



# Agilent Technologies 6000 Series Oscilloscopes

Data Sheet

**NEW**  
I<sup>2</sup>C/SPI,  
CAN/LIN Bus  
Decode Options  
Available



lab scope performance  
at a  
portable scope price

***MORE***  
The new Agilent 6000 Series oscilloscopes deliver more powerful features  
and higher performance than any other scopes in their price range.



**Agilent Technologies**



**The performance and problem-solving tools you need to meet your mixed analog and digital design challenges, today and tomorrow**

- **A variety of models optimized to meet your needs:**
  - 100 MHz, 300 MHz, 500 MHz and 1 GHz bandwidth
  - Up to 4 GSa/s sample rate
  - Unique 2+16-channel, 4+16-channel mixed signal oscilloscope (MSO) and 2- or 4-channel digital storage oscilloscope (DSO) models
- **Industry-leading performance:**
  - Standard 1 Mpts MegaZoom III deep memory; up to 8 Mpts optional
  - High-definition XGA (1024 x 768) color display system with ultra-fast real-time update rate of up to 100,000 waveforms/sec and 256 intensity levels
  - Flexibility to upgrade a DSO to an MSO at any time
- **Full-scale connectivity** – Standard USB, LAN, GPIB and XGA video output
- **Powerful triggering** including analog HDTV, CAN, I<sup>2</sup>C, LIN, SPI, and USB
- AutoProbe interface
- Built-in help system in six languages
- **NEW** I<sup>2</sup>C/SPI, CAN/LIN bus decode options
- **NEW** secure environment mode option

**Bring your toughest problems into focus with the right combination of features and performance**

If you work with both analog and digital circuitry, Agilent Technologies 6000 Series oscilloscopes can help you easily see more signal activity in your designs. The unique 2+16- or 4+16-channel mixed signal oscilloscope (MSO) models and the traditional 2- and 4-channel digital storage oscilloscope (DSO) models are optimized with the capabilities you need for verifying and debugging designs that include embedded microcontrollers, DSPs, FPGAs, ADCs, DACs, and transducers. These scopes give you the tools you need to solve your mixed analog and digital engineering challenges more easily.

**Ideal for mixed analog and digital signal analysis**

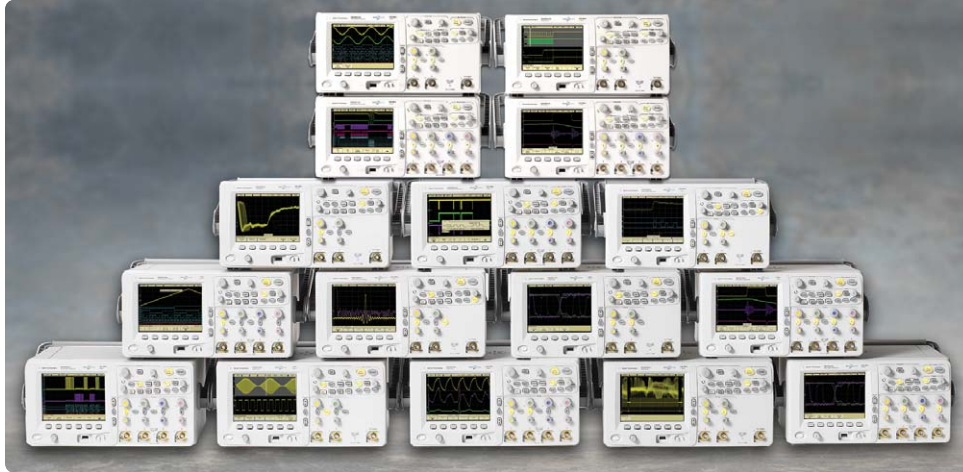
The 6000 Series scopes combine a suite of essential features that are ideal for analyzing designs with both analog and digital components:

- 1 Mpts of Agilent’s third generation MegaZoom III deep memory captures long, non-repeating signals and maintains high sample rates, allowing you to quickly zoom in on areas of interest. Optional 2 Mpts and 8 Mpts memory lets you capture fast and elusive signal problems over even longer periods of acquisition time.

- A revolutionary ultra-responsive, high-definition color display lets you see more signal details than ever before. The 100,000 waveforms/sec real-time waveform update rate is more than 27 times faster than that of a typical digital scope in this class.
- Three standard interfaces: high-speed USB2.0 device, 10/100 Base-T LAN (Ethernet), and GPIB interfaces allow you to easily save your waveform data or images to your PC. You can print the waveforms on a connected printer or connect a USB flash drive (or other USB mass storage device) to the USB 1.1 host port on the front or the rear of the oscilloscope.
- Flexible triggering lets you easily isolate and analyze the complex signals and fault conditions common in mixed analog and digital designs. I<sup>2</sup>C, CAN, LIN, USB, SPI and video, including analog HDTV/EDTV, triggering come standard.
- When your needs change, you can upgrade your DSO6000 Series scope to an MSO with the addition of a scope logic kit that you can install yourself.

This combination of capabilities is tailored to give you the measurement power you need to get your mixed analog and digital job done faster.

## Selection guide



**Figure 1. The 6000 Series family shown with 2+16-channel, 4+16-channel MSO and 2- and 4-channel DSO models.**

Agilent focuses on developing products that help you do your job better. Agilent's 6000 Series scopes are optimized for your measurement needs. Choose the one that's right for your application and your budget.

### Selection guide

Model	Bandwidth	Maximum sample rate	Memory	Channels
DSO6012A	100MHz	2GSa/s		2 scope
MSO6012A	100MHz	2GSa/s		2 scope + 16 logic
DSO6014A	100MHz	2GSa/s		4 scope
MSO6014A	100MHz	2GSa/s		4 scope + 16 logic
DSO6032A	300MHz	2GSa/s		2 scope
MSO6032A	300MHz	2GSa/s		2 scope + 16 logic
DSO6034A	300MHz	2GSa/s	MegaZoom III 1 Mpts standard, 2 Mpts and 8 Mpts optional	4 scope
MSO6034A	300MHz	2GSa/s		4 scope + 16 logic
DSO6052A*	500MHz	4GSa/s		2 scope
MSO6052A*	500MHz	4GSa/s		2 scope + 16 logic
DSO6054A*	500MHz	4GSa/s		4 scope
MSO6054A*	500MHz	4GSa/s		4 scope + 16 logic
DSO6102A*	1GHz	4GSa/s		2 scope
MSO6102A*	1GHz	4GSa/s		2 scope + 16 logic
DSO6104A*	1GHz	4GSa/s		4 scope
MSO6104A*	1GHz	4GSa/s		4 scope + 16 logic

\* Maximum sample rate and memory are achieved when 2 channels are interleaved.

Agilent responded to customer inputs and we are proud to present these additional reasons to buy the new Agilent 6000 Series.

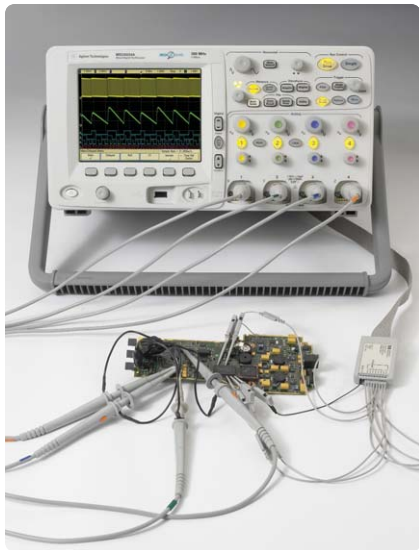
### New Agilent 6000 Series = older Agilent 54620/40 Series *PLUS*

- + 4/4+16 channel models and 1 GHz models
- + 2x - 10x sampling rate (up to 4 GSa/s scope and 2 GSa/s logic)
- + MSO-upgradeable DSOs
- + MegaZoom III deep memory combining fast and deep memory, new ultra-high definition color LCD display with XGA resolution and 256 levels of intensity
- + Faster waveform update rates (100,000 waveforms/sec)
- + Standard analog HDTV/EDTV, Nth edge burst and either edge triggering
- + Built-in front panel USB port replaces floppy drive
- + Standard USB, LAN and GPIB
- + XGA video output
- + AutoProbe interface (on 300 MHz - 1 GHz models)
- + 10 MHz reference clock in/out
- + Signal frequency feedthrough
- + 8-digit hardware frequency counter (when using external 10 MHz reference input)
- + Built-in storage compartment
- + Lighter weight

## Selection guide (continued)

### Easily see complex interactions with 2+16-channel or 4+16-channel mixed signal oscilloscopes (models MSO6000A)

The mixed signal oscilloscopes (MSOs), with 2 or 4 scope channels plus 16 logic channels, uniquely combine the detailed signal analysis of a scope with the multi-channel timing measurements of a logic analyzer. They let you see the complex interactions among your signals on up to 20 channels at the same time. No more guesswork and no more poking around to see a few channels at a time. These scopes can easily conquer mixed analog and digital debugging problems that a traditional scope can't begin to address, because they let you simultaneously test and monitor the high-speed digital control signals and the slower analog signals in your design.



**Figure 2. The 4+16-channel MSO allows you to view up to 4 analog and 16 digital signals on one instrument.**

### 2- or 4-channel DSOs (model DSO6000A) – scopes that can grow with your needs

If your designs include heavy analog content, the DSO6000A will give you the number of channels and measurement power you need, including MegaZoom III deep memory, high-definition display, and flexible triggering. Whether you're testing designs with four inputs, such as anti-lock brakes, or monitoring multiple outputs of a power supply, the 4-channel models help you perform your debug and verification with ease.

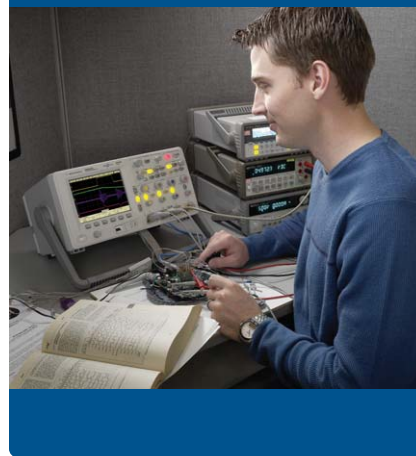
If you don't need 4 channels and good value is a primary concern, the 2-channel models provide you with all the benefits of MegaZoom III deep memory, high-definition display, and flexible triggering. They give you an affordable way to see long time periods while maintaining a high sample rate so you can see details in your designs.

### After-purchase upgrade options

You can expand the capabilities of all 6000 models whenever you choose. You can easily upgrade your DSO to include the 16 timing channel MSO capabilities or choose a memory upgrade option to 2 Mpts and 8 Mpts for increasing the acquisition memory depth on your scope after purchase. The upgrade is easy and affordable.

### Try a new MSO6000A MSO for yourself

There is no better way to experience the superiority of the new Agilent 6000 Series scopes than seeing one in action on your bench to measure your signals yourself. We can arrange for you to try out a new MSO6000A MSO. Contact your nearest Agilent sales office or visit the MSO6000A home page at [www.agilent.com/find/MSO6000](http://www.agilent.com/find/MSO6000). Contact Agilent today to request an evaluation.





# Industry-leading performance

## MegaZoom III deep memory



- I. Most responsive deep memory
- II. Highest definition color display
- III. Fastest waveform update rate, uncompromised

With many of today's designs containing a mix of signal types and speeds, it's often critical to capture and compare multiple cycles of digital signals along with slower analog signals. But doing so often requires an instrument that can deliver more resolution and memory than a traditional DSO can provide.

Agilent pioneered the patented MegaZoom approach beginning with products introduced in 1996 and continued to improve it with the 54600 Series introduced in 2000 and 2002. MegaZoom III as

implemented in the new 6000 Series products presents the most advanced use of deep memory and precision displays ever.

With up to 8 Mpts of MegaZoom III deep memory, now you can correlate high-speed digital control signals with slower analog signals, capture infrequent events and then quickly zoom in on the details to narrow in on problems. Unlike deep-memory options on alternative scopes, Agilent MegaZoom III is not a special mode with sluggish response. It's always on, always fast, and always there to help you capture the most critical signals with maximized sample rates. The 6000 Series scopes are the only deep-memory scopes in their class that respond instantly to your control inputs with a fast, high-definition display. Compare them to other scopes in this price range – only the 6000 Series provides deep memory at an affordable price.

## Five ways deep memory gives you better insight into your design

1. Deep memory allows the scope to maintain faster sample rates (or shorter sampling intervals between digitized points), even at slow time base settings.
2. At a given time base setting, deeper memory makes it possible to capture signals with finer resolution. And at a given sample rate, it lets you capture more time on your signals.
3. Deep memory helps you find details buried in complex signals.
4. Deep memory helps you discover anomalies in the absence of precise triggering events.
5. Deep memory is particularly valuable when you are dealing with mixed analog and digital designs where slow analog events require long time spans and fast digital control signals require the ability to maintain high sample rate.

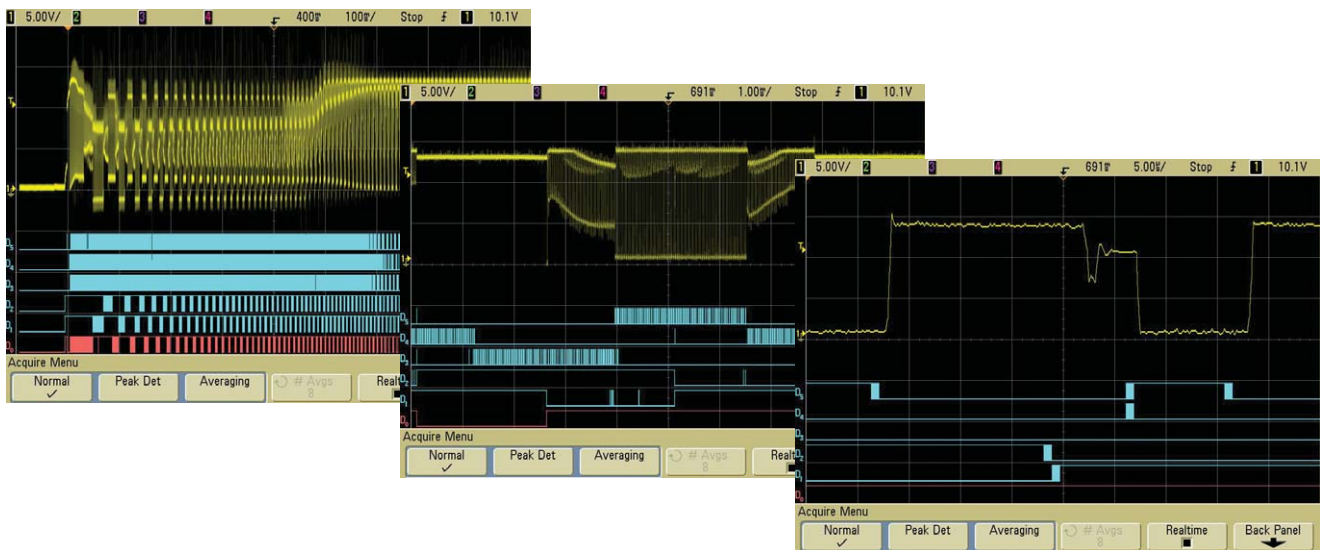


Figure 3. Motor drive signal start-up sequence with digital control signal triggering and various levels of zoom reveal "runt" pulse using Agilent's MSO6000A Series MSOs.

## Industry-leading performance (continued)

### Revolutionary high-definition color display helps you see subtle details that most scopes can't show you

Combine MegaZoom III deep memory with an ultra high-definition color display system, and you will see subtle details that most scopes won't show you. The MegaZoom III deep memory is mapped to 256 levels of intensity on a display that has industry-leading XGA resolution (1024 x 768 lines) and phenomenal waveform update rates of up to 100,000 waveforms per second in

the default real-time acquisition mode – so you see a more realistic representation of your signals.

With fast waveform update rates, your scope has less dead time between the acquisitions. Why is it important to minimize dead time? Capturing a random, infrequent glitch can be difficult, because you can't predict when the glitch will occur. If it occurs during the scope's dead time, you will miss it. By minimizing the dead time, you can improve the probability of the glitch occurring during the acquisition time.

With a real-time waveform update rate of up to 100,000 waveforms per second, there is less chance to miss a narrow occasional transient, less chance to miss a glitch or distorted edge that impacts circuit operation, and less chance to miss all those subtle details that can take days or weeks to find with a traditional digital scope.

Agilent's 6000 Series scopes provide the fastest waveform update rates in their class and you do not need to select special operating modes that may entail tradeoffs in performance and functionality. And with MegaZoom III deep memory and 16 logic channels available in MSO models, finding the root cause of intermittent failures in your embedded design becomes a much easier task.

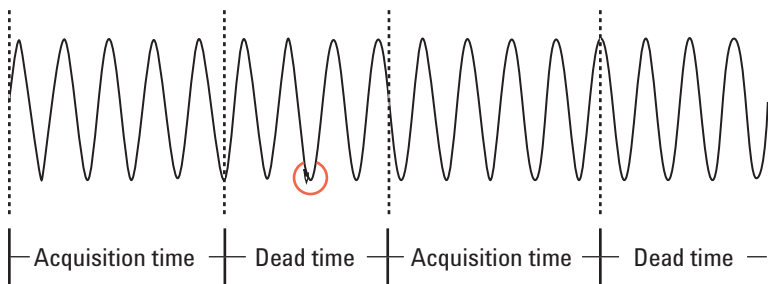


Figure 4. Slow update rate means long dead time when anomalies may be missed. With 100,000 wfms/sec update rate, dead time is minimized.



Figure 5. 256 levels of display intensity gradation show characteristics of jitter, noise, and signal anomalies.

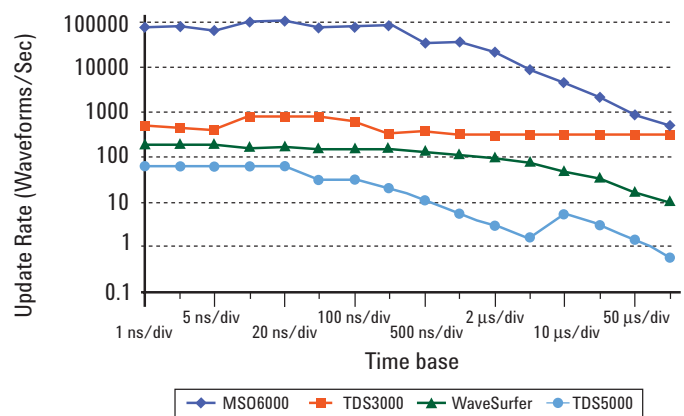


Figure 6. Comparison of waveform update rates using each scope's default real-time acquisition mode.

## Full-scale connectivity

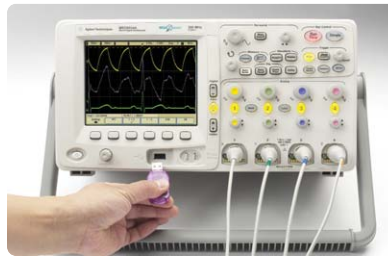
### Standard USB, Ethernet/LAN and GPIB interfaces – choose the interface you want to use

The 6000 Series scopes come with standard USB 2.0 USBTMC device, 10/100 Mbps LAN and GPIB interfaces on the rear panel and USB 1.1 host interfaces on the front and rear panels.

- USB offers the quickest and easiest connection scheme – it's perfect for benchtop use and systems connection.
- LAN offers high-speed connectivity over longer distances and allows sharing of instruments among multiple PCs.
- GPIB has many years of proven reliability for instrument communication – a good choice for use in existing GPIB-based test systems.

### Front-panel USB port

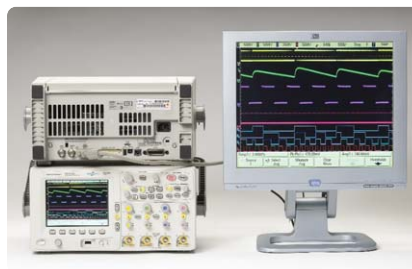
A built-in front-panel USB port makes it easy for you to store waveform data, screen images, and scope setups to a USB flash drive. You can store your waveform images as BMP or PNG files and your waveform data as CSV, ASCII XY pair and binary format files for easy import into other PC applications. If you share your lab equipment with others, you can save your measurement setups and traces to your own USB flash drive, making it simple to save and share your every-day setups as well as your advanced configurations.



**Figure 7. A built-in USB port makes it easy to save and share your work and update your system software quickly.**

### Built-in XGA video output

allows you to connect to a large external monitor or project your screen image to a large wall screen in classroom environments.



**Figure 8. Agilent 6000 Series with an external monitor attached.**

### Free IntuiLink Data Capture software simplifies PC connectivity

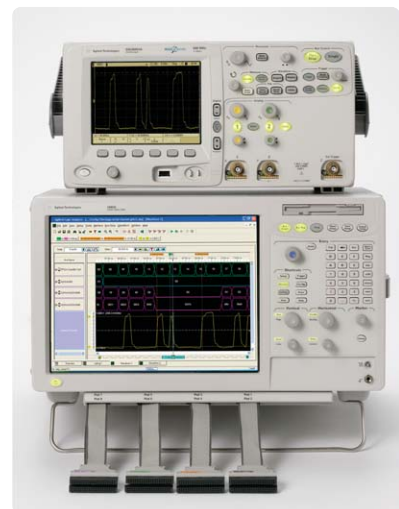
When you need to transfer images and waveform data to your PC, IntuiLink Data Capture lets you focus more time on design issues rather than on programming. With the click of a button on the Data Capture's dialog box, you can download data or transfer a snapshot of an oscilloscope bitmap screen directly to your PC, or save the image as a bitmap file. For more information on IntuiLink Data Capture, visit [www.agilent.com/find/intuilink](http://www.agilent.com/find/intuilink).

### IVI-COM driver

For a higher-level of instrument control, use the IVI-COM driver for the 6000 Series in your application. Download the IVI-COM driver for 6000 Series free from the Agilent Developer's Network at [www.agilent.com/find/adn](http://www.agilent.com/find/adn).

### Scope View logic analyzer and oscilloscopes correlation

Easily make time-correlated measurements between an Agilent 1680, 1690 or 16900 Series logic analyzer and a 6000 Series oscilloscope. The time-correlated logic analyzer and 6000 Series oscilloscope waveforms are integrated into a single logic analyzer waveform display for easy viewing and analysis. You can also trigger the 6000 Series oscilloscope from the logic analyzer (or vice versa), automatically de-skew the waveforms and maintain marker tracking between the two instruments.



**Figure 9. Make time-correlated measurements between an Agilent logic analyzer and 6000 Series oscilloscope.**

# Powerful triggering

## Full-width pattern triggering

With mixed analog and digital designs, sometimes it's hard to trace an anomaly back to its root cause unless you can trigger on it and correlate it with other signals. With the 6000 Series scopes, triggering is no longer a hassle. They come with flexible triggering capabilities across all channels so you can easily isolate and analyze complex signals and interactions common in your mixed analog and digital designs. Trigger on any combination of events across all 4 scope and 16 logic channels.

## Serial bus triggering

Agilent's 6000 Series scopes also allow you to trigger on the industry's most popular serial bus standards. Don't spend your time sorting through communication frames to find the one of interest. Let Agilent set up a serial bus trigger to sift through the frames for you.

- **I<sup>2</sup>C (Inter-Integrated Circuit):** The full range of I<sup>2</sup>C triggering includes start or stop condition, missing acknowledge, restart, EEPROM data read, address and/or data frame, or 10-bit write.
- **SPI (Serial Peripheral Interface):** SPI triggering lets you trigger on user-definable framing, number of bits per frame, as well as particular data patterns.
- **CAN (Controller Area Network):** CAN triggering synchronizes to the start of a CAN frame on any CAN high or CAN low signal. The N5424A option lets you trigger on CAN message IDs, data, error frame, or overload frame as well as decode CAN messages.

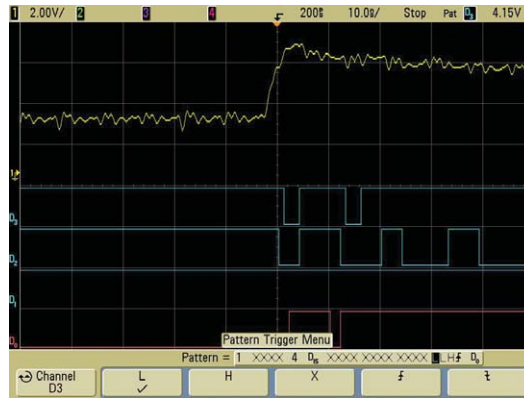


Figure 10. MSOs provide advanced pattern triggering across all scope AND logic channels for quick isolation of critical events.

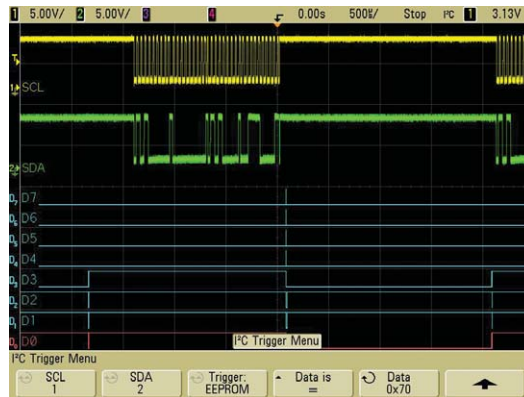


Figure 11. Trigger on address and/or data patterns within an I<sup>2</sup>C frame.

- **LIN (Local Interconnect Network):** Trigger on LIN sync break at the beginning of a message frame. The N5424A option lets you trigger on frame ID as well as decode LIN messages.
- **USB (Universal Serial Bus):** USB is quickly becoming the connection of choice for PC peripherals. Make your testing easy with start-of-packet (SOP), end-of-packet (EOP), reset complete (RC), enter suspend, or exit suspend modes.

serial bus triggering help you save time by automatically finding the right pattern from long streams of serial data within your embedded systems design.

## Analog HDTV/EDTV triggering

Capturing and analyzing baseband high-definition TV waveforms with a scope has never been easier. The 6000 Series supports analog HDTV/EDTV triggering for emerging standards like 1080i, 1080p, 720p and 480p as well as standard video triggering on any line within a field, all lines, all fields, odd or even fields for NTSC, SECAM, PAL and PAL-M video signals.

Instead of spending extra time using conventional edge triggering to capture and trace long streams of serial bus data, let Agilent's



## Other standard features

- Built-in help at your fingertips**  
 An innovative built-in help system in six different languages (English, Japanese, simplified Chinese, German, French and Russian) gives you quick access to the help you need. If you have a question about a particular feature, simply press and hold the corresponding front-panel key for a few seconds, and a help screen pops up to explain its function. You'll no longer have to look for the manual when you need assistance setting up scope functions or making complex measurements.
- Deep memory transfer over the bus**  
 Transfer all of your data over the bus, even when using deep memory. Typically it takes less than 5 seconds to transfer 4 MB of data over USB.
- Easy software upgrades**  
 The system software is stored in Flash ROM that can be upgraded easily from the scope's built-in USB port. For a free copy of the system software and the IntuiLink Data Capture software, visit the 6000 Series Web site at [www.agilent.com/find/MSO6000sw](http://www.agilent.com/find/MSO6000sw).
- AutoProbe interface**, featured on 300 MHz - 1 GHz models, automatically sets probe attenuation factors and provides power for selected Infiniium active probes supporting the award-winning 1130A 1.5 GHz InfiniMax differential active probe and 1156A 1.5 GHz single-ended active probe. The 100 MHz 6000 Series offers auto probe sense only.
- Waveform math with FFTs**  
 Analysis functions include subtract, multiply, integrate, and differentiate, as well as FFT (fast Fourier transforms).
- 250-ps peak detect** on the 500 MHz/1 GHz models, 500-ps peak detect on the 300 MHz models and 1-ns peak detect on the 100 MHz models means you won't have to worry about missing narrow glitches.
- Autoscale** lets you quickly display any active signals, automatically setting the vertical, horizontal and trigger controls for the best display.
- Easy printer connectivity**  
 Use the standard USB host port on the rear panel to easily connect HP Deskjet, Officejet and HP PCL 3.0 compatible printers.
- Built-in 5-digit hardware counter**  
 measures frequency up to the bandwidth of the scope (max 1 GHz). The counter resolution can be increased to 8 digit with an external 10 MHz reference.
- Built-in 10 MHz reference in/out**  
 port lets you synchronize multiple measurement instruments in a system or get higher accuracy time base using a high accuracy external clock.
- Trig Out** port on the rear panel provides an easy way to synchronize your scope to other instruments. Use the scope's Trig Out port to connect your scope to a frequency counter for more accurate frequency measurements or cross trigger other instruments.
- High resolution mode** offers up to 12 bits of resolution in real-time (single-shot) modes, reducing noise. This is accomplished by serially filtering sequential data points and mapping the filtered results to the display when operating at slow time base ranges.

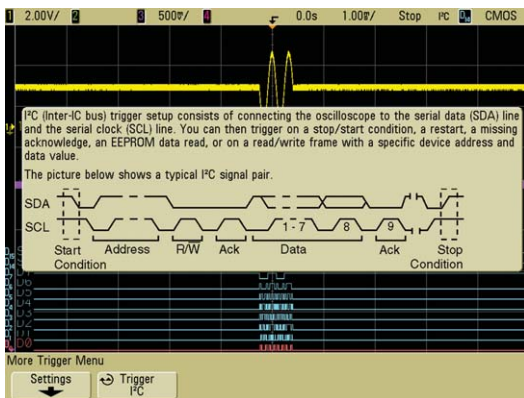


Figure 12. Press and hold any key for built-in Help, such as this description of the I<sup>2</sup>C bus triggering.



Figure 13. Built-in hardware counter allows for making 8-digit frequency measurement using an external 10 MHz reference input.

## Agilent 6000 Series oscilloscopes: The right combination of features and performance to bring your toughest problems into focus.

**MegaZoom III deep memory** helps you determine how your signals are impacting each other. With shallow memory scopes, you have to choose whether you look at a slow analog signal or fast digital content. With up to 8 Mpts deep memory, you don't have to choose – capture all of your data at once.

**Revolutionary high-definition color display with XGA resolution and 256 levels of intensity** reveals subtle details that most 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.



**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.

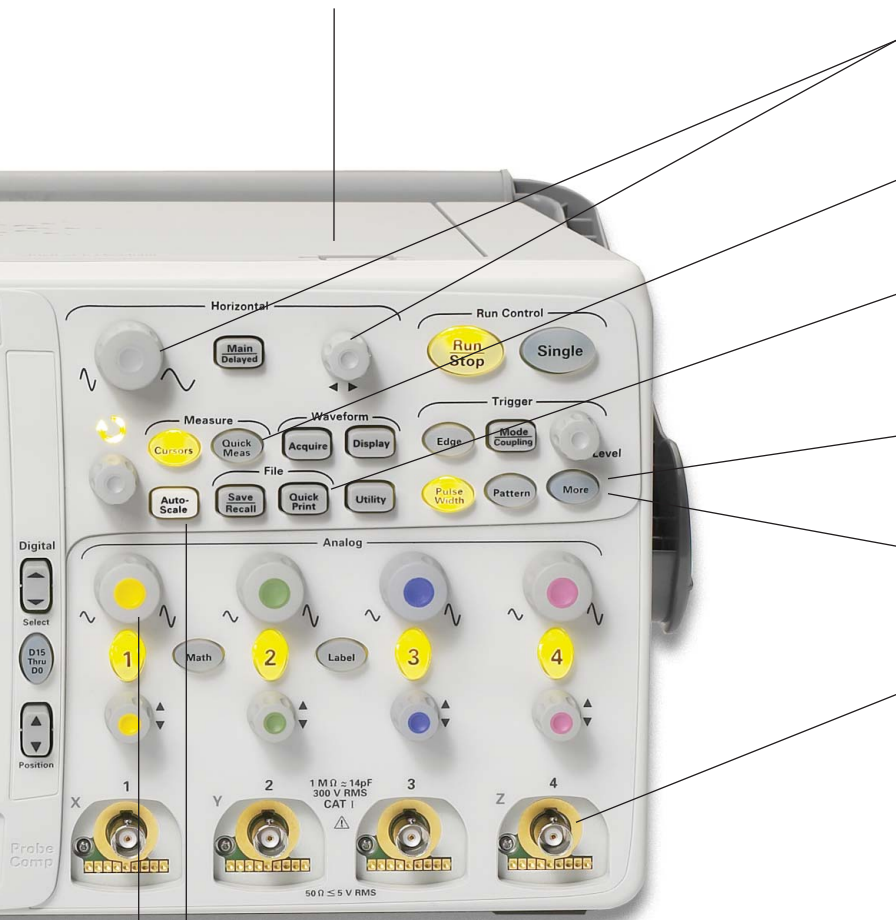


Rear panel inputs/outputs

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

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

**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.

**QuickPrint** automatically prints your screen or saves screen images to a connected USB storage device with automated file names.

**Standard serial triggering** includes CAN, I<sup>2</sup>C, LIN, SPI, and USB.

**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 - 1 GHz models only).

**Built-in help in six 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.

**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.

**2 or 4 scope and 16 logic channel MSOs** allow you to view and trigger on up to 20 time-aligned signals on your scope screen.

**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.

# Probes

To get the most out of your scope, you need the right probes and accessories for your particular application. That's why Agilent Technologies offers a complete family of innovative passive and

active probes for the 6000 Series scopes to get your job done easily. For more comprehensive information, refer to the Agilent 6000 Series Oscilloscopes Probes

and Accessories Data Sheet (Agilent publication number 5968-8153EN/ENUS). You can get a copy by visiting our Web site at: [www.agilent.com/find/MSO6000](http://www.agilent.com/find/MSO6000).

## Selection guide

Agilent passive probes	10070C	10074C (shipped with 6000 Series 100 MHz models)	10073C (shipped with 6000 Series 300 MHz - 1 GHz models)	10076A high-voltage probe	N2771A high-voltage probe
Probe bandwidth	20 MHz	150 MHz	500 MHz	250 MHz	50 MHz
Probe rise time (calculated)	<17.5 ns	<2.33 ns	<700 ps	<1.4 ns	<7 ns
Attenuation ratio	1:1	10:1	10:1	100:1	1000:1
Input resistance (when terminated into 1 M $\Omega$ )	1 M $\Omega$	10 M $\Omega$	2.2 M $\Omega$	66.7 M $\Omega$	100 M $\Omega$
Input capacitance	Approx. 70 pF	Approx. 15 pF	Approx. 12 pF	Approx. 3 pF	Approx. 1 pF
Maximum input (dc+peak ac)	400 Vpk CAT I (mains isolated) 400 Vpk CAT II (post receptacle mains)	500 Vpk CAT I (mains isolated) 400 Vpk CAT II (post receptacle mains)	500 Vpk CAT I (mains isolated) 400 Vpk CAT II (post receptacle mains)	4000 Vpk	15 kV dc, 10 kVrms, 30 kV dc + peak ac
Compensation range	None	9-17 pF	6-15 pF	6-20 pF	7-25 pF
Probe sense	No	Yes	Yes	Yes	No

Current probes	Description
1146A	100 kHz current probe, ac/dc
N2774A	50 MHz current probe, ac/dc
N2775A	Power supply for N2774A
1147A	50 MHz current probe, ac/dc with AutoProbe interface

Active single-ended probes	Description
1144A	800 MHz active probe
1145A	2-channel 750 MHz active probe
1142A	Power supply for 1144A/1145A
1156A	1.5 GHz active probe with AutoProbe interface

Active differential probes	Description
N2772A	20 MHz differential probe
N2773A	Probe power supply for N2772A
1130A	1.5 GHz InfiniiMax differential probe amplifier with AutoProbe interface (Order one or more InfiniiMax probe heads or connectivity kits per amplifier.)

### Note:

These Infinium active probes are not supported by 6000 Series 300 MHz - 1 GHz models – 1152A, 1153A, 1154A, 1155A, 1159A, 1168A, and 1169A. The 6000 Series 100 MHz models do not support any Agilent Infinium active probes with AutoProbe interface.



# Applications

## N5406A FPGA dynamic probe for 6000 Series MSO

The N5406A FPGA dynamic probe for the 6000 Series MSO provides the most effective solution for validating and debugging embedded designs incorporating Xilinx FPGAs. This innovative solution enables you to:

- **View internal FPGA activity correlated to external analog events** – With the FPGA dynamic probe, the 6000 Series MSO's 16 digital channels can be used to access hundreds of internal signals, unlocking visibility into your design that you never had before.
- **Make multiple measurements in seconds** – Moving probe points internal to an FPGA used to require time consuming recompiles. Now, in less than a second you can easily measure a different set of internal signals without design changes. By not changing the design, FPGA timing stays constant when you select new sets of internal signals for probing.

- **Leverage the work you did in your design environment** – The FPGA dynamic probe automatically maps internal signal names from your FPGA design tool to the MSO's digital channel labels. This provides easy signal identification and eliminates unintentional mistakes while saving hours of time.

For more information on the N5406A FPGA dynamic probe, see the *FPGA Dynamic Probe for Mixed-Signal Oscilloscopes* data sheet (Agilent publication number 5989-1848EN).

## E2690B oscilloscope tools

The E2690B oscilloscope's tools, licensed by Agilent Technologies from Amherst Systems Associates (ASA), are the most powerful suites of analysis, debug, collaboration and automation tools for Agilent real-time oscilloscopes. The E2690B oscilloscope tools make it easy for in-depth analysis of the captured signals.

This software works with the 6000 Series 300 MHz - 1 GHz models. For more information on the E2690B oscilloscope tools, see the *E2690B Oscilloscope Tools* data sheet (Agilent publication number 5989-3525EN).

## 89601A vector signal analysis software

Expand the measurement capability of your 6000 Series 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. Use these capabilities to demodulate 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.

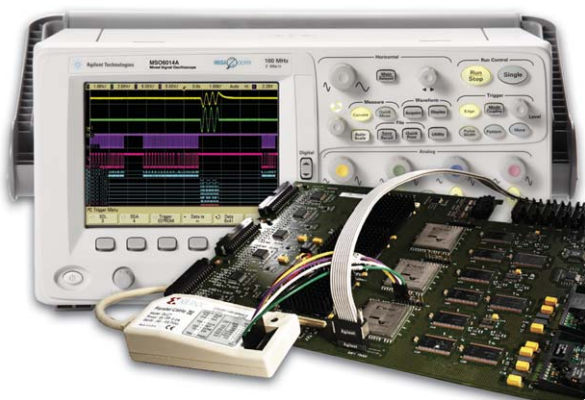


Figure 14. Debug and validate your FPGA designs faster and more effectively with FPGA dynamic probe and Agilent MSO.

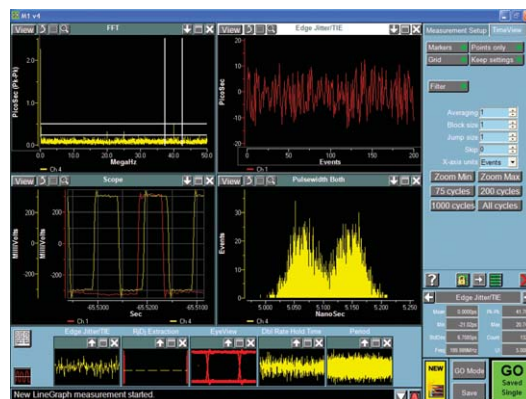


Figure 15. The E2690B oscilloscope tools make it easy for in-depth analysis of the captured signals.

## Applications (continued)

### N5423A I<sup>2</sup>C/SPI serial decode option

The N5423A serial decode option for I<sup>2</sup>C and SPI bus displays responsive, time-aligned on-screen decode of I<sup>2</sup>C and SPI serial buses. Agilent I<sup>2</sup>C and SPI serial bus decode software for 6000 Series scopes provides the fastest throughput solution for triggering on and analyzing I<sup>2</sup>C or SPI serial buses implemented in a wide variety of computer and embedded designs.

You can easily isolate serial packets to find sources of errors due to hardware or software related problems. The I<sup>2</sup>C/SPI serial decode option lets you effectively troubleshoot an embedded system capturing and decoding I<sup>2</sup>C or SPI buses, correlating them with other signals in the design such as digital control signals using a mixed-signal oscilloscope (MSO), and analog signals interfacing with the real world.

This software works with the 6000 Series oscilloscopes 4-channel DSOs or 4+16-channel MSOs only and decodes any combination of scope or logic channels.

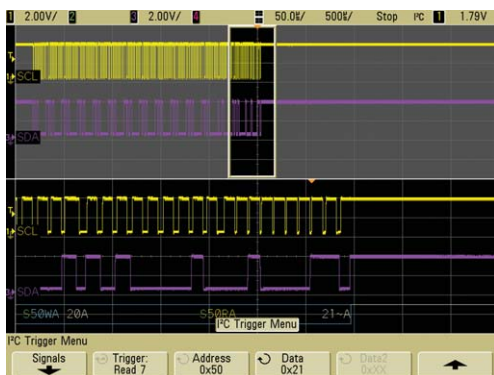


Figure 16. On-screen serial decode of an I<sup>2</sup>C packet.

### N2918A oscilloscope evaluation kit for 6000 Series oscilloscope

The N2918A scope evaluation kit for 6000 Series MSOs provides signals to help you experience the power of Agilent 6000 Series MSOs. The 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 signals debugging. Using this scope evaluation kit along with the easy-to-follow user's guide, you can quickly become familiar with how to effectively use an MSO.

### N5424A CAN/LIN automotive triggering and decode option

The most common serial buses utilized in today's automotive applications are CAN and LIN. To find and fix signal integrity problems in the naturally harsh environment in automobiles, automotive design engineers need scopes that can trigger on and decode serially transmitted data based on these protocols. Agilent N5424A CAN/LIN automotive triggering and decode option for the 6000 series oscilloscopes not only provide triggering on complex serial signals, but also provides

unique hardware-accelerated decode capabilities. Hardware-accelerated decode enables automotive engineers to capture random and infrequent events with color-coded serial bus trace to quickly identify error frames. This software works with the 6000 Series oscilloscopes 4-channel DSOs or 4+16-channel MSOs only.

For more information about this option, check out the Serial Bus Triggering and Decode option data sheet (Agilent publication number 5989-5126EN) or application note #1576.

### Option SEC – secure environment mode

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.

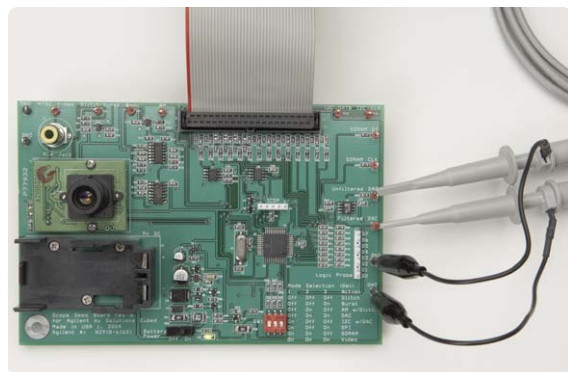


Figure 17. N2918A helps you experience the power of Agilent 6000 MSO.

# Performance characteristics

## Acquisition: scope channels

Sample rate	MSO/DSO601xA/603xA: 2 GSa/sec each channel MSO/DSO605xA/610xA: 4 GSa/sec half channel*, 2 GSa/sec each channel Equivalent-time sample rate: 400 GSa/s (when real-time mode is turned off)
Standard memory depth	With logic channels turned off, 1 Mpts half channel*, 500 kpts each channel With logic channels turned on, 625 kpts half channel*, 312 kpts each channel
Optional memory depth	With logic channels turned off, Option 2ML or 2MH – 2 Mpts half channel*, 1 Mpts each channel Option 8ML or 8MH – 8 Mpts half channel*, 4 Mpts each channel With logic channels turned on, Option 2ML or 2MH – 1.25 Mpts half channel*, 625 kpts each channel Option 8ML or 8MH – 5 Mpts half channel*, 2.5 Mpts each channel
Vertical resolution	8 bits
Peak detection	MSO/DSO601xA: 1-ns peak detect MSO/DSO603xA: 500-ps peak detect 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 12 bits of resolution when $\geq 10 \mu\text{s}/\text{div}$ @ 4 GSa/s or $\geq 20 \mu\text{s}/\text{div}$ @ 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: logic channels (MSO6000A or MSO-upgraded DSO6000A only)

Sample rate	2 GSa/sec one pod, 1 GSa/sec each pod
Maximum input frequency	250 MHz
Standard memory depth	With scope channels turned off, 1 Mpts one pod, 500 kpts each pod With scope channels turned on, 312 kpts one pod, 156 kpts each pod
Optional memory depth	With scope channels turned off, Option 2ML or 2MH – 2 Mpts one pod, 1 Mpts each pod Option 8ML or 8MH – 8 Mpts one pod, 4 Mpts each pod With scope channels turned on, Option 2ML or 2MH – 625 kpts one pod, 312 kpts each pod Option 8ML or 8MH – 2.5 Mpts one pod, 1.25 Mpts each pod
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, or only channel 3 or 4 is turned on.

## Performance characteristics (continued)

### Vertical system: scope channels

Scope channels	MSO/DSO6xx2A: Ch 1 and 2 simultaneous acquisition MSO/DSO6xx4A: Ch 1, 2, 3 and 4 simultaneous acquisition
Bandwidth (-3dB)*	MSO/DSO601xA: DC to 100 MHz MSO/DSO603xA: DC to 300 MHz MSO/DSO605xA: DC to 500 MHz MSO/DSO610xA: DC to 1 GHz
AC coupled	MSO/DSO601xA: 3.5 Hz to 100 MHz MSO/DSO603xA: 3.5 Hz to 300 MHz MSO/DSO605xA: 3.5 Hz to 500 MHz MSO/DSO610xA: 3.5 Hz to 1 GHz
Calculated rise time (=0.35/bandwidth)	MSO/DSO601xA: 3.5 nsec MSO/DSO603xA: 1.17 nsec MSO/DSO605xA: 700 psec MSO/DSO610xA: 350 psec
Single-shot bandwidth	MSO/DSO601xA: 100 MHz MSO/DSO603xA: 300 MHz MSO/DSO605xA: 500 MHz MSO/DSO610xA: 1 GHz (in half-channel mode)
Range <sup>1</sup>	MSO/DSO601xA: 1 mV/div to 5 V/div (1 M $\Omega$ ) MSO/DSO603xA and MSO/DSO605xA: 2 mV/div to 5 V/div (1 M $\Omega$ or 50 $\Omega$ ) 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 CAT II 100 Vrms, 400 Vpk 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; $\pm 75$ V on ranges >200 mV/div
Dynamic range	$\pm 8$ div
Input impedance	MSO/DSO601xA: 1 M $\Omega$ $\pm$ 1%    11 pF 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 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 MSO/DSO603xA/605xA/610xA: 10:1 10073C shipped standard for each scope channel
Probe ID	MSO/DSO601xA: Auto probe sense MSO/DSO603xA/605xA/610xA: Auto probe sense and AutoProbe interface Agilent- and Tektronix-compatible passive probe sense
ESD tolerance	$\pm 2$ kV

\* 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 - 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)

Noise peak-to-peak	MSO/DSO601xA: 3% full scale or 2 mV, whichever is greater MSO/DSO603xA: 3% full scale or 3 mV, whichever is greater MSO/DSO605xA: 3% full scale or 3.6 mV, whichever is greater MSO/DSO610xA: 3% full scale or 4 mV, 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; >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)} Example: for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, accuracy = ±{2.0% (80 mV) + 0.1 (10 mV) + 2.0 mV + 0.5% (5 mV) + 0.2%(80 mV)} = ± 4.785 mV
Dual cursor accuracy* <sup>1</sup>	±{DC vertical gain accuracy + 0.4% full scale (~1 LSB)} Example: for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, 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 - 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: logic channels (MSO6000A or MSO-upgraded DSO6000A only)

Number of channels	16 logic timing channels – labeled D15 - D0
Threshold groupings	Pod 1: D7 - D0 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 MSO/DSO603xA: 2 nsec/div to 50 sec/div MSO/DSO605xA: 1 nsec/div to 50 sec/div MSO/DSO610xA: 500 psec/div to 50 sec/div
Resolution	2.5 psec
Time base accuracy	15 ppm ( $\pm 0.0015\%$ )
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) Greater of 1 screen width or 250 $\mu$ s (with 2 Mpts memory option) Greater of 1 screen width or 125 $\mu$ s (with standard memory) Post-trigger (positive delay): 1 s - 500 seconds
Analog delta-t accuracy	Same channel: $\pm 0.0015\%$ reading $\pm 0.1\%$ screen width $\pm 20$ ps Channel-to-channel: $\pm 0.0015\%$ reading $\pm 0.1\%$ screen width $\pm 40$ ps <i>Same channel example (MSO/DSO605xA):</i> For signal with pulse width of 10 $\mu$ s, scope set to 5 $\mu$ s/div (50 $\mu$ s screen width), 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 $\pm (1 \text{ logic sample period, } 1 \text{ ns})$ Channel-to-channel: $\pm 0.005\%$ reading $\pm 0.1\%$ screen width $\pm (1 \text{ logic sample period}) \pm \text{chan-to-chan skew}$ <i>Same channel example:</i> For signal with pulse width of 10 $\mu$ s, scope set to 5 $\mu$ s/div (50 $\mu$ s screen width), 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 Phase error @ 1 MHz: $< 0.5$ degrees Z Blanking: 1.4 V blanks trace (use external trigger on MSO/DSO6xx2A, channel 4 on MSO/DSO6xx4A)
Reference positions	Left, center, right
<b>Trigger system</b>	
Sources	MSO6xx2A: Ch 1, 2, line, ext, D15 - D0 DSO6xx2A: Ch 1, 2, line, ext MSO6xx4A: Ch 1, 2, 3, 4, line, ext, D15 - D0 DSO6xx4A: Ch 1, 2, 3, 4, line, ext
Modes	Auto, Normal (triggered), single
Holdoff time	~60 ns to 10 seconds
Trigger jitter	15 ps rms

## Performance characteristics (continued)

### Trigger system (continued)

Selections	Edge, pulse width, pattern, TV, duration, sequence, CAN, LIN, USB, I <sup>2</sup> C, SPI, 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. 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. Minimum pulse width setting: 5 ns (MSO/DSO601xA/603xA scope channels) 2 ns (MSO/DSO605xA/610xA scope channels) 2 ns (logic channels on MSO6000A or MSO-upgraded DSO6000A) 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 ack, 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.
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. Minimum duration setting: 2 ns Maximum duration setting: 10 s
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.

## Performance characteristics (continued)

### 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)

### Logic (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 MSO/DSO6032A/6052A/6102A: 1 MΩ ± 3%    14 pF or 50 Ω	MSO/DSO6014A: 1.015 kΩ ± 5% MSO/DSO6034A/6054A/6104A: 2.14 kΩ ± 5%
Maximum input	CAT I 300 Vrms, 400 Vpk, CAT II 100 Vrms, 400 Vpk With 10073C 10:1 probe: CAT I 500 Vpk, CAT II 400 Vpk 5 Vrms with 50-ohm 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; MSO/DSO6032A/6052A/6102A: >100 MHz to bandwidth of oscilloscope: 200 mV For ±8 V range setting: DC to 100 MHz, 250 mV; MSO/DSO6032A/6052A/6102A: >100 MHz to bandwidth of oscilloscope: 500 mV	MSO/DSO6014A: DC to 100 MHz: 500 mV MSO/DSO6034A/6054A/6104A: 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 MSO/DSO603xA/605xA/610xA: Auto probe sense and AutoProbe interface Agilent- and Tektronix-compatible passive probe sense	

### 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); 640 vertical by 1000 horizontal points (waveform area) 256 levels of intensity scale
Controls	Waveform intensity on front panel. Vectors on/off; infinite persistence on/off, 8 x 10 grid with intensity control
Built-in help system	Key-specific help (in English) displayed by pressing and holding key or softkey of interest
Real-time clock	Time and date (user adjustable)

\* 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)

### Measurement features

Automatic measurements	Measurements are continuously updated. Cursors track last selected measurement. 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, standard deviation (AC RMS)
Time	Frequency, period, + width, – width and duty cycle on any channel Rise time, fall time, X at max Y (time at max volts), X at min Y (time at min volts), delay, and phase on scope channels only
Counter	Built-in 5-digit frequency counter on any channel. Counts up to the scope's bandwidth (1 GHz 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, $\Delta Y$ ). Additionally logic or scope channels can be displayed as binary or hex values.
Waveform math	One function of 1-2, 1x2, FFT, differentiate, integrate. Source of FFT, differentiate, integrate: scope channels 1 or 2, 1-2, 1+2, 1x2.

### FFT

Points	Fixed at 1000 points
Source of FFT	Scope channels 1 or 2 (or 3 or 4 on MSO/DSO6xx4A only), 1+2, 1-2, 1*2
Window	Rectangular, flattop, hanning
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

### Storage

Save/recall (non-volatile)	10 setups and traces can be saved and recalled internally. 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 Image formats: BMP (8-bit), BMP (24-bit), PNG (24-bit) Data formats: X and Y (time/voltage) values in CSV format, ASCII XY and binary format Trace/setup formats: Recalled

### 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 USB (USBTMC-USB488): 3.5 Mbytes/sec 100 Mbps LAN (TCP/IP): 1 Mbytes/sec
Printer compatibility	Selected HP Deskjet, Officejet and HP PCL 3.0 compatible printers

## Performance characteristics (continued)

### General characteristics

Physical size	35.4 cm wide x 18.8 cm high x 28.2 cm deep (without handle) 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 ~2 kHz; Amplitude ~5 V
Trigger out	When Triggers is selected (delay ~17 ns) 0 to 5 V into high impedance 0 to 2.5 V into 50 $\Omega$ When Source Frequency or Source Frequency/8* is selected 0 to 580 mV into high impedance 0 to 290 mV into 50 $\Omega$ Max frequency output: 350 MHz (in source frequency mode when terminated in 50 $\Omega$ ) 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	~Line 120 W max, 96-144 V/48-440 Hz, 192-288 V/48-66 Hz, automatic selection
Line frequency	50/60 Hz, 100-240 VAC; 440 Hz, 100-132 VAC
Power usage	110 W max

### Environmental characteristics

Ambient temperature	Operating -10 °C to +55 °C; non-operating -51 °C to +71 °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 <sup>2</sup>	Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected.
Indoor use	Rated for indoor use only

### Other

Measurement categories	CAT I: Mains isolated CAT II: Line voltage in appliance and to wall outlet
Regulatory information	Safety IEC 61010-1:2001 / EN 61010-1:2001 Canada: CSA C22.2 No. 1010.1:1992 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. The product was tested in a typical configuration with HP/Agilent test systems.

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

## Ordering information

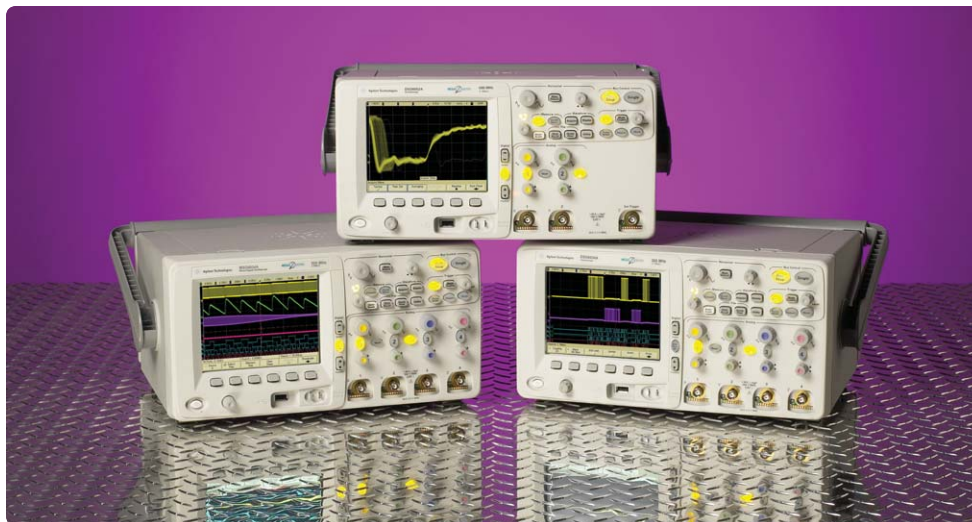
Model number	Description
DSO6012A	100 MHz 2-ch DSO
MSO6012A	100 MHz 2+16-ch MSO
DSO6014A	100 MHz 4-ch DSO
MSO6014A	100 MHz 4+16-ch MSO
DSO6032A	300 MHz 2-ch DSO
MSO6032A	300 MHz 2+16-ch MSO
DSO6034A	300 MHz 4-ch DSO
MSO6034A	300 MHz 4+16-ch MSO
DSO6052A	500 MHz 2-ch DSO
MSO6052A	500 MHz 2+16-ch MSO
DSO6054A	500 MHz 4-ch DSO
MSO6054A	500 MHz 4+16-ch MSO
DSO6102A	1 GHz 2-ch DSO
MSO6102A	1 GHz 2+16-ch MSO
DSO6104A	1 GHz 4-ch DSO
MSO6104A	1 GHz 4+16-ch MSO

### Accessories included:

Model number	DSO600xA	MSO600xA
User's guide (localized), Service guide, Programmer's guide	√	√
Power cord	√	√
10:1 divider passive probe per scope channel	√	√
Front panel cover	√	√
Agilent IO libraries suite 14.0	√	√
16:2 x 8 input logic probe		√
MSO logic cable tray		√
Standard 1-year warranty	√	√

#### Note:

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



## Ordering information (continued)

### Available options

Option number	Description	MSO/DSO603xA	MSO/DSO605xA	MSO/DSO610xA
Option 2ML	2 Mpts memory for MSO/DSO601xA/603xA models	√		
Option 8ML	8 Mpts memory for MSO/DSO601xA/603xA models	√		
Option 2MH	2 Mpts memory for MSO605xA/610xA models		√	√
Option 8MH	8 Mpts memory for MSO605xA/610xA models		√	√
N2910A	2 Mpts memory for MSO/DSO601xA/603xA models (after purchase)	√		
N2911A	8 Mpts memory for MSO/DSO601xA/603xA models (after purchase)	√		
N2912A	2 Mpts memory for MSO605xA/610xA models (after purchase)		√	√
N2913A	8 Mpts memory for MSO605xA/610xA models (after purchase)		√	√
N2914A*	MSO upgrade kit for MSO/DSO601xA/603xA models	√ (for DSOs only)		
N2915A*	MSO upgrade kit for DSO605xA/610xA models		√ (for DSOs only)	√ (for DSOs only)

\* Includes a 54620-68701 logic cable kit, a label and an upgrade license to activate the MSO features

### Warranty and calibration options

All models include a standard 1-year warranty.

Option number	Description
R-51B-001-3C	1-year return-to-Agilent warranty, extended to 3-years
A6J	ANSI Z540-compliant calibration



## Ordering information (continued)

### Accessories

Product number	Description
1180CZ	Testmobile scope cart
N2916A	Rackmount kit for 6000 Series scope
N2917A	Transit case for 6000 Series scope
N2919A	Testmobile bracket for 1180CZ and 6000 Series

### Passive probes

Product number	Description
10070C	1:1 passive probe with ID
10073C	10:1 500 MHz passive probe with ID (shipped standard with 6000 Series 300 MHz - 1 GHz models)
10074C	10:1 150 MHz passive probe with ID (shipped standard with 6000 Series 100 MHz models)

### Fine pitch probing

Product number	Description
10072A	Fine-pitch probe kit
10075A	0.5 mm, IC clip kit
E2613B	0.5 mm, Wedge probe adapter, 3-signal, qty 2
E2614A	0.5 mm, Wedge probe adapter, 8-signal, qty 1
E2643A	0.5 mm, Wedge probe adapter, 16-signal, qty 1
E2615B	0.65 mm, Wedge probe adapter, 3-signal, qty 2
E2616A	0.65 mm, Wedge probe adapter, 8-signal, qty 1
E2644A	0.65 mm, Wedge probe adapter, 16-signal, qty 1

### Current probes

Product number	Description
1146A	100 kHz current probe, ac/dc
N2774A	50 MHz current probe, ac/dc
N2775A	Power supply for N2774A
1147A	50 MHz current probe, ac/dc with AutoProbe interface

## Ordering information (continued)

### High-voltage probes

Product number	Description
10076A	100:1, 4 kV, 250 MHz probe with ID
N2771A	1000:1, 15 kV, 50 MHz high-voltage probe

### Logic probes

Product number	Description
10085-68701	16:16 logic cable and terminator
54620-68701	16:2 x 8 logic input probe assembly (shipped standard with all MSO6000A)

### Active single-ended probes

Product number	Description
1144A	800 MHz active probe
1145A	2-channel 750 MHz active probe
1142A	Power supply for 1144A and 1145A
1156A	1.5 GHz active probe with AutoProbe interface

### Active differential probes

Product number	Description
N2772A	20 MHz differential probe
N2773A	Differential probe power supply for N2772A
1141A	200 MHz differential probe
1142A	Probe control and power module for 1141A
1130A	1.5 GHz InfiniiMax differential probe amplifier with AutoProbe interface (Order one or more InfiniiMax probe heads or connectivity kits per amplifier.)

### Cable

Product number	Description
10833A	GPIB cable, 1 m long

### Manual

Option number	Description
ABA	Printed user's guide in English
ABJ	Printed user's guide in Japanese
AB2	Printed user's guide in simplified Chinese

## Ordering information (continued)

### Applications

Product number	Description
N5406A	FPGA dynamic probe for 6000 Series scope (One option listed below must be ordered.)
Option 001	Oscilloscope-locked license
Option 002	PC-locked license
E2690B N5385B	Oscilloscope tools software (US and Canada) Oscilloscope tools software (International) (One option listed below must be ordered.)
Option 004	Scope advisor for MSO/DSO610xA
Option 005	Scope guide for MSO/DSO603xA/605xA
E2693B E5388B	1 year subscription for oscilloscope tools (US and Canada) 1 year subscription for oscilloscope tools (International) (One option listed below must be ordered.)
Option 004	Subscription service for scope advisor
Option 005	Subscription service for scope guide
N5423A	(Option LSS) I <sup>2</sup> C/SPI serial decode option (for 4/4+16 ch models only)
N5424A	(Option AMS) CAN/LIN automotive triggering and decode (for 4/4+16 ch models only)
N2918A	Oscilloscope evaluation kit for 6000 Series scope
Option SEC	Secure environment mode option (factory installed option only for new purchase, not retrofittable for existing 6000 Series scope)

### Related Literature

Publication Title	Publication Type	Publication Number
<i>Agilent Technologies 6000 and 54600 Series Oscilloscope Probes and Accessories</i>	Data Sheet	5968-8153EN/EUS
<i>Serial Bus Triggering and Hardware-Accelerated Decode Options for Agilent 6000 Series Oscilloscopes</i>	Data Sheet	5989-5126EN
<i>Agilent Technologies FPGA Dynamic Probe for Mixed-Signal Oscilloscopes</i>	Data Sheet	5989-1848EN
<i>E2690B Oscilloscope Tools</i>	Data Sheet	5989-3525EN
<i>Improve Your Ability to Capture Elusive Events: Why Oscilloscope Waveform Update Rates are Important</i>	Application Note 1551	5989-2002EN
<i>Debugging Embedded Mixed-Signal Designs Using Mixed Signal Oscilloscopes</i>	Application Note 1562	5989-3702EN
<i>Oscilloscope Display Quality Impacts Ability to Uncover Signal Anomalies</i>	Application Note 1552 Application Note 1553	5989-2003EN 5989-2004EN
<i>Deep Memory Oscilloscopes: The New Tools of Choice</i>	Application Note 1446	5988-9106EN
<i>Evaluating Oscilloscope Vertical Noise Characteristics</i>	Application Note 1558	5989-3020EN
<i>Using an Agilent 6000 Series MSO to Debug an Automotive CAN Bus</i>	Application Note 1576	5989-5049EN
<i>Ten Things to Consider When Selecting Your Next Oscilloscope</i>	Application Note 1490	5989-0552EN