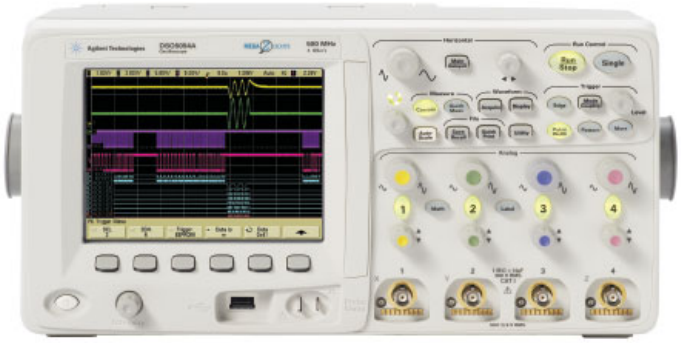
Agilent 5000 Series Portable Oscilloscope

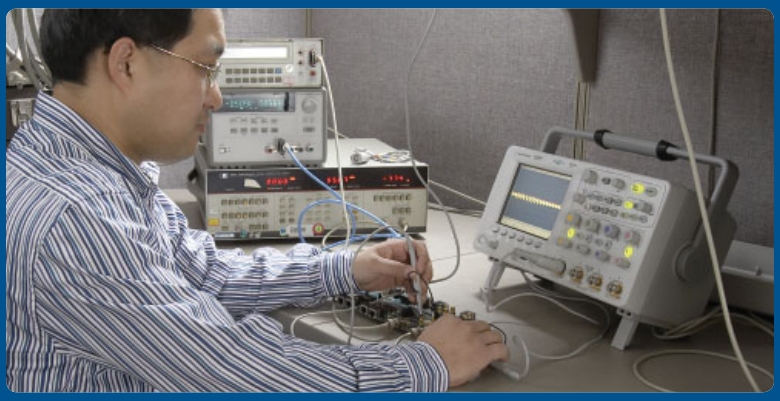
Data Sheet

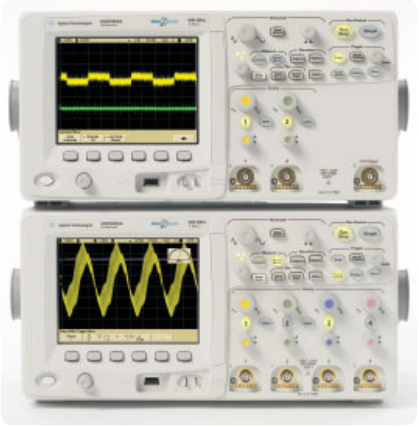
The Next Generation of Portable Oscilloscopes



Agilent Technologies

The new standard for the everyday scope





- 100 MHz, 300 MHz, and 500-MHz bandwidths
- 2 or 4 channels
- MegaZoom III memory and display technology
  - Up to 1-Mpts acquisition memory (page 4)
  - Up to 100,000 waveforms per second real-time update rate (page 5)
  - High-definition XGA (1024 x 768) display with 256 levels of intensity grading
- Up to 12 bits of vertical resolution, even in single-shot acquisitions (page 7)
- Complete connectivity – standard (page 6)
  - USB (3 ports)
  - LAN
  - GPIB
  - XGA display out
  - Full remote control, including web browser
  - LXI-C compliant
- Manuals and in-scope help localized in 11 languages
- Secure environment option

Traditional bench scopes are great for characterizing things that you know about. Agilent's MegaZoom III deep memory and fast update rate help you find the bugs that you don't know about.

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

Leading-edge technology for all scope users

The 5000 Series oscilloscopes leverage the same third generation MegaZoom III technology blocks used in our higher performance bench and lab oscilloscopes – **responsive deep memory, fast update rates with minimal "dead time", and analog-like display systems** – and deliver them in a compact package, at a price similar to oscilloscopes with older technology blocks.

Industry-leading customer support

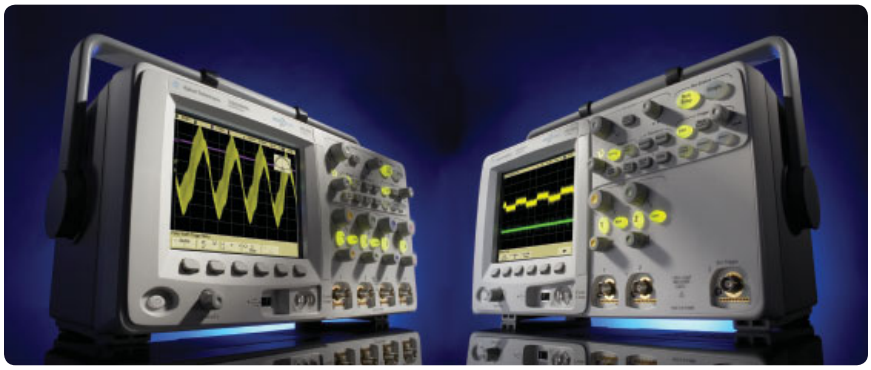
As the world's leading Test and Measurement vendor, Agilent maintains the largest network of sales engineers, application engineers, support engineers and technicians. From pre-sales collaboration, to calibration, to training and consulting, to repair and servicing, Agilent stands with you throughout the life of your product. It's no accident that Agilent has such loyal customers.

Don't take our word for it

Compare the 5000 series with your current bench scope. Or compare it to one of our competitors' newest scopes. You'll see why Agilent has been the **fastest-growing oscilloscope supplier** since 2001 (source: Prime Data 2005 Test Instrument Industry Service Market Share Analysis).

Model	BW (MHz)	Channels	Maximum sample rate	Memory	Update rate
DSO5012A	100	2	2 GSa/s	Up to 1 Mpts[1] (page 4)	Up to 100,000 waveforms per second (page 5)
DSO5014A	100	4	2 GSa/s		
DSO5032A	300	2	2 GSa/s		
DSO5034A	300	4	2 GSa/s		
DSO5052A	500	2	4 GSa/s[1]		
DSO5054A	500	4	4 GSa/s[1]		

1 Maximum sample rate and memory are achieved when two channels are interleaved



Why does deep memory matter?

See more time

This is the most easily understood use of deep memory. The more samples that you acquire, the more time that you can see at a particular sample rate.

Long capture times give you better visibility into cause-effect relationships in your design, which greatly simplifies root-cause debugging. It also allows you to capture start-up events (like the start-up sequence below) in a single acquisition.

You don't have to stitch together multiple acquisitions or set precise triggering conditions. Spend less time finding events, and more time analyzing them.

See more details

The relationship between memory depth and acquisition rate isn't as obvious. All scopes have a "banner" maximum sample rate specification, but many can only sustain these rates at a few timebase settings.

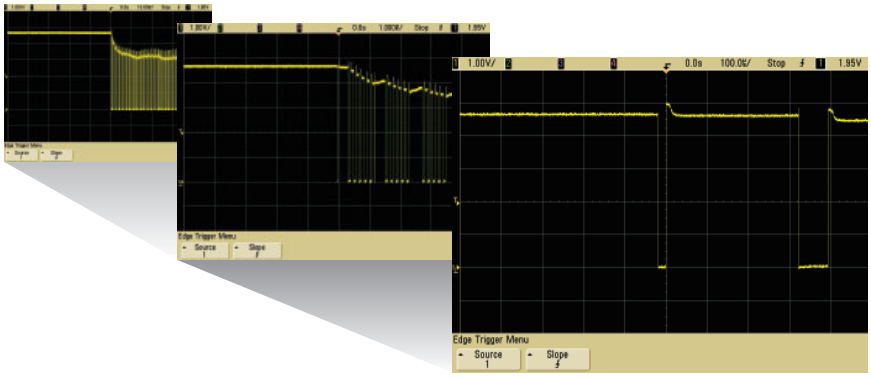


Figure 1.

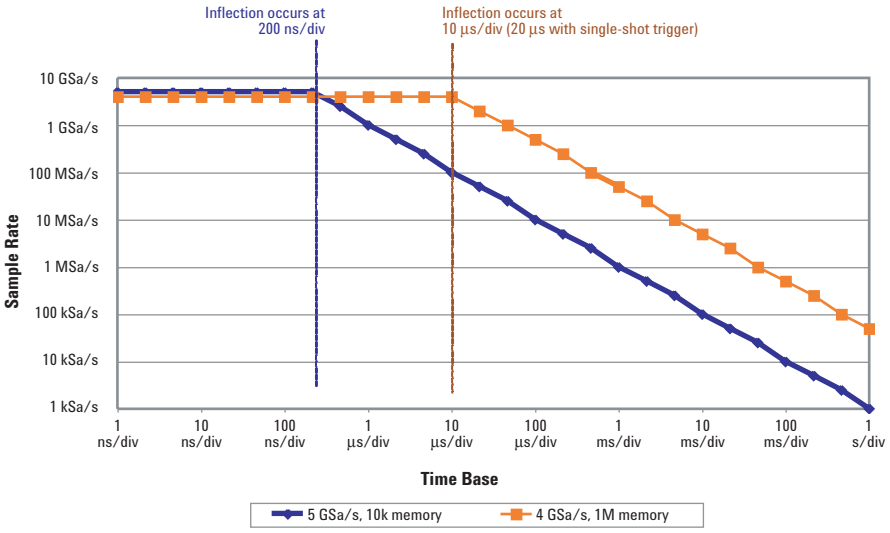


Figure 2.

MEGAZoom III

In the case of an oscilloscope with a 5 GSa/s acquisition rate and 10-k of memory (Figure 2), those 10,000 points can only fill 2-Ms of time. Since scopes have 10 time divisions, the sample rate drops at any time setting below 200-ns/div.

As a result, if you look at "slow/fast" events like a modulated signal, you run the risk of aliasing your signal. Or you may simply miss out on important signal details when you zoom in on it.

Deep memory oscilloscopes let you sustain a high sample rate over longer periods of time.

Always fast, always on

MegaZoom III is the third generation of the fast & deep memory architecture that Agilent introduced in 1996. It's not a special mode, unlike other deep-memory oscilloscopes. You have access to your MegaZoom memory at all times. And the display will respond instantly to your commands as you scale the t/div settings or pan and zoom in the Delayed (or "zoom") window.

You can learn more about MegaZoom III deep memory in Application Note 1446 - *Deep Memory Oscilloscopes: The New Tools of Choice*.

Why does a fast update rate matter?

This is a question that we hear frequently. If the human eye has trouble discerning above 30-50 frames per second, **is there really a difference between 3,600 and 100,000 waveforms per second?** If you know what you're looking for the answer is probably "no". However, if you are hunting for unknown signal anomolies or characterizing jitter, the answer is "yes".

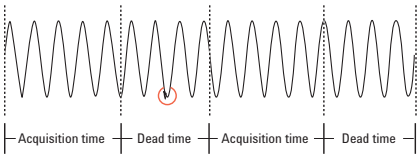


Figure 3. Reducing the dead time between acquisitions ...

If you know that there is a **glitch in your system**, it's easy to capture it using a pulse-width trigger. However, if you are just browsing through your design, your chances of finding a glitch increase as the update rate increases. If a glitch occurs during the "dead time" between sample, you miss it (Figure 3). With MegaZoom III technology, the dead time is much smaller (Figure 5). A scope with a slower update rate will capture the glitch eventually (if it recurs), but most engineers and technicians don't have the time or patience to wait for their tools to catch up.

If you are **characterizing signal jitter**, a fast update rate gives you accurate results sooner. And when the fast update rate is combined with the 5000 Series' XGA high-definition display (1024 x 768, 256 intensity levels), subtle differences in these acquisitions become obvious.

And like all other aspects of MegaZoom III technology, this is a real-time acquisition mode. **It's always fast, always on.**

Learn more about the benefits of a fast update rate by reading Application Note 1551 - *Improve Your Ability to Capture Elusive Events: Why Oscilloscope Waveform Update Rates are Important.*

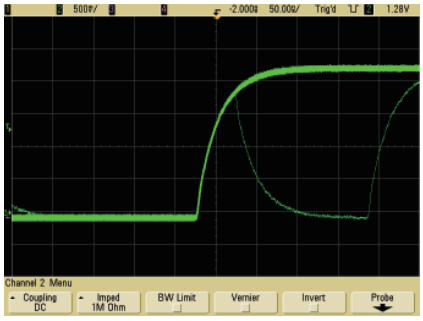


Figure 4. ... improves your chances of finding random events like glitches

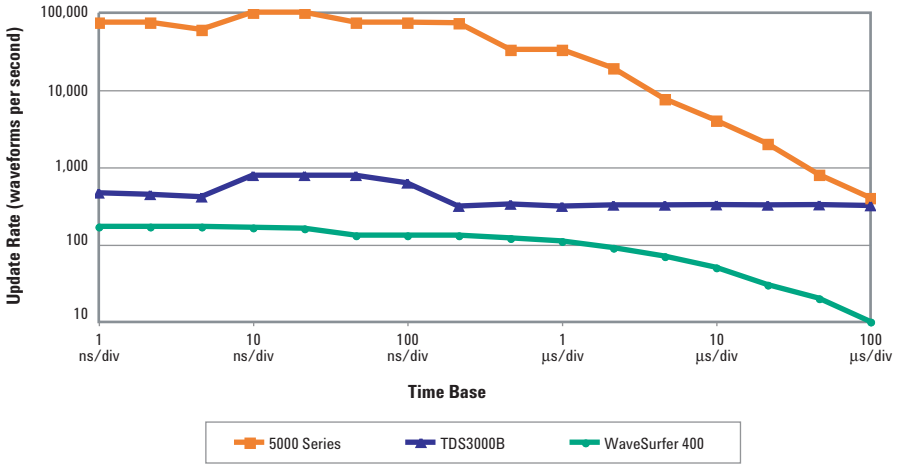


Figure 5. Update rates of popular oscilloscopes using their default real-time time acquisition mode

Catch problems sooner and cover more of your debug checklist – our 100,000 waveform per second update rate helps you find intermittent problems more than 25x faster than comparable scopes

Connectivity

Our customers tell us that oscilloscope connectivity is an increasingly important feature of their test instruments. That's why the 5000 Series scopes come with the most comprehensive hardware and software connectivitity tools in their class.

Hardware connectivity

Standard ports include:

- 2 x USB host ports (for external storage and printing devices), one on the front and one on the rear
- 1 x USB device port for high-speed PC connectivity
- 10/100 Mbit LAN for Internet/ Intranet connectivity
- GPIB to allow easy migration into existing test systems
- XGA Out for external monitors and projectors

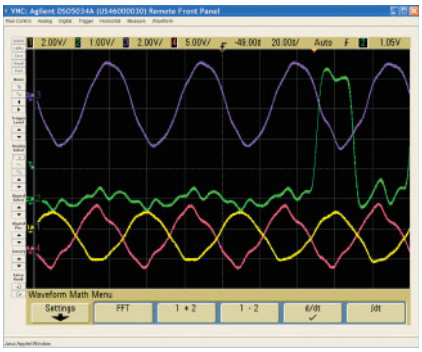


Figure 6. Agilent Remote Front Panel running in a web browser

LXI Class C

LAN eXtensions for Instrumentation (LXI) is a standards-based architecture for test systems. By specifying the interaction of system components, LXI enables fast and efficient test system creation and reconfiguration. The 5000 Series oscilloscopes follow specified LAN protocols, and adhere to LXI requirements such as a built-in Web control server, IVI-COM driver, and easy-to-use SCPI commands. The standard Agilent I/O Library Suite makes it easy to configure and integrate instruments in your system.

IntuiLink toolbars

IntuilLink gives you a quick way to move screenshots and data into Microsoft® Word and Excel. These toolbars can be installed from **www.agilent.com/find/intuilink**.

Scope View logic analyzer and oscilloscope correlation

Scope View enables simple time-correlated measurements between a 5000 Series oscilloscope and an Agilent 1680/90 or 16800/900 logic analyzer. Scope and logic waveforms are integrated into a single logic analyzer waveform display for easy viewing analysis – all with a simple point-to-point LAN connection. You can also cross-trigger the instruments, automatically de-skew the waveforms, and maintain marker tracking between the instruments.

Figure 7. OK, so the 5000 Series doesn't have RS-232. But it does have just about any other connection you might need – standard.

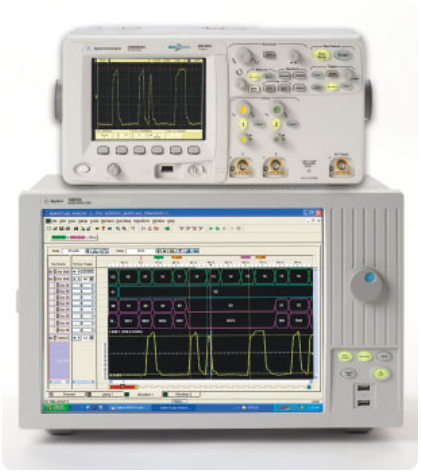


Figure 8. Combine best-in-class instruments with a simple connection

Other nice features

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

Help is at your fingertips
An embedded help system – available in 11 languages – gives you quick answers if you don't understand a feature. Simply press and hold the corresponding front-panel key, and a screen pops up to explain its function (Figure 9).

Waveform math with FFT
Analysis functions include subtract, multiply, integrate, and differentiate, as well as Fast Fourier Transforms (FFT).

Peak detect
250-ps on 500-MHz models, 500-ps on 300-MHz models and 1-ns on 100-MHz models helps you find narrow glitches.

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

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

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

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

23 automatic measurements with QuickMeas
Pressing **[QuickMeas]** brings up the last four measurements selected. Cursors automatically track the most recently selected measurement.

HDTV Trigger
The 5000 Series supports analog HDTV/EDTV triggering for standards like 1080i, 1080p, 720p and 480p as well as standard video triggering on any line within a field, all lines, all fields, odd or even fields for NTSC, SECAM, PAL and PAL-M video signals.

Easy software upgrades
System software is stored in Flash ROM that can be upgraded from the scope's built-in USB port or LAN. You can find the latest system and IntuiLink Data Capture software at **www.agilent.com/find/DSO5000sw**.

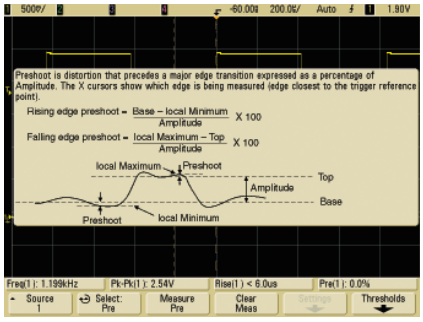


Figure 9. Press and hold a key for instant help

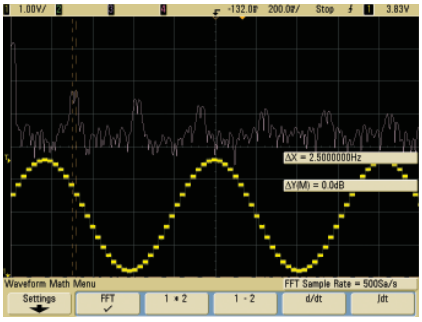
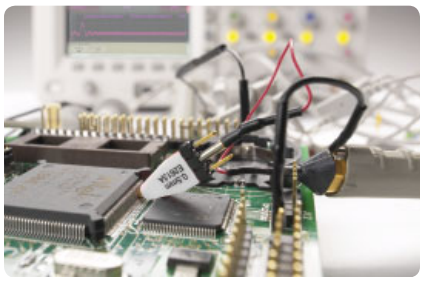


Figure 10. FFT allows you to view the spectral content of this unfiltered sine wave

Probing

To get the most out of your scope, you need the right probes and accessories for your application. That's why Agilent Technologies offers a complete family of innovative passive and active probes for the 5000 Series scopes to get your job done easily. For more comprehensive information, refer to the Agilent 6000 and 5000 Series Oscilloscope Probes and Accessories Data Sheet (Agilent publication number 5968-8153EN/ENUS) or visit **www.agilent.com/find/scope_probes**.



Selection guide

	10070C	**N2863A (shipped with 100 MHz and 300 MHz models)**	**10073C (shipped with 500 MHz models)**	**10076A high-voltage probe**	**N2771A high-voltage probe**
Probe bandwidth	20 MHz	300 MHz	500 MHz	250 MHz	50 MHz
Probe rise time (calculated)	< 17.5 ns	< 1.16 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 MΩ)	1 MΩ	10 MΩ	2.2 MΩ	66.7 MΩ	100 MΩ
Input capacitance	Approx. 70 pF	Approx. 12 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)	300 Vrms	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	5-30 pF	6-15 pF	6-20 pF	7-25 pF
Probe sense	No	Yes	Yes	Yes	No

Selection guide (continued)

Current probes	Description
1146A	100-kHz current probe, ac/dc
N2780A	2-MHz/500A current probe, ac/dc
N2781A	10-MHz/150A current probe, ac/dc
N2782A	50-MHz/30A current probe, ac/dc
N2783A	100-MHz/30A current probe, ac/dc
N2779A	Power supply for N278xA

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

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

Options

Option SEC – Secure Environment Mode

Provides compliance with National Industrial Security Program Operating Manual (NISPOM) Chapter 8 requirements, which allows you to move the instrument out of a secure area with confidence. Option SEC offers the highest level of security by ensuring that internal memory is clear of all setup and trace settings. When this option is installed, it will store setups and traces to internal volatile memory only. To permanently store data, you can save it to an external memory device via the oscilloscope's front-panel USB port.

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 available for Agilent real-time oscilloscopes. These tools make it easy to perform in-depth analysis of captured signals. More information can be found in the *Oscilloscope Tools* data sheet (Agilent publication number 5989-3525EN).

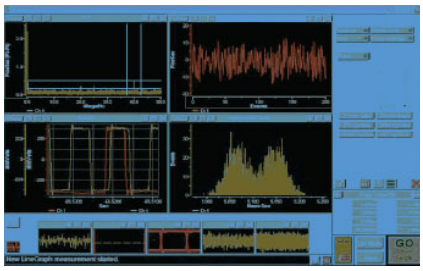


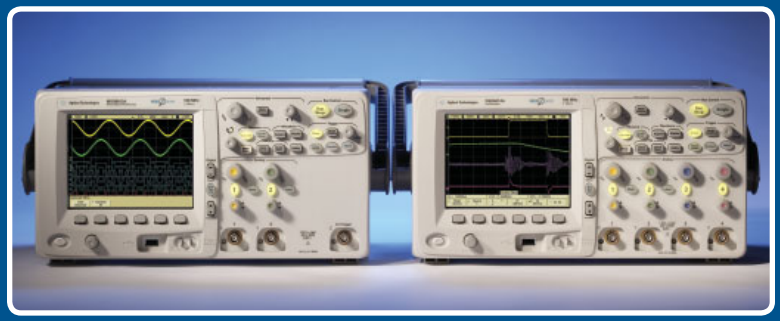
Figure 12. E2690B Oscilloscope Tools allows in-depth analysis of captured signals.

Need even more measurement power? Consider the DSO/MSO6000 Series.

The 6000 Series of oscilloscopes and mixed-signal oscilloscopes offers the same MegaZoom III memory and display technology of the 5000 Series, and adds a wealth of additional capabilities:

- MSO (Mixed Signal Oscilloscope) models with 16 fully-integrated digital channels
- 1 GHz bandwidth models
- 2 M samples memory standard, 8 M optional
- Hardware serial triggering for buses like I^2C, SPI, CAN, LIN, and USB
- Optional hardware-accelerated serial decode for buses like I^2C, SPI, CAN, and LIN
- Battery option
- Support for Altera and Xilinx FPGAs

You can learn more about the 6000 Series at **www.agilent.com/ find/mso6000**



Performance characteristics

Acquisition

Sample rate	DSO501xA/503xA: 2 GSa/sec each channel DSO505xA: 4 GSa/sec half channel[1], 2 GSa/sec each channel
Equivalent-time sample rate	400 GSa/s (when real-time mode is turned off)
Memory depth	1 Mpts half channel[1], 500 kpts each channel
Vertical resolution	8 bits, up to 12 in high-resolution or averaging modes
Peak detection	DSO501xA: 1-ns peak detect DSO503xA: 500-ps peak detect DSO505xA: 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 ≥10 µs/div, at 4 GSa/s or ≥20 µs/div, at 2 GSa/s
Filter	Sinx/x interpolation (single shot BW = sample rate/4 or bandwidth of oscilloscope, whichever is less) with vectors on and in real-time mode

Vertical system

Scope channels	DSO5xx2A: Ch 1 and 2 simultaneous acquisition DSO5xx4A: Ch 1, 2, 3 and 4 simultaneous acquisition
Bandwidth (–3dB)[2]	DSO501xA: DC to 100 MHz DSO503xA: DC to 300 MHz DSO505xA: DC to 500 MHz
AC coupled	DSO501xA: 3.5 Hz to 100 MHz DSO503xA: 3.5 Hz to 300 MHz DSO505xA: 3.5 Hz to 500 MHz
Calculated rise time (= 0.35/bandwidth)	DSO501xA: 3.5 nsec DSO503xA: 1.17 nsec DSO505xA: 700 psec
Single-shot bandwidth	DSO501xA: 100 MHz DSO503xA: 300 MHz DSO505xA: 500 MHz

1 Half channel is when only one channel of channel pair 1-2 is turned on, or one channel of channel pair 3-4 is turned on.

2 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)

Vertical system (continued)

Range[1]	2 mV/div to 5 V/div (1 MΩ or 50 Ω)
Maximum input	Maximum input voltage for analog inputs: CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6 kVpk CAT II 100 Vrms, 400 Vpk with N2863A 10:1 probe: CAT I 600 V, CAT II 300 V (DC + peak AC) with 10073C 10:1 probe: CAT I 500 Vpk, CAT II 400 Vpk with 50 Ω input: 5 Vrms
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% || 12 pF or 50 Ω ± 1.0%, selectable
Coupling	AC, DC
BW limit	25 MHz selectable
Channel-to-channel isolation	DC to max bandwidth > 40 dB
Standard probes	DSO501xA: 10:1 N2863A shipped standard for each oscilloscope channel DSO503xA: 10:1 N2863A shipped standard for each oscilloscope channel DSO505xA: 10:1 10073C shipped standard for each oscilloscope channel
Probe ID	Auto probe sense and AutoProbe interface Agilent- and Tektronix-compatible passive probe sense
ESD tolerance	±2 kV
Noise peak-to-peak	DSO501xA: 3% full scale or 2 mV, whichever is greater DSO503xA: 3% full scale or 3 mV, whichever is greater DSO505xA: 3% full scale or 3.6 mV, whichever is greater
DC vertical gain accuracy[2]	±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, oscilloscope 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)} = ± 4.785mV
Dual cursor accuracy[1]	±{DC vertical gain accuracy + 0.4% full scale (~1 LSB)} *Example:* for 50 mV signal, oscilloscope set to 10 mV/div (80 mV full scale), 5 mV offset, accuracy = ±{2.0% (80 mV) + 0.4% (80 mV)} = ±1.92 mV

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.

2 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	DSO501xA: 5 nsec/div to 50 sec/div DSO503xA: 2 nsec/div to 50 sec/div DSO505xA: 1 nsec/div to 50 sec/div
Resolution	2.5 psec
Timebase accuracy	25 ppm (±0.0025%)
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 125 µs Post-trigger (positive delay): 1 s to 500 seconds
Channel delta-t accuracy	Same channel: ±0.0025% reading ±0.1% screen width ±20 ps Channel-to-channel: ±0.0025% reading ±0.1% screen width ±40 ps *Same channel example (DSO505xA):* For signal with pulse width of 10 µs, oscilloscope set to 5 µs/div (50 µs screen width), delta-t accuracy = ±{0.0025% (10 µs) + 0.1% (50 µs) + 20 ps} = 50.27 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 DSO50x2A, channel 4 on DSO50x4A)
Reference positions	Left, center, right

Trigger system

Sources	DSO5xx2A: Ch 1, 2, line, ext DSO5xx4A: 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
Edge	Trigger on a rising, falling, or alternating edge of any source
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 (DSO501xA) 2 ns (DSO503xA, DSO505xA) Maximum pulse width setting: 10 s
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 channels, but only after a pattern has been established for a minimum of 2 nsec. The channel's high or low level is defined by that channel's trigger level.
TV	Trigger using any oscilloscope 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.
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 channels, sets edge trigger mode on highest-numbered channel, sets vertical sensitivity on channels, time base to display ~1.8 periods. Requires minimum voltage > 10 mVpp, 0.5% duty cycle and minimum frequency > 50 Hz.

Channel triggering

Range (internal)	±6 div from center screen
Sensitivity[1]	< 10 mV/div: greater of 1 div or 5mV; ≥ 10 mV/div: 0.6 div
Coupling	AC (~10 Hz), DC, noise reject, HF reject and LF reject (~50 kHz)

1 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)

External (EXT) triggering	DSO5xx2A	DSO5xx4A
Input impedance	1 MΩ ±3% || 12 pF or 50 Ω ±1%	1.015 kΩ ±5%
Maximum input	CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6 kVpk CAT II 100 Vrms, 400 Vpk with N2863A 10:1 probe: CAT I 600 V, CAT II 300 V (DC + peak AC) 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	For ± 1V range setting: DC to 100 MHz, 100 mV, >100 MHz to bandwidth of the oscilloscope, 200 mV For ±8 V range setting: DC to 100 MHz, 250 mV; >100 MHz to bandwidth of the oscilloscope, 500 mV	DC to 100 MHz, 500 mV
Coupling	AC (~10 Hz), DC, noise reject, HF reject and LF reject (~50 kHz)	
Probe ID	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 oscilloscope 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 displayed by pressing and holding key or softkey of interest	
Real-time clock	Time and date (user adjustable)	

Performance characteristics (continued)

Measurement features

Automatic measurements	Measurements are continuously updated. Cursors track last selected measurement.
Voltage	Peak-to-peak, maximum, minimum, average, amplitude, top, base, overshoot, preshoot, RMS, standard deviation
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 oscilloscope channels only.
Counter	Built-in 5-digit frequency counter on any channel. Counts up to the oscilloscope's bandwidth.
Threshold definition	Variable by percent and absolute value; 10%, 50%, 90% default for time measurements
Cursors	Manually or automatically placed readout of Horizontal (X, DX, 1/DX) and Vertical (Y, DY). Additionally oscilloscope 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: oscilloscope 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 DSO50x4A 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
Frequency resolution	0.05/time per div
Maximum frequency	50/time per div

Storage

Save/recall	10 setups and traces can be saved and recalled using internal non-volatile memory. 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 format, BIN 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 printers

Performance characteristics (continued)

General characteristics

Physical size	35.4 cm wide x 18.8 cm high x 17.4 cm deep (without handle) 38.5 cm wide x 18.8 cm high x 17.4 cm deep (with handle)
Weight	Net: 4.1 kg (9 lbs) Shipping: approximately 9 kgs (20 lbs)
Probe comp output frequency ~	1.2 kHz, Amplitude ~2.5 V
Trigger out	0 to 5 V into open circuit (~23 ns delay) 0 to 2.5 V into 50 Ω
Kensington lock	Connection on rear panel for security

Power requirements

Line rating	~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 hour; non-operating 90% RH at 65° C for 24 hour
Altitude	Operating to 4,570 m (15,000 ft); non-operating to 15,244 m (50,000 ft)
Vibration	Agilent class GP and MIL-PRF-28800F; Class 3 random
Shock	Agilent class GP and MIL-PRF-28800F (operating 30 g, 1/2 sine, 11-ms duration, 3 shocks/axis along major axis. Total of 18 shocks)
Pollution degree	Normally only dry non-conductive pollution occurs. 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. 61010-1:2004 USA: UL 61010-1:2004
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. Product specifications, characteristics, and descriptions in this document are subject to change without notice.

Ordering information

Available models

Product number	Description
DSO5012A	100 MHz, 2-channel portable oscilloscope
DSO5014A	100 MHz, 4-channel portable oscilloscope
DSO5032A	300 MHz, 2-channel portable oscilloscope
DSO5034A	300 MHz, 4-channel portable oscilloscope
DSO5052A	500 MHz, 2-channel portable oscilloscope
DSO5054A	500 MHz, 4-channel portable oscilloscope

Standard features

Product number	Description
Warranty	3-year return-to-Agilent warranty
Hardcopy user's guide	
ABA	Printed user's guide in English
ABD	Printed user's guide in German
ABF	Printed user's guide in French
ABZ	Printed user's guide in Italian
ABJ	Printed user's guide in Japanese
AC6	Printed user's guide in Korean
AB9	Printed user's guide in Portuguese
AKT	Printed user's guide in Russian
AB2	Printed user's guide in Simplified Chinese
ABE	Printed user's guide in Spanish
AB0	Printed user's guide in Traditional Chinese
Power cord	
900	United Kingdom
901	Australia/ New Zealand
902	Continental Europe
903	United States/ Canada
906	Switzerland
912	Denmark
917	South Africa/ India
918	Japan
919	Israel
920	Argentina
921	Chile
922	China
927	Brazil/ Thailand
Probes	One probe per channel DSO501x, DSO503x: N2863A DSO505x: 10073C
Software	Agilent IO Libraries
Other documentation	Service guide (CD-ROM, English), Certificate of Calibration, Declaration of Conformance
Miscellaneous	Protective front cover

Ordering information (continued)

Options

Product number	Description
SEC	Secure Environment Mode – Provides compliance with National Industrial Security Program Operating Manual (NISPOM) Chapter 8 requirements (factory installed option only for new purchase, not retrofittable for existing 5000 Series scope).
A6J	ANSI Z540-compliant calibration

Available software

Product number	Description
Oscilloscope Tools	
E2690B	Oscilloscope Tools software (US and Canada)
N5385B	Oscilloscope Tools software (International)
E2693B	1 year update subscription for oscilloscope tools (US and Canada)
N5388B	1 year update subscription for oscilloscope tools (International)
	(You will order Option 005 – Scope Guide. High-bandwidth Agilent oscilloscopes support more comprehensive versions of Oscilloscope Tools. Please refer to Agilent Publication 5989-3525EN: *E2690B Oscilloscope Tools* for more details.)

Accessories

Product number	Description
N2916B	Rackmount kit for 6000 and 5000 Series oscilloscopes
N2917B	Transit case for 6000 and 5000 Series oscilloscopes
N2760A	Soft carrying case for 5000 Series oscilloscopes

Cable

Product number	Description
10833A	GPIB cable, 1 m long

Probing

Common probes are listed on page 9. For a more comprehensive list, please refer to the Agilent 6000 and 5000 Series Oscilloscope Probes and Accessories Data Sheet (Agilent publication number 5968-8153EN/ENUS), or **visit www.agilent.com/find/scope_probes**

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Related literature

Publication title	Publication type	Publication number
Agilent Technologies 5000 and 6000 Series Oscilloscope Probes and Accessories	Data Sheet	5968-8153EN/EUS
Option SEC Secure Environment Mode Option for Agilent 5000 Series Oscilloscopes	Data Sheet	5989-6276EN
E2690B Oscilloscope Tools	Data Sheet	5989-3525EN
6000 Series Oscilloscopes	Data Sheet	5989-2000EN
Improve Your Ability to Capture Elusive Events	Application Note 1551	5989-2002EN
Oscilloscope Display Quality Impacts Ability to Uncover Signal Anomalies	Application Note 1552	5989-2003EN
Deep Memory Oscilloscopes: The New Tools of Choice	Application Note 1446	5988-9106EN
Evaluating Oscilloscope Vertical Noise Characteristics	Application Note 1558	5989-3020EN

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