

# Infiniium MXR-Series

See More. Do More. Save Time.

You want your design to shine, and that means seeing more signals in new ways. Be ready with a Keysight Infiniium MXR-Series oscilloscope: it's your window into the intricate interactions of complex designs. Get from symptom to resolution fast by coupling the efficiency of an 8-in-1 bench solution with unprecedented simultaneous 8 channel performance.

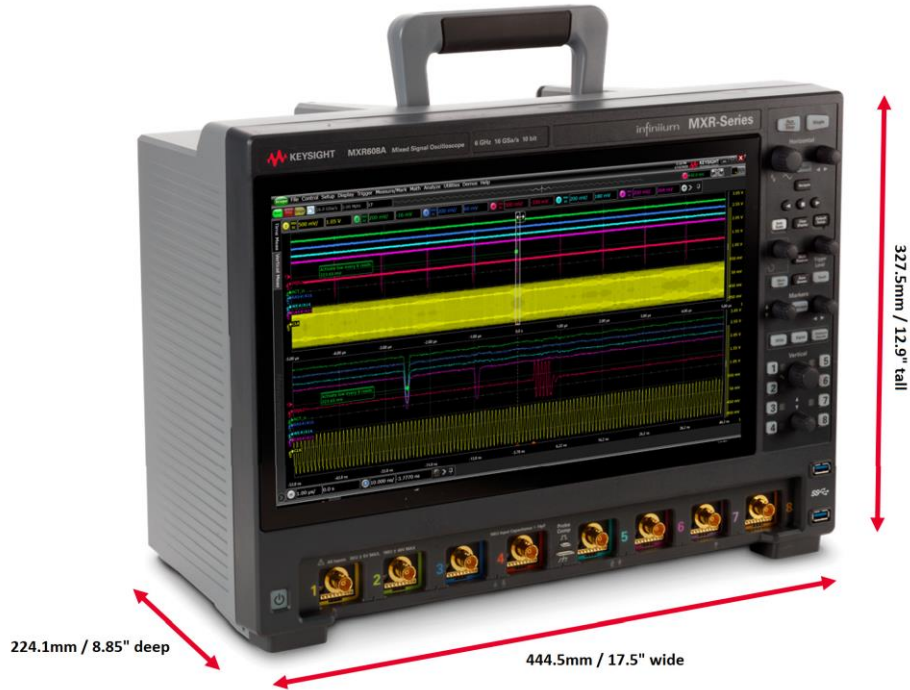


# Contents

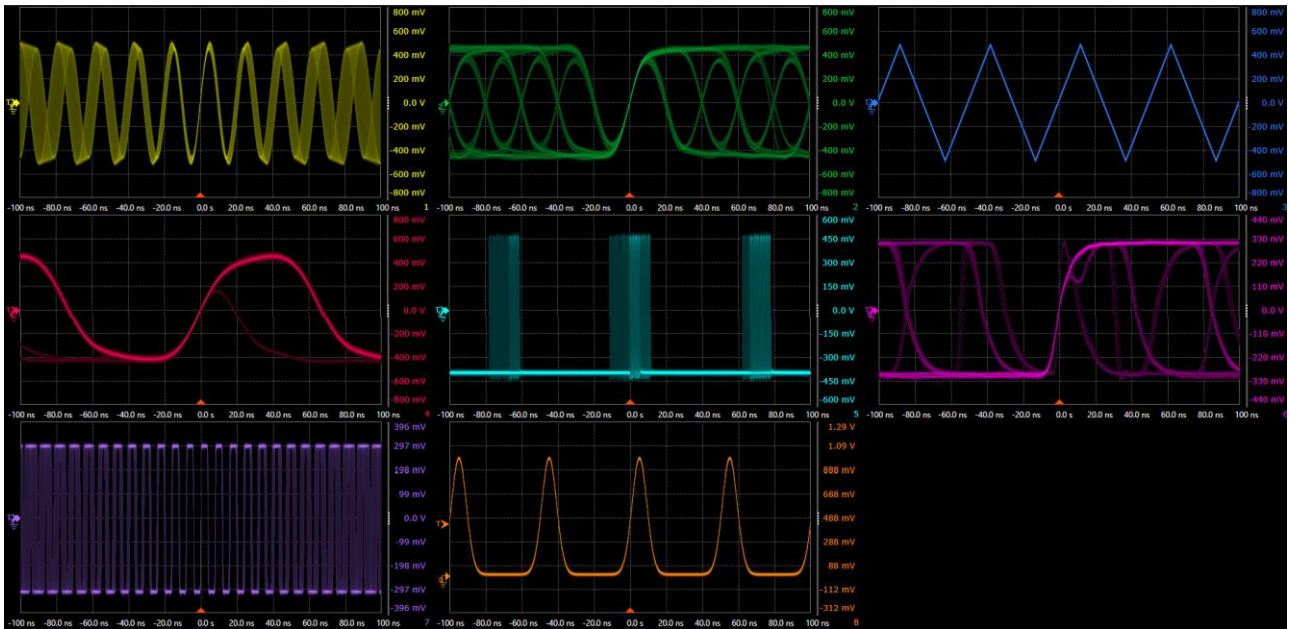
|  |    |
|--|----|
| Meet the Infiniium MXR-Series .....                                    | 3  |
| See More in the Time Domain with Eight Analog Channels .....           | 4  |
| See More with World-Class Signal Integrity .....                       | 4  |
| See More Information with History Mode and Segmented Memory.....       | 5  |
| See More in the Frequency Domain with Real-Time Spectrum Analysis..... | 5  |
| Do More with 8-in-1 Instrument Integration .....                       | 6  |
| Save Time with Groundbreaking ASIC Technology .....                    | 7  |
| Save Time with the All New Fault Hunter Application .....              | 7  |
| Completely Upgradeable .....   | 8  |
| Comprehensive Testing Applications.....                                | 9  |
| Signal Integrity Testing .....   | 9  |
| Power Supply, Rail, and PMIC Testing .....                             | 12 |
| Industry Specific Protocol Testing .....                               | 14 |
| Compliance Testing.....  | 15 |
| RF Testing .....   | 16 |
| Analyze, Document, and Share Data Remotely .....                       | 17 |
| Explore the Keysight Real-Time Oscilloscope Portfolio.....             | 17 |
| Performance Characteristics.....                                       | 18 |
| Ordering Guide and Upgrade Information.....                            | 29 |
| Standard accessories .....   | 29 |
| Main model configuration .....   | 30 |
| Probes and accessories .....   | 31 |
| Analysis software packages .....                                       | 32 |
| Protocol decode and trigger software packages .....                    | 32 |
| Protocol compliance packages.....                                      | 32 |
| Offline testing.....   | 33 |
| Post-purchase upgrades .....   | 34 |

## Meet the Infiniium MXR-Series

Welcome to the all-new Infiniium MXR-Series. With twelve models ranging in performance from 500 MHz to 6 GHz, 4 or 8 analog channels, and dozens of hardware and software options, the Infiniium MXR-Series is designed to meet your needs today. And with a platform that is fully upgradeable – with no exceptions - it will be ready for your measurement needs tomorrow.



| Infiniium MXR-Series Specifications |   | Model Numbers                  | 4 Channels | 8 Channels |
|-------------------------------------|---|--------------------------------|------------|------------|
| Analog channels                     | 4 or 8, <i>upgradeable</i>                | 500 MHz                        | MXR054A    | MXR058A    |
| Bandwidth                           | 500 MHz to 6 GHz, <i>upgradeable</i>      | 1 GHz                          | MXR104A    | MXR108A    |
| Sample rate                         | 16 GSa/s                                  | 2 GHz                          | MXR204A    | MXR208A    |
| Memory                              | 200 Mpts, <i>upgradeable</i> to 400 Mpts  | 2.5 GHz                        | MXR254A    | MXR258A    |
| Resolution                          | 10 bits, up to 16 with high resolution    | 4 GHz                          | MXR404A    | MXR408A    |
| ENOB                                | As high as 9.0                            | 6 GHz                          | MXR604A    | MXR608A    |
| Timebase accuracy                   | 8 parts per billion                       |                                |            |            |
| Intrinsic Jitter                    | As low as 118 fs                          |                                |            |            |
| Noise (1 mV/div)                    | As low as 43 $\mu$ V                      |                                |            |            |
| Digital logic channels              | 16, dedicated input, <i>upgradeable</i>   |                                |            |            |
| Integrated tools                    | 8-in-1                                    |                                |            |            |
| Eye diagram speed                   | >750,000 UI/s                             |                                |            |            |
| Screen display                      | 15.6" touch, full HD, dual screen support |                                |            |            |
|                                     |   | Integrated Tools               | Option     |            |
|                                     |   | 16 digital channels            | MXR2MSO    |            |
|                                     |   | 50 MHz waveform generator      | MXR2WAV    |            |
|                                     |   | RTSA, DDC                      | MXR2RTSA   |            |
|                                     |   | 4 digit DVM, 10 digit counters | Standard   |            |
|                                     |   | Protocol analysis              | Various    |            |



## See More in the Time Domain with Eight Analog Channels

The Infiniium MXR-Series is the first oscilloscope to offer 6 GHz bandwidth and 16 GSa/s sample rate on every single one of its eight channels. Combined with being the first oscilloscope with 200 Mpts of standard memory per channel, flexible three-stage triggering, over 50 standard measurements, a massive library of application specific packages, and ASIC-accelerated testing, the Infiniium MXR-Series lets you see more of your signal than ever before.

## See More with World-Class Signal Integrity

Each model incorporates a 10-bit ADC with a sample rate of 16 GSa/s available on all channels simultaneously. A high-resolution ADC's usefulness is dependent on the low-noise front end that supports the additional quantization levels. Our low noise front end includes custom ICs, like the 130 nm BiCMOS IC that incorporates user-selectable analog filters and bandwidth upgrades via a software license. This gives you:

- 4 times more vertical resolution than 8-bit oscilloscopes
- Up to 16 bits with high-res mode
- As low as 43  $\mu\text{V}$  of noise, 9.0 bits system ENOB with hardware filtering



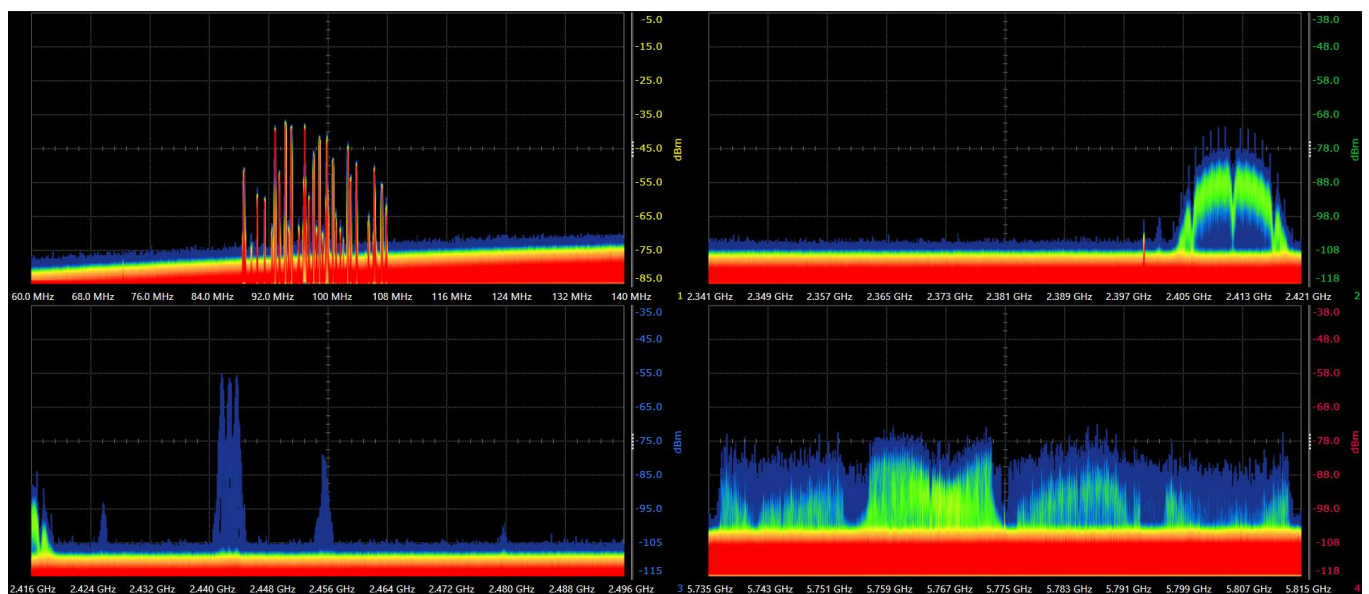


## See More Information with History Mode and Segmented Memory

The Infiniium MXR-Series comes standard with two useful tools that allow you to look forward and backward in time. With history mode, simply stop the oscilloscope at any time to review up to 1,024 previous trigger events. With segmented memory, you can capture up to 5,205 events post-trigger for analysis, with no limit between events. If your design has an elusive event that only seems to happen when you're not around, these tools can help you arm the oscilloscope to look for it, then let you review what gets captured at your leisure. And with a full HD screen of 1920x1080 pixels, and support for a second, independent external monitor, that data can be organized and displayed however is best for you.

## See More in the Frequency Domain with Real-Time Spectrum Analysis

Perform powerful RF analysis with up to 8 phase-coherent channels, all at once. Digitally down-convert data on all 8 channels simultaneously with an analysis bandwidth up to 2 GHz. The RTSA view in the Infiniium MXR-Series provides spans from 40 MHz to 320 MHz. In this image, we're viewing (clockwise) local US radio stations (~100 MHz), 2.4 GHz WLAN channel 1, 5 GHz WLAN channel 157, and Bluetooth all at once. And since the data is from the analog channel inputs, they are phase coherent by definition, with only a standard calibration required to ensure accuracy. And with a maximum frequency range of 6 GHz, the Infiniium MXR-Series easily supports applications from ZigBee to 5G FR1.



## Do More with 8-in-1 Instrument Integration

The Infiniium MXR-Series is more than just an oscilloscope - it's 8 instruments in 1. Keysight Technologies, Inc. pioneered multiple-instrument integration with the release of the mixed signal oscilloscope (MSO) in 1996. The InfiniiVision 2000/3000/4000X-Series took the concept to the next level by integrating five instruments in one in 2011. The Infiniium MXR-Series now integrates eight instruments in one to establish a new integration standard, with the first ever real-time spectrum analyzer on an oscilloscope.



Product sizes to scale!



- Oscilloscope
- Logic analysis
- Real-Time Spectral Analysis
- Serial protocol analysis
- Waveform generator
- Frequency response
- Digital voltmeter
- Triple counters with totalizer
- Phase noise testing



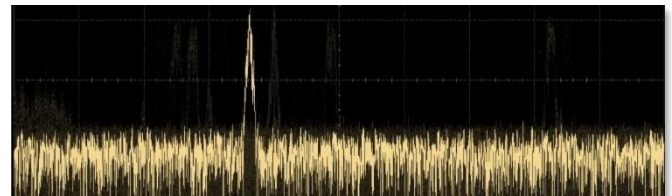
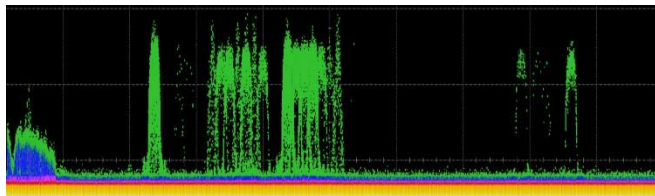
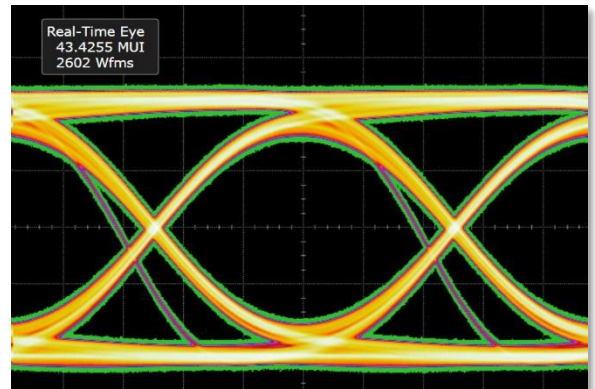
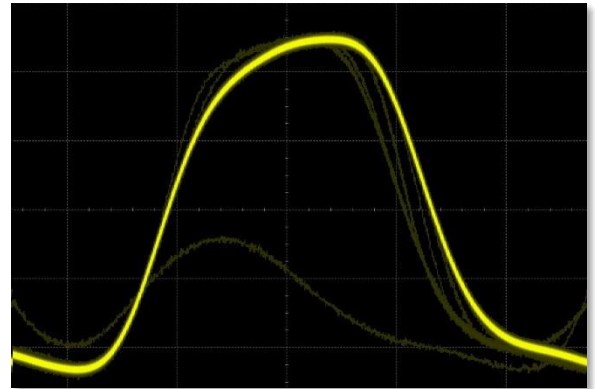
Generating a 10 MHz sine wave with frequency modulation, while measuring two signal frequencies with counters and a third signal's DC voltage with the DVM. Note that channels need not be enabled for the counter and DVM to operate.

## Save Time with Groundbreaking ASIC Technology

The Infiniium MXR-Series leverages a 100M+ gate CMOS ASIC from our UXR-Series oscilloscope, and acts as an “oscilloscope on a chip”. With many core oscilloscope features done in hardware, performance of some features improved by 100x or more over previous generations, including:

- Triggering and plotting: **200x faster**
- Eye diagrams: **50x faster**
- FFT plotting: **400x faster**
- Waveform averaging: **120x faster**
- And more!

In these images to the right, the fast trigger rate of >200,000 waveforms per second means seeing the runt on screen is instantaneous, even though it occurs only on 0.02% of pulses. Fast triggering lets you see rare events more readily, reducing test time by avoiding the usual tricks like infinite persistence to capture rare events. Eye diagrams are plotted at speeds over 750,000 UI per second, meaning six-sigma can be achieved in mere seconds. And below, RTSA’s speed of 400,000 FFT plots per second mean that even this bursty Bluetooth data is captured easily, while nearly invisible with usual FFT (~1,000 plots per second).



Highly dynamic Bluetooth data is difficult to capture consistently with standard FFT (right), but easy with RTSA (left).

## Save Time with the All New Fault Hunter Application

Fault Hunter automatically finds the most common types of signal faults. It begins by getting statistics on standard measurements and then runs tests to find outliers.

Setup

Source:  Triggering - Finds rare faults, restricted limits.  Limit Test - May miss rare faults, unrestricted limits. Duration: Run for a minute Autoscale

Control

Auto Setup  Run All after Auto Setup Run All Tests

| Test              | Result | Mean                    | Std Dev | Acceptable Range           | Run | View | Copy to Trig |
|-------------------|--------|-------------------------|---------|----------------------------|-----|------|--------------|
| Positive Glitch   | Failed | 34.8 ns                 | 184 ps  | > 17.3951 ns               | Run | View | Copy to Trig |
| Negative Glitch   | Passed | 34.8 ns                 | 9.32 ns | > 17.3951 ns               | Run | View | Copy to Trig |
| Slow Rising Edge  | Passed | 11.1 ns                 | 356 ps  | < 12.2036 ns               | Run | View | Copy to Trig |
| Slow Falling Edge | Passed | 11.5 ns                 | 378 ps  | < 12.6759 ns               | Run | View | Copy to Trig |
| Positive Runt     | Failed | Low -359 mV : Hi 385 mV | 9.19 mV | > -209.8 mV and < 237.0 mV | Run | View | Copy to Trig |
| Negative Runt     | Passed | Low -359 mV : Hi 385 mV | 9.19 mV | > -209.8 mV and < 237.0 mV | Run | View | Copy to Trig |

Fault Hunter is a new and innovative expert system for inspecting digital systems. It automatically evaluates your signal’s characteristics against user definable criteria, quickly finding and saving errors for your review. It’s flexible, and you can define the test duration from 60 seconds up to 48 hours. Set up your device under test on a Friday afternoon, and return Monday morning with a full test report to review, with billions of tests complete.

## Completely Upgradeable

Today's project requires 4 channels of 1 GHz analysis bandwidth. What if your next project needs 8 channels, and 6 GHz of analysis bandwidth? And a waveform generator? And compliance testing? No problem with the Infiniium MXR-Series, which is fully upgradeable – no exceptions.

The Infiniium MXR-Series is the world's first benchtop oscilloscope to offer an upgrade from 4 to 8 analog channels. Along with this, you can upgrade bandwidth, memory, integrated equipment, applications and more after purchase, with just a license key. No matter how your needs change, the Infiniium MXR-Series protects your investment by growing with your lab's needs of tomorrow.

| Post-Purchase Upgrades            | Model    |
|-----------------------------------|----------|
| Add analog bandwidth, up to 6 GHz | MXR2BW   |
| Add analog channels, 4 to 8       | MXR28CH  |
| Add memory, 400 Mpts/ch           | MXR2MEM  |
| Add RTSA and DDC                  | MXR2RTSA |
| Add RF Frequency Extension, 6 GHz | MXR2FRE  |
| Add waveform generator, 50 MHz    | MXR2WAV  |
| Add MSO, 16 channels              | MXR2MSO  |



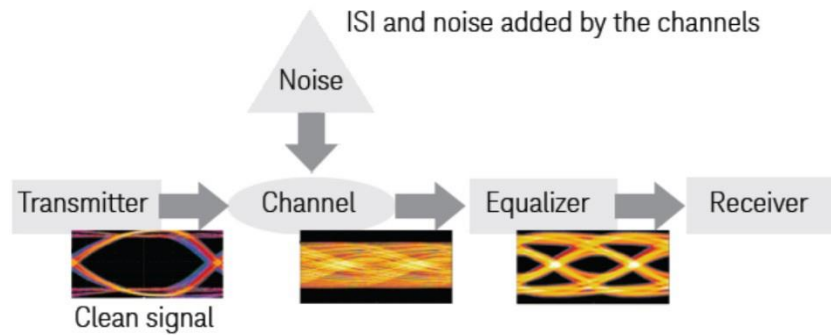


## Comprehensive Testing Applications

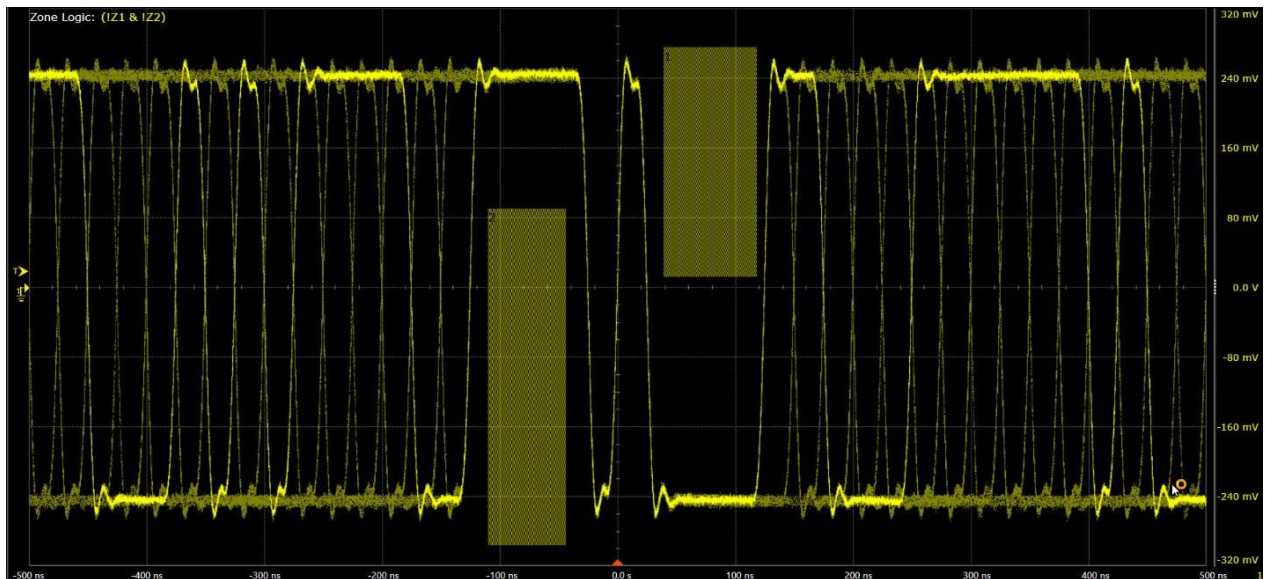
### Signal Integrity Testing

As data rates go up, the signal deteriorates from the transmitter to the receiver due to ISI, noise, and other factors. A high data rate coupled with a lossy channel will cause an open eye at a transmitter to be closed at the receiver. As eyes get more and more closed, it ultimately

leads to significant data corruption and errors. Being able to analyze and find the root cause of these problems can help you develop a more robust design, leading to shorter time to market and lower failure rates in the field. The Infiniium MXR-Series offers applications of various levels of depth to help you get the answers you need to improve your design.



### InfiniiScan Advanced and Zone Triggering – D9010SCNA



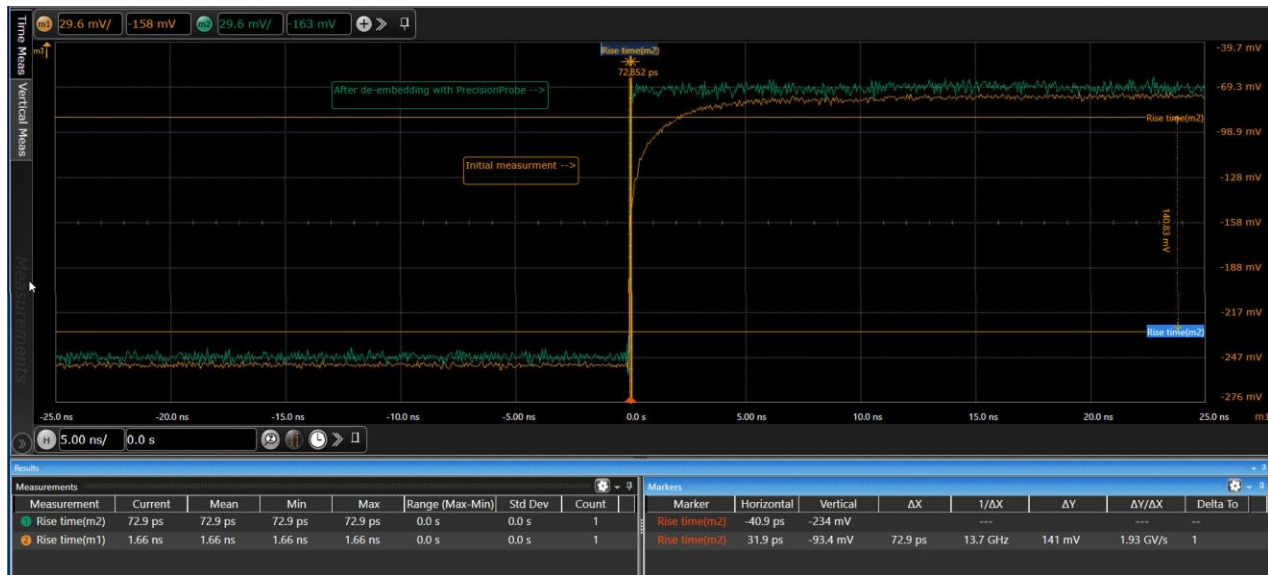
This package allows you to create a three-stage trigger to identify signal integrity issues that hardware triggering is unable to find in your electronic designs. This innovative software scans through thousands of acquired waveforms per second to help you isolate signal anomalies, saving you precious troubleshooting time. Trigger by drawing on-screen regions for a signal to hit or miss, or based on measured parameters.

## Vertical, Timing, and Phase Noise Analysis – D9010JITA



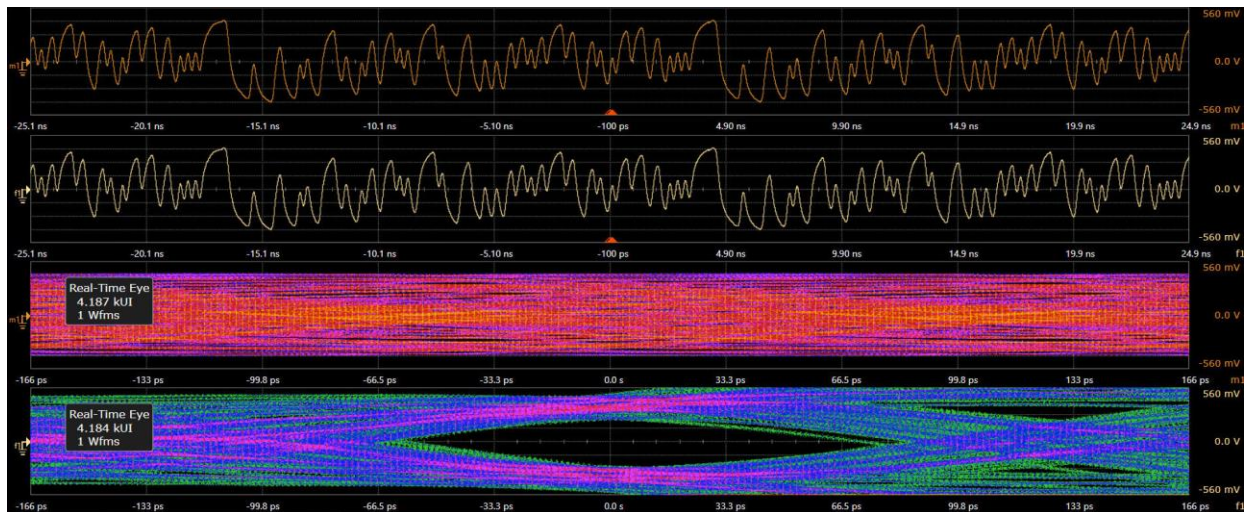
This package offers advanced statistical analysis of high-speed digital interfaces in the vertical (voltage) and horizontal (time) domains, as well as phase noise analysis. The result: the industry's most complete jitter and noise analysis software for real-time oscilloscopes.

## De-embedding – D9010DMBA



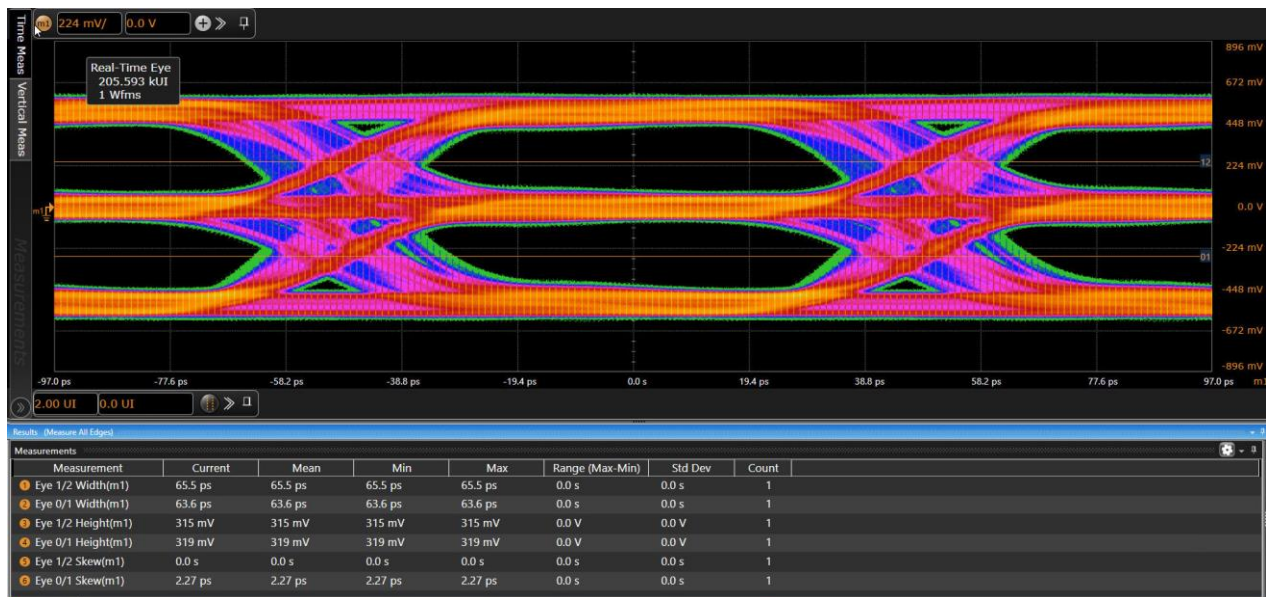
This package includes PrecisionProbe and InfiniiSim Basic, two tools designed to de-embed the effect of cables and fixtures from measurements. PrecisionProbe allows you to characterize the response of a probe, cable or fixture; InfiniiSim lets you model them out of a measurement.

## Equalization and Crosstalk – D9020ASIA



This package is intended for anyone working in high speed digital applications where eyes are closed. Equalization, InfiniiSim, and Crosstalk/Power Integrity packages enable deep analysis as to why an eye is closed, what it will take to open it, and simulating the results.

## PAM-3 and PAM-4 Analysis – D9010PAMA

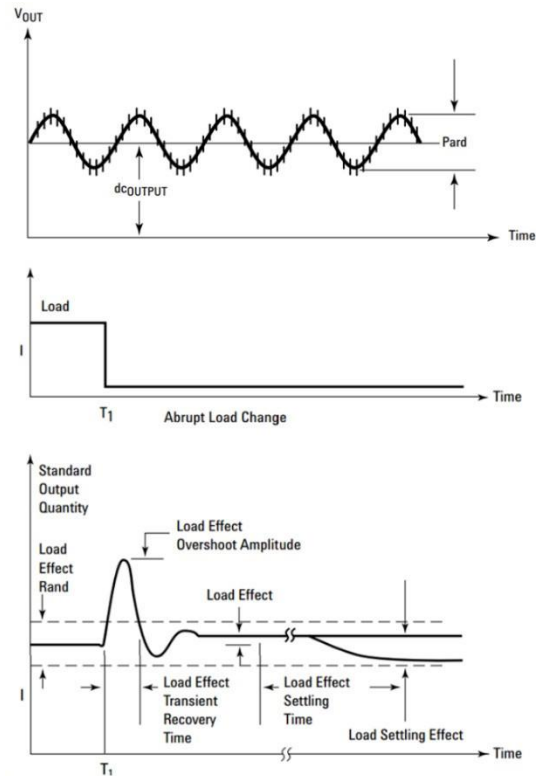


This package quickly sets up clock recovery and measurements for a PAM encoded signal. The software is also able to accurately set the individual threshold levels of your PAM signal and render each individual eye. It also includes BER/SER measurements and statistics.

## Power Supply, Rail, and PMIC Testing

The increased functionality, higher density, and higher frequency operation of many modern electronic products has driven the need for lower supply voltages. It is common in many designs today to have 3.3, 1.8, 1.5, and even 1.1 V DC supplies—each of them having tighter tolerances than in previous product generations.

Power supply induced jitter (PSIJ) can be one of the largest sources of clock and data jitter in digital systems. Similarly, noise on DC supplies is often caused by switching currents from the transitions of clock and data in these systems. Wouldn't you like a relatively easy method of determining how much of your systems' data jitter is PSIJ and/or how much of the noise on the DC supplies is coming from specific clocks, data lines or other toggling sources? We've got the tools for that in the Infiniium MXR-Series.



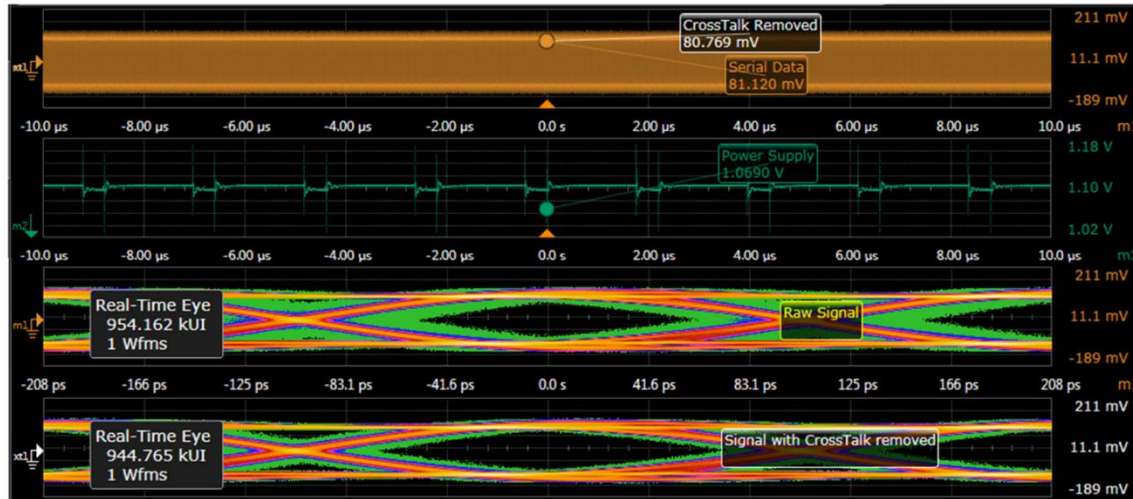
## Switch Mode Supplies – D9010PWRA



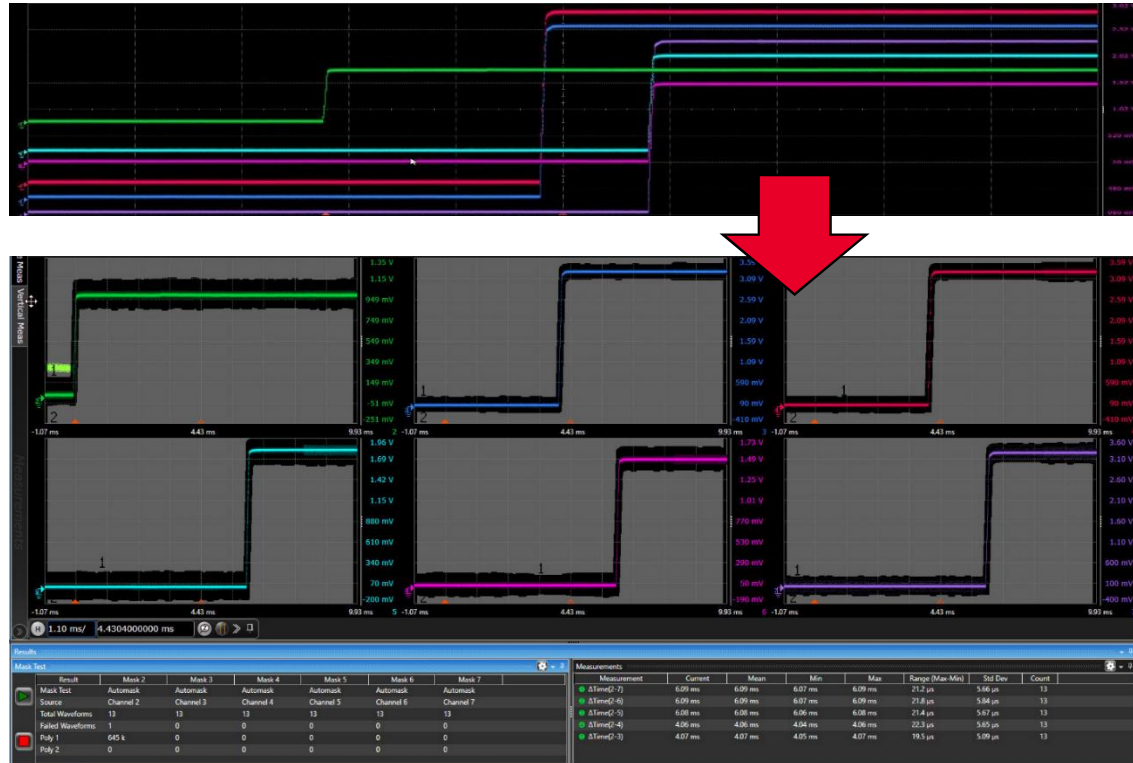
This application enables a broad range of automated power supply characterization measurements from input analysis, switching device characterization, and output analysis. It also includes critical frequency response measurements such as power supply rejection ratio (PSRR) and control loop response.

## Power Rail and PMIC Integrity – D9010POWA

This application is a tool for analyzing power supply induced jitter or switching current loads on a DC supply, and can analyze adverse interactions and their effects without the need for simulation or complex modeling. Together with the N7020A or N7024A Power Rail Probe, you have an even more powerful means of measuring and analyzing power integrity. And with standard mask testing on every channel, automatic delta time measurements, and a flexible user interface, PMIC analysis is simpler than ever.

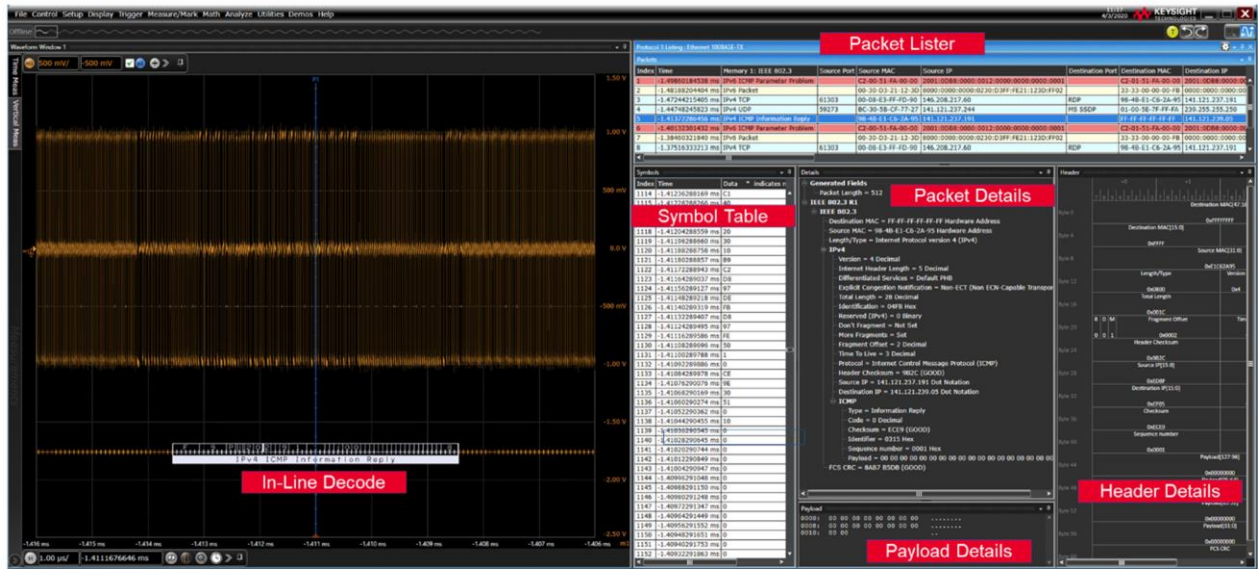


By simulating a power supply with less noise, we can realize much wider eye diagrams, leading to more robust transfer of data.



With waveforms separated into grids and independent mask tests possible on every channel, you can continuously test these six power rails over thousands of startup cycles.

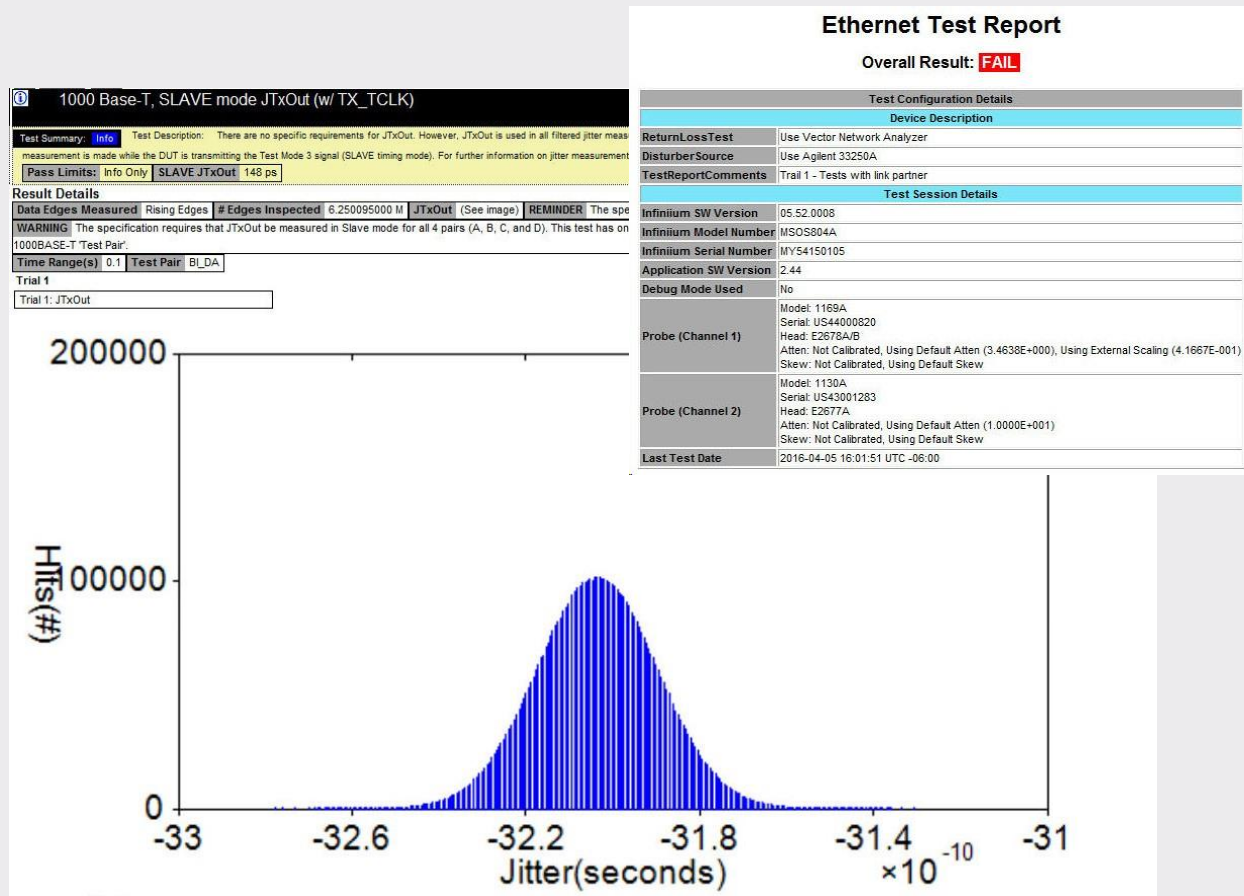
## Industry Specific Protocol Testing



Our protocol trigger and decode packages make easy to debug and test digital designs. Get access to a rich set of integrated protocol level triggers specific to each serial bus. When serial triggering is selected, the application enables special real-time triggering hardware inside the scope. Hardware-based triggering ensures that the scope never misses a trigger event when armed. This hardware takes signals acquired using either scope or digital channels and reconstructs protocol frames. It then inspects these protocol frames against specified protocol-level trigger conditions and triggers when the condition is met.

| Package               | Description   | Data Sheet |
|-----------------------|---|------------|
| Low Speed Serial      | I <sup>2</sup> C, SPI, Quad SPI, eSPI, Quad eSPI, RS232, UART, JTAG, I <sup>2</sup> S, SVID, Manchester | D9010LSSP  |
| Embedded              | USB 1.x and 2.0, 10/100 Mb/s Ethernet, USB-PD   | D9010EMBP  |
| Low Speed Automotive  | CAN, LIN, CAN-FD, SENT  | D9010AOTP  |
| MIPI Low Speed        | RFFE, I <sup>3</sup> C, SPMI  | D9010MPLP  |
| MIPI D-PHY            | Decode up to 2.5 Gbps MIPI D-PHY (no C-PHY)   | D9010MCDP  |
| Military              | ARINC 429, MIL-STD 1553, SpaceWire  | D9010MILP  |
| High Speed Automotive | 100BASE-T1 Automotive Ethernet  | D9020AOTP  |
| USB                   | USB 1.x and 2.0, eUSB2, Superspeed USB (5 Gbit/s)   | D9010USBP  |

## Compliance Testing



Compliance test applications on the Infiniium MXR-Series provide a fast and effortless way to validate that your designs meet industry standards. They save you time and money by automating the task of performing compliance measurements based on the latest requirements. These test application offers a user-friendly setup wizard and a comprehensive report that includes margin analysis.

| Standard            | Description  | Min. BW | Data Sheet             |
|---------------------|--|---------|------------------------|
| USB 2.0             | USB 2.0 Transmitter  | 2 GHz   | D9010USBC              |
| Ethernet            | 10M/100M/1GBASE-T and Energy Efficient Ethernet                              | 1 GHz   | D9010ETHC              |
| Ethernet            | 10G, MG Base-T, N-Base-T   | 4 GHz   | D9010EBZC <sup>1</sup> |
| Automotive Ethernet | 1000BASE-T1 (IEEE 802.3pb), 100BASE-T1 (IEEE 802.3bw and TC8). Broad-R Reach | 1 GHz   | AE6910T <sup>1</sup>   |
| C-PHY               | MIPI C-PHY, up to 1.5 Gbps   | 6 GHz   | D9010CPHC              |
| D-PHY               | MIPI D-PHY, up to 1.5 Gbps (up to CTS v1.2)                                  | 6 GHz   | D9020DPHC              |

1. Will be compatible with MXR-Series in a future release (subject to change)

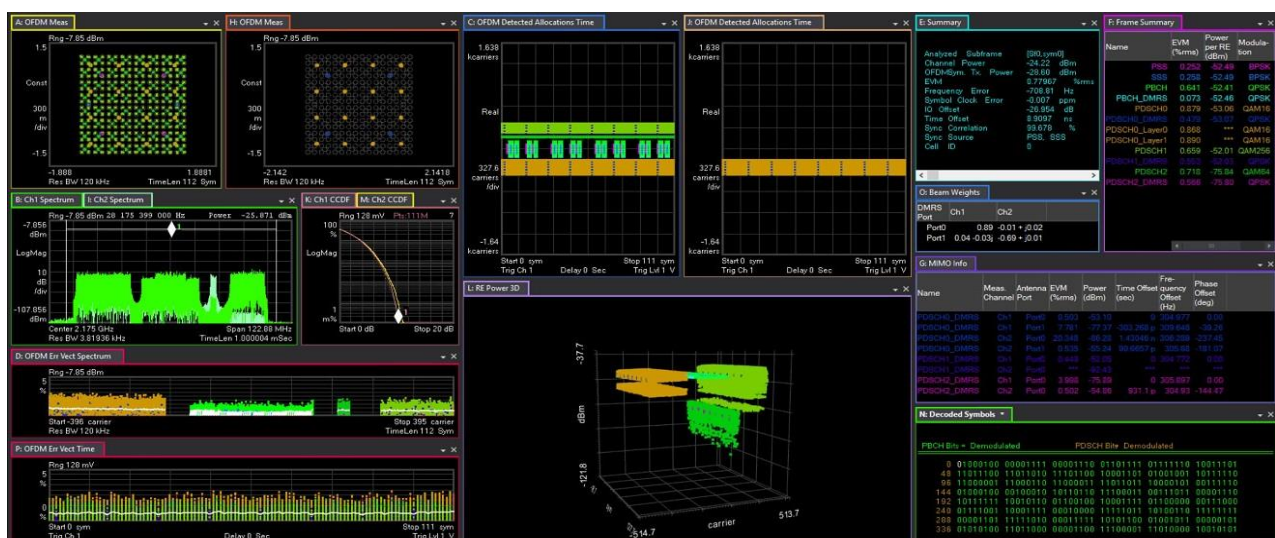
## RF Testing

With digital down-conversion (DDC) on every channel, the Infiniium MXR-Series provides you much more flexibility and affordability for RF testing, as well as never before seen test performance. Digitally down-converted data can be displayed and measured on screen, visualized in a Real-Time Spectrum Analyzer (RTSA) mode, or exported to PathWave Vector Signal Analysis (89600 VSA) for further measurements. All models come standard with 40 MHz of analysis bandwidth for DDC and RTSA on one center frequency, with options for 160 or 320 MHz of analysis on 4 or 8 different center frequencies.



And with our all new Frequency Extension option, the frequency range for DDC and RTSA is not limited to the bandwidth of your oscilloscope. For example, if your measurement needs in the time domain only call for 2 GHz of analog bandwidth, but you wish to analyze wireless data up to 6 GHz, you can purchase a 2 GHz Infiniium MXR-Series and still get 6 GHz analysis with DDC and RTSA. See specifications for details.

| Configuration                                     | Frequency Range                | Analysis Bandwidth              | Center Frequency Control         |
|---|--------------------------------|---------------------------------|----------------------------------|
| Standard Performance                              | 0 Hz to Oscilloscope Bandwidth | 40 MHz                          | All channels are locked together |
| + RTSA/DDC Option                                 | 0 Hz to Oscilloscope Bandwidth | RTSA: 160/320 MHz<br>DDC: 2 GHz | Independent per channel          |
| + RTSA/DDC Option<br>+ Frequency Extension Option | 0 Hz to 6 GHz                  | RTSA: 160/320 MHz<br>DDC: 2 GHz | Independent per channel          |





## Analyze, Document, and Share Data Remotely with Infiniium Offline

You depend on your oscilloscope to capture an accurate picture of what's happening in your design. Ever wish you could do additional signal viewing, analysis and documentation tasks away from your scope and target system? With Infiniium Offline, now you can. Infiniium Offline is a copy of the same powerful software provided on the Infiniium MXR-Series oscilloscope. You can capture waveforms on your scope, save to a file, and recall the waveforms into Infiniium Offline. In addition, the application supports a variety of popular waveform formats from multiple oscilloscope vendors. Now you can view, analyze, share, and document scope measurements anywhere your PC goes. Find model numbers in the configuration guide at the end of this document.



## Explore the Keysight Real-Time Oscilloscope Portfolio

Keysight engineers have been creating reliable, insightful products for more than 80 years. We are continually looking for new ways to help you shape the future with innovative products and test solutions. From high performance to extreme value, and bandwidths ranging from 50 MHz to more than 110 GHz, we have the oscilloscope solutions to meet your evolving needs. Below is a small sample of our portfolio; check our website for the latest information.



| Product Series:           | 1000 X-Series | 3000T X-Series | MXR-Series          | V-Series    | Z-Series    | UXR-Series             |
|---------------------------|---------------|----------------|---------------------|-------------|-------------|------------------------|
| Analog channels           | 2 or 4        | 2 or 4         | 4 or 8, upgradeable | 4           | 4           | 1, 2 or 4, upgradeable |
| Bandwidth, all channels   | 200 MHz       | 1 GHz          | 6 GHz               | 16 GHz      | 33 GHz      | 110 GHz                |
| Sample rate, all channels | 1 GSa/s       | 2.5 GSa/s      | 16 GSa/s            | 40 GSa/s    | 80 GSa/s    | 256 GSa/s              |
| Max memory, all channels  | 1 Mpts        | 2 Mpts         | 400 Mpts            | 2 Gpts      | 2 Gpts      | 2 Gpts                 |
| Resolution                | 8 bits        | 8 bits         | 10 bits             | 8 bits      | 8 bits      | 10 bits                |
| Timebase accuracy         | 50 ppm        | 1.6 ppm        | 8 ppb               | 100 ppb     | 100 ppb     | 25 ppb                 |
| Intrinsic Jitter          | -             | -              | 118 fs              | 100 fs      | 50 fs       | 25 fs                  |
| Lowest noise (1 mV/div)   | -             | 113 $\mu$ V    | 43 $\mu$ V          | 210 $\mu$ V | 410 $\mu$ V | 150 $\mu$ V            |
| Max ENOB                  | -             | -              | 9.0                 | 6.6         | -           | 6.8                    |
| Logic analysis            | -             | 16 ch.         | 16 ch.              | 16 ch.      | 16 ch.      | -                      |
| Hardware plotting         | Yes           | Yes            | Yes                 | -           | -           | Yes                    |
| Screen display            | 7" WVGA       | 8.5" WVGA      | 15.6" Full HD       | 12.1" XGA   | 12.1" XGA   | 15.4" XGA              |

## Performance Characteristics

|  |                            | Analog channel specifications   |         |         |         |          |         |
|--|----------------------------|---|---------|---------|---------|----------|---------|
|  |                            | MXR05xA   | MXR10xA | MXR20xA | MXR25xA | MXR40xA  | MXR60xA |
| Bandwidth (-3db)                               | 50 $\Omega$ <sup>[1]</sup> | 500 MHz   | 1 GHz   | 2 GHz   | 2.5 GHz | 4 GHz    | 6 GHz   |
|  | 1 M $\Omega$               | 500 MHz   | 500 MHz | 500 MHz | 500 MHz | 500 MHz  | 500 MHz |
| Typical rise/fall time <sup>[4]</sup>          | 10/90%                     | 860 ps  | 430 ps  | 215 ps  | 172 ps  | 107.5 ps | 71.7 ps |
|  | 20/80%                     | 620 ps  | 310 ps  | 155 ps  | 124 ps  | 77.5 ps  | 51.7 ps |
| Input channels                                 |                            | 4 or 8 channels analog, 16 channels digital (optional)  |         |         |         |          |         |
| Sample rate, real-time                         |                            | 16 GSa/s, all analog channels <sup>[1]</sup>  |         |         |         |          |         |
| Sample resolution                              |                            | 62.5 ps (divide by interpolation factor, if enabled)  |         |         |         |          |         |
| Vertical resolution <sup>[3]</sup>             |                            | 10 bits, up to 16 bits with high-resolution mode  |         |         |         |          |         |
| Real-time update rate                          |                            | >200,000 waveforms/sec  |         |         |         |          |         |
| Memory depth <sup>[1]</sup>                    | Standard                   | 200 Mpts/channel, all channels  |         |         |         |          |         |
|  | Optional                   | 400 Mpts/channel, all channels  |         |         |         |          |         |
| Input impedance                                | 50 $\Omega$ <sup>[1]</sup> | $\pm 3.5\%$ (typically $\pm 1\%$ at 25 °C)  |         |         |         |          |         |
|  | 1 M $\Omega$               | $\pm 1\%$ (14 pF typical)   |         |         |         |          |         |
| Input sensitivity <sup>[3]</sup>               | 50 $\Omega$ <sup>[1]</sup> | 1 mV/div to 1 V/div   |         |         |         |          |         |
|  | 1 M $\Omega$               | 1 mV/div to 5 V/div   |         |         |         |          |         |
| Input coupling                                 | 50 $\Omega$ <sup>[1]</sup> | DC  |         |         |         |          |         |
|  | 1 M $\Omega$               | DC, AC (>11 Hz)   |         |         |         |          |         |
| Bandwidth limit filters                        | Analog                     | 20 MHz, 200 MHz   |         |         |         |          |         |
|  | Digital <sup>[5]</sup>     | 14.7 MHz up to scope bandwidth, increments of one decimal point. Filter options: Brick Wall, 4 <sup>th</sup> Order Bessel, or Bandpass  |         |         |         |          |         |
| Max input voltage                              | 50 $\Omega$                | $\pm 5 V_{MAX}$ <sup>[1]</sup>  |         |         |         |          |         |
|  | 1 M $\Omega$               | 30 $V_{RMS}$ or $\pm 40 V_{MAX}$ (DC + $V_{PEAK}$ )   |         |         |         |          |         |
|  | Notes                      | Probing technology allows for testing of higher voltages; the included N2873A 10:1 probe supports 300 $V_{RMS}$ or $\pm 400 V_{MAX}$ (DC + $V_{PEAK}$ ). No transient overvoltage allowed in either the 50 $\Omega$ or 1 M $\Omega$ path, with or without probes. |         |         |         |          |         |
| Offset range                                   | 50 $\Omega$ <sup>[1]</sup> | $\leq 55$ mV/div: $\pm 0.8$ V   |         |         |         |          |         |
|  |                            | $\leq 120$ mV/div: $\pm 1.6$ V  |         |         |         |          |         |
|  | 1 M $\Omega$               | $\leq 260$ mV/div: $\pm 3.2$ V  |         |         |         |          |         |
| Offset accuracy <sup>[1][3]</sup>              | 50 $\Omega$ <sup>[1]</sup> | $> 260$ mV/div: $\pm 4$ V   |         |         |         |          |         |
|  |                            | $< 10$ mV/div: $\pm 5$ V  |         |         |         |          |         |
|  | 1 M $\Omega$               | $\leq 200$ mV/div: $\pm 20$ V   |         |         |         |          |         |
|  |                            | $> 200$ mV/div: $\pm 40$ V  |         |         |         |          |         |
| Dynamic range <sup>[6]</sup>                   |                            | $\pm 4$ divisions from center screen  |         |         |         |          |         |
| DC gain accuracy <sup>[1][2][3]</sup>          |                            | $\pm 2\%$ full scale ( $\pm 1\%$ typical)   |         |         |         |          |         |
| DC voltage measurement accuracy <sup>[2]</sup> |                            | Dual cursor: $\pm[(DC \text{ gain accuracy}) + (\text{resolution})]$<br>Single cursor: $\pm[(DC \text{ gain accuracy}) + (\text{offset accuracy}) + (\text{resolution}/2)]$   |         |         |         |          |         |
| Channel-channel isolation                      |                            | Adjacent Channels: $\leq -60$ dB (DC to 2 GHz), $\leq -50$ dB (2 to 6 GHz)<br>Non-Adjacent Channels: $\leq -85$ dB (DC to 2 GHz), $\leq -65$ dB (2 to 6 GHz)  |         |         |         |          |         |

1. Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and  $\pm 5$  °C from firmware calibration temperature. Input impedance is valid when V/div scaling is adjusted to show all waveform vertical values within the oscilloscope display.

2. Full scale is defined as 8 vertical divisions. Magnification is used below 2 mV/div, full-scale is defined as 16 mV. Testing is at maximum sample rate.

3. 50  $\Omega$  input: The major scale settings are 5 mV, 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, and 1 V per division.

1 M $\Omega$  input: The major scale settings are 5 mV, 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, and 5 V per division. For a 10:1 probe, vertical scaling is multiplied by 10.

4. 10/90 calculation based on  $Tr = 0.43/BW$ . 20/80 calculation based on  $Tr = 0.31/BW$ .

5. You may adjust bandwidth limits up to the bandwidth of the scope when using Brick Wall filter. When using 4th Order Bessel, maximum bandwidth limit is roughly 2/3 the bandwidth of oscilloscope. Bandpass is designed for use in our Phase Noise Analysis application and not designed for general purpose use. Contact Keysight if more information is needed.

| High-resolution mode (standard) |                |                          |
|---------------------------------|----------------|--------------------------|
| Bits of resolution              | Sample rate    | Bandwidth <sup>[1]</sup> |
| 10                              | Up to 16 GSa/s | Up to 6 GHz              |
| 11                              | 6.4 GSa/s      | 2.4 GHz                  |
| 12                              | 3.2 GSa/s      | 1.2 GHz                  |
| 13                              | 1.6 GSa/s      | 600 MHz                  |
| 14                              | 800 MSa/s      | 300 MHz                  |
| 15                              | 400 MSa/s      | 165 MHz                  |
| 16                              | 200 MSa/s      | 82.5 MHz                 |
| 16                              | 100 MSa/s      | 41.3 MHz                 |
| 16                              | 50 MSa/s       | 20.6 MHz                 |

1. Up to bandwidth specified or oscilloscope model bandwidth, whichever is lower

| RMS noise floor ( $V_{RMS AC}$ ) on 50 $\Omega$ inputs |                       |                        |                        |                      |                      |             |             |             |
|--|-----------------------|------------------------|------------------------|----------------------|----------------------|-------------|-------------|-------------|
| Vertical setting                                       | 20 MHz <sup>[1]</sup> | 200 MHz <sup>[1]</sup> | 500 MHz <sup>[1]</sup> | 1 GHz <sup>[1]</sup> | 2 GHz <sup>[1]</sup> | 2.5 GHz     | 4 GHz       | 6 GHz       |
| 1, 2 mV/div  | 43 $\mu$ V            | 59 $\mu$ V             | 63 $\mu$ V             | 73 $\mu$ V           | 91 $\mu$ V           | 100 $\mu$ V | 132 $\mu$ V | 193 $\mu$ V |
| 5mV/div  | 40 $\mu$ V            | 61 $\mu$ V             | 70 $\mu$ V             | 81 $\mu$ V           | 102 $\mu$ V          | 112 $\mu$ V | 149 $\mu$ V | 216 $\mu$ V |
| 10 mV/div  | 46 $\mu$ V            | 69 $\mu$ V             | 81 $\mu$ V             | 99 $\mu$ V           | 131 $\mu$ V          | 144 $\mu$ V | 189 $\mu$ V | 251 $\mu$ V |
| 20 mV/div  | 59 $\mu$ V            | 99 $\mu$ V             | 122 $\mu$ V            | 156 $\mu$ V          | 209 $\mu$ V          | 233 $\mu$ V | 297 $\mu$ V | 401 $\mu$ V |
| 50 mV/div  | 210 $\mu$ V           | 278 $\mu$ V            | 328 $\mu$ V            | 401 $\mu$ V          | 520 $\mu$ V          | 569 $\mu$ V | 719 $\mu$ V | 971 $\mu$ V |
| 100 mV/div   | 452 $\mu$ V           | 582 $\mu$ V            | 681 $\mu$ V            | 821 $\mu$ V          | 1.06 mV              | 1.17 mV     | 1.46 mV     | 2.03 mV     |
| 1 V/div  | 2.95 mV               | 4.10 mV                | 5.07 mV                | 6.33 mV              | 8.4 mV               | 9.31 mV     | 11.91 mV    | 16.26 mV    |

1. High-resolution is used for bandwidths 2 GHz and below.

| ENOB on 50 $\Omega$ inputs, 50 mV/div |         |         |         |         |       |       |         |       |       |       |       |
|---------------------------------------|---------|---------|---------|---------|-------|-------|---------|-------|-------|-------|-------|
| 20 MHz                                | 200 MHz | 250 MHz | 350 MHz | 500 MHz | 1 GHz | 2 GHz | 2.5 GHz | 3 GHz | 4 GHz | 5 GHz | 6 GHz |
| 9.0                                   | 8.5     | 8.4     | 8.3     | 8.2     | 8.0   | 7.6   | 7.5     | 7.4   | 7.2   | 7.1   | 6.8   |

High resolution on the Infiniium MXR-Series works like no other oscilloscope before it. Instead of setting high-resolution bits automatically with no user control, you select ADC bits or a system bandwidth, and let the scope optimize around that. This means the resolution of your data isn't changing without your explicit request. ADC resolution and bandwidth limit filters work in tandem to produce the best measurement results possible.

All Infiniium MXR-Series scopes come from the factory calibrated to 6 GHz, and leverage brickwall filters to achieve each model bandwidth. Thus, the noise and ENOB data above is applicable from 20 MHz up to the bandwidth of your oscilloscope model when using the built-in global bandwidth limit feature.

### Analog channel specifications (horizontal)

|  |  |  |
|--|--|--|
| Acquisition modes  | Sample Mode  | Sequential sampling with up to 32-point sin(x)/x interpolation   |
|  | Averaging  | 2 to 1,048,575 averages, up to 12,000 avg/sec (HW accelerated)   |
|  | Peak detect  | Oversamples at 16 GSa/s, saving min and max voltages, to detect glitches or aliasing   |
|  | Segmented  | Up to 5,205 future acquisitions  |
|  | History mode   | Up to 1,024 previous acquisitions  |
| Timebase range   | Roll mode  | Scrolls waveform across the display, right to left   |
|  | Roll mode  | 50 ms/div to 1000 s /div   |
|  | Other modes  | 5 ps/div to 200 s/div  |
| Zoom window  |  | 1 ps/div to current main time scale setting  |
| Horizontal position range                                    |  | 0 s to ±200 s, Continuously adjustable   |
| Horizontal position resolution                               | Main window  | 40 fs (granularity of horizontal position of waveform on screen)   |
|  | Zoom window  | 8 fs   |
| De-skew range  |  | ±1 ms, in steps of 100 fs  |
| Time scale accuracy <sup>[1][7]</sup>                        |  | ±(8 ppb initial + 75 ppb/year aging)   |
| Intra-channel intrinsic jitter, 4 channels <sup>[3][5]</sup> | 100 ns/div   | 118 f <sub>RMS</sub>   |
|  | 1 μs/div   | 130 f <sub>RMS</sub> (120 f <sub>RMS</sub> possible with external reference)   |
|  | 10 μs/div  | 140 f <sub>RMS</sub> (120 f <sub>RMS</sub> possible with external reference)   |
|  | 100 μs/div   | 145 f <sub>RMS</sub> (120 f <sub>RMS</sub> possible with external reference)   |
|  | 1 ms/div   | 155 f <sub>RMS</sub> (120 f <sub>RMS</sub> possible with external reference)   |
| Intra-channel intrinsic jitter, 8 channels <sup>[3][5]</sup> | 100 ns/div   | 150 f <sub>RMS</sub>   |
|  | 1 μs/div   | 156 f <sub>RMS</sub>   |
|  | 10 μs/div  | 172 f <sub>RMS</sub> (161 f <sub>RMS</sub> possible with external reference)   |
|  | 100 μs/div   | 175 f <sub>RMS</sub> (161 f <sub>RMS</sub> possible with external reference)   |
| 1 ms/div   | 181 f <sub>RMS</sub> (161 f <sub>RMS</sub> possible with external reference) |  |
| Inter-channel intrinsic jitter <sup>[3]</sup>                |  | 100 f <sub>RMS</sub>   |
| Inter-channel skew drift <sup>[3][6]</sup>                   |  | <500 f <sub>MAX</sub>  |
| Intra-channel jitter measurement floor <sup>[2][3]</sup>     | Time interval error:   | $\sqrt{\left(\frac{\text{noise floor}}{\text{slew rate}}\right)^2 + (\text{intrinsic jitter})^2}$  |
|  | Periodic:  | $\sqrt{2} \times \sqrt{\left(\frac{\text{noise floor}}{\text{slew rate}}\right)^2 + (\text{intrinsic jitter})^2}$  |
|  | Cycle-cycle / N-cycle:   | $\sqrt{3} \times \sqrt{\left(\frac{\text{noise floor}}{\text{slew rate}}\right)^2 + (\text{intrinsic jitter})^2}$  |
| Inter-channel jitter measurement floor <sup>[2][3][4]</sup>  |  | $\sqrt{\left(\frac{\text{Time interval}}{\text{error (edge 1)}}\right)^2 \left(\frac{\text{Time interval}}{\text{error (edge 2)}}\right)^2 \left(\frac{\text{inter-channel}}{\text{intrinsic jitter}}\right)^2}$   |
| Delta time measurement accuracy <sup>[2][3][4][8][9]</sup>   | Intra-channel  | $\pm \frac{5}{n} \times \sqrt{\left[\frac{\text{Time interval}}{\text{error (edge 1)}}\right]^2 + \left[\frac{\text{Time interval}}{\text{error (edge 2)}}\right]^2 + \left(\frac{\text{Time scale}}{\text{accuracy}} \times \frac{\text{Delta}}{\text{time}}\right)}$   |
|  | Inter-channel  | $\pm \frac{5}{n} \times \sqrt{\left[\frac{\text{Time interval}}{\text{error (edge 1)}}\right]^2 + \left[\frac{\text{Time interval}}{\text{error (edge 2)}}\right]^2 + \left[\frac{\text{Interchannel}}{\text{intrinsic jitter}}\right]^2 + \left(\frac{\text{Time scale}}{\text{accuracy}} \times \frac{\text{Delta}}{\text{time}}\right) + \left(\frac{\text{Interchannel}}{\text{skew drift}}\right)}$ |

1. Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ± 5 °C from firmware calibration temperature.

2. Sample rate at maximum. Noise floor and slew rate determined at fixed-voltage measurement threshold, near middle of signal. Displayed signal not vertically clipped. Slew rate of sine wave = (peak signal amplitude) × 2πf, slew rate of fast step ≈ (10 to 90% rise time).

3. Intra-channel = both edges on the same channel, Inter-channel = two edges on different channels.

4. Scope channels and signal interconnect de-skewed prior to measurement.

5. External timebase reference values measured using a Wenzel 501-04608A 10 MHz reference. Intrinsic jitter value depends on acquisition time range for Time Interval Error formula and depends on delta-time between edges for all two-edge formulas.

6. Skew between channels caused by ± 5 degrees C temperature change.

7. Initial = immediately after factory or user calibration.

8. Reading is the displayed Delta Time Measurement Accuracy measurement value. Do not double the listed Time Scale Accuracy value in Delta Time Measurement Accuracy formula.

9. 'n' represents the square root of the number of averages taken; e.g. n=1 is no averaging, n=16 is 256 averages. Averaging allows for more accurate delta time measurement accuracy.

### Analog channel triggering

|   |  |
|---|--|
| Trigger sources                           | Edge Trigger on all analog channels, aux-in, power supply line<br>Other Trigger operations as outlined below |
| Max edge trigger frequency (50 $\Omega$ ) | 6 GHz  |
| Trigger level range                       | $\pm 4$ divisions from center screen (auxiliary: $\pm 5$ V, max input 5 V <sub>PP</sub> )                    |
| Trigger sensitivity                       | Analog channels: see next table<br>Aux trigger input: 200 mV <sub>PP</sub> , DC to 3 GHz                     |
| Trigger hold off range                    | 25 ns to 10 s, fixed or random   |
| Trigger coupling                          | DC, AC, LF reject (50 kHz HPF), HF reject (50 kHz LPF)   |
| Sweep modes                               | Auto, triggered, single  |
| Trigger jitter                            | 4 channel models: 523 f <sub>SRMS</sub><br>8 channel models: 531 f <sub>SRMS</sub>                           |
| Minimum trigger re-arm time               | <5 $\mu$ s   |

### Trigger edge sensitivity, analog channels

| Bandwidth (HW or SW limit)→ | 20 MHz          | 200 MHz   | 1 GHz    | 2.5 GHz                        | >2.5 GHz  |          |
|-----------------------------|-----------------|-----------|----------|--------------------------------|-----------|----------|
| 1 M $\Omega$ path           | < 5 mV/div      | <0.7 div  | <1.0 div | <1.4 div to BW limit (500 MHz) |           |          |
|                             | $\geq$ 5 mV/div | <0.3 div  | <0.5 div | <0.8 div to BW limit (500 MHz) |           |          |
| 50 $\Omega$ path            | < 5 mV/div      | <0.15 div | <0.2 div | <0.3 div                       | <0.45 div | <0.6 div |
|                             | $\geq$ 5 mV/div | 0 div     | 0 div    | 0 div                          | <0.1 div  | <0.6 div |

### Digital channel specifications (optional)

|                             |   |
|-----------------------------|---|
| Analog bandwidth            | 300 MHz   |
| Maximum sample rate         | 8 GSa/s, all channels   |
| Maximum memory depth        | At 8 GSa/s: 250 Mpts/ch<br>Under 8 GSa/s: 125 Mpts/ch                                     |
| Minimum detectable glitch   | 2 ns  |
| Max input voltage           | $\pm 40$ V <sub>PEAK</sub>  |
| Input dynamic range         | $\pm 10$ V about threshold  |
| Minimum input voltage swing | 500 mV <sub>PP</sub>  |
| Input impedance             | 100 k $\Omega$ $\pm 2\%$ ( $\sim 8$ pF) at probe tip                                      |
| Resolution                  | 1 bit   |
| Channel to channel skew     | 200 ps (typical)  |
| Threshold selections        | TTL, CMOS (5.0 V, 3.3 V, 2.5 V), ECL, PECL, User-defined ( $\pm 8$ V in 10 mV increments) |
| Threshold accuracy          | $\pm(100$ mV + 3% of threshold setting)   |

**Available triggers (standard, unless otherwise noted)**

| Trigger type           | Channels available on            | Description   |
|------------------------|----------------------------------|---|
| Edge                   | Channels 1-8, digital, line, aux | Triggers on a specified slope (rising, falling or alternating between rising and falling) and voltage level on any channel or auxiliary trigger.  |
| Edge transition        | Channels 1-4                     | Triggers on rising or falling edges that cross two voltage levels in > or < the amount of time specified. Edge transition setting from 75 ps to 10 s  |
| Edge then edge (time)  | Channels 1-4, digital            | The trigger is qualified by an edge. After a specified time-delay between 1.5 ns to 20 s, a rising or falling edge on any one selected input will generate the trigger  |
| Edge then edge (event) | Channels 1-4, digital            | The trigger is qualified by an edge. After a specified delay between 1 to 65,000,000,000 rising or falling edges, another rising or falling edge on any one selected input will generate the trigger  |
| Pulse width            | Channels 1-4, digital            | Triggers on a pulse that is wider or narrower than the other pulses in your waveform by specifying a pulse width and a polarity. Pulse width range settings 75 ps to 20 s. Trigger point can be configured for "end of pulse" or "time out"   |
| Glitch                 | Channels 1-8, digital            | Triggers on glitches narrower than the other pulses in your waveform by specifying a width less than your narrowest pulse and a polarity. Glitch range settings: < 75 ps to < 10 s  |
| Runt                   | Channels 1-4                     | Triggers on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Can be time qualified with a range of 75 ps to 10 s   |
| Timeout                | Channels 1-4, digital            | Triggers the oscilloscope when the waveform has been at a higher voltage than the voltage specified by the Level control for too long (High Too Long), when the waveform has been at a lower voltage than the Level voltage for too long (Low Too Long), or when the waveform has taken too long to pass through the Level voltage (Unchanged Too Long). Timeout settings from 75 ps to 20 s. |
| Pattern/State          | Channels 1-4, digital            | Identifies a trigger condition by looking for a specified pattern or a pattern and an edge (state) across the input channels  |
| Setup / hold           | Channels 1-4                     | Triggers on violations of setup time, hold time, or both setup and hold time. Setup times from 75 ps to 20 s and hold times from 75 ps to 100 ns.   |
| Window                 | Channels 1-4                     | Specifies a voltage range and then trigger when the waveform either exits this range, enters this range, stays outside the range for too long or too short, or stays inside the range for too long or too short. Range setting from 75 ps to 20 s.  |
| Protocol               | Bus dependent                    | Trigger on certain packets or patterns in protocol-based data.<br><i>Requires a protocol trigger/decode option, for example D9010LSSP</i>   |
| Generic Protocol       | Channels 1-8                     | Software triggers on NRZ or 8b/10b-encoded data up to 6 Gbps, up to 80-bit pattern. Support multiple clock data recovery methods including constant frequency, 1st-order PLL, 2nd-order PLL, explicit clock, explicit 1st-order PLL, explicit 2nd-order PLL, Fibre Channel, FlexRay receiver, FlexRay transmitter   |
| Burst                  | Channels 1-4                     | Triggers on the Nth edge of a burst that occurs after an idle time from 1.5 ns to 20 s.   |
| Nth Edge               | Channels 1-8                     | Triggers on the Nth edge  |
| OR'd Edges             | Channels 1-4                     | Identifies a trigger condition by looking for selected edges on up to four channels   |
| InfiniiScan Zone       | Channels 1-8                     | Qualified trigger across up to 8 user-drawn zones. For each zone, user specifies "must intersect" or "must not intersect." Zones can be drawn on analog channels and combined using Boolean logic.<br><i>Requires option D9010SCNA</i>  |
| Measurement limit      | Channels 1-8, digital, line, aux | Software triggers on the results of the measurement values. For example, when the "time interval error (TIE)" is measured, InfiniiScan can trigger on a specific TIE value.<br><i>Requires option D9010SCNA</i>   |
| Non-monotonic edge     | Channels 1-8                     | Software triggers on the non-monotonic edge. The non-monotonic edge is specified by setting a hysteresis value.<br><i>Requires option D9010SCNA</i>   |

### Fault Hunter (standard)

|                    |   |
|--------------------|---|
| Auto Setup         | 30 second statistical measurement analysis of incoming signal   |
| Result information | Test failure automatically saved in memory. Fault condition can be copied to trigger for further testing.   |
| Test results       | Automatic identification of common digital signal errors: Positive glitch, negative glitch, slow rising edge, slow falling edge, positive runt, negative runt |

### Measurements (standard, unless otherwise noted)

|                     |   |
|---------------------|---|
| Maximum at once     | 20 in either main, zoom, or gated region (up to 16 gates)   |
| Maximum rate        | >300,000 measurements/second (any number of measurements on, "measure all edges" enabled)   |
| Voltage (analog)    | Amplitude, average, base, crossing point, maximum, minimum, overshoot and preshoot (as a percentage or voltage), $V_{PP}$ contrast, peak to peak, pulse (amplitude, base, top), RMS, top, thresholds (lower, middle, upper), voltage @ time |
| Time (analog)       | Rise time, fall time, period, frequency, pulse width (+/-), duty cycle, $T_{MIN}$ , $T_{MAX}$ , crossing point time, delta time, pulse count, bursts (width, period, interval), s/h time  |
| Time (digital)      | Period, frequency, pulse width (+/-), duty cycle, delta time  |
| Mixed (analog)      | Area, slew rate, charge. <i>Requires N282xA probe</i>   |
| Frequency domain    | FFT frequency and magnitude, channel power, power spectral density, occupied bandwidth  |
| Level qualification | Make timing measurements only when other input signal level conditions are true. Any channels not involved in a measurement can be used to qualify all timing measurements. <i>Requires D9010SCNA</i>                                       |
| Eye diagrams        | Eye height, eye width, eye jitter, crossing percentage, Q factor, duty-cycle distortion<br>>750,000 UI/second (for eye diagrams, with hardware acceleration enabled)  |
| Statistic modes     | Mean, standard deviation, minimum, maximum, count   |

### Math (standard, unless otherwise noted)

|                 |   |  |
|-----------------|---|--|
| Sources         | Any analog or digital channel, waveform memory, or other math functions |  |
| Maximum at once | 16  |  |
| Functions       | Math  | Add, subtract, multiply, divide, FFT (magnitude and phase), absolute value, average, common mode, delay, differentiate, integrate, invert, max, min, square, square root   |
|                 | Filters   | High pass filter, low pass filter, smoothing   |
|                 | Visualizations  | Amplitude demodulation, bus chart, envelope, gating, histogram, pattern average, measurement log, measurement trend, magnify / duplicate, XY mode (Z-Qualified)<br>Preinstalled scripts: Butterworth, FIR, LFE, RTEye, and SqrtSumOfSquare |
|                 | MATLAB  | User Defined: The input source data is passed to a MATLAB script you create. The processed data is passed back to Infiniium to be displayed as a function.<br><i>Requires a MATLAB license</i>   |
| FFT             | Range   | DC to Nyquist frequency  |
|                 | Horizontal Scale  | Linear, logarithmic  |
|                 | Vertical Units  | dBm, dBmV, dBuV, $V_{RMS}$ , Watts   |
|                 | Controls  | Start and stop frequency, span and center frequency, resolution bandwidth  |
|                 | Peak detect   | Automatically find and annotate up to 25 peaks of a user-defined level   |
|                 | Windows   | Flattop, rectangular, Hanning, Blackman Harris, Hamming  |
| Histograms      | Sources   | Any waveform or measurement below  |
|                 | Orientation   | Horizontal (timing and jitter) or vertical (noise and amplitude)   |
|                 | Measurements  | Peak-to-peak, min, max, mean, median, mode, standard deviation, mean $\pm 1\sigma/2\sigma/3\sigma$ , total hits, peak (area of most hits), bin width, FWHM (histogram width at half maximum)   |

### Waveform Generator (optional, specifications are typical)

|                       |                                       |   |   |
|-----------------------|---------------------------------------|---|---|
| Output                | Connector                             | BNC, rear panel   |   |
|                       | Voltage range, 50 $\Omega$            | 1 mV <sub>PP</sub> <sup>[1 9]</sup> to 5 V <sub>PP</sub> <sup>[2 10]</sup>  |   |
|                       | Voltage range, 1 M $\Omega$           | 2 mV <sub>PP</sub> <sup>[1 9]</sup> to 10 V <sub>PP</sub> <sup>[2 10]</sup>   |   |
|                       | Presets                               | TTL, CMOS (5 V), COMS (3.3 V), CMOS (2.5 V), ECL  |   |
|                       | Vertical resolution                   | 100 $\mu$ V   |   |
|                       | Vertical accuracy                     | 2% (< 1 kHz)  |   |
|                       | Frequency resolution <sup>[3 8]</sup> | 12.5 mHz  |   |
|                       | Frequency accuracy <sup>[4 7]</sup>   | Square/pulse: 1 ppm ( $f \geq 8$ kHz), $[f/25000]$ ppm ( $f < 8$ kHz)<br>Other waveforms: 1 ppm ( $f \geq 5$ kHz), 3 ppm ( $f < 5$ kHz) |   |
|                       | Modes                                 | Normal, single shot (all but square, pulse, noise, DC)  |   |
|                       | Waveforms                             | DC, sine, square, pulse, triangle/ramp, noise, sinc, exponential rise/fall, cardiac, Gaussian pulse, PRBS                               |   |
|                       | Protection                            | Overload automatically disables output  |   |
|                       | Isolation                             | Not available, main output BNC is grounded  |   |
|                       | DC offset                             | Range   | $\pm(8 V_{DC} - \text{Peak AC})$ into 1 M $\Omega$<br>$\pm(4 V_{DC} - \text{Peak AC})$ into 50 $\Omega$ |
|                       |                                       | Resolution  | 100 $\mu$ V or 3 digits, whichever is higher  |
| Accuracy              |                                       | Waveform modes: $\pm 1.5\%$ of offset setting $\pm 1\%$ of amplitude $\pm 1$ mV<br>DC mode: $\pm 1.5\%$ of offset setting $\pm 3$ mV    |   |
| Sine                  | Frequency range                       | 12.5 mHz to 50 MHz  |   |
|                       | Amplitude flatness                    | $\pm 0.5$ dB ( $\leq 20$ MHz), $\pm 1$ dB ( $> 20$ MHz)   |   |
|                       | Harmonic distortion                   | Harmonic distortion: -40 dBc <sup>[5 1]</sup>   |   |
|                       | SFDR                                  | Spurious (non-harmonic): -40 dBc <sup>[6 2]</sup>   |   |
|                       | THD                                   | 1% <sup>[7 3]</sup>   |   |
|                       | SNR                                   | 40 dB <sup>[8 4]</sup>  |   |
| Square / pulse        | Frequency range                       | Frequency range: 0.0125 Hz to 20 MHz  |   |
|                       | Duty cycle                            | Duty cycle: 20 to 80%, resolution of 1% or 1 ns, whichever is larger  |   |
|                       | Pulse width                           | Pulse width: 10 ns minimum, 1 ns resolution <sup>[9 5]</sup>  |   |
|                       | Rise/fall time                        | Rise/fall time: 9 ns (10 to 90%)  |   |
|                       | Overshoot                             | Overshoot: < 4%   |   |
|                       | Asymmetry (at 50% DC)                 | $\pm 1\% \pm 5$ ns  |   |
|                       | Jitter (TIE RMS)                      | 100ps <sup>[10 6]</sup>   |   |
| Triangle (ramp)       | Frequency range                       | 12.5 mHz to 200 kHz   |   |
|                       | Linearity                             | 0.01  |   |
|                       | Symmetry                              | 0 to 100%, 1% resolution  |   |
| Noise                 | Bandwidth                             | 40 MHz  |   |
| Sine Cardinal (Sinc)  | Frequency range                       | 12.5 mHz to 1.0 MHz   |   |
| Exponential Rise/Fall | Frequency range                       | 12.5 mHz to 10.0 MHz  |   |
| Cardiac               | Frequency range                       | 12.5 mHz to 200.0 kHz   |   |
| Gaussian Pulse        | Frequency range                       | 12.5 mHz to 5.0 MHz   |   |
| PRBS                  | Pattern length                        | 2 <sup>7</sup> , 2 <sup>15</sup> , 2 <sup>23</sup> , 2 <sup>31</sup>  |   |
|                       | Bit rate                              | 100 bps to 40 Mbps (speeds of 200 MHz divided by an integer value)  |   |
|                       | Encoding                              | NRZ   |   |



|            |               |  |   |
|------------|---------------|--|---|
| Modulation | Types         | AM, FM, FSK  |   |
|            | Carriers      | Sine, ramp, sine cardinal, exponential rise, exponential fall, and cardiac |   |
|            | Source        | Internal (no external modulation capability)                               |   |
|            | AM            | Profile  | sine, square, ramp  |
|            |               | Frequency  | 1 Hz to 20 kHz  |
|            |               | Depth  | 0% to 100%  |
|            | FM            | Profile  | sine, square, ramp  |
|            |               | Frequency  | 1 Hz to 20 kHz  |
|            |               | Minimum carrier  | 10 Hz   |
|            | FSK           | Deviation  | 1 Hz to carrier frequency or (2e12 / carrier frequency), whichever is smaller |
| Modulation |               | 50% duty cycle square wave   |   |
| FSK rate   |               | 1 Hz to 20 kHz   |   |
|            | Hop frequency | 2 x FSK rate to 10 MHz   |   |

1. 10 mV<sub>PP</sub> (1 M $\Omega$ ) / 5 mV<sub>PP</sub> (50  $\Omega$ ) minimum if |DC + Peak AC|  $\geq$  400mV
2. 8 V<sub>PP</sub> (1 M $\Omega$ ) / 4 V<sub>PP</sub> (50  $\Omega$ ) maximum for Gaussian waveshape
3. Resolution is Freq/25000 Hz for square and pulse waveforms < 8 kHz
4. Include (add) external reference clock frequency error, if applicable
5. For amplitude  $\leq$ 1 V<sub>PP</sub> at 50 MHz,  $\leq$ 2 V<sub>PP</sub> at 40 MHz,  $\leq$ 5 V<sub>PP</sub> at  $\leq$ 30 MHz, into 50  $\Omega$  load
6. For amplitude  $\geq$ 5 mV<sub>PP</sub> into 50  $\Omega$  load
7. For amplitude  $\leq$ 1 V<sub>PP</sub> at 50 MHz,  $\leq$ 2 V<sub>PP</sub> at 40 MHz,  $\leq$ 5 V<sub>PP</sub> at  $\leq$ 30 MHz, into 50  $\Omega$  load
8.  $\geq$ 35 mV<sub>PP</sub>, 0V offset, into 50  $\Omega$
9. 5 nS if frequency is < 8kHz
10. Amplitude  $\geq$ 20 mV<sub>PP</sub> into 50  $\Omega$  load

#### Digital Voltmeter (standard, specifications are typical)

|                |  |
|----------------|--|
| Functions      | AC <sub>RMS</sub> , DC, DC <sub>RMS</sub>  |
| Resolution     | 4 digits   |
| Measuring rate | 100/sec  |
| Auto Range     | Automatic adjustment of vertical amplification to maximize the dynamic range of measurements |
| Range Meter    | Graphical display of most recent measurement, plus extrema over the previous 3 seconds       |

#### Counter / Totalizer (standard, specifications are typical)

|                     |   |
|---------------------|---|
| Available counters  | Counter A and B: general purpose (Channels 1-4)<br>Counter C: trigger qualified (trigger channel) |
| Measurements        | Frequency, period, totalize, ratio (ratio of A/B, mathematical)                                   |
| Resolution          | General purpose: 5 to 10 digits<br>Trigger qualified: 5 to 8 digits                               |
| Accuracy            | $\pm$ (8 ppb initial $\pm$ 75 ppb/year aging)   |
| Uncertainty         | $\pm$ 0.1 digits  |
| Minimum pulse width | 75 ps <sup>[1]</sup>  |
| Maximum frequency   | General purpose: 6 GHz<br>Trigger qualified: 1/(trigger hold off time)                            |
| Totalizer           | Counter size: 64 bits<br>Edge: Rise or fall   |

1. for signals with <10 ns transition time

### Digital Down Conversion (optional)

|                             |  |
|-----------------------------|--|
| <b>Standard Performance</b> | All Infiniium MXR-Series come with a standard 40 MHz DDC analysis bandwidth, with a frequency range up to the oscilloscope bandwidth, and all channels tied to the same center frequency. The specifications below apply to the paid options that unlock full DDC performance. |
| Frequency Range             | 0 Hz to oscilloscope bandwidth<br>0 Hz to 6 GHz with Frequency Extension (below)   |
| Analysis Bandwidth          | 40 MHz, 80 MHz, 160 MHz, 320 MHz, 640 MHz, 1.2 GHz, 2 GHz (all channels)   |
| Per-channel control         | All 4 or 8 channels can operate up to 2 GHz span<br>All channels use the same span, but can each be at different center frequencies<br>Each channel stores IQ data for analysis via Keysight VSA (89600) or MATLAB (N6171A)  |

### Real Time Spectrum Analysis (optional)

|                                   |  |
|-----------------------------------|--|
| <b>Standard Performance</b>       | All Infiniium MXR-Series come with a standard 40 MHz RTSA analysis bandwidth, with a frequency range up to the oscilloscope bandwidth, and all channels tied to the same center frequency. The specifications below apply to the paid options that unlock full RTSA performance. |
| Frequency Range                   | 0 Hz to oscilloscope bandwidth<br>0 Hz to 6 GHz with Frequency Extension (below)   |
| Analysis Bandwidth <sup>[1]</sup> | 40, 80, 160, or 320 MHz. RTSA total Span is 320 MHz for channels 1-4 and channels 5-8.<br>Examples: 320 MHz span on channels 1, 5; 160 MHz span on channels 1, 2, 5, 6; 80 MHz span on channels 1 through 8  |
| Per-channel control               | All channels use the same span, but can each be at different center frequencies  |

1. 320 MHz option required for 320 MHz span on an individual channel.

### Frequency Extension (optional)

Enables a frequency range of DC to 6 GHz for RTSA and DDC options, regardless of oscilloscope bandwidth.

### Front end and RF performance (preliminary)

|  |  |
|--|--|
| Sensitivity / noise density <sup>[1]</sup> | -160 dBm/Hz  |
| Noise figure <sup>[1]</sup>                | 14 dB  |
| SNR / dynamic range <sup>[2]</sup>         | 108 dB   |
| Absolute amplitude accuracy                | ±1 dB (0 to 6 GHz)   |
| Deviation from linear phase                | ±7 degrees (0 to 6 GHz)  |
| Phase noise at 1 GHz                       | 10 kHz offset -124.7 dBc/Hz<br>100 kHz offset -126.7 dBc/Hz    |
| EVM <sup>[3]</sup>                         | -47 dB (0.47%)   |
| SFDR <sup>[4]</sup>                        | 71 dB  |
| Harmonic distortion <sup>[4]</sup>         | 2 <sup>nd</sup> order -65 dBc<br>3 <sup>rd</sup> order -47 dBc |
| Two-tone TOI Point                         | +21.5 dBm  |
| Input match (0 to 6 GHz)                   | -14 dB, 1.5 VSWR   |

1. Tested at 1 mV/div, -38 dBm, 1.0001 GHz CF, 500 kHz span, 3 kHz RBW.

2. Tested with 0 dBm 1 GHz input carrier, 0dBm scope input range. 1 GHz CF, 100 MHz span, 1 kHz RBW, measured +20 MHz from center.

3. Tested with 802.121 2.4 GHz carrier, 20 MHz wide, 64 QAM.

4. Tested with 1 GHz, 0dBm signal at input, FFT with 3 GHz CF, 5 GHz span, 100 kHz RBW.

## Display

|                   |   |
|-------------------|---|
| Size              | 15.6" capacitive multi-touch                                  |
| Resolution        | Full HD (1920x1080)   |
| Annotations       | Up to 100, floating or anchored                               |
| Grids             | Up to 16  |
| Windows           | Up to 8 waveform windows                                      |
| Waveform modes    | Connected samples (sin(x)/x interpolated or lines), dots only |
| Persistence modes | Infinite, variable, color graded                              |

## Computer system

|                  |  |
|------------------|--|
| Operating system | Windows 10   |
| CPU              | Intel Core i5-6500, 3.2 GHz  |
| System memory    | 8 GB   |
| Hard drives      | 500 GB removeable SSD, upgradeable to 1 TB SSD, additional of either are available |
| Peripherals      | Optical USB mouse and full-size keyboard provided                                  |
| LXI compliance   | Class C  |

## I/O

|                           |   |
|---------------------------|---|
| LAN                       | RJ-45 connector, supports 10/100/1000Base-T. Enables Web-enabled remote control, email on trigger, data/file transfers and network printing (supports up to 80 MB/s data offloading)  |
| USB                       | 4x USB 2.0 host ports (2x front panel, 2x side panel), 2x USB 3.0 host ports (side panel), 1x USB 3.0 device port (side panel, supports up to 200 MB/s data offloading)   |
| Audio                     | Microphone, line in, line out   |
| Display out               | DisplayPort and VGA (supports up to two simultaneous displays)  |
| Trigger out               | TTL levels, high impedance load   |
| Auxiliary out             | Configurable: DC level, probe compensation, trigger out, or a demo signal   |
| Timebase reference output | Amplitude into 50Ω: 1.65 ± 0.05 Vpp (8.3 ± 0.3 dBm) sine wave (internal or external timebase reference selected)<br>Frequency: 10 MHz ± (8 ppb initial + 75 ppb/year aging) when internal timebase reference is selected; external reference frequency when external timebase reference is selected |
| Timebase reference input  | Amplitude into 50 Ω: 356 mV <sub>PP</sub> (-5 dBm) to 5 V <sub>PP</sub> (+18 dBm) sine, 285 mV <sub>PP</sub> to 4 V <sub>PP</sub> square<br>Frequency: 10 MHz ± 5 ppm   |

## Supported file types

|                            |      |   |
|----------------------------|------|---|
| Infiniium setup files      | .set | Infiniium settings only                           |
|                            | .osc | settings and waveform data                        |
| Waveform files, compressed | .wfm | binary, Infiniium format                          |
|                            | .bin | binary, approx. 5x smaller than larger XY formats |
|                            | .h5  | open source, Infiniium or InfiniiVision format    |
|                            | .mat | MATLAB  |
| Waveform files, raw data   | .csv | XY values, comma-separated                        |
|                            | .tsv | XY values, tab-separated                          |
|                            | .txt | Y values  |
| Image files                | .png | 24-bit color                                      |
|                            | .jpg | 24-bit color                                      |
|                            | .bmp | 24-bit color                                      |
|                            | .gif | 8-bit color                                       |
|                            | .tif | 8-bit color                                       |

All images may be saved or printed with waveforms only, inverted backgrounds, with setup info, and/or in a compressed format.

### Environmental, safety and dimensions

|              |  |
|--------------|--|
| Temperature  | Operating: +5 to +40°C<br>Non-operating: -40 to +70°C  |
| Humidity     | Operating: ≤80% relative humidity (non-condensing) at +40°C<br>Non-operating: ≤90% relative humidity (non-condensing) up to +70°C  |
| Altitude     | Operating: up to 3,000 m (9,842 ft)<br>Non-operating: up to 15,300 m (50,196 ft)   |
| Power        | 100 to 120 V @ 50/60/400 Hz<br>100 to 240 V @ 50/60 Hz<br>Max power dissipated:<br>4 Channel – 450 Watts<br>8 Channel – 650 Watts  |
| Noise        | 55.3 dB (front of instrument)  |
| Weight       | Frame:<br>4 channel models: 13.75 kg (30.3 lbs.)<br>8 channel models: 14.50 kg (32.0 lbs.)<br>Shipping:<br>4 channel models: 20.95 kg (46.2 lbs.)<br>8 channel models: 21.90 kg (48.3 lbs.)<br>Package: 7.2 kg (15.9 lbs.) |
| Dimensions   | Height: 327 mm (12.9 in) with feet retracted<br>Width: 443 mm (17.5 in)<br>Depth: 223 mm (8.8 in) including knobs and rear feet  |
| Safety       | IEC 61010-1:2017<br>IEC 61010-2-030:2017<br>UL 61010-1:2012 (3 <sup>rd</sup> edition)<br>UL 61010-2-030:2018<br>CAN/CSA-22.2 No. 61010-1-12<br>CAN/CSA-22.2 No. 61010-2-030-17   |
| EM standards | CISPR 11/EN 55011<br>IEC 61000-4-2/EN 61000-4-2<br>IEC 61000-4-3/EN 61000-4-3<br>IEC 61000-4-4/EN 61000-4-4<br>IEC61326-1:2012/EN61326-1:2013  |

## Ordering Guide and Upgrade Information

Ordering your MXR-Series oscilloscope couldn't be easier. Contact your Keysight representative or authorized partner for more information, or to place an order: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

### Standard accessories



| Description                            | Part        | Quantity |
|--|-------------|----------|
| Passive Probe, 10:1, 500 MHz           | N2873A      | 4 or 8   |
| 50Ω Calibration Cable, 1 meter         | 54609-61609 | 1        |
| Accessory Pouch                        | 54925-62301 | 1        |
| Protective Front Cover                 | 54925-44101 | 1        |
| Local Power Cord                       | Varies      | 1        |
| Full-Size Keyboard                     | 0960-3245   | 1        |
| Optical Scroll Wheel Mouse             | 0960-3246   | 1        |
| 1 Year Factory Calibration Certificate | -           | 1        |
| Safety Leaflets, if Applicable         | -           | 1        |
| Probe Selection Guide                  | -           | 1        |

## Main model configuration

This page is intended for configuring a new unit. For post-purchase upgrades, see the last page.

| Channel bandwidth | 4 channels | 8 channels |
|-------------------|------------|------------|
| 500 MHz           | MXR054A    | MXR058A    |
| 1 GHz             | MXR104A    | MXR108A    |
| 2 GHz             | MXR204A    | MXR208A    |
| 2.5 GHz           | MXR254A    | MXR258A    |
| 4 GHz             | MXR404A    | MXR408A    |
| 6 GHz             | MXR604A    | MXR608A    |

| Integrated instruments                              | Model                   |
|---|-------------------------|
| 4 digit digital voltmeter, 10 digit counters        | Standard                |
| Waveform generator, 50 MHz                          | MXR000-WAV              |
| Logic analysis, 16 channels (includes N2756A probe) | MXR000-MSO              |
| RTSA (160 MHz) and DDC (2 GHz)                      | MXR000-160              |
| RTSA (320 MHz) and DDC (2 GHz)                      | MXR000-320              |
| Frequency response analyzer, 50 MHz                 | Part of D9010PWRA       |
| Phase noise analyzer                                | Part of D9010JITA       |
| Protocol analyzer                                   | Various, see next pages |

| Performance upgrades  | Model      |
|---|------------|
| Memory Upgrade, 400 Mpts/ch                                   | MXR000-400 |
| Upgrade to 1 TB Removable SSD                                 | MXR000-01T |
| Frequency Extension; extend RTSA/DDC frequency range to 6 GHz | MXR000-FRE |
| ISO 17025 Calibration (Not Accredited)                        | MXR000-1A7 |
| ISO 17025 Calibration (Accredited)                            | MXR000-AMG |

| Additional equipment                        | Model                       |
|---|-----------------------------|
| Rackmount Kit, 8U                           | MXR2RACK                    |
| Additional Removable SSDs, 500 GB or 1 TB   | MXR2SSD                     |
| Hard Shell Transit Case, Sold by CaseCruzer | 3F2002-1910C <sup>[2]</sup> |
| BNC(m) to SMA(f) Adapters, DC-10 GHz        | 54855-67604                 |
| GPIB Adapter, Sold by ICS Electronics       | 4865B <sup>[2]</sup>        |

1. Parts available from third party vendors listed in description, not sold by Keysight.

## Probes and accessories

The Infiniium MXR-Series oscilloscopes include both 1 M $\Omega$  and 50  $\Omega$  paths. This expands their flexibility by making them compatible with a wider range of probes than high-performance oscilloscopes that only support a 50  $\Omega$  path. All models ship standard with an N2873A 500 MHz passive probe per channel, and support a wide range of about 100 compatible current and voltage probes. The table below highlights probes commonly used with the Infiniium MXR-Series. Read *The Infiniium Oscilloscope Probes and Accessories Guide* for additional information, or visit the Probe Resource Center at [prc.keysight.com](http://prc.keysight.com).



| Category                  | Models     | Description  |
|---------------------------|------------|--|
| Passive                   | N2870A-76A | 2.5 mm probe tip diameter for fine pitch component probing, easily replaceable spring-loaded or solid probe tip, 10-25 pF input C (high-Z, 10:1) covers wide range of scope input, 7 probes and 4 accessory kits available, N2873A shipped with Infiniium MXR series |
| Digital                   | N2756A     | Ships with MXR000-MSO or MXR2MSO options. 16 flying leads with grabbers, ground leads, and other accessories.  |
| Single-ended Active       | N2795A-97A | Up to 2 GHz, low cost, high impedance input (1 M $\Omega$ at DC), wide dynamic /offset range, headlight, -40 to +85 C of extreme temp range for chamber testing (N2797A)   |
| Differential low voltage  | N2750A-52A | Up to 6 GHz, 200 k $\Omega$ input, InfiniiMode for Diff, SE, CM probing, built-in multifunction scope control, headlight   |
| Differential high voltage | DP0001A    | 400 MHz, 2 kV input, high CMRR >80 dB at DC, UL safety certified   |
| Current                   | N7026A     | 150 MHz, 30 A <sub>RMS</sub> , 1 mV/div sensitivity clamp-on, AutoProbe interface  |
| High sensitivity current  | N2820A/21A | 3 MHz, measurable down to 100 $\mu$ A AC/DC, provides wide dynamic range, ideal for capturing low level current flow   |
| Power rail                | N7020A/24A | 2 GHz or 6 GHz, low noise for power rail noise measurement, high offset voltage, 50 k $\Omega$ loading at DC   |

## Analysis software packages

| Signal integrity          | Description   | Data Sheet |
|---------------------------|---|------------|
| InfiniiScan Zone Trigger  | InfiniiScan visual and measurement-based triggering     | D9010SCNA  |
| EZJit Complete            | Timing jitter, vertical noise, and phase noise analysis | D9010JITA  |
| De-Embedding              | Modeling and simulating out cables, probes and fixtures | D9010DMBA  |
| Advanced Signal Integrity | Opening closed eye diagrams                             | D9020ASIA  |

| Power                         | Description  | Data Sheet |
|-------------------------------|--|------------|
| Power Integrity, Rails, PMICs | Power Integrity Analysis (PSIJ, SSN, victim/aggressor, etc.) | D9010POWA  |
| Switch Mode Supplies          | Power Supply Analysis (Input, Switching, Output, PSRR)       | D9010PWRA  |

| Additional packages      | Description                                    | Data Sheet |
|--------------------------|--|------------|
| PAM                      | PAM-4 measurements                             | D9010PAMA  |
| User Defined Application | Remote measurement automation and test reports | D9010UDAA  |

## Protocol decode and trigger software packages

| Package               | Description  | Data Sheet |
|-----------------------|--|------------|
| Low Speed Serial      | I <sup>2</sup> C, SPI, Quad SPI, eSPI, RS232, UART, JTAG, I <sup>2</sup> S, SVID, Manchester | D9010LSSP  |
| Embedded              | USB 1.x and 2.0, 10/100 Mb/s Ethernet, USB-PD  | D9010EMBP  |
| Low Speed Automotive  | CAN, LIN, CAN-FD, SENT   | D9010AUTP  |
| MIPI Low Speed        | RFFE (decode only), I <sup>3</sup> C, SPMI   | D9010MPLP  |
| MIPI C-PHY / D-PHY    | MIPI C-PHY and D-PHY, up to 2.5 Gbps   | D9010MCDP  |
| Military              | ARINC 429, MIL-STD 1553, SpaceWire   | D9010MILP  |
| High Speed Automotive | 100BASE-T1 Automotive Ethernet   | D9020AUTP  |
| USB                   | USB 2.0, eUSB2, Superspeed USB (5 Gbit/s)  | D9010USBP  |
| Basic Protocol Bundle | Contains packages LSSP, EMBP, AUTP, MPLP, MILP   | D9011BDLP  |

## Protocol compliance packages

| Standard            | Description  | Min. BW | Data Sheet             |
|---------------------|--|---------|------------------------|
| USB 2.0             | USB 2.0 Transmitter  | 2 GHz   | D9010USBC              |
| Ethernet            | 10M/100M/1GBASE-T and Energy Efficient Ethernet                              | 1 GHz   | D9010ETHC              |
| Ethernet            | 10G, MG Base-T, N-Base-T   | 4 GHz   | D9010EBZC <sup>1</sup> |
| Automotive Ethernet | 1000BASE-T1 (IEEE 802.3pb), 100BASE-T1 (IEEE 802.3bw and TC8). Broad-R Reach | 1 GHz   | AE6910T <sup>1</sup>   |
| C-PHY               | MIPI C-PHY, up to 2.5 Gbps   | 6 GHz   | D9010CPHC              |
| D-PHY               | MIPI D-PHY, up to 2.5 Gbps (up to CTS v1.2)                                  | 6 GHz   | D9020DPHC              |

1. Will be compatible with MXR-Series in a future release (subject to change)



## Good, Better, and Best Value Bundles

The Keysight Infiniium MXR-Series oscilloscope enables you to See More, Do More, and Save Time like no other oscilloscope in its class – with a full set of features and capabilities right out of the box. However, to unlock even more functionality, the Infiniium MXR-Series also has a wide variety of additional options, software, and probing.

Knowing what to order for your specific application can be daunting, so we have taken the hard part out of ordering by pre-packaging commonly used features into convenient bundles. Now, it's as easy as choosing your oscilloscope model and the bundle that best suits your needs, taking advantage of immediate savings in the process.

To take advantage of each value bundle, simply select your Infiniium MXR-Series oscilloscope model and then purchase one of the following additional Good, Better, or Best Value Bundles. The following options, software, and probes are included in each bundle:

|  |  | Good Bundle      | Better Bundle    | Best Bundle      |
|--|--|------------------|------------------|------------------|
| MXR000-MSO                                 | 16 Digital Channels                                      | ✓                | ✓                | ✓                |
| MXR000-WAV                                 | 50 MHz Waveform Generator                                | ✓                | ✓                | ✓                |
| D9010LSSP                                  | Low Speed Protocol Bundle                                | ✓                | ✓                | ✓                |
| MXR000-400                                 | 400 Mpts/ch Memory Upgrade                               |                  | ✓                | ✓                |
| D9010SCNA                                  | InfiniiScan Trigger Software                             |                  | ✓                | ✓                |
| N2796A (x2)                                | 2 GHz Single-Ended Active Probes                         |                  | ✓                | ✓                |
| MXR000-320                                 | Real Time Spectrum Analysis – 320 MHz Analysis Bandwidth |                  |                  | ✓                |
| MXR000-01T                                 | Removable 1 TB SSD Upgrade                               |                  |                  | ✓                |
| D9010JITA                                  | EZJit Complete (Vertical, Timing, Phase Noise Analysis)  |                  |                  | ✓                |
| <b>Total savings on the above options:</b> |  | <b>Save ~10%</b> | <b>Save ~23%</b> | <b>Save ~22%</b> |

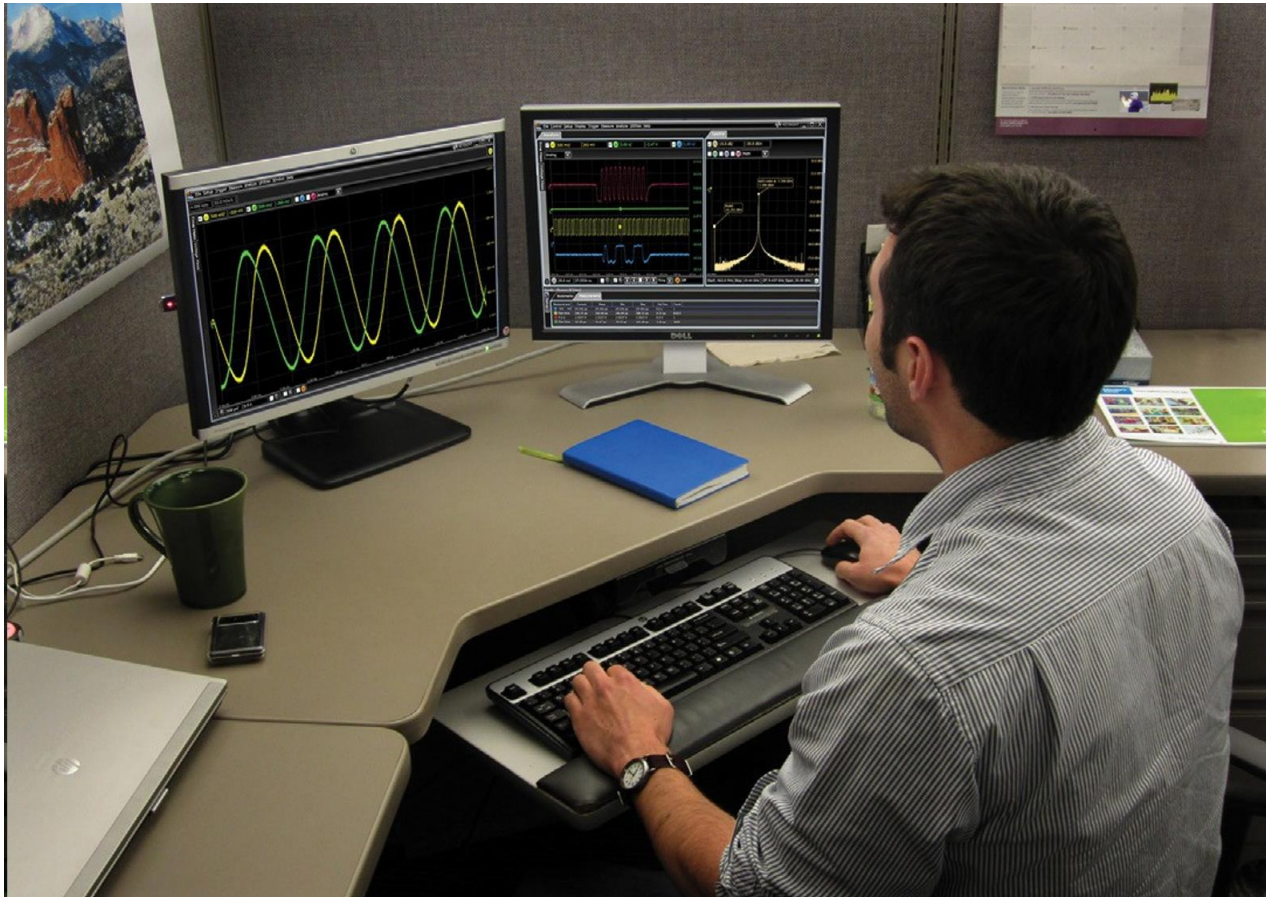


An example of the probes, hardware upgrades, and software available in the Good, Better, Best Value Bundles.

## Offline testing

View and analyze test results at your desk! Save an oscilloscope file, then view and analyze on your PC using the full Infiniium user interface without needing additional access to your scope.

Use waveform math, filtering, FFT, protocol decoding, jitter analysis, eye diagrams and more to get more insight. Infiniium offline is a truly powerful software tool to help you get your job done faster while freeing up precious hardware resources.



| Description                 | Details  | Option    |
|-----------------------------|--|-----------|
| Infiniium Offline           | Required as baseline software. Prerequisite to all other options.  | D9010BSEO |
| EZJit Complete              | Timing jitter, vertical noise, and phase noise analysis.   | D9010JITO |
| Advanced Signal Integrity   | Equalization, InfiniiSim, PAM-N analysis, and crosstalk  | D9010ASIO |
| Low Speed Protocol Package  | I2C, SPI, SR232/UART, JTAG, CAN, CAN-FD, LIN, FlexRay, SVID, USB 2.0, USB-PD, MIPI RFFE, eSPI, I2S, Ethernet 10/100BaseT, SpaceWire, SPMI, 100BASE-T1, Manchester, ARINC429, MIL-STD1553)                | D9010LSPO |
| High Speed Protocol Package | DDR2/3/4, LPDDR2/3/4, Ethernet 10GBASE-KR 64/66, Ethernet 100Base KR/CR, MIPI [CSI-3, DigRF v4, D-PHY, LLI, RFFE, UniPro], PCIe Gen 1/2/3, SATA/SAS, UFS, USB 2.0, USB 3.0, USB 3.0 SSIC, USB 3.1, C-PHY | D9010HSPO |

## Post-purchase upgrades

| Hardware options  | Model    |
|---|----------|
| Add logic analysis, 16 channels (includes N2756A probe) | MXR2MSO  |
| Add waveform generator, 50 MHz                          | MXR2WAV  |
| Add memory, 400 Mpts/ch                                 | MXRMEM   |
| Rackmount Kit, 8U                                       | MXR2RACK |
| Additional Removable SSD, 500 GB or 1 TB                | MXR2SSD  |

| RF analysis options   | Model    |
|---|----------|
| RTSA (160 MHz or 320 MHz) and DDC (2 GHz)                         | MXR2RTSA |
| Frequency Extension; extend RTSA and DDC frequency range to 6 GHz | MXR2FRE  |

| Bandwidth upgrades |               | 4 channels | 8 channels |
|--------------------|---------------|------------|------------|
| From 500 MHz...    | ...to 1 GHz   | MXR2BW-001 | MXR2BW-016 |
|                    | ...to 2 GHz   | MXR2BW-002 | MXR2BW-017 |
|                    | ...to 2.5 GHz | MXR2BW-003 | MXR2BW-018 |
|                    | ...to 4 GHz   | MXR2BW-004 | MXR2BW-019 |
|                    | ...to 6 GHz   | MXR2BW-005 | MXR2BW-020 |
| From 1 GHz...      | ...to 2 GHz   | MXR2BW-006 | MXR2BW-021 |
|                    | ...to 2.5 GHz | MXR2BW-007 | MXR2BW-022 |
|                    | ...to 4 GHz   | MXR2BW-008 | MXR2BW-023 |
|                    | ...to 6 GHz   | MXR2BW-009 | MXR2BW-024 |
| From 2 GHz...      | ...to 2.5 GHz | MXR2BW-010 | MXR2BW-025 |
|                    | ...to 4 GHz   | MXR2BW-011 | MXR2BW-026 |
|                    | ...to 6 GHz   | MXR2BW-012 | MXR2BW-027 |
| From 2.5 GHz...    | ...to 4 GHz   | MXR2BW-013 | MXR2BW-028 |
|                    | ...to 6 GHz   | MXR2BW-014 | MXR2BW-029 |
| From 4 GHz...      | ...to 6 GHz   | MXR2BW-015 | MXR2BW-030 |

Every model is calibrated to 6 GHz from the factory, so bandwidth upgrades require no further calibration outside of the standard recommended interval.

| Analog channel upgrades                       | Model       |
|---|-------------|
| Channel upgrade from 4 to 8 channels, 500 MHz | MXR28CH-001 |
| Channel upgrade from 4 to 8 channels, 1 GHz   | MXR28CH-002 |
| Channel upgrade from 4 to 8 channels, 2 GHz   | MXR28CH-003 |
| Channel upgrade from 4 to 8 channels, 2.5 GHz | MXR28CH-004 |
| Channel upgrade from 4 to 8 channels, 4 GHz   | MXR28CH-005 |
| Channel upgrade from 4 to 8 channels, 6 GHz   | MXR28CH-006 |

Requires return to Keysight service center. Model and serial number are kept. Cost of upgrade does not include shipping.

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

