

Keysight Technologies  
B2900A Series  
Precision Instrument

Selection Guide

## Pick the best instrument for your precision measurement application

The push for “Green” energy has created the need for continuous innovation to reduce device power consumption. In addition, the voltages used to bias devices and equipment continue to decrease, which requires measurement instruments to have ever greater levels of precision. Since selecting the right instrument to measure these types of sensitive devices can be very difficult, this document provides guidance to help you choose the correct solution for your application.

Source measure units (SMUs) B2901A/B2902A/B2911A/B2912A	Power sources B2961A/B2962A
<b>What is an SMU?</b> <ul style="list-style-type: none"> <li>– An SMU is an instrument that combines the capabilities of a current source, a voltage source, a current meter and a voltage meter along with the capability to switch easily between these various functions.</li> </ul>	<b>What is a low-noise power supply/source?</b> <ul style="list-style-type: none"> <li>– A low noise power source is a revolutionary power supply with 6.5 digit, 100 nV, 10 fA and 10 <math>\mu</math>Vrms performance. It can also output arbitrary waveforms in both voltage and current at up to 210 V and 3 A DC.</li> </ul>
<b>Key applications</b> <ul style="list-style-type: none"> <li>– Accurate current-voltage (I-V) measurement for</li> <li>– Semiconductor device evaluation (transistors, FETs, diodes, etc)</li> <li>– Optical device evaluation (Laser diodes, photo diodes, etc.)</li> <li>– Solar cell characterization</li> <li>– Nanotechnology device testing</li> <li>– General component test</li> </ul>	<b>Key applications</b> <ul style="list-style-type: none"> <li>– Precision low-noise voltage and current source for</li> <li>– AD/DA converter characterization</li> <li>– VCOs, VCXOs, PLLs, mixer evaluation</li> <li>– Sensor device testing</li> <li>– Measuring low-resistance, super conductive devices in conjunction with a nano-voltmeter</li> <li>– Biasing other instruments (such as network analyzers)</li> </ul>

## Comparison table by model and key options

In general, applications requiring both sourcing and measurement capabilities should use SMUs, while applications requiring very accurate output (sourcing) capabilities should use the power supply-source.

Model number		B2901A/02A	B2911A/12A	B2961A/62A	B2961A/62A with Option LN1 (N1294A-021)	B2961A/62A with Option LN2 (N1294A-022)
Product category		Source measure unit			Power source	
Number of channels		1 or 2			1 or 2	
Output range	Max. voltage	210 V		210 V	42 V	210 V
	Max. current (DC)	3.03 A		3.03 A	105 mA	3.03 A
	Max. power	31.8 W		31.8 W	4.4 W	31.8 W
Output resolution		5.5 digit	6.5 digit		6.5 digit	
Output capability	DC, pulse, sweep	Yes			Yes	
	Arbitrary wave form generation	No (List sweep)			Yes	
Noise	0.1 Hz to 10 Hz	10 μVpp			5 μVpp	
	10 Hz to 20 MHz	3 mVrms		3 mVrms	10 μVrms	350 μVrms
	Digit	6.5 digit			4.5 digit	
	Voltage	100 nV			10 μV	
	Current (*)	100 fA	10 fA	1 pA	100 pA	100 pA
	Auto ranging	Yes			No (Fixed range)	
	Programmable output resistance	No			Yes	No
Max. capacitive load		0.01 μF (normal mode) 50 μF (high cap. mode)		0.01 μF (normal) 50 μF (high cap.)	50 μF	1 mF

\* for low current sourcing and measurement typically less than 1 nA, recommend to use N1294A-001 or 002 triaxial adapter.



Figure 1. B2900A series of SMU

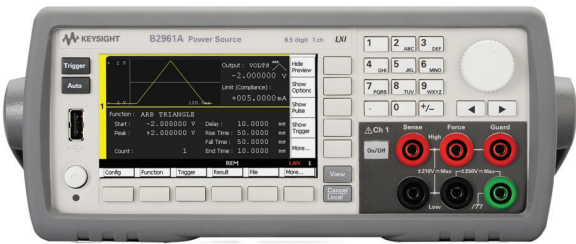


Figure 2. B2961A/62A power source

## What is an SMU?

An SMU has both precision source and measurement blocks, allowing it to force voltage or current and measure both current and voltage simultaneously. A typical SMU measurement application is shown below. In this example the SMU sweeps the voltage across a diode and measures the current through the diode.

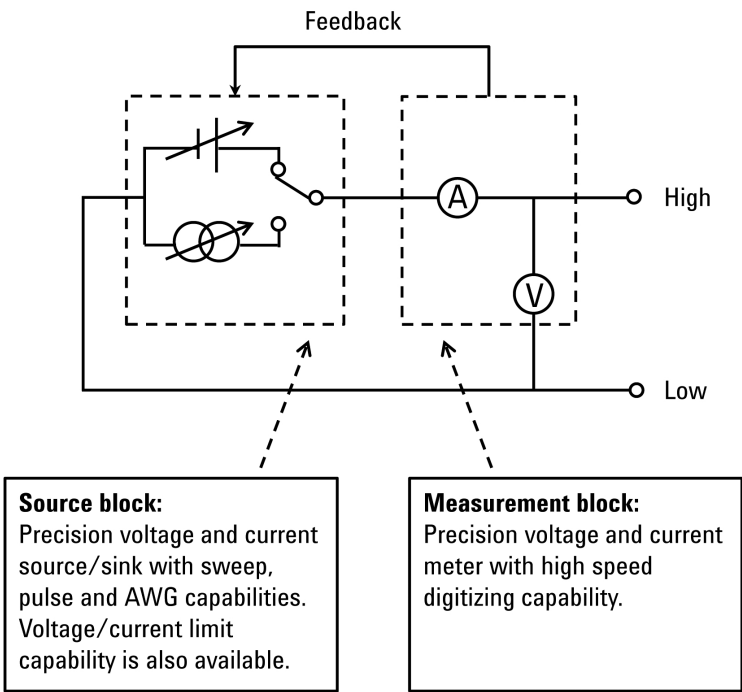


Figure 3. SMU block diagram

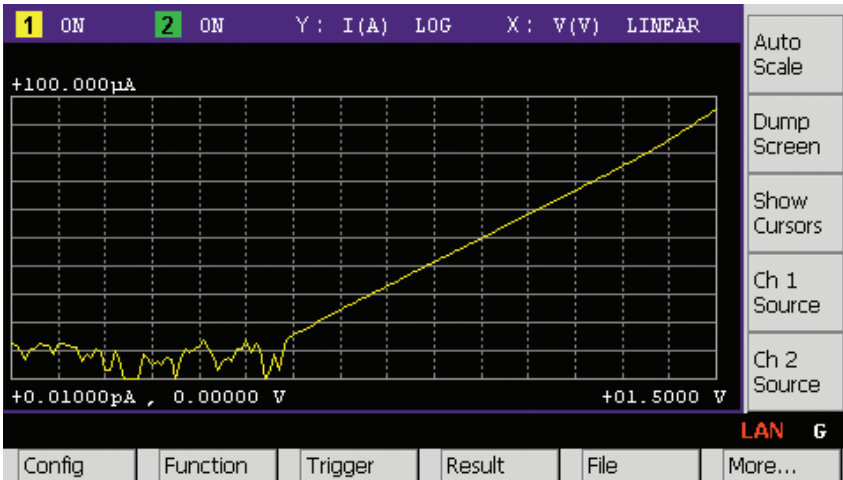


Figure 4. Typical I-V curve of diode (measured by SMU)

## B2900A series related accessories

Model	Description	Note
N1294A	B2900A series precision source/measure unit accessories	
N1294A-001	Banana–triax adapter for 2-wire (non Kelvin) connection	Recommend typ. < 1 nA
N1294A-002	Banana–triax adapter for 4-wire (Kelvin) connection	Recommend typ. < 1 nA
N1294A-011	1.5 m, interlock cable for 16442A/B test fixture (GPIO Dsub25 to 6-pin mini plug)	
N1294A-012	3 m, interlock cable for 16442A/B test fixture (GPIO Dsub25 to 6-pin mini plug)	
N1294A-021	Ultra low noise filter (42 V/105 mA, 50 Ohm) for B2961/62A	Only for B2961/62A
N1294A-022	Low noise filter (210 V/3 A) for B2961/62A	Only for B2961/62A
N1294A-031	GPIO–BNC trigger adapter	
N1295A	Device/component test fixture with 4 triax connectors for Keysight B2900A series	≤ 42 V, 1 A DC

## B2900A series related cables

Model	Description	Note
16494A	Triaxial cable	
16494A-001	Triaxial cable (1.5 m)	≤ 1 A DC
16494A-002	Triaxial cable (3 m)	≤ 1 A DC
16494A-003	Triaxial cable (80 cm)	≤ 1 A DC
16493L	GND cable	
16493L-001	Ground unit cable for B1500/E5260/E5270/41501 (Triaxial, 1.5 m)	≤ 3 A DC
16493L-002	Ground unit cable for B1500/E5260/E5270/41501 (Triaxial, 3 m)	≤ 3 A DC
16493B	Coaxial cable	
16493B-001	Coaxial cable (1.5 m)	Used with N1294A-021
16493B-002	Coaxial cable (3.0 m)	Used with N1294A-021

Pictures for key accessories



Figure 5a. N1294A-001 banana-triaxial adapter (2-wire)



Figure 5b. N1294A-002 banana-triaxial adapter (4-wire)



Figure 6a. N1294A-021 ultra-low noise filter (42 V/105 mA)



Figure 6b. N1294A-022 low noise filter (210 V/3 A)

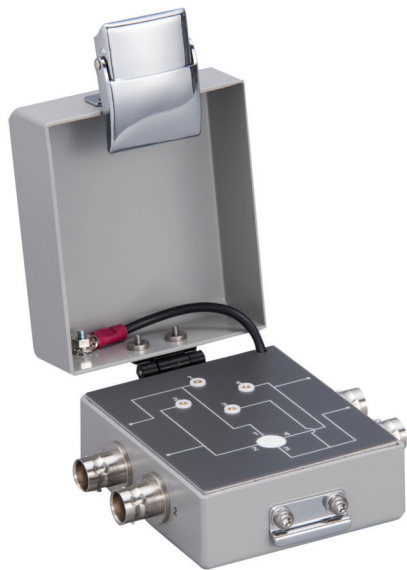
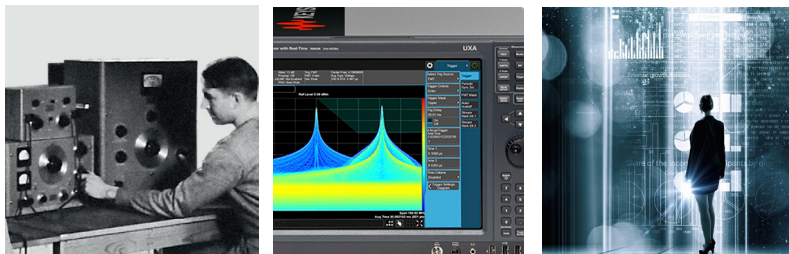


Figure 7. N1295A device component test fixture (42 V/1 A)

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