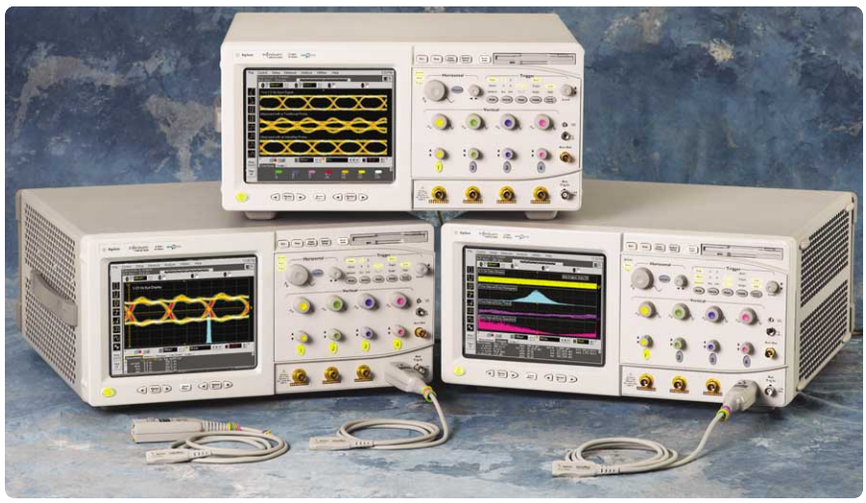
Infiniium 54850 Series Oscilloscopes
InfiniiMax 1130 Series Probes

6 GHz, 20 GSa/s Differential and Single-Ended Oscilloscope Measurement System

Data Sheet

- 6, 4 and 2.5 GHz bandwidth real-time oscilloscopes with 20 GSa/s sample rate on all four channels simultaneously
- Up to 1 Mpts MegaZoom deep memory at all sample rates and 32 Mpts MegaZoom deep memory at 2 GSa/s and slower sample rates
- Electronic attenuators eliminate the reliability and repeatability concerns associated with mechanical attenuator relays
- Trigger jitter 1.0 ps rms
- Easy-to-use, easy-to-understand jitter analysis option
- InfiniiMax 7 GHz, 5 GHz, and 3.5 GHz probing systems
- Each InfiniiMax probe amplifier supports both differential and single-ended measurements for a more cost-effective solution
- Unrivaled InfiniiMax probing accessories support browsing, solder-in, and socket use models at the maximum performance available
- Award-winning user interface based on Microsoft Windows® XP Pro supports CD-RW, dual-monitor, and third-party software packages



The highest-performance end-to-end measurement system available

If you are an experienced scope user, you know that your measurements are only as good as your probing system. And as bandwidth increases, it's increasingly important to ask the question: am I measuring my circuit or my scope probe? Nothing is more frustrating than chasing down an apparent design problem, only to find that it was caused by an inferior scope probe.

Together, the newest Agilent Infiniium scopes and the breakthrough Agilent InfiniiMax high-performance probing systems offer an end-to-end measurement system with unmatched performance, accuracy, and connectivity. The result is measurements you can trust and better insight into your circuit behavior.

Infiniium: Award-winning scopes

Infiniium has received eight industry awards to date, including EDN's "Innovation of the Year" award (twice) and T&M World's "Best in Test." Agilent is committed to breaking new ground and providing tools that bring unique value to our customers.

Agilent Technologies

Benefits

54850 Series Infiniium oscilloscopes

Model	Bandwidth	Channels	Sample rate per channel	Standard acquisition memory	Optional acquisition memory
54855A	6 GHz	4	20 GSa/s	262 kpts per channel	1 Mpts per channel up to 20 GSa/s 32 Mpts per channel ≤ 2 GSa/s
54854A	4 GHz	4	20 GSa/s	262 kpts per channel	1 Mpts per channel up to 20 GSa/s 32 Mpts per channel ≤ 2 GSa/s
54853A	2.5 GHz	4	20 GSa/s	262 kpts per channel	1 Mpts per channel up to 20 GSa/s 32 Mpts per channel ≤ 2 GSa/s

1130 Series InfiniiMax probe amplifier

Model	Bandwidth	Description
1134A	7 GHz	Probe amplifier – order one or both connectivity kits per probe amplifier
1132A	5 GHz	Probe amplifier – order one or both connectivity kits per probe amplifier
1131A	3.5 GHz	Probe amplifier – order one or both connectivity kits per probe amplifier
E2669A differential kit		Each connectivity kit includes browser, solder-in and socket probe-heads
E2668A single-ended kit		Each connectivity kit includes browser, solder-in and socket probe-heads
InfiniiMax probe amplifier specifications: Dynamic range = ± 2.5V, DC offset range = ±12V, maximum voltage = ± 40V		

1130 Series InfiniiMax probe system specifications (probe amplifier with probe head)

Probe head	Model number	Differential measurement (BW, input C, input R)	Single-ended measurement (BW, input C, input R)
Differential solder-in	E2677A	7 GHz, 0.27 pF, 50 kΩ	7 GHz, 0.44 pF, 25 kΩ
Differential socket	E2678A	7 GHz, 0.34 pF, 50 kΩ	7 GHz, 0.56 pF, 25 kΩ
Differential browser	E2675A	6 GHz, 0.32 pF, 50 kΩ	6 GHz, 0.57 pF, 25 kΩ
Single-ended solder-in	E2679A	N/A	5.2 GHz, 0.50 pF, 25 kΩ
Single-ended browser	E2676A	N/A	5.5 GHz, 0.67 pF, 25 kΩ

Benefits (continued)

How much bandwidth and sample rate do I need?

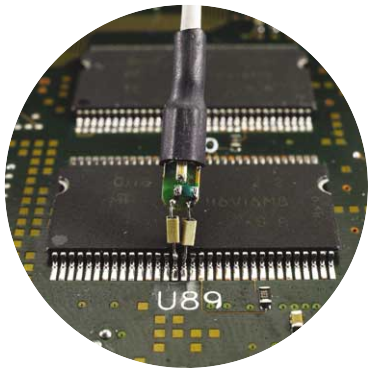
Bandwidth required to measure risetime with 3% error	Example: 100 ps rise time (20-80%)
Maximum signal frequency content = 0.4/rise time (20-80%)	Maximum signal frequency = 4 GHz
Scope bandwidth required = 1.4 x maximum frequency	Required scope bandwidth = 5.6 GHz
Minimum scope sample rate required = 2.5 x bandwidth	Required scope sample rate = 14 GSa/s

Key trends in the electronics market

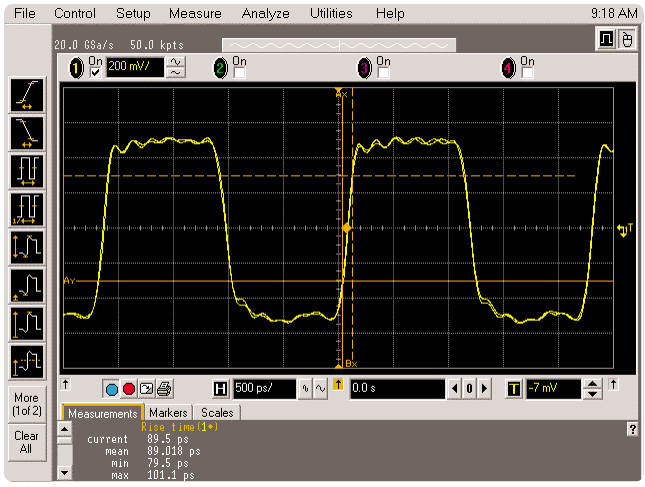
- Technologies with dramatically increased clock speeds and edge rates have emerged.
- Very fast serial differential buses are being used to save board space, reduce power and provide better noise immunity.
- Densely packed circuit boards, often with stacked daughter boards, increase the need to probe in very hard-to-reach places.

Key benefits of the 54850 and InfiniiMax Series

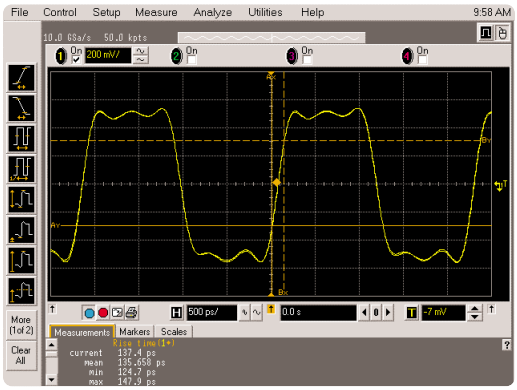
- Up to 6 GHz bandwidth can track even the fastest signal speeds.
- A sample rate of 20 GSa/s on all four channels can measure high-speed differential buses correlated with other signals.
- The innovative InfiniiMax probing system supports even the most demanding mechanical access requirements without sacrificing performance.



20 GSa/s Sample Rate on All Channels at Once!



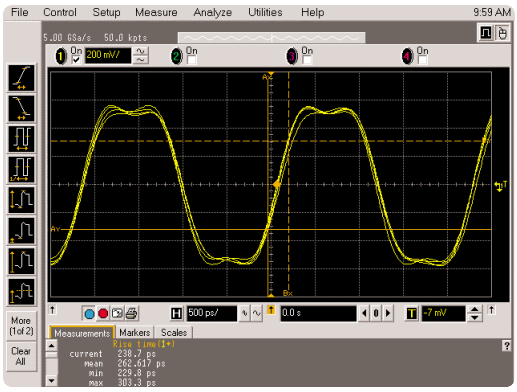
20 GSa/s provides accurate measurement.



10 GSa/s is not enough.

Sample rate	Measured rise time
20 GSa/s	89 psec
10 GSa/s	137 psec
5 GSa/s	238 psec

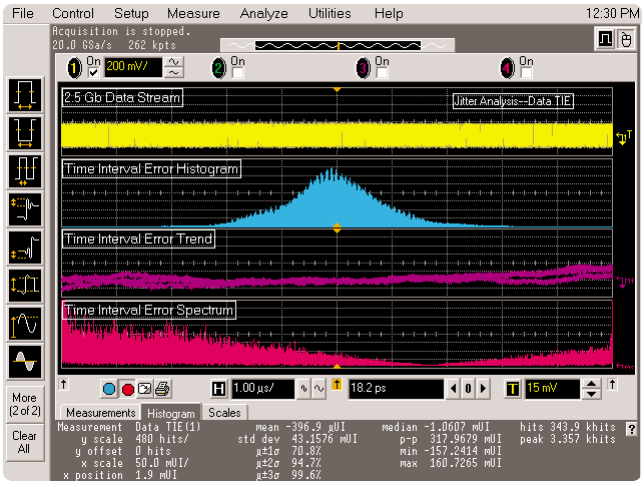
Example for 90 ps rise time input



5 GSa/s is not enough.

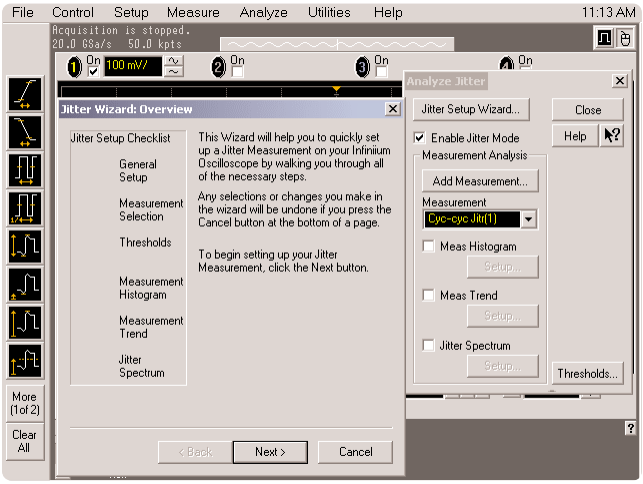
- The full real-time bandwidth of up to 6 GHz is supported on every channel by the 20 GSa/s sample rate.
- This industry-leading sample rate produces more accurate and repeatable measurements, avoiding measurement error and signal aliasing due to under sampling, as shown above.
- The combination of 6 GHz bandwidth and 20 GSa/s sample rate on all channels makes the 54850 series ideal for designs that include: PCI-Express, Serial ATA, Rapid IO, HyperTransport, InfiniBand, or Gigabit Ethernet.

Application Software



Easy-to-understand, easy-to-use jitter analysis

Includes the following key measurements: cycle-to-cycle jitter, n-cycle jitter, period jitter, time interval error, setup and hold time, measurement histograms, measurement trending, and jitter spectrum.



The jitter setup wizard

Guides you through the setup of the jitter measurement, describes what the measurement does and tells you when to use it.

Infiniium: "It's like someone who sits down and actually uses a scope designed this one."
Steve Montgomery, Director of Engineering, Linx Technologies

20 GSa/s sample rate on all four channels significantly reduces the chances of aliasing, increases measurement accuracy, and delivers the full real-time bandwidth of the oscilloscope on every channel simultaneously.

Get fast answers to your questions with the built-in information system. Infiniium's task-oriented Setup Guide provides step-by-step instructions for several advanced measurements and procedures.

See your signal more clearly with a large (8.4-inch) high-resolution color display. Infiniium's bright TFT display with anti-glare coating lets you see the details of your signal from all angles.

10 GB hard drive and 3.5" 1.44 MB floppy drive make it easy to save setup files, data files, screen shots, etc.

Identify anomalies easily with color-graded persistence, a colorful visual representation of waveform distribution.

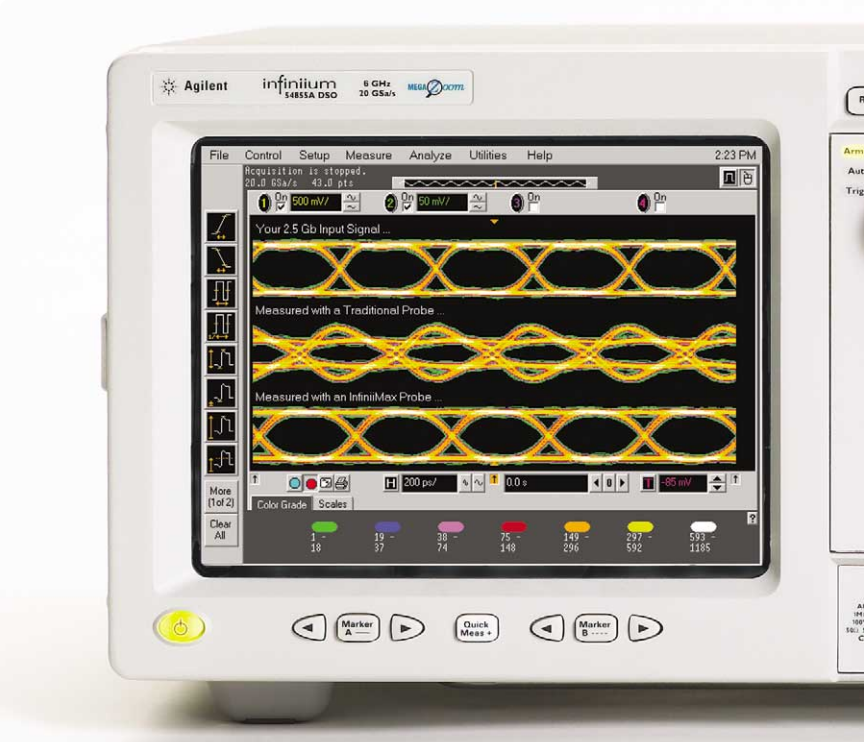
Label waveforms and add notes to your screen captures — Infiniium's keyboard makes it easy.

Drag and drop markers with your mouse or use the arrow keys.

Easy access to advanced features like math functions and FFTs, is provided by the Windows-based graphical user interface. This GUI also gives you unique capabilities like drag-and-drop measurements and zooming, and offers a graphical equivalent to all front panel controls.

Remote access with Web-enabled connectivity, e-mail on trigger, and GPIB over LAN allows you to access your scope from remote locations.

32 Mpts acquisition memory at 2 GSa/s or slower sample rates allows you to capture long time windows at high resolution – such as identifying glitches due to a power supply start-up from reset.



QuickMeas+ key gives you any five automated measurements with a push of a button. You can also configure this key to print/save screen shots, save waveforms, or load a favorite setup.

Zoom and search with instant response. Zoom into your signal using the horizontal scale knob and search through your waveform with the position knob. MegaZoom technology allows you to find your area of interest quickly and easily – even with 32 Mpts waveforms.

Hands-free operation with the Infiniium VoiceControl option. Just speak into the microphone to operate front-panel controls.

Built-in CD-RW drive on rear panel allows you to update the system software conveniently and can be used to archive large data files and install third-party application packages.

Install third-party software packages such as Excel, LabView, Agilent Vee, MATLAB®, anti-virus software, and more to perform customized processing and automation of your oscilloscope or to make the scope compliant to the network environment of your company.

An external monitor allows you to run third-party applications on a large, high-resolution display while using the scope's built-in monitor for high-speed waveform display.

Windows® XP Pro operating system.

A familiar interface makes simple tasks simple. Infiniium's analog-like front panel has a full set of controls color coded to the waveforms and measurements, making simple tasks simple.

Three-year standard warranty and a variety of Agilent support options protect your investment for the long term.

A new 18 GHz, BNC-compatible connector provides a high signal fidelity connection to Agilent active probes, SMA adapters, and standard BNCs.

AutoProbe interface completely configures your scope for use with the InfiniiMax probing system and previous generation Agilent active probes.

10/100 Mbps LAN interface lets you easily print waveforms on networked printers, save your results on your office PC, share information with others, and control the scope over the Web.

InfiniiMax: The Worlds Best High-Speed Probing System

InfiniiMax offers you the highest performance available for measuring differential and single-ended signals, with flexible connectivity solutions for today's high-density ICs and circuit boards.

Variable spacing via the tab on the side of the differential browser allows the probe tips to be adjusted for different circuit geometries from 0.25-5.80 mm (10-230 mills).

Z-axis compliance allows both probe tips of the differential browser to spring, supporting various probing angles and target system characteristics.

Ergonomic sleeves make hand browsing comfortable even over long periods of time.

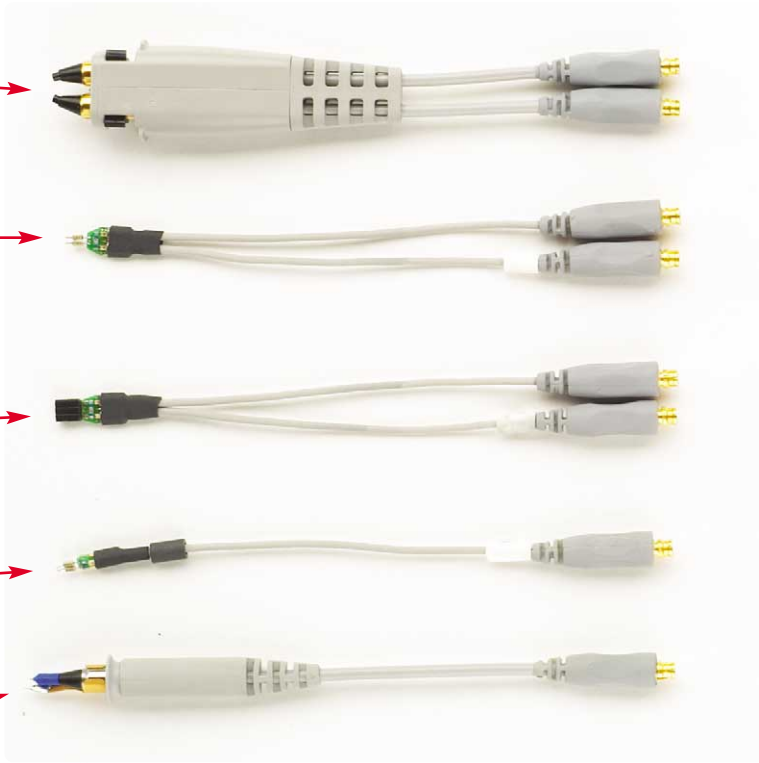
Differential browser is the best choice for general-purpose trouble-shooting of differential or single-ended signals up to 6 GHz bandwidth.

Solder-in differential probe head provides 7 GHz bandwidth and can be attached to very small geometry circuits for measuring both single-ended and differential signals.

The differential socket probe head can be used to measure either differential or single-ended signals to 7 GHz bandwidth.

Extremely small single-ended, solder-in probe heads support 5.2 GHz measurements of even the hardest-to-reach single-ended signals.

Single-ended browser is the best choice for general purpose probing of single-ended signals when small size of the probe head is the primary consideration. Bandwidths up to 5.5 GHz can be obtained in this configuration.



A flat frequency response over the entire probe bandwidth eliminates the distortion and frequency-dependent loading effects that are present in probes that have an in-band resonance.

The 54006A 7.5 GHz resistive divider probe is available as a low-cost probing alternative for casual inspection of signals.

Supplied axial lead resistors, when trimmed to the appropriate length, allow user to trade off bandwidth and reach. Values and trimming templates are supplied for measurements from 2.8 GHz to 7 GHz.

The damped-wire accessory provides maximum connection reach and flexibility without introducing an in-band resonance for signals up to 1.2 GHz bandwidth.

InfiniiMax probes have fully characterized performance for all of their various probe heads. This includes:

- Swept frequency response plot
- Common mode rejection vs. frequency plot
- Impedance vs. frequency plot
- Time-domain probe loading plot
- Time-domain probe tracking plot

See page 16 for an example.

One-year standard warranty on active probes and a variety of Agilent support options to choose from.

Controlled impedance transmission lines in every probe head deliver full performance versus the performance limitations produced by traditional wire accessories.

Probe interface software allows you to save the calibration information for up to 10 different probe heads per channel and will automatically retrieve calibration data for a probe amplifier as it is attached to the scope.

InfiniiMax is the world's best high-speed probe

- InfiniiMax's bandwidth is greater than the scope's bandwidth.
- Each use model (browsing, solder-in, socket) is optimized for maximum performance.
- Supports both differential and single-ended measurements with a single probe amplifier.

High-input impedance active probes minimize loading, support differential measurements and DC offset, and can compensate for cable loss.

Infiniium 54850 Series Performance Characteristics

Vertical

Input channels	4		
Analog bandwidth (–3 dB)*	54855A: 6 GHz	54854A: 4 GHz	54853A: 2.5 GHz
Rise time (10% to 90%)	54855A: 70 ps	54854A: 105 ps	54853A: 155 ps
Input impedance	50 Ω ± 2.5%		
Sensitivity[1]	1 mV/div to 1 V/div		
Input coupling	DC		
Vertical resolution[2]	8 bits, ≥12 bits with averaging		
Channel to channel isolation (any two channels with equal V/div settings)	DC to 100 MHz: 40 dB 100 MHz to 1 GHz: 28 dB > 1 GHz to 6 GHz: 24dB		
DC gain accuracy*[1]	± 1% of full scale at full resolution channel scale		
Maximum input voltage*	5 Vrms, CAT I		
Offset range	> ± 12 div or ± 4 Volts, whichever is smallest		
Offset accuracy*[1]	± (2% of channel offset + 1% of full scale)		
Dynamic range	± 8 div from center screen or ± 4 Volts, whichever is smallest		
DC voltage measurement accuracy*[1]			
Dual cursor	± [(DC gain accuracy)+(resolution)]		
Single cursor	± [(DC gain accuracy)+(offset accuracy)+(resolution/2)]		

Horizontal

Main sweep time scale range	54855A and 54854A: 5 ps/div to 20 s/div		54853A: 10 ps/div to 20 s/div
Main sweep time delay range	–200 s to 200 s		
Delayed sweep time scale range	1 ps/div to current main time scale setting		
Channel deskew range	–50 µs to 150 µs		
Time scale accuracy[3]	± 1 ppm pk		
Delta-time measurement accuracy[6,7]	≥ 256 Averages: 70 fs rms, ± [(0.5 ps) + (1 x 10^{-6}* |reading|)] peak Averaging disabled: 2.0 ps rms, ± [(7.0 ps) + (1 x 10^{-6}* |reading|)] peak		
Jitter measurement floor[6]			
Time interval error	54855A: 1.4 ps rms	54854A: 1.8 ps rms	54853A: 2.0 ps rms
Period jitter	54855A: 2.0 ps rms	54854A: 2.5 ps rms	54853A: 3.0 ps rms
N-cycle, cycle-cycle jitter	54855A: 3.0 ps rms	54854A: 3.8 ps rms	54853A: 4.5 ps rms

Infiniium 54850 Series Performance Characteristics (continued)

Acquisition

Real time sample rate per channel	20 GSa/s
Memory depth per channel	
Standard	262,144 at all sample rates
Option 001	1,025,000 at all sample rates 32,800,000 ≤ 2 GSa/s sample rate
Sampling modes	
Real time	Successive single-shot acquisitions
Real time with averaging	Selectable from 2 to 4096
Real time with peak detect	2 GSa/s peak detect, for less than 2 GSa/s sample rates (option 001 only)
Filters	
Sin(x)/x Interpolation	On/off selectable FIR digital filter. Digital signal processing adds points between acquired data points to enhance measurement accuracy and waveform display quality.

Trigger

Sensitivity[1]	
Internal Low[1]	54855A: 0.5 div p-p 0 to 2 GHz, 1.0 div p-p 2 to 4 GHz, < 2.5 div @ 5 GHz 54854A: 0.5 div p-p 0 to 2 GHz, 1.0 div p-p 2 to 4 GHz 54853A: 0.5 div p-p 0 to 2 GHz, 1.0 div p-p 2 to 2.5 GHz
Internal High[1]	54855A: 0.2 div p-p 0 to 6 GHz 54854A: 0.2 div p-p 0 to 4 GHz 54853A: 0.2 div p-p 0 to 2.5 GHz
Auxiliary	DC to 500 MHz: 500 mV p-p
Level range	
Internal	± 8 div from center screen or ± 4 Volts, whichever is smallest
Auxiliary	± 5 V
Sweep modes	Auto, triggered, single
Trigger jitter[6,8]	54855A: 1.0 ps rms 54854A: 1.3 ps rms 54853A: 1.7 ps rms
Trigger holdoff range	80 ns to 320 ms
Trigger actions	Specify an action to occur and the frequency of the action when a trigger condition occurs. Actions include e-mail on trigger and QuickMeas+.

Infiniium 54850 Series Performance Characteristics (continued)

Trigger (continued)

Trigger modes	
Edge	Triggers on a specified slope and voltage level on any channel or auxiliary trigger.
Glitch	Triggers on glitches narrower than the other pulses in your waveform by specifying a width less than your narrowest pulse and a polarity. Triggers on glitches as narrow as 500 ps. Glitch range settings: < 1.5 ns to < 160 ms.
Line	Triggers on the line voltage powering the oscilloscope.
Pattern	Triggers when a specified logical combination of the channels is entered, exited, present for a specified period of time or is within a specified time range. Each channel can have a value of High (H), Low (L) or Don't care (X). Triggers on patterns as narrow as 500 ps.
State	Pattern trigger clocked by the rising or falling edge of one channel. Logic type: AND or NAND.
Delay by time	The trigger is qualified by an edge. After a specified time delay between 30 ns to 160 ms, a rising or falling edge on any one selected input will generate the trigger.
Delay by events	The trigger is qualified by an edge. After a specified delay between 1 to 16,000,000 rising or falling edges, another rising or falling edge on any one selected input will generate the trigger.
Violation triggers	
Pulse width	Trigger on a pulse that is wider or narrower than the other pulses in your waveform by specifying a pulse width and a polarity. Triggers on pulse widths as narrow as 500 ps. Pulse width range settings: 1.5 ns to 160 ms.
Setup/hold	Triggers on setup, hold or setup and hold violations in your circuit. Requires a clock and data signal on any two input channels as trigger sources. High and low thresholds and setup and/or hold time must then be specified.
Transition	Trigger on pulse rising or falling edges that do not cross two voltage levels in > or < the amount of time specified.

Measurements and math

Waveform measurements	
Voltage	Peak to peak, minimum, maximum, average, RMS, amplitude, base, top, overshoot, preshoot, upper, middle, lower, area.
Time	Period, frequency, positive width, negative width, duty cycle, delta time, rise time, fall time, Tmin, Tmax, channel-to-channel phase.
Frequency domain	FFT frequency, FFT magnitude, FFT delta frequency, FFT delta magnitude, FFT phase.
Statistics	Displays the mean, standard deviation, minimum, maximum and number of measurements value for the displayed automatic measurements.
Histograms	Vertical (for timing and jitter measurements) or horizontal (noise and amplitude change) modes, regions are defined using waveform markers. Measurements included: mean, standard deviation, peak-to-peak value, median, min, max, total hits, peak (area of most hits), and mean ± 1, 2, and 3 sigma.
Eye-diagram measurements	Eye-diagram measurements include eye height, eye width, eye jitter, crossing percentage, Q factor, and duty-cycle distortion.
Jitter measurements (E2681A software package)	Cycle-cycle jitter, N-cycle jitter, cycle-cycle + width, cycle-cycle – width, cycle-cycle duty cycle, data rate, unit interval, time interval error data, time interval error clock, setup time, hold time, phase, period, frequency, + width, – width, duty cycle, rise time, fall time.

Infiniium 54850 Series Performance Characteristics (continued)

Measurements and math (continued)

Mask testing	Allows pass/fail testing to user-defined or Agilent-supplied waveform templates. AutoMask lets you create a mask template from a captured waveform and define a tolerance range in time/voltage or percentage. Test modes include test forever, test to specified time or event limit, and stop on failure. Communications Mask Test Kit option provides a set of ITU-T G.703, ANSI T1.102, and IEEE 802.3 industry-standard masks for compliance testing.
Waveform math	Four functions, select from add, average, differentiate, divide, FFT magnitude, FFT phase, integrate, invert, magnify, min, max, multiply, subtract, versus, common mode, smoothing.
FFT	
Frequency range[4]	DC to 10 GHz.
Frequency resolution	Sample rate/memory depth = Resolution.
Best resolution at maximum sample rate	20 GSa/1 Mpts = 20 kHz.
Frequency accuracy	(1/2 frequency resolution)+(1 x 10^{-6})(signal frequency).
Signal-to-noise ratio[5]	60 dB at 32k memory depth.
Window modes	Hanning, flattop, rectangular.
Measurement modes	
Automatic measurements	Measure menu access to all measurements, five measurements can be displayed simultaneously.
QuickMeas+	Front-panel button activates five pre-selected or five user-defined automatic measurements.
Drag-and-drop measurement toolbar	Measurement toolbar with common measurement icons that can be dragged and dropped onto the displayed waveforms.
Marker modes	Manual markers, track waveform data, track measurements.

Display

Display	
Display	8.4 inch diagonal color TFT-LCD.
Resolution	640 pixels horizontally x 480 pixels vertically.
Annotation	Up to 12 labels, with up to 100 characters each, can be inserted into the waveform area.
Grids	Can display 1, 2 or 4 waveform grids.
Waveform styles	Connected dots, dots, persistence (minimum, variable, infinite), color-graded infinite persistence.

Computer system and peripherals, I/O ports

Computer system and peripherals	
Operating system	Windows® XP Pro.
CPU	Intel® Pentium® III 1 GHz microprocessor.
PC system memory	512 MB.
Drives	≥ 10 GB internal hard drive, CD-RW drive on rear panel, standard 3.5 inch 1.44 MB floppy drive.
Peripherals	Logitech optical USB mouse and compact keyboard supplied. All Infiniium models support any Windows-compatible input device with a serial, PS/2 or USB interface.
File types	
Waveforms	Compressed internal format, comma and tab separated X and Y pairs or voltage values.
Images	BMP, PCX, TIFF, GIF or JPEG.

Infiniium 54850 Series Performance Characteristics (continued)

Computer system and peripherals, I/O ports (continued)

I/O ports	
LAN	RJ-45 connector, supports 10Base-T and 100Base-T. Enables Web-enabled remote control, e-mail on trigger or demand, data/file transfers and network printing.
GPIB	IEEE 488.2, fully programmable.
RS-232 (serial)	COM1, printer and pointing device support.
Parallel	Centronics printer port.
PS/2	2 ports. Supports PS/2 pointing and input devices.
USB	2 ports. Allows connection of USB peripherals and pointing devices while the oscilloscope is on.
Video output	15 pin VGA, full color output of scope waveform display.
Dual-monitor video output	15 pin XGA, full color output for using third-party applications.
Auxiliary output	DC (±2.4 V); square wave (~715 Hz and 456 MHz); trigger output (255 mV p-p into 50 Ω).
Trigger output	5 V 50 Ω back-terminated.
Time base reference output	10 MHz, 5V 50Ω back-terminated.

General characteristics

Temperature	Operating: 5° C to +40° C. Non-operating: –40° C to +70° C.
Humidity	Operating: Up to 95% relative humidity (non-condensing) at +40°C. Non-operating: Up to 90% relative humidity at +65°C.
Altitude	Operating: Up to 4,600 meters (15,000 feet). Non-operating: Up to 15,300 meters (50,000 feet).
Vibration	Operating: Random vibration 5-500 Hz, 10 minutes per axis, 0.3 g(rms). Non-operating: Random vibration 5-500 Hz, 10 minutes per axis, 2.41 g(rms); resonant search 5-500 Hz, swept sine, 1 octave/minute sweep rate, (0.75g), 5 minute resonant dwell at 4 resonances per axis.
Power	100-240 VAC, ± 10%, Cat II, 47 to 440 Hz; max power dissipated: 390 W.
Weight	Net: 13 kg (28.5 lbs.). Shipping: 16 kg (35.2 lbs.).
Dimensions (excluding handle)	Height: 216 mm (8.5 in). Width: 437 mm (17.19 in). Depth: 440 mm (17.34 in).
Safety	Meets IEC 61010-1 +A2, CSA certified to C22.2 No.1010.1, self-certified to UL 3111.

* Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period, and ±5°C from annual calibration temperature.

1 Full scale is defined as 8 vertical divisions. Vertical divisions are defined by the major scale settings above non-major scale settings. The major scale settings are 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V.

2 Vertical resolution for 8 bits = 0.4% of full scale, for 12 bits = 0.024% of full scale.

3 Within one year of previous calibration.

4 FFT amplitude readings are affected by input amplifier roll-off. 54855A: (–3 dB at 6 GHz, with amplitude decreasing as frequency increases above 6 GHz). 54854A: (–3 dB at 4 GHz, with amplitude decreasing as frequency increases above 4 GHz).

5 The noise floor varies with memory depth and averaging.

6 Signal peak-to-peak amplitude ≥ 5 divisions, vertical scale ≥ 10 mV/div, signal rise time ≤ 225 ps (54854) 150 ps (54855), sample rate = 20 GSa/s, sin(x)/x interpolation enabled, measurement threshold = fixed voltage at 50 % level.

7 Between two edges on a single channel. Rms value refers to the standard deviation of 256 consecutive measurements performed using an individual instrument.

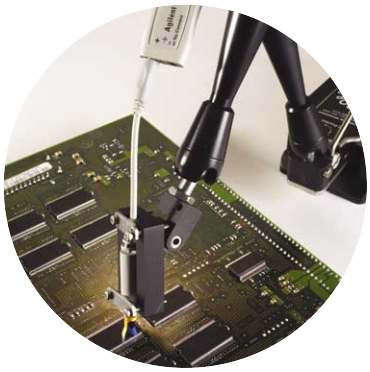
8 Internal trigger. Trigger level contained within full scale display range of trigger channel.

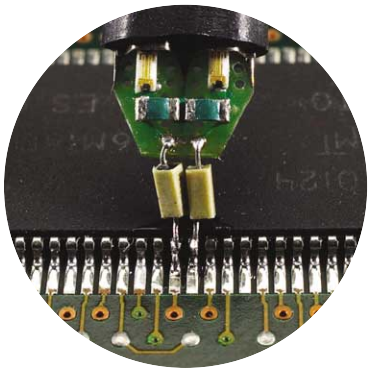
InfiniiMax 1130 Series Performance Characteristics

	1134A, 1132A, 1131A
Bandwidth*	1134A: > 7 GHz 1132A: > 5 GHz 1131A: > 3.5 GHz
Rise and fall time (10% to 90%) (calculated from tr = 0.43/bandwidth)	1134A: < 61 ps 1132A: < 86 ps 1131A: < 123 ps
System bandwidth (–3 dB)	1134A with 54855A: 6 GHz 1132A with 54854A: 4 GHz 1131A with 54853A: 2.5 GHz 1131A with 54846B: 2.25 GHz
Input capacitance[1]	Cm = 0.10 pF Cm is between tips Cg = 0.34 pF Cg is to ground for each tip Cdiff = 0.27 pF Differential mode capacitance = Cm + Cg/2 Cse = 0.44 pF Single-ended mode capacitance = Cm + Cg
Input resistance*	Differential mode resistance = 50 kΩ ± 1% Single-ended mode resistance = 25 kΩ ± 1%
Input dynamic range	± 2.5 V
Input common mode range	± 6.75 V dc to 100 Hz; ± 1.25 V > 100 Hz
Maximum signal slew rate	18 V/ns when probing a single-ended signal 30 V/ns When probing a differential signal
DC attenuation	10:1 ± 3% before calibration on oscilloscope 10:1 ± 1% after calibration on oscilloscope*
Zero offset error referred to input	< 30 mV before calibration on oscilloscope < 5 mV after calibration on oscilloscope*
Offset range*	± 12.0 V when probing single-ended
Offset accuracy	< 3% of setting before calibration on oscilloscope < 1% of setting after calibration on oscilloscope*
Noise referred to input	3.0 mV rms
Propagation delay	~6 ns (this delay can be deskewed relative to other signals)
Maximum input voltage*	40 V peak, CAT I
ESD tolerance	> 8 kV from 100 pF, 300 Ω HBM

* Denotes warranted specifications, all other are typical.

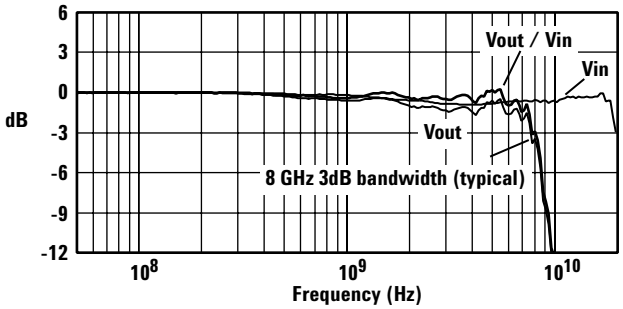
1 Measured using the probe amplifier and solder-in differential probe head with full bandwidth resistors.



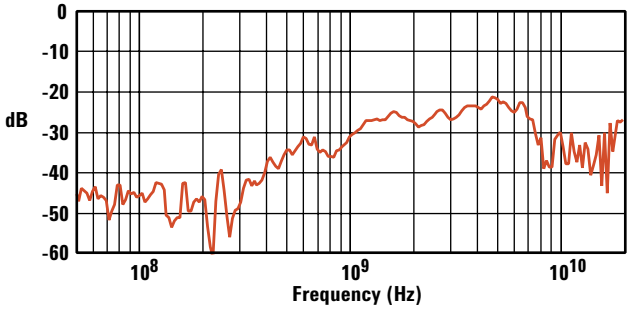


InfiniiMax 1130 Series Performance Characteristics (continued)

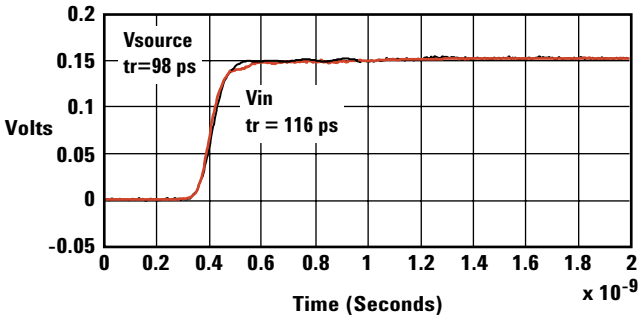
Example of characterized performance plots: differential solder-in probe head



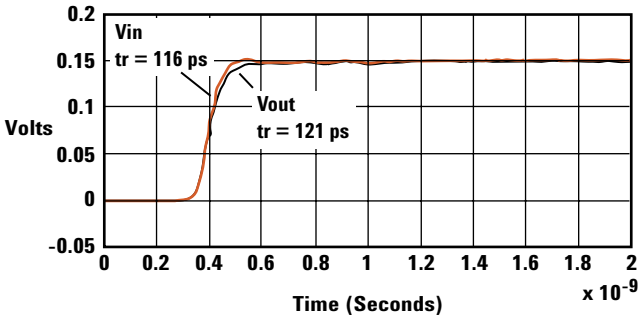
Swept frequency response



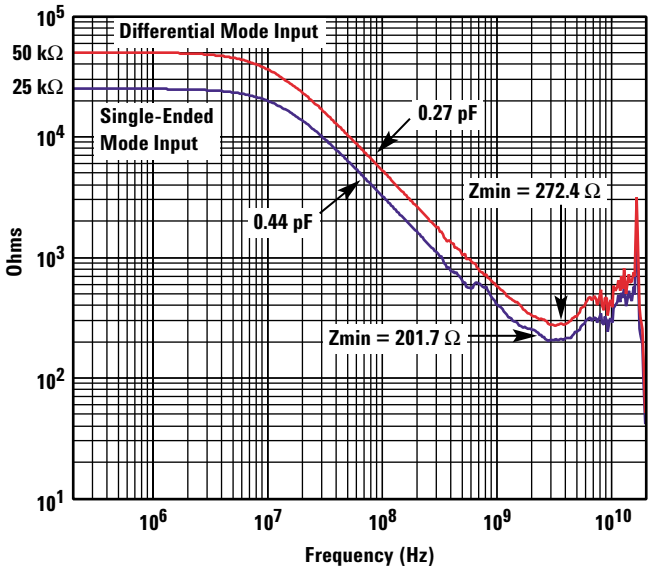
Common mode rejection vs. frequency



Time-domain probe loading



Time-domain probe tracking of 100 ps 10-90% step



Impedance vs. frequency

The electrical properties of the oscilloscope's probe head or probe accessory can often be the limiting factor in the measurement bandwidth or measurement accuracy that can be realized in practical use. The InfiniiMax probing system is the only high-bandwidth probing system that provides characterized performance plots for each of its probe heads. This allows you to see the measurement capability you can achieve for a given use model.

Ordering Information

54850 Series Infiniium oscilloscopes

Model	Bandwidth	Channels	Sample rate per channel	Standard acquisition memory
54855A	6 GHz	4	20 GSa/s	262 kpts per channel
54854A	4 GHz	4	20 GSa/s	262 kpts per channel
54853A	2.5 GHz	4	20 GSa/s	262 kpts per channel

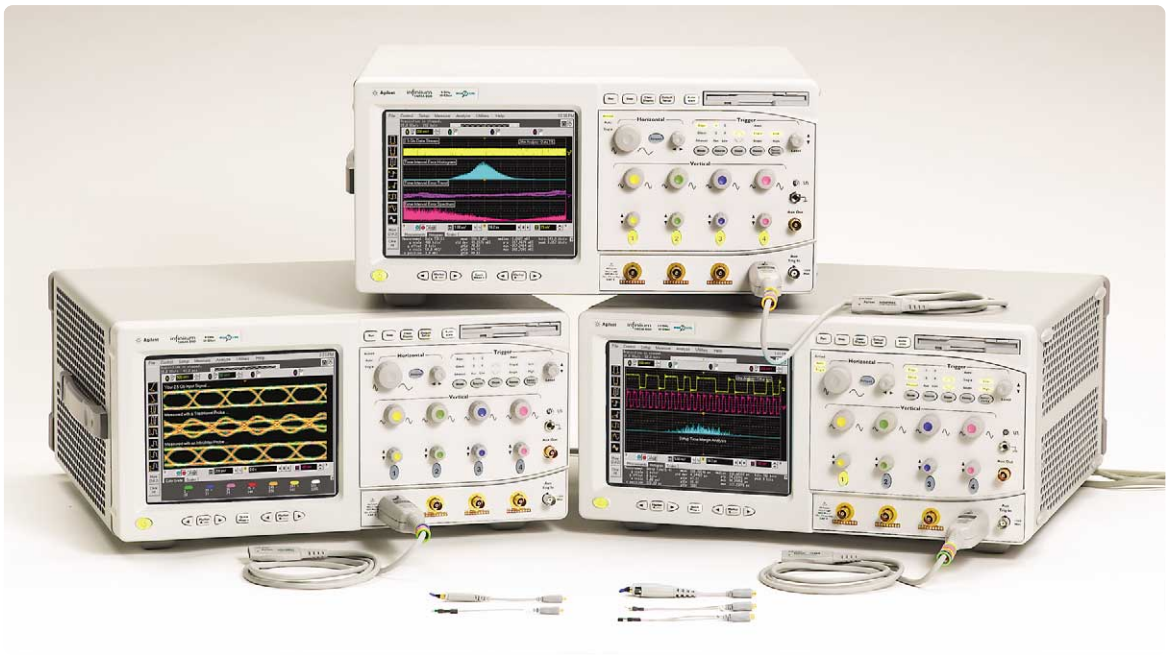
The above models include: optical USB mouse, compact keyboard, user's quick-start guide, documentation CD (service guide, programmer's guide, programmer's quick reference guide), recovery CD, accessory pouch, power cord, two 3.5 mm input adapters, probe deskew and performance verification kit, high-performance calibration cable (54855A only), and a three-year warranty. No probes are included with the 54850 Series oscilloscopes. The InfiniiMax 1130 Series probes must be purchased separately.

54850 Series Infiniium oscilloscope options and accessories

Acquisition memory options	Description
001	1M/ch memory upgrade for Infiniium 5485xA oscilloscopes (32M/ch for sample rates ≤ 2 GSa/s)

Instrument options	Description
1CM (E2609A)	Rack-mount kit

Service options	Description
A6J	ANSI Z540-compliant calibration



Ordering Information (continued)

54850 Series Infiniium oscilloscope options and accessories

Accessories	Description
E2681A	EZJIT jitter analysis software for Infiniium 5485xA oscilloscopes
E2654A	EZ Probe Positioner®: includes base, joystick, and articulating arm
E2680A	After-purchase memory upgrade for Infiniium 5485xA oscilloscopes Order 5485xA option 001 when purchasing a new Infiniium 5485xA oscilloscope. The E2680A is for customers who own a 5485xA scope and wish to upgrade the acquisition memory.
1184A	Testmobile with keyboard and mouse tray, drawer for accessories
E5850A	Time-correlation fixture – integrate Infiniium scope and 1670x logic analyzer
E2655A	Additional probe deskew/performance verification kit for InfiniiMax probes
54855-67604	18 GHz BNC-compatible to APC 3.5 (f) adapter for Infiniium 5485xA scopes
Foot Switch	Kinesis Savant 3-Action Programmable Foot Switch P/N AC004PF Allows you to easily program the 3-action foot pedals to perform the following scope functions: run, stop, toggle between run and stop, save waveform, save screenshot, measure any five waveform parameters and recall an instrument setup. See http://www.kinesis-ergo.com/prog_fs.htm for additional information and ordering instructions.

1130 Series InfiniiMax probing system

Probe amplifiers model	Description
1134A	7 GHz InfiniiMax probe amp – order one or both E266xA connectivity kits per amp
1132A	5 GHz InfiniiMax probe amp – order one or both E266xA connectivity kits per amp
1131A	3.5 GHz InfiniiMax probe amp – order one or both E266xA connectivity kits per amp

Connectivity kits model	Description
E2669A	InfiniiMax connectivity kit for differential measurements
E2668A	InfiniiMax connectivity kit for single-ended measurements

Additional components	Description
E2675A	InfiniiMax differential browser probe head and accessories. Includes 20 replaceable tips and ergonomic handle. Order E2658A for replacement accessories.
E2676A	InfiniiMax single-ended browser probe head and accessories. Includes 2 ground collar assemblies, 10 replaceable tips, a ground lead socket and ergonomic browser handle. Order E2663A for replacement accessories.
E2677A	InfiniiMax differential solder-in probe head and accessories. Includes 20 full bandwidth and 10 medium bandwidth damping resistors. Order E2670A for replacement accessories.
E2678A	InfiniiMax single-ended/differential socketed probe head and accessories. Includes 48 full bandwidth damping resistors, 6 damped wire accessories, 4 square pin sockets and socket heatshrink. Order E2671A for replacement accessories.
E2679A	InfiniiMax single-ended solder-in probe head and accessories. Includes 16 full bandwidth and 8 medium bandwidth damping resistors and 24 zero ohm ground resistors. Order E2672A for replacement accessories.

Ordering Information (continued)

1130 Series InfiniiMax probing system (continued)

Adapters	Description
N1022A	Adapts 113x/115x active probes to 86100 Infiniium DCA

Other compatible probes	Description
1144A	800 MHz active probe. Requires 1142A probe power supply when used with Infiniium scopes. Requires 01144-61604 probe power extender when using two or more 1144A active probes.
1145A	2-channel, 750 MHz active probe. Requires 1142A power supply when used with Infiniium oscilloscopes.
1156A	1.5 GHz single-ended active probe for Infiniium scopes
1157A	2.5 GHz single-ended active probe for Infiniium scopes
1158A	4 GHz single-ended active probe for Infiniium scopes
54006A	6 GHz passive resistive divider probe – 10:1 (500 ohms) or 20:1 (1 kohms)

Related Literature

Publication Title	Publication Type	Publication Number
Infiniium 54800 Series Oscilloscopes	Data Sheet	5988-3788ENUS
Infiniium 54800 Series Oscilloscope Probes, Accessories and Options	Selection Guide	5968-7141EUS
Restoring Confidence in Your High-Bandwidth Probe Measurements	Application Note 1419-01	5988-7951EN
Understanding Usability Versus Performance on High-Bandwidth Active Oscilloscope Probes	Application Note 1419-02	5988-8005EN
Performance Comparison of Differential and Single-Ended Active Voltage Probes	Application Note 1419-03	5988-8006EN
Understanding Oscilloscope Frequency Response and Its Effect on Rise Time Accuracy	Application Note 1420	5988-8008EN
The Truth About the Fidelity of High Bandwidth Voltage Probes	Application Note 1404	5988-6515EN

Product Web site

For the most up-to-date and complete application and product information, please visit our product Web site at:
www.agilent.com/find/infiniimax

Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

www.agilent.com/find/emailupdates
Get the latest information on the products and applications you select.

Agilent T&M Software and Connectivity
Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections. Visit **www.agilent.com/find/connectivity** for more information.

www.agilent.com/find/infiniimax

By internet, phone, or fax, get assistance with all your test & measurement needs

Online assistance:
www.agilent.com/find/assist

Phone or Fax
United States:
(tel) 800 452 4844

Canada:
(tel) 877 894 4414
(fax) 905 282 6495

China:
(tel) 800 810 0189
(fax) 800 820 2816

Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
(tel) (82 2) 2004 5004
(fax) (82 2) 2004 5115

Latin America:
(tel) (305) 269 7500
(fax) (305) 269 7599

Taiwan:
(tel) 0800 047 866
(fax) 0800 286 331

Other Asia Pacific Countries:
(tel) (65) 6375 8100
(fax) (65) 6836 0252
Email: tm_asia@agilent.com

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

Printed in USA February 7, 2003

5988-7976EN