Lecheng Intelligent

LC-SPV-ST-2525

Space photovoltaic

module stability testing system

Professional testing platform conforming to ECSS/AIAA/ASTM/ISO international standards

Product Overview

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Highly integrated all-in-one equipment

The AM0 light source, hot and cold stages, testing instruments and control system are seamlessly integrated into an independent cabinet, solving the pain points of traditional solutions where equipment is scattered and wiring is complicated.

Precisely simulating space conditions,

it is specifically designed for GaInPÿ/GaAs/Ge triple-junction solar cells and perovskite tandem solar cells, providing Class A AMO spectra that meet ASTM E490/E927 standards, as well as an ultra-wide temperature range of -180°C to +150°C that meets ECSS-E-ST-20-08C and AIAA S-111A standards (covering and exceeding the standard requirement of -170°C to +135°C).

Targeting high-end scientific research scenarios

Serving aerospace companies, university laboratories, and research institutions, it is suitable for the research and development screening, long-term stability assessment, and quality certification of photovoltaic modules.

Core advantages

Core Advantages

Integrated design

Say goodbye to cumbersome wiring; plug and play. The compact rack design saves valuable lab space.

In the meantime, enhance the overall image.

Precise Space Environment Simulation

Class A AM0 spectrum with an ultra-wide temperature range of + 180°C to +150°C , truly reproducing the outer space spectrum.

Extreme operating conditions.

Intelligent automated testing

Built-in industrial PC and professional software, supporting 24/7 unattended testing and automatic recording.

Data frees up scientific research manpower.

Flexible and scalable architecture

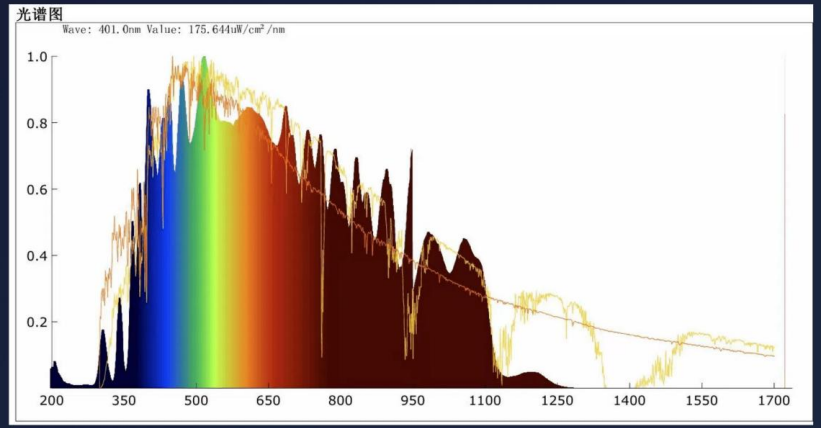
Supports customization from 1 to 9 channels, with optional modules such as vacuum chambers and liquid nitrogen systems to meet different needs.

The research needs of the current stage.

Class A **AM0** LED Sun Simulator

AM0 LED Solar Simulator

Spectral Standards	IEC 60904-9 Edition 3 (AM0)
Spectral matching degree	**Class A** 350-1200nm (can be extended to 1900nm as needed)
Irradiation inhomogeneity	ÿ **±2%** (Class A)
Long-term instability	ÿ **±2%** (Class A)
Standard irradiance	1367 W/m² (1 solar constant)
Intensity adjustment range	100 ~ 1500 W/m² continuously adjustable
Light source lifespan	> 10,000 hours



Ultra-wide temperature range precision optoelectronic testing hot and cold stage

Precision Photoelectric Test Thermal Stage

-180°C

~ +150°C

Ultra-wide temperature range coverage

Temperature control accuracy

±0.1°C

Setting precision

Temperature stability

±0.5°C

Long-term constant temperature

heating and cooling rate

Maximum heating rate 50°C/min

Maximum cooling rate: 30°C/min

Rapid temperature change

Electrical probe

4 Kelvin probes

Position can be adjusted independently

Optical observation window

Sapphire window

With heating and anti-fogging function

Vacuum compatibility

1×10ÿ³ Pa

Optional vacuum chamber

Test Project	Meets standards	Temperature range	Loop count
Thermal cycling test	ECSS-E-ST-20-08C AIAA S-111A	-170°C ~ +135°C (Device supports -180°C to +150°C)	100~1000 times
Thermal vacuum test	ECSS-E-ST-20-08C ISO 15104	-100°C ~ +135°C (Optional vacuum chamber)	Hundreds of hours
Temperature coefficient test	ECSS-E-ST-20-08C NASA-STD-1540	-150°C ~ +150°C	-

Heating and cooling rates: Maximum heating rate 50°C/min, maximum cooling rate -30°C/min (meets the ECSS standard requirement of ÿ1-3°C/min, providing faster testing efficiency).

Multichannel IV scanning and MPPT tracking

Multi-channel IV Scan & MPPT Tracking

Flexible channel architecture

Supports **1-9** channels of independent parallel testing, and can be customized and expanded according to requirements to meet the needs of high-throughput device screening.

equirements. High-precision measurement unit.

Voltage range: 0 ~ **±60 V;** Current

range: 0 ~ **±5 A;** Measurement

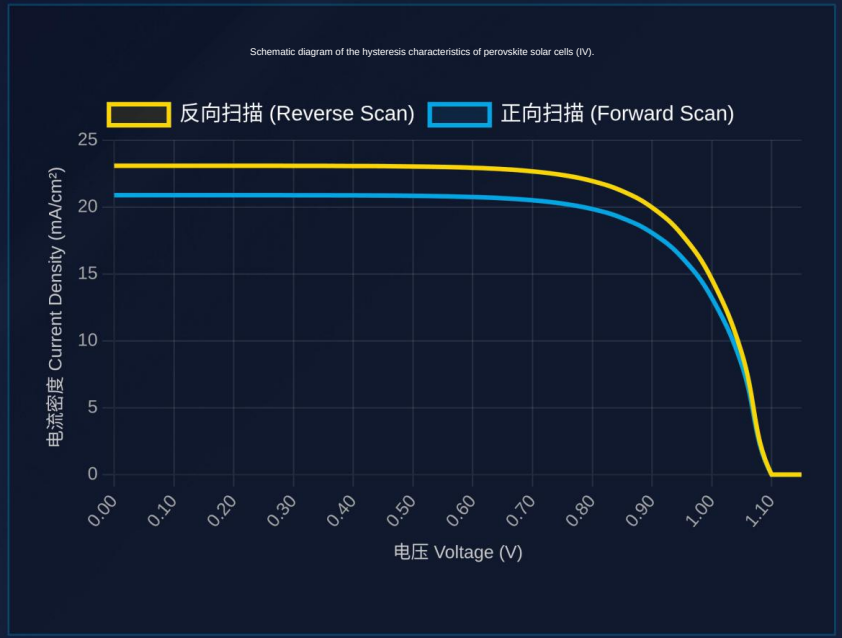
accuracy: ÿ **0.1% FS**

Hysteresis loop scanning

Designed specifically for perovskites, it supports forward/reverse/loop scanning, precisely quantifying hysteresis caused by ion migration.

Effect. MPPT Maximum Power Tracking

Built-in **P&O** (Perturbation and Observation) and **IncCond** (Incremental Conductivity) algorithms to lock the maximum power point in real time.



Intelligent Automation Control and Software Systems

Intelligent Control & Software System

hardware platform

- The built-in high-performance industrial PC ensures long-term stable operation of the system and has strong data processing capabilities.
- The 23.8-inch high-definition monitor offers a large screen display, and the wireless keyboard and mouse make operation convenient.
- Enrich data interfaces

  USB high-speed transmission, Ethernet supports remote network control.

Software Functions

- Automated sequence control

  supports complex test process editing, enabling 24/7 unattended testing.
- Real-time data visualization: plot IV curves, PV curves, and MPPT tracking trajectories in real time.
- Report generated automatically

  Export professional test reports with one click, supporting historical data. Query and compare.

Safety and Protection

- Multiple hardware protection mechanisms for over-temperature, over-current, and leakage current ensure the safety of equipment and samples.
- Emergency stop button

  A physical emergency stop switch that instantly cuts off the power supply in an emergency.
- Data security

  Local large-capacity storage + network backup to prevent experimental data loss.

Overall technical specifications and compliance standards

Technical Specifications & Compliance

Physical parameters

Server rack dimensions	650 mm (W) × 550 mm (D) × 900 mm (H)
Including workbench dimensions	1250 mm (W) × 550 mm (D) × 900 mm (H)
Total weight of equipment	Approximately 120 kg

Electrical parameters

Power requirements	AC 220V ±10%, 50Hz, single-phase three-wire system
Power consumption (peak/typical)	ÿ 4.5 kW / Approximately 2.5 kW

Environmental requirements

Work environment	Temperature: 18°C ~ 28°C / Humidity: ÿ 60% RH

International Standards

IEC 60904-9

Photovoltaic devices - Part 9: Solar simulator Performance requirements

(Edition 3, AM0 & AM1.5G)

North American Standards

ASTM E927

Specification for Solar Simulation for Terrestrial Photovoltaic Testing

Positioning of LC-SPV-ST-2525 in the Space Photovoltaic Testing System

According to the "Analysis of Key Test Items and Standards for Space Photovoltaic Modules," space photovoltaic modules need to undergo three main categories of tests:

1. Electrical Performance Characterization Testing ÿ Core Capabilities of this Equipment : • IV testing, MPPT testing, temperature coefficient testing • Compliant with ASTM E490/E927, IEC 60904-9, ECSS-E-ST-20-08C and other standards

2. Environmental and Reliability Testing ÿ Core Capabilities of This Equipment

• Thermal cycling test (-180°C ~ +150°C, 100-1000 cycles) • Thermal vacuum test (optional vacuum chamber) • Complies with ECSS-E-ST-20-08C, AIAA S-111A, ISO 15104 and other standards

3. Other specialized testsÿÿ Require external facilities : • High-energy particle irradiation test (accelerator or isotope source required) • Ultraviolet aging test (professional UV light source required) • Mechanical vibration/acoustic test (vibration table/reverberation chamber required)

LC-SPV-ST-2525 Test Items, Compliance Standards, and Equipment Capabilities

Test Project	Meets standards	Device capabilities
IV test, MPPT test	• ASTM E490, E927 • IEC 60904-9 • ECSS-E-ST-20-08C	ÿ Fully supported Class A AM0 Spectrum 1367 W/m² standard irradiance
Temperature coefficient test	• ECSS-E-ST-20-08C • NASA-STD-1540 • MIL-STD-1540	ÿ Fully supports a temperature range of -180°C to +150°C
Thermal cycling test	• ECSS-E-ST-20-08C • AIAA S-111A	ÿ Fully supports -180°C ~ +150°C for 100-1000 cycles with a heating/cooling rate of ÿ15°C/min.
Thermal vacuum test	• ECSS-E-ST-20-08C • ISO 15104	ÿ Optional vacuum chamber allows for a vacuum level of up to 1×10ÿ³ Pa.
Spectral response/quantum efficiency	• ASTM E1021 • ECSS-E-ST-20-08C	ÿ Optional monochrome light source module required
UV aging test	• ECSS-E-ST-20-08C • ASTM E2089	ÿ Not supported (requires external UV light source)
High-energy particle irradiation test	• AIAA S-111A • GJB/T 38190 • ECSS-E-ST-10-04C	ÿ Not supported (requires specialized irradiation facilities)

Full-scenario coverage: from R&D to certification

Full Scenario Coverage: From R&D to Certification

Materials research and development screening

- For new materials such as perovskite and organic photovoltaics
- High-throughput parallel testing accelerates recipe iteration.
- Fast IV scan, providing real-time feedback on device performance

Long-term stability assessment

- Simulates extreme high and low temperature cycles in space (-180°C to +150°C)
- Long-term light aging test (Light Soaking)
- Real-time monitoring of MPPT power decay curve

Product quality certification

- Compliant with IEC 60904-9 and ASTM E927 standards
- Generate authoritative test reports with traceable data.
- Final verification of aerospace-grade components before they leave the factory

Supported Technologies

- III-V group multijunction cells
- Perovskite/silicon tandem solar cells
- Flexible thin-film batteries

Contact Us

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Opening a new chapter of precise and

efficient space photovoltaic testing

The LC-SPV-ST-2525 system is now available for pre-order.

Contact our technical experts now for customized solutions and detailed quotes.

Welcome to schedule a consultation

Lecheng Intelligent

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