Agilent Technologies
1000 Series Portable Oscilloscopes

Data Sheet

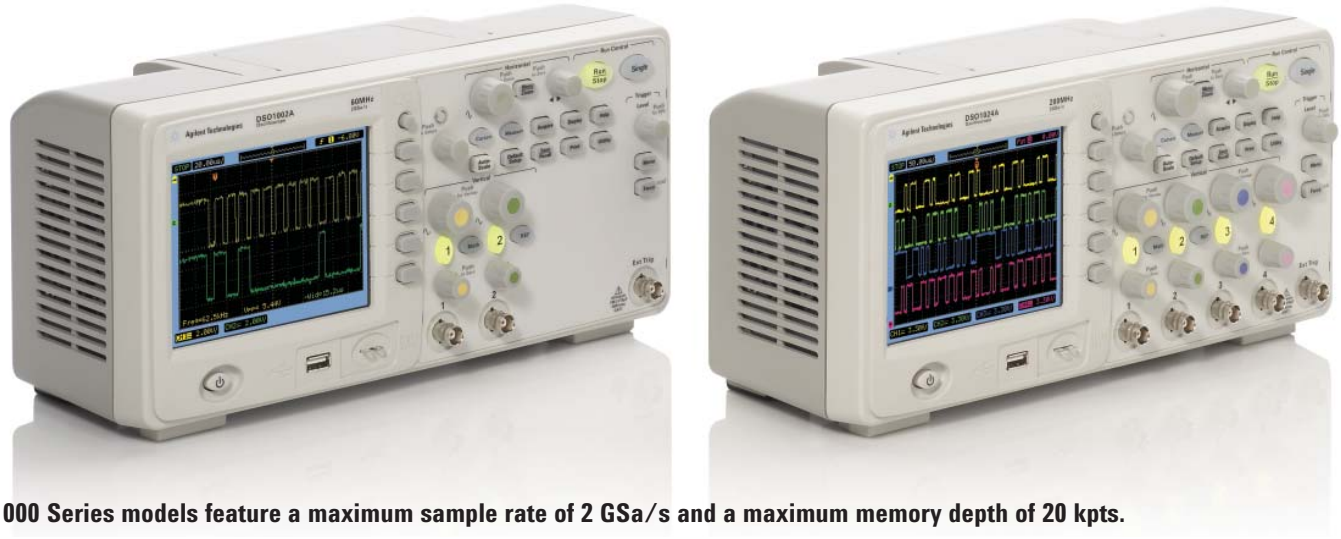
Engineered to give you more scope than you thought you could afford

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 new 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 more: more signal viewing, more capabilities and more productivity.



All 1000 Series models feature a maximum sample rate of 2 GSa/s and a maximum memory depth of 20 kpts.

2-channel model	
DSO1002A	60 MHz
DSO1012A	100 MHz
DSO1022A	200 MHz

4-channel model	
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/DSO1000A

More signal viewing

See more of your signal, more of the time:

- 20 kpts memory per channel, up to 8 times more than competitive scopes, means you can see more time and more detail on your signal
- A 5.7-inch diagonal color QVGA TFT LCD gives you a noticeably brighter and crisper waveform display
- A wider viewing angle lets you see the display even when you're not right in front of the unit
- True zoom mode means you can see the big picture and the details at the same time
- Optionally switch off the menu display for almost 25% more viewing area

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

All 1000 Series models provide up to 20 kpts per channel of convenient acquisition memory standard. The scope will maintain high-resolution acquisitions 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 waveform display as needed.

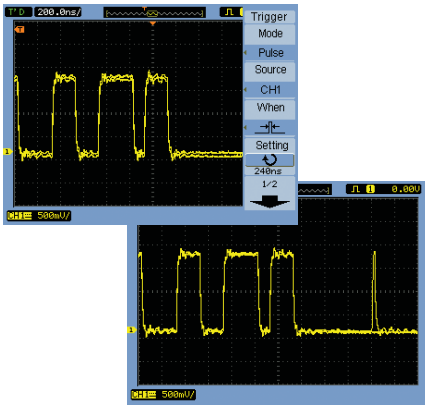


Figure 5. Turning off the menu gives almost 25% more viewing area for your signals.

True Zoom mode for signal details and context

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

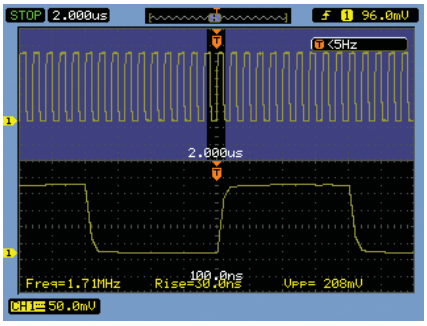


Figure 6. With True Zoom mode you can view a long record and the details of a zoom window simultaneously.

More capabilities

Feel like you're using a much higher-priced scope:

- 23 automatic measurements give you quick access to powerful functions
- Unique to its class, sequence mode allows easy debug with waveform recording, playback and storage
- Selectable band pass filtering eliminates unwanted signals
- Advanced triggering makes it simple to capture and view elusive signals

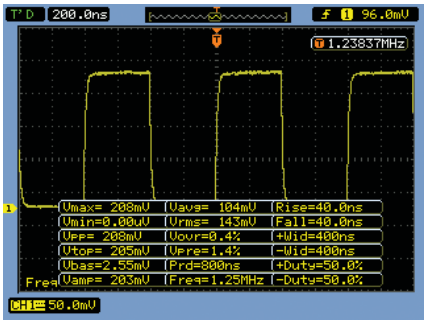


Figure 7. Display all single-channel measurements on screen simultaneously.

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.

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).

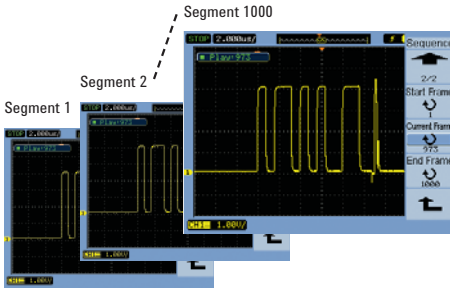


Figure 8. Use sequence mode to record up to 1000 triggers and review in playback mode for anomalies.

Digital filtering on waveforms

Apply a real-time digital filter of your choice to the 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 and alternate channel trigger modes. These modes ensure that you can capture and view hard-to-find signal conditions.

Remote programming

For remote instrument control over the built-in USB interface, utilize Agilent's I/O library or National Instrument's instrument drivers for the 1000 Series scope in your application. The drivers take full advantage of industry-accepted standards and are compatible with many application development environments, such as Agilent VEE Pro, National Instrument's LabView and LabWindows/CVI.

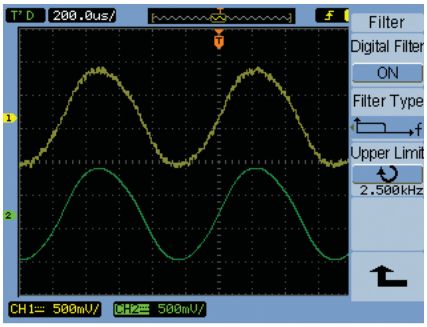


Figure 9. Apply a low-pass digital filter to transform the noisy waveform on channel 1 (yellow) into the clean waveform on channel 2 (green).

More productivity

Master the scope and get more answers in less time:

- Go/no-go mask testing automatically detects waveforms that deviate from the standard you set
- Waveform math and FFT functions give you information instantly
- Graphical user interface, built-in help system, front panel overlay, and user's manuals are available in your choice of 11 languages
- Autoscale puts your signals on screen with the touch of a button
- Built-in USB host and device ports, plus free IntuiLink software support PC connectivity and documentation
- Store setups and waveforms in internal memory or on an external USB flash drive
- Standard 3 year warranty means your scope will be available when you need it.

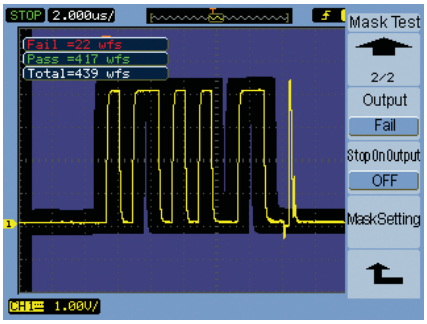


Figure 10. Mask testing provides a quick pass/fail comparison of an incoming signal to a test envelope you define.

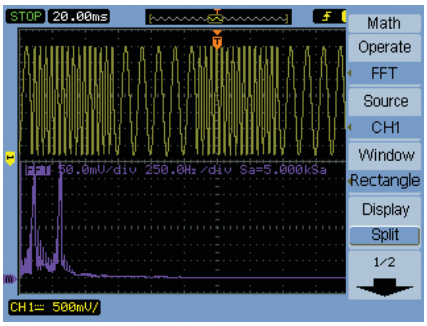


Figure 11. Built-in FFT enables easy spectral analysis on the time-domain signal.

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

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. 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, optional 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 and print to any PictBridge compatible printer.

PictBridge

Agilent 1000 Series portable oscilloscopes:

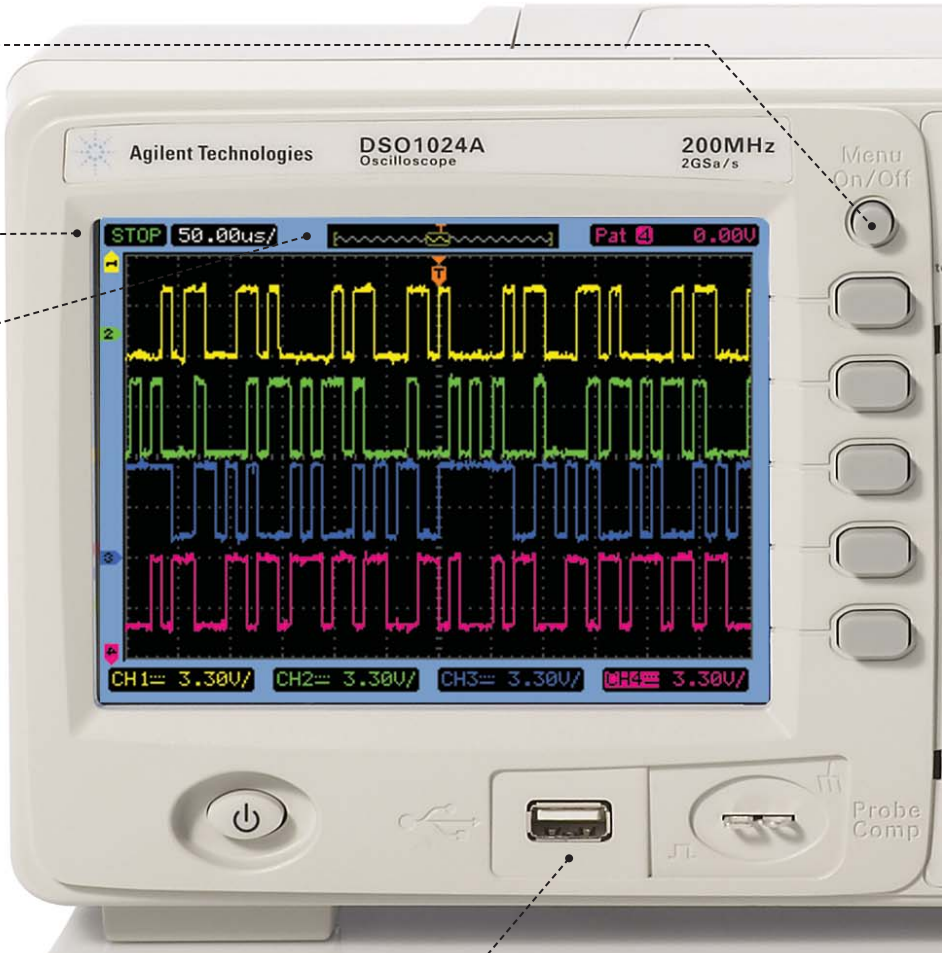
Engineered to give you more scope than you thought you could afford

More signal viewing

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 in zoom mode



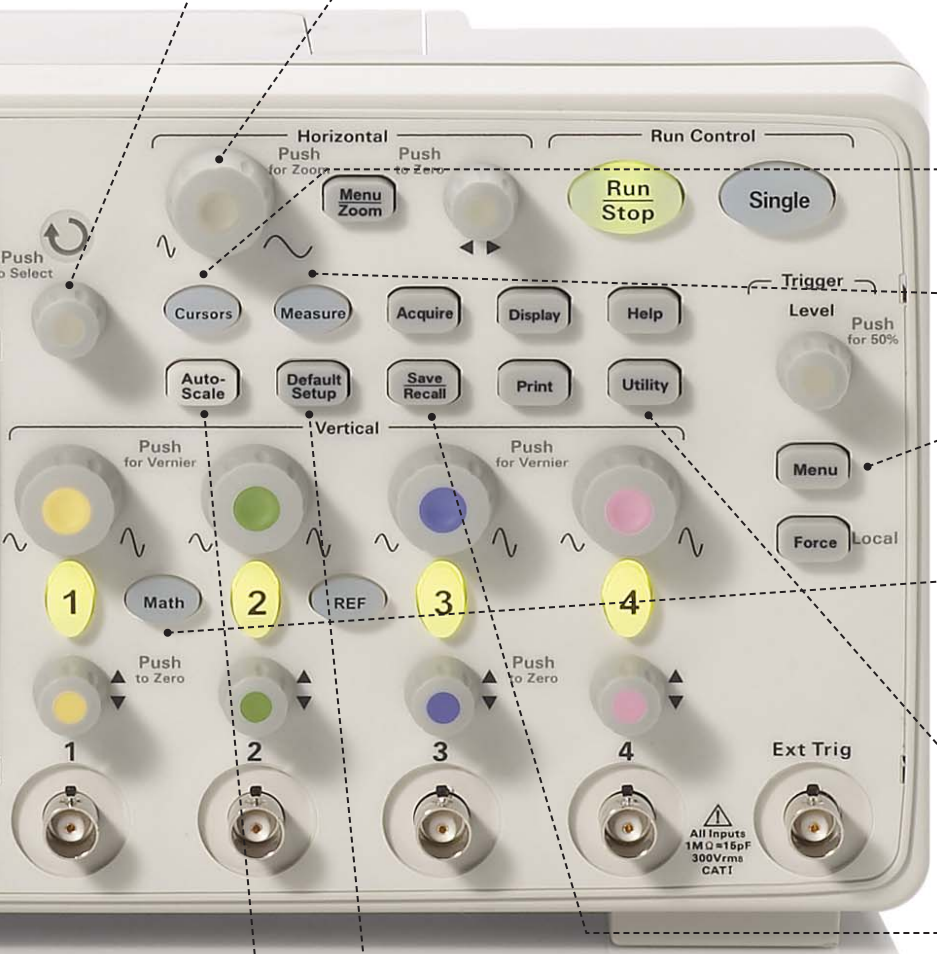
Sturdy snap handle for easy carrying

Two USB host ports (one on front and one on rear) facilitate saving data to a USB flash drive and enable quick firmware updates

Secure with a Kensington lock or looped cable

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

More 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, composite video and alternate channel

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

More productivity

Multi-language interface support and online help for 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

Performance characteristics

Bandwidth (-3dB)[1, 2]	DSO1002A, DSO1004A : DC to 60 MHz DSO1012A, DSO1014A : DC to 100 MHz DSO1022A, DSO1024A : DC to 200 MHz
Real-time sample rate	2 GSa/sec half channel[3], 1 GSa/sec each channel
Memory depth	20 kpts half channel[3], 10 kpts each channel
Channels	DSO1002A, DSO1012A, DSO1022A : 2 channels DSO1004A, DSO1014A, DSO1024A : 4 channels
Vertical resolution	8 bits
Vertical range	2 mV/div to 10 V/div
DC gain accuracy[1]	2 mV/div to 5 mV/div: ± 4.0% full scale 10 mV/div to 5 mV/div: ± 3.0% full scale
Vertical zoom	Vertical expand
Maximum input voltage	CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6kVpk
Dynamic range	±6 div
Time-base range	DSO102xA: 1 nsec/div to 50 sec/div DSO101xA : 2 nsec/div to 50 sec/div DSO100xA : 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
Time scale accuracy[1]	± 50 ppm from 0 °C to 30 °C, ± 50 ppm + 2 ppm per °C from 30 °C to 45 °C + 5 ppm × (years since manufacture)

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)

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

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 when viewing signals at slow sweep speeds (slower than 5 μsec/div)
Roll	Waveform display rolls from left to right. Minimum horizontal scale setting is 50 msec/div.
Interpolation	Sinx/x
Trigger coupling	AC, DC, LF reject
Trigger modes	
Force	Triggers immediately when front panel button is pressed
Edge	Triggers on the positive 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
Alternate	Triggers on two non-synchronized active channels
Trigger source	2-channel models: Ch 1, 2, Ext, Ext/5, AC Line (edge only) 4-channel models: Ch 1, 2, 3, 4, Ext, Ext/5, AC Line (edge only)
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, 1/ΔY) 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 (200 MHz max)
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 DSO1xx4A).
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
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 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 ports on front and rear panel compatible with full-speed USB flash drives, USB device port for USBTMC remote PC control
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" W x 6.21" H x 5.08" D (32.46 cm W x 15.78 cm H x 12.92 cm D)
Weight	Net: 3.03 kgs (6.68 lbs) Shipping: 4.87 kgs (10.74 lbs)
Probe comp output	Frequency ~1 kHz; Amplitude ~3 V
Kensington lock	Connection on rear panel for security – a notch built into the chassis for cable loop locking mechanism

Power requirements

Line range	100-240 VAC, 50/60 Hz ± 10%
Power usage	~60 W max

Environmental characteristics

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