# JINKOSOLAR PHOTOVOLTAIC MODULE

## USER MANUAL (UL61730)

EDITION 1/2025

Solar JinKO

# CONTENTS

# 1. General Information

## 1.1 Overview

In order to ensure the PV modules are installed correctly, please read the following installation instructions carefully before modules are installed and used. Please remember that these products generate electricity and certain safety measures need to be taken to avoid injury. Make sure the module array is designed in such a way as not to exceed the maximum system voltage of any system component such as connectors or inverters.

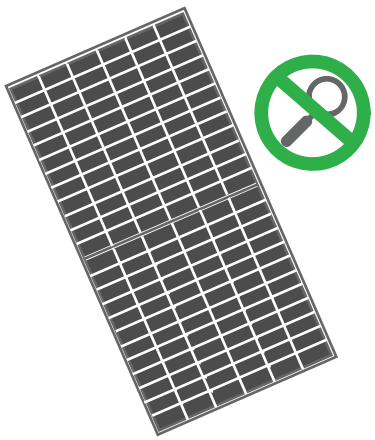
Modules must be installed over a roof which has appropriate fire resistance. Before mounting the module, please consult your local building department to determine approved roofing materials. The modules are qualified for application class A. Modules qualified for safety through UL61730 within this application class are considered to meet the requirements of Safety Class II.

For a single glass module, the Fire rating is Class C in Canada, but the Module Fire Performance is Type 1 in the U.S. For a dual glass module, the Fire rating is Class C in Canada, but the Module Fire Performance is Type 29 in the U.S. The specified construction is shown in the below table. Both type 1 and type 29 modules installed with Class A rankings achieve System Class A Fire Ratings in the U.S.

| Module model | Specific construction | Marking |
|---|---|---|
| **Single Glass Modules** | Superstrate: 3.2 mm thick;<br>EVA: 0.25~0.8 mm thick;<br>Substrate: 0.32~0.34 mm thick; | Class C (Canada)<br>Type 1 (USA) |
| **Dual Glass Modules** | Front glass 2.0/2.5 mm thick;<br>EVA: 0.5~0.8mm thick;<br>Back glass:2.0/2.5 mm thick; | Class C (Canada)<br>Type 29 (USA) |
| | Front glass 2.5 mm thick;<br>EVA: 0.4~0.6mm thick;<br>Back glass:2.5 mm thick; | Class A (Canada)<br>Type 30 (USA) |

**Notes**: Module model refer to appendix 1 for details.

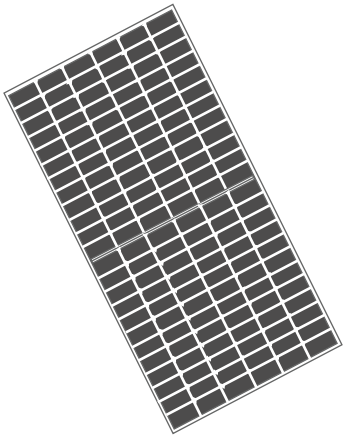
## 1.2 Warnings

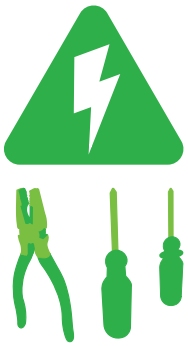


- PV modules generate DC electrical energy when exposed to sunlight or other light sources. Active parts of modules such as terminals can result in burns, sparks, and lethal shock.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- Front protective glass is utilized on the module. Broken solar module glass is an electrical safety hazard (may cause

electric shock or fire). These modules cannot be repaired and should be replaced immediately.

- To reduce the risk of electrical shocks or burns, modules may be covered with an opaque material during installation to avoid injury.
- 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 UL 61730 only when the module is mounted in the manner specified by the mounting instructions below.
- All installations must be performed in compliance with the National Electrical Code (NEC) or the Canadian Electrical Code (CEC) in Canada.
- A module with exposed conductive parts is considered to be in compliance with UL 61730 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.
- The installation of a PV array can only be done under the protection of sun- sheltering covers or sunshades and only qualified personnel can install or perform maintenance work on this module.
- Follow the battery manufacturer's recommendations, if batteries are used with modules.
- Do not use this module to replace or partly replace roofs and walls of buildings.
- Do not install modules where flammable gas may be present.
- Do not touch live terminals with bare hands. Use insulated tools for electrical connections.
- Do not use water to extinguish the fire when the power supply is not disconnected.





Use insulated tools for electrical connection

- Do not remove any part installed by Jinko Solar or disassemble the module.
- All instructions should be read and understood before attempting to install, wire, operate, and maintain the module.
- Do not lift up PV modules using the attached cables or the junction box.
- All PV systems must be grounded to earth. If there is no special regulation, please follow the National Electrical Code or other national code.
- 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 61730, may be used for grounding connections in accordance with the instructions provided with the module.

- Under normal conditions, a module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations, not under the requirements of the NEC, the value of Isc and Voc marked on the module should be multiplied by a factor of 1.25 when determining module voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.
- Once the PV module has been shipped to the installation site, all of the parts should be unpacked properly with care.
- Do not stand or step on the PV module as shown below. This is prohibited, and there is a risk of damage to the module and injury to you.

- Only PV modules with the same cell size should be connected in series.
- During transportation of modules, please attempt to minimize shock or vibration to the module, as this may damage the module or lead to cell micro cracks.
- Modules (glass, junction boxes, connectors, etc.) shall be protected from long-term exposure to environments containing sulfur, strong acid, strong alkaline, etc., which may pose a risk of corrosion to the product.
- Do not clean the glass with chemicals. Only use tap water. Make sure the module surface temperature is cool to the touch. Cleaning modules with cool water when module surface temperature is high may result in glass breakage. Do not brush paint or corrosive substances on the surface of the modules.
- Do not disconnect any of the modules when under load.
- The recommended standoff height is 6 inches (15cm). If other mounting means are employed this may affect the UL Listing.
- When looking at PV modules with anti-reflection (AR) coating technology, it will be normal to see some cells with a slight color difference at different angles. Modules with LRF (light reflective film) and without LRF should not be used in the same array.
- The junction box connector should not be in contact with oily substances, organic solvents, and other corrosive materials to avoid damage to the connector. (e.g. alcohol, gasoline, lubricants, rust inhibitors, herbicides, etc.).
- Before the installation of modules, it is recommended to add rainproof facilities in the project site to avoid direct open-air placement.

- Do not use modules in an environment with aliphatic, aromatic, phenols, ketones, halogenated substance or mineral oil, which may chemically corrode the junction box.
- Do not contact junction box connectors with oily substances (e.g. lubricant, rust inhibitor, etc.).

## 2. Installation

## 2.1 Installation Safety

- Always wear protective head gear, insulating gloves, and safety shoes (with rubber soles) and other protective measures during installation.
- When installing or maintaining the photovoltaic system, please do not wear metal rings, watches, and other metal products, so as not to cause electric shock and damage the modules.
- Keep the PV module packed in the carton until installation. Once the modules are removed from the packing box, they should be installed and connected. If they are not installed immediately, protective measures (such as adding rubber joint cover, etc.) should be taken on the connection head.
- Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot. There is a risk of burns and electric shock.
- Do not work in rain, snow, or windy conditions.
- Due to the risk of electrical shock, do not perform any work if the terminals of the PV module are wet.
- Use insulated tools and do not use wet tools.
- When installing PV modules, do not drop any objects (e.g., PV modules or tools).
- Make sure flammable gases are not generated or present near the installation site.
- The modules are equipped with PV wiring connectors that comply with UL 6703, Standard for Connectors for use in Photovoltaic Systems. Connectors from different manufacturers should not be mated together.

| Connector model name (female) | Allowable mating connector model name(male) |
|---|---|
| **PV-JK03M-F/xy** | PV-JK03M-M/xy |
| **PV-JK03M2-F/xy** | PV-JK03M2-M/xy |
| **PV-KBT4/6II-UR** | PV-KST4/6II-UR |
| **PV-KBT4/6I-UR** | PV-KST4/6I-UR |
| **PV-KBT4-EV02/6II-UR** | PV-KST4-EV02/6II-UR |
| **PV-KBT4-EV02/6I-UR** | PV-KST4-EV02/6I-UR |

**Table 1: Allowable mating connector model name**

- Insert module connectors fully and correctly. An audible "click" sound should be heard. This sound confirms that the connectors are fully seated. Check all connections.
- The module leads should be securely fastened to the module frame. Wire Management should be done in a way to prevent the connector from scratching or impacting the back sheet of the module.
- Do not touch the junction box or the end of the interconnect cables (connectors) with bare hands during installation or under sunlight, whether or not the PV module is connected to or disconnected from the system.
- Do not expose the PV module to excessive loads on the surface of the PV module or twist the frame.
- Do not hit or put excessive load on the glass or back sheet; this may break the cells or cause micro cracks.
- During installation or operation, do not use sharp tools to wipe the back sheet or glass. Scratches can appear on the module.
- Do not drill holes in the frame; it may cause corrosion of the frame and void the warranty.
- When installing modules on roof mounted structures, please try to follow the "from top to bottom" and/or "from left to right" principle. Do not step on the module. This will damage the module and would be dangerous for personal safety. In roof mounted applications, the assembly is to be mounted over a fire-resistant roof covering rated for the application.
- Thermal expansion and contraction can occur in the module. During installation, the spacing between two adjacent modules is recommended to be ⩾ 0.4 inch(10mm). If there are special requirements, please confirm with Jinko before installation.
- During the installation, disassembly, maintenance, and any other related processes of the product, it is recommended that the force applied between the cable and the connector and between the cable and the junction box shall be no more than 44.25 lb-ft (60N*m).
- All PV systems must be grounded to earth (Refer to 3. "Wiring and connection" for specific grounding).
- Rated operating altitude of up to 2000 m.

## 2.2 Installation Condition

### 2.2.1 Climate Condition

Please install the modules in the following conditions:
a) Operating temperature: –40°C (-40°F) to 85°C (185°F).
b) Humidity: < 85RH%.
c) Ambient air temperature range of -40°C to + 40°C.

***Note:**
The mechanical load bearing (include wind and snow loads) of the module is based on the approved mounting methods. The professional system installer must be responsible for mechanical load calculation according to the system design.

### 2.2.2 Site Selection

IIn most applications, Jinko Solar PV modules should be installed in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the module should typically face south, and in the Southern Hemisphere, the modules should typically face north. Modules facing 30 degrees away from true South (or North) will lose approximately 10 to 15 percent of their power output. If the module faces 60 degrees away from true South (or North), the power loss will be 20 to 30 percent.

When choosing a site, avoid trees, buildings, or obstructions, which could cast shadows on the modules, especially during the winter months when the arc of the sun is lowest over the horizon. Shading causes loss of output, even though the factory fitted bypass diodes of the PV module will minimize any such loss.

Do not install the PV module near open flames or flammable materials. When solar modules are used to charge batteries, the battery must be installed in a manner, which will protect the performance of the system and the safety of its users. Follow the battery manufacturer's guidelines concerning installation, operation, and maintenance recommendations. Do not install the PV module in a location where it would be immersed in water or continually exposed to water from a sprinkler, fountain, or other liquid.

### 2.2.3 Tilt Angle Selection

The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (Figure 1). The PV module generates maximum output power when it faces the sun directly.

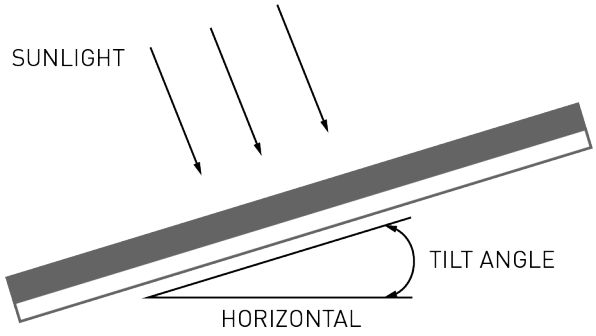



**Figure1: PV module tilt angle**

When the PV modules are attached to a permanent structure, the tilt angle of the PV modules should be selected to optimize the performance based on seasonal load and sunlight. In general, if the PV output is adequate when irradiance is low (e.g., winter), then the angle chosen should be adequate during the rest of the year. For grid-connected installations where the PV modules are attached to a permanent structure, PV modules should be tilted so that the energy production from the PV modules will be maximized on an annual basis. The System Fire Class Rating of a module or panel in a roof mounted system should meet local code requirements in order to achieve the specified System Fire Class Rating for a non-BIPV module or panel.

The fire test slope is 5 in/ft (22.5°) based on UL790 is required to maintain System Fire Class Rating. Any module or panel mounting system have limitations on inclination required to maintain a specific System Fire Class Rating.

## 2.3 Mechanical Installation Introduction

PV modules usually can be mounted by using the following methods: bolts and clamps.

***Note:**

1. All installation methods herein are only for reference, and Jinko Solar will not provide related mounting tools. The system installer or trained professional personnel must be responsible for the PV system's design, installation, and mechanical load calculation and security of the system.
2. Before installation, the following items should be addressed:
   a. Visually check the module for any damage. Clean the module if any dirt or residue remains from shipping.
   b. Check if module serial number stickers match.
   c. The minimum distance between modules should be more than 10mm for all installation methods.
3. The mounting with bolts and/or clamps on the long side of the frames can meet a maximum positive testing (downward) pressure of 5400Pa and negative testing (upward) pressure of 2400Pa. When mounting modules in snow-prone or high-wind environments, special care should be taken to mount the modules in a manner that provides sufficient design strength while meeting local code requirements.
4. 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 must be made in conformance with the grounding device manufacturer's instructions.
5. 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 61730, may be used for grounding connections in accordance with the instructions provided with the module.
6. The use of third-party grounding devices is not allowed unless the grounding device is UL2703 certified with Jinko modules. The installation of that grounding hardware must follow the grounding manufacturer's installation manual.
7. The clearance between the module and the roof deck should be a minimum of 0.6 inches (15mm).
8. When modules are mounted as specified in this manual, the modules will be concave to varying degrees due to the gravity, which is a normal physical phenomenon and does not affect the normal use of the modules. Any other external forces will cause additional sinking of the modules, so any operation of the modules should comply with this manual.

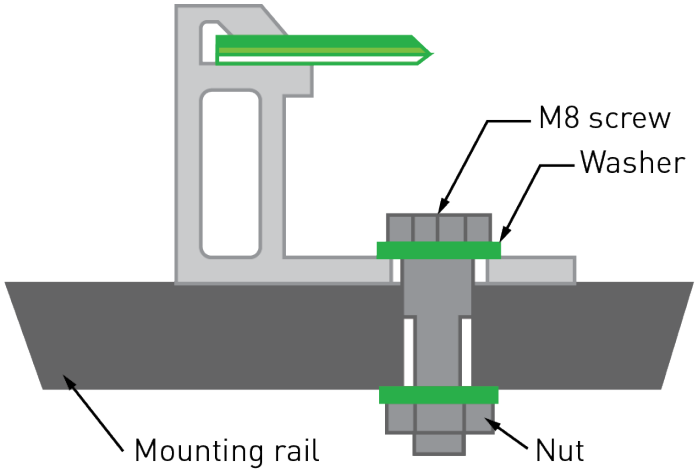
### 2.3.1 Mounting with Bolts

The module frame must be attached to a mounting rail using M8 corrosion-proof bolts together with spring washers and flat washers in four symmetrical locations on the PV module. The applied torque value should be big enough to fix the modules steadily. The torque value for M8 bolt is 16~20 N*m and M6 bolt is 8 N*m. For special racking systems or systems with special installation requirements, please reconfirm with the supplier for the appropriate torque value. Please find detailed mounting information in Figure2. The installation instructions shall specify that the modules have been evaluated by UL for bolt mounting using the 4 provided mounting holes in the frame with a torque of 16~20 N*m. The following stainless steel mounting hardware should be included in the installation instructions: For eight 14x9 holes for M8 and four 10x7 holes for M6, mounting hardware is shown below in Table 2:

| Mounting hardware configuration | | | |
|---|---|---|---|
| Hardware | Material | 14x9 | 10x7 (For Tracker) |
| Bolt<br>Spring Washer<br>Nut | Stainless Steel | M8 | M6 |

| Module Type | Hole relevant distances (mm) | Bolts installation (Max. Pressure) |
|---|---|---|
| | | Four inner mounting holes |
| JKMxxxN-54HL4-B | Inner holes:<br>860 | Test load:<br>+5400Pa & -2400Pa |

**Table 2: The mounting part for Four inner mounting holes**



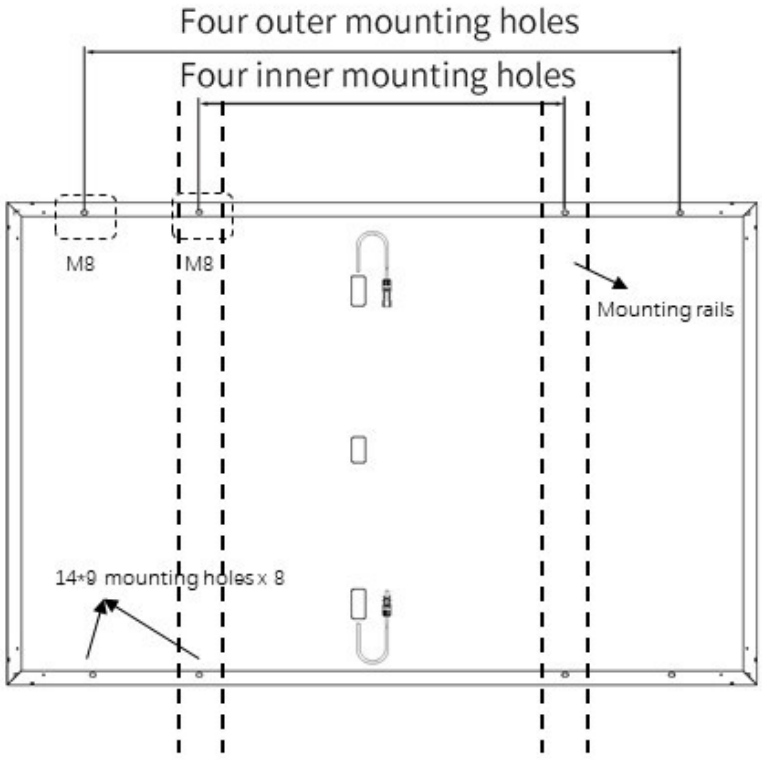




**Figure 2: PV module installed with Bolt fitting method**

### 2.3.2 Mounting with Clamps

The module clamps should not come into contact with the front glass and must not deform the frame. Be sure to avoid shading effects from the module clamps. The module frame is not to be modified under any circumstances. When choosing this type of clamp- mounting method, please be sure to use at least four clamps on each module. Two clamps should be attached on each long side of the module. The applied torque value should be high enough to mount the modules steadily. (Please consult with the clamp or racking supplier for the specific torque value). To increase friction, clamps with threaded (toothed) contact surfaces is recommended. Please find detailed mounting information in the below illustration. The mounting zone is greater than J and less than K. Figure 3 shows how a clamp should be mounted to the module frame.

When installing modules using clamps on the long side of the frame, the applicable product types and installation locations are shown in Figure 4 and Table 4.

When installing modules using clamps on the short side of the frame, the applicable product types and installation locations are shown in Figure 5 and Table 5.

When installing modules using clamps on the long side & short side of the frame, the applicable product types and installation locations are shown in Figure 6 and Table 6.

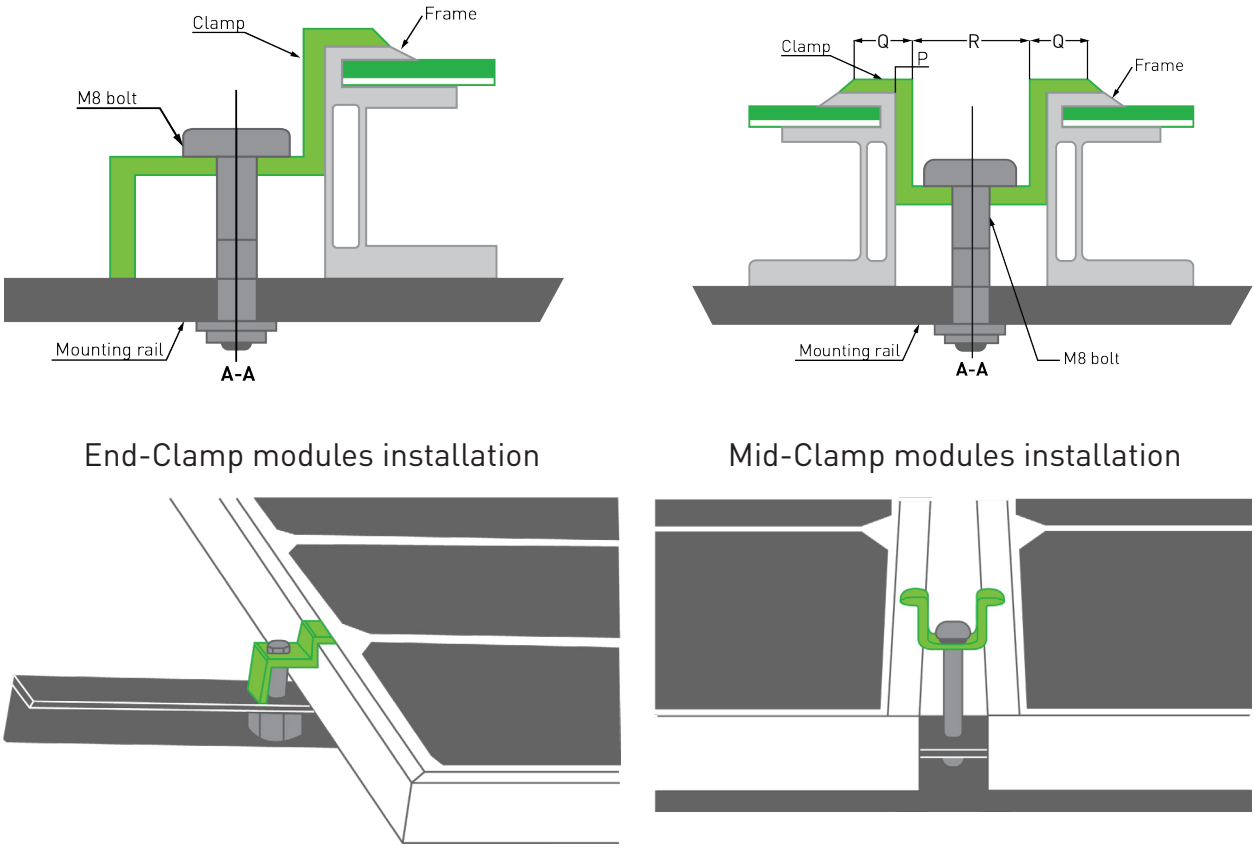



**Figure 3: PV module installed at the side with Clamp fitting method**

| Clamp type | Dimension (mm) | | | Composition material |
|---|---|---|---|---|
| **End Clamp (40 mm thickness)** | 39 x 50 x 42<br>39 x 60 x 42<br>(For 1.5mm thickness frame) | | | Aluminum-alloy |
| **End Clamp (35 mm thickness)** | 41.5 x 50 x 40 | | | |
| **End Clamp (30 mm thickness)** | 41.5 x 50 x 35<br>41.5 x 60 x 35<br>(JKMxxxN-72HL4-BDX only) | | | |
| **Middle Clamp (40 mm & 35 mm thickness)** | 42 x 50 x 28<br>42 x 60 x 28<br>(For 1.5mm thickness frame) | | | |
| | Q | R | P | |
| | 13.5 | 15 | 2.5 | |
| **Middle Clamp (30 mm thickness)** | 42 x 50 x 29.5<br>42 x 60 x 28<br>(JKMxxxN-72HL4-BDX only) | | | |
| | Q | R | P | |
| | 14 | 14 | 3 | |

**Table 3: Mechanical dimensions, specification and material when modules installed with mid Clamp**

### 2.3.2.1 Mounting with Clamps at Long Sides of the Frames

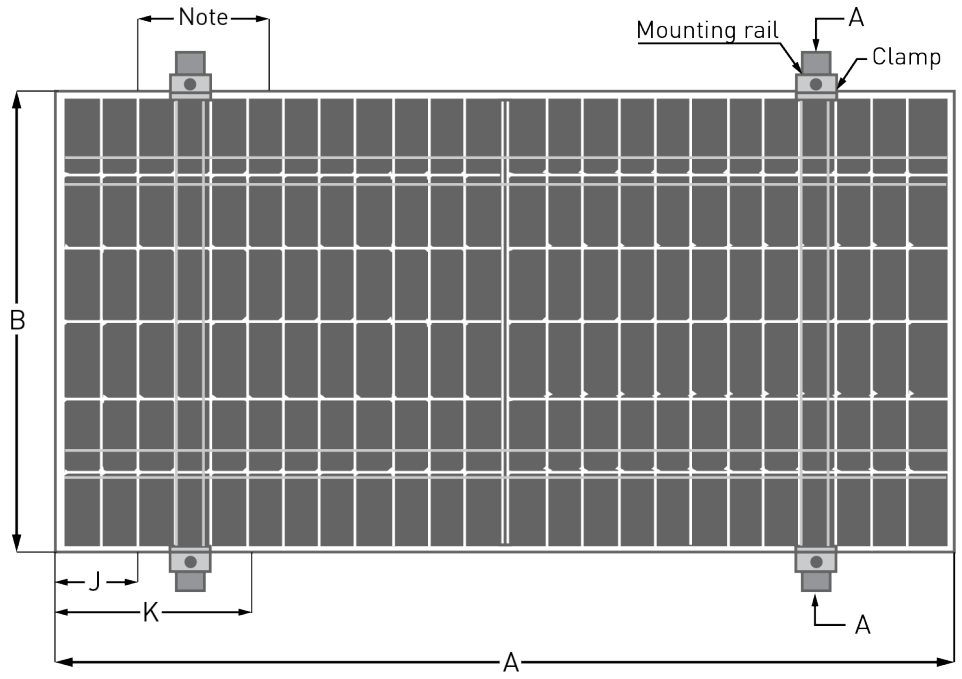



**Figure 4: Installation methods of clamps on long sides**

| Module type | Dimension (mm) Note: A is the length of the long side of the module | | | Test Load (Pa) |
|---|---|---|---|---|
| | A*B*C | J | K | |
| JKMxxxM-72HL4-(V)-(TV) | 2278*1134*35 | A/5-50 | A/5+50 | +5400 / -2400 |
| JKMxxxN-72HL4-(V)-(TV) | 2278*1134*35 | | | |
| JKMxxxN-54HL4-B | 1722*1134*35 | | | |
| JKMxxxN-72HL4-BDV | 2278*1134*30 | A/4-50 | A/4+50 | |
| | 2278*1134*35 | | | |
| JKMxxxN-72HL4-BDX | 2278*1134*30 | A/4-50 | A/4+50 | +6000 / 4000 |
| JKMxxxN-66HL4M-BDV* | 2382*1134*30 | A/4-50 | A/4+50 | +5400 / -2400 |

**(* = preliminary data)**

**Table 4: Mechanical dimensions when modules installed at long side with Clamp**

### 2.3.2.2 Clamping Mounting on Short Sides of the Frames

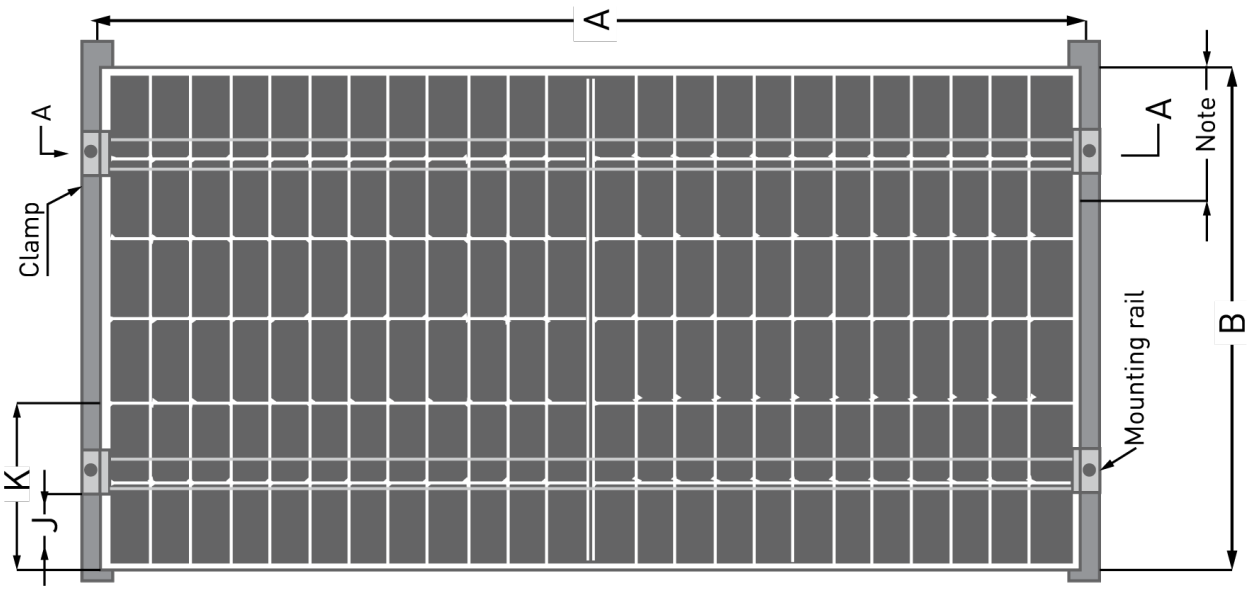



**Figure 5: Installation of clamps on short side of frames**

| Module type | Dimension (mm) | | | Test Load (Pa) |
|---|---|---|---|---|
| | A*B*C | J | K | |
| JKMxxxN-54HL4-B | 1722*1134*35 | 100 | 240 | +/- 1600 |
| JKMxxxN-72HL4-BDV | 2278*1134*30 | 100 | 240 | +/- 1000 |
| | 2278*1134*35 | | | |
| JKMxxxN-66HL4M-BDV* | 2382*1134*30 | 100 | 240 | +/- 1000 |

**(* = preliminary data)**

**Table 5: Mechanical dimensions of modules installed with clamps on short side of frame**

**Note**: The installation method of clamps on short sides is based on Jinko's internal results and have not been evaluated by UL.

### 2.3.2.3 Clamping Mounting on Long/Short Sides

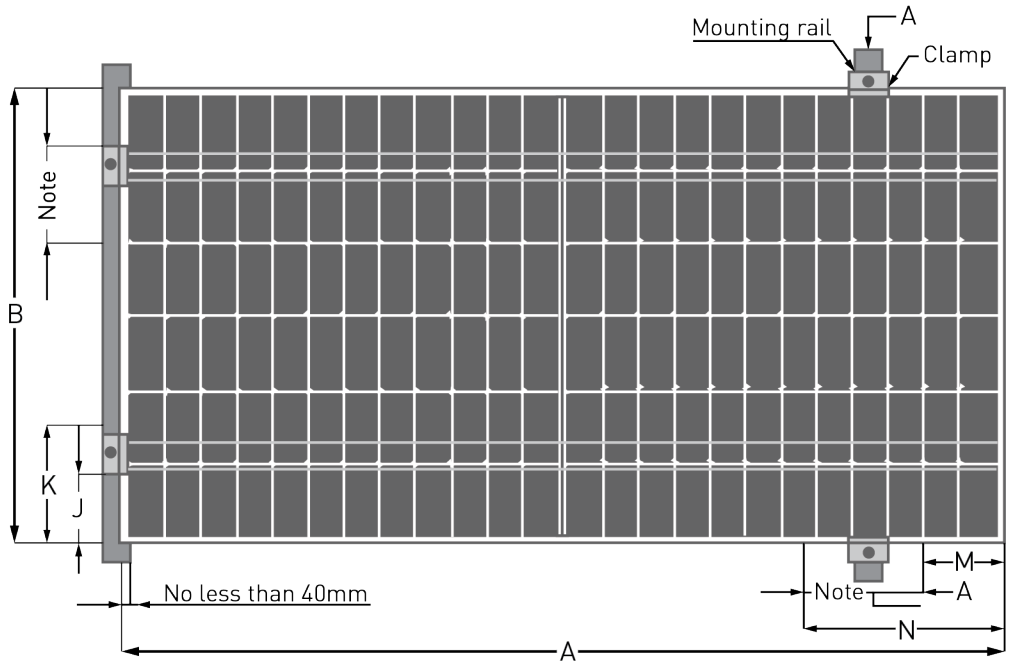



**Figure 6: Installation of clamps on long/short side of frame**

| Module type | Dimension (mm) | | | | | Test Load (Pa) |
|---|---|---|---|---|---|---|
| | A*B | J | K | M | N | |
| JKMxxxN-54HL4-B | 1722*1134*35 | 100 | 240 | A/4-50 | A/4+50 | +/- 2400 |
| JKMxxxN-72HL4-BDV | 2278*1134*35<br>2278*1134*30 | 130 | 240 | A/4-50 | A/4+50 | +/- 1600 |
| JKMxxxN-66HL4M-BDV* | 2382*1134*30 | 130 | 240 | A/4-50 | A/4+50 | +/- 1600 |

**(* = preliminary data)**

**Table 6: Mechanical dimensions of modules installed with clamps on long & short side of frame**

**Note**: The installation method of clamps on long and short sides is based on Jinko's internal results and have not been evaluated by UL.

### 2.3.3 Mounting with Tracker

Jinko modules are also compatible with various mainstream tracker systems in the industry. The maximum load that Jinko modules can achieve are listed in Table 7. (For detailed installation drawings and installation method, please refer to installation manual of tracker supplier. For other tracker systems that are not listed in the table, please contact Jinko customer service department for more information.)

| Module type | Tracker system | Installation | Test load (Pa) |
|---|---|---|---|
| **Eagle® 72HM G5B (JKMxxxM-72HL4-TV)** | NEXTracker 1P | 400mm hole distance | 2175/-2100 |
| | NEXTracker 1P | 790mm hole distance | 2700/-2400 |
| **Eagle® 72HM G6T (JKMxxxN-72HL4-TV)** | NEXTracker 1P | 400mm hole distance | 2250/-2100 |
| | NEXTracker 1P | 790mm hole distance | 2700/-2400 |
| **Eagle® 72HM G6B (JKMxxxN-72HL4-BDV)** **Eagle® 72HM G6X (JKMxxxN-72HL4-BDX)** | NEXTracker 1P | 400mm hole distance | ±2400 |
| | ATI V3 | Hi-rise clamp 300mm | ±1200 |
| | ATI V3 | Hi-rise clamp 400mm | 1500/-1400 |
| | ATI V3 | Through bolt clamp 1400mm bolting at 400mm and 1400mm positions | ±3300 |
| | ATI V3 | Through bolt clamp 1300mm bolting at 1100mm positions | ±2400 |
| **Eagle® 66HM G7B* (JKMxxxN-72HL4-BDV)** | NEXTracker 1P | 400mm hole distance | ±1800 |
| | ATI V3 | Hi-rise clamp 300mm | NA |
| | ATI V3 | Hi-rise clamp 400mm | NA |
| | ATI V3 | Through bolt clamp 1400mm bolting at 400mm and 1400mm positions | ±2800 |
| | ATI V3 | Through bolt rail at 400mm positions | ±1500 |

**(* = preliminary data)**

**Table 7: Mechanical dimensions of modules installed with clamps on long & short side of frame**

**Note**: The installation methods of NEXTracker & ATI are based on Jinko's internal results and has not been evaluated by UL.

## 3. Wiring and Connection

1. Before this procedure, please read the operating instructions of the PV system carefully. Connect the PV module connections in series or parallel, as determined by the user's configuration requirement for system power, current, and voltage.
2. PV modules connected in series should have similar current, and modules shall not be connected together to create a voltage higher than the permitted system voltage. The maximum number of modules in series depends on system design, the type of inverter used, and environmental conditions.
3. The maximum fuse rating in an array string can be found on the product label or in the product datasheet. The current rating of overcurrent protection also corresponds to the maximum reverse current that a module can withstand, e.g. when one string is shaded, the other parallel strings of modules will be loaded by the shaded string, and the current will pass through to create a current circuit. Based on the maximum series current ratings of overcurrent protection on modules and local electrical codes and standards, make sure the module strings in parallel are protected with the appropriate in-line string fuse. Recommended maximum series/parallel module configurations; ([1500 V/(1.25*Voc)] / [ current rating of overcurrent protection/Isc+1].
4. Connect the conductors from the PV array to the combiner box in accordance with the design and local codes and standards. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of the PV system (for a single module, it is recommended that the cross-sectional area of cables be 4mm2(Cu Wire)); otherwise cables and connectors will become overheated from high current. Please note the temperature limit of the cables is 90°C.
5. Jinko modules can be grounded using bolts. Attach the equipment grounding conductor to the module frame using the hole and hardware provided. Note that a stainless-steel bolt is used between the ground 6-12AWG wire and module frame as illustrated in the following figure. A washer is used to avoid corrosion due to dissimilar metals. Tighten the screw securely. It is recommended that the applied torque is 1.7~2.0 ft-lbs (2.3~2.8 N*m).

| Module | Mounting hardware configuration | | | |
|---|---|---|---|---|
| | Hardware | Material | Size | Number provided |
| All | Bolt | Stainless Steel | M4 | 2 |
| | Spring washer | Stainless Steel | M4 | 2 |
| | Nut | Stainless Steel | M4 | 2 |
| | Star Washer | Stainless Steel | M4 | 2 |
| | Plain Washer | Stainless Steel | M4 | 4 |

**Table 8: The mounting part of the ground mounting hole**

6. The use of bolt grounding devices is not allowed unless the grounding device is UL61730 or UL2703 certified with Jinko modules. Alternate grounding options built into the racking system are acceptable as long as they have been UL approved.

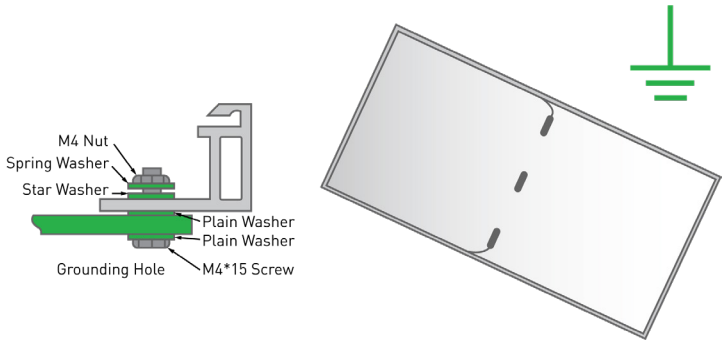



**Figure 7: Ground Installation PV modules**

7. Other third-party grounding methods cannot be used unless the grounding device is UL2703 certified with Jinko modules.
8. Follow the requirements of applicable local and national electrical codes.
9. These modules contain factory installed bypass diodes. If these modules are incorrectly connected to each other, the bypass diodes, cable, or junction box may be damaged.
10. The module shall be wired in accordance with the NEC. The grounding method of the frame of arrays shall comply with the NEC, article 250.
11. CNL models shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.
12. It is recommended that the M8 bolt be tightened to a torque of about 16~20 N*m and the M6 bolt be tightened to a torque of about 8 N*m.

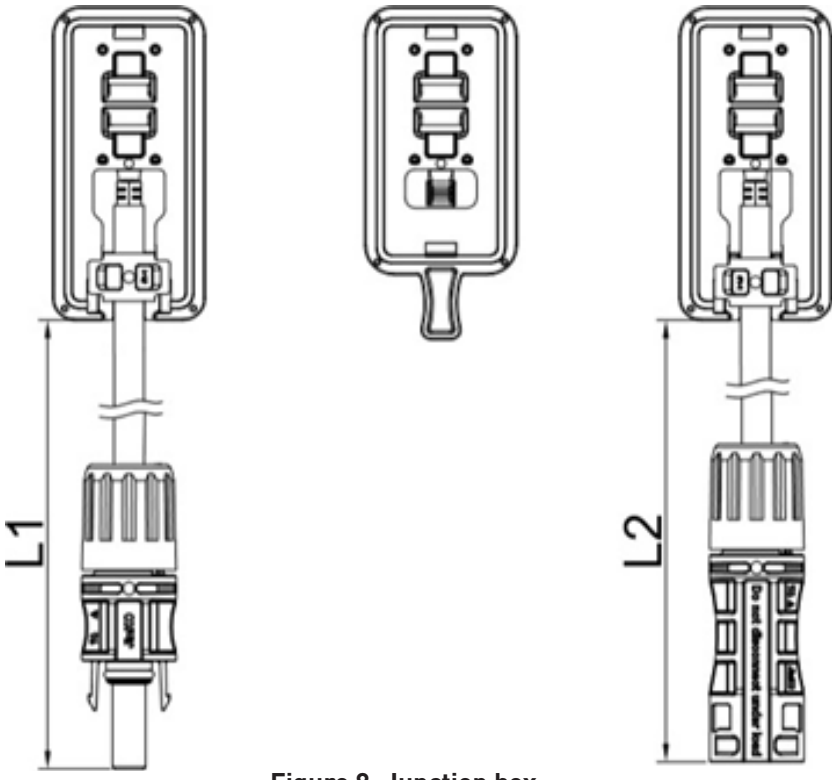
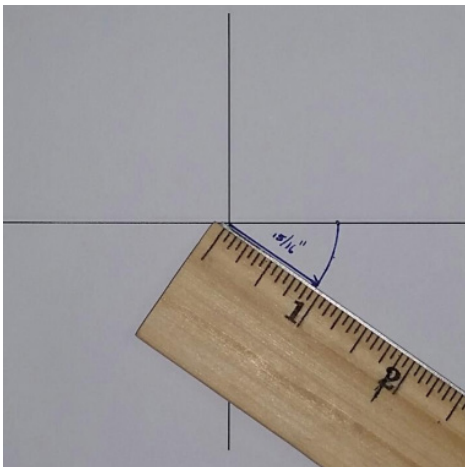


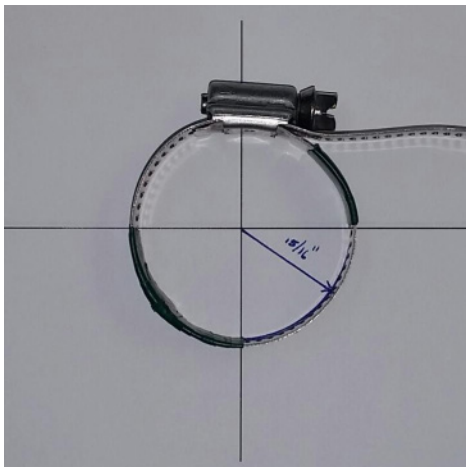

**Figure 8: Junction box**

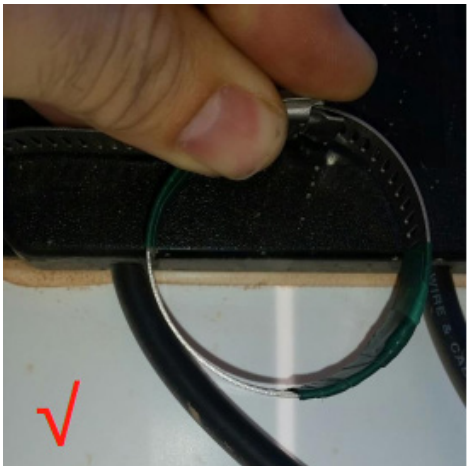
13. The junction box cable is defined in figure 8. Since cable lengths vary by module type, please review the data sheet for the model being installed. It is recommended that cable lengths be considered before designing the wiring layout.

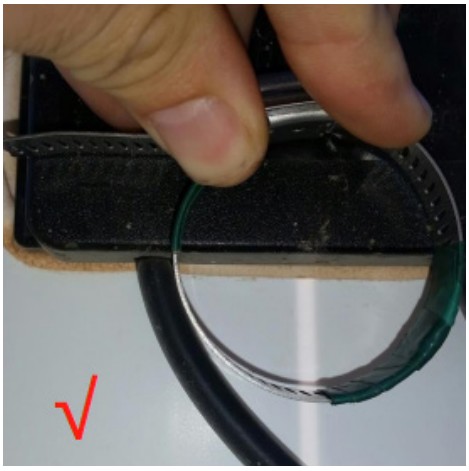
14. Jinko Solar requires the below wire management solution:

    1. The bending radius of cables shall be no less than 4 x the cable OD (outer diameter), see below schematic diagram:









2. The cable shall be fixed with metal cable ties or metal cable clip on the frame as the attached picture shows.

3. No stress on the cable able to pull it out or stress the connection in the J-Box.

15. Jinko Solar requires the negative grounding of the inverter when a system is installed with standard PV solar modules. Alternatively, a 'charge-equalizing' device may be used to mitigate the effects of the Potential Induced Degradation (PID) phenomenon that can occur in specific environments that the array is installed in.

## 4. Maintenance and Care

It is required to perform regular inspections and maintenance of the modules, especially during the warranty period. To ensure optimum module performance, Jinko recommends the following maintenance measures:

### 4.1 Visual Inspection

Inspect the modules visually to find if there are any visual defects, if there are, the following items should be evaluated:

1. If the modules are observed having slight module color differences at different angles, this is a normal phenomenon for modules with anti-reflection coating technology. If the colors are within the cell, please consult Jinko for further analysis.
2. Whether the glass is broken.
3. No sharp objects are in contact with the PV module surfaces.
4. The PV modules are not shaded by unwanted obstacles or foreign material.
5. Corrosion along the cells' busbar. The corrosion is caused by moisture intrusion thought the module backsheet. Check the backsheet for damage.
6. Check whether the back sheet is burnt.
7. Check if screws and mounting accessories are tight, adjust and tighten as necessary.

### 4.2 Cleaning

1. A buildup of dust or dirt on the module front side will result in decreased energy output. Clean the module at least once per year, more frequently in dusty conditions, using a soft dry or damp cloth. Water with high mineral content may leave deposits on the glass surface and is not recommended. It is recommended to use neutral water with a PH value ranging from 6.5 to 8.5 to clean the glass, so as not to cause damage to the glass coating layer.
2. Never use abrasive material under any circumstances.
3. In order to reduce the potential for electrical and or thermal shock, Jinko recommends to clean PV modules during early morning or late afternoon hours when solar irradiation is low and modules are cooler, especially in regions with hot temperatures.
4. Never attempt to clean PV module with broken glass or other signs of exposed wiring, as this presents a shock hazard.
5. Never use chemicals when cleaning modules as this may affect the module warranty and energy yield. For environment with extreme climates, please contact Jinko after-sales department for specific requirement if needed.
6. For single-glass modules, backsheet cleaning is not necessary. For dual-glass modules, cleaning the module backside regularly when necessary, can improve performance. Follow the requirements in 4.2 a) – e). Please wear insulated gloves and pay special attention

## 4.3 Inspection of Connector and Cable

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

1. Check the sealing gels of the junction box for any damage.
2. Examine the modules for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check the electrical grounding.

**For more details, please refer to O&M manual**

## 5. Electrical Specification

The module electrical ratings are measured under Standard Test Conditions (1000 W/ m2, (25± 2) °C, AM 1,5 according to IEC 60904-3). The module might produce more or less voltage or current than the rated value in non-standard conditions. Tables in Appendix 2 are electrical characteristics of PV products at STC.  The protection class of module is Class II.

## 6. Disclaimer of Liability

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

No responsibility is assumed by Jinko for any infringement of patents or other rights of third parties, which may result from use of the PV module. NO license is granted by implication or otherwise under any patent or patent rights. The information in this manual is based on Jinko's knowledge and experience and is believed to be reliable, but such information including product specification (without limitations) and suggestions do not constitute a warranty, expresses or implied. Jinko reserves the right to change the installation manual, the PV module, the electrical specifications, or product information sheets without prior notice.

## Appendix 1 : Applicable Products

This document is applicable to the series of solar modules as listed below:

Group 1

| | | | |
|---|---|---|---|
| JKMxxxM-72HL4-TV | | | |

(xxx =495~550, in increment of 5)

Group 2

| | | | |
|---|---|---|---|
| JKMxxxN-54HL4-B | | | |

(xxx =405~440, in increment of 5)

Group 3

| | | | |
|---|---|---|---|
| JKMxxxN-72HL4-TV | | | |

(xxx =555~585, in increment of 5)

Group 4

| | | | |
|---|---|---|---|
| JKMxxxN-72HL4-BDV | | | |

(xxx =555~600, in increment of 5)

Group 5

| | | | |
|---|---|---|---|
| JKMxxxN-72HL4-BDX | | | |

(xxx =545~590, in increment of 5)

Group 6

| | | | |
|---|---|---|---|
| JKMxxxN-66HL4M-BDV | | | |

(xxx =605~630, in increment of 5)

Notes:

- V: Module with 1500V System Voltage
- Blank: Module with 1000V System Voltage
- H: Half-cut series module
- B: Black backsheet series module
- L4: Large cell of 182mm cell dimension
- BDV: Bifacial & double glass module
- BDX: Extreme Weather module

## Appendix 2 : Electrical Specifications

For the tolerance of electrical characteristics and protection class of modules, please refer to Section 5 “Electrical Specification”.

| Module Type | Group 1 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| xxx = | 495 | 500 | 505 | 510 | 515 | 520 | 525 | 530 | 535 | 540 | 545 | 550 |
| Maximum Power at STC (Pmax, Wp) | 495 | 500 | 505 | 510 | 515 | 520 | 525 | 530 | 535 | 540 | 545 | 550 |
| Maximum Power Voltage (Vmp, V) | 39.96 | 40.07 | 40.18 | 40.29 | 40.40 | 40.50 | 40.61 | 40.71 | 40.81 | 40.91 | 41.07 | 41.23 |
| Maximum Power Current (Imp, A) | 12.39 | 12.48 | 12.57 | 12.66 | 12.75 | 12.84 | 12.93 | 13.02 | 13.11 | 13.20 | 13.27 | 13.34 |
| Open-circuit Voltage (Voc, V) | 48.82 | 48.90 | 48.98 | 49.05 | 49.12 | 49.20 | 49.27 | 49.35 | 49.42 | 49.49 | 49.65 | 49.81 |
| Short-circuit Current (Isc, A) | 13.18 | 13.25 | 13.32 | 13.40 | 13.47 | 13.54 | 13.64 | 13.71 | 13.79 | 13.87 | 13.94 | 14.01 |
| Maximum system Voltage | 1500VDC | | | | | | | | | | | |
| Dimensions | 2274*1134*40mm (89.52*44.65*1.57 inch)<br>2278*1134*35mm (89.69*44.65*1.38 inch) | | | | | | | | | | | |
| Maximum series overcurrent protective device rating | 30A | | | | | | | | | | | |
| Temperature coefficients | 0.048% for Isc<br>-0.29% for Voc<br>-0.35% for Pmax | | | | | | | | | | | |

| Module Type | Group 2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| xxx = | 405 | 410 | 415 | 420 | 425 | 430 | 435 | 440 |
| Maximum Power at STC (Pmax, Wp) | 405 | 410 | 415 | 420 | 425 | 430 | 435 | 440 |
| Maximum Power Voltage (Vmp, V) | 31.52 | 31.74 | 31.95 | 32.16 | 32.37 | 32.58 | 32.78 | 32.99 |
| Maximum Power Current (Imp, A) | 12.85 | 12.92 | 12.99 | 13.06 | 13.13 | 13.20 | 13.27 | 13.34 |
| Open-circuit Voltage (Voc, V) | 38.10 | 38.32 | 38.53 | 38.74 | 38.95 | 39.16 | 39.36 | 39.57 |
| Short-circuit Current (Isc, A) | 13.30 | 13.37 | 123.44 | 13.51 | 13.58 | 13.65 | 13.72 | 13.80 |
| Maximum system Voltage | 1000VDC | | | | | | | |
| Dimensions | 1718*1134*35mm (67.64*44.65*1.38 inch)<br>1718*1134*40mm (67.64*44.65*1.57 inch)<br>1722*1134*35mm (67.80*44.65*1.38 inch) | | | | | | | |
| Maximum series overcurrent protective device rating | 25A | | | | | | | |
| Temperature coefficients | 0.045% for Isc<br>-0.25% for Voc<br>-0.29% for Pmax | | | | | | | |

| Module Type | Group 3 | | | | | | |
|---|---|---|---|---|---|---|---|
| xxx = | 555 | 560 | 565 | 570 | 575 | 580 | 585 |
| Maximum Power at STC (Pmax, Wp) | 555 | 560 | 565 | 570 | 575 | 580 | 585 |
| Maximum Power Voltage (Vmp, V) | 43.36 | 43.54 | 43.72 | 43.90 | 44.08 | 44.26 | 44.44 |
| Maximum Power Current (Imp, A) | 12.81 | 12.87 | 12.93 | 12.99 | 13.05 | 13.11 | 13.17 |
| Open-circuit Voltage (Voc, V) | 51.90 | 52.03 | 52.16 | 52.29 | 52.42 | 52.55 | 52.68 |
| Short-circuit Current (Isc, A) | 13.48 | 13.54 | 13.60 | 13.66 | 13.72 | 13.78 | 13.84 |
| Maximum system Voltage | 1500VDC | | | | | | |
| Dimensions | 2274*1134*35mm (89.52*44.65*1.38 inch)<br>2278*1134*35mm (89.69*44.65*1.38 inch) | | | | | | |
| Maximum series overcurrent protective device rating | 30A | | | | | | |
| Temperature coefficients | 0.045% for Isc<br>-0.25% for Voc<br>-0.29% for Pmax | | | | | | |

| Module Type | Group 4 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| xxx = | 565 | 570 | 575 | 580 | 585 | 590 | 595 | 600 |
| Maximum Power at STC (Pmax, Wp) | 565 | 570 | 575 | 580 | 585 | 590 | 595 | 600 |
| Maximum Power Voltage (Vmp, V) | 43.43 | 43.58 | 43.73 | 43.88 | 44.02 | 44.17 | 44.31 | 44.45 |
| Maximum Power Current (Imp, A) | 13.01 | 13.08 | 13.15 | 13.22 | 13.29 | 13.36 | 13.43 | 13.50 |
| Open-circuit Voltage (Voc, V) | 51.90 | 52.10 | 52.30 | 52.50 | 52.70 | 52.90 | 53.10 | 53.30 |
| Short-circuit Current (Isc, A) | 13.77 | 13.83 | 13.89 | 13.95 | 14.01 | 14.07 | 14.13 | 14.19 |
| Maximum system Voltage | 1500VDC | | | | | | | |
| Dimensions | 2278*1134*35mm(89.69*44.65*1.38 inch)<br>2278*1134*30mm (89.69*44.65*1.18 inch) | | | | | | | |
| Maximum series overcurrent protective device rating | 30A | | | | | | | |
| Temperature coefficients | 0.045% for Isc<br>-0.25% for Voc<br>-0.29% for Pmax | | | | | | | |

| Module Type | Group 5 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| xxx = | 545 | 550 | 555 | 560 | 565 | 570 | 575 | 580 | 585 | 590 |
| Maximum Power at STC (Pmax, Wp) | 545 | 550 | 555 | 560 | 565 | 570 | 575 | 580 | 585 | 590 |
| Maximum Power Voltage (Vmp, V) | 41.38 | 41.58 | 41.77 | 41.95 | 43.43 | 43.58 | 43.73 | 43.88 | 44.02 | 44.17 |
| Maximum Power Current (Imp, A) | 13.17 | 13.23 | 13.29 | 13.35 | 13.01 | 13.08 | 13.15 | 13.22 | 13.29 | 13.36 |
| Open-circuit Voltage (Voc, V) | 50.07 | 50.27 | 50.47 | 50.67 | 51.9 | 52.10 | 52.30 | 52.50 | 52.70 | 52.90 |
| Short-circuit Current (Isc, A) | 13.95 | 14.01 | 14.07 | 14.13 | 13.77 | 13.83 | 13.89 | 13.95 | 14.01 | 14.07 |
| Maximum system Voltage | 1500VDC | | | | | | | | | |
| Dimensions | 2274*1134*30mm (89.52*44.65*1.18 inch)<br>2278*1134*30mm(89.69*44.65*1.18 inch) | | | | | | | | | |
| Maximum series overcurrent protective device rating | 30A | | | | | | | | | |
| Temperature coefficients | 0.045% for Isc<br>-0.25% for Voc<br>-0.29% for Pmax | | | | | | | | | |

| Module Type | Group 6 (preliminary data) | | | | | |
|---|---|---|---|---|---|---|
| xxx = | 605 | 610 | 615 | 620 | 625 | 630 |
| Maximum Power at STC (Pmax, Wp) | 605 | 610 | 615 | 620 | 625 | 630 |
| Maximum Power Voltage (Vmp, V) | 40.31 | 40.46 | 40.60 | 40.74 | 40.88 | 41.02 |
| Maximum Power Current (Imp, A) | 15.01 | 15.08 | 15.15 | 15.22 | 15.29 | 15.36 |
| Open-circuit Voltage (Voc, V) | 48.48 | 48.68 | 48.88 | 49.08 | 49.28 | 49.48 |
| Short-circuit Current (Isc, A) | 15.90 | 15.96 | 16.02 | 16.08 | 16.14 | 16.20 |
| Maximum system Voltage | 1500VDC | | | | | |
| Dimensions | 2382*1134*30mm (93.77*44.65*1.18 inch) | | | | | |
| Maximum series overcurrent protective device rating | 30A | | | | | |
| Temperature coefficients | 0.045% for Isc<br>-0.25% for Voc<br>-0.29% for Pmax | | | | | |

## 7. Contact us

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