

QuickSun[®] 800 - Series

Economic tunnel or tower simulator
for manufacturing, laboratory, and
mobile applications



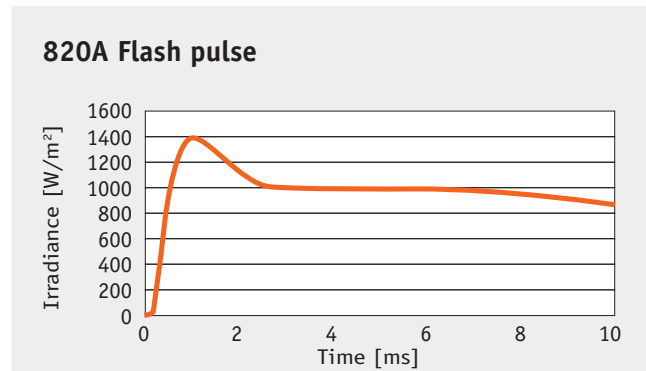
Class A Performance

800-Series simulators are always tested, certified and results reported exactly as specified in the applicable solar simulator standards and this is being proved by a globally recognized inspection body, SGS Fimko Ltd.

In order to comply with the Class AAA tolerances of the standard IEC 60904-9, ed. 2, proprietary optics has been developed for filtering the spectrum and improving irradiance non-uniformity. Since voltage, current and irradiance signals are recorded simultaneously, Short Term Instability (STI) is inherently 0% and in A class.

800-Series simulators are routinely applied to measure standard mono/polycrystalline silicon, or a-Si, CdTe and CIS/CIGS PV modules. The measurement of thin film materials only requires filtering of the monitor cell in order to comply with the spectral response of the material to be measured.

All 800-Series simulators are equipped with two flash generators. This extends the length of the flash pulse and improves Long Term Instability (LTI). Capacitance Compensation (CAC) method allows testing of high capacitance PV materials.



	810A	820A	830A
Max module size [cm x cm]	80 x 125	120 x 200	150 x 220
Testing capacity [meas/hr]	120	120	90
Flash tunnel [cm x cm x cm]	390x160x250	465x240x250	555x250x270
Flash pulse duration [ms]	18	18	18
IV data recording duration [ms]	7	7	7
Irradiance range [W/m²]	200 - 1200	200 - 1200	200 - 1200
Flash tube lifetime* [flashes]	400 000	250 000	150 000

IEC60904-9 ed. 2 compliance

Spectrum < ± 25%	A	A	A
Non-Uniformity < ±2%	A	A	A
Short term instability (STI) < 0.5%	A	A	A
Long term instability (LTI) < ±2%	A	A	A

* on average

Load and sampling

QuickSun electronics records voltage, current and irradiance signals when voltage is swept from short circuit to open circuit. Simultaneously module temperature is measured either

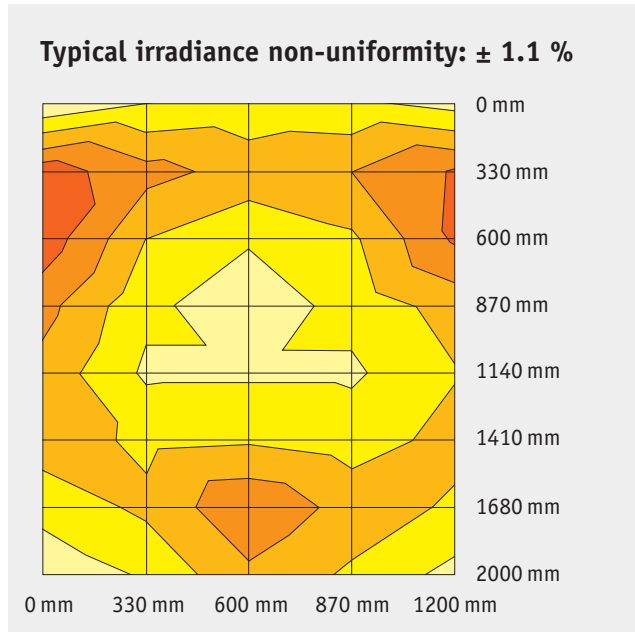
indirectly by ambient temperature measurement or by an IR sensor. Dark reverse IV characteristics can be recorded with an optional power source.

Contacting	Module cables	4-wire
Load	Feedback controlled MOSFET	Adjustable bias 0–4.5 V
Voltage sweep	Isc -> Voc, Voc -> Isc	Capacitance Compensation (CAC) method
Voltage measurement	1–100 V (other scales on request)	Accuracy better than 0.2 %
Current measurement	0.5–25 A (other scales on request)	Accuracy better than 0.2 %
Irradiance control	200–1200 W/m²	Resolution 1 W/m²
Pmp repeatability	(Max-min) / (max+min) < 0.25 %	Std. < 0.1 %
EL image	12 MP	Typ. exposure time 5–10 secs
Hipot	Max 5 kV	
Operation temperature	15–35 °C	
Mains utilities	1~, 230 Vac, 16 A, 50–60 Hz	

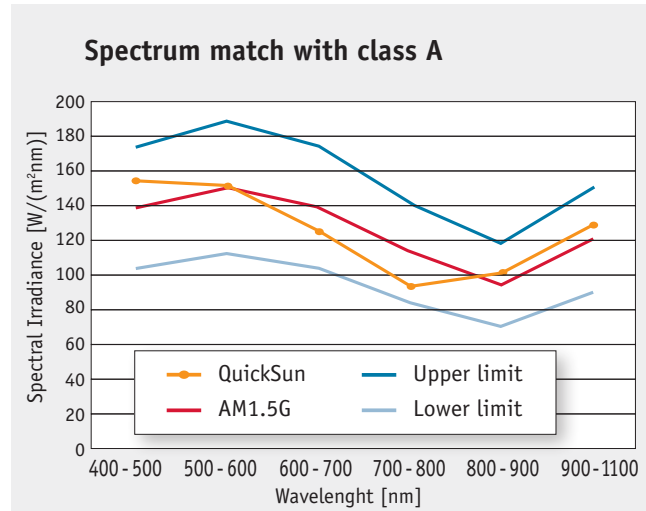
Simulator Testing

Every QuickSun simulator is thoroughly factory acceptance tested (FAT) before dispatching the system to the client's site. The test results are included with the simulator docu-

mentation assisting the module manufacturers to convince their clients that modules are tested with a true Class AAA simulator.



Non-uniformity is measured by recording the short circuit current distribution of a laminated c-Si cell over specified test area. Same test can be easily reproduced at client's site by using the test sensor and Quicksun software tools provided with the simulator.



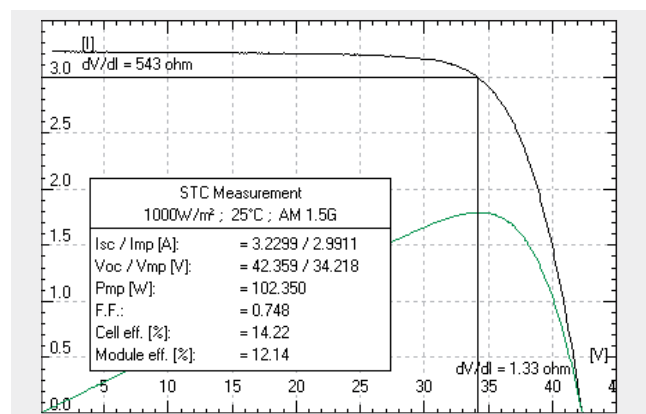
Spectrum of every simulator is recorded and compared to comply with the Class A tolerances as specified in IEC 60904-9, ed. 2

Voltage, current and temperature measurement accuracies are calibrated and verified to comply with IEC 60904-9, ed. 2 specifications. Irradiance measurement accuracy is factory calibrated but final calibration is performed on-site by applying client's certified reference modules.

QuickSun software

QuickSun software is designed to provide flexibility for different end-users, from fully automated large scale production lines to smaller factories and research institutes. It combines a diverse range of options for control and data handling to ease in use and simplicity. Full remote control of the software is possible through a TCP interface, and measurement data is conveniently transferred to an external database using an ODBC interface.

Classification of measurements based on all key performance parameters is readily available. QuickSun also analyses curve derivatives for shunt and series resistance evaluation, measures series resistance according to IEC 60891, and has easy-



to-use features for irradiance non-uniformity measurement.

Remote control and saving options

Interface	Function	Description
TCP	Data / Control	Total Control of QuickSun simulator with client/server TCP protocol. Measurement data in reply messages.
Digital Automation Interface, QS-DAI*	Control	Control of QuickSun simulator by digital signal. Generally used together with External Database.
Data export	Data	Exporting of measurement data in CSV -style.
External database, ODBC	Data	Sending of measurement data and characteristics to a SQL database with ODBC interface.
Label printing*	Data	Data exchange and printing control of Codesoft label design software.

* Optional

Installation Alternatives

800-Series simulators can be installed either horizontally or vertically and instructions for constructing a corresponding flash tunnel or tower are supplied with the simulators.

Flash tunnel gives easier access to the flash head e.g. for changing the flash tube but takes more factory space. A test surface with fixed test sensor positions covering the nominal test area of each simulator is an essential part in order to perform fluent and reproducible irradiance non-uniformity measurements.

EL imaging and Hipot

EL imaging option is available with two integrated 8.3 Mpixel CCD cameras. This results in about 500 μm pixel resolution and enables visual detection of faults like micro cracks. Typical exposure time is 5–20 seconds and 850 W power source provides up to 14 A to 72 cells c-Si modules.

Also instrumentation for Electrical Safety Testing option is available including manual frame contacting. True leakage current and insulation resistance are evaluated simultaneously with nA scale measurement sensitivity which confirms also reliable frame contacting.

