Agilent Technologies

DSO5012A 5000 Series Oscilloscope: 100 MHz, 2 channels

Product Status: Currently Orderable | Currently Supported

Product Upgrades: **Hardware, Software & Firmware Upgrades**

Key Specifications

Big scope performance in a small package

- 100 MHz
- 2 channels
- 2 GSa/s sample rate

MegaZoom III memory and display technology

- Up to 8 Mpts acquisition memory
- Up to 100,000 waveform per second real-time update rate
- High-definition XGA (1024 x 768) display with 256 levels of intensity grading

Complete connectivity — standard

- USB (2 host ports, 1 device port), LAN, GPIB, 100 MBit LAN
- XGA display out
- Full remote control, including web browser interface
- LXI-C compliant

Description

Take the scope challenge. Win a free 7000 Series scope. Get 15% off any InfiniiVision scope.

Agilent's 5000 series delivers our proprietary MegaZoom III technology in a small benchtop package. By combining fast sample rates with deep memory and impressive update rates, these scopes help you avoid the trade-offs associated with typical bench scopes.

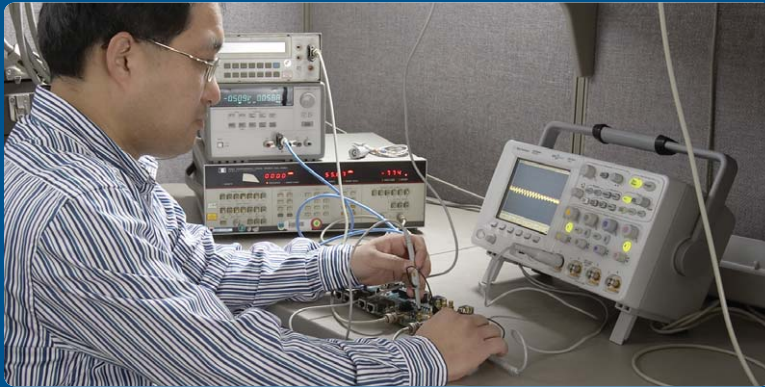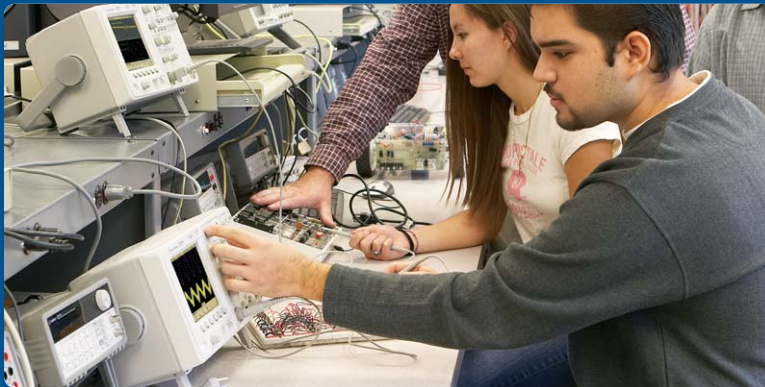If you need more channels or support for I2C, SPI, CAN, LIN, and USB, consider the DSO5014A

Secure Environment Mode Option for 5000 Series Oscilloscope Details
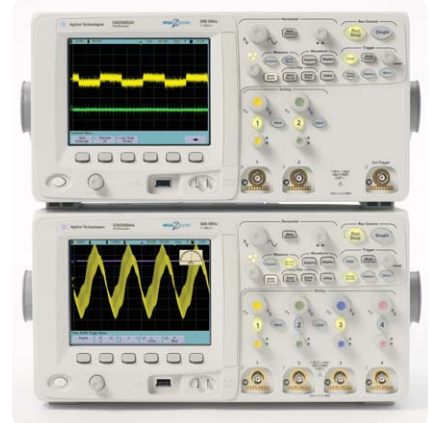
Check out the large selection of Oscilloscope Probes

See available Oscilloscope Accessories

Take 20 Seconds to See What are you missing with other portable oscilloscopes?
See Video Demos

The new standard for everyday scopes

- 100, 300, and 500 MHz bandwidths

- 2 or 4 channels

- MegaZoom III memory and display technology
  - Up to 8 Mpts acquisition memory
  - 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

- Triggering and hardware accelerated decode for I^2C, SPI, CAN, LIN and RS-232/UART (page 6)

- Up to 12 bits of vertical resolution, even in single-shot acquisitions (page 7)

- Complete connectivity – standard (page 6)
  - USB (2 host, 1 device), LAN, GPIB, XGA display out
  - Full remote control, including web browser
  - LXI class C compliant

- Manuals and in-scope help available in 11 languages

Traditional bench scopes are great for characterizing things that you know about. Agilent's MegaZoom III deep memory and fast update rates help you find the bugs 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 InfiniiVision 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," analog-like display systems, and integrated serial analysis** – 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 InfiniiVision 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 1997** (CAGR, source: Prime Data 2006 Test Instrument Industry Service Market Share Analysis).

Model	BW (MHz)	Channels	Maximum sample rate	Memory	Update rate
DSO5012A	100	2	2 GSa/s		
DSO5014A	100	4	2 GSa/s		
DSO5032A	300	2	2 GSa/s	Up to 8 Mpts[1]	Up to 100,000 waveforms per second (page 5)
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

Performance characteristics

Acquisition

Sample rate	DSO501xA/503xA: 2 GSa/a each channel DSO505xA: 4 GSa/s half channel[1], 2 GSa/s each channel
Equivalent-time sample rate	400 GSa/s (when real-time mode is turned off)
Memory depth	Standard 1 Mpts half channel[1], 500 kpts each channel Opt 080: 8 Mpts half channel[1], 4 Mpts 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	DSO50x2A: 2 Ch 1 and 2 simultaneous acquisition DSO50x4A: 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, CAT I
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, RMS, input shorted	DSO501xA: 0.5% full scale or 250 µV, whichever is greater DSO503xA: 0.5% full scale or 300 µV, whichever is greater DSO505xA: 0.5% full scale or 360 µV, 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)} = ± 4.785 mV
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
Time scale accuracy*	Specification: 25 ppm from 0 °C to 40 °C Characteristic: 25 ppm + 1 ppm per °C from 40 °C to 55 °C
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 at 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
Segmented memory re-arm time	8 µs (minimum time between trigger events)

Trigger system

Sources	DSO50x2A: Ch 1, 2, line, ext DSO50x4A: Ch 1, 2, 3, 4, line, ext
Modes	Auto, normal (triggered), single
Holdoff time	~60 ns to 10 seconds
Trigger jitter	15 ps rms

* Denotes warranted specification. Specifications are valid after a 30 minute warm-up period and ±10 °C from firmware calibration procedure.

Performance characteristics (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
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.
I^{2}C	Trigger on I^{2}C (Inter-IC bus) serial protocol at a start/stop condition or user defined frame with address and/or data values. Also trigger on missing acknowledge, address with no acq, restart, EEPROM read, and 10-bit write.
SPI	Trigger on SPI (Serial Protocol Interface) data pattern during a specific framing period. Supports positive and negative Chip Select framing as well as clock Idle framing and user-specified number of bits per frame.
RS-232/UART	View the information sent over a RS-232 serial bus. Display real-time time-aligned decode of transmit and receive lines. The application also enables triggering on RS-232/UART conditions.
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.

Performance characteristics (continued)

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.

External (EXT) triggering	DSO50x2A	DSO50x4A
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-Ω input, CAT I	±15 V
Range	DC coupling: trigger level ± 1 V and ± 8 V	±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
Display update rate	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, Ratio (dB)
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, ΔX, 1/ΔX) and vertical (Y, ΔY). Tracking Cursors provides an additional mode for cursor positioning beyond the current manual method. When cursor tracking is enabled, changing a cursor's x-axis position results in the y-axis cursor tracking the corresponding y-axis (voltage, current, etc.) value. Additionally logic or scope channels can be displayed as binary or hex values.
Waveform math	f (g(t)) g(t): { 1, 2, 3, 4, 1-2, 1+2, 1x2, 3-4, 3+4, 3x4} f(t): { 1-2, 1+2, 1x2, 3-4, 3+4, 3x4, FFT(g(t)), differentiate d/dt g(t), integrate ∫ g(t) dt, square root √g(t) } Where 1,2,3,4 represent analog input channels 1, 2, 3, and 4 Note: Channels 3 and 4 only available on DSO5xx4A models
Measurement Statistics	Statistical data for enabled measurements such as mean, min, max, standard deviation and count

FFT

Points	Fixed at 1000 points
Source of FFT	1, 2, 1+2, 1-2, 1x2, DSO5xx4A: 3, 4, 3+4, 3-4, 3x4; where 1, 2, 3, 4 represent the analog channel inputs 1, 2, 3, and 4
Window	Rectangular, flattop, hanning, Blackman Herris
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	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	

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 voltage range	100-120 V, 50/60/400 Hz; 100-240V, 50/60 Hz auto ranging
Line frequency	50/60 Hz, 100-240 VAC; 440 Hz, 100-132 VAC
Power usage	120 W max

Environmental characteristics

Ambient temperature	Operating -10 °C to +55 °C; non-operating –40 °C to +70 °C
Humidity operating	95% RH at 40 °C for 24 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
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.