



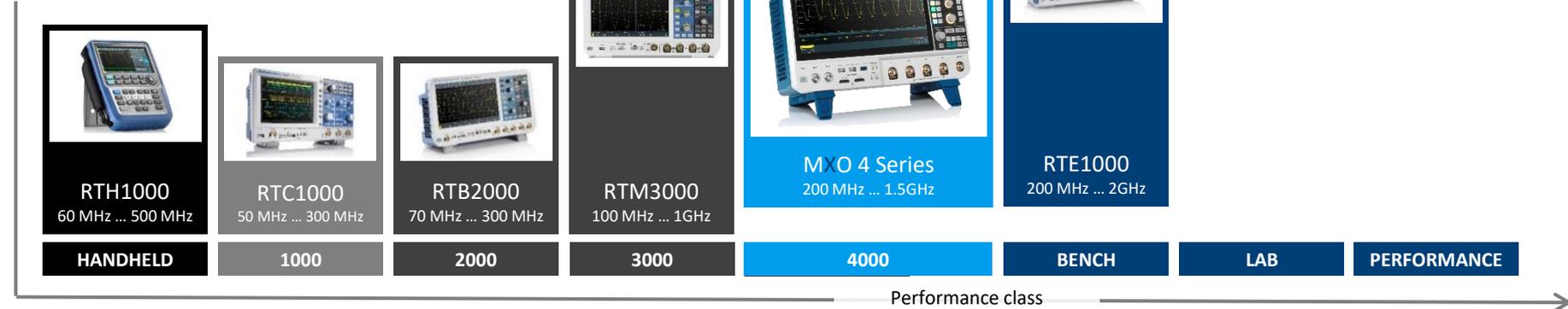
R&S®MXO 4 Product Presentation

New family of oscilloscopes: The R&S®MXO 4

R&S OSCILLOSCOPE PORTFOLIO

MOST MODERN SCOPE LINE FROM 50 MHz TO 16 GHz

Bandwidth



R&S® ESSENTIALS

Next generation oscilloscope for accelerated insight

R&S® MXO 4 SERIES

ROHDE & SCHWARZ

Make ideas real



INDUSTRY'S FIRST...

>4.5 Million wfms / sec

12-bit ADC 18-bit HD

400 Mpts memory /ch

Digital trigger

Starting at €7,600

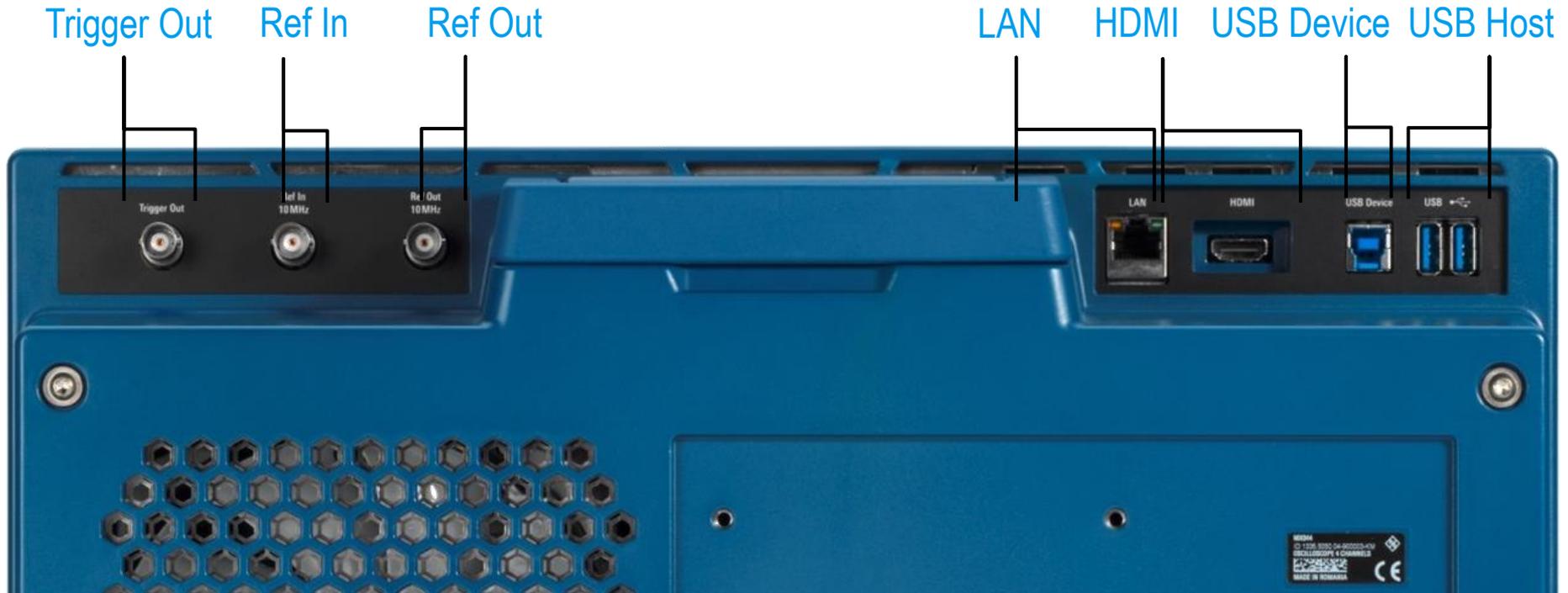
2x ARB Gen 100 MHz

Standardized MSO 16ch 5GSa/s



AND AT THE BACK...

Newest I/O for new lab environment



AND VESA MOUNTING...

Best space saving for flexible setup





R&S®MXO 4 series

Features and benefits

Understand the new product

WORLD'S FASTEST PERFORMANCE

RS Designed

28 nm CMOS

36 million Gates

200 Gb/s

4.5 Million Acquisition/s
Realtime capture rate

18-bit Vertical Resolution
System Architecture

0.0001 Trigger Sensitivity
Digital trigger Architecture

MSO and waveform generation

400 Mpts Standard Memory

Hardware backend processing
Waveforms, Spectrum, Math, Measurement, Mask, Zone Trigger, Serial bus...

Pixelizer

MYO-EP ASIC

MSO and waveform generation



x8



Rohde & Schwarz

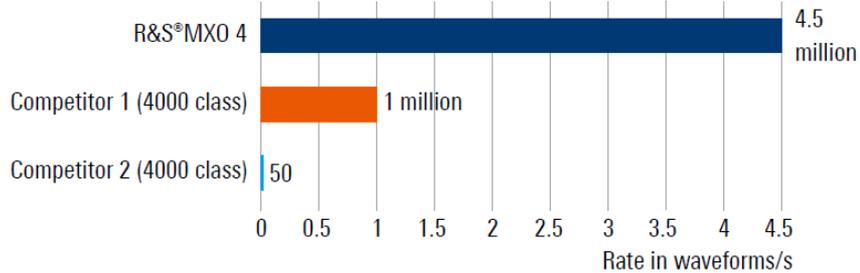
Understand the new product- eXcitingly Fast

FIND SIGNAL ANOMALIES QUICKLY

R&S® MXO 4 features

- ▶ Optimized signal processing & dedicated ASIC
- ▶ 4.5 million waveforms per second
- ▶ Smooth workflows – even with measurements, spectrum, math or long acquisitions

Real-time acquisition rate



World's Fastest Scope
> 4.5 M wfms/s

Minimal blind time



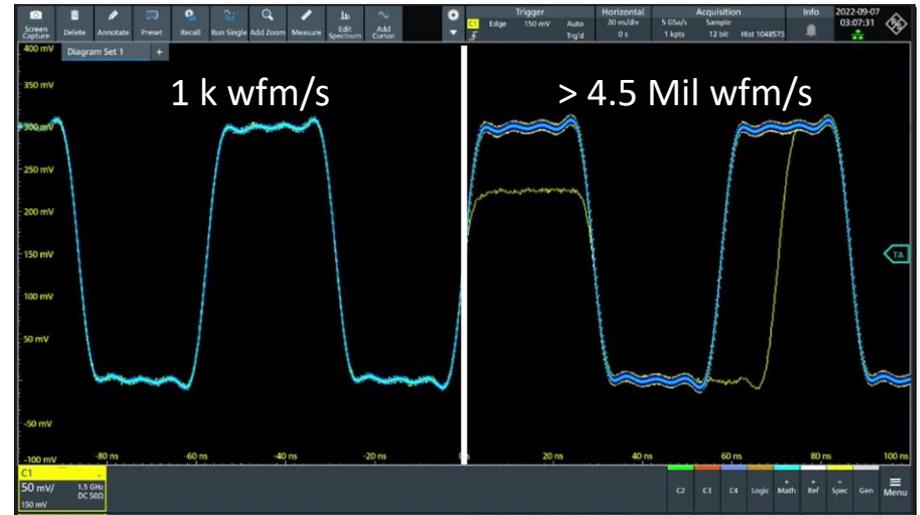
Rohde & Schwarz

INSTANTLY SEE INFREQUENT EVENTS

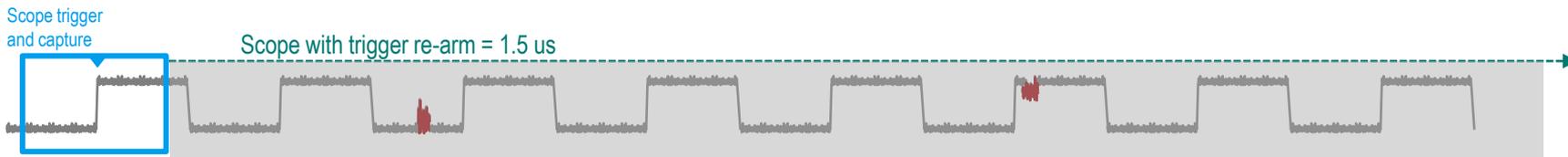
Customer

benefit

- ▶ Acquire, process & display signals with unrivaled speed
- ▶ Detect signal faults & anomalies quickly
- ▶ Increase your statistical confidence

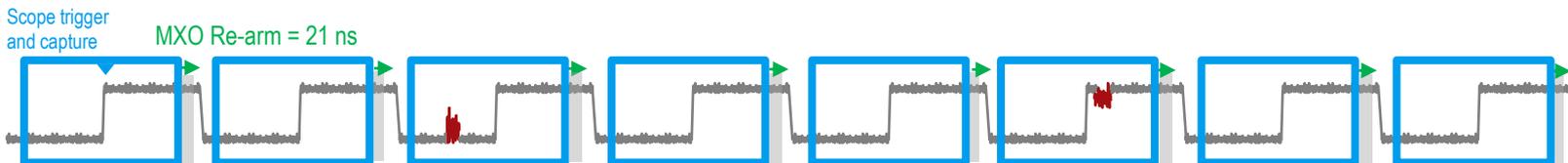


LOWEST BLIND TIME: SUPERIOR SIGNAL VISIBILITY

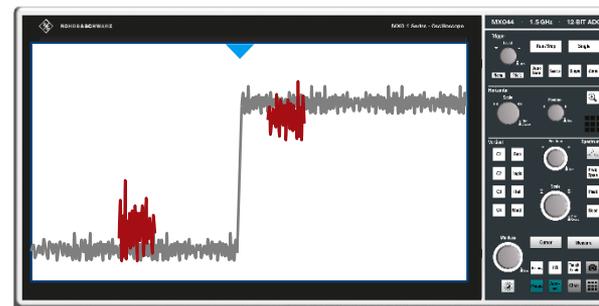


- ▶ During trigger re-arm, scope is blind
- ▶ Even scope at 600k wfm/s will have blind time > 1.5 us

Missing critical signal issues!



- ▶ MXO 4 trigger re-arm time is only 21 ns



Faster scope = more chance to capture rare events

Understand the new product- eXtremely Precise

SEE YOUR SIGNALS ACCURATELY

Industry highest
18 bit architecture

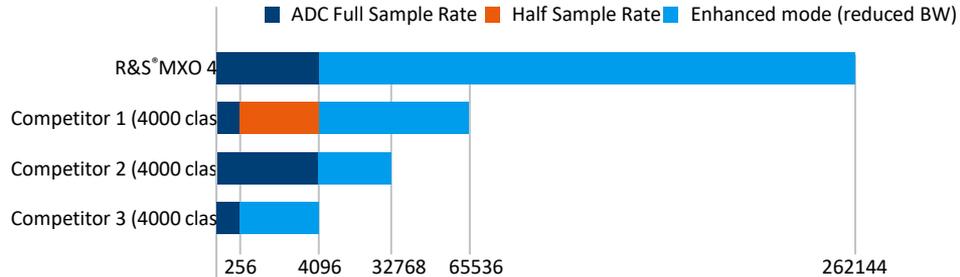
Extremely precise



R&S® MXO 4 features

- ▶ 12-bit ADC all the time
- ▶ 18-bit architecture (with HD mode)

Vertical Quantization level (Resolution)



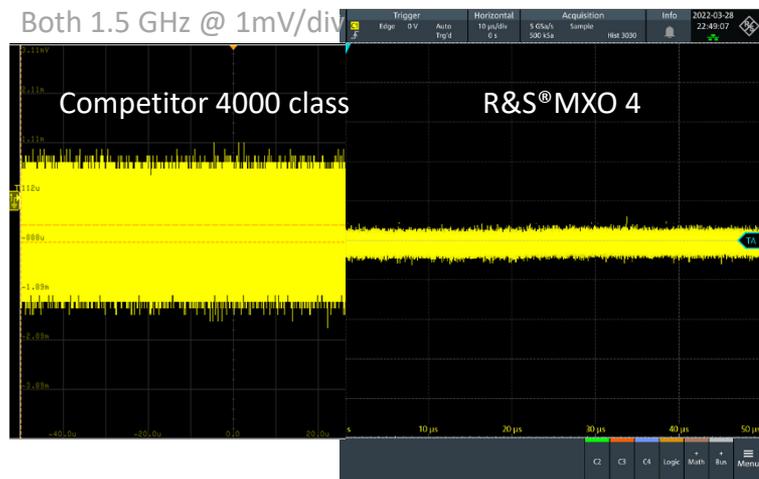
Understand the new product- eXtremely Precise HIGHEST VERTICAL RESOLUTION

R&S®MXO 4 features

At 500uV/div:

- ▶ Lowest Noise: 120 uV full screen @ 1.5 GHz
- ▶ Largest offset range at highest sensitivity: +/- 5V

Both 1.5 GHz @ 1mV/div

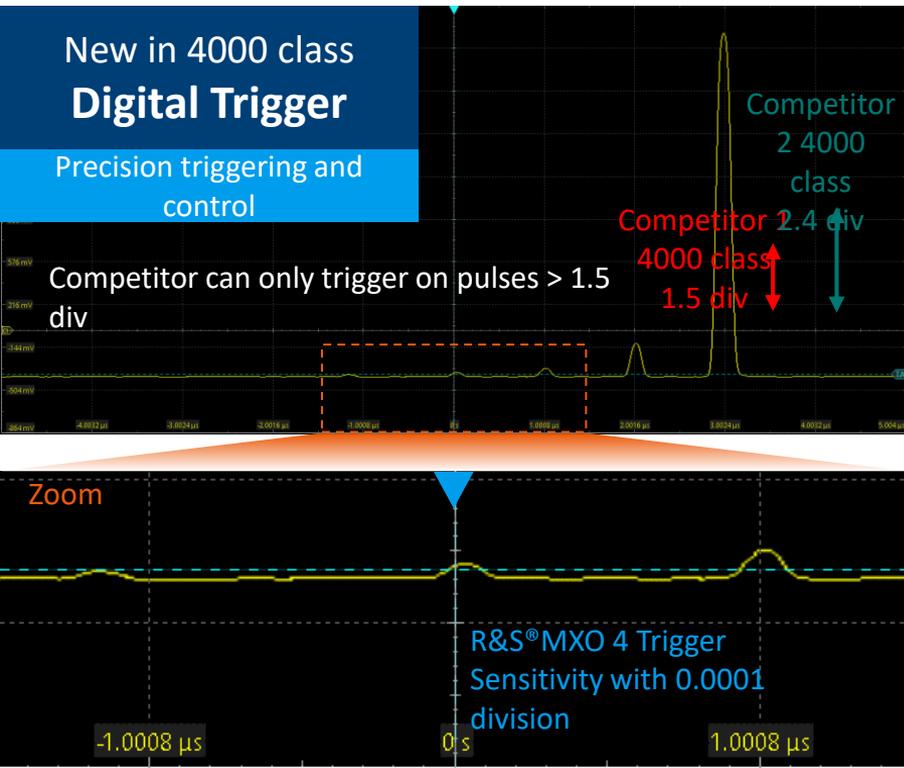


High resolution & offset
Low noise signal path

More accurate measurements



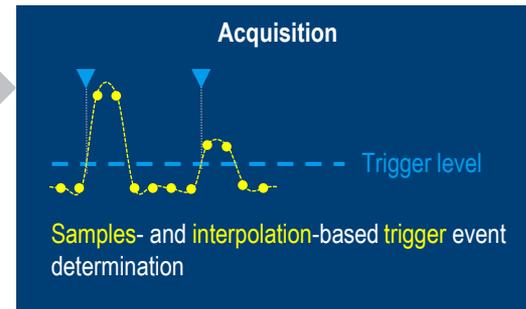
ISOLATE EVENTS WITH MORE PRECISION



R&S® MXO 4 features

- ▶ Detect trigger event on sampled waveforms
- ▶ Adjustable trigger sensitivity
- ▶ Minimal trigger jitter < 1ps
- ▶ 18 bit architecture

MXO 4 Digital Trigger

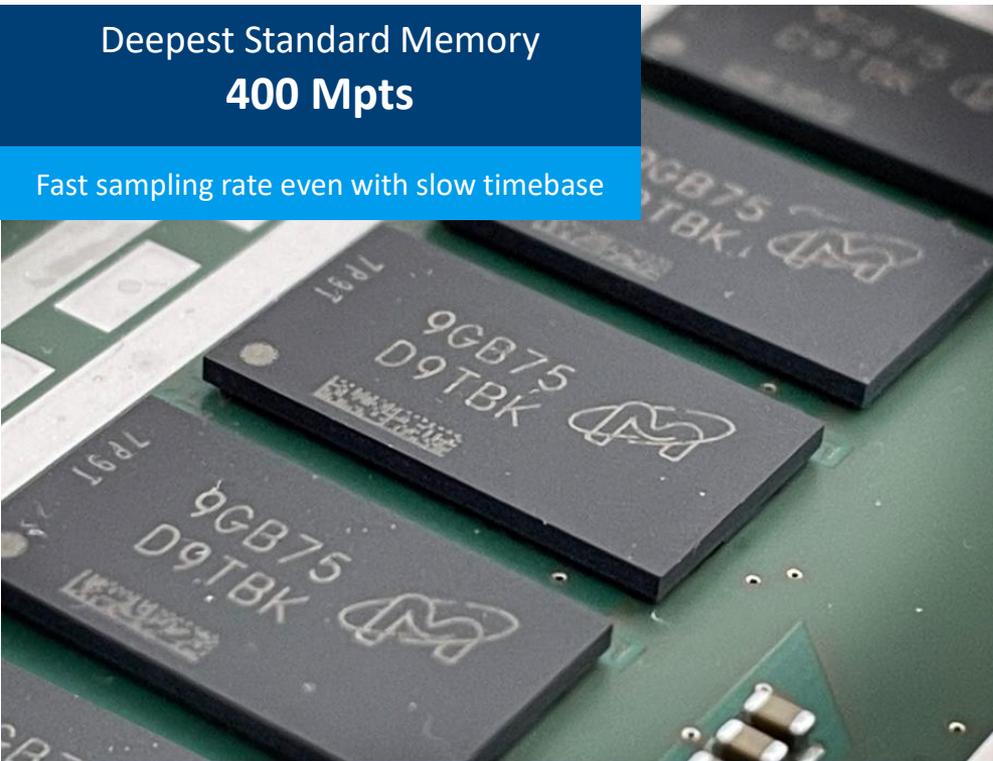


Understand the new product- eXceptionally deep memory

CAPTURE MORE TIME

Deepest Standard Memory
400 Mpts

Fast sampling rate even with slow timebase



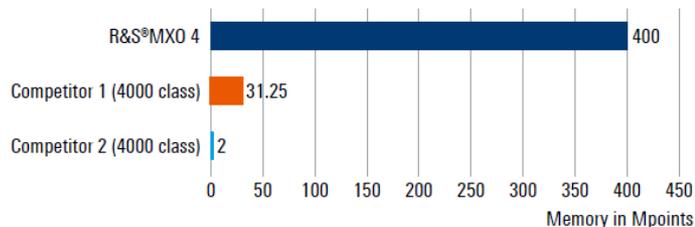
R&S®MXO 4 features

- ▶ Standard memory: 400 Mpts per channel
- ▶ Maximum memory: 800 Mpts on 2 channels
- ▶ Segmented memory & History mode

Customer benefit

- ▶ Measure more (at high sample rate)
- ▶ Capture distant trigger events
- ▶ Analyze previous acquisitions

Standard memory per channel

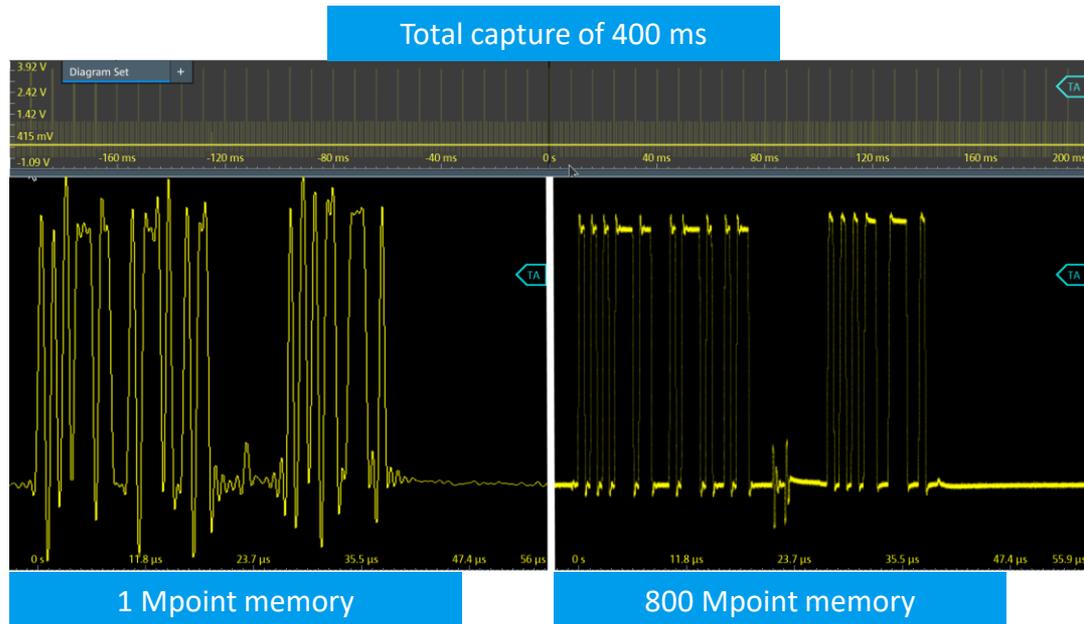


FAST SAMPLING RATE EVEN WITH SLOW TIMEBASE

- ▶ You never know when you need to see more...
 - Power up/power down events
 - Issues where cause and symptom separated by longer time
 - serial bus activity

- ▶ Support 5000s/div

| Sampling rate | Duration (400 Mpts) | Duration (800 Mpts) |
|---------------|---------------------|------------------------|
| 5 GSa / s | 80 msec | 160 msec |
| 500 MSa / s | 0.8 sec | 1.6 sec |
| 5 MSa / s | 80 sec | 160 sec |
| 8 kSa / s | 50000 sec | 100000 sec (1.15 days) |



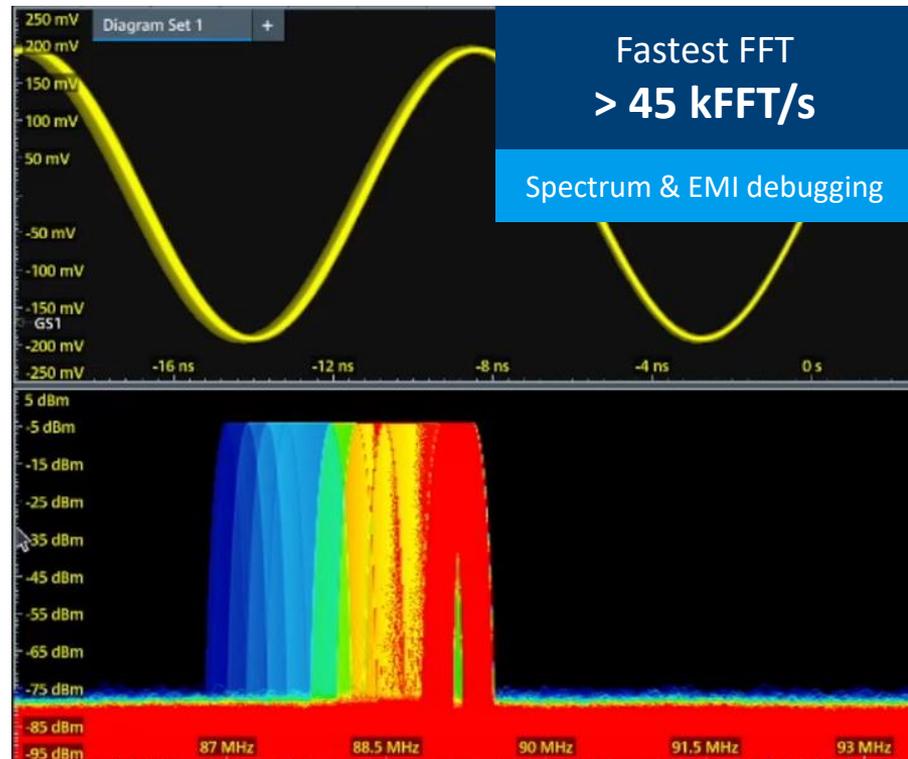
SPECTRUM ANALYSIS

R&S® MXO 4 features

- ▶ Fastest RF insights into your measurement
- ▶ Independent span/RBW control vs time base
- ▶ Automatic peak list and max/min-hold measurement
- ▶ Standard spectrum features

| | | | |
|----------|------------|-----------|---------|
| CF Span | Start Stop | Full span | |
| Center | Span | 900 MHz | 1.8 GHz |
| Auto RBW | Span/RBW | On | 1000 |
| Traces | | | |
| Norm | Min Hold | Max Hold | Average |

| RF Characteristic | |
|-----------------------------|-----------------|
| Spectrum Update Rate | > 45k FFT/s |
| Sensitivity / Noise density | -160 dBm (1 Hz) |
| Noise figure | 14 dB |
| Dynamic range | 92 dB |
| SFDR | 68 dBc |
| 2nd Harmonic distortion | -52 dBc |
| 3rd Harmonic distortion | -46 dBc |



FUN TO USE

Improving user experience
Better and easier UI

Shortest learning curve

▶ Usability innovation

- Box design for better touchability
- Cursor: display dynamic values
- Search in menu

▶ New R&S SW architecture (under the UI)

- Savesets, SCPI → all future scopes will adopt



SYNERGIZED TECHNOLOGY BLOCKS

>4.5 Million wfms / sec

Capture faster and see more

12-bit ADC 18-bit HD

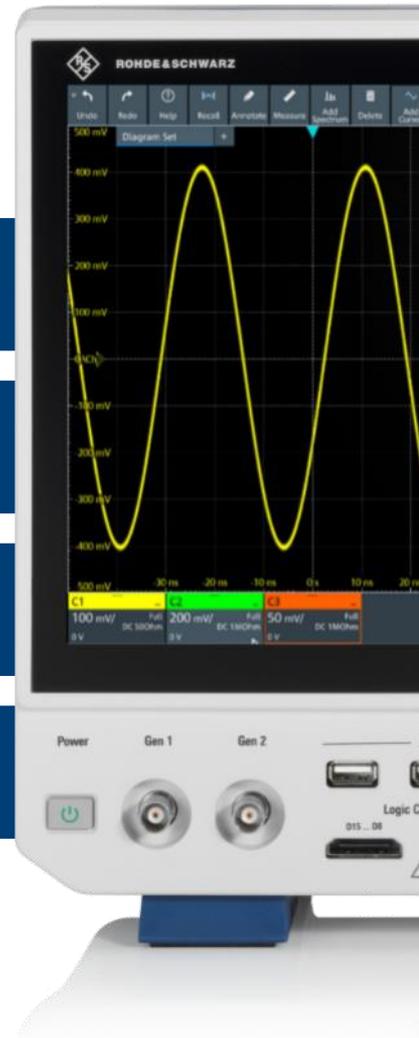
Enabling highest resolution

400 Mpts memory /ch

Deeper memory to capture more

Digital trigger

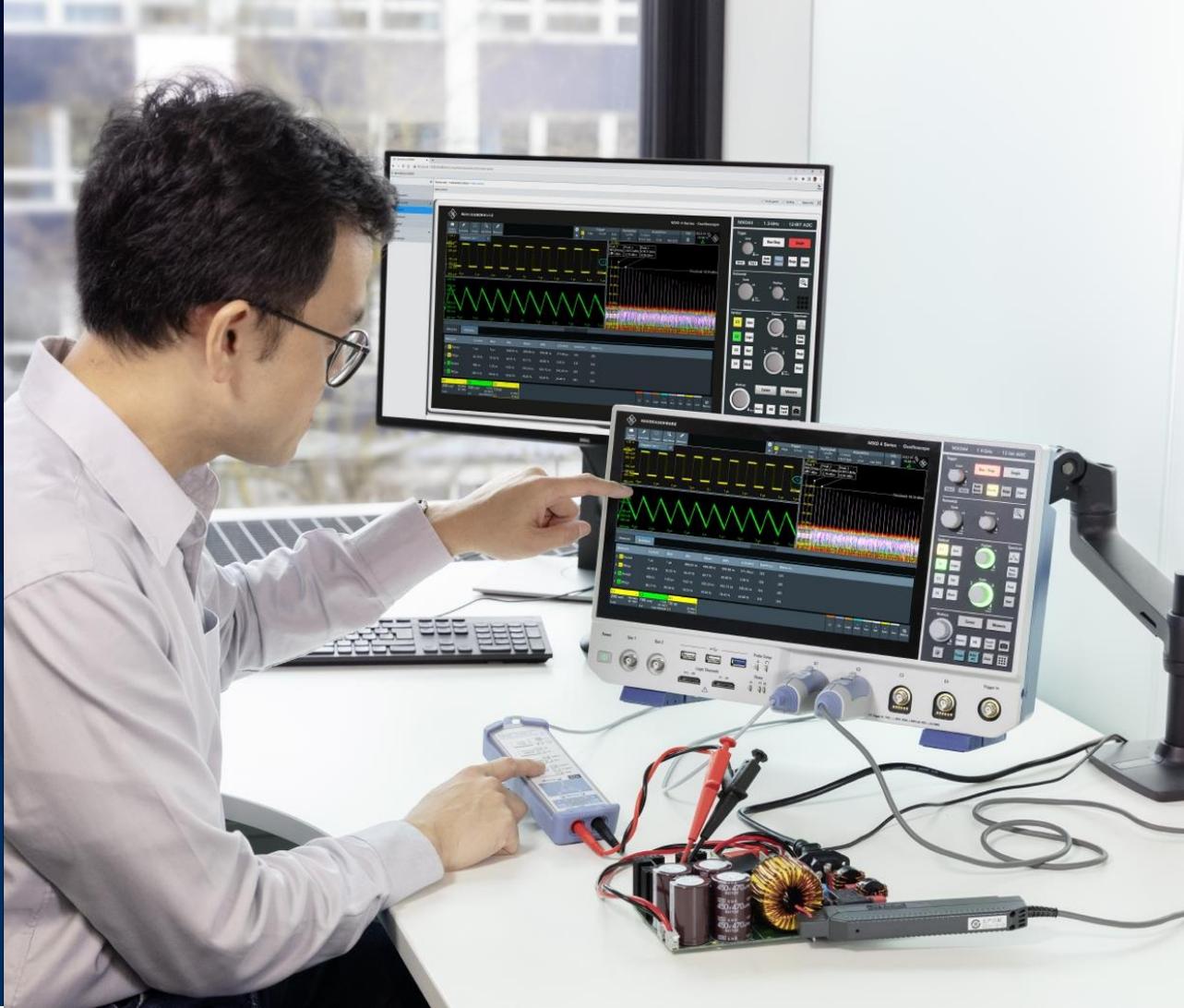
Advance architecture enabling performance



YOUR GO-TO TOOL

READY FOR MANY USES

- ▶ Spectrum
- ▶ EMI
- ▶ Logic
- ▶ Serial Bus
- ▶ Power
- ▶ Power Integrity
- ▶ Frequency Response
- ▶ Arbitrary Generator

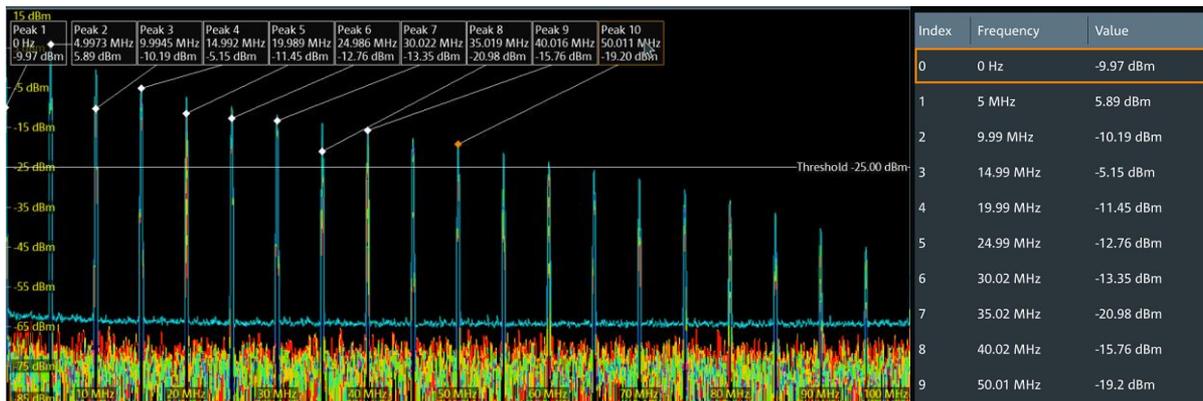


PRISTINE RF MEASUREMENT CAPABILITY

- ▶ Fastest RF insights into your measurement
- ▶ Superb RF performance to correlate timed events
- ▶ Automatic peak list and max/min-hold measurement
- ▶ Frequency analysis made easy

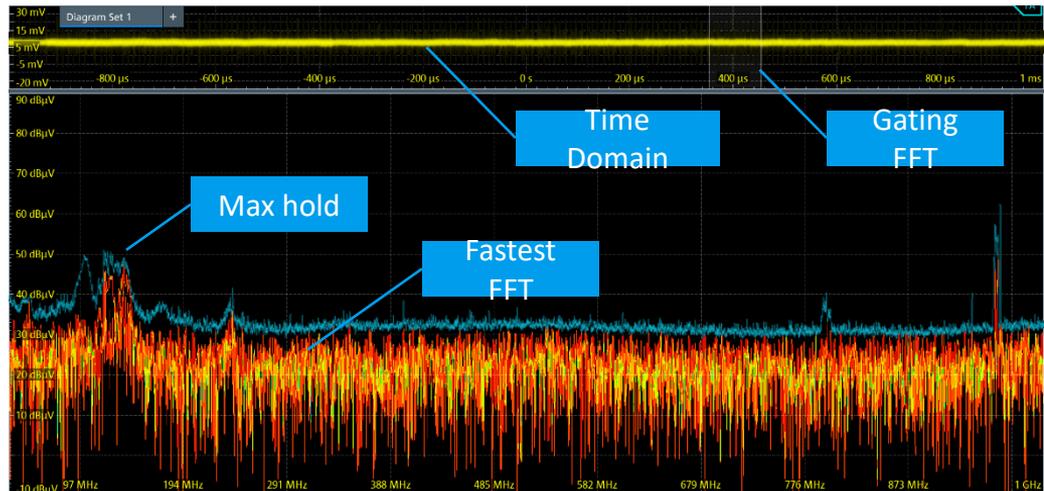
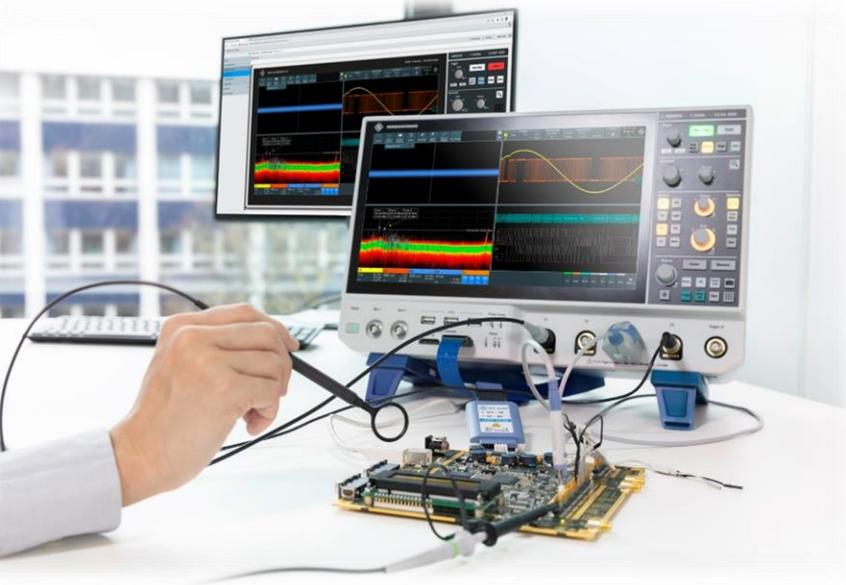
Deep memory and decoupled time & spectrum settings for easy navigation

| | | |
|----------|------------|---------------|
| CF Span | Start Stop | Full span |
| Center | 900 MHz | Span 1.8 GHz |
| Auto RBW | On | Span/RBW 1000 |
| Traces | Norm | Min Hold |
| | Max Hold | Average |



Your Go-To Tool

INSIGHTFUL EMI DEBUG



- ▶ Fast FFT to capture intermitted EMI fault
- ▶ Time and Spectrum correlated to find emission

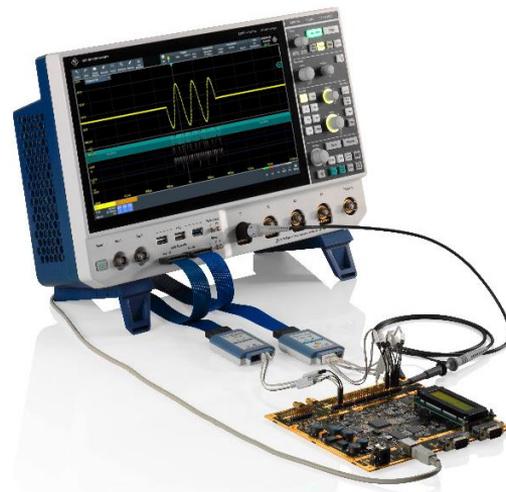
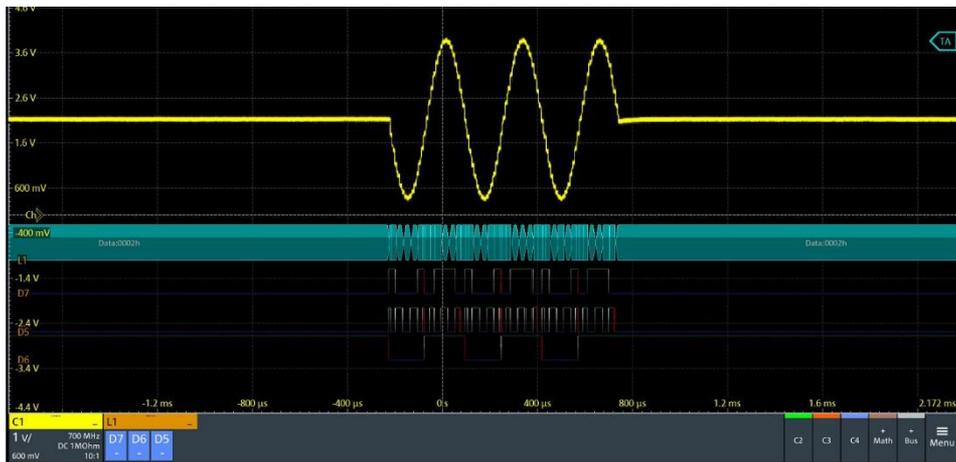
Responsive and easy setup for debug work



Rohde & Schwarz

LOGIC ANALYSIS BY DEFAULT

- ▶ MSO is built into every instrument
- ▶ Only need logic probes to start using 16 digital channels
- ▶ Analysis of low-speed serial buses with digital channels
- ▶ Expand the channel count quickly for timing analysis



16 Digital channels

5 GSa/s Sample rate

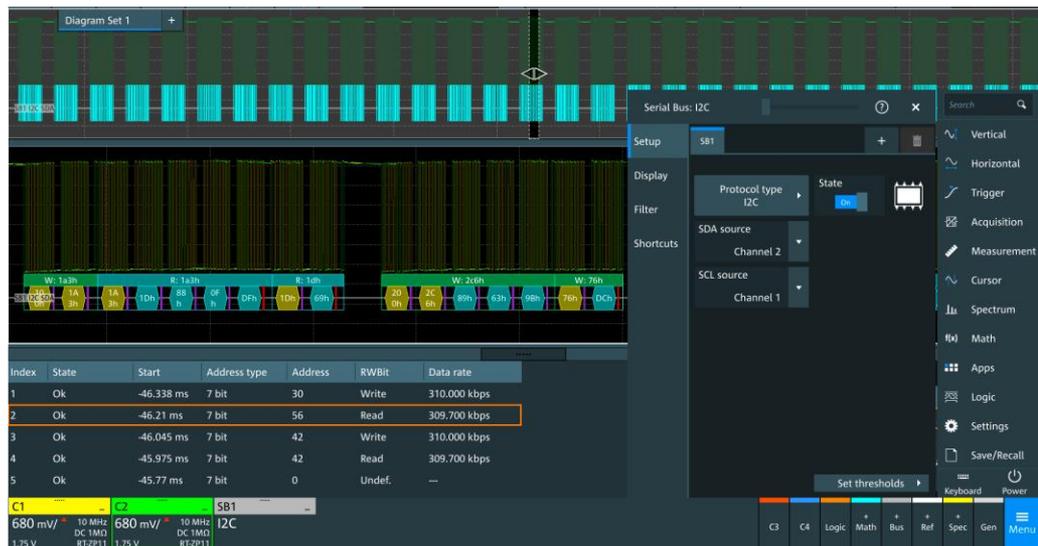
400 MHz Toggle rate

SERIAL BUS ANALYSIS

- ▶ Hardware-based triggering
- ▶ Color-coded protocol frames
- ▶ Decode table with frame details

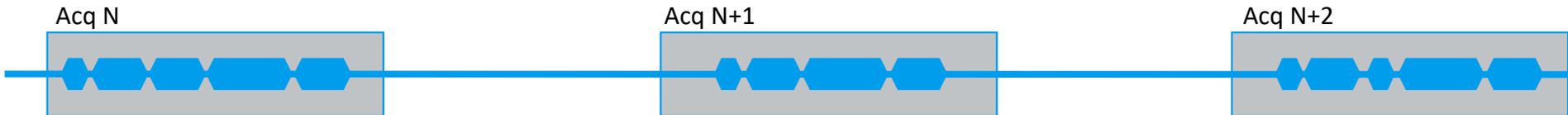
SPI details

| Index | MOSI | MISO |
|-------|------|------|
| 1 | 00h | |
| 2 | 03h | |
| 3 | C7h | |

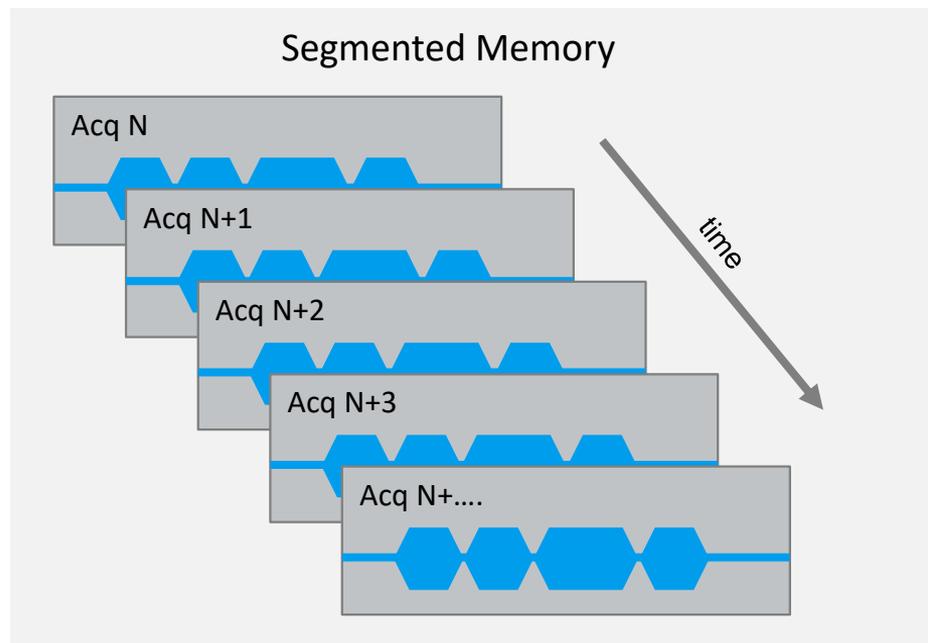


Protocol trigger and decode design for easy setup and insightful display

SERIAL BUS ANALYSIS INNOVATION



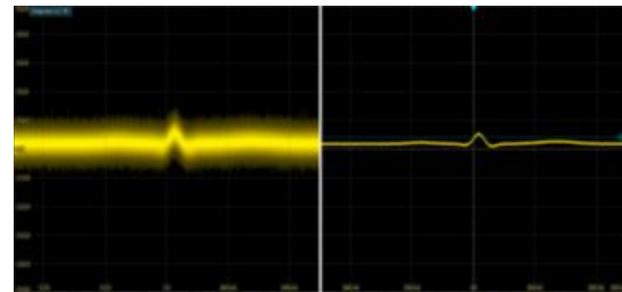
- ▶ Capture more packet with deep memory
- ▶ Leverage on the segmented memory to record more packets
 - Only capture around trigger, not the dead time in between
 - 10k segments (standard)
 - 1M segments
 - with [option B108](#) memory extension option



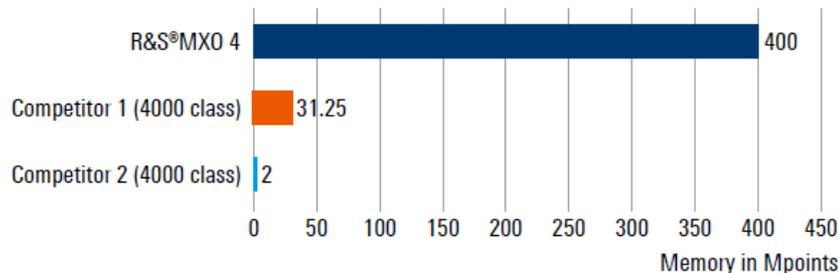
Capture more events

ENGINEERED FOR POWER MEASUREMENTS

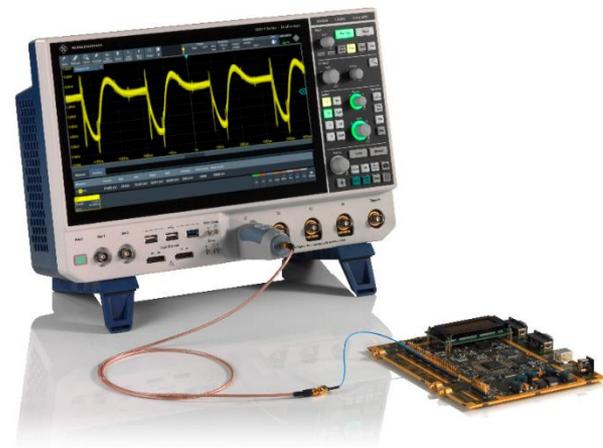
- ▶ See power signal details with up to 18 bit resolution
- ▶ Maintaining fast sample rates with deepest memory
- ▶ Digital trigger for enhanced debugging capabilities
- ▶ Extensive probe portfolio: High voltage and current probes



Standard memory per channel



POWER INTEGRITY



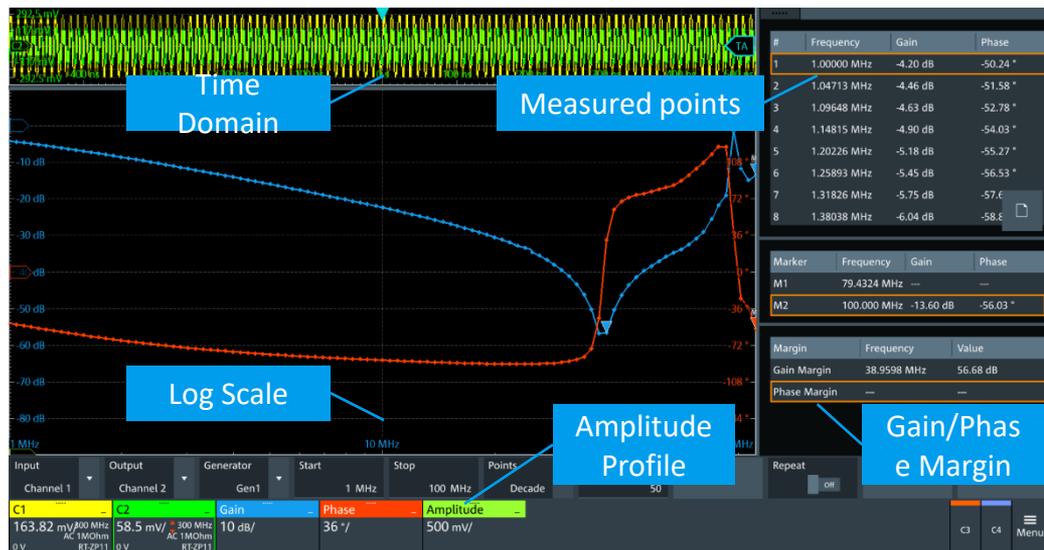
18-bit resolutions and fast acquisitions makes result correlation faster and precise

- ▶ Highest offset at <math><10\text{mV/div}</math> sensitivity ($\pm 5\text{V}$ at 1:1)
- ▶ Low noise and high sensitivity of $500\mu\text{V/div}$
- ▶ Easy bandwidth control to limit high frequency noise
- ▶ Spectrum domain for additional insights
- ▶ Support for ZPR power rail probes for $\pm 60\text{V}$ offset

FREQUENCY RESPONSE ANALYSIS



- ▶ Flexible tools for:
 - Frequency response, S21
 - Control loop response
 - Power supply rejection ratio



All-in-one tool analytic tool and future enhancements for impedance & lower start frequency

Your Go-To Tool

ARBITRARY GENERATOR

2 Channels Generator

100 MHz Bandwidth

312.5 MSa/s Sample rate

40 Mpts Memory length

16 bits Vertical resolution

Flexible signal generations and capable of recording and replaying captured waveform

Function Generator

Sine

Square

Ramp

DC

Pulse

Cardinal sine

Cardiac

Gauss

Lorentz

Exponential Rise/Fall

Modulation

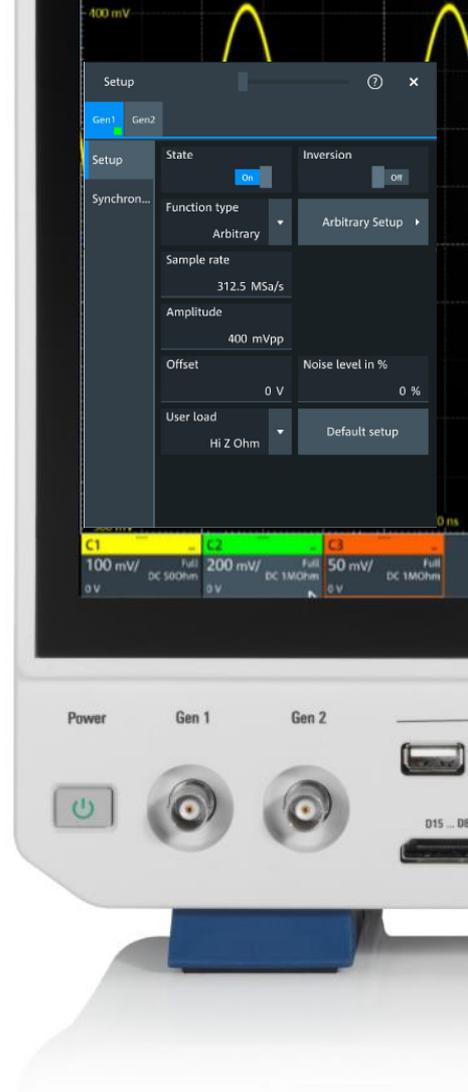
Amplitude

Frequency

Frequency Shift Keying

Pulse Width

Sweep



Rohde & Schwarz

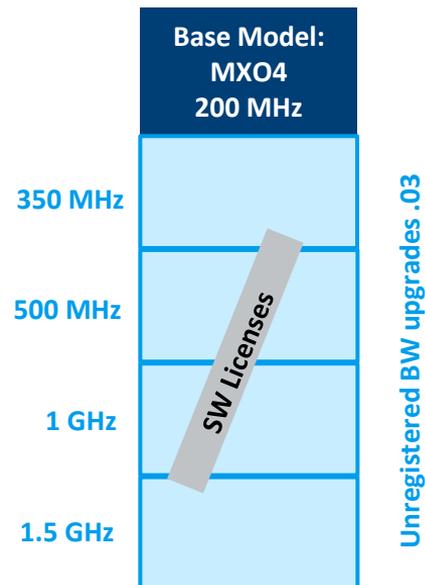
OPTIONS & AVAILABILITY



R&S® MXO 4 BANDWIDTH UPGRADE



| Base Unit | Upgrades | Also available as a package |
|-----------------------|---|---|
| MXO44 1335.5050.04 | | MXO44-242 OSCILLOSCOPE 4CH 200 MHZ 1335.5050P02 |
| + | MXO4-B243 350 MHz option 1335.4276.02 | MXO44-243 OSCILLOSCOPE 4CH 350 MHZ 1335.5050P03 |
| + | MXO4-B245 500 MHz option 1335.4299.02 | MXO44-245 OSCILLOSCOPE 4CH 500 MHZ 1335.5050P05 |
| + | MXO4-B2410 1 GHz option 1335.4318.02 | MXO44-2410 OSCILLOSCOPE 4CH 1 GHZ 1335.5050P10 |
| + | MXO4-B2415 1.5 GHz option 1335.4330.02 | MXO44-2415 OSCILLOSCOPE 4CH 1.5 GHZ 1335.5050P15 |



R&S® MXO 4 HW OPTIONS

| HW Option | Coverage |
|---|---|
| MXO4-B1 MIXED-SIGNAL-OPTION 1335.4130.02 | Include 2x MSO logic probes that enable MSO function on the MXO |
| MXO4-B6 ARBITRARY WAVEFORM GEN. 1335.4147.02 | License to enable built-in 2 channels waveform generator with frequency up to 100 MHz |
| MXO4-B108 MEMORY OPTION 800MPTS 1335.5772.02 | Enable interleaving of memory to enhance the standard 400Mpts per channel into 800Mpts, history/segmented memory increase to 1M acquisitions/segments |



R&S® MXO 4 SW BUNDLES PRICING:

| SW Bundle | Coverage |
|--|--------------------------------|
| MXO4-K510 Low speed serial bus 1335.5195.02 | I2C, SPI, RS232, UART |
| MXO4-K520 Automotive Protocols 1335.5550.02 | CAN, CAN-FD, CAN-XL, LIN |
| MXO4-K36 Frequency response analysis 1335.5572.02 | Bode Analysis, PSRR, Impedance |

More protocols and analysis function to be available in the future



R&S® MXO 4 SUPPORT FOR R&S PROBE PORTFOLIO



High voltage



Single ended compact



Differential modular



Power rail



Standard



Broadband



Differential High voltage



Differential compact



Current



EMC near field



PASSIVE

ACTIVE

SPECIALIZED

Lastly...

WHY BUY R&S MXO4?



World first oscilloscope with 4.5 million wfm/s



Industry leading 18 bit HD mode with 12 bit ADC



Deepest standard memory of 400 Mpts per channels



First in class to implement digital trigger technology



Fastest FFT spectrum update rate in the class



R&S® ESSENTIALS

R&S® MXO 4 SERIES



Next-generation oscilloscope for accelerated insight

eXcitingly fast • eXtremely precise • eXceptionally deep
memory

