DSO1000A/B Series Portable Oscilloscopes

Data Sheet

Engineered to give you more scope than you thought you could afford

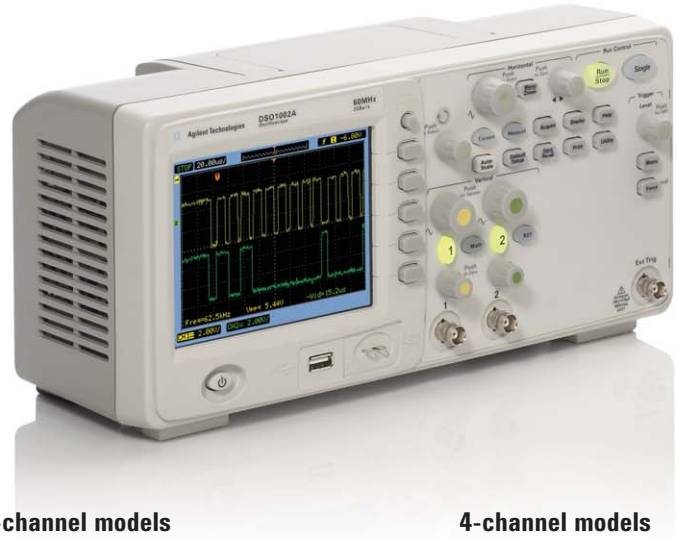
Anticipate ___Accelerate ___Achieve

Agilent Technologies

More scope than you thought you could afford

Weighing less than 7 pounds with a small footprint, the 1000 Series can go anywhere with ease.

Agilent's 1000 Series oscilloscopes deliver the performance and features you expect in a big scope – and the portability and low price you require in a small one. We've redefined the economy scope by giving you powerful signal capture and display, advanced measurement capabilities and accelerated productivity.



2-channel models	
DSO1052B	50 MHz
DSO1072B	70 MHz
DSO1102B	100 MHz
DSO1152B	150 MHz
DSO1022A	200 MHz

4-channel models	
DSO1004A	60 MHz
DSO1014A	100 MHz
DSO1024A	200 MHz

Whether your job is designing products in R&D, teaching the next generation in education, or testing in manufacturing or service, the new 1000 Series oscilloscopes can help get it done with confidence.

R&D

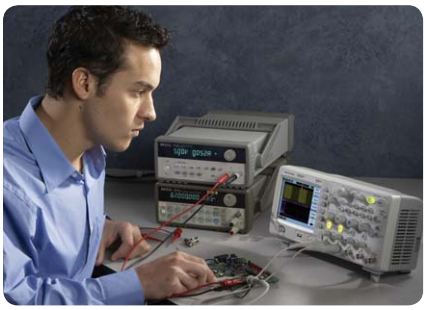


Figure 1. Features normally only found on much higher priced scopes equip the 1000 Series to be a powerful choice for R&D applications.

Education

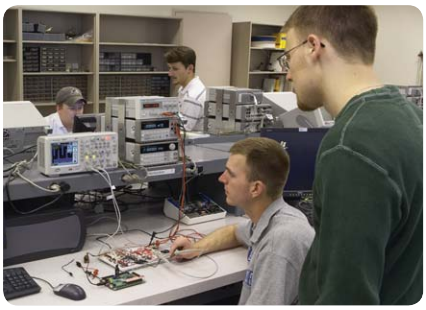


Figure 2. Economical prices make the 1000 Series ideal for teaching basic scientific and engineering measurements at lab stations in schools and universities.

Manufacturing

Figure 3. Standard go/no-go mask testing is just one of the reasons manufacturing and service test demand 1000 Series solutions.

For more information, visit www.agilent.com/find/DSO1000

Powerful signal capture and display

- **Wide viewing angle, bright color display**
- **Up to 20 kpts memory, up to 8x more than other scopes**
- **Up to 2 GSa/s sample rate**
- **Simultaneous viewing of main and zoomed waveforms**
- **25% more viewing area with menus switched off**

Figure 4. The bright, crisp display on the 1000 Series oscilloscope and its wide viewing angle let you quickly identify your signal activity.

Capture long time periods with high resolution

1000A Series models provide up to 20 kpts and 1000B models provide up to 16 kpts of acquisition memory standard. The scope will maintain high-resolutionacquisitions even at slower timebase settings so you can see the details on your signals.

See your signals more clearly

Every 1000 Series scope incorporates a bright, crisp LCD color display (300 cd/m^2). You can quickly view your signal from almost any angle. Unlike conventional scopes that always require menus to be on, the entire 5.7-inch diagonal screen is available for full waveform display as needed.

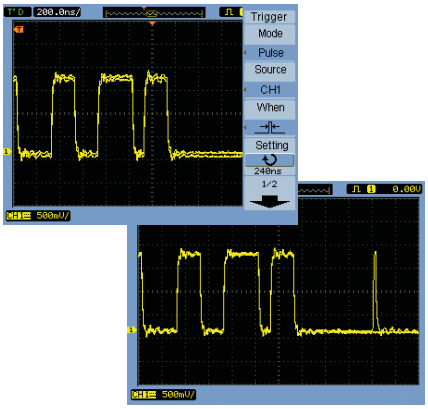


Figure 5. Turning off the menu gives almost 25% more viewing area for your signals.

Simultaneous viewing of main and zoomed waveforms

Dual display shows your entire signal and zoomed in waveform details at the same time.

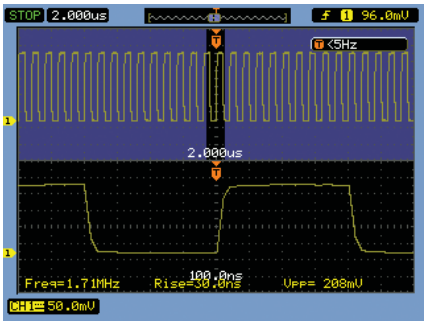


Figure 6. View a long record and the details of a zoom window simultaneously.

Advanced measurement capability

- **23 automatic measurements**
- **Waveform math including FFT**
- **Standard go/no-go mask testing**
- **Sequential acquisition of up to 1000 trigger events**
- **Selectable high-pass, low-pass, band-pass, and band-reject digital filters**

23 automatic measurements

All 1000 Series scopes come equipped with 23 automatic voltage, time and frequency measurements. Press the Measure key to bring up the three you use most often or display all single-channel measurements on the screen simultaneously.

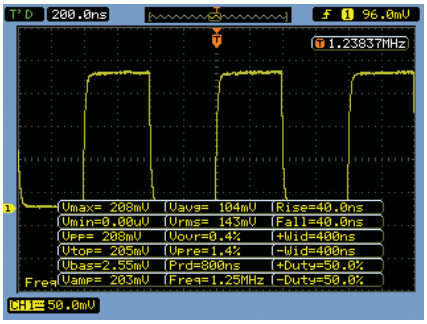


Figure 7. Display all single-channel measurements on screen simultaneously.

Sequence mode for easier debug

Record up to 1000 occurrences of a trigger event and then play them back to easily spot glitches or other anomalies for further examination. Store the waveforms to internal or external memory (USB flash drive).

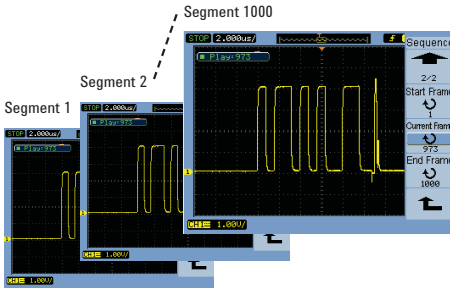


Figure 8. Use sequence mode to record up to 1000 triggers and review in playback mode for anomalies.

Digital filtering on waveforms

Apply a real-time digital filter of your choice to the input source waveform to eliminate unwanted frequencies from your display. Digital filtering selections include low-pass, high-pass, band-pass and band-reject filters. Frequency limits are selectable between 250 Hz and the full bandwidth of your oscilloscope.

Advanced triggering

Triggering options for the 1000 Series include edge, pulse width, composite video, pattern ("A" models only) and alternate channel trigger modes. These modes ensure that you can capture and view hard-to-find signal conditions.

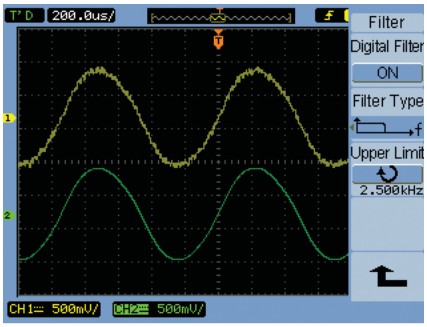


Figure 9. The Ch 1 waveform (Yellow) shows an unfiltered input and the Ch 2 waveform (Green) shows the same input signal with a low pass filter.

Remote programming (Only available on "A" models)

For remote instrument control over the built-in USB device port, utilize Agilent's I/O libraries with direct command control from Agilent VEE Pro, or National Instrument's I/O libraries and available instrument drivers for the 1000A Series scope in your application.
These NI certified drivers include Plug and Play for LabView and IVI for LabVIEW, LabWindows/CVI, and Measurement Studio for Visual Studio.

Accelerated productivity

- **Autoscale**
- **11-Language localization of user interface, front panel controls, and manuals**
- **Context-sensitive built-in help menus**
- **USB connectivity**
- **Free education student lab guide and professor slide set**

Make fast go/no-go decisions

Automatic pass/fail mask testing comes as a standard feature on all 1000 Series scopes. Acquire a "golden" waveform and define tolerance limits to create a test envelope. Create custom mask's based on XY tolerances and input those into the scope. Incoming signals will be compared to the allowable range and quickly flagged as pass or fail. This is ideal for manufacturing or service where you need to make decisions quickly.

Waveform math and FFT

Standard math functions include addition, subtraction or multiplication of any two input channels and Fast Fourier Transform (FFT) with four user-selectable windows (Rectangle, Hanning, Hamming and Blackman).

Multi-language interface

Operate the oscilloscope in the language most familiar to you. The built-in help system, graphical user interface, front panel overlays and user's manual are available in eleven languages. Choose from: English, Japanese, simplified Chinese, traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese, and Italian.

Autoscale

Quickly display any active signals and automatically set the vertical, horizontal and trigger controls for optimal viewing with the press of the autoscale button. (This feature can be disabled or enabled for education customers).

Connectivity

Built-in USB host and device ports and free IntuiLink software make documentation and PC connectivity easy. Store waveforms and setups to a USB flash drive, easily update scope firmware, document directly to a connected PC running Microsoft Word or Excel, and print to any PictBridge compatible printer.

Education Resource Kit

Agilent provides a variety of oscilloscope resource training tools to help your EE students come up-to-speed on what an oscilloscope is and how to use one. Downloadable resources include: EE student's oscilloscope lab guide and tutorial, Professor's Oscilloscope Fundamentals slide-set, probe loading experiment and oscilloscope application notes.

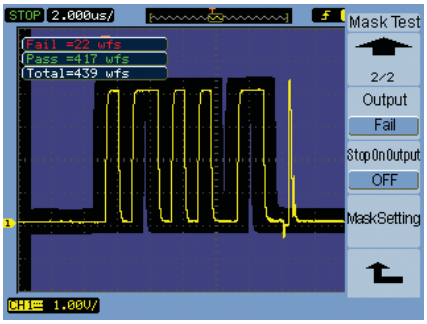


Figure 10. Mask testing provides a quick pass/fail comparison of an incoming signal to a test envelope you define.

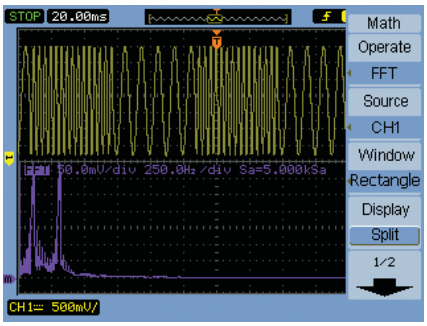


Figure 11. Built-in FFT enables easy spectral analysis on the time-domain signal.

Figure 12. Choose from 11 different languages for oscilloscope interface and help.

PictBridge

Agilent 1000A Series portable oscilloscopes:

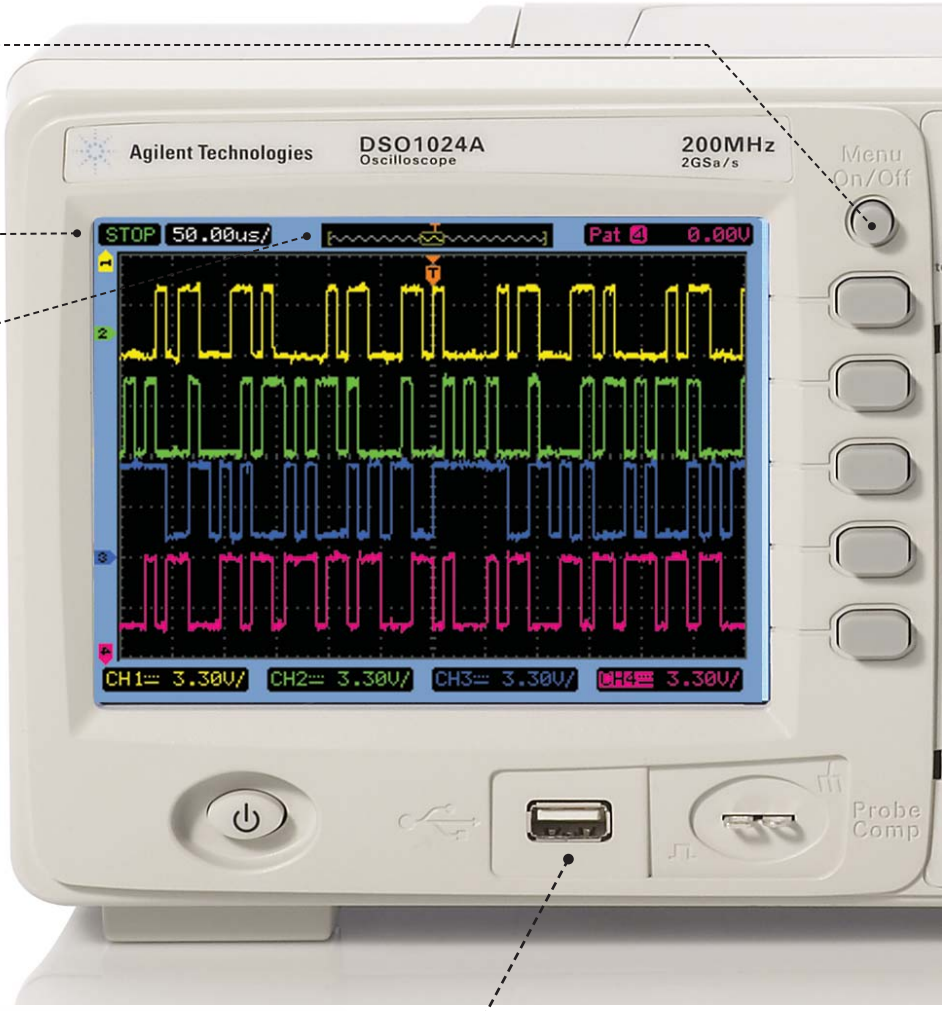
Engineered to give you more scope than you thought you could afford

Powerful Signal Capture and Display

Turn menu off for almost 25% more viewing area (or set to turn off automatically on timeout)

Bright and crisp 5.7-inch color LCD display with wide angle viewing

Acquisition memory bar shows full 20 kpts of memory and highlights portion displayed



Sturdy snap handle for easy carrying

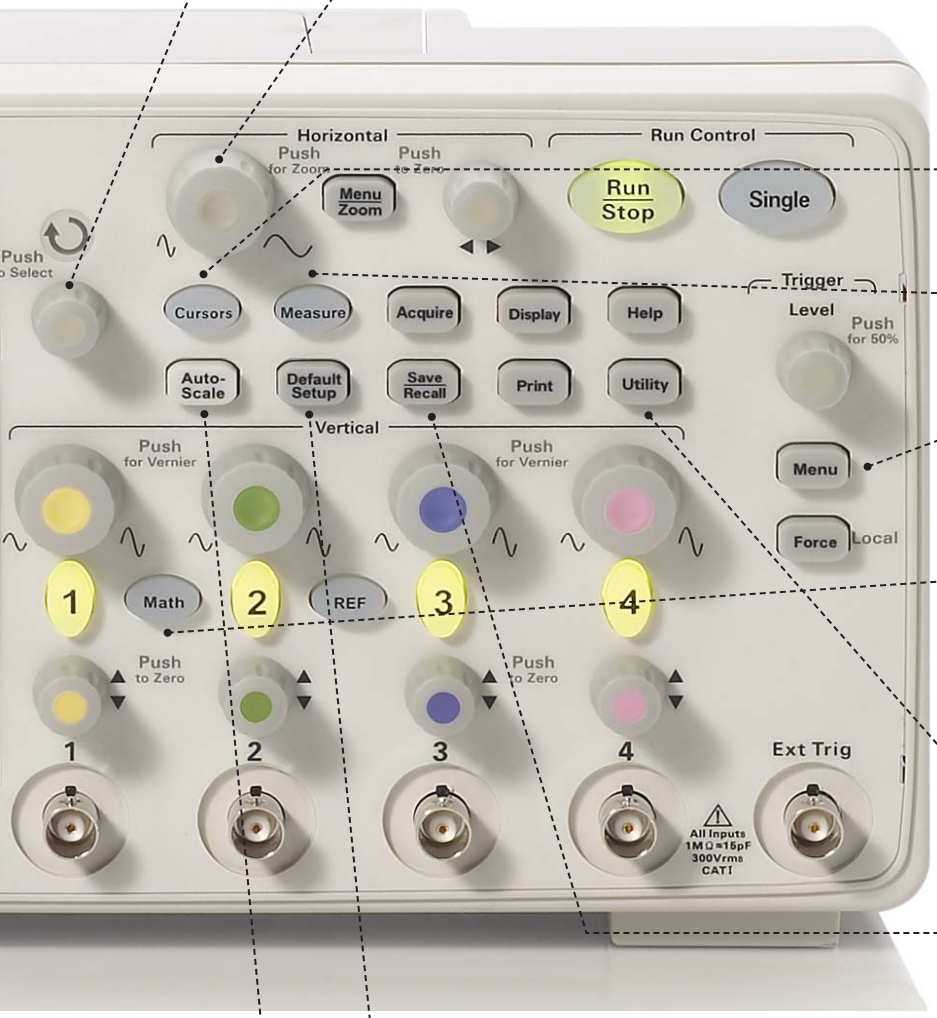
Secure with cable lock

Two USB host ports facilitate saving data to a USB flash drive and enable quick firmware updates

USB device port for USBTMC remote PC control also allows easy printing to all PictBridge compatible printers

Secure with a Kensington lock or looped cable

Advanced Measurement Capabilities



User-friendly menu facilitates access to advanced features like mask test, sequence mode, and digital filtering

Push-button knobs enhance usability, for example, the Main/Zoom knob zooms in on a particular section of waveform. Push to toggle zoom on and off.

Measurement cursors can be placed manually or automatically

23 automatic measurements with a "measure all" feature

Comprehensive trigger functions including edge, pulse width, pattern ("A" models only), composite video and alternate channel

Four math functions for quick display: +, -, x, FFT

Accelerated Productivity

Multi-language interface support and built-in context-sensitive help in 11 languages

Save up to 10 setups and waveform memories internally

Default setup quickly returns the scope to a known starting point

AutoScale to get your signal on screen fast with vertical, horizontal, and trigger controls automatically adjusted for best signal display

Agilent 1000B Series portable oscilloscopes:

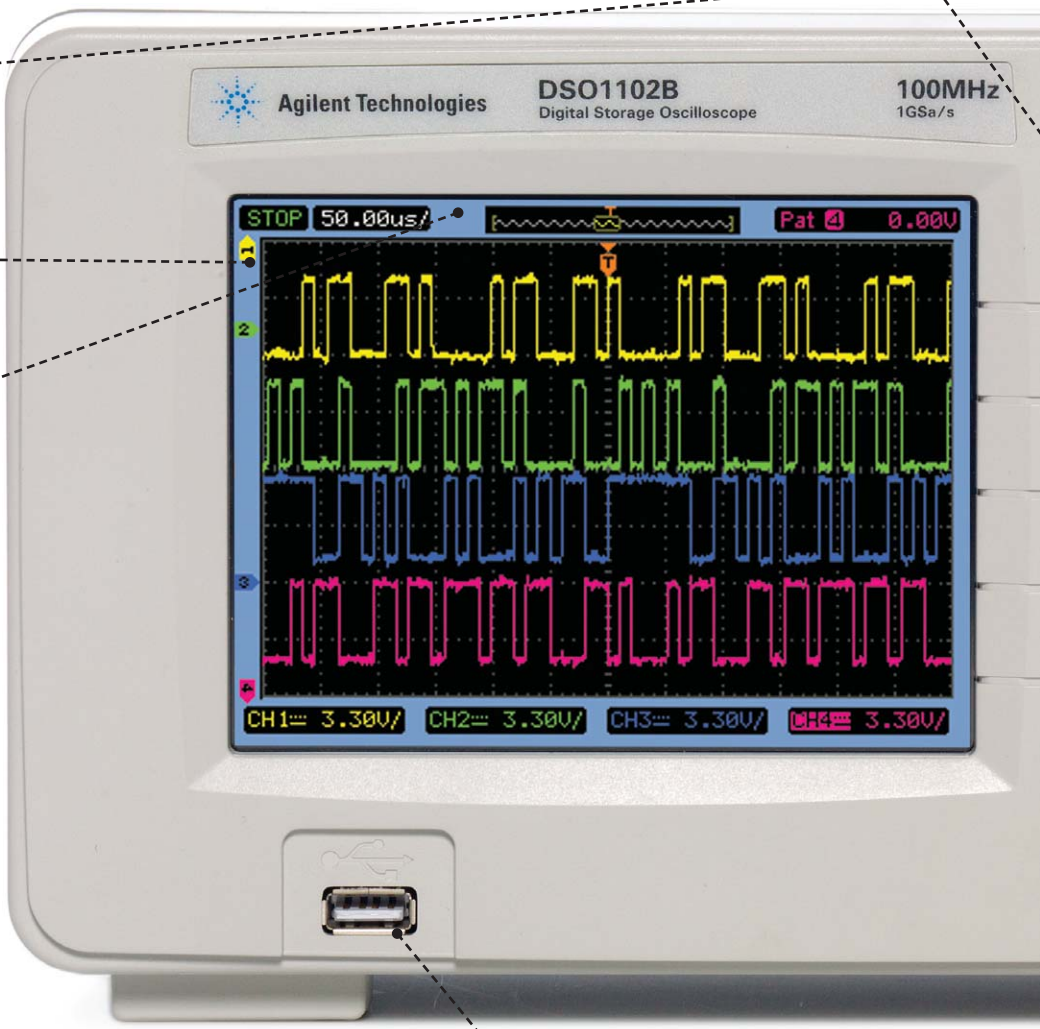
Engineered to give you more scope than you thought you could afford

Powerful Signal Capture and Display

Turn menu off for almost 25% more viewing area (or set to turn off automatically on timeout)

Bright and crisp 5.7-inch color LCD display with wide angle viewing

Acquisition memory bar shows full 16 kpts of memory and highlights portion displayed



Sturdy snap handle for easy carrying

USB host port facilitates saving data to a USB flash drive and enable quick firmware updates

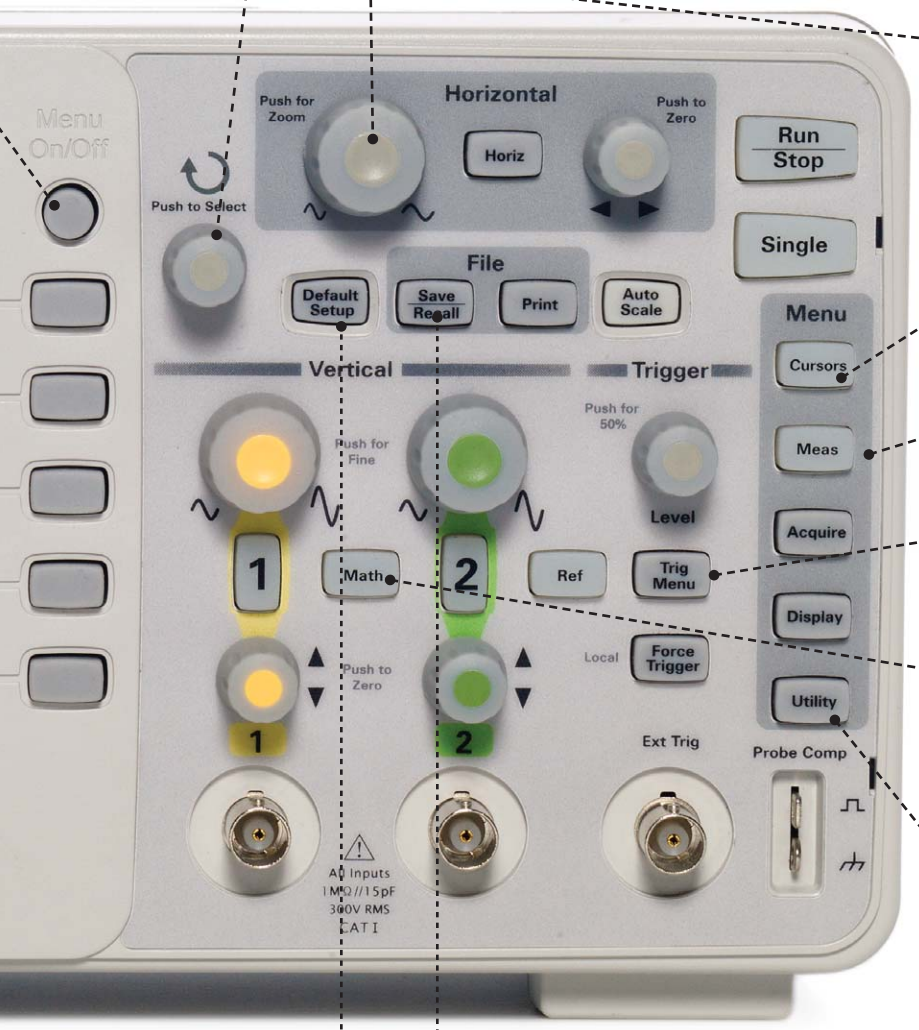
Secure with cable lock

Secure with a Kensington lock or looped cable

MaskTesting Pass/Fail BNC output

USB device port

Advanced Measurement Capabilities



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Performance characteristics

Bandwidth (-3dB)[1, 2]	DSO1052B:	DC to 50 MHz
	DSO1002A, DSO1004A:	DC to 60 MHz
	DSO1072B:	DC to 70 MHz
	DSO1102B, DSO1012A, DSO1014A:	DC to 100 MHz
	DSO1152B:	DC to 150 MHz
	DSO1022A, DSO1024A:	DC to 200 MHz
Real-time sample rate	2 GSa/sec half channel interleaved, 1 GSa/sec all channels (A models)	
	1 GSa/sec half channel interleaved, 500 MSa/sec all channela (B models)	
Memory depth	20 kpts half channel interleaved, 10 kpts all channels (A models)	
	16 kpts half channel interleaved, 8 kpts all channels (B models)	
Channels	DSO1052B, DSO1002A, DSO1072B, DSO1102B, DSO1012A, DSO1152B, DSO1022A : 2 channels	
	DSO1004A, DSO1014A, DSO1024A : 4 channels	
Vertical resolution	8 bits	
Vertical sensitivity (range)	2 mV/div to 10 V/div	
DC gain accuracy[1]	2 mV/div to 5 mV/div: ± 4.0% full scale (A and B models)	
	10 mV/div to 5 V/div: ± 3.0% full scale (A models only)	
	10 mV/div to 10 V/div: ± 3.0% full scale (B models only)	
Vertical zoom	Vertical expand	
Maximum input voltage	CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6kVpk	
Dynamic range	+6 divisions from center screen	
Time-base range	DSO1022A, DSO1024A:	1 nsec/div to 50 sec/div
	DSO1012A, DSO1014A, DSO1102B:	2 nsec/div to 50 sec/div
	DSO1002A, DSO1004A, DSO1052B, DSO1072B:	5 nsec/div to 50 sec/div
Selectable BW limit	20 MHz	
Horizontal modes	Main (Y-T), XY, delayed zoom and roll	
Input coupling	DC, AC and ground	
Input impedance	1 MΩ ±1% in parallel with 18 pF ± 3 pF (A models)	
	1 MΩ ±2% in parallel with 15 pF ± 3 pF (B models)	
Time scale accuracy[1]	± 50 ppm from 0 °C to 30 °C, (A models)	
	± 50 ppm + 2 ppm per °C from 30 °C to 45 °C + 5 ppm × (years since manufacture) (A models)	
	± 50 ppm over 1 ms (B models only)	

[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.

[2] 20 MHz (when vertical scale is set to < 5 mV)

Performance characteristics

Acquisition modes	
Normal	Displays sampled data directly to the screen in real time
Averaging	Selectable from 2, 4, 8,16, 32, 64, 128 or 256
Sequence	Selectable 1 to 1,000 acquisition frames can be recorded, played back and stored in the scope memory or external USB memory
Peak detect	Captures high-frequency glitches as narrow as 10 nsec (A models) and 20 nsec (B models) when viewing signals at slow sweep speeds
Roll	Waveform display rolls from right to left. minimum horizontal scale setting is 50 msec/div.
Interpolation	Sin (x)/x
Trigger coupling	AC, DC, LF reject, HF reject
Trigger modes	
Force	Triggers immediately when front panel button is pressed
Edge	Triggers on the positive and/or negative slope on any channel
Video	Triggers on NTSC, PAL or SECAM video signals
Pulse width	Triggers on pulse width greater than, equal to or less than a specific time limit, ranging from 20 nsec to 10 sec (A models) and 50ns to 10 sec (B models)
Alternate	Triggers on two non-synchronized active channels
Trigger source	Ch 1, 2, Ext, Ext/5, AC Line (edge only) (2 channel A models) Ch 1, 2, Ext, AC Line (edge only) (B Models) Ch 1, 2, 3, 4, Ext, Ext/5, AC Line (edge only) (4-channel A models)
Trigger sensitivity[1]	≥5 mV/div: 1 div from DC to 10 MHz, 1.5 div from 10 MHz to full bandwidth <5 mV/div: 1 div from DC to 10 MHz, 1.5 div from 10 MHz to 20 MHz
Cursor measurement	Manual, track waveform or automatic measurement selections. Manual and track waveform selections provide readout of Horizontal (X, ΔX) and Vertical (Y, ΔY)
Auto measurement	
Voltage	Maximum, minimum, peak-to-peak, top, base, amplitude, average, RMS, overshoot, preshoot
Time	Period, frequency, rise time, fall time, + width, - width, +duty cycle, -duty cycle, delay A-->B (rising edge), delay A-->B (falling edge), phase A-->B (rising edge) and phase A-->B (falling edge)
Counter	Integrated 6-digit frequency counter on any channel. Counts up to the scope's bandwidth
Display all measurements	Mode to display all single-channel automatic measurements simultaneously on the display
Math functions	A+B, A-B, AxB, FFT Source channel selection for A and B can be any combination of oscilloscope channels 1 and 2 (or 3 and 4 on 4 channel A models).
AutoScale	Finds and displays all active channels, sets edge trigger modes on highest numbered channels, sets vertical sensitivity on channels, time base to display ~2 periods. Requires minimum voltage >20 mVpp, 1% duty cycle and minimum frequency >50 Hz
Display	5.7 inch diagonal color QVGA TFT LCD display with 300 cd/m^2 backlight intensity
Display persistence	OFF, Infinite
Display types	Dots, Vectors
Waveform update rate	400 waveforms/sec (A models) 200 wfm/sec (B models)
Save/Recall internal	10 setups and 10 waveforms can be saved and recalled using internal non-volatile memory locations. 1 reference waveform can be saved and recalled using an internal volatile memory location for visual comparisons.
Save/Recall external	Setups: STP saved and recalled (Note: setups not transferable between A and B models) Waveforms: WFM saved and recalled, CSV saved Reference waveforms: REF saved and recalled for visual comparisons Images: 8-bit BMP, 24-bit BMP, PNG saved

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

I/O	
Standard ports	USB 2.0-compliant host port on front panel (A and B models) and rear panel (A models only) compatible with USB flash drives. USB 2.0 device port for PictBridge compatible printing (A and B models) and USBTMC remote PC control (A models only)
Max transfer rate	USB 2.0 full-speed up to 12 Mb/sec
USB flash drive compatibility	Most FAT formatted <2 GB or FAT32 formatted <32 GB flash drives
Printer compatibility	PictBridge-compliant printers via USB device port

General characteristics	
Physical size	12.78 inches W x 6.21 inches H x 5.08 inches D (32.46 cm W x 15.78 cm H x 12.92 cm D) (A models) 11.9 inches W x 6.06 inches H x 5.23 inches D (30.3 cm W X 15.4 cm H X 13.3 cm D) (B models)
Weight	Net: 3.03 kgs (6.68 lbs) Shipping: 4.87 kgs (10.74 lbs) (A models) Net: 2.4 kgs (5.3lbs) Shipping: 3.87 kgs (8.3lbs) (B models)
Probe comp output	Frequency ~1 kHz; Amplitude ~3 V
Scope lock	Secure with a Kensington lock or looped cable through notch built into chassis

Power requirements	
Line range	100-240 VAC, 50/60 Hz ± 10%
Power usage	~60 W max (A models) ~50 W max (B models)

Environmental characteristics (A models)	
Ambient temperature	Operating 0°C to +40°C; non-operating -20°C to +60°C
Humidity	Operating 90% RH at 40°C for 24 hr; non-operating 60% RH at 60°C for 24 hr
Altitude	Operating to 4,400 m (15,000 ft); non-operating to 15,000 m (49,213 ft)
Vibration	Agilent class GP and MIL-PRF-28800F; class 3 random
Shock	Agilent class GP and MIL-PRF-28800F
Pollution degree[2]	Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected
Indoor use	Rated for indoor use only

Environmental characteristics (B models)	
Ambient temperature	Operating 10°C to +40°C; non-operating -20°C to +60°C
Cooling Method	Fan force air flow
Humidity	Operating; +35°C or below ≤90 % relative humidity ; non-operating +40°C ≤60 % relative humidity
Altitude Operating	Operating to 3,000 m (9.842 ft); non-operating to 15,000 m (49,213 ft)
Vibration	Agilent class GP and M-PRF-28800F; class 3 random
Shock	Agilent class GP and M-PRF-28800F;
Pollution degree[2]	Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected
Regulatory	Safety - UL61010-1:2003, CSA22.2 No. 61010-1:2003, EN61010-1:2001, IEC61010-1:2001. EMI – Passes IEC 61236 -1:2004 / EN 61326-1:2006 Meets EU EMC Directive 2004/108/EC requirements
Indoor use	Rated for indoor use only

Ordering information

2 - Channel Models	Description
DSO1052B	50 MHz, 1 GSa/s, 16 kpts, 2-ch
DSO1072B	70 MHz, 1 GSa/s, 16 kpts, 2-ch
DSO1102B	100 MHz, 1 GSa/s, 16 kpts, 2-ch
DSO1152B	150 MHz, 1 GSa/s, 16 kpts, 2-ch
DSO1022A	200 MHz, 2 GSa/s, 20 kpts, 2-ch

4 - Channel Models	Description
DSO1004A	60 MHz, 2 GSa/s, 20 kpts, 4-ch
DSO1014A	100 MHz, 2 GSa/s, 20 kpts, 4-ch
DSO1024A	200 MHz, 2 GSa/s, 20 kpts, 4-ch

Soft carrying case for 1000 Series

Rackmount kit for 1000A Series only

Accessories included:

- Documentation CD
- Localized front panel overlay (if language option other than English is chosen)
- Power cord
- 10:1 passive probe for each input channel (2 or 4)
- Education student lab guide and professor slide set downloadable free from: www.agilent.com/find/1000edu

Optional accessories:

- N2738A – Soft carrying case for 1000A/B Series
- N2739A – Rackmount kit for 1000A Series (A models only)

Recommended probes

- N2862B – 150 MHz 10:1 passive probe (standard with 50, 60, 70, 100 MHz models)
- N2863B – 300 MHz 10:1 passive probe (standard with 150, 200 MHz models)
- 10070D – 20 MHz 1:1 passive probe
- 10076B – 250 MHz, 100:1, 4 kV passive probe
- N2771B – 50 MHz, 1000:1 30 kV passive probe
- N2791A – 25 MHz, 700V differential probe
- N2891A – 70 MHz, 7 kV differential probe
- 1146A – 100 kHz, 100A AC/DC current probe (requires 9V battery)

Software and Drivers

- IntuiLink toolbar connectivity software downloadable free from www.agilent.com/find/intuilink