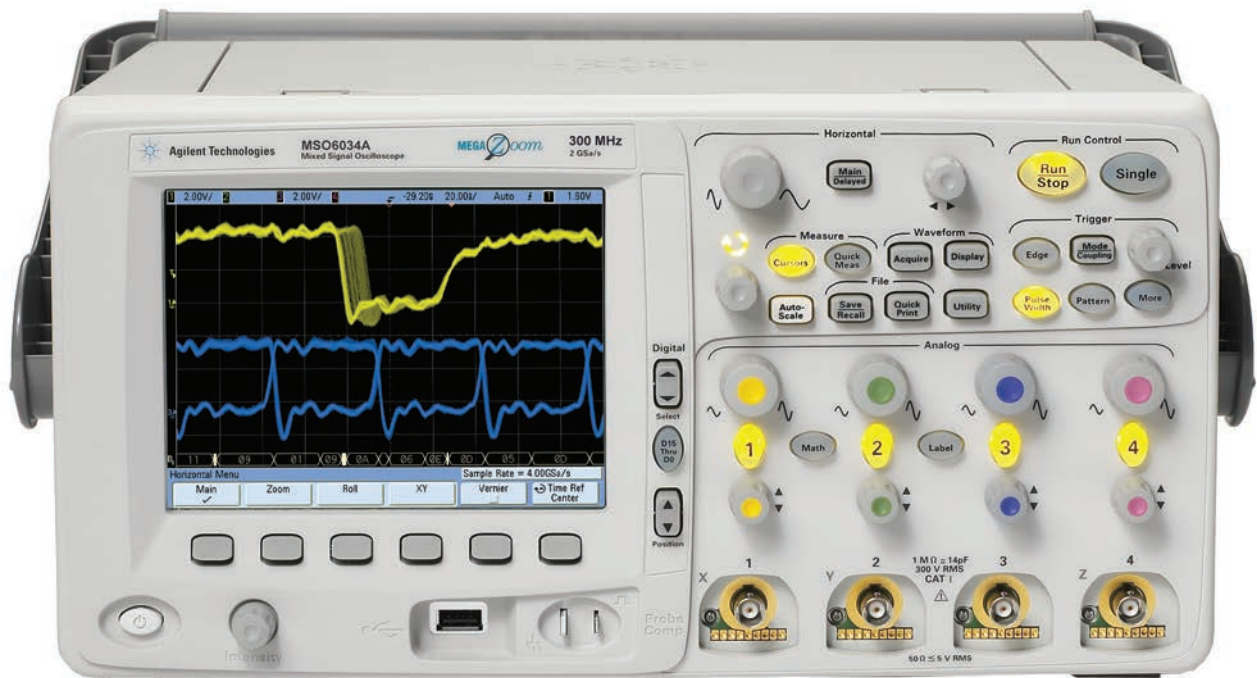


# Agilent Technologies InfiniiVision 6000 Series Oscilloscopes

Data Sheet

**Engineered for the best signal visibility**



*Anticipate — Accelerate — Achieve*



**Agilent Technologies**

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

**Agilent has been the fastest growing oscilloscope supplier since 1997** (source: Prima Data, 2007). Wonder why? Agilent engineers developed the InfiniiVision 6000 Series with advanced technology that will allow you to see more subtle signal detail and more infrequent events than any other scope on the market. See the InfiniiVision 6000 Series oscilloscope—the industry's best for signal viewing.

*There is no better way to experience the superiority of the InfiniiVision 6000 Series scopes than to see it. Contact Agilent today to request an evaluation.*

*Or visit:  
[www.agilent.com/find/mso6000](http://www.agilent.com/find/mso6000)*



The InfiniiVision 6000 Series offers bandwidths up to 1 GHz. Each model, equipped with a 6.3" XGA LCD display, comes in a whisper-quiet package that weighs only 11 pounds.

| Model    | Bandwidth | Sample rate | Memory | Scope channels | Digital channels | Update rate  |
|----------|-----------|-------------|--------|----------------|------------------|--|
| DSO6012A | 100 MHz   | 2 GSa/s     | 8 Mpts | 2              | 16               | Up to 100,000 deep-memory waveforms per second, even with deep memory, digital channels and serial decode turned on. |
| DSO6014A |           |             |        | 4              |                  |  |
| MSO6012A |           |             |        | 2              |                  |  |
| MSO6014A |           |             |        | 4              |                  |  |
| DSO6032A | 300 MHz   | 2 GSa/s     | 8 Mpts | 2              | 16               |  |
| DSO6034A |           |             |        | 4              |                  |  |
| MSO6032A |           |             |        | 2              |                  |  |
| MSO6034A |           |             |        | 4              |                  |  |
| DSO6052A | 500 MHz   | 4 GSa/s     | 8 Mpts | 2              | 16               |  |
| DSO6054A |           |             |        | 4              |                  |  |
| MSO6052A |           |             |        | 2              |                  |  |
| MSO6054A |           |             |        | 4              |                  |  |
| DSO6102A | 1 GHz     | 4 GSa/s     | 8 Mpts | 2              | 16               |  |
| DSO6104A |           |             |        | 4              |                  |  |
| MSO6102A |           |             |        | 2              |                  |  |
| MSO6104A |           |             |        | 4              |                  |  |

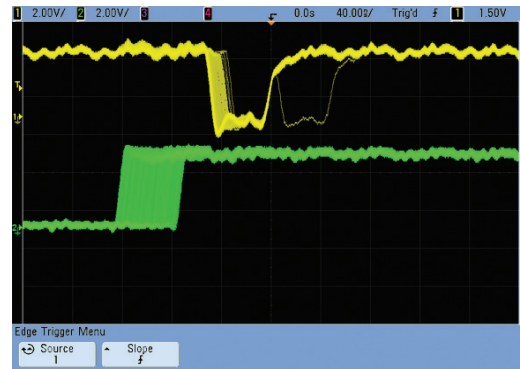
Choose from sixteen InfiniiVision 6000 Series models. Agilent provides an easy 5-minute DSO-to-MSO upgrade kit for previously purchased 6000 Series DSOs.

# What gives the InfiniiVision 6000 Series the best signal visibility?

## 1. High resolution

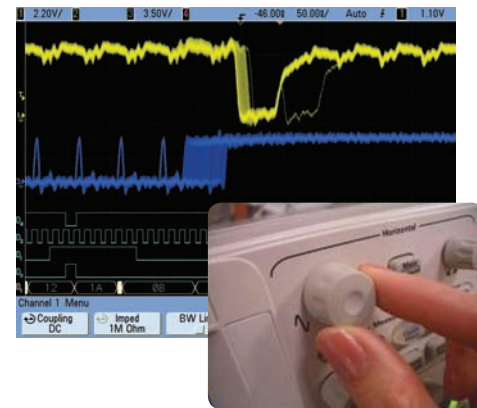
Oscilloscopes are visual tools and high-resolution screens make the product better. High resolution displays have become increasingly important as general purpose scopes need to display digital and serial signals in addition to traditional scope channels.

View up to 20 channels simultaneously with serial protocol. See subtle signal detail with up to 256 levels of intensity.



## 2. Fastest architecture

See a display more representative of the actual signals under test than with any other scope. The InfiniiVision 6000 Series shows jitter, infrequent events, and subtle signal detail that other scopes miss. Turn knobs and the instrument responds instantly and effortlessly. Need to also view digital channels? The instrument stays responsive. Decoding serial packets? Offering the industry's only hardware-accelerated serial bus decode, Agilent's InfiniiVision series delivers serial debug without compromising analog measurements.



## MEGA Zoom III

InfiniiVision scopes incorporate acquisition memory, waveform processing, and display memory in an advanced 0.13  $\mu$  ASIC. This patented 3rd generation technology, known as MegaZoom III, delivers up to 100,000 waveforms (acquisitions) per second with responsive deep memory always available.

## 3. Insightful applications

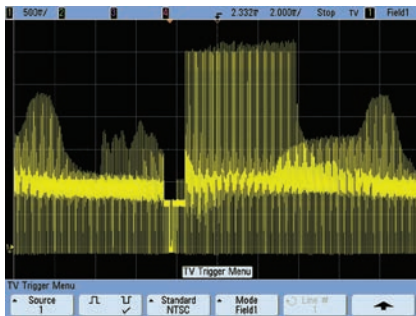
Customize your general purpose scope. A wide range of application packages provide meaningful insight into your application-specific problems. (See pages 8-10 for more detail.)

- Serial with hardware-accelerated decode

- |   |   |   |
|---|---|---|
| <ul style="list-style-type: none"><li>I<sup>2</sup>C, SPI</li><li>I<sup>2</sup>S</li><li>CAN/LIN</li><li>RS-232/UART</li><li>DSO/MSO offline analysis</li></ul> | <ul style="list-style-type: none"><li>Core-assisted FPGA debug</li><li>Vector signal analysis</li><li>Segmented memory</li><li>Mask testing</li><li>Power measurement</li></ul> | <ul style="list-style-type: none"><li>Secure environment</li><li>FlexRay</li><li>MIL-STD 1553</li></ul> |
|---|---|---|

# Your design has analog, digital and serial signals ... shouldn't your scope?

*Analog: Up to 1 GHz bandwidth and up to 4 GSa/s sample rate*

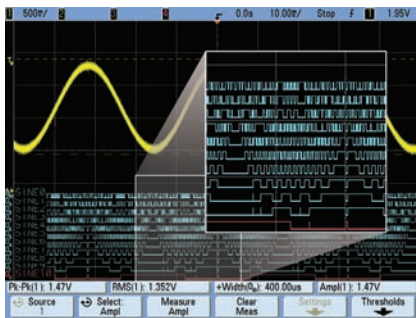


**The InfiniiVision 6000 Series scope channels provide faster identification of your most elusive problems –**

**Revolutionary high-resolution display.** Engineered with an XGA display and 256 levels of intensity grading, see a precise representation of the analog characteristics of the signals you're testing. Equipped with the industry's fastest uncompromised update rate at 100,000 waveforms/sec update rate, you'll capture critical signal detail and see infrequent events that traditional scopes miss.

**MegaZoom III technology.** MegaZoom III responsive deep memory captures long, non-repeating signals and maintains high sample rates, allowing you to quickly zoom in on areas of interest. Sample rate and memory depth go hand-in-hand. Deep memory in oscilloscopes sustains a high sample rate over longer time spans.

*Digital: 16 digital timing channels with mixed signal triggering*



**Capture a mix of analog or digital signals. Compare multiple cycles of digital signals with slower analog signals –**

**16 high-speed timing channels with up to 2 GSa/s deep memory.** Use the timing channels to evaluate control signal relationship. Or capture and view data buses up to 16 bits wide. Trigger on and display individual signals or bus waveforms in hex or binary.

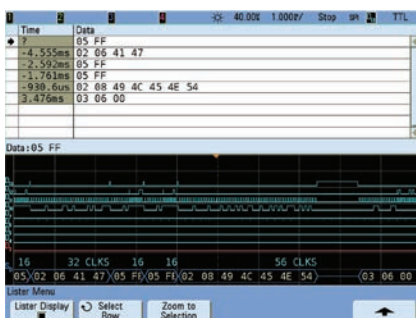
**Mixed signal trigger.**

Trigger across any combination of analog and digital signals simultaneously. See precise analog measurements timed with exact digital content, all in one box.

**Applications for digital channels.**

Designing with Altera or Xilinx FPGAs? Use the FPGA dynamic probe for rapid internal FPGA measurements. Using I<sup>2</sup>C, SPI, or RS-232? Use the analog or digital signals from a 4-channel model to acquire and decode these serial buses.

*Serial: Hardware-accelerated decode and trigger for I<sup>2</sup>C, SPI, RS-232, CAN, LIN, I<sup>2</sup>S, MIL-STD 1553, and FlexRay*



**Capture long streams of serial data and gain fast insight into your problems. Agilent 6000 Series oscilloscopes provide the best serial protocol capabilities in their class**

**Serial bus triggering and decoding.**

Display responsive, on-screen decode of serial bus traffic. Isolate specific events with pinpoint accuracy. Show decode to validate serial bus activity in real time.

**Quickly find infrequent errors.**

Hardware-accelerated decoding increases your probability of capturing elusive events. Agilent oscilloscopes can help you catch that intermittent problem before it becomes an intermittent customer complaint or quality concern.

**Easily capture enough serial data to see all of the details.**

Use deep memory to capture serial data stream over a long period of time.

**Listing Display Window**

Shows a tabular view of all captured packets that match on screen waveform data.



## Other useful features

**High resolution mode.** Offers up to 12 bits of vertical resolution in real-time, single-shot mode. This is accomplished by serially filtering sequential data points and mapping the filtered results to the display when operating at time base settings greater than 10- $\mu$ s/div.

**Help is at your fingertips.** An embedded help system – available in 11 languages – gives you quick answers if you don't understand a feature. Simply press and hold the corresponding front-panel key, and a screen pops up to explain its function.

**Waveform math with FFT.** Analysis functions include subtract, multiply, integrate, square root, and differentiate, as well as fast Fourier transforms (FFT).

**Peak detect.** 250 ps on 500-MHz and 1-GHz models, 500 ps on 350-MHz models and 1 ns on 100-MHz models helps you find narrow glitches.

**AutoProbe interface.** Automatically sets probe attenuation factors and provides power for selected active probes, including the award-winning 1130A 1.5-GHz InfiniiMax differential active probe and 1156A 1.5-GHz single-ended active probe systems.

**5-digit hardware counter.** Measures frequency up to the bandwidth of the scope.

### Trig Out and Reference Clock In/Out.

Provides an easy way to synchronize your scope to other instruments. Use the Trig Out port to connect your scope to a frequency counter for more accurate frequency measurements or to cross trigger other instruments.

**Autoscale.** Displays all analog and digital active signals, and automatically sets the vertical, horizontal and trigger controls.

### 23 automatic measurements with statistics

Get up to 4 simultaneous measurements with 5 additional statistics beyond the current value. Fast update rate provides statistical data for enabled measurements such as mean, min, max, standard deviation and count. Pressing [QuickMeas] brings up the last four automated measurements selected. Cursors automatically track the most recently selected measurement.

### Analog HDTV/EDTV trigger.

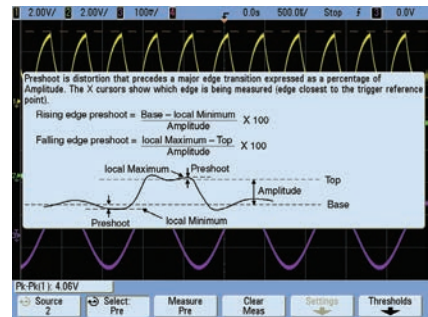
The 6000 Series comes standard with analog HDTV/EDTV triggering for standards like 1080i, 1080p, 720p and 480p as well as standard video triggering on any line within a field, all lines, all fields and odd or even fields for NTSC, SECAM, PAL and PAL-M video signals.

### Bus mode display (on MSO models).

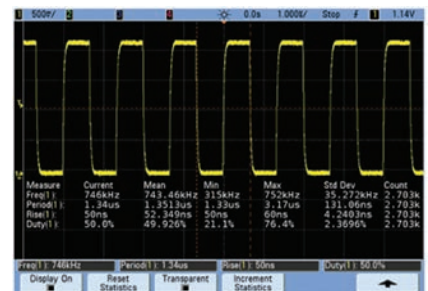
Quick and easy read-out of hexadecimal or binary representation of logic signals.

### Easy software upgrades.

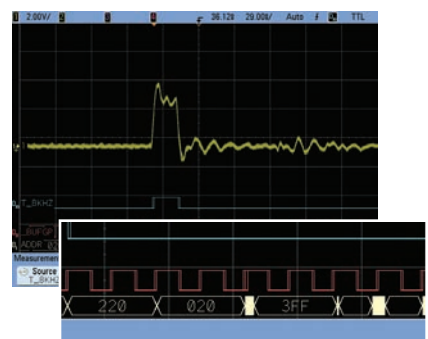
System software is stored in flash ROM that can be upgraded from the scope's built-in USB port or LAN. You can find the latest system and IntuiLink software at: [www.agilent.com/find/mso6000sw](http://www.agilent.com/find/mso6000sw)



Press and hold a key for instant help.



Measurement statistics allow you to have confidence in your measurements. Statistics can show that a measurement is not only correct at one moment, but that it has stabilized and has a low variance over time, giving it a higher statistical validity.



Digital signals can be displayed individually or as overlaid bus values.

## Why does a fast update rate matter?

While bandwidth, sample rate and memory depth are key criteria for deciding which scope to purchase, an equally important characteristic is update rate.

### What is update rate?

Update rate is how many waveforms acquisitions per seconds you scope can acquire, process, and display. Oscilloscope “dead-time” is the time it takes for a scope to process and then display an acquired waveform before re-arming its triggering for the next acquisition. For traditional scopes, this time is often orders of magnitude greater than acquisition time on fast time-per-division settings.

If a glitch occurs during the scope’s dead-time, it won’t be captured. The key to improving the probability of capturing a signal anomaly during the scope acquisition time is to minimize dead-time.

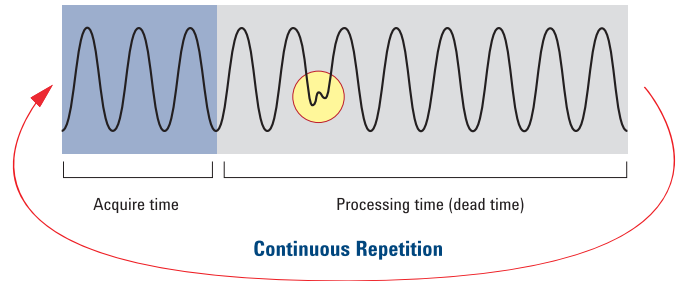
Oscilloscope vendors usually specify what their scope’s “best-case” waveform update rates are. Some scope architectures suffer from factors that can seriously degrade the “best-case” update rates spec. Agilent’s 6000 Series architecture delivers the world’s fastest update rate when using:

- Analog channels
- Analog and digital
- Deep memory
- Serial decode

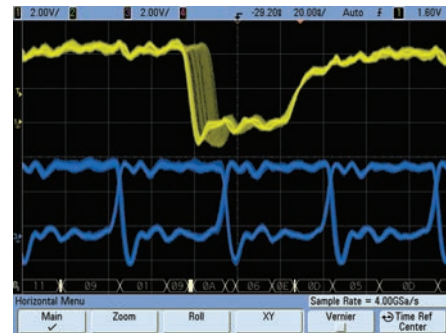
### Why is update rate important?

1. Responsiveness. If you rotate the timebase control, you expect the oscilloscope to respond immediately – not seconds later after the scope finishes processing data.
2. Signal detail. Fast waveform update rates improve the display quality of the waveform that you see on screen.
3. Certainty. Fast waveform update rates improve the scope’s probability of capturing random and infrequent events.

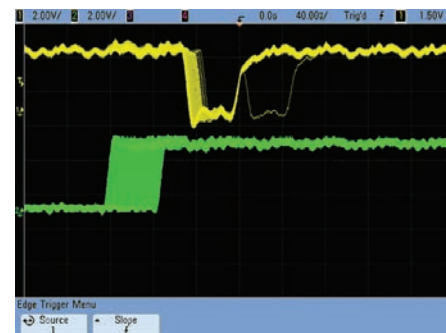
Update rates directly affect a scope probability of capturing and displaying infrequent and random events. Slow update rates will cause a scope to miss subtle or infrequent signal details.



**Improves instrument responsiveness**



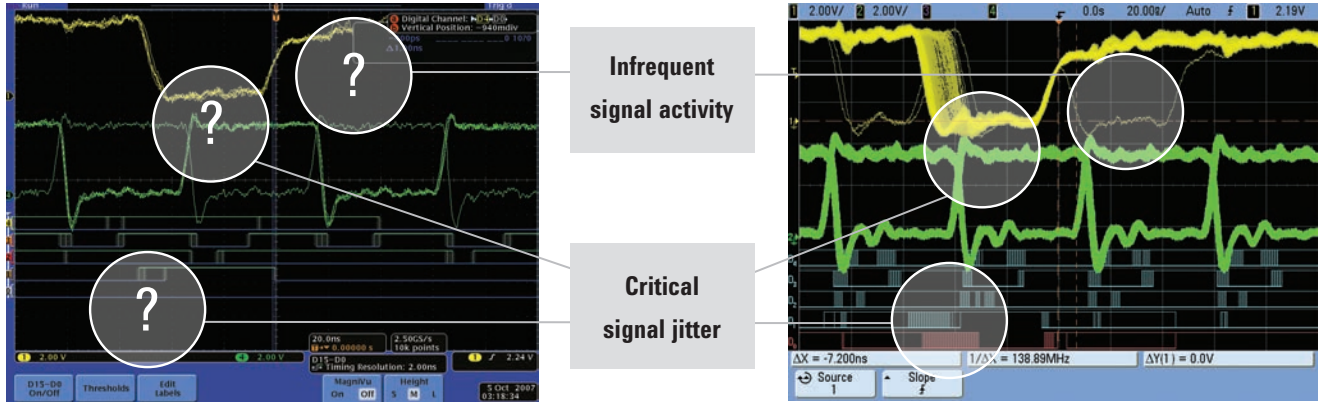
**Improves scope display quality**



**Improves probability of capturing infrequent events**

# How update rate affects signal visibility

Capturing random and infrequent events on an oscilloscope is all about statistical probabilities. The key to improving the probability of capturing a signal anomaly is to minimize dead-time and take more pictures of the signal in a given timeframe. Here is an example with Tek and Agilent scopes both connected to a target with a glitch that occurs 25 times per second.



## Tek MSO4104

- Product data sheet: 50,000 waveforms per second.
- Update rate = 18 waveforms per second with 10 Mpts and digital channels turned on. Resulting measurement shown.
- Probability of capturing the infrequent glitch = 0.09% after running for 10 seconds.
- Average time to capture just one glitch = 128 minutes.

## Agilent MS06104A

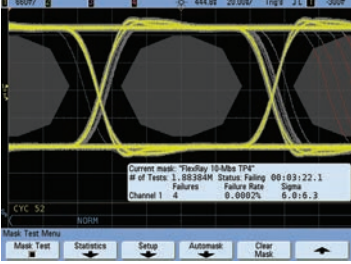
- Product data sheet: 100,000 waveforms per second.
- Update rate = 95,000 waveforms per second with auto memory and digital channels turned on. Resulting measurement shown.
- Probability of capturing the infrequent glitch = 99% after running for 10 seconds.
- Average time to capture just one glitch = 1.5 seconds.

|                         | Memory* | Scope settings   |                  |               | Measured update rates |                 |                  |
|-------------------------|---------|------------------|------------------|---------------|-----------------------|-----------------|------------------|
|                         | Tek     | Timebase setting | Digital Channels | Serial Decode | TEK MSO4104A**        | LeCroy WR 104Xi | Agilent MS06104A |
| Initial setup           | 10 Kpts | 20 ns/div        | -                | -             | 55,000                | 27              | 95,000           |
| Change timebase         | 10 Kpts | 10 ns/div        | -                | -             | 2,700                 | 27              | 95,000           |
| Add digital channels    | 10 Kpts | 20 ns/div        | On               | -             | 125                   | 27              | 95,000           |
| Increase memory setting | 10 Mpts | 20 ns/div        | On               | -             | 35                    | 27              | 95,000           |
| Turn on serial decode   | 10 Mpts | 20 ns/div        | On               | On            | 0.2                   | 25              | 95,000           |

\* Agilent and LeCroy memory depth selection was automatically selected. Memory depth = display window times sample rate with up to 8 Mpts for Agilent.  
 \*\* Tek measurements taken with version 2.13 firmware.

Seeing subtle signal detail and infrequent events requires a scope with fast waveform update rates. Don't take a scope vendor's banner waveform update rate specification at face value. Test it yourself. It's actually pretty easy to characterize a scope's update rate. Run a moderately fast signal (e.g. 50 Mhz) into a scope channel. Measure the scope's average trigger output signal frequency. This is your scope's update rate for the specified timebase setting. Test the update rate of the scope under various setup conditions. Setup conditions that Agilent suggests varying include timebase range, memory depth, and number of channels, including analog, digital, as well as channels assigned for serial decoding.

# Software applications



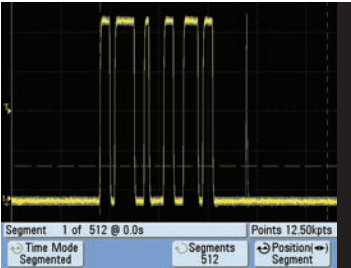
Mask testing uncovers an infrequent signal anomaly.

## Mask testing (N5455A or Option LMT)

Agilent's mask test option (Option LMT or N5455A) for InfiniiVision Series oscilloscopes provides a fast and easy way to test your signals to specified standards, and uncover unexpected signal anomalies, such as glitches. Mask testing on other oscilloscopes is based on software-intensive processing technology, which tends to be slow.

Agilent's InfiniiVision scopes can perform up to 100,000 real-time waveform pass/fail tests per second. This provides testing throughput significantly faster than other mask test solutions, making valid pass/fail statistics available almost instantly.

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



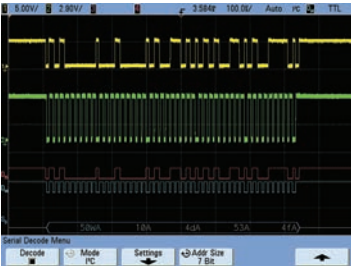
Use segmented memory to optimize available memory.

## Segmented memory (N5454A or Option SGM on new scope purchases)

Segmented memory optimizes available memory for data streams that have long dead times between activity. The application excels at analyzing signal activity associated with laser pulses, serial buses, and bursty signals such as radar.

View an overlay of all signal segments, including MSO channels and serial decode, while highlighting the current segment. Quickly move between segments to view signal detail associated with a specific segment.

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



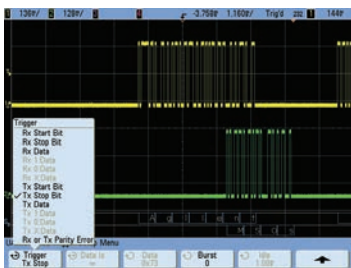
View on-screen serial decode of an I<sup>2</sup>C packet.

## I<sup>2</sup>C/SPI serial trigger and decode (N5423A or Option LSS on new scope purchases)

This application displays real-time time-aligned decode of I<sup>2</sup>C and SPI serial buses. Hardware-accelerated decode means the scope stays responsive and fast.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of the scope or logic acquisition channels.

For more information: [www.agilent.com/find/I<sup>2</sup>C-SPI](http://www.agilent.com/find/I2C-SPI)



Trigger on and decode RS-232/UART transmission.

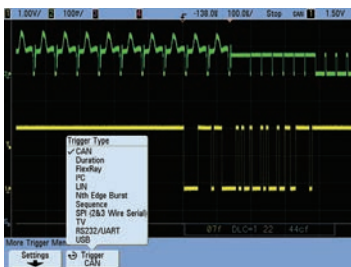
## RS-232/UART serial decode and trigger (N5457A or Option 232 on new scope purchases)

Does your design include RS-232 or another type of UART? 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 a RS-232 or other UART serial bus.

Display real-time time-aligned decode of transmit and receive lines. The application also enables triggering on RS-232/UART conditions.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of the scope or logic acquisition channels.

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



Trigger on and decode CAN serial packets.

## CAN/LIN triggering and decode (N5424A or Option AMS on new scope purchases)

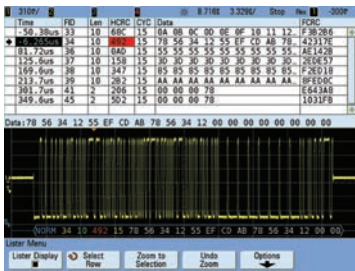
Trigger on and decode serially transmitted data based on CAN and LIN protocols. This application not only provides triggering on complex serial signals, but it also provides unique hardware-accelerated capabilities. Hardware-accelerated triggering and decode means the scope stays responsive and fast.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of scope or logic acquisition channels.

For more information: [www.agilent.com/find/CAN-LIN](http://www.agilent.com/find/CAN-LIN)



# Software applications



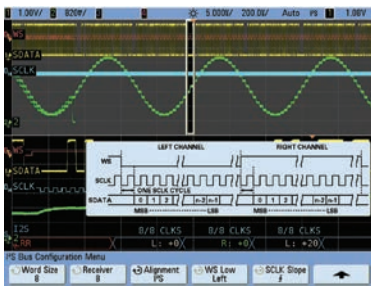
Time-correlated display of the FlexRay physical layer signal with protocol decoding.

## FlexRay Measurements (N5432C or Option FLX on new scope purchases)

Trigger on and time-correlate FlexRay communication with physical layer signals. With Agilent's unique hardware-accelerated decoding, it provides the fastest decode update rates in the industry while the scope remains responsive and fast. Also included with this option is FlexRay eye-diagram mask testing and physical layer conformance test solution.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of scope or logic acquisition channels.

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



On-screen serial decode of an SPI packet

## I<sup>2</sup>S triggering and decode (Option SND or N5468A)

Find and debug intermittent errors and signal integrity problems faster on I2S audio protocol devices. This application offers powerful triggering and our unique hardware-accelerated decode and lister window so you can more easily find errors you could miss using other serial bus decode tools.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of scope or logic acquisition channels.

For more information: [www.agilent.com/find/I2S](http://www.agilent.com/find/I2S)



Time-correlated display of the MIL-STD 1553 physical layer signal with protocol decoding.

## MIL-STD 1553 Serial Trigger and Decode (N5469A or Option 553 on new scope purchase)

This application provides integrated MIL-STD 1553 serial bus triggering, hardware-based decoding, and eye-diagram mask testing to help you debug and characterize the electrical/physical layer of MIL-STD 1553 serial buses faster than with traditional "bit-counting" methods.

This application requires a 4-channel DSO or 4-channel MSO and can use any combination of scope of logic acquisition channels

For more information: [www.agilent.com/find/1553](http://www.agilent.com/find/1553)



Debug and validate your FPGA designs faster and more effectively

## FPGA dynamic probe application (N5406A for Xilinx, N5434A for Altera)

Give your MSO internal FPGA visibility. 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 a few mouse clicks. In a few seconds, easily measure a different set of internal signals without changing your FPGA design.

For more information:

[www.agilent.com/find/7000-altera](http://www.agilent.com/find/7000-altera)

[www.agilent.com/find/7000-xilinx](http://www.agilent.com/find/7000-xilinx)



Use your scope to quickly make and analyze power measurements.

## Power application (U1881A)

Need to make power measurements with your scope? Agilent's power application provides a full suite of power measurements that run on a PC connected to an InfiniiVision 7000B Series oscilloscope. Make more accurate power supply efficiency measurements by using an U1880A deskew fixture to deskew your voltage and current probes.

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

## Software applications and other accessories

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*Expand the capability of your scope with 89601A vector analysis software.*

### Vector signal analysis software (89601A)

Expand the measurement capability of your scope with the 89601A vector signal analysis software. This advanced DSP-based software takes the digitized signal data provided by the scope and provides FFT-based spectrum analysis and wide bandwidth digital modulation analysis for wireless communication signals like WCDMA and cdma2000, and wireless networking signals like 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/7000-vs-a](http://www.agilent.com/find/7000-vs-a)

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*View and analyze previously acquired scope data on a PC-based offline tool.*

### Offline viewing and analysis (B4610A)

Need to view and analyze scope data away from your scope? Need to share measurement data with geographically dispersed team members? Save your scope data to a USB or network drive and import the data into a PC-based offline viewer. Pan and zoom.

Use searching and filtering to gain insight on analog and digital buses. Email the data to team members who can use the same tool at their PCs.

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

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*Secure environment mode ensures nonvolatile memory is cleared on power off.*

### Secure environment mode (Option SEC)

Option SEC – secure environment mode provides the highest level of security by ensuring internal non-volatile memory is clear of all setup and trace settings in compliance with National Industrial Security Program Operation Manual (NISPOM) Chapter 8 requirements. When this option is installed, it will store setup and trace settings to internal volatile memory only.

Volatile memory will be cleared during the power off cycle of the instrument. So you can move the instrument out of a secure area with confidence.

For more information: *Option SEC Secure Environment Mode Option for Agilent 7000B Series Oscilloscopes Data Sheet*

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*The evaluation kit helps you discover the power of InfiniiVision 7000B Series oscilloscopes.*

### Evaluation kit (N2918A)

The evaluation kit includes a variety of signals that demonstrate MegaZoom III technology with its fast deep memory, superior waveform update rate, high definition display and mixed analog, digital and serial abilities.

Using this scope evaluation kit along with the easy-to-follow user's guide, you can quickly become familiar with how to effectively operate an InfiniiVision 7000B Series scopes.

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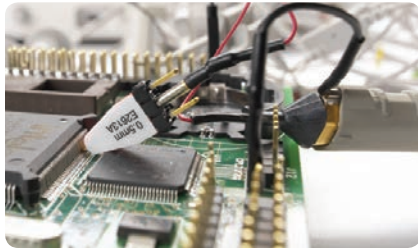


### Battery power option (Option BAT – factory installed)

Agilent 6000 Series oscilloscopes provide an optional internal rechargeable lithium ion battery that will enable 2+ hours without line power. Specifically designed for applications where line power is not available or where you need to take your scope with you but you need more power than a handheld scopemeter provides. New oscilloscopes equipped with this option can also be operated off of the N5429A 12-V automotive adapter. The Agilent 6000 Series oscilloscopes offer the only high-performance scope with battery option on the market.

For more information: [www.agilent.com/find/6000\\_BAT](http://www.agilent.com/find/6000_BAT)

## Probes and accessories



Agilent offers a complete family of innovative passive and active probes for the InfiniiVision 6000 Series scopes to get your job done easily and accurately. Choosing the correct probe for your application will help to ensure you are acquiring the signals you expect. Below is a general guide on how to choose the type of probe. For the most up-to-date information about Agilent's accessories, please visit our Web site at [www.agilent.com/find/scope\\_probes](http://www.agilent.com/find/scope_probes).

| Probe type   | Key characteristics   | DS0601xA,<br>MS0601xA                        | DS0603xA, MS0603xA<br>DS0605xA, MS0605xA<br>DS0610xA, MS0610xA |
|--|---|--|--|
| <b>Passive probes:</b> most common type of probe, rugged and economical with bandwidth generally lower than 600 MHz  |   |  |  |
| 10070C   | 1:1 20 MHz with probe ID  | Recommended*                                 | Recommended  |
| 10073C   | 10:1 500 MHz with probe ID  | Compatible*                                  | Included   |
| 10074C   | 10:1 150 MHz with probe ID  | Included*                                    | Compatible   |
| <b>High voltage passive probe:</b> view up to 30 kVDC + peak AC voltage referenced to earth ground   |   |  |  |
| 10076A   | 100:1, 4 kV, 250 MHz probe with ID  | Recommended                                  | Recommended  |
| N2771A   | 1000:1, 30 kV, 50 MHz probe   | Recommended                                  | Recommended  |
| <b>Single-ended active probes:</b> contains small, active amplifier and enables the probe input capacitance to be very low resulting in high input impedance on high frequencies. Least intrusive of all probes.                             |   |  |  |
| 1156A  | 1.5 GHz AutoProbe interface   | Incompatible*                                | Recommended  |
| 1144A  | 800 MHz (requires 1142A – power supply)   | Incompatible                                 | Recommended  |
| 1145A  | 750 MHz 2-ch (requires 1142A – power supply)  | Incompatible                                 | Recommended  |
| <b>Active differential probes:</b> use to look at signals that are referenced to each others instead of earth ground and to look at small signals in the presence of large DC offsets or other common mode signals such as power line noise. |   |  |  |
| 1130A  | 1.5 GHz InfiniiMax amplifier with AutoProbe interface (requires one or more InfiniiMax probe head – E2675A, E2668A, E2669A) | Incompatible                                 | Recommended  |
| N2772A   | 20 MHz, 1.2 kVDC + peak AC max (requires N2773A power supply)   | Recommended                                  | Recommended  |
| 1141A  | 200 MHz, 200 VDC + peak AC max (requires 1142A power supply)  | Compatible                                   | Recommended  |
| N2790A   | 100 MHz, 1.4 kV high-voltage differential probe with AutoProbe interface  | Incompatible                                 | Recommended  |
| N2791A   | 25 MHz, 700 V high-voltage differential probe (battery or USB powered)  | Recommended                                  | Recommended  |
| N2792A   | 200 MHz, +/-20 V differential probe (battery or USB powered)  | Recommended                                  | Recommended  |
| N2793A   | 800 MHz, +/-15 V differential probe (battery or USB powered)  | Recommended                                  | Recommended  |
| <b>Current probes:</b> sense the AC or DC current flowing through a conductor and convert it to a voltage that can be viewed and measured on an oscilloscope. Compatible with 1 MΩ scope input.  |   |  |  |
| 1146A  | 100 kHz, 100 A, AC/DC   | Recommended                                  | Recommended  |
| 1147B  | 50 MHz, 30 A, AC/DC with AutoProbe interface  | Incompatible                                 | Recommended  |
| N2780A   | 2 MHz, 500 A, AC/DC (use with N2779A power supply)  | Recommended                                  | Recommended  |
| N2781A   | 10 MHz, 150 A, AC/DC (use with N2779A power supply)   | Recommended                                  | Recommended  |
| N2782A   | 50 MHz, 30 A, AC/DC (use with N2779A power supply)  | Recommended                                  | Recommended  |
| N2783A   | 100 MHz, 30 A, AC/DC (use with N2779A power supply)   | Recommended                                  | Recommended  |
| <b>MSO probes:</b> offer the best performance and access to the industry's broad range of logic analyzer probing accessories   |   |  |  |
| 01650-61607**  | 40-pin, 16-channel logic probe  | Recommended with MSO6000 models              | Recommended with MSO6000 models                                |
| 54620-68701  | Logic probe with 2x8 flying leads (includes 20 IC clips and five ground leads)  | Recommended and included with MSO6000 models | Recommended and included with MSO6000 models                   |

\* **Recommended** is a suggestion from Agilent scope and probing experts that this probe works well with this scope.  
**Compatible** indicates that the probe and scope will work together but that there are other choices that will work better.  
**Included** means that this probe ships with this scope.  
**Incompatible** is a warning that the probe will not work with the indicated scope.

\*\* With the addition of 40-pin logic cable, the Agilent MSO accepts numerous logic analyzer accessories such as Mictor, Samtec, flying leads or soft touch connectorless probe.

For more comprehensive information, refer to the *Agilent InfiniiVision Series Oscilloscopes Probes and Accessories Data Sheet and Selection Guide* (Agilent publication numbers 5968-8153EN and 5989-6162EN).



# Connectivity

The 6000 Series scopes come with the most comprehensive connectivity tools in their class.

## LXI LXi class C

LAN eXtensions for Instrumentation (LXI) is a standards-based architecture for test systems. By specifying the interaction of system components, LXI enables fast and efficient test system creation and reconfiguration. The 6000 Series oscilloscopes follow specified LAN protocols and adhere to LXI requirements such as a built-in Web control server, IVI-COM driver, and easy-to-use SCPI commands. The standard Agilent I/O Library Suite makes it easy to configure and integrate instruments in your system.

### IntuiLink toolbars and IntuiLink Data Capture

IntuiLink gives you a quick way to move oscilloscope screen shots and data into Microsoft® Word and Excel. These toolbars can be installed from [www.agilent.com/find/intuilink](http://www.agilent.com/find/intuilink).

### View Scope logic analyzer and oscilloscope correlation

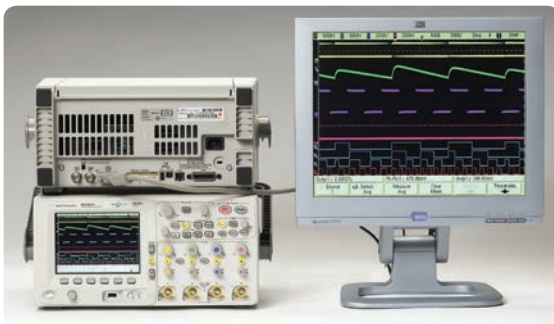
View Scope enables simple and free time-correlated measurements between a 6000 Series oscilloscope and an Agilent 16900, 16800, 1690, or 1680 Series logic analyzer. Scope and logic waveforms are integrated into a single logic analyzer waveform display for easy viewing analysis – all with a simple point-to-point LAN connection. You can also cross-trigger the instruments, automatically de-skew the waveforms, and maintain marker tracking between the instruments.

### National Instrument drivers

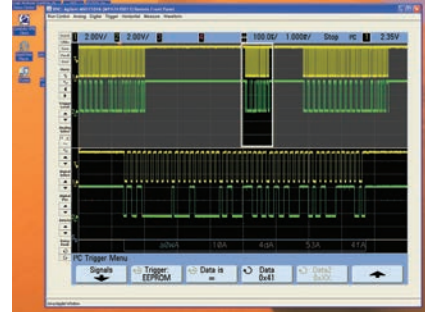
InfiniiVision 6000 Series oscilloscopes are supported by LabVIEW plug-and-play and IVI-C drivers.



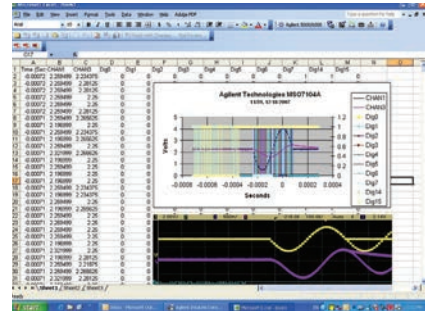
**6000L Series, the most space efficient and affordable LXI Class C compliant oscilloscope.**



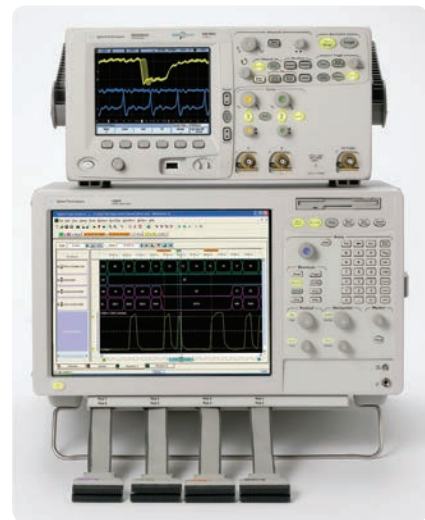
**View 6000 Series signals on an external monitor using the always-on XGA video output.**



**Agilent Remote Front Panel running in a Web browser**



**Use IntuiLink to import scope screen shots and data into Microsoft Word and Excel.**



**Use ViewScope to time-correlate oscilloscope and logic analyzer measurements.**



# Agilent InfiniiVision Portfolio

Agilent's InfiniiVision lineup includes 5000, 6000 and 7000B 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.



**Largest display, shallow depth**



**Optional battery, 100 MHz MSO**



**Ideal for ATE rackmount applications**



**Smallest form factor, lowest price**

| Bandwidth             | 7000B Series       | 6000A Series       | 6000L Series       | 5000 Series       |
|-----------------------|--------------------|--------------------|--------------------|-------------------|
| 100 MHz Bandwidth     | •                  | •                  | •                  | •                 |
| 300/350 MHz Bandwidth | •                  | •                  | •                  | •                 |
| 500 MHz Bandwidth     | •                  | •                  | •                  | •                 |
| 1 GHz Bandwidth       | •                  | •                  | •                  |                   |
| MSO Models            | •                  | •                  | •                  |                   |
| GPIB Connectivity     |                    | •                  | •                  | •                 |
| Rackmount height      | 7U                 | 5U                 | 1U                 | 5U                |
| Battery option        |                    | •                  |                    |                   |
| Display size          | 12.1"              | 6.3"               |                    | 6.3"              |
| Footprint (WxHxD)     | 17.9"x 10.9"x 6.8" | 15.7"x 7.4"x 11.1" | 17.1"x 1.7"x 10.6" | 15.2"x 7.4"x 6.9" |



## Agilent's InfiniiVision oscilloscope portfolio offers:

- A variety of form factors to fit your environment
- Responsive controls and best signal visibility
- Insightful application software
- Responsive deep memory with MegaZoom III

# Agilent InfiniiVision 6000 Series oscilloscopes:

*The fastest way to debug your analog, digital and serial designs*

**High-resolution color display with XGA resolution and 256 levels of intensity** reveals subtle details that other scopes won't show you.

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

**Intensity knob** allows you to see the right level of waveform detail, just like an analog scope.

**Free IntuiLink data capture PC software** makes transferring waveform data or screen image to a PC fast and easy. Built-in web viewer via LAN allows for remote measurements and viewing.



**Built-in help in eleven languages** – Simply press and hold the front-panel key of interest for a few seconds, and a help screen pops up to explain its function.



**An XGA video output port** allows you to connect to a large external monitor.

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

## Rear panel inputs/outputs



**Trig Out port** provides an easy way to synchronize your scope to other instruments.

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

**Built-in storage compartment** allows you to store probes and power cord for easy access and transportation.

**Quickly pan and zoom for analysis** with MegaZoom III's instant response and optimum resolution.

**QuickMeas** shows up to four automated measurements with the push of a button.

**Save** screen images to a connected USB storage device with automated file names.

**Standard serial triggering** includes I<sup>2</sup>C, SPI, and USB (optional CAN/LIN, and RS-232 advanced triggering and decode).

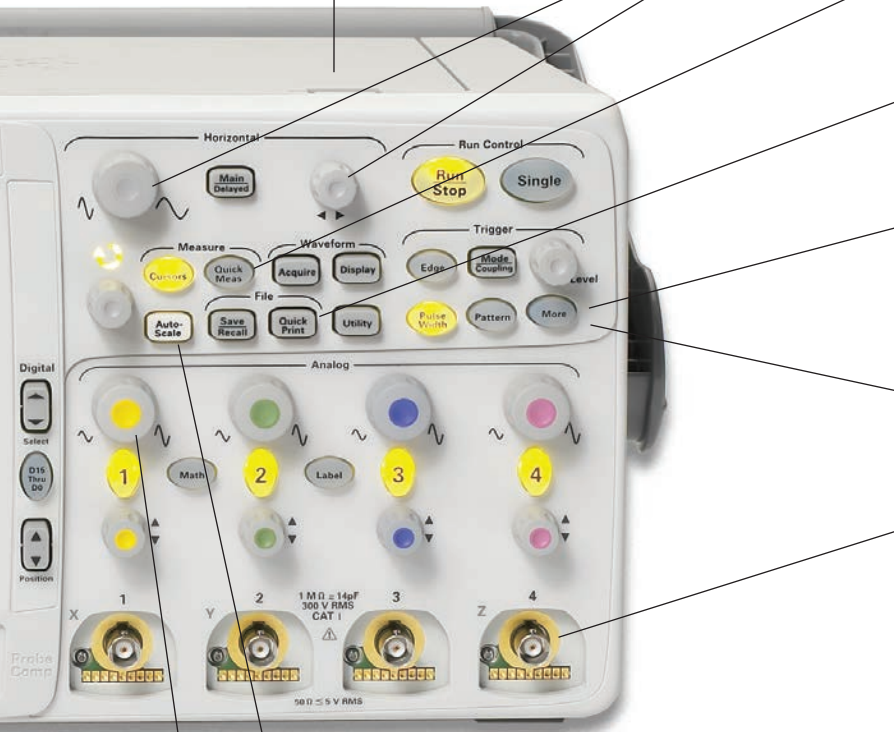
**Standard analog HDTV/EDTV triggering** supports triggering on 1080i, 1080p, 720p, 480p HDTV/EDTV standards.

**AutoProbe interface** automatically configures the attenuation ratio of the probe and provides probe power for Agilent's active probes (available on 300 MHz to 1 GHz models only).

**Maximum sample rate and resolution** is achieved on every measurement. The scope automatically adjusts memory depth as you use it, so you get maximum sample rate and resolution on every measurement. You don't even have to think about it.

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

**Dedicated front-panel controls** make it easy to access the most common scope controls, including vertical and horizontal scaling.



**InfiniiVision 6000 Series 2-channel model**

## Performance characteristics

### Acquisition: scope channels

|                      |   |
|----------------------|---|
| Sample rate          | MSO/DSO601xA/603xA: 2 GSa/sec each channel<br>MSO/DSO605xA/610xA: 4 GSa/sec half channel*, 2 GSa/sec each channel<br>Equivalent-time sample rate: 400 GSa/s (when real-time mode is turned off) |
| Maximum memory depth | 2 channels/4 channels<br>8 Mpts/4 Mpts  |
| Vertical resolution  | 8 bits  |
| Peak detection       | MSO/DSO601xA: 1-ns peak detect<br>MSO/DSO603xA: 500-ps peak detect<br>MSO/DSO605xA/610xA: 250-ps peak detect  |
| Averaging            | Selectable from 2, 4, 8, 16, 32, 64 ... to 65536  |
| High resolution mode | Average mode with avg = 1<br>12 bits of resolution when $\geq 10 \mu\text{s}/\text{div}$ @ 4 GSa/s or $\geq 20\text{-}\mu\text{s}/\text{div}$ @ 2 GSa/s   |
| Filter               | Sinx/x interpolation (single shot BW = sample rate/4 or bandwidth of scope, whichever is less) with vectors on and in real-time mode  |

### Acquisition: digital channels (MSO6000A or MSO-upgraded DSO6000A only)

|                         |   |
|-------------------------|---|
| Sample rate             | 2 GSa/sec one pod**, 1 GSa/sec each pod   |
| Maximum input frequency | 250 MHz   |
| Maximum memory depth    | One pod/both pods (with scope channels turned off)<br>8 Mpts/4 Mpts<br>One pod/both pods (with scope channels turned on)<br>2.5 Mpts/ 1.25 Mpts |
| Vertical resolution     | 1 bit   |
| Glitch detection        | 2 ns (min pulse width)  |

\* Half channel is when only one of channel 1 or 2 is turned on, and only channel 3 or 4 is turned on.

\*\* A pod is a group of eight digital channels, either 0-7 or 8-15.



## Performance characteristics (continued)

### Vertical system: scope channels

|  |   |
|--|---|
| Scope channels                         | MSO/DSO6xx2A: Ch 1 and 2 simultaneous acquisition<br>MSO/DSO6xx4A: Ch 1, 2, 3 and 4 simultaneous acquisition  |
| Bandwidth (–3dB)*                      | MSO/DSO601xA: DC to 100 MHz<br>MSO/DSO603xA: DC to 300 MHz<br>MSO/DSO605xA: DC to 500 MHz<br>MSO/DSO610xA: DC to 1 GHz  |
| AC coupled                             | MSO/DSO601xA: 3.5 Hz to 100 MHz<br>MSO/DSO603xA: 3.5 Hz to 300 MHz<br>MSO/DSO605xA: 3.5 Hz to 500 MHz<br>MSO/DSO610xA: 3.5 Hz to 1 GHz  |
| Calculated rise time (=0.35/bandwidth) | MSO/DSO601xA: 3.5 nsec<br>MSO/DSO603xA: 1.17 nsec<br>MSO/DSO605xA: 700 psec<br>MSO/DSO610xA: 350 psec   |
| Single-shot bandwidth                  | MSO/DSO601xA: 100 MHz<br>MSO/DSO603xA: 300 MHz<br>MSO/DSO605xA: 500 MHz<br>MSO/DSO610xA: 1 GHz (in half-channel mode)   |
| Range <sup>1</sup>                     | MSO/DSO601xA: 1 mV/div to 5 V/div (1 M $\Omega$ )<br>MSO/DSO603xA and MSO/DSO605xA: 2 mV/div to 5 V/div (1 M $\Omega$ or 50 $\Omega$ )<br>MSO/DSO610xA: 2 mV/div to 5 V/div (1 M $\Omega$ ), 2 mV/div to 1 V/div (50 $\Omega$ ) |
| Maximum input                          | CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6 kVpk<br>CAT II 100 Vrms, 400 Vpk<br>With 10073C or 10074C 10:1 probe: CAT I 500 Vpk, CAT II 400 Vpk  |
| Offset range                           | $\pm 5$ V on ranges <10 mV/div; $\pm 20$ V on ranges 10 mV/div to 200 mV/div;<br>$\pm 75$ V on ranges >200 mV/div   |
| Dynamic range                          | $\pm 8$ div   |
| Input impedance                        | MSO/DSO601xA: 1 M $\Omega$ $\pm$ 1%    11 pF<br>MSO/DSO603xA/605xA/610xA: 1 M $\Omega$ $\pm$ 1%    14 pF or 50 $\Omega$ $\pm$ 1.5%, selectable  |
| Coupling                               | AC, DC  |
| BW limit                               | MSO/DSO601xA: 20 MHz selectable<br>MSO/DSO603xA/605xA/610xA: 25 MHz selectable  |
| Channel-to-channel isolation           | DC to max bandwidth >40 dB  |
| Standard probes                        | MSO/DSO601xA: 10:1 10074C shipped standard for each scope channel<br>MSO/DSO603xA/605xA/610xA: 10:1 10073C shipped standard for each scope channel  |
| Probe ID                               | MSO/DSO601xA: Auto probe sense<br>MSO/DSO603xA/605xA/610xA: Auto probe sense and AutoProbe interface<br>Agilent- and Tektronix-compatible passive probe sense   |

\* Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and  $\pm 10$  °C from firmware calibration temperature.

<sup>1</sup> 1 mV/div is a magnification of 2 mV/div setting for 100 MHz models and 2 mV/div is a magnification of 4 mV/div setting for 300 MHz to 1 GHz models. For vertical accuracy calculations, use full scale of 16 mV for 1 mV/div sensitivity setting and 32 mV for 2 mV/div sensitivity setting.

## Performance characteristics (continued)

### Vertical system: scope channels (continued)

|   |  |
|---|--|
| ESD tolerance                           | ±2 kV  |
| Noise, RMS, input shorted               | MSO/DSO601xA: 0.50% FS or 250 µV, whichever is greater<br>MSO/DSO603xA: 0.50% FS or 300 µV, whichever is greater<br>MSO/DSO605xA: 0.50% FS or 360 µV, whichever is greater<br>MSO/DSO610xA: 0.65% FS or 360 µV, whichever is greater   |
| DC vertical gain accuracy* <sup>1</sup> | ±2.0% full scale   |
| DC vertical offset accuracy             | ≤200 mV/div: ±0.1 div ±2.0 mV ±0.5% offset value;<br>>200 mV/div: ±0.1 div ±2.0 mV ±1.5% offset value  |
| Single cursor accuracy <sup>1</sup>     | ±{DC vertical gain accuracy + DC vertical offset accuracy + 0.2% full scale (~1/2 LSB)}<br><i>Example:</i> for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset,<br>accuracy = ±{2.0% (80 mV) + 0.1 (10 mV) + 2.0 mV + 0.5% (5 mV) + 0.2% (80 mV)} =<br>± 4.785 mV |
| Dual cursor accuracy* <sup>1</sup>      | ±{DC vertical gain accuracy + 0.4% full scale (~1 LSB)}<br><i>Example:</i> for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset,<br>accuracy = ±{2.0% (80 mV) + 0.4% (80 mV)} = ±1.92 mV   |

\* Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ±10 °C from firmware calibration temperature.

<sup>1</sup> 1 mV/div is a magnification of 2 mV/div setting for 100 MHz models and 2 mV/div is a magnification of 4 mV/div setting for 300 MHz to 1 GHz models. For vertical accuracy calculations, use full scale of 16 mV for 1 mV/div sensitivity setting and 32 mV for 2 mV/div sensitivity setting.

### Vertical system: digital channels (MSO6000A or MSO-upgraded DSO6000A only)

|                              |   |
|------------------------------|---|
| Number of channels           | 16 logic timing channels – labeled D15 - D0           |
| Threshold groupings          | Pod 1: D7 - D0<br>Pod 2: D15 - D8                     |
| Threshold selections         | TTL, CMOS, ECL and user-definable (selectable by pod) |
| User-defined threshold range | ±8.0 V in 10 mV increments                            |
| Maximum input voltage        | ±40 V peak CAT I; transient overvoltage 800 Vpk       |
| 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 capacitance            | ~8 pF   |
| Input resistance             | 100 kΩ ±2% at probe tip                               |
| Channel-to-channel skew      | 2 ns typical, 3 ns maximum                            |

\* Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ±10 °C from firmware calibration temperature.

## Performance characteristics (continued)

### Horizontal

|                             |   |
|-----------------------------|---|
| Range                       | MSO/DSO601xA: 5 nsec/div to 50 sec/div<br>MSO/DSO603xA: 2 nsec/div to 50 sec/div<br>MSO/DSO605xA: 1 nsec/div to 50 sec/div<br>MSO/DSO610xA: 500 psec/div to 50 sec/div  |
| Resolution                  | 2.5 psec  |
| Time scale accuracy*        | $\leq \pm (15 + 2^*(\text{instrument age in years})) \text{ ppm}$   |
| Vernier                     | 1-2-5 increments when off, ~25 minor increments between major settings when on  |
| Delay range                 | Pre-trigger (negative delay): Greater of 1 screen width or 1 ms (with 8 Mpts memory option)<br>Post-trigger (positive delay): 1 s to 500 seconds  |
| Analog delta-t accuracy     | Same channel: $\pm 0.0015\%$ reading $\pm 0.1\%$ screen width $\pm 20 \text{ ps}$<br>Channel-to-channel: $\pm 0.0015\%$ reading $\pm 0.1\%$ screen width $\pm 40 \text{ ps}$<br><i>Same channel example (MSO/DSO605xA):</i><br>For signal with pulse width of $10 \mu\text{s}$ , scope set to $5 \mu\text{s}/\text{div}$ ( $50 \mu\text{s}$ screen width),<br>$\text{delta-t accuracy} = \pm\{0.0015\% (10 \mu\text{s}) + 0.1\% (50 \mu\text{s}) + 20 \text{ ps}\} = 50.17 \text{ ns}$  |
| Logic delta-t accuracy      | Same channel: $\pm 0.005\%$ reading $\pm 0.1\%$ screen width $\pm (1 \text{ logic sample period, } 1 \text{ ns})$<br>Channel-to-channel:<br>$\pm 0.005\%$ reading $\pm 0.1\%$ screen width $\pm (1 \text{ logic sample period}) \pm \text{chan-to-chan skew}$<br><i>Same channel example:</i><br>For signal with pulse width of $10 \mu\text{s}$ , scope set to $5 \mu\text{s}/\text{div}$ ( $50 \mu\text{s}$ screen width),<br>$\text{delta-t accuracy} = \pm\{0.005\% (10 \mu\text{s}) + 0.1\% (50 \mu\text{s}) + 1 \text{ ns}\} = 51.5 \text{ ns}$ |
| Modes                       | Main, delayed, roll, XY   |
| XY                          | Bandwidth: Max bandwidth<br>Phase error @ 1 MHz: $<0.5 \text{ degrees}$<br>Z Blanking: 1.4 V blanks trace (use external trigger on MSO/DSO6xx2A, channel 4 on MSO/DSO6xx4A)   |
| Reference positions         | Left, center, right   |
| Segmented memory rearm time | $8 \mu\text{s}$ (minimum time between trigger events)   |

### Trigger system

|                |  |
|----------------|--|
| Sources        | MSO6xx2A: Ch 1, 2, line, ext, D15 - D0<br>DSO6xx2A: Ch 1, 2, line, ext<br>MSO6xx4A: Ch 1, 2, 3, 4, line, ext, D15 - D0<br>DSO6xx4A: Ch 1, 2, 3, 4, line, ext |
| Modes          | Auto, Normal (triggered), single   |
| Holdoff time   | $\sim 60 \text{ ns}$ to 10 seconds   |
| Trigger jitter | 15 ps rms  |

\* Denotes warranted specifications for units manufactured after January 1, 2008. Specifications are valid after a 30 minute warm-up period and within  $10 \text{ }^\circ\text{C}$  of firmware calibration procedure.

## Performance characteristics (continued)

### Trigger system (continued)

|                  |  |
|------------------|--|
| Selections       | Edge, pulse width, pattern, TV, duration, sequence, CAN, LIN, USB, I <sup>2</sup> C, SPI, RS-232, Nth edge burst   |
| Edge             | Trigger on a rising, falling, alternating or either edge of any source   |
| Pattern          | Trigger at the beginning of a pattern of high, low, and don't care levels and/or a rising or falling edge established across any of the analog and digital channels, but only after a pattern has stabilized for a minimum of 2 nsec.<br>The scope channel's high or low level is defined by that channel's trigger level. The logic channel's trigger level is defined by the threshold for the pod, 0 - 7 or 8 - 15.                 |
| Pulse width      | Trigger when a positive- or negative-going pulse is less than, greater than, or within a specified range on any of the source channels.<br>Minimum pulse width setting: 5 ns (MSO/DSO601xA/603xA scope channels)<br>2 ns (MSO/DSO605xA/610xA scope channels)<br>2 ns (logic channels on MSO6000A or MSO-upgraded DSO6000A)<br>Maximum pulse width setting: 10 s  |
| TV               | Trigger using any scope channel on most analog progressive and interlaced video standards including HDTV/EDTV, NTSC, PAL, PAL-M or SECAM broadcast standards. Select either positive or negative sync pulse polarity. Modes supported include Field 1, Field 2, all fields, all lines, or any line within a field. TV trigger sensitivity: 0.5 division of sync signal. Trigger holdoff time can be adjusted in half field increments. |
| Sequence         | Arm on event A, trigger on event B, with option to reset on event C or time delay.   |
| CAN              | Trigger on CAN (Controller Area Network) version 2.0A and 2.0B signals. Trigger on the start of frame (SOF) bit (standard). N5424A option supports triggering on remote frame ID (RTR), data frame ID (~RTR), remote or data frame ID, data frame ID and data, error frame, all errors, acknowledge error and overload frame.  |
| LIN              | Trigger on LIN (Local Interconnect Network) sync break at beginning of message frame (standard). N5424A option supports triggering on frame ID.  |
| USB              | Trigger on USB (Universal Serial Bus) start of packet, end of packet, reset complete, enter suspend, or exit suspend on the differential USB data lines. USB low speed and full speed are supported.   |
| I <sup>2</sup> C | Trigger on I <sup>2</sup> C (Inter-IC bus) serial protocol at a start/stop condition or user defined frame with address and/or data values. Also trigger on missing acknowledge, address with no acq, restart, EEPROM read, and 10-bit write.  |
| SPI              | Trigger on SPI (Serial Protocol Interface) data pattern during a specific framing period. Supports positive and negative Chip Select framing as well as clock Idle framing and user-specified number of bits per frame.  |
| RS-232/UART      | This application eliminates the need to manually decode bus traffic. Using data captured on the scope or digital channels, the application provides the ability to easily view the information sent over a RS-232 serial bus. Display real-time time-aligned decode of transmit and receive lines. This application also enables triggering on RS-232/UART conditions.   |
| I <sup>2</sup> S | This application provides triggering on audio bus protocol channels for audio left, right, either as well as =, ≠, >, < entered data values and within and out of range values. It provides the ability to easily view the audio packets on the waveform and in a listing window.  |
| Duration         | Trigger on a multi-channel pattern whose time duration is less than a value, greater than a value, greater than a time value with a timeout, or inside or outside of a set of time values.<br>Minimum duration setting: 2 ns<br>Maximum duration setting: 10 s   |
| MIL-STD 1553     | Trigger on specific Command/Status Words, Data Words, and error conditions.  |
| FlexRay          | Trigger on FlexRay Frames, errors, events and cycle-multiplexed triggering. N5432C or option FLX supports also triggering on particular frame types symbolically, such as Startup frames, Null frame, Sync frame, etc., as well as Boolean NOT frame types.  |



## Performance characteristics (continued)

### Trigger system (continued)

|                |   |
|----------------|---|
| Nth edge burst | Trigger on the Nth edge of a burst that occurs after an idle time that you specify. Max edge count: 65,536.   |
| Autoscale      | Finds and displays all active scope and logic (for MSO6000A series MSO) channels, sets edge trigger mode on highest-numbered channel, sets vertical sensitivity on scope channels and thresholds on logic channels, time base to display ~1.8 periods. Requires minimum voltage >10 mVpp, 0.5% duty cycle and minimum frequency >50 Hz. |

### Scope channel triggering

|                  |   |
|------------------|---|
| Range (internal) | ±6 div from center screen   |
| Sensitivity*     | <10 mV/div: greater of 1 div or 5 mV; ≥10 mV/div: 0.6 div   |
| Coupling         | AC (~3.5 Hz on MSO/DSO601xA, ~10 Hz on MSO/DSO603xA/605xA/610xA), DC, noise reject, HF reject and LF reject (~50 kHz) |

### Digital (D15 - D0) channel triggering (MSO6000A or MSO-upgraded DSO6000A only)

|                                |   |
|--------------------------------|---|
| Threshold range (user defined) | ±8.0 V in 10 mV increments              |
| Threshold accuracy             | ±(100 mV + 3% of threshold setting)     |
| Predefined thresholds          | TTL = 1.4 V, CMOS = 2.5 V, ECL = -1.3 V |

| External (EXT) triggering | MSO/DSO6xx2A (2-/2+16-ch models)   | MSO/DSO6xx4A (4-/4+16-ch models)   |
|---------------------------|--|--|
| Input impedance           | MSO/DSO6012A: 1 MΩ ± 3%    11 pF or 50 Ω<br>MSO/DSO6032A/6052A/6102A:<br>1 MΩ ± 3%    14 pF or 50 Ω  | MSO/DSO6014A: 1.015 kΩ ±5%<br>MSO/DSO6034A/6054A/6104A:<br>2.14 kΩ ±5%                       |
| Maximum input             | CAT I 300 Vrms, 400 Vpk, CAT II 100 Vrms, 400 Vpk<br>With 10073C 10:1 probe: CAT I 500 Vpk, CAT II 400 Vpk<br>5 Vrms with 50-Ω input   | ±15 V  |
| Range                     | DC coupling: trigger level ±1 V and ±8 V   | ±5 V   |
| Sensitivity               | For ±1 V range setting: DC to 100 MHz, 100 mV;<br>MSO/DSO6032A/6052A/6102A:<br>>100 MHz to bandwidth of oscilloscope: 200 mV<br>For ±8 V range setting: DC to 100 MHz, 250 mV;<br>MSO/DSO6032A/6052A/6102A:<br>>100 MHz to bandwidth of oscilloscope: 500 mV | MSO/DSO6014A:<br>DC to 100 MHz: 500 mV<br>MSO/DSO6034A/6054A/6104A:<br>DC to 500 MHz: 500 mV |
| Coupling                  | AC (~3.5 Hz), DC, noise reject, HF reject and LF reject (~50 kHz)  |  |
| Probe ID                  | MSO/DSO601xA: Auto probe sense<br>MSO/DSO603xA/605xA/610xA: Auto probe sense and AutoProbe interface<br>Agilent- and Tektronix-compatible passive probe sense  |  |

\* Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ±10 °C from firmware calibration temperature.

## Performance characteristics (continued)

### Display system

|                              |   |
|------------------------------|---|
| Display                      | 6.3-inch (161 mm) diagonal color TFT LCD  |
| Throughput of scope channels | Up to 100,000 waveforms/sec in real-time mode   |
| Resolution                   | XGA – 768 vertical by 1024 horizontal points (screen area);<br>640 vertical by 1000 horizontal points (waveform area)<br>256 levels of intensity scale  |
| Controls                     | Waveform intensity on front panel. Vectors on/off; infinite persistence on/off,<br>8 x 10 grid with intensity control   |
| Built-in help system         | Key-specific help displayed by pressing and holding key or softkey of interest.<br>Language support for 11 languages including English, German, French, Russian, Japanese,<br>Traditional Chinese, Simplified Chinese, Korean, Spanish, Portuguese and Italian. |
| Real-time clock              | Time and date (user adjustable)   |

### Measurement features

|                               |  |
|-------------------------------|--|
| Automatic measurements        | Measurements are continuously updated. Cursors track last selected measurement.<br>Up to four measurements can be displayed on screen at any one time.   |
| Voltage (scope channels only) | Peak-to-peak, maximum, minimum, average, amplitude, top, base, overshoot, preshoot, RMS,<br>standard deviation (AC RMS), Ratio (dB)  |
| Time                          | Frequency, period, + width, – width and duty cycle on any channel.<br>Rise time, fall time, X at max Y (time at max volts), X at min Y (time at min volts), delay, and<br>phase on scope channels only.  |
| Counter                       | Built-in 5-digit frequency counter on any channel. Counts up to the scope's bandwidth (1 GHz<br>max). The counter resolution can be increased to 8 digits with an external 10-MHz reference.   |
| Threshold definition          | Variable by percent and absolute value; 10%, 50%, 90% default for time measurements  |
| Cursors                       | Manually or automatically placed readout of horizontal (X, $\Delta X$ , $1/\Delta X$ ) and vertical (Y, $\Delta Y$ ).<br>Tracking Cursors provides an additional mode for cursor positioning beyond the current<br>manual method. When cursor tracking is enabled, changing a cursor's x-axis position<br>results in the y-axis cursor tracking the corresponding y-axis (voltage, current, etc.) value.<br>Additionally logic or scope channels can be displayed as binary or hex values. |
| Waveform math                 | f (g(t))<br>g(t): { 1, 2, 3, 4, 1-2, 1+2, 1x2, 3-4, 3+4, 3x4}<br>f(t): { 1-2, 1+2, 1x2, 3-4, 3+4, 3x4, FFT(g(t)), differentiate d/dt g(t), integrate $\int g(t) dt$ , square<br>root $\sqrt{g(t)}$ } Where 1,2,3,4 represent analog input channels 1, 2, 3, and 4<br>Note: Channels 3 and 4 only available on MSO/DSO6xx4A models  |
| Measurement statistics        | Statistical data for enabled measurements such as mean, min, max, standard deviation<br>and count  |

## Performance characteristics (continued)

### Storage

---

|                            |  |
|----------------------------|--|
| Save/recall (non-volatile) | 10 setups and traces can be saved and recalled internally.<br>Optional secure environment mode ensures setups and traces are stored to internal volatile memory so data is erased when power is removed. Compliant to NISPOM Chapter 8 requirements. |
| Storage type and format    | USB 1.1 host ports on front and rear panels<br>Image formats: BMP (8-bit), BMP (24-bit), PNG (24-bit)<br>Data formats: X and Y (time/voltage) values in CSV format, ASCII XY and binary format<br>Trace/setup formats: Recalled                      |

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### FFT

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|                      |  |
|----------------------|--|
| Points               | Up to 10 kpts in precision mode  |
| Source of FFT        | 1, 2, 1+2, 1-2, 1x2, MSO/DSO6xx4A: 3, 4, 3+4, 3-4, 3x4;<br>where 1, 2, 3, 4 represent the analog channel inputs 1, 2, 3, and 4 |
| Window               | Rectangular, flattop, hanning, Blackman Harris   |
| Noise floor          | -50 to -90 dB depending on averaging   |
| Amplitude            | Display in dBV, dBm at 50 $\Omega$   |
| Frequency resolution | 0.05/time per div  |
| Maximum frequency    | 50/time per div  |

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### I/O

---

|                            |   |
|----------------------------|---|
| Standard ports             | USB 2.0 high speed device, two USB 1.1 host ports, 10/100-BaseT LAN, IEEE488.2 GPIB, XGA video output   |
| Max transfer rate          | IEEE488.2 GPIB: 500 kbytes/sec<br>USB (USBTMC-USB488): 3.5 Mbytes/sec<br>100 Mbps LAN (TCP/IP): 1 Mbytes/sec  |
| Supported printers via USB | For a list of currently supported printers visit <a href="http://www.agilent.com/find/InfiniiVision-printers">www.agilent.com/find/InfiniiVision-printers</a> |

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### General characteristics

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|                   |   |
|-------------------|---|
| Physical size     | 35.4 cm wide x 18.8 cm high x 28.2 cm deep (without handle)<br>39.9 cm wide x 18.8 cm high x 28.2 cm deep (with handle) |
| Weight            | Net: 4.9 kgs (10.8 lbs) Shipping: 9.4 kgs (20.7 lbs)  |
| Probe comp output | Frequency ~1.2 kHz; Amplitude ~2.5 V  |

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## Performance characteristics (continued)

### General characteristics (continued)

|                   |  |
|-------------------|--|
| Trigger out       | When Triggers is selected (delay ~17 ns)<br>0 to 5 V into high impedance<br>0 to 2.5 V into 50 $\Omega$<br>When Source Frequency or Source Frequency/8* is selected<br>0 to 580 mV into high impedance<br>0 to 290 mV into 50 $\Omega$<br>Max frequency output: 350 MHz (in source frequency mode when terminated in 50 $\Omega$ )<br>125 MHz (in source frequency/8 mode when terminated in 50 $\Omega$ ) |
| 10 MHz ref in/out | TTL out, 180 mV to 1 V amplitude with 0 to 2 V offset  |
| Kensington lock   | Connection on rear panel for security  |

### Power requirements

|                      |   |
|----------------------|---|
| Line voltage range   | 100-120 V, 50/60/400 Hz; 100-240V, 50/60 Hz auto ranging  |
| Line frequency       | 50/60 Hz, 100-240 VAC; 400 Hz, 100-120 VAC  |
| Power usage          | 120 W max   |
| Battery option – BAT | 100-240 V, 50/60 Hz<br>2+ hours between charges, battery-low indicator at 20%<br>Battery capacity after repeated charging: 80% after 300 cycles<br>Non-operating temperature: –20 °C to 60 °C<br>Operating temperature: 0 °C to 50 °C<br>Power consumption is 67-75 Watts with optional N5429A DC Power adapter |

### Environmental characteristics

|                     |  |
|---------------------|--|
| Ambient temperature | Operating -10 °C to +55 °C; non-operating –40 °C to +70 °C   |
| Humidity            | Operating 95% RH at 40 °C for 24 hr; non-operating 90% RH at 65 °C for 24 hr   |
| Altitude            | Operating to 4,570 m (15,000 ft); non-operating to 15,244 m (50,000 ft)  |
| Vibration           | Agilent class B1 and MIL-PRF-28800F; class 3 random  |
| Shock               | Agilent class B1 and MIL-PRF-28800F; class 3 random; (operating 30g, 1/2 sine, 11 ms duration, 3 shocks/axis along major axis, total of 18 shocks) |
| Pollution degree    | Normally only dry non-conductive pollution occurs.<br>Occasionally a temporary conductivity caused by condensation must be expected.               |
| Indoor use          | Rated for indoor use only  |

### Other

|                           |   |
|---------------------------|---|
| Measurement categories    | CAT I<br><br>Regulatory information    Safety IEC 61010-1:2001 / EN 61010-1:2001<br>Canada: CSA C22.2 No. 1010.1:1992<br>UL 61010B-1:2003   |
| Supplementary information | The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, and carries the CE-marking accordingly.<br>The product was tested in a typical configuration with HP/Agilent test systems. |

\* Source Frequency/8 is supported on 300 MHz to 1 GHz 6000 Series only.

## Ordering information

| Model    | Bandwidth | Maximum sample rate | Memory depth | Scope channels | Digital channels |
|----------|-----------|---------------------|--------------|----------------|------------------|
| DSO6012A | 100 MHz   | 2 GSa/s             | 8 Mpts       | 2              |                  |
| MSO6012A | 100 MHz   | 2 GSa/s             | 8 Mpts       | 2              | 16               |
| DSO6014A | 100 MHz   | 2 GSa/s             | 8 Mpts       | 4              |                  |
| MSO6014A | 100 MHz   | 2 GSa/s             | 8 Mpts       | 4              | 16               |
| DSO6032A | 300 MHz   | 2 GSa/s             | 8 Mpts       | 2              |                  |
| MSO6032A | 300 MHz   | 2 GSa/s             | 8 Mpts       | 2              | 16               |
| DSO6034A | 300 MHz   | 2 GSa/s             | 8 Mpts       | 4              |                  |
| MSO6034A | 300 MHz   | 2 GSa/s             | 8 Mpts       | 4              | 16               |
| DSO6052A | 500 MHz   | 4 GSa/s             | 8 Mpts       | 2              |                  |
| MSO6052A | 500 MHz   | 4 GSa/s             | 8 Mpts       | 2              | 16               |
| DSO6054A | 500 MHz   | 4 GSa/s             | 8 Mpts       | 4              |                  |
| MSO6054A | 500 MHz   | 4 GSa/s             | 8 Mpts       | 4              | 16               |
| DSO6102A | 1 GHz     | 4 GSa/s             | 8 Mpts       | 2              |                  |
| MSO6102A | 1 GHz     | 4 GSa/s             | 8 Mpts       | 2              | 16               |
| DSO6104A | 1 GHz     | 4 GSa/s             | 8 Mpts       | 4              |                  |
| MSO6104A | 1 GHz     | 4 GSa/s             | 8 Mpts       | 4              | 16               |

### Accessories included:

| Model number  | DSO60xxA | MSO60xxA |
|---|----------|----------|
| Standard 3-year warranty  | •        | •        |
| Standard 1-year warranty on MSO/DSO6000A-BAT option   | •        | •        |
| 10073C or 10074C 10:1 divider passive probe with readout per scope channel  | •        | •        |
| 16 channel flying lead set logic probe (two pods with eight channels each)  |          | •        |
| Built-in help language support for English, French, German, Russian, simplified Chinese, traditional Chinese, Korean, Spanish, Portuguese, Japanese and Italian | •        | •        |
| Interface language support<br>GUI menus: English, simplified Chinese, traditional Chinese, Korean, Japanese   | •        | •        |
| Choose one of ABA (printed users guide in English), ABJ (printed users guide in Japanese) or AB2 (printed users guide in simplified Chinese)                    | •        | •        |
| Documentation CDs/PDFs of Programmer's reference guide, User's guide and Service guide  | •        | •        |
| Agilent I/O libraries suite 15.0  | •        | •        |
| Localized power cord  | •        | •        |
| Front panel cover   | •        | •        |

Note: IntuiLink Data Capture software available free on web at [www.agilent.com/find/intuilink](http://www.agilent.com/find/intuilink)



## Ordering information (continued)

### Options

| Product             | Description   |
|---------------------|---|
| DSO to MSO upgrade* | N2914A* for DSO/MSO601xA, DSO/MSO603xA<br>N2915A* for DSO/MSO605xA, DSO/MSO610xA  |
| SEC                 | Secure Environment Mode - Provides compliance with National Industrial Security Program Operating Manual (NISPOM) Chapter 8 requirements (factory-installed option only for new purchase) |
| A6J                 | ANSI Z540 compliant calibration   |

\*Includes a 54620-68701 logic cable kit, a label and an upgrade license to activate the MSO features. Installs in less than 5 minutes.

### Serial data analysis applications

| Option number – user installed | Option number – factory installed | Description  |
|--------------------------------|-----------------------------------|--|
| N5424A                         | AMS                               | CAN/LIN automotive triggering and decode (4 and 4+16 channel models only)  |
| N5423A                         | LSS                               | I <sup>2</sup> C/SPI serial decode option (for 4/4+16 channel models only) |
| N5457A                         | 232                               | RS-232/UART triggering and decode (4 and 4+16 channel models only)         |
| N5468A                         | SND                               | I <sup>2</sup> S Triggering and Decode (4 and 4+16 channel models only)    |
| N5432C                         | FLX                               | FlexRay Measurements (4 and 4+16 channel models only)                      |
| N5469A                         | 553                               | MIL-STD 1553 Triggering and Decode (4 and 4+16 channel models only)        |

### User installed

| PC-assisted applications | Description  |
|--------------------------|--|
| N5406A                   | FPGA dynamic probe for Xilinx (MSO models only)      |
| N5434A                   | FPGA dynamic probe for Altera (MSO models only)      |
| B4610A                   | Offline viewing and analysis of MSO/DSO data on a PC |
| U1881A                   | Power measurement and analysis application           |
| E2690B                   | ASA's Oscilloscope tools                             |

### Other

| Option number – user installed | Option number – factory installed | Description                  |
|--------------------------------|-----------------------------------|------------------------------|
| N5454A                         | SGM                               | Segmented memory             |
|                                | BAT                               | Re-chargeable battery option |
| N5455A                         | LMT                               | Mask limit testing           |

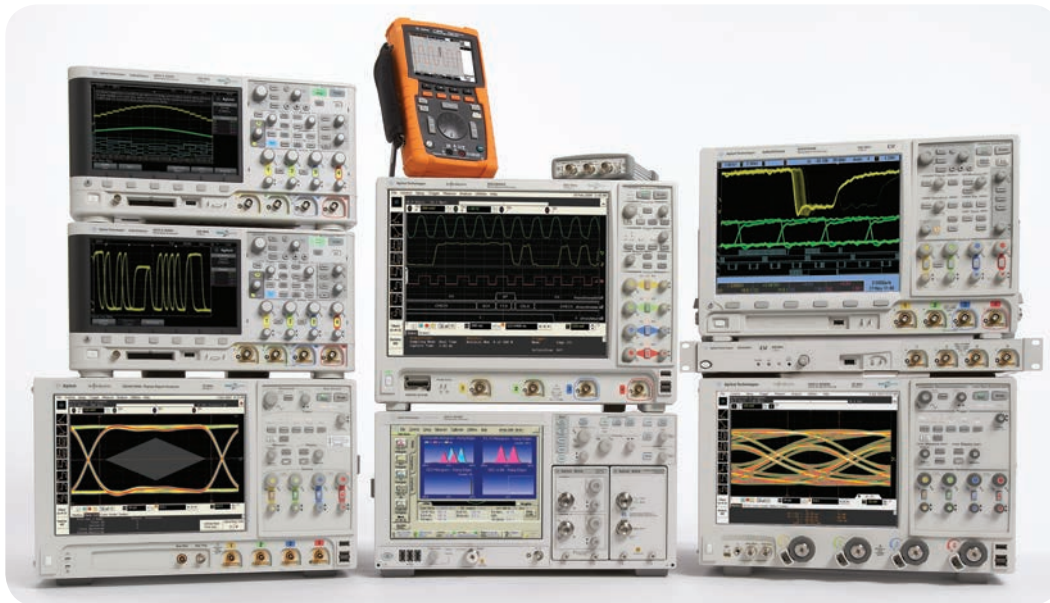
## Ordering information (continued)

### Accessories

| Options | Description   |
|---------|---|
| N2916B  | Rackmount kit for 6000 Series oscilloscope                              |
| N2917B  | Transit case with foam molding customized for InfiniiVision 6000 Series |
| N2918A  | InfiniiVision evaluation kit  |
| 1180CZ  | Testmobile scope cart   |
| N2919A  | Testmobile bracket for 1180CZ and 6000                                  |
| 10833A  | GPIB cable, 1 m long  |



**N2916B rackmount kit**



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