



## PHOTOVOLTAIC SOLAR ENERGY POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W



These PV modules use squared, 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.

The cell circuit is laminated using EVA (Ethylene-Vinyl Acetate) as a encapsulant in combination with a tempered glass on its front and a plastic polymer (Tedlar) on the back which provides complete protection and seals against environmental agents and electrical insulation.

The junction boxes with IP-65, are made from high temperature resistant plastics and containing terminals, connection terminals and protection diodes (by-pass).

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).

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.

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.

### WARRANTIES

Our manufacturing plants have been prepared in accordance with the ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007.

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.

The photovoltaic modules from Solar Innova have passed several international certification requirements and continue to even improve on an already superior quality and performance of products of proven technologies. Quality is one of our core principles and the pursuit of quality is the engine of the company's future, in our desire to continually offer better products.

Our PV modules are certified by internationally recognized laboratories (ZDHY, SGS, BRE Global, TÜV Rheinland Germany, TÜV Rheinland North America), and are proof of our strict adherence to international safety standards, long term performance and overall quality of products (ISO, OHSAS, CE, IEC, EN, MCS, UL).



## PHOTOVOLTAIC SOLAR ENERGY POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W

ELECTRICAL CHARACTERISTICS						
<b>Maximum power (Pmpp)</b>	Watts	240	245	250	255	260
<b>Tolerance</b>	%	0 ~ + 5				
<b>Voltage at maximum power (Vmpp)</b>	Volts	29.84	29.99	30.23	30.42	30.62
<b>Current at maximum power (Impp)</b>	Amperes	8.04	8.17	8.27	8.38	8.49
<b>Open circuit voltage (Voc)</b>	Volts	36.84	37.02	37.32	37.56	37.80
<b>Short circuit current (Isc)</b>	Amperes	8.56	8.63	8.77	8.83	8.97
<b>Maximum system voltage (Vsyst)</b>	Volts	600 (UL) / 1000 (IEC)				
<b>Diodes (By-pass)</b>	Quantity	6				
<b>Maximum series fuse</b>	Amperes	15				
<b>Efficiency (ηm)</b>	%	14.62	14.92	15.23	15.53	15.84
<b>Form Factor</b>	%	≥ 73				

MECHANICAL CHARACTERISTICS			
<b>Size</b>	Height	1655 mm.	65.2 inches
	Width	992 mm.	39.1 inches
	Thickness	40 mm.	1.57 inches
<b>Weight</b>	Net	20 kg.	44,1 pounds
<b>Structure</b>	Material	Anodized aluminum AL6063-T5, minim 15 μm	
<b>Front</b>	Material	High transmissivity toughened glass	
	Thickness	3.2 ± 0.2 mm.	0.13 inches
<b>Cells</b>	Type	Polycrystalline	
	Quantity	6 x 10 = 60	
	Size	156 x 156 mm.	6 inches
<b>Serial connection</b>	Quantity	60	
<b>Parallel connection</b>	Quantity	1	
<b>Encapsulation</b>	Materials	Glass/EVA/Cells/EVA/TPT	
<b>Junction box</b>	Type	IP-65	
	Isolation	Versus humidity and inclement weather	
<b>Cables</b>	Type	Polarized and Symmetric in length	
	Length	900 mm.	35.4 inches
	Section	4 mm <sup>2</sup>	0.006 inches <sup>2</sup>
	Features	Low contact resistance Minimal losses for voltage drop	
<b>Connectors</b>	Type	4	

THERMAL CHARACTERISTICS		
<b>Temperature coefficient of short circuit current α (Icc)</b>	%/° C	+ 0.055
<b>Temperature coefficient of open circuit voltage β (Voc)</b>	%/° C	- 0.347
<b>Temperature coefficient of power γ (Pmpp)</b>	%/° C	- 0.48
<b>Maximum power temperature coefficient (Impp)</b>	%/° C	+ 0.10
<b>Voltage temperature coefficient of maximum power (Vmpp)</b>	%/° C	- 0.38
<b>NOCT (Nominal Operating Cell Temperature)</b>	° C	+ 47 ± 2

TOLERANCES		
<b>Working temperature</b>	° C	- 40 ~ + 85
<b>Dielectric Isolation Voltage</b>	V	3000
<b>Relative humidity</b>	%	0 ~ 100
<b>Wind resistance</b>	m/s	60
	kg./m <sup>2</sup>	2400
	lbs./pies <sup>2</sup>	491.56
<b>Mechanical load-bearing capacity</b>	kg./m <sup>2</sup>	551 (5400 Pa) IEC
	lbs./pies <sup>2</sup>	75,2 (3600 Pa) UL
<b>Fire resistance</b>	Class	C











## PHOTOVOLTAIC SOLAR ENERGY POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W

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

<b>MEASUREMENTS PERFORMED IN ACCORDANCE WITH ASTM STANDARD TEST METHODS E1036, CORRECTED TO STANDARD TEST CONDITIONS (STC)</b>		
<b>Air quality/Spectral distribution</b>	AM	1,5 ASTM G173-03e1 (2008)
<b>Luminous intensity/Radiation</b>	W/m <sup>2</sup>	1000
<b>Cell temperature</b>	° C	25

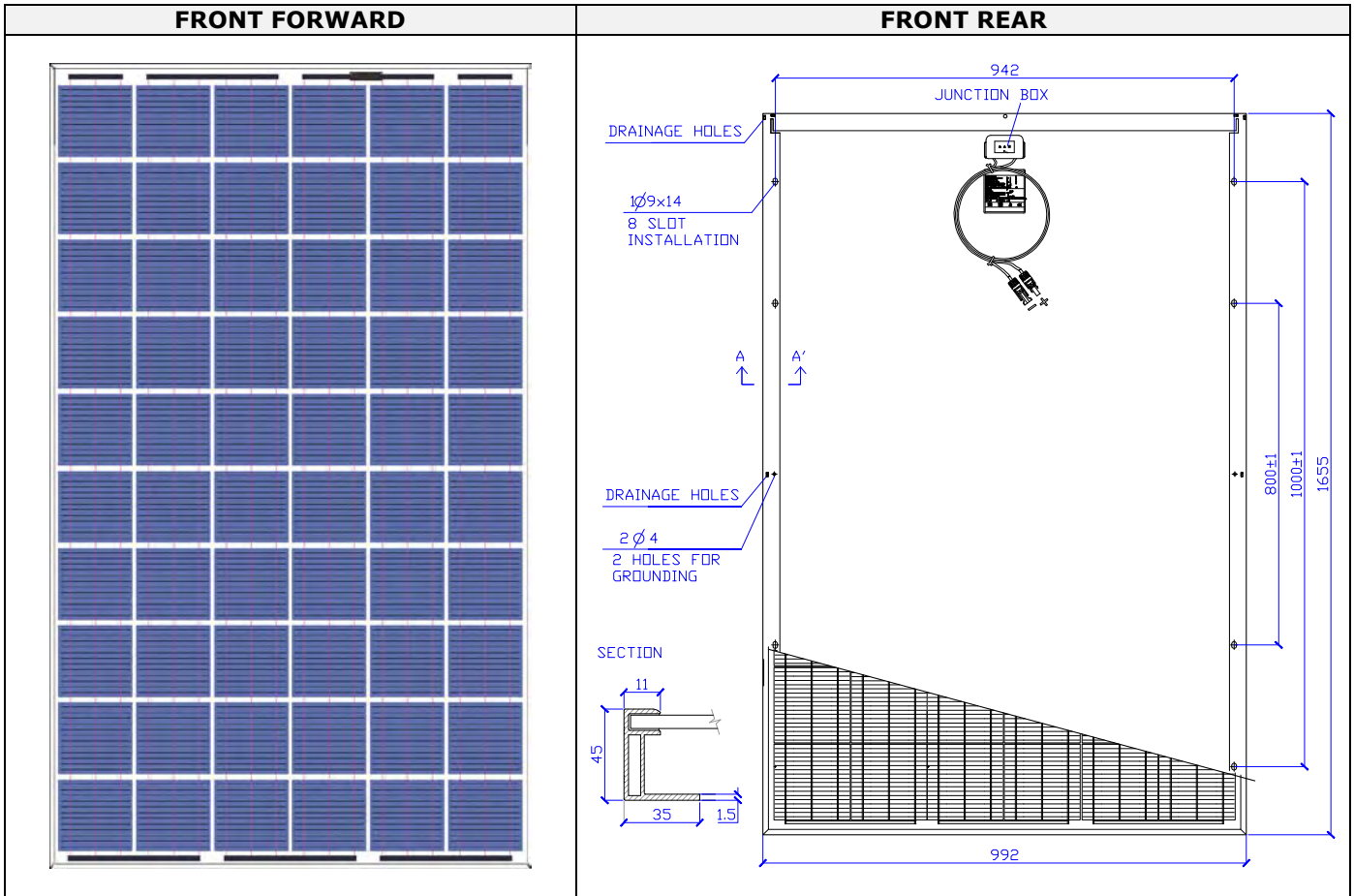
<b>STRUCTURAL CHARACTERISTICS</b>	
<b>Cells</b>	High efficiency cells with anti-reflective layer of Silicon Nitride.
<b>Electric conductors</b>	Flat Copper (Cu) bath in a Tin (Sn) and Silver (Ag) alloy, which improves weldability.
<b>Welds</b>	Cell and drivers in installments for stress relief.
<b>Laminate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

<b>CHARACTERISTICS OF WORK</b>
- The power of solar cells varies 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 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 <sup>2</sup> , temperature 20° C and wind speed of 1 m/s.
- The electrical data reflect typical values of the modules and laminates as measured at the output terminals at the end of the manufacturing process.

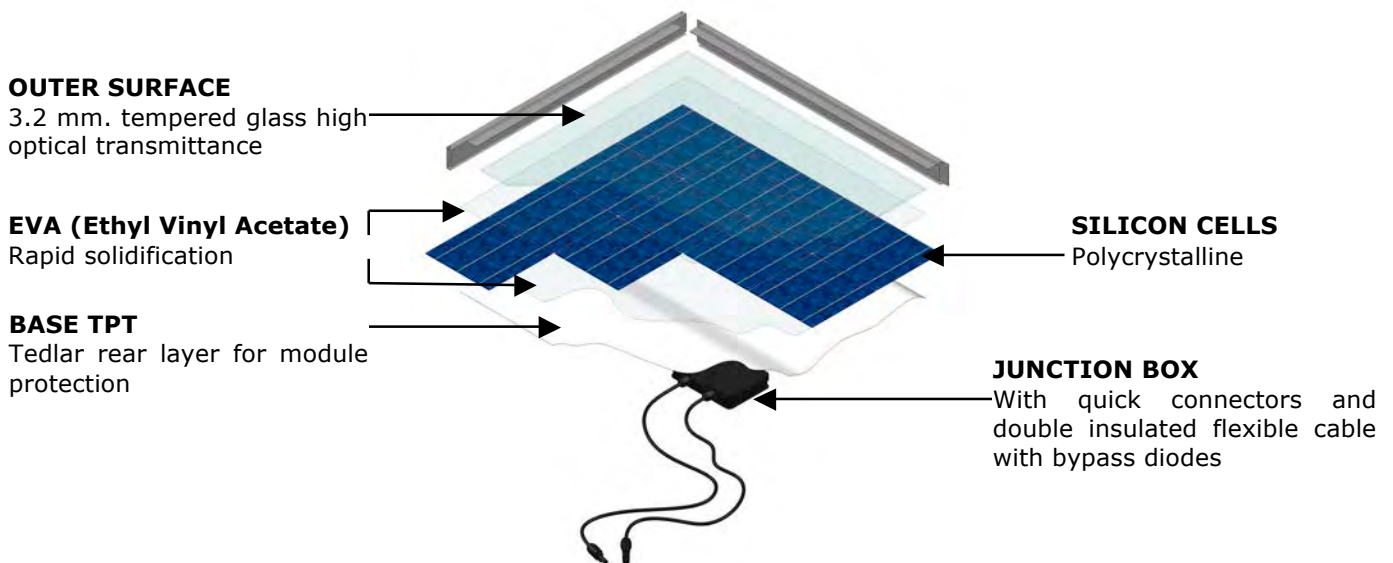
<b>CERTIFICATES</b>			
 TÜVRheinland® <b>CERT</b> ISO 9001 ISO 14001 BS OHSAS 18001			
 www.tuv.com TÜVRheinland ID.0000031889	 www.tuv.com TÜVRheinland ID.0000031889		



**PHOTOVOLTAIC SOLAR ENERGY**  
**POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W**



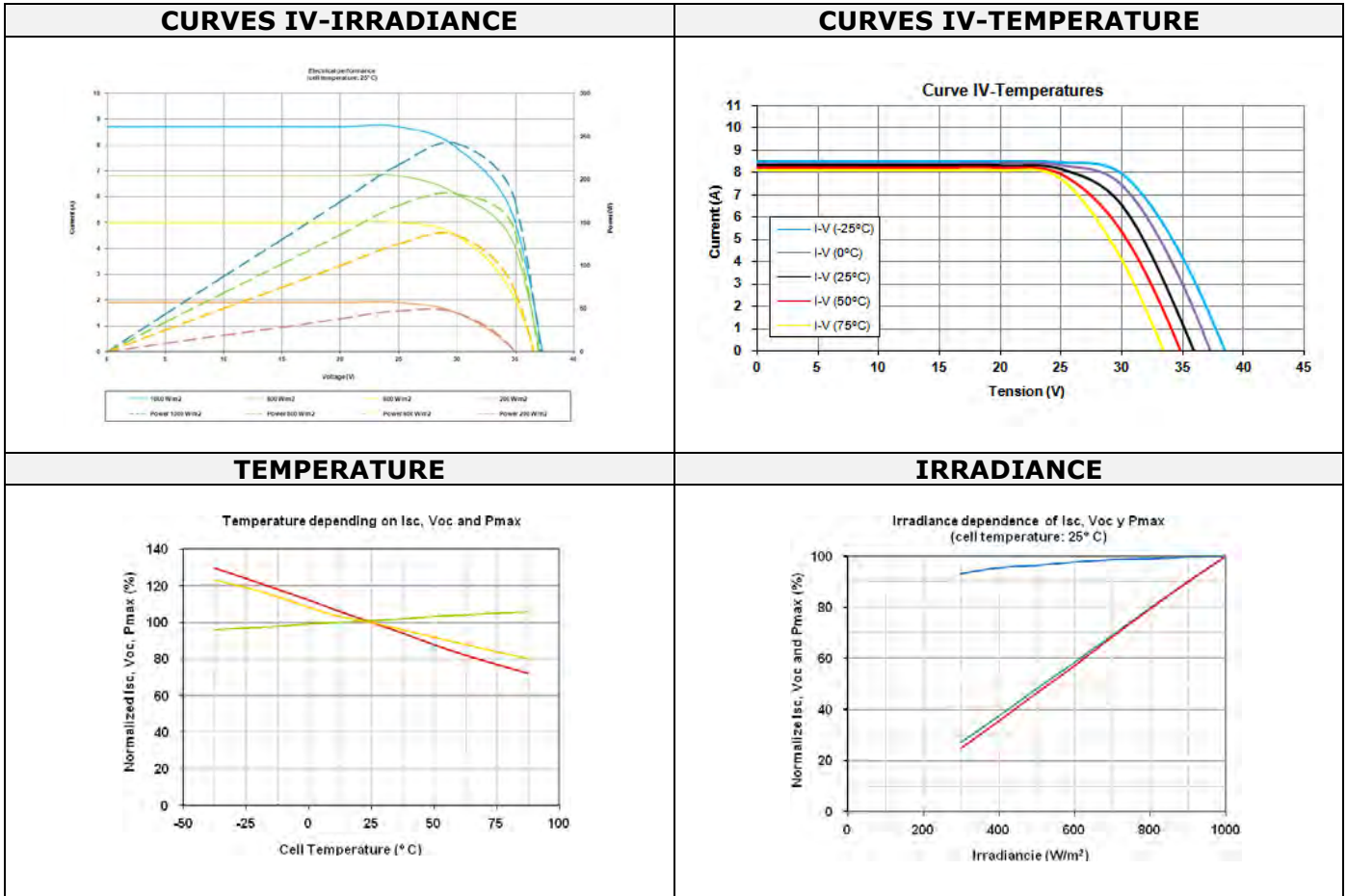
**CONSTRUCTION DETAILS**





**PHOTOVOLTAIC SOLAR ENERGY**  
**POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W**

**PERFORMANCE**





**PHOTOVOLTAIC SOLAR ENERGY**  
**POLYCRYSTALLINE MODULES - SI-ESF-M-P240-260W**

PACKAGING AND TRANSPORT		
<b>Panel</b>	Size	1655 x 992 x 45 mm.
	Weight	20 kg.
<b>Pallets</b> (each big pallet add 18 pieces solar modules by 9 boxes)	Size	1700 x 1150 x 2140 mm. (20' FT) 1700 x 1150 x 2510 mm. (40' FT)
	Panels	40 u./pallet (20' FT) 48 u./pallet (40' FT)
	Weight (Empty)	165 kg. (20' FT)
		250 kg. (40' FT)
<b>Container 20' FT</b>	Size	6.89 x 2.35 x 2.39 m.
	Panels	240 u.
	Pallets	6 u.
	Weight (Net)	20 kg. x 40 u. + 165 kg. = 965 kg.
	Weight (Gross)	965 kg. x 6 pallets = 5790 kg.
<b>Container 40' FT</b> (each big pallet add 4 pieces solar modules by 2 boxes)	Size	12.04 x 2.35 x 2.38 m.
	Panels	624 u.
	Pallets	13 u.
	Weight (Net)	20 kg. x 48 u. + 250 kg. = 1210 kg.
	Weight (Gross)	1210 kg. x 13 pallets = 15730 kg.

