



MANUFACTURER

SOLAR INNOVA GREEN TECHNOLOGY, S.L.
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Paseo de los Molinos, 12
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PHOTOVOLTAIC MODULES

Series

STANDARD

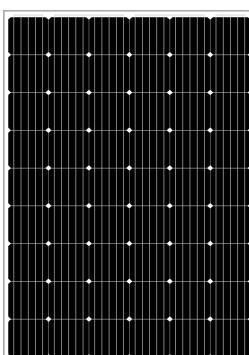
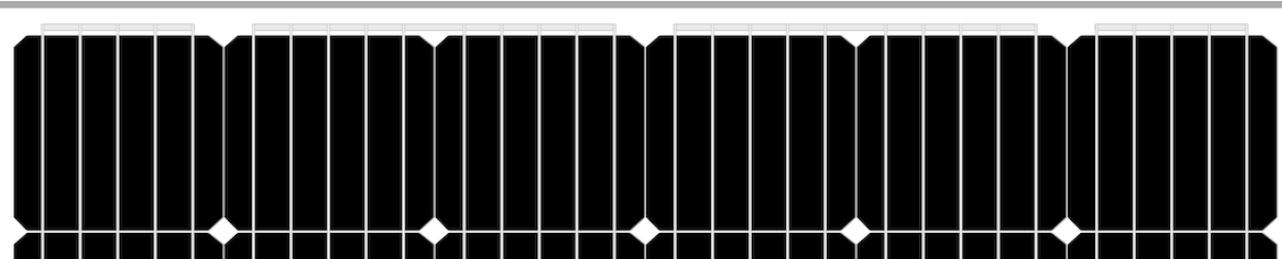
Reference

SI-ESF-M-ST-M156-54-PERC

Type

MONOCRYSTALLINE

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:

- EVA (Ethylene-Vinyl Acetate).

BACK

The rear of the module contains a plastic polymer (Tedral) which provides complete protection and seals against environmental agents and electrical insulation.

FRAME

The compact, anodized aluminum frame provides an optimal relationship-weight moment of inertia, to obtain greater rigidity and resistance to twisting and bending. It has several holes to attach the module to the support structure and ground if necessary.

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.

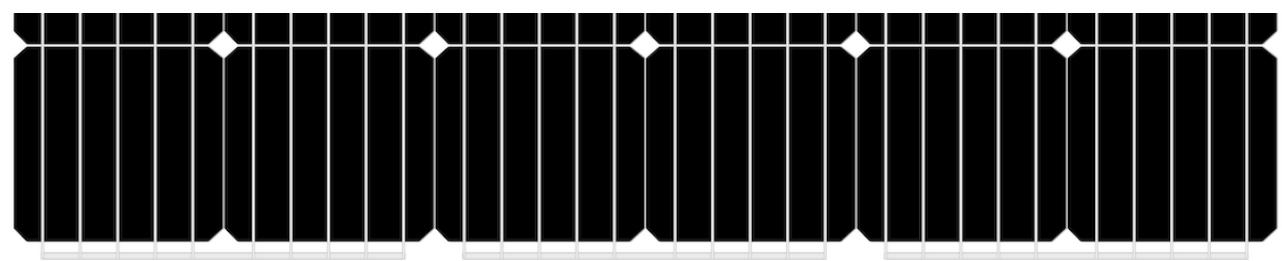
WARRANTIES

Our manufacturing plants have been prepared in accordance with:

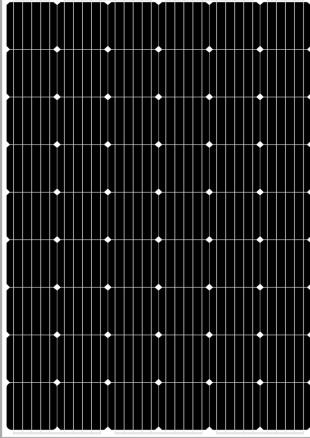
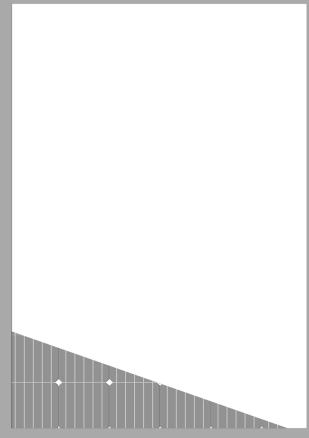
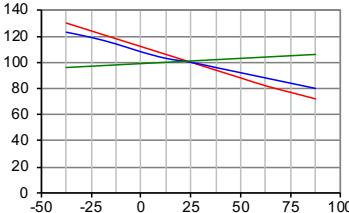
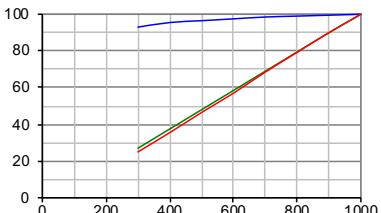
- ISO 9001, in terms of Quality Systems and Business.
- ISO 14001, in terms of Environmental Management Systems.
- ISO 45001, in terms of Management Systems Health and Safety.

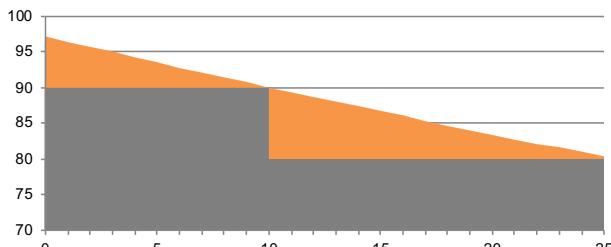
CERTIFICATES

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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03660 - NOVELDA (Alicante) SPAIN				W: www.solarinnova.net								
PHOTOVOLTAIC MODULES												
Series	STANDARD	Reference	SI-ESF-M-ST-M156-54-PERC	Type	MONOCRYSTALLINE							
PV CELLS												
Type	Monofacial	sc-Si										
MECHANICAL CHARACTERISTICS				TEMPERATURE COEFFICIENTS								
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	270	275	280	285						
Power selection	[Pmpp]	Wp	0/+5									
Voltage at maximum power	[Vmpp]	V	30,03	30,19	30,35	30,67						
Current at maximum power	[Impp]	A	8,99	9,10	9,22	9,30						
Open circuit voltage	[Voc]	V	36,52	36,68	36,82	37,09						
Short circuit current	[Isc]	A	9,42	9,60	9,75	9,84						
Maximum system voltage	[Vsyst]	V	1500 / 1000									
Maximum series fuse rating	[Icf]	A	15									
Efficiency	[ηm]	%	18,39	18,71	19,06	19,43						
Form Factor	[FF]	%	78,48	78,00	77,94	78,15						
STC (Standard Test Conditions):	Irradiance: 1000 W/m ² + Cell Temperature: 25º C + Air Mass: 1.5											
* (Considering LID, the power range of the certification authority)												
NMOT CONDITIONS												
Maximum power	[Pmpp]	Wp	199	202	206	210						
Voltage at maximum power	[Vmpp]	V	27,35	27,48	27,63	27,93						
Current at maximum power	[Impp]	A	7,30	7,39	7,49	7,55						
Open circuit voltage	[Voc]	V	33,38	33,53	33,65	33,90						
Short circuit current	[Isc]	A	7,64	7,79	7,91	7,98						
NMOT (Nominal Module Operating Temperature):	Irradiance: 800 W/m ² + Ambient Temperature: 20º C + Air Mass: 1.5 + Wind Speed: 1 m/s											
MECHANICAL CHARACTERISTICS												
PANEL	WIDTH (X)	HIGH (Y)	DIAGONAL		AREA							
Size	992	x	1480	mm	1,47 m ²							
CELLS												
Size	156,75	x	156,75	mm	210 mm	0,25 m ²						
Quantity	6	x	9	=	54 units	1,33 m ²						
COMPONENTS												
MATERIAL	QUANTITY	THICKNESS (Z)	DESCRIPTION	DENSITY	TOTAL WEIGHT							
Frame	1 units	35 mm	Al 6065-T5	1,23 kg/m ²	1,80 kg							
Glass	1 units	3,2 mm	Tempered	8,10 kg/m ²	11,89 kg							
Sheet Encapsulant	1 units	0,38 mm	EVA	0,40 kg/m ²	0,59 kg							
Busbars	5 units	0,2 mm	CuSn6	0,10 kg/m ²	0,13 kg							
PV Cells	54 units	0,21 mm	sc-Si	0,50 kg/m ²	0,66 kg							
Sheet Encapsulant	1 units	0,38 mm	EVA	0,40 kg/m ²	0,59 kg							
Backsheet	1 units	0,5 mm	TPT	0,47 kg/m ²	0,69 kg							
Junction Box	1 units	10 mm	Monopolar	0,10 kg/m ²	0,10 kg							
Diodes (By-pass)	4 units			0,01 kg/m ²	0,02 kg							
Cables (+/-)	2 units	4 mm ²	900 mm	0,10 kg/m ²	0,20 kg							
Connectors	2 units	MC4-T4 type	PVC-IP67	0,05 kg/m ²	0,10 kg							
TOTAL		35 mm		11,46 kg/m ²	16,78 kg							
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							
TOLERANCES												
Working temperature	- 40 / + 85 °C		Glass dimension	< ± 2,5 mm								
Dielectric isolation voltage	3000 V		Glass symmetry tolerance	< ± 3 mm								
Relative humidity	0 / 100 %		Cell single string distolerance	< ± 1 mm								
Wind resistance	2400 Pa	245 kg/m ²										
Snow resistance	5400 Pa	551 kg/m ²	Maximum hail resistance	Ø 28	23 m/s	IEC 61215						
Conductivity at ground	≤ 0,1 Ω		Resistance	≥ 100 Ω								
CLASSIFICATIONS												
Application class	A Class	IEC 61730	Pollution	Degree	1	IEC 61730						
Electrical protection class	II Class	IEC 61140	Material	Group	I	IEC 61730						
Fire safety class	C Class	ANSI/UL 790 IEC 61730	Safety	Factors	1,5	IEC 61730						

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	Series	STANDARD	Reference	SI-ESF-M-ST-M156-54-PERC	Type	MONOCRYSTALLINE		
	DRAWING							
	JUNCTION BOX							
Position	[Front] - Rear	■ Border	- Axis (X)	■ Axis (Y)	-			
FRONT		REAR						
								
		WIDTH (X) 992 mm						
PERFORMANCE								
CELLS			IRRADIANCE					
TEMPERATURE			Irradiance depending on Isc, Voc and Pmax (cell temperature: 25°C)					
Temperature depending on Isc, Voc and Pmax								
Isc, Voc, Pmax normalized (%)			Cell temperature (°C)					
--- Pmax	--- Voc	--- Isc	--- Voc	--- Isc	--- Pmax			
PANELS			IV-IRRADIANCE					
TEMPERATURE			Irradiance (W/m²)					
Electrical performance (cell temperature: 25°C)								
Current (A)			Irradiance (W/m²)					
1000 W/m²	800 W/m²	600 W/m²	400 W/m²	200 W/m²	--- P-I 1000 W/m²	--- P-I 800 W/m²		
800 W/m²	600 W/m²	400 W/m²	200 W/m²		--- P-I 600 W/m²	--- P-I 400 W/m²		
600 W/m²	400 W/m²	200 W/m²			--- P-I 400 W/m²	--- P-I 200 W/m²		
400 W/m²	200 W/m²							
200 W/m²								
SOLAR SIMULATOR								
Class	AAA	IEC 60904-9	Power measurement uncertainty is ± 3 %					
ELECTRICAL MEASURES								
STC CONDITIONS			NMOT CONDITIONS					
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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	PHOTOVOLTAIC MODULES		Reference		SI-ESF-M-ST-M156-54-PERC								
	Series		Type		MONOCRYSTALLINE								
	STANDARD		STANDARD GUARANTEES		LINEAR PERFORMANCE WARRANTY								
 <p>%</p> <p>Years</p> <table> <tr> <td>Manufacturing defects</td> <td>12 years.</td> </tr> <tr> <td>Performance</td> <td>90 % of rated power after 12 years of operation,</td> </tr> <tr> <td></td> <td>80 % of rated power after 25 years of operation.</td> </tr> <tr> <td>Lifespan</td> <td>> 30 years.</td> </tr> </table>						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.
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													
Solar Hours Peak	6 day		kWh	Coal	Petrol/Gas Combined								
Irradiation rate	1000 W/ m ²		1	0,961	0,828								
Energy generated	1,62 kWh/ day	Avoid	day	1,56	1,34								
	49 kWh/ month	CO2	month	46,71	40,24								
	591 kWh/ year	emissions	year	568,25	489,60								
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/EN 61701	Salt mist corrosion testing of photovoltaic (PV) modules.												
IEC/EN 62716	Photovoltaic (PV) modules - Ammonia corrosion testing.												
UNE-EN IEC 62804-1	Photovoltaic (PV) Modules - Test Methods for the detection of potential-induced degradation. Part 1: Crystalline silicone.												
IEC/EN 62790	Junction boxes for photovoltaic modules - Safety requirements and tests.												
IEC/EN 62852	Connectors for DC-application in photovoltaic systems - Safety requirements and test.												
UL 1703	Standard for Flat-Plate Photovoltaic Modules and Panels.												
PACKING													
PANELS X PALLET		CONTAINER 20' PALLETS	TOTAL	CONTAINER 40'HQ PALLETS	TOTAL								
-	-	-	-	26	22								
IEC 62759-1	Photovoltaic (PV) modules - Transportation testing - Part 1: Transportation and shipping of module package units.												
EXPORT INFORMATION													
HS Code	85414020	TARI code	8541409021										
REGISTER OF ELECTRICAL AND ELECTRONIC EQUIPMENT PRODUCERS													
WEEE	7378	Entity	ECOASIMELEC										
DESCRIPTION													
Silicon cell photovoltaic solar module sc-Si from the manufacturer SOLAR INNOVA, Standard series, maximum power (W _p) 270-285 W, voltage at maximum power (V _{mp}) 30,03-30,67 V, current at maximum power (I _{mp}) 8,99-9,30 A, open-circuit voltage (V _{oc}) 36,52-37,09 V, short-circuit current (I _{sc}) 9,42-9,84 A, efficiency 18,39-19,43 %, composed of 54 cells, front layer tempered glass thick 3,2 mm, encapsulant layers of cells of EVA, back layer of TPT, anodized aluminum frame Al 6065-T5, junction box (diodes, cables 4 mm ² , 900 mm and connectors MC4-T4), working temperature - 40 / + 85 °C, dimensions 992 x 1480 x 35 mm, maximum wind load 2400 Pa, maximum snow load 5400 Pa, weight 16,78 kg.													
COMMENTS													
<hr/> <hr/>													
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.													