



LONGi

Hi-MO X10

Peak of Crystalline Silicon
First Choice for Value

HPBC
2.0

TaiRay

Diversified and Complex Scenarios | Significantly Different Demand

Safety and Efficiency are the Core | Appearance and Functionality are Extension

Sunroom

Function Matching

Module function matching scenarios
Anti-dust, Anti-humidity and heat,
Anti-glare

High-emission plants

High-End Residential

More Efficient

Limited roof area
More power generation,
higher return

High-energy-consumption plants

Residential PV & ESS

Safe and Stable

Reduce the risk of failure
Ensure safe operation
throughout the life cycle

PV gas station

Modern Villas

Aesthetics and Low Carbon

Aesthetic art appearance
Practicing low carbon philosophy

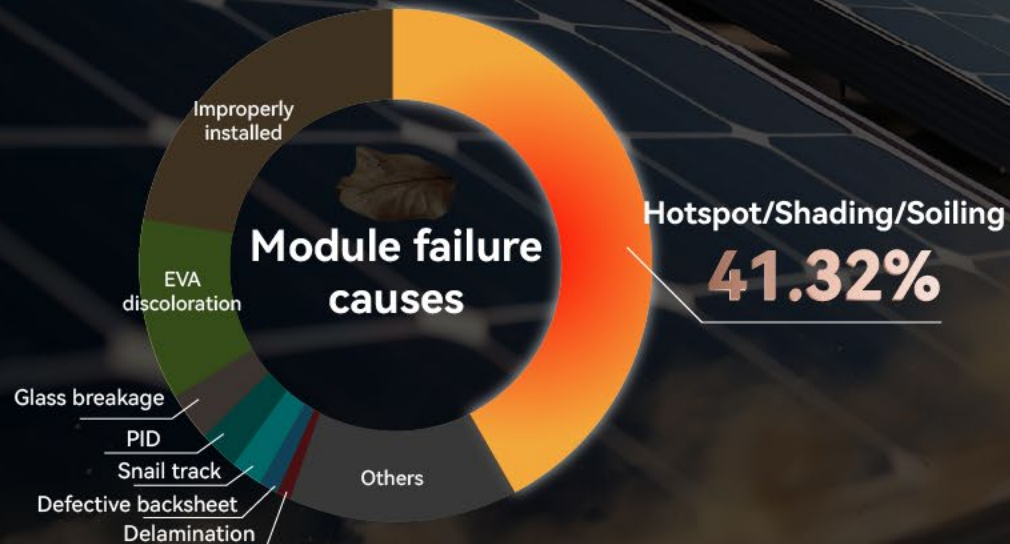
Landmark building

Shading and Hot Spots are Core Challenges for Safe and Efficient Operation

Frequent Shading and Hot Spot Problems | Threatening Power Station Safety and Return

Nearly 50% of Module Failures are Caused by Shading

- Rooftop equipment shading
Fans, air floors, attics, etc.
- Surroundings shading
Buildings, tree shade, etc.
- Dust and scale shading
Dust, scale adhesion, etc.



Shading and Hot Spots Have a Serious Impact on the Stable Operation of Modules and Systems



Reduction in power generation

Shading dramatically reduces module power generation efficiency



Aging

Destroys module encapsulation materials
Accelerates module aging



Safety hazard

Hot spots may cause fire and other safety accidents



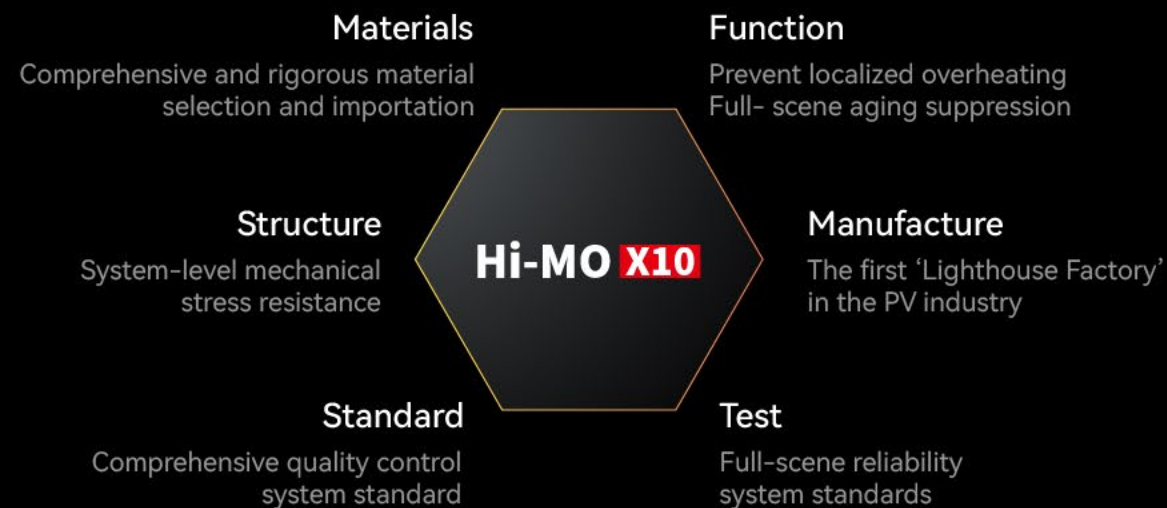
Increasing O&M

Increase frequency of O&M
Increase electricity cost

Hi-MO X10 Ultra-High Safety | New Pilotage

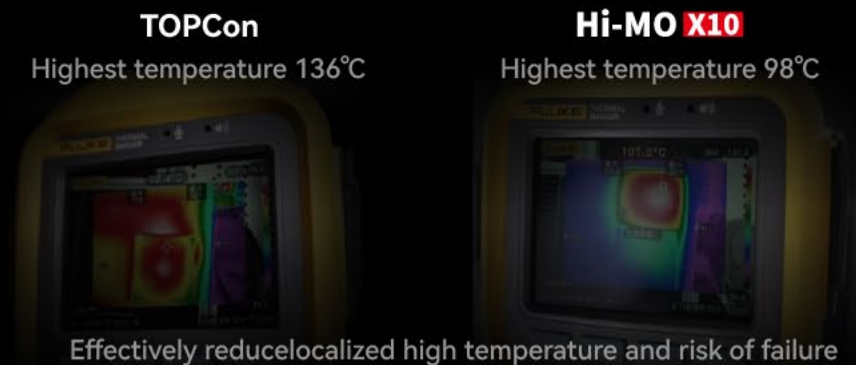
Product Reliability Ensures Stable Operation of Power Plants

‘Hexagonal Warrior’, Reliable Cornerstone of Station

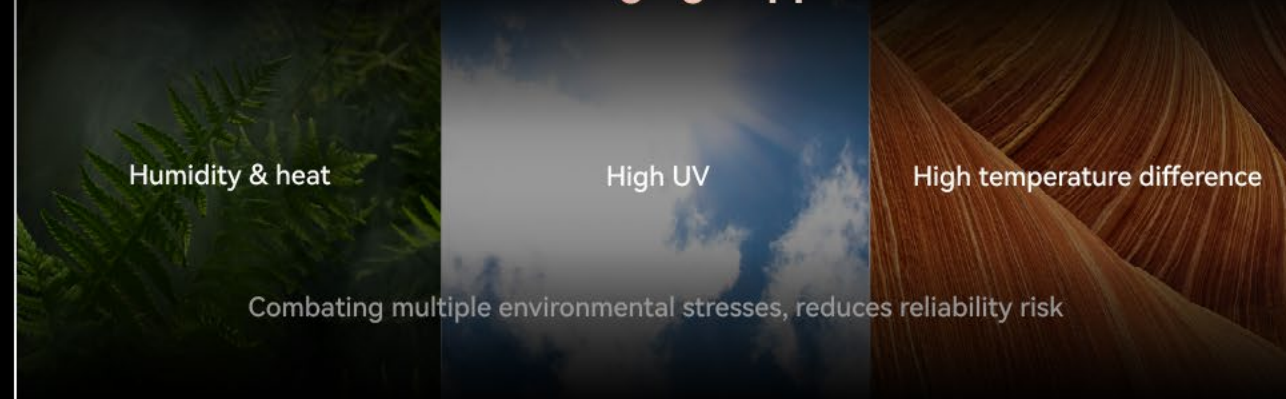


Compared to competitors, reduce product failure risk by 45.2%+

Prevent localized overheating



Full-Scene Aging Suppression



Hi-MO X10 Ultra-High Return | New Pilotage

Higher Capacity, Higher Generation, More return

Ultra-High Power | Ultra-Low Degradation

High efficiency

Leading power of 30W higher

Low degradation

Stronger long-term
power generation gains

Low failure

Reduce module loss

Low temperature coefficient

Better performance at high temperatures

Flexible Design | Shading Optimization



Flexible design

Maximizing roof utilization

Shading optimization

Reduction of power loss

TOPCon

65%



Hi-MO X10

92%



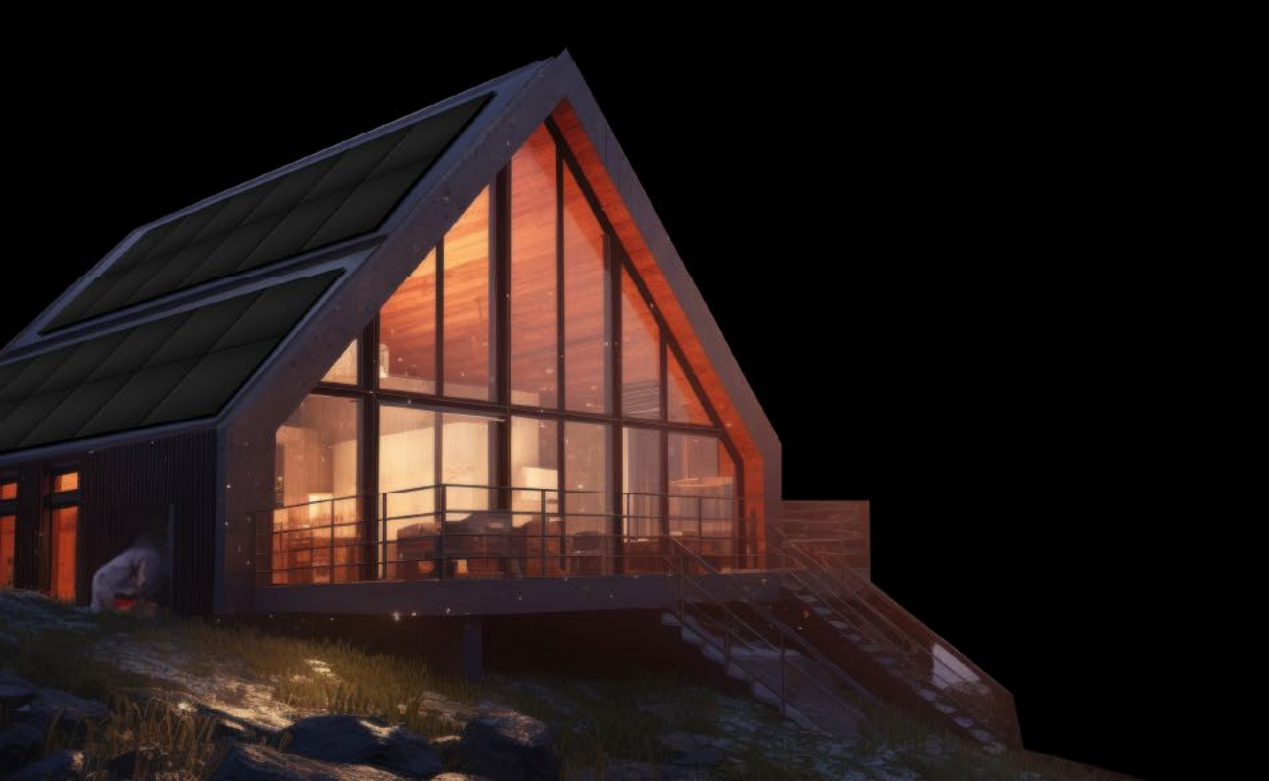
Hi-MO X10 Scenario Matching | New Pilotage

Practicing Low Carbon Aesthetics | Function Matching Scenario

Module Aesthetics | Architectural Integration

No frontal gridline, simplified appearance

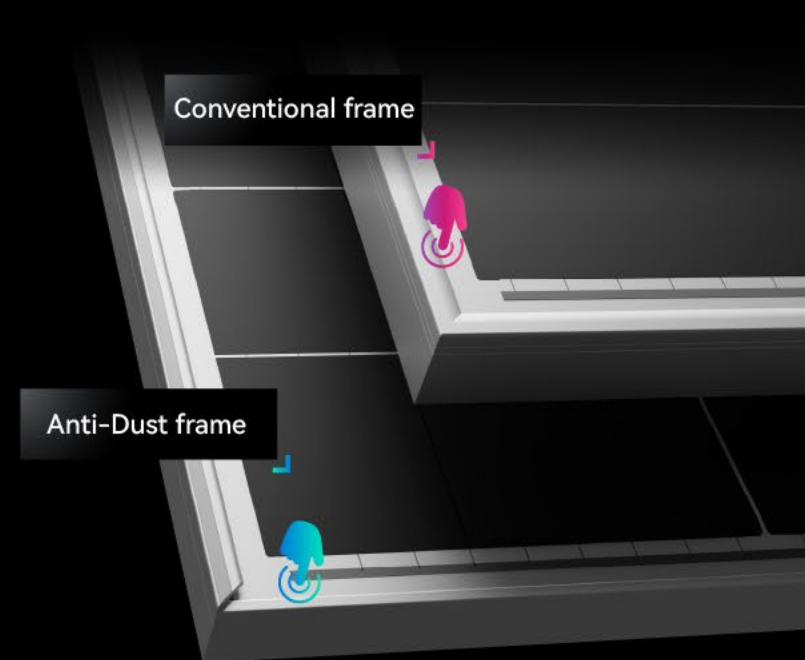
Technology and aesthetics are integrated into multiple scenarios



Genetic Continuity | Innovative Design

Technology enablement, anti-dust design

Solve customer pain points, reduce the impact of dust accumulation and improve power generation revenue



First Choice for High-Value Modules in Global DG Market

Three Key Leaps | Four Overall Leadings

Maximum
conversion efficiency

24.8%

Maximum
module power

670w

Four Leadings



Performance
leading



Reliability
leading



Standard
leading



Manufacturing
leading

Three Leaps



Silicon Substrate



Cell technology



BC Manufacturing

HPBC
2.0

54^C
Monofacial

HPBC
2.0

72^C
Monofacial

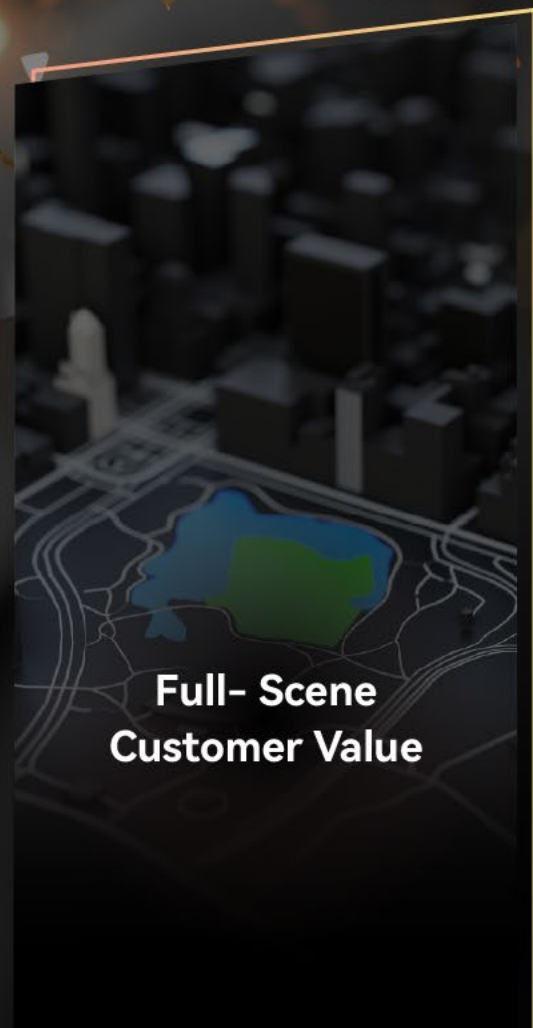
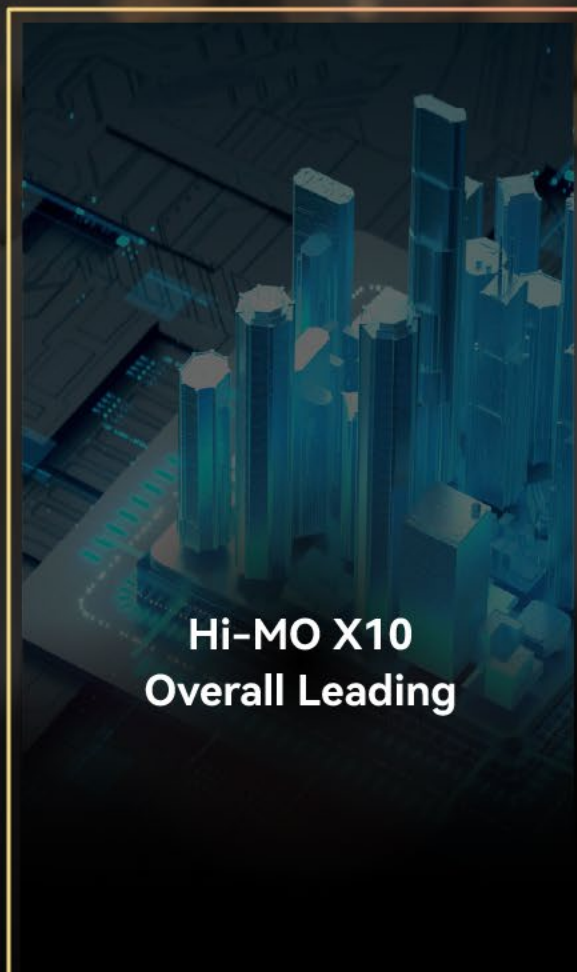
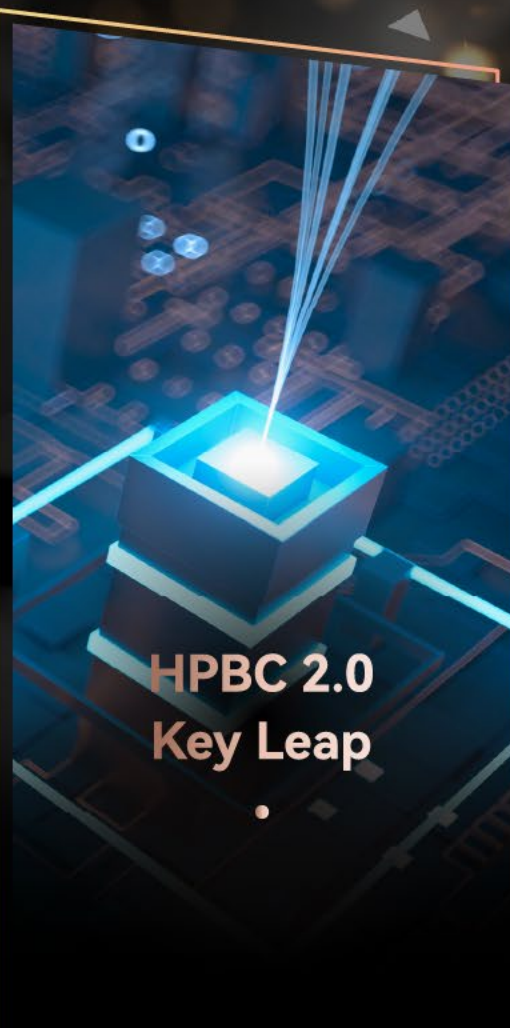
HPBC
2.0

72^C
Anti-Dust

HPBC
2.0

72^C
Bifacial

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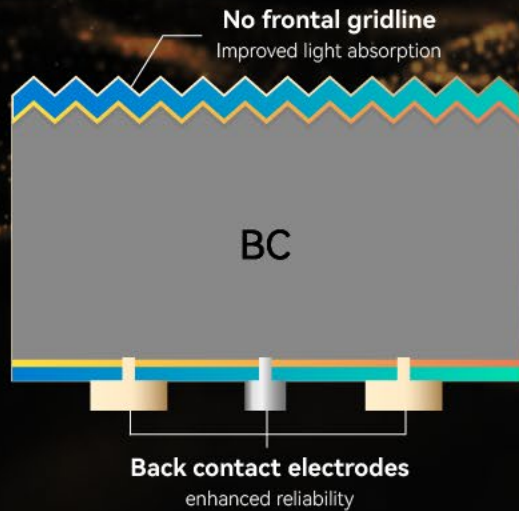


BC: Peak of Silicon Cell Technology

Talent and Compatibility Coexist | Closest to Efficiency Limits

Talent

No frontal gridline + Back contact electrodes
Improved light absorption and enhanced reliability



Compatibility

Platform technology
compatible with other passivation processes

Tunneling oxide
passivation contact

Heterojunction
passivation

Passivated emitter
and rear contact

Peak Efficiency

BC closest to the crystalline silicon
cell limit of 29.4 %

29.1%

XBC theoretical efficiency

Successful Launch of HPBC 1.0 in 2022 Boosted BC Technology to Commercialization

Hi-MO X6 Enter Thousands of Industries and Households

Aerospace

High-end Villa

Transportation

Manufacture

Education

Family



Hybrid Passivation Efficiency Improvement

Self-developed innovative hybrid passivation
Cell efficiency: 25.8%
Module efficiency: 23.3%



Process Innovation Industrial Layout

Process innovation breakthrough
Partner gathering and coexistence
BC turn into mass production first time



Empirical Test Performance Leading Power Generation

Customer-owned Station:
2%+ higher than mainstream TOPCon
PV Magazine Rank:
No.1 in monofacial power generation in 2023



Worldwide Shipment Customer Preferences

2024 H1 BC module shipments 10GW+
2022 BC modules shipments 1GW

HPBC 2.0 Sets Sail | Great Leaps in 3 Key Technologies

BC Platform x Bipolar Hybrid Passivation x TaiRay Core x 0BB Structure



Leap the Cell Technology Barrier

Upgrade three-layer structure of light absorption/photovoltaic conversion/electricity transmission



Leap the Silicon Substrate Limitations

Equipped with TaiRay core
Enhances overall power generation potential and reliability



Leap the BC Manufacturing Dilemma

Innovative development of 0BB structure,
Breakthroughs in key processes and materials

HPBC 2.0

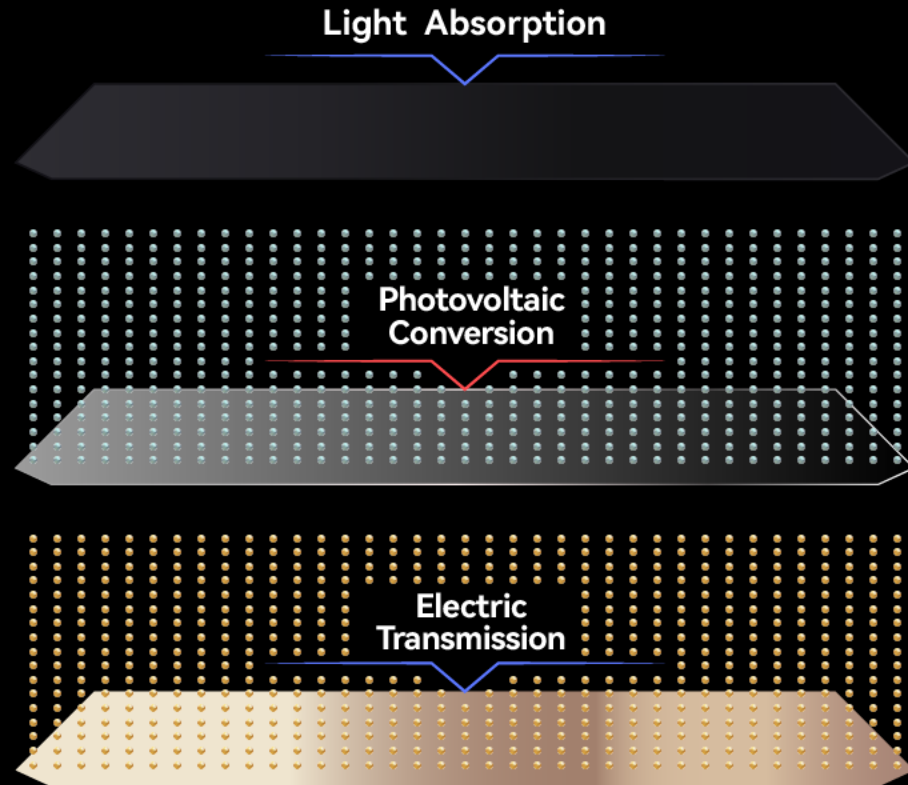
Mass
Efficiency

26.6%+

Last generation of crystalline silicon cells to achieve 1% leap in absolute efficiency. Closest to the theoretical limit of 29.4% for mass production cells. Customer's best choice for performance/reliability/aesthetics

Leap the Cell Technology Barrier

Bipolar Hybrid Passivation | Upgrade Three-layer Structure



Optimised Multi-layer Anti-reflection Film: Increase Light Absorption

2.25% increase in short-circuit current
12%+ reduction in reflections at short waves

Self-developed Bipolar Hybrid Passivation

Mass production Voc exceeds 745 mV
Effective against UV-induced degradation

Soft Breakdown Design+ Bipolar Low Resistance Passivation Contacts

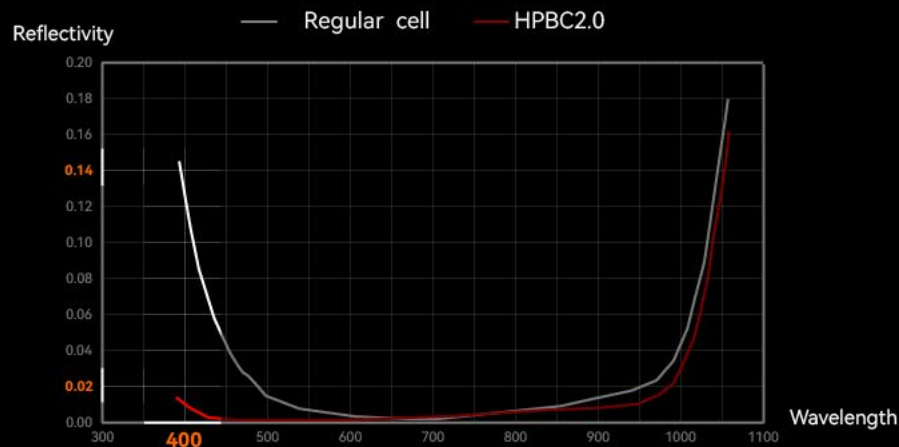
Reduced shading power loss
Overall cell efficiency improvement

Light Absorption Layer: Optimised Multi-layer Anti-reflection Film

Reduces Reflections and Boosts Current | Uniform Texture and Low Light Enhancement

Regular Cell Texture

Unevenness $> 2\mu\text{m}$
Short-wave reflectivity $> 14\%$



High Irradiation Condition

Overall enhancement of power generation
improves cell short-circuit current by about 2.25 %

Low Irradiation Condition

Shortwave reflectivity reduced by 12%
Additional 0.4% boost in power generation

HPBC 2.0 Texture

Unevenness $< 1\mu\text{m}$
Short-wave reflectivity $< 2\%$

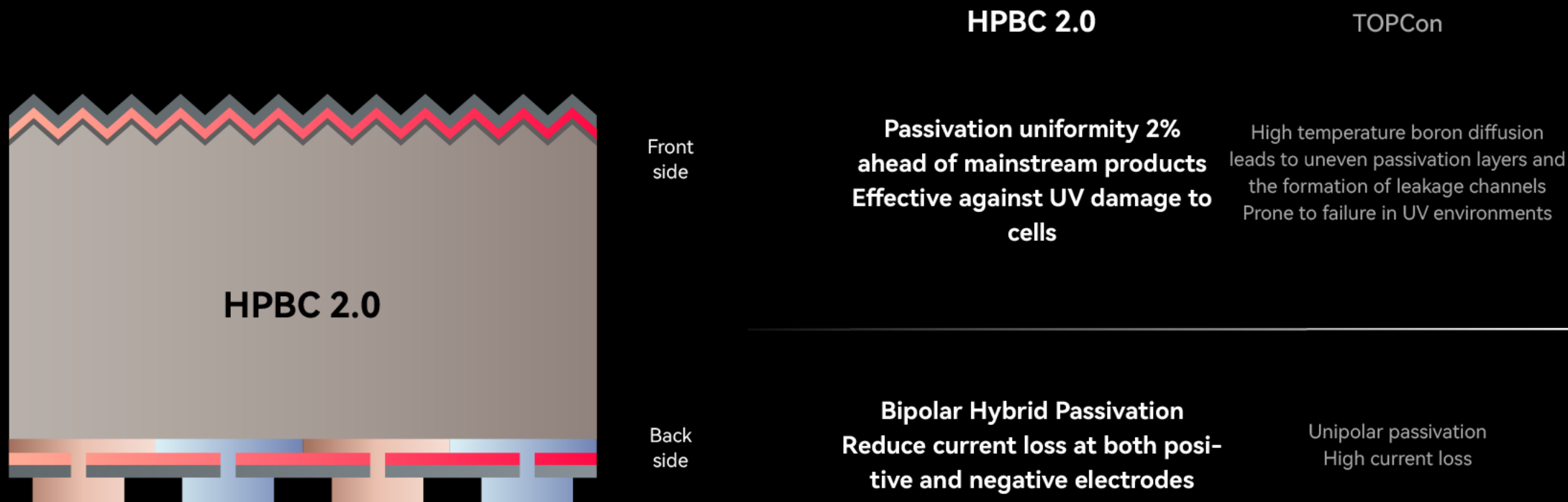


$> 2\mu\text{m}$

$< 1\mu\text{m}$

Photovoltaic Conversion Layer: Self-developed Bipolar Hybrid Passivation

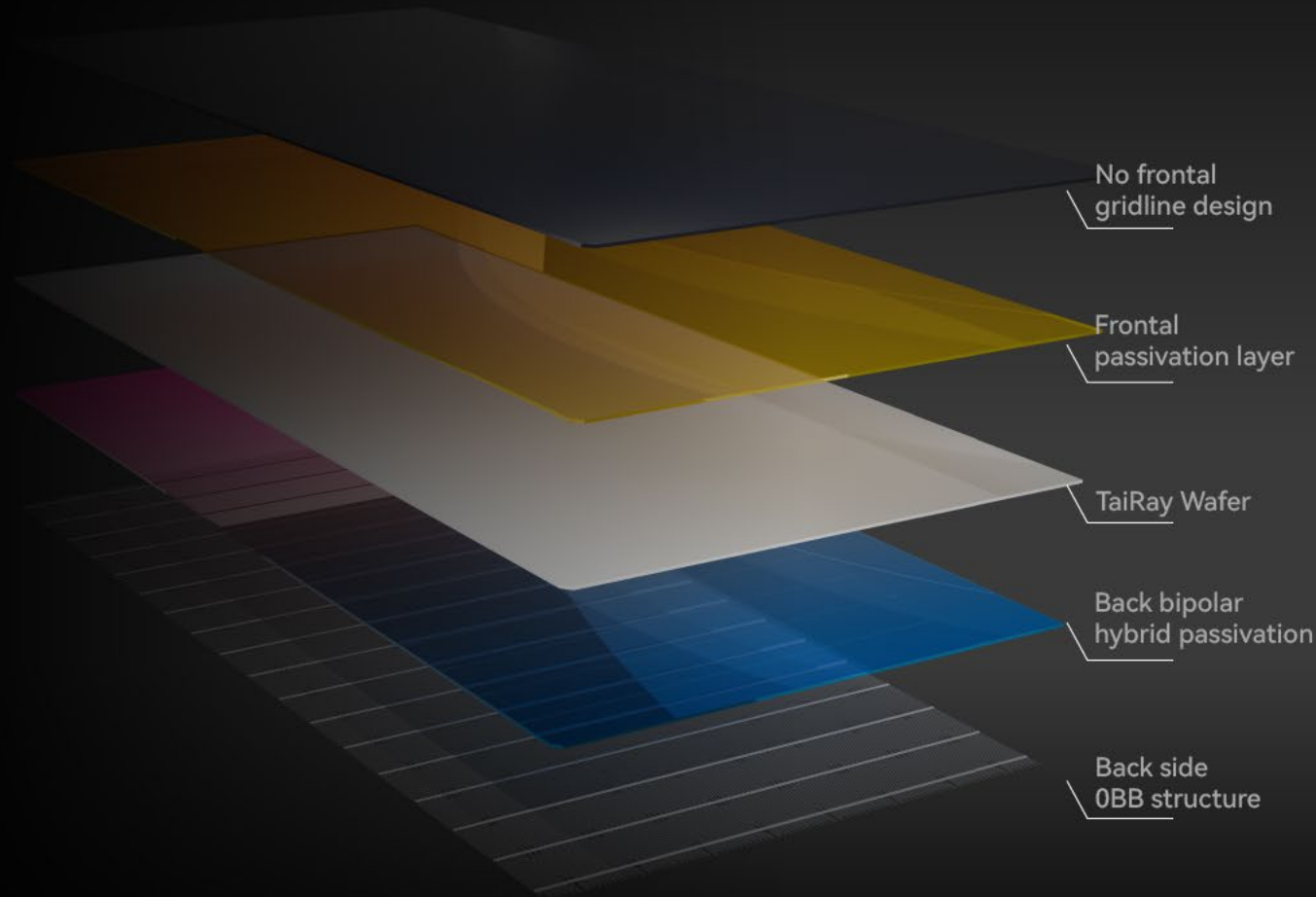
Bipolar Hybrid Passivation Boosts Voc | Uniform Passivation Reduces Aging Risk



Bipolar hybrid passivation process boosts open-circuit voltage by 15mV+. Mass production voltage exceeds 745mV
Comprehensively improve cell efficiency and degradation performance

Electricity Transmission Layer: Soft Breakdown Design+ Bipolar Low Resistance Passivation

Soft Breakdown Design Reduces Shading Power Loss | Low Resistance Contact Improves Overall Cell Performance



Innovative Soft Breakdown Design

Similar to built-in bypass diode
Reduces power loss by 70%+ under shading

High-doped Bipolar Passivation Contact Layer

Lower contact resistance, lower manufacturing temperature, no silicon-based damage. Improve current efficiency

Anode Paste Optimization

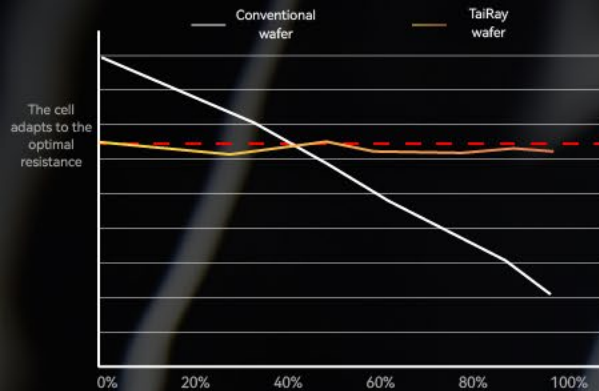
42% lower resistivity
Fearless of moisture corrosion

TaiRay Wafer: Revolutionary Changes in the Silicon Wafer Industry in the Last 10 Years

Better Matching | Higher Concentration | Lower Impurities | More Impact-Resistant

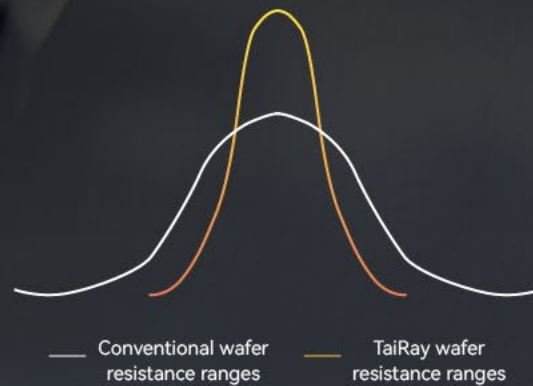
Better Matching

Better matching of best cell resistance than conventional wafer



Higher Concentration

The resistant distribution is more concentrated reduce the risk of mismatching



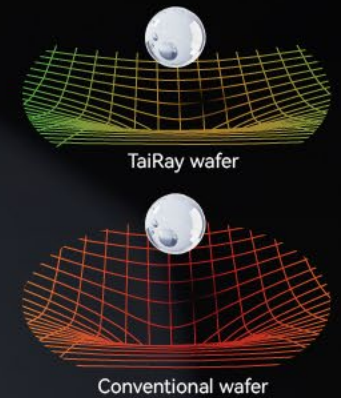
Lower impurities

Reduce the migration and activation energy of impurities and better gettering performance



More impact-resistant

Mechanical strength increased by 16%, less prone to cause breakage and micro-cracks

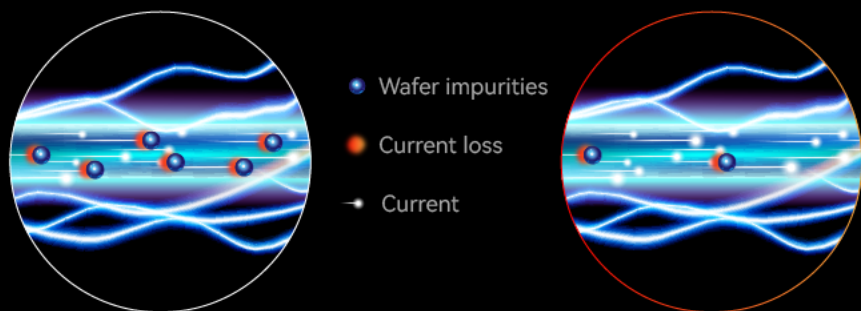


Under the same stress, the surface collapse of TaiRay wafer is smaller

Leap the Silicon Substrate Limitations | TaiRay Comprehensively Enhance the Performance

Improve Power Generation Potential | Reduce Micro-Crack Risk

Improve Power Generation Potential



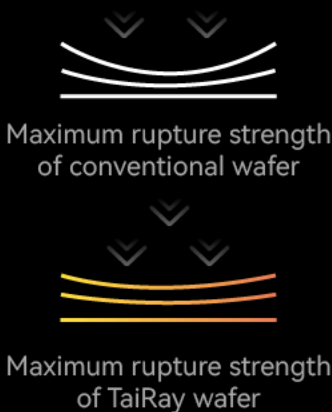
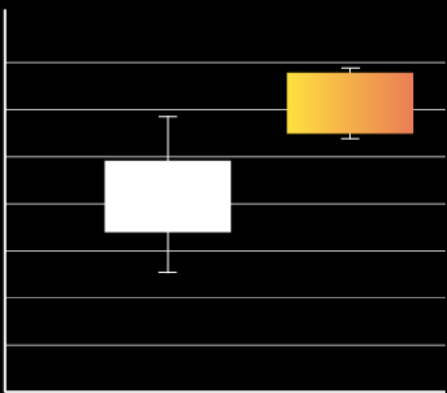
Conventional wafer

More wafer impurities
Poor resistance uniformity
More current loss

TaiRay wafer

Less wafer impurities
High resistance uniformity
Less current loss

Reduce Micro-Crack Risk

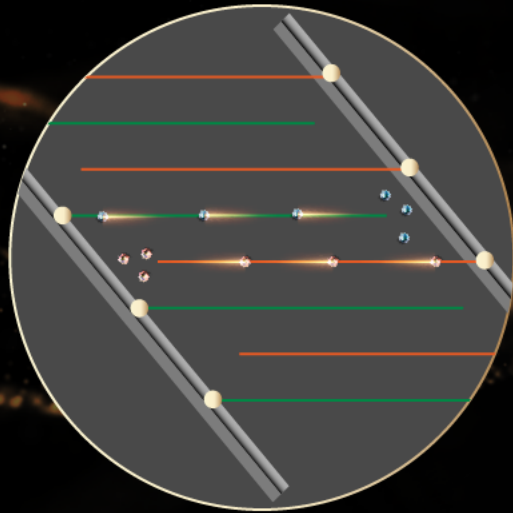


Maximum rupture strength increased by 16%
significantly reducing the risk of cell micro-cracks

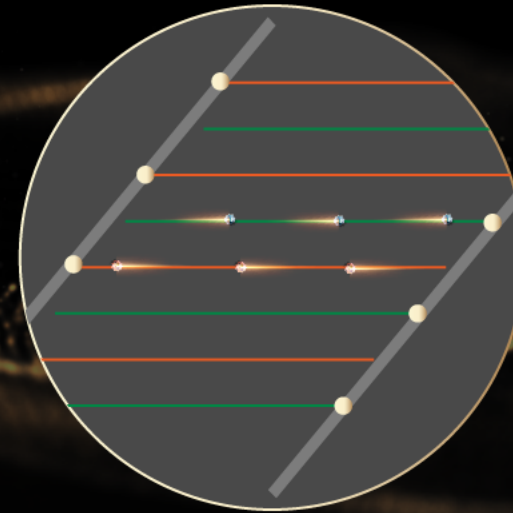
Leap the BC Manufacturing Dilemma | Innovative Development of 0BB Structures

No Frontal Gridline | No Back Busbar

Traditional BC backside gridline structure



Hi-MO X10
Backside 0BB structure



- Busbar
- Welding strip
- Positive charge
- Negative charge
- Solder joints

Remove the busbar, the finger directly connect with welding strip.

Reduce electricity transmission distance, increase module power by about 5 W, increase bifacial rate to 75%

Leap the BC Manufacturing Dilemma | Breakthroughs in Key Processes and Materials

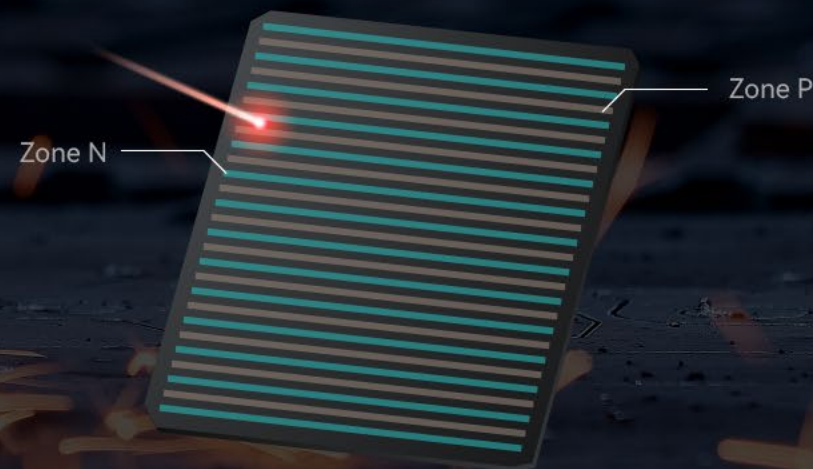
Innovative Insulation Materials Improves the Upper Limit of Cell Efficiency | Laser Etching Process Achieves Accurate PN Partitioning

High-Transparency Insulation Material + High-Precision Printing



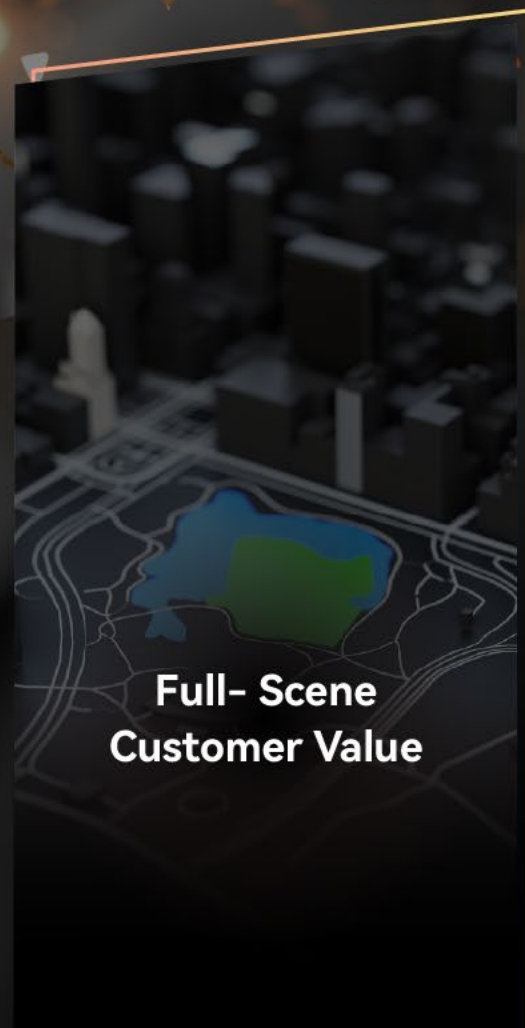
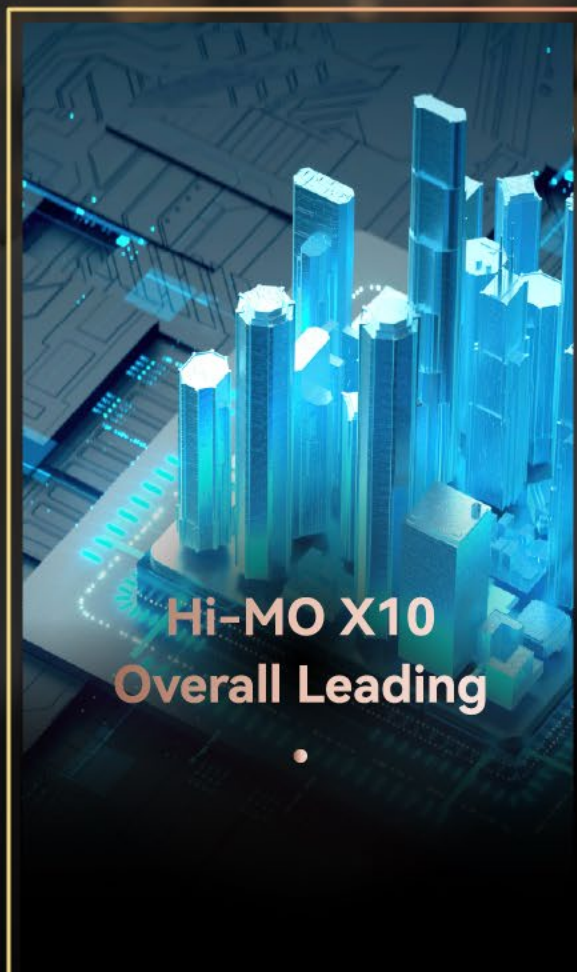
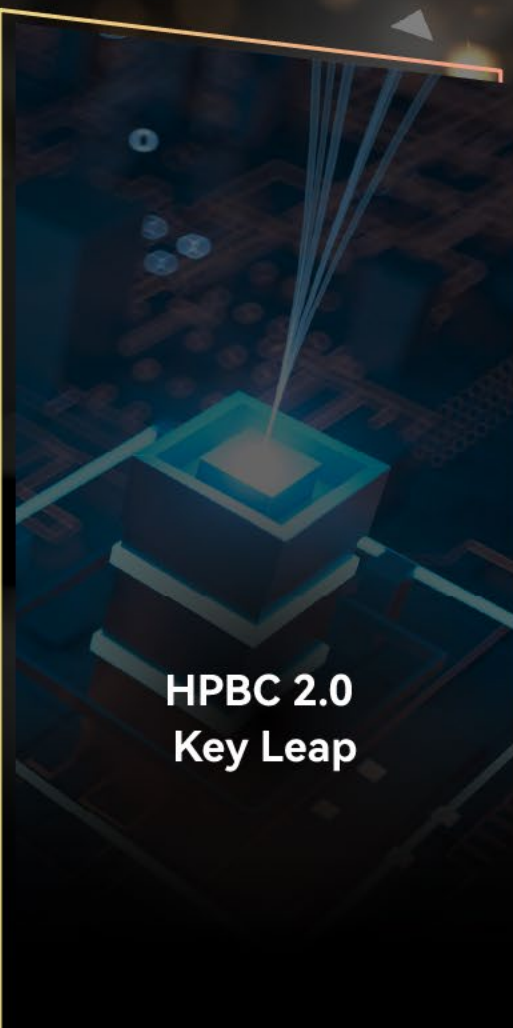
High-transparency insulation material improves the second absorption of light, matching high-precision printing to eliminate the leakage effects, improving cell efficiency by 0.2%+.

Laser Etching Process



LONGi develops laser vision algorithms and control equipment to achieve fine control of pulse speed and pulse width, further achieving precise isolation of the PN zone.

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Overall Product Leading

Four Leading Establish the Core Superiority of Hi-MO X10



Performance Leading

Peak efficiency

Fearless to high temperature | Lasting strength

Anti-shading



Reliability Leading

Prevent localized overheating

Full- Scene aging suppression

System-level resistance to mechanical stress



Standard Leading

Raw material standard

Full- Scene reliability standard



Manufacturing Leading

Lighthouse factory

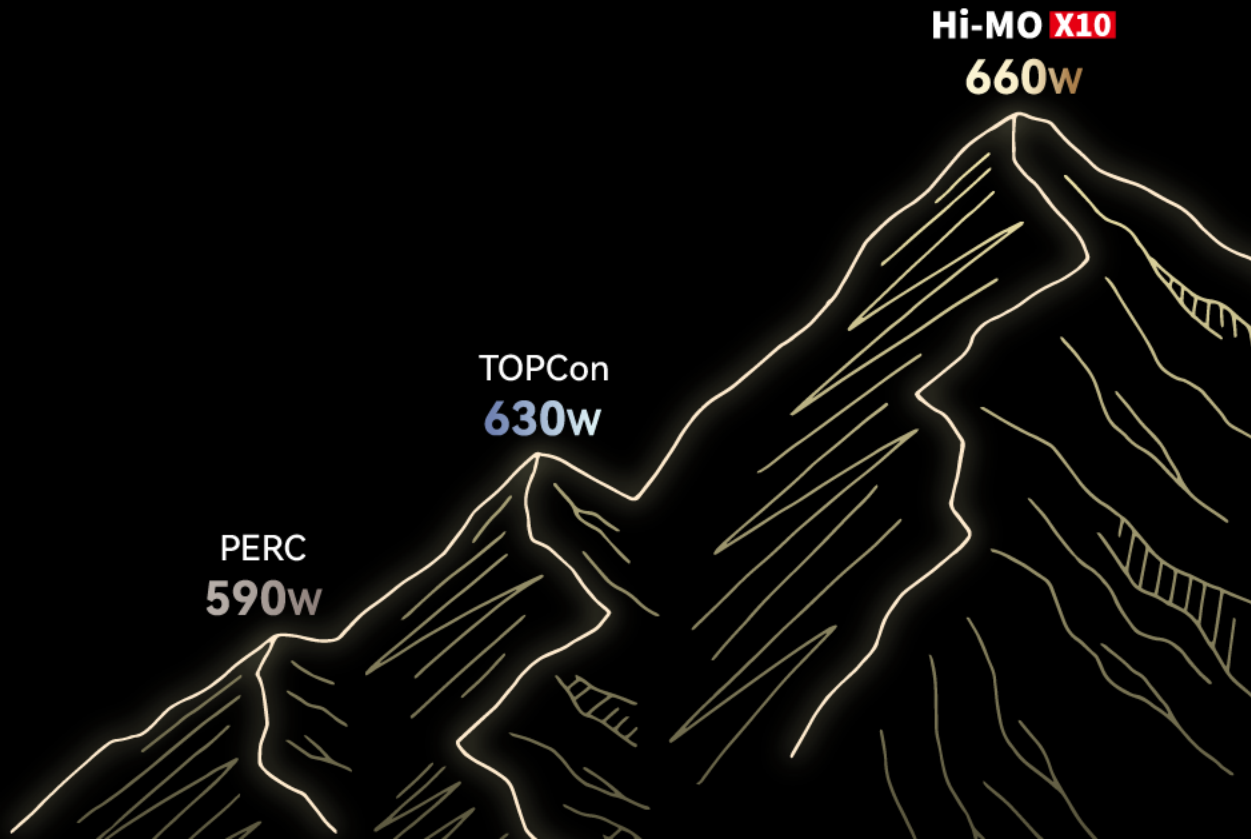
Technological manufacturing

Peak Efficiency | Power Leads TOPCon by 30W

About 5% Increase in Installed Capacity on the Same Roof

Ultra-High Power

The mass production power leads competitors by 30W



Higher Installed Capacity

About 5% Increase in Installed Capacity compared to TOPCon for same area



Fearless of High Temperature | Lasting Strength

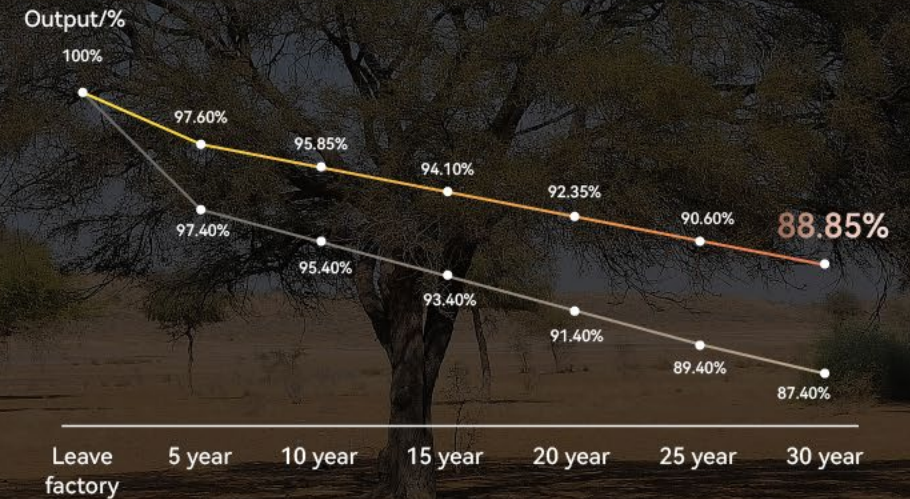
Better Power Generation Performance at High Temperatures | Stronger Long-term Power Generation Gain

Fearless to High Temperature



Power temperature coefficient: -0.26%/°C. up by 0.03%/°C compared with TOPCon.
Better power generation performance at high temperatures.

Lasting Strength



First year degradation: 1%. linear degradation: 0.35%.
Long-lasting power generation throughout life cycle.
Lower degradation rate, lower mismatch loss, reduction of mismatch risk by over 2.36%.

Anti-Shading | Can Recover 70% of Power Loss

Minimize Shading Loss | Maximize Roof Utilization

Equipment Shading

Leaves Shading

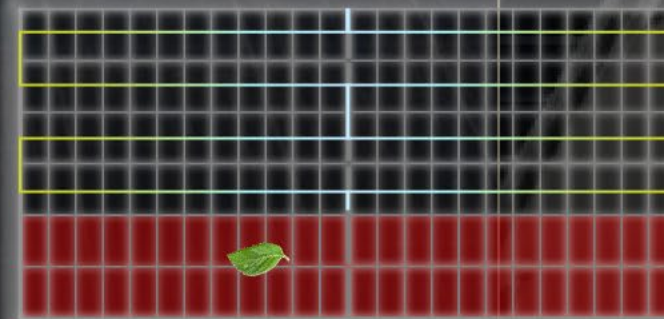
Dust Shading

Snow Shading



Hi-MO X10

Single-cell shading leads to self-bypass
No affect to the power output of the entire string of cells.
Less power loss



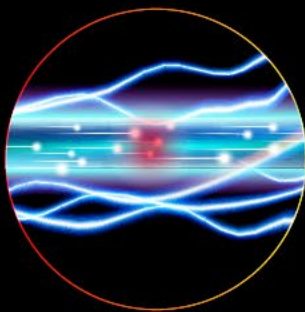
Conventional moudle

Single-cell shading leads to the entire string of cells to bypass
Large power loss

In the case of one cell shaded, the power loss is 70% less than that of TOPCon modules

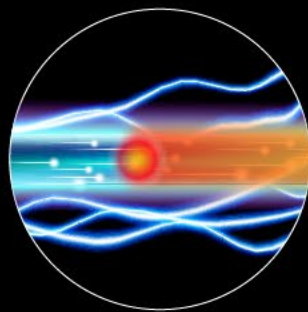
Prevent Localized Overheating | Eliminate Fire Hazards

Innovative Soft Breakdown Design | Buy “Fire Insurance” for Your Roof



Hi-MO X10

Soft breakdown design allows blocked current to bypass and prevent localized overheating



TOPCon

The current is blocked, and occurs localized heating, the temperature rises to form a “hot spot”

Localized temperature reduced
28%+ compare with regular cell

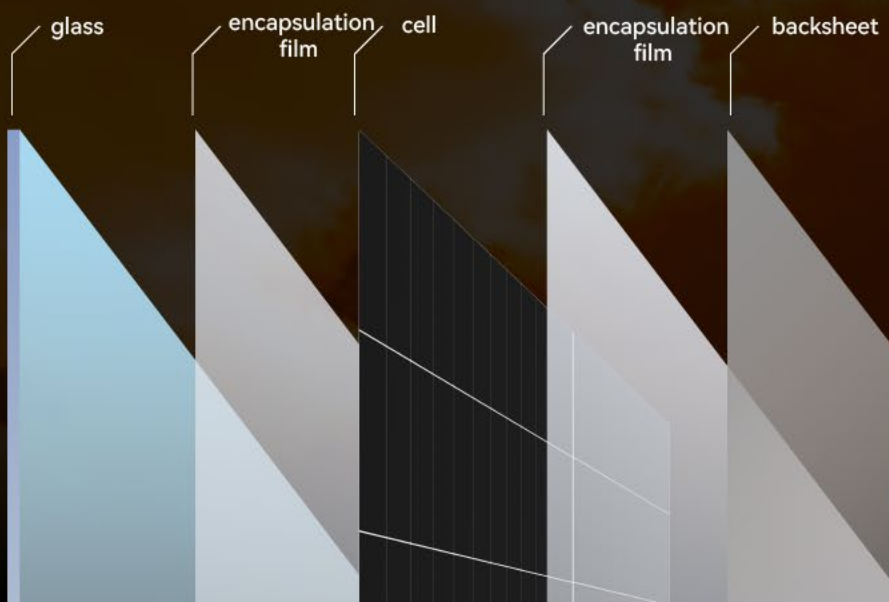
Even if the probability is one in ten thousand, once a fire occurs, the power station will suffer huge losses. The innovative Soft Breakdown function of Hi-MO X10 is equivalent to buying a 30-year fire insurance for the rooftop power station.

Full-Scene Aging Suppression

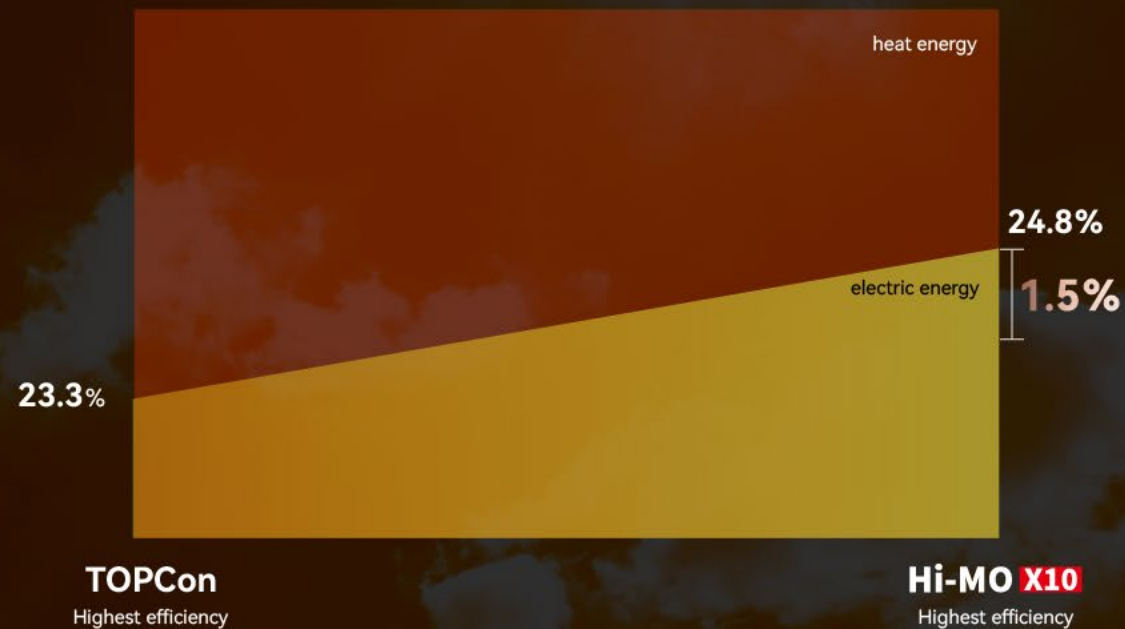
More Reliable Packaging Resists Aging | Lower Operating Temperature

High-Reliability Packaging

- High density packaging
- POE encapsulation film
- Pure silver electrode paste
- Innovation bipolar hybrid passivation



Low Operating Temperature

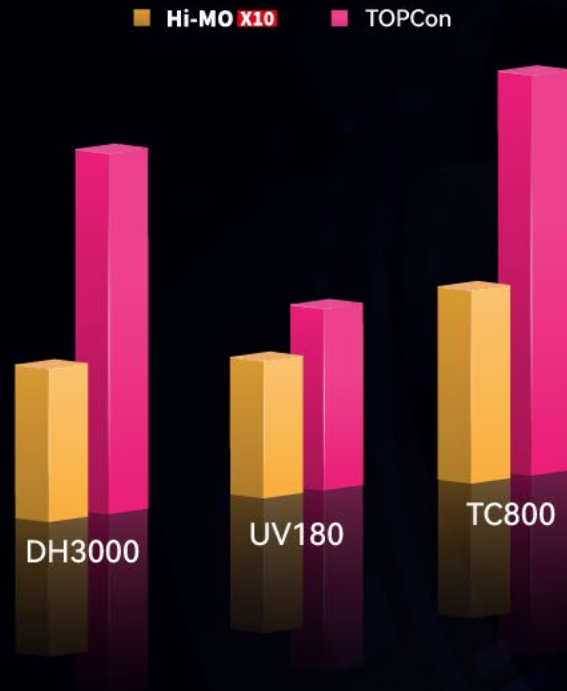


The operating temperature of the module is on average 0.5°C lower.
Reduces long-term aging rate of films and metals.

Full- Scene Aging Suppression

Heightened Test Shows the Reliable Quality | Ultra-long Warranty Protects Customer Value

Comparison of Module Degradation
Under Multiple Rigorous Tests



15
Provide 15 years
product warranty

30
Provide 30 years power warranty
30th year, guarantee 88.85% output power

DH test

At 85°C and 85% relative humidity,
test for 1000 h/2000 h/3000 h.

UVID test

Irradiate for a certain period of time
under a specific UV light intensity

TC test

High and low temperature environment
simulation 85°C to - 40°C 200 runs

System-Level Resistance to Mechanical Stress

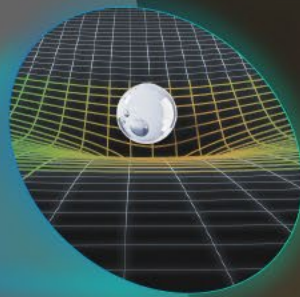
High Thickness TaiRay wafer | Full Back Contact One-line Welding Structure

Hi-MO X10

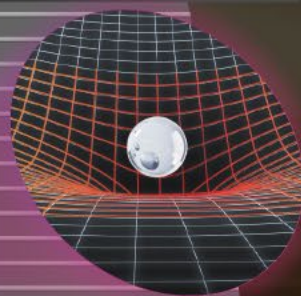
Cell edge stress **26Mpa**

TOPCon

Cell edge stress **50Mpa**



Under the same stress,
the surface collapse of TaiRay wafer
is smaller



TaiRay Core

Ultra-high mechanical strength
Maximum rupture strength increased by 16%.

High Thickness TaiRay wafer

Wafer thickness is 10 μ m thicker than mainstream
thicker for stronger reliability

Full Back Contact One-line Welding Structure

Reduce cell edge stress
improve anti-cracking performance

LONGi Raw Material Standard

Comprehensive and Rigorous Material Selection and Introduction | Leading the Quality Revolution in the Industry

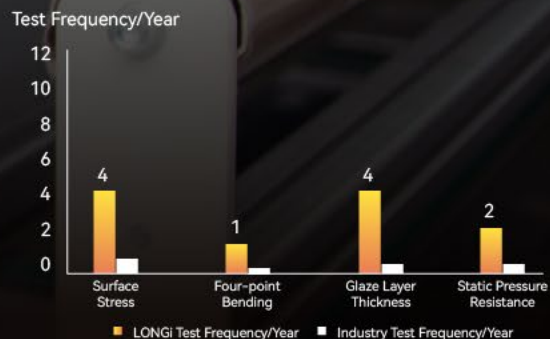
PV Glass Standard

LONGi's Pioneer | Industry Leading

Standard for local thermal shock resistance test of glass
Reduce the probability of glass cracking and failure caused by hot spots

Tempered glass strength standard upgrade
Reduce the risk of outdoor operational load failure

Standardized management of film or glaze layer
Reduce power degradation due to coating failure



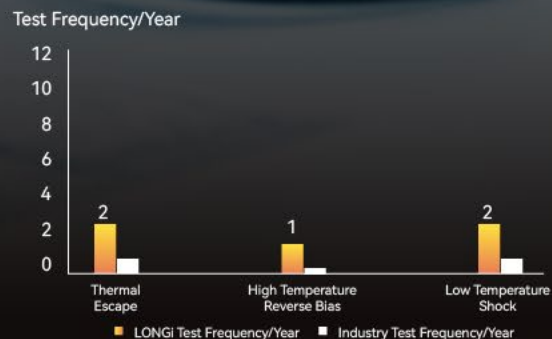
Junction Box Standard

Rigorous Upgrading | Robust and Reliable

Junction box thermal escape Standard
Reduce risk of failure after shading removal

High-temperature reverse bias standard for diodes
Reduce the probability of thermal failure of diodes

Cable riveting compression ratio standard
Reduce the risk of wire loss and fire



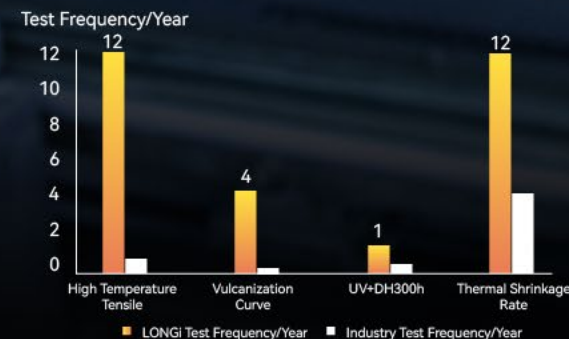
Cell & Encapsulation Film Standards

LONGi's Pioneer | Industry Benchmark

Cell four-point bending strength standard
Reduce risk of hidden cracks and load failures

POE standard
Reduce the risk of PID failure

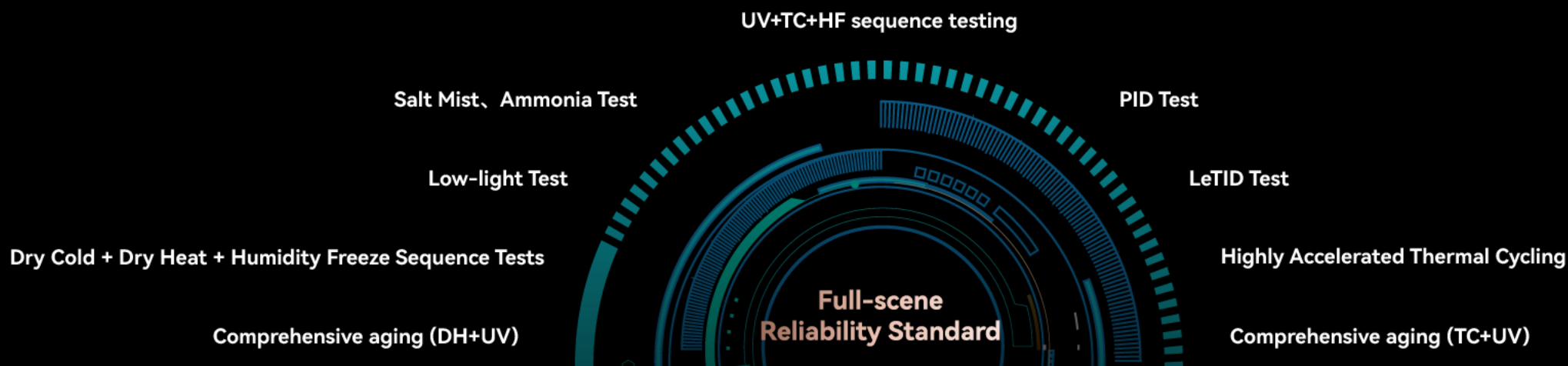
EVA acetic acid content standard
Reduce risk of cell busbar/ribbon corrosion failure



LONGi Full-Scene Reliability Standard

Comprehensive Protection of Customer Value

From complex and diverse climatic environments to extreme disastrous weather response, LONGi continues to build “**full-scene reliability system standards**”
The differentiated product reliability test covers from single rigorous tests to comprehensive aging test, providing comprehensive protection to customer value.



Module Test Items	IEC Test Standards	LONGi Test Standards	Industry Test Frequency	LONGi Monitoring Frequency
LID	PL≤5%	PL≤1.5%	Quarterly	Monthly
PID 192	PL≤5%	PL≤2.5%	Quarterly	Monthly
LeTID	PL≤5%	PL≤2%	Quarterly	Monthly
Hot spot	PL≤5%	PL≤3%	Quarterly	Monthly
UV15+DML+TC50+HF10	PL≤5%	PL≤5%	Seldom	Quarterly
TC200	PL≤5%	PL≤2.5%	Once only at production introduction	Quarterly
DH1000+SML	PL≤5%	PL≤5%	Seldom	Quarterly
Hail Test	PL≤5%	PL≤3%	Once only at production introduction	Quarterly

The Only Lighthouse Factory in PV Industry

World's Most advanced Factory | Highest Level in Manufacturing

LONGi Lighthouse Factory



November 2023
LONGi Jiaxing Factory Awarded Lighthouse Factory Certification



Global 153



China 62

World Economic Forum launches, Global selection
Digital Manufacturing Industry 4.0
World's most advanced factory
Highest level in manufacturing and digitalization



12s

Average time for one product offline

43%

Reduced yield loss

20%

Reduced energy consumption per unit



Flexible Automation Production

90%+ automation rate for the whole line



Full-process AI Quality Inspection

Industry's first full-process AI quality inspection



Cell Intelligent Allocation

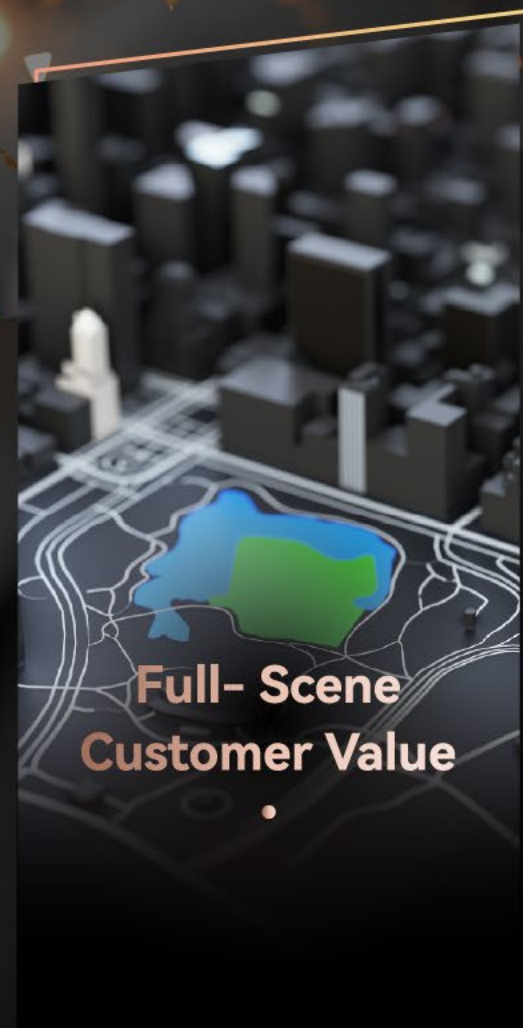
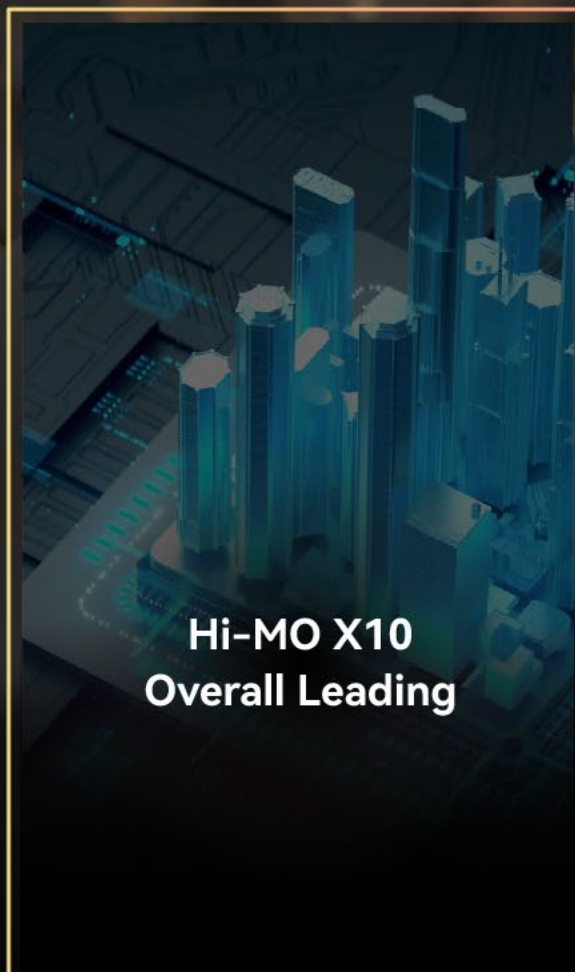
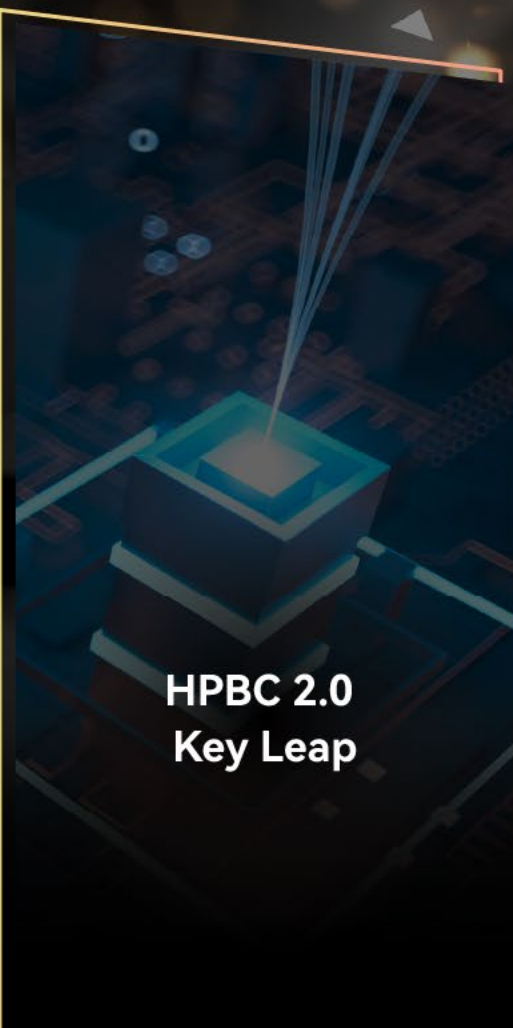
AI Intelligent Production System Program



Overall Delivery

84% reduction in production delivery period

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Power Generation Simulation of Typical Scenario

Efficient and Reliable | More Gain

📍 Madrid, Spain

🏠 Roof area: 10000 m²

📐 Roof angle: Color Steel Tile Roofing 3°

- System design: 20 pcs/string, a total of 154 strings, 11 inverters of 175 kW, system voltage 1500V

8%+

increase in power generation



Project capacity ⬆ 4.76%



Low temperature coefficient ⬆ 0.80%



Low degradation ⬆ 1.13%



Low fault failure ⬆ 0.16%



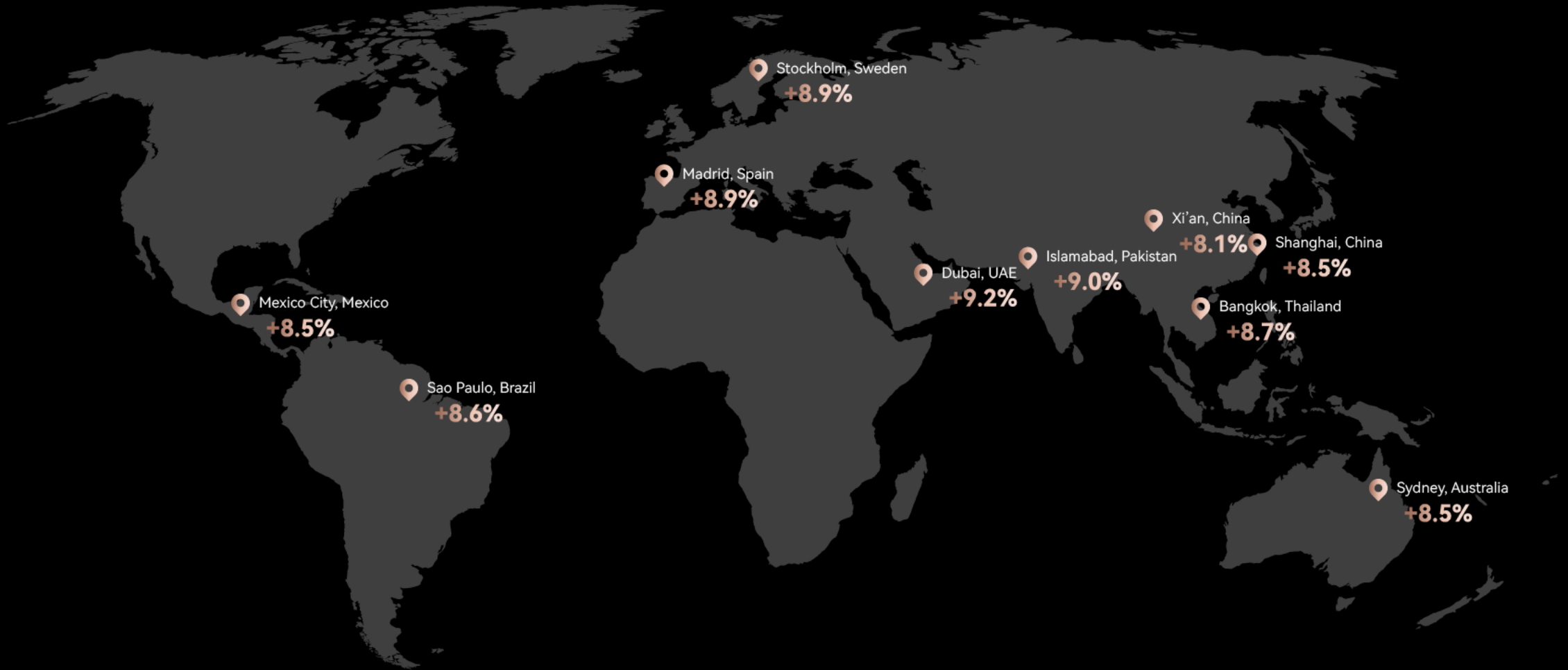
Anti-Shading ⬆ 0.95%



IAM ⬆ 0.68%

Power Generation Exceeds TOPCon by 8.7%

Power Generation Simulation Average Data of Typical Regions Worldwide



Investment Residential

Higher Investment Returns

📍 Xi'an, China

🏠 Roof area: 260 m²

🕒 Roof angle: 25° tiled

🔌 Full Grid Connection, Feed-in tariff : \$0.05/kWh

- System design: 15 pcs /string, a total of 5 strings, 5 inverters of 8kW

TOPCon

Hi-MO X10

630	Module rated power (W)	660		
47.25	Project capacity (kW)	49.50	⬆️	4.76%
1485.2	Total power generation (MWh)	1602.1	⬆️	7.9%
11.56	IRR (%)	12.57	⬆️	8.75%
8.19	Payback period (year)	7.59	⬇️	7.34%



Value C&I

Lower LCOE

📍 Xi'an, China

🏠 Roof area: 14000 m²

📐 Roof angle: Color Steel Tile Roofing 3°

💡 Self-consumption, C&I electricity price : \$0.11/kWh

- System design: 22 pcs /string, a total of 160 strings, 11 inverters of 175kW, system voltage 1500V

TOPCon

Hi-MO X10

630	Module rated power (W)	660		
2217.6	Project capacity (kW)	2323.2	⬆️	4.76%
66593	Total power generation (MWh)	71958	⬆️	8.1%
29.36	IRR (%)	31.33	⬆️	6.72%
0.05	LCOE (\$ /kWh)	0.047	⬇️	6.9%



Residential

Lower LCOE

 Madrid, Spain

 Roof area: 260 m²

 Roof angle: 35° tiled

 Self-consumption, Residential electricity price : \$0.17/kWh

- System design: 13 pcs/string, a total of 6 strings, 6 inverters of 8kW

TOPCon		Hi-MO X10			
630	Module rated power (w)	660			
49.14	Project capacity (kW)	51.48	⤴	4.76%	
2396	Total power generation (MWh)	2610	⤴	9.0%	
0.039	LCOE (\$ /kWh)	0.036	⤵	7.16%	



Long Tail C&I

Higher Investment Returns

📍 Madrid, Spain

🏠 Roof area: 10000 m²

🕒 Roof angle: Color Steel Tile Roofing 3°

🔌 Full Grid Connection, Feed-in tariff : \$0.05/kWh

- System design: 20 pcs/string, a total of 154 strings, 11 inverters of 175 kW, system voltage 1500V

TOPCon

Hi-MO X10

630	Module rated power (W)	660		
1940	Project capacity (kW)	2033	⬆️	4.76%
83647	Total power generation (MWh)	90933	⬆️	8.7%
9.07%	IRR (%)	9.96%	⬆️	9.88%
10.06	Payback period (year)	9.27	⬇️	7.89%



LONGi

Thanks all