

Installation Guide
for
DAS SOLAR
Single Glass Photovoltaic Module

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1. Purpose of this guide

- This guide contains information regarding the installation and safe handling of DAS SOLAR CO.,LTD, photovoltaic module (hereafter referred to as “module”). DAS SOLAR CO.,LTD. referred to as “DAS SOLAR”.
- Installers must read and understand this guide prior to installation. For any questions, please contact our Global Quality & Customer Support department for further information. Installers should follow all safety precautions described in this guide as well as local codes when installing a module.
- 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 (care and maintenance) and in case of sale or disposal of the modules. Under normal conditions,

1.1 General safety

- Modules that fall under this application class may be used in system operating at more than 50V DC or 240W, where general contact access is anticipated. The module is considered to be in compliance with IEC61215&61730:2016 only when the modules mounted in the manner specified by the mounting instructions below.
- A module with exposed conductive parts is considered to be in compliance with IEC61215&61730:2016 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.
- Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified persons.
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single module may generate more than 30V DC when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Do not disconnect under load.
- Photovoltaic solar modules convert light energy to direct current electrical energy. They are designed for outdoor use. Modules can be ground mounted, mounted on rooftops, vehicles or boats. The proper design of support structures lies within responsibility of the system designers and installers.
- Do not use mirrors or other magnifiers to concentrate sunlight onto the modules.
- When installing the system, abide to all local, regional and national statutory regulations. Obtain a

building permit if necessary.

- This product must be installed by a licensed electrician in accordance with the applicable electrical code (i.e. the NEC for the USA and CEC for Canada).
- STC:irradiance of 1000 W/m², 25°C Cell Temperature and 1.5 Air Mass).
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.

1.2 Handling safety

- Do not lift the module by grasping the module's junction box or electrical leads.
- Do not stand or step on the module.
- Do not drop the module or allow objects to fall on the module.
- To avoid glass breakage, do not place any heavy objects on the module.
- Be cautious when setting the module down on to a surface.
- Inappropriate transport and installation may break the module.
- 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 module 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.
- Be careful when setting the panel down onto a surface, particularly when placing it on a corner.
- A panel with broken glass cannot be repaired and must not be used since contact with any panel surface can cause a electric shock.
- Work only under dry conditions, and use only dry tools. Do not handle panels when they are wet unless wearing appropriate protective equipment.
- When storing uninstalled panels outdoors for a period of time, be sure to cover the panels and make sure the junction boxes face up to stop water from collecting inside the panel and causing damage to exposed connectors.

1.3 Installation safety

- Never open electrical connections or unplug connectors while the circuit is under load. And do not disconnect during load connection for a removable connector.
- Contact with electrically charged parts of the panels, such as terminals, can result in burns, sparks and lethal shock whether or not the panel is connected.

- Do not touch the PV module unnecessarily during installation. The glass surface may be hot; there is a risk of burns and electric shock.
- Do not work in the rain, snow or in windy conditions.
- Avoid exposing cables to direct sunlight in order to prevent their degradation.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Artificially concentrated sunlight shall not be directed on the module or panel. And completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic objects while installing or troubleshooting photovoltaic systems.
- Use only insulated tools that are approved for working on electrical installations.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, rechargeable batteries, etc.
- Under normal outdoor conditions the current and voltage generated by the system will differ from those listed on the datasheet. Datasheet values are the values measured under standard test conditions. Accordingly, during system designing phase, current and short-circuit current should be multiplied by a factor of 1.25 to determine components ratings.
- Only use connectors to connect modules to form a string, or connect to another device. Removing the connectors will make the warranty void.

1.4 Fire Safety

- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The fire rating of the module is Class C according to UL790.
- Consult your local authority for guidelines and requirements for building or structural fire safety.
- Roof constructions and installations may affect the fire safety of a building; Improper installation may create hazards in the event of a fire.
- Use components such as ground fault circuit breakers and fuses as required by local authority.
- Do not use panels near equipment or in places where flammable gases may be generated.
- Do not use non-integral module and panel are installed on a roof that has fire danger. If a non-integral

module and panel are installed on a roof that must have fire-resistant degree of class A.

- A minimum distance of 10 cm between the roof plane and the module frame is generally recommended.
- The slope of tested module is 5 in/ft (127 mm/305 mm). To maintain the corresponding fire prevention level, the tilt angle should be less than 5 in/ft (127 mm/305 mm) when the modules are mounted on the roof.

2. Product Identification

Each module has two labels providing the following information:

1. **Nameplate:** describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; weight, dimensions etc.; the maximum system voltage of 1000/1500 volts DC.
2. **Barcode 1:** each individual module has a unique serial number. The serial number has 17 digits. The first is type of backsheet, the second is type of module, the third is type of cell, the fourth to seventh is year and month, the eighth to ninth is the factory code, the tenth to twelfth is batch number, the thirteenth to seventeenth is number. Each module has only one barcode. It is permanently attached to the interior of the module and is visible from the front of the module. This bar code is inserted prior to laminating..



Do not remove any labels. Removing a label will make the warranty void.

- Barcode 2:** each individual module has a unique serial number. The serial number has 16 digits. The first to third is year and month, the fourth is type of backsheet, the fifth is type of module, the sixth is type of cell, the seventh to eighth is the factory code, the ninth to eleventh is batch number, the twelfth to sixteenth is number. Each module has only one barcode. It is permanently attached to the interior of the module and is visible from the front of the module. This bar code is inserted prior to laminating.



Do not remove any labels. Removing a label will make the warranty void.

3.Mechanical Installation

3.1 Selecting the location

- The modules can only be used on earth but not in outer space.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- DAS SOLAR modules shall be installed on proper buildings or other appropriate places (such as ground, garage, building outer wall, roof, PV tracking system) but shall not be installed on any mobile vehicles.
- Any module without a frame (laminated) shall not be considered to comply with the requirements of UL 1703 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 UL 1703.
- Do not install modules at such places as that are possible to be submerged.
- DAS SOLAR suggests that modules be installed in the working environment with the temperature of -40°C to 40°C which is the monthly average highest and lowest temperature of the installation places.
- Make sure that installed modules do not suffer wind or snow pressure that exceeds the permissible maximum load.
- Modules shall be installed in places free from shades throughout the year. Make sure there are no light-blocking obstacles in the installation places.
- Carry out lightning protection for modules installed in places with frequent lightning and thunder.
- Do not install modules in places with possible inflammable gases.
- Modules can not be used in environments with too much hails, snows, flue gas, air pollution and soot or in places with strong corrosive substances such as salt, salt mist, saline, active chemical steam, acid rain, or other substances corroding modules, affecting module safety or performance.
- Please take protective measures to ensure reliable and safe installation of modules in severe environments such as heavy snow, cold and strong wind or islands close to water and salt mist or deserts.
- The mounting solution including scope and orientation: In general, solar modules should be installed where they receive the most light throughout the year. In the Northern Hemisphere, modules are best placed

ed facing south, while in the southern Hemisphere, modules are best placed facing north. If the module is tilted 30 degrees away from due south (or due north), it will lose about 10% to 15% of its power output; If the module is tilted 60 degrees away from due south (or north) it will lose about 20 to 30 percent of its power output. When selecting a location, avoid trees, buildings, or other obstacles that will cast shadows on the components.

3.2 General Installation

- The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time.
- In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.
- Modules must be securely attached to the mounting structure.
- Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the module frame is generally recommended.
- Do not attempt to drill holes in the glass surface of the modules as this will void the warranty.
- Do not drill additional mounting holes in the module frames of the modules as this will void the warranty.
- Before installing modules on a roof, ensure that the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.
- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated winds for the area.
- Dust building up on the surface of the module can impair with module performance. DAS SOLAR recommend 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 module frames(the recommended minimum distance between two modules is 2 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.
- Ensure panels are not subjected to wind or snow loads exceeding the maximum permissible loads, and

are not subject to excessive forces due to the thermal expansion of the support structures: See the following paragraph for more detailed information.

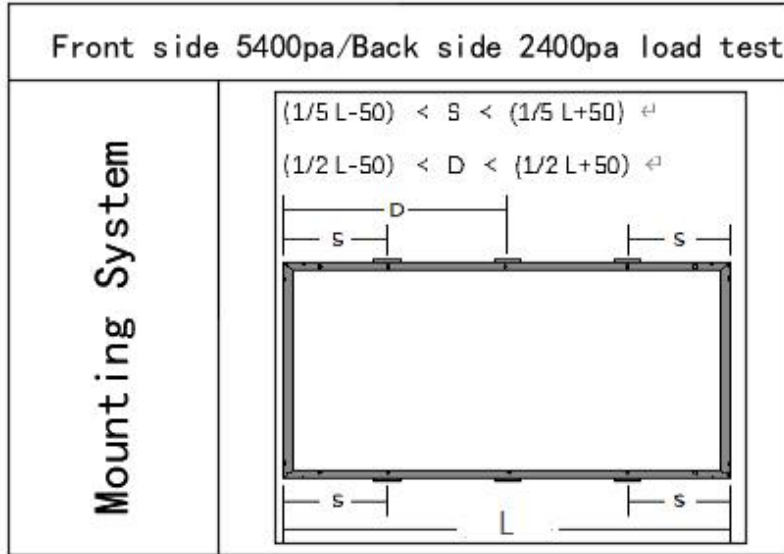
3.3 Installation methods

- 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.
- We suggest each module be securely fastened at 4 points. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.
- For our modules, designed mechanical load of front face is 1600Pa and safety factor is 1.5; designed mechanical load of back face is 1600Pa and safety factor is 1.5.
- Module can be installed in both landscape and portrait modes.
- For best performance, separate laying of positive and negative cables wherever possible. Induced voltage surges in the DC main cable should be minimized by laying the positive and negative cables as close together as possible.
- Where this is not possible or not desirable, the inverter energy system should be connected to the distribution board located physically nearest to the inverter, and the main switchboard. And main switch for the switchboard, to which the inverter is connected, shall be a lockable switch.
- The modules must be properly secured to their support so that they can withstand live load conditions, including wind uplift, to the pressure they have been certified for. It is the installer's responsibility to insure that the clamps used to secure the modules are strong enough.

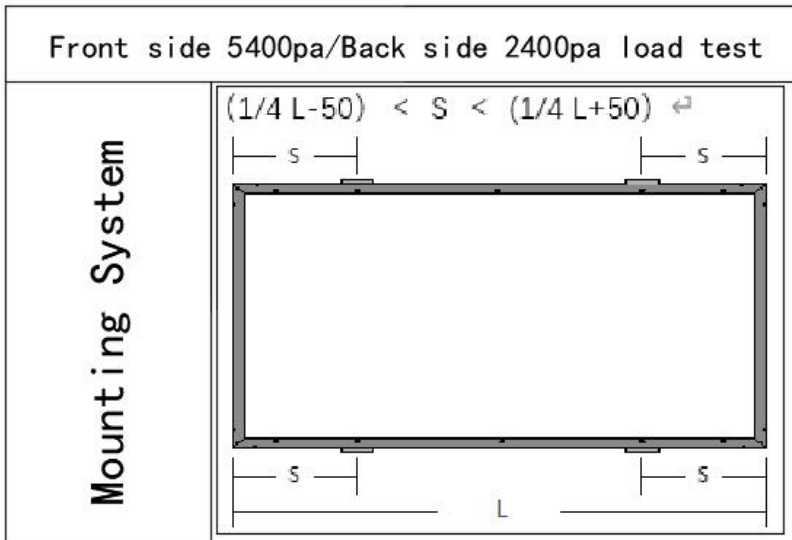
3.4 Attachment guidelines

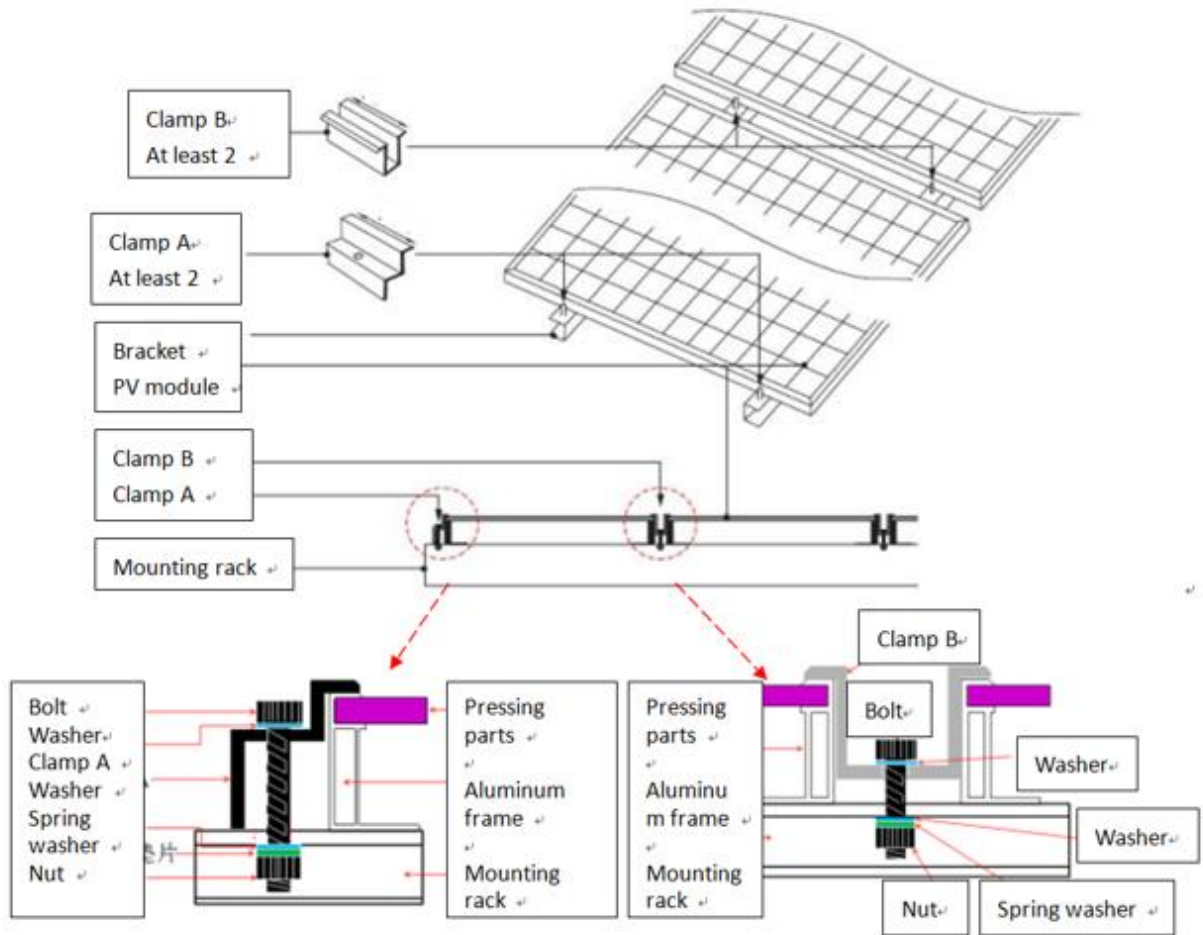
- See below for reference

72 series module installation method





60 series modules installation method






Bill of materials

The following parts can be used for A category

Article	Name	Image	Size (mm)	Material
1	Clamp A		Length ≥40	Aluminum alloy 6063
2	Clamp B		Length ≥40	Aluminum alloy 6063

3	Fastener		M8 bolts + Flat Washers+Spring Washers + Screw nut	SUS304
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4. Electrical Installation



WARNING Electrical Hazard

This module produces electricity when exposed to light. Follow all applicable electrical safety precautions. Australia Installations should be in accordance to AS/NZS 3000 and AS/NZS 5033.

ONLY qualified personnel can install or perform maintenance work on these modules. **BE AWARE** of dangerous high DC voltage when connecting module. **DO NOT** damage or scratch the rear surface of the module. **DO NOT** handle or install module when they are wet.

Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of ISC and VOC marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.

4.1 General installation

- Any hardware used must be compatible with the mounting structure material to avoid galvanic corrosion
- It is not recommended to use modules with different configurations (grounding, wiring) in the same system.
- The module maximum system voltage is 1000/1500 volts DC. For applications requiring a high operating voltage several modules can be connected in series to form a string of modules; The system voltage is then equal to the sum of the voltage of each module.
- For applications requiring high operating currents several strings of modules can be connected in parallel; the system current is then equal to the sum of the current of each string of modules.
- Our modules are supplied with connectors to be used for system electrical connections.
- The maximum number of series connected modules can be calculated through this formal: $1000(1500)/(1.25 \cdot V_{oc})$.
- The recommended maximum parallel module configuration is 1 parallels.

Module series	Maximum system voltage	Maximum number of modules
Regular Module 144 series	1000V/1500V	1

And the number of modules have something to do with system design parameters such as current or power output.

- Please refer to local regulations to determine the system wires size, type and temperature.

- To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current (The recommended cable cross section is 4mm² for a single module and if rated current of a connector is higher than 10A). Please note that the upper limit temperature of cable is 85° C, and that of the connector is 105° C, the lower limit temperature is -40°C. And all the cables diameter that been used for wiring must reach at least 4 mm². The type of the connectors are 1.PV2e / 2.QC4.10-cd /3. PV-KST4-EVO2/xy_UR (male) / PV-KBT4-EVO2/xy_UR (female) /4. YC4 /5. PV-ZH202B (1500V)/6. PV-JK03M2/xy/7.PV-TT02. The type of the cables are 1.H1Z2Z2-K 1*4.0mm² /2.62930 IEC 131 1*4.0mm² /3.62930 IEC 131 1*6.0mm.
- The DC current generated by photovoltaic systems can be converted into AC and fed into a public grid. As local utilities' policies on connecting renewable energy systems to their grids vary from region to region. A qualified system designer or integrator should always be consulted. Building permits, inspections and approvals by the local utility are generally required.

4.2 Grounding

- For grounding and connection requirements, please refer to local and national safety and electrical standards. If requested, please use the recommended connector type for the ground connection.
- The correct grounding by proper grounding wires and components of the border and all metal parts are connected together, the grounding conductor or conduction band may be copper, copper alloy or other as their national electrical code to accept the material, then the grounding conductor must use the grounding electrode is connected to the ground right.
- The installation of the components in the middle part can be connected to the grounding of the metal frame by means of a third party registered grounding device.
- In design of modules, the anodized corrosion resistant aluminum alloy frame is used for rigidity support. For safety utilization and to protect modules from lightning and static-electricity damage, the module frame shall be grounded.
- The grounding device shall be in full contact with inner side of the aluminum alloy and penetrate the frame surface oxide film.
- Do not drill additional grounding holes on module frame.
- To get the optimal power output, DAS SOLAR suggests that DC negative pole of the module array shall be grounded in installation of modules. Otherwise, the system power output will be reduced.
- Module installation methods can not lead to electrochemical corrosion between module aluminum

frame and different metals.

- Holes on the frame shall be drilled in advance and grounding signs shall be indicated. These holes are only used for grounding but not for installation of modules.

5.Maintenance

- To ensure optimum module performance, DAS SOLAR recommends the following maintenance measures:
 - Clean the glass surface of the module when required. Always use clean water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent may be used to remove stubborn dirt.
 - Check the electrical, grounding and mechanical connections every six months to verify that they are clean, secure, undamaged and free of corrosion.
 - If any problem arises, consult a professional for suggestions.
 - Caution: observe the maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries etc.

6.Dimension & Parameters

DAS-WOBPH-XXX (XXX=360-370) Electrical Characteristics

Rated Power (Pmp)	360	365	370
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	39.40	39.47	39.54
Maximum Power Current (Imp)	9.14	9.25	9.36
Open Circuit Voltage (Voc) $\pm 2\%$	47.35	47.41	47.47
Short Circuit Current (Isc) $\pm 4\%$	9.68	9.79	9.90

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.34 %/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43 \pm 2 °C
Maximum System Voltage	1000V/1500V
Maximum Series Fuse	15A/20A
Grounding conductivity	<0.1 Ω
Safety Class	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1842*1008*35mm
Weight	20.1kg/19.3kg
Solar Cells	Monocrystalline 158.75x26.46mm(420pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH120PH-XXX (XXX=330-335) Electrical Characteristics

Rated Power (Pmp)	330	335
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	33.61	33.88
Maximum Power Current (Imp)	9.82	9.89
Open Circuit Voltage (Voc) $\pm 2\%$	40.82	41.09
Short Circuit Current (Isc) $\pm 4\%$	10.24	10.32

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.34 %/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43±2 °C
Maximum System Voltage	1000/1500V
Maximum Series Fuse	15/20A
Grounding conductivity	<0.1Ω
Safety Class	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	1684x 1002 x 35mm
Weight	18.6kg/18kg
Solar Cells	Monocrystalline 158.75x79.375mm(120pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH144P6-XXX (XXX=445-455) Electrical Characteristics

Rated Power (Pmp)	445	450	455
Power Tolerance There is ±3% uncertainty at Max Power at STC.	±3%	±3%	±3%
Maximum Power Voltage (Vmp)	40.83	41.03	41.22
Maximum Power Current (Imp)	10.90	10.97	11.04
Open Circuit Voltage (Voc) ±2%	49.13	49.33	49.53
Short Circuit Current (Isc) ±4%	11.35	11.41	11.47

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43±2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	20A
Grounding conductivity	<0.1Ω
Safety Class	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2108 x 1048 x 40mm 2094 x 1038 x 35mm
Weight	24.3 kg/23.2kg
Solar Cells	Monocrystalline 166x83mm(144pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH120P6-XXX (XXX=365-380) Electrical Characteristics

Rated Power (Pmp)	365	370	375	380
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	33.80	34.01	34.22	34.46
Maximum Power Current (Imp)	10.80	10.88	10.96	11.03
Open Circuit Voltage (Voc) $\pm 2\%$	40.61	40.81	41.01	41.24
Short Circuit Current (Isc) $\pm 4\%$	11.25	11.33	11.41	11.48

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43 ± 2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	20A
Grounding conductivity	<0.1 Ω
Safety Class	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1765 x 1048 x 35 mm 1755 x 1038 x 35 mm
Weight	21.2kg/19.5kg
Solar Cells	Monocrystalline 166x83mm(120pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH144PA-XXX (XXX=530-565) Electrical Characteristics

Rated Power (Pmp)	530	535	540	545	550	555
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	41.31	41.51	41.67	41.83	41.99	42.18
Maximum Power Current (Imp)	12.83	12.89	12.96	13.03	13.10	13.16
Open Circuit Voltage (Voc) $\pm 2\%$	49.16	49.36	49.52	49.68	49.84	50.03
Short Circuit Current (Isc) $\pm 4\%$	13.72	13.77	13.84	13.91	13.98	14.04

Rated Power (Pmp)	560	565
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	42.30	42.42
Maximum Power Current (Imp)	13.24	13.32
Open Circuit Voltage (Voc) $\pm 2\%$	50.15	50.27
Short Circuit Current (Isc) $\pm 4\%$	14.12	14.20

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43±2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	25A
Grounding conductivity	<0.1Ω
Safety Class	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2278 x 1134 x 35 mm
	2274 x 1134 x 35 mm
	2256 x 1133 x 35 mm
Weight	27.5kg/27.4kg/27.2kg
Solar Cells	Monocrystalline 182x91mm(144pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH132PA-XXX (XXX=485-500) Electrical Characteristics:

Rated Power (Pmp)	485	490	495	500
Power Tolerance There is ±3% uncertainty at Max Power at STC.	±3%	±3%	±3%	±3%
Maximum Power Voltage (Vmp)	37.93	38.08	38.23	38.38
Maximum Power Current (Imp)	12.79	12.87	12.95	13.03
Open Circuit Voltage (Voc) ±2%	45.10	45.25	45.40	45.55
Short Circuit Current (Isc) ±4%	13.67	13.75	13.83	13.91

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43±2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	25A
Grounding conductivity	<0.1Ω
Safety Class	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2090 x 1134 x 35 mm
	2073 x 1133 x 35 mm
Weight	25.2 kg;25.0kg;
Solar Cells	Monocrystalline 182x91mm(132pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm ²
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH120PA-XXX (XXX=440-455) Electrical Characteristics

Rated Power (Pmp)	440	445	450	455
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	34.35	34.50	34.67	34.84
Maximum Power Current (Imp)	12.81	12.90	12.98	13.06
Open Circuit Voltage (Voc) $\pm 2\%$	41.08	41.15	41.24	41.33
Short Circuit Current (Isc) $\pm 4\%$	13.62	13.71	13.80	13.89

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43 \pm 2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	25A
Grounding conductivity	<0.1 Ω
Safety Class	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1905 x 1134 x 35 mm 1890 x 1033 x 35 mm
Weight	23.0 kg;22.8kg
Solar Cells	Monocrystalline 182x91mm(120pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm2
Hailstone Impact Test	80 km/h for 25mm ice ball

DAS-WH108PA-XXX (XXX=400-420) Electrical Characteristics

Rated Power (Pmp)	400	405	410	415	420
Power Tolerance There is $\pm 3\%$ uncertainty at Max Power at STC.	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Maximum Power Voltage (Vmp)	31.18	31.35	31.52	31.68	31.84
Maximum Power Current (Imp)	12.83	12.92	13.01	13.10	13.20
Open Circuit Voltage (Voc) $\pm 2\%$	37.21	37.38	37.55	37.71	37.87
Short Circuit Current (Isc) $\pm 4\%$	13.67	13.76	13.85	13.94	14.03

Framed modules

Working Conditions	
Pmax Temperature Coefficient	-0.340%/°C
Voc Temperature Coefficient	-0.26 %/°C
Isc Temperature Coefficient	+0.048%/°C
Nominal module operating temperature (NMOT)	43±2 °C
Maximum System Voltage	1500V
Maximum Series Fuse	25A
Grounding conductivity	<0.1Ω
Safety Class	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	1724 x 1134 x 35 mm
	1707 x 1133 x 35 mm
	1722 x 1134 x 30mm
Weight	20.8kg;20.5kg; 21.2kg
Solar Cells	Monocrystalline 182x91mm(108pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm2
Hailstone Impact Test	80 km/h for 25mm ice ball

7.Diode Information

DAS SOLAR module connecting box contains bypass diode which is in parallel connection with the cell strands. If heat spot occurs locally with the module, the diode will come into operation to stop the main current from flowing through the heat spot cells with the view to restrain module heating and performance loss. But bypass diode is not the overcurrent protection device.

If the diode is found or doubted to get out of order, the installer or system maintenance supplier shall contact DAS SOLAR. Please do not try to open the module connecting box on your own.

Based on the maximum series fuse rating of module and local electrical installation code, always make sure DAS SOLAR PV modules are assembled with the appropriate string fuse for circuit protection. In Usually DAS SOLAR PV modules' maximum series fuse rating is 15A/20A/25A.

Type: 1.SB3050DY/2.20SQ045/3.SB3045DY/4.GF3045MG/5.30SQ050/6.SKT3545F/7.QCMK4045/
8.30SQ050A/9.QCM4045/10.20SQ050/11.QCM2545/12.QCMK3045/13.SKT4045F/14.SKT4545F/
15.MK5045/16.MK4045/17.25SQ045/18.35SQ045/19. GF3045/20. GF4045

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