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smart by nature

INLINE IV TEST SYSTEMS FOR CPV ASSEMBLIES

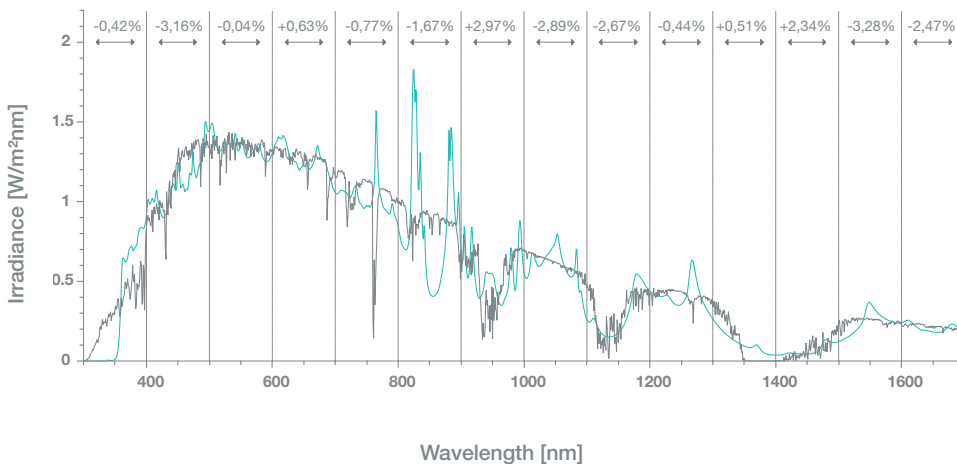


INLINE IV TEST SYSTEMS FOR CPV ASSEMBLIES

The current-voltage (IV) characteristic of a solar cell is an essential performance metric. **neonsee**'s inline measurement systems provide the means to evaluate IV characteristics for quality control purposes and binning of multi-junction solar cells as well as CPV assemblies in production environments. Reliable and accurate measurements, customised and automated test sequences along with electrical and illumination conditions that are tuneable in wide ranges serve as a basis for state-of-the-art process optimisation and analyses. **neonsee**'s highly integrated turn-key IV test solutions offer full control of these parameters, all programmable by intuitive software, enabling comprehensive IV-derived loss analysis of your photovoltaic devices.



neonsee InIV-HCSS-26: A inline 260x260mm² IV quality control system.



KEY FEATURES

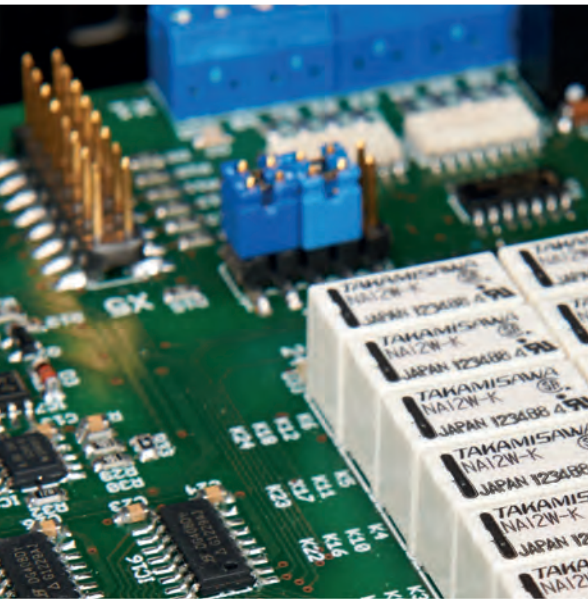
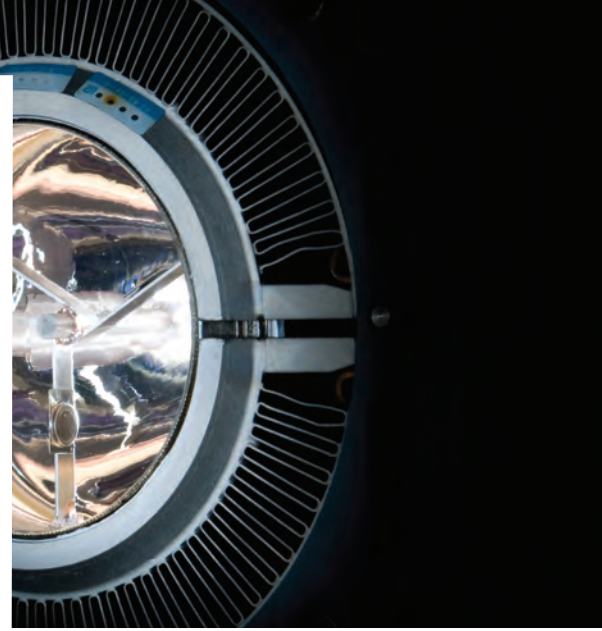
- Class AAA+ solar simulation
- Collimation up to $\pm 0.35^\circ$
- Full range irradiance control
- Steady-state & flash illumination
- Production line interfacing
- Database connectivity
- Fully integrated turn-key system

*Comparison of AM1.5D spectrum (ASTM G 173-03) and **neonsee** dual-source solar simulator spectrum. Deviations from standard are denoted within corresponding intervals.*

SYSTEM CAPABILITIES

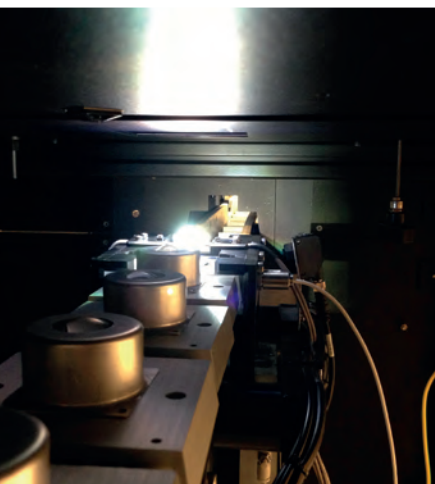
SOLAR SIMULATOR

- 100x100 – 300x300mm² illuminated area
- AM1.5D equivalent Class AAA+ (IEC 60904-9 & ASTM E 927)
- Collimation up to $\pm 0.35^\circ$
- Flash mode with exposure times down to 60ms
- 0 – 1200W/m² full range irradiance control for each light source
- Multi-source configurations
- Spectral tuning according to ASTM E 2236
- Continuous & automated irradiance stabilisation
- Automated calibration via component cells
- Adjustable fixture for customer fresnel lenses
- Integrated spectrometer



ELECTRICAL

- 4-Quadrant electronic load / source
- 16 Bit FPGA-based data acquisition
- Measurement resolution 0,3nA & 300 μ V
- Simultaneous measurement of I, V, E & T
- Acquisition of entire IV curve in less than 2ms
- Programmable voltage sweep
- True 4-point probing



PRODUCTION ENVIRONMENT

- Production line interfacing via SMEMA or comparable protocols
- Automated contacting & marking systems
- Tactile or IR temperature monitoring
- Database connectivity
- Engineering services for integration in existing automation

MEASUREMENT CAPABILITIES

Methods

Light IV

Dark IV

Differential Voc

Temperature coefficients

Jsc – Voc / Suns – Voc

Variable intensity method / weak light

Rs according to IEC 60891

Temperature – voltage equivalence

Diode models fitting

Spectral measurements

Loop test

Results

Voc, Isc, FF, Efficiency, Vmpp, Impp, Pmax, Rs, Rsh

Rs, Rsh

$dVoc = Voc(T_2) - Voc(T_1) \propto$ thermal resistance heatsink – multi-junction solar cell

α (Isc), β (Voc), γ (Pmax)

Rs-free IV characteristics (like SINTON Instruments SUNS-VOC), pFF, FF₀, Rs from FF & pFF

Voc (E), Isc (E), FF (E), Efficiency (E), Vmpp (E), Impp (E), Pmax (E), Rs (E), Rsh (E)

Rs, Rs (E)

V (T), V (E)

Diode saturation currents & ideality factors

Spectral distribution, mismatch factor, IEC 60904-9 & ASTM E 927 classification

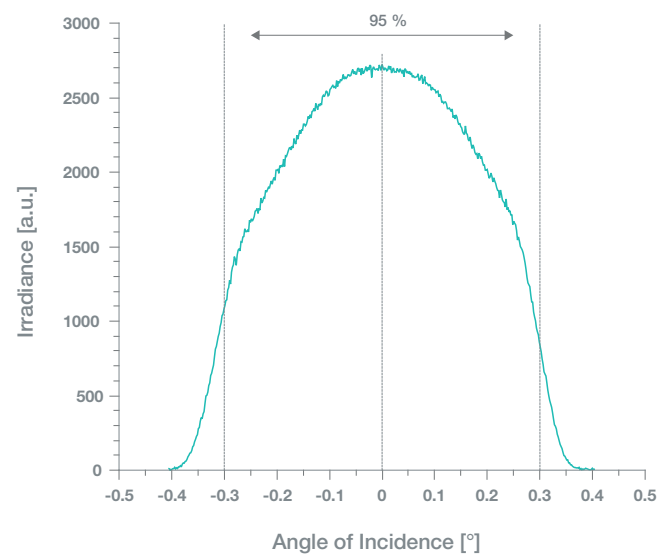
Reproduceability of Voc, Isc, FF, Efficiency

SOFTWARE

- All components are software programmable / remote controlled
- Fully automated measurement sequences
- Recipe-based configuration

GENERAL

- Highly integrated turn-key system
- Modular & field-upgradeable design
- 1 year warranty
- CE certified



Angular distribution of 210x210mm² systems. 95% of the irradiance reach the device under test within $\pm 0.3^\circ$.

We are looking forward to customize our systems to your requirements. Please contact us and request a tailored offer.

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