DATA SHEET

Infiniium MXR-Series

See More. Do More. Save Time.

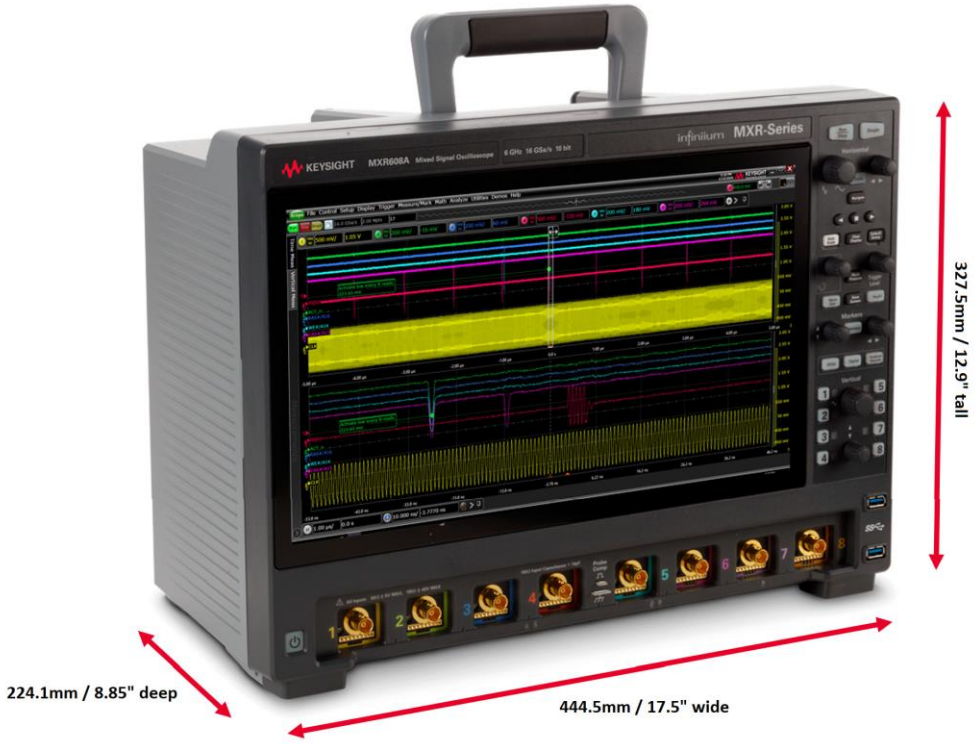
You want your design to shine, and that means seeing more signals in new ways. Be ready with a Keysight Infiniium MXR-Series oscilloscope: it's your window into the intricate interactions of complex designs. Get from symptom to resolution fast by coupling the efficiency of an 8-in-1 bench solution with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

KEYSIGHT TECHNOLOGIES

Contents

Meet the Infiniium MXR-Series

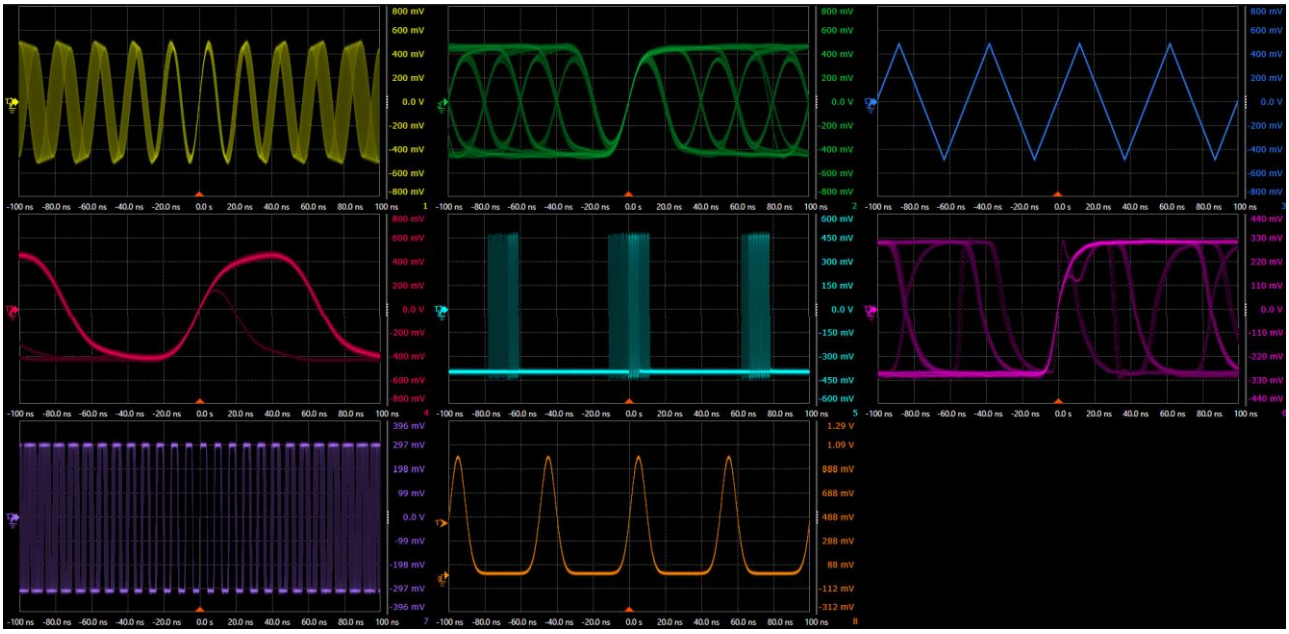
Welcome to the all-new Infiniium MXR-Series. With twelve models ranging in performance from 500 MHz to 6 GHz, 4 or 8 analog channels, and dozens of hardware and software options, the Infiniium MXR-Series is designed to meet your needs today. And with a platform that is fully upgradeable – with no exceptions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



Infiniium MXR-Series Specifications	
Analog channels	4 or 8, *upgradeable*
Bandwidth	500 MHz to 6 GHz, *upgradeable*
Sample rate	16 GSa/s
Memory	200 Mpts, *upgradeable* to 400 Mpts
Resolution	10 bits, up to 16 with high resolution
ENOB	As high as 9.0
Timebase accuracy	8 parts per billion
Intrinsic Jitter	As low as 118 fs
Noise (1 mV/div)	As low as 43 µV
Digital logic channels	16, dedicated input, *upgradeable*
Integrated tools	8-in-1
Eye diagram speed	>750,000 UI/s
Screen display	15.6” touch, full HD, dual screen support

Model Numbers	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 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:

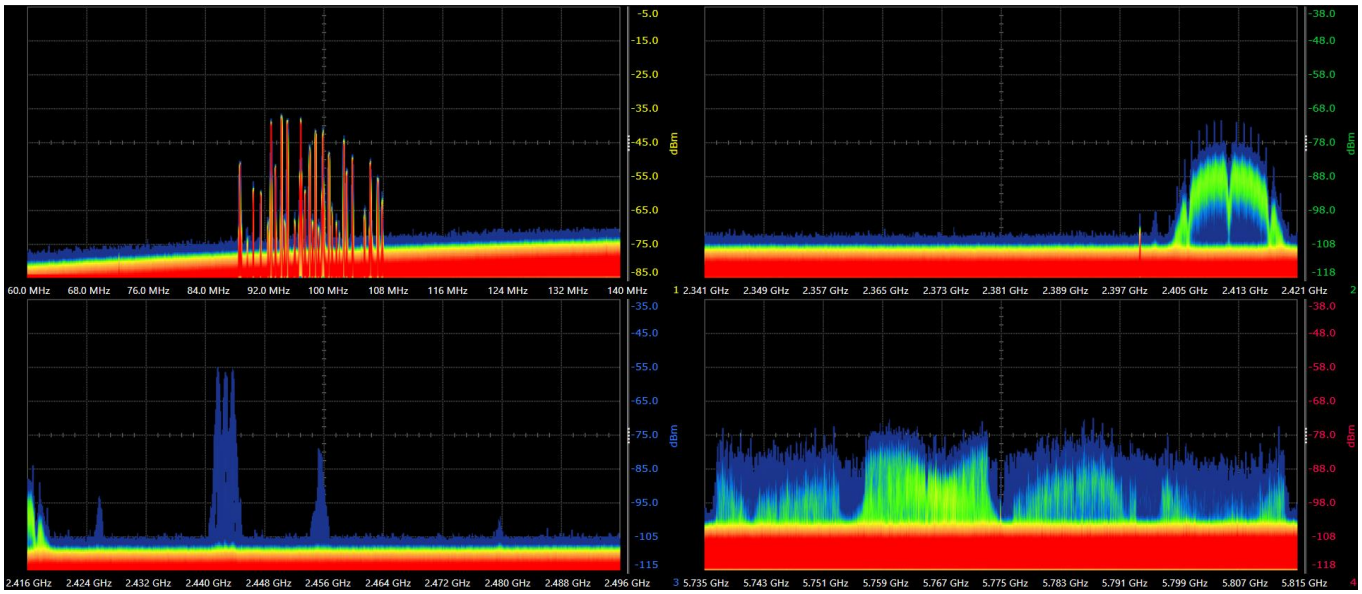
- 4 times more vertical resolution than 8-bit oscilloscopes
- Up to 16 bits with high-res mode
- As low as 43 µV of noise, 9.0 bits system ENOB with hardware filtering

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.

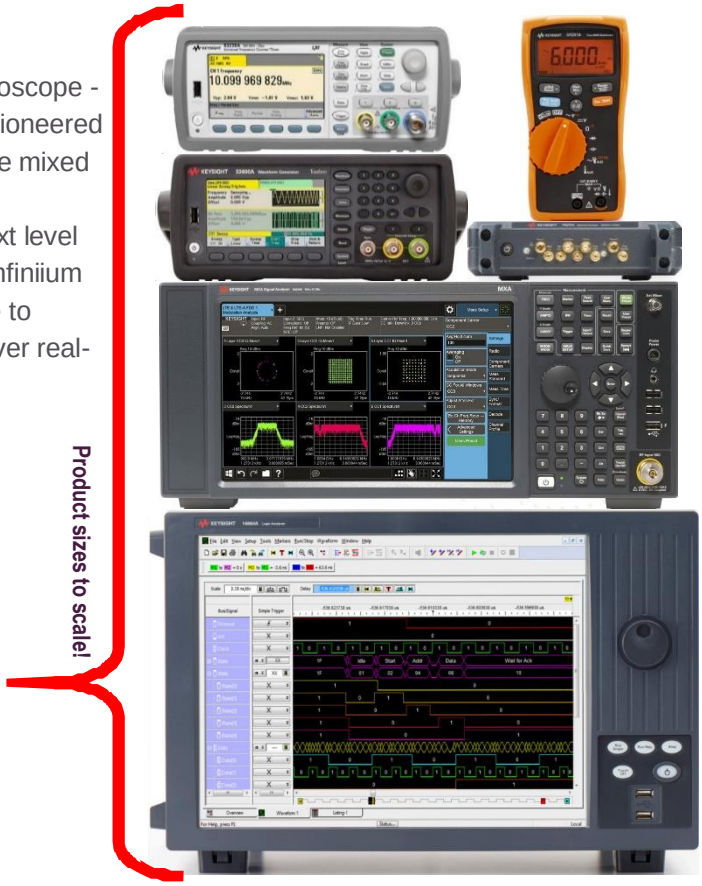
See More in the Frequency Domain with Real-Time Spectrum Analysis

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.

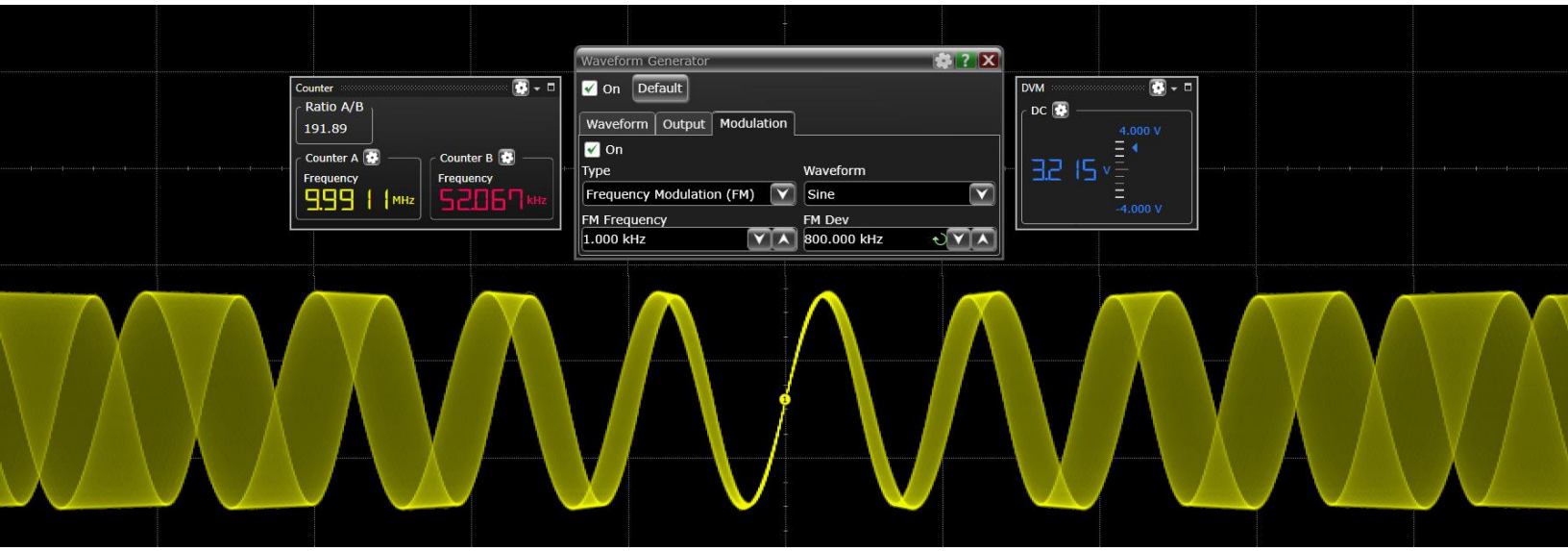


Do More with 8-in-1 Instrument Integration

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.



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

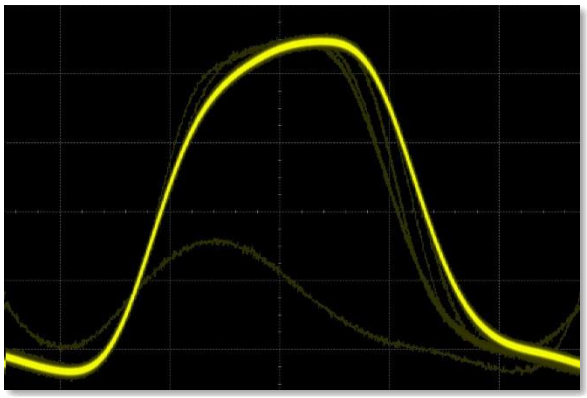


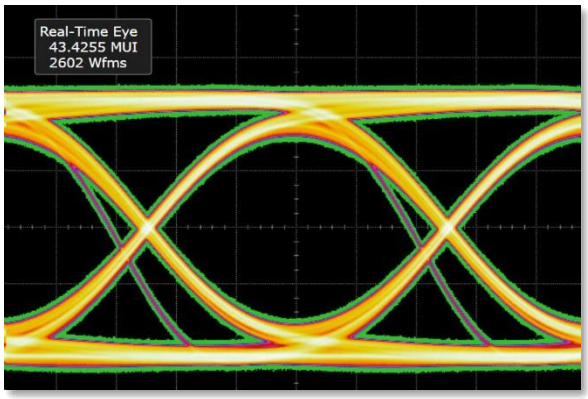
Generating a 10 MHz sine wave with frequency modulation, while measuring two signal frequencies with counters and a third signal's DC voltage with the DVM. Note that channels need not be enabled for the counter and DVM to operate.

Save Time with Groundbreaking ASIC Technology

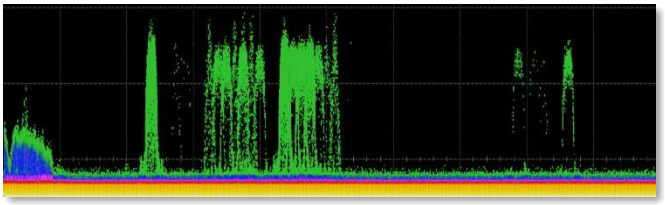
The Infiniium MXR-Series leverages a 100M+ gate CMOS ASIC from our UXR-Series oscilloscope, and acts as an “oscilloscope on a chip”. With many core oscilloscope features done in hardware, performance of some features improved by 100x or more over previous generations, including:

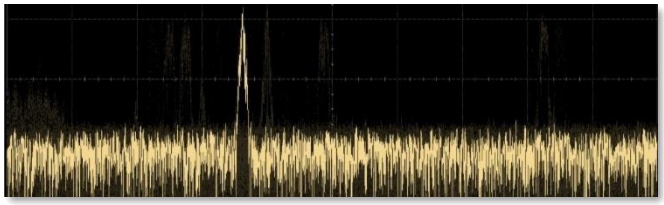
- Triggering and plotting: 200x faster
- Eye diagrams: 50x faster
- FFT plotting: 400x faster
- Waveform averaging: 120x faster
- And more!





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 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

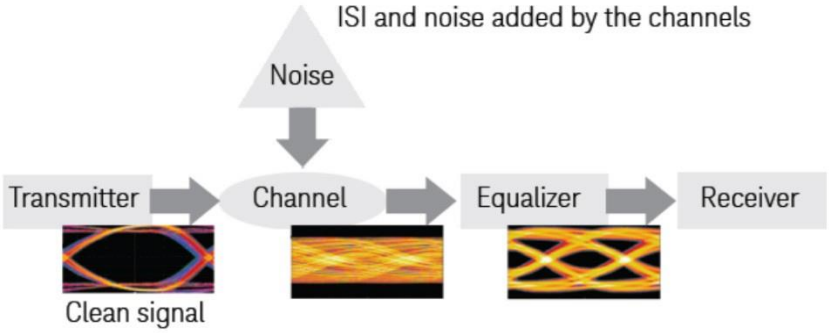
Today's project requires 4 channels of 1 GHz analysis bandwidth. What if your next project needs 8 channels, and 6 GHz of analysis bandwidth? And a waveform generator? And compliance testing? No problem with the Infiniium MXR-Series, which is fully upgradeable – no exceptions.

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

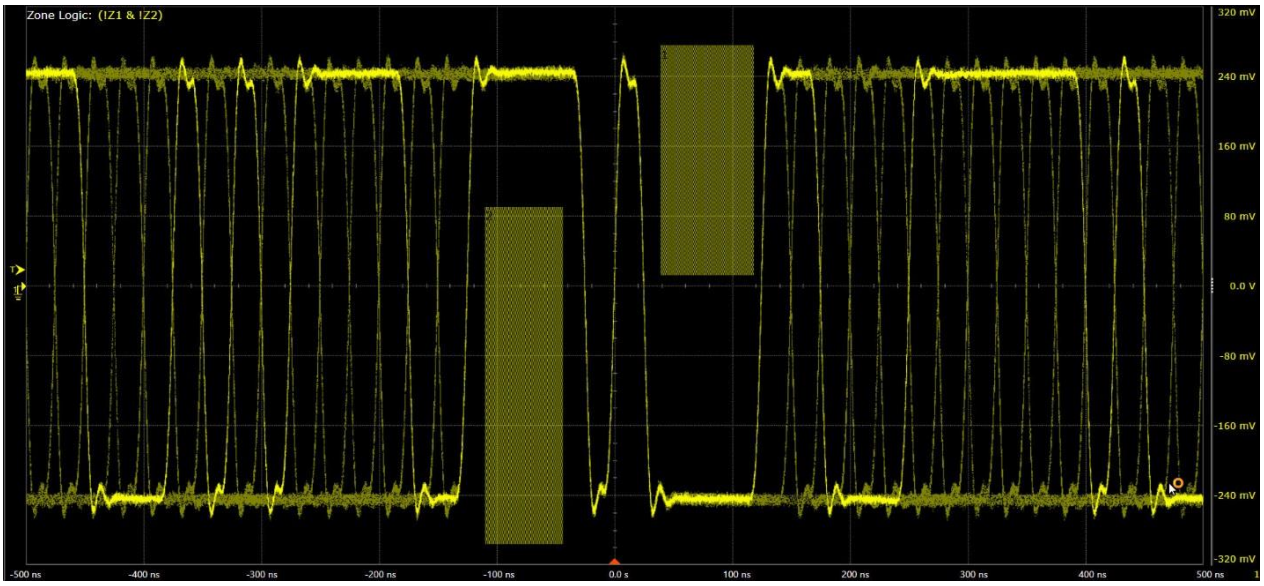
Comprehensive Testing Applications

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

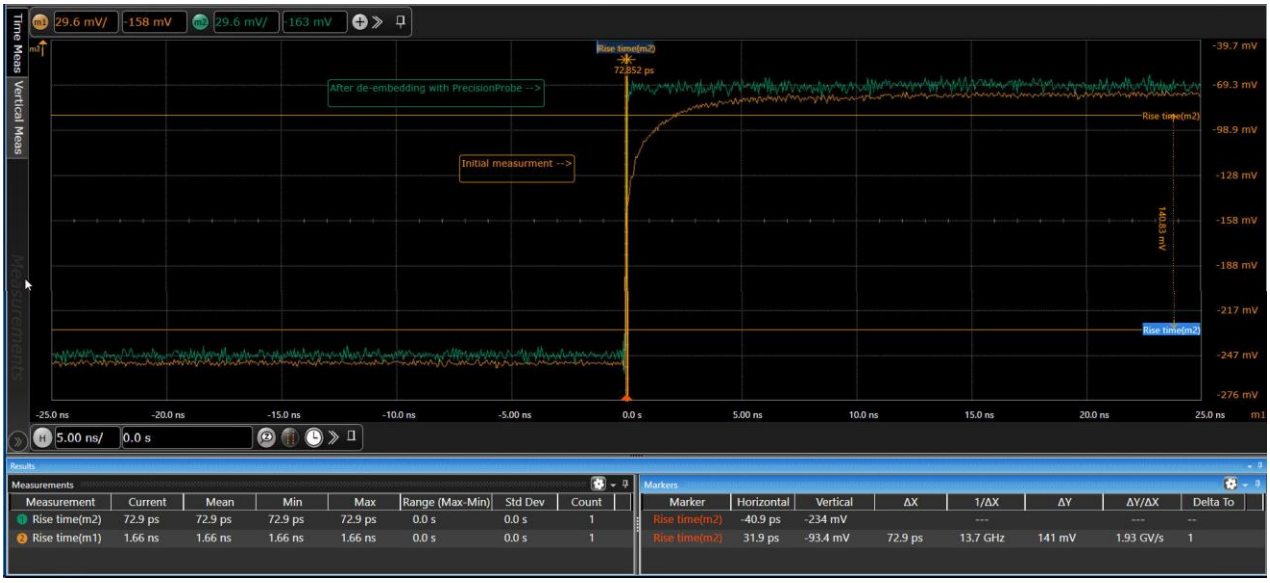


This package allows you to create a three-stage trigger to identify signal integrity issues that hardware triggering is unable to find in your electronic designs. This innovative software scans through thousands of acquired waveforms per second to help you isolate signal anomalies, saving you precious 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

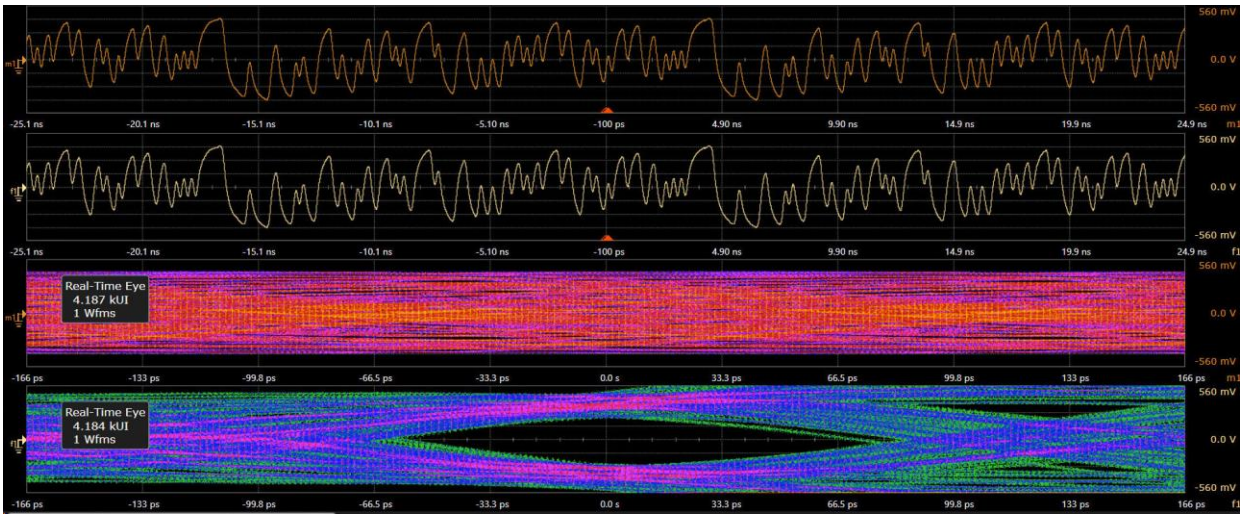
This package offers advanced statistical analysis of high-speed digital interfaces in the vertical (voltage) and horizontal (time) domains, as well as phase noise analysis. The result: the industry's most complete jitter and noise analysis software for real-time oscilloscopes.

De-embedding – D9010DMBA



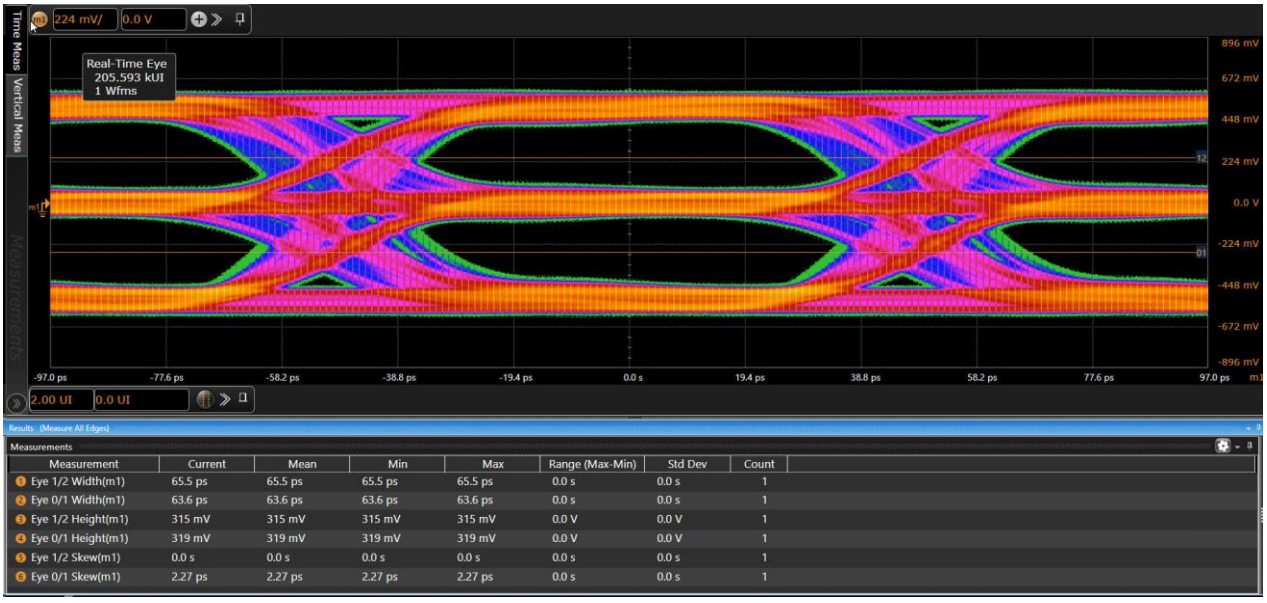
This package includes PrecisionProbe and InfiniiSim Basic, two tools designed to de-embed the effect of cables and fixtures from measurements. PrecisionProbe allows you to characterize the response of a probe, cable or fixture; InfiniiSim lets you model them out of a measurement.

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

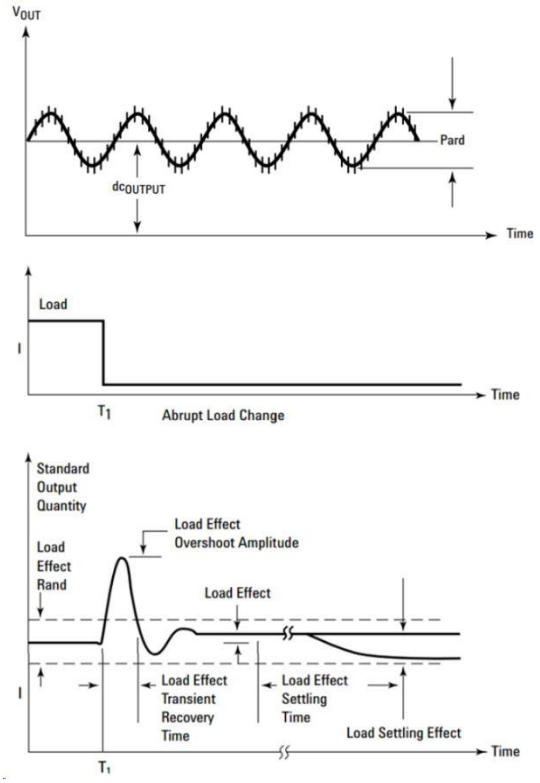


This package quickly sets up clock recovery and measurements for a PAM encoded signal. The software is also able to accurately set the individual threshold levels of your PAM signal and render each individual eye. It also includes BER/SER measurements and statistics.

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.

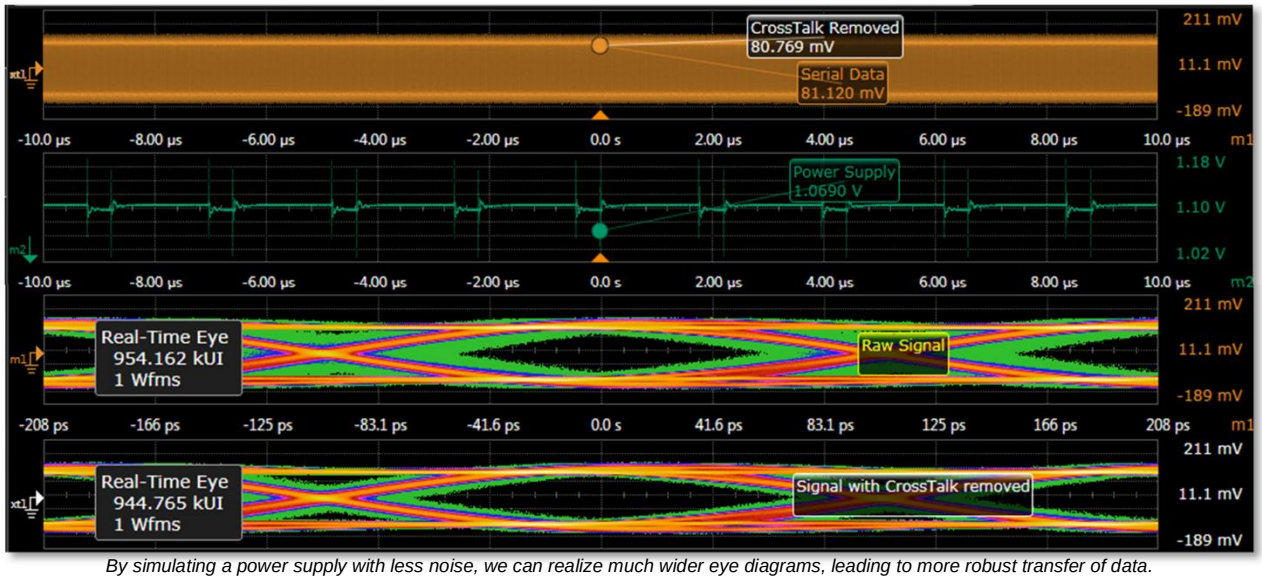


Switch Mode Supplies – D9010PWRA

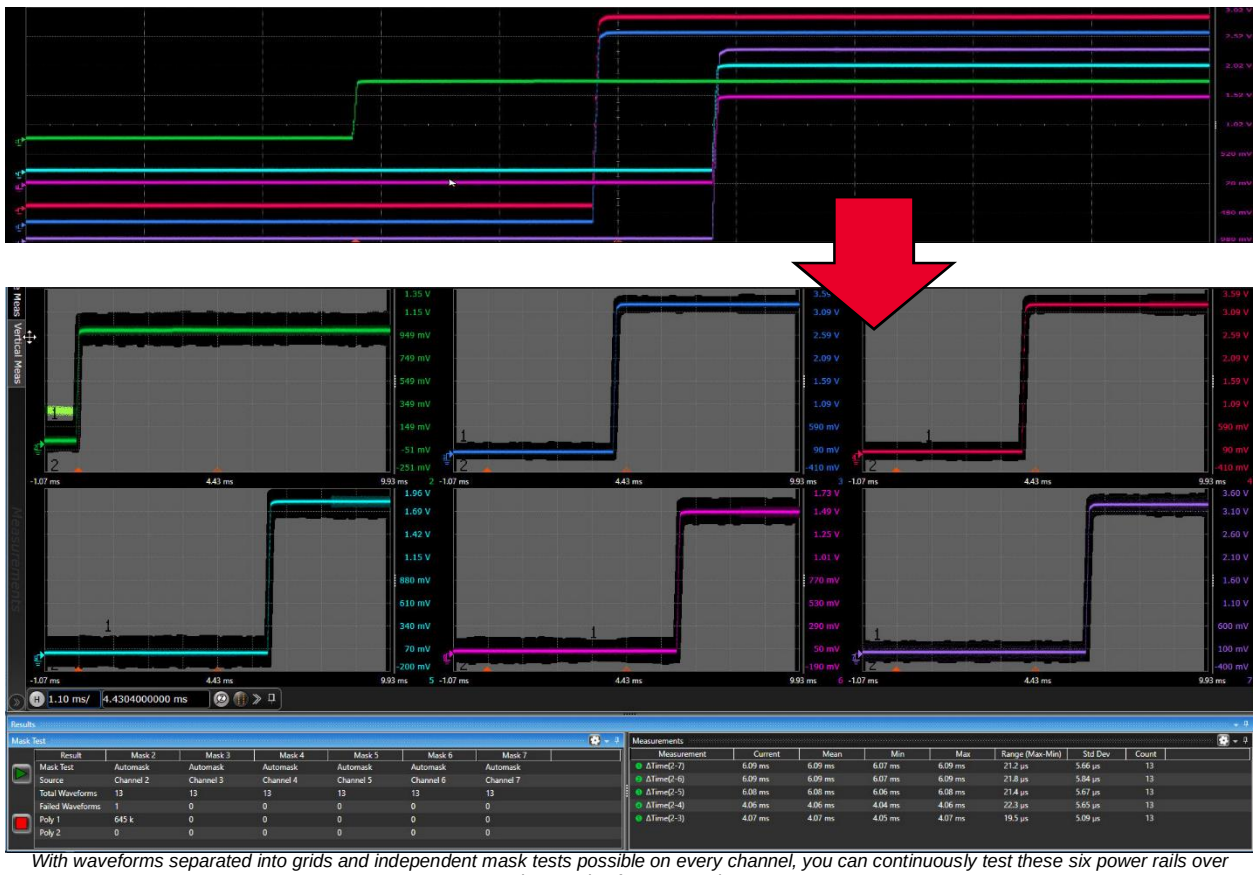
This application enables a broad range of automated power supply characterization measurements from input analysis, switching device characterization, and output analysis. It also includes critical frequency response measurements such as power supply rejection ratio (PSRR) and control loop response. Additionally, users can create Bode plots from DC to 50 MHz, both magnitude and phase, with D9010PWRA. See the data sheet for more.

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.

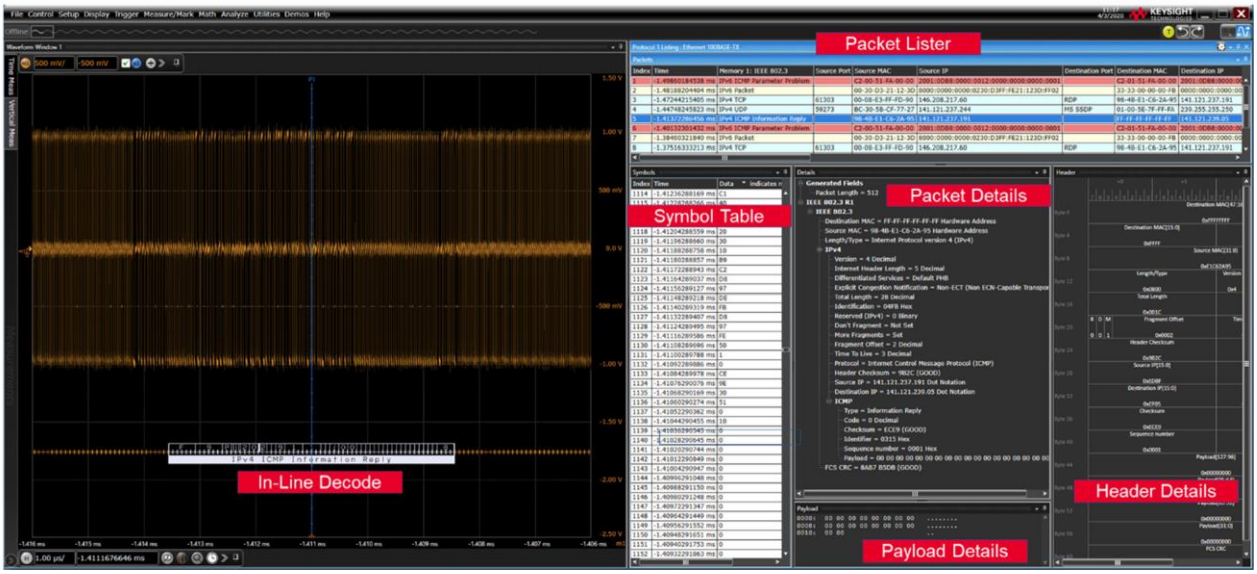


By simulating a power supply with less noise, we can realize much wider eye diagrams, leading to more robust transfer of data.



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.

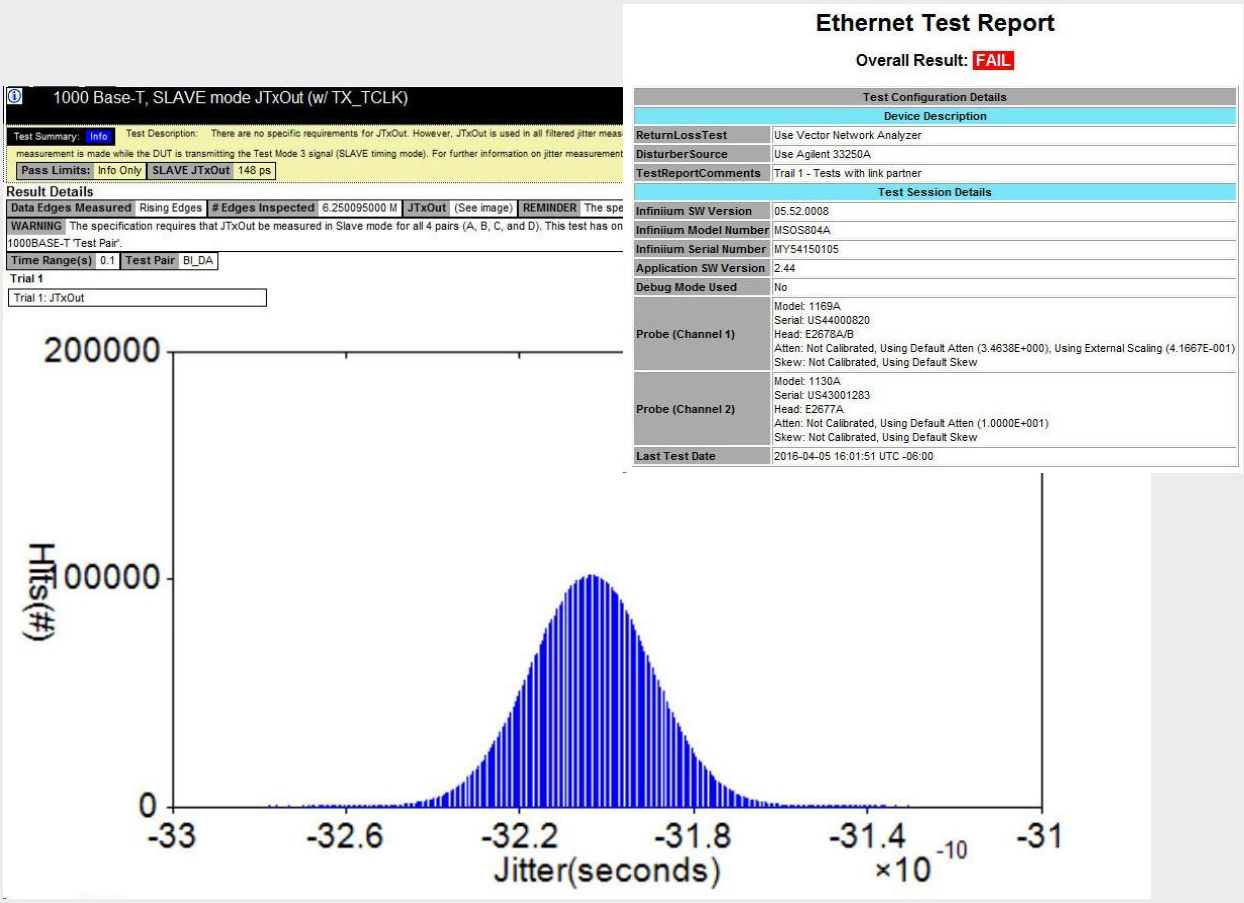
Industry Specific Protocol Testing



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^2C, SPI, Quad SPI, eSPI, Quad eSPI, RS232, UART, JTAG, I^2S, SVID, Manchester	D9010LSSP
Embedded	USB 2.0, 10/100 Mb/s Ethernet, USB-PD, PCIe Gen 1 (decode)	D9010EMBP
Low Speed Automotive	CAN, LIN, CAN-FD, SENT, FlexRay	D9010AUTP
MIPI Low Speed	RFFE, I^3C, SPMI	D9010MPLP
MIPI C-PHY, D-PHY	C-PHY/D-PHY based CSI & DSI (Up to 2.5 Gbps)	D9010MCDP
MIPI M-PHY	CSI 3, DigRFv4, LLI, UniPro, UFS, SSIC (Up to Gear 1 Speed)	D9010MPMP
Military	ARINC 429, MIL-STD 1553, SpaceWire	D9010MILP
High Speed Automotive	100BASE-T1 Automotive Ethernet	D9020AUTP
USB	USB 2.0, USB-PD, eUSB2, USB4 LS (decode)	D9010USBP
Infiniium Basic Bundle	Includes D9010LSSP, D9010EMBP, D9010MPLP, D9010MILP, D9010AUTP	D9011BDLP

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 preforming compliance measurements based on the latest requirements. These test application offers a user-friendly setup wizard and a comprehensive report that includes margin analysis.

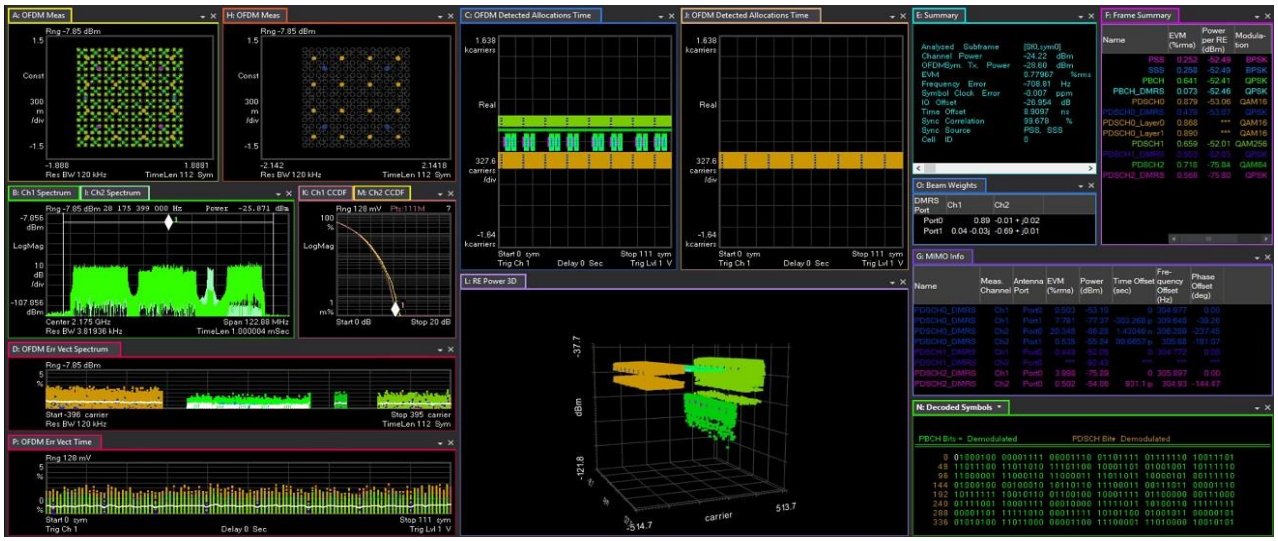
Standard	Description	Min. BW	Data Sheet
USB 2.0	USB 2.0 Transmitter	2 GHz	D9010USBC
Ethernet	10M/100M/1GBASE-T and Energy Efficient Ethernet	1 GHz	D9010ETHC
Ethernet	10G, MG Base-T, N-Base-T	4 GHz	D9010EBZC
Automotive Ethernet	1000BASE-T1	2.5 GHz	AE6910T
	100BASE-T1	1 GHz	
	10BASE-T1	500 MHz	
C-PHY	MIPI 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

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 DDC: 2 GHz	Independent per channel
+ RTSA/DDC Option + Frequency Extension Option	0 Hz to 6 GHz	RTSA: 160/320 MHz 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 µV	43 µV	210 µV	410 µV	150 µV
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 Ω [1]	500 MHz	1 GHz	2 GHz	2.5 GHz	4 GHz	6 GHz
	1 MΩ	500 MHz	500 MHz	500 MHz	500 MHz	500 MHz	500 MHz
Typical rise/fall time [4]	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 [1]					
Sample resolution		62.5 ps (divide by interpolation factor, if enabled)					
Vertical resolution [3]		10 bits, up to 16 bits with high-resolution mode					
Real-time update rate		>200,000 waveforms/sec					
Memory depth [1]	Standard	200 Mpts/channel, all channels					
	Optional	400 Mpts/channel, all channels					
Input impedance	50 Ω [1]	±3.5% (typically ±1% at 25 °C)					
	1 MΩ	±1% (14 pF typical)					
Input sensitivity [3]	50 Ω [1]	1 mV/div to 1 V/div					
	1 MΩ	1 mV/div to 5 V/div					
Input coupling	50 Ω [1]	DC					
	1 MΩ	DC, AC (>11 Hz)					
Bandwidth limit filters	Analog	20 MHz, 200 MHz					
	Digital [5]	14.7 MHz up to scope bandwidth, increments of one decimal point. Filter options: Brick Wall, 4th Order Bessel, or Bandpass					
Max input voltage	50 Ω	±5 V_{MAX} [1]					
	1 MΩ	30 V_{RMS} or ±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 ±400 V_{MAX} (DC + V_{PEAK}). No transient overvoltage allowed in either the 50 Ω or 1 MΩ path, with or without probes.					
Offset range	50 Ω [1]	≤55 mV/div: ±0.8 V ≤120 mV/div: ±1.6 V ≤260 mV/div: ±3.2 V >260 mV/div: ±4 V					
	1 MΩ	<10 mV/div: ±5 V ≤200 mV/div: ±20 V >200 mV/div: ±40 V					
Offset accuracy [1][3]		<2 V: ±0.1 div ± 2 mV ± 1%; >2 V: ±0.1 div ± 2 mV ± 1.5%					
Dynamic range [6]		±4 divisions from center screen					
DC gain accuracy [1][2][3]		±2% full scale (±1% typical)					
DC voltage measurement accuracy [2]		Dual cursor: ±[(DC gain accuracy) + (resolution)] Single cursor: ±[(DC gain accuracy) + (offset accuracy) + (resolution/2)]					
Channel-channel isolation		Adjacent Channels: ≤-60 dB (DC to 2 GHz), ≤-50 dB (2 to 6 GHz) Non-Adjacent Channels: ≤-85 dB (DC to 2 GHz), ≤-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 ± 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 Ω 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 MΩ 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 [1]**
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 Ω inputs								
Vertical setting	20 MHz [1]	200 MHz [1]	500 MHz [1]	1 GHz [1]	2 GHz [1]	2.5 GHz	4 GHz	6 GHz
1, 2 mV/div	43 µV	59 µV	63 µV	73 µV	91 µV	100 µV	132 µV	193 µV
5mV/div	40 µV	61 µV	70 µV	81 µV	102 µV	112 µV	149 µV	216 µV
10 mV/div	46 µV	69 µV	81 µV	99 µV	131 µV	144 µV	189 µV	251 µV
20 mV/div	59 µV	99 µV	122 µV	156 µV	209 µV	233 µV	297 µV	401 µV
50 mV/div	210 µV	278 µV	328 µV	401 µV	520 µV	569 µV	719 µV	971 µV
100 mV/div	452 µV	582 µV	681 µV	821 µV	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 Ω 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	
	Roll mode	Scrolls waveform across the display, right to left	
Timebase range	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 [1][7]		±(8 ppb initial + 75 ppb/year aging)	
Intra-channel intrinsic jitter, 4 channels [3][5]		4 channel models	8 channel models
	100 ns/div	118 fs_{RMS}	150 fs_{RMS}
	1 µs/div	130 fs_{RMS} [9]	156 fs_{RMS}
	10 µs/div	140 fs_{RMS} [9]	172 fs_{RMS} [10]
	100 µs/div	145 fs_{RMS} [9]	175 fs_{RMS} [10]
	1 ms/div	155 fs_{RMS} [9]	181 fs_{RMS} [10]
Inter-channel intrinsic jitter [3]		100 fs_{RMS}	
Inter-channel skew drift [3][6]		<500 fs_{MAX}	
Intra-channel jitter measurement floor [2][3]	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 [2][3][4]		$\sqrt{\left(\begin{matrix}\text{Time interval}\\ \text{error (edge 1)}\end{matrix}\right)^2 + \left(\begin{matrix}\text{Time interval}\\ \text{error (edge 2)}\end{matrix}\right)^2 + \left(\begin{matrix}\text{inter}-\text{channel}\\ \text{intrinsic jitter}\end{matrix}\right)^2}$	
Delta time measurement accuracy [2][3][4][8]	Intra-channel	$\pm\left[\frac{5}{n} \times \sqrt{\left[\begin{matrix}\text{Time interval}\\ \text{error (edge 1)}\end{matrix}\right]^2 + \left[\begin{matrix}\text{Time interval}\\ \text{error (edge 2)}\end{matrix}\right]^2} + \left(\left(\begin{matrix}\text{Time scale}\\ \text{accuracy}\end{matrix}\right) \times \left(\begin{matrix}\text{Delta}\\ \text{time}\end{matrix}\right)\right)\right]$	
	Inter-channel	$\pm\left[\frac{5}{n} \times \sqrt{\left[\begin{matrix}\text{Time interval}\\ \text{error (edge 1)}\end{matrix}\right]^2 + \left[\begin{matrix}\text{Time interval}\\ \text{error (edge 2)}\end{matrix}\right]^2 + \left[\begin{matrix}\text{Interchannel}\\ \text{intrinsic jitter}\end{matrix}\right]^2} + \left(\left(\begin{matrix}\text{Time scale}\\ \text{accuracy}\end{matrix}\right) \times \left(\begin{matrix}\text{Delta}\\ \text{time}\end{matrix}\right)\right) + \left(\begin{matrix}\text{Intechannel}\\ \text{skew drift}\end{matrix}\right)\right]$	

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) x 2πf; slew rate of fast edge = 0.8 * amplitude / (risetime 10-90%).
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. '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.
9. 120 fs_{RMS} possible with external reference.
10. 161 fs_{RMS} possible with external reference.

Analog channel triggering	
Trigger sources	Edge Trigger on all analog channels, aux-in, power supply line Other Trigger operations as outlined below
Max edge trigger frequency (50 Ω)	6 GHz
Trigger level range	±4 divisions from center screen (auxiliary: ±5 V, max input 5 V_{PP})
Trigger sensitivity	Analog channels: see next table Aux trigger input: 200 mV_{PP}, 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 fs_{RMS} 8 channel models: 531 fs_{RMS}
Minimum trigger re-arm time	<5 us

Trigger edge sensitivity, analog channels						
Bandwidth (HW or SW limit)→		20 MHz	200 MHz	1 GHz	2.5 GHz	>2.5 GHz
1 MΩ path	< 5 mV/div	<0.7 div	<1.0 div	<1.4 div to BW limit (500 MHz)		
	≥ 5 mV/div	<0.3 div	<0.5 div	<0.8 div to BW limit (500 MHz)		
50 Ω path	< 5 mV/div	<0.15 div	<0.2 div	<0.3 div	<0.45 div	<0.6 div
	≥ 5 mV/div	0 div	0 div	<0.1 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
	Under 8 GSa/s: 125 Mpts/ch
Minimum detectable glitch	2 ns
Max input voltage	±40 VPEAK
Input dynamic range	±10 V about threshold
Minimum input voltage swing	500 mVPP
Input impedance	100 kΩ ±2% (~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 (±8 V in 10 mV increments)
Threshold accuracy	±(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. Requires a protocol trigger/decode option, for example D9010LSSP
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. Requires option D9010SCNA
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. *Requires option D9010SCNA*
Non-monotonic edge	Channels 1-8	Software triggers on the non-monotonic edge. The non-monotonic edge is specified by setting a hysteresis value. *Requires option D9010SCNA*

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. Requires N282xA probe
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. Requires D9010SCNA
Eye diagrams	Eye height, eye width, eye jitter, crossing percentage, Q factor, duty-cycle distortion >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)
	MATLAB	Preinstalled scripts: Butterworth, FIR, LFE, RTEye, and SqrtSumOfSquare 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. Requires a MATLAB license
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 ±1σ/2σ/3σ, 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 Ω	1 mV_{PP} [1] to 5 V_{PP} [2]
	Voltage range, 1 MΩ	2 mV_{PP} [1] to 10 V_{PP} [2]
	Presets	TTL, CMOS (5 V), COMS (3.3 V), CMOS (2.5 V), ECL
	Vertical resolution	100 µV
	Vertical accuracy	2% (< 1 kHz)
	Frequency resolution [3]	12.5 mHz
	Frequency accuracy [4]	Square/pulse: 1 ppm (f ≧ 8 kHz), [f/25000] ppm (f < 8kHz) Other waveforms: 1 ppm (f ≧ 5 kHz), 3 ppm (f < 5kHz)
	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, arbitrary
	Protection	Overload automatically disables output
	Isolation	Not available, main output BNC is grounded
DC offset	Range	±(8 V_{DC} – Peak AC) into 1 MΩ ±(4 V_{DC} – Peak AC) into 50 Ω
	Resolution	100 µV or 3 digits, whichever is higher
	Accuracy	Waveform modes: ± 1.5% of offset setting ± 1% of amplitude ± 1 mV DC mode: ± 1.5% of offset setting ± 3 mV
Sine	Frequency range	12.5 mHz to 50 MHz
	Amplitude flatness	± 0.5 dB (≦20 MHz), ± 1 dB (>20 MHz)
	Harmonic distortion	Harmonic distortion: -40 dBc [5]
	SFDR	Spurious (non-harmonic): -40 dBc [6]
	THD	1% [7]
	SNR	40 dB [8]
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 [9]
	Rise/fall time	Rise/fall time: 9 ns (10 to 90%)
	Overshoot	Overshoot: < 4%
	Asymmetry (at 50% DC)	±1% ± 5 ns
	Jitter (TIE RMS)	100ps [10]
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	2^7, 2^15, 2^23, 2^31
	Bit rate	100 bps to 40 Mbps (speeds of 200 MHz divided by an integer value)
	Encoding	NRZ

Arbitrary	Waveform Length	1 to 122,070 points	
	Repetition Rate	12.5 mHz to 12 MHz	
	Sample Rate	200 MSa/s	
	Filter Bandwidth	40 MHz	
	Editor	On-screen editor; import/export of data to and from channels/memories, import/export data to and from a file (.csv)	
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
		Deviation is smaller	1 Hz to carrier frequency or (2e12 / carrier frequency), whichever
	FSK	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_{PP} (1 MΩ) / 5 mV_{PP} (50 Ω) minimum if | DC + Peak AC | ≥ 400mV
2. 8 V_{PP} (1 MΩ) / 4 V_{PP} (50 Ω) 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 ≤1 V_{PP} at 50 MHz, ≤2 V_{PP} at 40 MHz, ≤5 V_{PP} at ≤30 MHz, into 50 Ω load. -30 dBc at 5 V_{PP}, 50 MHz
6. For amplitude ≥5 mV_{PP} into 50 Ω load
7. For amplitude ≤1 V_{PP} at 50 MHz, ≤2 V_{PP} at 40 MHz, ≤5 V_{PP} at ≤30 MHz, into 50 Ω load. 4% at 5 V_{PP}, 50 MHz
8. ≥35 mV_{PP}, 0V offset, into 50 Ω
9. 5 nS if frequency is < 8kHz
10. Amplitude ≥20 mV_{PP} into 50 Ω load

Digital Voltmeter (standard, specifications are typical)	
Functions	AC_{RMS}, DC, DC_{RMS}
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) Counter C: trigger qualified (trigger channel)
Measurements	Frequency, period, totalize, ratio (ratio of A/B, mathematical)
Resolution	General purpose: 5 to 10 digits Trigger qualified: 5 to 8 digits
Accuracy	±(8 ppb initial ± 75 ppb/year aging)
Uncertainty	±0.1 digits
Minimum pulse width	75 ps (for signals with <10 ns transition time)
Maximum frequency	General purpose: 6 GHz Trigger qualified: 1/(trigger hold off time)
Totalizer	Counter size: 64 bits Edge: Rise or fall

Real Time Spectrum Analysis and Digital Down Conversion (optional)							
		RTSA			DDC		
Standard Performance		All Infiniium MXR-Series come with a standard 40 MHz RTSA and 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 RTSA and DDC performance (see configuration guide).					
Frequency Range		0 Hz to oscilloscope bandwidth 0 Hz to 6 GHz with Frequency Extension (below)					
Analysis Bandwidth [1]		40, 80, 160, or 320 MHz. RTSA total Span is 320 MHz for channels 1-4 and channels 5-8. 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			40 MHz, 80 MHz, 160 MHz, 320 MHz, 640 MHz, 1.28 GHz, 2.16 GHz (all channels)		
Per-channel control		All channels use the same span, but can each be at different center frequencies. No data is stored; visualization only			All channels use the same span (up to 2 GHz), but can each be at different center frequencies. Each channel stores IQ data for analysis via Keysight VSA (89600) or MATLAB (N6171A)		
Performance Data		Typical passband magnitude flatness: +/- .25 dB from 160 MHz to max Frequency Range			Typical out-of-band rejection: >50 dB		
Minimum signal duration with 100% amplitude accuracy		15 µs			N/A		
Minimum detectable signal duration		10 ns			N/A		
Available views		Spectral density (color graded)			Histogram		
Supported triggers		Frequency mask trigger: must intersect, must not intersect, up to 8 zones (AND logic)			All oscilloscope time domain triggers, external trigger		
Window types		Rectangular, Hanning, Hamming, Blackman-Harris, Flattop					
Number of markers		200					
Supported marker types		Frequency, amplitude					
FFT Rate, 100% POI	Span	FFT/s (RTSA)		POI (RTSA)	FFT/s (DDC)		
	40 MHz	25,000		122 µs	2,000		
	80 MHz	50,000		62 µs	4,000		
	160 MHz	100,000		30 µs	8,000		
	320 MHz	200,000		15 µs	14,000		
	640 MHz	N/A		N/A	23,000		
	1.28 GHz	N/A		N/A	30,000		
	2.16 GHz	N/A		N/A	35,000		
Resolution Bandwidth			Window Type				
	Span	Sample Rate	Rectangle	Hamming	Hanning	Blackman	Flattop
	40 MHz	50 MSa/s	12.2 KHz	16.7 KHz	18.3 KHz	24.5 KHz	46.6 KHz
	80 MHz	100 MSa/s	24.4 KHz	33.4 KHz	36.6 KHz	48.9 KHz	93.2KHz
	160 MHz	200 MSa/s	48.8 KHz	66.8 KHz	73.2 KHz	97.8 KHz	186 KHz
	320 MHz	400 MSa/s	97.6 KHz	133 KHz	146 KHz	195 KHz	373 KHz
	640 MHz	800 MSa/s	195 KHz	267 KHz	293 KHz	392 KHz	746 KHz
	1.28 GHz	1.6 GSa/s	390 KHz	534 KHz	586 KHz	783 KHz	1.59 MHz
	2.16 GHz	3.2 GSa/s	781KHz	1.07 MHz	1.17 MHz	1.56 MHz	2.98 MHz

Frequency Extension (optional)
Enables a frequency range of DC to 6 GHz for RTSA and DDC options, regardless of oscilloscope bandwidth. If this option is enabled by itself (i.e. without the 160 MHz or 320 MHz RTSA option), the user gets the standard performance of the RTSA and DDC features listed above, but with an adjustable maximum frequency of 6 GHz.

Front end and RF performance		
Sensitivity / noise density [1]		-160 dBm/Hz
Noise figure [1]		14 dB
SNR / dynamic range [2]		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
	100 kHz offset	-126.7 dBc/Hz
EVM [3]		-47 dB (0.47%)
SFDR [4]		71 dB
Harmonic distortion [4]	2nd order	-65 dBc
	3rd 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 / Resolution	15.6” capacitive multi-touch, 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) 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_{PP} (-5 dBm) to 5 V_{PP} (+18 dBm) sine, 285 mV_{PP} to 4 V_{PP} square Frequency: 10 MHz ± 5 ppm

Supported file types		
Infiniium setup files	.set .osc	Infiniium settings only settings and waveform data
Waveform files, compressed	.wfm .bin .h5 .mat	binary, Infiniium format binary, approx. 5x smaller than larger XY formats open source, Infiniium or InfiniiVision format MATLAB
Waveform files, raw data	.csv .tsv .txt	XY values, comma-separated XY values, tab-separated Y values
Image files	.png .jpg .bmp .gif .tif	24-bit color 24-bit color 24-bit color 8-bit color 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 Non-operating: -40 to +70°C	
Humidity		Operating: ≤80% relative humidity (non-condensing) at +40°C Non-operating: ≤90% relative humidity (non-condensing) up to +70°C	
Altitude		Operating: up to 3,000 m (9,842 ft) Non-operating: up to 15,300 m (50,196 ft)	
Power		100 to 120 V @ 50/60/400 Hz; 100 to 240 V @ 50/60 Hz Max power dissipated: 4 Channel = 450 Watts; 8 Channel = 650 Watts	
Noise		55.3 dB (front of instrument)	
		4 channel models	8 channel models
Weight	Frame	13.75 kg (30.3 lbs.)	14.50 kg (32.0 lbs.)
	Shipping	20.95 kg (46.2 lbs.)	21.90 kg (48.3 lbs.)
	Packaging	7.2 kg (15.9 lbs.)	7.2 kg (15.9 lbs.)
Dimensions		Height: 327 mm (12.9 in) with feet retracted Width: 443 mm (17.5 in) Depth: 223 mm (8.8 in) including knobs and rear feet	
Safety		IEC 61010-1:2017 IEC 61010-2-030:2017 UL 61010-1:2012 (3rd edition) UL 61010-2-030:2018 CAN/CSA-22.2 No. 61010-1-12 CAN/CSA-22.2 No. 61010-2-030-17	
EM standards		CISPR 11/EN 55011 IEC 61000-4-2/EN 61000-4-2 IEC 61000-4-3/EN 61000-4-3 IEC 61000-4-4/EN 61000-4-4 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

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 [2]
BNC(m) to SMA(f) Adapters, DC-10 GHz	54855-67604
GPIB Adapter, Sold by ICS Electronics	4865B [2]

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 MΩ and 50 Ω paths. This expands their flexibility by making them compatible with a wider range of probes than high-performance oscilloscopes that only support a 50 Ω 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.

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 MΩ 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 kΩ 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_{RMS}, 1 mV/div sensitivity clamp-on, AutoProbe interface
High sensitivity current	N2820A/21A	3 MHz, measurable down to 100 µA 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 kΩ 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^2C, SPI, Quad SPI, eSPI, RS232, UART, JTAG, I^2S, SVID, Manchester	D9010LSSP
Embedded	USB 2.0, 10/100 Mb/s Ethernet, USB-PD, PCIe Gen 1 (decode)	D9010EMBP
Low Speed Automotive	CAN, LIN, CAN-FD, SENT	D9010AUTP
MIPI Low Speed	RFFE, I^3C, SPMI	D9010MPLP
MIPI C-PHY / D-PHY	C-PHY/D-PHY based CSI & DSI (Up to 2.5 Gbps)	D9010MCDP
MIPI M-PHY	CSI 3, DigRFv4, LLI, UniPro, UFS, SSIC (Up to Gear 1 Speed)	D9010MPMP
Military	ARINC 429, MIL-STD 1553, SpaceWire	D9010MILP
High Speed Automotive	100BASE-T1 Automotive Ethernet	D9020AUTP
USB	USB 2.0, eUSB2, USB4 LS	D9010USBP
Basic Protocol Bundle	Includes D9010LSSP, D9010EMBP, D9010MPLP, D9010MILP, D9010AUTP	D9011BDLP

Protocol compliance packages

Standard	Description	Min. BW	Data Sheet
USB 2.0	USB 2.0 Transmitter	2.5 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
Automotive Ethernet	1000BASE-T1	2.5 GHz	AE6910T
	100BASE-T1	1 GHz	
	10BASE-T1	500 MHz	
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

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:

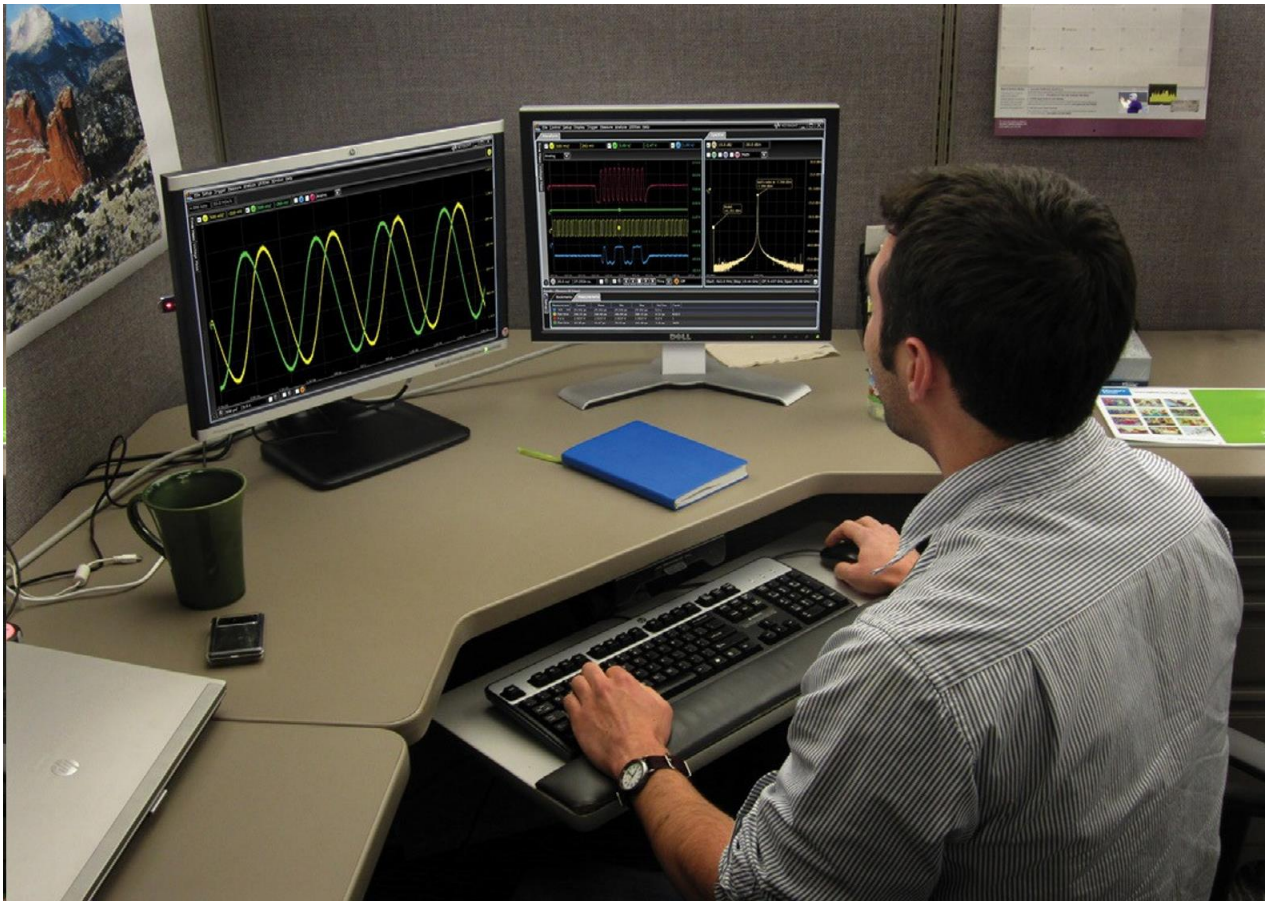
		Good Bundle	Better Bundle	Best Bundle
MXR000-MSO	16 Digital Channels	✔	✔	✔
MXR000-WAV	50 MHz Waveform Generator	✔	✔	✔
D9010LSSP	Low Speed Protocol Bundle	✔	✔	✔
MXR000-400	400 Mpts/ch Memory Upgrade		✔	✔
D9010SCNA	InfiniiScan Trigger Software		✔	✔
N2796A (x2)	2 GHz Single-Ended Active Probes		✔	✔
MXR000-320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

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

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

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