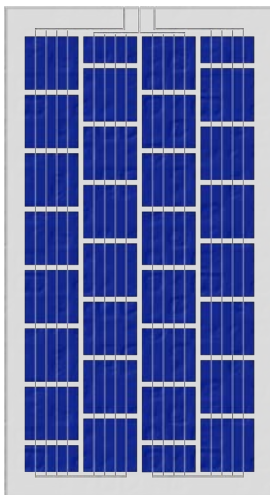
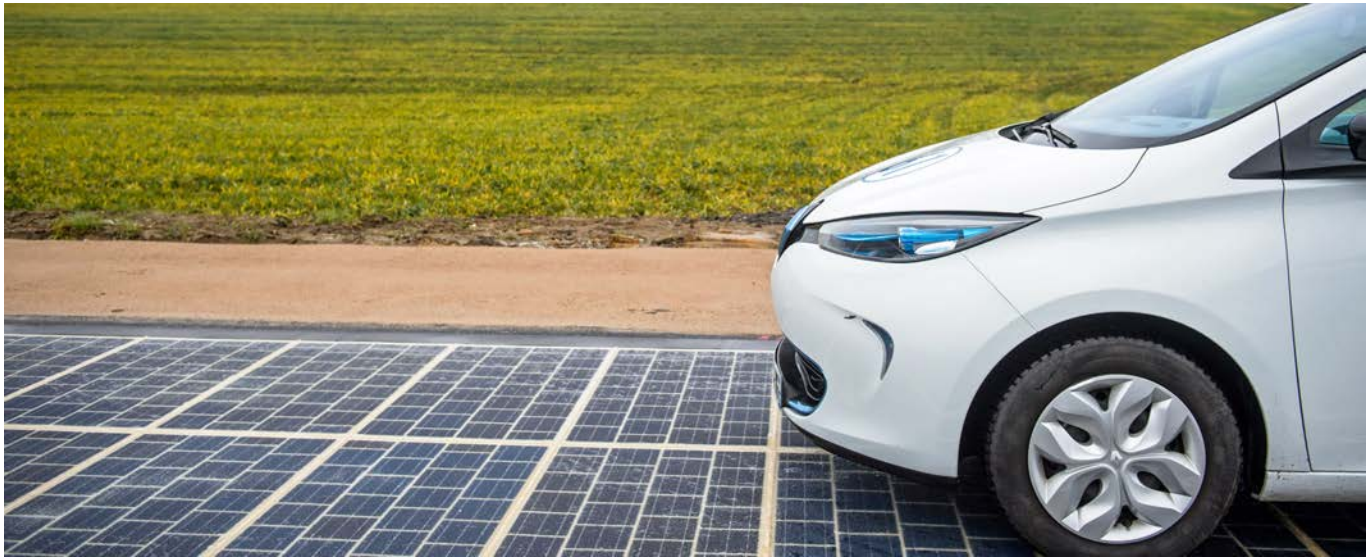




## PHOTOVOLTAIC SOLAR ENERGY

### SOLAR GLASS PAVEMENT - SI-ESF-M-BIPV-RD-P156-28-135W



Solar Innova uses the latest materials to manufacture photovoltaic solar pavement.

Our solar pavement is ideal for any application that uses the photoelectric effect as a clean energy source because of its minimal chemical pollution and no noise pollution. Thanks to its design, can be integrated easily into any installation.

The front of the solar pavement contains a tempered solar glass anti-slip with high transmissivity, low reflectivity and low iron content.

This PV solar pavement use high-efficiency polycrystalline silicon cells 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 PVB (Polyvinyl Butyral) as an encapsulant which provides complete protection and seals against environmental agents and electrical insulation.

The rear of the solar pavement contains a tempered solar glass low iron content.

The junction boxes with IP65, are made from high temperature resistant plastics and containing terminals, connection terminals and protection diodes (by-pass). These pavements 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.

Our solar pavement 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 this solar pavement makes its 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, ISO 14001 and OHSAS 18001.

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.




Our solar PV solar pavement is certified by internationally recognized laboratories and are proof of our strict adherence to international safety standards, long term performance and overall quality of products.







## PHOTOVOLTAIC SOLAR ENERGY

### SOLAR GLASS PAVEMENT - SI-ESF-M-BIPV-RD-P156-28-135W

ELECTRICAL CHARACTERISTICS (STC)		
Maximum power (P <sub>mpp</sub> )	Wp	135
Tolerance	Wp	0 ~ + 5
Voltage at maximum power (V <sub>mpp</sub> )	Volts	14.57
Current at maximum power (I <sub>mpp</sub> )	Amperes	9.28
Open circuit voltage (V <sub>oc</sub> )	Volts	17.66
Short circuit current (I <sub>sc</sub> )	Amperes	9.98
Maximum system Voltage (V <sub>syst</sub> )	Volts	1000 (IEC)
Diodes (By-pass)	Quantity	1
Maximum series fuse	Amperes	20
Efficiency (η <sub>m</sub> )	%	11.88
Form Factor	%	≥ 73

<b>STC:</b>	 Irradiance: 1,000 W/m <sup>2</sup>	 Module temperature: 25° C	 Air quality: 1.5
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ELECTRICAL CHARACTERISTICS (TONC)		
Maximum power (P <sub>mpp</sub> )	Wp	100
Voltage at maximum power (V <sub>mpp</sub> )	Volts	13.27
Current at maximum power (I <sub>mpp</sub> )	Amperes	7.54
Open circuit voltage (V <sub>oc</sub> )	Volts	16.14
Short circuit current (I <sub>sc</sub> )	Amperes	8.09

<b>NOCT:</b>	 Irradiance: 800 W/m <sup>2</sup>	 Air temperature: 20° C	 Air quality: 1.5	 Wind speed: 1 m/s
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MECHANICAL CHARACTERISTICS		
<b>Size</b>	Height	1437 mm
	Width	792 mm
	Thickness	21 mm
<b>Weight</b>	Net	49 kg
<b>Front</b>	Material	High transmission tempered glass anti-slip
	Thickness	8 ± 0.2 mm
<b>Cells</b>	Type	Polycrystalline
	Quantity	4 x 7
	Size	156 x 156 mm
Serial connection	Quantity	28
Parallel connection	Quantity	1
<b>Encapsulation</b>	Material	PVB
	Thickness	0.76 ± 0.03 mm
<b>Rear</b>	Material	Tempered glass
	Thickness	8 ± 0.2 mm
<b>Junction box</b>	Material	PVC
	Protection	IP65
	Isolation	Versus humidity and inclement weather
<b>Cables</b>	Type	Polarized and symmetric in length
	Length	650 mm
	Section	4 mm <sup>2</sup>
	Features	Low contact resistance Minimal losses for voltage drop
<b>Connectors</b>	Material	PVC
	Type	MC4
	Protection	IP67

THERMAL CHARACTERISTICS		
Temperature coefficient of short circuit current α (I <sub>cc</sub> )	%/° C	+ 0.0814
Temperature coefficient of open circuit voltage β (V <sub>oc</sub> )	%/° C	- 0.3910
Temperature coefficient of maximum power γ (P <sub>mpp</sub> )	%/° C	- 0.5141
Temperature coefficient of current at maximum power (I <sub>mpp</sub> )	%/° C	+ 0.10
Temperature coefficient of voltage at maximum power (V <sub>mpp</sub> )	%/° C	- 0.38
<b>NOCT (Nominal Operating Cell Temperature)</b>	° C	+ 47 ± 2



## PHOTOVOLTAIC SOLAR ENERGY

### SOLAR GLASS PAVEMENT - SI-ESF-M-BIPV-RD-P156-28-135W

OPTICAL CHARACTERISTICS		
<b>Transmittance</b>	%	35

TOLERANCES				
<b>Working temperature</b>	° C	° F	- 40 ~ + 85	- 40 ~ + 185
<b>Dielectric Isolation Voltage</b>	Volts		3,000	
<b>Relative humidity</b>	%		0 ~ 100	
<b>Wind resistance</b>	m/s		60	
	kg/m <sup>2</sup>	Pa	245	2,400
	lbs/feet <sup>2</sup>		491.56	
<b>Mechanical load-bearing capacity</b>	kg/m <sup>2</sup>	Pa	551	5,400 (IEC)
	lbs/feet <sup>2</sup>	Pa	75.2	3,600 (UL)
<b>Fire resistance</b>	Clase		A (UL 790)	
<b>Wind resistance</b>	Clase		F (ASTM D3161)	
<b>Hail resistance</b>	Level		4 (ANSI FM 4473)	

MEASUREMENTS PERFORMED IN ACCORDANCE WITH STANDARD TEST METHODS EN 60904-3 AND ASTM E1036, CORRECTED TO STANDARD TEST CONDITIONS (STC)		
<b>Air quality/Spectral distribution</b>	AM	1.5 ASTM G173-03e1 (2,008)
<b>Luminous intensity/Radiation</b>	W/m <sup>2</sup>	1,000
<b>Cell temperature</b>	° C	25

MEASUREMENTS PERFORMED IN SOLAR SIMULATOR	
<b>Class</b>	AAA (according to IEC 60904-4)
<b>Power measurement uncertainty is within</b>	± 3 %

STRUCTURAL CHARACTERISTICS	
<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>Welding</b>	Of cells and drivers in sections for stress relief.
<b>Laminate</b>	Composed of ultra-clear tempered glass on the front, thermostable, PVB encapsulant embedding cells and electrical insulation on the rear formed by a tempered glass.
<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.

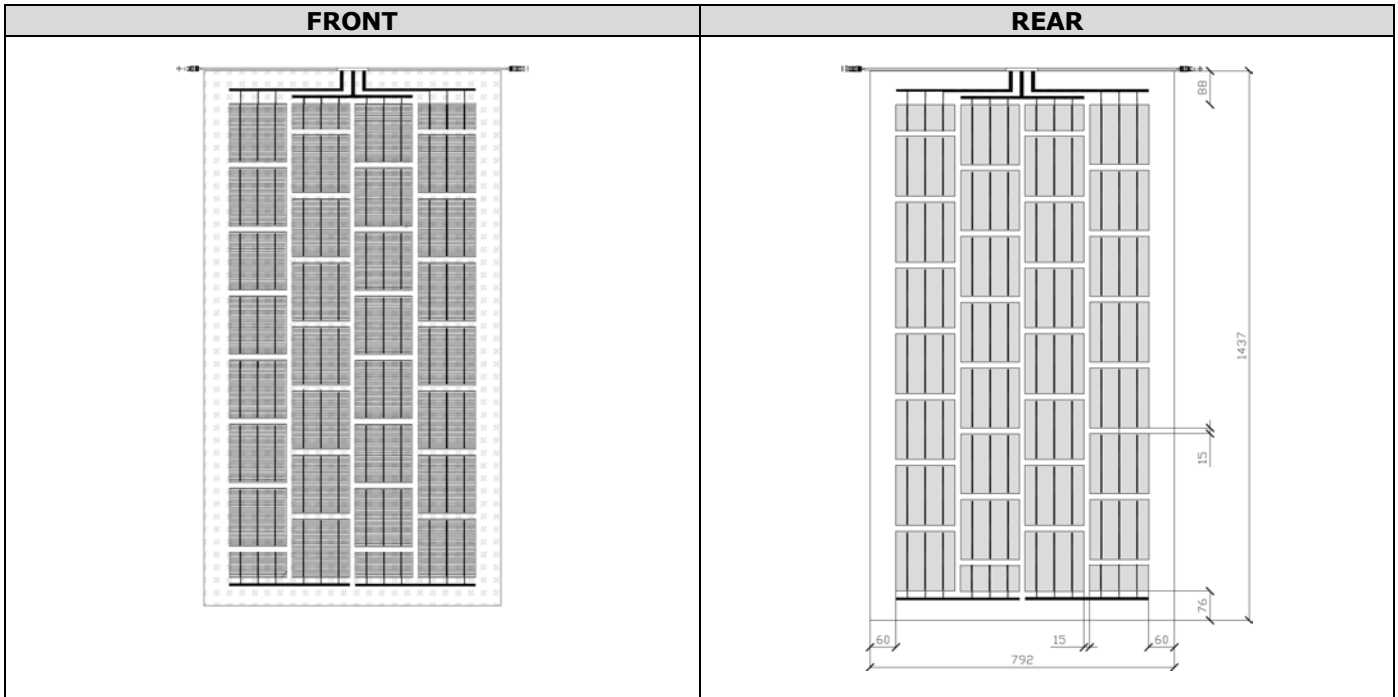
CHARACTERISTICS OF WORK
- The power of solar cells vary in the output of the production process. The different power specifications of these modules reflect this dispersion.
- Cells during the early months of light exposure, may experience a degradation photonics could decrease the value of the maximum power of 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 reflects typical values of the modules and laminates as measured at the output terminals at the end of the manufacturing process.

WARRANTIES		
<b>Manufacturing defects</b>	Years	12
<b>Performance</b>	Minimal Rated Power	90 % at 10 years,
	%/Years	80 % at 25 years.

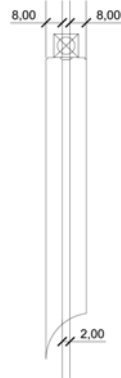
CERTIFICATES			
			



**PHOTOVOLTAIC SOLAR ENERGY**  
**SOLAR GLASS PAVEMENT - SI-ESF-M-BIPV-RD-P156-28-135W**



**THICKNESS**



**COMPONENTS**



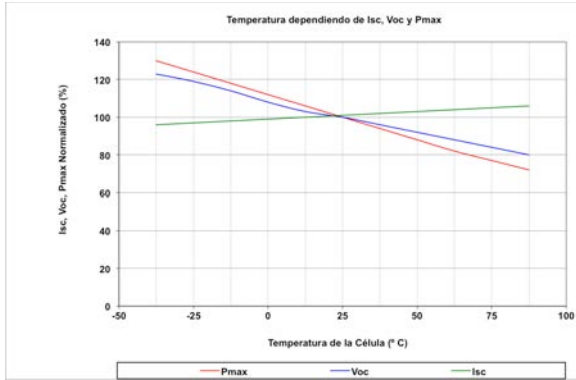


## PHOTOVOLTAIC SOLAR ENERGY

### SOLAR GLASS PAVEMENT - SI-ESF-M-BIPV-RD-P156-28-135W

#### PERFORMANCE

##### TEMPERATURE



##### IRRADIANCE

