

Installation Manual of Standard Solar Modules

Version: V2.0



Safety precautions

- ✧ The manual provides information on installation and safety use of solar modules produced by Csunpower Technology (Nanjing) Co., Ltd (hereafter called Csunpower). All safety precautions and local regulations in this manual should be observed, during installation and daily maintenance.
- ✧ Only such qualified persons which had professional skills and knowledge can install modules and solar system. Please carefully read the manual before installation. The workers should be familiar with mechanical installation and electrical installation. Please carefully keep this manual, when you maintain modules or sell modules.
- ✧ For any questions, please contact with Csunpower customer service department for further explanation.

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1 PURPOSE

This manual is for Csunpower's modules (hereafter called Module), introduce safety and maintenance information of module installation. Please read this manual carefully before you install modules, follow the rules strictly during the installation.

2 DISCLAIMER OF LIABILITY

Because the use of this manual and the conditions or methods of installation, operation, use and maintenance of module are beyond Csunpower's control, Csunpower does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.

No responsibility is assumed by Csunpower for any infringement of patents or other rights of third parties, which may result from use of the module. No license is granted by implication or otherwise under any patent or patent rights.

The information in this manual is based on Csunpower's knowledge and experience and is believed to be reliable, but such information including product specification (without limitations) and suggestions do not constitute a warranty, expresses or implied. Csunpower reserve the right to change the manual, the PV produce, the specifications, or product information sheets without prior notice.

3 QUALITY ASSURANCE

Csunpower provides 12 years assurance for materials and process of modules after modules are sold. Refer to the quality agreement for specific description.

4 SECURITY AND TRANSPORTATION



Do not step on the module



Do not dismount or drop the module



Artificially concentrated sunlight shall not be directed on the module



Do not hoist on the junction boxes



Do not use pointed or sharp objects on the module



Do not bend the module with hands



Do not touch the surface of the coated glass with bare hands



Ensure that all contacts are kept clean and dry

5 MECHANICAL INSTALLATION

5.1 Site choosing

- Select a suitable location for installing the module (Altitude is less than 2000m).
- The modules should face south in northern latitudes and north in southern latitudes.
- The modules should not be solid shaded at any time.
- Do not use modules near equipment or in locations where flammable gases may be generated or collected.
- Regular modules are not design for at the seaside, module installation location should be away from the seaside at least 1 kilometer.
- The module should be installed under the following conditions:
 - Operating Temp: $-40^{\circ}\sim 85^{\circ}$
 - Storage Temp: $-40^{\circ}\sim 60^{\circ}$
 - Humidity: $\leq 85\%$
 - Wind Pressure: $\leq 2400\text{Pa}$
 - Snow Pressure: $\leq 5400\text{Pa}$
 - Corrosion resistance: except area with salt or sulfur corrosion

5.2 Mounting angle

- A string of module should be mounted at the same angle, radiation exposure varies with the Angle of installation, it will cause current difference, which lead to lower operating efficiency of the whole system.
- Mounting angle please refer to table 1

table 1

latitude	Mounting angle
$0^{\circ}\sim 15^{\circ}$	$= 15^{\circ}$
$15^{\circ}\sim 25^{\circ}$	$= \text{Latitude}$
$25^{\circ}\sim 30^{\circ}$	$= \text{Latitude} + 5^{\circ}$
$30^{\circ}\sim 35^{\circ}$	$= \text{Latitude} + 10^{\circ}$
$35^{\circ}\sim 40^{\circ}$	$= \text{Latitude} + 15^{\circ}$
$> 40^{\circ}$	$= \text{Latitude} + 20^{\circ}$

5.3 Module mounting

- General rules
 - The module mounting structure must be made of durable, corrosion-

resistant and UV-resistant material.

- Modules must be securely attached to the mounting structure.
- In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time. In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.
- Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the frame of the module is generally recommended.
- Observe the linear thermal expansion of the module frames (the recommended minimum distance between two modules is 2cm).
- Always observe the instructions and safety precautions included with the module support frames.
- Do not attempt to drill holes in the glass surface or the frames of the modules as this will void the warranty.
- Before installing modules 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.
- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated winds for the area.

➤ Installation methods

- Modules can be installed on the frame by the following 3 methods:
 - ✓ Mounting hole system: use corrosion free M8 bolt, module can be installed on the support frame through the installation holes on its own frame, show in figure1
 - ✓ Clamping system: choose the right fixture to fix the module on the support frame, show in figure2
 - ✓ Insertion system: Insert the whole module into the rail, show in figure3

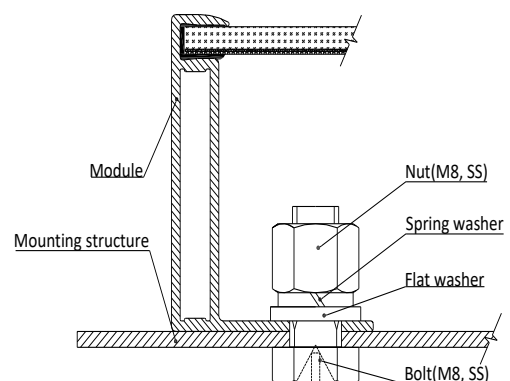
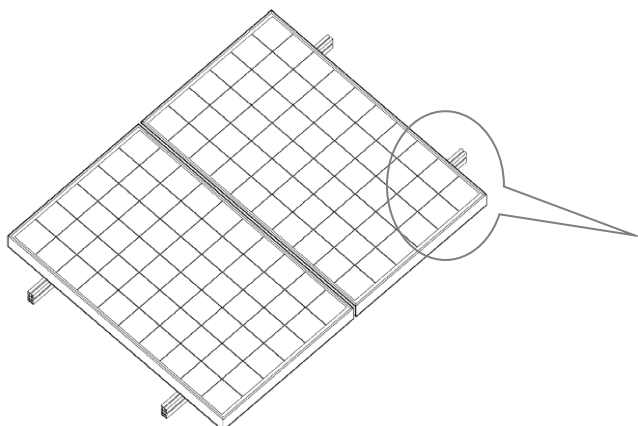


figure 1

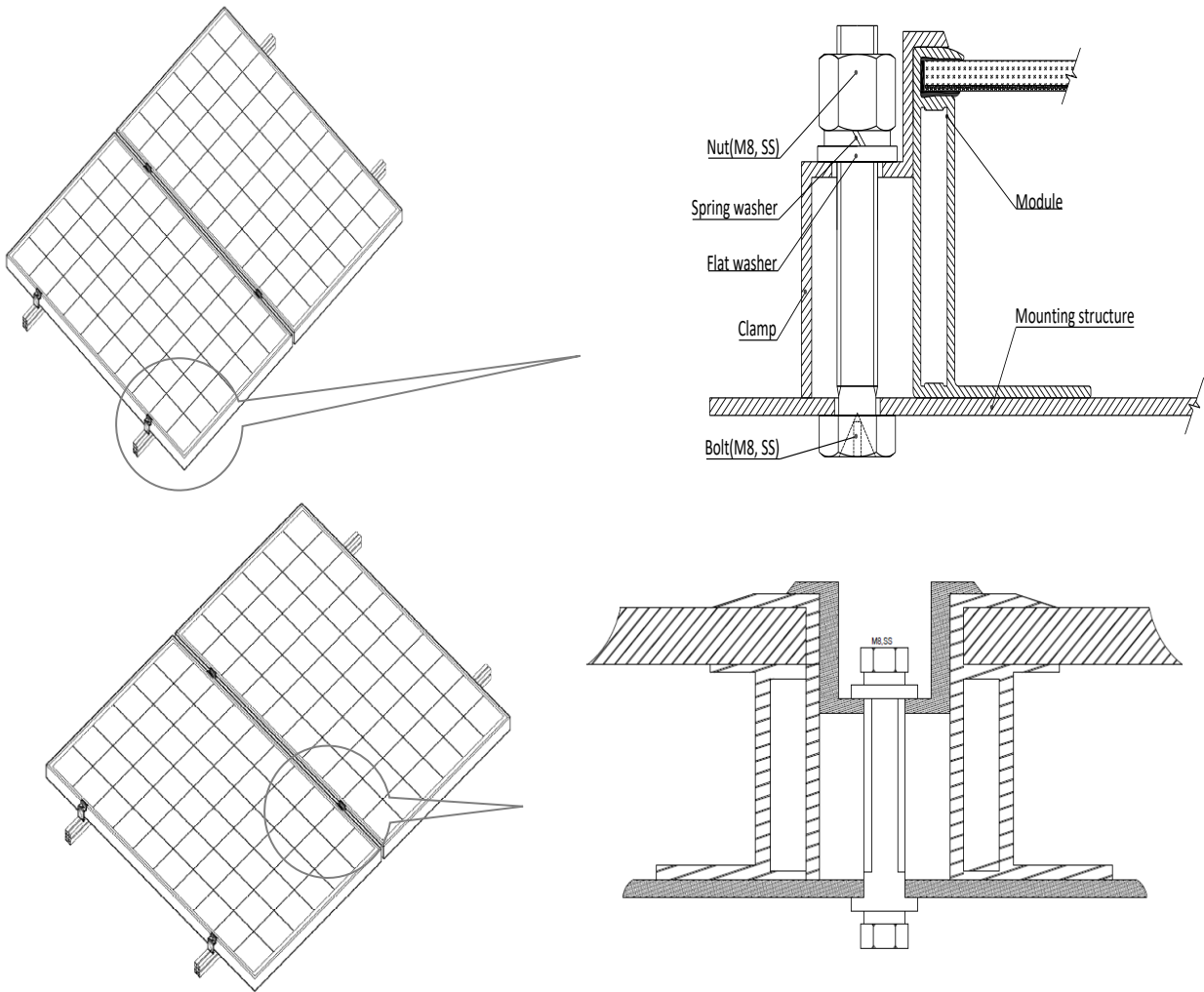


figure2

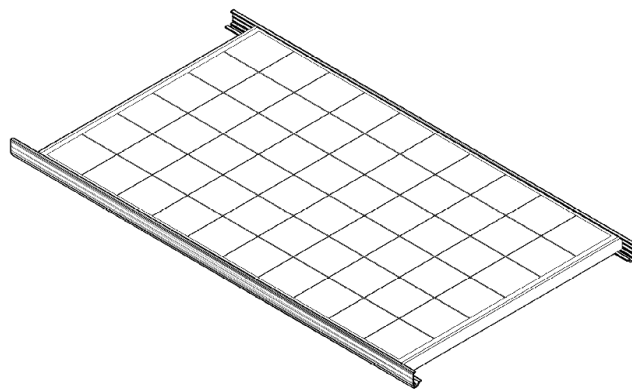
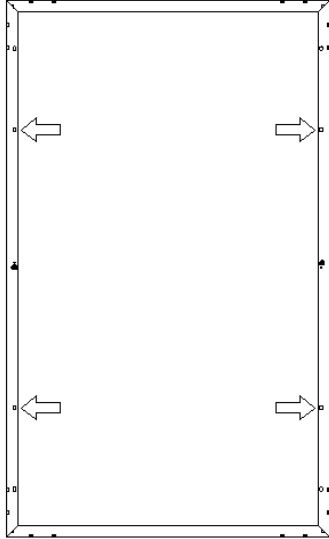
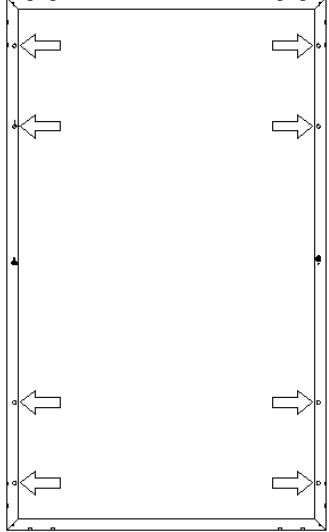
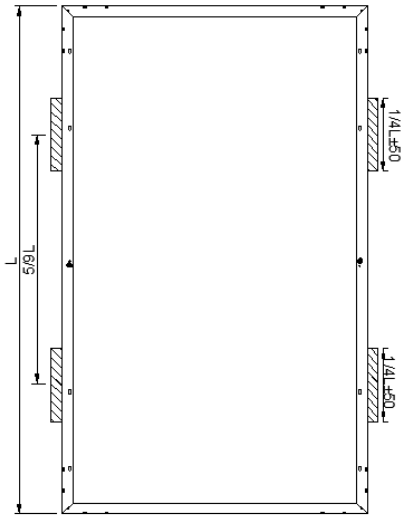
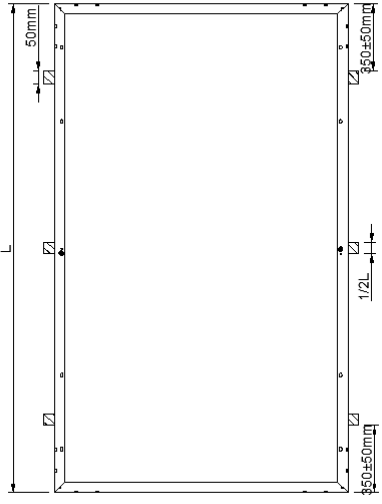
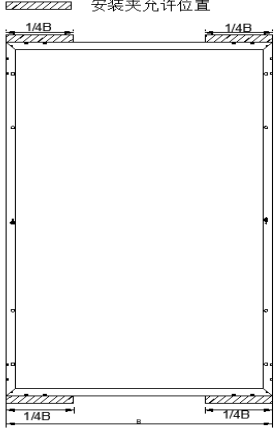
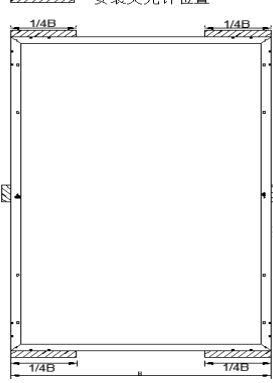
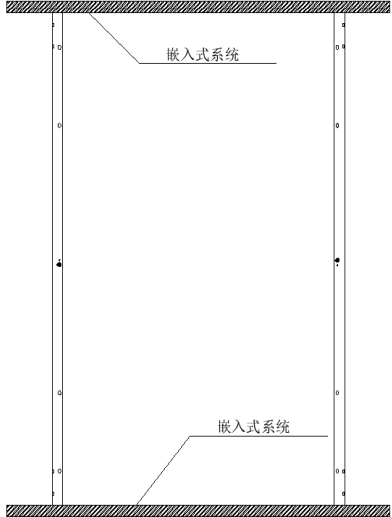
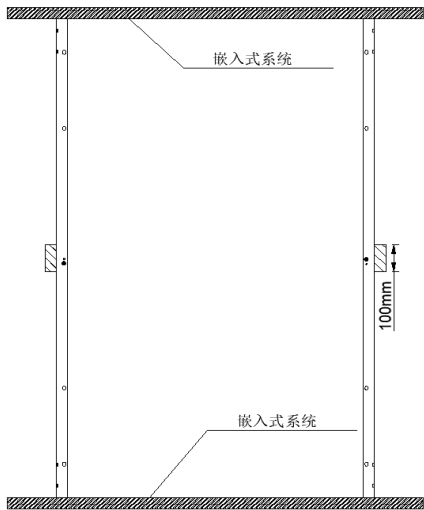
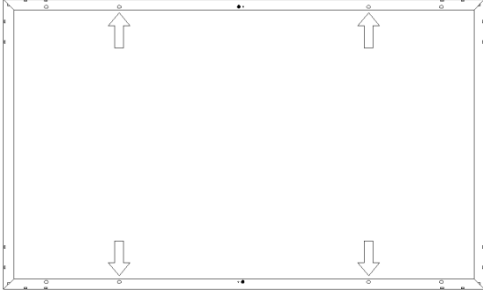
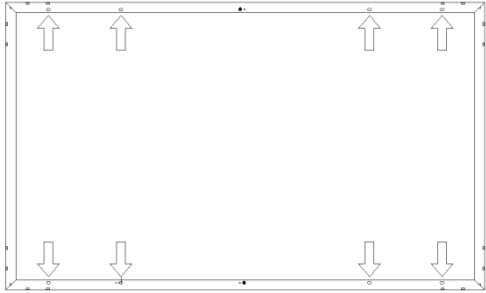
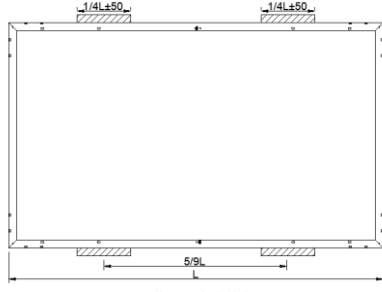
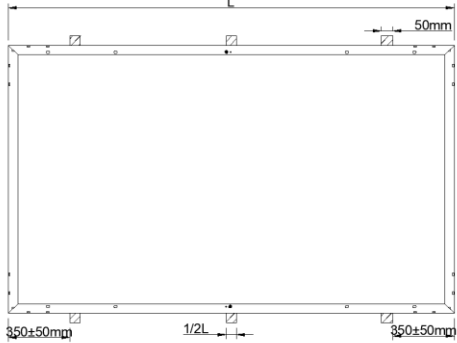
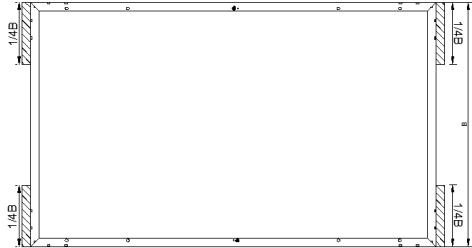
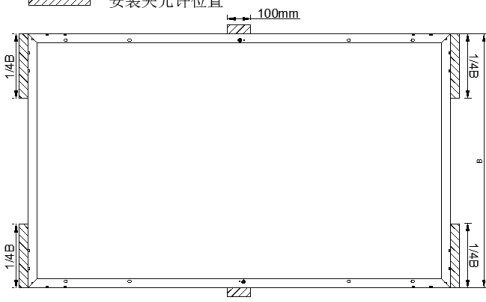


figure3

- Select the proper installation method depending on the load, please refer to figure4 for details (width of clamp $\geq 40\text{mm}$):

Standard solar module install method		
	2400 Pa (1.0 times safety factor) /1600 Pa (1.5 times safety factor)	5400 Pa (1.0 times safety factor) /3600 Pa (1.5 times safety factor)
Screw fitting	 <p>使用四个安装孔</p>	 <p>使用八个安装孔</p>
Clamping system Attachment to the long module side	<p>■ allow position for Fixture ▨ 安装夹允许位置</p>  <p>使用四个安装夹</p>	<p>■ allow position for Fixture ▨ 安装夹允许位置</p>  <p>使用六个安装夹</p>

<p>Clamping system Attachment to the short module side</p>	<p>■ allow position for Fixture</p> <p>安装夹允许位置</p>  <p>使用四个安装夹</p>	<p>■ allow position for Fixture</p> <p>安装夹允许位置</p>  <p>短边使用四个安装夹 长边使用两个安装夹</p>
<p>Insertion system</p>	<p>■ allow position for Fixture</p> <p>嵌入式系统</p>  <p>嵌入式系统</p>	<p>■ allow position for Fixture</p> <p>安装夹允许位置</p>  <p>嵌入式系统</p> <p>100mm</p> <p>嵌入式系统</p>

Standard solar module install method		
	2400 Pa (1.0 times safety factor) /1600 Pa (1.5 times safety factor)	5400 Pa (1.0 times safety factor) /3600 Pa (1.5 times safety factor)
Screw fitting	 <p>使用四个安装孔</p>	 <p>使用八个安装孔</p>
Clamping system Attachment to the long module side	<p>allow position for Fixture</p> <p>▨ 安装夹允许位置</p>  <p>使用四个安装夹</p>	<p>allow position for Fixture</p> <p>▨ 安装夹允许位置</p>  <p>使用六个安装夹</p>
Clamping system Attachment to the short module side	<p>allow position for Fixture</p> <p>▨ 安装夹允许位置</p>  <p>使用四个安装夹</p>	<p>allow position for Fixture</p> <p>▨ 安装夹允许位置</p>  <p>短边使用四个安装夹 长边使用两个安装夹</p>

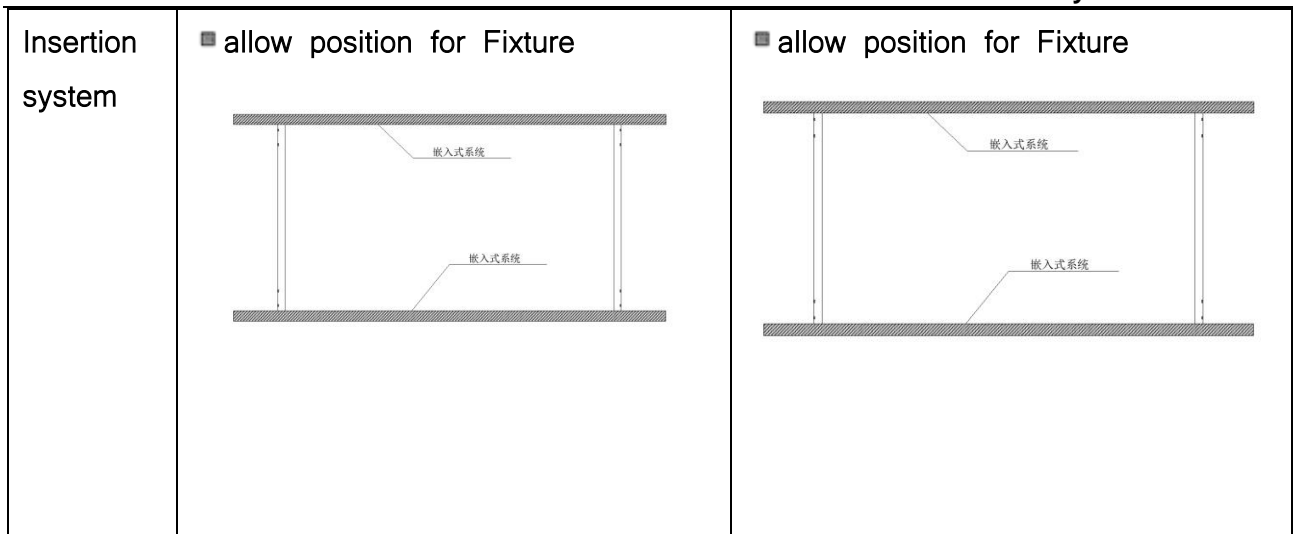


figure4

Notes : The module has passed IEC61215 mechanical loading tests of 2400Pa(1.0 times safety factor)/1600Pa(1.5 times safety factor) and 5400Pa(1.0 times safety factor)/3600Pa(1.5 times safety factor) on existing 8 installing holes.

➤ Module specification (shown in figure5, table2 and table3)

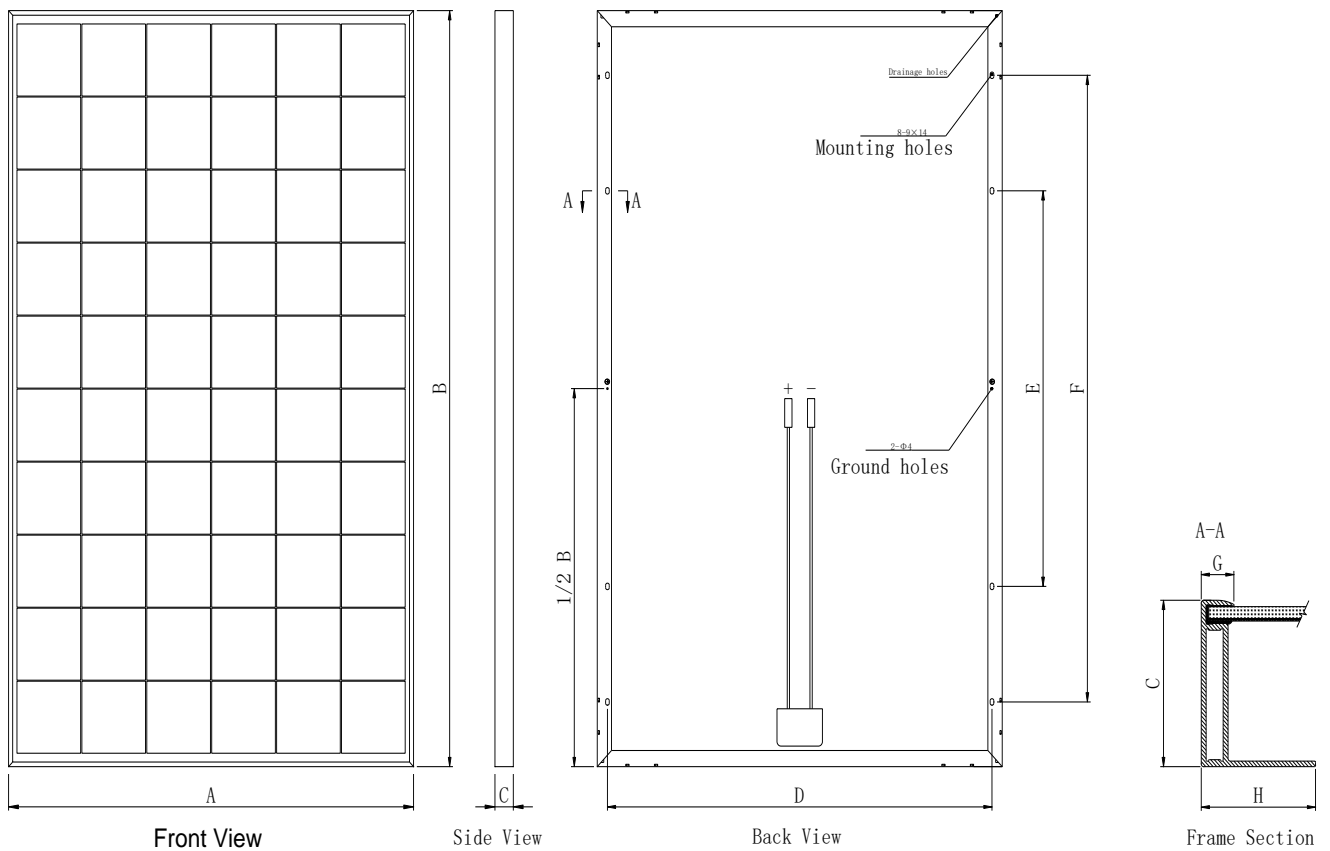


figure5

Table2

No.	Cell Type	Module Type	A	B	C	H	Weight (kg)	System voltage
1	166mm*83mm Half Cell Standard Module	CSP17-72HBxxxW	1038	2094	35	35	23.5	1500V
2		CSP17-72HxxxW	1038	2094	35	35	23.5	1500V
3		CSP17-60HBxxxW	1038	1755	35	35	19.5	1500V
4		CSP17-60HxxxW	1038	1755	35	35	19.5	1500V
5	158.75mm*79.375mm Half Cell Standard Module	CSP16-72HBxxxW	1002	2008	35	35	22.7	1500V
6		CSP16-72HxxxW	1002	2008	35	35	22.7	1500V
7		CSP16-60HBxxxW	1002	1684	35	35	18.7	1500V
8		CSP16-60HxxxW	1002	1684	35	35	18.7	1500V
9	182mm*91mm Half Cell Standard Module	CSP18-72HxxxW	1134	2279	35	35	28.5	1500
10		CSP18-66HxxxW	1134	2094	35	35	26.3	1500

Note1: "XXX" means power value

Note2: PV module classification of various kinds of modules product by Csunpower is Grade II.

Table3 Electrical properties at STC

module type/s	CSP17-72H	CSP17-72H	CSP17-72H	CSP17-72H
Pmax (±3%) [W]	435	440	445	450
VPmax [V]	40.5	40.7	40.8	41.0
IPmax [A]	10.74	10.82	10.90	10.98
Voc (±3%) [V]	49.0	49.2	49.4	49.6
Isc (±3%) [A]	11.31	11.39	11.46	11.53

module type/s	CSP17-60H	CSP17-60H	CSP17-60H	CSP17-60H
Pmax (±3%) [W]	360	365	370	375
VPmax [V]	33.6	33.9	34.2	34.4
IPmax [A]	10.70	10.76	10.82	10.89
Voc (±3%) [V]	40.7	41.0	41.3	41.6
Isc (±3%) [A]	11.24	11.30	11.37	11.45

module type/s	CSP17-72HB	CSP17-72HB	CSP17-72HB	CSP17-72HB
Pmax (±3%) [W]	415	420	425	430
VPmax [V]	39.70	39.90	40.10	40.30
IPmax [A]	10.46	10.53	10.60	10.67
Voc (±3%) [V]	48.20	48.40	48.60	48.80
Isc (±3%) [A]	11.03	11.1	11.17	11.24

module type/s	CSP17-60HB	CSP17-60HB	CSP17-60HB	CSP17-60HB
Pmax (±3%) [W]	340	345	350	355
VPmax [V]	32.50	32.80	33.00	33.30
IPmax [A]	10.47	10.53	10.61	10.66
Voc (±3%) [V]	39.60	39.80	40.10	40.40
Isc (±3%) [A]	10.99	11.05	11.11	11.18

module type/s	CSP16-72H	CSP16-72H	CSP16-72H	CSP16-72H
Pmax (±3%) [W]	400	405	410	415
VPmax [V]	40.3	40.5	40.7	40.9
IPmax [A]	9.92	10	10.07	10.15
Voc (±3%) [V]	49	49.2	49.4	49.6
Isc (±3%) [A]	10.45	10.52	10.59	10.66

module type/s	CSP16-60H	CSP16-60H	CSP16-60H	CSP16-60H
Pmax (±3%) [W]	330	335	340	345
VPmax [V]	33.8	34	34.2	34.5
IPmax [A]	9.76	9.85	9.94	10
Voc (±3%) [V]	40.6	40.7	41.1	41.2
Isc (±3%) [A]	10.39	10.48	10.55	10.56

module type/s	CSP16-72HB	CSP16-72HB	CSP16-72HB	CSP16-72HB
Pmax (±3%) [W]	390	395	400	405
VPmax [V]	40	40.1	40.3	40.5
IPmax [A]	9.75	9.86	9.92	10
Voc (±3%) [V]	48.5	48.7	49	49.2
Isc (±3%) [A]	10.3	10.37	10.45	10.52

module type/s	CSP16-60HB	CSP16-60HB	CSP16-60HB	CSP16-60HB
Pmax (±3%) [W]	320	325	330	335
VPmax [V]	33.4	33.6	33.8	34
IPmax [A]	9.58	9.67	9.76	9.85
Voc (±3%) [V]	40.3	40.4	40.6	40.7
Isc (±3%) [A]	10.2	10.3	10.39	10.48

module type/s	CSP18-72H	CSP18-72H	CSP18-72H	CSP18-72H
Pmax (±3%) [W]	545	540	535	530
VPmax [V]	42.38	42.16	41.93	41.70
IPmax [A]	12.86	12.81	12.76	12.71
Voc (±3%) [V]	50.01	49.90	49.78	49.65
Isc (±3%) [A]	13.69	13.64	13.60	13.55

module type/s	CSP18-66H	CSP18-66H	CSP18-66H	CSP18-66H
Pmax (±3%) [W]	495	490	485	480
VPmax [V]	38.17	37.99	37.81	37.67
IPmax [A]	12.97	12.90	12.83	12.76
Voc (±3%) [V]	45.46	45.33	45.20	45.07
Isc (±3%) [A]	13.86	13.79	13.72	13.65

STC: Irradiance 1000W/m², module temperature 25°C, AM1.5.

Table4 Temperature characteristic

Type	Monocrystalline Silicon
Temperature coefficient of Pmax	-0.33%/°C
Temperature coefficient of Voc	-0.27%/°C
Temperature coefficient of Isc	+0.56%/°C
Normal Operating Cell Temperature (NOCT)	45±2°C

6 ELECTRICAL INSTALLATION

DC power generated by PV system can be converted to AC power, connected to the Grid. Policies to the Grid connected renewable energy system vary from region to region. Please turn to senior system design engineer for relevant information before you start to design the PV system.

Usually, you should get a formal approval from local public utilities sector before you start it.

➤ General Rules

- Installation structure should be compatible with Aluminum frame of module, in order to avoid galvanic corrosion.
- Negative grounding is recommended during installation of Module to prevent PID effect.
- Positive and negative part of the module should use the same type of connector for electrical connection.
- All electrical components should have ratings equal or greater to the system rating. Do not exceed the maximum allowable system, voltage as listed on the module label.
- 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.
- To prevent discharge in the process of dismantling conductor, you must use an opaque material to completely cover the modules.
- PV system only installed by certified professionals, module can generate a current under light, non-professionals not familiar with safety regulations may be subject to the risk of electric shock, etc.
- Always use the same type of module in a PV system. While connected in series, voltage of each string should below maximum system voltage (show in figure6). Recommended maximum series module configurations: $1500\text{ V}/(1.25*V_{oc})$, please refer to table 3.
- While connected in parallel, the output current is equal to the sum of current of each string (show in figure7). Use a fuse in each string of module; please refer to the application requirements locally. Recommended maximum parallel module configurations: $\text{Fuse rating}/(1.25*I_{sc})$, please refer to table 3.

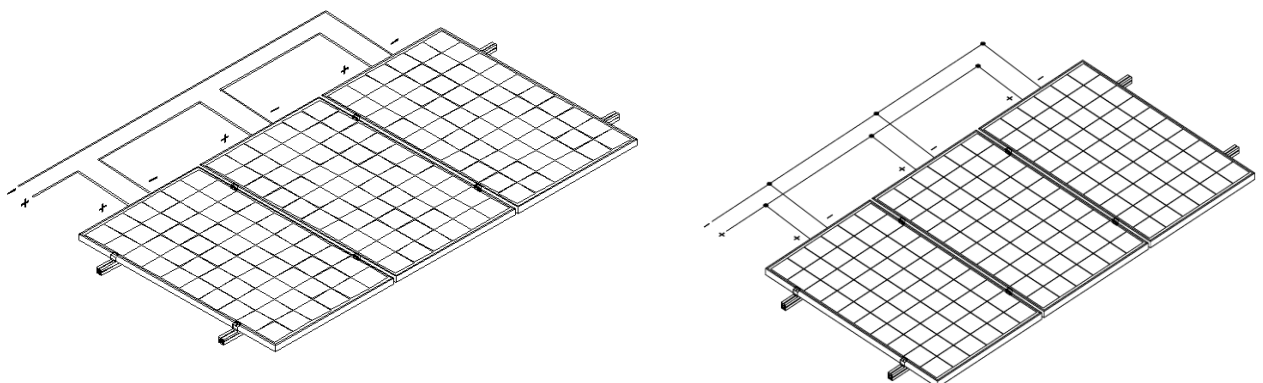


figure6 (series)

figure7 (parallel)

- Please refer to local regulations to determine the system wires size, type and temperature.
- The cross-section area of cable and the capacity of connector must be selected to suit the maximum system short circuit current, otherwise the cable and connector will be overheated under large current. Please pay attention: the temperature limit of cables is 85℃ and the temperature limit of connector 105℃.
- During the installation, make sure the connectors, inverters and other electrical components in a disconnected.
- In order to reduce lightning damage, keep the loop as small as possible while laying cable. Recommended that each string using the fuse protection device.

7 GROUNDING

- Installation with connecting nose and bolts
 - All frame and mounting structure are required to grounding in accordance with the National Electrical Code.
 - While using metal structure, please make sure its surface has been electroplating treated, to keep a good conducting circuit.
 - Choose a proper grounding conductor, connecting frame with the mounting structure, effectively grounding.
 - Grounding conductor must be connected to ground via a suitable ground electrode (Lugs recommended). Mounting frame should also be grounding without bolts and nuts electrically connecting to module frame.
 - Striping the grounding wire to proper length, do not hurt the metal core during, insert it into the lug, fastening the screw then. Follow figure8 use bolt to connect lug to the frame. Recommended M3 screw assembly is 2.3 N•m.

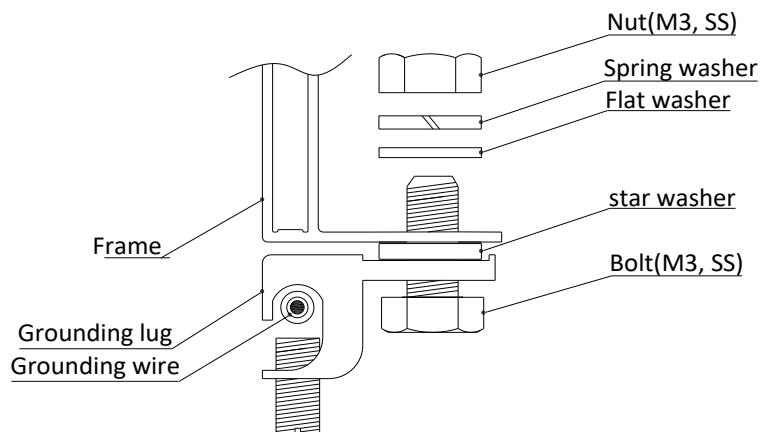


figure8

8 BYPASS DIODE AND BLOCK DIODE

In system with more than 2 strings of module, while one module shaded and others under light, overload Isc will cause overheat of cell to damage the modules.

By-pass diodes are required to protect each string of the module from the effect of shading. Do not try to open the j-box by yourself to change diode even if it breaks down, turn to professionals for help, the information of bypass diode.

Blocking diodes are used between battery and module to prevent damage on module while discharge.

9 MAINTENANCE

Module under normal circumstances no maintenance. Here we recommend the following maintenance methods to ensure the best performance of module:

- In most conditions, the rain can be enough to keep the glass clean.
- Clean the glass surface of the module when required. Always use clean water and a soft sponge or cloth for cleaning. Mild, non-abrasive cleaning agent may be used to remove stubborn dirt.
- Do not try to clean a module with broken glass or perforated back sheet, it will cause serious electrical shock.
- Regulation inspection every 6 month for grounding, mechanical and electrical connections. Make sure all connectors clean, reliable, no damage or corrosion happened.
- You must use an opaque material to completely cover the module during maintenance. If you need electrical or mechanical inspection or maintenance, it is recommended to have a licensed, authorized professional carry out the job to avoid hazards of electric shock or injury.

Guidelines for Module Cleaning:

- Properly trained personnel, Skilled workers who understand the risks of applying water to electrical components should clean modules.
- Personnel shall wear appropriate Personal Protective Equipment (PPE) during cleaning like Helmet, Glasses, Hand Gloves and Safety Shoes to avoid accidents and injury.
- The ideal time for cleaning of modules is during low light conditions when production is lowest and module temperature is equal to ambient temperature.
- Fresh water (TDS < 500) may be used to clean the modules.
- PH of water should be Neutral.

- Water pressure must not exceed 25 to 35 bar at the nozzle.
- Do not use water that is more than 25°C warmer or colder than module surface temperature.
- Do not spray pressurized water directly at sealed interfaces of module like junction box, edge seal, and connectors.
- Do not brush or clean backside of module to avoid stress to lead wires or junction box.
- In case of excessive soiling, a non-conductive nylon or similar material brush, sponge may be used with caution.
- Frequency of module cleaning cycle is once in month.
- In excessive soiling condition, modules cleaning can be done twice a month.
- Do not walk on modules or pressure on module surface.
- Soft Microfiber cloth with handle available in market suitable for solar module cleaning can be used.
- Ensure brushes or agitating tools are not abrasive to glass, aluminium.
- Make ensure that any brushes used, or agitating tools are of non-conductive materials to minimize risk of electric shock.



Warning: Before any electrical maintenance, you should firstly shut down the system, any improper maintenance can lead to electric shock or injury.

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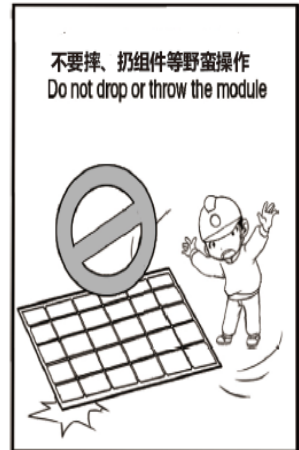
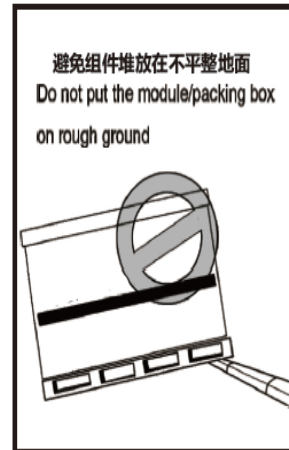
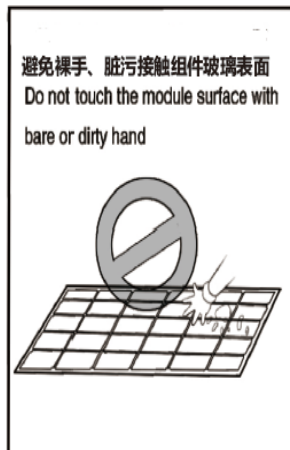
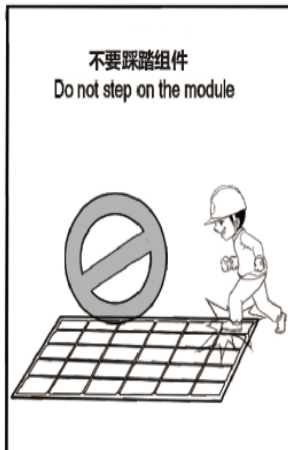
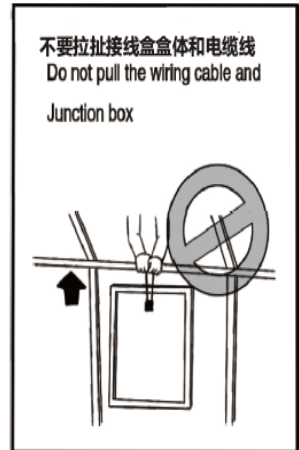
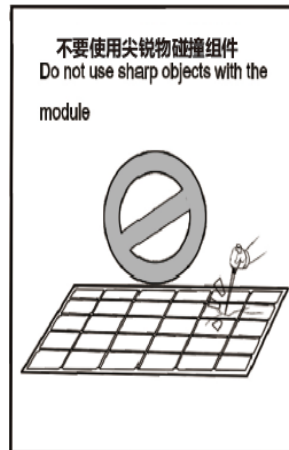
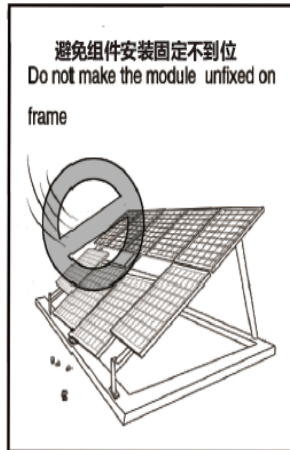
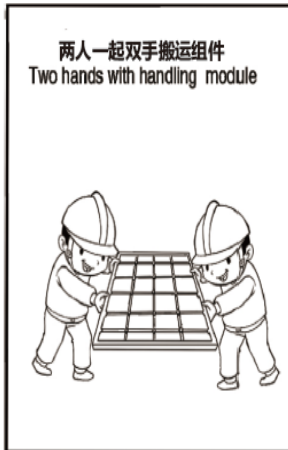
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10 APPENDIX

Module Installation Warning

光伏组件搬运安装须知

PV Module Carry And Installation Instructions



免责声明：
组件上有易碎的玻璃面板和电池片，用户在安装搬运过程中，应该按照“光伏组件搬运安装须知”小心作业，不正确的搬运安装所导致的组件破损、组件内部电池片的损坏等损失，由用户自己承担。
Disclaimer
There are fragile glass surface and silicon cells in the PV module. During the carry and installation process, user should follow "PV Module Carry And Installation Instructions" to handle the module carefully. Any module damage /cell damage caused by mishandling are born by user own.

Disclaimer : Due to the damage caused by illegal operations , Csunpower does not offer any assurance of quality.