

About Enlitech

Our Philosophy & Vision



Provide The Best Solution

Enlitech was founded in March 2009. Enlitech is a customer-oriented company and is committed to provide customers with the best product and service solutions. The core technologies include artificial light source and spectrum analyzing technique.

Enlitech's four main product markets include image sensor testing solutions, advanced photoelectric detector testing systems, quantum efficiency test solutions, and various light simulators. The industries Enlitech serves include Semiconductors, Materials Research, Aerospace, Automobiles, Electronic Components, Photovoltaics, etc.



Enlighten Your Idea

Sincerity (Core Value)

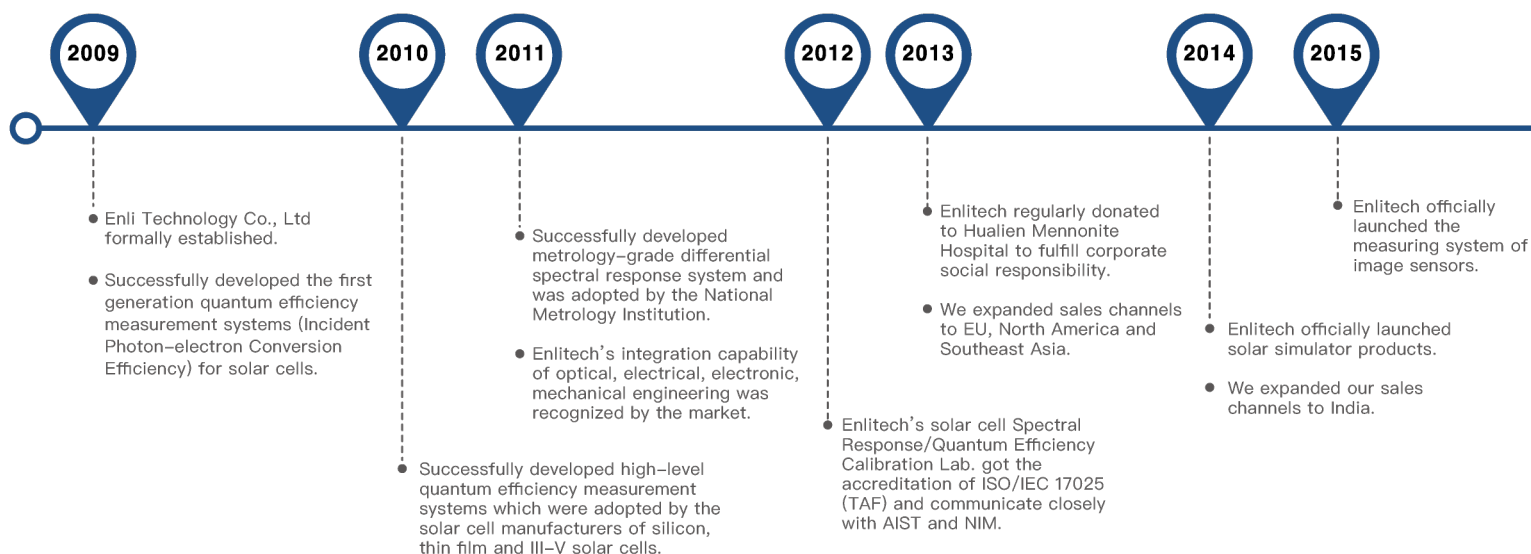
Act in accordance with our value, that is, honesty and keep our commitments to our customers.

Providing the Best Solution

We devote time and effort to Research & Development to supply customers with the most integrated, up-to-date solution.

Relentless Pursuit of Excellence and Innovation

Perseverance and determination are prerequisites toward achievements. Making persistent breakthroughs is our ultimate goal.



Award and Certification

Enlitech's Calibration and Testing Laboratory has obtained the international certification of ISO/IEC 17025:2005 since 2013. The laboratory was qualified to issue a number of optical calibration and certification reports. Enlitech is the first company in the PV field to pass this certification.

ISO/IEC 17025 is a conformity standard developed by the International Organization for Standardization and the International Electrotechnical Commission. ISO/IEC 17025 is the global standard for auditing the technical competence of calibration and testing laboratories. ISO/IEC 17025, like ISO 9001, not only establishes standards for quality management systems, documentation and personnel, but also requires calibration laboratories to proceed:

1. Analyze the uncertainty of each measurement.
2. Incorporate uncertainty analysis into test procedures and test thresholds.
3. Provide the uncertainty results in calibration certificates and measurement results.

ISO/IEC 17025 is the most important measurement and metrology standard. Almost all national certification bodies around the world have passed this standard. Enlitech is committed to complying with this international standard and obtained ISO/IEC 17025:2005 accredited laboratory qualification by iLAC-MRA in 2013. Moreover, Enlitech's solar cell Spectral Response/Quantum Efficiency Measurement Lab. obtained the annual accreditation of ISO/IEC 17025 (TAF) and the effective date was extended to 2024.



2016

2017

2018

2019

2020

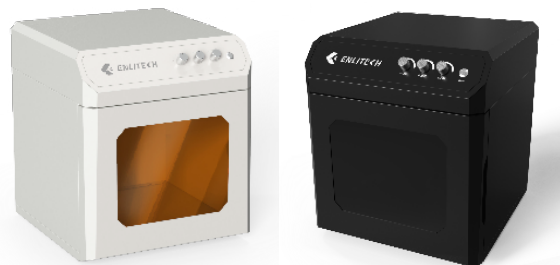
2021

- The second generation solar simulators were officially launched and were adopted by benchmark laboratories.
- The Shanghai branch established and was in charge of sales and customer service.
- Signed the representative contract with India partner to further expand the sales in India.
- Enlitech was invested by NIEA (National Innovation and Entrepreneurship Association).
- New Product Launch: Absolute Electroluminescence EQE/ Photoluminescence Quantum Yield Tester.
- The wafer-level image sensor testing systems were adopted by the aerospace customers.
- The characterization system of solar cells — the Open Circuit Voltage (Voc) Loss Analysis System launched and was adopted by the leading-edge Labs.
- The EQE / Photon-Electron Conversion Testing Systems were adopted by the world-renowned solar cell manufacturer.
- The Image sensor Testing Systems were adopted by the international companies for automobile and mobile phone applications.
- The unique system — Star Simulators were adopted by the aerospace customers.
- Enlitech donated for the prevention of COVID-19 infections and was awarded by many public hospitals and social welfare organizations.
- Enlitech's brand new CIS (Corporate Identity System) launched.
- Enlitech established and activated the clean room for optical products.
- We took part in TSMC Charity Foundation's "Deliver Our Love" event by donating roof PV systems to social welfare organizations.
- Enlitech's research and development project, "Image sensor tester for high level chips and camera modules for 5G/AI applications", was awarded and sponsored by the Ministry of Economic Affairs.
- Enlitech's research and development project, "The System of open-circuit voltage (Voc) loss analysis for perovskite solar cells", was awarded and sponsored by the Ministry of Science and Technology.
- Enlitech's solar cell Spectral Response/Quantum Efficiency Measurement Lab. obtained the annual accreditation of ISO/IEC 17025 (TAF) and the effective date was extended to 2024.

Indoor Ambient Light Simulator: ILS-30

Introduction

The ILS-30 is an indoor ambient light simulator that can illuminate three different color temperatures of light (3000K, 4000K and 5500K). The light intensity can be continuously adjusted from 250 lux to 1000 lux, covering all indoor ambient light intensity levels. The ILS-30 provides a 100mm x 100mm beam. Uniformity can be better than 95% over a 50mm x 50mm beam area. It is easy to adjust light intensity or color temperature. The ILS-30 is very compact in size and easy to install. The ILS-30 can help you quickly build an accurate indoor PV characterization facility.



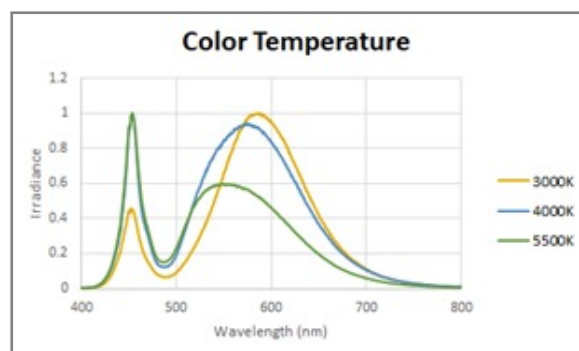
Application

- ◆ 250 lux ~ 1000 lux ambient light simulation
- ◆ Indoor PV characterization

Specification / Product Selection Guide

Item	Specification
Color temperature	3 different white light sources with different color temperatures 3000K±500K 5000K±500K 5500K±500K User defines color temperature output.
Light intensity range	250 lux ~ 1000 lux
Illumination area	100 mm x 100 mm
Uniformity area	>95% @ 50mm x 50 mm >90% @ 100 mm x 100 mm

Testing Results / Publications



ILS-30 Spectra at different color temperature



Full-spectrum Irradiance Spectrometer: HS-IL

Introduction

HS-IL is a full-spectrum irradiance meter. Combining with the years-integration capability of Enlitech, although the size of HS-IL is small and compact, the wide wavelength measurement range (300nm ~ 1100nm) and high dynamic range of light intensity measurement are achieved. The light intensity detecting range up to 5 orders of magnitude makes the HS-IL be applied in various fields.



These applications cover outdoor solar spectrum measurement, indoor solar simulator calibration, spectral calibration of light sources for glovebox integration, accurate calibration of indoor light source and ambient light, etc. The measuring probe head adopts a cosine correction. The fiber-free design makes the uncertainty of HS-IL in measuring various spectra can be greatly reduced by 50% compared with the fiber-type design. Spectral irradiance measurements are traceable to the International Standard Unit (SI).

- ♦ Full-spectrum range, UV-VIS-NIR, 300 nm ~ 1100 nm
- ♦ High dynamic range: 10 lux ~ 200,000 lux, from ambient light to outdoor sun light intensity
- ♦ Variety of optical parameters (W/m², Lux, CIE XYZ, all-in-one)
- ♦ Jsc(EQE) calibration under indoor or arbitrary spectra
- ♦ Can directly operate inside the glovebox
- ♦ NIST-traceable irradiance calibration

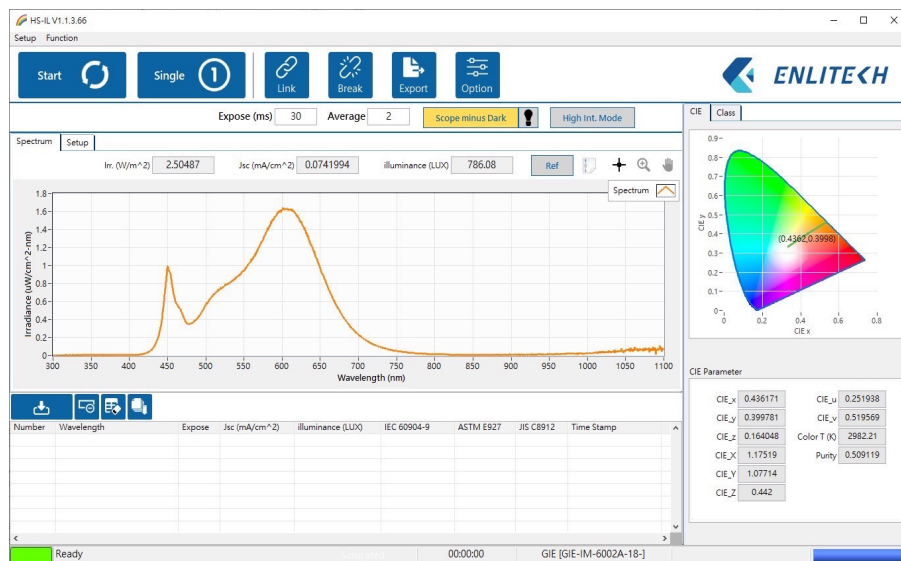
Application

- ♦ Solar simulator irradiance measurement and classification (according to IEC 60904-9)
- ♦ Varies kind of light sources characterization (W/m², Lux, CIE XYZ, all-in-one)
- ♦ Jsc(EQE) calculation and Jsc(IV) comparison
- ♦ Outdoor light irradiance measurement

Specification / Product Selection Guide

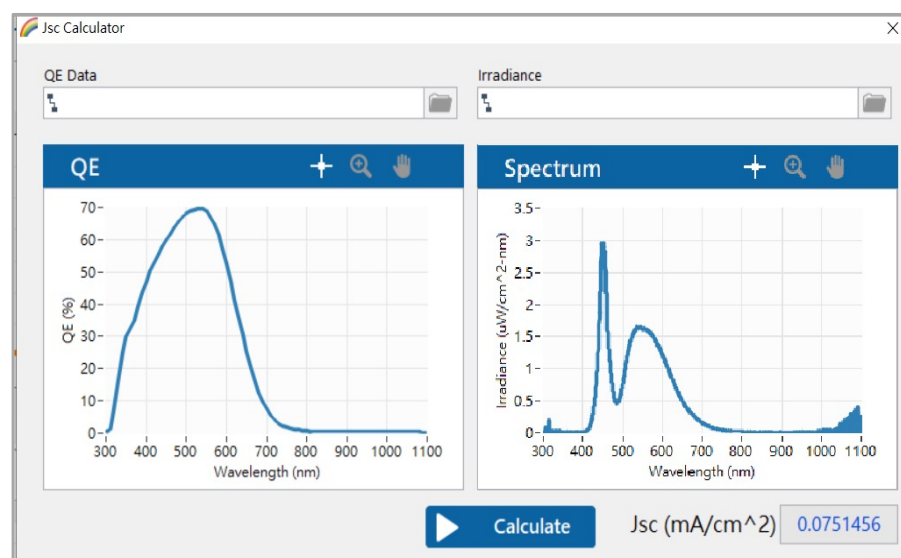
	HS-IL NIST-traceable irradiance spectrometer	Other brands' spectrometer
Application	Designed for accurate irradiance spectrum measurement	General purpose, ex. absorption or transmission spectra testing
Wavelength range	300-1100nm	350-1050nm
Calibration Traceability	NIST-traceable calibration inside	Do not provide the calibration. Users need to do calibration by themselves.
Calibration design	1. No fiber guiding, lower uncertainty, more accurate. 2. Fixed cosine corrector on the main body.	1. Fiber guiding design. 2. Higher uncertainty of measurement. (fiber movement will induce 2-3% spectrum shape, wavelength dependent)
Built-in Irradiance calibration file	YES, inside the PC	No
Irradiance dynamic range	-10 lux ~ 200,000 lux -0.001 sun ~ 1.2 sun -0.1 W/m ² ~ 2000 W/m ²	-1000 lux~ 200,000 lux -Higher uncertainty under indoor light intensity. -High Jsc(EQE) and Jsc(IV) comparison error, > 5%
Software and function	-Irradiance/ lux/ chromatics -Jsc(EQE) calculation (EQE spectrum integration with irradiance spectrum) -CIE coordinate calculation -Color temperature -Color purity calculation -Color simulator classification	-General purpose -"Counts" display
Controller	-Built-in pocket-size IPC (industry controller) -With color LCD display and touch control pad -Compact size for various environments, such as inside glovebox -Multi-functional port, HDMI, USB etc	No

Testing Results / Publications



HS-IL software

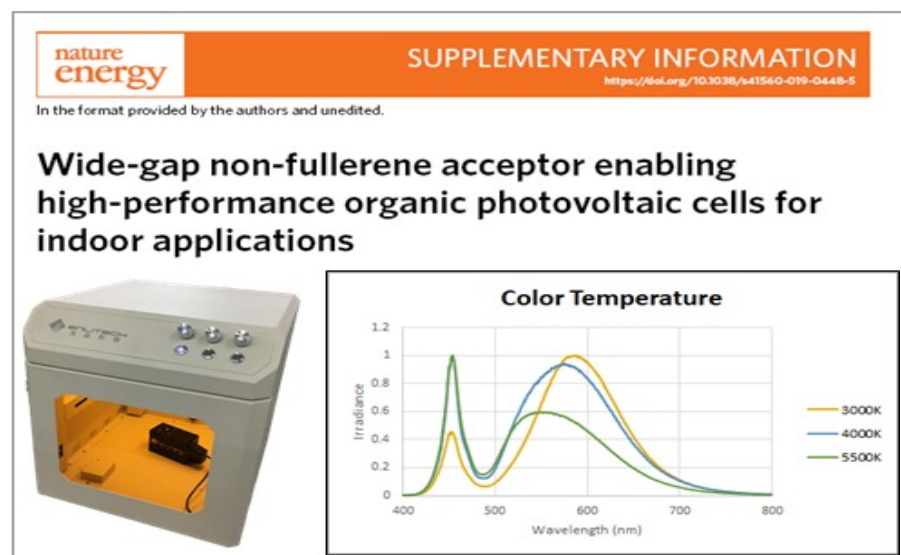
HS-IL is equipped with a pocket-size IPC and software. The software functions include professional irradiance test (W/m^2), illuminance test (Lux) and all color parameter analysis such as color temperature, CIE XYZ coordinates, color coordinate diagram, spectrum analysis, etc. It can be applied to all kinds of fields such as Photometry and Radiometry applications.



Jsc (EQE) Calculator

The HS-IL software can be applied to evaluate the indoor light sources. It also can calculate the EQE spectral integral and Jsc current density of the photovoltaic device from the measured spectrum.

- User-input different light source spectra and device EQE spectra freely
- Realtime calculate and display Jsc (EQE)
- Realtime calculate and display Lux



Indoor PV Evaluation

HS-IL can be applied for indoor PV evaluation. It can analyze the spectrum of indoor light sources, and auto-calculate Jsc (EQE) to compare with Jsc (SS). At present, it is an important experimental data requirement for indoor photovoltaic research published in the top journal.



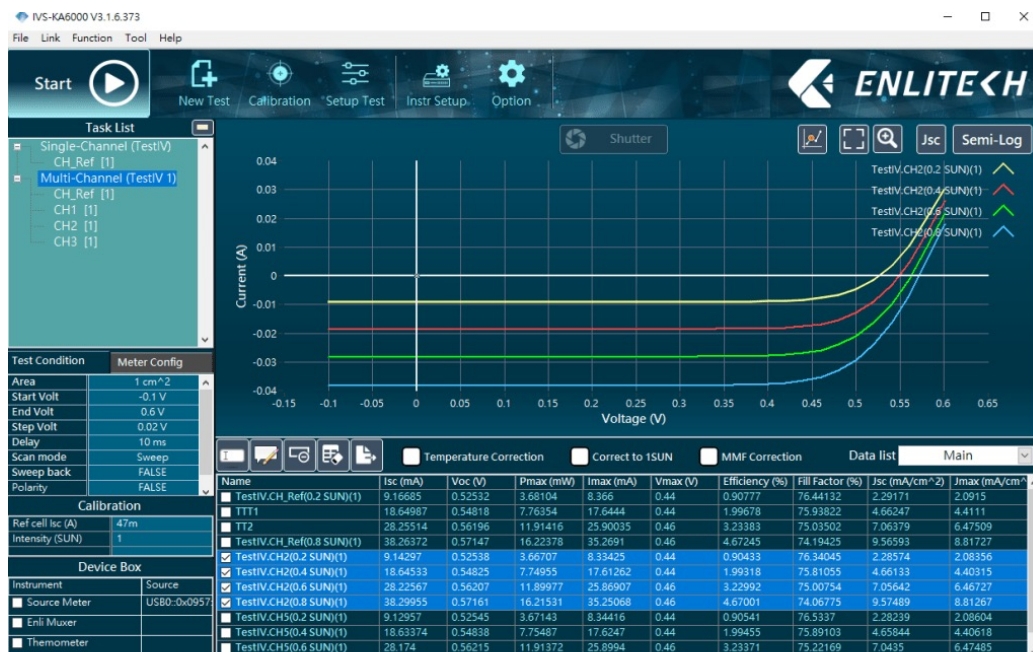
More Information ►

PV IV testing software: IVS-KA6000

Introduction

The Most Comprehensive IV Measuring and Analysis Software for Perovskite Solar Cells

IVS-KA6000 is a PV current-voltage (IV) testing software developed by Enlitech with over 10 years of experience. The last generation IVS-KA5000 had more than 1000 users in many laboratories around the world. IVS-KA6000 is redesigned and improved on the basis and user feedback. IVS-KA6000 can control a variety of SMUs and collect current and voltage data according to the parameters set by the user. The formulas and algorithms of the IVS-KA6000 are based on the foundation developed and published by NREL.



From the analyzing functions of IVS-KA6000, users can get the details of improving the conversion efficiency of the solar cells. Numerous laboratories adopted IVS-KA6000 consistently break the efficiency records and land on NREL's Efficiency Chart, such as ISCAS's 23.3% perovskite solar cells in 2019, UNIST's 24.8% perovskite solar cells in 2020, and ICCAS's 18% organic solar cells in 2020.

Application

- ◆ Measurements: Isc, Voc, Jsc, Jmax, Pmax, Vmax, Imax, η , FF, Rs, Rsh
- ◆ Forward scan/ Reverse scan/ Automatic forward and reverse scanning measurement
- ◆ Light soaking & MPPT measurement
- ◆ I-t, V-t, MPPT tracking function Single-sample multi-sub-cell automatic test
- ◆ Real-time correction function according to IEC
- ◆ NREL asymptotic measurement

Software Interface

Task project

- Show created task projects.

Test

- Show the test conditions of the

Calibration parameters

- Show the light intensity correction parameters.

Connections

- Show the connection status of instruments.
- Control connections.

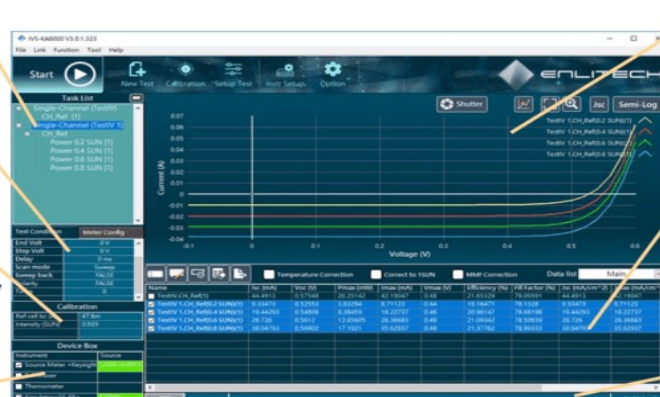


Fig.1 IVS-KA6000 is the most comprehensive IV measuring and analysis software for perovskite solar cells.

Graph data

- Show the IV curve.
- Chart overlay display.
- Zoom in IV curve.
- Jsc/Semi-log display.

Data table

- Show the parameters of IV curves.
- IV correction function.
- Export data as text files.

Light soaking

- Light soaking status.
- Light soaking control.

IVS-KA6000 software main functions.

Graph area

- Current/Voltage data chart.
- Export data as text files.

Statistics

- Starting time of measurement
- Max value
- Min value
- Average

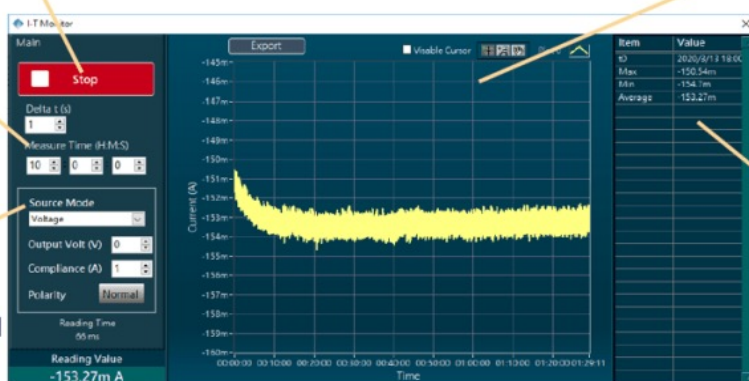
- Press the button to control start or

Measurement time setting

- Press the button to control start or

SMU Setting

- Output source control.
- Set the output level and compliance.



I-t (current-time) monitoring function, which can monitor the device current or voltage variation with time.



NREL Asymptotic measurement for perovskite solar cells. IVS-KA6000 has a unique "asymptotic method" test function. The "asymptotic method" has become one of the standard methods for efficiency testing of new solar cells. IVS-KA6000 has a complete "asymptotic method" supporting scheme and automatic program control.

