

InfiniiVision 1000 X-Series Oscilloscopes

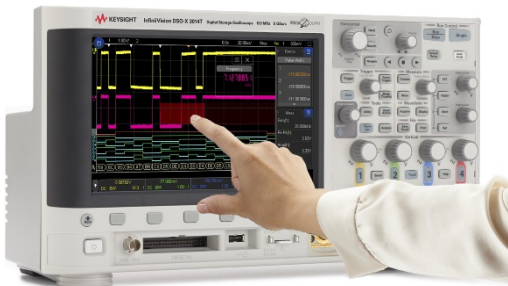
2-channel and 4-channel models with 50 MHz to 200 MHz bandwidth



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Need More Bandwidth, Sampling Rate, and Analysis?



Consider the InfiniiVision 3000T X-Series

- 350 MHz, 500 MHz and 1 GHz
- 5 GSa/s
- Uncompromised 1,000,000 waveform update rate
- Capacitive touch screen
- Industry exclusive zone touch trigger
- Additional serial decode/trigger
- Gated FFT



Leading Technology in a Value-Priced Oscilloscope (DSOX models)

Keysight's InfiniiVision 1000 X-Series oscilloscopes are engineered to give you quality, industry-proven technology at unbelievably low prices. Now it's easy to get professional measurements and accessible expertise at your fingertips. Don't settle for less – and test to impress.

- 70 to 200 MHz bandwidth (DSOX models)
- Frequency response analysis (Bode gain & phase plots), included in models with WaveGen
- See more signal detail with 200,000 waveforms/sec update rate
- Have confidence in your measurements with Keysight-custom technology that leverages more than 60 years of oscilloscope expertise
- Test quickly and easily with a simple, intuitive user-interface and built-in help and training signals
- Get professional-level functionality with industry-leading software analysis including standard serial bus analysis for the most popular serial bus standards, and 6-in-1 instrument integration



| | DSOX1202A 2 channels | DSOX1202G 2 channels with function generator | DSOX1204A 4 channels | DSOX1204G 4 channels with function generator |
|---------------------------------------|--|---|---|---|
| Bandwidth | 70 MHz (base bandwidth) 100 MHz (D1202BW1A) 200 MHz (D1202BW2A) | | 70 MHz (base bandwidth) 100 MHz (D1200BW1A) 200 MHz (D1200BW2A) | |
| Analog channels | 2 | | 4 | |
| External trigger | Front panel input (Displayable as a 3rd digital channel) | | Back panel input (not displayed) | |
| Sample rate per channel (max) | 2 GSa/s (one- or two-channel operation) 1 GSa/s (if external trigger view is turned on) | | 2 GSa/s (one- or half-channel ¹ operation) 1 GSa/s (three- or four-channel operation) | |
| Memory depth per channel (max) | 2 M points (one- or two-channel operation) 1 M points (if external trigger view is turned on) | | 2 M points (one- or half-channel ¹ operation) 1 M points (three- or four-channel operation) | |
| WaveGen | Not available | 20-MHz function generator | Not available | 20-MHz function generator |
| Bode plot | Not available | Standard | Not available | Standard |
| Waveform update rate | 200,000 waveforms per second | | | |
| Serial protocol analysis | Standard : I ² C, SPI, UART/RS-232, CAN, LIN | | | |
| Segmented memory | Standard | | | |
| Mask/limit testing | Standard | | | |
| Built-in training signals | Standard | | | |
| Integrated digital voltmeter | Standard | | | |
| Frequency counter | Standard | | | |
| Waveform math | Add, subtract, multiply, divide, FFT (magnitude and phase), low pass filter | | | |
| Automatic measurements | 14 amplitude, 14 timing, and 4 pulse count measurements | | | |
| Display | 7-inch TFT LCD WVGA | | | |
| Connectivity | USB 2.0 (host and device), LAN | | | |

1. Half-channel operation on a 4-channel model refers to two-channel operation when using channel-1 or channel-2 AND channel-3 or channel-4. Example: If viewing just channel-1 and channel-3, maximum sample rate is 2 GSa/s and maximum memory is 2 M points. But if viewing channel-1 and channel-2, maximum sample rate is 1 GSa/s and maximum memory is 1 M points.

Leading Technology in a Value-Priced Oscilloscope (EDUX models)

EDUX1052A and EDUX1052G




Provide a quality education for students and prepare them for industry with professional level instruments. The 1000 X-Series leverages the same technology as our higher-end oscilloscopes, allowing students to learn on the same hardware and software being used in leading R&D labs. Don't settle for less – set your students up for success.

- Built-in training signals that enable students to quickly learn to capture and analyze signals.
- The educator's resource kit includes dynamic teaching labs; a comprehensive lab guide; a tutorial written specifically for undergraduate students; and an oscilloscope fundamentals PowerPoint slide set for professors and lab assistants.
- IoT systems design applied courseware. The 1000 X-Series oscilloscope can be used with the U3800A Internet of Things(IoT) Systems Design Applied Courseware.
- Bode plots are fundamental concepts. The 1000 X-Series' frequency response analyzer capability is the perfect tool to help students understand the gain and phase performance of passive RLC circuits or active op-amps (available in "G" model only).
- Optional DSOXBODE Bode plot training kit available. See page 8 for additional details.
- BenchVue Software with the BV0004B BenchVue Oscilloscope app (standard) lets you control and visualize the 1000X-Series and multiple measurements simultaneously.



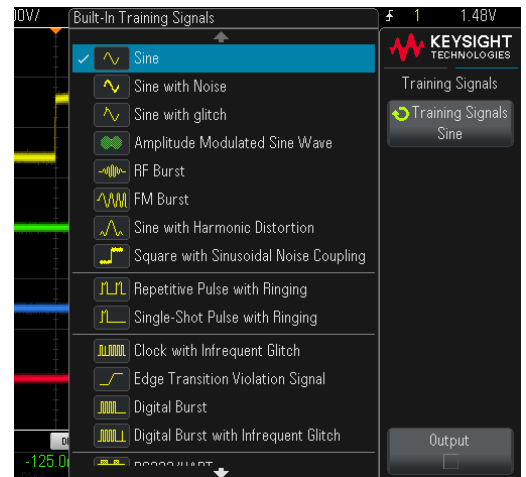
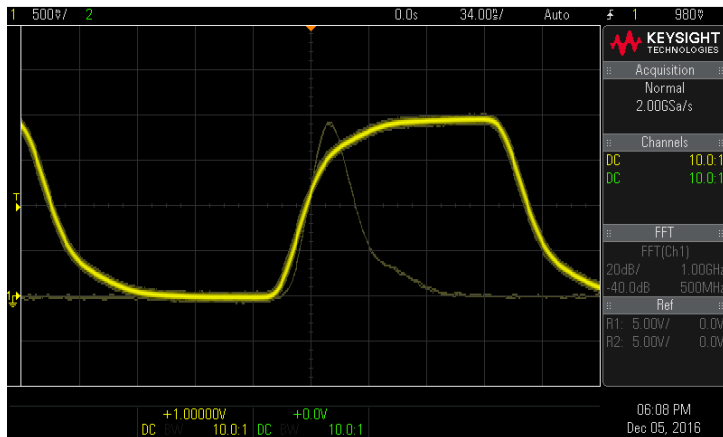
| | EDUX1052A 2 channels | EDUX1052G 2 channels with function generator |
|---|---|--|
| Bandwidth | 50 MHz | |
| Analog channels | 2 + 1 (ext. trigger viewable as digital channel) | |
| External trigger (or 3rd digital channel) | 1 | |
| Maximum sample rate | 1 GSa/s (all channels) | |
| Maximum memory depth | 200,000 points (all channels) | |
| Waveform update rate | 100,000 waveforms per second | |
| WaveGen | Not available | 20-MHz function generator |
| Bode plot | Not available | Standard |
| Serial protocol analysis | Standard: I ² C, UART/RS-232 | |
| Integrated digital voltmeter | Standard | |
| Frequency counter | Standard | |
| Built-in training signals | Standard | |
| Waveform math | Add, subtract, multiply, divide, FFT (magnitude and phase), low pass filter | |
| Automatic measurements | 14 amplitude, 14 timing, and 4 pulse count measurements | |
| Display | 7-inch TFT LCD WVGA | |
| Connectivity | USB 2.0 (host and device), LAN | |

Leading Technologies

(Click on  below to be redirected to videos on Keysight's YouTube channel)

Have confidence in your measurements with Keysight-custom technology that leverages more than 60 years of oscilloscope expertise.

Low-cost oscilloscopes don't have to be low quality. Designing premier test solutions has been the goal and passion of Keysight Technologies ever since we made our first oscillator in 1939, and now we're bringing you a professional-quality oscilloscope for a fraction of the price.



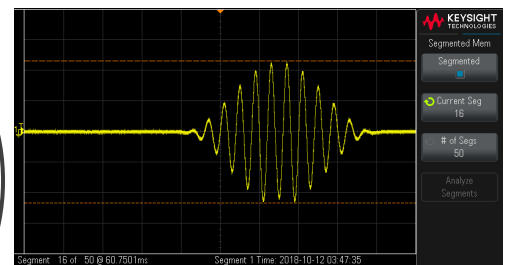
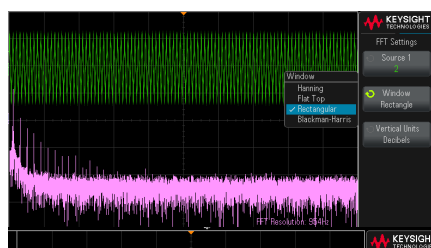
Up to 200,000 waveforms/sec update rate captures glitch easily.

 **Training Signals**

 **Superior Measurements**

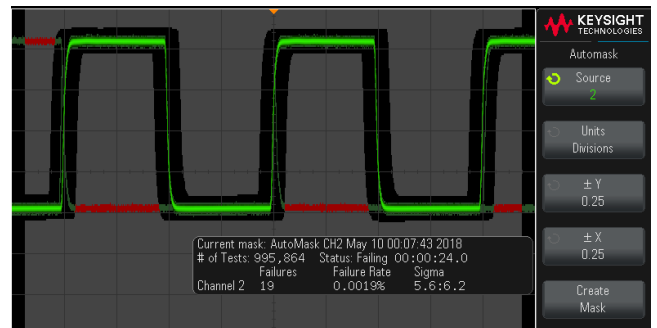
 **Memory Performance**

 **FFT**

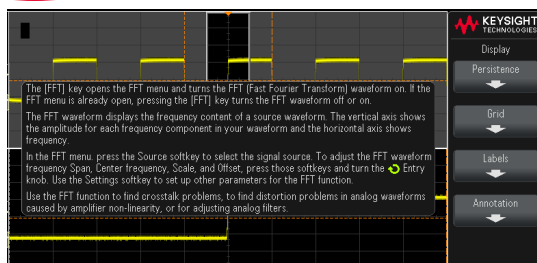


Segment Memory.

 **Mask test**



 **Intuitive Controls / Built-in Help**



6-in-1 Instrument Integration

Get professional-level oscilloscope functionality with industry-leading software analysis and 6-in-1 instrument integration. The 1000 X-Series gives you the following functionality that will save you money and valuable bench space.

OSCILLOSCOPE

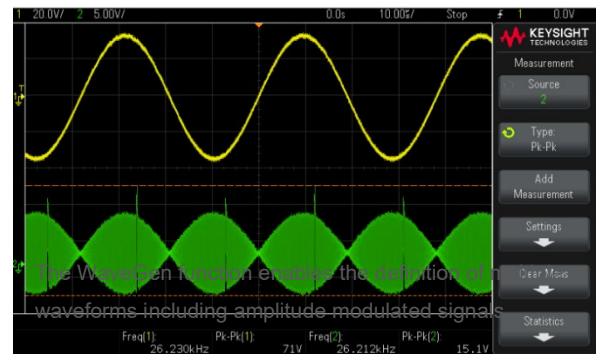


The 1000 X-Series is a family of low-cost oscilloscopes that don't compromise on quality. Each model has measurement and standard software analysis capability that rivals oscilloscopes 3x the price.

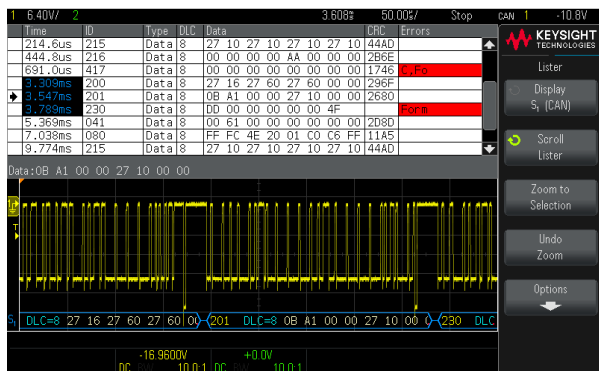
WaveGen (built-in 20 MHz function generator with modulation capability)

(EDUX1052G, DSOX1202G, and DSOX1204G models only)

The 1000 X-Series offers an integrated 20 MHz function generator with modulation capability. It's 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. Add modulation to the signal with customizable AM, FM and FSK settings. No need to buy a separate function generator when you can get one integrated into your new oscilloscope.



Hardware-based serial protocol decode and triggering



The 1000 X-Series is a powerful protocol analyzer that enables hardware-based specialized serial communication analysis (standard). Other vendors' oscilloscopes use software post-processing techniques that slow down the waveform and decode update rate, but the 1000 X-Series has faster decoding based on hardware technology that enhances scope usability and the probability of capturing infrequent serial communication errors.

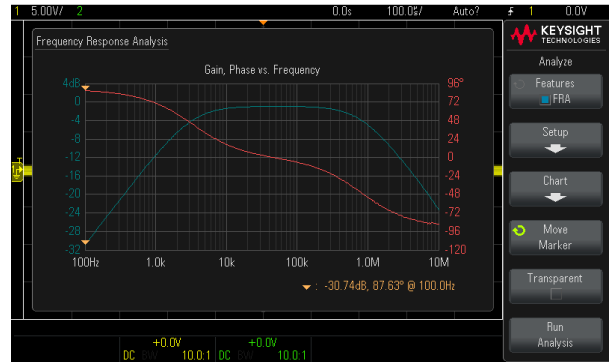
The EDUX models support I²C and UART/RS232 (standard). The DSOX models support I²C, SPI, UART/RS232, CAN and LIN (standard).

6-in-1 Instrument Integration (continued)

Frequency Response Analyzer (EDUX1052G, DSOX1202G, and DSOX1204G models only)

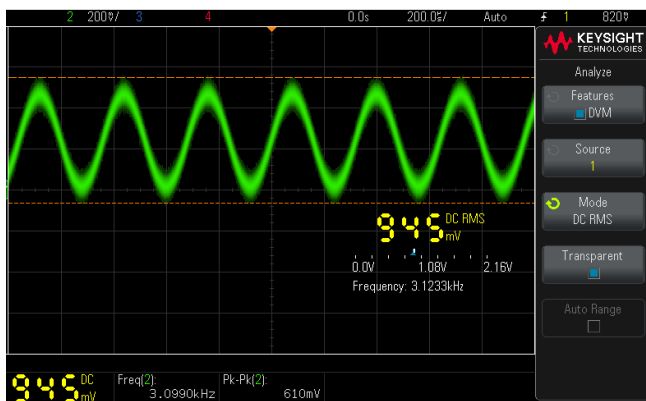


Frequency response analysis (gain & phase Bode plots) is a critical measurement to characterize amplifiers, passive networks, and power supply feedback networks. Bode plots are also fundamental concepts that every electrical engineering student should learn. The 1000 X-Series' frequency response analyzer capability (standard in "G" models) is the perfect tool to help students understand the gain and phase performance of passive RLC circuits and amplifiers. This capability is achieved with a gain and phase measurement versus frequency (Bode plot). Vector network analyzers (VNAs) and low-cost frequency response analyzers are typically used for these measurements, but now an easy-to-use and affordable gain and phase analysis is possible by utilizing the 1000 X-Series' built-in WaveGen and Bode plot capability.



Also available is the DSOXBODE Bode plot training kit along with a downloadable tutorial and lab guide for engineering students learning about frequency response measurements (Bode plots).

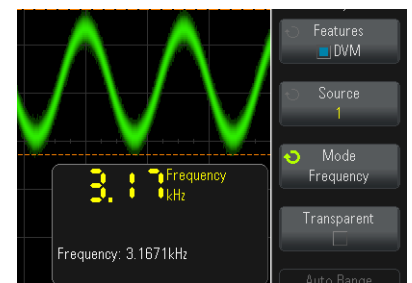
Digital Voltmeter



The 1000 X-Series has an integrated 3-digit voltmeter (DVM) inside each oscilloscope. The voltmeter operates through probes connected to the oscilloscope channels, but its measurement is decoupled from the oscilloscope triggering system so both the DVM and triggered oscilloscope measurements can be made with the same connection. You can quickly measure AC RMS, DC, and DC RMS without configuring the oscilloscope capture. The voltmeter results are always displayed, keeping these quick characterization measurements at your fingertips. The built-in DVM comes standard in 1000 X-Series oscilloscopes.

Frequency Counter

There is an integrated 5-digit frequency counter inside each oscilloscope. The frequency counter operates through probes connected to the oscilloscope channels so that both the counter and triggered oscilloscope measurements can be made with the same connection. You can quickly measure frequency without configuring the oscilloscope capture. The high-resolution frequency measurement results are always displayed, keeping these quick characterization measurements at your fingertips.



More Productivity Tools

Localized GUI and help



Operate the oscilloscope in the language most familiar to you. The graphical user interface (GUI), built-in help system, front panel overlays, and user's manual are available in English, Simplified Chinese, Traditional Chinese, Japanese, Korean, French, German, Italian, Portuguese, Russian and Spanish. The GUI and front panel overlay are also available in Polish, Thai, and Czech, and the built-in help is also available in Polish and Thai during operation. Access the built-in help system by simply pressing and holding any button.

Probe solutions



Get the most out of your 1000 X-Series oscilloscope by using the right probes and accessories for your application. Keysight offers a complete family of innovative probes and accessories for the InfiniiVision 1000 X-Series. InfiniiVision 1000 X-Series oscilloscopes come standard with switchable 1:1/10:1 high-impedance passive probes for each channel of the oscilloscope

Educator's Oscilloscope Training Kit

The **Educator's Oscilloscope Training Kit** (standard) provides an array of built-in training signals so that electrical engineering and physics students can learn what an oscilloscope does and how they can perform basic oscilloscope measurements. Also included in the kit is a comprehensive oscilloscope lab guide and tutorial written specifically for the undergraduate student. Keysight also provides a PowerPoint slide-set that professors and lab assistants can use as a pre-lab lecture on oscilloscope fundamentals. This lecture takes about 30 minutes and should be presented before electrical engineering and physics students begin their first circuits lab. Note that this PowerPoint slide-set also includes a complete set of speaker notes.



Bode Plot Training Kit

The **DSOXBODE** Bode plot training kit consists of a series R-L-C circuit board with a BNC input that attaches directly to the output of the oscilloscope's WaveGen function generator. There are clearly labeled test points for probing VIN and BPFOUT (bandpass filter output) or LPFOUT (low-pass filter output). Also included with this training kit is a comprehensive **tutorial and lab guide** that engineering students and professors can download. This training guide begins with a tutorial on frequency response measurements with fill-in-the-blank questions, and then provides step-by-step lab instructions on how to perform Bode plots. The DSOXBODE Bode plot training kit is compatible with all "G" model InfiniiVision 1000 X-Series oscilloscopes.



More Productivity Tools (continued)

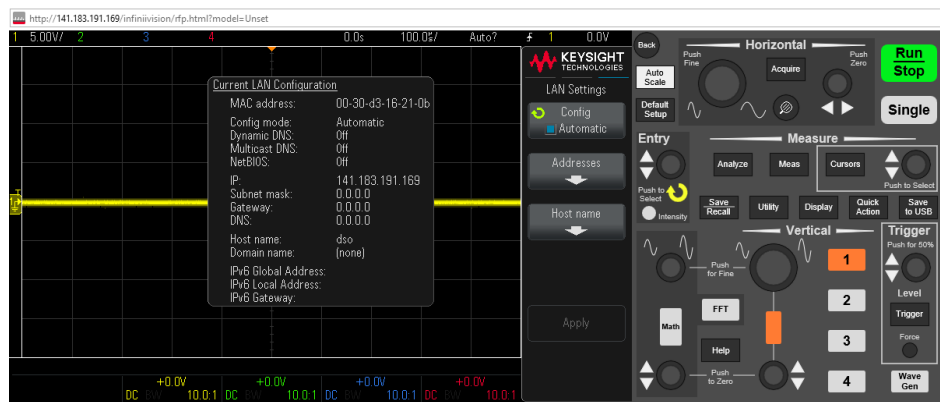
Connectivity and remote control



Built-in USB host and USB device ports make PC connectivity easy. BenchVue Software with the BV0004B BenchVue Oscilloscope app (standard) lets you control and visualize the 1000 X-Series and multiple measurements simultaneously. Build automated test sequences just as easy as using your front panel. Save time with the ability to export measurement data to Excel, Word, and MATLAB in three clicks. Monitor and control your 1000 X-Series with a mobile device from anywhere.



Standard LAN port supports remote web-based virtual front panel to control and to save data or images.



Web-based virtual front panel.

Offline oscilloscope analysis software



Keysight's D9010BSEO Infiniium Offline PC-based oscilloscope analysis software lets you do additional signal viewing, analysis, and documentation tasks while you're away from your oscilloscope. You can capture waveforms on your scope, save to a file and recall the waveforms into the Infiniium Offline software on your PC.



BenchVue oscilloscope app



The Oscilloscope App within BenchVue (standard) enables control of oscilloscopes to quickly capture and annotate screen images, record trace data and data log measurements (included in model BV0000A). Build automated test sequences just as easy as using your front panel. Save time with the ability to export measurement data to Excel, Word, and MATLAB in three clicks. Monitor and control your 1000 X-Series with a mobile device from anywhere.



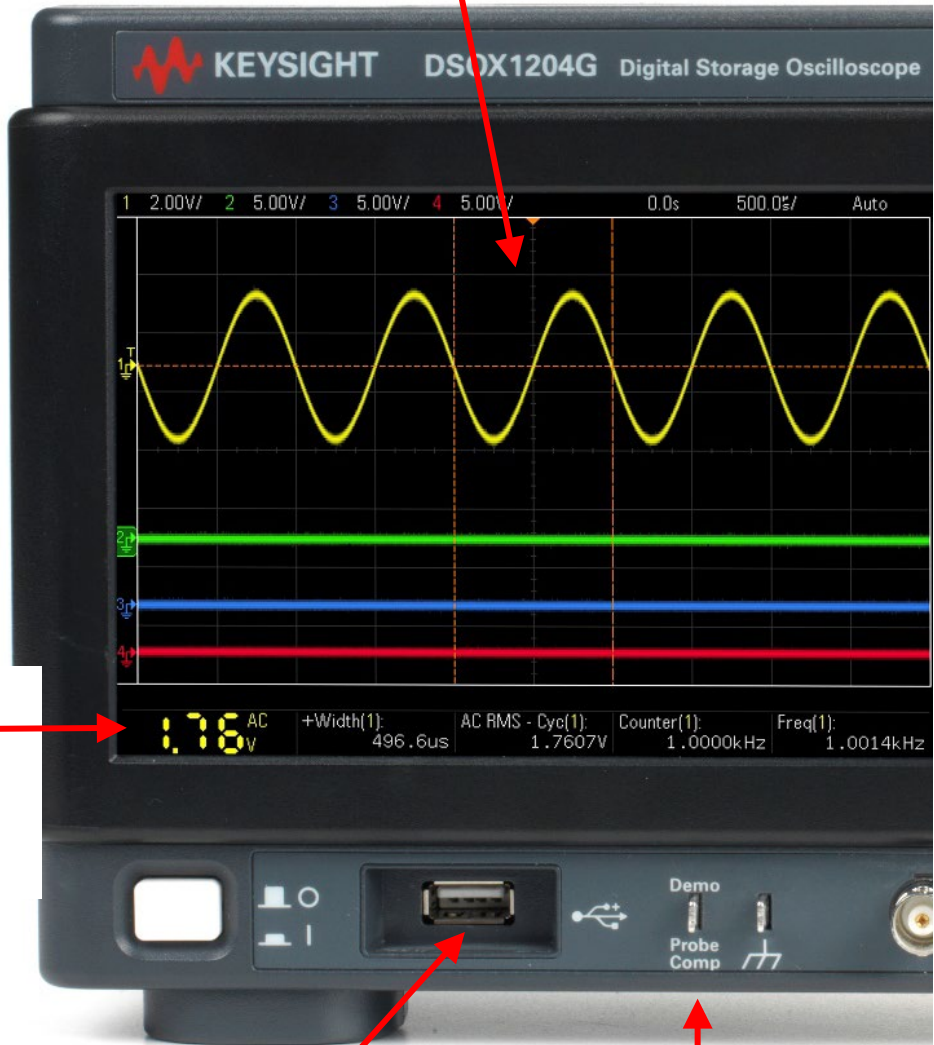
A real oscilloscope

Fast Waveform Update Rate

Fast 200,000 waveforms/sec update rate helps you quickly see random and infrequent signal glitches and errors

DVM/Counter

Integrated 3-digit voltmeter
5-digit frequency counter

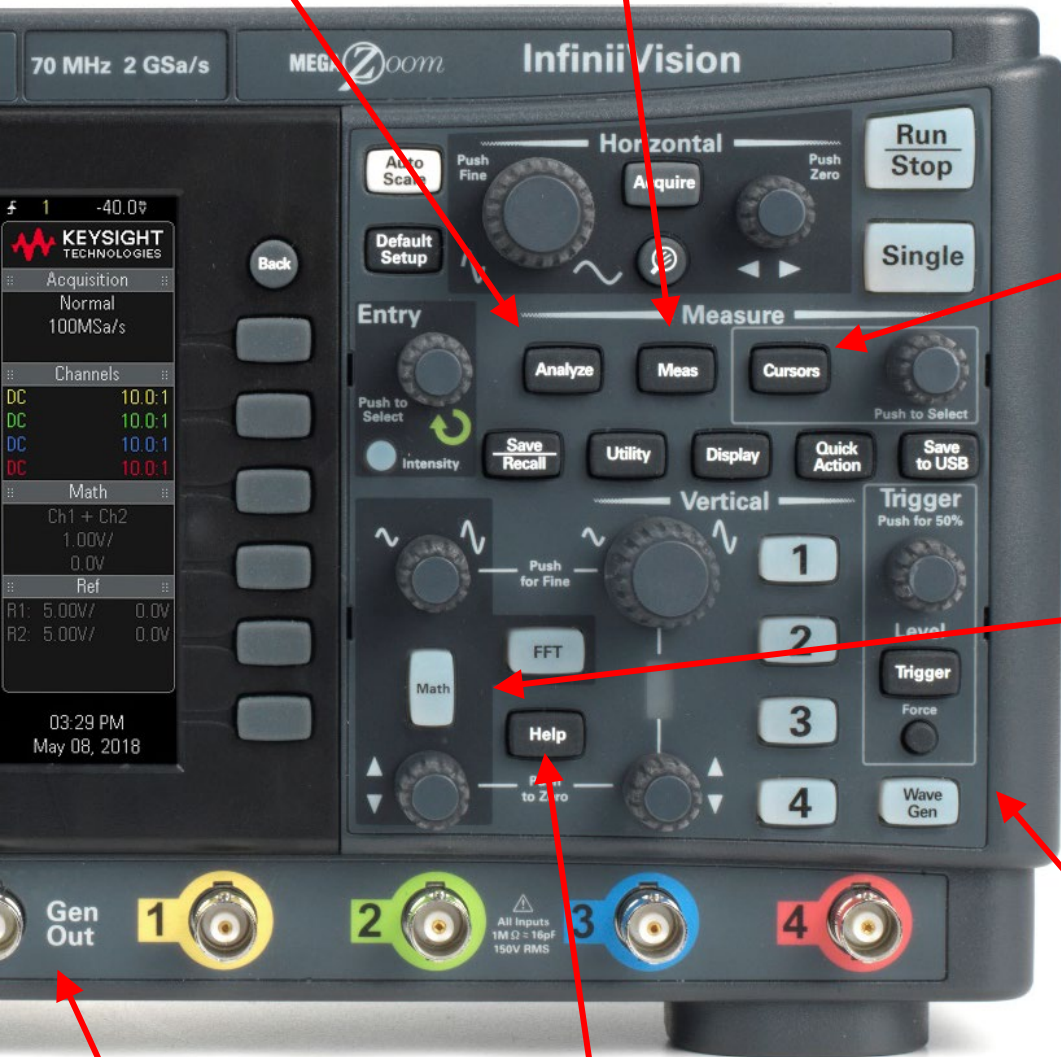


USB

Screenshots and data can be quickly and easily saved with built-in USB port and your USB storage device.

Training Signals

Built-in education training kit signals with downloadable training guide.



Measurements

Press the measure key to access 32 built-in automatic measurements

Analyze Features

- Mask Limit Testing
- DVM
- Frequency Response Analysis
- Serial Bus Decode
- Reference waveforms (2)

Cursors

Custom measurements are easily accomplished by cursors. Measure any value or the difference using four powerful cursors

Waveform Math Tools

Quick access to waveform math (+ - x ÷), FFT (gain and phase), and low-pass filter.

Function Generator

Built-in generator enables you to generate the signals you need to quickly simulate your design and perform gain & phase Bode plots.

Built-in localized-help

All buttons provide instant access to language-localized help by simply holding down the button you want explained

Industry leading user Interface

Fast and easy operation with the common oscilloscope controls right at your fingertips.

Performance Characteristics

Oscilloscope overview

| | EDUX1052A/EDUX1052G | DSOX1202A/DSOX1202G | DSOX1204A/DSOX1204G |
|-----------------------------------|-----------------------------|--|---|
| Bandwidth (–3 dB) ^{1, 2} | 50 MHz | 70 MHz 100 MHz (option D1202BW1A) 200 MHz (option D1202BW2A) | 70 MHz 100 MHz (option D1200BW1A) 200 MHz (option D1200BW2A) |
| Calculated rise time (10 to 90%) | ≤ 7 ns | ≤ 5 ns (70 MHz base model) ≤ 3.5 ns (with 100 MHz option) ≤ 1.7 ns (with 200 MHz option) | ≤ 5 ns (70 MHz base model) ≤ 3.5 ns (with 100 MHz option) ≤ 1.7 ns (with 200 MHz option) |
| Input channels | 2 | 2 | 4 |
| Maximum sample rate | 1 GSa/s (all channels) | 2 GSa/s (all channels) 1 GSa/s (if ext. trigger is displayed) | 2 GSa/s (one- or half-channel ³ operation) 1 GSa/s (three- or four-channel operation) |
| Maximum memory depth | 200 k points (all channels) | 2 M points (all channels) 1 M points (if ext. trigger is displayed) | 2 M points (one- or half-channel ³ operation) 1 M points (three- or four-channel operation) |
| Waveform update rate | ≥ 100,000 waveforms/sec | ≥ 200,000 waveforms/sec | ≥ 200,000 waveforms/sec |

Vertical system

| | All Models |
|--|---|
| Input coupling | DC, AC (10 Hz cutoff frequency) |
| Input impedance/capacitance | 1 MΩ ± 2%, 16 pF ± 3 pF |
| Input sensitivity range ⁴ | 500 μV/div to 10 V/div |
| Standard probes | N2142A 1/10 switchable 75 MHz (2 included in EDUX1052A/EDUX1052G) N2140A 1/10 switchable 200 MHz (2 included in DSOX1202A/DSOX1202G) N2140A 1/10 switchable 200 MHz (4 included in DSOX1204A/DSOX1204G) |
| Probe attenuation factor | 0.1X to 10,000X in 1-2-5 sequence; (–20 dB to +80 dB in 0.1 dB steps) |
| Hardware bandwidth limits | Approximately 20 MHz (selectable) |
| Vertical resolution | 8 bits |
| Invert signal | Selectable |
| Maximum input voltage | 150 Vrms, 200 Vpk |
| DC vertical accuracy | ± [DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] |
| DC vertical gain accuracy ¹ | +3% full scale (≥ 10 mV/div) +4% full scale (< 10 mV/div) |
| DC vertical offset accuracy | ± 0.1 div ± 2 mV ± 1% of offset setting |
| Skew | Channel to channel: 1 ns (without deskew) Channel to external: 2 ns (without deskew) |
| Offset range | 500 uV/div to 200 mV/div: +2 V > 200 mV/div to 10 V/div: +100 V |

1. Denotes warranted specifications; All others are typical. Specifications are valid after a 30-minute warm-up period and from ± 10 °C user calibration temperature.
2. Bandwidth specifications apply for 1 mV/div to 10 V/div vertical settings. Bandwidth at the 500 μV/div vertical setting is limited to 20 MHz.
3. Half-channel operation on a 2-channel model refers to two-channel operation when using channel-1 or channel-2 AND channel-3 or channel-4.
4. 500 μV/div is a 2X digital magnification of 1 mV/div setting.

Performance Characteristics (continued)

Horizontal system

| All Models | |
|---------------------------------|--|
| Time base range | 5 ns/div to 50 s/div (50 MHz, 70 MHz, and 100 MHz models), 2 ns/div to 50 s/div (200 MHz models) |
| Horizontal resolution | 2.5 ps |
| Timebase accuracy ⁵ | 50 ppm ± 5 ppm per year (aging) |
| Timebase delay time range | Pre-trigger: Greater of 1 screen width or 200 µs Post-trigger: 1 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) ± 200 ps (same channel) |
| Modes | Main, zoom, roll, XY |
| XY | X = channel 1, Y = channel 2, Z = external trigger, 1.4 V blanking Bandwidth: Maximum bandwidth. Phase error at 1 MHz: < 0.5 degree |

Acquisition system

| | | EDUX1052A/EDUX1052G | D50X1202A/D50X1202G D50X1204A/D50X1204G |
|-----------------------|--|--|--|
| Maximum sample rate | | 1 GSa/s | 2 GSa/s (2 ch operation), 1 GSa/s (4 ch operation) |
| Maximum record length | | 200 k points | 2 M points (2 ch operation), 1 M points (4 ch operation) |
| Acquisition mode | Normal | Default mode | Default mode |
| | Peak Detect | Capture glitches as narrow as 10 ns at all time base settings | Capture glitches as narrow as: 70 MHz model: 10 ns at all time base settings 100 MHz model: 5 ns at all time base settings 200 MHz model: 2.5 ns at all time base setting |
| | Averaging | Selectable from 2, 4, 8, 16, 64, ... to 65,536 | Selectable from 2, 4, 8, 16, 64, ... to 65,536 |
| | High Resolution | Real-time boxcar averaging reduces random noise and effectively increases vertical resolution to 12 bits of resolution when ≥ 20 µs/div at 1 GSa/s | Real-time boxcar averaging reduces random noise and effectively increases vertical resolution to 12 bits of resolution when ≥ 20 µs/div at 2 GSa/s |
| | Segmented | Not available | Segmented memory optimizes available memory for data streams that have long dead times between activity. Maximum number of segments = 500 Minimum trigger re-arm time = 1 µs (1,000,000 waveforms/sec in Segmented acquisition mode) |
| Time mode | Normal | Default mode | Default mode |
| | Roll | Displays the waveform moving across the screen from right to left. Available at the timebase settings of 50 ms/div or slower | Displays the waveform moving across the screen from right to left. Available at the timebase settings of 50 ms/div or slower |
| | XY | Displays the volts-versus-volts display | Displays the volts-versus-volts display |
| | | X = Channel 1, Y = Channel 2 | X = Channel 1, Y = Channel 2 |
| | | Z = External trigger, 1.4 V blanking | Z = External trigger, 1.4 V blanking |
| | Phase error at 1 MHz: < 0.5 degree | Phase error at 1 MHz: < 0.5 degree | |
| Autoscale | Finds and displays all signals connected to analog input channels and the external trigger input. Sets trigger type to rising edge at ~50% on external (highest priority source), or lowest numbered channel with a signal that exceeds ~10 mVpp. Optimizes vertical scaling for stacked waveforms and sets timebase to display ~ 1.8 periods. Can be customized to function on just channels that are previously turned on and displayed. | Finds and displays all signals connected to analog input channels and the external trigger input. Sets trigger type to rising edge at ~50% on external (highest priority source), or lowest numbered channel with a signal that exceeds ~10 mVpp. Optimizes vertical scaling for stacked waveforms and sets timebase to display ~ 1.8 periods. Can be customized to function on just channels that are previously turned on and displayed. | |

5. Denotes warranted specifications; All others are typical. Specifications are valid after a 30-minute warm-up period and from ± 10 °C user calibration temperature.

Performance Characteristics (continued)

Trigger system

| | All Models |
|-----------------------|--|
| Trigger sources | Analog channels, line ⁶ , external, WaveGen, WaveGen modulation FM/FSK |
| Trigger modes | Normal (triggered): Requires trigger event for oscilloscope to trigger Auto: Triggers on selected source or automatically triggers (asynchronously) in absence of a valid trigger event Single: Triggers only once upon detection of a valid trigger event Force: Front panel button that forces an asynchronous trigger while in the Normal trigger mode |
| Trigger coupling | DC: DC coupled trigger AC: AC coupled trigger, cutoff frequency: ~ 10 Hz HF reject: High frequency reject, cutoff frequency ~ 50 kHz LF reject: Low frequency reject, cutoff frequency ~ 50 kHz Noise reject: Selectable OFF or ON, decreases trigger sensitivity 2X |
| Trigger holdoff range | 60 ns to 10 s |

Trigger sensitivity

| | EDUX1052A/EDUX1052G | DSOX1202A/DSOX1202G DSOX1204A/DSOX1204G |
|-----------------------|---|---|
| Internal ⁷ | Greater of: 0.6 div or 2.5 mV (\leq 10 MHz) 0.9 div or 3.8 mV (10 to 50 MHz) | Greater of: 0.6 div or 2.5 mV (\leq 10 MHz) 0.9 div or 3.8 mV (10 to 70 MHz) 1.2 div or 5 mV (70 to 200 MHz) |
| External | \leq 10 MHz: 250 mVpp 10 to 50 MHz: 500 mVpp | \leq 10 MHz: 20 mVpp (1.6 V range) 100 mVpp (8 V range) 10 to 200 MHz: 100 mVpp (1.6 V range) 500 mVpp (8 V range) |

Trigger level range

| | EDUX1052A/EDUX1052G | DSOX1202A/DSOX1202G DSOX1204A/DSOX1204G |
|-----------------------|--------------------------------|--|
| Internal | \pm 6 div from center-screen | \pm 6 div from center-screen |
| External ⁸ | \pm 8 V | \pm 1.6 V or \pm 8 V selectable |

6. Line trigger to \leq 60 Hz.

7. Denotes warranted specifications; All others are typical. Specifications are valid after a 30-minute warm-up period and from \pm 10 °C firmware calibration temperature.

8. Input voltage must remain within these limits for proper operation.

Performance Characteristics (continued)

Trigger type selections

| | EDUX1052A/EDUX1052G | DSOX1202A/DSOX1202G DSOX1204A/DSOX1204G |
|---------------------|--|--|
| Edge | Trigger on a rising, falling, alternating or either edge of any source | |
| Pattern/state | Not available | Trigger when a specified pattern/state on any combination inputs is entered ⁹ |
| Pulse width | Trigger on a pulse of a selected channel with a time duration that is 'less than a value,' 'greater than a value' or 'inside a time range' Range minimum: 10 ns, 10 s max | |
| Setup and hold | Not available | Trigger and clock/data setup and/or hold time violation. Setup time can be set from -7 ns to 10 s. Hold time can be set from 0 s to 10 ns |
| Rise/fall time | Not available | Trigger on rise-time or fall-time edge-speed violations (< or >) based on a user-selectable threshold and time setting range between 5 ns and 10 s |
| Video | Trigger on all lines or individual lines; odd/even or all fields from the composite video; or broadcast standards (NTSC, PAL, SECAM, and PAM-M) | |
| I ² C | Trigger at a start/stop condition or user-defined frame with address and/or data values. Also, trigger on missing acknowledge, restart, EEPROM read and 10-bit write | |
| RS-232/422/485/UART | Trigger on Rx or Tx start bit, stop bit, data content or parity error | |
| SPI | Not available | Trigger on SPI (Serial Peripheral Interface) data pattern during a specific framing period. Supports positive and negative chip select framing as well as clock idle framing. Supports MOSI or MISO (4-channel models) data as half duplex data |
| CAN | Not available | Trigger on CAN (controller area network) version 2.0A and 2.0B signals. Trigger on the start of frame (SOF) bit, remote transfer request frame ID (RTR), data frame ID (~RTR), remote or data frame ID, data frame ID + data, error frame, all errors, acknowledge error, or overload frame. |
| LIN | Not available | Trigger on LIN (Local Interconnect Network) sync break, frame ID, frame ID + data, parity error, or checksum error |

9. The pattern must have stabilized for a minimum of 5 ns to qualify as a valid trigger condition.

Performance Characteristics (continued)

Serial protocol analysis/decode (standard)

| | EDUX1052A/EDUX1052G | DSOX1202A/DSOX1202G DSOX1204A/DSOX1204G |
|-------------------|---|--|
| I ² C | Baud Rate: Up to 3.4 Mbps Address size: 7-bit or 8-bit Number of time-correlated decode traces: One plus protocol lister/table | Baud rate: Up to 3.4 Mbps Address size: 7-bit or 8-bit Number of time-correlated decode traces: One plus protocol lister/table |
| UART/RS232 | Baud Rate: 100 bps to 10 Mbps Number of bits: 5 to 9 Bit order: lsb or msb Decode formats: Hex, binary, or ASCII Number of time-correlated decode traces: Two (Tx and Rx) plus protocol lister/table | Baud rate: 100 bps to 10 Mbps Number of bits: 5 to 9 Bit order: lsb or msb Decode formats: Hex, binary, or ASCII Number of time-correlated decode traces: Two (Tx and Rx) plus protocol lister/table |
| SPI ¹⁰ | Not available | Baud rate: Up to 25 Mbps Chip select: low, high, or time-out Number of time-correlated decode traces on 4-channel models: Two (MISO and MOSI) plus protocol lister/table Number of time-correlated decode traces on 2-channel models: One (Data) plus protocol lister/table |
| CAN | Not available | Baud rate: 10 kbps to 5 Mbps Standard: "Classic" CAN 2.0 Real-time totalizer: Number of frames, number of error frames, number of overload frames, bus load (%) Number of time-correlated decode traces: One plus protocol lister/table |
| LIN | Not available | Baud rate: 2.4 kbps to 625 kbps Standards: LIN 1.3 and 2.x Number of time-correlated decode traces: One plus protocol lister/table |

10. 4-channels models (DSOX1204A or DSOX1204G) recommended for 4-wire SPI measurement applications.

Waveform measurements

| | All Models |
|------------------------|--|
| Cursors | Single cursor accuracy: \pm [DC vertical gain accuracy + DC vertical offset accuracy + 0.25% full scale] Dual cursor accuracy: \pm [DC vertical gain accuracy + 0.5% full scale] Units: Seconds(s), Hz (1/s), phase (degrees) |
| Automatic measurements | Select up to 4 continuously updated measurements from a list of 32 available amplitude, timing, and count measurements Cursors track last selected measurement Use default (relative/%) or customizable measurement threshold levels (absolute or relative) Measurements automatically gated by zoom window Vertical/amplitude measurements (14): Peak-to-peak, maximum, minimum, amplitude, top, base, overshoot, preshoot, average-N cycles, average-full screen, DC RMS-N cycles, DC RMS-full screen, AC RMS-N cycles, AC RMS-full screen (standard deviation) Timing measurements (14): Period, frequency, counter, +width, -width, +duty cycle, -duty cycle, bit rate, rise time, fall time, delay, phase, X at min Y, X at max Y Count measurements (4): +pulse count, -pulse count, rising edge count, falling edge count Snapshot: Performs 24 parametric measurements once (not updated) on a single source (ch1, ch2, ch3, or ch4) one time Automatic measurement logging: Available via BenchVue BV0004B (standard) |

Performance Characteristics (continued)

Waveform math

| | All Models |
|----------------|---|
| Math functions | Add, subtract, multiply, divide, FFT (magnitude), FFT (phase), low-pass filter |
| Record size | Up to 64 k points resolution |
| FFT | Window types: Hanning, Flat top, Rectangular, Blackman-Harris Vertical scaling: dB (logarithmic) or RMS (linear) Horizontal scaling: User-defined span and center frequency settings, or Auto Setup |

Digital voltmeter (standard)

| | All Models |
|----------------|--|
| Functions | DC, AC-rms, DC-rms |
| Resolution | 3 digits |
| Measuring rate | 100 times/second |
| Auto ranging | 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 |

Frequency counter (standard)

| | All Models |
|----------------|--|
| Functions | Frequency |
| Resolution | 5 digits |
| Measuring rate | 100 times/second |
| Auto ranging | 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 |

Frequency response analysis - Bode plot (standard on “G” models)

| | EDUX1052G/ DSOX1202G/ DSOX1204G |
|--------------------------------------|--|
| Dynamic range | > 80 dB (typical, based on 0 dBm (630 mVpp) input into 50-Ω load) |
| Input test source | WaveGen out |
| V _{IN} and V _{OUT} | Channel 1, 2, 3, and 4 (channel 3 and 4 on 4-channel models only) |
| Frequency range | 10 Hz to 20 MHz |
| Number of test points | 1 to 1000 points across selected frequency range |
| Test amplitude | 1 mVpp to 9 Vpp into 50-Ω |
| Test results | Overlaid logarithmic gain (dB) and linear phase (degrees) plots versus logarithmic frequency |
| Manual measurements | A single pair of tracking gain and phase markers at user-defined frequency setting |
| Plot scaling | Auto-scaled during test with user-defined scaling after test |

Performance Characteristics (continued)

WaveGen – Built-in function generator (standard on “G” models)

Note: Only available on WaveGen models EDUX1052G, DSOX1202G, and DSOX1204G. WaveGen is not upgradeable.

| | EDUX1052G/ DSOX1202G/ DSOX1204G |
|---------------------|--|
| WaveGen out | Front-panel BNC connector |
| Waveforms | Sine, square, ramp, pulse, DC, noise |
| Modulation | Modulation types: AM, FM, FSK Carrier waveforms: Sine, ramp Modulation source: Internal (no external modulation capability) |
| | AM: <ul style="list-style-type: none"> – Modulation: sine, square, ramp – Modulation frequency: 1 Hz to 20 kHz – Depth: 0 to 100% |
| | FM: <ul style="list-style-type: none"> – Modulation: sine, square, ramp – Modulation frequency: 1 Hz to 20 kHz – Minimum carrier frequency: 10 Hz – Deviation: 1 Hz to carrier frequency or $(2e12 / \text{carrier frequency})$, whichever is smaller |
| | FSK: <ul style="list-style-type: none"> – Modulation: 50% duty cycle square wave – FSK rate: 1 Hz to 20 kHz – Hop frequency: 2 x FSK rate to 10 MHz |
| 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 Ω load, 500 MHz bandwidth): 40 dB (typical); 30 dB (min) |
| 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 Rise/fall time: 18 ns (10 to 90%) Pulse width resolution: 10 ns or 5 digits, whichever is larger Overshoot: $< 2\%$ Asymmetry (at 50% DC): $\pm 1\% \pm 5$ ns Jitter (TIE RMS): 500 ps |
| Ramp /triangle wave | Frequency range: 0.1 Hz to 200 kHz Linearity: 1% Variable symmetry: 0 to 100% Symmetry resolution: 1% |
| Noise | Bandwidth: 20 MHz typical |

Performance Characteristics (continued)

WaveGen – Built-in function generator (continued)

Note: Only available on WaveGen models EDUX1052G, DSOX1202G, and DSOX1204G. WaveGen is not upgradeable.

| | EDUX1052G/ DSOX1202G/ DSOX1204G |
|---|---|
| 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 |
| Amplitude | Square, Pulse, Ramp: |
| | 2 mVpp to 20 Vpp into Hi-Z (offset ≤ ±0.4 V) |
| | 1 mVpp to 10 Vpp into 50 Ω (offset ≤ ±0.4 V) |
| | 50 mVpp to 20 Vpp into Hi-Z (offset > ±0.4 V) |
| | 25 mVpp to 10 Vpp into 50 Ω (offset > ±0.4 V) |
| | Sine: |
| | 2 mVpp to 12 Vpp into Hi-Z (offset ≤ ± 0.4 V) |
| | 1 mVpp to 9 Vpp into 50 Ω (offset ≤ ± 0.4 V) |
| | 50 mVpp to 12 Vpp into Hi-Z (offset > ± 0.4 V) |
| | 25 mVpp to 9 Vpp into 50 Ω (offset > ± 0.4 V) |
| | Resolution: ≤ 1% of the amplitude |
| | Accuracy: 2% (Frequency = 1 kHz) |
| DC offset | Square, Pulse, Ramp: |
| | ± [10 V – ½ amplitude] into Hi-Z |
| | ± [5 V – ½ amplitude] into 50 Ω |
| | Sine: |
| | ± [8 V – ½ amplitude] into Hi-Z |
| | ± [4.5 V – ½ amplitude] into 50 Ω |
| | Resolution: Larger of 100 μV or 3 digits |
| Accuracy: ± 1.5% of offset setting ± 1.5% of amplitude ± 1 mV | |
| Main output | Impedance: 50 Ω typical |
| | Isolation: Not available, main output BNC is grounded |
| | Protection: Overload automatically disables output |
| | Sine, square, ramp, pulse, DC, noise |

Performance Characteristics (continued)

Connectivity

| | All Models |
|----------------|---|
| Standard Ports | One USB 2.0 hi-speed device port on rear panel. Supports USBTMC protocol One USB 2.0 hi-speed host port on front panel. Supports memory devices One Ethernet 1 Gb/s networking: RJ-45 |

Nonvolatile storage

| | All Models |
|--------------------------------|--|
| Reference waveform display | Two internal waveforms or USB thumb drive |
| Waveform/data storage | Setups (.scp), images (.bmp, .png), channel waveforms (.csv, .bin), reference waveforms (.h5), mask (.msk), serial protocol data (.csv), Bode gain & phase data (.csv) |
| Max USB flash drive size | Supports industry standard flash drives |
| Setups without USB flash drive | 10 internal setups |
| USB drive format | FAT32, NTFS, EXT2/3/4 |

General and environmental characteristics

| | All Models |
|-------------------------------|--|
| Power line consumption | 50 W max |
| Power voltage range | 100 to 120 V, 50/60/400 Hz; 100 to 240 V, 50/60 Hz |
| Environmental rating | 0 to +50 °C, 3,000 m Max Maximum Relative Humidity (non-condensing): 95%RH up to 40°C, decreases linearly to 45%RH at 50°C ¹¹ |
| Electromagnetic compatibility | Meets EMC directive (2004/108/EC), meets or exceeds IEC 61326-1:2005/EN61326-1:2013 (basic) 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 61000-4-8/EN 61000-4-8 IEC 61000-4-11/EN 61000-4-11 Canada: ICES/NMB-001:2006 Australia/New Zealand: AS/NZS CISPER 11:2011 |
| Safety | ANSI/UL Std. No. 61010-1:2012; CAN/CSA-C22.2 No. 61010-1-12 ANSI/UL Std. No. 61010-2-030:2012; CAN/CSA-C22.2 No. 61010-2-030-12 |
| Dimensions (W x H x D) | 314 mm (12.4 in) x 165 mm (6.5 in) x 130 mm (5.1 in) |
| Weight | Net: 3.23 kg (7.1 lbs.), shipping: 4.2 kg (9.2 lbs.) |
| Display | 7.0" diagonal color TFT LCD WVGA |

11. From 40 °C to 50 °C, the maximum % relative humidity follows the line of constant dew point.

Configuring your InfiniiVision 1000 X-Series Oscilloscope

Step 1: Choose your oscilloscope

| | |
|-----------|--|
| EDUX1052A | 50 MHz, 2 channels |
| EDUX1052G | 50 MHz, 2 channels with function generator |
| DSOX1202A | 70/100/200 MHz, 2 channels |
| DSOX1202G | 70/100/200 MHz, 2 channels with function generator |
| DSOX1204A | 70/100/200 MHz, 4 channels |
| DSOX1204G | 70/100/200 MHz, 4 channels with function generator |

Step 2: Select bandwidth options

Model: DSOX1202A/G (2-channel models)

| | | |
|--------------|--------------------------|--|
| DSOX1202-070 | 70 MHz bandwidth option | Compatible with DSOX1202A or DSOX1202G |
| DSOX1202-100 | 100 MHz bandwidth option | Compatible with DSOX1202A or DSOX1202G |
| DSOX1202-200 | 200 MHz bandwidth option | Compatible with DSOX1202A or DSOX1202G |

Model: DSOX1204A/G (4-channel models)

| | | |
|--------------|--------------------------|--|
| DSOX1200-070 | 70 MHz bandwidth option | Compatible with DSOX1204A or DSOX1204G |
| DSOX1200-100 | 100 MHz bandwidth option | Compatible with DSOX1204A or DSOX1204G |
| DSOX1200-200 | 200 MHz bandwidth option | Compatible with DSOX1204A or DSOX1204G |

Step 3: Select optional accessories

| | | |
|----------|---|--|
| DSOXBODE | Bode plot training kit | Option |
| N2137A | User's Guide (hardcopy) for InfiniiVision 1000 X-Series | Option (electronic copy downloadable at no charge) |
| N2738A | Soft carrying case for 1000 X-Series oscilloscopes | Option |
| N2138A | Rackmount kit for 1000 X-Series oscilloscopes | Option |

Step 4: Select optional PC-based test automation and documentation software

| | | |
|-----------|--|----------|
| BV0004B | BenchVue oscilloscope application | Standard |
| D9010UDAA | User-defined Application (UDA) software | Option |
| D9010BSEO | Infiniium Offline Oscilloscope Analysis Software | Option |

Configuring your InfiniiVision 1000X-Series Oscilloscope (continued)

Step 5: Select optional probes

Passive Probes

| | | |
|--------|---|--|
| N2142A | 1:1, 10:1 switchable 75 MHz passive probe | 2 probes included standard with EDUX1052A/G |
| N2140A | 1:1, 10:1 switchable 200 MHz passive probe | 2 probes included standard with DSOX1202A/G 4 probes included standard with DSOX1204A/G |
| N2842A | 10:1, 300 MHz passive probe | Option |
| N2889A | 1:1, 10:1 switchable 350 MHz passive probe | Option |
| 10070D | 1:1, 20 MHz passive probe | Option |
| N2870A | 1:1, 35 MHz passive probe | Option |
| N7007A | 10:1 400 MHz extreme temperature passive probe | Option |
| 10076C | 100:1 500 MHz 3.7 KV high voltage passive probe | Option |

Differential Probes

| | | |
|--------|---|--------|
| N2791A | 25 MHz, 10:1, 100:1 switchable high voltage up to $\pm 700V$ | Option |
| N2891A | 70 MHz, 100:1, 1000:1 switchable high voltage up to $\pm 7000V$ | Option |

Current Probes

| | | |
|--------|--|--------|
| 1146B | 100 kHz, 100A, AC/DC current probe | Option |
| N2780B | 2 MHz, 500A, AC/DC current probe (with N2779A power supply) | Option |
| N2781B | 10 MHz, 150A, AC/DC current probe (with N2779A power supply) | Option |
| N2783B | 50 MHz, 30A, AC/DC current probe (with N2779A power supply) | Option |
| N2783B | 100 MHz, 30A, AC/DC current probe (with N2779A power supply) | Option |
| N7040A | 23 MHz, 3 kA, AC current probe (Rogowski coil) | Option |
| N7041A | 30 MHz, 600A, AC current probe (Rogowski coil) | Option |
| N7042A | 30 MHz, 300A, AC current probe (Rogowski coil) | Option |

Step 6: Select language options (hard copy of user's guide is not included unless ordered)

| | Front panel overlay (EDUX1052A/G, DSOX1202A/G) | Front panel overlay (DSOX1204A/G) | User's guide (All models) |
|-----------------------|---|--------------------------------------|------------------------------|
| English | Standard | Standard | N2137A-ABA |
| Chinese (Simplified) | DSOX1202-AB2 | DSOX1200-AB2 | N2137A-AB2 |
| Chinese (Traditional) | DSOX1202-AB0 | DSOX1200-AB0 | N2137A-AB0 |
| Czech | DSOX1202-AKB | DSOX1200-AKB | Not available |
| French | DSOX1202-ABF | DSOX1200-ABF | N2137A-ABF |
| German | DSOX1202-ABD | DSOX1200-ABD | N2137A-ABD |
| Italian | DSOX1202-ABZ | DSOX1200-ABZ | N2137A-ABZ |
| Japanese | DSOX1202-ABJ | DSOX1200-ABJ | N2137A-ABJ |
| Korean | DSOX1202-AB1 | DSOX1200-AB1 | N2137A-AB1 |
| Polish | DSOX1202-AKD | DSOX1200-AKD | Not available |
| Portuguese | DSOX1202-AB9 | DSOX1200-AB9 | N2137A-AB9 |
| Russian | DSOX1202-AKT | DSOX1200-AKT | N2137A-AKT |
| Spanish | DSOX1202-ABE | DSOX1200-ABE | N2137A-ABE |
| Thai | DSOX1202-AB3 | DSOX1200-AB3 | Not available |
| Turkish | DSOX1202-AB8 | DSOX1200-AB8 | Not available |

Configuring your InfiniiVision 1000X-Series Oscilloscope (continued)

Included standard

| |
|---|
| Standard passive probes (Two N2142A for EDUX1052A/G; Two N2140A for DSOX1202A/G; Four N2140A for DSOX1204A/G) |
| Standard secure erase |
| Interface language support GUI: English, Japanese, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese, Italian, Polish, Czech, Thai, and Turkish |
| Built-in help language support for English, Japanese, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, Russian, Portuguese, Italian, Polish, and Thai |
| Localized Power cord |
| Standard 3-year warranty (90 days for non-serialized accessories) |
| Soft copy of Certificate of Calibration (CoC) downloadable from https://service.keysight.com/infoline/public/details.aspx?i=DOCI |

After-purchase bandwidth upgrades

Model: DSOX1202A/G (2-channel models)

| | | |
|-----------|---------------------------------------|--|
| D1202BW1A | Upgrade bandwidth from 70 to 100 MHz | Compatible with DSOX1202A or DSOX1202G |
| D1202BW2A | Upgrade bandwidth from 70 to 200 MHz | Compatible with DSOX1202A or DSOX1202G |
| D1202BW3A | Upgrade bandwidth from 100 to 200 MHz | Compatible with DSOX1202A or DSOX1202G |

Model: DSOX1204A/G (4-channel models)

| | | |
|-----------|---------------------------------------|--|
| D1200BW1A | Upgrade bandwidth from 70 to 100 MHz | Compatible with DSOX1204A or DSOX1204G |
| D1200BW2A | Upgrade bandwidth from 70 to 200 MHz | Compatible with DSOX1204A or DSOX1204G |
| D1200BW3A | Upgrade bandwidth from 100 to 200 MHz | Compatible with DSOX1204A or DSOX1204G |

Learn more at: www.keysight.com

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