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Multi-channel PV ModuleIV+MPPT Steady-State Test System

Lecheng Intelligence Technology (Suzhou) Co., Ltd.

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Multi-channel PV Module IV+MPPT Steady-State Test System

Simulated Solar Multi-Channel Photovoltaic Module Steady-State Testing System

Multiple groups were simultaneously irradiated using a standard sunlight simulator.

Components or devices to achieve multi-channel independent control and data transfer.

collection;

Outdoor Multi-channel PV Module Aging Test System

Real-time monitoring of outdoor validation scenarios

The power generation performance of photovoltaic modules or devices, to achieve

Multi-channel PV modules or devices in each household

Real-time performance data under external environmental conditions

Acquisition;

Low-light multi-channel photovoltaic module testing system

Mainly used in various consumer electronics applications

Small thin-film photovoltaic modules in low-light demonstration scenarios

Monitoring the power generation performance of devices or equipment to achieve corresponding field

Multi-channel data acquisition under different conditions;

Test Objects and Capabilities

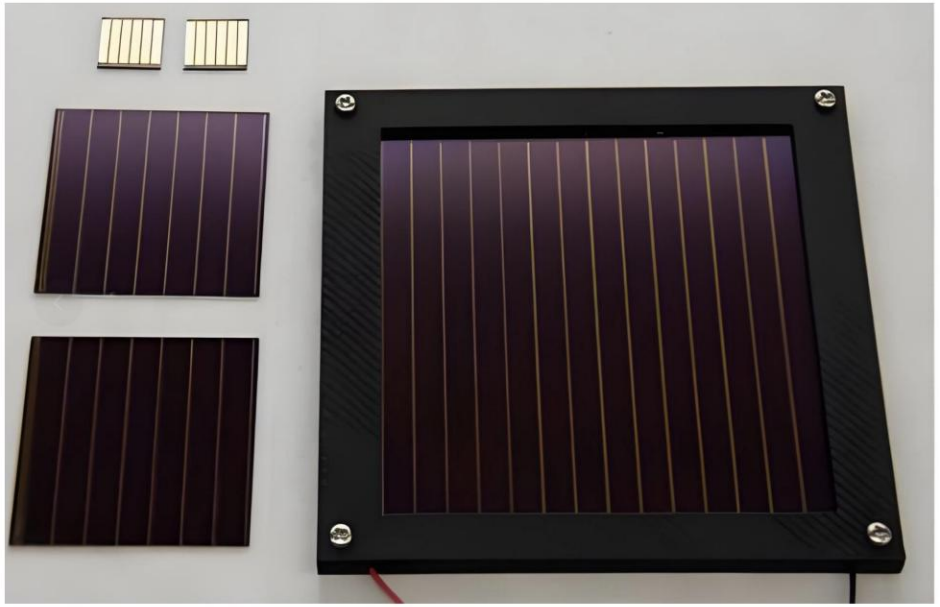
Flexible Testing Solutions for Various Thin-Film Photovoltaic Modules

Test Objects

Material Glass Substrate / Flexible Substrate Thin-Film Solar Cells	**Thickness Range** 1mm–7.0mm
Small Device Size ÿ25×25mm, with customized 8-point test fixture	**Module Size** ÿ250×250mm (Customizable), with lead wire

Testing Capabilities

19 Number of channels (Customizable)	8 points Points per Channel	20-60V (Customizable) Maximum Voltage
1A Maximum Current	**0.1%** Measurement Accuracy	**20W** Channel Power



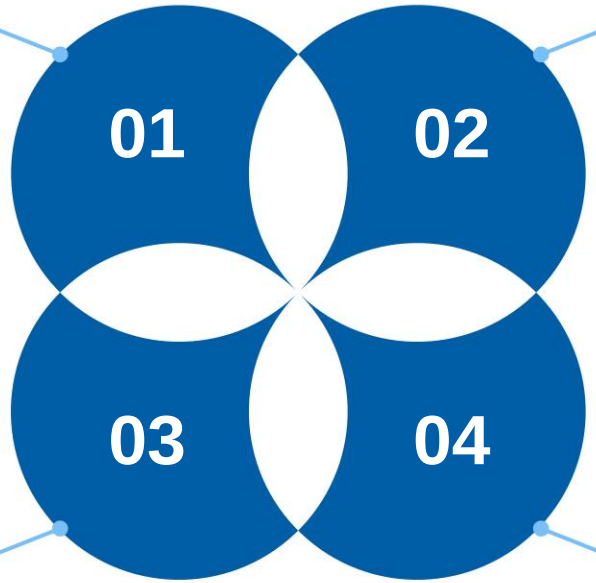
Specifically designed for high-precision R&D scenarios, supporting comprehensive testing needs from small devices to standard modules.

Intelligent Software Test System

Multi-channel I-V test

Supports forward and reverse scan testing, 9-point fitting method, and other IV scanning techniques. Independent control for each channel allows for flexible setting of different scan parameters.

The interval duration is designed to meet the needs of complex experiments.



MPPT tracking algorithm

It incorporates multiple maximum power point tracking algorithms, including the perturbation observation method, the incremental conductance method, and the fixed voltage method, to effectively address the hysteresis effect of perovskite solar cells and ensure data accuracy.

Real-time monitoring and display

Real-time display and recording of IV curves, PV curves, and Temperature change curve. The interface is intuitive and supports multiple channels.

Data can be compared on the same screen, and alarms can be triggered immediately for abnormal conditions.

Automated data management

Supports scheduled testing and automatic saving of functions.

Data files are automatically named and archived; various methods can be selected.

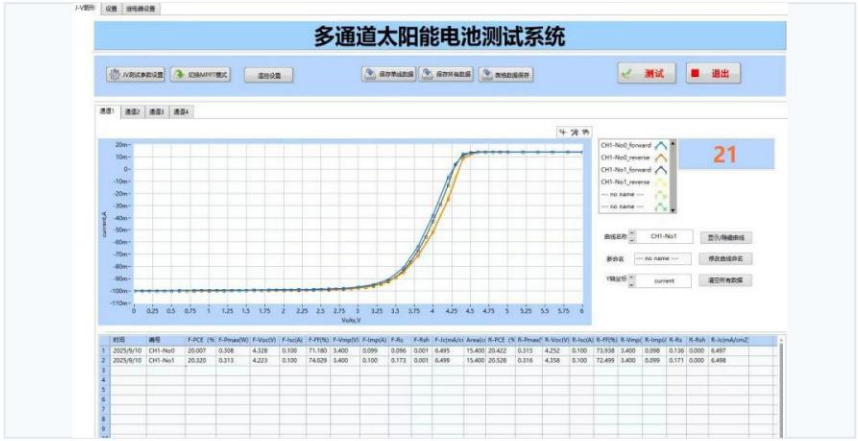
Data can be stored independently or aggregated centrally for easy data export.

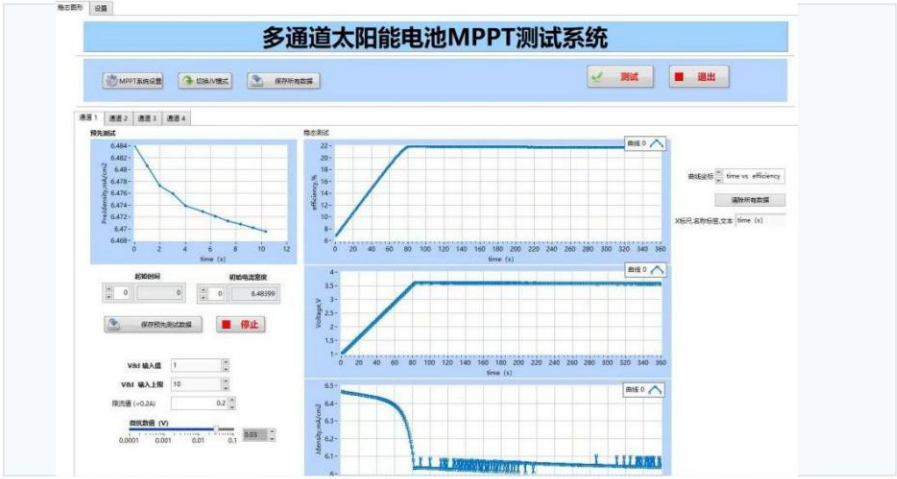
out.

Multi-channel I-V+MPPT test

IV Curve Test

- Forward and reverse sweep test modes
- IV test method can be customized
- Automatic continuous scanning and interval testing
- Independent control for each channel





MPPT Tracking Algorithm

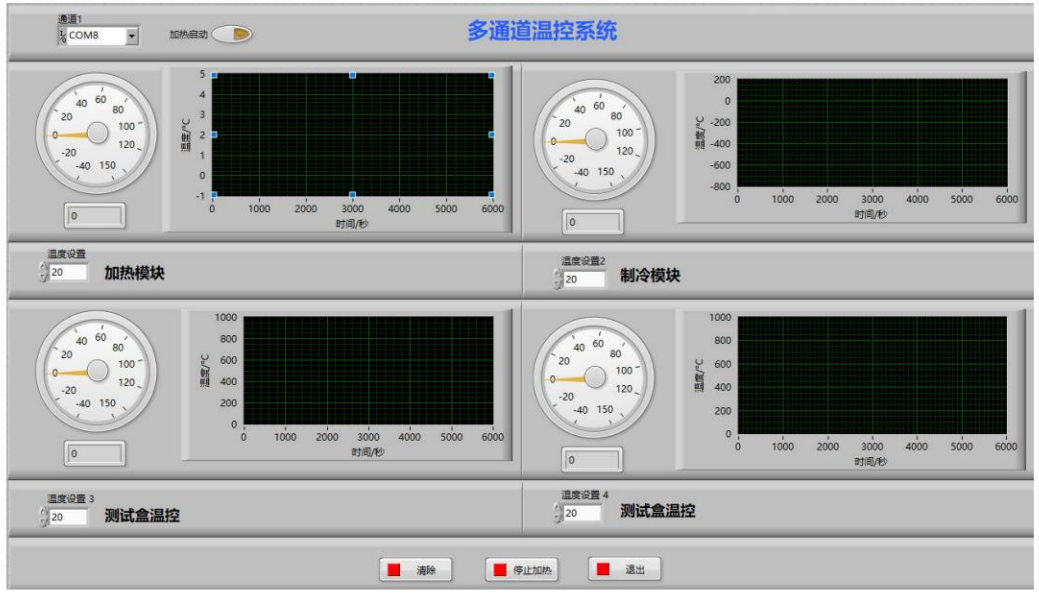
- Perturbation and Observation (P&O)
- Incremental Conductance (IncCond)
- Constant Voltage (CV)
- Real-time tracking of the maximum power point
- Scheduled data saving

Monitored Data Types

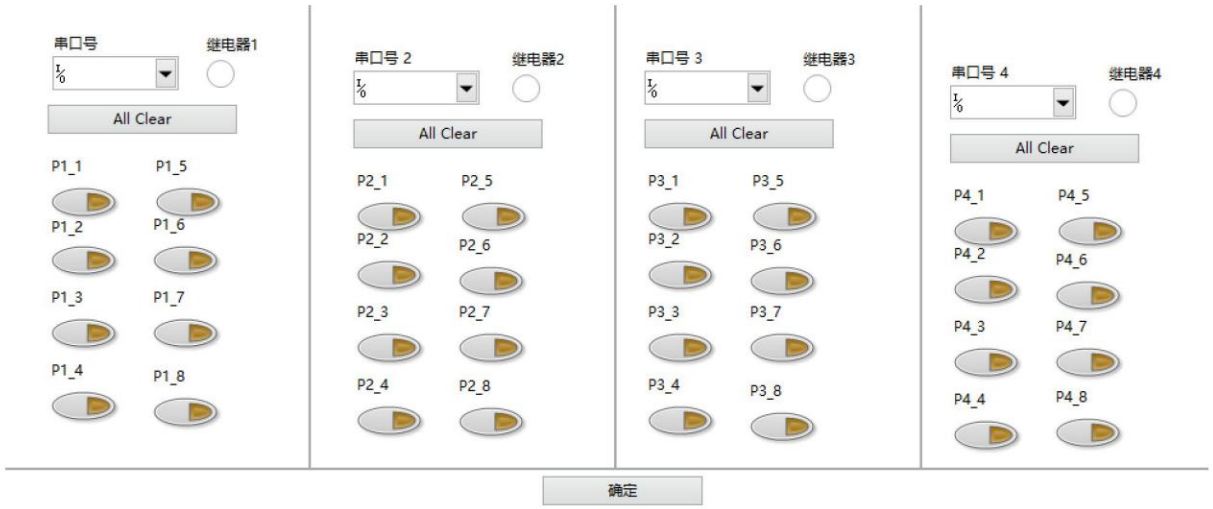
Lux	Voc	Isc	FF	PCE
Pmax	Imax	Vmax	Rs	Rsh

Temperature Control, Curve Monitoring

Small Device Test Unit



Multi-channel temperature control and curve monitoring

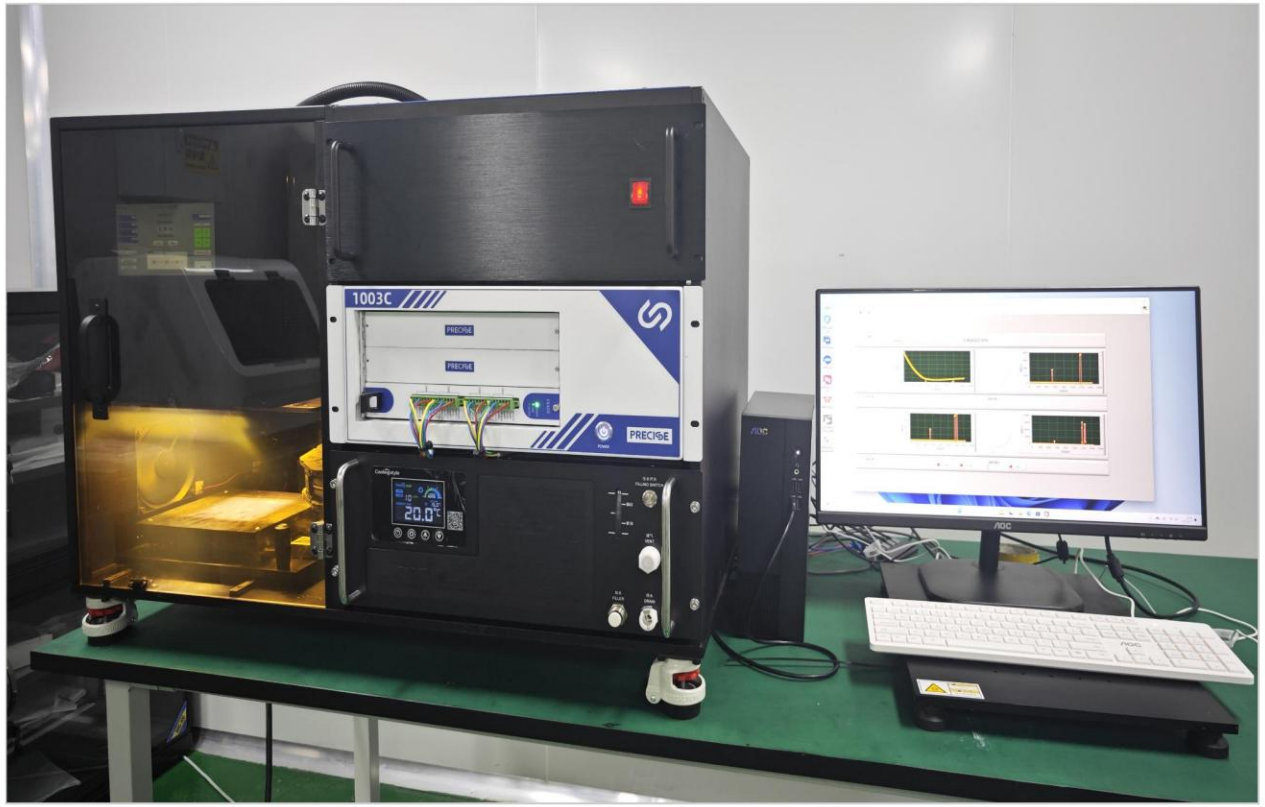


Small Device Test Unit

PART 01

Simulated Sunlight Multi-channel PV Module Steady-State Test System

I. Product Overview



Product Overview

High-throughput automated testing solution specifically designed for perovskites

LED Steady-State Sunlight Simulator

The light source is a Class AAA LED steady-state solar simulator

Multi-channel parallel testing

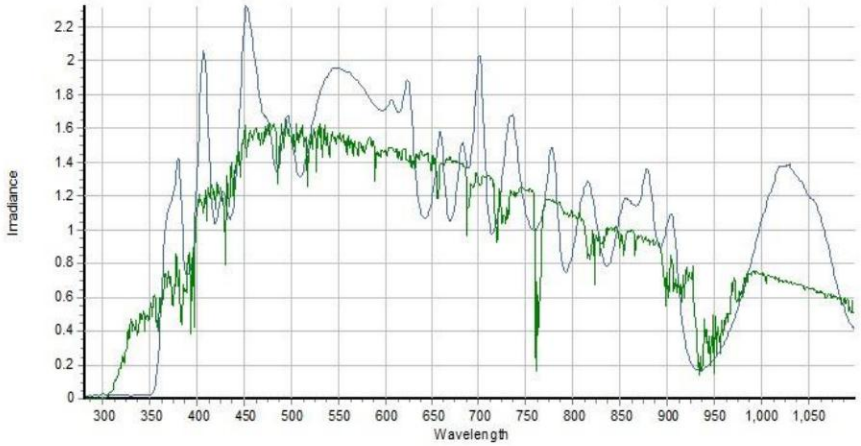
By simultaneously irradiating multiple components or devices using a standard sunlight simulator, multi-channel independent control and data acquisition can be achieved, significantly improving the efficiency of R&D screening.

Precise Environmental Simulation

Equipped with an independent temperature control and monitoring function, it can simulate high temperature, high humidity and different light conditions to accurately assess the stability and degradation characteristics of the components.

II. Product Features

2.1 The light source adopts a 3A-grade LED steady-state solar simulator.



Model	LED-100	LED-250
Light Source Category	LED steady-state light source	
Light source lifespan	10000h	
Effective area,	100*100mm	250*250mm
spectral wavelength	350-1100nm	
range, power adjustment range	100-1200 W/m2 adjustable	
The spacing is adjustable from 5-30cm with an accuracy of 0.1cm.		
Spectral matching degree	A+ (AM1.5G)	
Time instability	Aÿ±2%	
Spot uniformity	Aÿ2%	
Power supply voltage	AC 220V/50Hz	

Image: Physical image and spectrum of a Class 3A LED simulator.

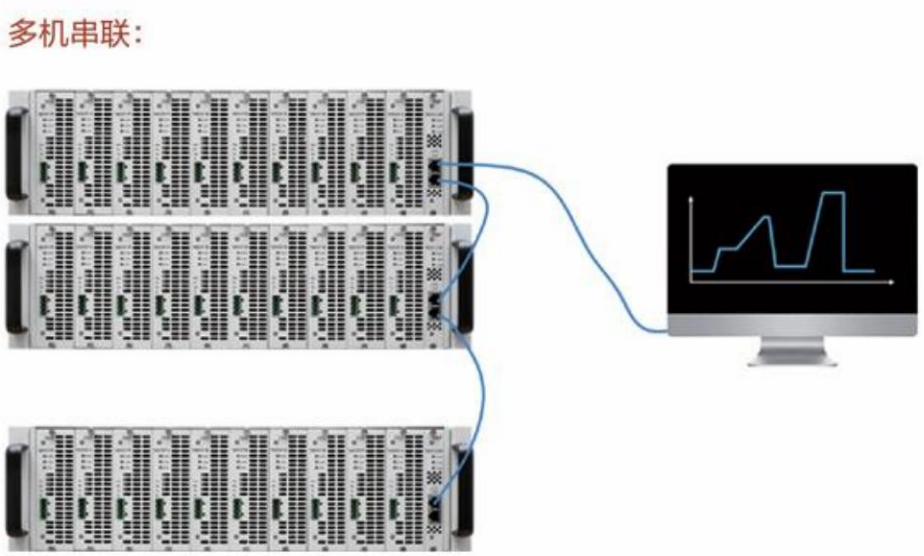
II. Product Features

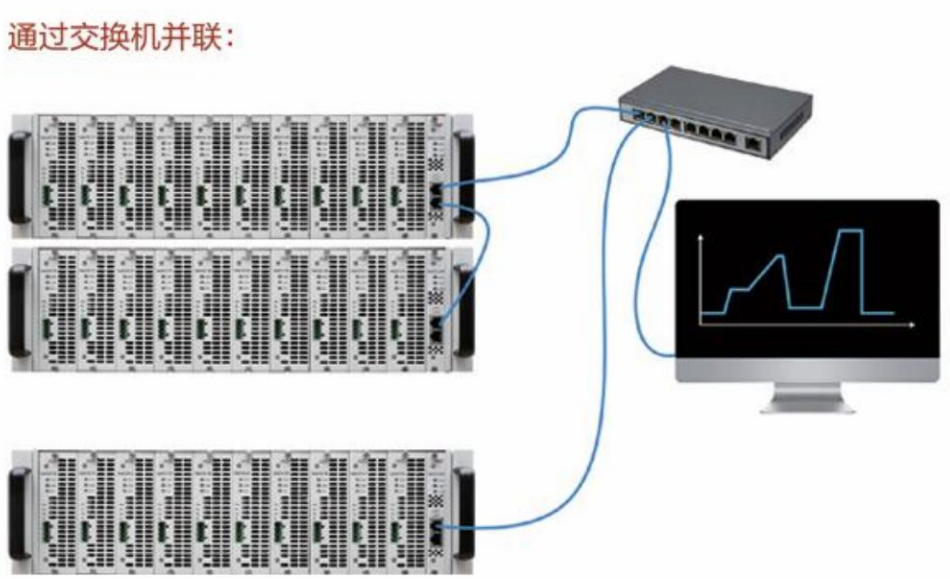
2.2 Multi-channel parallel testing

ÿ Multi-channel electrical test unit: Simultaneously irradiates multiple components or **devices** using a standard sunlight simulator , enabling independent data transmission through multiple channels.

Acquisition;

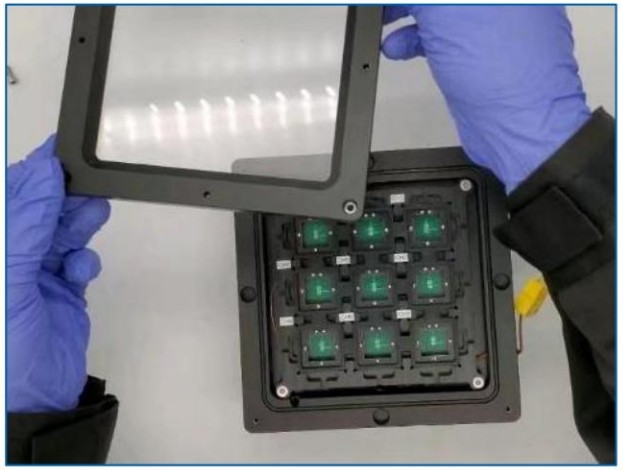
ÿ Multi-channel temperature control and monitoring module: Each test box integrates a temperature control module with multi- channel independent temperature control function;



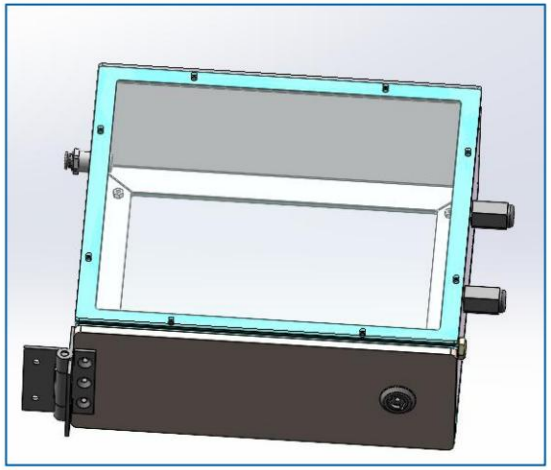


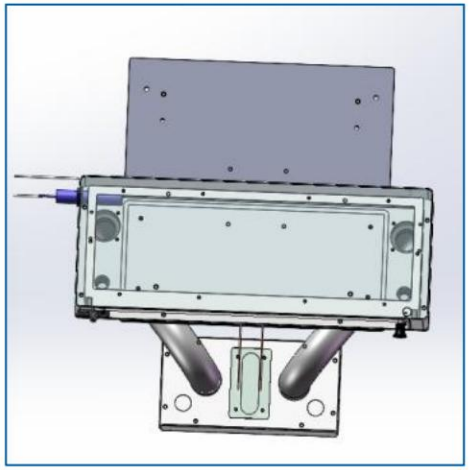
II. Product Features

2.3 Possesses environmental control function

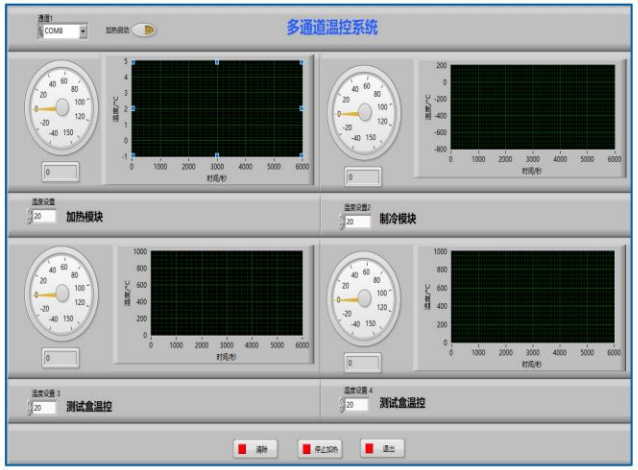


Nitrogen - purged environmenta lchamber (customizable)



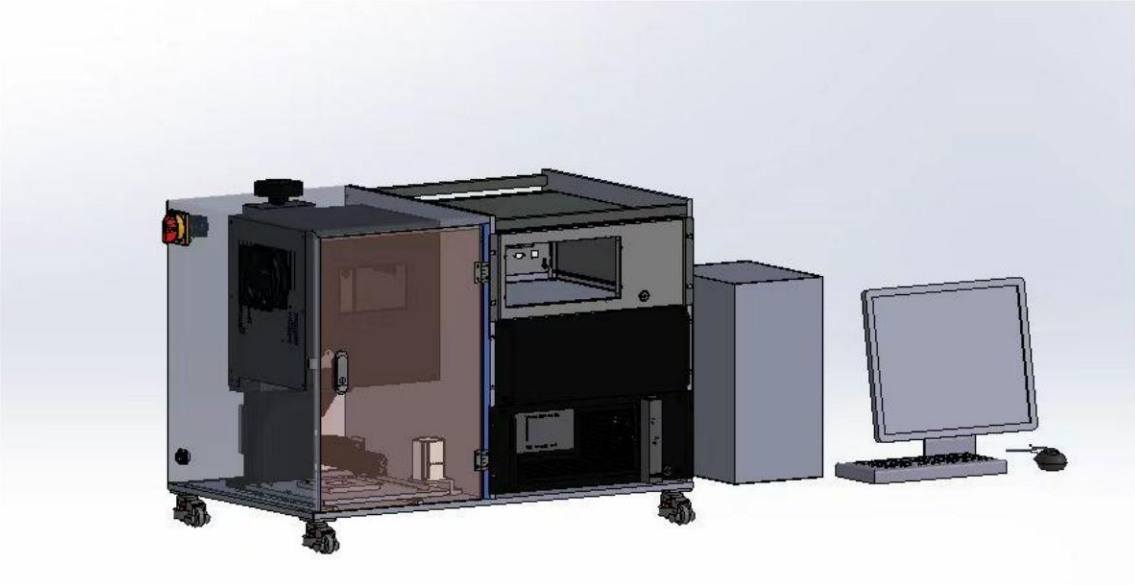


Dual 8 5 (85°C / 85% RH) environmenta lchamber (Customizable)



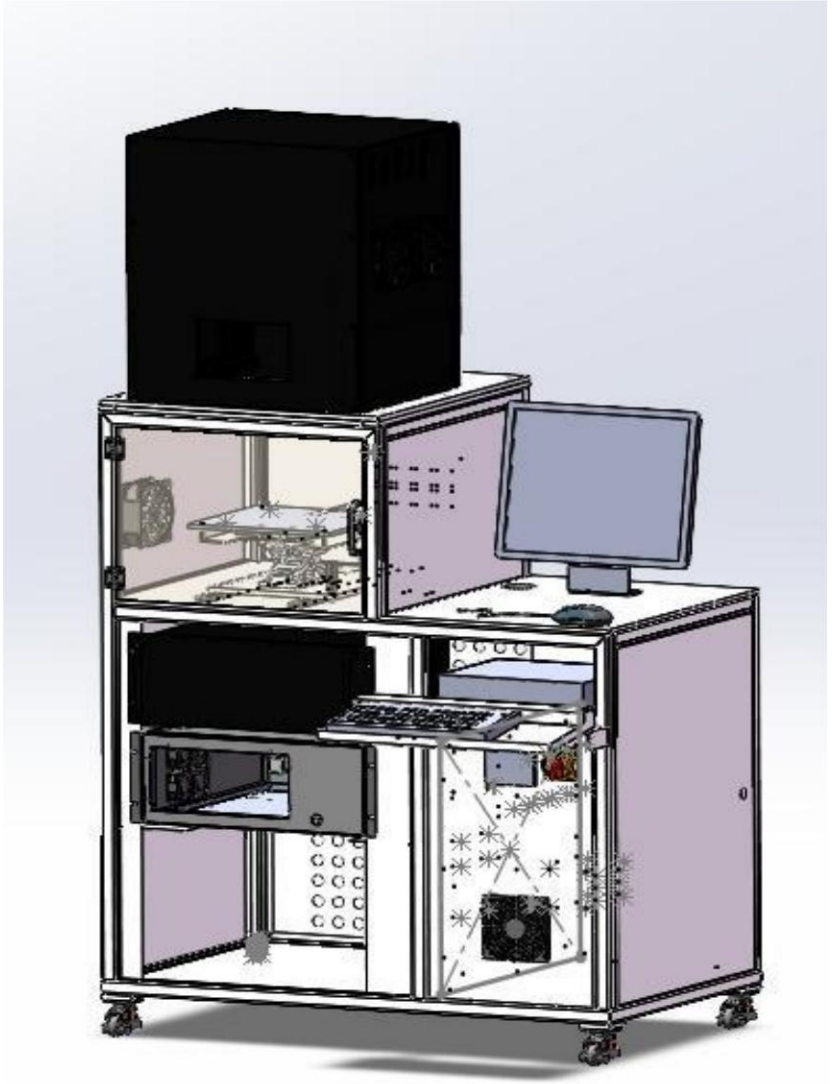
Multi-channel temperature control system

III. Introduction of Two Typical Products



MCTA-100-4T Schematic Diagram

(Desktop Model)



MCTA-250-9T Schematic Diagram

(Vertical

III. Introduction of Two Typical Products

	MCTA-100-4T (Desktop)	MCTA-250-9T (Vertical)
Test Channels	4 Channels (Customizable, supports independent control & data acquisition)	9 Channels (Each supports 8-point scanning)
Light Source	LED Steady-State Solar Simulator **(Class AAA)**	LED Steady-State Sunlight Simulator **(Class AAA)**
Compatible Size	50×50mm	250mm × 250mm
Temp. Control Range	25 - 100°C (Accuracy ±2°C)	-10°C ~ 100°C (accuracy ±2°C)
Electrical Range	Voltage Max 20V/Current Max 1A	Range I: 60V / 1A; Range II: 20V / 1A; Range III: 10V / 500mA
Measurement accuracy :	**0.1%** (voltage/current/power)	**0.1%** (voltage/current/power)

IV. Core Product Functions

01

Multi-point Relay Scanning Test

Multiple independent channels, each supporting 8-point relay cyclic detection, can cover a large number of samples in a single experiment, greatly improving data output efficiency.

02

Independent Temp. Control & Rapid Cooling

Integrated multi-channel independent temperature control modules (-10°C to 100°C) with rapid cooling capabilities ensure testing accuracy under different temperature environments.

03

Environmental Humidity Control

Optional humidity control module for precise adjustment of humidity in the test area (20%-80% RH), meeting complex environmental aging test requirements.

04

Automated Software Monitoring

The accompanying software supports fully automated data acquisition, real-time curve monitoring, and anomaly alarms, enabling 24/7 unattended operation.

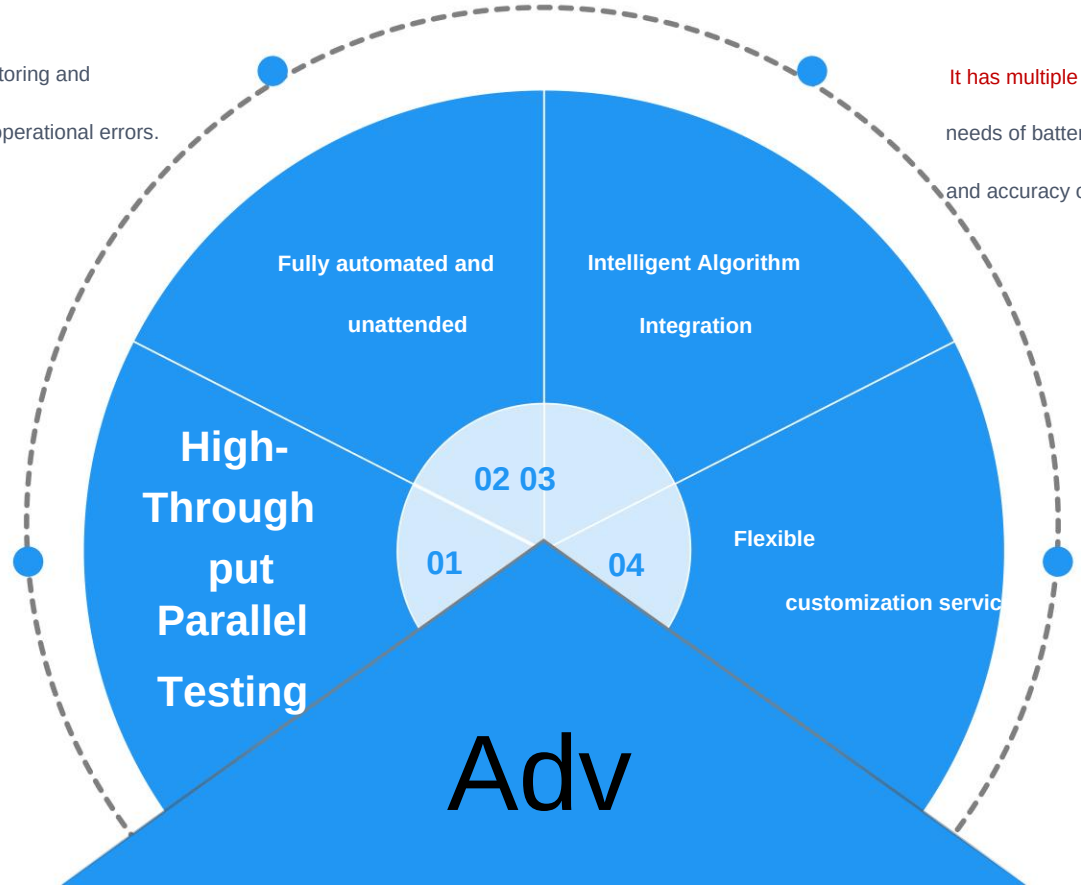
V. Product Application Scenarios and

Typical Application Scenario

Suitable for long-term stability testing, process screening, and lifetime assessment of perovskite and tandem solar cells.
High-precision data acquisition captures subtle performance degradation trends.

It operates 24/7 without interruption, and with remote monitoring and abnormal alarms, it significantly reduces labor costs and operational errors.

It has multiple built-in MPPT Tracking Algorithms to adapt to the testing needs of batteries with different characteristics, ensuring the authenticity and accuracy of the data.



It supports simultaneous independent operation of multiple channels, and a single experiment can cover a large number of samples, significantly shortening the R&D verification cycle.

The modular hardware and software architecture can be deeply customized according to the customer's specific experimental scenario to meet special testing needs.

PART 02

Outdoor Multi-channel PV Module Aging Test System

I. Product Overview

High-throughput testing solutions designed specifically for outdoor demonstration scenarios

Outdoor Validation

Real-time monitoring of power generation performance in actual outdoor operating conditions, providing more valuable reference data.

Smart Tracking

Uses MPPT algorithms to automatically track the maximum power point without manual intervention.

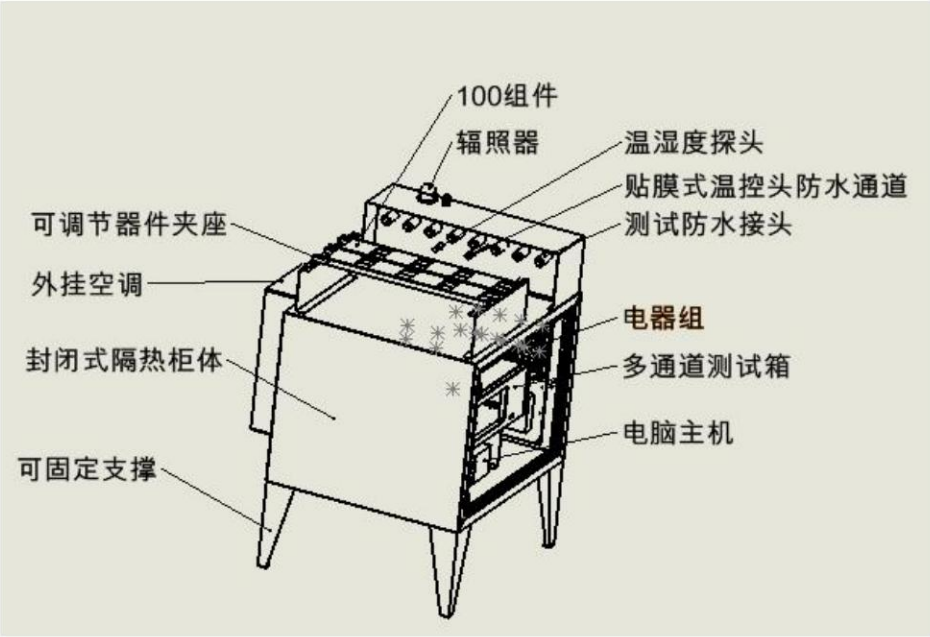
Multi-channel Testing

Integrates a multi-channel source meter and relay matrix to achieve parallel testing of multiple modules.

Accelerated R&D

Provides massive amounts of measured data for perovskite material development and process reliability screening.

II. Product Architecture



Device Structure

Outdoor Test Cabinet + Indoor Remote Monitoring

Highly Integrated Multi-channel Test Platform

The multi-channel source meter can test multiple channels simultaneously, and each channel can be configured with up to 8 points for relay cyclic testing.
try;

Relay Matrix Automatically switches test points, enabling an unattended, automated t

Environmenta integrates a real-time monitoring module for temperature, humidity, and irradiance to ensure the traceability of test environment data.

Data AcquisitiAountomatic saving, naming, and remote transmission ensure data security

Control Softwlanr-heouse developed system that supports deep customization of the inter

System Composition

Multi-channel Source Meter Test System + Relay Matrix + Environmental Monitoring Mod

III. Environmental Monitoring S

Temperature Monitoring

Configuration 4 independent channels, surface-mount thermocouples

Range -40°C to 100°C

Measurement Accura0c.y1°C (with real-time curve display)

Humidity Monitoring

Probe Type Single-probe monitoring system

Range 5 - 100 RH%

Measurement Accura0c.y1 RH% (Error ±2 RH%)

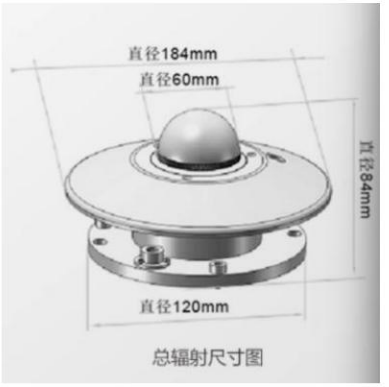
Irradiance monitoring

Sampling Frequency 5-10 min per point (real-time monitoring)

Measurement Accura0c.y1 W/m²

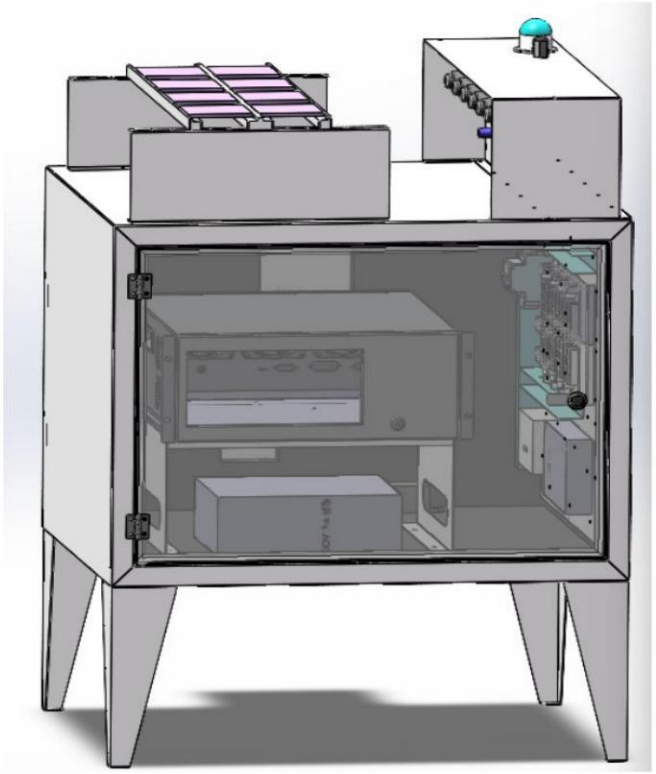
Function Real-time reading and calculation of cumulative irradiation

Temp & Humidity Sensor



Digital Irradiance meter

IV. Typical Product Introduction

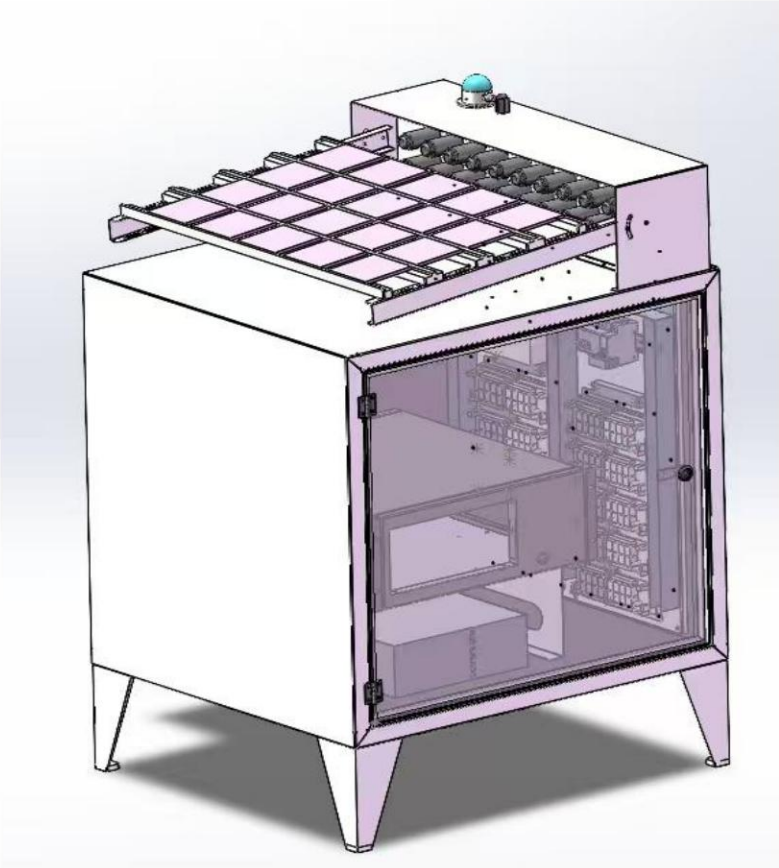


OT-MCTA8T Diagram

Electrical Specs	Electrical Specs	Env. & Facility	Env. & Facility
Test Channels	8 Channels (8 points/ch)	Temperature monitoring	-40 ~ 100 °C (4 Channels)
Voltage Range	0 - 20 V	Humidity monitoring	5 - 100 RH%
Current Range	5μA - 1A	Irradiance monitoring	0 - 1500 W/m2
Measurement Accuracy	0.1%	**Light Source Type** Outdoor natural sunlight	
Max Channel Power	20 W/CH	**Power Requirement** 220V AC, 50Hz, 10A	

OT-MCTA8T Technical Specifications Overview

IV. Typical Product Introduction



OT-MCTA19T schematic diagram (tilt angle adjustable)

Electrical Specs

Electrical Specs

Test Channels	19 Channels (8 points/ch)
Voltage Range	0 - 20 V
Current Range	5μA - 1A
Measurement Accuracy	0.1%
Max Channel Power	20 W/CH
Tilt angle adjustable range	0-60 degrees

Env. & Facility

Env. & Facility

Temperature monitoring	-40 ~ 100 °C (4 Channels)
Humidity monitoring	5 - 100 RH%
Irradiance monitoring	0 - 1500 W/m2
Light Source Type	Outdoor natural sunlight
Power Requirement	220V AC, 50Hz, 10A

V. Product Advantages

01

Multi-channel parallel testing

Multiple independent channels, each supporting 8-point switching, can cover 64 test points at a time, greatly improving data output efficiency.

02

The fully automated, unattended

testing process, combined with remote monitoring, enables 24/7 uninterrupted operation and reduces labor costs.

03

Intelligent Algorithm Integration

It incorporates multiple MPPT tracking algorithms (perturbation observation method; incremental conductance method; fixed voltage method) to adapt to the testing needs of batteries with different characteristics and ensure data accuracy.

04

Flexible customization services

Both the hardware and software architectures adopt a modular design, which can be deeply customized according to the customer's specific experimental scenarios and special needs.

PART 03

Low-Light Multi-channel PV Module Test System

I. Product Overview

High-throughput testing solution specifically designed for low-light scenarios in thin-film photovoltaics

Industry Consensus

Thin-film PV technologies like perovskite and OPV are increasingly Used in consumer electronics.

Focus on Low Light

The LL-MCT series specializes in monitoring power generation performance in low-light validation scenarios.

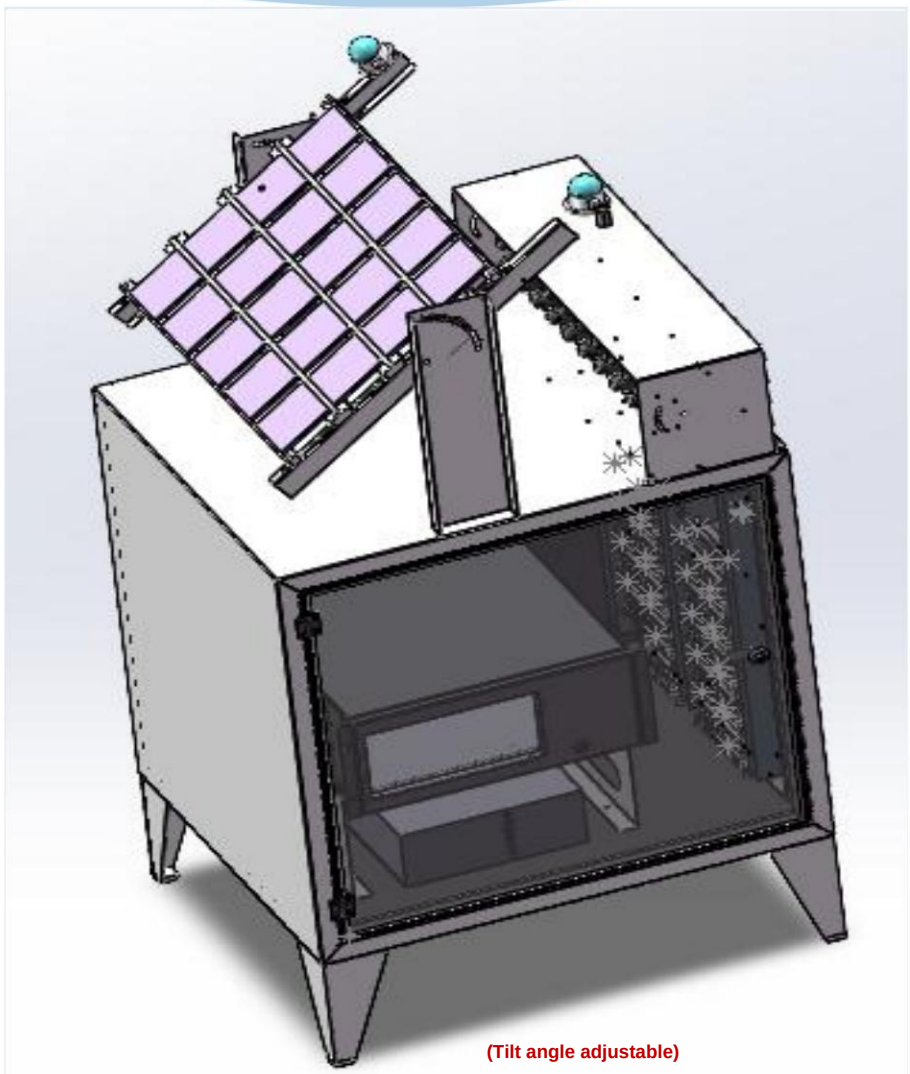
Intelligent Tracking

Utilizes MPPT algorithms to track the maximum power point in real-time, enabling high-throughput automated testing.

Application scenarios

Indoor low-light environments; consumer electronics; smart home devices; wearable devices

II. System Architecture



(Tilt angle adjustable)

Highly Integrated Multi-channel Test Platform

The Multi-channel Source Meter allows for simultaneous testing across multiple channels, with each channel supporting 8-point bit rotation, significantly improving testing efficiency.

Relay Matrix Automatically switches test points, enabling an unattended, automated testing process.

Environmental Monitoring integrates real-time monitoring modules for temperature, humidity, and illuminance, ensuring the traceability of test environment data.

Data Acquisition Automatic saving, naming, and remote transmission Ensure data security.

Control Software's self-developed system supports deep customization of the interface and functions.

System Composition

Multi-channel Source Meter Test System + Relay Matrix + Environmental Monitoring Module + Data Acquisition System + Control Software

III. Environmental Monitoring S

Temperature Monitoring

Configuration4 independent channels, surface-mount thermocouples

Range -40°C to 100°C

Measurement0A.1c°cCur(awciyth real-time curve display)

Humidity Monitoring

Probe Type Single-probe monitoring system

Range 5 - 100 RH%

Measurement0A.1ccRuHra%cy(Error ±2 RH%)

Illuminance Monitoring

Sampling Freq2uteimnceys/sec to 1 time/24 hours

Range 0 - 200,000 Lux (3 ranges selectable)

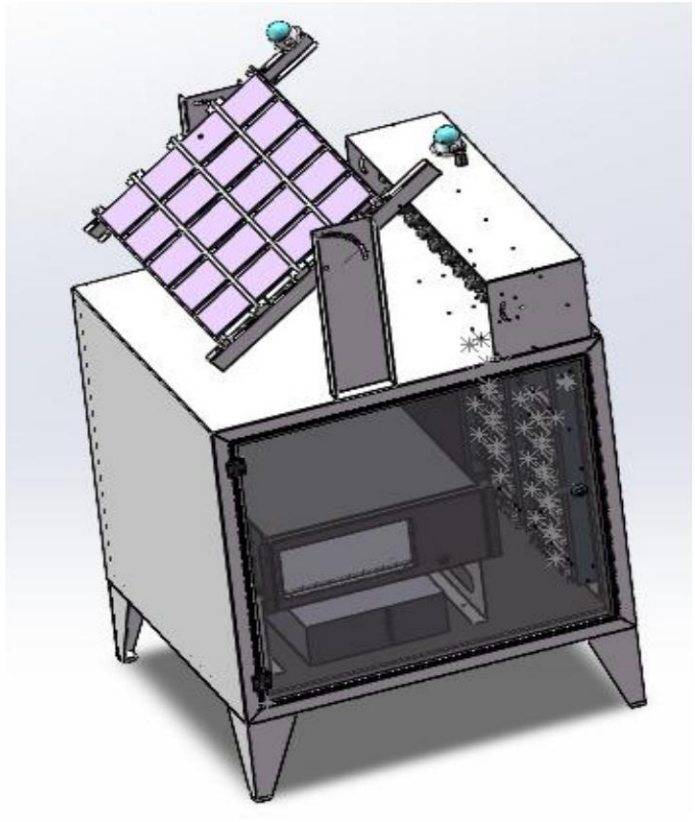
Accuracy Error ±4% (at 25°C)

Function Automatic calculation of cumulative irradiation

Temp & Humidity Sensor

Digital Lux Meter

IV. Typical Product Introduction



OT-MCTA19T schematic diagram

Electrical Specs

Electrical Specs

Test Channels	19 Channels (8 points/ch)
Voltage Range	0 - 20 V
Current Range	5μA - 1A
Measurement Accuracy	0.1%
Max Channel Power	20 W/CH
Tilt angle adjustable range	0-360 degrees

Env. & Facility

Env. & Facility

Temperature monitoring	-40 ~ 100 °C (4 Channels)
Humidity monitoring	5 - 100 RH%
Illuminance monitoring: 0-10000 / 65535 / 200,000 Lux (Two sets, following the component and horizontal angle)	
Light Source Type: Indoor low-light or simulated low-light light source	
Power Requirement 220V AC, 50Hz, 10A	

V. Low-Light Simulators

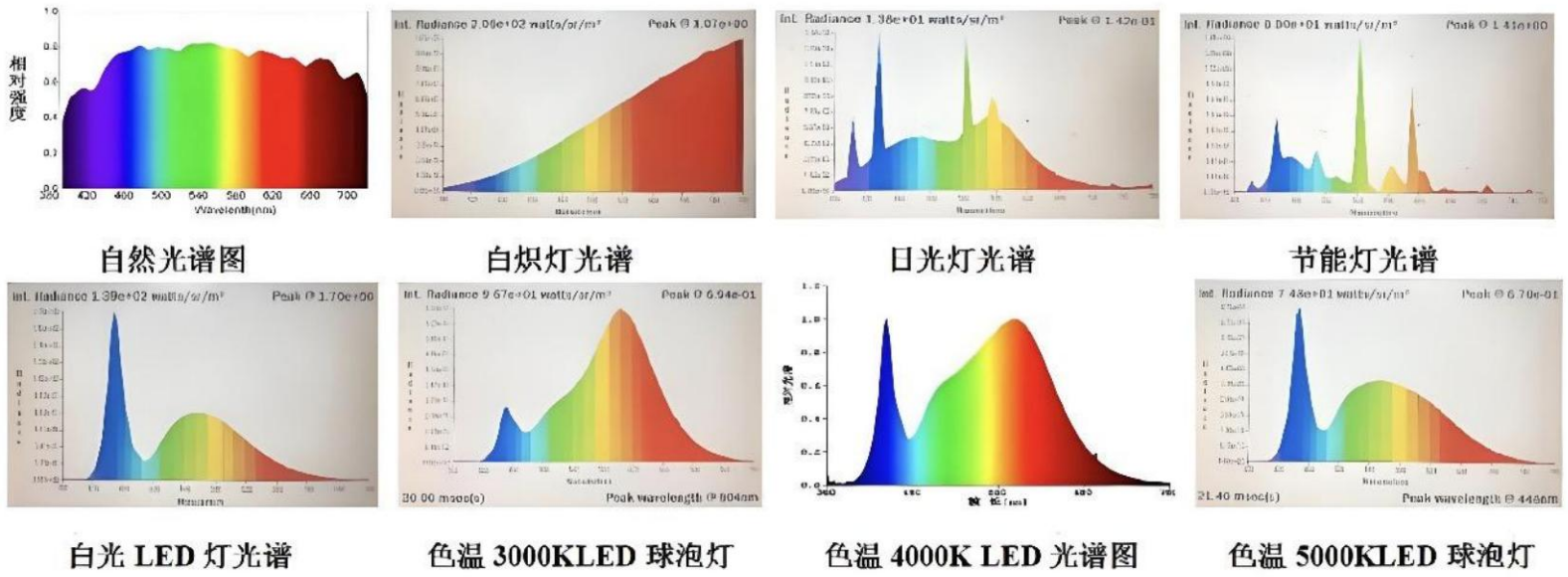
Standard light source spectral characteristics for indoor low-light environments (100-1000 lux), focusing on Spectral Power Distribution (SPD) and color temperature.

Light source A: Simulates incandescent lamp, color temperature approximately 2856K, continuous spectrum with abundant red light energy and less blue light component, color rendering index (Ra) as high as 97, can truly reproduce the color of objects, suitable for home environment assessment.

D65 light source: simulates average sunlight, with a more balanced spectral distribution and excellent color rendering, and is a universal standard light source for color evaluation.

F11/TL84 light source: narrow-band fluorescent lamp, its spectral distribution is not as smooth as the former two, and its color rendering is relatively low, but it is often used for color evaluation in the European market.

LED lights: cool light and warm white light



Service and Support

3 Days

Fast Installation & Commissioning

Engineers complete installation and commissioning within 3 working days after site readiness.

1 Day

Professional Technical Training

Provide at least 1 day of on-site training for operation, software use, and maintenance.

12 Months

Free Warranty Period

The entire machine comes with a 12-month free warranty, including periodic inspections and Maintenance recommendations.

Lifetime

Lifetime Maintenance Service

Paid maintenance service is available after the warranty period to ensure long-term equipment operation.

24 Hours

Rapid After-Sales Response

Respond within 24 hours of a failure, prioritizing Remote video guidance.

72 Hours

On-site Fault Resolution

For urgent issues that cannot be resolved remotely, arrive on-site within 72 hours.

Professional Service Team and Standardized Tools

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Contact Us

Looking forward to creating the future with you

The most professional and efficient intelligent solution in the field of perovskite detection.

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