R&S®ESSENTIALS

# MXO 3 Series OSCILLOSCOPE

Next generation oscilloscope:
Fast. Precise. Compact.




**Four- and eight-channel models**

Product Brochure
Version 07.00

**More at: www.rohde-schwarz.com/product/mxo3**

ROHDE&SCHWARZ
Make ideas real

# MXO 3 SERIES OSCILLOSCOPE

## FAST. PRECISE. COMPACT.

Get big capabilities in a small package. Gain the freedom and versatility your work demands without compromising on results. Enjoy unmatched performance to quickly and easily gain expert understanding of your device under test.



8-channel model



4-channel model

**Bandwidth:**
**100 MHz to 1 GHz**

**Fast:**
**4.5 million acquisitions/s, up to 99 % real time capture**

**Precise:**
**12-bit ADC, 18-bit HD mode, digital trigger**

**Compact:**
**11.6" Full HD display and feature-packed**

## WHY ENGINEERS LOVE ROHDE & SCHWARZ OSCILLOSCOPES

- A trusted, global high-quality company with a long-standing commitment to customers and continuous technological innovation
- The newest oscilloscope portfolio from 60 MHz to 16 GHz
- In-house ASICs for the world's most responsive oscilloscopes
- Frontend technology development for pristine signal integrity
- 18-bit architecture with HD mode for the highest resolution
- Digital triggers for the world's most sensitive event isolation
- Superior user interface and front panel to streamline workflows

## WHY THE MXO 3 SERIES

- Gain the freedom and versatility your work demands without compromising on results. Equipped with next-generation MXO technology, the MXO 3 series delivers fast and precise measurements in a small package
- **Fast**
  - Industry's fastest update rate of up to 4.5 million acquisitions/s
  - The highest real-time signal capture up to 99 %
  - Fast in both the time and frequency domains
- **Precise**
  - 12-bit ADC at all sample rates, 18-bit in HD mode
  - Advanced and flexible digital trigger
  - Deep 125 Mpoints standard memory
- **Compact**
  - Save space with all models that fit comfortably on your bench
  - See and share easily with the large 11.6" Full HD display
  - Rackmount with 5U height for all models

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## OSCILLOSCOPE PORTFOLIO

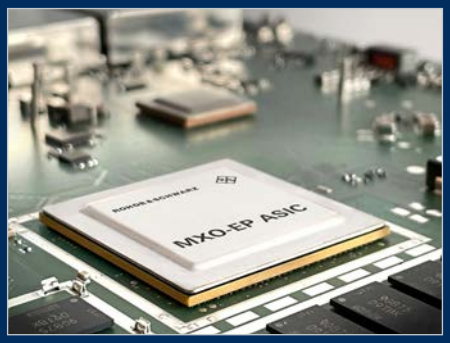
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- 4- and 8-channel models
- 100 MHz to 1 GHz bandwidth
- 5 Gsample/s sample rate
- 125 Mpoints per channel standard memory
- 12-bit ADC at all sample rates

# MXO 3 OSCILLOSCOPE TECHNOLOGY

## FAST. PRECISE. COMPACT.

MXO 3 series oscilloscopes blend cutting-edge hardware and software technology for fast and precise results in a compact format.




### Fast.

All MXO oscilloscopes incorporate cutting-edge ASIC technology. Get the world's fastest update rate of up to 4.5 million acquisitions/s enabled by the Rohde&Schwarz MXO-EP ASIC that processes 400 Gbit/s. This chip also enables hardware-accelerated functions including math, spectrum, zone triggering and mask testing.



### Precise.

The low-noise frontend Rohde&Schwarz ASIC technology, 12-bit vertical resolution in Rohde&Schwarz proprietary ADC technology and 18-bit resolution and digital trigger that is so sensitive it can trigger on smallest signal details combine to make the most precise oscilloscope in its class. The 125 Mpoints standard memory and up to 500 Mpoints option can capture hundreds of milliseconds of time while retaining a fast sample rate and full bandwidth.



Pencil size compared to oscilloscope dimensions

### Compact.

The innovative technology in both the 4-channel and 8-channel models comes in a surprisingly small package even though MXO 3 oscilloscopes still have a large 11.6" Full HD display. The small footprint and light weight mean the oscilloscope is easy to place on a crowded bench or quickly move to a new measurement location. For rackmounting, it is just 5U high.

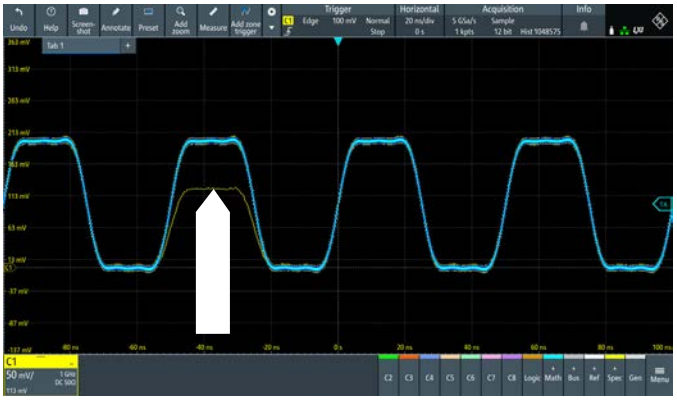
# FAST

## SEE MORE SIGNAL DETAILS AND SUBTLE CHANGES INSTANTLY.

- **Up to 99 % real-time capture**
- **Hardware-accelerated functionality**
- **Industry's fastest spectrum**

### Up to 99 % real-time capture

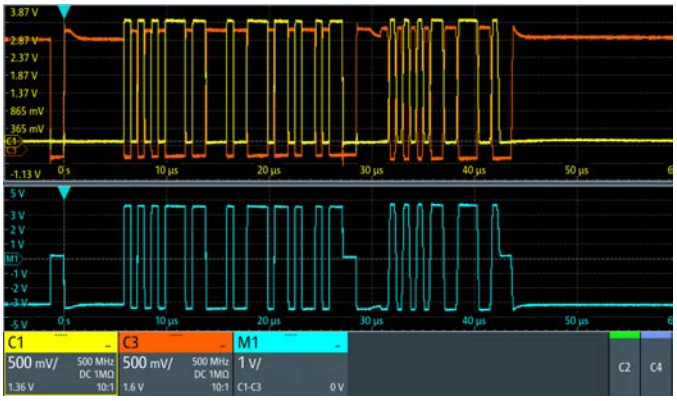
While most oscilloscopes capture less than 2 % of real-time system activity, MXO oscilloscopes capture up to 99 % of your signal's activity. Instantly see details that other oscilloscopes miss. With 4.5 million waveforms/s, quickly see rare events and anomalies that other oscilloscopes mask. Minimum trigger re-arm time is just 21 ns versus microseconds on other oscilloscopes.



### Hardware-accelerated everything

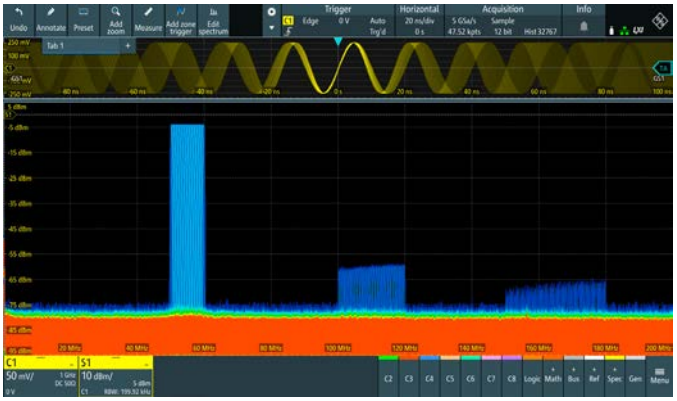
What other companies do with software, MXO oscilloscopes do with hardware. The MXO 3 incorporates hardware accelerated:

- Math (up to 700 000 operations/s)
- FFTs (up to 50 000 FFTs/s)
- HD filters (up to 4.5 million acquisitions/s)
- Zone triggering (up to 600 000 triggers/s)
- Mask testing (up to 4 000 000 tests/s)
- XY mode (up to 2 000 000 plots/s)
- Protocol decode



### Industry's fastest spectrum

MXO 3 processes FFTs in hardware to created it spectrum display. See details in the frequency domain, including dynamic signal changes that other oscilloscopes cannot show. The free-run trigger mode is only found on Rohde & Schwarz oscilloscopes and ensures the fastest spectrum performance available of 50 000 FFTs/s.



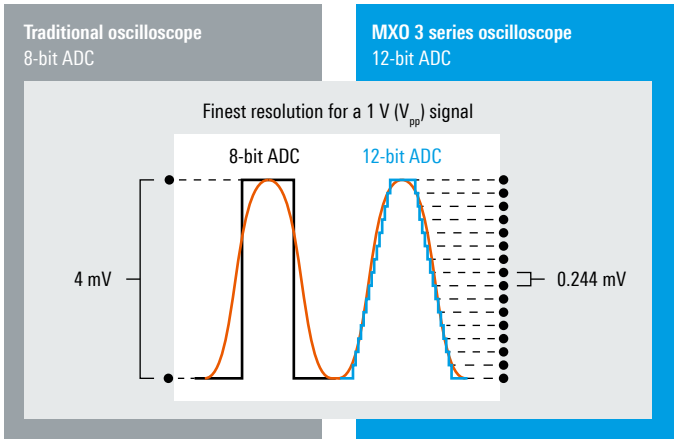
# PRECISE
## NOTHING GETS PAST YOU.

- **Low noise plus more vertical resolution**
- **Sharper view of signals in HD mode**
- **Biggest offset in the industry for higher SNR**

### Low noise plus more vertical resolution

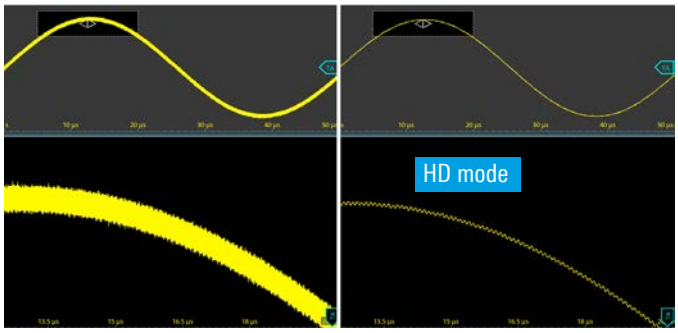
See small signal changes in the presence of larger signals:

- With 12-bit vertical resolution in hardware at all sample rates, 16x more resolution than 8-bit oscilloscopes
- Low-noise: only < 50 µV RMS noise on 1 MΩ and 50 Ω paths at 1 mV/div with 100 MHz bandwidth




### Sharper view of signals in HD mode

Use HD mode to see signal detail that would normally be buried in noise. HD mode offers both noise reduction and up to 18 bit vertical resolution. Unlike other oscilloscopes, HD mode runs at full sample rate and is done in hardware so it's both precise and fast.




### Biggest offset in the industry for higher SNR

The most sensitive vertical scale reveals more of a signal and less measurement system noise. MXO 3 oscilloscopes have large ±3 V offset at 1 mV/div on both 50 Ω and 1 MΩ paths. Zoom in on small-amplitude signals to get best SNR. The offset is 2x to 3x better than other leading models in the industry.



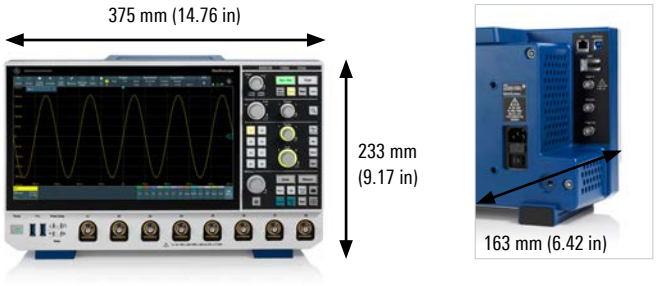
# COMPACT

## GET BIG CAPABILITIES IN A SURPRISINGLY SMALL PACKAGE.

- **Fits anywhere**
- **Lots of capabilities in a small size**
- **Still has vibrant large 11.6" Full HD display**

### Fits anywhere

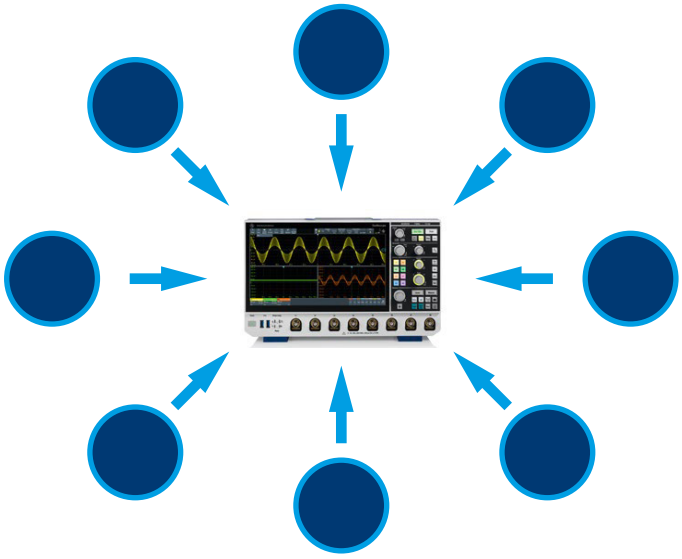
Small MXO 3 oscilloscope footprint and light weight make them easy to fit anywhere – even on crowded benches. The small footprint leaves more space for the creative mess of engineering. The instrument only uses 5U on a rack.




### Lots of capabilities in a small size

Use your MXO 3 oscilloscope for a wide variety of challenges with n-in-1 instrument integration:

- Spectrum analyzer
- Logic analyzer (MSO)
- Protocol analyzer (serial buses)
- DMM
- Function generator
- FRA (Bode plot frequency response analyzer)



### Still has vibrant large 11.6" Full HD display

Though small, the MXO 3 still has a 11.6" Full HD display and a front panel harmonized with other MXO oscilloscopes to make it easy to use and share measurement insight with others.



# DEEP ACQUISITION MEMORY

## OSCILLOSCOPE STAYS RESPONSIVE, EVEN WITH DEEP MEMORY.

- **Deep memory when you need it**
- **Accurately capture long time without the headaches**
- **Independent sample rate, record length and timebase settings**

### Deep memory when you need it

MXO 3 comes standard with 125 Mpoints of memory per channel and an option to upgrade to 500 Mpoints. At any sample rate, deeper memory lets your oscilloscope acquire more time. You may not know how much time you need to capture for a particular challenge and having deep memory is a great insurance policy.



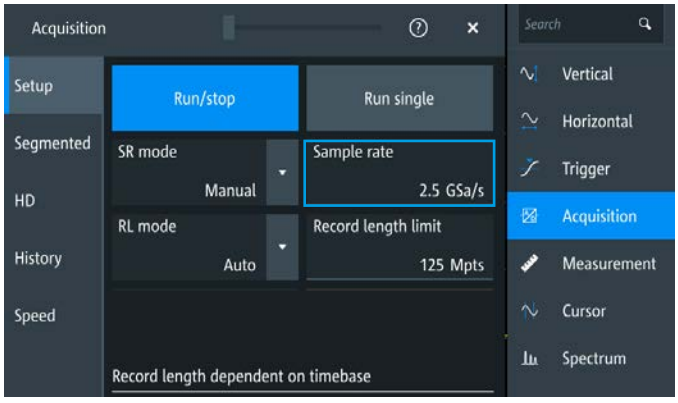
### Accurately capture long time without the headaches

Capturing milliseconds or longer on most oscilloscopes often results in an inaccurate capture. When an oscilloscope runs out of memory, it compensates by reducing sample rate often aliasing captured signals. The MXO 3 memory of 125 Mpoints captures 50 ms of time at full 1 GHz bandwidth with 2.5 Gsample/s without any worry. Or 200 ms of time with 500 Mpoints at 2.5 Gsample/s.




### Independent sample rate, record length and timebase settings

Make sure you have the right sample rate for your measurement. While most oscilloscopes restrict sample rate and memory with timebase settings, MXO oscilloscopes offer both automated and manual sample rate controls, record lengths and timebases that are all independent of each other.



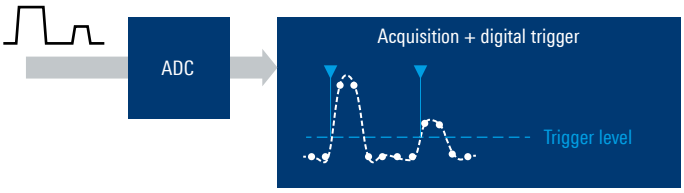
# DIGITAL TRIGGER

## GREATER TRIGGER SENSITIVITY, REDUCED JITTER, WIDER FILTERING OPTIONS

- **Single signal path**
- **Industry's most precise and sensitive trigger**
- **Adjustable digital trigger filters**

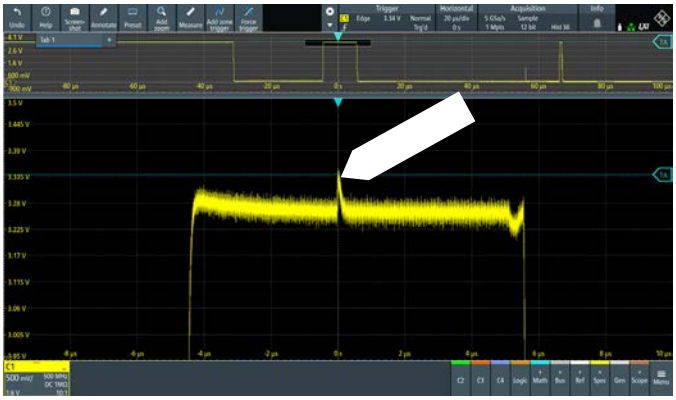
### Single signal path

The digital trigger, pioneered and patented by Rohde&Schwarz, uses a single signal path for measurement and triggering. Older analog triggers that have separate measurement and trigger paths with limitations. Users cannot see the actual trigger circuit signal, trigger levels are restricted and noise reduction is severely limited. MXO digital triggering enables faster and more precise triggering.




### Most precise and sensitive trigger

Isolate small changes in the presence of large signals with trigger sensitivity down to 0.0001 vertical divisions. Trigger precisely on any analog level with interpolated based trigger detection between ADC samples. MXO oscilloscopes have an industry best < 1 ps trigger jitter for additional precision. Minimum trigger re-arm time is just 21 ns compared to other oscilloscopes with a rearm time in the microseconds.



### Adjustable digital trigger filters

Use 18-bit HD mode to suppress broadband noise. Unlike conventional oscilloscopes where the filter is only applied to the signal path and not the trigger path, MXO oscilloscopes allow for both HD and bandwidth filters. A single path for triggering and measurement means the oscilloscope trigger can turn precisely on/off the signal that is used as a filter.



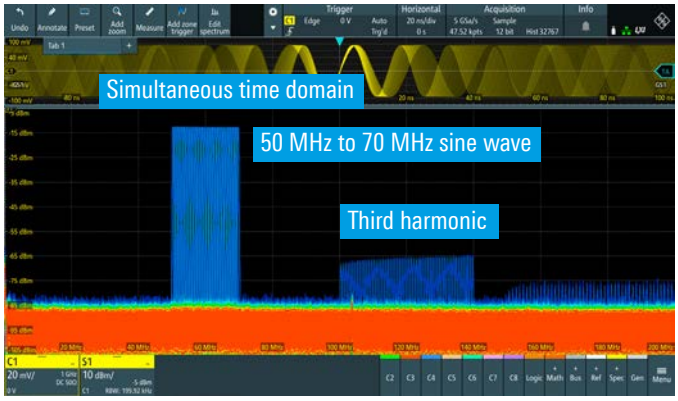
# SPECTRUM

## FAST AND PRECISE FREQUENCY DOMAIN MEASUREMENTS

- **Fast: up to 50 000 FFTs/s**
- **Independent of time domain settings**
- **Free run for effective harmonics and EMI debugging**

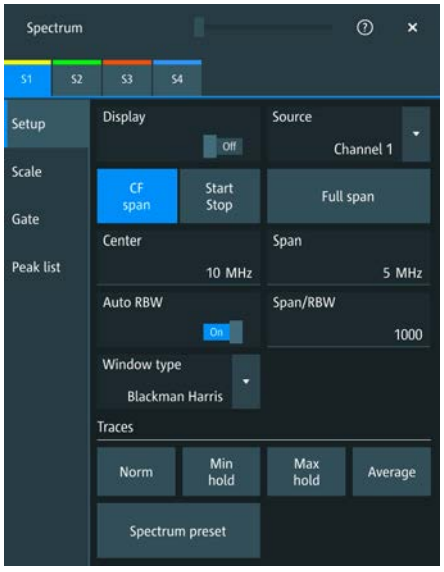
### Fast: up to 50 000 FFTs/s

MXO spectrum is hardware accelerated. Up to 50 000 FFTs/s make for fast and accurate frequency domain analysis. The analysis bandwidth matches the oscilloscope frequency (max. 1 GHz) and up to four spectra can be used simultaneously.




### Independent of time domain settings

Unlike other oscilloscopes where time and frequency controls are subordinate, MXO 3 spectrum settings are independent of time domain settings, so both time and frequency events are easy to see simultaneously. Select CF/span or start/stop as with a spectrum analyzer. Choose your window type and adjust the resolution bandwidth (RBW) if needed. Use averaging, peak list, max. hold and other spectrum settings.




### Free run for effective harmonics and EMI debugging

MXO 3 includes a special triggerless free run mode for frequency domain debugging. Maximize FFTs/s for faster signal build-up. Quickly see spurs, harmonics and other frequency domain signals. Combine with a near-field probe for EMI emission debugging. CF/span/RBW can be adjusted to match EMI test needs.



# SUPERIOR USER INTERFACE

## R&S®SmartGrid UI DESIGNED FOR HIGH PRODUCTIVITY

- **Customize your layout, fast**
- **Quick access to settings and capabilities**
- **Short learning curve**

### Customize your layout, fast

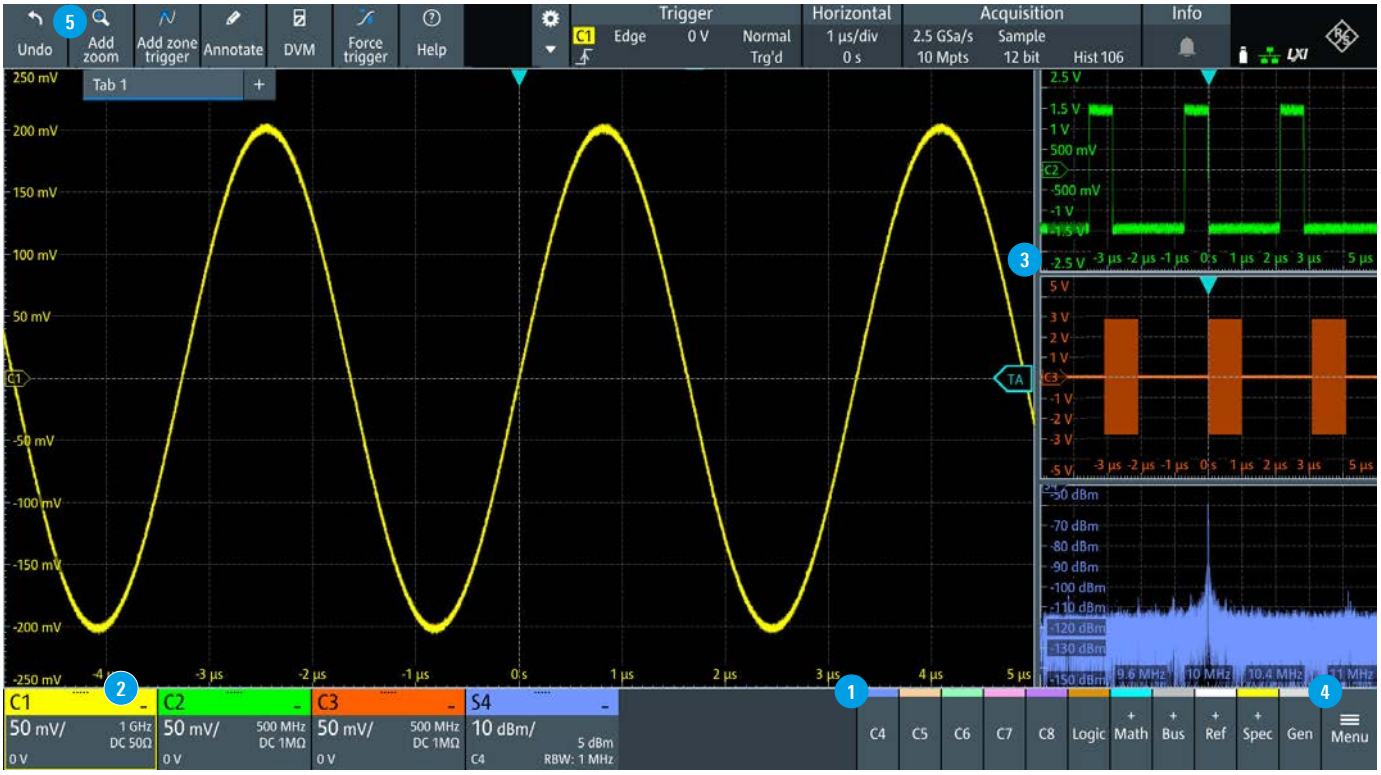
1. Tap to turn on sources and other functions
2. Quickly customize your display layout with drag & drop using R&S®SmartGrid
3. Adjust grid and result table boundaries using sliders

### Quick access to settings and capabilities

4. Easily navigate to all settings using the main menu
5. Quickly access important tools with the customizable toolbar

### Short learning curve

The MXO user interface is intuitive for those with oscilloscope experience. For those needing a function description or who only occasionally use oscilloscopes, simply press the help button on the toolbar for a description of the function and the SCPI command.



# INTUITIVE USER INTERFACE

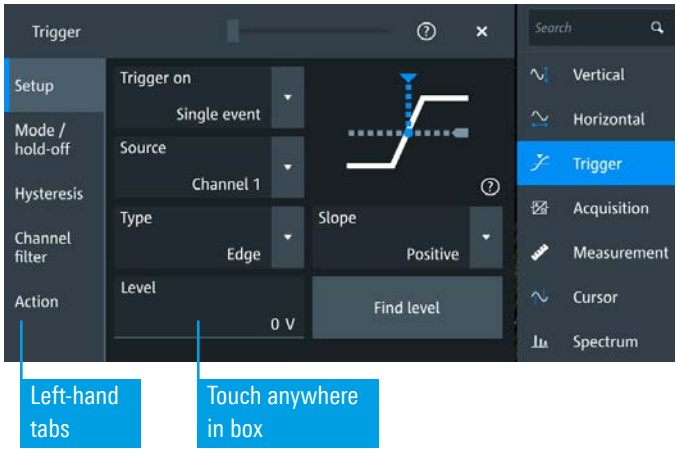
## FAST, EASY AND SMART

- **Left-hand tab maximizes waveform area**
- **Quickly customize your toolbar**
- **Fast search**

### Left-hand tab maximizes waveform area

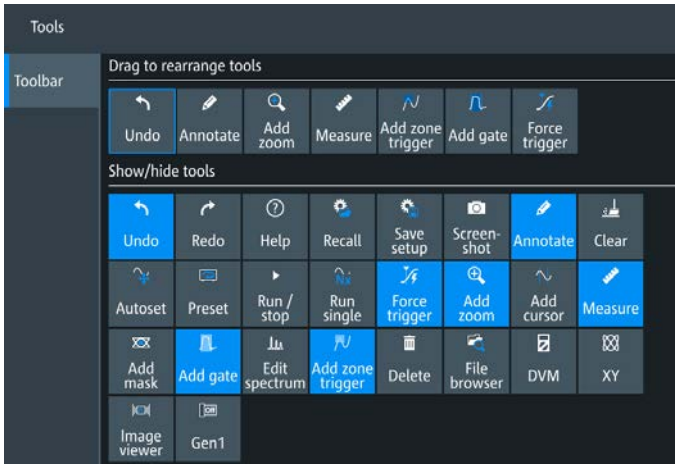
The MXO user interface was designed using extensive user feedback, competitive comparisons and research into the latest user interface concepts outside of test and measurement:

- Dialog has left-hand tab design maximize waveform viewing
- Anywhere-in-box touch allow you to activate a field by touching a large target area



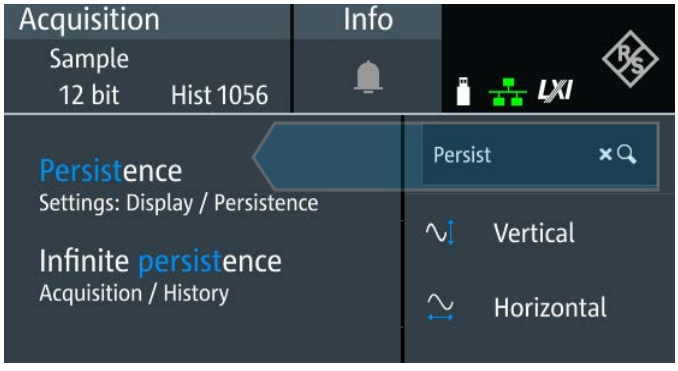

### Quickly customize your toolbar

The MXO toolbar has quick toolbar access. Pick from a wide range of available tools to customize the display.




### Fast search

MXO oscilloscopes pioneered menu search integration. Simply start typing the setting you want and linked list appears. Simply tap on your item for instant navigation.



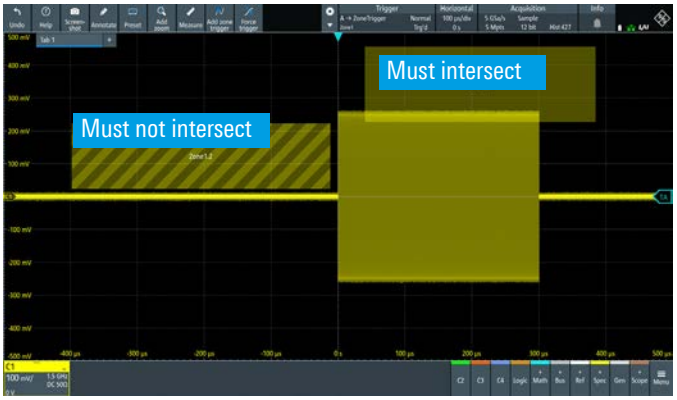
# ZONE TRIGGER

## GET INFINITE OSCILLOSCOPE TRIGGER TYPES WITH ZONE TRIGGERING

- **Draw to trigger**
- **Trigger in the frequency domain**
- **Trigger on math waveforms**

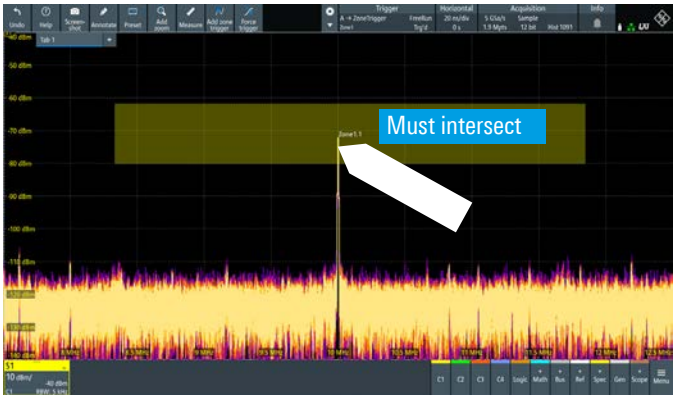
### Draw to trigger

Zone triggering quickly creates triggers that are impossible for traditional types. Simply draw where a signal should or should not intersect. Hardware acceleration means the MXO zone trigger can react to up to 600 000 events/s for an average blind time of 1.6 µs, far shorter than the zone triggering blind times on other oscilloscopes.



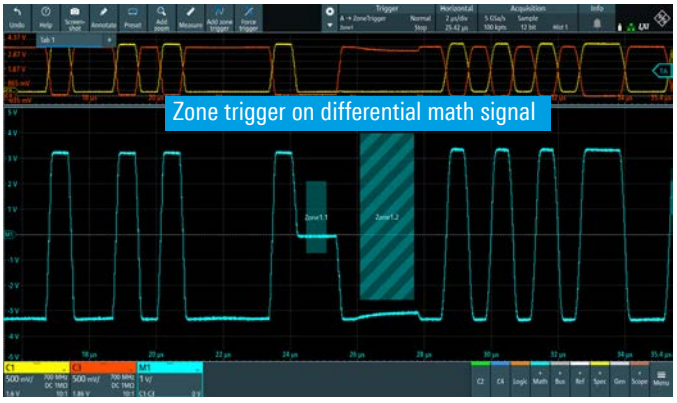

### Trigger in the frequency domain

The Rohde&Schwarz zone trigger works in both the time domain and frequency domain or across both. Use zone triggering for EMI debugging to see what tones exceed certain power levels. Interestingly, zone triggering works in free run mode for a fast 50 000 FFTs/s. The speed lets you quickly and easily see small details and dynamic changes that other oscilloscopes miss.




### Trigger on math waveforms

The Rohde&Schwarz zone trigger also works on math waveforms. Trigger on power (current × voltage) or other math functions. Math triggering can be used independently or combined with zone triggering on individual sources.



# MXO 3 Series AT A GLANCE

**11.6" high resolution, multitouch display**

- ► High resolution: 1920 × 1080 pixel (Full HD)
- ► Gesture support speeds up scaling and zooming
- ► Easy-to-see signal details




**Interfaces on front side**

- ► Two USB 3.0 ports

**Active probe interfaces**

- ► Support for 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

**Connectivity**
- ► USB port
- ► HDMI video output
- ► Ethernet

**Integrated arbitrary waveform generator**
- ► 50 MHz arbitrary waveform generator
- ► Wide range of waveforms and modulation types
- ► Easy configuration of frequency, amplitude, offset and noise




**Clear orientation with color-coded LEDs**
- ► Color-coded keys and rotary knobs for fast correlation with signal sources
- ► Shows currently selected channel
- ► Simple election between fine/course adjustment

**Interface on instrument side**
- ► MSO logic probe connectors



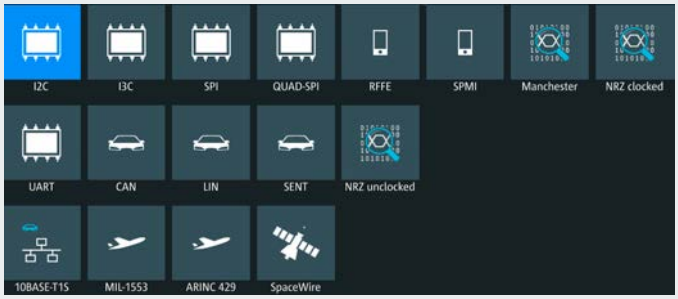
**Intuitive front panel increases productivity**
- ► Fast, direct access to primary instrument settings
- ► Quickly adjust settings with knobs and keys
- ► Sectional layout makes finding the right function easy

# SERIAL BUS TRIGGER AND DECODE

## SERIAL BUS TRIGGER AND DECODE OPTIONS

### Triggering and decoding for a wide range of serial buses

Choose from one or more of the MXO 3 serial bus trigger and decode options. The options convert physical layer digital or analog waveforms into packets for specific buses. MXO 3 supports a wide range of serial buses and as your bus support needs change, the MXO 3 has you covered. MXO 3 allows up to four simultaneous serial bus decodes all time correlated in the waveform area.




### Fast decode with multiple views

Easily see dynamic bus activity with hardware-accelerated decode. View bus packets in the main waveform window, in a time-correlated zoom window or a listing table. Expand the table view with a slider. Select a specific decode table row to see additional packet details in the lower right side of the table.



### Trigger at the packet level

Each supported bus also includes packet-level triggering. Hardware based triggering analyzes packet fields in real time and you can specify a packet-level trigger. Software based triggers search each acquisition and stop the instrument when the acquisition includes the specified trigger event.




### Trigger and decode packages

| Option | Description | Buses |
|---|---|---|
| R&S®MXO3-K500 | bus analysis | |
| R&S®MXO3-K510 | low speed serial buses | I²C/SPI/UART/RS-232/RS-422/RS-485/NRZ clocked/NRZ unclocked/Manchester/QuadSPI |
| R&S®MXO3-K520 | automotive buses | CAN/CAN FD/CAN XL/LIN/SENT |
| R&S®MXO3-K530 | aerospace protocols | ARINC 429/MIL-STD-1553/SpaceWire |
| R&S®MXO3-K550 | MIPI low speed protocols | SPMI/RFFE/I³C |
| R&S®MXO3-K560 | automotive Ethernet buses | 10BASE-T1S |
| R&S®MXO3-K570 | USB protocols | USB 1.1/2.0 |

# LOGIC ANALYSIS (MSO)

## ADD LOGIC ANALYSIS TO YOUR OSCILLOSCOPE

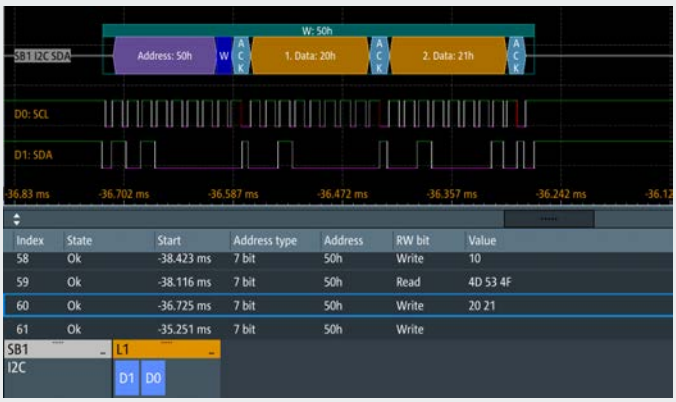
### Built-in logic analysis

Every MXO 3 series oscilloscope is enabled for MSO logic analysis. Just add the R&S®MXO3-B1 mixed signal option for 16 digital channels.



### Timing relationships and serial bus test

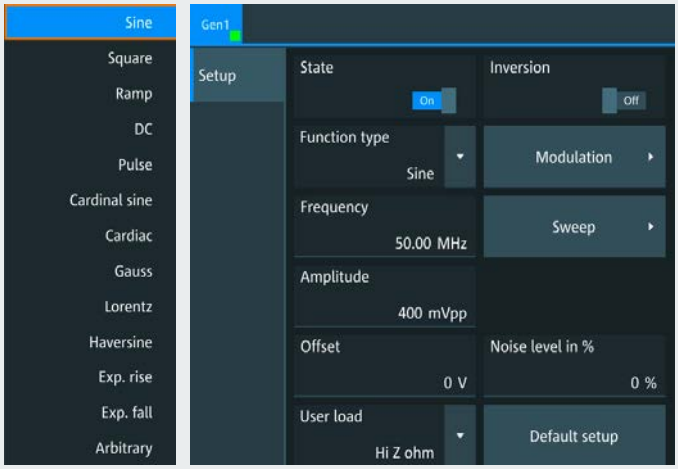
Capture long periods while retaining a fast sample rate of up to 5 Gsample/s with 125 Mpoints of memory per logic channel. Use the MSO to see precise timing relationships or to trigger and decode serial buses such as the I²C here on the left.



# ARBITRARY WAVEFORM GENERATOR

### Function and arbitrary waveform generator

Add an integrated 50 MHz arbitrary waveform generator with the R&S®MXO3-B6 option. Choose from a variety of wave shapes or load your own arbitrary waveform file. The modulation feature lets you explore advanced signal variations.




| R&S®MXO3-B6 arbitrary waveform generator option | |
|---|---|
| Analog output | 1 output with 50 Ω or 1 MΩ selection |
| Maximum frequency | 50 MHz |
| Arbitrary waveform length | 128 ksample |
| Maximum sample rate | 312.5 Msample/s |
| Vertical resolution | 14 bit |
| Waveform types | sine, square, ramp, DC, pulse, cardinal sine, cardiac, Gauss, Lorentz, haversine, exponential rise/fall, arbitrary |
| Modulation and sweep | PWM on square, AM, FM, FSK on sine, frequency sweep on sine |

# FREQUENCY RESPONSE ANALYSIS WITH BODE PLOT

Add the R&S®MXO3-K36 frequency response analysis option for frequency response analysis (FRA). Characterize the frequency response of various electronic devices for CLR, PSRR and more testing.

Measure phase and gain margins. Configure the amplitude output level during testing. Save screenshots, table results or both for reporting and documentation. FRA calibration data can be saved for future testing.

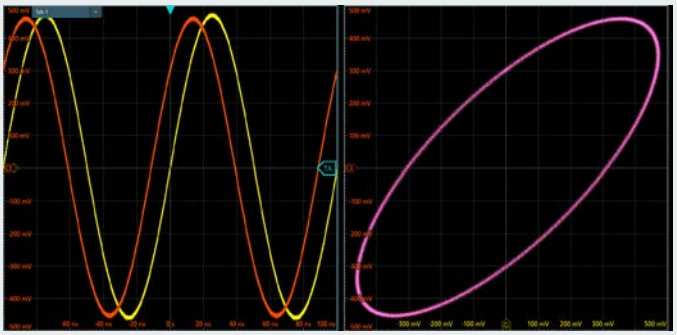


| R&S®MXO3-K36 frequency response analysis option | |
|---|---|
| Note: R&S®MXO3-B6 is a prerequisite for FRA applications. | |
| Frequency range | 10 mHz to 50 MHz |
| Amplitude mode | fixed or amplitude profile |
| Amplitude level | 10 mV to 10 V into high Z; 5 mV to 5 V into 50 Ω |
| Test points | 10 points to 500 points per decade |

# XY MODE, MASK TEST AND DIGITAL VOLTMETER

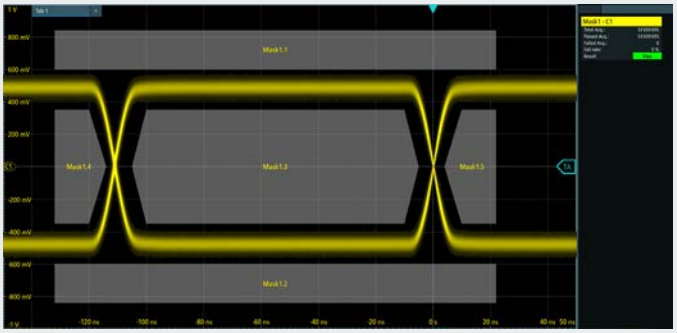
### Hardware-accelerated XY mode

Use XY mode to quickly see the graphic relationship between two signals. Hardware-accelerated XY means you get up to 600 000 plots/s, similar or faster than analog oscilloscopes. Use XY mode to plot Lissajous and I-V curves. Select any channel, math or track signals as sources to plot. Looking for an entertaining hobby? Check out oscilloscope music and oscilloscope art in XY mode and try it out with an MXO 3.



### Fastest mask test

Quickly determine how well your signals conform to physical layer requirements. The instrument provides a statistical record of all waveforms that pass and/or fail the mask test. Hardware-accelerated mask testing is among the fastest in the industry. Mask testing supports up to 4 million mask tests/s as well as single-channel and multichannel testing.



### Digital voltmeter (DVM)

Want a quick check of DC values? The digital voltmeter updates even when the channel is turned off. Dock the results on either side or at the bottom of the display. Each DVM per channel shares a global configurable measurement bandwidth and time period.



# POWER ANALYSIS

## Characterizing input power quality

The R&S®MXO3-K31 power analysis option enables power-quality measurements and provides concurrent analysis of three pairs of voltage and current sources. The option eliminates many of the manual and tedious calculations needed to determine real, apparent and reactive power.



## Harmonic current analysis in line with standards

AC power supplies have different standards for limiting harmonic current. Identifying distortion from harmonic content can be tedious without the right tool. The R&S®MXO3-K31 includes current harmonic analysis for testing in line with all common standards. You can setup three concurrent harmonic measurements.



| R&S®MXO3-K31 power analysis option | |
|---|---|
| Power quality | active, apparent and reactive power, crest factor and phase angle |
| Current harmonics | THD RMS and fundamental functions, in line with EN 6100-3-2 classes A, B, C, D, MIL-STD-1399 and RTCA DO-160 |
| Switching loss | automated measurement for power devices identifying turn on, turn-off, conduction and non-conduction region |
| Turn on/off time | measure time taken for device to transition from their on/off state to another |
| More analysis functions will be added in future. | |

# 3-PHASE ANALYSIS FOR POWER AND DRIVES

The MXO 3 series oscilloscopes combined with the R&S®MXO3-K333 3-phase power analysis option enable comprehensive characterization of 3-phase power systems. Automated measurements cover total power, harmonics, phase quantities and distortion, with flexible wiring configurations to quickly visualize waveforms, harmonic spectra, numerical results and phasor diagrams.

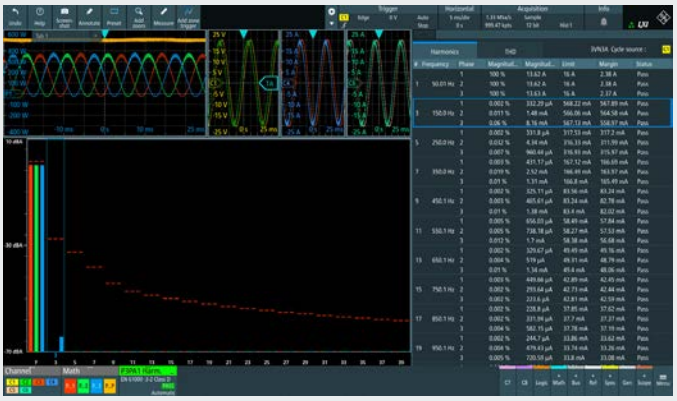
## Full system transparency from power results to signal behavior

Get comprehensive 3-phase power quality measurements while preserving full time-domain visibility. Automated 3-phase measurements are never isolated from the waveform. Engineers can immediately trace RMS values, power factors and harmonic content back to the original signals for faster root-cause analysis when results deviate from expectations.



## Harmonics analysis with diagnostic depth

Perform detailed 3-phase harmonics and THD analysis in line with IEC 61000-3-2 while retaining access to time-domain and frequency-domain views. Instead of relying solely on pass/fail results, engineers can investigate the origin, distribution and phase relationship of harmonic components with FFT, statistics and waveform inspection within the same environment for diagnosing the root cases of harmonics and move beyond simple compliance verification.

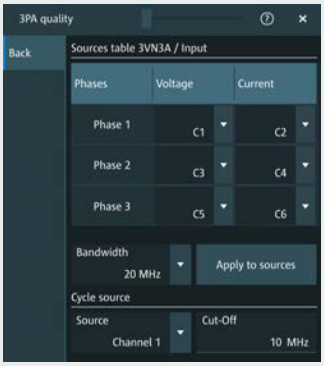


## Flexible wiring configurations and cycle source filtering for real systems

Support common three-phase wiring configurations without having to re-engineer the measurement setup:

- Two-wire, three-wire and four-wire systems (2V2A, 3V3A, 3VN3A)
- Flexible voltage and current combination that support sources from math and reference input

Cycle source filtering also helps identify fundamental frequencies in the presence of noisy converter signals, essential for accurate power and harmonic computation. Such flexibility simplifies measurements across power distribution, converters and industrial power systems.



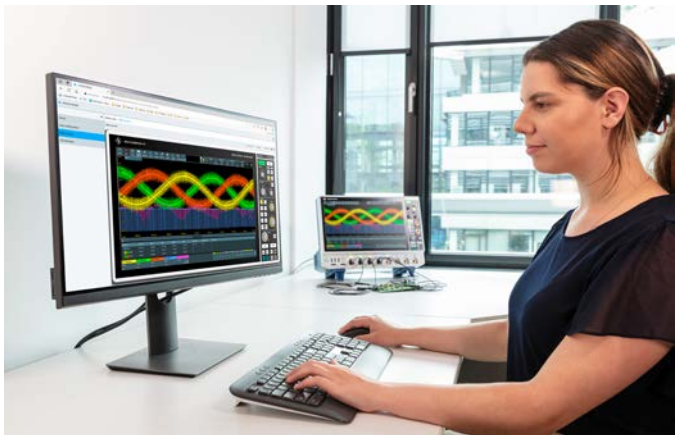

| Option | Description | Analysis |
|---|---|---|
| R&S®MXO3-K333 | 3-phase analysis | 3-phase power quality analysis with phasor diagram and harmonic testing in line with IEC 61000-3-2 |

# REMOTE CONTROL AND CONNECTIVITY

## ANYTIME, ANYWHERE.

### Easy remote access

Remotely control the oscilloscope and view its display on your web browser and VNC viewer with the same user interface as the instrument, including the front panel. Mount a network drive for storage.



### WebDAV support

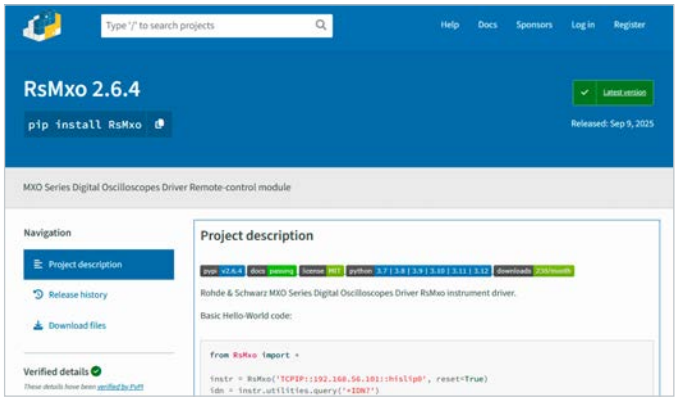
You can easily access instrument data with the web-distributed authoring and versioning (WebDAV) protocol to share, copy, move and edit files on the instrument through a web server. A WebDAV client can be a file transfer client or file manager such as Dolphin or Nemo in Linux, Finder in Mac OS X and File Explorer in Windows. The clients are all capable of accessing the device through IP addresses or device hostnames.

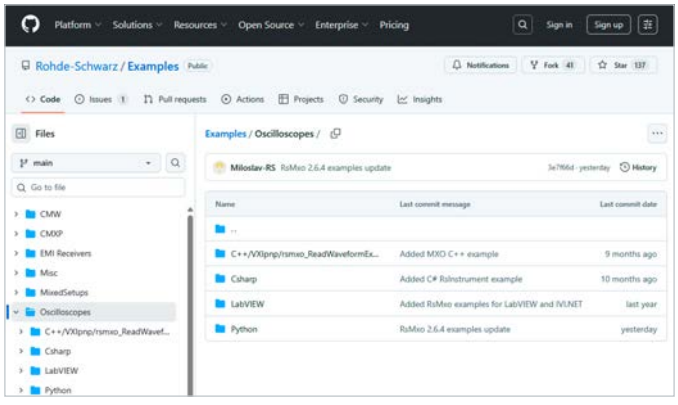
### Remotely control using LabView, and python drivers

All oscilloscope functions can be accessed remotely via Ethernet or USB-TMC interface. LabVIEW, VXI, C# and Python instrument drivers are also available, for which sample codes can be found on GitHub and PyPi websites.

```
#   SYSTem:DISPlay:UPDate ON
mxo.system.display.set_update(True)
#   TRIGger:MODE AUTO
mxo.trigger.set_mode(trigger_mode=TriggerMode.AUTO)
#   ACQuire:SRATe:MODE AUTO
mxo.acquire.sampleRate.set_mode(sample_rate_mode=AutoManualMode.AUTO)
```

| Relevant links |
|---|
| github.com/Rohde-Schwarz/ Examples/tree/main/Oscilloscopes |
| plugins. jetbrains.com/plugin/19828-rohde--schwarz-instrument-connectivity |
| pypi.org/project/RsMxo/ |
| www.nuget.org/packages/RsMxo |
| RsMxo.readthedocs.io/ |



# FIRMWARE UPDATES AND SECURITY

### Rohde&Schwarz closed-system Linux OS

MXO incorporates a closed Linux operating system for more equipment security. Created and maintained by Rohde&Schwarz, the operating system has been hardened by the company for use across a wide range of Rohde&Schwarz instruments. No external applications or scripts can be executed in the system for a high security level that corporate IT teams can work with.






### Regular firmware updates that are free

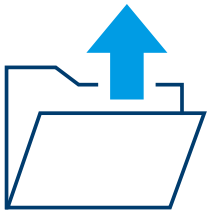
Regular firmware updates add new functions to MXO 3 oscilloscopes. Download the latest firmware version at www.rohde-schwarz.com. Use a USB storage device or LAN connection for installation.





### Software based upgrades

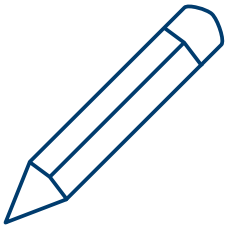
Easy-to-install software licenses upgrade memory, turn on additional serial bus trigger and decode options, enable the generator, digital channels and the frequency response analysis (Bode plot). Upgrade bandwidth with a software license.





### Secure erase for media sanitization

Working in a high-security environment? The MXO 3 includes media sanitization procedures in line with NIST Special Publication 800-88: Guidelines for Media Sanitization. Find instructions in the MXO 3 instrument security procedures document.





# KEY APPLICATIONS

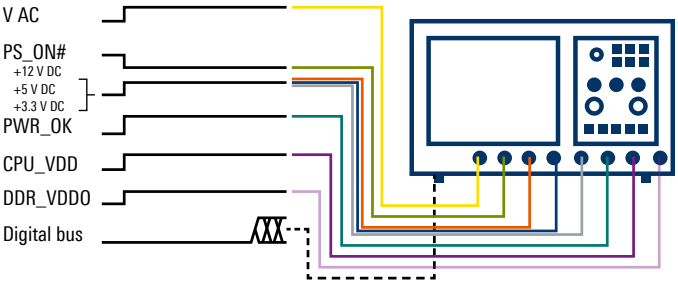
## Power electronics

Combine MXO 3 with current probes, high voltage probes and/or optically isolated probes for power electronic measurements. The MXO 3 excels in power electronic measurements with HD mode noise suppression, rich math and 8-channel models.



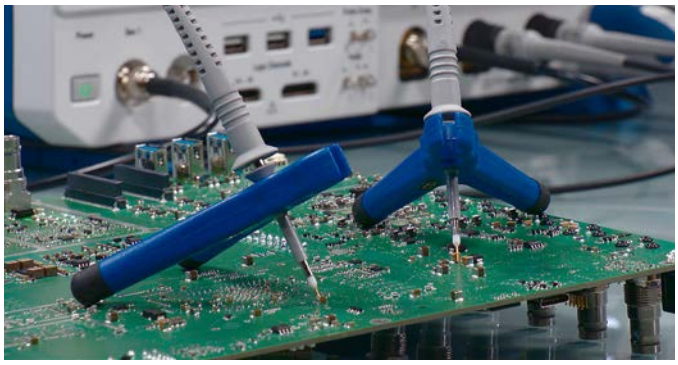
## PMIC, power integrity and sequencing

With its industry-best high offset, low noise and extensive time and frequency domain capabilities, MXO 3 excels in a variety of power measurements. Combine with an R&S®RT-ZPR power rail probe for excellent power integrity measurements. Use with passive probes for power sequencing testing. Use for voltage regulator and other on-board power tests.




## Embedded hardware testing

The MXO 3 puts big capabilities in a small form to excel at a variety of embedded hardware development testing needs. These include board bring up, hardware integration testing and software hardware integration tasks. The MXO 3 has robust capabilities for embedded hardware manufacturing and troubleshooting and repair.

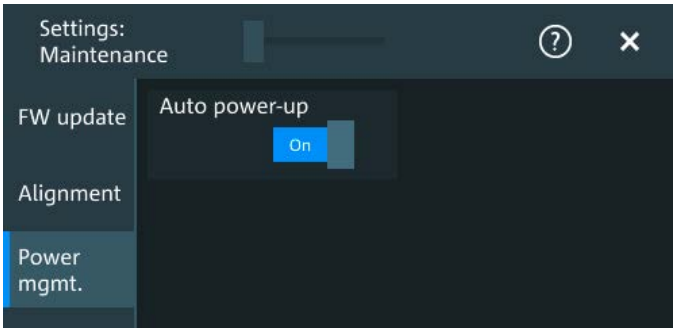


# QUIET AND SUSTAINABLE PERFORMANCE

## KEEP POWER CONSUMPTION IN CHECK

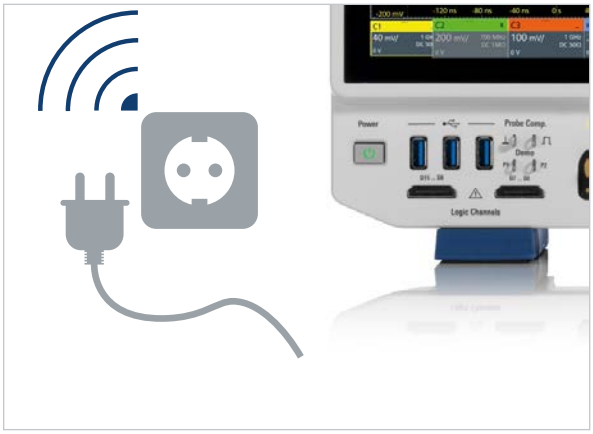
### Reduce power consumption

Reducing power consumption is important now and will be in the future. The electrical power used over the life-cycle of an electronic device can make up 90 % of its $CO_2$ footprint. Minimizing power consumption reduces the environmental impact of an oscilloscope. Rising energy prices make reducing power consumption essential to long-term affordability.



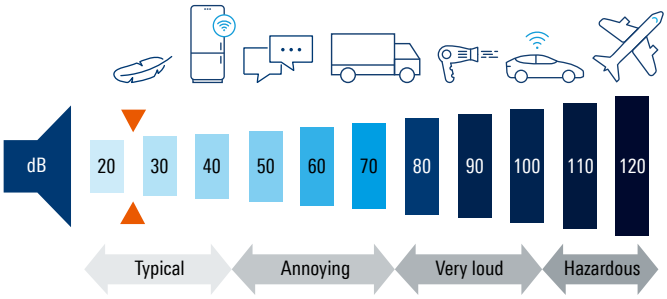

### Remotely turn on/off your Rohde&Schwarz oscilloscope

When working remotely, keeping the unit powered in the lab 24/7 can waste a lot of energy. While remote IP controlled socket power supplies are possible, most electronic equipment will only power up to a standby state with the main power switched on. The MXO 3 provides a convenient feature that allows it to be turned on automatically as soon as electric power is switched on. By simply connecting it into a smart socket system, you can enable the option of remotely turning on the device only when you intend to use it, while keeping it powered off at other times.



### Peace and quiet

Need a quiet space? Do loud instruments or loud equipment disturb others? The MXO 3 series has a very low operating audible noise level and sounds like a soft whisper. You might not even notice that it's turned on.






# EXTENSIVE PROBE PORTFOLIO

## THE RIGHT PROBE FOR THE YOUR MEASUREMENT

MXO 3 oscilloscope comes standard with one 500 MHz passive probe for each channel. Choose from a comprehensive portfolio of high-quality passive and active probes from Rohde&Schwarz for other probe needs



### Complete portfolio for power measurements

The portfolio of dedicated probes for power measurements includes active and passive probes for different voltage and current ranges – from µA to kA and from µV to kV. Dedicated power rail probes can detect small and sporadic distortions on DC power rails. High voltage differential probes allow isolated floating measurements.

### High voltage differential probes

The R&S®RT-ZHD series high voltage differential probes have an excellent common mode rejection ratio (CMRR) for a broad frequency with 200 MHz bandwidth and can safely measure up to 6000 V peak voltage. Low noise makes it an ideal probe for switching power analysis with ground reference.

### Micro button and R&S®ProbeMeter for easy control

Our active probes feature a micro button, cleverly located on the probe tip. You can assign various functions to the micro button, such as run/stop, autoset and adjust offset to directly control the oscilloscope from the probe.

Most Rohde&Schwarz active probes come with the R&S®ProbeMeter that takes precision to a whole new level. The probes impressive accuracy of 0.1% ensures reliable and trustworthy measurements. When Rohde&Schwarz designs a probe, thermal drifts, filters and usability are usually the best overall. Make measurements a breeze and get precise results with confidence.



With high CMRR, R&S®RT-ZISO isolated probing excels for WBG and faster IGBT switch node testing applications.

## Rohde&Schwarz has a comprehensive probe portfolio to meet every probing need.

► For more information, see product brochure "Probes and accessories for Rohde&Schwarz oscilloscopes" (PD 3606.8866.12)



### Passive probes included as standard (38 MHz to 700 MHz)

R&S®RT-ZP11, R&S®RT-ZP1X

Passive probes come standard with every Rohde&Schwarz oscilloscope. They are low cost, general purpose probes 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. 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-ZS10E, R&S®RT-ZS10, R&S®RT-ZS20, R&S®RT-ZS30, R&S®RT-ZS60

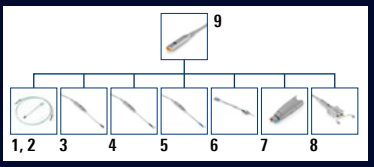
A very high dynamic range and exceptionally low offset and gain errors combined with the right accessories make these probes ideal for Rohde&Schwarz oscilloscopes.



### 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 and R&S®RT-ZA15 external attenuator

A flat frequency response and high input impedance with low input capacitance permit precise measurements on differential signals while maintaining a low load on the DUT. The CMMR for the entire probe bandwidth has high interference immunity.




1 R&S®RT-ZMA50; 2 R&S®RT-ZMA11; 3 R&S®RT-ZMA10; 4 R&S®RT-ZMA12; 5 R&S®RT-ZMA15; 6 R&S®RT-ZMA14; 7 R&S®RT-ZMA30; 8 R&S®RT-ZMA40; 9 R&S®RT-ZM

### Modular broadband probes (1.5 GHz to 16 GHz)

R&S®RT-ZM15, R&S®RT-ZM30, R&S®RT-ZM60, R&S®RT-ZM90, R&S®RT-ZM130, R&S®RT-ZM160

Current probing requirements need a technically sophisticated, yet easy-to-handle solution. The various probing solutions meet the demands for high probe bandwidths and dynamic range along with the need for low capacitive load.



### 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 DC offset make these probes an excellent tool for characterizing power rails. The integrated high-precision DC voltmeter (R&S®ProbeMeter) 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-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 up to 6000 V (peak). Different models allow measurements in up to CAT IV environments. Differential probes provide exceptional common mode rejection over a wide bandwidth.



### 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-ZC30, R&S®RT-ZC31

Rohde&Schwarz current probes enable accurate, non-intrusive measurements of DC and AC currents. Different models are available to measure currents in the range from 1 mA to 2000 A with a bandwidth of up to 120 MHz. Current probes are available with the Rohde&Schwarz probe interface or a BNC connector for an external power supply.



### EMC near-field probes (30 MHz to 3 GHz)

R&S®HZ-15, R&S®HZ-17

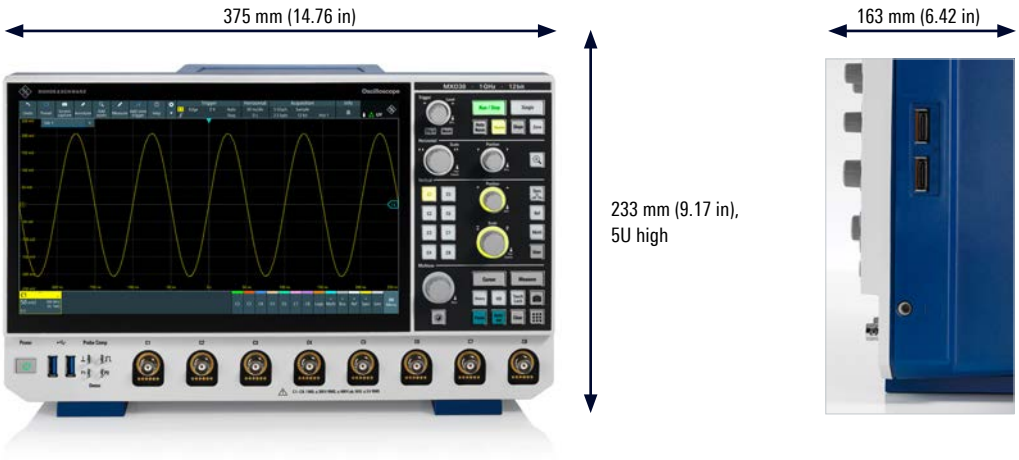
Powerful E and H near-field probes for the frequency range from 30 MHz to 3 GHz with an optional preamplifier expand the application range of the MXO 3 series oscilloscope to include EMI debugging.

# ACCESSORIES AND RACKMOUNT

## Safe transport and easy rack mounting

An extensive selection of storage and transportation accessories means the MXO 3 series oscilloscopes are always fully protected and easy to transport. The rackmount kit allows easy installation of the oscilloscope in integrated environments.



# SPECIFICATIONS OF BASE UNIT

| Vertical system: analog channels | | |
|---|---|---|
| Input channels | | 4 channels or 8 channels |
| Input impedance | | 50 Ω ± 1.5%,<br>1 MΩ ± 1% \|\| 12 pF (meas.) |
| Analog bandwidth (–3 dB) | MXO 34, 4-channel instrument | |
| | at 50 Ω input impedance | |
| | MXO 3 | ≥ 100 MHz |
| | MXO 3 with -B242 option | ≥ 200 MHz |
| | MXO 3 with -B243 option | ≥ 350 MHz |
| | MXO 3 with -B245 option | ≥ 500 MHz |
| | MXO 3 with -B2410 option | ≥ 1 GHz |
| | at 1 MΩ input impedance | |
| | MXO 3 | ≥ 100 MHz (meas.) |
| | MXO 3 with -B242 option | ≥ 200 MHz (meas.) |
| | MXO 3 with -B243 option | ≥ 350 MHz (meas.) |
| | MXO 3 with -B245 option | ≥ 500 MHz (meas.) [1] |
| | MXO 3 with -B2410 option | ≥ 500 MHz (meas.) [1] |
| | MXO 38, 8-channel instrument | |
| | at 50 Ω input impedance | |
| | MXO 3 | ≥ 100 MHz |
| | MXO 3 with -B282 option | ≥ 200 MHz |
| | MXO 3 with -B283 option | ≥ 350 MHz |
| | MXO 3 with -B285 option | ≥ 500 MHz |
| | MXO 3 with -B2810 option | ≥ 1 GHz |
| | at 1 MΩ input impedance | |
| | MXO 3 | ≥ 100 MHz (meas.) |
| | MXO 3 with -B282 option | ≥ 200 MHz (meas.) |
| | MXO 3 with -B283 option | ≥ 350 MHz (meas.) |
| | MXO 3 with -B285 option | ≥ 500 MHz (meas.) [1] |
| | MXO 3 with -B2810 option | ≥ 500 MHz (meas.) [1] |
| Additional bandwidth filters available up to instrument bandwidth | | 500/350/200/100/50/20 MHz (meas.) |
| Rise/fall time (calculated) | 10% to 90% at 50 Ω | |
| | MXO 34, 4-channel instrument | |
| | MXO 3 | < 3.5 ns |
| | MXO 3 with -B242 option | < 1.75 ns |
| | MXO 3 with -B243 option | < 1 ns |
| | MXO 3 with -B245 option | < 700 ps |
| | MXO 3 with -B2410 option | < 350 ps |
| | MXO 38, 8-channel instrument | |
| | MXO 3 | < 3.5 ns |
| | MXO 3 with -B282 option | < 1.75 ns |
| | MXO 3 with -B283 option | < 1 ns |
| | MXO 3 with -B285 option | < 700 ps |
| | MXO 3 with -B2810 option | < 350 ps |
| Vertical resolution | | 12 bit,<br>up to 18 bit for high definition mode |
| Input sensitivity | at 50 Ω | 1 mV/div to 1 V/div,<br>entire analog bandwidth supported for all input sensitivities |
| | at 1 MΩ | 1 mV/div to 10 V/div,<br>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 coupling | at 50 Ω | DC |
| | at 1 MΩ | DC, AC (> 7 Hz) |

[1] With R&S®RT-ZP05M passive probe.

## Vertical system: analog channels

| | | |
|---|---|---|
| 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-ZP05M 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 specifications (PD 3607.3851.22) |
| Position range | | ±5 div |
| Offset range at 50 Ω | input sensitivity | |
| | 70 mV/div to 1 V/div | ±20 V |
| | 1 mV/div to < 70 mV/div | ±3 V |
| Offset range at 1 MΩ | input sensitivity | |
| | 1 V/div to 10 V/div | ±250 V |
| | 60 mV/div to < 1 V/div | ±30 V |
| | 1 mV/div to < 60 mV/div | ±3 V |
| Offset accuracy | | ±(0.35 % × \|net offset\| + 0.5 mV + 0.1 div × input sensitivity) (net offset = offset – position × input sensitivity) |
| DC measurement accuracy | after adequate suppression of measurement noise using high definition (HD) mode or waveform averaging or a combination of both | ±(DC gain accuracy × \|reading – net offset\| + offset accuracy) |
| Channel-to-channel isolation (each channel with same input sensitivity) | input frequency within instrument bandwidth | > 60 dB (1:1000) |

**RMS noise floor**[2)]

| At 50 Ω (meas.) | Input sensitivity | Analog bandwidth (–3 dB) | | | | |
|---|---|---|---|---|---|---|
| | | 100 MHz | 200 MHz | 350 MHz | 500 MHz | 1 GHz |
| | 1 mV/div | 50 µV | 64 µV | 76 µV | 83 µV | 136 µV |
| | 2 mV/div | 53 µV | 68 µV | 81 µV | 88 µV | 143 µV |
| | 5 mV/div | 64 µV | 78 µV | 92 µV | 101 µV | 166 µV |
| | 10 mV/div | 91 µV | 107 µV | 121 µV | 133 µV | 224 µV |
| | 20 mV/div | 156 µV | 174 µV | 195 µV | 213 µV | 371 µV |
| | 50 mV/div | 380 µV | 418 µV | 468 µV | 516 µV | 901 µV |
| | 100 mV/div | 923 µV | 1.06 mV | 1.20 mV | 1.31 mV | 2.01 mV |
| | 200 mV/div | 1.60 mV | 1.76 mV | 1.96 mV | 2.12 mV | 3.46 mV |
| | 500 mV/div | 3.69 mV | 3.96 mV | 4.32 mV | 4.75 mV | 8.00 mV |
| | 1 V/div | 7.28 mV | 7.82 mV | 8.50 mV | 9.30 mV | 15.77 mV |

| At 1 MΩ (meas.) | Input sensitivity | Analog bandwidth (–3 dB) | | | | |
|---|---|---|---|---|---|---|
| | | 20 MHz | 100 MHz | 200 MHz | 350 MHz | 500 MHz |
| | 1 mV/div | 35 µV | 46 µV | 53 µV | 62 µV | 65 µV |
| | 2 mV/div | 34 µV | 48 µV | 55 µV | 66 µV | 70 µV |
| | 5 mV/div | 47 µV | 60 µV | 70 µV | 81 µV | 88 µV |
| | 10 mV/div | 74 µV | 88 µV | 102 µV | 118 µV | 129 µV |
| | 20 mV/div | 138 µV | 157 µV | 180 µV | 205 µV | 226 µV |
| | 50 mV/div | 334 µV | 372 µV | 422 µV | 477 µV | 524 µV |
| | 100 mV/div | 715 µV | 849 µV | 1.00 mV | 1.13 mV | 1.23 mV |
| | 200 mV/div | 1.37 mV | 1.56 mV | 1.79 mV | 2.02 mV | 2.21 mV |
| | 500 mV/div | 3.37 mV | 3.76 mV | 4.23 mV | 4.77 mV | 5.20 mV |
| | 1 V/div | 7.08 mV | 8.29 mV | 9.70 mV | 11.18 mV | 12.05 mV |
| | 2 V/div | 13.78 mV | 15.70 mV | 18.04 mV | 20.40 mV | 22.39 mV |
| | 5 V/div | 34.20 mV | 37.64 mV | 42.92 mV | 48.16 mV | 52.09 mV |
| | 10 V/div | 68.50 mV | 75.54 mV | 85.48 mV | 96.27 mV | 104.25 mV |

[2)] HD mode active for bandwidth ≤ 500 MHz.

| 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 and 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" | 300 MHz (meas.) |
| Maximum input voltage | | ±40 V ($V_p$); 32 V (RMS), derates to 7 V (RMS) with 20 dB/decade at frequencies above 25 MHz |
| 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 level between ±4 V | ±(100 mV + 3 % of threshold setting) |
| Comparator hysteresis | | normal, robust, maximum |

| 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 | ±20 ms |
| | 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, roll |
| Channel-to-channel skew | between analog channels | < 100 ps (meas.) |
| | between digital channels | < 500 ps (meas.) |
| Timebase accuracy | after delivery/calibration, at +23 °C | ±2.5 ppm |
| | during calibration interval | ±3.5 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) | |
| | MXO 34 | max. 5 Gsample/s on 2 channels, max. 2.5 Gsample/s on 4 channels |
| | MXO 38 | max. 5 Gsample/s on 4 channels, max. 2.5 Gsample/s on 8 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 [3)] | standard | 125 Mpoints |
| | R&S®MXO34-B105 option | 500 Mpoints with 4 active channels (single capture), 500 Mpoints with 2 active channels (run continuous) |
| | R&S®MXO38-B105 option | 500 Mpoints with 8 active channels (single capture), 500 Mpoints with 4 active channels (run continuous) |

[3)] 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 math or high definition mode.

| Acquisition system | | |
|---|---|---|
| Acquisition modes | sample | middle sample in decimation interval |
| | peak detect | largest and smallest sample in decimation interval |
| | average | average of acquired waveforms |
| | 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. 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 bit resolution of the waveform signal by using digital filtering, leading to reduced noise. Because of the digital trigger concept of the MXO 3, 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 | MXO 34 | max. 5 Gsample/s on 2 channels,<br>max. 2.5 Gsample/s on 4 channels |
| | MXO 38 | max. 5 Gsample/s on 4 channels,<br>max. 2.5 Gsample/s on 8 channels |

| Trigger system | | |
|---|---|---|
| Trigger sources | | analog channels (C1 to C4),<br>digital channels (D0 to D15),<br>external trigger input, line trigger, serial bus |
| Trigger level range | | ±5 div from center of screen |
| Trigger modes | | auto, normal, single, n single |
| Trigger sensitivity | | 0.0001 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 1 kHz to 500 MHz |
| | LF reject | attenuates frequencies < 50 kHz |
| Trigger hysteresis | modes | auto (default setting) or manual |
| | adjustment resolution | 0.0001 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 edge (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 a specified range | |
| | 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 a specified range | |
| | 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 |

| Trigger system | | |
|---|---|---|
| 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 a specified range; 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** | | |
| Zone trigger | triggers on user-defined zones drawn on the display | |
| | source | acquired waveforms (input channels), math waveforms (including power analysis waveforms), spectrum waveforms, XY plots |
| | number of zones/areas | up to 4 zones with up to 8 areas each |
| | area shapes | polygons with up to 16 points |
| | area types | must intersect, must not intersect |
| | combination of zones | logical combination of zones of multiple sources using Boolean expressions |
| | trigger compatibility | requires sequence trigger A ▷ zone trigger where primary A condition can be: edge, glitch, width, runt, window, timeout, interval, slew rate, setup & hold, state, pattern |
| Sequence trigger (A/B/R trigger) | triggers on B event after occurrence of A event; delay condition after A event specified as time interval; an optional R event resets the trigger sequence to A | |
| | A event | edge, glitch, width, runt, window, timeout, interval, slew rate |
| | 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<br>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 ($V_p$),<br>derates at 20 dB/decade to 5 V (RMS) above 250 kHz |
| | trigger level | ±5 V |
| | sensitivity | |
| | input frequency ≤ 100 MHz | 300 mV ($V_{pp}$) (meas.) |
| | input frequency > 100 MHz and ≤ 500 MHz | 500 mV ($V_{pp}$) (meas.) |
| | input coupling | AC, DC (50 Ω and 1 MΩ) |
| | trigger filter | HF reject (attenuates > 50 kHz),<br>LF reject (attenuates < 50 kHz),<br>noise reject |
| | trigger modes | edge (positive, negative or either) |
| Trigger output | functionality | A pulse is generated for each event triggering signal acquisition. |
| | output voltage | 0 V to 5 V (nom.) at high impedance;<br>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 to channel 4, math waveforms, reference waveforms |
| | setup parameters | center frequency, frequency span, resolution bandwidth (automatic or manual), gate position, gate width, vertical scaling, vertical position |
| | scaling | dBm, dBV, dBµV, V (RMS) |
| | span | 1 Hz to 1.2 GHz[4)] |
| | resolution bandwidth (RBW) | span/4 ≥ RBW ≥ span/6000 |
| | 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 | The values in the peak list are also shown in the diagram to allow easy correlation. | |

| 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) | –157 dBm (1 Hz) (meas.) |
| Noise figure | at 1 GHz (calculated based on the noise power density above) | 16 dB (meas.) |
| Dynamic range | measured for a 1 GHz input carrier with level –3 dBm at input of oscilloscope, using spectrum analysis with center frequency 1 GHz, span 2 MHz, RBW 400 Hz at +20 MHz from center frequency | 106 dB (meas.) |
| Absolute amplitude accuracy | 0 Hz to 800 MHz | ±1 dB (meas.) |
| Spurious-free dynamic range (excluding harmonics) | measured for a 250 MHz input carrier and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 600 MHz, span 1.2 GHz, RBW 300 kHz | 65 dBc (meas.) |
| Second harmonic distortion | measured for a 250 MHz input carrier and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 600 MHz, span 1.2 GHz, RBW 300 kHz | –59 dBc (meas.) |
| Third harmonic distortion | measured for a 250 MHz input carrier and level –3 dBm at input sensitivity 50 mV/div, using spectrum analysis with center frequency 600 MHz, span 1.2 GHz, RBW 300 kHz | –60 dBc (meas.) |

[4)] The stop frequency depends on the analog bandwidth of the instrument.

| Waveform measurements | | |
|---|---|---|
| Automatic measurements | measurements on acquired waveforms (input 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 |
| | track | measurement results displayed as continuous trace that is time-correlated to the measurement source |
| | number of active measurements | 16 |
| | result line annotation | |
| Cursor measurements | available cursors | up to two cursor sets on screen, each set with two horizontal and two vertical cursors |
| | target waveforms | acquired waveforms (input channels), math waveforms, reference waveforms, XY diagrams |
| | operating modes | vertical measurements, horizontal measurements, or both;<br>vertical cursors either set manually or locked to waveform |
| | source mode | single source, use second source, multiple sources (multichannel cursor) |
| | multiple sources mode selection | acquired waveforms (input channels), math waveforms, reference waveforms |
| Waveform histogram | number of diagrams | up to 8 |
| | sources | acquired waveforms (input channels), math waveforms, reference waveforms |
| | mode | vertical, horizontal |
| | windowing | user-defined |

| Waveform math | | |
|---|---|---|
| General features | number of math equations | up to 8 |
| | number of reference waveforms | up to 8 |
| | sources | channel 1, channel 2, channel 3, channel 4, channel 5, channel 6, channel 7, channel 8, math waveforms 1 to 8, reference waveforms 1 to 8 |
| Functions | operators | add, subtract, multiply, divide, absolute value, square, square root, integrate, differentiate, $\log_{10}$, $\log_e$, $\log_2$, 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 |

| Digital voltmeter | | |
|---|---|---|
| Accuracy | | related to channel settings of voltmeter source |
| Measurements | | DC, DC RMS, AC RMS |
| Sources | | C1, C2, C3, C4, C5, C6, C7, C8 |
| Number of measurements | | up to 4 |
| Resolution | | up to 6 digits |
| Bandwidth | | up to 20 MHz |

| Display characteristics | | | |
|---|---|---|---|
| Diagram types | Yt, XY, zoom, spectrum | | |
| Display configuration (waveform layout) | The display area can be split into separate diagram areas by dragging and dropping signal icons. Each diagram area can hold any number of signals. Diagrams can be stacked on top of each other and later accessed via dynamic tabs (Tab 1, etc.). | | |
| Signal icons | Each active waveform is represented by a signal icon on the signal bar; the signal icon displays the individual vertical and acquisition settings. | | |
| Toolbar | enables quick access to important tools; allows to set the most common parameters directly 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 bar | displays trigger, horizontal and acquisition system settings; allows quick access to these settings | | |
| Main menu | provides access to all instrument settings in a compact menu structure | | |
| Axis label | The x-axis and y-axis are labeled with values and physical unit. | | |
| Diagram label | Diagrams can be individually labeled with a descriptive, user-defined name. | | |
| Diagram layout | The grid, crosshair, axis labeling and diagram labeling can be switched on and off separately. | | |
| Persistence | 50 ms to 50 s, or infinite | | |
| Zoom | vertical and horizontal; touch interface simplifies resize and drag operations on zoom window | | |
| Signal colors (waveform coding) | predefined or user-defined color tables for persistence display | | |

| History and segmented memory | | | |
|---|---|---|---|
| Acquisition memory | automatic | automatic setting of segment size and sample rate | |
| | manual | user-defined setting of segment size and sample rate | |
| Memory segmentation | function | memory segments for the acquisition | |
| | number of segments | record length | segments [5] (up to) |
| | | 1 kpoints | 1048575 |
| | | 2 kpoints | 524287 |
| | | 5 kpoints | 262143 |
| | | 10 kpoints | 131071 |
| | | 20 kpoints | 65535 |
| | | 50 kpoints | 32767 |
| | | 100 kpoints | 16383 |
| | | 200 kpoints | 9361 |
| | | 500 kpoints | 4095 |
| | | 1 Mpoints | 2113 |
| | | 2 Mpoints | 1056 |
| | | 5 Mpoints | 427 |
| | | 10 Mpoints | 213 |
| | | 20 Mpoints | 106 |
| | | 50 Mpoints | 41 |
| | | 100 Mpoints | 20 |
| | | 200 Mpoints | 9 |
| | | 400 Mpoints | 4 |
| | | 500 Mpoints | 3 |
| | Segmentation is available 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 | provides access to past acquisitions in the segmented memory | |
| | timestamp resolution | 1 ns | |
| | 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 | |

[5] With R&S®MXO3-B105 memory option. The maximum number of segments depends on the number of active channels and the bit resolution of the acquired data and, therefore, on the acquisition system settings such as decimation mode, use of waveform math or high definition (HD) mode. The maximum number of segments without R&S®MXO3-B105 memory option is limited to 10000.

| Mask testing | | |
|---|---|---|
| Test definition | number of masks | up to 8 simultaneously |
| | source | acquired waveforms (input channels), math waveforms, reference waveforms, spectrum waveforms, XY plots |
| | fail condition | waveform hit |
| | test rate | up to 4 million waveforms/s |
| | action on error | acquisition stop, beep, save waveform, pulse on trigger out |
| Mask definition with segments | number of segments per mask test | up to 8 |
| | segment definition | array of at least 3 points defines an inner region |
| Result statistics | category | total completed acquisition, failed acquisition, passed acquisition, fail rate, overall test result (pass/fail) |
| Visualization options | waveform style | vectors, dots |
| | mask colors | predefined colors for mask without violation (translucent gray), mask with violation (translucent red) |

| Miscellaneous | | |
|---|---|---|
| Remote control | web interface | full operation of the instrument's touch interface, keys and multifunction wheel via web browser |
| | VNC | control of the instrument through virtual network computing |
| | SCPI | standard instrument programming interface through VISA |
| Languages | available languages for the user interface | English, German, French, Simplified Chinese, Traditional Chinese, Japanese, Russian, Spanish, Italian, Portuguese, Korean, Czech, Polish |
| | online help on the instrument | English |

| Input and output | | |
|---|---|---|
| **Front** | | |
| Channel inputs | | BNC; for details, see Vertical system |
| | probe interface | auto detection of passive probes, Rohde&Schwarz active probe interface |
| Digital channel inputs | D15 to D8, D7 to D0 | interface for R&S®RT-ZL03X 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.) |
| Demo P1 | analog signal output for demo apps | $V_p \leq \pm 5$ V (meas.) |
| Demo P2 | digital signal output demo apps | $V_p \leq 3.3$ V (meas.) |
| USB interface | | 2 × USB 3.1 Gen 1 ports, type A plug |
| **Rear** | | |
| Trigger input | | BNC; for details, see Trigger system |
| Trigger out | | BNC; for details, see Trigger system |
| Waveform generator output (requires R&S®MXO3-B6 option) | | BNC; for details, see R&S®MXO3-B6 option |
| USB interface | | 1 × USB 3.1 Gen 1 port, type B plug |
| LAN interface | | RJ-45 connector, supports 10/100/1000BASE-T, LXI compliant |
| External monitor interface | | HDMI, 1920 × 1080 pixel at 60 Hz, output of oscilloscope display |
| 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 |

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| General data | | |
|---|---|---|
| **Display** | type | 11.6" LC TFT color display with capacitive touchscreen |
| | resolution | 1920 × 1080 pixel (Full HD) |
| **Temperature** | | |
| Temperature range | operating temperature range | 0 °C to +45 °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 resistance | damp heat | +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 | 8 Hz to 500 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 emissions | | in line with CISPR 11/EN 55011 group 1, class A (for a shielded test setup); the instrument complies with the emission requirements stipulated by EN 55011, EN 61326-1 and EN 61326-2-1 class A, making the instrument suitable for use in industrial environments |
| Immunity | | in line with IEC/EN 61326-1 table 2, immunity test requirements for industrial environment [6] |
| **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. 2.8 A to 1.8 A, in line with MIL-PRF 28800F, section 3.5 |
| Power consumption | maximum | 280 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 | 375 mm × 233 mm × 163 mm (14.76 in × 9.17 in × 6.42 in) |
| Weight | without options, nominal | 4.0 kg (8.82 lb) |
| Rackmount height | with R&S®ZZA-MXO3 rackmount kit | 5 HU |

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

# ORDERING INFORMATION

| Designation | Type | Order No. |
|---|---|---|
| **Choose your base model** | | |
| Oscilloscope, 100 MHz, 4 channels | MXO 34 | 1335.2050.04 |
| Oscilloscope, 100 MHz, 8 channels | MXO 38 | 1335.2050.08 |
| Base unit (including standard accessories: 500 MHz passive probe (10:1) per channel, accessories bag, quick start guide, power cord) | | |
| **Choose your bandwidth upgrade** | | |
| Upgrade of MXO 34 to 200 MHz bandwidth | R&S®MXO3-B242 | 1335.2221.02 |
| Upgrade of MXO 34 to 350 MHz bandwidth | R&S®MXO3-B243 | 1335.2244.02 |
| Upgrade of MXO 34 to 500 MHz bandwidth | R&S®MXO3-B245 | 1335.2267.02 |
| Upgrade of MXO 34 to 1 GHz bandwidth | R&S®MXO3-B2410 | 1335.2280.02 |
| Upgrade of MXO 38 to 200 MHz bandwidth | R&S®MXO3-B282 | 1335.2815.02 |
| Upgrade of MXO 38 to 350 MHz bandwidth | R&S®MXO3-B283 | 1335.2821.02 |
| Upgrade of MXO 38 to 500 MHz bandwidth | R&S®MXO3-B285 | 1335.2838.02 |
| Upgrade of MXO 38 to 1 GHz bandwidth | R&S®MXO3-B2810 | 1335.2844.02 |
| **Choose your options** | | |
| Mixed signal option for MXO 3 series with 16 digital channels | R&S®MXO3-B1 | 1335.2073.02 |
| Arbitrary waveform generator, 50 MHz, 1 analog channel | R&S®MXO3-B6 | 1335.2850.02 |
| Memory upgrade to 500 Mpoints | R&S®MXO3-B105 | 1335.3105.02 |
| Basic jitter analysis | R&S®MXO3-K12 | 1335.3170.02 |
| Power analysis | R&S®MXO3-K31 | 1335.2880.02 |
| Frequency response analysis | R&S®MXO3-K36 | 1335.2896.02 |
| 3-phase analysis | R&S®MXO3-K333 | 1335.3334.02 |
| Bus analysis | R&S®MXO3-K500 | 1335.2980.02 |
| Low speed serial buses (I²C/QuadSPI/SPI/UART/RS-232/RS-422/RS-485/NRZ clocked/NRZ unclocked/Manchester) | R&S®MXO3-K510 | 1335.2867.02 |
| Automotive protocols (CAN/CAN FD/CAN XL/LIN/SENT) | R&S®MXO3-K520 | 1335.2873.02 |
| Aerospace protocols (ARINC 429/MIL-STD-1553/SpaceWire) | R&S®MXO3-K530 | 1335.2996.02 |
| MIPI low speed protocols (SPMI/RFFE/I³C) | R&S®MXO3-K550 | 1335.5214.02 |
| Automotive Ethernet protocols (10BASE-T1S) | R&S®MXO3-K560 | 1335.5943.02 |
| USB protocols (USB 1.1/2.0) | R&S®MXO3-K570 | 1335.3186.02 |
| R&S®ScopeStudio Software | R&S®MXO-PC | 1801.9005.02 |
| R&S®ScopeStudio Protocol Decode Option | R&S®MXO-PC-K1 | 1804.8874.02 |
| Application bundle, consists of the following options: R&S®MXO3-B6, R&S®MXO3-B105, R&S®MXO3-K31, R&S®MXO3-K36, R&S®MXO3-K510, R&S®MXO3-K520, R&S®MXO3-K530, R&S®MXO3-K550, R&S®MXO3-K560 | R&S®MXO3-PK1 | 1335.2909.02 |
| **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-ZP05M | 1335.3505.02 |
| 700 MHz, 14.9 MΩ, 25:1, 30 V, 4 pF, MMCX | R&S®RT-ZPMMCX | 1803.1599.02 |
| 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, 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, 60 V DC, 42.4 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 |
| **High voltage probes: passive** | | |
| 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 |

| Designation | Type | Order No. |
|---|---|---|
| **High voltage probes: differential** | | |
| 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 | 1409.7750.02 |
| 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 | 1409.7766.02 |
| 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 | 1409.7772.02 |
| **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** [1] | | |
| 300 MHz logic probe, 8 channels | R&S®RT-ZL03X | 1335.3005.02 |
| **Probe accessories** | | |
| Accessory set for R&S®RT-ZP10/-ZP11 passive probe (2.5 mm probe tip) | R&S®RT-ZA1 | 1409.7566.02 |
| 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 for the logic probes | R&S®RT-ZA19 | 1335.7875.02 |
| Power deskew and calibration test fixture | R&S®RT-ZF20 | 1800.0004.02 |
| Tripod positioner with central tensioning knob for easy clamping and positioning of probes (span width: 200 mm, clamping range: 15 mm) | R&S®RT-ZAP | 1326.3641.02 |
| **Choose your accessories** | | |
| Front cover | R&S®MXO3-Z1 | 1335.1902.02 |
| Soft case | R&S®MXO3-Z3 | 1335.1919.02 |
| Transit case | R&S®MXO3-Z4 | 1335.1925.02 |
| Rackmount kit, for MXO 3 oscilloscopes with 5 HU | R&S®ZZA-MXO3 | 1335.2715.02 |
| VESA mount (compatible with standard 100 mm × 100 mm pattern) | Choose industry standard mounts | |

[1] The R&S®MXO3-B1 mixed signal option contains two R&S®RT-ZL03X logic probes.


Service at Rohde&Schwarz

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

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

Instrument management made easy

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

Find out more about our service portfolio under:

# OUR OSCILLOSCOPE PORTFOLIO



# OSCILLOSCOPE PORTFOLIO

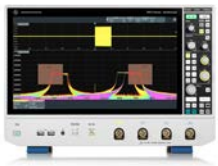





| | R&S®RTH1000 | R&S®RTC1000 | R&S®RTB 2 | MXO 3 |
|---|---|---|---|---|
| **Vertical system** | | | | |
| Bandwidth [1] | 60/100/200/350/500 MHz | 50/70/100/200/300 MHz | 70/100/200/300 MHz | 100/200/350/500 MHz/1 GHz |
| Number of channels | 2 plus DMM/4 | 2 | 2/4 | 4/8 |
| Vertical resolution; system architecture | 10 bit; 16 bit | 8 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 | 1 mV to 10 V |
| V/div, 50 Ω | – | | | 1 mV to 1 V |
| Digital channels | 8 | 8 | 16 | 16 |
| **Horizontal system** | | | | |
| Sampling rate per channel (in Gsample/s) | 1.25 (4-channel model); 2.5 (2-channel model); 5 (all channels interleaved) | 1; 2 (2 channels interleaved) | 1.25; 2.5 (2 channels interleaved) | 2.5; 5 (2 channels interleaved) |
| Maximum memory (per channel; 1 channel active) | 125 kpoints (4-channel model); 250 kpoints (2-channel model); 500 kpoints | 1 Mpoints; 2 Mpoints | 10 Mpoints; 20 Mpoints | standard: 125 Mpoints; max. upgrade: 500 Mpoints [2] |
| Segmented memory | standard, 50 Mpoints | – | standard, 160 Mpoints | standard: 10 000 segments; option: 1 000 000 segments |
| Acquisition rate (in waveforms/s) | 50 000 | 10 000 | 50 000 (300 000 in fast segmented memory mode) | > 4 500 000 |
| **Trigger** | | | | |
| Types | digital | analog | analog | advanced (includes zone trigger), digital trigger (15 trigger types) |
| Sensitivity | – | – | at 1 mV/div: > 2 div | 0.0001 div, across full bandwidth, user controllable |
| **Analysis** | | | | |
| Mask test | tolerance mask | tolerance mask | tolerance mask | user configurable, hardware based |
| Mathematics | elementary | elementary | basic (math on math) | advanced (formula editor) |
| 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, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, QUAD-SPI, SENT, RFFE I³C, NRZ, Manchester, SpaceWire, USB 1.1/2.0 |
| 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), frequency response analysis, basic jitter analysis, 3-phase 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 | 11.6" touchscreen, 1920 × 1080 pixel (Full HD) |
| **General data** | | | | |
| Dimensions in mm (W × H × D) | 201 × 293 × 74 | 285 × 175 × 140 | 390 × 220 × 152 | 375 × 233 × 163 |
| Weight in kg | 2.4 | 1.7 | 2.5 | 4 |
| Battery | lithium-ion, > 4 h | – | – | – |

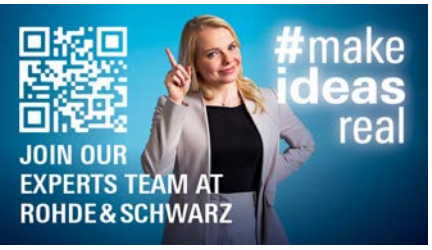
[1] Upgradeable. [2] Requires an option.






| MXO 4 | MXO 5/MXO 5C | R&S®RTO6 | R&S®RTP |
|---|---|---|---|
| | | | |
| 200/350/500 MHz/1/1.5 GHz | 100/200/350/500 MHz/1/2 GHz | 600 MHz/1/2/3/4/6 GHz | 4/6/8/13/16 GHz |
| 4 | 4/8 | 4 | 4 |
| 12 bit; 18 bit | 12 bit; 18 bit | 8 bit; 16 bit | 8 bit; 16 bit |
| 500 µV to 10 V | 500 µV to 10 V | 1 mV to 10 V (HD mode: 500 µV to 10 V) | |
| 500 µV to 1 V | 500 µV to 1 V | 1 mV to 1 V (HD mode: 500 µV to 1 V) | 2 mV to 1 V (HD mode: 1 mV to 1 V) |
| 16 | 16 | 16 | 16 |
| | | | |
| 2.5; 5 (2 channels interleaved) | 5 on 4 channels; 2.5 on 8 channels (2 channels interleaved) | 10; 20 (2 channels interleaved in 4 GHz and 6 GHz model) | 20; 40 (2 channels interleaved) |
| standard: 400 Mpoints; max. upgrade: 800 Mpoints [2)] | standard: 500 Mpoints max. upgrade: 1 Gpoints [2)] | standard: 200 Mpoints/800 Mpoints; max. upgrade: 1 Gpoints/2 Gpoints | standard: 100 Mpoints/400 Mpoints; max. upgrade: 3 Gpoints |
| standard: 10000 segments; option: 1000000 segments | standard: 10000 segments; option: 1000000 segments | standard | standard |
| > 4500000 | > 4500000 | 1000000 (2500000 in ultra-segmented memory mode) | 750000 (> 3000000 in ultra-segmented memory mode) |
| | | | |
| advanced (includes zone trigger), digital trigger (15 trigger types) | advanced (includes zone trigger), digital trigger (15 trigger types) | advanced (includes zone trigger), digital trigger (15 trigger types), high speed serial pattern trigger including 5 Gbps clock data recovery (CDR) [2)] | advanced (includes zone trigger), digital trigger (14 trigger types) with real-time deembedding [2)], high speed serial pattern trigger including 8/16 Gbps clock data recovery (CDR) [2)] |
| 0.0001 div, across full bandwidth, user controllable | 0.0001 div, across full bandwidth, user controllable | 0.0001 div, across full bandwidth, user controllable | 0.0001 div, across full bandwidth, user controllable |
| | | | |
| user configurable, hardware based | user configurable, hardware based | user configurable, hardware based | user configurable, hardware based |
| advanced (formula editor) | advanced (formula editor) | advanced (formula editor, Python interface) | advanced (formula editor, Python interface) |
| I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, QUAD-SPI, SENT, RFFE, I³C, NRZ, Manchester, SpaceWire, USB 1.1/2.0 | I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, 100/1000BASE-T1, QUAD-SPI, SENT, RFFE, I³C, NRZ, Manchester, SpaceWire, USB 1.1/2.0 | I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429, FlexRay, CAN FD, CAN XL, MIPI RFFE, USB 2.0/HSIC, MDIO, 8b10b, Ethernet, Manchester, NRZ, SENT, MIPI D-PHY, SpaceWire, MIPI M-PHY/UniPro, CXPI, USB 3.1 Gen 1, USB-SSIC, PCIe 1.1/2.0, USB Power Delivery, Automotive Ethernet 10BASE-T1S, 100/1000BASE-T1, I³C | I²C, SPI, UART/RS-232/RS-422/RS-485, SENT, CAN, LIN, CAN FD, CAN XL, MIL-STD-1553, ARINC 429, SpaceWire, USB 2.0/HSIC/PD, USB 3.1 Gen 1/Gen 2/SSIC, PCIe 1.1/2.0/3.0, 8b10b, MIPI RFFE, MIPI D/M-PHY/UniPro, Automotive Ethernet 10BASE-T1S, 100/1000BASE-T1, Ethernet 10/100BASE-TX, MDIO, Manchester, NRZ, I³C |
| power, digital voltmeter (DVM), frequency response analysis, basic jitter analysis, 3-phase analysis | power, digital voltmeter (DVM), frequency response analysis, basic jitter analysis, eye analysis, 3-phase analysis | power, advanced spectrum analysis and spectrogram, jitter and noise decomposition, clock data recovery (CDR), I/Q data and RF analysis (R&S®VSE), deembedding, embedding, equalization, PAM-N, TDR/TDT analysis, advanced eye diagram, EMC/ESD test | advanced spectrum analysis and spectrogram, jitter and noise decomposition, real-time deembedding, embedding, equalization, PAM-N, TDR/TDT analysis, I/Q data and RF analysis (R&S®VSE), advanced eye diagram, EMC/ESD test |
| – | see specifications (PD 3683.8196.22, PD 3684.1472.22) | see specifications (PD 5216.1640.22) | see specifications (PD 3683.5616.22) |
| | | | |
| 13.3" touchscreen, 1920 × 1080 pixel (Full HD) | for MXO 5 only: 15.6" touchscreen, 1920 × 1080 pixel (Full HD) | 15.6" touchscreen, 1920 × 1080 pixel (Full HD) | 13.3" touchscreen, 1920 × 1080 pixel (Full HD) |
| | | | |
| 414 × 279 × 162 | MXO 5: 445 × 314 × 154<br>MXO 5C: 445 × 105 × 405 | 450 × 315 × 204 | 441 × 285 × 316 |
| 6 | MXO 5: 9<br>MXO 5C: 8.7 | 10.7 | 18 |
| – | – | – | – |

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