

MANUFACTURER



SOLAR INNOVA GREEN TECHNOLOGY, S.L.

N.I.F.: ESB-54.627.278

Paseo de los Molinos, 12

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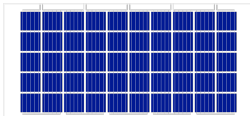
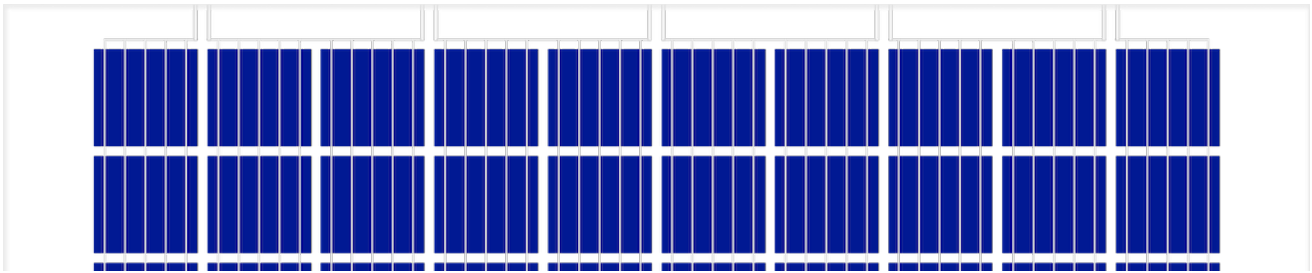
W: www.solarinnova.net



PHOTOVOLTAIC MODULES

Series	BIPV-FENCES	Reference	SI-ESF-M-BIPV-FC-P156-50	Type	POLYCRYSTALLINE
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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:

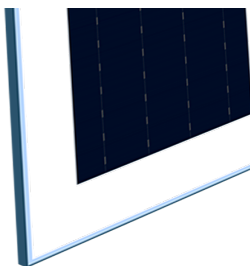
- ☑ High transmissivity.
- ☑ Low reflectivity.
- ☑ Low iron content.

PV CELLS

These PV modules use high-efficiency polycrystalline silicon cells (the cells are made of several crystals 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.

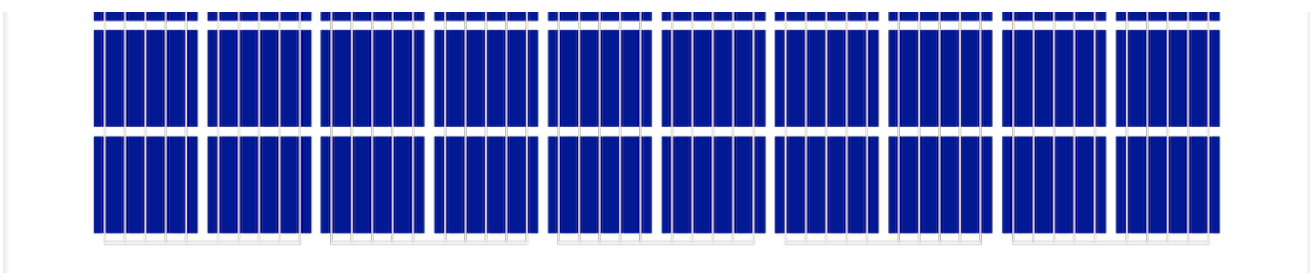
WARRANTIES

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.
- ☑ ISO 45001, 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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PV CELLS					
Type	Monofacial			mc-Si	
MECHANICAL CHARACTERISTICS					
Size	mm	156,75 x 156,75 ±0,5		Tk Voltage	%/K -0,36
Thickness	µm	210 ±20		Tk Current	%/K 0,07
Front	-	Si3N4 anti-reflection coating		Tk Power	%/K -0,38
Back	+	Aluminum back surface field (Al-BSF)			

PV MODULES ELECTRICAL CHARACTERISTICS

STC CONDITIONS					
Maximum power	[Pmpp]	Wp	233		±3% (*)
Power selection	[Pmpp]	%	±3		
Voltage at maximum power	[Vmpp]	V	27,95		IEC 60904-1
Current at maximum power	[Impp]	A	8,35		IEC 60904-3
Open circuit voltage	[Voc]	V	32,50		±3% (*)
Short circuit current	[Isc]	A	9,01		±4% (*)
Maximum system voltage	[Vsyst]	V	1500 / 1000		IEC / UL
Maximum series fuse rating	[Icf]	A	10		
Efficiency	[ηm]	%	11,67		
Form Factor	[FF]	%	79,70		
STC (Standard Test Conditions): Irradiance: 1000 W/m2 + Cell Temperature: 25° C + Air Mass: 1.5					
* (Considering LID, the power range of the certification authority)					

NMOT CONDITIONS

Maximum power	[Pmpp]	Wp	172		IEC 61215
Voltage at maximum power	[Vmpp]	V	25,45		
Current at maximum power	[Impp]	A	6,78		
Open circuit voltage	[Voc]	V	29,71		
Short circuit current	[Isc]	A	7,31		
NMOT (Nominal Module Operating Temperature): Irradiance: 800 W/m2 + Ambient Temperature: 20° C + Air Mass: 1.5 + Wind Speed: 1 m/s					

MECHANICAL CHARACTERISTICS

PANEL	WIDTH (X)		HIGH (Y)	DIAGONAL	AREA	POWER/AREA
Size - Glass-1	2000	x	1000		2,00 m2	117 Wp/m2
Size - Glass-2	2000	x	1000		2,00 m2	
CELLS						
Size	156,75	x	156,75	210 mm	0,02 m2	
Distance - Top			78			
Distance - between Cells	15	x	15			
Distance - Left	149					
Distance - Right	149					
Distance - Bottom			78			
Quantity	10	x	5	=	50 units	1,23 m2

COMPONENTS

MATERIAL	QUANTITY	THICKNESS (Z)	DESCRIPTION	DENSITY	TOTAL WEIGHT	THERMAL RESISTANCE
Glass-1	1 units	8 mm	FTG-UClear	20,25 kg/m2	40,50 kg	0,1776 m2K/W
Sheet Encapsulant	1 units	0,76 mm	PVB	0,81 kg/m2	1,62 kg	0,0032 m2K/W
Busbars	5 units	1 mm	CuSn6	0,10 kg/m2	0,12 kg	
PV Cells	50 units	0,21 mm	mc-Si	0,20 kg/m2	0,25 kg	
Sheet Encapsulant	1 units	0,76 mm	PVB	0,81 kg/m2	1,62 kg	0,0032 m2K/W
Glass-2	1 units	8 mm	FTG	20,25 kg/m2	40,50 kg	0,1776 m2K/W
Junction Box	1 units	10 mm	PVC-IP68	0,10 kg/m2	0,10 kg	
Diodes (By-pass)	5 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	
TOTAL		17,73 mm		42,67 kg/m2	85,02 kg	0,36 m2K/W

THERMAL CHARACTERISTICS

TEMPERATURE COEFFICIENTS				POLYCRYSTALLINE
Temperature coefficient of short circuit current	α	[Isc]		0,0825 %/° C
Temperature coefficient of open circuit voltage	β	[Voc]		-0,4049 %/° C
Temperature coefficient of maximum power	γ	[Pmpp]		-0,4336 %/° 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	2,77 W/m2 K	EN 673	G-value	0,36 %	EN 410

UV TRANSMITTANCE			ACOUSTIC INSULATION (R)		
UV-Value	1,50 %	300-380 nm EN 410	R-value	32(-1;-3)	EN 12758

VISIBLE LIGHT TRANSMISSION (LT)					
LT-value	38,57 %	380-780 nm EN 410	Opacity	61,43 %	CIE D65 ISO 9050

EXTERIOR REFLECTION (LRe)			INTERIOR REFLECTION (LRI)		
RLi-value	8,00 %	EN 410	RLe-value	15,00 %	EN 410

TOLERANCES					
Working temperature	- 40 / + 85 °C		Glass dimension	< ± 2,5 mm	EN 12543-5
Dielectric isolation voltage	3000 V		Glass symmetrytolerance	< ± 3 mm	EN 12543-5
Relative humidity	0 / 100 %		Cell single string distolerance	< ± 1 mm	EN 12543-6
Wind resistance	2400 Pa	245 kg/m2			IEC 61215
Snow resistance	28800 Pa	2937 kg/m2	Maximum hail resistance	Ø 35 97 m/s	IEC 61215
Conductivity at ground	≤ 0.1 Ω		Resistance	≥ 100 Ω	

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

LAMINATED GLASS (EN 14449)					
Impact resistance	1B1 Class	EN 12600	High temperature	OK	EN 12543-4
Manual attack	P2A Class	EN 356	Humidity	OK	EN 12543-4

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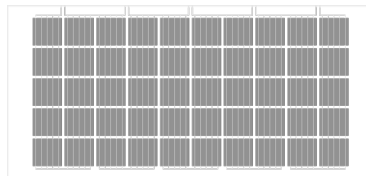
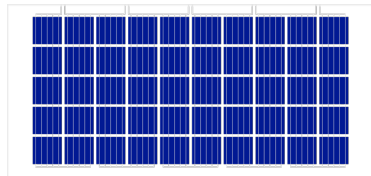
Series BIPV-FENCES Reference SI-ESF-M-BIPV-FC-P156-50 Type POLYCRYSTALLINE

DRAWING

JUNCTION BOX

Position Front - Rear ■ Edge - Axis (X) ■ Axis (Y) -

PANEL FRONT REAR SECTION



HIGH (Y) 1000 mm

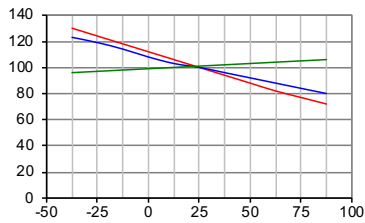
WIDTH (X) 2000 mm THICKNESS (Z) 17,73 mm

PERFORMANCE

CELLS

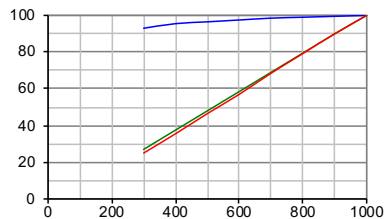
TEMPERATURE

Temperature depending on Isc, Voc and Pmax



IRRADIANCE

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



Isc, Voc, Pmax normalized (%)

Cell temperature (°C)

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

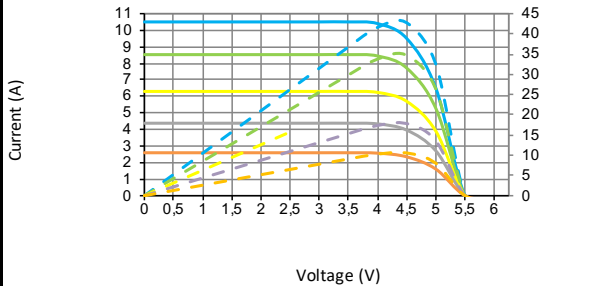
Irradiance (W/m²)

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

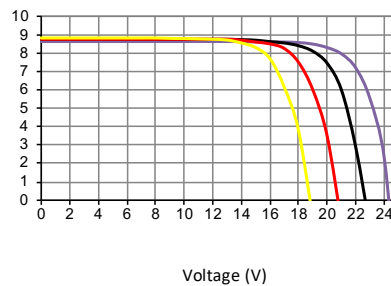
PANELS

TEMPERATURE

Electrical performance (cell temperature: 25°C)



IV-IRRADIANCE



Current (A)

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

Voltage (V)

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

Power (W)

SOLAR SIMULATOR

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

ELECTRICAL MEASURES

STC CONDITIONS		NMOT CONDITIONS	
Irradiance	1000 W/m²	Irradiance	800 W/m²
Cell temperature	25 °C	Ambient temperature	20 °C
Air Mass	1,5	Air Mass	1,5
	ASTM G173	Wind speed	1 m/s
	ASTM 1036		

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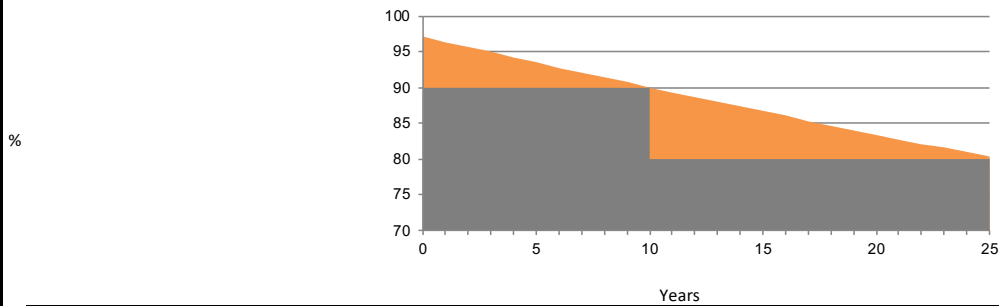


PHOTOVOLTAIC MODULES

Series BIPV-FENCES **Reference** SI-ESF-M-BIPV-FC-P156-50 **Type** POLYCRYSTALLINE

STANDARD GUARANTEES

LINEAR PERFORMANCE WARRANTY



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

ENVIRONMENTAL INFORMATION

		kWh	Coal	Petrol/Gas	Combined
Solar Hours Peak	6 day				
Irradiation rate	1000 W/ m2		1	0,961	0,828
Energy generated	1,40 kWh/ day	Avoid		1,35	1,16
	42 kWh/ month	CO2		40,37	34,78
	511 kWh/ year	emissions		491,17	423,20
				190,13	190,13

CERTIFICATES

ISO 9001	Quality Management Systems.
ISO 14001	Environmental Management Systems.
ISO 45001	Occupational Health and Safety Management Systems.
CE	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.
IEC/EN 61215	Crystalline silicon terrestrial photovoltaic (PV) modules. Design qualification and type approval.
IEC/EN 61730-1	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction.
IEC/EN 61730-2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing.
IEC 63092-1	Photovoltaics in buildings - Part 1: Requirements for building-integrated photovoltaic modules.
UL 1703	Standard for Flat-Plate Photovoltaic Modules and Panels.
EN 13501	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
EN 14449	Glass in building - Laminated glass and laminated safety glass - Evaluation of conformity/Product standard.
EN 12543	Glass in building - Laminated glass and laminated safety glass.
EN 12600	Glass in building - Pendulum test - Impact test method and classification for flat glass.
EN 50583	Photovoltaics in buildings - Part 1: BIPV modules.



PACKING

PANELS X PALLET	CONTAINER 20'		PANELS X PALLET	CONTAINER 40'HQ	
	PALLETS	TOTAL		PALLETS	TOTAL
-	-	-	26	22	572

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

EXPORT INFORMATION

HS Code	85.41.43.00	TARIC code	85.41.43.00
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REGISTER OF ELECTRICAL AND ELECTRONIC EQUIPMENT PRODUCERS

WEEE	7378	Entity	ECOASIMELEC
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DESCRIPTION

Silicon cell photovoltaic solar module mc-Si, BIPV-Fences series, for architectural integration, from the manufacturer SOLAR INNOVA, maximum power (Wp) 233 W, voltage at maximum power (Vmp) 27,95 V, current at maximum power (Imp) 8,35 A, open-circuit voltage (Voc) 32,50 V, short-circuit current (Isc) 9,01 A, efficiency 11,67 %, composed of 50 cells, front layer tempered glass thick 8 mm, encapsulant layers of cells of PVB, back layer of tempered glass thick 8 mm, junction box (diodes, cables 4 mm2, 900 mm and connectors MC4-T4), working temperature - 40 / + 85 °C, dimensions 2000 x 1000 x 17,73 mm, maximum wind load 2400 Pa, maximum snow load 28800 Pa, weight 85,02 kg.

COMMENTS

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.
Images for illustration purposes only.