KEYSIGHT TECHNOLOGIES

Smart Bench Essentials Series Products Catalog

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Introduction

NEW SMART BENCH ESSENTIALS SERIES PRODUCTS

Keysight Smart Bench Essentials (SBE) Series is a revolutionary design solution for modern test workbenches in teaching labs and aspiring new product development electronic engineers. The Smart Bench Essentials Series enables you to test, analyze, and share results collaboratively, across the room or across the world. Whether you are teaching, learning, or working on a design, from a classroom or from your home, you have full access to configure and test using your connected instruments.

Keysight's Smart Bench Essentials Series is a connected solution of test instruments consisting of a power supply, function generator, digital multimeter, and an oscilloscope. With this new complete portfolio of instruments, students, and general electronic test engineers will have a truly connected, modern design solution for their lab or test workbenches.

SMART REMOTE CONNECTIVITY

Test, analyze, and share results collaboratively or remotely.

INDUSTRY-GRADE PERFORMANCE

Measure with confidence using exceptional line and load regulation for a stable output

SIGNATURE 7-INCH COLOR DISPLAY

View and monitor all outputs simultaneously from any angle.

KEYSIGHTCARE INCLUDED

Get access to technical experts and 24/7 online knowledge center.

Fully Connected to Accelerate Your Daily Tasks

Keysight offers a complete portfolio of instruments with a common user interface and software that enables access to new Smart Bench Essentials Series instruments remotely from anywhere. Technical support gives professors and students access to Keysight's measurement experts.

The Smart Bench Essentials Series provides reliable connectivity and usability in a compact form factor. Together, the hardware and software connection to your next innovation.

CONNECTED TO YOUR NEXT INNOVATION

ACCELERATE YOUR DESIGN WITH A CONNECTED BENCH

- Capture elusive signals so you can perfect your design.
- Track and monitor your real-time test results through a sizable 7-inch display.
- Store test results and export data for post-analysis review and report generation.

CONNECTED TO EACH OTHER

IMPROVE YOUR PRODUCTIVITY MANAGING YOUR LAB ASSETS

- Perform with minimal training and setup to control your test hardware.
- Manage all your lab instruments using a multibench configuration.

CONNECTED TO THE CLOUD

GET MORE TEST INSIGHTS ANYTIME FROM ANYWHERE

- Test, analyze, and share results collaboratively — across the room or across the world.
- View the connection status for all instruments to enable administrators to configure measurement settings from a single administrator PC.

CONNECTED TO THE LAB

STREAMLINE AND SIMPLIFY LAB MANAGEMENT

- Test, analyze, and share results collaborately or remotely using Pathwave lab software.
- View the connection status for all instruments to enable admin.istrators to configure measurement settings for a single adfministrator PC.

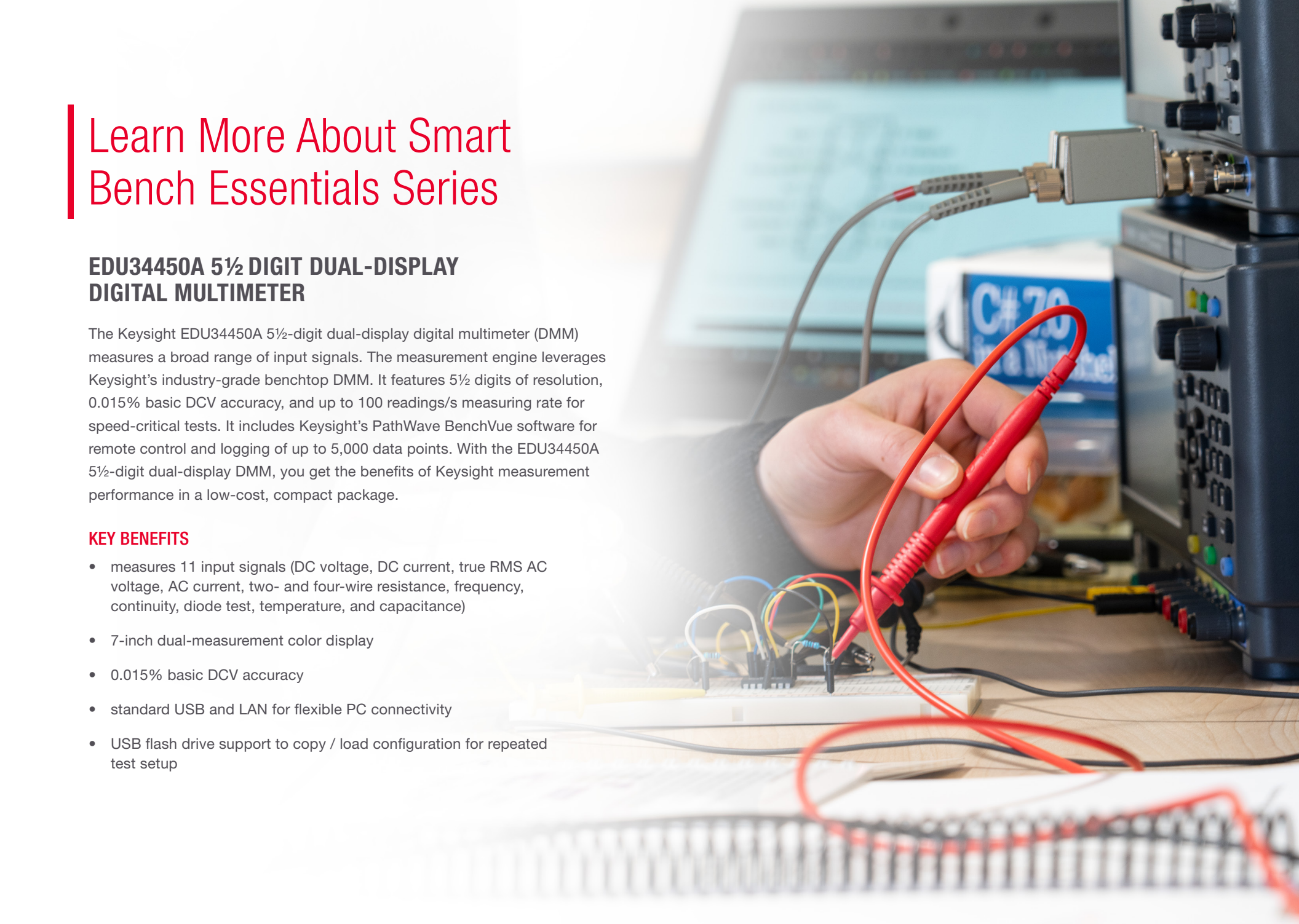
Learn More About Smart Bench Essentials Series

EDU34450A 5½ DIGIT DUAL-DISPLAY DIGITAL MULTIMETER

The Keysight EDU34450A 5½-digit dual-display digital multimeter (DMM) measures a broad range of input signals. The measurement engine leverages Keysight's industry-grade benchtop DMM. It features 5½ digits of resolution, 0.015% basic DCV accuracy, and up to 100 readings/s measuring rate for speed-critical tests. It includes Keysight's PathWave BenchVue software for remote control and logging of up to 5,000 data points. With the EDU34450A 5½-digit dual-display DMM, you get the benefits of Keysight measurement performance in a low-cost, compact package.

KEY BENEFITS

- measures 11 input signals (DC voltage, DC current, true RMS AC voltage, AC current, two- and four-wire resistance, frequency, continuity, diode test, temperature, and capacitance)
- 7-inch dual-measurement color display
- 0.015% basic DCV accuracy
- standard USB and LAN for flexible PC connectivity
- USB flash drive support to copy / load configuration for repeated test setup



EDU34450A
5-1/2 Digit Multimeter

SPECIFICATIONS

Model	Digits of resolution	Display type	1-year DCV accuracy (%)	DC voltage / current range	AC voltage / current range	Resistance range	Reading speed (per second)	Other measurement types	Non-volatile memory
EDU34450A	5½-digit	7-inch color display, histogram	0.015	100 mV to 1 kV / 10 mA to 3 A	100 mV to 750 V / 10 mA to 3 A	100 to 100 MΩ	100	Frequency, continuity, diode test, temperature, and capacitance	5,000 readings

EDU33210 SERIES 20 MHZ FUNCTION / ARBITRARY WAVEFORM GENERATOR

The Keysight EDU33210 Series function / arbitrary waveform generator offers the standard signals and features you expect — such as modulation, sweep, and burst. Additional features provide the capabilities and flexibility you need to get your job done quickly, no matter how complex. An intuitive, information-packed front-panel interface enables you to easily resume where you left off.

KEY BENEFITS

- 7-inch color display for simultaneous parameter setup, signal viewing, and editing
- six built-in modulation types and 17 popular waveforms to simulate typical applications for testing
- 16-bit arbitrary waveform capability with memory up to 8 M samples per channel
- USB and LAN input / output interface for remote connectivity

EDU3312A
Waveform Generator

1. 7-inch WVGA display
2. Soft keys
3. Numeric keypad
4. Function keys
5. Knob and cursor arrows
6. Output connectors, setup, and on / off buttons
7. Sync / trigger output connector
8. External triggering / gate / FSK / burst connector
9. Calibration connector
10. USB port
11. Power switch

SPECIFICATIONS

Models and options	EDU33211A	EDU33212A
Number of channels	One	Two
Frequency	20 MHz	
Standard waveforms	Sine, square, ramp, pulse, triangle, Gaussian noise, pseudorandom binary sequence (PRBS), DC	
Arbitrary waveforms	Cardiac, exponential fall, exponential rise, Gaussian pulse, haversine, Lorentz, D-Lorentz, negative ramp, sine	
User-defined arbitrary	Up to 8 MSa per channel; with up to 1 MSa per waveform	
Sampling rate	1µSa/s to 250 MSa/s, 1 µSa/s resolution	
Modulation types	AM, FM, PM, FSK, BPSK, PWM	
Pulse width	16 ns minimum; adjustable with 100 ps resolution	
Duty cycle	0.01% to 99.99%; 0.01% resolution	
Total harmonic distortion	f_{out}= 10 Hz to 20 kHz: < 0.075%	
Jitter (rms) (measured)	≤ 5 MHz at 2 ppm of the period plus 100 ps > 5 MH at 100 ps	
Connectivity	Front-panel BNC, shell connects to chassis; all inputs and output BNC connectors are chassis referenced	

EDU36311A TRIPLE-OUTPUT BENCH POWER SUPPLY

The Keysight EDU36311A triple-output DC bench power supply comes with a robust design and usability at an affordable price. Its 90 W electrically isolated channels supply clean and reliable power. The 7-inch color wide video graphics array (WVGA) display gives you a clear view — from instrument set up to the output status. You can easily control the E36311A triple-output DC bench power supply remotely via USB or LAN. This solution includes Keysight's PathWave BenchVue power supply application software for the PC.

KEY BENEFITS

Clean, reliable power

- low output ripple and noise
- excellent programming / readback accuracy
- exceptional line / load regulation
- superior overvoltage, overcurrent, and overtemperature protection

Convenient benchtop capabilities

- independent power supplies (three) in one box
- low acoustic noise
- device protection against overvoltage and overcurrent

Intuitive and easy-to-use interfaces

- 7-inch color display
- distinctive color-coded channels
- individual knobs for voltage and current
- flexible connection using LAN (LXI) or USB

EDU36311A Triple-output Programmable DC Power Supply

SPECIFICATIONS

Model	Output	Voltage	Current	Power
E36311A	1	0 to 6 V	0 to 5 A	90W
	2	0 to 30 V	0 to 1 A	
	3	0 to 30 V	0 to 1 A	

1. 7-inch color wide video graphics array display
2. Output selection keys
3. Voltage / current knobs
4. Function / navigation / numeric keys
5. Output on / off keys
6. Output terminals
7. Soft keys
8. Earth ground reference
9. USB port
10. Power switch

INFINIIVISION 1000 X-SERIES OSCILLOSCOPES

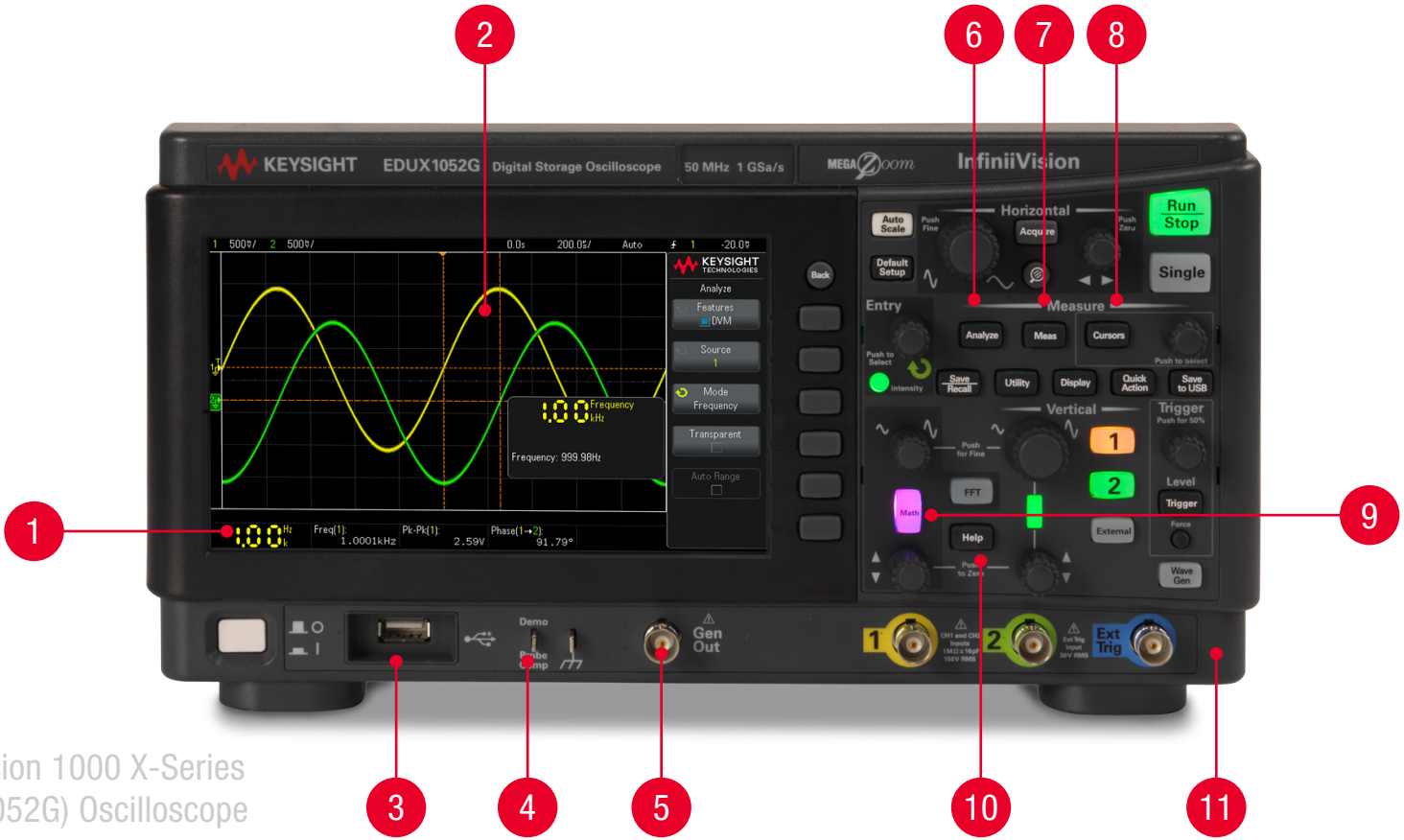
The Keysight InfiniiVision 1000 X-Series oscilloscopes support up to 200 MHz and four analog channels to provide a quality education for students to prepare them for industry with professional-level instruments.

The 1000 X-Series oscilloscopes leverage the same technology as Keysight's higher-end oscilloscopes, enabling students to learn on the same hardware and software used in leading research and development labs.

BenchVue software with the BV0004B BenchVue oscilloscope application (standard) lets you control and visualize the InfiniiVision 1000 X-Series oscilloscopes and multiple measurements simultaneously.

KEY BENEFITS

- Professional-level functionality so students have experience with industry-leading software analysis, including standard serial bus analysis for the most popular series bus standards and 6-in-1 instrument integration.
- Built-in training signals enable students to learn to capture and analyze signals quickly.
- Educator's resource kit includes dynamic teaching labs, a comprehensive lab guide, a tutorial written specifically for undergraduate students, and oscilloscope fundamentals PowerPoint slide set for professors and lab assistants.



InfiniiVision 1000 X-Series (EDUX1052G) Oscilloscope

1. **DVM/Counter** - Integrated 3-digit voltmeter 5-digit frequency counter
2. **Fast Waveform Update Rate** - Fast 200,000 waveforms/sec update rate helps you quickly see random and infrequent signal glitches and errors
3. **USB** - Screenshots and data can be quickly and easily saved with built-in USB port and your USB storage device
4. **Training Signals** - Built-in education training kit signals with downloadable training guide
5. **Function Generator** - Built-in generator enables you to generate the signals you need to quickly simulate your design and perform gain & phase Bode plots
6. **Analyze Features** - Mask Limit Testing DVM Frequency Response Analysis Serial Bus Decode
7. **Measurements** - Press the measure key to access 32 built-in automatic measurements
8. **Cursors** - Custom measurements are easily accomplished by cursors. Measure any value or the difference using four powerful cursors
9. **Waveform Math Tools** - Quick access to waveform math (+−× ÷), FFT (gain and phase) and low-pass filter.
10. **Built-in Localized Help** - All buttons provide instant access to language-localized help by simply holding down the button you want explained
11. **Industry Leading User Interface** - Fast and easy operation with the common oscilloscope controls right at your fingertips

SPECIFICATIONS

Models and options	EDUX1052A	EDUX1052G	DSOX1202A	DSOX1202G	DSOX1204A	DSOX1204G
Bandwidth	50 MHz		70 MHz (base bandwidth) 100 MHz (Option D1202BW1A) 200 MHz (Option D1202BW2A)		70 MHz (base bandwidth) 100 MHz (Option D1200BW1A) 200 MHz (Option D1200BW2A)	
Analog channels	2		2		4	
External trigger	1 external trigger viewable as digital channel		Front panel input (displayable as a third digital channel)		Back panel input (displayable as a third digital channel)	
Maximum sample rate	1 GSa/s (all channels)		2 GSa/s (one- or two-channel operation) 1 GSa/s (if external trigger view is on)		2 GSa/s (one- or half-channel operation) 1 GSa/s (three- or four-channel operation)	
Maximum memory depth	200 k points (all channels)		2 M points (one- or two-channel operation) 1 M points (if external trigger view is on)		2 M points (one- or half-channel operation) 1 M points (three- or four-channel operation)	
WaveGen	Not available	20 MHz function generator	Not available	20 MHz function generator	Not available	20 MHz function generator
Bode plot	Not available	Standard	Not available	Standard	Not available	Standard
Waveform update rate	100,000 waveforms per second		200,000 waveforms per second			
Serial protocol analysis	Standard: I^2C, UART / RS-232		Standard: I^2C, SPI, UART / RS-232, CAN, LIN			
Segmented memory	Not available		Standard			
Mask / limit testing	Not available		Standard			
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 WVGA display					
Connectivity	USB 2.0 host and device, LAN					

PathWave Software Supports Smart Bench Essentials Series Instruments

Keysight has several PathWave software solutions for the Smart Bench Essentials Series. The PathWave BenchVue application, included with the instrument purchase, allows you to control the instruments and test remotely.

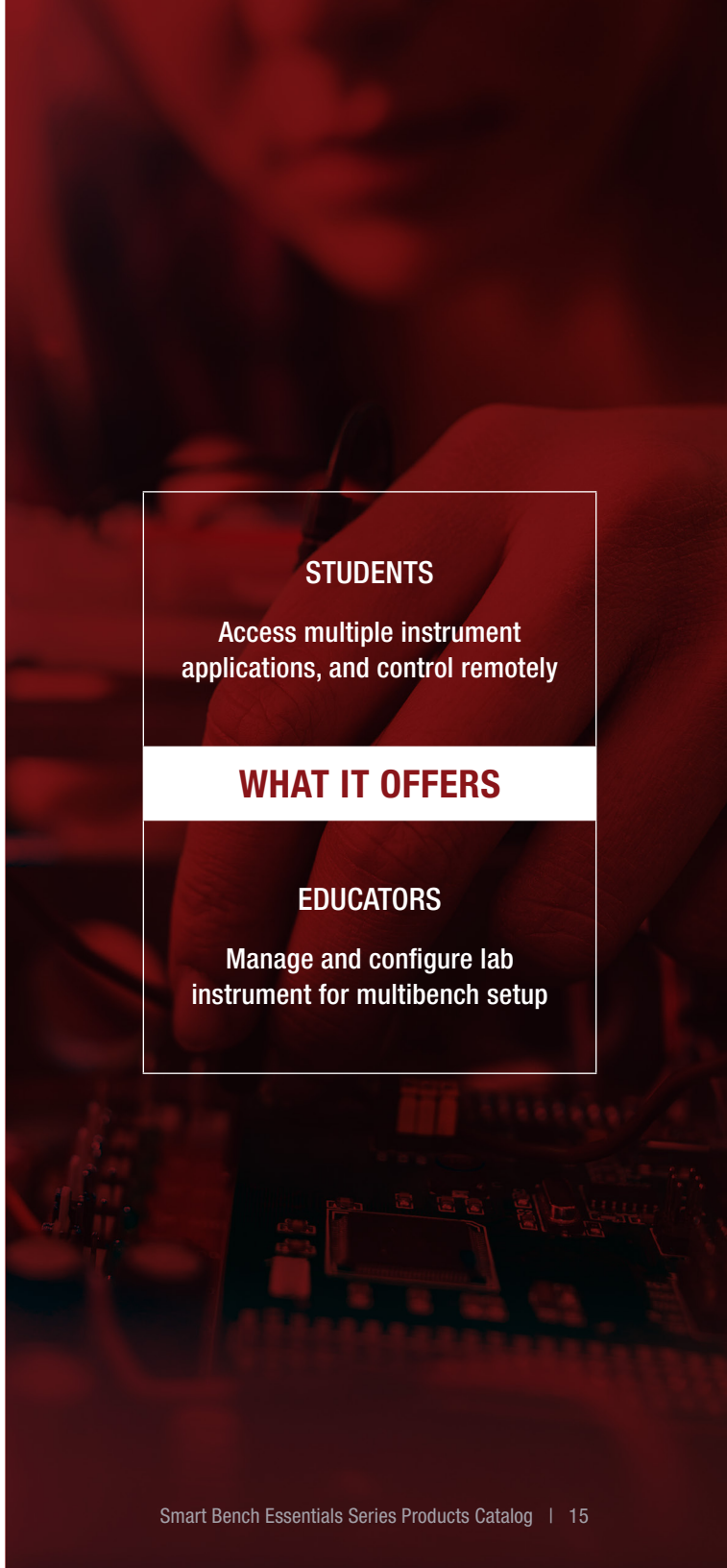
Consider the PathWave PW9111EDU lab management and control software if you have many instruments in your lab. It enables you to configure your lab from a single PC, track your assets, check for the latest firmware, and perform a mass firmware update on all the instruments.

We are launching the PW9112EDU PathWave Lab Operation for remote learning that allows students to access your lab setup and perform lab work through a web browser.

PATHWAVE PW9111EDU LAB MANAGEMENT AND CONTROL

Keysight's industry-ready remote access lab solution offers you a convenient way to make the switch to online learning. This solution's design gives you the ability to set up your basic instrument lab remotely. It covers all your needs, from web-based lab management and scheduling administration to instrument control and remote access for measurement and analysis.

Now, with Keysight PathWave lab management and control solution, educators can spend less time on manual set up and tracking and focus on what really matters — providing high-quality teaching. The PathWave lab management and control software solution give educators centralized control to seamlessly connect and monitor all the lab instruments.



PATHWAVE PW9112EDU REMOTE LEARNING

Online learning has been a part of many educational institutions since the spread of the internet. New norms such as social distancing and limits on in-person interaction are dramatically accelerating the shift from traditional in-building learning to virtual classes on digital platforms.

The availability of online courses opens opportunities to international and distance learning students. Remote learning offers students the flexibility of learning at anytime, from anywhere. With these benefits, online learning is expanding exponentially, and educational institutions must rapidly transform to keep pace with this megatrend of remote learning.

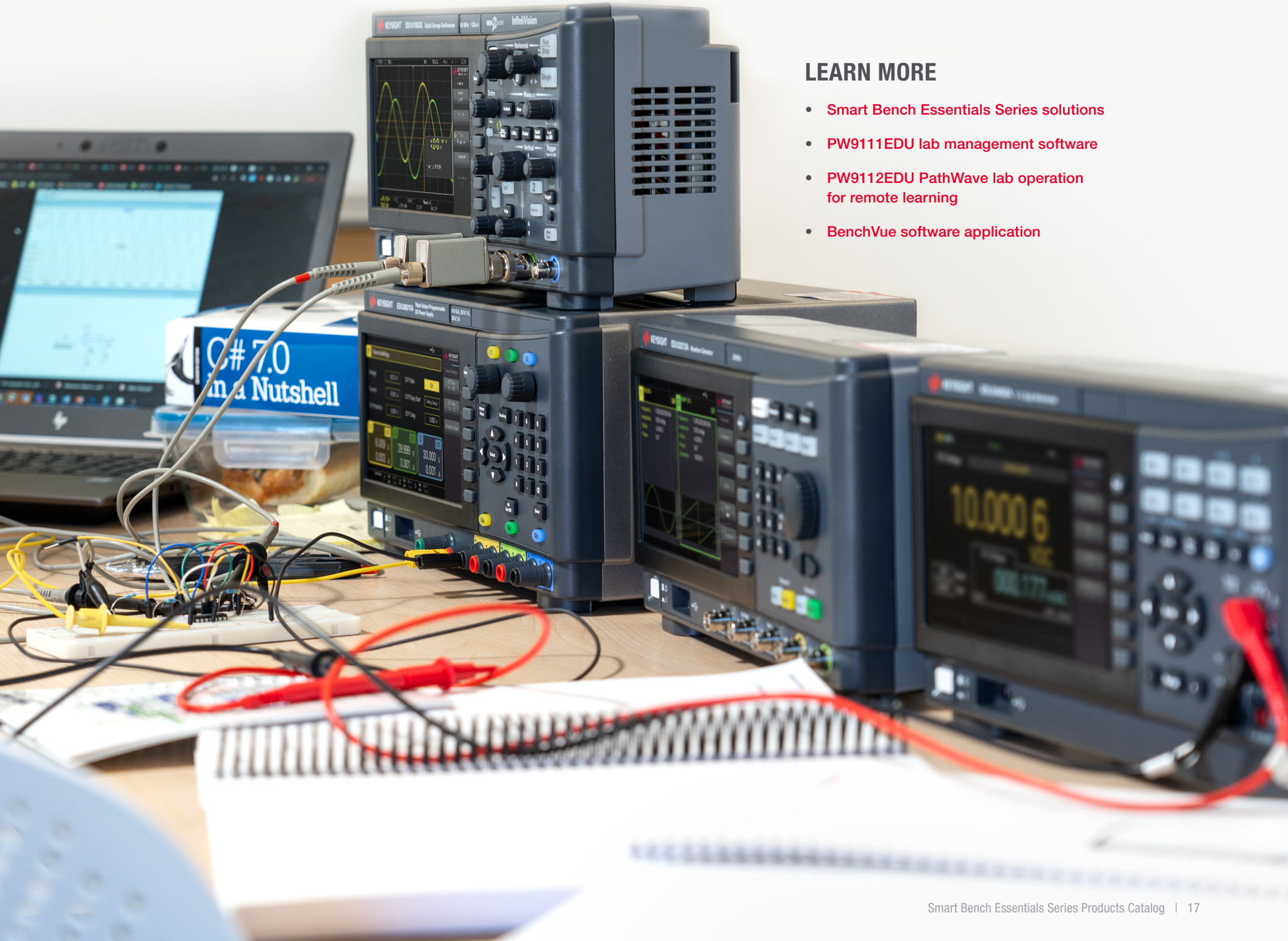
Keysight's industry-ready remote access lab solution offers you a convenient way to make the switch to online learning. You can now complete the remote setup of your basic instrument lab. It covers your needs, from web-based lab management and scheduling administration to instrument control and remote access for measurement and analysis.

PATHWAVE BENCHVUE SOFTWARE APPLICATION

Keysight PathWave BenchVue software comes with your instrument purchase so you can remote control the instruments to test anytime, or anywhere.

KEY BENEFITS

- quick setup with simple configuration
- consistent learning quality to equip students to be industry-ready
- single platform for real-time teamwork and collaboration
- streamline and simplify lab management with centralized control



LEARN MORE

- Smart Bench Essentials Series solutions
- PW9111EDU lab management software
- PW9112EDU PathWave lab operation for remote learning
- BenchVue software application