the screen. Extended offset enables use of more sensitive vertical resolution, meaning higher ADC bits and lower noise.
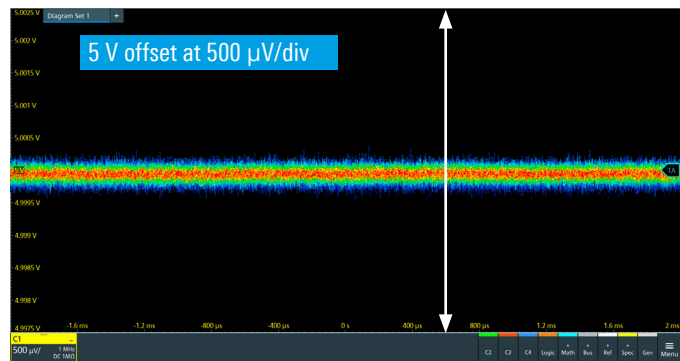
CAPTURE MORE TIME
DEEPEST STANDARD MEMORY

► **Industry's deepest memory of 400 Mpoints per channel (optional 800 Mpoints interleaved)**
► **Standard segmented memory (10 000 segments, optional 1 000 000 segments)**
► **Standard history mode (10 000 acquisitions, optional 1 000 000 acquisitions)**

Deep memory as an insurance policy

After bandwidth and sample rate, memory depth is the most important attribute that determines the product's ability to handle a large range of troubleshooting tasks. More acquisition memory gives oscilloscopes the ability to capture more time. More memory enables the oscilloscope to retain rated sample rate and bandwidth with slower timebase settings.

With 400 Mpoints acquisition memory standard on all four channels simultaneously, the R&S®MXO 4 series oscilloscope offers up to 100 times the standard memory compared to the primary competitor.

Maintain fast sampling rates with slow timebase settings

Ever adjust your oscilloscope timebase to capture more time intervals, press stop, then zoom in to find signal details that do not look right? If so, you have experienced the aliasing problem that oscilloscopes with shallow memory have. The deep memory of the R&S®MXO 4 enables longer time captures at full sample rate.

Standard segmented memory

Use segmented memory to capture signals separated by inactivity. Examples include laser pulses, serial bus activity and RF pulses. The segmented memory of the R&S®MXO 4 series oscilloscope enables signal capture over a long observation period up to 1 000 000 segments.

Standard history capability

Press stop and use history mode to see previously captured acquisitions. History mode is an always-on capability. All measurement and analysis tools are available in history mode including the serial bus decoder, mask test and automatic measurements.

Need even more memory?

During tests that involve looking at power up/down behavior or decoding longer bus events, there is always the wish to record longer time intervals. The memory extension option turns on 800 Mpoints (interleaved 2 channels), up to 1 000 000 segments and up to 1 000 000 acquisitions.

Standard memory per channel
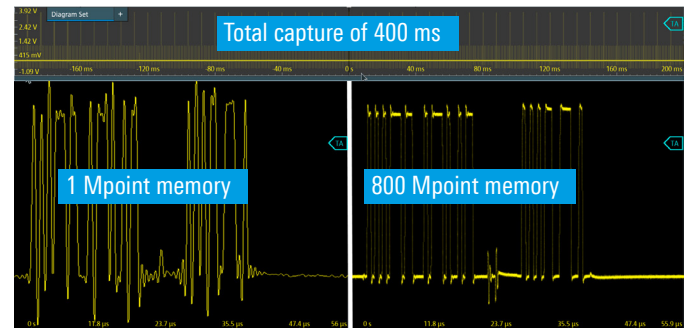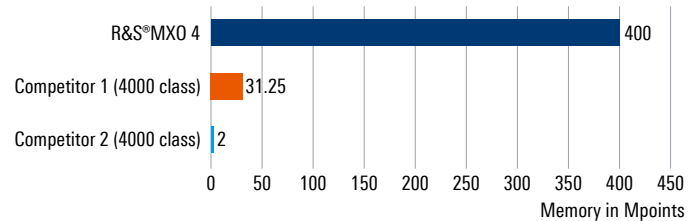
Traditional single-shot acquisition

Total acquisition time = memory depth/sample rate
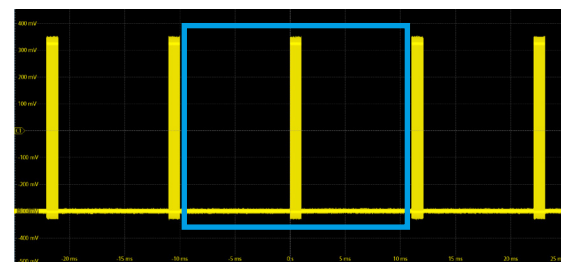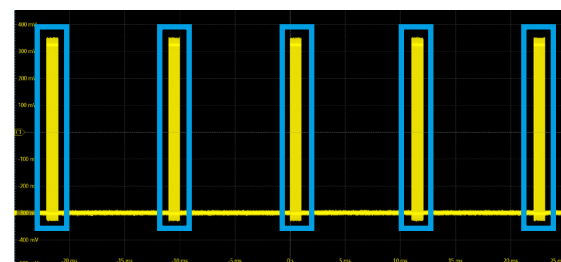
Segmented memory acquisition

Segmented acquisition time = memory depth/# of segments

ISOLATE EVENTS WITH MORE PRECISION

HIGH-PRECISION DIGITAL TRIGGER

- ▶ Industry's most sensitive trigger: 1/10 000 vertical division
- ▶ Best in class trigger jitter of just 1 ps
- ▶ World's fastest trigger rearm time of < 21 ns
- ▶ Adjustable digital trigger filters
- ▶ User-selectable hysteresis

Modern digital trigger

The MXO-EP ASIC incorporates the Rohde & Schwarz patented digital trigger system. Digital triggering implies a common path for the measurement signal and trigger versus a split path in older analog trigger architectures. Digital triggers offer numerous advantages.

Adjustable digital trigger filters

Use the up to 18 bit HD mode on the trigger to reduce measurement system noise. The digital trigger architecture makes it possible to adapt the cutoff frequency of the digital lowpass filter to the signal to be measured. Unlike oscilloscopes with analog trigger circuits, the same filter settings can be used for both the trigger signal and the measurement signal. As a result, noise on the trigger signal can be suppressed, for instance while simultaneously capturing and displaying the filtered or unfiltered measurement signal.

World's most sensitive trigger

The R&S®MXO 4 series digital trigger is up to 10 000 times more sensitive than all competitors that are still using older analog trigger architectures. Triggering sensitivity enables users to isolate difficult-to-find small physical layer anomalies in the presence of large signals, accelerating debug and troubleshooting.

User selectable hysteresis

Use automated trigger hysteresis settings or manually enter your values. Unlike using oscilloscopes with analog triggers, R&S®MXO 4 series users have full access to control all trigger hysteresis settings. This provides additional flexibility for determining where to trigger, including how much trigger noise suppression is desired.
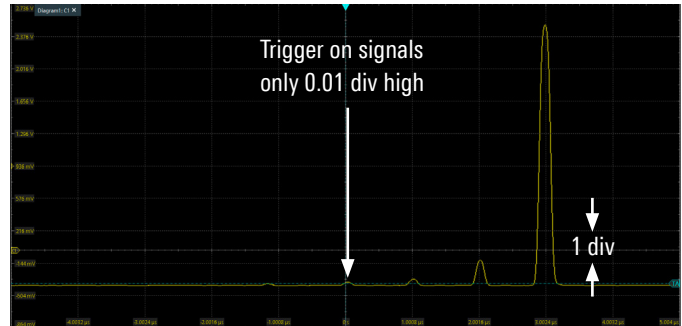
SPECTRUM ANALYSIS
SUPERIOR RF MEASUREMENT CAPABILITY

► **Pristine RF spectrum**
► **Dedicated RF controls**
► **RF/time domain views with independent controls**
► **Gated spectrum for easy correlation between frequency and time**

RF insights into your measurements

The R&S®MXO 4 series oscilloscope is engineered with spectrum analysis in mind to bring forward fast and powerful analysis capabilities. It boasts an industry leading spectrum acquisition rate of 45000 FFT/s. This allows capture of spurious spectrum events, especially when doing EMI debugging. The pristine RF characteristics of the instrument balance great spectrum performance with the synchronized time domain view.

RF characteristics	
Spectrum update rate	> 45000 FFT/s
Sensitivity/noise density	–160 dBm (1 Hz)
Noise figure	14 dB
Dynamic range	106 dB
SFDR	65 dBc
Second harmonic distortion	–60 dBc
Third harmonic distortion	–59 dBc

Frequency analysis setup made easy

You can configure the spectrum analysis function of the R&S®MXO 4 by simply entering typical parameters: center frequency, span and resolution bandwidth (RBW). The spectrum settings are independent of the time domain settings but the time and frequency domains are time-correlated.
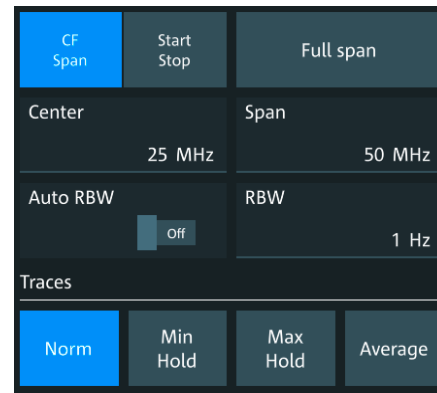
Automatic peak list and max./min. hold measurements

Rohde & Schwarz understands the need for an additional tool in spectrum measurements. This is why the R&S®MXO 4 includes advanced spectrum analysis functions like max. and min. hold as well as peak list indication as part of the standard features. This makes it easier to navigate the plot and gain quick insights into the spectrum diagram.
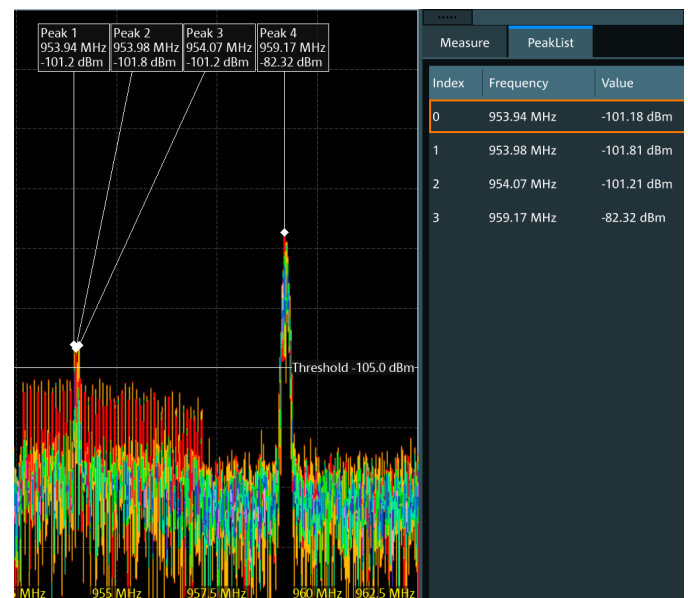
SUPERIOR USER EXPERIENCE
ADVANCED USABILITY, EASY DOCUMENTATION, FAST REMOTE CONTROL

Quick access to important tools

The toolbar **1** enables quick access to important tools. Choose from a variety of tools and arrange them with maximum flexibility. The main menu **2** provides access to all instrument settings. Signal activators **3** on the left of the main menu enable signal activation and quick access to analog channel, math functions, FFT, signal generator and serial protocols setup.

R&S®SmartGrid

Get an individual waveform layout on the screen using R&S®SmartGrid **4**. See the fundamental signal parameters in the signal toolbar **5**. From here, drag&drop into R&S®SmartGrid to change the waveform layout.

Enhanced touchability

The box design **6** implemented on all the instrument settings provides enhanced touchability. Press on any part of the box to change the value of the parameter.

Search capability

Easily find any oscilloscope capability you are looking for by simply typing it in the search menu **7**.

Save results fast

Save waveforms in various file formats or download them via Ethernet or USB for later analysis with MATLAB® or Excel. You can also save screen content, measurement data and reports.

Documentation at the press of a button

Document your measurements quickly:
▶ Screenshots include waveforms and results
▶ Clear grid annotations for easy-to-read signal characteristics
▶ Color-coded labels highlight anomalies in the diagram
▶ Save waveforms and measurement results in binary or CSV formats for signal analysis on a PC

Miscellaneous		
Contents	waveform	complete
		selection (zoom, cursor, gate, manual)
		number of acquisitions
		history memory
		measurement results
Format	measurement data	binary, CSV, 1 to 4 channels
	graphics	PNG, JPG, BMP, TIF, PDF
Drivers		VXI, LabView, LabWindows, .NET
Remote control		web interface, VNC, SCPI
Languages		choose from 13

Remote control access: anytime, anywhere

Remotely control the oscilloscope and view the display on a PC or mobile device. View the same user interface on the oscilloscope. All oscilloscope functions are also available remotely via Ethernet or the USB interface.

Language selection

The R&S®MXO 4 series user interface supports multiple languages. Just a few seconds are needed to switch languages while the instrument is running, making the oscilloscope truly international.

ENHANCED USABILITY

13.3" high resolution, multitouch display
- ▶ High resolution: 1920 × 1080 pixel (Full HD)
- ▶ Gesture support speeds up scaling and zooming
- ▶ Easy to see signal detail

Interfaces
- ▶ Three USB 3.0 and two USB 2.0 ports
- ▶ USB device port, Ethernet
- ▶ HDMI™ port

Integrated arbitrary waveform generator
- ▶ Two-channel 100 MHz waveform generator
- ▶ Wide range of waveform and modulation types
- ▶ Easy setup of frequency, amplitude, offset and noise

16 logic channels
- ▶ Add 16 logic channels without reduction of analog ch
- ▶ High MSO sample rates ensure timing accuracy
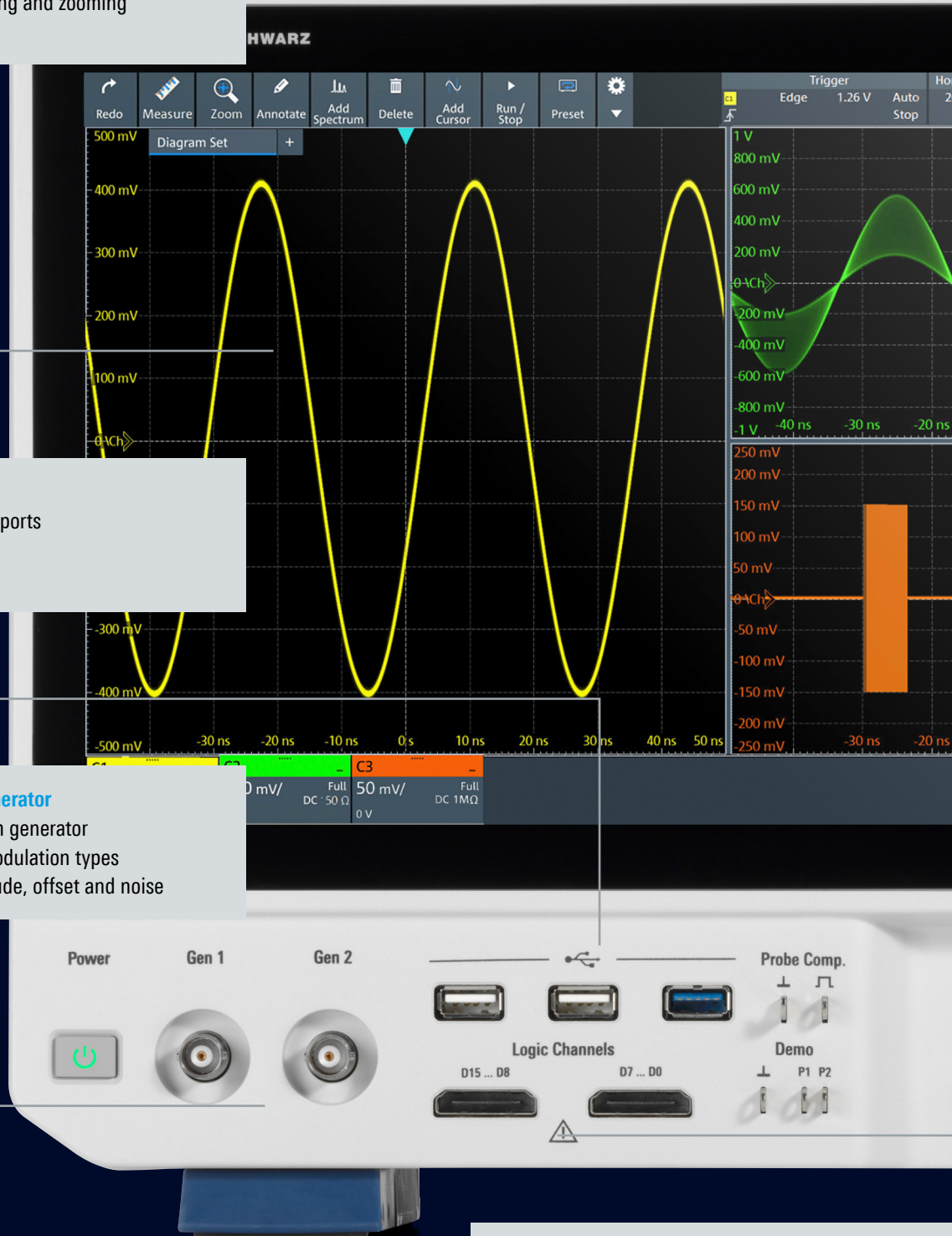
Intuitive front panel increases productivity
► Fast, direct access to primary instrument settings
► Quickly adjust settings with knobs and buttons
► Sectional layout makes finding the right button easy
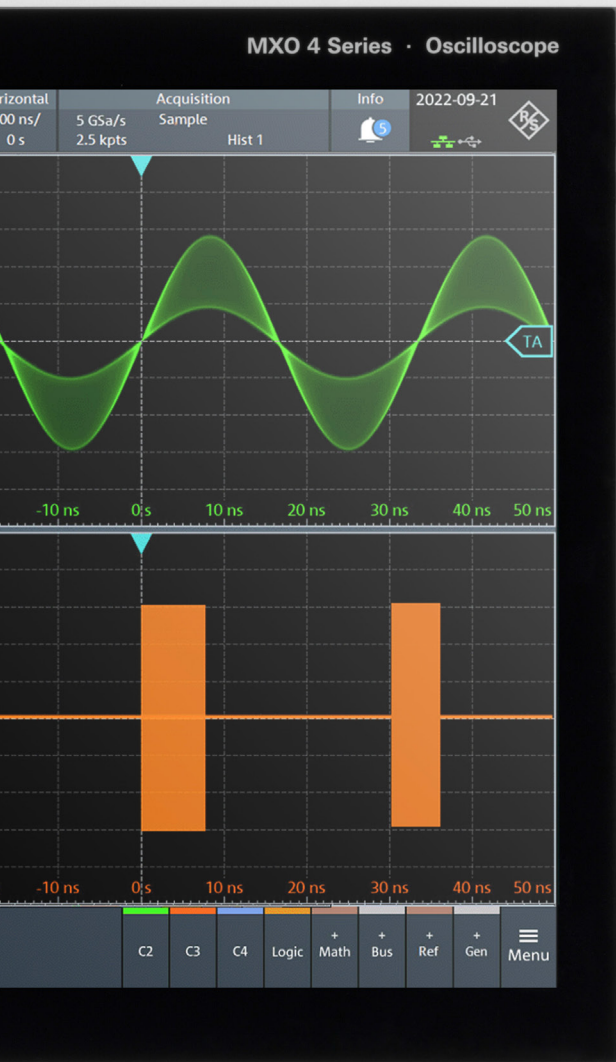
Clear orientation with color-coded LEDs
► Color-coded buttons and knobs enable fast association with sources
► Indication of currently selected channel
► Selection between fine/course adjustments made simple
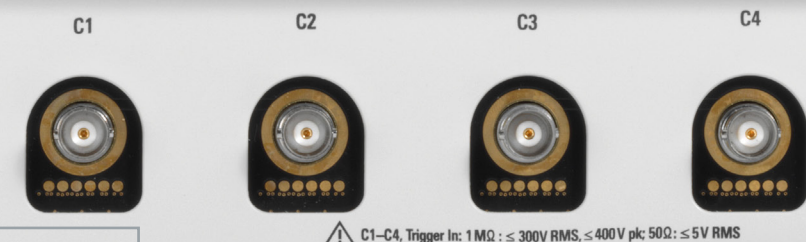
Active probe interface
► Supports over 30 Rohde & Schwarz current and voltage probes
► 50 Ω and 1 MΩ path enable support of an even wider range of passive and active probes, including ones from third parties

FUN TO DRIVE
15-MINUTE LEARNING CURVE, SUPERIOR TOUCH, INTUITIVE NAVIGATION

Superior usability

Extensive user feedback and research into the smart device user interface concept led to the development of the R&S®MXO 4 series user interface:

▶ Navigate anywhere from the pull-up menu in the lower right corner. Positioned close to the front panel, this leads to reduced hand movement when switching between the two menu dialogs

▶ Left-hand tab dialogs produce small areas, maximizing waveform viewing

▶ Box design to touch anywhere in a large target area

▶ Signal icons make it easy to turn on/off sources and to adjust the R&S®SmartGrid layout

▶ Unique in the industry, use the tool bar to quickly access your favorite tools

▶ Use the re-purposed toolbar space to modify existing elements such as cursors, measurements and spectrum settings, or to quickly delete elements

▶ Fast one-touch access to the trigger setup, horizontal settings and acquisition control directly from the information panel

▶ Select the Rohde & Schwarz icon to see current instrument details including LAN IP and firmware version

▶ UI consistency with the R&S®RTO6 and R&S®RTP oscilloscopes
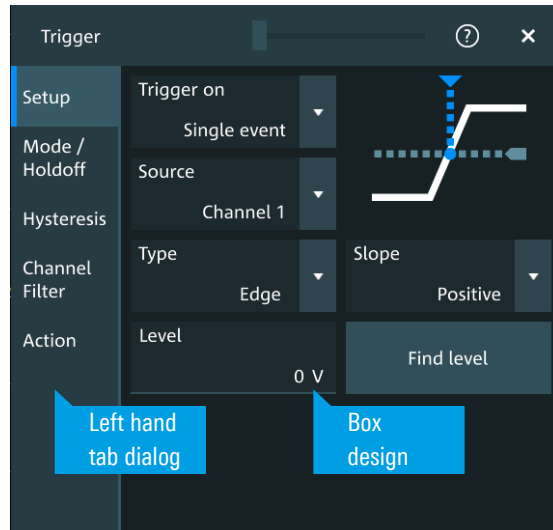
YOUR GO-TO TOOL
READY FOR MANY USES

An oscilloscope as flexible as you

Need additional test capability? Customize your R&S®MXO 4 series oscilloscope with the application software and probes that your applications need.
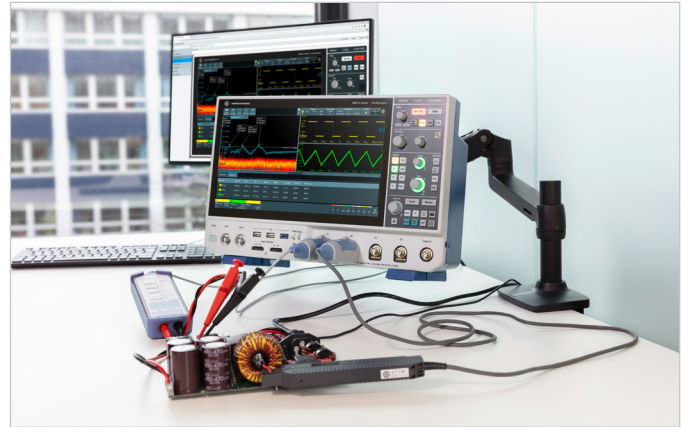
Need additional logic channels?

Add 16 digital channels with the R&S®MXO4-B1 MSO option. Unlike some other oscilloscopes that force a tradeoff between digital and analog channel usage, the R&S®MXO 4 series logic channels can be used simultaneously with all analog channels. Simply connect an R&S®MXO4-B1 probe to the R&S®MXO 4 to use the digital channels.
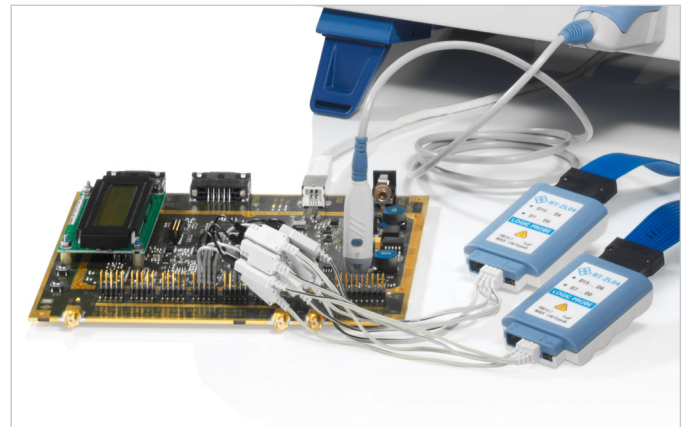
Need configurable waveform generation?

With the R&S®MXO4-B6 waveform generation option, you can add two integrated 100 MHz arbitrary waveform generators. Captured waveforms on the oscilloscope can be replayed by the generator and noise can be added to create worst case performance to determine system tolerance. Select from a wide range of available waveshapes or load an arbitrary waveform.

Choose from a wide selection of compatible probes

Rohde&Schwarz provides a broad portfolio of current and voltage probes. All R&S®MXO 4 series oscilloscope channel inputs include a Rohde&Schwarz probe interface connection for Rohde&Schwarz active probes. Moreover, many third-party probes are also compatible with the instrument.

EMI DEBUGGING

Easy navigation in frequency domain

The R&S®MXO 4 spectrum function has the familiar inter-face of a spectrum analyzer. The spectrum setup dialog offers basic spectrum analyzer controls such as start and stop frequency and resolution bandwidth. In spectrum mode, the R&S®MXO 4 time domain settings are unaf-fected. This makes navigation in the frequency domain an easy task. The maximum FFT capture bandwidth cor-responds to the R&S®MXO 4 series bandwidth allowing a quick overview of all the test device's emissions from 0 Hz to 1.5 GHz.
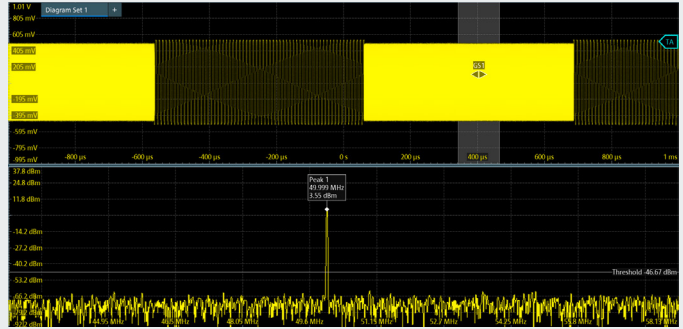
Gated spectrum for correlated time and frequency analysis

With the gated spectrum function, it is possible to restrict the spectrum analysis to a user-defined region of the captured time domain signal. Excessive spectral emissions can be correlated to dedicated time periods in a signal. Typical appli-cations include the correlation of unwanted emissions to fast switching edges in switched-mode power supplies or to data transfers on bus interfaces. Having identified the problem, the design engineer can easily check the effectiveness of different solutions such as blocking capacitors or reduced rise/fall times by observing the level change of the spectral emission.

Ultra-fast spectrum acquisitions for spurious spectrum events

The R&S®MXO 4 series architecture is optimized both in hardware and software to leverage the powerful ASIC capabilities to deliver fast and responsive spectrum cap-tures. This is critical in detecting random and spurious emissions that are otherwise hidden due to the blind time in acquisitions. The spectrum analysis is equipped with max. hold, min. hold and average arithmetics to keep track of spectrum events that occur during the testing. These are important test receiver functions and now they come standard on the R&S®MXO 4 series spectrum function.
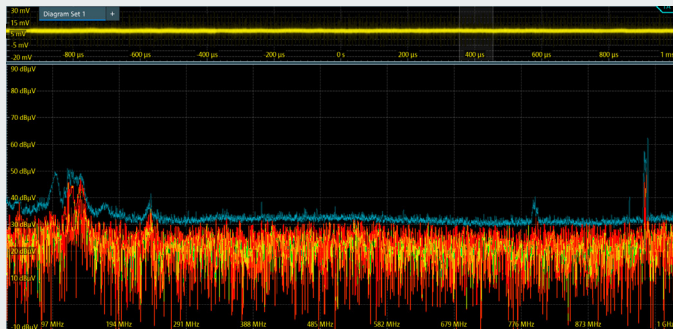
The right setup with the right probes

Rohde & Schwarz offers the compact R&S®HZ-15 near-field probe set, which is particularly helpful for EMI debugging of embedded designs. The most compact probe in this set allows capturing of near-field emissions from single circuit lines. The R&S®HZ-15 covers the frequency range from 30 MHz to 3 GHz. With reduced sensitivity, it can also be used below 30 MHz. The optional R&S®HZ-16 preamplifier provides 20 dB gain in the frequency range from 100 kHz to 3 GHz, in case higher sensitivity is needed.
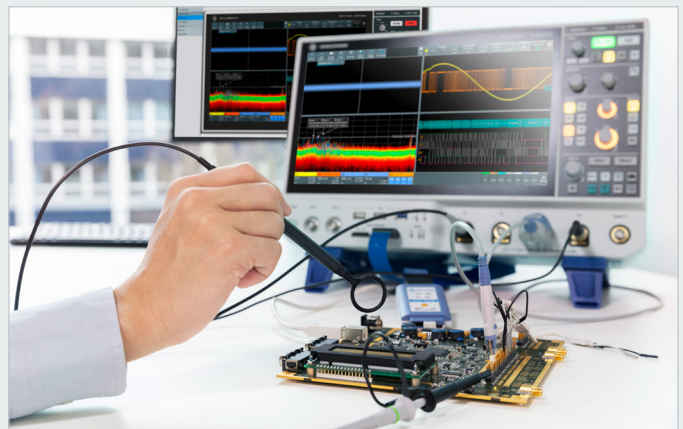
LOGIC ANALYSIS

Logic analysis enabled by default

All R&S®MXO 4 series oscilloscopes have the R&S®MXO4-B1 MSO hardware built into every instrument. The MSO option offers the logic probes required to start using the 16 digital channels.

See more signal details with fast sample rate and deep memory

With a sampling rate of 5 Gsample/s, the R&S®MXO 4 series oscilloscope provides high time resolution of 200 ps for all digital channels. This sampling rate is available over the entire memory depth of 400 Mpoints per channel. The MSO option offers comprehensive trigger capabilities to detect critical events such as narrow glitches or certain pattern combinations.
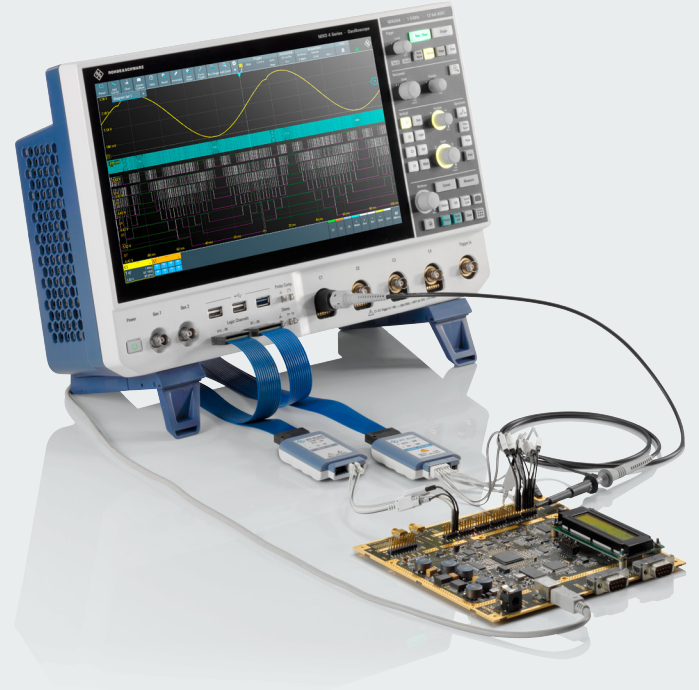
Analysis of low speed serial buses with digital channels

Today, high speed interfaces are often combined with low speed control or programming buses in a single device. You can use the digital channels of the R&S®MXO4-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.

SERIAL BUS ANALYSIS

Dual-path protocol analysis

With the R&S®MXO 4 series, you can experience protocol analysis innovation. Typically, protocol packets must be acquired at the same sample rate as the rest of the oscilloscope.

With dual-path protocol analysis, you can set the instrument sample rate for the waveform path and the oscilloscope will automatically use another internal decoupled sample rate for the decoding path. Even with very slow sample rates, the protocol data is correctly decoded. On other oscilloscopes, signals would be undersampled and decoding would not be possible.

Undersampled data; unreliable decoding

Undersampled data; perfectly decoded frames
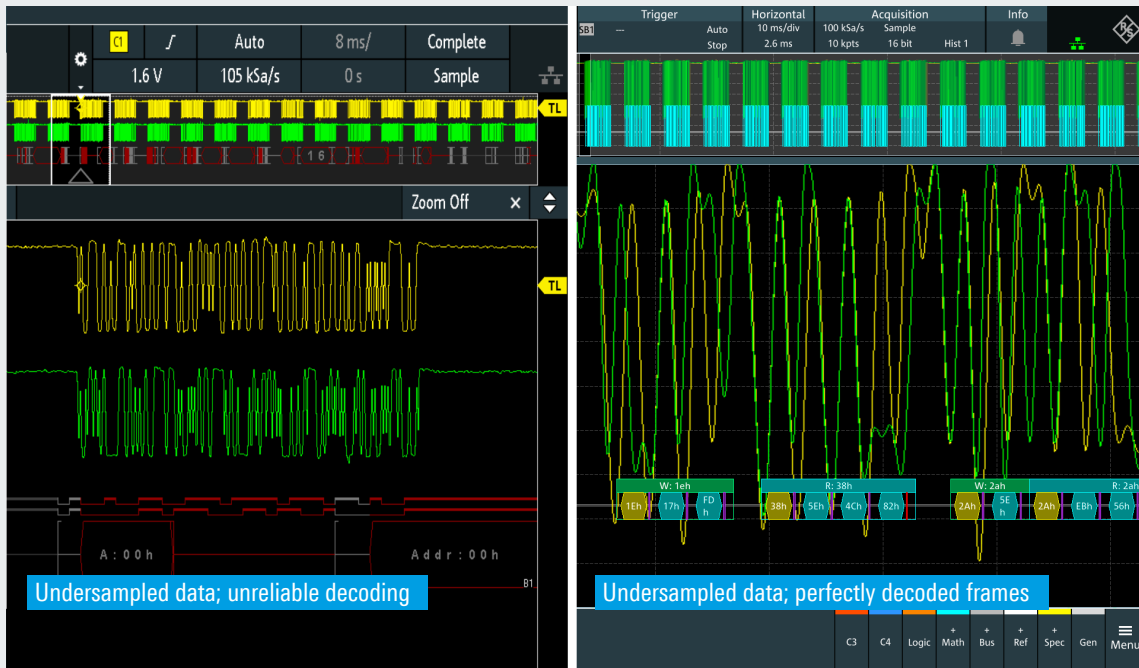
Capture more packets with deep memory

Need to capture long time periods? You can use deep memory to capture more packets. With a memory depth of up to 800 Mpoints, the R&S®MXO 4 series can capture long time periods where the cause and result are distanced in time. Over the entire capture, signal detail is time-correlated with packet content for fast debug.

Trigger and decode packages

Option	Description	Buses
R&S®MXO4-K510	low speed serial buses	I²C/SPI/RS-232/RS-422/RS-485/UART
R&S®MXO4-K520 [1]	automotive buses	CAN/LIN/CAN FD/CAN XL

[1] Available with future firmware release.

Individual screen setup

The decoded layer condenses or expands using the vertical and horizontal control knobs or using fingers on the touch-screen. Use the R&S®SmartGrid function to rearrange the windows displayed on the screen to best fit your viewing preferences. The decoded bus can be overlaid on the captured signal and/or displayed in a separate window.

Index	State	Start	Address type	Address	RWBit	Data rate
1	Ok	-46.338 ms	7 bit	30	Write	310.000 kbps
2	Ok	-46.21 ms	7 bit	56	Read	309.700 kbps
3	Ok	-46.045 ms	7 bit	42	Write	310.000 kbps
4	Ok	-45.975 ms	7 bit	42	Read	309.700 kbps
5	Ok	-45.77 ms	7 bit	0	Undef.	---

C1 ..... _	C2 ..... _	SB1 ..... _
680 mV/ 10 MHz DC 1MΩ 1.75 V RT-ZP11	680 mV/ 10 MHz DC 1MΩ 1.75 V RT-ZP11	I2C

POWER ANALYSIS

See power signal details with up to 18 bit resolution

Even the smallest signal details of a highly dynamic signal matter for power measurements, for example when verifying $R_{DS(on)}$ for a MOSFET. The HD mode of the R&S®MXO 4 series oscilloscope increases the vertical resolution up to 18 bit so that previously unseen signal details become visible and can be measured. The oscilloscope also offers adjustable digital filters that allow noise suppression resulting in sharper waveforms with more signal details.

Digital trigger for enhanced debugging capabilities

With up to 18 bit vertical resolution, the digital trigger architecture enables triggering on the smallest vertical variation sampled. The trigger sensitivity requires 0.0001 div and is adjustable to factor in different trigger requirements, for example to avoid false triggering on noise. It is also possible to use the digital trigger to adapt the cutoff frequency only on the trigger path while maintaining the original waveform for viewing and measurements.
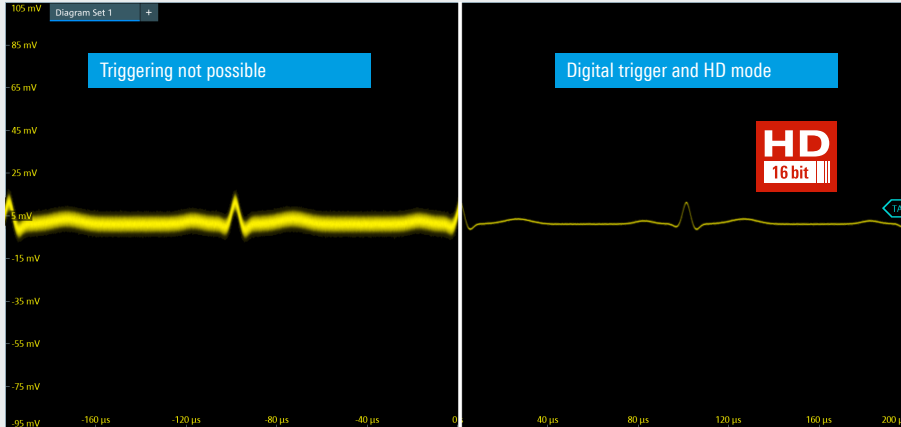
Maintaining fast sample rates with deepest memory

Analyzing start-up, shut-down or transients of power supplies requires a high sample rate and long recording times. With up to 800 Mpoints memory, highest in its class, the R&S®MXO 4 series oscilloscopes enable recording of long duration while maintaining high sample rates of up to 5 Gsample/s.

Acquisition time (at 5 Gsample/s)

	Time in ms
R&S®MXO 4	160
Competitor 1 (4000 class)	12.5
Competitor 2 (4000 class)	0.8
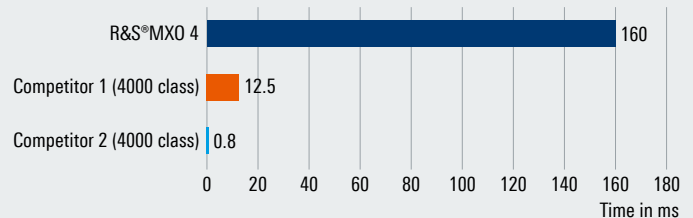
Extensive probe portfolio: High voltage and current probes

The Rohde&Schwarz portfolio of high voltage probes includes active differential probes for voltages up to 6000 V (peak). These probes provide an exceptional common mode rejection ratio over a broad frequency range. Rohde&Schwarz current probes enable accurate, non-intrusive measurement of DC and AC currents. Different models are available to measure currents in the range from 1 mA to 2000 A with a maximum bandwidth of up to 120 MHz.
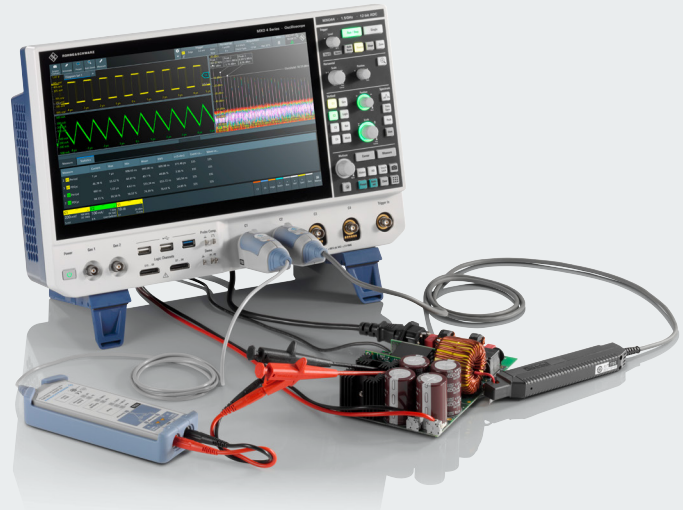
FREQUENCY RESPONSE ANALYSIS

Making bode plots with R&S®MXO 4 series

Perform low-frequency response analysis

The R&S®MXO4-K36 frequency response analysis (FRA) option lets you perform low-frequency response analysis on your oscilloscope easily and quickly. It characterizes the frequency response of a variety of electronic devices, including passive filters and amplifier circuits. For switched-mode power supplies, it measures the control loop response (CLR) and power supply rejection ratio (PSRR).

The FRA option uses the oscilloscope's built-in waveform generator to create stimulus signals ranging from 10 Hz to 100 MHz. Measuring the ratio of the stimulus signal and the output signal of the DUT at each test frequency, the oscilloscope plots gain and phase logarithmically.

Features and functionalities

Amplitude profile

The R&S®MXO4-K36 provides user-configurable profiles of the amplitude output level from the generator. This helps improve signal-to-noise ratio (SNR) at different frequency ranges when performing measurement on CLR and PSRR. Users can also load lookup tables for generator settings.

Improved resolution and marker support

This includes user configurable points per decade to adjust needed resolution and sweep time. Markers are available on the traces with a table to show corresponding coordinates. Users can easily determine the phase and gain margin with an auto placement function.

Parallel display of time domain

Having both time and frequency domain views allows the user to monitor if the injected signal causes distortion that leads to errors in the measurement. These effects are hard to spot from just the Bode plot. Using the time domain window of the oscilloscope is a great way to adjust the amplitude profile to the optimal level.

Measurement table

The table of measurement results provides information about each measured point, consisting of frequency, gain and phase shift. The markers and table allow interactive display of the selected information. For reporting purposes, screenshots, table results or both can be quickly saved to a USB device.

Broad probe portfolio

Accurate CLR and PSRR characterization is highly dependent on choosing the right probes since the peak-to-peak amplitudes of both V_{in} and V_{out} can be very low at some test frequencies. These values could be buried in the oscilloscope's noise floor and in the switching noise of the DUT itself. We recommend the low-noise R&S®RT-ZP1X 38 MHz bandwidth 1:1 passive probes to reduce attenuation error and provide the best SNR.

POWER INTEGRITY

Debugging and validating power rails

Accurately measure ripple and PARD

As power rail tolerance levels get smaller, it becomes increasingly difficult to measure power ripple accurately. The inherent low noise of the R&S®MXO 4 series enables accurate power integrity measurements on the millivolt level. The fast update rate of the R&S®MXO 4 series allows you to quickly see infrequent and worst-case ripple as well as periodic and random disturbance (PARD) anomalies.

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 scale settings. Together with the superb low noise frontend of the R&S®MXO 4 series oscilloscope and the 18 bit vertical resolution, this combination provides accelerated insight into the power integrity of your design.

Power rail characterization with high fidelity probes

Wide bandwidth, high sensitivity, very low noise and 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-ZPR 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.

Find coupled sources with fast spectrum

With the industry's most capable spectrum, you can see switching characteristics or quickly scan for sources coupled onto the power rail. The R&S®MXO 4 series oscilloscope spectrum algorithm allows you to analyze the spectrum independently of the time domain settings. This quickly provides a comprehensive picture of your power rails.

Measure	Current	Max	Min	Mean	RMS	σ (S-dev)	Event co...	Wave co...
1 C1 PTP	24.97 mV	38.58 mV	20.99 mV	25.3 mV	25.34 mV	1.5 mV	50539	50539
2 C1 σ	1.9 mV	2.55 mV	1.64 mV	1.83 mV	1.83 mV	82.23 µV	50539	50539

Using spectrum analysis with time gating to effectively find coupled sources that contribute to power rail noise

INTEGRATED ARBITRARY GENERATOR

Compact and configurable

Two-channel 100 MHz arbitrary waveform generator

Equipped with the R&S®MXO4-B6 option, the R&S®MXO 4 series oscilloscope offers a fully integrated two-channel 100 MHz arbitrary waveform generator. With 625 Msample/s and 16 bit resolution, the generator is suitable for implementing prototype hardware and for educational purposes. The integrated generator provides both standard and arbitrary stimulus to the DUT. The generator can be operated as a function or modulation generator. It also supports sweep mode.

Wide range of waveforms and modulation types

The integrated arbitrary waveform generator provides stimulus output of sine, square, pulse, ramp, triangle, sinc, arbitrary and noise waveforms to your device under test. For all waveforms, you can set the frequency, amplitude, offset and noise and also add a burst.

The modulation feature supports AM, FM, FSK and PWM modulations with modulation shapes of sine, rectangle, triangle and ramp.

Waveform generator specifications	
Analog output	2 channels
Bandwidth	100 MHz
Amplitude	high-Z: 10 mV to 10 V (peak-to-peak), 50 Ω: 5 mV to 5 V (peak-to-peak)
Arbitrary waveform sample rate	1 sample to 40 Msample on each channel
Sample rate	1 sample/s to 312.5 Msample/s
Resolution	16 bit
Operating modes	▶ function and arbitrary waveform generator (DC, sine, square, pulse, triangle, ramp, inverse ramp, sinc, arbitrary) ▶ modulation (AM, FM, FSK, PWM) ▶ frequency sweep ▶ noise

EXTENSIVE PROBE PORTFOLIO
THE RIGHT PROBE FOR THE BEST MEASUREMENT

Extensive probe range for all measurement tasks

A complete portfolio of high-quality passive and active probes covers all measurement tasks. With an input impedance of 1 MΩ, the active probes only put a minimum load on the signal source operating point. The very large dynamic range, even at high frequencies, prevents signal distortion, e.g. 60 V (V_{pp}) at 1 GHz for the active single-ended probes.

Complete portfolio for power measurements

The portfolio of dedicated probes for power measurements includes active and passive probes for the different voltage and current ranges – from µA to kA and from µV to kV. Dedicated power rail probes detect even small and sporadic distortions on DC power rails.
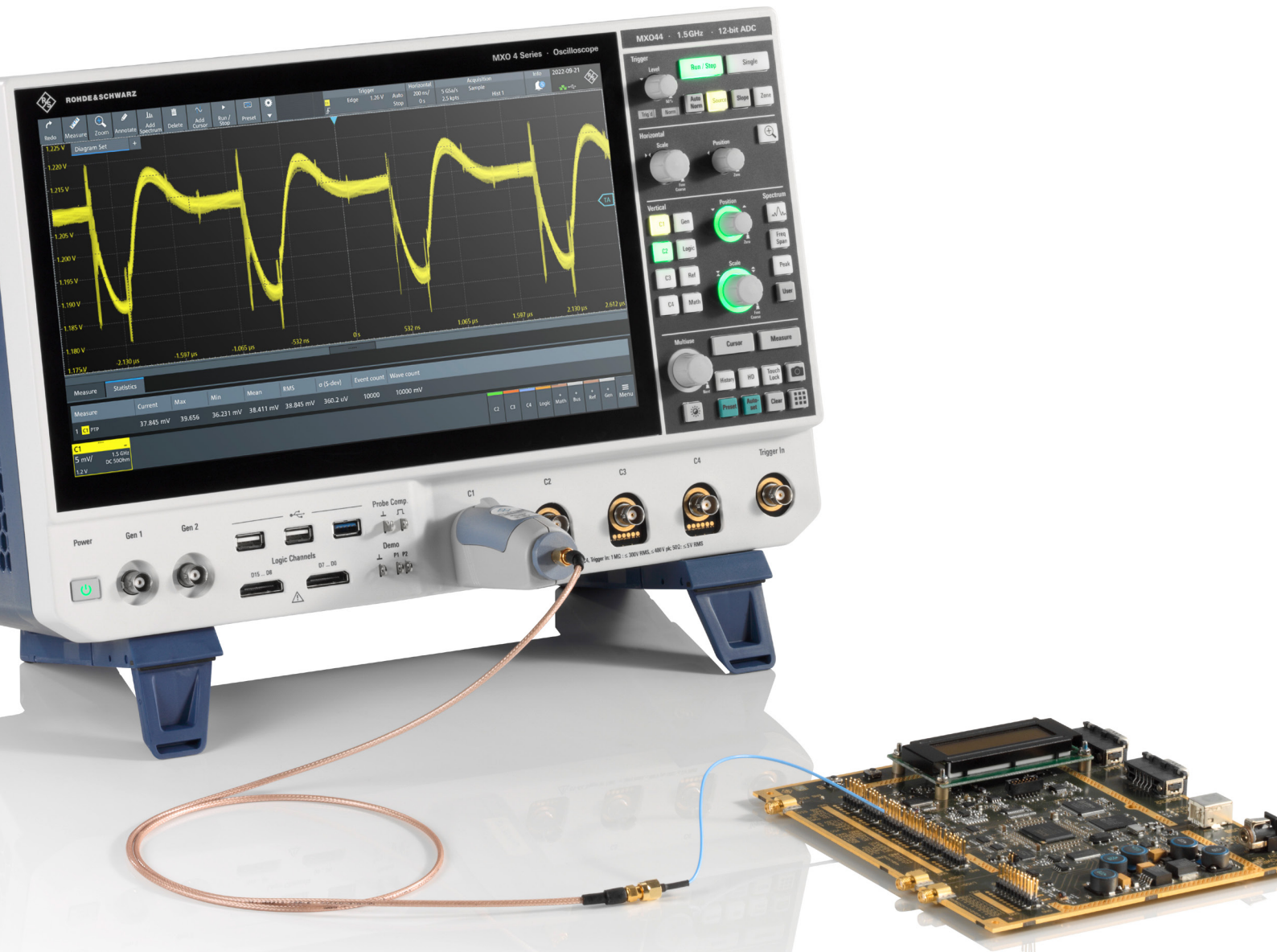
Micro button for convenient instrument control

The situation is familiar to all engineers: You have carefully positioned the probe on the DUT and you want to start the measurements, but you don't have a free hand. The micro button on Rohde & Schwarz active probes solves the problem. It is conveniently situated on the probe tip, and you can assign it different functions such as run/stop, autoset and adjust offset.

Micro button

High-voltage differential probes

The R&S®RT-ZHD series high voltage differential probes provide excellent common mode rejection ratio (CMRR) over a broad frequency range with a 200 MHz bandwidth and can safely measure up to 6000 V peak voltages. These probes have exceptionally low noise, making them ideal for switching power analysis.

Like the rest of the Rohde & Schwarz probe family, the R&S®RT-ZHD probes are also equipped with the high precision R&S®ProbeMeter, offering 0.1 % accuracy while ensuring 0.5 % gain accuracy and very low drift in measurements. They also have an integrated 5 MHz analog filter and audible overrange indicator and micro buttons to give users full awareness of and control over the probe measurements.
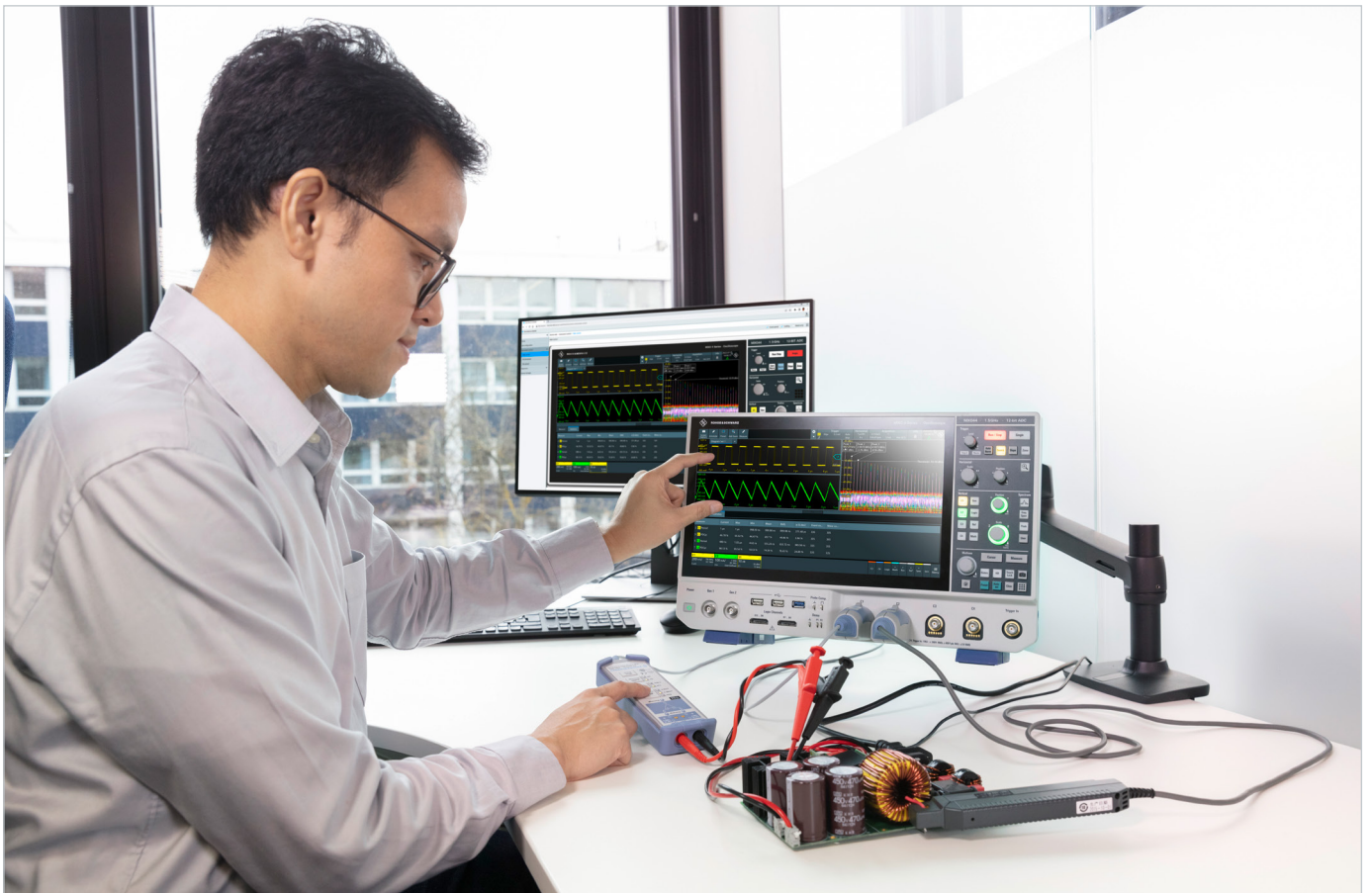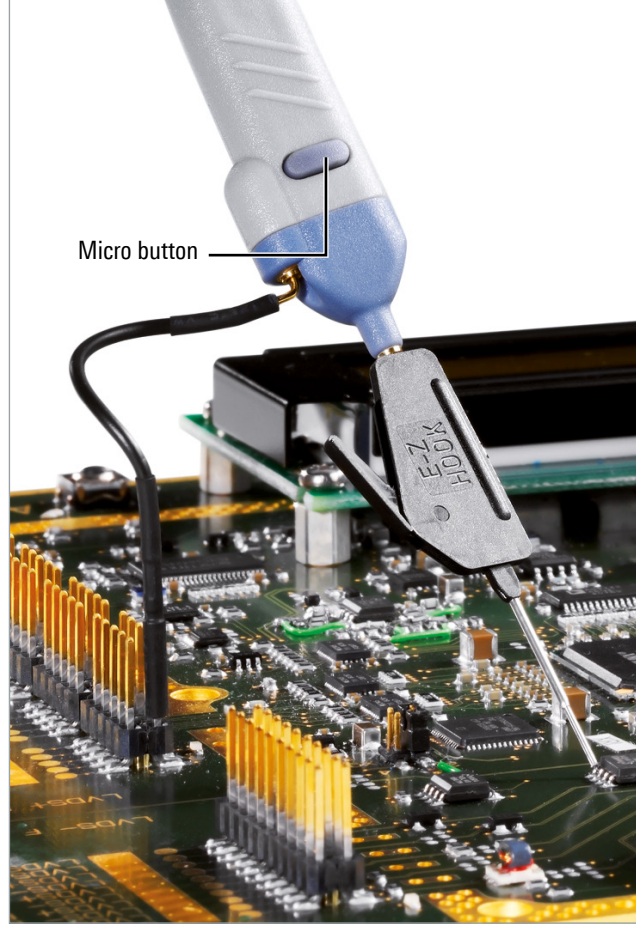
High voltage differential probes for switching power analysis measurements

Rohde & Schwarz has a comprehensive probe portfolio to meet every probing need.
▶ For more information, see "Probes and accessories for Rohde & Schwarz oscilloscopes" (PD 3606.8866.12).

Standard passive probes
(38 MHz to 700 MHz)

R&S®RT-ZP11, R&S®RT-ZP1x

Passive probes are standard accessories for Rohde & Schwarz oscilloscopes. They are low-cost, general purpose probing solutions for a broad range of applications.

Passive broadband probes
(8 GHz)

R&S®RT-ZZ80

These are an economical yet powerful alternative to active probes for measuring high speed signals on low impedance lines. Their input impedance is low and remains practically constant over the entire frequency range. They feature extremely low input capacitance, very low noise and high linearity.

Active single-ended broadband probes
(1 GHz to 6 GHz)

R&S®RT-ZS10L, R&S®RT-ZS10E, R&S®RT-ZS10, R&S®RT-ZS20, R&S®RT-ZS30, R&S®RT-ZS60

Very wide dynamic range, exceptionally low off-set and gain errors combined with the right accessories make these probes the ideal accessory for Rohde & Schwarz oscilloscopes.

R&S®RT-ZD40: browser adapters to easily vary the pin offset

R&S®RT-ZA15 external attenuator for R&S®RT-ZD20/-ZD30

Active differential broadband probes
(1 GHz to 4.5 GHz)

R&S®RT-ZD10, R&S®RT-ZD20, R&S®RT-ZD30, R&S®RT-ZD40

The flat frequency response and high input impedance with low input capacitance permit precise measurements on differential signals while keeping the DUT load low. The high common mode rejection over the entire probe bandwidth ensures high immunity to interference. Special browser adapters allow flexible contacting with high signal fidelity.

Power rail probes
(2 GHz and 4 GHz)

R&S®RT-ZPR20, R&S®RT-ZPR40

Wide bandwidth, high sensitivity, very low noise and extra-large offset compensation make the R&S®RT-ZPR power rail probes an excellent tool for characterizing power rails. An integrated high accuracy DC voltmeter provides instantaneous DC voltage readout.

High voltage probes
(100 MHz to 400 MHz; ±750 V to ±6000 V)

R&S®RT-ZH03, R&S®RT-ZH10, R&S®RT-ZH11, R&S®RT-ZD01, R&S®RT-ZHD07, R&S®RT-ZHD15, R&S®RT-ZHD16, R&S®RT-ZHD60

The Rohde & Schwarz portfolio of high voltage probes includes passive single-ended and active differential probes for voltages up to 6000 V (peak). Different models allow measurements in up to CAT IV environments. Differential probes provide an exceptional common mode rejection ratio over a broad frequency range.

Current probes
(20 kHz to 120 MHz; ±1 mA to 2000 A)

R&S®RT-ZC02, R&S®RT-ZC03, R&S®RT-ZC05B, R&S®RT-ZC10, R&S®RT-ZC10B, R&S®RT-ZC15B, R&S®RT-ZC20, R&S®RT-ZC20B, R&S®RT-ZC030, R&S®RT-ZC31

Rohde & Schwarz current probes enable accurate, non-intrusive measurement of DC and AC currents. Different models are available to measure currents in the range from 1 mA to 2000 A with a maximum bandwidth of up to 120 MHz. Current probes are available with the Rohde & Schwarz probe interface or BNC with external power supply.
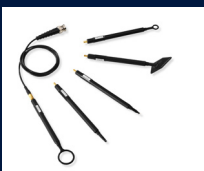
EMC near-field probes
(30 MHz to 3 GHz)

R&S®HZ-15, R&S®HZ-17

Powerful E and H near-field probes for the frequency range from 30 MHz to 3 GHz with an optional preamplifier expand the application range of the R&S®MXO 4 series oscilloscope to include EMI debugging.

AND THERE IS SO MUCH MORE ...
AN OSCILLOSCOPE THAT EVOLVES WITH YOUR NEEDS

Grows with your needs – fully software based upgrades

The R&S®MXO 4 series flexibly adapts to relevant project updates. You can simply install the necessary software licenses, e.g. triggering and decoding of serial protocols or the frequency response analysis option. The waveform generator and MSO capabilities are built-in and just need to be activated. The bandwidth can be upgraded up to 1.5 GHz via keycode. All this makes retrofitting very easy.

Regular firmware improvements

Regular firmware updates consistently add new functions to the R&S®MXO 4 series oscilloscopes. Download the latest firmware version at www.rohde-schwarz.com and use a USB storage device or LAN connection for installation. Your R&S®MXO 4 series oscilloscope is always up-to-date.

Multilingual support: choose among thirteen languages

The user interface and online help of the R&S®MXO 4 series oscilloscope support thirteen languages (English, German, French, Spanish, Italian, Portuguese, Czech, Polish, Russian, Simplified and Traditional Chinese, Korean and Japanese). You can change the language in just a few seconds while the instrument is running.

Safe transport and easy rack mounting

An extensive selection of storage and transportation accessories means the R&S®MXO 4 series oscilloscopes are always fully protected and easy to transport. The rackmount kit allows easy installation of the oscilloscope in integrated environments.

Accessories	
Front cover	R&S®MXO4-Z1
Soft carrying case	R&S®MXO4-Z3
Transit case, with trolley function	R&S®MXO4-Z4
19" rackmount kit	R&S®ZZA-MXO4
VESA mount	standard 100 mm × 100 mm VESA pattern on back of all instruments

OSCILLOSCOPE PORTFOLIO
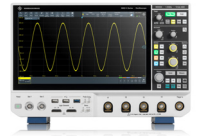
R&S®	RTH1000	RTC1000	RTB2000	RTM3000	MXO 4
Vertical					
Bandwidth	60/100/200/350/500 MHz [1]	50/70/100/200/300 MHz [1]	70/100/200/300 MHz [1]	100/200/350/500 MHz/1 GHz [1]	200/350/500 MHz/1/1.5 GHz [1]
Number of channels	2 plus DMM/4	2	2/4	2/4	4
ADC resolution; system architecture	10 bit; 16 bit	8 bit; 16 bit	10 bit; 16 bit	10 bit; 16 bit	12 bit; 18 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	500 µV to 10 V
V/div, 50 Ω	–			500 µV to 1 V	500 µV to 1 V
Horizontal					
Sampling rate per channel (in Gsample/s)	1.25 (4 CH model); 2.5 (2 CH model); 5 (all channels interleaved)	1; 2 (2 CH interleaved)	1.25; 2.5 (2 CH interleaved)	2.5; 5 (2 CH interleaved)	2.5; 5 (2 CH interleaved)
Maximum memory (per channel/1 channel active)	125 kpoints (4 CH model); 250 kpoints (2 CH model); 500 kpoints	1 Mpoints; 2 Mpoints	10 Mpoints; 20 Mpoints	40 Mpoints; 80 Mpoints	standard: 400 Mpoints; max. upgrade: 800 Mpoints [2]
Segmented memory	standard, 50 Mpoints	–	option, 320 Mpoints	option, 400 Mpoints	standard: 10 kpoints; option: 1 Mpoints
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])	> 4 500 000
Trigger					
Types	digital	analog	analog	analog	digital
Sensitivity	–	–	at 1 mV/div: > 2 div	at 1 mV/div: > 2 div	0.0001 division, all bandwidth, user controllable
Mixed signal option					
Number of digital channels [1]	8	8	16	16	16
Analysis					
Mask test	tolerance mask	tolerance mask	tolerance mask	tolerance mask	[3]
Mathematics	elementary	elementary	basic (math on math)	basic (math on math)	basic (math on math)
Serial protocols triggering and decoding [1]	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, CAN FD, SENT	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN [3], CAN FD [3], CAN XL [3], LIN [3], MIL-STD-1553 [3], ARINC 429 [3]
Applications [1,2]	high-resolution frequency counter, advanced spectrum analysis, harmonics analysis, user scripting	digital voltmeter (DVM), component tester, fast Fourier transform (FFT)	digital voltmeter (DVM), fast Fourier transform (FFT), frequency response analysis	power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis	power [3], frequency response analysis
Compliance testing [1,2]	–	–	–	–	–
Display and operation					
Size and resolution	7" touchscreen, 800 × 480 pixel	6.5", 640 × 480 pixel	10.1" touchscreen, 1280 × 800 pixel	10.1" touchscreen, 1280 × 800 pixel	13.3" touchscreen, 1920 × 1080 pixel (Full HD)
General data					
Dimensions in mm (W × H × D)	201 × 293 × 74	285 × 175 × 140	390 × 220 × 152	390 × 220 × 152	414 × 279 × 162
Weight in kg	2.4	1.7	2.5	3.3	6
Battery	lithium-ion, > 4 h	–	–	–	–

[1] Upgradeable.   [2] Requires an option.   [3] Available with future firmware release.   CH: Channel.

RTE1000	RTO6	RTP
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]
2/4	4	4
8 bit; 16 bit	8 bit; 16 bit	8 bit; 16 bit
500 µV to 10 V	1 mV to 10 V (with HD mode: 500 µV to 10 V)	
500 µV to 1 V	1 mV to 1 V (with HD mode: 500 µV to 1 V)	2 mV to 1 V (with HD mode: 1 mV to 1 V)
5	10; 20 (2 CH interleaved in 4 GHz and 6 GHz model)	20; 40 (2 CH interleaved)
50 Mpoints; 200 Mpoints	standard: 200 Mpoints/800 Mpoints; max. upgrade: 1 Gpoints/2 Gpoints	standard: 100 Mpoints/400 Mpoints; max. upgrade: 3 Gpoints
standard	standard	standard
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)
digital	digital (includes zone trigger)	advanced (includes zone trigger[1], digital trigger (14 trigger types) with real-time deembedding[2], high speed serial pattern trigger incl. 8/16 Gbps CDR[2]
0.0001 division, all bandwidth, user controllable	0.0001 division, all bandwidth, user controllable	0.0001 division, all bandwidth, user controllable
16	16	16
user-configurable, hardware based	user-configurable, hardware based	user-configurable, hardware based
advanced (formula editor)	advanced (formula editor, Python interface)	advanced (formula editor, Python interface)
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	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-T1/1000BASE-T1	I²C, SPI, UART/RS-232/422/485, SENT, LIN, CAN, CAN FD, MIL-STD-1553, ARINC 429, SpaceWire, USB2.0/HSIC/PD, USB3.1 Gen1/2/SSIC, PCIe 1.1/2.0/3.0, 8b10b, MIPI RFFE, MIPI D/M-PHY/UniPro, Automotive Ethernet 10/100/1000BASE-T1, Ethernet 10/100BASE-TX, MDIO, Manchester, NRZ
power, advanced spectrum analysis and spectrogram	power, advanced spectrum analysis and spectrogram, jitter and noise decomposition, clock data recovery, I/Q data, RF analysis, deembedding, TDR/TDT analysis	advanced spectrum and spectrogram, jitter and noise decomposition, real-time deembedding, TDR/TDT analysis, I/Q data and R&S®VSE analysis, advanced eye
–	see data sheet (PD 5216.1640.22)	see data sheet (PD 3683.5616.22)
10.4" touchscreen, 1024 × 768 pixel	15.6" touchscreen, 1920 × 1080 pixel	13.3" touchscreen, 1920 × 1080 pixel (Full HD)
427 × 249 × 204	450 × 315 × 204	441 × 285 × 316
8.6	10.7	18
–	–	–

SPECIFICATIONS OF BASE UNIT

Vertical system: analog channels

Input channels		4 channels
Input impedance		50 Ω ± 1.5%, 1 MΩ ± 1% ‖ 12 pF (meas.)
Analog bandwidth (–3 dB)	at 50 Ω input impedance	
	R&S®MXO 4	≥ 200 MHz
	R&S®MXO 4 with -B243 option	≥ 350 MHz
	R&S®MXO 4 with -B245 option	≥ 500 MHz
	R&S®MXO 4 with -B2410 option	≥ 1 GHz
	R&S®MXO 4 with -B2415 option	≥ 1.5 GHz [1]
	at 1 MΩ input impedance	
	R&S®MXO 4	≥ 200 MHz (meas.)
	R&S®MXO 4 with -B243 option	≥ 350 MHz (meas.)
	R&S®MXO 4 with -B245 option	≥ 500 MHz (meas.)
	R&S®MXO 4 with -B2410 option	≥ 700 MHz (meas.) [2]
	R&S®MXO 4 with -B2415 option	≥ 700 MHz (meas.) [2]
Bandwidth limits	max. –1.5 dB, min. –4 dB	1 GHz, 500 MHz, 350 MHz, 200 MHz, 100 MHz, 50 MHz, 20 MHz (meas.)
Rise/fall time (calculated)	10% to 90% at 50 Ω	
	R&S®MXO 4	< 1.75 ns
	R&S®MXO 4 with -B243 option	< 1 ns
	R&S®MXO 4 with -B245 option	< 700 ps
	R&S®MXO 4 with -B2410 option	< 350 ps
	R&S®MXO 4 with -B2415 option	< 234 ps
Vertical resolution		12 bit, 18 bit for high definition mode
Input sensitivity	at 50 Ω	0.5 mV/div to 1 V/div, entire analog bandwidth supported for all input sensitivities
	at 1 MΩ	0.5 mV/div to 10 V/div, entire analog bandwidth supported for all input sensitivities
DC gain accuracy	offset and position set to 0 V, after self-alignment	
	input sensitivity > 5 mV/div	±1% full scale
	input sensitivity ≤ 5 mV/div to ≥ 1 mV/div	±1.5% full scale
	input sensitivity < 1 mV/div	±2.5% full scale
Input coupling	at 50 Ω	DC
	at 1 MΩ	DC, AC
Maximum input voltage	at 50 Ω	5 V (RMS), 30 V (V_p)
	at 1 MΩ	300 V (RMS), 400 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
	at 1 MΩ with R&S®RT-ZP11 passive probe	400 V (RMS), 1650 V (V_p), 300 V (RMS) CAT II; for derating and details, see R&S®RT-Zxx Standard Probes data sheet (PD 3607.3851.22)
Position range		±5 div
Offset range at 50 Ω	input sensitivity	
	100 mV/div to 1 V/div	±20 V
	0.5 mV/div to < 100 mV/div	±5 V
Offset range at 1 MΩ	input sensitivity	
	800 mV/div to 10 V/div	±200 V
	80 mV/div to < 800 mV/div	±50 V
	0.5 mV/div to < 80 mV/div	±(5 V – input sensitivity × position)
Offset accuracy		±(0.35% × |net offset| + 0.5 mV + 0.1 div × input sensitivity) (net offset = offset – position × input sensitivity)

[1] 1.5 GHz analog bandwidth in interleave mode with 5 Gsample/s real-time sampling rate.
[2] With R&S®RT-ZP11 passive probe.

Vertical system: analog channels

DC measurement accuracy	after adequate suppression of measurement noise using high-resolution sampling mode or waveform averaging or a combination of both	±(DC gain accuracy × |reading – net offset| + offset accuracy)
Channel-to-channel isolation (each channel at same input sensitivity)	input frequency inside instrument bandwidth	> 60 dB (1:1000)

Vertical system: analog channels

RMS noise floor [3]

At 50 Ω (meas.)	Input sensitivity	Analog bandwidth (–3 dB)				
		20 MHz	200 MHz	350 MHz	500 MHz	1 GHz
	0.5 mV/div	20 µV	43 µV	47 µV	50 µV	98 µV
	1 mV/div	22 µV	45 µV	50 µV	54 µV	104 µV
	2 mV/div	25 µV	52 µV	56 µV	61 µV	116 µV
	5 mV/div	43 µV	72 µV	77 µV	84 µV	152 µV
	10 mV/div	76 µV	118 µV	120 µV	131 µV	238 µV
	20 mV/div	148 µV	219 µV	219 µV	241 µV	436 µV
	50 mV/div	360 µV	508 µV	492 µV	543 µV	1.01 mV
	100 mV/div	747 µV	1.17 mV	1.19 mV	1.30 mV	2.47 mV
	200 mV/div	1.40 mV	2.13 mV	2.14 mV	2.34 mV	4.43 mV
	500 mV/div	3.47 mV	4.91 mV	4.80 mV	5.27 mV	10.13 mV
	1 V/div	6.88 mV	9.71 mV	9.47 mV	10.41 mV	19.96 mV
1 MΩ (meas.)	Input sensitivity	Analog bandwidth (–3 dB)				
		20 MHz	100 MHz	200 MHz	350 MHz	500 MHz
	0.5 mV/div	28 µV	40 µV	42 µV	47 µV	51 µV
	1 mV/div	28 µV	40 µV	46 µV	50 µV	53 µV
	2 mV/div	30 µV	43 µV	49 µV	54 µV	58 µV
	5 mV/div	44 µV	58 µV	67 µV	71 µV	78 µV
	10 mV/div	73 µV	92 µV	109 µV	109 µV	120 µV
	20 mV/div	138 µV	169 µV	199 µV	198 µV	218 µV
	50 mV/div	344 µV	442 µV	525 µV	529 µV	586 µV
	100 mV/div	739 µV	959 µV	1.13 mV	1.14 mV	1.24 mV
	200 mV/div	1.40 mV	1.74 mV	2.06 mV	2.07 mV	2.27 mV
	500 mV/div	3.47 mV	4.43 mV	5.22 mV	5.28 mV	5.75 mV
	1 V/div	7.11 mV	8.92 mV	10.44 mV	10.53 mV	11.49 mV
	2 V/div	13.83 mV	16.9 mV	19.87 mV	19.56 mV	21.38 mV
	5 V/div	34.84 mV	44.32 mV	52.43 mV	53.39 mV	57.97 mV
	10 V/div	57.16 mV	68.58 mV	80.66 mV	78.53 mV	85.46 mV

Vertical system: digital channels

Input channels		16 logic channels (D0 to D15)
Arrangement of input channels		arranged in two logic probes with 8 channels each, assignment of the logic probes to the channels (D0 to D7 or D8 to D15) is displayed on the probe
Input impedance		100 kΩ ± 2 % || ~4 pF (meas.) at probe tips
Maximum input frequency	signal with minimum input voltage swing and hysteresis setting: normal	400 MHz (meas.)
Maximum input voltage		±40 V (V_p)
Minimum input voltage swing		500 mV (V_{pp}) (meas.)
Threshold groups		D0 to D3, D4 to D7, D8 to D11 and D12 to D15
Threshold level	range	±8 V in 25 mV steps
	predefined	CMOS 5.0 V, CMOS 3.3 V, CMOS 2.5 V, TTL, ECL, PECL, LVPECL
Threshold accuracy	threshold between ±4 V	±(100 mV + 3% of threshold setting)
Comparator hysteresis		normal, robust, maximum

[3] HD mode active for bandwidth ≤ 500 MHz.

Horizontal system

Timebase range		selectable between 200 ps/div and 10 000 s/div, time per div settable to any value within range
Deskew range (channel deskew)	between analog channels	±100 ns
	between digital channels	±100 ns
Reference position		0 % to 100 % of measurement display area
Horizontal position range (trigger offset range)	max.	+(memory depth/current sampling rate)
	min.	–5000 s
Modes		normal
Channel-to-channel skew	between analog channels	< 100 ps (meas.)
	between digital channels	< 500 ps (meas.)
Timebase accuracy	after delivery/calibration, at +23 °C	±0.2 ppm
	during calibration interval	±1 ppm
Delta time accuracy	corresponds to time error between two edges on same acquisition and channel; signal amplitude greater than 5 divisions, measurement threshold set to 50 %, vertical gain 10 mV/div or greater; rise time lower than four sample periods; waveform acquired in real-time mode	±(0.20/real-time sampling rate + timebase accuracy × |reading|) (peak) (meas.)

Acquisition system

Sampling rate	analog channels (real time)	max. 5 Gsample/s on 2 channels, max. 2.5 Gsample/s on 4 channels
	analog channels (interpolated)	max. 5 Tsample/s
	digital channels	max. 5 Gsample/s on each channel
Waveform acquisition rate	max.	> 4 500 000 waveforms/s
Trigger rearm time	min.	< 21 ns
Memory depth [4)]	standard	400 Mpoints with 4 active channel (single), 400 Mpoints with 2 active channel (run)
	R&S®MXO4-B108 option	800 Mpoints with 2 active channel (single), 800 Mpoints with 1 active channel (run)
Acquisition modes	sample	middle sample in decimation interval
	peak detect	largest and smallest sample in decimation interval
	average	average value of samples in decimation interval
	number of averaged waveforms	2 to 16 777 215
	envelope	envelope of acquired waveforms
Sampling modes	real-time mode	max. sampling rate set by digitizer
	interpolated time	enhancement of sampling resolution by interpolation; max. equivalent sampling rate is 5 Tsample/s
Interpolation modes		linear, sin(x)/x, sample & hold
Fast segmentation mode	continuous recording of waveforms in acquisition memory without interruption due to visualization	
	max. real-time waveform acquisition rate	> 4 600 000 waveforms/s
	min. blind time between consecutive acquisitions	< 21 ns

High definition mode

General description		The high definition mode increases the numeric resolution of the waveform signal by using digital filtering, leading to reduced noise. Because of the digital trigger concept of the R&S®MXO 4, signals with increased numeric resolution are used as the input for triggering.
Numeric resolution	bandwidth, at 5 Gsample/s	bit resolution
	1 kHz to 10 MHz	18 bit
	100 MHz	16 bit
	200 MHz	15 bit
	500 MHz	14 bit
Real-time sampling rate	all models	max. 5 Gsample/s on 2 channels, max. 2.5 Gsample/s on 4 channels

[4)] The maximum available memory depth depends on the bit depth of the acquired data and, therefore, on the settings of the acquisition system, such as decimation mode, waveform arithmetic or high definition mode.

Trigger system

Trigger sources		analog channels (C1 to C4), digital channel (D0 to D15), trigger in, serial bus
Trigger level range	range	±5 div from center of screen
Trigger modes		auto, normal, single, n single
Trigger sensitivity		10^{-4} div, from DC to instrument bandwidth for all vertical scales
Trigger jitter	full-scale sine wave of frequency set to –3 dB bandwidth	< 1 ps (RMS) (meas.)
Coupling mode	standard	same as selected channel
	HF reject	cutoff frequency selectable from 100 kHz to 50 % of analog bandwidth
	LF reject	attenuates < 50 kHz
Trigger hysteresis	modes	auto (standard) or manual
	sensitivity	10^{-4} div, from DC to instrument bandwidth for all vertical scales
Holdoff range	time	100 ns to 10 s, fixed and random
Main trigger modes		
Edge	triggers on specified slope (positive, negative or either) and level	
Glitch	triggers on glitches of positive, negative or either polarity that are shorter or longer than specified width	
	glitch width	200 ps to 1000 s
Width	triggers on positive or negative pulse of specified width; width can be shorter, longer, inside or outside the interval	
	pulse width	200 ps to 1000 s
Runt	triggers on pulse of positive, negative or either polarity that crosses one threshold but fails to cross a second threshold before crossing the first one again; runt pulse width can be arbitrary, shorter, longer, inside or outside the interval	
	runt pulse width	200 ps to 1000 s
Window	triggers when signal enters or exits a specified voltage range; triggers also when signal stays inside or outside the voltage range for a specified period of time	
Timeout	triggers when signal stays high, low or unchanged for a specified period of time	
	timeout	0 ps to 1000 s
Interval	triggers when time between two consecutive edges of same slope (positive or negative) is shorter, longer, inside or outside a specified range	
	interval time	200 ps to 1000 s
Slew rate	triggers when the time required by a signal edge to toggle between user-defined upper and lower voltage levels is shorter, longer, inside or outside the interval; edge slope may be positive, negative or either	
	toggle time	0 ps to 1000 s
Setup & hold	triggers on setup time and hold time violations between clock and data present on any two input channels; monitored time interval may be specified by the user in the range from –100 s to 100 s around a clock edge and must be at least 200 ps wide	
Pattern	triggers when a logical combination (and, nand, or, nor) of the input channels stays true for a period of time shorter, longer, inside or outside a specified range	
State	triggers when a logical combination (and, nand, or, nor) of the input channels stays true at a slope (positive, negative or either) in one selected channel	
Advanced trigger modes		
Sequence trigger (A/B/R trigger)	triggers on B event after occurrence of A event; delay condition after A event specified either as time interval or number of B events; an optional R event resets the trigger sequence to A	
	A event	any trigger mode
	B event	edge, glitch, width, runt, window, timeout, interval, slew rate
	R event	edge, glitch, width, runt, window, timeout, interval, slew rate
Serial bus trigger	optional	see dedicated triggering and decoding options
Trigger input	input impedance	50 Ω (meas.) or 1 MΩ (meas.) || 11 pF (meas.)
	max. input voltage at 50 Ω	30 V (V_p)
	max. input voltage at 1 MΩ	300 V (RMS), 400 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
	trigger level	±5 V
	sensitivity	
	input frequency ≤ 500 MHz	300 mV (peak-to-peak) (meas.)

Trigger system

	input coupling	AC, DC (50 Ω and 1 MΩ), HF reject (attenuates > 50 kHz or > 50 MHz, user-selectable), LF reject (attenuates < 5 kHz or < 50 kHz, user-selectable)
	trigger modes	edge (rise or fall)
Trigger out	functionality	A pulse is generated for every acquisition trigger event.
	output voltage	0 V to 5 V (nom.) at high impedance; 0 V to 2.5 V (nom.) at 50 Ω
	pulse width	selectable between 16 ns and 50 ms
	pulse polarity	low active or high active
	output delay	depends on trigger settings

Spectrum analysis

General description		Spectrum analysis allows signal analysis in the frequency domain.
Spectrum	sources	channel 1, channel 2, channel 3, channel 4
	setup parameters	center frequency, frequency span, automatic RBW, resolution bandwidth, gate position, gate width, vertical scale, vertical position
	scaling	dBm, dBV, dBμV, V (RMS)
	span	1 Hz to 1.8 GHz
	resolution bandwidth	span/10 ≥ RBW ≥ span/8000
	windows	flat top, Hanning, Hamming, Blackman, rectangular, Kaiser Bessel, Gaussian
	trace types	normal, max. hold, min. hold, average
	max. real-time waveform acquisition rate	> 40 000 waveforms/s
Gate		delimits the display region used for spectrum analysis
Peak list		peak list; diagram labels for easy identification of the peak list entries in the diagram

RF characteristics

Sensitivity/noise density	at 1 GHz (measurement of the power spectral density at 1 GHz at input sensitivity 2 mV/div, corresponding to –30 dBm input range of the oscilloscope, using spectrum analysis with center frequency 1 GHz, span 500 kHz, RBW 3 kHz)	–160 dBm (1 Hz) (meas.)
Noise figure	at 1 GHz (calculated based on the noise density above)	14 dB (meas.)
Dynamic range	measured for an input carrier with a frequency of 1 GHz and a level of –3 dBm at the input of the oscilloscope, using spectrum analysis with center frequency 1 GHz, span 2 MHz, RBW 400 Hz at +20 MHz from the center frequency	106 dB (meas.)
Absolute amplitude accuracy	0 Hz to 1.2 GHz	±1 dB (meas.)
Spurious-free dynamic range (excluding harmonics)	measured for an input carrier with frequency 250 MHz and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 900 MHz, span 1.8 GHz, RBW 300 kHz	65 dBc (meas.)
Second harmonic distortion	measured for an input carrier with frequency 250 MHz and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 900 MHz, span 1.8 GHz, RBW 300 kHz	–60 dBc (meas.)
Third harmonic distortion	measured for an input carrier with frequency 250 MHz and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 900 MHz, span 1.8 GHz, RBW 300 kHz	–59 dBc (meas.)

Waveform measurements

Automatic measurements	measurements on channels, math waveforms, reference waveforms	amplitude, high, low, maximum, minimum, peak-to-peak, mean, RMS, sigma, positive overshoot, negative overshoot, area, rise time, fall time, positive pulse width, negative pulse width, period, frequency, positive duty cycle, negative duty cycle, delay, phase, burst width, pulse count, edge count, pulse train, positive switching, negative switching, cycle area, cycle mean, cycle RMS, cycle sigma, setup, hold, setup/hold time, setup/hold ratio, slew rate rising, slew rate falling, delay to trigger
	gate	delimits the display region evaluated for automatic measurements
	reference levels	user-configurable vertical levels define support structures for automatic measurements
	statistics	displays maximum, minimum, mean, standard deviation and measurement count for each automatic measurement
	number of active measurements	16
Cursor measurements	setup	up to two cursor sets on screen, each set consisting of two horizontal and two vertical cursors.
	target	acquired waveforms (input channels), math waveforms, reference waveforms, XY diagrams
	operating mode	vertical measurements, horizontal measurements or both; vertical cursors either set manually or locked to waveform

Waveform math

General features	number of math equations	up to 5
	sources	channel 1, channel 2, channel 3, channel 4, math waveforms 1 to 4
Functions	operators	add, subtract, multiply, divide, absolute value, square, square root, integrate, differentiate, log10, loge, log2, reciprocal, invert, low pass, high pass, rescale (a*x+b)
	filter	low pass, high pass
	filter types	gaussian, rectangular
	gate	delimits the display region used for waveform math

Display characteristics

Diagram types	Yt, zoom, spectrum
Display interface configuration	display area can be split up into separate diagram areas by dragging and dropping signal icons; each diagram area can hold any number of signals; diagram areas may be stacked on top of each other and later accessed via the dynamic tab menu
Signal icon	each active waveform is represented by a separate signal icon on the signal bar; the signal icon displays the individual vertical and acquisition settings
Toolbar	enables quick access to 19 important tools; allows direct setting of their most common parameters in a simple menu and gives access to more detailed parameters in the main menu; user-defined selection of tools in the toolbar
Upper menu	displays the trigger, horizontal and acquisition settings; allows quick access to these settings
Main menu	provides access to all instrument settings in a compact menu structure
Axis label	X-axis ticks and Y-axis ticks labeled with tick value and physical unit
Diagram label	diagrams may be individually labeled with a descriptive user-defined name
Diagram layout	grid, crosshair, axis labels and diagram label may be switched on and off separately
Persistence	50 ms to 50 s, or infinite
Zoom	user-defined zoom window provides vertical and horizontal zoom; touchscreen interface simplifies resize and drag operations on zoom window
Signal colors	predefined or user-defined color tables for persistence display

History and segmented memory

Acquisition memory		automatic, manual		
	automatic	automatic segment size and sample rate		
	manual	user-defined size and sample rate		
Memory segmentation	function	memory segments for the acquisition		
	number of segments	record length	segments [5] (up to)	total memory
		1 kpoints	1 048 575	1.048 Gpoints
		2 kpoints	524 287	1.048 Gpoints
		5 kpoints	262 143	1.310 Gpoints
		10 kpoints	131 071	1.310 Gpoints
		20 kpoints	65 535	1.310 Gpoints
		50 kpoints	32 767	1.638 Gpoints
		100 kpoints	16 383	1.638 Gpoints
		200 kpoints	9361	1.872 Gpoints
		500 kpoints	4095	2.047 Gpoints
		1 Mpoints	2113	2.113 Gpoints
		2 Mpoints	1056	2.112 Gpoints
		5 Mpoints	427	2.135 Gpoints
		10 Mpoints	213	2.130 Gpoints
		20 Mpoints	106	2.120 Gpoints
		50 Mpoints	41	2.050 Gpoints
		100 Mpoints	20	2.000 Gpoints
		200 Mpoints	9	1.800 Gpoints
		400 Mpoints	4	1.600 Gpoints
		800 Mpoints	2	1.600 Gpoints
	Segmentation is active on all analog and logic channels, protocol decoding and spectrum analysis.			
Fast-segmented mode	continuous recording of waveforms in acquisition memory without interruption due to visualization; blind time between consecutive acquisitions, see Acquisition system			
History mode	function	The history mode always provides access to past acquisitions in the segmented memory.		
	timestamp resolution	1 ps		
	history player	replays the recorded waveforms; repetition possible; adjustable speed; manual next/previous segment; numerical segment number input		
	analyze options	overlay all segments, average all segments, envelope all segments		

Input and output

Front

Channel inputs		BNC-compatible; for details, see Vertical system
	probe interface	auto-detection of passive probes, Rohde & Schwarz active probe interface
Trigger input		BNC; for details, see Trigger system
	probe interface	auto detection of passive probes
Waveform generator outputs (requires R&S®MXO4-B6 option)		BNC; for details, see R&S®MXO4-B6, waveform generator, demo lugs and GND lug
Digital channel inputs	D15 to D8, D7 to D0	interface for R&S®RT-ZL04 logic probe
Probe compensation output	signal shape	rectangle, V_{low} = 0 V, V_{high} = 3.3 V amplitude 3.3 V (V_{pp}) ± 5% (meas.)
	frequency	1 kHz ± 1% (meas.)
Ground jack		connected to ground
USB interface		1 × USB 3.0 super speed port, 2 × USB 2.0 high speed ports, type A plug

Rear

Trigger out		BNC; for details, see Trigger system
USB interface		2 × USB 3.1 gen1 ports, type A plug, 1 × USB 3.1 gen1, type B plug
LAN interface		RJ-45 connector, supports 10/100/1000BASE-T

[5] With R&S®MXO4-B108 memory option. The maximum number of segments without R&S®MXO4-B108 memory option is limited to 10000. The maximum number of segments depends on the number of active channels and the bit depth of the acquired data and, therefore, on the settings of the acquisition system, such as decimation mode, waveform arithmetic or high definition mode.

Input and output

External monitor interface		HDMI™, 1920 × 1080 pixel at 60 Hz, output of oscilloscope display
Reference input	connector	BNC
	impedance	50 Ω (nom.)
	input frequency range	10 MHz (±20 ppm)
	sensitivity	≥ –10 dBm into 50 Ω, ≤ 10 dBm at 10 MHz
Reference output	connector	BNC
	impedance	50 Ω (nom.)
	output signal	10 MHz (specified in timebase accuracy), 8 dBm (nom.)
Security slot		for standard Kensington style lock
VESA mount		VESA compatibility mounting interface, 100 mm × 100 mm pattern size
Right side		
Ground jack		connected to ground

General data

Display	type	13.3" LC TFT color display with capacitive touchscreen
	resolution	1920 × 1080 pixel (Full HD)
Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	–40 °C to +70 °C
		in line with MIL-PRF-28800F, section 4.5.5.1.1.1 class 3 tailored to +45 °C for operation
Climatic loading		+25 °C/+45 °C at 95 % relative humidity cyclic, in line with IEC 60068-2-30
Altitude		
Operating		up to 3000 m above sea level
Nonoperating		up to 4600 m above sea level
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 1.8 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
		10 Hz to 55 Hz, in line with MIL-PRF-28800F, section 4.5.5.3.2 class 3
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
		5 Hz to 500 Hz, acceleration 2.058 g (RMS), in line with MIL-PRF-28800F, section 4.5.5.3.1 class 3
Shock		40 g shock spectrum, in line with MIL-STD-810G, method no. 516.6, procedure I
		30 g functional shock, halfsine, duration 11 ms, in line with MIL-PRF-28800F, section 4.5.5.4.1
Electromagnetic compatibility (EMC)		
RF emission		in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup); instrument complies with emission requirements stipulated by EN 55011, EN 61326-1 and EN 61326-2-1 class A, making it suitable for use in industrial environments
Immunity		in line with IEC/EN 61326-1 table 2, immunity test requirements for industrial environment [6]

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

General data

General data		
Certifications		VDE, $_c$CSA$_{US}$, KC
Calibration interval		1 year
Power supply		
AC supply		100 V to 240 V ±10 % at 50 Hz to 60 Hz and 400 Hz ±5 %, max. 2.3 A to 1.3 A, in line with MIL-PRF 28800F, section 3.5
Power consumption		max. 210 W
Safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1, UL 61010-1
Mechanical data		
Dimensions	W × H × D	414 mm × 279 mm × 162 mm (16.3 in × 10.99 in × 6.38 in)
Weight	without options, nominal	6.0 kg (13.23 lb)
Rackmount height	with R&S®ZZA-MXO4 rackmount kit	6 HU

ORDERING INFORMATION

Designation	Type	Order No.
R&S®MXO 4 series, base model		
Oscilloscope, 200 MHz, 4 channels	R&S®MXO 4	1335.5050.04
Base unit (including standard accessories: 700 MHz passive probe (10:1) per channel, accessories bag, quick start guide, power cord)		
Choose your bandwidth upgrade		
Upgrade of R&S®MXO 4 series oscilloscopes to 350 MHz bandwidth	R&S®MXO4-B243	1335.4276.02
Upgrade of R&S®MXO 4 series oscilloscopes to 500 MHz bandwidth	R&S®MXO4-B245	1335.4299.02
Upgrade of R&S®MXO 4 series oscilloscopes to 1 GHz bandwidth	R&S®MXO4-B2410	1335.4318.02
Upgrade of R&S®MXO 4 series oscilloscopes to 1.5 GHz bandwidth	R&S®MXO4-B2415	1335.4330.02
Choose your options		
Mixed signal option for R&S®MXO 4 series with 16 digital channels	R&S®MXO4-B1	1335.4130.02
Arbitrary waveform generator, 100 MHz, 2 analog channels	R&S®MXO4-B6	1335.4147.02
Memory upgrade to 800 Mpoints on 2 channels	R&S®MXO4-B108	1335.5772.02
Low speed serial triggering and decode (I²C/SPI/UART/RS-232/RS-422/RS-485)	R&S®MXO4-K510	1335.5195.02
Automotive serial triggering and decode (CAN/CAN FD/CAN XL/LIN) [1]	R&S®MXO4-K520	1335.5550.02
Frequency response analysis	R&S®MXO4-K36	1335.5572.02
Application bundle, consists of the following options: R&S®MXO4-K510, R&S®MXO4-K520 [1], R&S®MXO4-K36, R&S®MXO4-B6	R&S®MXO4-PK1	1335.5237.02
Choose your additional probes		
Single-ended passive probes		
700 MHz, 10 MΩ, 10:1, 400 V, 9.5 pF, 2.5 mm	R&S®RT-ZP11	1803.0005.02
500 MHz, 10 MΩ, 10:1, 400 V, 9.5 pF, 2.5 mm	R&S®RT-ZP10	1409.7550.00
500 MHz, 10 MΩ, 10:1, 300 V, 10 pF, 5 mm	R&S®RT-ZP05S	1333.2401.02
38 MHz, 1 MΩ, 1:1, 55 V, 39 pF, 2.5 mm	R&S®RT-ZP1X	1333.1370.02
Active broadband probes: single-ended		
1.0 GHz, 10:1, 1 MΩ, BNC interface	R&S®RT-ZS10L	1333.0815.02
1.0 GHz, active, 1 MΩ, Rohde & Schwarz probe interface	R&S®RT-ZS10E	1418.7007.02
1.0 GHz, active, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZS10	1410.4080.02
1.5 GHz, active, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZS20	1410.3502.02
Active broadband probes: differential		
1.0 GHz, active, differential, 1 MΩ, R&S®ProbeMeter, micro button, incl. 10:1 external attenuator, 1 MΩ, 70 V DC, 46 V AC (peak), Rohde & Schwarz probe interface	R&S®RT-ZD10	1410.4715.02
1.5 GHz, active, differential, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZD20	1410.4409.02
Power rail probe		
2.0 GHz, 1:1, 50 kΩ, ±0.85 V, ±60 V offset, Rohde & Schwarz probe interface	R&S®RT-ZPR20	1800.5006.02

[1] Available with future firmware release.

Designation	Type	Order No.
High voltage probes		
250 MHz, 100:1, 100 MΩ, 850 V, 6.5 pF	R&S®RT-ZH03	1333.0873.02
400 MHz, 100:1, 50 MΩ, 1000 V, 7.5 pF	R&S®RT-ZH10	1409.7720.02
400 MHz, 1000:1, 50 MΩ, 1000 V, 7.5 pF	R&S®RT-ZH11	1409.7737.02
High voltage probes: differential		
100 MHz, 8 MΩ, 1 kV (RMS) (CAT III), BNC interface	R&S®RT-ZD01	1422.0703.02
200 MHz, 250:1/25:1, 5 MΩ, 750 V (peak), 300 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD07	1800.2307.02
100 MHz, 500:1/50:1, 10 MΩ, 1500 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD15	1800.2107.02
200 MHz, 500:1/50:1, 10 MΩ, 1500 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD16	1800.2207.02
100 MHz, 1000:1/100:1, 40 MΩ, 6000 V (peak), 1000 V CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD60	1800.2007.02
Current probes		
20 kHz, AC/DC, 0.01 V/A and 0.001 V/A, ±200 A and ±2000 A, BNC interface	R&S®RT-ZC02	1333.0850.02
100 kHz, AC/DC, 0.1 V/A, 30 A, BNC interface	R&S®RT-ZC03	1333.0844.02
2 MHz, AC/DC, 0.01 V/A, 500 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC05B	1409.8204.02
10 MHz, AC/DC, 0.01 V/A, 150 A (RMS), BNC interface	R&S®RT-ZC10	1409.7750K02
10 MHz, AC/DC, 0.01 V/A, 150 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC10B	1409.8210.02
50 MHz, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC15B	1409.8227.02
100 MHz, AC/DC, 0.1 V/A, 30 A (RMS), BNC interface	R&S®RT-ZC20	1409.7766K02
100 MHz, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC20B	1409.8233.02
120 MHz, AC/DC, 1 V/A, 5 A (RMS), BNC interface	R&S®RT-ZC30	1409.7772K02
EMC near-field probe		
Probe set for E and H near-field measurements, 30 MHz to 3 GHz	R&S®HZ-15	1147.2736.02
Logic probe		
400 MHz logic probe, 8 channels	R&S®RT-ZL04	1333.0721.02
Probe accessories		
Accessory set for R&S®RT-ZP11 passive probe (2.5 mm probe tip)	R&S®RT-ZA1	1409.7566.00
Probe power supply for R&S®RT-ZC10/-ZC20/-ZC30	R&S®RT-ZA13	1409.7789.02
External attenuator 10:1, 2.0 GHz, 1.3 pF, 60 V DC, 42.4 V AC (peak), for R&S®RT-ZD20/-ZD30 probes	R&S®RT-ZA15	1410.4744.02
Probe pouch	R&S®RT-ZA19	
Power deskew and calibration test fixture	R&S®RT-ZF20	1800.0004.02
3D positioner with central tensioning knob for easy clamping and positioning of probes (span width: 200 mm, clamping range: 15 mm)	R&S®RT-ZA1P	1326.3641.02
Choose your accessories		
Front cover	R&S®MXO4-Z1	1335.4360.02
Soft bag	R&S®MXO4-Z3	1335.5589.02
Transit case	R&S®MXO4-Z4	1335.5595.02
Rackmount kit, for R&S®MXO 4 oscilloscopes with 6 HU	R&S®ZZA-MXO4	1335.5108.02
VESA mount (compatible with standard 100 mm × 100 mm pattern)	Choose industry standard mounts	

Warranty	
Base unit	3 years
All other items [2]	1 year
Service options	
Extended warranty, one year	R&S®WE1
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

(Service options note:) Please contact your local Rohde & Schwarz sales office.

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

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Rohde & Schwarz

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