

MANUFACTURER



SOLAR INNOVA GREEN TECHNOLOGY, S.L.

N.I.F.: ESB-54.627.278  
 Paseo de los Molinos, 12  
 03660 - NOVELDA (Alicante) SPAIN

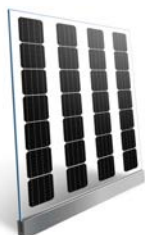
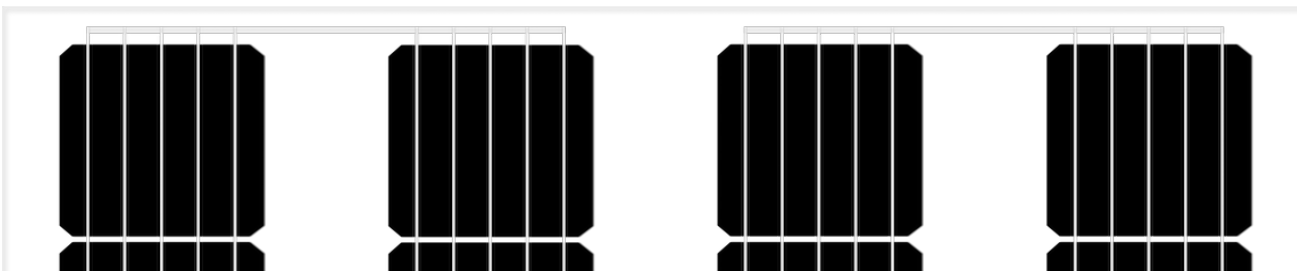
T/F: +34965075767  
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PHOTOVOLTAIC MODULE

Series	BIPV-BALCONY	Reference	SI-ESF-M-BIPV-BL-M156-28	Type	MONOCRYSTALLINE
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INTRODUCTION



**MATERIALS**

Solar Innova uses the latest materials to manufacture photovoltaic modules.

**USE**

Our modules 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.

**FRONT**

The front of the module contains a tempered solar glass with:

- High transmissivity.
- Low reflectivity.
- Low iron content.

**PV CELLS**

These PV modules use high-efficiency monocrystalline silicon cells (the cells are made of a single crystal of high purity silicon) to transform the energy of sunlight into electric energy.

Each cell is electrically rated to optimize the behavior of the module.

Its performance is excellent over the entire range of light spectrum, with particularly high yields in low light situations or cloudiness to direct sunlight (diffuse radiation).

**ENCAPSULANT**

The cell circuit is laminated using as encapsulant:

- PVB (Polivinil Butiral).

**BACK**

The rear of the module contains a tempered glass which provides complete protection and seals against environmental agents and electrical insulation.

**JUNCTION BOX**

The junction boxes with IP67, are made from high temperature resistant plastics and containing terminals, connection terminals and protection diodes (by-pass).

These modules 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.

**PERFORMANCE**

Our modules 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 modules 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.

**QUALITY CONTROL**

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.

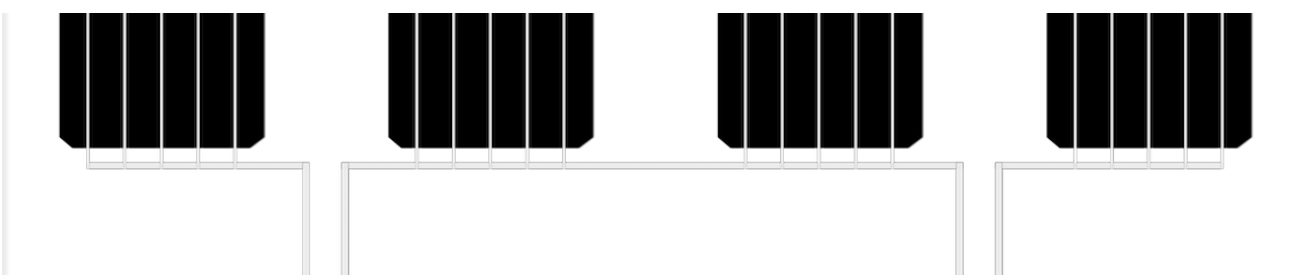
**WARRANTIES**

Our manufacturing plants have been prepared in accordance with:

- ISO 9001, in terms of Quality Systems and Business.
- ISO 14001, in terms of Environmental Management Systems.
- OHSAS 18001, in terms of Management Systems Health and Safety.

**CERTIFICATES**

Our PV modules 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				MECHANICAL CHARACTERISTICS			
Type	Monofacial	sc-Si		Size	mm	156,75 x 156,75 ±0,25	
Color	Front/Rear	RAL	5004 7030	Thickness	µm	180 ±20	
Maximum power	[Pmpp]	Wp	5,28	Front	[-]	Si3N4 anti-reflection coating	
Voltage at maximum power	[Vmpp]	V	0,57	Back	[+]	Aluminum (Al-BSF)	
Current at maximum power	[Impp]	A	9,31	TEMPERATURE COEFFICIENTS			
Open circuit voltage	[Voc]	V	0,67	Tk Voltage	%/K	-0,36	
Short circuit current	[Isc]	A	9,83	Tk Current	%/K	0,07	
Efficiency	[ηc]	%	21,49	Tk Power	%/K	-0,38	

PV MODULE ELECTRICAL CHARACTERISTICS

STC CONDITIONS				NMOT CONDITIONS			
Maximum power	[Pmpp]	Wp	148 ±3% (*)	Maximum power	[Pmpp]	Wp	109 IEC 61215
Power selection	[Pmpp]	%	±5				
Voltage at maximum power	[Vmpp]	V	15,88 IEC 60904-1	Voltage at maximum power	[Vmpp]	V	14,46
Current at maximum power	[Impp]	A	9,31 IEC 60904-3	Current at maximum power	[Impp]	A	7,56
Open circuit voltage	[Voc]	V	18,79 ±3% (*)	Open circuit voltage	[Voc]	V	17,17
Short circuit current	[Isc]	A	9,83 ±4% (*)	Short circuit current	[Isc]	A	7,98
Maximum system voltage	[Vsyst]	V	1500/1000 IEC/UL				
Maximum series fuse	[Icf]	A	15				
Efficiency	[ηm]	%	11,73				
Form Factor	[FF]	%	80,01				

\*(Considering LID, the power range of the certification authority)

MECHANICAL CHARACTERISTICS

PANEL	WIDTH (X)		HIGH (Y)		DIAGONAL		AREA	POWER/AREA
Size - Glass-1	1000	x	1260	mm			1,26 m2	117 Wp/m2
Size - Glass-2	1000	x	1260	mm			1,26 m2	
CELLS								
Size	156,75	x	156,75	mm	210 mm		0,02 m2	
Distance - Top			31	mm				
Distance - between Cells	95	x	4	mm				
Distance - Left	44	mm						
Distance - Right	44	mm						
Distance - Bottom			108	mm				
Quantity	4	x	7	=	28 units		0,69 m2	

COMPONENTS

MATERIAL	QUANTITY	THICKNESS (Z)	DESCRIPTION	DENSITY	TOTAL WEIGHT	THERMAL RESISTANCE
Glass-1	1 units	10 mm	Tempered	25,31 kg/m2	31,89 kg	0,1795 m2K/W
Sheet Encapsulant	1 units	0,76 mm	PVB	0,81 kg/m2	1,02 kg	0,0032 m2K/W
Busbars	5 units	0,2 mm	CuSn6	0,10 kg/m2	0,07 kg	
PV Cells	28 units	0,21 mm	sc-Si	0,20 kg/m2	0,14 kg	
Sheet Encapsulant	1 units	0,76 mm	PVB	0,81 kg/m2	1,02 kg	0,0032 m2K/W
Glass-2	1 units	10 mm	Tempered	25,31 kg/m2	31,89 kg	0,1795 m2K/W
Junction Box	2 units	10 mm	Multipolar	0,10 kg/m2	0,20 kg	
Diodes (By-pass)	2 units			0,01 kg/m2	0,02 kg	
Cables (+/-)	2 units	4 mm2	900 mm	0,10 kg/m2	0,20 kg	
Connectors	2 units	MC4-T4 type	PVC-IP67	0,05 kg/m2	0,10 kg	
<b>TOTAL</b>		<b>21,93 mm</b>		<b>52,80 kg/m2</b>	<b>66,55 kg</b>	<b>0,37 m2K/W</b>

THERMAL CHARACTERISTICS

TEMPERATURE COEFFICIENTS			MONOCRYSTALLINE		
Temperature coefficient of short circuit current	α	[Isc]		0,0814	%/°C
Temperature coefficient of open circuit voltage	β	[Voc]		-0,3910	%/°C
Temperature coefficient of maximum power	γ	[Pmpp]		-0,5141	%/°C
Temperature coefficient of current at maximum power		[Impp]		0,1000	%/°C
Temperature coefficient of voltage at maximum power		[Vmpp]		-0,3800	%/°C
Nominal Module Operating Temperature		[NMOT]		+ 47 ± 2	°C

THERMAL TRANSMITTANCE (U) SOLAR HEAT GAIN COEFFICIENT (G)

Ug-value	2,74 W/m2 K	EN 673	G-value	0,37 %	EN 410
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UV TRANSMITTANCE ACOUSTIC INSULATION (R)

UV-value	1,50 %	300-380 nm	EN 410	R-value	32(-1;-3)	EN 12758
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LIGHT TRANSMISSION (LT)

LT-value	45,40 %	380-780 nm	EN 410	Opacity	54,60 %	CIE D65 ISO 9050
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INTERIOR REFLECTION (RL int) EXTERIOR REFLECTION (RL ext)

RLi-value	15,00 %	EN 410	RLe-value	8,00 %	EN 410
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TOLERANCES

Working temperature	-40 / +85 °C		Glass dimension	< ±2,5 mm	EN 12543-5
Dielectric isolation voltage	3000 V		Glass symmetry tolerance	< ±3 mm	EN 12543-5
Relative humidity	0 / 100 %		Cell single string distolerance	< ±1 mm	EN 12543-6
Maximum wind load	2400 Pa	245 kg/m2			IEC 61215
Maximum snow load	5400 Pa	551 kg/m2	Maximum hail resistance	Ø 35 97 m/s	IEC 61215
Conductivity at ground	≤ 0.1 Ω		Resistance	≥ 100 Ω	

CLASSIFICATIONS

Application	A Class	IEC 61730	Pollution	1 Degree	IEC 61730
Electrical protection	II Class	IEC 61140 IEC 61730	Material	I Group	IEC 61730
Fire safety	A Class	ANSI/UL 790 IEC 61730	Safety	1.5 Factors	IEC 61730

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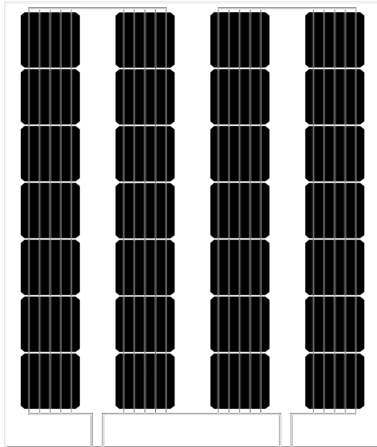
DRAWING

JUNCTION BOX

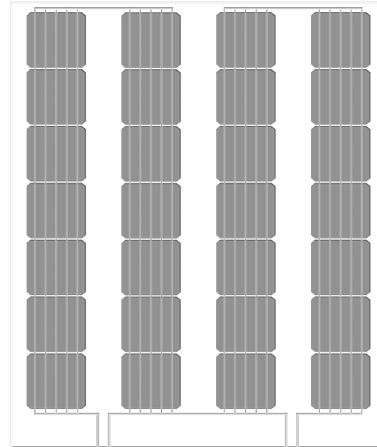
Position	Front	-	Rear	-	Border	■	Axis (X)	■	Axis (Y)	-
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PANEL

FRONT



REAR



WIDTH (X) 1000 mm

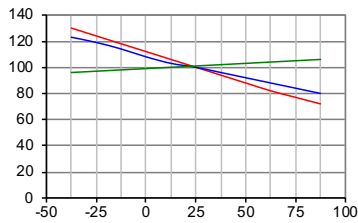
HIGH (Y) 1260 mm

PERFORMANCE

CELLS

TEMPERATURE

Temperature depending on Isc, Voc and Pmax

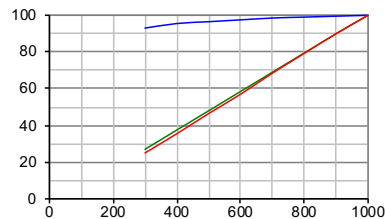


Cell temperature (°C)

--- Pmax --- Voc --- Isc

IRRADIANCE

Irradiance depending on Isc, Voc and Pmax (cell temperature: 25° C)



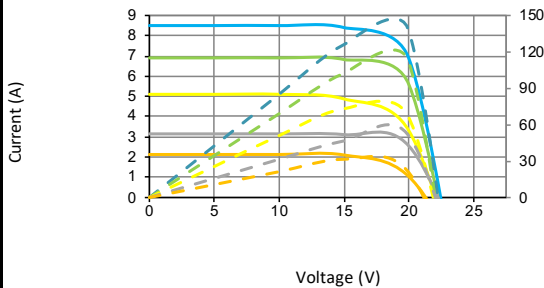
Irradiance (W/m²)

--- Voc --- Isc --- Pmax

PANELS

TEMPERATURE

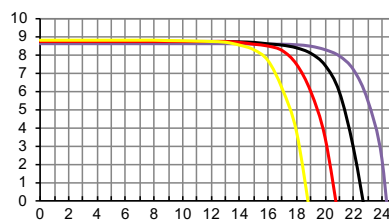
Electrical performance (cell temperature: 25° C)



Voltage (V)

--- I-V 1000 W/m2	--- P-I 1000 W/m2
--- I-V 800 W/m2	--- P-I 800 W/m2
--- I-V 600 W/m2	--- P-I 600 W/m2
--- I-V 400 W/m2	--- P-I 400 W/m2
--- I-V 200 W/m2	--- P-I 200 W/m2

IV-IRRADIANCE



Voltage (V)

I-V (-25°C) I-V (0°C) I-V (+25°C) I-V (+50°C) I-V (+75°C)

SOLAR SIMULATOR

Class	AAA	IEC 60904-9	Power measurement uncertainty is	± 3 %
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ELECTRICAL MEASURES

STC CONDITIONS (Standard Test Conditions)

NMOT CONDITIONS (Nominal Module Operating Temperature)

Irradiance	1000 W/m²	IEC 60904-1	Irradiance	800 W/m²	IEC 61215
Cell temperature	25 °C	IEC 60904-3	Ambient temperature	20 °C	
Air Mass	1,5	ASTM G173	Air Mass	1,5	ASTM G173-03
		ASTM 1036	Wind speed	1 m/s	

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**STANDARD GUARANTEES**

**LINEAR PERFORMANCE WARRANTY**



<b>Manufacturing defects</b>	12 years.
<b>Performance</b>	90 % of rated power after 12 years of operation, 80 % of rated power after 25 years of operation.
<b>Lifespan</b>	> 30 years.

**ENVIRONMENTAL INFORMATION**

		kWh	Coal	Petrol/Gas	Combined
<b>Solar Hours Peak</b>	6 day				
<b>Irradiation rate</b>	1000 W/ m2		1	0,961	0,828
<b>Energy generated</b>	0,89 kWh/ day	<b>Avoided</b>	day	0,85	0,73
	27 kWh/ month	<b>CO2</b>	month	25,57	22,03
	324 kWh/ year	<b>emissions</b>	year	311,14	268,08
				120,44	kg/CO2

**CERTIFICATES**

<b>ISO 9001</b>	Quality Management Systems.
<b>ISO 14001</b>	Environmental Management Systems.
<b>OHSAS 18001</b>	Occupational Health and Safety Management Systems.
<b>CE</b>	Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.
<b>EN 50583-1</b>	Photovoltaics in buildings - Part 1: BIPV modules.
<b>IEC/EN 61215</b>	Crystalline silicon terrestrial photovoltaic (PV) modules. Design qualification and type approval.
<b>IEC/EN 61730-1</b>	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction.
<b>IEC/EN 61730-2</b>	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing.
<b>IEC/EN 61701</b>	Salt mist corrosion testing of photovoltaic (PV) modules.
<b>IEC/EN 62716</b>	Photovoltaic (PV) modules - Ammonia corrosion testing.
<b>IEC/EN 62790</b>	Junction boxes for photovoltaic modules - Safety requirements and tests.
<b>IEC/EN 62804-1</b>	Photovoltaic (PV) Modules - Test Methods for the detection of potential-induced degradation. Part 1: Crystalline silicone.
<b>IEC/EN 62852</b>	Connectors for DC-application in photovoltaic systems - Safety requirements and test.
<b>UL 1703</b>	Standard for Flat-Plate Photovoltaic Modules and Panels.



**PACKING**

PANELS X PALLET	CONTAINER 20'		PANELS X PALLET	CONTAINER 40'HQ	
	PALLETS	TOTAL		PALLETS	TOTAL
-	-	-	30	26	780

**IEC 62759-1** Photovoltaic (PV) modules - Transportation testing - Part 1: Transportation and shipping of module package units.

**EXPORT INFORMATION**

<b>HS Code</b>	85414020	<b>TARIC code</b>	8541409021
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**COMMENTS**

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**NOTICE**

The specifications and technical data may be subject to possible modifications without notice.  
This data sheet are conform to the requirements of the Standard EN 50380:2018.