

# Infiniium EXR-Series

Powerful. Easy to Own. Intuitive to Use.



# Table of Contents

|   |    |
|---|----|
| Meet the Infiniium EXR-Series .....   | 3  |
| See More in the Time Domain with Eight Analog Channels .....                      | 4  |
| See More with World-Class Signal Integrity.....                                   | 5  |
| See More Information with History Mode and Segmented Memory .....                 | 5  |
| Powerful Measurement Capabilities — D9010PWRA .....                               | 6  |
| Powerful Measurement Capabilities — D9010POWA .....                               | 7  |
| Industry-Specific Protocol Testing .....  | 8  |
| Physical Layer Testing .....  | 9  |
| Ease of Ownership .....   | 12 |
| Completely Upgradeable.....   | 13 |
| Combine Multiple Oscilloscopes for up to 40-Channel Tests with Multiscope .....   | 14 |
| Comprehensive Testing Applications — Infiniium Offline .....                      | 14 |
| Comprehensive Testing Applications — Compliance Testing .....                     | 15 |
| Intuitive to Use .....  | 16 |
| Identify Errors in One Click Using Fault Hunter .....                             | 17 |
| Configure Complex Measurements Simply with Setup Wizards.....                     | 18 |
| Complete Control of Your User Interface.....                                      | 19 |
| Explore the Keysight Real-Time Oscilloscope Portfolio.....                        | 20 |
| Performance Characteristics.....  | 21 |
| Ordering Guide and Upgrade Information.....                                       | 32 |
| Infiniium Application Software Bundles for EXR/MXR A/S-Series Oscilloscopes ..... | 41 |
| Confidently Covered by Keysight Services .....                                    | 42 |

# Meet the Infiniium EXR-Series

Welcome to your all-new Infiniium EXR-Series. With eight models ranging in performance from 500 MHz to 6 GHz, 4 or 8 analog channels, and dozens of hardware and software options, your Infiniium EXR-Series is powerful, easy to own, and intuitive to use.



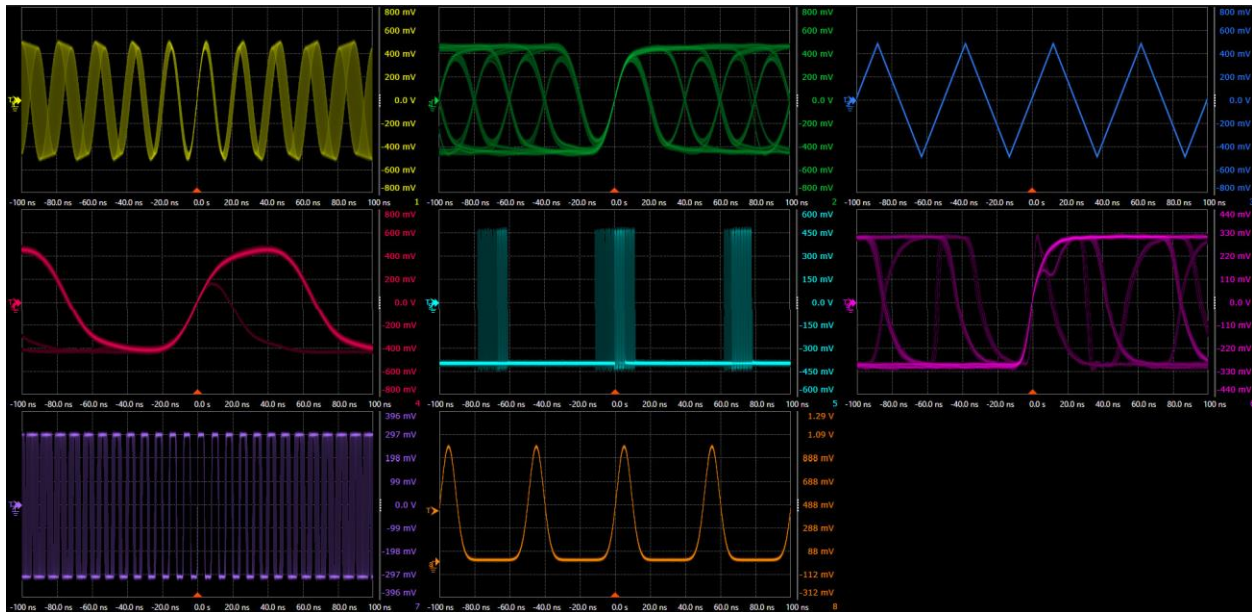
## Infiniium EXR-Series Specifications

|                        |   |
|------------------------|---|
| Analog channels        | 4 or 8, <i>upgradeable</i>  |
| Bandwidth              | 500 MHz to 6 GHz, <i>upgradeable</i>  |
| Sample rate            | 16 GSa/s  |
| Memory                 | 100 Mpts, <i>upgradeable</i> to 400 Mpts or 1.6 Gpts flexible memory <sup>1</sup> |
| Resolution             | 10 bits, up to 16 with high resolution  |
| ENOB                   | As high as 9.0  |
| Digital logic channels | 16, dedicated input, <i>upgradeable</i>   |
| Update rate            | > 200,000 wfm/s   |
| Eye diagram speed      | > 750,000 UI/s  |
| Screen display         | 15.6" touch, full HD, dual screen support   |

1. See data sheet spec tables to learn more about the 1.6 Gpts combined flexible memory option.

| Model numbers | 4 Channels | 8 Channels |
|---------------|------------|------------|
| 500 MHz       | EXR054A    | EXR058A    |
| 1 GHz         | EXR104A    | EXR108A    |
| 2 GHz         | EXR204A    | EXR208A    |
| 2.5 GHz       | EXR254A    | EXR258A    |
| 4 GHz         | EXR404A    | EXR408A    |
| 6 GHz         | EXR604A    | EXR608A    |

| Integrated Tools               | Option                             |
|--------------------------------|------------------------------------|
| 16 digital channels            | EXR2MSO                            |
| 50 MHz waveform generator      | EXR2WAV                            |
| Bode plotter                   | Included with D9010PWRA or EXR2WAV |
| 4-digit DVM, 10-digit counters | Standard                           |
| Protocol analysis              | Various                            |



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

The Infiniium EXR-Series offers up to 6 GHz of bandwidth and 16 GSa/s sample rate on every single one of its four or eight channels. Combined with 100 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 EXR-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:

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



# See More Information with History Mode and Segmented Memory

The Infiniium EXR-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 > 100,000 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 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.

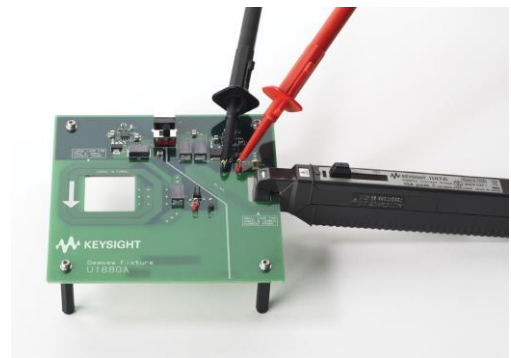


# Powerful Measurement Capabilities — D9010PWRA

## Switch Mode Supplies

The Power Measurements Software Package enables a broad range of automated power supply characterization measurements on your EXR-Series oscilloscopes including unique frequency response analysis for performing control loop response and power supply rejection ratio (PSRR) measurements.

While designed to measure the rigorous operating parameters of switched mode power supplies, the measurements can also be used as a toolkit of measurements for any power converter and/or inverter. These measurements provide an ideal method to document the performance parameter of your power system. Each measurement has a Setup Wizard that makes setup of connections and analysis as simple as possible. Check the D9010PWRA data sheet for descriptions of each of the measurements outlined in the table below.



The Keysight U1880A deskew fixture allows you to quickly deskew your voltage and current probes, enabling accurate and precise power measurements.

| Input Analysis    | Switching Device Analysis | Output Analysis    | Frequency Response Analysis |
|-------------------|---------------------------|--------------------|-----------------------------|
| Real Power        | Switching Loss            | Output Ripple      | PSRR                        |
| Apparent Power    | RDS(ON)                   | Turn On/Off Time   | Control Loop Response       |
| Reactive Power    | VCE(SAT)                  | Efficiency         | Bode Plots                  |
| Power Factor      | Slew Rate                 | Transient Response |                             |
| Crest Factor      | Modulation Analysis       |                    |                             |
| Phase Angle       | Safe Operating Area       |                    |                             |
| Current Harmonics |                           |                    |                             |
| Inrush Current    |                           |                    |                             |



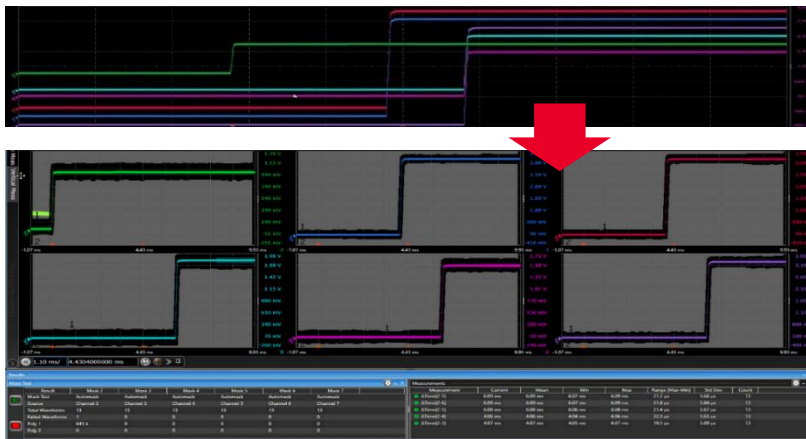
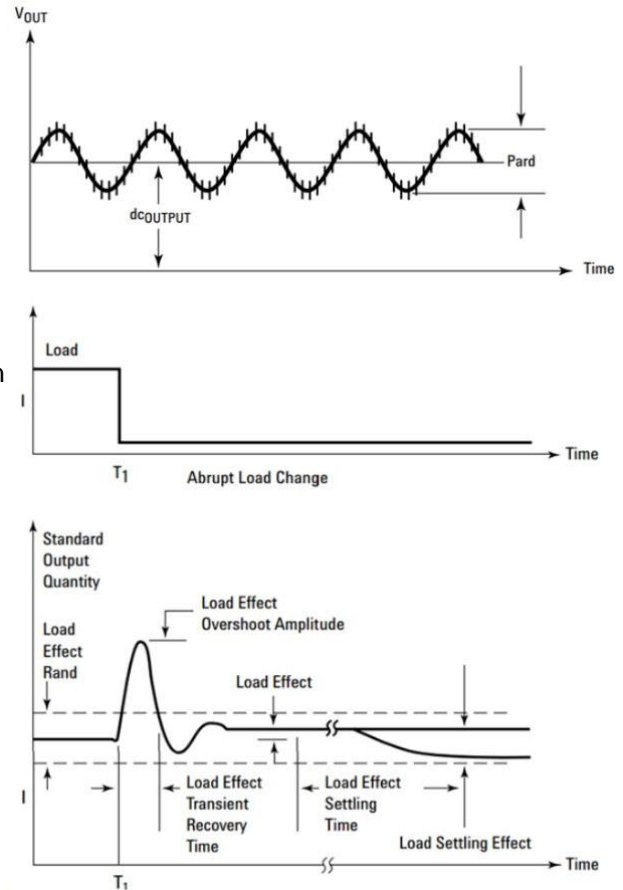
# Powerful Measurement Capabilities — D9010POWA

## Power Rail and PMIC Integrity

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 with tighter tolerances than in previous product generations.

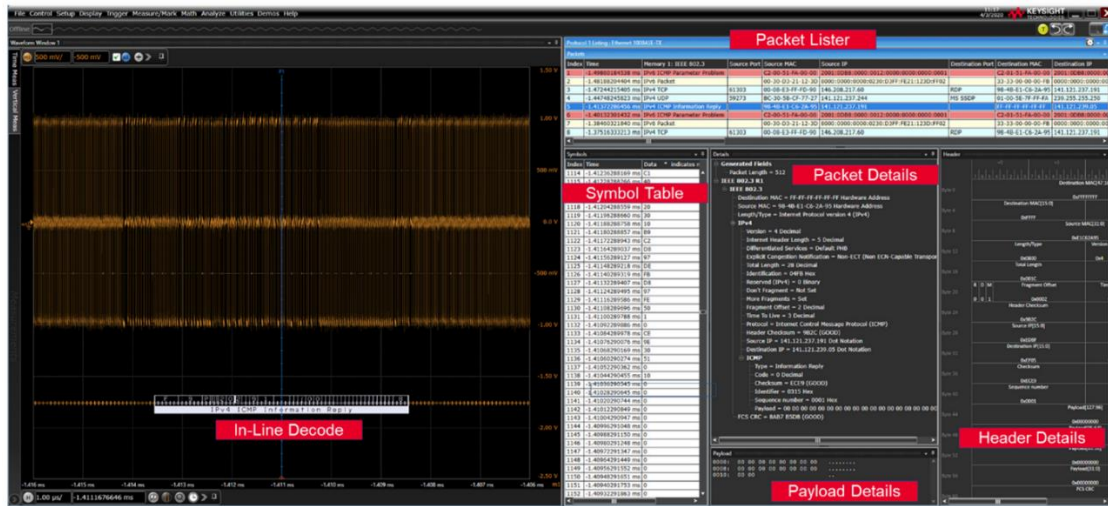
Power supply induced jitter (PSIJ) can be one of the largest sources of clock and data jitter in digital systems. Similarly, noise on DC supplies is often caused by switching currents from the transitions of clock and data in these systems. Wouldn't you like a relatively easy method of determining how 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? The Infiniium EXR-Series can help you make those measurements.

D9010POWA is a tool for analyzing PSIJ 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 rail integrity. And with standard mask testing on every channel, automatic delta time measurements, and a flexible user interface, PMIC analysis is simpler than ever.



With waveforms separated into grids and independent mask tests possible on every channel, you can continuously test six power rails over thousands of startup cycles. Notice how there are mask tests and measurement results on screen for a single screen shot test report.

# Industry-Specific Protocol Testing



Protocol trigger and decode packages make it 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. The hardware takes signals acquired using either analog 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. Visit the web pages and data sheets for each package to learn more – available triggers and decodes are in the configuration guide section of this document. Consider our D9011BDLP package that enables dozens of protocol triggers and decodes into one affordable and easy to order bundle!

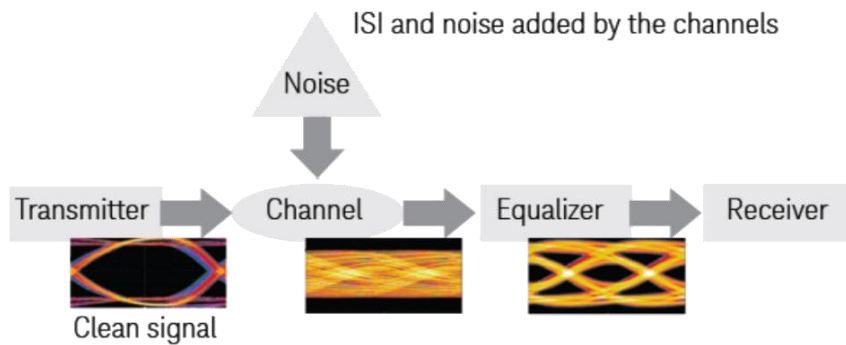
| Package                | Description   | Model     |
|------------------------|---|-----------|
| Low-Speed Serial       | I2C, SPI, Quad SPI, eSPI, Quad eSPI, RS232, UART, JTAG, I2S, SVID, Manchester | D9010LSSP |
| Embedded               | USB 2.0, 10/100 Mb/s Ethernet, USB-PD, PCIe Gen 1 (decode)                    | D9010EMBP |
| Low-Speed Automotive   | CAN, LIN, CAN-FD, SENT, FlexRay, CAN XL                                       | D9010AUTP |
| MIPI Low Speed         | RFFE, I3C, 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  | D9120AUTP |
| USB                    | USB 2.0, USB-PD, eUSB2, USB4 LS (decode)                                      | D9010USBP |
| Infiniium Basic Bundle | Includes D9010LSSP, D9010EMBP, D9010MPLP, D9010MILP, D9010AUTP                | D9011BDLP |



# Physical Layer Testing

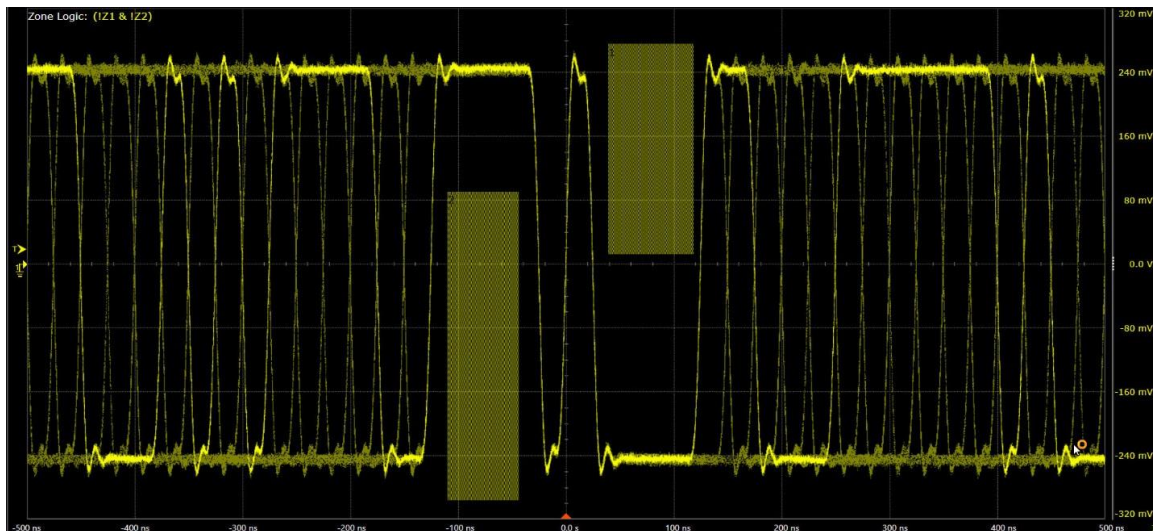
As data rates go up, the signal deteriorates from the transmitter to the receiver due to ISI, noise, and other factors. A high data rate coupled with a lossy channel will cause an open eye at a transmitter to be closed at the receiver. As eyes become more closed, it ultimately leads to significant data 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 times to market and lower failure rates in the field. Your Infiniium EXR-Series offers applications of various depths to help you get the answers you need to improve your design.

The simplest of physical layer tests is a standard feature called “Fault Hunter.” Read about that feature of your EXR-Series oscilloscope later in this data sheet.



## InfiniiScan Advanced and Zone Triggering — D9010SCNA

The InfiniiScan package allows you to create a three-stage trigger to identify signal integrity issues in your electronic designs that hardware triggering cannot find. This innovative software scans through thousands of acquired waveforms per second to help you isolate signal anomalies, saving you precious troubleshooting time. Set up a trigger by drawing a region for a signal to hit or miss, or pass/fail measured parameters.

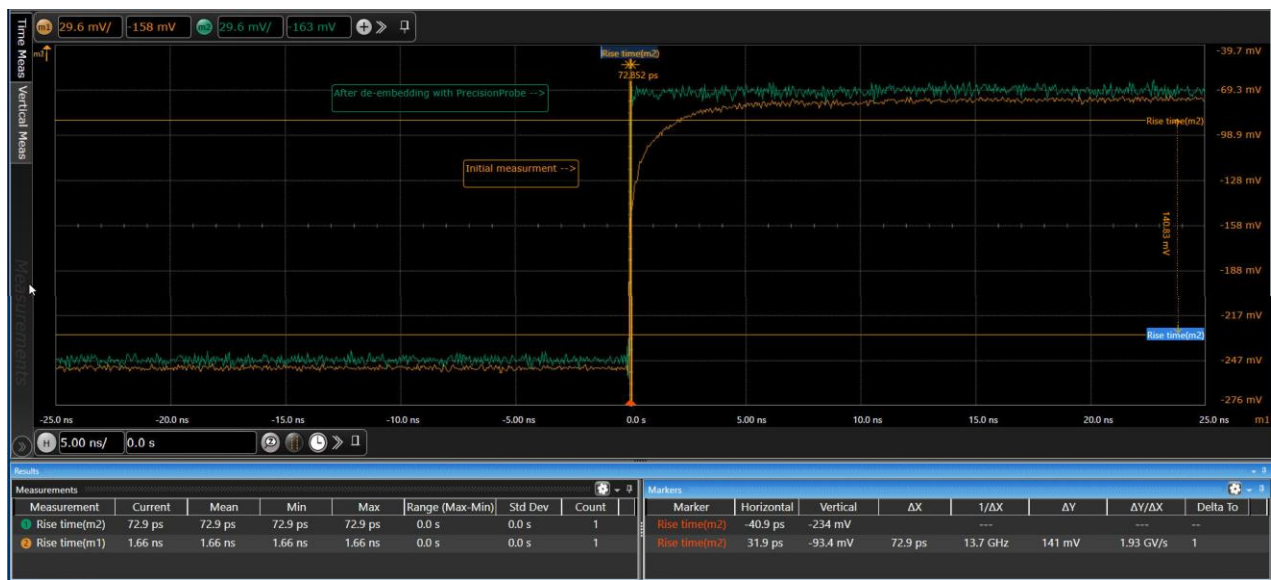


## Vertical, Timing, and Phase Noise Analysis — D9010JITA



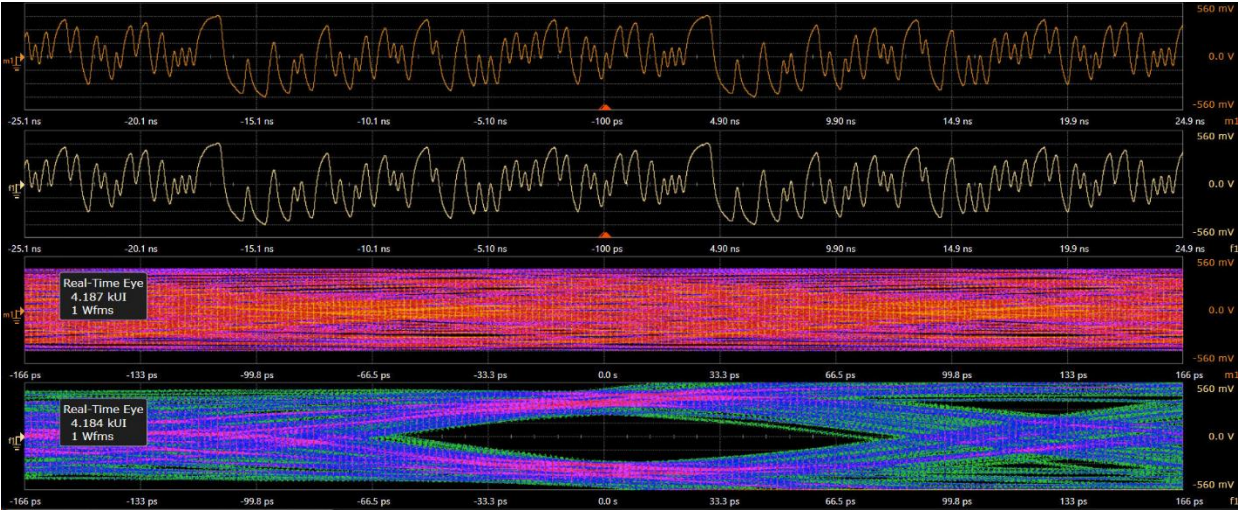
This package offers advanced statistical analysis of high-speed digital interfaces in the vertical (voltage) and horizontal (time) domains, as well as phase noise analysis. The result: the industry's most complete jitter and noise analysis software for real-time oscilloscopes.

## De-embedding — D9010DMBA



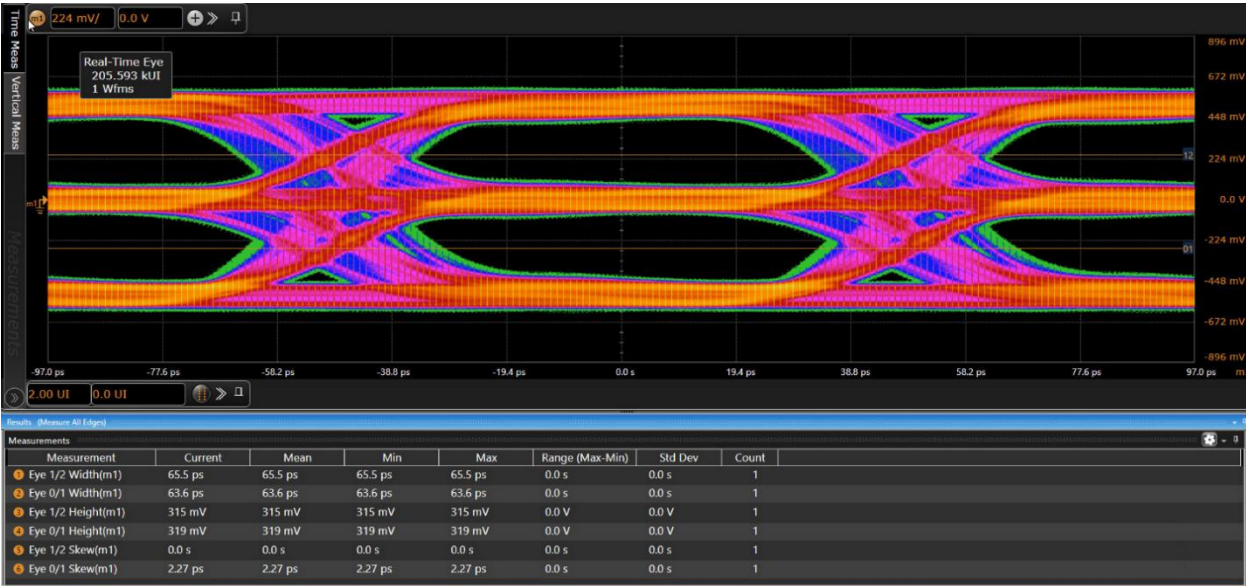
This package includes PrecisionProbe and InfiniiSim Basic, two tools designed to de-embed the effect of cables and fixtures from measurements. PrecisionProbe characterizes the response of a probe, cable, or fixture. InfiniiSim enables you to model them out of a measurement.

# Equalization and Crosstalk — D9010ASIA



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.

# PAMn Analysis — D9011PAMA



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



# Ease of Ownership

## Save Budget and Bench Space with Instrument Integration

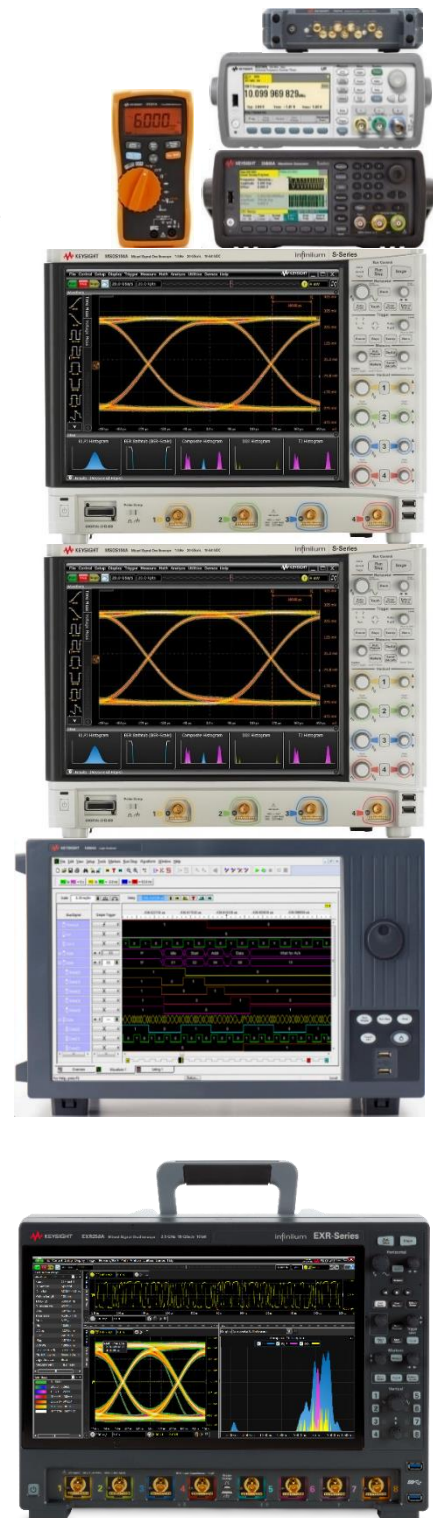
Your Infiniium EXR-Series is more than just an oscilloscope - it's 7 instruments in 1. Keysight pioneered multiple-instrument integration with the release of the mixed signal oscilloscope (MSO) in 1996. The InfiniiVision 2000/3000/4000 X-Series took the concept to the next level by integrating five instruments in one in 2011. The Infiniium EXR-Series integrates seven instruments in one. They are pictured on the right of this page, to scale, next to an EXR258A.

- 8 high-speed analog oscilloscope channels
- 16 digital channels (logic analyzer)
- 50 MHz arbitrary waveform generator
- 50 MHz frequency response analyzer
- 10-digit counter
- 4-digit voltmeter
- Protocol analyzer

Having all these tools integrated into your oscilloscope has many benefits aside from the obvious space and budget simplifications. One user interface means a lower learning curve when you need to use one of the integrated tools. It also means fewer pieces of instrumentation to store, calibrate, and keep updated on firmware.

The counter and DVM are standard features, and special because they use a separate signal path, different than the captured waveform, to make their measurements. This makes them much more accurate, flexible, and user friendly than standard on-screen measurements. Simply connect a probe or cable to an unused channel – no need to scale, trigger, or otherwise set the signal up on screen to make basic frequency and voltage measurements!

The logic analysis, AWG, and FRA can be purchased at any time for permanent installation to your EXR-Series. The variety of protocol analysis capabilities can be purchased for different lengths of time, to best fit your budget and project needs at the moment, or permanently.



Product sizes to scale!

# Completely Upgradeable

Assume that 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? This is no problem with the Infiniium EXR-Series, which is fully upgradeable – no exceptions. The Infiniium EXR gives you the flexibility to use capital or operating expense budgets more intelligently when making your purchase now and in the future.

Keysight is the world's only oscilloscope manufacturer to offer an upgrade from 4 to 8 analog channels, and it is always more affordable than purchasing a new 8 channel oscilloscope. 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 EXR-Series protects your investment by growing with your lab's needs of tomorrow.

| <b>Post-Purchase Upgrades</b>                          | <b>Model</b> |
|--|--------------|
| Add analog bandwidth, up to 6 GHz                      | EXR2BW       |
| Add analog channels, 4 to 8                            | EXR28CH      |
| Add memory, 400 Mpts/ch or 1.6 Gpts/ch flexible memory | EXR2MEM      |
| Add waveform generator, 50 MHz                         | EXR2WAV      |
| Add MSO, 16 channels                                   | EXR2MSO      |

# Combine Multiple Oscilloscopes for up to 40-Channel Tests with Multiscope

With software 11.10 or greater, you can combine multiple EXR-Series oscilloscopes together using a cabling system to perform up to 40 analog-channel tests. This gives you the ability to have individual 4 or 8 channel oscilloscopes when needed and combine oscilloscopes on the fly when higher channel density measurements are required. All channels from each oscilloscope can be viewed and analyzed on a “leader” oscilloscope or managed from your PC using Infiniium Offline.



MultiScope is a standard feature of the EXR-Series oscilloscope and of Infiniium Offline – the only requirement to combine two oscilloscopes is the cabling kit. Specifications for frame-to-frame jitter, setup instructions, and ordering information can be found in the MultiScope Brochure and User’s Guide. Simply search for “MultiScope” on our website or look in the technical documentation on your oscilloscope model’s product page.

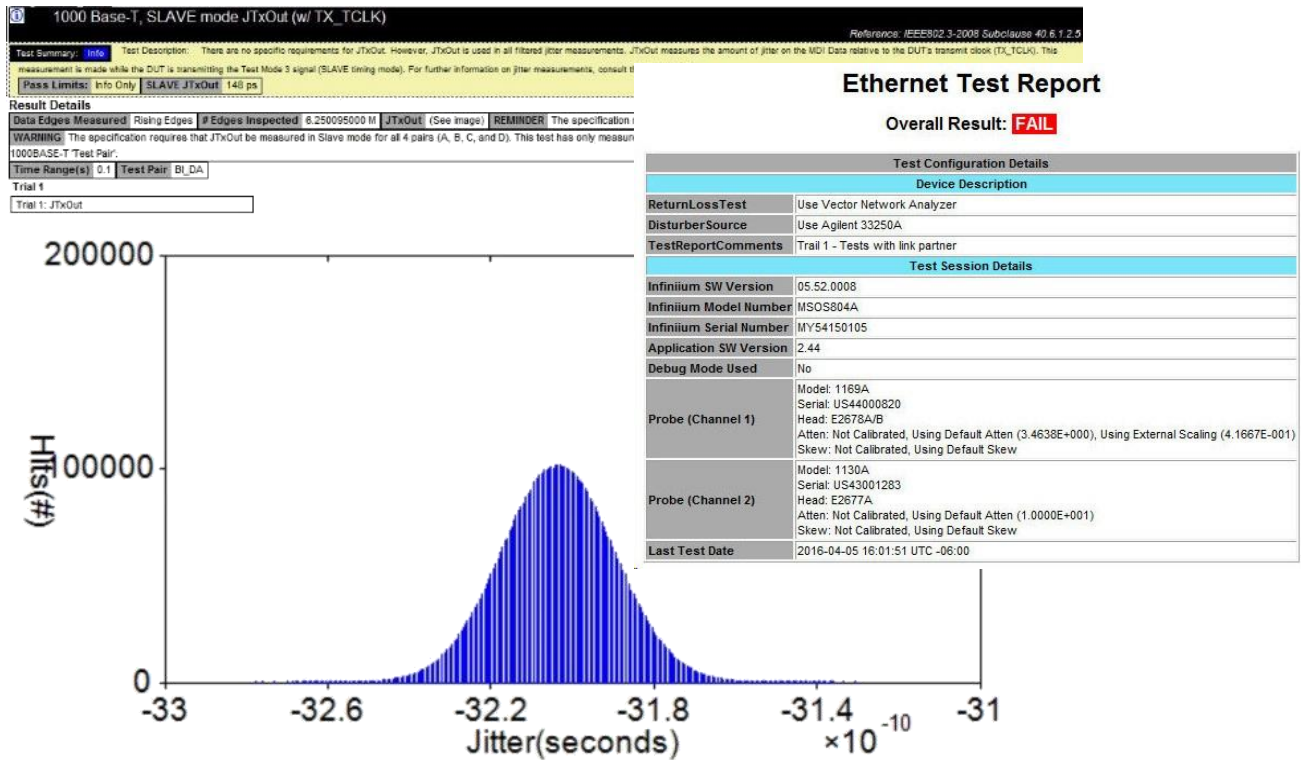
## Comprehensive Testing Applications — Infiniium Offline

You depend on your oscilloscope to capture an accurate picture of what’s happening in your design. But in today’s environment, you may find yourself in a variety of situations where access to an oscilloscope is limited. you may be sharing the instrument with others in the lab, have limited site access, or are trying to collaborate with a colleague remotely. Infiniium Offline can solve all of these problems, and more.

Infiniium Offline (D9010BSEO) is a copy of the same powerful software provided on your Infiniium EXR-Series oscilloscope, just without the oscilloscope hardware. If you wish to control an oscilloscope remotely from the comfort of your desk or home office, the hosted mode can connect and control a single EXR-Series, or many EXR-Series with the MultiScope application outlined above. When access to the oscilloscope is limited, you can capture waveforms on your scope, save to a file, and recall the waveforms into Infiniium Offline from any PC. 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. Infiniium Offline model numbers are in the configuration guide at the end of this document.



# Comprehensive Testing Applications — Compliance Testing



Compliance test applications on the Infiniium EXR-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 applications offer a user-friendly setup wizard and a comprehensive report that includes margin analysis. Contact Keysight if you are looking for a compliance test solution, so we can help you pick the right tools for the job.

| Standard            | Description                                     | Rec'd BW | Software model |
|---------------------|---|----------|----------------|
| 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 | 5GBASE-T1                                       | 6 GHz    | AE6910T        |
|                     | 2.5BASE-T1                                      | 4 GHz    |                |
|                     | 1000BASE-T1                                     | 2.5 GHz  |                |
|                     | 100BASE-T1                                      | 1 GHz    |                |
|                     | 10BASE-T1S                                      | 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      |
| JEDEC               | DDR3 and LPDDR3 Compliance Test Software        | 6 GHz    | D9030DDRC      |

# Intuitive to Use

## Visualize Rare Phenomena Automatically with Exclusive ASIC Technology

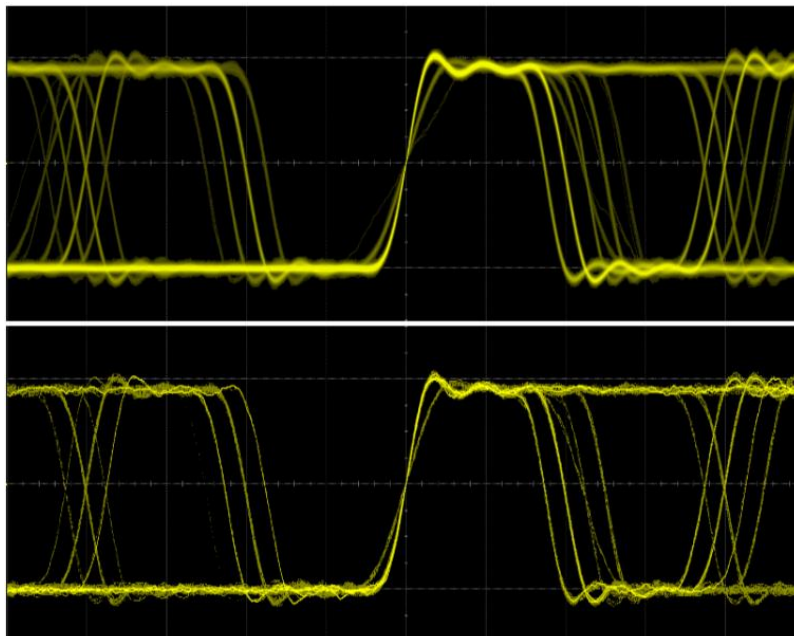
Many oscilloscopes claim impressive specifications, but behind the scenes, they require special setups from the user, or they rely on special modes that compromise the performance of the oscilloscope. For example, some oscilloscopes claim fast triggering when in a special mode that may severely restrict memory and/or sample rate, or only when using segmented memory. With the EXR-Series, we made maximizing performance automatic, always-on, and with no guesswork from you.

Since memory depth, sample rate, bits of resolution, and update rate are automatically optimized based on your measurement setup, there is no extra work required. Just press Auto Scale and go!

The Infiniium EXR-Series leverages a 100M+ gate CMOS ASIC from our UXR-Series oscilloscope, which 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:

| Metric                | Why You Care                          | Infiniium EXR-Series                  | Comparable Scopes |
|-----------------------|---------------------------------------|---------------------------------------|-------------------|
| Update rate (wfm/s)   | See more of your signal               | > 200,000 ( <b>&gt; 200x faster</b> ) | < 1,000           |
| Averaging (wfm/s)     | Noise reduction on repetitive signals | > 12,000 ( <b>&gt; 100x faster</b> )  | < 100             |
| Measurements (meas/s) | Reach 6σ quicker                      | > 300,000 ( <b>20% faster</b> )       | < 250,000         |
| Eye plotting (UI/s)   | Identify transients and jitter        | > 750,000 ( <b>&gt; 50x faster</b> )  | < 15,000          |

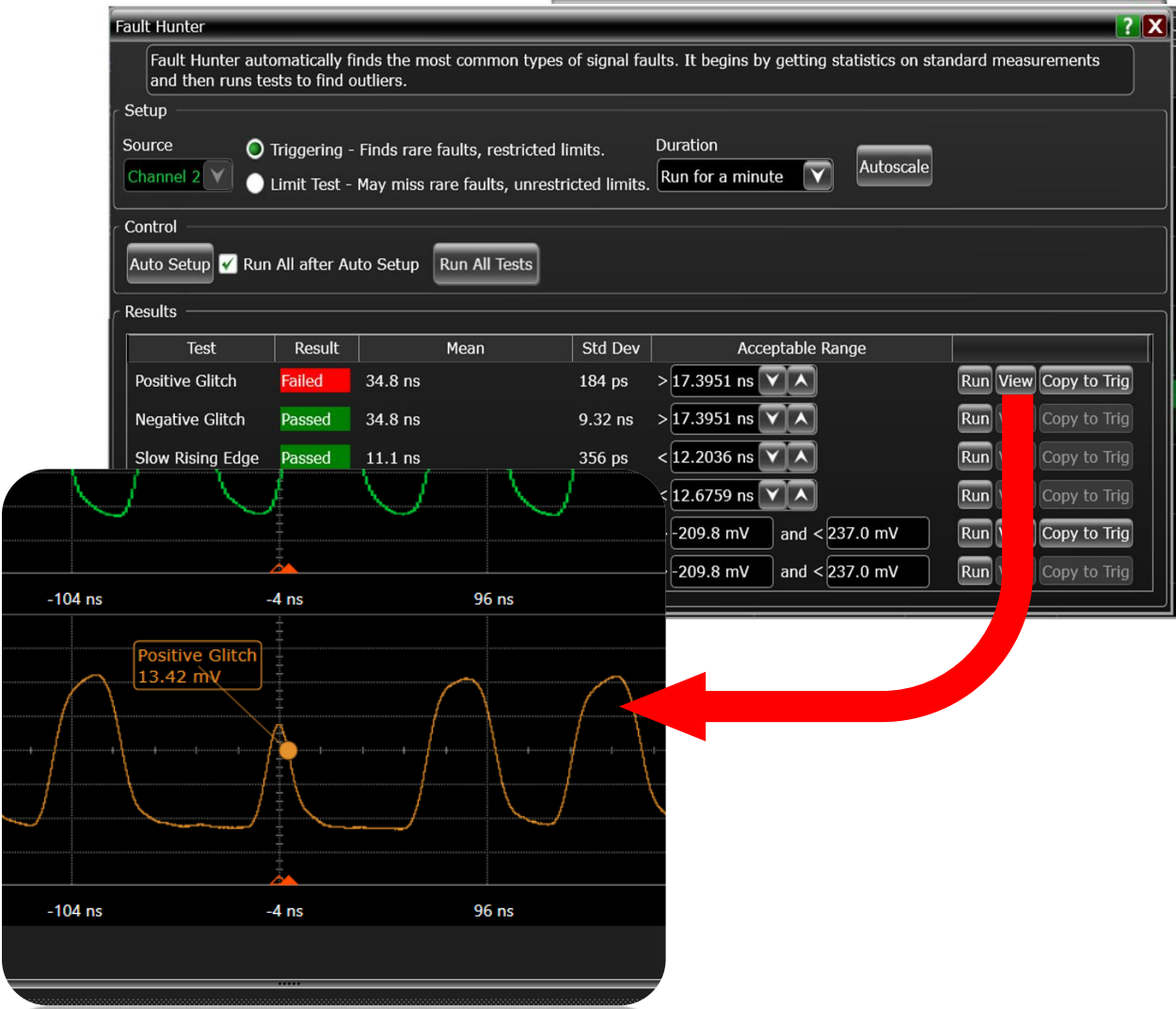
wfm/s = waveforms per second.  
 meas/s = measurements per second.  
 UI/s = Unit Intervals per second.



This is a comparison of the EXR-Series (top) vs. another oscilloscope, each viewing the same signal with identical settings. The lower photo is an oscilloscope triggering under 1,000 wfm/s, with one second of persistence enabled. How many signal details would you miss if you were using the oscilloscope on the bottom instead of the EXR-Series?

# Identify Errors in One Click Using Fault Hunter

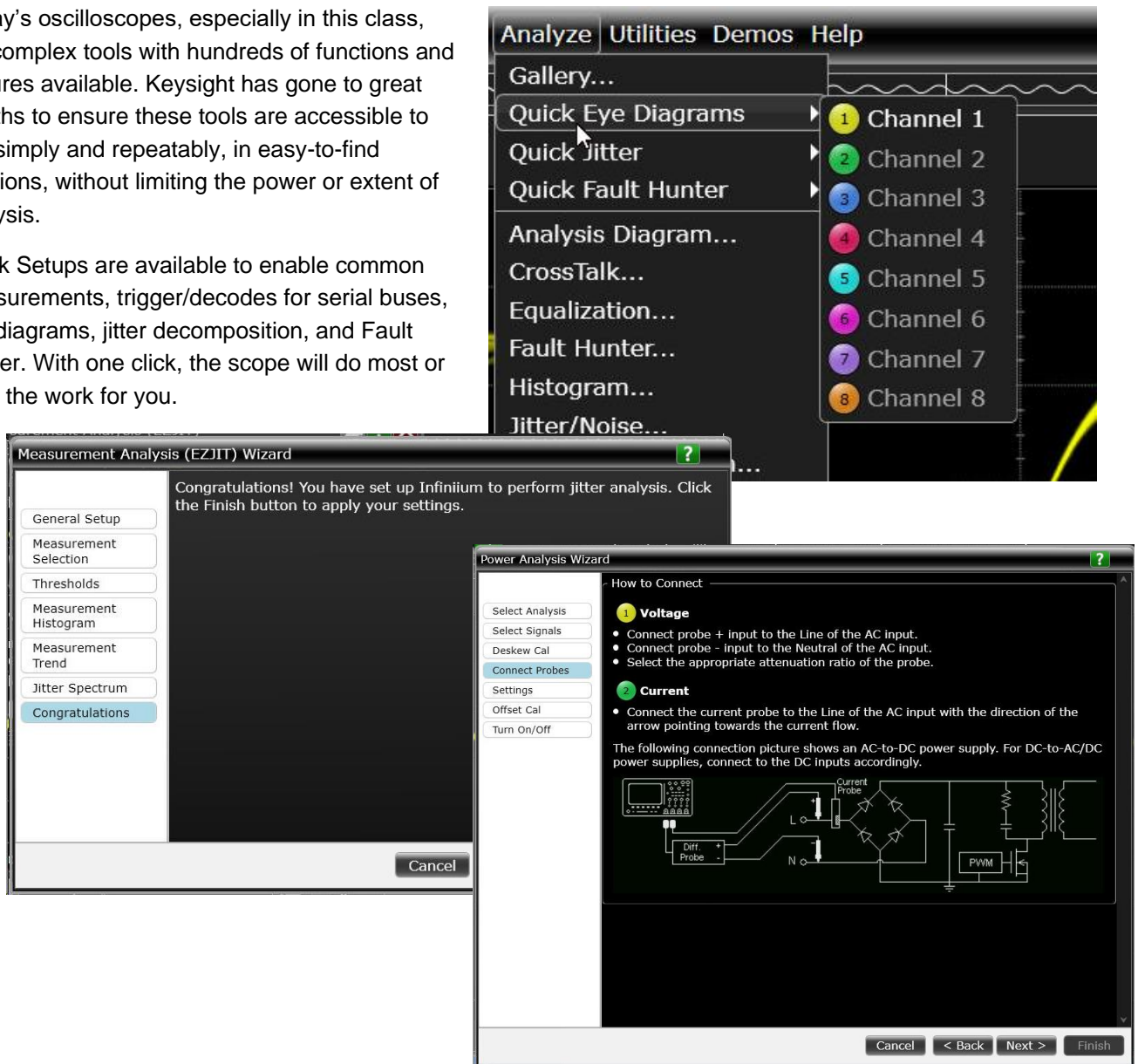
Fault Hunter is an innovative, expert system for inspecting digital systems that can run with a single button press on the front panel of your EXR-Series oscilloscope. It automatically evaluates your signal's characteristics against user-definable criteria, quickly finding and saving errors for your review. It's flexible; 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 and billions of tests completed thanks to our always-on fast triggering speeds of > 200,000 wfms/s.



# Configure Complex Measurements Simply with Setup Wizards

Today's oscilloscopes, especially in this class, are complex tools with hundreds of functions and features available. Keysight has gone to great lengths to ensure these tools are accessible to you simply and repeatably, in easy-to-find locations, without limiting the power or extent of analysis.

Quick Setups are available to enable common measurements, trigger/decodes for serial buses, eye diagrams, jitter decomposition, and Fault Hunter. With one click, the scope will do most or all of the work for you.



For more complex tests, there are Setup Wizards. These step-driven dialog boxes walk you through fine-tuning your analysis even further, explaining different features and settings in more detail. Setup Wizards are available for power analysis, power integrity, real-time eye diagrams, jitter decomposition, measurement analysis (trends, histograms, etc.), crosstalk, and more!

Finally, you might notice a green question mark at the top right of any dialog box. This will act as a shortcut to the built-in help system for that feature, explaining in detail what you can adjust in that dialog box.



## Complete Control of Your User Interface

When you connect an external monitor to most oscilloscopes, it simply duplicates the built-in screen. This can be helpful for when the built-in monitor is small or in an inconvenient place, but not so helpful when you wish to use that extra screen space to visualize waveforms or analysis. With the Infiniium EXR-Series, a second monitor can be used to effectively extend the amount of space you can use to view data thanks to the flexibility of the Infiniium user interface. Organize your waveforms and traces into tabs, separate windows, separate grids, overlay waveforms on top of each other, move data onto separate monitors, and more with a few swipes and taps of your mouse or fingertip.

You can also remotely control your EXR-Series from another Windows 10 PC, with the proper network setup, using the standard Windows 10 feature Remote Desktop Connection. Simply enter the oscilloscope's IP address, default username and password (see the user's guide) and go! Alternatively, you can use most available VNC software without issue. This gives you complete control of the interface, as if you were sitting in front of the oscilloscope itself.



# Explore the Keysight Real-Time Oscilloscope Portfolio

Keysight engineers have created 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.



| Products                       | 1000 X  | 3000 G      | EXR                 | S-Series               | UXR                    |
|--------------------------------|---------|-------------|---------------------|------------------------|------------------------|
| Analog channels                | 2 or 4  | 2 or 4      | 4 or 8, upgradeable | 4                      | 1, 2 or 4, upgradeable |
| Max Bandwidth (all channels)   | 200 MHz | 1 GHz       | 6 GHz               | 4 GHz (8 GHz with 2ch) | 110 GHz                |
| Max Sample rate (all channels) | 1 GSa/s | 2.5 GSa/s   | 16 GSa/s            | 10 GSa/s               | 256 GSa/s              |
| Max memory (all channels)      | 1 Mpts  | 2 Mpts      | 400 Mpts            | 400 Mpts               | 2 Gpts                 |
| Resolution                     | 8 bits  | 8 bits      | 10 bits             | 10 bits                | 10 bits                |
| Timebase accuracy              | 50 ppm  | 1.6 ppm     | 8 ppb               | 12 ppb                 | 25 ppb                 |
| Intrinsic Jitter               | –       | –           | 118 fs              | 100 fs                 | 25 fs                  |
| Lowest noise (1 mV/div)        | –       | 113 $\mu$ V | 43 $\mu$ V          | 74 $\mu$ V             | 150 $\mu$ V            |
| Max ENOB                       | –       | –           | 9                   | 8.1                    | 6.8                    |
| Logic Analysis                 | –       | 16 ch       | 16 ch               | 16 ch                  | –                      |
| Hardware plotting              | Yes     | Yes         | Yes                 | No                     | Yes                    |
| Screen display                 | 7" WVGA | 8.5" WVGA   | 15.6" Full HD       | 15.6" XGA              | 15.4" XGA              |



# Performance Characteristics

## Analog channel specifications

|  |                          | EXR05xA  | EXR10xA     | EXR20xA | EXR25xA | EXR40xA  | EXR60xA |
|--|--------------------------|--|-------------|---------|---------|----------|---------|
| Bandwidth (-3 db)                            | 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 BNC (f), 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                 | 100 Mpts/channel, all channels   |             |         |         |          |         |
|  | Optional                 | 400 Mpts/channel, all channels (400 Mpts/ch option)<br>1.6 Gpts shared between channels 1-4, 5-8 (1.6 Gpts Combined Flexible Memory option) <sup>6</sup>   |             |         |         |          |         |
| 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 <sub>MAX</sub> <sup>1</sup>  |             |         |         |          |         |
|  | 1 M $\Omega$             | 30 V <sub>RMS</sub> or $\pm$ 40 V <sub>MAX</sub> (DC + V <sub>PEAK</sub> )   |             |         |         |          |         |
|  | Notes                    | Probing technology allows for testing of higher voltages; the included N2873A 10:1 probe supports 300 V <sub>RMS</sub> or $\pm$ 400 V <sub>MAX</sub> (DC + V <sub>PEAK</sub> ). 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 |         |         |          |         |
|  |                          | $\leq$ 260 mV/div:   | $\pm$ 3.2 V |         |         |          |         |
|  |                          | > 260 mV/div:  | $\pm$ 4 V   |         |         |          |         |
| 1 M $\Omega$                                 | < 10 mV/div:             | $\pm$ 5 V  |             |         |         |          |         |
|  | $\leq$ 200 mV/div:       | $\pm$ 20 V   |             |         |         |          |         |
|  | > 200 mV/div:            | $\pm$ 40 V   |             |         |         |          |         |
| Offset accuracy <sup>1,3</sup>               |                          | < 2 V: $\pm$ 0.1 div $\pm$ 2 mV $\pm$ 1%; > 2 V: $\pm$ 0.1 div $\pm$ 2 mV $\pm$ 1.5%   |             |         |         |          |         |
| Dynamic range                                |                          | $\pm$ 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 gain accuracy) + (resolution)]   |             |         |         |          |         |
|  |                          | Single cursor: $\pm$ [(DC gain accuracy) + (offset accuracy) + (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.
6. Combined flexible memory shares 1.6 Gpts of memory between channels 1 through 4. This means you can have 1 channel with 1.6 Gpts, two channels with 800 Mpts, or three channels with 533 Mpts memory (on top of 400 Mpts on all channels). Double those channel counts for 8 channel models, as the same logic applies to channels 5-8.

### 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 |
| 5 mV/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. Keysight recommends this to maximize signal to noise ratio and still meet the system bandwidth requirements you need for your measurement.

### 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 EXR-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 EXR-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 78,953 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 <sup>1,7</sup>                      |                       | ± (8 ppb initial + 75 ppb/year aging)  |                                       |
| Intra-channel intrinsic jitter <sup>3,5</sup>           |                       | 4 channel models   | 8 channel models                      |
|   | 100 ns/div            | 118 f <sub>SRMS</sub>  | 150 f <sub>SRMS</sub>                 |
|   | 1 μs/div              | 130 f <sub>SRMS</sub> <sup>[9]</sup>   | 156 f <sub>SRMS</sub>                 |
|   | 10 μs/div             | 140 f <sub>SRMS</sub> <sup>[9]</sup>   | 172 f <sub>SRMS</sub> <sup>[10]</sup> |
|   | 100 μs/div            | 145 f <sub>SRMS</sub> <sup>[9]</sup>   | 175 f <sub>SRMS</sub> <sup>[10]</sup> |
|   | 1 ms/div              | 155 f <sub>SRMS</sub> <sup>[9]</sup>   | 181 f <sub>SRMS</sub> <sup>[10]</sup> |
| Inter-channel intrinsic jitter <sup>3</sup>             |                       | 100 f <sub>SRMS</sub>  |                                       |
| Inter-channel skew drift <sup>3,6</sup>                 |                       | < 500 f <sub>S</sub> MAX   |                                       |
| 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> |                       | $\sqrt{\left(\frac{\text{Time interval}}{\text{error (edge 1)}}\right)^2 + \left(\frac{\text{Time interval}}{\text{error (edge 2)}}\right)^2 + (\text{inter-channel})^2 + (\text{intrinsic jitter})^2}$  |                                       |
| Delta time measurement accuracy <sup>2,3,4,8</sup>      | Intra-channel         | $\pm \left[ \frac{5}{n} \times \sqrt{\left[\frac{\text{Time interval}}{\text{error (edge 1)}}\right]^2 + \left[\frac{\text{Time interval}}{\text{error (edge 2)}}\right]^2} + \left( \left(\frac{\text{Time scale}}{\text{accuracy}}\right) \times \left(\frac{\text{Delta}}{\text{time}}\right) \right) \right]$  |                                       |
|   | Inter-channel         | $\pm \left[ \frac{5}{n} \times \sqrt{\left[\frac{\text{Time interval}}{\text{error (edge 1)}}\right]^2 + \left[\frac{\text{Time interval}}{\text{error (edge 2)}}\right]^2 + [\text{Interchannel}]^2} + \left( \left(\frac{\text{Time scale}}{\text{accuracy}}\right) \times \left(\frac{\text{Delta}}{\text{time}}\right) + (\text{Interchannel skew drift}) \right) \right]$ |                                       |

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.

3. Displayed signal not vertically clipped. Slew rate of sine wave = (peak signal amplitude) × 2πf; slew rate of fast edge = 0.8 × amplitude / (risetime 10-90%).

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

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

6. 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.

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

8. Initial = immediately after factory or user calibration.

9. 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.

10. 120 f<sub>SRMS</sub> possible with external reference.

11. 161 f<sub>SRMS</sub> possible with external reference.

## 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 VPP)                                 |
| Trigger sensitivity                       | Analog channels: see next table<br>Aux trigger input: 200 mVPP, 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 fsRMS<br>8 channel models: 531 fsRMS   |
| 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     | < 0.1 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<br>Under 8 GSa/s: 125 Mpts/ch                                     |
| Minimum detectable glitch   | 2 ns  |
| Max input voltage           | $\pm 40$ VPEAK  |
| Input dynamic range         | $\pm 10$ V about threshold  |
| Minimum input voltage swing | 500 mVPP  |
| Input impedance             | 100 k $\Omega$ $\pm$ 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 ( $\pm 8$ 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>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.<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>   |

### Serial Data Analysis (standard)

|                        |   |
|------------------------|---|
| Real-Time Eye displays | > 750,000 Unit Intervals per second<br>Unfolding of eye diagram<br>BER eye contours (contact Keysight)<br>Recovered clock display |
| Clock recovery methods | 1 <sup>st</sup> or 2 <sup>nd</sup> order PLL, explicit clock, Golden PLL (for PCI Express)  |
| Automation             | One-click quick setup<br>Complete setup wizard<br>Custom mask templates, mask editor  |

### 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), VPP 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, TMIN, TMAX, 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<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)  |
|                 | MATLAB  | Preinstalled scripts: Butterworth, FIR, LFE, RTEye, and SqrtSumOfSquare<br>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>Requires a MATLAB license |
| FFT             | Range   | DC to Nyquist frequency  |
|                 | Horizontal Scale  | Linear, logarithmic  |
|                 | Vertical Units  | dBm, dBmV, dBuV, V <sub>RMS</sub> , 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   | Flatop, 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)   |

### 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)                 |
|                     | 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            | $\pm$ (8 ppb initial $\pm$ 75 ppb/year aging)                   |
| Uncertainty         | $\pm$ 0.1 digits  |
| Minimum pulse width | 75 ps (for signals with < 10 ns transition time)                |
| Maximum frequency   | General purpose: 2.5 GHz  |
|                     | Trigger qualified: 1/(trigger hold off time)                    |
| Totalizer           | Counter size: 64 bits   |
|                     | Edge: Rise or fall  |

## Waveform Generator (optional, specifications are typical)

|                       |                                   |   |
|-----------------------|-----------------------------------|---|
| Output                | Connector                         | BNC, rear panel   |
|                       | Voltage range, 50 $\Omega$        | 1 mV <sub>PP</sub> <sup>1</sup> to 5 V <sub>PP</sub> <sup>2</sup>   |
|                       | Voltage range, 1 M $\Omega$       | 2 mV <sub>PP</sub> <sup>1</sup> to 10 V <sub>PP</sub> <sup>2</sup>  |
|                       | Presets                           | TTL, CMOS (5 V), CMOS (3.3 V), CMOS (2.5 V), ECL  |
|                       | Vertical resolution               | 100 $\mu$ V   |
|                       | Vertical accuracy                 | 2% (< 1 kHz)  |
|                       | Frequency resolution <sup>3</sup> | 12.5 mHz  |
|                       | Frequency accuracy <sup>4</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, arbitrary              |
|                       | Protection                        | Overload automatically disables output  |
|                       | Isolation                         | Not available, main output BNC is grounded  |
| DC offset             | Range                             | $\pm$ (8 V <sub>DC</sub> – Peak AC) into 1 M $\Omega$<br>$\pm$ (4 V <sub>DC</sub> – 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</sup>   |
|                       | SFDR                              | Spurious (non-harmonic): -40 dBc <sup>6</sup>   |
|                       | THD                               | 1% <sup>7</sup>   |
|                       | SNR                               | 40 dB <sup>8</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 <sup>9</sup> , whichever is larger  |
|                       | Pulse width                       | Pulse width: 10 ns minimum, 1 ns resolution <sup>9</sup>  |
|                       | Rise/fall time                    | Rise/fall time: 9 ns (10 to 90%)  |
|                       | Overshoot                         | Overshoot: < 10%  |
|                       | Asymmetry (at 50% DC)             | $\pm$ 1% $\pm$ 5 ns   |
|                       | Jitter (TIE RMS)                  | 100 ps <sup>10</sup>  |
| Triangle (ramp)       | Frequency range                   | 12.5 mHz to 200 kHz   |
|                       | Linearity                         | 1%  |
|                       | 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   |
| 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)               |
|                       | Amplitude resolution              | 14 bits (including sign bit)  |

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

|            |          |  |   |  |
|------------|----------|--|---|--|
| 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  | 1 Hz to carrier frequency or $(2e12 / \text{carrier frequency})$ , whichever is smaller |  |
|            | FSK      | Modulation   | 50% duty cycle square wave  |  |
|            |          | FSK rate   | 1 Hz to 20 kHz  |  |
|            |          | Hop frequency  | 2 x FSK rate to 10 MHz  |  |

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

## Display

|                   |   |
|-------------------|---|
| Size / Resolution | 15.6" capacitive multi-touch, Full HD (1920x1080)                 |
| Annotations       | Up to 100, floating or anchored                                   |
| Grids and Windows | Up to 16 grids on 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                       | 6x USB 3.0 host ports (2x front panel, 4x side panel),<br>1x USB 3.0 device port (side panel, supports up to 200 MB/s data offloading)  |
| Audio                     | Microphone, line in, line out <sup>1</sup>  |
| 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 50 $\Omega$ : $1.65 \pm 0.05$ Vpp ( $8.3 \pm 0.3$ dBm) sine wave (internal or external timebase reference selected)<br>Frequency: 10 MHz $\pm$ (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 $\Omega$ : 356 mVPP (-5 dBm) to 5 VPP (+18 dBm) sine, 285 mVPP to 4 VPP square<br>Frequency: 10 MHz $\pm$ 5 ppm   |

1. Ferrites should be used on the headphone cables to reduce possible electro-magnetic interference.

## 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 InfiniVision 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   |
|                | 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 models: 450 Watts<br>8 channel models: 650 Watts |
| Acoustic Noise | Operator position (0.5 m height at 0.25 m away) | 4 channel models: 45.5 dB                                  |
|                |   | 8 channel models: 49.9 dB                                  |
|                | Bystander position (1 m height at 1 m away)     | 4 channel models: 39.4 dB                                  |
|                |   | 8 channel models: 42.9 dB                                  |
| Weight         | Frame   | 4 channel models: 13.75 kg (30.3 lbs.)                     |
|                |   | 8 channel models: 14.50 kg (32.0 lbs.)                     |
|                | Shipping  | 4 channel models: 20.95 kg (46.2 lbs.)                     |
|                |   | 8 channel models: 21.90 kg (48.3 lbs.)                     |
|                |   | Package: 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 EXR-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   |
| 50 $\Omega$ 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           | EXR054A    | EXR058A    |
| 1 GHz             | EXR104A    | EXR108A    |
| 2 GHz             | EXR204A    | EXR208A    |
| 2.5 GHz           | EXR254A    | EXR258A    |
| 4 GHz             | EXR404A    | EXR408A    |
| 6 GHz             | EXR604A    | EXR608A    |

| Integrated instruments                              | Model                                      |
|---|--|
| 4-digit digital voltmeter, 10 digit counters        | Standard                                   |
| Arbitrary waveform generator, 50 MHz                | EXR2WAV                                    |
| Logic analysis, 16 channels (includes N2756A probe) | EXR2MSO                                    |
| Frequency response analyzer, 50 MHz                 | Part of D9010PWRA or included with EXR2WAV |
| Phase noise analyzer                                | Part of D9010JITA                          |
| Protocol analyzer                                   | Various, see next pages                    |

| Performance upgrades                              | Model       |
|---|-------------|
| Memory Upgrade, 200 Mpts/ch                       | EXR2MEM-001 |
| Memory Upgrade, 400 Mpts/ch                       | EXR2MEM-002 |
| Memory Upgrade, 1.6 Gpts Combined Flexible Memory | EXR2MEM-004 |
| Upgrade to 1 TB Removable SSD                     | EXR2SSD-01T |
| ISO 17025 Calibration (Not Accredited)            | EXR000-1A7  |
| ISO 17025 Calibration (Accredited)                | EXR000-AMG  |

| Additional equipment                        | Model                     |
|---|---------------------------|
| Rackmount Kit, 8U                           | EXR2RACK                  |
| Additional Removable SSDs, 500 GB or 1 TB   | EXR2SSD                   |
| Hard Shell Transit Case, Sold by CaseCruzer | 3F2002-1910C <sup>1</sup> |
| BNC(m) to SMA(f) Adapters, DC-10 GHz        | 54855-67604 <sup>2</sup>  |
| GPIB Adapter, Sold by ICS Electronics       | 4865B <sup>3</sup>        |

1. Parts available from third party vendors listed in description, not sold by Keysight. Contact [sales@casecruzer.com](mailto:sales@casecruzer.com) to order.
2. Precision adapter designed to extend the oscilloscope mating plane to sma connector. The measured insertion loss of this adaptor and the front panel connector is around -.05db at 13GHz. This loss is included in the performance specification of the oscilloscope.
3. Parts available from third party vendor listed in description, not sold by Keysight.

## Add-On software

Infiniium EXR-Series core software offers a wide variety of advanced measurement, analysis, and decode software applications. Choose the add-on software that best fits your needs and unlocks the full potential of your hardware.

| Signal integrity          | Description   | Model     |
|---------------------------|---|-----------|
| 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                             | D9010ASIA |

| Power                         | Description  | Model     |
|-------------------------------|--|-----------|
| 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                                    | Model     |
|--------------------------|--|-----------|
| PAMn Application         | PAMn measurements                              | D9011PAMA |
| User Defined Application | Remote measurement automation and test reports | D9010UDAA |

| Package               | Description  | Model     |
|-----------------------|--|-----------|
| Low Speed Serial      | I <sup>2</sup> C, SPI, Quad SPI, eSPI, RS232, UART, JTAG, I <sup>2</sup> S, SVID, Manchester, MDIO | D9010LSSP |
| Embedded              | 10/100 Mbps Ethernet, USB 2.0, USB-PD, eUSB2, PCIe Gen 1, DisplayPort AUX                          | D9010EMBP |
| Low Speed Automotive  | CAN, LIN, CAN-FD, SENT, FlexRay, CAN XL  | D9010AUTP |
| MIPI Low Speed        | RFFE, I <sup>3</sup> C, 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   | D9120AUTP |
| USB                   | USB 2.0, eUSB2, HSIC, USB-PD, USB 3.x, USB4 LS, DisplayPort AUX                                    | D9010USBP |
| Basic Protocol Bundle | Includes D9010LSSP, D9010EMBP, D9010MPLP, D9010MILP, D9010AUTP                                     | D9011BDLP |

## Probes and accessories

The Infiniium EXR-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.

Additionally, legacy probes from Tektronix may be used on the EXR-Series with the proper adapter, listed below. See the data sheet for a list of compatible probes.



The table below highlights probes commonly used with the Infiniium EXR- 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                   | N287xA                     | 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 EXR-Series |
| Hi-Z+ Passive             | PP000xA                    | Passive probes that, with the help of an adapter, can achieve best-in-class bandwidth, voltage, and loading specifications, up to 1 GHz or 1.2 kV.   |
| Differential Active       | PP001xA                    | Four new active differential probes can achieve best-in-class bandwidth, voltage, and loading specifications up to 1.7 GHz and achieve $\pm 42$ V range.   |
| Digital                   | N2756A                     | Ships with EXR2MSO options. 16 flying leads with grabbers, ground leads, and other accessories.  |
| Single-ended Active       | N2795A<br>N2796A<br>N2797A | 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  | N275xA                     | Up to 6 GHz, 200 k $\Omega$ input, InfiniiMode for Diff, SE, CM probing, built-in multifunction scope control, headlight   |
| Differential low voltage  | 113xB                      | InfiniiMax Gen I Probes that provide up to 7 GHz bandwidth for differential, solder-in, browser, and SMA connections   |
| Differential high voltage | DP0001A                    | 400 MHz, 2 kV input, high CMRR > 80 dB at DC, UL safety certified  |
| Current                   | N7026A                     | 150 MHz, 30 ARMS, 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   |
| Adapter                   | N2744A                     | Adapter for using legacy Tektronix TekProbe oscilloscopes. See data sheet for compatible models.   |

## Post-purchase upgrades

| Hardware options  | Model                                  |
|---|--|
| Add logic analysis, 16 channels (includes N2756A probe) | EXR2MSO                                |
| Add arbitrary waveform generator, 50 MHz                | EXR2WAV                                |
| Add frequency response analyzer (Bode plots)            | Included with D9010PWRA or AWG options |
| Rackmount Kit, 8U                                       | EXR2RACK                               |
| Additional Removable SSD, 500 GB                        | EXR2SSD-500                            |
| Additional Removable SSD, 1 TB                          | EXR2SSD-01T                            |

### Memory upgrades

|                      | ...to 200 Mpts/ch | ...to 400 Mpts/ch | ...to 1.6 Gpts/<br>Combined Flexible Memory |
|----------------------|-------------------|-------------------|---|
| From 100 Mpts/ch...  | EXR2MEM-001       | EXR2MEM-002       | EXR2MEM-004                                 |
| From 200 Mpts/ch...  | -                 | EXR2MEM-003       | EXR2MEM-005                                 |
| From 400 Mpts/ch.... | -                 | -                 | EXR2MEM-006                                 |

### Analog channel upgrades (from 4 channels, to 8 channels)

|                     |             |
|---------------------|-------------|
| For 500 MHz models: | EXR28CH-001 |
| For 1 GHz models:   | EXR28CH-002 |
| For 2 GHz models:   | EXR28CH-003 |
| For 2.5 GHz models: | EXR28CH-004 |
| For 4 GHz models:   | EXR28CH-005 |
| For 6 GHz models:   | EXR28CH-006 |

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

| <b>Bandwidth upgrade path</b> | <b>4 channels</b> | <b>8 channels</b> |            |
|-------------------------------|-------------------|-------------------|------------|
| From 500 MHz...               | ...to 1 GHz       | EXR2BW-001        | EXR2BW-007 |
|                               | ...to 2 GHz       | EXR2BW-002        | EXR2BW-008 |
|                               | ...to 2.5 GHz     | EXR2BW-003        | EXR2BW-009 |
|                               | ...to 4 GHz       | EXR2BW-013        | EXR2BW-022 |
|                               | ...to 6 GHz       | EXR2BW-014        | EXR2BW-023 |
| From 1 GHz...                 | ...to 2 GHz       | EXR2BW-004        | EXR2BW-010 |
|                               | ...to 2.5 GHz     | EXR2BW-005        | EXR2BW-011 |
|                               | ...to 4 GHz       | EXR2BW-015        | EXR2BW-024 |
|                               | ...to 6 GHz       | EXR2BW-016        | EXR2BW-025 |
| From 2 GHz...                 | ...to 2.5 GHz     | EXR2BW-006        | EXR2BW-012 |
|                               | ...to 4 GHz       | EXR2BW-017        | EXR2BW-026 |
|                               | ...to 6 GHz       | EXR2BW-018        | EXR2BW-027 |
| From 2.5 GHz...               | ...to 4 GHz       | EXR2BW-019        | EXR2BW-029 |
|                               | ...to 6 GHz       | EXR2BW-020        | EXR2BW-021 |
| From 4 GHz...                 | ...to 6 GHz       | EXR2BW-021        | EXR2BW-030 |

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



## 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. Infiniium Offline uses the exact same code as your Infiniium EXR-Series.

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. See the Infiniium Offline data sheet to learn more.



| 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  | I <sup>2</sup> C, SPI, RS232/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 |

## Compliance software

Keysight offers a wide variety of compliance software applications for the Infiniium EXR-Series. Choose your license term, license type, and KeysightCare software support subscription that best fits your needs and budget.

All Infiniium EXR-Series models come standard with:

- Serial data analysis (SDA) software to provide flexible clock recovery including 1st, 2nd, and 3rd-order PLL and constant algorithms. With a stable clock, you can look at real-time eyes of transition and non-transition bits. EXR-Series oscilloscopes with SDA software also provide a new unique view of bits preceding an eye.
- User defined function
- Fast Fourier Transform (FFT) for frequency domain (spectrum) analysis. Use the FFT to compute both magnitude and phase and take advantage of several useful features to assist in spectral analysis. The FFT can control span and resolution bandwidth.

| Standard            | Description                                     | Rec'd BW | Software model |
|---------------------|---|----------|----------------|
| 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 | 5GBASE-T1                                       | 6 GHz    | AE6910T        |
|                     | 2.5BASE-T1                                      | 4 GHz    |                |
|                     | 1000BASE-T1                                     | 2.5 GHz  |                |
|                     | 100BASE-T1                                      | 1 GHz    |                |
|                     | 10BASE-T1S                                      | 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      |
| JEDEC               | DDR3 and LPDDR3 Compliance Test Software        | 6 GHz    | D9030DDRC      |

# Compliance software licensing and KeysightCare software support subscriptions

Each of the Infiniium measurement, analysis, decode, triggering, and compliance software options are offered as various software licensing options. Choose your license term, type, and support contract for each software product.

## Select your software license:

1. Choose your software product (for example: D9010USBC).
2. Choose your license term: perpetual or subscription.
  - **Perpetual** – Perpetual licenses can be used indefinitely.
  - **Subscription** – Subscription licenses can be only be used through the term of the license (6, 12, 24, or 36 months license options available).
3. Choose your license type: node-locked, transportable, USB portable, or floating.
  - **Node-locked** – License can be used on one specified instrument/computer.
  - **Transportable** – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (Internet connection required).
  - **USB Portable** – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number E8900-D10).
  - **Floating (single site)** – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.
4. Choose your support subscription duration.
  - Perpetual licenses are sold with a **12 (default), 24, 36, or 60-month software support subscription**. Support subscriptions can be renewed for a fee after that.
  - Subscription licenses include a **software support subscription through the term of the license**.

# Infiniium Application Software Bundles for EXR/MXR A/S-Series Oscilloscopes

**Save 40% off list price**

## Application Software Bundles Overview

To simplify configuration and provide a cost-effective solution, Keysight offers seven different subscription-only bundles of oscilloscope software optimized for specific technologies and applications. Select the bundle that meets your needs, choose a subscription duration between 6 to 36 months, and save 40% off the list price relative to purchasing the same subscription items individually. Each bundle is available on Keysight's Infiniium MXR, EXR, and S-Series oscilloscopes and may be purchased at any time.

- **D9110ESSB** – Essential Bundle
- **D9110AUTB** – Automotive Bundle
- **D9110MILB** – Aerospace and Defense Bundle
- **D9110HSSB** – High-Speed Serial Bundle
- **D9110SINB** – Signal Integrity Bundle
- **D9110POWB** – Power Bundle
- **D9110PREB** – Premium Bundle

Visit the [bundle web page](#) to find out more about what is included in each software bundle.




# Confidently Covered by Keysight Services

Prevent delays caused by technical questions and reduce system downtime due to instrument maintenance and repairs with Keysight Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, software support, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for instruments, software, and solutions. KeysightCare covers an extensive group of instruments, application software, and solutions and ensures optimal uptime, faster response, faster access to experts, and faster resolution.

## Keysight Services

| Offering   | Benefits  |
|--|---|
| <b>KeysightCare</b><br> | KeysightCare provides elevated support for Keysight instruments and software, with access to technical support experts who respond within a specified time and ensure committed repair and calibration turnaround times (TAT). KeysightCare offers multiple service agreement tiers, including KeysightCare Assured, Enhanced, and Application Software Support. See the <a href="#">KeysightCare data sheet</a> for details. |
| KeysightCare Assured   | KeysightCare Assured goes beyond basic warranty with repair services that include committed TAT and unlimited access to technical experts.  |
| KeysightCare Enhanced  | KeysightCare Enhanced includes all the benefits of KeysightCare Assured plus Keysight's accurate and reliable <a href="#">Calibration Services</a> , accelerated, and committed TAT, and technical response.  |
| <b>Keysight Support Portal &amp; Knowledge Center</b>  | All KeysightCare tiers include access to the Keysight Support Portal where you can manage support and service resources related to your assets such as service requests, and status, or browse the Knowledge Center.  |
| <b>Education Services</b>  | Build confidence and gain new skills to make accurate measurements, with flexible Education Services developed by Keysight experts. Including Start-up Assistance.  |
| <b>Alternative acquisition options</b>   |   |
| <b>KeysightAccess</b>  | Reduce budget challenges with a leased-based subscription service, that offers low monthly payments, enabling you to get the instruments, software, and technical support you want for your test needs.   |

## Recommended services

Maximize your test system up-time by securing technical support, repair, and calibration services with committed response and turnaround times. 1-year KeysightCare Assured is included in every new instrument purchase. Obtain multi-year KeysightCare upfront to eliminate the need for lengthy and tedious paperwork and yearly requests for maintenance budget. Plus, you benefit from secured service for 2, 3, or 5 years.

| Service                       | Function   |
|-------------------------------|--|
| <b>KeysightCare Enhanced*</b> | <b>Includes tech support, warranty and calibration</b>       |
| R-55B-001-1                   | KeysightCare Enhanced – Upgrade 1 year                       |
| R-55B-001-2                   | KeysightCare Enhanced – Extend to 2 years                    |
| R-55B-001-3                   | KeysightCare Enhanced – Extend to 3 years (Recommended)      |
| R-55B-001-5                   | KeysightCare Enhanced – Extend to 5 years (Recommended)      |
| <b>KeysightCare Assured</b>   | <b>Includes tech support and warranty</b>                    |
| R-55A-001-2                   | KeysightCare Assured – Extend to 2 years                     |
| R-55A-001-3                   | KeysightCare Assured – Extend to 3 years                     |
| R-55A-001-5                   | KeysightCare Assured – Extend to 5 years                     |
| <b>Start-Up Assistance</b>    |  |
| PS-S40-01                     | Included – instrument fundamentals and operations starter    |
| PS-S40-04                     | Recommended – instrument fundamentals and operations starter |
| PS-S40-02                     | Optional, technology & measurement science standard learning |

\* Available in select countries. For details, please view the [datasheet](#). R-55B-001-2/3/5 must be ordered with R-55B-001-1.



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at [www.keysight.com](http://www.keysight.com).

This information is subject to change without notice. © Keysight Technologies, 2022 - 2023, Published in USA, September 15, 2023, 3120-1495.EN