Semight

S2027H

Single-Channel Precision Source Meter

Version 1.0

Semight

Product Description

The S2027H precision source meter is compact and cost-effective bench-top Source/Measure Units (SMUs) with the capability to source and measure both voltage and current. These capabilities make the S2027H ideal for a wide variety of IV (current versus voltage) measurement tasks that require both high resolution and accuracy.

The S2027H provides best-in-class performance for a modest price. They have broad voltage (±60 V) and current (± 3 A DC and ±10 A pulsed) sourcing capability, excellent precision (minimum 100 fA/100 nV measuring resolution) and possess a superior color LCD graphical user interface (GUI). These features improve efficiency and lower the cost of ownership when integrating the SMUs into systems for production test.

Key Features

Feature	Benefit
Integrated 4-quadrant sourcing and measuring capabilities	Easily and accurately measure current and voltage using a single instrument without the need to manually change any connections
Measurement range: ±60 V, ±3A (DC), ±10A (pulsed)	A single SMU product covers both high voltage and high current measurement needs, allowing for more standardization and simplifying inventory and support concerns
Source and measurement resolution down to 100 fA and 100 nV	Can make low-level measurements using a low-cost bench-top SMU that were previously only possible using a more expensive semiconductor device analyzer
Fast measurement	Up to 1M ADC sampling rate, NPLC and sampling rate optional setting
User-friendly front panel GUI with 5.0 inch capacitive touchscreen supports both graphical and numerical view modes	Can quickly and easily perform measurements and display data on the front panel, thereby greatly speeding up interactive test, characterization and debug operations

Free quick V/I control software	Can make measurements remotely from a PC without the need to program
Supports both conventional and default SCPI commands	Conventional SCPI commands provide some compatibility with older SMU code (such as Keithley 2400 series) to minimize code conversion work
Works with PXIe chassis	Easily integrate multi-channel expansion into rack and stack systems
Small form factor with USB3.0, LAN	Easy integration into rack and stack systems

Technical Specification

Temperature :23 ℃ ± 5 ℃

Humidity :30% to 70% RH

After 60 minutes warm-up, ambient temperature changes less than ± 3 ℃

Calibration period:1 Year

Measurement speed: 1PLC (power line cycle)

Voltage source/ measurement specifications

Voltage accuracy	Range	Programming resolution	Accuracy (1 Year) ± (% reading+ offset)	Typical Noise (RMS) 0.1 Hz-10Hz

	±60 V	10 µV	0.02%+3 mV	200 µV
	±6 V	1 µV	0.02%+0.3 mV	60 µV
	±0.6 V	100 nV	0.02%+50 µV	20 µV
Temperature coefficient	±(0.15 × accuracy)/°C (0°C-18°C,28°C-50°C)			
Settling time	<50µs (typical)			
Overshoot	<±0.1% (Typical. Normal mode. Step is 10 % to 90 % range, full range, resistive load)			
Noise 10 Hz-20 MHz	6 V voltage source, 3A resistive load, <5 mVrms			

Current source/ measurement specifications

	Range	Programming resolution	Accuracy (1 Year) ± (% reading+ offset)	Typical Noise (RMS) 0.1 Hz-10 Hz
Current accuracy	±10 A[1]	1 µA	0.03% + 2mA	20 µA
	±3 A			
	±1 A	100 nA	0.03% + 90 µA	3 µA
	±100 mA	10 nA	0.03% + 9 µA	200 nA
	±10 mA	1 nA	0.03% + 900 nA	20 nA
	±1 mA	100 pA	0.03% + 90 nA	2 nA
	±100 µA	10 pA	0.03% + 9 nA	200 pA
	±10 µA	1 pA	0.03% +1 nA	30 pA
	±1 µA[2]	100 fA	0.03% + 200 pA	5 pA

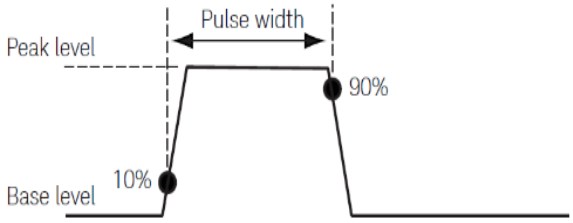
Temperature coefficient	±(0.15 × accuracy)/°C (0°C-18°C,28°C-50°C)
Settling time	<100μs (typical)
Overshoot	<±0.1% (Typical. Normal mode. Step is 10 % to 90 % range, full range, resistive load)

1, 10 A range is available only for pulse mode, accuracy specifications for 10 A range are typical.

2, Low Current Measurements, Triaxial Cable is recommended to connect: HI connect to core cable, Guard connects to inner shield, outer shield connects to protective ground, LO connect to core cable, inner shield not connect, and outer shield connect to protective ground. Triaxial Cable rated insulation voltage is not less than 250V.

Pulse source specifications (4W)

Minimum programmable pulse width	100 μs
Pulse width programming resolution	1 μs
Pulse width programming accuracy	±10 μs
Pulse width jitter	2 μs
Pulse width definition	The time from 10 % leading to 90 % trailing edge as follows



Item	Maximums	Maximum pulse width	Maximum duty cycle
1	0.4A/50 V	DC, no limit	100%
2	1A/20 V	DC, no limit	100%
3	3A/6.6 V	DC, no limit	100%
4	10A/20 V	1 ms	5%

5	10A/50 V	400 µs	2%

Typical Pulse Performance(4W)

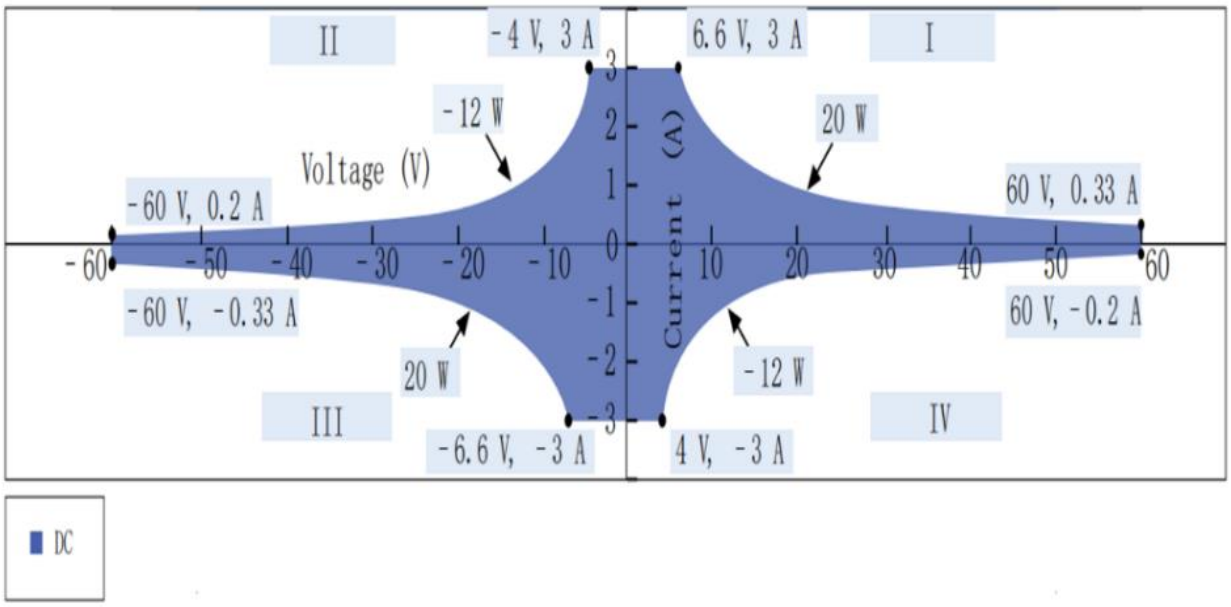
Source	Maximum output	Typical rise time [1]	Typical Settling Time[2]	Test load
Voltage	50 V	250 µs	400 µs	NO load
	5 V	40 µs	100 µs	NO load
Current	10A~100 µA	90 µs	250 µs	Full load[3]
	10 µA	120 µs	300 µs	Full load[3]
	1 µA	300 µs	600 µs	Full load[3]

1, Leading edge, the time from 10 % leading to 90 % leading

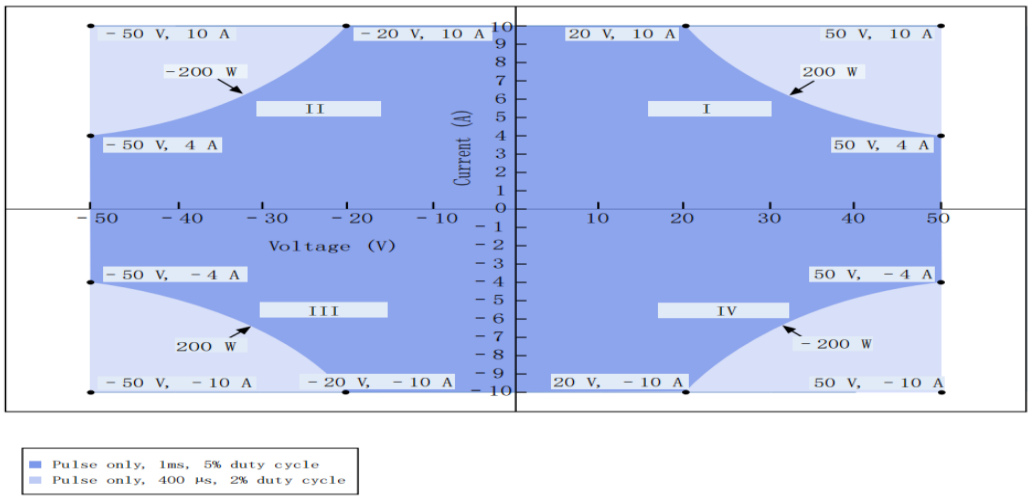
2, The time required from Pulse out 0 to reach within 1 % of final value

3, Test condition: Normal, resistive load 6V maximum output

DC I-V Out capability



Pulse I-V Output capability



Typical output settling time

Source	Range	Output settling time[1]			Condition
		Fast[2]	Normal	Slow	
Voltage	60 V	<120 µs	<300 µs	<1 ms	Time required to reach within 0.1 % of final value at open load condition. Step is 10 % to 90 % range
	6 V	<30 µs	<50 µs	<300 µs	
	0.6V	<30 µs	<50 µs	<300 µs	
Current	3 A~100 µA	<50 µs	<100 µs	<0.8 ms	Time required to reach within 0.1 % (0.3 % for 3 A range) of final value at short condition. Step is 10 % to 90 % range
	10 µA	<100 µs	<150 µs	<0.8 ms	
	1 µA	<300 µs	<400 µs	<1 ms	

1,Output transition speed: Fast, Normal, Slow. Users can adjust the APFC parameters based on the load characteristics to obtain precision, and fast output characteristics

2, Slow mode is recommended for overshoot sensitive equipment, Fast mode may have overshoot on output in some condition

Sampling rate and NPLC setting

Setting	Range
NPLC	0.00005 PLC ~ 10 PLC
Sampling Rate	5 sps ~ 1 Msps

Derating accuracy with PLC setting< 1 PLC

Add % of range using the following table for measurement with PLC < 1

PLC	Range						
	600 mV	6V	60 V	1 µA	10 µA	100 µA to 100 mA	1 A to 3A
0.1	0.02%	0.01%	0.01%	0.02%	0.01%	0.01%	0.01%
0.01	0.3%	0.03%	0.02%	0.2%	0.04%	0.02%	0.02%
0.001	3.2%	0.4%	0.1%	2.5%	0.4%	0.03%	0.03%

Supplemental characteristics

Sensing Modes	2-wire or 4-wire (Remote-sensing) connections
Maximum sense lead resistance:	1 kΩ for rated accuracy
Max voltage between Force and Sense	2 V
Maximum output voltage in output connector	>range 105% (60V range>60.5V)
DC floating voltage	Max ±150 V DC between low force and chassis ground
Sweep	Sweep step time: from 20 µs to 16 s, Max: 8K point

Auto range	Support, turn off output is recommended for overshoot sensitive equipment before range change
Source delay	Support, It is recommended that users set appropriate source delay to obtain higher accuracy
Over temperature protection	The output will be turned off (also disable operation) when the SMU internal temperature is detected higher than 85 degrees. When the temperature returns to less than 65 degrees, operation recover
Other abnormal protection	Power reset, recover operation or hardware damage

WARNING: here are potentially hazardous voltages (±60.5 V) present at the HI, Sense HI, and Guard terminals of this instrument. To prevent electrical shock, the safety precaution must be done before turn on the instrument. Never connect the Guard terminal to any output, including chassis ground, or output LO, doing so will damage the instrument.

Communication port

LAN	1000BASE-T / 100BASE-T
USB	USB 3.0 HOST (front)
	USB 3.0 DEVICE (back)

Environmental specifications

Environment	For use in indoor facilities
Operating	0 ℃ to +50 ℃, 30 % to 70 % non-condensing

Storage	-30 ℃ to 70 ℃, 10 % to 90 % non-condensing
Altitude	Operating: 0 m to 2000 m, Storage: 0 m to 4600 m
Power	LINE: 100-240VAC, 50/60Hz, 250W FUSE: T3.15AL 250 VAC
Warm-up	1 hour
Dimensions（mm）	404.5*217.5*105.5 (with foot pad/handle/ rotary Knob) 446*233*112 (with sheath)
Weight	Net weight 5.2Kg

Front Panel

Display	5.0” TFT color display (800x480), Capacitive touchscreen
Hardkeys	Home，Menu，Exit，Enter，Trigger，Up，Down power on, output on/off, rotary Knob
Softkeys	LCD Mapping function keys
Connectivity	USB Host, output, ground

Rear panel

Connectivity	OUTPUT interface, LAN, USB device, AC socket, Ground

Ordering information

Power cable, USB cable, Output connector, quick reference, U disk (including PDF manuals, quick I/V Measurement Software and drivers)

Model number	
S2027H	Single-Channel Precision Source Meter, pulser

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Visit www.semight.com for more information.

*This information is subject to change without notice.