INSTALLATION MANUAL

FOR GCL SOLAR PV MODULES

Contents

IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety instructions for the Photovoltaic solar module of GCL System Integration Technology Co., Ltd. (hereafter referred to as "GCL" Solar). Installers should follow all safety precautions described in this guide as well as local codes when installing a Module.

Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified personnel. Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference and in case of sale or disposal of the Modules. For any questions, please contact our quality personnel for technical support.

1 Introduce

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

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

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

2 Safety Precautions

2.1 General Safety

Modules are designed to meet the requirements for the standards IEC 61215-1:2021, IEC61215-1-1:2021, IEC61215-2:2021, IEC61730-1:2023 and IEC61730-2:2023 that have safety class II according to IEC 61140.The construction meets Class A fire rating for UL790. The safety class of the PV modules can reach class Ⅱ.

When Modules are mounted on rooftops, the roof must have a fire resistance covering suitable for this application. Rooftop PV systems should only be installed on rooftops capable of handling the additional weighted load of PV system components, including Modules, and have a complete analysis of the structure performed by a certified building specialist or engineer.

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

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

2.2 Electrical Performance Safety

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

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

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

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

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

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

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

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

Do not touch the wet connector without protecting yourself with personal protection equipment or rubber gloves. Do not use mirrors or other magnifiers to concentrate sunlight onto the Modules.

If instructions are provided allowing modules to be installed in parallel electrically, the installation instructions shall specify that each module (or series string of modules so connected) shall be provided with the maximum series fuse. Recommended maximum series is [Max System voltage V/(1.25xVoc)], parallel module configurations is [fuse rating/1.25xIsc]

2.3 Operating Safety

Do not open the package of Modules until they are ready to be installed during transportation and storing. At the same time please protect the package against exposure to damage. Secure pallets from falling over.

Do not exceed the maximum height of pallets to be stacked, as indicated on the pallet packaging. Store pallets in a cool and dry location until the Modules are ready to be unpackaged.

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

Do not stand or step on the Modules.

Do not drop the Modules on another Module.

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

Be cautious when setting the Modules down on to a surface, especially on the corner of the Modules. Inappropriate transport and installation may break the Modules.

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

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

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

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

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

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

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

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

2.4 Fire Safety

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

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

Use appropriate components such as fuses, circuit breaker and grounding connector as requires by local authority. Do not use Modules where flammable gasses may be generated.

3 Installation Condition

3.1 Installation Position and Working Environment

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

Modules must be mounted on appropriate mounting structures positioned on suitable buildings, the ground, or other structures suitable for modules (e.g. carports, building facades or PV trackers).

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

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

The modules are suitable for operation in outdoor non-weather protected locations, exposed to direct and indirect solar radiation, in an environmental temperature range of at least –40°C to +40°C and up to 100% relative humidity as well as rain. The temperature limits are defined as the monthly average high and low of the installation site.

Ensure Modules are not subject to wind or snow loads exceeding the maximum permissible loads.

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

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

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

Modules cannot be installed or used in extreme areas or weather conditions, and highly corrosive areas should be considered carefully. Please adopt appropriate measures to ensure the performance and safety of the Modules when they are installed or operated in areas with heavy snow, extremely cold, strong wind, or near an island or desert that is prone to produce salt fog, or near water.

Galvanic corrosion can occur between the aluminum frame of the Modules and mounting or grounding hardware if such hardware is comprised of dissimilar metals. Modules can be installed at seaside locations 50m to 500m from the sea, but the components should be protected against corrosion.

The irradiance reflected on the rear of the bifacial solar modules shall not exceed 300W/m^2.

3.2 Tilt Angle of Installation

The installation of PV module string should be in the same orientation and the same installation angle. Different installation directions and installation angles will lead to the mismatches in current and voltage which is caused by different light absorption of different PV modules, this mismatch will cause the PV system power output loss.

The largest power will be generated When direct sunlight on solar PV module. For modules which are installed on the fixed brackets, the best installation angle should be selected to ensure the maximum power output can be generated at winter time, if the angle can guarantee enough power output during the winter, it will make the whole solar PV system in the rest of the year can have enough power output also.

Solar modules are recommended to be installed at an optimized tilt angle to maximize the energy output. For detailed information on the best installation angle, please refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator. Dust building up on the surface of the modules can impair module performance. We recommend installing the modules with a tilt angle of at least 10°, making it easier for dust to be washed off by rain. Any faults caused by and/or attributable to tilt angle less than 10 degrees are not covered by manufacturer's warranty. It is roughly equal to the latitude of the project site as a rule of thumb, facing toward the equator. Optimized system designs must incorporate other local requirements.

Installation inclination refers to the Angle between the module and the ground plane, as shown in Figure 1.
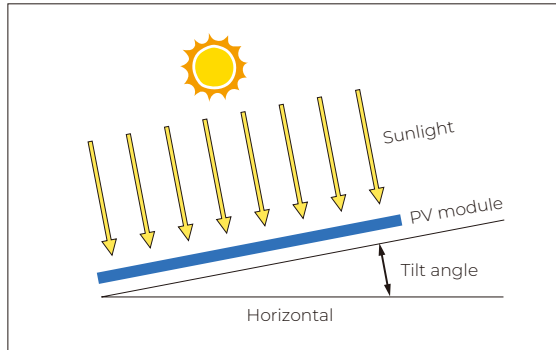
Fig.1 Tilt angle

Table 1 Recommended tilt angle for fixed systems

Latitude	Tilt angle
0°~15°	15°
15°~25°	The same latitude
25°~30°	Same latitude +5°
30°~35°	Same latitude +10°
35°~40°	Same latitude +15°
40°+	Same latitude +20°

3.3 Installation Requirements for Bifacial Module

Under the certain installation conditions, the backside of bifacial cells module will also generate electricity power after receiving the reflected light, which will bring additional power generation gain to the power station system.

The shading on the module surface will affect the power generation much, the module should be installed in the place where the module cannot be shadowed totally (such as the shadow from building, chimney and tree etc.), and even the partially shading (such as the dirt, snow and aerial wire etc.) should be avoided.

The generation gain is related to the ground reflectivity, the module installation height to the ground, the array spacing and the shadow shading to the module backside.

Generally speaking, the reflectance is various with the different ground (See table 2), and this will lead to different power generation gain.
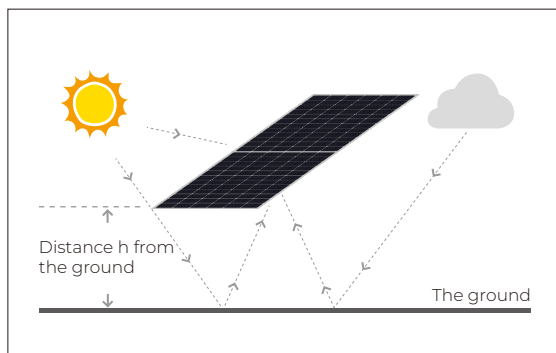
Fig.2 Distance from the earth

Table 2 Reflectivity of different surfaces

The ground type	Reflectivity range (%)
Water	5-12
Grassland	12-25
Ground	20-33
Concrete	20-40
Sand	20-40
Snow	80-85

Due to the different ground clearance height will affect the power generation gain, it is recommended to install the module at a height from 0.5m to 2m. See Fig.2 .

In the system design, besides the ground type and the module installation height to ground, the proper array spacing and how to avoid shadow shading on the back need to be considered too, please consult with the professional system designer.

4 Mechanical Installation

4.1 Conventional Requirements

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

The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions. The module is considered to be in compliance with IEC61730-2:2023 only when the module is mounted in the manner specified by the mounting instructions. Based on standards IEC61730-2:2023 standard, when for the rooftop mounting, the rooftop covering material should have class C fire resistance at least.

The Modules mounting structure should be made of durable, corrosion-resistant and UV-resistant material. Modules should be securely attached to the mounting structure.

In regions with heavy snowfall in winter, select the height of the mounting system. So that the lowest edge of the Modules is not covered by snow for any length of time. In addition, ensure that the lowest portion of the Modules is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.

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

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

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

Dust building up on the surface of the Modules can impair with modules performance. We 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 Modules frames (the recommended minimum distance between two Modules is 1 cm).

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

A module with exposed conductive parts is considered to be in compliance with IEC TS 62548:2013 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the national regulations. Any module without a frame (laminate) shall not be considered to comply with the requirements of IEC 61215-1:2021, IEC61215-1-1:2021, IEC61215-2:2021, IEC61730-1:2023 and IEC61730-2:2023 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by a field Inspection certifying that the installed module complies with the requirements of IEC TS 62548:2013

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

Modules can be mounted in landscape or portrait orientation.

4.2 Modules Installed with Clamps

Modules should be mounted using specialized clamps as shown in Figure 1. Remark: Some combinations of the material could be used, regarding the detailed information, please refer to the listing report.

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

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

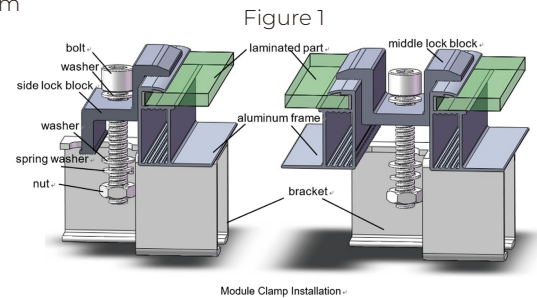Lock blocks need to meet: length ≥ 50mm, thickness ≥ 4mm

Thickness: Following as Clamp A and Clamp B

Material: Aluminum Alloy 6005-T6

Bolt: Stainless Steel, M8

Nut: Stainless Steel, M8

Washer: Stainless Steel, M8

Figure 1

Module Clamp Installation

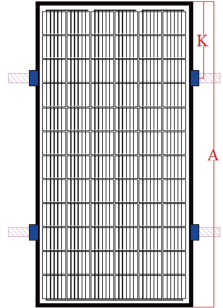B) Recommended bolt torque range: 16N.m to 20N.m.

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

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

E) Mounting method (showed in Table 1): a=1/4xL ±50mm

1. Framed Modules

• Installation with the mounting clamp

Table 1 Installation Method	Installation Method A
Clamping on the long side Note: The length of the clamp ≥50mm.	

Module Type	Module dimensions (mm)	Installation Method A
		Design load: downward/upward ym=1.5(Pa)
GCL-NT10/78GDFxxx	2465×1134×30	3600/1600
GCL-NT10/72GDFxxx	2278×1134×30	3600/1600
GCL-NT10R/72GDFxxx	2382×1134×30	3600/1600
GCL-NT10R/54GDFxxx	1800×1134×30 1762×1134×30	3600/1600
GCL-NT10R/54BGDFxxx	1800×1134×30 1762×1134×30	3600/1600
GCL-NT10/60GDFxxx	1908×1134×30	3600/1600
GCL-NT10/54GDFxxx	1722×1134×30 1800×1134×30	3600/1600
GCL-NT12/66GDFxxx	2384×1303×35 2384×1303×33	3600/1600
GCL-NT12/60GDFxxx	2172×1303×35 2172×1303×33	3600/1600
GCL-NT12R/66GDFxxx	2382×1134×30	3600/1600
GCL-NT12R/60GDFxxx	2172×1134×30	3600/1600
GCL-NT12R/54GDFxxx	1960×1134×30	3600/1600
GCL-NT10/44GDF-Txxx	2278×1134×30	3600/1600

5 Electrical Installation

5.1 Electrical Property

Rated electrical characteristics such as Pmax is +/-3 % and Voc +/-3% and Isc +/-4% of tolerance values at Standard Test Conditions. Under normal conditions, the photovoltaic Modules may experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of short circuit current, Isc, and open circuit voltage, Voc, marked on Modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fusing sizes, and size of controls connected to the Modules output.

For a module or panel in abnormal condition, the multiplying 1.25 factor at conditions of an irradiance of 125 mW/cm2, AM 1.5 spectrum, and a cell temperature of minus 10°C for VOC and plus 75°C for ISC should be taken into consideration.

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

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

5.2 Cables and Wiring

The junction boxes have been designed to be easily interconnected in series for their well-connected cable and the connector with IP67 (IP68) protection grade. Each Modules has two single-conductor wires, one positive and one negative, which are pre-wired inside the junction box. The connectors at the opposite end of these wires allow easy series connection of adjacent Modules by firmly inserting the positive connector of a Module into the negative connector of an adjacent Module until the connector is fully seated.

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

Each PV module has two PV cables which can withstand 85°C temperature and they are sunlight resistant(UV). The cross-sectional area of the cable is 4mm2 or 12AWG, and the external diameter is 5mm～7mm. The minimum bending radius of the cables must be 43mm. Any cable damage caused by bending too much or cable management system is not covered under warranty. Plug & Play connectors are included at the end of each cable. All other cables used to connect the direct current system shall have similar (or higher) specifications, and should have the suitable insulation ability which can suffer the possible maximum system Voc. We require all cables and electrical connections to comply with the electrical regulations of the countries where the PV system is installed.

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

5.3 Connector

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

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

5.4 Bypass Diodes

If PV module part by shadow block, which can lead to reverse voltage related to solar cells, PV modules in other unaffected battery string or other PV modules in the system and current will force through keep out part of the power loss and heat affected cell. When the PV module is connected in parallel with the bypass diode, the current in the system will flow directly through the diode, so as to bypass the blocked part of the PV module and minimize the heating degree and power consumption of the PV module.

Please do not try to open the junction box to replace the diode, or even when the diode problem, please do this work by professionals.

6 Grounding

The Modules use an anodic oxidized aluminum frame to resist corrosion. So the frame of Modules should be connected to the equipment grounding conductor to prevent thunder and electrical shock. All PV module frames and mounting brackets must be properly grounded in accordance with the applicable national electrical code.

When grounding, the grounding device must be fully in contact with the frame aluminum alloy and the installation bracket, through the oxide film on the frame surface and the insulation layer of the bracket. Please do not drill any additional ground holes on the border of the assembly.

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

6.1 Grounding by Using Grounded Clamp

Grounding by cable

- The grounding bolts must be made of stainless steel and be used in the specified grounding holes. First, make the M3. 5 stainless steel bolt pass through the spring washer, flat washer, cup washer (copper conductor with a diameter of 2.1 mm) and star washer, and then insert through the grounding hole, flat washer and spring washer on the frame. Finally, tighten with a M3.5 nut. Caution: The upper limited temperature of the conductor is 85℃. As for the installation, refer to Figure 10.

Grounding by lugs

- All the module frames and mounting structures shall be grounded according to regional and national electricity regulations. Use recommended hardware to connect grounding cables and fasten to the Module frames.

- While using the metal structure, make sure the surface of the system have been electroplated to keep a good conducting circuit.

- Use suitable grounding conductors to connect the Module frame to the mounting structure. This can achieve proper grounding effects.

- The grounding conductor must be connected to ground via an appropriate grounding electrode. It is recommended to use lugs to connect the grounding cables. I f it is only mechanically connected to a grounded module without bolts and nuts, the mounting system should be grounded as well.

- First, peel the grounding cable to a proper length without damage to the metal core. Then insert the peeled cable into the lug, tighten the screw. As shown in Figure 11, connect the lug to the aluminum frame with stainless steel bolts and connection components. The recommended tightening torque for M3 bolts is 2.3N·m.
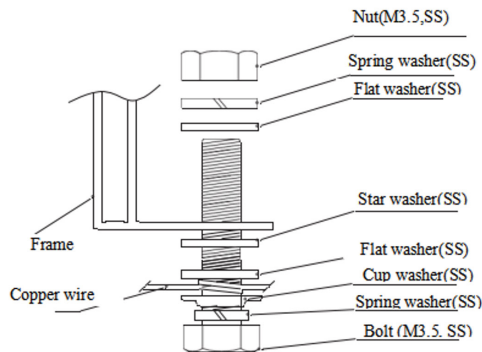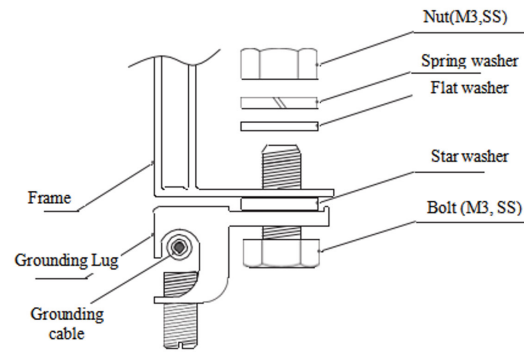
Figure 10

Figure 11

7 Operation and Maintenance

Normally, the Modules do not need repair. Follow the maintenance methods below to ensure the best performance of the Modules:

- In most conditions, the normal rainwater can keep the module glass clean. Clean the glass surfaces with wet soft sponge or cloth if necessary. Use mild non-abrasive cleaning agent to remove stubborn dirt.

- Do not try to clean a Module with broken glass or perforated backsheet. It will cause serious electrical shock. Take a regular inspection on grounding, mechanical and electrical connections every 6 months. Make sure all the Module connectors are connected, clean and without damage or corrosion.

- When disassembling the connectors, must make sure all the components are working well; otherwise the connector's shall be replaced. Damage on the connector will cause electronic leakage. The tightening torque of the nut should be 1.5 N·m - 3 N·m.

- Use opaque material to completely cover the Modules during repair to avoid electric shock. When exposed to the sunshine, the Modules will produce high voltage. The repair work must be carried out by professionals.
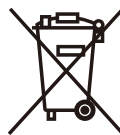
Meaning of crossed-out wheeled dustbin: Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge.

Warning: Shut down the system before any electric repair.
Improper maintenance may cause electric shock or fire.

8.1 Module Appearance Inspection

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

A) Whether the glass is broken;

B) Corrosion along the cells' bus-bar.

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

C) If there is burning vestige on the backsheet

8.2 Connector and Cable Inspection

It is recommended to conduct electrical preventive inspection and maintenance every 6 months

Check the tightness of the connector and whether there is any external sheath damage or direct sunlight, and whether the connection is solid.

Check electrical leakage to ground.

Check the sealing gels of the junction box for any damage.

8.3 Cleaning

Dust accumulation on the glass surface of the module will reduce its power output and may cause hot spots. So the surface of PV modules should be kept clean. Maintenance work should be performed at least once six months or frequently. Warning: It should be carried out by trained personnel.

The back surface of the module normally does not need to be cleaned but, in the event this is deemed necessary, avoid the use of any sharp projects that might damage the penetrating the substrate material.

8.4 Troubleshooting

After the module is put into use, the photovoltaic system cannot work normally. Please inform the installer immediately. It is recommended to carry out preventive inspection every 6 months. Do not replace components without authorization. If inspection and maintenance of electrical or mechanical properties are required, qualified and professionally trained professionals should be allowed to operate to avoid electric shock or casualties.

Performance at STC

	Module type	GCL-NT10/78GDF595	GCL-NT10/78GDF600	GCL-NT10/78GDF605	GCL-NT10/78GDF610
STC condition	Pmp [W] /Tolerance	595±3%	600±3%	605±3%	610±3%
	Voc [V] /Tolerance	55.80±3%	55.95±3%	56.10±3%	56.25±3%
	Isc [Adc] /Tolerance	13.45±4%	13.50±4%	13.55±4%	13.60±4%
	Vmp [V]	46.85	47.06	47.27	47.48
	Imax [Adc]	12.70	12.75	12.80	12.85
BNPI condition	Pmp [W] /Tolerance	655±3%	660±3%	665±3%	670±3%
	Voc [V] /Tolerance	55.95±3%	56.10±3%	56.25±3%	56.40±3%
	Isc [Adc] /Tolerance	14.85±4%	14.90±4%	14.95±4%	15.00±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.56±4%	16.61±4%	16.66±4%	16.71±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/78GDF615	GCL-NT10/78GDF620	GCL-NT10/78GDF625	GCL-NT10/78GDF630
STC condition	Pmp [W] /Tolerance	615±3%	620±3%	625±3%	630±3%
	Voc [V] /Tolerance	56.40±3%	56.55±3%	56.70±3%	56.85±3%
	Isc [Adc] /Tolerance	13.65±4%	13.70±4%	13.75±4%	13.80±4%
	Vmp [V]	47.68	47.88	48.08	48.28
	Imax [Adc]	12.90	12.95	13.00	13.05
BNPI condition	Pmp [W] /Tolerance	675±3%	680±3%	685±3%	690±3%
	Voc [V] /Tolerance	56.55±3%	56.70±3%	56.85±3%	57.00±3%
	Isc [Adc] /Tolerance	15.05±4%	15.10±4%	15.15±4%	15.20±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.76±4%	16.81±4%	16.86±4%	16.91±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/78GDF635	GCL-NT10/78GDF640	GCL-NT10/78GDF645	
STC condition	Pmp [W] /Tolerance	635±3%	640±3%	645±3%	
	Voc [V] /Tolerance	57.00±3%	57.15±3%	57.30±3%	
	Isc [Adc] /Tolerance	13.85±4%	13.90±4%	13.95±4%	
	Vmp [V]	48.48	48.68	48.87	
	Imax [Adc]	13.10	13.15	13.20	
BNPI condition	Pmp [W] /Tolerance	695±3%	700±3%	705±3%	
	Voc [V] /Tolerance	57.15±3%	57.30±3%	57.45±3%	
	Isc [Adc] /Tolerance	15.25±4%	15.30±4%	15.35±4%	
BSI/aBSI condition	Isc [Adc] /Tolerance	16.96±4%	17.01±4%	17.06±4%	
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	
	φ Voc	95±5%	95±5%	95±5%	
	φ Isc	80±5%	80±5%	80±5%	
	Maximum system voltage [V]	1500	1500	1500	
	Maximum Over-Current Protection Rating [A]	30	30	30	

	Module type	GCL-NT12R/66GDF580	GCL-NT12R/66GDF585	GCL-NT12R/66GDF590	GCL-NT12R/66GDF595
STC condition	Pmp [W] /Tolerance	580±3%	585±3%	590±3%	595±3%
	Voc [V] /Tolerance	47.20±3%	47.35±3%	47.50±3%	47.65±3%
	Isc [Adc] /Tolerance	15.55±4%	15.60±4%	15.65±4%	15.70±4%
	Vmp [V]	39.32	39.53	39.73	39.94
	Imax [Adc]	14.75	14.80	14.85	14.90
BNPI condition	Pmp [W] /Tolerance	640±3%	645±3%	650±3%	655±3%
	Voc [V] /Tolerance	17.20±3%	17.25±3%	17.30±3%	17.35±3%
	Isc [Adc] /Tolerance	47.35±4%	47.50±4%	47.65±4%	47.80±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.22±4%	19.27±4%	19.32±4%	19.37±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12R/66GDF600	GCL-NT12R/66GDF605	GCL-NT12R/66GDF610	GCL-NT12R/66GDF615
STC condition	Pmp [W] /Tolerance	600±3%	605±3%	610±3%	615±3%
	Voc [V] /Tolerance	47.80±3%	47.95±3%	48.10±3%	48.25±3%
	Isc [Adc] /Tolerance	15.75±4%	15.80±4%	15.85±4%	15.90±4%
	Vmp [V]	40.14	40.34	40.53	40.73
	Imax [Adc]	14.95	15.00	15.05	15.10
BNPI condition	Pmp [W] /Tolerance	660±3%	665±3%	670±3%	675±3%
	Voc [V] /Tolerance	47.95±3%	48.10±3%	48.25±3%	48.40±3%
	Isc [Adc] /Tolerance	17.40±4%	17.45±4%	17.50±4%	17.55±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.42±4%	19.47±4%	19.52±4%	19.57±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12R/66GDF620	GCL-NT12R/66GDF625		
STC condition	Pmp [W] /Tolerance	620±3%	625±3%		
	Voc [V] /Tolerance	48.40±3%	48.55±3%		
	Isc [Adc] /Tolerance	15.95±4%	16.00±4%		
	Vmp [V]	40.93	41.12		
	Imax [Adc]	15.15	15.20		
BNPI condition	Pmp [W] /Tolerance	680±3%	685±3%		
	Voc [V] /Tolerance	48.55±3%	48.70±3%		
	Isc [Adc] /Tolerance	17.60±4%	17.65±4%		
BSI/aBSI condition	Isc [Adc] /Tolerance	19.62±4%	19.67±4%		
Bifaciality coefficient	φ Pmax	80±5%	80±5%		
	φ Voc	95±5%	95±5%		
	φ Isc	80±5%	80±5%		
	Maximum system voltage [V]	1500	1500		
	Maximum Over-Current Protection Rating [A]	35	35		

	Module type	GCL-NT12R/60GDF530	GCL-NT12R/60GDF535	GCL-NT12R/60GDF540	GCL-NT12R/60GDF545
STC condition	Pmp [W] /Tolerance	530±3%	535±3%	540±3%	545±3%
	Voc [V] /Tolerance	42.87±3%	43.01±3%	43.15±3%	43.29±3%
	Isc [Adc] /Tolerance	15.62±4%	15.68±4%	15.74±4%	15.79±4%
	Vmp [V]	35.76	35.96	36.15	36.36
	Imax [Adc]	14.82	14.88	14.94	14.99
BNPI condition	Pmp [W] /Tolerance	585±3%	590±3%	595±3%	600±3%
	Voc [V] /Tolerance	43.02±3%	43.16±3%	43.30±3%	43.44±3%
	Isc [Adc] /Tolerance	17.26±4%	17.32±4%	17.38±4%	17.43±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.26±4%	19.32±4%	19.38±4%	19.43±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12R/60GDF550	GCL-NT12R/60GDF555	GCL-NT12R/60GDF560	GCL-NT12R/60GDF565
STC condition	Pmp [W] /Tolerance	550±3%	555±3%	560±3%	565±3%
	Voc [V] /Tolerance	43.43±3%	43.57±3%	43.71±3%	43.85±3%
	Isc [Adc] /Tolerance	15.84±4%	15.90±4%	15.95±4%	16.00±4%
	Vmp [V]	36.57	36.76	36.97	37.17
	Imax [Adc]	15.04	15.10	15.15	15.20
BNPI condition	Pmp [W] /Tolerance	605±3%	610±3%	615±3%	620±3%
	Voc [V] /Tolerance	43.58±3%	43.72±3%	43.86±3%	44.00±3%
	Isc [Adc] /Tolerance	17.48±4%	17.54±4%	17.59±4%	17.65±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.48±4%	19.54±4%	19.59±4%	19.67±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12R/54GDF475	GCL-NT12R/54GDF480	GCL-NT12R/54GDF485	GCL-NT12R/54GDF490
STC condition	Pmp [W] /Tolerance	475±3%	480±3%	485±3%	490±3%
	Voc [V] /Tolerance	38.55±3%	38.70±3%	38.85±3%	39.00±3%
	Isc [Adc] /Tolerance	15.58±4%	15.64±4%	15.70±4%	15.76±4%
	Vmp [V]	32.14	32.35	32.55	32.76
	Imax [Adc]	14.78	14.84	14.90	14.96
BNPI condition	Pmp [W] /Tolerance	525±3%	530±3%	535±3%	540±3%
	Voc [V] /Tolerance	38.67±3%	38.82±3%	38.97±3%	39.12±3%
	Isc [Adc] /Tolerance	17.22±4%	17.28±4%	17.34±4%	17.40±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.22±4%	19.28±4%	19.34±4%	19.40±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12R/54GDF495	GCL-NT12R/54GDF500	GCL-NT12R/54GDF505	GCL-NT12R/54GDF510
STC condition	Pmp [W] /Tolerance	495±3%	500±3%	505±3%	510±3%
	Voc [V] /Tolerance	39.15±3%	39.30±3%	39.45±3%	39.60±3%
	Isc [Adc] /Tolerance	15.82±4%	15.88±4%	15.94±4%	16.00±4%
	Vmp [V]	32.96	33.16	33.36	33.55
	Imax [Adc]	15.02	15.08	15.14	15.20
BNPI condition	Pmp [W] /Tolerance	545±3%	550±3%	555±3%	560±3%
	Voc [V] /Tolerance	39.27±3%	39.42±3%	39.57±3%	39.72±3%
	Isc [Adc] /Tolerance	17.47±4%	17.53±4%	17.59±4%	17.65±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	19.49±4%	19.55±4%	19.61±4%	19.67±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT10/44GDF-T340	GCL-NT10/44GDF-T345	GCL-NT10/44GDF-T350	GCL-NT10/44GDF-T355
STC condition	Pmp [W] /Tolerance	340±3%	345±3%	350±3%	355±3%
	Voc [V] /Tolerance	31.28±3%	31.43±3%	31.58±3%	31.73±3%
	Isc [Adc] /Tolerance	13.73±4%	13.83±4%	13.93±4%	14.03±4%
	Vmp [V]	26.18	26.38	26.58	26.78
	Imax [Adc]	12.99	13.08	13.17	13.26
BNPI condition	Pmp [W] /Tolerance	370±3%	375±3%	380±3%	385±3%
	Voc [V] /Tolerance	31.37±3%	31.52±3%	31.67±3%	31.82±3%
	Isc [Adc] /Tolerance	14.90±4%	14.95±4%	15.00±4%	15.05±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.33±4%	16.32±4%	16.31±4%	16.30±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/44GDF-T360			
STC condition	Pmp [W] /Tolerance	360±3%			
	Voc [V] /Tolerance	31.88±3%			
	Isc [Adc] /Tolerance	14.13±4%			
	Vmp [V]	26.97			
	Imax [Adc]	13.35			
BNPI condition	Pmp [W] /Tolerance	390±3%			
	Voc [V] /Tolerance	31.97±3%			
	Isc [Adc] /Tolerance	15.10±4%			
BSI/aBSI condition	Isc [Adc] /Tolerance	16.29±4%			
Bifaciality coefficient	ϕ Pmax	80±5%			
	ϕ Voc	95±5%			
	ϕ Isc	80±5%			
	Maximum system voltage [V]	1500			
	Maximum Over-Current Protection Rating [A]	30			

	Module type	GCL-NT10/72GDF550	GCL-NT10/72GDF555	GCL-NT10/72GDF560	GCL-NT10/72GDF565
STC condition	Pmp [W] /Tolerance	550±3%	555±3%	560±3%	565±3%
	Voc [V] /Tolerance	50.99±3%	51.14±3%	51.29±3%	51.44±3%
	Isc [Adc] /Tolerance	13.65±4%	13.71±4%	13.77±4%	13.83±4%
	Vmp [V]	42.54	42.75	42.95	43.15
	Imax [Adc]	12.93	12.98	13.04	13.09
BNPI condition	Pmp [W] /Tolerance	605±3%	610±3%	615±3%	620±3%
	Voc [V] /Tolerance	51.10±3%	51.25±3%	51.40±3%	51.55±3%
	Isc [Adc] /Tolerance	15.03±4%	15.09±4%	15.15±3%	15.21±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.72±4%	16.78±4%	16.84±4%	16.90±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/72GDF570	GCL-NT10/72GDF575	GCL-NT10/72GDF580	GCL-NT10/72GDF585
STC condition	Pmp [W] /Tolerance	570±3%	575±3%	580±3%	585±3%
	Voc [V] /Tolerance	51.60±3%	51.75±3%	51.90±3%	52.05±3%
	Isc [Adc] /Tolerance	13.89±4%	13.95±4%	14.01±4%	14.07±4%
	Vmp [V]	43.35	43.56	43.75	43.95
	Imax [Adc]	13.15	13.20	13.26	13.31
BNPI condition	Pmp [W] /Tolerance	625±3%	630±3%	635±3%	640±3%
	Voc [V] /Tolerance	51.70±3%	51.85±3%	52.00±3%	52.15±3%
	Isc [Adc] /Tolerance	15.27±4%	15.33±4%	15.39±4%	15.45±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.96±4%	17.02±4%	17.08±4%	17.14±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/72GDF590	GCL-NT10/72GDF595		
STC condition	Pmp [W] /Tolerance	590±3%	595±3%		
	Voc [V] /Tolerance	52.20±3%	52.35±3%		
	Isc [Adc] /Tolerance	14.13±4%	14.19±4%		
	Vmp [V]	44.15	44.35		
	Imax [Adc]	13.37	13.42		
BNPI condition	Pmp [W] /Tolerance	645±3%	650±3%		
	Voc [V] /Tolerance	52.30±3%	52.45±3%		
	Isc [Adc] /Tolerance	15.51±4%	15.57±4%		
BSI/aBSI condition	Isc [Adc] /Tolerance	17.20±4%	17.26±4%		
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%		
	ϕ Voc	95±5%	95±5%		
	ϕ Isc	80±5%	80±5%		
	Maximum system voltage [V]	1500	1500		
	Maximum Over-Current Protection Rating [A]	30	30		

	Module type	GCL-NT10/60GDF460	GCL-NT10/60GDF465	GCL-NT10/60GDF470	GCL-NT10/60GDF475
	Module type	GCL-NT10/60GT460	GCL-NT10/60GT465	GCL-NT10/60GT470	GCL-NT10/60GT475
STC condition	Pmp [W] /Tolerance	460±3%	465±3%	470±3%	475±3%
	Voc [V] /Tolerance	42.54±3%	42.69±3%	42.84±3%	43.00±3%
	Isc [Adc] /Tolerance	13.67±4%	13.75±4%	13.82±4%	13.89±4%
	Vmp [V]	35.53	35.73	35.94	36.13
	Imax [Adc]	12.95	13.02	13.08	13.15
BNPI condition	Pmp [W] /Tolerance	505±3%	510±3%	515±3%	520±3%
	Voc [V] /Tolerance	42.67±3%	42.82±3%	42.97±3%	43.12±3%
	Isc [Adc] /Tolerance	15.06±4%	15.13±4%	15.21±3%	15.28±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.76±4%	16.82±4%	16.90±4%	16.98±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

Module type	GCL-NT10/60GDF480	GCL-NT10/60GDF485	GCL-NT10/60GDF490	GCL-NT10/60GDF495
Module type	GCL-NT10/60GT480	GCL-NT10/60GT485	GCL-NT10/60GT490	GCL-NT10/60GT495

		GCL-NT10/60GDF480	GCL-NT10/60GDF485	GCL-NT10/60GDF490	GCL-NT10/60GDF495
		GCL-NT10/60GT480	GCL-NT10/60GT485	GCL-NT10/60GT490	GCL-NT10/60GT495
STC condition	Pmp [W] /Tolerance	480±3%	485±3%	490±3%	495±3%
	Voc [V] /Tolerance	43.15±3%	43.30±3%	43.45±3%	43.60±3%
	Isc [Adc] /Tolerance	13.96±4%	14.03±4%	14.10±4%	14.16±4%
	Vmp [V]	36.34	36.53	36.72	36.92
	Imax [Adc]	13.21	13.28	13.35	13.41
BNPI condition	Pmp [W] /Tolerance	525±3%	530±3%	535±3%	540±3%
	Voc [V] /Tolerance	43.27±3%	43.42±3%	43.57±3%	43.72±3%
	Isc [Adc] /Tolerance	15.35±4%	15.43±4%	15.50±3%	15.57±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	17.06±4%	17.13±4%	17.21±3%	17.29±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

		GCL-NT10/54GDF415	GCL-NT10/54GDF420	GCL-NT10/54GDF425	GCL-NT10/54GDF430
	Module type	GCL-NT10/54GDF-J415	GCL-NT10/54GDF-J420	GCL-NT10/54GDF-J425	GCL-NT10/54GDF-J430
	Module type	GCL-NT10/54GDF-B415	GCL-NT10/54GDF-B420	GCL-NT10/54GDF-B425	GCL-NT10/54GDF-B430
STC condition	Pmp [W] /Tolerance	415±3%	420±3%	425±3%	430±3%
	Voc [V] /Tolerance	38.35±3%	38.50±3%	38.64±3%	38.90±3%
	Isc [Adc] /Tolerance	13.73±4%	13.80±4%	13.87±3%	13.94±4%
	Vmp [V]	31.95	32.16	32.39	32.60
	Imax [Adc]	12.99	13.06	13.12	13.19
BNPI condition	Pmp [W] /Tolerance	455±3%	460±3%	465±3%	470±3%
	Voc [V] /Tolerance	38.45±3%	38.60±3%	38.75±3%	38.90±3%
	Isc [Adc] /Tolerance	15.07±4%	15.16±4%	15.24±3%	15.32±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.71±4%	16.82±4%	16.91±4%	17.01±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10/54GDF435	GCL-NT10/54GDF440	GCL-NT10/54GDF445	
	Module type	GCL-NT10/54GDF-J435	GCL-NT10/54GDF-J440	GCL-NT10/54GDF-J445	
	Module type	GCL-NT10/54GDF-B435	GCL-NT10/54GDF-B440	GCL-NT10/54GDF-B445	
STC condition	Pmp [W] /Tolerance	435±3%	440±3%	445±3%	
	Voc [V] /Tolerance	39.06±3%	39.20±3%	39.34±3%	
	Isc [Adc] /Tolerance	14.01±4%	14.07±4%	14.13±4%	
	Vmp [V]	32.81	33.01	33.21	
	Imax [Adc]	13.26	13.33	13.40	
BNPI condition	Pmp [W] /Tolerance	475±3%	480±3%	485±3%	
	Voc [V] /Tolerance	39.05±3%	39.20±3%	39.35±3%	
	Isc [Adc] /Tolerance	15.40±4%	15.49±4%	15.57±4%	
BSI/aBSI condition	Isc [Adc] /Tolerance	17.10±4%	17.23±4%	17.33±4%	
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	
	φ Voc	95±5%	95±5%	95±5%	
	φ Isc	80±5%	80±5%	80±5%	
	Maximum system voltage [V]	1500	1500	1500	
	Maximum Over-Current Protection Rating [A]	30	30	30	

	Module type	GCL-NT10R/72GDF570	GCL-NT10R/72GDF575	GCL-NT10R/72GDF580	GCL-NT10R/72GDF585
STC condition	Pmp [W] /Tolerance	570±3%	575±3%	580±3%	585±3%
	Voc [V] /Tolerance	50.69±3%	50.84±3%	50.99±3%	51.14±3%
	Isc [Adc] /Tolerance	14.25±4%	14.30±4%	14.35±3%	14.40±4%
	Vmp [V]	42.16	42.35	42.54	42.75
	Imax [Adc]	13.52	13.58	13.64	13.69
BNPI condition	Pmp [W] /Tolerance	625±3%	630±3%	635±3%	640±3%
	Voc [V] /Tolerance	50.65±3%	50.80±3%	50.95±3%	51.10±3%
	Isc [Adc] /Tolerance	15.63±4%	15.68±4%	15.73±3%	15.78±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	17.32±4%	17.37±4%	17.42±4%	17.47±4%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

Module type	GCL-NT10R/72GDF590	GCL-NT10R/72GDF595	GCL-NT10R/72GDF600	GCL-NT10R/72GDF605
STC condition — Pmp [W] /Tolerance	590±3%	595±3%	600±3%	605±3%
Voc [V] /Tolerance	51.29±3%	51.44±3%	51.60±3%	51.75±3%
Isc [Adc] /Tolerance	14.45±4%	14.50±4%	14.55±4%	14.60±4%
Vmp [V]	42.95	43.15	43.35	43.56
Imax [Adc]	13.74	13.79	13.84	13.89
BNPI condition — Pmp [W] /Tolerance	645±3%	650±3%	655±3%	660±3%
Voc [V] /Tolerance	51.25±3%	51.40±3%	51.55±3%	51.70±3%
Isc [Adc] /Tolerance	15.83±4%	15.88±4%	15.93±4%	15.98±4%
BSI/aBSI condition — Isc [Adc] /Tolerance	17.52±4%	17.57±4%	17.62±4%	17.67±4%
Bifaciality coefficient — φ Pmax	80±5%	80±5%	80±5%	80±5%
φ Voc	95±5%	95±5%	95±5%	95±5%
φ Isc	80±5%	80±5%	80±5%	80±5%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30

Module type	GCL-NT10R/72GDF610	GCL-NT10R/72GDF615	GCL-NT10R/72GDF620	GCL-NT10R/72GDF625
STC condition — Pmp [W] /Tolerance	610±3%	615±3%	620±3%	625±3%
Voc [V] /Tolerance	51.90±3%	52.05±3%	52.20±3%	52.35±3%
Isc [Adc] /Tolerance	14.65±4%	14.70±4%	14.75±4%	14.80±4%
Vmp [V]	43.75	43.95	44.15	44.34
Imax [Adc]	13.95	14.00	14.05	14.10
BNPI condition — Pmp [W] /Tolerance	665±3%	670±3%	675±3%	680±3%
Voc [V] /Tolerance	51.85±3%	52.00±3%	52.15±3%	52.30±3%
Isc [Adc] /Tolerance	16.03±4%	16.08±4%	16.13±3%	16.18±4%
BSI/aBSI condition — Isc [Adc] /Tolerance	17.72±4%	17.77±4%	17.82±3%	17.87±4%
Bifaciality coefficient — φ Pmax	80±5%	80±5%	80±5%	80±5%
φ Voc	95±5%	95±5%	95±5%	95±5%
φ Isc	80±5%	80±5%	80±5%	80±5%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10R/54GDF425	GCL-NT10R/54GDF430	GCL-NT10R/54GDF435	GCL-NT10R/54GDF440
	Module type	GCL-NT10R/54BGDF425	GCL-NT10R/54BGDF430	GCL-NT10R/54BGDF435	GCL-NT10R/54BGDF440
STC condition	Pmp [W] /Tolerance	425±3%	430±3%	435±3%	440±3%
	Voc [V] /Tolerance	38.75±3%	39.00±3%	39.25±3%	39.50±3%
	Isc [Adc] /Tolerance	13.70±4%	13.75±4%	13.80±4%	13.85±4%
	Vmp [V]	32.21	32.46	32.71	32.96
	Imax [Adc]	13.20	13.25	13.30	13.35
BNPI condition	Pmp [W] /Tolerance	470±3%	475±3%	480±3%	485±3%
	Voc [V] /Tolerance	38.85±3%	39.10±3%	39.35±3%	39.60±3%
	Isc [Adc] /Tolerance	15.00±4%	15.05±4%	15.10±4%	15.15±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.59±4%	16.64±4%	16.69±4%	16.74±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10R/54GDF445	GCL-NT10R/54GDF450	GCL-NT10R/54GDF455	GCL-NT10R/54GDF460
	Module type	GCL-NT10R/54BGDF445	GCL-NT10R/54BGDF450	GCL-NT10R/54BGDF455	GCL-NT10R/54BGDF460
STC condition	Pmp [W] /Tolerance	445±3%	450±3%	455±3%	460±3%
	Voc [V] /Tolerance	39.75±3%	40.00±3%	40.25±3%	40.50±3%
	Isc [Adc] /Tolerance	13.90±4%	13.95±4%	14.00±4%	14.05±4%
	Vmp [V]	33.21	33.46	33.71	33.96
	Imax [Adc]	13.40	13.45	13.50	13.55
BNPI condition	Pmp [W] /Tolerance	490±3%	495±3%	500±3%	505±3%
	Voc [V] /Tolerance	39.85±3%	40.10±3%	40.35±3%	40.60±3%
	Isc [Adc] /Tolerance	15.20±4%	15.25±4%	15.30±4%	15.35±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	16.79±4%	16.84±4%	16.89±4%	16.94±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	GCL-NT10R/54GDF465			
	Module type	GCL-NT10R/54BGDF465			
STC condition	Pmp [W] /Tolerance	465±3%			
	Voc [V] /Tolerance	40.75±3%			
	Isc [Adc] /Tolerance	14.10±4%			
	Vmp [V]	34.21			
	Imax [Adc]	13.60			
BNPI condition	Pmp [W] /Tolerance	510±3%			
	Voc [V] /Tolerance	40.85±3%			
	Isc [Adc] /Tolerance	15.40±4%			
BSI/aBSI condition	Isc [Adc] /Tolerance	16.99±4%			
Bifaciality coefficient	φ Pmax	80±5%			
	φ Voc	95±5%			
	φ Isc	80±5%			
	Maximum system voltage [V]	1500			
	Maximum Over-Current Protection Rating [A]	30			

	Module type	GCL-NT12/66GDF660	GCL-NT12/66GDF665	GCL-NT12/66GDF670	GCL-NT12/66GDF675
STC condition	Pmp [W] /Tolerance	660±3%	665±3%	670±3%	675±3%
	Voc [V] /Tolerance	46.27±3%	46.44±3%	46.61±3%	46.79±3%
	Isc [Adc] /Tolerance	18.08±4%	18.12±4%	18.16±4%	18.20±4%
	Vmp [V]	38.45	38.65	38.85	39.06
	Imax [Adc]	17.17	17.21	17.25	17.29
BNPI condition	Pmp [W] /Tolerance	730±3%	735±3%	740±3%	745±3%
	Voc [V] /Tolerance	46.41±3%	46.59±3%	46.77±3%	46.95±3%
	Isc [Adc] /Tolerance	19.99±4%	20.03±4%	20.07±4%	20.11±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	22.32±3%	22.36±3%	22.40±3%	22.44±3%
Bifaciality coefficient	φ Pmax	80±5%	80±5%	80±5%	80±5%
	φ Voc	95±5%	95±5%	95±5%	95±5%
	φ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12/66GDF680	GCL-NT12/66GDF685	GCL-NT12/66GDF690	GCL-NT12/66GDF695
STC condition	Pmp [W] /Tolerance	680±3%	685±3%	690±3%	695±3%
	Voc [V] /Tolerance	46.98±3%	47.17±3%	47.36±3%	47.55±3%
	Isc [Adc] /Tolerance	18.24±4%	18.27±4%	18.31±4%	18.35±4%
	Vmp [V]	39.26	39.45	39.65	39.86
	Imax [Adc]	17.33	17.36	17.40	17.44
BNPI condition	Pmp [W] /Tolerance	750±3%	755±3%	760±3%	765±3%
	Voc [V] /Tolerance	47.13±3%	47.31±3%	47.49±3%	47.67±3%
	Isc [Adc] /Tolerance	20.15±4%	20.19±4%	20.23±4%	20.27±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	22.48±4%	22.54±4%	765±3%	22.62±4%
Bifaciality coefficient	ɸ Pmax	80±5%	80±5%	47.67±3%	80±5%
	ɸ Voc	95±5%	95±5%	20.27±4%	95±5%
	ɸ Isc	80±5%	80±5%	22.62±4%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12/66GDF700	GCL-NT12/66GDF705	GCL-NT12/66GDF710	
STC condition	Pmp [W] /Tolerance	700±3%	705±3%	710±3%	
	Voc [V] /Tolerance	47.74±3%	47.93±3%	48.12±3%	
	Isc [Adc] /Tolerance	18.38±4%	18.42±4%	18.46±4%	
	Vmp [V]	40.06	40.27	40.46	
	Imax [Adc]	17.47	17.51	17.55	
BNPI condition	Pmp [W] /Tolerance	770±3%	775±3%	780±3%	
	Voc [V] /Tolerance	47.85±3%	48.03±3%	48.21±3%	
	Isc [Adc] /Tolerance	20.31±4%	20.35±4%	20.39±4%	
BSI/aBSI condition	Isc [Adc] /Tolerance	22.67±4%	22.71±4%	22.75±4%	
Bifaciality coefficient	ɸ Pmax	80±5%	80±5%	80±5%	
	ɸ Voc	95±5%	95±5%	95±5%	
	ɸ Isc	80±5%	80±5%	80±5%	
	Maximum system voltage [V]	1500	1500	1500	
	Maximum Over-Current Protection Rating [A]	35	35	35	

	Module type	GCL-NT12/60GDF600	GCL-NT12/60GDF605	GCL-NT12/60GDF610	GCL-NT12/60GDF615
STC condition	Pmp [W] /Tolerance	600±3%	605±3%	610±3%	615±3%
	Voc [V] /Tolerance	42.06±3%	42.25±3%	42.45±3%	42.65±3%
	Isc [Adc] /Tolerance	18.08±4%	18.12±4%	18.17±4%	18.21±4%
	Vmp [V]	34.95	35.15	35.35	35.55
	Imax [Adc]	17.17	17.21	17.26	17.30
BNPI condition	Pmp [W] /Tolerance	665±3%	670±3%	675±3%	680±3%
	Voc [V] /Tolerance	42.30±3%	42.50±3%	42.70±3%	42.90±3%
	Isc [Adc] /Tolerance	19.99±4%	20.03±4%	20.08±4%	20.12±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	22.32±4%	22.36±4%	22.41±3%	22.45±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12/60GDF620	GCL-NT12/60GDF625	GCL-NT12/60GDF630	GCL-NT12/60GDF635
STC condition	Pmp [W] /Tolerance	620±3%	625±3%	630±3%	635±3%
	Voc [V] /Tolerance	42.85±3%	43.04±3%	43.23±3%	43.43±3%
	Isc [Adc] /Tolerance	18.25±4%	18.30±4%	18.34±4%	18.38±4%
	Vmp [V]	35.75	35.95	36.15	36.35
	Imax [Adc]	17.34	17.39	17.43	17.47
BNPI condition	Pmp [W] /Tolerance	685±3%	690±3%	695±3%	700±3%
	Voc [V] /Tolerance	43.10±3%	43.30±3%	43.50±3%	43.70±3%
	Isc [Adc] /Tolerance	20.17±4%	20.21±4%	20.26±4%	20.30±4%
BSI/aBSI condition	Isc [Adc] /Tolerance	22.52±4%	22.54±4%	22.61±4%	22.65±4%
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%	80±5%	80±5%
	ϕ Voc	95±5%	95±5%	95±5%	95±5%
	ϕ Isc	80±5%	80±5%	80±5%	80±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	GCL-NT12/60GDF640	GCL-NT12/60GDF645		
STC condition	Pmp [W] /Tolerance	640±3%	645±3%		
	Voc [V] /Tolerance	43.62±3%	43.81±3%		
	Isc [Adc] /Tolerance	18.42±4%	18.46±4%		
	Vmp [V]	36.55	36.75		
	Imax [Adc]	17.51	17.55		
BNPI condition	Pmp [W] /Tolerance	705±3%	710±3%		
	Voc [V] /Tolerance	43.90±3%	44.10±3%		
	Isc [Adc] /Tolerance	20.35±4%	20.40±4%		
BSI/aBSI condition	Isc [Adc] /Tolerance	22.71±4%	22.77±4%		
Bifaciality coefficient	ϕ Pmax	80±5%	80±5%		
	ϕ Voc	95±5%	95±5%		
	ϕ Isc	80±5%	80±5%		
	Maximum system voltage [V]	1500	1500		
	Maximum Over-Current Protection Rating [A]	35	35		