

LED Sun Simulator

■ Introduction

Manufacturers will use solar simulators to measure the efficiency of solar cells on production lines, as well as in laboratory. Nowadays, all sun simulators are designed with xenon or halogen lamps which increase costs due to the high power consumption and depreciation rate. King Design Industrial CO., LTD (KDI) and Industrial Technology Research Institute of Taiwan, R.O.C (ITRI) co-developed the solar simulator based on Light Emitting Diode (LED), which takes another step forward, conforming to IEC 60904-9. With its state-of-the-art technology, there are two features that you will notice straightaway from this innovative product.

■ AAA⁺ Class

KDI LED simulator (KD-SS01-1616) could provide up to 36 inch square illumination area adhere to meeting the AAA requirements in three categories based on the criteria of spectral distribution match, non-uniformity of illumination area, and temporal stability.

● Spectral Distribution Match

The reference spectral distribution of sunlight at Air Mass 1.5 Global is laid down in IEC 60904-3. Spectral match of a solar simulator is defined by the deviation from 400-1100nm reference spectral irradiance into six spectral ranges. For Class A of solar simulator, the ratio of percentage distribution of intervals is from 0.75 to 1.25, as specified in Figure 1.

Wavelength	Relative Energy Distribution		Coincidence	Class
	IEC 60904-9	KD-SS01-1616		
400-500nm	18.40%	18.41%	1.00	A
500-600nm	19.90%	20.43%	1.03	A
600-700nm	18.40%	18.74%	1.02	A
700-800nm	14.90%	15.48%	1.04	A
800-900nm	12.50%	12.85%	1.03	A
900-1100nm	15.90%	14.09%	0.89	A

Fig.1: Spectral match of KD-SS01-1616, Class A requires 0.75-1.25

● Non-uniformity of Illumination Area

The spatial non-uniformity of illumination area is one of the most difficult characteristic to achieve. KD-SS01-1616 was set in the optical compartment, which ensures uniformity variations of less than 1%.

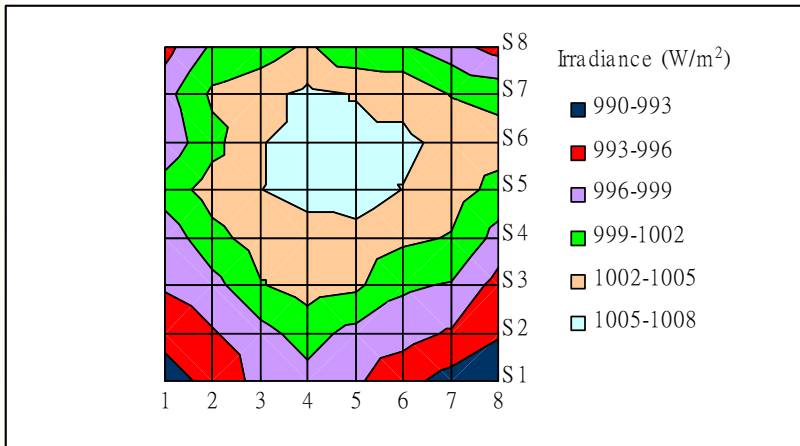


Fig.2: The 36 inch square illumination area, Class A requires non-uniformity less than 2%; KD-SS01-1616 uniformity variations are less than 1%.

● **Temporal Stability**

Electronic control assures that the lamp fluctuation does not exceed 0.2% during the solar cell measurement to meet the IEC 60904-9 A class requirement.

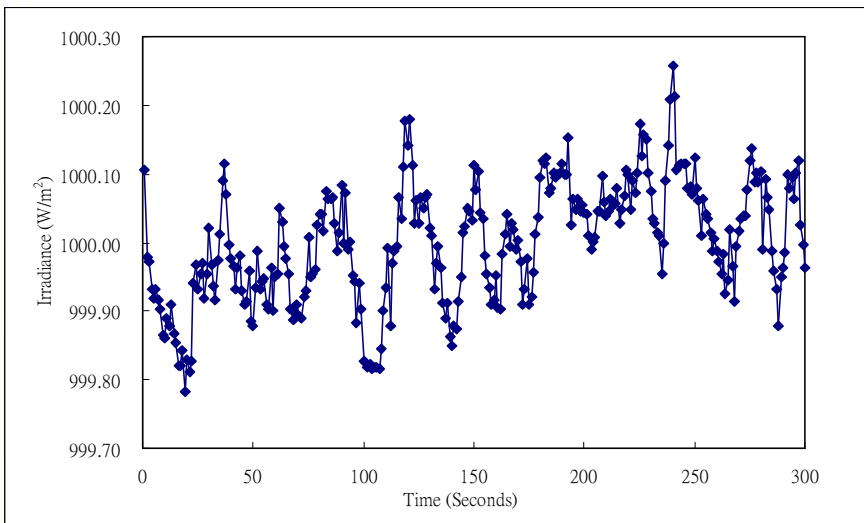


Fig.3: KD-SS01-1616 output variation over the time period of 300 seconds, our system stability can reach 99.8%, excluding lamp fluctuations to distort the solar cell measurement.

■ **Compact, and Long Life-Time**

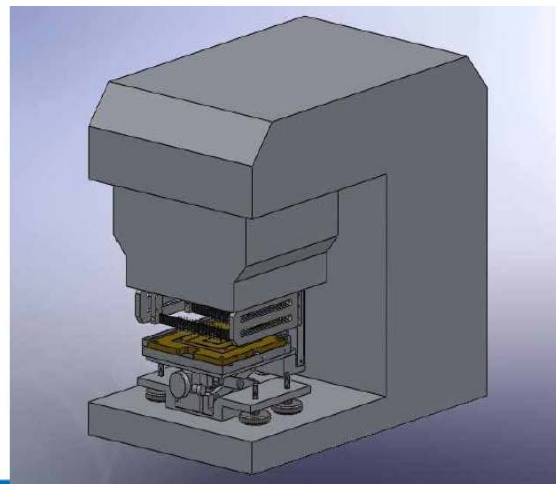
The KD-SS01-1616 system, included LED light source, power supply, and optical compartment, are housed in a 320x580x520mm³ box. Its compact design is easy to operate, and install, which can be used in lab-testing, as well as, particularly, be mounted on an automation production line for inspection and measurement of a solar cell.

The KD-SS01-1616 can illuminate steadily for more than 20000 hours surpassing other lamp systems of the simulator on the market, whilst only consuming 1/3 of the electrical power. “Users will see the benefit, significantly reducing R&D, Quality Assurance and Production costs, once they decide to choose LED simulator.” says KDI

■ **Specifications:**

System Specifications	
Lamp Type	Light-Emitting Diode (LED)
Illumination Area	160mm x 160mm
Output type	Steady State
Lifetime	20000 Hrs
Lamp Power	300W
Irradiance	200-1100W/m ²
Spectral Distribution Match	IEC 60904-9, A Class
Non-uniformity of illumination	< 1%
Temporal stability	LTI < 1% ;
	STI < 0.5%;
Input Power	90~240VAC/5A, 50/60 Hz
Cooling System	Air Ventilation

■ **Light Source Unit:**



Taiwan Head Office

Tel : 886-2-2662-5100

Fax : 886-2-2662-3094

E-mail : service@kdi.tw

KD Photovoltaic Advanced Testing & Equipments Research Center. (PVTEC)

Tel : 886-3-5835033

Jiangsu Kunshan, China

Tel : 86-512-5759-9065

Fax : 86-512-5757-1659

Guangdong Donguan, China

Tel : 86-769-351-6866

Fax : 86-769-351-6000