InfiniiVision 2000 X-Series Oscilloscopes

Data Sheet

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Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Anticipate — Accelerate — Achieve

Agilent Technologies

Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Breakthrough technology for budget conscious customers

Agilent Technologies is the fastest growing scope vendor in the market for good reason: we deploy our investments in technology to solve your measurement problems. This commitment to superior technology brings you the InfiniiVision X-Series oscilloscopes – engineered to deliver value, functionality and flexibility at prices that fit into your existing budgets. Whether you are looking for a basic entry-level oscilloscope or a more sophisticated model to get your job done, you want the most you can get for your money. The full line of InfiniiVision X-Series oscilloscopes – 30 models – ensure that you get exactly what you need today with room to grow in the future.

Overview of the Agilent InfiniiVision X-Series oscilloscopes

	InfiniiVision 2000 X-Series	InfiniiVision 3000 X-Series
Analog channels	2 and 4 analog channels	
Digital timing channels	8 on MSO models or with DSOX2MSO upgrade	16 on MSO models or with DSOX3MSO (for 500MHz models and below) and DSOXPERFMSO for 1 GHz models upgrade
Bandwidth (upgradable)	70, 100, 200 MHz	100, 200, 350, 500 MHz, 1 GHz
Maximum sample rate	1 GSa/s per channel 2 GSa/s half channel interleaved mode	2 GSa/s per channel (2.5 GSa/s on 1 GHz models) 4 GSa/s half-channel interleaved mode (5 GSa/s on a 1 GHz models)
Maximum memory depth	100 kpts (standard)	2 Mpts standard, 4 Mpts optional (Option DSOX3MemUp)
Waveform update rate	50,000 waveforms per second	1,000,000 waveforms per second
WaveGen built-in 20 MHz function generator	Yes (Option DSOX2WAVEGEN) No AWG capability	Yes (Option DSOX3WAVEGEN) With AWG capability
Integrated digital voltmeter	Yes (option DSOXDVM)	Yes (option DSOXDVM)
Search and navigate	No	Yes
Serial protocol analysis	No	Yes (multiple options)
Segmented memory	Yes (Option DSOX2SGM)	Yes (Option DSOX3SGM)
Mask limit testing	Yes (Option DSOX2MASK)	Yes (Option DSOX3MASK)
AutoProbe interface	No	Yes

Need more memory or a Bigger Screen

See the InfiniiVision 7000B Series oscilloscopes

- 12.1" display - nearly 40% larger than the nearest competitor.
- 100 MHz to 1 GHz DSO and MSO models
- 8 Mpts memory standard.
- Upgradability for MSO channels and Measurement applications
- Hardware-based measurement applications including serial decode
- Xilinx FPGA dynamic probe support
- Altera FPGA dynamic probe support
- Standard LAN, USB, and XGA video out connectivity

See **www.agilent.com/find/7000** for more details.

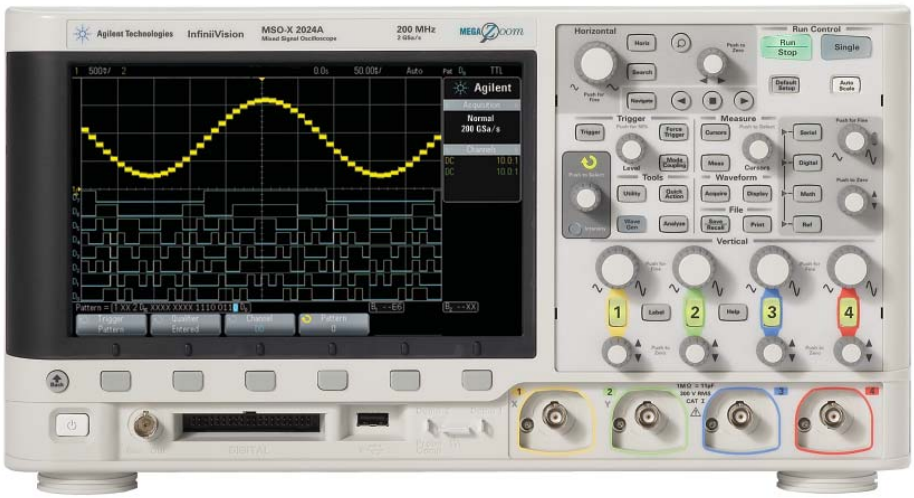
Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

More scope

The InfiniiVision 2000 X-Series offers entry-level price points to fit your budget with superior performance and optional capabilities that are not available in any other oscilloscope in its class. Agilent's breakthrough technology delivers more scope for the same budget.

With more scope, you can:

- **See more** of your signal more of the time with the largest screen in its class, the deepest memory and the fastest waveform update rates
- **Do more** with the power of 4 instruments in 1: oscilloscope, logic timing analyzer, WaveGen built-in 20 MHz function generator (optional), and digital voltmeter (optional)
- **Get more** investment protection with the classes only fully upgradable scope, including bandwidth



Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

See more of your signal, more of the time

Largest display

Engineering for the best signal visibility starts with the largest display. Our 8.5-inch WVGA display offers twice the viewing area with five times the resolution (WVGA 800x480 versus QVGA 320x240).

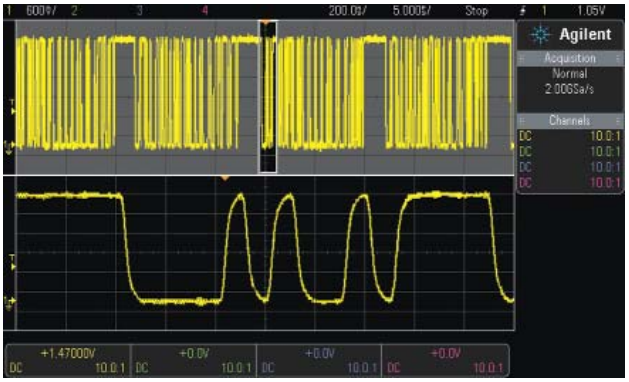
Fastest update rate

With Agilent-designed *MegaZoom* IV custom ASIC technology, the InfiniiVision 2000 X-Series family delivers up to 50,000 waveforms per second. With this speed you can see signal detail and infrequent anomalies more of the time.

Notice that the Agilent 2000 X-Series allows you to see more of your signals, and captures the infrequent glitch that you are unable to see on other oscilloscopes in this class.

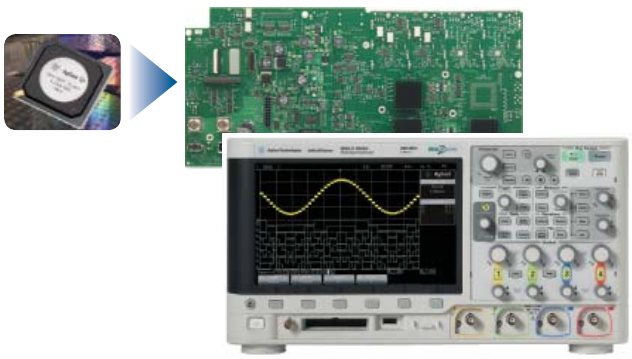
Deeper memory for longer time capture

With up to 100 kpts of memory you get 40X more than other scopes in this class, enabling you to capture long, non-repeating signals while maintaining a high sample rate, then quickly zoom in on areas of interest. Deep memory lets the scope maintain a high sample rate over longer time spans.



How does Agilent do that?

Agilent-designed *MegaZoom IV* custom ASIC technology combines the capabilities of an oscilloscope, logic analyzer, and WaveGen built-in function generator in a compact form factor at an affordable price. 4th generation *MegaZoom* technology enables the industry's fastest waveform update rate with responsive deep memory acquisitions.

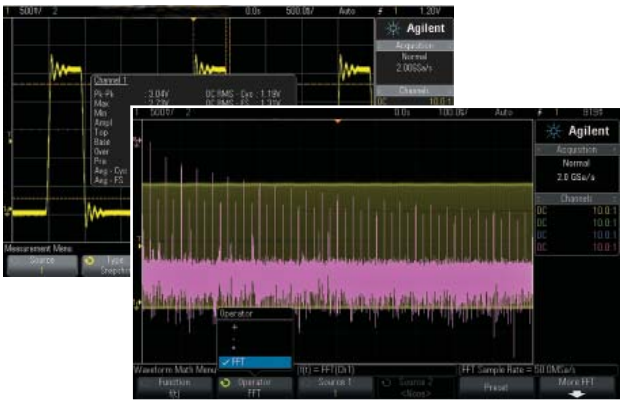


Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Do more with the power of 4 instruments in 1

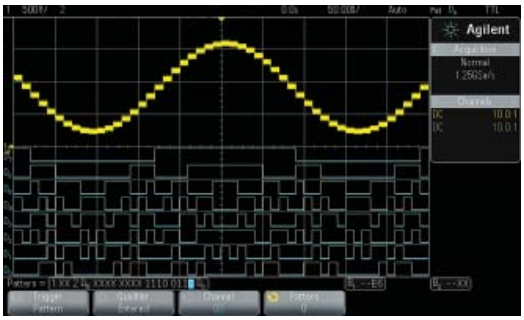
Best-in-class oscilloscope

The InfiniiVision 2000 X-Series features the deepest memory in its class with 100 kpts of Agilent's patented *MegaZoom* IV technology that is always enabled and always responsive providing the industry's fastest update rate at up to 50,000 waveforms per second, with no compromise if you turn on measurements or add digital channels. In addition, the 2000 X-Series offers 23 automated measurements such as voltage, time, and frequency as well as four waveform math functions including FFT. All of this at a comparable price to the Tektronix TDS2000C oscilloscope.



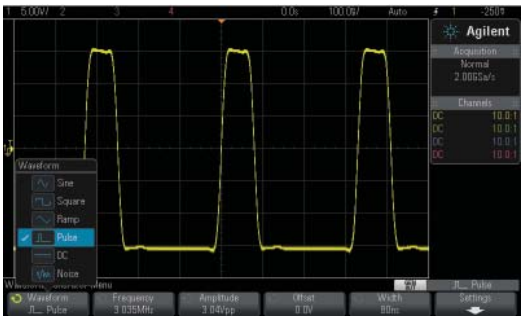
Industry's first economy-class mixed signal oscilloscope (MSO)

The 2000 X-Series is the first instrument in its class to offer an integrated logic timing analyzer. Digital content is everywhere in today's designs and with an additional 8 integrated digital timing channels, you now have up to 12 channels of time-correlated triggering, acquisition and viewing on the same instrument. Buy a 2 or 4 channel DSO and at any time, upgrade it yourself to a MSO with a license to turn on those integrated 8 digital timing channels.



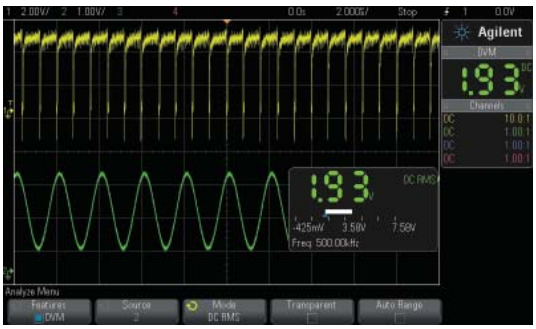
Industry-exclusive WaveGen built-in 20 MHz function generator

An industry first, the 2000 X-Series offers an integrated 20 MHz function generator. Ideal for educational or design labs where bench space and budget are at a premium, the integrated function generator provides stimulus output of sine, square, ramp, pulse, DC and noise waveforms to your device under test. No need to buy a separate function generator when you can get one integrated in your new oscilloscope. Turn on WaveGen at any time by ordering the DSOX2WaveGen option and install the license yourself.



Integrated digital voltmeter

An industry first, the 2000 X-Series offers an integrated 3-digit voltmeter (DVM) and 5-digit frequency counter inside the oscilloscopes. The voltmeter operates through the same probes as the oscilloscope channels, however, the measurements are de-coupled from the oscilloscope triggering system so that both the DVM and triggered oscilloscope measurements can be made with the same connection. The voltmeter results are always displayed, keeping these quick characterization measurements at your fingertips. Turn on DVM at any time by ordering the DSOXDVM option.



Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Get more investment protection with the industry's only fully upgradable oscilloscope

Upgradability:

Project needs change, but traditional oscilloscopes are fixed – you get what you pay for at the time of purchase. With the 2000 X-Series, your investment is protected. If you need more bandwidth (up to 200 MHz), digital channels, WaveGen, integrated digital voltmeter, or measurement applications in the future, you can easily add them all after the fact.

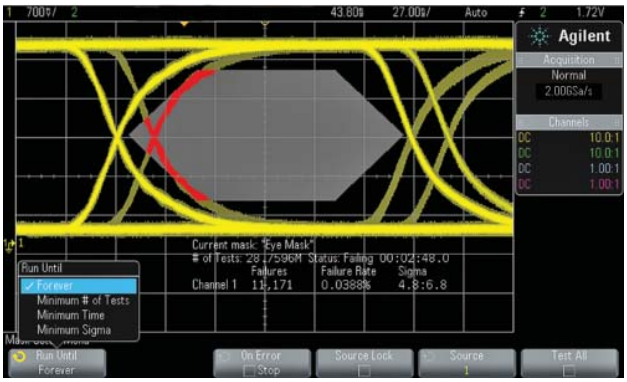
See page 22 for more information on upgradable products.

Add at the time of your purchase or upgrade later:

- Bandwidth
- Digital channels (MSO)
- WaveGen built-in 20 MHz function generator
- Integrated digital voltmeter (DVM)
- Measurement applications
  - Mask testing
  - Segmented memory
  - Educators' lab kit

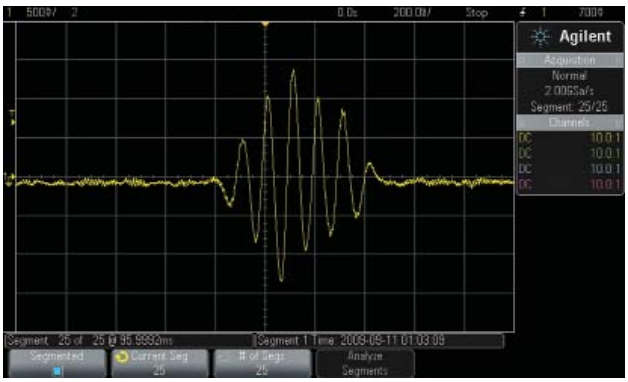
Mask testing

Whether performing pass/fail tests to specified standards in manufacturing or testing for infrequent signal anomalies in R&D debug, the mask test option can be a valuable productivity tool. The 2000 X-Series features the industry's only hardware-based mask testing and can perform up to 50,000 tests per second.



Segmented memory

When capturing low-duty cycle pulses or data bursts, you can use segmented memory acquisition to optimize acquisition memory. Segmented memory acquisition lets you selectively capture and store important segments of signals without capturing unimportant signal idle/dead-time. Segmented memory acquisition is ideal for applications including packetized serial pulses, pulsed laser, radar bursts and high-energy physics experiments. Up to 25 segments can be captured on the 2000 X-Series models with a minimum re-arm time under 19 µs.



Get more investment protection with the industry's only fully upgradable oscilloscope

InfiniiView Oscilloscope Analysis Software (N8900A)

Agilent's InfiniiView PC-based analysis oscilloscope software allows you to do additional signal viewing, analysis and documentation tasks away from your scope. Capture waveforms on your scope, save to a file, and recall the waveforms into InfiniiView. The application supports a variety of popular waveform formats from multiple oscilloscope vendors and includes the following features:

View and analyze away from your scope and target system

Navigate

- Pan and zoom to anywhere in the data record. Navigate in time, or between bookmarks.

View

- Up to 8 waveforms simultaneously, 1, 2, or 4 grids (stacked, side by side, custom layout, zoom)

Measurements

- Over 50 automated measurements
- View up to 20 simultaneously
- User-customizable result window (size, position, information)
- X & Y markers with dynamic delta values

Analyze

- 20 math operators including FFT and filters
- Up to four independent/cascaded math functions
- Measurement histogram

View Windows

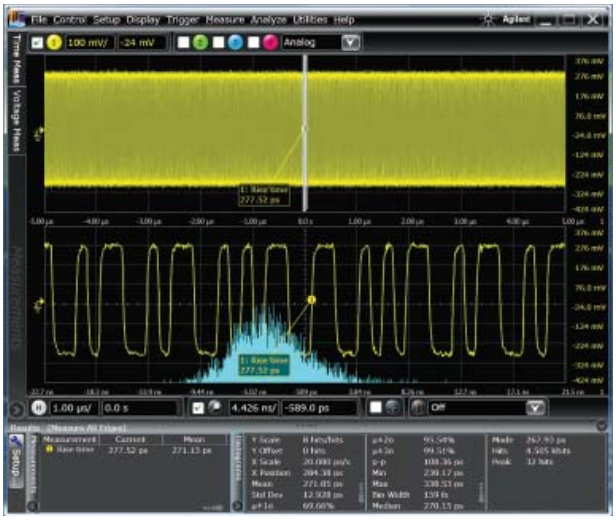
- Analog, math, spectral, measurement results (simultaneous, tabbed, or undocked)

Documentation

- Right-click to copy
- Up to 100 bookmarks
- Annotated axis values
- Markers with dynamic delta value updates when moved
- One step save/load setup and all waveforms

Analysis Upgrades (Optional)

- Protocol decode for I²C/SPI, RS232/UART, CAN/ LIN/FlexRay, SATA, 8B/10B, digRF v4, JTAG , MIPI D-Phy, SVID, Ehernet 10G KR, PCIe 1, 2, 3, USB 2, 3, HSIC
- Jitter analysis
- Serial data analysis



Use familiar scope controls to quickly navigate and zoom in to any event of interest.

Add bookmarks and call outs to produce friendly and useful documentation.

Other productivity tools

Agilent Spectrum Visualizer (ASV) Software

This PC-based software package connects to the scope via USB or ethernet connection and uses the Agilent I/O libraries to communicate. It provides advanced FFT frequency domain analysis at a cost-effective price as well as spectrum and spectrogram analysis with an intuitive user interface that RF engineers are familiar with. Tools include:

Spectrum Measurements

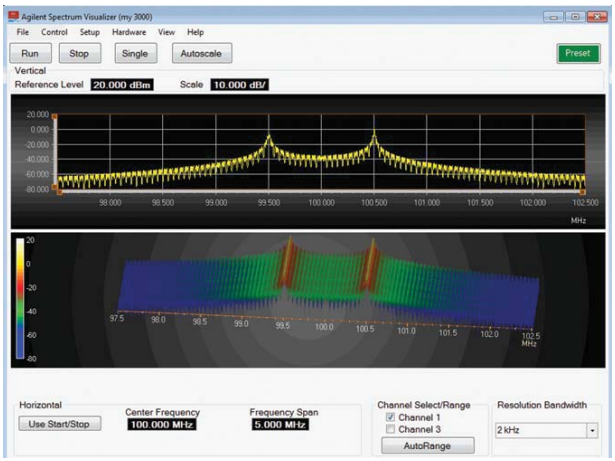
- Power (dBm) vs. frequency
- Horizontal (x-axis): Specify center frequency and frequency span, or start and stop frequencies
- Vertical (y-axis): Specify reference level (dBm) and scale (dB/div)
- Settable resolution bandwidth
- Flat top, Guassian, or Hanning windows applied to the time domain data for the FFT analysis
- Marker to peak amplitude, and marker to center frequency.
- Marker peak search can be enabled for time-varying signals
- Multiple marker, with delta X and delta Y readouts

Acquisition and Display Modes

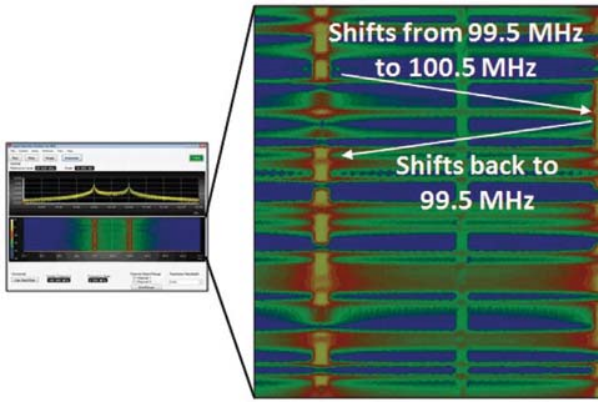
- Free Run (continuous), Triggered, Stop, Single, Preset
- Triggered mode: specify trigger power level (dBm), single or continous sweep
- Enable/disable y-axis label
- Enable/disable main trace display
- Max hold display mode
- Gated Measurements
- Multiple viewing options
  - Spectrogram
  - waterfall
  - 3D
- Changeable scaling settings on main window
- Local language support
- Multiple oscilloscopes can be configured to allow user to rapidly switch between multiple instruments

Arbitrary Waveform Generator Source Control

- 20 MHz sine wave
- 10 MHz square wave
- Pulsed waveform
- WaveGen source settings can be altered while ASV is running for interactive signal source and analysis capability



Waterfall View for ASV Spectrogram Measurement

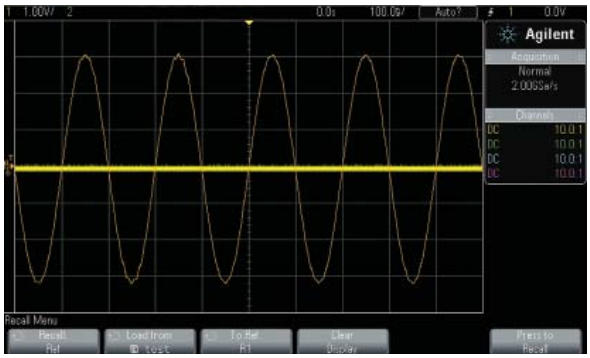


Close-Up Detail on Frequency Shift Keying (FSK) Characteristics with the ASV Spectrogram Measurement

Other productivity tools

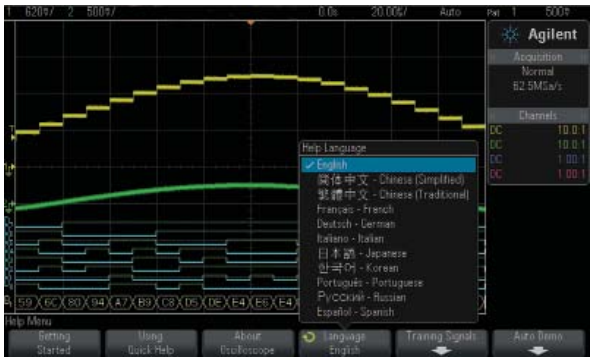
Reference waveforms

Store up to two waveforms in the scope's non-volatile reference waveform memory locations. Compare these reference waveforms with live waveforms, and perform post analysis and measurements of stored data. You can also store waveform data on a removable USB memory device that can be recalled back into one of the available two reference memories of the scope for full waveform measurement and analysis. Save and/or transfer waveforms as XY data pairs in a comma-separated values format (*.csv) for PC analysis. Save screen images to a PC for documentation purposes in a variety of formats including: 8-bit bitmaps (*.bmp), 24-bit bitmaps (*.bmp), and PNG 24-bit images (*.png).



Localized GUI and help

Operate the scope in the language most familiar to you. The graphical user interface, built-in help system, front panel overlays, and user's manual are available in 11 languages. Choose from: English, Japanese, simplified Chinese, traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese and Italian. During operation, access the built-in help system just by pressing and holding any button.



Probe solutions

Get the most out of your 2000 X-Series scope, by using the right probes and accessories for your application. Agilent offers a complete family of innovative probes and accessories for the InfiniiVision 2000 X-Series scopes. For the most up-to-date and complete information about Agilent's probes and accessories, please visit our Web site at www.agilent.com/find/scope_probes.

Autoscale

Quickly display any active signals and automatically set the vertical, horizontal and trigger controls for optimal viewing with the press of the autoscale button. (This feature can be disabled or enabled for the education environment).

Other productivity tools

Connectivity and LXI Compatibility

Built-in USB host (one front, one back) and USB device ports make PC connectivity easy. Operate the scope from your PC and save and recall stored waveforms as well as set-up files via LAN. An optional LAN/VGA module gives you network connectivity and complete LXI class C support as well as the ability to connect to an external monitor. An optional GPIB module is also available. Only one module may be used at a time.

Intuilink toolbars and Data Capture gives you a quick way to move screen shots and data into Microsoft Word® and Excel. These toolbars can be installed from www.agilent.com/find/intuilink

View Scope enables simple and free time-correlated measurements between a 2000 X-Series oscilloscope and an Agilent 16900, 16800, 1690 or 1680 Series logic analyzer.

Virtual Front Panel

Use the VNC viewer via your internet browser to remotely control your oscilloscope from your computers web browser. The virtual front panel looks and acts as the real front panel on the oscilloscope with the same associated keys and knobs. Use this capability in cases where remote training and learning of the oscilloscope are required. This instrument is fully LXI complaint with the LAN/VGA connection module.

Secure environment mode

The -SEC (Secure Environment Mode) comes standard with all models and provides the highest level of security by ensuring that internal non-volatile memory is clear of all setup and trace settings. This option stores setups and traces to internal volatile memory only, and volatile memory is cleared during the power off cycle of the instrument. This procedure ensures that all setup and trace settings are removed from memory.

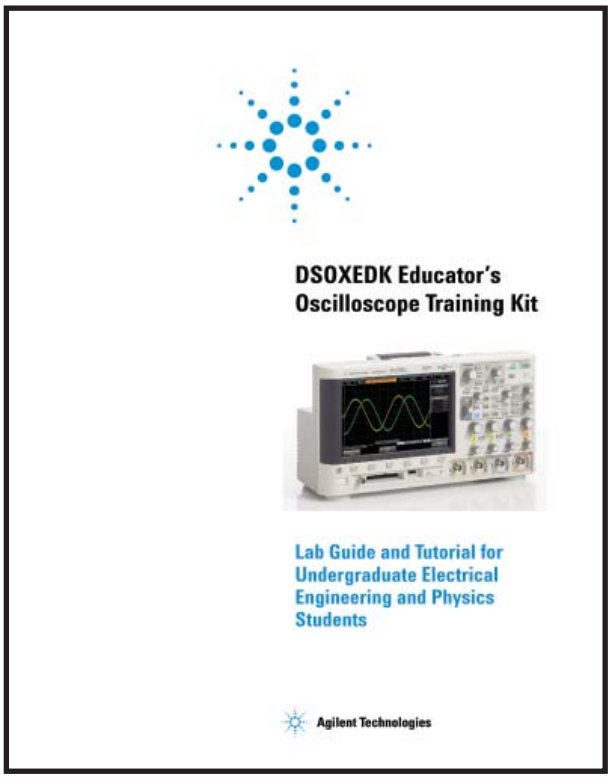
Designed with education in mind

Quickly and easily set up or upgrade a teaching lab

Teach your students what an oscilloscope is and how to perform basic measurements with the Educator's Oscilloscope Training Kit (DSOXEDK). It includes training tools created specifically for electrical engineering and physics undergraduate students and professors. It contains an array of built-in training signals, a comprehensive oscilloscope lab guide and tutorial written specifically for the undergraduate student, and an oscilloscope fundamentals PowerPoint slide set for professors and lab assistants. For more information, refer to www.agilent.com/find/EDK. Also available are DreamCatcher's full semester application-specific courseware written around Agilent test and measurement equipment: www.dreamcatcher.asia/cw.
With features such as the ability to disable autoscale and the 50- Ohm input data path, the InfiniiVision X-Series is a perfect choice for education.

Get your students to quickly put the scope to work

Intuitive localized front panel design with pushable knobs for quick access to commonly used oscilloscope functions helps students spend more time learning the concepts and less time learning how to use the oscilloscope. Enable your students to answer their own questions with the localized built-in help system that provides quick access by simply pressing and holding any button.

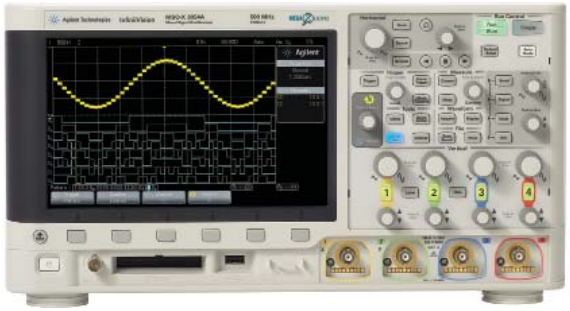


Stretch your budget over the long term

Save money with an industry-exclusive built-in 20 MHz WaveGen, instead of a separate function generator. Buy what you need today and protect your investment in the future with the only oscilloscopes in this class with upgradable bandwidth, 8 digital channels (MSO), WaveGen, integrated digital voltmeter and measurement applications. Get long scope life and keep repair costs to a minimum with a standard 3-year warranty, and an instrument reliability you've come to expect from the leader in test and measurement equipment.

Optimize lab bench space

With 4 instruments in 1, you will save on precious lab bench space by getting an oscilloscope, logic timing analyzer, WaveGen function generator and integrated digital voltmeter all in one innovative instrument with a footprint that is only 5.57 inches deep. With the large 8.5-inch WVGA display, you can easily view all signals on one screen with enough viewing area for more than one student to view.



Designed with research and development in mind

Find more glitches and infrequent events

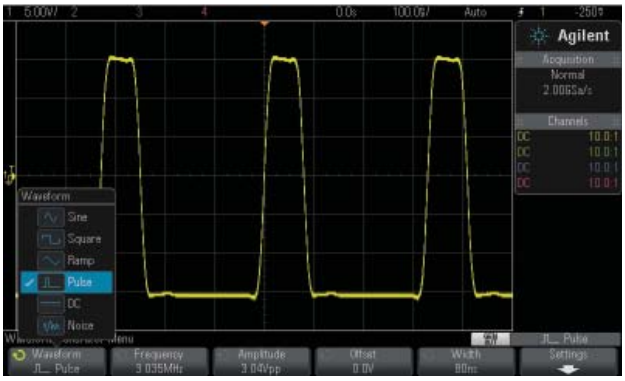
With the fastest architecture in the industry, up to 50,000 waveforms/sec, you can see jitter, infrequent events, and more subtle signal details that other oscilloscopes miss.

Capture and view more of your signals at once

With integrated eight digital timing channels (MSO) models, you can get up to 12 channels of time-correlated triggering, acquisition and viewing on the same instrument with no compromise to the oscilloscopes waveform update rate. Don't need an MSO right now? No problem, just upgrade later when you need it.

Optimize lab bench space

With 4 instruments in 1, you will save you money and precious lab bench space by getting an oscilloscope, logic timing analyzer, WaveGen function generator and integrated digital voltmeter all in one innovative instrument with a footprint that is only 5.57 inches deep. With the large 8.5-inch WVGA display, you can easily view all signals on one screen with enough viewing area for more than one engineer to view.



Make the most of a limited budget

Project needs change, but traditional oscilloscopes are fixed – you get what you pay for at time of purchase. With the 2000 X-Series, your investment is protected. If you need more bandwidth (up to 200 MHz), 8 digital channels (MSO), WaveGen, integrated digital voltmeter or measurement applications like mask testing and segmented memory in the future, you can easily add them all when you need to. Get a long scope life and keep repair costs to a minimum with a standard 3-year warranty and an instrument reliability you've come to expect from the leader in test and measurement equipment.

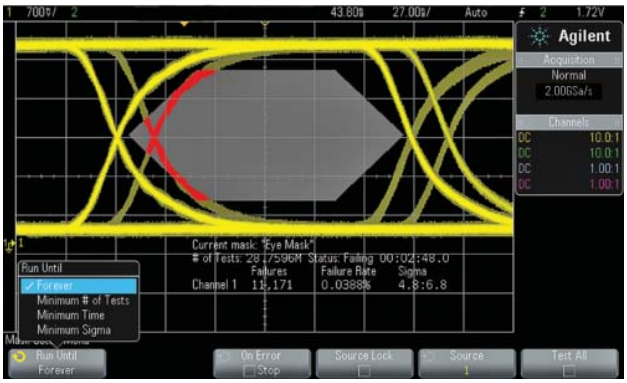
Designed with manufacturing in mind

Stretch a limited budget

Protect your investment with the 2000 X-Series. If you need more bandwidth (up to 200 MHz) or measurement applications like mask testing in the future, you can easily add them all when you need them.

Get your technicians to quickly put the scope to work

Intuitive localized front panel design and pushable knobs for quick access to commonly used oscilloscope functions allow technicians to spend more time testing and less time learning where the menus are on the oscilloscope. Enable your technicians to answer their own questions with the localized built-in help system that provides quick access by simply pressing and holding any button. Get a long scope life and keep repair costs to a minimum with a standard 3-year warranty and a 2-year calibration interval, you get the instrument reliability you've come to expect from the leader in test and measurement equipment.



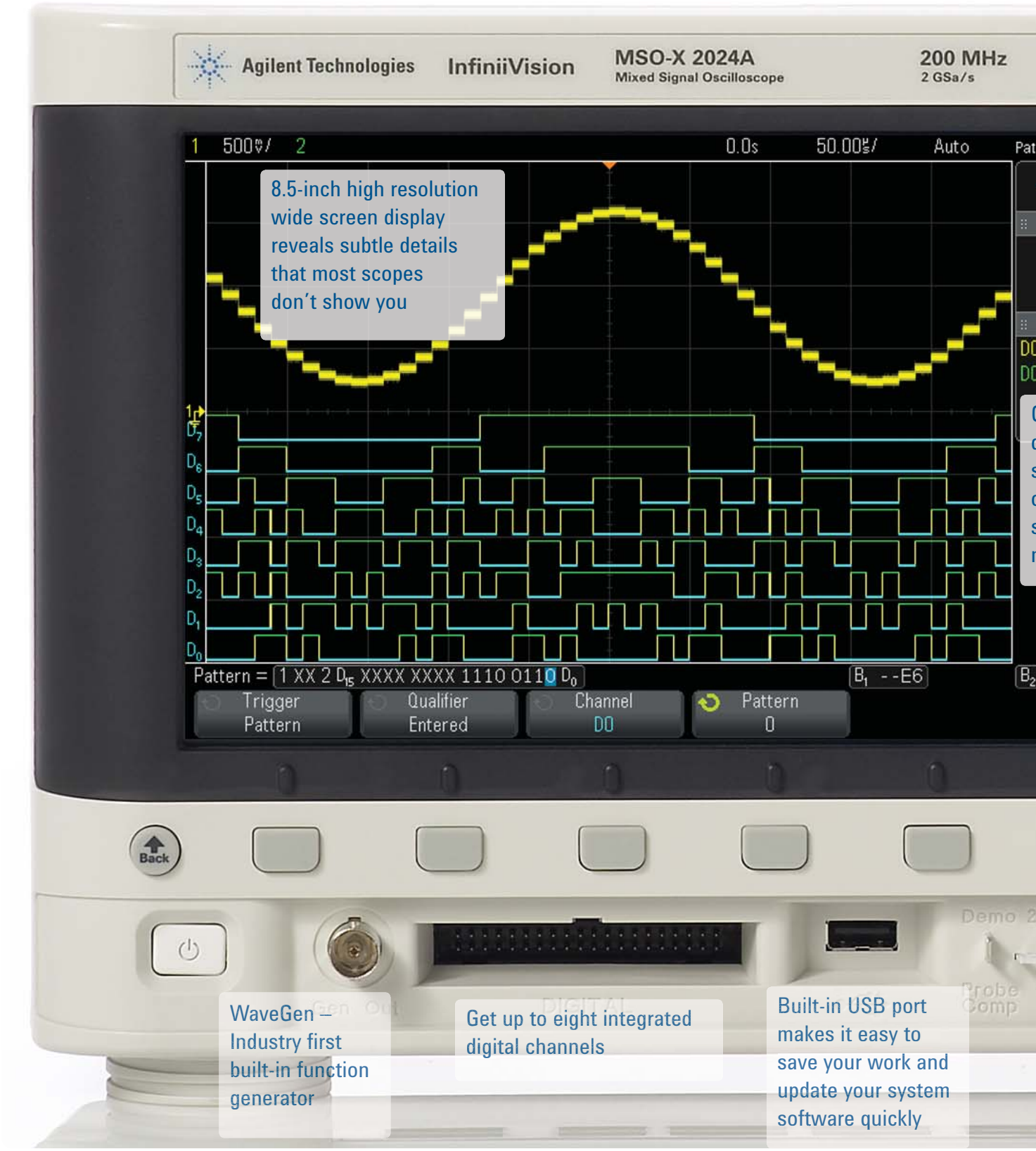
Faster, low-escape test throughput

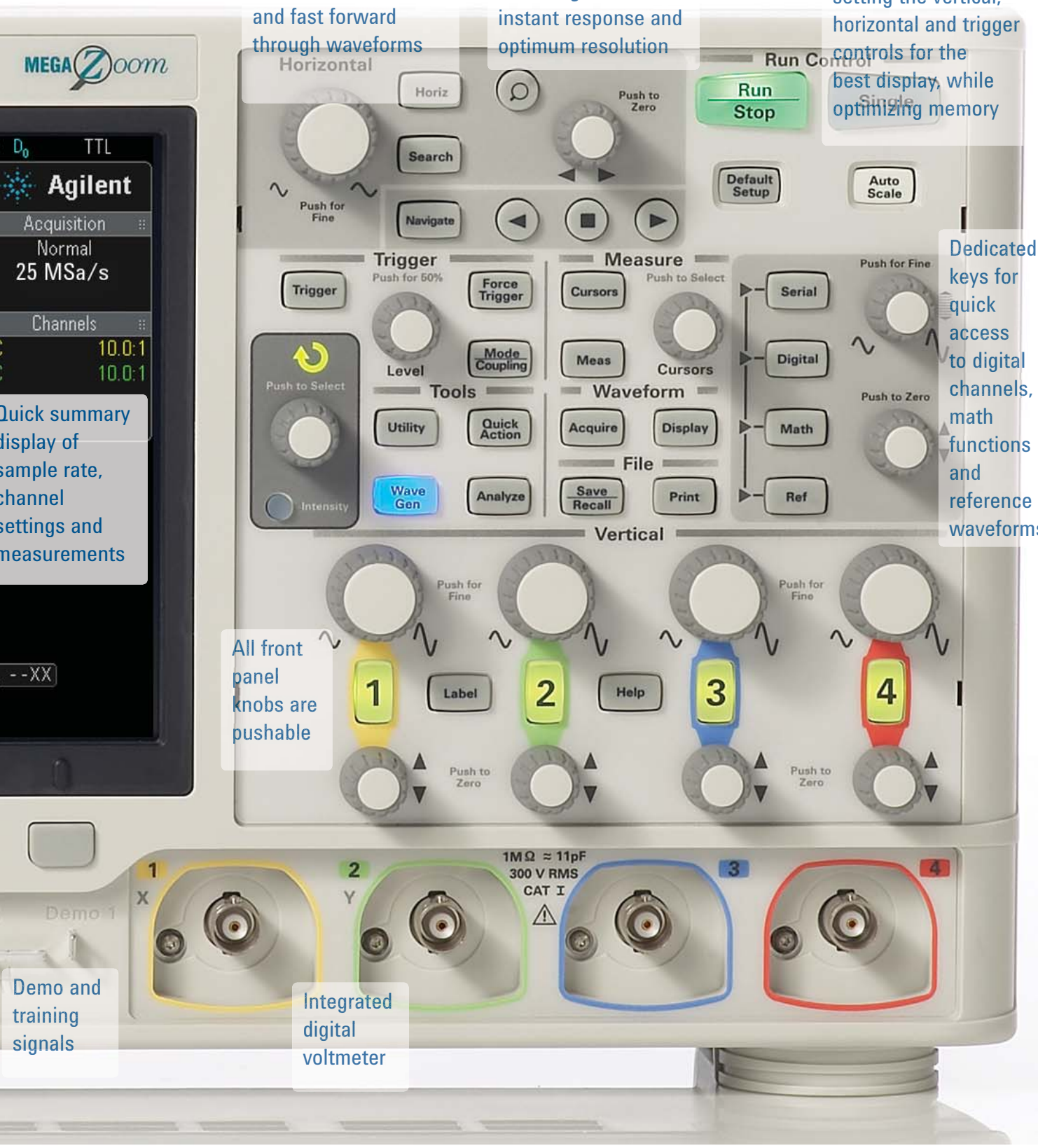
With the fastest architecture in its class, featuring up to 50,000 waveforms/sec, you will capture more of those elusive problems you worry about and ensure they don't ship to customers. With the mask limit testing measurement application, you can quickly test up to 50,000 signals per second to a known good waveform with quick go/no-go test results, saving you valuable test time while having more certainty.

Optimize test bench space

With 4 instruments in 1, you will save on precious line bench space by getting an oscilloscope, logic timing analyzer, WaveGen function generator, and integrated digital voltmeter all in one innovative instrument with a footprint that is only 5.57 inches deep. With the large 8.5-inch WVGA display, you can easily view all signals on one screen even when the scope is sitting far away from the operator.

Oscilloscope shown actual size




Navigation front panel controls make it easy to play, stop, rewind and fast forward through waveforms
Quickly pan and zoom for analysis with *MegaZoom* IV's instant response and optimum resolution
Autoscale lets you quickly display any analog or digital active signals, automatically setting the vertical, horizontal and trigger controls for the best display, while optimizing memory
Dedicated keys for quick access to digital channels, math functions and reference waveforms
Quick summary display of sample rate, channel settings and measurements
All front panel knobs are pushable
Demo and training signals
Integrated digital voltmeter
MEGAZoom
Agilent
Acquisition
Normal
25 MSa/s
Channels
10.0:1
10.0:1
TTL
Horizontal
Horiz
Search
Navigate
Push for Fine
Push to Zero
Run Control
Run
Stop
Single
Default Setup
Auto Scale
Trigger
Trigger
Push for 50%
Force Trigger
Level
Mode Coupling
Measure
Cursors
Push to Select
Meas
Cursors
Serial
Digital
Math
Ref
Push for Fine
Push to Zero
Push to Select
Intensity
Tools
Utility
Quick Action
Wave Gen
Analyze
Waveform
Acquire
Display
File
Save Recall
Print
Vertical
Push for Fine
Push to Zero
1
2
3
4
Label
Help
1MΩ ≈ 11pF
300 V RMS
CAT I
X
Y
Demo 1

Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Configuring your InfiniiVision X-Series oscilloscope

Step 1. *Choose your bandwidth and channel count.*

InfiniiVision 2000 X-Series scopes						
	DSOX2002A MSOX2002A	DSOX2004A MSOX2004A	DSOX2012A MSOX2012A	DSOX2014A MSOX2014A	DSOX2022A MSOX2022A	DSOX2024A MSOX2024A
Bandwidth (upgradable)*	70 MHz		100 MHz		200 MHz	
Analog channels	2	4	2	4	2	4
Digital channels (MSO)	8 integrated digital channels (optional)[1]					

1. See pages 20-21 for more detailed information on upgradability.

Step 2. *Tailor your scope with measurement applications to save time and money*[2]

Application	2000 X-Series
WaveGen (built-in function generator)	DSOX2WAVEGEN
Integrated digital voltmeter	DSOXDVM
Educator's kit	DSOXEDK
Mask testing	DSOX2MASK
Segmented memory	DSOX2SGM
InfiniView oscilloscope analysis software	N8900A
Agilent spectrum vsualizer (ASV)	64997A

2. See pages 20-21 for more detailed information on upgradability, and installation process.

Step 3. *Choose your probes*[3]

Probes	2000 X-Series
N2862B 150 MHz 10:1 passive probe	Standard one per channel for 70 and 100 MHz models
N2863B 300 MHz, 10:1 passive probe	Standard one per channel for 200 MHz models
N6459-60001 8-channel logic probe and accessory kit	Standard on MSO models or with DSOX2MSO upgrade
N2889A 350 MHz 10:1/1:1 passive probe	Optional
10070D 20 MHz 1:1 passive probe with probe ID	Optional
10076A 250 MHz 100:1, 4 kV high-voltage passive probe with probe ID	Optional
N2791A 25 MHz, ±700 V high-voltage differential probe	Optional
N2792A 200 MHz 10:1 differential probe	Optional
1146A 100 kHz, 100 A, AC/DC current probe	Optional

3. See page 20 for probe compatibilty table. For more information on probes and accessories, see the Agilent literature 5968-8153EN

Step 4.

Add the final touches.

Recommended accessories	2000 X-Series
LAN/VGA connection module	DSOXLAN
GPIB connection module	DSOXGPIB
Rack mount kit	N6456A
Soft carrying case and front panel cover	N6457A
Hard copy manual	N6458A
Front panel cover (only)	N2747A

Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

Performance characteristics

	DSOX2000 Series (digital signal oscilloscope)						MSOX2000 Series (mixed signal oscilloscope)					
Characteristic	2002A	2004A	2012A	2014A	2022A	2024A	2002A	2004A	2012A	2014A	2022A	2024A
Analog Bandwidth* (-3 dB)	70 MHz		100 MHz		200 MHz		70 MHz		100 MHz		200 MHz	
Bandwidth upgrade	YES		YES		NO		YES		YES		NO	
Channels	2	4	2	4	2	4	2	4	2	4	2	4
Maximum sample rate	2 GSa/s half-channel interleaved, 1 GSa/s per channel											
Maximum memory depth (record length)	100 kpts half-channel, 50 kpts per channel,											
Display	8.5-inch WVGA with 64 levels of intensity grading											
Waveform update rate	50,000 waveforms/s											
External trigger input	Included on all models											
Vertical resolution	8 bits											
Horizontal resolution	2.5 ps											
Vertical sensitivity (range)	1 mV/div to 5 V/div **											
DC vertical accuracy	±[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] **											
DC vertical gain accuracy*	±3% full scale (≥ 10 mV/div); ±4% full scale (< 10 mV/div) **											
DC vertical offset accuracy	±0.1div ± 2mV ± 1% of offset setting											
Vertical zoom	Ability to scale and position a live or stopped waveform vertically. When the acquisition is stopped, turning the vertical scale and offset (position) knobs will scale and move the signal. Pan and zoom redraws the waveform in < 100 ms.											
Maximum input voltage	CAT I 300 Vrms, 400 Vpk; transient overvoltage 1.6 kVpkCAT II 300 Vrms, 400 Vpk with N2862A or N2863A 10:1 probe: 300 Vrms											
Position range/offset	1 mV to 200 mV/div: ±2 V >200 mV to 5 V/div: ± 50V											
Bandwidth limit	20 MHz selectable											
Input coupling	AC, DC											
Input impedance	1 MΩ ±2%											
Time base range	5 ns/div to 50 s/div		5 ns/div to 50 s/div		2 ns/div to 50 s/div		5 ns/div to 50 s/div		5 ns/div to 50 s/div		2 ns/div to 50 s/div	
Time base accuracy*	25 ppm ±5 ppm per year (aging)											
Δ Time accuracy (using cursors)	± (time base accuracy* reading) ± (0.0016 * screen width) ± 100 ps											
Dynamic range	(±8 divisions from center screen)											
Horizontal zoom (modes)	Horizontally expand or compress a live or stopped waveform											

* Denotes warranted specifications, all others are typical.
Specifications are valid after a 30-minute warm-up period and from ±10 °C firmware calibration temperature.
** 1 mV/div and 2 mV/div is a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 1 mV/div and 2 mV/div sensitivity setting.

Performance characterisitics

Acquisition modes

Normal	
Peak detect	Capture glitch as narrow as 500 ps at all timebase settings.
Averaging	Select from 2,4,8,16, 64... to 65,536
High resolution mode	12 bits of resolution when ≥ 20 µs/div
Segmented	Re-arm time= 19 µs (minimum time between trigger events)

Trigger system

Trigger modes	• Edge (rising/falling alternate, either)–Conventional level-driven trigger. • Pulse width (or glitch)–Trigger on a pulse width less than, greater than, or within a time range, with a selectable time limit ranging from 17 ns to 10 s. • Pattern-trigger on a logical AND combination of the channels. Each channel can have a value of zero, one, don't care (X), or a rising or falling edge (one channel only). • Video–Trigger on all lines or individual lines, odd/even or all fields from composite video or broadcast standards (NTSC, PAL, PAL-M, SECAM).
Trigger coupling	Coupling selections: AC, DC, noise reject, LF reject and HF reject.
Trigger source	Each analog channel, each digital channel (MSO models or DSOX2MSO upgrade, Ext, WaveGen, line)
Trigger sensitivity (internal)*	< 10 mV/div: greater of 1 div or 5 mV; ≥ 10 mV/div: 0.6 div
Trigger sensitivity (external)*	200 mV (DC to 100 MHz); 350 mV (100 MHz - 200 MHz)

Cursors

Types	Amplitude, time , frequency (FFT), manual, tracking, binary, HEX
Measurements	ΔT, 1/ΔT, ΔV/X, 1/ΔX, ΔY, Phase and Ratio
Cursors**	• Single cursor accuracy: ±[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] • Dual cursor accuracy: ±[DC vertical gain accuracy + 0.5% full scale]*

Automatic waveforms measurements

Voltage	Snapshot all, maximum, minimum, peak-to-peak, top, base, amplitude, overshoot, preshoot, average- N cycles, average-full screen, DC RMS- N cycles, DC RMS- full screen, AC RMS- N cycles
Time	Period, frequency, rise time, fall time, + width, – width, duty cycle, delay A→B (rising edge), delay A→B (falling edge), phase A→B (rising edge,) and phase A→B (falling edge)

* Denotes warranted specifications, all others are typical.
Specifications are valid after a 30-minute warm-up period and from ±10 °C firmware calibration temperature.

** 1 mV/div and 2 mV/div is a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 2 mV/div sensitivity setting.

Performance characterisitics

Waveform math

Operators	Add, subtract, multiply, FFT
FFT	Windows: Hanning, flat top, rectangular; Blackman-Harris - up to 64 kpts resolution
Sources	Math functions available between any two channels

Display characteristics

Display	8.5-inch WVGA
Resolution	800 (H) x 480 (V) pixel format (screen area)
Interpolation	Sin(x)/x interpolation (using FIR filter; used when there is less than one sample per column of the display)
Persistence	Off, infinite, variable persistence (100ms-60s)
Intensity gradation	64 intensity levels
Modes	Normal XY - XY mode changes the display from voltage versus time scale to a volts versus volts scale Roll – Displays the waveform moving across the screen from right to left much like a strip chart recorder

MSO (digital channels)

Upgradable from DSO	Yes
MSO channels	8 channels (D0 to D7)
Maximum sample rate	1 GSa/s
Maximum record length	50 kpts per channel (digital channels only) 12.5 kpts per channel (analog and digital channels)
Threshold selections	TTL (+1.4 V), CMOS (+2.5 V), ECL (-1.3 V), User-definable (±8.0 V in 10 mV stops)
Threshold accuracy*	± (100 mV + 3% of threshold settings)
Maximum input dynamic range	±10 V about threshold
Minimum voltage swing	500 mVpp
Input impedance	100 kΩ ± 2% at probe tip, ~8 pF
Minimum detectable pulse width	5 ns
Channel-to-channel skew	2 ns (typical), 3 ns (maximum)

Environmental and safety

Power line consumption	100 watts
Temperature	Operating: 0 to +55 °C Non-operating: -30 to +71 °C
Humidity	Operating: Up to 80% RH at or below +40 °C; up to 45% RH up to +50 °C Non-operating: Up to 95% RH up to 40 °C; up to 45% RH up to 50 °C
Altitude	Operating and non-operating: up to 4,000 m
Electromagnetic compatibility	Meets EMC Directive (2004/108/EC), meets or exceeds IEC 61326-1:2005/EN 61326-1:2006 Group 1 Class A requirement CISPR 11/EN 55011 IEC 61000-4-2/EN 61000-4-2 IEC 61000-4-3/EN 61000-4-3 IEC 61000-4-4/EN 61000-4-4 IEC 61000-4-5/EN 61000-4-5 IEC 61000-4-6/EN 61000-4-6 IEC 61000-4-11/EN 61000-4-11 Canada: ICES-001:2004 Australia/New Zealand: AS/NZS
Safety	UL61010-1 2nd edition, CAN/CSA22.2 No. 61010-1-04

* Denotes warranted specifications, all others are typical.
Specifications are valid after a 30-minute warm-up period and from ±10 °C firmware calibration temperature.

Performance characteristics

WaveGen – built-in function generator	
Waveforms	Sine, square, pulse, triangle, ramp, noise, DC
Sine	• Frequency range: 0.1 Hz to 20 MHz • Amplitude flatness: ±0.5 dB (relative to 1 kHz) • Harmonic distortion: –40 dBc • Spurious (non harmonics): –40 dBc • Total harmonic distortion: 1% • SNR (50 ohm load, 500 MHz BW) : 40 dB (Vpp ≥ 0.1 V); 30 dB (Vpp <0.1 V)
Square wave/pulse	• Frequency range: 0.1 Hz to 10 MHz • Duty cycle: 20 to 80% • Duty cycle resolution: Larger of 1% or 10 ns • Pulse width: 20 ns minimum • Pulse width resolution: 10 ns or 5 digits, whichever is larger • Rise/fall time: 18 ns (10 to 90%) • Overshoot: < 2% • Asymmetry (at 50% DC): ±1% ± 5 ns • Jitter (TIE RMS): 500 ps
Ramp/triangle wave	• Frequency range: 0.1 Hz to 100 kHz • Linearity: 1% • Variable symmetry: 0 to 100% • Symmetry resolution: 1%
Noise	Bandwidth: 20 MHz typical
Frequency	• Sine wave and ramp accuracy: ◦ 130 ppm (frequency < 10 kHz) ◦ 50 ppm (frequency > 10 kHz) • Square wave and pulse accuracy: ◦ [50+frequency/200] ppm (frequency < 25 kHz) ◦ 50 ppm (frequency ≥ 25 kHz) • Resolution: 0.1 Hz or 4 digits, whichever is larger
Amplitude	• Range: ◦ 20 mVpp to 5 Vpp into Hi-Z ◦ 10 mVpp to 2.5 Vpp into 50 ohms • Resolution: 100 µV or 3 digits, whichever is larger • Accuracy: 2% (frequency = 1 kHz)
DC offset	• Range: ◦ ±2.5 V into Hi-Z ◦ ±1.25 V into 50 ohms • Resolution: 100 µV or 3 digits, whichever is larger • Accuracy: ±1.5% of offset setting ±1.5% of amplitude ±1 mV
Trigger output	Trigger output available on Trig out BNC

Integrated Digital Voltmeter			
Functions	ACrms, DC, DCrms, Frequency		
Resolution	ACV/DCV: 3 digits Frequency: 5.5 digits		
Measuring rate	100 times/ second		
Autoranging	Automatic adjustment of vertical amplification to maximize the dynamic range of measurements.		
Range meter	Graphical display of most recent measurement, plus extrema over the previous 3 seconds.		
Measurement Range			
	Frequency Range	Vertical Range	Vertical Accuracy
ACRms	20 Hz-100KHz	100 MHz to 500 MHz: 1 mV/div to 5 V/div** (1 MΩ and 50 Ohm) 1 GHz model: 1 mV/div to 5 V/div** (1 MΩ), 1mV/div to 1V/div (50 Ohm)	[DC vertical gain accuracy + 0.5% full scale
DCRms	20 Hz-100KHz		[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale]
DC	NA		[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale]
Frequency counter	1Hz – BW of Scope	<10 mV/div: greater of 1 div or 5 mV; ≥ 10 mV/div: 0.6 div	25 ppm ± 5 ppm per year (aging)

InfiniiVision X-Series physical characteristics

Instrument		
Dimensions	mm	Inches
Width	380.6	14.98
Height	204.4	8.05
Depth	141.5	5.57
Weight	kg	lb
Instrument only	3.85	8.5
With accessories	4.08	9.0
Instrument shipping – package dimensions	mm	Inches
Width	450	17.7
Height	250	9.84
Depth	360	14.17
Rack mount	mm	Inches
Width	481.6	18.961
Height	221.5	8.72
Depth	189.34	7.454

Connectivity	
Standard ports	One USB 2.0 high-speed device port on rear panel Two USB 2.0 high-speed host ports, front and rear panel Supports memory devices and printers
Optional ports	GPIB, LAN, VGA

Nonvolatile storage	
Reference waveform display	2 internal waveforms or USB thumb drive
Waveform storage	Set up, .bmp, .png, .csv, ASCII, XY, reference waveforms, .alb, .bin, lister, mask , HDFS
Max USB flash drive size	Supports industry standard flash drives
Set ups without USB flash drive	10 internal setups
Set ups with USB flash drive	Limited by size of USB drive

Accessories included	
Standard 3- year warranty	
Standard SEC mode (Secure Environment)	
Standard Probe	
N2862B 150 MHz 10:1 passive probe	Standard one per channel for 70 and 100 MHz models
N2863B 300 MHz, 10:1 passive probe	Standard one per channel for 200 MHz models
N6459-60001 8-channel logic probe and accessory kit	Standard on MSO models or with DSOX2MSO upgrade
Built-in help language support for English, Japanese, simplified Chinese, traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese and Italian, Certificate of Calibration, Documentation CD	
Interface language support GUI menus: English, Japanese, simplified Chinese, traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese and Italian	
Localized power cord	

For MET/CAL procedures, click on the Cal Labs solutions link below Cal Labs Solutions
http://www.callabsolutions.com/MetCALandCLS.asp
These procedures are FREE to customers.

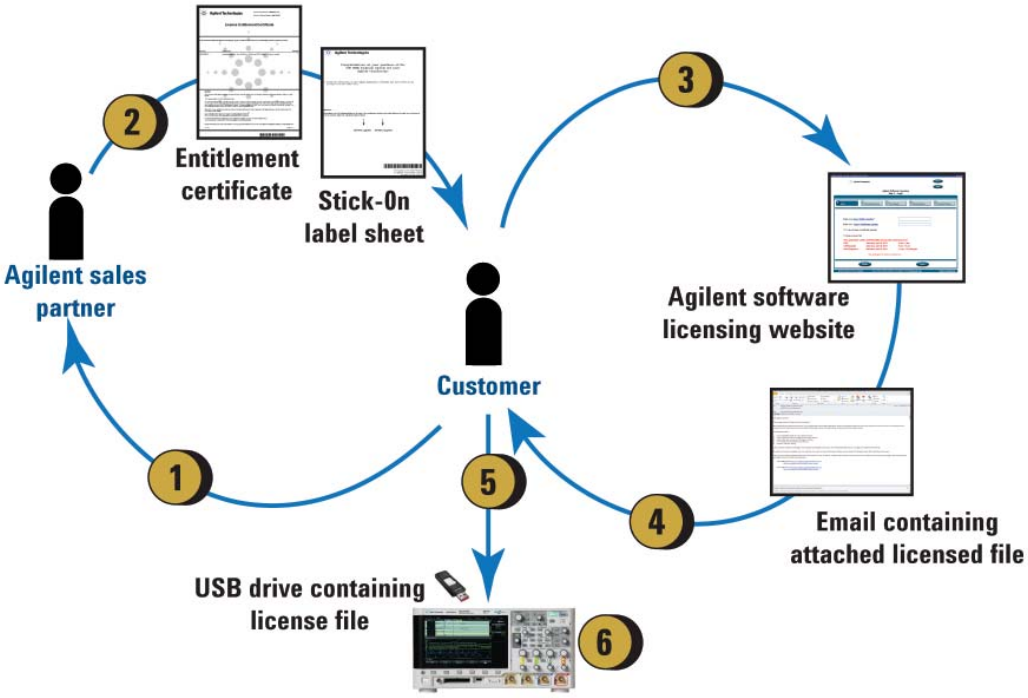
Probe Compatibility Table

To assist you in selecting the proper probe for your application: Use our probe compatibility table below to find the probes that are recommended for use with your 2000 and 3000 X-Series InfiniiVision oscilloscope.

Probe Type	Probe Model	MSO/DSO 2000 X-Series[1]	MSO/DSO 3000 X-Series
Passive probes,	N2862B 10:1 150 MHz (included in 70/100 MHz models) N2863B 10:1 300 MHz (included in 200 MHz models) N2890A 10:1 500 MHz (included in 350/500 MHz models)	Recommended	Recommended
	N2889A 1:1/10:1 350 MHz	Recommended	Recommended
High-voltage passive probes,	10076D 4 kV	Recommended	Recommended
	N2771B 30 kV	Recommended	Recommended
Differential active probes,	1130A 1.5 GHz	Incompatible	Compatible
	1141A 200 MHz (use with 1142A)	Incompatible	Recommended
	N2791A 25 MHz	Recommended	Recommended
	N2891A 70 MHz	Recommended	Recommended
	N2790A 100 MHz (with AutoProbe)	Incompatible	Recommended
	N2792A 200 MHz	Recommended	Recommended
	N2793A 800 MHz	Recommended	Recommended
Single-ended active probes,	N2795A 1 GHz (with AutoProbe)	Incompatible	Recommended
	N2796A 2 GHz (with AutoProbe)	Incompatible	Recommended
	1156A 1.5 GHz (with AutoProbe)	Incompatible	Recommended
	1144A 800 MHz (use with 1142A)	Incompatible	Recommended
	1145A 750 MHz (use with 1142A)	Incompatible	Recommended
MSO logic probes,	01650-61607 16-channel	Incompatible	
	N6459-60001 8-channel MSO cable (included in 2000 X-Series MSOs)	Recommended	Compatible
	N6450-60001 16-channel MSO cable (included in 3000 X-Series MSOs)	Incompatible	Recommended
Current probes,	1146A 100 kHz	Recommended	Recommended
	N2780A 2 MHz (use with N2779A)	Recommended	Recommended
	N2781A 10 MHz (use with N2779A)	Recommended	Recommended
	N2782A 50 MHz (use with N2779A)	Recommended	Recommended
	N2783A 100 MHz (use with N2779A)	Recommended	Recommended
	1147A 50 MHz (with AutoProbe)	Incompatible	Recommended
	N2893A 100 MHz (with AutoProbe)	Incompatible	Recommended

1. The 2000 X-Series does not support AutoProbe interface active probes.

License-only bandwidth upgrades and measurement applications



Bandwidth upgrade models	
2000 X-Series	
DSOX2BW12	70 MHz to 100 MHz, 2 ch, License only
DSOX2BW14	70 MHz to 100 MHz, 4 ch, License only
DSOX2BW22	100 MHz to 200 MHz, 2 ch, License only
DSOX2BW24	100 MHz to 200 MHz, 4 ch, License only

Measurement applications	
DSOX2WAVEGEN	WaveGen (built-in function generator)
DSOXDVM	Integrated digital voltmeter
DSOXEDK	Educator's kit
DSOX2MASK	Mask testing
DSOX2SGM	Segmented memory
DSOX2MSO	Upgrade to 8 digital timing channels

Process description

1. Place order for a license only bandwidth upgrade or measurement appliction product to an Agilent sales partner. If multiple bandwidth upgrade steps are needed, order all the corresponding upgrade products required to get from current bandwidth to desired bandwidth. In the case where the new bandwidth requires higher bandwidth passive probes, they are included with the upgrade. For the DSOX2BW22 and DSOX2BW24, the N2863B 10:1 300 MHz passive probes (1 per channel) will be sent with the upgrade.
2. Receive a paper or electronic .pdf Entitlement Certificate document for any of the orderable measurement applications For bandwidth upgrades only, you receive a stick-on label document indicating upgraded bandwidth specification.
3. Use Entitlement Certificate or electronic .pdf document containing instructions and certificate number needed to generate a license file for a particular 2000 or 3000 X-Series oscilloscope model number and serial number unit.
4. Receive the licensed file and installation instructions via email.
5. Copy license file (.lic extension) from email to a USB drive and follow instructions in email to install the purchased bandwidth upgrade or measurement application on the oscilloscope.
6. For bandwidth upgrades only, attach bandwidth upgraded stick-on labels to front and rear panels of the oscilloscope. Model number and serial number of the oscilloscope do not change.

Agilent Technologies Oscilloscopes

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