



## Max Power Solar Installation Manual for PV Modules

### 1. General Information

This Installation manual contains information regarding the installation and the safe handling methods of the photovoltaic module (hereafter referred to as “module”) supplied by Oz Power Products Pty Ltd T/A Max Power Solar (MPS). System users and installers should read and understand this manual before handling or installing the modules. Before installing solar photovoltaic systems, the mechanical and electrical requirements for the total system should be checked as well. Keep this manual in a safe place for future reference. This document does not constitute a warranty, expressed or implied. Installations are carried out at the installers own risk.

The installer should consider every safety precaution specified in this manual, and the appropriate local codes when installing a module. Max Power Solar modules are tested and certified for installation in Australia.

The company reserves the right to make changes to the product specifications or installation manual without prior notice.

### 2. Safety and General Rules

- 1) There is a serious risk of various types of injury occurring during the installation.
- 2) Modules should only be installed and maintained by a qualified and licensed electrician with Clean Energy Council Solar PV accreditation.
- 3) Contact local authorities to determine local laws, permits and codes to make sure your installation is fully compliant.
- 4) DANGER! Danger due to electric shock! A solar module generates electricity and voltage even at a low intensity of illumination. Arcing can occur when contacts in a live electrical circuit are physically disconnected. This can result in grave or mortal injury. The severity increases when several modules are connected.
- 5) Appropriate safety practices, suitable protective clothes and safety equipment must be used.
- 6) Appropriate safety practices and equipment for working at heights must be used.
- 7) Make sure to strictly follow the local and national regulations for work safety and accident prevention.
- 8) Observe local regulations concerning fire protection classification for rooftop installations.
- 9) Do not work under rain, snow, hot or windy conditions.
- 10) Use proper electrically rated insulated tools and do not use wet tools.
- 11) Do not drop tools or hard objects on PV modules.
- 12) Make sure flammable gases are not generated near the installation site. Do not install the modules near open flame and flammable materials. Solar modules are not explosion-proof operating equipment.
- 13) Completely cover the PV module surface with an opaque material during the entire installation and wiring of the PV module. Only then is the module is reliably de-energised.
- 14) Make sure the PV connectors are tightly sealed and connected properly. Do not disconnect or unplug the PV connectors when the solar system is under load. Ensure that the modules are first disconnected from the inverter prior to opening any contacts in the solar installation. Be certain to observe the time intervals specified by the manufacturer after switching off the inverter and prior to starting subsequent work such that the energized components can be discharged.
- 15) Do not work alone. Always work with a team of at least two people.
- 16) For series connections, make sure the maximum open circuit Voltage is less than the specified maximum system voltage and use a safety factor of 1.25.
- 17) For parallel connections, make sure cables are connected according the Australian electrical wiring standards and take proper measures to prevent reverse current flows. Use a safety factory of 1.25.
- 18) MPS modules have original MC4, and the same connectors must be use for installation.
- 19) Panels must not be installed flat and need a minimum tilt of 5 degrees.



- 20) Do not expose PV modules to concentrated sunlight with mirrors or lenses.
- 21) The PV panels are primarily made of glass and should be handled with caution.
- 22) In the case that the glass surface of the PV modules is broken, make sure to be using the appropriate safety precautions for the safe removal of the panels.
- 23) Solar panels must be installed in accordance with AS-5033 Installation of PV arrays. Other relevant standards are AS-3000 Electrical Wiring Rules, AS-1768 Lightning Protection, AS-1170.2 Wind Loads, AS-4777 Grid Connections of Energy Systems via Inverters.
- 24) Do not twist the frame of the module or subject the module to mechanical stress as the glass or solar cells may break.
- 25) Do not stand or step on the module. Do not drop or place objects on the modules.
- 26) Be very careful with the back of the module as the delicate thin solar cells may break.
- 27) Do not scratch or hit the back sheet of the module or damage it.
- 28) Do not scratch the aluminum frame as it will cause corrosion of the frame.
- 29) Do not rest the module on its unprotected edges.
- 30) Do not pull the cables on the junction box.
- 31) Do not lift the modules by the cables or by the junction box.
- 32) Do not touch the contacts or exposed terminals.
- 33) Do not open the junction box under any circumstances.
- 34) Do not over bend the output cable as the insulation may break down.
- 35) Do not drill holes in the aluminum frame.
- 36) Do not touch the PV module with bare hands as the frame has sharp edges and may cause injury.
- 37) During installation at heights, there is a danger that tools, panels or other materials could fall.
- 38) Keep children and unauthorised people away from the modules and work site.
- 39) Carry out work so that people are not endangered and that no damage can occur.
- 40) The solar panels, tools and other materials must be dry during installation.
- 41) Bind cables to ensure cables are not drooping behind the panels.
- 42) Make sure cables are not exposed to direct sunlight as they could be UV damaged.
- 43) Store the modules in cool dry areas.
- 44) Do not install damaged modules.
- 45) Ensure that adequate ventilation exists below the module to help avoid elevated module temperatures.
- 46) Do not expose the modules to chemicals.
- 47) Do not place the modules in standing water. The junction box is splash-proof only.
- 40) The modules are not suitable for mobile usage or for indoor installations.
- 41) Observe the local requirements for functional grounding or earthing.
- 42) Observe the local requirements and regulations for lightning protection.
- 43) Ensure a safety factor of 1.25 when determining permitted voltages for components.
- 44) Keep the water drains clear.
- 45) Do not install modules where a portion could be in a permanent shade, this will cause hot spots.
- 46) Do not expose cables to direct sunlight after installation.
- 47) Modules must be installed over strong structure with proper fire resistance when mounted on roofs.
- 48) Installation site should have operation temperature -20 to 46 Celsius.
- 49) The maximum working temperature range is -40 to 82 Celsius.
- 50) Foreign metals mounted on the module may cause corrosion.
- 51) Each module has 2 single conductor cables, negative and positive.
- 52) Ensure cables are not damaged when secured to the mounting structure.

### 3. Maintenance

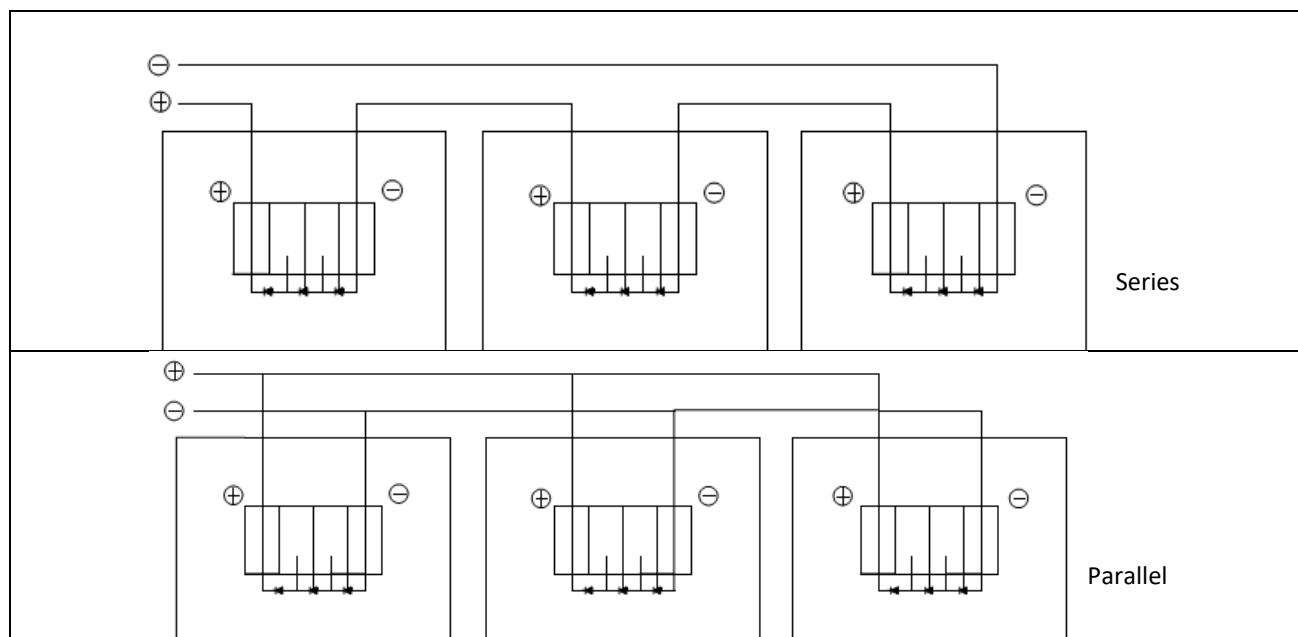
Under normal circumstances, a well-designed PV system should operate trouble free over its entire operational life, and it requires minimal maintenance. However, system performance and reliability can be improved by taking some simple steps. We encourage you to periodically inspect the PV array, just as you might do for a typical roof inspection and it is the user’s responsibility to report to the supplier regarding any damages found. Panels perform better when they are clean and shade free.

### 4. Connections

Rated electrical characteristics of module such as  $I_{sc}$ ,  $V_{oc}$  and  $P_{max}$  are measured under Standard Test Conditions (STC). Standard Test Conditions are: 1000 W/m<sup>2</sup> Irradiance, 25°C Cell Temperature and 1.5 Air Mass. Under normal conditions, photovoltaic modules may produce higher current and/or voltage than reported at Standard Test Conditions. Hence, consider an additional safety factor of 1.25 on  $I_{sc}$  and  $V_{oc}$  values marked on modules, when determining component voltage ratings, conductor capacities, fusing sizes, and size of controls connected to the modules output. Modules can be configured in series and/or parallel.

Series configuration: module voltages will add up when they are connected in series. The maximum quantity of modules in one string depends on the local temperature, maximum system voltage etc.

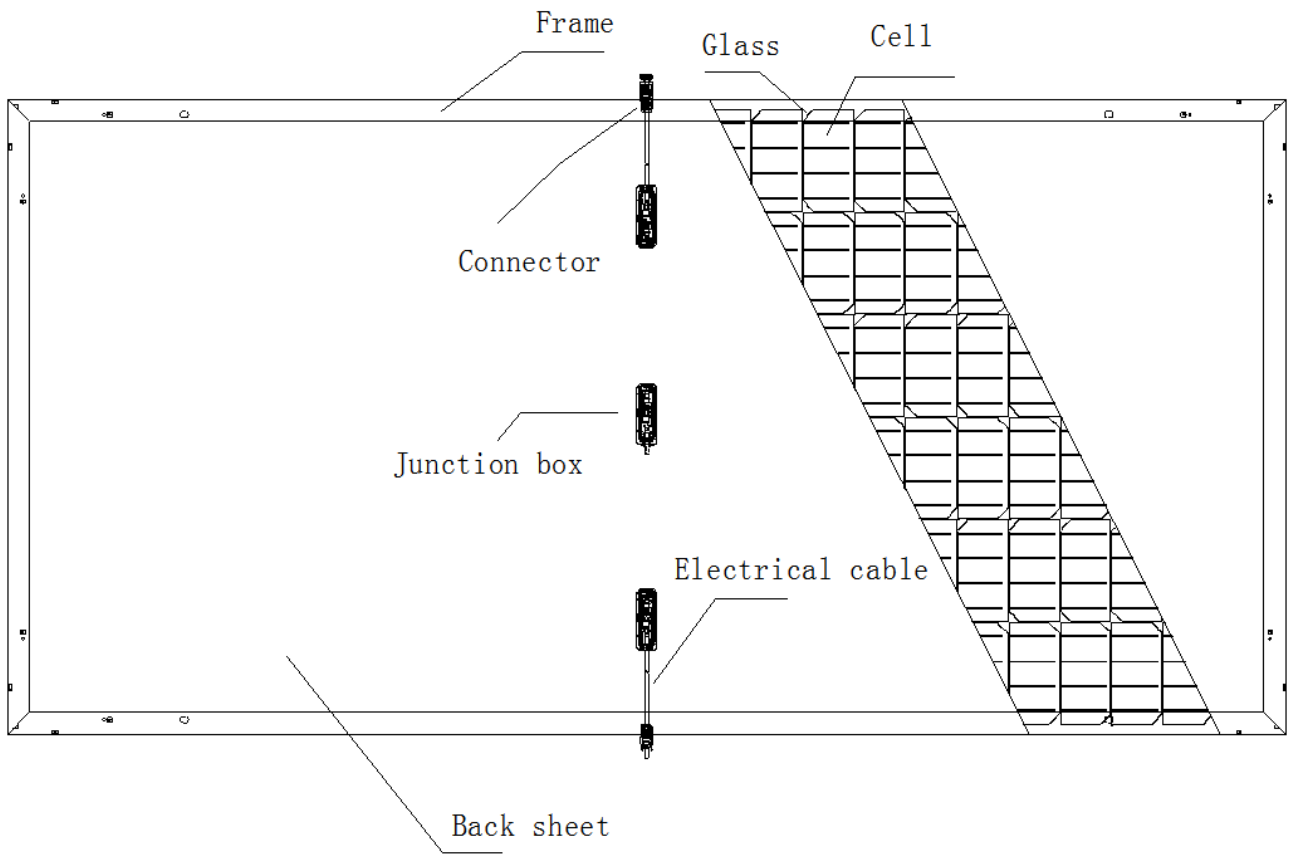
Parallel configuration: module currents will add up when they are connected in parallel. Modules with different electrical characteristics must not be connected directly in series.



### 5. Bypass Diodes

There are bypass diodes in the module junction box, wired in parallel with the PV cell strings. To limit modules heating and performance losses in the case of partial shading, the diodes bypass the current generated by the non-shaded cells. Be aware that bypass diodes are not over-current protection devices. Do not attempt to open the junction box. In the event of a known or suspected diode failure, installers or maintenance providers should contact Max Power Solar.

## 6. Module Components

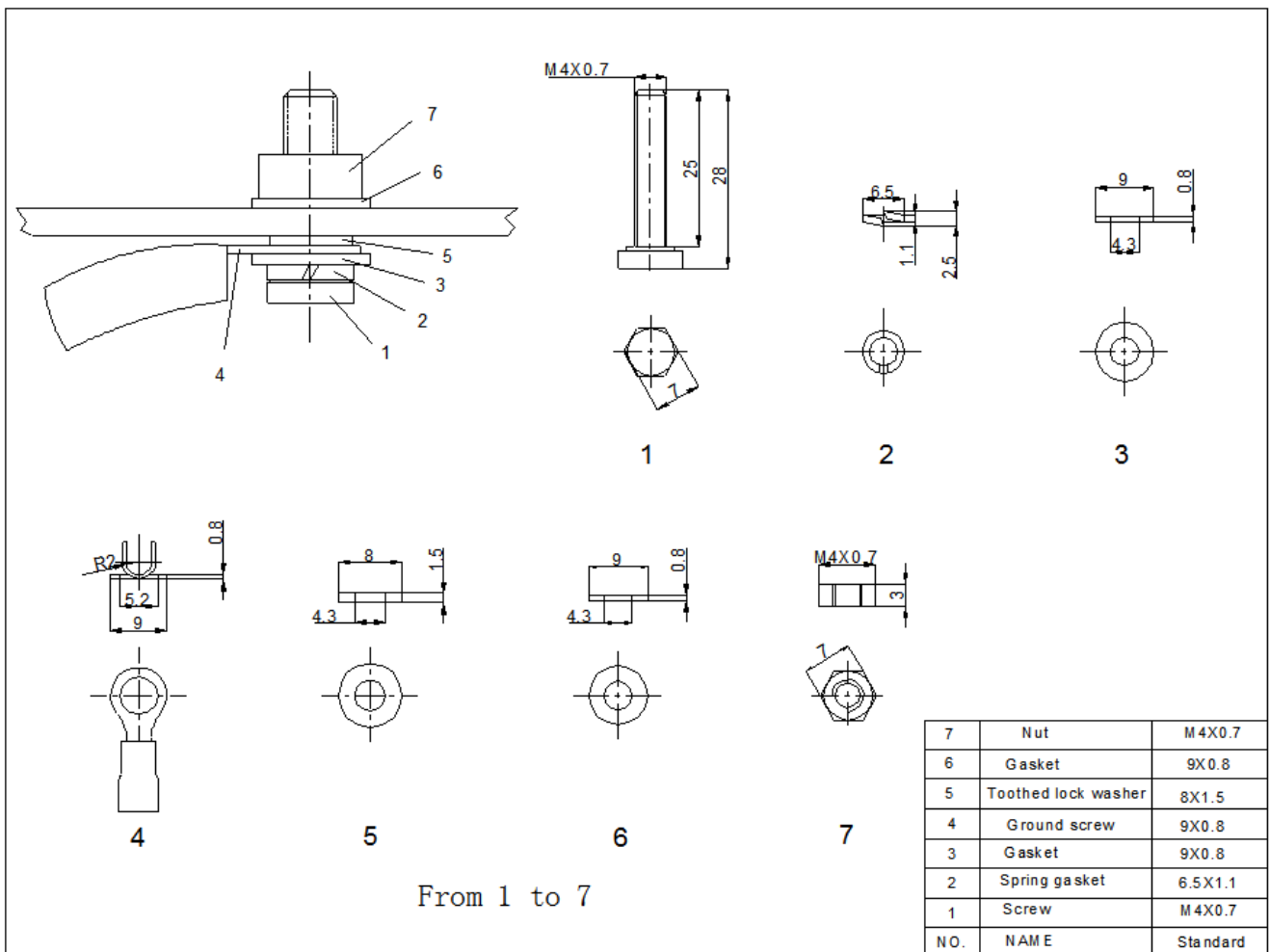


## 7. Grounding or Earthing

Earthing the solar array is mandatory in Australia, removal of one module must not affect the grounding for the rest of the system.

Each PV module has grounding holes. Do not drill additional grounding holes in the frame. The negative pole of the module must be grounded. Otherwise, the module warranty may be void.

An example of acceptable ground connection using a screw, nut (hardware not provided) and washer retaining a ground screw is shown in figure 4. The size of the grounding cable should be decided by the professional person who responsible for electrical installation. In a connection of this type, the hardware (such as a toothed locked washer/star washer) must score the frame surface to make positive electrical contact with the frame. The ground wire must be considered within the requirement of local and regulation at the site of installation. If steel parts used for grounding purpose, steel parts must be plated, painted or enamelled for protection against corrosion before usage.





### **8. Installation on Pitched Roof**

The tilt angle of the PV module is the angle between the PV module and a horizontal ground surface. The PV module generates the maximum output power when it faces the sun directly. In the Southern Hemisphere, the PV modules should typically face north. We recommend 5 degrees as minimum to keep dirt and water off the module surface.

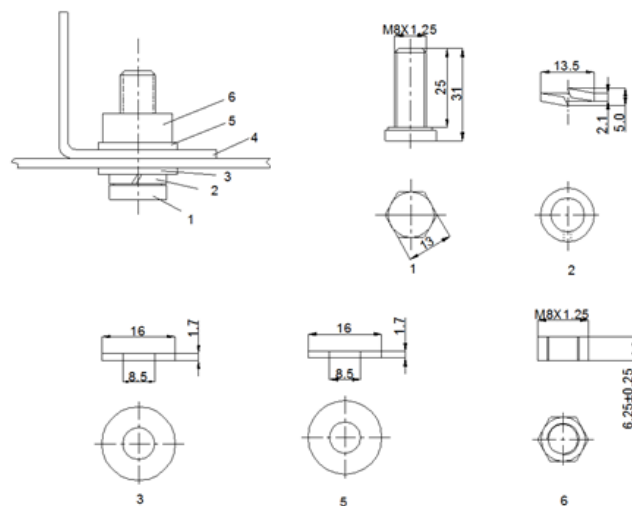
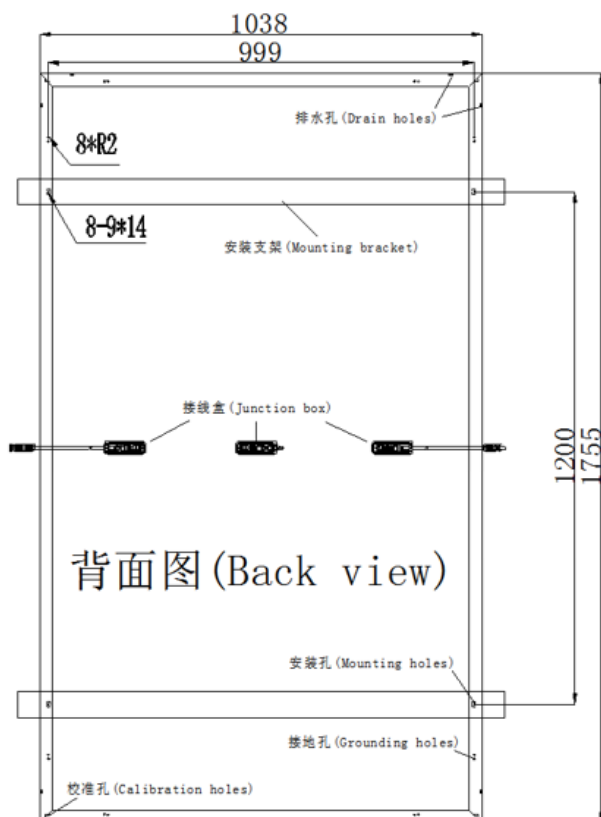
### **9. Installation Sites.**

The modules should not be installed in areas where hail, snow, sand, and air pollution are excessive. Nor should they be sited in locations where aggressive substances such as salt, mist, chemically active vapors, acid rain and other corrosive agents could affect the safety and performance of modules.

Max Power Solar modules have passed the salt mist corrosion test according to IEC60701. But corrosion may occur in the module frame connecting to the clamping and grounding section when other metal parts are clamped on to the modules. These parts shall be prepared with anti-corrosion treatment before usage.

**10. Installation of 120/166mm Cells Modules - MPS-370M60 & MPS-370M60B**

The modules may be fastened to a support using the bolt holes in the bottom of the frame at location “C”, as shown in Figure 1 (back view of the module), Figure 2 (mounting detail) and Figure 3 (parts detail). The modules have 4 mounting holes to be installed with four (4) M8 bolts.



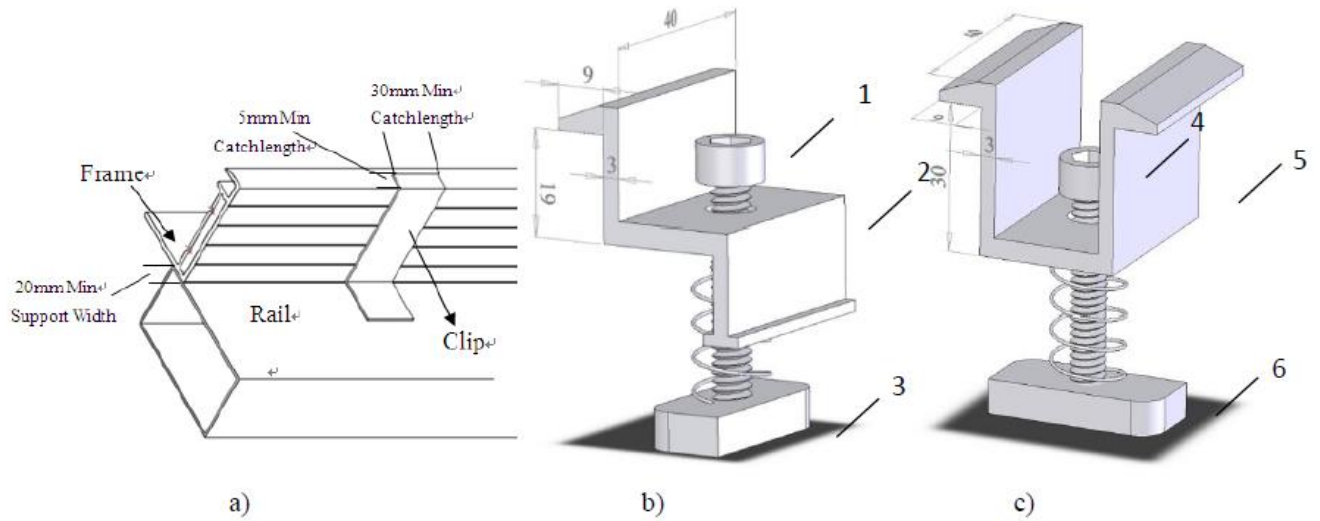
Figures 2

NO.	NAME	Size	Material
6	Nut	M8X1.25	S35C
5	Gasket	16X1.7	Fe
4	Mount	≈5	Q235
3	Gasket	16X1.7	Fe
2	Spring gasket	13.5X2.1	Mn65
1	Screw	M8X1.25	S35C

Figures 1 Figures 3

**11. Mounting Clamps**

The modules may be mounted using clamps designed for solar modules as shown in Figures 4 and 5 on the next page. Note that the clamp positions are important – the clamp centerlines must be between 217mm and 267 mm from the end of the module. The module must be supported along the length of the long edge, and should overlap the array rail by at least 20mm. Note that the mounting clamps should meet the minimum dimensions (catch width of 5mm and length of 30mm) as shown in Figure 4 a. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



NO.	NAME	Standard	Material
6	Nut	M8	S35C
5	Clip2	As shown in figure c)	Material
4	Screw	M8	S35C
3	Nut	M8	S35C
2	Clip1	As shown in figure b)	Material
1	Screw	M8	S35C
NO.	NAME	Standard	Material

Figures 4

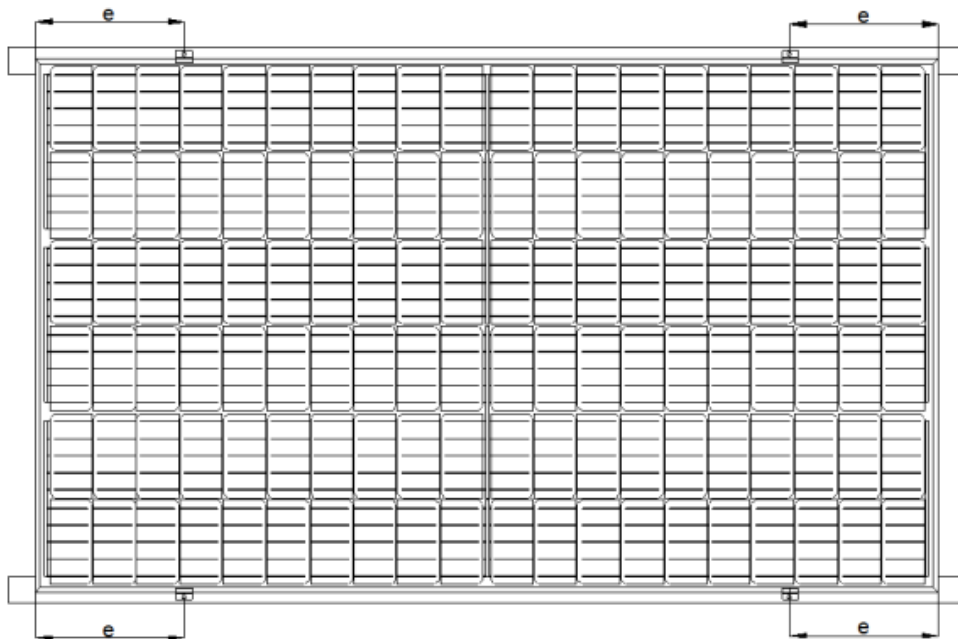
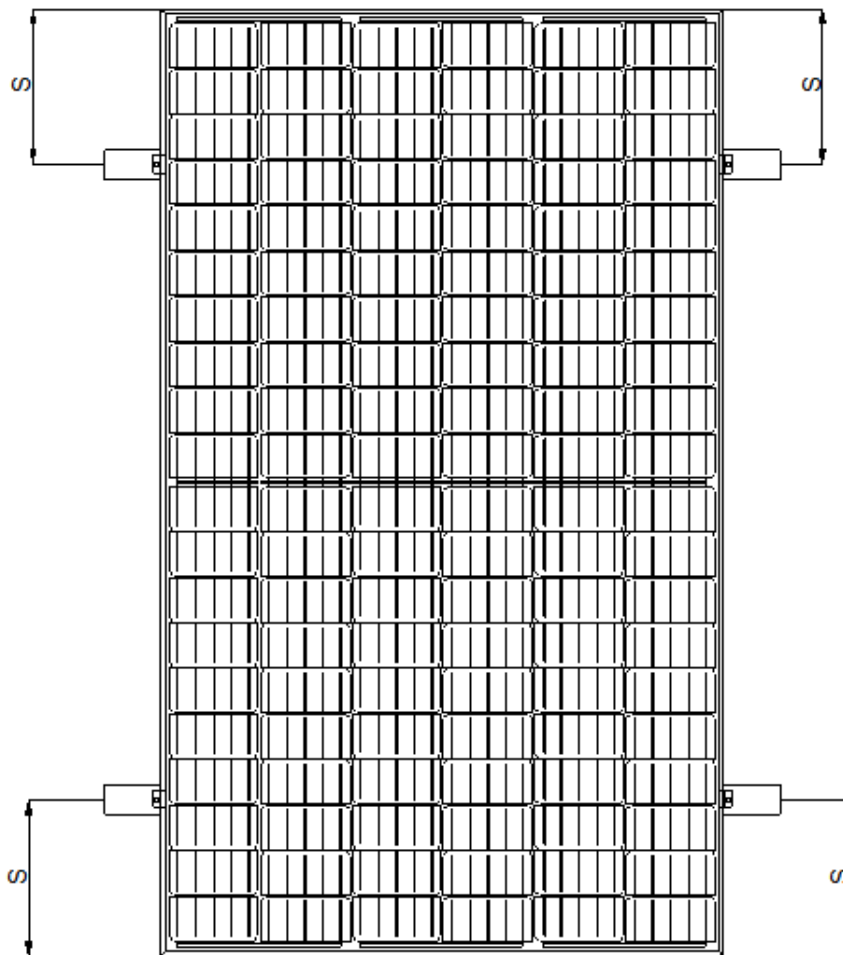


Figure 5:  $252\text{mm} < e < 302\text{mm}$



**12. Long Edge Perpendicular to Array Rails**

The modules may also be mounted using clips on the long sides of the module when the array rails are perpendicular to the long sides, as shown below in Figure 6. The clip centerlines must be between 217mm and 267mm from the ends of the module. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) shown in Figure 4. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).

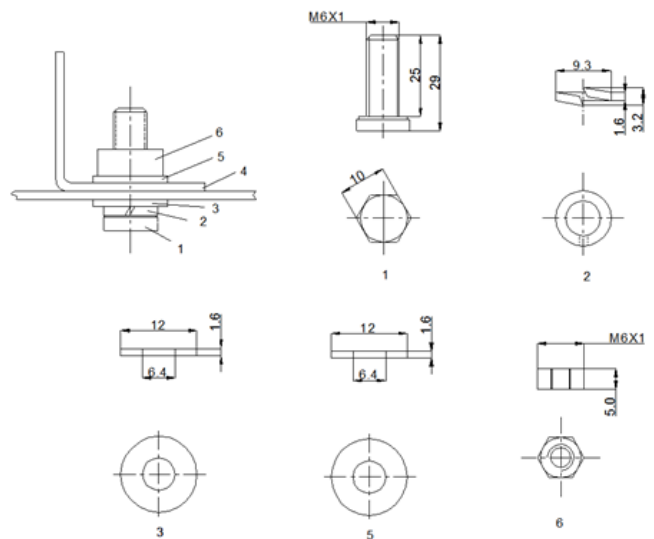
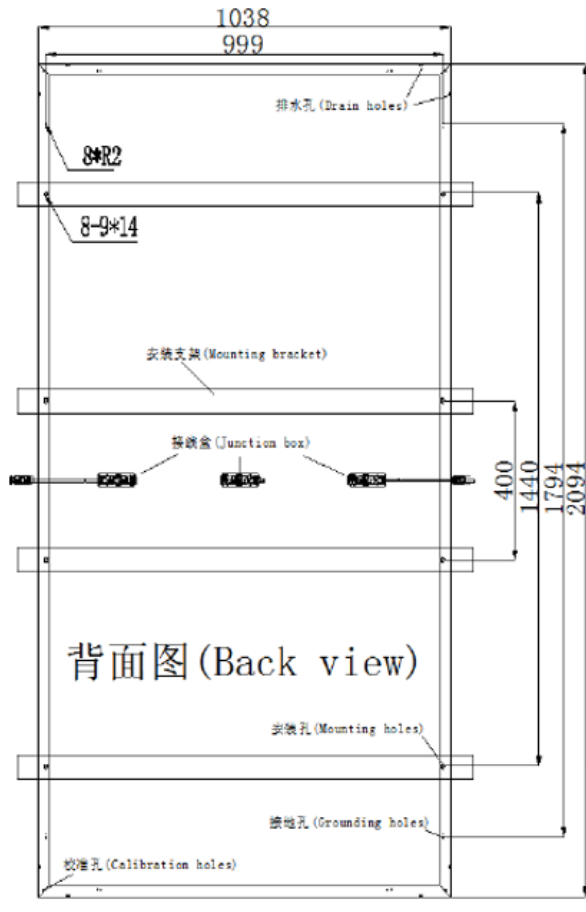


Figures 6:  $217\text{mm} < s < 267\text{mm}$

Maximum   Loading withstand	
Front	3600 Pa
Rear	240 Pa

### 13. Installation of 144/166mm Cells Modules - MPS-450M72

The modules may be fastened to a support using the bolt holes in the bottom of the frame at location "C", as shown in Figure 1 below (back view of the module) Figure 2 (mounting detail) and Figure 3 (parts detail). The modules have 8 mounting holes to be installed with 8 M6 bolts.



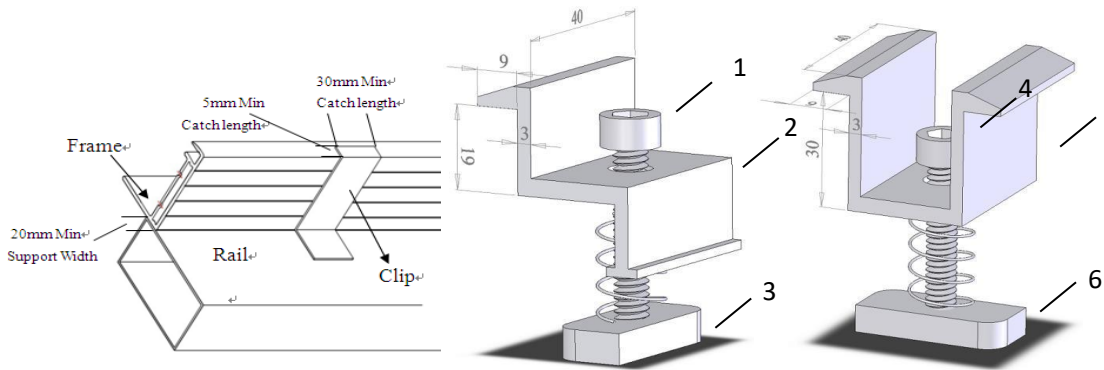
Figures 2

NO.	NAME	Size	Material
6	Nut	M6X1	S35C
5	Gasket	12X1.6	Fe
4	Mount	≈5	Q235
3	Gasket	12X1.6	Fe
2	Spring gasket	9.3X1.6	Mn65
1	Screw	M6X1	S35C

Figures 1 Figures 3. |

### 14. Mounting Clamps for Long Edge Parallel to Array Rails

The modules may be mounted using clips (clamps) designed for solar modules as shown in Figures 4 and 5. Note that the clip positions are important – the clip centerlines must be between 309mm and 359 mm and between 829mm and 879 mm from the end of the module. The module must be supported along the length of the long edge, and should overlap the array rail by at least 20mm. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) as shown in Figure 4 a on page 7. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



NO.	NAME	Standard	Material
6	Nut	M8	S35C
5	Clip2	As shown in figure c)	Material
4	Screw	M8	S35C
3	Nut	M8	S35C
2	Clip1	As shown in figure b)	Material
1	Screw	M8	S35C
NO.	NAME	Standard	Material

Figures 4 |

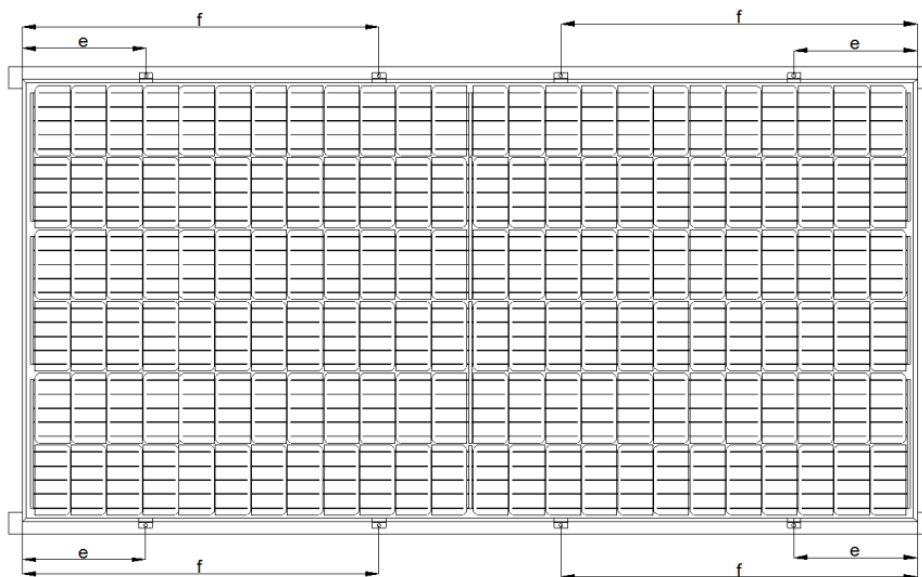
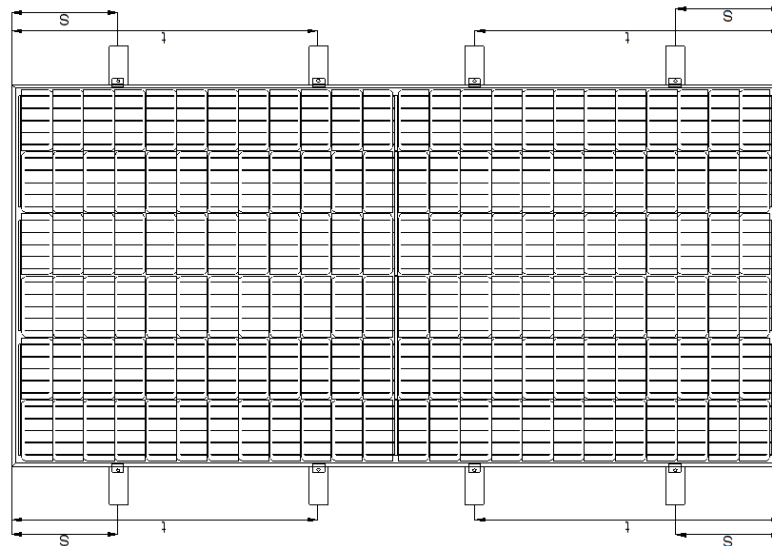


Figure 5:  $309\text{mm} < e < 359\text{mm}$ 、 $829\text{mm} < f < 879\text{mm}$

### 15. Mounting Clamps for Long Edge Perpendicular to Array Rails

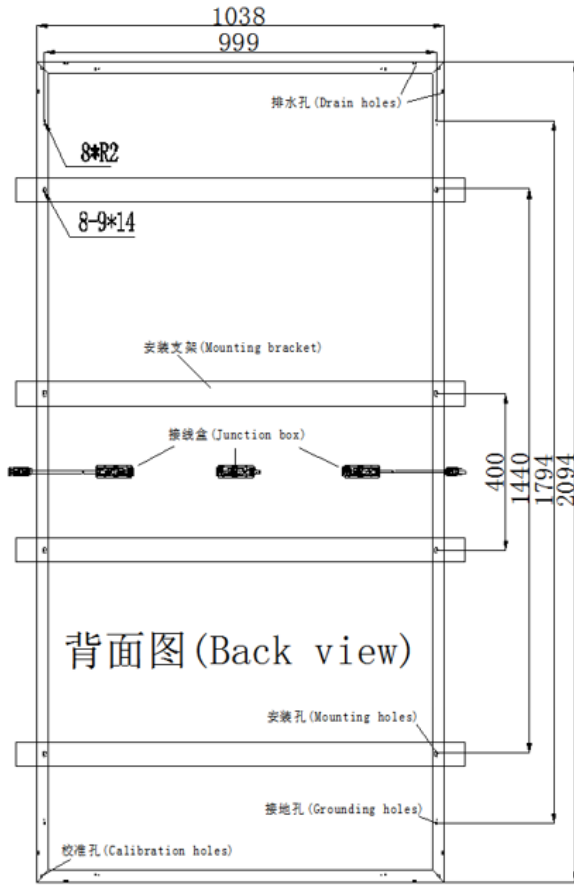
The modules may also be mounted using clips on the long sides of the module when the array rails are perpendicular to the long sides, as shown in Figure 6. The clip centerlines must be between 309mm and 359 mm and between 829mm and 879mm from the ends of the module. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) shown in Figure 4 a. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



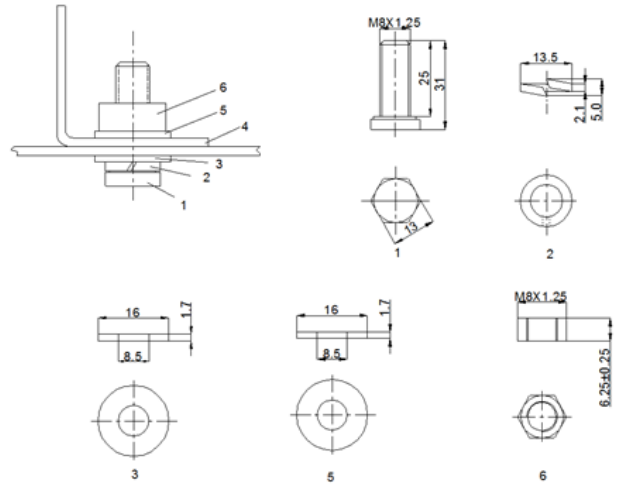
Figures 6:  $309\text{mm} < s < 359\text{mm}$ 、 $829\text{mm} < t < 879\text{mm}$

### 16. Mounting Using Frame Bolt Holes figures 7,8 &9

The modules may be fastened to a support using the bolt holes in the bottom of the frame at location “C”, as shown in Figure 7 (back view of the module), Figure 8 (mounting detail) and Figure 9 (parts detail) on the next page. The modules have 8 mounting holes to be installed with M8 bolts.



Figures 7



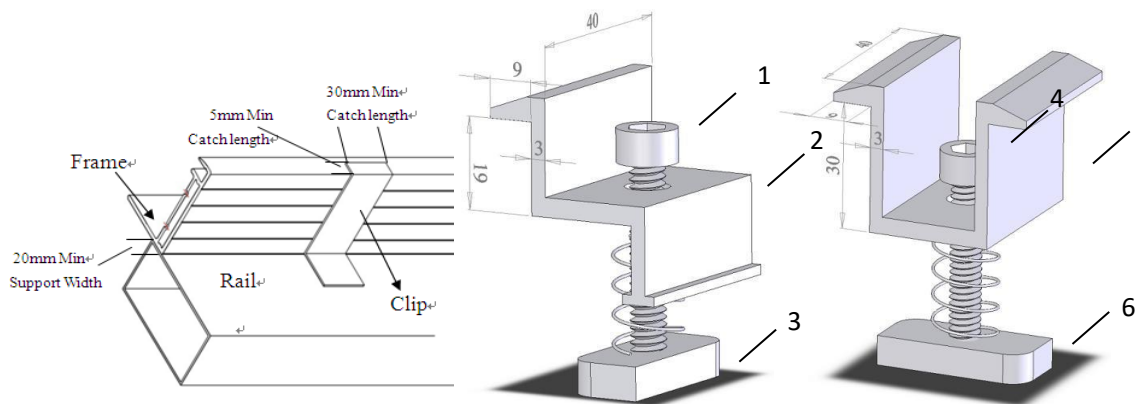
Figures 8

NO.	NAME	Size	Material
6	Nut	M8X1.25	S35C
5	Gasket	16X1.7	Fe
4	Mount	≈5	Q235
3	Gasket	16X1.7	Fe
2	Spring gasket	13.5X2.1	Mn65
1	Screw	M8X1.25	S35C

Figures 9

### 17. Mounting Using Clips on Long Edge of Module

The modules may be mounted using clips (clamps) designed for solar modules as shown in Figures 10 and 11. Note that the clip positions are important – the clip centerlines must be between 302mm and 352 mm and between 822mm and 872 mm from the end of the module. The module must be supported along the length of the long edge, and should overlap the array rail by at least 20mm. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) as shown in Figure 10 a. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



NO.	NAME	Standard	Material
6	Nut	M8	S35C
5	Clip2	As shown in figure c)	Material
4	Screw	M8	S35C
3	Nut	M8	S35C
2	Clip1	As shown in figure b)	Material
1	Screw	M8	S35C

Figures 10

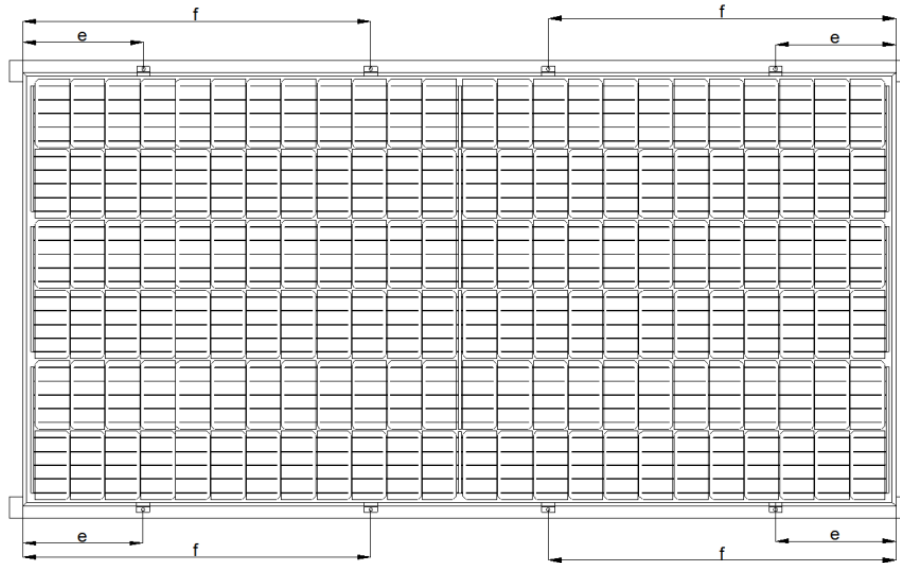
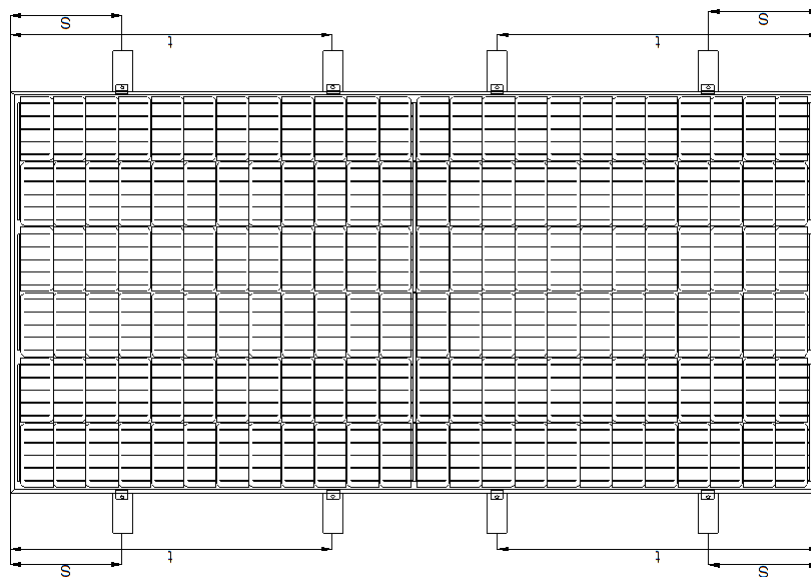


Figure 11:  $302\text{mm} < e < 352\text{mm}$ 、 $822\text{mm} < f < 872\text{mm}$

### 18. Long Edge Perpendicular to Array Rails

The modules may also be mounted using clips on the long sides of the module when the array rails are perpendicular to the long sides, as shown in Figure 12. The clip centerlines must be between 302mm and 352mm and between 822mm and 872mm from the ends of the module. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) shown in Figure 10a. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).

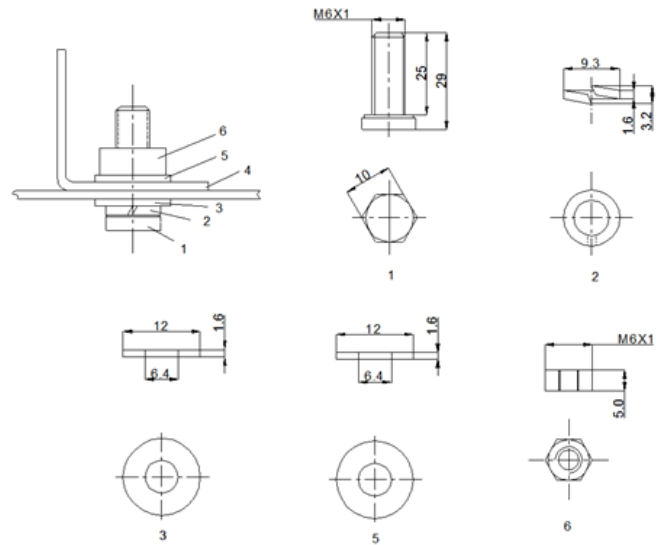
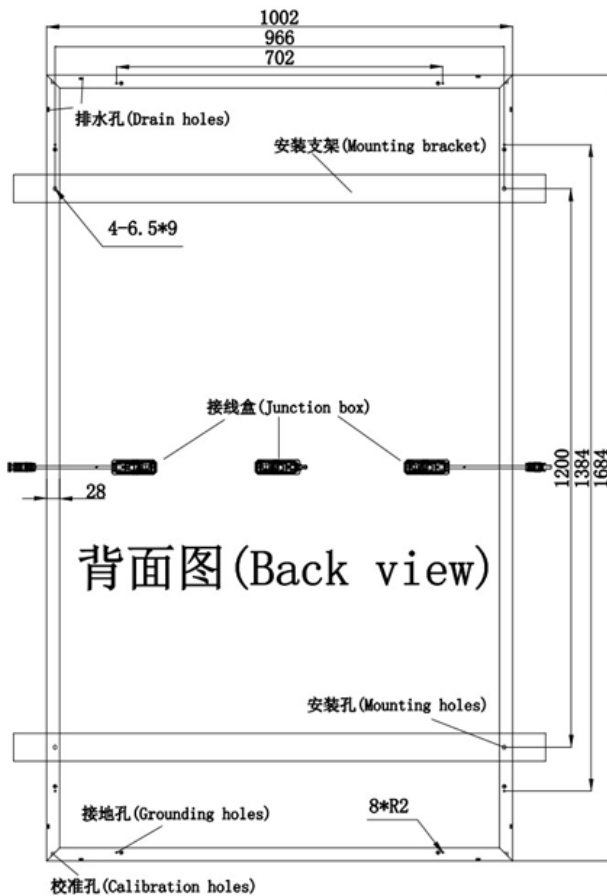


Figures12:  $302\text{mm} < s < 352\text{mm}$ 、 $822\text{mm} < t < 872\text{mm}$

Maximum   Loading withstand	
Front	3600 Pa
Rear	240 Pa

### 19. Installation of 60/158.75mm Cells Modules - MPS-330M60 & MPS-330M60B

The modules may be fastened to a support using the bolt holes in the bottom of the frame at location "C", as shown in Figure 1 below (back view of the module), Figure 2 (mounting detail) and Figure 3 (parts detail). The modules have 4 mounting holes to be installed with four (4) M6 bolts.



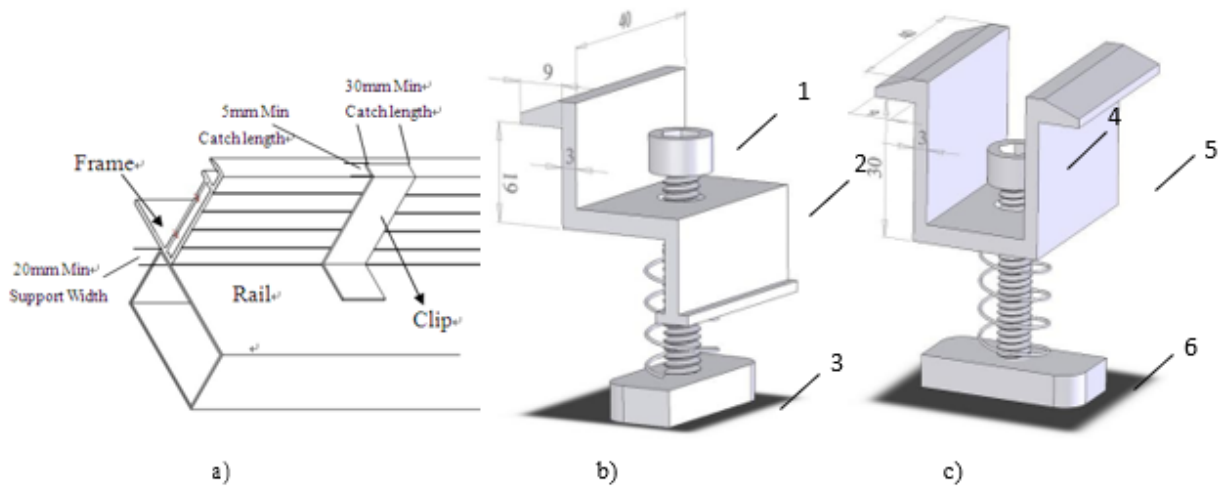
Figures 2

NO.	NAME	Size	Material
6	Nut	M6X1	S35C
5	Gasket	12X1.6	Fe
4	Mount	≈5	Q235
3	Gasket	12X1.6	Fe
2	Spring gasket	9.3X1.6	Mn65
1	Screw	M6X1	S35C



**20. Long Edge Parallel to Array Rails (Figure 5)**

The modules may be mounted using clips (clamps) designed for solar modules as shown in Figures 4 and 5. Note that the clip positions are important – the clip centerlines must be between 217mm and 267 mm from the end of the module. The module must be supported along the length of the long edge, and should overlap the array rail by at least 20mm. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) as shown in Figure 4 a). The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



6	Nut	M8	S35C
5	Clip2	As shown in figure c)	Material
4	Screw	M8	S35C
3	Nut	M8	S35C
2	Clip1	As shown in figure b)	Material
1	Screw	M8	S35C
NO.	NAME	Standard	Material

Figures 4

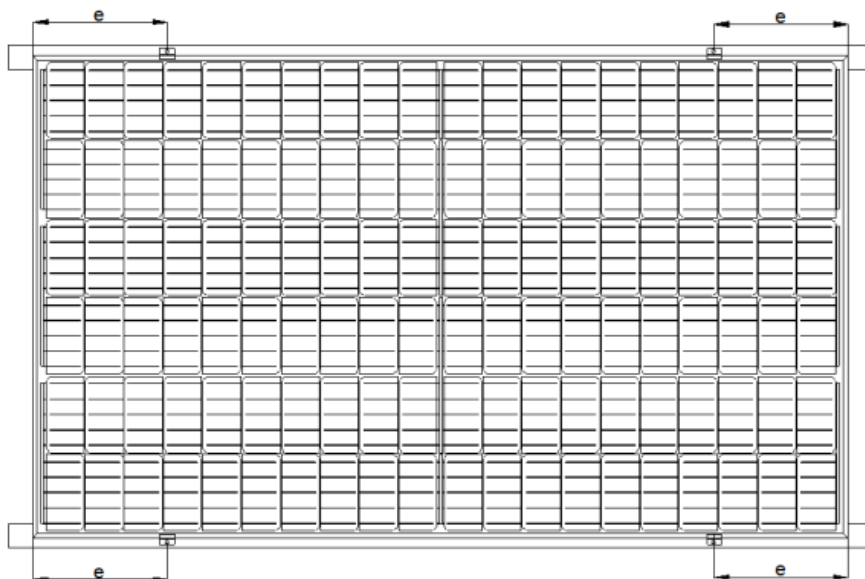
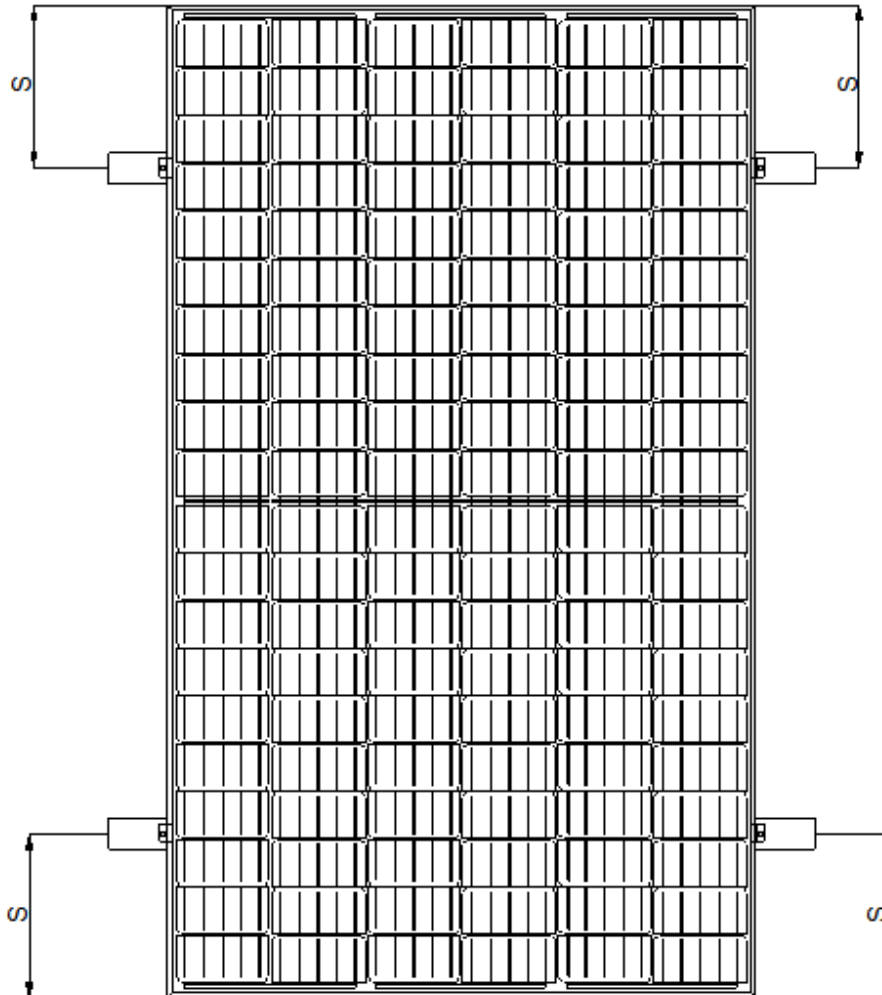


Figure 5  $217\text{mm} < e < 267\text{mm}$ 
**21. Long Edge Perpendicular to Array Rails**

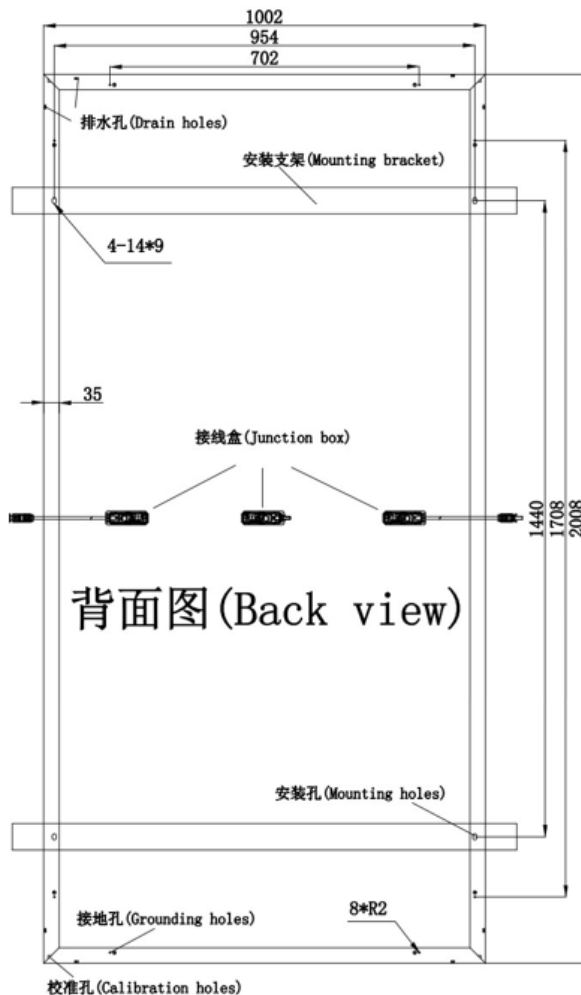
The modules may also be mounted using clips on the long sides of the module when the array rails are perpendicular to the long sides, as shown in Figure 6 below. The clip centerlines must be between 217mm and 267mm from the ends of the module. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) shown in Figure 4a. The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).


 Figures 6:  $217\text{mm} < s < 267\text{mm}$ 

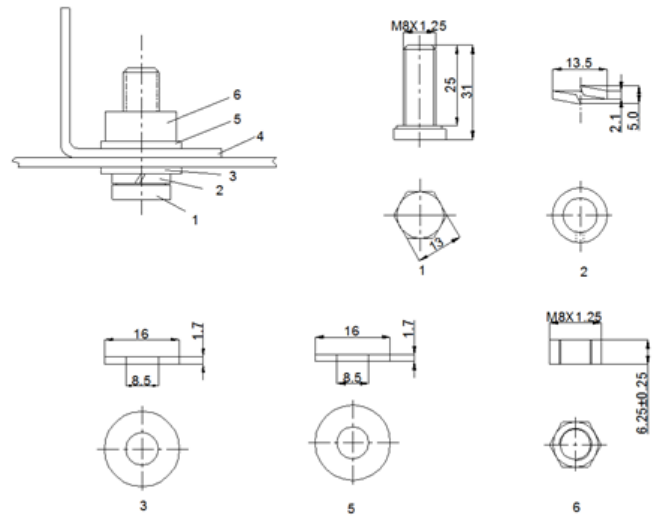
Maximum   Loading withstand	
Front	3600 Pa
Rear	240 Pa

## 22. Installation of 144/158.75mm Cells Modules - MPS-400M72

The modules may be fastened to a support using the bolt holes in the bottom of the frame at location "C", as shown below in Figure 1 (back view of the module), Figure 2 (mounting detail) and Figure 3 (parts detail). The modules have 4 mounting holes to be installed with four (4) M8 bolts.



Figures 1 Figures 3.

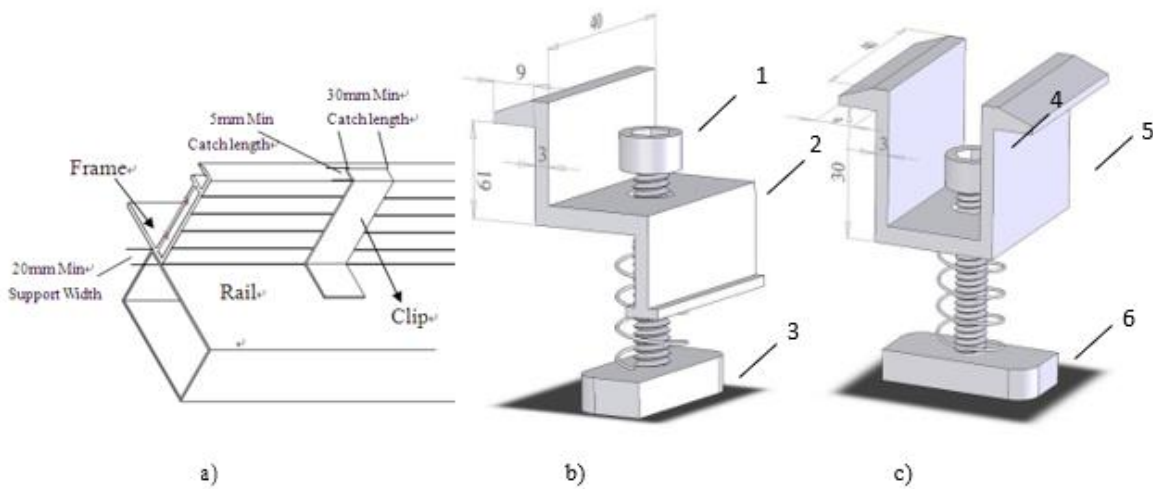


Figures 2

NO.	NAME	Size	Material
6	Nut	M8X1.25	S35C
5	Gasket	16X1.7	Fe
4	Mount	≈5	Q235
3	Gasket	16X1.7	Fe
2	Spring gasket	13.5X2.1	Mn65
1	Screw	M8X1.25	S35C

### 23. Long Edge Parallel to Array Rails (Figure 5)

The modules may be mounted using clips (clamps) designed for solar modules as shown in Figures 4 and 5. Note that the clip positions are important – the clip centerlines must be between 259mm and 309 mm from the end of the module. The module must be supported along the length of the long edge, and should overlap the array rail by at least 20mm. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) as shown in Figure 4 a) . The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



6	Nut	M8	S35C
5	Clip2	As shown in figure c)	Material
4	Screw	M8	S35C
3	Nut	M8	S35C
2	Clip1	As shown in figure b)	Material
1	Screw	M8	S35C
NO.	NAME	Standard	Material

Figures 4

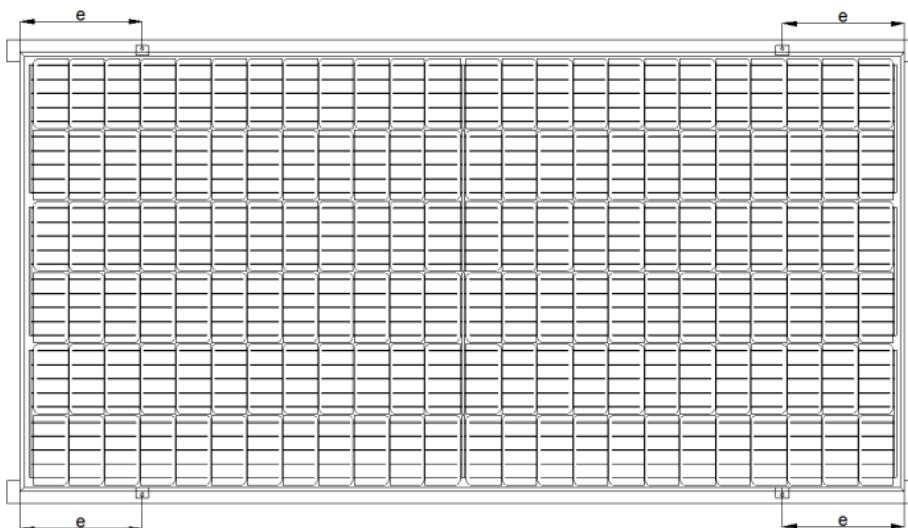
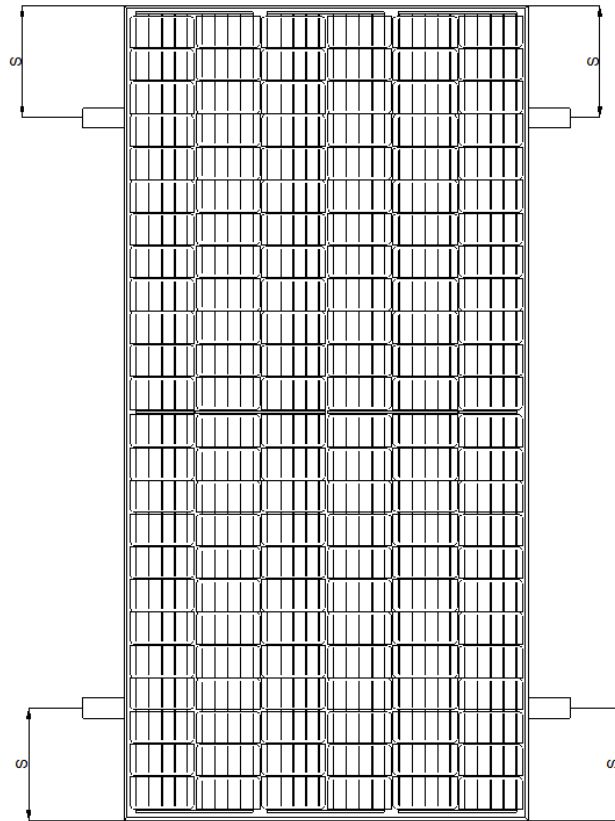


Figure 5:  $259\text{mm} < e < 309\text{mm}$

#### 24. Long Edge Perpendicular to Array Rails

The modules may also be mounted using clips on the long sides of the module when the array rails are perpendicular to the long sides, as shown in Figure 6. The clip centerlines must be between 259mm and 309mm from the ends of the module. Note that the mounting clips should meet the minimum dimensions (catch width of 5mm and length of 30mm) shown in Figure 4 a). The array rails must support the bottom of the modules and must be continuous pieces (no breaks in the rail).



Figures 6:  $259\text{mm} < s < 309\text{mm}$

Maximum   Loading withstand	
Front	3600 Pa
Rear	240 Pa



**25. Mechanical and Electrical Ratings**

Standard Test Conditions are : irradiance of  $1\text{kW/m}^2$ , AM 1.5 spectrum, and cell temperature of 25° Celsius.

Pmax of any individual module will be within ±3% tolerance of these specified values

Voc of any individual module will be within ±5% tolerance of these values.

Ioc of any individual module will be within ±5% tolerance of these values.

Specifications and electric characteristics in Table 1 below are subject to technical and product innovations. Information in this document is subject to change without notice.

**Specifications for MPS Photovoltaic Modules under STC**

Type of Cells	Type of Module	Maximum Power Pmax (W)	Operating Voltage Vmp (V)	Operating Current Imp (A)	Open Circuit Voltage Voc (V)	Short Circuit Current Isc (A)	Max.Series Fuse Rating(A)	System Voltage (V)
60 halves cut 120 cells mono	MPS-330M60	330	33.41	9.88	40.94	10.35	20	1000
	MPS-330M60 B	330	33.41	9.88	40.94	10.35	20	1000
	MPS-370M60	370	34.42	10.75	41.28	11.24	20	1000
	MPS-370M60 B	370	34.42	10.75	41.28	11.24	20	1000
72 halves cut 144 cells mono								
	MPS-400M72	400	40.09	9.98	49.24	10.42	20	1000
	MPS-450M72	450	41.56	10.83	49.87	11.30	20	1000

**Manufacture and Importer Contact Details**

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Module Brand	Max Power Solar - MPS