# InfiniiVision 3000 X-Series Oscilloscopes

Data Sheet

## 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

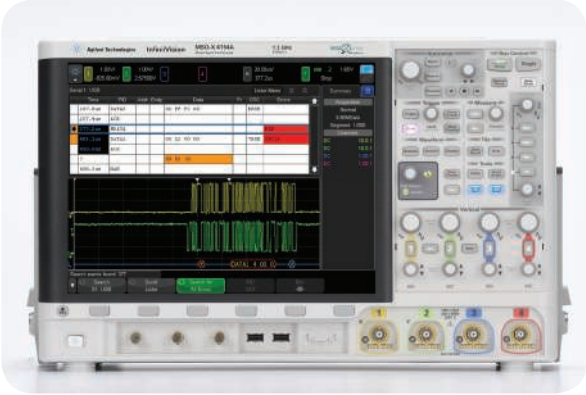
### Overview of the Agilent InfiniiVision X-Series oscilloscopes

| InfiniiVision | 6000 X-Series | 4000 X-Series | 3000 X-Series | 2000 X-Series |
|---|---|---|---|---|
| Analog channels | 2 or 4 | 2 or 4 | 2 or 4 | 2 or 4 |
| Digital channels | 16 (MSO models or upgrade) | 16 (MSO models or upgrade) | 16 (MSO models or upgrade) | 8 (MSO models or upgrade) |
| Bandwidth (upgradable) | 1, 2.5, 4, 6 GHz | 200, 350, 500 MHz, 1, 1.5 GHz | 100, 200, 350, 500 MHz, 1 GHz | 70, 100, 200 MHz |
| Max sampling rate | 20 GSa/s | 5 GSa/s | 4 GSa/s (≤ 500 MHz)<br>5 GSa/s (1 GHz) | 2 GSa/s |
| Max memory depth | 4 Mpts | 4 Mpts | 2 Mpts (standard)<br>4 Mpts (option) | 100 kpts (standard)<br>1 Mpts (option) |
| Max waveform update rate | > 450,000 waveforms/sec | > 1,000,000 waveforms/sec | > 1,000,000 waveforms/sec | > 50,000 waveforms/sec |
| Display | 12.1 inches, capacitive, multi-touch, gesture enabled | 12.1 inches, capacitive | 8.5 inches | 8.5 inches |
| InfiniiScan Zone trigger | Standard | Standard | No | No |
| Voice control | Standard | No | No | No |
| WaveGen 20-MHz funtion/ arbitrary waveform generator | Dual-channel AWG (option) | Dual-channel AWG (option) | Single-channel AWG (option) | Single-channel funtion (option) |
| Integrated digital voltmeter | Option | Option | Option | Option |
| Integrated hardware counter | 5 digits (standard),<br>10 digits + totalizer (option) | 5 digits (standard) | 5 digits (standard) | 5 digits (standard) |
| Search and navigate | Standard, lister supported | Standard | Standard | Standard |
| Segment memory | Standard | Standard | Option | Option |
| Mask/limit test | Option | Option | Option | Option |
| Serial protocol analysis options | $I^2C$/SPI, UART, CAN/LIN, FlexRay, $I^2S$, MIL-STD1553, ARINC429, USB2.0 | $I^2C$/SPI, UART, CAN/LIN, FlexRay, $I^2S$, MIL-STD1553, ARINC429, USB 2.0 | $I^2C$/SPI, UART, CAN/LIN, FlexRay, $I^2S$, MIL-STD1553, ARINC429 | $I^2C$/SPI, UART, CAN/LIN |
| Advanced analysis options | Power analysis, USB 2.0 signal quality test, HDTV analysis, FPGA | Power analysis, USB 2.0 signal quality test, HDTV analysis, FPGA | Power analysis, HDTV analysis | No |
| Color grade | Standard | No | No | No |
| Histogram | Standard | No | No | No |
| FFT | Standard enhanced FFT | Standard | Standard | Standard |
| Jitter analysis with clock recovery | Option | No | No | No |
| Realtime eye diagram | Option | No | No | No |
| Advanced math | Standard, display four funtions simultaneously | Standard, display one funtion | Option, display one funtion | No |
| Connectivity | Standard USB 2.0, LAN, video (GPIB option), USB mouse and keyboard support | Standard USB 2.0, LAN, video (GPIB option), USB mouse and keyboard support | Standard USB 2.0 (LAN/ video/GPIB option), USB keyboard support | Standard USB 2.0 (LAN/ video/GPIB option), USB keyboard support |

## Need a bigger display and state-of-the-art usability?

### Consider the InfiniiVision 4000 X-series

- Industry's first 12.1-inch capacitive touch display
- InfiniiScan Zone touch trigger capability
- 200 MHz - 1.5 GHz DSO and MSO models
- 1,000,000 wfms/sec
- Fully upgradable 5 instruments in 1
- 20 MHz dual-channel WaveGen with arbitrary waveform



See **www.agilent.com/find/4000X-series** for more details.

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

### More scope

The InfiniiVision 3000 X-Series redefined oscilloscopes. It sees the most signal detail, does more functions than any other oscilloscope, and gives you maximum investment protection.

The 3000 X-Series's innovation starts with the industry's only 5-instruments-in-1 integration. The industry-leading one million waveforms per second update rate is 20 times faster than the competition to display the most signal detail. The 3000 X-Series provides maximum investment protection with fully-upgradable 5-instruments-in-1; even bandwidth is upgradable. Our breakthrough technology delivers more scope for the same budget.

3000 X-Series – oscilloscopes redefined

**Key features**

- **See more:**
  - One million waveforms per second update rate
  - MegaZoom IV smart memory technology
  - Large 8.5-inch WVGA display
  - Optional segmented memory
- **Do more:**
  - Industry's first 5-instruments-in-1 (oscilloscope, digital channels, built-in 20 MHz function/ arbitrary waveform generator with modulation, integrated digital voltmeter and protocol analyzer)
- **Get more:**
  - Investment protection with Industry's only fully-upgradable oscilloscope, including bandwidth to 1 GHz
  - Industry's leading application solutions

InfiniiVision 3000 X-Series with MegaZoom IV smart memory technology

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

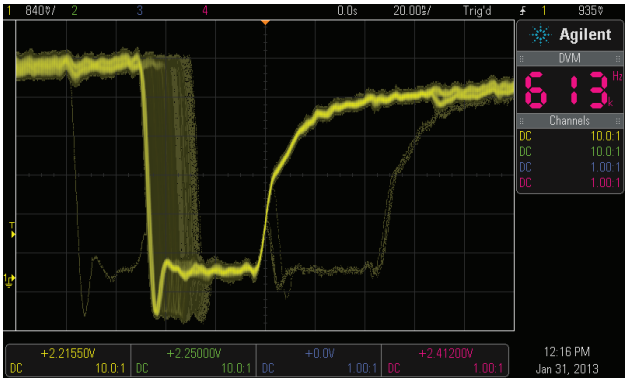
## See more of your signal, more of the time

### Largest display

The best signal visibility starts with the largest display. The InfiniiVision 3000 X-Series comes with a large 8.5-inch WVGA display so you can view analog, digital and serial signals easily on the screen.

### Fastest update rate

If you can't see the problem, it is hard to troubleshoot it. With Agilent's MegaZoom IV smart memory technology, the 3000 X-Series updates waveforms up to 1 million times per second, which gives you the highest probability of capturing random and infrequent events that you would miss on an oscilloscope with a lower waveform update rate.




Fast update rate of the 3000 X-Series displaying the rare metastable signal

### Deeper memory for longer time capture

With up to 4 Mpts of MegaZoom IV deep memory, you can capture long, non-repeating signals while maintaining a high sample rate, then quickly zoom in on areas of interest.

The InfiniiVision 3000 X-Series optimizes your deep-memory oscilloscope measurements by using MegaZoom IV technology to make the most effective trade-offs in sample rate, memory depth and waveform update rate automatically. Although many people think deeper memory is always better, usually deep memory means making tradeoffs.

Oscilloscopes with deep memory require additional waveform processing time to acquire deep memory waveforms, which means waveform update rates will be reduced significantly. For this reason, most other oscilloscopes have manual memory-depth selections, and the typical default memory depth setting is usually relatively shallow (10 to 100 kpts). If you want to use deep memory in these other oscilloscopes, you must manually turn it on and deal with the update rate tradeoff.

4M deep memory captured a long time span without losing the details

### How does Agilent do that?

The MegaZoom IV smart memory technology combines the capabilities of an oscilloscope, digital channels, protocol analyzer, WaveGen built-in function generator and DVM in a compact form factor. Fourth generation MegaZoom technology enables the industry's fastest waveform update rate with responsive deep memory.

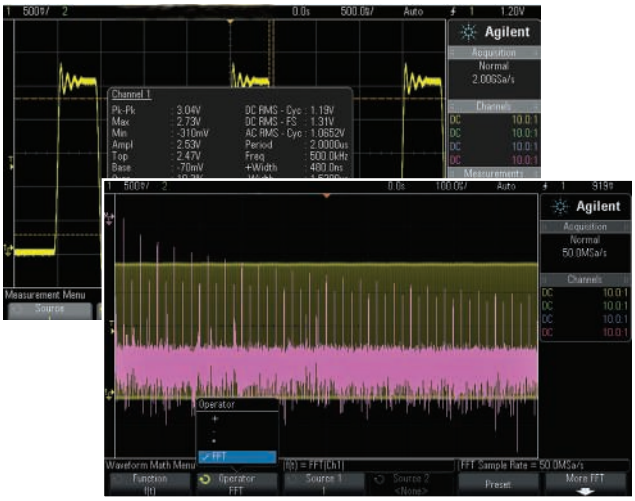
# Oscilloscopes redefined: Breakthrough technology delivers more scope for the same budget

## Do more with the power of 5 instruments in 1

### Best-in-class oscilloscope

The InfiniiVision 3000 X-Series features up to 4 Mpts of memory with Agilent's patented *MegaZoom* IV technology that is always enabled and always responsive providing the industry's fastest update rate at up to 1 million waveforms per second, with no compromise if you turn on measurements, digital channels or protocol decodes.

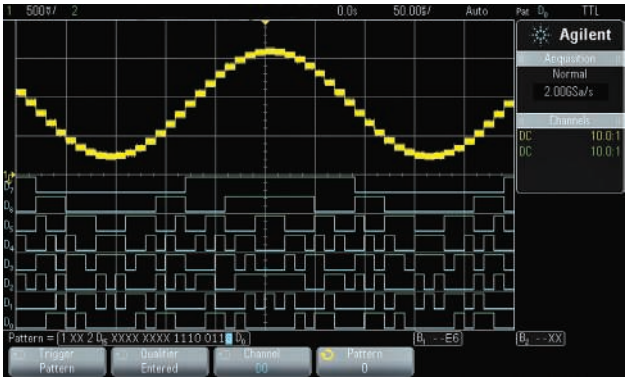
In addition, the 3000 X-Series offers 35 (50 with N2820A Series high-sensitivity AC/DC current probe) automated measurements, 10 parametric triggers, serial protocol triggers, as well as waveform math functions including FFT.




### Upgradable, integrated mixed signal oscilloscope (MSO)

The 3000 X-Series is the first instrument in its class to offer an integrated and upgradable digital channels. Digital content is everywhere in today's designs and traditional 2 and 4 channel oscilloscopes do not always provide enough channels for the job at hand.

With an additional 16 integrated digital channels, you now have up to 20 channels of time-correlated triggering, acquisition and viewing on the same instrument. Buy a 2 or 4 channel DSO and at anytime, and upgrade it yourself to an MSO with a license to turn on those integrated 16 digital channels.




### Industry's first WaveGen built-in 20 MHz function/arbitrary waveform generator

An industry first, the 3000 X-Series offers an integrated built-in 20 MHz function/arbitrary waveform generator, available with modulation support (DSOX3WAVEGEN). The integrated function generator provides stimulus output of sine, square, ramp, pulse, DC, Sinc (x), exponential rise/fall, cardiac, Gaussian Pulse and noise waveforms to your device under test. The modulation feature supports AM, FM, and FSK modulations with modulation shapes of sine, square, and ramp.

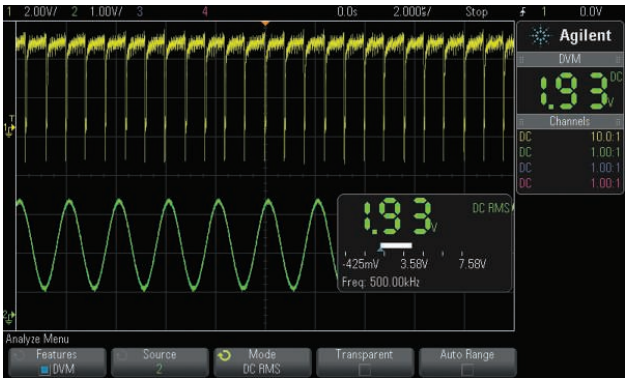
With AWG functionality, you can store the waveforms from analog channels or reference memory to the arbitrary memory and output from WaveGen. Easily create/edit the waveform using built-in editor or by using Agilent's free Benchlink Waveform Builder Basic: www.agilent.com/find/33503.

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

## Do more with the power of 5 instruments in 1

### Integrated digital voltmeter

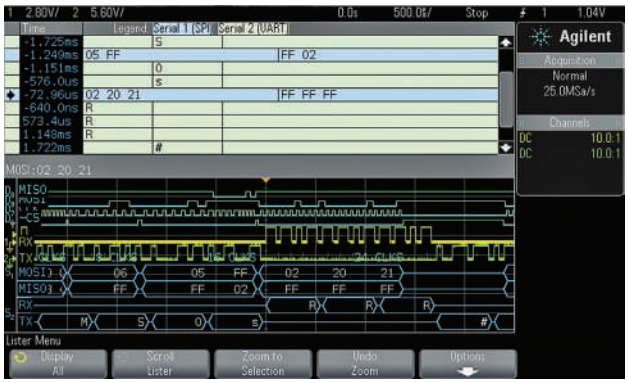
An industry first, the 3000 X-Series offers an integrated 3-digit voltmeter (DVM) and 5-digit frequency counter inside the oscilloscopes (DSOXDVM). The voltmeter operates through the same probes as the oscilloscope channels, however, the measurements are de-coupled from the oscilloscope triggering system 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.




### Hardware-based serial protocol decode and triggering

- Embedded serial triggering and analysis ($I^2C$, SPI)
- Computer serial triggering and analysis (RS232/422/485/UART)
- Automotive and industrial serial triggering and analysis (CAN,LIN)
- FlexRay automotive triggering and analysis
- Audio serial triggering and analysis ($I^2S$)
- Aerospace and defense serial triggering and analysis (MIL-STD 1553 and ARINC 429)

Agilent's InfiniiVision Series oscilloscopes are the industry's first scopes to use hardware-based serial protocol decoding. Other vendors scopes use software post-processing techniques to decode serial packets/frames. With these software techniques, waveform and decode-update rates tend to be slow (sometimes seconds per update). That's especially true when using deep memory, which is often required to capture multiple packetized serial bus signals. Faster decoding with hardware-based technology enhances scope usability, and more importantly, the probability of capturing infrequent serial communication errors.




After capturing a long record of serial bus communication using the InfiniiVision scope's MegaZoom IV deep memory, you can easily perform a search operation based on specific criteria, and then quickly navigate to bytes/frames of serial data that satisfy that search criteria. Sometimes it may be necessary to correlate data from one serial bus to another. Agilent's InfiniiVision 3000 X-Series oscilloscope can decode and list two serial buses simultaneously using hardware-based decoding. as well as display the captured data in a time interleaved "Lister" display.

# 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 3000 X-Series, your investment is protected. If you need more bandwidth (up to 1 GHz), digital channels, WaveGen, DVM or measurement applications in the future, you can easily add them all after the fact.

See pages 27 and 28 for more detailed information on available upgrades.

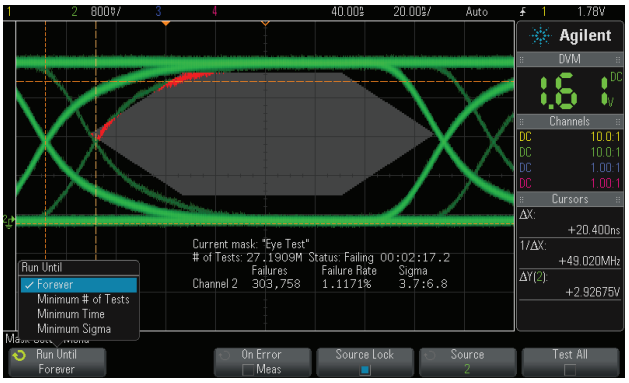
Add at the time of your purchase or upgrade later:

- Bandwidth
- Digital channels (MSO)
- WaveGen built-in 20 MHz function/arbitrary waveform generator
- Integrated digital voltmeter
- Measurement applications
  - Serial protocol analysis
  - Power measurement analysis
  - HDTV video triggering and analysis
  - Advanced math analysis
  - Mask/limit testing
  - Segmented memory
  - Educators' lab kit

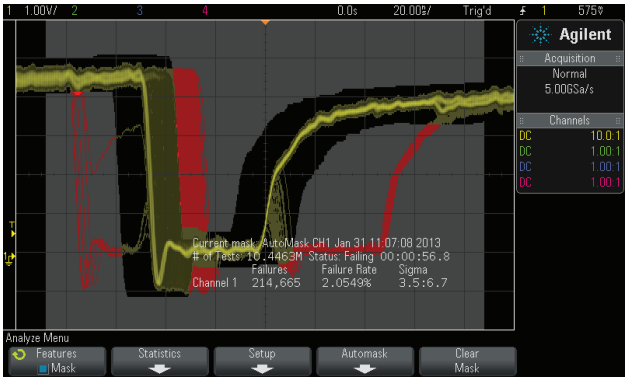
### Mask/limit testing

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 3000 X-Series features hardware-based mask testing and can perform up to 270,000 tests per second.

Multiple test criteria can be selected including the ability to run tests for a specific number of acquisitions, time, or until detection of a failure. Pass/fail masks can be automatically created based on an input reference waveform along with user-specified tolerance bands, or can be created on a PC and then imported via a USB memory stick.




Mask test evaluated more than 27 million waveforms in just over two minutes



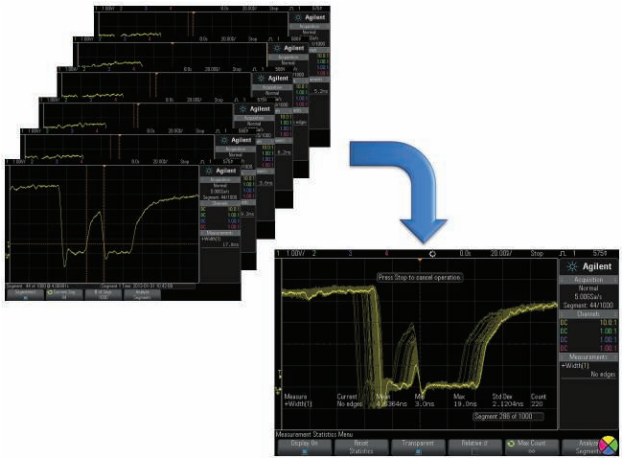

Limit testing made easy with the "automask" feature

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

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

### Segmented memory

When capturing low-duty cycle pulses or data bursts, you can use segmented memory acquisition to optimize acquisition memory. Segmented memory acquisition not only lets you selectively capture and store important segments of signals without capturing unimportant signal idle/deadtime, but it also allows you to run post-capture inter-segment analysis such as segment play back, waveform measurements, and waveform overlay. Segmented memory acquisition is ideal for applications including packetized serial buses, pulsed laser, radar bursts and high-energy physics experiments. Up to 1000 segments can be captured on the 3000 X-Series models with a minimum re-arm time under 1 µs. Segmented memory works simultaneously with serial bus decodes as well.



Capture 1000 very infrequent glitches over 100 seconds using segmented memory, then run inter-segment measurement and overlay analysis on the 1000 segments.

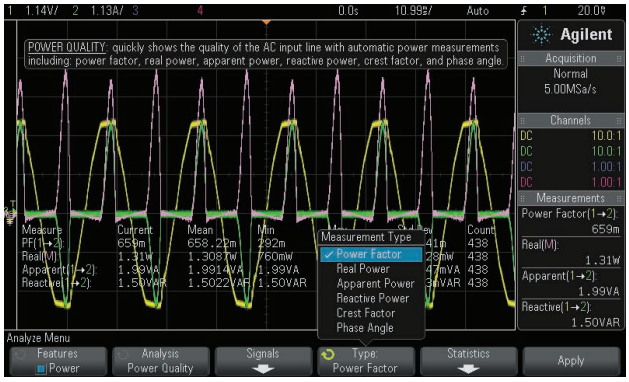
### Power Measurement and Analysis

When working with switching power supplies and power devices, the DSOX3PWR power measurements application provides a full suite of power measurements and analysis that runs in the oscilloscope. Measurements include:

- Current harmonics
- Efficiency
- Inrush current
- Modulation
- Power quality
- Switching response
- Transient response
- Turn on/turn off
- Output ripple
- Power Supply Rejection Ratio (PSRR)
- Slew rate

Also included at no additional charge is a license for the U1881A PC-based power analysis software package which provides additional offline measurements and report generation. U1881A additional measurements include:

- Safe operating area (SOA)/SOA mask editor
- Dynamic on resistance (Rds)
- On/offline analysis




An example screen for power quality analysis

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

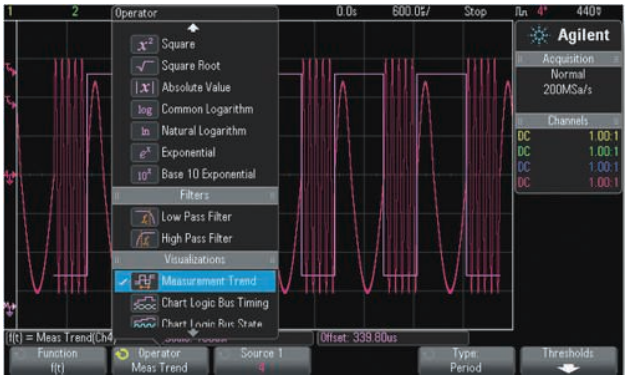
## Get more investment protection with the industry's only fully upgradable oscilloscope

### HDTV video triggering and measurement analysis.

Whether debugging consumer electronics with HDTV or characterizing a design, the DSOX3VID measurement application provides support for a variety of HDTV standards including:

- 480p/60
- 567p/50
- 720p/50
- 720p/60
- 1080i/50
- 1080i/60
- 1080p/24
- 1080p/25
- 1080p/30
- 1080p/50
- 1080p/60
- Generic (custom bi-level and tri-level sync video standards)

### Advanced math analysis




In addition to the standard waveform math functions (add, subtract, multiply, integrate, differentiate, square root, FFT), the optional DSOX3ADVMATH application provides additional advanced waveform transforms, filters, and visualization tools including:

**Transforms**

- Ax + B
- Square ($x^2$)
- Absolute value (|x|)
- Common logarithm (log)
- Natural logarithm (ln)
- Exponential ($e^X$)
- Base 10 exponential ($10^X$)

**Filters**

- Low pass filter (4th order Bessel-Thompson filter with selectable -3dB frequency)
- High pass filter (single-pole high pass filter with selectable -3dB frequency)

**Visualizations Tools**

- Magnify
- Measurement trend
- Chart logic bus timing
- Chart logic bus state

## Other productivity tools

### Infiniium Offline Oscilloscope Analysis Software (N8900A)

Agilent's Infiniium Offline 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 Infiniium Offline. The application supports a variety of popular waveform formats from multiple oscilloscope vendors and includes the following features:

**Navigate and view**

- Navigate in time or between bookmarks
- Up to eight waveforms simultaneously
- One, two, or four grids

**Measurements**

- More than 50 automated measurements
- View up to 20 simultaneously
- User-customizable result window

**Analyze**

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

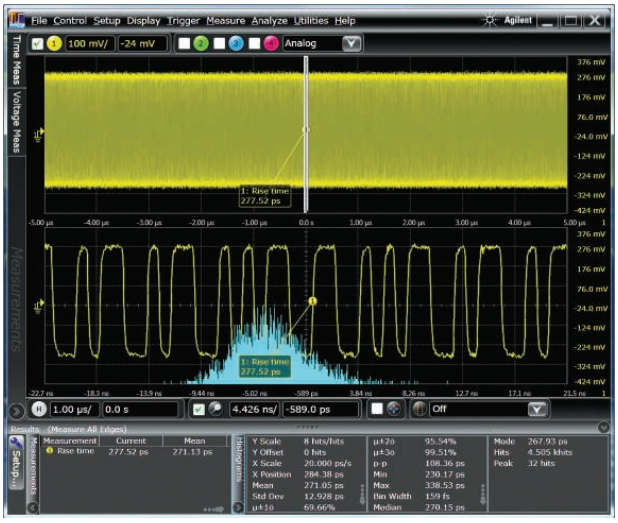
**Documentation**

- Up to 100 bookmarks
- Markers with dynamic delta value updates when moved
- One step save/load setup and all waveforms

**Analysis upgrades (optional)**

- Protocol decode
- Jitter analysis
- Serial data analysis

For more information, visit
**www.agilent.com/find/N8900A**

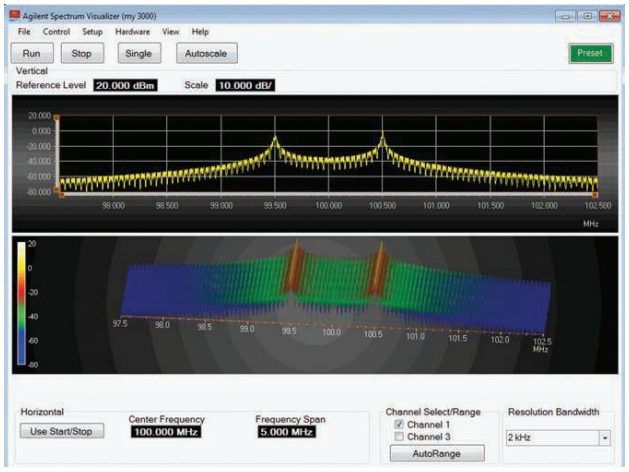



Use familiar scope controls to quickly navigate and zoom in to any event of interest.

### Agilent Spectrum Visualizer Software (64997A)

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.

For more information visit
**www.agilent.com/find/ASV_InfiniiVision**



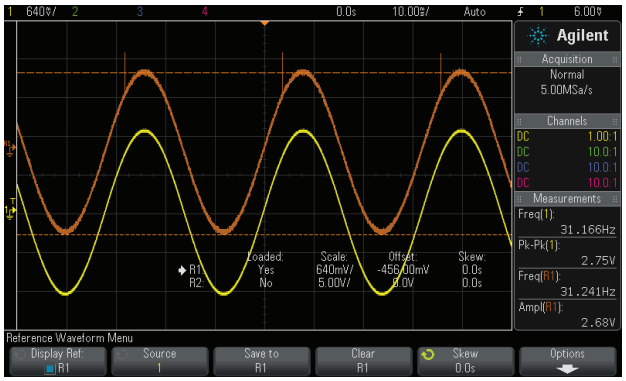

Waterfall view for ASV spectrogram measurement

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

## Other productivity tools

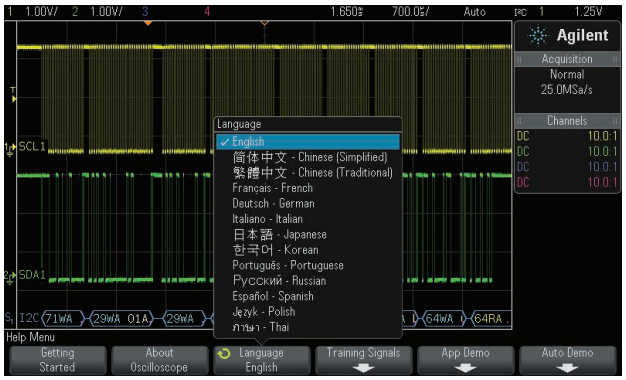
### Reference waveforms

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 on stored data. You can also store waveforms on a removable USB memory device in *.h5 format and recall them back into scope's reference waveform memory later. Save and/or transfer waveforms to a PC as XY data pairs in a comma-separated values format (*.csv) or store bitmap images and transfer them to a PC for documentation purposes in a variety of image 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, and front panel overlays are available in 13 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 and compatibility

Get the most out of your 3000 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 3000 X-Series oscilloscopes including the innovative N2820A Series high-sensitivity current probes for ultra-low current measurements. For the most up-to-date and complete information about Agilent's probes and accessories, visit our Web site at www.agilent.com/find/scope_probes.

Also available is the N2744A T2A (Tektronix TekProbe® interface to Agilent AutoProbe) probe interface adapter. This adapter allows users of Tektronix TekProbe active probes to connect directly to the InfiniiVision 3000 X-Series AutoProbe interface BNC input.

### 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 via a USB thumb drive file with a SCPI remote command.)

# 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/recall stored waveforms as well as set-up files via LAN. The 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.

34840B BenchVue lets you visualize the 3000 X-Series and multiple measurements simultaneously. Save time with the ability to export measurement data to Excel, Word and MATLAB in three clicks. Monitor and control your 3000 X-Series with a mobile device from anywhere. Learn more at www.agilent.com/find/BenchVue

## Virtual front panel

The traditional VNC connection through your favorite PC browser lets you:

- Operate the 3000 X-Series remotely
- Save/recall data and setup files
- Get screen image
- Get instrument status

In addition to the traditional VNC connection, the 3000 X-Series supports remote oscilloscope control from any html5-enabled browser on your tablet devices. The virtual front panel looks and acts like the real front panel on the oscilloscope with the same associated keys and knobs.

## Warranty and calibration

Through improved quality processes and rigorous testing, the Agilent InfiniiVision X-Series oscilloscopes are now able to perform at specification for two years without yearly calibration thereby reducing cost of ownership to you.

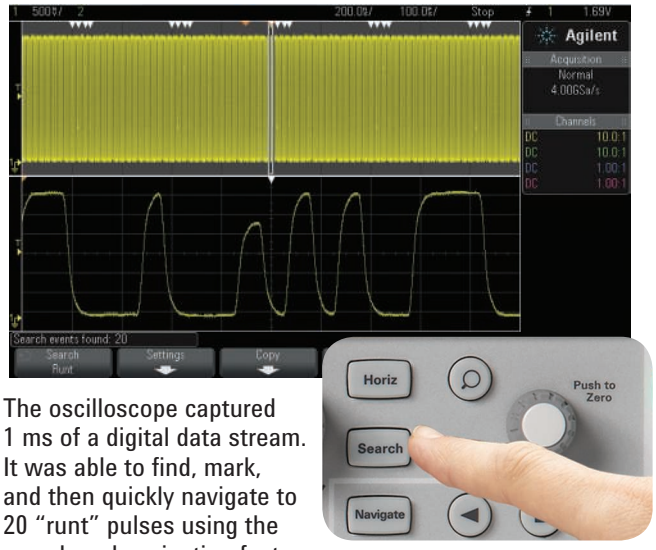
## Secure erase

The secure erase feature comes standard with all 3000 X-Series models. At the press of a button, internal non-volatile memory is cleared of all setup, reference waveforms, and user preferences, ensuring the highest level of security in compliance with National Industrial Security Program Operation Manual (NISPOM) chapter 8 requirements.

# Other productivity tools

## Search and navigation

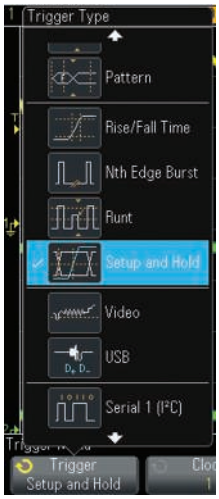
When capturing long complex waveforms using the scope's deep acquisition memory, manually scrolling through stored waveform data to find specific events of interest can be slow and cumbersome. But with the InfiniiVision 3000 X-Series scope's automatic search & navigation capability, you can easily set up specific search criteria and then quickly navigate to "found and marked" events using the scope's front panel forward and back navigation keys. Available search criteria include: edges, pulse width (time-qualified), rise/fall times (time-qualified), runt pulses (time- and level-qualified), and serial.




The oscilloscope captured 1 ms of a digital data stream. It was able to find, mark, and then quickly navigate to 20 "runt" pulses using the search and navigation feature

## Advanced parametric and serial bus triggering

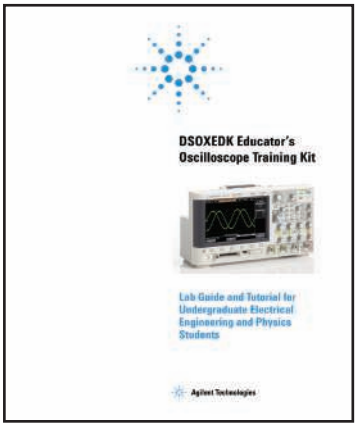
With today's more complex signals, it is also often necessary to trigger on complex signal conditions in order to synchronize the scope's acquisition on specific events of interest. Agilent's InfiniiVision 3000 X-Series scopes can trigger on the following conditions: edge, pulse width (time-qualified), pattern, rise/rall time, Nth edge burst, runt, setup & hold, video, USB 2.0 full/low speed, Serial1, and Serial2.




Examples of advanced triggers

## Quickly and easily set up or upgrade a teaching lab

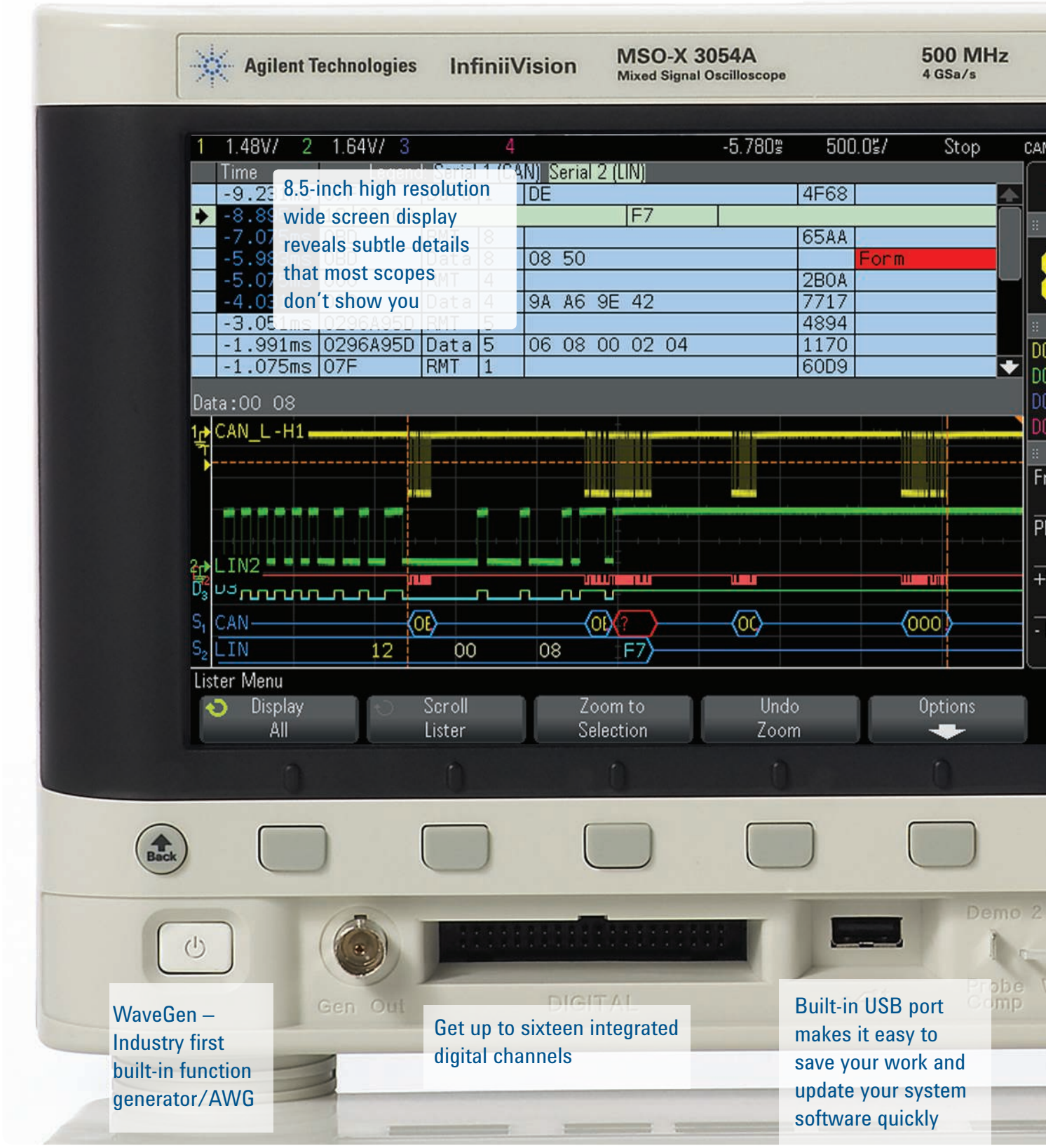
Teach your students what an oscilloscope is and how to perform basic measurements with the Educator's Oscilloscope Training Kit (DSOXEDK). It includes training tools created specifically for electrical engineering and physics undergraduate students and professors. It contains an array of built-in training 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.

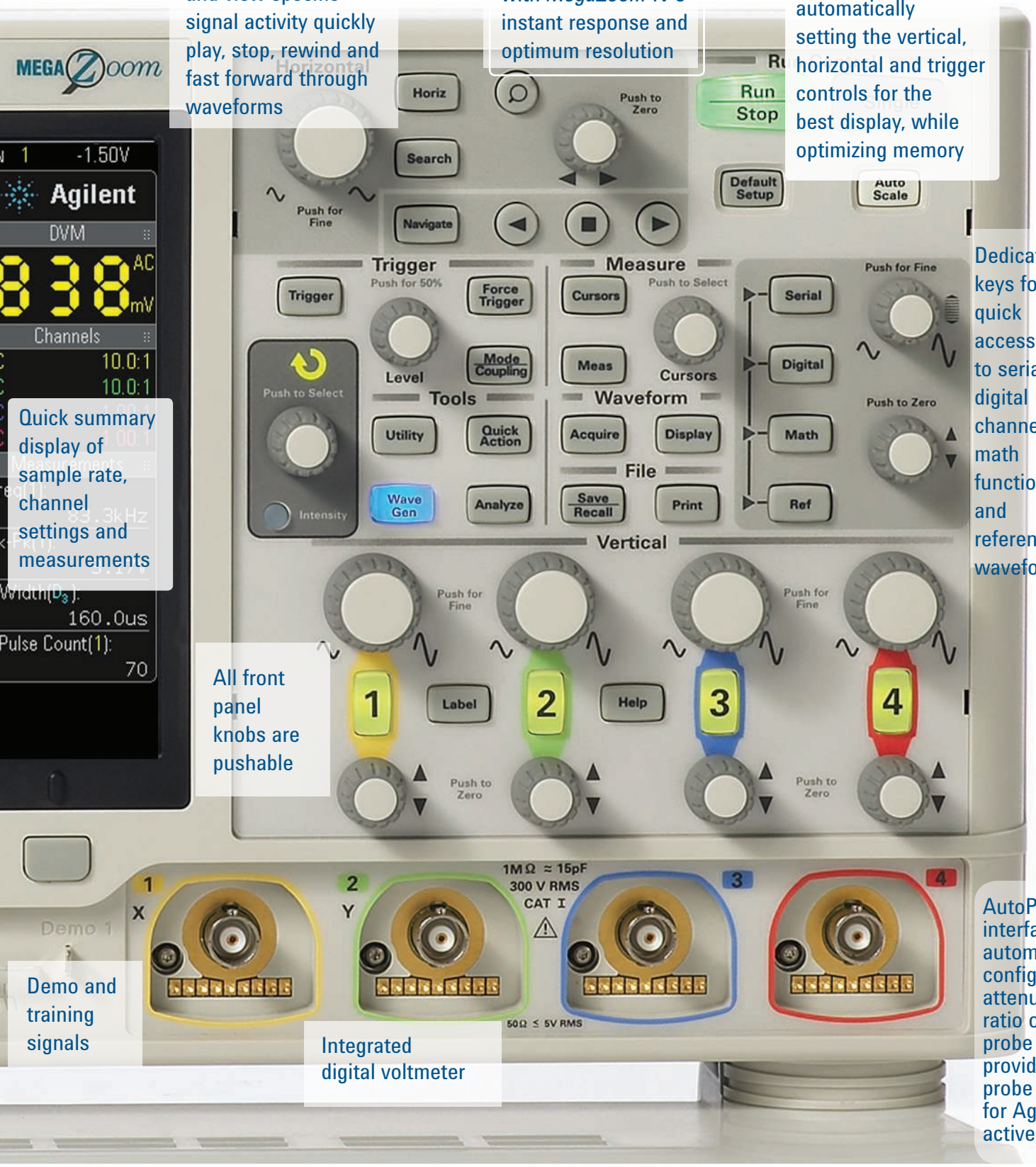



## 30-day trial license

The 3000 X-Series comes with a one-time 30-day all-optional-features trial license. You can choose to start the 30-day trial at any time. In addition you can redeem individual optional feature 30-day trial licenses at any time by visiting **www.agilent.com/find/30daytrial**. This enables you to receive in effect 60 days of trial license of each optional feature.

Oscilloscope shown actual size




Search and navigate front panel controls make it easy to find and view specific signal activity quickly 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 serial, 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
AutoProbe interface automatically configures the attenuation ratio of the probe and provides the probe power for Agilent's active probes
MEGAZoom
Agilent
DVM
Channels
Horiz
Search
Navigate
Run
Stop
Default Setup
Auto Scale
Trigger
Force Trigger
Mode Coupling
Measure
Cursors
Meas
Serial
Digital
Math
Ref
Tools
Utility
Quick Action
Waveform
Acquire
Display
File
Save Recall
Print
Wave Gen
Analyze
Vertical
Label
Help
Push for Fine
Push to Zero
Push to Select
Intensity
1MΩ ≈ 15pF
300 V RMS
CAT I
50Ω ≤ 5V RMS

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

## Configuring your InfiniiVision X-Series oscilloscope

### Step 1. *Choose your bandwidth, number of channels and memory depth.*

**3000 X-Series specification overview**

| | | 3012A | 3014A | 3024A | 3032A | 3034A | 3052A | 3054A | 3102A | 3104A |
|---|---|---|---|---|---|---|---|---|---|---|
| Bandwidth* (– 3 dB) | | 100 MHz | | 200 MHz | 350 MHz | | 500 MHz | | 1 GHz | |
| Calculated rise time (10-90%)" | | ≤ 3.5 ns | | ≤ 1.75 ns | ≤ 1 ns | | ≤ 700 ps | | ≤ 450 ps | |
| Input channels | DSOX | 2 | 4 | 4 | 2 | 4 | 2 | 4 | 2 | 4 |
| | MSOX | 2 + 16 | 4 + 16 | 4 + 16 | 2 + 16 | 4 + 16 | 2 + 16 | 4 + 16 | 2 + 16 | 4 + 16 |

* For example, if you choose 500 MHz, 4+16 channels, the model number will be MSOX3054A.

### Step 2. *Tailor your scope with measurement applications to save time and money. After purchase upgrade model numbers are listed below (values in parentheses are factory-installed option numbers).*

| Description | Model number |
|---|---|
| Oscilloscope features | |
| Memory | DSOX3MEMUP (-040) |
| Segmented memory | DSOX3SGM (-SGM) |
| MSO upgrade | DSOX3MSO |
| MSO upgrade for 1 GHz models | DSOXPERFMSO |
| Serial protocols | |
| Embedded serial triggering and analysis ($I^2C$, SPI) | DSOX3EMBD (LSS) |
| Computer serial triggering and analysis (RS232/UART) | DSOX3COMP (-232) |
| Automotive serial triggering and analysis (CAN/LIN) | DSOX3AUTO (-AMS) |
| FlexRay serial triggering and analysis | DSOX3FLEX (-FLX) |
| Audio serial triggering and analysis ($I^2S$) | DSOX3AUDIO (-SND) |
| MIL-STD 1553 and ARINC 429 serial triggering and analysis | DSOX3AERO (-AER) |
| Measurement applications | |
| WaveGen 20 MHz arbitary/function generator | DSOX3WAVEGEN (-001) |
| Integrated 3-digit digital voltmeter (DVM) | DSOXDVM (-DVM) |
| Power analysis application | DSOX3PWR (-PWR) |
| Mask limit testing | DSOX3MASK (-LMT) |
| Enhanced video/TV application package | DSOX3VID (-VID) |
| Advanced math | DSOX3ADVMATH (-MAT) |
| Productivity tools | |
| Education and training kit | DSOXEDK (-EDK) |
| Infiniium Offline oscilloscope analysis software | N8900A |
| Agilent spectrum visualizer | 64997A |
| Vector signal analyzer software | 89601B (version 15 and higher) |
| Benchlink waveform builder pro and basic | 33503A |

## Configuring your InfiniiVision X-Series oscilloscope

### Step 3. *Choose your probes - For complete list of compatible probes, see Agilent document 5968-8153EN and visit* **www.agilent.com/find/scope_probes**.

| Probes | 3000 X-Series |
|---|---|
| N2862B Passive probe 150 MHz 10:1 attenuation | 1 per channel included 100 MHz models |
| N2863B Passive probe 300 MHz, 10:1 attenuation | 1 per channel included 200 MHz models |
| N2890A Passive probe 500 MHz, 10:1 attenuation | 1 per channel included 350/500 MHz/1 GHz models |
| N6450-60001 16 digital channel MSO cable | 1 per scope included on all MSO models and MSO upgrades |
| N2889A Passive probe 350 MHz 10:1/1:1 switchable attenuation | Optional |
| 10076B Passive probe 250 MHz 100:1 attenuation | Optional |
| N2771B Passive probe 50 MHz 1000:1 attenuation | Optional |
| N2795A Single-ended active probe 1 GHz ±8 V with AutoProbe | Optional |
| N2750A InfiniiMode differential probe 1.5-GHz 700-fF 200-kΩ with AutoProbe | Optional |
| N2790A Differential active probe 100 MHz ±1.4 kV with AutoProbe | Optional |
| N2791A Differential active probe 25 MHz ±700 V | Optional |
| N2792A Differential active probe 200 MHz ±20 V | Optional |
| N2793A Differential active probe 800 MHz ±15 V | Optional |
| 1146A AC/DC Current probe 100 kHz 100 A | Optional |
| 1147B AC/DC Current probe 50 MHz 15 A with AutoProbe | Optional |
| N2893A AC/DC Current probe 100 MHz 15 A with AutoProbe | Optional |
| N2820A 2-channel high-sensitivity current probe 50 uA - 5 A with AutoProbe | Optional |
| N2821A 1-channel high-sensitivity current probe 50 uA - 5 A with AutoProbe | Optional |

### Step 4. *Add the final touches.*

| Recommended accessories | 3000 X-Series |
|---|---|
| LAN/VGA connection module | DSOXLAN |
| GPIB connection module | DSOXGPIB |
| Rack mount kit | N6456A |
| Soft carrying case and front panel cover | N6457A |
| Hard transit case for 2000 and 3000 X-Series | CaseCruzer 3F1112-1510J (available from http://www.casecruzer.com/) |
| Hard copy manual | N6459A |
| Front panel cover only | N2747A |

N2820A high-sensitivity high-dynamic range current probe

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

## Performance characteristics

### DSO and MSO 3000 X-Series oscilloscopes

## 3000 X-Series specification overview

| | | 3012A | 3014A | 3024A | 3032A | 3034A | 3052A | 3054A | 3102A | 3104A |
|---|---|---|---|---|---|---|---|---|---|---|
| Bandwidth * (–3 dB) | | 100 MHz | | 200 MHz | 350 MHz | | 500 MHz | | 1 GHz | |
| Calculated rise time (10 - 90%) | | ≤ 3.5 ns | | ≤ 1.75 ns | ≤ 1 ns | | ≤ 700 ps | | ≤ 450 ps | |
| Input channels | DSOX | 2 | 4 | 4 | 2 | 4 | 2 | 4 | 2 | 4 |
| | MSOX | 2 + 16 | 4 + 16 | 4 + 16 | 2 + 16 | 4 + 16 | 2 + 16 | 4 + 16 | 2 + 16 | 4 + 16 |
| Maximum sample rate | | 4 GSa/s half channel, 2 GSa/s all channel | | | | | | | 5 GSa/s half ch, 2.5 GSa/s all ch | |
| Maximum memory depth | | Standard 2 Mpts, optional 4 Mpts and optional segment memory | | | | | | | | |
| Display size and type | | 8.5-inch WVGA display | | | | | | | | |
| Waveform update rate | | > 1 million waveforms per second | | | | | | | | |
| Number of active probes supported | | In general, one for 2-channel models and two for 4-channel models. Contact Agilent for specific configurations. | | | | | | | | |

## Vertical system analog channels

| | |
|---|---|
| Hardware bandwidth limits | Approximately 20 MHz (selectable) |
| Input coupling | AC, DC |
| Input impedance | Selectable: 1 MΩ ± 1% (14 pF), 50 Ω ± 1.5% |
| Input sensitivity range | 100 MHz ~ 500 MHz models: 1 mV/div to 5 V/div** (1 MΩ and 50 Ohm)<br>1 GHz models: 1 mV/div to 5 V/div** (1 MΩ), 1 mV/div to 1 V/div (50 Ohm) |
| Vertical resolution | 8 bits (measurement resolution is 12 bits with averaging) |
| Maximum input voltage | 300 Vrms, 400 Vpk; transient overvoltage 1.6 kVpk<br>With N2862A, N2863A or N2890A 10:1 probe: 300 Vrms<br>Frequency de-rating (assumes sine wave input): 400 Vpk until 40 kHz. Then de-rates at 20 db/dec until 6 Vpk |
| DC vertical accuracy | ±[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] ** |
| DC vertical gain accuracy* | ± 2.0% full scale** |
| DC vertical offset accuracy | ± 0.1 div ± 2 mV ± 1% of offset setting |
| Channel-to-channel isolation | > 100:1 from DC to maximum specified bandwidth of each model<br>(measured with same V/div and coupling on channels) |
| Offset range | ± 2 V (1 mV/div to 200 mV/div)<br>± 50 V (> 200 mV/div to 5 V/div) |

## Vertical system digital channels

| | |
|---|---|
| Digital input channels | 16 digital (D0 to D15. pod 1: D7 ~ D0, Pod 2: D15 ~ D8) |
| Thresholds | Threshold per pod |
| Threshold selections | TTL (+1.4 V), 5V CMOS (+2.5 V), ECL (–1.3 V), user-defined (selectable by pod) |
| User-defined threshold range | ± 8.0 V in 10 mV steps |
| Maximum input voltage | ± 40 V peak CAT I; transient overvoltage 800 Vpk |
| Threshold accuracy* | ± (100 mV + 3% of threshold setting) |
| Maximum input dynamic range | ± 10 V about threshold |
| Minimum voltage swing | 500 mVpp |
| Input impedance | 100 kΩ ± 2% at probe tip |
| Input capacitance | ~8 pF |
| Vertical resolution | 1 bit |

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

** 1 mV/div and 2 mV/div are 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.

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

### Performance characteristics

| Horizontal system analog channels | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 3012A | 3014A | 3024A | 3032A | 3034A | 3052A | 3054A | 3102A | 3104A |
| Time base range | | 5 ns/div to 50 s/div | | 2 ns/div to 50 s/div | | | 1 ns/div to 50 s/div | | 500 ps/div to 50 s/div | |
| Time base accuracy* | | 25 ppm ± 5 ppm per year (aging) | | | | | | | | |
| Time base delay time range | Pre-trigger | Greater of 1 screen width or 250 µs | | | | | | | | |
| | Post-trigger | 1 s to 500 s | | | | | | | | |
| Channel-to-channel deskew range | | ± 100 ns | | | | | | | | |
| Δ Time accuracy (using cursors) | | ± (time base acc. x reading) ± (0.0016 x screen width) ± 100 ps | | | | | | | | |
| Modes | | Main, zoom, roll, XY | | | | | | | | |
| XY | | On channels 1 and 2 only. Z Blanking on ext trigger input, 1.4 V threshold. Bandwidth: Maximum bandwidth. Phase error at 1 MHz: < 0.5 degree. | | | | | | | | |

| Horizontal system digital channels | |
|---|---|
| Minimum detectable pulse width | 5 ns |
| Channel-to-channel skew | 2 ns (typical); 3 ns (maximum) |

| Acquisition system | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3012A | 3014A | 3024A | 3032A | 3034A | 3052A | 3054A | 3102A | 3104A |
| Maximum analog channels sample rate | | 4 GSa/s half channel interleaved, 2 GSa/s all channel | | | | | | | 5 GSa/s half channel interleaved, 2.5 GSa/s all channel | |
| Maximum analog channels record length | | 2 Mpts half channel interleaved, 1 Mpts all channel (standard)<br>4 Mpts half channel interleaved, 2 Mpts all channel (optional with DSOX3MEMUP (-040)) | | | | | | | | |
| Maximum duration of time captured at highest sampling rate (all analog channels) | | 500 us with 4M memory upgrade | | | | | | | 400 us with 4M memory upgrade | |
| Maximum digital channels sample rate | | 1 GSa/s | | | | | | | 1.25 GSa/s | |
| Maximum digital channels record length | | 1 Mpts (standard - with digital channels only)<br>2 Mpts (optional with DSOX3MEMUP - with digital channels only) | | | | | | | | |
| Modes | Normal | Default mode | | | | | | | | |
| | Peak detect | Capture glitches as narrow as 250 ps at all time base settings | | | | | | | | |
| | Averaging | Selectable from 2, 4, 8, 16, 64, ... to 65,536 | | | | | | | | |
| | High resolution | Real time boxcar averaging reduces random noise and effectively increases vertical resolution<br>12 bits of resolution when ≥ 10 µs/div at 4 GSa/s (5 GSa/s for 1 GHz models)<br>or ≥ 20-µs/div at 2 GSa/s (2.5 GSa/s for 1 GHz models) | | | | | | | | |
| | Segmented | Segmented memory optimizes available memory for data streams that have long dead times between activity. Maximum segments = 1000. Re-arm time = 1 µs (minimum time between trigger events) | | | | | | | | |

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

## Performance characteristics

| Trigger system | |
|---|---|
| Trigger sources | Analog channel (1~4), digital channel (D0~D15), line, external, WaveGen (1 or mod) (FM/FSK) |
| Trigger modes | • Normal (triggered): requires trigger event for scope to trigger<br>• Auto: triggers automatically in absence of trigger event<br>• Single: triggers only once on a trigger event, press **[Single]** again for scope to find another trigger event, or press **[Run]** to trigger continuously in either Auto or Normal mode<br>• Force: front panel button that forces a trigger |
| Trigger coupling | DC: DC coupled trigger<br>AC: AC coupled trigger, cutoff frequency: < 10 Hz (internal); <50 Hz (external)<br>HF Reject: High frequency reject, cutoff frequency ~ 50 kHz<br>LF Reject: Low frequency reject, cutoff frequency ~ 50 kHz<br>Noise Reject: Selectable OFF or ON, decreases sensitivity 2x |
| Trigger holdoff range | 40 ns to 10.00 s |
| Trigger sensitivity | |
| Internal* | < 10 mV/div: greater of 1 div or 5 mV; ≥ 10 mV/div: 0.6 div |
| External* | 200 mVpp from DC to 100 MHz<br>350 mVpp 100 MHz to 200 MHz |
| Trigger level range | |
| Any channel | ± 6 div from center screen |
| External | ± 8 V |

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

## Performance characteristics

| Trigger type selections | |
|---|---|
| Edge | Trigger on a rising, falling, alternating or either edge of any source |
| Edge then edge (B trigger) | Arm on a selected edge, wait a specified time, then trigger on a specified count of another selected edge |
| Pulse width | Trigger on a pulse on a selected channel, whose time duration is less than a value, greater than a value, or inside a time range<br>• Minimum duration setting: 2 ns (500 MHz, 1 GHz), 4 ns (350 MHz), 6 ns (200 MHz), 10 ns (100 MHz)<br>• Maximum duration setting: 10 s<br>• Range minimum: 10 ns |
| Runt | Trigger on a position runt pulse that fails to exceed a high level threshold. Trigger on a negative runt pulse that fails to exceed a low level threshold. Trigger on either polarity runt pulse based on two threshold settings. Runt triggering can also be time-qualified (< or >) with a minimum time setting of 2~10 ns and maximum timesetting of 10 s.<br>• Minimum time setting: 2 ns (500 MHz, 1 GHz), 4 ns (350 MHz), 6 ns (200 MHz). 10 ns (100 MHz) |
| Setup and hold | Trigger and clock/data setup and/or hold time violation. Setup time can be set from –7 s to 10 s. Hold time can be set from 0 s to 10 ns. |
| Rise/fall time | Trigger on rise-time or fall-time edge speed violations (< or >) based on user-selectable threshold. Select from (< or >) and time settings range between<br>• Minimum: 1 ns (500 MHz, 1 GHz), 2 ns (350 MHz), 3 ns (200 MHz), 5 ns (100 MHz)<br>• Maximum: 10 s |
| $N^{th}$ edge burst | Trigger on the Nth (1 to 65535) edge of a pulse burst. Specify idle time (10 ns to 10 s) for framing. |
| Pattern | Trigger when a specified pattern of high, low, and don't care levels on any combination of analog, digital , or trigger channels is [entered \| exited]. Pattern must have stabilized for a minimum of 2 ns to qualify as a valid trigger condition.<br>• Minimum duration setting: 2 ns (500 MHz, 1 GHz), 4 ns (350 MHz), 6 ns (200 MHz), 10 ns (100 MHz)<br>• Maximum duration setting: 10 s<br>• Range minimum: 10 ns |
| Or | Trigger on any selected edge across multiple analog or digital channels |
| Video | Trigger on all lines or individual lines, odd/even or all fields from composite video, or broadcast standards (NTSC, PAL, SECAM, PAM-M) |
| Enhanced Video (optional) | Trigger on lines and fields of enhanced and HDTV standards (480p/60, 567p/50, 720p/50, 720p/60, 1080p/24, 1080p/25, 1080p/30, 1080p/50, 1080p/60, 1080i/50, 1080i/60). |
| USB | Trigger on start of packet, end of packet, reset complete, enter suspend, or exit suspend. Support USB low-speed and full-speed. |
| $I^2C$ (optional) | Trigger at a start/stop condition or user defined frame with address and/or data values. Also trigger on missing acknowledge, address with no accq, restart, EEPROM read, and 10-bit write. |
| SPI (optional) | Trigger on SPI (Serial Peripherial Interface) data pattern during a specific framing period. Supports positive and negative Chip Select framing as well as clock Idle framing and user-specified number of bits per frame. Supports MOSI and MISO data. |
| RS-232/422/485/UART (optional) | Trigger on Rx or Tx start bit, stop bit or data content or parity error. |
| $I^2S$ (optional) | Trigger on 2's complement data of audio left channel or right channel (=, ≠, <, >, > <, < >, increasing value, or decreasing value) |
| CAN (optional) | Trigger on CAN (controller area network) version 2.0A and 2.0B signals. Trigger on the start of frame (SOF) bit (standard). Remote frame ID (RTR), data frame ID (~RTR), remote or data frame ID, data frame ID and data, error frame, all errors, acknowledge error and overload frame. |
| LIN (optional) | Trigger on LIN (Local Interconnect Network) sync break, sync frame ID, or frame ID and data. |
| FlexRay (optional) | Trigger on frame ID, frame type (sync, start-up, null, normal), cycle-repetitive, cycle-base, and errors. |
| MIL-STD 1553 (optional) | Trigger on MIL-STD 1553 signals based on word type (Data or Command/Status), Remote Terminal Address, data, and errors (parity, sync, Manchester encoding). |
| ARINC 429 (optional) | Trigger and decode on ARINC429 data. Trigger on word start/stop, label, label + bits, label range, error conditions (parity, word, gap, word or gap, all), all bits (eye), all 0 bits, all 1 bits. |

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

## Performance characteristics

| Waveform measurements | |
|---|---|
| Cursors** | • Single cursor accuracy:<br>±[DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale]<br>• Dual cursor accuracy:<br>±[DC vertical gain accuracy + 0.5% full scale]*<br>• Units: Seconds(s), Hz (1/s), Phase (degrees), Ratio (%) |
| Automatic measurements | Measurements continuously updated with statistics. Cursors track last selected measurement. Select up to four measurements from the list below:<br>• Voltage: peak-to-peak, maximum, minimum, amplitude, top, base, overshoot, pre-shoot, average- N cycles, average- full screen, DC RMS- N cycles, DC RMS- full screen, AC RMS- N cycles, AC RMS- full screen (standard deviation), ratio (RMS1/RMS2)<br>• Time: period, frequency, counter, + width, - width, burst width, duty cycle, rise time, fall time, delay, phase, X at min Y, X at Max Y<br>• Count: positive pulse count, negative pulse count, rising edge count, falling edge count<br>• Mixed: area- N cycles, area- full screen |
| Counter | Built-in frequency counter:<br>• Source: on any analog or digital channel<br>• Resolution: 5 digits<br>• Maximum frequency: bandwidth of scope |

| Waveform math | |
|---|---|
| Arithmetic | f (g(t))<br>g(t): { add, subtract, multiply between any 2 channels}<br>f(t): {FFT(g(t)), differentiate d/dt g(t), integrate $\int$ g(t) dt, square root $\sqrt{}$g(t) }<br>Enabled between any combination of two channels |
| Arithmetic | DSOX3ADVMath advanced waveform math option adds Ax + B, Square, Absolute, Common Log, Natural Log, Exponential, Base 10 Exponential, LP Filter, HP Filter, Magnify, Measurement Trend, Chart Logic Bus (Timing or State). |
| FFT | Up to 64 kpts resolution<br>Set FFT Window to: Hanning, Flat Top, Rectangular, Blackman-Harris |

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

| Display characteristics | |
|---|---|
| Display | 8.5-inch WVGA |
| Resolution | 800 (H) x 480 (V) pixel format (screen area) |
| Graticules | 8 vertical divisions by 10 horizontal divisions with intensity controls. |
| Format | YT, XY, and Roll |
| Maximum waveform update rate | > 1,000,000 wfms/s |
| Persistence | Off, infinite, variable persistence (100 ms - 60 s) |
| Intensity gradation | 64 intensity levels |

## Performance characteristics

| WaveGen – Built-in function/arbitrary waveform generator (specifications are typical) | |
|---|---|
| WaveGen out | Front-panel BNC connector |
| Waveforms | Sine, Square, Ramp, Pulse, DC, Noise, Sine Cardinal (Sinc), Exponential Rise, Exponential Fall, Cardiac, Gaussian Pulse, and Arbitrary. |
| Modulation | Modulation types: AM, FM, FSK<br>Carrier waveforms: sine, ramp, sine cardinal, exponential rise, exponential fall, and cardiac.<br>Modulation source: internal (no external modulation capability)<br>AM:<br>Modulation: sine, square, ramp<br>Modulation frequency: 1 Hz to 20 kHz<br>Depth: 0% to 100%<br>FM:<br>Modulation: sine, square, ramp<br>Modulation frequency: 1 Hz to 20 kHz<br>Minimum carrier frequency: 10 Hz<br>Deviation: 1 Hz to carrier frequency or (2e12 / carrier frequency), whichever is smaller<br>FSK:<br>Modulation: 50% duty cycle square wave<br>FSK rate: 1 Hz to 20 kHz<br>Hop frequency: 2 x FSK rate to 10 MHz |
| Sine | • Frequency range: 0.1 Hz to 20 MHz<br>• Amplitude flatness: ±0.5 dB (relative to 1 kHz)<br>• Harmonic distortion: –40 dBc<br>• Spurious (non harmonics): –40 dBc<br>• Total harmonic distortion: 1%<br>• SNR (50 ohm load, 500 MHz BW) : 40 dB (Vpp > = 0.1 V); 30 dB (Vpp < 0.1V) |
| Square wave /pulse | • Frequency range: 0.1 Hz to 10 MHz<br>• Duty cycle: 20 to 80%<br>• Duty cycle resolution: Larger of 1% or 10 ns<br>• Pulse width: 20 ns minimum<br>• Rise/fall time: 18 ns (10 to 90%)<br>• Pulse width resolution: 10 ns or 5 digits, whichever is larger<br>• Overshoot: < 2%<br>• Asymmetry (at 50% DC): ±1% ± 5 ns<br>• Jitter (TIE RMS): 500 ps |
| Ramp/triangle wave | • Frequency range: 0.1 Hz to 200 kHz<br>• Linearity: 1%<br>• Variable symmetry: 0 to 100%<br>• Symmetry resolution: 1% |
| Noise | Bandwidth: 20 MHz typical |
| Sine Cardinal (Sinc) | Frequency range: 0.1 Hz to 1.0 MHz |
| Exponential Rise/Fall | Frequency range: 0.1 Hz to 5.0 MHz |
| Cardiac | Frequency range: 0.1 Hz to 200.0 kHz |
| Gaussian Pulse | Frequency range: 0.1 Hz to 5.0 MHz |
| Arbitrary | • Waveform length: 1 to 8k points<br>• Amplitude Resolution: 10 bits (including sign bit)***<br>• Repetition Rate: 0.1Hz to 12MHz<br>• Sample Rate: 100 MSa/s<br>• Filter Bandwidth: 20 MHz |

## Performance characteristics

| WaveGen – Built-in function/arbitrary waveform generator (specifications are typical) *(Continued)* | |
|---|---|
| Frequency | • Sine wave and ramp accuracy:<br>◦ 130 ppm (frequency < 10 kHz)<br>◦ 50 ppm (frequency > 10 kHz)<br>• Square wave and pulse accuracy:<br>◦ [50+frequency/200] ppm (frequency < 25 kHz)<br>◦ 50 ppm (frequency ≥ 25 kHz)<br>• Resolution: 0.1 Hz or 4 digits, whichever is larger |
| Amplitude | • Range:<br>◦ 20 mVpp to 5 Vpp into Hi-Z**<br>◦ 10 mVpp to 2.5 Vpp into 50 ohms**<br>• Resolution: 100 µV or 3 digits, whichever is higher<br>• Accuracy: 2% (frequency = 1 kHz) |
| DC offset | • Range:<br>◦ ±2.5 V into Hi-Z**<br>◦ ±1.25 V into 50 ohms**<br>• Resolution: 100 µV or 3 digits, whichever is higher<br>• Accuracy (waveform modes): ± 1.5% of offset setting ± 1% of amplitude ± 1 mV<br>• Accuracy (DC mode): ± 1.5% of offset setting ± 3 mV |
| Trigger output | Trigger output available on Trig out BNC |
| Main Output | • Impedance : 50 ohms typical<br>• Isolation: not available, main output BNC is grounded<br>• Protection: overload automatically disables output |

* Gaussian Pulse: 4 Vpp maximum into Hi-Z; 2 Vpp maximum into 50 ohms.
** Sinc, Cardiac and Gaussian Pulse: ±1.25 V into Hi-Z; +- 625 mV into 50 ohms
*** Full resolution is not available at output due to internal attenuator stepping.

| Digital voltmeter (specifications are typical) | |
|---|---|
| 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. |

| Connectivity | |
|---|---|
| Standard ports | One USB 2.0 hi-speed device port on rear panel. Supports USBTMC protocol.<br>Two USB 2.0 hi-speed host ports, front and rear panel<br>Supports memory devices, printers and keyboards |
| Optional ports | GPIB, LAN (10/100Base-T), WVGA video out |
| Trigger out | BNC connector on the rear panel. Supported modes: triggers, mask, and waveform generator sync pulse |

## Performance characteristics

| General and environmental characteristics | |
|---|---|
| Power line consumption | 100 watts |
| Power voltage range | 100-120V, 50/60/400 Hz; 100-240V, 50/60 Hz ± 10% auto ranging |
| Temperature | Operating: 0 to +55 °C<br>Nonoperating: –30 to +71 °C |
| Humidity | Operating: Up to 80% RH at or below +40 °C; up to 45% RH up to +50 °C<br>Non-operating: Up to 95% RH up to 40 °C; up to 45% RH up to 50 °C |
| Altitude | Operating: up to 4,000 m, Non-operating 15,300 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<br>CISPR 11/EN 55011<br>IEC 61000-4-2/EN 61000-4-2<br>IEC 61000-4-3/EN 61000-4-3<br>IEC 61000-4-4/EN 61000-4-4<br>IEC 61000-4-5/EN 61000-4-5<br>IEC 61000-4-6/EN 61000-4-6<br>IEC 61000-4-11/EN 61000-4-11<br>Canada: ICES-001:2004<br>Australia/New Zealand: AS/NZS |
| Safety | UL61010-1 2nd edition, CAN/CSA22.2 No. 61010-1-04 |
| Vibration | Meets IEC60068-2-6 and MIL-PRF-28800; class 3 random |
| Shock | Meets IEC 60068-2-27 and MIL-PRF-28800; class 3 random;(operating 30g, ½ sine. 11 ms duration, 3 shocks/axis along major axis, total of 18 shocks |
| Dimensions | 381 mm (15 in) W x 204 mm (8 in) H x 142 mm (5.6 in) D |
| Weight | Net: 3.9 kg (8.5 lbs), shipping: 4.1 kg (9.0 lbs) |

## Performance characteristics

| Nonvolatile storage | |
|---|---|
| Reference waveform display | 2 internal waveforms or USB thumb drive |
| Waveform storage | Setup, .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 |

| Included standard with oscilloscope | |
|---|---|
| Factory warranty | 3-year warranty (90 days for unserialized accessories such as passive probes) |
| Calibration | Certificate of calibration, 2-year calibration interval |
| Standard secure erase | |
| Probes | |
| N2862B Passive probe 150 MHz 10:1 attenuation | 1 per channel included 100 MHz models |
| N2863B Passive probe 300 MHz, 10:1 attenuation | 1 per channel included 200 MHz models |
| N2890A Passive probe 500 MHz, 10:1 attenuation | 1 per channel included 350/500 MHz and 1 GHz models |
| N6450-60001 16 digital channel MSO cable | 1 per scope included on all MSO models and DSOX3MSO (for 500 MHz models and below) DSOX3PERFMSO (for 1 GHz Models) |
| **Interface and built-in help language support** English, Japanese, simplified Chinese, traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese, Italian, Thai, and Polish. | |
| Localized power cord | |

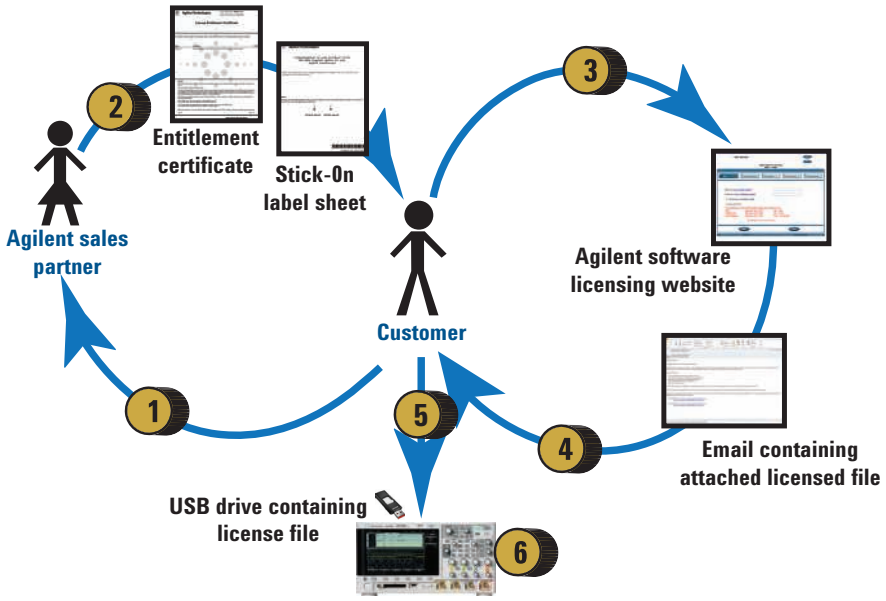
**For MET/CAL procedures, click on the Cal Labs solutions link below**
**http://www.callabsolutions.com/products/Agilent/**
**These procedures are FREE to customers**

## Related literature

| Publication title | Publication type | Publication number |
|---|---|---|
| *Serial Bus Applications for Agilent InfiniiVision 3000 X-Series Oscilloscopes* | Data sheet | 5990-6677EN |
| *Power Measurements for Agilent InfiniiVision 3000 X-Series oscilloscope* | Data sheet | 5990-8869EN |
| *Mask/Waveform Limit Testing For Agilent InfiniiVision Series Oscilloscopes* | Data sheet | 5990-3269EN |

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

## **License-only** bandwidth upgrades and measurement applications




### License Only Bandwidth Upgrade Models

#### 3000 X-Series

| | |
|---|---|
| **DSOX3BW24** | **100 MHz to 200 MHz, 4 ch, License only** |
| **DSOX3BW52** | **350 MHz to 500 MHz, 2 ch, License only** |
| **DSOX3BW54** | **350 MHz to 500 MHz, 4 ch, License only** |

### Measurement Applications

| | |
|---|---|
| DSOX3WAVEGEN | WaveGen (built -in function generator with AWG) |
| DSOXDVM | Integrated digital voltmeter |
| DSOXEDK | Educator's kit |
| DSOX3MASK | Mask testing |
| DSOX3SGM | Segmented memory |
| DSOX3ADVMATH | Advanced waveform math |
| DSOX3VID | Enhanced video triggering |
| DSOX3EMBD | Embedded serial triggering and analysis ($I^2C$, SPI) |
| DSOX3COMP | Computer serial triggering and analysis (RS232/422/485/UART) |
| DSOX3AUDIO | Audio serial triggering and analysis ($I^2S$) |
| DSOX3AUTO | Automotive serial triggering and analysis (CAN, LIN) |
| DSOX3FLEX | FlexRay serial triggering and analysis |
| DSOX3AERO | Aerospace serial triggering and analysis (MIL-STD 1553, ARINC 429) |
| DSOX3PWR | Power measurements and analysis |
| DSOX3MSO | MSO upgrade: add 16 digital timing channels (for 500 MHz and below models) |
| DSOXPERFMSO | MSO upgrade: add 16 digital timing channels (for 1 GHz models) |

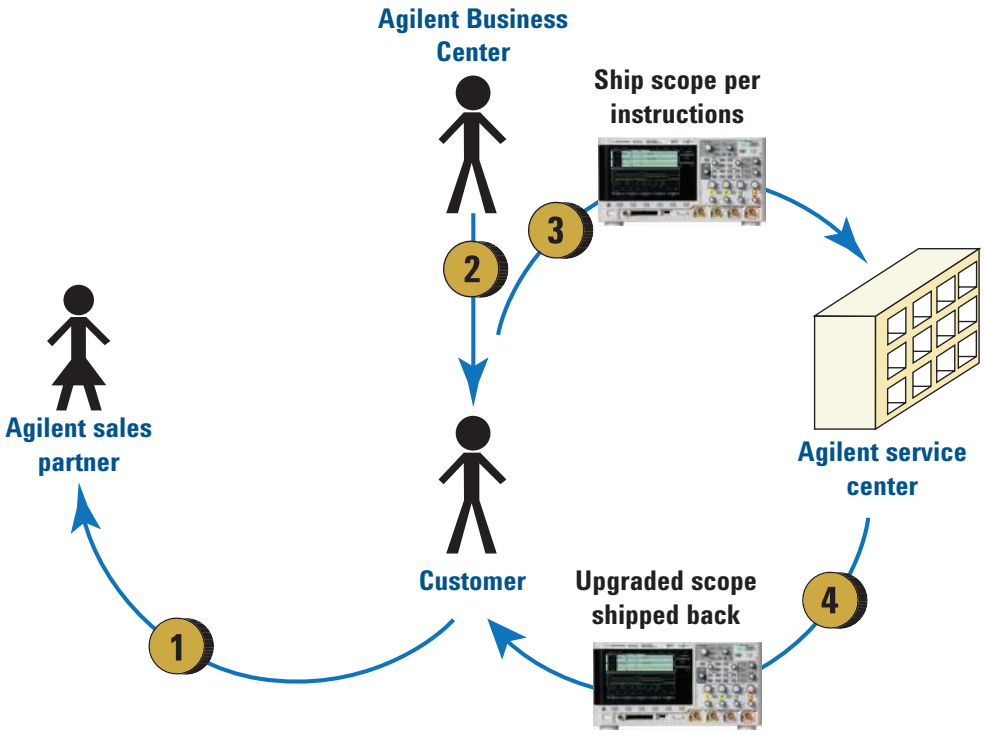
### Process Description

1. Place order for a license only bandwidth upgrade or measurement application 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 DSOX3BW24, the N2863B 10:1 300 MHz passive probes (1 per channel) will be sent with the upgrade.
2. For measurement applications, you will receive a paper or electronic .pdf Entitlement Certificate. For bandwidth upgrades only, you will receive a stick-on label document indicating upgraded bandwidth specification in addition to a paper Entitlement Certificate.
3. Use Entitlement Certificate 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 label to front and rear panels of the oscilloscope. Model number and serial number of the oscilloscope do not change.

* See page 30 for return-to-Agilent service center upgrade process for these products

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

### Return-to-Agilent Service Center Bandwidth Upgrades




| Return-to-Agilent Bandwidth Upgrade Models | |
|---|---|
| **3000 X-Series** | |
| DSOX3BW32 | 100 MHz to 350 MHz, 2 ch, Service center |
| DSOX3BW34 | 200 MHz to 350 MHz, 4 ch, Service center |
| DSOX3BW12 | 500 MHz to 1 GHz, 2 ch, Service center |
| DSOX3BW14 | 500 MHz to 1 GHz, 4 ch, Service center |

**Process Description**

1. Place order for a return-to-Agilent Service Center bandwidth upgrade product to an Agilent sales partner. Service Center installation, calibration, shipment costs are in addition to bandwidth upgrade product price. If multiple 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 DSOX3BW32 and DSOX3BW34, the N2890A 10:1 500 MHz passive probe (1 per channel) will be sent with the upgrade.
2. Agilent Business Center will contact you regarding process and timing of the Service Center installation. Continue to use oscilloscope until contacted again later when parts are available at Service Center.
3. Ship the oscilloscope per provided instructions to Service Center.
4. Service Center ships back upgraded oscilloscope with stick-on labels applied to front and rear panels indicating upgraded bandwidth specification. Model number and serial number of the oscilloscope do not change.

* See page 29 for license-only upgrade process for these products

# Agilent Technologies Oscilloscopes

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*For other unlisted countries:*
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