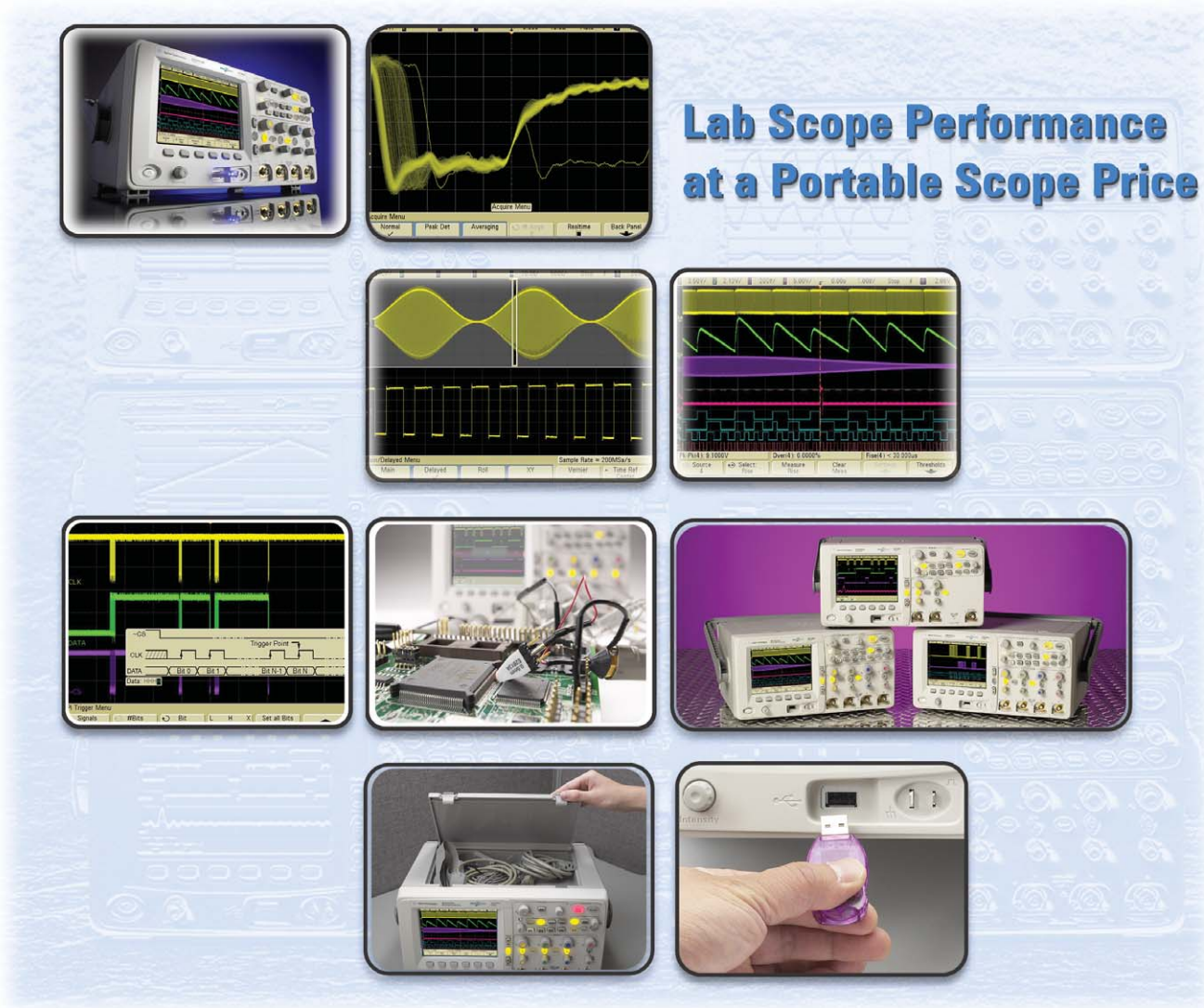
Agilent Technologies
6000 Series Oscilloscopes

Data Sheet



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:**
  - 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^2C, LIN, SPI, and USB
- AutoProbe interface
- Built-in help system

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 8- or 16-bit 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 of real-time (sinx/x) 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^2C, 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

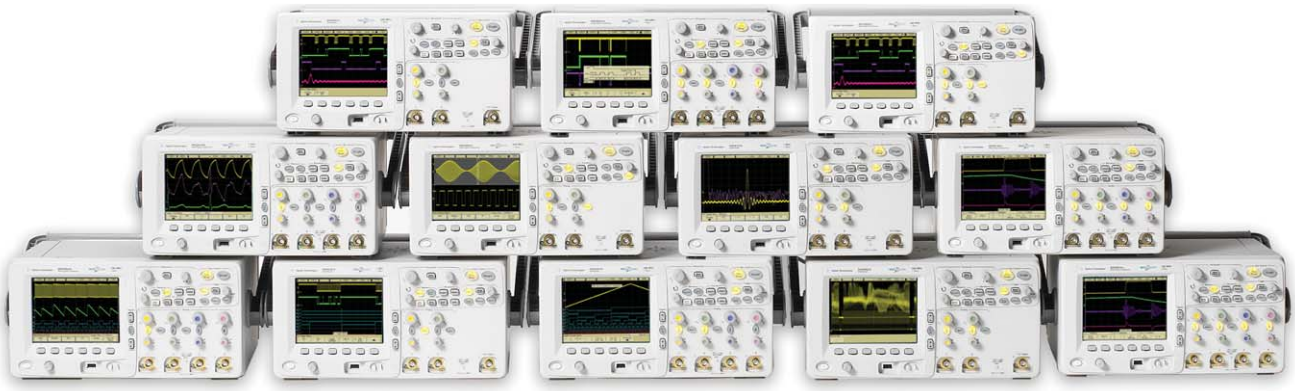


Figure 1. The 6000 Series family shown with 2+16-channel, 4+16-channel MSO and 2- and 4-channel DSO models.

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
DSO6032A	300MHz	2GSa/s	MegaZoom III 1 Mpts standard, 2 Mpts and 8 Mpts optional	2 scope
MSO6032A	300MHz	2GSa/s		2 scope + 16 logic
DSO6034A	300MHz	2GSa/s		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 54640 Series *PLUS*

+ 4/4+16 channel models and 1 GHz models
+ 2x 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 and either edge triggering
+ Built-in front panel USB port replaces floppy drive
+ Standard USB, LAN and GPIB
+ XGA video output
+ AutoProbe interface
+ 10 MHz reference clock in/out
+ Signal frequency feedthrough
+ 8-digit hardware frequency counter (when using external 10 MHz reference input)
+ Lighter weight

All for comparable prices

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.

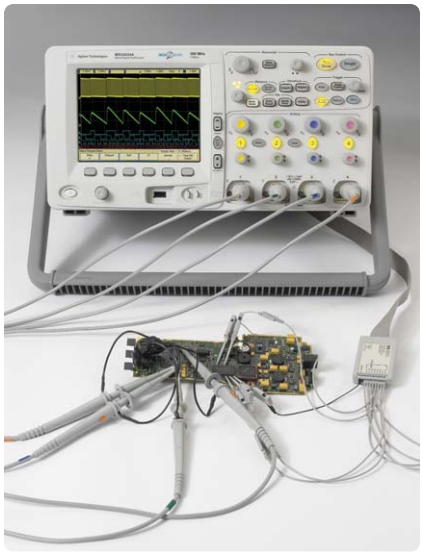


Figure 2. The 4+16-channel MSO allows you to view up to 4 analog and 16 digital signals on one instrument.

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 bring you 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**. Contact Agilent today to request an evaluation.

Industry-leading performance

MegaZoom III deep memory

MEGA Zoom III

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 represents the most advanced use of deep memory and precision displays ever.

With up to 8 Mpts of MegaZoom III deep memory, now you can finally 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 the 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 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 ability to maintain high sample rate.

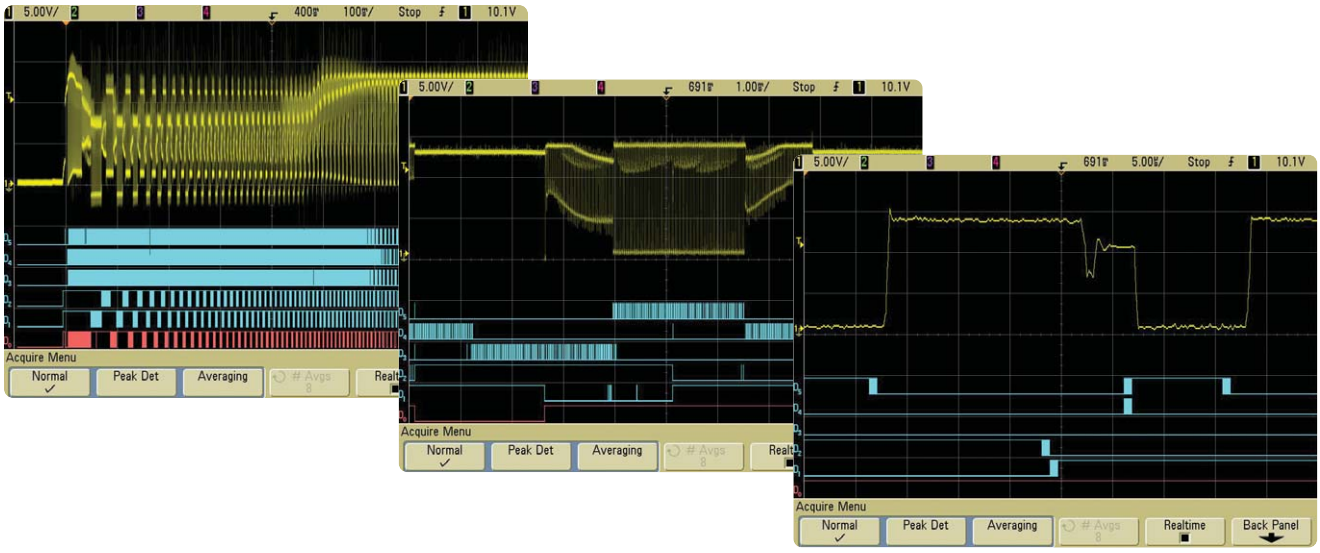


Figure 3. Motor drive signal start-up sequence with digital control signal triggering and various levels of zoom reveal "runt" pulse using Agilent's MSO6000A Series MSOs.

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 the MegaZoom III deep memory and additional 16 logic channels available in MSO models, finding the root cause of intermittent failures in your embedded design becomes a much easier task.

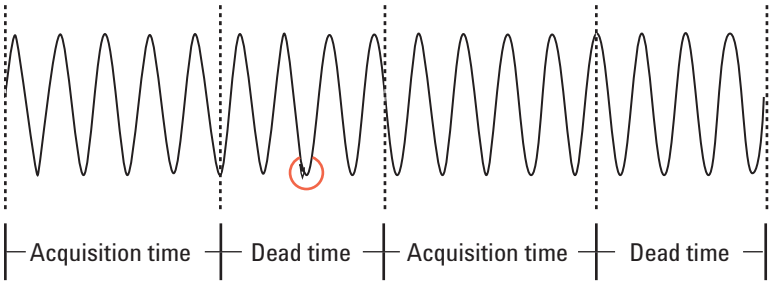


Figure 4. Slow update rate means long dead time when anomalies may be missed. With 100,000 wvfms/sec update rate, dead time is minimized.

Figure 5. 256 levels of display intensity gradation shows characteristics of jitter, noise, and signal anomalies on Agilent's 6000 Series oscilloscope.

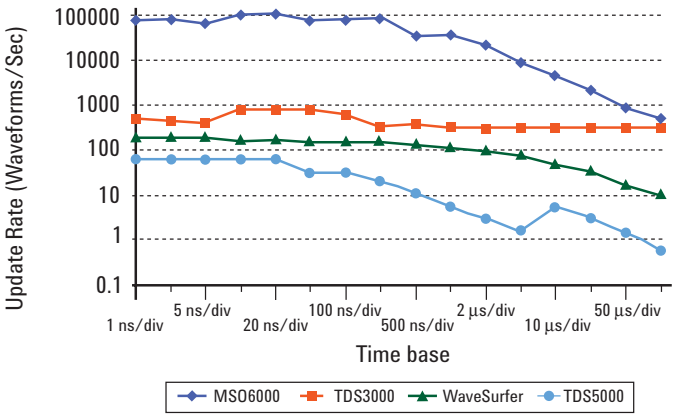


Figure 6. Waveform update rates in comparison using each scope's default real-time acquisition mode.

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 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 distances and allows sharing of instruments among multiple PCs. Choose a local area network (LAN) to filter out unwanted LAN traffic and speed up the I/O throughput, or take advantage of the remote capabilities and distribute your test results worldwide.
- 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 files and your waveform data as CSV 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 reproduce your every-day setups as well as your advanced configurations.

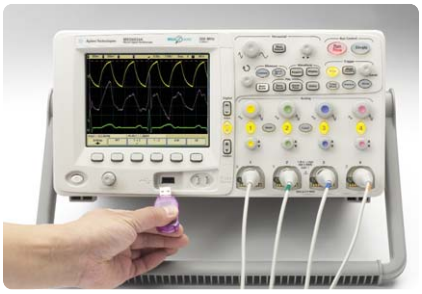


Figure 7. A built-in USB port makes it easy to save and share your work and update your system software quickly.

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.

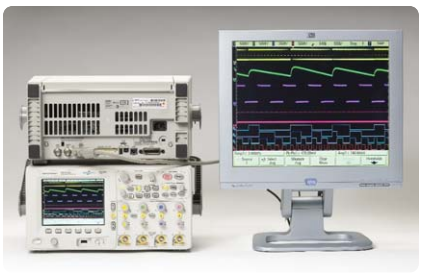


Figure 8. Agilent 6000 Series with an external monitor attached.

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 menu bar, 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**.

Logic analyzer/oscilloscope time-correlation fixture (E5850A)
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.

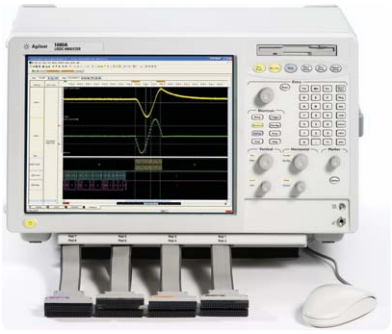


Figure 9. Make time-correlated measurements between an Agilent logic analyzer and 6000 Series oscilloscope.

Powerful triggering

Full-width pattern triggering

With mixed analog and digital designs, sometimes it is 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.

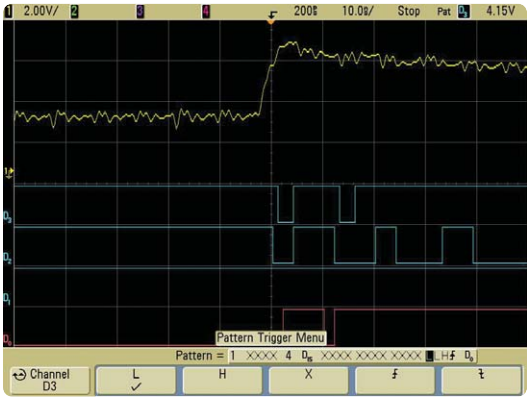


Figure 10. MSOs provide advanced pattern triggering across all scope and logic channels for quick isolation of critical events.

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.

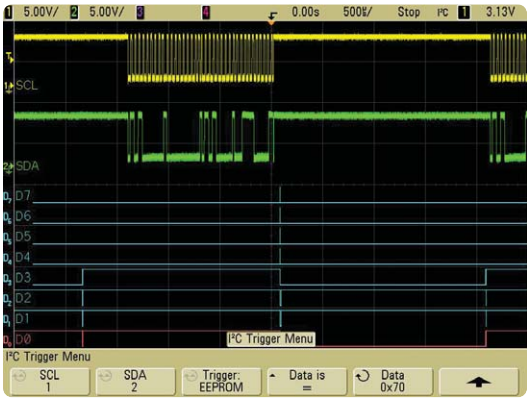


Figure 11. Trigger on address and/or data patterns within an I^2C frame.

- **I^2C (Inter-Integrated Circuit):** The full range of I^2C 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. Want to isolate and trigger on a particular frame's content on a CAN serial bus?
- **LIN (Local Interconnect Network):** Trigger on LIN sync break at the beginning of a message frame.
- **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.

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

Other standard features

- **Built-in help at your fingertips** An innovative built-in help system 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**.

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

- **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 and 500-ps peak detect on the 300 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, Laserjet 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 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.

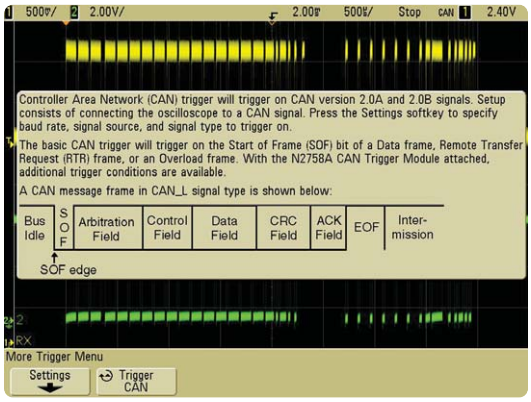


Figure 12. Press and hold any key for built-in Help, such as this description of the CAN bus triggering.

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.

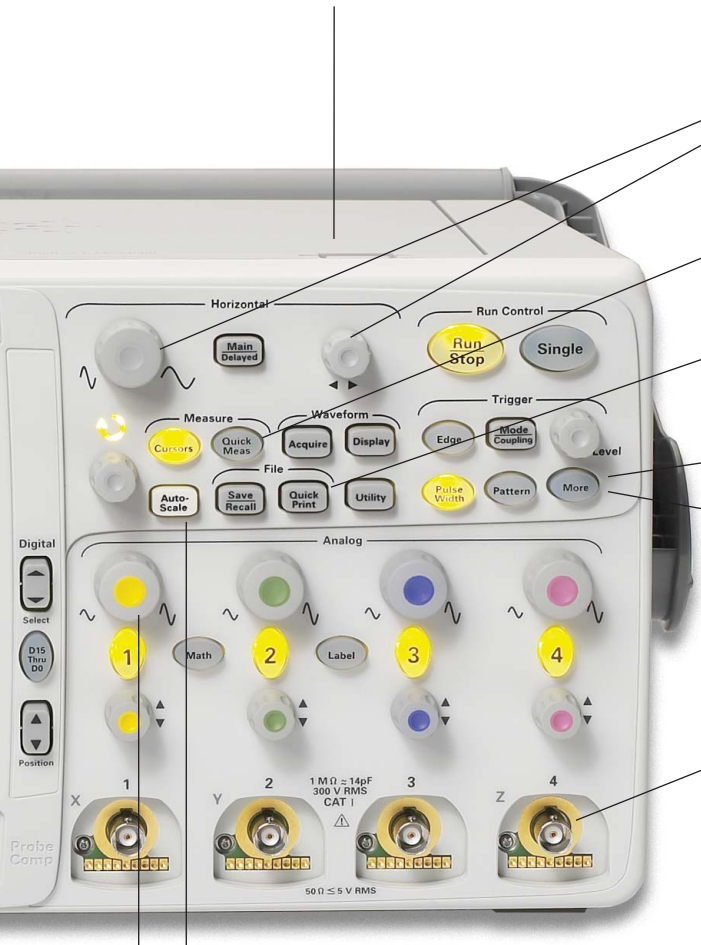
Standard USB, LAN and GPIB ports provide PC and printer connectivity.

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 three 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^2C, 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.

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

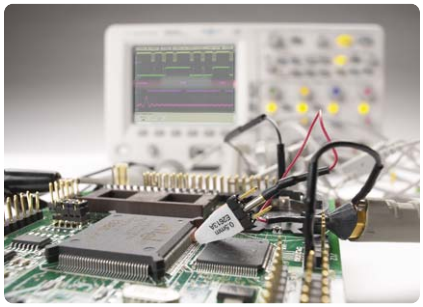
Maximum sample rate and resolution is achieved on every measurement. The scope automatically adjusts memory depth as you use it, so you get maximum sample rate and resolution on every measurement. You don't even have to think about it.

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**.

Selection guide

Agilent passive probes	10070C	10073C (shipped with 6000 Series)	10076A high-voltage probe	N2771A high-voltage probe
Probe bandwidth	20 MHz	500 MHz	250 MHz	50 MHz
Probe rise time (calculated)	<17.5 ns	<700 ps	<1.4 ns	<7 ns
Attenuation ratio	1:1	10:1	100:1	1000:1
Input resistance (when terminated into 1 MΩ)	1 MΩ	2.2 MΩ	66.7 MΩ	100 MΩ
Input capacitance	Approx. 70 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)	4000 Vpk	15 kV dc, 10 kVrms, 30 kV dc + peak ac
Compensation range	None	6-15 pF	6-20 pF	7-25 pF
Probe sense	No	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.)

Performance characteristics

Acquisition: scope channels

Sample rate	MSO/DSO603xA: 2 GSa/sec each channel MSO/DSO605xA/610xA: 4 GSa/sec half channel*, 2 GSa/sec each channel
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/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	12 bits of resolution when ≥100 µs/div, (average mode with avg = 1)
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
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/DSO603xA: DC to 300 MHz MSO/DSO605xA: DC to 500 MHz MSO/DSO610xA: DC to 1 GHz
AC coupled	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/DSO603xA: 1.17 nsec MSO/DSO605xA: 700 psec MSO/DSO610xA: 350 psec
Single-shot bandwidth	MSO/DSO603xA: 300 MHz MSO/DSO605xA: 500 MHz MSO/DSO610xA: 1 GHz (in half-channel mode)
Range[1]	MSO/DSO603xA and MSO/DSO605xA: 2 mV/div to 5 V/div (1 MΩ or 50 Ω) MSO/DSO610xA: 2 mV/div to 5 V/div (1 MΩ), 2 mV/div to 1 V/div (50 Ω)
Maximum input	CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.7 kVpk CAT II 100 Vrms, 400 Vpk With 10073C 10:1 probe: CAT I 500 Vpk, CAT II 400 Vpk
Offset range	±5 V on ranges <10 mV/div; ±20 V on ranges 10 mV/div to 200 mV/div; ±75 V on ranges >200 mV/div
Dynamic range	±8 div
Input impedance	1 MΩ ± 1% || 14 pF or 50 Ω ± 1.5%, selectable
Coupling	AC, DC
BW limit	25 MHz selectable
Channel-to-channel isolation	DC to max bandwidth >40 dB
Standard probes	10:1 10073C shipped standard for each scope channel
Probe ID	Agilent- and Tektronix-compatible passive probe sense
ESD tolerance	±2 kV
Noise peak-to-peak	MSO/DSO603xA or 605xA: 3% full scale or 3 mV, whichever is greater MSO/DSO610xA: 3% full scale or 4 mV, whichever is greater
DC vertical gain accuracy*[1]	±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[1]	±{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) + 1.0 mV + 0.5% (5 mV) + 0.2%(80 mV)} = ± 3.78 mV
Dual cursor accuracy*[1]	±{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.

1 2 mV/div is a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 2 mV/div sensitivity setting.

Performance characteristics (continued)

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	500 psec/div to 50 sec/div (MSO/DSO610xA) 1 nsec/div to 50 sec/div (MSO/DSO605xA) 2 nsec/div to 50 sec/div (MSO/DSO603xA)
Resolution	2.5 psec
Time base accuracy	15 ppm (±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 µs (with 2 Mpts memory option) Greater of 1 screen width or 125 µs (with standard memory) Post-trigger (positive delay): 1 s - 500 seconds
Analog delta-t accuracy	Same channel: ±0.0015% reading ±0.1% screen width ±20 ps Channel-to-channel: ±0.0015% reading ±0.1% screen width ±40 ps *Same channel example (MSO/DSO605xA):* For signal with pulse width of 10 µs, scope set to 5 µs/div (50 µs screen width), delta-t accuracy = ±{0.0015% (10 µs) + 0.1% (50 µs) + 20 ps} = 50.17 ns
Logic delta-t accuracy	Same channel: ±0.005% reading ±0.1% screen width ±(1 logic sample period, 1 ns) Channel-to-channel: ±0.005% reading ±0.1% screen width ±(1 logic sample period) ±chan-to-chan skew *Same channel example:* For signal with pulse width of 10 µs, scope set to 5 µs/div (50 µs screen width), delta-t accuracy = ±{0.005% (10 µs) + 0.1% (50 µs) + 1 ns} = 51.5 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

Performance characteristics (continued)

Trigger system

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		0.025% screen width + 15 ps rms
Selections		Edge, pulse width, pattern, TV, duration, sequence, CAN, LIN, USB, I^2C, SPI
	Edge	Trigger on a rising, falling, alternating or either edge of any source
	Pattern	Trigger on a pattern of high, low, and don't care levels and/or a rising or falling edge established across any of the sources. 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/DSO603xA 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 bit of a data frame, a remote transfer request frame, or an overload frame.
	LIN	Trigger on LIN (Local Interconnect Network) sync break at beginning of message frame.
	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^2C	Trigger on I^2C (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, 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
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 (~10 Hz), 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	1 MΩ ±3% || 14 pF or 50 Ω	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 ± 1V and ± 8V	±5 V
Sensitivity	DC to 100 MHz, 100 mV; >100 MHz bandwidth, 200 mV (for ± 1V range) DC to 100 MHz, 250 mV; >100 MHz bandwidth, 500 mV (for ± 8V range)	DC to 500 MHz, 400 mV
Coupling	AC (~3.5 Hz), DC, noise reject, HF reject and LF reject (~50 kHz)	
Probe ID	Auto probe sense and AutoProbe interface	

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 continuous 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 settable)

* 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.
Voltage (scope channels only)	Peak-to-peak, maximum, minimum, average, amplitude, top, base, overshoot, preshoot, 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 digit 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, ΔX, 1/ΔX) and Vertical (Y, ΔY). 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 Ω
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
Storage type and format	USB 1.1 host ports on front and rear panels Image formats: BMP (8-bit), BMP (24-bit) Data formats: X and Y (time/voltage) values in CSV 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, Laserjet, color Laserjet 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 selected (delay ~17 ns) 0 to 5 V into open circuit 0 to 2.5 V into 50 Ω When source frequency or source frequency/8 selected 0 to 580 mV into open circuit 0 to 290 mV into 50 Ω Max frequency output: 350 MHz (in source frequency mode when terminated in 50 Ω) 125 MHz (in source frequency/8 mode when terminated in 50 Ω)
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, 192-228 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; (operating 30 g, 1/2 sine, 11-ms duration, 3 shocks/axis along major axis. Total of 18 shocks)
Pollution degree2	Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected.
Indoor use	This instrument is rated for indoor use only

Other

Installation 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.

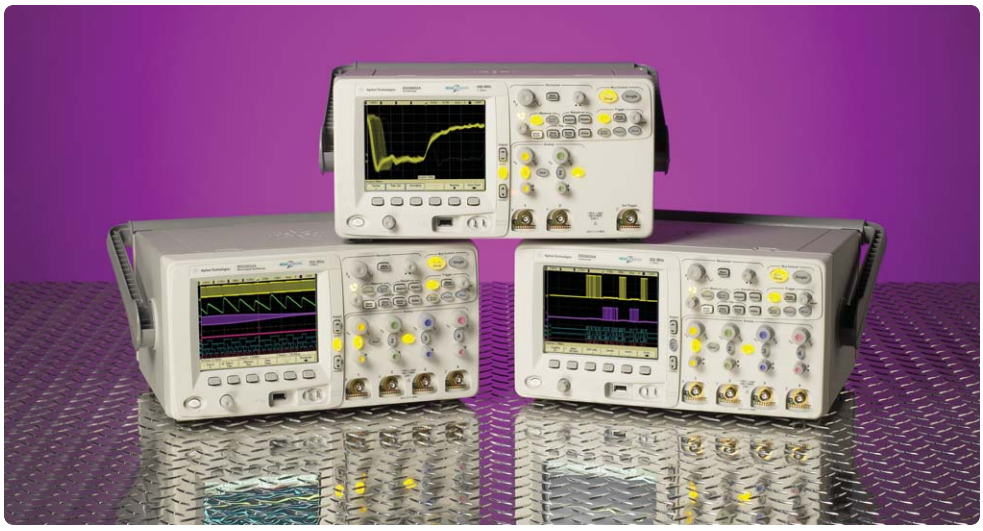
Ordering information

Model number	Description
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	√	√
10073C 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**



Ordering information (continued)

Available options

Option number	Description	MSO/DSO603xA	MSO/DSO605xA	MSO/DSO610xA
Option 2ML	2 Mpts memory for MSO/DSO603xA models	√		
Option 8ML	8 Mpts memory for MSO/DSO603xA 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/DSO603xA models (after purchase)	√		
N2911A	8 Mpts memory for MSO/DSO603xA 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 DSO603xA 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
R-51B-001-5C	1-year return-to-Agilent warranty, extended to 5-years

Accessories

Product number	Description
E5850A	Time-correlation fixture (integrate Agilent logic analyzer and oscilloscope)
1180CZ	Testmobile scope cart

Passive probes

Product number	Description
10070C	1:1 passive probe with ID
10073C	10:1 500 MHz passive probe with ID (shipped standard with all 6000 Series models)

Ordering information (continued)

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

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

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

Printed in USA January 21, 2005
5989-2000EN

Agilent Technologies