Smart Bench Essentials Series Products Catalog
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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.

SIGNATURE 7-INCH COLOR DISPLAY
View and monitor all outputs simultaneously from any angle.

INDUSTRY-GRADE PERFORMANCE
Measure with confidence using exceptional line and load regulation for a stable output

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 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 collaboratively or remotely using Pathwave lab software.
- View the connection status for all instruments to enable administrators to configure measurement settings for a single administrator PC.

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.
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

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

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


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
<table>
<thead>
<tr>
<th>Specifications</th>
<th>EDUX1052A</th>
<th>EDUX1052G</th>
<th>DSOX1202A</th>
<th>DSOX1202G</th>
<th>DSOX1204A</th>
<th>DSOX1204G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Models and options</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>50 MHz</td>
<td></td>
<td>70 MHz (base bandwidth)</td>
<td>100 MHz (Option D1202BW1A)</td>
<td>200 MHz (Option D1202BW2A)</td>
<td>70 MHz (base bandwidth)</td>
</tr>
<tr>
<td><strong>Analog channels</strong></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>External trigger</strong></td>
<td>1 external trigger viewable as digital channel</td>
<td>Front panel input (displayable as a third digital channel)</td>
<td>Back panel input (displayable as a third digital channel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum sample rate</strong></td>
<td>1 GSa/s (all channels)</td>
<td>2 GSa/s (one- or two-channel operation)</td>
<td>1 GSa/s (if external trigger view is on)</td>
<td>2 GSa/s (one- or half-channel operation)</td>
<td>1 GSa/s (three- or four-channel operation)</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum memory depth</strong></td>
<td>200 k points (all channels)</td>
<td>2 M points (one- or two-channel operation)</td>
<td>1 M points (if external trigger view is on)</td>
<td>2 M points (one- or half-channel operation)</td>
<td>1 M points (three- or four-channel operation)</td>
<td></td>
</tr>
<tr>
<td><strong>WaveGen</strong></td>
<td>Not available</td>
<td>20 MHz function generator</td>
<td>Not available</td>
<td>20 MHz function generator</td>
<td>Not available</td>
<td>20 MHz function generator</td>
</tr>
<tr>
<td><strong>Bode plot</strong></td>
<td>Not available</td>
<td>Standard</td>
<td>Not available</td>
<td>Standard</td>
<td>Not available</td>
<td>Standard</td>
</tr>
<tr>
<td><strong>Waveform update rate</strong></td>
<td>100,000 waveforms per second</td>
<td></td>
<td></td>
<td>200,000 waveforms per second</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Serial protocol analysis</strong></td>
<td>Standard: I²C, UART / RS-232</td>
<td></td>
<td>Standard: I²C, SPI, UART / RS-232, CAN, LIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Segmented memory</strong></td>
<td>Not available</td>
<td></td>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mask / limit testing</strong></td>
<td>Not available</td>
<td></td>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Integrated digital voltmeter</strong></td>
<td></td>
<td></td>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency counter</strong></td>
<td></td>
<td></td>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Built-in training signals</strong></td>
<td></td>
<td></td>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Waveform math</strong></td>
<td>Add, subtract, multiply, divide, FFT (magnitude and phase), low-pass filter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Automatic measurements</strong></td>
<td></td>
<td></td>
<td>14 amplitude, 14 timing, and 4 pulse count measurements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td></td>
<td></td>
<td>7-inch WVGA display</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Connectivity</strong></td>
<td></td>
<td></td>
<td>USB 2.0 host and device, LAN</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.
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