



POLYSOLAR PV Glazing Modules

Transparent and opaque amorphous-silicon thin-film laminated-glass photovoltaic glazing & BIPV modules



Distributor:

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Product Range



Opaque (100W) Transparent (85W) Transparent (85W) Opaque (125W)
(10mm tempered)

Laminated BIPV glazing: 1100mm wide x 1300mm high x 7mm/10mm thick

Transparent-shading Application



Opaque Roofing Application



Shelter Application



Solar Farm Mounted



+ glass balustrades & balconies, conservatory roofs, tinted-windows, yachts, atria, curtain walling & cladding, covered walkways, bus-shelters, car-ports, etc.

Product Specifications

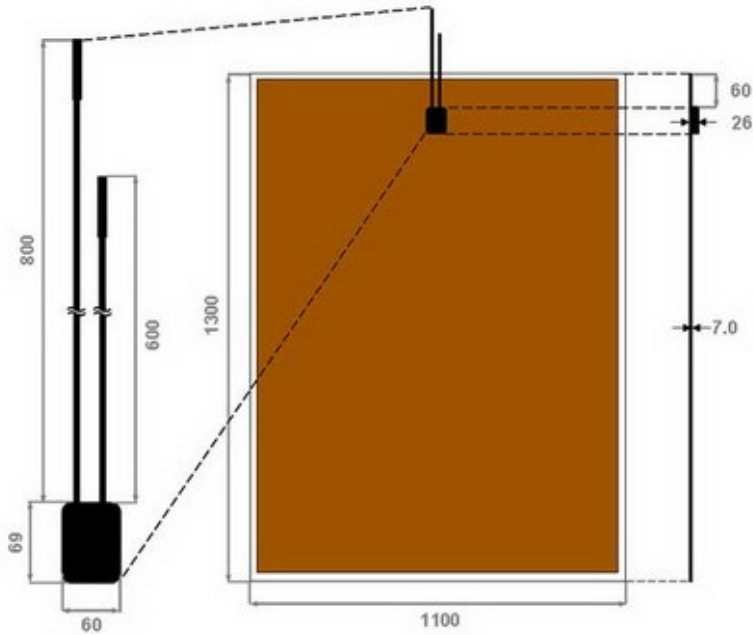
Model Type (laminated glass-glass modules)	PS-A Series Opaque Module	PS-C Series 20% Transparent Module	PS-B Series 17.5% Transparent Edge connect	PS-E Series Opaque, High Performance
Active Material of Cell	Amorphous Silicon (a-Si)			a-Si & μ -Si
Junction Type of Cell	Single Junction			Double junction
Material for Encapsulation	Polyvinylbutyral (PVB), thickness: 0.76 mm			
Front Cover	Float glass, thickness: 3.2 mm			Low-iron, 3.2mm
Back Cover	Glass thermally strengthened 3.2mm thick [scs=10,000psi]	Float glass 3.2mm thickness	Glass, tempered 6.0mm thickness [surface compress. stress >10,000psi]	Glass thermally strengthened 3.2mm thick [scs=10,000psi]
Wiring Material	Tin & silver coated copper ribbon 0.1mm			
Junction Box	BypassDiode	Yes		
	IP Class	IP 65	IP67	IP65
Junction Box Cable length	Downward 800mm X2	Upward 800mm(+)/ 600mm (-)	Sideways 890mm X2	Upward 800mm X2
Connecting Cable Plug	Rated voltage 1000 Volts D.C. Plug/Socket MC4 compatible \varnothing 4mm, cable cross section 2.5mm ²			
Transparency	No	Average transmittance T(%) at 400-800nm: 20 \pm 3.5%	Avg. transmittance T(%) at 400-800nm: 17.5 \pm 3.5%	No
Frame	Not provided			
Dimensions	Width	1100mm+2/-1mm		
	Length	1300mm +2/-1mm	1300-1311mm	1300mm
	Thickness	7.0 \pm 0.5mm	9.8 \pm 0.5mm	7.0 \pm 0.5mm
	with junction box	21.2 \pm 1.0mm	26 \pm 1.0mm	10.0 \pm 1.0mm
Weight	24.0 \pm 0.5Kg		33.5 \pm 0.5Kg	24.0 \pm 0.5Kg
Certifications	IEC 6164 & 61730 by TÜV- Rheinland MCS approval in application		Applying	

Electrical Specifications

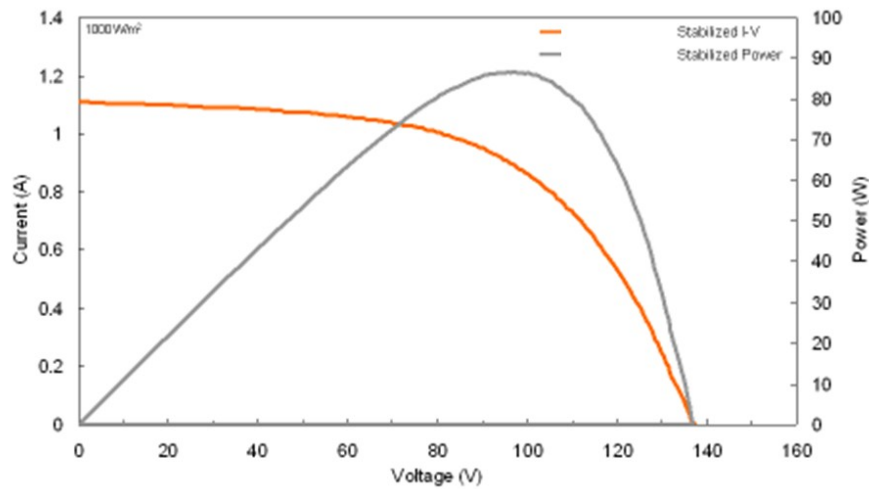
Polysolar Model	Class	Stabilized Performance				Initial Performance				Max over current rating	Temp Co-efficient	Max System Voltage
		Vmpp (V)	I _{mp} (A)	Voc (V)	I _{sc} (A)	Vmpp (V)	I _{mp} (A)	Voc (V)	I _{sc} (A)			
		Electrical tolerance \pm 10%										
PS-A-873	80W	97	0.85	135	1.08	107	0.99	138	1.18	2.0A	Isc +0.003%/K Voc -0.30%/K P _{mp} -0.17%/K V _{mp} -0.31%/K	1000Vdc (IEC) 600Vdc (UL)
PS-A-872	85W	99	0.88	136	1.13	110	1.02	139	1.19			
PS-A-871	90W	102	0.91	137	1.15	111	1.06	140	1.21			
PS-A-870	95W	103	0.94	137	1.20	111	1.13	140	1.26			
PS-A-87	100W	103	1.00	138	1.24	111	1.19	141	1.30			
PS-C-905	70W	93	0.78	134	1.06	99	0.93	137	1.09			
PS-B-775												
PS-C-904	75W	95	0.81	135	1.08	102	0.96	138	1.11			
PS-B-774												
PS-C-903	80W	99	0.83	136	1.09	105	0.99	139	1.13			
PS-B-773												
PS-C-902	85W	103	0.85	137	1.11	106	1.05	140	1.15			
PS-B-772												
PS-A-656	65W	33	2.05	53	2.83	34	2.51	54	2.97			
PS-E-110	110W	100	1.12	130	1.32	102	1.31	135	1.41	2.0A		
PS-E-115	115W	103	1.14	128	1.35	104	1.35	136	1.42			
PS-E-120	120W	105	1.16	129	1.39	105	1.39	138	1.46			
PS-E-125	125W	107	1.18	130	1.42	107	1.41	139	1.50			

The modules electrical ratings are measured under Standard Test Conditions (STC) and have been delivered on the specific table of electrical characteristics as shown above. A photovoltaic module may produce more current and/or voltage than reported at STC. Sunny, cool weather and reflection from snow or water can increase current and power output. Therefore, the values of I_{sc} and Voc marked on the modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to PV output. [STC]: 1000 W/m², AM 1.5, 25. The exactly measured electrical characteristics are shown on the label of the modules. All electrical data is average production data and is subject to a measuring equipment tolerance of Module nominal power is subject to a tolerance of \pm 2%. Manufacturer warranty: 2 years product; 10years 90% of power; 20years 80% of power.

Transparent Module Dimensions:



Transparent Module Performance (current and power v. voltage):



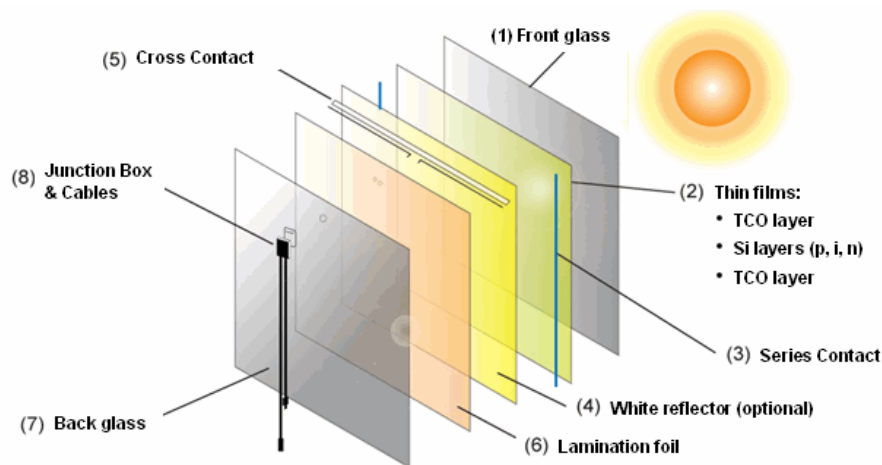
Warranted Manufacture

Manufactured for Polysolar on a state-of-art Oerlikon thin-film line, Polysolar's modules are guaranteed to generate at least 80% of their nominal power output for twenty years and 90% for ten years. They also come with a two-year manufacturer's product warranty. MCS certification (for UK FiT) is in progress.

Unique Technology

Polysolar's transparent-tinted BIPV glazing modules use a thin-film of amorphous silicon (a-Si) sandwiched between laminated glass sheets. Instead of an opaque metal layer to collect the electrical power, Polysolar's modules uniquely use transparent conductors on both sides of the a-Si. This allows the whole module to be transparent – the thin silicon layer lets through about 20% of the daylight and gives it a chestnut tint. Unlike conventional opaque modules, Polysolar's transparent modules can produce electricity from light coming from either side of the module, giving useful flexibility in orientation.

Polysolar's opaque modules incorporate an additional white layer to reflect light back through the module to generate a small amount of extra power:



About 10% of world PV production is based on a-Si, but most other modules available in the UK are based on crystalline silicon (c-Si). C-Si is best suited for regions with high-intensity sunlight, while a-Si is best for climates like the UK.

Watt-for-watt, Polysolar's a-Si is cheaper (and much less resource intensive) than c-Si to manufacture. In the UK climate, 1kWp of a-Si modules will deliver significantly more energy over the course of a year than 1kWp of c-Si modules (1kWp of a-Si modules will occupy $\sim 17\text{m}^2$, approx twice as much area as c-Si).

Polysolar is working with Sheffield University to characterise the unique performance of transparent a-Si PV modules under UK climate conditions.

Benefits

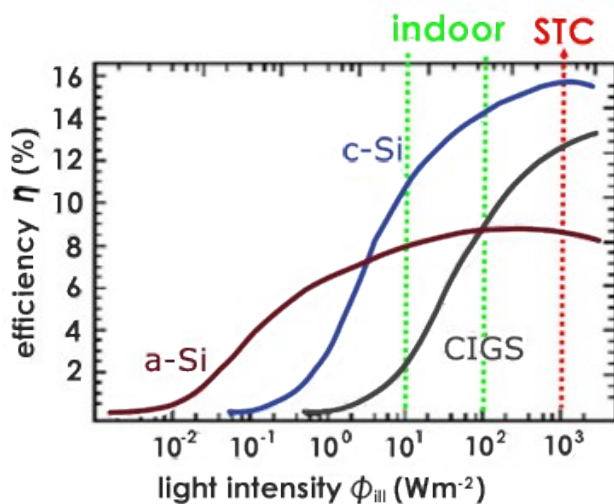
Polysolar's BIPV glazing modules is used as a high-performance, cost-effective alternative to regular laminated glass, conventional photovoltaic modules and specialist semi-transparent PV glazing. It offers substantial performance, aesthetic and financial benefits:

- **Unique see-through transparency**

Up to now, semi-transparency in photovoltaic modules has only been possible by patterning small areas of opaque PV cells with areas of transparent glass. This has been done by laser ablation of opaque a-Si cells and also by laser drilling and area patterning of c-Si cells and of some other PV cell types. This really makes them suitable only for use in areas where light transmission but not close-up visibility is required. Polysolar's transparent a-Si modules are the first in the world that are truly transparent. Tests are expected to show that the unique two-sided PV capability can deliver higher kWh/kWp than conventional single-sided PV (e.g. a vertically mounted east & west facing transparent Polysolar module could generate power from both morning & afternoon sunlight).

- **Higher electrical energy output for UK conditions**

On cloudy days and in winter when light levels fall, Polysolar's a-Si modules maintain their conversion efficiency, while the performance of crystalline-silicon drops dramatically. Study findings from the 17th European Photovoltaic Conference in 2001 showed that a-Si modules in Oxford (UK) yielded over 25% more kWh (useful electrical energy) per kWp (rated power output) than crystalline-Si modules.



- **Lowest-cost transparent PV in world**

It is the unique manufacturing method and scale that enables Polysolar's transparent modules to be produced at the same very low cost per watt as any other high-volume photovoltaic module. Laser ablation, drilling and short-run hand assembly processes make alternative semi-transparent PV modules fabulously expensive in comparison.

- **Higher financial return from energy generation**

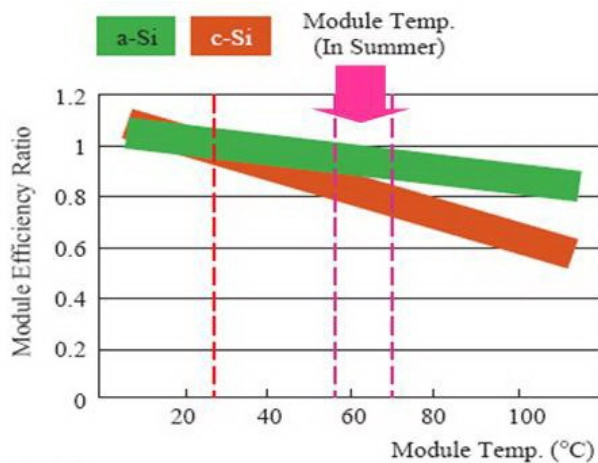
The combination of very low cost per watt with low-light performance advantage for a-Si in the UK means that Polysolar's modules generate more units of electricity per year for a lower capital outlay than conventional c-Si modules. Financial returns accrue where the PV electricity units displace units bought from the grid and/or where feed-in-tariffs are paid per PV unit generated. In a new building application where Polysolar's PV glazing modules avoid use of alternative laminated glass and/or shading, they can be even more cost effective.

- **Direct replacement for glass**

Polysolar's modules are 1100mmx1300mm sheets of laminated glass and can be handled and used exactly as other laminated glass sheet of the same size. They can be incorporated into insulated glazing units. They cannot be cut or drilled.

- **Low sensitivity to temperature changes**

Direct sunlight in summer can cause PV module temperatures to rise sharply. Polysolar's a-Si modules maintain good performance at these high temperatures while the conversion efficiency of crystalline-Si modules falls quickly. Both types of cells perform at their best when cold (and in bright sunlight).



- **Superior aesthetics and lifetime durability**

For building integrated applications the aesthetics of the photovoltaic installation are important and help secure planning. The glazing modules are laminated and available with heat strengthened or tempered glass. Where insulated glazing is required, the modules can be incorporated into double and triple glazed units. Transparent modules are available with edge mounted connectors (as well as face-mounted connectors) for totally hidden wiring. The UV-blocking, IR-reflective and tinted coatings that form an integral part of the photovoltaic function are equally useful in glazing energy management.



Polysolar is an award-winning specialist developer of transparent photovoltaic glazing for building-integrated applications. In addition to offering the World's first truly transparent BIPV glazing product, Polysolar is working with major industrial and research partners to develop the next-generation of large-area colourless transparent BIPV glazing based on patent-protected organic photovoltaic technology.

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