



# CSUN Crystalline Silicon PV Module Products Installation Manual (Version 9.5)

**Company:** CSUN Solar Tech Co., Ltd

**ADD. :** No.6, Shuige Road , Jiangning Distrist , Nanjing , P.R. China 211100

**TEL. :** +86-25-52095881

**EMAIL:** [sales@chinasunergy.com](mailto:sales@chinasunergy.com)

**WEB:** [www.csunsolartech.com](http://www.csunsolartech.com)

目录

Crystalline Silicon PV Module Products ..... 1  
(Version: July 2022) ..... 1  
1 General Information ..... 1  
2 Disclaimer of Liability ..... 1  
3 Safety Precaution ..... 2  
    3.1 General Safety ..... 2  
    3.2 Handling Safety ..... 3  
    3.3 Installation Safety ..... 3  
4 Product Identification and Current Sorting ..... 5  
(A) Product Identification ..... 5  
5 Electrical Property Parameters of Modules ..... 5  
6 Installation Instructions ..... 6  
    6.1 Installation Environment ..... 6  
    6.2 Selection of Mounting Structure ..... 6  
    6.3 Three kinds of Mounting ..... 8  
        *Recommended mounting method* ..... 8  
        (A) Roof Mounting ..... 12  
        (B) Pole Mounting ..... 13  
        (C) Ground Mounting ..... 13  
    6.4 Installation Method ..... 14  
7 Electrical Installation ..... 17  
    7.1 General With Regard to Electrical Installation ..... 17  
    7.2 Grounding ..... 18  
8 Maintenance and Care ..... 19  
9 PV recycling ..... 20

# **Crystalline Silicon PV Module Products**

## **Installation Manual (IEC Version)**

**(Version: July 2022)**

### **1 General Information**

This manual contains information regarding the installation and safe handling of the photovoltaic module (hereafter is referred to as “module”) which are produced by CSUN Solar Tech Co., Ltd., or its subsidiaries (hereinafter referred to as “CSUN”).

Installers must read and understand the manual before installation. Any questions, please contact the sales or customer service personnel of CSUN for further explanations. The installer should conform to all safety precautions in the manual and local laws & regulations when installing module; before installing a solar photovoltaic system, installers should become familiar with the mechanical and electrical requirement for such a system. CSUN has the right to refuse to compensate for the product damage due to construction or design defects of the solar photovoltaic system.

Keep this manual in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

### **2 Disclaimer of Liability**

Customers shall strictly abide by the requirements of this manual when installing the modules of CSUN. If the conditions or methods of the installation, handling, use and maintenance of the customer are beyond the range specified in this manual and cause damage, CSUN does not assume responsibility for any loss, damage or expense thus caused.

No responsibility is assumed by CSUN for any infringement of patent right or other rights of third parties, which may result from the customer’s use of the CSUN’s modules. No patent license or patent rights is granted to customer, express or implied, due to its use of CSUN’s modules.

The information in this manual is based on CSUN’s best knowledge and experience and is believed to be reliable; but such information including product specification (without limitations) and suggestions do not specifications, or product information without prior notice.

**Notification is needed while the modules are reinstalling.**

# 3 Safety Precaution

## 3.1 General Safety

- ▶ When installing the modules, it should be abided by the relevant local laws and regulations. It is need to obtain the required certificates in advance when necessary, such as the building permit.
- ▶ Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of ISC and VOC marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.
- ▶ Installing solar photovoltaic systems require specialized skills and knowledge. Installation should be performed only by qualified persons. Installers should assume the risk of all injuries that might occur during installation, such as electric shock..
- ▶ Photovoltaic modules are designed for outdoor use. Modules may be mounted on ground, rooftops, vehicles or boats. Proper design of support structures is the responsibility of the system designers or installers. Mounting holes or clamp range and numbers suggested in this manual shall be used.
- ▶ A single module may produce the direct current (hereafter is referred to as DC ) voltage of above 30V in direct sunlight and it is extremely dangerous to contact it.. Do not touch or lean on an operating module.
- ▶ Do not disconnect under load or apply paint or adhesive to module surface.
- ▶ Keep all electrical contacts clean and dry. Do not change the wiring of the bypass diodes. Do not disassemble the modules or remove any attached nameplates or components from the modules.
- ▶ Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules. Do not expose the backside of modules directly to sunlight for a long time.
- ▶ Modules should store in a dry and ventilated environment. In the storage and handing process, in case of inclement weather (rain, snow, wind, etc.), materials such as plastic film and waterproof cloth need to be covered on the packing boxes.
- ▶ During normal work, materials such as plastic film and waterproof cloth are forbidden to be covered on the glass surfaces of modules.

- ▶ Unpack the modules with packing box when they are moving on the ground . Unpacking directly when the modules are superposed is forbidden.
- ▶ Artificially concentrated sunlight shall not be directed on the module or panel.

## 3.2 Handling Safety

- ▶ Keep children and unauthorized persons away from the modules while transporting and installing them.  
Improper transportation and placing may lead to glass breakage or power loss of the modules, resulting in the loss of the use value of modules.
- ▶ Handle modules with care. Lift and put down modules gently. Do not drop modules or drop objects on the modules. Pay special attention not to collide, scratch or press the module backside when transporting and installing the modules. The double glass module should be handled more carefully. Non-slip gloves are required when handling and during installation.
- ▶ It is forbidden to pull the junction box or cables when carry or lift the modules. Carry a module by its edges with two or more persons. Increasing one or two persons lift up the middle of the panel is necessary for Non-frame module.
- ▶ Do not stack the modules for transportation. Do not set the modules down on any hard surface, which maybe cause the cells broken.
- ▶ To avoid module damage, do not place heavy objects or tools on the modules, and do not stand or step on the modules.
- ▶ Inappropriate transport and installation may damage the module. Control the vehicle speed when the road condition is relatively poor.

## 3.3 Installation Safety

- ▶ Abide by the safety regulations for all other components used in the system, including wiring and cables, connectors, solar charge controller, inverters, storage batteries, etc. Use suitable equipment, connectors, wiring and mounting system for a PV system. Use the same type modules and ensure color grade consistent as far as possible in one system.
- ▶ The modules are qualified for application class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is

anticipated (Modules qualified for safety through EN IEC 61730- 1 and -2 within this application class are considered to meet the requirements for Safety Class II).

- ▶ Do not install or handle the modules when they are wet or during strong wind.
- ▶ Modules are constructed with tempered glass, which shall be handled with care. Improper operations may cause the tempered glass breakage. If the front glass is broken or if the backsheet is burned-out, contact with any module surface or the aluminum frame can produce electrical shock, particularly when the module is wet. Broken or damaged modules must be disposed properly.
- ▶ The maximum system voltage is indicated in the nameplate. During the system installation, the maximum open circuit voltage in series cannot exceed the maximum system voltage .
- ▶ Completely cover the module with an opaque material during installation to keep electricity from being generated. Under high temperature and high humidity environment, the material component of glass surface will not cause pollution, such as rubber glue splotch, oil, printing and dyeing, etc . Contact the glass surface with bare hand is prohibited.
- ▶ Do not place the glass surface or the backsheet surface of the modules down directly on the ground in the installation site (mud, sandy land, grassland, Gobi, etc).
- ▶ Modules not used up should be stored and transported after packing in accordance with the manufacture's packing.
- ▶ Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems. Use insulated tools that are approved for working on electrical installations and always keep them dry.
- ▶ The triangle hole punched on the backside frame of the module is the drain hole which cannot be blocked.
- ▶ During modules interconnection, guarantee to fix the connecting cables to the mounting system, so as to restrict the amplitude of swing of the slack part of the wire.
- ▶ Conform to the allowable minimum bending radius of the wire ( Defination: Minimum bending radius is 12 times of times of the wire's external diameter ). Concerning to the wire with junction box, the allowable minimum bending rading radius is 10 times of OD ( diameter ). About theother minimum bending radius ,please seek help from professional installer.
- ▶ Always protect the wire with conduit where animals or children can touch it.

- ▶ Please use the connector which is specially designed for photovoltaic system and assemble it with the tools recommended or specified by the manufacturer. In case that the connector applicable to the solar photovoltaic system is required, please contact the local supplier.
- ▶ Make sure that the polarity is correct when connecting the module with inverter, storage battery or combiner box to avoid the damage of bypass diodes in the modules due to incorrect polarity.

## 4 Product Identification and Current Sorting

### (A) Product Identification

Each module has 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 at STC; weight, dimension, maximum system voltage and the fuse rating are all shown on the nameplate.
- ▶ Barcode: Each module has a unique serial number. It contains the relevant production information of the module.

### (B) Current Sorting (some products)

Each module has a specific label on either side of long aluminum frame with the following information:

- ▶ Modules are sorted by  $I_{mp}$  (current at maximum power point). Attach label of current gear with “Ix”

on

side face of modules’ long aluminum frame according to the result of sorting .”X” could be 1,2,3(3 represents the top current gear ).

- ▶ CSUN recommends connecting the same  $I_{mp}$  class modules in series in order to avoid or minimize power loss due to mismatch effects in arrays.

## 5 Electrical Property Parameters of Modules

- ▶ Under Standard Test Conditions (1, 000W/m<sup>2</sup> , AM 1.5 and 25° C (77°F) ) the electric characteristics, including  $I_{sc}$ ,  $V_{oc}$  and  $P_{max}$ , the deviation between the measured value and nominal value is within  $\pm 10\%$ .
- ▶ Under normal outdoor conditions, a module is likely to produce different current and voltage than the values measured under STC in the specification of CSUN module products. Therefore, when determining the parameters related to the power output of the module, for example, nominal voltage, conductor capacity, fuse

capacity and controller capacity, etc., refer to the values of short-circuit current and open circuit voltage of the modules, and take 125% of those values during design and installation.

- ▶ The maximum nominal voltage for all module series is 1000V or 1500V according to IEC standards. Please check it according to the nameplate .

## **6 Installation Instructions**

### **6.1 Installation Environment**

- ▶ In most applications, PV modules should be installed in a location where they will receive maximum sunlight throughout the year.
- ▶ Select a suitable location for installing the modules.(Altitude is less than 2000m)
- ▶ The module shall be installed in the place where the sunshine is adequate. The module should not be shaded at any time during its operation. During installation, the module surface shall not be partly shaded by clothes, tools, packaging materials, etc.
- ▶ Install the module in well ventilated place and guarantee that adequate natural air heat dissipation channels are provided at the back and sides of the module to ensure that the heat generated during operation is radiated in time.
- ▶ Never place the module in locations where flammable gases may be easily generated or collected.
- ▶ CSUN suggests installing the module in dry areas where the climate is moderate. In case of the special installation environments such as the seaside, farm, high humidity environment and sandstorm environment, contact the local dealer for professional support and confirmation.
- ▶ Modules connected in series should be at the same tilt and azimuth. Differing orientations or angles may cause a loss of power output due to differing amount of sunlight exposure for each module. Typically, the optimal tilt for a module is roughly the same as the installation location.
- ▶ When unpacking the modules should be installed as soon as possible and connected the combiner box to avoid connection failure . Protecting covers are advised to be used if modules are installed in the site with heavy sand or salt mist.

### **6.2 Selection of Mounting Structure**

Select a proper installation method based on the required load (See below for more detailed information). All installation methods herein are only for reference, and CSUN will not provide related mounting



components. The system installer or trained professional personnel must be responsible for the PV system's design, installation, and mechanical load calculation and security of the system.

For each installation, modules can be installed either in portrait or landscape mode. If you integrate our obsolete products and need advice, please contact CSUN Global Customer Service department for installation instructions.

- ▶ Always conform to the instruction manual and safety rules attached to the mounting system.
- ▶ The entire PV system consisting of modules must be able to withstand anticipated mechanical pressure which comes from local wind force, snow, etc.
- ▶ Drilling holes on the surface of module glass may void the warranty.
- ▶ Drilling additional mounting holes on module frames may void the warranty.
- ▶ The mounting system structure must be made of durable, corrosion-resistant and UV-resistant materials.
- ▶ Forces generated during thermal expansion and contraction of the mounting system structure shall not influence the performance and use of the module.
- ▶ The bearing surface of the mounting structure must be smooth without any twist or deformation, and the connected support frames shall be at the same height.

CSUN Standard Module Type (using 156.75 mm solar cell)	Module Dimension Length × Width × Thickness
CSUN300-60M Series (Full cell solar module)	1640mm × 992mm × 35mm 1650mm × 992mm × 35mm
CSUN400-72M Series (Full cell solar module)	1956mm × 992mm × 40mm 1960mm × 992mm × 40mm
CSUN305-60MH Series(Half cell solar module)	1670mm × 992mm × 35mm
CSUN400-72MH Series(Half cell solar module)	1988mm × 992mm × 40mm





CSUN Standard Module Type (using 158.75 mm solar cell)	Module Dimension Length × Width × Thickness
CSUN320-60MH Series (Half cell solar module)	1680mm × 1002mm × 35mm
CSUN410-72MH Series (Half cell solar module)	2008mm × 1002mm × 35mm


CSUN Standard Module Type (using 166 mm solar cell)	Module Dimension Length × Width × Thickness
CSUN370-60MH Series (Half cell solar module)	1755mm × 1038mm × 35mm
CSUN450-72MH Series (Half cell solar module)	2094mm × 1038mm × 35mm

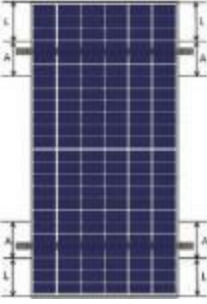
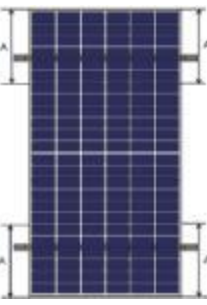
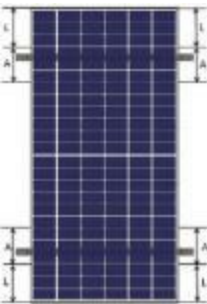
CSUN Standard Module Type (using 182 mm solar cell)	Module Dimension Length × Width × Thickness
CSUN410-54MH Series (Half cell solar module)	1724mm × 1134mm × 35(30)mm 1722mm × 1134mm × 30mm
CSUN550-72MH Series (Half cell solar module)	2279mm × 1134mm × 35mm 2278mm × 1134mm × 35mm

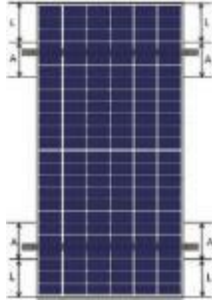
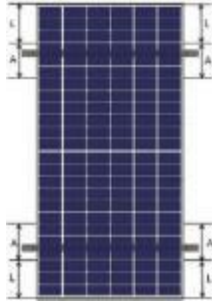
## 6.3 Three kinds of Mounting

### *Recommended mounting method*

Mounting method*	Mechanical load	Installation location	Module type
Four bolts mounting with beams underneath	Test load: Positive $\leq 6000\text{Pa}$ Negative $\leq 4000\text{Pa}$ Safety factor: 1.5		CSUN320-60 Series CSUN305-60MH Series CSUN330-60MH Series CSUN370-60H Series CSUN410-54MH Series(35mm & 30mm)**
Four bolts mounting with beams underneath	Test load: positive $\leq 5400\text{Pa}$ negative $\leq 2400\text{Pa}$ Safety factor: 1.5		CSUN320-60 Series CSUN305-60MH Series CSUN330-60MH Series CSUN370-60H Series CSUN410-54MH Series(35mm & 30mm)**
Four bolts mounting with beams underneath	Test load: positive $\leq 6000\text{Pa}$ negative $\leq 3800\text{Pa}$ Safety factor: 1.5		CSUN400-72M Series
Four bolts mounting with beams underneath	Test load: positive $\leq 6000\text{Pa}$ negative $\leq 4000\text{Pa}$ Safety factor: 1.5		CSUN400-72M Series CSUN400-72MH Series CSUN410-72MH Series CSUN450-72MH Series CSUN550-72MH Series


<p>Eight bolts mounting with beams underneath</p>	<p>Test load: positive <math>\leq 6000\text{Pa}</math> negative <math>\leq 4000\text{Pa}</math> Safety factor: 1.5</p>		<p>CSUN320-60 Series CSUN305-60MH Series CSUN330-60MH Series CSUN370-60H Series CSUN410-54MH Series(35mm &amp; 30mm)**</p>
---	--	--	--


<p>Four clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 6000\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p>L = 200mm Clamping zone: A = 200 mm</p>	<p>CSUN410-54MH Series(35mm &amp; 30mm)**</p>
<p>Four clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 2400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>	 <p>Clamping zone: A = 1/4 long frame length <math>\pm 50</math> mm</p>	<p>CSUN320-60 Series CSUN400-72MH Series CSUN305-60MH Series CSUN330-60MH Series CSUN370-60H Series CSUN410-54MH Series(35mm &amp; 30mm)**</p>
<p>Four clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 6000\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p>CSUN400-72MH Series L = 280 mm Clamping zone: A = 300 mm</p>	<p>CSUN320-60 Series CSUN400-72MH Series</p>

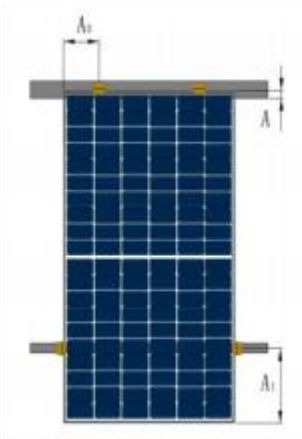
<p>Four clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p>CSUN400-72MH Series L = 300 mm CSUN320-60MH Series L = 200 mm CSUN370-60MH Series L = 200 mm CSUN410-72MH Series L = 300 mm Clamping zone: A = 200 mm</p>	<p>CSUN320-60 Series CSUN400-72MH Series CSUN305-60MH Series CSUN330-60MH Series CSUN370-60H Series</p>
<p>Four clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>	 <p>CSUN550-72MH Series L = 400 mm, clamping zone A = 250 mm</p>	<p>CSUN550-72MH Series</p>

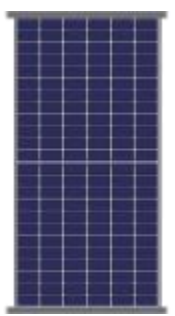
### Customized mounting method

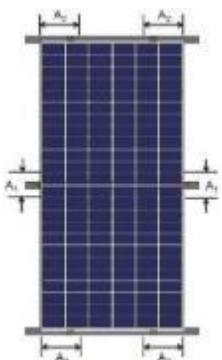
Note: The installation methods below are based on the internal evaluation results in CSUN

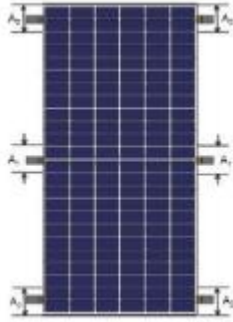
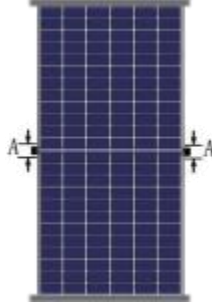
Mounting method*	Mechanical load	Installation location	Module type
<p>Four clamps short end mounting with beams parallel with long frame</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>	 <p>A0 = 1/4 short frame length <math>\pm 50\text{mm}</math></p>	<p>CSUN370-60H Series CSUN410-54MH Series (35mm &amp; 30mm)**</p>

<p>Four clamps short end mounting with beams underneath the short frame</p>	<p>Test load: positive <math>\leq 2400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>	 <p style="text-align: center;"><math>A_0 = 1/4 \text{ short frame length} \pm 50\text{mm}</math></p>	<p>CSUN410-54MH Series(35mm &amp; 30mm)**</p>
---	--	---	---

<p>Four clamps mixed mounting with beams underneath</p>	<p>Test load: positive <math>\leq 2400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>	 <p style="text-align: center;"><math>A \geq 40\text{mm};</math> <math>A_0 = 1/4 \text{ short frame length} \pm 50\text{mm};</math> For csun410-72MH Series, <math>A_1 = 360 \sim 560\text{mm}</math> For CSUN370-60HM and CSUN410-54MH Series, <math>A_1 = 280 \sim 420\text{mm}</math></p>	<p>CSUN410-72MH Series CSUN370-60H Series CSUN410-54MH Series(35mm &amp; 30mm)**</p>
---	--	--	--

<p>Short frame insertion / Slide-in</p>	<p>Test load: positive <math>\leq 2400\text{Pa}</math> negative <math>\leq 2400\text{Pa}</math> Safety factor: 1.5</p>		<p>CSUN320-60MH Series CSUN320-60MH Series CSUN370-60MH Series CSUN410-54MH Series(35mm &amp; 30mm)**</p>
---	--	---	---

<p>Six clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p style="text-align: center;">Clamping zone: <math>A_0 = 1/4 \text{ short frame length} \pm 50 \text{ mm}</math> <math>A_1 = 100 \text{ mm}</math></p>	<p>CSUN300-60M Series CSUN400-72M Series CSUN305-60MH Series CSUN400-72MH Series CSUN320-60MH Series CSUN370-60MH Series CSUN410-54MH Series(35mm &amp; 30mm)** CSUN450-72MH Series</p>
--	--	---	---

<p>Six clamps mounting with beams underneath</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p>Clamping zone: <math>A_1 = 100\text{ mm}</math> <math>A_2 = 200\text{ mm}</math></p>	<p>CSUN300-60M Series CSUN400-72M Series CSUN305-60MH Series CSUN400-72MH Series CSUN320-60MH Series CSUN370-60MH Series CSUN410-54MH Series(35mm &amp; 30mm)** CSUN410-72MH Series CSUN450-72MH Series CSUN550-72MH Series</p>
<p>Insertion installation with two clamps in the middle</p>	<p>Test load: positive <math>\leq 5400\text{Pa}</math> negative <math>\leq 3800\text{Pa}</math> Safety factor: 1.5</p>	 <p>Clamping zone A = 100mm</p>	<p>CSUN300-60M Series CSUN400-72M Series CSUN305-60MH Series CSUN400-72MH Series CSUN320-60MH Series CSUN370-60MH Series CSUN410-72MH Series CSUN450-72MH Series</p>

\* The module clamps must not come into contact with the front glass or deform the frame in any way. Avoid shading effects caused by clamps or insertion systems. Drainage holes in the module frame must not be closed or obscured by the clamps;

\*\* 35mm or 30mm represents the height of frame;

\*\*\* The mounting holes reserved for tracker mounting system with special accessories. If the length of module is over 2 meters, its mechanical load value for tracker needs to be confirmed by module supplier

## (A) Roof Mounting

- ▶ It is necessary to provide a special support frame for the roof mounting. When installing a module on a roof or building, ensure that it is securely fastened and cannot fall or be damaged as a result of strong winds or heavy snows. During roof mounting, check the building codes being used to ensure that the building and its structure where the module is installed have adequate bearing capacity. The roof needs to be penetrated during module installation and fixing shall be sealed to avoid rainwater seepage.
- ▶ To be suitable for operation, reduce steam condensation and facilitate the ventilation & heat dissipation of the module during tile installation, the module shall be parallel to the wall or roof surface of the building, and the clearance between module and surface of the wall or roof shall be at least 115mm to prevent wiring damage and to allow air circulation, ventilation and heat dissipation behind the module. During stacking type installation, the module shall be installed on the fire-resistant roof. The modules Fire Resistance Rated Class of the modules is Class C, and the modules are suitable for mounting on an above Class A roof. Do not install modules on a roof or building during strong winds.

## (B) Pole Mounting

- ▶ When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated wind power of the local area. The support rod must be constructed on a solid foundation.

## (C) Ground Mounting

- ▶ 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. The module shall be installed on the mounting system with appropriate height instead of being directly laid on the ground. In addition, assure the lowest portion of the module is placed high enough, that it is not shaded by plants or trees, and the module is not damaged by sand and stone driven by wind, or the module surface is not shaded by the mud splashed by rain water.



FIG 1 Pole mounting



FIG 2 Ground mounting

- ▶ For the roof system installed in the area that ever experienced relatively heavy snowfall or snow cover, the customer shall reinforce the mounting system at the lower frame of the module, in order to prevent the lower frame from being pressed and damaged by the falling snow, and avoid the module damage due to melt snow freezing in daytime. CSUN suggests to selecting the support reinforcing mechanism shown in Figure 3.

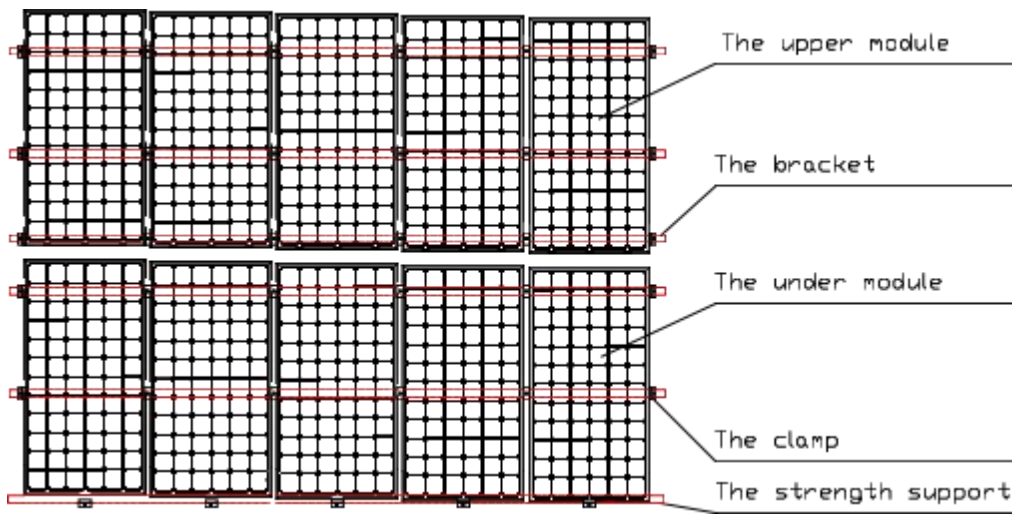


FIG 3 Schematic diagram of reinforcement mounting of module

## 6.4 Installation Method

- ▶ Concerning to modules with frame. Modules must be installed on the frame using mounting holes. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.
- ▶ The modules have been evaluated by IEC61215 standard for mechanical load design (testing load). According to the requirement of IEC61215, 1.5 times of safety parameter should be considered while calculating corresponding maximal design load .
- ▶ Normal load is suitable for the most condition of environment: The design static load for the obverse side is 1600pa, can sustain 1600pa static load, The design static load for the reverse side is 1600pa ,and can sustain 1600pa static load.
- ▶ The mounting system and other various goods & materials required (such as screw ) shall be made of durable, corrosion-resistant and UV-resistant materials.

### 6.4.1 Screw fitting:

- ▶ Using corrosion-proof screws (M8) in the existing installing holes in the module frame. The range of torque is from 16-20N.M while tightening the screw.
- ▶ Do not attempt to drill holes in the glass surface or additional mounting.
- ▶ The frame of each module has 4 mounting holes used to secure. As shown in Figure 4, four mounting holes are needed in normal .Regarding to large modules of type 72, eight mounting holes are needed or in the condition of sustaining higher load.



- ▶ The module frame must be attached to the mounting system using M8 stainless steel hardware together with spring washers and flat washers in four places symmetrical on the module. As shown in Figure 5

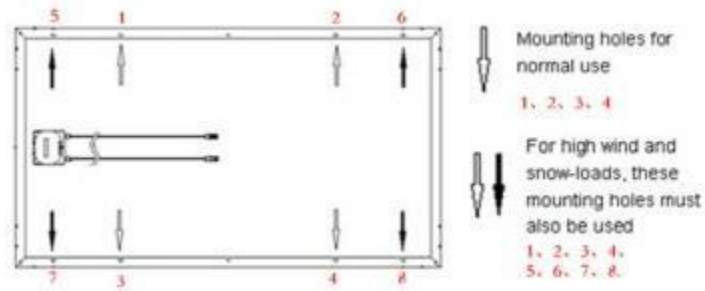


FIG 4 Mounting holes

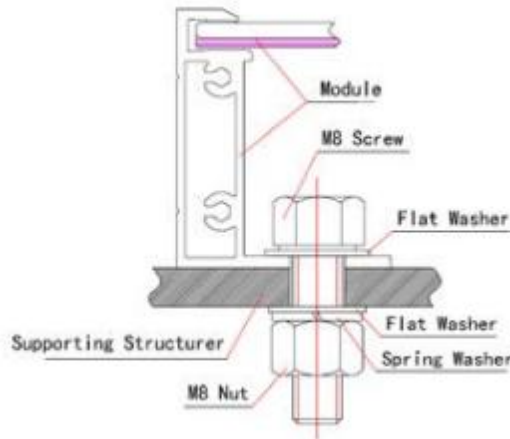


FIG5 Screw fitting method

#### 6.4.2 pressing block fixation:

- ▶ The components can be installed by pressing blocks, and the components need to be firmly fixed on the installation support through at least four pressing blocks pressed on the frame.
- ▶ The installer is responsible for confirming that the pressure block used for installation has sufficient strength.
- ▶ The pressing block used to fix the component needs to clamp the frame for at least 7mm, but it cannot contact the front glass of the component or deform the frame.
- ▶ The pressing block shall not cover the components, and the pressing block shall not block the water hole on the frame.

According to the installation value range of a and B in the figure below, the installation of long side

pressing block of conventional components can meet the requirements of nominal full load of components; (see Figure 6). The installation position is not within the required range, and the actual load will be affected.

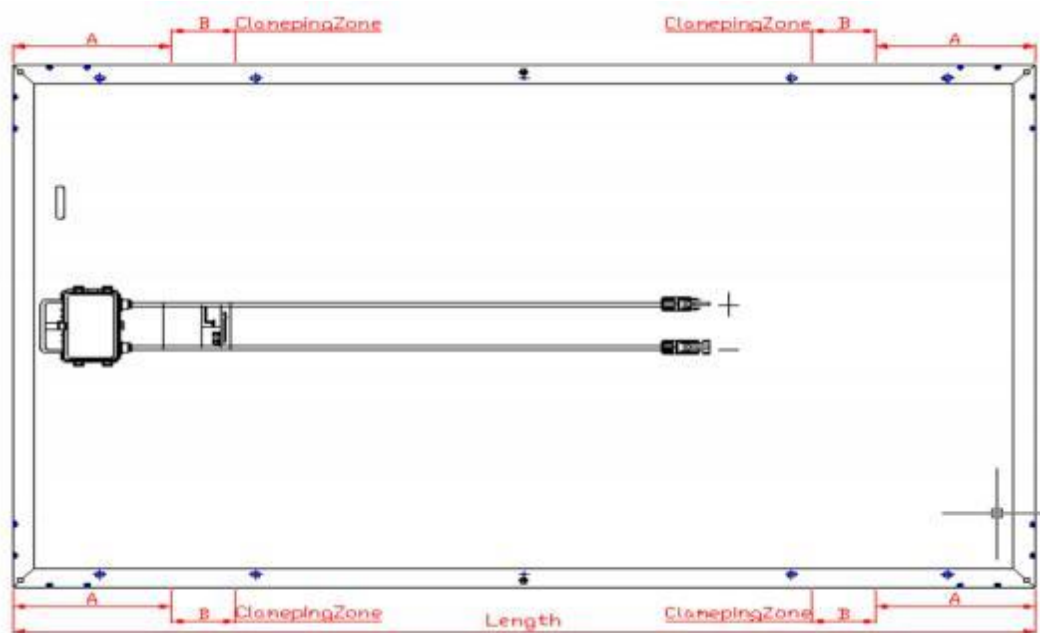


Figure 6 installation position of pressure block

Model	Component size	A: Distance from component edge to installation area	B : Installation area
CSUNxxx-60M/P	1640*992*35	250mm	100mm
CSUNxxx-72M/P	1956*992*40	400mm	100mm
CSUNxxx- 144M/P- 158	2008*1002*35	400mm	100mm
CSUNxxx- 144M/P- 166	2094*1038*35	400mm	100mm

- ▶ use a wrench for installation, and the pressure of each pressing block on the frame should not be too large to avoid potential damage to the frame. The recommended maximum pressure of each pressure block on the frame is 20MPa (2900psi).
- ▶ the installation structure of components must use corrosion-resistant and UV resistant materials. All mounting hardware (bolts, spring washers, flat washers, nuts) should be M8 size stainless steel, and the minimum recommended length of the pressure block is 50mm.

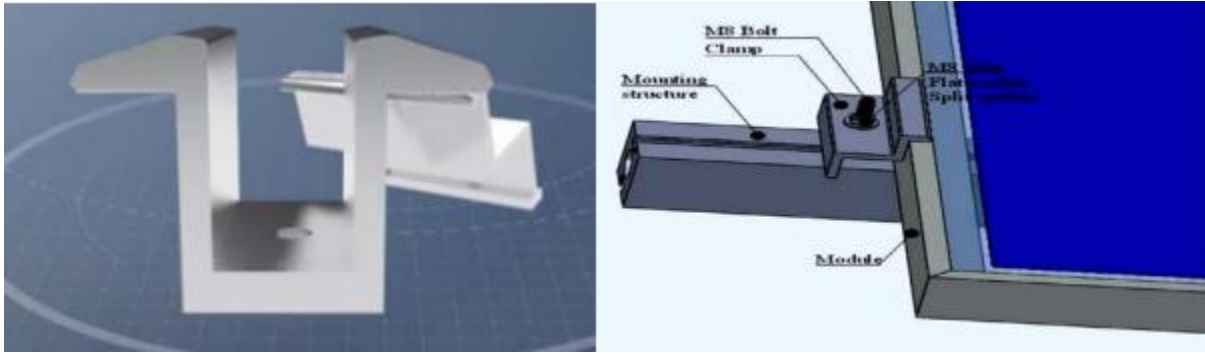


Figure 7: Standard pressing block and installation method

- ▶ a torque wrench should be used for installation, with a torque range of 14-20n • m;

**\* NOTES:**

CSUN's limited warranty will be void in cases where improper clamps or installation methods deviating from this manual are used. When installing inter-modules or end type clamps, take measures so as:

- A. Not to bend the module frame.
- B. The clips must only fix the modules by the contact with the frame. Do not allow contact between clip and glass.
- C. Not to damage the surface of the frame.
- D. When mounting, be sure that the module's drain holes are not blocked.

For matters concerning installation not mentioned in this section, contact the local dealer for professional support.

## 7 Electrical Installation

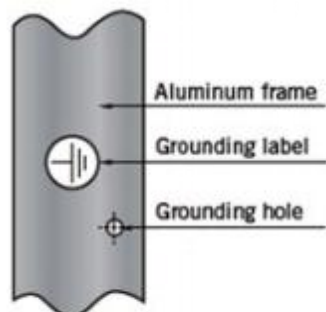
### 7.1 General With Regard to Electrical Installation

- ▶ Try to use the modules with the same configuration in the same photovoltaic system. If the modules are connected in series, the total voltage is the sum of voltages of all the modules, and the maximum number of the series modules  $(N) = V_{\max}(\text{System}) / [V_{oc}(\text{at STC})]$ .
- ▶ If the system requires the installation of high current, several photovoltaic modules can be connected in parallel, and total current is the sum of current of all the modules. The maximum number of the parallel module strings  $(N) = I_{\max}(\text{fuse rating}) / I_{sc}$ .
- ▶ When connecting modules, make sure that the connectors of the same series module shall come from the same manufacturer or totally be compatible with each others, and the same requirements shall go to the connection terminals of module end and system end, for the connectors of the different manufacturers may not be compatible with each others, which easily leads to mismatch risk.

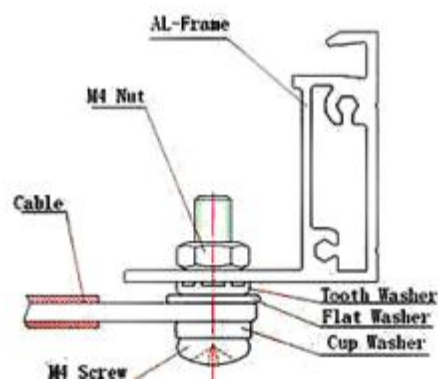
- ▶ The cross section area and connector capacity of the cable selected must satisfy the maximum short-circuit current of the system (It is recommended that the cross section area of the cable used for the single module is  $4\text{mm}^2$ , and the rated current of the connector is greater than 10A. Please note that the upper temperature limit of the cable and connector is  $85\text{C}$  and  $105\text{C}$  respectively).
- ▶ When installing the module, place the end with the junction box up and try to avoid the rain.
- ▶ Do not carry out installation in rainy weather for humidity will void the insulation protection, thus causing safety accidents.
- ▶ The module only can be used in the area which the height below 2000 meter.

## 7.2 Grounding

- ▶ All module frames and mounting racks must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent, connector for this wire.
- ▶ If the mount system is made of metal, the surface of the structure must be electroplated and have excellent conductivity.
- ▶ Proper grounding is achieved by connecting the module frame(s) and structural members contiguously using a suitable grounding conductor.
- ▶ The grounding conductor must then make a connection to earth using a suitable earth ground electrode.  
Recommend to use the ground wire accessories (lugs) connected to ground Cable. Welding ground cable to the jack of lugs, and then with the M4 screws inserted into the wiring nose ring and the grounding hole of the module frame, fastening with nuts. Star spring washers should be used to prevent the screws from loosening and lead to poor grounding.(as shown in FIG8)
- ▶ The ground resistance of the module must be less than 10 ohm.
- ▶ CSUN recommends to install modules at the temperature from  $-40^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ , and the relative humidity should be less than 85RH%. Besides, the ultimate temperature of working is from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ , If the modules are used in high-temperature and high-humidity environment, CSUN requires.  
The customer to ground the negative end of the inverter (as shown in FIG9). Offset Box or PID Box can also be used instead of the inverter.



18



12

FIG 8-a Grounding hole

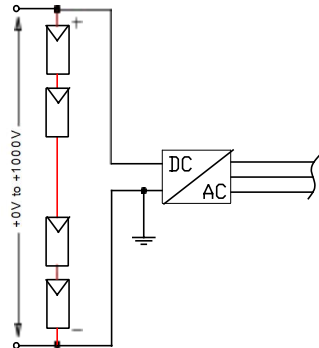


FIG 8-b Grounding method

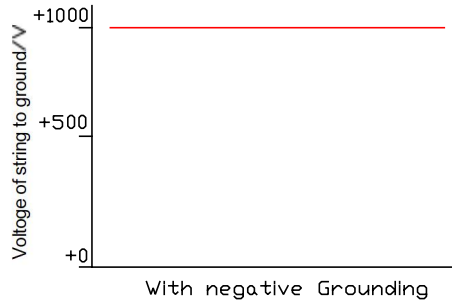


FIG 9 Schematic diagram for grounding potential of the inverter

## 8 Maintenance and Care

- ▶ Clean the glass surface on a regular basis. Avoid the hotspot risk caused by ornithocopros, leaves and dead insects covering the glass surface.
  - ▶ In general, use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.
  - ▶ Avoid pressing part of the module hard during cleaning. Such as washing modules by water torch. The strength on the module is less than 690 kPa, because pressing hard may cause glass deformation, cell damage and service life reduction. Remove the snow covered on the module in time to avoid the module damage caused by long-term accumulation of snow cover and freezing of melted snow. Remove plants and sundries surrounding the modules in time to stop them from shading modules and influencing the property.
  - ▶ 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, adjust and tighten as necessary.
  - ▶ Never clean the electrical connectors including cable, junction box and connector with the cleaning agents that contain organic matters such as alkane.
  - ▶ If any problem arises, have it investigated by a competent specialist.
- \* If the maintenance measures are not included in this manual, please contact the local dealer for professional support.

# 9 PV recycling



Meaning of crossed-out wheeled dustbin:

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.

When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge.

## Appendix: Module Electrical Rating

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
CSUNXXX-72M ( CSUNXXX-72M) Series (XXX=325-370), mono crystalline									

Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN370-72M	1000	47.5	9.9	38.9	9.52	370	20	72	21
CSUN365-72M	1000	47.4	9.79	38.8	9.41	365	20	72	21
CSUN360-72M	1000	47.3	9.67	38.6	9.33	360	20	72	21
CSUN355-72M	1000	47.1	9.57	38.4	9.24	355	20	72	21
CSUN350-72M	1000	46.9	9.49	38.2	9.17	350	20	72	21
CSUN345-72M	1000	46.7	9.41	38.0	9.09	345	20	72	21
CSUN340-72M	1000	46.5	9.38	37.9	8.89	340	20	72	21
CSUN335-72M	1000	46.3	9.32	37.8	8.79	335	20	72	21
CSUN330-72M	1000	46.1	9.23	37.7	8.72	330	20	72	21
CSUN325-72M	1000	46.0	9.12	37.6	8.62	325	20	72	21
CSUNXXX-72P ( CSUNXXX-72P ) Series (XXX=320-345), poly crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN345-72P	1000	46.5	9.6	38.2	9.04	345	20	72	21
CSUN340-72P	1000	46.3	9.5	38.1	8.94	340	20	72	21
CSUN335-72P	1000	46.2	9.37	38	8.84	335	20	72	21
CSUN330-72P	1000	46.1	9.28	37.8	8.75	330	20	72	21
CSUN325-72P	1000	46.0	9.19	37.6	8.66	325	20	72	21
CSUN320-72P	1000	45.9	9.1	37.3	8.57	320	20	72	21
CSUNXXX-60M ( CSUNXXX-60M) Series(XXX=280-305), mono crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN305-60M	1000	39.9	9.72	32.4	9.42	305	20	60	25
CSUN300-60M	1000	39.8	9.6	32.2	9.31	300	20	60	25
CSUN295-60M	1000	39.6	9.54	32	9.22	295	20	60	25
CSUN290-60M	1000	39.5	9.47	31.9	9.1	290	20	60	25
CSUN285-60M	1000	38.7	9.32	31.6	9.04	285	20	60	25
CSUN280-60M	1000	38.6	9.2	31.4	8.92	280	20	60	25

CSUNXXX- 60 P ( CSUNXXX- 60 P) Series(XXX=2 6 0 - 2 8 5), poly crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN285-60P	1000	38.6	9.49	31.6	9.02	285	20	60	25
CSUN280-60P	1000	38.5	9.36	31.4	8.92	280	20	60	25
CSUN275-60P	1000	38.4	9.27	31.3	8.79	275	20	60	25
CSUN270-60P	1000	38.3	9.19	31.2	8.67	270	20	60	25
CSUN265-60P	1000	38.2	9.1	31.0	8.55	265	20	60	25
CSUN260-60P	1000	38.1	9.01	30.9	8.43	260	20	60	25

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
CSUNXXX- 72 MH ( CSUNXXX- 72 MH) Series (XXX=3 2 5 - 3 7 0), mono crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN370-72MH	1500	47.5	9.9	38.9	9.52	370	20	72	21
CSUN365-72MH	1500	47.4	9.79	38.8	9.41	365	20	72	21
CSUN360-72MH	1500	47.3	9.67	38.6	9.33	360	20	72	21
CSUN355-72MH	1500	47.1	9.57	38.4	9.24	355	20	72	21
CSUN350-72MH	1500	46.9	9.49	38.2	9.17	350	20	72	21

CSUN345-72MH	1500	46.7	9.41	38	9.09	345	20	72	21
CSUN340-72MH	1500	46.5	9.38	37.9	8.89	340	20	72	21
CSUN335-72MH	1500	46.3	9.32	37.8	8.79	335	20	72	21
CSUN330-72MH	1500	46.1	9.23	37.7	8.72	330	20	72	21
CSUN325-72MH	1500	46.0	9.12	37.6	8.62	325	20	72	21

CSUNXXX- 72 PH ( CSUNXXX- 72 PH ) Series (XXX=3 2 0 - 3 4 5), poly crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN345-72PH	1500	46.5	9.6	38.2	9.04	345	20	72	21
CSUN340-72PH	1500	46.3	9.5	38.1	8.94	340	20	72	21
CSUN335-72PH	1500	46.2	9.37	38	8.84	335	20	72	21
CSUN330-72PH	1500	46.1	9.28	37.8	8.75	330	20	72	21
CSUN325-72PH	1500	46.0	9.19	37.6	8.66	325	20	72	21
CSUN320-72PH	1500	45.9	9.1	37.3	8.57	320	20	72	21

CSUNXXX- 60 MH ( CSUNXXX- 60 MH ) Series(XXX=2 8 0 - 3 0 5), mono crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN305-60MH	1500	39.9	9.72	32.4	9.42	305	20	60	25
CSUN300-60MH	1500	39.8	9.6	32.2	9.31	300	20	60	25
CSUN295-60MH	1500	39.6	9.54	32.0	9.22	295	20	60	25
CSUN290-60MH	1500	39.5	9.47	31.9	9.10	290	20	60	25
CSUN285-60MH	1500	38.7	9.32	31.6	9.04	285	20	60	25
CSUN280-60MH	1500	38.6	9.2	31.4	8.92	280	20	60	25

CSUNXXX- 60 PH ( CSUNXXX- 60 PH) Series(XXX=2 6 0 - 2 8 5), poly crystalline									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN285-60PH	1500	38.6	9.49	31.6	9.02	285	20	60	25
CSUN280-60PH	1500	38.5	9.36	31.4	8.92	280	20	60	25
CSUN275-60PH	1500	38.4	9.27	31.3	8.79	275	20	60	25
CSUN270-60PH	1500	38.3	9.19	31.2	8.67	270	20	60	25
CSUN265-60PH	1500	38.2	9.1	31.0	8.55	265	20	60	25
CSUN260-60PH	1500	38.1	9.01	30.9	8.43	260	20	60	25

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
CSUNXXX- 1 4 4 MH - BB ( Series( XXX= 3 9 0 - 4 2 0 ), 1 5 8 mono crystalline, BB: Full black)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN390-144MH	1500	48.5	10.12	40.6	9.61	390	20	144	25
CSUN395-144MH	1500	48.7	10.19	40.8	9.68	395	20	144	25
CSUN400-144MH	1500	48.9	10.26	41.0	9.76	400	20	144	25
CSUN405-144MH	1500	49.1	10.33	41.2	9.83	405	20	144	25

CSUN410-144MH	1500	49.3	10.40	41.4	9.91	410	20	144	25
CSUN415-144MH	1500	49.5	10.47	41.6	9.98	415	20	144	25
CSUN420-144MH	1500	49.7	10.54	41.8	10.05	420	20	144	25
CSUN385-144MH-BB	1500	48.3	10.05	40.4	9.53	385	20	144	25
CSUN390-144MH-BB	1500	48.5	10.12	40.6	9.61	390	20	144	25
CSUN395-144MH-BB	1500	48.7	10.19	40.8	9.68	395	20	144	25
CSUN400-144MH-BB	1500	48.9	10.26	41.0	9.76	400	20	144	25

CSUNXXX- 1 4 4 MH/ - BB ( CSUNXXX- 1 4 4 MH Series( XXX= 4 2 5 - 4 6 0 ), 1 6 6 mono crystalline , BB: Full black)  
Tolerance of Rated Maximum Power:  $\pm 3\%$  ; Tolerance of Rated Short Circuit Current:  $\pm 3.5\%$  ; Tolerance of Rated Open Circuit Voltage:  $\pm 3\%$  ;

CSUN425-144MH	1500	48.3	11.22	40.4	10.52	425	20	144	25
CSUN430-144MH	1500	48.5	11.30	40.6	10.60	430	20	144	25
CSUN435-144MH	1500	48.7	11.37	40.8	10.67	435	20	144	25
CSUN440-144MH	1500	48.9	11.44	41.0	10.74	440	20	144	25
CSUN445-144MH	1500	49.1	11.52	41.2	10.81	445	20	144	25
CSUN450-144MH	1500	49.3	11.59	41.4	10.88	450	20	144	25
CSUN455-144MH	1500	49.5	11.66	41.6	10.94	455	20	144	25
CSUN460-144MH	1500	49.7	11.73	41.8	11.01	460	20	144	25
CSUN415-144MH-BB	1500	47.9	11.06	40.0	10.38	415	20	144	25
CSUN420-144MH-BB	1500	48.1	11.14	40.2	10.45	420	20	144	25
CSUN425-144MH-BB	1500	48.3	11.22	40.4	10.52	425	20	144	25
CSUN430-144MH-BB	1500	48.5	11.30	40.6	10.60	430	20	144	25
CSUN435-144MH-BB	1500	48.7	11.37	40.8	10.67	435	20	144	25
CSUN440-144MH-BB	1500	48.9	11.44	41.0	10.74	440	20	144	25

CSUNXXX- 1 2 0 MH/ - BB ( CSUNXXX- 1 2 0 MH Series( XXX= 3 2 5 - 3 4 0 ), 1 5 8 mono crystalline , BB: Full black)  
Tolerance of Rated Maximum Power:  $\pm 3\%$  ; Tolerance of Rated Short Circuit Current:  $\pm 3.5\%$  ; Tolerance of Rated Open Circuit Voltage:  $\pm 3\%$  ;

CSUN325-120MH	1500	40.56	10.23	33.87	9.60	325	20	120	25
CSUN330-120MH	1500	40.84	10.30	34.13	9.67	330	20	120	25
CSUN335-120MH	1500	41.12	10.38	34.36	9.75	335	20	120	25
CSUN340-120MH	1500	41.36	10.46	34.63	9.82	340	20	120	25
CSUN320-120MH-BB	1500	40.3	10.16	33.62	9.52	320	20	120	25
CSUN325-120MH-BB	1500	40.4	10.27	33.7	9.64	325	20	120	25
CSUN330-120MH-BB	1500	40.7	10.34	34.0	9.71	330	20	120	25

CSUNXXX- 1 2 0 MH/ - BB ( CSUNXXX- 1 2 0 MH Series( XXX= 3 5 5 - 3 8 0 ), 1 6 6 mono crystalline , BB: Full black)  
Tolerance of Rated Maximum Power:  $\pm 3\%$  ; Tolerance of Rated Short Circuit Current:  $\pm 3.5\%$  ; Tolerance of Rated Open Circuit Voltage:  $\pm 3\%$  ;

CSUN355-120MH	1500	40.3	11.27	33.7	10.54	355	20	120	25
CSUN360-120MH	1500	40.5	11.35	33.9	10.62	360	20	120	25
CSUN365-120MH	1500	40.7	11.45	34.1	10.71	365	20	120	25
CSUN370-120MH	1500	40.9	11.54	34.3	10.79	370	20	120	25
CSUN375-120MH	1500	41.1	11.62	34.5	10.87	375	20	120	25
CSUN380-120MH	1500	41.3	11.70	34.7	10.95	380	20	120	25
CSUN355-120MH-BB	1500	40.3	11.27	33.7	10.54	355	20	120	25
CSUN360-120MH-BB	1500	40.5	11.35	33.9	10.62	360	20	120	25
CSUN365-120MH-BB	1500	40.7	11.45	34.1	10.71	365	20	120	25

CSUNXXX- 7 2 MH/ - BB ( CSUNXXX- 7 2 MH Series( XXX= 3 9 0 - 4 1 0 ), 1 5 8 mono crystalline , BB: Full black)  
Tolerance of Rated Maximum Power:  $\pm 3\%$  ; Tolerance of Rated Short Circuit Current:  $\pm 3.5\%$  ; Tolerance of Rated Open Circuit Voltage:  $\pm 3\%$  ;

CSUN390-72MH	1500	48.5	10.12	40.6	9.61	390	20	72	25
CSUN395-72MH	1500	48.7	10.19	40.8	9.68	395	20	72	25
CSUN400-72MH	1500	48.9	10.26	41.0	9.76	400	20	72	25
CSUN405-72MH	1500	49.1	10.33	41.2	9.83	405	20	72	25
CSUN410-72MH	1500	49.3	10.40	41.4	9.91	410	20	72	25
CSUN390-72MH-BB	1500	48.5	10.12	40.6	9.61	390	20	72	25
CSUN395-72MH-BB	1500	48.7	10.19	40.8	9.68	395	20	72	25



CSUN400-72MH-BB	1500	48.9	10.26	41.0	9.76	400	20	72	25
CSUN405-72MH-BB	1500	49.1	10.33	41.2	9.83	405	20	72	25
CSUN410-72MH-BB	1500	49.3	10.40	41.4	9.91	410	20	72	25
<b>CSUNXXX- 60 MH/ - BB ( CSUNXXX-60 MH Series(XXX=325-335) , 158 mono crystalline , BB: Full black)</b>									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN325-60MH	1500	41.04	10.21	33.44	9.72	325	20	60	25
CSUN330-60MH	1500	41.30	10.32	33.75	9.78	330	20	60	25
CSUN335-60MH	1500	41.56	10.36	34.0	9.87	335	20	60	25
CSUN325-60MH-BB	1500	41.04	10.21	33.44	9.72	325	20	60	25
CSUN330-60MH-BB	1500	41.30	10.32	33.75	9.78	330	20	60	25

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
<b>CSUNXXX- 144 M/ - BB ( Series(XXX=390-420) , 158 mono crystalline, BB: Full black )</b>									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN390-144M	1000	48.5	10.12	40.6	9.61	390	20	144	20
CSUN395-144M	1000	48.7	10.19	40.8	9.68	395	20	144	20
CSUN400-144M	1000	48.9	10.26	41.0	9.76	400	20	144	20
CSUN405-144M	1000	49.1	10.33	41.2	9.83	405	20	144	20
CSUN410-144M	1000	49.3	10.40	41.4	9.91	410	20	144	20
CSUN415-144M	1000	49.5	10.47	41.6	9.98	415	20	144	20
CSUN420-144M	1000	49.7	10.54	41.8	10.05	420	20	144	20
CSUN385-144M-BB	1000	48.3	10.05	40.4	9.53	385	20	144	20
CSUN390-144M-BB	1000	48.5	10.12	40.6	9.61	390	20	144	20
CSUN395-144M-BB	1000	48.7	10.19	40.8	9.68	395	20	144	20
CSUN400-144M-BB	1000	48.9	10.26	41.0	9.76	400	20	144	20
<b>CSUNXXX- 144 M/ - BB ( CSUNXXX- 144 M Series(XXX=425-460) , 166 mono crystalline , BB: Full black)</b>									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN425-144M	1000	48.3	11.22	40.4	10.52	425	20	144	20
CSUN430-144M	1000	48.5	11.30	40.6	10.60	430	20	144	20
CSUN435-144M	1000	48.7	11.37	40.8	10.67	435	20	144	20
CSUN440-144M	1000	48.9	11.44	41.0	10.74	440	20	144	20
CSUN445-144M	1000	49.1	11.52	41.2	10.81	445	20	144	20
CSUN450-144M	1000	49.3	11.59	41.4	10.88	450	20	144	20
CSUN455-144M	1000	49.5	11.66	41.6	10.94	455	20	144	20
CSUN460-144M	1000	49.7	11.73	41.8	11.01	460	20	144	20
CSUN415-144M-BB	1000	47.9	11.06	40.0	10.38	415	20	144	20
CSUN420-144M-BB	1000	48.1	11.14	40.2	10.45	420	20	144	20
CSUN425-144M-BB	1000	48.3	11.22	40.4	10.52	425	20	144	20
CSUN430-144M-BB	1000	48.5	11.30	40.6	10.60	430	20	144	20
CSUN435-144M-BB	1000	48.7	11.37	40.8	10.67	435	20	144	20
CSUN440-144M-BB	1000	48.9	11.44	41.0	10.74	440	20	144	20
<b>CSUNXXX- 120 MH/ - BB ( CSUNXXX- 120 MH Series(XXX=325-340) , 158 mono crystalline , BB: Full black)</b>									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN325-120MH	1000	40.56	10.23	33.87	9.60	325	20	120	20
CSUN330-120MH	1000	40.84	10.30	34.13	9.67	330	20	120	20
CSUN335-120MH	1000	41.12	10.38	34.36	9.75	335	20	120	20
CSUN340-120MH	1000	41.36	10.46	34.63	9.82	340	20	120	20
CSUN320-120MH-BB	1000	40.3	10.16	33.62	9.52	320	20	120	25
CSUN325-120MH-BB	1000	40.4	10.27	33.7	9.64	325	20	120	25
CSUN330-120MH-BB	1000	40.7	10.34	34.0	9.71	330	20	120	25
<b>CSUNXXX- 120 MH/ - BB ( CSUNXXX- 120 MH Series(XXX=355-380) , 166 mono crystalline , BB: Full black)</b>									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN355-120MH	1000	40.3	11.27	33.7	10.54	355	20	120	20
CSUN360-120MH	1000	40.5	11.35	33.9	10.62	360	20	120	20
CSUN365-120MH	1000	40.7	11.45	34.1	10.71	365	20	120	20
CSUN370-120MH	1000	40.9	11.54	34.3	10.79	370	20	120	20
CSUN375-120MH	1000	41.1	11.62	34.5	10.87	375	20	120	20
CSUN380-120MH	1000	41.3	11.70	34.7	10.95	380	20	120	20
CSUN355-120MH-BB	1000	40.3	11.27	33.7	10.54	355	20	120	20
CSUN360-120MH-BB	1000	40.5	11.35	33.9	10.62	360	20	120	20
CSUN365-120MH-BB	1000	40.7	11.45	34.1	10.71	365	20	120	20

CSUNXXX- 7 2 M/ - BB ( CSUNXXX- 7 2 M Series( XXX= 3 9 0 - 4 1 0 ) , 1 5 8 mono crystalline , BB: Full black)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									
CSUN390-72M	1000	48.5	10.12	40.6	9.61	390	20	72	20
CSUN395-72M	1000	48.7	10.19	40.8	9.68	395	20	72	20
CSUN400-72M	1000	48.9	10.26	41.0	9.76	400	20	72	20
CSUN405-72M	1000	49.1	10.33	41.2	9.83	405	20	72	20
CSUN410-72M	1000	49.3	10.40	41.4	9.91	410	20	72	20
CSUN390-72M-BB	1000	48.5	10.12	40.6	9.61	390	20	72	20
CSUN395-72M-BB	1000	48.7	10.19	40.8	9.68	395	20	72	20
CSUN400-72M-BB	1000	48.9	10.26	41.0	9.76	400	20	72	20
CSUN405-72M-BB	1000	49.1	10.33	41.2	9.83	405	20	72	20

CSUN410-72M-BB	1000	49.3	10.40	41.4	9.91	410	20	72	20
----------------	------	------	-------	------	------	-----	----	----	----

CSUNXXX- 6 0 MH/ - BB ( CSUNXXX- 6 0 MH Series( XXX= 3 2 5 - 3 3 5 ) , 1 5 8 mono crystalline , BB: Full black)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN325-60MH	1000	41.04	10.21	33.44	9.72	325	20	60	25
CSUN330-60MH	1000	41.30	10.32	33.75	9.78	330	20	60	25
CSUN335-60MH	1000	41.56	10.36	34.0	9.87	335	20	60	25
CSUN325-60MH-BB	1000	41.04	10.21	33.44	9.72	325	20	60	25
CSUN330-60MH-BB	1000	41.30	10.32	33.75	9.78	330	20	60	25

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
-------	----------------------------	------------------------------------	-------------------------------------	-----------------------------	-----------------------------	---------------------------------	-----------------------	-----------------------	------------------------

CSUNXXX- 1 5 6 MH/ ( Series( XXX= 5 8 0 - 6 0 0 ) , 1 8 2 mono crystalline)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN580-156MH	1500	53.44	13.79	45.00	12.89	580	25	156	20
CSUN585-156MH	1500	53.61	13.85	45.18	12.95	585	25	156	20
CSUN590-156MH	1500	53.79	13.91	45.36	13.01	590	25	156	20
CSUN595-156MH	1500	53.97	13.97	45.54	13.07	595	25	156	20
CSUN600-156MH	1500	54.14	14.03	45.72	13.13	600	25	156	20

CSUNXXX- 1 4 4 MH/ ( Series( XXX= 5 3 5 - 5 5 0 ) , 1 8 2 mono crystalline)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN535-144MH	1500	49.35	13.78	41.50	12.90	535	25	144	20
CSUN540-144MH	1500	49.50	13.85	41.65	12.97	540	25	144	20
CSUN545-144MH	1500	49.65	13.92	41.80	13.04	545	25	144	20
CSUN550-144MH	1500	49.80	13.98	41.95	13.12	550	25	144	20

CSUNXXX- 1 3 2 MH/ ( Series( XXX= 4 9 0 - 5 0 5 ) , 1 8 2 mono crystalline)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN490-132MH	1500	45.25	13.74	38.08	12.87	490	25	132	20
CSUN495-132MH	1500	45.40	13.82	38.23	12.95	495	25	132	20
CSUN500-132MH	1500	45.55	13.90	38.38	13.03	500	25	132	20
CSUN505-132MH	1500	45.70	13.97	38.53	13.11	505	25	132	20

CSUNXXX- 1 2 0 MH/ ( Series( XXX= 4 4 5 - 4 6 0 ) , 1 8 2 mono crystalline)									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN445-120MH	1500	41.10	13.75	34.60	12.87	445	25	120	20
CSUN450-120MH	1500	41.25	13.82	34.75	12.95	450	25	120	20
CSUN455-120MH	1500	41.40	13.89	34.90	13.04	455	25	120	20
CSUN460-120MH	1500	41.55	13.96	35.05	13.13	460	25	120	20

Model	Max. System Voltage (V DC)	Open Circuit Voltage at STC (V DC)	Short Circuit Current at STC (A DC)	Rated Voltage at STC (V DC)	Rated Current at STC (V DC)	Rated Max. Power at STC (Watts)	Max. Fuse Current (A)	Total Number Of cells	Max. No. Series module
-------	----------------------------	------------------------------------	-------------------------------------	-----------------------------	-----------------------------	---------------------------------	-----------------------	-----------------------	------------------------

CSUNXXX- 1 3 2 M ( Series( XXX= 6 4 5 - 6 7 0 ) , 2 1 0 mono crystalline ) CSUNXXX- 1 2 0 M ( Series( XXX= 5 8 5 - 6 1 0 ) , 2 1 0 mono crystalline )									
Tolerance of Rated Maximum Power: $\pm 3\%$ ; Tolerance of Rated Short Circuit Current: $\pm 3.5\%$ ; Tolerance of Rated Open Circuit Voltage: $\pm 3\%$ ;									

CSUN645-132MH	1500	45.08	18.38	37.24	17.32	645	30	132	20
CSUN650-132MH	1500	45.27	18.43	37.42	17.37	650	30	132	20
CSUN655-132MH	1500	45.46	18.46	37.61	17.42	655	30	132	20

CSUN660-132MH	1500	45.65	18.50	37.80	17.46	660	30	132	20
CSUN665-132MH	1500	45.84	18.55	37.98	17.51	665	30	132	20
CSUN670-132MH	1500	46.00	18.65	38.40	17.45	670	30	132	20
CSUN585-120MH	1500	40.96	18.37	33.82	17.30	585	30	120	20
CSUN590-120MH	1500	41.14	18.42	34.00	17.36	590	30	120	20
CSUN595-120MH	1500	41.32	18.46	34.18	17.41	595	30	120	20
CSUN600-120MH	1500	41.50	18.50	34.36	17.46	600	30	120	20
CSUN605-120MH	1500	41.68	18.56	34.54	17.52	605	30	120	20
CSUN610-120MH	1500	41.85	18.66	34.76	17.55	610	30	120	20

---