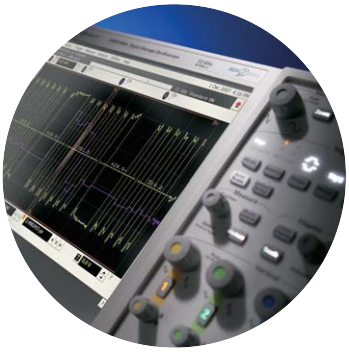


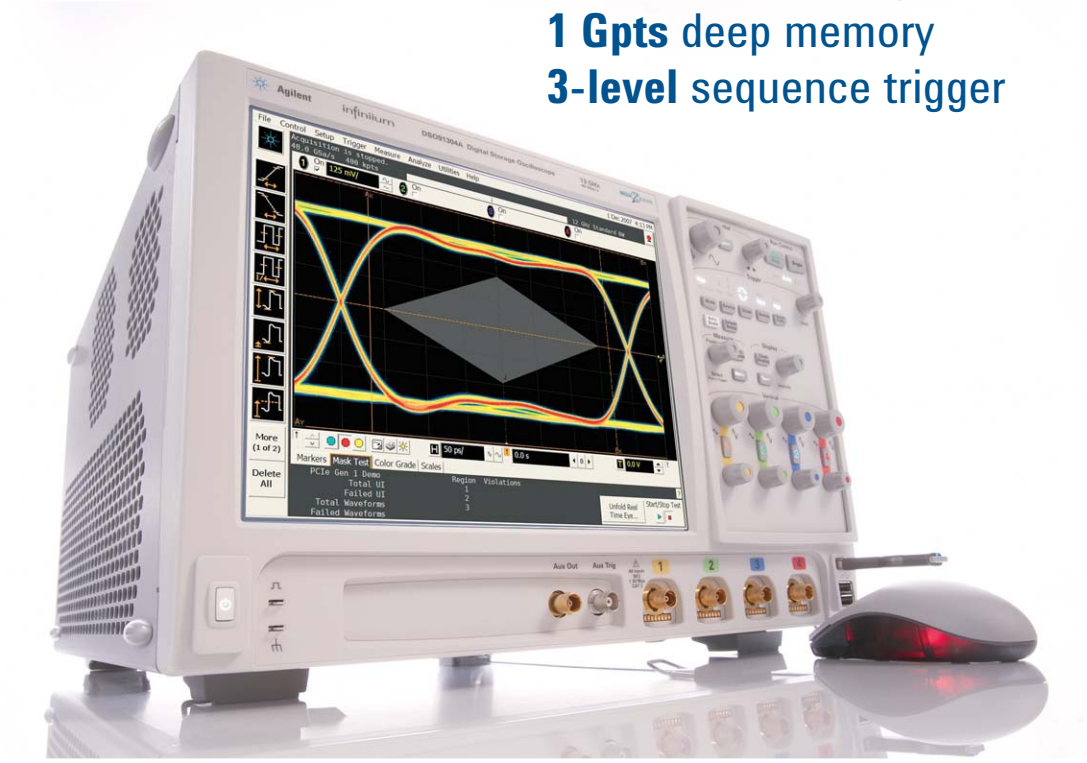
Agilent Infiniium DSO/DSA90000A Series

Data Sheet

Superior signal integrity
Deep application analysis
Better insight



13 GHz bandwidth
40 GSa/s sampling rate
1 Gpts deep memory
3-level sequence trigger



Agilent Technologies

Infiniium 90000A Series: Highlights

Superior signal integrity, deep application analysis, better insight

"The Agilent Infiniium 90000A oscilloscope helps us capture large amounts of data and process that data record in a much shorter time. This improves our development time and shortens our time to market."
Bill Simms, Mixed Signal Design Validation manager, NVIDIA Corp

The all-new Agilent Technologies Infiniium DSO/DSA90000 Series oscilloscopes deliver the industry's lowest noise floor, deepest memory depth, and unmatched signal analysis and debugging capability, providing you with the best insight into your high-speed digital and RF designs.

Making the most accurate and repeatable measurements always begins with superior signal integrity. A 12-GHz-bandwidth oscilloscope with an industry-leading low noise floor of 365 µVrms at 5 mV per division is a great way to increase your confidence in your measurement results. The 90000 Series lets you capture an ultra-long record of signals, such as 25 ms of your signal at 40 GS/s, using the ultra responsive 1 Gpts of acquisition memory.

To capture a signal of interest, use the industry's first three-level sequence triggering system "InfiniiScan Plus." InfiniiScan Plus provides you with triggering flexibility like you have never experienced before. The 90000 Series offers a 125-ps glitch detection trigger and a full set of high-definition TV triggers, including triggers for high-speed video interfaces such as HDMI (high-definition multimedia interface) and DisplayPort.



If you are investigating complex jitter phenomena every day, use the industry's only oscilloscope that triggers with the TIE (time interval error) jitter value. Our simultaneous analysis and debugging tools can demystify the secrets of jitter by displaying eye pattern analysis, protocol decoding information, jitter trend, and histogram analysis on one screen for time-correlated signal analysis.

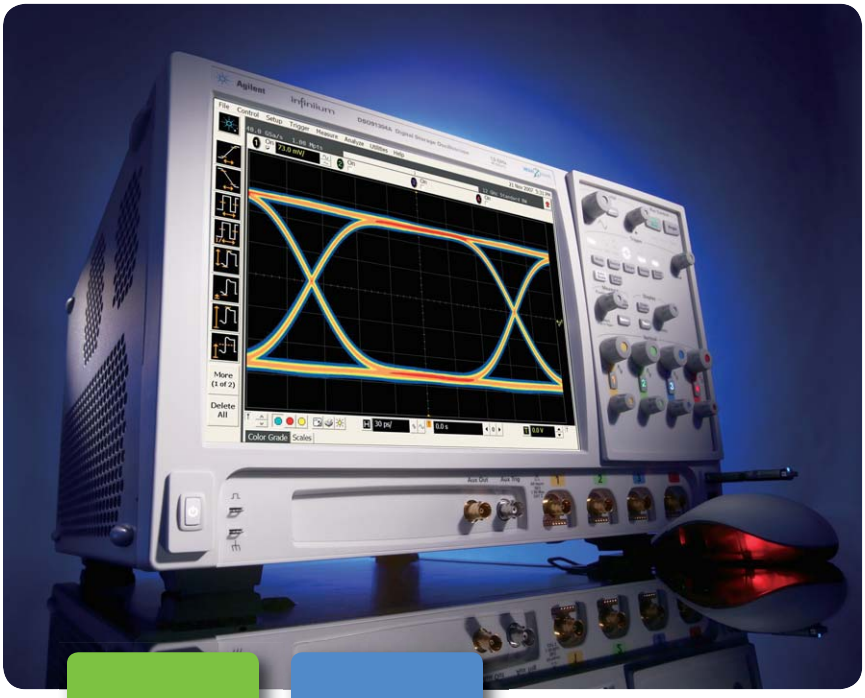
And if you are looking for the fastest way to offload data from an oscilloscope, we have the industry-leading data transfer solution, through gigabit Ethernet and USB 2.0 device port.

Welcome to the exciting world of superior signal integrity, deep application analysis, and better insight!

- **Low noise:** Industry's lowest noise floor for both oscilloscopes and probes
- **1 Gpts:** Industry-leading MegaZoom ultra-deep memory at 40 GSa/s on all four channels
- **Three levels:** Industry's only three-level sequence triggering with InfiniiScan Plus trigger system
- **13 GHz and 40 GSa/s:** Up to 13 GHz bandwidth, up to 40 GSa/s sample rate on four channels
- **22 MSa/s:** Industry-leading data transfer rate from the oscilloscope
- **122,000 measurements per sec:** Amazing measurement update throughput
- **–55 to 150 °C:** Industry's only environmental chamber probing solution
- **2.5 µs:** Industry-leading segment memory speed
- **Flatness:** Industry's flattest frequency response
- **Upgrade:** Industry's only bandwidth-upgradeable series from 2.5 GHz to 13 GHz
- **Share:** Industry's only server-based oscilloscope application software license solution
- **Applications:** Industry's largest selection of application software packages
- **12.1 inch display:** Large display size with XGA resolution

Infiniium 90000A Series: Design Concept

Superior signal integrity, deep application analysis, better insight



Signal Integrity

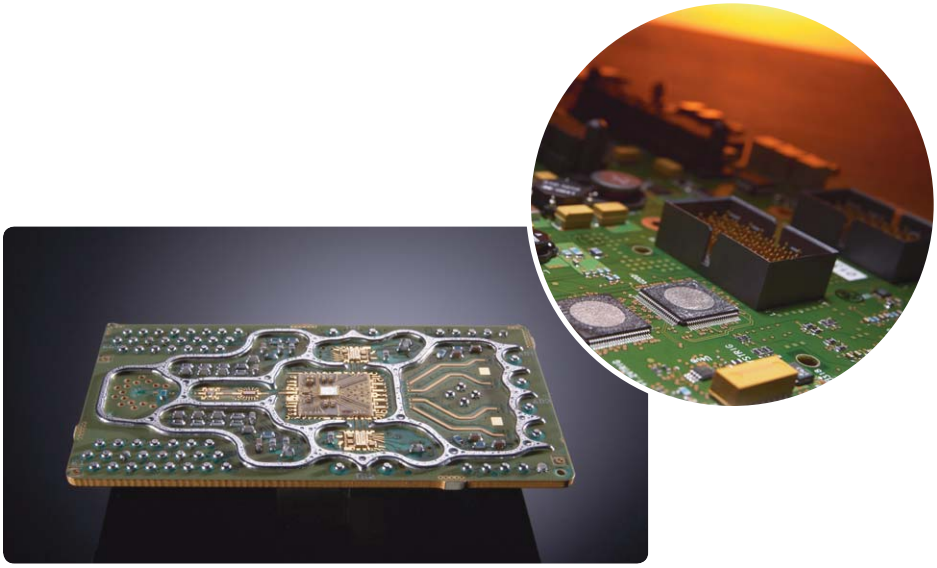
Debug

Compliance

Analysis

The design concept

Infiniium 90000A Series scopes provide the solution for all high-speed digital and RF design engineers evaluating signal integrity, validating compliance, and analyzing and debugging designs.



Infiniium 90000A Series: Selection Guide

Superior signal integrity, deep application analysis, better insight

90000A Series Infiniium oscilloscopes

Model	Real-time bandwidth on 4 ch	Maximum sampling rate on 4 ch	Standard memory	Maximum memory	Noise floor at 5 mV/div
91304A	13 GHz	40 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	389 µVrms
91204A	12 GHz	40 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	365 µVrms
90804A	8 GHz	40 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	283 µVrms
90604A	6 GHz	20 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	234 µVrms
90404A	4 GHz	20 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	186 µVrms
90254A	2.5 GHz	20 GSa/s on 4 ch	10 Mpts on 4 ch	1 Gpts on 4 ch	147 µVrms

How much time span can I capture?

Sampling rate	10 Mpts of memory	20 Mpts of memory	50 Mpts of memory	100 Mpts of memory	200 Mpts of memory	500 Mpts of memory	1 Gpts of memory
40 GSa/s	250 µs	500 µs	1.25 ms	2.5 ms	5.0 ms	12.5 ms	25.0 ms
20 GSa/s	500 µs	1 ms	2.5 ms	5.0 ms	10.0 ms	25.0 ms	50.0 ms

Note: time span capture = memory depth x 1/sampling rate



Acquiring 25 ms of PCI EXPRESS® Gen 2 data at 40 GS/s using 1 Gpts of memory will provide you the highest chance of capturing your signal of interest.

Infiniium 90000A Series: Selection Guide

Superior signal integrity, deep application analysis, better insight

How much bandwidth do I need to measure a given rise/fall time accurately?

Rise/fall time (20 - 80%)	3% accuracy	10% accuracy	20% accuracy
100 ps	5.6 GHz	4.8 GHz	4.0 GHz
75 ps	7.5 GHz	6.4 GHz	5.3 GHz
60 ps	9.3 GHz	8.0 GHz	6.7 GHz
50 ps	11.2 GHz	9.6 GHz	8.0 GHz
40 ps	14.0 GHz	12.0 GHz	10.0 GHz
30 ps	18.7 GHz	16.0 GHz	13.3 GHz

Notes: Maximum signal frequency content = 0.4/rise time (20 - 80%)
Scope bandwidth required = 1.4 x maximum signal frequency for 3% measurement accuracy
Scope bandwidth required = 1.2 x maximum signal frequency for 10% measurement accuracy
Scope bandwidth required = 1.0 x maximum signal frequency for 20% measurement accuracy

Choose the probes you need for your application

InfiniiMax II Series probe amplifiers

Model	Bandwidth	Description
1169A	12 GHz (spec) 13 GHz (typical)	InfiniiMax II probe amplifier – order one or more probe heads
1168A	10 GHz	InfiniiMax II probe amplifier – order one or more probe heads

InfiniiMax II probe amplifier specifications: Dynamic range = 3.3 V, DC offset range = ± 16 V, maximum voltage = ± 30 V

InfiniiMax I Series probe amplifiers

Model	Bandwidth	Description
1134A	7 GHz	InfiniiMax I probe amplifier – order one or more probe heads
1132A	5 GHz	InfiniiMax I probe amplifier – order one or more probe heads
1131A	3.5 GHz	InfiniiMax I probe amplifier – order one or more probe heads
1130A	1.5 GHz	InfiniiMax I probe amplifier – order one or more probe heads

InfiniiMax I probe amplifier specifications: Dynamic range = 5 V, DC offset range = ± 12 V, maximum voltage = ± 30 V

Infiniium 90000A Series: Selection Guide

Superior signal integrity, deep application analysis, better insight

InfiniiMax II Series probe heads

InfiniiMax II Series probe heads are recommended for 1169A/68A probe amplifiers. The typical performance when used with a DSO/DSA91304A is shown below.

Probe head	Model number	Differential measurement (Bandwidth, input C, input R)	Single-ended measurement (Bandwidth, input C, input R)
High-Bandwidth differential SMA	N5380A	12.5 GHz	12.5 GHz
High-Bandwidth differential solder-in	N5381A	13 GHz, 0.21 pF, 50 kΩ	13 GHz, 0.35 pF, 25 kΩ
High-Bandwidth differential browser	N5382A	13 GHz, 0.21 pF, 50 kΩ	13 GHz, 0.35 pF, 25 kΩ
High-Bandwidth differential replaceable ZIF solder-in*	N5425A/N5426A (requires both N5425A and N5426A)	13 GHz, 0.33 pF, 50 kΩ	13 GHz, 0.53 pF, 25 kΩ
High-Bandwidth differential replaceable long wire ZIF solder in*	N5451A (requires N5425A)	9 GHz at 7 mm wire	5 GHz at 11 mm wire

InfiniiMax I Series probe heads (can be used with 1169A/68A probe amplifiers with limitations)

Probe head	Model number	Differential measurement (Bandwidth, input C, input R)	Single-ended measurement (Bandwidth, input C, input R)
High-bandwidth differential replaceable ZIF solder-in*	N5425A/N5426A (requires both N5425A and N5426A)	12 GHz, 0.33 pF, 50 kΩ	12 GHz, 0.53 pF, 25 kΩ
High-bandwidth differential replaceable long-wire ZIF solder-in*	N5451A (requires N5425A)	9 GHz at 7 mm wire	5 GHz at 11 mm wire
Differential solder-in (Higher loading, high-frequency response variation)	E2677A	12 GHz, 0.27 pF, 50 kΩ	12 GHz, 0.44 pF, 25 kΩ
Differential socket (Higher loading)	E2678A	12 GHz, 0.34 pF, 50 kΩ	12 GHz, 0.56 pF, 25 kΩ
Differential browser – wide span	E2675A	6 GHz, 0.32 pF, 50 kΩ	6 GHz, 0.57 pF, 25 kΩ
Differential SMA	E2695A	8 GHz	8 GHz
Single-ended solder-in (must bandlimit input to ≤ 6 GHz)	E2679A	N/A	6 GHz, 0.50 pF, 25 kΩ
Single-ended browser	E2676A	N/A	6 GHz, 0.67 pF, 25 kΩ
Differential kit	E2669A (includes E2675A, E2677A and E2678A)		
Single-ended kit	E2668A (includes E2676A, E2679A and E2678A)		
High-impedance adapter	E2697A (includes 500 MHz passive probe)		

* Number of insertions supported: 20 cycles (50 cycles (typical))

Infiniium 90000A Series: Selection Guide

Superior signal integrity, deep application analysis, better insight

Recommended bandwidth and Infiniium 90000A Series support for popular bus standards

				Serial data analysis (E2688A)				
Bus standard	**Bit rate**	**Recommended bandwidth[1]**	**Jitter analysis[2]**	**SW clock recovery**	**8b/10b decode**	**Mask testing**	**Compliance testing**	**Test fixtures**
Ethernet	250 Mbs	2 GHz	Yes	Yes	N/A	Yes	N5392A	N5395B
USB 2.0	up to 480 Mbs	2 GHz	Yes	Yes	N/A	Yes	N5416A	E2649A
DDR1	up to 400 MTs	2 GHz	Yes	N/A	N/A	No	U7233A	No
DDR2	up to 800 MTs	4 GHz	Yes	N/A	N/A	No	N5413A	W2631A
DDR3	up to 1.6 GTs	6 GHz	Yes	N/A	N/A	No	U7231A	W2635A
SATA 1.5 Gbps	1.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	N5411A	COMAX
SAS 150	1.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	N5412A	N5421A
Fibre Channel	2.125 Gbps	4 GHz	Yes	Yes	Yes	Yes	N5410A	No
HDMI 1.3a/b	up to 3.4 Gbps	8 GHz	Yes	Yes	Yes	Yes	N5399A	N1080A
DisplayPort 1.1	2.7 Gbps	8 GHz	Yes	Yes	Yes	Yes	U7232A[4]	W2641A
PCI EXPRESS I	2.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	N5393A[3]	PCI-SIG®
ExpressCard	2.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	N5393A[3]	PCMCIA.org
InfiniBand	2.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	No	Fujikura
Advanced TCA	2.5 Gbps	6 GHz	Yes	Yes	Yes	Yes	No	No
SATA 3 Gbps	3.0 Gbps	10 GHz	Yes	Yes	Yes	Yes	N5411A[4]	COMAX
SAS 300	3.0 Gbps	10 GHz	Yes	Yes	Yes	Yes	N5412A[4]	N5421A
10G Ethernet	3.125 Gbps	8 GHz	Yes	Yes	N/A	Yes	No	No
XAUI	3.125 Gbps	8 GHz	Yes	Yes	Yes	Yes	N5431A	No
Serial Rapid IO	up to 3.125 Gbps	8 GHz	Yes	Yes	Yes	Yes	N5431A	No
FireWire	up to 3.2 Gbps	8 GHz	Yes	Yes	N/A	N/A	Yes - QP	Quantum Para.
Fibre Channel	4.25 Gbps	10 GHz	Yes	Yes	Yes	Yes	N5410A[4]	No
FBD I	up to 4.8 Gbps	12 GHz	Yes	Yes	N/A	Yes	N5409A[4]	N4235A/36/38A
PCI EXPRESS II	5.0 Gbps	12 GHz	Yes	Yes	Yes	No	No	No
SATA 6 Gbps	6.0 Gbps	13 GHz	Yes	Yes	Yes	No	No	No
SAS 600	6.0 Gbps	13 GHz	Yes	Yes	Yes	No	No	No
Fibre Channel	8.5 Gbps	13 GHz	Yes	Yes	Yes	No	No	No

1 Recommended bandwidth is derived from a combination of data rate and edge speed
2 Jitter analysis solutions: EZJIT (E2681A), EZJIT Plus (N5400A), oscilloscope tools (E2690B)
3 Requires E2688A serial data analysis
4 Requires E2688A serial data analysis and N5400A EZJIT Plus jitter analysis

Infiniium 90000A Series

Superior signal integrity, deep application analysis, better insight

40-GSa/s sample rate on each of four channels provides ultra-low noise **13 GHz full real-time bandwidth** of the oscilloscope simultaneously.

See your signal more clearly with a **12.1-inch XGA (1024 x 768) high-resolution touch screen color display**. Infiniium's bright TFT display.

Identify anomalies easily with a **256-level intensity-graded or color-graded-persistence** display that provides a three dimensional view of your signals.

Live indicator shows when the scope is running a long operation.

Remote access through **10/100/1000 BaseT LAN interface** with **Web-enabled connectivity** using ultra-responsive Ultra VNC.

GPIB over LAN provides remote measurement. Optional **Infiniium application remote program interface** allows application/compliance software automation. **LXI class C** compliant.

Removable hard disk drive option is available for added data security.

Optional USB external DVD-RW drive allows you to install your favorite third-party software conveniently and can be used to back up your critical measurement data.

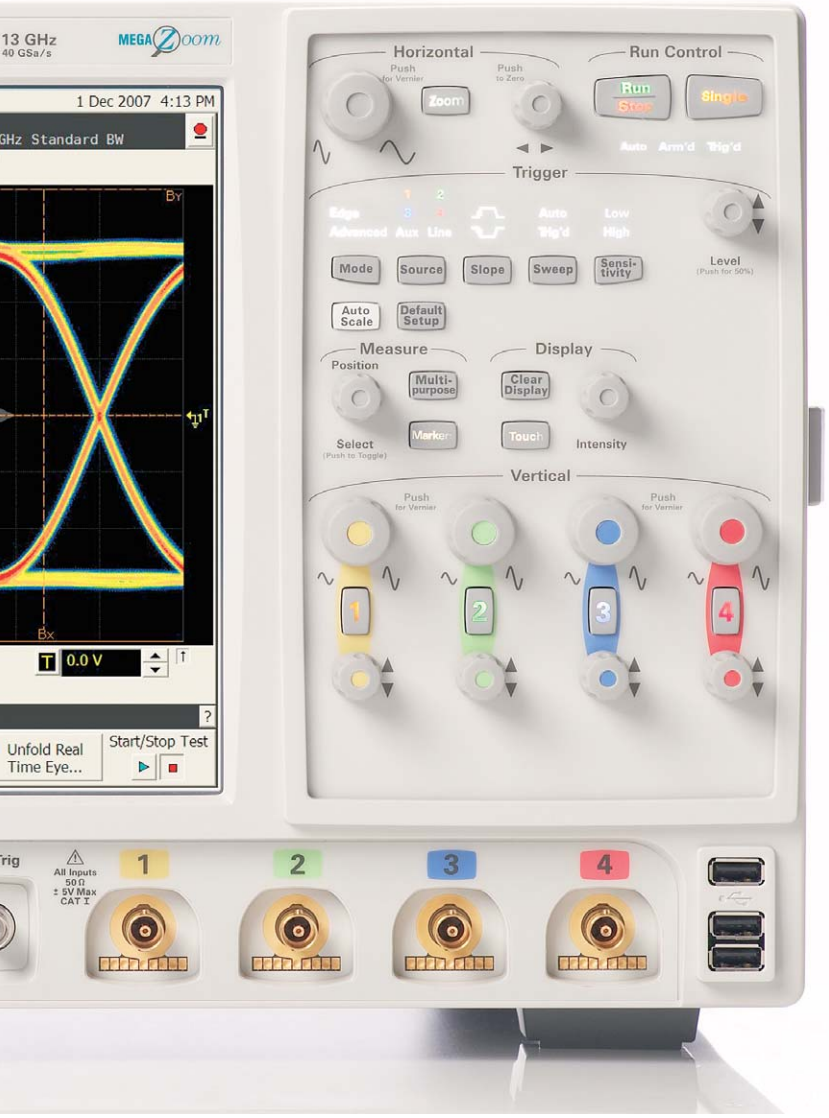
Capture your longest signal with up to 25 ms data using 1 G point of acquisition at 40 GSa/s.



Install third-party software packages on **Windows XP Pro** operating system 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.

Infiniium Series oscilloscope: Award-winning Infiniium scopes have received ten 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.

Simply press the **horizontal delay knob** to set the delay value to zero. A **zoom button** provides quick access to two screen zoom mode.



Starting with an **18-GHz, BNC-compatible connector**, an **ultra-low noise floor** front end design using **Faraday cage** technology ensures high signal integrity in its signal path.

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

10-MHz reference clock can be input to or output from the scope to allow precise timebase synchronization with RF instruments or logic analyzers.

Dedicated **single acquisition button** provide better control to capture an unique event.

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

Measure section including a **toggling marker** button and a **dedicated marker knob** provides quick access to your marker control.

Quick access to fine/vernier control by pressing the horizontal and vertical sensitivity knobs.

Increase your productivity with a familiar Infiniium graphical user interface, like your favorite drag-and-drop measurement icons. Infiniium's analog-like front panel has a full set of controls color coded to the waveforms and measurements, making your tasks simple.

Three front panel USB 2.0 host ports will suite perfectly for your USB keyboard, mouse, and USB memory drive connection for saving setup files, data files, and screen shots.

How about **four more USB 2.0 host ports** and **a USB 2.0 device port** on the back panel? Perfect for extra connectivity including an optical drive. **A USB 2.0 device port** lets you control the scope and transfer data via a USB 2.0 480-Mbpts connection.

InfiniiMax II: The World's best high-speed probing system just keeps getting better

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.

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

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

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 introduced 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.

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

Probe calibration software delivers the most accurate probe measurements and linear phase response and allows various probe combinations to be deskewed to the same reference time.

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.

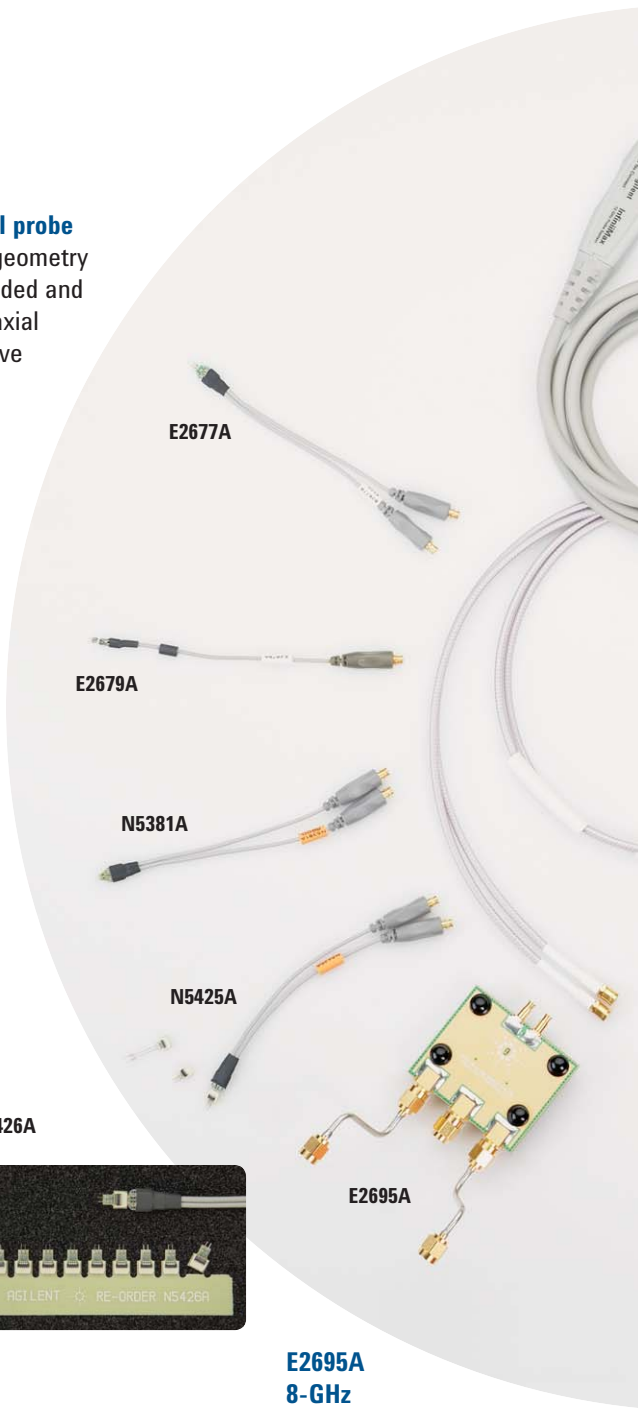
E2677A 12-GHz solder-in differential probe head can be attached to very-small-geometry circuits for measuring both single-ended and differential signals. External mini-coaxial resistors facilitate wider span but have increased high-frequency response variation relative to N5381A.

E2679A 6-GHz extremely small single-ended, solder-in probe heads for probing even the hardest-to-reach single-ended signals.

N5381A 13-GHz high-bandwidth solder-in differential probe head provides maximum bandwidth and minimizes capacitive loading to ≤ 210 fF. Variable spacing from 0.2 to 3.3 mm (8 to 130 mills).

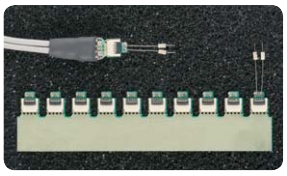
N5425A 13-GHz high-bandwidth solder-in differential ZIF probe head and N5426A ZIF tip provides maximum bandwidth with industry's first lead-free solder-in probe solution in an economical replaceable tip form factor.

N5451A 9-GHz/5-GHz long-wire ZIF tip provides high-bandwidth economical replaceable solder-in tip with extra reach (9 GHz with 7 mm and 5 GHz with 11 mm wire).



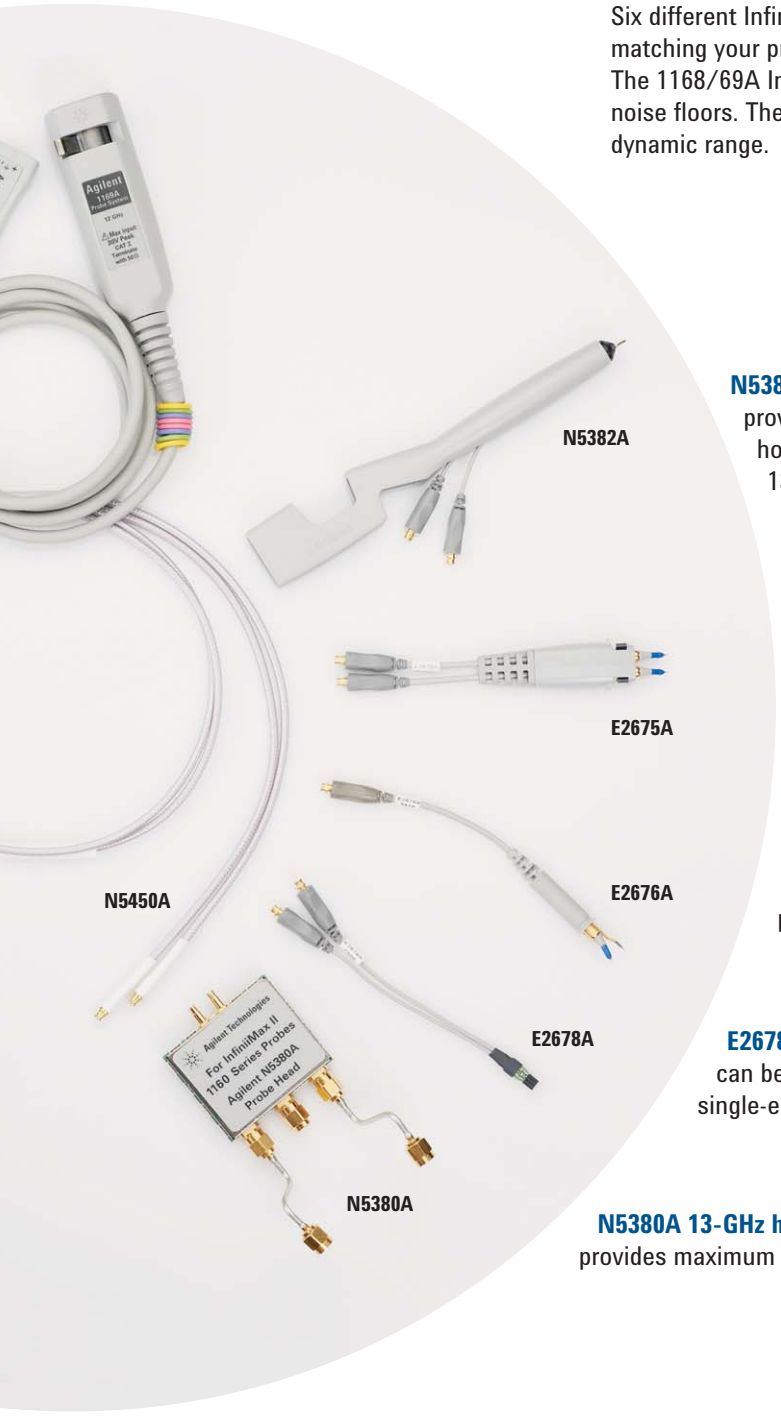
N5426A

N5451A



E2695A 8-GHz differential SMA probe head allows you to connect two SMA cables to make a differential measurement on a single scope channel.

Six different InfiniiMax probe amplifiers from 1.5 GHz to 13 GHz are available for matching your probing solution to your performance and budget requirements. The 1168/69A InfiniiMax II amplifiers offer the highest bandwidth and the lowest noise floors. The 1134/32/31/30A offer a more cost effective solution and wider dynamic range.



N5382A 13-GHz high-bandwidth differential browser provides maximum bandwidth for hand-held or probe holder use. Variable spacing from 0.2 to 3.3 mm (8 to 130 mills).

E2675A 6-GHz differential browser is the best choice for general-purpose trouble shooting of differential or single-ended signals with z-axis compliance and variable spacing from 0.25 - 5.80 mm (10 - 230 mills).

E2676A 6-GHz 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.

E2678A 12-GHz differential socket probe head can be used to measure either differential or single-ended signals via a plug-on socket connection.

N5380A 13-GHz high-bandwidth differential SMA probe head provides maximum bandwidth for SMA-fixtured differential pairs.

N5450A InfiniiMax extreme temperature extension cable provides extra reach into environmental chambers.

Probe performance plots available
The InfiniiMax II probe manuals contain an extensive set of performance plots (bandwidth, probe tracking, CMRR, step response, impedance) for various probe configurations. See the following Web site for this information
http://cp.literature.agilent.com/litweb/pdf/01169-97005.pdf

Deep Application Analysis

InfiniiScan Plus: Industry's first three-level sequence trigger system

One of the keys to a "deep application analysis" is to have a superior triggering system that combines the stability of a hardware trigger and the flexibility of a software trigger. The InfiniiScan Plus trigger system provides the world's first three-level sequence trigger.*

Available hardware trigger selections for first level:

- Edge
- Edge transition
- Edge then edge
- Glitch
- Pulse width
- Pattern/state
- Runt
- Setup and hold
- Timeout
- Video (including HDTV trigger)
- Window

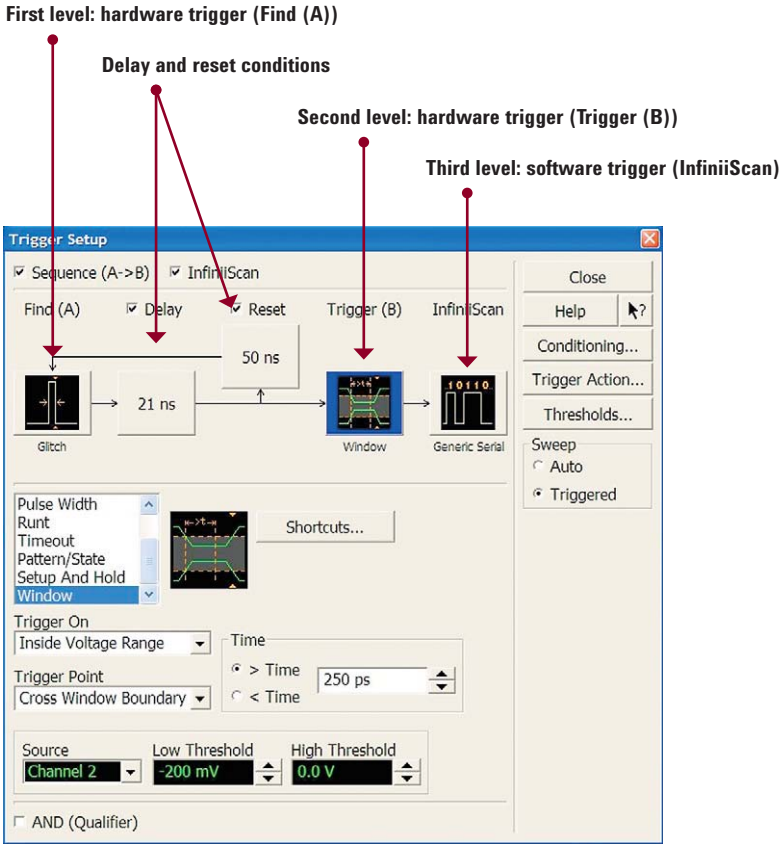
Available hardware trigger selections for second level:

- Edge
- Edge transition
- Glitch
- Pulse width
- Pattern/state
- Runt
- Setup and hold
- Timeout
- Window

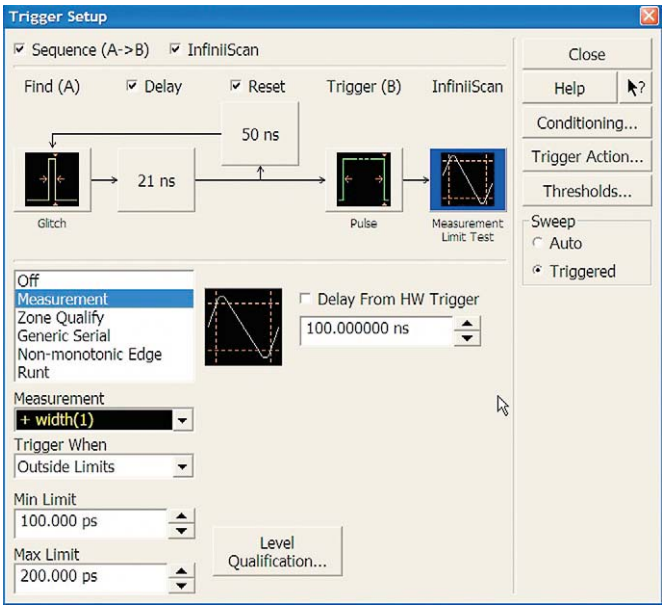
Available software trigger selection for third level:

- Measurement
- Zone qualify
- Glitch
- Generic serial
- Non-monotonic edge
- Runt

* Two level hardware sequence feature will become available starting in mid 2008 with a free firmware upgrade



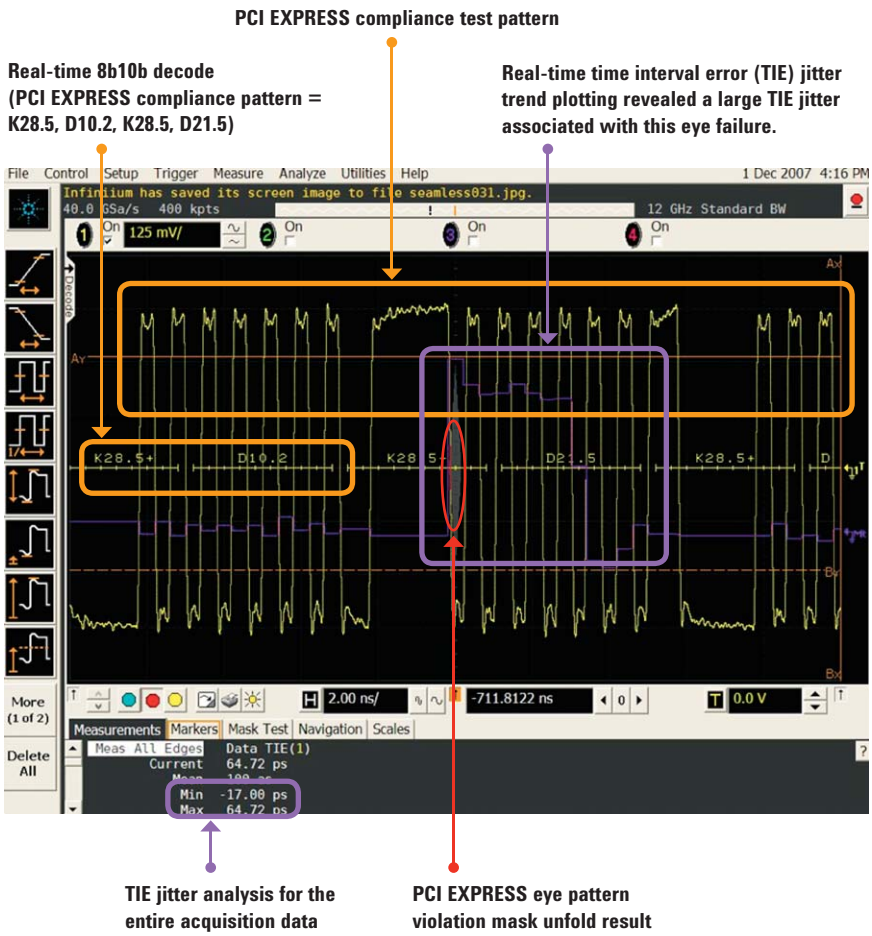
InfiniiScan Plus trigger setup



InfiniiScan software trigger setup screen

Deep Application Analysis
Advanced integrated analysis solution

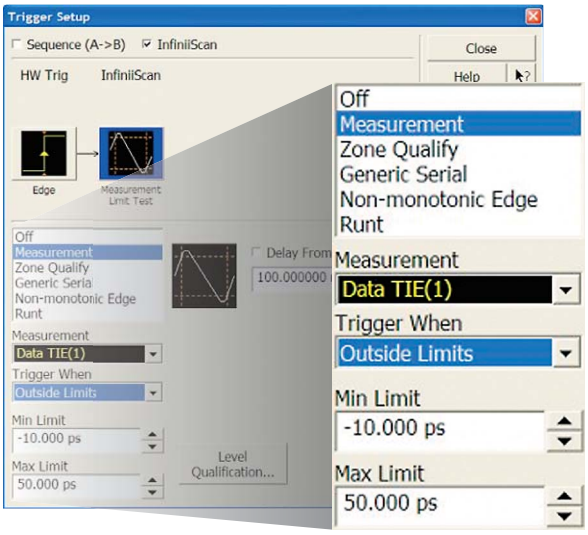
This example shows troubleshooting the eye pattern failure of PCI EXPRESS compliance pattern. A serial data analyzer will quickly analyze the eye pattern, and if there is a violation, it will unfold it for you to see. Once you correlate the TIE jitter to a particular eye pattern failure, the next step of the debug/analysis is to set up the trigger condition in order for the Infiniium scope to trigger on a particular TIE value.



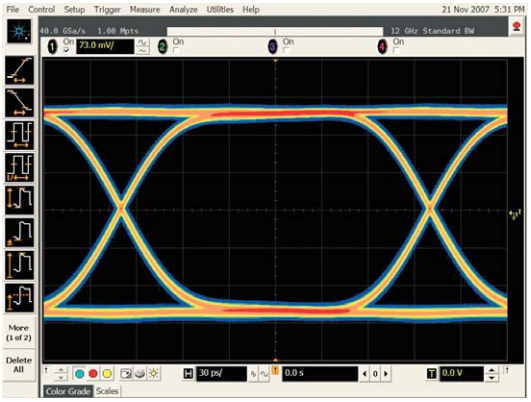


Navigation tool to search through each eye pattern failures (example has eight failures). Could all failures be related to this particular TIE jitter issue?

Picture on the right shows the InfiniiScan setup screen to trigger on a TIE jitter more than 50 ps or less than –10 ps. Infiniium Series is the first oscilloscope that can trigger with a measured TIE jitter value.



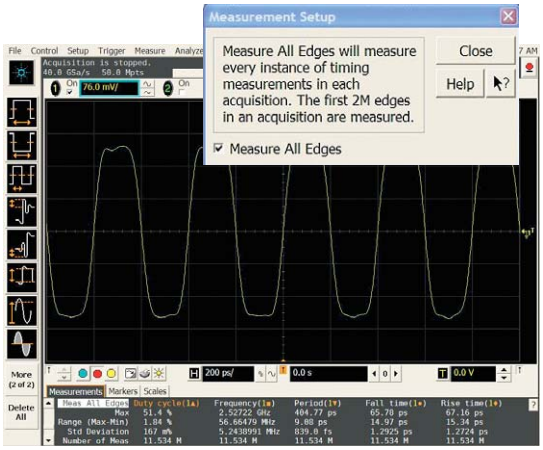
Deep Application Analysis
Advanced integrated analysis solution



5 Gbps PCI EXPRESS Gen 2 eye pattern. The ultra-low noise floor of DSA91204A shows the true performance of your device under test.



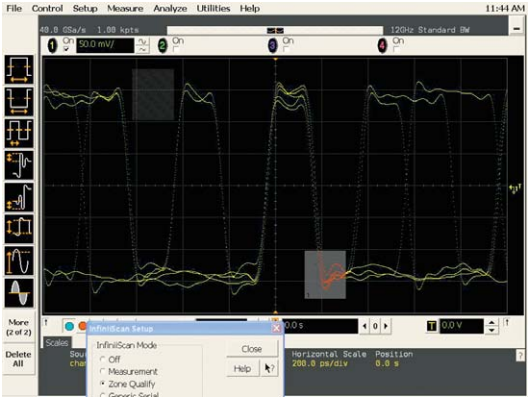
Consistently trigger on 200 ps single bit (one UI) of PCI EXPRESS Gen 2 using industry-leading < 250 ps glitch trigger.



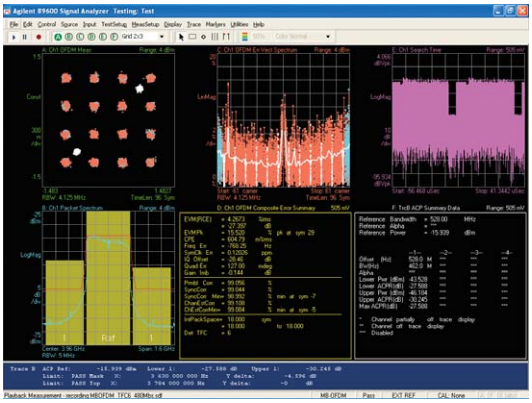
Making more than 5 million measurements in less than 1 minute using the "Measure All Edges" mode and long memory, increases your confidence in the measurement statistics.



Total jitter (Tj) analysis (Dj/Rj) for 5 Gbps PRBS signal using N5400A EZJIT Plus. Deep memory makes it possible to reveal a low-frequency-jitter components.



The "true" ease of use. Just draw boxes and the scope will trigger. The industry's only software event finder, "InfiniiScan Event Identification Tool" will provide the next level of ease-of-use for the scope triggering system.



Certified Wireless USB compliance testing using VSA (vector signal analysis software) and the DSA91204A. VSA is used in the CWUSB compliance test workshop.

Infiniium 90000A Series Oscilloscopes
Performance characteristics

Vertical

Input channels	Four					
Analog bandwidth (–3 dB)*, 10	**90254A** 2.5 GHz	**90404A** 4 GHz	**90604A** 6 GHz	**90804A** 8 GHz	**91204A** 12 GHz	**91304A** 13 GHz
DSP enhanced bandwidth[3]	91304A: 13-GHz real-time, user-selectable DSP enhanced bandwidth					
Rise time/fall time[11]	**90254A**	**90404A**	**90604A**	**90804A**	**91204A**	**91304A**
10 - 90%	140 ps	105 ps	70 ps	54 ps	35 ps	32 ps
20 - 80%	105 ps	79 ps	53 ps	38 ps	26 ps	24 ps
Input impedance	50 Ω, ± 3%					
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 3 GHz: 90804A/91204A/91304A: 60 dB (≥ 1000:1) 90254A/90404A/90604A: 50 dB (≥ 316:1) 3 GHz to 8 GHz: 40 dB (≥ 100:1) 8 GHz to BW: 35 dB (≥ 56:1)					
DC gain accuracy*, 1	± 2% of full scale at full resolution channel scale					
Maximum input voltage*	± 5 V					

Offset range	**Vertical sensitivity**	**Available offset**
	0 mV/div to ≥ 40 mV/div	± 0.4 V
	> 40 mV/div to ≥ 75 mV/div	± 0.9 V
	> 75 mV/div to ≥ 130 mV/div	± 1.6 V
	> 130 mV/div to ≥ 240 mV/div	± 3.0 V
	> 240 mV/div	± 4.0 V

Offset accuracy*, 1	≤ 3.5 V: ± (2% of channel offset + 1% of full scale) + 1 mV > 3.5 V: ± (2% of channel offset + 1% of full scale)
Dynamic range	± 4 div from center screen
DC voltage measurement accuracy*, 1	Dual cursor: ± [(DC gain accuracy) + (resolution)] Single cursor: ± [(DC gain accuracy) + (offset accuracy) + (resolution/2)]

RMS noise floor (scope only)

Volts/div	**90254A**	**90404A**	**90604A**	**90804A**	**91204A**	**91304A**
5 mV	131 µV	188 µV	241 µV	294 µV	387 µV	419 µV
10 mV	153 µV	217 µV	274 µV	329 µV	438 µV	498 µV
20 mV	224 µV	314 µV	390 µV	460 µV	612 µV	737 µV
50 mV	521 µV	732 µV	904 µV	1.06 mV	1.39 mV	1.71 mV
100 mV	1.01 mV	1.42 mV	1.76 mV	2.07 mV	2.71 mV	3.34 mV
200 mV	1.99 mV	2.77 mV	3.42 mV	4.01 mV	5.26 mV	6.55 mV
500 mV	5.26 mV	7.39 mV	9.20 mV	10.8 mV	14.2 mV	17.3 mV
1 V	10.2 mV	14.4 mV	17.8 mV	21.0 mV	27.6 mV	33.9 mV

* 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. Magnification is used below 5 mV/div. Below 5 mV/div, full-scale is defined as 40 mV. The major scale settings are 5 mV, 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 13 GHz DSP enhanced bandwidth not applicable at 5 mV/div.

10 11.8 GHz analog bandwidth at 5 mV/div for DSO91304A and DSO91204A models.

11 Calculated from the bandwidth.

Vertical (continued)

RMS noise floor (scope with probe) Volts/div	90254A with 1131A	90404A with 1132A	90604A with 1134A	90804A with 1168A	91204A with 1169A	91304A with 1169A
20 mV	3.2 mV	3.6 mV	4.2 mV	2.7 mV	2.9 mV	3.0 mV
50 mV	3.3 mV	3.6 mV	4.2 mV	2.8 mV	3.1 mV	3.4 mV
100 mV	3.4 mV	3.8 mV	4.4 mV	3.3 mV	3.8 mV	4.6 mV
200 mV	3.8 mV	4.5 mV	5.3 mV	5.2 mV	6.2 mV	7.8 mV
500 mV	6.0 mV	7.9 mV	9.9 mV	12 mV	14 mV	17 mV
1 V	10 mV	14 mV	18 mV	22 mV	27 mV	34 mV

Horizontal

Main timebase range	5 ps/div to 20 s/div real-time, 5 ps/div to 500 ns/div equivalent-time
Main timebase delay range	–200 s to 200 s real-time, –25 µs to 200 s equivalent-time
Zoom timebase range	1 ps/div to current main time scale setting
Channel deskew	± 25 µs range, 100 fs resolution
Time scale accuracy*	± (0.4 + 0.5 * YrsSinceCal) ppm pk
Delta-time measurement accuracy[6a, 6b, 7]	
Absolute, averaging disabled	$\sqrt{\left(\frac{5.0 \cdot Noise}{SlewRate}\right)^2 + 20x10^{-24}} + \frac{TimeScaleAccy \cdot Reading}{2}$ sec pk
Absolute, >- 256 averages	$\sqrt{\left(\frac{0.35 \cdot Noise}{SlewRate}\right)^2 + 0.1x10^{-24}} + \frac{TimeScaleAccy \cdot Reading}{2}$ sec pk
Standard deviation, averaging disabled	$\sqrt{\left(\frac{1.4 \cdot Noise}{SlewRate}\right)^2 + 0.6x10^{-24}}$ sec $_{rms}$
Standard deviation, >- 256 averages	$\sqrt{\left(\frac{0.1 \cdot Noise}{SlewRate}\right)^2 + 0.01x10^{-24}}$ sec $_{rms}$
Jitter measurement floor[6a, 6b]	
Time interval error[6c]	$\sqrt{\left(\frac{1.0 \cdot Noise}{SlewRate}\right)^2 + 0.3x10^{-24}}$ sec $_{rms}$
Period jitter	$\sqrt{\left(\frac{1.4 \cdot Noise}{SlewRate}\right)^2 + 0.6x10^{-24}}$ sec $_{rms}$
N-cycle, cycle-cycle jitter	$\sqrt{\left(\frac{2.4 \cdot Noise}{SlewRate}\right)^2 + 1.7x10^{-24}}$ sec $_{rms}$

Infiniium 90000A Series Oscilloscopes
Performance characteristics

Acquisition

Maximum real-time sample rate	91304A/91204A/90804A: 40 GSa/s (4 channels simultaneously) 90604A/90404A/90254A: 20 GSa/s (4 channels simultaneously)						
Memory depth per channel							
Standard	10 Mpts on 4 channels						
Option 20M	20 Mpts on 4 channels (standard on DSA models)						
Option 50M	50 Mpts on 4 channels						
Option 100	100 Mpts on 4 channels						
Option 200	200 Mpts on 4 channels						
Option 500	500 Mpts on 4 channels						
Option 01G	1 Gpts on 4 channels						
Maximum acquired time at highest real-time resolution	**91304A/91204A/90804A**			**90604A/90404A/90254A**			
Resolution	25 ps (40 GSa/s)			50 ps (20 GSa/s)			
Standard	0.25 ms			0.5 ms			
Option 20M	0.5 ms			1.0 ms			
Option 50M	1.25 ms			2.5 ms			
Option 100	2.5 ms			5.0 ms			
Option 200	5.0 ms			10.0 ms			
Option 500	12.5 ms			25.0 ms			
Option 01G	25.0 ms			50.0 ms			
Data transfer speed							
Gigabit Ethernet	Samples:	1 k	64 k	1 M	16 M	32 M	128 M
	MSa/s (Word):	0.1	1.88	9.25	12.00	12.80	12.80
	MSa/s (Byte):	0.11	1.88	12.60	19.70	20.30	22.00
USB 2.0 hi-speed (device)	Samples:	1 k	64 k	1 M	16 M	32 M	128 M
	MSa/s (Word):	0.11	1.88	8.34	8.55	9.07	11.38
	MSa/s (Byte):	0.11	1.88	11.60	14.40	14.90	18.10
Sampling modes							
Real-time	Successive single-shot acquisitions						
Real-time with averaging	Selectable from 2 to 65534						
Real-time with peak detect	91304A/91204A/90804A: 40 GSa/s 90604A/90404A/90254A: 20 GSa/s						
Real-time with hi resolution	Real-time boxcar averaging reduces random noise and increases resolution						
Equivalent-time	Resolution: 100 fs Full bandwidth on all 4 channels, 262,144 sample points maximum memory						
Segmented memory	Captures bursting signals at maximum sample rate without consuming memory during periods of inactivity Number of segments: Up to 131,072 segments (depending on installed memory depth) Minimum intersegment time: 91304A / 91204A / 90804A: 2.7 µs 90604A / 90404A / 90254A: 2.5 µs (the time between the end of the previous acquisition and the beginning of the next acquisition) Maximum number of segments versus sample rate and memory depth:						
	Sample rate	**10 M**	**20 M**	**50 M**	**100 M**	**200 M**	**500 M**	**1 G**
	40 GSa/s	1024	2048	4096	8192	16384	32768	65536
	20 GSa/s	2048	4096	8192	16384	32768	65536	131072
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.						

Hardware trigger

Sensitivity[1]	91304A/91204A/90804A: Internal low[1]: 2.0 div p-p 0 to 5 GHz Internal high[1]: 0.3 div p-p 0 to 4 GHz, 1.0 div p-p 4 to 7.5 GHz 90604A/90404A/90254A[12]: Internal low[1]: 2.0 div p-p 0 to 5 GHz Internal high[1]: 0.3 div p-p 0 to 3 GHz, 1.0 div p-p 3 to 5 GHz Auxiliary: DC to 100 MHz: 200 mV p-p into 50 Ω 100 MHz to 1 GHz: 500 mV p-p into 50 Ω
Level range	
Internal	± 4 div from center screen or ± 4 Volts, whichever is smallest
Auxiliary	± 5 V, also limit input signal to ± 5 V
Sweep modes	Auto, triggered, single
Display jitter (displayed trigger jitter)[6a, 8]	90804A, 91204A, 91304A: $\sqrt{\left(\frac{0.9 \bullet Noise}{SlewRate}\right)^2 + 0.3x10^{-24}}$ sec $_{rms}$ 90254A, 90404A, 90604A: $\sqrt{\left(\frac{0.9 \bullet Noise}{SlewRate}\right)^2 + 0.3x10^{-24}}$ sec $_{rms}$
Trigger sources	Channel 1, channel 2, channel 3, channel 4, aux, and line
Trigger modes	
Edge	Triggers on a specified slope (rising, falling or alternating between rising and falling) and voltage level on any channel or auxiliary trigger.
Edge transition	Trigger on rising or falling edges that cross two voltage levels in > or < the amount of time specified. Edge transition setting from 250 ps.
Edge then edge (time)	The trigger is qualified by an edge. After a specified time delay between 10 ns to 10 s, a rising or falling edge on any one selected input will generate the trigger.
Edge then edge (event)	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.
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 125 ps. Glitch range settings: < 250 ps to < 10 s.
Line	Triggers on the line voltage powering the oscilloscope.
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 125 ps. Pulse width range settings: 250 ps to 10 s. Trigger point can be “end of pulse” or “time out”.
Runt	Triggers on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Can be time qualified with minimum setting of 250 ps.
Timeout	Trigger when a channel stays high, low, or unchanged for too long. Timeout setting: from 250 ps to 10 s.
Pattern/pulse range	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 or times out. Each channel can have a value of High (H), Low (L) or Don’t care (X).
State	Pattern trigger clocked by the rising, falling or alternating between rising and falling edge of one channel.
Setup/hold	Triggers on setup, hold, or setup and hold violations in your circuit. Requires a clock and data signal on any two inputs (except aux or line) channels as trigger sources. Setup and/or hold time must then be specified.

Hardware trigger (continued)

Trigger modes (continued)	
Window	Triggers on an event associated with a window defined by two-user adjustable thresholds. Event can be window "entered," "exited," "inside (time qualified)," or "outside (time qualified)" voltage range. Trigger point can be "cross window boundary" or "time out." Time qualify range: from 250 ps to 10 s.
Video	Triggers from negative sync composite video, field 1, field 2, or alternating fields for interlaced systems, any field, specific line, or any line for interlaced or non-interlaced systems. Supports NTSC, PAL-M (525/60), PAL, SECAM (625/50), EDTV (480p/60), EDTV (576p/50), HDTV (720p/60), HDTV (720p/50), HDTV (1080i/60), HDTV (1080i/50), HDTV (1080p/60), HDTV (1080p/50), HDTV (1080p/30), HDTV (1080p/25), HDTV (1080p/24), and user-defined formats.
Trigger sequences	Three level trigger sequences including two-level hardware (Find (A) and Trigger (B)) and one-level InfiniiScan software trigger. Supports all hardware trigger modes except "edge then edge" and "video," and all InfiniiScan software trigger modes. Supports "delay (by time)" and "reset (by time or event)" between two hardware sequences. The minimum latency between "find (A)" and "trigger (B)" is 3 ns. (Two level hardware sequence feature will be available starting in mid 2008 with a free firmware upgrade).
Trigger qualification AND qualifier	Single or multiple channels may be logically qualified with any other trigger mode
Trigger holdoff range	100 ns to 10 s
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 execute "multipurpose" user setting.
Trigger shortcuts	Provides easy shortcuts to all trigger features

Software trigger (requires InfiniiScan event identification software – Option 009)

Trigger modes	
Generic serial	Software triggers on NRZ-encoded data up to 8.0 Gbps, up to 80-bit pattern. Support multiple clock data recovery methods including constant frequency, 1st-order PLL, 2nd-order PLL, explicit clock, explicit 1st-order PLL, explicit 2nd-order PLL, Fibre Channel, FlexRay receiver, FlexRay transmitter (requires E2688A except for the constant frequency clock data recovery mode).
Measurement limit	Software triggers on the results of the measurement values. For example, when the "pulse width" measurement is turned on, InfiniiScan measurement software trigger triggers on a glitch as narrow as 75 ps. When the "time interval error (TIE)" is measured, InfiniiScan can trigger on a specific TIE value.
Non-monotonic edge	Software triggers on the non-monotonic edge. The non-monotonic edge is specified by setting a hysteresis value.
Runt	Software triggers on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Unlike hardware runt trigger, InfiniiScan runt trigger can be further qualified via a hysteresis value.
Zone qualify	Software triggers on the user defined zones on screen. Zones can be specified as either "must intersect" or "must not intersect." Up to four zones can be defined.

Measurements and math

Maximum measurement update rate	> 42,000 measurement/sec (one measurement turned on) > 122,000 measurement/sec/measurement (five measurements turned on)
Measurement modes	Standard, Measure All Edges mode

Measurements and math (continued)

Waveform measurements	
Voltage	Peak to peak, minimum, maximum, average, RMS, amplitude, base, top, overshoot, preshoot, upper, middle, lower
Time	Rise time, fall time, period, frequency, positive width, negative width, duty cycle, burst width, Tmin, Tmax, Tvolt, acquired time, setup time (requires Option 002 or 004, standard on DSA models), hold time (requires Option 002 or 004, standard on DSA models), channel-to-channel delta time, channel-to-channel phase
Mixed	Area, slew rate
Frequency domain	FFT frequency, FFT magnitude, FFT delta frequency, FFT delta magnitude
Level qualification	Any channels that are not involved in a measurement can be used to level-qualify all timing measurements
Eye-diagram measurements	Eye height, eye width, eye jitter, crossing percentage, Q factor, and duty-cycle distortion
Jitter analysis measurements	Requires Option 002 (or E2681A) or 004 (or N5400A). Standard on DSA Series.
Clock	Time interval error (TIE) clock with TIE band, high, low-pass filter, cycle-cycle jitter, N-cycle jitter, cycle-cycle + width, cycle-cycle width, cycle-cycle duty cycle
Data	Time interval error (TIE) data with TIE band, high, low-pass filter, data rate, unit interval, clock recovery rate
Timing	Two sources: Setup time, hold time, phase, advanced One source: Period, frequency, + width, width, duty cycle, burst width, rise time, fall time, slew rate
Statistics	Displays the current, mean, minimum, maximum, range (max-min), standard deviation, number of measurements value for the displayed automatic measurements
Histograms	
Source	Waveform or measurement
Orientation	Vertical (for timing and jitter measurements) or horizontal (noise and amplitude change) modes, regions are defined using waveform markers
Measurements	Mean, standard deviation, mean ± 1, 2, and 3 sigma, median, mode, peak-to-peak, min, max, total hits, peak (area of most hits), X scale hits, and X offset hits
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 screen divisions. Test modes (run until) include test forever, test to specified time or event limit, and stop on failure. Executes "multipurpose" user setting on failure. "Unfold real time eye" feature will allow individual bit errors to be observed by unfolding a real time eye when clock recovery is on. 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	
Number of functions	Four
Operators	Absolute value, add, average, Butterworth[9], common mode, differentiate, divide, FFT magnitude, FFT phase, FIR[9], high pass filter, integrate, invert, LFE[9], LFE-All[9], low pass filter (4th-order Bessel Thompson filter), magnify, max, min, multiply, RT Eye[9], smoothing, SqrtSumOfSquare[9], square, square root, subtract, versus, and optional user defined function (Option 010)
FFT	
Frequency range[4]	DC up to 20 GHz (at 40 GSa/s) or 10 GHz (at 20 GSa/s)
Frequency resolution	Sample rate/memory depth = resolution
Best resolution at maximum sample rate	91304A/91204A/90804A: 800 Hz 90604A/90404A/90254A: 400 Hz
Frequency accuracy	(1/2 frequency resolution) + (1 x 10-6)(signal frequency)

Measurements and math (continued)

FFT (continued)	
Signal-to-noise ratio[5]	60 dB to > 100 dB depending on settings
Window modes	Hanning, flattop, rectangular
Measurement modes	
Automatic measurements	Measure menu access to all measurements, five measurements can be displayed simultaneously
Multipurpose	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
Snapshot	Takes 29 snap shot measurements (customizable). Requires My Infiniium customization tool (Option 006).
Marker modes	Manual markers, track waveform data, track measurements

Display

Display	
Display	12.1-inch color XGA TFT-LCD with touch screen
Intensity grayscale	256-level intensity-graded display
Resolution XGA	1024 pixels horizontally x 768 pixels vertically
Annotation	Up to 12 labels, with up to 100 characters each, can be inserted into the waveform area
Grids	One, two or four waveform grids, each with 8 bit vertical resolution
Waveform styles	Connected dots, dots, infinite persistence, color graded infinite persistence. Includes up to 256 levels of intensity-graded waveforms.
Waveform update rate	
Maximum waveform update	> 400,000 waveforms per second (when in the segment memory mode)

Computer system and peripherals, I/O ports

Computer system and peripherals	
Operating system	Windows® XP Pro
CPU	Intel® Pentium® 4 3.4-GHz microprocessor
PC system memory	2 GB DDR2 (standard) 4 GB DDR2 (optional – Option 803)
Drives	≥ 80-GB internal hard drive Optional removable hard drive (Option 801) Optional USB external DVD-RW drive (Option 820)
Peripherals	Logitech optical USB mouse, compact USB keyboard and stylus supplied. All Infiniium models support any Windows-compatible input device with a serial, PS/2 or USB interface.
File types	
Waveforms	Compressed internal format (*.wfm), comma-separated values (*.csv), tab separated values (*.tsv), public binary format (.bin), and Y value files (*.txt)
Images	BMP, PCX, PNG, TIFF, GIF or JPEG
I/O ports	
LAN	RJ-45 connector, supports 10Base-T, 100Base-T, and 1000Base-T. Enables Web-enabled remote control, e-mail on trigger or demand, data/file transfers and network printing (VXI-11). Recommended Web remote control tool: Ultra VNC (**http://www.ultravnc.com/**).

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

I/O ports (continued)	
GPIB	IEEE 488.2, fully programmable (optional – Option 805)
RS-232 (serial)	COM1, printer and pointing device support
Parallel	Centronics printer port
PS/2	Two ports. Supports PS/2 pointing and input devices.
USB 2.0 hi-speed (host)	Three USB 2.0 hi-speed host ports on front panel plus four USB 2.0 Hi-Speed host ports on rear panel
USB 2.0 hi-speed (device)	One USB 2.0 hi-speed device port on rear panel that enables USB instrument control
Dual-monitor video output	15 pin XGA (1024x768), full color output of scope waveform display or dual monitor video output
Auxiliary output	DC (± 2.4 V); square wave (~715 Hz and ~2 GHz); trigger output (255 mV p-p into 50)
Trigger output	5 V 50 Ω back-terminated
Time base reference output	10 MHz filtered sine wave with all harmonics ≤ –40 dBc. Amplitude into 50 Ω: 800 mV p-p to 1.26 V p-p (4 dBm ± 2 dB) if derived from internal reference. Tracks external reference input amplitude ± 1 dB if applied and selected.
Time base reference input	Must be 10 MHz, input Z0 = 50 Ω. Minimum 500 mV p-p (–2 dBm), maximum 2.0 V p-p (+10 dBm).
LXI compliance	Functional Class C

General characteristics

Temperature[11]	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, (0.75 g), 5 minute resonant dwell at 4 resonances per axis
Power	100 - 240 VAC at 50/60 Hz; maximum input power 800 Watts
Weight	Net: 20 kg (44 lbs.) Shipping: 27.4 kg (60 lbs.)
Dimensions (excluding handle)	Height: 283 mm (11.13 inch); Width: 432 mm (17.02 inch); Depth: 506 mm (19.91 inch)
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. Magnification is used below 5 mV/div. Below 5 mV/div, full-scale is defined as 40 mV. The major scale settings are 5 mV, 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 13 GHz DSP enhanced bandwidth not applicable at 5 mV/div.
4 FFT amplitude readings are affected by scope and probe bandwidth limitations and input amplifiers roll-off (e.g. 3 dB roll-off at specified bandwidth of scope/probe).
5 The FFT signal to noise ratio varies with volts/division setting, memory depth and use of time or frequency averaging.
6a Noise is the displayed noise floor. SlewRate is the displayed slew rate of the signal at the threshold crossings. Sample rate = max, sin(x)/x interpolation enabled.
6b Measurement threshold = fixed voltage at 50% level.
6c Time ranges ≤ 10 µs.
7 Values represent time error between two edges on a single channel. Standard deviation value refers to the standard deviation of 256 consecutive measurements performed using an individual instrument. Reading is the displayed DTMA measurement value. TimeScaleAccy is the oscilloscope's specified time scale accuracy.
8 Internal edge trigger mode. Trigger threshold = fixed voltage at 50% level. The slew rate independent value in the formula represents the traditional trigger jitter.
9 Requires Option 010 user defined function.
10 11.8 GHz analog bandwidth at 5 mV/div for DSO91304A and DSO91204A models.
11 Calculated from the bandwidth.
12 Typically triggers as low as 5 mV/div sensitivity.

InfiniiMax II Series
Performance characteristics

	1169A, 1168A	
Bandwidth*	1169A: > 12 GHz (13 GHz typical)	1168A: > 10 GHz
Rise and fall time		
Probe only	1169A: 28 ps (20 - 80%), 40 ps (10 - 90%)	1168A: 34 ps (20 - 80%), 48 ps (10 - 90%)
When phase compensated by 90000A Series oscilloscope	1169A w/91204A: 25 ps (20 - 80%) 36 ps (10 - 90%) 1169A w/91304A: 23 ps (20 - 80%) 33 ps (10 - 90%)	1168A w/90804A: 38 ps (20 - 80%) 54 ps (10 - 90%)
System bandwidth (–3 dB)	1169A w/91304A: 13 GHz (typical) 1169A w/91204A: 12 GHz	1168A w/90804A: 8 GHz
Input capacitance[1]	Cm = 0.09 pF Cm is between tips Cg = 0.26 pF Cg is to ground for each tip Cdiff = 0.21 pF Differential mode capacitance = Cm + Cg/2 Cse = 0.35 pF Single-ended mode capacitance = Cm + Cg	
Input resistance*	Differential mode resistance = 50 kΩ ± 2% Single-ended mode resistance = 25 kΩ ± 2%	
Input dynamic range	3.3 V peak to peak, ± 1.65 V	
Input common mode range	6.75 V peak to peak dc to 100 Hz; 1.25 V peak to peak > 100 Hz	
Maximum signal slew rate	25 V/ns when probing a single-ended signal 40 V/ns when probing a differential signal	
DC attenuation	3.45:1	
Zero offset error referred to input	± 1.5 mV	
Offset range	± 16.0 V when probing single-ended	
Offset gain accuracy	< ± 1% of setting when probing single-ended	
Noise referred to input	2.5 mV rms, probe only	
Propagation delay	~6 ns (this delay can be deskewed relative to other signals)	
Maximum input voltage	30 V peak, CAT I	
ESD tolerance	> 8 kV from 100 pF, 300 Ω HBM	
Temperature	Operating: 5 °C to +40 °C Non-operating: 0 °C to +70 °C	

* Denotes warranted specifications, all others are typical.

1 Measured using the probe amplifier and N5381A solder-in differential probe head.





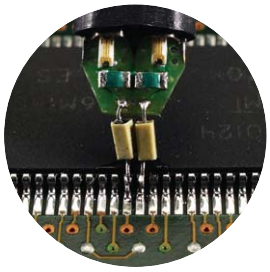


InfiniiMax I Series
Performance characteristics

	1134A, 1132A, 1131A, 1130A
Bandwidth*	1134A: > 7 GHz 1131A: > 3.5 GHz 1132A: > 5 GHz 1130A: > 1.5 GHz
Rise and fall time (10% to 90%)	1134A: 60 ps 1131A: 100 ps 1132A: 86 ps 1130A: 233 ps
System bandwidth (–3 dB)	1134A w/90604A: 6 GHz 1132A w/90404A: 4 GHz 1131A w/90254A: 2.5 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 ± 2% Single-ended mode resistance = 25 kΩ ± 2%
Input dynamic range	5.0 V peak to peak, ± 2.5 V
Input common mode range	6.75 V peak to peak dc to 100 Hz; 1.25 V peak to peak > 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	< ± 1% of setting when probing single-ended
Noise referred to input	3.0 mV rms
Propagation delay	~6 ns (this delay can be deskewed relative to other signals)
Maximum input voltage	30 V peak, CAT I
ESD tolerance	> 8 kV from 100 pF, 300 Ω HBM
Temperature	Operating: 5 °C to +40 °C Non-operating: 0 °C to +70 °C

* Denotes warranted specifications, all others are typical.

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



Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series oscilloscopes

Model	Bandwidth	Channels	Sample rate	Standard memory
DSO/DSA91304A	13 GHz	4	40 GSa/s	10 Mpts/20 Mpts (DSA)
DSO/DSA91204A	12 GHz	4	40 GSa/s	10 Mpts/20 Mpts (DSA)
DSO/DSA90804A	8 GHz	4	40 GSa/s	10 Mpts/20 Mpts (DSA)
DSO/DSA90604A	6 GHz	4	20 GSa/s	10 Mpts/20 Mpts (DSA)
DSO/DSA90404A	4 GHz	4	20 GSa/s	10 Mpts/20 Mpts (DSA)
DSO/DSA90254A	2.5 GHz	4	20 GSa/s	10 Mpts/20 Mpts (DSA)

Note: The DSO/DSA91304A uses DSP enhancement software to achieve 13 GHz bandwidth. It also adds a valuable DSP noise reduction and bandwidth control feature to reduce noise at bandwidths of 10, 8, 6, 4, 2, and 1 GHz. The non-DSP enhanced bandwidth of the DSO/DSA91304A is 12 GHz. DSA Series comes with standard 20 Mpts memory, high speed serial data analyzer (Option 003/E2688A), EZJIT plus jitter analysis software (Option 004/N5400A), and noise reduction and bandwidth control software (Option 005/N5403A).

Standard accessories

- USB optical mouse
- USB keyboard
- User's quick-start guide
- Detachable accessory pouch
- Power cord
- Stylus pen
- High-performance calibration cable (not included in DSO/DSA90254A)
- E2655B probe deskew and performance verification kit
- Two 54855-67604 BNC-compatible to precision 3.5 mm (f) adapters (not included in DSO/DSA90254A)
- One-year warranty

Note: No probes are included with the DSO/DSA90000A Series oscilloscopes. The InfiniiMax Series probes or any other probes must be purchased separately.

After-Burner III Upgrade Program

If you find you need a little more speed after you purchase your Infiniium DSO/DSA90000A Series oscilloscope, the After-Burner III Upgrade Program is available. This upgrade program allows you to upgrade any DSO/DSA90000A Series scope to a higher-bandwidth model, protecting your valuable Infiniium oscilloscope and probing system investment over the long term.

Upgrade	Description	Return to service center required
N5471A	DSO/DSA91204A to DSO/DSA91304A upgrade (12 GHz to 13 GHz)	No
N5471B	DSO/DSA90804A to DSO/DSA91204A upgrade (8 GHz to 12 GHz)	Yes
N5471C	DSO/DSA90604A to DSO/DSA90804A upgrade (6 GHz to 8 GHz)	Yes
N5471D	DSO/DSA90404A to DSO/DSA90604A upgrade (4 GHz to 6 GHz)	Yes
N5471E	DSO/DSA90254A to DSO/DSA90404A upgrade (2.5 GHz to 4 GHz)	Yes

Note: Order as many upgrades as needed to reach the desired final bandwidth of the instrument. For example, to upgrade from a DSO/DSA90804A to DSO/DSA91304A, order N5471B and N5471A.

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series oscilloscope options and accessories

Factory installed options

Type	Options	Description
Memory	20M	20-Mpts-per-channel memory upgrade (standard on DSA Series)
Memory	50M	50-Mpts-per-channel memory upgrade
Memory	100	100-Mpts-per-channel memory upgrade
Memory	200	200-Mpts-per-channel memory upgrade
Memory	500	500-Mpts-per-channel memory upgrade
Memory	01G	1-Gpts-per-channel memory upgrade
Software	002	EZJIT jitter analysis software (standard on DSA Series)
Software	003	High-Speed serial data analysis with clock recovery and 8b/10b decoding (standard on DSA Series)
Software	004	EZJIT Plus jitter analysis software (standard on DSA Series)
Software	005	Noise reduction and bandwidth control option (standard on DSA Series and DSO91304A)
Software	006	My Infiniium integration package
Software	007	Low-speed serial data analysis for I^2C/SPI
Software	008	Automotive serial data analysis for CAN / FlexRay
Software	009	InfiniiScan event identification software
Software	010	Infiniium user-defined function application software
Software	011	Infiniium application remote program interface software
Compliance	021	Ethernet electrical performance validation and compliance software
Compliance	022	PCI EXPRESS electrical performance validations and compliance software
Compliance	023	HDMI electrical performance validation and compliance software
Compliance	024	Fully buffered DIMM compliance applications
Compliance	025	Fibre channel compliance applications
Compliance	026	Serial ATA electrical performance validation and compliance software
Compliance	027	Serial attached SCSI (SAS) electrical performance validation and compliance software
Compliance	028	DisplayPort compliance test software
Compliance	029	USB 2.0 compliance test software
Compliance	030	XAUI electrical validation with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO support
Compliance	031	DDR1 compliance test applications

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series oscilloscope options and accessories (continued)

Factory installed options (continued)

Type	Options	Description
Compliance	032	DDR2 compliance test applications
Compliance	033	DDR3 compliance test applications
Hardware	801	≥ 80-GB removable hard disk drive. Replaces internal hard disk with a removable hard disk. Order the N5474A for additional hard disk drive cartridges.
Hardware	803	Additional 2 GB CPU memory (4 GB total)
Hardware	805	GPIB card option (New units only. No after purchase addition possible.)
Hardware	807	1-MΩ adapter option (comes with one unit of E2697A)
Hardware	820	USB external DVD-RW optical drive option (standalone model number is N5473A)
Hardware	821	Two additional precision BNC to SMA adapters (standalone model number is 54855-67604)
Hardware	1CM	Rack-mount kit option (standalone model number is N5470A)
Service	A6J	ANSI Z540-compliant calibration

Accessories/after purchase	Description
N5403A	After-purchase noise reduction and bandwidth control software for Infiniium 90000A Series
N5472A	10 Mpts to 20 Mpts after-purchase memory upgrade (DSO Series only)
N5472B	20 Mpts to 50 Mpts after-purchase memory upgrade
N5472C	50 Mpts to 100 Mpts after-purchase memory upgrade
N5472D	100 Mpts to 200 Mpts after-purchase memory upgrade
N5472E	200 Mpts to 500 Mpts after-purchase memory upgrade
N5472F	500 Mpts to 1 Gpts after-purchase memory upgrade
N5473A	USB external DVD-RW optical drive
N5474A	Additional ≥ 80-GB removable hard disk drive cartridge for Option 801
N5475A	Transit case for Infiniium DSO/DSA90000A Series
54855-67604	18-GHz BNC-compatible to precision 3.5 mm (f) adapter
E2655B	Additional probe deskew/performance verification kit for InfiniiMax probes
Foot switch 	Kinesis Savant 2-action programmable foot switch P/N FS20A-USB-UL. Allows you to easily program the 2-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/** for additional information and ordering instructions.

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

InfiniiMax I and II Series probing system

InfiniiMax probe amplifiers	Description
1169A	12-GHz InfiniiMax II probe amp – order one or more probe heads
1168A	10-GHz InfiniiMax II probe amp – order one or more probe heads
1134A	7-GHz InfiniiMax I probe amp – order one or more probe heads
1132A	5-GHz InfiniiMax I probe amp – order one or more probe heads
1131A	3.5-GHz InfiniiMax I probe amp – order one or more probe heads
1130A	1.5-GHz InfiniiMax I probe amp – order one or more probe heads

InfiniiMax II probe heads	Recommended for use with InfiniiMax II probe amplifiers
N5380A	InfiniiMax II 12-GHz differential SMA adapter. Includes semi-rigid coax to change span between SMA connectors.
N5381A	InfiniiMax II 12-GHz differential solder-in probe head and accessories. Includes wire for replacement leads. Order 01169-21306 for 0.005 inch or 01169-81301 for 0.007 inch replacement nickel wire.
N5382A	InfiniiMax II 12-GHz differential browser. Includes wire for replacement leads. Order 01169-21304 for 0.007 inch replacement steel wire.
N5425A	InfiniiMax I and II 12-GHz differential solder-in ZIF probe head. Requires N5426A ZIF tip. N5426A InfiniiMax I and II 12-GHz ZIF tip (replaceable solder-in tip). Includes ten replaceable ZIF tips. Order N5426A for more ZIF tips.
N5451A	InfiniiMax I and II 9-GHz/5-GHz long wire ZIF tip (replaceable solder-in tip). Includes ten replaceable ZIF tips. Order N5451A for more long wire ZIF tips. Requires N5425A ZIF probe head.

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

InfiniiMax I and II Series probing system (continued)

InfiniiMax I probe heads*	Recommended for use with InfiniiMax I probe amplifiers
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 two 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 ten 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, six damped-wire accessories, four square-pin sockets and socket heatshrink. Order E2671A for replacement accessories. Order E5381-82103 for 34 damped-wire accessories only.
E2679A	InfiniiMax single-ended solder-in probe head and accessories. Includes 16 full-bandwidth and eight medium-bandwidth damping resistors and 24 zero ohm ground resistors. Order E2672A for replacement accessories.
E2695A	Differential SMA probe head. Includes semi-rigid coax to change span between SMA connectors.

* See page 4 for specifications and limitations when used with InfiniiMax II Series probe amplifiers.

Connectivity kits model	Description
E2669A	InfiniiMax connectivity kit for differential/single-ended measurements. Includes a differential browser, four solder-in differential probe heads and two socketed differential probe heads. Includes all necessary accessories.
E2668A	InfiniiMax connectivity kit for single-ended measurements. Includes one single-ended browser, one solder-in probe head and one socketed probe head. Includes all necessary accessories.

Adapters	Description
N1022A	Adapts 113x/115x/116x active probes to 86100 Infiniium DCA.

Others	Description
N5450A 	InfiniiMax extreme temperature extension cable provides you the extra reach to probe your device's signals in extreme testing conditions that were previously impossible, such as within heat or cold chambers. Cable length: 92 cm (about 36 inches) Supports two temperature range groups: Group 1: from –55 to +105 °C when used with N5381A differential solder-in probe head Group 2: from –25 to +80 °C when used with E2677A differential solder-in probe head, E2678A differential socket probe head, or N5426A ZIF Tip Supports two different test cycle numbers: At least 250 test cycles for Group 1 (with N5381A) At least 1000 test cycles for Group 2 (with E2677A/E2678A/N5426A)

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Other probe selections

Accessories	Description
E2697A	High-impedance adapter (includes 500 MHz passive probe)
	The E2697A high-impedance adapter allows connection of probes that require a high-impedance input (e.g., passive probes, current probes) to the Infiniium DSO/DSA90000A Series high-performance oscilloscopes. The E2697A provides switchable AC/DC coupling, as well as 10:1 and 1:1 attenuation settings.

Specifications/characteristics

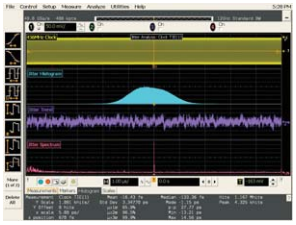
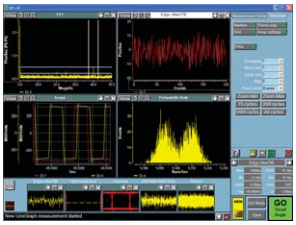
Bandwidth	Analog BW (–3 dB)	500 MHz (with supplied 10073C passive probe)
	System bandwidth	500 MHz (with 10073C passive probe and DSO/DSA90000A Series oscilloscope)
DC attenuation	1.16:1 E2697A internal attenuator at 1:1 (at scale settings > 200 mV/div signal size limited by input dynamic range)	
	11.6:1 E2697A internal attenuator at 10:1 (at scale settings > 200 mV/div signal size limited by input dynamic range)	
Input dynamic range	± 0.8 V E2697A internal attenuator setting of 1:1	
	± 8 V E2697A internal attenuator setting of 10:1	
Input dynamic range	with 10073C passive probe:	
	± 8 V E2697A internal attenuator setting of 1:1	
	± 80 V E2697A internal attenuator setting of 10:1	
Input impedance*	1 MΩ ± 1% (~12 pF)	
Input coupling	DC, AC (7 Hz)	
Maximum input voltage	± 100 V [dc + ac] [ac < 10 kHz], CAT I	
Offset range	± 5 V E2697A internal attenuator setting of 1:1	
	± 50 V E2697A internal attenuator setting of 10:1	

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

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.
1153A	200-MHz differential probe for Infiniium scopes
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	7.5-GHz (typical) passive resistive divider probe – 10:1 (500 Ω) or 20:1 (1 kΩ)
EZ probe positioner 	Includes base, joystick, and articulating arm available from Cascade Microtech Inc. (**http://www.cascademicrotech.com**)

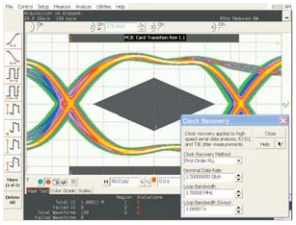
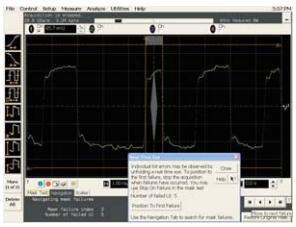
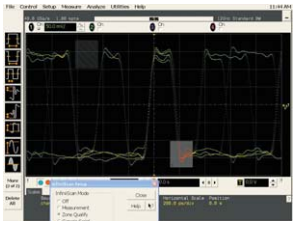
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software

Accessories	Description
E2681A	EZJIT jitter analysis software (Option 002)
	EZJIT jitter analysis software, combined with Agilent's Infiniium oscilloscopes, is a key tool for identifying and quantifying jitter components that affect the reliability of your design. Time correlation of jitter to the real-time signal makes it easy to trace jitter components to their sources. Features: • Includes: cycle-to-cycle jitter, n-cycle jitter, period jitter, time interval error, setup/hold time, data rate, unit interval • Displays: measurement histogram, measurement trend, and jitter spectrum • Jitter setup wizard • Complete realtime integration to the scope application • Selectable PLL clock recovery type
N5400A	EZJIT Plus jitter analysis software (Option 004)
	Building on the capabilities of the EZJIT software, EZJIT Plus adds additional compliance views and an expanded measurement setup wizard for simplifying and automating RJ/DJ separation for testing against industry standards. Order N5401A to upgrade E2681A EZJIT to N5400A EZJIT Plus analysis software. Features: • Automated data rate and pattern detection of repetitive data signals • Automated RJ/DJ setup wizard • Arbitrary data analysis mode allows for RJ/DJ separation on non-repetitive data • PLL clock recovery (PCI EXPRESS, Fibre Channel, 1st order, 2nd order, or explicit clock (1st and 2nd order)) • Real-time trend, histogram and spectrum displays • Composite histogram views of separated RJ, PJ, DJ, DDJ, DCD and ISI jitter subcomponents • Bathtub curve of total jitter versus eye-opening down to 10.18 BER • TIE band pass filter
E2690B	Oscilloscope tools
	ASA's oscilloscope tools, licensed from Amherst Systems Associates (ASA), comprise the most powerful suite of analysis, debug, collaboration, and automation tools for Agilent real-time oscilloscopes (**www.amherst-systems.com**).

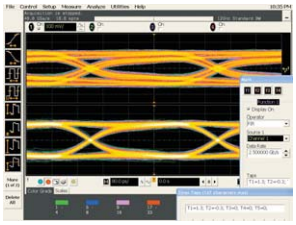
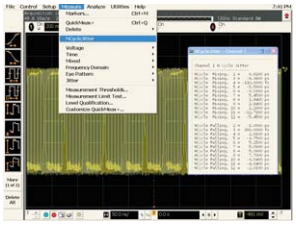
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
E2688A	High-speed serial data analysis (with clock recovery feature) (Option 003)
	Easily perform mask testing and characterize serial data streams that employ embedded clocks using the built in serial data wizard. The E2688A provides mask templates and selectable clock recovery for verifying compliance to popular standards. You can even characterize proprietary serial buses with the built-in, general-purpose golden PLL clock recovery. Features include: • Golden PLL clock recovery • Set up wizard to configure the clock recovery • Real-time eye diagram display with eye-mask unfolding • Recovered clock display • Time interval error (TIE) jitter measurement with statistics on the data stream • Mask template loading • 8b/10b decode with symbol trigger and search • Serial listing window for tabular view and navigation of 8b/10b codes
	
	Clock recovery methods available: • First-order PLL • Second-order PLL • Constant frequency • Explicit clock • Explicit clock first-order PLL • Explicit clock second-order PLL
	Standard masks include: PCI EXPRESS (2.5 Gbps), Serial ATA (1.5 Gbps), Fibre Channel electrical (1.0625, 2.125, 4.25 Gbps), Ethernet IEEE 802.3 (10/100/1000Base-T), Serial Attached SCSI, XAUI Highlighted feature: Eye-mask unfolding • Correlates eye diagram failures with live waveform locations with time stamped information relative to the trigger location • The number of failed UI count on the last acquisition provided • Navigation control allow users to scroll through each failed UI • Restore original mask feature recreates the eye diagram from the unfolded waveform
N5414A	InfiniiScan event identification software (Option 009)
	The Agilent InfiniiScan event identification software quickly and easily identifies signal integrity issues. This innovative software scans through thousands of acquired waveforms per second to help isolate anomalous signal behavior. InfiniiScan can scan for multiple events simultaneously with resolution down to 70 ps events plus automated navigation to failure events. InfiniiScan software finders consist of • Measurement software finder • Zone qualify (shown on the left) • Generic serial pattern software finder • Non-monotonic edge software finder • Runt software finder InfiniiScan goes beyond the classic limitations of hardware triggering and deep memory.

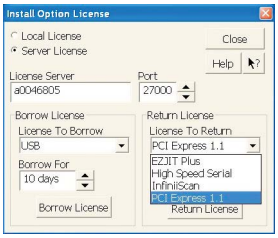
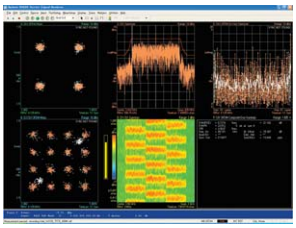
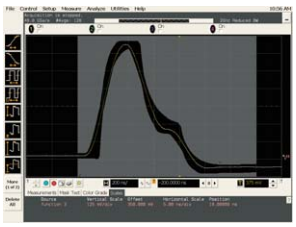
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
N5391A/N5402A	I^2C/SPI serial data analysis software (Option 007)/Automotive serial data analysis software (Option 008)
	The N5391A low-speed serial data analysis (I^2C/SPI) software and N5402A automotive serial data analysis software (CAN/FlexRay) provides a fast and easy way to debug inter-integrated circuit (I^2C) and 2-wire, 3-wire, or 4-wire serial peripheral interface (SPI), or controlled area network (CAN) and FlexRay buses. Numerical decode values are automatically displayed and synchronized below the captured signal's waveform. A listing window view with automatic click and zoom capability shows the index number, time stamp value, address, data/remote/error frame type, and data content of all packets that have been captured.
N5430A	Infiniium user-defined function (Option 010)
	The Agilent N5430A Infiniium user-defined function will open up new possibilities to mathematical analysis features of Infiniium by creating the gateway to MATLAB from MathWorks (**www.mathworks.com**/). You can now add your favorite MATLAB .m scripts as "math function operators," and use them just like any other standard functions provided with the Infiniium. The scope passes data to MATLAB and then displays the result back on the screen in real time. The screen shot shows a signal equalization example using user-defined function. Requires MATLAB software (sold separately). Features: • Seamless gateway to powerful MATLAB analysis functionality • Real-time analysis, real-time update • Requires XML programming and .m script file • Supports two control variables and two sources • Supports MATLAB version R14 SP1 and later Visit **www.agilent.com/find/scope_forum_hints** and share your user-defined function experiences!
N5452A	Infiniium application remote interface (Option 011) The Agilent N5452A will allow users to control various compliance test applications remotely using .NET languages.
E2699A	My Infiniium integration package (Option 006)
	My Infiniium allows you to customize Infiniium GUI by letting you launch user-created applications, such as those written for Agilent VEE Pro, NI LabVIEW, MATLAB or Microsoft Excel, directly from the oscilloscope's front panel or graphical user interface. For more detailed information, please request Agilent publication number 5988-9934EN. Visit **www.agilent.com/find/scope_forum_hints** and share your My Infiniium experiences!

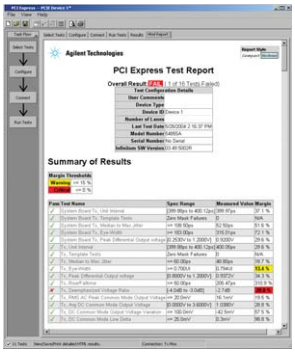
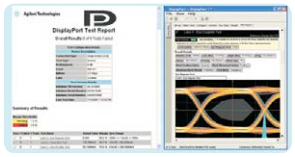
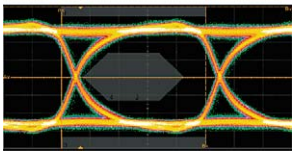
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
N5435A	Infiniium application server license
	The Agilent N5435A Infiniium application server license allows you to transport your scope application licenses from one oscilloscope to another through your server.
89600A	Vector signal analysis software
	Turn your scope into a wide band spectrum analyzer. Infiniium oscilloscopes team up with the 89600A vector signal analysis software to provide powerful, flexible, wideband signal analysis with up to 13 GHz bandwidth for applications including wideband communications, modulated radar, and WiMedia-based MB-OFDM ultra-wide band. Features include: • Analysis bandwidth of up to 13 GHz depending on scope model. Multi-channel capture for BBIQ and MIMO. • Flexible analog and digital demodulation supports the most advanced, complex modulation formats • Flexible, powerful displays including EVM, CCDF, PDF, CPE, frequency error, I/O offset, and spectrogram provide rapid insight into dynamic signal behavior • The newest demodulation feature includes PHY Radio test support for Certified Wireless USB, high-speed Bluetooth® and wireless HDMI, all based on WiMedia MB-OFDM UWB technology
N5392A	Ethernet electrical performance validation and compliance software
	The Agilent N5392A Ethernet electrical performance validation and compliance software performs a wide range of electrical tests to meet the Ethernet electrical specifications for 1000Base-T, 100Base-TX and 10Base-T systems as documented in the IEEE 802.3-2005 and ANSI X3.263-1995 standards. Features: • Test setup wizard guides you through test selection, configuration, connection, execution, and results reporting • Supports 1000Base-T, 100Base-TX and 10Base-T standards • Supports 1000BASE-T disturbing signal measurements with the use of 33250A arbitrary waveform generators • Supports return loss measurements with most HP/Agilent vector network analyzers • Test results report formally documents your test configuration, measurements made, pass/fail status, and waveforms • Pass/fail margin analysis provides an indication of how close your device is to meeting a test specification • Fixtures available: N5395B Ethernet test fixtures and N5396A jitter test cable

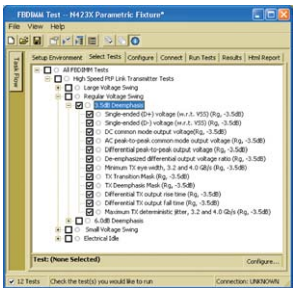
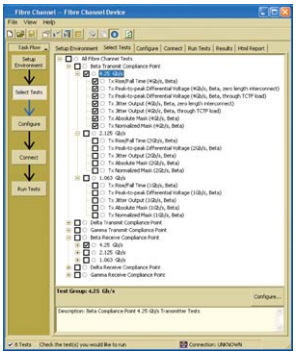
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
N5393B	PCI EXPRESS electrical performance validation and compliance software
	The Agilent N5393B PCI EXPRESS electrical performance validation and compliance software provides you with a fast and easy way to verify and debug your PCI EXPRESS designs by automatically executing electrical checklist tests, and it displays the results in a flexible report format. N5393B utilizes the clock recovery method used in the official PCI-SIG signal quality test methodology ("SigTest") application, ensuring that your test results are consistent with results from the SigTest application. Features: • Test setup wizard guides you through entire compliance test • Wide-range of electrical tests are performed, significantly more than SigTest • PCI-SIG SigTest clock recovery algorithm • Automatic HTML report generation • Pass/fail margin analysis • Requires the E2688A serial data analysis software • Compliance Test Fixtures available from PCI-SIG (CLB or CBB)
U7232A	DisplayPort electrical performance validation and compliance software
	Verify and debug your DisplayPort designs more easily with industry's only solution for DisplayPort. Agilent U7232A provides you with a fast and easy way to verify and debug your DisplayPort interface designs for sink and source ICs, motherboard systems, computers and graphics cards. The DisplayPort electrical test software is designed for use in DisplayPort Authorized Compliance Test Houses, so you can confidently use it to execute DisplayPort electrical checklist tests as well as employ it as a development tool. Features: • DUT definition setup wizard for defining DUT capability • Wide range of electrical tests • Measurement process configurability • Automated scope measurement setup • Test results reports with pass/fail margin analysis
N5399A	HDMI electrical performance validation and compliance software
	The N5399A HDMI electrical performance validation and compliance software handles all the electrical waveform tests as specified in the HDMI compliance test specification. These include data eye, under and overshoot, clock jitter and duty cycle as well as inter- and intra-pair skew. Features: • Test setup wizard guides you through entire compliance test • Ultimate test execution speed supporting 4 probe testing • Automatic HTML report generation • Software clock recovery feature tailored to HDMI 1.2/1.3 • Supports HDMI 1.2/1.3 • Fixtures available: N1080A

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

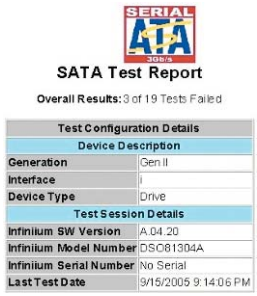
Infiniium DSO/DSA90000A Series application software (continued)

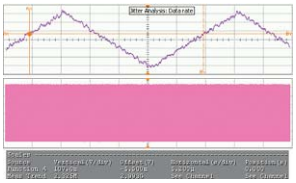
Accessories (continued)	Description
N5409A	Fully buffered DIMM
	The Agilent N5409A fully buffered DIMM compliance application tool provides you with a fast and easy way to characterize and evaluate the signal integrity of both your high-speed FB-DIMM signals as well as your reference clock. The tests performed by the N5409A are based on the JEDEC high-speed point-to-point link specification. Requires E2688A serial data analysis and N5400A EZJIT Plus jitter analysis software. Three fixtures are available for testing AMBs, DIMMs and mother boards. Features: • Easy-to-use graphical test selection and setup • Automatic HTML report generation • RJ/DJ jitter analysis at 10^{-12} BER • Supports both JEDEC and Intel eye masks • Built-in AMB control for test setup (DIMM and AMB testing) • User configurable margin analysis • Debug mode allows changes in test parameters giving you better insight into problems
N5410A	Fibre Channel compliance application
	The Agilent N5410A Fibre Channel compliance application provides you with a fast and easy way to characterize and evaluate the signal integrity of your electrical Fibre-Channel devices. Supporting FC4, FC2, and FC1 speeds, the N5410A allows you to specify the measurement point at which you are probing your signal (delta, gamma, etc.). The tests performed by the N5410A are based on the FC-PH (ANSI X3.230-1994) and FC-PH-2 Fibre Channel - Physical and Signaling Interface specification. Features: • Easy-to-use graphical test selection and setup • Supports 4.250 GBit/s, 2.125 GBit/s, and 1.0625 GBit/s speeds • Supports testing at beta, delta, and gamma compliance points • Automatic HTML report generation • RJ/DJ jitter separation analysis at 10^{-12} BER • Physical layer measurements for rise/fall time, jitter, differential voltage, and eye mask • Supports TCTF compliance load filter • Debug mode allows changes in test parameters giving you better insight into problems

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
N5411A	SATA compliance test software



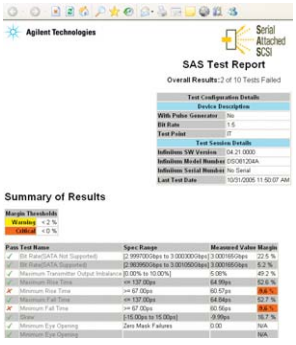


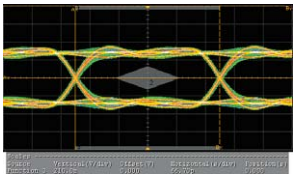
The N5411A SATA electrical performance validation and compliance software provides you with a fast and easy way to validate and debug your SATA 1.5-Gbps (Gen 1) and 3.0-Gbps (Gen 2) designs. N5411A allows you to automatically execute SATA II electrical checklist tests at each of the i, m and x interface points, and displays the results in a flexible report format. Agilent's DSO81204B real-time scope-based method of implementation (MOI) document for Serial ATA compliance testing, available from SATA-IO Web site (**www.sata-io.org/moi.asp**), is based on N5411A.

For a fixture solution, COMAX H303000202 iSATA test fixture is available from CRUZ System (**www.cruzsystems.com**).

Features:
- Available method of implementation (MOI) from SATA-IO
- Complete set of SATA transmitter electrical tests
- Test results report generation
- Debug mode provided
- Pass/fail margin analysis

N5412A — Serial Attached SCSI (SAS)





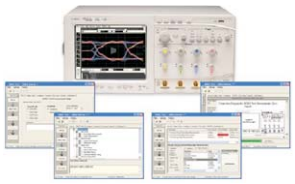
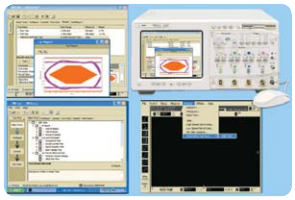
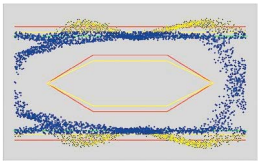
Agilent's N5412A Serial Attached SCSI (SAS) electrical performance validation and compliance software provides you with a fast and easy way to validate and debug your SAS 1.5-Gbps (SAS 150) and 3.0-Gbps (SAS 300) designs. N5412A allows you to automatically execute SAS electrical checklist tests at each of the IT, CT, IR and CR interface points, and displays the results in a flexible report format.

Additionally, Agilent currently provides a full set of compliance test fixtures, N5421A, for the SFF-8482, SAS x2 internal drive/backplane connector interfaces. The N5421A kit also includes the TX and RX transient circuit test loads.

Features:
- User configurable test setup wizard for ease-of-use
- Complete set of SAS IT/CT and IR/CR transmitter electrical tests
- Graphical HTML test results report generation
- Trials test capability for quick comparison of multiple port configurations
- Pass/fail margin analysis for simple characterization

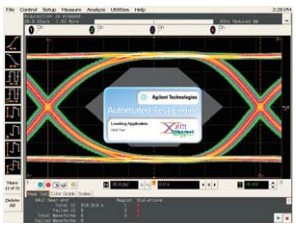
Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
U7233A/N5413A/U7231A 	DDR1/DDR2/DDR3 compliance test application The Agilent U7233A DDR1 compliance test application tool, N5413A DDR2 compliance test application tool, and U7231A DDR3 compliance test application tool provide you with a fast and easy way to characterize and evaluate your DDR1/DDR2/DDR3 designs. The tests performed are based on the Intel DDR2 667/800 JEDEC Specification Addendum Rev 1.1 (DDR2/N5413A), JESD79-3 DDR3 SDRAM Specification (DDR3/U7231A), and JESD79E DDR SDRAM Specification (DDR1/U7233A). Features: • Industry's only automated test executive saves you time and ensures you get accurate repeatable result • Automatic HTML report generation speeds the documentation of worst case conditions • The "compliance mode" provides you the clock jitter tests and the electrical test • The "advance debug mode" provides you the eye diagram analysis, the mask test, and the ringing test
N5416A 	USB compliance test software The N5416A USB 2.0 compliance test software makes USB signal integrity testing as simple as capturing the signals with your oscilloscope; eliminating the need to transfer scope waveforms to a PC. Features: • Uses the USB-IF organization developed MATLAB scripts • User friendly/comprehensive test setup wizard and reports • Fast execution speed • The USB-IF certified solution, support for hosts, devices, hubs and OTG • Available fixtures: For USB 2.0 hi-speed testing, order the N5416A test software as well as the E2649A USB 2.0 hi-speed test fixtures. For low/full speed testing order the E2646A SQiDD board.
QP-SIGKit/QP-SIGKit4B 	IEEE-1394a/b electrical test tools A pre-compliance test solution is available from Quantum Parametrics for use in conjunction with Agilent 90000A Series oscilloscopes. See **http://www.quantumparametrics.com** for additional information.

Ordering Information
Infiniium DSO/DSA90000A Series oscilloscopes and accessories

Infiniium DSO/DSA90000A Series application software (continued)

Accessories (continued)	Description
N5431A	XAUI electrical validation with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO support
	The XAUI electrical validation application improves your efficiency by providing fast and accurate XAUI validation. With the superior signal integrity and probing provided by the Agilent 90000 Series oscilloscopes, you will have confidence that devices that pass testing with the N5431A are in conformance to the XAUI specifications as described in IEEE 802.3-2005. You also have the flexibility of testing to the XAUI-derived 10GBASE-CX4, CPRI, OBSAI RP3 and Serial Rapid IO standards. Features: • Fast setup, configuration, and test with wizard-driven framework • Powerful characterization capability through the MultiTrial feature • Flexibility to test to other XAUI derived standards • Accurate measurements with the Agilent 90000 Series oscilloscope with superior signal integrity and probing • Unmatched probing flexibility with the InfiniiMax probing system
N5403A	Noise reduction and bandwidth control option Use the DSP noise reduction capability to reduce noise for a given measurement bandwidth as shown in the tables below. Included standard for DSO91304A and DSA Series scopes. RMS noise floor

Volts/div	1 GHz	2 GHz	3 GHz	4 GHz	6 GHz	8 GHz	10 GHz	12 GHz	13 GHz
5 mV	92 µV	131 µV	161 µV	188 µV	241 µV	294 µV	342 µV	387 µV	419 µV
10 mV	110 µV	153 µV	186 µV	217 µV	274 µV	329 µV	382 µV	438 µV	498 µV
20 mV	164 µV	224 µV	270 µV	314 µV	390 µV	460 µV	529 µV	612 µV	737 µV
50 mV	384 µV	521 µV	628 µV	732 µV	904 µV	1.06 mV	1.22 mV	1.39 mV	1.71 mV
100 mV	765 µV	1.01 mV	1.22 mV	1.42 mV	1.76 mV	2.07 mV	2.34 mV	2.71 mV	3.34 mV
200 mV	1.4 mV	1.99 mV	2.39 mV	2.77 mV	3.42 mV	4.01 mV	4.55 mV	5.26 mV	6.55 mV
500 mV	3.9 mV	5.26 mV	6.36 mV	7.39 mV	9.20 mV	10.8 mV	12.3 mV	14.2 mV	17.3 mV
1 V	7.6 mV	10.2 mV	12.3 mV	14.4 mV	17.8 mV	21.0 mV	23.9 mV	27.6 mV	33.9 mV

	Agilent offers the industry's first noise reduction capability that allows you to reduce the noise in your measurement to match the required bandwidth of the measurement so you don't include any more noise in your measurements than you have to.
E2625A	Communication mask test kit E2625A communication mask test kit comes with a set of electrical communication adapters to ensure convenient, reliable and accurate connections to your device under test. Included are more than 20 industry standard ANSI T1.102 and ITU-T G.703 communication signal mask templates.

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