


Keysight  Our Distributor Network

RIGHT Instrument. RIGHT Expertise.  
Delivered RIGHT Now.

# Keysight Technologies General Purpose Test & Measurement Catalogue



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## Keysight Our Distributor Network

**RIGHT** Instrument. **RIGHT** Expertise.  
Delivered **RIGHT** Now.

Keysight and our network of Keysight Authorized Distributors have teamed up to provide fast, easy access to the world's largest selection of off-the-shelf T&M instruments. It's the best of both worlds: Keysight's measurement expertise and product breadth combined with speed and convenience from our distribution partners.

It's never been easier to get the right instrument in the right hands, right away.

# What's New

## Keysight 1000 X-Series Oscilloscopes

We leverage the same, proven technology of our higher-end InfiniiVision family, to give you professional-level measurements you can trust.



- 70 to 200 MHz, 2 or 4-channel
- 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

See page 17

[www.keysight.com/find/1000X-Series](http://www.keysight.com/find/1000X-Series)

## Keysight Streamline Series USB Products

Compact form with zero compromise in performance. All new USB Products VNAs and oscilloscopes:



- Faceless USB instruments controlled via PC
- Same technology and measurements as Keysight benchtop and modular instruments
- Small size makes it perfect for a rack
- Same user interface and automated code as comparable benchtop models

See page 30

[www.keysight.com/find/streamline-series](http://www.keysight.com/find/streamline-series)

## DAQ970A Data Acquisition Mainframe with DAQM Series Modules

Next-generation multi-channel data acquisition (DAQ) system — sample more signals, faster. Combine the latest precision of the DAQ970A system with BenchVue software's programming capability to get:



- Fast reading measurements up to 5000 readings/sec and scan rates up to 450 channels/sec
- Ability to measure high voltages up to 300 V and keep up with trends for higher voltages across industry
- Ability to measure wide temperature range (from -200 °C to 1800 °C) for many high-performance applications
- Ability to measure frequency of signals up to 300 kHz to measure mechanical rotary dynamics and power line cycles

Speed your development process with test automation without programming, the widest range of measurement options, and industry-leading scan and reading rates.

See page 29

[www.keysight.com/find/daq](http://www.keysight.com/find/daq)

## BenchVue Software: Control. Automate. Simplify.

Keysight BenchVue software for PC eliminates the many of the issues around bench testing. By making it simple to connect, control instruments, and automate test sequences you can quickly move past the test development phase and access results faster than ever before. Dedicated instrument apps allow you to quickly configure the most commonly used measurements and setups for each instrument family. Rapidly build custom test sequences with the integrated Test Flow app to automate and visualize test results without the need for instrument programming. A variety of powerful BenchVue apps enable you to significantly reduce test development time.



### Use BenchVue apps to:

- Configure the most commonly used controls and measurements from your Keysight instruments
- Visualize multiple measurements simultaneously
- Easily log and export data and screen images in just a few clicks for faster analysis
- Create automated test sequences fast with minimal instrument knowledge
- Access deeper instrument controls and measurement solutions
- Save time with software that offers multiple instrument apps in one platform



### Look For This Icon

throughout the catalog to identify BenchVue software enabled products.

BenchVue software works with hundreds of Keysight digital multimeters, power supplies, function/waveform generators, spectrum analyzers, data acquisition units, network analyzers, oscilloscopes, power meters, power sensors, electronic loads, universal counters and more — look for the BenchVue enabled icon for compatible products.

Start accelerating your workflow today and download a 30-day trial version at [www.keysight.com/find/BenchVue](http://www.keysight.com/find/BenchVue)

### Remotely control your bench instruments

Configure BenchVue to remotely monitor and control bench instruments from a different location. This allows remote teaching/learning labs to be monitored by a teacher or for engineers to remotely control systems across the world.

 [Using BenchVue to Remotely Control Bench Instruments](#)



## DOWNLOAD YOUR NEXT INSIGHT

Keysight software is downloadable expertise. From first simulation through first customer shipment, we deliver the tools your team needs to accelerate from data to information to actionable insight.

Learn more at [www.keysight.com/find/software](http://www.keysight.com/find/software)

# The Keysight RF Bench and Handheld Instruments

## Reach higher in RF — with confidence

Keysight Authorized Distributors now offer a range of RF instruments that deliver tremendous value, balancing excellent performance with affordable pricing. To see the full portfolio of RF products offered by Keysight Authorized Distributors, visit: [www.keysight.com/find/rf](http://www.keysight.com/find/rf)

### 1. Handheld spectrum analyzers and network analyzers

Quality measurements in the field with rugged handheld instruments.

See pages 5-7

### 2. Spectrum/signal analyzers

Value-priced, general-purpose spectrum analysis.

See pages 8-9

### 3. Audio analyzer and signal generators

Assure quality while minimizing the cost of your general-purpose testing with reliable RF performance and capability.

See pages 10-11

### 4. Power sensors and meters

Meters and sensors cover numerous frequency and power ranges to accurately measure the power of RF and microwave signals.

See page 12

### 5. RF & Microwave test accessories

Keysight test accessories complete your test solution and eliminate the weak links in your measurement system.

See page 13

### 6. Network analyzers

Industry standard of middle-range vector network analyzer, providing best-in-class performance, for passive device test.

See page 14

### 7. LCR meters

Bring unparalleled accuracy to your lab for component evaluation.

See page 40

### 8. BenchVue software

Capture, visualize, and share data from multiple instruments with no need for programming.

See page 3



## N9340B and N9342/43/44C Handheld Spectrum Analyzers (HSAs)

### Field testing just got easier

If you are making measurements in the field, the Keysight handheld spectrum analyzer family makes your job easier. They've got the features you need for operating in tough field environments, and their measurement performance gives you confidence the job's been done right. The HSAs let you automate routine tasks to save time and ensure consistent results.

- **Field ready:** Rugged design, without fans or vents, clear viewing day and night
- **Benchtop performance:**  $-164$  dBm/Hz DANL, 20 GHz sweep time  $< 0.9$  s
- **Task planner:** Reduces setup time by up to 95% while enabling test automation and improving consistency
- **Multi-functional:** Signal monitoring, interference hunting, EMI pre-compliance test, stimulus/response measurement, and AM/FM, ASK/FSK signal analysis



	N9340B	N9342C	N9343C	N9344C
Frequency range	9 kHz to 3 GHz	9 kHz to 7 GHz	9 kHz to 13.6 GHz	9 kHz to 20 GHz
DANL, normalized to 1 Hz	$-164$ dBm	$-164$ dBm	$-155$ dBm	$-155$ dBm
Phase noise	$-87$ dBc at 30 kHz $-120$ dBc at 1 MHz	$-89$ dBc at 30 kHz $-119$ dBc at 1 MHz	$-89$ dBc at 30 kHz $-119$ dBc at 1 MHz	$-89$ dBc at 30 kHz $-119$ dBc at 1 MHz
TOI	10 dBm	10 dBm	12 dBm	15 dBm
Auto tune	No	Yes	Yes	Yes
Built-in GPS	No	Yes	Yes	Yes
Full span sweep time	1 s	$< 0.4$ s	$< 0.7$ s	$< 0.9$ s
Optional measurement features	AM/FM/ASK/FSK signal analysis, stimulus/response measurement, spectrum monitoring, AM/FM IBOC measurement	AM/FM/ASK/FSK signal analysis, stimulus/response measurement, spectrum monitoring, channel scanner, cable antenna tester <sup>1</sup> , U2020/U2040 X-Series and U2000 Series USB power sensor support, time-gated sweep and security feature		

1. Cable antenna tester option is only available on N9342C HSA.



## FieldFox Handheld Analyzers

*Quality RF measurements in the field: Carry precision with you*

Measuring up and earning a spot in your field kit is the driving idea behind Keysight's FieldFox handheld analyzers. Compact and lightweight at 7.1 lbs or 3.2 kg, FieldFox eliminates the need to transport benchtop equipment to the field or carry multiple instruments. FieldFox offers budget flexibility allowing you to choose the capabilities you need today and easily upgrade later.

### Precise and portable

- Maximum frequency from 4 to 50 GHz across family of 22 models
- Measurement results agree with those obtained with benchtop analyzers
- Compact form factor measures 29 x 19 x 7 cm (11.5 x 7.4 x 2.8 in)
- Light weight at just 3.2 kg (7.1 lbs)

### Rugged and weather resistant

- Dust-free design with no fans or vents extends reliability in harsh environments
- Weather-resistant design withstands salty, humid environments
- MIL-PRF-28800F Class 2 compliant
- MIL-STD-810G, Method 511.5 Procedure I requirements for operation in explosive environments (type tested)
- Standard 3-year warranty



	Combination analyzers			Vector network analyzers		Spectrum analyzers	
Model number	N9912A	N9913/4/5/6/7/8A	N9950/1/2A	N9923A	N9925/6/7/8A	N9935/6/7/8A	N9960/1/2A
Maximum frequency range	4, 6 GHz	4, 6.5, 9, 14, 18, 26.5 GHz	32, 44, 50 GHz	4, 6 GHz	9, 14, 18, 26.5 GHz	9, 14, 18, 26.5 GHz	32, 44, 50 GHz
Cable and antenna analyzer	Standard			Optional		Optional (VSWR & RL)	
Vector network analyzer	Optional (1 port)	Optional		Standard		—	
QuickCal	Optional			Optional		—	
Full 2-port S-parameters	—	Optional		Optional		—	
VNA time domain	Optional			Optional		—	
Spectrum analyzer	Optional			—		Standard	
Real-time spectrum analyzer	—	Optional		—		Optional	
<b>NEW</b> Noise figure analyzer	—	Optional		—		Optional	
I/Q analyzer	—	Optional		—		Optional	
89600 VSA software support	—	Optional		—		Optional	
Interference analyzer	Optional			—		Optional	
Tracking generator	Optional			—		Optional	
Vector voltmeter	Optional			Optional		—	
Built-in power meter	Optional			—	Optional	Optional	
USB power sensor support	Optional			Optional		Optional	
DC voltage source	—	Optional		—	Optional	Optional	
iOS device remote control	Optional			Optional		Optional	

Additional options are available. For more information visit: [www.keysight.com/find/FieldFox](http://www.keysight.com/find/FieldFox)

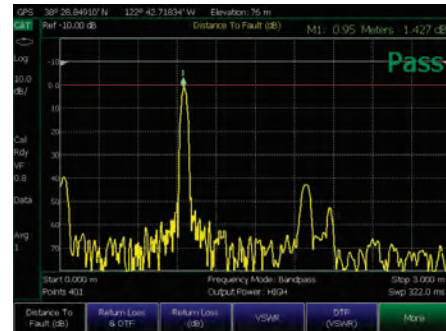
## Utilize the Industry's Most Comprehensive Handheld Analyzers

Now, FieldFox is going further by adding real-time spectrum analysis (RTSA) capability. FieldFox analyzers are equipped to handle routine maintenance, in-depth troubleshooting and anything in between. These rugged handhelds deliver precise microwave and millimeter-wave measurements wherever you need to go.

The FieldFox base combination model functions as a cable and antenna tester and can be configured to include a spectrum analyzer, RTSA, full 2-port network analyzer, and more.

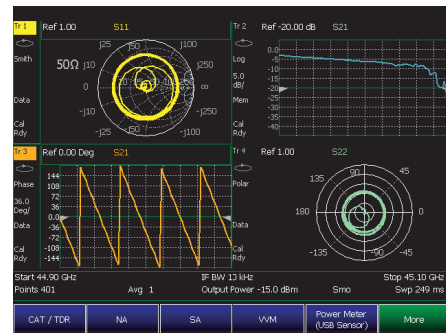
### Combination (cable and antenna analyzer)

- Distance-to-fault (DTF) and return loss/VSWR
- 1-port cable loss, 2-port insertion loss, and time-domain reflectometry (TDR)
- Integrated QuickCal for simple field measurements — no calibration kit required



### Vector network analyzer

- All four S-parameters, magnitude and phase
- Time-domain analysis, mixed-mode reflection S-parameters
- CalReady, QuickCal, full 2-port cal, TRL, waveguide cal, ECal support, and a Guided Calibration Wizard



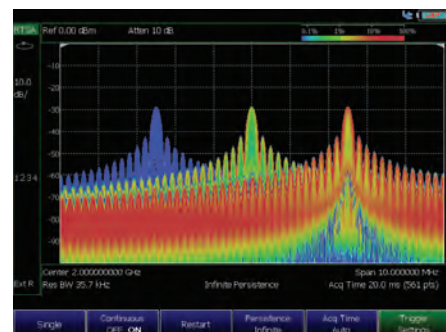
### Spectrum analyzer

- Unprecedented amplitude accuracy of  $\pm 0.5$  dB with InstAlign1 — no warm-up required
- Tracking generator, independent source, and preamplifier covering the full frequency range
- Channel power (CHP), occupied bandwidth (OBW), interference analysis, analog demodulation



### Real-time spectrum analyzer (RTSA)

- Capture signals as short as 12  $\mu$ s with 100% POI with a maximum 10 MHz real-time bandwidth and full amplitude accuracy
- Visualize small signals as short as 22 ns independent of amplitude accuracy
- Detect a low level signal in the presence of a high-power transmitter using the spectrum density view





## N9320B spectrum analyzer

(9 kHz to 3 GHz)

*Value-priced performance with robust measurement features*

- Ideal for R&D, manufacturing, bench repair and education
- $\pm 0.5$  dB overall amplitude accuracy
- Tracking generator: 100 kHz to 3 GHz
- -145 dBm DANL (preamp on)
- AM/FM and ASK/FSK demodulation analysis
- EMI resolution bandwidth (-6 dB)
- USB, LAN, GPIB connectivity; USB power sensor support



## N9322C spectrum analyzer

(9 kHz to 7 GHz)

*Broad measurement set with optimized performance and usability*

- Ideal for ISM band wireless, C-band satellite, military radio, component verification
- -152 dBm DANL (preamp on)
- 2 ms to 1000 s sweep time (span  $\geq 100$  Hz)
- 7 GHz tracking generator, built-in VSWR bridge
- AM/FM, ASK/FSK demodulation
- EMI resolution bandwidth (-6 dB) and quasi-peak detector
- USB, LAN, GPIB connectivity; USB power sensor support



## RF and microwave accessories kit

An assortment of antenna, filters, attenuators, cables, adapters and close-field probes provide a complete solution when using Keysight low-cost handheld and benchtop solutions.

[www.keysight.com/find/n9311x](http://www.keysight.com/find/n9311x)

N9311X-100  
Near Field Probes





## N9000B CXA signal analyzer

(9 kHz to 3.0, 7.5, 13.6 or 26.5 GHz)

*Master the essentials with the CXA*

Whether you're rapidly updating a next-generation product or revising an existing design, the CXA signal analyzer helps you perform signal characterization, circuit design verification, and troubleshooting. The CXA's built-in capabilities let you perform essential measurements of frequency, power, spurious and distortion without overspending your budget.

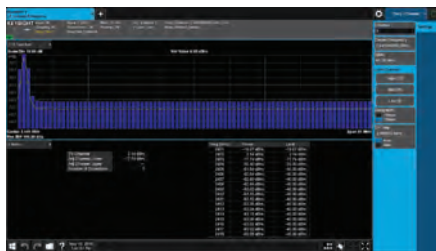
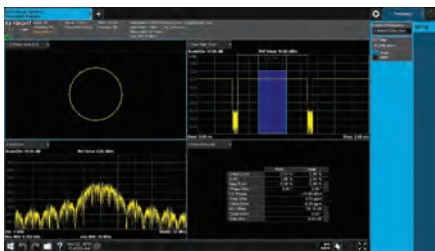
- Characterize signals and devices with general-purpose spectrum analysis and one-button PowerSuite measurements
- -163 dBm DANL @ 2 GHz (preamp on)
- Phase Noise (10 kHz offset) -110 dBc/Hz at 1 GHz
- Built-in tracking generator
- USB 2.0, LAN, GPIB and LXI Class C compliance

[www.keysight.com/find/cxa](http://www.keysight.com/find/cxa)



## X-Series measurement applications for CXA

*These apps provide fast, one-button RF conformance measurements to help you design, evaluate, and manufacture devices and equipment.*



Featured apps	Description
General purpose	Analog demodulation, phase noise, noise figure, pulse analysis, vector modulation analyzer (VMA), EMI emission measurements
Cellular communications	W-CDMA/HSPA+, LTE/LTE-Advanced FDD, NB-IoT and eMTC, LTE/LTE-Advanced TDD, GSM/EDGE/EVO
Wireless connectivity	WLAN 802.11, Bluetooth®, Bluetooth 5, ZigBee/Z-Wave

Complete offering available at [www.keysight.com/find/x-series\\_apps](http://www.keysight.com/find/x-series_apps)

Need an ESA spectrum analyzer replacement?  
Check out the ESA migration plan toward a CXA signal analyzer from our website: [www.keysight.com/find/ESA2CXA](http://www.keysight.com/find/ESA2CXA)

## U8903B audio analyzer

Measure and quantify analog and digital audio signals with a single box

- Offers combined functionality of a distortion meter, SINAD meter, frequency counter, AC voltmeter, DC voltmeter and FFT analyzer with a low-distortion audio source
- Configure 2 to 8 analog analyzer channels
- Two-in-one digital card covers AES3, SPDIF and DSI formats
- Measure speech quality with PESQ and POLQA options
- Measure audio quality directly from *Bluetooth* signal



## N9310A signal generator

Professional performance and compact size for general-purpose testing needs

- Ideal for benchtop R&D, education, field measurements, and manufacturing
- 9 kHz to 3 GHz frequency coverage with 0.1 Hz resolution
- Rugged body, large display and full-size front panel
- USB connectivity for test automation and memory stick support
- Extensive analog modulation: AM, FM, phase, & pulse modulation
- Optional I/Q modulator
- Optional precision frequency reference



### Effective FSK measurement solution

See how to easily check generic FSK transceiver measurements on the test bench.

 [FSK Modulation](#)



## X-Series Signal Generators

To know your device's behavior, you'll take many paths. That's the idea behind the X-Series signal generators. They produce the signals you need to test your design within and beyond its limits.

### MXG X-Series signal generator

*Reach better performance*

The pure and precise MXG X-Series signal generators are fine-tuned to be your “golden transmitter” in R&D. Whether you're pushing for a linear RF chain or an optimized link budget, MXG models deliver what you need: phase noise, output power, and more.

- Test radar receiver sensitivity or characterize ADCs with industry-leading phase noise
- Characterize nonlinear PA behavior with industry-leading output power



### EXG X-Series signal generator

*Achieve faster throughput*

The cost-effective EXG X-Series signal generators are optimized for manufacturing test. Analog models provide the signals you need for basic parametric testing of components, functional verification of receivers, and virtually anything in between.

- Thoroughly verify receiver performance by simulating complex analog modulation scenarios with multi-function generator capability
- Maximize throughput with < 800  $\mu$ s simultaneous switching of frequency and power



To reduce cost of ownership, the X-Series signal generators are designed for high reliability and fast, easy calibration, service, and repair.

	MXG: N5181B RF analog	EXG: N5171B RF analog
Frequency range	9 kHz to 3 or 6 GHz	9 kHz to 1, 3 or 6 GHz
Phase noise (20 kHz offset)	-146 dBc/Hz at 1 GHz	-122 dBc/Hz at 1 GHz
Spurious (non-harmonic)	-96 dBc at 1 GHz	-72 dBc at 1 GHz
Output power (1 GHz)	+26 dBm	+26 dBm
Switching speed	$\leq$ 800 $\mu$ s	$\leq$ 800 $\mu$ s
AM, FM, PM, pulse	■	■
LF function generator	■	■
Pulse train	■	■
Step/list sweep	■	■
USB power meter	■	■
BenchVue software enabled	■	■

## USB and LAN Power Sensors



USB power sensors plug directly into your PC or enabled Keysight instrument and give you the capability to measure power in a compact and portable form factor. All models feature internal zeroing to eliminate external calibration. Setup is fast and easy; just connect and start measuring immediately with BenchVue software.

### U2040/53/63 and L2050/60 X-Series USB/LAN peak and average wide dynamic range power sensors

- Wide power range, from  $-70$  to  $+26$  dBm; 10 MHz to 33 GHz
- Extremely fast measurement speed of 50,000 readings per second
- Accurate power measurements for any signal
- LAN/power over Ethernet (PoE) based sensor with thermal vacuum option (U2049XA)

### U2020 X-Series USB peak and average power sensors

- 50 MHz to 50 GHz;  $-45$  to  $+20$  dBm power range
- Fast pulse analysis with 30 MHz video bandwidth
- Greater than 25,000 readings per second

### U8480 Series USB thermocouple power sensors

- Wide frequency range DC to 120 GHz;  $-35$  to  $+20$  dBm power range
- Fastest available thermal power sensor
- Reference level accuracy with linearity less than 0.8 percent

### U2000 Series USB average power sensors

- 9 kHz to 24 GHz
- $-60$  to  $+20$  dBm or  $-30$  to  $+44$  dBm power range

## Power Meters



### P-Series N1911A/12A (single-channel/dual-channel)

- Key measurements: peak, average, peak-to-average ratio, rise time, fall time, and pulse width
- 30 MHz video bandwidth; 13 ns rise/fall time
- Single-shot real-time capture at 100 Msamples per second
- 22 predefined signal formats, including LTE
- USB, LAN and GPIB standard; LXI Core compliant



### EPM Series N1913A/14A (single-channel/dual-channel)

- Color LCD screen simplifies viewing and analysis
- Measurement speed up to 400 readings/second
- USB, LAN and GPIB standard; LXI Core compliant
- Option 201 comes with front and rear USB port, trigger in/out port, VGA port and front reference calibrator as a single package

Use these compatible sensors with your Keysight power meters

	Model number	N8480 Series sensors	P-Series sensors	E-Series E9320 sensors	E-Series E9300 sensors	E-Series CW sensors	8480D Series sensors	8486 waveguide sensors
P-Series	N1912A	$-35$ to $+20$ dBm	$-35$ to $+20$ dBm	$-65$ to $+20$ dBm	$-60$ to $+20$ dBm	$-70$ to $+20$ dBm	$-70$ to $-20$ dBm	$-70$ to $-20$ dBm
	N1911A							
EPM Series	N1914A	$-5$ to $+44$ dBm	NA	NA	$-30$ to $+44$ dBm			
	N1913A							

## Eliminate the Weak Links in Your Measurement System

### RF and microwave manual and programmable step attenuators

- Fast, precise signal-level control up to 50 GHz
- High reliability and exceptional repeatability reduces downtime
- Attenuation range of 121 dB in 1 dB steps

#### Fixed attenuators

- Precise attenuation, flat frequency response, and low SWR over broad frequency range up to 67 GHz



Model	Frequency range (DC to)	Type	Attenuation
8494G	4 GHz	Programmable	0 to 11 dB, 1 dB steps
8491A	12.4 GHz	Fixed	3, 6, 10, 20, 30, 40, 50, 60 dB
8495B	18 GHz	Manual	0 to 70 dB, 10 dB steps
8495D	26.5 GHz	Manual	0 to 110 dB, 10 dB steps

Model	Frequency range (DC to)	Type	Attenuation
84904L	40 GHz	Programmable	0 to 11 dB, 1 dB steps
8490G	67 GHz	Fixed	3, 6, 10, 20, 30, 40 dB
J7211 A/B/C	6/18/26.5 GHz	One box	0 to 121/101 dB, 1 dB steps

### Low-noise and system amplifiers for signal conditioning

- Broadband performance up to 50 GHz optimizes the operating range of your test systems
- Excellent noise figure and high gain significantly reduces overall test system noise figure

Type	Model	Frequency	Gain	Noise figure
Pre-amplifier	87405B	0.01 to 4 GHz	22 dB	5 dB
	87405C	0.1 to 18 GHz	25 dB	6 dB
	N4985A-S30	0.00001 to 30 GHz	30 dB	5 dB
	N4985A-S50	0.00001 to 50 GHz	27 dB	6 dB
System amplifier	83020A	2 to 26.5 GHz	30 dB	13 dB
	83050A	2 to 50 GHz	21 dB	10 dB



### Multi-channels attenuation control units J7204A/B (4-ch), J7205A/B (5-ch), DC to 6/18 GHz, 121 dB, 1 dB steps

- Exceptional 0.03 dB insertion loss repeatability per section for the entire 5 million cycles ensures accuracy and reduces calibration intervals
- Excellent attenuation accuracy and flatness ensure precise measurements
- Up to 5-channels enable multi-DUT measurements at one time




### High-Performance Electro-Mechanical Switches N1810UL/TL, 87104/6D, 87222D/E

- Exceptional 0.03 dB insertion loss repeatability cycles ensure accuracy and reduces calibration cycles over a long operating life of 5 million cycles
- Excellent isolation of more than 65 dB to 40 GHz reduces channel-to-channel crosstalk
- Broad selection of configuration of SPDT, SP4T, SP6T and transfer switches with operating frequency up to 50 GHz



## E5063A ENA vector network analyzer

- Various 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
- Supports all Keysight calibration kits including the N755xA economy ECal module
-  BenchVue software enabled



1. The E5063A starting frequency can be set down to 50 kHz.
2. Optional capability. Consists of conventional time domain analysis capabilities and GUI for PCB test.
3. Optional capability.
4. External software (Keysight N1500A Material Measurement Suite) required.

### E5063A highlights

Frequency <sup>1</sup>	100 kHz to 500 M, 1.5, 3, 4.5, 6.5, 8.5, 14 or 18 GHz
Test port	2-port 50 Ω S-parameter test set
Dynamic range	117 dB (spec.), 122 dB (typ.)
Trace noise	0.005 dBrms (spec.), 0.002 dBrms (typ.)
Stability	0.01 dB/°C
Source power	–20 to 0 dBm
Sweep type	Linear and log frequency, segment
NOP	10,001 points (max.)
Channel	32 channels (max.)
Key software capability	Fixture simulator, Time domain analysis/Test Wizard option <sup>2</sup> , Wireless power transfer analysis <sup>3</sup> , and Materials measurement <sup>4</sup>
Interface	LAN, USB (front 2, rear 4), USBTMC, GPIB <sup>3</sup> , Handler I/O <sup>3</sup>
Display	10.4 inch multi-touchscreen
Operating system	Windows 10

## P9370A and P9371A USB vector network analyzers (VNA)

- Compact, faceless, USB instruments
- Frequency range from 300 kHz up to 4.5 GHz, and 6.5 GHz
- Same measurements, automated code capabilities, calibration, metrology and intuitive GUI as benchtop VNAs
- Full 2-port with ability to extend the number of ports

See the Streamline Series of modular products on [page 30](#) for more details.



## N7550 Series electronic calibration modules (ECal)

- Frequency coverage from DC to 4, 6.5, 9, 14, 18, 26.5 GHz
- Supports Type N and 3.5 mm connectors
- Smaller, lighter 2-port ECal module
- Zero wait time for faster calibration
- Convenience of ECal with the performance of an economy mechanical kit



# The Keysight Essential Bench

## The deepest bench in the industry

Only Keysight delivers the industry's largest selection of bench instruments and groundbreaking BenchVue software — the zero-programming way to view, capture, and export the data you collect from your bench. To see the full portfolio of essential bench products offered by Keysight Authorized Distributors, visit: [www.keysight.com/find/essentialbench](http://www.keysight.com/find/essentialbench)

### 1. BenchVue software

Capture, visualize, and share data from multiple instruments with no need for programming.

See page 3

### 2. Oscilloscopes

See more of your signals and solve your toughest challenges with innovative scope technology.

See pages 16-22

### 3. Digital multimeters (DMMs)

Capture measurements quickly with graphical displays, on-screen analysis, and auto calibration.

See pages 23-25

### 4. Function/arbitrary waveform generators

Validate the most challenging designs with Trueform arbitrary waveforms, modulation, and two-channel synchronization.

See pages 26-27

### 5. Data acquisition/switch units

Simplify ad hoc testing with temperature and electrical signal measurement flexibility, universal channels, and no external signal conditioning.

See pages 28-29

### 6. Frequency counters/timers

Expand your measurement and analysis capabilities with histograms, trend/strip charts, statistics, data logging, and more.

See page 31

### 7. Power supplies

Enable faster, safer testing with built-in measurements, battery drain analysis/characterization, full DUT protection, and output sequencing.

See pages 32-37

### 8. Handheld instruments

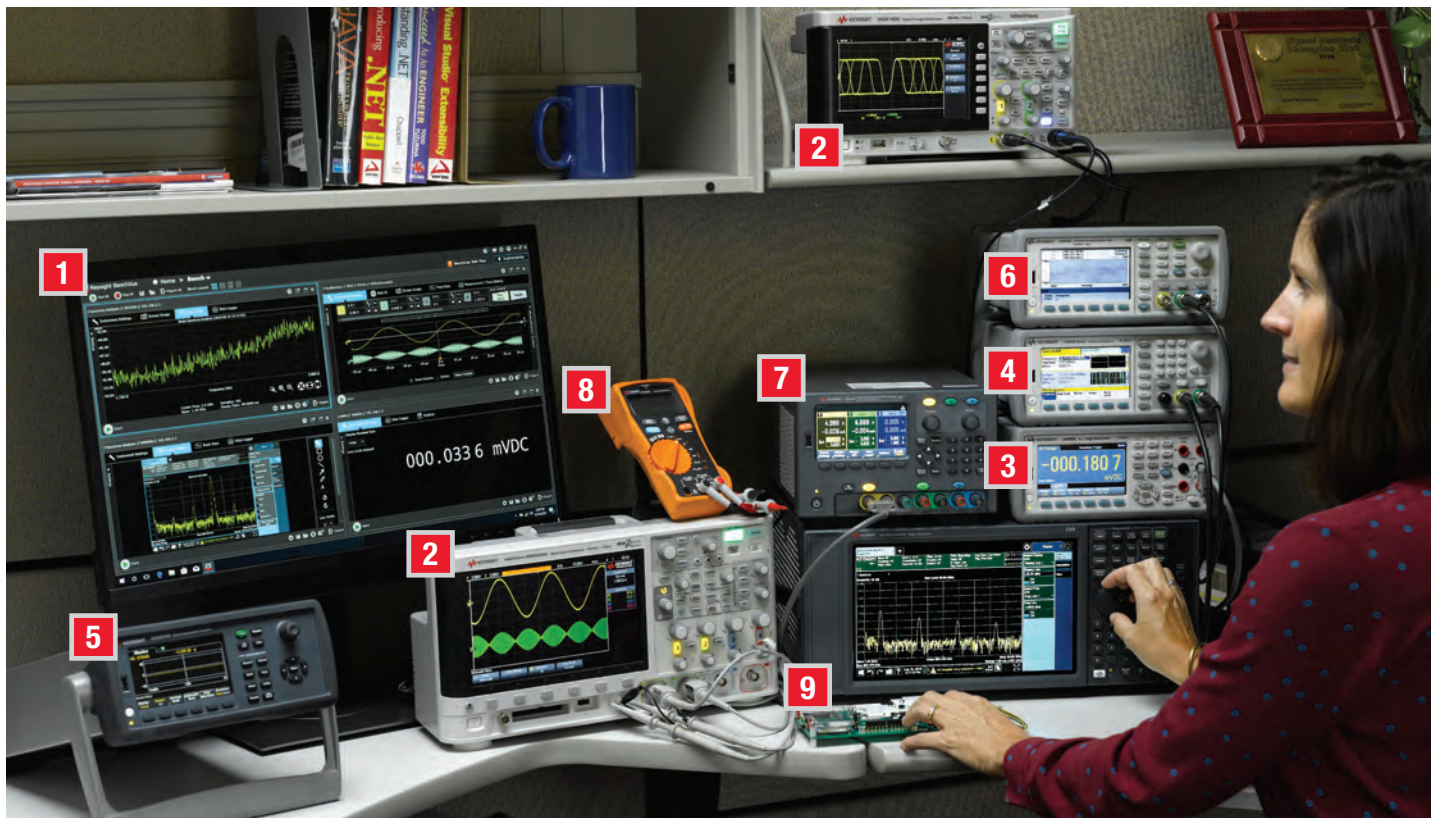
Handle a wider range of challenges with thermal image temperature measurements and fully featured multimeters with frequency counters, square waves, and wireless connectivity.

See pages 41-43

### 9. Spectrum/signal analyzers

Value-priced, general-purpose spectrum analysis.

See pages 8-9



## Digital Storage (DSO) and Mixed Signal (MSO) Oscilloscopes

**Get products to market faster.** Our award-winning oscilloscopes provide the fastest update rates, capacitive touch screen, and the most software options.

**Produce the highest-performing products.** Our scopes make measurements you can trust, thanks to industry-leading signal integrity and the largest selection of oscilloscope probes.

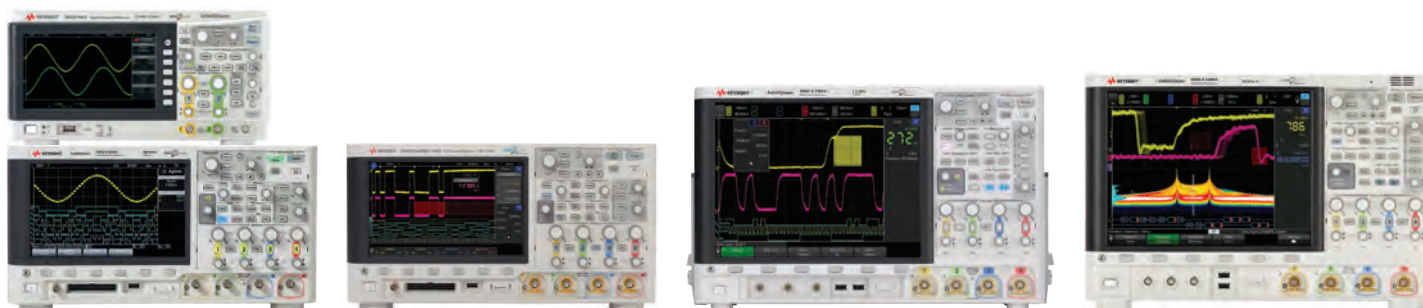
**Achieve the lowest cost of ownership.** Many of our oscilloscopes let you integrate several instruments in one mainframe and easily upgrade.

Model series	Bandwidth	Maximum memory	Maximum sample rate	Channels	Display	Update rate	Touch zone triggering	Instrument integration
InfiniiVision 1000 X-Series	50 to 200 MHz	1 Mpts and segmented memory standard on DSO models	2 GSa/s	2 or 4 analog +1 digital	7.0"	50,000 wfms/s	—	FRA (Bode plot) 5-digit counter 3-digit DVM 20 MHz WaveGen Protocol analyzer
InfiniiVision 2000 X-Series <sup>1</sup>	70 to 200 MHz	1 Mpts and segmented memory standard	2 GSa/s	2 or 4 analog + 8 digital <sup>2</sup>	8.5"	200,000 wfms/s	—	5-digit counter 3-digit DVM 20 MHz Function Gen Protocol analyzer
InfiniiVision 3000T X-Series	100 MHz to 1 GHz	4 Mpts and segmented memory standard	5 GSa/s	2 or 4 analog + 16 digital <sup>2</sup>	8.5" capacitive touch	1,000,000 wfms/s	Yes	FRA (Bode plot) 8-digit counter 3-digit DVM 20 MHz AWG Protocol analyzer
InfiniiVision 4000 X-Series	200 MHz to 1.5 GHz	4 Mpts and segmented memory standard	5 GSa/s	2 or 4 analog + 16 digital <sup>2</sup>	12.1" capacitive touch	1,000,000 wfms/s	Yes	FRA (Bode plot) 5-digit counter 3-digit DVM 20 MHz dual AWG Protocol analyzer
InfiniiVision 6000 X-Series	1 GHz to 6 GHz	4 Mpts and segmented memory standard	20 GSa/s	2 or 4 analog + 16 digital <sup>2</sup>	12.1" capacitive touch	450,000 wfms/s	Yes	FRA (Bode plot) 10-digit counter 3-digit DVM 20 MHz dual AWG Protocol analyzer

1. 2000X specifications for models manufactured after March 5, 2018, older models can be upgraded using DSOX2PLUS option.

2. +8 or +16 digital channels on mixed-signal oscilloscope models or DSO-to-MSO upgrade kits.


**NEW** InfiniiVision USB oscilloscopes, P9241/42/43A  
See [page 30](#) for details.





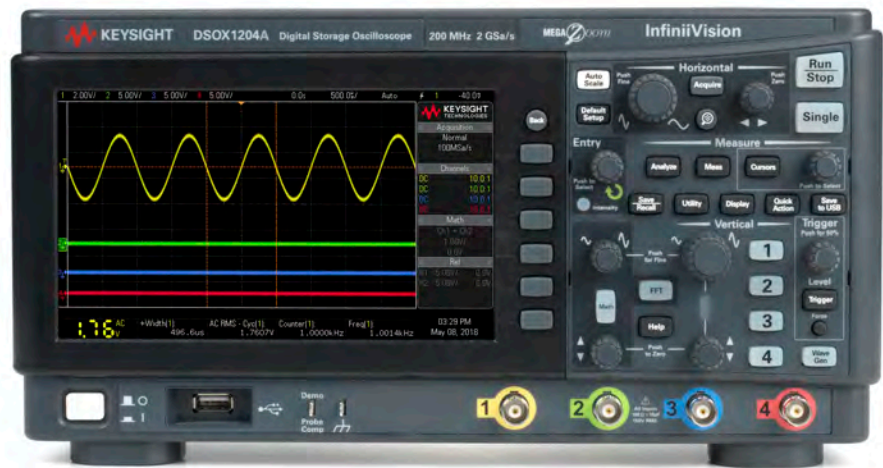
## InfiniiVision 1000 X-Series 50 to 200 MHz

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.

- Fast 50,000 waveforms/second update rate enhances signal visibility
- Key features for education customers: Keysight exclusive Bode plot display, integrated waveform generator, free education kit, online help, standard 10:1/1:1 switchable passive probes
- Enhanced usability with BenchVue software to quickly capture and log measurement data, get screen images, and traces for insight into your test challenges
-  BenchVue software enabled

[www.keysight.com/find/1000X-Series](http://www.keysight.com/find/1000X-Series)

**NEW** InfiniiVision 1000X-Series oscilloscopes, now with 4 channels and up to 200MHz.



Model series	Bandwidth (–3 dB)	Input channels	Sampling rate	Memory depth	Waveform update rate	Built-in WaveGen
DSOX1102A	70 MHz, upgradeable to 100 MHz	2	2 GSa/s	1 Mpts	50,000 wfms/s	No
DSOX1102G						Yes
EDUX1002A	50 MHz		1 GSa/s	100 Kpts		No
EDUX1002G						Yes
DSOX1204A	70 MHz, upgradeable to 200 MHz	4	2 GSa/s (half channels) 1 GSa/s (all channels)	1 Mpts		No
DSOX1204G						Yes

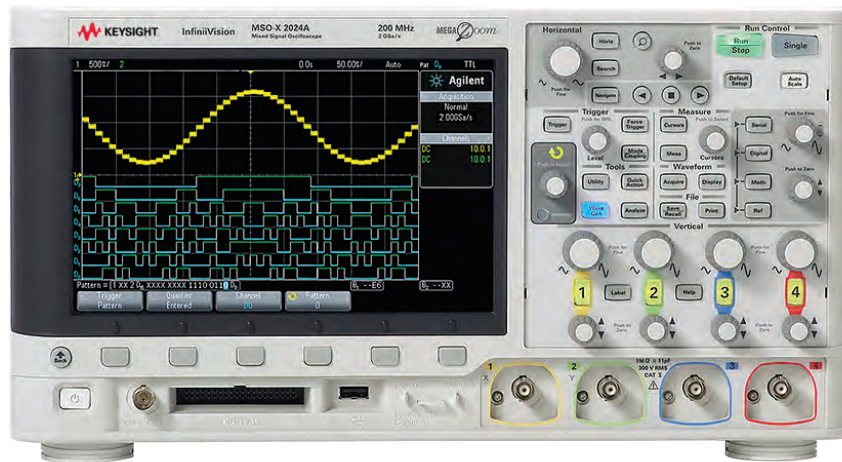
Get measurements you can count on to create the designs that will change the future. The 1000 X-Series leverages the same, proven technology we use in our higher-end InfiniiVision family, giving you professional-level measurements you can trust. Now you can get even more functionality with capabilities like 4-wire SPI decode and remote connection via LAN. Get the performance you need to measure with confidence.

## InfiniiVision 2000 X-Series oscilloscopes

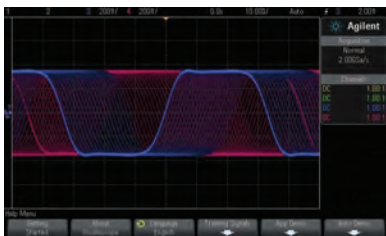
*Breakthrough technology delivers more scope for the same budget*

- 70 to 200 MHz economy scopes
- Hardware based mask testing as well as serial protocol trigger and decode for I2C, SPI, RS-232/UART, CAN, LIN
- Fully upgradeable: add bandwidth, digital channels, serial protocol trigger and decodes, measurement applications and WaveGen
- 5-year standard warranty

[www.keysight.com/find/2000X-Series](http://www.keysight.com/find/2000X-Series)



**LXI**



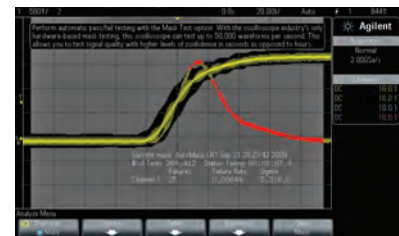
### Display

- High resolution 8.5" display
- Up to 200,000 wfms/s update rate
- Fast, responsive MegaZoom IV memory, 1 Mpts



### 5 instruments in 1

- Best-in-class oscilloscope
- Built-in WaveGen 20 MHz function generator with modulation capability (optional)
- Serial/protocol options



### Investment protection, upgradeable

- Bandwidth upgradeable
- MSO with integrated digital timing channels
- 3-digit digital voltmeter (optional)

Model series <sup>1</sup>	Bandwidth (–3 dB)	Input channels		Sampling rate	Memory depth	Waveform update rate
		DSOX	MSOX			
2002A	70 MHz	2	2 + 8	2 GSa/s	1 Mpts	200,000 wfms/s
2004A		4	4 + 8			
2012A	100 MHz	2	2 + 8			
2014A		4	4 + 8			
2022A	200 MHz	2	2 + 8			
2024A		4	4 + 8			

1. 2000X specifications for models manufactured after January 1, 2018, older models can be upgraded using DSOX2PLUS option.



## InfiniiVision 3000T X-Series oscilloscopes

*Touch, discover, solve*

- 100 MHz to 1 GHz digital storage and mixed signal scopes
- Standard Zone touch triggering
- Mixed domain analysis with time/frequency measurement correlation
- 20 MHz built-in WaveGen function/arbitrary generator with modulation capability
- Fully upgradeable: add bandwidth, digital channels, measurement applications, DVM, counter or WaveGen any time customer installable
- Calibration period of 3 years

[www.keysight.com/find/3000TX-Series](http://www.keysight.com/find/3000TX-Series)



LXI

## InfiniiVision 4000 X-Series oscilloscopes

*Oscilloscope experience redefined*

- 200 MHz to 1.5 GHz digital storage and mixed signal scopes
- 12.1-inch capacitive touch display
- Standard Zone touch triggering with up to 1,000,000 waveform updates/second update rate
- Built-in dual channel 20 MHz WaveGen function/arbitrary generator with modulation capability
- 3-year standard warranty

[www.keysight.com/find/4000X-Series](http://www.keysight.com/find/4000X-Series)



LXI

Model series	Bandwidth (–3 dB)	Input channels DSOX	MSOX	Sampling rate	Memory depth	Display size and type	Waveform update rate	Calculated rise time (10 to 90%)		
3012T	100 MHz	2	2 + 16	5 GSa/s half channel, 2.5 GSa/s all channel	Standard 4 Mpts, standard segment memory	8.5-inch capacitive touch display with standard zone trigger	> 1 million waveforms per second	≤ 3.5 ns		
3014T		4	4 + 16							
3022T	200 MHz	2	2 + 16							
3024T		4	4 + 16							
3032T	350 MHz	2	2 + 16							
3034T		4	4 + 16							
3052T	500 MHz	2	2 + 16							
3054T		4	4 + 16							
3102T	1 GHz	2	2 + 16							
3104T		4	4 + 16							
4022A	200 MHz	2	2 + 16			12.1-inch high-definition capacitive touch display				≤ 1.75 ns
4024A		4	4 + 16							
4032A	350 MHz	2	2 + 16							
4034A		4	4 + 16							
4052A	500 MHz	2	2 + 16							
4054A		4	4 + 16							
4104A	1 GHz	4	4 + 16							≤ 450 ps
4154A	1.5 GHz <sup>1</sup>	4	4 + 16							≤ 300 ps

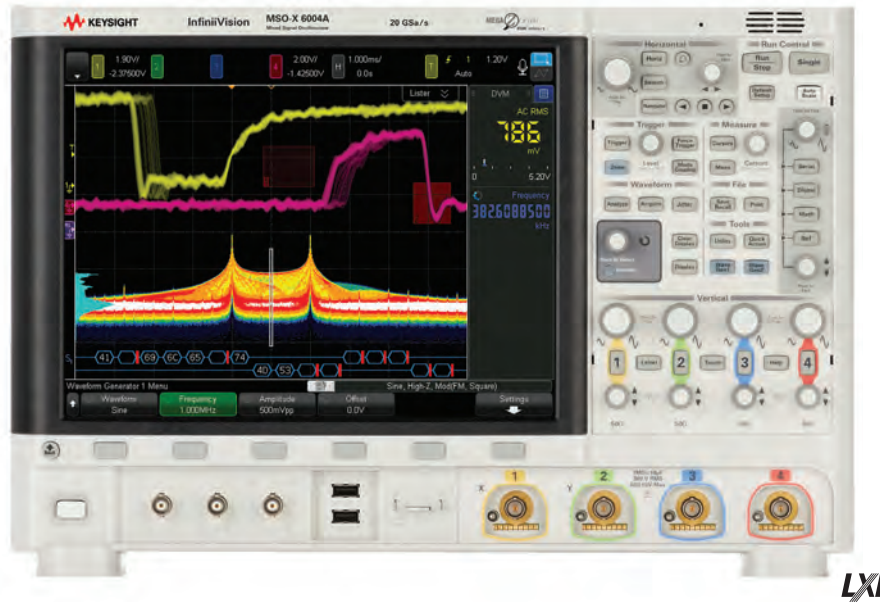
1. 1.5 GHz real-time bandwidth in half-channel mode or full-channel equivalent time mode.

## InfiniiVision 6000 X-Series oscilloscopes

*The new standard in price performance*

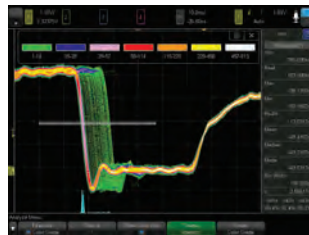
- 1 to 6 GHz digital storage and mixed signal scopes
- 12.1-inch capacitive multi-touch screen with Zone touch trigger
- Superior noise floor and waveform update rate
- Standard histogram and color grade, plus enhanced color FFT
- Optional jitter and real-time eye-diagram analysis
- Voice control in 14 languages

[www.keysight.com/find/6000X-Series](http://www.keysight.com/find/6000X-Series)



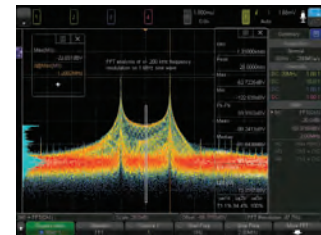
### Bandwidth standard

- Performance meets price: two opposing concepts meet in a portable 6-GHz oscilloscope



### New visualization standard

- Quickly troubleshoot your design by visualizing your challenges



### Integration standard

- Get the power of 6 instruments in 1, fully upgradeable

Model series	Bandwidth (–3 dB)	Input Channels		Sampling rate	Memory depth	Display size and type	Waveform update rate
		DSOX	MSOX				
6002A	1 to 6 GHz	2	2 + 16	20 GSa/s	4 Mpts	12.1-inch capacitive multi-touch screen, Hardware InfiniiScan Zone touch trigger	450,000 wfms/s <sup>1</sup>
6004A		4	4 + 16				

1. DSO only.

## Applications — Engineered to Turn Measurements into Answers

You need fast, accurate answers to your measurement questions. That's why Keysight offers the broadest selection of compliance and debugging applications in the industry. Our applications work with your oscilloscope to quickly and easily provide exceptional insight into your signals.

### Add additional functionality

*Instantly integrate instruments or upgrade your scope's functionality*

The Education Training Kit and built-in DVM are now standard on all InfiniiVision oscilloscopes.

Applications	1000 X-Series	2000 X-Series	3000T X-Series	4000 X-Series	6000 X-Series
WaveGen function generator	■	■			
WaveGen arbitrary/function generator			■	■	■
Frequency Response Analysis (FRA)	■		■	■	■
DSO to MSO upgrade kit		■	■	■	■



### Debug your designs faster

*Decode serial bus designs & deploy FPGAs with hardware-based analysis software*

Applications	1000 X-Series	2000 X-Series	3000T X-Series	4000 X-Series	6000 X-Series
USB 2.0 triggering and decode				■	■
I2C/SPI trigger and decode	■	■	■	■	■
RS-232/UART trigger and decode	■	■	■	■	■
CAN/LIN trigger and decode	■	■	■	■	■
SENT trigger and decode			■	■	■
I2S trigger and decode			■	■	■
Mil-Std 1553/ARINC 429 trigger and decode			■	■	■
CXPI trigger and decode			■	■	■
FlexRay trigger and decode			■	■	■
Manchester/NRZ trigger and decode			■	■	■
HDTV video analysis			■	■	■
Power measurement and analysis			■	■	■
USB signal quality test				■	■
NFC triggering and automated test			■	■	



### Simplify your job

*PC-based software, limit testing and segmented memory all help organize your data*

Applications	1000 X-Series	2000 X-Series	3000T X-Series	4000 X-Series	6000 X-Series
Mask/waveform limit testing	Standard on DSO models	■	■	■	■
Segmented memory	Standard on DSO models	Standard	Standard	Standard	Standard
Infinium Offline	■	■	■	■	■
PC-based analysis software	■	■	■	■	■
BenchVue software enabled	■	■	■	■	■
Software application bundle		■	■	■	■
Jitter					■



## Probes — Engineered for Signal Access and Measurement Accuracy

To get top performance from your scope, you need the right probe for your application. Keysight offers a broad selection.

### N7026A clamp current probe and N7040/1/2A Rogowski AC current probe

Accurate measurements in tight spots

- These two new current probes enable you to measure wider ranges
- Probe down to 1 mA/div with the high sensitivity clamp on current probe
- Measure up to 3,000 A<sub>pk</sub> with the new Rogowski coil probe

[www.keysight.com/find/N7026A](http://www.keysight.com/find/N7026A) | [www.keysight.com/find/N7040A](http://www.keysight.com/find/N7040A)



### N2820A and N2821A high sensitivity current probes

See the big picture without losing sight of the details

- Ideal for measuring current consumption of battery-powered devices or integrated circuits
- Measure AC and DC currents as low as 50 µA, and as high as 5 A
- Also use as a voltage probe with as low as 3 µV sensitivity
- Bandwidth; 3 MHz Zoom-Out Channel, 500 kHz Zoom-In Channel

[www.keysight.com/find/N2820A](http://www.keysight.com/find/N2820A)



### N7020A power rail probe

Industry's most accurate view of DC power rail behavior up to 2 GHz

- 2 GHz single-ended active probe for power rail noise measurements
- 16x less noise than a conventional 1:1 differential probe
- Low DC loading with input impedance of 50 kΩ
- Large offset range (±24 V) enables use of the max vertical sensitivity of a scope

[www.keysight.com/find/N7020A](http://www.keysight.com/find/N7020A)



	1000 X-Series	2000 X-Series	3000T X-Series	4000 X-Series	6000 X-Series
Scope bandwidth	50 to 100 MHz	70 to 200 MHz	100 MHz to 1 GHz	200 MHz to 1.5 GHz	1 to 6 GHz
Probe interface	BNC	BNC	AutoProbe Lite		
Standard probe (scope bandwidth)	N2140A (70 MHz/100 MHz) N2142A (50 MHz)	N2862B (70 MHz/100 MHz) N2863B (200 MHz)	N2843A (all)	N2894A (all)	
Passive probe	1:1 N2140A/ N2142A	10070D, N2870A			
	10:1 N2140A/ N2142A	N2862B, N2863B, N7007A	N2862B, N2863B, N2890A, N2871A, N7007A	N2894A, N7007A	
High-voltage passive probe	100:1 10076C				
Low Z passive probe	N2874A, N2876A				
Active differential probes (high speed)	—		N2750A, 1130B <sup>1</sup>		N2750A/51A/52A, 1130B/31B/32B <sup>1</sup>
(high voltage)	N2791A, N2891A	N2791A, N2891A	N2790A/91A/92A/93A, N2818A/19A, N2891A, N2804A/05A		
Active single-ended probe	—		N2795A/96A/97A	N2795A/96A/97A, N7020A	N2795A/96A/97A
Current probe	1146B, N2780B/81B/82B/83B <sup>2</sup> , N7040A	1146B, N2780B/81B/82B/83B <sup>2</sup> , N7040A	1146B, 1147B, N2893A, N2780B/81B/82B/83B <sup>2</sup> , N2820A/21A, N7026A, N7040A		

1. Order one or more InfiniiMax. Probe heads or connectivity kits required per amplifier model shown.  
2. Requires N2779A power supply.

## Truevolt Digital Multimeters

Lower DC current ranges and faster reading rates, allows enhanced measurements

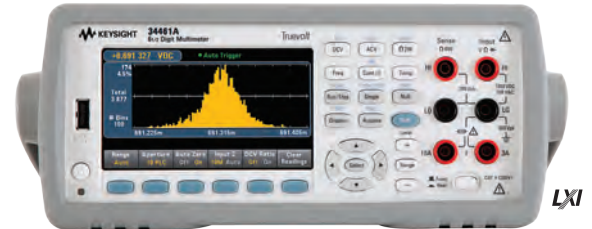
**Get more insight quickly.** Truevolt digital multimeters (DMMs) graphical capabilities such as trend and histogram charts offer more insights quickly. Both models also provide a data logging mode for easier trend analysis and a digitizing mode for capturing transients.

**Measure low-power devices.** The ability to measure very low current, 1  $\mu\text{A}$  range with pA resolution, allows you to make measurements on very low power devices.

**Maintain calibrated measurements.** Auto calibration allows you to compensate for temperature drift so you can maintain measurement accuracy throughout your workday.

### 34460A/34461A Basic Truevolt DMMs

- Up to 1,000 readings/s at 4½ digits
- 12 measurement functions including temperature
- Up to 10 k readings internal memory
- Color, graphical display, with built-in graphics, math, and statistics
- 34461A DMM is a replacement for the previous-generation 34401A model



### 34465A/34470A Performance Truevolt DMMs

- Measure sleep and standby current with pico-amp resolution
- View DC and AC volts with dual display
- 1  $\mu\text{A}$  range and up to 50,000 rdgs/sec



	Bench / System		Performance	
	34460A	34461A	34465A	34470A
Digits of resolution	6½	6½	6½	7½
1 year DCV accuracy	0.0075%	0.0035%	0.0030%	0.0016%
Maximum measurement speed (readings/s)	300	1,000	5,000 std/ 50,000 opt	5,000 std/ 50,000 opt
DC, True RMS AC voltage ranges	100 mV – 750 V	100 mV – 750 V	100 mV – 750 V	100 mV – 750 V
DC, True RMS AC current ranges	100 $\mu\text{A}$ – 3 A	100 $\mu\text{A}$ – 10 A	1 $\mu\text{A}$ – 10 A	1 $\mu\text{A}$ – 10 A
2- and 4-wire resistance rang	100 $\Omega$ – 100 M $\Omega$	100 $\Omega$ – 100 M $\Omega$	100 $\Omega$ – 1 G $\Omega$	100 $\Omega$ – 1 G $\Omega$
Frequency range	3 Hz – 300 kHz	3 Hz – 300 kHz	3 Hz – 300 kHz	3 Hz – 300 kHz
Diode/continuity	5 V / yes	5 V / yes	5 V / yes	5 V / yes
Other measurements	Capacitance, temperature, period	Capacitance, temperature, period	Capacitance, temperature, period	Capacitance, temperature, period
Connectivity	USB, LAN (opt), and GPIB (opt)	USB, LAN, and GPIB (opt)	USB, LAN, and GPIB (opt)	USB, LAN, and GPIB (opt)



## Digital Multimeters

*Lab accuracy at production-line speeds*

### U3606B 5½ digit multimeter/30 W DC power supply

*Get twice the measurement functionality in half the space*

- Allows simultaneous supply-and-measure operations
- DMM: 120,000 count resolution with DCV accuracy 0.025%
- Power supply: Four output ranges with over-voltage and over-current protection, auto ramp and scan function and square-wave output
- Securable with PC-grade physical lock
- Not BenchVue software enabled



### 34450A 5½ digit dual-display DMM

*Achieve throughput breakthrough in a low-cost DMM*

- 11 measurement functions, including temperature and capacitance
- Ultra-bright OLED with dual display capability
- Up to 50,000 memory points, log up to 14 hours of data



### B2980A Series femto / picoammeter and electrometer / high resistance meter

*Quickly and accurately evaluate your DUTs with precision/low-noise sourcing and easy-to-use GUI*

- World's-best current measurement resolution of 0.01 fA (0.01 x 10<sup>-15</sup> A)
- Resistance measurements up to 10 PΩ (10 x 10<sup>15</sup> Ω)
- 4.3" liquid crystal display that supports a variety of viewing modes (numeric, graph, trend chart and histogram)
- Available in battery-powered versions for low-level measurements in the presence of AC power line noise







## 34420A 7½ digit nanovolt/micro-ohm meter

High sensitivity for low-level measurements, plus resistance and temperature

- 0.1 ppm transfer accuracy
- 100 pV/100 nΩ sensitivity
- Low-noise voltage measurements with resistance and temperature functions



## 3458A 8½ digit performance DMM

Accelerate every test with high-throughput and high-speed math and statistics

- 8½ digit resolution with 0.05 ppm transfer accuracy
- Measurements include DC & AC voltage, DC & AC current, 2- and 4-wire resistance, frequency and period
- Performance leader with max. reading rate of 100,000 readings/s
- Not BenchVue software enabled



### Measure low current with 1 pA resolution

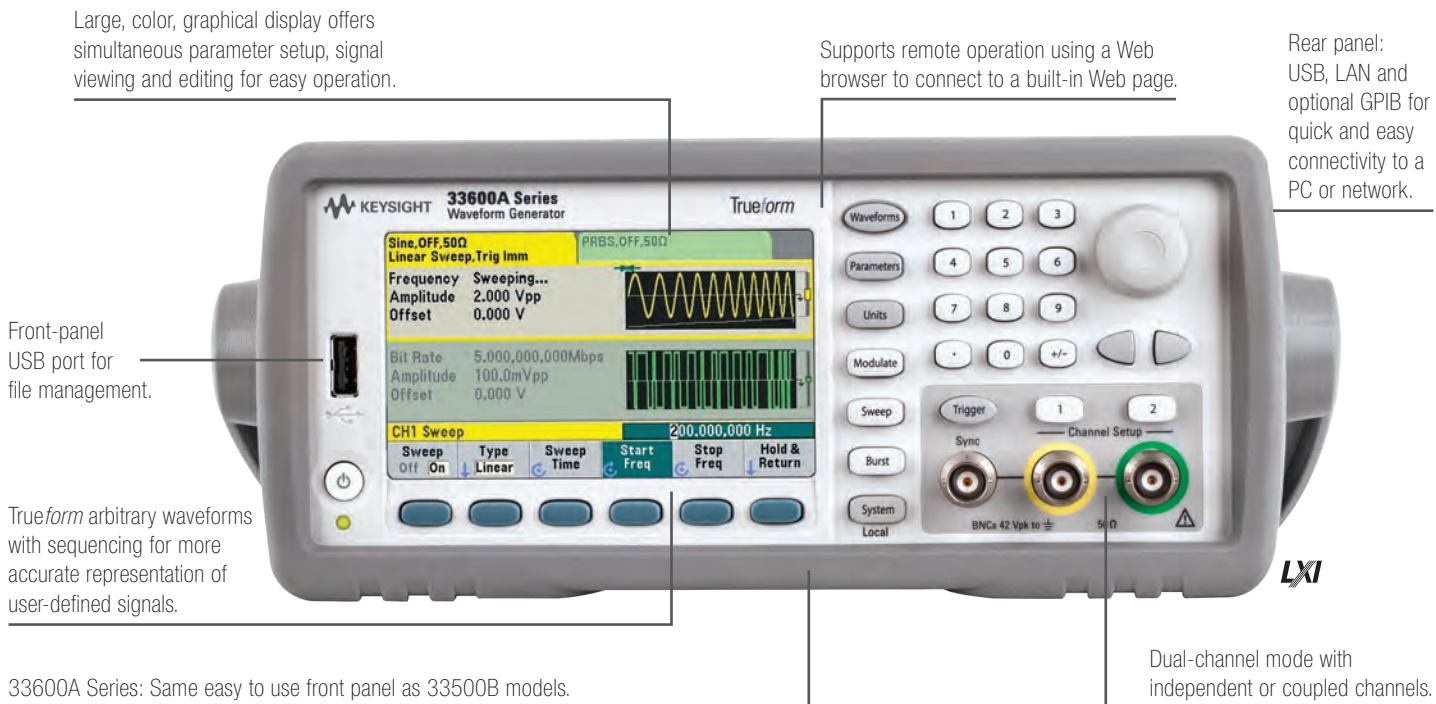
This video shows the low current measuring capabilities of the 34465A and 34470A DMMs. Using a small piezo-electric generator, we show just how useful low current measurements are.

[▶ Measuring Low Currents with a DMM](#)



## Trueform Waveform Generators

Superior signal fidelity with Trueform technology provides the highest resolution, lowest distortion and lowest jitter when compared to DDS function/arbitrary waveform generators all at a comparable price.



### 33600A Series Trueform waveform generators

Four upgradeable models are available at 80 and 120 MHz with 1- and 2-channels. The 33600A Series offers a full set of standard features and an optional baseband IQ signal player.

- 80 and 120 MHz, 1- and 2-channel models
- 2-channel coupling and synchronization
- Trueform arbitrary waveforms with sequencing
- PRBS serial patterns

	33611A	33612A	33621A	33622A
Number of channels	1	2	1	2
Frequency	1 $\mu$ Hz to 80 MHz sine		1 $\mu$ Hz to 120 MHz sine	
Standard waveforms	Sine, square, ramp, pulse, triangle, Gaussian noise, PRBS, DC			
Arbitrary waveforms	Trueform arbitrary waveforms with sequencing, 4 MSa/channel memory, optional 64 MSa/channel			
Sampling rate, resolution	660 MSa/s, 14-bits		1 GSa/s, 14-bits	
Modulation types	AM, FM, PM, FSK, BPSK, PWM, Sum (carrier + modulation)			
Burst	Counted or gated			
Sweep	Linear, logarithmic and frequency list			
Total harmonic distortion and jitter	<0.03% THD and < 1 ps jitter			
Timebase	TCXO standard, OCXO optional for higher stability			
Options and security	IQ baseband signal player, NISPOM and file security, OCXO high-stability timebase			
Connectivity	USB, LAN, GPIB (optional)			



## 33500B Series Trueform waveform generators

Eight upgradeable models are available at 20 and 30 MHz with 1- and 2-channels. The 33500B Series offers a full set of standard features and an optional baseband IQ signal player.

- Sine waves with up to 5x lower harmonic distortion
- Pulses up to 30 MHz with <40 ps jitter
- Individual arbitrary waveform segments that can be sequenced
- 16 bits of resolution with 1 mVpp to 10 Vpp amplitude

	33511B	33512B	33521B	33522B	33509B	33510B	33519B	33520B
Number of channels	1	2	1	2	1	2	1	2
Frequency	20 MHz	20 MHz	30 MHz	30 MHz	20 MHz	20 MHz	30 MHz	30 MHz
Standard waveforms	Sine, square, ramp, pulse, triangle, Gaussian noise, PRBS (pseudorandom binary sequence), DC							
Arbitrary waveforms	Trueform arbitrary waveforms with sequencing, 1 MSa/channel standard, 16 MSa/channel optional				Optional arbitrary waveforms			
Sampling rate, resolution	160 MSa/s, 16 bits		250 MSa/s, 16 bits		160 MSa/s, 16 bits		250 MSa/s, 16 bits	
Modulation types	AM, FM, PM, FSK, BPSK, PWM, sum (carrier + modulation)							
Burst	Counted or gated							
Sweep	Linear, logarithmic and frequency list							
Timebase	TCXO standard, OCXO optional for higher stability							
Total harmonic distortion and jitter	<0.04% THD and <40 ps jitter (rms)							
Options and security	IQ baseband signal player (only available on 33512B/22B), NISPOM and file security, OCXO high-stability timebase							
Connectivity	USB, LAN, GPIB							

## 33210A 10 MHz function generator

The most affordable model for basic functions and waveforms

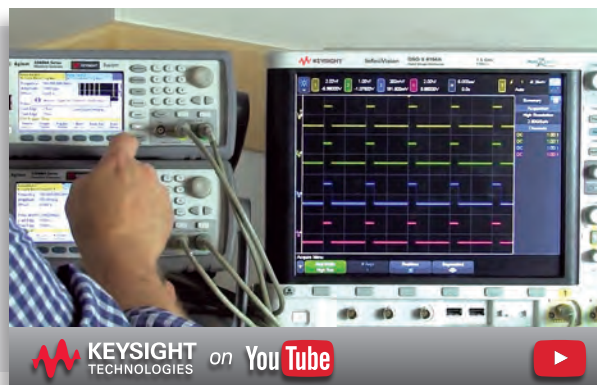
- 10 MHz sine and square waveforms
- Ramp, triangle, noise, pulse generation with variable edge, and DC waveforms
- AM, FM, and PWM modulation, linear and logarithmic sweeps and burst all standard
- Arbitrary waveforms optional



Don't know how to phase synchronize multiple waveform generators?

Watch this video to see how easy it is.

[▶ Synchronizing Multiple Waveform Generators](#)



## 34980A multifunction data acquisition switch / measure unit

*Achieve maximum versatility in a minimum footprint*

This 8-slot mainframe includes a choice of 21 optional plug-in modules for custom configurations. As a one-instrument solution it is ideal for medium to high-density switch/measure applications in design verification, automated test, and data acquisition applications.

- Optional built-in 6½ digit DMM — make 11 measurements with up to 3,000 readings/s
- High-performance switching — up to 560 2-wire multiplexer channels or 4,092 matrix cross-points in one mainframe
- Built-in USB, LAN, and GPIB
- Keysight BenchLink Data Logger Pro software (34832A) for high-speed data logging and a convenient way to collect and analyze data with no programming



### 21 modules to choose from

Model	Description	Key specifications
34921A-25A	Multiplexers	Up to 300 V/1 A
34931A-33A	Matrix switches	Up to 128 crosspoints
34934A	High-density matrix switch	512-crosspoint reed matrix
34937A/38A	GP switches	1 A and 5 A
34939A	High-density GP switch	64-channel Form A channels up to 60 W
34941A/42A	RF switches	50 or 75 ohms
34945A	µW switch/attenuation driver	Drive 64 coils
34946A/47A	µW switches	SPDT switch to 26.5 GHz
34950A-34959A	System control	Choose from D/A, DIO, counter and breadboard

## BenchVue Software Data Acquisition application

Easily control Keysight data acquisition units to configure channels, execute scan lists and log data. Clearly analyze or view measurement data using visualization tools and a broad choice of display options.

BenchVue software supports 34970A, 34972A and DAQ970A modules.

34980A BenchVue DAQ software coming soon!



## NEW DAQ970A data acquisition / switch units

Get the next-generation data acquisition (DAQ) system with a 3-slot mainframe and your choice of 8 plug-in modules. Interface with the DAQ using Keysight BenchVue DAQ software, the intuitive graphical front panel with task oriented, self-guiding menus, or a web browser.

- Advanced 6½ digit internal DMM with improved accuracy and faster measurement speed
- Ability to measure very low current ranges (1 µA DC and 100 µA AC) and higher resistance range (1000 MΩ)
- New auto-calibration that compensates for internal drifts caused by time and temperature changes
- 3497XA compatible, program and configuration

### PLUS

- All modules have been updated to have improved switching speeds and accuracies
- NEW DAQM900A solid state multiplexer with scan rate speed of up to 450 channels/sec



## 34970A / 34972A data acquisition / switch units

- 3-slot mainframe and your choice of 7 plug-in modules
- 6½ digit (22-bit) internal DMM provides 11 measurement functions without needing external signal conditioning
- 50 k readings of non-volatile memory holds data when power is removed



Description	34970/72A modules	DAQ970A modules	Key specifications
20-channel solid-state multiplexer	—	DAQM900A	up to 450 ch/s
20-channel multiplexer + 2 current channels	34901A	DAQM901A	Armature 2/4 wire, 60 ch/s (80 ch/s for DAQ970A), up to 300 V, 1 A
16-channel multiplexer	34902A	DAQM902A	Reed 2/4 wire, 250 ch/s, up to 300 V, 50 mA
20-channel actuator/GP switch	34903A	DAQM903A	SPDT/Form C, 120 ch/s, up to 300 V, 1 A
4x8 matrix	34904A	DAQM904A	Armature 2-wire, 120 ch/s, up to 300 V, 1 A
2 GHz, dual 4-channel, RF mux, 50Ω	34905A	DAQM905A	Common low (not terminated, 60 ch/s up to 42 V, 0.7 A
Multifunction module	34907A	DAQM907A	Two 8-bit digital I/O ports, up to 42 V, 400 mA 26-bit 100 kHz event counter, up to 42 V Two 16-bit analog outputs, up to ±12 V, 10 mA
40-channel single-ended multiplexer	34908A	DAQM908A	Common low (no 4-wire meas.) 60 ch/s, up to 300 V, 1 A



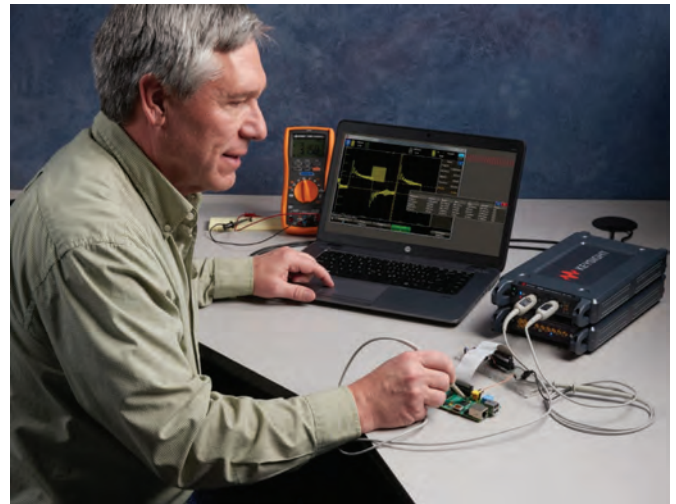
## USB Products

Compact form with zero compromise in performance

- New faceless USB instruments controlled via PC
- Same technology and measurements as Keysight benchtop and modular instruments
- High-performance USB 3.0 interface

[www.keysight.com/find/streamline-series](http://www.keysight.com/find/streamline-series)

	Vector Network Analyzer (VNA)	Oscilloscope
Model	P9370A/P9371A	P9241A/P9242A/P9243A
Bandwidth	300 kHz to 6.5 GHz	200 MHz, 500 MHz and 1 GHz
Additional capabilities	<ul style="list-style-type: none"> <li>– Full 2-port</li> <li>– Ability to extend the number of ports</li> <li>– Same calibration and metrology as all trusted Keysight VNAs</li> <li>– Automatic fixture removal</li> <li>– Time domain analysis</li> <li>– Scalar / mixer converter measurements</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>
BenchVue software enabled	No	No



[www.keysight.com/find/connectivity](http://www.keysight.com/find/connectivity)



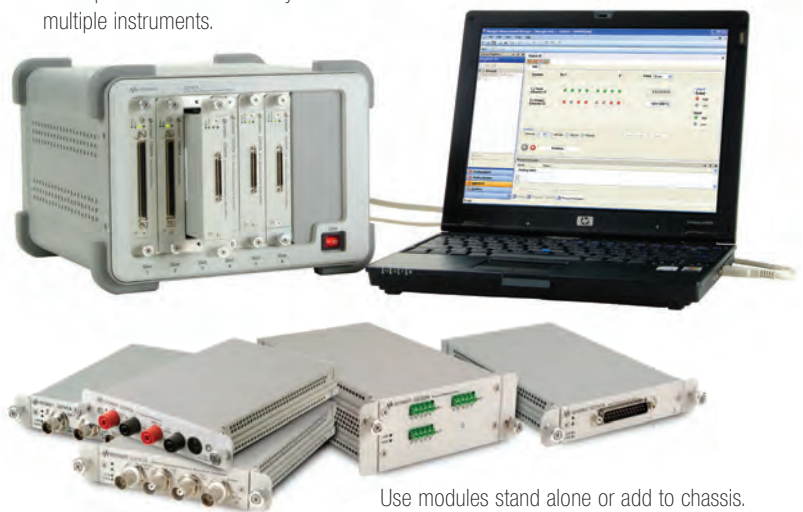
## USB modular instruments

- U2701A/02A 100/200 MHz oscilloscope
- U2722A/23A 3-channel source measure unit
- U2741A 5½ digit digital multimeter
- U2761A 20 MHz function generator
- U2751A 4x8 switch matrix

U2781A USB modular product chassis can host up to six modules and synchronize multiple instruments.

## USB modular data acquisition

- U2300 Series USB modular multifunction DAQ devices
- U2500 Series USB modular simultaneous-sampling multifunction DAQ devices
- U2600 Series USB modular isolated digital I/O devices
- U2802A 31-channel thermocouple input module



Use modules stand alone or add to chassis.

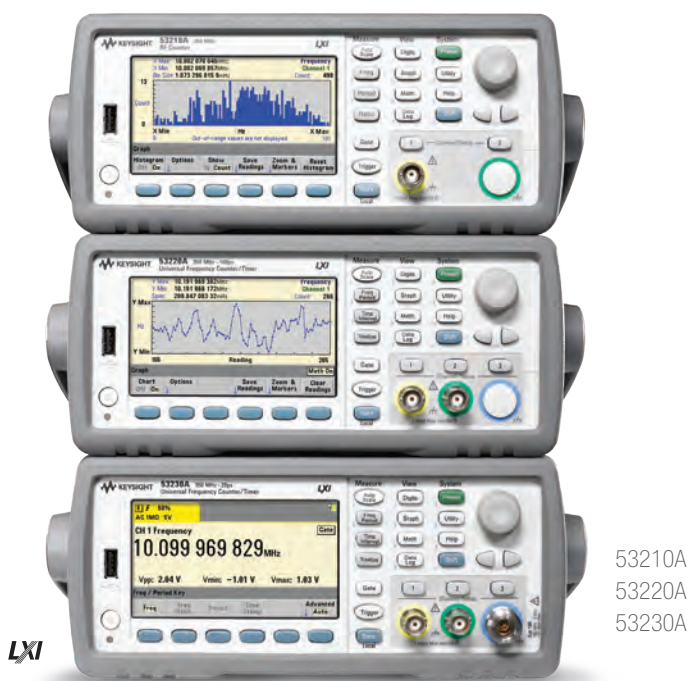
Converters	
82357B	USB/GPIB interface
E5810B	LAN/GPIB/USB gateway

GPIB cards, cables, and adapters	
82350C	High performance PCIe GPIB interface card
10834A	GPIB to GPIB adapter
10833A/B/C/D/F or G	GPIB cables

## 53200 Series RF and universal frequency counters/timers

*Accelerate measurement and analysis with histograms, trend charts and statistics*

- 350 MHz, with options up to 15 GHz
- Advanced capabilities: histograms, trending, data logging, optional pulse/burst microwave measurements
- 20 ps single-shot time interval measurements
- Continuous, gap-free measurements, with time stamps on signal edges
- Onboard memory for 1 M readings
- 53181A, 53131A, 53132A counter emulation mode



53210A  
53220A  
53230A

	53210A	53220A	53230A
Type	1 channel; optional RF channel	2-channel universal; optional RF channel	
Measurements	Frequency, frequency ratio, period, max./min./peak-to-peak input voltage		
		Time interval, rise/fall time, single period, pulse width, duty cycle, phase, totalize	
Analysis		NA	Timestamp/modulation domain analysis
	Math: smoothing (reading moving average), scaling, $\Delta$ -change, null		
Frequency range (optional)	Statistics: mean, standard deviation, max., peak-to-peak, count; full color display for trendline, histograms		
		Allan deviation	
Frequency resolution	10 digits/s	DC to 350 MHz (6 or 15 GHz)	
Time interval	NA	100 ps	12 digits/s
Connectivity		20 ps	
		USB, LAN, and GPIB	

## 53140 Series CW microwave counters

*CW frequency counter, true power meter and digital volt meter in one portable package*

- Channel 1: 10 Hz to 125 MHz
- Channel 2: 50 MHz to 20, 26.5 or 46 GHz
- True power meter with a selection of sensors including thermocouple power sensors
- DC DVM to assist with antenna alignment and telecom power-supply measurements
- GPIB and RS-232 interfaces
- Portable and rugged with optional battery for field use
- Not BenchVue software enabled



## Power Supply Collection





*Low-noise, accuracy and speed*

Our broad selection of both bench-friendly and system-ready instruments meet your test challenges from basic to your most complex.




### DC bench power supplies

E36100 Series	E36300 Series	E3600 Series	U8000 Series
			
<ul style="list-style-type: none"> <li>– 5 models</li> <li>– 1 output</li> <li>– 30 to 40 W</li> <li>– Testing low power devices</li> </ul>	<ul style="list-style-type: none"> <li>– 3 models</li> <li>– 3 outputs</li> <li>– 80 or 160 W</li> <li>– Power and characterizing devices</li> </ul>	<ul style="list-style-type: none"> <li>– 7 models</li> <li>– 1 or 2 outputs</li> <li>– 30 to 100 W</li> <li>– Testing higher power devices</li> </ul>	<ul style="list-style-type: none"> <li>– 4 models</li> <li>– 1 to 3 outputs</li> <li>– 90 to 375 W</li> <li>– Economical manual device testing</li> </ul>

### DC system power supplies

N6700 Modular Series	N5700 Series	N8700 Series	N8900 Series
			
<ul style="list-style-type: none"> <li>– 30+ modules</li> <li>– 1 to 4 outputs per mainframe</li> <li>– 50 to 300 W per output</li> <li>– Modular flexible to expand and change with your testing needs over time</li> </ul>	<ul style="list-style-type: none"> <li>– 24 models</li> <li>– 1 output</li> <li>– 750 or 1500 W</li> <li>– Meets your test needs in a compact size</li> </ul>	<ul style="list-style-type: none"> <li>– 21 models</li> <li>– 1 output</li> <li>– 3300 or 5000 W</li> <li>– Meets your high-power test needs in a compact size</li> </ul>	<ul style="list-style-type: none"> <li>– 28 models</li> <li>– 1 output</li> <li>– 5000, 10000, or 15000 W</li> <li>– Flexibility to expand up to 100 kW to meet your highest power test needs</li> </ul>

### DC power analyzer and sources

N6705 DC power analyzer	B2961/62A low-noise source	B2900 source measure units
		
<ul style="list-style-type: none"> <li>– 30+ modules</li> <li>– 1 to 4 outputs</li> <li>– 50 to 300 W per output</li> <li>– Characterize your devices in real-time without a PC</li> </ul>	<ul style="list-style-type: none"> <li>– 2 models</li> <li>– 1 or 2 output</li> <li>– 6.5 digit resolution</li> <li>– Meets your low-noise component testing</li> </ul>	<ul style="list-style-type: none"> <li>– 4 models</li> <li>– 1 or 2 output</li> <li>– 5.5 or 6.5 digit resolution</li> <li>– Component I-V measurements without PC programming</li> </ul>

## Power Supplies

*Keysight offers more than 300 power products to meet your specific needs*

The Keysight Power Products Selection Guide helps you choose your instrument by the number of outputs, output power characteristics, packaging, special features and application specific solutions.

[www.keysight.com/find/PowerBrochureDisty](http://www.keysight.com/find/PowerBrochureDisty)







## E36100B Series DC power supplies

Designs change — and so should your DC power supply. Meet the E36100, engineered to power your designs safely during manual tests or automated sequences.

- Choose the best model for your needs: five models offer up to 5 A or 100 V
- Save space on your bench, 2U 1/4-form factor
- Connect for computer control with standard LAN (LXI Core) and USB connectivity
- Easily view the high-contrast OLED display from anywhere on your bench, even from a sharp angle



Model	Voltage	Current	Power
E36102B	6 V	5 A	30 W
E36103B	20 V	2 A	40 W
E36104B	35 V	1 A	35 W
E36105B	60 V	0.6 A	36 W
E36106B	100 V	0.4 A	40 W

## E3600 Series DC power supplies

*Reliable power, repeatable results*

For environments that need to watch test costs as closely as they watch test results.

- Extremely low output noise—as low as 1 mVp-p/0.2 mVrms
- Tight 0.01% load and line regulation for steady output power levels
- Fast load transient response time (<50 μs)
- 16 models from 30 to 200 W output power, 2-3U high
- Convenient front-panel, GPIB, and RS-232 programming (except on E36320A and E3630A)

Model	Output	Range	Voltage	Current	Power
E3631A	3	1	25 V	1 A	80 W
			-25 V	1 A	
			6 V	5 A	
E3632A	1	2	15 V	7 A	120 W
			30 V	4 A	
E3633A	1	2	8 V	20 A	200 W
			20 V	10 A	
E3634A	1	2	25 V	7 A	200 W
			50 V	4 A	
E3620A	2	1	25 V	1 A	50 W
E3630A	3	1	6 V	2.5 A	35 W
			20 V	0.5 A	
			-20 V	0.5 A	
E3640A	1	2	8 V	3 A	30 W
			20 V	1.5 A	
E3641A	1	2	35 V	0.8 A	30 W
			60 V	0.5 A	
E3642A	1	2	8 V	5 A	50 W
			20 V	2.5 A	
E3643A	1	2	35 V	1.4 A	50 W
			60 V	0.8 A	
E3644A	1	2	8 V	8 A	80 W
			20 V	4 A	
E3645A	1	2	35 V	2.2 A	80 W
			60 V	1.3 A	
E3646A	2	2	8 V	3 A	60 W
			20 V	1.5 A	
E3647A	2	2	35 V	0.8 A	60 W
			60 V	0.5 A	
E3648A	2	2	8 V	5 A	100 W
			20 V	2.5 A	
E3649A	2	2	35 V	1.4 A	100 W
			60 V	0.8 A	

Consider the new E36312A as a replacement for this popular model.



E3631A



E3640A

## E36300A Series DC power supplies

With low output ripple/noise and accurate voltage/current measurement, you can test with confidence — and power your next insight.

- 4.3" color display that shows voltage and current on all three channels simultaneously
- Programming/readback accuracy as low as 0.03%
- Output ripple and noise: < 2 mVpp/350  $\mu$ Vrms
- Data logging plus output sequencing and coupling
- Front and rear output terminals
- Color-coded channels and individual knobs for voltage and current
- Modern I/O (USB, LAN and GPIB)

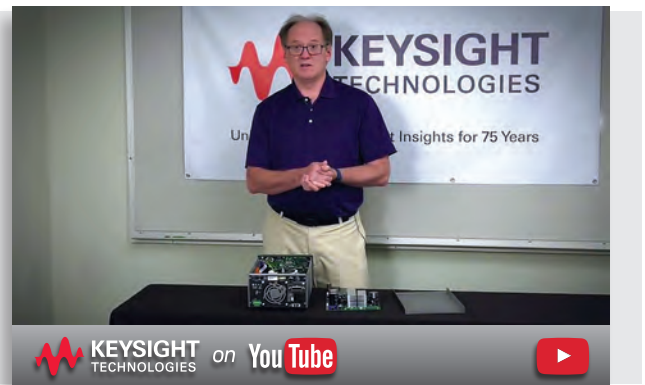


Model	Power	Channels	DC output Rating (0 to 40 °C)	
			Channel 1	Channel 2
E36311A Economy model	80 W	1	0 to 6 V	0 to 5 A
		2	0 to +25 V	0 to 1 A
		3	0 to -25 V	
E36312A Performance model	80 W	1	0 to 6 V	0 to 5 A
		2	0 to 25 V	0 to 1 A
		3		
E36313A Performance with high current model	160 W	1	0 to 6 V	0 to 10 A
		2	0 to 25 V	0 to 2 A
		3		

Curious about what is inside our newest power supply?

Watch Keysight Technology Manager, John Kenny, take it apart. Learn how the E36300 triple output bench power supply was designed for the highest reliability and quiet operation.

[▶ Triple Output Bench Power Supply E36300 Teardown](#)



## N5700 and N8700 Series DC system power supplies

Basic high-power, single output power supplies

- 45 affordable models in compact 1U (750 and 1500 W) and 2U (3.3 and 5 kW) packages
- Built-in measurements and advanced programming features simplify system design
- Perform remote programming with USB, LAN, and GPIB



750 W models		1500 W models		3.3 kW models		5 kW models	
N5741A	0-6 V, 0-100 A, 600 W	N5761A	0-6 V, 0-180 A, 1080 W	N8731A	0-8 V, 0-400 A, 3200 W	N8754A	0-20 V, 0-250 A, 5000 W
N5742A	0-8 V, 0-90 A, 720 W	N5762A	0-8 V, 0-165 A, 1320 W	N8732A	0-10 V, 0-330 A, 3300 W	N8755A	0-30 V, 0-170 A, 5100 W
N5743A	0-12.5 V, 0-60 A, 750 W	N5763A	0-12.5 V, 0-120 A, 1500 W	N8733A	0-15 V, 0-220 A, 3300 W	N8756A	0-40 V, 0-125 A, 5000 W
N5744A	0-20 V, 0-38 A, 760 W	N5764A	0-20 V, 0-76 A, 1520 W	N8734A	0-20 V, 0-165 A, 3300 W	N8757A	0-60 V, 0-85 A, 5100 W
N5745A	0-30 V, 0-25 A, 760 W	N5765A	0-30 V, 0-50 A, 1500 W	N8735A	0-30 V, 0-110 A, 3300 W	N8758A	0-80 V, 0-65 A, 5200 W
N5746A	0-40 V, 0-19 A, 760 W	N5766A	0-40 V, 0-38 A, 1520 W	N8736A	0-40 V, 0-85 A, 3300 W	N8759A	0-100 V, 0-50 A, 5000 W
N5747A	0-60 V, 0-12.5 A, 750 W	N5767A	0-60 V, 0-25 A, 1500 W	N8737A	0-60 V, 0-55 A, 3300 W	N8760A	0-150 V, 0-34 A, 5100 W
N5748A	0-80 V, 0-9.5 A, 760 W	N5768A	0-80 V, 0-19 A, 1520 W	N8738A	0-80 V, 0-42 A, 3300 W	N8761A	0-300 V, 0-17 A, 5100 W
N5749A	0-100 V, 0-7.5 A, 750 W	N5769A	0-100 V, 0-15 A, 1500 W	N8739A	0-100 V, 0-33 A, 3300 W	N8762A	0-600 V, 0-8.5 A, 5100 W
N5750A	0-150 V, 0-5 A, 750 W	N5770A	0-150 V, 0-10 A, 1500 W	N8740A	0-150 V, 0-22 A, 3300 W		
N5751A	0-300 V, 0-2.5 A, 750 W	N5771A	0-300 V, 0-5 A, 1500 W	N8741A	0-300 V, 0-11 A, 3300 W		
N5752A	0-600 V, 0-1.3 A, 780 W	N5772A	0-600 V, 0-2.6 A, 1560 W	N8742A	0-600 V, 0-5.5 A, 3300 W		

## N8900 Series autoranging high-power system supplies

Do the job of multiple power supplies with a single high-power autoranging DC power supply

- 5, 10 and 15 kW single output, autoranging programmable DC power for Automated Test Equipment (ATE) applications
- 28 models that offer up to 1500 V or 510 A
- Easily parallel to create “one” power supply with up to 100 kW of power
- Master/slave (group) operation, 10 store/recall states, Web server



### DC output ratings

5 kW models (1 phase line-to line)			10 kW models (L1, L2, L3, PE)			15 kW models (L1, L2, L3, PE)		
N8920A	80 V, 170 A	208 VAC (187 – 229 VAC)	N8925A	80 V, 340 A	208 VAC (187 – 229 VAC)	N8931A	80 V, 510 A	208 VAC (187 – 229 VAC)
N8921A	200V, 70 A		N8926A	200V, 140 A		N8932A	200V, 210 A	
N8923A	500V, 30 A		N8928A	500V, 60 A		N8934A	500V, 90 A	
N8924A	750 V, 20 A		N8929A	750 V, 40 A		N8935A	750 V, 60 A	
			N8930A	1000 V, 30 A		N8937A	1500 V, 30 A	
N8940A	80 V, 170 A	400 VAC (360 – 440 VAC)	N8945A	80 V, 340 A	400 VAC (360 – 440 VAC)	N8951A	80 V, 510 A	400 VAC (360 – 440 VAC)
N8941A	200V, 70 A		N8946A	200V, 140 A		N8952A	200V, 210 A	
N8943A	500V, 30 A		N8948A	500V, 60 A		N8954A	500V, 90 A	
N8944A	750 V, 20 A		N8949A	750 V, 40 A		N8955A	750 V, 60 A	
			N8950A	1000 V, 30 A		N8957A	1500 V, 30 A	



## B2960A Series low-noise power sources

*Best-in-class noise performance*

- Ultra-low noise performance with the external low-noise filter (10  $\mu$ Vrms)
- High sourcing resolution (6.5 digit, 100 nV / 10 fA)
- Innovative sourcing capability and superior GUI

[www.keysight.com/find/B2960A](http://www.keysight.com/find/B2960A)



B2962A

Model	Number of channels	Max. voltage	Max. current (DC)	Output noise (10 Hz to 20 MHz)	Measurement resolution
B2961A/62A	1 or 2	210 V	3.03 A	3 mVrms	4.5 digit
B2961A/62A with -LN2 (low noise)				350 $\mu$ Vrms	
B2961A/62A with -LN1 (ultra-low noise)		42 V	105 mA	10 $\mu$ Vrms	
B2961A/62A with -LN0 (high current ultra-low noise)		21 V	500 mA		

## B2900A Series source measure unit (SMU)

*Best-in-class source and measurement performance*

- Innovative graphical user interface: I-V measurement without PC programming
- High sourcing and measurement resolution 10 fA/100 nV
- Wide output range (210 V / 3 A DC / 10.5 A pulse)
- Multiple free software control options allow you to choose the solution that best fits your particular application

[www.keysight.com/find/B2900A](http://www.keysight.com/find/B2900A)



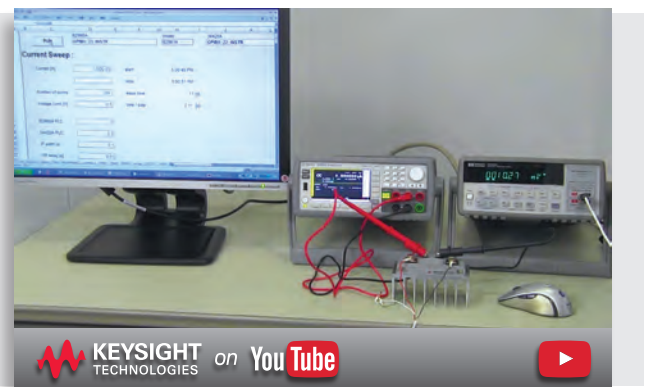
B2912A

Model	B2901A	B2902A	B2911A	B2912A
Number of channels	1	2	1	2
Maximum voltage			210 V	
Maximum current (DC)			3.03 A	
Output resolution	5.5 digit		6.5 digit	
Output noise (10 Hz to 20 MHz)			3 mVrms	
Measurement resolution			6½ digit	

### How to evaluate low noise amplifiers

See the B2961A/62A 6.5 Digit Low Noise Power Source in action. We use voltage bias to the low noise amplifier by choosing the resistance to meet the recommended bias current. However, the problem that bias current is easily changed by environmental condition like temperature change is also indicated in the video.

▶ [Basic Electronic Measurement Series](#)



KEYSIGHT TECHNOLOGIES on YouTube



## N6700 low-profile modular power systems

Accelerate ATE with small, flexible, fast DC power

- Small size: up to 4 outputs in 1U of rack space
- Streamline tasks with built-in measurements, output sequencing, flexible triggering and digital I/O; LIST mode for user-defined arbitrary waveforms (module dependent)
- Fast output response and command processing (<1 ms)
- Perform remote programming with USB, LAN, and GPIB



### Mainframes

Model	Description
N6700C	Low-profile MPS (400 W)
N6701C	Low-profile MPS (600 W)
N6702C	Low-profile MPS (1200 W)
N6705C	DC power analyzer (600 W)



### Modules

Model	Type	Maximum power	Voltage	Current	Number of slots used	Number of ranges	Ripple & noise (Vp-p)	Programming accuracy	Up or down programming time with load (typical)
N6731B	Basic	50 W	0-5 V	0-10 A	1	1	10 mV	0.1% + 19 mV	20 ms
N6732B		50 W	0-8 V	0-6.25 A			12 mV	0.1% + 19 mV	
N6733B		50 W	0-20 V	0-2.5 A			14 mV	0.1% + 20 mV	
N6734B		50 W	0-35 V	0-1.5 A			15 mV	0.1% + 35 mV	
N6735B		50 W	0-60 V	0-0.8 A			25 mV	0.1% + 60 mV	
N6736B		50 W	0-100 V	0-0.5 A			30 mV	0.1% + 100 mV	
N6741B		100 W	0-5 V	0-20 A			11 mV	0.1% + 19 mV	
N6742B		100 W	0-8 V	0-12.5 A			12 mV	0.1% + 19 mV	
N6743B		100 W	0-20 V	0-5 A			14 mV	0.1% + 20 mV	
N6744B		100 W	0-35 V	0-3 A			15 mV	0.1% + 35 mV	
N6745B		100 W	0-60 V	0-1.6 A			25 mV	0.1% + 60 mV	
N6746B		100 W	0-100 V	0-1 A			30 mV	0.1% + 100 mV	
N6773A		300 W	0-20 V	0-15 A			20 mV	0.1% + 20 mV	
N6774A		300 W	0-35 V	0-8.5 A			22 mV	0.1% + 35 mV	
N6775A		300 W	0-60 V	0-5 A			35 mV	0.1% + 60 mV	
N6776A		300 W	0-100 V	0-3 A			45 mV	0.1% + 100 mV	
N6777A		300 W	0-150 V	0-2 A			68 mV	0.1% + 150 mV	
N6751A	Performance	50 W	0-50 V	0-5 A	1	Autoranging	4.5 mV	0.06% + 19 mV	0.2 ms
N6752A		100 W	0-50 V	0-10 A	1		4.5 mV	0.06% + 19 mV	0.2 ms
N6753A		300 W	0-20 V	0-50 A	2		5 mV	0.06% + 10 mV	0.4 ms
N6754A		300 W	0-60 V	0-20 A	2		6 mV	0.06% + 25 mV	0.35 ms
N6755A		500 W	0-20 V	0-50 A	2		5 mV	0.06% + 10 mV	0.5 ms
N6756A		500 W	0-60 V	0-17 A	2		6 mV	0.06% + 25 mV	0.7 ms
N6761A	Precision	50 W	0-50 V	0-1.5 A	1	Autoranging	4.5 mV	0.016% + 6 mV	0.6 ms
N6762A		100 W	0-50 V	0-3 A	1		4.5 mV	0.016% + 6 mV	0.6 ms
N6763A		300 W	0-20 V	0-50 A	2		5 mV	0.03% + 5 mV	0.4 ms
N6764A		300 W	0-60 V	0-20 A	2		6 mV	0.03% + 12 mV	0.35 ms
N6765A		500 W	0-20 V	0-50 A	2		5 mV	0.03% + 5 mV	0.5 ms
N6766A		500 W	0-60 V	0-17 A	2		6 mV	0.03% + 12 mV	0.7 ms
N6781A	Source Measure Unit (SMU)	20 W	0-20 V	0±3 A	1	Multiple	12 mV	0.025% + 200 µV	15-300 µs
N6782A		20 W	0-20 V	0±3 A	1		12 mV	0.025% + 200 µV	
N6784A		20 W	0±20 V	0±3 A	1		12 mV	0.025% + 200 µV	
N6785A		80 W	0-20 V	0±8 A	2		15 mV	0.025% + 1.8 mV	12-300 µs
N6786A		80 W	0-20 V	0±8 A	2		15 mV	0.025% + 1.8 mV	



## N6705C DC power analyzer, N6781/85A SMUs, and 14585A Control & Analysis software

*Deliver exceptional battery life in your devices*

The N6781A and N6785A two-quadrant SMUs are designed to power, characterize, and test battery-powered devices (smart phones, tablets, and components).

- 20 V,  $\pm$  3 A, 20 W (N6781A); 20 V,  $\pm$  8 A, 80 W (N6785A)
- Stable, glitch-free sourcing and sinking (charge/eLoad)
- Seamless dynamic measurements down to nA

The N6705C DC power analyzer is an easy to use R&D tool for sourcing and measuring DC voltage and current into the DUT

- Integrates capabilities of up to four power supplies, with DMM, scope, ARB and data logger capability
- Select any combination of N6700 Series modules ([page 37](#))
- Pair with the 14585A Control and Analysis software can to control up to four N6705 mainframes (16 power supplies) from a single PC



14585A Control and Analysis software

N6705C



N6781A



N6785A

## N3300 Series DC electronic loads

*Fast electronic loads that accelerate manufacturing test*

- Choose from two mainframes: The N3300A mainframe is full-rack width with 6 slots and the N3301A mainframe is half-rack width with 2 slots
- Mix and match up to 6 modules as single, parallel, or series outputs for up to 1800 W in a single mainframe
- Measure voltage and current simultaneously in constant current (CC), constant voltage (CV), and constant resistance (CR) mode
- Observe transient behavior using waveform digitization and 4,096 data point buffer



N3300A

Input ratings	N3302A	N3303A	N3304A	N3305A	N3306A	N3307A
Current	0–30 A	0–10 A	0–60 A	0–60 A	0–120 A	0–30 A
Voltage	0–60 V	0–240 V	0–60 V	0–150 V	0–60 V	0–150 V
Maximum power at 40 °C	150 W	250 W	300 W	500 W	600 W	250 W

## AC6800B and 6800C Series Basic and Performance AC Power Sources

*Engineer dependability into your designs with stable, reliable AC power*

Test your designs with confidence, knowing that your products will perform as designed—even if they encounter fluctuating voltages from the AC power grid, extreme inrush currents, or transient spikes. Keysight's two families of AC power sources provide the capabilities you need for thorough AC testing, from basic power to more sophisticated source and measurement needs.

Both families also produce DC power, either alone or as a DC offset to an AC waveform.



### AC6800B Series basic AC sources

*A basic AC source alternative featuring stable and reliable power*

- Four models, up to 4000 VA
- Intuitive user interface—if you've used a Keysight DC power supply, these will feel very familiar to you
- Flexible I/O: USB and LAN (standard), and GPIB (optional)
- Access and control the source remotely using a standard Web browser

### 6800C Series performance AC sources/analyzers

*The complete AC power test solution*

- Three models, up to 1750 VA
- Virtual front panel
- Extensive power measurement capabilities
- I/O: USB, LAN, GPIB and RS-232
- Built-in arbitrary waveform generator to simulate many types of power waveforms

	AC6800B Series Basic AC Sources				6800C Series Performance AC Sources		
	AC6801B	AC6802B	AC6803B	AC6804B	6811C	6812C	6813C
Phases	Single-phase						
Maximum output power	500 VA	1000 VA	2000 VA	4000 VA	375 VA	750 VA	1750 VA
AC output mode							
Voltage range	155 Vrms/310 Vrms				300 Vrms		
Maximum rms current	5 A/2.5 A	10 A/5 A	20 A/10 A	40 A/20 A	3.25 A	6.5 A	13 A
Maximum peak current	15 A/7.5 A	30 A/15 A	60 A/30 A	120 A/60 A	40 A	40 A	80 A
Frequency	500 Hz				1 kHz		
DC output mode							
Voltage range	219 V/438 V				425 V		
Max current	4 A/2 A	8 A/4 A	16 A/8 A	32 A/16 A	2.5 A	5 A	10 A
Max instantaneous current	12 A/6 A	24 A/12 A	48 A/24 A	96 A/48 A	40 A	40 A	80 A
Power capacity	400 W	800 W	1600 W	3200 W	285 W	575 W	1350 W
Measurements and I/O							
Measurements	Voltage, current, power				Voltage, current, power		
Transients and advanced measurements	N/A Basic transient capability via optional analog card (AC68ALGU)				Includes preprogrammed standard waveforms and transient generation system AC source analyzer graphical user interface		
I/O	USB and LAN with remote Web interface Optional GPIB (AC68GPBU)				USB, LAN, GPIB and RS-232		

## LCR Meters

Keysight LCR meters provide the best combination of accuracy, speed, and versatility at affordable prices for both R&D and production applications.

### E4980A/AL precision LCR meter

*Industry-leading combination of accuracy, speed, versatility and upgradability*

- Exceptionally low noise at both low and high impedance
- 20 Hz to 2 MHz, test frequency with 4-digit resolution (E4980A)
- 20 Hz to 300 kHz/500 kHz/1 MHz, test frequency with 4-digit resolution (E4980AL)
- Frequency upgradable to 500 kHz or 1 MHz (E4980AL)
- 0.05% basic impedance accuracy
- 5.6 ms (SHORT), 88 ms (MED) at 1 MHz (E4980A)
- 12 ms (SHORT), 118 ms (MED) at 1 MHz (E4980AL)
- 20 Vrms test signal, 40 V DC bias, (and DC source with E4980A Option 001)
- 201-point programmable list sweep.  
Sweep type: frequency, OSC level, DC bias, (and DC source with E4980A Option 001)
- Open/short/load compensation
- Available material measurement software N1500A-006



### E4981A capacitance meter

*Fast, accurate, and repeatable measurement*

- Ideal for reliable high-speed measurements for high-volume ceramic capacitor manufacturing
- 120 Hz / 1 kHz / 1 MHz test frequencies (E4981A-001)
- 120 Hz / 1 kHz test frequencies (E4981A-002)
- High-speed measurement:  
2.3 ms (1 MHz), 3.0 ms (1 kHz), 11.0 ms (120 Hz)
- Accurate C-D testing: 0.07%, 0.0005



### E4982A LCR meter

*Best performance for the passive component manufacturing such as SMD inductors and EMI filters*

- Four frequency options:  
1 MHz to 300 MHz / 500 MHz / 1 GHz / 3 GHz, upgradable
- High-speed measurement:  
0.9 ms (Mode 1), 2.1 ms (Mode 2), 3.7 ms (Mode 3)
- 0.8% basic accuracy with unparalleled measurement repeatability
- Wide impedance measurement range from 140 mΩ to 4.8 kΩ
- 1 kHz frequency resolution





## Handheld Digital Multimeters

Rich features and robust design for real-world conditions

- Up to 60,000 counts and 0.025% basic DCV accuracy, accurate true-RMS AC measurements and up to 800 hours of battery life (U1280 Series)
- High-contrast OLED display with 160° viewing angle (U1273AX, U1273A, U1253B)
- Re-invented with ergonomic design and dust- and water-resistant with IP 67 (U1240C, U1280 Series), and operating temperature as low as -40 °C (U1273AX)
- CAT III 1000 V and CAT IV 600 V over-voltage protection (U1240, U1240C, U1250, U1270 and U1280 Series)



Recommended for	Model	Counts	Bandwidth	Voltage AC/DC	Current AC/DC	Battery life	Additional features	Additional features	
Electrical, HVAC and utilities	U1231A	6,000	1 kHz	600 mV to 600 V	NA	500 hours	Built-in flashlight, continuity alert with flashing backlight, Z <sub>Low</sub>	N/A	
	U1232A				60 µA to 10 A			V <sub>sense</sub> *	
	U1233A								
Installation and maintenance	U1241B	10,000	2 kHz	1 V to 1000 V	1 mA to 10 A	300 hours	Switch counter	N/A	
	U1242B							Harmonic ratio, dual and differential temperature measurements	
	U1241C		100 mV to 1000 V	400 hours		Built-in LED flashlight	N/A		
	U1242C						Harmonic ratio, dual and differential temperature measurements, V <sub>sense</sub> *, Z <sub>Low</sub>		
Electronics troubleshooting	U1251B	50,000	30 kHz	50 mV to 1000 V	500 µA to 10 A	72 hours	NA	N/A	
	U1252B		100 kHz			36 hours			
	U1253B					8 hours**			
Industrial	U1271A	30,000	20 kHz	300 mV to 1000 V	300 µA to 10 A	300 hours	Low pass filter High altitude rated (3000 m)	AC and/or DC voltage check	
	U1272A		100 kHz	30 mV to 1000 V				30–60 hours	Low impedance mode, offset compensation
	U1273A/AX								
Electronics troubleshooting	U1281A	60,000	30 kHz	60 mV to 1000 V	600 µA to 10 A	800 hours	N/A	N/A	
	U1282A		100 kHz					Frequency counter, square wave output, V <sub>sense</sub> *, low pass filter	

\*V<sub>sense</sub> is a non-contact voltage detector. \*\* Rechargeable.

### The Remote Link solution

Safely measure, view and log test measurements up to 100 meters away from your handheld meter by simply plugging in the U1117A IR-to-Bluetooth adapter. Display results on the U1115A remote logging display or Windows PCs, or iOS/Android-based smart devices.

Only shippable to countries with country type approval, refer to [www.keysight.com/find/hhgowireless](http://www.keysight.com/find/hhgowireless) for more information.



## U1700 Series handheld capacitance and LCR meters

Save time with auto-ID and one-button access

- Auto-identification of L, C and R; and detailed component analysis with DCR, Z, ESR, D, Q and  $\theta$  functions.
- Tolerance and compare modes for quick component sorting
- One-button access to measurements



U1733C

	U1701B	U1731C	U1732C	U1733C
Counts	11,000	20,000	20,000	20,000
Capacitance	1000 pF to 199.99 mF	200 pF to 20 mF	20 pF to 20 mF	20 pF to 20 mF
Inductance	N/A	200 $\mu$ H to 2000 H	20 $\mu$ H to 2000 H	20 $\mu$ H to 2000 H
Resistance	N/A	2 $\Omega$ to 200 M $\Omega$	2 $\Omega$ to 200 M $\Omega$	2 $\Omega$ to 200 M $\Omega$
Frequency	N/A	100 Hz, 120 Hz, 1 kHz	100 Hz, 120 Hz, 1 kHz, 10 kHz	100 Hz, 120 Hz, 1 kHz, 10 kHz, 100 kHz
Additional features	Dual display, min./max./avg. recording, data logging to PC			

## Handheld clamp meters

Save money without compromising safety or convenience

Use clamp meters to measure high voltage and current (up to 1000V and 1000A) and avoid the need to disconnect high current cables. The clamp meters have built-in DMMs, with lower resolutions than typical dedicated DMMs, to be used for preventative maintenance and quick verifications.

- Large 2-inch jaw size (U1210 Series); LED light, wire separator and hook to grab the right wire (U1190 Series)
- Includes DMM capabilities: resistance, capacitance, frequency and temperature
- CAT IV 600 V and CAT III 1000 V safety ratings (U1210 Series)



U1213A



U1194A

## U5850 Series True/IR thermal imagers

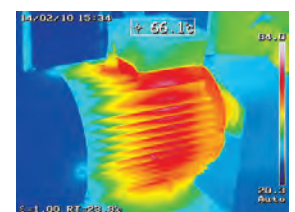
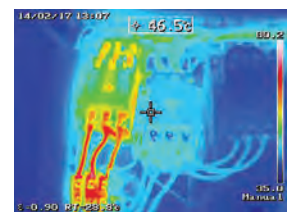
See more details with in-camera fine resolution

- Fine resolution capability delivers the clarity of 320 x 240 pixels at the cost of a 160 x 120 pixels detector. Time lapse mode takes images at preset intervals unattended.
- For distant and inaccessible targets: digital zoom magnifies by up to 4x
- Accurately measure objects as close as 10 cm (3.9 in) to distinguish close-fit components
- Compact, lightweight, ergonomic with easy-to-use customizable color palette
- High temperature range (up to 1200 °C)
- Standard 3-year warranty



True/IR

U5857A



True/IR images

## U1450A/60A Series insulation resistance testers

Accomplish more in a day's work with Keysight insulation resistance testers

- Insulation resistance test up to 260 GΩ
- Adjustable test voltages 50, 100, 250, 500, and 1,000 V; 10 V up to 1.1 kV on select models
- Simplify test report generation with a click of a button
- Certified to IP 67, drop proof up to 3 m (10 ft), CAT III 1000V and CAT IV 600V



	U1451A	U1452A	U1452AT	U1453A	U1461A
Display type	LCD			OLED	
Insulation resistance tester features					
Insulation test voltage range	250, 500, 1,000 V	50, 100, 250, 500, 1,000 V	50, 100 V	50, 100, 250, 500, 1,000 V	
Insulation resistance range	66 GΩ	260 GΩ	66 GΩ	260 GΩ	
Earth bond resistance measurement	0.01 to 60K Ω			0.001 to 60K Ω	
Timed, PI, DAR	Timed only	√	√	√	√
Adjustable insulation test voltages	—			10 to 1.1K V	
Live circuit test inhibit	30, 50, 75 V				
Remote testing and report generation <sup>1</sup>	√	√	√	√	√
Multimeter features	AC/DC voltage, auto AC/DC voltage identification <sup>2</sup> , resistance, continuity, capacitance			AC/DC voltage, auto AC/DC voltage identification <sup>2</sup> , resistance, continuity, capacitance, diode test	AC/DC voltage (V, mV), AC/DC current (uA, mA), auto AC/DC voltage and current identification <sup>2</sup> , resistance, continuity, capacitance, diode test, temperature, low pass filter (LPF), V <sub>sense</sub>

1. Requires Keysight Handheld Logger software for Windows PC and Keysight Insulation Tester App for iOS/Android.
2. Automatically identify the signal component (AC or DC) of an electrical source.

## U1600 Series handheld oscilloscopes

Maximum versatility for more rigorous troubleshooting

- 5.7-inch VGA TFT LCD display with indoor, outdoor, and night-vision viewing modes
- Two independent, isolated channels
- Up to 2 GSa/s sample rate and up to 2 Mpts deep memory to zoom in on critical details



	U1610A	U1620A
Oscilloscope channel count	2	2
Bandwidth	100 MHz	200 MHz
Maximum sampling rate	1 GSa/s interleaved, 500 MSa/s per channel	2 GSa/s interleaved, 1 GSa/s per channel
Maximum recording length	120 Kpts interleaved, 60 Kpts per channel	2 Mpts interleaved, 1 Mpts per channel
Internal scope storage	10 setups and waveforms can be saved and recalled internally	
Rise time	3.50 ns typical	1.75 ns typical
Additional features	Indoor, outdoor and night vision mode, built-in DMM, data logger capability, dual windows zoom	

# Lock in Peak Performance with Keysight Extended Warranty and Calibration Plans

*Ensure accurate measurements and achieve greater peace of mind with every new instrument purchase*

- Get greater peace of mind — standard — with Keysight's three-year warranty
- Extend your peace of mind and eliminate budgetary surprises for up to 5 years with Extended Warranty
- Lock in OEM-quality calibration at the lowest price, with the peace of mind that your equipment will perform at its original specification with Calibration Plans

Keysight Extended Warranty and Calibration Plans are instrument options, so it's all part of the same approval process. Extended Warranty Plans are up to 70% less expensive than a comparable per-incident repair, and Calibration Plans are up to 20% less expensive than a single calibration event. Plus, you lock in today's prices to save even more. Both Extended Warranty and Calibration Plans offer a streamlined service process. All Keysight calibrations all include a full inspection and clearing to help prevent future issues.

Longer plans, on-site support, and other options are also available. To learn more see [www.keysight.com/find/services](http://www.keysight.com/find/services)



New Zealand  
[www.rftest.co.nz](http://www.rftest.co.nz)  
[sales@rftest.co.nz](mailto:sales@rftest.co.nz)  
Tel (64) 4 570 2480

[www.keysight.com](http://www.keysight.com)

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