

# Infiniium 9000 Series Oscilloscopes



Complimentary scope with  
every Infiniium 9000 Series...



...Now until September 30, 2013

Data Sheet



Engineered for broadest measurement capability

Anticipate — Accelerate — Achieve



Agilent Technologies

# If you haven't purchased an Agilent scope lately, why should you consider one now?

If you're like most engineers, you never know what your next project will demand from you. You need an oscilloscope that can adapt to a wide variety of debug and test challenges.

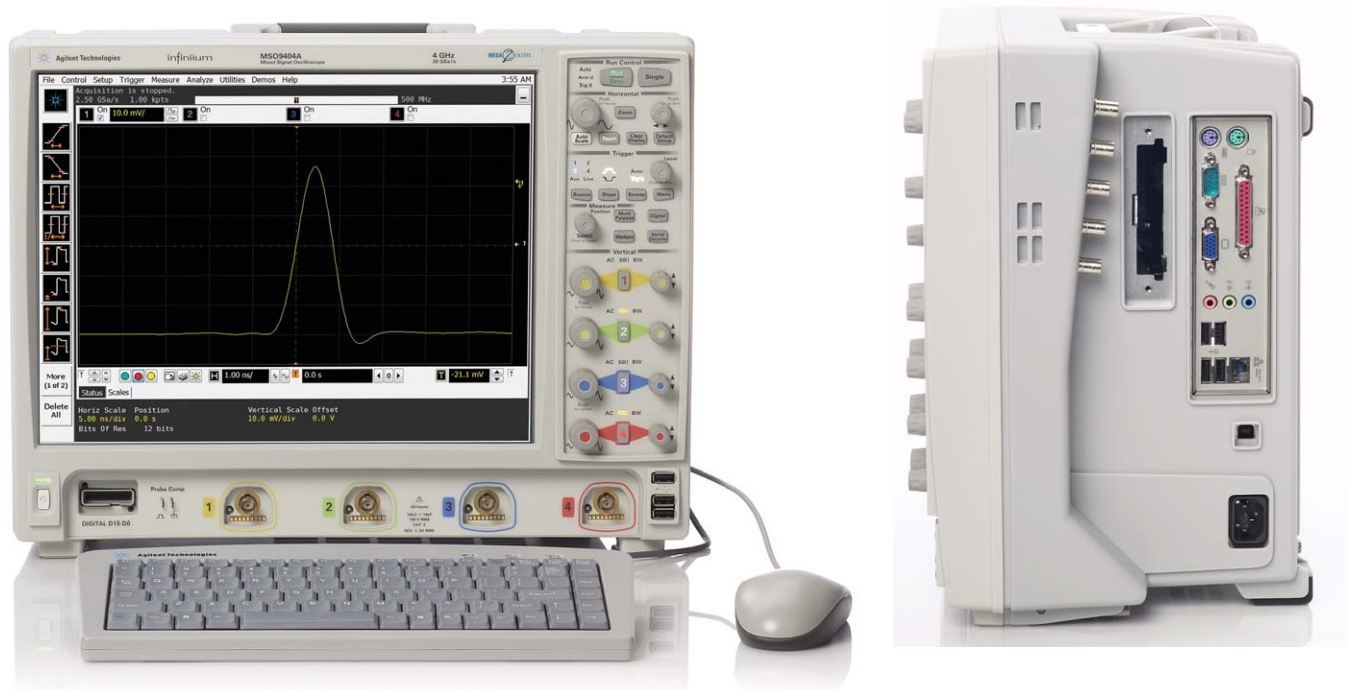
That's why we designed our new Infiniium 9000 Series oscilloscope to meet a full range of needs.

First we built in the powerful features you'd expect in any Infiniium scope. Then we engineered the scope for the broadest measurement capability, so it would be the most indispensable tool in your arsenal.

There is no better way to experience the superiority of the Infiniium 9000 Series scopes than to see it.

Contact Agilent today to request an evaluation.

Or visit:  
[www.agilent.com/find/9000](http://www.agilent.com/find/9000)



The Infiniium 9000 Series offers bandwidths up to 4 GHz. Each model, equipped with a large 15" XGA LCD display, comes in a whisper-quiet package that is just 9" (23 cm) deep and weighs only 26 pounds (11.8 kg).

| Model    | Analog bandwidth | Analog sample rate<br>4-channel/2-channel | Standard memory<br>4-channel/2-channel | Scope channels | Logic channels |
|----------|------------------|-------------------------------------------|----------------------------------------|----------------|----------------|
| DSO9064A | 600 MHz          | 5 GSa/s/10 GSa/s                          | 20 Mpts/40Mpts                         | 4              | -              |
| MSO9064A | 600 MHz          | 5 GSa/s/10 GSa/s                          | 20 Mpts/40Mpts                         | 4              | 16             |
| DSO9104A | 1 GHz            | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | -              |
| MSO9104A | 1 GHz            | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | 16             |
| DSO9254A | 2.5 GHz          | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | -              |
| MSO9254A | 2.5 GHz          | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | 16             |
| DSO9404A | 4 GHz            | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | -              |
| MSO9404A | 4 GHz            | 10 GSa/s/20 GSa/s                         | 20 Mpts/40Mpts                         | 4              | 16             |

# What makes the Infiniium 9000 Series the go-to scope for a whole range of test and debug challenges?

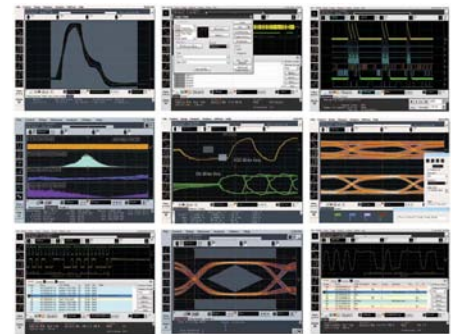
## It's three instruments in one

1. Scope: The powerful features of our Infiniium Series oscilloscopes coupled with superior specifications give you precise signal representation.
2. Logic analyzer: Fast deep-memory digital channels let you see critical data values and timing relationships.
3. Protocol analyzer: The world's first scope-based protocol viewer with multi-tab viewing. Quickly drill and move between protocol and physical layers.



## It offers the widest range of debug and compliance application software

Need accurate answers to your measurement questions? The Infiniium 9000 Series offers the largest range of application-specific software for debug, analysis and compliance testing. Which application is right for you? Take a look at the possibilities on pages 7-12.

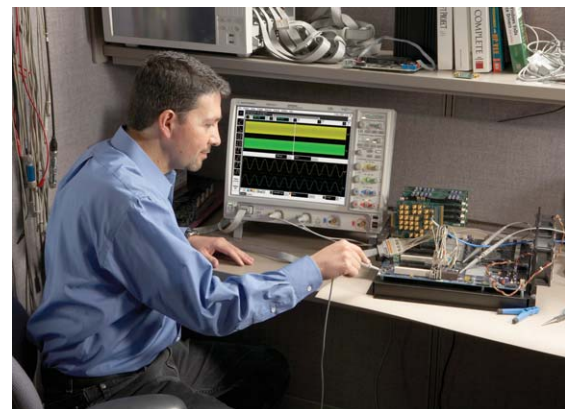


## It's sized to fit your environment

Limited bench space? It has a small footprint and thin profile  
Height: 12.9" (33 cm); width: 16.8" (43 cm); depth: just 9" (23 cm)

Need to share the scope? It's light weight: 26 lbs. (11.8 kg)

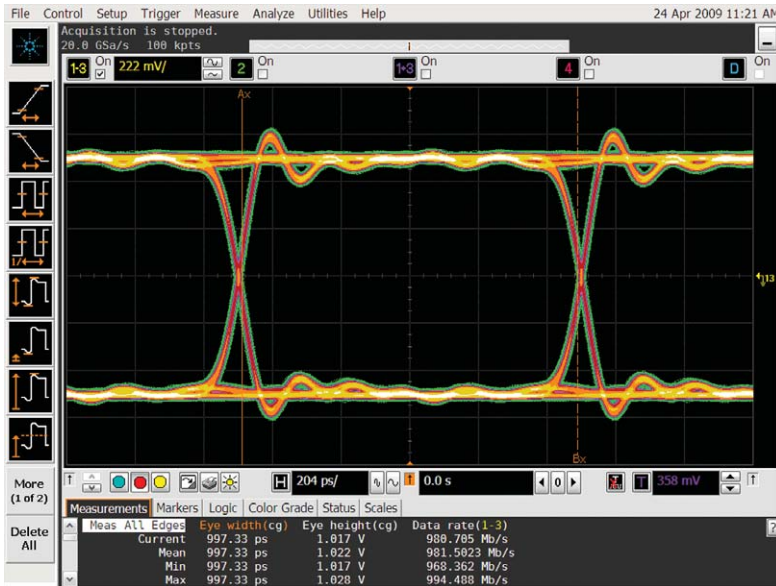
Need to see lots of signals? It has the biggest screen: 15" (23 cm) XGA



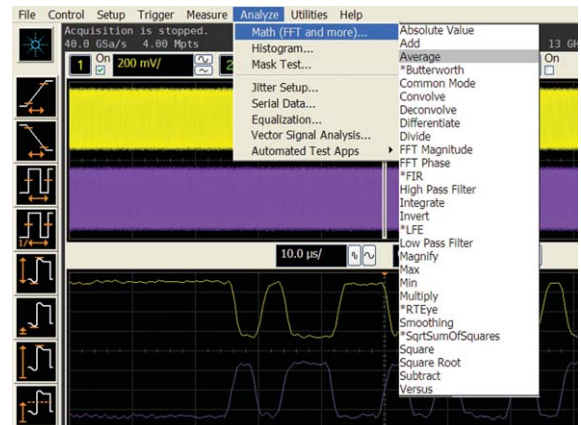
# It's three instruments in one

## 1. Oscilloscope

High-performance scope channels ensure superior viewing of signals under test. All models incorporate a powerful, feature-packed Infiniium oscilloscope with responsive deep memory.



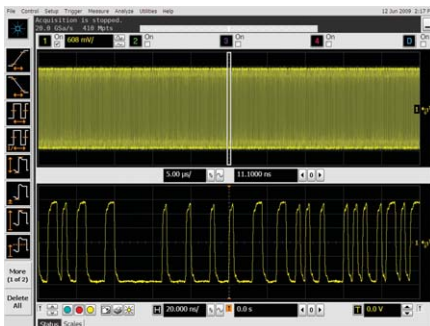
Up to 4 GHz bandwidth and 20 GSa/s high sample rates guarantee you'll see a precise representation of the analog characteristics of signals you're testing.



Mask tests, histograms and a wide variety of functions provide deep signal analysis.

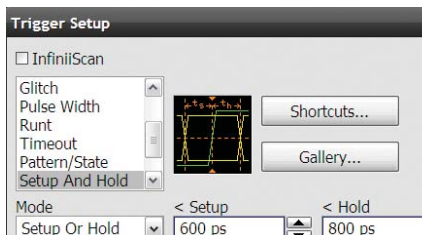
### Responsive deep memory

With standard 20 Mpts/ch, and up to 1 Gpts/ch of memory, you can capture long time periods while retaining fast sample rates. Fast update rates mean your scope stays responsive with deep memory on, ensuring precise representation of analog signals.



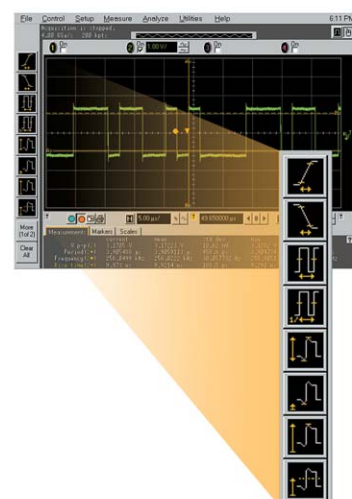
### Advanced triggering

Advanced triggers are essential when you are investigating suspected problems. Infiniium offers a full range of advanced triggers to help you isolate and capture the condition you need to characterize. The 9000 Series simplifies trigger setups by using intuitive dialog boxes with descriptive graphics.



### Drag and drop measurements

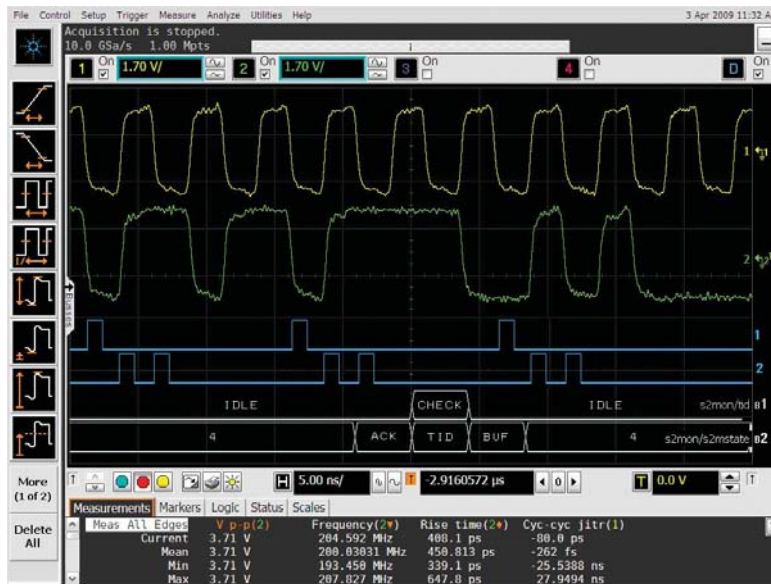
It's simple: drag an icon from the measurement bar and drop it on the cycle you want to measure. You can make up to ten measurements on your waveforms. All of the measurements appear at the bottom of the display with statistics and are color-coded to the channel you are measuring.



# It's three instruments in one

## 2. Logic analyzer

MSO models add 16 high-speed timing channels with standard 128 Mpts digital memory, allowing you to retain fast 2 GSa/s sample rates over long periods of time.



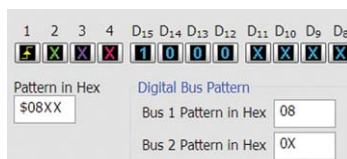
Use the timing channels to evaluate control signal relationships and data buses up to 16 bits wide. Use symbols to more quickly interpret waveforms.



Designing with Altera or Xilinx FPGAs? Use the FPGA dynamic probe for rapid internal FPGA measurements. Using I<sup>2</sup>C, SPI, RS-232, or low- or full-speed USB? Use the digital channels to acquire and decode these buses, preserving analog channels for other time-correlated measurements.

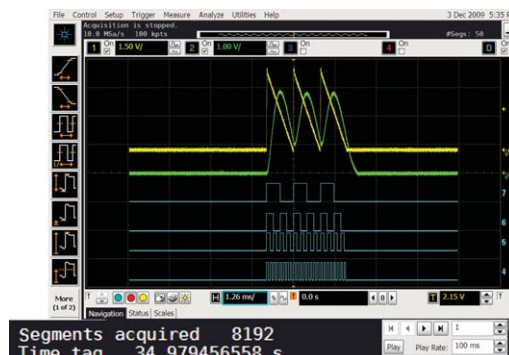
### Digital and mixed-signal trigger

Trigger on and display individual signals or buses. With precise time-correlation between analog and digital signals, confidently trigger across any combination of analog and digital signals simultaneously.



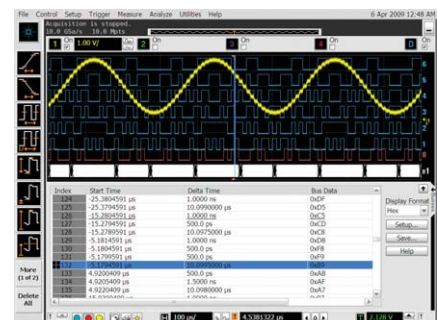
### Industry's only segmented memory for both analog and digital channels

Capture short bursts without consuming memory during periods when the trigger condition is not met. Agilent is the only vendor that supports segmented memory capture on both analog and digital channels.



### Waveform and Listing Windows

View buses as waveforms or easily follow events in the listing window expandable to the entire display. A blue tracking marker provides time-correlation between waveform and listing displays.

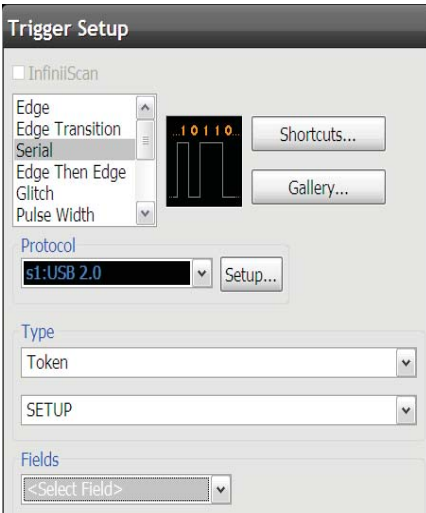


# It's three instruments in one

## 3. Protocol analyzer

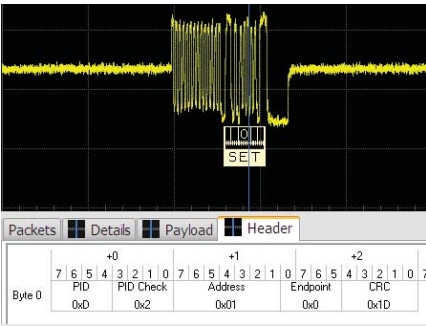
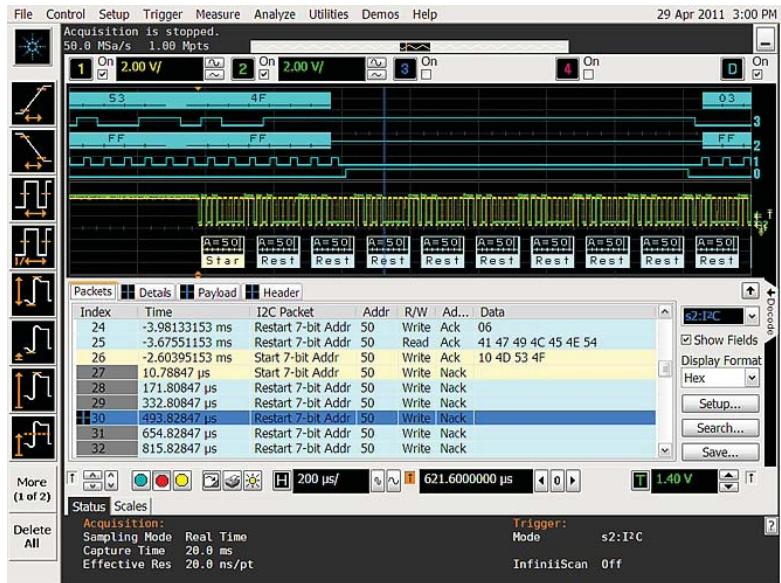
Does your design include a serial bus that is a key point for testing or debugging? Add protocol analysis capability to your scope for:

- CAN
- FlexRay
- I<sup>2</sup>C
- JTAG
- LIN
- MIPI D-Phy
- PCIe
- RS-232/UART
- SATA
- SPI
- USB
- 8B/10B
- digRF



Quickly move between physical and protocol layer information using the time-correlated tracking marker. Display protocol content using waveform symbols and the industry's first multi-tab protocol viewer. The packets tab shows a high level view of the packet over time.

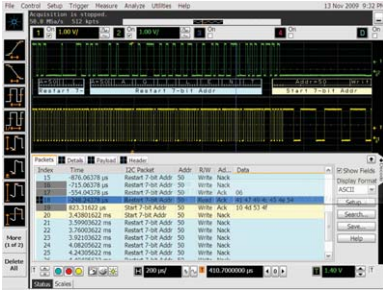
Protocol-level triggering makes it easy to isolate events with pinpoint accuracy.



Use any combination of analog or digital channels for serial protocol decode, with up to four buses decoded simultaneously.

Header tab shows packets in a databook format. Hovering on any tab reveals additional detail.

# Widest range of debug and compliance software applications: serial protocol-level



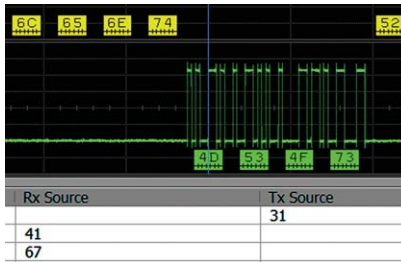
Trigger and view on-screen serial decode of I<sup>2</sup>C packets.

## I<sup>2</sup>C/SPI serial trigger and decode (N5391B or Option 007 on new scope purchases)

This application displays real-time time-aligned decode of I<sup>2</sup>C and SPI serial buses. Hardware-based triggering means triggering reliably, even on the most infrequent events.

This application works on all models and can use any combination of scope or logic acquisition channels.

For more information: [www.agilent.com/find/9000\\_I2C-SPI](http://www.agilent.com/find/9000_I2C-SPI)



Trigger on and decode RS-232/UART transmission.

## RS-232/UART serial decode and trigger (N5462B or Option 001 on new scope purchases)

This application eliminates the need to manually decode bus traffic. Using data captured on the scope or logic channels, the application lets you easily view the information sent over an RS-232 RS-422, RS-485 or other UART serial buses.

Display real-time time-aligned decode of transmit and receive lines. Hardware-based triggering means triggering reliably, even on the most infrequent events.

This application works on all models and can use any combination of the scope or logic acquisition channels.

For more information: [www.agilent.com/find/9000\\_RS-232](http://www.agilent.com/find/9000_RS-232)



Trigger on and decode CAN, LIN and FlexRay serial packets.

## CAN, LIN and FlexRay triggering and decode (N8803B or Option 008 on new scope purchases)

Trigger on and view both protocol layer information and physical layer signal characteristics for CAN, LIN and FlexRay buses. Numerical decode values are automatically displayed and synchronized below the captured signal or seen in protocol viewer.

Hardware-based triggering for CAN and LIN means triggering reliably, even on the most infrequent events. FlexRay uses software-based protocol triggering.

This application works on all models and can use any combination of scope or logic acquisition channels.

For more information: [www.agilent.com/find/9000\\_CAN](http://www.agilent.com/find/9000_CAN)



Import BSDL files and decode JTAG scan chain activity.

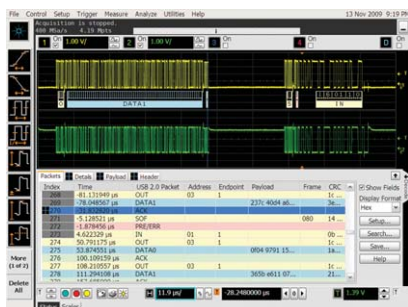
## JTAG (IEEE 1149.1) triggering and decode (N8817A or Option 042 on new scope purchases)

This application displays real-time time-aligned decode of JTAG (IEEE 1149.1) TDI and TDO signals. The application eliminates the difficult task of manually determining JTAG TAP controller states, instruction and data register decode, and flags error conditions. The application includes scan chain description features including the ability to import .bsdl files for each device and displays device names and opcodes in the protocol listing.

This application works on all models and can use any combination of scope or logic acquisition channels.

For more information: [www.agilent.com/find/9000\\_JTAG](http://www.agilent.com/find/9000_JTAG)

# Widest range of debug and compliance software applications: serial protocol and FPGA



Trigger on and decode USB packets.

## USB serial trigger and protocol viewer (N5464B or Option 005 on new scope purchases)

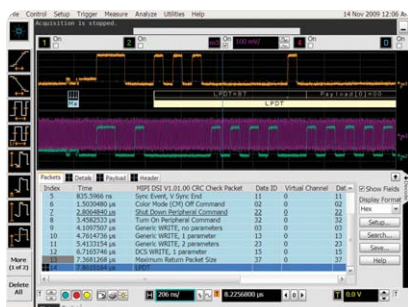
Trigger on and quickly view USB packets, payload, header and detail information. Powerful time-correlated views of waveform and symbol, to the bit level, make it easy to isolate communication faults to logic or analog sources.

USB hardware-based triggering means triggering reliably, even on the most infrequent events.

Low and full-speed USB protocol is supported on digital and scope channels of all models.

High-speed USB protocol is supported on scope channels of 1 GHz, 2.5 GHz and 4 GHz models.

For more information: [www.agilent.com/find/9000\\_USB](http://www.agilent.com/find/9000_USB)



Trigger on and decode MIPI packets

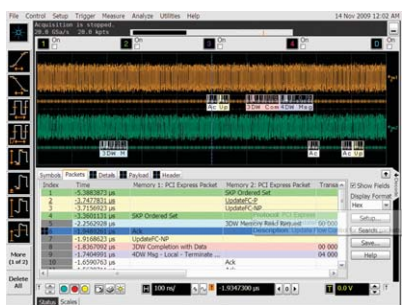
## MIPI D-Phy serial decode and trigger (N8802A or Option 019 on new scope purchases)

This application eliminates the need to manually decode bus traffic. Using data captured on the scope, the application lets you easily view the information sent over MIPI serial buses.

The application also enables software-based protocol triggering.

This application works on all 4 GHz models and can use any combination of the scope channels

For more information: [www.agilent.com/find/N8802A](http://www.agilent.com/find/N8802A)



Trigger on and decode PCIe serial packets.

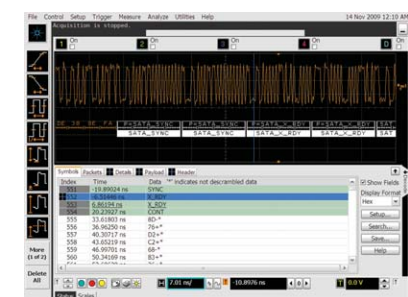
## PCI Express® serial trigger and protocol viewer (N5463B or Option 006 on new scope purchases)

This application provides protocol-level triggering and viewing of a PCIe® lane. Quickly view packets, payload, header, and detail information. Powerful time-correlated views of waveform, symbol, character, link and transaction layer packet data down to the bit level make it easy to isolate communication faults to logic or analog sources.

Trigger on and view CRC, 8B/10B and disparity errors. Hardware-based triggering for PCIe means triggering reliably, even on the most infrequent events.

This application is supported on scope channels of 4 GHz models.

For more information: [www.agilent.com/find/9000\\_PCI](http://www.agilent.com/find/9000_PCI)



Trigger on and decode SATA serial packets

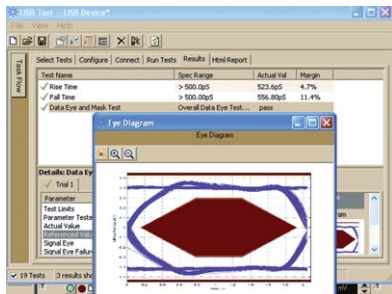
## SATA triggering and decode (N8801A or option 038 on new scope purchases)

Trigger on and view both protocol layer information and physical layer signal characteristics for SATA 1 (1.5 GB/s). Numerical decode values are automatically displayed and synchronized below the capture signal or seen in protocol viewer.

This application enables software-based protocol triggering. This application works on 4 GHz and can use any combination of scope channels

For more information: [www.agilent.com/find/N8801A](http://www.agilent.com/find/N8801A)

## Widest range of debug and compliance software applications: serial physical-layer



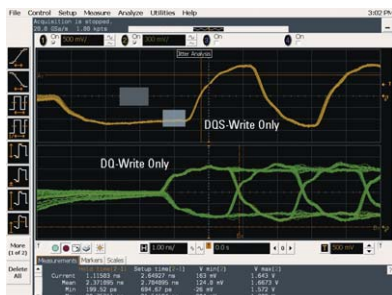
Check for USB compliance.

### USB 2.0 compliance testing (N5416A or Option 029 on new scope purchases)

Quickly determine USB compliance with this USB-IF recognized solution. A setup wizard guides you through test selection and configuration.

This application is USB-IF approved and supported on all 2.5 GHz and 4 GHz models.

For more information: [www.agilent.com/find/9000\\_USB-compliance](http://www.agilent.com/find/9000_USB-compliance)



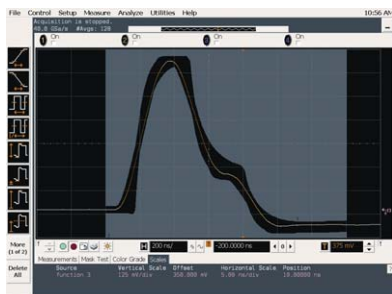
Test DDR memory.

### DDR1 and LPDDR/DDR2 and LPDDR2/DDR3 compliance testing (U7233A/N5413B/U7231A or Options 031/032/033 on new scope purchases) or N5459A Opt 001 for all memory applications

Quickly and easily evaluate and characterize your memory designs. Automated testing based on JEDEC specifications saves time. The application also includes additional debug and compliance capabilities.

This application is supported on all models. However, the DDR technology you are using may dictate the minimal bandwidth required for your scope.

For more information: [www.agilent.com/find/9000\\_DDR](http://www.agilent.com/find/9000_DDR)



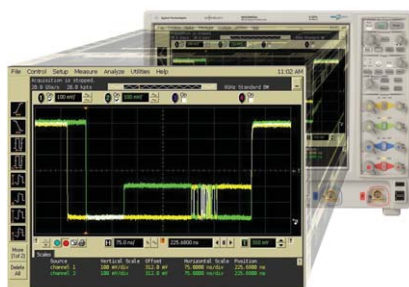
Validate Ethernet compliance.

### Ethernet compliance testing (N5392A or Option 021 on new scope purchases)

Perform a wide range of electrical tests for 10-, 100-, and 1000-Base-T systems. An N5395C test fixture and N5396A jitter test cable speed compliance testing.

This application is supported on all 600 MHz and higher bandwidth models.

For more information: [www.agilent.com/find/9000\\_ethernet](http://www.agilent.com/find/9000_ethernet)



Check for MIPI compliance.

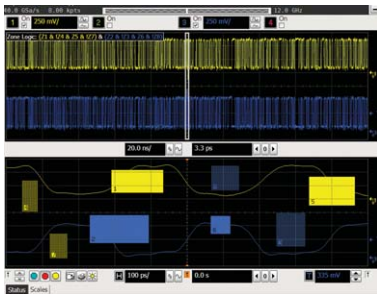
### MIPI compliance testing (U7238A or Option 035 on new scope purchased)

Quickly validate your embedded D-Phy data link for CSI and DSI architectures. This software performs a wide range of tests required for meeting MIPI D-Phy physical layer requirements.

This application is supported on analog channels of all 4 GHz models.

For more information: [www.agilent.com/find/U7238A](http://www.agilent.com/find/U7238A)

## Widest range of debug and compliance software applications: InfiniiScan and jitter analysis



*Identify signal integrity issues with InfiniiScan Zone – Qualify triggering.*

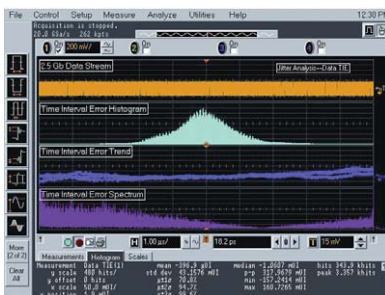
### InfiniiScan event identification (N5415B or Option 009 on new scope purchases)

Rapidly trigger on complex events and identify signal integrity issues.

This innovative software quickly scans through thousands of acquired waveform cycles and isolates anomalous signal behavior. Up to eight zones across channels are available.

This application is supported on all models.

For more information: [www.agilent.com/find/infiniiScan](http://www.agilent.com/find/infiniiScan)



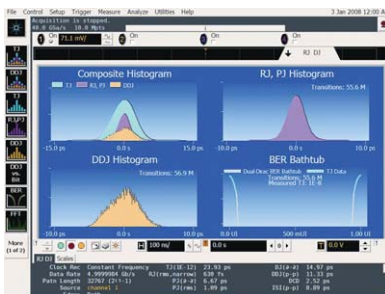
*Conduct jitter analysis.*

### EZJIT analysis software (E2681A or option 002 on new scope purchases)

Quickly characterize and evaluate most commonly needed jitter measurements, including cycle-cycle, N-cycle, period, time-interval, error, setup and hold time, histograms, measurement trending and jitter spectrum.

This application is supported on all models.

For more information: [www.agilent.com/find/EZJIT](http://www.agilent.com/find/EZJIT)



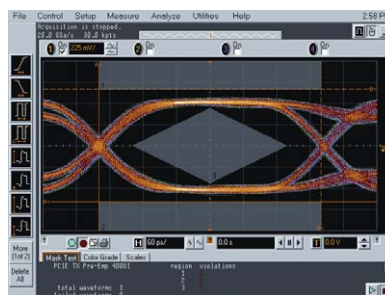
*Analyze jitter plus RJ/DJ separation.*

### EZJIT Plus analysis software (N5400A or Option 004 on new scope purchases. To upgrade from EZJIT to EZJIT Plus, order N5401A.)

EZJIT Plus adds additional compliance views and an expanded measurement setup wizard to simplify and automate RJ/DJ separation for testing against industry standards.

This application is supported on all models.

For more information: [www.agilent.com/find/EZJITPlus](http://www.agilent.com/find/EZJITPlus)



*Recover embedded clocks with serial data analysis (SDA).*

### High-speed serial data analysis software (N5384A or Option 003 on new scope purchases)

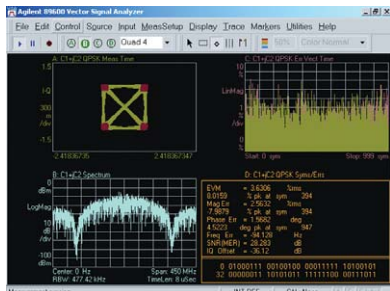
Quickly validate signal integrity for high-speed serial interfaces with embedded clocks. Recover embedded clocks synchronized with the analog waveform view. Build and validate eye diagrams.

The SDA package also includes software-based bit-level triggering and decode for 8B/10B.

This application is supported on all models.

For more information: [www.agilent.com/find/9000\\_SDA](http://www.agilent.com/find/9000_SDA)

## Widest range of debug and compliance software applications: viewing and analysis



*Use vector signal analysis software to see FFT-based spectrum analysis.*

### Vector signal analysis software (89601B)

Expand the measurement capability of your scope with the 89601B vector signal analysis software. This advanced DSP-based software takes the digitized signal data from the scope. Then it provides FFT-based spectrum analysis and wide-bandwidth digital modulation analysis for wireless communication signals such as WCDMA and cdma2000 and wireless networking signals such as 802.11 WiFi and 802.16 WiMax.

Take advantage of the super-wide bandwidth of your scope to capture and evaluate radar signals.

For more information: [www.agilent.com/find/VSA](http://www.agilent.com/find/VSA)



*Prove your designs conform to industry standards with a communication mask test kit.*

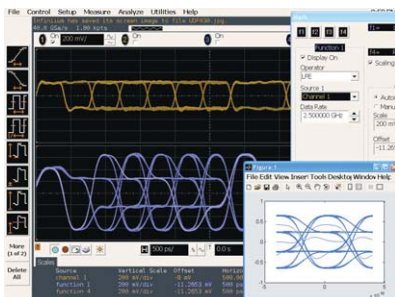
### Communication mask test kit (E2625A)

Take the frustration out of communications testing and prove your designs conform to industry standards with the communication mask test kit option.

The kit comes with a set of electrical communication adapters to ensure convenient, reliable, and accurate connections to your device under test. The kit includes more than 20 industry-standard ANSI T1.102, ITU-T G.703, and IEEE 802.3 communication signal mask templates.

This application is supported on all models.

For more information: [www.agilent.com/find/9000\\_comm](http://www.agilent.com/find/9000_comm)



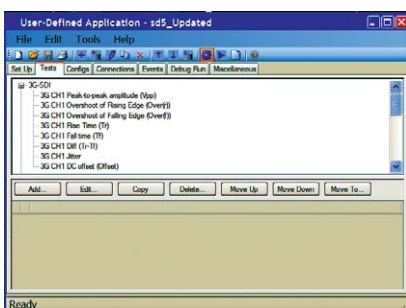
*Signal equalization using user-defined function.*

### User-defined function (N5430A or Option 010 on new scope purchases)

Install MATLAB® on your scope and add your favorite MATLAB .m scripts as function operators and use them as standard waveform functions.

This application is supported on all models and requires MATLAB software (not included with UDF)

For more information: [www.agilent.com/find/UDF](http://www.agilent.com/find/UDF)



*Quickly automate oscilloscope measurements.*

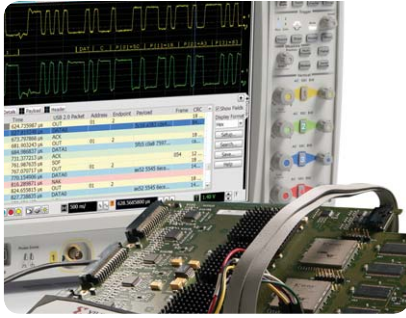
### User-definable application (N5467A or Option 040 on new scope purchases)

Rapidly develop your own automated measurements and tests. This application provides the framework you need to quickly program and automate any single or set of measurements the oscilloscope can make.

The application also provides full control of other Agilent instruments and HTML reporting capabilities.

For more information: [www.agilent.com/find/9000\\_UDA](http://www.agilent.com/find/9000_UDA)

## Infiniium 9000 Series applications and upgrades



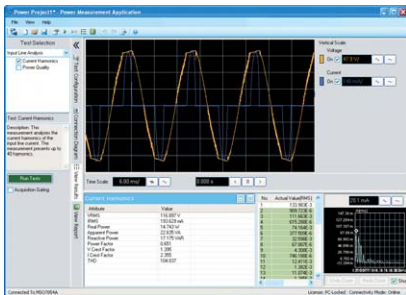
*Rapid FPGA debug.*

### FPGA dynamic probe application (N5397A or Option 016 on new scope purchases)

Agilent's MSO FPGA dynamic probe provides internal FPGA visibility and quick instrument setup using an innovative core-assisted debug approach. Measurement tasks that previously took hours can be done in seconds with a few mouse clicks.

This application is supported on all MSO models.

For more information: [www.agilent.com/find/9000\\_xilinx](http://www.agilent.com/find/9000_xilinx)



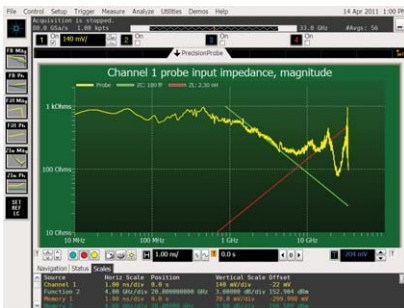
*Use your scope to quickly make and analyze power measurements.*

### Power application (U1882A or Option 015 on new scope purchases)

Agilent's power application provides a full suite of power measurements. Make more accurate power-supply efficiency measurements by using an U1880A de-skew fixture to de-skew your voltage and current probes.

This application is supported on all models.

For more information: [www.agilent.com/find/9000\\_power-app](http://www.agilent.com/find/9000_power-app)



*Quickly characterize and correct for any input to your oscilloscope*

### PrecisionProbe software (N2808A)

Make more accurate measurements independent of what probes or cables used. Agilent's N2808A PrecisionProbe software characterizes and corrects for the loss in your specific cable or probe. PrecisionProbe removes the uncertainty about the input connected to your oscilloscope by allowing you to see its characteristics in less than five minute. PrecisionProbe gives you design and debug confidence by allowing you to quickly de-embed probe and cable loss to make more accurate measurements.

For more information: [www.agilent.com/find/PrecisionProbe](http://www.agilent.com/find/PrecisionProbe)

### InfiniiView Oscilloscope Analysis Software (N8900A)



Wish you could do additional signal viewing, analysis and documentation tasks away from your scope and target system? With Agilent's InfiniiView oscilloscope analysis software you can. Capture waveforms on your scope, save to a file, and open the data record into Agilent's InfiniiView application. View, analyze, share, and document scope measurements anywhere your PC goes.

## Agilent Infiniium portfolio

Agilent's real-time Infiniium lineup includes 9000, 9000 H-, 90000A and 90000 X Series oscilloscopes. These share a number of advanced hardware and software technology blocks. Use the following selection guide to determine which best matches your specific needs.



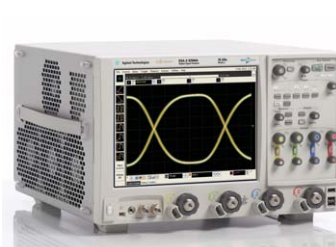
**Widest range of applications.  
Biggest display plus thin depth**



**See your signals in HD**



**Low noise, high bandwidth**



**Fastest real-time oscilloscope**

|                                       | 9000 Series                | 9000 H-Series              | 90000 Series              | 90000 X-Series            | 90000 Q-Series            |
|---------------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| 600 MHz and 1 GHz bandwidth           | •                          | •                          |                           |                           |                           |
| 2.5 GHz and 4 GHz bandwidth           | •                          |                            | •                         |                           |                           |
| Bandwidth upgradability               | Up to 4 GHz                | •                          | Up to 13 GHz              | Up to 62 GHz              | Up to 62 GHz              |
| 50 $\Omega$ & 1 M $\Omega$ inputs     | •                          | •                          | 1 M $\Omega$ with adapter | 1 M $\Omega$ with adapter | 1 M $\Omega$ with adapter |
| MSO models                            | •                          | •                          |                           |                           |                           |
| Max 2-channel (4-channel) sample rate | 20 GSa/s<br>(10 GSa/s)     | 10 GSa/s<br>(10 GSa/s)     | 40 GSa/s<br>(40 GSa/s)    | 80 GSa/s<br>(40 GSa/s)    | 160 GSa/s<br>(80 GSa/s)   |
| GPIO                                  | N4865A GPIO to LAN adapter | N4865A GPIO to LAN adapter | Built in option           | Built in option           | Built in option           |
| Rackmount height                      | 8U                         | 8U                         | 7U                        | 7U                        | 8U                        |
| Display size                          | 15"                        | 15"                        | 12"                       | 12"                       | 15"                       |



# Agilent Infiniium 9000 Series oscilloscopes

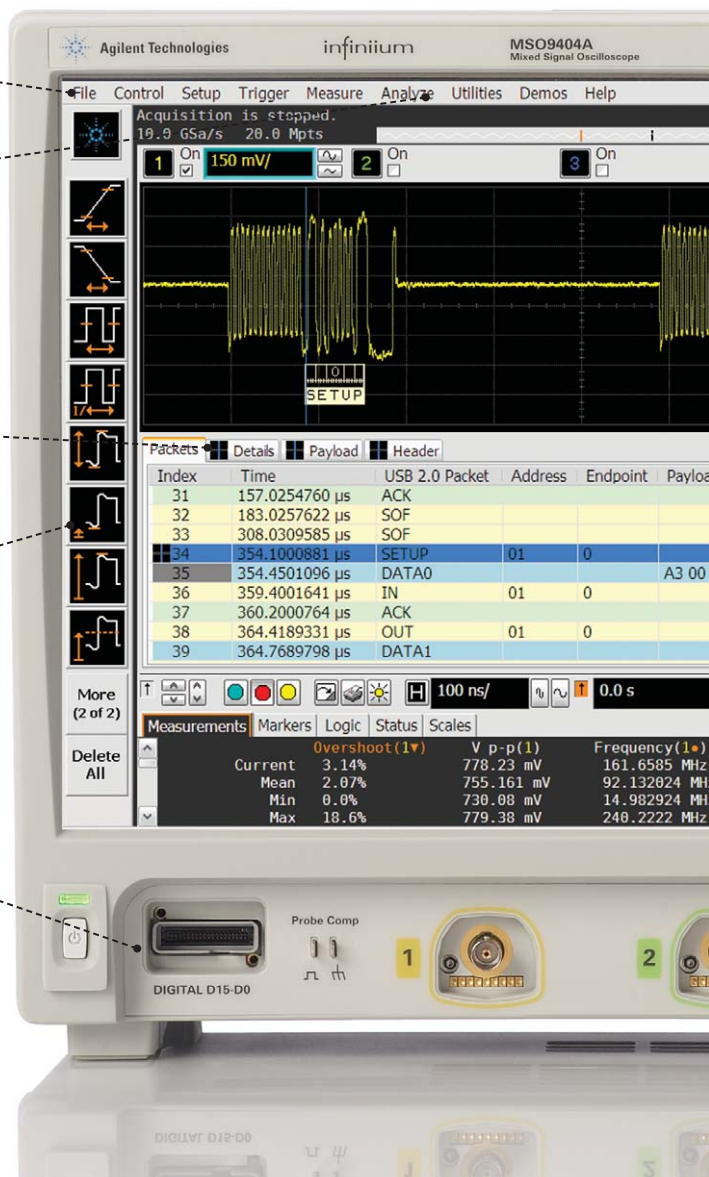
**15" XGA display** makes it easier to view analog, digital and serial signals.

**Comprehensive built-in information system** gives you fast answers to your questions. The task-oriented setup guide provides step-by-step instructions for several measurement procedures.

**Touchscreen display** comes standard for mouse-free operation.

**Drag-and-drop measurements** from the measurement bar provide an intuitive way to make a measurement on a particular cycle of your waveform.

**Mixed-signal oscilloscope (MSO) models** seamlessly integrate four analog scope channels with 16 digital channels.



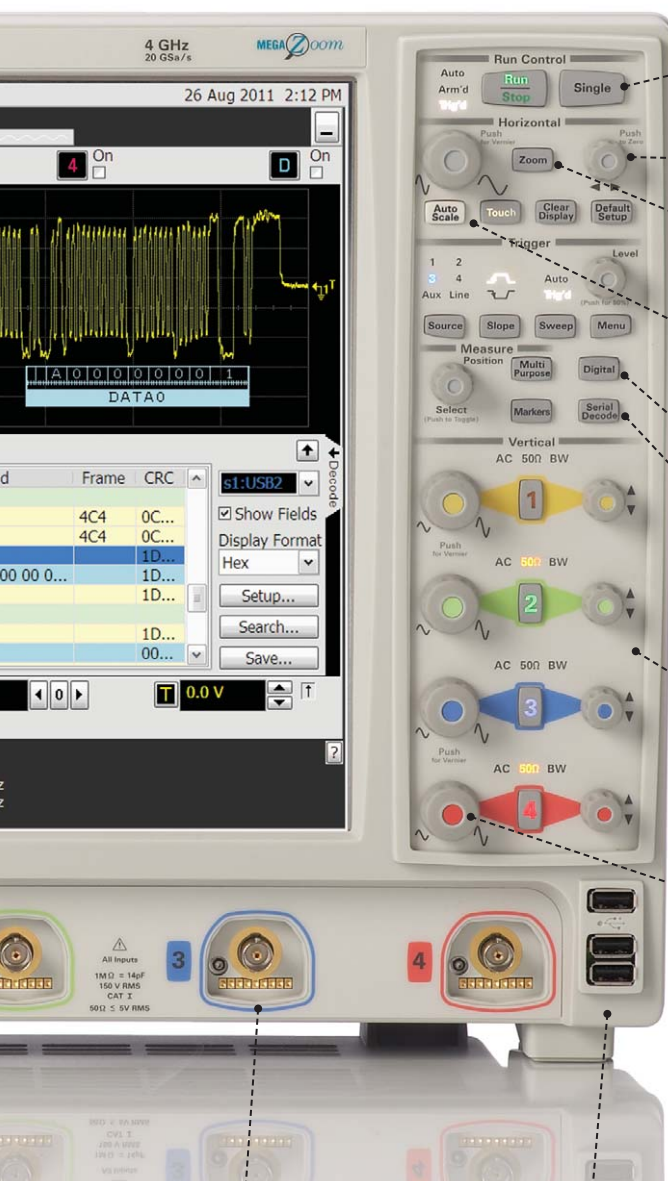
**AUX OUT** for calibration

**Built-in 10-MHz reference in/out port** synchronizes multiple measurement instruments in a system.

**Standard USB and LAN** ports provide PC and printer connectivity.

**XGA and DVI video output port** lets you connect to an external monitor.

**Trig in/out ports** provide an easy way to synchronize your scope to other instruments.



Dedicated **single acquisition button** provides better control to capture a unique event.

Pressing **horizontal delay knob** sets the delay to zero. A **zoom button** provides quick access to two screen-zoom modes.

**MegaZoom instant response and optimum resolution** allows you to pan and zoom quickly.

**Autoscale** lets you rapidly display any analog or digital active signals, automatically setting the vertical, horizontal and trigger controls for the best display, while optimizing memory.

**Digital channel** button provides quick setup access.

**Serial decode** button enables quick setup access.

**Dedicated per-channel front panel controls** make it easy to access the vertical and horizontal scaling and offset.

**Quick access to fine/vernier control** by pressing the horizontal and vertical sensitivity knobs.

**AutoProbe interface** automatically configures the attenuation ratio of the probe and provides probe power for Agilent's active probes.

**Built-in USB ports** makes it easy to save your work and update your system software quickly.



**Accessory pouch detaches easily.**



## Infiniium 9000 Series performance characteristics

| Vertical: scope channels                                | 9064A                                                                                                | 9104A   | 9254A                                           | 9404A   |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------|
| Analog bandwidth (–3 dB) 50 $\Omega$ <sup>1</sup>       | 600 MHz                                                                                              | 1.0 GHz | 2.5 GHz                                         | 4 GHz   |
| 1 M $\Omega$                                            | 500 MHz                                                                                              | 500 MHz | 500 MHz                                         | 500 MHz |
| Typical Rise Time / Fall Time 10% to 90% at 50 $\Omega$ | 540 ps                                                                                               | 253 ps  | 142 ps                                          | 85 ps   |
| Typical Rise Time / Fall Time 20% to 80% at 50 $\Omega$ | 360 ps                                                                                               | 174 ps  | 98 ps                                           | 59 ps   |
| Input channels                                          | DSO9000 – 4 analog<br>MSO9000 – 4 analog + 16 digital                                                |         |                                                 |         |
| Input impedance <sup>1</sup>                            | 50 $\Omega$ $\pm$ 2.5%, 1 M $\Omega$ $\pm$ 1% (11pF typical)                                         |         |                                                 |         |
| Input sensitivity <sup>3</sup>                          | 1 M $\Omega$ : 1 mV/div to 5 V/div<br>50 $\Omega$ : 1 mV/div to 1 V/div                              |         |                                                 |         |
| Input coupling                                          | 1 M $\Omega$ : AC (3.5 Hz), DC<br>50 $\Omega$ :DC                                                    |         |                                                 |         |
| Bandwidth limit                                         | 20 MHz on 1 M $\Omega$ input ; 500 MHz up to full scope bandwidth in increments of 500 MHz           |         |                                                 |         |
| Vertical resolution <sup>2,3</sup>                      | 8 bits, $\geq$ 12 bits with averaging                                                                |         |                                                 |         |
| Channel-to-channel isolation                            | DC to 50 MHz: 50 dB<br>>50 MHz to 2.5 GHz: 40 dB<br>>2.5 GHz to 4 GHz: 25 dB                         |         |                                                 |         |
| DC gain accuracy <sup>1,2,3</sup>                       | $\pm$ 2% of full scale at full resolution on channel scale $\pm$ 5 °C from cal temp                  |         |                                                 |         |
| Maximum input voltage <sup>1</sup>                      | 1 M $\Omega$ : 150V RMS or DC, CAT I<br>$\pm$ 250 V (DC + AC) in AC coupling<br>50 $\Omega$ : 5 Vrms |         |                                                 |         |
| Offset range                                            | Vertical sensitivity                                                                                 |         | Available offset                                |         |
| 1 M $\Omega$                                            | 1 mV to <10 mV/div                                                                                   |         | $\pm$ 2 V                                       |         |
|                                                         | 10 mV to <20 mV/div                                                                                  |         | $\pm$ 5 V                                       |         |
|                                                         | 20 mV to <100 mV/div                                                                                 |         | $\pm$ 10 V                                      |         |
|                                                         | 100 mV to <1 V/div                                                                                   |         | $\pm$ 20 V                                      |         |
|                                                         | 1 V to 5 V/div                                                                                       |         | $\pm$ 100 V                                     |         |
| 50 $\Omega$                                             |                                                                                                      |         | $\pm$ 12 div or $\pm$ 4V, whichever is smallest |         |

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 scope display.

2 Vertical resolution for 8 bits = 0.4% of full scale, for 12 bits = 0.024% of full scale.

3 50 $\Omega$  input: Full scale is defined as 8 vertical divisions. Magnification is used below 10mV/div, full-scale is defined as 80 mV. The major scale settings are 5mV, 10mV, 20mV, 50 mV, 100mV, 200 mV, 500 mV, 1V.

1M $\Omega$  input: Full scale is defined as 8 vertical divisions. Magnification is used below 5mV/div, full-scale is defined as 40 mV. The major scale settings are 5mV, 10mV, 20mV, 50 mV, 100 mV, 200 mV, 500 mV, 1V,2V, 5V.

# Infiniium 9000 Series performance characteristics

## Vertical: scope channels (con't)

|                                              |                                                                                                                          |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Offset accuracy <sup>1,3</sup>               | ± (1.25% of channel offset +1% of full scale + 1 mV)                                                                     |
| Dynamic range                                | 1 MΩ: ± 8 div from center screen<br>50 Ω: ± 8 div from center screen                                                     |
| DC voltage measurement accuracy <sup>2</sup> | Dual cursor ± [(DC gain accuracy)+(resolution)]<br>Single cursor ± [(DC gain accuracy)+(offset accuracy)+(resolution/2)] |

## RMS Noise Floor ( $V_{RMS\ AC}$ )

|           | 9064A   |                | 9104A   |              | 9254A   |              | 9404A   |              |
|-----------|---------|----------------|---------|--------------|---------|--------------|---------|--------------|
| Volts/div | full BW | 500 MHz filter | full BW | 1 GHz filter | full BW | 2 GHz filter | full BW | 4 GHz filter |
| 10 mV     | 213 uV  | 138 uV         | 240 uV  | 120 uV       | 273 uV  | 210 uV       | 402 uV  | 263 uV       |
| 20 mV     | 470 uV  | 175 uV         | 481 uV  | 154 uV       | 445 uV  | 330 uV       | 627 uV  | 424 uV       |
| 50 mV     | 1.15 mV | .464 mV        | 1.24 mV | .415 mV      | 1.22 mV | .780 mV      | 1.67 mV | 1.12 mV      |
| 100 mV    | 2.37 mV | .895 mV        | 2.43 mV | .786 mV      | 2.54 mV | 1.50 mV      | 3.17 mV | 2.16 mV      |
| 200 mV    | 4.65 mV | 1.75 mV        | 4.85 mV | 1.50 mV      | 5.06 mV | 2.86 mV      | 6.18 mV | 4.15 mV      |
| 500 mV    | 11.8 mV | 4.60 mV        | 12.3 mV | 4.15 mV      | 12.2 mV | 7.61 mV      | 15.8 mV | 11.26 mV     |
| 1 V       | 23.9 mV | 8.91 mV        | 24.3 mV | 7.85 mV      | 25.2 mV | 14.9 mV      | 31.5 mV | 21.9 mV      |

| Vertical: digital channels     | On all MSO Models                                                                                           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------|
| Input channels                 | 16 digital channels                                                                                         |
| Threshold groupings            | 16 digital channels Pod 2: D15 – D8                                                                         |
| Threshold selections           | TTL (1.4V), CMOS, (5.0V, 3.3V, 2.5V), ECL (-1.3V), PECL (3.7V), user defined (±8.00 V in 100 mV increments) |
| Maximum input voltage          | ±40 V peak CAT I                                                                                            |
| Threshold accuracy             | ±(100 mV + 3% of threshold setting)                                                                         |
| Input dynamic range            | ±10 V about threshold                                                                                       |
| Minimum input voltage swing    | 500 mV peak-to-peak                                                                                         |
| Input impedance (flying leads) | 100 kΩ ± 2% (~ 8 pF) at probe tip                                                                           |
| Resolution                     | 1 bit                                                                                                       |
| Analog bandwidth               | 400 MHz                                                                                                     |

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 Vertical resolution for 8 bits = 0.4% of full scale, for 12 bits = 0.024% of full scale.

3 50Ω input: Full scale is defined as 8 vertical divisions. Magnification is used below 10mV/div, full-scale is defined as 80 mV. The major scale settings are 5mV, 10mV, 20mV, 50 mV, 100 mV, 200 mV, 500 mV, 1V.

1MΩ input: Full scale is defined as 8 vertical divisions. Magnification is used below 5mV/div, full-scale is defined as 40 mV. The major scale settings are 5mV, 10mV, 20mV, 50 mV, 100 mV, 200 mV, 500mV, 1V,2V, 5V.

# Infiniium 9000 Series performance characteristics

## Horizontal

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| Channel-to-channel skew (digital) | 2 ns typical                               |
| Glitch detect (digital)           | ≥ 2.0 ns                                   |
| Main time base range              | 5 ps/div to 20 s/div                       |
| Horizontal position range         | 0 to ± 200 s                               |
| Delayed sweep range               | 1 ps/div to current main time base setting |
| Resolution                        | 1 ps                                       |
| Modes                             | Main, delayed, roll (200 ms to 20 sec)     |
| Reference positions               | Left, center, right                        |
| Channel deskew                    | - 1 ms to +1 ms range                      |
| Time scale accuracy               | ± (0.4 + 0.5 * YrsSinceCal) ppm pk         |

## Delta-time measurement accuracy<sup>2,3,4,5</sup>

|                                          |                                                                                                                      |      |         |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------|---------|
| Absolute averaging disabled              | $\sqrt{\left(\frac{x * Noise}{SlewRate}\right)^2 + y * 10^{-24} + \frac{TimeScaleAccy * Reading}{2}} \text{ sec pk}$ | x=   | y=      |
|                                          |                                                                                                                      | 9064 | 4.8 20  |
|                                          |                                                                                                                      | 9104 | 4.8 15  |
|                                          |                                                                                                                      | 9254 | 4.0 15  |
| Absolute >256 averages                   | $\sqrt{\left(\frac{x * Noise}{SlewRate}\right)^2 + y * 10^{-24} + \frac{TimeScaleAccy * Reading}{2}} \text{ sec pk}$ | 9404 | 5.0 20  |
|                                          |                                                                                                                      | x=   | y=      |
|                                          |                                                                                                                      | 9064 | .33 .1  |
|                                          |                                                                                                                      | 9104 | .33 .05 |
| Standard deviation averaging disabled    | $\sqrt{\left(\frac{1.4 * Noise}{SlewRate}\right)^2 + y * 10^{-24}} \text{ sec}_{rms}$                                | 9254 | .33 .10 |
|                                          |                                                                                                                      | 9404 | .35 .15 |
|                                          |                                                                                                                      | y=   |         |
|                                          |                                                                                                                      | 9064 | .75     |
| Standard deviation >256 averages         | $\sqrt{\left(\frac{0.1 * Noise}{SlewRate}\right)^2 + 0.01 * 10^{-24}} \text{ sec}_{rms}$                             | 9104 | .65     |
|                                          |                                                                                                                      | 9254 | .75     |
|                                          |                                                                                                                      | 9404 | .80     |
|                                          |                                                                                                                      |      |         |
| Jitter measurements floor <sup>2,3</sup> | $\sqrt{\left(\frac{x * Noise}{SlewRate}\right)^2 + y * 10^{-24}} \text{ sec}_{rms}$                                  | x=   | y=      |
|                                          |                                                                                                                      | 9064 | 1.0 1.0 |
|                                          |                                                                                                                      | 9104 | 1.0 0.5 |
|                                          |                                                                                                                      | 9254 | .95 1.1 |
| Time interval error <sup>4</sup>         | $\sqrt{\left(\frac{x * Noise}{SlewRate}\right)^2 + y * 10^{-24}} \text{ sec}_{rms}$                                  | 9404 | .95 1.2 |
|                                          |                                                                                                                      | y=   |         |
|                                          |                                                                                                                      | 9064 | .75     |
|                                          |                                                                                                                      | 9104 | .65     |
| Period jitter                            | $\sqrt{\left(\frac{1.4 * Noise}{SlewRate}\right)^2 + y * 10^{-24}} \text{ sec}_{rms}$                                | 9254 | .75     |
|                                          |                                                                                                                      | 9404 | .80     |
|                                          |                                                                                                                      | y=   |         |
|                                          |                                                                                                                      | 9064 | 1.8     |
| N-cycle, cycle-cycle jitter              | $\sqrt{\left(\frac{2.4 * Noise}{SlewRate}\right)^2 + y * 10^{-24}} \text{ sec}_{rms}$                                | 9104 | 1.4     |
|                                          |                                                                                                                      | 9254 | 1.9     |
|                                          |                                                                                                                      | 9404 | 2.0     |
|                                          |                                                                                                                      |      |         |

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 Noise is the displayed noise floor. SlewRate is the displayed slew rate of the signal at the threshold crossings. Sample rate = max, sin(x)/x interpolation enabled.

3 Measurement threshold = fixed voltage at 50% level.

4 Time ranges ≤ 10 μs.

5 Values represent time error between two edges on a single channel. Standard deviation value refers to the standard deviation of 256 consecutive measurements performed using an individual instrument. Reading is the displayed DTMA measurement value.

# Infiniium 9000 Series performance characteristics

| Acquisition                                                                                                       | 9104, 9254, 9404                                                                                                                                                                                                      | 9064                                               |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Maximum real-time sample rate                                                                                     | 4 ch x 10 GS/s or 2 ch x 20 GS/s                                                                                                                                                                                      | 4 ch x 5 GSa/s or 2 ch x 10 GSa/s                  |
| Memory depth per channel                                                                                          |                                                                                                                                                                                                                       |                                                    |
| Standard                                                                                                          | 20 Mpts on 4 channels, 40 Mpts on 2 channels                                                                                                                                                                          |                                                    |
| Option 50M                                                                                                        | 50 Mpts on 4 channels, 100 Mpts on 2 channels                                                                                                                                                                         |                                                    |
| Option 100                                                                                                        | 100 Mpts on 4 channels, 200 Mpts on 2 channels                                                                                                                                                                        |                                                    |
| Option 200                                                                                                        | 200 Mpts on 4 channels, 400 Mpts on 2 channels                                                                                                                                                                        |                                                    |
| Option 500                                                                                                        | 500 Mpts/ 250 Mpts on 4 channels, 1 Gpts/ 500 Mpts on 2 channels (single/repetitive mode)                                                                                                                             |                                                    |
| Sampling Modes                                                                                                    |                                                                                                                                                                                                                       |                                                    |
| Real-time                                                                                                         |                                                                                                                                                                                                                       |                                                    |
| Real-time with peak detect                                                                                        |                                                                                                                                                                                                                       |                                                    |
| Real-time with high resolution (user selectable to 9-, 10-, 11-, or 12-bits of resolution)                        |                                                                                                                                                                                                                       |                                                    |
| Real-time with roll mode (200 ms to 20 sec.)                                                                      |                                                                                                                                                                                                                       |                                                    |
| Equivalent-time (1.0 ps fine interpolator resolution yields a maximum effective sample rate of 1,000 GSa/s)       |                                                                                                                                                                                                                       |                                                    |
| Segmented memory ( 1 ps time stamp resolution between segments)                                                   |                                                                                                                                                                                                                       |                                                    |
| Up to 8192 segments for 20 Mpts standard memory, up to 131,072 segments with Option 500                           |                                                                                                                                                                                                                       |                                                    |
| Maximum time between triggers is 562,950 seconds (6.5 days)                                                       |                                                                                                                                                                                                                       |                                                    |
| Re-arm time (minimum time between trigger events) is 4.5 μs with analog channels, 5.8 μs with digital channels on |                                                                                                                                                                                                                       |                                                    |
| Filters                                                                                                           | Sin (x) / x Interpolation                                                                                                                                                                                             |                                                    |
| Acquisition: digital channels                                                                                     |                                                                                                                                                                                                                       |                                                    |
| Maximum real time sample rate                                                                                     | 2 GSa/s                                                                                                                                                                                                               |                                                    |
| Maximum memory depth per channel                                                                                  | 128/ 64 Mpts with 2 GSa/s. 64/32 Mpts with sampling < 2 GSa/s (single/repetitive mode).                                                                                                                               |                                                    |
| Minimum width glitch detection                                                                                    | 2 ns                                                                                                                                                                                                                  |                                                    |
| Trigger: scope channels                                                                                           |                                                                                                                                                                                                                       |                                                    |
| Trigger sources                                                                                                   | Channel 1, channel 2, channel 3, channel 4, aux, and line                                                                                                                                                             |                                                    |
| Sensitivity                                                                                                       | 1 MΩ input, edge trigger, DC to 500 MHz: 0.6 div<br>50 Ω DC to 2 GHz, 0.5 div<br>2 GHz to 4 GHz: 1.0 div<br>Auxiliary DC to 700 MHz: 300 mVp-p                                                                        |                                                    |
| Trigger level range                                                                                               | ± 8 V @ 5 V/div, < 5 V/div ± 4 div from center screen (50 Ω)<br>Channel 1,2,3,4 ± 8 V @ 5 V/div, < 5 V/div ± 8 div from center screen (1 MΩ)<br>Auxiliary ± 5 V (50Ω up to 500 MHz with at least 500 mV signal swing) |                                                    |
| Sweep modes                                                                                                       | Auto, triggered, single                                                                                                                                                                                               |                                                    |
| Display jitter (displayed trigger jitter) <sup>1,2</sup>                                                          | $\sqrt{\left(\frac{1.0 * \text{Noise}}{\text{SlewRate}}\right)^2 + y * 10^{-24} \text{ sec}_{\text{rms}}}$                                                                                                            | y=<br>9064 .50<br>9104 .35<br>9254 .50<br>9404 .40 |
| Trigger holdoff range                                                                                             | 100 ns to 10 s fixed and random                                                                                                                                                                                       |                                                    |
| Trigger actions                                                                                                   | Specify an action to occur, and the frequency of the action, when a trigger condition occurs.<br>Actions include: e-mail on trigger and execute “multipurpose” user settings                                          |                                                    |
| Trigger coupling                                                                                                  | 1 MΩ: DC, AC, (10 Hz) low frequency reject (50 kHz high pass filter), high frequency reject (50 kHz low pass filter)                                                                                                  |                                                    |

1. Internal edge trigger mode. Trigger threshold = fixed voltage at 50% level. The slew rate independent value in the formula represents the traditional trigger jitter.

2. Display jitter example. At 100 mV/div typical noise values are 3.2 mV RMS for 9404 models, 2.5 mV RMS for 9254A models, and 2.4 mV RMS for 9104A models. For slew rate of 500 mVpp sin wave with frequency equal to max analog bandwidth of each model, typical display jitter is .95 ps RMS for 9404A models, .97ps for 9254A models, and 1.7 ps RMS for 9104A models.

# Infiniium 9000 Series performance characteristics

## Trigger: digital channels MSO Models

|                                |                                     |
|--------------------------------|-------------------------------------|
| Threshold range (user defined) | ±8.0 V in 100-mV increments         |
| Threshold accuracy             | ±(100 mV + 3% of threshold setting) |

## Measurements and math

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Waveform measurements             | (can be made on either min or zoom window with up to 10 simultaneous measurements with statistics)                                                                                                                                                                                                                                                                                                                                          |
| Voltage (scope channels)          | Peak-to-peak, minimum, maximum, average, RMS, amplitude, base, top, overshoot, V overshoot, preshoot, V preshoot, upper, middle, lower, crossing point voltage, pulse top, pulse base, pulse amplitude                                                                                                                                                                                                                                      |
| Time (digital channels)           | Period, frequency, positive width, negative width, duty cycle, delta time                                                                                                                                                                                                                                                                                                                                                                   |
| Time (scope channels)             | Rise time, fall time, period, frequency, positive width, negative width, duty cycle, Tmin, Tmax, Tvolt, channel-to-channel delta time, channel-to-channel phase, count pulses, burst width, burst period, burst interval, setup time, hold time                                                                                                                                                                                             |
| Mixed (scope channels only)       | Area, slew rate                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Frequency domain                  | FFT frequency, FFT magnitude, FFT delta frequency, FFT delta magnitude                                                                                                                                                                                                                                                                                                                                                                      |
| Level qualification               | Any channels that are not involved in a measurement can be used to level-qualify all timing measurements                                                                                                                                                                                                                                                                                                                                    |
| Eye-diagram measurements          | Eye height, eye width, eye jitter, crossing percentage, Q factor, and duty-cycle distortion                                                                                                                                                                                                                                                                                                                                                 |
| Measurement modes                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Statistics                        | Displays the mean, standard deviation, minimum, maximum range, and number of measurement values for the displayed automatic measurements                                                                                                                                                                                                                                                                                                    |
| Histograms (scope channels)       |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Source                            | Waveform or measurement (histogram on measurement requires EZJIT or EZJIT+ option)                                                                                                                                                                                                                                                                                                                                                          |
| Orientation                       | Vertical (for timing and jitter measurements) or horizontal (noise and amplitude change) modes, regions are defined using waveform markers                                                                                                                                                                                                                                                                                                  |
| Measurements                      | Mean, standard deviation, mean ± 1, 2, and 3 sigma, median, mode, peak-to-peak, min, max, total hits, peak (area of most hits), X scale hits, and X offset hits                                                                                                                                                                                                                                                                             |
| Marker modes                      | Manual markers, track waveform data, track measurements                                                                                                                                                                                                                                                                                                                                                                                     |
| Waveform math                     |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Number of functions               | Four                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Operators                         | Absolute value, add, average, Butterworth <sup>2</sup> , common mode, differentiate, divide, FFT magnitude, FFT phase, FIR <sup>11</sup> , high pass filter, integrate, invert, LFE <sup>2</sup> , low pass filter (4th-order Bessel Thompson filter), magnify, max, min, multiply, RT Eye <sup>2</sup> , smoothing, SqrtSumOfSquare <sup>2</sup> , square, square root, subtract, versus Chartstate (MSO models), charttiming (MSO models) |
| Automatic measurements            | Measure menu access to all measurements, ten measurements can be displayed simultaneously                                                                                                                                                                                                                                                                                                                                                   |
| Multipurpose                      | Front-panel button activates up to ten pre-selected or ten user-defined automatic measurements                                                                                                                                                                                                                                                                                                                                              |
| Drag-and-drop measurement toolbar | Measurement toolbar with common measurement icons that can be dragged and dropped onto the displayed waveforms                                                                                                                                                                                                                                                                                                                              |
| FFT                               |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Frequency range                   | DC to 10 GHz (at 20 GSa/s) or 5 GHz (at 10 GSa/s)                                                                                                                                                                                                                                                                                                                                                                                           |
| Frequency resolution              | Resolution = sample rate/memory depth                                                                                                                                                                                                                                                                                                                                                                                                       |
| Window modes                      | Hanning, flattop, rectangular, Blackman Harris, Force                                                                                                                                                                                                                                                                                                                                                                                       |

<sup>2</sup> Requires MATLAB software.

## Infiniium 9000 Series performance characteristics

### Trigger modes

|                                                 |                                                                                                                                                                                                                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Edge (analog and digital)                       | Triggers on a specified slope (rising, falling or alternating between rising and falling) and voltage level on any channel.                                                                                                                                  |
| Edge transition (analog)                        | Trigger on rising or falling edges that cross two voltage levels in > or < the amount of time specified. Edge transition setting from 250 ps.                                                                                                                |
| Edge then edge (time)<br>(analog and digital)   | The trigger is qualified by an edge. After a specified time delay between 10 ns to 10 s, a rising or falling edge on any one selected input will generate the trigger.                                                                                       |
| Edge then edge (event)<br>(analog and digital)  | The trigger is qualified by an edge. After a specified delay between 1 to 16,000,000 rising or falling edges, another rising or falling edge on any one selected input will generate the trigger.                                                            |
| Glitch (analog and 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 equal pulse width settings                                                                   |
| Line                                            | Triggers on the line voltage powering the oscilloscope.                                                                                                                                                                                                      |
| Pulse width (analog and digital)<br>4 GHz model | Trigger on a pulse that is wider or narrower than specified.<br>Minimum detectable pulse width: 125 ps for analog channels, 1 ns for digital channels.<br>Pulse width range settings: 250 ps to 10 s for analog channels, 2 ns to 10 s for digital channels. |
| 2.5 GHz model                                   | Minimum detectable pulse width: 200 ps for analog channels, 1 ns for digital channels. Pulse width range settings: 350 ps to 10 s for analog channels, 2 ns to 10 s for digital channels.                                                                    |
| 1 GHz and 600 MHz model                         | Minimum detectable pulse width: 500 ps for analog channels, 1 ns for digital channels. Pulse width range settings: 700 ps to 10 s for analog channels, 2 ns to 10 s for digital channels.                                                                    |
| Runt (analog)                                   | Triggers on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Runt settings equal pulse width settings.                                                                                              |
| Timeout (analog and digital)                    | Trigger when a channel stays high, low, or unchanged for too long.<br>Timeout settings equal pulse width settings.                                                                                                                                           |
| Pattern/pulse range<br>(analog and digital)     | Triggers when a specified logical combination of the channels is entered, exited, present for a specified period of time or is within a specified time range or times out. Each channel can have a value of High (H), Low (L) or Don't care (X).             |
| State (analog and digital)                      | Pattern trigger clocked by the rising, falling or alternating between rising and falling edge of one channel.                                                                                                                                                |
| Setup/hold (analog)                             | Triggers on setup, hold, or setup and hold violations in your circuit. Requires a clock and data signal on any two inputs (except aux or line) channels as trigger sources. Setup and/or hold time must then be specified.                                   |
| Window (analog)                                 | Trigger on entering, exiting, or inside specified voltage range                                                                                                                                                                                              |
| Video (analog)                                  | NTSC, PAL-M(525/60), PAL, SECAM(625,50) EDTV(480p/60), EDTV(576/50), HDTV(720p/60), HDTV(720p/50) HDTV(1080i/60)                                                                                                                                             |
| Serial (analog and digital)                     | Requires specified serial software option, I <sup>2</sup> C, SPI, CAN, LIN, FlexRay, RS-232/UART, JTAG, USB, PCIe, MIPI D-Phy, generic 8B/10B                                                                                                                |
| Zone-qualified                                  | Requires InfiniiScan software option. SW-based triggering across up to 8 user-drawn zones. For each zone, user specifies "must intersect" or "must not intersect." Zones can be drawn on multiple channels and combined using Boolean expressions.           |

## Infiniium 9000 Series performance characteristics

### Display

|                                                            |                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display                                                    | 15 inch color XGA TFT-LCD with touch screen                                                                                                                                                                                                                                                                     |
| Display intensity grayscale                                | 64-level intensity-graded display                                                                                                                                                                                                                                                                               |
| Resolution                                                 | 1024 pixels horizontally x 768 pixels vertically                                                                                                                                                                                                                                                                |
| Annotation                                                 | Up to 12 labels, with up to 100 characters each, can be inserted into the waveform area                                                                                                                                                                                                                         |
| Grids                                                      | Can display 1, 2 or 4 waveform grids                                                                                                                                                                                                                                                                            |
| Waveform styles                                            | Connected dots, dots, variable persistence, infinite persistence, color graded infinite persistence. Includes up to 64 levels of intensity-graded waveforms.                                                                                                                                                    |
| Waveform update rate<br>(10 GS/s, 50 ns/div, sin(x)/x: on) | Segmented mode: Maximum up to 250,000 waveforms/sec<br>Real time mode Maximum of 4,000 waveforms/sec.<br>Typical of 2,100 waveforms/sec with 1kpts memory.<br>Typical of 420 waveforms/sec with 100 kpts memory<br>Typical of 400 waveforms/sec with 1 Mpts memory<br>Typical of 300 waveforms/sec with 10 Mpts |

### Computer system and peripherals, I/O ports

|                                 |                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Computer system and peripherals |                                                                                                                                                                                                                                      |
| Operating system                | Windows 7 Embedded Standard                                                                                                                                                                                                          |
| CPU                             | Intel® Core 2 Duo, M890, 3.0 GHz microprocessor                                                                                                                                                                                      |
| PC system memory                | 4 GB                                                                                                                                                                                                                                 |
| Drives                          | ≥ 250-Gb internal hard drive (optional removable hard drive), external DVD-RW drive (optional)                                                                                                                                       |
| Peripherals                     | Optical USB mouse and compact keyboard supplied. All Infiniium models support any Windows-compatible input device with a PS/2 or USB interface.                                                                                      |
| File types                      |                                                                                                                                                                                                                                      |
| Waveforms                       | Compressed internal format (*.wfm), comma separated values (*.csv), .hdf5, .bin, tab separated values (*.tsv), ability to save .osc (composite including both setup and waveform. and Y value files (*.txt)                          |
| Images                          | BMP, TIFF, GIF, PNG or JPEG                                                                                                                                                                                                          |
| I/O ports                       |                                                                                                                                                                                                                                      |
| LAN                             | RJ-45 connector, supports 10Base-T, 100Base-T, and 1000Base-T. Enables Web-enabled remote control, e-mail on trigger, data/file transfers and network printing.                                                                      |
| RS-232 (serial)                 | 9-pin, COM1, printer and pointing device support                                                                                                                                                                                     |
| PS/2                            | Two ports. Supports PS/2 pointing and input devices.                                                                                                                                                                                 |
| USB 2.0 Hi-Speed                | Three 2.0 high-speed ports on front panel plus four ports on side panel. Allows connection of USB peripherals like storage devices and pointing devices while the oscilloscope is on. One device port on side for instrument control |
| Video output                    | 15 pin XGA on side of scope, full output of scope display or dual monitor video output, DVI                                                                                                                                          |
| Auxiliary output                | DC ( $\pm 2.4$ V); square wave ~755 Hz with ~200 ps rise time.                                                                                                                                                                       |
| Time base reference output      | 10 MHz, Amplitude into 50 ohms: 800 mV pp to 1.26 V pp (4 dBm $\pm$ 2 dB) if derived from internal reference. Tracks external reference input amplitude $\pm$ 1 dB if applied and selected.                                          |
| Time base reference input       | Must be 10 MHz, input Z = 50 ohms. Minimum 500 mV pp (–2 dBm), maximum 2.0 V pp (+10 dBm).                                                                                                                                           |
| LXI compliance                  | LXI Class C                                                                                                                                                                                                                          |

## Infiniium 9000 Series performance characteristics

### General characteristics

|                                  |                                                                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature                      |                                                                                                                                                                                            |
| Operating                        | 5 °C to + 40 °C                                                                                                                                                                            |
| Non-operating                    | –40 °C to + 65 °C                                                                                                                                                                          |
| Humidity                         |                                                                                                                                                                                            |
| Operating                        | Up to 95% relative humidity (non-condensing) at +40 °C                                                                                                                                     |
| Non-operating                    | Up to 90% relative humidity at +65 °C                                                                                                                                                      |
| Altitude                         |                                                                                                                                                                                            |
| Operating                        | Up to 4,000 meters (12,000 feet)                                                                                                                                                           |
| Non-operating                    | Up to 15,300 meters (50,000 feet)                                                                                                                                                          |
| Vibration                        |                                                                                                                                                                                            |
| Operating                        | Random vibration 5-500 Hz, 10 minutes per axis, 0.3 g (rms)                                                                                                                                |
| Non-operating                    | Random vibration 5-500 Hz, 10 minutes per axis, 2.41 g (rms); resonant search 5-500 Hz, swept sine, 1 octave/minute sweep rate, (0.75 g), 5 minute resonant dwell at 4 resonances per axis |
| Power                            | 100-120 V, ± 10% 50/60/400 Hz<br>100-240 V, ± 10% 50/60 Hz<br>Max power dissipated: 375 W                                                                                                  |
| Typical operator noise           | 30 dB at front of instrument                                                                                                                                                               |
| Weight                           | Net: 11.8 kg (26 lbs.) Shipping: 17.8 kg (39 lbs.)                                                                                                                                         |
| Dimensions (with feet retracted) | Height: 12.9 in (33 cm); width: 16.8 in (43 cm); depth: 9 in (23 cm)                                                                                                                       |
| Safety                           | Meets IEC1010-1 Second Edition, certified to UL61010-1 and CAN/CSA-C22.2 No 61010-1 Second Edition (IEC61010-1:2001, MOD).                                                                 |

# Infiniium 9000 Series ordering information

## How to configure an Infiniium 9000 Series

1. Choose needed bandwidth
2. Choose MSO or DSO
3. Choose desired software applications
4. Choose memory depth upgrade
5. Choose any additional probes and accessories

## Accessories included:

All models ship standard with: 1-year warranty, four N2873A 500 MHz passive probes, probe accessory pouch (mounts on rear of instrument), Agilent I/O libraries suite 15.0, localized power cord, front panel cover, keyboard, mouse, and stylus. User guide and programmer's guide ship on oscilloscope hard drive. Service guide available on Agilent.com. MSO models additionally ship with channel flying lead set logic probe, MSO cable and calibration fixture.

| Model    | Analog bandwidth | Analog sample rate* (4 ch / 2 ch) | Standard memory* (4 ch / 2 ch) | Scope channels | Logic channels |
|----------|------------------|-----------------------------------|--------------------------------|----------------|----------------|
| DSO9064A | 600 MHz          | 5 GSa/s / 10 GSa/s                | 20 Mpts / 40 Mpts              | 4              | -              |
| MSO9064A | 600 MHz          | 5 GSa/s / 10 GSa/s                | 20 Mpts / 40 Mpts              | 4              | 16             |
| DSO9104A | 1 GHz            | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | -              |
| MSO9104A | 1 GHz            | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | 16             |
| DSO9254A | 2.5 GHz          | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | -              |
| MSO9254A | 2.5 GHz          | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | 16             |
| DSO9404A | 4 GHz            | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | -              |
| MSO9404A | 4 GHz            | 10 GSa/s / 20 GSa/s               | 20 Mpts / 40 Mpts              | 4              | 16             |

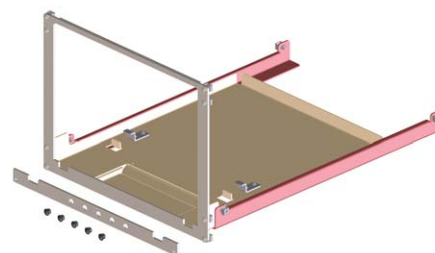
\* In 2-channel mode, maximum sample rate and memory depth double.

## Additional options and accessories

|                                 |                                                                           |
|---------------------------------|---------------------------------------------------------------------------|
| Option A6J                      | ANSI Z540 compliant calibration                                           |
| DSO9000A-820                    | External DVD-RW with USB connection                                       |
| N2902A or Option 1CM (8U)       | 9000 Series oscilloscope rackmount kit                                    |
| Option 801                      | Removable solid state drive                                               |
| N2746A (requires Option 801)    | Additional solid state drive Windows 7                                    |
| Gemstar 5000 custom-molded case | Available from <a href="http://www.gemstarmfg.com">www.gemstarmfg.com</a> |
| N2918B                          | Infiniium 9000 Series Evaluation Kit                                      |
| N4865A                          | GPIO to LAN adapter                                                       |



*Quickly remove your solid state drive for additional security with Option 801.*



*Mount your 9000 Series scope in an 8U high, 19" (487mm) wide rack with option 1CM.*

## Infiniium 9000 Series ordering information

| SW Applications                                               | Factory-installed option<br>for new scope purchases | User-installed stand-alone<br>product number | User-installed floating<br>license (N5435A option) |
|---------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------|----------------------------------------------------|
| RS-232/UART triggering and decode                             | 001                                                 | N5462B                                       | 031                                                |
| EZJIT jitter analysis software                                | 002                                                 | E2681A                                       | 002                                                |
| High-speed SDA and clock recovery                             | 003                                                 | N5384A                                       | 003                                                |
| EZJIT Plus jitter analysis software                           | 004                                                 | N5400A                                       | 001                                                |
| USB triggering and decode                                     | 005                                                 | N5464B                                       | 034                                                |
| PCI Express 1.1 triggering and decode                         | 006                                                 | N5463B                                       | 032                                                |
| I <sup>2</sup> C/SPI triggering and decode                    | 007                                                 | N5391B                                       | 006                                                |
| CAN, LIN, and FlexRay triggering and decode                   | 008                                                 | N8803B                                       | 033                                                |
| InfiniiScan                                                   | 009                                                 | N5415B                                       | 004                                                |
| User-defined function                                         | 010                                                 | N5430A                                       | 005                                                |
| Application remote programming interface                      | 011                                                 | N5452A                                       |                                                    |
| InfiniiSim signal equalization                                | 012                                                 | N5461A                                       | 025                                                |
| InfiniiSim basic signal de-embedding                          | 013                                                 | N5465A 001                                   | 026                                                |
| InfiniiSim advanced signal de-embedding                       | 014                                                 | N5465A 002                                   | 027                                                |
| Power measurement application software                        | 015                                                 | U1882A                                       |                                                    |
| Xilinx FPGA dynamic probe                                     | 016                                                 | N5397A                                       |                                                    |
| Altera FPGA dynamic probe                                     | 017                                                 | N5433A                                       |                                                    |
| RS-232, SPI and I <sup>2</sup> C triggering and decode bundle | 018                                                 | N8800B                                       |                                                    |
| MIPI D-Phy Triggering and decode                              | 019                                                 | N8802A                                       | 036                                                |
| Ethernet compliance                                           | 021                                                 | N5392A                                       | 008                                                |
| USB2.0 compliance                                             | 029                                                 | N5416A                                       | 017                                                |
| DDR1 and LPDDR compliance                                     | 031                                                 | U7233A                                       | 021                                                |
| DDR2 and LPDDR2 compliance                                    | 032                                                 | N5413B                                       | 016                                                |
| DDR3 compliance                                               | 033                                                 | U7231A                                       | 020                                                |
| MIPI D-Phy compliance                                         | 035                                                 | U7238A                                       | 022                                                |
| SATA1 (1.5 GB/s triggering and decode)                        | 038                                                 | N8801A                                       | 035                                                |
| User definable application                                    | 040                                                 | N5467A                                       |                                                    |
| JTAG (IEEE 1149.1) triggering and decode                      | 042                                                 | N8817A                                       | 038                                                |
| USB HSIC compliance test                                      | 043                                                 | U7248                                        | 042                                                |
| DigRF protocol decode                                         | 045                                                 | N8807A                                       | 047                                                |
| SVID protocol triggering and decode                           | 046                                                 | N8812A                                       | 054                                                |
| Communication mask test kit                                   |                                                     | E2625A                                       |                                                    |
| MATLAB basic                                                  | 061                                                 |                                              |                                                    |
| MATLAB advanced                                               | 062                                                 |                                              |                                                    |
| HDMI 1.4 (up to 740 Mbps)                                     |                                                     | N5399B                                       |                                                    |
| 10GBase-T Ethernet compliance                                 |                                                     | U7236A                                       |                                                    |
| Precision Probe                                               |                                                     | N2808A                                       | 044                                                |
| eMMC compliance                                               | 064                                                 | N6465A                                       | 061                                                |
| BroadR-Reach compliance                                       | 065                                                 | N6467A                                       | 062                                                |
| MOST compliance                                               | 073                                                 | N6466A                                       | 068                                                |

## Memory upgrade

| Memory per scope channel (4-channel/2-channel mode) | Factory-installed option for new scope purchases | User-installed option (N2900A) |
|-----------------------------------------------------|--------------------------------------------------|--------------------------------|
| 20 Mpts/40 Mpts                                     | Standard                                         | 020                            |
| 50 Mpts/100 Mpts                                    | 50M                                              | 050                            |
| 100 Mpts/200 Mpts                                   | 100                                              | 100                            |
| 200 Mpts/400 Mpts                                   | 200                                              | 200                            |
| 500 Mpts/1 Gpts                                     | 500                                              | 500                            |

### DSO to MSO upgrades (N2901A/B/C/D)

Upgrade your existing DSO to an MSO model in 5 minutes. The upgrade kit turns on all MSO capability and includes an MSO cable, 16-channel lead set with grabbers, an MSO-enabled sticker, and a digital-analog deskew fixture.

## Post-sales upgrades

### DSO → MSO upgrades

|        |                                  |
|--------|----------------------------------|
| N2901D | DSO9064A to MSO9064A Upgrade Kit |
| N2901A | DSO9104A to MSO9104A Upgrade Kit |
| N2901B | DSO9254A to MSO9254A Upgrade Kit |
| N2901C | DSO9404A to MSO9404A Upgrade Kit |

### Oscilloscopes bandwidth upgrades

|        |                              |                                                                                            |
|--------|------------------------------|--------------------------------------------------------------------------------------------|
| N2905A | Upgrade to 2.5 GHz bandwidth | -option 006 600 MHz to 2.5 GHz<br>-option 010 1 GHz to 2.5 GHz                             |
| N2904A | Upgrade to 4.0 GHz bandwidth | -option 006 600 MHz to 4 GHz<br>-option 010 1 GHz to 4 GHz<br>-option 025 2.5 GHz to 4 GHz |

### Additional acquisition memory

(N2900A or options 50, 100, 200, and 500 on new scope purchase)

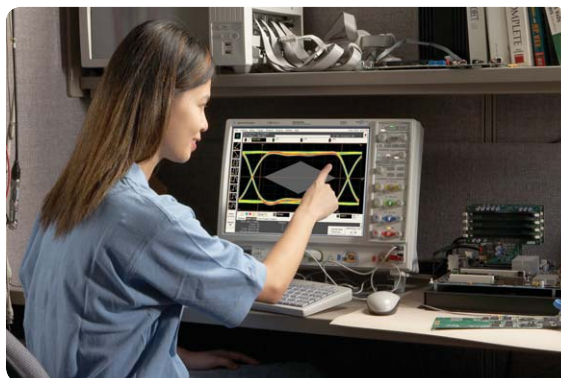
Increase memory depth to capture longer time periods and maintain faster speeds. Memory depth doubles in 2-channel mode.

### Memory depth upgrades

|        |                                  |                                                                                                                                                     |
|--------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| N2900A | Depth doubles in 2 channel mode. | -option 050 upgrade to 50 Mpts/ch<br>-option 100 upgrade to 100 Mpts/ch<br>-option 200 upgrade to 200 Mpts/ch<br>-option 500 upgrade to 500 Mpts/ch |
|--------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

### Operating system upgrades

|        |                                                                                            |
|--------|--------------------------------------------------------------------------------------------|
| N2753A | Windows 7 for Infiniium 9000 scope with Windows XP and SN>MY50410100                       |
| N2754A | Window 7 and M890 motherboard for Infiniium 9000 scopes with Windows XP and SN <MY50410100 |





**myAgilent**

[www.agilent.com/find/myagilent](http://www.agilent.com/find/myagilent)

A personalized view into the information most relevant to you.



[www.lxistandard.org](http://www.lxistandard.org)

LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Agilent is a founding member of the LXI consortium.

### Agilent Channel Partners

[www.agilent.com/find/channelpartners](http://www.agilent.com/find/channelpartners)

Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.



**Three-Year Warranty**

[www.agilent.com/find/ThreeYearWarranty](http://www.agilent.com/find/ThreeYearWarranty)

Agilent's combination of product reliability and three-year warranty coverage is another way we help you achieve your business goals: increased confidence in uptime, reduced cost of ownership and greater convenience.



**Agilent Advantage Services**

[www.agilent.com/find/AdvantageServices](http://www.agilent.com/find/AdvantageServices)

Accurate measurements throughout the life of your instruments.



[www.agilent.com/quality](http://www.agilent.com/quality)

*PCI Express and PCIe are registered trademarks of PCI-SIG.*

*MATLAB is a U.S. registered trademark of The MathWorks, Inc.*



### Agilent Technologies Oscilloscopes

Multiple form factors from 20 MHz to > 90 GHz | Industry leading specs | Powerful applications

[www.agilent.com](http://www.agilent.com)  
[www.agilent.com/find/9000](http://www.agilent.com/find/9000)

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

#### Americas

|               |                |
|---------------|----------------|
| Canada        | (877) 894 4414 |
| Brazil        | (11) 4197 3600 |
| Mexico        | 01800 5064 800 |
| United States | (800) 829 4444 |

#### Asia Pacific

|                    |                |
|--------------------|----------------|
| Australia          | 1 800 629 485  |
| China              | 800 810 0189   |
| Hong Kong          | 800 938 693    |
| India              | 1 800 112 929  |
| Japan              | 0120 (421) 345 |
| Korea              | 080 769 0800   |
| Malaysia           | 1 800 888 848  |
| Singapore          | 1 800 375 8100 |
| Taiwan             | 0800 047 866   |
| Other AP Countries | (65) 375 8100  |

#### Europe & Middle East

|                |                      |
|----------------|----------------------|
| Belgium        | 32 (0) 2 404 93 40   |
| Denmark        | 45 45 80 12 15       |
| Finland        | 358 (0) 10 855 2100  |
| France         | 0825 010 700*        |
|                | *0.125 €/minute      |
| Germany        | 49 (0) 7031 464 6333 |
| Ireland        | 1890 924 204         |
| Israel         | 972-3-9288-504/544   |
| Italy          | 39 02 92 60 8484     |
| Netherlands    | 31 (0) 20 547 2111   |
| Spain          | 34 (91) 631 3300     |
| Sweden         | 0200-88 22 55        |
| United Kingdom | 44 (0) 118 927 6201  |

*For other unlisted countries:*

[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

(BP2-19-13)

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2012, 2013  
Published in USA, May 3, 2013  
5990-3746EN



**Agilent Technologies**