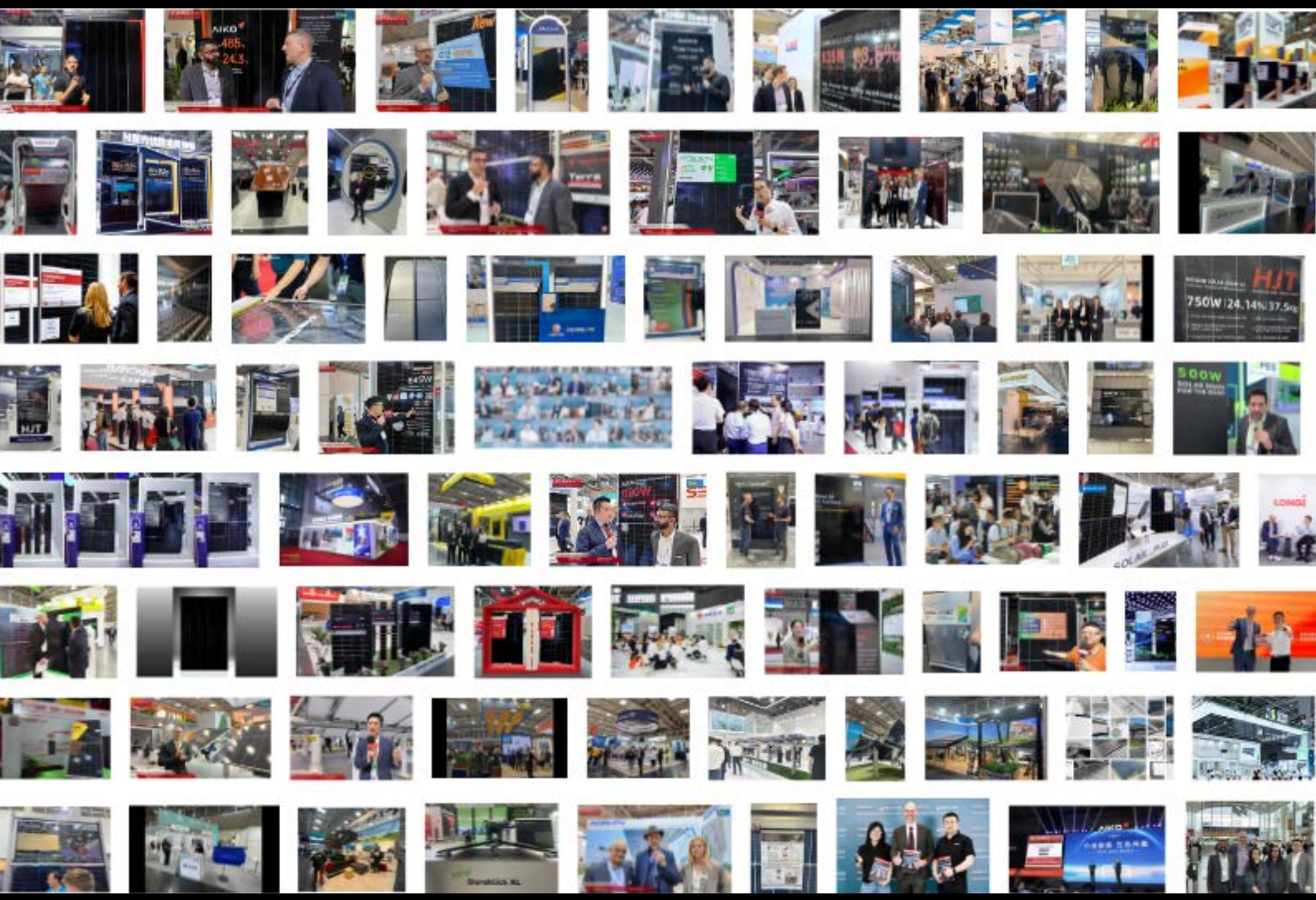
TAIYANGNEWS

ALL ABOUT SOLAR POWER

New Solar Modules & Mounting Systems Overview 2025



Review of new module products & mounting solutions from leading solar shows 2025

Authors: Shravan K. Chunduri, Michael Schmela

LONGi

BEYOND CHAMPIONSHIP

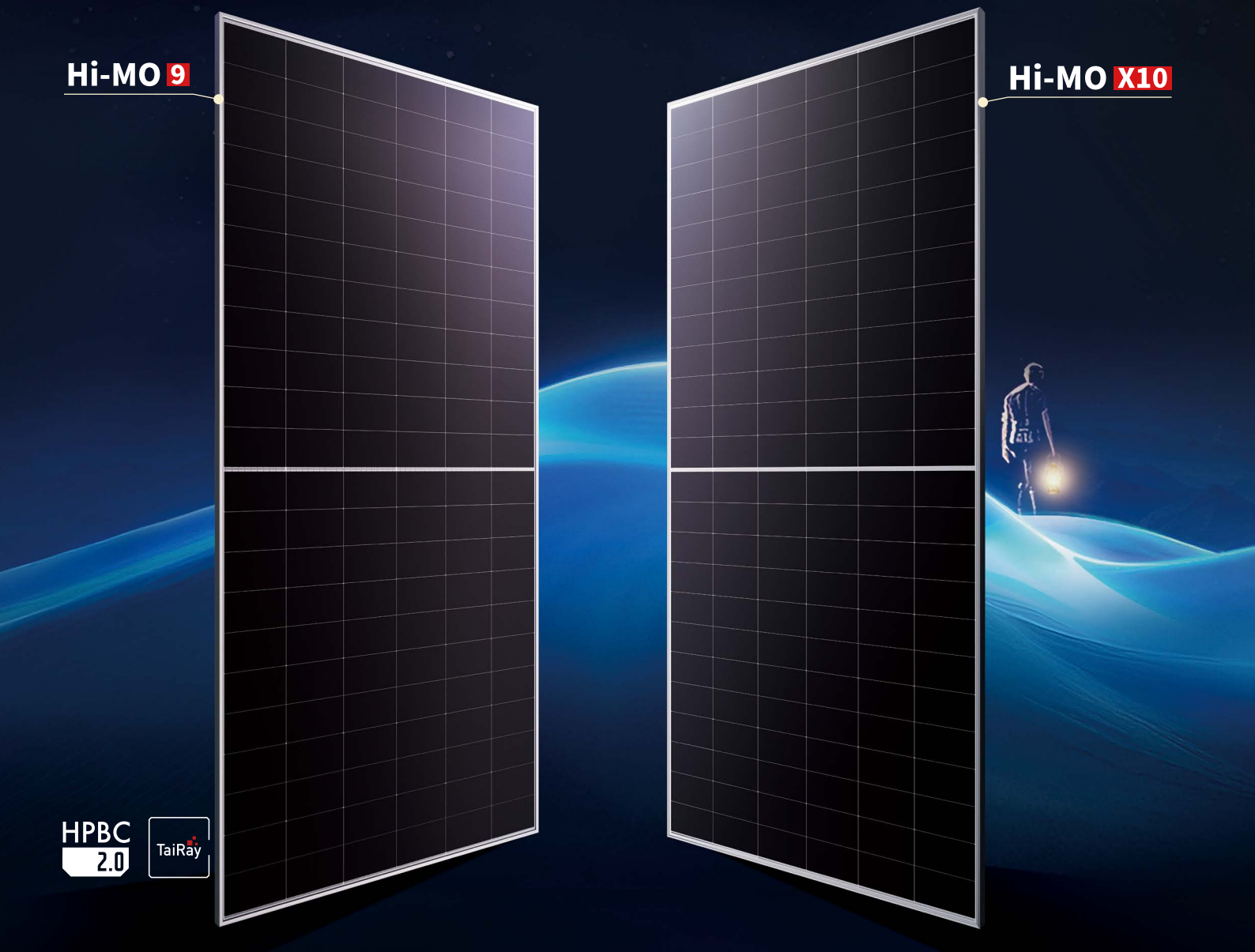
Hi-MO 9
Utility

Power Up to 670W

Hi-MO X10
Distributed Generation

Efficiency Up to 24.8%

- No gridline on the front
  0BB on the back
- Avoiding hot spots
  Anti-shading
- 30 years of lower degradation
- Bifacial 75%-80%+
  On-Demand



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AIKO

ABC Upgraded INFINITE

Redefine PV Efficiency Again
Leading 25% Era

- **Ultimate Efficiency**

+30W More Power Than TOPCon With Same Size

1762×1134x30mm Series
(Mono-glass & Dual-glass):
INFINITE Black: Up to
490W

30 years Product Warranty
30 years Performance* Warranty

1762×1134x30mm Series
(Mono-glass & Dual-glass):
INFINITE White: Up to
500W

1954×1134×30 mm Series
(Mono-glass & Dual-glass):
INFINITE Black: Up to
540W Coming Soon...

- **Pure Aesthetics**
  - Front-side grid-free
  - Elegant full-black design
- **Unrivaled Durability**
  - High temperature restriction
  - Micro-crack resistance
  - Hail resistance
  - IEC Fire Class A
- **Intelligent Technology**
  - Partial shading optimization
  - InvisiRibbon
  - ZeroGap
  - Better temperature coefficient

1. Modules

Overview

The solar module segment is evolving rapidly, as evidenced by a surge in innovation. Manufacturers are focusing on higher efficiencies, larger formats, enhanced durability, and tailored applications to maintain competitiveness in a saturated market. If products showcased at recent major international solar exhibitions are any indication, companies are pushing performance boundaries while addressing specific customer needs, from rooftop space constraints to extreme environmental durability.

Speaking strictly about technology, cell-level architectures are the key. The perovskite-based tandem architecture is the latest buzzword in the industry. While still at the lab scale, several companies showcased perovskite prototypes at leading solar shows. **Huasun** introduced a full-size 2-terminal perovskite-HJT tandem module currently in pilot production, targeting high-power output. **Trinasolar** reported certified results on both cell and module levels for its perovskite/silicon tandem architecture, verified by **Fraunhofer ISE**. **JinkoSolar** shared progress on its perovskite-TOPCon tandem cell, with reliability test results showing minimal degradation under damp heat and thermal cycling. **JA Solar** exhibited a tandem module using 32 M12-sized cells based on perovskite/c-Si technology. **GCL** showcased 2 perovskite options – a large single-junction module and a 4-terminal tandem design – with commercial sampling available for selected partners and plans to scale production from 100 MW to 500 MW. **DAS Solar** also highlighted its 4-terminal perovskite-silicon tandem prototype, underscoring the industry's steady advancement in next-gen solar modules.

While the 2 leaders in back contact technology - **Aiko** and **Longi** - presented product updates, several other companies seem to jump on the BC bandwagon. LONGi, a pioneer in the segment, showcased utility-scale BC modules featuring 80% bifaciality, along with anti-glare and anti-hail designs. Technologically, it promoted a hybrid BC architecture that combines heterojunction (HJT) and TOPCon, reaching 27.81% cell and 25.9% module efficiency. AIKO, another BC frontrunner, revealed its 3rd-generation near-gapless module with minimal string spacing, achieving 25% efficiency. It also introduced its 'Intelligent Module' that integrates real-time monitoring of voltage, current, and temperature via standard power cables, and backed its performance with field tests on shading, micro-cracks, and hot spots. **JA Solar** presented a next-gen zero-busbar (ZBB) BC module with direct finger-to-finger interconnection, eliminating both busbars and wiring. **SPIC Solar** highlighted its Zebra IBC module using copper-based metallization, along with a sleek, all-black BIPV variant. **TCL SunPower** introduced monofacial and bifacial BC modules for the residential and C&I segments, offering a 40-year performance warranty, and also promoted lightweight modules with 1.1 mm glass. **GCL SI** featured BC modules for residential use, while **DAS Solar** added safety features, such as string-level arc fault protection and module-level rapid shutdown. Several other companies, including **Euronergy**, **PHONO Solar**, **Runergy**, **Solar N Plus**, **SunPro**, and **Suntech**, also exhibited BC modules at the show.

TOPCon is no doubt the mainstream; however, to reach efficiencies close to BC, several leading manufactures have moved from TOPCon+. This upgraded version of the technology, a trend in field, consisting of rear poly-fingers, edge passivation, and stencil printing. Companies like **Tongwei**, **DAS Solar**, **Canadian Solar**, and **DMEGC Solar** have showcased modules based on the updated TOPCon technology.

HJT continued to gain traction with several manufacturers presenting refinements focused on bifaciality, interconnection architecture, and new material integration. **Huasun** showcased its HJT modules with nearly 100% bifaciality, ideal for vertical PV installations. **Jetion** displayed HJT modules built with fiberglass frames, likely aimed at reducing weight and improving durability. **3SUN** exhibited HJT modules based on in-house cell production and introduced a prototype featuring ZBB interconnection for future rollout. **Gain Solar** also highlighted in-house cell manufacturing for its HJT modules,

combined with ZBB layout, while **Grand Sunergy** brought attention to its gapless HJT module design. ZBB interconnection in HJT was also a focus for **Leascend** and Solargiga, both of which showcased such modules. In addition to these technological upgrades, several other companies contributed to the growing momentum behind HJT. **Boviet Solar**, **Luxor**, **PHONO SOLAR**, **SolarSpace**, **Sunpro**, and **Talesun** all presented their latest HJT product ranges supporting different application scenarios.

Module products also featured technological advancements that are independent of the cell level. The one on the top is ZBB. Nearly every leading supplier is working on this technology, and many such products are covered in this report. However, the list is too long to be incorporated in this overview. Taking this technology to the next level, **Ulica** developed a technology that connects the fingers using more than 200 thin triangular ribbons, eliminating the need for busbars. **Solyco** developed a soldering-free interconnection process that eliminates the use of critical materials such as silver, lead, and bismuth. Full-screen modules that avoid dust accumulation at the bottom are also a true module-level innovation, and **DAH Solar**, an early developer of the technology, presented its updated product range. **Seraphim** has developed a full-screen module that combines a steel frame with sectional aluminum inserts pre-integrated during the lamination process, designed for durability and ease of installation. Several other companies also presented modules with an optimized frame design that avoids dust accumulation.

While not a technological change altogether, module makers are optimizing the bill of materials (BOM) to develop modules for various application scenarios. Building-Integrated Photovoltaics (BIPV) is a strong emerging subsect of this optimization. **Euronergy** showcased solar tiles and color-matched lightweight modules designed to blend with building exteriors. **FuturaSun** offers modules in various colors suited for architectural projects, and **Gain Solar** showcased a diverse BIPV range, which included solar roof tiles and multi-colored modules in varying sizes and thicknesses. **Megasol** has 2 types of solar tiles on offer, differing in power output. Certified for BIPV use by DIBt, **PHONO SOLAR** featured high-transmittance modules suited for greenhouses and integrated façades. Similarly, **Polyshine** promoted its translucent bifacial modules for greenhouse installations, while **ZNSHINE** offered double-glass colored monofacial modules, expanding options for seamless architectural integration.

Flexible and lightweight modules are not only finding applications in BIPV, but are also mainly promoted for roofs with low load-bearing capacity. There are several varieties of modules with different BOM, like with thin glass, all polymer wrapped frameless, and so on. The products from DMEGC Solar, DAS Solar and Jetion, are among the companies that have such flexible and lightweight modules featured in this report.

Agri-PV is yet another interesting budding application of PV combined with agriculture. **BISOL** showcased its Europe-made Agri-PV modules based on large-format G12 wafers, while **Eco Green** also presented solutions tailored for agricultural use. **Solar N Plus** displayed translucent bifacial modules, further enhancing compatibility with farming environments.

There were a handful of PV manufacturers that exhibited products targeting non-mainstream applications, such as those with improved hail resistance, suitable for desert conditions, products suitable for FPV, etc. **OPES** even presented products suitable for Vehicle-Integrated PV (VIPV).

Addressing the carbon-conscious market, manufacturers are trying various means to reduce the carbon footprint of their products. **JA Solar** introduced its low-carbon PV modules, claiming up to 40% lower emissions compared to conventional options. **DMEGC Solar** emphasized its Europe-focused modules manufactured in zero-carbon factories powered solely by renewables and free from PFAS materials. **SolarSpace** showcased its certified low-carbon modules, reporting a footprint of 445 kg CO_2/kWc. In this context, **GCL SI**'s SiRo platform – an innovative blockchain-based traceability solution that links each module to a QR code for transparent lifecycle tracking – is also noteworthy.

A few companies, such as **BTE Solar**, **FOTOTHERM**, **TWL-Technologies**, **Sunmaxx**, and **ZNSHINE**, also presented hybrid panels that combine PV and thermal.

LONGi Showcases Full Line of Back-Contact Portfolio

Leading vertically integrated Chinese solar manufacturer LONGi showcased a wide range of BC modules based on its proprietary HPBC (Hybrid Passivated Back Contact) cell architecture during Intersolar Europe 2025 in Munich.

Speaking to TaiyangNews, Alex Li, Director of Product Development at LONGi, said that the HPBC cell platform combines multiple innovations, including high-aspect-ratio fingers and hybrid passivation.

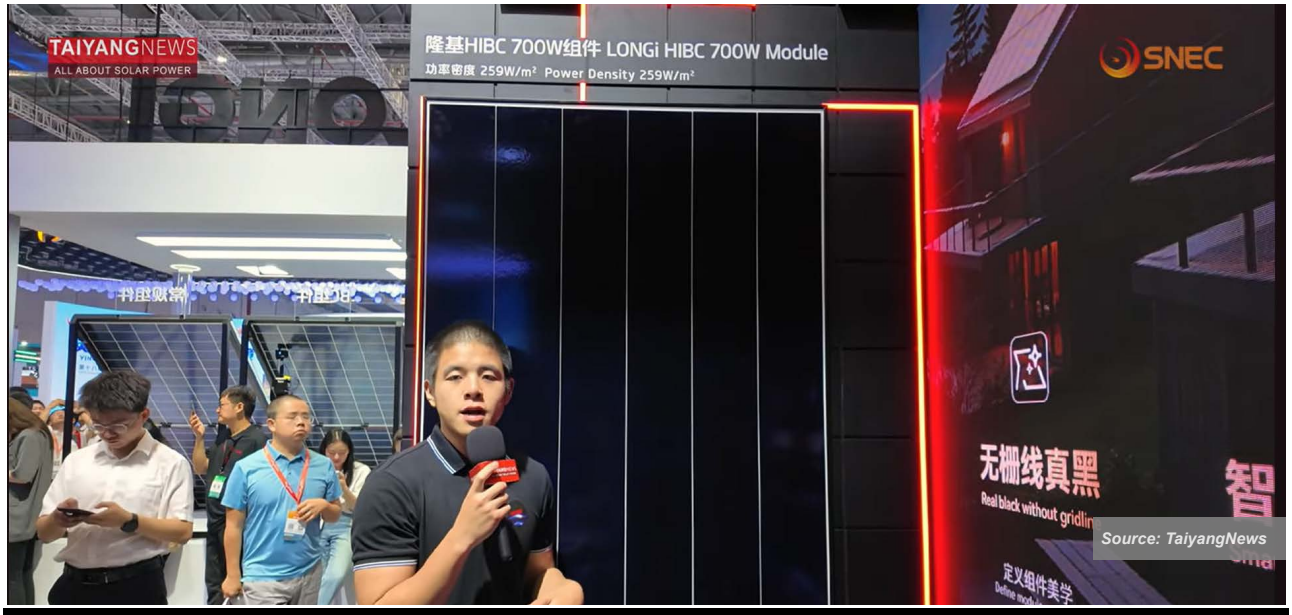
According to Li, these advancements result in a module-level power increase of up to 30 W compared to conventional technologies. The featured Hi-MO 9 module delivers 670 W with 24.8% efficiency.

Among the residential-focused offerings, the EcoLife Series featured 54-cell modules. These include dual-glass EcoLife Pro models with up to 510 W of power and 25% efficiency. Monofacial and bifacial versions under the broader EcoLife lineup offer outputs between 495 W and 500 W, with all models backed by a 30-year product and performance warranty.

Also on display were the Anti-Glare and Anti-Hail modules, targeted at commercial installations. The anti-glare variant meets airport safety guidelines with reduced reflectivity, while the anti-hail version is certified to withstand hailstones up to 40 mm in diameter.

While Hi-MO 9 was the highlight of LONGi's back-contact (BC) product lineup at Intersolar Europe 2025, it was the Hi-MO X10 module that received The smarter E AWARD 2025 in the Photovoltaics category. With 670 W output and 24.8% efficiency , the module also features cell-level shading bypass and a 30-year performance guarantee. The jury recognized its combination of high yield, thermal safety, and refined construction.

In a live demo comparing its HPBC 2.0 module to a conventional TOPCon module, LONGi showed that in the portrait orientation, the HPBC module continued generating power even with all substrings partially obstructed. In contrast, the TOPCon module



Back-Contact Breakthrough: LONGi showcased its advanced Hi-MO 9 and Hi-MO X10 BC modules at Intersolar Europe and SNEC 2025, emphasizing high efficiency, shading resilience, and expanded utility-scale applications.

LONGi		
Product Series	**Hi-MO 9**	**Hi-MO X10 Guardian**
Model name	LR8-66HYD 635 - 670M	LR7-72HVHF 640 - 670M
Wafer type	n-type	n-type
Cell technology	BC	BC
Cell size	–	–
No. of cells	132	144
Module technology	Bifacial, Busbarless, Glass-Glass, Halfcut	Anti dust, Glass-Backsheet, Monofacial
No. of busbars	MBB	MBB
Glass Thickness (front/rear)	2.0 / 2.0 mm	3.2 mm
Maximum power (Pmax)	670 W	670 W
Module efficiency STC	24.8%	24.8%
Bifaciality	75 ± 5%	–
Dimensions	2,382 x 1,134 x 30 mm	2,382 x 1,134 x 30 mm
Weight	33.5 kg	28.5 kg
Application	C&I, Distributed Generation	C&I, Distributed Generation
Product Warranty	12 years	15 years
Performance Warranty	30 years	30 years
Commercial Availability	Yes	Yes
Focused Regions For Commercialisation	Global Utility Market	Global Distributed Market

Graphic: TaiyangNews

showed a sharper drop in output. Li explained that this is due to the HPBC module's ability to bypass only the shaded cells rather than entire substrings.

At the SNEC 2025 event in Shanghai, LONGi focused on utility-scale modules, lab efficiency records, and upgraded materials for long-term durability. LONGi extended its presentation of BC solutions with a focus on high-power utility-scale modules and reliability enhancements.

A key highlight at SNEC was that LONGi was also awarded the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence. The badge recognizes the company's consistent performance, with its high-efficiency modules ranking among the global Top 10 in TaiyangNews' monthly TOP SOLAR MODULES listing for at least 6 months

At the event, speaking to TaiyangNews, Charles Cheng, Product Marketing Expert at LONGi, highlighted the performance upgrades in the company's Hi-MO 9 and HIBC product lines.

The upgraded Hi-MO 9 LR8-66HYD module, featuring 132 HPBC 2.0 half-cells, delivers up to 670 W and 24.8% efficiency. Cheng emphasized that this version shows a 6.5% gain over its predecessor, supported by a better low-light performance and up to 80% bifaciality.

Constructed with 2 mm glass on both sides and weighing 33.5 kg, the module is certified for mechanical loads of 5,400 Pa on the front side and 2,400 Pa on the rear. The embedded TaiRay wafer – developed in-house – adds mechanical strength and resilience against microcracks.

Cheng noted the module's adaptability for demanding environments, including desert installations, offshore arrays, and hail-prone zones. The HPBC 2.0's inherent shading tolerance, where individual cells can be bypassed instead of full substrings, contributes to energy yield and fire safety.

Dante Zeng, Product Marketing Manager at LONGi, introduced the company's Hybrid Interdigitated Back-Contact (HIBC) module that combines HJT with TOPCon technology for passivating the contacts, which has a rated power output of over 700 W and up to 25.9% efficiency. LONGi says this module builds on its lab achievement of 27.81% cell efficiency, verified by Germany's ISFH.

Zeng highlighted the module's durability features, such as a high resistance to water vapor and a temperature coefficient of -0.24%/°C, which enhance its output in humid and hot climates. The rear-side interconnection design and TaiRay wafer improve crack resistance under stress.

Zeng also discussed the Hi-MO X10 Guardian LR7-72 HVHF, a 144-cell HPBC 2.0 module built for commercial and industrial rooftops. Measuring 2,382 × 1,134 mm and weighing 28.5 kg, the module includes a specialized frame with no front edge on the short side, which reduces dust accumulation. This model also features anti-shading and fire-prevention properties, making it suitable for low-tilt rooftops and metal surfaces. Zeng said this module is a mainstream product for LONGi in 2025, with a projected production volume exceeding 70 GW.

While LONGi states that all the above-discussed products, except for the HIBC module, are commercially available, the products do not meet the commercialization criterion for inclusion in the TaiyangNews TOP SOLAR MODULES yet. At present, the company is represented by a 24.2% efficiency product in the list. That said, the company is in the process of updating proof of commercialization data for higher efficiency products, which may be reflected in the coming editions.

During the TaiyangNews PV System Technology Trends Conference 2025, Cheng also presented on the topic 'BC Module with Record Efficiency for PV Future', showcasing the same Hi-MO 9 module. He reiterated LONGi's progress with HIBC technology, which has achieved a certified cell efficiency of 27.81%, and highlighted a record 34.85% efficiency for a silicon–perovskite tandem solar cell. Given these results and the advantages of BC, LONGi plans to continue developing this architecture as its core technology. With 30 GW of BC shipped in 2024 and 40 GW already on order, the company has set ambitious targets of 800 W+ tandem modules by 2030 and 900 W+ by 2031.

AIKO Presents 3rd-Gen ABC Modules and Smart Technologies

At Intersolar Europe 2025, AIKO presented several new products, including the 3rd generation of its All Back Contact (ABC) modules, smart functionalities, and real-world performance tests. Speaking to TaiyangNews at the company's booth, Christian Peter, Managing Director of AIKO Solarlab and AIKO Energy, elaborated on the latest product developments and the company's approach to technology advancement.

AIKO's booth featured its flagship ABC modules. One of the highlights was the new INFINITE module, which builds on the ABC cell platform with notable module-level enhancements. Repositioning the string connectors to the back, which is inherent to BC, and reducing the inter-cell gaps were identified as 2 key improvements, "increasing the active area and minimizing dead space, pushing the efficiency further," according to Peter. The module applies near-gapless technology, with no gap between cells of the same string and only a slight gap between strings. The 3rd generation product line has a rated efficiency of up to 25%, compared to 24.3% for the previous generation.

AIKO also introduced its 'Intelligent Module', which integrates a junction box with real-time monitoring of voltage, current, and temperature. Data transmission takes place through the standard power cable, avoiding the need for extra connectors or external optimizers. "This was a direct response to customer demand for better O&M optimization," said Peter. He added that this technology can be implemented across all AIKO modules during production.

BC Module: AIKO showcased dual-glass module delivers 485 W of output at 24.3% efficiency during the Intersolar Europe 2025.

The company's booth also featured demonstrations of conditions such as partial shading, micro-cracks, and hotspots. A live impact test compared the robustness of ABC cells to conventional n-type TOPCon cells. When a 2 kg weight was dropped on unencapsulated cells, the TOPCon cell shattered completely, while the ABC cell sustained only localized damage. Measured current dropped 35% for the TOPCon cell and 16.5% for the ABC cell. Peter explained that ABC cells experience less mechanical stress because all contacts are placed on the backside, which improves resistance to microcracks and long-term reliability. In contrast, contacts on both sides of TOPCon cells create higher stress at the edges during interconnection.

On efficiency and cost optimization, Peter remarked: "If there were easy wins, everyone would already be doing them." Current development work focuses on reducing silver consumption by shifting toward copper, improving passivation layers, and raising factory yields. High yield, he added, is one of the most important factors for cost reduction, requiring experience and detailed engineering.

In addition, AIKO also promoted the NeoStar 3P+54 AIKO-A485-MCE54Dw dual-glass module series. Based on BC cell technology with 108 half-cut cells, this product reaches a maximum output of 485 W and an efficiency of 24.3%.

Measuring 1,762 × 1,134 × 30 mm with a weight of 24.2 kg, the NeoStar is positioned for Europe's distributed generation market. It is built with 2 mm dual-glass structure and black anodized aluminum to meet the needs of the applications. The module is certified to withstand mechanical loads of 5,400 Pa on the front and hail impact using 23 mm hailstones at 23 m/s. It is offered with a standard 15-year product warranty, extendable to 25 years, and a 30-year linear performance warranty.

At SNEC 2025 in Shanghai, AIKO presented its ABC module portfolio under the theme "Pioneering the 25% Efficiency Revolution." The company highlighted a full-scenario lineup covering the modules for residential, commercial, and utility-scale applications. A key focus was the unveiling of its mass-produced ABC module with a record efficiency of 24.4%, which received the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence. AIKO also noted new project deployments, such as Comet 2U 660 W BC modules in Japan. In addition, during SNEC 2025, the company signed cooperation agreements with multiple domestic and international partners, totaling over 2 GW.

During the event, AIKO President and Founder Gang Chen spoke with TaiyangNews Managing Director Michael Schmela as part of the SNEC Solar Leadership Conversations 2025. Chen

noted that AIKO has led the TaiyangNews TOP SOLAR MODULES Efficiency Ranking for over 27 consecutive months, with the company's current ABC module efficiency at 24.4%.

Chen explained that AIKO's average efficiency has now reached 25.3%, while the theoretical maximum for BC technology is about 29.5%. He added that ongoing development work is directed at improving interconnection and reducing losses at both the cell and module levels.

During the TaiyangNews PV Systems Technology Trends Conference, Claudio Martins Godinho, AIKO's Europe Service Director, presented the company's latest module portfolio in the presentation titled Evolution of AIKO ABC Technology, reflecting the company's key exhibits at SNEC 2024.

AIKO	
Product Series	**Neostar**
Model name	3P+54 AIKO-A485-MCE54Dw
Wafer type	n-type
Cell technology	BC
Cell size	–
No. of cells	108
Module technology	Backcontact, Glass-Glass, Halfcells
No. of busbars	MBB
Glass Thickness (front/rear)	2.0 / 2.0 mm
Maximum power (Pmax)	485 W
Module efficiency STC	24.3%
Bifaciality	–
Dimensions	1,762 × 1,134 × 30 mm
Weight	24.2 kg
Product Warranty	15 Years
Performance Warranty	30 Years
Application	Distributed Generation
Commercial Availability	Yes
Focused Regions For Commercialisation	EU & Australia

Graphic: TaiyangNews

For the residential segment, he introduced the Infinite series in 54-cell formats, available in both bifacial and monofacial versions with an all-black appearance. These modules, measuring 1,762 × 1,134 × 30 mm, deliver efficiencies of up to 25%. They feature a temperature coefficient of -0.26%/°C and a guaranteed degradation rate of no more than 1% in the first year and 0.35% annually thereafter.

In the C&I sector, Godinho highlighted the Comet and Nebular product lines. The AIKO-G-MCH72Mw is a 72-cell monofacial module from the Comet series with dimensions of 2,382 × 1,134 mm, while the AIKO-A-MAH54Tm is a 54-cell Nebular module measuring 1,762 × 1,134 mm. Both carry the same reliability features as the residential products.

For utility-scale projects, he presented the Polaris and Sirius modules. These modules, sized at 2,382 × 1,134 × 30 mm, reach power outputs of up to 655 W with efficiencies of 24.2%. Given their key characteristics, these modules, with a rated bifaciality of about 75%, are promoted as suitable for the utility sector. They are built with durability-focused features such as high water-resistance encapsulation, anti-corrosion frames, and waterproof caps. However, their reliability features match the abovementioned products.

All the products discussed above are commercially available and, indeed, AIKO tops the latest TaiyangNews TOP SOLAR MODULES listing with a 24.5% ABC product. The company has been the top seed since its debut in March 2023. Naturally, the company was the first to qualify for the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence.

AIKO

Vertical PV and Pre-Commercial Tandem Modules

At Intersolar Europe 2025, Huasun Energy presented its latest advancements in HJT, focusing on market-specific innovations and next-generation tandem solutions. Speaking to TaiyangNews, Christian Comes, Director of Business Development, Europe, at Huasun Energy, highlighted 2 key directions in the company's product roadmap.

Addressing market challenges such as midday price drops in countries like Germany and Spain, Huasun promoted east-west vertical installations that shift energy generation to early morning and late afternoon periods. The company's Kunlun G12R module is designed specifically for vertical installations. The series features HJT cells that are light-sensitive on both front and rear sides with nearly equal effectiveness, delivering a bifaciality close to 100%. Comes said that such high bifaciality is crucial for maintaining total energy yield in vertical layouts. The module promoted at the show has a rated output of 570 W and 22.3% efficiency. Huasun states that this design can improve revenue by up to 20% over conventional south-facing systems.

Huasun's Kunlun Series with ultra-high bifaciality was also named a finalist for The smarter E AWARD 2025 in the Photovoltaics category. The shortlisted product, featuring a 3.1 m² surface area, reaches power outputs approaching 770 W corresponding to 24.75% efficiency. The module is built with steel alloy frames and can withstand loads up to 2,400 Pa. Huasun offers a 30-year power output warranty with degradation limited to less than 9.7% over the period. Huasun claims that all of its high-efficiency range of products are commercially available, while we have not received proof of commercialization. Thus, its module with 23.5% is the company's top product in our TOP SOLAR MODULES list. In parallel, the company is in the process of updating proof of commercialization data for higher efficiency products, and the listing may reflect this in the coming editions.

For future product readiness, Huasun showcased a full-size HJT-perovskite tandem module now in pilot production. These modules are expected to exceed 800 W in power and reach efficiencies between 27% and 28%. Huasun adopts a 2-terminal architecture for its perovskite-HJT tandem structure, and with the low-temperature nature of existing HJT manufacturing, the process is highly compatible for tandem integration. The company targets a commercial rollout in the next 2 to 3 years, contingent on stability and reliability improvements, with a dedicated pilot line already established.

In addition, Huasun exhibited its Everest-G12R-96 colored module series aimed at Europe's residential rooftop segment, where visual integration is increasingly valued. Each module in the series comprises 96 G12R half-cut HJT cells with a zero-busbar (ZBB) design, providing up to 410 W of power at an efficiency of 20.5%. The Saddle Brown variant displayed at the show has light transmittance of up to 80% and is framed with a glass-fiber-reinforced polyurethane composite. Measuring 1,762 × 1,134

Taking Part in the Tandem Buzz: Huasun, in addition to showcasing the high-bifacial PV modules for vertical installations, also displayed a full-size tandem product at Intersolar Europe 2025.

HUASUN

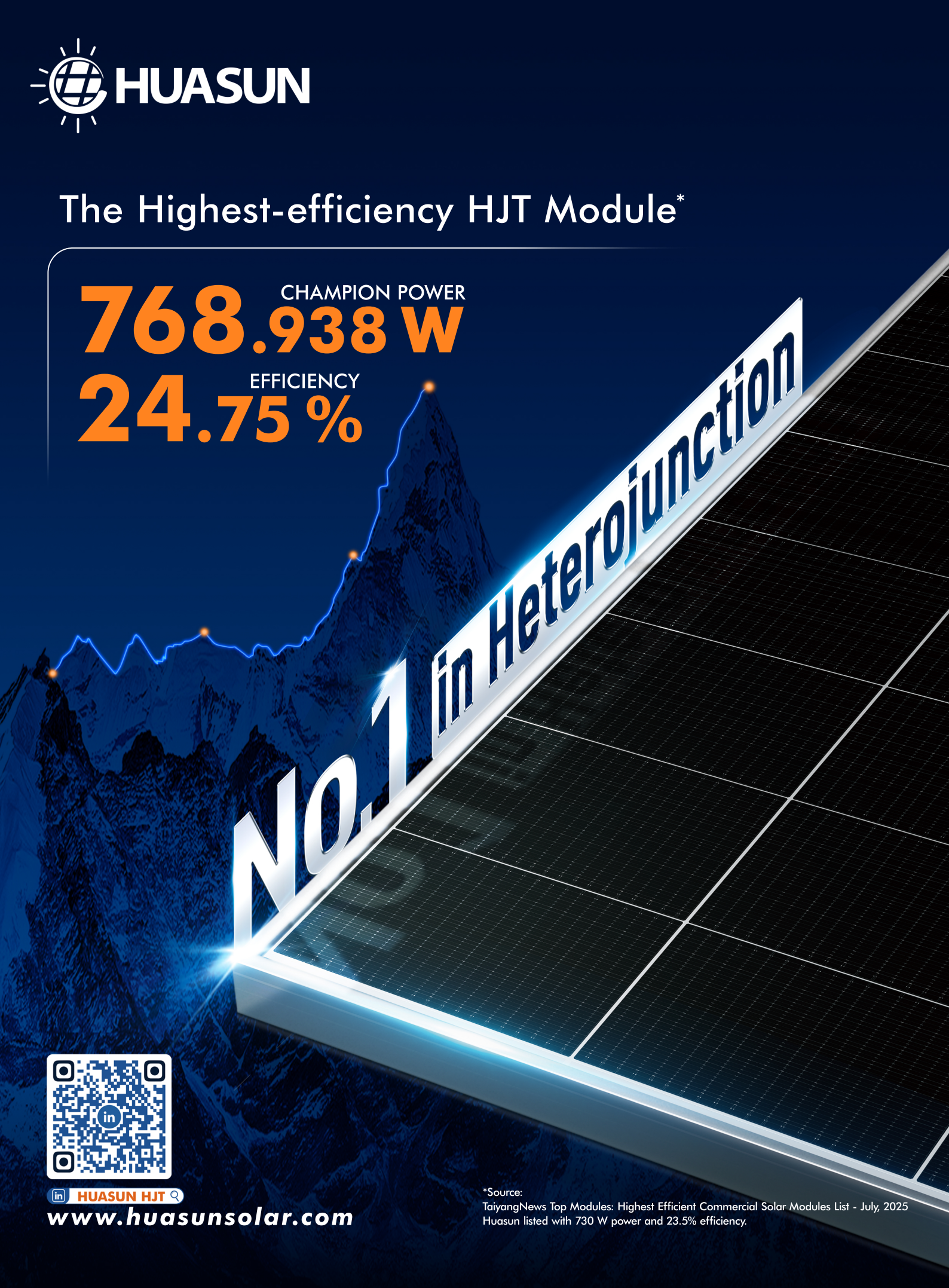
The Highest-efficiency HJT Module*

CHAMPION POWER

768.938 W

EFFICIENCY

24.75 %



HUASUN HJT

www.huasunsolar.com

*Source:
TaiyangNews Top Modules: Highest Efficient Commercial Solar Modules List - July, 2025
Huasun listed with 730 W power and 23.5% efficiency.

Huasun			
Product Series	**Color Module**	**Kunlun G12R**	**Kunlun G12**
Model name	HSN-210R-S96DSC	HSN-210R-B120DSV	HSN-210-B132DSU
Wafer type	n-type	n-type	n-type
Cell technology	HJT	HJT	HJT
Cell size	G12R	G12R	G12
No. of cells	96	120	132
Module technology	Glass-Glass, Halfcell, ZBB	Bifacial, Glass-Glass, Half-cell, ZBB	Bifacial, Glass-Glass, Halfcell, ZBB
No. of busbars	MBB	MBB	MBB
Glass Thickness (front/ rear)	–	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	410 W	570 W	770 W
Module efficiency STC	20.5%	22.3%	24.75%
Bifaciality	–	100%	100%
Dimensions	1,762 × 1,134 × 30 mm	2,249 × 1,134 × 30 mm	2,384 × 1,134 × 30 mm
Weight	23.5 kg	33.3 kg	39.9 kg
Application	Distributed Generation	Agri PV, BIPV & Mobility	Agri PV, BIPV & Mobility
Product Warranty	15 years	15 years	15 years
Performance Warranty	30 years	30 years	30 years
Commercial Availability	Yes	Yes	Yes
Focused Regions For Commercialisation	Europe	Europe	Europe

Graphic: TaiyangNews

× 30 mm and laminated with 2 mm front and rear glass, it weighs 23.5 kg. It is rated for snow loads of up to 5,400 Pa and 2,400 Pa wind. Huasun offers a 15-year product and 30-year performance warranty for this series.

TaiyangNews conducted an exclusive interview with Huasun Energy's Chairman & CEO, Jimmy Xu, at SNEC 2025. He emphasized that Huasun is advancing primarily with perovskite tandems and east–west vertical PV. In Xuancheng, the company operates a tandem lab, a 1 MW trial line, and a 100 MW pilot line, with first modules under outdoor testing and commercialization expected by 2027-2028. As to east-west systems, Xu underscores that vertical PV also offers strong agrivoltaic potential: for example, farmland that traditionally earns about RMB 1,200/mu can instead host roughly 25 kW of vertical modules, producing around 30,000 kWh annually. At SNEC, Huasun was also one of the 10 companies that received the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence.

Comes also emphasized the strategic case for vertical PV at the TaiyangNews PV Systems Technology Trends Conference in a presentation titled: The End of LCOE: Rethink Your PV Plant Design. As mature markets experience midday price collapses and curtailment, he noted that traditional LCOE-driven south-facing systems are increasingly exposed to negative price events. Comes presented comparative modeling, showing that vertical PV systems, based on Kunlun HJT modules with over 95% bifaciality, can deliver up to 21% higher revenue than south-facing plants without storage.

Huasun

Application Scenario-Based Modules and Low-Carbon Products

Leading integrated solar manufacturer JA Solar exhibited its low-carbon PV module for the first time at Intersolar Europe 2025 and a line of application-specific products at SNEC 2025.

Covering the latest event first, JA Solar was awarded the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence at SNEC held in June. Going into details of the products on display, Senior Engineer Weichen Jin, speaking to TaiyangNews, introduced JA Solar's application-scenario-based PV module lineup, which is part of its DeepBlue 4.0 Pro series. The company promotes the JAM66D45/LB model, called DESERTBLUE, for desert installations. Equipped with 132 TOPCon half-cells, this module boasts a power output of up to 650 W and an efficiency of up to 24.1%, according to the datasheet. Sized at 2,382 × 1,134 × 30 mm and laminated with 2 mm front and rear glass, it weighs 34.5 kg. In addition, this double-glass module has a maximum bifaciality of 85%. This module is slated to be commercialized towards the end of 2025.

Meanwhile, with slight tweaks to the abovementioned model's BOM by incorporating 3.2 mm-thick front glass, the company developed a hailstorm resilient variant. This module has similar power and efficiency to DesertBlue. Thanks to design optimization, the module can endure the impact of hailstones up to 55 mm in diameter without failures, said Jin.

For PV installations in the coastal region, the company promoted the JAM66D44/LB model, named OCEANBLUE. This module, featuring 132 half-cells, has a maximum rated power output of 735 W and an efficiency of 23.7%. It consists of 18 busbars, 2 more over DESERTBLUE. It is larger in dimensions at 2,384 × 1,303 × 35 mm, has a 2 mm double-glass construction, and weighs 39.2 kg.

Under the rooftop application category, JA Solar displayed its JAM72S40/MR model. As the name implies, it consists of 72 cells cut in half, or 144 half-cut cells. This module can deliver up to 610 W of power and a maximum efficiency of 23.6%. Smallest among all the DeepBlue 4.0 Pro series models on display, at 2,278 × 1,134 × 30 mm, this module incorporates a 3.2 mm front glass and a backsheet. With a weight of 27.4 kg, it is up to 14% lighter than a comparable dual-glass counterpart, claimed Jin.

JA Solar's booth also featured the latest DeepBlue 5.0 series JAM66D45/LB model. This module has a rated power output of 670 W and an efficiency of 24.8%. It features a multi-cut cell layout, while the other details are open to public yet.

Carbon Focus: JA Solar showcased its Low Carbon PV module for the 1st time, featuring up to 40% lower embedded carbon footprint, at Intersolar Europe 2025.

JA Solar's booth also featured a BC product that is somewhat represent a next generation technology, especially the interconnection part. The ZBB technology the company employed is a true ZBB, which not only eliminates the busbars at cell level, the interconnection is attained without using the wires, but in connecting fingers directly. The module is rated with more than 25% efficiency. The company remarks the product as part of its future technology development without a clear commercialization timeline.

Beyond crystalline silicon (c-Si) based offerings, the company introduced its perovskite/c-Si tandem cell-based module. This module features 32 M12-size perovskite-tandem cells. Although the displayed module's nameplate indicates that the embedded cells have achieved more than 30% efficiency, module-level efficiency was not given. According to Jin, this product's operational stability - up to 10% performance degradation during 10 years of field service - has been validated by a 3rd-party certification agency. The company has one operational pilot line.

JA Solar				
Product Series	**ITS Low Carbon DEEPBLUE 4.0 Pro**			**DEEPBLUE 4.0 Pro Desertblue**
Model name	JAM54D40/LB	JAM54D41/LB	JAM60D42/LB	JAM66D45LB
Wafer type	n-type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	TOPCon	TOPCon
Cell size	182 × 188 mm	182 × 188 mm	182 × 199 mm	182 × 210 mm
No. of cells	108	108	120	132
Module technology	Bifacial, Glass-Glass, Halfcut, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcut, MBB	Bifacial, Glass-Glass, Halfcell, MBB
No. of busbars	16BB	16BB	16BB	16BB
Glass Thickness (front/rear)	1.6 / 1.6 mm	1.6 / 1.6 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	460 W	455 W	540 W	650 W
Module efficiency STC	23%	22.8%	23.1%	24.1%
Bifaciality	80 ± 5%	80 ± 5%	80 ± 5%	80 ± 5%
Dimensions	1,762 × 1,134 × 30 mm	1,762 × 1,134 × 30 mm	2,063 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm
Weight	22 kg	22 kg	28.8 kg	34.5 kg
Application	Utility, Residential, C&I *1	Utility, Residential, C&I *1	Utility, Residential, C&I *1	Utility
Product Warranty	25 years	25 years	12 years	12 years
Performance Warranty	30 years	30 years	30 years	30 years
Commercial Availability	Yes	Yes	Yes	Q4 2025
Focused Regions For Commercialisation	European market	European market	European market	China, Middle East, North Africa & LATAM
Note	*1 carbon-conscious installations	*1 carbon-conscious installations	*1 carbon-conscious installations	

Graphic: TaiyangNews

Jin Gao, Head of JA ESS Solution team, took over from Jin to share some insight on the company's latest BluePlanet series BP-ES-125kW-261kWh ESS solution. Designed for C&I scale storage application, this product, equipped with 5 battery packs, each comprised of 314 Ah capacity lithium iron phosphate (LFP) cells, can store or discharge up to 261 kWh of energy. The nominal charge/discharge rate of the 832 V DC battery bank is 0.5P. Integrated with a power conversion system (PCS), this storage system can deliver up to 125 kW 3-phase AC power to C&I consumers. The PCS has an efficiency level of more than 99%, while the whole system round-trip-efficiency (RTE) is more than 90%. Offered with dimensions of 989 × 1,465 × 2,471.5 mm, Gao characterizes the system as compact footprint. Gao. The system is also modular, enabling to connect up to 20 units in parallel, the storage capacity can be enhanced to a maximum of about 5.2 MWh of energy, says Gao.

At Intersolar Europe 2025, JA Solar displayed the ITS Low Carbon PV module for the first time. Speaking to TaiyangNews, Dylan Middleton, ESG Manager – Sustainability and Supply Chain at JA Solar, shared details of the module designed to meet the rising demand for low-carbon products in the European market.

To address the high emissions typically associated with polysilicon production, the module incorporates solar cells made with up to 50% fluidized bed reactor (FBR) polysilicon, which uses less energy, thus has a low carbon footprint (check GCL's article on p.28). According to Middleton, this shift results in a carbon footprint that is up to 40% lower than conventional PV modules.

In addition to emissions reduction, the company emphasizes recycling and transparency across the manufacturing chain. The ITS Low Carbon approach is being extended across JA Solar's full module portfolio. The company states that its vertically integrated manufacturing, from ingot casting to module assembly, supports traceability, procurement control, and quality assurance. Middleton also noted that JA Solar's carbon footprint claims are based on ISO 14067 standards and have been validated by third-party experts.

Except for the module specifically promoted for desert applications, all the products discussed above are available commercially, according to JA Solar. However, the top of its TOPCon module listed in TaiyangNews TOP SOLAR MODULES is rated with 23.2% efficiency. On other hand, the company is in the process of updating proof of commercialization data for higher efficiency products, which may reflect in the coming editions.

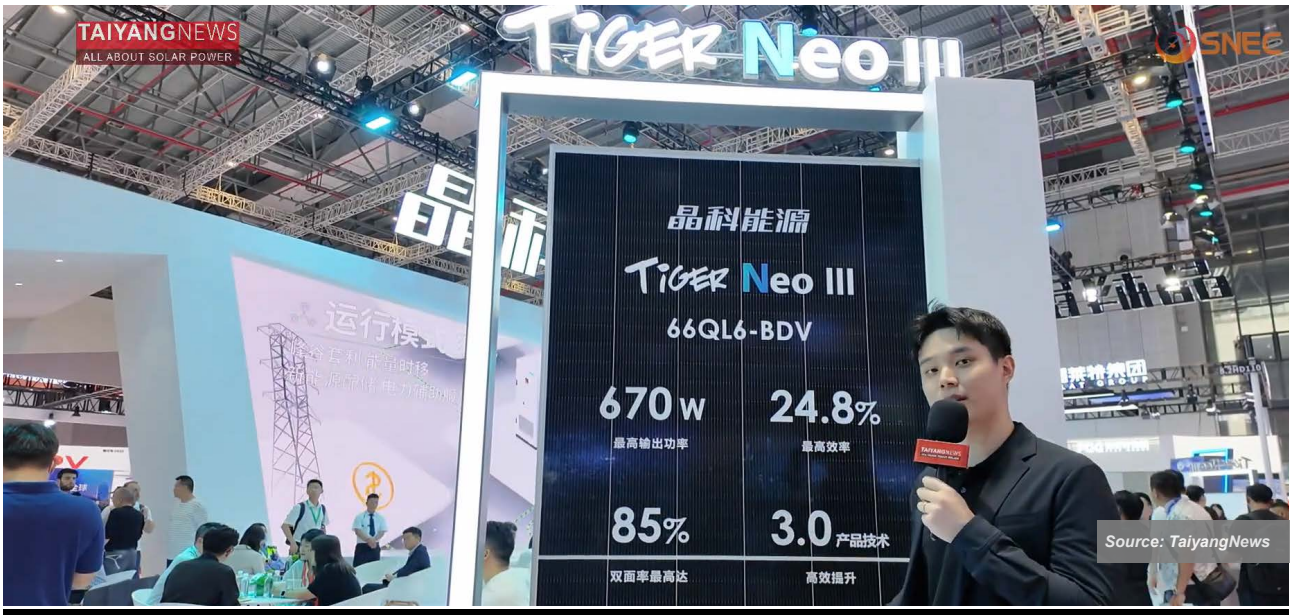
JA Solar

JinkoSolar Showcases Tiger Neo Series and Tandem R&D

At Intersolar Europe 2025, JinkoSolar presented the latest additions to its Tiger Neo TOPCon module range, catering to both distributed generation and utility-scale projects. On display were its dual-glass modules in 48- and 54-cell formats, offered in both monofacial and bifacial variants. These panels incorporate several of the company's latest innovations, including upgraded TOPCon technology called HOT 3.0, metallization enhancement, and 20 slim multi-busbars. Available in 2 frame color options of silver and black, these modules have a rated mechanical load tolerance of +6,000/−4,000 Pa.

Addressing the needs of Europe's DG and C&I consumers, JinkoSolar highlighted its 48-cell and 54-cell dual-glass panels, which are already commercially available. The 48HL4M-BDV bifacial series, comprising 96 half-cut TOPCon cells, delivers up to 470 W of power at 23.52% efficiency, while its monofacial counterpart, the 48HL4M-DV, offers up to 475 W and 23.77% efficiency.

The 54-cell format modules include the 54HL4R-B (all-black monofacial), 54HL4R-(V) (monofacial), and 54HL4M-BDV (bifacial) series. The all-black monofacial 54HL4R-B, assembled with 108 cells, achieves up to 460 W of power with 23.02% efficiency. These modules measure 1,762 × 1,134 × 30 mm with 3.2 mm front glass and weigh 21 kg. The bifacial 54HL4M-BDV, a larger format measuring 1,961 × 1,134 × 30 mm, also built with 108 TOPCon half-cut cells, reaches up to 520 W of power and 23.38% efficiency. All 54-cell models come with a 30-year performance warranty, while the all-black versions carry a 25-year product warranty and the others 15 years.



Covering All Bases: JinkoSolar showcased its latest TOPCon modules in various configurations, suitable for all mainstream segments from DG to utility.

The commercialization details of these modules are unavailable at present, and the company is in the process of updating proof of commercialization. Once available, these modules may qualify for the TaiyangNews TOP SOLAR MODULES listing. The company. is currently represented with a module featuring 23.2% efficiency.

At SNEC 2025, speaking to TaiyangNews, Andy You, Solutions Engineer at JinkoSolar, Jinko presented its upgraded Tiger Neo 3.0 module, developed on its latest TOPCon technology generation characterized as HOT 4.0. The showcased model features 132 half-cut bifacial cells, a 670 W maximum power output, and up to 24.8% efficiency. Bifaciality is rated at up to 85%. Sized at 2,382 × 1,134 × 30 mm with 2 mm glass on both sides, the company says the module also integrates new welding techniques to reduce the risk of microcracks and thermal hotspots. The company expects it to be commercially available by Q4 2025.

JinkoSolar also shared updates on its R&D in tandem solar technology. The company reported achieving 34.22% efficiency and over 2.01 V open-circuit voltage (Voc) for its perovskite-TOPCon tandem cell. It added that in-house damp heat and thermal cycling tests indicated less than 5% degradation, underlining progress toward commercial reliability.

Shayne Li, JinkoSolar's Product Manager, also presented an extended product portfolio titled "N-type and tigerNeo 3.0 Performance: Brightening the Future" during the TaiyangNews PV Systems Technology Trends Conference. Several of these products are designed for specific applications and environmental conditions. For instance, the BDX variants are built to withstand harsh mechanical and weather stress.

For dusty or snowy environments, JinkoSolar introduced an anti-dust module, JKMxxxN-72HL4-(V)-L, with a modified short-frame edge that prevents particle accumulation.

The company highlighted the Neo Marine (BDU) module for floating PV applications. This module uses a corrosion-resistant 20 µm anodized aluminum frame, double-layer coated glass for improved anti-humidity and light transmission, and a POE encapsulant to minimize vapor penetration and mitigate PID. It features reinforced sealing with enhanced silicon adhesive and integrates a TOPCon cell architecture. Additional features include IP68 connectors with fluor rubber sleeves and shrink tubing to protect against UV radiation and water ingress.

JinkoSolar		
Product Series	**Tiger Neo 3.0**	**Tiger Neo**
Model name	66QL6-BDV	JKM630N-66HL4M-BDX
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	–	–
No. of cells	132	132
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Monofacial, Glass-Glass, Halfcell, MBB
No. of busbars	–	–
Glass Thickness (front/rear)	2.0 / 2.0 mm	3.2 / 3.2 mm
Maximum power (Pmax)	670 W	630 W
Module efficiency STC	24.8%	23.32
Bifaciality	80 ± 5%	–
Dimensions	2,382 × 1,134 × 30 mm	2,382 × 1,134 × 35 mm
Weight	32.4 kg	28.2 kg
Application	Utility, C&I	–
Product Warranty	12 years	12 years
Performance Warranty	30 years	30 years
Commercial Availability	Q4 2025	–
Focused Regions For Commercialisation	Global & EU focused	–

Graphic: TaiyangNews

JinkoSolar

DMEGC Solar Presents Infinity RT Series & Special-Application Modules at Intersolar Europe 2025

DMEGC Solar showcased its Infinity RT series, built on TOPCon cell technology, at Intersolar Europe 2025. The modules are designed for utility-scale, distributed generation, residential, and lightweight applications. For large-scale installations, the DMxxxG12RT-B66HSW module features 132 G12R half-cut cells with dimensions of 182 × 210 mm and delivers up to 635 W of power with an efficiency of 23.5%.

The products promoted for the distributed generation are mainly differ by wafer dimension – smaller wafer formats of M10R (182 × 187.5 mm). The company is promoting a total of 3 products for this applications. These include the DMxxxM10RT-B54HBT and DMxxxM10RT-54HSW modules, both equipped with 108 cells and capable of delivering between 460 and 465 W at efficiencies ranging from 23 to 23.3%. A larger variant, the DMxxxM10RT-B60HBT with 120 cells reaches a maximum output of 510 W and 23.1% efficiency.

For residential rooftop applications, DMEGC Solar showcased full-black Infinity RT modules in both bifacial and monofacial configurations. The bifacial model, DMxxxM10RT B54HBB, delivers up to 460 W, weighs 24.5 kg, and is built with dual 2 mm glass layers on the front and rear. The monofacial version, DMxxxM10RT 54HBB, also delivers up to 460 W with a peak efficiency of 23%. The module is built with 3.2 mm glass on front and polymer backsheet on rear accounting to a weight of 20.6 kg. Both modules have a size of 1,762 × 1,134 × 30 mm and offer certified endurance to static snow loads of up to 3,600 Pa on the front and wind loads up to 1,600 Pa on the rear. Each model is accompanied by a 25-year product warranty and a 30-year performance guarantee.

Comprehensive Lineup: DMEGC Solar showcased its expanded Infinity RT module series at Intersolar and SNEC 2025 and highlights 635 W with an efficiency of 23.5% module for large scale installations.

The product lineup also included the lightweight DM465M10RT-54HSW-L, which is approximately 44% lighter than conventional bifacial modules, as well as the compact DMxxxM10T B32HBT module. The latter is a double-glass rooftop solution comprising 64 M10 half-cut cells, measuring 1,542 × 766 × 30 mm and weighing 15.3 kg. It delivers up to 270 W of power with an efficiency of 22.9% and is certified for front and rear load resistance of 8,100 and 4,000 Pa, respectively.

The company also presented special application modules, including agrivoltaics and greenhouse-ready panels designed for controlled light transmission. A greenhouse (GH) module with planned mid-2025 DIBt certification was mentioned for overhead applications like carports and parking structures.

DMEGC Solar noted that its modules targeted at Europe are produced in zero-carbon factories that are powered entirely by renewable energy and utilize PFAS-free materials. The company claims its Infinity and Infinity RT series emit up to 30% less CO_2 over their lifecycle, with a typical carbon footprint below 450 kg CO_2 eq per kWp.

One of the key highlights at the company's SNEC exhibit was once again the Infinity RT Series, but as a future product. The G12RT-B66DSW module, which is expected to achieve up to 660 W of power and 24.4% efficiency in mass production by H1 2026. This target is based on innovations such as a busbar-free (ZBB) design, segmented cell architecture, and advanced stacking processes.

The company also showcased its G12RT-B66HSW dual-glass module, slated to reach 650 W power output and 24.1% efficiency. According to the company, the module features Defect Elimination Technology (DET), described as process and design measures aimed at reducing cell- and module-level imperfections. The module is designed for utility-scale solar projects and is commercially available. The company has reflected its technical advancements at TaiyangNews PV System Technology Trends Conference 2025.

Kinyang Zou, Product Manager at DMEGC Solar, presented the company's latest "Next-Generation of n-type High-Efficiency Solutions" at the TaiyangNews PV System Technology Trends Conference 2025. The presentation largely mirrored the product lineup showcased at recent industry events.

DMEGC Solar is currently transitioning its residential product portfolio from M10R to G12R wafer formats, with average module power output

DMEGC Solar			
Product Series	**Infinity RT**		
Model name	DM660G12RT-B66HSW	DM465M10RT- 54HSW / DM465M10RT-54HBW	DM650G12RT-B66HSW
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	TOPCon
Cell size	G12R	M10R	G12R
No. of cells	132	108	132
Module technology	Bifacial, Glass-Glass, Halfcell,	Glass-Backsheet / Glass-Glass, Halcell, Monofacial / Bifacial, MBB	Bifacial, Glass-Glass, Halfcut, MBB
No. of busbars	16BB	16BB	20BB
Glass Thickness (front/ rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	660 W	465 W	650 W
Module efficiency STC	24.4%	23.3%	24.1%
Bifaciality	80 ± 5%	– / 80 ± 5 %	80 ± 5 %
Dimensions	2,382 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm	2,382 x 1,134 x 30 mm
Weight	32.3 kg	20.6 kg	32.3 kg
Product Warranty	15 years	20 years	15 years
Performance Warranty	30 years	30 years	30 years
Application	Utility	Distributed Generation	Utility
Commercial Availability	Yes	Yes	H2 2025
Focused Regions For Commercialisation	Global	Global	Global

Graphic: TaiyangNews

around 460 W. Technological updates include the implementation of poly finger structures in TOPCon cells to reduce parasitic absorption and series resistance, as well as the use of 1/3 and 1/4 cell cutting techniques to improve current collection and module performance. The company is also pursuing a ZBB approach under its IFC (Installer Friendly Concept), combining overlapping cell layouts with single ribbon connections to streamline module integration. Beyond standard residential products, the portfolio includes specialized modules such as ultra-black designs for aesthetic integration, modules with reinforced mechanical properties for hail-prone regions, anti-glare surfaces for sensitive sites, and lightweight modules for improved handling. DMEGC Solar also introduced a light-transmitting AgriPV module with variable transmittance between 3% and 50%, aimed at enabling dual land use in solar-agriculture applications.

DMEGC Solar claims all these products are available commercially, however, the company is represented with 23% efficient TOPCon module in TaiyangNews TOP SOLAR MODULES listing. However, the company is in the process of updating proof of commercialization data for higher efficiency products, which may reflect in the coming editions. At SNEC 2025, DMEGC Solar was also awarded the TOP SOLAR MODULES 2024 Badge of Excellence. The recognition for the company's consistent performance, with its high-efficiency modules ranking among the global Top 10 in TaiyangNews' monthly TOP SOLAR MODULES listing for at least 6 months.

DMEGC Solar

Trinasolar Unveils Module Solutions for Extreme Weather

Trinasolar showcased its latest modules designed to withstand harsh environmental conditions at Intersolar Europe 2025. Among the highlights at its booth were the Vertex S+ Shield (NED9R.28) and Vertex N Shield (NED19RC.20), and a new addition to the Honey series, the NEG9M4C.26 dual-glass module.

For utility-scale applications, Trinasolar presented the Vertex N Shield NED19RC.20 module, built with a 25% thicker-than-standard front glass and a reinforced frame structure. According to the company, this module offers up to 2.5 times greater resistance to impact compared to conventional designs and is certified to withstand hailstones as large as 75 mm in diameter. The mechanical load ratings reach +8,000/-6,000 Pa for fixed-tilt installations and +3,600/-3,000 Pa for tracking systems. The module boasts a power rating of 670 W and a very high efficiency of 24.8%. The same module was also presented at SNEC 2025. While Trina says that all these products are available commercially, it is currently represented by a 23% efficiency TOPCon module in the TaiyangNews TOP SOLAR MODULES listing. However, the company is in the process of updating proof of commercialization data for these products, and this may be reflected in future editions.

For rooftop applications, the company promotes Vertex S+ Shield NED9R.28. This dual-glass module is built with 144 half cells interconnected in a 14-busbar layout. It has a rated power output of 470 W and an efficiency of 23.5%. It measures 1,762 x 1,134 x 30 mm and weighs 27.5 kg. The company offers a 15-year workmanship warranty and a 30-year performance warranty on this module, which is expected to be available in Q3 2025 in Switzerland, Germany, and the Scandinavian peninsula.

The new Honey NEG9M4C.26 module is designed as a replacement for Trinasolar's earlier Honey modules and other similar 60-cell format products. Calling it compact, durable, and easy to install, the company promotes it especially for repowering applications in tight or space-limited rooftop environments. The dual glass module comes with broad inverter compatibility to facilitate easy integration into both legacy and new systems. At SNEC, Trinasolar also exhibited a 760 W module with an efficiency of 24.5%. Among the key highlights for the company at the show was that it received the TaiyangNews TOP SOLAR MODULES 2024 Badge of Excellence, recognizing its consistent performance

Shielded Strength: Trinasolar unveiled the Shield variants of its product series that provide enhanced durability with thicker glass that enhances mechanical stability and hail resistance. Pictured are the Vertex S+ Shield, Vertex N Shield, and Honey dual-glass modules at Intersolar Europe 2025.

Trinasolar		
Product Series	**Vertex S i-TOPCon Shield**	**Vertex N i-TOPCon Ultra Shield**
Model name	TSM-NED9R.28	TSM-NED19RC.20
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	G12	G12
No. of cells	144	132
Module technology	Bifacial, Glass Glass, Halfcell, MBB	Bifacial, Glass Glass, Halfcell, MBB
No. of busbars	14BB	16BB
Glass Thickness (front/rear)	–	–
Maximum power (Pmax)	470 W	670 W
Module efficiency STC	23.5%	24.8%
Bifaciality	–	85 ± 5%
Dimensions	1,762 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm
Weight	27.5 kg	39.7 kg
Application	Rooftop	Ground-mounted
Product Warranty	15 years	12 years
Performance Warranty	30 years	30 years
Commercial Availability	Q3 2025	Yes
Focused Regions For Commercialisation	Switzerland, Germany and Scandinavian Peninsula	Europe, Asia-Pacific, Middle East Asia and Latin America.

Graphic: TaiyangNews

among the global Top 10 in TaiyangNews' monthly TOP SOLAR MODULES listing.

The other highlights of the company were in line with the company's presentation at the TaiyangNews PV Systems Technology Trends Conference 2025. Rui Xia from Trinasolar presented the key highlights of lab achievements. Top of the list is its perovskite/silicon tandem technology, for which the company reported certified cell efficiencies of 31.1% and 32.2% on large-area 210 mm wafers, independently confirmed by Fraunhofer ISE.

At the module level, Trina achieved a certified efficiency of 30.6% on a 1,185.6 cm² area. This result was based on stabilized MPP tracking and enabled by process innovations such as low-temperature (<100°C) encapsulation, room-temperature interconnections, and hybrid additives for improved perovskite film quality.

Rui has also introduced tandem modules at standard industrial dimensions of 2,384 × 1,303 mm. The initial model reached 808 W in November 2024, with certified upgrades to 829 W in May 2025. The latest iteration, internally tested, achieved 841 W. Trinasolar also exhibited an industrial-standard perovskite tandem module with a proclaimed new world-record-breaking 841 W at SNEC, which it said gained a lot of traction. These modules use 210 half-cut tandem cells with dual-layer metallization to reduce contact resistivity.

Trinasolar

JA SOLAR

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Unanimous recognition from global customers with products distributed across 178 countries and regions

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Typhoon-Proof
Plateau
Offshore
Extreme Cold
Light Weight
Anti-Glare
Desert
Anti-Flare
Heat & Humid

A One-Stop Shop: GCL SI's Product Range at Intersolar & SNEC 2025

GCL System Integration (GCL SI), a vertically integrated PV company, showcased a comprehensive lineup of innovations at Intersolar Europe and SNEC 2025, spanning low-carbon polysilicon, advanced solar modules, tandem technologies, and energy storage systems. Speaking to TaiyangNews, Philipp Matter, President of Europe & Americas and Vice President of the Global Sales & Marketing Center at GCL SI, outlined the company's latest developments across perovskite modules, back-contact technology, digital traceability tools, and low-carbon silicon production.

Among the exhibits were GCL's large-format single-junction perovskite module and a 4-terminal perovskite/crystalline silicon tandem module. The single-junction design, with dimensions of 2,000 × 1,000 mm, achieves up to 19.04% steady-state efficiency. The tandem variant, using a perovskite-on-glass overlay atop a crystalline silicon base, reaches 26.36% efficiency on a 1.71 m² area. GCL announced that it signed its first commercial supply and testing agreement for perovskite modules with a European partner during the event. Its current 100 MW perovskite production capacity is expected to expand to 500 MW by Q4 2025. This single junction perovskite module is commercially available for sampling only for special partners.

The company also showcased its BC module for residential use, rated at 480 W power and 24.8% efficiency. While the product is already available in China, a European release is scheduled for September 2025. It is still evaluating the large-scale deployment of BC across various markets.

GCL SI's SiRo platform, a blockchain-integrated traceability solution that links each PV module to a QR code, was also featured during the event. This system enables transparent tracking of carbon footprint and supply chain origin, addressing emerging compliance requirements in ESG-conscious markets.

Speaking to TaiyangNews at SNEC 2025, Vitor Rodrigues, Technical Director for EU and LATAM at GCL SI, highlighted the company's granular polysilicon produced using fluidized bed reactor (FBR) technology. The process is a less carbon-intensive alternative to the mainstream Siemens process. According to the company, this method results in up to 74% lower carbon emissions, enabled by a lower operating temperature of 700°C compared to 1,100°C in the Siemens process and a more continuous production flow. The granular silicon also enhances processing and logistics through its spherical product form. GCL currently maintains an annual capacity of 480,000 tons.

Comprehensive Representation: GCL SI presented advancements from perovskite and BC modules to low-carbon FBR silicon and traceable solar tech at Intersolar Europe and SNEC 2025.

GCL SI				
Product Series	**TOPCon 2.0**	**GPC 2.0**	**Single Junction Perovskite Module**	
Model name	NT12R/66GDF	NR12R/66GDF	KSXX-N-300	XXGD-S-480
Wafer type	n-type	n-type	Perovskite	Perovskite
Cell technology	TOPCon	BC	Single Junction Perovskite	Single Junction Perovskite
Cell size	G12R	G12R	–	–
No. of cells	132	132	–	–
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Perovskite Module	Perovskite Module
No. of busbars	16BB	MBB	–	–
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	–	–
Maximum power (Pmax)	650 W	660 W	315 W	480 W
Module efficiency STC	24.06%	24.43%	–	17.40%
Bifaciality	80 ± 5 %	70 ± 5 %	–	–
Dimensions	2,382 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm	2,005 × 1,005 × 35 mm	2,405 × 1,155 × 35 mm
Weight	32.6 kg	33.5 kg	34.5 kg	45 kg
Application	Utility	C&I	–	–
Product Warranty	12 years	15 years	10 years	–
Performance Warranty	30 years	30 years	10 years	–
Commercial Availability	Sep-25	Oct-25	Yes: 1.71 m²; Q4 2025: 2.76 m²	Yes: 2 m²; Q4 2025: 2.76 m²
Focused Regions For Commercialisation	Global	Europe	–	–

Graphic: TaiyangNews

Among the showcased products, GCL's NT12R-66GDF, part of its upgraded module series trickily named as TOPCon 2.0, uses 132 G12R half-cut cells and delivers up to 660 W with 24.06% efficiency. The double-glass module, with 2 mm front and rear glass, measures 2,382 × 1,134 × 30 mm and weighs 32.6 kg. It has a rated bifaciality of up to 90%. The design incorporates non-destructive half-cell cutting and is intended for operations in extreme weather conditions, such as heavy snowfall and high wind flow. The module is slated for commercial availability in September 2025.

Also on display was GCL's GPC 2.0 series BC module NR12R-66GDF, built with 132 G12R half-cut cells like the module mentioned above. The version highlighted in the datasheet achieves up to 660 W output with 24.43% efficiency. It also shares the dimensions with the TOPCon module above, but weighs slightly more at 33.5 kg. The module is bifacial too, with a rated bifaciality of 75%. Both these modules are accompanied by a 30-year linear power warranty. The BC module includes a 15-year product warranty with an annual degradation rate of 0.35%, while the TOPCon version carries a 12-year product warranty and an annual degradation rate of 0.40%. GCL SI expects its BC module to hit the market by the beginning of Q4 2025.

Rodrigues also highlighted the company's silicon-perovskite tandem modules, which are different from those exhibited at Intersolar. The company's booth at SNEC showcased 2 sizes: 2,400 × 1,150 mm with 29.51% efficiency, and 2,000 × 1,000

mm with 26.36% efficiency. Both use a 4-terminal structure, with perovskite-on-glass layered atop a BC silicon module. These modules have received IEC certification.

Rodrigues also presented "GCL's Modules with Built-in Traceability and Carbon Data" during the TaiyangNews PV Systems Technology Trends Conference. He reiterated the company's advancements in TOPCon and BC modules. Rodrigues further outlined GCL's roadmap for silicon-perovskite tandem modules, indicating a 2 GW tandem module facility is under development, with commercial availability expected in the second half of 2026.

Energy Storage Systems

Expanding its clean energy portfolio, GCL showcased its energy storage systems. The booth featured the G-Power Max containerized system rated at 6.25 MWh for utility-scale applications, and the G-Power Core 261 cabinet for C&I use. These storage systems complement GCL's production of lithium iron phosphate, a key material used in battery manufacturing.

GCL SI

Tongwei Solar's Latest TOPCon Products Based on Several Cell-Level Upgrades

At Intersolar Europe 2025, Tongwei Solar hosted its TNC 2.0 Global Launch Event to unveil its upgraded TOPCon cell technology and associated module portfolio. Tongwei's TOPCon platform, referred to as TNC, has reportedly been enhanced in several aspects under the new TNC 2.0 generation.
The most significant is the adoption of rear poly fingers, where the rear polysilicon layer is applied in a patterned layout precisely under the metal fingers, avoiding its presence in non-contact areas to minimize parasitic absorption and improve bifaciality, which is claimed to reach up to 88%.
The other improvements include edge passivation and stencil printing. At the module level, Tongwei has implemented ZBB technology it calls 908 Technology, which removes the need for soldering pad points along busbars, reducing shadowing as well as silver consumption per cell.

According to Xing Guoqiang, Chief Technology Officer at Tongwei, one of the improvements involves the application of an aluminum oxide (Al_2O_3) film along the laser-cut edges of half-cut cells – a technique the company refers to as Tongwei Passivation Edge (TPE). The company says that this helps reduce carrier recombination losses in defect-

Source: Tongwei Solar

TNC Upgrade:Tongwei Solar launched solar modules based on its upgraded TOPCon technology called TNC 2.0, featuring rear poly fingers, edge passivation, stencil printing, and ZBB, at Intersolar Europe 2025.

Tongwei Solar		
Product Series	**TNC 2.0**	
Model name	TWMNH-66HD	TWMNF-66HD
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	G12R	G12
No. of cells	132	132
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	650 W	750 W
Module efficiency STC	24.1%	24.1%
Bifaciality	80 ± 5%	80 ± 5%
Dimensions	2,382 × 1,134 × 30 mm	2,384 × 1,303 × 33 mm
Weight	32.2 kg	37.3 kg
Application	Utility, C&I	Utility
Product Warranty	12 Years	12 Years
Performance Warranty	30 Years	30 Years
Commercial Availability	Yes	Yes
Focused Regions For Commercialisation	Global	Global

Graphic: TaiyangNews

prone areas. In terms of metallization, the company has introduced stencil printing using a steel-based stencil screen without crossover mesh wires. This results in finer finger widths and improved aspect ratios, enabling lower shading losses and better current collection.

Additionally, Tongwei introduced 2 module types based on the TNC 2.0 cells at the event. The TWMNH-66HD and TWMNF-66HD. The former features 132 cells based on the G12R wafer format, and is rated for a power output of up to 670 W and an efficiency of up to 24.8%. The TWMNF-66HD variant, made of 132 G12-sized half-cut cells, is rated for a maximum 765 W of power and 24.6% efficiency. As mentioned above, these modules feature an enhanced bifaciality of up to 88%.

However, in response to our query for further details, the company altered the specification to 24.1% efficiency with 2 different power ratings of 750 W and 650 W, which are claimed to be commercially available. In the TaiyangNews TOP SOLAR MODULES listing, Tongwei is represented with a 23% efficiency product, as we have yet to receive proof of commercialization for this latest product range.

In terms of certifications, Tongwei was awarded IEC TS 62994:2019 and UK MCS certifications by TÜV Rheinland during the launch ceremony, recognizing the product's compliance with lifecycle, environmental, and safety standards. In addition, the company released its 2024 ESG Report and introduced the Global Sustainable Partnership Program. Speaking at the event, Zhu Zihan, Chief Sustainability Officer, presented Tongwei's 3S ESG management system and outlined long-term climate targets. The company also received the AA1000 Assurance Statement from TÜV Rheinland, acknowledging its transparency in sustainability reporting and corporate governance.

The company presented the same technology platform, TNC 2.0, at SNEC 2025, and also highlighted it at the TaiyangNews PV Systems Technology Trends Conference. Aran Huang from Tongwei Solar's Overseas Technical Support team presented "TNC 2.0: Taking the PV Industry to the Next Level". With its upgraded TNC 2.0 technology, company targets a cell efficiency of 26.5%. Aran also shared updates on the company's HJT product range, called THC, which reportedly achieved a peak output of 790.8 W with 25.46% efficiency.

Tongwei was also awarded the TaiyangNews Top Solar Modules 2024 Badge of Excellence at SNEC, with both its TNC and THC product lines ranked among the top 10 most efficient mass-produced modules globally – making Tongwei the only company with 2 series on the list, the company underscored.

Tongwei Solar

Jetion Solar Presents High-Efficiency Products for Different Scenarios

Jetion Solar highlighted its advancements across both TOPCon and HJT technology at both the major industry exhibitions – SNEC in Shanghai and Intersolar Europe in Munich. The company presented a diversified product lineup designed to address utility-scale, rooftop installations, and applications requiring lightweight or flexible solutions.

At SNEC, the spotlight was on products tailored for different deployment scenarios. Top of the shelf was a flexible TOPCon module rated up to 580 W with 23.5% efficiency, featuring a lightweight structure of 2.7 kg/m2, making it suitable for rooftops and projects where load restrictions apply. Jetion displayed another weight-optimized product – JT SEt(L)-182T108S – specifically targeted at rooftops and buildings with limited load capacity. The module has a comparatively lower power rating of 420 W to 440 W and a maximum efficiency of 22.5%. However, a few parameters of the module are unclear – the cell technology and whether it is flexible. Measuring 1,721 × 1,133 × 19.3 mm, it has

Source: Jetion

Weight-Watching: While Jetion displayed modules for all mainstream applications at recent leading solar shows, lightweight products – such as the flexible module shown here – remained central to its promotion.

Jetion			
Product Series	**Flexible**	**Jenius**	
Model name	XSFM-580-TD	JT SEt(L)-182T108S	JT SLK(B)-210H132
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	HJT
Cell size	–	M10	G12
No. of cells	–	108	132
Module technology	–	Halfcell, MBB	Bifacial, Halfcell, MBB
No. of busbars	–	MBB	MBB
Glass Thickness (front/ rear)	–	3.2 / - mm	2.0 / 2.0 mm
Maximum power (Pmax)	580 W	440 W	740 W
Module efficiency STC	23.50%	22.50%	23.80%
Bifaciality	–	–	90±5%
Dimensions	–	1,722 × 1,134 × 30 mm	2,384 × 1,303 × 33 mm
Weight	2.7 kg/m²	20.9 kg	36.4 kg
Product Warranty	–	–	–
Performance Warranty	12 years	12 years	15 years
Application	25 years	25 years	30 years
Commercial availability	–	–	–
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

a density of 3.4 kg/m2 due to a slightly higher overall weight of 13.1 kg. For large-scale projects, the company is promoting JT SLB(B)-182T132, also built on the TOPCon technology platform. The module has a rated power range of 610 W to 630 W and a top efficiency of 23.3%. Among its key elements, the company emphasized its optimized size, whose benefits can be seen in container capacity utilization and logistics handling, apart from system-level cost considerations.

In addition to these TOPCon products, the company also presented a HJT module, the JT SLK(B)-210H132, built with a fiberglass frame and designed for outputs in the 690 W to 740 W range at 23.8% efficiency. The design, according to the company, enhances durability, provides resistance to harsh environments, and incorporates recyclable materials.

At Intersolar Europe, Jetion Solar displayed a similar lineup, reiterating its focus on high-efficiency and application-specific products. Once again, the company displayed its HJT and TOPCon modules for utility applications. For rooftop applications, the company presented another lightweight variant, the JT SEL(L)-182T108S. While offering the same electrical characteristics of 440 W power and 22.5% efficiency, the module is marginally different in dimensions, at 1,722 × 1,134 × 30 mm, and weighs 20.9 kg. Jetion provided additional information on the module build – dual-glass construction, aluminium frame, and a patented clamp system. All these are aimed at easing the mounting and reducing the structural load on buildings, emphasizes Jetion.

The commercialization status of these products is unknown. What is certain, however, is that they are not included in the TaiyangNews TOP SOLAR MODULES listing, where the company is currently represented with a 22.9% efficiency TOPCon module that meets the criteria.

Jetion

DAS Solar Presents Comprehensive Technology Portfolio and All-Scenario Solutions

At SNEC 2025, DAS Solar presented a broader portfolio structured around its 'One Core, Three Branches' strategy, covering ecological, floating, and urban PV applications, according to the company's official press release. By 'ecological', the company means products for diverse geographical application scenarios. However, the company does have an environmentally friendly product in its portfolio. One of its flagship products on display at the booth was a 745 W large-format module with a steel frame and 23.4% efficiency. The steel frame is not only more environmentally friendly, offering 80% lower carbon emissions than aluminum, but also provides superior corrosion resistance and self-healing edge protection through zinc-aluminum-magnesium coating. These characteristics make it ideal for utility installations, according to the company. It stated that the module is available commercially in 2025, but did not specify whether it is currently available or will be available soon. Currently, the company is represented by a 22.5% efficiency TOPCon product in the TaiyangNews TOP SOLAR MODULES listing, as we await proof of commercialization for its latest high-efficiency products.

Next gen technologies: DAS Solar also promoted products based on its BC technology by combining TOPCon tunnelling oxide layers with full-area passivated contact structures. Claiming it has been working on this front for over half a decade, it adds that its BC technology is now represented with module efficiency reaching 24.8% and cell efficiency exceeding 27.2% in mass production. The DBC series is also equipped with advanced electrical safety features, including string-level arc fault protection and module-level rapid shutdown, reducing voltage to 0 V within 1 second – a key innovation to address fire safety risks in PV systems.

DAS Solar also displayed its 4-terminal perovskite-silicon tandem module. This prototype module, representing the company's R&D effort in next-generation technologies, has a rated power of 755 W of power output and an efficiency of 26.8%.

Flexible mounting solutions: Addressing diverse geographical applications scenarios, which the company characterizes as 'ECO PV scenario solution area', DAS Solar presented its flexible mounting system for ecological scenarios such as deserts, hills, and farmland. Using pre-stressed cable structures, the mounting system offers high wind resistance, large spans, and elevated clearance, ideal for uneven terrain. According to the company, the slide-in module installation method increases installation efficiency while reducing system costs. Compared with traditional mounting, this flexible

Source: DAS Solar

Now, Next and Beyond: DAS Solar's product showcase represented the present with TOPCon, the near future with BC, and the next generation with Perovskite.

DAS Solar				
Product Series	**Bifacial Double Glass (Black Frame)**	**Bifacial Double Glass**	**Diamond**	**Bifacial Double Glass**
Model name	DAS-DH96NE	DAS-DH132NE	DAS-DH132TE	DAS-DH156NF
Wafer type	n-type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	BC	TOPCon
Cell size	G12R	G12R	G12R	G12R
No. of cells	96	132	132	156
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Back Contact, Bifacial, Glass-Glass, Halfcells, MBB	Bifacial, Glass-Glass, Halfcells, MBB
No. of busbars	16BB	16BB	MBB	18BB
Glass Thickness (front/rear)	1.6 / 1.6 mm	2.0 / 2.0 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	460 W	630 W	645 W	745 W
Module efficiency STC	23%	23%	23.9%	23.4%
Bifaciality	80%	80%	70%	80 ± 5%
Dimensions	1,762 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm	2,446 x 1,303 x 30 mm
Weight	23.5 kg	31.9 kg	31.9 kg	40.1 kg
Product Warranty	25 years	15 years	15 years	15 years
Performance Warranty	30 years	30 years	30 years	30 years
Application	Residential, Architecture	Utility, C&I	Utility, C&I	Utility
Commercial Availability	2025	2025	2025	2025
Focused Regions For Commercialisation	Overseas	Overseas, China	Overseas, China	Overseas, China

Graphic: TaiyangNews

design saves more than 25% in land use, according to the company.

At the event, DAS Solar also introduced its flexible tracking system, equipped with an advanced flexible drive system that precisely follows the sun's trajectory. Featuring an adaptable layout, DAS Solar says the system has applications in agri-PV, forestry-PV, and fishery complementary PV applications, where dual usage of land is key.

For FPV: As part of its offering for floating PV (FPV), DAS Solar displayed its fully self-developed floating solar ecosystem – from floats and anchors to racks, modules, and O&M tools. For inland applications such as lakes, reservoirs, and subsidence areas, DAS Solar uses marine-grade polymer floats that are resistant to ultraviolet-induced degradation (UVID).

To address the challenges of offshore deployment, DAS Solar has developed specialized high-sealing, UVID- and salt-resistant floating modules with a 25-year service life. These modules feature a composite frame that reduces costs by 20 to 25% compared to aluminum, while maintaining long-term mechanical strength, according to the company.

Urban setup: In the urban segment, DAS Solar featured frameless, lightweight back contact modules suitable for flat roofs and weight-sensitive surfaces. These modules are installed using adhesives and are up to 70% lighter than conventional glass modules. Additional urban-focused products included balcony PV kits and portable solar devices.

Modules in focus at Intersolar: At Intersolar Europe 2025, DAS Solar showcased a range

of n-type module innovations built on its latest generation of TOPCon and BC technologies. The company displayed a 96-cell black-framed module (DAS-DH96NE) based on upgraded TOPCon technology, which it characterizes as TOPCon 5.0, featuring process enhancements such as nano-contact metallization, rear-side poly fingers, and edge passivation. The module has a rated power output of up to 460 W and an efficiency of 23%. With dimensions of 1,762 × 1,134 × 30 mm, the module is promoted for residential applications in Europe. The company also introduced a large-format 132-cell model (DAS-DH132NE), also based on the same cell technology platform, for high-output installations. It is rated for up to 630 W of power and 23% efficiency. Under UV resistance testing in accordance with TÜV Rheinland's 2 PfG 2944/07.23 standard, the module showed a degradation of less than 1% under accelerated exposure. As mentioned above, the DAS Solar indicates a 2025 commercial availability for the module.

Additional products showcased at the company's Intersolar booth included the Diamond series back-contact module (DAS-DH108TA), which is built with 108 half cells. It achieves a power output of 480 W and an efficiency of 24.8%. DAS Solar also exhibited a short-side frameless module intended to improve draining and reduce soiling in low-tilt installations, and a lightweight glass-free module weighing 4.7 kg/m², certified for standard wind and snow loads.

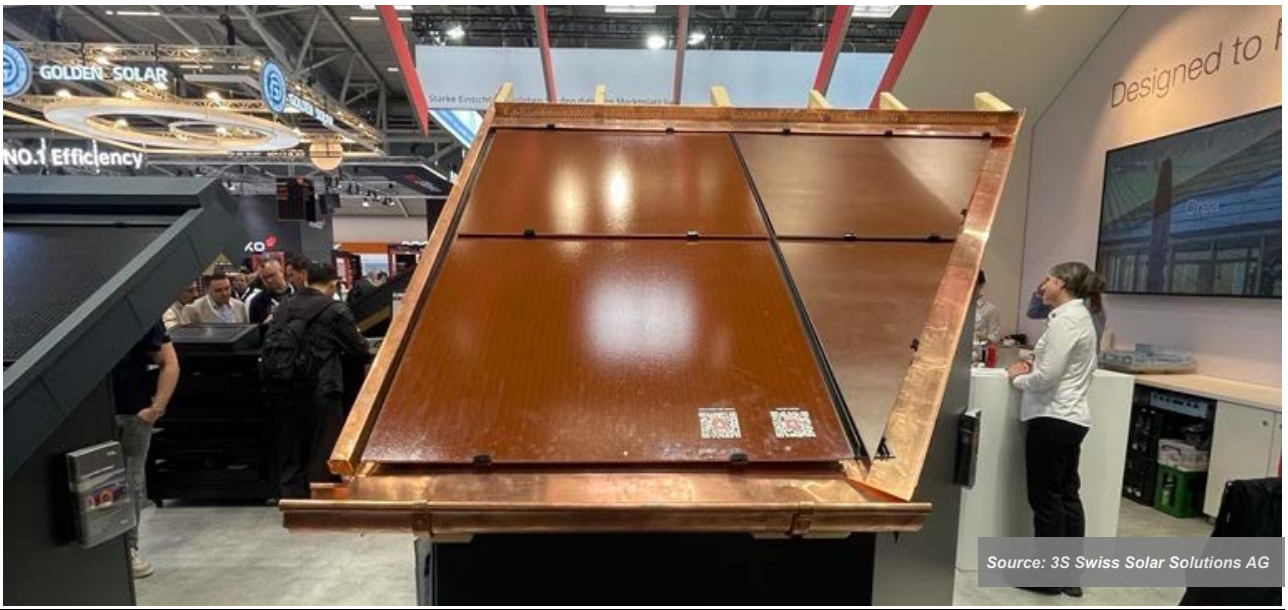
At the TaiyangNews PV Systems Technology Trends Conference 2025, Leo Chang, Director of Global Technical Support at DAS Solar, detailed the company's n-type cell roadmap. He presented the evolution of DAS Solar's TOPCon technology from its initial 23.5% efficiency to the present target of 27% cell efficiency. He also elaborated that the company's TOPCon module, promoted as DAON 5.0, aims for over 650 W output and 24% module efficiency. On the BC front, Chang introduced DBC 3.0 cells with symmetrical SiO_x/poly-Si passivated contacts, achieving over 27.2% cell efficiency.

DAS Solar

3S Swiss Solar Unveils Color BIPV Modules at Intersolar 2025

At Intersolar Europe 2025, 3S Swiss Solar Solutions AG, a Switzerland-based company specializing in building-integrated photovoltaics (BIPV), presented its latest BIPV products designed for the European market.

The company showcased the latest colored modules from its TeraSlate Flair series. These modules are based on the G12 wafer format and a half-



Source: 3S Swiss Solar Solutions AG

Tailor-made Modules: 3S Swiss Solar introduced its new TeraSlate Flair series at Intersolar Europe 2025, available in different sizes and shapes for different kinds of roofs.

cell layout. The key features of this series include a frameless design and hail resistance rated to HW5, which indicates that the module can endure up to 50 mm diameter hailstones striking at 30.8 m/s. The modules are an evolution of the earlier MegaSlate II series. While the latter is based on M2-size p-type PERC full-cells, the former incorporates G12-size half-cells. While the M2 variant had a 5BB metallization layout, the latest G12 variant is based on a 12BB layout.

3S Swiss Solar	
Product Series	**TeraSlate Flair**
Model name	Terracotta Rust - T75
Wafer type	p-type
Cell technology	PERC
Cell size	G12
No. of cells	48
Module technology	Glass-Backsheet, Halfcell
No. of busbars	–
Glass Thickness (front/ rear)	5 mm
Maximum power (Pmax)	165 W
Module efficiency STC	14.3%
Bifaciality	–
Dimensions	935 × 1,300 × 6.5 mm
Weight	17.7 kg
Product Warranty	10 years
Performance Warranty	25 years
Application	Residential
Commercial Availability	Yes
Focused Regions For Commercialisation	Switzerland, Europe

Graphic: TaiyangNews

The terracotta rust variant (T75) displayed at the event includes 48 G12 half-cut cells, offers up to 165 W output, and delivers a Voc of 33.1 V with a short-circuit current of 6.2 A. It has a temperature coefficient (Pmax) of -0.319%/K and supports a 1,000 V DC system voltage. The module is constructed with 5 mm ESG solar glass and a backsheet. The company uses 'readymade textile' terminology for naming the module sizes. The 'L' size, most likely stands for large, measures 935 × 1,300 × 6.5 mm and weighs 17.7 kg. The Flair series is also offered in different sizes; the Q variant has the same length of 1,300 mm but a lower width of 720 mm, while M and S have the same width of 875 mm, but differ in length 935 mm and 720 mm, following the same order.

In terms of durability, the modules meet IEC 61215 requirements with a 5,400 N/m² compressive and 2,400 N/m² suction load rating. They also hold IEC 61701 and IEC 62716 certifications for salt mist and ammonia resistance, respectively. The warranty package includes a 10-year product warranty and a 25-year performance warranty, as well as a 40-year weather resistance guarantee. The TeraSlate Flair series is already available commercially.

3S also highlighted its broader TeraSlate lineup, including the standard TeraSlate (L), TeraSlate Crea for custom designs of different roof shapes, and the Overlapping Facade system. The company supports these offerings with integrated planning and monitoring software tools.

3S Swiss Solar Solutions

Europe-Made HJT Module from 3SUN

3SUN, an Italian manufacturer of HJT PV cells and modules, unveiled the 3SUNB60 module series during Intersolar Europe 2025. The product is based on HJT technology developed in-house and manufactured at the company's integrated cell and module production factory in Catania, Italy, perhaps the only giga-factory in Europe that is operational.

The **3SUNB60** module, showcased at the event, is equipped with 120 cells built with G12 half-cut wafers. This HJT module has a rated power output of 640 W and an efficiency of 22.6%. The module, on display, supports a system voltage of up to 1,500 V DC and offers a bifaciality factor of up to 90%, owing to the symmetrical structure of its HJT cells. Constructed as a glass-glass module with 2 mm front and rear glass layers, it measures 2,172 × 1,303 × 35 mm and weighs 36 kg. It comes with a performance warranty of up to 30 years.

3SUN also previewed 2 upcoming products. The **3SUNB48** is a short-format glass-glass module targeting Europe's distributed generation market.

3SUN			
Product Series	**B60**	**B48**	**B66**
Model name	3SUNB60	3SUNB48	3SUNB66
Wafer type	n-type	n-type	n-type
Cell technology	HJT	HJT	HJT
Cell size	G12	G12	G12
No. of cells	120	96	132
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, ZBB
No. of busbars	10BB	10BB	MBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	640 W	510 W	730 W
Module efficiency STC	22.6%	22.3%	23.5%
Bifaciality	90%	90%	90%
Dimensions	2,172 × 1,303 × 35 mm	1,754 × 1,303 × 30 mm	2,384 × 1,303 × 35 mm
Weight	36 kg	29 kg	39 kg
Product Warranty	15 years	25 years	15 years
Performance Warranty	30 years	30 years	30 years
Application	Utility, C&I	Residental, C&I	Utility
Commercial availability	Yes	Yes	2026
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

Source: 3SUN

Made-In-Europe: 3SUN introduced its new glass-glass 3SUNB60 module series at Intersolar Europe 2025, featuring European-made HJT cells.

Built with Europe-made HJT cells, it offers a powerrange of 490 W to 510 W and features a black frame for architectural integration. Additionally, the company introduced the 3SUNB66, a future model based on its second-generation HJT technology, which features a ZBB interconnection layout. Based on 132 HJT cells, this module is expected to deliver up to 730 W of power and 23.5% efficiency. It is scheduled for commercial release in 2026, while the other 2 products discussed above are commercially available, according to the company. However, 3SUN has not provided the proof of commercialization for these products, and thus are not included in the TaiyangNews TOP SOLAR MODULES listing.

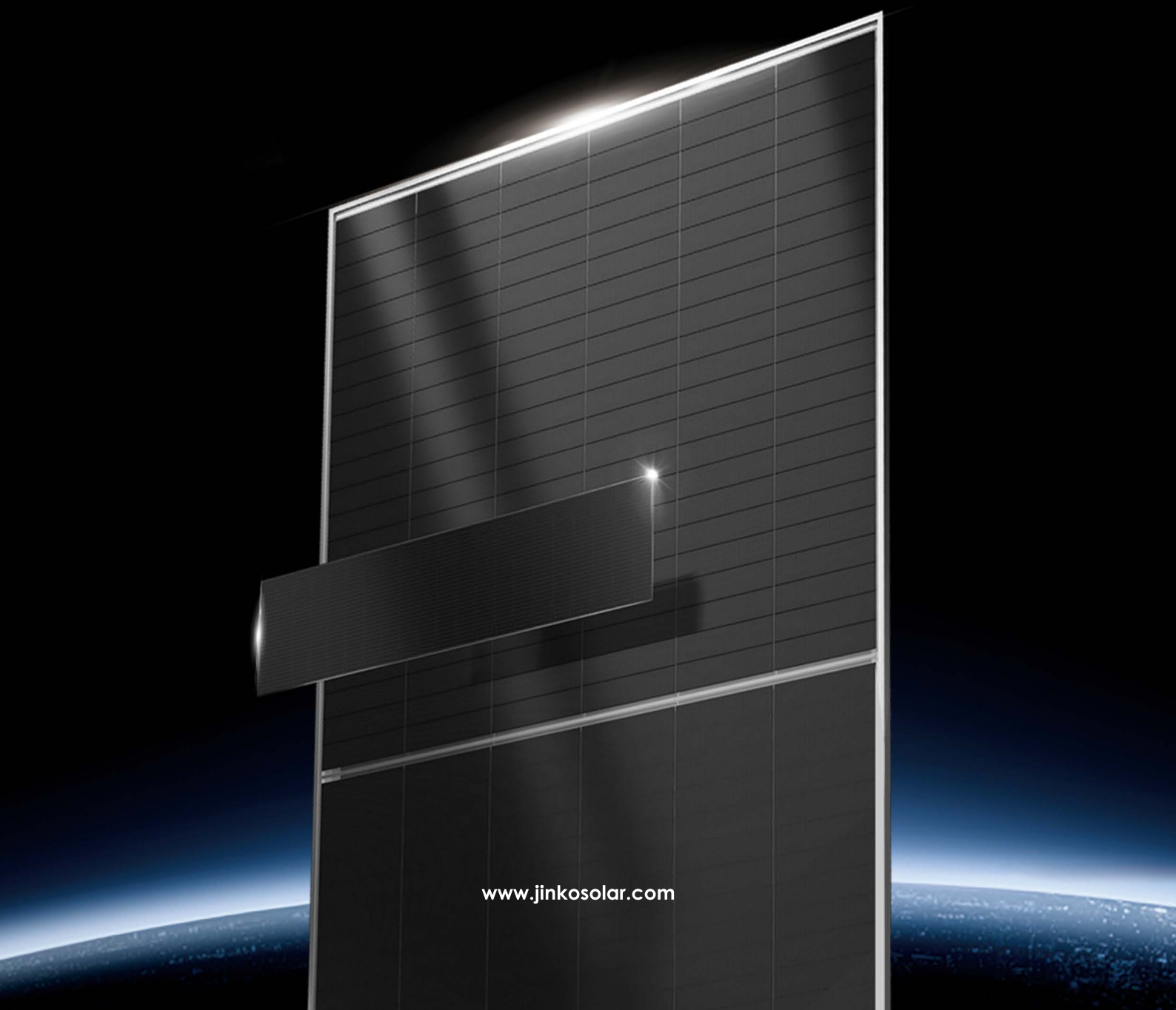
3SUN

TIGER Neo III

JinKO Solar

670W | 24.8%

Tiger Neo 3.0 Era is Coming



www.jinkosolar.com

AESOLAR Previews Shade-Resistant Segmented PV Module at Intersolar Europe 2025

At Intersolar Europe 2025, AESOLAR presented updates on its next-generation shade-resistant photovoltaic module, currently under development in collaboration with the Fraunhofer Center for Silicon Photovoltaics (CSP). Speaking to TaiyangNews, Hamid Hanifi, Director of Technology and Innovation at AESOLAR, explained that the new module builds on the company's earlier hotspot-free module, first introduced in 2018, by addressing limitations in diode integration and shading resilience under real-world rooftop conditions.

The new product, developed under Germany's SegmentPV project and funded by the Federal Ministry of Economic Affairs and Climate Action, incorporates a segmented architecture where groups of PV cells are protected by bypass diodes. According to AESOLAR, this new layout improves shading tolerance while reducing heat buildup compared to its earlier model, which used one diode per cell. Integrating these diodes into the laminate while ensuring hotspot prevention proved challenging, requiring simulation modeling and lab testing to validate configurations. Fraunhofer CSP has been testing the resulting designs to ensure their performance and long-term durability under partial shading.

Hanifi said that a key factor in the redesign was the careful selection of PV cell technology. After evaluating multiple options, including PERC, HJT, and BC cells, AESOLAR selected TOPCon due to its reverse-bias resilience and compatibility with company's manufacturing supply chain. He added that unlike BC cells, which may break down under shading, TOPCon cells demonstrated superior stability in real-world shaded conditions during tests at Fraunhofer CSP.

The module, marketed as Shaded Star, is expected to launch commercially in 2026. Unlike optimizer-based shading solutions, AESOLAR says its segmented design avoids the need for external electronics by allowing unshaded segments to continue operating independently. While the cost is expected to be slightly higher than standard modules, energy yields could improve without increasing total system costs.

Bengt Jäckel, Group Manager at Fraunhofer CSP,

Shading Solution: AESOLAR, in collaboration with Fraunhofer CSP, is developing its next-generation segmented PV module featuring shade tolerance and reduced hotspot risk under real-world conditions.

added that the project required careful diode selection, circuit design, and new reliability test development. These tests simulate routine shading conditions to ensure durability over the module's lifetime. He noted that as rooftop PV systems increasingly fill every available surface, partial shading is becoming a standard operating condition, requiring dedicated design responses like the segmented module.

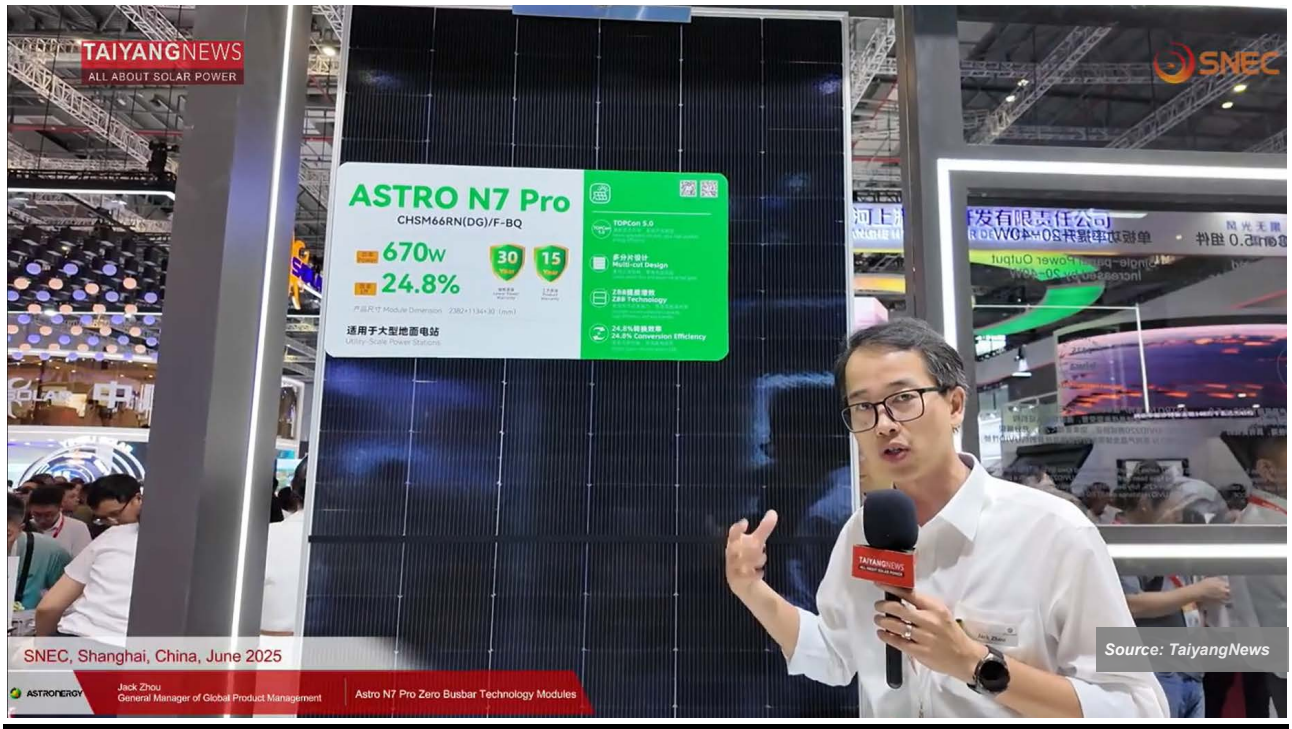
AESOLAR

Astronergy Showcases TOPCon Modules Featuring ZBB for DG And 16BB for Utility Applications

Astronergy's showcase at both Intersolar Europe and SNEC 2025 was nearly identical, addressing the DG and utility-scale segments. It included modules based on the company's so-called TOPCon 5.0 cell platform, featuring ZBB or 16BB configurations.

For DG applications, Astronergy displayed its ASTRO N7 and ASTRO N7s module series at Intersolar. These products use half-cut cells with a ZBB interconnection design. The ASTRO N7s module has a maximum rated power of 470 W and a conversion efficiency of 23.5%. The module, consisting of 96 cells of G12R size, has a double-glass covering and a black frame, and is offered with a 25-year product and a 30-year performance warranty. While it states that the module is commercially available, Astronergy is currently represented by a 23.1% TOPCon module in the TaiyangNews TOP SOLAR MODULES listing. Any updates regarding proof of commercialization may lead this module's inclusion in the coming editions.

In the The ZBB, as it is known, has no busbars on cells and interconnection is the crux where the ribbons are attached to the fingers. Astronergy realizes this in via in a process it calls Carrier Film. Here 20 metal ribbons are placed on the cells and their position is kept intact by means of a low-fluidity carrier film. The interconnection is realized in the lamination step. As with any ZBB process, it also reduces front-side shading and optimizes current flow. The low temperature process improves module reliability and durability by minimizing soldering stress and the risk of microcracks, according to the company.



Products for All Applications: Astronergy promoted its latest ASTRO N7 and ASTRO N7s series for DG-scale applications, and the ASTRO N8 Pro series module targeting utility-scale applications, during SNEC 2025.

Astronergy		
Product Series	**ASTRO N7s**	**ASTRO N7 Pro**
Model name	CHSM48RN(DG)(BLH)/F-BH	CHSM66RN(DG)/F-BQ
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	G12R	G12R
No. of cells	96	132
Module technology	Bifacial, Glass-Glass, Halfcell, ZBB	Bifacial, Glass-Glass, Halfcell, ZBB
No. of busbars	20BB	-
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	470 W	670 W
Module efficiency STC	23.5%	24.8%
Bifaciality	85 ± 5%	85 ± 5%
Dimensions	1,762 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm
Weight	24.5 kg	31.65 kg
Product Warranty	25 years	15 years
Performance Warranty	30 years	30 years
Application	Residential, C&I, Distributed Generation	Utility, C&I, Distributed Generation
Commercial Availability	Yes	H1 2026
Focused Regions For Commercialisation	-	-

Graphic: TaiyangNews

In the utility-scale category, Astronergy presented the ASTRO N7 Pro and ASTRO N8 Pro modules. Speaking to TaiyangNews at SNEC 2025, Jack Zhou, Astronergy's General Manager of Global Product Management, highlighted the CHSM66RN(DG)/F-BQ module from the company's latest ASTRO N7 Pro series. The module, comprising 264 pieces of G12R size TOPCon 1/4 cut cells, is rated for a maximum power of 670 W and an efficiency of 24.8%.. This module is expected to be commercially available from H1 2026. In addition, the ASTRO N8 Pro model, equipped with 16BB TOPCon cells, can deliver up to 800 W of power and 24.6% efficiency. However, the company didn't specify a timeline for its commercialization.

Astrometry also highlighted its European expansion efforts, including a 1 GW manufacturing facility in Turkeym underscoring its manufacturing proximity to the European market. On business front, the comapny has also signed a 3-year framework cooperation agreement with Stockholm-based Aprilice AB, a solar distributor and project developer active across Sweden and the wider Nordic region. Under the agreement, Astronergy will deliver high-efficiency PV modules, including the latest TOPCon series.

The company also shed some light on its progress on sustainability, highlighting that 2 of its Chinese manufacturing bases, Haining in Zhejiang and Yancheng in Jiangsu Province, have achieved Silver certification under the Solar Stewardship Initiative (SSI) ESG standard.

Astronergy

Made-in-Europe Agri-PV Module from BISOL

BISOL Group, a Slovenia-based PV module and solar solutions provider, showcased its G12R-size TOPCon cell-based modules at Intersolar Europe 2025. Having recently completed a successful transition of its module production from M10 to G12R cell size, the company has mainly promoted its latest fully Made-in-Europe upgraded Lumina series solar module.

The latest BISOL Lumina series module, equipped with 42 G12R cells, delivers a power output of up to 400 W. This bifacial module, laminated with 3.2 mm thick front glass and a transparent rear-side backsheet, offers a transparent area of more than 25%, making it well-suited for agri-PV applications. Measuring 1,975 × 1,134 mm and enclosed in a black frame, it weighs up to 23.5 kg.

The module is also certified to withstand hailstorms with 35 mm diameter hailstones and snow loads of up to 7,000 Pa.

Alongside, BISOL also displayed its n-type M10R-based Supreme and Spectrum series. The Supreme BDO 435 W module reaches an efficiency of 21.8%. The Spectrum BDO 410 W module achieves 20.5% efficiency and is characterized by the use of coloured glass variants, including Ruby Ray, Jade Shine, and Amber Glow, targeting aesthetic and architectural applications. These 2 modules have dimensions of 1,762 × 1,134 × 30 mm and weigh 21 kg. Both feature 3.2 mm tempered glass, a black backsheet, and IP68-certified junction boxes.

BISOL did not respond to our inquiry on the product's commercialization status.

BISOL			
Product Series	**Lumina**	**Supreme**	**Spectrum**
Model name	–	BDO 435 W	BDO 410 W
Wafer type	n-type	n-type	n-type
Cell technology	–	–	–
Cell size	G12R	M10R	M10R
No. of cells	42	96	96
Module technology	Bifacial, Glass-Back-sheet, Halfcell	Halfcell	Halfcell
No. of busbars	–	–	–
Glass Thickness (front/ rear)	3.2 mm	3.2 mm	3.2 mm
Maximum power (Pmax)	400 W	435 W	410 W
Module efficiency STC	–	21.80%	20.50%
Bifaciality	–	–	–
Dimensions	1,975 × 1,134 mm	1,762 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm
Weight	–	21 kg	21 kg
Product Warranty	–	25 years	25 years
Performance Warranty	–	30 years	30 years
Application	Agrivoltaics	Residential, Utility & C&I	Residential, Utility & C&I
Transparency	> 25%	–	–
Commercial Availability	–	–	–
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

BISOL

Module for Agrivoltaics: BISOL promoted its latest Lumina series module featuring G12R-sized TOPCon cells for Europe's Agrivoltaics applications.

BLACKGLAS Showcases Modular PV-Based Outdoor SolutionsMobile

At Intersolar Europe 2025, BLACKGLAS, a brand of Germany-based Luxglas Technology GmbH, showcased its range of mobile solar products designed for residential and small-scale outdoor applications. The lineup includes 3 main offerings Solar Table, Solar Fence, and SolarScreen. ntended for multi-purpose use, the company says these modules combine energy generation with functional outdoor design elements such as furniture, fencing, and balcony partitions.

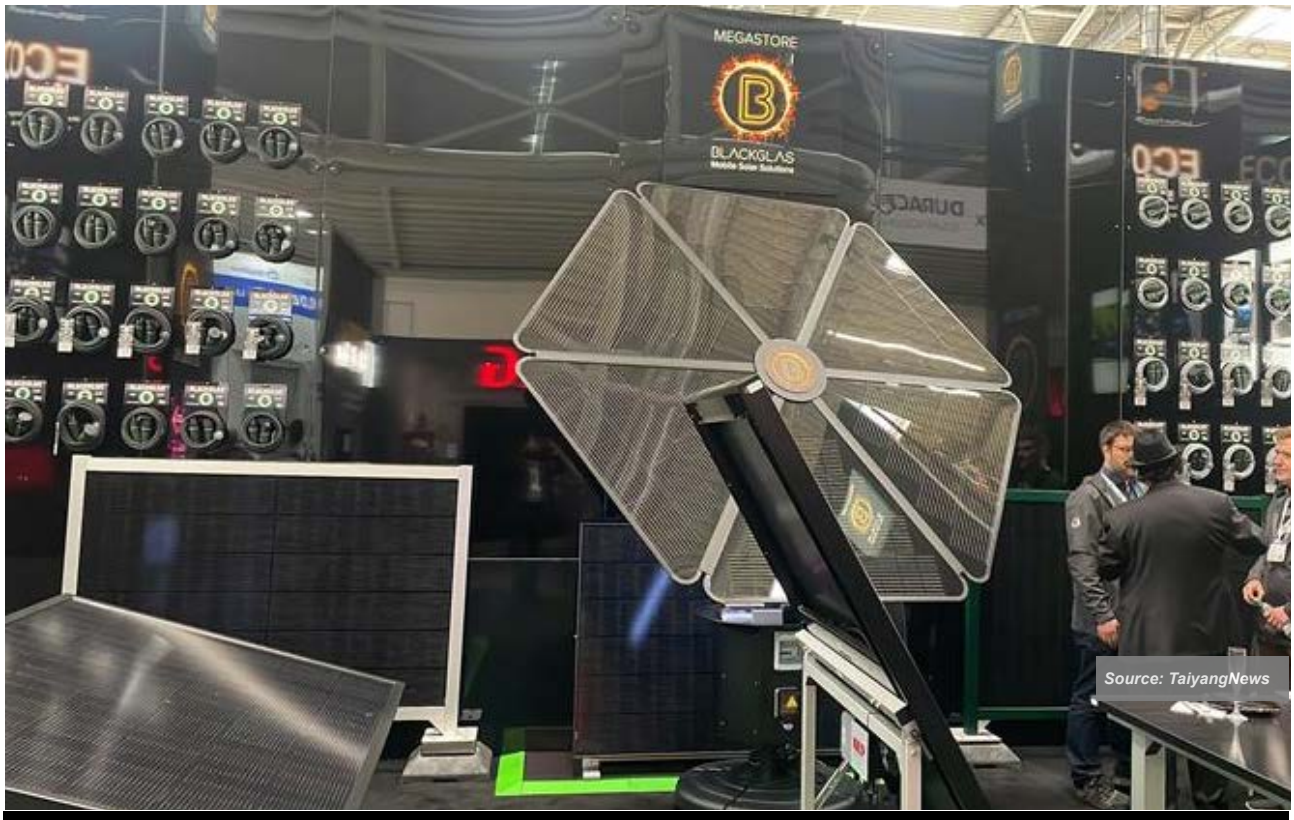
All 3 systems are based on a common hardware foundation: an all-black dual-glass module consisting of 108 half-cut cells, a 440 W power rating, aluminum frame mounting, and integrated with a microinverter for direct AC output. A 5 m cable is provided with each system to allow flexible positioning. These solutions are designed to operate either as grid-connected or standalone units. For battery-supported applications, the company enables integration with the Anker SOLIX Solarbank Plus 1.6 kWh model, expanding their use into off-grid or hybrid scenarios.

Solar Table incorporates the PV module as the tabletop and is mounted on aluminum profile-based legs. It supports tilt adjustment in 7 steps up to 45 degrees, allowing users to orient the module for optimal sunlight exposure.

According to the company, the table can be used not only as a typical outdoor fixture but also as a mobile PV generator, capable of powering appliances or charging storage devices when not in use as furniture. The table is available in 5 configurations: ECOfix, which uses a stationary frame without wheels; ECOflex and ECOpower, which differ in leg profile sizes of 40 × 40 mm and 80 × 80 mm, respectively; ECOnova, which features round legs with a 60 mm diameter; and ECOluna, which comes with rectangular profile legs.

The Solar Fence solution reconfigures the same 440 W module for vertical mounting within a frame, making it suitable for use as PV fencing. It is available in 2 versions: ECOcube, which uses 60 × 30 mm aluminum profiles, and ECOtube, which incorporates 42.4 mm round stainless steel tubes. Both models include integrated microinverters and are designed to serve as functional boundary structures that contribute to distributed energy generation.

SolarScreen, is designed specifically for space-constrained environments, such as balconies or small terraces. The system has a compact footprint of 500 × 1,200 × 1,800 mm and can be fitted into narrow spaces where traditional PV systems may not be feasible. BLACKGLAS offers this model in 6 design variants 2 ECOmirror, ECOsurface, ECOelegance, ECOtablet, ECOzoom, and ECOstorage – each aimed at delivering different aesthetic and functional attributes. Like the other



Multi-Use Designs: BLACKGLAS showcased its product lineup, comprising Solar Table, Solar Fence, and SolarScreen, during Intersolar Europe 2025.

products, SolarScreen includes a microinverter and supports optional battery connection.

BACKGLAS

Boviet Solar Showcases HJT Modules Range

Boviet Solar Technology Co. Ltd., a Vietnamese manufacturer of monocrystalline PV cells and modules, presented its latest range of HJT products at Intersolar Europe 2025. The company introduced new models under its Gamma Series monofacial and Vega Series bifacial module families.

All showcased modules are built with, featuring half-cut architecture, multi-busbar interconnection, and large-area cell formats. The Gamma Series monofacial module, designed for residential applications, features a black frame with a transparent backsheet and offers a rated power output of 440 W at 22.53% efficiency. It measures 1,722 × 1,134 × 30 and weighs 20 kg.

The Vega Series bifacial modules, designed for commercial and utility-scale projects, include variants with rated power outputs of 590 W, 630 W, and 730 W. The 590 W module reaches an efficiency of 22.84% and is built with a double-glass structure and silver frame, with dimensions of 2,278 × 1,134 × 35 mm and a weight of 32.01 kg. The 630 W variant has a maximum efficiency of 23.32%, measures 2,382 × 1,134 × 33 mm, and weighs 32.50 kg. The powerful product of the range comes with a maximum power output of 730 W at 23.50% efficiency, measures 2,384 × 1,303 × 33 mm, and weighs 38.50 kg. The company has yet to provide a response on the timeline for commercialization of these products. Boviet Solar has not provided proof of commercialization for its products, thus the company is not included TaiyangNews TOP SOLAR MODULES list.

Boviet Solar

Boviet Solar				
Product Series	**Vega Series**			
Model name	BVM7609M-XXX-H-HC-BF	BVM7612M-XXX-H-HC-BF-DG	BVM8611M-XXXR-H-HC-BF-DG	BVM8611M-XXX-H-HC-BF-DG
Wafer type	n-type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	TOPCon	TOPCon
Cell size	–	–	–	–
No. of cells	–	–	–	–
Module technology	Glass-backsheet, Halfcell, Monofacial	Bifacial, Glass-Glass, Halfcell	Bifacial, Glass-Glass, Halfcell	Bifacial, Glass-Glass, Halfcell
No. of busbars	–	–	–	–
Glass Thickness (front/rear)	–	–	–	–
Maximum power (Pmax)	440 W	590 W	630 W	730 W
Module efficiency STC	22.53%	22.84%	23.32%	23.5%
Bifaciality	–	–	–	–
Dimensions	1,722 × 1,134 × 30 mm	2,278 x 1,134 x 35 mm	2,382 x 1,134 x 33 mm	2,384 x 1,303 x 33 mm
Weight	20 kg	32 kg	32 kg	38.5 kg
Application	Residential	C&I and Utility	C&I and Utility	C&I and Utility
Product Warranty	–	–	–	–
Performance Warranty	–	–	–	–
Commercial Availablity	–	–	–	–
Focused Regions For Commercialisation	–	–	–	–

Graphic: TaiyangNews

BTE Solar Unveils Hybrid PVT Module

At Intersolar Europe 2025, Chinese solar thermal specialist BTE Solar presented its latest photovoltaic thermal (PVT) collector. PVT modules combine photovoltaic and thermal energy generation in a single unit. A standard PV layer on the front generates electricity, while the rear thermal layer collects excess heat. This heat is absorbed by a circulating water-glycol solution through embedded pipes. The captured thermal energy can be used for water heating, space heating, or industrial applications. The approach also passively helps in increasing the efficiency of the solar device by reducing the operating temperature, as higher operating temperature of the PV panel negatively affects the efficiency.

BTE Solar's PVT E module, the heat it is captured by a glycol-based heat transfer system integrated below the matrix. According to the company, its PVT E module consists of a top layer made of 144 TOPCon half-cut solar cells, delivering a rated electrical output of up to 580 W and an efficiency of 22.44%. This layer is laminated with 2 mm front glass. The module has a footprint of 2,279 × 1,134 × 37 mm and weighs in at around 39 kg.

Dual Output: At Intersolar Europe 2025, BTE Solar promoted its PVT hybrid solar panel, which integrates a 580 W PV module with an underlying thermal chamber capable of producing up to 1,180 W of heat.

The thermal chamber beneath the PV layer contains 1.2 liters of propylene glycol as the heat transfer liquid. The system uses copper piping to circulate the fluid at a working pressure of 0.6 MPa (6 bar). The module can recover and deliver up to 1,180 W of thermal energy, according to BTE Solar. The module is designed for a variety of applications such as pairing with heat pumps, supplying hot water for buildings, or supporting thermal processes in small industrial setups. BTE Solar sees the system as a practical choice for rooftops or other installations where both electricity and heat are needed from the same footprint. The commercial availability of the PV/T E series is expected later this year.

BTE Solar

Canadian Solar Presents Upgraded TOPCon Technology Portfolio

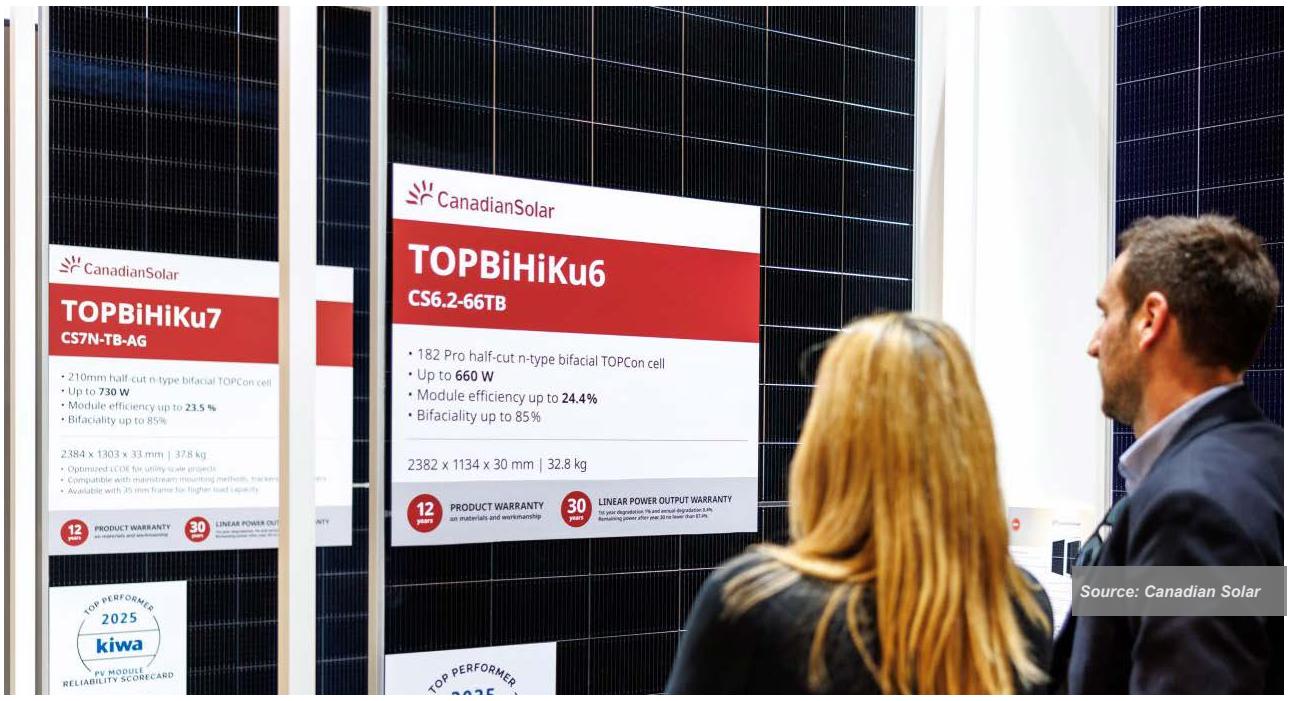
At Intersolar Europe 2025, Canadian Solar unveiled its new product linebased on it's latest TOPCon technology called TOPCon 2.0. The TOPBiHiKu CS6.2 module series is designed for both utility and commercial & industrial (C&I) PV systems, delivering a power output of up to 660 W and a peak efficiency of 24.4%. The module's key technological enhancements include fine line printing, advanced firing, rear polysilicon optimization, improved passivation, and SMBB design. These updates aim to reduce shading and resistive losses, enhance light utilization, and finally result in improved open-circuit voltage of 10 mV. The module achieves a bifaciality of up to 90%. In May, Canadian Solar indicated plans to begin global deliveries of the product in August 2025, but no further updates have been available since.

At SNEC 2025, Canadian Solar showcased its N-type 182 Pro module. This bifacial module has a maximum rated power output of 670 W and a maximum efficiency of 24.8%. With a bifaciality of up to 90%, the company says this module is well-suited for residential, C&I, and utility-scale applications. The company has yet to provide a response on the timeline for commercialization, leaving its market readiness unclear. In fact, the Canadian Solar is represented with mere 22.5% TOPCon product in TaiyangNews TOP SOLAR MOUDLES features, as the company has not provided the proof of commercialization for its high efficiency modules.

In an exclusive interview with TaiyangNews during SNEC 2025, Canadian Solar's President, Yan Zhuang, discussed the company's strategic direction

Canadian Solar		
Product Series	**TOPBiHiKu6**	**TOPBiHiKu7**
Model name	CS6.2-66TB-660	CS6.2-66TD-670
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	–	–
No. of cells	132	132
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB
No. of busbars	20BB	16BB
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	660 W	670 W
Module efficiency STC	24.4%	24.8%
Bifaciality	80 ± 5%	–
Dimensions	2,382 × 1,134 × 30 mm	2,382 × 1,134 × 30 mm
Weight	32.8 kg	36 kg
Product Warranty	12 years	12 years
Performance Warranty	30 years	30 years
Application	Utility	Utility
Commercial Availability	Yes	Yes
Focused Regions For Commercialisation	Global	Global

Graphic: TaiyangNews



Source: Canadian Solar

2 Debuts: Canadian Solar introduced its 660 W module at Intersolar Europe 2025, and showcased a slightly higher power 670 W and 24.8% efficiency product at SNEC, both featuring up to 90% bifaciality for diverse PV applications.

and market outlook. He highlighted that the solar sector is undergoing a fundamental transition from modules toward storage and system-level integration. Zhuang also emphasized the importance of vertical integration, particularly in cell and wafer production, to manage costs and supply chain stability.

Canadian Solar

CARBON One: Europe-Built TOPCon Modules on Display

At Intersolar Europe 2025, French photovoltaic company CARBON showcased its upcoming CARBON One series, a demonstrative lineup of pre-qualified TOPCon PV modules developed to meet European manufacturing standards.

CARBON stated that the modules will be manufactured at its 500 MW pilot production line – also named CARBON One – which is under development. CARBON aims to establish a fully vertically integrated PV manufacturing facility in Europe, targeting an annual production capacity of 5 GW for ingots, wafers, and cells, and 3.5 GW for modules. To support this goal, the company has formed a coalition of European industry players and collaborates with research institutes such as CEA-Liten and CEA-INES.

CARBON One modules have undergone BOM pre-qualification according to IEC 61215 and IEC 61730 standards. The lineup includes a 460 W dual-glass residential module using 48 half-cut TOPCon cells, and a 500 W version with 54 half-cells. The latter will be offered in both standard and premium full-black versions. The modules are expected hit the open market in 2026.

CARBON

Local Manufacturing: French PV firm CARBON presented its demonstrative product range from the CARBON One series of TOPCon modules at Intersolar Europe 2025.

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DAH Solar Presents Upgraded FullScreen Module

At SNEC 2025, DAH Solar promoted its latest FullScreen 4.0 Anti-Dust PV modules, alongside hybrid inverters and ESS. The company, known for its balcony solar systems, also has a patented frameless module design called FullScreen.

FullScreen removes the conventional 5 mm front-side frame and replaces it with a 128° curved edge along each side. According to the company, this modification reduces the tendency for water and dust to settle at the bottom edge, potentially lowering cleaning frequency.

While the company's FullScreen 4.0 lineup includes several variants, it displayed 2 models at its booth – DHN-66Y18-DG-700725W and DHN-66Z16-DG-FS(BB)-585625W. The former is the larger of the two, featuring a maximum power output of 725 W with 23.34% efficiency, and uses 2 mm glass on both sides. It measures 2,384 × 1,303 × 33 mm and weighs 32.3 kg. The smaller variant is rated for up to 625 W of power and 23.14% efficiency. Both modules are commercially available and promoted for C&I applications, though in different regions – the 725 W version is targeted at Brazil, while the smaller 625 W model is positioned for Europe.

The 4.0 series incorporates changes aimed at addressing installation challenges associated with frameless modules. Traditional EPDM clamps along the long edge of portrait installations can loosen or fail under high wind pressure. DAH Solar's new design uses a specialized frame with integrated slots that support dedicated clamps, which is said to reduce the likelihood of mechanical stress or cracking along the frame edge. The new frame also increases wind load resistance to 3,600 Pa.

To support installation, the modules are compatible with self-grounding mid/side clamps. According to the DAH Solar, this allows for simplified grounding and reduced wiring, while also removing shading effects caused by external clamping components during low-tilt installations.

DAH Solar		
Product Series	**High Power PV**	**All Black PV**
Model name	DHN-66Y18-DG-700~725W	DHN-66Z16-DG-FS(BB)-585~625W
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	G12R	G12R
No. of cells	–	–
Module technology	Bifacial, Fullscreen, Glass-Glass, Halfcut, MBB	Bifacial, Fullscreen, Glass-Glass, Halfcut, MBB
No. of busbars	18BB	18BB
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	725 W	625 W
Module efficiency STC	23.34%	23.14%
Bifaciality	85%	85%
Dimensions	2,384 × 1,303 × 33 mm	2,382 × 1,134 × 28 mm
Weight	32.3 kg	32.3 kg
Application	Utility	Utility
Product Warranty	15 years	15 years
Performance Warranty	30 years	30 years
Commercial Availability	Yes	Yes
Focused Regions For Commercialisation	C&I market in Brazil	C&I market in Europe

Graphic: TaiyangNews

Source: DAH Solar

Frameless Redesign: DAH Solar highlighted its upgraded FullScreen 4.0 PV modules, featuring an updated frame design aimed at improving the module's wind load capacity and ease of installation, during SNEC 2025.

DAH Solar

DAS Energy Unveils Lightweight Flexible PV Module at Intersolar Europe 2025

DAS Energy, an Austrian manufacturer known for lightweight and flexible PV modules, presented its latest HYBRID 20 × 2 series at Intersolar Europe 2025. The new module, designed for both building-applied and building-integrated photovoltaic (BAPV/BIPV) applications, is targeted at the European market.

The HYBRID 20 × 2 module features a frameless and glassless construction, built with 40 cells of 182 mm side length and are based on PERC architecture. It is rated for a maximum power output of 140 W and measures 2,000 × 400 mm. According to the company, the module uses multi-layer encapsulation on both sides instead of glass, enabling it to achieve a lightweight profile of just 4.55 kg – equating to 5.69 kg/m² –and the flexibility needed for curved surface installations. It can be used on unconventional surfaces such as domed roofs or non-flat façades.

DAS Energy	
Product Series	**HYBRID 20 × 2**
Model name	–
Wafer type	p-type
Cell technology	PERC
Cell size	M10
No. of cells	40
Module technology	Frameless, Glass-less,Halfcell, Monofacial
No. of busbars	10BB
Glass Thickness (front/rear)	–
Maximum power (Pmax)	140 W
Module efficiency STC	–
Bifaciality	–
Dimensions	2,000 × 400 mm
Weight	4.5 kg
Application	BIPV and BAPV
Product Warranty	10-years
Performance Warranty	25 years
Commercial Availablity	–
Focused Regions For Commercialisation	–

Graphic: TaiyangNews

True Flexibility: DAS Energy, while offering flexible and lightweight modules for different rooftop use cases, also offers 1.6 mm rear glass as an option when additional structural rigidity is needed.

To simplify mounting, the module can be fixed with adhesive bonding, eliminating the need for metal substructures or ballast systems. The junction box, which includes bypass diodes, can be positioned on either the front or rear side depending on the application. DAS Energy also offers an optional 1.6 mm thin glass rear layer to increase structural rigidity, particularly for BIPV use cases in roofs, ceilings, or walls of commercial and industrial buildings.

According to the company, the HYBRID 20 × 2 can endure long-term exposure to UV radiation and is resistant to salt-mist corrosion, enhancing its reliability in coastal or high-humidity regions.

DAS Energy provides a 10-year product warranty and a performance warranty of up to 25 years for this model. The product is available commercially and is primarily focus on Erupean market, but not limted to.

DAS Energy

Eco Green Showcases Specialty Modules and Storage Solutions

France-headquartered Eco Green Energy showcased solar modules designed for special applications during Intersolar Europe 2025. One of the key highlights was the Atlas Agri Series, a bifacial TOPCon module for agrivoltaics. Built with 72 half-cut cells of the 182 mm wafer format, it offers a power output of up to 350 W and an efficiency of 15.74%. Its double-glass design, with 2 mm tempered glass on both sides, allows for up to 33% light transparency – vital for crop growth beneath the panels – and offers a bifaciality factor of up to 85%. The module is designed for wind and snow loads up to 5,400 Pa on the front and 2,400 Pa on the rear.

The company's flexible modules were also on display, offered in 3 power variants: 200 W, 400 W, and 430 W. The 200 W and 400 W modules measure 790 x 1,235 x 3 mm and 1,149 x 1,750 x 2 mm and weigh 3.56 kg and 6.43 kg, respectively. The 430 W module measures 1,080 x 2,050 x 2 mm and weighs 7.2 kg. Depending on the model, they incorporate either M6 or M10 half-cut cells.

Eco Green Energy also exhibited its Atlas TOPCon-R Full Black module. The module has a rated output of 500 W and is certified by CERTISOLIS, the

Eco Green Energy				
Product Series	**Atlas Agri**	**EGE Flexible Atlas Flex**	**EGE Flexible Atlas TOPCon Flex**	**EGE Flexible Helios Plus Flex**
Model name	–	EGE-200W-48M(FM10R)-FB	EGE-400W-108N(FM10R)	EGE-430W-144M(FM6)
Wafer type	n-type	n-type	n-type	n-type
Cell technology	TOPCon	–	TOPCon	–
Cell size	G12R	M10R	M10R	M6
No. of cells	72	48	108	144
Module technology	Bifacial, Glass-Glass, MBB	Flexible, Monofacial, MBB	Flexible, Monofacial, MBB	Flexible, Monofacial, MBB
No. of busbars	10BB	10BB	10BB	9BB
Glass Thickness (front/rear)	2.0 / 2.0 mm	–	–	–
Maximum power (Pmax)	350 W	200 W	400 W	430 W
Module efficiency STC	15.74%	20.5%	19.89%	19.38%
Bifaciality	80 ± 10 %	–	–	–
Dimensions	1,961 x 1,134 x 30 mm	790 x 1,235 x 3 mm	1,149 x 1,750 x 2 mm	1,080 x 2,050 x 2 mm
Weight	28 kg	3.56 kg	6.43 kg	7.2 kg
Product Warranty	25 years	6 years	6 years	6 years
Performance Warranty	30 years	12 years	12 years	12 years
Application	Agrivoltaics	Distributed Generation	Distributed Generation	Distributed Generation
Commercial Availability	–	–	–	–
Focused Regions For Commercialisation	–	–	–	–

Graphic: TaiyangNews

official French body responsible for testing and certifying PV modules for performance, reliability, and carbon footprint. Its certification holds particular relevance in France, where such national validation is a prerequisite for public tenders and eligibility for rooftop subsidies. The Atlas TOPCon-R Full Black module is targeted at standard rooftop installations in the French residential and C&I segments. The commercialization status of the company's product range is unknown as of the time of this report.

On the energy storage side, the company introduced a new C&I-scale battery system, called the GAIA Core BESS. The unit integrates lithium-iron-phosphate (LFP) cells and comes with built-in power conditioning, energy management, and battery management systems. With a total storage capacity of up to 211 kWh, it is designed to support hybrid energy setups.

Eco Green Energy

EGING PV Introduces Products with Cell and Module-Level Advancements

China-based solar PV manufacturer EGING PV showcased several products at Intersolar Europe and SNEC 2025, held in May and June 2025, respectively.

At Intersolar, the company presented its Europe-focused product portfolio addressing local market demands. The company presented 2 newly designed formats under its residential offerings, which are intentionally designed with smaller dimensions and module power outputs: 132 W (810 × 766 × 30 mm) and 264 W (1,542 × 766 × 30 mm). EGING emphasizes that these panels offer space efficiency by increasing rooftop area utilization compared to higher-power and larger form-factor residential modules.

The company also presented standard bifacial TOPCon modules for utility applications and a BC module based on TOPCon architecture (TBC) for commercial applications, along with modules for offshore installations. Notable among these products was the bifacial-designed double-glass TOPCon module based on a 182 mm wafer. With a glass thickness of 1.6 mm, the product appears to be designed for balcony solar applications, where 1.6 mm glass is a common feature, especially in Europe.

At SNEC in Shanghai, EGING PV exhibited modules for residential, C&I, and utility applications, featuring advanced technology improvements such as edge passivation, rear-side poly fingers, and a ZBB design. The company highlighted a module with a steel frame that offers a cheaper and potentially more sustainable alternative to aluminum. However, no EGING PV products available in the market currently feature a steel frame.

For balcony solar, the company presented both grid-tied and off-grid solutions. The former is targeted at energy-sufficient households interested in income-generating PV installations. In this case, the company offers a microinverter combined with energy storage, which it claims to enable self-consumption and excess power feed-in. The off-grid solution is designed for plug-and-play installation, with the lower-power 132 W or 264 W modules offered to allow easy balcony setup. However, EGING PV has not provided the key electrical characteristics along with the commercialization status.

EGING PV

Focus on Small Applications: EGING's product showcase at the leading solar shows represented multiple use case scenarios, and the balcony PV displayed at SNEC is just one example.

Euronergy Showcases Lightweight & Aesthetic PV Modules

At Intersolar Europe 2025, Netherlands-based module manufacturer Euronergy presented its latest range of lightweight, colored, and BIPV products. The lineup included 4 module families: WISTERIA, TWAYBLADE, HYDRANGEA, and the 3rd-generation DANDELION series. All showcased modules are based on the company's self-developed technology called U-IBC (ultimate interdigitated back contact) that uses a conductive backsheet and conductive adhesive.

Conductive backsheets are backsheets integrated with a predefined circuit on a copper sheet. The contact between the cell's positive and negative electrodes to the respective copper circuit is established via a conductive adhesive. An insulating encapsulation composite material is used for insulating positive and negative electrodes. This approach eliminates the use of ribbons for interconnection. All the specialty materials used in the process, such as conductive backsheets and encapsulation composites, are developed by the company in-house. It also helps reduce the operating temperature of the module, thanks to improved heat dissipation via the copper layer, according to Euronergy.

The WISTERIA series, built around a single-glass architecture, includes the EUQJH60B-465W model. With 120 U-IBC half-cells, this module delivers up to 480 W of power and 23.54% efficiency. Measuring 1,908 × 1,134 × 30 mm and weighing 24.2 kg, it uses a 3.2 mm front glass and a black backsheet for a clean visual appearance. It is certified to withstand 25 mm hailstones at 80 km/h and is rated for loads of 5,400 Pa on the front and 2,400 Pa on the rear.

The company also introduced BIPV tile designs under its TWAYBLADE series. The EUQJH12B 95W solar tile, with 24 U-IBC half-cells, achieves up to 95 W of power and 23.4% efficiency. With a weight of 8.7 kg and a size of 1,588 × 403 × 50 mm, it is intended

Euronergy			
Product Series	**WISTERIA**	**TWAYBLADE**	**HYDRANGEA**
Model name	EUQJH60B-465W	EUQJH12B 95W	EUQJH57J
Wafer type	n-type	n-type	n-type
Cell technology	BC	BC	BC
Cell size	–	–	–
No. of cells	120	24	144
Module technology	Monofacial, Glass-Back-sheet, ZBB	Monofacial, ZBB	Monofacial, Glass-Backsheet, ZBB
No. of busbars	–	–	–
Glass Thickness (front/ rear)	3.2 mm	–	–
Maximum power (Pmax)	480 W	95 W	410 W
Module efficiency STC	23.5%	23.4%	21.2%
Bifaciality	–	–	–
Dimensions	1,762 × 1,134 × 30 mm	1,588 × 403 × 50 mm	1,850 × 1,158 mm
Weight	24.8 kg	8.7 kg	5.2 kg
Application	–	–	–
Product Warranty	15 years	15 years	15 years
Performance Warranty	30 years	30 years	25 years
Commercial Availability	–	–	–
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

U-IBC Technology: Euronergy presented its BC module lineup – including flexible, colored, and BIPV options – during Intersolar Europe 2025.

for aesthetic rooftop integration.

For color-matching and lightweight applications, the HYDRANGEA series includes modules with blue, dark green, orange, or light green appearances. The EUQJH57J model includes 114 U-IBC half-cells, offering 410 W output and 21.17% efficiency. With a flexible 2 mm laminate and weighing just 5.2 kg, the modules can conform to curved surfaces. Colored encapsulant films provide visual variation while maintaining high optical performance.

The DANDELION series addresses safety and reliability concerns for lightweight rooftop modules. The 3rd-generation EUQJH57J-420W model features 114 half-cells, with a rated power of up to 430 W and 22.2% efficiency. It weighs 8.6 kg and measures 1,850 × 1,158 × 2.5 mm.

Euronergy offers a 15-year product warranty on all the abovementioned modules. A 30-year linear performance warranty is provided for the WISTERIA and TWAYBLADE lines, while the HYDRANGEA and DANDELION series are covered for 25 years.

Euronergy

FOTOTHERM Presents Updated PVT Hybrid Module at Intersolar Europe 2025

Italian solar company FOTOTHERM introduced an updated version of its PVT hybrid module at Intersolar Europe 2025. Displayed at the company's booth, the new model – FT AS-N – builds on the firm's AS series lineup with new design features.

The system uses the company's patented FOTOTHERM technology, which integrates a traditional PV layer with an embedded heat exchanger underneath. FT AS-N adopts a split-type junction box for improved layout and heat management, while maintaining the full-black aesthetic.

The PV section of the module contains 60 monocrystalline cells, each with an edge length of 156 mm. According to the company, it can deliver a peak power output of up to 320 W with an efficiency just under 20%. The module is rated for up to 1,000 V DC and a short-circuit current of 10.06 A. With dimensions of 1,640 × 992 × 36 mm and a weight of 30 kg.

FOTOTHERM	
Product Series	**–**
Model name	FT AS-N FT AS-N full-black aesthetic
Wafer type	n-type
Cell technology	Monocrystalline silicon cell
Cell size	156 mm
No. of cells	60 Cells
Module technology	Full black, Photovoltaic Thermal (PVT)
No. of busbars	–
Glass Thickness (front/ rear)	–
Maximum power (Pmax)	320 W
Module efficiency STC	19.67%
Bifaciality	–
Dimensions	1,640 × 992 × 36 mm
Weight	30 kg
Product Warranty	12 years
Performance Warranty	30 years
Application	Heat pump
Commercial Availability	–
Focused Regions For Commercialisation	–
Thermal Efficiency	47.20%
Nominal Thermal Output	827 W
Heat exchanger fluid flow rate	1.5 to 2.5 litre/minute

Graphic: TaiyangNews

The thermal performance side of the module includes a 1.63 m² heat exchanger embedded with metal pipes. FOTOTHERM states that it is designed to recover heat efficiently, with a thermal conversion rate of 47.2%. Under nominal conditions, the module can deliver up to 827 W of heat. It supports a liquid flow rate between 1.5 and 2.5 liters/minute. Pressure losses range from 400 to 900 mmH_2O, and the internal fluid volume is around 0.91 liters, which is important for sizing pumps and antifreeze additives. FOTOTHERM offers a 12-year product warranty and a 30-year linear performance guarantee. The company has not provided commercialization details for this product.

Source: TaiyangNews

PV and Thermal: The Italian PVT company, FOTOTHERM, unveiled its brand-new full-black hybrid PVT module at Intersolar Europe 2025.

FOTOTHERM

FuturaSun Highlights Colored Modules and Products Built for Challenging Climates

At Intersolar Europe 2025, Italy-based PV company FuturaSun introduced a wide-ranging portfolio of PV modules in different colors and products for severe weather conditions. The Silk Nova Colour series, offered in multiple colors, adds aesthetics to architectural applications. The red variant, composed of 108 M10 half-cut cells, delivers a power output of up to 370 W at a maximum efficiency of 18.97%. The orange version utilizes 96 G12R cells, with a

Source: FuturaSun

Modules in Color: A key highlight of FuturaSun's product display at its Intersolar Europe booth was its various colored modules for architectural appeal.

FuturaSun				
Product Series	**Silk Nova Red**	**Silk Nova Orange**	**Silk Rhino**	**Silk Nova Green Duetto**
Model name	–	–	–	–
Wafer type	n-type	n-type	n-type	n-type
Cell technology	–	–	–	–
Cell size	M10	G12R	M10	G12R
No. of cells	108	96	96	96
Module technology	Glass-Backsheet, MBB	Glass-Backsheet, MBB	Glass-backsheet, MBB	Glass-Glass, MBB
No. of busbars	10BB	10BB	16BB	10BB
Glass Thickness (front/rear)	3.2 mm / -	3.2 mm / -	4 mm / -	2 / 2 mm
Maximum power (Pmax)	370 W	400 W	455 W	410 W
Module efficiency STC	18.97%	20.02%	22.77%	20.53%
Bifaciality	–	–	–	–
Dimensions	1,722 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm
Weight	20.8 kg	21.3 kg	26.6 kg	25.5 kg
Product Warranty	15 years	15 years	15 years	15 years
Performance Warranty	25 years	25 years	25 years	30 years
Commercial Availability	–	–	–	–
Focused Regions For Commercialisation	–	–	–	–

Graphic: TaiyangNews

rated maximum power of 400 W and an efficiency of 20.02%, and is promoted for traditional terracotta-tile roofs. The green Silk Nova Duetto, built with 96 cells and G12R wafers, achieves up to 410 W of power and 20.53% efficiency. Lastly, the silver model, also with 96 G12R cells, delivers 390 W of maximum power at an efficiency of 19.52%. All Colour series panels measure 1,762 × 1,134 × 30 mm.

FuturaSun offers a product warranty of up to 15 years for all the abovementioned models. While the glass-glass green variant has a performance warranty of up to 30 years, the glass-backsheet models are offered with a warranty of up to 25 years. For installations in areas with severe weather, FuturaSun presented the Silk Rhino model. The special BOM enabling this characteristic is most likely the 4 mm front glass, while the rear still sports a white backsheet. Built with 96 M10 n-type half-cut cells, it reaches 455 W of power and 22.77% efficiency. The 1,762 × 1,134 × 30 mm module features mechanical stability of up to 7,800 Pa snow and 5,400 Pa wind loads, and is certified to withstand Class 5 hail events. It carries a 15-year product guarantee and a 25-year performance warranty.

For rooftop applications, the company is promoting the Silk Nova Duetto glass-glass module. With dimensions of under 2 m², the module is particularly aimed at rooftop installations in northern Europe. It delivers 450 W. A glass-backsheet version of this has a slightly higher power of 460 W.
The Silk Nova Premium Max Duetto is part of the company's higher power offerings. Measuring 2,384 × 1,134 × 35 mm and consisting of 132 G12 half-cut cells, this model achieves 720 W at 23.18% efficiency and is targeted at utility-scale applications.

In addition to modules, FuturaSun announced its FuturaPulse hybrid inverter series, offering modular options in single- and 3-phase formats with power outputs ranging from 3 kW to 15 kW. The commercial availability status of these products is unknown at present.

FuturaSun

Gain Solar Showcases BIPV Product Lineup

During Intersolar Europe 2025, Gain Solar, a sister company of Yingli Group, primarily focused on developing building-integrated photovoltaic (BIPV) modules, showcased its latest offerings. The products displayed at the event mimic diverse building construction materials, such as roof tiles, black stones, and colored façades. The company's roof tile lineup consists of 4 models - T-max Tile S Series, T-max Tile_A Series, T-max Tile_O Series, and T-max Tile_L Series.

Somewhat special among them is the T-max Tile_ S Series, which is has an appearance similar to traditional curved roof tiles. Built with 6 full cells, the company says these solar tiles can each deliver up to 35 W of power with an efficiency of up to 15%. However, the datasheets do not disclose the size or the technology of the cells used. Sized at 586 × 400 mm and laminated with curved 3.2 mm front and rear glass, the tile weighs 5 kg. The company says that its full black appearance and bent shape can integrate well with building architecture featuring traditional roof tiles.

Gain Solar's The 'A Series', equipped with 24 M10 half cells, comes in color options of black, red, and gray. However, the power and efficiency levels vary with the color. According to the datasheet, the black variant has a maximum power output of 90 W and an efficiency not exceeding 18.9%. The red and gray colored counterparts have a rated power output of up to 75 W and 78 W, with corresponding efficiencies of 15.8% and 16.4%, respectively. With dimensions of 1,260 × 480 mm, these tiles are built with 3.2 mm tempered glass and EVA encapsulant on both the front and rear. Weighing 8.5 kg, these solar tiles can support roofs with a buckle design or positioning overlap of consecutive tiles, added the company.

Offering similar color variants as the 'A Series', the 'O Series' has 2 different sizes – 630 × 480 mm built with 10 of M10 cells and 1,260 × 480 mm. The 'L Series', sized at 1,340 × 420 mm, consists of 18 M10 half-cells. The cross-sectional view of the solar tile shows the 3.2 mm tempered front glass + EVA + cell + EVA + backplane + bottom bracket from the air side to the building side. It weighs 6 kg. The company stated that this tile is suited for low-load-bearing capacity roof installations.

Solar + Architecture: Gain Solar's stall at Intersolar Europe 2025 showcased its range of BIPV products that are promoted as replacements for different building construction materials such as rooftiles, bricks, and colored façades.

According to Gain Solar, these solar tiles offer a lifespan of more than 30 years, matching those of building materials. Given that waterproofing characteristics are a major requirement for roof tiles, the company states that the curved S series solar tile is designed for double waterproofing, while the O and L series have a triple waterproof structure.

In addition, they have a maximum front and back side static load of 5,400 Pa and 2,400 Pa, respectively. During hailstorm events, all these solar tiles can endure 25 mm diameter hailstones at 23 m/s.

Apart from solar tiles, the company also promoted its 'Black Brick' series BIPV product that imitates a marble texture. This product is available in multiple texture patterns, thanks to optical nano-coating technology. Designed in 2 different sizes – 1,200 × 600 mm and 1,780 × 1,180 mm – it is laminated with a front 6 mm tempered glass and a rear PVB baseplate. Also on display at the event was the 'Colored Glaze' series BIPV module. Both the products have application in traditional building curtain wall or as a façade decoration.

Gain Solar

Golden Solar Unveils ZBB HJT Module with 750 W Output

Golden Solar, a China-based company that transitioned from materials science to solar technology, presented its latest high-efficiency HJT module at Intersolar Europe 2025. The module, designated JGDN132, features a ZBB cell design and is built with in-house HJT cells.

The new module is based on 210.6 mm wafers and uses a 132 half-cut cell layout. The JGDN132 HJT module is built with a dual-glass structure and delivers a power output of up to 750 W, with a reported module efficiency of 24.14%. According to the company, the use of ZBB technology plays a critical role in minimizing metallization costs – a major hurdle in scaling HJT manufacturing. To further reduce silver consumption, Golden Solar has adopted stencil printing with silver-coated copper paste for cell metallization. According to the company, this method enables fine-line printing with higher aspect ratios.

The ZBB architecture also reduces front-side shading, thereby improving light absorption and contributing to higher module efficiency. For cell interconnection, the company claims to employ a

Several Upgrades: Golden Solar presented its latest HJT module built with cells using stencil printing of silver-coated copper paste and interconnected in a ZBB configuration.

stress-free welding technique.

Golden Solar	
Product Series	**–**
Model name	JGDN132-0BB
Wafer type	n-type
Cell technology	HJT
Cell size	210.6 mm
No. of cells	132
Module technology	Bifacial, Glass-Glass, Halfcell, ZBB
No. of busbars	MBB
Glass Thickness (front/ rear)	2. 0 / 2.0 mm
Maximum power (Pmax)	750 W
Module efficiency STC	24.14%
Bifaciality	–
Dimensions	2,384 × 1,303 × 33 mm
Weight	37.5 kg
Application	–
Product Warranty	15 years
Performance Warranty	30 years
Commercial Availability	–
Focused Regions For Commercialisation	–

Graphic: TaiyangNews

The company has yet to provide a response on the timeline for commercialization, leaving the product's market readiness unclear.

Golden Solar

Grand Sunergy's Gap-Less HJT Module

Chinese HJT module maker Grand Sunergy showcased its latest 745 W module at Intersolar Europe 2025. The product, part of its GSM-MH3/132-BHDG, part of its HJT210R series, features a zero-gap cell layout.

This new module uses 132 G12 half-cut HJT cells and delivers up to a claimed 745 W of power at an efficiency of 23.98%. This is a 15 W increase and roughly 2% relative efficiency gain over the company's earlier 730 W model that featured 23.51% efficiency. These improvements are primarily linked to the zero-gap cell-to-cell interconnection, which minimizes inactive areas between cells.

Grand Sunergy highlights the inherent low-light performance of HJT cells as a benefit for installations exposed to varied irradiance, such as during early morning, late evening, or cloudy conditions. With

Grand Sunergy	
Product Series	**High Efficiency HJT Module**
Model name	GSM-MH3/132-BHDG
Wafer type	n-type
Cell technology	HJT
Cell size	G12
No. of cells	132
Module technology	Bifacial, Glass-Glass, Halfcell, Zero-Gap, ZBB
No. of busbars	MBB
Glass Thickness (front/ rear)	–
Maximum power (Pmax)	750 W
Module efficiency STC	24.14%
Dimensions	2,384 × 1,303 × 33 mm
Weight	38.5 kg
Product Warranty	15 years
Performance Warranty	30 years
Application	Utility
Commercial Availability	Q4 2025
Focused Regions For Commercialisation	China & Middle East

Graphic: TaiyangNews

dimensions of 2,384 × 1,303 × 33 mm, the module is positioned for use in utility-scale and commercial rooftop projects. The product is scheduled to become commercially available in China and the Middle East in Q4 this year. In the TaiyangNews TOP SOLAR MODULES listing, the company is currently represented by an HJT module with 22.86% efficiency.

Zero Gap: Grand Sunergy showcased its latest 745 W large-size HJT module, featuring a zero-gap design, at Intersolar Europe 2025.

Grand Sunergy

Hanersun's High-Efficiency Lightweight Modules

At SNEC 2025, Hanersun presented its product range for several applications, including utility scale, C&I, and flexible modules, with several niche use cases.

Among the modules on display was the HITOUCH 6N 720W, built with 210 mm cells. The module reaches a conversion efficiency of 23.2% and a bifaciality rating of 85%, targeting large-scale utility installations that require high power output. Also featured was the HITOUCH 6N 630 W, a TOPCon module based on rectangular 182 × 210 mm cells, offering 23.3% efficiency and promoted for C&I applications.

In the flexible and lightweight category, Hanersun exhibited the Airy Series HITOUCH 5 with a 535 W power rating, weighing only 9 kg, and designed

Module Showcase: Hanersun presented a wide range of products, including a standard utility-scale product with 720 W, a 630 W rectangular wafer-based C&I module, and a 9 kg flexible 535 W module that is suitable for several niche applications.

for BIPV and structurally constrained scenarios. The company also showcased the Zephyr Series HITOUCH 5N 445W, which it claims is 35% lighter than standard modules and adaptable to curved surfaces. Not only are several performance characteristics of these products unknown (the reason for the empty spaces in the specs table), but the commercialization details of these products are missing as well.

Hanersun showcased a similar portfolio of modules at Intersolar Europe 2025, where it also strengthened its European presence through 4 strategic partnerships. In the solar module segment, the company partnered with Lithuanian energy leader SOLMAN to drive high-efficiency module supply and project development in the Baltic region. The other 3 agreements are focused on energy storage systems.

Hanersun

HT-SAAE Launches Flexible PV Module

HT-SAAE, a company that operates manufacturing facilities in China and Turkey, introduced its newly developed flexible PV module HT60-18X (NLm) at Intersolar Europe 2025. During an interaction with TaiyangNews at its booth, SAAE's VP of Sales, Emre Kulac, shared some details on the product. Part of the company's Jupiter Flex series, the module is designed for lightweight and adaptable rooftop applications.

The module integrates 120 M10-size half-cut TOPCon cells in a 16BB interconnection layout to deliver a rated maximum power output of 460 W and efficiency of 21.1%. According to the datasheet, it is designed for systems with a 1,500 V DC voltage, which makes it well-suited for a variety of residential PV applications across Europe.

Its polymer-based front sheet and glassless, frameless structure allow for greater flexibility and reduced weight. Measuring 1,927 × 1,131 × 3 mm and weighing 6.3 kg, the module is approximately

Source: TaiyangNews

Glass-Free Flexibility: HT-SAAE unveils a 460 W lightweight TOPCon module engineered for curved and non-penetrative rooftop installations at Intersolar Europe 2025.

HT SAAE	
Product Series	**Jupiter Flex Series**
Model name	HT60-18X (NLm)
Wafer type	n-type
Cell technology	TOPCon
Cell size	M10
No. of cells	120
Module technology	Halfcut, Frameless, Flexible, MBB
No. of busbars	16BB
Glass Thickness (front/ rear)	–
Maximum power (Pmax)	460 W
Module efficiency STC	21.1%
Bifaciality	–
Dimensions	1,927 × 1,131 × 3 mm
Weight	6.3 kg
Product Warranty	12 years
Performance Warranty	25 years
Application	Distributed Generation, Low load bearing roof
Commercial Availability	Yes
Focused Regions For Commercialisation	Turkey & USA

Graphic: TaiyangNews

70% lighter than standard modules. HT-SAAE provides a 12-year product warranty and a 25-year linear power output warranty for the module. The product is available commercially and is specifically promoted for the Turkish and US markets.

HT-SAAE

Jolywood Showcases Innovations in Modules and Materials

Jolywood showcased its PV materials and modules at Intersolar Europe 2025, highlighting its dual role as a leading supplier of backsheets and encapsulants as well as an n-type PV module manufacturer. Speaking to TaiyangNews at the booth, Vincent Wang, R&D Director at Jolywood, elaborated on the company's latest product innovations and shared insights into its strategy to stay competitive in the PV landscape.

Jolywood's flexible NIWA Air module series was one of the highlights at its booth. Built with a reinforced frontsheet, the 575 W module delivers up to 20.9% efficiency and is targeted at curved rooftops, balconies, camping gear, and vehicle integration. Also on display was the company's newest transparent backsheet with a black grid, based on a PET polymer core and FFC nano-coating, offering

Materials Mastery: Jolywood's PV product display at Intersolar was based on material innovation – total polymer laminated flexible modules and product using double-beam steel frame-based glass-backsheet module with low carbon footprint and a thin front glass panel for reduced weight.

Jolywood		
Product Series	**NIWA Air**	**JW Plus WINDPROOF**
Model name	JW-HF144N	JW-HT132N-R2
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	–	182 × 210 mm
No. of cells	144	132
Module technology	Halfcut, Flexible, MBB	Bifacial, Glass-Backsheet, Hal-fell,MBB
No. of busbars	–	16BB
Glass Thickness (front/rear)	–	2.8 mm
Maximum power (Pmax)	575 W	645 W
Module efficiency STC	20.9%	23.9%
Bifaciality	–	80 ± 5%
Dimensions	2,260 × 1,219 × 2.8 mm	2,382 × 1,134 × 29 mm
Weight	8 kg	28.2kg
Application		C&I, utility
Product Warranty	12 years	12 years
Performance Warranty	25 years	30 years
Commercial Availability	Yes	Yes
Focused Regions For Commercialisation	Global	Global

Graphic: TaiyangNews

over 93% light transmission, which is expected to decay by less than 2% over 3 years in outdoor testing.

Other materials included a reflective black backsheet, designed to deliver an all-black appearance on the cell side while reflecting incident sunlight back into the module for higher absorption. The company also presented its latest encapsulant innovations, with EPE film receiving particular attention for compatibility with multiple cell technologies.

As part of its PV business, Jolywood introduced modules with a double-beam steel frame to cater to structural demands in newer module formats. The company says this design replaces traditional aluminum frames while matching mechanical strength, reducing CO_2 emissions by up to 45%, and cutting costs. Coated with a 25 µm layer of aluminum-magnesium-zinc alloy, the frame supports a 645 W module rated at 23.9% efficiency.

Jolywood also highlighted a thin-glass module integrated with 1.8 mm tempered front glass, a transparent meshed backsheet, and a double-beam steel frame. It adds that the module's breathable backsheet helps eliminate internal acidic buildup, lowering the risk of metallization corrosion. This structure enables lower operating temperatures, enhanced performance, and reliability. The thin-glass version is also 17% to 20% lighter than standard double-glass modules, beneficial for logistics and installation processes.

While Jolywood indicates that the 2 products are available globally, the company is represented with a 22.53% efficiency TOPCon module in the TaiyangNews TOP SOLAR MODULES listing, as it has yet to provide the proof of commercialization for its modules with higher efficiencies.

Jolywood

Leascend's Presents Powerful HJT Modules

China's Leascend Photovoltaic Technology Co. Ltd. ("Leascend PV") showcased its HJT products, covering both cells and modules, at SNEC 2025.

The Leascend Uranus G12 SMBB HJT module features a 132 half-cut cell configuration using 210 mm wafers. At the exhibition, the company highlighted a module with a mass production level above 735 W, and a conversion efficiency of 23.66%. The company claims reaching a peak

Leascend	
Product Series	**Uranus**
Model name	G12-0BB
Wafer type	n-type
Cell technology	HJT
Cell size	210 mm
No. of cells	132
Module technology	Bifacial, Glass-Glass, ZBB
No. of busbars	–
Glass Thickness (front/ rear)	–
Maximum power (Pmax)	740 W
Module efficiency STC	23.82%
Bifaciality	90 ± 5%
Dimensions	2,384 × 1,303 × 35 mm
Weight	38.4 kg
Application	Utility
Product Warranty	–
Performance Warranty	30 years
Commercial Availablity	–
Focused Regions For Commercialisation	–

Graphic: TaiyangNews

output of 781.97 W under bifacial test conditions, with a rated bifaciality of 85±5%. The company also showcased its **Uranus G12-0BB HJT** module, which utilizes ZBB technology. This module reaches a rated output of 740 W with a maximum efficiency of 23.82%.

Both the modules have dimensions of 2,384 × 1,303 × 35 mm and weigh 38.4 kg. The 2 mm dual glass

Bifacial boost: Leascend Photovoltaic showcased its latest HJT module with 90% bifacial gain, which according to the company, when factored in, can reach greater than 780 W output power.

module supports wind loads of up to 5,400 Pa. The temperature coefficient of power is –0.24%/°C. First-year degradation is rated at ≤1%, the module carries a 15-year product warranty and a 30-year linear power output warranty.

On the cell side, the company showcased its latest G12-0BB HJT cells, combining crystalline silicon with thin-film passivation. These cells offer high efficiency and stability while avoiding light-induced degradation (LID) and potential-induced degradation (PID). With a bifaciality of up to 95%, the company claims this cell's average conversion efficiency in mass production has surpassed 26%, with the latest batches reaching 26.23%. Commercialization timelines for these products are unclear. Thus, despite qualifying for inclusion with its integrated cell and module capability, the company does not feature in the TaiyangNews TOP SOLAR MODULES listing given the lack of proof of commercialization.

Leascend

LESSO Solar Presents Integrated PV Solutions at SNEC 2025

At SNEC 2025, LESSO Solar showcased its all-in-one clean energy platform, which includes PV modules, inverters, ESS, and smart energy management solutions.

LESSO's module portfolio on display featured multiple n-type TOPCon bifacial modules built on the 182 mm and 210 mm wafer platforms. One highlight was the 730 W dual-glass bifacial product, featuring 132 half-cells based on the 210 mm wafer. Featuring a conversion efficiency of 23.5%, this TOPCon module uses 2.0 mm tempered glass on both sides, supports a maximum system voltage of 1,500 V, and measures 2,384 × 1,303 × 35 mm.

In the medium power range, the company exhibited a 640 W n-type bifacial TOPCon module constructed with 156 half-cut cells made using 182 mm wafers. The module achieves an efficiency of 22.54%, features a dual-glass configuration, and is designed for utility and C&I rooftop installations. The product dimensions are 2,278 × 1,134 × 35 mm, and it supports up to 35 A fuse rating under 1,500 V systems.

LESSO also presented a 605 W module based on the 210R format with 120 cells and 22.84% efficiency, and a 580 W module based on the 182 mm format with 144 cells and 22.45% efficiency.

In addition to PV modules, LESSO showcased its residential energy storage platform. The iStorageE2A Series offers capacities ranging from 7,600 Wh to 12,000 Wh, forming part of the company's all-in-one clean energy solution strategy. Alongside the storage

Trinasolar

Smart Energy
Powering a Net-Zero Future

Lesso Solar		
Product Series	**–**	**–**
Model name	–	–
Wafer type	n-type	n-type
Cell technology	TOPCon	TOPCon
Cell size	G12	M10
No. of cells	132	156
Module technology	Bifacial, Glass-Glass, Halfcell	Bifacial, Glass-Glass, Halfcell
No. of busbars	–	–
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	730 W	640 W
Module efficiency STC	23.5%	22.5%
Bifaciality	–	–
Dimensions	2,384 × 1,303 × 35 mm	2,278 × 1,134 × 35 mm
Weight	–	–
Application	Residential	Residential
Product Warranty	–	–
Performance Warranty	–	–
Commercial Availablity	–	–
Focused Regions For Commercialisation	–	–

Graphic: TaiyangNews

units, the company presented its hybrid inverters for PV + storage integration, as well as string inverters for direct solar-to-grid applications. LESSO also displayed its range of EV chargers, completing the residential clean energy ecosystem highlighted at the event.

LESSO unveiled its Solar Green Power ecosystem, consisting of PV + ESS + EV, tailored for residential and small commercial users. PV being the key component, the company presented various integration scenarios, including roofs, balconies, carports, and gardens. As part of its EV solutions, the company displayed a 7kW smart EV charger, compatible with mainstream EV brands, supporting app-based charging control and real-time monitoring. The residential lithium battery systems come equipped with temperature control and compatibility with hybrid inverters. It supports on-grid, off-grid, and hybrid operating modes, offering options for energy independence and peak shaving. Fully certified with CE, UL, TÜV, and other global safety standards, these systems provide a comprehensive solution that enables smarter, cleaner, and more efficient energy use in daily life, underscores LESSO. While notable, the company has yet to provide a response on the timeline for commercialization.

LESSO Solar

Luxor Solar Displays 5 Products Based on 2 Cell Architectures

At Intersolar Europe 2025, German-based module maker Luxor Solar GmbH highlighted 5 products among its exhibits. All the products are from its ECO LINE series, of which 3 are based on HJT technology and 2 are built on TOPCon.

The ECO LINE TOPCon series featured 2 modules. The first of the two, Fullblack M96 450W 182R+, offers a power output of up to 455 W with 22.54% efficiency. The module is highlighted for its all-black appearance. The Secure M96 460W 182R+ variant, emphasized for its safety, comes with a black frame and a white mesh. It has a rated power of 475 W and 23.54% efficiency. As their names indicate, the 2 modules are built with 96 cells, measure 1762 ×

Source: Luxor Solar

Unified Format: Luxor Solar showcased 5 glass-glass PV modules built on TOPCon and HJT cell technologies at Intersolar Europe 2025, all featuring the M10 wafer format

Luxor			
Product Series	**ECO LINE**		
Model name	M96R	M96R-BW	M96R-BW-W470
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	HJT
Cell size	M10	M10	M10
No. of cells	96	96	96
Module technology	Bifacial, Glass-Glass, Half Cells	Bifacial, Glass-Glass, Half Cells	Glass-Glass, Half Cells
No. of busbars	–	–	–
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	–
Maximum power (Pmax)	455 W	475 W	475 W
Module efficiency STC	22.54%	23.54%	23.54%
Bifaciality	80%	80%	–
Dimensions	1,762 × 1,134 × 30 mm	1,762 × 1,134 × 30 mm	–
Weight	23.5 kg	23.5 kg	–
Application	30 years	30 years	–
Product Warranty	30 years	30 years	30 years
Performance Warranty	Distributed Generation	Distributed Generation	Utility
Commercial Availablity	–	–	–
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

1134 × 30 mm, and weigh 23.5 kg.

From the HJT lineup, 2 out of 3 products are also of the smaller form factor. One is a frameless module with no covering at the inter-cell spacing, rendering the cell gaps transparent. Mainly promoted for BIPV and measuring 1,756 x 1,128 x 5 mm, M96 465 W 182R+ has a power rating of up to 465 W and an efficiency of 23.25%. Its counterpart, M76 470 W182R+ uses a white mesh and a black frame, leading to a slightly higher efficiency of 23.54% and a 475 W power rating. It is also larger, with dimensions of 1,960 x 1,134 x 30 mm. Also on display was the larger M132 640 182R+, which is offered with a standard frame and a white mesh. Consisting of 132 cells, this module has a power rating of 645 W and 23.65% efficiency.

All modules in the series employ glass-glass architecture and come with a 30-year product and linear performance guarantee. The specification details of these products also carry the SGS logo, indicating audited supply chain traceability and social responsibility. The company has not responded to our query on product availability and targeted markets.

Luxor Solar

Megasol's Swiss-Engineered Solar Tiles

At Intersolar Europe 2025, Megasol Energy Ltd., a relatively new player in Europe's BIPV segment, presented its MATCH Tile solar roof system. The series comprises 2 tile models: the MATCH Tile M64-HC20 totallyblack F4 N and MATCH Tile M25-HC8 totallyblack F2 N. The only differences between them are the number of cells and rated power per tile.

The M64-HC20 module incorporates 20 M6 half-cut cells and has a rated maximum power output of 64 W and 18.32% efficiency. The M25-HC8 version includes 8 similar half-cut cells and delivers up to 25 W at an efficiency of 14.66%. Both models feature front and rear lamination with Fjord-type glass and are available in full black or optional Terracotta designs. The larger tile measures 465 × 915 mm and the smaller one 465 × 455 mm. Each tile is rated for an operating system voltage of 1,000 V DC. The company says that these tiles are engineered to meet environmental demands, with hail resistance

BIPV Focus: Megasol presented its MATCH Tile solar roof system designed for building-integrated PV applications, at Intersolar Europe 2025.

Megasol		
Product Series	**MATCH Tile**	
Model name	M64-HC20 totallyblack F4 N	M25-HC8
Wafer type	n-type	n-type
Cell technology	BC	BC
Cell size	M6	M6
No. of cells	20	8
Module technology	Halfcell, Glass-Glass	Halfcell, Glass-Glass
No. of busbars	–	–
Glass Thickness (front/rear)	–	–
Maximum power (Pmax)	64 W	25 W
Module efficiency STC	18.32%	14.66%
Bifaciality	–	–
Dimensions	465 × 915 mm / 465 × 455 mm	465 × 915 mm / 465 × 455 mm
Weight	–	–
Application	Residential	Residential
Product Warranty	10 years	10 years
Performance Warranty	25 years	25 years
Commercial Availability	–	–
Focused Regions For Commercialisation	–	–

Graphic: TaiyangNews

up to Class 5 (50 mm hailstones) and mechanical strength capable of withstanding snow loads of up to 13 kN/m². For fire safety, the system uses heat-resistant glass on both sides and steel construction to mitigate fire risk, according to the company.

Megasol lists a 10-year product warranty, a 25-year performance guarantee, and a projected service life of up to 50 years for the MATCH Tile range, although its availability has yet to be confirmed.

Megasol

Specially Designed VIPV Module From OPES

At Intersolar Europe 2025, OPES Solar Mobility, a Germany-based developer of vehicle-integrated photovoltaic (VIPV) modules, showcased its new 500 W solar module for VIPV applications. The TaiyangNews team met Robert Fritsch, Head of Sales at OPES, who offered insights into the module's design and use case.

The semi-flexible module, developed for commercial vehicles such as light commercial vans, camper vans, buses, and trucks, is based on CIGS cell technology. It features a direct matrix interconnection approach that replaces traditional ribbon-based designs. Fritsch says this layout helps reduce power losses caused by dynamic and irregular shading conditions commonly experienced during vehicle operation. Cells directly affected by shade reduce output locally, while others maintain performance through current rerouting, which supports stable energy generation under urban and mobile environments.

Designed for VIPV applications, the company says the module undergoes testing to meet specific durability requirements for performance under conditions such as continuous vibration, high temperatures, and direct adhesive mounting onto curved vehicle surfaces. Unlike conventional rooftop PV systems mounted with substructures, these modules are bonded directly to vehicle exteriors. Fritsch added that OPES applies in-house testing to evaluate adhesive strength, airflow dynamics, shock, and thermal cycling. OPES emphasizes that the modules are already available commercially.

Production of the new module is scheduled to begin at OPES' Leipzig-based facility in Germany within this year.

Vehicle Integration: OPES Solar Mobility introduced its semi-flexible 500 W VIPV module for the commercial vehicle segment at the exhibition.

OPES

PHONO Displays Modules Featuring Diverse Cell Architectures for Specific Applications

PHONO, a solar brand under SUMEC ENERGY, presented high-performance modules addressing both utility-scale and distributed solar applications at Intersolar Europe 2025. The company promoted HJT for utility and TOPCon and BC for rooftop applications. In addition, PHONO presented specialized formats for BIPV and consumer-scale installations.

The Helios Series, targeted at utility-scale installations, is based on HJT and incorporates 132 cells made of 210 mm wafers. Featuring a 20-busbar design, the module has a maximum power output of 730 W and 23.50% conversion efficiency. With dimensions of 2,384 × 1,303 × 33 mm and a weight of 37.9 kg, the module also boasts a bifaciality rating of 90 ± 5%.

The Draco Series, built on n-type TOPCon technology, includes a 460 W dual-glass module PS460L8-16/QMH with a conversion efficiency of 23.02%. It weighs 23 kg and measures 1,762 × 1,134 × 30 mm, with a bifaciality of 80±5%. The module is designed for rooftop and BIPV use cases, including corridors, terraces, curtain walls, and carport structures. The series is certified by Germany's DIBt, enabling structural integration in building applications across Europe.

The Quasar Series utilizes an all-back-contact design. The 495 W module (PS495L7GFH-18/VBH) reaches an efficiency of 24.25% and features a ZBB layout. The module dimensions are 1,800 × 1,134 × 30 mm, and it incorporates bifacial functionality.

The company also displayed high-light-transmittance modules for greenhouse and building-integrated PV applications, along with a portfolio of small-format modules and plug-and-play balcony systems tailored to household consumers.

PHONO continued its showcase of next-generation modules at SNEC 2025, with an emphasis on adaptation to environmental conditions. The Transparent Series featured modules with 34% light transmittance, targeting agrivoltaics and architectural use. The Draco 450 W TOPCon anti-

Source: PHONO

Module Versatility: All architectures: The product disply of PHONO at Intersolar included products represented all mainstream cell architecutres – TOPCon, HJT and BC

PHONO Solar			
Product Series	**HJT Helios**	**TOPCon Draco**	**BC Quasar**
Model name	PS730M13GFH-22/ WSHW	PS460L8-16/QMH	PS495L7GFH-18/VBH
Wafer type	n-type	n-type	n-type
Cell technology	HJT	TOPCon	BC
Cell size	210 mm	182 mm	192R
No. of cells	132	96	108
Module technology	Bifacial, Halfell, ZBB	Bifacial, Glass-Glass, Halfcell	Busbarless, Halfcell, MBB
No. of busbars	20BB	16BB	MBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm	–	2.0 / 2.0 mm
Maximum power (Pmax)	730 W	460 W	495 W
Module efficiency STC	23.5%	23.02%	24.25%
Bifaciality	90 ± 5%	80 ± 5%	70±5%
Dimensions	2,384 x 1,303 x 33 mm	1,762 x 1,134 x 30 mm	1,800 x 1,134 x 30 mm
Weight	37.9 kg	23 kg	25 kg
Application	Utility	BIPV,Residential	AgriPV, BIPV
Product Warranty	15 years	15 years	15 years
Performance Warranty	30 years	25 years	30 years
Commercial Availablity	–	–	–
Focused Regions For Commercialisation	–	–	Europe

Graphic: TaiyangNews

dust variant was introduced for desert and high-soiling environments, using structural enhancements to mitigate dust accumulation. Helios HJT and Quasar BC modules were also highlighted again, with the latter promoted for its shading-tolerant, hotspot-resistant performance. The company has yet to respond to our inquiry on the status of availability and targeted markets as of the time of this report.

PHONO

Polyshine Solar Showcases Lightweight PV Module Solutions

At SNEC 2025 in Shanghai, Polyshine Solar exhibited a set of lightweight PV module solutions for specific installation environments. According to the company, its focus was to adapt PV technology for rooftops and structures with limited load capacity, curved surfaces, or unconventional application settings.

A new lightweight module, the JG-Series, was introduced as part of the presentation. The module uses a 1.1 mm ultra-thin glass package, reducing weight by 50% compared to standard modules. The reported power conversion efficiency reaches up to 23.3%, with design specifications intended to meet installation requirements for structurally constrained rooftops.

The company presented 5 application scenarios. The first addressed industrial facilities with high energy demand but insufficient roof load capacity. For these installations, Polyshine presented a module weighing under 5.5 kg/m² and capable of conforming to curved surfaces with a bending radius of 0.5 m. The module is coated to minimize dust accumulation and reduce maintenance needs.

Another focus application for the company was

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Adaptive Design: Polyshine Solar showcased lightweight PV modules at SNEC 2025, including solutions for rooftops, traffic barriers, greenhouses, balconies, and architectural settings.

integrating PV into traffic sound barriers. These modules are intended for elevated road structures where lightweight materials are required. The design combines noise reduction with electricity generation, converting transportation infrastructure into dual-use systems. The company showed colored PV modules for use in architectural settings. It stated that these modules are designed for visual integration into buildings while withstanding exposure to humidity and salt in seaside environments.

Polyshine Solar also showcased greenhouse structures. It featured a translucent bifacial module, allowing for power generation on both surfaces while permitting controlled light transmission suited for plant cultivation.

On the balcony PV side, the company's balcony-specific modules are designed for simple and quick installation. They can be secured with cable ties and adapted to different balcony and garden railing structures, enabling households to adopt PV with minimal effort. The company has yet to clarify the status of availability and targeted markets for these products.

Polyshine Solar

Qn-SOLAR Showcases TOPCon Modules for Europe

Qn-SOLAR, a Shanghai-based PV module manufacturer specializing in TOPCon technology, displayed 2 new high-efficiency modules at Intersolar Europe 2025. The company featured the QNN182-HG-54 TOPCon solar module. This module, built with 108 half-cells based on 182 mm wafer format, has a maximum rated power of 430 W and an efficiency of 22.02%. It measures 1,722 × 1,134 × 30 mm with a 2 mm dual-glass construction, and weighs 24 kg. A 35 mm frame version is also available, according to the company.

The second module on display, the QNN210R-HG-54, is based on a larger 182 × 210 mm (G12R) cell format. It also features 108 half-cells and offers up to 510 W of output with a peak efficiency of 22.93%. This module is slightly larger, measuring 1,961 × 1,134 × 30 mm, and weighs 27.5 kg.

Dual Format Lineup : Qn-SOLAR promoted its latest M10 and G12R size TOPCon cell-based modules at Intersolar Europe 2025.

Qn-Solar	
Product Series	**–**
Model name	QNN210R-HG-54
Wafer type	n-type
Cell technology	TOPCon
Cell size	210R
No. of cells	108
Module technology	Bifacial, Glass-Glass, Halfcell, MBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm
Maximum power (Pmax)	510 W
Module efficiency STC	22.93%
Bifaciality	–
Dimensions	1,961 × 1,134 × 30 mm
Weight	27.5 kg
Application	Utility, Residential
Product Warranty	20 - 30 years
Performance Warranty	30 years
Commercial Availability	–
Focused Regions For Commercialisation	–

Graphic: TaiyangNews

The modules are certified for high wind of 2,400 Pa and 5,400 Pa snow loads and are tested to withstand hailstones up to 25 mm in diameter impacting at speeds of 23 m/s.

The M10 variant is backed by a 15-year product warranty, while the G12R module includes a 20-year warranty. Both come with a 30-year performance guarantee, which limits annual power degradation to less than 0.4% after the first year, where LID is stated to be under 1%. These warranties are supported by third-party insurers including Ariel Re.

As of the time of publishing this report, the company has not responded to our query on the timeline for commercialization of these products. In this context, it is worth noting that Qn-Solar's TOPCon product is currently listed in the TaiyangNews TOP SOLAR MODULES with an efficiency of 22.45%.

Qn-SOLAR

Runergy Debuts BC Module and Promotes a TOPCon Product for DG

At Intersolar Europe 2025, vertically integrated solar manufacturer Runergy presented its latest portfolio of PV modules, including its first BC module. The showcased products are targeted at both utility-scale and DG applications.

The HY-WH132C11 module is Runergy's first BC product, built on a 132-cell half-cut architecture using 210R wafers. It is rated for up to 670 W of power and a conversion efficiency of up to 24.8%. The module is configured with a glass front and a backsheet on the rear, with external dimensions of 2,382 × 1,134 × 30 mm. According to the company, the module withstands hail impact up to 55 mm in diameter at velocities up to 33 m/s.

For rooftop and other DG applications, Runergy promoted its HY-WH96N11 series TOPCon modules. This, also a single-glass monofacial module, however, uses 96 pieces of 210R-size n-type half-cut cells, delivering up to 470 W output and a maximum efficiency of 23.5%. The module is sized at 1,762 × 1,134 × 30 mm and includes a tempered glass front with a backsheet rear layer. According to the company, the single-glass configuration results in a product that is approximately 15% lighter than a double-glass version. Hail resistance specifications are the same as the BC module. Both products carry a 15-year product warranty and a 30-year performance warranty.

Runergy has not responded to our query on product availability. At the same time, the company is represented in the TaiyangNews TOP SOLAR MODULES with a TOPCon product reaching 22.5% efficiency.

Runergy		
Product Series	**–**	**–**
Model name	HY-WH132C11	HY-WH96N11
Wafer type	n-type	n-type
Cell technology	BC	TOPCon
Cell size	G12R	G12R
No. of cells	132	96
Module technology	Backcontact, Glass-Backsheet, Half cells	Glass-Backsheet, Half cells
No. of busbars	MBB	16BB
Glass Thickness (front/rear)	–	3.2 mm
Maximum power (Pmax)	670 W	470 W
Module efficiency STC	24.80%	23.50%
Bifaciality	–	–
Dimensions	2,382 × 1,134 × 30 mm	1,762 × 1,134 × 30 mm
Weight	–	21.2 kg
Application	–	15 years
Product Warranty	–	25 years
Performance Warranty	–	Distributed Generation
Commercial Availablity	–	–
Focused Regions For Commercialisation	–	–

Graphic: TaiyangNews

Runergy

Seraphim's Full-Screen TOPCon Module

Seraphim, a well-known Chinese PV cell and module manufacturer, showcased its latest product portfolio at Intersolar Europe 2025. Speaking to TaiyangNews at its booth, Andrew Zhang, Technical Director at Seraphim, introduced the company's new Sable-series full-screen TOPCon module. According to the company, the module, which combines a steel frame with sectional aluminum inserts integrated before the lamination process, is designed aesthetics, prevents dust and water buildup, which is beneficial for low-tilt rooftop systems

A key highlight of the Sable series indeed is its dust-accumulation-free design. Unlike traditional anti-dust modules, where the short-edge frame height is typically lower than the long side, Seraphim's approach uses a steel cover on all 4 sides, which is lower than the segmented aluminum inserts. According to the company, this configuration allows rainwater and dust to run off easily, even at low installation angles.

Seraphim	
Product Series	**Sable**
Model name	SRP-620-BTC-BG
Wafer type	n-type
Cell technology	TOPCon
Cell size	G12R
No. of cells	132
Module technology	Antidust, Bifacial, Fullscreen, Glass-Glass, Halfcell, MBB
No. of busbars	16BB
Glass Thickness (front/ rear)	2.0 / 2.0 mm
Maximum power (Pmax)	620 W
Module efficiency STC	22.95%
Bifaciality	80 ± 5%
Dimensions	2,382 × 1,134 × 26 mm
Weight	33.7 kg
Application	C&I
Product Warranty	15 years
Performance Warranty	30 years
Commercial Availability	Q4 2025
Focused Regions For Commercialisation	Poland, Spain, Turkey, Mexico, Brazil

Graphic: TaiyangNews

Full-Screen Design: The Sable-series full-screen TOPCon module from module, apart from making for good aesthetics, prevents dust and water buildup at the bottom.

Zhang further explained that this module, despite having no full aluminum frame, retains strong mechanical durability through a hybrid framing system. The steel portion reinforces structural integrity, while the aluminum sections with embedded rubber cushioning and clamping mechanisms allow faster mounting and minimize stress, he added.

The module has reportedly also passed hail impact tests and is currently undergoing long-term reliability assessments, including TC600, DH2000, and HF60 testing protocols.

From a performance standpoint, this module incorporates 132 G12R half-cut TOPCon cells and delivers a power output of 620 W with up to 22.95% efficiency, and is rated with a bifaciality of up to 80%±5%. It measures 2,382 × 1,134 × 26 mm and weighs 32.5 kg, with 2 mm glass layers on both the front and rear sides.

This product carries a 15-year product warranty and a 30-year performance guarantee. It is expected to be commercialized in select markets, including Poland, Spain, Turkey, Mexico, and Brazil, in Q4 2025.

Seraphim

Soldering-Free Interconnection From SOLYCO

SOLYCO Solar AG, a Germany-based module producer, has developed a proprietary interconnection technology called TECC-Connect PV, which eliminates the use of critical materials such as silver, lead, and bismuth, and also makes the process soldering-free. The technology has been implemented in the company's HJT module, the SOLYCO Pro R-TG 96h-T.5 /450, which was publicly displayed for the first time at Intersolar Europe.

SOLYCO's TECC-Connect design removes the need for silver, lead, and bismuth. It replaces conventional soldering with a conductive thermoplastic material. This material coats a copper wire core of 280 µm.

During the interaction with TaiyangNews, Lars Podlowski, Managing Director and CTO of SOLYCO, details that the low melting point of the plastic, of around 130°C to 180°C, allows interconnection without high-temperature soldering. This makes it suitable for temperature sensitive solar cell architectures, including HJT and tandem cells, he adds.

The SOLYCO Pro R-TG 96h-T.5 /450 module uses 96 G12R-size HJT half-cells. It reaches a power output of up to 450 W and a conversion efficiency

Lead-Free Interconnection: At Intersolar Europe 2025, SOLYCO introduced its new HJT module featuring TECC-Connect technology that eliminates the use of silver, lead, and bismuth.

SOLYCO	
Product Series	**SOLYCO Pro**
Model name	R-TG 96h-T.5 /450
Wafer type	n-type
Cell technology	HJT
Cell size	G12R
No. of cells	96
Module technology	Bifacial, Full black, Glass-Glass, ZBB
No. of busbars	ZBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm
Maximum power (Pmax)	450 W
Module efficiency STC	22.5%
Bifaciality	90%
Dimensions	1,762 × 1,134 × 30 mm
Weight	24.8 kg
Application	Residential, C&I
Product Warranty	30 years
Performance Warranty	30 years
Commercial Availability	Yes
Focused Regions For Commercialisation	Europe

Graphic: TaiyangNews

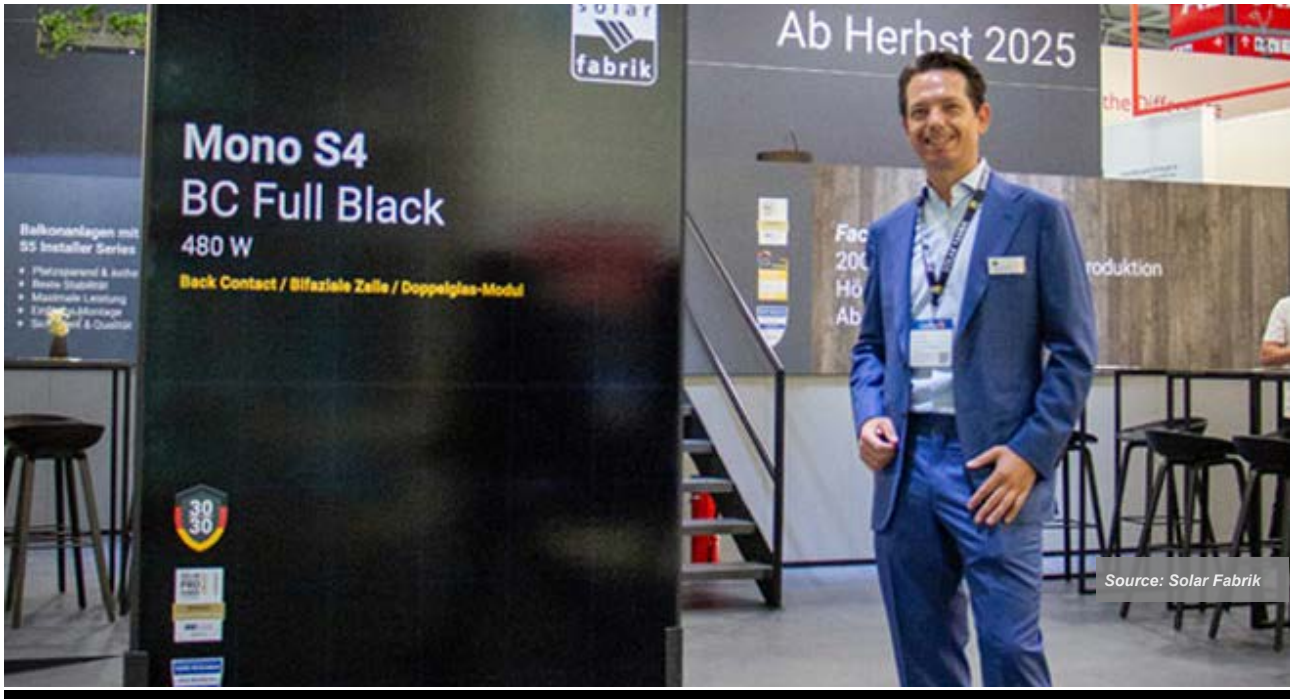
of 22.5%. The cells are interconnected using Ecoprogetti's 0BB stringer with SOLYCO's TECC wire, which eliminates solder joints entirely. The module is laminated with 2 mm glass on both sides. It measures 1,762 × 1,134 mm in dimensions, has a 30 mm black aluminum frame and weighs 24.8 kg. The datasheet lists a bifaciality of up to 90% and a temperature coefficient (Pmax) of -0.24%/°C. Podlowski mentioned that commercial availability of the module is planned for 2026. It is expected to carry a 30-year warranty on both product and performance.

SOLYCO

Made-in-Europe Modules from Solar Fabric

At Intersolar Europe 2025, German PV module manufacturer Solar Fabrik presented its latest made-in-Europe product portfolio, featuring TOPCon and BC solar modules designed for the European residential and commercial segments.

Under the Mono S4 Halfcut series, Solar Fabrik displayed 2 TOPCon module variants: Trend White and Trend Black. Both are built with 108 half-cut



Source: Solar Fabrik

Aesthetics in Focus: Out of the 3 modules promoted by Solar Fabrik at Intersolar Europe 2025, 2 are all black products with superior aesthatics one is built with black frame.

Solar Fabrik			
Product Series	**Trend White Mono S4**	**Trend Black Mono S4**	**BC Full Black Mono S4**
Model name	–	–	–
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	BC
Cell size	–	–	–
No. of cells	108	108	108
Module technology	Glass-Glass, Halfcell, Monofacial	Glass-Glass, Halfcell, Monofacial	Glass-Glass, Halfcell, Monofacial
No. of busbars	9BB	9BB	MBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	455 W	450 W	480 W
Module efficiency STC	–	–	23.5%
Bifaciality	–	–	–
Dimensions	1,762 × 1,134 × 30 mm	1,762 × 1,134 × 30 mm	1,800 × 1,134 × 30 mm
Weight	24.9 kg	24.9 kg	25 kg
Application	Residential	Residential	Residential
Product Warranty	30 years	30 years	30 years
Performance Warranty	30 years	30 years	30 years
Commercial Availablity	–	–	Fall 2025
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

TOPCon cells and dual-glass lamination (2 mm front and rear). The Trend White version is rated for a maximum output of 455 W, while the black variant offers up to 450 W. Module dimensions are 1,762 × 1,134 × 30 mm, with a weight of 24.9 kg and a rated power density of 225 W/m². According to the datasheet, the white variant has a white grid mesh between the cell-to-cell and string-to-string gaps, applied on the glass. Similarly, its black counterpart features a full black aesthetic, meaning it has a black mesh. Both models are rated to withstand up to 5,400 Pa of wind load and are tested against hail impact up to 40 mm at speeds of 29.2 m/s.

The Mono BC Full Black S4 Halfcut module represented the company's BC product stream at the show. It is rated at 480 W and offers a higher power density of 235 W/m², attributed to its front-side shade-free back-contact architecture. It also uses 108 half-cut BC cells and has slightly larger dimensions of 1,800 × 1,134 × 30 mm, weighing 24.9 kg. The module features a full-black appearance enabled by the application of black mesh on one of the 2 mm double glasses used. It also comes with shading tolerance inherent to BC technology. Durability and safety specifications match those of the above-discussed TOPCon modules. The product is expected to be available during the fall of 2025, while the commercialization status is not known for the TOPCon products. All showcased modules carry a 30-year product and performance warranty.

Solar Fabrik

Solargiga Debuts HJT and Flexible n-Type Modules for Diverse Applications

China-based solar module manufacturer Solargiga Energy presented its n-type PV modules at SNEC 2025, designed for specific deployment scenarios. A key highlight was a HJT module rated at 745 W power and 24.0% efficiency. The module utilizes a ZBB interconnection layout and has a bifaciality of up to 90%.

The company also offers modules for marine environments, which feature corrosion-resistant composite frames and sealed junction boxes. According to the company, the efficiency of these modules has been greatly improved since SNEC 2024, from 18.89% then to the current level of 23.2%. A flexible module variant was also introduced, characterized by a 0.5 m bending radius and over 70% weight reduction compared to standard modules. This module is promoted for curved and elevated surfaces with wind and snow load considerations.

Additional products included lightweight modules for residential rooftops, anti-hail modules with enhanced mechanical load tolerance, and industrial-use modules with an adapted frame design aimed at mitigating dust accumulation. Most of the technical details of these products were not available from open sources. The company is yet to provide a response on the detailed specifications and market rollout plans.

Solargiga

Solar N Plus' Display Includes BC Modules, TOPCon Cells, and Panels for Mainstream and Specialty Applications

Solar N Plus showcased its new BC modules and latest TOPCon modules at Intersolar Europe, while it promoted TOPCon cells, modules with different power ratings and products for special application scenarios at SNEC.

At Intersolar Europe, the company presented a new BC module aimed at residential and commercial rooftops where appearance and efficiency are important. It also displayed its other product range, with module outputs reaching 630 W and efficiencies of 24.4%. These modules are built and promoted for mainstream applications, including utility-scale, distributed generation, and rooftop systems.

Flexible Power: Solargiga Energy presented its portfolio of n-type HJT, flexible, and application-specific solar modules at SNEC 2025, including designs for marine and industrial use.

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*vs. Standard TOPCon, data from a 100MW utility-scale power plant in Madrid, Spain using TNC 2.0 640W modules

Source: Solar N Plus

Power Precision: Solar N Plus showcased a 144-cell dual-glass design that reaches 600 W output at 23.2% efficiency with 80 ± 5% bifaciality.

Solar N Plus	
Product Series	**–**
Model name	SP-N16/144HG
Wafer type	n-type
Cell technology	TOPCon
Cell size	–
No. of cells	144
Module technology	Bifacial, Halfcell, MBB
No. of busbars	MBB
Glass Thickness (front/ rear)	2.0 / 2.0 mm
Maximum power (Pmax)	600 W
Module efficiency STC	23.2%
Bifaciality	80±5%
Dimensions	2,382 × 1,134 × 30 mm
Weight	31.5 kg
Application	–
Product Warranty	15 years
Performance Warranty	30 years
Commercial Availability	–
Focused Regions For Commercialisation	–

Graphic: TaiyangNews

A key highlight was the SP-N16-144HG TOPCon module. This dual-glass module, measuring 2,278 × 1,134 × 30 mm, is built with 144 half-cells and weighs 31.5 kg. This module achieves a maximum power of 600 W with 23.2% efficiency and offers a bifaciality of 80±5%. Like the rest of the company's portfolio, it is backed by a 15-year product warranty and a 30-year linear power warranty.

At SNEC, Solar N Plus displayed a different set of products at its booth. The company highlighted its latest TOPCon cell platform, modules with a wide power range, and products designed for specific application scenarios. The company claims that its latest and proprietary TOPCon technology, called TNP TOPCon+, achieves efficiencies up to 27.12% and is also highlighted for the common attributes of the technology, including a low temperature coefficient, zero LID, and resistance to PID. However, the top cell products of the company, as listed on its website, have an efficiency of 25.5%.

The accompanying module lineup covers power outputs from 400 W to more than 740 W, incorporating half-cut designs with narrow spacing and low-stress interconnections with SMBB or ZBB.

The company also displayed modules tailored to specific scenarios. These included floating PV

modules using corrosion-resistant composite frames, anti-dust modules designed for arid and dusty conditions, and translucent bifacial modules for agricultural installations.

Solar N Plus

SolarSpace Highlights HJT and Low-Carbon TOPCon Modules

At SNEC 2025, Chinese PV cell and module manufacturer SolarSpace showcased high-efficiency TOPCon and new HJT modules. Speaking to TaiyangNews at the event, Tony Wang, Head of Technical Support at SolarSpace, introduced the **Lumina II** series modules targeted at utility, C&I, and residential applications.

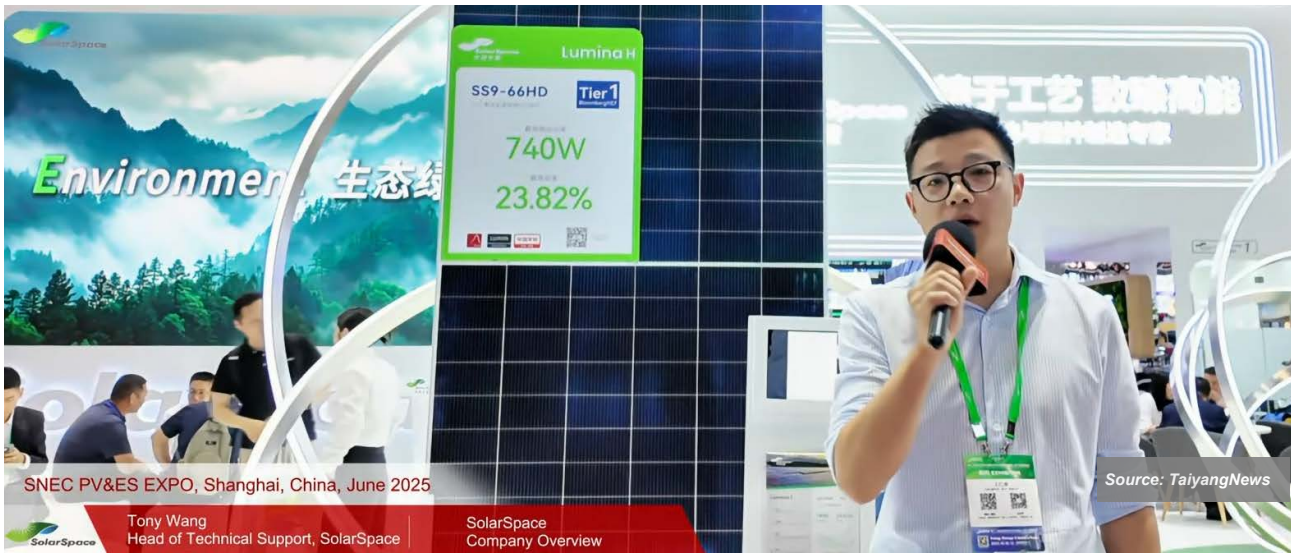
Among SolarSpace's highlights for utility-scale applications was the newly launched SS9-66HD 715–740H HJT module. Built with 132 G12 half-cut cells, this bifacial, double-glass module delivers up to 740 W output and 23.82% efficiency. It is rated for 1,500 V DC systems, offers a Voc of 51.50 V, and an Isc of 17.89 A. The module features 2 mm glass on both sides, a weight of 37.8 kg, a temperature coefficient of -0.25%/°C, and supports a bifaciality of up to 90%.

As part of its TOPCon offerings, SolarSpace also showcased its SS9-66HD 730N series module. It is rated up to 730 W and 23.5% efficiency, with a temperature coefficient of -0.29%/°C.

A third highlight among its utility range was the SSA-66HD module with G12R cells, which has a rated power output of 635 W at 23.51% efficiency. These modules are laminated with dual 2 mm glass

SolarSpace				
Product Series	**Lumina II**			
Model name	SS9-66HD	SS9-66HD	SSA-66HD	SLA-48HDB
Wafer type	n-type	n-type	n-type	n-type
Cell technology	HJT	TOPCon	TOPCon	TOPCon
Cell size	G12	G12	–	–
No. of cells	132	132	132	96
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB
No. of busbars	18BB	18BB	16BB	16BB
Glass Thickness (front/rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	2.0 / 2.0 mm	1.6 / 1.6 mm
Maximum power (Pmax)	740 W	730 W	635 W	460 W
Module efficiency STC	23.82%	23.5%	23.51%	23.02%
Bifaciality	80 ± 10%	80 ± 10%	80 ± 10%	80 ± 10%
Dimensions	2,384 × 1,303 × 33 mm	2,384 × 1,303 × 33 mm	2,382 × 1,134 × 30 mm	1,762 × 1,134 × 30 mm
Weight	37.8 kg	37.5 kg	32.5 kg	20.5 kg
Application	Utility	Utility	Utility, C&I	Distributed Generation
Product Warranty	15 years	15 years	15 years	15 years
Performance Warranty	30 years	30 years	30 years	30 years
Commercial Availability	Q3 2026	Yes	Yes	Yes
Focused Regions For Commercialisation	US	Global	Global	Europe

Graphic: TaiyangNews



Sustainability & Scale: At SNEC 2025, SolarSpace showcased its latestTOPCon module lineup for mainstream applications, along with a few low-carbon variants.

and come with 15-year product and 30-year linear performance warranties.

SolarSpace promoted the SLA-48HDB module for residential use. This all-black, bifacial module with 96 half-cut cells delivers up to 460 W and 23.02% efficiency. It is built with 1.6 mm glass on the front and a black-glazed rear glass. It sports a compact format of 1,762 × 1,134 mm with a 30 mm black frame, and weighs 20.5 kg. This module is marketed as a BIPV-ready solution with the same warranty terms as utility modules.

The company's exhibits at the show also included modules with a low carbon footprint. SS9-66HD 730N and SSA-66HD 635N, for example, have Certisolis certification for embedded carbon footprints below 445 kg CO_2/kWc. These products also hold Environmental Product Declaration (EPD) certifications. Sustainability was also topic of discussion when the TaiyangNews team visited the company's booth at Intersolar Europe 2025. During the interaction, Colin Zhu, the company's marketing director, shared the company's strategic focus on scaling up module shipments and strengthening ESG practices to support its transition from a cell specialist to a global module brand.

➡ SolarSpace

SPIC Showcases Low-Silver IBC & All-Black BIPV Modules

At Intersolar Europe 2025, SPIC Solar, a subsidiary of China's State Power Investment Corporation and one of the early adopters of BC technology, presented 2 notable product innovations: a low-silver-content Zebra IBC module and an all-black BIPV module designed for architectural applications.

The Zebra IBC module features 120 half-cut BC cells, with both fingers and busbars metallized using conductive copper inks supplied by Copprint, an Israel-based company specializing in silver-free metallization pastes. The special copper paste supplier also presented the details of its technology at TaiyangNews' 2023 flagship event, High Efficiency Solar Technologies virtual conference. According to the company, this metallization approach replaces conventional silver with copper, significantly lowering the silver content of the module. For interconnection, the cells are soldered using a tin-lead (Sn-Pb) ribbon. According to SPIC Solar, the total silver content of the module is under 5 mg/W – a vital milestone for cost and resource sustainability in BC module production.

SPIC also showcased a full-black, dual-glass BIPV module based on 120 half-cut M6 BC cells based

Copper Shift: SPIC Solar presented its Zebra IBC module featuring low-silver metallization and a visually refined all-black BIPV model at Intersolar Europe 2025.

SPIC	
Product Series	**ANDROMEDA 3.0**
Model name	SPICN6(LDG)-60-410/IH
Wafer type	n-type
Cell technology	BC
Cell size	M6
No. of cells	120
Module technology	Back Contact, Glass-Glass, Halfcell, MBB
No. of busbars	MBB
Glass Thickness (front/rear)	3.2 / 3.2 mm *1
Maximum power (Pmax)	410 W
Module efficiency STC	22.5%
Bifaciality	–
Dimensions	1,721 x 1,056 x 7.5 mm *2
Weight	34 kg *2
Application	BIPV
Product Warranty	10 years
Performance Warranty	30 years
Commercial Availability	Yes
Focused Regions For Commercialisation	–
Note	*1 optional: 6.0 / 6.0 mm *2 1,721 x 1,056 x 14 mm / 60 kg

Graphic: TaiyangNews

on the TOPCon structure. This ANDROMEDA 3.0 series module, designed for integration into building façades and rooftops, has a rated power output of up to 410 W and a maximum efficiency of 22.5%. A key feature of this product is its anti-glare design. The module surface is treated to reduce reflectivity to below 3%, minimizing glare, which is an important factor for urban PV applications. While SPIC confirms that this product is commercially available, the company has not specified any commercialization plans for the modules using copper metallization. In fact, SPIC's 22.8% efficiency module is already featured in TaiyangNews TOP SOLAR MODULES listing, and the company is in the process of updating the commercialization data for even higher efficiency module products. In the same context, the company was also awarded the TOP SOLAR MODULES 2024 Badge of Excellence.

SPIC

Sunmaxx's PVT Module Named Finalist for The smarter E AWARD

Sunmaxx's PX1 PVT module was selected as a finalist in the Photovoltaics category for The smarter E AWARD 2025 in Munich. The hybrid module is designed to simultaneously generate electricity and heat, making it suitable for residential and multi-family building applications. According to

SunmaxPVT	
Product Series	**–**
Series	–
Model name	Sunmaxx PX-1
Wafer type	–
Cell technology	TOPCon
Cell size	M10
No. of cells	108
Module technology	PVT
No. of busbars	MBB
Glass Thickness (front/ rear)	3.2 / - mm
Maximum power (Pmax)	440 W
Module efficiency STC	22.50%
Bifaciality	–
Dimensions	1,725 x 1,137 x 40 mm
Weight	29 kg
Application	–
Product Warranty	10 years
Performance Warranty	25 years
Commercial Availability	–
Focused Regions For Commercialisation	–
Nominal Thermal Output	1,200 W

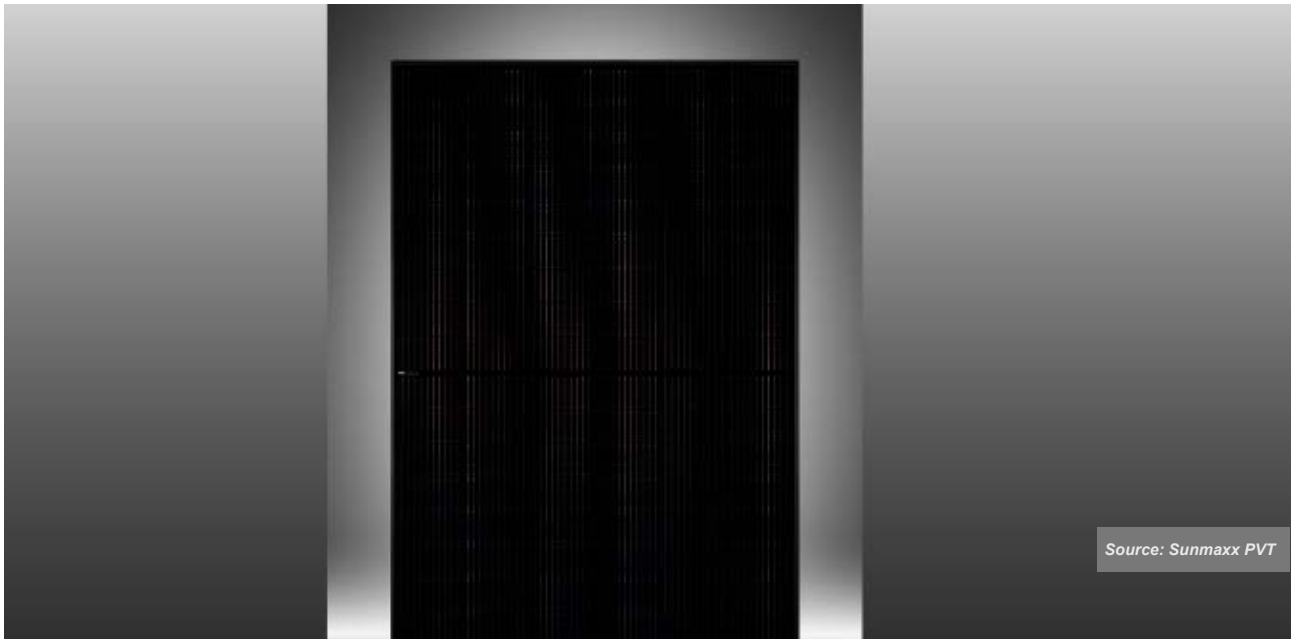
Graphic: TaiyangNews

the company, the automated and cost-effective manufacturing of its PVT module is the key element for the product to make it to the list of finalists.

PX 1 integrates a rear-side aluminum heat exchanger with a TOPCon module using 108 half-cut M10 cells. Sunmaxx specifies an electrical output of 400 W to 440 W with module efficiencies ranging from 21.8% to 22.5%. The product also delivers a maximum thermal output of 1,200 W under standard test conditions. Active cooling is achieved through a brine-to-water heat pump system, which the company claims can improve electrical output by 5% to 10% compared to passive systems. The captured heat is redirected for domestic use, including water and space heating. Weighing under 30 kg, PX 1 is designed for pitched and flat roofs, façades, and open areas. It is compatible with conventional PV mounting systems and various heat pumps. Sunmaxx highlights its applicability across new constructions and renovations.

The module comes with a 10-year product warranty. Performance guarantees include 97% output after the first year, decaying linearly thereafter, reaching 80% output after 25 years, comparable to mainstream monofacial products.

Sunmaxx



Source: Sunmaxx PVT

Finalist: Sunmaxx's PX-1 module, combining PV and thermal output, was named a finalist for The smarter E AWARD 2025

Sunpro Power Presents TOPCon, HJT, and BC Products

China-based module manufacturer Sunpro Power showcased its portfolio of products based on 3 high-efficiency technologies – TOPCon, HJT, and BC. Its product lineup focuses on the residential, C&I, and utility-scale applications.

For utility-scale installations, the company presented its 710 W TOPCon bifacial module based on the M12 wafer format. It features 132 half-cut cells, double-glass construction, and module dimensions of 2,384 × 1,303 × 35 mm, with a weight of 36.8 kg and an efficiency of 22.95%. Sunpro also exhibited its 725 W HJT bifacial module for the utility segment, rated at 23.4% efficiency, built with 132 half-cut cells and a similar double-glass structure. It has identical dimensions (2,384 × 1,303 × 35 mm) and a weight of 38.6 kg.

Sunpro showcased its 630 W TOPCon rectangular module, based on the 210R format, aimed at the C&I segment. Built with 120 cells, it measures 2,382 × 1,134 × 35 mm, weighs 30.8 kg, and is rated for a maximum efficiency of 22.64%.

In the residential category, Sunpro showcased its 450 W to 500 W modules, also based on the 210R wafer format. This module features compact size, double glass, and black aesthetics. These modules are designed for rooftop installations and feature an annual degradation rate of ≤0.4% after the first year.

A 470 W BC module was the company's feature in the high-efficiency category. It utilizes a zero-busbar design and nano-encapsulation to enhance reliability against PID and LeTID effects. The modules are supported by a 25-year product warranty and a 30-year linear performance warranty. The company claims all these modules are commercially available.

SunPro Power

Modules for All: Sunpro Power showcased a broad range n-type modules at SNEC 2025, including 710 W TOPCon, 725 W HJT, and 470 W back-contact designs.

Sunpro Power			
Product Series	**182 TOPCon Lightweight**	**210R TOPCon**	**BC 192R TOPCon**
Model name	SPSF400-M10	SPDG300-N64R12	SPDG-BC144RL10
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	Backcontact
Cell size	M10	G12R	182 x 95.8mm
No. of cells	108	64	144
Module technology	Flexible, Halfcell, Monofacial, MBB	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB
No. of busbars	10BB	16BB / 18BB	MBB
Glass Thickness (front/rear)	–	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	400 W	300 W	645 W
Module efficiency STC	20.2%	15.01%	24.6%
Bifaciality	–	88%	75%
Dimensions	1,737 x 1,142 x 2.5 mm	1,762 x 1,134 x 30 mm	2,382 x 1,134 x 30 mm
Weight	5.8 kg	23.8 kg	33.5 kg
Application	Curved surface	Agrivoltaics	Utility, C&I
Product Warranty	12 years	25 years	25 years
Performance Warranty	25 years	30 years	30 years
Commercial Availability	Yes	Yes	Yes
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

Suntech Highlights Balcony PV with Flexible BC Modules Alongside TOPCon Portfolio

At Intersolar Europe 2025, Suntech presented a range of modules suitable for both balcony solar and mainstream applications. While its products for utility, C&I, and residential segments are based on TOPCon technology, the company is promoting lightweight, flexible BC modules for balcony PV.

The products promoted for balcony PV weigh only 3 kg and feature a frameless, ultra-thin design that conforms to curved surfaces, enabling deployment across a variety of settings. According to the company, these BC cell-based modules achieve up to 470 W output with 23.5% efficiency, and support tool-free installation in under 10 minutes. Promoted for home energy systems, they feature a first-year power degradation rate of less than 2.5%. While not providing the annual power attenuation rate, the company stated it guarantees up to 85% power retention value after 25 years of field operation.

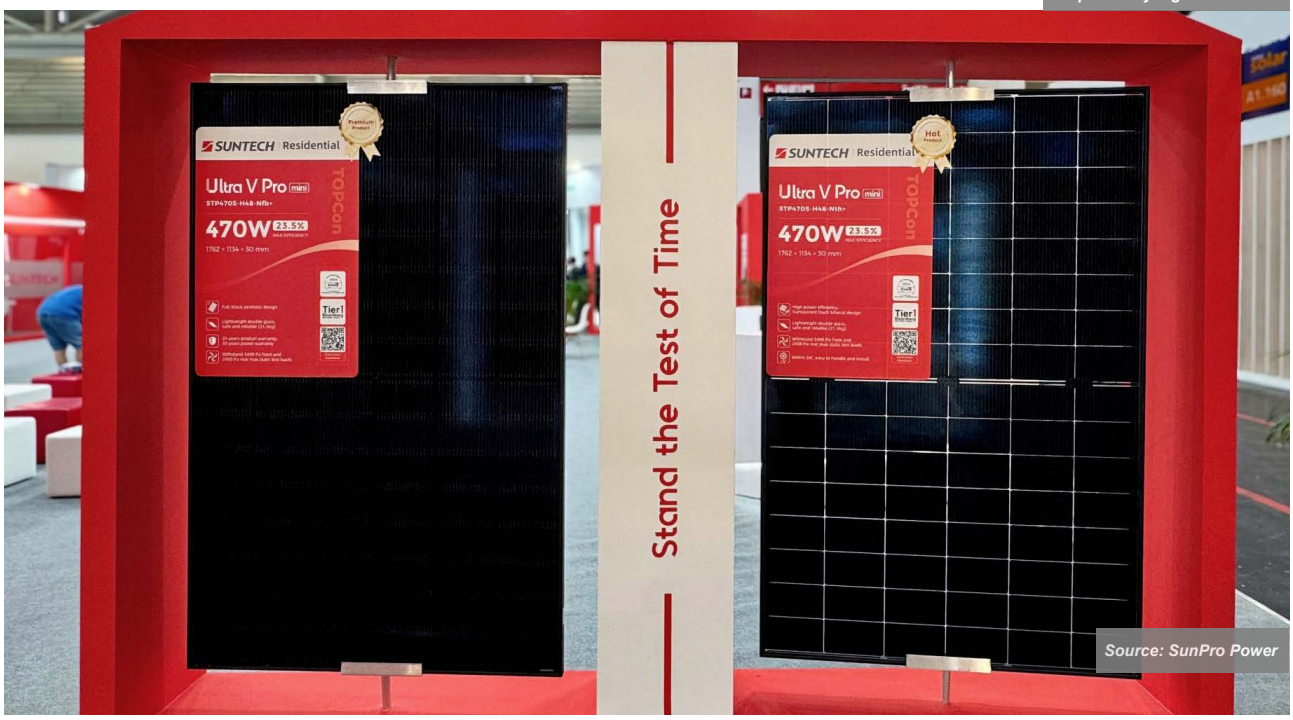
The system pairs with Suntech's STPMG-800-2 microinverter to enable stable grid-connected operation for small-scale applications.

In the residential rooftop segment, Suntech showcased the STP470S-H48-Nfb+ module from its Ultra V Pro Mini series. It is a full-black glass-glass monofacial product based on TOPCon half-cell technology. It features 96 half cells, weighs 23.5 kg, and measures 1961 × 1134 × 30 mm. The company offers a 25-year product warranty and a 30-year linear power warranty on these modules.

For C&I and utility applications, Suntech presented the Ultra V Pro Nsh+ series. For the formers, the company promoted STP635S-C78/Nsh+, which is rated at 635 W power and 23.3% efficiency. Built on TOPCon half-cell architecture, this bifacial module features a glass-glass construction. Consisting of 156 cells, this module has dimensions of 2465 × 1134 × 35 mm and weighs 35.1 kg.

Suntech Power			
Product Series	**Ultra V Pro Mini**	**Ultra V Pro**	**Ultra X Pro**
Model name	STP470S-H48-Nfb+	STP635S-H66-Nsh+	STP700S-D66-Nsh+
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	TOPCon
Cell size	–	–	–
No. of cells	96	132	132
Module technology	Halfcell, MBB	Bifacial, Halfcell, MBB	Bifacial, Halfcell, MBB
No. of busbars	MBB	MBB	MBB
Glass Thickness (front/rear)	1.6 / 1.6 mm	2.0 / 2.0 mm	2.0 / 2.0 mm
Maximum power (Pmax)	470 W	635 W	700 W
Module efficiency STC	23.5%	23.50%	23.20%
Bifaciality		80 ± 5%	80 ± 5%
Dimensions	1,762 × 1,134 × 30 mm	2,382 x 1,134 x 30 mm	2,384 × 1,303 × 33 mm
Weight	21.5 kg	32.5 kg	37.3 kg
Application	Residential	C&I	Utility
Product Warranty	25 years	15 years	15 years
Performance Warranty	30 years	30 years	30 years
Commercial Availability			–
Focused Regions For Commercialisation			–

Graphic: TaiyangNews



Source: SunPro Power

TOPCon for Mainstream: At Intersolar Europe 2025, Suntech showcased a PV portfolio consisting of TOPCon modules for residential, C&I, and utility-scale applications, and flexible BC modules for balcony PV.

For utility-scale installations, Suntech highlighted the STP700S-D66-Nsh+, offering up to 700 W of power with 23.2% efficiency. The bifacial, glass-glass module is based on n-type TOPCon technology. Built with 132 cells, it weighs 37.3 kg and measures 2384 × 1303 × 33 mm. The product includes a 15-year product warranty and a 30-year linear power warranty. Apart from the announcements on these product releases, neither technical details nor commercialization timelines are available from open sources, and the company has not responded to our inquiry on the matter.

Suntech

Talesun Solar Showcases n-Type Module Lineup

Talesun Solar, a Chinese PV module manufacturer, presented its latest range of n-type solar modules at Intersolar Europe 2025. The company's exhibit included products designed for residential, C&I, and utility-scale applications, featuring a mix of HJT and TOPCon technologies.

For utility-scale and high-end DG installations, Talesun showcased the TH8G66 module, a bifacial double-glass product rated at 735 W power and an efficiency of 23.7%. It incorporates 132 half-cut HJT cells with a ZBB design. The module measures 2,384 × 1,303 × 33 mm and weighs 37.9 kg. It is backed by a 15-year product warranty and a 30-year linear power warranty, with 1% first-year degradation and an annual rate of 0.30% for the rest of the assured life span.

For the residential segment, the company highlighted the TM3G48 module, rated at 450 W with a module

Talesun			
Product Series	–	–	–
Model name	TM3G48	TM8G66	TH8G66
Wafer type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	HJT
Cell size	–	–	–
No. of cells	96	132	132
Module technology	Bifacial, Glass-Glass, Halfcell, MBB	Bifacial, Glass-Glass, Halfcell, MBB	–
No. of busbars	16BB	18BB	–
Glass Thickness (front/ rear)	2.0 / 2.0 mm	2.0 / 2.0 mm	–
Maximum power (Pmax)	450 W	710 W	735 W
Module efficiency STC	22.5%	22.9%	–
Bifaciality	80 ± 5%	80 ± 5%	–
Dimensions	1,762 × 1,134 × 30 mm	2,384 × 1,134 × 33 mm	–
Weight	24.7 kg	38.5 kg	–
Application	Residential	Utility	C&I
Product Warranty	15 years	12 years	–
Performance Warranty	30 years	30 years	–
Commercial Availablity	–	–	–
Focused Regions For Commercialisation	–	–	–

Graphic: TaiyangNews

N-Type Focus : Talesun Solar highlighted its latest n-type HJT and TOPCon modules at Intersolar Europe 2025, covering residential, C&I, and utility-scale applications.

efficiency of 22.5%. This module is also based on HJT cell technology using 96 half-cut cells in a ZBB configuration. It features dimensions of 1,762 × 1,134 × 30 mm and a weight of 21.8 kg. Warranty coverage includes 15 years for product defects and a 30-year linear power output guarantee.

For C&I and utility-scale installations, Talesun displayed the TM8G66 module, built with 132 half-cut TOPCon cells using an 18-busbar design. This module is rated at 710 W with an efficiency of 23.0%, and shares the same outer dimensions as TH8G66 – 2,384 × 1,303 × 33 mm – but weighs slightly more at 38.5 kg. It comes with a 12-year product warranty and a 30-year linear power warranty under standard degradation conditions.

Talesun

TCL Group Subsidiaries Exhibit BC and TOPCon Product Range

At Intersolar Europe 2025, TCL SunPower Global, formed through the merger of TCL and SunPower, showcased its latest BC modules and residential energy storage solutions.

The SunPower M Class BC module series includes monofacial and bifacial models based on a shingled design. The monofacial variant reaches a maximum power output of 500 W at a claimed 25% efficiency, while the framed bifacial version offers 490 W at 24.5% efficiency. Both modules have dimensions of 1,134 × 1,762 × 30 mm, with the monofacial module weighing 20.6 kg and the bifacial version 24.2 kg. A BC module with 660 W output and 24.4% efficiency was also displayed, aimed at C&I applications. All modules mentioned above are backed by a 40-year product and performance warranty. SunPower emphasizes that the modules are to be commercially available in Q4 2025. Currently, Maxeon, which was acquired by TCL, is represented by a BC product in TaiyangNews TOP SOLAR MODULES list. The listed product has 24.1% efficiency, and TaiyangNews has yet to receive the proof of commercialization for these higher-efficiency products.

TCL SunPower also presented a new residential energy storage solution combining a hybrid inverter (8-13 kW) with a 5 kWh battery, aimed at European markets, with availability expected in the second half of 2025.

TCL Solar, another company under the TCL Group umbrella, displayed an expanded lineup of BC and

TCL Group				
Product Series	**G12R-66P**	**G10LD-54P**	**G12R-48P**	**SunPower M Class**
Model name	HSM-BD66-GR640~665	HSM-BD54-LA445~470	HSM-ND48-WR440~470	SPR-BE54-DC 490 W
Wafer type	n-type	n-type	n-type	n-type
Cell technology	BC	BC	TOPCon	BC
Cell size	G12R	M10	G12R	G11RA
No. of cells	132	108	96	54
Module technology	Bifacial, Back contact, Glass-Glass, Halfcell, MBB	Back contact, Glass-Backsheet, Halfcell, Monofacial, MBB	Flexible, Halfcell, Monofacial, MBB	Back Contact, Bifacial, Shingled, Glass-Glass, ZBB
No. of busbars	MBB	MBB	16BB	MBB
Glass Thickness (front/rear)	2.0 / 2.0 mm	3.2 mm	1.1 mm	2.0 / 2.0 mm
Maximum power (Pmax)	665 W	470 W	470 W	490 W
Module efficiency STC	24.6%	23.6%	23.5%	24.5%
Bifaciality	70 ± 5%	–	–	40 ± 5%
Dimensions	2,382 x 1,134 x 30 mm	1,757 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm	1,762 x 1,134 x 30 mm
Weight	33.5 kg	21.5 kg	10.8 kg	24.2 kg
Application	Residential, C&I	Residential	Residential	Residential, C&I
Product Warranty	15 years	25 years	12 years	40 years
Performance Warranty	30 years	30 years	25 years	40 years
Commercial Availability	Yes	Yes	Yes	Q4 2025
Focused Regions For Commercialisation	Global	EU, ANZ & Japan	EU, ANZ & Japan	EMEA

Graphic: TaiyangNews

TOPCon modules at SNEC 2025. Its products cover different application scenarios, including across utility-scale, residential, and lightweight categories. Speaking to TaiyangNews, Rayy Wu, PMT Engineer at TCL Solar, provided updates on the company's latest product offerings.

The promoted G12R-66P series BC module integrates 132 G12R half-cut cells and has a rated power output of 680 W and a claimed conversion efficiency of 25.2%. With dimensions of 2,382 × 1,134 × 30 mm and laminated with 2 mm front and rear glass, it weighs 33.5 kg. It has a temperature coefficient of -0.26%/°C. According to a LinkedIn post by the company, this module supports more than 10% higher shading tolerance, due to the BC cell's low breakdown voltage characteristics, compared to its counterpart. It is offered with a workmanship warranty of 15 years and a performance warranty of 30 years.

Targeting residential rooftops, the G10LD-54P module uses 108 M10-size BC half-cells, providing up to 480 W output at 24.1% efficiency. With dimensions of 1,757 × 1,134 × 30 mm, it features a 3.2 mm front glass and a black backsheet. The black-framed module weighs 21.5 kg and is rated for mechanical loads of 5,400 Pa on the front and 2,400 Pa on the rear. It carries a 25-year product and 30-year performance warranty.

The company also introduced a lightweight TOPCon module designed for rooftops with low load-bearing capacity. Featuring 96 G12R half-cut cells, it offers 460 W output at 23% efficiency. The module is built with 1.1 mm front glass and a PET backsheet,

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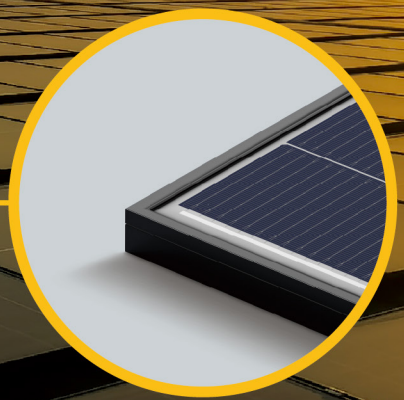

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C&I Rooftop PV Project

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BC at Focus: TCL Group subsidiaries, TCL Solar and TCL SunPower, launched a range of BC modules at two major solar shows — SNEC and Intersolar Europe 2025. The module shown here is a residential product with 480 W power output, displayed at SNEC.

resulting in a total weight of 10.8 kg and a weight-to-area ratio of 5.4 kg/m². It is certified for mechanical loads of 3,600 Pa on the front side and 2,400 Pa on the rear, and is offered with a 12-year product warranty and a 25-year performance guarantee.

TCL Solar also exhibited its mass-produced G12R-66P TOPCon module, offering up to 675 W of power and 25% efficiency. This product is built with 132 G12R half-cut cells and is targeted at utility-scale deployments. The company claims that all the products are already available commercially.

TCL SunPower

TWL-Technologie GmbH Unveils New PVT Module

Germany-based TWL-Technologie GmbH presented its latest PVT hybrid module, the PRISMA PVT RBX series, at Intersolar Europe 2025. This integrated product is designed to generate electricity and recover thermal energy simultaneously, offering dual functionality from a single panel. The PRISMA PVT RBX was developed in partnership with Mubea, a company specializing in cooling plates for e-mobility. It incorporates a heat exchanger made from automotive-grade materials.

The front of the module is a bifacial PV panel composed of 144 TOPCon cells. It is rated for a maximum power output of 450 W and 22.5% efficiency. The panel supports a system voltage of up to 1,500 V DC and has a rated open-circuit voltage (Voc) of 52.9 V and short-circuit current (Isc) of 10.74 A. With dimensions of 1,762 × 1,134 × 30 mm and weighing 33 kg, the module is certified to withstand a snow load of 5,400 Pa and a 4,000 Pa wind load.

On the thermal energy side, the PVT panel can generate up to 1,100 W of thermal energy, according to the company. The fluid used for heat transfer circulates at pressures between 1 and 3 bar and flow rates of 40 to 150 liters/hour. The module shows a low-pressure drop of 17 mbar at a flow of 144 liters/hour. With a fluid volume of 1.75 liters, the module is suited for use with brine-based heat pumps and geothermal regeneration systems.

Harnessing Dual Energy: TWL-Technologie's PRISMA PVT RBX module integrates TOPCon PV and thermal collector layers to produce both electricity and heat in a single combined panel.

TWL-Technologie GmbH	
Product Series	**PRISMA**
Model name	PRISMA PVT RBX
Wafer type	n-type
Cell technology	TOPCon
Cell size	–
No. of cells	144
Module technology	PVT (Photovoltaic Thermal)
No. of busbars	–
Glass Thickness (front/rear)	1.6 / 1.6 mm
Maximum power (Pmax)	450 W
Module efficiency STC	22.5%
Bifaciality	–
Dimensions	1,762 × 1,134 × 30 mm
Weight	33 kg
Application	Heatpump
Product Warranty	10 years
Performance Warranty	25 years
Commercial Availability	Q4 2025
Focused Regions For Commercialisation	Global, focus on Germany, Austria, Switzerland
Nominal Thermal Output	1,100 W

Graphic: TaiyangNews

The PRISMA PVT RBX is expected to enter commercial production by fall 2025. Warranty information will be provided at the time of its release. systems.

TWL-Technologie

Ulica Solar Unveils ZBB TOPCon Module at SNEC 2025

At SNEC 2025, vertically integrated PV manufacturer Ulica Solar introduced its latest QIN Series TOPCon module featuring a 'true' ZBB interconnection process called Stacked Finger technology. Speaking with TaiyangNews at the company's booth, Jacob Fang, Regional Manager at Ulica Solar, outlined the module's key benefits of its novel interconnection approach as higher power density, lower operating temperature, and silver saving. The module is free of cuts, meaning that instead of slicing a fully processed cell into 2 pieces, wafers are cut into 2 pieces and processed.

However, the most important feature is the Stacked Finger ZBB technology. The crux of the technology lies in the lack of busbars, both within the cells and the interconnection between them. Instead, it uses more than 200 triangular-shaped copper wires

Source: TaiyangNews

Interconnecting fingers directly: Ulica Solar highlighted its QIN series ZBB TOPCon PV module, featuring patented Stacked Finger technology that directly interconnects the fingers eliminating the need for busbars altogether.

Ulica Solar	
Product Series	**QIN**
Model name	QIN-UL-2382-144CDGNBBC-30-EN-V
Wafer type	n-type
Cell technology	TOPCon
Cell size	–
No. of cells	144
Module technology	Bifacial, Glass-Glass, Halfcell, ZBB
No. of busbars	> 200 ultra-fine ribbon
Glass Thickness (front/ rear)	2.0 / 2.0 mm
Maximum power (Pmax)	660 W
Module efficiency STC	24.43%
Bifaciality	–
Dimensions	2,382 × 1,134 × 30 mm
Weight	32 kg
Application	Utility, C&I, Rooftop Market
Product Warranty	15 years
Performance Warranty	30 years
Commercial Availability	Q4 2025
Focused Regions For Commercialisation	Global

Graphic: TaiyangNews

to connect the fingers of one cell to the fingers of the next cell. The triangular shape of these interconnection wires increases the light reflectivity, resulting in optical gains. The primary benefit of this technology is improved power density. Fang notes that in the given module dimensions of 2,382 × 1,134 × 30 mm, a standard module would deliver 620 W

of power output, while the QIN module has a power rating of 660 W, a gain of 40 W. The module is rated with 24.3% efficiency. This ‘true’ ZBB architecture also leads to reduced operating temperatures, given that the current is passed from one cell to the other through the direct interconnection of fingers without the busbar interface, says Fang. This characteristic, he added, is ideal for regions such as the Middle East, which sees high operating temperature conditions. Since the approach eliminates busbars, it also results in savings on silver, which Fang quantifies to be around 70%.

As to the product specs, the module is built from 144 half-cut ZBB TOPCon cells. The module laminate consists of a dual glass structure with 2 mm glass on both sides and rated with a mechanical load resistance of 5,400 Pa on the front and 2,400 Pa on the rear. The module has also passed anti-PID tests at 85°C and 85% humidity for 192 hours.

The QIN Series module carries a 15-year product

warranty and a 30-year linear performance warranty. The product is slated to be commercialized soon in Q4 2025. Ulica is also in the process of qualifying for the TaiyangNews TOP SOLAR MODULES listing.

Ulica Solar

Yingli Showcases TOPCon Modules for Rooftops and Challenging Ground-Mount Conditions

At SNEC 2025, Yingli Solar presented a series of TOPCon modules, addressing both rooftop and ground-mount applications.

For the residential segment, Yingli displayed an all-black module designed with 96 G12R half-cut cells and a 16-busbar layout. This bifacial TOPCon module measures 1,762 × 1,134 × 28 mm and delivers up to 460 W of power at an efficiency of 23.0%.

A somewhat more powerful product for the same application integrates 96 half-cut cells with 18 busbars. This version is slightly larger at 1,762 × 1,303 × 30 mm. It is rated for 535 W of power and 23.3% efficiency. However, the company did not disclose the cell size used in this module.

For utility-scale use, Yingli exhibited its Panda Series bifacial TOPCon modules. One variant, measuring

Yingli Solar				
Product Series	**PANDA**			
Model name	–	–	–	–
Wafer type	n-type	n-type	n-type	n-type
Cell technology	TOPCon	TOPCon	TOPCon	TOPCon
Cell size	–	–	–	–
No. of cells	96	96	132	132
Module technology	Bifacial, Glass-Glass, Half Cells	Bifacial, Glass-Glass, Half Cells	Bifacial, Glass-Glass, Half Cells	Glass-Glass, Half Cells
No. of busbars	16BB	18BB	–	–
Glass Thickness (front/rear)	–	–	–	–
Maximum power (Pmax)	460 W	535 W	730 W	650 W
Module efficiency STC	23.00%	23.30%	23.50%	24.10%
Bifaciality	–	–	–	–
Dimensions	1,762 × 1,134 × 30 mm	1,762 × 1,303 × 30 mm	–	2,382 × 1,134 × 30 mm
Weight	–	–	–	–
Application	–	–	–	–
Product Warranty	–	–	–	–
Performance Warranty	Distributed Generation	Distributed Generation	–	–
Commercial Availablity	–	–	–	–
Focused Regions For Commercialisation	–	–	–	–

Graphic: TaiyangNews

For higher altitudes: Yingli Solar's booth featured its latest TOPCon modules tailored high-altitude environments during SNEC 2025.

2,382 × 1,134 × 30 mm, incorporates 132 G12R half-cut cells and achieves up to 650 W of power output at an efficiency of 24.1%. An even larger version, sized at 2,384 × 1,303 × 33 mm, also uses 132 half-cut TOPCon cells, but most likely the larger G12 size. It has a rated power output of 730 W and up to 23.5% efficiency. These modules target projects in extreme conditions, such as elevated terrains, where mechanical endurance and long-term reliability are critical.

The company is yet to respond to our query on the commercialization timelines. Currently, Yingli's TOPCon module, with 22.4% efficiency, features in the TaiyangNews TOP SOLAR MODULES, as we await the proof of commercialization for its higher efficiency products.

Yingli Solar

PU Framed, Colored and PVT ZNSHINE Modules for Specialized PV Applications

ZNSHINE Solar participated in SNEC 2025 with a module portfolio covering both standard PV modules and specialized products targeting specific application scenarios, such as BIPV and PVT systems. Regarding the cell technology underlying the modules listed below, the company only specified 'n-type,' which most likely refers to TOPCon.

Among the DG offerings, the company exhibited a 465 W all-black dual-glass module incorporating 90 G12 n-type half-cut cells interconnected with a 16BB configuration. It is rated at 23.27% efficiency and has dimensions of 1,762 × 1,134 × 30 mm. A variant of this product with a polyurethane (PU) frame was also displayed, designed to offer improved environmental resistance.

ZNSHINE also introduced a 625 W monofacial single-glass module built using 182.2 × 183.75 mm n-type half-cells. This module, with a PU frame, targets off-grid or system-specific applications such as solar pumping. It has a rated efficiency of 24.18%

Application Versatility: ZNSHINE Solar showcased its conventional PV module lineup along with niche offerings such as BIPV and PVT modules during SNEC 2025

and measures 2,279 × 1,134 × 30 mm.

For large-scale installations, the company presented a 740 W bifacial glass-glass module composed of 132 G12 n-type half-cut cells in an 18BB layout. This utility-scale product measures 2,384 × 1,303 × 30 mm and is built with a steel frame. It has a maximum rated efficiency of 23.82%.

In the BIPV category, ZNSHINE displayed colored monofacial double-glass modules using G12R n-type cells. These modules are available in variants of red, green, and yellow, and are designed for architectural integration. These modules feature a power output of 410 W, 20.52% efficiency, and physical dimensions of 1,762 × 1,134 × 30 mm. The rated Voc is 35.50 V, while the Isc is rated at 14.17 A.

The company also exhibited a PVT module, which integrates 144 half-cut 9BB cells and provides up to 450 W electrical output at 20.70% efficiency. It is built in dimensions of 2,084 × 1,038 × 35 mm. According to the company, this module can generate more than 1,600 W of thermal energy under nominal operating conditions. The company has not provided commercialization timelines for these products.

ZNSHINE

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2. Mounting Solutions & Trackers

Overview

The solar mounting and tracker sector continues to evolve rapidly, driven by the demands of diverse project types—from utility-scale plants in challenging terrains to application-specific solutions for rooftops, agrivoltaics, and even floating PV. Innovations showcased at recent solar exhibitions highlight a wide variety of solutions tailored to different site conditions and needs.

Among the most notable developments, cable-based mounting systems were in the spotlight, particularly at SNEC. **ESET** presented a flexible 4-cable mounting structure designed for difficult terrains requiring large spans and adaptable layouts. **Solar First** displayed a similar cable-truss system with spans ranging from 20 to 40 meters, offering a viable solution for locations with limited foundation options.

In the tracker segment, manufacturers focused on improving terrain adaptability, wind resistance, and installation efficiency. **Arctech**, **Gonvarri Solar Steel**, and others presented terrain-following trackers suited for uneven landscapes, with design updates that reduce components and enhance reliability. **Antaisolar** introduced a 1P tracker with an octagonal torque tube and a weather-adaptive control system. **ARRAY** offered a passive wind stow feature that mechanically secures only exterior tracker rows during strong winds. ESET's tracker featured an all-posts self-locking function for improved structural stability. Arctech also showed a hybrid tracker integrated with a containerized storage system for off-grid sites. Gonvarri Solar Steel promoted tracker solutions for agri-PV integration, a segment continuing to gain traction. **VesprSolar** launched snap-in clamps to speed up installation and enhance structural performance. Adding a touch of aesthetics, **SmartFlower**'s flower-shaped dual-axis tracker caters to residential and commercial use with self-cleaning and safety features. **Clenergy** and Mibet also showcased tracker products.

Ground-mount innovations included vertical PV systems from **Next2Sun** for agri-PV, offering dual land use and a flatter energy generation profile. The company also presented solar-powered fencing. **SUNfarming** displayed agri-PV solutions designed for crops, livestock, and vineyards, featuring rainwater harvesting and long product lifespans. For difficult terrains, **Clenergy**, **HQ Mount**, and Gonvarri Solar Steel introduced fixed structures and helical screw foundations adaptable to different soil types. **Mibet** promoted a single-pile structure aimed at simplifying installation and reducing project costs. **K2 Systems** presented compact ground-mount kits and an upgraded system allowing for bifacial module installation without row shading. Carport solutions also featured, with HQ Mount and K2 Systems showing efficient single-post structures. VesprSolar expanded its snap-in clamp tech to fixed-tilt mounts as well.

Rooftop mounting solutions focused on flexibility, simplified installation, and compatibility with varied roof types. Antai, Clenergy, and **Enstall** presented systems for flat and pitched roofs supporting both portrait and landscape orientations. Non-penetrating solutions from HQ Mount and **Soltop** addressed low load-bearing rooftops with systems supporting over 1,200 kg per point. K2 Systems showcased updates to its Dome flat-roof system with lighter materials and snap-in components, along with pre-assembled kits for high-load conditions. Mibet offered ballast-mounted and clamp-hook combinations suitable for flat, metal, and tile roofs. Solar First displayed rapid-deployment rooftop kits. Aesthetic and space-conscious options included curtain wall BIPV from Solar First, Antai's balcony mounts, and in-roof solar tiles from Soltop.

Floating PV systems are also gaining attention. **SCOTRA** introduced a polyethylene-based floater with a six-compartment structure, ensuring buoyancy even if damaged and emphasizing recyclability. Mibet launched its floating system combining eco-friendly HDPE floats with robust structural design. Solar First also presented its floating solution for water-based PV installations.

Antaisolar Showcases Tracker and Mounting Solutions

China's Antaisolar, a supplier of mounting and tracker solutions, showcases its latest solutions at the leading solar shows SNEC and Intersolar Europe 2025.

At SNEC in particular, Antaisolar displayed its tracker developments, including a prototype of its latest AT-Spark 1P tracker and the existing TAI-Universal 2P model. The company also presented several rooftop mounting configurations.

In a conversation with TaiyangNews, Adrian Eve, Senior Sales Manager at Antaisolar, shared some details on the AT-Spark prototype. This single-axis 1-in-Portrait (1P) tracker is designed with a multi-slew drive system and features an octagonal torque tube, developed to improve torsional resistance and structural stiffness per unit weight. The octagonal profile supports torque distribution across multiple drive points.

Additional design features include a double-ball bearing system, which replaces conventional bolt-based alignment methods, enables automatic slope adjustment during installation. The clamshell bearing seat and detachable bearing allow simplified shaft assembly. The tracker also utilizes Antaisolar's SmartTrail control system, which features multiple protection modes for extreme weather conditions, such as high snowfall and heavy winds, and optimized positioning via integrated algorithms. AT-Spark is expected to become commercially available between September and October 2025.

TAI-Universal is a single-axis tracker that supports 4 module strings (up to 120 modules) in a 2-in-Portrait (2P) configuration. It uses a synchronous multi-point slew drive and supports a ±60° tracking range. The system can be installed on sites with up to a 20% north-south slope and includes a 5° stow function for operational safety. However, these 2 tracker

Market Specific: Antaisolar showcased the AT-Spark 1P prototype and the TAI-Universal 2P tracker at SNEC, while TAI-Simple was the key exhibit at Intersolar, catering to local markets.

platforms share several core features, including backtracking, slope adaptability up to 20%, and wind resistance up to 55 m/s. Both products are offered with a 15-year warranty on structural components and 10 years on the drive and controller.

Antaisolar also exhibited rooftop mounting systems, including rail and hook-based designs for flat and pitched roofs. The systems support portrait and landscape layouts and include metal-roof-compatible solutions used across multiple markets. A balcony PV mounting option was also on display.

At Intersolar, while also presenting these rooftop mounting solutions, the company's emphasis was more on the TAI-Simple tracker model. Speaking to TaiyangNews, Marvin Oerlemans, Sales Manager at Antaisolar, described the TAI-Simple tracker, a single-axis independent tracking system for 1P layouts. The model supports tracker lengths of up to 97 m and can accommodate up to 90 modules, rated for 1,500 V DC systems. It features a spherical carbon steel torque tube, operated by a 24 V DC motor with a single-point slew drive, allowing a rotation of ±60°. The tracker is designed to handle north-south slopes of up to 20%. A built-in controller manages tracking operations and automatically moves the system to a 30° stow position at night or as required.

Antaisolar

Arctech's Latest PV Tracker Lineup at SNEC 2025

At SNEC 2025, solar tracker manufacturer Arctech presented its expanded product lineup, including terrain-adaptive tracker systems and an autonomous cleaning robot for PV installations. The company also introduced a containerized storage-tracker hybrid solution.

Arctech's booth featured the SkyLine II Pro 1P tracker system designed for ground-mounted PV installations. Speaking to TaiyangNews, Liang Wu, Director and Head of the Technology Support Team for MEA and India, briefed the key features of the product on display. This single-axis tracker supports housing up to 120 modules per row. Its integrated multi-point slew drive mechanism, connected via a

Tracking Terrain: A key feature of the latest SkyLine II Pro from Arctech, promoted at SNEC, is its ability to follow the terrain, considerably reducing land grading time and costs.

transmission rod, allows synchronized rotation of the steel torque tube to a maximum of ±60°.

The tracker's controller uses real-time tilt sensor data and astronomical algorithms to maintain alignment accuracy within 2°, the company claims. Its backtracking function adjusts module tilt based on terrain contours, which can help optimize performance under low-light conditions. Protection features allow the system to stow in flat or tilted positions in response to conditions like flooding, snow, or high wind speeds exceeding 70 m/s. Wu added that the terrain-following feature helps reduce site preparation by allowing the tracker to adapt to natural land undulations.

Arctech also displayed the SkyFly series, a flexible tracking system for hilly or mountainous areas. It uses a cable-supported structure with dual anchoring and accommodates multi-span installations up to 35 m wide with a 10 m ground clearance. The system supports up to 168 modules and rotates across ±45°. Synchronization is enabled via a LoRa wireless protocol, and control accuracy is within 2°, according to the company. Operating between -20°C and 60°C, the SkyFly tracker also includes backtracking and stow features similar to the SkyLine II Pro.

Arctech showcased its Star Shine I Series PV cleaning robot, designed for water-less cleaning of solar modules. The compact, 38 kg robot operates autonomously, using a dual-control system to navigate panels at speeds between 10 and 18 m per minute. It is capable of overcoming vertical obstacles up to 50 mm and can handle cross-twisting of ±20° caused by uneven module surfaces. The cleaning system, powered by a 24 V battery, recharges at its docking station and is rated for over 99.5% cleaning efficiency.

Wu also introduced a concept containerized solution called 'tracker storage'. This integrated system combines torque tubes, piles, modules, a hybrid inverter, and a battery bank in a single transportable unit. It is designed to provide a continuous power supply at greenfield project sites that are not yet connected to the grid.

Arctech

Row-Specific Stowing from Array Technologies

During Intersolar Europe 2025, ARRAY Technologies, a US-based solar tracker maker, promoted a new wind stowing strategy that it calls Passive Stowing, which is nothing but row specific stowing. Unlike standard stowing protocols that stow the entire array simultaneously, this approach uses a row-specific

Passive Protection: ARRAY Technologies showcased the advantages and operational details of its row-specific stowing technique called passive-wind-stow technology at Intersolar Europe 2025.

stowing strategy to reposition only the exterior tracker rows, leaving the interior rows in active tracking mode. The rationale behind this is that high winds predominantly affect the outer rows, and their impact reduces as winds move inward. The exterior rows of a utility-scale PV tracker array, switched to a passive stow position, act as a protective barrier for the inner rows. The intended benefit of this position is that the stowing angles that cause misalignment to the Sun's real-time position during the periods of high winds can be limited to outer rows, while the inner rows continue to be in active tracking mode.

Passive stowing is a mechanical solution that functions independently of external sensors or grid power. The mechanical system is activated by real-time wind force. Beyond a predefined limit, this system triggers the tracker to move into a safe position. These thresholds may vary depending on the site's location. Each row has a built-in torque-limiting clutch at the driving point, which engages only when the wind-induced torque exceeds the preset limit, allowing the affected row to rotate to its stow position. This feature is available on a row-to-row basis, enabling only the affected rows to enter the stow position. ARRAY says that its passive stowing limits energy generation losses due to stowing to 0.05%, compared to about 2.8% loss with "one stowing strategy for all."

This passive stow strategy is built into the company's DuraTrack and OmniTrack tracker systems.

ARRAY Technologies

Clenergy's Mounting Systems at Intersolar Europe 2025

Australia-based PV mounting company Clenergy showcased its mounting solutions for various roof structures, including pitched tile, metal, flat roofs, and ground-mounted applications, at Intersolar Europe 2025. The company's lineup includes systems designed for residential, commercial, and utility-scale deployments.

For pitched tile roofs, Clenergy exhibited its PV-ezRACK SolarRoof Pro 2.0 system. This design includes adjustable tile hooks, compatible rails, and fasteners. The adjustable hook offers a 3-position flexibility, enabling adaptation to different tile

Sur-Mounting Challenges: Clenergy exhibited its full range of PV mounting solutions at Intersolar Europe 2025, featuring systems for pitched tile roofs, flat rooftops, and ground-mount installations with tracker options.

thicknesses and structural tolerances. According to the company, the components can be configured for both portrait and landscape module layouts by rotating the L-feet, reducing the need for dual-layer rails in non-standard roof geometries.

The SolarRoof Pro 2.0 U Support variant is promoted for aluminum and steel roof sheets ranging from 0.5 mm to 2.0 mm in thickness, and uses standard self-drilling screws.

Also on the company's promotion list was the PV-ezRACK Flat Roof Ascent 1.1 system for flat roof installations. This low-ballast solution supports south- and north-facing installations. It accommodates modules with dimensions up to 1,150 × 2,400 mm and thicknesses ranging from 28 mm to 40 mm. In the ground-mount and tracking systems, Clenergy's showcase included ezTracker D1P – configured as a single-axis, 1P tracker – and the SolarTerrace Ikon series for ground-mounted applications. These systems are designed for varied terrain and installation needs.

Clenergy

From Roof Mounts To 3D Planning Tools From Enstall

Enstall, a Netherlands-based provider of PV module mounting structures, showcased its commercially available products at Intersolar Europe 2025. The company promoted a comprehensive range of brands, offering PV mounting systems suitable for various roof types.

The company's BluBase range encompasses a wide array of mounting systems for both flat and pitched roofs, including anchoring systems. The Esdec series, which is said to enable quick and easy installations, supports a wide range of pitched roofs, including tiled, steel, corrugated, and several others. For flat roofs, Esdec offers solutions suitable for modular and flexible flat roof mounting systems and large-scale projects.

Sunfer is Enstall's Spanish brand that offers a comprehensive portfolio for various roof types, including coplanar tile, coplanar metal and light roofing, inclined, ballasted, façade-mounted systems, and parking canopies. The PanelClaw series is specifically designed for PV racking solutions for large flat roofs, featuring a wave mounting system

Mounting Tools: Enstall presented a wide range of mounting structures and digital tools for pitched and flat rooftops at Intersolar Europe 2025.

designed for PV projects that utilize larger solar panels.

Complementing its extensive range of PV mounting solutions, Enstall highlighted its digital platform, including the tools to assist in the efficient planning and installation process. The company also promoted a 3D PV planning tool that allows users to create roof layouts directly in Google Maps, generating a 3D design of a PV system. The tool, which accommodates virtually any roof shape or type, prompts users to input both roof pitch and building height, addressing common planning errors in load calculations.

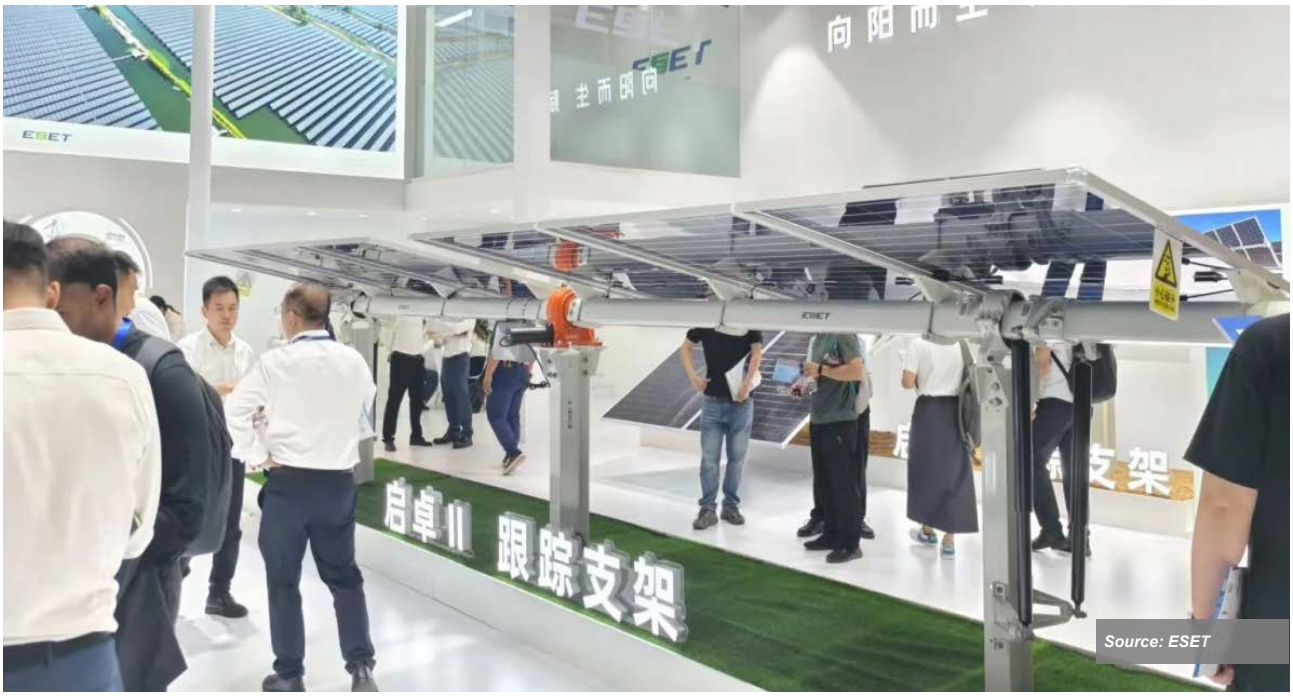
Enstall

ESET Displays ESEEK Tracker & Flexible Mounting System at SNEC 2025

At SNEC 2025, ESET displayed its ESEEK single-axis tracker, designed for utility-scale solar applications requiring structural adaptability and mechanical reliability. The system combines a self-locking tracker structure with an independent-row architecture, featuring a 1P layout and a ±60° tracking range.

The company highlighted the 'all posts self-locking function', which enhances the system stability during critical wind speeds, as the key feature of this product. The tracker incorporates a rhombus-shaped girder designed to balance torsional and bending resistance, along with a full-structure locking feature. The drive mechanism is based on a high-precision slew gear with single-point actuation. The system operates using astronomical algorithms with position sensor feedback and supports a tracking accuracy of ≤1°.

It is compatible with 1 to 4 module strings per row, operates at 1,000 V or 1,500 V DC, and offers multiple power supply options, including string-powered, AC, or self-powered configurations. The tracker supports LoRa, ZigBee, and RS-485 communication protocols for control and monitoring options. It also supports multiple configurable modes, such as night return, snow mode, hail protection, cleaning, and manual maintenance angles. It can be installed on rammed posts, PHC piles, or predrilled



Source: ESET

Piles and Cables: ESET showcased its ESEEK single-axis tracker featuring a self-locking structure, along with a flexible 4-cable mounting system for complex site conditions

concrete foundations, with a slope adaptation of up to 20% north-south. Daily energy consumption is approximately 0.03 kWh per tracker, and the system meets the IP65 protection standard.

In addition to the ESEEK tracker, ESET also presented its 4-cable flexible mounting system, designed for terrain-challenged sites that require large spans and flexible layout configurations.

ESET

Gonvarri Solar Steel Displays Upgraded 1P tracker with Terrain-Adaptive Design

At Intersolar Europe 2025, Gonvarri Solar Steel (GSS), a supplier of PV tracking and fixed-tilt structures, showcased the upgraded version of its earlier-generation 1P solar tracker. Enhancements in structural efficiency and terrain adaptation are the key focus with this upgrade.

According to Fernando Micó, Chief Business Development Officer of GSS, in addition to addressing the fact that much of the favorable land for solar has already been taken, the latest developments are designed to meet the demands of today's market: fewer components, faster assembly, and greater operational reliability. The key developments among these are increased rotation angles of up to 60°, as well as pre-assembly processes that reduce time and errors on site.

Out in the market, the company says it has been able to hold its own despite fierce competition, growing 21% in 2024 over 2023. The company is mainly promoting its customization approach and acting "ad hoc" as its leverage. GSS adds that it is now expanding into Eastern Europe.

While its 1P model was the focus at Intersolar, the company also highlighted the 2P model as a differentiating solution. The latter is a short tracker that is better suited to complex terrain, like in Italy, where the topography and archaeological restrictions demand greater precision, according to Micó. Both these trackers are suitable for agrivoltaics, meeting the required ground clearance and allowing livestock or machinery to pass between rows. For particularly challenging terrain, the company offers fixed structures with more aluminum or steel, as required.

Source: Gonvarri Solar Steel)

Tracking Upgrade: Gonvarri Solar Steel's booth at Intersolar Europe 2025 featured its upgraded 1P tracker model, adaptable to terrain slopes and engineered for non-flat project sites.

Specifically, regarding the expansion of agrivoltaics, Micó emphasized that Italy is leading the way.

While GSS did not specify the model promoted at the show, TracSmarT+1P is one of its latest trackers introduced earlier in 2025. This 1P tracker system supports both single-row and dual-row configurations. A typical 80 m tracker row can hold 2 strings of 30 modules each, and movement is controlled via a slew drive with an integrated DC motor, offering a ±60° tracking range. The dual-row version is supported by 26 piles. The tracker system incorporates SmarTSlope terrain adaptation, which enables installation on undulating surfaces with a slope variation of up to ±15° north-south.

Gonvarri Solar Steel

Diverse PV Mounting Solutions from HQ Mount

HQ Mount, a China-based provider of PV mounting systems, participated in Intersolar Europe 2025 with a lineup of mechanical structures intended for a variety of installation scenarios. The company presented solutions for carport installations, undulating terrain, and ballasted flat roofs.

The carport system on display featured an anodized aluminum frame, designed for dual-purpose use in vehicle shading and PV deployment. The system is reported to have passed 3,000 hours of salt spray testing, indicating applicability in coastal environments prone to corrosion.

HQ Mount also presented a terrain-adaptive ground mounting structure utilizing a patented helical screw foundation. The top bracket supports ±15° tilt adjustment, enabling installation on sloped or uneven terrain. The system is intended for variable soil types, including sand and frozen ground.

For non-penetrating rooftop installations, the company displayed a ballasted flat roof system capable of supporting up to 1.2 tons per point. The structure is designed to preserve the roof's waterproofing layer and is promoted for buildings with low load-bearing capacity and membrane-based roofing.

HQ Mount

Source: HQ Mount

Varied Applicability: HQ Mount presented its aluminum and steel PV mounting structures for carports, uneven terrain, and flat roofs at Intersolar Europe 2025.

A Range of Latest Mounting Solutions from K2 Systems

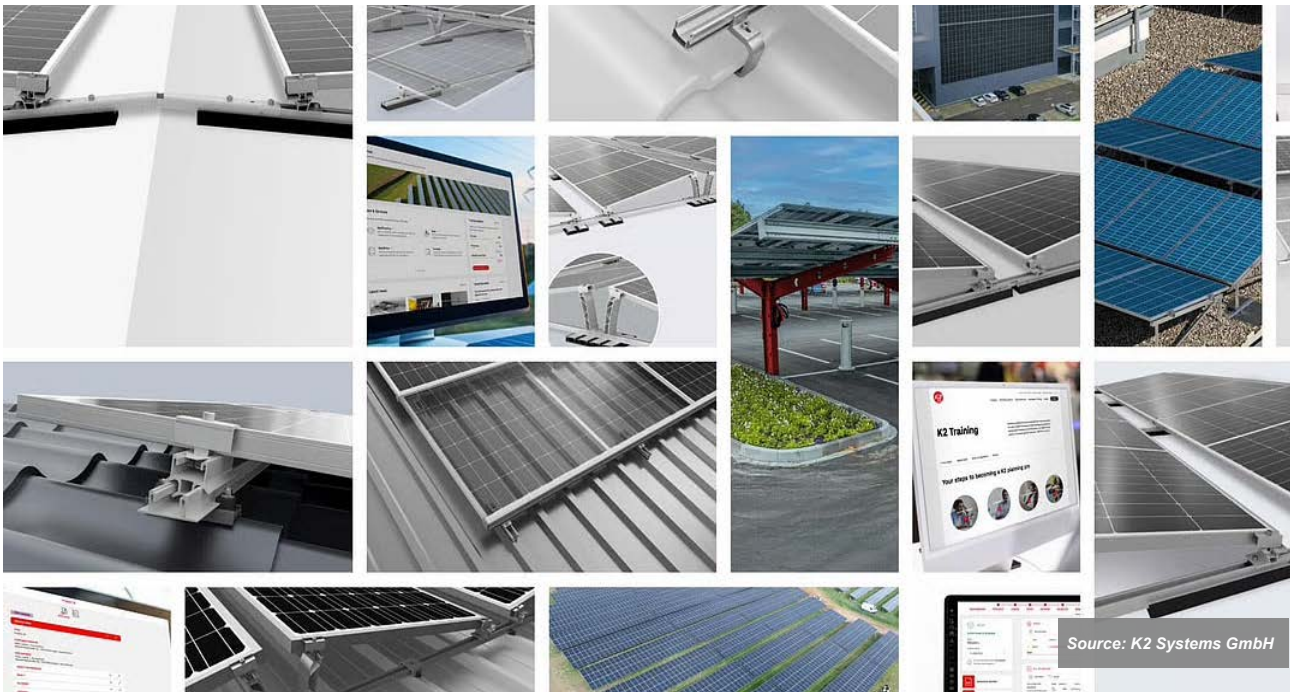
Germany's K2 Systems GmbH presented several new products from its mounting and racking portfolio at Intersolar Europe 2025. For flat roofs, the company displayed an updated Dome system at its booth, which features reduced wall thickness of the mount, enabling a quick snap-in installation. Another update to the Dome system is a pre-assembled design for higher load cases, featuring long-side clamping and tool-free assembly. The company also presented a single, pre-assembled connector with a tool-free and equipotential connection to prevent voltage differences between metallic components and minimize the risk of electric shocks.

It also displayed a new ridge connector, intended to reduce ballast and roof anchor requirements while simplifying module block connections across roof ridges. Other additions included a load distributor to support the mounting rail and facilitate installation, as well as a wall-mounting system for PV designed with only a few minimal components to shorten installation time.

The latest update on the racking system is that it supports double-sided installation, helping maximize land use without requiring shading distances between rows. All components are made of aluminum, except for the ramming posts. However, stainless steel is used for concrete foundations or in cases where soil acidity is a concern.

K2 has further expanded its offering with ground-mount racking system kits, aimed at smaller installations, and a single-post carport solution designed to allow obstacle-free parking. The carport is available in both single and double formats and can be customized with optional drainage features.

The company also presented these products at the TaiyangNews PV System Technology Trends Conference. As part of her presentation, Nadine Wade, product manager at K2 Systems gave an overview of developments in the mounting systems segment of PV. She emphasized that developments in mounting systems are being influenced by the construction industry, module manufacturers, new entrants, and the absence of standardization norms. Meanwhile, new EU regulations are emerging, and product certifications are gaining increasing importance.



Source: K2 Systems GmbH

Developments in Mountings: K2 Systems presented updates on its PV mounting solutions at Intersolar Europe 2025, focusing on material shifts, flat-roof designs, and new product introductions.

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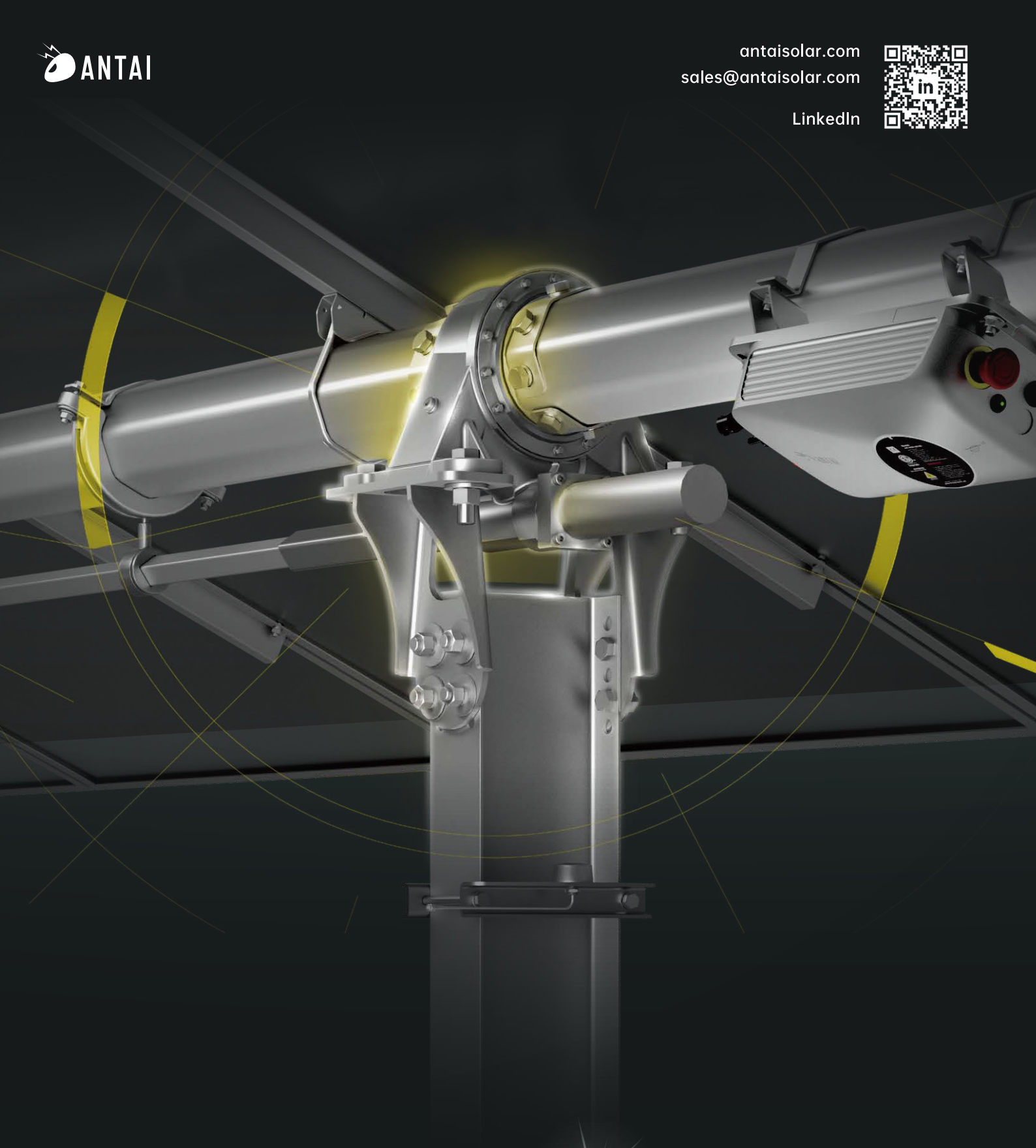


AT-SPARK

Multi-Slew Mechanical Linkage Single-Axis Independent Solar Tracking System - 1P

There is also a material transition from steel to aluminum underway, driven by factors such as corrosion resistance, sustainability, and design flexibility. Wade adds that aluminum provides durability without requiring special coatings, is fully recyclable, and allows for more adaptable, lightweight designs that benefit both logistics and assembly.

K2 Systems

Mibet Energy Showcases Mounting & Floating PV Systems

Mibet Energy, a Chinese company specializing in PV mounting systems and BIPV solutions, showcased a comprehensive lineup of products at SNEC 2025. The display covered ground-mounted and rooftop applications, as well as floating solar, single-axis tracking systems, and PV carports – highlighting the company's flexibility across different installation scenarios.

A highlight at its booth was the MRac PGT2 Ground Mounting System, aimed at large commercial and utility-scale solar projects. Made from high-quality aluminum, the system features a patented single-pile structure that is claimed to speed up installation and help reduce overall project costs.
Also on display was the MRac GT7 system, built for utility-scale power plants. This version uses hot-dip galvanized steel for added strength and stability, and is designed for fast deployment and broad module compatibility. Both PGT2 and GT7 support framed and frameless modules, in portrait or landscape layouts, with adjustable tilt angles ranging from 0° to 60°.

Mibet's rooftop portfolio includes ballast-mounted systems for flat roofs and clamp-and-hook solutions for metal and tile roofs – all designed to maintain waterproofing integrity while ensuring reliable installation.

The company also introduced the Solarboat Floating System, which combines eco-friendly HDPE floats with high-strength structures for water-based installations. In the tracking segment, its TR2 single-axis Drivelight Tracker incorporates intelligent algorithms and a stable multi-point drive structure for sun tracking.

Mibet Energy

Source: Mibet Energy

Showcasing Versatility: Mibet Energy exhibited mounting systems for ground, rooftop, floating, and tracking applications at SNEC 2025 – including pre-assembled designs and adjustable tilt options.

Vertical PV and Solar Fence Solutions from Next2Sun

At Intersolar Europe 2025, Germany-based vertical PV specialist Next2Sun presented its latest agri-PV and solar fence solutions designed for dual-use land applications and optimized energy generation during peak electricity pricing periods. The company displayed 2 main system types – Fields2Sun and Fence2Sun – targeted at utility-scale and residential or commercial projects, respectively.

Unlike conventional south-facing fixed-tilt systems that concentrate energy output around midday, Next2Sun's vertical installations align solar panels in an east-west orientation. This layout, when paired with bifacial modules, enables solar generation during early morning and late afternoon when electricity demand is high.

The vertical structure, however, requires wider spacing between module rows, typically 10 to 12 m. While this reduces energy yield per unit area compared to traditional designs, the system creates opportunities for dual land use, particularly when integrated with agriculture. Crops or livestock can be maintained in the space between panel rows, turning such farmlands into agri-PV installations.

To maximize energy capture on both faces of the panel, Next2Sun uses HJT modules with a high bifaciality of up to 95% – for example, from Huasun – while stating that 100% bifaciality would be ideal. The company noted that its vertical system occupies just 1% of the land area, leaving most of the space free for agricultural use. The Fence2Sun solution repurposes solar modules as fencing, providing both boundary demarcation and clean energy production for residential or commercial sites.

During the week of the Intersolar show, Next2Sun also signed a cooperation agreement with leading HJT manufacturer Huasun Energy, securing the exclusive use of the latter's bifacial HJT modules for its vertical PV systems across Europe. It also gives Next2Sun the right to market Huasun's modules and explore deployment in the China market.

Next2Sun reports that its vertical PV technology has been recognized with multiple awards across Europe. To date, the company has implemented a cumulative 40 MW of vertical PV projects in 6 countries.

Next2Sun

Vertical Advantage: Next2Sun showcased its vertical PV systems at Intersolar Europe 2025, highlighting dual-use agri-PV and solar fence solutions.

SCOTRA Showcases FPV Product at Intersolar Europe 2025

Targeting Europe's promising FPV markets, South Korea-based FPV solutions provider SCOTRA exhibited its latest offerings during Intersolar Europe 2025. The company highlighted its latest floater at the event.

This product, which offers buoyancy support and acts as a base platform for the installed PV modules and mounting rails or brackets, features a polyethylene (PE) based bulkhead structure that has 6 independent compartments without fillers. Sized at 1,000 × 700 × 600 mm and weighing 24.5 kg, its maximum volume of water displacement can exert an upward buoyancy force of up to 330 kg. This implies that it can support its own weight without sinking, as well as the additional weight of installed components – PV modules, structures, and cables of up to 305 kg. According to the company, its compartmentalized design helps maintain the consistency of buoyancy, even if partially damaged. In addition, this floater's PE material can be recycled after the end of its operational lifespan, which makes it a sustainable product, says SCOTRA.

SCOTRA

SmartFlower Presents Solar Sculpture at Intersolar Europe 2025

At Intersolar Europe 2025, Boston-based SmartFlower Solar showcased its signature solar solution – SmartFlower. The striking black flower-like structure garnered much attention at the company's booth. Combining performance with visual impact, the company stated that its products cater to commercial, institutional, and residential users looking for a blend of aesthetics, efficiency, and simplicity.

Speaking to TaiyangNews, Matthew Downing, Social Media and Marketing Specialist at SmartFlower Solar, explained how the product balances form and function. The system, inspired by nature, features solar 'petals' that unfold at sunrise, mimicking a blooming sunflower. These identical petals are mounted on a dual-axis tracking system that rotates throughout the day to maintain a perfect 90° angle with the sun.

The flower stands atop a pyramid-shaped column available in 2 customizable colors. With a total PV capacity of 2.5 kW, the SmartFlower can generate between 4,000 and 6,500 kWh of electricity annually, depending on its location. According to the company,

Float, No Matter What: SCOTRA's floater with its compartmental design helps its be afloat even if partially damaged

the system operates reliably across a temperature range of -20°C to 55°C.

Flowering Innovation: SmartFlower is a dual-axis tracking system with the appearance of a flower that follows the Sun all day.

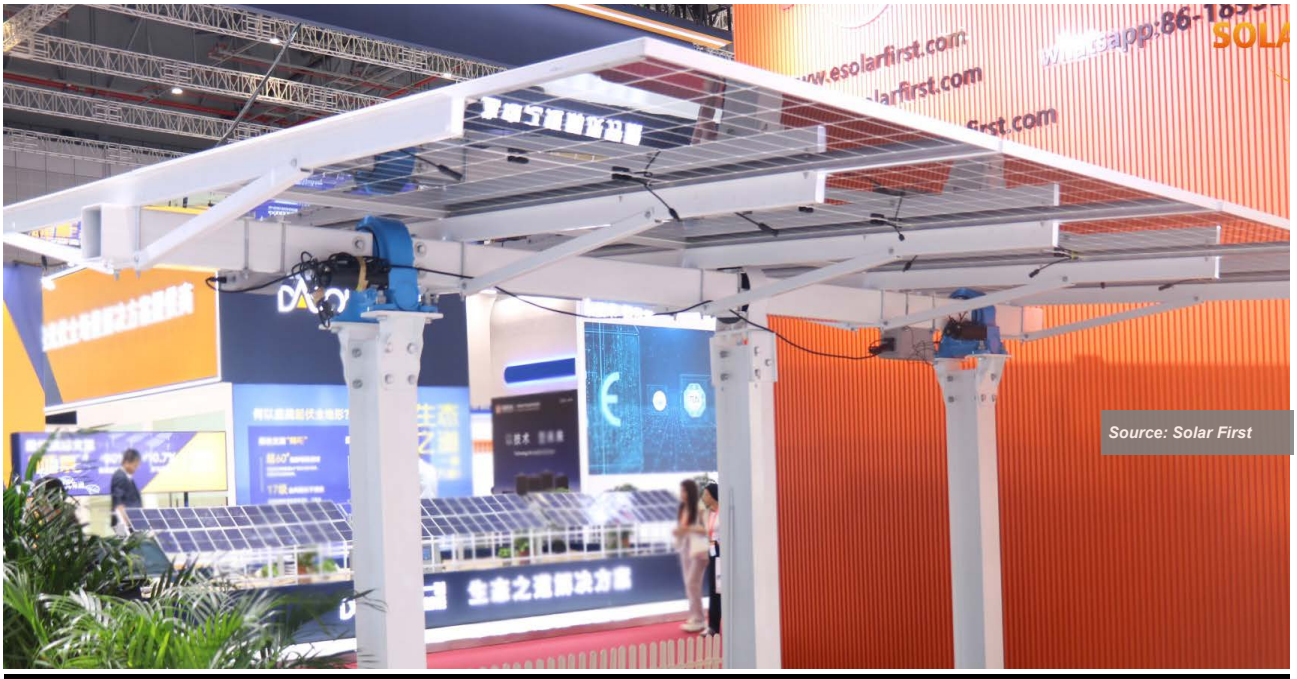
To ensure safety in high-wind conditions, the system features 2 auto-retract safety modes – one for wind speeds exceeding 48 km/h and another for wind speeds above 64 km/h. The petals automatically reopen once conditions normalize. The product is supported with a 2-year system warranty, and the PV modules carry a 25-year performance warranty.

SmartFlower

Solar First Group Displays Mounting Solutions for Various Applications

At SNEC 2025, Solar First Group presented a range of PV mounting structures designed for different installation environments. The company's exhibit included 6 structural categories: flexible mounting systems, single-axis trackers, floating PV platforms, PHC pile ground mounts, BIPV curtain wall systems, and rooftop mounting kits.

The flexible mounting structure uses a cable-truss configuration with span lengths of 20 to 40 m. It is designed for terrain with limited foundation options, such as hillsides, water treatment sites, and agricultural or aquaculture projects. The structure supports elevated clearance and reduces



Adaptive Mounts: Solar First Group showcased a diverse portfolio of PV mounting systems at SNEC 2025, spanning flexible structures, trackers, floating platforms, BIPV façades, and rooftop kits.

foundation requirements by approximately 55%. The company states that its intelligent tracking system is capable of operating on continuous slopes up to 15%. It incorporates a multi-point drive system and independent row tracking, with control algorithms that adjust tilt angles based on terrain and real-time weather conditions to maintain optimal irradiation levels.

The floating PV platform is designed for reservoirs, lakes, and aquaculture ponds. It features reinforced U-steel connections to increase overall rigidity and wind resistance. The system has a transport packaging density of 6 × 40-foot containers per MW installed. For ground-based solar plants in unstable conditions, such as deserts, tidal flats, or Gobi regions, Solar First displayed its PHC pile mounting structure, which offers wide adaptability and is compatible with mechanized installation in coarse or soft ground.
The BIPV curtain wall system consists of colored PV glass panels intended for architectural integration. It complies with wind pressure resistance up to 42 m/s and snow load of 35 cm, with customizable framing and surface options to meet structural and design standards.

In the rooftop segment, the company exhibited mounting accessories suitable for both metal and wooden roofs, including multiple clamp types (corner, vertical lock, U-shaped) and stainless steel hooks. These allow for mechanical anchoring across varied roof geometries.

Solar First

Soltop Unveils Duraklick XL Flat-Roof Mounting System

At Intersolar Europe 2025, Switzerland-based Soltop Energie presented its latest PV mounting systems, including a new system for flat-roof applications. One of the key highlights at the exhibition was the Duraklick XL, a mounting structure designed specifically for flat roofs. According to Soltop, the system features a patent-pending design and is capable of supporting up to 1,200 kg. It is designed for non-invasive installation, with no roof drilling required. Instead, the structure is placed on a protective mat measuring 6 to 8 mm, laid directly onto the roof surface. Mounting rails are then positioned based on system size, and the module supports are installed on these rails.

Source: TaiyangNews

Flat-Roof Focus: Soltop's latest addition to its flat-roof mounting solution, Duraklick XL, facilitates non-invasive installations and still bears a weight of 1,200 kg.

In addition to the Duraklick XL, Soltop also displayed its in-roof and on-roof mounting systems. The company's SwissSolarRoof is an in-roof solution that uses solar panel tiles with a 3.2 mm front and a 2 mm rear glass configuration. For situations where solar tiles do not fully cover the roof area, Soltop offers dummy tiles to fill the gaps. The company also offers another system, Duramont, designed for inclined roof applications.

Soltop

SUNfarming's Agrivoltaic Solutions for Integrated Land Use

Germany-based SUNfarming GmbH presented its agri-PV system portfolio for applications in crop production, animal farming, and ecological land use during Intersolar Europe 2025. Speaking to TaiyangNews, Peter Schrum, Chairman of SUNfarming, explained the company's 2-decade evolution from its initial projects in Africa to its current large-scale installations in Germany. Schrum noted that there was no real market for agrivoltaics when the company began operations. At the time, glass-glass modules, which facilitated some level of transparency needed for such applications, were expensive. However, costs have now dropped, making deployments economically viable in Central Europe, India, and several other parts of the world. Agrivoltaics may become indispensable for regions with limited land availability, added Schrum.

The company's systems are equipped with glass-glass modules that offer light permeability and can withstand hailstorms up to Class 5, with a service life of up to 50 years. With adequate height, a working width of 3 m between rows, and integrated rainwater harvesting, the system supports the growth of pasture fodder, specialty crops, catch crops, and more. SUNfarming highlights 4 core benefits: dual-use of land, evaporation reduction, lower environmental impact, and income diversification. In animal farming applications, SUNfarming deploys overhead PV structures that provide shelter for cattle, poultry, and other livestock. For peatland areas, the company offers a PV design that converts moorlands into pastureland.

The company also introduced an 'umbrella' system designed for viticulture. It integrates overhead solar

Dual-Use Infrastructure: SUNfarming promoted the integration of PV into agriculture for the dual use of land, presenting diverse uses cases of agri-PV at Intersolar Europe.

modules with protective nets to shield against hail, birds, and insects. This configuration complies with DIN SPEC 91434. A separate solution is optimized for vegetable crops, like tomatoes, serving as a functional alternative to foil tunnels.

SUNfarming

VesprSolar Debuts Snap-In Mounting Clamps to Replace Bolts in PV installations

At Intersolar Europe 2025, US-based VesprSolar showcased its alternative to traditional bolt-based PV module mounting. The company introduced 2 products – the V-Clamp and V-MAX clamp systems – which are designed to simplify ground-mounted solar installations.

Traditional nut-and-bolt methods often suffer from issues like over-tightening, loose connections, and inconsistent workmanship. VesprSolar's snap-in clamp design addresses these problems by eliminating the need for torque-specific fastening. V-Clamp is intended for fixed-tilt setups, while V-MAX targets 1P installations.

According to the company, both clamps are easy to install using standard pliers and are designed to fasten along the length of the module frame. In addition to simplifying installation, the clamps also provide electrical bonding between module frames and mounting structures through a threaded groove system – eliminating the need for copper grounding wires. The company claims to reduce the installation times significantly 37.8 manhours for the V-Clamp and 38.9 manhours for V-MAX, compared to 104.3 manhours for a conventional 1 MW nut-bolt-based installation.

VesprSolar also emphasized the mechanical endurance of its system. In static load tests on 665 W modules, the V-MAX clamp allowed the module frame to withstand up to 4.45 kN of axial force, far more than the 2.6 kN supported by a standard M8 bolt. In dynamic load testing, which simulates the real-world stress of utility-scale tracker systems, the V-MAX-mounted module endured 887 unbalanced cycles before failure, compared to just 245 for the bolt-mounted version.

VesprSolar

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