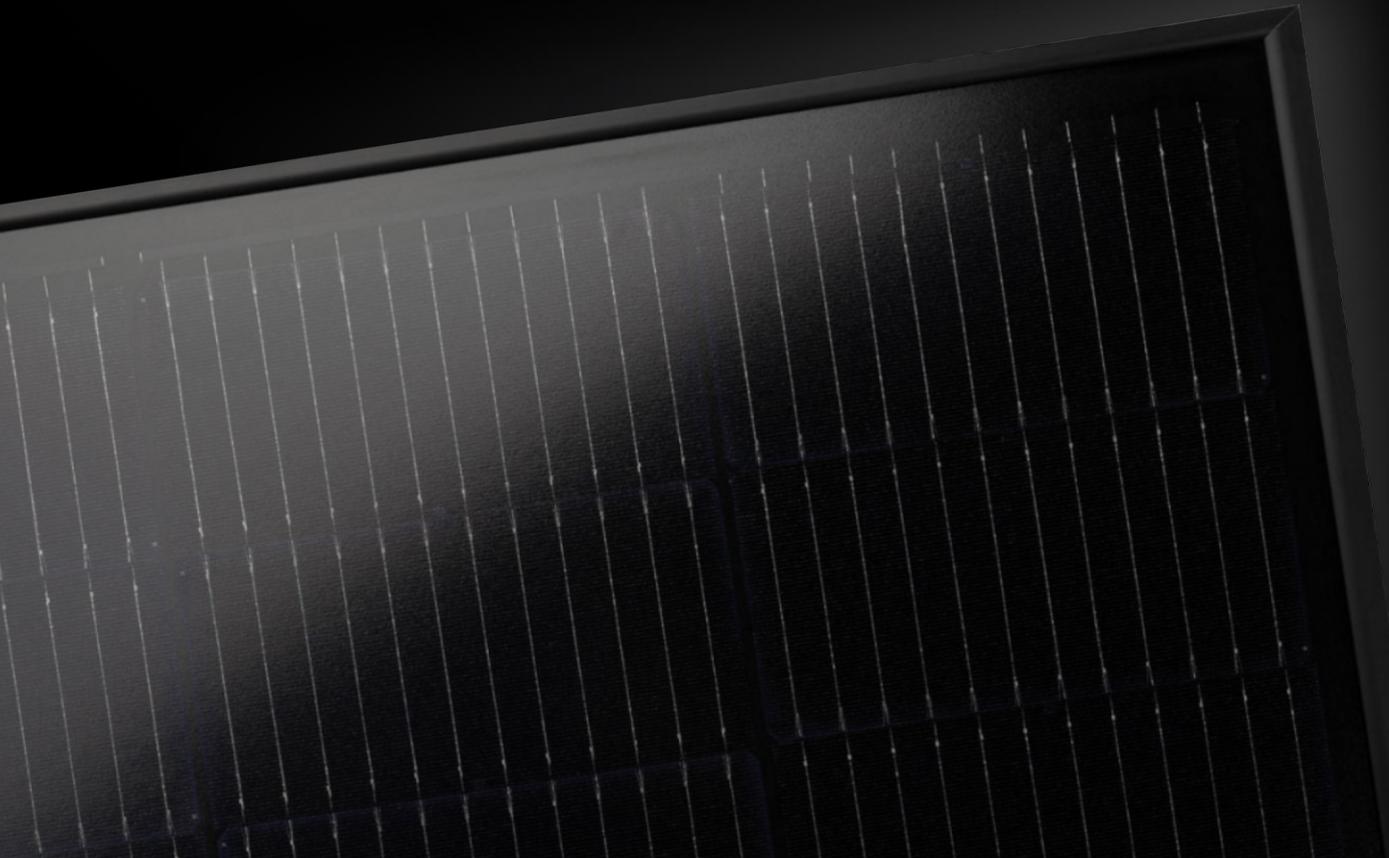




Spark™
Solar

Powered By The Sun™

A WORLD CLASS
SOLAR MODULE
MANUFACTURER





Unmatched Quality

Spark Solar adheres to international standards of quality. Institutes best-in-class quality control processes, and strives to consistently deliver only the highest quality products to our customers. High efficiency, cutting-edge technology, and safety consist three pillars of what we call "Quality"



Reliability

A name you can bank upon, Spark Solar is synonymous with reliability. Spark Solar is highly focused to provide most efficient and high performance solar panels. Spark Solar is committed to offer products that last longer than industry requirements



Sustainability

At Spark Solar, we are committed to building a company of which we can all be proud – not only of the innovative products we create, but the manner in which we achieve them. We believe we have a positive role to play in meeting growing renewable energy demand around the world

About Spark Solar

Spark Solar is a globally renowned Indian manufacturer of high- performance solar panels.

Capitalizing on its strength in solar panel manufacturing, it is committed to providing panels with unparalleled efficiency and reliability to enable customers to maximize the returns on their PV projects. With its leading industry experience, continuous effort on R&D, and customer-oriented service Spark Solar is your most trustworthy long-term partner

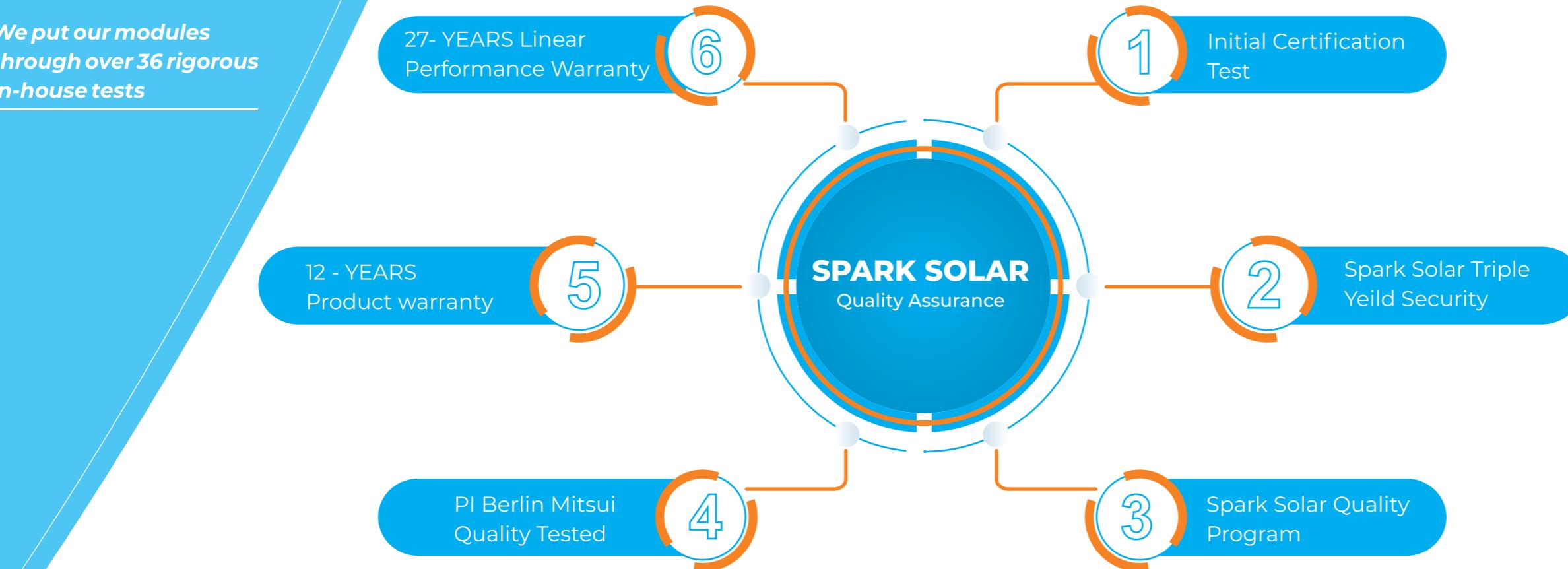
Since 2010, Spark Solar has been leading solar innovation. Spark solar panels consistently deliver more energy and long-term peace of mind with the highest performing solar power systems available. Spark Solar is the solar energy choice of more homeowners and businesses around the world.

Today Spark Solar has been exporting to more than 10 countries around the world and is dedicated to being a leading company in innovation excellence, superior product quality, strong partnerships and environmental stewardship.



At Spark Solar we strive to deliver only the highest quality products to our customers. Spark Solar adheres to international standards of quality and implements stringent quality control processes, holding our products to the highest standards.

We put our modules through over 36 rigorous in-house tests



The quality of panel relies on its ability to adapt to any environment and resist different types of stress. These characteristics ultimately influence the amount of electricity generated over a panel's lifetime.

Spark solar panels are tested by internationally recognized PI Berlin Mitsui lab. Outside of the laboratory, our modules continue to prove

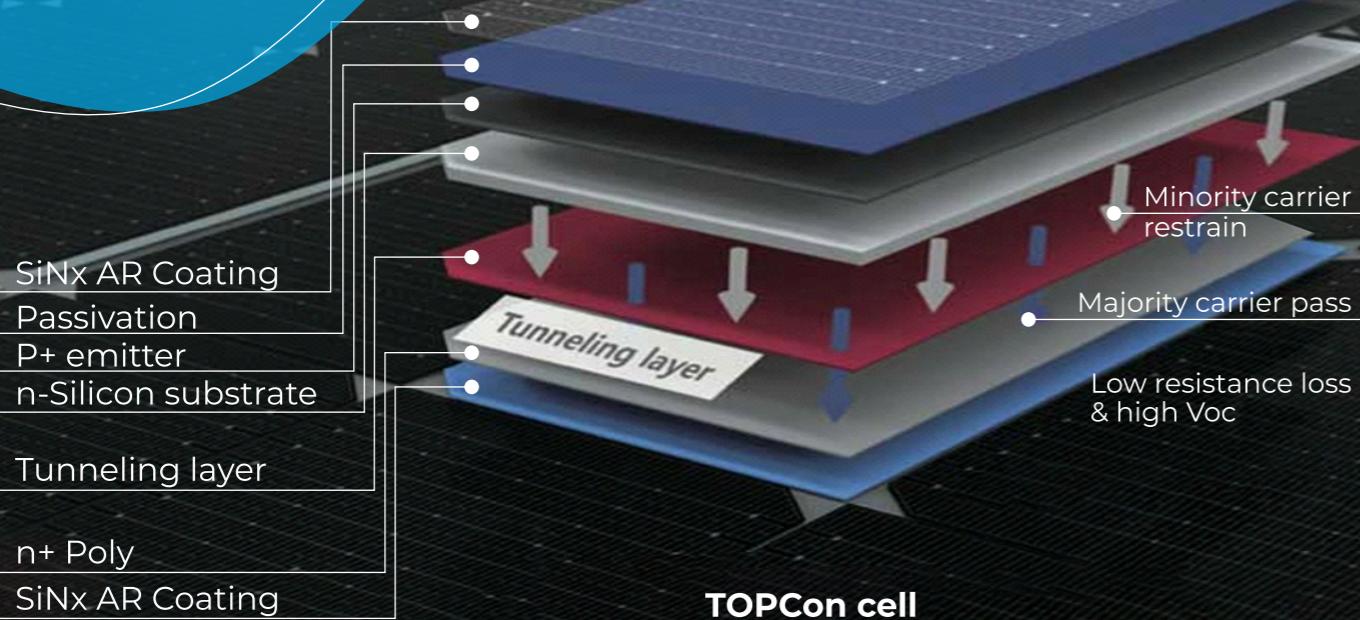
Component Testing

Spark Solar Carefully tests the performance of each module component in order to maximize electrical output whilst minimizing module degradation overtime.

Tests include:

- Bypass Diode Testing •
- Materials and Components Testing •
- Quality Checks throughout •
- Micro-crack testing •
- NOCT Measurement •
- Electrical Component testing •
- Flash Testing •




TOPCon cell

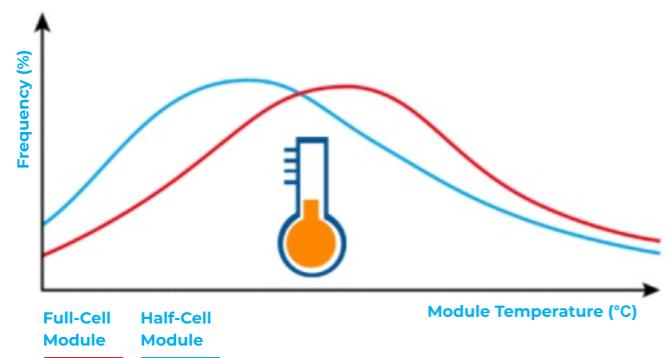
With TOPCon cell **upto 24.5%**
Conversion efficiency can be achieved.

TOPCON (Tunnel Oxide Passivated Contact) solar cell, is the next generation of solar cell technology after PERC.

Improvements are not limited to efficiency alone. Temperature Coefficient, potentially one of the most influential factors outside of Standard Test Conditions (STC), is significantly improved compared to mainstream mono PERC technologies.

Lower Operating Temperature

Half-cut cells have half of the working current, thereby the thermal loss is remarkably reduced. Operating temperature correspondingly decreases, and the reliability of module is improved as well as power gain.

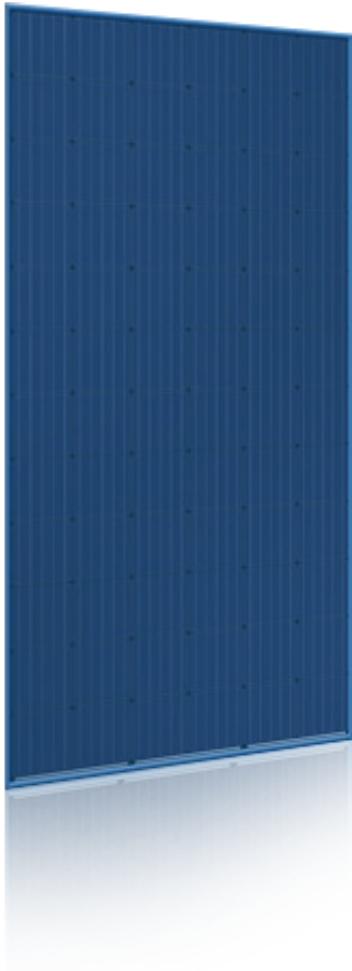


Lower Hot Spot Temperature

Hotspots are a major source of failure for photovoltaic modules in the field. Small area shadings can drastically increase the temperature of shaded area. This phenomena is called hot spot. The prolonged hot spot could bring irreversible damage and degradation of modules. As the string current of half-cut cell modules is half of full-cell modules, the hot spot temperature decreases with reduced heat dissipation. Half-cell module design could mitigate hotspot degradation resulting in increased reliability of solar module. Result's show the maximum hotspot cell temperature of the shaded half-cell module is 20 °C lower than that of the full-cell module.



Building Integrated Photovoltaic Modules



BIPV SERIES



Advanced Glass

Our high transmission glass features a unique anti-reflective coating that directs more light on the solar cells, resulting in higher energy yield

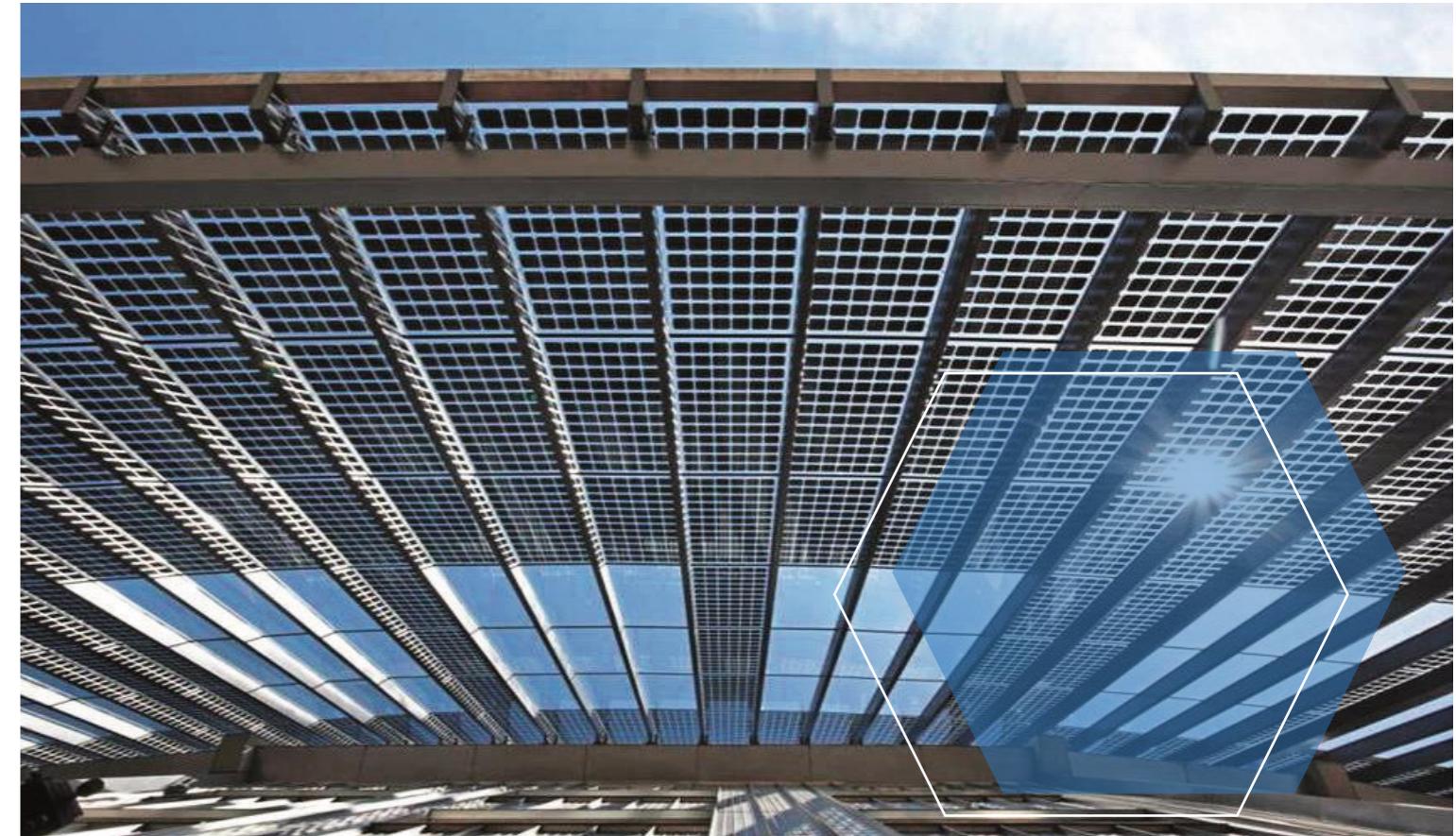
See Through Panels

Transparent crystalline PV panels in combination with aluminium profile can easily be integrated in facades and roofs.

TRUST SPARK SOLAR TO DELIVER RELIABLE PERFORMANCE OVER TIME

World-class manufacturer of BIPV modules

- Unrivalled manufacturing capacity and world –class technology
- Rigorous quality control meeting the highest international standards
- Long term reliability test
- 2x100% EL inspection ensuring defect free modules



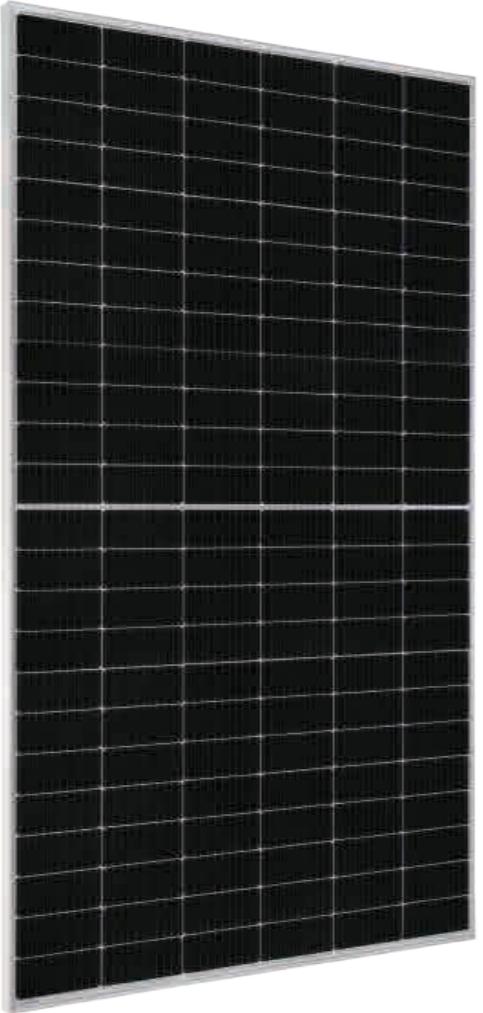
NEXT GEN BIPV

WE MANUFACTURE NEXT GEN ARCHITECTURAL SOLAR PHOTOVOLTAIC GLASS (BIPV). BY EMBEDDING PHOTOVOLTAIC CELLS BETWEEN TWO SHEETS OF GLASS, THIS RANGE OF LAMINATED SAFETY GLASS MAXIMISES A BUILDING'S ABILITY TO PRODUCE THE SAME AMOUNT OF ENERGY AS IT CONSUMES. BRINGING THE BEST OF THE WORLDS OF DESIGN AND FUNCTION TOGETHER, MODULES CAN BE DESIGNED WITH LIMITLESS AESTHETIC POSSIBILITIES AND ACHIEVE THE HIGHEST ENERGY PRODUCTION FOR SEAMLESS INTEGRATION INTO BUILDINGS. AND SINCE THIS PRODUCT REPLACES INSTEAD OF ADDING TO A STRUCTURE, IT IS ALSO COST-EFFECTIVE.

Benefits of Building Integrated Photovoltaic (BIPV)

- ❖ Green marketing value potential to qualify for LEED points
- ❖ Noise protection
- ❖ Thermal insulation (heating as well as cooling)
- ❖ Adjust light transmission by changing the distance between cells
- ❖ Electromagnetic shielding
- ❖ Aesthetic quality (integration in buildings as a design element)
- ❖ Weatherproof (waterproof and windproof façade or roof of a building)
- ❖ Sun protection/ shadowing

RAPID
144 M10 Half Cell Series
SMART MODULE



**Spark™
Solar**
Powered By The Sun™

The Ultimate Power Performance | Durability | Reliability

FEATURES



Remarkable
performance in
shaded condition



Low-light Behaviour



Higher Performance



Temperature Coefficient

HOW IT WORKS

Spark Rapid 144 Cell Series module produces energy even if part of the module is shaded. Whereas if standard module is partially shaded minimum one string will completely stop producing power, this accounts to one third reduction in power generation. Moreover, it can even completely stop generating power if shaded across its breadth. Rapid 144 Cell Series module is split into two parts. Each section of 72 half cut cells generates power on standalone basis but combines again before current exits the module. This structure results in power generation in non-shaded area of the module even if one of the section is partially or completely shaded, resulting in higher overall energy yield as compared to standard module.

QUADRATECH | SMART TECHNOLOGY

New Multi-Busbar cell design

For more power and better reliability. Shorter distance between busbar allows better flow of electrons and reduces power loss. Less residual stress, less micro-cracks and hotspot risks.



Half cut cells

With high-precision laser cut cells, the current (I) flowing in each busbar is halved resulting in lower electrical resistance and an increased overall efficiency of about 2.5%



Three piece junction box

The unique three piece design lowers series resistance avoids diode heating and enable quicker heat dissipation, which guarantees long-term stable performance and improved power efficiency.



Passivated Emitter Rear Cell (PERC)

Higher efficiency is achieved with latest PERC cell technology which captures more wavelengths of light through mirror like reflector behind the solar cell



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Spark 144 M10 RAPID Series

upto 21.5%

15
27

EFFICIENCY

YEAR PRODUCT WARRANTY

YEAR LINEAR POWER OUTPUT
WARRANTY

TEMPERATURE RATINGS*

Nominal Module Operating Temperature :	44.0°C ($\pm 3^\circ\text{C}$)
Temperature coefficient of P_{MPP} (Y)	-0.35 %/ $^\circ\text{C}$
Temperature coefficient of V_{oc} (β)	-0.275 %/ $^\circ\text{C}$
Temperature coefficient of I_{sc} (α)	0.045 %/ $^\circ\text{C}$

*The temperature coefficients stated are linear values

GENERAL DATA

Cell type :	P type MBB Mono PERC cells
Cell matrix :	144 cells [2 x (6 x 12)]
Junction box :	3-part, 3 bypass diodes, IP 68 rated
Cable :	4mm ² solar cable, Portrait : N (-) 400 mm, P (+) 200 mm Landscape : ≥ 1300 mm / Customized
Frame :	Silver anodized aluminum alloy
Glass :	3.2 mm low iron solar glass with anti-reflective, high transmission technology
Connectors :	EV02 / TS4 / Multi Contact MC4

MAXIMUM RATINGS

Operating temperature :	-40 upto +85°C
(Permitted Module Temperature on Continuous Duty)	
Maximum system voltage :	1500 V _{DC} (IEC/UL)
Max series fuse rating :	25 A
Max reverse current :	25 A
Maximum test load (front) :	5400 Pa (550 kg/m ²)*
Maximum test load (rear) :	2400 Pa (244 kg/m ²)*
Application classification :	Class A
Safety Class :	II
Fire Rating :	C

* See installation manual for mounting instructions.
Design load = Test load / 1.5 (safety factor)

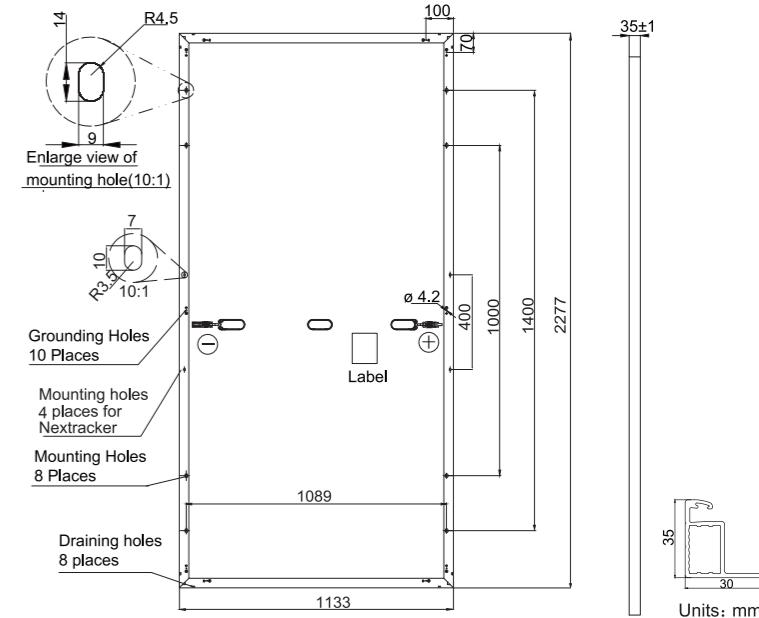
MECHANICAL SPECIFICATION

Dimensions :	2277 x1133 x 35 mm
Area :	2.58 m ²
Weight :	28 kg (61.73 lbs)

PACKAGING INFORMATION

Container Size :	20'	40'HC
Quantity Per Pallet :	30	30
Pallets/Container :	10	20
Quantity/Container :	300	600

(Two pallets = One stack)



ELECTRICAL DATA@STC

Module code* : SSXXX144 M10

Nominal Power	- P_{MPP} (Wp)	535	540	545	550	555
Power Tolerance	- (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage	- $V_{\text{MP}}\text{ (V)}$	41.47	41.64	41.80	41.96	42.00
Nominal Power Current	- $I_{\text{MP}}\text{ (A)}$	12.90	12.97	13.04	13.11	13.18
Open Circuit Voltage	- V_{OC} (V)	49.45	49.60	49.75	49.9	50.05
Short Circuit Current	- I_{SC} (A)	13.79	13.86	13.93	14.00	14.07
Panel Efficiency	- (%)	20.7	20.9	21.1	21.3	21.5

Values at standard test conditions STC (airmass AM 1.5, irradiance 1000 W/m², cell temperature 25°C).

*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above.

ELECTRICAL DATA@NMOT

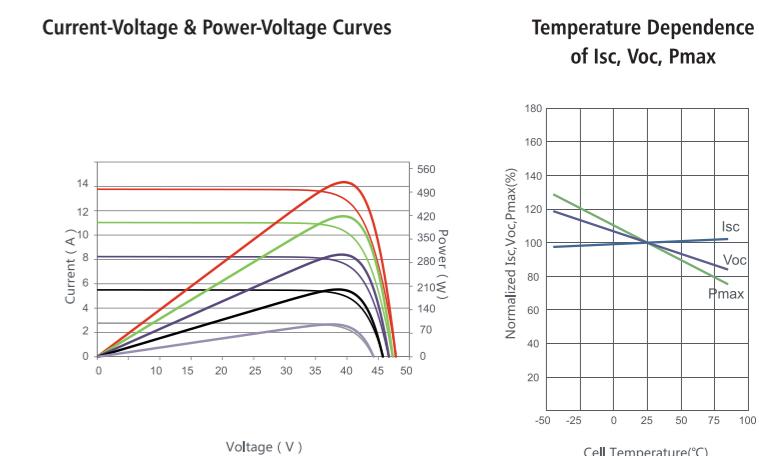
Module code* : SSXXX144 M10

Nominal Power	- P_{MPP} (Wp)	405	408	412	416	420
Nominal Power Voltage	- $V_{\text{MP}}\text{ (V)}$	38.78	38.99	39.20	39.43	39.64
Nominal Power Current	- $I_{\text{MP}}\text{ (A)}$	10.43	10.47	10.51	10.55	10.59
Open Circuit Voltage	- V_{OC} (V)	46.31	46.43	46.55	46.68	46.8
Short Circuit Current	- I_{SC} (A)	11.05	11.09	11.13	11.17	11.21

Nominal Module Operating Temperature NMOT (800 W/m², AM 1.5, windspeed 1 m/s, ambient temperature 20°C). Typical values, actual values may differ. *Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above.

Electrical Performance & Temperature Dependence

Current-Voltage & Power-Voltage Curves



*Due to continuous innovation, research and product improvement the specifications in this product information sheet are subject to change without prior notice. Installation instructions must be followed. See the installation manual or contact technical service department for further information on approved installation. Atleast 97.5% of nominal power during first year. Thereafter max. degression in performance of 0.7% p.a. See warranty conditions for further details.



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