

# INSTALLATION MANUAL

## FOR JA SOLAR PHOTOVOLTAIC MODULES

JAM6(K)-72-xxx/PR/1500V, xxx=345 to 370 in increment of 5;

JAM6(K)-60-xxx/PR/1500V, xxx=285 to 310 in increment of 5;

JAM6(K)-72-xxx/4BB/1500V, xxx=320 to 345 in increment of 5;

JAM6(K)-60-xxx/4BB/1500V, xxx=265 to 285 in increment of 5;

JAM72S03-xxx/PR, xxx= 360 to 395 in increment of 5;

JAM60S03-xxx/PR, xxx= 300 to 330 in increment of 5;

JAM72S01-xxx/PR, xxx= 345 to 390 in increment of 5;

JAM60S01-xxx/PR, xxx= 285 to 325 in increment of 5;

JAM72S01-xxx/SC, xxx= 320 to 365 in increment of 5;

JAM60S01-xxx/SC, xxx= 265 to 305 in increment of 5;

JAM72S01-xxx/MR/1500V, xxx= 365 to 385 in increment of 5;

JAM60S01-xxx/MR/1500V, xxx= 305 to 320 in increment of 5;

JAM72S09-xxx/PR/1500V, xxx= 370 to 405 in increment of 5

JAM60S09-xxx/PR/1500V, xxx= 310 to 335 in increment of 5;

JAM72S10-xxx/PR/1500V, xxx= 380 to 410 in increment of 5

JAM60S10-xxx/PR/1500V, xxx= 315 to 345 in increment of 5;

JAM72S10-xxx/MR/1500V, xxx= 390 to 420 in increment of 5

JAM60S10-xxx/MR/1500V, xxx= 320 to 345 in increment of 5;

JAM78S10-xxx/MR/1500V, xxx= 410 to 455 in increment of 5

JAM66S10-xxx/MR/1500V, xxx= 345 to 380 in increment of 5;

JAM6(K)-72-xxx/PR, xxx=345 to 370 in increment of 5;

JAM6(K)-60-xxx/PR, xxx=285 to 310 in increment of 5;

JAM6(K)-72-xxx/4BB, xxx=320 to 345 in increment of 5;

**JAM6(K)-60-xxx/4BB, xxx=265 to 285 in increment of 5;**  
**JAM72S03-xxx/PR/1000V, xxx= 360 to 395 in increment of 5;**  
**JAM60S03-xxx/PR/1000V, xxx= 300 to 330 in increment of 5;**  
**JAM72S01-xxx/PR/1000V, xxx= 345 to 390 in increment of 5;**  
**JAM60S01-xxx/PR/1000V, xxx= 285 to 325 in increment of 5;**  
**JAM72S01-xxx/SC/1000V, xxx= 320 to 365 in increment of 5;**  
**JAM60S01-xxx/SC/1000V, xxx= 265 to 305 in increment of 5;**  
**JAM72S01-xxx/MR/1000V, xxx= 365 to 385 in increment of 5;**  
**JAM60S01-xxx/MR/1000V, xxx= 305 to 320 in increment of 5;**  
**JAM72S09-xxx/PR/1000V, xxx= 370 to 405 in increment of 5**  
**JAM60S09-xxx/PR/1000V, xxx= 310 to 335 in increment of 5;**  
**JAM72S10-xxx/PR/1000V, xxx= 380 to 410 in increment of 5**  
**JAM60S10-xxx/PR/1000V, xxx= 315 to 345 in increment of 5;**  
**JAM72S10-xxx/MR/1000V, xxx= 390 to 420 in increment of 5**  
**JAM60S10-xxx/MR/1000V, xxx= 320 to 345 in increment of 5;**  
**JAM78S10-xxx/MR/1000V, xxx= 410 to 455 in increment of 5**  
**JAM66S10-xxx/MR/1000V, xxx= 345 to 380 in increment of 5;**  
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**JAM72S17-xxx/PR/1000V, xxx= 380 to 390 in increment of 5;**

**JAM60S17-xxx/PR/1000V, xxx= 315 to 325 in increment of 5;**

**JAM72S17-xxx/MR/1000V, xxx= 390 to 395 in increment of 5;**

**JAM60S17-xxx/MR/1000V, xxx= 315 to 325 in increment of 5;**

**JAP6(K)-72-xxx/4BB/1500V, xxx=310 to 330 in increment of 5;**

**JAP6(K)-60-xxx/4BB/1500V, xxx=255 to 275 in increment of 5;**

**JAP72S01-xxx/SC, xxx= 310 to 345 in increment of 5**

**JAP60S01-xxx/SC, xxx= 255 to 290 in increment of 5;**

**JAP72S01-xxx/PR, xxx=330 to 345 in increment of 5;**

**JAP60S01- xxx/PR, xxx=275 to 285 in increment of 5;**

**JAP72S03-xxx/SC, xxx= 320 to 345 in increment of 5;**

**JAP60S03-xxx/SC, xxx= 270 to 290 in increment of 5;**

**JAP72S03-xxx/PR, xxx= 335 to 355 in increment of 5;**

**JAP60S03-xxx/PR, xxx= 280 to 295 in increment of 5;**

**JAP72S09-xxx/SC/1500V, xxx= 320 to 345 in increment of 5;**

**JAP60S09-xxx/SC/1500V, xxx= 265 to 290 in increment of 5;**

**JAP72S10-xxx/SC/1500V, xxx= 335 to 350 in increment of 5;**

**JAP60S10-xxx/SC/1500V, xxx= 275 to 290 in increment of 5;**

**JAP72S02-xxx/SC/1000V, xxx= 310 to 345 in increment of 5;**

**JAP60S02-xxx/SC/1000V, xxx= 255 to 290 in increment of 5;**

**JAP72S02-xxx/PR/1000V, xxx=330 to 345 in increment of 5;**

**JAP60S02- xxx/PR/1000V, xxx=275 to 285 in increment of 5;**

**JAP72S08-xxx/SC/1000V, xxx= 320 to 345 in increment of 5;**

**JAP60S08-xxx/SC/1000V, xxx= 270 to 290 in increment of 5;**

**JAP72S08-xxx/PR/1000V, xxx= 335 to 355 in increment of 5;**

**JAP60S08-xxx/PR/1000V, xxx= 280 to 295 in increment of 5;**

**JAP72S01-xxx/MS, xxx= 325 to 340 in increment of 5;**  
**JAP60S01-xxx/MS, xxx= 270 to 280 in increment of 5;**  
**JAP72S03-xxx/MS, xxx= 320 to 345 in increment of 5;**  
**JAP60S03-xxx/MS, xxx= 270 to 285 in increment of 5;**  
**JAP6(K)-72-xxx/4BB, xxx=310 to 330 in increment of 5;**  
**JAP6(K)-60-xxx/4BB, xxx=255 to 275 in increment of 5;**  
**JAP72S01-xxx/SC/1000V, xxx= 310 to 345 in increment of 5**  
**JAP60S01-xxx/SC/1000V, xxx= 255 to 290 in increment of 5;**  
**JAP72S01-xxx/PR/1000V, xxx=330 to 345 in increment of 5;**  
**JAP60S01- xxx/PR/1000V, xxx=275 to 285 in increment of 5;**  
**JAP72S03-xxx/SC/1000V, xxx= 320 to 345 in increment of 5;**  
**JAP60S03-xxx/SC/1000V, xxx= 270 to 290 in increment of 5;**  
**JAP72S03-xxx/PR/1000V, xxx= 335 to 355 in increment of 5;**  
**JAP60S03-xxx/PR/1000V, xxx= 280 to 295 in increment of 5;**  
**JAP72S09-xxx/SC/1000V, xxx= 320 to 345 in increment of 5;**  
**JAP60S09-xxx/SC/1000V, xxx= 265 to 290 in increment of 5;**  
**JAP72S10-xxx/SC/1000V, xxx= 335 to 350 in increment of 5;**  
**JAP60S10-xxx/SC/1000V, xxx= 275 to 290 in increment of 5;**  
**JAP72S01-xxx/MS/1000V, xxx= 325 to 340 in increment of 5;**  
**JAP60S01-xxx/MS/1000V, xxx= 270 to 280 in increment of 5;**  
**JAP72S03-xxx/MS/1000V, xxx= 320 to 345 in increment of 5;**  
**JAP60S03-xxx/MS/1000V, xxx= 270 to 285 in increment of 5;**

**JAP72S04-xxx/SC, xxx= 325 to 340 in increment of 5;**  
**JAP60S04-xxx/SC, xxx= 270 to 295 in increment of 5;**  
**JAM72S04-xxx/PR, xxx= 360 to 375 in increment of 5;**  
**JAM60S04-xxx/PR, xxx= 300 to 310 in increment of 5**

**JAM60S13-xxx/PR, xxx= 310 to 330 in increment of 5;**

**JAM72S18-xxx/PR, xxx= 370 to 405 in increment of 5;**

**JAM60S18-xxx/PR, xxx= 310 to 335 in increment of 5**

## INSTALLATION MANUAL



### **IMPORTANT SAFETY INSTRUCTIONS**

- ✧ *This manual contains important safety instructions for the Solar Photovoltaic Modules (hereafter referred to as “Modules”) of Shanghai JA Solar Technology Co., Ltd. (hereafter referred to as “JA Solar”). Installers should follow all safety precautions described in this guide as well as local codes when installing a Module.*
- ✧ *Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified personnel. Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference and in case of sale or disposal of the Modules.*
- ✧ *For any questions, please contact our Global Quality and Customer Service department for further information.*

## 1. INTRODUCTION

### ***Thank you for choosing JA SOALR Modules!***

This Installation Manual contains essential information for electrical and mechanical installation that you should know before handling, installing JA Solar Modules. This Manual also contains safety information you need to be familiar with. All the information described in this Manual is the intellectual property of JA Solar and is based on the technologies and experience that have been acquired and accumulated by JA Solar.

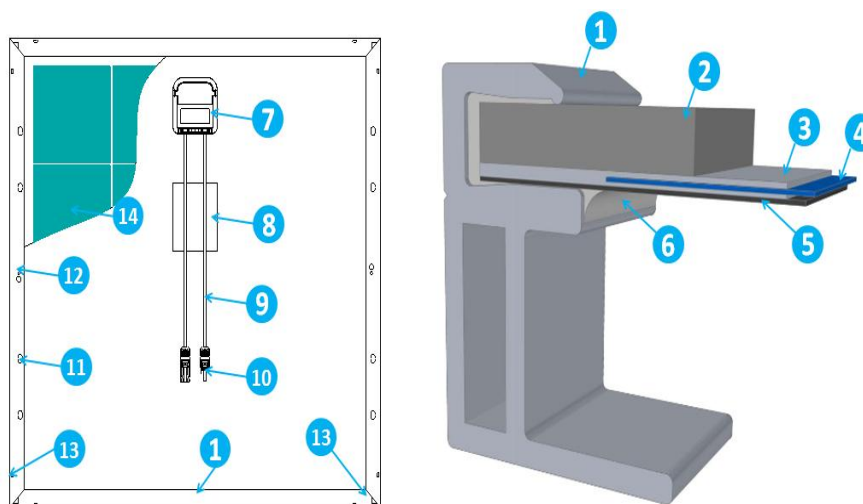
This Manual does not constitute a warranty, expressed or implied. JA Solar does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with installation, operation, use or maintenance of Modules. No responsibility is assumed by JA Solar for any infringement of patents or other rights of third parties that may result from use of Modules. JA Solar reserves the right to make changes to the product, specifications or installation manual without prior notice.

Failure to comply with the requirements listed in this manual will invalidate the Limited Warranty for Modules as provided by JA Solar at the same time of sale to the direct customer. Additional recommendations are provided to enhance safety practices and performance results. Please provide a copy of this manual to the PV system owner for their reference, and inform them of all relevant aspects of safety, operation, and maintenance.

## 2. Codes and Regulations

The mechanical and electrical installation of PV systems should be performed in accordance with all applicable codes, including electrical codes; building codes and electric utility interconnect requirements. Such requirements may vary for mounting location, such as building rooftop or motor vehicle applications. Requirements may also vary with system voltage, and for DC or AC application. Contact local authorities for governing regulations.

### 3. Safety Precautions



- |                    |                      |                      |                    |
|--------------------|----------------------|----------------------|--------------------|
| 1. Aluminum Frame  | 2. Glass             | 3. Encapsulating EVA | 4. Cell            |
| 5. Backsheet       | 6. Silicone adhesive | 7. Junction Box      | 8. Label           |
| 9. Cable           | 10. Connector        | 11. Mounting hole    | 12. Grounding hole |
| 13. Drainage holes | 14. Cell             |                      |                    |

**Figure 1** Modules components and cross-section of the laminated assembly

#### 3.1 Conventional Safety

JA Solar Modules are designed to meet the requirements for the standards IEC 61215-1:2016, IEC61215-1-1:2016, IEC61215-2:2016, IEC61730-1:2016 and IEC61730-2:2016 that have safety class II according to IEC 61140. The construction meets Class C fire rating for UL790. Rooftop PV systems should only be installed on rooftop to be capable of handling the additional weighted load of PV system components, including Modules, by a certified building specialist or engineer and have a formal structure of the complete analysis result.

For your safety, do not attempt to work on a rooftop until safety precautions have been identified and taken, including without limitation fall protection measures, ladders or stairways, and personal protective equipment.

For your safety, do not install or handle Modules under adverse conditions, including without limitation strong or gusty winds, and wet or frosted roof surfaces.

#### 3.2 Electrical performance Safety

Photovoltaic Modules can produce DC electricity when exposed to light and therefore can produce an electrical shock or burn. DC voltage of 30 Volts or higher is potentially lethal.

Modules produce voltage even when not connected to an electrical circuit or load. Please use insulated tools and rubber gloves when working with Modules in sunlight.

Modules have no on/off switch. Modules can be rendered inoperative only by removing them from sunlight, or by fully covering their front surface with cloth, cardboard, or other completely opaque material, or by working with Modules face down on a smooth, flat surface.

In order to avoid arcs and electrical shock, please do not disconnect electrical connections under load. Faulty connections can also result in arcs and electrical shock. So please keep connectors dry and clean, and ensure that they are in proper working condition. Never insert metal objects into the connector, or modify them in any way in order to secure an electrical connection.

Modules can produce higher output than the rated specifications. Industry standard ratings are made at Standard Test Conditions of 1000 W/m<sup>2</sup> Irradiance, 25°C Cell Temperature and 1.5 Air Mass.

Reflection from snow or water can increase sunlight and therefore boost current and power. In addition, colder temperatures can substantially increase voltage and power.

If the glass or other material is damaged, please wear personal protection equipment and separated the module from the circuit.

Do not touch the Modules if it's wet, unless during the cleaning procedure. At the same time the cleaning operation should according to the manual.

Do not touch the wet connector without protecting yourself with personal protection equipment or rubber gloves.

Do not use mirrors or other magnifiers to concentrate sunlight onto the Modules.

### **3.3 Operating Safety**

Do not open the package of JA Solar Modules until they are ready to be installed during transportation and storing.

At the same time please protect the package against exposure to damage. Secure pallets from falling over.

Do not exceed the maximum height of pallets to be stacked, as indicated on the pallet packaging.

Store pallets in a cool and dry location until the Modules are ready to be unpacked.

Please unpack the package of JA Solar Modules according to "JA Solar Modules Un-Pack Instruction".

Do not lift the Modules by grasping the Modules' junction box or electrical leads in any condition.

Do not stand or step on the Modules.

Do not drop the Modules on another Module.

Do not place any heavy objects on the Modules to avoid glass breakage.

Be cautious when setting the Modules down on to a surface, especially on the corner of the Modules.

Inappropriate transport and installation may break the Modules.

Do not attempt to disassemble the Modules, and do not remove any attached nameplates or components from the Modules.

Do not apply paint or adhesive to the Modules top surface.

To avoid damage to the backsheet, do not scratch or hit the backsheet.

Do not drill holes in the frame. This may compromise the frame strength and cause corrosion of the frame.

Do not scratch the anodized coating of the frame (except for grounding connection). It may cause corrosion of the frame or compromise the frame strength.

Do not attempt to repair the Modules with damaged glass or backsheet.

Work only under dry conditions, and use only dry tools. Do not handle Modules when they are wet unless wearing appropriate protective equipment.

When storing uninstalled Modules outdoor for any period of time, always cover the Modules and ensure that the glass faces down to stop water from collecting inside the Modules and causing damage to exposed connectors.

### **3.4 Fire Safety**

Consult your local authority for guidelines and requirements for building or structural fire safety.

Roof constructions and installations may affect the fire safety of building. Improper installation may create hazards in the event of a fire.

Use appropriate components such as fuses, circuit breaker and grounding connector as requires by local authority.

Do not use Modules where flammable gasses may be generated.

## **4. Installation Condition**

### **4.1 Installation position and working environment**

JA Solar Modules are intended for use in terrestrial applications only—no outer space marine or vehicle use.

Modules should not be installed nor operated in areas where, salt, hail, snow, sand, dust, air pollution, chemically active vapors, acid rain, soot, etc., are excessive.

Please adopt appropriate measures to ensure the performance and safety of the Modules when they are installed or operated in the areas where produces heavy snow, extremely cold, strong wind ,or near the island or desert where is prone to produce salt fog, or near water.

Modules should be mounted on appropriate mounting structures positioned on suitable buildings, the ground, or other structures suitable for Modules (e.g. carports, building facades or PV trackers). Modules should not be mounted on moving vehicles of any kind.

Modules should not be installed in locations where they could be submerged in water.

Modules should be installed in locations where the altitude is less than 2000m

The PV modules of JA Solar are suitable for operation in outdoor non-weather protected locations, exposed to direct and indirect solar radiation, in an environmental temperature range of at least  $-40\text{ }^{\circ}\text{C}$  to  $+40\text{ }^{\circ}\text{C}$  and up to 100 % relative humidity as well as rain. The temperature limits are defined as the monthly average high and low of the installation site. Ensure Modules are not subject to wind or snow loads exceeding the maximum permissible loads.

The Modules should be installed in a location where there's no shading throughout the year. Ensure there's no obstacle to block light near the installation site.

Lightning protection is recommended for PV systems that are to be installed in locations with high probability of lightning strikes.

Do not use Modules near equipment or in locations where flammable gasses may be generated or collected.

JA Solar Modules should not be sited in locations where aggressive substances such as salt or salt-water, or any other type of corrosive agent, could affect the safety and/or performance of the Modules.

JA Solar Modules have passed the IEC 61701 salt-mist, but galvanic corrosion can occur between the aluminum frame of the Modules and mounting or grounding hardware if such hardware is comprised of dissimilar metals. JA



Solar recommends that only stainless steel and aluminum metal directly contact Modules in seaside installations to limit corrosion.

## 4.1 Tilt Angle Selection

The tilt angle of the Modules is measured between the surface of the Modules and a horizontal ground surface. The Modules generates maximum power output when it faces the sun directly. Artificially concentrated sunlight shall not be directed on the module or panel.

In the northern hemisphere, Modules should typically face south, and in the southern hemisphere, Modules should typically face north.

For detailed information on the best installation angle, please refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator.

Because the Modules passed UL 790 class C fire tests, the slope of tested module is 5 in/ft (416 mm/m), which is the most severe condition. And there is no limited for title angel .

## 5. Mechanical Installation

### 5.1 Conventional requirements

Ensure the installation method and supporting system of Modules is strong enough to make the nodules can withstand all the load conditions. The Installer should provide this guarantee. The installation supporting system should be tested by the third-party organization with the analysis ability of Static Mechanical, according to the local national or international standards.

The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions. The module is considered to be in compliance with IEC61730-2:2016 only when the module is mounted in the manner specified by the mounting instructions .Based on standards IEC61730-2:2016 standard, when for the rooftop mounting, the rooftop covering material should have class C fire resistance at least.

The Modules mounting structure should be made of durable, corrosion-resistant and UV-resistant material. Modules should 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 Modules is not covered by snow for any length of time. In addition, ensure that the lowest portion of the Modules is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.

When the Modules are supported parallel to the surface of the building wall or roof, a minimum stand-off of 102 mm (4 inches) between the modules and the surface of the wall or the roof is required to allow air to circulate behind the Modules for heat dissipation. The position of junction box should be on the top side, and away from the ground.

Do not attempt to drill holes in the glass surface and the Modules frames of the Modules as this will void the warranty.

Before installing Modules on a roof, ensure the roof coverings should have fire resistant Class C. In addition, any roof penetration required to mount the Modules should be properly sealed to prevent leaks.

Dust building up on the surface of the Modules can impair with Modules performance. JA solar recommends installing the Modules with a tilt angle of at least 10 degrees, making it easier for dust to be washed off by rain.

Observe the linear thermal expansion of the Modules frames (the recommended minimum distance between two

Modules is 1 cm).

Always keep the backsheet of the panel free from foreign objects or structural elements, which could come into contact with the panel, especially when the panel is under mechanical load.

A module with exposed conductive parts is considered to be in compliance with IEC TS 62548:2013 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the national regulations. Any module without a frame (laminate) shall not be considered to comply with the requirements of IEC 61215-1:2016, IEC61215-1-1:2016, IEC61215-2:2016, IEC61730-1:2016 and IEC61730-2:2016 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by a field Inspection certifying that the installed module complies with the requirements of IEC TS 62548:2013

Metals with the aluminum frame of the Modules that will result in galvanic corrosion. An addendum to IEC 60950-1 Table J.1 that recommends metal combinations not exceeds an electrochemical potential difference of 0.6 Volts.

JA Solar Modules can be mounted in landscape or portrait orientation.

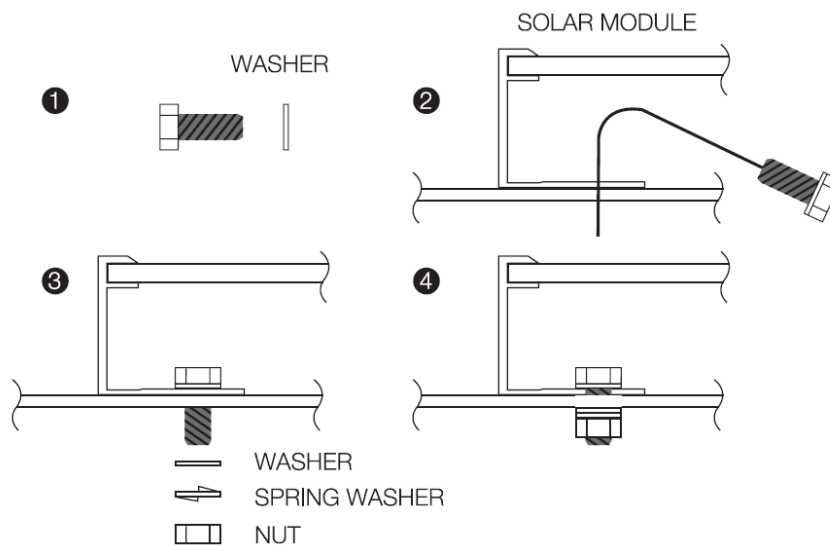
## 5.2 Installation methods

Modules can be installed on the frame using mounting holes, clamps. Modules should be installed according to the following examples. Not mounting the Modules according to these instructions may void the warranty.

### 5.2.1 Modules installed with mounting holes

Modules should be bolted to support structures through total 8 mounting holes located in the frame's back flanges with positive design load 3600Pa (Safety factor is 1.5) and negative design load 1600Pa (Safety factor is 1.5).

Refer to what is shown in Figure 2 (Mounting Details). Besides, two or more screws or two full threads of a single screw shall engage the metal.



**Figure 2** Mounting Details

For your reference, please use the components specified in below:

1. Bolt

Material: Stainless Steel

2. Washer

Material: Stainless Steel

- |                           |                           |
|---------------------------|---------------------------|
| Size and Length: M8*16mm  | Size: M8                  |
| 3. Spring Washer          | 4. Nut                    |
| Material: Stainless Steel | Material: Stainless Steel |
| Size: M8                  | Size: M8                  |

Recommended torque is between 14N.m to 20N.m.

### 5.2.2 Modules installed with clamp

Modules should be mounted using specialized clamps as shown in Figure 3, Figure 4, Figure 5 and Figure 6.

Remark: Some combinations of the material could be used, regarding the detailed information, please refer to the listing report.

A) A Module should be attached on a supporting structure rail by metal clamps.

It is recommended to use the clamps under the following condition or approved by system installation:

Size: No less than 38mm) width

Thickness: Following as Clamp A and Clamp B

Material: Aluminum Alloy 6063-T5

Bolt: Stainless Steel , M8

Nut: Stainless Steel, M8

Washer: Stainless Steel, M8

B) Recommended bolt torque range: 18N.m to 24N.m.

C) The Modules clamps should not contact the front glass or deform the frame in any way. Avoid shading effects from the Modules clamps. Drainage holes on the Modules frame should not be closed or obscured by the clamps. Besides, two or more screws or two full threads of a single screw shall engage the metal.

D) This instruction is just used for the 35mm and 40mm height frame

E) This mounting method is designed for positive load 3600Pa (Safety factor is 1.5) or negative load 1600Pa (Safety factor is 1.5). Only those types which have been qualified could use this method.

F) Mounting method ( showed in Figure 5):  $a=1/4*L$

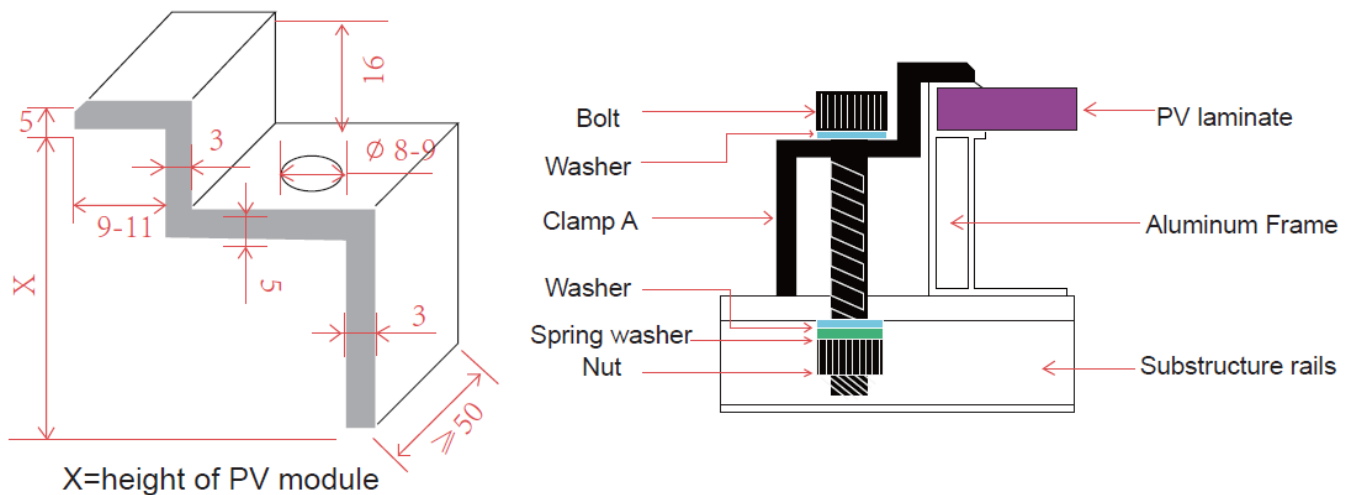


Figure 3 Clamp A

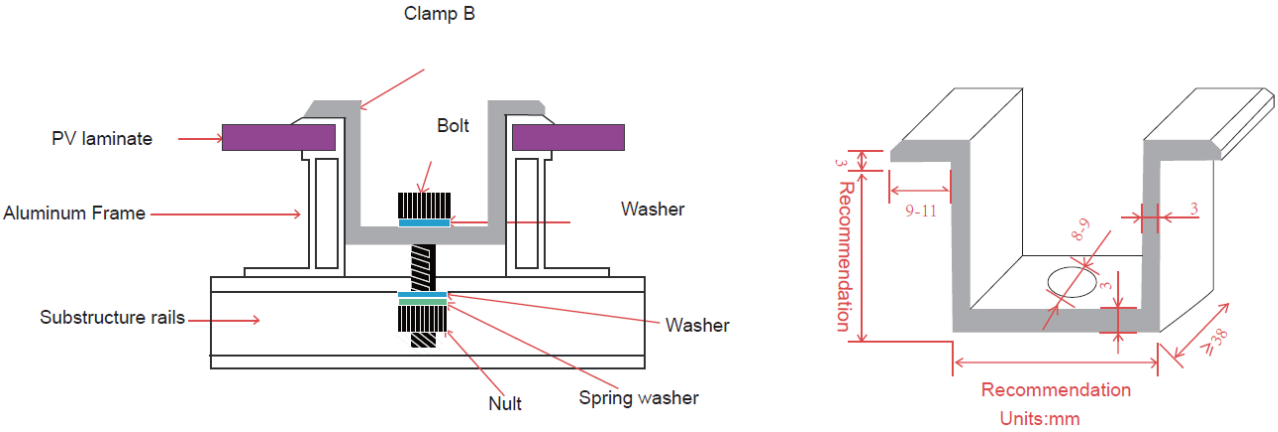


Figure 4 Clamp B

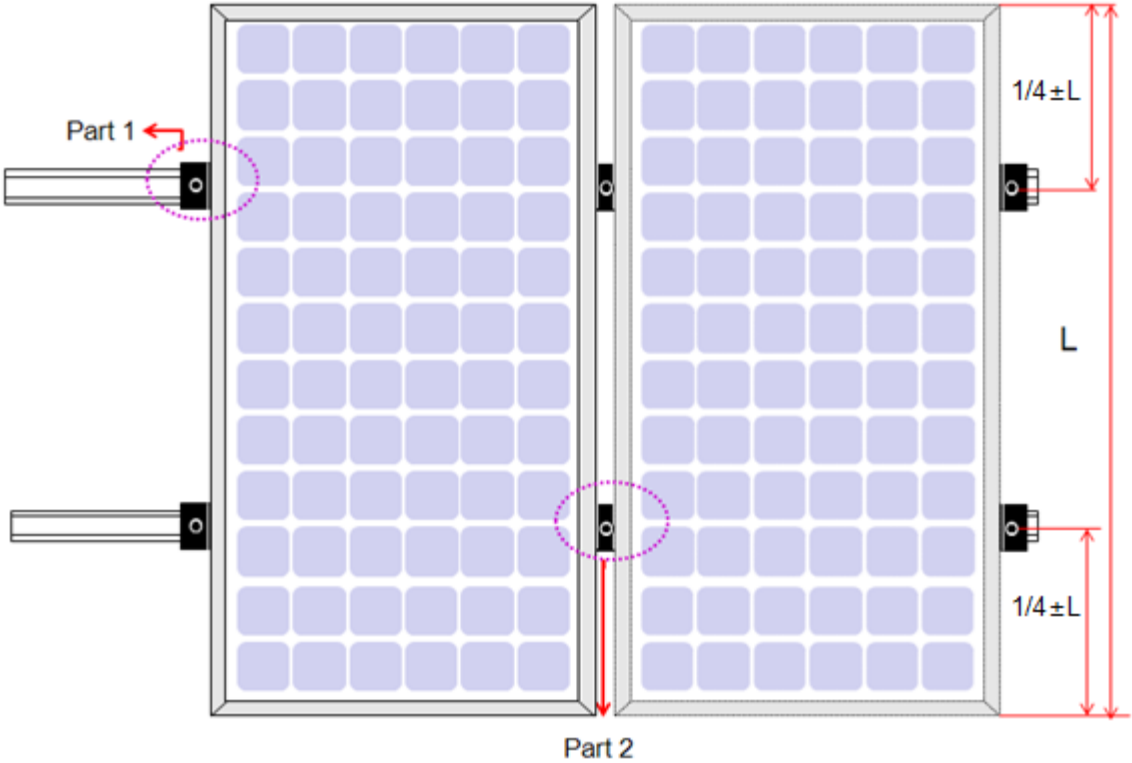
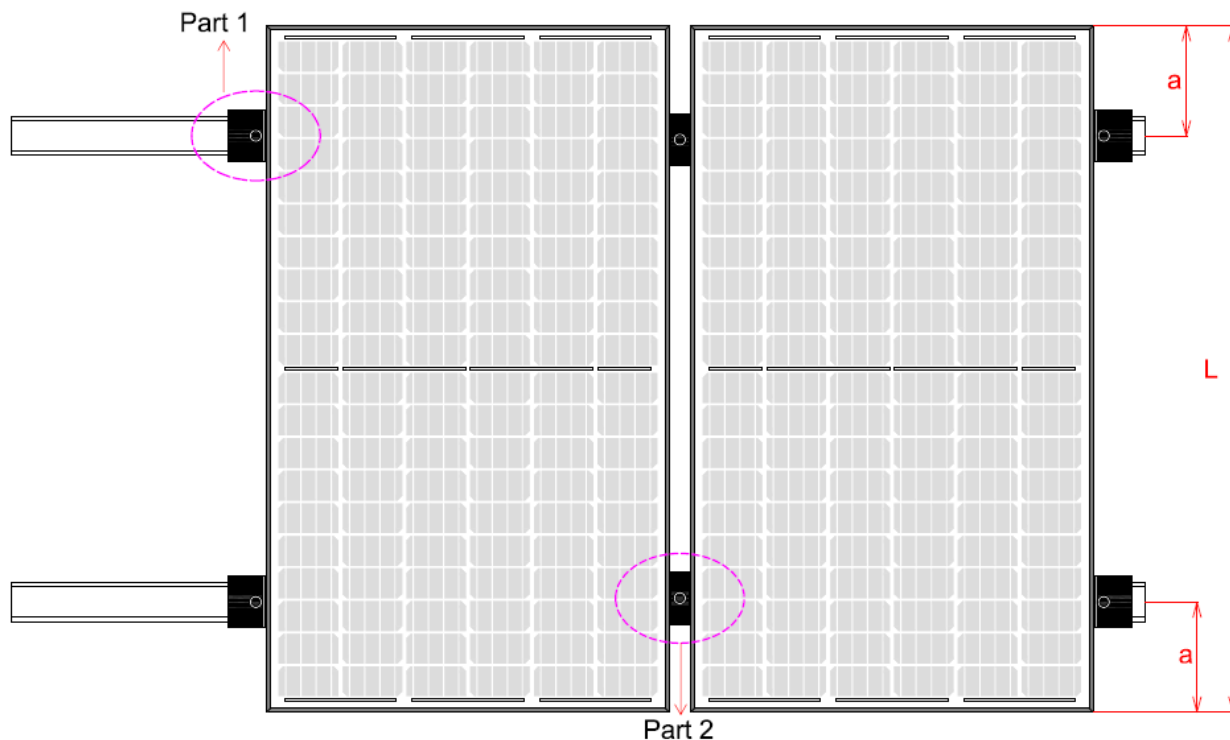


Figure 5 Mounting instruction 1



**Figure 6** Mounting instruction 2

## 6. Electrical Installation

### 6.1 Electrical Property

Rated electrical characteristics such as  $P_{max}$  is within  $\pm 3\%$ ,  $V_{oc}$  within  $\pm 2\%$  and  $I_{sc}$  within  $\pm 4\%$  of tolerance values at Standard Test Conditions. 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  $I_{sc}$  and  $V_{oc}$  marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to the PV output. For a module or panel in abnormal condition, the multiplying 1.25 factor at conditions of an irradiance of  $125 \text{ mW/cm}^2$ , AM 1.5 spectrum, and a cell temperature of minus  $10^\circ\text{C}$  for  $V_{oc}$  and plus  $75^\circ\text{C}$  for  $I_{sc}$  should be taken into consideration.

The maximum number of Modules that can be connected in a series string should be calculated in accordance with applicable regulations in such a way that the specified maximum system voltage of the Modules and all other electrical DC components will not be exceeded in open-circuit operation at the lowest temperature expected at the PV system location. For this, the IEC TS62548:2013 is to be a reference. The parallel number is 1.

An appropriately rated over-current protection device should be used when the reverse current could exceed the value of the maximum fuse rating of the Modules. An over-current protection device is required for each series string if more than two series strings are connected in parallel.

### 6.2 Cables and Wiring

These junction boxes have been designed to be easily interconnected in series for their well-connected cable and the connector with IP67 protection grade. Each Modules has two single-conductor wires, one positive and one negative, which are pre-wired inside the junction box. The connectors at the opposite end of these wires allow easy series connection of adjacent Modules by firmly inserting the positive connector of a Module into the negative connector of an adjacent Module until the connector is fully seated.

Use field wiring with suitable cross-sectional areas that are approved for use at the maximum short-circuit current of the Modules. JA Solar recommends installers use only sunlight resistant cables qualified for direct current (DC) wiring in PV systems. And the rated system voltage of PV wire should be not than PV modules.

#### Rating Required Minimum Field Wiring

Testing Standard	Wire size	System voltage	Temperature Rating
EN 50618:2014	H1Z2Z2-K 1×4mm <sup>2</sup>	DC:1500V, AC: 1000V	-40°C to +90°C

Cables should be fixed to the mounting structure in such a way that mechanical damage of the cable and/or the Modules is avoided. Do not apply stress to the cables. For fixing, use appropriate means, such as sunlight resistant cable ties and/or wire management clips specifically designed to attach to the Modules frame. While the cables are sunlight resistant and waterproof, where possible, avoid direct sunlight exposure and water immersion of the cables.

## 6.3 Connectors

Keep connectors dry and clean, and ensure that connector caps are hand tight before connecting the Modules. Do not attempt making an electrical connection with wet, soiled, or otherwise faulty connectors. Avoid sunlight exposure and water immersion of the connectors. Avoid connectors resting on the ground or roof surface.

Faulty connections can result in arcs and electrical shock. Check that all electrical connections are securely fastened. Make sure that all locking connectors are fully engaged and locked. Besides, the connector should be mated with its original female or male connector of the same supplier.

Testing Standard	Manufacture	Type	System Voltage	Rated Current	Temperature Rating
IEC 62852:2014	Stäubli Electrical Connectors AG <a href="https://ec.staubli.com/">https://ec.staubli.com/</a>	PV-KST4-EV02-XY PV-KBT4-EV02-XY	DC 1500V	45A	-40°C to +85°C
IEC 62852:2014	QC Solar (Suzhou) Corporation <a href="http://www.qc-solar.com/">http://www.qc-solar.com/</a>	QC4.10-35/45	DC 1500V	41A	-40°C to +85°C

## 6.4 Bypass Diodes

The junction boxes used with JA Solar Modules contain 3 bypass diodes and each wired in parallel with the PV cell strings. In the case of partial shading, the diodes bypass the current generated by the non-shaded cells, thereby limiting Modules heating and performance losses. Bypass diodes are not over-current protection devices.

Bypass diodes divert current from the cell strings in the event of partial shading. In the event of a known or suspected diode failure, installers or maintenance providers should contact JA Solar. Never attempt to open the junction box by yourself.

## 7. Grounding

JA Solar Modules use an anodic oxidized aluminum frame to resist corrosion. So the frame of Modules should be connected to the equipment grounding conductor to prevent thunder and electrical shock.

The grounding device should fully contact with the inside of the aluminum alloy, and should penetrate the surface of the frame oxidation film.

Please don't drill any additional grounding hole on the frame of the Modules, otherwise JA Solar expressly disclaim liability for invalidness of the warranty.

For optimal performance, JA Solar Modules should only be used in configurations where the DC cathode of the Modules array is connected to ground. Failure to comply with this requirement will reduce the performance of the system and invalidate JA Solar's Limited Power Warranty for Modules.

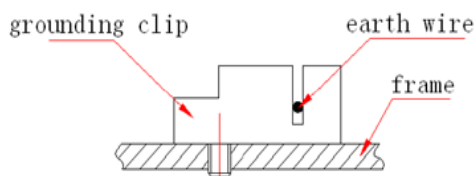
The grounding method should not result in the direct contact of dissimilar metals with the aluminum frame of the Modules that will result in galvanic corrosion. Metals with the aluminum frame of the Modules that will result in galvanic corrosion. An addendum to IEC 60950-1 that recommends metal combinations not exceeds an electrochemical potential difference of 0.6 Volts. The frame rails have pre-drilled holes marked with a grounding sign. These holes should be used for grounding purposes and should not be used for mounting the Modules. Where common grounding hardware (nuts, bolts, star washers, spilt-ring lock washers, flat washers and the like) is used to attach a listed grounding/bonding device, the attachment should be made in conformance with the grounding device manufacturer's instructions. Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in UL 1703, may be used for grounding connections in accordance with the instructions provided with the module.

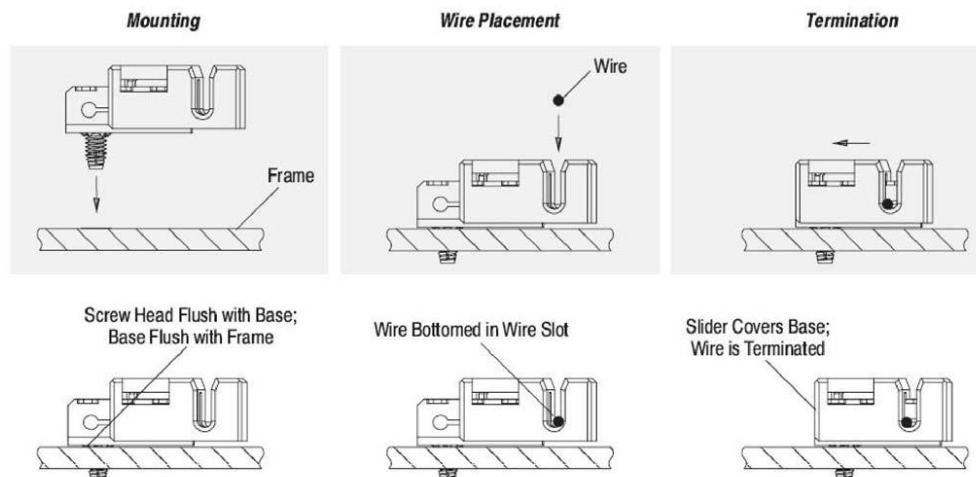
The following grounding methods are available.

### 7.1 Grounding by using grounded clamp

There is a grounding hole with 4.2 mm diameter on the edge side closer to the middle of the back frame of the Modules. The middle line of the grounding mark is overlapped with the grounding hole, and the direction is same as the longer frame.

The grounding between Modules should be approved by qualified electrician. And the grounding device should produced by qualified electrical manufacture. The recommended twist torque value is 2.3 Nm. A copper core in size of 6 mm<sup>2</sup> can be used as grounding clamp. The copper wire should not be squashed during the installation.





**Figure 5: Installation Methods**

Note: The figure above is using TYCO. 1954381-1 (recommended)



**Figure 6** Grounding sign

## 8. Operation and Maintenance

It is required to perform regular inspection and maintenance of the Modules, especially within warranty scope. It is the user's responsibility to report to the supplier regarding the damages found within 2 weeks.

The dust accumulated on the front transparent substrate may reduce the power output, and may even cause regional hot-spot effect. The industrial effluents or bird drops may be serious cases, and the extent of the severity depends on the transparency of the foreign objects. It's usually not dangerous of the accumulated dust to reduce the sunshine, because the light intensity is still homogeneous and the power reduction usually is not obvious.

When Modules are the work, there should exist environmental influence factors to cast shadows and cover part or even all of the Modules, such as other Modules, system support, bird drops and a lot of dust, clay or plant and so on, these may distinctly reduce the power output. JA Solar advises that there should be no obstructed object over the Modules surface at any time.

The cleaning frequency depends on the accumulating velocity of the fouling. In many instances the front substrate goes cleaned with the rain, and we can decrease the cleaning frequency. It is recommended to wipe the glass surface with wet sponge or soft cloth. Please do not clean the glass with cleaning agent which contains acid or alkali.



## 8.1 The visual inspection of the Modules

Inspect the Modules visually to find if there are appearance defect, the following two types need more attention especially:

- A) Whether the glass is broken;
- B) Corrosion along the cells' bus-bar.

The corrosion is caused by the dampness infiltrated into the Modules when the surface encapsulation material damaged during the installation or transportation.

- C) If there is burning vestige on the backsheet

## 8.2 Inspection of the connector and the cable

It's recommended to implement the following preventive maintenance every 6 months:

- A) Check the encapsulation of the connector with the cable.
- B) Check the sealing gel of the junction box to ensure if it is crack or crevice.

## Appendix 1: Performance at STC and other parameters

Rated electrical characteristics such as Pmax is within +/- 3 %, Voc within +/- 2 % and Isc within +/- 4 % of tolerance values at STC. For all series modules, the parameters of modules with same power position in a group are the same.

1. 1500V: JAM6(K)-72-\*\*\*/PR/1500V, 345-370; JAM72S01-\*\*\*/PR, 345-390;  
1000V: JAM6(K)-72-\*\*\*/PR, 345-370; JAM72S01-\*\*\*/PR/1000V, JAM72S02-\*\*\*/PR/1000V, 345-390

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S01-345/PR	22±3%	1960*991*40 1960*991*35	345	47.05	9.54	38.39	8.99	20
JAM72S01-350/PR			350	47.24	9.61	38.58	9.07	
JAM72S01-355/PR			355	47.45	9.69	38.76	9.16	
JAM72S01-360/PR			360	47.66	9.81	38.96	9.24	
JAM72S01-365 /PR			365	47.93	9.85	39.21	9.31	
JAM72S01-370/PR			370	48.18	9.91	39.45	9.38	
JAM72S01-375/PR			375	48.45	9.98	39.75	9.44	
JAM72S01-380/PR			380	48.71	10.05	40.03	9.50	
JAM72S01-385/PR			385	48.98	10.11	40.29	9.56	
JAM72S01-390/PR			390	49.28	10.16	40.61	9.61	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C								

2. 1500V: JAM6(K)-60-\*\*\*/PR/1500V, 285-310; JAM60S01-\*\*\*/PR, 285-325;  
1000V: JAM6(K)-60-\*\*\*/PR, 285-310; JAM60S01-\*\*\*/PR/1000V, JAM60S02-\*\*\*/PR/1000V, 285-325

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S01-285/PR	18.2±3%	1650*991*35	285	39.25	9.46	31.70	8.99	20
JAM60S01-290/PR			290	39.46	9.57	31.80	9.12	
JAM60S01-295/PR			295	39.64	9.66	32.03	9.21	
JAM60S01-300/PR			300	39.85	9.75	32.26	9.30	
JAM60S01-305/PR			305	40.05	9.85	32.57	9.37	
JAM60S01-310/PR			310	40.30	9.91	32.84	9.44	
JAM60S01-315/PR			315	40.53	9.98	33.16	9.50	
JAM60S01-320/PR			320	40.80	10.05	33.48	9.56	
JAM60S01-325/PR			325	41.08	10.12	33.75	9.63	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C, Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C								

3. 1500V: JAM6(K)-72-\*\*\*/4BB/1500V, 320-345; JAM72S01-\*\*\*/SC, 320-365;  
1000V: JAM6(K)-72-\*\*\*/4BB, 320-345; JAM72S01-\*\*\*/SC/1000V, JAM72S02-\*\*\*/SC/1000V, 320-365

Model	Module	Module	Max. Power	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum
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	weight (kg)	size(mm)	at STC condition					Series Fuse(A)
JAM72S01-320/SC	22±3%	1960*991*40 1960*991*35	320	45.32	9.25	36.96	8.66	20
JAM72S01-325/SC			325	45.60	9.33	37.15	8.75	20
JAM72S01-330/SC			330	45.85	9.42	37.38	8.83	20
JAM72S01-335/SC			335	46.09	9.51	37.60	8.91	20
JAM72S01-340/SC			340	46.32	9.60	37.87	8.98	20
JAM72S01-345/SC			345	46.61	9.68	38.17	9.05	20
JAM72S01-350/SC			350	46.89	9.75	38.46	9.11	20
JAM72S01-355/SC			355	47.13	9.81	38.76	9.16	20
JAM72S01-360/SC			360	47.35	9.87	39.01	9.23	20
JAM72S01-365/SC			365	47.64	9.93	39.31	9.29	20

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.059% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.330% /°C  
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C

4. 1500V: JAM6(K)-60-\*\*\*/4BB/1500V, 265-285; JAM60S01-\*\*\*/SC, 265-285;  
1000V: JAM6(K)-60-\*\*\*/4BB, 265-285; JAM60S01-\*\*\*/SC/1000V, JAM60S02-\*\*\*/SC/1000V, 265-285

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S01-265/SC	18.2±3%	1650*991*35	265	38.23	9.17	30.43	8.71	20
JAM60S01-270/SC			270	38.39	9.29	30.69	8.80	
JAM60S01-275/SC			275	38.52	9.38	30.80	8.93	
JAM60S01-280/SC			280	38.65	9.49	30.98	9.04	
JAM60S01-285/SC			285	38.78	9.58	31.15	9.15	
JAM60S01-290/SC			290	38.98	9.69	31.32	9.26	
JAM60S01-295/SC			295	39.21	9.75	31.69	9.31	
JAM60S01-300/SC			300	39.48	9.81	32.06	9.36	
JAM60S01-305/SC			305	39.75	9.88	32.25	9.43	

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.059% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.330% /°C;  
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C

5. 1500 V: JAM72S03-\*\*\*/PR, 360-395; 1000V: JAM72S03-\*\*\*/PR/1000V, JAM72S08-\*\*\*/PR/1000V, 360-395;

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S03-360/PR	22.5±3%	2000*991*40	360	46.98	9.87	38.73	9.30	30
JAM72S03-365/PR			365	47.30	9.92	39.05	9.35	
JAM72S03-370/PR			370	47.56	9.97	39.36	9.41	
JAM72S03-375/PR			375	47.78	10.03	39.58	9.48	
JAM72S03-380/PR			380	48.05	10.09	39.80	9.55	

JAM72S03-385/PR			385	48.32	10.15	40.07	9.61	
JAM72S03-390/PR			390	48.61	10.21	40.34	9.67	
JAM72S03-395/PR			395	48.91	10.28	40.63	9.73	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C								

6. 1500V: JAM60S03-\*\*\*/PR, 300-330; 1000V: JAM60S03-\*\*\*/PR/1000V, JAM60S08-\*\*\*/PR/1000V, 300-330

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S03-300/PR	18.5 ± 3%	1678*991*35	300	39.05	9.90	32.23	9.31	30
JAM60S03-305/PR			305	39.32	9.97	32.50	9.39	
JAM60S03-310/PR			310	39.61	10.03	32.78	9.46	
JAM60S03-315/PR			315	39.93	10.10	33.07	9.53	
JAM60S03-320/PR			320	40.22	10.16	33.34	9.60	
JAM60S03-325/PR			325	40.56	10.22	33.65	9.66	
JAM60S03-330/PR			330	40.84	10.29	33.91	9.74	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C								

7. 1500V: JAP6(K)-72-\*\*\*/4BB/1500V, 310-330; JAP72S01-\*\*\*/SC, 310-345;

1000V: JAP6(K)-72-\*\*\*/4BB, 310-330; JAP72S01-\*\*\*/SC/1000V, JAP72S02-\*\*\*/SC/1000V, 310-345

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S01-310/SC	22 ± 3%	1960*991*40 1960*991*35	310	45.56	8.92	36.89	8.40	20
JAP72S01-315/SC			315	45.85	9.01	37.09	8.49	
JAP72S01-320/SC			320	46.12	9.09	37.28	8.58	
JAP72S01-325/SC			325	46.38	9.17	37.39	8.69	
JAP72S01-330/SC			330	46.40	9.28	37.65	8.77	
JAP72S01-335/SC			335	46.70	9.35	37.83	8.87	
JAP72S01-340/SC			340	46.80	9.51	38.04	8.94	
JAP72S01-345/SC			345	47.03	9.57	38.30	9.01	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330% /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C								

8. 1500V: JAP6(K)-60-\*\*\*/4BB/1500V, 255-275; JAP60S01-\*\*\*/SC, 255-290

1000V: JAP6(K)-60-\*\*\*/4BB, 255-275; JAP60S01-\*\*\*/SC/1000V, JAP60S02-\*\*\*/SC/1000V, 255-290

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S01-255/SC	18.2 ± 3%	1650*991*35	255	37.51	8.93	30.49	8.36	20
JAP60S01-260/SC			260	37.74	9.04	30.71	8.47	

JAP60S01-265/SC			265	37.95	9.11	30.92	8.57	
JAP60S01-270/SC			270	38.17	9.18	31.13	8.67	
JAP60S01-275/SC			275	38.38	9.29	31.34	8.77	
JAP60S01-280/SC			280	38.65	9.37	31.61	8.86	
JAP60S01-285/SC			285	38.70	9.60	31.70	9.01	
JAP60S01-290/SC			290	38.95	9.66	31.98	9.07	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330% /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C								

9. 1500V: JAP72S01-\*\*\*/PR, 330-345;

1000V: JAP72S01-\*\*\*/PR/1000V, JAP72S02-\*\*\*/PR/1000V, 330-345

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S01-330/PR	22±3%	1960*991*40	330	46.04	9.35	37.58	8.79	20
JAP72S01-335/PR			335	46.35	9.41	37.87	8.86	
JAP72S01-340/PR		1960*991*35	340	46.66	9.47	38.19	8.91	
JAP72S01-345/PR			345	46.95	9.53	38.45	8.98	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330% /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C								

10. 1500V: JAP60S01-\*\*\*/PR, 275-285

1000V: JAP60S01-\*\*\*/PR/1000V, JAP60S02-\*\*\*/PR/1000V, 275-285

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S01-275/PR	18.2±3%	1650*991*35	275	38.47	8.80	31.28	9.37	20
JAP60S01-280/PR			280	38.75	8.86	31.62	9.43	
JAP60S01-285/PR			285	39.05	8.94	31.91	9.48	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330% /°C;								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C								

11. 1500V: JAP72S03-\*\*\*/SC, 320-345

1000V: JAP72S03-\*\*\*/SC/1000V, JAP72S08-\*\*\*/SC/1000V, 320-345

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S03-320/SC	22.5±3%	2000*991*40	320	45.02	9.06	37.21	8.60	20
JAP72S03-325/SC			325	45.31	9.14	37.48	8.68	
JAP72S03-330/SC			330	45.57	9.22	37.78	8.74	
JAP72S03-335/SC			335	45.80	9.30	37.99	8.82	
JAP72S03-340/SC			340	46.13	9.38	38.25	8.91	
JAP72S03-345/SC			345	46.38	9.44	38.48	8.97	

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.330% /°C  
 Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C

## 12. 1500V: JAP60S03-\*\*\*/SC, 270-290

1000V: JAP60S03-\*\*\*/SC/1000V, JAP60S08-\*\*\*/SC/1000V, 270-290

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S03-270/SC	18.5±3%	1678*991*35	275	37.65	9.24	31.33	8.64	20
JAP60S03-275/SC			275	37.87	9.33	31.54	8.74	
JAP60S03-280/SC			280	38.08	9.43	31.81	8.83	
JAP60S03-285/SC			285	38.30	9.53	32.02	8.92	
JAP60S03-290/SC			290	38.50	9.62	32.23	9.01	

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.330% /°C  
 Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.410% /°C

## 13. 1500V: JAP72S03-\*\*\*/PR, 335-355

1000V: JAP72S03-\*\*\*/PR/1000V, JAP72S08-\*\*\*/PR/1000V, 335-355

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S03-335/PR	22.5±3%	2000*991*40	335	46.87	9.35	38.07	8.80	20
JAP72S03-340/PR			340	47.18	9.41	38.39	8.86	
JAP72S03-345/PR			345	47.47	9.47	38.65	8.93	
JAP72S03-350/PR			350	47.75	9.54	38.91	9.00	
JAP72S03-355/PR			355	47.96	9.61	39.18	9.07	

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.300% /°C  
 Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C

## 14. 1500V: JAP60S03-\*\*\*/PR, 280-295

1000V: JAP60S03-\*\*\*/PR/1000V, JAP60S08-\*\*\*/PR/1000V, 280-295

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S03-280/PR	18.5±3%	1678*991*35	280	39.27	9.37	31.82	8.80	20
JAP60S03-285/PR			285	39.57	9.42	32.11	8.88	
JAP60S03-290/PR			290	39.85	9.48	32.40	8.96	
JAP60S03-295/PR			295	40.13	9.55	32.66	9.04	

Temperature Coefficient of Isc ( $\alpha$  Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$  Voc): -0.300% /°C  
 Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.390% /°C

## 15. 1500V: JAM72S01-\*\*\*/MR/1500V, 365-385; 1000V: JAM72S01-\*\*\*/MR/1000V, JAM72S02-\*\*\*/MR/1000V, 365-385

Model	Module weight	Module size(mm)	Max. Power at STC	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series
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	(kg)		condition					Fuse(A)
JAM72S01-365/MR	22±3%	1960*991*40 1960*991*35	365	47.61	9.79	38.88	9.39	20
JAM72S01-370/MR			370	47.92	9.85	39.16	9.45	
JAM72S01-375/MR			375	48.21	9.91	39.44	9.51	
JAM72S01-380/MR			380	48.52	9.96	39.75	9.56	
JAM72S01-385/MR			385	48.81	10.02	40.03	9.62	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

16. 1500V: JAM60S01-\*\*\*MR/1500V, 305-320; 1000V: JAM60S01-\*\*\*MR/1000V, JAM60S02-\*\*\*MR/1000V, 305-320

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S01-305/MR	18.2±3%	1650*991*35	305	39.69	9.82	32.36	9.43	20
JAM60S01-310/MR			310	40.01	9.88	32.67	9.49	
JAM60S01-315/MR			315	40.32	9.94	32.96	9.56	
JAM60S01-320/MR			320	40.61	10.00	33.25	9.63	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300% /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

17. 1000V: JAM72S04-\*\*\*PR, 360-375

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S04-360/PR	22.5±3%	1960*991*40	360	44.01	9.81	38.96	9.24	20
JAM72S04-365/PR			365	44.27	9.85	39.21	9.31	
JAM72S04-370/PR			370	44.53	9.91	39.45	9.38	
JAM72S04-375/PR			375	44.84	9.98	39.75	9.44	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): 0 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.380% /°C								

18. 1000V: JAM60S04-\*\*\*PR, 300-310

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S04-300/PR	18.2±3%	1650*991*35	300	37.32	9.75	32.26	9.30	20
JAM72S04-305/PR			305	37.64	9.85	32.57	9.37	
JAM72S04-310/PR			310	37.93	9.91	32.84	9.44	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): 0 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.380% /°C								

19. 1000V: JAP72S04-\*\*\*SC, 325-340

Model	Module weight	Module size(mm)	Max. Power at STC	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series
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	(kg)		condition					Fuse(A)
JAP72S04-325/SC	22.5±3%	1960*991*40	325	42.33	9.17	37.39	8.69	20
JAP72S04-330/SC			330	42.60	9.28	37.65	8.77	
JAP72S04-335/SC			335	42.80	9.35	37.83	8.87	
JAP72S04-340/SC			340	43.03	9.51	38.04	8.94	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): 0 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.400% /°C								

## 20. 1000V: JAP60S04-\*\*\*/SC, 270-280

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S04-270/SC	18.2±3%	1650*991*35	270	36.06	9.18	31.13	8.67	20
JAP60S04-275/SC			275	36.29	9.29	31.34	8.77	
JAP60S04-280/SC			280	36.58	9.37	31.61	8.86	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): 0 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.400% /°C								

## 21. 1500V: JAM60S09-\*\*\*/PR/1500V, 310-335; 1000V: JAM60S09-\*\*\*/PR/1000V, 310-335; JAM60S12-\*\*\*/PR/1000V, 305-330;

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S09-305/PR/1500V	18.4±3%	1657*996*35	305	40.02	9.97	32.31	9.44	20
JAM60S09-310/PR/1500V			310	40.30	10.04	32.60	9.51	
JAM60S09-315/PR/1500V			315	40.53	10.11	32.89	9.58	
JAM60S09-320/PR/1500V	18.6±3%	1666*1005*35	320	40.78	10.18	33.17	9.65	
JAM60S09-325/PR/1500V			325	41.04	10.25	33.44	9.72	
JAM60S09-330/PR/1500V			330	41.30	10.32	33.75	9.78	
JAM60S09-335/PR/1500V			335	41.54	10.39	34.02	9.85	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 22. 1500V: JAM72S09-\*\*\*/PR/1500V, 370-405; 1000V: JAM72S09-\*\*\*/PR/1000V, 370-405; JAM72S12-\*\*\*/PR/1000V, 365-380

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S09-365/PR/1500V	22.3±3%	1979*996*40	365	47.89	9.96	38.67	9.44	20
JAM72S09-370/PR/1500V			370	48.18	10.01	38.99	9.49	
JAM72S09-375/PR/1500V			375	48.47	10.06	39.27	9.55	
JAM72S09-380/PR/1500V	22.6±3%	1988*1005*40	380	48.75	10.12	39.59	9.60	
JAM72S09-385/PR/1500V			385	49.04	10.17	39.90	9.65	
JAM72S09-390/PR/1500V			390	49.35	10.22	40.21	9.70	
JAM72S09-395/PR/1500V			395	49.64	10.27	40.48	9.76	



JAM72S09-400/PR/1500V			400	49.92	10.33	40.78	9.81	
JAM72S09-405/PR/1500V			405	50.23	10.38	41.08	9.86	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

23. 1500V: JAM60S10-\*\*\*/PR/1500V, 315-345; 1000V: JAM60S10-\*\*\*/PR/1000V, 315-345; JAM60S17-\*\*\*/PR/1000V, 315-325

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S10-315/PR/1500V	18.7±3% 19.0±3%	1689*996*35 1698*1005*35	315	40.03	10.09	33.37	9.44	20
JAM60S10-320/PR/1500V			320	40.27	10.16	33.62	9.52	
JAM60S10-325/PR/1500V			325	40.56	10.23	33.87	9.60	
JAM60S10-330PR/1500V			330	40.84	10.30	34.13	9.67	
JAM60S10-335/PR/1500V			335	41.12	10.38	34.36	9.75	
JAM60S10-340/PR/1500V			340	41.36	10.46	34.63	9.82	
JAM60S10-345/PR/1500V			345	41.61	10.53	34.90	9.89	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.051% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.289 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C								

24. 1500V: JAM72S10-\*\*\*/PR/1500V, 380-415; 1000V: JAM72S10-\*\*\*/PR/1000V, 380-415; JAM72S17-\*\*\*/PR/1000V, 380-390

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S10-380/PR/1500V	22.7±3% 23.0±3%	2015*996*40 2024*1005*40	380	48.33	10.05	39.93	9.52	20
JAM72S10-385/PR/1500V			385	48.62	10.11	40.24	9.57	
JAM72S10-390/PR/1500V			390	48.91	10.16	40.55	9.62	
JAM72S10-395/PR/1500V			395	49.21	10.21	40.85	9.67	
JAM72S10-400/PR/1500V			400	49.50	10.26	41.17	9.72	
JAM72S10-405PR/1500V			405	49.81	10.32	41.46	9.77	
JAM72S10-410/PR/1500V			410	50.12	10.37	41.76	9.82	
JAM72S10-415/PR/1500V			415	50.42	10.42	42.05	9.87	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.051% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.289 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C								

25. 1500V: JAP60S09-\*\*\*/SC/1500V, 265-290; 1000V: JAP60S09-\*\*\*/SC/1000V, 265-290

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S09-265/SC/1500V	18.4±3% 18.6±3%	1657*996*35 1666*1005*35	265	37.68	9.20	30.44	8.71	20
JAP60S09-270/SC/1500V			270	37.92	9.28	30.72	8.79	
JAP60S09-275/SC/1500V			275	38.18	9.36	30.94	8.89	
JAP60S09-280/SC/1500V			280	38.43	9.44	31.19	8.98	
JAP60S09-285/SC/1500V			285	38.69	9.53	31.43	9.07	

JAP60S09-290/SC/1500V			290	38.95	9.62	31.70	9.15	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.40% /°C								

26. 1500V: JAP72S09-\*\*\*/SC/1500V, 320-345; 1000V: JAP72S09-\*\*\*/SC/1000V, 320-345;

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)		
JAP72S09-320/SC/1500V	22.3±3%	1979*996*40	320	45.29	9.21	36.62	8.74	20		
JAP72S09-325/SC/1500V			325	45.56	9.28	36.90	8.81			
JAP72S09-330/SC/1500V			330	45.82	9.35	37.18	8.88			
JAP72S09-335/SC/1500V			22.6±3%	1988*1005*40	335	46.10	9.42		37.45	8.95
JAP72S09-340/SC/1500V			340		46.39	9.48	37.74		9.01	
JAP72S09-345/SC/1500V			345		46.68	9.55	38.04		9.07	
JAP72S09-345/SC/1500V										
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.058% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.330 /°C										
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.40% /°C										

27. 1500V: JAP60S10-\*\*\*/SC/1500V, 275-290; 1000V: JAP60S10-\*\*\*/SC/1000V, 275-29

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)		
JAP60S10-275/SC/1500V	18.7±3%	1689*996*35	275	37.95	9.29	31.22	8.81	20		
JAP60S10-280/SC/1500V			280	38.14	9.38	31.47	8.90			
JAP60S10-285/SC/1500V			19.0±3%	1698*1005*35	285	38.31	9.47		31.71	8.99
JAP60S10-290/SC/1500V			290		38.48	9.56	31.91		9.09	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C										
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C										

28. 1500V: JAP72S10-\*\*\*/SC/1500V, 335-350; 1000V: JAP72S10-\*\*\*/SC/1000V, 335-350;

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S10-335/SC/1500V	22.7±3%	2015*996*40	335	45.73	9.35	37.90	8.84	20
JAP72S10-340/SC/1500V			340	45.89	9.43	38.08	8.93	
JAP72S10-345/SC/1500V	23.0±3%	2024*1005*40	345	46.07	9.50	38.25	9.02	
JAP72S10-350/SC/1500V			350	46.27	9.58	38.43	9.11	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

29. 1500V: JAM72S10-\*\*\*/MR/1500V, 390-420; 1000V: JAM72S10-\*\*\*/MR/1000V, 390-420; JAM72S17-\*\*\*/MR/1000V, 390-395

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S10-390/MR/1500V	22.7±3%	2015*996*40	390	49.01	10.23	40.71	9.58	20

JAM72S10-395/MR/1500V	23.0±3%	2024*1005*40	395	49.30	10.28	41.02	9.63
JAM72S10-400/MR/1500V			400	49.58	10.33	41.33	9.68
JAM72S10-405/MR/1500V			405	49.86	10.39	41.60	9.74
JAM72S10-410/MR/1500V			410	50.12	10.45	41.88	9.79
JAM72S10-415/MR/1500V			415	50.41	10.51	42.18	9.84
JAM72S10-420/MR/1500V			420	50.70	10.56	42.47	8.89
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.044% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.272 /°C							
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C							

30. 1500V: JAM60S10-\*\*\*/MR/1500V, 320-345; 1000V: JAM60S10-\*\*\*/MR/1000V, 320-345; JAM60S17-\*\*\*/MR/1000V, 315-325

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S10-315/MR/1500V	18.7±3%	1689*996*35	315	40.35	10.08	33.48	9.41	20
JAM60S10-320/MR/1500V			320	40.60	10.16	33.73	9.49	
JAM60S10-325/MR/1500V			325	40.87	10.23	33.97	9.57	
JAM60S10-330/MR/1500V	19.0±3%	1698*1005*35	330	41.08	10.30	34.24	9.64	
JAM60S10-335/MR/1500V			335	41.32	10.38	34.48	9.72	
JAM60S10-340/MR/1500V			340	41.55	10.46	34.73	9.79	
JAM60S10-345/MR/1500V			345	41.76	10.54	34.99	9.86	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.044% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.272 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C								

31. 1500V: JAP72S01-\*\*\*/MS, 325-340; 1000V: JAP72S01-\*\*\*/MS/1000V, 325-340

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S01-325/MS	22±3%	1960*991*40	325	45.31	9.14	37.48	8.68	20
JAP72S01-330/MS			330	45.57	9.22	37.78	8.74	
JAP72S01-335/MS		1960*991*35	335	45.80	9.30	37.99	8.82	
JAP72S01-340/MS			340	46.13	9.38	38.25	8.91	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

32. 1500V: JAP60S01-\*\*\*/MS, 270-280; 1000V: JAP60S01-\*\*\*/MS/1000V, 270-280

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S01-270/MS	18.2±3%	1650*991*35	270	37.65	9.24	31.33	8.64	20
JAP60S01-275/MS			275	37.87	9.33	31.54	8.74	
JAP60S01-280/MS			280	38.08	9.43	31.81	8.83	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 33. 1500V: JAP72S03-\*\*\*/MS, 320-345; 1000V: JAP72S03-\*\*\*/MS/1000V, 320-345

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP72S03-320/MS	22.5±3%	2000*991*40	320	45.29	9.21	36.62	8.74	20
JAP72S03-325/MS			325	45.56	9.28	36.90	8.81	
JAP72S03-330/MS			330	45.83	9.35	37.18	8.88	
JAP72S03-335/MS			335	46.10	9.42	37.45	8.95	
JAP72S03-340/MS			340	46.39	9.48	37.74	9.01	
JAP72S03-345/MS			345	46.68	9.55	38.04	9.07	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 34. 1500V: JAP60S03-\*\*\*/MS, 270-285; 1000V: JAP60S03-\*\*\*/MS/1000V, 270-285

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAP60S03-270/MS	18.5±3%	1678*991*35	270	37.92	9.28	30.72	8.79	20
JAP60S03-275/MS			275	38.18	9.36	30.94	8.89	
JAP60S03-280/MS			280	38.43	9.44	31.19	8.98	
JAP60S03-285/MS			285	38.69	9.53	31.43	9.07	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.054% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 35. 1500V: JAM78S10-\*\*\*/MR/1500V, 410-455; 1000V: JAM78S10-\*\*\*/MR/1000V, 410-455

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM78S10-410/MR/1500V	24.5±3%	2180*996*40	410	52.56	10.16	42.23	9.71	20
JAM78S10-415/MR/1500V			415	52.84	10.22	42.53	9.76	
JAM78S10-420/MR/1500V			420	53.11	10.28	42.77	9.82	
JAM78S10-425/MR/1500V			425	53.41	10.32	43.11	9.86	
JAM78S10-430/MR/1500V			430	53.72	10.36	43.41	9.91	
JAM78S10-435/MR/1500V			435	53.98	10.40	43.78	9.94	
JAM78S10-440/MR/1500V			440	54.25	10.44	44.15	9.97	
JAM78S10-445/MR/1500V			445	54.56	10.48	44.46	10.01	
JAM78S10-450/MR/1500V			450	54.83	10.52	44.78	10.05	
JAM78S10-455/MR/1500V			455	55.12	10.56	45.10	10.09	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.044% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.272 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C								

## 36. 1500V: JAM66S10-\*\*\*/MR/1500V, 345-380; 1000V: JAM66S10-\*\*\*/MR/1000V, 345-380

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Voc (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
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JAM66S10-345/MR/1500V	20.7 ± 3%	1852*996*40	345	44.40	10.11	35.98	9.59	20
JAM66S10-350/MR/1500V			350	44.69	10.17	36.35	9.63	
JAM66S10-355/MR/1500V			355	45.01	10.24	36.60	9.70	
JAM66S10-360/MR/1500V			360	45.26	10.31	36.93	9.75	
JAM66S10-365/MR/1500V			365	45.53	10.37	37.21	9.81	
JAM66S10-370/MR/1500V			370	45.80	10.43	37.49	9.87	
JAM66S10-375/MR/1500V			375	46.08	10.49	37.77	9.93	
JAM66S10-380/MR/1500V			380	46.35	10.55	38.08	9.98	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.051% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.289 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.350% /°C								

## 37. 1000V: JAM60S13-\*\*\*/PR, 310-330

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S13-310/PR	18.4 ± 3%	1657*996*35	310	37.70	10.04	32.60	9.51	20
JAM60S13-315/PR			315	38.01	10.11	32.89	9.58	
JAM60S13-320/PR	18.6 ± 3%	1666*1005*35	320	38.30	10.18	33.17	9.65	
JAM60S13-325/PR			325	38.58	10.25	33.44	9.72	
JAM60S13-330/PR			330	38.91	10.32	33.75	9.78	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 38. 1000V: JAM60S18-\*\*\*/PR, 310-335

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM60S18-310/PR	18.4 ± 3%	1657*996*35	310	40.30	10.04	32.60	9.51	20
JAM60S18-315/PR			315	40.53	10.11	32.89	9.58	
JAM60S18-320/PR	18.6 ± 3%	1666*1005*35	320	40.78	10.18	33.17	9.65	
JAM60S18-325/PR			325	41.04	10.25	33.44	9.72	
JAM60S18-330/PR			330	41.30	10.32	33.75	9.78	
JAM60S18-335/PR			335	41.54	10.39	34.02	9.85	
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C; Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C								
Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C								

## 39. 1000V: JAM72S18-\*\*\*/PR, 370-405

Model	Module weight (kg)	Module size(mm)	Max. Power at STC condition	Vom (V)	Isc (A)	Vpm (V)	Ipm (A)	Maximum Series Fuse(A)
JAM72S18-370/PR	22.3 ± 3%	1979*996*40	370	48.18	10.01	38.99	9.49	20
JAM72S18-375/PR	22.6 ± 3%	1988*1005*40	375	48.47	10.06	39.27	9.55	
JAM72S18-380/PR			380	48.75	10.12	39.59	9.60	

JAM72S18-385/PR			385	49.04	10.17	39.90	9.65
JAM72S18-390/PR			390	49.35	10.22	40.21	9.70
JAM72S18-395/PR			395	49.64	10.27	40.48	9.76
JAM72S18-400/PR			400	49.92	10.33	40.78	9.81
JAM72S18-405/PR			405	50.23	10.38	41.08	9.86
Temperature Coefficient of Isc ( $\alpha$ Isc): +0.060% /°C;    Temperature Coefficient of Voc ( $\beta$ Voc): -0.300 /°C Temperature Coefficient of Pmax ( $\gamma$ Pmp): -0.370% /°C							

## Appendix 2: Parameter of Diode

J-box: PVJB-JA-003, J-box diode: 25THY045, supplied by Yangzhou HY

<b>HY</b>		<b>25THY045</b>	
<b>PHOTOVOLTAIC SOLAR CELL PROTECTION SCHOTTKY RECTIFIER</b>		<b>REVERSE VOLTAGE - 45Volts FORWARD CURRENT - 25 Amperes</b>	
<p><b>FEATURES</b></p> <ul style="list-style-type: none"> <li>●Metal of silicon rectifier , majority carrier conduction</li> <li>●Guard ring for transient protection</li> <li>●Low power loss,high efficiency</li> <li>●High current capability,low IR</li> <li>●High surge capacity</li> <li>●For use in low voltage,high frequency inverters,free wheeling,and polarity protection applications</li> </ul> <p><b>MECHANICAL DATA</b></p> <ul style="list-style-type: none"> <li>●Polarity: Color band denotes cathode</li> <li>●Weight: 0.07 ounces , 2.1 grams</li> <li>●Mounting position: Any</li> </ul>		<p><b>R - 6</b></p> <p>Dimensions in inches and (millimeters)</p>	
<b>MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS</b>			
Rating at 25°C ambient temperature unless otherwise specified.			
Single phase, half wave ,60Hz, resistive or inductive load.			
For capacitive load, derate current by 20%			
CHARACTERISTICS	SYMBOL	25THY045	UNIT
Maximum Recurrent Peak Reverse Voltage	$V_{RRM}$	45	V
Maximum RMS Voltage	$V_{RMS}$	31.5	V
Maximum DC Blocking Voltage	$V_{DC}$	45	V
Maximum Average Forward Rectified Current @ $T_c = 170^\circ\text{C}$	$I_{AV}$	25	A
Peak Forward Surge Current 8.3ms single half sine-wave super Imposed on rated load(JEDEC Method)	$I_{FSM}$	350	A
Peak Forward Voltage at 25A DC(Note 1)	$V_F$	0.55	V
Maximum DC Reverse Current at Rated DC Blocking Voltage	@ $T_c = 25^\circ\text{C}$	0.1	mA
	@ $T_c = 75^\circ\text{C}$	1.5	
	@ $T_c = 100^\circ\text{C}$	30	
	@ $T_c = 125^\circ\text{C}$	100	
Typical Thermal Resistance	$R_{\theta JC}$	2	$^\circ\text{C}/\text{W}$
Operating Temperature Range(IN DC Forward Mode-Forward Operations,without reverse bias, 1<1h)	$T_J$	-55 to+200	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to+200	$^\circ\text{C}$
NOTES: 1.300us Pulse Width, 2%Duty Cycle.			
2.The typical data above is for reference only(典型值仅供参考).			
Rev. 7, 16-Mar-2017			

## J-box: PVJB-JA-003, J-box diode: 20SQ045, supplied by Yangzhou Yangjie



## 20SQ045

## 肖特基二极管 SCHOTTKY Diodes

## ■特征 Features

- 低正向, 低漏电流  
Low VF, low IR
- 低功耗, 大电流  
Low Power loss, High efficiency
- 高静电能力 (ESD) $\geq$ 30KV  
参考标准: IEC-61000-4-2, 接触式  
High ESD (ESD) $\geq$ 30KV  
Reference standard: IEC - 61000-4-2, contact
- $I_F$  (AV) 20.0A
- $V_{RRM}$  45V

## ■用途 Applications

- 太阳能行业  
The solar industry

## ■极限值 (绝对最大额定值)

Limiting Values (Absolute Maximum Rating)

参数名称 Item	符号 Symbol	单位 Unit	条件 Conditions	20SQ045
反向重复峰值电压 Repetitive Peak Reverse Voltage	$V_{RRM}$	V	$I_R=0.2mA$ ; $T_a=25^\circ C$	45
平均整流输出电流 Average Rectified Output Current	$I_o$	A	60Hz 正弦波, 电阻负载, $T_a=25^\circ C$ 60Hz sine wave, R-load, $T_a=25^\circ C$	20
正向(不重复)浪涌电流 Surge(Non-repetitive)Forward Current	$I_{FSM}$	A	60Hz正弦波, 一个周期, $T_a=25^\circ C$ 60Hz sine wave, 1 cycle, $T_a=25^\circ C$	275
正向浪涌电流的平方对电流浪涌持续时间积分值 Current Squared Time	$I^2t$	$A^2s$	$1ms \leq t < 8.3ms$ $T_j=25^\circ C$	315
储存温度 Storage Temperature	$T_{stg}$	$^\circ C$		-55 ~ +150
结温 Junction Temperature	$T_j$	$^\circ C$	在正向直流条件下, 没有施加反向电压, 通电 $\leq 1h$ (图1) ① IN DC Forward Mode-Forward Operations, without reverse bias, $t \leq 1h$ (Fig. 1) ①	-55 ~ +200

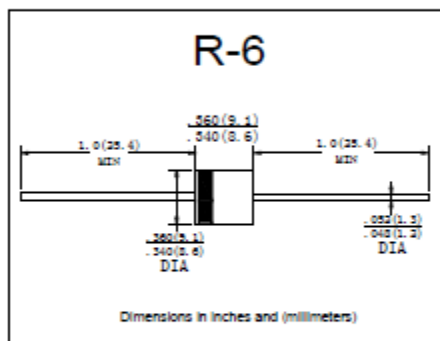
■电特性 ( $T_a=25^\circ C$  除非另有规定)Electrical Characteristics ( $T_a=25^\circ C$  Unless otherwise specified)

参数名称 Item	符号 Symbol	单位 Unit	测试条件 Test Condition	最大值 Max
正向峰值电压 Peak Forward Voltage	V <sub>FM</sub>	V	$I_{FM}=20.0A$	0.48
反向峰值电流 Peak Reverse Current	$I_{RRM1}$	$\mu A$	$V_{RRM}=V_{RRM}$ $T_a=25^\circ C$	0.1
	$I_{RRM2}$		$T=100^\circ C/125^\circ C$	7/20
热阻(典型) Thermal Resistance(Typical)	$R_{\theta J-c}$	$^\circ C/W$	结和壳之间	2.5
	$R_{\theta J-1}$		结到引线之间 (离本体根部1mm处)	2.0
	$R_{\theta J-a}$		结到环境之间 (离壳表面9mm处)	45

## ■备注 NOTE

- ① Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test.

## ■外形尺寸和印记 Outline Dimensions and Mark





## J-box: PVJB-JA-003, J-box diode: 25SQ045, supplied by Panjit

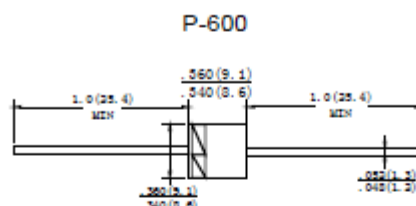


### 25SQ045 光伏旁路二极管

#### ■特征 Features

- 低功耗, 大电流  
IF(AV) 25A  
VRRM 45V
- 低反向漏电流, 高温反向特性优。

#### ■外形尺寸和印记 Outline Dimensions and Mark



Dimensions in inches and (millimeters)

#### ■印码 Marking Code

- 25SQ045

#### ■极限值 (绝对最大额定值)

Limiting Values (Absolute Maximum Rating)

参数名称 Item	符号 Symbol	单位 Unit	条件 Conditions	25SQ045
反向重复峰值电压 Repetitive Peak Reverse Voltage	$V_{RRM}$	V	$I_R=0.1mA$ ; $T_a=25^\circ C$	45
平均整流输出电流 Average Rectified Output Current	$I_o$	A	60Hz 正弦波, 电阻负载, $T_a=25^\circ C$ 60Hz sine wave, R-load, $T_a=25^\circ C$	25
正向(不重复)浪涌电流 Surge(Non-repetitive)Forward Current	$I_{FSM}$	A	60Hz正弦波, 一个周期, $T_a=25^\circ C$ 60Hz sine wave, 1 cycle, $T_a=25^\circ C$	400
正向浪涌电流的平方对电流浪涌持续时间的积分值 Current Squared Time	$I^2t$	$A^2s$	$1ms \leq t < 8.3ms$ $T_j=25^\circ C$	300
储存温度 Storage Temperature	$T_{stg}$	$^\circ C$		-55 ~ +150
结温 Junction Temperature	$T_j$	$^\circ C$	在正向直流条件下, 没有施加反向压降, 通电 $\leq 1h$ (图示1) ① IN DC Forward Mode-Forward Operations, without reverse bias, $t \leq 1h$ (Fig. 1)①	-55 ~ +200

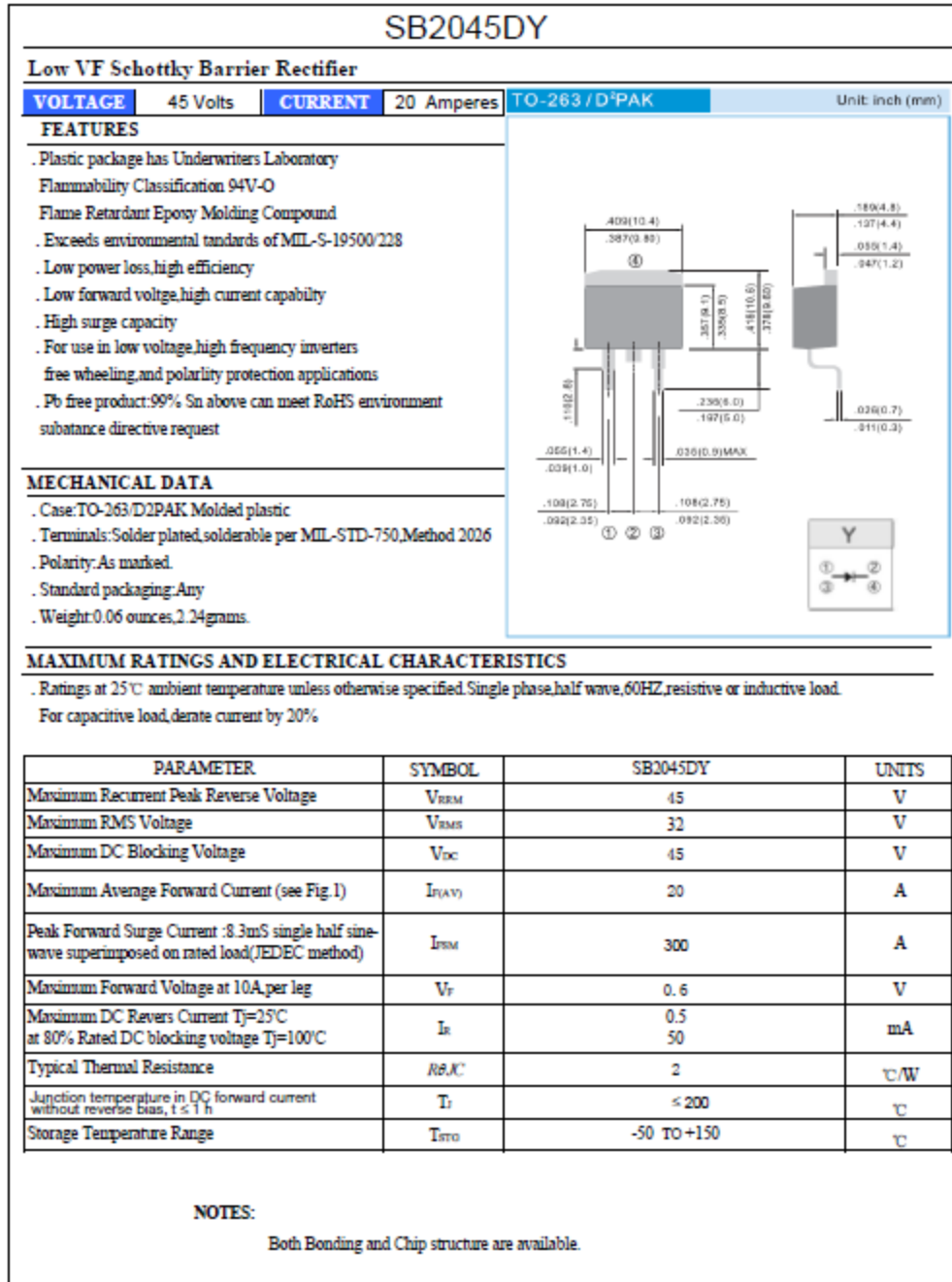
#### ■电特性 ( $T_a=25^\circ C$ 除非另有规定)

Electrical Characteristics ( $T_a=25^\circ C$  Unless otherwise specified)

参数名称 Item	符号 Symbol	单位 Unit	测试条件 Test Condition	最大值 Max
正向峰值电压 Peak Forward Voltage	$V_{FM}$	V	$I_{FM}=25A$	0.58
反向峰值电流 Peak Reverse Current	$I_{RRM1}$	$\mu A$	$V_{RM}=V_{RRM}$ $T_a=25^\circ C$	0.5
	$I_{RRM2}$		$T_a=100^\circ C$	100
热阻(典) Thermal Resistance(Typical)	$R_{\theta J-c}$	$^\circ C/W$	结和壳之间	2.0
	$R_{\theta J-1}$		结到引线之间 (离本体1mm处)	1.8
	$R_{\theta J-a}$		结到环境之间 (离壳表面9mm处)	45

#### ■备注 NOTE

- ① Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test.

**J-box: PVJB-JA-004, J-box diode: SB2045DY, supplied by Panjit**

## J-box: PVJB-JA-004, J-box diode: SB2045DY, supplied by Yangzhou Yangjie



SB2045DY

RoHS  
COMPLIANT

肖特基二极管 Schottky Diodes

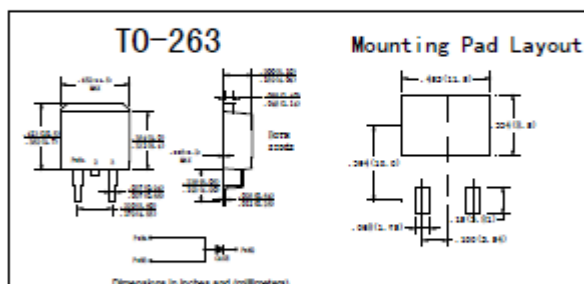
## ■特征 Features

- 耐正向浪涌能力高  
High surge Forward current capability
- 低功耗, 大电流  
Low Power loss, High efficiency
- IF (AV) 20A
- VRRM 45V

## ■用途 Applications

- 太阳能行业  
Photovoltaic Solar cell Protection  
Schottky Rectifier

## ■外形尺寸和印记 Outline Dimensions and Mark



## ■极限值 (绝对最大额定值)

Limiting Values (Absolute Maximum Rating)

参数名称 Item	符号 Symbol	单位 Unit	条件 Conditions	SB2045DY
反向重复峰值电压 Repetitive Peak Reverse Voltage	VRRM	V		45
平均整流输出电流 Average Rectified Output Current	I <sub>o</sub>	A	80HZ 正弦波, 电阻负载, T <sub>a</sub> =25℃ 80HZ sine wave, R-load, T <sub>a</sub> =25℃	20
正向(不重复)浪涌电流 Surge(Non-repetitive)Forward Current	IFSM	A	80HZ正弦波, 一个周期, T <sub>a</sub> =25℃ 80HZ sine wave, 1 cycle, T <sub>a</sub> =25℃	320
正向浪涌电流的平方对电流浪涌持续时间的积分值 Current Squared Time	I <sup>2</sup> t	A <sup>2</sup> s	1ms ≤ t < 8.3ms T <sub>j</sub> =25℃	427
储存温度 Storage Temperature	T <sub>stg</sub>	℃		-55 ~ +150
结温 Junction Temperature	T <sub>j</sub>	℃	在正向直流条件下, 没有施加反向压降, 通电 ≤1h (图1) ① IN DC Forward Mode-Forward Operations, without reverse bias, t ≤ 1 h (Fig. 1)①	-55 ~ + 200


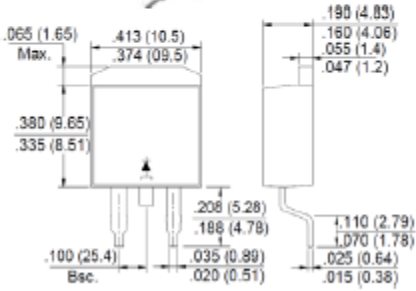
■电特性 (T<sub>a</sub>=25℃ 除非另有规定)Electrical Characteristics (T<sub>a</sub>=25℃ Unless otherwise specified)

参数名称 Item	符号 Symbol	单位 Unit	测试条件 Test Condition	最大值 Max
正向峰值电压 Peak Forward Voltage	VFM	V	I <sub>FM</sub> = 20A	0.55
反向峰值电流 Peak Reverse Current	I <sub>RRM1</sub>	mA	V <sub>RM</sub> = V <sub>RRM</sub> T <sub>a</sub> =25℃	0.5
	I <sub>RRM2</sub>		T <sub>a</sub> =100℃	50
热阻(典型) Thermal Resistance(Typical)	R <sub>θJ-c</sub>	℃/W	结和壳之间 Between junction and case	2.0

## ■备注 NOTE

- ① Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test.

## J-box: PVJB-JA-004, J-box diode: SB2045DY, supplied by Yangzhou HY

Photovoltaic Solar Cell Protection Schottky Diode 太阳能电池保护用肖特基二极管		Reverse Voltage - 45 Volts 反向电压 45V Forward Current - 20 Amperes 正向电流 20A	
<p><b>Features 特征</b></p> <ul style="list-style-type: none"> <li>Low power loss, high efficiency 低功耗, 高效率</li> <li>High current capability, low <math>V_f</math> 大电流能力, 低正向压降</li> <li>High surge capacity 耐浪涌能力高</li> </ul> <p><b>Mechanical Data 外观信息</b></p> <ul style="list-style-type: none"> <li>Case: D2PAK molded plastic 封装: D2PAK塑料</li> <li>Polarity: As marked on the body 极性: 标识在本体上</li> <li>Mounting position: Any 安装位置: 任何地方</li> </ul> <p><b>Applications 应用</b></p> <ul style="list-style-type: none"> <li>For use in solar cell junction box as a bypass diode 用于太阳能接线盒, 当作旁路二极管使用</li> </ul>		<p><b>D2PAK</b></p>   <p>Package Outline Dimensions in Inches (Millimeters) 封装外观尺寸单位英寸(毫米)</p>	
<p><b>Maximum Ratings and Electrical Characteristics 最大额定值及电气特性</b></p> <p>Rating at 25°C ambient temperature unless otherwise specified. 环境温度25°C, 除非特别说明。 Single phase, half wave, 60Hz, resistive or inductive load. 单相半波, 60Hz, 阻性或感性负载。 For capacitive load, derate current by 20%. 对于电容性负载, 降低20%的额定电流。</p>			
Characteristics 特性	Symbol 符号	SB2045DY	Unit 单位
Maximum Repetitive Peak Reverse Voltage 最大重复峰值反向电压	$V_{RRM}$	45	V
Maximum RMS Voltage 最大有效反向电压	$V_{RMS}$	31.5	V
Maximum DC Blocking Voltage 最大直流阻断电压	$V_{DC}$	45	V
Maximum Average Forward Rectified Current @ $T_c=175^\circ\text{C}$ 最大正向平均整流电流	$I_{AV}$	20	A
Peak Forward Surge Current, 8.3ms Single Half Sine-Wave, Superimposed on Rated Load ( JEDEC Method ) 8.3ms单一正弦半波叠加在额定负载上的浪涌能力 (JEDEC方法)	$I_{FSM}$	400	A
Peak Forward Voltage at 20A DC ( Note1 ) 在20A电流下的正向峰值电压 (备注1)	$V_f$	0.55	V
Maximum DC Reverse Current at Rated DC Blocking Voltage @ $T_j=25^\circ\text{C}$ Maximum DC Reverse Current at Rated DC Blocking Voltage @ $T_j=125^\circ\text{C}$ 在额定直流电压下的最大反向直流电流	$I_R$	0.5 50	 mA
Typical Thermal Resistance Junction to Case 结到壳的典型的散热阻值	$R_{\theta JC}$	1.5	$^\circ\text{C}/\text{W}$
Junction Temperature Range 结温工作范围	$T_j$	-55 to +200	$^\circ\text{C}$
Storage Temperature Range 储存温度范围	$T_{STG}$	-55 to +200	$^\circ\text{C}$
<p>Notes: 1. 300uS pulse width, 2% duty cycle. 300uS. 脉宽, 2% 占空比。 2. The typical data above is for reference only. 典型值仅供参考。</p>			
SPA2045-U-00-M004 Rev. 1,16-May-2018			

**J-box: PVJB-JA-004, J-box diode: SB2045DY, supplied by Jinan Jingheng****SCHOTTKY BARRIER RECTIFIER**

肖特基二极管

Reverse Voltage - 45 Volts

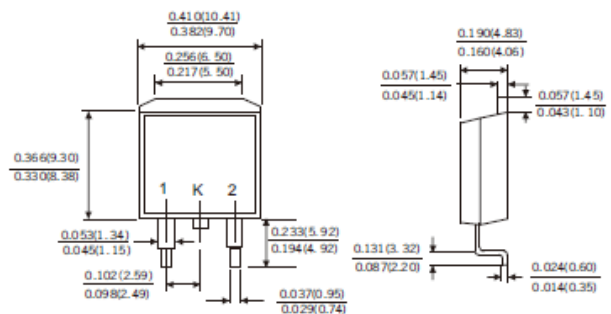
反向电压-45伏

Forward Current - 20Amperes

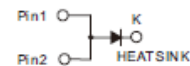
正向电流-20A

**FEATURES 特点**

- Plastic package has Underwriters Laboratory Flammability Classification 94V-0  
塑料材料阻燃等级UL94 V-0级
- Metal silicon junction ,majority carrier conduction  
肖特基结, 多数载流子导电
- Guard ring for overvoltage protection  
保护环用于过压保护
- Low power loss ,high efficiency  
低功耗, 高效率
- High current capability ,Low forward voltage drop  
大电流处理能力, 低正向压降
- Single rectifier construction  
单整流二极管结构
- High surge capability  
高浪涌电流能力
- For use in low voltage ,high frequency inverters,  
free wheeling ,and polarity protection applications  
用于低压、高频逆变器, 续流和极性保护装置
- High temperature soldering guaranteed:260°C/10 seconds,  
耐焊接热: 260°C/10S
- Component in accordance to RoHS 2011/65/EU  
器件符合RoHS法规2011/65/EU和WEEE 2012/19/EU指令

**TO-263AC  
D<sup>2</sup>PAK****MECHANICAL DATA 机械参数**

- Case: JEDEC TO-263(D<sup>2</sup>PAK) molded plastic body  
外形: TO-263(D<sup>2</sup>PAK)塑料封装
- Terminals: Solderable per MIL-STD-202,method 208  
端子: 可焊性符合MIL-STD-202,方法208
- Polarity: As marked  
极性: 如标注
- Mounting Position: Any  
安装位置: 任意
- Weight: 1.33 gram (approximately)  
重量: 大约1.33克



Dimensions in inches and (millimeters)

## SB2045DY

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

## 最大额定值及电特性

(Ratings at 25°C ambient temperature unless otherwise specified ,Single phase ,half wave ,resistive or inductive load. For capacitive load,derate by 20%.)

额定参数是指在环境温度25°C，单向半波，感性或阻性负载，除非特别说明。电容负载，按降额20%计算

Parameters 参 数	Symbols 符 号	SB2045DY	Unit 单位
Maximum repetitive peak reverse voltage 最大可重复反向峰值电压	VRRM	45	V
Maximum RMS voltage 最大有效值电压	VRMS	32	V
Maximum DC blocking voltage 最大直流阻断电压	VDC	45	V
Maximum average forward rectified current See Fig.1 最大平均正向整流电流(如图一)	I(AV)	20.0	A
Peak forward surge current 8.3ms single half sine-wave superimposed on rated load (JEDEC method) 峰值正向浪涌电流(8.3ms单个半正弦波在 额定负载上) JEDEC方法	IFSM	300	A
Maximum instantaneous forward voltage at I=20.0A 20.0A时的最大瞬态正向电压	V <sub>F</sub>	0.55	V
Maximum instantaneous reverse current at rated DC blocking voltage(Note 1) 额定直流电压下的最大瞬态 反向电流(注释1)	T <sub>c</sub> = 25°C	150	μA
	T <sub>c</sub> = 100°C	50	mA
Typical thermal resistance (Note 2) 典型热阻(注释2)	R <sub>θJC</sub>	1.5	°C/W
Storage temperature range 存储温度范围	T <sub>STG</sub>	-65 to +200	°C
Operating junction temperature range at reduced reverse voltage VR ≤ 80%VRRM 加80%反向电压 in DC forward model 在正向直流模式下	T <sub>J</sub>	-65 to +150	°C
		-65 to +200	°C

Notes(注释): 1.Pulse test: 300 μs pulse width,1% duty cycle 脉冲测试: 300微秒脉冲宽度, 1%占空比

2.Thermal resistance from junction to case 热阻, 从结到壳

## Company information

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