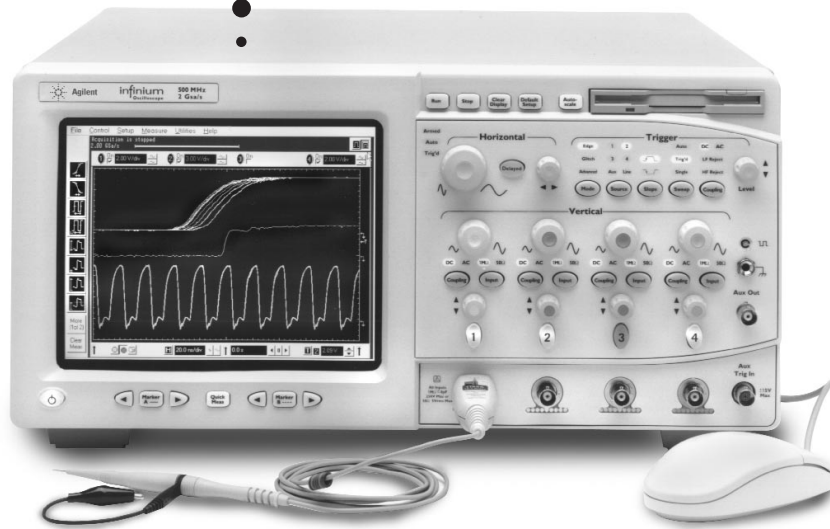


Agilent Technologies Infiniium 54810/15/20/25/35/45A Oscilloscopes

Data Sheet



- 500 MHz, 1 GHz and 1.5-GHz bandwidth models
- 2- or 4-channel models
- Up to 8-GSa/s sample rates
- Simple, analog-like front panel
- Familiar Windows[®]98-based graphical user interface
- Built-in information system
- LAN printer and file sharing
- Eye diagrams and mask testing
- VoiceControl Option

Agilent Infiniium oscilloscopes combine a simple, analog-like front panel, the graphical user interface of a PC, and powerful connectivity capabilities to make high-performance features accessible and uncomplicated. Infiniium oscilloscopes are designed to help you get your measurement job done faster.

Simple Analog-like Front Panel

Agilent Infiniium oscilloscopes give you the simple, uncluttered front panel of an analog scope for accessing basic functions. Dedicated scale and position knobs for each channel provide intuitive operation. Trigger LEDs show you trigger status at a glance. To speed up measurements, the QuickMeas key gives you instant access to any four measurements.

Familiar Graphical User Interface

Agilent Infiniium scopes employ a graphical user interface based on Windows[®] 98. Windows' familiar interface means you won't have to spend a lot of time learning and relearning the scope. Pull-down menus give you easy access to advanced features. Dialog boxes display all the choices you need to make for measurement setups. In addition, waveforms, markers, and measurements can be easily positioned on the display by using your mouse to drag and drop.

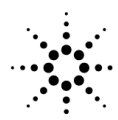
Exceptional Connectivity

Agilent Infiniium scopes give you the tools you need to document your work and share your results. It takes just a few mouse clicks to save waveforms and screen bitmaps to hard drive, floppy, or, when networked, to a drive on your network. LAN connectivity

also lets you easily print your results to networked printers, and makes it simple to share your waveforms and data with others.

The Performance You Need

And Agilent Infiniium scopes aren't just easier to use. These scopes provide the high performance specifications and features you need to get your measurement job done faster. With bandwidths to 1.5 GHz and sample rates to 8 GSa/s, Infiniium can view your fastest signals. Powerful triggering and analysis makes it easy to capture and analyze your waveforms. Display and math features like color-graded persistence and histograms let you easily view and isolate signal problems faster.



Agilent Technologies

Innovating the HP Way

Performance to Get the Job Done

Agilent Infiniium scopes combine ease-of-use with 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, and review the features on the next two pages to see how Infiniium makes its advanced power so usable.

General-Purpose Versatility

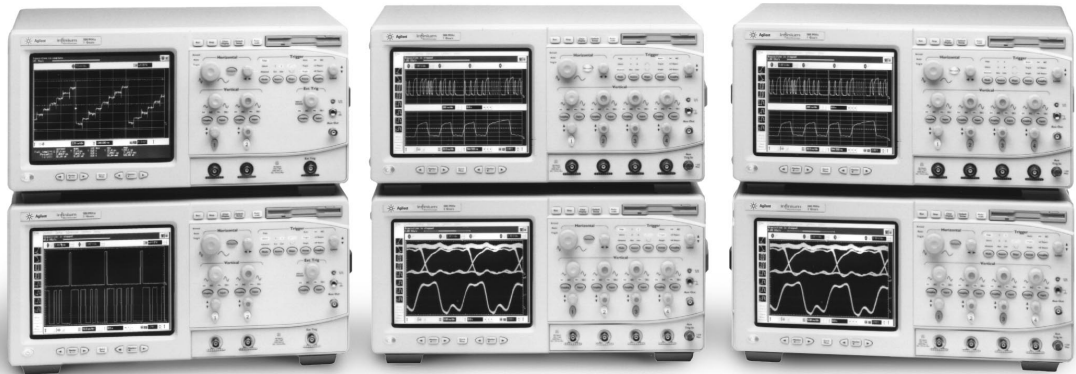
The 500 MHz versions of Infiniium provide exceptional performance and capability for general purpose lab measurements. Select a sample rate of 1 or 2 GSa/s based on your need for single shot measurement accuracy, and let your application needs and budget determine your choice of a 2- or 4-channel model. Whichever Infiniium you select, you can be sure of getting a powerful scope that makes it easier to get your job done.

For applications requiring more than 500 MHz of bandwidth, the new 54835A offers four channels at 1 GHz, with sample rates up to 4 GSa/s.

Ultimate Performance

The Infiniium family's 54845A provides the performance you need for your most demanding signals. 1.5 GHz bandwidth and a sample rate of up to 8 GSa/s ensure fast, accurate capture of your waveforms. Like the other Infiniium models, the 54845A's familiar user interface makes it easy to take advantage of every bit of the performance inside.

| Model | Channels | Bandwidth | Sample Rate | Memory Depth |
|--------|----------|-----------|--------------------------|----------------------|
| 54810A | 2 | 500 MHz | 1 GSa/s | 32K |
| 54815A | 4 | 500 MHz | 1 GSa/s | 32K |
| 54820A | 2 | 500 MHz | 2 GSa/s | 32K |
| 54825A | 4 | 500 MHz | 2 GSa/s | 32K |
| 54835A | 4 | 1 GHz | 4 GSa/s (2 channel mode) | 64K (2 channel mode) |
| | | | 2 GSa/s (4 channel mode) | 32K (4 channel mode) |
| 54845A | 4 | 1.5 GHz | 8 GSa/s (2 channel mode) | 64K (2 channel mode) |
| | | | 4 GSa/s (4 channel mode) | 32K (4 channel mode) |



Infiniium models 54815A and 54825A

Infiniium models 54810A and 54820A

Infiniium models 54835A and 54845A

Features to Get the Job Done Faster

Drag and Drop Measurements

Just drag and drop an icon from the measurement toolbar onto the portion of the waveform you want to measure and the measurement appears instantly on screen.

Easy Zooming

Infiniium's graphical user interface gives you a new, easier way to zoom. Use the mouse to draw a box around the section of the waveform that you want to expand, then click inside the box to zoom in on the area of interest. You can also undo the zoom (up to 10 levels of undo available).

Built-in Information System

Infiniium's built-in information system puts measurement assistance at your fingertips in seven different languages (English, French, German, Japanese, Korean, Traditional Chinese and Simplified Chinese). You'll no longer have to look for the manual when you need help setting up scope functions or making complex measurements. Setup Guides give you step-by-step instructions for 24 different measurements and procedures. In addition, you'll find a thorough index of help topics and context-sensitive help available from the dialog boxes.

VoiceControl Option

If you've found that you don't have enough hands to probe fine pitch ICs and control the front panel of your scope at the same, Infiniium now offers a solution. The VoiceControl option allows you to speak natural English language commands through the supplied collar-mounted microphone, allowing hands-free operation of the front panel. VoiceControl is speaker and gender independent and does not require the scope to be "trained" to recognize a particular user. For complete information, visit our website at www.agilent.com/find/infiniium or order the Infiniium VoiceControl datasheet (5968-6659).

Advanced Triggering

Agilent Infiniium scopes include powerful Violation Triggering technology, making it easier for you to capture and view your toughest signals. In addition to standard capabilities such as edge, glitch, logic, state, and video trigger, Violation Triggering adds the ability to trigger on rise time, fall time, setup and hold time, and runt pulses. Runt pulse trigger is standard

on models 54835A/54845A, and optional (opt. 015) on models 54810A/54815A/54820A/54825A.

Waveform Math with FFTs and Histograms

Agilent Infiniium scopes provide a wide variety of math functions, including Fast Fourier Transforms (FFTs) and histograms. FFTs allow quick identification of frequency components within your signals, while histograms provide a quantifiable way to analyze signal variations over time. Both help you better understand noise, jitter, and other sources of problems within your design.

Color-grade Persistence

The color-grade persistence display mode provides a visual representation of waveform behavior over time, making it easy to locate and identify signal anomalies. And you don't lose debugging power: all scope capabilities are available in this mode.

Display Annotation

Add labels to the display to identify waveforms, annotate setups, or provide operator instructions. Infiniium's keyboard makes this an easy task.

Eye Diagram Measurements

Agilent Infiniium scopes provide eye diagram measurements to make general testing of communications designs and systems even easier.

AutoMask and Mask Test Capability

AutoMask allows you to define a tolerance limit and automatically create a test envelope based on the waveform on screen. Mask testing then provides a pass/fail comparison of your incoming signal to the test envelope.

Communication Mask Test Kit Option

Easily test your product's conformance to ANSI T1.102 and ITU G.703 standards with Agilent Infiniium oscilloscopes' Communication Mask Option. This option provides a library of industry standard waveform masks, and eases the measurement task with pushbutton alignment of the appropriate mask to your signal and clear indication of failure points on the waveform. A set of "smart" termination adapters works with the probe interface to assure error-free measurements.

Internal Hard and Floppy Disk Drives

Saving your results is simple with Infiniium's data storage capabilities. Use the internal 3.2 Gbyte hard drive or the 120 MB LS-120 SuperDisk floppy

drive to store waveform data, screen images, or scope setups. It's easy to share your information with others, as well. Waveform data can be stored in ASCII or Microsoft Excel formats, while images can be stored as BMP, PCX, TIF, GIF, EPS, or PS formats. Both allow easy import into other programs for documentation or further analysis.

Standard Interfaces

10/100 MBPS LAN, GPIB, RS-232, and Centronics interfaces are standard features⁴. LAN allows you to transfer files or use network printers with the same ease as when you do these tasks on your PC. Infiniium scopes are fully HP-IB programmable.

Printer Support

Agilent Infiniium oscilloscopes offer full support of HP DeskJet and LaserJet printers. Visit our website at <http://www.hp.com/info/infiniium21> for a list of tested printers.

1152A 2.5-GHz, 0.6-pF Active Probe

Use the 1152A active probe with Infiniium model 54845A for the most non-intrusive, faithful reproduction of signals. Even without grounding, this probe accurately reproduces high-frequency edges. Agilent's breakthrough technology assures minimum loading on your circuit.

High-Bandwidth Differential Probes

These high-bandwidth probes are essential for viewing the high speed, low level differential signals prevalent in today's designs. Both probes have 1:1 gain and additional attenuators for larger signals. The 1154A also features 10X gain for mV measurements.

Simple Surface-Mount Probing

The Agilent Wedge Probe Adapter provides accurate, mechanically non-invasive contact to 0.5 mm TQFP/PQFP package leads. Infiniium's probes include an adapter that connects to the Wedge to make surface-mount probing hassle-free.

Infiniium Accessories

A complete line of accessories is available for Agilent Infiniium oscilloscopes, including alternative pointing devices, special probing solutions, and more. For complete information, visit our website at <http://www.agilent.com/find/infiniium>, or see the Agilent Infiniium Probes and Accessories Product Overview (5966-3543).

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period, and $\pm 10^{\circ}\text{C}$ (models 54810A/15A/20A/25A) or $\pm 5^{\circ}\text{C}$ (models 54835A/45A) from firmware calibration temperature.

| | 54810A, 54815A, 54820A and 54825A | 54835A | 54845A |
|--|---|--|---|
| Acquisition | | | |
| Maximum Sample Rate Real Time | 54810A/15A: 1 GSa/s on each channel 54820A/25A: 2 GSa/s on each channel | 2 channel mode: 4 GSa/s 4 channel mode: 2 GSa/s | 2 channel mode: 8 GSa/s 4 channel mode: 4 GSa/s |
| Maximum Effective Sample Rate Equivalent Time | 100 GSa/s | 500 GSa/s | |
| Memory Depth | 32,768 points/channel | 2 channel mode: 65,536 points 4 channel mode: 32,768 points | |
| Memory Depth Modes Auto: | Optimized for best combination of update rate and display quality. | | |
| Manual: | Selectable from 16 to 32,768 points | Selectable 2 channel mode: from 16 to 65,536 points 4 channel mode: from 16 to 32,768 points | |
| 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 1 ns or wider at sample rates of 250 MSa/s or less | n/a | |
| Filters: 9-bit Bandwidth Limit Filter: | BW = Sample Rate/20 | | |
| (Sinx)/x Interpolation: | On/Off selectable FIR digital filter. Digital signal processing adds points between aquired data points to enhance measurement accuracy and waveform display quality. BW= Sample Rate/4 | | |
| Averaging | Selectable from 2 to 4096 | | |
| Vertical | | | |
| Number of Channels | 54810A/20A: 2 (simultaneous acquisition) 54815A/25A: 4 (simultaneous acquisition) | 4 (simultaneous acquisition) | |
| Analog Bandwidth (-3dB)* | 500 MHz | 50 Ω : 1.0 GHz 1M Ω : 500 MHz (with 1161A probe) | 50 Ω : 1.5 GHz 1 M Ω : 500 MHz (with 1161A probe) |
| System Bandwidth with 1160A 10:1 passive probe | 500 MHz | - | |
| 1161A 10:1 passive probe | - | 500 MHz | |
| 1162A 1:1 passive probe | 25 MHz | 25 MHz | |
| 1163A 10:1, 500 Ω passive probe | 500 MHz | 1.0 GHz | 1.5 GHz |
| 1152A 2.5 GHz, .6 pF active probe | 500 MHz | 1.0 GHz | 1.3 GHz |
| 1153A 200 MHz differential probe | 200 MHz | 200 MHz | |
| Real Time Bandwidth* | 54810A/15A: 250 MHz 54820A/25A: 500 MHz | 50 Ω : 1.0 GHz (2 channel mode) 500 MHz (4 channel mode) | 50 Ω : 1.5 GHz (2 channel mode) 1.0 GHz (4 channel mode) |
| Rise Time ¹ | 54810A/15A: 700 ps (Equivalent Time) 1.4 ns (Real Time) 54820A/25A: 700 ps | 50 Ω : 350 ps 1M Ω : 700 ps | 50 Ω : 233 ps 1 M Ω : 700 ps |
| Sensitivity ² 1 M Ω : | 1 mV/div to 5 V/div | 2 mV/div to 2 V/div | |
| 50 Ω : | 1 mV/div to 5 V/div | 2 mV/div to 1 V/div | |
| Expand about: | Choose between expanding about center screen or ground. This applies to channels, memories or math functions. | | |
| Input Impedance* | 1 M $\Omega \pm 1\%$ (≈ 8 pF), or 50 $\Omega \pm 1\%$ | 1 M $\Omega \pm 1\%$ (≈ 12 pF), or 50 $\Omega \pm 1.5\%$ | |
| VSWR (50 Ω) | n/a | dc to 500 MHz: 1.3 500 MHz to 1 GHz: 1.5 | dc to 500 MHz: 1.3 500 MHz to 1 GHz: 1.5 1 GHz to 1.5 GHz: 1.75 |
| Input Coupling | dc, ac (7 Hz, available in 1 M Ω only) | dc, ac (7 Hz, available in 1 M Ω only) | |
| Maximum Input Voltage* 1 M Ω : | ± 250 V (dc + ac) [ac<10 kHz], CAT I | ± 100 V (dc + ac) [ac<10 kHz], CAT I | |
| 50 Ω : | 5 Vrms, CAT I | 5 Vrms, CAT I | |
| Hardware Bandwidth Limit (-3 dB) | On/Off selectable, 30 MHz | n/a | |
| Channel-to-channel isolation (with channels at equal sensitivity) | dc to 50 MHz: 50 dB 50 MHz to 500 MHz: 40 dB | dc to 100 MHz: 40 dB 100 MHz to 1 GHz: 30 dB 1 GHz to 1.5 GHz: 25 dB | |

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period, and $\pm 10^{\circ}\text{C}$ (models 54810A/15A/20A/25A) or $\pm 5^{\circ}\text{C}$ (models 54835A/45A) from firmware calibration temperature.

| | 54810A, 54815A, 54820A and 54825A | 54835A and 54845A |
|---|---|---|
| Offset Range | Vertical Sensitivity Available Offset 1 mV to 49 mV/div $\pm 2\text{ V}$ > 50 mV to 249 mV/div $\pm 10\text{ V}$ > 250 mV to 1.24 V/div $\pm 50\text{ V}$ 1.25 V to 5V/div $\pm 250\text{ V}$ | Vertical Sensitivity Available Offset 1M Ω : 2 mV/div to 100 mV/div $\pm 4\text{ V}$ >100 mV/div to 2 V/div $\pm 40\text{ V}$ 50 Ω : all $> \pm 12\text{ div}$ |
| Dynamic Range | $\pm 12\text{ div}$ from center screen | $\pm 8\text{ div}$ from center screen |
| Full resolution channel scales | All volts/division settings $\geq 7\text{ mV/div}$ | 10, 20, 50, 100, 200, 500, 1000 mV/div (plus 2000 mV/div in 1 M Ω) |
| dc Gain Accuracy ^{*2,3} | $\pm 1.25\%$ of full scale at full resolution channel scale | $\pm 1\%$ of full scale at full resolution channel scale |
| Resolution ² | 8 bits (0.4% of full scale), 12 bits or greater with sufficient averaging | |
| Real Time | 8 bits (0.4% of full scale), 12 bits or greater with sufficient averaging | |
| Equivalent Time | 8 bits (0.4% of full scale), 12 bits or greater with sufficient averaging | |
| Offset Accuracy ^{*2} | $\pm (1.25\%$ of channel offset + 2% of full scale) at full resolution channel scale | $\pm (1\%$ of channel offset + 1% of full scale) at full resolution channel scale |
| dc Voltage Measurement Accuracy ^{*2,3} | $\pm [(\text{dc gain accuracy}) + (\text{resolution})]$ | |
| Dual Cursor | $\pm [(\text{dc gain accuracy}) + (\text{offset accuracy}) + (\text{resolution}/2)]$ | |
| Single Cursor | $\pm [(\text{dc gain accuracy}) + (\text{offset accuracy}) + (\text{resolution}/2)]$ | |
| Example (Single cursor accuracy, 70 mV signal, 10 mV/div, 0 offset) | Accuracy = $\pm [1.25\%(80\text{mV}) + (1.25\%(0) + 2\%(80\text{ mV})) + (.4\%/2)(80\text{ mV})] = \pm 2.8\text{ mV}$ | Accuracy = $\pm [1\%(80\text{mV}) + (1\%(0\text{ V}) + 1\%(80\text{ mV})) + (.4\%/2)(80\text{ mV})] = \pm 1.76\text{ mV}$ |
| AutoProbe Interface | AutoProbe is an intelligent communication and power link between compatible probes and Infiniium scopes. AutoProbe completely configures the scope for the attached probe. For instance, it identifies the probe type and sets up the proper input impedance, attenuation ratio, probe power and offset range, as needed. | |
| Horizontal | | |
| Main Time Base Range | 500 ps/div to 20 s/div | 100 ps/div to 20 s/div |
| Horizontal Position Range (pre trigger) | 0 to -1 s or one full screen width, whichever is larger | |
| Horizontal Position Range (post trigger) | 0 to 1 s or one full screen width, whichever is larger | |
| Delayed Sweep Range | 1 ps/div to current main time base setting | 1 ps/div to current main time base setting |
| Delayed Sweep Delay Range | Within main time base acquisition record | |
| Resolution | 10 ps | 2 ps |
| Timebase Accuracy | 50 ppm (.005%) | 70 ppm (.007%) |
| Delta-t Accuracy [*] | $\pm [(.005\%)(\text{delta-t}) + (0.2)(\text{sample period})]$ | |
| Real Time mode4 | $\pm [(.007\%)(\text{delta-t}) + (0.2)(\text{sample period})]$ | |
| Equivalent Time mode (≥ 16 avgs.) | $\pm [(.005\%)(\text{delta-t}) + (\text{full scale}/(2*\text{memory depth})) + 60\text{ps}]$ | |
| Peak Detect mode | $\pm [(.005\%)(\text{delta-t}) + (1\text{ sample period})]$ | |
| Example (Equivalent Time mode (≥ 16 avgs.), 9 ns signal, 1 ns/div, 1 channel) | Accuracy = $\pm [(.005\%)(9\text{ ns}) + ((10\text{ ns})/(2*32,768)) + 60\text{ps}] = \pm [(450 \times 10^{-15}) + (152 \times 10^{-15}) + (60 \times 10^{-12})] = 61\text{ ps}$ | Accuracy = $\pm [(.007\%)(9\text{ ns}) + ((10\text{ ns})/(2*65,536)) + 30\text{ps}] = \pm [(630 \times 10^{-15}) + (76 \times 10^{-15}) + (30 \times 10^{-12})] = 31\text{ ps}$ |
| Jitter, RMS | n/a | 8 ps $\pm .005\%$ (delay setting) |
| Trigger | | |
| Sensitivity ^{*2} | Internal (normal) dc to 100 MHz: 0.5 div 100 MHz to 500 MHz: 1.0 div 500 MHz to 1 GHz: N/A | |
| Internal (noise reject) dc to 100 MHz: 1.0 div 100 MHz to 500 MHz: 1.5 div | N/A | |
| External (54810/20A) dc to 100 MHz: 0.0225 x (signal range) 100 MHz to 500 MHz: 0.045 x (signal range) | N/A | |
| Auxiliary (54815/25/35/45A) dc to 500 MHz: 300 mVp-p | 300 mVp-p | |
| Maximum Input Voltage [*] External (54810/20A) | 1 M Ω : $\pm 250\text{ V}$ (dc + ac) [ac < 10 kHz], CAT I, 50 Ω : 5 Vrms, CAT I | n/a |
| Auxiliary (54815/25/45A) | 2.5 k Ω : $\pm 15\text{ V}$, CAT I | 2.5 k Ω : $\pm 15\text{ V}$, CAT I |
| Minimum Pulse Width (internal, external) | 1 ns at $> 1.0\text{ div}$ | 500 ps at $> 1.0\text{ div}$ |
| Level Range | Internal $\pm 12\text{ div}$ from center screen $\pm 8\text{ div}$ from center screen | |
| External (54810/20A) | $\pm 1\text{ V}$, $\pm 5\text{ V}$, $\pm 25\text{ V}$ | |
| Auxiliary (54815/25/45A) | $\pm 5\text{ V}$ | |

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period, and $\pm 10^{\circ}\text{C}$ (models 54810A/15A/20A/25A) or $\pm 5^{\circ}\text{C}$ (models 54835A/45A) from firmware calibration temperature.

| Trigger (continued) | 54810A, 54815A, 54820A and 54825A | 54835A and 54845A |
|--|--|-------------------|
| Sweep Modes | Auto, triggered, single | |
| Trigger Coupling | dc, ac(7 Hz), low frequency reject (50 kHz), high frequency reject (50 kHz) | |
| Trigger Holdoff Range | 60 ns - 320 ms | |
| Trigger Modes | Edge, Glitch, Pattern, State, Delay by Time, Delay by Events, Violation (Runt, Setup/Hold Time, Pulse width, Transition), Video, Line | |
| Glitch | Select positive or negative polarity, width. Captures glitches as narrow as 500 ps. | |
| Pattern | Select inputs as High, Low or X (don't care) to create pattern. Trigger when pattern is entered, exited, present > t, present < t, or present over a range of time. Captures patterns as narrow as 500 ps. | |
| State | Select one channel as clock, specify other inputs as High, Low or X. Logic Type: AND or NAND. Setup time is 1 ns and hold time is 0 ns. | |
| Delay by Time | Time: 30 ns to 160 ms. The trigger is qualified by an edge. After the delay, a rising/falling edge on any one selected input will generate the trigger. | |
| Delay by Events | Events: 1 to 16,000,000 rising or falling edges. The trigger is qualified by an edge. After the delay, a rising/falling edge on any one selected input will generate the trigger. | |
| Violation Trigger | | |
| Runt | Select Positive, Negative or either polarity, thresholds, time qualified. Captures runts as narrow as 500 ps. Standard feature on models 54835A/54845A. Option 015 on models 54810A/54815A/54820A/54825A. | |
| Setup/Hold | Modes: Setup, Hold or Setup and Hold. Select Clock, thresholds, setup and/or hold time. Edges must be ≥ 1.5 ns. The difference in slew rates between clock and data must be less than a 2:1 ratio. | |
| Pulse Width | Triggers on pulse width > t, or < t. Captures pulses as narrow as 500 ps. | |
| Transition | Select Rise Time or Fall Time, present > t or present < t, thresholds. Captures edges as fast as 800 ps. | |
| Accuracy (time) for glitch, pulse width and time-qualified pattern | 1.5 ns - 20 ns: $\pm(20\%$ setting + 500 ps) 20 ns - 160 ms: $\pm(3\%$ setting + 2 ns) | |
| Video Triggering | 525 lines/60 Hz (NTSC), 625 lines/50 Hz (PAL), 875 lines/60 Hz. Trigger on Field 1 or Field 2, any line. User defined triggering: User can specify sync pulse level, width and polarity, edge number. | |
| Display | | |
| Display | 8.4 inch diagonal color active matrix LCD module incorporating amorphous silicon TFTs. | |
| Annotation | Up to 12 labels, with up to 100 characters each, can be inserted in the waveform display area. Labels can be saved to and recalled from image files and setup files. | |
| Active Display Area | 6.73"x 5.04" (33.92 sq. in.) 171 mm x 128 mm (21,888 sq. mm) | |
| Waveform Viewing Area | 4.10"x 6.25" (25.6 sq. in.) 104 mm x 159 mm (16,536 sq. mm) in Full screen mode | |
| Display Resolution | 640 pixels horizontally x 480 pixels vertically | |
| Persistence | Minimum, Variable (Up to 6 levels of gray scale, 100 ms to 40 s), Infinite, Color Graded | |
| Color Graded Infinite Persistence | Previous sweeps are stored in differing colors based on the number of times each pixel is illuminated. User can turn on or off, and can define colors to be used. This allows easy visual recognition of waveform behavior over time. | |
| Display Update Rate | Real Time mode, minimum persistence display mode, triggered sweep mode, no interpolation, markers off, math off, connect the dots off, 1 channel acquisition, 50 ns/div, statistics on | |
| Measurement Conditions | | |
| Waveforms/sec | >2,100 | |
| Vpp Measurements/sec | >130 | |
| Measurements | | |
| Automatic Parametrics | 27 automatic measurements: V_{pp} , V_{min} , V_{max} , V_{avg} , V_{amptd} , V_{base} , V_{top} , V_{rms} , Preshoot, Overshoot, V_{upper} , V_{middle} , V_{lower} , Rise Time, Fall Time, Period, Frequency, Positive Width, Negative Width, Duty Cycle, Delta Time, T_{max} , T_{min} , FFT Frequency, FFT Magnitude, FFT Delta Frequency, FFT Delta Magnitude. Over HP-IB only: VTime, TVolts | |
| Threshold Definition | Selectable 10%, 20%, 50%, 80%, 90% or Custom (in % or absolute voltage) Independent thresholds can be set for each channel. | |
| Top-Base Definition | Standard or Custom (in absolute voltage) | |
| Statistics | On/Off selectable. Current measurement, mean and standard deviation | |
| Histograms | Use vertical and horizontal waveform markers to define region to analyze. Can use in vertical (for timing and jitter measurements) or horizontal (noise and amplitude change) modes. Measurements included: mean, standard deviation, peak-to-peak value, median, total hits, peak (area of most hits), and mean $\pm 1, 2$, 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. | |

Performance Characteristics

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| Measurements (continued) | 54810A, 54815A, 54820A and 54825A | 54835A and 54845A |
|---------------------------------|---|--|
| Mask Testing | Allows pass/fail testing to user-defined or Agilent-supplied waveform templates. Up to 8 regions of polygons allowed. Mask inversion inverts mask around baseline. Test modes include test forever, test to specified time or event limit, and stop on failure. Auto-mask allows user to define tolerance range in time/voltage or percentage and create a mask template from a captured waveform. Masks can be automatically aligned with the incoming signal. All masks can be manually scaled via controls or the mouse. | |
| Communications Mask Option | Option 100 provides a set of ITU G.703 and ANSI T1.102 industry standard masks for compliance testing. For a complete list of the masks provided, request Agilent Communications Mask Testing Option 100 technical data sheet (see page 8) | |
| Measurement Toolbar | 16 Drag and Drop automatic measurement icons. | |
| QuickMeas+ | Allows user to configure a button below the display for the following functions: QuickMeas: activates 4 preselected automatic measurements. QuickPrint: prints out screen. QuickScreen: saves screen image to file; multiple button pushes increments filename suffix (e.g. Data01, Data02, etc.). QuickWaveform: saves waveform data to a file on the disk drive; multiple button pushes increments filename suffix. QuickSetup: loads in a specific instrument setup file | |
| Markers Modes | Manual Markers, Track Waveform Data, Track Measurements | |
| Waveform Math | 4 functions f1-f4. Select from Add, Subtract, Multiply, Divide, Invert, Magnify, Vs, Min, Max, Integrate, Differentiate, FFT Magnitude. Any of the Waveform Math functions (e.g., FFT) can be averaged. | |
| FFT | | |
| Frequency Range ⁵ | 54820A/54825A: dc to 1 GHz (Sample rate/2) 54810A/54815A: dc to 500 MHz (Sample rate/2) | 54835A: 2 channel mode – dc to 2 GHz 4 channel mode – dc to 1 GHz 54845A: 2 channel mode – dc to 4 GHz 4 channel mode – dc to 2 GHz |
| Frequency Accuracy | $(1/2 \text{ frequency resolution}) + (5 \times 10^{-5})(\text{signal frequency})$ | $(1/2 \text{ frequency resolution}) + (7 \times 10^{-5})(\text{signal frequency})$ |
| Amplitude Display | Power in dBm | |
| Signal-to-noise ratio | 70 dB at 32K memory depth. Noise floor varies with memory depth and with averaging. | |
| Window Modes | Hanning, Flattop, Rectangular | |
| Computer System/Storage | | |
| CPU | AMD K6-2™ 400 MHz microprocessor | |
| Disk Drives | 3.2 GByte internal hard drive. Storage capacity is limited only by disk space. 3.5" 120 MB LS-120 SuperDisk floppy drive (reads/writes to std. 3.5" floppies). Store and recall setups, waveforms, and store screen images to both the hard drive and the floppy drive. | |
| File types: Waveforms Images | Internal Y values; X and Y values in ASCII or Microsoft Excel formats BMP, PCX, TIF, GIF, EPS or PS formats | |
| Mouse | Standard mouse supplied. Supports any Microsoft® mouse-compatible pointing device, serial or PS/2 | |
| Waveform Memories | 4 nonvolatile waveform memories | |
| I/O | | |
| LAN | Enables data/setup file transfers and use of network printers; supports Microsoft Networking; 10/100 MBPS operation that complies with IEEE 802.3 Ethernet and ISO/IEC 8802-3 Ethernet standards; TCP/IP protocol and RJ-45 connector. | |
| HP-IB | Fully programmable, complies with IEEE 488.2 | |
| RS-232 (serial) | 2 ports: COM1, COM2. Printer and pointing device support | |
| Centronics | Printer support | |
| Printers | Full support of HP DeskJet and LaserJet printers. Visit the Infiniium website at http://www.agilent.com/find/infiniium | |
| PS/2 port | For PS/2 mouse | |
| Keyboard port | Standard keyboard for file naming and waveform annotation, scope control | |
| Video Output | 15 pin VGA, full color | |
| Auxiliary Output | DC ($\pm 2.5\text{v}$); square wave (715 Hz [$\pm 5\%$], 350 mVpp [$\pm 5\%$]); trigger output (350 mVpp [$\pm 5\%$], frequency varies with occurrence of trigger) | |
| General Characteristics | | |
| Temperature | | |
| Operating: | 0°C to +50°C | 10°C to +40°C |
| Nonoperating: | -40°C to 70°C | |
| Humidity | | |
| Operating: | Up to 95% relative humidity (noncondensing) at +40°C | |
| Nonoperating: | Up to 90% relative humidity at +65°C | |

| General Characteristics | 54810A, 54815A, 54820A and 54825A | 54835A and 54845A |
|-------------------------------|--|--|
| Altitude | | |
| Operating: | Up to 4,600 meters (15,000 ft.) | |
| Nonoperating: | Up to 15,300 meters (50,000 ft.) | |
| Vibration | | |
| Operating: | Random vibration 5-500 Hz, 10 minutes per axis, 0.3g(rms) | |
| Nonoperating: | Random vibration 5-500 Hz, 10 minutes per axis, 2.41g(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 | Voltage: 100-240VAC, +/- 10%, Cat II, 47 to 440 Hz; Max power dissipation: 390 W | |
| Weight | Net: 10.6 kg (23.4 lb), Shipping: 13.6 kg (30 lb) | Net: 12.0 kg (26.5 lb), Shipping: 15 kg (33 lb) |
| Dimensions (excluding handle) | Height: 216 mm (8.50 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 | |

Notes

¹Rise time figures are calculated from $t_r = 0.35/\text{bandwidth}$

²54810A/15A/20A/25A: Magnification is used below 7 mV/div range. Below 7 mV/div, full scale is defined as 56 mV. 54845A: 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 above plus 2 V)

³54810A/15A/20A/25A: The dc gain accuracy decreases 0.08% of full scale per degree C from the firmware calibration temperature.

⁴For bandwidth limited signals, $t_r \geq 1.4 \times \text{sample interval}$

⁵FFT amplitude readings are affected by input amplifier roll-off; 54810A/15A/20A/25A: (-3 dB at 500 MHz, with amplitude decreasing as frequency increases above 500 MHz). 54845A: (-3 dB at 1.5 GHz, with amplitude decreasing as frequency increases above 1.5 GHz).

Ordering Information

54810A Infiniium Oscilloscope

54815A Infiniium Oscilloscope

54820A Infiniium Oscilloscope

54825A Infiniium Oscilloscope

54835A Infiniium Oscilloscope

54845A Infiniium Oscilloscope

All of the above models include:

- 1 Mouse (C3751-60201), 1 Infiniium Mouse Pad (54810-85901), 1 Keyboard (E2610A), 1 User's Quick Start Guide, English language* (54810-97000), 1 Service Guide, 1 Programmer's Guide, 1 Programmer's Quick Reference Guide, Information System in English, French, German, Japanese, Korean and Chinese (for Taiwan), 2 1160A 10:1 10 MΩ passive probes (54810A, 54820A), 4 1160A 10:1 10 MΩ passive probes (54815A, 54825A), 4 1161A 10:1 10 MΩ passive probes (54635A, 54845A), 1 Accessory Pouch (54810-68701), 1 US power cord, Three-year warranty

* Other languages also available

Options

090 Delete standard probes

2 1160A probes for the 54810A/20A

4 1160A probes for the 54815A/25A

4 1161A probes for the 54835/45A

001* Additional standard probes

2 1160A probes for the 54810A/15A/20A/25A

2 1161A probes for the 54835/45A

002* Add 1 1162A 1:1 passive probe

003* Add 1 1163A 10:1 500 Ω, low C passive probe

006* Add 1 1152A 2.5 GHz, .6 pF active probe (for 54835/45A)

008* Add 1 1153A 200 MHz differential probe

009 Add 1 1154A 500 MHz differential probe

010 Add 1 1159A 1 GHz differential probe

015 Extended (runt) triggering (standard on 54835A/54845A)

100* Communications Mask Test Kit
includes mask library disk and set of termination adapters

200 VoiceControl option

1BP Mil Std 45662A and ANSI/NCSS Z-540 calibration with test data

1CL* Add 1 Keyboard (E2610A)

1CM* Add 1 Rackmount kit (E2609A)

UL5* Add 1 Touchpad pointing device (E2612A)

UL6* Add 1 Clip-on track ball pointing device (E2611A)

W50 Five-year, customer-return, repair coverage (additional 2 years)

* Multiple options can be ordered

For more information about Agilent Technologies test and measurement products, applications, services, and for a current sales office listing, visit our web site:

<http://www.agilent.com/find/infiniium>

You can also contact one of the following centers and ask for a test and measurement sales representative.

United States:

Agilent Technologies
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
(tel) 1 800 452 4844

Canada:

Agilent Technologies Canada Inc.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
(tel) 1 877 894 4414

Europe:

Agilent Technologies
Test & Measurement
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(tel) (31 20) 547 9999

Japan:

Agilent Technologies Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192-8510, Japan
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Latin America:

Agilent Technologies
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5200 Blue Lagoon Drive, Suite #950
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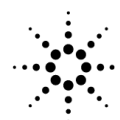
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