

## POWER SUPPLY SELECTION

## POWER SUPPLIES

Tektronix and Keithley power supplies offer a wide range of performance. Get single-channel models with superior accuracy and 10nA current measurement resolution. New high voltage power supplies combine high voltage with sensitive, low current measurement for high voltage device testing and characterization and high voltage research. For multiple source needs, select a dual-channel or triple-channel supply. All channels are isolated and fully programmable. For testing battery-operated devices, consider a battery simulator.



CATEGORY	DESCRIPTION	CHANNELS	MAX VOLTAGE/MAX CURRENT	RESOLUTION	VOLTAGE ACCURACY	CURRENT ACCURACY	INTERFACE
PWS2000	Manual	1	18V-72V/1.5A-6A	10mV, 10mA	$\pm (0.05\% + 15 \text{ mV})$	$\pm (0.1\% + 15 \text{ mA})$	Not applicable
PWS4000	USB Programmable Single-Channel	1	20V-72V /1.2A-5A	1mV, 0.1mA	$\pm (0.02\% + 2.5 \text{ mV})$	$\pm (0.05\% + 1 \text{ mA})$	USB
2200	USB and GPIB Programmable Single-Channel	1	20V-72V /1.2A-5A	1mV, 0.1mA	$\pm (0.02\% + 2.5 \text{ mV})$	$\pm (0.05\% + 1 \text{ mA})$	USB, GPIB
2231A-30-3	Optional USB Triple-Channel	3	CH1/2: 30V/3A CH3: 5V/3A	10mV, 1mA	$\pm (0.06\% + 20\text{mV})$	$\pm (0.2\% + 10 \text{ mA})$	Optional USB
2220/2230	USB Multi-Channel; USB and GPIB Multi-Channel	2 (2220 Series) 3 (2230 Series)	CH1/2-30V / 1.5A (2220 Series) CH1/2-30V / 1.5A, CH3-6V / 5A (2230 Series)	1mV, 1mA	$\pm (0.03\% + 10 \text{ mV})$	$\pm (0.1\% + 5 \text{ mA})$	USB USB & GPIB (-G versions)
2230G-30-3, 2230G-30-6, 2230G-60-3	High Power, 3-Channel Programmable Power Supply	3	30V/3A (2230G-30-3) 30V/6A (2230G-30-6) 60V/3A (2230G-60-3)	1mV, 1mA	$\pm(0.03\% + 10\text{mV})$	$\pm(0.1\% + 5\text{mA}),$ 2230G-30-6, 30V Channels: $\pm(0.1\% + 8\text{mA})$	USB, GPIB, RS-232
2260B	360W, 720W and 1080W Wide output range USB, LAN, and Optional GPIB	1	30V-800V / 1.44A-108A	1mV, 1mA	$\pm (0.1\% + 10 \text{ mV})$	$\pm (0.1\% + 10 \text{ mA})$	USB, LAN, analog, and optional GPIB
2280S-32-6 2280S-60-3	Precision measurement 6½-digit measurement resolution	1	32V-60V/3.2A-6A	0.1mV, 10nA	$\pm (0.02\% + 2 \text{ mV})$	$\pm (0.05\% + 10 \text{ }\mu\text{A})$	USB, GPIB, and LAN
2281S-20-6	Single-Channel, Precision DC Power Supply & Battery Simulator	1	20V/6A	0.1mV, 10nA	$\pm (0.02\% + 2 \text{ mV})$	$\pm (0.05\% + 10 \text{ }\mu\text{A})$	USB, GPIB, and LAN
2290-5 2290-10	High Voltage	1	5kV / 5mA (2290-5) 10kV / 1mA (2290-10)	1V, 1μA	$\pm 0.01\%$ (2290-5), $\pm 6\text{V}$ (2290-10)	$\pm 0.01\%$ (2290-5), $\pm 5\mu\text{A}$ (2290-10)	GPIB (2290-5), GPIB, RS-232 (2290-10)
2302, 2302-PJ, 2306, 2306-PJ, 2308	Battery Simulator	1 (2302) 2 (2306, 2308)	15V / 5A	1mV, 100nA	0.05% + 3mV	0.2% + 1μA	GPIB
2303, 2303-PJ	Fast Transient Response	1	15V / 5A	1mV, 100nA	0.05% + 3mV	0.2% + 1μA	GPIB



## PWS2000 Series Single-Channel Power Supply

More power. More features. More value. Support many different applications with wide output voltage and current ranges, and down to 10 mV/10 mA resolution. Save time with a numeric keypad for fast and accurate voltage/current selection. Strain less with a bright, large readout digital display.

MODEL	PWS2185	PWS2323	PWS2326	PWS2721
Output Voltage	18 V	32 V	32 V	72 V
Output Current	5 A	3 A	5 A	1.5 A
Programmable	No	No	No	No

- Linear regulation
- 0.05% basic DC voltage accuracy
- 0.2% basic DC current accuracy
- Less than 3 mVp-p ripple and noise
- 20 user-defined setup memories
- The numeric keypad makes it easy to specify a precise current limit before you start your test.
- PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.



### ANOTHER PRODUCT FOR CONSIDERATION

The PWS4000 Series offers greater accuracy, additional features and programmability.

#### SHIPS WITH PRODUCT

Calibration Certificate  
User Documentation  
Power Cord  
3-year Warranty

#### RECOMMENDED ACCESSORIES

RMU2U: Rackmount Shelf Kit for 1 or 2 Units  
386759800: Rackmount Cosmetic Filler Panel

#### RECOMMENDED SERVICE

R5: 5-year Extended Warranty

**LEARN MORE** 📄 Download the Application Note "Choosing the Right Power Supply for Accurate Power Delivery."



## PWS4000 Series USB Programmable, Single-Channel Power Supply

Precision. Now available at the touch of a button. Generate the power you need with down to 1 mV/0.1 mA resolution and a basic voltage accuracy of 0.03%. Accelerate complex tests with list mode and a USB port for remote programming. Save time with a numeric keypad for fast and accurate voltage/current selection. Performance. Accuracy. Affordability. Meet your new power supply.

MODEL	PWS4205	PWS4305	PWS4323	PWS4602	PWS4721
Output Voltage	20 V	30 V	32 V	60 V	72 V
Output Current	5 A	5 A	3 A	2.5 A	1.2 A
Programmable	Yes	Yes	Yes	Yes	Yes

- Linear regulation
- 0.03% basic DC voltage accuracy; 0.05% basic DC current accuracy
- USB interface for remote programming
- Less than 5 mVp-p ripple and noise
- Remote sense, list mode and 40 user-defined setup memories
- The numeric keypad makes it easy to specify a precise current limit before you start your test.
- PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.



### ANOTHER PRODUCT FOR CONSIDERATION

The DMM Series offers accurate voltage, current and resistance measurements for AC and DC signals.

#### SHIPS WITH PRODUCT

Calibration Certificate  
User Documentation  
Power Cord  
3-year Warranty

#### RECOMMENDED ACCESSORIES

RMU2U: Rackmount Shelf Kit for 1 or 2 Units  
386759800: Rackmount Cosmetic Filler Panel

#### RECOMMENDED SERVICE

SILV100: 5-year Extended Warranty

**LEARN MORE** 📄 Download "Choosing the Right Power Supply for Accurate Power Delivery" Application Note.

## POWER SUPPLIES



## 2200 Programmable Single-Channel DC Power Supplies with Remote Sensing

Keithley programmable single-channel DC power supplies offer an excellent combination of performance, versatility, and ease of use, including 0.03% basic accuracy, 0.1 mA measurement resolution, and keypad data entry. Select from a variety of DC power supplies with voltages from 20 V to 72 V.

MODEL	2200-20-5	2200-30-5	2200-32-3	2200-60-2	2200-72-1
MAX Output Voltage	20 V	30 V	32 V	60 V	72 V
MAX Output Current	5 A	5 A	3 A	2.5 A	1.2 A
Power	100 W	150 W	96 W	150 W	86 W
Ripple and Noise	<1 mV <sub>RMS</sub> <sup>1</sup> <3 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> <sup>1</sup> <4 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> <sup>1</sup> <4 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> <sup>1</sup> <5 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> <sup>1</sup> <3 mV <sub>P-P</sub>

- Low noise, linear regulation
- 0.03% basic voltage output
- 0.05% basic current accuracy
- 1 mV and 0.1 mA output and measurement resolution
- Seven programmable output lists with up to 80 steps/list
- GPIB and USB interfaces
- Remote sensing compensates for voltage drops in the test leads by extending the power supply feedback loop to the input of the load.



Series 2200 rear panel.



### SHIPS WITH PRODUCT

User Documentation  
Rear Panel Mating Connector  
Calibration Certificate  
Power Cord  
3-year Warranty

### RECOMMENDED ACCESSORIES

CS-1638-12: Rear Panel Mating Connector, Single Channel  
USB-B-1: USB Cable  
4299-7: Fixed Rack Mount Kit  
RMU2U: Rackmount Shelf Kit for 1 or 2 Units  
386759800: Rackmount Cosmetic Filler Panel  
KPCI-488LPA: IEEE-488 Interface Board for PCI Bus  
7007-05: Double Shielded IEEE-488 Cable, 0.5 m (1.6 ft)  
7007-1: Double Shielded IEEE-488 Cable, 1 m (3.2 ft)  
7007-2: Double Shielded IEEE-488 Cable, 2 m (6.5 ft)  
7007-3: Double Shielded IEEE-488 Cable, 3 m (10 ft)  
7007-4: Double Shielded IEEE-488 Cable, 4 m (13 ft)

### RECOMMENDED SERVICE

Model Number\*-EW: 1 additional year of factory warranty  
C/Model Number\*-3Y-STD: 3 calibrations within 3 years of purchase  
C/Model Number\*-3Y-DATA: 3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase  
C/Model Number\*-5Y-STD: 5 calibrations within 5 years of purchase  
C/Model Number\*-5Y-DATA: 5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

\*Insert Model Number. Example: C/2200-20-5-3Y-DATA.

**LEARN MORE** 📄 Download the "Understanding Linear Power Supply Specifications" Application Note.



## 2231A-30-3 Triple-Channel DC Power Supply

The 2231A-30-3 Triple-Channel DC Power Supply can output a total of 195 W of power, providing the power levels needed to energize a wide range of circuits and devices for benchtop work. Two channels can supply up to 30 V at 3 A each; the third channel can provide up to 5 V at 3 A. The 2231A-30-3 does not compromise on performance or convenience features, offering the versatility and ease of use you need, so it can be the only DC power supply on your bench.

MODEL	2231A-30-3
MAX Output Voltage	CH1: 30 V, CH2: 30 V, CH3: 5 V
MAX Output Current	CH1: 3 A, CH2: 3 A, CH3: 3 V
Power	195 W
Ripple and Noise	<1 mV <sub>RMS</sub> <sup>1</sup> , <5 mV <sub>P-P</sub>

- 195 W with two 30 V @ 3 A outputs and one 5 V @ 3 A output
- All channels are isolated and programmable
- 0.06% basic voltage accuracy and 0.2% basic current accuracy
- Double output levels by connecting two channels in series or parallel
- Optional USB interface
- Fully supported by [TekSmartLab™](#)
- Connect the two 30 V channels in series or parallel to double the output voltage to 60 V or the supplied current to 6 A.



### SHIPS WITH PRODUCT

Calibration Certificate  
User Documentation  
Power Cord  
3-year Warranty

### RECOMMENDED ACCESSORIES

2231A-001: USB Adaptor with USB Cable

### RECOMMENDED SERVICE

Model Number\*-EW: 1-Year KeithleyCare® Gold Plan  
Model Number\*-5Y-EW: 5-Year KeithleyCare Gold Plan  
C/Model Number\*-3Y-STD: KeithleyCare 3-Year Std Calibration Plan  
C/Model Number\*-5Y-STD: KeithleyCare 5-Year Std Calibration Plan  
\*Insert Model Number. Examples: 2231A-5Y-EW, C/2200-20-5-3Y-DATA



## 2220/2230 Programmable Multiple Channel DC Power Supplies with Remote Sensing

Keithley programmable multi-channel DC power supplies offer an excellent combination of performance, versatility, and ease of use including fully isolated channels, fully programmable channels, and all channel measurements displayed simultaneously. Choose either the dual-channel DC power supply or the triple-channel DC power supply.

- Dual- and triple-channel models
- Two 30 V / 1.5 A channels
- One 6 V / 5 A channel (on triple-channel model)
- All channels are isolated and programmable
- USB interface, USB and GPIB on G versions
- Fully supported by **TekSmartLab™**
- Power two isolated circuits with isolated output channels



2230G-30-1 rear panel

MODEL	2220-30-1, 2220G-30-1*, 2220J-30-1*, 2220GJ-30-1*	2230-30-1, 2230G-30-1*, 2230J-30-1*, 2230GJ-30-1*
MAX Output Voltage	Ch 1: 30 V, Ch 2: 30 V	Ch1: 30 V, Ch 2: 30 V, Ch 3: 6 V
MAX Output Current	Ch1: 1.5 A, Ch 2: 1.5 A	Ch1: 1.5 A, Ch 2: 1.5 A, Ch 3: 5 A
Power	45 W/channel; 90 W total	Ch 1 and Ch 2: 45 W each Ch 3: 30 W, 120 W total
Ripple and Noise	<1 mV <sub>RMS</sub> , <3 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> , <3 mV <sub>P-P</sub>

\*G versions include a GPIB interface; J versions for Japan.

### SHIPS WITH PRODUCT

User Documentation  
Rear Panel Mating Connector  
Calibration Certificate  
Power Cord  
3-year Warranty

### RECOMMENDED ACCESSORIES

CS-1655-15: Rear Panel Mating Connector, Multi-Channel  
USB-B-1: USB Cable  
4299-7: Fixed Rack Mount Kit  
RMU2U: Rack-mount Shelf Kit for 1 or 2 Units  
386759800: Rack-mount Cosmetic Filler Panel

### Additional Recommended Accessories for "G" Versions

KPCI-488LPA: IEEE-488 Interface Board for PCI Bus  
7007-05: Double Shielded IEEE-488 Cable, 0.5 m (1.6ft)  
7007-1: Double Shielded IEEE-488 Cable, 1 m (3.2 ft)  
7007-2: Double Shielded IEEE-488 Cable, 2 m (6.5 ft)  
7007-3: Double Shielded IEEE-488 Cable, 3 m (10 ft)  
7007-4: Double Shielded IEEE-488 Cable, 4 m (13 ft)

### RECOMMENDED SERVICE

Model Number\*-EW: 1 additional year of factory warranty  
C/Model Number\*- 3Y-STD: 3 calibrations within 3 years of purchase  
C/Model Number\*- 3Y-DATA: 3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase  
C/Model Number\*- 5Y-STD: 5 calibrations within 5 years of purchase  
C/Model Number\*- 5Y-DATA: 5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

\*Insert Model Number. Examples: 2220-30-1-5Y-EW, C/2220-30-1-3Y-DATA.

**LEARN MORE** 📄 Download "Ensuring that Power Supply Performance Meets Your Requirements" Application Note.



## 2230G Series High Power, 3-Channel Programmable DC Power Supplies

The Series 2230G 3-channel programmable power supplies provide up to 375 W of power in a space-saving 2U high, half-rack width enclosure to power automotive circuits, LED drivers, power supplies, power ICs and other high-power circuits. The 2230G-30-3 offers 195 W with two 30 V, 3 A channels and a 5 V, 3 A channel. The 2230G-30-6 and the 2230-60-3 supplies output as much as 375 W. The 2230G-30-6 provides two 30 V, 6 A channels, while the 2230G-60-3 has two 60 V, 3 A channels. Both 375 W supplies have a 5 V, 3 A channel as the third channel. These three supplies are linear power supplies; and thus, they are low noise supplies to have minimal impact on a device-under-test (DUT).

- 195 W model has two 30 V, 3 A channels and one 5 V, 3 A channel
- 375 W models have two 30 V, 6 A channels or two 60 V, 3 A channels and one 5 V, 3 A channel
- All channels are independently controlled and are isolated to power a wide range of test setups
- All channels have remote sensing so that the programmed voltage is accurately applied to the load
- Low noise, linear regulation with <1 mVrms ripple & noise
- USB, GPIB, and RS-232 interfaces and rear panel connections for automated test convenience
- Power two isolated circuits with isolated output channels.
- Combine 30 V channels in series to extend voltage output to 60 V. Combine channels in parallel to extend current output capacity. For example, combine all three channels of a 2230G-30-6 to output up to 15 A.

MODEL	2230G-30-3	2230G-30-6	2230G-60-3
MAX Output Voltage	Ch1/Ch2: 30 V Ch3: 5 V	Ch1/Ch2: 30 V Ch3: 5 V	Ch1/Ch2: 60 V Ch3: 5 V
MAX Output Current	Ch1/Ch2: 3 A Ch3: 3 A	Ch1/Ch2: 6 A Ch3: 3 A	Ch1/Ch2: 3 A Ch3: 3 A
Power	Ch1/Ch2: 90 W Ch3: 15 W Total: 195 W	Ch1/Ch2: 180 W Ch3: 15 W Total: 375 W	Ch1/Ch2: 180 W Ch3: 15 W Total: 375 W
Ripple and Noise	<1 mV <sub>RMS</sub> , <3 mV <sub>P-P</sub>	Ch1/Ch2: <1 mV <sub>RMS</sub> , <4 mV <sub>P-P</sub> Ch3: <1 mV <sub>RMS</sub> , <3 mV <sub>P-P</sub>	<1 mV <sub>RMS</sub> , <4 mV <sub>P-P</sub>

### SHIPS WITH PRODUCT

Quick Start Guide, Rear Panel Mating Connector, Harmonic Reduction Module (with 2230G-30-6 and 2230G-60-3), Harmonic Reduction Module Line Cord (with 2230G-30-6 and 2230G-60-3), USB Cable, Power Cord, Calibration Certificate

### RECOMMENDED ACCESSORIES

116128300: Screw Terminal Block, 15 Terminals; 4299-7: Universal Rack Mount Shelf Kit; 7007-1: Shielded GPIB Cable, 1 m (3.2 ft); 7007-2: Shielded GPIB Cable, 2 m (6.5 ft); KPCI-488LPA: IEEE-488 Interface for PCI Bus; KUSB-488B: IEEE-488 USB-GPIB Interface Adapter; USB-B-1: USB Cable 1 m (3.2 ft)

### RECOMMENDED SERVICE

#### KeithleyCare Extended Warranty

Model No.\*-EW: 1 Year, extends 3-year warranty one additional year  
Model No.\*-5Y-EW: 5 Year, extends 3-year warranty to 5 years

#### KeithleyCare Standard Calibration Plan

C/Model No.\*-3Y-STD: 3 Year, 3 calibrations within 3 years of purchase  
C/Model No.\*-3Y-DATA: 3 Year, 3 calibrations within 3 years with Z540 data report  
C/Model No.\*-5Y-STD: 5 Year, 5 calibrations within 5 years of purchase  
C/Model No.\*-5Y-DATA: 5 Year, 5 calibrations within 5 years with Z540 data report

\*Replace Model Number with a 2230G series model number. For example, if the 2230G-30-3 is selected, then the part number for the 1 Year KeithleyCare Extended Warranty is 2230G-30-3-EW.

**LEARN MORE** 📄 Download "Ensuring that Power Supply Performance Meets Your Requirements" Application Note.



## POWER SUPPLIES



## 2260B Series Programmable DC Power Supply (360 W, 720 W, 1080 W)

Source a wide range of voltages and currents using the Series 2260B Programmable DC Power Supplies. All twelve instruments have constant power outputs to provide a wide range of voltage and output currents. The wide range of output voltages and currents and multiple interfaces in the 2260B power supplies enables their use in a broad array of applications including research and design, quality control, and production test.

MODEL	2260B-30-36	2260B-80-13	2260B-250-4	2260B-800-1	2260B-30-72	2260B-80-27
MAX Output Voltage	30 V	80 V	250 V	800 V	30 V	80 V
MAX Output Current	36 A	13.5 A	4.5 A	1.44 A	72 A	27 A
Power	360 W	360 W	360 W	360 W	720 W	720 W
Ripple and Noise	<7 mV <sub>RMS</sub> <sup>1</sup> <60 mV <sub>P-P</sub>	<7 mV <sub>RMS</sub> <sup>1</sup> <60 mV <sub>P-P</sub>	<15 mV <sub>RMS</sub> <sup>1</sup> <80 mV <sub>P-P</sub>	<30 mV <sub>RMS</sub> <sup>1</sup> <150 mV <sub>P-P</sub>	<11 mV <sub>RMS</sub> <sup>1</sup> <80 mV <sub>P-P</sub>	<11 mV <sub>RMS</sub> <sup>1</sup> <80 mV <sub>P-P</sub>

MODEL	2260B-250-9	2260B-800-2	2260B-30-108	2260B-80-40	2260B-250-13	2260B-800-4
MAX Output Voltage	250 V	800 V	30 V	80 V	250 V	800 V
MAX Output Current	9 A	2.88 A	108 A	40.5 A	13 A	4.32 A
Power	720 W	720 W	1080 W	1080 W	1080 W	1080 W
Ripple and Noise	<15 mV <sub>RMS</sub> <sup>1</sup> <100 mV <sub>P-P</sub>	<30 mV <sub>RMS</sub> <sup>1</sup> <200 mV <sub>P-P</sub>	<14 mV <sub>RMS</sub> <sup>1</sup> <100 mV <sub>P-P</sub>	<14 mV <sub>RMS</sub> <sup>1</sup> <100 mV <sub>P-P</sub>	<15 mV <sub>RMS</sub> <sup>1</sup> <120 mV <sub>P-P</sub>	<30 mV <sub>RMS</sub> <sup>1</sup> <200 mV <sub>P-P</sub>

- Wide output range with constant power
- Programmable voltage/current rise and fall times
- Constant current priority setting
- Programmable output resistance
- USB, LAN, Analog Control, optional GPIB
- Precisely control voltage rise time with the variable slew rate control.



### SHIPS WITH PRODUCT

2260B Basic Accessories Kit, Test Leads, USB Cable, Quick Start Guide, User Documentation, Power Cord, 3-year Warranty

### RECOMMENDED ACCESSORIES

2260-001: Accessory Kit; 2260-002: Simple IDC Tool; 2260-003: Contact Removal Tool; 2260-004: Basic Accessories Kit; 2260-005: Cable for 2 units in Series connection; 2260-006: Cable for 2 units in Parallel connection; 2260-007: Cable for 3 units in Parallel connection; 2260-008: Test Lead Set with Lugs; 2260-009: Test Leads (250 V, 800 V); 2260-010: Basic Accessories Kit (250 V, 800 V models); 2260-EXTERM-HV: Extended Terminal (250 V, 800 V models); 2260B-GPIB-USB: GPIB To USB Adapter; 2260B-EXTERM: Extended Terminal; 2260B-RMK-JIS: Rack Mount Kit (JIS); 2260B-RMK-EIA: Rack Mount Kit (EIA)

### RECOMMENDED SERVICE

Model Number\*-EW: 3-year factory warranty extended to 1 additional year from date of shipment

Model Number\*-5Y-EW: 3-year factory warranty extended to 5 years from date of shipment  
 C/Model Number\*- 3Y-STD: KeithleyCare 3-Year Standard Calibration Plan  
 C/Model Number\*- 3Y-DAT: KeithleyCare 3-Year Calibration with Data Plan  
 C/Model Number\*- 5Y-STD: KeithleyCare 5-Year Standard Calibration Plan  
 C/Model Number\*- 5Y-DAT: KeithleyCare 5-Year Calibration with Data Plan  
 \*Insert Model Number. Examples: 2260B-30-36-5Y-EW, C/2260B-30-36-3Y-DATA.

**LEARN MORE** 📄 Download "Avoiding Inrush Current when Testing High Power LEDs with Series 2260B Power Supplies" Application Note.



## 2280S Series Precision Measurement DC Power Supply

Series 2280S Precision Measurement, Low Noise, Programmable DC Power Supplies are much more than just sources of clean power; they are also precision measurement instruments. They can source stable, low noise voltages as well as monitor load currents over a wide dynamic range from amps to nanoamps. The 2280S-32-6 can output up to 32 V at up to 6 A; the 2280S-60-3 can output up to 60 V at up to 3.2 A.

MODEL	2280S-32-6	2280S-60-3
MAX Output Voltage/Current	32 V / 6 A	60 V / 3.2 A
Output Power	192 W	192 W
Max Current Measurement Accuracy	±(0.05% + 10 µA)	±(0.05% + 10 µA)
Transient Response Time	<50 µs	<50 µs

- 10 nA resolution to 6 A with high accuracy, measure voltage and current with 6½-digit resolution
- Capture dynamic load currents as short as 140 µs
- Output up to 192 W of low noise, linear regulated power
- Programmable rise and fall times eliminate voltage overshoot and undershoot transients
- Built-in graphing simplifies analyzing trends or displaying voltage or current waveforms
- GPIB, USB, and LAN interfaces, built-in LXI web interface simplifies automated control/monitoring/data logging
- Kickstart Instrument Control Software for the PC enables instrument control without programming. Download at [www.tek.com/keithley-kickstart](http://www.tek.com/keithley-kickstart).

### SHIPS WITH PRODUCT

2280-001: Output mating connector  
 174694600: LAN crossover cable (1.5 m)  
 User Documentation  
 QuickStart guide  
 Calibrate Certificate  
 Power Cord  
 3-year Warranty

### RECOMMENDED ACCESSORIES

2280-001: Rear Panel Mating connector and Cover  
 2280-Test-Lead: Power Supply Test Lead Kit, 1000 V, 20 A Rating  
 174694600: LAN Crossover Cable (3 m)  
 USB-B-1: USB Cable Type A to B, 1 m (3.3 ft)  
 2450-TLINK: Trigger Link cable to connect 2280S digital I/O to Trigger Link I/O on other Keithley instruments  
 4299-8: Single Fixed Rack-Mount Kit  
 4299-9: Dual Fixed Rack-Mount Kit  
 4299-10: Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 26xx Instrument  
 4299-11: Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 24xx, Series 2000, or 2U Agilent Instrument  
 7007-05: Double Shielded Premium IEEE-488 Interface Cables, 0.5 m (1.6 ft)  
 7007-1: Double Shielded Premium IEEE-488 Interface Cables, 1 m (3.2 ft)  
 7007-2: Double Shielded Premium IEEE-488 Interface Cables, 2 m (6.5 ft)  
 7007-3: Double Shielded Premium IEEE-488 Interface Cables, 3 m (10 ft)  
 7007-4: Double Shielded Premium IEEE-488 Interface Cables, 4 m (13 ft)  
 KPCI-488LPA: IEEE-488.2 Interface Board for the PCI Bus

**LEARN MORE** 📄 Download "Making Low Current Measurements with the Series 2280S Precision Measurement DC Power Supply" Application Note.



## 2281S Series Precision DC Power Supply with Battery Test and Battery Simulation Functions

The Series 2281S single-channel, precision DC supply and battery simulator innovatively integrates the functions of high-precision power supply, battery test, and battery simulation. It is able to analyze the DC consumption of a device under test, test a battery and generate a battery model based on the battery charging process, and simulate a battery based on the battery model. The 2281S-20-6 can output power up to 20 V and 6 A and sink current up to 1 A.

The 2281S uses linear regulation to ensure low output noise and superior load current measurement sensitivity. A high resolution color thin film transistor (TFT) screen displays a wide range of information on measurements. Soft-key buttons and a navigation wheel combine with the TFT display to provide an easy-to-navigate user interface that speeds instrument setup and operation. In addition, built-in plotting functions allow monitoring trends such as drift. These features provide the flexibility required for both benchtop and automated test system applications. In addition, the 2281S provides a list mode, triggers, and other speed optimization functions to minimize test time in automated testing applications.

MODEL	2281S-20-6
Description	Single-Channel, Precision DC Power Supply & Battery Simulator
Maximum Output Voltage/Current	20 V / 6 A
Output Power	120 W
Maximum Current Measurement Accuracy	±(0.05% + 10 µA)

- One box integrates the functions of high-precision power supply, battery test, and battery simulation
- Sink current up to 1 A and source current up to 6 A
- Build a battery model based on charging a battery measurement. Use the model for battery simulation.
- Simulate real output during discharge with a battery model. Set the SOC/Voc, capacity, and resistance of a simulated battery according to test requirements
- Manually create, edit, import and export battery models
- Kickstart Instrument Control Software for the PC enables instrument control without programming. Download at [www.tek.com/keithley-kickstart](http://www.tek.com/keithley-kickstart).
- Log battery charge/discharge process and data (V, I, R and Amp-Hour).
- Offers both dynamic and static simulation modes to simulate battery output.

### SHIPS WITH PRODUCT

Quick Start Guide, User Documentation, 174694600 LAN Crossover Cable (1.5 m), Power Cord, Rear Panel Mating, Connector with Cover

### RECOMMENDED ACCESSORIES

2450-TLINK: Trigger Link Cable to connect 2281S Digital I/O to Trigger Link I/O on other Keithley instruments; 4299-8: Single Fixed Rack-Mount Kit; 4299-9: Dual Fixed Rack-Mount Kit; 4299-10: Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 26xx Instrument; 4299-11: Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 24xx, Series 2000, or 2U Agilent Instrument; 174694600: LAN crossover cable (3 m); 7007-05: Double Shielded Premium IEEE-488 Interface Cables, 0.5 m (1.6 ft); 7007-1: Double Shielded Premium IEEE-488 Interface Cables, 1 m (3.2 ft); 7007-2: Double Shielded Premium IEEE-488 Interface Cables, 2 m (6.5 ft); 7007-3: Double Shielded Premium IEEE-488 Interface Cables, 3 m (10 ft); 7007-4: Double Shielded Premium IEEE-488 Interface Cables, 4 m (13 ft); KPCI-488LPA: IEEE-488.2 Interface Board for the PCI Bus; KUSB-488B: IEEE-488.2 USB-GPIB Interface Adapter for USB Port with built-in 2 m (6.6 ft) cable; USB-B-1: USB Cable Type A to B, 1 m (3.3 ft)

**LEARN MORE** Download "How to Accelerate a Power Management Unit Test Using the Keithley 2281S Battery Simulator" Application Note.



## 2290 High Voltage Power Supply

Series 2290 High Voltage Power Supplies facilitate high voltage device and material testing, as well as high energy physics experimentation. The 2290-5 5 kV Power Supply provides voltage outputs up to 5000 V, and the 2290-10 10 kV Power Supply offers up to 10,000 V. These supplies measure both output voltage with 1 V resolution and output current with 1 µA resolution.

MODEL	2290-5	2290-10
MAX Output Voltage	5 kV	10 kV
MAX Output Current	5 mA	1 mA
Power	25 W	10 W
Ripple	3 mV <sub>RMS</sub> maximum with filter	1 V <sub>RMS</sub>

- Source voltages up to 5 kV and 10 kV
- 1 µA current measurement resolution
- Low noise for precision sourcing and sensitive measurements; selectable filters reduce noise to less than 3mVRMS on the 5 kV supply
- Safety interlock controls high voltage output
- GPIB programmable
- Protection module prevents damage to low voltage instrumentation
- The 2290-PM-200 Protection Module protects low voltage measurement equipment from voltages greater than 200 V.
- Reverse breakdown testing of a high voltage diode using a Keithley SourceMeter® SMU instrument to measure leakage currents down to picoamp levels. The 2290-PM-200 SMU Protection Module protects the SourceMeter SMU instrument from high voltage when the diode breaks down.

**SHIPS WITH PRODUCT:** User Documentation, Power Cord

### RECOMMENDED ACCESSORIES

#### For 2290-5

2290-5-SHV: 5 kV SHV Female–SHV Female Cable, 3 m (10 ft)  
 2290-5-MHV: 5 kV SHV Female–MHV Male Cable, 3 m (10 ft)  
 2290-5-SHVBH: 5 kV SHV Male Bulkhead Connector  
 2290-5-RMK-1: Single Fixed Rack Mount Kit for 5 kV Power Supply  
 2290-5-RMK-2: Dual Fixed Rack Mount Kit for 5 kV Power Supply

#### For 2290-10

2290-10-SHVUC: 10 kV SHV Male to Underterminated Cable, 3 m (10 ft)  
 2290-10-SHV: 10 kV SHV Male–SHV Male Cable, 3 m (10 ft)  
 2290-10-SHVBH: 10 kV SHV Female Bulkhead Connector  
 2290-10-RMK-1: Single Fixed Rack Mount Kit for 10 kV Power Supply  
 2290-10-RMK-2: Dual Fixed Rack Mount Kit for 10 kV Power Supply

#### For both

2290-PM-200: 10 kV Protection Module  
 2290-INT-CABLE: 3-Pin Connector to Underterminated Interlock Cable  
 4299-7: Fixed Shelf Rack Mount Kit  
 KPCI-488LPA: IEEE-488.2 Interface Board for the PCI Bus  
 KUSB-488B: IEEE-488.2 USB-GPIB Interface Adapter for USB port with built-in 2 m (6.6 ft) cable

#### Double Shielded Premium IEEE-488 Interface Cables

7007-05: 0.5 m (1.6 ft); 7007-1: 1 m (3.2 ft); 7007-2: 2 m (6.5 ft); 7007-3: 3 m (10 ft); 7007-4: 4 m (13 ft)

### RECOMMENDED SERVICE

Model\*-3Y-EW: 1-Year Factory Warranty extended to 3 years from date of shipment  
 Model\*-5Y-EW: 1-Year Factory Warranty extended to 5 years from date of shipment  
 C/Model\*-3Y-STD: KeithleyCare 3-Year Standard Calibration Plan  
 \*Insert Model Number. Examples: 2290-5-3Y-EW, C/2290E-10-3Y-STD

**LEARN MORE** Download the Application Note.

## POWER SUPPLIES



## 2300 Series Portable Device Battery/Charger Simulator

Keithley's battery-simulating power supplies can simulate a battery's output characteristics and its discharged state. These supplies can measure low, sleep mode load current and pulsed output load current. Dual-channel models facilitate testing portable device, charge control circuitry with a battery channel and a charger simulator channel.

MODEL	2302, 2302-PJ	2306, 2306-PJ	2308
Channels	1	2	2
Max Output Voltage/Current	15 V / 5 A	15 V / 5 A	15 V / 5 A
Power	45 W	45 W	45 W
Transient Response to a 10× Load Current Change	<40 μs recovery time and <75 mV voltage drop	<40 μs recovery time and <75 mV voltage drop	<35 μs recovery time and <90 mV voltage drop
Current Sink Capacity	3 A	3 A	3 A

- Optimized for battery-powered device testing
- 100 nA current measurement sensitivity
- Load pulse current measurement: 33 μs–833 μs
- Variable output resistance: 0–1 Ω with 10 mΩ resolution
- Measure sleep, currents, standby currents, and full load currents to determine power consumption
- Sink current to simulate a discharged battery



2306 rear panel.

### SHIPS WITH PRODUCT

User Documentation  
Rear Panel Mating Connector  
Calibration Certificate  
Power Cord  
1-year Warranty

### RECOMMENDED ACCESSORIES

2306-DISP: Remote Display (2302, 2306, 2308)  
CS-846: Mating Output Connector  
SC-182: Low Inductance Coaxial Cable  
4288-1: Single Fixed Rack Mount Kit  
4288-2: Dual Fixed Rack Mount Kit  
KPCI-488LPA: IEEE-488 Interface Board for PCI Bus  
KUSB-488B: IEEE-488 USB-to-GPIB Interface Adapter  
7007-05: Double Shielded IEEE-488 Cable, 0.5 m (1.6 ft)  
7007-1: Double Shielded IEEE-488 Cable, 1 m (3.2 ft)  
7007-2: Double Shielded IEEE-488 Cable, 2 m (6.5 ft)  
7007-3: Double Shielded IEEE-488 Cable, 3 m (10 ft)  
7007-4: Double Shielded IEEE-488 Cable, 4 m (13 ft)

### RECOMMENDED SERVICE

Model\*-3Y-EW: 1-year factory warranty extended to 3 years from date of shipment  
Model\*-PJ-3Y-EW: 1-year factory warranty extended to 3 years from date of shipment  
\*Insert Model Number. Example: 2302-3Y-EW.

**LEARN MORE** 📄 Download "Simulating Battery Impedance with the Models 2302 and 2306 Battery Simulators/Chargers" Application Note.



## 2303 High Speed Power Supply

The 2303 Power Supply provides both voltage control and power consumption monitoring for automated testing of portable, battery-operated devices. It is optimized for testing battery-operated, wireless communication devices such as cellular phones that undergo substantial load changes for very short time intervals.

MODEL	2303, 2303-PJ
Channels	Single Output
Max Output Voltage/Current	15 V / 3 A or 9 V / 5 A
Power	45 W
Transient Response to a 10× Load Current Change	<40 μs recovery time and <100 mV voltage drop
Current Sink Capacity	2 A

- Ultra-fast response times to load changes
- Optimized for battery-powered device testing
- 100 nA current measurement sensitivity
- Load pulse current measurement: 33 μs–833 μs
- Measure sleep, standby currents, and full load currents to determine power consumption
- Sink current to simulate a discharged battery
- Keithley's high speed power supply maintain a stable voltage during large load changes.



2303 rear panel.

### SHIPS WITH PRODUCT

User Documentation  
Rear Panel Mating Connector  
Calibration Certificate  
Power Cord  
1-year Warranty

### RECOMMENDED ACCESSORIES

CS-846: Mating Output Connector  
SC-182: Low Inductance Coaxial Cable  
4288-1: Single Fixed Rack Mount Kit  
4288-2: Dual Fixed Rack Mount Kit  
KPCI-488LPA: IEEE-488 Interface Board for PCI Bus  
KUSB-488B: IEEE-488 USB-to-GPIB Interface Adapter  
7007-05: Double Shielded IEEE-488 Cable, 0.5 m (1.6 ft)  
7007-1: Double Shielded IEEE-488 Cable, 1 m (3.2 ft)  
7007-2: Double Shielded IEEE-488 Cable, 2 m (6.5 ft)  
7007-3: Double Shielded IEEE-488 Cable, 3 m (10 ft)  
7007-4: Double Shielded IEEE-488 Cable, 4 m (13 ft)

### RECOMMENDED SERVICE

Model\*-3Y-EW: 1-year factory warranty extended to 3 years from date of shipment  
C/Model\*-3Y-ISO: 3 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2303, 2303-PJ

\*Insert Model Number. Examples: 2303-3Y-EW, C/2303-3Y-ISO.

**LEARN MORE** 📄 Download "Stabilizing Fast Transient Response Power Supply Load Circuits" Application Note.



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