



# Basic Instruments

## Safely Test High-Power Devices

January 2023 – March 2023

# Table of Contents

3	Spotlight
4	Featured Products
5	Signal Generators
6	Signal Analyzers
7	Oscilloscopes
10	Data Acquisition / Switch Units
13	DC Power Supplies
18	Source Measure Units
19	Electric Loads
20	Waveform Generators
21	Digital Multimeters
24	Vector Network Analyzers
25	Keysight Streamline Series / USB Instruments
26	PathWave BenchVue Software
27	Special Offers
30	KeysightCare

## SPOTLIGHT

# Safely Test High-Power Devices

Power and characterize up to 800 W safely and easily with our new auto-ranging benchtop power supply.

The Keysight E36150 Series autoranging benchtop power supply features two models with 800 W power on a single channel output. These power supplies provide up to 60 V and 80 A to give you plenty of usable power to meet your testing needs.

The E36150 Series new power supplies also provide advanced characterization and power simulation capabilities. These include voltage and current meter, data logging, scope view, and an arbitrary waveform generator (AWG). Feature-packed to deliver high performance, the E36150 Series provides a one-box solution that eliminates the demand of having to meet the requirements of multiple instruments.

The E36150 Series power supplies are designed for versatility and are perfect for various applications, including R&D, design validation, reliability, and quality testing across all types of industries. The solution features an autoranging architecture and peak power handling capabilities enabling you to meet your various test requirements with plenty of usable power and flexibility.

## Reducing cabling complexity

- Enables easy access to power outputs to connect and disconnect the device under test (DUT) quickly and safely with its front-panel, high-current detachable binding post.
- Withstands maximum current output of 80 A while being fully compliant with the International Electrotechnical Commission (IEC) 61010 safety requirements.

## Advanced power control and analysis (Keysight PathWave BenchVue BV9200B / BV9201B)

- Advanced tools for data logging, oscilloscope, arbitrary waveform generator (AWG), and complementary cumulative distribution function (CCDF) statistical analysis — no additional programming required.
- Convenient access with a familiar PC control interface using the compatible PathWave BenchVue BV9200 / BV9201B software.

## Peak power-handling capabilities

- Power up to safely test your electromechanical or high-capacitance devices that require a quick surge of power.
- Accommodate power surges of up to three times its 800 W rated output, delivering a total of 2400 W for at least seven milliseconds.

▶ WATCH SPOTLIGHT VIDEO

▶ LEARN MORE ABOUT E36150 SERIES



FEATURED PRODUCTS

# Smart Bench Essentials

4 instruments; 1 connected interface



**EDU36311A DC power supply**  
90 W, triple output, and programmable for clean, reliable power



**EDUX1052G oscilloscope**  
50 MHz, 2 analog channels, and 1 GSa/s sample rate for accurate capture and analysis



**Keysight PathWave BenchVue software**  
Integrated, smart software to test, analyze, and share results remotely



**EDU34450A 5.5-digit multimeter**  
Measures 11 input signals at up to 110 readings/s for speed-critical tests



**EDU33211A/EDU33212A function generators**  
17 arbitrary waveforms and 6 built-in modulations to get you set up and testing quickly

**PATHWAVE**

**BenchVue instrument application**

- instrument set up and test
- data logging and screen capture
- data export to several file types



**PATHWAVE**

**PW9111EDU lab manager**

- lab configuration
- asset tracking
- mass firmware update



**PATHWAVE**

**PW9112EDU remote learning**

- lab scheduling and resource booking
- remote access and authentication
- browser-based lab work



Expert Technical Support

IN ADDITION TO YOUR THREE-YEAR WARRANTY, YOU WILL RECEIVE THREE YEARS OF KEYSIGHTCARE TECHNICAL SUPPORT ON ALL BASIC INSTRUMENTS IN THIS CATALOG.

SIGNAL GENERATORS

# X-Series Signal Generators

The Keysight X-Series creates signals capable of testing your very best devices. From the pure and precise MXG to the cost-effective EXG and general-purpose CXG, the X-Series helps you generate true performance.

	MXG-Analog	EXG-Analog	CXG-Analog
<b>Model number</b>	N5181B	N5171B	N5166B
<b>Frequency range</b>	9 kHz to 6 GHz	9 kHz to 6 GHz	9 kHz to 6 GHz
<b>Maximum output power</b>	+24 dBm	+21 dBm	+18 dBm
<b>Frequency switching (list mode)</b>	800 $\mu$ s	800 $\mu$ s	5 ms
<b>Level accuracy</b>	$\pm$ 0.6 dB	$\pm$ 0.6 dB	$\pm$ 0.6 dB
<b>SSB phase noise (1 GHz, 20 kHz offset)</b>	-146 dBc/Hz	-122 dBc/Hz	-119 dBc/Hz
<b>Harmonics (at 1 GHz)</b>	-35 dBc	-35 dBc	-35 dBc
<b>Analog modulation</b>	AM, FM, PM, and pulse modulation	AM, FM, PM, and pulse modulation	AM, FM, PM, and pulse modulation
<b>Digital modulation</b>	N/A	N/A	120 MHz bandwidth
	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



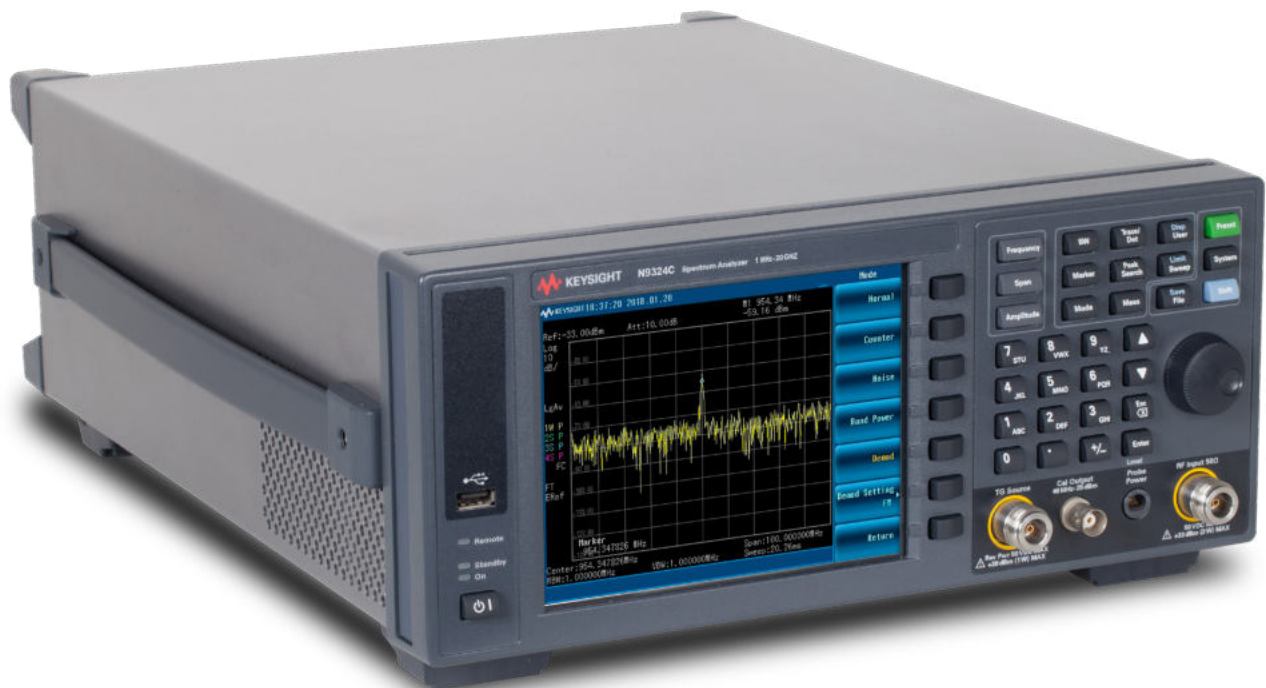
SIGNAL ANALYZERS

# Basic Spectrum Analyzers (BSAs)\*

The BSAs define value-priced general-purpose instruments up to 20 GHz. You can rely on the BSA for proven testing efficiency, usability, and the flexibility to adapt to new requirements.

Model	N9320B	N9321C	N9322C	N9323C	N9324C
Frequency	9 kHz to 3 GHz	9 kHz to 4 GHz	9 kHz to 7 GHz	1 MHz to 13.6 GHz	1 MHz to 20 GHz
Overall amplitude accuracy	±0.5 dB	±0.6 dB	±0.6 dB	±0.7 dB	±0.7 dB
DANL at 1 GHz	-145 dBm	-152 dBm	-152 dBm	-144 dBm	-144 dBm
Maximum analysis bandwidth	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz
Phase Noise at 1GHz	-90 dBc / Hz	-90 dBc / Hz	-90 dBc / Hz	-92 dBc / Hz	-92 dBc / Hz
	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

\* From selected distributors only



# InfiniiVision Oscilloscopes

- Experience up to 1,000,000 waveforms / second update rate.
- Get MegaZoom IV and measure with uncompromised, responsive smart memory.
- Test using multiple instrument functionality.
- Expand your platform with upgradable bandwidth, a mixed-signal oscilloscope (MSO), serial analysis, and a built-in waveform function generator.



Get more functionality with available software packages

	Automobile	Aerospace & Defense	Embedded	Power	USB	Ultimate Bundle
<b>1000X</b>	Standard (DSOX)	NA	Standard	NA	NA	NA
<b>2000X</b>	D2000AUTB	NA	D2000GENB	NA	NA	D2000BDLB
<b>3000X</b>	D3000AUTB	D3000AERB	D3000GENB	D3000PWRB	D3000USBB	D3000BDLB
<b>4000X</b>	D4000AUTB	D4000AERB	D4000GENB	D4000PWRB	D4000USBB	D4000BDLB
<b>6000X</b>	D6000AUTB	D6000AERB	D6000GENB	D6000PWRB	D6000USBB	D6000BDLB

➤ SAVE 40% OFF QUALIFYING INFINIIVISION SOFTWARE FOR A LIMITED TIME! SEE THE SPECIAL OFFERS SECTION AT THE END OF THIS CATALOG TO LEARN MORE.

Model	1000 X-Series	2000 X-Series	3000G X-Series	4000 X-Series	6000 X-Series	Infiniium EXR-Series
<b>Description</b>	Professional-level capabilities in an entry-level oscilloscope <ul style="list-style-type: none"> <li>• Protocol analysis</li> <li>• Bode plots</li> <li>• Fast Fourier transform (FFT)</li> </ul>	Entry-level with more capabilities <ul style="list-style-type: none"> <li>• Serial bus options</li> <li>• Mixed-signal oscilloscope options</li> </ul>	Advanced capabilities simplified <ul style="list-style-type: none"> <li>• Advanced math</li> <li>• Standard embedded software**</li> <li>• Waveform and measurement histograms**</li> </ul>	Everything the 3000G has plus see more of your signal <ul style="list-style-type: none"> <li>• Higher bandwidth</li> <li>• Larger touch screen</li> <li>• Up to four active probes</li> </ul>	Dive deeper and analyze more signal detail <ul style="list-style-type: none"> <li>• Voice control</li> <li>• Advanced jitter analysis, time interval error plots, histograms, and eye diagrams</li> </ul>	Simplify data gathering and analysis <ul style="list-style-type: none"> <li>• 25% lower noise than S-Series</li> <li>• New Fault Hunter feature</li> <li>• Multiscope application</li> </ul>
<b>Bandwidth</b>	50 MHz to 200 MHz	70 MHz to 200 MHz	100 MHz to 1 GHz	200 MHz to 1.5 GHz	1 GHz to 6 GHz	500 MHz to 2.5 GHz
<b>Channels (analog + digital)</b>	2, 4	2, 2+8, 4, 4+8	2, 2+16, 4, 4+16			4, 4+16, 8, 8+16
<b>Sample rate</b>	Up to 2 GSa/s		Up to 5 GSa/s		Up to 20 GSa/s	Up to 16 GSa/s
<b>Memory depth</b>	Up to 2 Mpts and segmented memory standard	Up to 1 Mpts and segmented memory standard	Up to 4 Mpts and segmented memory standard			Up to 3.2 Gpts
<b>Waveform update rate</b>	>200,000 wfms/s	>200,000 wfms/s	>1,000,000 wfms/s		>450,000 wfms/s	>200,000 wfms/s
<b>Display</b>	7-inch	8.5-inch	8.5-inch capacitive touch screen	12.1-inch capacitive touch screen	12.1-inch capacitive multi-touch screen	15.6-inch capacitive touchscreen
<b>Built-in instruments</b>	20-MHz function generator, 5-digit counter, frequency response analyzer*	20-MHz function generator, 5-digit counter*	20-MHz AWG, 8-digit counter, frequency response analyzer*	Dual 20-MHz AWG, 5-digit counter, and frequency response analyzer*	Dual 20-MHz AWG, 10-digit counter, and frequency response analyzer*	10-digit counter, DVM, and protocol analyzers
	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>	<a href="#">DATA SHEET</a>
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\* All X-Series models have a built-in protocol analyzer and 3-digit digital voltmeter (DVM)

\*\* Only standard on the 3000G X-Series models

## Featured Resource

# 5 Mistakes People Make When Getting a Low-Cost Scope

Choosing the right oscilloscope is a difficult task, especially if you're on a budget. You want to make the best decision for your needs while saving money and maintaining quality.

Avoid five common mistakes people make when selecting a low-cost oscilloscope so you — and your wallet — are happy with your decision.

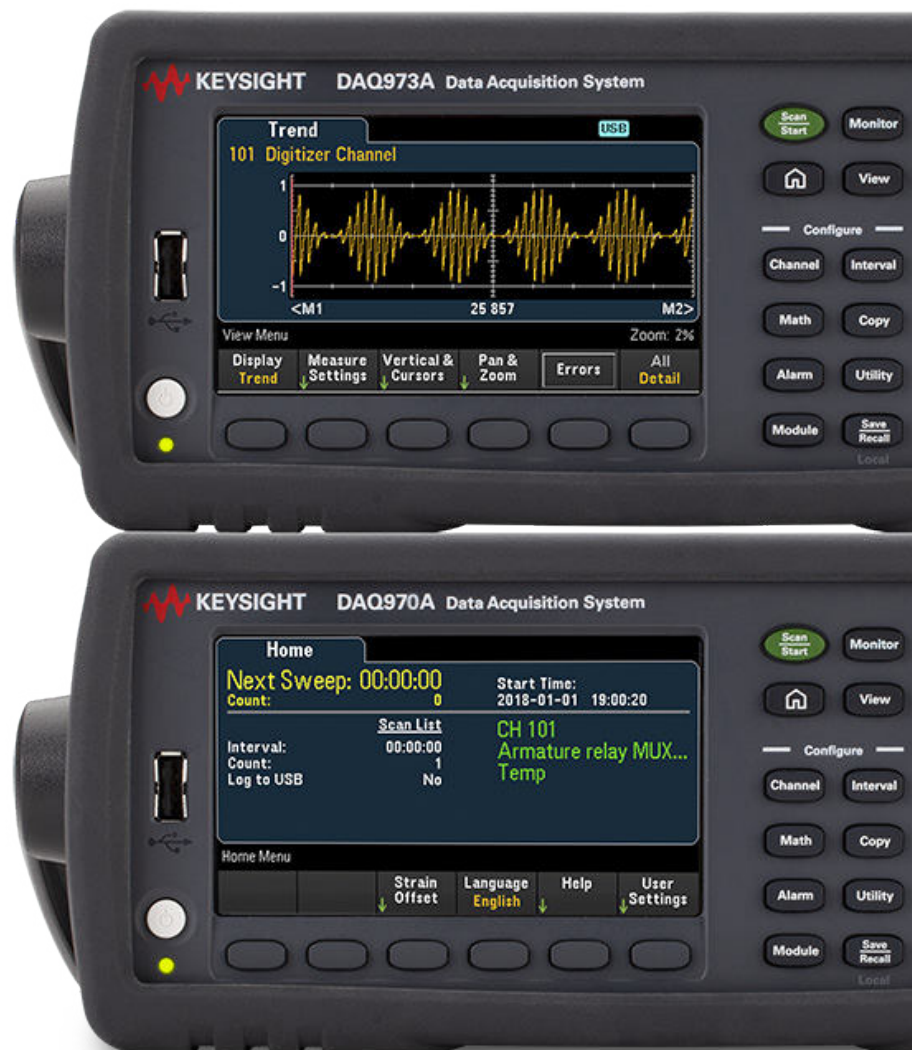
[▶ DOWNLOAD THE WHITE PAPER](#)



# DAQ970A and DAQ973A Data Acquisition System

Get the next-generation Keysight data acquisition (DAQ) system with a three-slot mainframe and your choice of nine plug-in modules. Interface with the DAQ using BenchVue DAQ software, the intuitive graphical front panel with task-oriented, self-guiding menus, or a web browser.

- Features an advanced 6.5-digit internal DMM with improved accuracy and faster measurement speed (50,000 readings / second) to sample more signals.
- Measures very low current ranges (1  $\mu$ A DC and 100  $\mu$ A AC) and higher resistance range (1,000 M $\Omega$ ).
- Compensates using new auto-calibration for internal drifts caused by time and temperature changes.
- Comes with additional GPIB for the DAQ973A; easy connectivity to your PC with LAN and USB.
- Code compatible with Keysight 34970A / 34972A.
- Each module updated with improved switching speeds and accuracies.
- Fast Keysight DAQM900A solid-state multiplexer with scan rate speed of up to 450 channels / second.
- New Keysight DAQM909A 4-channel simultaneous sampling digitizer module with a sampling rate of up to 800 kSa / second.



▶ DATA SHEET

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DAQ970A/73A Modules	Description	Key specifications	
<b>DAQM900A</b>	20-channel solid-state multiplexer	Up to 450 ch/s	<a href="#">Get a Quote &gt;</a>
<b>DAQM901A</b>	20-channel multiplexer plus 2 current channels	Armature 2 / 4 wire, 80 ch/s with DAQ970A/ DAQ973A, up to 300 V, 1 A	<a href="#">Get a Quote &gt;</a>
<b>DAQM902A</b>	16-channel multiplexer	Reed 2 / 4 wire, 250 ch/s, up to 300 V, 50 mA	<a href="#">Get a Quote &gt;</a>
<b>DAQM903A</b>	20-channel actuator / GP switch	SPDT / Form C, 120 ch/s, up to 300 V, 1 A	<a href="#">Get a Quote &gt;</a>
<b>DAQM904A</b>	4 x 8 matrix	Armature 2-wire, 120 ch/s, up to 300 V, 1 A	<a href="#">Get a Quote &gt;</a>
<b>DAQM905A</b>	2 GHz, dual 4-channel, RF mux, 50Ω	Common low (not terminated), 60 ch/s up to 42 V, 0.7 A	<a href="#">Get a Quote &gt;</a>
<b>DAQM907A</b>	Multifunction module	<ul style="list-style-type: none"> <li>• Two 8-bit digital I/O ports, up to 42 V, 400 mA</li> <li>• 26-bit 100 kHz event counter, up to 42 V</li> <li>• Two 16-bit analog outputs, up to ±12 V, 10 mA</li> </ul>	<a href="#">Get a Quote &gt;</a>
<b>DAQM908A</b>	40-channel single-ended multiplexer	Common low (without 4-wire measurements) 60 ch/s, up to 300 V, 1 A	<a href="#">Get a Quote &gt;</a>
<b>DAQM909A</b>	4-channel simultaneous sampling digitizer	Differential inputs, up to 800 kSa/s sampling rate, 24-bit resolution	<a href="#">Get a Quote &gt;</a>



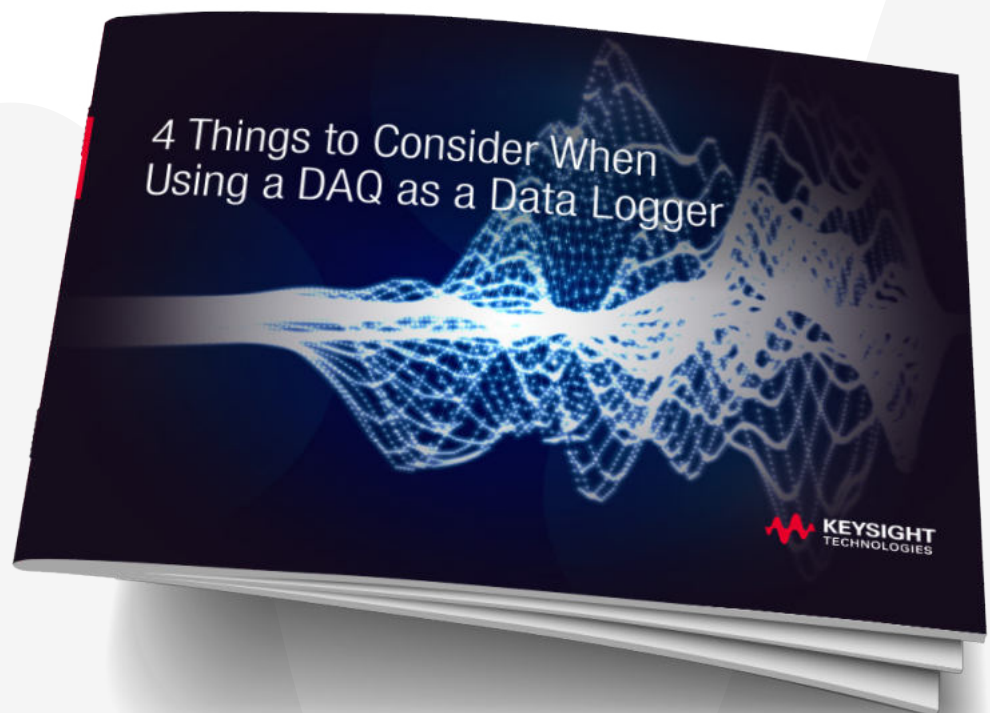
## Featured Resource

# 4 Considerations for Data Acquisition Systems

There is a growing trend across all industries to design feature-rich products. However, you know that the more features added, the more complex the test development becomes.

Explore four considerations for a DAQ that will help you develop a test system optimized for speed and accuracy.

[▶ DOWNLOAD THE EBOOK](#)



# N6700 Modular Power System

**N6700:** DC power supply — ideal for automated test systems.

- Small 1U mainframe (400, 600, 1200 W) holds up to four output modules.
- Over 35 programmable DC modules offer unique capabilities, performance, voltage, and current combinations.
- Multiple DC electronic load modules, 100 and 200 W, allow current to be sourced and sunk in the same mainframe.



**N6705C:** DC power analyzer — deep insight without a complex test system.

- Holds and uses up to four N6700 Series modules (600 W total).
- Integrates digital multimeter (DMM), oscilloscope, arb, and data logger capabilities.
- Characterizes and improves battery run time with a source / measure unit (SMU) and BV9200B analysis software.



➤ [N6700C, N6701C, & N6702C DATA SHEET](#)

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➤ [N6705C DATA SHEET](#)

[Get a Quote >](#)

# E36300 Series Triple-Output DC Power Supplies

**PATHWAVE**  
SOFTWARE INCLUDED

- large display with voltages and currents for all three outputs
- accurate programming / readback as low as 0.03%
- low output ripple and noise less than 2 mVpp / 350 uVrms
- precise data logging plus output sequencing and coupling
- convenient front and rear output terminals
- color-coded outputs and individual knobs for voltage and current
- LAN (LXI Core), USB, and GPIB (optional)

Model	E36311A			E36312A			E36313A		
	Economy model			Most popular			Twice the current		
<b>Power</b>	80 W			80 W			160 W		
<b>Channels</b>	1	2	3	1	2	3	1	2	3
<b>DC output Rating (0 to 40 °C)</b>	0 to 6 V	0 to +25 V	0 to -25 V	0 to 6 V	0 to 25 V	0 to 25 V	0 to 6 V	0 to 25 V	0 to 25 V
	0 to 5 A	0 to 1 A	0 to 1 A	0 to 5 A	0 to 1 A	0 to 1 A	0 to 10 A	0 to 2 A	0 to 2 A
	<a href="#">Get a Quote &gt;</a>			<a href="#">Get a Quote &gt;</a>			<a href="#">Get a Quote &gt;</a>		



[▶ DATA SHEET](#)

# E36200 Series DC Power Supplies

- single or dual outputs; easily combine the dual outputs into a single output with 400 W
- auto-parallel the Keysight E36233A 400 W autoranging dual output power supply to create a single 40 A (30 V) output
- auto-series the E36233A to create a single 120 V (10A) output
- programming / readback accuracy as low as 0.03%
- output ripple and noise < 350  $\mu$ Vrms
- data logging plus output sequencing and coupling
- front and rear output terminals
- color-coded outputs and individual knobs for voltage and current
- LAN, USB, and GPIB (optional)

Model	E36231A		E36232A		E36233A		E36234A	
Power	200 W		200 W		400 W		400 W	
Channels	1		1		1	2	1	2
DC output Rating (0 to 40 °C)	0 to 30 V	0 to 20 A	0 to 60 V	0 to 10 A	0 to 30 V	0 to 20 A	0 to 60 V	0 to 10 A
	<a href="#">Get a Quote &gt;</a>		<a href="#">Get a Quote &gt;</a>		<a href="#">Get a Quote &gt;</a>		<a href="#">Get a Quote &gt;</a>	



[DATA SHEET](#)

# E36150 Series Autoranging Benchtop Power Supplies

- Peak power that handles up to three times the maximum power rating to accommodate start-up power surge requirements from electromechanical and high capacitance devices under test
- High performance with precise output accuracy, minimal noise, and excellent load / line regulation
- Adjustable slew rate, data logging, voltage and current meter, four-wire remote sensing, LIST output programming, and digital controls
- Comprehensive overvoltage, overcurrent, and overtemperature provide device protection
- Flexible Keysight BV0003B PathWave BenchVue power supply application and test flow automation support
- Inclusive Keysight BV9200B / BV9201B PathWave BenchVue advanced power control and analysis software assistance
- Scalable and upgradable with Keysight Option E36150ADVU for scope view and arbitrary waveform generator (AWG) functions that offer advanced characterization and power simulation
- Adaptable LAN / LXI, USB, and general purpose interface bus (GPIB) (upgrade option) interfaces

Model	E36154A	E36155A
Output	1	
Power	800 W	
Voltage	0 to 30 V	0 to 60 V
Current	0 to 80 A	0 to 40 A
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



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## Featured Resource

# 4 Ways to Build Your Power Supply Skills

Today's designs place higher demands on the systems that power them. You may find that more of your design problems are created by these power systems.

Use these four practical tips to ensure you deliver reliable power during the design phase and get the most out of your power supply.

[▶ DOWNLOAD THE EBOOK](#)



# B2900 Series Precision Source Measure Units (SMUs)

## B2900B/BL Series precision SMUs

- minimum source resolution at 10 fA / 100 nV;
- minimum measurement resolution at 10 fA / 100 nV
- maximum output at 210 V, 3.03 A DC
- waveform generation (arbitrary) and digitizing capabilities from 10  $\mu$ s interval
- integrated 4-quadrant source and measurement capabilities
- 4.3-inch color display supports graphical and numerical view modes
- application software to facilitate PC-based instrument control (free)
- high throughput and SCPI command supporting conventional SMU command set

## B2960B/BL Series low-noise power source

- 6.5 digit 2-channel, wide and bipolar voltage / current sourcing (100 nV - 210 V / 10 fA - 10.5 A, 31.8 W)
- noise performance at 10  $\mu$ Vrms, 1nVrms /  $\sqrt{\text{Hz}}$  with external filter
- precision arbitrary waveform capability with support for seven built-in functions and user-defined waveforms (1 MHz - 10 kHz)
- 4.3-inch color display supports both graphical and numerical view modes
- application software to facilitate PC-based instrument control (free)
- high throughput and SCPI command supporting conventional SMU command set



➤ [B2900B DATA SHEET](#)

➤ [B2960B DATA SHEET](#)

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**ELECTRIC LOADS**

# EL30000 Series Bench DC Electronic Loads

The Keysight EL30000 Series bench DC electronic loads provide superior performance in a compact bench form factor.

- Test up to 600 W, 1 or 2 inputs.
- Operate in constant current (CC), constant voltage (CV), constant resistance (CR), or constant power (CP) modes.
- Make accurate measurements with excellent programming / feedback accuracy.
- Perform static and dynamic tests.
- View measurements on a 4.3-inch LCD color display.
- Transfer data via USB drive, LAN, USB, or GPIB.

Model	Number of inputs	Input power	DC Input voltage	DC Input current	
<b>EL34143A</b>	1	350 W	150 V	60 A	<a href="#">Get a Quote &gt;</a>
<b>EL34243A</b>	2	600 W	150 V	60 A per input, 120 A parallel	<a href="#">Get a Quote &gt;</a>

**Need more power?**

See the Keysight E36200 Series 200 and 400 W autoranging power supplies.



- [DATA SHEET](#)
- [ELECTRONIC LOAD FUNDAMENTALS WHITE PAPER](#)

# 33500B and 33600A Series Trueform Waveform Generators

- Generate Trueform arbitrary waveforms with high fidelity and less jitter and harmonic distortion.
- Access ease-of-use features, such as modulation, sweep, burst, dual-channel coupling, and IQ baseband signal player.

Model	Description	Channels	Frequency range	Pulse	Arbitrary waveforms					
					Std/Opt arb	# Bits	Sample rate	Memory/Channel		
33509B 33510B	Exclusive Trueform waveform technology with < 40 ps jitter and < 0.04% THD.	1	20 MHz	20 MHz	Optional	16	160 MSa/s	1 M Standard, 16 M Optional		
		2			Standard					
33511B 33512B		1	30 MHz	30 MHz	Optional					
		2			Standard					
33519B 33520B		1	80 MHz	80 MHz	Standard		14		660 MSa/s	4 M Standard, 64 M Optional
		2			Optional					
33521B 33522B	1	120 MHz	100 MHz	Standard	1 GSa/s					
	2			Optional						



➤ DATA SHEET

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# Truevolt Digital Multimeters

- 6.5- and 7.5-digit performance
- graphical capabilities such as trend and histogram charts
- measure very low current, 1  $\mu$ A range with pA resolution, enabling measurements on very low power devices
- auto-calibration to compensate for temperature drift
- basic measurements such as DCV, ACV, DCI, ACI, 2- and 4-wire resistance, frequency, period, continuity, diode, temperature, and capacitance

Model	Description	Digits of resolution	Max reading rate at 4½ digits (RDGS/S)	Built-in PC interfaces
34460A	Display DMM results in histogram, bar, and trend charts on color graphical display for easy monitoring and to speed up statistical analysis	6.5	300	USB; optional GPIB, LAN
34461A			1,000	USB, LAN; optional GPIB
34465A	Comes with a digitizer and advanced triggering capability so you can make more measurements with higher speed, better accuracy, and more memory	6.5	50,000	USB, LAN; optional GPIB
34470A		7.5		



[▶ DATA SHEET](#)

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# 3458A Digital Multimeter, 8.5-Digit

- Get 8.5-digit resolution with 0.1 ppm transfer accuracy.
- Perform accurate measurements with 8 ppm (0.0008%) DCV accuracy (4 ppm optional).
- Experience a maximum reading rate of 100,000 readings / second.
- Execute measurements that include DC and AC voltage, DC and AC current.
- Measure using 2- and 4-wire resistance, frequency, and period.
- Use the 148K reading memory for prolonged data logging (now comes standard).
- RoHs compliant.



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## Featured Resource

# Solving for Common Low Resistance Measurement Accuracy Issues

A 4-wire measurement method is the most accurate method to measure small resistances, especially in ranges below 100 ohms. The 4-wire method eliminates measurement errors that long leads and switches introduce in your test setups. The method is also very useful when you need to monitor for accurate and precise temperature changes. This solution brief will compare the differences between making a 2-wire and a 4-wire resistance measurement.

[▶ DOWNLOAD THE SOLUTION BRIEF](#)



# E5063A ENA Vector Network Analyzer\*

- frequency options to suit your test needs and budget, upgradable at any time
- PCB manufacturing test capability with Option 011
- support for six languages via softkey and the embedded help manual in English / Simplified Chinese
- support all Keysight calibration kits, including the Keysight N755xA economy ECal module

## ENA Series E5063A

<b>Frequency</b>	100 kHz to 500 M, 1.5, 3, 4.5, 6.5, 8.5, 14 or 18 GHz
<b>Test port</b>	2-port 50 $\Omega$ S-parameter test set
<b>Dynamic range</b>	117 dB (spec.), 122 dB (typ.)
<b>Trace noise</b>	0.005 dBrms (spec.), 0.015 dBrms (typ.)
<b>Source power</b>	-20 to 0 dBm
<b>Key software capability</b>	Fixture simulator, Time domain analysis/Test Wizard option <sup>1</sup> , Wireless power transfer analysis <sup>1</sup> , and Materials measurement <sup>2</sup>
<b>Interface</b>	LAN, USB (front 2, rear 4), USBTMC, GPIB <sup>1</sup> , Handler I/O <sup>1</sup>

1. Optional capability.

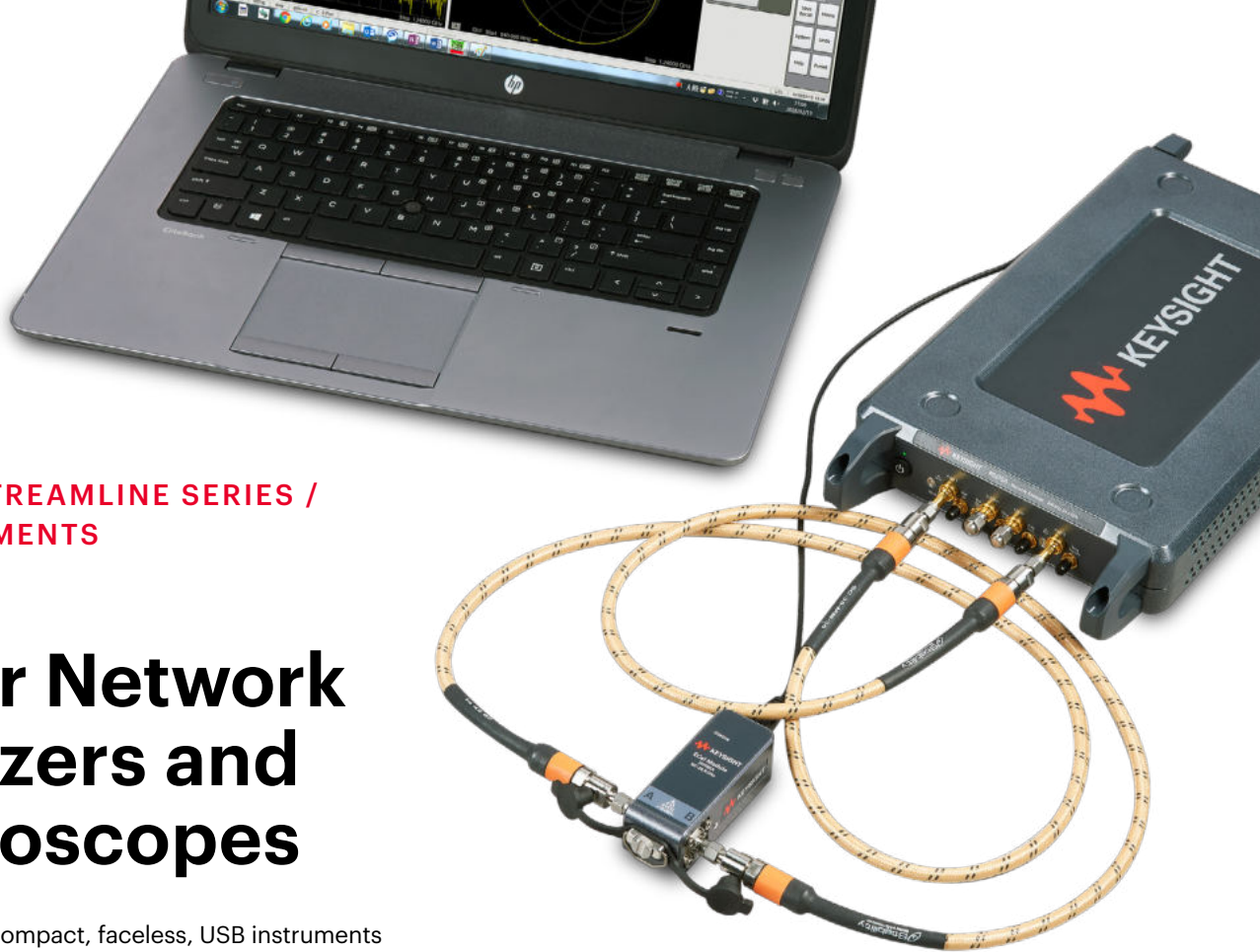
2. External software; Keysight N1500A Material Measurement Suite required.

\* From selected distributors only



[DATA SHEET](#)

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**KEYSIGHT STREAMLINE SERIES /  
USB INSTRUMENTS**

# Vector Network Analyzers and Oscilloscopes

- multiple new compact, faceless, USB instruments
- common technology and measurement capabilities as benchtop and modular instruments
- perfect for component and subassembly test, R&D labs, and light manufacturing
- small footprint in size, weight, and power
- ideal for a rack at 1U high

**Vector Network Analyzer (VNA)\***

**Oscilloscope**

<b>Models</b>	P9370A/B, P9371A/B, P9372A/B, P9373A/B, P9374A/B P9375A/B, P9377B, P9382B, P9384B	P9241A, P9242A, P9243A
<b>Bandwidth</b>	300 kHz to 26.5 GHz (P937xA) 9 kHz to 20 GHz (P937xB/P938xB) 100 kHz to 44 GHz (P937xB)	200 MHz, 500 MHz, and 1 GHz
<b>Capabilities</b>	<ul style="list-style-type: none"> <li>• Full 2-port (P937xA/B) and 4-port (P938xB) VNA</li> <li>• Ability to extend the number of ports</li> <li>• Same calibration and metrology as all trusted Keysight VNAs</li> </ul>	<ul style="list-style-type: none"> <li>• 2 analog channels</li> <li>• 5 GSa/s</li> <li>• 1,000,000 wfms/s</li> <li>• Zone triggering</li> <li>• 6-in-1 instrument: arbitrary waveform generator, frequency response analyzer, digital voltmeter, counter, protocol analyzer</li> </ul>
	<a href="#">P397XA DATA SHEET</a>	<a href="#">P93XXB DATA SHEET</a>
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# Instrument Control Software Applications

PATHWAVE

- Use to connect instruments, record results quickly, and visualize measurements.
- Save time with automated test sequences.
- Analyze and export data in multiple formats.

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## Control Multiple Instruments

Drag-and-drop your way to connect instruments, record results, and visualize measurements across multiple instruments simultaneously, without the need for programming.

## Access Integrated Apps

Choose from a wide array of apps with powerful features to simplify your test workflow — from measurement setup and automation to exporting data and analyzing in-depth results — in one software application. The applications support hundreds of Keysight instruments and are continually expanding.

## Automate Test Sequences

Rapidly build custom test sequences with an intuitive interface to quickly create tests that previously required days of traditional programming. The integrated Test Flow application makes it simple to drag and drop controls or measurements into a sequence for rapid test development.

## Analyze and Export Data

Get easy access to extensive data, screen captures, trace, and measurement logging capabilities. Export your data in multiple formats in just a few clicks.

## Instrument Compatibility

- data acquisition units, digital multimeters, and electronic loads
- FieldFox handheld analyzers, function generators, and USB modular products
- universal counters, oscilloscopes, and photovoltaic array simulators
- power analyzers, power meters and power sensors, and power supplies
- signal generators, spectrum analyzers, and network analyzers



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Bundle option	Discount	Automotive	Power	Jitter
<b>Better</b>	25%	<p><b>DSO3054GAUT</b></p> <ul style="list-style-type: none"> <li>• DSOX3054G: 4-channel, 500-MHz oscilloscope with embedded analysis software and function / arbitrary waveform generator</li> <li>• D3000AUTB: Automotive software option</li> <li>• DP0010A: 250-MHz differential active probe</li> <li>• DP0021A-009: automotive accessory kit for DP001xA probes</li> </ul>	<p><b>DSO3054GPWR</b></p> <ul style="list-style-type: none"> <li>• DSOX3054G: 4-channel, 500-MHz oscilloscope with embedded analysis software and function / arbitrary waveform generator</li> <li>• D3000PWRB: power analysis software option</li> <li>• N2790A: 100-MHz high-voltage differential active probe</li> <li>• 1147B: 50-MHz current probe</li> <li>• U1880A: deskew fixture</li> </ul>	<p><b>DSOX6004JIT</b></p> <ul style="list-style-type: none"> <li>• DSOX6004A: 4-channel, 1-GHz oscilloscope</li> <li>• D6000BDLB: ultimate bundle software option</li> <li>• DSOX6WAVEGEN2: 2-channel function / arbitrary waveform generator</li> <li>• N2750A: 1.5-GHz differential active probe</li> </ul>
<b>Best</b>	25%	<p><b>MSO4154AAUT</b></p> <ul style="list-style-type: none"> <li>• MSOX4154A: 4+16 channel, 1.5-GHz mixed-signal oscilloscope</li> <li>• D4000BDLB: Ultimate bundle software option</li> <li>• DSOX4WAVEGEN2: 2-channel function / arbitrary waveform generator</li> <li>• DP0010A: 250-MHz differential active probe</li> <li>• DP0021A-009: automotive accessory kit for DP001xA probes</li> </ul>	<p><b>MSOX4154PWR</b></p> <ul style="list-style-type: none"> <li>• MSOX4154A: 4+16 channel, 1.5-GHz mixed-signal oscilloscope</li> <li>• D4000BDLB: ultimate bundle software option</li> <li>• DSOX4WAVEGEN2: 2-channel function / arbitrary waveform generator</li> <li>• N2790A: 100-MHz high-voltage differential active probe</li> <li>• N7026A: 150-MHz high-sensitivity current probe</li> <li>• U1880A: deskew fixture</li> </ul>	<p><b>MSOX6004JIT</b></p> <ul style="list-style-type: none"> <li>• MSOX6004A: 4+16 channel, 1-GHz mixed-signal oscilloscope</li> <li>• DSOX6004A-02G: 2.5-GHz bandwidth option</li> <li>• D6000BDLB: ultimate bundle software option</li> <li>• DSOX6WAVEGEN2: 2-channel function / arbitrary waveform generator</li> <li>• N2751A: 3.5-GHz differential active probe</li> </ul>

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4000X	D4000AUTB	D4000AERB	D4000GENB	D4000PWRB	D4000USBB	D4000BDLB
6000X	D6000AUTB	D6000AERB	D6000GENB	D6000PWRB	D6000USBB	D6000BDLB

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Bundle option	Discount	N9000B CXA	N5166B CXG
Good	10%	<ul style="list-style-type: none"> <li>• Frequency range, 3 GHz</li> <li>• Preamplifier, 3 GHz</li> <li>• Fine resolution attenuator</li> <li>• Precision frequency reference</li> </ul>	<ul style="list-style-type: none"> <li>• Frequency range, 3 or 6 GHz</li> <li>• RF bandwidth, 60 MHz</li> <li>• Waveform memory size, 32 MSa</li> </ul>
Better	15%	<ul style="list-style-type: none"> <li>• Frequency range, 7.5 GHz</li> <li>• Preamplifier, 7.5 GHz</li> <li>• Fine resolution attenuator</li> <li>• Precision frequency reference</li> </ul>	<ul style="list-style-type: none"> <li>• Frequency range, 3 or 6 GHz</li> <li>• RF bandwidth, 120 MHz</li> <li>• Waveform memory size, 32 MSa</li> </ul>
Best	20%	<ul style="list-style-type: none"> <li>• Frequency range, 26.5 GHz</li> <li>• Preamplifier, 26.5 GHz</li> <li>• Fine resolution attenuator</li> <li>• Precision frequency reference</li> </ul>	<ul style="list-style-type: none"> <li>• Frequency range, 6 GHz</li> <li>• RF bandwidth, 120 MHz</li> <li>• Waveform memory size, 512 MSa</li> <li>• AM, FM, phase modulation</li> <li>• Waveform license 5-pack</li> </ul>



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