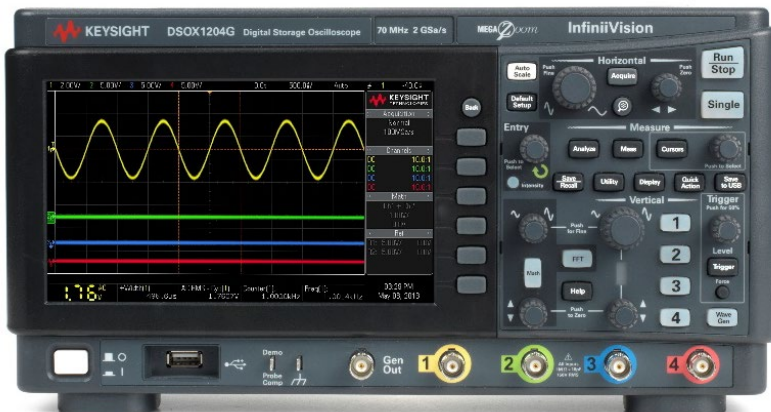


# InfiniiVision 1000 X-Series Oscilloscopes



2 Channel: EDUX1002A; EDUX1002G; DSOX1102A; DSOX1102A



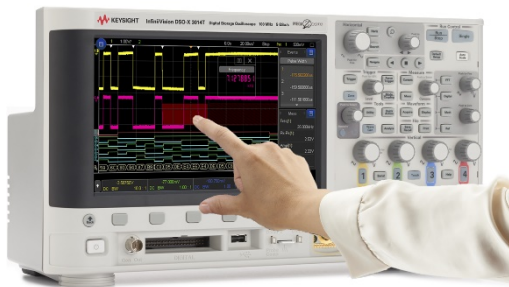
4 Channel: DSOX1204A; DSOX1204G



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### Need more bandwidth, sampling rate, and analysis?



Consider the InfiniiVision 3000T X-Series

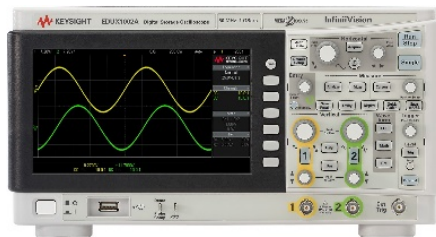
- 350 MHz, 500 MHz and 1 GHz
- 5 GSa/s
- Uncompromised 1,000,000 waveform update rate
- Capacitive touch screen
- Industry exclusive zone touch trigger
- Plenty decode/trigger and gated FFT



## Leading technology in a value-priced oscilloscope

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
- Frequency Response Analysis (Bode gain & phase plots), included in models with WaveGen
- See more signal detail with 50,000 wfms/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 and 6-in-1 instrument integration



|                              | <b>DSOX1102A</b><br>70/100 MHz, 2 channel   | <b>DSOX1102G</b><br>70/100 MHz, 2 channel<br>with function generator | <b>DSOX1204A</b><br>70/100/200 MHz, 4 channel   | <b>DSOX1204G</b><br>70/100/200 MHz, 4 channel<br>with function generator |
|------------------------------|---|--|---|--|
| Analog channels              | 2   | 2  | 4   | 4  |
| External trigger             | 1 (can be used as a 3rd digital channel at the front)                                 | 1 (can be used as a 3rd digital channel at the front)                | 1 (back)  | 1 (back)   |
| Bandwidth                    | 70 MHz (base)<br>100 MHz (DSOX1B7T102)  | 70 MHz (base)<br>100 MHz (DSOX1B7T102)                               | 70 MHz (base)<br>100 MHz (D1200BW1A)<br>200 MHz (D1200BW2A)                           | 70 MHz (base)<br>100 MHz (D1200BW1A)<br>200 MHz (D1200BW2A)              |
| Maximum sample rate          | 2 GSa/s (all channels)  | 2 GSa/s (all channels)   | 2 GSa/s (half channels)<br>1 GSa/s (all channels)                                     | 2 GSa/s (half channels)<br>1 GSa/s (all channels)                        |
| Maximum memory depth         | 1 Mpts  | 1 Mpts   | 1 Mpts  | 1 Mpts   |
| Segmented memory             | Standard  | Standard   | Standard  | Standard   |
| Mask/limit testing           | Standard  | Standard   | Standard  | Standard   |
| WaveGen                      | Not available   | 20-MHz function generator<br>(includes Bode plot test)               | Not available   | 20-MHz function generator<br>(includes Bode plot test)                   |
| Serial protocol analysis     | Option:<br>I <sup>2</sup> C, SPI, UART/RS-232 - (DSOX1EMBD)<br>CAN, LIN - (DSOX1AUTO) |  | Option:<br>I <sup>2</sup> C, SPI, UART/RS-232 - (D1200EMBA)<br>CAN, LIN - (D1200AUTA) |  |
| Waveform math                | Add, subtract, multiply, divide, FFT (magnitude and phase), low pass filter           |  |   |  |
| Integrated digital voltmeter | Free with product registration  |  |   |  |
| Display                      | 7-inch TFT LCD WVGA   |  |   |  |
| Waveform update rate         | 50,000 waveforms per second   |  |   |  |
| Connectivity                 | USB 2.0 (host and device)   |  | USB 2.0 (host and device)<br>LAN  |  |

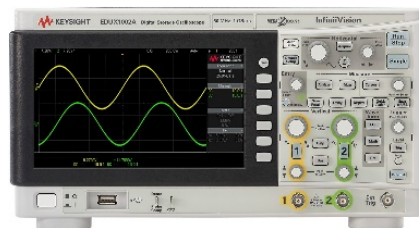
## Leading technology in a value-priced oscilloscope (education model)

### EDUX1002A and EDU1002G



Provide a quality education for students and prepare for the 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 LRC circuits or active op-amps.
- BenchVue Software with the BV0004B BenchVue Oscilloscope app lets you control and visualize the 1000X-Series and multiple measurements simultaneously.



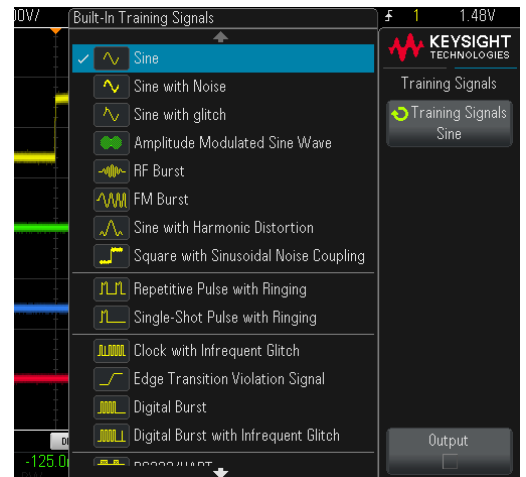
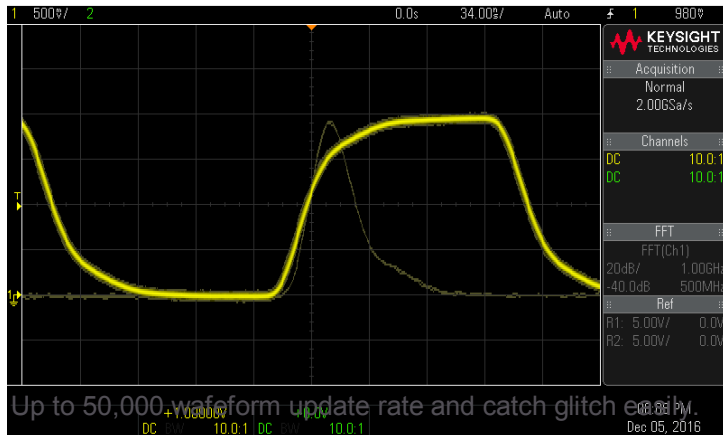
|   | <b>EDUX1002A</b><br>50 MHz, 2 channel                                       | <b>EDUX1002G</b><br>50 MHz, 2 channel with function generator |
|---|---|---|
| Analog channels                           | 2   | 2   |
| External trigger (or 3rd digital channel) | 1   | 1   |
| Bandwidth                                 | 50 MHz  | 50 MHz  |
| Maximum sample rate                       | 1 GSa/s   | 1 GSa/s   |
| Maximum memory depth                      | 100 kpts  | 100 kpts  |
| WaveGen                                   | Not available   | 20-MHz function generator (includes Bode plot test)           |
| Serial protocol analysis                  | Option:<br>I <sup>2</sup> C, UART/RS-232 - (EDUX1EMBD)                      |   |
| Waveform math                             | Add, subtract, multiply, divide, FFT (magnitude and phase), low pass filter |   |
| Display                                   | 7-inch TFT LCD WVGA   |   |
| Waveform update rate                      | 50,000 waveforms per second   |   |
| Connectivity                              | USB 2.0 (host and device)   |   |

# Leading Technologies

(Click on  below, you will be redirected to VIDEO on Keysight Youtube channel)

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

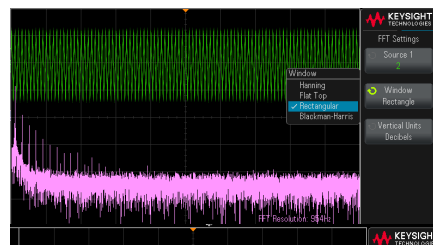
Low-cost oscilloscopes don't have to be low quality. Designing premier test solutions has been the goal and passion of Keysight Technologies ever since we made our first oscillator in 1939, and now we're bringing you a professional-quality oscilloscope for a fraction of the price.



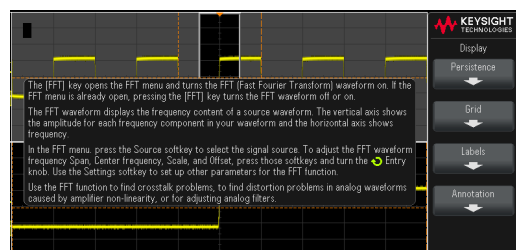
## Training Signals

## Superior Measurements

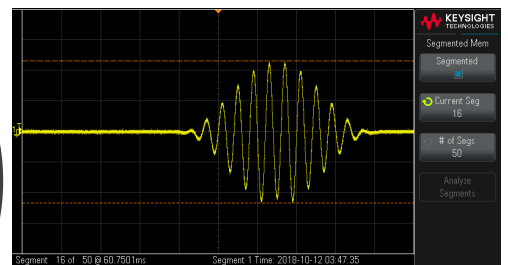
## FFT



## Intuitive Controls / Built-in Help

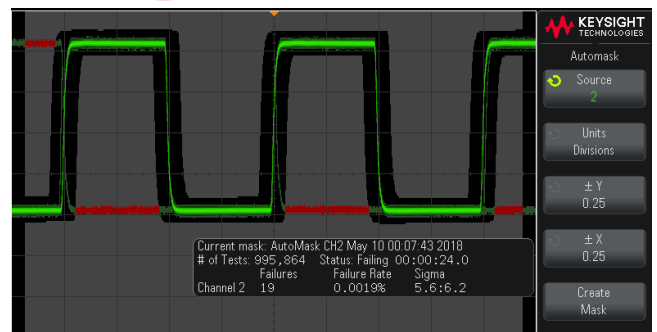


## Memory Performance



Segment Memory.

## Mask test



## 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, so you can save money and valuable bench space.

### OSCILLOSCOPE

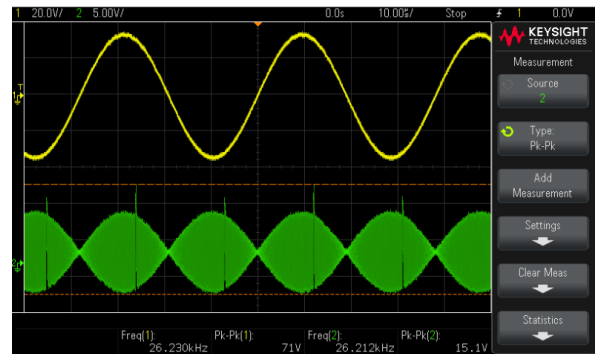


The 1000 X-Series is a family of low-cost oscilloscopes that don't compromise on quality. Each has measurement and software analysis capability that rivals oscilloscopes 3x the price.

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

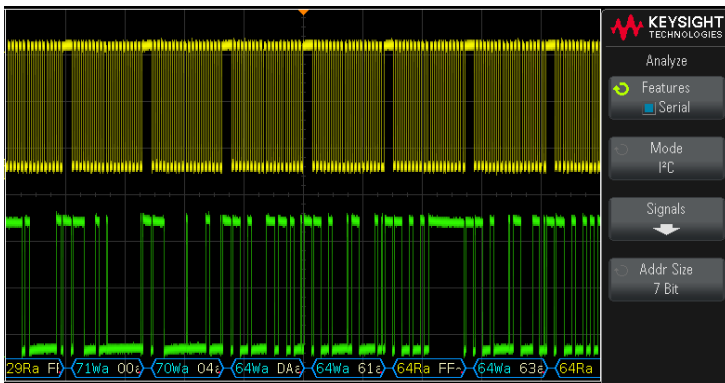
(EDUX1002G, DSOX1102G, and DSOX1204G models only)

The 1000 X-Series offers an integrated 20 MHz function generator with a signal 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. WaveGen is available on EDUX1002G, DSOX1102G, and DSOX1204G models only.



The WaveGen function enables the definition of multiple waveforms including amplitude modulated signals

### Hardware-based serial protocol decode and triggering



When you add optional software, the 1000 X-Series is a powerful protocol analyzer that can do powerful decode and hardware-based triggering that enables specialized serial communication analysis. 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 by using hardware-based technology that enhances scope usability and the probability of capturing infrequent serial communication errors.

## 6-in-1 instrument integration (continued)

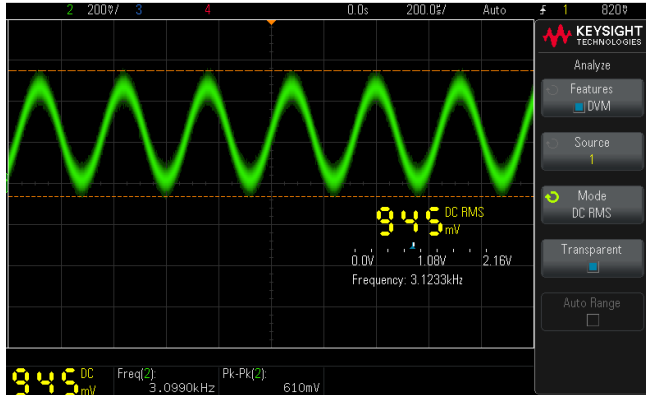
### Frequency Response Analyzer (EDUX1002G, DSOX1102G, and DSOX1204G models only)



Frequency response analysis is a critical measurement to characterize the stability of feedback networks and switch-mode power supplies. Bode plots are fundamental concepts that every electrical engineering student must know. The 1000 X-Series' frequency response analyzer capability is the perfect tool to help students understand the gain and phase performance of passive LRC circuits or active op-amps. 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 gain and phase analysis is possible by utilizing the 1000 X-Series' built-in WaveGen. (EDUX1002G, DSOX1102G, and DSOX1204G models only).



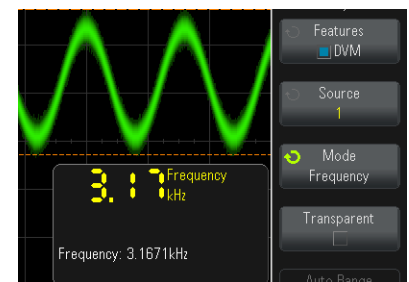
### Digital Voltmeter



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. Turn on the DVM capability for no additional cost by registering your oscilloscope.

### Frequency Counter

An integrated 5-digit frequency counter inside each oscilloscope. It operates through probes connected to the oscilloscope channels, but its measurement is decoupled from the oscilloscope triggering system, so 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 voltmeter results are always displayed, keeping these quick characterization measurements at your fingertips. Turn on the counter capability for no additional cost by registering your oscilloscope.



## 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.

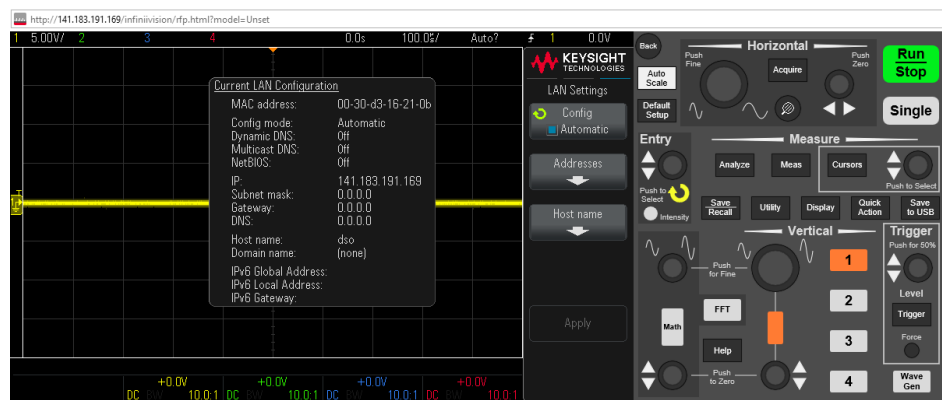
## Connectivity and remote control (LAN connectivity for DSOX1204A/G only)



Built-in USB host and USB device ports make PC connectivity easy. BenchVue Software with the BV0004B BenchVue Oscilloscope app 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 in the 4-channel models (DSOX1204A/G series) supports remote web-based virtual front panel to control and to save data or images.



Web-based virtual front panel. (DSOX1204A/G model only).



## More productivity tools (continued)

### Offline oscilloscope analysis software

Keysight's N8900A 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 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.



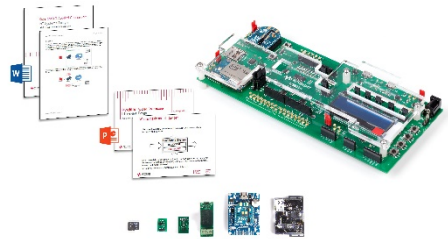
### Oscilloscope basic courseware

The Educator's Oscilloscope Training Kit 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.



### IoT systems design courseware

The 1000 X-Series oscilloscope can be used with the U3800A Internet of Things (IoT) Systems Design Applied Courseware, which is designed to give students the opportunity to work with industry-grade test and measurement instruments. The IoT Systems Design Applied Courseware is a ready-to-teach package that equips students with the knowledge on how to design and develop an embedded system with IoT capabilities. Designed as a resource for educators, the courseware consists of teaching slides and a training kit and integrates hands-on industry-relevant experiences and real-world applications in IoT systems design and testing.



# A real oscilloscope

## Measurements

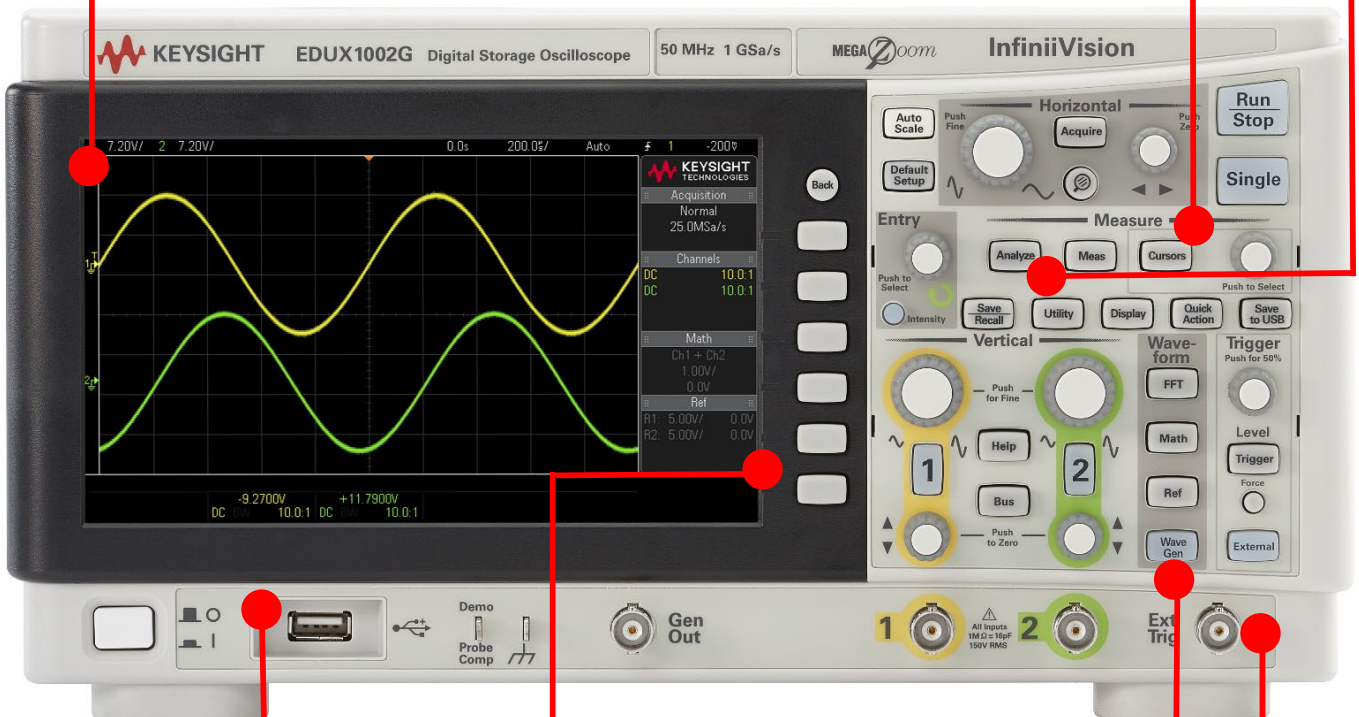
Press the measure key to access 24 built-in automatic measurements

## Built-in localized-help

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

## Cursors

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



## USB save

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

## Waveform Tools

Quick access to waveform math (+ - × ÷) and FFT. Reference Waveforms allow quick comparison of stored waveforms

## Industry leading user Interface

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

## External Trigger

It can be used for triggering or displayed as a 3<sup>rd</sup> channel for a digital signal. It can also be used to create a 3-channel bus-type display

### Fast Waveform Update Rate

Fast 50,000 waveforms/sec update rate helps you quickly see random and infrequent signal glitches and errors

### Analyze Features

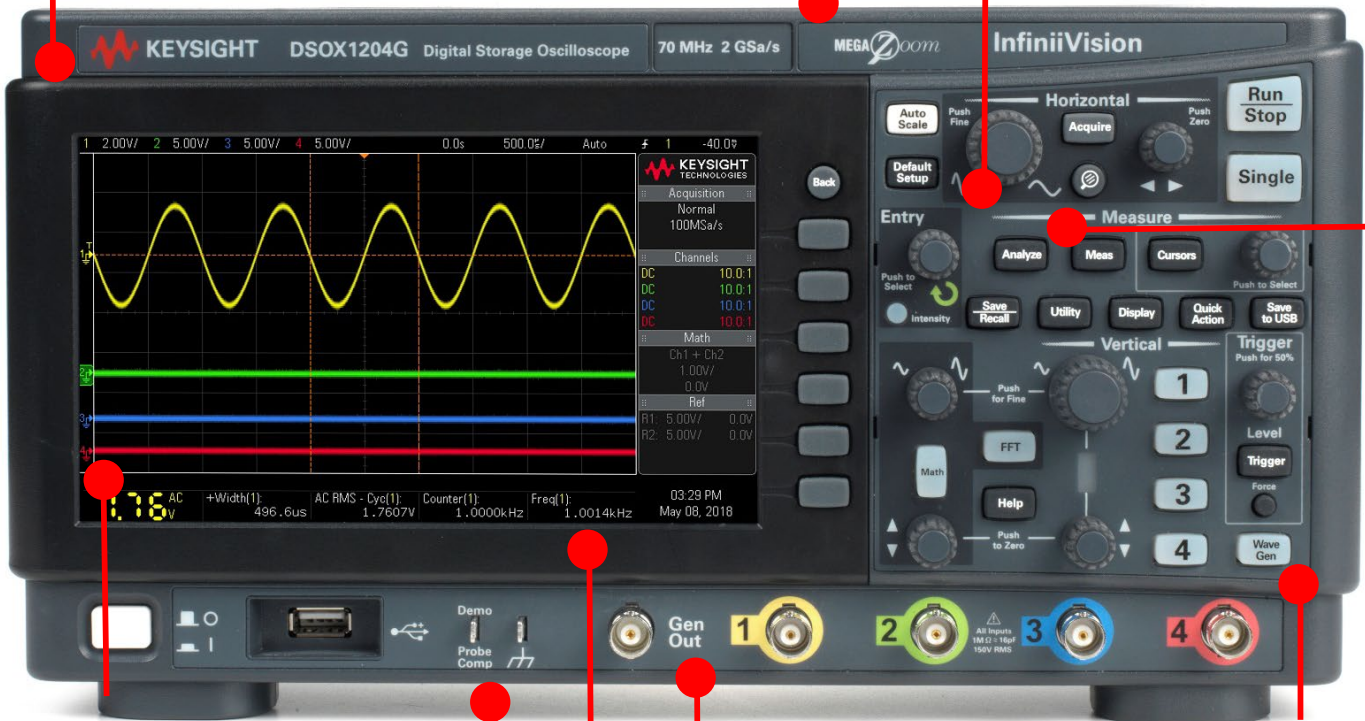
Mask Limit Testing DVM  
Frequency Response Analysis  
Serial Bus Decode

### Compact Size with Big Screen

314 mm × 165 mm × 130 mm  
(12.4" × 6.5" × 5.1") 7" WVGA

### Remote Control

USB  
LAN (DSOX1204 model only)



### Digital Voltmeter

Integrated 3-digit voltmeter  
5-digit frequency counter

Includes four 1:1/10:1 switchable probes

### Function Generator

Built-in generator enables you to generate the signals you need to quickly simulate your design.

### Training Signals

Standard in all models so you can quickly learn how to troubleshoot many common signal problems

### Frequency Response Analysis

Built-in generators are easily synchronized for measuring stimulus/response testing including Bode Plot for Gain & Phase

## Configuring Your InfiniiVision 1000X-Series Oscilloscope

### Step 1 Choose your oscilloscope

|           |   |
|-----------|---|
| EDUX1002A | 50 MHz, 2 channel                                 |
| EDUX1002G | 50 MHz, 2 channel with function generator         |
| DSOX1102A | 70/100 MHz, 2 channel                             |
| DSOX1102G | 70/100 MHz, 2 channel with function generator     |
| DSOX1204A | 70/100/200 MHz, 4 channel                         |
| DSOX1204G | 70/100/200 MHz, 4 channel with function generator |

### Step 2 Select bandwidth upgrades

Model: DSOX1102A/G

|             |                                     |  |
|-------------|-------------------------------------|--|
| DSOX1B7T102 | Upgrade bandwidth from 70 to 100MHz | Compatible with DSOX1102A or DSOX1102G |
|-------------|-------------------------------------|--|

Model: DSOX1204A/G

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

### Step 3 Add desired decodes

Model: EDUX1002A/G

|           |   |  |
|-----------|---|--|
| EDUX1EMBD | Decodes and analysis for I <sup>2</sup> C, UART(RS-232) protocols | Compatible with EDUX1002A or EDUX1002G |
|-----------|---|--|

Model: DSOX1102A/G

|           |  |  |
|-----------|--|--|
| DSOX1EMBD | Decodes and analysis for I <sup>2</sup> C, SPI, UART(RS-232) protocols | Compatible with DSOX1102A or DSOX1102G |
| DSOX1AUTO | Decodes and analysis for CAN, LIN protocols                            | Compatible with DSOX1102A or DSOX1102G |

Model: DSOX1204A/G

|           |  |  |
|-----------|--|--|
| D1200EMBA | Decodes and analysis for I <sup>2</sup> C, SPI, UART(RS-232) protocols | Compatible with DSOX1204A or DSOX1204G |
| D1200AUTA | Decodes and analysis for CAN, LIN protocols                            | Compatible with DSOX1204A or DSOX1204G |

## Configuring Your InfiniiVision 1000X-Series Oscilloscope (continued)

### Step 4 Choose probes, accessories, and additional software options

#### Passive Probes

|        |   |  |
|--------|---|--|
| N2142A | 1:1, 10:1 switchable 75 MHz passive probe       | 2 probes included standard with EDUX1002A/G  |
| N2140A | 1:1, 10:1 switchable 200 MHz passive probe      | 2 probes included standard with DSOX1102A/G<br>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 |

#### Software Application

|          |  |        |
|----------|--|--------|
| N5467B/C | User-defined Application (UDA) software          | Option |
| BV0004B  | BenchVue oscilloscope application                | Option |
| N8900A   | Infiniium Offline Oscilloscope Analysis Software | Option |

#### Other Accessories

|        |  |  |
|--------|--|--|
| N2137A | User's Guide for InfiniiVision DSOX1204A/G model                       | Option, Compatible with DSOX1204A/G              |
| N2132A | User's Guide for InfiniiVision EDUX1002A/G model and DSOX1102A/G model | Option, Compatible with EDUX1002A/G, DSOX1102A/G |
| N2738A | Soft carrying case for 1000 X-Series oscilloscopes                     | Option   |
| N2133A | Rackmount kit for 1000 X-Series oscilloscopes (white)                  | Option   |
| N2138A | Rackmount kit for 1000 X-Series oscilloscopes (black)                  | Option   |

## Configuring Your InfiniiVision 1000X-Series Oscilloscope (continued)

### Step 5 Select language options (hard copy of user guide is not included unless ordered)

Model: EDUX1002A/G and DSOX1102A/G

|                       | Front panel overlay | User's guide  |
|-----------------------|---------------------|---------------|
| English               | Standard            | N2132A-ABA    |
| Chinese (Simplified)  | DSOX1000-AB2        | N2132A-AB2    |
| Chinese (Traditional) | DSOX1000-AB0        | N2132A-AB0    |
| Czech                 | DSOX1000-AKB        | Not available |
| French                | DSOX1000-ABF        | N2132A-ABF    |
| German                | DSOX1000-ABD        | N2132A-ABD    |
| Italian               | DSOX1000-ABZ        | N2132A-ABZ    |
| Japanese              | DSOX1000-ABJ        | N2132A-ABJ    |
| Korean                | DSOX1000-AB1        | N2132A-AB1    |
| Polish                | DSOX1000-AKD        | Not available |
| Portuguese            | DSOX1000-AB9        | N2132A-AB9    |
| Russian               | DSOX1000-AKT        | N2132A-AKT    |
| Spanish               | DSOX1000-ABE        | N2132A-ABE    |
| Thai                  | DSOX1000-AB3        | Not available |
| Turkish               | DSOX1000-AB8        | Not available |

Model: DSOX1204A/G

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

### Included standard

Standard passive probes (Two N2142A for EDUX1002A/G;  
Two N2140A for DSOX1102A/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

Certificate of calibration

## Performance Characteristics

### Oscilloscopes overview

|                                  | EDUX1002A/EDUX1002G    | DSOX1102A/DSOX1102G                               | DSOX1204A/DSOX1204G   |
|----------------------------------|------------------------|---|---|
| Bandwidth (-3 dB) <sup>1,2</sup> | 50 MHz                 | 70 MHz<br>100 MHz (option DSOX1B7T102)            | 70 MHz<br>100 MHz (option D1200BW1A)<br>200 MHz (option D1200BW2A)            |
| Calculated rise time (10 to 90%) | ≤ 7 ns                 | ≤ 5 ns (70 MHz model)<br>≤ 3.5 ns (100 MHz model) | ≤ 5 ns (70 MHz model)<br>≤ 3.5 ns (100 MHz model)<br>≤ 1.7 ns (200 MHz model) |
| Input channels                   | 2                      | 2   | 4   |
| Maximum sample rate              | 1 GSa/s                | 2 GSa/s   | 2 GSa/s half-channel interleaved<br>1 GSa/s per channel                       |
| Maximum memory depth             | 100 kpts               | 1 Mpts  | 1 Mpts  |
| Waveform update rate             | ≥ 50,000 waveforms/sec | ≥ 50,000 waveforms/sec                            | ≥ 50,000 waveforms/sec  |

### Vertical system analog channels

|  | EDUX1002A/EDUX1002G/DSOX1102A/DSOX1102G/DSOX1204A/DSOX1204G   |
|--|---|
| Input coupling                         | DC, AC (10 Hz cutoff frequency)   |
| Input impedance/capacitance            | 1 MΩ ± 2%/16 pF ± 3 pF  |
| Input sensitivity range <sup>3</sup>   | 500 μV/div to 10 V/div  |
| Standard probes                        | N2142A 1/10 switchable 75 MHz (2 included in EDUX1002A/EDUX1002G)<br>N2140A 1/10 switchable 200 MHz (2 included in DSOX1002A/DSOX1002G)<br>N2140A 1/10 switchable 200 MHz (4 included in DSOX1204A/DSOX1204G) |
| Probe attenuation factor               | 0.1X to 1000X 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 <sup>1</sup> | +3% full scale (> 10 mV/div)<br>+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)<br>Channel to external: 2 ns (without deskew)   |
| Offset range                           | 500 μV/div to 200 mV/div: +2 V<br>> 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. For 1 mV/div to 10 V/div settings, bandwidth is 20 MHz at the 500 μV/div setting.
3. 500 μV/div is a magnification of 1 mV/div setting.

## Performance Characteristics (continued)

### Horizontal system analog channels

|                                 | All Models   |
|---------------------------------|--|
| Time base range                 | 5 ns/div to 50 s/div   |
| Horizontal resolution           | 2.5 ps   |
| Time base accuracy <sup>4</sup> | 50 ppm ± 5 ppm per year (aging)  |
| Time base delay time range      | Pre-trigger: Greater of 1 screen width or 200 µs<br>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

|                                       | EDUX1002A/EDUX1002G   |   | D50X1102A/D50X1102G<br>D50X1204A/D50X1204G   |
|---------------------------------------|---|---|--|
| Maximum sample rate                   | 1 GSa/s   |   | 2 GSa/s  |
| Maximum analog channels record length | 100 kpts  |   | 1 Mpts   |
| 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 10 ns at all time base settings<br><br>Capture glitches as narrow as 5 ns at all time base settings (100 MHz model)<br>2.5 ns at all time base setting (200 MHz model) |
| 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 segments = 50. Re-arm time = 19µs (minimum time between trigger events)  |  |
| Time mode                             | Normal  | Default mode  | Default mode   |
|                                       | Roll  | Displays the waveform moving across the screen from right to left. Available at the time base 50 ms/div or slower   | Displays the waveform moving across the screen from right to left. Available at the time base 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 active channels and external trigger. Sets edge trigger mode on external trigger first then highest numbered active channel. Sets vertical sensitivity. Sets time base to display ~ 1.8 periods. Requires minimum voltage of 10 mVpp (channel) | Finds and displays all active channels and external trigger. Sets edge trigger mode on external trigger first then highest numbered active channel. Sets vertical sensitivity. Sets time base to display ~ 1.8 periods. Requires minimum voltage of 10 mVpp (channel) |  |

4. 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 <sup>5</sup> , external, WaveGen, WaveGen modulation FM/FSK |
| Trigger modes         | Normal (triggered): Requires trigger event for oscilloscope to trigger            |
|                       | Auto: Triggers automatically in absence of a trigger event                        |
|                       | Single: Triggers only once on a trigger event                                     |
| Trigger coupling      | Force: Front panel button that forces a trigger                                   |
|                       | DC: DC coupled trigger  |
|                       | AC: AC coupled trigger, cutoff frequency: ~ 10 Hz                                 |
|                       | HF reject: High frequency reject, cutoff frequency ~ 50 kHz                       |
| Trigger holdoff range | LF reject: Low frequency reject, cutoff frequency ~ 50 kHz                        |
|                       | Noise reject: Selectable OFF or ON, decreases sensitivity 2x                      |
|                       | 60 ns to 10 s   |

### Trigger sensitivity

|                       | EDUX1002A/EDUX1002G   | DSOX1102A/DSOX1102G  | DSOX1204A/DSOX1204G  |
|-----------------------|---|--|--|
| Internal <sup>6</sup> | Greater of:<br>0.6 div or 2.5 mV ( $\leq 10$ MHz)<br>0.9 div or 3.8 mV (10 to 50 MHz) | Greater of:<br>0.6 div or 2.5 mV ( $\leq 10$ MHz)<br>0.9 div or 3.8 mV (10 to 70 MHz)<br>1.2 div or 5 mV (70 to 100 MHz) | Greater of:<br>0.6 div or 2.5 mV ( $\leq 10$ MHz)<br>0.9 div or 3.8 mV (10 to 70 MHz)<br>1.2 div or 5 mV (70 to 200 MHz) |
| External              | $\leq 10$ MHz: 250 mVpp   | $\leq 10$ MHz:<br>50 mVpp (1.6 V range)<br>250 mVpp (8 V range)  | $\leq 10$ MHz:<br>20 mVpp (1.6 V range)<br>100 mVpp (8 V range)  |
|                       | 10 to 50 MHz: 500 mVpp  | 10 to 100 MHz:<br>100 mVpp (1.6 V range)<br>500 mVpp (8 V range)   | 10 to 200 MHz:<br>100 mVpp (1.6 V range)<br>500 mVpp (8 V range)   |

### Trigger level range

|                       | EDUX1002A/EDUX1002G            | DSOX1102A/DSOX1102G<br>DSOX1204A/DSOX1204G |
|-----------------------|--------------------------------|--|
| Internal              | $\pm 6$ div from center screen | $\pm 6$ div from center screen             |
| External <sup>7</sup> | $\pm 8$ V                      | $\pm 1.6$ V or $\pm 8$ V selectable        |

5. Line trigger to  $\leq 60$  Hz.

6. 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.

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

## Performance Characteristics (continued)

### Trigger type selections

|                     | EDUX1002A/EDUX1002G  | DSOX1102A/DSOX1102G<br>DSOX1204A/DSOX1204G   |
|---------------------|--|--|
| Trigger types       | Edge, pulse width, video, pattern/state  | Edge, pulse width, video, rise/fall time, setup and hold, pattern/state  |
| Edge                | Trigger on a rising, falling, alternating or either edge of any source   |  |
| Pattern/state       | Trigger when a specified pattern/state on any combination inputs is entered <sup>8</sup>   |  |
| 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'<br>Range minimum: 10 ns, 10 s max |  |
| Setup and hold      | Not available  | Trigger and clock/data setup and/or hold time violation.<br>Setup time can be set from -7 ns to 10 s.<br>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<br><br>Select from (< or >) and time settings range between<br>Minimum: 5 ns Maximum: 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 <sup>2</sup> 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 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                 | Not available  | Trigger on LIN (Local Interconnect Network) sync break, sync frame ID or frame ID and data, parity error, checksum error and frame   |

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

## Performance Characteristics (continued)

### 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         | Measurements continuously updated with statistics.  |
|                                | Cursors track last selected measurement. Select up to four measurements from the list below:  |
|                                | Snapshot: Measure all single waveform measurements (24)   |
|                                | 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) |
|                                | Time:   |
|                                | 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  |
| Automatic measurement logging: |   |
| Available via BenchVue BV0004B |   |

### Waveform math

|            | All Models   |
|------------|--|
| Arithmetic | Add, subtract, multiply, divide, FFT (magnitude), FFT (phase), low-pass filter |
| FFT        | Record Size: Up to 64 kpts resolution  |
|            | Window types: Hanning, Flat top, Rectangular, Blackman-Harris                  |

## Performance Characteristics (continued)

### WaveGen – Built-in function generator (specifications are typical)

Note: Only available on WaveGen models EDUX1002G, DSOX1102G, and DSOX1204G. WaveGen is not upgradeable.

|                     | EDUX1002G/ DSOX1102G/ DSOX1204G   |
|---------------------|---|
| WaveGen out         | Front-panel BNC connector   |
| Waveforms           | Sine, square, ramp, pulse, DC, noise  |
| Modulation          | Modulation types: AM, FM, FSK<br>Carrier waveforms: Sine, ramp<br>Modulation source: Internal (no external modulation capability)   |
|                     | AM:   |
|                     | – Modulation: sine, square, ramp  |
|                     | – Modulation frequency: 1 Hz to 20 kHz  |
|                     | – Depth: 0 to 100%  |
|                     | FM:   |
|                     | – 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:  |
|                     | – 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<br>Amplitude flatness: $\pm 0.5$ dB (relative to 1 kHz)<br>Harmonic distortion: $-40$ dBc<br>Spurious (non-harmonics): $-40$ dBc<br>Total harmonic distortion: 1%<br>SNR (50 $\Omega$ load, 500 MHz bandwidth): 40 dB (typical); 30 dB (min)  |
| 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): $\pm 1\% \pm 5$ 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   |

## Performance Characteristics (continued)

### WaveGen – Built-in function generator (specifications are typical) (continued)

Note: Only available on WaveGen models EDUX1002G, DSOX1102G, and DSOX1204G. WaveGen is not upgradeable.

|                                  | EDUX1002G/ DSOX1102G/ 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)                                   |
| Amplitude                        | Resolution: 0.1 Hz or 4 digits, whichever is larger           |
|                                  | 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                             |
| Main output                      | Resolution: Larger of 250 uV or 3 digits                      |
|                                  | Accuracy: ± 1.5% of offset setting ± 1.5% of amplitude ± 1 mV |
|                                  | 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)

### Digital voltmeter (specifications are typical)

| All Models     |  |
|----------------|--|
| Functions      | ACrms, DC, DCrms   |
| Resolution     | ACV/DCV: 3 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       |

### Frequency counter (specifications are typical)

| All Models     |  |
|----------------|--|
| Functions      | Frequency  |
| Resolution     | 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       |

### Frequency response analysis (Bode plot) (specifications are typical)

| EDUX1002G/ DSOX1102G/ DSOX1204G |   |
|---------------------------------|---|
| Dynamic range                   | > 80 dB (typical)   |
| Input and output sources        | Output: WaveGen out<br>Input 1 and 2 can be assigned to any channel   |
| Frequency range                 | 10 Hz to 20 MHz   |
| Number of test points           | Up to 1,000 total points  |
| Test amplitude                  | 10 mVpp to 9 Vpp into 50-Ω<br>Fixed amplitude across the entire sweep |
| Test results                    | Logarithmic overlaid gain and phase plot                              |
| Manual measurements             | A single pair of tracking gain and phase markers                      |
| Plot scaling                    | Auto-scaled during test and manual                                    |

## Environmental

### Connectivity

| EDUX1002A/EDUX1002G/DSOX1102A/DSOX1102G |   |
|---|---|
| Standard Ports                          | One USB 2.0 hi-speed device port on rear panel. Supports USBTMC protocol<br>One USB 2.0 hi-speed host port on front panel. Supports memory devices, printers, and keyboards |

| DSOX1204A/DSOX1204G |   |
|---------------------|---|
| Standard Ports      | One USB 2.0 hi-speed device port on rear panel. Supports USBTMC protocol<br>One USB 2.0 hi-speed host port on front panel. Supports memory devices<br>One Ethernet 1 Gb/s networking: RJ-45 |

## 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 <sup>9</sup> |
| 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   |

## Nonvolatile storage

|                                | All Models  |
|--------------------------------|---|
| Reference waveform display     | Two internal waveforms or USB thumb drive                                 |
| Waveform storage               | Set up, .bmp, .png, .csv, ASCII XY, reference waveforms, .bin, mask, HDF5 |
| 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 (DSOX1204A/G only)   |

9. From 40 °C to 50 °C, the maximum % Relative Humidity follows the line of constant dew point.

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- Поставка электронных компонентов под контролем ВП;
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