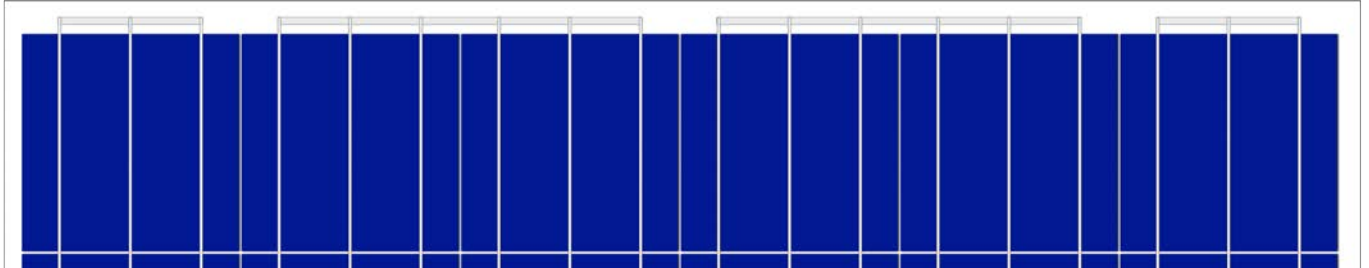




## PHOTOVOLTAIC SOLAR ENERGY

### POLYCRYSTALLINE MODULES - SI-ESF-M-BIPV-SM-P156-54



#### ABOUT SOLAR INNOVA

Solar Innova uses the latest materials to manufacture photovoltaic modules. This ensures that we can control our quality strictly in raw materials and production processes, offering our customers a durable and sustainable performance products backed by our 25 year limited power warranty.

#### PERFORMANCE

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.

#### ARCHITECTURAL INTEGRATION

The "architectural integration of photovoltaic modules", also called "Solar Architecture" or "BIPV" (Building Integrated Photovoltaics) is defined as the installation of these PV modules have a dual function; Energy and architectural (cladding, fencing or shading) and also replace conventional construction or are constituent elements of architectural composition elements. The line of frameless

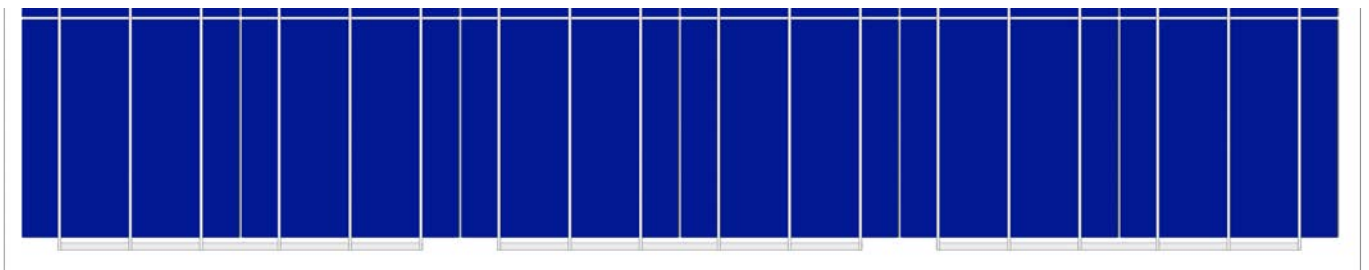
PV modules Solar Innova was developed considering engineers and architects to provide them with modules that integrate functional and aesthetically in facades and roofs, serving simultaneously as architectural building material and power generator.

#### CERTIFICATES

Our manufacturing plants have been prepared in accordance with:

- ✓ ISO 9001:2008, in terms of Quality Systems and Business.
- ✓ ISO 14001:2004, in terms of Environmental Management Systems.
- ✓ OHSAS 18001:2007, in terms of Management Systems Health and Safety.

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.





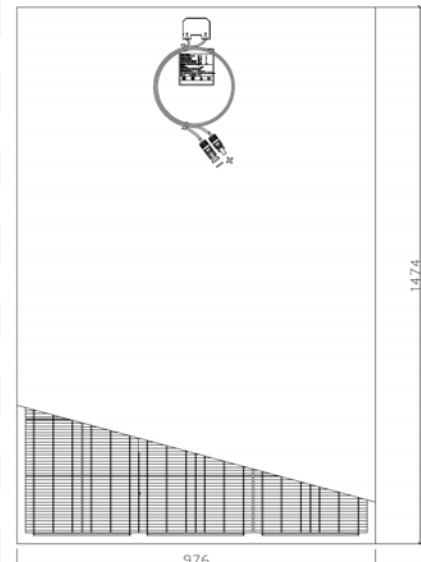
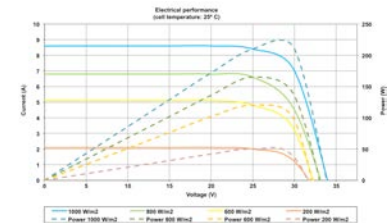
## PHOTOVOLTAIC SOLAR ENERGY POLYCRYSTALLINE MODULES - SI-ESF-M-BIPV-SM-P156-54

### ELECTRICAL CHARACTERISTICS (STC)

|  |      |                        |       |       |       |
|--|------|------------------------|-------|-------|-------|
| <b>Maximum power (Pmpp)</b>            | [Wp] | 220                    | 225   | 230   | 235   |
| <b>Tolerance</b>                       | [Wp] | 0 ~ + 5                |       |       |       |
| <b>Voltage at maximum power (Vmpp)</b> | [V]  | 26.99                  | 27.08 | 27.38 | 27.56 |
| <b>Current at maximum power (Impp)</b> | [A]  | 8.15                   | 8.31  | 8.40  | 8.53  |
| <b>Open circuit voltage (Voc)</b>      | [V]  | 33.32                  | 33.43 | 33.80 | 34.02 |
| <b>Short circuit current (Isc)</b>     | [A]  | 8.63                   | 8.70  | 8.83  | 8.97  |
| <b>Maximum system voltage (Vsyst)</b>  | [V]  | 600 (UL) / 1,000 (IEC) |       |       |       |
| <b>Maximum series fuse</b>             | [A]  | 15                     |       |       |       |
| <b>Form Factor</b>                     | [%]  | ≥ 73                   |       |       |       |

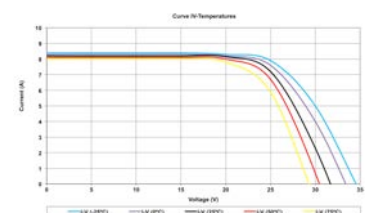
### MECHANICAL CHARACTERISTICS

|                                  |                 |   |
|----------------------------------|-----------------|---|
| <b>Height</b>                    | mm              | 1,474   |
| <b>Width</b>                     | mm              | 976   |
| <b>Thickness</b>                 | mm              | 30  |
| <b>Weight</b>                    | kg              | 17  |
| <b>Front</b>                     | Material        | High transmissivity toughened glass                       |
| <b>Front-Thickness</b>           | mm              | 4 ± 0.2   |
| <b>Cells</b>                     | Type            | Polycrystalline   |
| <b>Cells</b>                     | Quantity        | 6 x 9   |
| <b>Cells-Size</b>                | mm              | 156 x 156   |
| <b>Cells-Serial connection</b>   | Quantity        | 54  |
| <b>Cells-Parallel connection</b> | Quantity        | 1   |
| <b>Encapsulation</b>             | Materials       | Glass/EVA/Cells/EVA/TPT                                   |
| <b>Junction box</b>              | Type            | IP67  |
| <b>Junction box</b>              | Isolation       | Versus humidity and inclement weather                     |
| <b>Cables</b>                    | Type            | Polarized and symmetric in length                         |
| <b>Cables-Length</b>             | mm              | 900   |
| <b>Cables-Section of copper</b>  | mm <sup>2</sup> | 4   |
| <b>Cables</b>                    | Features        | Low contact resistance<br>Minimal losses for voltage drop |
| <b>Connectors</b>                | Type            | MC4   |



### THERMAL CHARACTERISTICS

|   |      |          |
|---|------|----------|
| <b>Temperature coefficient of short circuit current α (Icc)</b>   | %/°C | + 0.0825 |
| <b>Temperature coefficient of open circuit voltage β (Voc)</b>    | %/°C | - 0.4049 |
| <b>Temperature coefficient of maximum power γ (Pmpp)</b>          | %/°C | - 0.4336 |
| <b>Temperature coefficient of current at maximum power (Impp)</b> | %/°C | + 0.10   |
| <b>Temperature coefficient of voltage at maximum power (Vmpp)</b> | %/°C | - 0.38   |
| <b>NOCT (Nominal Operating Cell Temperature)</b>                  | °C   | + 47 ± 2 |



### WARRANTIES

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

