SOLAR INNOVA GREEN TECHNOLOGY, S.L.
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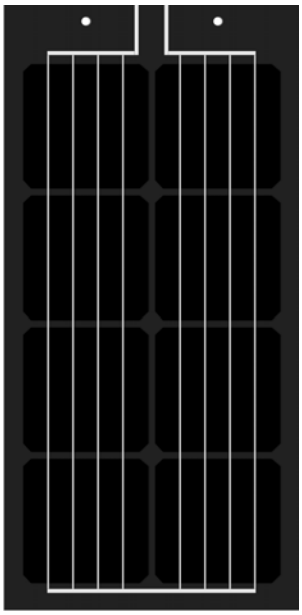
PHOTOVOLTAIC SOLAR ENERGY

SOLAR TILES - SI-ESF-M-BIPV-TL-F-M156-8-40W



Solar Innova uses the latest materials to manufacture photovoltaic glass solar tiles.

Our tiles are ideal for any application that uses the photoelectric effect as a clean energy source because of its minimal chemical pollution and no noise pollution. Thanks to its design, can be integrated easily into any installation.

The front of the solar tile contains a tempered solar glass with high transmissivity, low reflectivity and low iron content.

These PV solar tiles use high-efficiency monocrystalline silicon cells to transform the energy of sunlight into electric energy. Each cell is electrically rated to optimize the behavior of the module.

The cell circuit is laminated using PVB (Polyvinyl butyral) as a encapsulant in combination with a tempered glass on its front and back which provides complete protection and seals against environmental agents and electrical insulation.

The back of the tile contains tempered glass with low iron content.

The junction boxes with IP65, are made from high temperature resistant plastics and containing terminals, connection terminals and protection diodes (by-pass). These tiles are supplied with symmetric lengths of cable, with a diameter of copper section of 4 mm and an extremely low contact resistance, all designed to achieve the minimum voltage drop losses.

Our solar roof tiles comply with all safety requirements not only flexibility but also double insulation and high resistance to UV rays, all are suitable for use in outdoor applications. The design of these solar tiles makes their integration in both industrial and residential buildings (one of the most emerging sectors in the photovoltaic market), and other infrastructure, simple and aesthetic.

WARRANTIES

Our manufacturing plants have been prepared in accordance with the ISO 9001, ISO 14001 and OHSAS 18001.

We have quality control divided into three elements:

- √ Regular inspections allow us to guarantee the quality of the raw material.
- √ Quality control in the process of our manufacturing procedures.
- √ Quality control of finished products, we conduct through inspections and tests of reliability and performance.

Our PV solar tiles are certified by internationally recognized laboratories and are proof of our strict adherence to international safety standards, long term performance and overall quality of products.

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ELECTRICAL CHARACTERISTICS (STC)		
Maximum power (Pmpp)	Wp	40
Tolerance	Wp	0 ~ + 1.20
Voltage at maximum power (Vmpp)	Volts	4.15
Current at maximum power (Impp)	Amperes	9.66
Open circuit voltage (Voc)	Volts	5.15
Short circuit current (Isc)	Amperes	10.15
Maximum system Voltage (Vsyst)	Volts	715 (IEC)
Diodes (By-pass)	Quantity	2
Maximum series fuse	Amperes	10
Efficiency (ηm)	%	14.22
Form Factor	%	≥ 73

STC:	Irradiance: 1,000 W/m²	Module temperature: 25º C	Air quality: 1.5

ELECTRICAL CHARACTERISTICS (TONC)		
Maximum power (Pmpp)	Wp	29
Voltage at maximum power (Vmpp)	Volts	3.78
Current at maximum power (Impp)	Amperes	7.84
Open circuit voltage (Voc)	Volts	4.71
Short circuit current (Isc)	Amperes	8.23

NOCT:	Irradiance: 800 W/m²	Air temperature: 20º C	Air quality: 1.5	Wind speed: 1 m/s

MECHANICAL CHARACTERISTICS		
Size	Height	760 mm
	Width	370 mm
	Thickness	9 mm
Weight	Net	6.5 kg
Front	Material	High transmission tempered glass
	Thickness	4 ± 0.2 mm
Cells	Type	Monocrystalline
	Quantity	2 x 4 units
	Size	156 x 156 mm
Serial connection	Quantity	8 units
Parallel connection	Quantity	1 unit
Encapsulation	Material	PVB
	Thickness	0.76 ± 0.03 mm
Rear	Material	Tempered glass
	Thickness	4 ± 0.2 mm
Junction box	Material	PVC
	Protection	IP65
	Isolation	Versus humidity and inclement weather
Cables	Type	Polarized and symmetric in length
	Length	450 mm
	Section	4 mm²
	Features	Low contact resistance
		Minimal losses for voltage drop
Connectors	Material	PVC
	Type	MC4
	Protection	IP67

THERMAL CHARACTERISTICS		
Temperature coefficient of short circuit current α (Icc)	%/º C	+ 0.0814
Temperature coefficient of open circuit voltage β (Voc)	%/º C	- 0.3910
Temperature coefficient of maximum power γ (Pmpp)	%/º C	- 0.5141
Temperature coefficient of current at maximum power (Impp)	%/º C	+ 0.10
Temperature coefficient of voltage at maximum power (Vmpp)	%/º C	- 0.38
NOCT (Nominal Operating Cell Temperature)	º C	+ 47 ± 2

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TOLERANCES				
Working temperature	º C	º F	- 40 ~ + 85	- 40 ~ + 185
Dielectric Isolation Voltage	Volts		3,000	
Relative humidity	%		0 ~ 100	
Wind resistance	m/s		60	
	kg/m^2	Pa	245	2,400
	$lbs/feet^2$		491.56	
Mechanical load-bearing capacity	kg/m^2	Pa	551	5,400 (IEC)
	$lbs/feet^2$	Pa	75.2	3,600 (UL)
Fire resistance	Clase		C	
Hail resistance	Level		4	

MEASUREMENTS PERFORMED IN ACCORDANCE WITH STANDARD TEST METHODS EN 60904-3 AND ASTM E1036, CORRECTED TO STANDARD TEST CONDITIONS (STC)		
Air quality/Spectral distribution	AM	1.5 ASTM G173-03e1 (2,008)
Luminous intensity/Radiation	W/m^2	1,000
Cell temperature	º C	25

MEASUREMENTS PERFORMED IN SOLAR SIMULATOR	
Class	AAA (according to IEC 60904-4)
Power measurement uncertainty is within	± 3 %

STRUCTURAL CHARACTERISTICS	
Cells	High efficiency cells with anti-reflective layer of Silicon Nitride.
Electric conductors	Flat Copper (Cu) bath in a Tin (Sn) and Silver (Ag) alloy, which improves weldability.
Welding	Of cells and drivers in sections for stress relief.
Laminate	Composed of ultra-clear tempered glass on the front, thermostable PVB encapsulant embedding cells and electrical insulation on the rear with ultra-clear tempered glass.
Junction box	Hoses and quick connectors with anti-error. Include bypass diodes, interchangeables thanks to the wiring system has no welds, all electrical contacts are made by pressure, thus avoiding the possibility of cold welding.

CHARACTERISTICS OF WORK
- The power of solar cells vary in the output of the production process. The different power specifications of these modules reflect this dispersion.
- Cells during the early months of light exposure, may experience a degradation photonics could decrease the value of the maximum power of the module up to 3%.
- The cells, in normal, operating conditions, reach a temperature above the standard measurement conditions of the laboratory. The NOCT is a quantitative measure of the increase. NOCT measurement is performed under the following conditions: radiation of 0.8 kW/m^2, temperature 20º C and wind speed of 1 m/s.
- The electrical data reflects typical values of the modules and laminates as measured at the output terminals at the end of the manufacturing process.

WARRANTIES		
Manufacturing defects	Years	12
Performance	Minimal Rated Power %/Years	90 % at 10 years, 80 % at 25 years.

CERTIFICATES			
ISO	CE		

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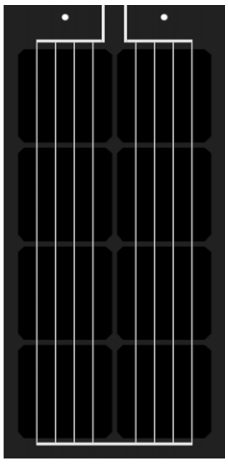
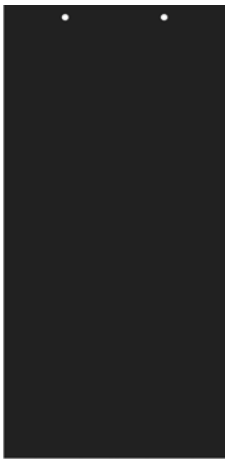
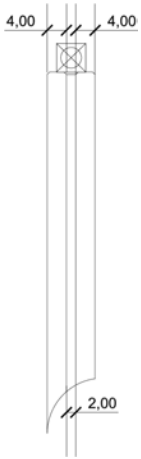
FRONT FORWARD	FRONT REAR
	

THICKNESS



COMPONENTS

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PERFORMANCE

TEMPERATURE	IRRADIANCE