9200XF Solar Simulator Field Recertification Service

With over 40 years of experience in designing and manufacturing solar simulators, Newport's Oriel Instruments brings the expertise and skill of re-certifying any solar simulator model to a convenient location: straight to the lab.

No more tearing down an experimental setup to ship back a bulky, fragile system to the factory in order to ensure classification after a simple lamp change or component retrofit. A qualified engineer will be onsite to perform a thorough, 3-point classification measurement based on the current industry standards on solar simulator specifications. Oriel strives to get the system back to the same specification levels as when it first shipped from the factory.

- Onsite recertification service for maximum convenience
- Avoid the hassle and turnaround time of shipping a simulator back to the US factory
- Real time performance metrics compared to IEC 60904-9 2007 Edition, JIS C 8912, and ASTM E 927-10 standards

Newport®

DEFINING PERFORMANCE STANDARDS

Photovoltaic standards mandate that all solar simulators meet demanding requirements in three key performance areas: spectral match to the true solar spectrum, spatial uniformity of irradiance, and temporal stability of irradiance.

There are three standards that define solar simulator performance:

- IEC 60904-9 Edition 2 (2007) Photovoltaic Devices - Part 9: Solar Simulator Performance Requirements
- JIS C 8912-1998, Solar Simulators for Crystalline Solar Cells and Modules
- ASTM E 927-10 (2010) Specification for Solar Simulation for Terrestrial PV Testing

Table 1: Class ABB Standards and Specifications

	IEC	JIS	ASTM
Spectral Match (fraction of ideal pecentage)	0.75 - 1.25	0.7 - 1.25	0.7 - 1.25
Non-Uniformity of Irradiance	<5%	±3%	<5%
Temporal Instability	<2% (STI) <5% (LTI)	±3%	<5%

Table 2: Class ABA Standards and Specifications

	IEC	JIS	ASTM
Spectral Match (fraction of ideal percentage)	0.75 - 1.25	0.7 - 1.25	0.7 - 1.25
Non-Uniformity of Irradiance	<5%	±3%	<5%
Temporal Instability Short Term	0.5%	≤±1%	2%
Temporal Instability Long Term	2%	N/A	N/A

Table 3: Class AAA Standards and Specifications

	IEC	JIS	ASTM
Spectral Match (fraction of ideal pecentage)	0.75 - 1.25	0.7 - 1.25	0.7 - 1.25
Non-Uniformity of Irradiance	2.0%	<±2%	2%
Temporal Instability Short Term	0.5%	≤±1%	2%
Temporal Instability Long Term	2.0%	N/A	N/A

SPECTRAL MATCH

The standard defines the spectral match of a solar simulator as a percentage of the integrated intensity in 6 spectral ranges (listed in Table 4). Any deviation from the specified percentages must then lie within a range that determines the class of the simulator. For Newport solar simulators, this range is 0.75 to 1.25 times the ideal percentage.

To ensure that all Newport solar simulators fall easily and reliably within this range, we designed a proprietary, highly stable spectral correction filter. The proprietary filter can withstand the very high intensity from the lamp witout changing spectral properties. The filter was also designed to maintain Class A performance over the full life of the lamp. Figure 1 shows a typical spectral match test report generated by the field kit.

Table 4: Ideal Spectral Match Defined by IEC Standards for Class A Spectral Match

Spectral Range (nm)	400-500	500-600	600-700	700-800	800-900	900-1100
Ideal %	18.5	20.1	18.3	14.8	12.2	16.1

TEMPORAL INSTABILITY

Temporal instability is the second performance parameter of solar simulator standards. It requires that the output light be stable over time in order to ensure that the lamp fluctuations do not distort the measurement of solar cell efficiency. Figure 3 shows a typical instability report for a SOL1A. These standards are specified in Tables 1-3 for each solar simulator class.

SPATIAL UNIFORMITY OF IRRADIANCE

The irradiance uniformity over the work area is the most difficult specification requirement to achieve and maintain. Hot spots can lead to significant errors in measured cell efficiency and can cause inaccurate binning of cells. The spatial non-uniformity performance standard is desined to minimize the impact of hot spots and has a very stringent requirement of ≤2%. Figure 2 shows the uniformity of the irradiance across a typical simulator workng area. Each unit will come with a plot of irradiance non-uniformity generated from the field kit. These standards are specified in Tables 1-3 for each solar simulator class.

ORDERING INFORMATION

Model	Description
92001F	Type I: Recertification for all Class 1A, Class 2A, and 94025A models
92002F	Type II: Recertification for 94043A and 94063A models
92003F	Type III: Recertification for 94083A and 94123A (-CPV) models
92004F	Type IV: Recertification for all other models

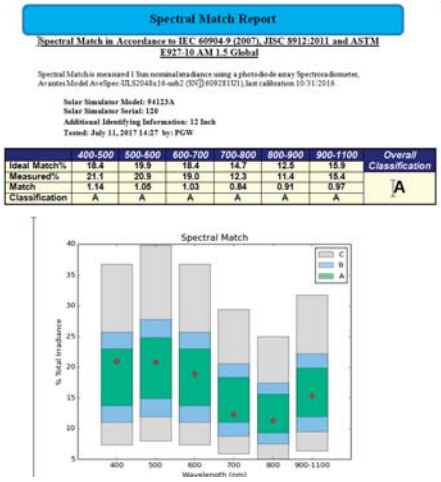

Figure 1: Oriel Sol3A with AM 1.5G spectral correction filter meets IEC, JIS, ASTM Class A requirements for spectral match.

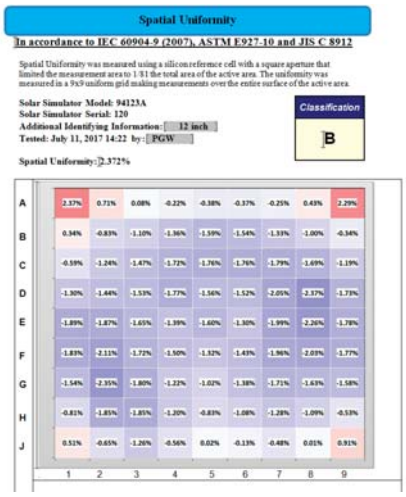

Figure 2: Measured uniformity of an Oriel Sol2A solar simulator

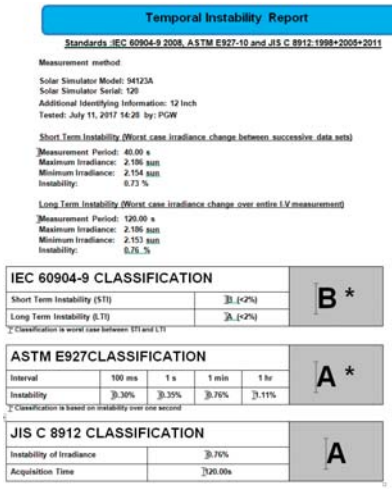

Figure 3: Typical temporal stability report of a 1.6 kW Oriel Sol1A Solar Simulator