

# **Installation Guide**

## **For**

### **VDS GmbH**

#### **photovoltaic module**

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## Purpose of this guide

- This guide contains information regarding the installation and safe handling, photovoltaic module (hereafter referred to as “module”).
- 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.

## 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 IEC61215:2016&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 IEC61215:2016&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).
- The electrical characteristics are under standard test conditions (irradiance of 100 mW/cm<sup>2</sup>, AM 1.5 spectrum, and a cell temperature of 25°C (77°F)).
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.

### **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 back sheet, do not scratch or hit the back sheet.
- 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 or torn back sheet cannot be repaired and must not be used since contact with any panel surface or the frame can cause an 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 any period of time, always cover the panels and ensure that the glass faces down to stop water from collecting inside the panel and causing damage to exposed connectors.

### **Installation safety**

- Any module without a frame (laminate) shall not be considered to comply with the requirements of IEC61215:2016&61730:2016 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 IEC61215:2016&61730:2016.
- Never open electrical connections or unplug connectors while the circuit is under load. And do not disconnect during load connection for are movable 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 and the frame 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.
- Do not expose the artificially sunlight to a 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 data sheet. Data sheet 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.

### **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.

- Consult your local authority for guidelines and requirements for building or structural firesafety.
- 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.
- The safe distance between the module and the roof we suggest is 20~30 centimeters.

## 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 1500 volts DC.

**Bar code:** each individual module has a unique serial number. The first to the fourth represents Jiangsu green Paul new energy Co., Ltd., the fifth to the sixth represents the processing manufacturer, the seventh to the eleventh represents the order number of the component products, the twelfth to the Fifteen represents the production date, and the 16th to the twentieth represents the serial number of the components

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..



## **Mechanical installation**

### **Selecting the location**

Select a suitable location for installing the modules.

The modules should face south in northern latitudes and north in southern latitudes.

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

Modules should not be shaded at any time. If a module is shaded or even partially shaded, it will fail to perform at ideal conditions and result in lower power output. A permanent and/or regular shade on the module voids the warranty.

This installation manual is applicable for all PV system of 500 m or more away from the coastline.

Do not use modules near equipment or in locations where flammable gases may be generated or collected.

### **General Installation**

Before installing modules check for any optical deviations. Any optical deviations noticed after system installed may void warranty. Any potential costs for labor, material or other cost such as documentation, safety or performing the (de/ re-) installation will not be covered.

The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material. Always use a tested and certified mounting structure approved for your system design.

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,

trees or damaged by ground soil moved by or through the air.

For ground mounting systems, the minimum distance VDS Power GmbH recommend from the ground to the bottom of the module is at least 24 inches (60cm).

Modules must be securely attached to the mounting structure. For Clamping System installation methods, the recommended maximum compression for each clamp is 2900 PSI (20 Mpa) in order to avoid potential damages to module frames. Follow the instruction of the clamping system supplier.

Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof

plane and the frame of the module is generally recommended.

Always observe the instructions and safety precautions included with the module support frames.

Before installing modules on a roof, always ensure the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.

Dust building up on the surface of the module can impair with the module performance. The modules shall be installed with a tilt angle no less than 10 degrees, making it easier for dust to be removed by rain. A flat angle requires more frequent cleaning.

Observe and take into account the linear thermal expansion of the module frames (the recommended minimum distance between two modules is 2 cm).

Always keep the front and back sheet of the module free from other objects, plants and vegetation, structural elements, which could come into contact with the module, especially when the module is under mechanical load.

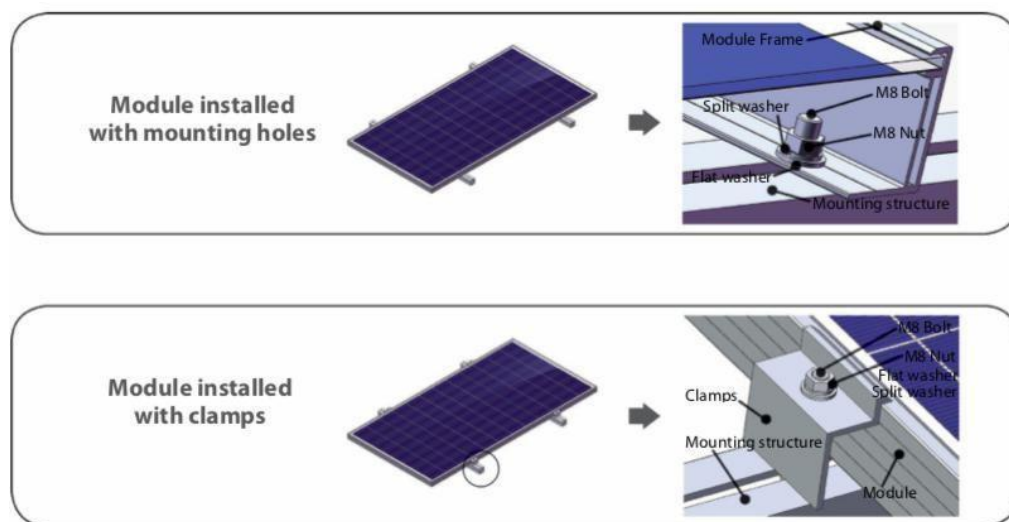
When installing a module on a pole, select a pole and module mounting structure that will withstand the anticipated wind load and snow load for the area.



Ensure modules 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. Never allow modules overlap or exceeds the rooftop: Refer to the following installation methods for more detailed information.

## Installation methods

Modules can be installed on the frame using mounting holes, clamps\* or an insertion system. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.



*\* The minimum recommended length for each clamp is 50 mm.*

Module can be installed in both landscape and portrait modes.

The modules must be properly secured to their support so that they can withstand live load conditions, including positive and negative load, to the pressure they have been certified for.

It is the installer's responsibility to ensure that the clamps used to secure the modules are

strong enough.

## **Attachment guidelines**



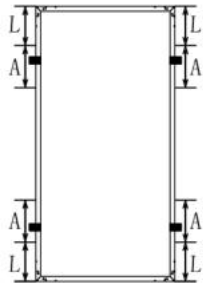
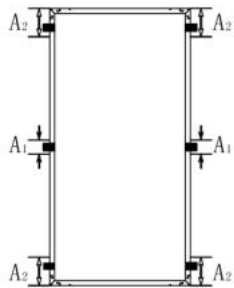
Select the proper installation method depending on the load(See below for more detailed information).

With different installation methods, the modules have been tested to withstand the loads of 2400 Pa and 5400 Pa ,

The diagrams in the tables below are designed for illustration purpose. For each installation, modules can be installed either in portrait or landscape mode. If you integrate our obsolete products and need advice, please contact vDS Power GmbH

Customer Support Department for installation instructions based on older manuals.

VDS module(XXX is output power)	Module(LWH)
VDS-S120/FNH-XXX	1684mm × 1002mm × 35mm
VDS-S144/FNH-XXX	2008mm × 1002mm × 35mm
VDS-S108/M6H-XXX	1594mm × 1048mm × 35mm
VDS-S120/M6H-XXX	1756mm × 1039mm × 35mm
	1765mm × 1048mm × 35mm
	1776mm × 1052mm × 35mm
VDS-S144/M6H-XXX	2095mm × 1039mm × 35mm
	2102mm × 1040mm × 35mm
	2108mm × 1048mm × 35mm
	2115mm × 1052mm × 35mm
VDS-S132/M6H-XXX	1922mm × 1046mm × 35mm
VDS-S156/M6H-XXX	2278mm × 1048mm × 35mm
VDS-S108/M6H-XXX-BG	1603mm × 1046mm × 30mm
VDS-S120/M6H-XXX-BG	1756mm × 1039mm × 30mm
VDS-S132/M6H-XXX-BG	1922mm × 1046mm × 30mm
VDS-S144/M6H-XXX-BG	2095mm × 1039mm × 30mm
VDS-S156/M10H-XXX	2472mm × 1135mm × 35mm
VDS-S108/M10H-XXX	1724mm × 1134mm × 35mm
VDS-S120/M10H-XXX	1909mm × 1134mm × 35mm
VDS-S132/M10H-XXX	2094mm × 1134mm × 35mm
VDS-S144/M10H-XXX	2279mm × 1134mm × 35mm
VDS-S108/M10H-XXX-BG	1724mm × 1134mm × 30mm
VDS-S120/M10H-XXX-BG	1922mm × 1134mm × 30mm
VDS-S132/M10H-XXX-BG	2094mm × 1134mm × 30mm
VDS-S144/M10H-XXX-BG	2279mm × 1134mm × 30mm
	2292mm × 1134mm × 30mm
VDS-S132/M12H-XXX	2384mm × 1303mm × 35mm
VDS-S120/M12H-XXX	2172mm × 1303mm × 35mm
VDS-S110/M12H-XXX	2384mm × 1096mm × 35mm
VDS-S100/M12H-XXX	2172mm × 1096mm × 35mm
VDS-S132/M12H-XXX-BG	2384mm × 1303mm × 30mm
VDS-S120/M12H-XXX-BG	2172mm × 1303mm × 30mm
VDS-S108/M12H-XXX-BG	1962mm × 1303mm × 30mm
VDS-S110/M12H-XXX-BG	2384mm × 1096mm × 30mm
VDS-S100/M12H-XXX-BG	2172mm × 1096mm × 30mm

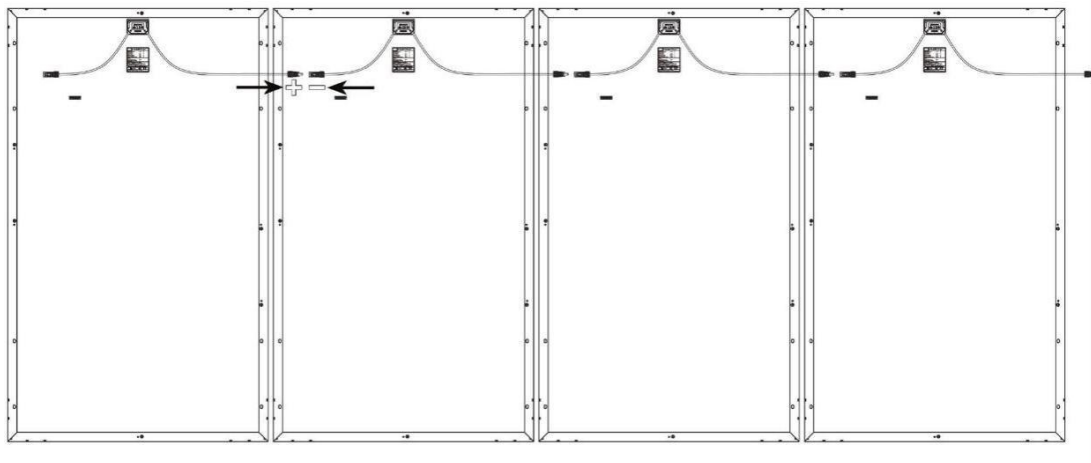
4 bolts installation	Test load: positive 5400Pa negative 2400Pa Design load: positive 3600Pa negative 1600Pa Safety factor: 1.5		VDS-S120/FNH-XXX VDS-S108/M6H-XXX VDS-S120/M6H-XXX VDS-S132/M6H-XXX VDS-S108/M6H-XXX-BG VDS-S120/M6H-XXX-BG VDS-S132/M6H-XXX-BG VDS-S108/M10H-XXX VDS-S120/M10H-XXX VDS-S108/M10H-XXX-BG VDS-S120/M10H-XXX-BG VDS-S108/M12H-XXX-BG
8 bolts installation	Test load: positive 5400Pa negative 3800Pa Design load: positive 3600Pa Negative 2500Pa Safety factor: 1.5		VDS-S144/FNH-XXX VDS-S144/M6H-XXX VDS-S156/M6H-XXX VDS-S144/M6H-XXX-BG VDS-S156/M10H-XXX VDS-S132/M10H-XXX VDS-S144/M10H-XXX VDS-S132/M10H-XXX-BG VDS-S144/M10H-XXX-BG VDS-S132/M12H-XXX VDS-S120/M12H-XXX VDS-S110/M12H-XXX VDS-S100/M12H-XXX VDS-S132/M12H-XXX-BG VDS-S120/M12H-XXX-BG VDS-S110/M12H-XXX-BG VDS-S100/M12H-XXX-BG
4 clamps installation	Test load: positive 5400Pa negative 3800Pa Design load: positive 3600Pa Negative 2500Pa Safety factor: 1.5	 L=250mm Clamp zone: A=200mm	VDS-S120/FNH-XXX VDS-S108/M6H-XXX VDS-S120/M6H-XXX VDS-S132/M6H-XXX VDS-S108/M6H-XXX-BG VDS-S120/M6H-XXX-BG VDS-S132/M6H-XXX-BG VDS-S108/M10H-XXX VDS-S120/M10H-XXX VDS-S108/M10H-XXX-BG VDS-S120/M10H-XXX-BG VDS-S108/M12H-XXX-BG
六夹具安装	Test load: positive 5400Pa negative 3800Pa Design load: positive 3600Pa Negative 2500Pa Safety factor: 1.5	 Clamp zone: A1 = 100 mm A2 = 200 mm	VDS-S144/FNH-XXX VDS-S144/M6H-XXX VDS-S156/M6H-XXX VDS-S144/M6H-XXX-BG VDS-S156/M10H-XXX VDS-S132/M10H-XXX VDS-S144/M10H-XXX VDS-S132/M10H-XXX-BG VDS-S144/M10H-XXX-BG VDS-S132/M12H-XXX VDS-S120/M12H-XXX VDS-S110/M12H-XXX VDS-S100/M12H-XXX VDS-S132/M12H-XXX-BG VDS-S120/M12H-XXX-BG VDS-S110/M12H-XXX-BG VDS-S100/M12H-XXX-BG

\* The module clamps must not come into contact with the front glass or deform the frame in any way. Avoid shading effects from the module clamps and insertion systems. Drainage holes in the module frame must not be closed or obscured by the clamps.

\*\* The loads of 2400 Pa and 5400 Pa are under IEC standard. The installation methods applicable for 5400 Pa are also relevant for 2400 Pa.

\*\*\* The mounting holes reserved for Nextracker mounting system with special accessories.

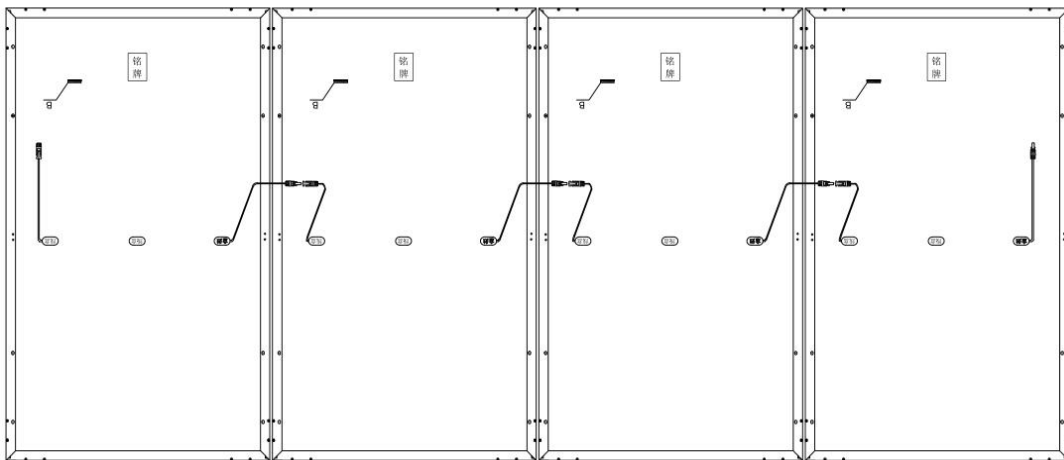
### **Recommended installation method of full cell solar module:**



The modules in PV array are recommended for portrait connecting, and cable length is not less than 0.7 m.

### **VDS Power GmbH half-cell module recommended connection method:**

The modules are installed horizontally in the square array, and the module line length: the length of the positive and negative lines is not less than 0.30 m.



Our components can be installed horizontally without affecting the relevant warranty and service life of the components.

## Electrical Installation

### General installation

Any hardware used must be compatible with any other used material to avoid galvanic corrosion. Defects caused by corrosion void the warranty.

It is not recommended to use modules with different configurations (grounding, wiring) in the same system.

Excessive cables must be organized or fixed in an adequate way,

e.g. attached to the mounting structure by using non-metallic cable ties. Solar cables, connectors and junction boxes should not be exposed to water exposure, and snow, and rain or water submersion for a long period of time(IP65/67/68).

For applications requiring 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. The maximum system voltage is 600 volts ,1000 volts or 1500 volts depending on the product family DC according to standards.

The maximum number of series connected modules depends on system design, the type of

inverter used and environmental conditions.

Based on the maximum series fuse rating of module and local electrical installation code, always make sure VDS Power GmbH modules are assembled with the appropriate string fuse for circuit protection.

There is no specific limitation on the number of modules that can be connected

in parallel, the number of modules is determined by system design parameters such as current or power output. 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 is 62930 produced by Wuxi Xinhongye Wire

Caution: do not secure the cables too tight. Any cable damage caused by cable management system is not covered under VDS Power GmbH's warranty.

Always refer to the cable manufacturer's bending radius which includes the radius just behind the connectors.

When designing large modules arrays connected to a single inverter, always take into account the resulting isolation resistance (Riso), which decrease increasing the number of modules in the array. A too low Riso can results in inverter faults. Please refer to local regulations to determine the system wires size, type and temperature.

VDS Power GmbH modules are supplied with connectors used for system electrical connections.

The recommended connectors are

TL-CABLE01S connectors, Amphenol H4 connectors, Multi Contact MC4 connectors etc.

VDS Power GmbH strongly recommends using the genuine connector type specified by MY VDS Power GmbH 's product data sheet. Any choice of a different connector type other than specified may void the warranty of the module.

To ensure reliable electric connection and to prevent possible intrusion of humidity, two connectors must be mated and locked together until a click can be heard.

Long-term exposure to wet environments may cause connectors' poor connectivity, resulting in current leakage and poor conductivity which voids the warranty. VDS Power GmbH recommends proper connector/cable/wire management to prevent moisture intrusion.

Depending on the amount of humidity, VDS Power GmbH recommends periodic inspections of the installation system to maintain optimal module performance.

We have added 3 junction boxes from different manufacturers. The details are shown in the figure below

Junction box (接线盒):	Supplier: Suzhou Xtong Photovoltaic Technologies Co., Ltd	Supplier: Zhejiang Renhe Photovoltaic Technology Co., Ltd.	Supplier: Ningbo huayu Photovoltaic Technology Co., Ltd
	Model: PV-XT1609Nxyz(20A、25A、30A、35A)	Model: FT50xy(20A、25A、30A)	Model: FT50xy(20A、25A、30A)
Cable(线缆):	Supplier: Suzhou Xtong Photovoltaic Technologies Co., Ltd	Supplier: Zhejiang Renhe Photovoltaic Technology Co., Ltd.	Supplier: Ningbo huayu Photovoltaic Technology Co., Ltd
	Model: H1Z2Z2-K 1×4.0mm <sup>2</sup>	Model: 62930IEC 131 1×4.0mm <sup>2</sup>	Model: 62930IEC 131 1×4.0mm <sup>2</sup>
Connector (连接器):	Supplier: Suzhou Xtong Photovoltaic Technologies Co., Ltd	Supplier: Zhejiang Renhe Photovoltaic Technology Co., Ltd.	Supplier: Ningbo huayu Photovoltaic Technology Co., Ltd
	Model: PV-XT101.1	Model: RHC2xyz	Model: PV-H4
Bypass diode (二极管):	Supplier: Suzhou Xtong Photovoltaic Technologies Co., Ltd	Supplier: Zhejiang Renhe Photovoltaic Technology Co., Ltd.	Supplier: Ningbo huayu Photovoltaic Technology Co., Ltd
	Model: XT3050M-B/XT4050M-B/XT4550M-B/XT5050M-B	Model: MK3045/MK4045/MK5045	Model: HY3050MKHY4050MK/HY5050MK

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 the Grids vary from region to region. Always seek the advice from a qualified system designer or integrator. Building permits, inspections and approvals by the local utility are generally required.

Especially for larger installations VDS Power GmbH recommends lightning protection following the local requirements and regulations.

When the installation is finished and after connection to the grid please do a professional hand over to the owner including an installation protocol is required. Provide a clear documentation of the system to the owner consisting of following minimum data such as: user guide, system layout, data sheets, performance expectations, electrical system data e.g. a copy of the installation test report following minimum requirements of IEC 62446 / IEC 60364-6.



## Grounding

For grounding and bonding requirements, please refer to regional and national safety and electricity standards. If grounding is required, use a recommended connector type for the grounding wire.

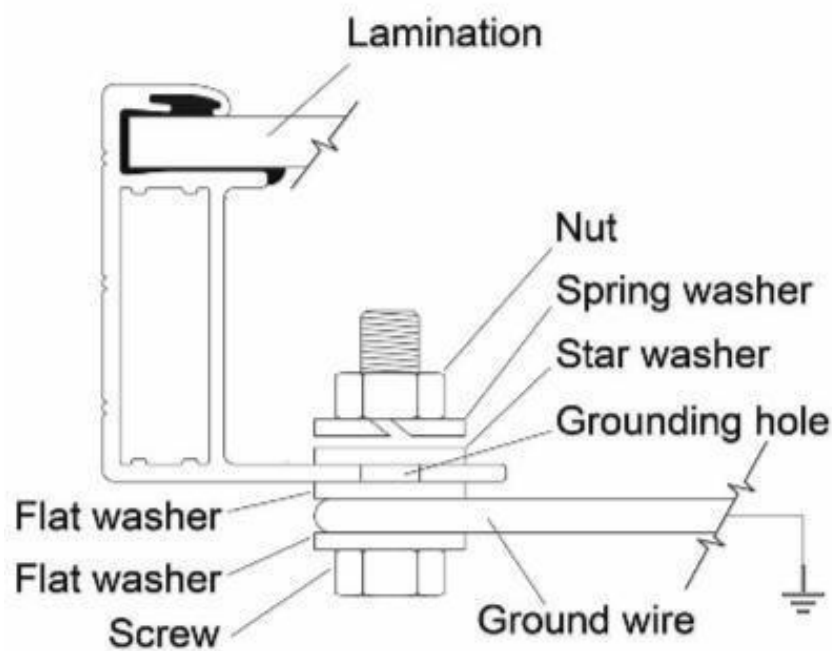
For grounding, this guide refers to module frame grounding. If grounding is required, make sure module frames (metal exposed to touch) are always grounded.

VDS Power GmbH recommends always refer to local state and national code requirements for PV module grounding. We highly recommend negative grounding if it's allowed by local authorities.

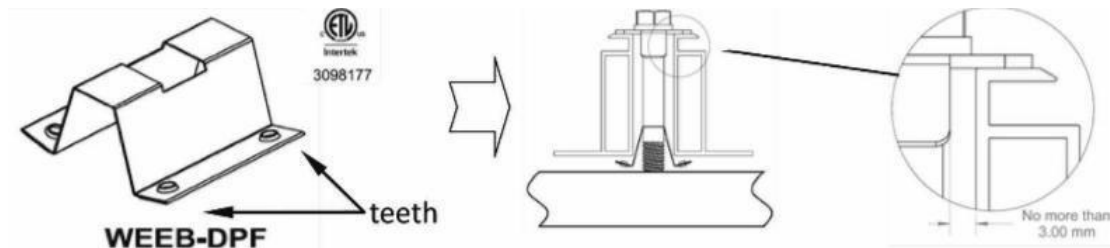
When attaching the frame grounding hardware and wire to the frame it must be placed corresponding to the ground symbol stamped location to ensure proper electrical connection.

VDS Power GmbH recommends one of the following parts for grounding:

Use M5 bolt and washer to bond the ground wire and aluminum frame through the grounding hole (as shown below). The tightening torque is 3-7Nm. All nuts and washers should be made of stainless steel. 4-14 mm<sup>2</sup> (AWG 6-12) exposed copper wire is recommended as ground wire.



2) Use WEEB-DPF to bond solar modules to module mounting brackets (grounding part is tested to UL467)



Notice that WEEB teeth is positioned completely under the edge of the module frame.

When position of solar module is finalized, torque fasteners to 20.5 N-m/15 ft-lb using general purpose anti-seize on threads.

## Maintenance

To ensure optimum module performance, VDS Power GmbH recommends the following maintenance measures:

Clean the module minimum once a year or more often when required depending of the pollution. Remove all organic from the surface. Module with soiling or contamination may reduce the power generation of the system. Always use clean water and a soft non-abrasive sponge or cloth for cleaning. A mild, non-abrasive cleaning agent may be used to remove stubborn dirt.

Uncontrolled pollution is voiding the warranty or not cleaning the modules in time voids the warranty.

Check the electrical, grounding and mechanical connections every six months to verify that they are clean, secure, undamaged and free of corrosion. Or else the warranty may be voided.

In the event of a ground fault condition, NEVER wash or spray modules with

water until ground fault has been identified, corrected by an authorized solar inverter service technician and the inverter is fully operational. This can cause electrocution or a serious safety issue.

If any problem arises, consult a professional solar service providers for suggestions.

Caution: observe solar manufacturers' maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries etc

## After-sale Service

After sales unit: VDS Power GmbH

Address: Rudolf-Diesel-Strasse 10 - 33178 Borchten, Germany

Telephone: +49 (0)5251 2986711

E-mail: [info@vdspower.de](mailto:info@vdspower.de)

## Dimension & Parameters

*VDS-S156/M6H-xxx (XXX=450-495)*

### Electrical Characteristics

Max. power( tol erance $\pm 3\%$ ) [W]:	450	455	460	465	470	475	480	485	490	495
Open - circuit voltage ( tolerance $\pm 3\%$ ) [V]:	51.9	52.1	52.3	52.5	52.7	52.9	53.1	53.3	53.5	53.7
Short- circuit current( t olerance $\pm 3\%$ ) [A]:	11.15	11.21	11.27	11.34	11.40	11.47	11.53	11.60	11.66	11.72
Maximum system voltage [V]	43.3	43.5	43.7	43.9	44.1	44.3	44.5	44.7	44.9	45.1
Maximu m Power Current [A]:	10.4	10.46	10.53	10.6	10.66	10.73	10.79	10.86	10.92	10.98

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II

Insulation Resistance	$\geq 100\text{M}\Omega$
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Mechanical Specifications	
External Dimensions	2278*1048*40mm
Weight	29 kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(156pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S144/M6H-xxx (XXX=415-460)**

**Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	415	420	425	430	435	440	445	450	455	460
Open - circuit voltage ( tolerance $\pm 3\%$ ) [V]:	47.8	48.0	48.2	48.4	48.6	48.8	49.0	49.2	49.4	49.6
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.11	11.18	11.25	11.32	11.40	11.47	11.54	11.61	11.68	11.75
Maximum system voltage [V]	40.0	40.2	40.4	40.6	40.8	41.0	41.2	41.4	41.6	41.8
Maximum Power Current [A]:	10.38	10.46	10.52	10.6	10.67	10.74	10.81	10.87	10.94	11.01

Working Conditions
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Pmax Temperature Coefficient	-0.41 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.05 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2115 x 1052x40 /2108*1048*40/2095X1039X40mm
Weight	24 kg
Solar Cells	Monocrystalline:166x166mm(144pcs )
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP67
Output Cables	4.0 mm <sup>2</sup> , cable lengths 1000mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**CSDZ-S132/M6H-xxx (XXX=380-420)**

**Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	380	385	390	395	400	405	410	415	420
Open - circuit voltage ( tolerance $\pm 3\%$ ) [V]:	43.7	43.9	44.1	44.3	44.5	44.7	44.9	45.1	45.3
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.19	11.26	11.33	11.40	11.47	11.54	11.61	11.68	11.75
Maximum system voltage [V]	36.5	36.7	36.9	37.1	37.3	37.5	37.7	37.9	38.1
Maximum Power Current [A]:	10.42	10.5	10.58	10.66	10.74	10.81	10.88	10.96	11.03

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	<b>1936*1048*40mm</b>
Weight	22kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(132pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball



VDS-S120/M6H-xxx (XXX=345-380)

# Electrical Characteristics

Max. power (tolerance $\pm 3\%$ ) [W]:	345	350	355	360	365	370	375	380
Open-circuit voltage (tolerance $\pm 3\%$ ) [V]:	39.9	40.1	40.3	40.5	40.7	40.9	41.1	41.3
Short-circuit current (tolerance $\pm 3\%$ ) [A]:	11.14	11.21	11.28	11.35	11.42	11.49	11.56	11.63
Voltage at max. power [V]:	33.3	33.5	33.7	33.9	34.1	34.3	34.5	34.7
Current at max. power [A]:	10.37	10.46	10.54	10.62	10.71	10.79	10.87	10.96

Working Conditions		Mechanical Specifications	
Pmax Temperature Coefficient	-0.41 %/°C	External Dimensions	1776X1052X40/1765X1048X40/1756X1039X40mm
Voc Temperature Coefficient	-0.32 %/°C	Weight	20kg
Isc Temperature Coefficient	+0.05 %/°C	Solar Cells	Monocrystalline:166X166mm(120pcs)
Operating Temperature	-40~+85 °C	Front glass	3.2 mm tempered glass, low iron
NMOT	45 $\pm$ 2 °C	Frame	Anodized/Electrophoretic aluminum alloy
Maximum System Voltage	1500V	Junction Box	IP67
Maximum overcurrent protection rating	20A	Output Cables	4.0 mm <sup>2</sup> , cable lengths 1000mm
Grounding conductivity	<0.1 $\Omega$	Hailst <sup>19</sup> Impact Test one	80 km/h for 25mm ice ball
PV module classification	Class II		
Insulation Resistance	$\geq 100M\Omega$		

**VDS-S108/M6H-xxx (XXX=315-340) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	315	320	325	330	335	340
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	36.0	36.2	36.4	36.6	36.8	37.0
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.35	11.35	11.42	11.49	11.56	11.63
Maximum system voltage [V]	29.9	30.1	30.3	30.6	30.8	31.0
Maximum Power Current [A]:	10.54	10.63	10.73	10.76	10.88	10.97

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1594*1048*40mm
Weight	18kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(108pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball



**VDS-S144/M6H-xxx-BG (XXX=440-465) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	440	445	450	455	460	465
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	49.1	49.3	49.5	49.7	49.9	50.1
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.37	11.45	11.53	11.62	11.70	11.78
Maximum system voltage [V]	41.1	41.4	41.7	42.0	42.3	42.6
Maximum Power Current [A]:	10.71	10.75	10.80	10.84	10.87	10.92

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	2111*1046*30mm
Weight	28.5 kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(144pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S132/M6H-xxx-BG (XXX=405-425) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	405	410	415	420	425
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	45.1	45.3	45.5	45.7	45.9
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.49	11.58	11.66	11.74	11.82
Maximum system voltage [V]	37.3	37.5	37.7	37.9	38.1
Maximum Power Current [A]:	10.86	10.93	11.01	11.08	11.16

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1922*1046*30mm
Weight	27 kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(132pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S120/M6H-xxx-BG (XXX=370-385) Electrical Characteristics**

Max. power (tolerance $\pm 3\%$ ) [W]:	370	375	380	385
Open-circuit voltage (tolerance $\pm 3\%$ ) [V]:	41.0	41.2	41.4	41.6
Short-circuit current (tolerance $\pm 3\%$ ) [A]:	11.45	11.54	11.60	11.69
Maximum system voltage [V]	33.9	34.1	34.3	34.5
Maximum Power Current [A]:	10.92	11.00	11.08	11.16

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1773*1046*30mm
Weight	25 kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(120pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S108/M6H-xxx-BG (XXX=330-345) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	330	335	340	345
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	36.9	37.1	37.3	37.5
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	11.45	11.55	11.65	11.75
Maximum system voltage [V]	30.5	30.7	30.9	31.1
Maximum Power Current [A]:	10.82	10.91	11.00	11.09

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1603*1046*30mm
Weight	23 kg
Solar Cells	Monocrystalline 166x166mm 166x166mm(108pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

***VDS-S144/FNH-xxx -HV (XXX=395-420) Electrical Characteristics***

Max. power( tolerance $\pm 3\%$ ) [W]:	395	400	405	410	415	420
Open- circuit voltage ( tolerance $\pm 3\%$ ) [V]:	48.8	49.0	49.2	49.4	49.6	49.8
Short- circuit current( t olerance $\pm$ 3%) [A]:	10.10	10.17	10.24	10.31	10.38	10.45
Voltage at max. power [V]:	41.6	41.8	42.0	42.2	42.4	42.6
Current at max. power [A]:	9.51	9.58	9.65	9.72	9.79	9.86

Working Conditions	
Pmax Temperature Coefficient	-0.41 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.05 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$



Mechanical Specifications	
External Dimensions	2008X1002X40 mm
Weight	23 kg
Solar Cells	Polycrystalline:158.75*158.75(144pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP67
Output Cables	4.0 mm <sup>2</sup> , cable lengths 1000mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S120/FNH-xxx -HV (XXX=330-350)      Electrical Characteristics**

Max. power( tolerance± 3%) [W]:	330	335	340	345	350	
Open- circuit voltage ( tolerance ± 3%) [V]:	40.7	40.9	41.1	41.3	41.5	
Short- circuit current( tolerance ± 3%) [A]:	10.1 3	10.21	10.29	10.37	10.45	
Voltage at max. power [V]:	34.7	34.9	35.1	35.3	35.5	
Current at max. power [A]:	9.54	9.62	9.70	9.78	9.86	

Working Conditions	
Pmax Temperature Coefficient	-0.41 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.05 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	1684x1002x40 mm
Weight	19 kg
Solar Cells	Polycrystalline:158.75*158.75(120pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP67
Output Cables	4.0 mm <sup>2</sup> , cable lengths 1000mm
Hailstone Impact	80 km/h for 25mm ice ball

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**VDS-S132/M12H-xxx (XXX=650-670) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	650	655	660	665	670
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	44.9	45.1	45.3	45.5	45.7
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	18.27	18.33	18.39	18.45	18.50
Maximum system voltage [V]	37.6	37.8	38.0	38.2	38.4
Maximum Power Current [A]:	17.29	17.33	17.37	17.41	17.45

Working Conditions		Mechanical Specifications	
Pmax Temperature Coefficient	-0.42 %/°C	External Dimensions	2384*1303*35mm
Voc Temperature Coefficient	-0.32 %/°C	Weight	33.9 kg
Isc Temperature Coefficient	+0.04 %/°C	Solar Cells	Monocrystalline 210x210mm(132pcs)
Operating Temperature	-40~+85 °C	Front glass	3.2 mm tempered glass, low iron
NMOT	45±2 °C	Frame	Anodized/Electrophoretic aluminum alloy
Maximum System Voltage	1500V	Junction Box	IP68
Maximum overcurrent protection rating	20A	Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Grounding conductivity	<0.1Ω		
PV module classification	Class II		
Insulation Resistance	≥100MΩ		

Hailstone Impact Test	80 km/h for 25mm ice ball
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**VDS-S120/M12H-xxx (XXX=590-605) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	590	595	600	605
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	41.1	41.3	41.5	41.7
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	18.42	18.47	18.52	18.57
Maximum system voltage [V]	34.0	34.2	34.4	34.6
Maximum Power Current [A]:	17.35	17.40	17.44	17.49

Working Conditions		Mechanical Specifications	
Pmax Temperature Coefficient	-0.42 %/°C	External Dimensions	2172*1303*35mm
Voc Temperature Coefficient	-0.32 %/°C		
Isc Temperature Coefficient	+0.04 %/°C	Weight	30.9 kg
Operating Temperature	-40~+85 °C	Solar Cells	Monocrystalline 210x210mm(120pcs)
NMOT	45±2 °C		
Maximum System Voltage	1500V	Front glass	3.2 mm tempered glass, low iron
Maximum overcurrent protection rating	20A	Frame	Anodized/Electrophoretic aluminum alloy
Grounding conductivity	<0.1Ω	Junction Box	IP68
PV module classification	Class II	Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Insulation Resistance	≥100MΩ		

Hailstone Impact Test	80 km/h for 25mm ice ball
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Max. power( tolerance $\pm 3\%$ ) [W]:	545	550	555
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	37.7	37.9	38.1
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	18.47	18.52	18.56
Maximum system voltage [V]	31.4	31.6	31.8
Maximum Power Current [A]:	17.37	17.40	17.45

Working Conditions		Mechanical Specifications	
Pmax Temperature Coefficient	-0.42 %/°C	External Dimensions	2384*1096*35mm
Voc Temperature Coefficient	-0.32 %/°C	Weight	<b>28.6</b> kg
Isc Temperature Coefficient	+0.04 %/°C	Solar Cells	Monocrystalline 210x210mm(110pcs)
Operating Temperature	-40~+85 °C	Front glass	3.2 mm tempered glass, low iron
NMOT	45±2 °C	Frame	Anodized/Electrophoretic aluminum alloy
Maximum System Voltage	1500V	Junction Box	IP68
Maximum overcurrent protection rating	20A	Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Grounding conductivity	<0.1Ω		
PV module classification	Class II		
Insulation Resistance	≥100MΩ		
Hailstone Impact Test	80 km/h for 25mm ice ball		

Max. power( tolerance $\pm 3\%$ ) [W]:	495	500	505
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	51.5	51.7	51.9
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	12.21	12.28	12.35
Maximum system voltage [V]	42.6	42.8	43.0
Maximum Power Current [A]:	11.63	11.69	11.75

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2185*1098*35mm
Weight	26.3 kg
Solar Cells	Monocrystalline 210x210mm(150pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm

Hailstone Impact	80 km/h for 25mm ice ball
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Test	
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**VDS-S108/M10H-xxx (XXX=390-410)****Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	390	395	400	405	410
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	36.7	36.9	37.1	37.3	37.5
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	13.59	13.66	13.73	13.81	13.88
Maximum system voltage [V]	30.8	31.0	31.2	31.4	31.6
Maximum Power Current [A]:	12.69	12.76	12.83	12.91	12.98

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

**Mechanical Specifications**

External Dimensions	1724*1134*40mm
Weight	22.2kg
Solar Cells	Monocrystalline 182x182mm 182x182mm(108pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S156/M10H-xxx (XXX=560-595)**
**Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	560	565	570	575	580	585	590	595
Open - circuit voltage ( tolerance $\pm 3\%$ ) [V]:	53.4	53.5	53.6	53.7	53.8	53.9	54.0	54.1
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	13.67	13.72	13.82	13.91	14.00	14.10	14.19	14.28
Maximum system voltage [V]	43.4	43.5	43.6	43.7	43.8	43.9	44.0	44.1
Maximum Power Current [A]:	12.91	12.99	13.08	13.16	13.25	13.33	13.41	13.50

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2472*1135*40mm
Weight	32kg
Solar Cells	Monocrystalline 182x182mm 182x182mm(156pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S144/M10H-xxx (XXX=530-550)**

**Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	530	535	540	545	550
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	49.0	49.2	49.4	49.6	49.8
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	13.76	13.81	13.87	13.93	13.99
Maximum system voltage [V]	40.8	41.0	41.2	41.4	41.6
Maximum Power Current [A]:	13.00	13.05	13.11	13.17	13.23

Working Conditions	
Pmax Temperature Coefficient	- 0.42 %/°C
Voc Temperature Coefficient	- 0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	- 40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	<b>2279*1134*40mm</b>
Weight	29.2kg
Solar Cells	Monocrystalline 182x182mm 182x182mm(144pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths

	900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S132/M10H-xxx (XXX=480-500)****Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	480	485	490	495	500
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	44.9	45.1	45.3	45.5	45.7
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	13.36	13.45	13.54	13.63	13.72
Maximum system voltage [V]	37.1	37.3	37.5	37.7	37.9
Maximum Power Current [A]:	12.94	13.00	13.07	13.13	13.19

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	20A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2094*1134*40mm
Weight	27.2kg
Solar Cells	Monocrystalline 182x182mm 182x182mm(132pcs)
Front glass	3.2 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	IP68
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

**VDS-S120/M10H-xxx (XXX=435-455)**
**Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	435	440	445	450	455
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	40.8	41.0	41.2	41.4	41.6
Short-circuit current( tolerance $\pm 3\%$ ) [A]:	13.34	13.41	13.49	13.60	13.69
Maximum system voltage [V]	33.7	33.9	34.1	34.3	34.5
Maximum Power Current [A]:	12.91	12.98	13.06	13.14	13.20

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
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Voc Temperature Coefficient	-0.32 %/°C
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Isc Temperature Coefficient	+0.04 %/°C
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Operating Temperature	-40~+85 °C
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NMOT	45±2 °C
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Maximum System Voltage	1500V
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Maximum overcurrent protection rating	20A
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Grounding conductivity	<0.1Ω
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PV module classification	Class II
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Insulation Resistance	≥100MΩ
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**Mechanical Specifications**

External Dimensions	<b>1909*1134*40mm</b>
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Weight	24.2kg
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Solar Cells	Monocrystalline 182x182mm 182x182mm(120pcs)
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Front glass	3.2 mm tempered glass, low iron
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Frame	Anodized/Electrophoretic aluminum alloy
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Junction Box	IP68
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Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
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Hailstone Impact Test	80 km/h for 25mm ice ball
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**VDS-S144/M10H-xxx-BG (XXX=505-545) /Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	505	510	515	520	525	530	535	540	545
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	48.0	48.2	48.4	48.6	48.8	49.0	49.2	49.4	49.6
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	13.44	13.51	13.57	13.63	13.69	13.76	13.81	13.87	13.81
Maximum system voltage [V]	39.8	40.0	40.2	40.4	40.6	40.8	41.0	41.2	41.4
Maximum Power Current [A]:	12.69	12.75	12.81	12.87	12.93	13.0	13.05	13.11	13.17

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	25A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

Mechanical Specifications	
External Dimensions	2285*1134*30mm/2279*1134*30mm
Weight	31.5 kg/29kg
Solar Cells	Monocrystalline 182x182mm(144p cs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	F301x
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball

Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045



**VDS-S132/M10H-xxx-BG (XXX=465-500) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	465	470	475	480	485	490	495	500
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	44.3	44.5	44.7	44.9	45.1	45.3	45.5	45.7
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	13.16	13.23	13.29	13.36	13.45	13.54	13.63	13.72
Maximum system voltage [V]	36.5	36.7	36.9	37.1	37.3	37.5	37.7	37.9
Maximum Power Current [A]:	12.74	12.81	12.87	12.94	13.00	13.07	13.13	13.19

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	25A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	2094*1134*30mm
Weight	28kg
Solar Cells	Monocrystalline 182x182mm(132pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	F301x
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6

Bypass diode	FSL3045
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**VDS-S120/M10H-xxx-BG (XXX=420-455) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	420	425	430	435	440	445	450	455
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	40.2	40.4	40.6	40.8	41.0	41.2	41.4	41.6
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	13.12	13.19	13.27	13.34	13.41	13.49	13.6	13.69
Maximum system voltage [V]	33.1	33.3	33.5	33.7	33.9	34.1	34.3	34.5
Maximum Power Current [A]:	12.69	12.76	12.84	12.91	12.98	13.06	13.14	13.2

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	25A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1922*1134*30mm
Weight	27kg
Solar Cells	Monocrystalline 182x182mm(120pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	F301x
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045

**VDS-S108/M10H-xxx-BG (XXX=380-405)****Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	380	385	390	395	400	405
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	36.3	36.5	36.7	36.9	37.1	37.3
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	13.44	13.52	13.59	13.66	13.73	13.81
Maximum system voltage [V]	30.4	30.6	30.8	31.0	31.2	31.4
Maximum Power Current [A]:	12.50	12.60	12.69	12.76	12.83	12.91

Working Conditions	
Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	25A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

Mechanical Specifications	
External Dimensions	1724*1134*30mm
Weight	<b>21kg</b>
Solar Cells	Monocrystalline 182x182mm(108pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	F301x
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045

**VDS-S132/M12H-xxx-BG (XXX=630-660) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	630	635	640	645	650	655	660
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	44.7	44.9	45.1	45.3	45.5	45.7	45.9
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	18.16	18.21	18.26	18.31	18.35	18.40	18.45
Maximum system voltage [V]	36.9	37.1	37.3	37.5	37.7	37.9	38.1
Maximum Power Current [A]:	17.07	17.12	17.19	17.23	17.27	17.31	17.35

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	30A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

**Mechanical Specifications**

External Dimensions	2384*1303*30mm
Weight	38.7kg
Solar Cells	Monocrystalline 210x105mm(132pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	FT50xy
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045

**VDS-S120/M12H-xxx-BG (XXX=570-600) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	570	575	580	585	590	595	600
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	40.5	40.7	40.9	41.1	41.3	41.5	41.7
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	18.11	18.16	18.21	18.26	18.31	18.36	18.42
Maximum system voltage [V]	33.4	33.6	33.8	34.0	34.2	34.4	34.6
Maximum Power Current [A]:	17.07	17.12	17.16	17.21	17.25	17.30	17.34

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	30A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

**Mechanical Specifications**

External Dimensions	2172*1303*30mm
Weight	35.3kg
Solar Cells	Monocrystalline 210x105mm(120pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	FT50xy
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045

**VDS-S108/M12H-xxx-BG (XXX=510-540) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	510	515	520	525	530	535	540
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	36.4	36.6	36.8	37.0	37.2	37.4	37.6
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	18.11	18.15	18.20	18.25	18.29	18.34	18.39
Maximum system voltage [V]	30.0	30.2	30.4	30.6	30.8	31.0	31.2
Maximum Power Current [A]:	17.00	17.05	17.11	17.16	17.21	17.26	17.31

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	30A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

**Mechanical Specifications**

External Dimensions	1962*1303*30mm
Weight	31.8kg
Solar Cells	Monocrystalline 210x105mm(108pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	FT50xy
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045

**VDS-S110/M12H-xxx-BG (XXX=525-550) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	525	530	535	540	545	550	
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	37.1	37.3	37.5	37.7	37.9	38.1	
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	18.14	18.19	18.24	18.30	18.35	18.39	
Maximum system voltage [V]	30.8	31.0	31.2	31.4	31.6	31.8	
Maximum Power Current [A]:	17.04	17.11	17.16	17.21	17.24	17.29	

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45±2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	30A
Grounding conductivity	<0.1Ω
PV module classification	Class II
Insulation Resistance	≥100MΩ

**Mechanical Specifications**

External Dimensions	2384*1096*30mm
Weight	32.5kg
Solar Cells	Monocrystalline 210x105mm(110pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	FT50xy
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045



**VDS-S100/M12H-xxx-BG (XXX=480-500) Electrical Characteristics**

Max. power( tolerance $\pm 3\%$ ) [W]:	480	485	490	495	500		
Open-circuit voltage ( tolerance $\pm 3\%$ ) [V]:	33.9	34.1	34.3	34.5	34.7		
Short- circuit current( tolerance $\pm 3\%$ ) [A]:	18.13	18.18	18.25	18.31	18.36		
Maximum system voltage [V]	28.1	28.3	28.5	28.7	28.9		
Maximum Power Current [A]:	17.08	17.14	17.19	17.25	17.30		

**Working Conditions**

Pmax Temperature Coefficient	-0.42 %/°C
Voc Temperature Coefficient	-0.32 %/°C
Isc Temperature Coefficient	+0.04 %/°C
Operating Temperature	-40~+85 °C
NMOT	45 $\pm$ 2 °C
Maximum System Voltage	1500V
Maximum overcurrent protection rating	30A
Grounding conductivity	<0.1 $\Omega$
PV module classification	Class II
Insulation Resistance	$\geq 100M\Omega$

**Mechanical Specifications**

External Dimensions	2172*1096*30mm
Weight	29.5kg
Solar Cells	Monocrystalline 210x105mm(100pcs)
Front glass	2.0 mm tempered glass, low iron
Frame	Anodized/Electrophoretic aluminum alloy
Junction Box	FT50xy
Output Cables	4.0 mm <sup>2</sup> , symmetrical lengths 900mm
Hailstone Impact Test	80 km/h for 25mm ice ball
Cable	62930 IEC 131
Connector	SIKE6
Bypass diode	FSL3045