

SSIVT CURRENT VOLTAGE MEASUREMENT

IV Measurement Instruments for Advanced Characterization



Features

- Using Keithley 2400 series
- Continuous or flash operation
- Calculates all critical cell performance parameters
- Industry leading power range
- Easy-to-use software interface
- Remote operation of flash systems
- Works with all Sciencetech Solar Simulators

Applications

- Accurate modular IV test and photovoltaic cell performance characterization
- Test applications that demand tightly coupled sourcing and measurement
- Providing precise voltage and current sourcing as well as measurement capabilities

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A. Overview

The Sciencetech model SSIIVT is an electrical current voltage measurement system that uses a Keithley 2400 series sourcemeter to characterize photovoltaic cell performance. Sciencetech manufactures Solar Simulators and offers a variety of cell measurement accessories such as reference cells, cell chucks and cooling equipment to provide the full PV measurement package.

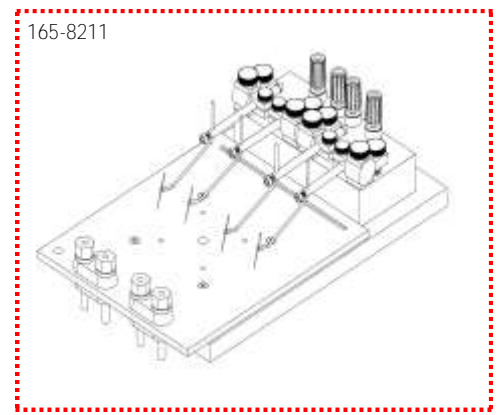
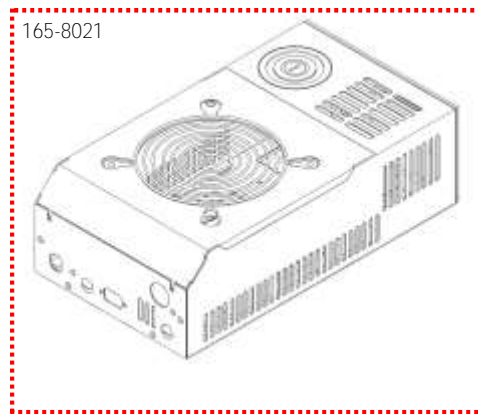
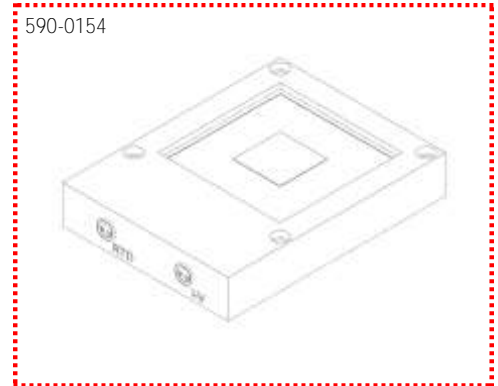
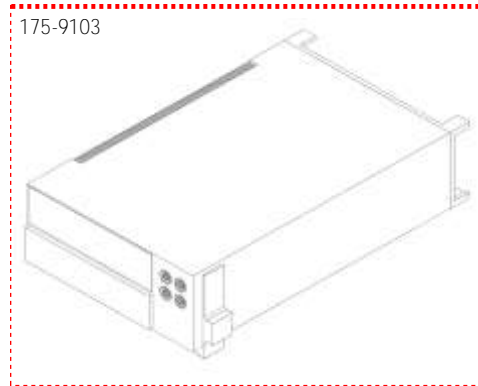
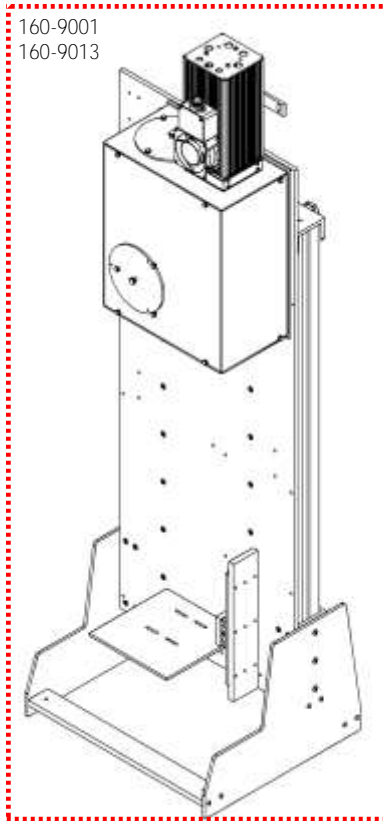
Coupled with Sciencetech's Load Booster system Sciencetech offers industry leading power range. Our maximum measurable panel is up to 200V, 80A .

Sciencetech's SSIIVT systems can be combined with our wide range of flash and continuous solar simulators and accessories to create a customized modular system to meet your exact needs.

Modular measurement systems

Sample test system:

- 150W Fully Reflective Solar Simulator (160-9001)
- Downward Facing Vertical Stand for SS150 (160-9013)
- Current-Voltage Measurement System - 20W Version for Continuous Solar Simulator (175-9103)
- Calibrated Reference Cell, Quartz Window (590-0154)
- 16.5x16.5cm Solar Cell Chuck, Liquid Cooled, Vacuum Ready (165-8204)
- Water Recirculating Cooler 500W Capacity (165-8021)
- Probe Station, 4 Probes, Tungsten Needle-tip Kelvin Probes (165-8211)



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B. Specifications

Sciencetech's SSIIVT series of IV measurement systems cover a wide range of measurement conditions, as shown in the table below.

Model	SSIIVT-20C (sku:175-9103)	SSIIVT-20F (sku:175-9104)	SSIIVT-21C (sku:175-9106)	SSIIVT-60C (sku:175-9101)	SSIIVT-60F (sku:175-9102)
Measured Quantities	Voc, Isc, Vmax, Imax, Pmax, FF, Rseries, Rshunt				
PV Voltage Range	0 - 200V	0 - 200V	0 - 20V	0 - 60V	0 - 60V
Current Range	0 - 1A	0 - 1A	0 - 1A	0 - 3A	0 - 3A
Power Range	0 - 20W	0 - 20W	0 - 20W	0 - 60W	0 - 60W
Running Mode	Continuous	Flash	Continuous	Continuous	Flash
Source Measure Unit (SMU) Model	Keithley 2400	Keithley 2400	Keithley 2401	Keithley 2420	Keithley 2420
Voltage Source Accuracy at Maximum Voltage (1 Year, 23°C ± 5°C)	0.02% + 24mV	0.02% + 24mV	0.02% + 2.4mV	0.02% + 7.2mV	0.02% + 7.2mV
Voltage Measurement Accuracy at Maximum Voltage (1 Year, 23°C ± 5°C)	0.015% + 10mV	0.015% + 10mV	0.015% + 1.5mV	0.015% + 3mV	0.015% + 3mV
Voltage Programming Resolution at Maximum Voltage	5mV	5mV	500µV	1.5mV	1.5mV
Default Voltage Measurement Resolution at Maximum Voltage	1mV	1mV	100µV	1mV	1mV
Current Source Accuracy at Maximum Current (1 Year, 23°C ± 5°C)	0.27% + 900µA	0.27% + 900µA	0.27% + 900µA	0.059% + 2.7mA	0.059% + 2.7mA
Current Measurement Accuracy at Maximum Current (1 Year, 23°C ± 5°C)	0.22% + 570µA	0.22% + 570µA	0.22% + 570µA	0.052% + 1.71mA	0.052% + 1.71mA
Current Programming Resolution at Maximum Current	50µA				
Default Current Measurement Resolution at Maximum Current	10µA				
A to D	16 bit				
Connection	4-wire (Remote) Measurement				
# of Data Points / Scan*	2 - 100				
Scan time*	2 - 50s for steady-state illumination and 10s - 10mins for flash illumination				
Software	Compatible with Windows 7 (XP / Vista optional)				

Sciencetech's SSIIVT-20C and SSIIVT-20F systems can be coupled with a Sciencetech load booster system (as shown in the figure on the right) to allow for much higher power measurements. The load booster is inserted between the Keithley and the device under test. The BI100, for example, allows us to measure up to 10A up to the full 200V range of the Keithley.

Model	Voltage	Current
BI100 (166-9001)	200V	10A
BI200 (166-9010)	200V	20A
BI400 (166-9011)	200V	40A
BI600 (166-9012)	200V	60A
BI800 (166-9013)	200V	80A

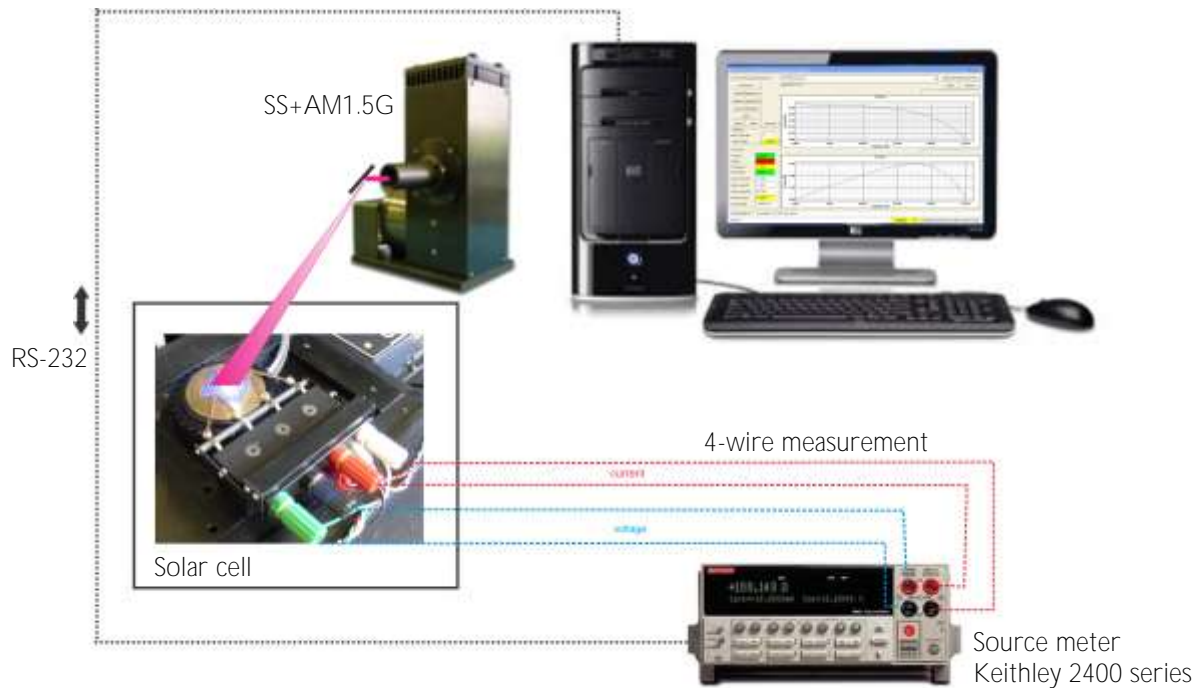


The load booster can be used in both AC and DC measurements.

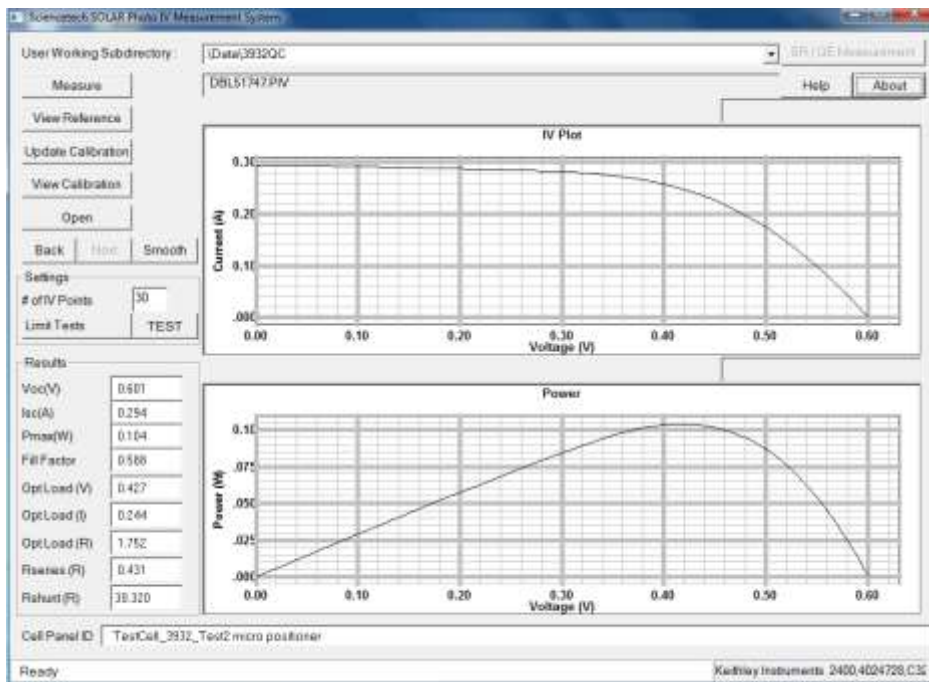


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C. SSIIVT system configuration



D. SciRunIV Software (SOFT-0102)



Software features:

- Light and dark IV measurements
- Displays reference data
- Manual or automatic range selection
- Allows user calibration of reference detectors
- Graphs Current Vs. Voltage and Power Vs. Voltage
- Overlay Curves for comparison
- Measures V_{OC} , I_{SC} , V_{max} , I_{max} , P_{max} , FF , R_{series} and R_{shunt}
- Outputs data to text files readable by all major data analysis software
- Curve smoothing function
- Configurable limit tests to assess cell quality
- Linear and non-linear step voltage
- Records number of flashes for flash systems.
- Temperature logging (optional)
- Point-by-point Irradiance and temperature measurements (optional)
- Cell efficiency calculation (optional)



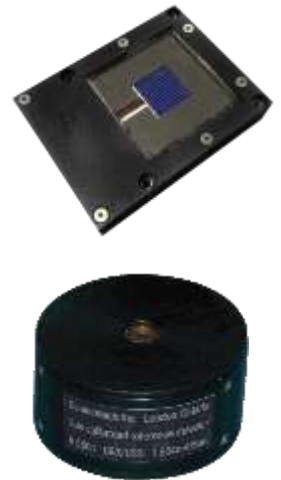
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E. Accessories

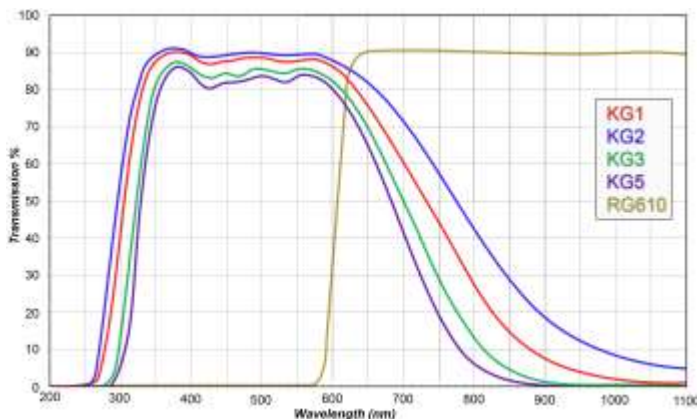
Reference cells and detector

The SC-LT- series calibrated reference cells (as shown on the top right) are a recommended accessory for our Solar Simulators and IV measurement systems. They allow accurate calibration of light intensity to ensure repeatable results. The reference cells with different window materials and bandpass are listed in the table below and transmission spectrums are given in the bottom plot. The Solar Reference Cells come with a Certificate of Calibration and compatible set of connecting cables. The following parameters of the reference cell are certified: I_{sc} , I_{max} , V_{oc} , V_{max} , P_{max} , Area, Fill Factor and Efficiency. The certification is accredited by NIST to the ISO-17025 standard and is traceable both to the National Renewable Energy Laboratory (NREL), and to the International System of Units (SI). A compatible cable set is also supplied with each Solar Reference Cell.

The SSIVT-REF single element silicon detector (as shown on the bottom right) is designed to be used for monitoring and verifying the Sun level of solar simulators. The detector is used effectively in sensing wavelengths between 190nm and 1100nm and is calibrated to the Sun. It is included with all Flash versions of SSIVT for flash reference measurements but is also available sold separately. It can also be used with the Sciencetech SOL-METER solar power meter.



Model	SC-LT-O	SC-LT-KG1	SC-LT-KG2	SC-LT-KG3	SC-LT-KG5	SC-LT-RG610	SSIVT-REF
Part No	590-0154	590-0269	590-0270	590-0271	590-0272	590-0273	125-9007
Window Material	Quartz	KG1	KG2	KG3	KG5	RG610	None
Bandpass	190 - 1100nm	315 - 725nm	304 - 785nm	315 - 710nm	330 - 665nm	610nm Long pass	190 - 1100nm
Cell Size	20 x 20mm						5mm
Overall Size	92 x 70 x 16mm						50 x 50 x 25mm
Temperature Sensor	100 Ω Pt RTD						None
Calibration Irradiance	1000 W/m ²						1000 W/m ²
Operating Current	-130mA/Sun						-2 mA/sun
Operating Temp	10-40 °C						10-40 °C



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Upgrades of Hardware and Software

	Name	Description
175-9050	IV Test / PTS Temperature Measurement Upgrade	<p>This is a modification to the Keithley unit used for IV Test measurements to allow the system to measure temperature at the same time as intensity. These Keithley units are used in all of Sciencetech's line of Photovoltaic Testing Systems, as well as our stand-alone IV Test units.</p> <p>Please note that this system requires a calibrated reference cell to operate, and will not function with flash illumination systems.</p>
175-9105	(SSIVT-TU) Point-by-Point Irradiance and Temperature Measurement Upgrade for IV Testers	<p>This upgrade adds the necessary hardware and software modifications to Sciencetech's SSIVT line of IV Testers to allow real-time measurement of temperature, irradiance, and calculations of thermal coefficients for each point of the IV curve.</p> <p>Please note that this upgrade requires a Sciencetech IV Tester in order to function, and will not work if a 3rd party tester is purchased from a different supplier.</p> <p>Please speak with your authorized Sciencetech technical support staff member to discuss specifications and any additional details required.</p>

Preconfigured host PC (490-0402)

Pre-configured, Out of the Box

We supply a new mid-grade Personal Computer with a flat screen monitor using licensed Windows Software pre-installed with all drivers.

Not "Just a Computer"

When you purchase a pre-configured host PC from Sciencetech with any Sciencetech equipment, every aspect of the system is tested to ensure smooth operation. With complex systems it can be difficult to select the correct computer and avoid incompatibilities so let us provide a fully tested and operational PC for you. We provide all drivers, hardware, software, cables, etc. needed to get the system up and running.

System requirements

- Windows 7 Operating system, 32-Bit only (Compatible with Windows XP / Vista)
- REQUIRES Hardware Serial Port on Computer Motherboard
- Intel Core i3 processor or better
- At least 1GB RAM
- Optical Drive
- Screen resolution



F. Dimensions and Weight

Dimensions

89mm high × 213mm wide × 370mm deep (3 1/2 in × 8 3/8 in × 14 9/16 in)

Bench configuration (with handle & feet)

104mm high × 238mm wide × 370mm deep (4 1/8 in × 9 3/8 in × 14 9/16 in)

Weight

3.21kg (7.08 lbs.)

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