

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 |
|---|---|
| <p>What is an SMU?</p> <ul style="list-style-type: none"> - 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. | <p>What is a low-noise power supply/source?</p> <ul style="list-style-type: none"> - A low noise power source is a revolutionary power supply with 6.5 digit, 100 nV, 10 fA and 10 μVrms performance. It can also output arbitrary waveforms in both voltage and current at up to 210 V and 3 A DC. |
| <p>Key applications</p> <ul style="list-style-type: none"> - Accurate current-voltage (I-V) measurement for <ul style="list-style-type: none"> - Semiconductor device evaluation (transistors, FETs, diodes, etc) - Optical device evaluation (Laser diodes, photo diodes, etc.) - Solar cell characterization - Nanotechnology device testing - General component test | <p>Key applications</p> <ul style="list-style-type: none"> - Precision low-noise voltage and current source for <ul style="list-style-type: none"> - AD/DA converter characterization - VCOs, VCXOs, PLLs, mixer evaluation - Sensor device testing - Measuring low-resistance, super conductive devices in conjunction with a nano-voltmeter - Biasing other instruments (such as network analyzers) |

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 μ Vpp | | 5 μ Vpp | |
| | 10 Hz to 20 MHz | 3 mVrms | 3 mVrms | 10 μ Vrms | 350 μ Vrms |
| Digit | Digit | 6.5 digit | | 4.5 digit | |
| | Voltage | 100 nV | | 10 μ V | |
| Current (*) | Current (*) | 100 fA | 10 fA | 1 pA | 100 pA |
| | Auto ranging | Yes | | No (Fixed range) | |
| Programmable output resistance | No | | Yes | No | No |
| Max. capacitive load | 0.01 μ F (normal mode) | | 0.01 μ F (normal) | 50 μ F | 1 mF |
| | 50 μ F (high cap. mode) | | 50 μ F (high cap.) | | |

* 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

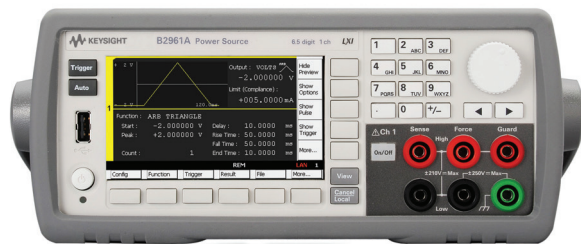


Figure 2. B2961A/62A power source

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.

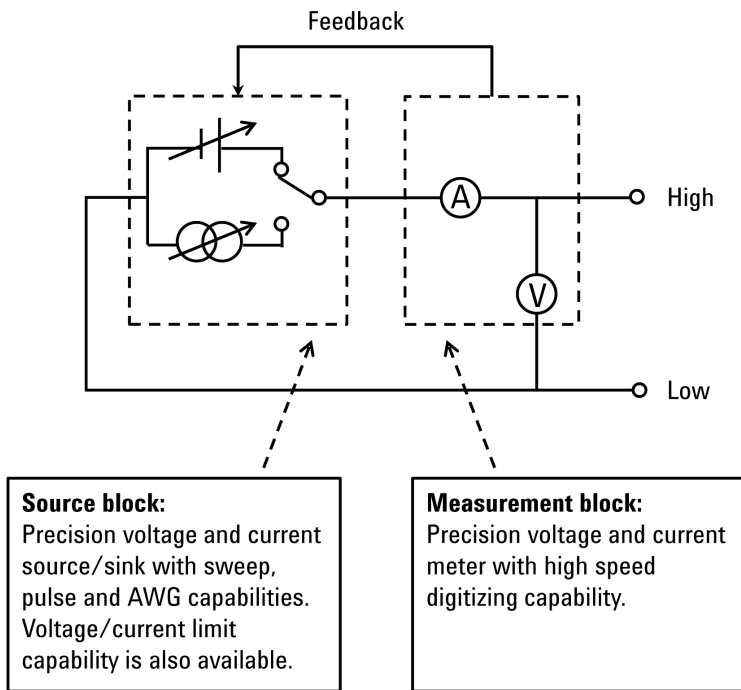


Figure 3. SMU block diagram

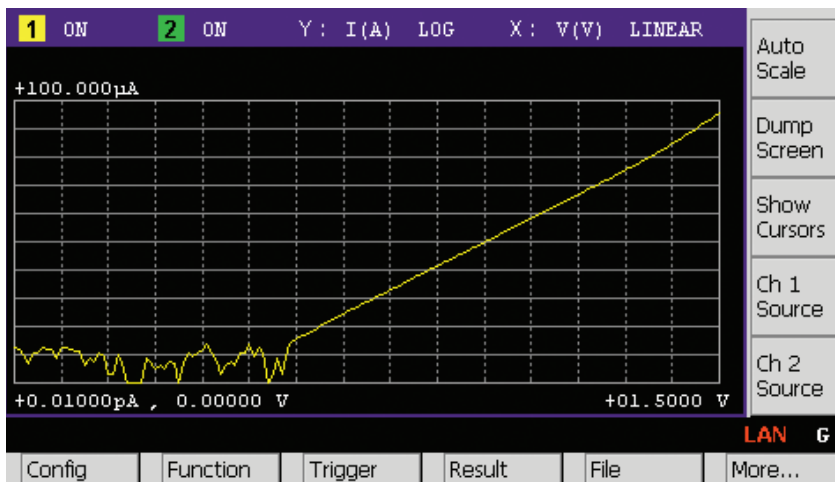


Figure 4. Typical I-V curve of diode (measured by SMU)

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)

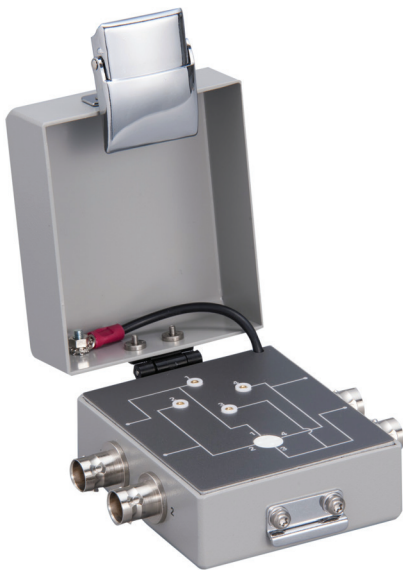
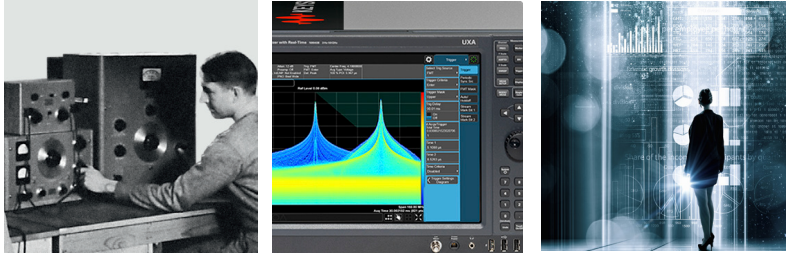


Figure 7. N1295A device component test fixture (42 V/1 A)

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Published in USA, December 1, 2017
5991-1379EN
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