



Installation Guide for CSUN PV Module

China Sunergy (Nanjing) Co., Ltd

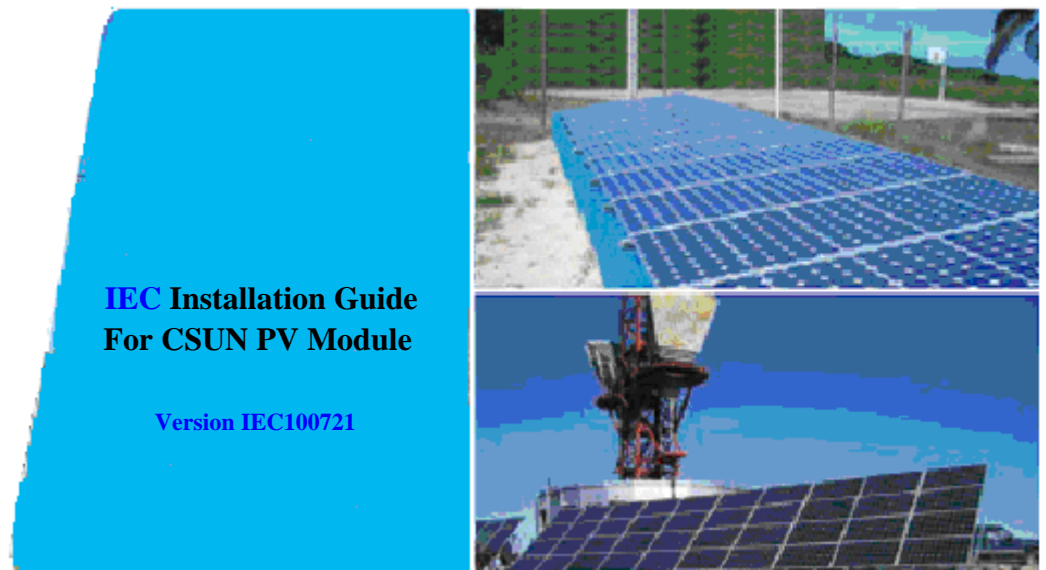
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To be a leading company of the renewable category of the world

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1、 Purpose of this guide

This guide contains information regarding the installation and safe handling of China Sunergy (Nanjing) Co., Ltd photovoltaic module (hereafter is referred to as “module”). China Sunergy(Nanjing) Co., Ltd (hereafter is referred to as “CSUN”).

Installers must read and understand the guide before installation. Any questions, please contact our customer service department for further explanations. The installer should conform to all safety precautions in the guide and local codes when installing a module.

Before installing a solar photovoltaic system, installers should become familiar with the mechanical and electrical requirement for such a system. Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

(1) General

- Installing solar photovoltaic systems may require specialized skills and knowledge. Installation should be performed only by qualified persons.
- Each module comes with a permanently attached junction box. CSUN can provide customers with fitted cables for ease of installation if desired. Installers should assume the risk of all injury that might occur during installation, including, without limitation, the risk of electric shock.
- One individual module may generate DC voltages greater than 30 volts when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Photovoltaic modules are designed for outdoor use. Modules may be ground mounted, mounted on rooftops, vehicles or boats. Proper design of support structures is responsibility of the system designers and installers. Use of mounting holes is suggested in a following paragraph.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules. Do not disconnect under load.

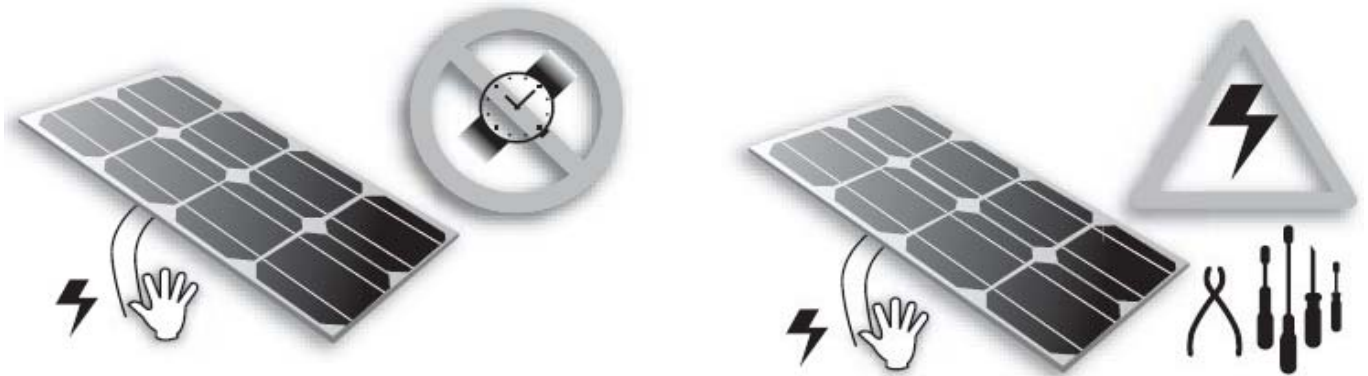


- Do not apply paint or adhesive to module top surface.
- Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules. Do not expose backsheet foils directly to sunlight.
- When installing the system, abide with all local, regional and national statutory regulations. Obtain a building permit where necessary.

(2) Safety precaution for installing a solar photovoltaic system

- Do not use modules of different configurations in the same system.
- Solar modules produce electrical energy when light shines on their front surface. The DC voltage may exceed 30V. If modules series connection, the total voltage is equal to the sum of the individual module voltages. If modules parallel connection, the total current is equal to the sum of individual module currents.
- When series connection, the maximum total number of series modules shouldn't exceed N. N is the number of series modules $.N = \text{Maximum system voltage} / V_{oc}$, at standard condition, AM1.5, temperature 25°C.
- Also when parallel connection, the maximum total number of parallel modules shouldn't exceed N. N is the number of parallel modules $.N = \text{Conductor current} / I_{sc}$, at standard condition, AM1.5, temperature 25°C.
- We suggest that every series CSUN module string should be fused prior to be connected with other strings. Please refer to the applicable regional and local codes for additional fuse requirements. When necessary, please install blocking diodes to protect CSUN module or CSUN system been damaged by reverse current.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Completely cover the module with an opaque material during installation to keep electricity from being generated.

- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.



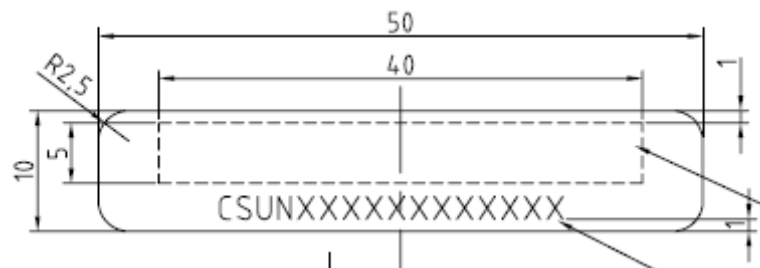
- Use only insulated tools that are approved for working on electrical installations.
- Abide with the safety regulations for all other components used in the system, including wiring and cables, connectors, charging regulators, inverters, storage batteries and rechargeable batteries, etc.
- Use only equipment, connectors, wiring and support frames suitable for a solar electric system. Always use the same type of module within a particular photovoltaic system.
- The electrical characteristics are within ± 3 percent of the indicated values of I_{sc} , V_{oc} , and P_{max} under standard test conditions (irradiance of $1000\text{W}/\text{m}^2$, AM 1.5 spectrums, and a cell temperature of 25°C (77°F)).
- Under normal outdoor conditions the module will produce current and voltages that are different than those listed in the data sheet. Data sheet values are values expected at standard test conditions. Accordingly, during system design, values of short-circuit current and open-circuit voltage should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacity, fuse ratings and size of controls connected to the modules or system output.
- Fire Resistance rated Class is Class C.

2、 Product Identification

Each module has four labels providing the following information:

- Nameplate: describes the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, all are measured under STC; weight, dimension, the maximum system voltage, the maximum fuse rating and power tolerance are all shown on the nameplate. Generally, power tolerance is $\pm 3\%$.
- Barcode: each module has a unique serial number. The serial number has 16 digits. The

“CSUN” is the short name for China Sunergy (Nanjing) Co., Ltd. The 5th digit refers to the cell manufacturer, ABC used to represent. And the 6th digit refers to the modules manufacturer address, ABC used to represent. The 7th digit refers to the modules production month. ABC used to represent. For example, “A” refers to “January”; “L” refers to “December”; The 8th and 9th digit refer to the modules production workshop. “1” refers to the 1 workshop. The 10th to 11th digit refer to the modules production year. “10” refers to the year of “2010”. The last five digits refer to serial number from 00001 to 99999.



There are three barcodes on one module. One is permanently attached to the interior of the module visible when viewing from the front of the module. This barcode is inserted at the beginning of laminating. One is attached to the aluminum frame. And another is attached near the nameplate.

- Do not remove the label. If you remove the label, the product warranty will be not guaranteed by CSUN.
- The modules would be named only by “CSUN***-**M/P”, They are all identical products(design, materials, production process, etc).

3、Mechanical Installation

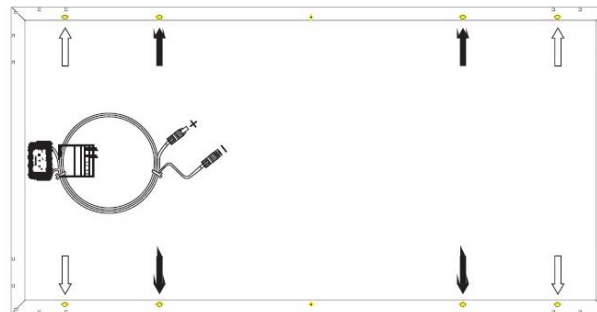
(1)Selecting the location

- In most applications, PV modules should be installed in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the modules should typically face south, and in the Southern Hemisphere, the modules should typically face north. Modules facing 30 degrees away from true South (or north) will lose approximately 10 to 15 percent of their power output. If the module faces 60 degrees away from true South (or North), the power loss will be 20 to 30 percent.
- For detailed information on the best elevation tilt angle for the installation, refer to standard solar photovoltaic installation guides or a reputable solar installer or systems integrator.
- The module should not be shaded at any time of the day.

- According to the design of our installation manual, Final customers could adopt the screw installation method to make the frame supporting.
- Put the modules on the frame and put on the screws and then combine them firmly after put on all the gaskets. The module frame is made of anodized aluminum, and therefore corrosion can occur if the module is subject to a salt-water environment with contact to a rack of another type of metal.(Electrolysis Corrosion) if required. PVC or stainless steel washers can be placed between the solar module frame and support structure to prevent this corrosion.
- Module support structures that are to be used to support modules should be wind rated and approved for use by the appropriate local and civil codes prior to installation. Do not use module near equipment or in locations where flammable gases can be generated or collected.

(2)Selecting the proper support frame

- Always observe the instructions and safety precautions included with the support frames to be used with the modules.
- Do not attempt to drill holes in the glass surface or additional mounting holes in the frame. To do so will void the warranty.



↑ Mounting holes for normal installation
 ⬇ For high wind and snow-loads, these mounting holes must also be used

- Modules must be securely attached to the mounting structure using four mounting holes for normal installation. If additional wind or snowloads are anticipated for this installation, additional mounting holes are also used. The details please see the above drawing. Load calculations are left to the system designers or installers.
- The support module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- Select the height of the mounting system to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience heavy snowfalls. In addition,

assure the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by sand and stone driven by wind.

(3) Roof mount

- When installing a module on a roof or building, ensure that it is securely fastened and cannot fall as a result of wind or snow loads.
- Provide adequate ventilation under a module for cooling (10cm minimum air space between module and mounting surface).



- When installing module on a roof, ensure that the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.
- In some cases, a special support frame may be necessary.
- The roof installation of solar modules may affect the fireproofing of the house construction.
- The modules are rated fire Class C, and are suitable for mounting over a class A roof. Do not install modules on a roof or building during strong winds in case of accidents.

(4) Pole mount

- When installing a module on a pole, choose a pole and module mounting structure that will withstand anticipated winds for the area.



Ground mount

Roof mount

Pole mount

(5) Grounding

- All module frames and mounting racks must be properly grounded in accordance with the appropriate respective national electrical code. Proper grounding is achieved by connecting the module frame(s) and structural members contiguously one to another using a suitable grounding conductor. The grounding conductor or strap may be copper, copper alloy, or other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.
- Attach a separate conductor as grounding wire to one of the 6mm diameter grounding holes marked with the grounding symbol on the module frame with a set of M4 or M5 screw, cup washer, flat washer, tooth washer, and M4 or M5 nut . This is to ensure positive electrical contact with the frame.

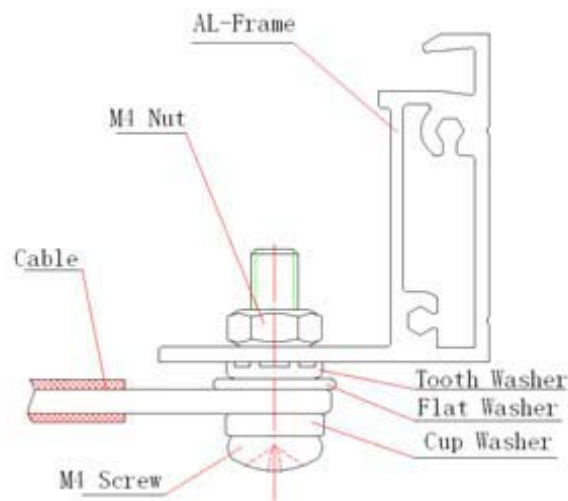
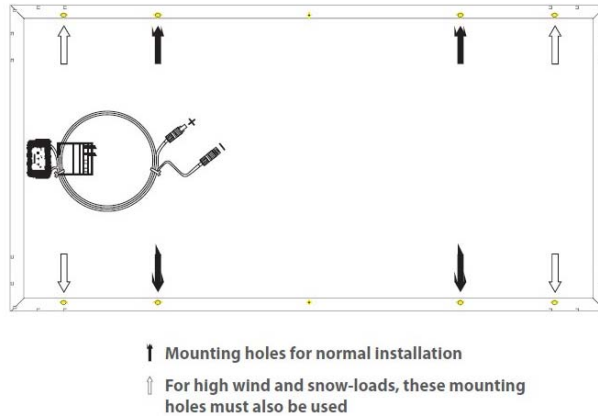


FIG. Schematic drawing for SST module grounding

(6) General installation

- Module mounting must use the pre-drilled mounting holes in the frame.
- The most common mounting is achieved by mounting the module using the four symmetry holes close to the inner side on module frames.
- If excessive wind or snow loads are expected, all eight mounting holes must be used.



- Do not lift the module by grasping the module's junction box or electrical leads. Do not stand or step on module. Do not drop module or allow objects to fall on module. Do not set the module down on any hard surface.
- To avoid glass breakage, do not place any heavy objects on the module. Inappropriate transport and installation may break module.

4、Wiring and connection

- Before this procedure, please read the operation instructions of the PV control system carefully.
- Make wiring by Multi-connecting cables between the modules in series or parallel connection, which is determined by user's configuration requirement for system power, current and voltage. And please refer to page 4. (2)Safety precaution for installing a solar photovoltaic system.
- Open the connection box of the control system and connect the cabled from the PV arrays to the connection box in accordance with the installation indication of the PV control systems.
- Each module has two 4mm² diameter type (12AWG) standard 90°C sunlight resistant output cables each terminated with plug & play connectors. This cable is suitable for applications where wiring is exposed to the direct rays of the Sun. We recommend that all wiring and electrical connections comply with the appropriate national electrical code.
- For field connections, use the minimum $\Phi 4\text{mm}^2$ diameter copper wires insulated for a minimum of 90°C and Sunlight resistant as well.

5、Maintenance and Care

- A built up of dust or dirt on the module(s) front face will result in a decreased energy output. Clean the panel(s) preferably once per annum if possible (dependant on site conditions) using a soft cloth dry or damp, as necessary.
- Never use abrasive material under any circumstances.

- Examine the PV module(s) for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check electrical leakage to ground.
- Check fixing screws and mounting brackets and tight, adjust and tighten as necessary.

6、 Appendix

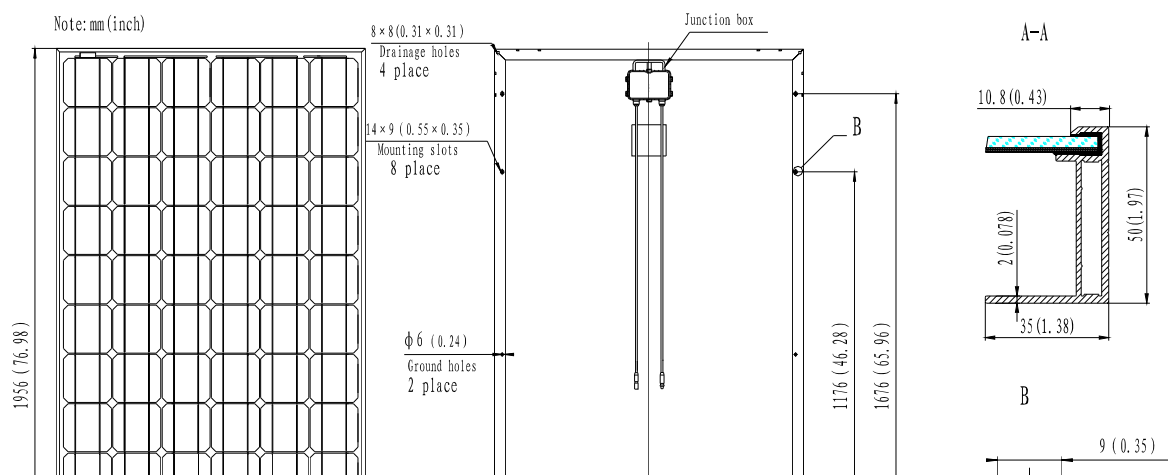
Model Type	Scope	Cell Number	Cell Size (mm)	Module Size (mm)
CSUN295-72M	305W 300W 295W 290W 285W	72	M156×156	1956×990×50
CSUN275-72P	290W 285W 280W 275W 270W 265W	72	P156×156	1956×990×50
CSUN245-60M	260W 255W 250W 245W 240W 235W	60	M156×156	1640×990×50
CSUN230-60P	245W 240W 235W 230W 225W 220W	60	P156×156	1640×990×50
CSUN195-72M	205W 200W 195W 190W 185W	72	M125×125	1580×808×35

Specifications of CSUN 295-72M Monocrystalline solar module

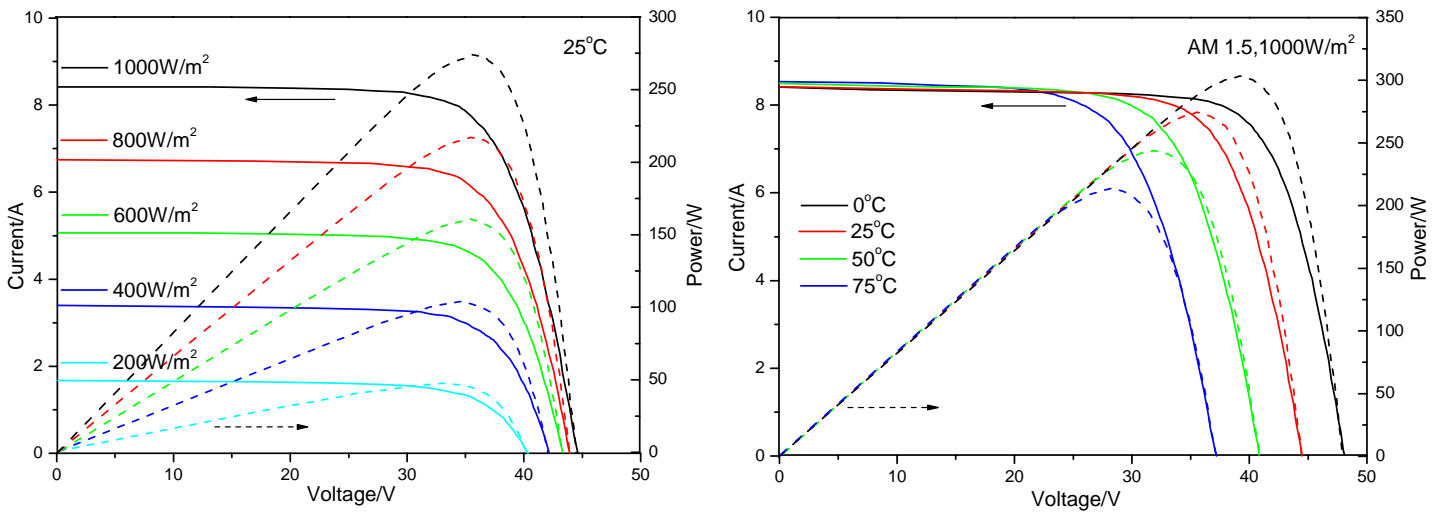
Type	CSUN 305-72M	CSUN 300-72M	CSUN 295-72M	CSUN 290-72M	CSUN 285-72M
Electrical typical data					
Pmpp [W]	305	300	295	290	285
Voc [V]	44.9	44.8	44.6	44.5	44.4

Isc [A]	8.87	8.80	8.73	8.67	8.60
Vmpp [V]	36.2	36.1	35.9	35.8	35.7
Impp [A]	8.43	8.32	8.22	8.11	7.99
Practical module efficiency	17.73%	17.44%	17.15%	16.86%	16.57%
Module efficiency	15.75%	15.49%	15.23%	14.98%	14.72%
Maximum system voltage [V]	1000				
Voltage temperature coefficient	-0.307%/K				
Current temperature coefficient	+0.039%/K				
Power temperature coefficient	-0.423%/K				
Series fuse rating [A]	15				
Cells	6x12 pieces monocrystalline solar cells series strings (156mmx156mm)				
Junction box	with 6 bypass diodes				
Cable	length 900 mm, 1x4 mm ²				
Front glass	White toughened safety glass, 4 mm				
Cell encapsulation	EVA (Ethylene-Vinyl-Acetate)				
Back sheet	composite film				
Frame	Anodized aluminum profile				
Dimensions	1956x990x50mm (LxWxH)				
Maximum surface load capacity	5,400 Pa				
Hail	maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹				
Temperature range	- 40 °C to + 85 °C				

Dimensions



I-V Curves



Note:

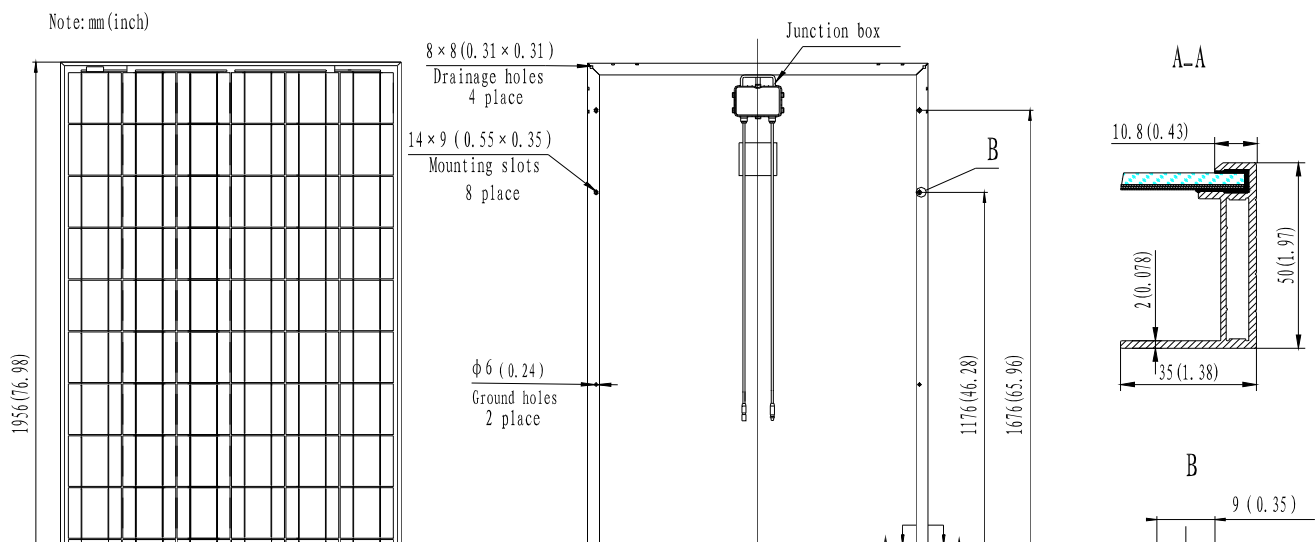
- ✚ The electrical data relates to standard test conditions [STC]: 1,000 W/m²; AM 1,5; 25°C.
- ✚ performance deviation of P_{mpp}: -/+ 3%. performance deviation of Voc[V], I_{sc}[A], V_{mpp} [V] and I_{mpp} [A]: -/+ 10%.
- ✚ certified in accordance with IEC 61215, IEC 61730-1/2 and UL 1703.

Specifications of CSUN 275-72P Polycrystalline solar module

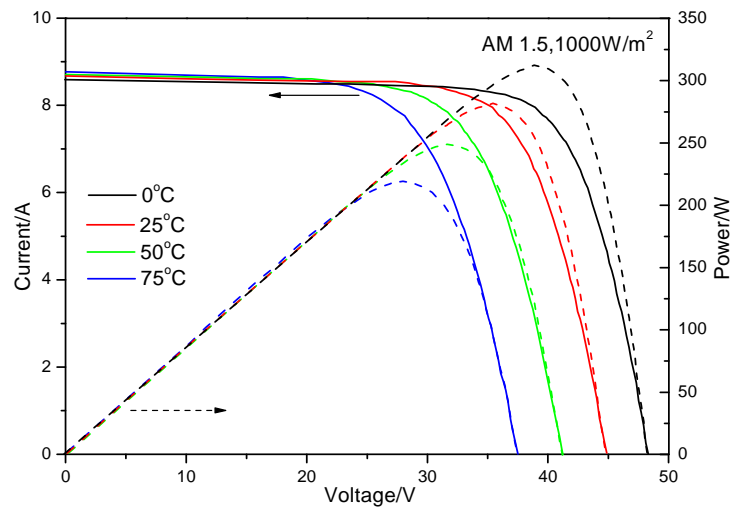
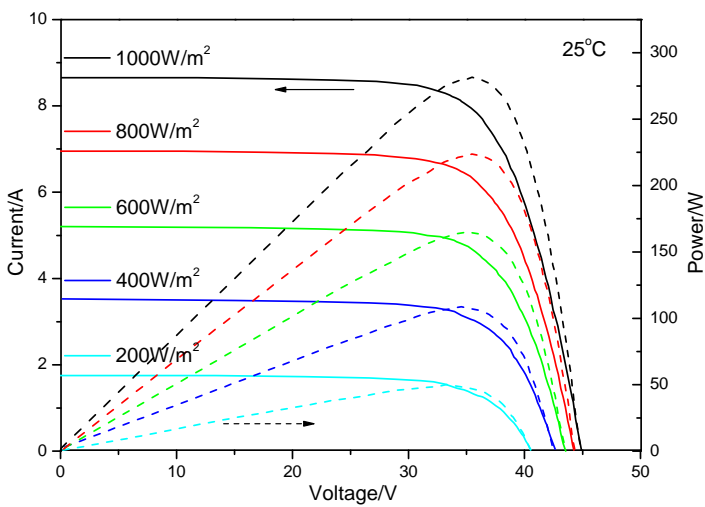
Type	CSUN 290-72P	CSUN 285-72P	CSUN 280-72P	CSUN 275-72P	CSUN 270-72P	CSUN 265-72P
Electrical typical data						
P _{mpp} [W]	290	285	280	275	270	265
V _{oc} [V]	44.3	44.1	44.0	43.8	43.7	43.6

Isc [A]	8.75	8.67	8.58	8.48	8.40	8.31
Vmpp [V]	35.6	35.4	35.3	35.2	35.0	34.9
Impp [A]	8.15	8.05	7.94	7.82	7.72	7.60
Practical module efficiency	16.55%	16.27%	15.98%	15.70%	15.41%	15.12%
Module efficiency	14.98%	14.72%	14.46%	14.20%	13.94%	13.68%
Maximum system voltage [V]	1000					
Voltage temperature coefficient	-0.292%/K					
Current temperature coefficient	+0.045%/K					
Power temperature coefficient	-0.408%/K					
Series fuse rating [A]	15					
Cells	6×12 pieces polycrystalline solar cells series strings (156mm×156mm)					
Junction box	with 6 bypass diodes					
Cable	length 900 mm, 1×4 mm ²					
Front glass	White toughened safety glass, 4mm					
Cell encapsulation	EVA (Ethylene-Vinyl-Acetate)					
Back sheet	composite film					
Frame	Anodized aluminum profile					
Dimensions	1956×990×50mm (L×W×H)					
Maximum surface load capacity	5,400 Pa					
Hail	maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹					
Temperature range	- 40 °C to + 85 °C					

Dimensions



I-V Curve



Note:

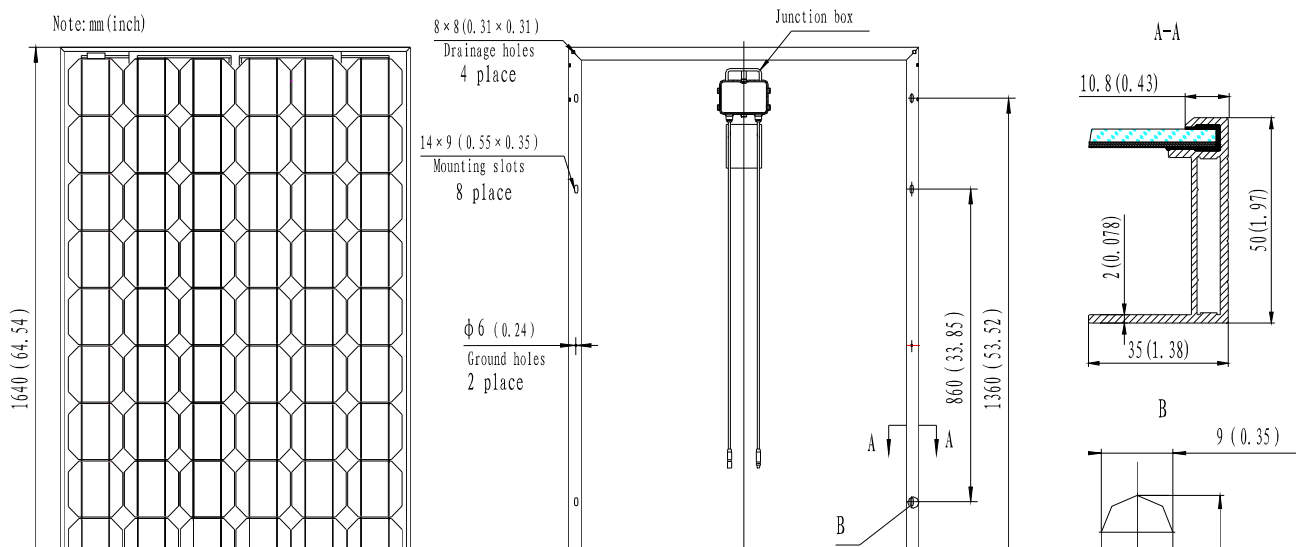
- ✚ The electrical data relates to standard test conditions [STC]: 1,000 W/m²; AM 1,5; 25°C.
- ✚ performance deviation of Pmp: +/- 3%. performance deviation of Voc[V],Isc[A],Vmp [V] and Imp [A]: +/- 10%.
- ✚ certified in accordance with IEC 61215, IEC 61730-1/2 and UL 1703.

Specifications of CSUN 245-60M Monocrystalline solar module

Type	CSUN 260-60M	CSUN 255-60M	CSUN 250-60M	CSUN 245-60M	CSUN 240-60M	CSUN 235-60M
Electrical typical data						
Pmp [W]	260	255	250	245	240	235
Voc [V]	37.6	37.5	37.3	37.2	37.0	36.8

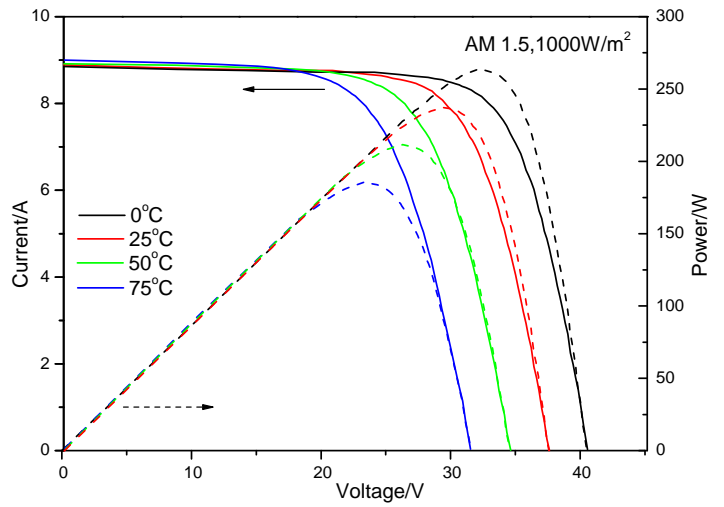
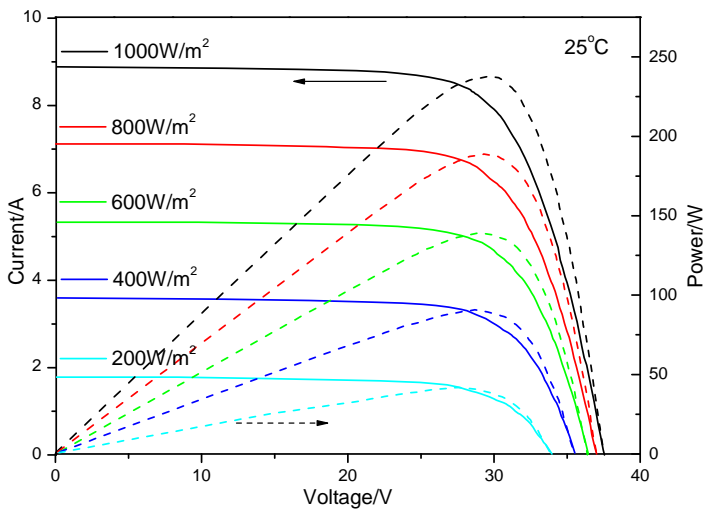
Isc [A]	8.93	8.86	8.78	8.69	8.62	8.54
Vmpp [V]	30.3	30.2	30.1	30.0	29.8	29.6
Impp [A]	8.58	8.45	8.31	8.17	8.06	7.94
Practical module efficiency	18.14%	17.79%	17.44%	17.09%	16.74%	16.39%
Module efficiency	16.02%	15.71%	15.40%	15.09%	14.78%	14.47%
Maximum system voltage [V]	1000					
Voltage temperature coefficient	-0.307%/K					
Current temperature coefficient	+0.039%/K					
Power temperature coefficient	-0.423%/K					
Series fuse rating [A]	15					
Cells	6×10 pieces monocrystalline solar cells series strings (156mm×156mm)					
Junction box	with 6 bypass diodes					
Cable	length 900 mm, 1×4 mm ²					
Front glass	White toughened safety glass, 3.2 mm					
Cell encapsulation	EVA (Ethylene-Vinyl-Acetate)					
Back sheet	composite film					
Frame	Anodized aluminum profile					
Dimensions	1640×990×50mm (L×W×H)					
Maximum surface load capacity	5,400 Pa					
Hail	maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹					
Temperature range	- 40 °C to + 85 °C					

Dimensions



Note:

I-V Curves



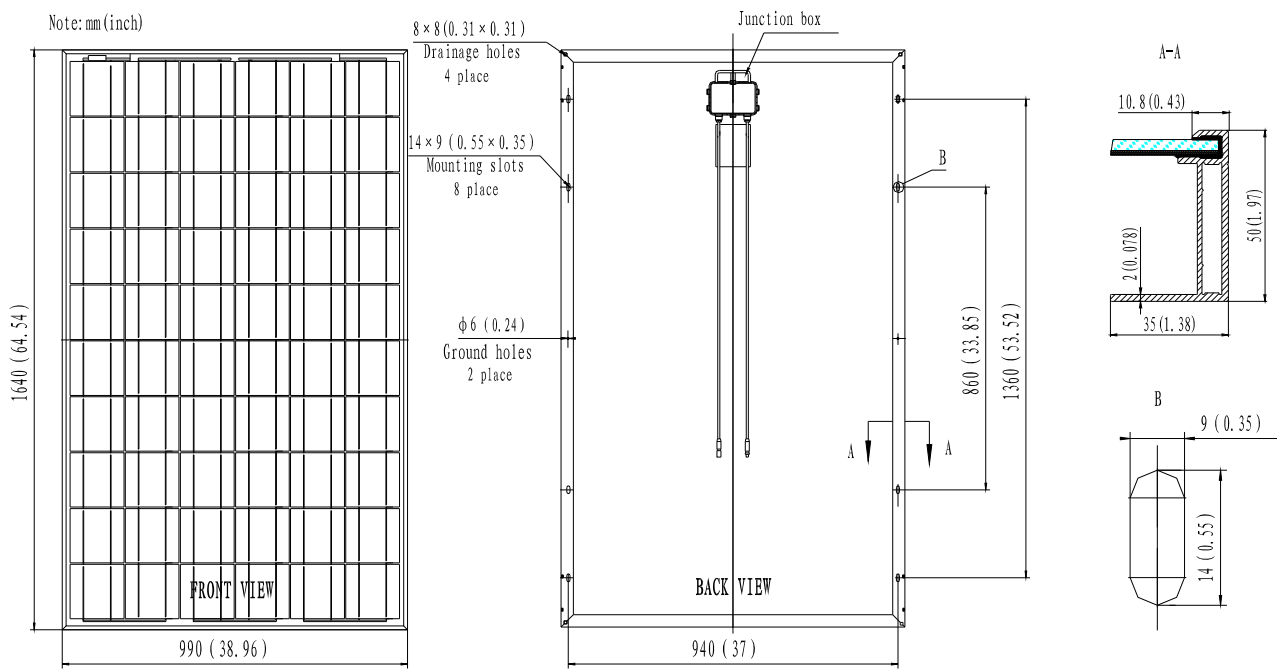
- 🔧 The electrical data relates to standard test conditions [STC]: 1,000 W/m²; AM 1,5; 25°C.
- 🔧 performance deviation of P_{mpp}: -/+ 3%. performance deviation of Voc[V],Isc[A],Vmpp [V] and Impp [A]: -/+ 10%.
- 🔧 certified in accordance with IEC 61215, IEC 61730-1/2 and UL 1703.

Specifications of CSUN 230-60P Polycrystalline solar module

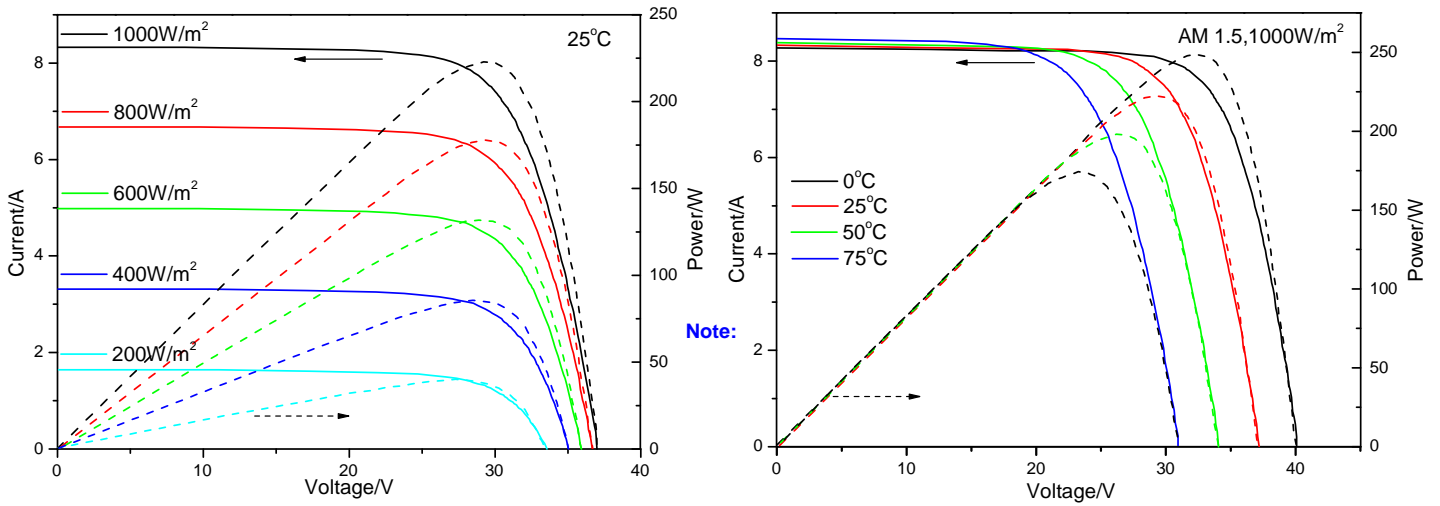
Type	CSUN 245-60P	CSUN 240-60P	CSUN 235-60P	CSUN 230-60P	CSUN 225-60P	CSUN 220-60P
Electrical typical data						
P _{mpp} [W]	245	240	235	230	225	220
V _{oc} [V]	37.1	36.9	36.8	36.7	36.6	36.4
I _{sc} [A]	8.74	8.67	8.59	8.52	8.40	8.32
V _{mpp} [V]	29.7	29.6	29.5	29.4	29.2	29
I _{mpp} [A]	8.25	8.11	7.97	7.83	7.71	7.59

Practical module efficiency	16.78%	16.44%	16.10%	15.75%	15.41%	15.07%
Module efficiency	15.09%	14.78%	14.47%	14.17%	13.86%	13.55%
Maximum system voltage [V]	1000					
Voltage temperature coefficient	-0.292%/K					
Current temperature coefficient	+0.045%/K					
Power temperature coefficient	-0.408%/K					
Series fuse rating [A]	15					
Cells	6×10 pieces polycrystalline solar cells series strings (156mm×156mm)					
Junction box	with 6 bypass diodes					
Cable	length 900 mm, 1×4 mm ²					
Front glass	White toughened safety glass, 3.2 mm					
Cell encapsulation	EVA (Ethylene-Vinyl-Acetate)					
Back sheet	composite film					
Frame	Anodized aluminum profile					
Dimensions	1640×990×50mm (L×W×H)					
Maximum surface load capacity	5,400 Pa					
Hail	maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹					
Temperature range	- 40 °C to + 85 °C					

Dimensions



I-V Curves



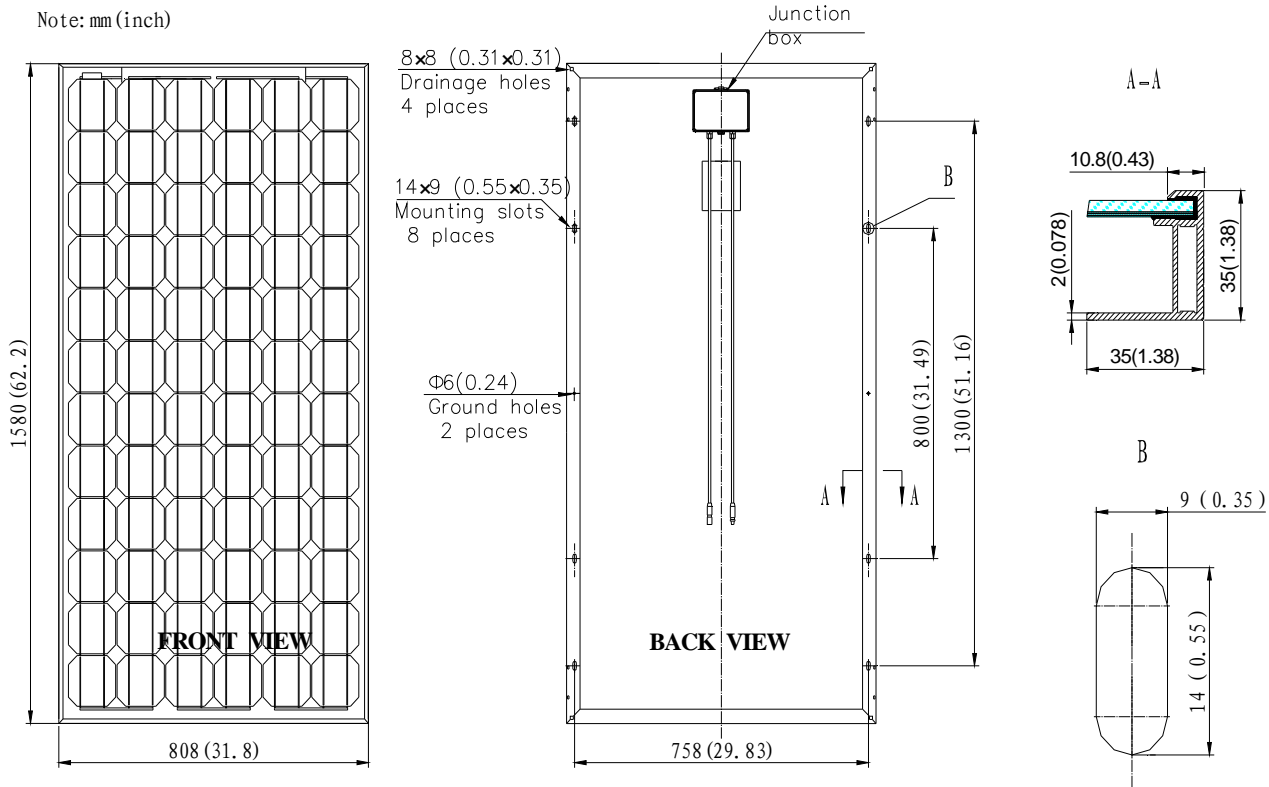
- ⚡ The electrical data relates to standard test conditions [STC]: 1,000 W/m²; AM 1,5; 25°C.
- ⚡ performance deviation of P_{mpp}: -/+ 3%. performance deviation of Voc[V],Isc[A],Vmpp [V] and Imp [A]: -/+ 10%.
- ⚡ certified in accordance with IEC 61215, IEC 61730-1/2 and UL 1703.

Specifications of CSUN 195-72M Monocrystalline solar module

Type	CSUN 205-72M	CSUN 200-72M	CSUN 195-72M	CSUN 190-72M	CSUN 185-72M
Electrical typical data					
P _{mpp} [W]	205	200	195	190	185
Voc [V]	45.6	45.3	45.1	45.0	44.8
Isc [A]	5.82	5.72	5.63	5.56	5.48
V _{mpp} [V]	38.0	37.6	37.0	36.5	35.8

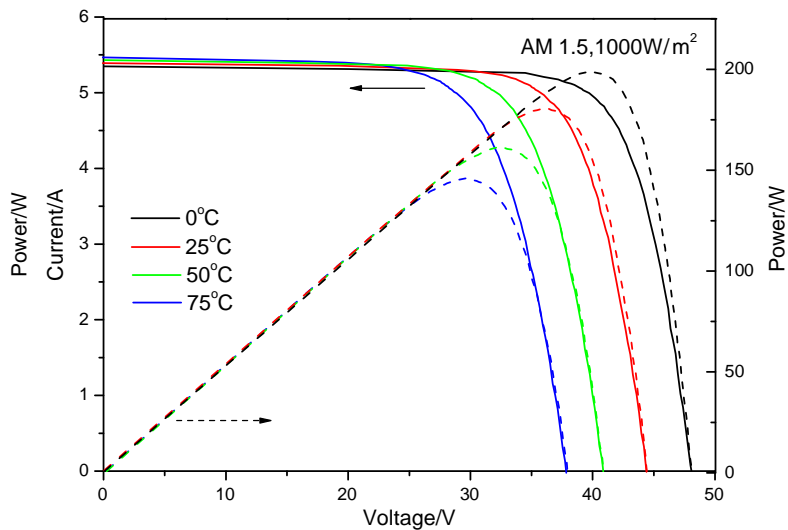
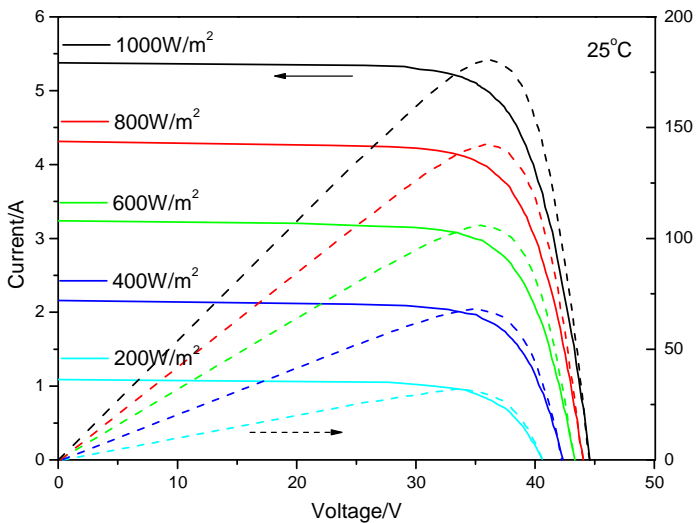
Imp _p [A]	5.40	5.32	5.28	5.21	5.17
Practical module efficiency	18.39%	17.94%	17.49%	17.05%	16.60%
Module efficiency	16.06%	15.67%	15.27%	14.88%	14.49%
Maximum system voltage [V]	1000				
Voltage temperature coefficient	-0.307%/K				
Current temperature coefficient	+0.039%/K				
Power temperature coefficient	-0.423%/K				
Series fuse rating [A]	10				
Cells	6×12 pieces monocrystalline solar cells series strings (125mm×125mm)				
Junction box	with 6 bypass diodes				
Cable	length 900 mm, 1×4 mm ²				
Front glass	White toughened safety glass, 3.2 mm				
Cell encapsulation	EVA (Ethylene-Vinyl-Acetate)				
Back sheet	composite film				
Frame	Anodized aluminum profile				
Dimensions	1580×808×35mm (L×W×H)				
Maximum surface load capacity	5400 Pa				
Hail	maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹				
Temperature range	– 40 °C to + 85 °C				

Dimensions



Note:

I-V Curves



- ⚡ The electrical data relates to standard test conditions [STC]: 1,000 W/m²; AM 1,5; 25°C.
- ⚡ performance deviation of P_{mpp}: +/- 3%. performance deviation of Voc[V],I_{sc}[A],V_{mpp} [V] and I_{mpp} [A]: +/- 10%.
- ⚡ certified in accordance with IEC 61215, IEC 61730-1/2 and UL 1703.