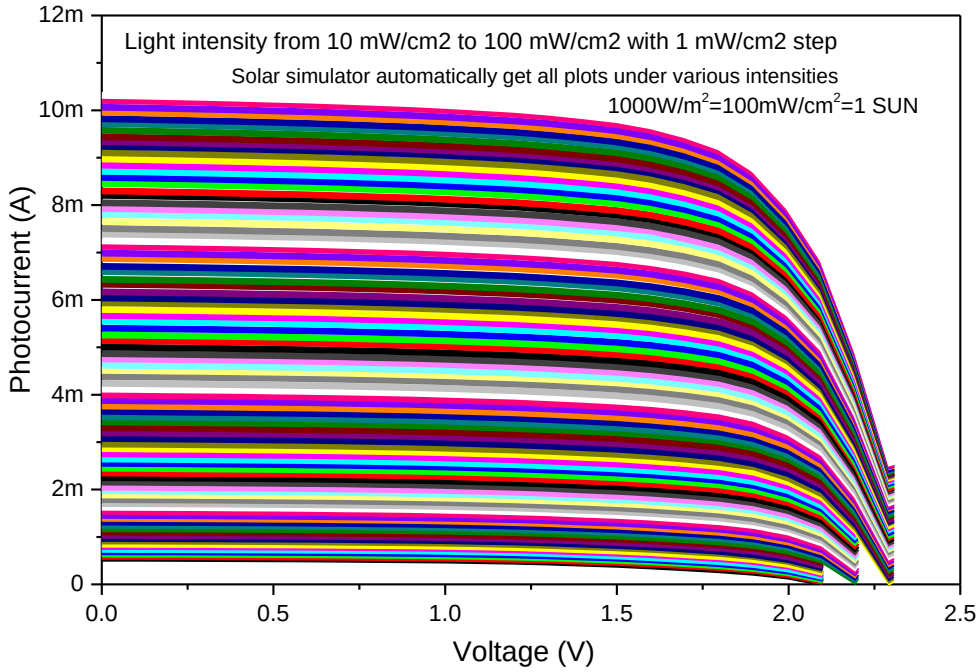
http://www.optosenselab.co.uk

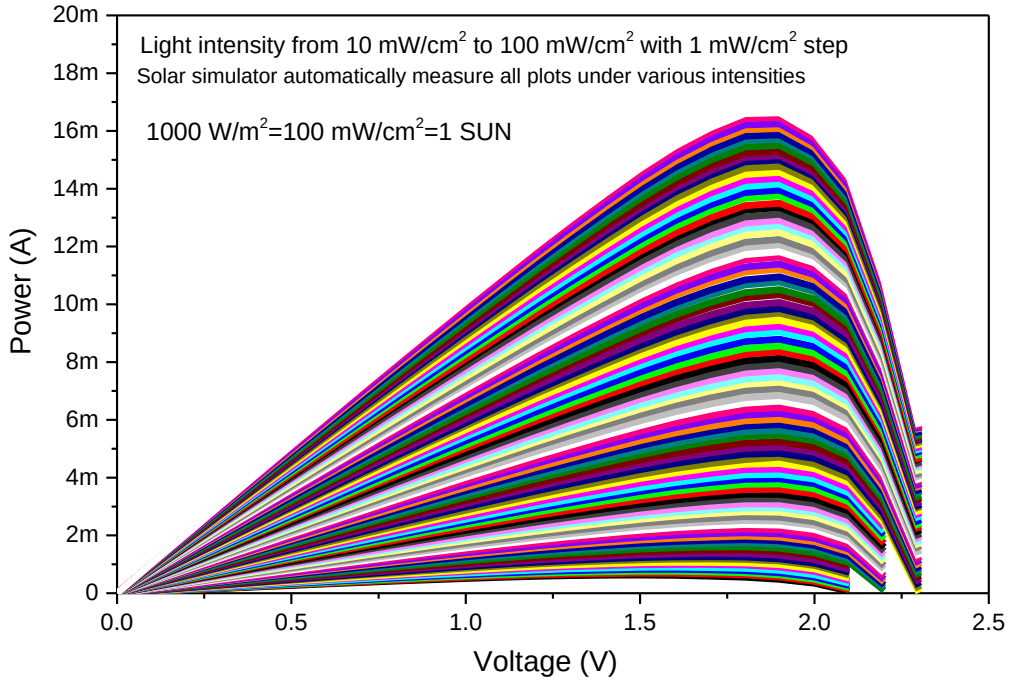
LSS AUTOMATIC SOLAR IV CHARACTERIZATION SYSTEM

Solar Simulator system automatically measures current-voltage (I-V) under various light intensities

For example

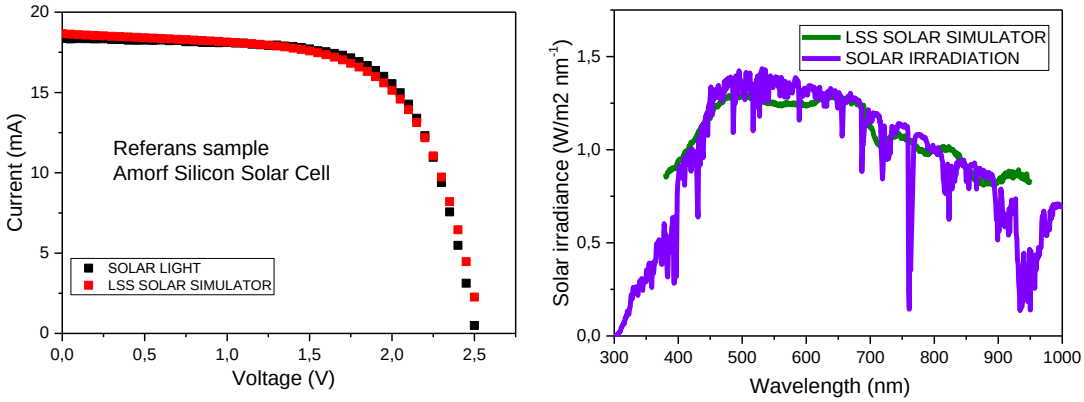


Solar Simulator system automatically measures power-voltage (P-V) under various light intensities


Light intensity from 10 mW/cm2 to 100 mW/cm2 with 1 mW/cm2 step
Solar simulator automatically measure all plots under various intensities
1000 W/m2=100 mW/cm2=1 SUN
Power (A)
Voltage (V)
20m
18m
16m
14m
12m
10m
8m
6m
4m
2m
0
0.0
0.5
1.0
1.5
2.0
2.5

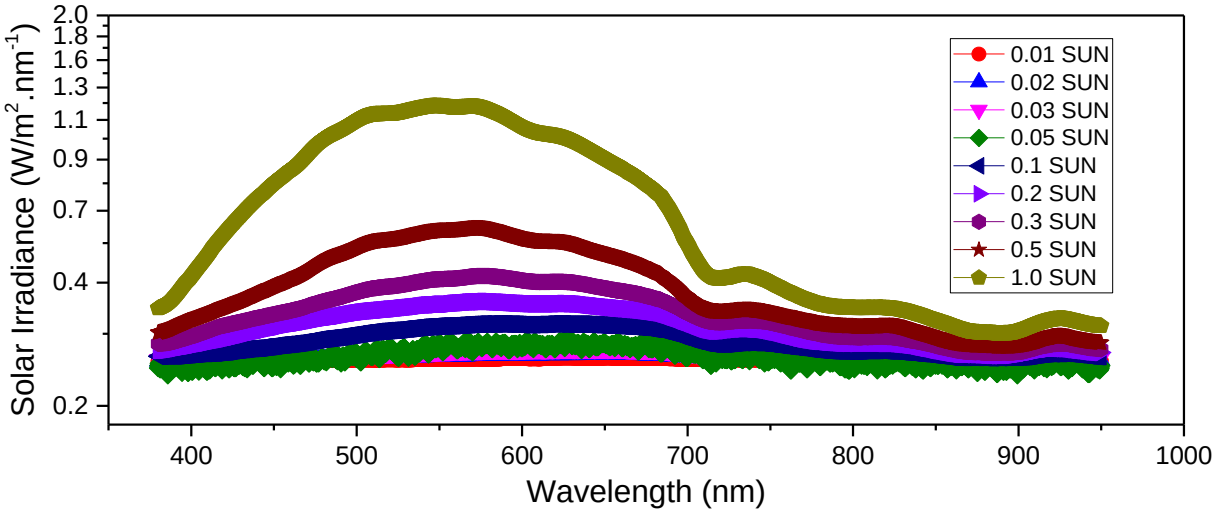
TECHNICAL DATA AND CALIBRATION RESULTS

PHOTOVOLTAIC I-V TEST RESULTS



LSS SOLAR SIMULATOR SPECTRAL SOLAR IRRADIANCE MATHING

SPECTRAL IRRADIANCE OF LSS SOLAR SIMULATOR FOR VARIOUS INTENSITIES



SPECTRAL SOLAR IRRADIANCE OF LSS SOLAR SIMULATOR

LSS SOLAR IV CHARACTERIZATION SYSTEM includes

SOLAR SIMULATOR

I-V CHARACTERIZATION SYSTEM, SOURCEMETER

SAMPLE HOLDER

CONNECTIONS

SOFTWAREs

Solar IV characterization Software

Solar Life-Time Software

Transient photocurrent software

Photovoltaic mechanism analysis software

Solar Cell I-V Characterization System

This system analyze all photovoltaic and photoconducting characteristics of all solar cells such Dye sensitized solar cell, quantum dots solar cells, Organic solar Cells, Silicon Solar cells, Thin films solar Cells under various solar light intensities from 0.1 W/cm^2 to 1500 W/m^2.

This system is a complete current-voltage (I-V), current-time (I-t) and power-voltage (P-V) measurement environment.

The system contains the following elements:

- Maintenance Free Solar Simulator (FSS)

I-V system, source meter

Voltage range: -24 V to +24 V

Current range: 100 nA to 500 mA

- I-V Solar IV software
- Solar cell probes
- Solar cell probes
- Calibrated Reference solar cell

19 independently controlled LED wavelengths from 400 nm – 1100 nm

Front panel control of the 6 IEC wavelength bands

Rapid turn-on / turn-off

Factory calibrated AM1.5G spectral match

User storable spectrum

Factory calibrated intensity

User configurable intensity offset

Front panel LED Fault indication

USB Communications

Meets Class AAA specification for IEC 60904-9, JIS C 8912, and ASTM E 927-05

2” X 2” illumination area at 1 sun

Standoff distance of 8” (203 mm) nominal or variable

Height adjustment from -0.6” to 4.6” (-15 mm to 117 mm) from the working plane

PV Cell Placement Indicator

Easy-Adjust light adjustment

Can be mounted pointing up, down, or to the side with 90^{o} rotational accessory

Temperature controlled for stable output

FULL AUTOMATIC SOLAR SIMULATOR

	LSS SOLAR SIMULATOR
Bands	400-500, 500-600, 600-700, 700-800, 900-1100 nm 6 BANDS
Light control	USB
Automatically intensity light Control	0.1 to 1000 W/m^2 (0.1 to 1.0 sun or more) by a certain step
Power Requirements	100-240 VAC, 50-60 Hz, 300W
Operating Temp Range	$20^{o}C$ to $30^{o}C$
Humidity	<85%, relative, non-condensing
Certificate	ISO 9001 :2015
Illumination Area	2”X2” (51mmX51mm)
Total Power Output	(1.5 sun)
Uniformity Classification[1]	

Temporal Stability[2]	A - IEC 60904-9 2007, JIS C 8912, ASTM E 927-05
Spectral Match[3]	
Operating Temp Range	$20^{o}C$ to $30^{o}C$

LSS solar simulator generates a continuous light spectrum corresponding to a class AAA spectrum. This system is designed to illuminate any type of solar cell up to 25 x 25 mm or more. LSS solar simulator generates a continuous light spectrum whose intensity varies from 1 W/m^2 to 1000 W/m^2. The simulator and I-V measurement system are controlled by the computer.

Common Measurements made in I/V Characterization of photovoltaic devices

Dark I/V measurements are commonly used to analyze the electrical characteristics of solar cells. Dark I/V measurements are more sensitive than light I/V measurements in determining parameters such as series resistance, shunt resistance, diode factor, and diode saturation currents.

Solar simulator automatically determine the photovoltaic parameters as follows
Open circuit voltage (V_{oc})
Short Circuit current (I_{sc})
Fill factor (FF)
Voltage at P_{max} (V_{max})
Current at Pmax (I_{max})
Maximum power output (P_{max})
Shunt resistance (R_{sh}) •
Series resistance (R_s) •
Characteristic resistance of solar cell (R_{ch}) •
Photoreponse (RR)
Solar cell efficiency (n)
Solar simulator automatically determine the photovoltaic mechanism like monomolecular recombination mechanism, supra linear mechanism and etc.

LSS SOLAR SIMULATOR SYSTEM measures the followings

Solar Simulator system is controlled automatically by computer

Solar Simulator system adjusts automatically the intensity of light 0.1 W/m^2 -1000 W /m^2 by any step, for example from 1 W/m^2 to 1000 W/m^2 with 1 W/m^2.

Solar Simulator system automatically measures current-voltage (I-V) under various light intensities

Solar Simulator system automatically measures power-voltage (P-V) under various light intensities

Solar Simulator system automatically analyses photovoltaic mechanism (I-V) under various light intensities

Solar Simulator system automatically measures photo transient current-time (I-t) under various light intensities

Solar Simulator system measures automatically open circuit voltage-time (V_{oc}-t) under various light intensities

Solar Simulator system measures automatically short current-time (I_{sc}-t) under various light intensities

SYSTEM IS UPGRADED ACCORDING TO REQUIRMENTS OF CUSTOMER

After-sales of the system, the following trainings will be given

Dye sensitized solar cell preparation and characterization

Quantum dots solar cell preparation and characterization

Organic solar cell preparation and characterization

Silicon solar cell preparation and characterization

Schott preparation and characterization of the diodes

PN junction diode preparation and characterization

Preparation and characterization of MIS diode

To teach the calculation of all electronic parameters

TECHNICAL SPECIFICATIONS OF LSS AUTOMATIC SOLAR IV CHARACTERIZATION SYSTEM

1. Solar Simulator system automatically is controlled by computer.

2. Solar Simulator system automatically measure I-V characteristics from 1 W/cm^2 - 1000 W /cm^2 by adjusting light intensity with step of 1 mW/cm^2.
3. The intensity of solar simulator should automatically adjust by system
4. Solar simulator system should simultaneously measure I-V characteristics curve of the device, Solar Cell I-V characteristic curve, Power-voltage curve, Isc-Solar light intensity curve and photovoltaic mechanism curve and should analyze photovoltaic mechanism and write type of the mechanism on computer screen.
5. Solar Simulator should automatically measure open circuit voltage V_{oc} and short circuit current, I_{SC} , Shunt resistance (R_{sh}) • Conversion efficiency (n), Maximum power output (P_{max}), Voltage at P_{max} (V_{max}), characteristic resistance, R_{ch} , Fill factor (FF) • Series resistance (R_s)
6. Solar Simulator system measures automatically current-voltage (I-V) of solar cell under various solar lights
7. Solar Simulator system measures automatically short circuit current, I_{sc}-time (I_{sc}-t) characteristics of the solar cell.
8. System should automatically measure transient photocurrent measurements under solar light from 1 W/cm^2 to 1000 W^2 with step of 1 W/cm^2.
9. Solar Simulator system should automatically analyze photovoltaic mechanism of solar cells a, photodiode and photodetectors with photodetector parameters.
10. System should have a source meter having the specifications
    Voltage range: -24 V to +24 V
    Current range: 100 nA to 500 mA
11. System should have an automatic shuttering system which automatically changes solar light from 1 W/m^2 to 1000 W/m^2.
12. System should have sample holder and it is comprised of two probes. Holder size should have 132.5mmx132.5mm.
13. System should have software to control measurements and analysis of data.
14. Installing and training

SOFTWARE OF THE SYSTEM

System has two software, first characterize all photovoltaic parameters

Software measure all photovoltaic parameters of solar cells by computer. The system determine all photovoltaic parameters. Software of Solar Simulator system determine the following photovoltaic parameters such as short circuit current I_{sc}, open circuit voltage V_{oc}, maximum power P_{max}, maximum current I_{max}, maximum voltage V_{max}, efficiency η, shunt resistance R_{sh} and series resistance $R_{s.}$

Also ,system analyze the automatically the photovoltaic mechanism analysis.

Second software characterize the transient photovoltaic parameters

The second software analyze the life of the solar cell and transient photocurrent measurements.

For transient photocurrent measurements, the system measure

Automatically reads open circuit voltage Voc –time

Automatically reads short circuit current I_{sc} –time