Smart Bench Essentials

A Modern Workbench

Basic instruments are the backbone of any engineer's bench. They play a pivotal role in the quality and performance of your products. Keysight Smart Bench Essentials (SBE) are thoughtfully designed sets of products that work together to streamline your workflows. They include a digital multimeter (DMM), function / waveform generator, DC power supply, and oscilloscope.

Smart Bench Essentials Education meets the needs of educational laboratories, providing essential performance with features tailored for teaching environments.

Smart Bench Essentials Plus is an elevated set of everyday instruments that delivers enhanced performance to meet the growing demands of development engineers and technicians testing general electronics in consumer, automotive, healthcare, and semiconductor industries. When compared to Smart Bench Essentials Education, it offers:
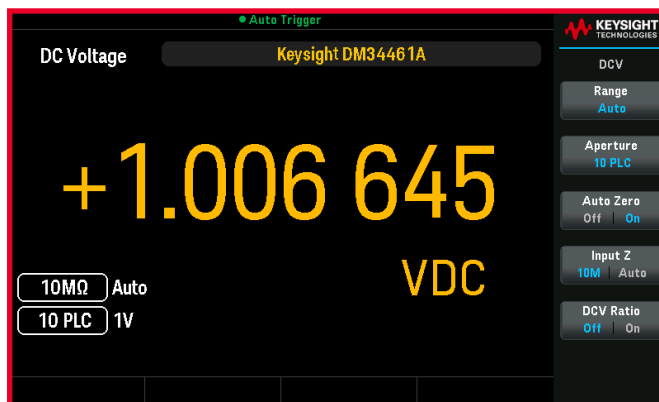

5x more waveform generator bandwidth

Enables faster edge transition for longer, more complex signal patterns in advanced simulation and testing.
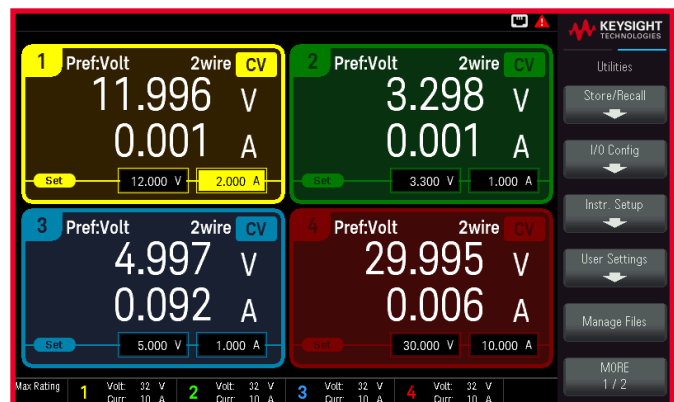

64x higher scope vertical resolution

Dramatically improves signal fidelity and enables the accurate detection of subtle voltage variations.

10x more DMM resolution and accuracy

Allows for precise characterization of low-level signals and boosts confidence in critical validation tasks.

4x more power supply output capacity

Drive larger loads while maintaining stable, low-noise, and low-ripple power delivery.

Modernize your teaching lab with Smart Bench Essentials Education

Smart Bench Essentials Education is a revolutionary design solution for modern teaching labs and aspiring new product development electronics engineers. It allows users to test, analyze, and share results collaboratively, across the room or around the world. You have full access to configure and test using your connected instruments.

The hardware is leveraged from many years of extensive measurement knowledge. So, you get the benefits of Keysight's measurement performance in a low-cost, compact package. We gave the user interface and display special treatment to make them straightforward to operate. With the signature 7-inch color display, you can view more information clearly, even from a distance.
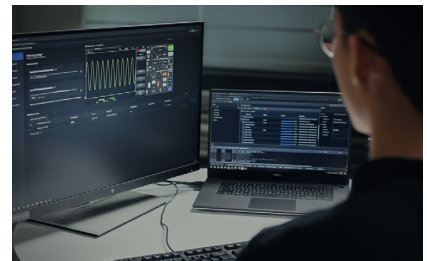

Smart remote connectivity

Test, analyze, and troubleshoot in real time with remote control and data logging via LAN / USB.

Signature 7-inch color display

Monitor multiple outputs simultaneously and use built-in charting tools to gain quick insights.

Digital Learning Suite

Access learning resources, lab management tools, instrument controls, and data analysis tools.

Advance your basic bench with Smart Bench Essentials Plus

Gain test insights you can trust with Smart Bench Essentials Plus. This elevated general-purpose bench solution is equipped with pro-level measurement technologies that deliver precision and reliability so you can trust the accuracy of your results.

- Minimize measurement errors resulting from real-world factors with Keysight Truevolt technology in a 6.5-digit dual-display DMM.
- Generate true representations of your waveforms with Keysight Trueform technology in a 100-MHz waveform / function generator.
- Deliver reliable and responsive power with a 400 W, four-channel DC power supply.
- See even the smallest signals beyond the noise powered by a custom ASIC and 14-bit ADC in a portable four-channel oscilloscope.

Unlike other general-purpose test instruments, Smart Bench Essentials Plus consistently meets and exceeds industry and safety standards so you can safeguard the integrity of your products. Streamline insights with built-in graphical charting tools to visualize, analyze, and share test results, and instrument software to configure, control, and automate tests easily.

Now you can own measurement confidence that goes beyond basic.

Precision and accuracy

Measure accurately, generate true signals, deliver reliable power, and see tiny details.

Quality, reliability, safety

Meet industry-standard quality, including ISO / IEC17025 and IEC61010 specifications.
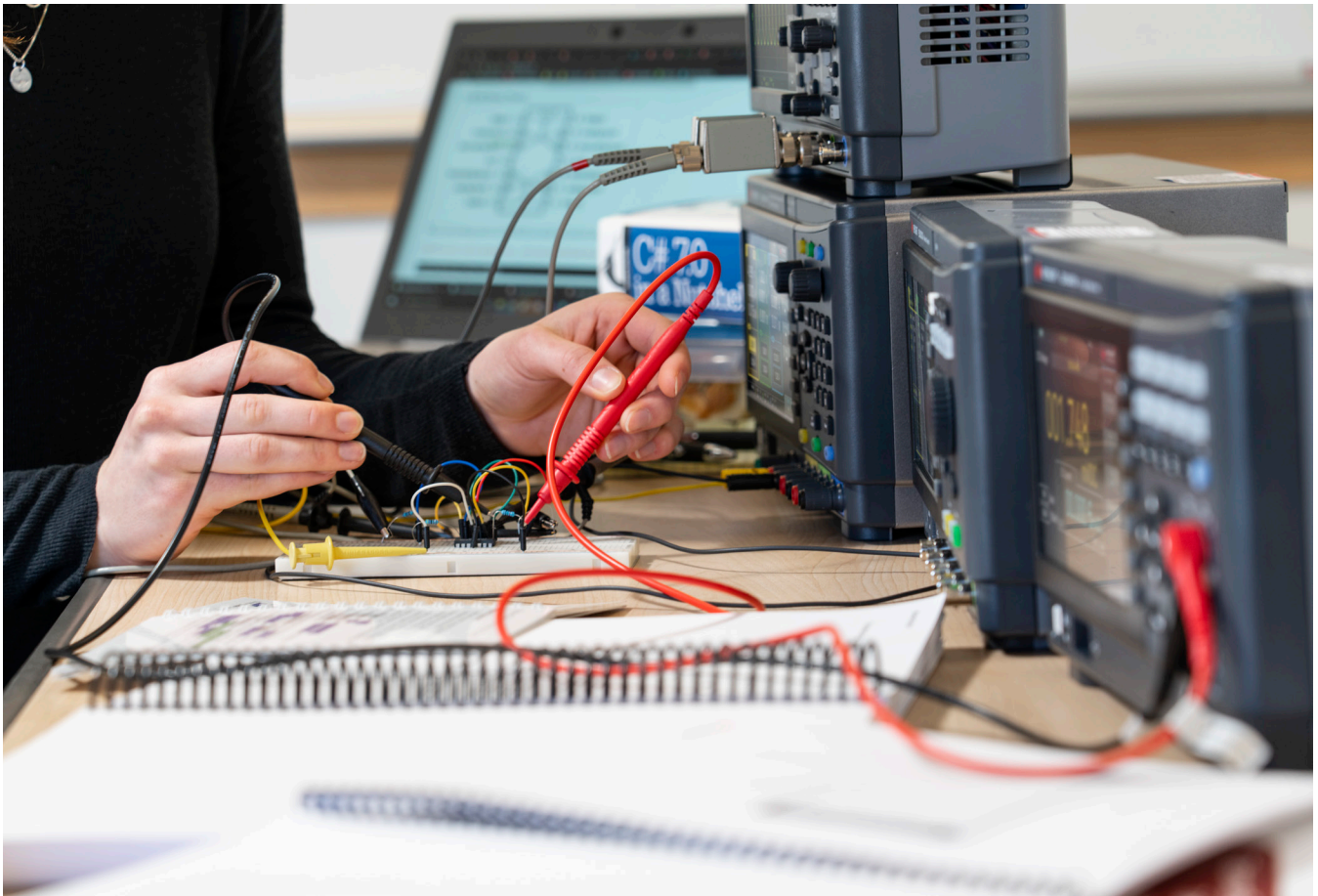
Productivity

Speed validation with robust, user-friendly, and visually intuitive test instrument software.

Measure confidently with KeysightCare

Smart Bench Essentials products include three years of extended warranty and three years of KeysightCare technical support, which provides unlimited access to technical experts with committed response times. Receive personalized, proactive, and priority support, whether you are finding answers in the Knowledge Center, managing service requests, or interacting with Keysight experts.

Upgrading to KeysightCare Enhanced can extend your peace of mind and eliminate budgetary surprises for up to five years. KeysightCare Enhanced includes a calibration service of choice with prioritized turnaround times so you can trust your test results with calibrated in-tolerance instruments and accurate measurements. Available in select countries. Learn more.

Choose Your Smart Bench Essentials

Digital multimeters

Smart Bench Essentials DMMs: Education (left), Plus (right)

The Smart Bench Essentials digital multimeters are designed for accurate and reliable hardware design validation and debugging, built on Keysight's trusted benchtop DMM architecture. They support up to 11 different input signals and feature a 7-inch dual-measurement color display.

The Plus model offers enhanced measurement capabilities, incorporating Truevolt technology to reduce noise and deliver more accurate, stable readings with excellent resolution, linearity, and accuracy. It also includes faster reading speeds and an integrated digitizer with graphical trend charting to accelerate insight during critical debugging tasks.

Key feature	SBE Education	SBE Plus	
Model	**EDU34450A**	**DM34460A**	**DM34461A**
Digits of resolution	5.5 digits	6.5 digits	
DCV accuracy	0.015%	0.0040%	
Max reading rate	110 reading/s	1,000 reading/s	50,000 reading/s
Memory	5,000 readings	50,000 readings	2 million readings
Statistical graphics	Basic statistical function	Bar meter	Bar meter, histogram, trend chart
Digitizer	No	No	Yes
	Learn more	**Learn more**	**Learn more**

Function / waveform generators

Smart Bench Essentials waveform generators: Education (left), Plus (right)

The Smart Bench Essentials function / waveform generators deliver precise, flexible waveform generation with dual-channel outputs, six built-in modulation types, and 17 popular waveforms to simulate common test scenarios. An intuitive front panel and 7-inch color display enable fast signal setup, editing, and visualization.

The Plus models add Keysight Trueform technology, which uses a virtual variable clock and advanced filtering to deliver low jitter, low harmonic distortion, and high signal integrity. This results in a more accurate representation of the intended signal, reducing measurement uncertainty and ensuring reliable test results. They also feature deeper memory and higher sampling rates for more advanced testing needs.

Key feature	SBE Education		SBE Plus	
Model	**EDU33211A**	**EDU33212A**	**FG33531A**	**FG33532A**
Number of channels	1	2	1	2
Max bandwidth	20 MHz		100 MHz	
Max arbitrary waveform length	8 MSa/channel		Up to 8 MSa/channel (16 MSa/channel with Option MEM)	
Max sample rate	250 MSa/s		320 MSa/s	
Total harmonics distortion	< 0.075%		< 0.06%	
Jitter	100 ps		< 50 ps	
	Learn more	Learn more	Learn more	Learn more

DC power supplies

Smart Bench Essentials DC power supplies: Education (left), Plus (right)

The Smart Bench Essentials DC power supplies deliver stable, reliable power with multiple isolated output channels, intuitive controls, and robust protection features for safe, efficient testing. A 7-inch color display and modern USB and LAN interfaces support seamless remote control and data logging.

The Plus model offers greater precision and responsiveness, with low output noise, minimal ripple, and fast load transient response. It adds advanced capabilities such as output sequencing and adjustable slew rates for application-specific tasks. Its four flexible channels can be configured in series or parallel, supporting up to 128 V or 40 A, respectively.

Key feature	SBE Education	SBE Plus
Model	EDU36311A	E36441A
Number of outputs	3	4
Total power	90 W	400 W
Ripple and noise	< 1 mVrms	< 1 mVrms
Accuracy	0.05% +10 mV	0.05% +5 mV
	Learn more	Learn more

Oscilloscopes

Smart Bench Essentials oscilloscopes: Education (left), Plus (right)

The Smart Bench Essentials oscilloscopes deliver reliable signal acquisition and analysis, built on the proven Keysight InfiniiVision architecture. They feature intuitive user interfaces, clear color displays, standard math functions, FFT analysis, and serial protocol decoding — enabling comprehensive signal analysis directly on the instrument.

The Plus model is a mixed-signal oscilloscope powered by a 14-bit ADC and custom ASIC, delivering four times the vertical resolution and half the noise of other general-purpose oscilloscopes. This allows you to troubleshoot designs and ensure product quality by revealing small signals that other scopes might miss. The 10.1-inch capacitive touchscreen, deep memory, and a fast update rate make it ideal for capturing elusive glitches and fine signal details.

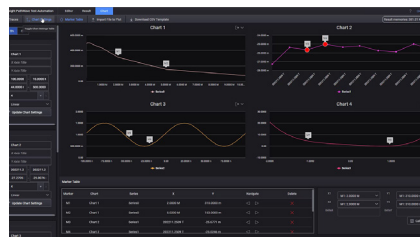| Key feature	SBE Education	SBE Plus
Model	EDUX1052A / G	HD304MSO
Bandwidth	50 MHz	200 MHz to 1 GHz
Channels	2 analog	4 analog + 16 digital
Max sample rate	1 GSa/s	3.2 GSa/s
Max waveform update rate	200,000 wfms/sec	1,300,000 wfms/sec
Max memory depth	200 K points	100 M points
	Learn more	Learn more

Software applications

Keysight has several software solutions for Smart Bench Essentials that will help you improve validation time by quickly visualizing, analyzing, and sharing test results.

Keysight PathWave BenchVue instrument applications allow you to control the instrument set parameters, visualize I/V data, and quickly build automated tests and capture screen images and log data.

For teaching labs with many instruments, the Keysight Digital Learning Suite provides educators and students secure access to industry-ready resources. It streamlines lab control, data visualization, and analysis, reducing workflow time and improving resource utilization.

The PathWave Test Automation offers flexible test sequencing and plan creation to boost development efficiency, enhance performance, and speed up time-to-market.

PathWave BenchVue

- simple instrument setup and testing
- accurate data logging and screen capture
- in-depth data for analysis

Digital Learning Suite

- controls engineering lab resources
- manages tools to visualize and analyze measurement data
- increases lab resource utilization

PathWave Test Automation

- fast test flow visualization, analysis, and insights
- maximize your team's productivity
- develop customized test sequences quickly and easily

KEYSIGHT

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.