Agilent Technologies Infiniium 54800 Series Oscilloscopes

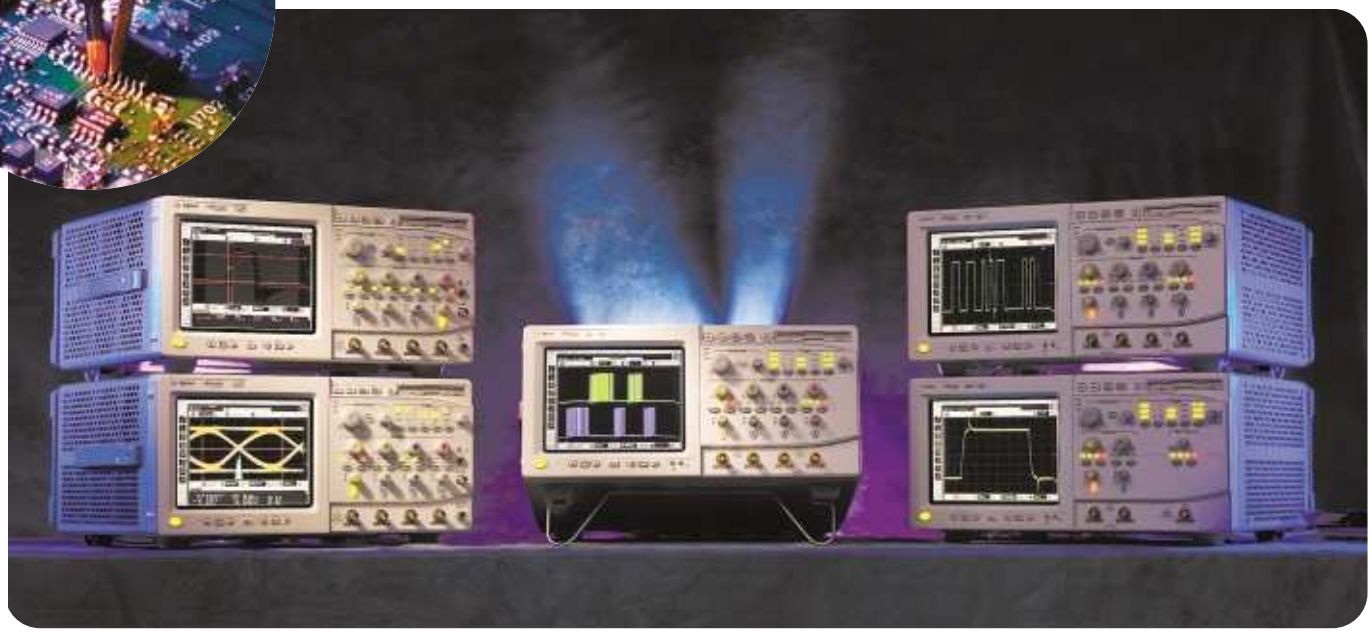
With Next-Generation Deep Memory

Instant Response, Optimum Resolution

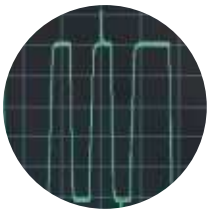
Contents

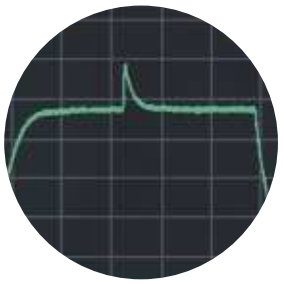
Agilent Technologies

Now with deep-memory technology, Infiniium scopes make it faster and easier to see what's happening in your design.



A deep-memory scope doesn't have to be difficult to use. Infiniium scopes from Agilent Technologies can simplify your debugging tasks and help you easily discover intermittent problems in your design.





The performance you need

- **600 MHz to 2.25 GHz bandwidth**
- **Up to 8 GSa/s**
- **2- and 4-channel models**
- **Up to 4 Mpts standard; up to 16 Mpts optional**
- **Advanced probing solutions**

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 engineers.

Here's what engineers are saying about their Infiniium scopes.

"Everything is where you want it to be. Readouts, knobs — they are easy to see, easy to use."

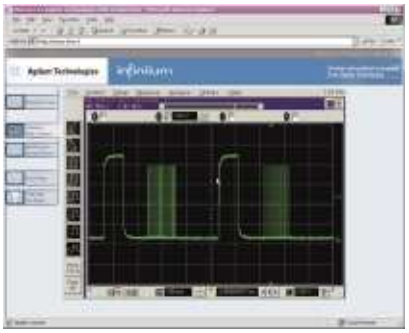
Matt Berger
Senior Engineering Technician
National Semiconductor

Simple things are simple

Analog-like front panel provides simple controls for basic functions — easy to find and easy to use.

"We use Infiniium to save large quantities of screen shots on our LAN — then we pull them up immediately over the network. It saves a lot of time and a lot of hassle."

Stu Nuffer
Senior Systems Engineer
LSI Logic

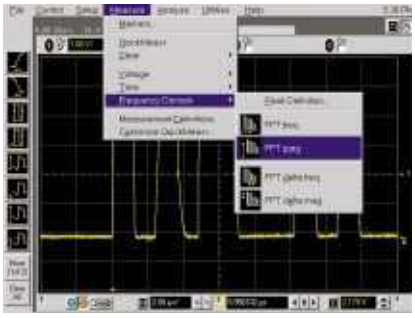


Convenient communication and data sharing

PC architecture with a standard LAN interface makes it easy to share your work and communicate your results.

"Other scopes are hard to use, hard to maneuver. With Infiniium, it's easy to find your way around when you're looking for advanced features."

Norm Reed
Radar Systems Technologist
Canadian Department of
National Defense



Easy access to advanced features

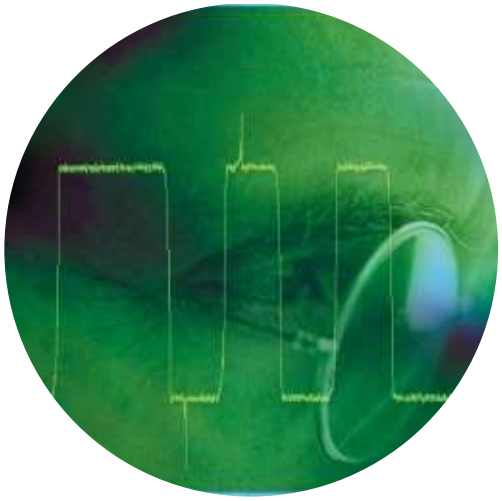
Familiar Windows®-based graphical user interface makes it easy to navigate and access advanced features.

"Complex triggering has its place, but sometimes I just want to capture everything and look at it."

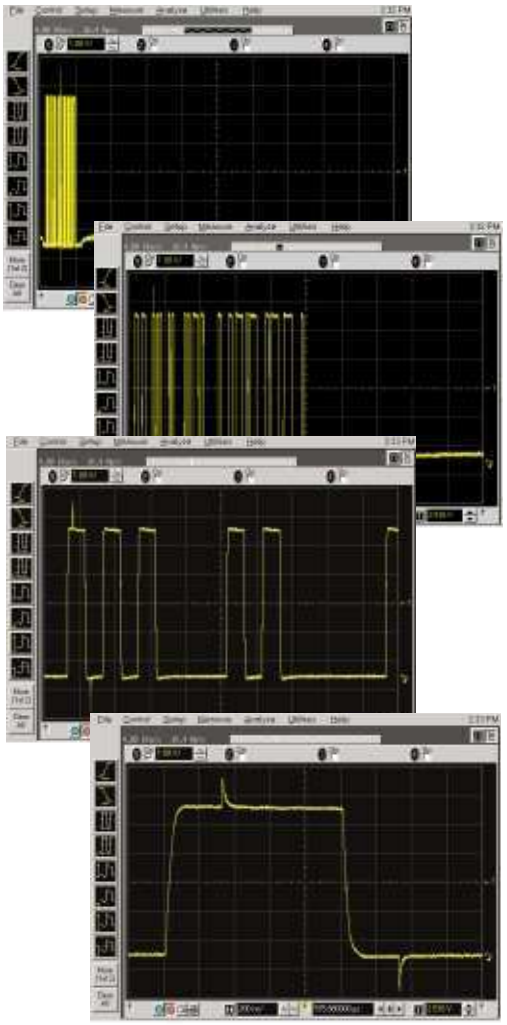
Chuck Hill
Consultant
Alta Engineering

Automatic deep memory with instant response

With Infiniium's deep memory, you can easily make long single-shot acquisitions and search through your data with instant response.



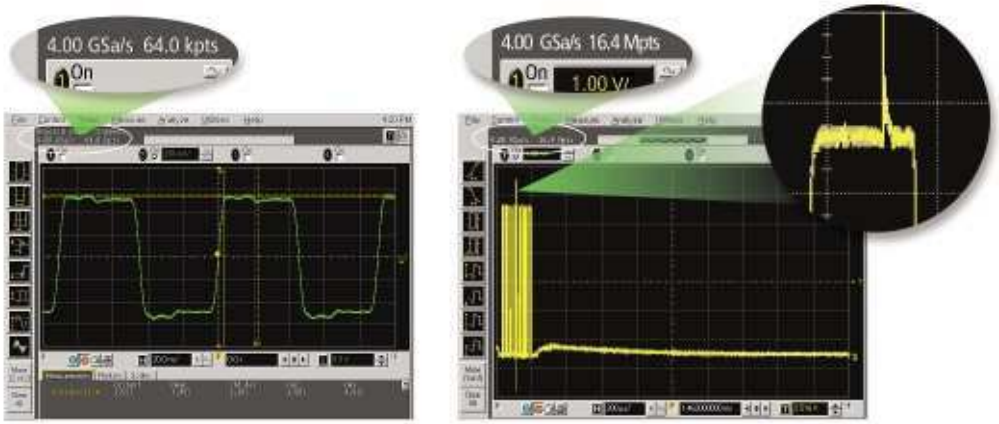
Deep memory without annoying delays



Infiniium scopes use advanced MegaZoom technology so you get all the benefits of fast, automatic, affordable deep memory. Due to its unique ASIC architecture, this powerful memory management system called MegaZoom can search through up to 16 million points of continuous signal history without the usual bottlenecks and frustrating delays.

Instant Response

While first-generation deep-memory scopes update the display slowly, Infiniium's MegaZoom memory management system instantaneously updates the display even with a 16 Mpts memory on. And deep memory is on all the time – so you always have the maximum available sample rate and don't undersample or miss fast events. Discover problems you never found with your first-generation deep-memory scope.



Infiniium's deep memory is easy to use for all your debugging tasks

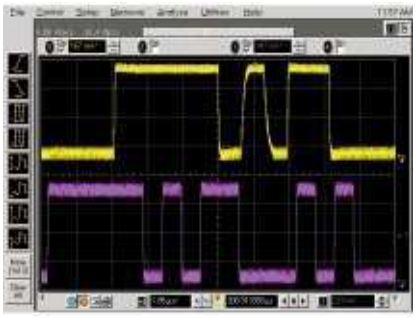
Optimum Resolution

Get the insight you need to solve your debugging challenges in a fraction of the time it used to take. Just press the Autoscale key to automatically adjust the sample rate to achieve the best waveform resolution. Then, as you change the horizontal scale to display more time and view your entire signal, MegaZoom adds more memory to give you the fastest sample rate and best resolution possible. Now you can see events as narrow as 250 ps without using a special mode such as peak detect.

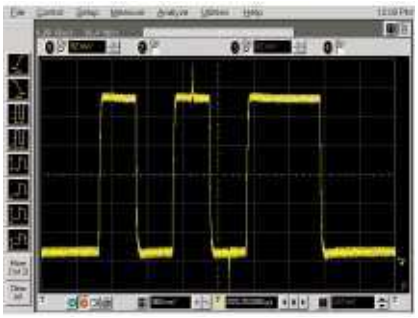
Affordable Deep Memory

Every Infiniium with MegaZoom is a deep-memory oscilloscope with a standard 4 Mpt memory (or 2 Mpt memory on each channel). Memory options to 16 Mpts (or 8 Mpts on each channel) are available and cost up to 60 percent less than the price of first-generation deep memory oscilloscopes. Infiniiums are affordable enough that all of your scopes can be deep-memory models.

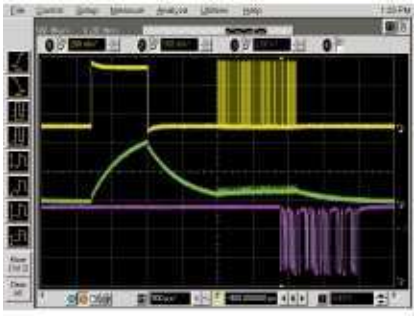
By combining powerful features, ease of use, and the right specifications, Infiniium scopes help you find answers faster. A simple, analog-like front panel, Windows-based interface, and powerful connectivity capabilities make high-performance features accessible and uncomplicated. All with the performance and features you need for today's demanding jobs.



Look at signal details

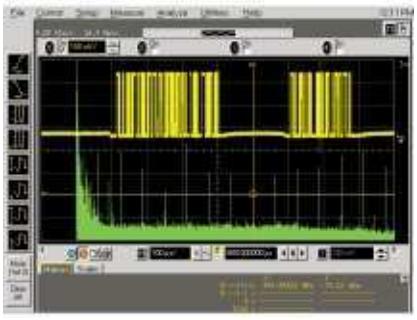


Find anomalies

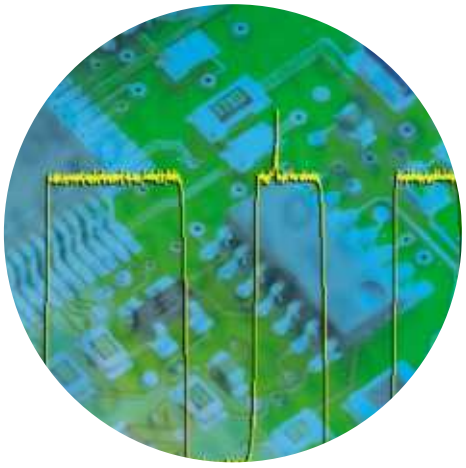


Correlate slow analog and fast digital signals

Verify signal integrity



Math and FFTs on 16 Mpts

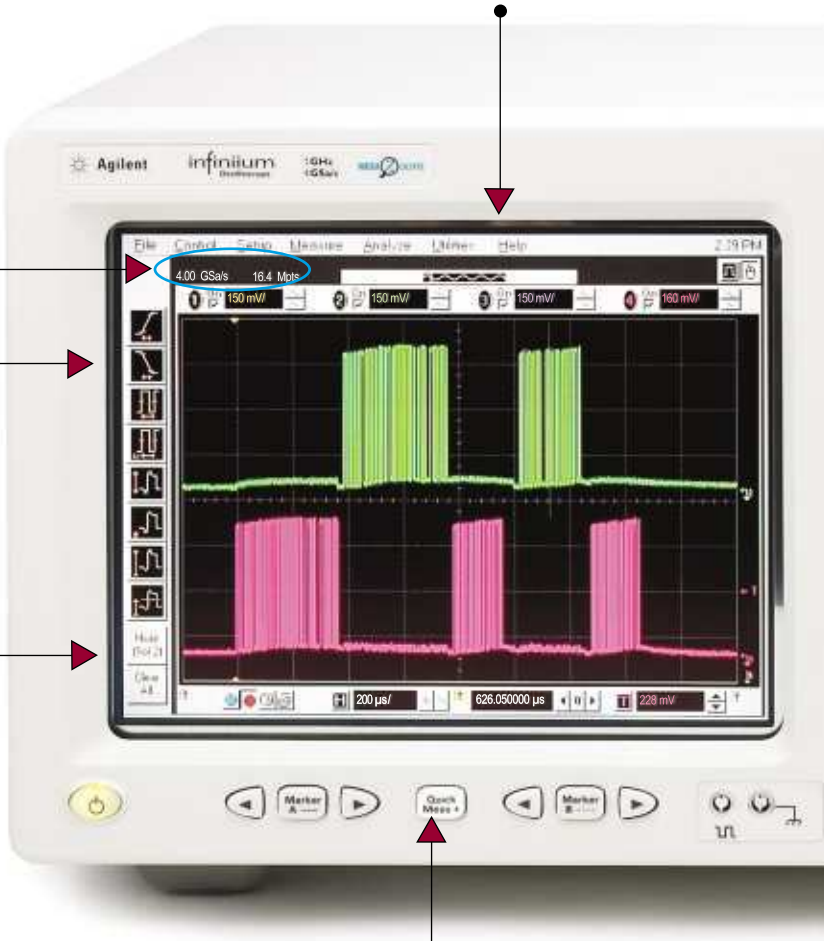


Infiniium: “It’s like someone who sits down and actually uses a scope designed this one.”

Steve Montgomery
Director of Engineering, Linx Technologies

Maximum sample rate and resolution on every measurement. The scope automatically adjusts memory depth as you use it, so you get maximum sample rate and resolution on every measurement. You don't even have to think about it.

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.



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

See fast events — as fast as 250 ps — without using special modes like peak detect. Peak points are displayed in a darker color than the waveform indicating more data points are available. Just zoom in to see the event in detail.

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.

Store all your setups and results on the 5-GB hard drive for future recall or sharing via the LAN interface.

Remote access with web-enabled connectivity, e-mail on trigger, and GPIB over LAN.

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

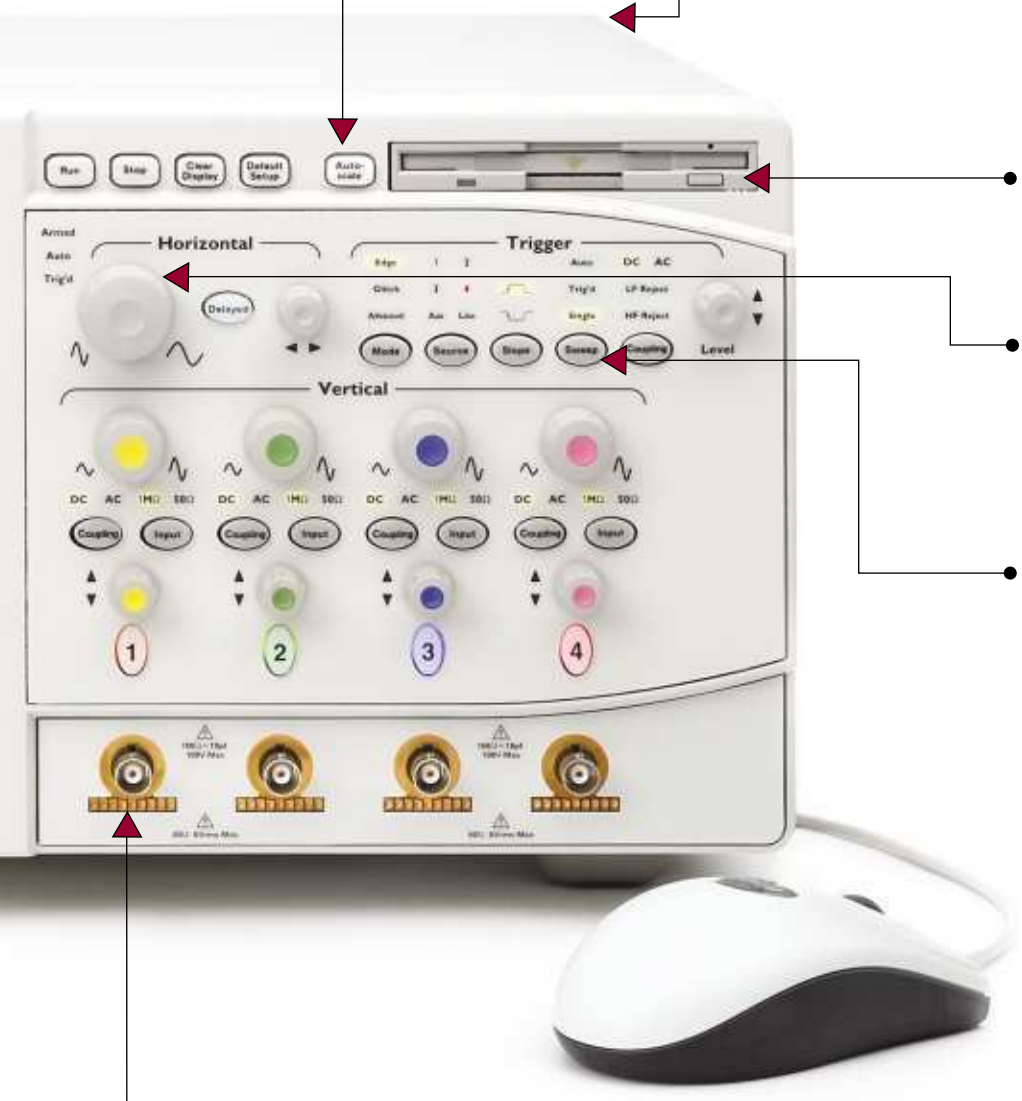
QuickMeas+ gives you any four automated measurements with the push of a button. You can also configure this key to print/save screen shots, save waveforms, or load a favorite setup.

Autoscale automatically sets deep memory to the amount required for the maximum sample rate and resolution. You never have to set deep memory manually.

Built-in CD-Rom drive on rear panel allows you to update the system software conveniently.

Hands-free operation with the Infiniium VoiceControl option. Just speak into the collar-mounted microphone to operate front-panel controls (now available with all Infiniium models).

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



120 MB LS-120 SuperDisk floppy drive makes it easy to save your work (to super floppies or standard 1.44 MB 3.5-inch disks).

Zoom and search with instant response. Zoom into your signal using the horizontal scale knob and search through your waveform with the position knob. Find your area of interest quickly and easily.

Single Sweep sets the deepest memory available, so you capture your entire waveform with the best resolution available. Never undersample again.

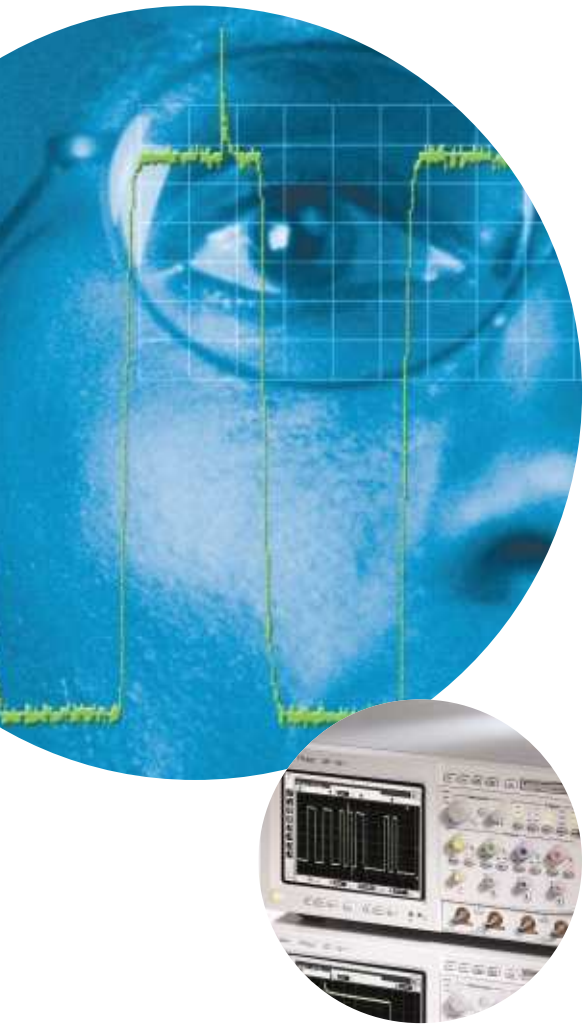
3 year standard warranty protects your investment.

Easy access to advanced features like math 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.

AutoProbe interface completely configures your scope for use with a wide range of passive, active and differential probes.

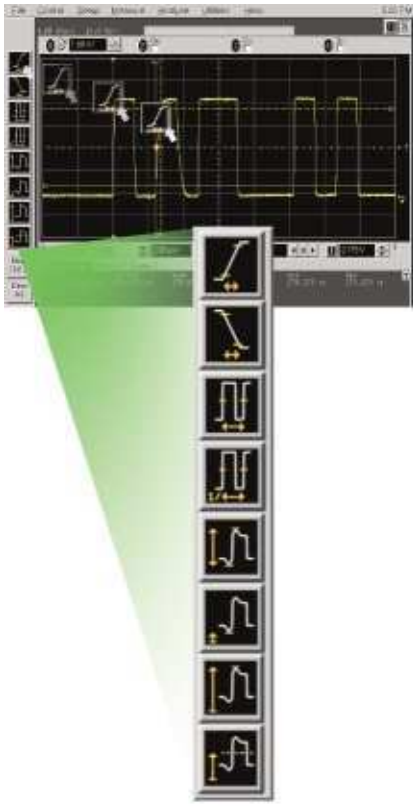
A familiar interface makes simple tasks simple. Infiniium's analog-like front panel has a full set of controls color coded to the LEDs, waveforms, and measurements.

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



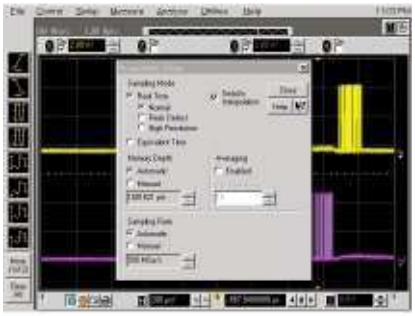
Drag-and-Drop Measurements

It's simple: drag an icon from the measurement bar and drop it on the cycle you want to measure. You can make up to four measurements on your waveforms, on up to four different cycles. All the measurements appear at the bottom of the display with statistics and are color coded to the channel you are measuring. Scope measurements have never been this powerful or this easy.



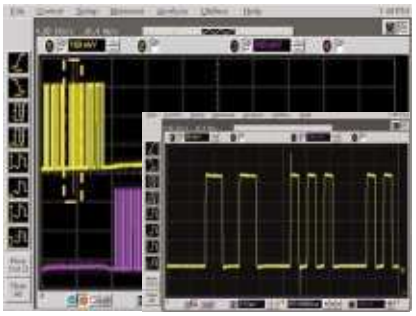
Dialog Boxes for Easy Setup

With Infiniium, you don't need to navigate through annoying softkey menus. Dialog boxes display all the choices you need for measurement setups, all in one place. Help is available for each field, guiding you through each step.



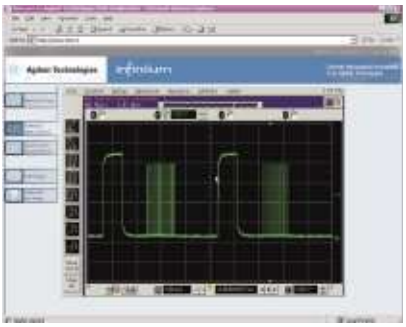
Simple Zooming

Zooming with Infiniium's graphical user interface is simple and convenient. Just use the mouse to draw a box around the area of interest and click inside. Zoom uses the full display so you get meaningful vertical as well as horizontal resolution gains. Use multiple zoom boxes to see deep inside your signal. Zooming couldn't be simpler or faster.



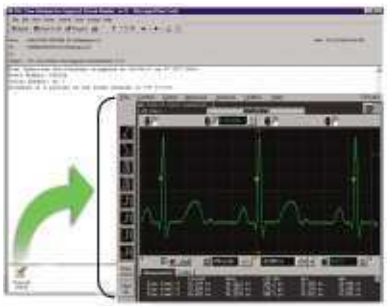
Web-Enabled Control

For distributed teams, simply set up Infiniium on your LAN, and up to three users can access it from any Java™-enabled Web browser. No special software is required. You can easily grab screen shots for a report, or troubleshoot designs at a remote location.



E-Mail on Trigger

Infiniium can automatically send an e-mail with a bit map of the display when the scope triggers. You can have your Infiniium send a message to your cell phone then control your scope from any web browser.

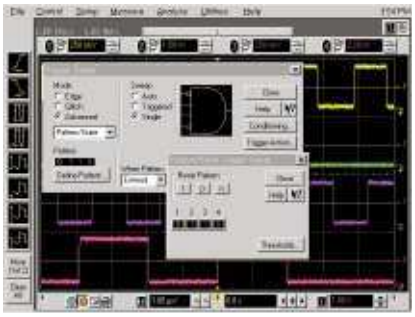


GPIB Commands over LAN

Send GPIB commands over the LAN or access data from Infiniium scopes at remote locations worldwide – or from your home or office.

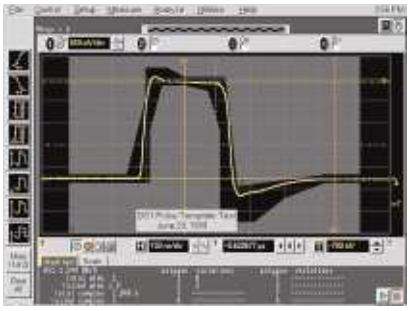
Advanced Triggering

Advanced triggers are essential when investigating known problems. Infiniium offers a full range of advanced triggers to help you isolate and capture the condition you need to characterize. Advanced trigger setups are simplified by using intuitive dialog boxes with descriptive graphics.



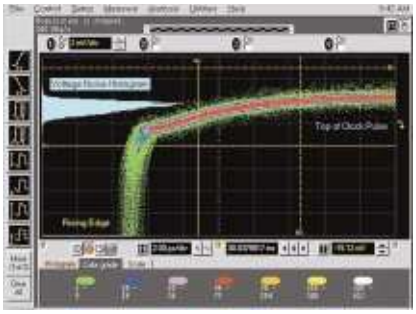
AutoMask and Mask Test

Mask testing is simplified with AutoMask. Acquire a waveform, define tolerance limits, and create a test envelope. Mask testing provides a pass/fail comparison of an incoming signal to the test envelope. Easily test your design's conformance to industry standards with the Communication Mask Test Kit option.



Color-Graded Persistence with Histograms

By providing a colorful, visual representation of waveform distribution, color-graded persistence makes it easy to pick out signal anomalies and see how often they occur. Histograms quantify both noise and jitter in your target system.



QuickMeasure and Statistics

Instantly make four common measurements on your signal, with easy-to-read statistics, by pressing the QuickMeas+ button on the front of Infiniium. The measurements displayed can be easily customized.

Infiniium: High-performance scopes at competitive prices

54800 Series Infiniium Oscilloscopes

Model	Bandwidth	Channels	Max. Sample Rate	Standard Acquisition Memory	Optional Max. Acquisition Memory
54830B	600 MHz	2	4 GSa/s	2 Mpts/ch (4 Mpts max.)	8 Mpts/ch (16 Mpts max.)
54831B	600 MHz	4	4 GSa/s	2 Mpts/ch (4 Mpts max.)	8 Mpts/ch (16 Mpts max.)
54832B	1 GHz	4	4 GSa/s	2 Mpts/ch (4 Mpts max.)	8 Mpts/ch (16 Mpts max.)
54845B	1.5 GHz	4	8 GSa/s	32 kpts/ch (64 kpts max.)	
54846B	2.25 GHz	4	8 GSa/s	32 kpts/ch (64 kpts max.)	

Choose a Model to Fit Your Needs

Agilent Infiniium scopes combine ease-of-use, the right specifications, and a broad feature set to help you get your job done faster. Use the information here to find the scope that meets your signal measurement needs. Review the options and accessories on the following pages to see how Infiniium makes advanced power so usable.

Common to All Infiniium 54800 Oscilloscopes

- Simple things simple with analog-like front panel
- Advanced features are accessible with Windows GUI
- File and printer sharing with LAN
- Web-enabled, remote control from any web browser
- E-mail on trigger
- Advanced triggering
- Color-graded persistence and histograms
- Drag-and-drop measurements and zoom boxes
- USB (2), mouse, keyboard, GPIB, VGA, LAN, Centronics ports
- QuickMeasure
- Statistics
- Built-in information system
- 5 GB HDD, 120 MB floppy
- Waveform labels
- Math functions including FFTs
- Advanced, quiet multi-fan cooling system
- USB pre-compliance testing option
- VoiceControl option, hands-free control
- CD-Rom drive
- New ATX PC motherboard
- Pentium III 866 MHz processor
- 256 MB CPU memory
- PS/2 mouse, condensed keyboard
- Standard 3-year warranty

Unique to the 54830B Series

- 600 MHz and 1 GHz bandwidths
- Maximum 4 GSa/s sample rate
- 2-channel model (54830B)
- MegaZoom deep memory
- 2 Mpts memory per channel (4 Mpts max.)
- Optional 4 or 8 Mpts memory per channel (8 or 16 Mpts max.)

Unique to the 54840B Series

- 1.5 GHz and 2.25 GHz bandwidths
- Maximum 8 GSa/s sample rate
- Cycle-to-cycle jitter measurement
- Eye diagram measurements
- AutoMask
- Communication mask testing option

Active Probes (Options 11, 12, 13, 14)

Probing high-frequency signals becomes more challenging as the variety of test points and the frequencies of the signals continue to grow. Probes need to be lightweight, small, affordable, and offer the accessories and probe tips you require to get your job done easily.

The new 1156A, 1157A, and 1158A active probes are small, low-mass, active probes with bandwidths up to 4 GHz. Agilent offers a variety of probe tips to help you probe any test point, and the revolutionary EZ-Probe Positioner option provides stable, accurate X, Y, Z positioning of your probe.

The 1155A probe is a low-mass, versatile, and affordable 2-channel, 750-MHz active probe. Used with an optional Wedge Probe Adapter, this combination is an excellent solution for probing TQFP and PQFP packages. When used with the standard grabber tips, the 1155A can be used to probe any test point. When used with the 600 MHz Infiniium oscilloscopes, this pairing delivers 2 channels with a system bandwidth of 500 MHz.

For more information on probing solutions, accessories, and options, please visit our website at **www.agilent.com/find/infiniium** and see the *Infiniium 54800 Series Oscilloscopes Probes, Accessories, and Options Guide*, (Agilent literature No. 5968-7141 EN/EUS) and many other useful documents and webpages.

Wedge Probe Adapters (Option 007)

Agilent Wedge Probe Adapters offer a safe, easy method for connection to surface-mount ICs. The Wedge makes two contact points with each leg of the IC. There's no need to worry about accidentally shorting IC pins together on a delicate component – or worse yet on an irreplaceable prototype.

Wedge adapters are available for probing 3, 8, or 16 signals with 0.5 mm and 0.65 mm TQFP and PQFP packages. The Wedge easily attaches to Infiniium probes, connecting directly to the 1155-58A active probes and the 1160A family of miniature passive probes.

Model	Probe Bandwidth	Channels	Input C	Option No.
1155A	750 MHz	2	2 pF	11
1156A	1.5 GHz	1	0.8 pF	12
1157A	2.5 GHz	1	0.8 pF	13
1158A	4 GHz	1	0.8 pF	14

USB 2.0 Test Option for Infiniium Oscilloscopes (Option B30 or E2645A)

The Agilent USB test option makes USB signal-integrity pre-compliance testing as simple as capturing the signals with your oscilloscope. Infiniium has significantly reduced the work associated with USB pre-compliance testing by eliminating the need to transfer scope signals to a PC. The Infiniium USB test option features run-time MATLAB embedded in the scope and USB signal integrity scripts, providing a one-box solution. This option works with Infiniium 54830 and 54840 Series oscilloscopes. (Option B30)

The USB-IF compliance program recognizes Infiniium as a recommended scope for use in pre-compliance testing. In addition, all MATLAB scripts used with the USB test option come from the USB-IF organization.

Standard	Agilent Equipment	Additional Equipment
Low/Full Speed	• Infiniium oscilloscope: 54831B, 54832B, 54845B or 54846B • USB test option B30 (for new Infiniium purchases) or E2645A (for existing Infiniium oscilloscopes). Includes USB-IF MATLAB scripts and Signal Quality InRush Droop/Drop (SQIDD) board • Additional Signal Quality Inrush Drop/Droop (SQIDD) test fixtures can be purchased as Option B31 or E2646A • Order 54832B/46B Option 004 to receive four passive probes required for USB 2.0 test • 1147A 50MHz current probe	• USB-IF Test Procedure located at: http://www.usb.org
High Speed	• Infiniium oscilloscope: 54846B only • Order 54846B Option B30 or E2645A (if you already own a 54846A/B). Includes USB-IF MATLAB scripts and Signal Quality InRush Droop/Drop (SQIDD) board • SQIDD board only: Option B31 (for new Infiniium models) or E2646A • High-speed USB test set: Option 017 (for new 54846B) or E2645-60001 • High-speed USB Host test set: Option 018 (for new 54846B) or E2645-60002 • High-speed USB Device test set: Option 019 (for new 54846B) or E2645-60003 • Order 54846B Option 004 to receive (four) 1161A passive probes required for USB 2.0 test • 1147A 50MHz current probe • High speed test fixtures: order E2649A for complete set of six fixtures and power supply	• Order Tektronix P6248 differential probe and Tektronix 1103 probe power supply provided by your local instumentation distributor • USB-IF Test Procedure located at: http://usb.org/developers/docs.html

Communication Mask Test Kit (Option 100 or E2625A)

Take the frustration out of communications testing and prove your designs conform to industry standards with the Communication Mask Test Kit option. Infiniium's familiar Windows interface makes it easy for you to access the masks you need and configure your tests.

In addition, the Communication Mask Test Kit comes with a set of electrical communication adapters to ensure convenient, reliable, and accurate connections to your device under test. Includes more than 20 industry-standard ANSI T1.102, ITU-T G.703, and IEEE 802.3 communication signal mask templates. This option works with Infiniium 54840 Series oscilloscopes only. (Option 100)

Logic Analyzer/Oscilloscope Time-Correlation Fixture (E5850A)

Now you can more effectively verify and track down problems between the analog and digital portions of a design. Easily make time-correlated measurements between an Agilent 16700 Series logic analysis system and an Infiniium 54800 Series oscilloscope. With the E5850A Time-Correlation Fixture, you can trigger the Infiniium from the logic analyzer (or vice versa), automatically deskew the waveforms, and simultaneously view the Infiniium waveforms and the logic analyzer's timing waveforms on your Agilent 16700 Series Logic Analyzer. This option works with all Infiniium 54830 and 54840 series.

VoiceControl Option (Option 200 or E2635A)

If you're making measurements on target systems with densely packed ICs, your hands are tied up holding probes, making it difficult to turn knobs and press buttons on the front panel of your scope. Infiniium's award-winning VoiceControl option solves this problem. Just speak into the collar-mounted microphone to operate your Infiniium's front-panel controls without using your hands. Simply tell the scope what you want it to do, using natural English-language commands, such as "set channel one to 1.25 volts per division." The VoiceControl system does not require the scope to be trained to understand a particular user. This option works with Infiniium 54830 and 54840 Series oscilloscopes.

Testmobiles (1182B and 1184A)

Agilent's 1182B and 1184A testmobiles provide a convenient solution for your portability and storage needs. The 1182B includes a 20-inch deep instrument tray with adjustable tilt and height. The 1184A includes a drawer for accessories and a keyboard tray with a mouse extension for either right- or left-hand operation.

Performance Characteristics

Vertical	54830B, 54831B and 54832B		54845B and 54846B	
Input Channels	54830B: 54831B / 54832B:	2 4	4	
Analog Bandwidth @50 Ω (-3 dB)*[1]	54830B / 54831B: 54832B:	600 MHz 1 GHz	54845B: 54846B:	1.5 GHz 2.25 GHz
Calculated Rise Time[2] @50 Ω	54830B / 54831B: 54832B:	583 ps 350 ps	54845B: 54846B:	233 ps 178 ps
Input Impedance*	1 MΩ ± 1% (13 pF typical), 50 Ω ± 1%		1 MΩ ± 1% (12 pF typical), 50 Ω ± 1.5%	
Sensitivity[3]	1 mV/div to 5 V/div (1 MΩ) 1 mV/div to 1 V/div (50 Ω)		2 mV/div to 2 V/div (1 MΩ) 1 mV/div to 1 V/div (50 Ω)	
Input Coupling	1 MΩ: AC, DC; 50 Ω:DC		1 MΩ: AC, DC; 50 Ω:DC	
Hardware Bandwidth Limit	20 MHz		N/A	
Vertical Resolution[4]	8 bits, ≥12 bits with averaging		8 bits, ≥12 bits with averaging	
Channel to Channel Isolation (any two channels with equal V/div settings)	DC to 50 MHz: 50 dB >50 MHz to 500 MHz: 40 dB >500 MHz to 1 GHz: 30 dB		DC to 100 MHz: 40 dB >100 MHz to 1 GHz: 28 dB >1 GHz to 2.25 GHz: 24 dB	
DC Gain Accuracy*[3, 5]	± 1.25% of full scale at full resolution channel scale		± 1% of full scale at full resolution channel scale	
Maximum Input Voltage*				
1 MΩ	150 V RMS or DC, CAT I ± 250 V (DC + AC) in AC coupling		± 100 V (DC + AC)[AC<10 kHz], CAT I	
50 Ω	5 Vrms, CAT I		5 Vrms, CAT I	
Offset Range	Vertical Sensitivity	Available Offset	Vertical Sensitivity	Available Offset
1 MΩ	1 mV to <10 mV/div 10 mV to <20 mV/div 20 mV to <100 mV/div 100 mV to <1 V/div 1 V to 5 V/div	± 2 V ± 5 V ± 10 V ± 20 V ± 100 V	2 mV to 100 mV/div >100 mV to 2 V/div	± 4 V ± 40 V
50 Ω	1 mV to <5 mV/div 5 mV to <200 mV/div 200 mV to 1 V/div	± 2 V ± 5 V ± 20 V	All	>± 12 div
Offset Accuracy*[3]	± (1.25% of channel offset+2% of full scale+1 mV)		± (1% of channel offset + 1% of full scale)	
Dynamic Range	± 6 div from center screen (1 MΩ) ± 12 div from center screen (50 Ω)		± 8 div from center screen (1 MΩ) ± 8 div from center screen (50 Ω)	
DC Voltage Measurement Accuracy*[3, 5]				
Dual Cursor	± [(DC gain accuracy)+(resolution)]			
Single Cursor	± [(DC gain accuracy)+(offset accuracy)+(resolution/2)] Example for single cursor accuracy for 54830B/31B/32B, 70 mV signal, 10 mV/div, 0 offset: Accuracy = ± [1.25% (80 mV) + (1.25% (0) + 2% (80 mV) + 1 mV) + (0.4%/2) (80 mV)] = ±3.8 mV			

Horizontal	54830B, 54831B and 54832B	54845B and 54846B
Main Time Base Range	500 ps/div to 20 s/div (54830/31B) 200 ps/div to 20 s/div (54832B)	100 ps/div to 20 s/div
Horizontal Position Range	0 to ± 200 s	0 to ± 1 s or one full screen width, whichever is larger
Delayed Sweep Range	1 ps/div to current main time base setting	
Resolution	4 ps	2 ps
Timebase Accuracy	15 ppm (±0.0015%)	70 ppm (±0.007%)
Δt Accuracy		
Real Time Mode	±[(0.0015%)(Δt)+(0.2)(sample period)]	±[0.007%)(Δt)+(0.2)(sample period)]
Equivalent Time Mode	±[(0.0015%)(Δt)+(full scale/(2x memory depth))+30ps]	±[(0.007%)(Δt)+(full scale/(2x memory depth))+30ps]
Peak Detect Mode	±[(0.0015%)(Δt)+(1 sample period)]	N/A
Example (Equivalent Time Mode (≥16 avgs.), 9ns signal, 1ns/div, 1 channel)	Accuracy= ±[(0.007%)(9ns)+(10ns)/(2x65,536)+30ps]= ±[(630x10^{-15})+(76x10^{-15})+(30x10^{-12}]=31ps	Accuracy= ±[(0.007%)(9ns)+(10ns)/(2x65,536)+30ps]= ±[(630x10^{-15})+(76x10^{-15})+(30x10^{-12}]=31ps
Channel to Channel Deskew Range	± 100 µs	± 100 µs
Jitter, RMS	8 ps ± 0.05ppm x |delay time|	8 ps ± 0.005ppm x |delay time|

Acquisition

Real Time Sample Rate (Max)		
2 Channels Interleaved	4 GSa/s	8 GSa/s
Each Channel	2 GSa/s	4 GSa/s
Equivalent Time Sample Rate (Max)	250 GSa/s	500 GSa/s
Memory Depth	2 Channels Interleaved / Each Channel	2 Channels Interleaved / Each Channel
Standard	4 M / 2 M	64 K / 32 K
Option 040	8 M / 4 M	N/A
Option 080	16 M / 8 M	N/A
Sampling Modes		
Real Time	Successive single-shot acquisitions	
Equivalent Time	Random repetitive sampling (higher time resolution at faster sweep speeds)	
Peak detect	Captures and displays narrow pulses or glitches at all real time sample rates (54830B/31B/32B only)	
Hi Resolution	Real-time boxcar averaging reduces random noise and increases resolution (54830B/31B/32B only)	
Averaging	Selectable from 2 to 4096	
Filters		
Sin[x])/x Interpolation	Filter On/Off selectable FIR digital filter. Digital signal processing adds points between acquired data points to enhance measurement accuracy and waveform display quality. BW= Sample Rate/4	
9-bit Bandwidth (BW) Limit	BW = Sample Rate / 20 (54845B/46B only)	

Trigger	54830B, 54831B and 54832B	54845B and 54846B
Sensitivity		
Internal[8]	DC to 500 MHz: 0.6 div 500 MHz to 1 GHz: 1.5 div (50 Ω)	DC to 100 MHz: 0.5 div 100 MHz to 500 MHz: 1.0 div 500 MHz to 1 GHz: 1.5 div
External (54830B)	DC to 100 MHz: 0.05 x (signal range) 100 MHz to 500 MHz: 0.10 x (signal range)	N/A N/A
Auxiliary (54831B/32B)	DC to 500 MHz: 300 mVp-p	DC to 500 MHz: 300 mVp-p
Level Range		
Internal	± 6 div from center screen (1 MΩ) ± 12 div from center screen (50 Ω)	± 8 div from center screen (1 MΩ) ± 8 div from center screen (50 Ω)
External (54830B)	± 1 V, ± 5 V, ± 25 V (1 MΩ) ± 1 V, ± 5 V, ± 8 V (50 Ω)	N/A
Auxiliary (54831B/32B)	± 5 V	± 5 V
Sweep Modes	Auto, triggered, single	Auto, triggered, single
Trigger Coupling	DC, AC, low frequency reject (50 kHz high pass filter), high frequency reject (50 kHz low pass filter)	
Trigger Conditioning	Noise reject adds hysteresis to trigger circuitry decreasing sensitivity to noise	N/A
Trigger Holdoff Range	80 ns to 320 ms	60 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+	
Trigger Modes		
Edge	Triggers on a specified slope and voltage level on any channel, auxiliary trigger (4 channel models), external trigger (2 channel models) or line input.	
Glitch	Triggers on glitches narrower than the other pulses in your waveform by specifying a width less than your narrowest pulse and a polarity. Minimum glitch width is 500 ps (54845B/46B) or 1 ns (54830B/31B/32B). 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, is present or absent 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).	
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 on any one selected input will generate the trigger.	
TV	Trigger on one of the three standard television waveforms: 525 lines/60 Hz (NTSC, PAL-M), 625 lines/50 Hz (PAL), 875 lines/60 Hz (Zenith HDTV), or define a custom waveform	
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. Capture pulse widths as narrow as 500 ps (54845B/46B) or 1 ns (54830B/31B/32B). Pulse width range settings: > or <1.5 ns to > or <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. Capture edges as fast as 800 ps	

Measurements and Math	54830B, 54831B and 54832B	54845B and 54846B
Waveform Measurements		
Voltage	Peak-to-Peak, Minimum, Maximum, Average, RMS, Amplitude, Base, Top, Overshoot, Preshoot, Upper, Middle, Lower, Area	
Time	Rise time, Fall time, Period, Frequency, Positive Width, Negative Width, Duty Cycle, Delta Time, Tmin, Tmax, Channel to Channel Phase, Cycle-to Cycle Jitter (54845B/46B only)	
Frequency Domain	FFT Frequency, FFT Magnitude, FFT Delta Frequency, FFT Delta Magnitude, FFT Phase	
Eye Pattern (54845B/46B only)	Eye Height, Eye Width, Jitter, Crossing %, Q-Factor, Duty Cycle Distortion	
Measurement Modes		
Automatic Measurements	Measure menu access to all measurements, 4 measurements can be displayed simultaneously	
QuickMeas+	Front panel button activates four pre-selected or four 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	
Statistics	Displays the mean, standard deviation, minimum and maximum measurement values 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, total hits, peak (area of most hits), and mean ± 1,2, and 3 sigma	
Eye Diagram Measurements	Eye diagram display mode allows triggering on both the negative-going and positive-going edges of a signal. Eye diagram measurements include eye height, eye width, jitter, crossing percentage, Q factor, and duty cycle distortion (54845B/46B only)	
Mask Testing	Allows pass/fail testing to user-defined or Agilent-supplied waveform templates. AutoMask allows user to create a mask template from a captured waveform and define 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 (54845B/46B only)	
Marker Modes	Manual Markers, Track Waveform Data, Track Measurements	
Waveform Math	4 functions f1-f4. Select from Add, Average, Differentiate, Divide, FFT Magnitude, FFT Phase, Integrate, Invert, Magnify, Min, Max, Multiply, Subtract, Versus, Measurement Trend (54845B/46B only)	
FFT		
Frequency Range[6]	54830B/31B/32B: DC to 2 GHz (2 channels interleaved), DC to 1 GHz (each channel) 54845B/46B: DC to 4 GHz (2 channels interleaved), DC to 2 GHz (each channel)	
Frequency Resolution	Resolution = Sample Rate / Memory Depth,	
Best resolution at maximum sample rate	54830B/31B/32B: = 4 GSa/s / 16 M = 250 Hz 54845B/46B: = 8 GSa/s / 64 K = 125 kHz	
Frequency Accuracy	(1/2 frequency resolution)+(5x10-5)(signal frequency)	
Signal-to-Noise Ratio[9]	80 dB at 1 Mpt memory depth (54830B/31B/32B) 70 dB at 32 kpts memory depth (54845B/46B)	
Window Modes	Hanning, Flattop, Rectangular	

Display, Computer System and Peripherals, I/O Ports	54830B, 54831B and 54832B	54845B and 54846B
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	
Waveform Styles	Connect Dots, Dots, Persistence (minimum, variable, infinite), Color-Graded Infinite Persistence	
Display Update Rate[7]		
Waveforms/second	>7,800	>1,700
Vp-p Measurements/second	>130	>260
Computer System and Peripherals		
CPU	Intel Pentium III™ 866 MHz microprocessor	
PC System Memory	256 MB	
Drives	5 GB internal hard drive, CD-ROM drive on rear panel, LS-120 Superdisk floppy drive reads/writes to both standard 3.5 inch 1.44 MB and 120 MB disks	
Peripherals	2 button PS/2 mouse and condensed keyboard supplied. All Infiniium models support any Windows 98 compatible input device with a serial, PS/2 or USB interface	
File Types		
Waveforms	Internal Y values; X and Y values in ASCII or Microsoft Excel formats	
Images	BMP, PCX, TIFF, GIF or JPEG	
I/O Ports		
LAN	RJ-45 connector, supports 10Base-T and 100Base-T. Enables Web-enabled remote control, e-mail on trigger, 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	
Auxiliary Output	DC (±2.4 V); square wave (715 Hz [±5%]); trigger output (0 to 255 mV p-p [±5%] into 50 Ω)	
TTL Output	TTL compatible signal	

General Characteristics	54830B, 54831B and 54832B	54845B and 54846B
Temperature		
Operating	0°C to + 50°C	+ 10°C to + 40°C
Non-operating	- 40°C to + 70°C	- 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: 13.3 kg (29.1 lbs.) Shipping: 16.2 kg (35.6 lbs.)	14 kg (31 lbs.) 17 kg (37.4 lbs.)
Dimensions (excluding handle)	Height: 216 mm (8.5 in); Width: 437 mm (17.19 in); Depth: 440 mm (17.34 in)	
Safety	Meets IEC1010-1 +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 ±10°C (models 54830B/31B/32B) or ±5°C (models 54845B/46B) from firmware calibration temperature

1 Typical system bandwidth for 54830B/31B/32B in 1 MΩ input with standard 1165A passive probe attached is 600 MHz

2 Rise time figures for 54830B/31B/32B/45B are calculated from t r = 0.35/bandwidth. Rise time figure for 54846B calculated from t r = 0.4/bandwidth.

3 54830B/31B/32B: Magnification is used below 5 mV/div range. Below 5 mV/div, full scale is defined as 40 mV. 54845B/46B: Magnification is used below 10 mV/div range and between major attenuation settings. Full scale is defined as the major attenuator setting above an intermediate setting. (Major settings 50 Ω: 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 1 MΩ: all of the 50 Ω ranges above plus 2 V)

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

5 The dc gain accuracy decreases 0.08% of full scale per degree C from the firmware calibration temperature

6 FFT amplitude readings are affected by input amplifier roll-off 54830B/31B (-3 dB at 600 MHz, with amplitude decreasing as frequency increases above 600 MHz), 54832B: (–3 dB at 1 GHz, with amplitude decreasing as frequency increases above 1 GHz), 54845B: (–3 dB at 1.5 GHz, with amplitude decreasing as frequency increases above 1.5 GHz), 54846B: (–3 dB at 2.25 GHz, with amplitude decreasing as frequency increases above 2.25 GHz)

7 Real time mode, 64 kpt memory, minimum persistence display mode, triggered sweep mode, no interpolation, markers off, math off, connect dots off, 1 channel acquisition, 50 ns/div

8 For 54830B Series specification valid for vertical ranges > 5 mV / div

9 Noise floor varies as memory depth increases with averaging on

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Ordering Information and Configuration

Agilent Model	Channels	Bandwidth	Sample Rate	Memory Depth
54830B	2	600 MHz	4 GSa/s (interleaved = CH/2) 2 GSa/s on each channel	4 M (interleaved = CH/2) 2 M on each channel
54831B	4	600 MHz		
54832B*	4	1 GHz		
54845B	4	1.5 GHz	8 GSa/s (interleaved = CH/2) 4 GSa/s on each channel	64 K (interleaved = CH/2) 32 K on each channel
54846B*	4	2.25 GHz		

The above models include: PS/2 Mouse, Condensed Keyboard, User's Quick Start Guide in English language,** Documentation CD (Service Guide, Programmer's Guide, Programmer's Quick Reference Guide***), Recovery CD**, Information System in English and Japanese language, Two 1165A 10:1 10 MΩ passive probes (54830B), Four 1165A 10:1 10 MΩ passive probes (54831B), Four 1161A 10:1 10 MΩ passive probes (54845B), Accessory pouch (54810-68701), US power cord, three-year warranty

* Passive probes not included, please order option 001, 002, or 004
** Other languages also available (54845B/46B only)
*** 54845B/46B only

Ordering Information and Configuration: Infiniium Options

Agilent Infiniium Options	Description
Acquisition Memory Options	
040	8 Mpts on half the acquisition channels (interleaved) or 4 Mpts on each acquisition channel
080	16 Mpts on half the acquisition channels (interleaved) or 8 Mpts on each acquisition channel
N2845A	After-purchase memory upgrade, 2 Mpts/ch to 4 Mpts/ch
N2846A	After-purchase memory upgrade, 2 Mpts/ch to 8 Mpts/ch
N2847A	After-purchase memory upgrade, 4 Mpts/ch to 8 Mpts/ch
Probe Options	
001	Add two 1165A, 10:1 passive probes for the 54830B/31B/32B Add two 1161A, 10:1 passive probes for the 54845B/46B
002	Add one 1162A 1:1 passive probe
004	Add four 1165A, 10:1 passive probes for the 54832B Add four 1161A, 10:1 passive probes for the 54845B/46B
007	Add one Wedge adapter kit (1 each 3/8/16 signals, 0.5mm)
008	Add one 1153A 200 MHz differential probe
009	Add one 1154A 500 MHz differential probe
010	Add one 1159A 1 GHz differential probe
011	Add one 1155A 2 Channel, 750 MHz active probe
012	Add one 1156A 1.5 GHz active probe (54830B/31B/32B only)
013	Add one 1157A 2.5 GHz active probe (54845B only)
014	Add one 1158A 4 GHz active probe (54846B only)
016 (E2654A)	EZ-Probe, Positioner: includes base, joystick, and articulating arm
Instrument Options	
B30 (E2645A)	USB 2.0 Test Option - includes software and 1 E2646A SQiDD test fixture for low/full speed USB 2.0 testing
E2646A	Additional USB 2.0 SQiDD test fixture for low/full speed USB 2.0 testing
100 (E2625A)	Communication Mask Test Kit (54845B/46B only)
200 (N2850A)	VoiceControl option
1CM (E2609A)	Add one rackmount kit
UL9 (E2647A)	Add one cordless Logitech trackball
1182B	Testmobile with tilt tray
1184A	Testmobile with keyboard and mouse tray, drawer for accessories
E5850A	Time correlation fixture, integrate Infiniium and 16700
Manuals	
OB3	Printed service manual for the 54830B/31B/32B
OBF	Printed programmers manual for the 54830B/31B/32B
Service Options	
A6J	ANSI Z540-compliant calibration
W32	3-year, return-to-Agilent, up-front calibration option
W34	3-year, return-to-Agilent, stds comp calibration service
W50	5-year, return-to-Agilent, repair coverage (additional 2 years)
W52	5-year, return-to-Agilent, stds calibration service

For additional information on probes, accessories, and options for Infiniium, and for information on upgrading your existing Infiniium, please refer to the *Infiniium 54800 Series Oscilloscopes Probes, Accessories and Options Guide* 5968-7141EN/EUS.

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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

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