

Sunirad A-30

(Class AAA - AM 1.5G)



Customer:

Scope & purpose:

King Design Industrial Co. Ltd.

Taiwan Head Office

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Quotation No.:
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Image show principle of tabletop system, part can be change according to available.

Sunirad A-30, class AAA 300 x 300 mm Steady State Solar Simulator The

Sunirad A-30 is a class AAA Solar Simulator intended for continuous operation.

This equipment also can work as a light soaker as it is intended for long duration operation.

This system is a complete current-voltage (I-V) measurement environment for the most demanding user.

The complete environment solution requests the following elements:

- 1 x Steady State Solar Simulator - Sunirad A-30
- 1 x I-V Basic system
- 1 x I-V Tracer software
- 1 x Calibrated Reference Si-solar cell
- 1 x Probes plate
- 2 x Kelvin probes – 4 wires measurement
- 1 x PC computer under Windows 11 Pro

All equipment is configured in our factory to reduce the setting costs at the customer site. The computer and software are fully installed and configured to be ready after unpacking and connecting.

The long lifetime plasma light engine from King Design Industrial Co., LTD. generates a continuous light spectrum corresponding to a class A spectrum.

This system is designed to illuminate any type of solar cell up to 8 Inches (M12+ standard wafer solar cell).

Plasma light engine is illuminating the 300 x 300 mm sample area with a stability and irradiance uniformity within class A.

The system consists of a light engine fit into a reflector box (diffuse illuminator). A 150 mm wide sample holder access gap is granted between the sample holder top surface and the reflector bottom to accommodate probes and other contacting devices having height lower than 150 mm.

The light engine of the simulator and I-V measurement system are controlled by a computer with a GPIB link.

Sunirad A-30 product is compliant with the tests list describe below:

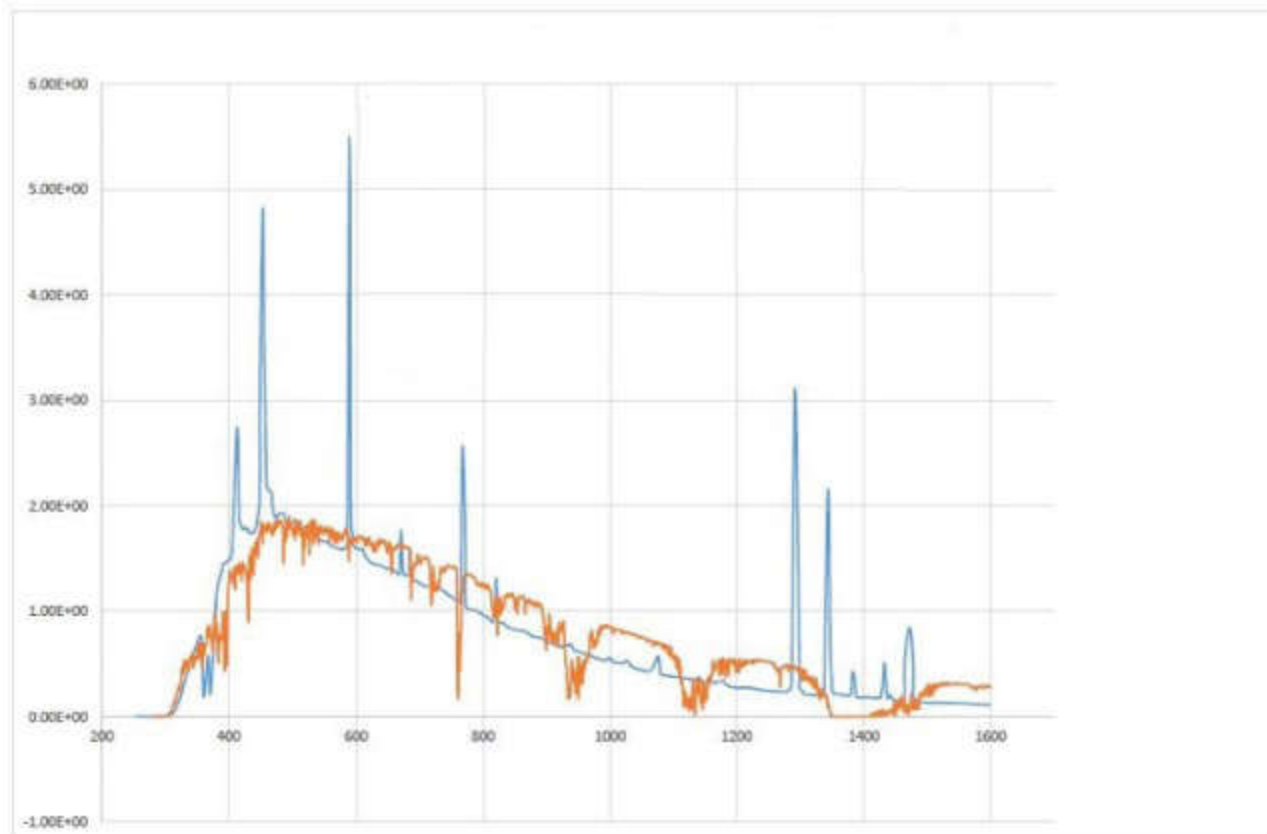
- Maximum power determination test (MQT 02) IEC 61215-2:2021
 - Performance at STC (MQT 06) IEC 61215-2:2021
 - Performance at low irradiance (MQT 07) IEC 61215-2:2021 (with filters option)
 - Stabilization test (MQT 19) IEC 61215-2:2021
 - Light soaking test IEC 61646:2008
 - Light Induced Degradation (LID)
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Specifications of Steady State Solar Simulator - Sunirad A-30

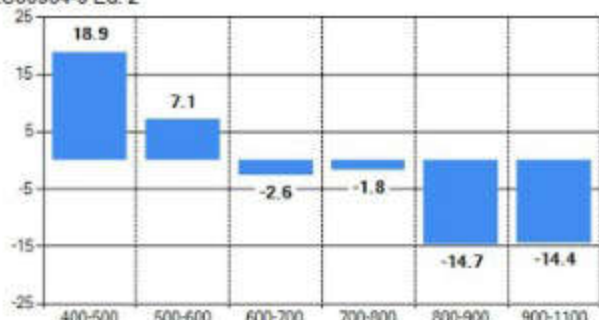
Illuminating unit

Spectrum: Class A as per IEC 60904-9 Ed.3, JIS8932, ASTM E927 Irradiance: 700 to 1200 W/m².

Spectral matching as per IEC 60904-9 Ed.3



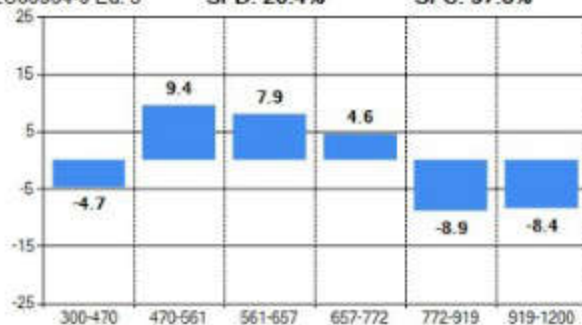
IEC60904-9 Ed. 2



IEC60904-9 Ed. 3

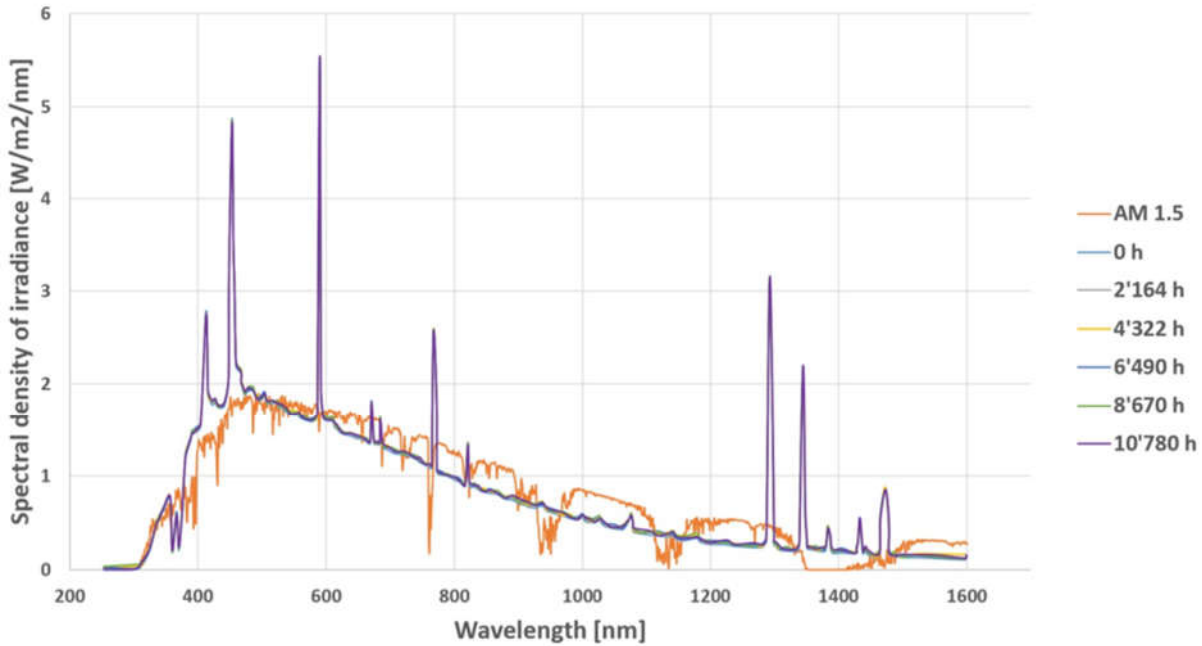
SPD: 20.4%

SPC: 97.6%



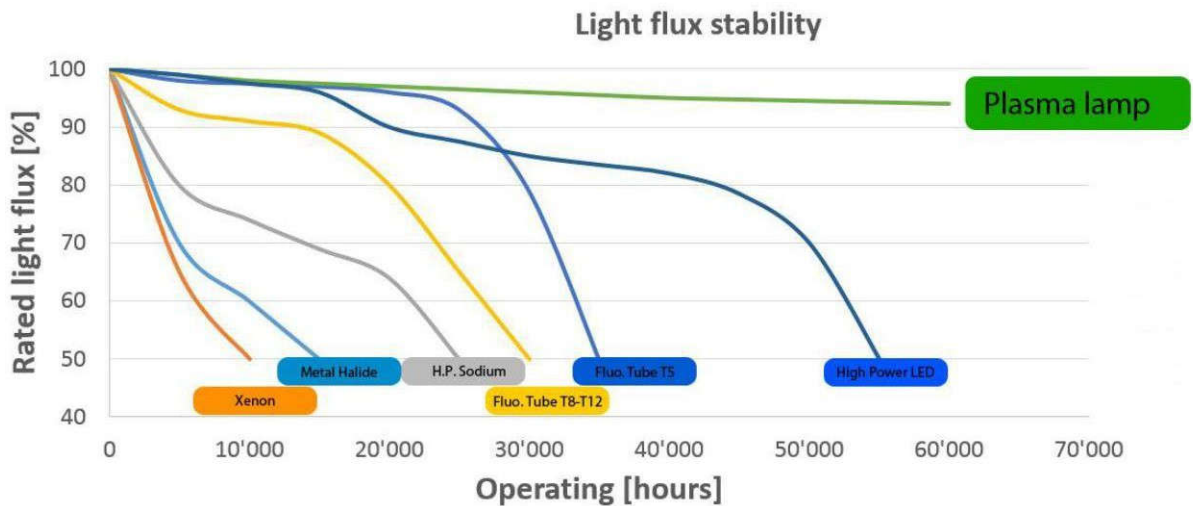
Spectral stability

Matching with AM1.5G spectrum



The spectral stability provided by the plasma lamp is much better than LED and xenon lamp, no spectral shift can be measured after more than 10'780 hours of operation.

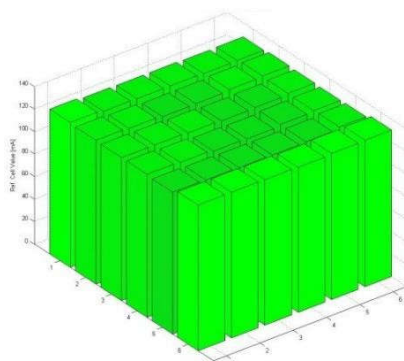
Light flux stability



The light flux stability of plasma lamp is much better than LED and xenon lamp, the bulb has a lifetime up to 100'000 hours and the radio frequency device (Light-Tron) is up to 40'000 hours.

Plasma lamp is the best lamp technology for the most demanding user, the continuity of measurements is ensured by the extreme lifetime of bulb.

Irradiance uniformity: Class A as per IEC 60904-9:2020 ed.3, JIS8932, ASTM E927



Typical light intensity distribution

Class AAA specification is obtained in the irradiance range from 500 to 1'200 W/m². Lower irradiance settings may reduce the characteristics to class BBB.

Irradiance stability: Class A as per IEC 60904-9, JIS 8912, ASTM E 927-05 if the room temperature stays constant.

The characteristics are measured with the illuminating unit loaded with black material (e.g., monocrystal solar cell), if no optical load is provided by the customer.

Sample holder

The sample holder contains:

- a drawer under the illuminating unit
- a thermostat table (sample holder) made of anodized aluminum plates having an internal water-cooling system.

The thermostat sample holder can be maintained at a constant temperature ($\pm 2^{\circ}\text{C}$) between 20°C and 60°C when loaded with a light absorbing sample and the lamp power set to 1000 W/m^2 irradiance.

Due to the vast variety of solar modules and encapsulation types possible, it is strongly recommended to provide us with actual samples, so finer temperature specifications may be given for the sample holder.

Unless otherwise agreed in the acceptance tests, the sample temperature is measured with PT100 sensors attached on the back side of the device.

List of consumables

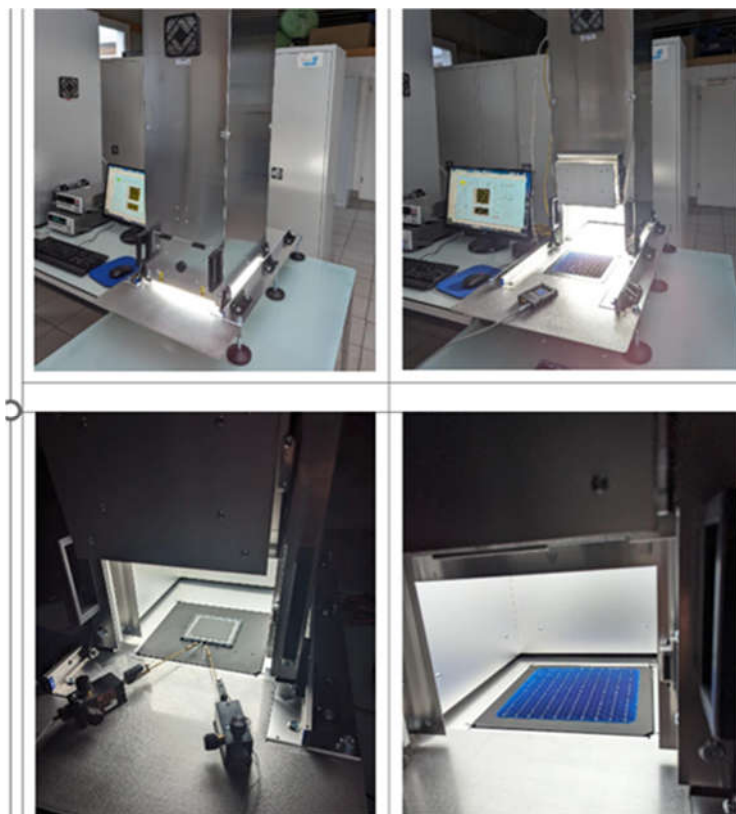
- Radio frequency part (Light-Tron) into the lamp (expected lifetime 40'000 hours)
- Reflective material inside the reflector (expected lifetime 10'000 hours)

Documentation

Comprehensive documentation is provided with the system, including operation and software manuals.

Safety

No safety means are necessary for system operation. Direct view to the light source is prevented by the system design. UV safety glasses are provided with the system.



System with perovskite module loaded System with M10 solar cell loaded

Source Meter Unit (SMU)

Low Power 8 Channel Source Measure Unit



Low Power 8 Channel Source Measure Unit

Maximize Solar Cell Research with the Source Measure Unit: Precision, Power and Performance in a User-Friendly Package

Exceptional Flexibility and Accuracy

The *Source Measure Units* offer cutting-edge technology for precise solar cell characterization and research, redefining precision, and efficiency in testing. With multiple input channels, customizable power options, and intuitive software, they provide unparalleled flexibility for optimizing solar cell devices and modules. The *Source Measure Units* offer full maximum power point tracking (MPPT) on all channels, coupled with 4-quadrant operation and 16-bit resolution across multiple ranges, ensuring high accuracy and versatility. Beyond these core features, the *Source Measure Units* incorporate additional channels augmenting functionality, facilitating seamless integration of a temperature/relative humidity (Rh) probe having a 5-channel general-purpose datalogger. The datalogger supports a wide range of inputs (4-20 mA, 0-1 V, 0-5 V, 0-10 V to Pt100) and outputs (5 V, 12 V, and 24 V), enabling comprehensive data collection and user formatting.

Unmatched Flexibility

Experience unmatched flexibility with the *Source Measure Units*, enabling independent maximum power point tracking for each channel in asynchronous mode. Moreover, our synchronous mode permits simultaneous scanning of all channels at the same voltage, facilitating the study of multi-junction devices requiring synchronized recording. Select from a range of options to meet your specific requirements, including a low-power variant (200 mW/channel, 2-point measurements) and a high-power variant (5,000 mW/channel, 2/4-point measurements). Both models feature a user-friendly 5-inch touch display, providing real-time insights from the temperature/ humidity probe and datalogger, alongside recent data records.

Upgrade with Optional Accessories

The *Source Measure Unit* comes prepared for advantageous tools, including a *Temperature and Relative Humidity Probe* for continuous environmental data logging and the *CalCell reference device*, guaranteeing accurate calibration of your solar simulator. To streamline connectivity and setup of your *Source Measure Unit*

system, we also offer a comprehensive cable kit featuring high-quality cables.

These accessories form an integral part of ensuring consistent and dependable results in your solar cell research endeavors.

Software

Our intuitive software platform simplifies data logging while recording IV or MPP data, guaranteeing accurate and well-formatted records across various sensor types. Our software is continuously updated to ensure it remains cutting-edge, providing you with the latest features and improvements.

Specifications

The Low Power 8 Channel *Source Measure Unit* is specifically tailored for laboratory PV devices and small modules, supporting voltages of up to 5 V and currents of up to 40 mA, with a maximum of 200 mW per channel.

- 200 mW/channel, 2-point measurements
- Operation Range: -5 V to +5 V / 40 mA
- Dimensions: 350 mm x 133 mm x 95 mm (WxDxH)
- 16-bit resolution
- Banana plugs (4 mm) for robust and versatile connection to solar cells
- Fully independent maximum power point tracking on all channels
- Datalogger that accepts a large range of probes (resistive, voltage, current, source V / measure I, source I / measure V, Pt100)
- Operates from 110-240 VAC
- CE certified - CSA/UL compliant
- 5-inch touch screen
- Free software online



IV and Lifetime Software

The IV and Lifetime software is developed to control and collect data from the *Source Measure Unit* systems. It is intended for characterization and lifetime studies of solar cells, measuring IV curves or applying maximum power point tracking (MPPT) under irradiation. The software automatically extracts the solar cells performance parameters (PCE, Isc, Voc, Fill Factor, MPPV, MMPI, Rsh, Rs).

