

**MANUFACTURER**

SOLAR INNOVA GREEN TECHNOLOGY, S.L.  
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**PHOTOVOLTAIC MODULES**

Series

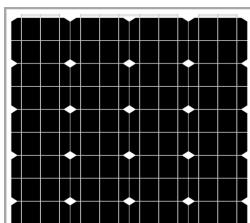
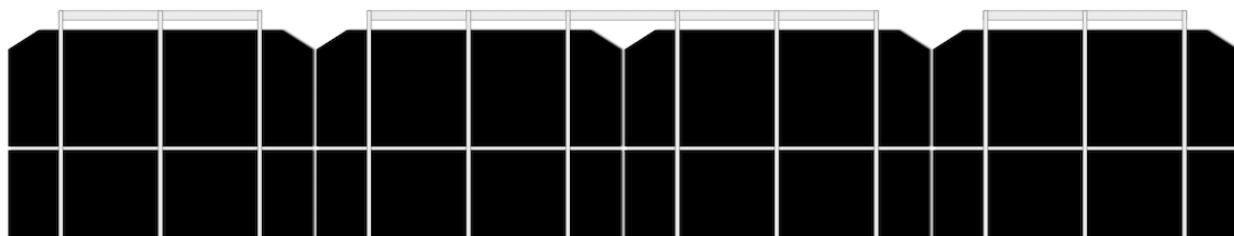
NON STANDARD

Reference

SI-ESF-M-NE-M-55W

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 (Teflon) 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.

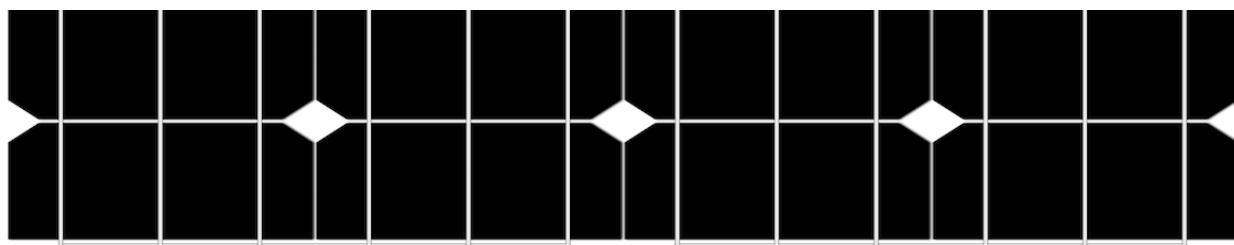
**WARRANTIES**

Our manufacturing plants have been prepared in accordance with:

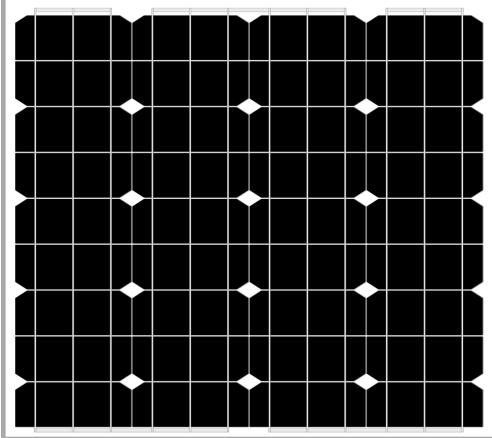
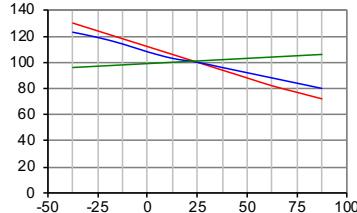
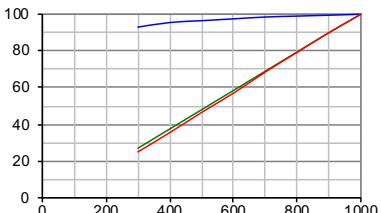
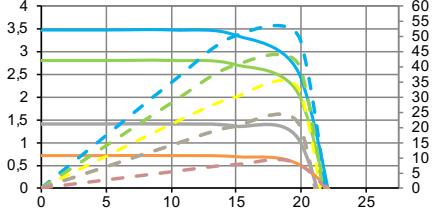
- ⇒ ISO 9001, in terms of Quality Systems and Business.
- ⇒ ISO 14001, in terms of Environmental Management Systems.
- ⇒ ISO 45001, in terms of Management Systems Health and Safety.

**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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PHOTOVOLTAIC MODULES						
Series	NON STANDARD		Reference	SI-ESF-M-NE-M-55W		Type
	PV CELLS			MONOCRYSTALLINE		
Type	Monofacial	sc-Si				
MECHANICAL CHARACTERISTICS				TEMPERATURE COEFFICIENTS		
Size	mm	156,75 x 63,9 ±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	55			±3% (*)
Power selection	[Pmpp]	Wp	0/+1,65			
Voltage at maximum power	[Vmpp]	V	17,10			IEC 60904-1
Current at maximum power	[Impp]	A	3,22			IEC 60904-3
Open circuit voltage	[Voc]	V	22,30			±3% (*)
Short circuit current	[Isc]	A	3,47			±4% (*)
Maximum system voltage	[Vsyst]	V	715			IEC / UL
Maximum series fuse rating	[Icf]	A	10			
Efficiency	[ηm]	%	12,71			
Form Factor	[FF]	%	71,16			
STC (Standard Test Conditions):	Irradiance: 1000 W/m <sup>2</sup> + Cell Temperature: 25º C + Air Mass: 1.5					
	* (Considering LID, the power range of the certification authority)					
NMOT CONDITIONS						
Maximum power	[Pmpp]	Wp	41			IEC 61215
Voltage at maximum power	[Vmpp]	V	15,57			
Current at maximum power	[Impp]	A	2,61			
Open circuit voltage	[Voc]	V	20,38			
Short circuit current	[Isc]	A	2,81			
NMOT (Nominal Module Operating Temperature):	Irradiance: 800 W/m <sup>2</sup> + Ambient Temperature: 20º C + Air Mass: 1.5 + Wind Speed: 1 m/s					
MECHANICAL CHARACTERISTICS						
PANEL	WIDTH (X)	HIGH (Y)		AREA	POWER/AREA	
Size	676	x	641 mm	0,43 m <sup>2</sup>	127 Wp/m <sup>2</sup>	
CELLS						
Quantity	4	x	9	=	36 units	0,36 m <sup>2</sup>
COMPONENTS						
MATERIAL	QUANTITY	THICKNESS (Z)	DESCRIPTION	DENSITY	TOTAL WEIGHT	
Frame	1 units	35 mm	Al 6065-T5	1,23 kg/m <sup>2</sup>	0,53 kg	
Glass-1	1 units	3,2 mm	Tempered	8,10 kg/m <sup>2</sup>	3,51 kg	
Sheet Encapsulant	1 units	0,38 mm	EVA	0,40 kg/m <sup>2</sup>	0,18 kg	
Busbars	5 units	0,2 mm	CuSn6	0,10 kg/m <sup>2</sup>	0,04 kg	
PV Cells	36 units	0,21 mm	sc-Si	0,20 kg/m <sup>2</sup>	0,07 kg	
Sheet Encapsulant	1 units	0,38 mm	EVA	0,40 kg/m <sup>2</sup>	0,18 kg	
Backsheet	1 units	0,5 mm	TPT	0,47 kg/m <sup>2</sup>	0,20 kg	
Junction Box	1 units	10 mm	Monopolar	0,10 kg/m <sup>2</sup>	0,10 kg	
Diodes (By-pass)	2 units			0,01 kg/m <sup>2</sup>	0,02 kg	
Cables (+/-)	2 units	4 mm <sup>2</sup>	900 mm	0,10 kg/m <sup>2</sup>	0,20 kg	
Connectors	2 units	MC4-T4 type	PVC-IP67	0,05 kg/m <sup>2</sup>	0,10 kg	
TOTAL		35 mm		11,82 kg/m <sup>2</sup>	5,12 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	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	
Wind resistance	2400 Pa	245 kg/m <sup>2</sup>			IEC 61215	
Snow resistance	5400 Pa	551 kg/m <sup>2</sup>	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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PHOTOVOLTAIC MODULES								
Series	NON STANDARD	Reference	SI-ESF-M-NE-M-55W	Type	MONOCRYSTALLINE			
DRAWING								
JUNCTION BOX								
Position	Front - Rear	■ Border	■ Axis (X)	■ Axis (Y)	-			
FRONT								
								
REAR								
								
mm								
WIDTH (X) 676 mm								
PERFORMANCE								
CELLS								
TEMPERATURE			IRRADIANCE					
Temperature depending on Isc, Voc and Pmax			Irradiance depending on Isc, Voc and Pmax (cell temperature: 25°C)					
								
Cell temperature (°C)			Irradiance (W/m²)					
--- Pmax    --- Voc    --- Isc			--- Voc    --- Isc    --- Pmax					
PANELS								
TEMPERATURE			IV-IRRADIANCE					
Electrical performance (cell temperature: 25°C)								
								
Voltage (V)			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			--- 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 %					
ELECTRICAL MEASURES								
STC 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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Series	NON STANDARD	Reference	SI-ESF-M-NE-M-55W	Type	MONOCRYSTALLINE
PHOTOVOLTAIC MODULES					
STANDARD GUARANTEES					
LINEAR PERFORMANCE WARRANTY					
%	100	95	90	85	80
	90	85	80	75	70
	80	75	70	65	60
	70	65	60	55	50
	60	55	50	45	40
	50	45	40	35	30
	40	35	30	25	20
	30	25	20	15	10
	20	15	10	5	0
Years	0	5	10	15	20
12	12	12	12	12	12
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 <sup>2</sup>	1	0,961	0,828	0,372 kg/CO <sub>2</sub>
Energy generated	0,33 kWh/ day	Avoided	day	0,32	0,27 0,12 kg/CO <sub>2</sub>
	10 kWh/ month	CO <sub>2</sub>	month	9,52	8,21 3,69 kg/CO <sub>2</sub>
	121 kWh/ year	emissions	year	115,88	99,85 44,86 kg/CO <sub>2</sub>
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	PANELS X PALLET	CONTAINER 40'HQ 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	85414020	TARIC code	8541409021		
REGISTER OF ELECTRICAL AND ELECTRONIC EQUIPMENT PRODUCERS					
WEEE	7378	Entity	ECOSIMÉLEC		
DESCRIPTION					
Silicon cell photovoltaic solar module sc-Si from the manufacturer SOLAR INNOVA, Non Standard series, maximum power (Wp) 55 W, voltage at maximum power (Vm) 17,10 V, current at maximum power (Im) 3,22 A, open-circuit voltage (Voc) 22,30 V, short-circuit current (Isc) 3,47 A, efficiency 12,71 %, composed of 36 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 <sup>2</sup> , 900 mm and connectors MC4-T4), working temperature - 40 / + 85 °C, dimensions 676 x 641 x 35 mm, maximum wind load 2400 Pa, maximum snow load 5400 Pa, weight 5,12 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.					
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