MANUFACTURER

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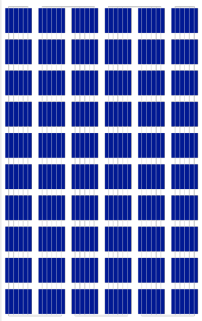
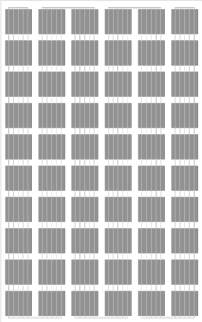
PHOTOVOLTAIC MODULE

Series	BIPV-Customized	**Reference**	SI-ESF-M-BIPV-CT-P156-60

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).

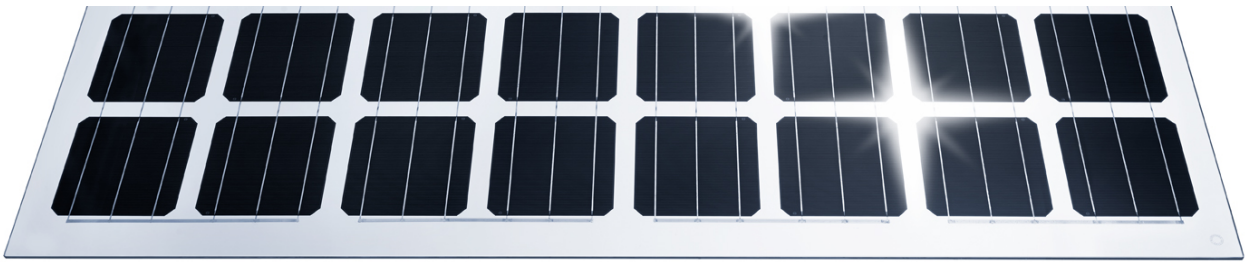
These modules are supplied with symmetric lengths of cable, with a diameter of copper section of 4 mm and an extremely low contact resistance, all designed to achieve the minimum voltage drop losses.

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.
- 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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PV CELLS

ELECTRICAL CHARACTERISTICS					MECHANICAL CHARACTERISTICS			
Type	Monofacial		mc-Si		**Size**	mm	156,75 x 156,75	±0,5
Color	Front/Rear	RAL	5013	7030	**Thickness**	µm	210	±20
Maximum power	[Pmpp]	Wp	4,67		**Front**	[-]	Si3N4 anti-reflection coating	
Voltage at maximum power	[Vmpp]	V	0,56		**Back**	[+]	Aluminum (Al-BSF)	
Current at maximum power	[Impp]	A	8,35		**TEMPERATURE COEFFICIENTS**			
Open circuit voltage	[Voc]	V	0,65		**Tk Voltage**	%/K	-0,36	
Short circuit current	[Isc]	A	9,01		**Tk Current**	%/K	0,07	
Efficiency	[ηc]	%	19,01		**Tk Power**	%/K	-0,38	

PV MODULE

ELECTRICAL CHARACTERISTICS

STC CONDITIONS					NMOT CONDITIONS				
Maximum power	[Pmpp]	Wp	280	IEC 60904-1	**Maximum power**	[Pmpp]	Wp	206	IEC 61215
Tolerance	[Pmpp]	%	±5	IEC 60904-3					
Voltage at maximum power	[Vmpp]	V	33,54	ASTM G173	**Voltage at maximum power**	[Vmpp]	V	30,54	
Current at maximum power	[Impp]	A	8,35	ASTM 1036	**Current at maximum power**	[Impp]	A	6,78	
Open circuit voltage	[Voc]	V	39,00		**Open circuit voltage**	[Voc]	V	35,65	
Short circuit current	[Isc]	A	9,01		**Short circuit current**	[Isc]	A	7,31	
Maximum system voltaje	[Vsyst]	V	1500/1000	IEC/UL					
Maximum series fuse		A	15						
Efficiency	[ηm]	%	11,44						
Form Factor	[FF]	%	79,70						

MECHANICAL CHARACTERISTICS

PANEL	WIDTH (X)		HIGH (Y)		DIAGONAL		AREA	POWER/AREA
Size - Glass-1	1200	x	2040	mm			2,45 m2	114,40 Wp/m2
Size - Glass-2	1200	x	2040	mm			2,45 m2	
CELLS								
Size	156,75	x	156,75	mm	210 mm		0,02 m2	
Distance - Top			56	mm				
Distance - between Cells	30	x	40	mm				
Distance - Left	55	mm						
Distance - Right	55	mm						
Distance - Bottom			56	mm				
Quantity	6	x	10	=	60 units		1,47 m2	

COMPONENTS

MODULE	MATERIAL	QUANTITY		THICKNESS (Z)		DESCRIPTION	DENSITY		TOTAL WEIGHT		THERMAL RESISTANCE	
	Glass-1	1	units	6	mm	Tempered	15,19	kg/m2	37,18	kg	0,1757	m2K/W
	Sheet Encapsulant	1	units	0,76	mm	PVB	0,81	kg/m2	1,98	kg	0,0032	m2K/W
	Busbars	5	units	0,2	mm	CuSn6		kg/m2		kg		
	PV Cells	1	units	0,21	mm	mc-Si	0,11	kg/m2	0,26	kg		
	Sheet Encapsulant	1	units	0,76	mm	PVB	0,81	kg/m2	1,98	kg	0,0032	m2K/W
	Backsheet	0	units	0,5	mm	TPT	0,00	kg/m2	0,00	kg	0,0000	m2K/W
	Glass-2	1	units	6	mm	Tempered	15,19	kg/m2	37,18	kg	0,1757	m2K/W
	Junction Box	2	units	10	mm	Multipolar	0,10	kg/m2	0,20	kg		
	Diodes (By-pass)	3	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			**13,93**	**mm**		**32,31**	**kg/m2**	**79,09**	**kg**	**0,36**	**m2K/W**

THERMAL CHARACTERISTICS

TEMPERATURE COEFFICIENTS			POLYCRYSTALLINE	
Temperature coefficient of short circuit current	α	[Isc]	0,0825	%/º C
Temperature coefficient of open circuit voltage	β	[Voc]	-0,4049	%/º C
Temperature coefficient of maximum power	γ	[Pmpp]	-0,4336	%/º C
Temperature coefficient of current at maximum power		[Impp]	0,1000	%/º C
Temperature coefficient of voltage at maximum power		[Vmpp]	-0,3800	%/º C
Nominal Module Operating Temperature		[NMOT]	+ 47 ± 2	º C

THERMAL TRANSMITTANCE (U)				SOLAR HEAT GAIN COEFFICIENT (G)		
Ug-value	2,79 W/m2 K		EN 673	**G-value**	0,36 %	EN 410
UV TRANSMITTANCE				**EXTERIOR REFLECTANCE**		
UV-Value	1,50 %	300-380 nm	EN 410	**RT-Value**	8,00 %	EN 410
LIGHT TRANSMISSION (LT)						
LT-value	39,78 %	380-780 nm	EN 410	**Opacity**	60,22 %	D65-CIE 2º ISO 9050
ACOUSTIC INSULATION (R)						
R-Value	32(-1:-3)		EN 12578			

TOLERANCES

Working temperature	-40 / +85 ºC		**Glass dimension**	< ±2,5 mm	
Dielectric isolation voltage	3000 V		**Glass symmetrytolerance**	< ±3 mm	
Relative humidity	0 / 100 %		**Cell single string distolerance**	< ±1 mm	
Maximum wind load	2400 Pa	244 kg/mm2			IEC 61215
Maximum snow load	5400 Pa	550 kg/mm2	**Maximum hail resistance**	⌀ 35	97 km/h IEC 61215

CLASSIFICATIONS

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

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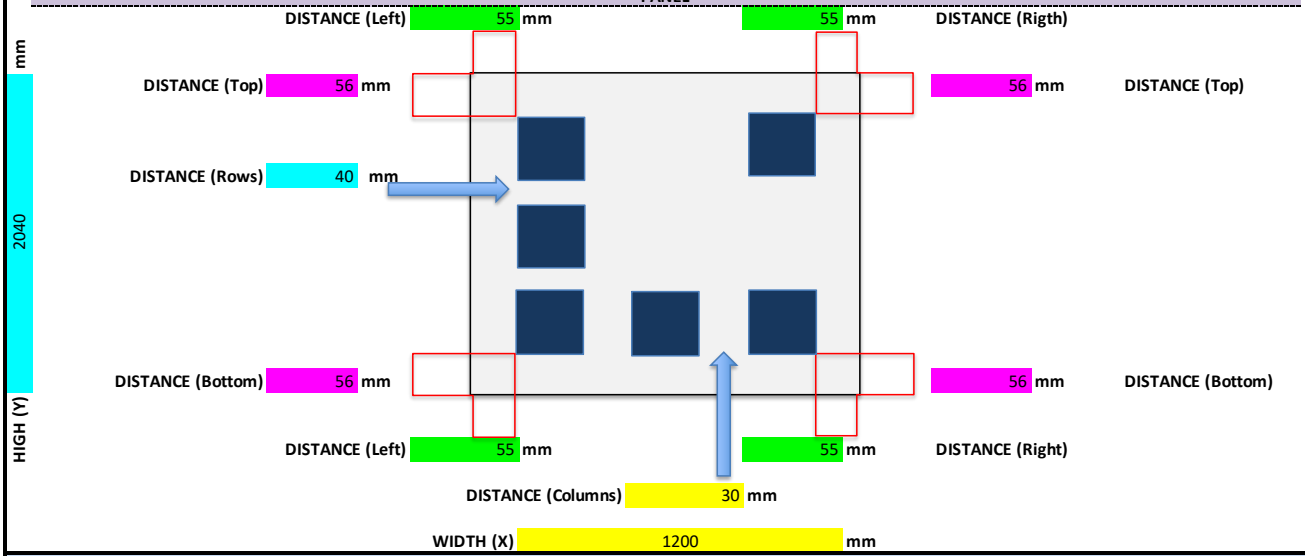
DRAWING

JUNCTION BOX

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

PANEL

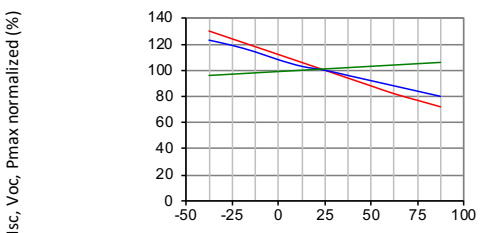


PERFORMANCE

CELLS

TEMPERATURE

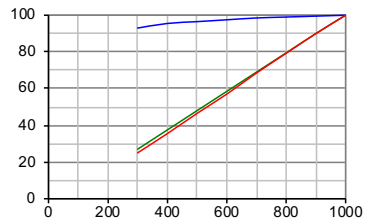
Temperature depending on Isc, Voc and Pmax



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

IRRADIANCE

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

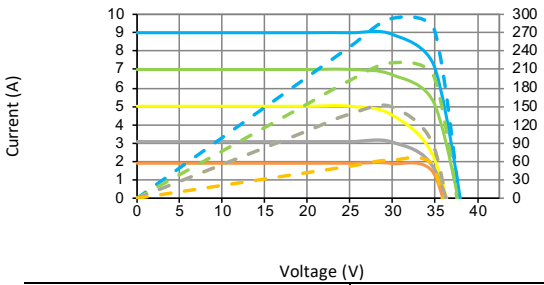


--- Voc --- Isc --- Pmax

PANELS

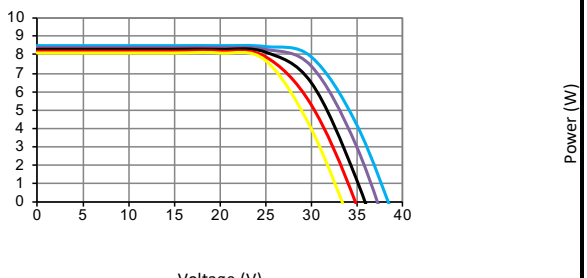
TEMPERATURE

Electrical performance
(cell temperature: 25º C)



--- 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



I-V (-25ºC) I-V (0ºC) I-V (+25ºC) I-V (+50ºC) I-V (+75ºC)

SOLAR SIMULATOR

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

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 ºC	IEC 60904-3	**Ambient temperature**	20 ºC	
Air Mass	1,5	ASTM G173	**Air Mass**	1,5	ASTM G173-03
		ASTM 1036	**Wind speed**	1 m/s	

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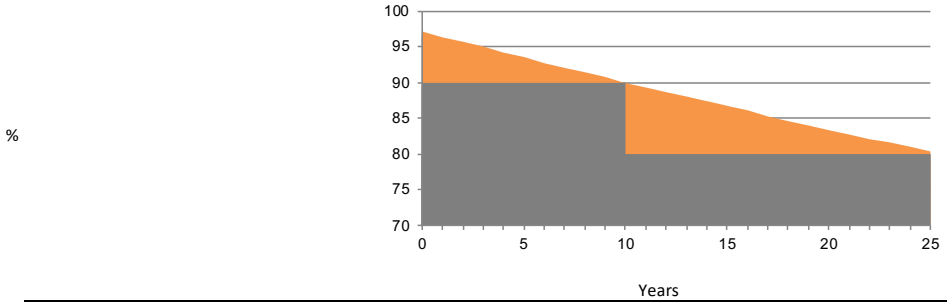
STANDARD GUARANTEES

LINEAR PERFORMANCE WARRANTY



Manufacturing defects	12 years.
Performance	90% of rated power after 10 years of operation,
	80% of rated power after 25 years of operation.

ENVIRONMENTAL INFORMATION

Solar Hours Peak	6	day		**kWh**	**Coal**	**Petrol/Gas**	**Combined**	
Irradiation rate	1000	W/ m2		1	0,961	0,828	0,372	kg/CO2
Energy generated	1680,354	kWh day	**Avoided**	**day**	1615	1391	625	kg/CO2
	50410,62	kWh month	**CO2**	**month**	48445	41740	18753	kg/CO2
	613329,21	kWh year	**emissions**	**year**	589409	507837	228158	kg/CO2

CERTIFICATES

ISO 9001	Quality 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.
EN 50583-1	Photovoltaics in buildings - Part 1: BIPV modules.
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.
IEC/EN 62790	Junction boxes for photovoltaic modules - Safety requirements and tests.
IEC/EN 62804-1	Photovoltaic (PV) Modules - Test Methods for the detection of potential-induced degradation. Part 1: Crystalline silicone.
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

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

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

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 50380:2018.