Keysight Technologies
Infiniium DSO9064L Oscilloscopes

Optimized for manufacturing environments

Data Sheet

KEYSIGHT TECHNOLOGIES

Keysight Infiniium DSO9064L Oscilloscopes

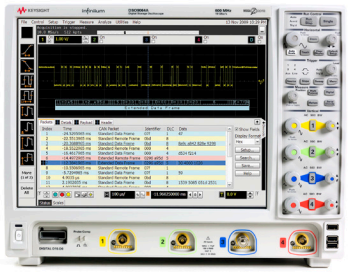
The Keysight Technologies, Inc. Infiniium DSO9064L oscilloscope provides measurements optimized for manufacturing applications. It incorporates the Infiniium 9000 Series oscilloscope's software, hardware, and IO functionality with additional modifications to make it more suitable for manufacturing applications.

- Can be controlled programmatically via USB or Ethernet.
- Full manual control is available using an external monitor with a mouse and keyboard.
- Large front-panel LEDs provide critical status.
- Reset power switch position eliminates the potential of accidental power cycles.
- Absence of front-panel controls normally found on Infiniium 9000 Series oscilloscopes eliminates the possibility of operators accidentally changing scope settings.

Model	Analog bandwidth	Analog sample rate 4-channel/2-channel	Standard memory 4-channel/2-channel	Scope channels
DSO9064L	600 MHz	10 GSa/s/20 GSa/s	20 Mpts/40Mpts	4

DSO9064A versus DSO9064L

Deciding between a DSO9064A and a DSO9064L? Here's a table that will help.



	DSO9064A	DSO9064L
Primary use model	R&D bench	Manufacturing
Bandwidth	600 MHz	600 MHz
Max sample rate	10 GSa/s	20 GSa/s
LAN connectivity indicator on front panel	No	Yes - LED
Trigger indicator on front panel	Yes - LED	Yes - LED
Application status LED on front panel	No	Yes
Support for 50 Ω and 1 MΩ probes	Yes	Yes
Integrated display	Yes	No
Support for external monitor	Yes	Yes
Front panel control with knobs/buttons	Yes	No
Probe detection	Auto	Requires user to set
AutoProbe interface to support active probes	Yes	No. Supports BNC connection and passive probes (no support for active probes)
Passive probes ship standard	Yes (qty. 4)	No, must be ordered separately
Keyboard, mouse, styles, and accessory pouch included	Yes	No
Power cord options	Worldwide options by country	US and China

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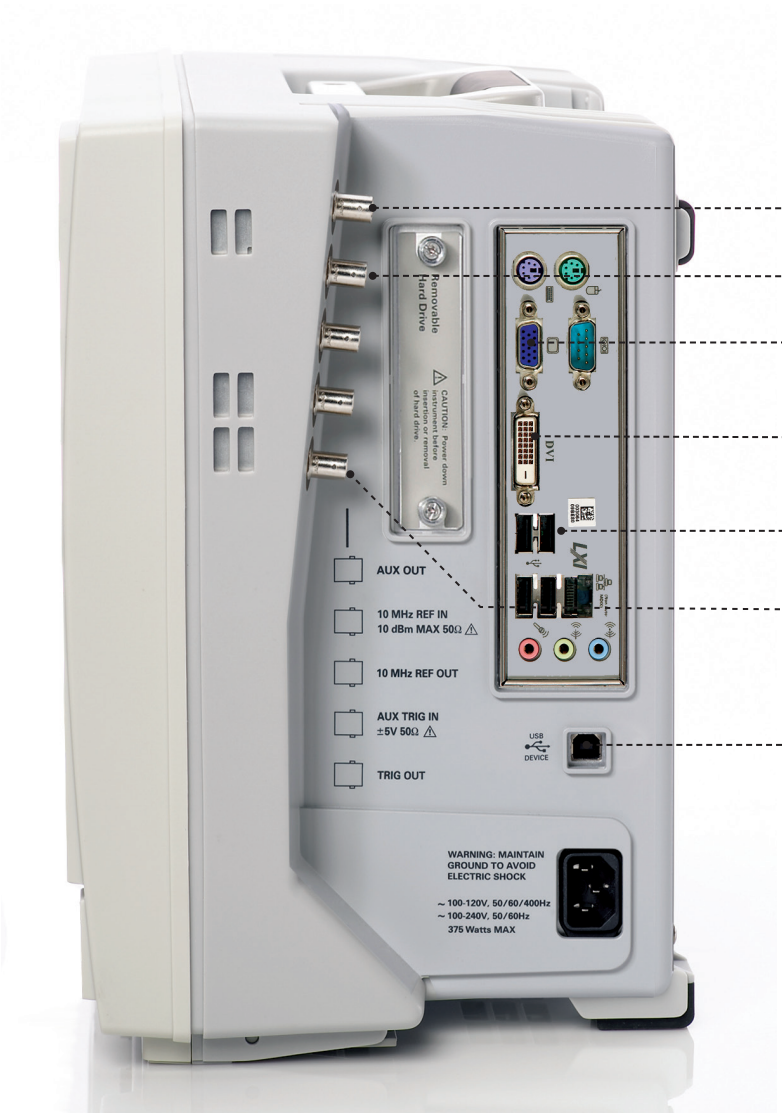


AUX OUT for calibration

Built-in 10-MHz reference in/out port synchronizes multiple measurement instruments in a system

XGA and DVI video output port lets you connect to an external monitor

Standard 10/100/1000 bT LAN port

Trig in/out ports provide an easy way to synchronize your scope to other instruments

USB 2.0 host port

Optional removable SSD shown.

Infiniium DSO9064L Performance Characteristics

Vertical: scope channels		DSO9064L	
Analog bandwidth (–3 dB)	50 Ω[1] 1 MΩ	600 MHz 500 MHz	
Typical Rise Time/Fall Time 10% to 90% at 50 Ω		540 ps	
Typical Rise Time/Fall Time 20% to 80% at 50 Ω		360 ps	
Input channels		4 analog	
Input impedance[1]		50 Ω ± 2.5%, 1 MΩ ± 1% (11 pF typical)	
Input sensitivity[3]		1 MΩ: 1 mV/div to 5 V/div 50 Ω: 1 mV/div to 1 V/div	
Input coupling		1 MΩ: AC (3.5 Hz), DC 50 Ω: DC	
Bandwidth limit		20 MHz on 1 MΩ input	
Vertical resolution[2,3]		8 bits, ≥ 12 bits with averaging	
Channel-to-channel isolation		DC to 50 MHz: 50 dB > 50 MHz to 2.5 GHz: 40 dB > 2.5 GHz to 4 GHz: 25 dB	
DC gain accuracy[1,2,3]		± 2% of full scale at full resolution on channel scale ± 5 °C from cal temp	
Maximum input voltage[1]		1 MΩ: 150 Vrms or DC, CAT I 50 Ω: 5 Vrms	± 250 V (DC + AC) in AC coupling
Offset range		Vertical sensitivity	Available offset
1 MΩ		1 mV to <10 mV/div 10 mV to <20 mV/div 20 mV to <100 mV/div 100 mV to <1 V/div 1 V to 5 V/div	± 2 V ± 5 V ± 10 V ± 20 V ± 100 V
50 Ω			± 12 div or ±4 V, whichever is smallest
Offset accuracy[1,3]		± (1.25% of channel offset +1% of full scale + 1 mV)	
Dynamic range		1 MΩ: ± 8 div from center screen 50 Ω: ± 8 div from center screen	
DC voltage measurement accuracy[2]		Dual cursor Single cursor	± [(DC gain accuracy)+(resolution)] ± [(DC gain accuracy)+(offset accuracy)+(resolution/2)]

1 Denotes warranted specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ±5 °C from firmware calibration temperature. Input impedance is valid when V/div scaling is adjusted to show all waveform vertical values within scope display.

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

3 50 Ω input: Full scale is defined as 8 vertical divisions. Magnification is used below 10 mV/div, full-scale is defined as 80 mV. The major scale settings are 5 mV, 10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V.

1 MΩ input: Full scale is defined as 8 vertical divisions. Magnification is used 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 V, 5 V.

Infiniium DSO9064L Performance Characteristics, continued

Horizontal	
Channel-to-channel skew (digital)	2 ns typical
Glitch detect (digital)	≥ 2.0 ns
Main time base range	5 ps/div to 20 s/div
Horizontal position range	0 to ± 200 s
Delayed sweep range	1 ps/div to current main time base setting
Resolution	1 ps
Modes	Main, delayed, roll (200 ms to 20 sec)
Reference positions	Left, center, right
Channel deskew	–1 ms to +1 ms range
Time scale accuracy	Time period ± (time period)/(0.4 + 0.5*YrsSinceCAL) ppm

Acquisition	
Maximum real-time sample rate	4 ch x 10 GS/s or 2 ch x 20 GS/s
Memory depth per channel	20 Mpts on 4 channels, 40 Mpts on 2 channels
Sampling modes	Real-time Real-time with peak detect Real-time with high resolution (user selectable to 9-, 10-, 11-, or 12-bits of resolution) Real-time with roll mode (200 ms to 20 sec.) Equivalent-time (1.0 ps fine interpolator resolution yields a maximum effective sample rate of 1,000 GSa/s) Segmented memory (1 ps time stamp resolution between segments) Up to 8192 segments for 20 Mpts standard memory, up to 131,072 segments with Option 500 Maximum time between triggers is 562,950 seconds (6.5 days) Re-arm time (minimum time between trigger events) is 4.5 µs with analog channels, 5.8 µs with digital channels on
Filters	Sin (x)/x Interpolation

Trigger: scope channels		
Trigger sources	Channel 1, channel 2, channel 3, channel 4, aux, and line	
Sensitivity[1]	1 MΩ input, edge trigger, 50 Ω Auxiliary	DC to 500 MHz: 0.6 div DC to 600 MHz, 0.5 div DC to 700 MHz: 300 mVp-p
Trigger level range	± 4 div from center screen (50 Ω)	
Channel 1,2,3,4	± 8 div from center screen with max of ± 8 V (1 MΩ)	
Auxiliary	± 5 V (50 Ω up to 500 MHz with at least 500 mV signal swing)	
Sweep modes	Auto, triggered, single	
Trigger holdoff range	100 ns to 10 s fixed and random	
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 settings	
Trigger coupling	1 MΩ: DC, AC, (10 Hz) low frequency reject (50 kHZ high pass filter), high frequency reject (50 kHz low pass filter)	

1. Internal edge trigger mode. Trigger threshold = fixed voltage at 50% level. The slew rate independent value in the formula represents the traditional trigger jitter.

Infiniium DSO9064L Performance Characteristics, continued

Measurements and math	
Waveform measurements	**Can be made on either min or zoom window with up to 10 simultaneous measurements with statistics)**
Voltage (scope channels)	Peak-to-peak, minimum, maximum, average, RMS, amplitude, base, top, overshoot, V overshoot, preshoot, V preshoot, upper, middle, lower, crossing point voltage , pulse top, pulse base, pulse amplitude
Time	Rise time, fall time, period, frequency, positive width, negative width, duty cycle, Tmin, Tmax, Tvolt, channel-to-channel delta time, channel-to-channel phase, count pulses, burst width, burst period, burst interval, setup time, hold time
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**
Measurement modes	
Statistics	Displays the mean, standard deviation, minimum, maximum range, and number of measurement values for the displayed automatic measurements
Histograms	
Source	Waveform or measurement (histogram on measurement requires EZJIT, EZJIT+, or EZJIT option)
Complete	
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
Marker modes	Manual markers, track waveform data, track measurements
Waveform math	
Number of functions	16
Operators	Absolute value, add, AM demodulation, average, horizontal gating, Butterworth[1], common mode, differentiate, divide, FFT magnitude, FFT phase, FIR, high pass filter, integrate, invert, LFE[1], low pass filter (4th-order Bessel Thompson filter), magnify, max, min, multiply, RT Eye[1], smoothing, SqrtSumOfSquare[1], square, square root, subtract, versus Chartstate (MSO models), charttiming (MSO models)
Automatic measurements	Measure menu access to all measurements, ten measurements can be displayed simultaneously
Multipurpose	Front-panel button activates up to ten pre-selected or ten user-defined automatic measurements
Drag-and-drop	Measurement toolbar with common measurement icons that can be dragged and dropped onto the measurement toolbar displayed waveforms
FFT	
Frequency range	DC to 10 GHz (at 20 GSa/s) or 5 GHz (at 10 GSa/s)
Frequency resolution	Resolution = sample rate/memory depth
Window modes	Hanning, flattop, rectangular , Blackman Harris, Force

1 Requires MATLAB software.

Infiniium DSO9064L Performance Characteristics, continued

Trigger modes	
Edge	Triggers on a specified slope (rising, falling or alternating between rising and falling) and voltage level on any channel.
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. Glitch range settings equal pulse width settings
Line	Triggers on the line voltage powering the oscilloscope.
Pulse width	Minimum detectable pulse width: 500 ps for analog channels. Pulse width range settings: 700 ps to 10 s for analog channels, 2 ns to 10 s for digital channels.
Runt (analog)	Triggers on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Runt settings equal pulse width settings.
Timeout	Trigger when a channel stays high, low, or unchanged for too long. Timeout settings equal pulse width settings.
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 (analog)	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.
Window (analog)	Trigger on entering, exiting, or inside specified voltage range
Video (analog)	NTSC, PAL-M(525/60), PAL, SECAM(625,50) EDTV(480p/60), EDTV(576/50), HDTV(720p/60), HDTV(720p/50) HDTV(1080i/60)
Zone-qualified	Requires InfiniiScan software option. SW-based triggering across up to 8 user-drawn zones. For each zone, user specifies "must intersect" or "must not intersect." Zones can be drawn on multiple channels and combined using Boolean expressions.

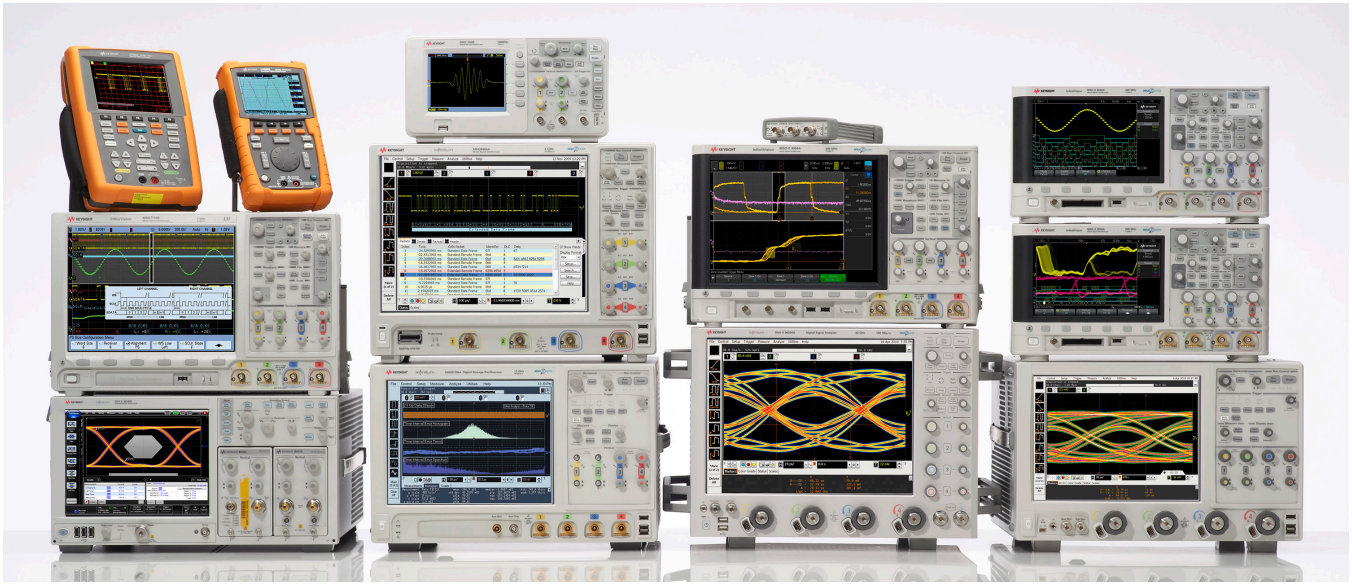
Infiniium DSO9064L Performance Characteristics, continued

When connected to an external display		
Display intensity grayscale	64-level intensity-graded display	
Resolution	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	Can display 1, 2 or 4 waveform grids	
Waveform styles	Connected dots, dots, variable persistence, infinite persistence, color graded infinite persistence. Includes up to 64 levels of intensity-graded waveforms.	
Waveform update rate (10 GS/s, 50 ns/div, sin(x)/x: on)	Segmented mode:	Maximum up to 250,000 waveforms/sec
	Real time mode:	Maximum of 4,000 waveforms/sec. Typical of 2,100 waveforms/sec with 1 kpts memory. Typical of 420 waveforms/sec with 100 kpts memory Typical of 400 waveforms/sec with 1 Mpts memory Typical of 300 waveforms/sec with 10 Mpts

Computer system and peripherals, I/O ports	
Computer system and peripherals	
Operating system	Windows 7 Embedded Standard
CPU	Intel Core 2 Duo, M890, 3.0 GHz microprocessor
PC system memory	4 GB
Drives	≥ 250-Gb internal hard drive (optional removable solid state drive), external DVD-RW drive (optional)
Peripherals	All Infiniium models support any Windows-compatible input device with a PS/2 or USB interface.
File types	
Waveforms	Compressed internal format (*.wfm), comma separated values (*.csv), .hdf5, .bin, tab separated values (*.tsv), ability to save .osc (composite including both setup and waveform. and Y value files (*.txt)
Images	BMP, TIFF, GIF, PNG 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, data/file transfers and network printing.
RS-232 (serial)	9-pin, COM1, printer and pointing device support
PS/2	Two ports. Supports PS/2 pointing and input devices.
USB 2.0 Hi-Speed	Four 2.0 ports on side panel. Allows connection of USB peripherals like storage devices and pointing devices while the oscilloscope is on. One device port on side for instrument control
Video output	15 pin XGA on side of scope, full output of scope display or dual monitor video output, DVI
Auxiliary output	DC (± 2.4 V); square wave ~755 Hz with ~200 ps rise time.
Time base reference output	10 MHz, Amplitude into 50 ohms: 800 mV pp to 1.26 V pp (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 Z = 50 ohms. Minimum 500 mV pp (–2 dBm), maximum 2.0 V pp (+10 dBm).

Infiniium DSO9064L Performance Characteristics, continued

General characteristics	
Temperature	
Operating	5 °C to + 40 °C
Non-operating	–40 °C to + 65 °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 4,000 meters (12,000 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	100-120 V, ± 10% 50/60/400 Hz 100-240 V, ± 10% 50/60 Hz Max power dissipated: 375 W
Typical operator noise	30 dB at front of instrument
Weight	25.3 lbs. (11.5 kg)
Dimensions (with feet retracted)	Height: 12.9 in (33 cm); width: 16.8 in (43 cm); depth: 9 in (23 cm)
Safety	Meets IEC1010-1 Second Edition, certified to UL61010-1 and CAN/CSA-C22.2 No 61010-1 Second Edition (IEC61010-1:2001, MOD).



Keysight Technologies Oscilloscopes

Multiple form factors from 20 MHz to > 90 GHz | Industry leading specs | Powerful applications

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Published in USA, August 4, 2014
5990-3770EN
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