LEDs COPY THE SUN

The SINUS-2100 is the ideal solar simulator research and certification of solar modules. Its nearly perfect simulation of the sun's spectrum enables highly accurate solar cell efficiency measurement. The intelligent LED-based light source is what makes this exceptional accuracy possible. LED's present the new benchmark:

FEATURES

- Multiple color LED-based light source
- Wide range of exposure times
- All LEDs can be separately tuned for user defined spectra
- Unique special optical lens system for perfect color mixing
- Built-in spectrometer
- Fast on-the-fly auto-correction of spectrum and intensity for highly stable light
- Exceeds class AAA criteria
- Fully integrated electroluminescence camera (option)
- Fully integrated additional light engine for bifacial modules (option)
- Fully integrated climate chamber (option)

WAVELABS is proud partner of

CLASSIFICATION

	SINUS-2100		Class AAA requirements
Spectral Match	Class A++	0.95 - 1.05	0.75 - 1.25
Non-uniformity of irradiance	Class A	< 2%	2%
Short-term instability (STI)	Class A	Synchronized	Synchronized
Long term instability (LTI)	Class A+	< 0.5%	2%

Validity of classification:
WPVS cell ISE021/030-2014, 1 sun, AM1.5, 100ms, 4,800 mm distance between light engine and solar cell

SPECTRAL QUALITY

Wavelength range (nm)	SINUS-2100	AM1.5
400 - 500	18.4%	18.4%
500 - 600	19.9%	19.9%
600 - 700	18.4%	18.4%
700 - 800	14.9%	14.9%
800 - 900	12.5%	12.5%
900 -1,100	15.9%	15.9%

FUNCTIONALITY

IV curve measurement	Under illumination, optional dark IV measurement
Solar cell parameter analytics	Voc, Isc, FF, Pmpp and efficiency
Temperature correction	Solar cell parameters are adjusted according to IEC 60904-5, IEC 60891
User defined analytics	Open software interface allows export of all measured data for analysis and import of classification criteria
Visual inspection	Fully integrated electroluminescence camera (optional)
Bifacial testing	Additional AM1.5 LED light source for rear side illumination (optional)
Climate chamber	Temperature variation between 10°C and 80°C (optional)

PRODUCT FEATURES

Intensity range	As required: from 0.1 up to 1 sun
Spectrum	AM1.5, AM0 or other customer defined spectrum including illumination by single colors
Irradiance time	As required, 50 ms and longer.
Flash-to-flash time interval	2 s
Voltage resolution	0.025%
Current resolution	0.025%
IV curve measurement duration	As required: 10 ms and longer.
Distance light engine – test area	4,800 mm
Test area	2,000 mm x 1,000 mm

TECHNOLOGIES AND COMPONENTS

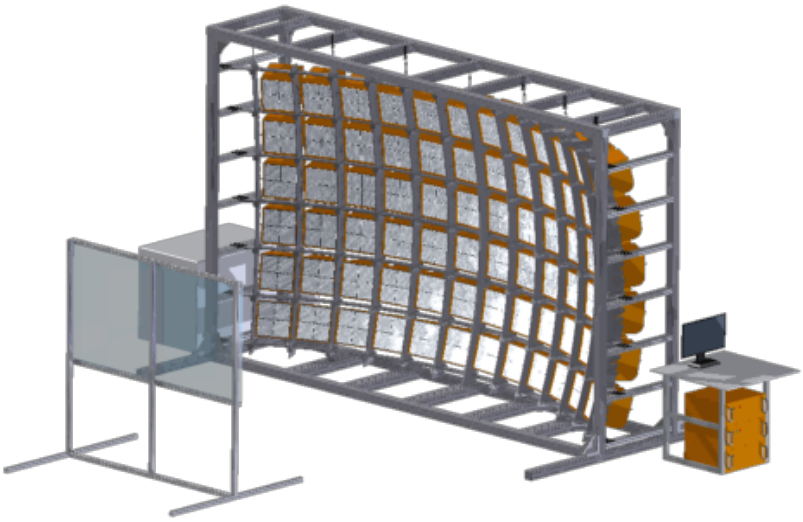
Light source	Multiple individually controlled LEDs with different peak wavelengths. Cooling via re-circulation chiller.
Feedback system	Spectrum and intensity are monitored during each single measurement. Adjustments, if necessary, are made on the fly.
IV measurement	Active electronic load for 4-quadrant measurement capability with 14 bit calibrated analog-digital converter and calibrated shunt resistor
System control	Integrated PC runs application software and controls hardware
User interface	Touch screen, keyboard and mouse

PRODUCT DIMENSION AND REQUIREMENTS

Light engine	6,700 x 4,880 x 2910 mm³, ca. 1,600 kg
Power	Max 60kW (max. 3x80 A at 400 V), 50/60Hz - 1sec. / 10 sec cycle time 6KW
Environment	Non-condensing ambient humidity with relative humidity less than 70%
Cooling Power	Max. 50 kW (depends on cycle time) – 1sec. / 10 sec cycle time 5KW
Maintenance Area	1 m free area around light engine required

SCOPE OF DELIVERY

Light engine
Power supply
IV electronics
Industrial PC
Touch screen
Keyboard with trackball or mouse
Rack for light engine and other hardware
Cables
Optional Chiller



CONTACT

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