



ASTROENERGY

Crystalline Silicon PV Module Installation Manual



Catalogue

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1 Introduction

We appreciate for your trust and confidence towards the photovoltaic (PV) module products manufactured by Chint Solar.

Please read all instructions and the electrical and mechanical requirements in this manual carefully before installation. Specialized skills are required for installing and operating PV modules, and only professionals are capable to perform this task. All safety precautions in this manual shall be strictly observed during installation, and the manual shall be properly kept for further reference. The installer must inform the end customer (or consumer) accordingly.

1.1 Purpose

This document provides detailed instructions and safety precautions regarding the installation, electrical connection, and maintenance of following PV modules manufactured by Chint Solar:

CHSM6610M	CHSM6610M(BL)	CHSM6610M/HV
CHSM60M-HC	CHSM60M(BL)-HC	CHSM6610M/HV
CHSM6610P/HV	CHSM60P-HC	CHSM6612M
CHSM6612M/HV	CHSM72M-HC	CHSM60M/LV-HC
CHSM6612P	CHSM6612P/HV	CHSM72P-HC
CHSM72M/LV-HC	CHSM72M(BL)-HC	CHSM66M-HC
CHSM66M/LV-HC	CHSM54M-HC	CHSM54M/LV-HC
CHSM54M(BL)-HC	CHSM55M-HC	CHSM50M-HC
CHSM66N-HC	CHSM60N-HC	CHSM78N-HC
CHSM72N-HC	CHSM54N-HC	CHSM78M-HC

CHSM66N/LV-HC	CHSM60N/LV-HC	CHSM78N/LV-HC
CHSM72N/LV-HC	CHSM54N/LV-HC	CHSM78M/LV-HC
CHSM55M/LV-HC	CHSM50M/LV-HC	CHSM60N(BL)-HC
CHSM72N(BLH)-HC	CHSM72N(BL)-HC	CHSM60N(BLH)-HC
CHSM54N(BLH)-HC	CHSM54N(BL)-HC	

1.2 Scope of liability

No warranty expressed or implied is made with regard to any information in this manual because how this manual is complied with is beyond the control of Chint Solar. Chint shall not be liable for any form of loss, including but not limited to loss, damage, casualty or additional cost caused by improper installation, operation, use and maintenance of PV modules and systems.

Chint Solar reserves the right to update this manual without prior notice. In case of any inconsistency between the description of different language versions of this manual, the Chinese version shall prevail.

2 Regulations

The mechanical installation and electrical connection of PV systems should be performed in accordance with local laws, regulations and corresponding international and domestic standards including electrical codes, building codes and electrical connection requirements. Such requirements may vary from different mounting location, e.g. rooftop system and floating systems. Requirements may also vary with system voltage and for DC/AC applications. Please contact local authorities for detailed governing regulations.

3 Safety Precautions



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- Chint Solar's modules are designed to meet the requirements of IEC61215 and IEC61730, and they have been qualified for Application Class A (equivalent to Safety Class II requirements). Modules can be applied to publicly accessible systems operating at greater than 50V DC or 240W.
- The module design complies with IEC61730 and UL61730 standards and meets Class C fire rating (IEC61730), type 4 fire rating (UL61730).
- When installing or operating PV modules on rainy days or dewy mornings, take appropriate protective measures to prevent moisture from penetrating the connectors. Unauthorized personnel are prohibited from approaching the installation area or PV module storage area.
- It is forbidden to install or use damaged PV modules.
- It is forbidden to repair PV modules by unauthorized personnel, including but not limited to replacing any part of PV modules (such as diodes, junction boxes, connectors, etc.).

! WARNING

Read and understand all safety instructions before installing, wiring, handling, and/or maintaining PV modules. PV modules generate direct current electricity when they are exposed to sunlight or other light sources. Whether the module is connected or not, direct contact with the live part of the module such as the wiring terminal may cause personal injury or even death.

3.1 General safety

- Before installation, please contact the relevant local authority to make sure the installation permit and installation inspection requirements can meet the local requirements. The installation process should comply with the safety rules applicable to all components in the system, including cables, terminals, charging monitors, batteries, inverters, etc.
- Installation and maintenance must be completed by professionally qualified electricians. During the installation, wear safety helmets, insulating gloves, safety shoes and use insulating tools to avoid the direct contact with a DC voltage of 30V or even higher.
- It is forbidden to plug in connectors of different types and models.
- It is forbidden to expose PV modules to the following substances: grease or organic ester compounds (e.g. DOP, plasticizers), aromatics, phenols, ketones, halogenated substances, mineral oil, alkanes (e.g. gasoline, cleaning lubricants, electronic resurrection agents), alcohol, , adhesive sheets that can generate oxime gas and potting glue (only for connectors, such as KE200, CX-200/chemlok, etc.), TBP (plasticizer), detergent, etc., to avoid chemical damage and affect the electrical safety performance of PV modules.
- Photovoltaic module installation is prohibited on windy days.
- Avoid focusing sunlight on PV modules.
- It is forbidden to place PV modules near equipment or where flammable gas may be generated.
- It is forbidden to install PV modules on movable platform, excepting tracking systems.



- It is forbidden to disassemble and move any part of the PV module; if the connector of the PV module is wet, do not perform any actions to avoid the risk of electric shock.
- It is forbidden to connect or disconnect the PV module when there is electrical current or external electrical current.
- The cover of the junction box should always be kept closed.
- Avoid partial shading of PV modules for a long period of time, otherwise the temperature of the shaded module may rise due to hot spot effect, burning the module and causing fire hazard in severe cases.
- For PV modules used in deserts or windy and sandy areas, it is recommended to use connector dust caps before installation, or take other measures to prevent sand and dust from entering the connectors, otherwise it may cause insertion problems or electrical safety hazards.

3.2 Operation safety measures

- Avoid package damaging and falling during transportation and storage. Ensure the packing cases are well ventilated, water-proof and dry. After the arrival, carefully open the outer package and prevent scratches and bumps of PV modules. When stacking PV modules, strictly follow the stacking requirements in chapter 4.3.
- Avoid impact or scratches on any part of the PV module, otherwise the reliability and safety of the PV module will be affected; standing or walking on the PV module is prohibited; at the same time, in order to avoid glass damage, it is forbidden to apply excessive load or distorted PV modules.
- Do not install or carry PV modules by one person. It is forbidden to pick up, drag, or move PV modules by grabbing the junction box (including the box body, cables, and connectors); when placing a PV module on a flat surface, it must be operated carefully and be aware of bumps in the corners.
- When installing or repairing the PV system, do not wear any metal accessories to avoid the risk of electric shock; if it is installed far above the ground, please wear a seat belt.
- When operating PV modules in the sun, please use insulated tools, and wear rubber gloves and protective clothing. At the same time, in order to avoid the risk of arc and electric shock, do not directly touch the junction box and the end of the output cable (connector) with bare hands.
- For electrical connection, choose a dry and weak-light morning or evening; or use opaque materials to completely cover the surface of the PV modules to prevent current generation.
- A certain distance between the PV module and the installation surface should be kept to prevent the installation surface from touching the junction box.
- When installing on the roof, comply with the fire protection requirements of the building. It is recommended to install PV modules on a fireproof and insulated roof covering, and ensure adequate ventilation between the PV modules and the installation surface. In order to ensure the fire rating on the roof, the minimum distance between the frame of the PV module and the roof surface is



10cm.

- The connector must be fully mated when wiring. If the cable is too long, it is recommended to fix the cable to the rack system with a UV-resistant nylon cable tie. When fixing the cable to the rack, the bending radius of the cable should not be less than 48mm.
- Avoid directly exposing cables and connectors to sunlight. Please use anti-UV cables.
- Do not disconnect the electrical connection when there is a load.
- It is strictly forbidden to try to disassemble the PV module, and it is strictly prohibited to remove the nameplate of the PV module or other parts on the PV module; it is strictly forbidden to paint or apply any adhesive on the surface of the PV module.
- It is strictly forbidden to drill holes in the frame of the PV module.
- It is strictly forbidden to scratch the anodized layer on the surface of the aluminum alloy frame, except when it is connected to the ground. Scratches may cause corrosion of the frame, affecting the frame's load-bearing capacity and long-term reliability.
- If the PV module glass or other packaging materials are damaged, please wear personal protective equipment to separate the PV module from the site or the circuit. It is strictly forbidden to touch wet PV modules, unless you are wearing electric shock protection equipment that meets the requirements.
- When professionals replace or repair PV modules,

do not damage the surrounding PV modules or their support structures.

- When cleaning PV modules, you must follow the cleaning requirements of PV modules.
- The connectors must be kept dry and clean to ensure that they are in good working condition. Do not insert other metal objects into the connector or make electrical connections in any other way.

4 Handling and unpacking

- If the PV module is not in use, please do not open the product packaging. The goods should be stored in a dark, dry and ventilated place. If the PV modules are stored in an uncontrollable environment, the storage time must be less than 3 months when the outer packaging of the PV modules is kept intact.
- It is recommended to unpack an appropriate number of PV modules per day according to the project progress, and the unpacked PV modules should be installed within a day. If unpacking too many PV modules and being stacked on the ground, in severe weather such as heavy rain and typhoons, the PV modules may be immersed in water for a long time affecting the reliability of the product or be scraped away.

4.1 Transport

- During the transportation of the PV modules to the project site, they must be packed in the packaging box provided by Chint Solar, and they should be stored in the original packaging box before installation. Please protect the packaging from damage.



- It is necessary to ensure the safety when unloading PV modules, especially when hoisting roof projects. It is forbidden to use lifting straps directly on the pallet for hoisting. The PV modules should be placed in a protective device and then hoisted to the roof to prevent the packing box from deforming and bumping against the wall during the hoisting process.

! Special instructions

Due to the limitation of the height of the container, when the PV modules are removed from the container, the distance between the upper surface of the forklift tines and the ground should be less than 80mm, otherwise collisions may easily occur, which may damage PV modules.

4.2 Unpack

When unpacking, you need to tear the stretch film first, then use a knife to cut the binding tape, and remove the packing box cover.

If the inner packaging is fixed with anti-falling tape, two people in a group should hold the frame with both hands in the same direction to take out one piece of PV module each time. Take out the PV module by tearing a piece of fixing glue, and do not remove the fixing tape at one time to prevent the whole PV module from tipping. Unpacking should follow the steps of tearing off one piece of the fixing tape followed by taking out one piece of PV module, instead of tearing off all fixing tape which may cause module collapsing. If the internal packaging is fixed by the internal packing belt, first cut the internal packing belt, use anti-inverted sticks and other non-sharp and stable items to prop up one of the long-side enclosure frame, and then cut the

other side of the frame. Two people in turn move and take out the PV modules. The whole handling process needs to be handled gently to avoid any collision with hard objects and any part of the frame dragging on the ground.

4.3 Stack

When taking out the PV module from the packing box, put the cardboard on the ground first to prevent the PV module from colliding and scratching with the cement surface, hard object on the ground, color steel tile, metal corrugated, etc.

When the PV modules are stacked, they must be neatly and stably stacked on a horizontal surface, and stacked with the glass side facing down and the back side facing up. At the same time, there must be cardboard bedding under the PV modules. For example, when installing PV modules on the roof, the number of piles should not exceed 20. For roofs with poor load-bearing capacity, it is recommended that the designer or installer evaluate the load-bearing capacity of the roof and reduce the load-bearing unit area of the roof by reducing the number of piles. At the same time, avoid installation tools and other objects on the surface of the PV module.

Chint PV modules adopt high and low current bins, and the handlers need to place them separately and mark them according to the markings on the power list on the PV module outer packaging (for example, 270W-L means low current bin; 270W-H means high current bin; the current division method required by other customers is similar); According to the system design requirements, modules of the same current bin are usually required to be installed in the same array.



If the customer requires PV modules to be distinguished by color, the outer packaging box shall be marked accordingly, and the PV modules shall be marked to prevent confusion when they are taken out of the packaging box and stacked up. According to the system design requirements, the color of PV modules in the same row or the same array should be the same.

5 Mechanical installation

5.1 Environment

- Recommended ambient temperature: -20°C to 50°C ; extreme operating ambient temperature for PV modules: -40°C to 85°C .
- The modules mentioned in this installation manual are only allowed to be installed below 2000 m above sea level.
- Mechanical load on PV modules: under standard installation conditions, the maximum tested snow/wind load is 5400 Pa/2400 Pa and the design load (considering a safety factor of 1.5 times) is 3600Pa/1600Pa. Refer to 5.3 for detailed installation and mechanical loads.
- PV modules are strictly forbidden to be installed and used in environments with excessive amounts of hail, snow, hurricanes, sand, soot, air pollution, and etc. PV modules are strictly forbidden to be installed or used in environments where there are strongly corrosive substances (e.g. salt, salt spray, brine, active chemical vapors, acid rain, strong vapor confined environments or any other substance that will corrode PV modules and affect their safety or performance).
- If the PV modules will be installed in special environments such as high temperature and high

humidity environments, humid salt-mist environments (C3+areas specified in ISO 9223), marine and floating environments and farms, the purchaser or user needs to inform Chint Solar in advance. The types of PV modules, BOM, and warranty issues will be decided by mutual agreement between the parties.

- If the above precautions are not observed, Chint Solar's warranty will be void.

5.2 Tilt angle selection

The tilt angle of a PV module refers to the angle between the surface of the PV module and the ground surface, as shown in Fig. 1. The power output of a PV module is maximized when it faces the sun directly.

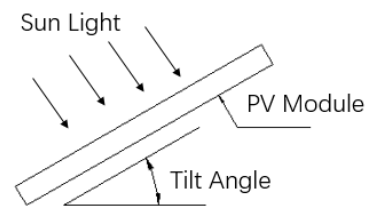


Fig. 1 Schematic diagram of tilt angle

For northern hemisphere, PV modules should preferably face south. For southern hemisphere, PV modules should preferably face north. For detailed mounting inclination, please follow local regulatory guidelines or the recommendations of an experienced installer. Chint Solar recommends an installation tilt angle of no less than 10° , so that when it rains, the dust on surface is easily carried away by the rainwater, thus reducing the number of times of clean; at the same time, it helps the water on the surface of the PV module to flow away, avoiding the long-term accumulation of large amounts of water on the glass surface, which can affect the appearance and



performance of the PV module.

PV modules connected in series should be installed in the same orientation and angle. Different orientations and angles may result in different amounts of solar radiation being received by each module, resulting in power loss.

5.3 Mounting Guide

- PV module mounting system must be composed of durable, corrosion-resistant and UV-resistant materials, and it must be inspected and tested by a third-party testing organization with static mechanical analysis capabilities meeting national and regional regulations or corresponding international standards.
- The PV module must be securely fastened to the mounting system. If the PV module is mounted in a snowy area, the height of the mounting system should be designed in a way that the lowest end of the PV module is not covered by snow. In addition, it should be ensured that the lowest end of the PV module is not shaded by surrounding trees or other vegetation.
- When the PV module is mounted on a rack parallel to the roof, the minimum clearance between the PV module frame and the roof is 10cm, which is necessary for air circulation to prevent wiring damage of the PV module.
- The PV module frame will suffer thermal expansion and contraction effect, therefore the space between two adjacent PV module frames should be no less than 10mm when mounted.

For detailed installation methods, please refer to the following specifications:

5.3.1 Bolted mounting

All modules must be securely fastened with at least 4 bolts (As shown in Fig. 2, Fig. 3, Fig. 4 , Fig. 5 and Fig. 6). The corresponding mechanical loads are shown in Table 1.

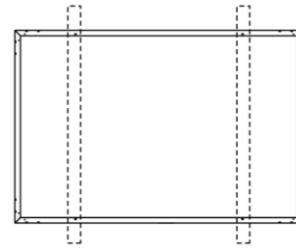


Fig 2. Bolt installation for 54cell

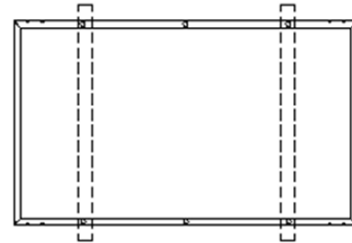


Fig 3. Bolt installation for 60cell

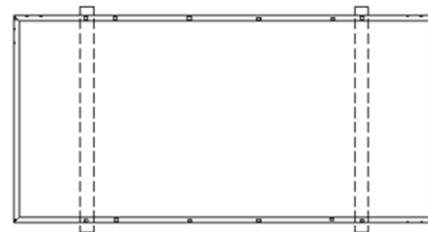


Fig 4. Outer four-hole bolt installation for 72cell

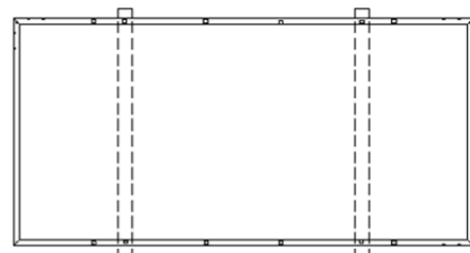


Fig 5. Internal four-hole bolt installation for 72cell

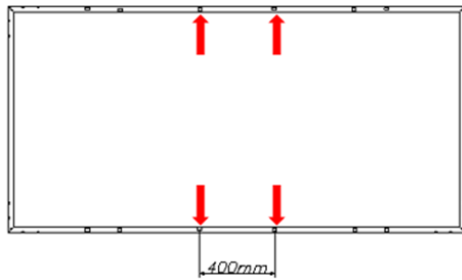


Fig 6. 400mm-pitched mounting hole, bolted mounting for single axis tracker

! ATTENTION

In order to achieve maximum safety precautions against wind and snow loads, it is recommended that all available mounting holes should be used. The bolt installation steps are as follows (Fig. 7).

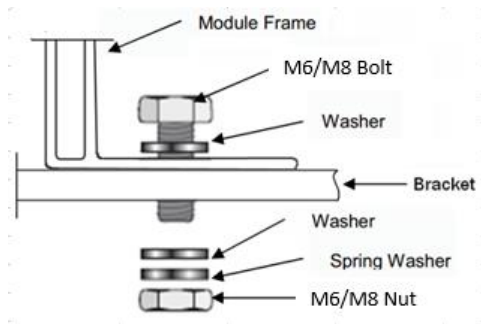


Fig. 7 Diagram of the bolt installation process

- ① Place the PV module on top of the rack.
- ② Insert 4 stainless steel bolts in corresponding mounting holes. The 9x14mm mounting holes match with M8 bolts, while the 7x10mm mounting holes match with M6 bolts. 7x10mm mounting holes are positioned with a hole pitch of 400mm.
- ③ Make sure to use two stainless steel washers for each bolt, one on each side of the rack. Then screw on the top of a stainless-steel spring washer or toothed lock washer. Finally, lock with a stainless-steel nut.
- ④ The tightening torque is recommended to be

9~12Nm for M6 bolts and 17~23Nm for M8 bolts. Due to the possible difference of bolt material, the specific torque value is subject to the information confirmed by the bolt supplier.

5.3.2 Clamped mounting

Photovoltaic modules can be installed across the support frame (Fig. 8) or parallel to the frame of the photovoltaic module (Fig. 9). When using clamps to install, each module must be secured with a minimum of 4 clamps.

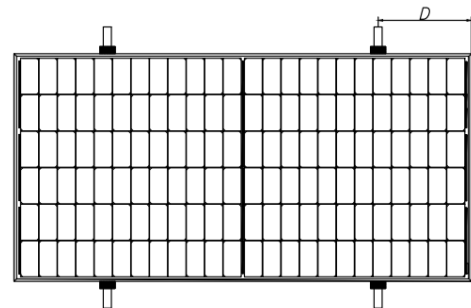


Fig. 8 Rails overlapping the long-side frame

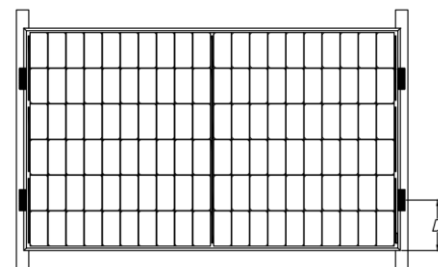


Fig. 9 Rails overlapping the short-side frame

! ATTENTION:

- The length of the rack must be longer than the PV module, otherwise it should be confirmed by Chint Solar in advance.
- The above two diagrams show the mounting method using aluminum clamps. "D" indicates the mounting range. Table 1 shows the recommended mounting position and corresponding machine



loads.

- Each aluminum clamp is equipped with an M8 bolt, a flat washer, a spring washer and an M8 nut. The mounting steps are as follows::

① Place the module on the two supporting rails (not provided by Chint) which should be made with stainless material and treated with an anti-corrosion process (e.g. hot dipped galvanizing). Each PV module needs at least four clamps to be fixed. The module clamps should not come into contact with the glass and should not deform the frame, otherwise they may cause module damage.

② Be sure to avoid shadowing effects from the module clamps. Weep holes on the module frame must not be closed or obscured by the clamps. The clamp must have at least 8mm but no more than 11mm overlap with the frame of the module (The clamp section can be changed under the premise of ensuring reliable installation).

③ The top surface of the rail contacted with module frame should be equipped with grooves compatible with an M8 bolt.

④ If the grooves are not provided, holes of a suitable diameter may need to be drilled to allow bolts attaching to the rail at the same locations as mentioned above.

⑤ Ensure that the mounting sequence of each clamp is in the order of flat washer, spring washer and nut.

⑥ There are two types of clamps, the mid clamp shown in Fig 10 and the fringe clamp shown in Fig 11 and Fig. 12. The mid clamp has dimensions of a ≥ 40 mm, b ≥ 26 mm, c ≥ 5 mm, d ≥ 28 mm, $\varnothing = 9$

mm. For module of 182mm-wafer, the size of mid and fringe clamp must meet a ≥ 60 mm. The tightening torque is suggested to be 17~23Nm for Class 8.8 screw and bolts.

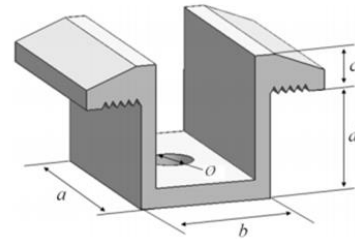


Fig. 10 Schematic diagram of the mid clamp

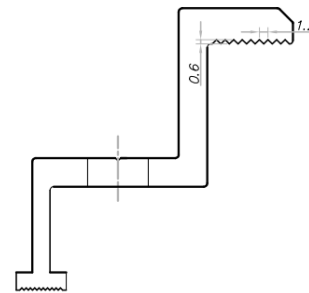


Fig. 11 Schematic cross section of the fringe clamp

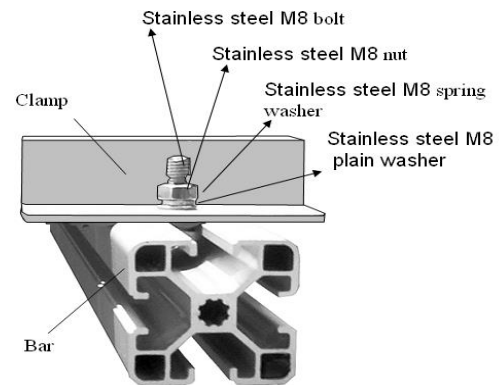


Fig. 12 Schematic diagram of the fringe clamp

⑦ To prevent modules from coming off the fixed device after installation, it is suggested to choose fringe and mid clamps and make contact with the A side of the frame with groove patterns. Suggest to have 9 patterns with a space between 2 adjacent patterns of 1.2mm and a depth of 0.6mm, as shown in figure 11.



⑧ For the installation method shown in Fig. 9, the module needs to be fixed with professional clamps (as shown in Fig. 13), and the overlap between the C side of the module and the rail should be $\geq 15\text{mm}$. Chint's limited warranty will be void if improper clamps or improper installation is used.

short-side frame

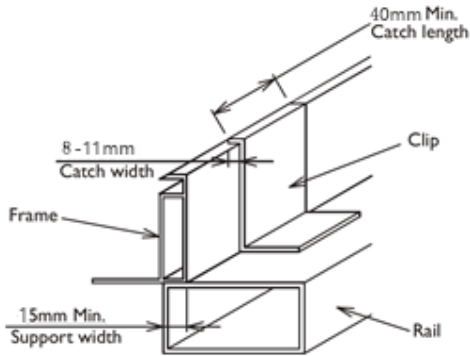


Figure 13 Mounting requirements for rails overlapping the

Table 1 Installation range and corresponding values

Module type	Module dimension L*W*H (mm)	Installation method				
		Fig 2 & Fig 3 & Fig 4	Fig 5	Fig 8	Fig 9	Fig 6
CHSM6610M CHSM6610M/HV CHSM6610P	1648*990*35 1648*990*40	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 198~408mm	+2400/-2400Pa Installation scope 50~200mm	---
CHSM6610P/HV CHSM6610M(BL)	1650*992*35 1650*992*40	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 198~408mm	+2400/-2400Pa Installation scope 50~200mm	---
CHSM60M-HC CHSM60P-HC CHSM60M(BL)-HC CHSM60M/LV-HC CHSM60M(BLH)-HC	1666*992*35	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 207~408mm	+2400/-2400Pa Installation scope 50~200mm	---
CHSM60M-HC CHSM60P-HC CHSM60M(BL)-HC	1675*992*35	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 215~415mm	+2400/-2400Pa Installation scope 50~200mm	---



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CHSM60M/LV-HC CHSM60M(BLH)-HC	1692*1002*35	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 350±50mm	+2400/-2400Pa Installation scope 50~200mm	---
	1755*1038*35 1765*1048*35	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 400±50mm	+1800/-1800Pa Installation scope 200±50mm	---



Table 1 (continue)

Module type	Dimensions L*W*H (mm)	Installation method				
		Fig 2 & Fig 3 & Fig 4	Fig 5	Fig 8	Fig 9	Fig 6
CHSM60M-HC	1755*1038*30	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope 350±50mm	+1800/-1800Pa Installation scope 200±50mm	---
CHSM60M(BL)-HC	1755*1038*30	+5400Pa	---	+5400/-2400Pa Installation scope	---	---
CHSM60M/LV-HC	1755*1038*35	-2400Pa	---	400~450mm	---	---
CHSM60M(BLH)-HC	1890*1133*35	+5400Pa	---	+5400/-2400Pa Installation scope	---	---
CHSM60N-HC	1890*1133*30	-2400Pa	---	400~450mm	---	---
CHSM60N/LV-HC	1890*1133*30	+5400Pa -2400Pa	---	+5400/-2400Pa Installation scope	---	---
CHSM60N(BLH)-HC	1903*1134*30			400~450mm		
CHSM60N(BL)-HC						
	2172*1303*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 375~425mm	---	+1800Pa -1800Pa +Bumper
CHSM54M-HC	1708 *1133*30					
CHSM54M(BL)-HC	1708 *1133*35	+5400Pa	---	+5400/-2400Pa Installation scope	+1400/-1400Pa Installation scope	---
CHSM54M/LV-HC	1722*1134*30	-2400Pa	---	359±50mm	200±50mm	---
CHSM54M(BLH)-HC	1722*1134*35					
CHSM54N-HC	1722*1134*35					
CHSM54N(BLH)-HC						
CHSM54N(BL)-HC						
CHSM6612M	1954*990*40	+5400Pa	+5400Pa	+5400/-2400Pa Installation scope	---	+2400Pa -2400Pa +Bumper
CHSM6612M/HV	1954*990*35	-2400Pa	-2400Pa	299~498mm		
CHSM6612P	1960*992*40	+5400Pa	+5400Pa	+5400/-2400Pa Installation scope	---	+2400Pa -2400Pa +Bumper
CHSM6612P/HV	1960*992*35	-2400Pa	-2400Pa	299~498mm		
CHSM72M-HC	1986*992*40	+5400Pa	+5400Pa	+5400/-2400Pa Installation scope	---	+2400Pa -2400Pa +Bumper
CHSM72P-HC	1986*992*35	-2400Pa	-2400Pa	315~505mm		
CHSM72M/LV-HC						



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CHSM72M(BL)-HC CHSM72M(BLH)-HC	2000*992*40 2000*992*35	+5400Pa -2400Pa	+5400Pa -2400Pa	+5400/-2400Pa Installation scope 315~505mm	---	+2400Pa -2400Pa +Bumper
CHSM72M-HC CHSM72P-HC	2018*1002*40 2018*1002*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 350±50mm	---	+2400Pa -2400Pa +Bumper
CHSM72M/LV-HC CHSM72M(BL)-HC CHSM72M(BLH)-HC	2108*1048*35 2094*1038*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 400±50mm	---	+2400Pa -2400Pa +Bumper
CHSM72N-HC CHSM72N(BLH)-HC CHSM72N(BL)-HC	2256*1133*35 2279*1134*35 2278*1134*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 400~450mm	---	+1800Pa -1800Pa +Bumper
CHSM66M-HC CHSM66M(BL)-HC CHSM66N-HC	2384*1303*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 475~525mm	---	+1800Pa -1800Pa +Bumper
CHSM55M-HC CHSM55M/LV-HC	2384*1096*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 474~525mm	---	+1800Pa -1800Pa +Bumper
CHSM50M-HC CHSM50M/LV-HC	2172*1096*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 375~425mm	---	+1800Pa -1800Pa +Bumper
CHSM78N-HC CHSM78N/LV-HC CHSM78M-HC CHSM78M/LV-HC	2465*1134*35	+5400Pa -2400Pa	+2400Pa -2400Pa	+5400/-2400Pa Installation scope 400~450mm	---	+1800Pa -1800Pa +Bumper

6 Electrical Installation

6.1 Electrical characteristics

The electrical characteristics are detailed in the PV module product manual.

The rated values of electrical characteristics, including I_{sc} , V_{oc} and P_{mpp} , have some tolerance with the measured values at standard condition: $\pm 5\%$ for I_{sc} , $\pm 3\%$ for V_{oc} and $\pm 3\%$ for P_{mpp} . The standard test condition refers to $1000W/m^2$, AM1.5 and cell temperature at $25^\circ C$.

According to IEC and UL standards, the standard maximum system voltage for the regular module series is 1000V, the 1500V standard products are also available according to the requirements. The IEC & UL standard maximum system voltage for half-cell module series is 1500V (except for BL & LV series PV modules).

The actual maximum voltage must be less than the standard maximum system voltage and the maximum output voltage of the inverter and other electrical equipment installed in the system. The number of PV modules connected in series should match the voltage



specification of the inverter. The total voltage generated by PV modules in series should not be higher than the maximum voltage allowed by the system.

To ensure the above requirements, the open-circuit voltage of the string needs to be calculated at the lowest expected ambient temperature at certain location. This can be calculated using the following formula:

$$\text{Maximum system voltage} \geq N * V_{oc} * [1 + TC_{voc} * (T_{min} - 25)]$$

Where:

N: number of PV modules in a single string

V_{oc} : open-circuit voltage of each PV module (refer to the PV module nameplate or product manual)

TC_{voc} : temperature coefficient of PV module for open-circuit voltage (refer to the PV module product manual)

T_{min} : minimum ambient temperature.

When the modules connect in parallel, the output current will be equal to the sum of each branch current. We suggest that every series SPV module string should be fused prior to be connected with other strings. The maximum number of modules $N = I_{max}$ (maximum fuse current) / I_{sc} . Please refer to the applicable regional and local codes for additional fuse requirements.

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- Under normal operating conditions, the output current and/or voltage of the PV module may be higher than the value under standard testing conditions. Therefore, in PV system design, for example determining the rated voltage of

equipment, current carrying capacity of wires and fuse and parameters associated with the output power of PV modules, the corresponding short-circuit current and open-circuit voltage should be applied with a safety factor of 1.25. The number of PV modules connected in series should match the voltage specification of the inverter. The total voltage generated by the PV modules connected in series cannot be higher than the maximum voltage allowed by the system.

- According to the National Electrical Code 690.8, the parameters need to be multiplied by an additional 125% (80% derating) factor, i.e. the parameters including the optimum operating current and voltage at standard test condition (STC) needs to be multiplied by the square of 1.25 when determining voltage ratings, conductor capacities, fuse ratings, and control sizes for PV output.
- The maximum reverse current is 15/20A for module with $I_{sc} \leq 9.61A$ and 25/30A for module with $I_{sc} > 9.61A$. Application of the blocking diode and fuse in the combiner box are recommended for reverse current protection when more than two strings are connected in parallel.
- Depending on the maximum rated fuse current of the PV module and the local electrical installation standards, the connection of parallel strings of PV modules needs to be equipped with suitable fuses or preventive diodes for circuit protection purposes.

6.2 Electrical connection

To ensure the normal operation of the system, make sure the polarity of cables is correct when connecting modules or loads, such as inverters and batteries. If the



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PV module is not connected correctly, the bypass diode may be damaged. Fig. 14 shows how the PV modules are connected in series and parallel. PV modules can be wired in series to boost the voltage. Series connections are made by connecting the wire from the positive terminal of one module to the negative terminal of the next module. PV modules can be wired in parallel to increase the current by connecting the positive terminal of one module to the positive terminal of the next module. If a module is not connected correctly, the bypass diode may be damaged.

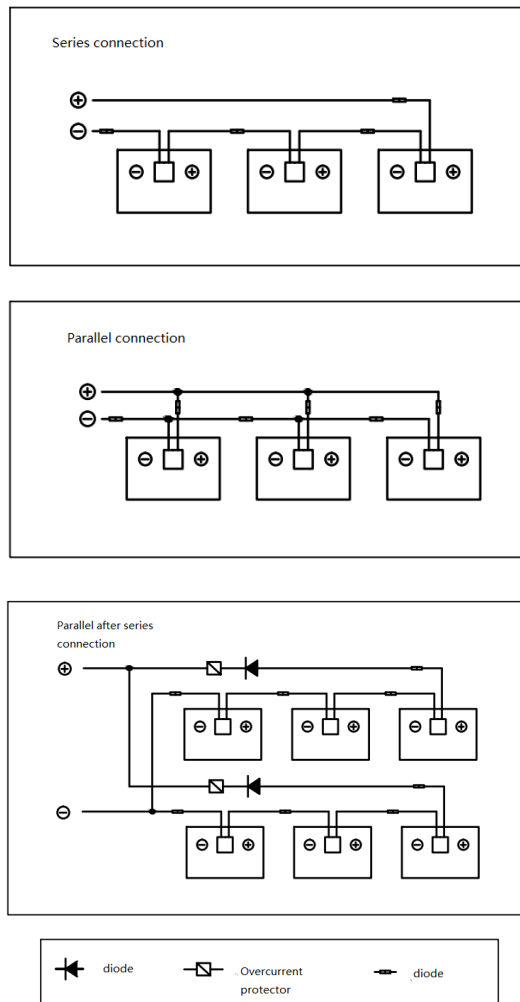


Fig. 14 Schematic diagram of electrical connection

! ATTENTION

- If one PV module string (or PV array) is connected to another with opposite polarity, irreversible damage can be caused to the PV module product. Be sure to confirm the voltage and polarity of each string before making a parallel connection. If measurements reveal opposite polarity or a voltage difference greater than 10V between the strings, check their structural configuration before proceeding with the connection.
- The number of modules connected in series and parallel should be reasonably designed according to the system configuration.
- PV modules with different electrical performance models cannot be connected in one string.
- The system shall use special cables and connectors for PV system and ensure that all connections are securely fastened. The cable must be 4mm² (i.e. 12 AWG) and withstand the maximum possible open-circuit voltage of the PV system.
- When fixing the cable to the rack, it is necessary to avoid mechanical damage to the cable or to the PV module. Do not press the cable hard. To secure the cable to the rack in the proper way, specially designed UV-resistant coils and cable clips must be used. Avoid direct sunlight and water soaking to the cable.
- Keep the connectors dry and clean and make sure that the nuts on the connectors are tightened before connecting them. Do not connect the connectors when they are damp, contaminated or in other bad conditions. Avoid exposing connectors to direct sunlight and soaking in water. Avoid the connectors falling on the ground or the roof. Do not plug or



unplug the connectors when the PV module is in live state. When it is necessary to remove the connectors, ensure that the PV module is not in working condition and that professional unlocking tools and safety measures are used. Direct dragging and pulling is forbidden.

- The junction box of the PV module contains bypass diodes connected in parallel to the string of the PV module. The bypass diode in the junction box prevents module degradation due to shading or covering. Refer to the junction box diode specification provided in the relevant product datasheet for more details. I When the localized hot spot phenomenon occurs in the PV module due to partial shading or coverage, the diode in the junction box will start to work, so that the module current will no longer flow through the hot spot cell, so as to limit the heat and loss of the PV module. When a diode failure is suspected or found, please contact Chint Solar and do not attempt to open the junction box cover.

6.3 Grounding

The PV modules are designed with an anodised, corrosion-resistant aluminum alloy frame as a rigid support. To ensure safety and to avoid lightning strikes and electrostatic damage to the PV modules, the PV module frame must be earthed. The earthing device must be in full contact with the interior of the aluminum alloy of the frame, penetrating the surface oxide film. The following is the specific grounding method, as shown in Fig. 15.

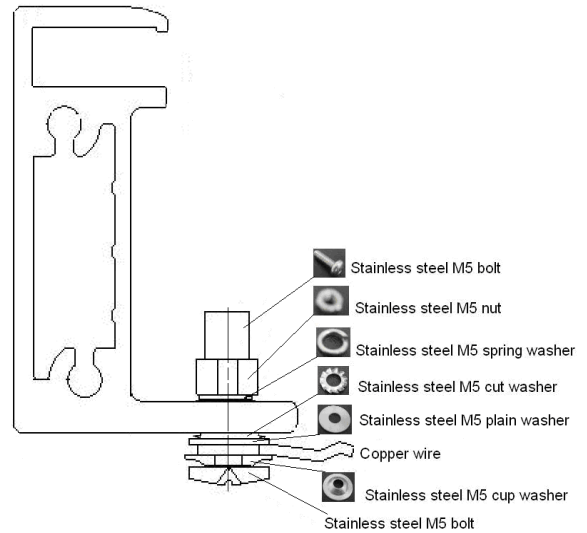


Fig. 15 Grounding the aluminum frame with copper wire

- The grounding requirements must be checked in accordance with the applicable regulations and standards before work is started.
- Use the marked 5.5 mm grounding holes to ground the anodized frame. Use one M5 nut, two M5 cut washers, one M5 plain washer, one M5 spring washer, and one M5 bolt and the copper wire. All nuts, bolts, and washers shall be of type M5 and made of stainless steel (Fig. 15).
- Insert the bolt through the cup washer and wrap the copper wire around the bolt. (Note that the copper wire cannot be attached directly to the aluminum.)
- Insert the bolt through the cut washer and then through the hole in the aluminum frame.
- Add the spring washer and nut on the other side of the bolt and tighten to secure all parts. The tightening torque should be 4~4.5N•m.

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- Use UL-467 certified bonding and grounding devices, including Burndy (formerly Wiley Electronics) Washer Electrical Equipment Bonding (WEEB) and similar devices, such as barbed washers, that meet the requirements of UL-467 and is suitable for electrical bonding and grounding of PV modules.
- Other grounding methods may be used when the racking system is tested following the UL 2703 requirements.
- Do not drill any additional grounding hole on the frame of the modules. 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.

7 Maintenance

PV modules must be inspected and maintained regularly, especially during the warranty period, which is the responsibility of the user. This helps to find and figure out problems in time and ensure the safe and effective operation of the PV system.

7.1 Routine Inspection

PV modules in PV arrays should be inspected regularly for damages, such as glass breakage, cable breakage, junction box damage, cell cracks, and backsheet breakage and other factors that cause functional and safety failures of PV modules. If any of the above problems occurs, the supplier should be notified to replace the broken module with a new one of the same type in time.

It is recommended to perform preventive inspection every 6 months and not to replace the components of

PV modules without authorization. When conducting inspection or maintenance in term of the electrical and mechanical performance, it is recommended that qualified professionals perform the work to avoid electric shock or personal injury.

Take routine maintenance to keep PV modules free of snow, bird droppings, seeds, pollen, leaves, branches, dust, stains, etc.

7.2 PV module cleaning

If the PV module has a sufficient angle of tilt (at least 15°), it is generally not necessary to clean the PV module (as the rainfall will provide a self-cleaning effect). If there is a large accumulation of dirt on the PV module surface that has seriously affected the power production, the module can be rinsed with water without detergent, and use a gentle sponge or brush to clean the surface during the cooler hours of the day. Dust must not be scraped or wiped off under dry conditions as this may result in tiny scuff marks. For snow removal, the PV module surface can be cleaned with a brush with soft bristles.



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



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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.

For more details on cleaning and maintenance, please

refer to the PV Module Cleaning Manual.



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Modified version and date

- Rev 1.0, released in June 2018.
- Rev 1.1, released in July 2020.
- Rev 1.2, released in October 2021.

- Rev 1.3, released in Apr 2022.

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Annex1: The electric data

Module family A: Poly c-Si cell type				
Type Name or Model No.	CHSM6612P/HV-xxx (poly 72cells)		CHSM6612P-xxx (poly 72cells)	
			CHSM6612P (BL)-xxx (poly 72cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	310, 315, 320, 325, 330, 335	340, 345, 350, 355,360, 365,370,375,380,385,390,395	310, 315, 320, 325, 330, 335	340, 345, 350, 355,360, 365,370,375,380,385,390,395
Rated Short Circuit Current [A].....	8.92, 9.04, 9.25, 9.48, 9.52, 9.57	9.62, 9.67, 9.72, 9.78, 9.79,9.86,9.93,10.00, 10.07,10.14,10.20, 10.27	8.92, 9.04, 9.25, 9.48, 9.52, 9.57	9.62, 9.67, 9.72, 9.78, 9.79,9.86,9.93,10.00, 10.07,10.14,10.20, 10.27
Rated Open Circuit Voltage [V].....	45.15, 45.30, 45.45, 45.67, 45.86, 45.98	46.16, 46.37, 46.57, 46.70, 47.01,47.26,47.51,47.76, 48.01,48.26,48.51, 48.76	45.15, 45.30, 45.45, 45.67, 45.86, 45.98	46.16, 46.37, 46.57, 46.70, 47.01,47.26,47.51,47.76, 48.01,48.26,48.51, 48.76
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1954x990x40(45/35/30), 1960x992x40(45/35/30), 1981x1002x40(45/35/30), 1956x991x40(45/35/30) 1979x1002x40(45/35/30)		1648x990x40(35/30), 1650x992x40(35/30), 1654x989x40(35/30), 1659x1002x35(40/30), 1650x991x40(35/30)	
Module area [m ²].....	1.93 / 1.94/1.98		1.63 / 1.64/1.66	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	72		72	
Cells per bypass diode	24		24	
Serial/parallel connection of cells	S		S	
Type Name or Model No.	CHSM6610P/HV-xxx (poly 60cells)		CHSM6610P-xxx (poly 60cells)	
			CHSM6610P (BL)-xxx (poly 60cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	260, 265, 270, 275, 280	285, 290, 295,300,305, 310,315,320,325	260, 265, 270, 275, 280	285, 290, 295,300,305, 310,315,320,325



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Rated Short Circuit Current [A].....	8.95, 9.18, 9.45, 9.52, 9.59	9.68, 9.75, 9.83, 9.79, 9.86,9.81,9.99,10.13, 10.22	8.95, 9.18, 9.45, 9.52, 9.59	9.68, 9.75, 9.83, 9.79, 9.86,9.81,9.99,10.13, 10.22
Rated Open Circuit Voltage [V].....	37.72, 37.87, 38.00, 38.45, 38.69	38.94, 39.18, 39.42,39.51, 39.64,39.56,39.82, 40.04,40.31	37.72, 37.87, 38.00, 38.45, 38.69	38.94, 39.18, 39.42,39.51, 39.64,39.56,39.82, 40.04, 40.31
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1648x990x40(35/30), 1650x992x40(35/30), 1654x989x40(35/30), 1659x1002x35(40/30), 1650x991x40(35/30)		1648x990x40(35/30), 1650x992x40(35/30), 1654x989x40(35/30), 1659x1002x35(40/30), 1650x991x40(35/30)	
Module area [m ²].....	1.63 / 1.64/1.66		1.63 / 1.64/1.66	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	60		60	
Cells per bypass diode	20		20	
Serial/parallel connection of cells	S		S	
Module family B: Mono c-Si cell type				
Type Name or Model No.	CHSM6612M/HV-xxx (mono 72 cells)		CHSM6612M-xxx (mono 72 cells)	
			CHSM6612M (BL)-xxx (mono 72 cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	330, 335, 340, 345, 350, 355	360, 365, 370, 375,380, 385,390,395,400,405	330, 335, 340, 345, 350, 355	360, 365, 370, 375,380, 385,390,395,400,405
Rated Short Circuit Current [A].....	9.29, 9.38, 9.41, 9.48, 9.53, 9.60	9.66, 9.75, 9.91, 9.94, 9.99,10.04,10.09,10.14, 10.19,10.24	9.29, 9.38, 9.41, 9.48, 9.53, 9.60	9.66, 9.75, 9.91, 9.94, 9.99,10.04,10.09,10.14, 10.19,10.24
Rated Open Circuit Voltage [V].....	45.89, 45.98, 46.38, 46.70, 47.01, 47.31	47.62, 47.82, 48.36, 48.45, 48.61,48.78, 48.94, 49.10,49.26,49.43	45.89, 45.98, 46.38, 46.70, 47.01, 47.31	47.62, 47.82, 48.36, 48.45, 48.61,48.78, 48.94, 49.10,49.26,49.43
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	



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Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1954x990x40(45/35/30), 1960x992x40(45/35/30), 1981x1002x40(45/35/30), 1956x991x40(45/35/30) 1979x1002x40(45/35/30)		1954x990x40(45/35/30), 1960x992x40(45/35/30), 1981x1002x40(45/35/30), 1956x991x40(45/35/30) 1979x1002x40(45/35/30)	
Module area [m ²].....	1.93 / 1.94/1.98		1.93 / 1.94/1.98	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	72		72	
Cells per bypass diode	24		24	
Serial/parallel connection of cells	S		S	
Type Name or Model No.	CHSM6610M/HV-xxx (mono 60 cells)		CHSM6610M-xxx (mono 60 cells)	
			CHSM6610M (BL)-xxx (mono 60 cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	275, 280, 285, 290, 295	300, 305, 310, 315,320,325,330,335	275, 280, 285, 290, 295	300, 305, 310, 315,320,325,330,335
Rated Short Circuit Current [A].....	9.38, 9.41, 9.46, 9.54, 9.59	9.68, 9.72, 9.86,9.98,10.05, 10.12,10.22,10.30	9.38, 9.41, 9.46, 9.54, 9.59	9.68, 9.72, 9.86,9.98,10.05, 10.12,10.22,10.30
Rated Open Circuit Voltage [V].....	38.36, 38.83, 39.15, 39.45, 39.81	39.90, 40.05, 40.18, 40.33, 40.48,40.63, 40.78,40.93	38.36, 38.83, 39.15, 39.45, 39.81	39.90, 40.05, 40.18, 40.33, 40.48,40.63, 40.78,40.93
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1648x990x40(35/30), 1650x992x40(35/30), 1654x989x40(35/30), 1659x1002x35(40/30), 1650x991x40(35/30)		1648x990x40(35/30), 1650x992x40(35/30), 1654x989x40(35/30), 1659x1002x35(40/30), 1650x991x40(35/30)	
Module area [m ²].....	1.63 / 1.64/1.66		1.63 / 1.64/1.66	



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Min- creepage distance [mm]	10.4		10.4	
Number of solar cells	60		60	
Cells per bypass diode	20		20	
Serial/parallel connection of cells	S		S	
Module family C: ½ cut Poly c-Si cell type				
Type Name or Model No.	CHSM72P-HC-xxx (poly 144 cells)		CHSM72P/LV-HC-xxx (poly 144 cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	315, 320, 325, 330, 335, 340, 345	350, 355,360,365,370,375, 380,385,390,395,400,405, 410,415,420,425,430,435,440	315, 320, 325, 330, 335, 340, 345	350, 355,360,365,370,375, 380,385,390,395,400,405, 410,415,420,425,430,435,440
Rated Short Circuit Current [A].....	8.98, 9.08, 9.18, 9.28, 9.37, 9.47, 9.57	9.65, 9.74,9.76,9.81,9.87, 9.93,10.00,10.08,10.16,10.23,10.28,10.36,10.59,10.63,10.68,11.20,11.26,11.32,11.38	8.98, 9.08, 9.18, 9.28, 9.37, 9.47, 9.57	9.65, 9.74,9.76,9.81,9.87, 9.93,10.00,10.08,10.16,10.23,10.28,10.36,10.59,10.63,10.68,11.20,11.26,11.32,11.38
Rated Open Circuit Voltage [V].....	45.08,45.23,45.38, 45.53, 45.74, 45.86, 46.04	46.25, 46.45,47.15,47.36, 47.63,47.87,48.15,48.37, 48.55,48.66,48.78,48.87, 48.28,48.61,49.05,47.98, 48.28,48.58,48.88	45.08,45.23,45.38,4 5.53, 45.74, 45.86, 46.04	46.25, 46.45,47.15,47.36, 47.63,47.87,48.15,48.37, 48.55,48.66,48.78,48.87, 48.28,48.61,49.05,47.98, 48.28,48.58,48.88
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree	I		I	
Dimensions (l x w x h) [mm].....	1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35/30		1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35/30	
Module area [m²].....	1.97/1.98/2.02/2.20/2.21/2.17/2.01		1.97/1.98/2.02/2.20/2.21/2.17/2.01	
Min- creepage distance [mm]	10.4		10.4	
Number of solar cells	144		144	
Cells per bypass diode	48		48	



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Serial/parallel connection of cells	SP		SP	
Type Name or Model No.	CHSM60P-HC-xxx (poly 120 cells)		CHSM60P/LV-HC-xxx (poly 120 cells)	
Maximum System Voltage [VDC]	1500		1000	
Rated Maximum Power [W]	260, 265, 270, 275, 280, 285, 290, 295	300,305,310,315,320, 325,330,335,340,345, 350,355,360,365	260, 265, 270, 275, 280, 285, 290, 295	300,305,310,315,320, 325,330,335,340,345, 350,355,360,365
Rated Short Circuit Current [A].....	8.91, 9.00, 9.09, 9.18, 9.27, 9.34, 9.43, 9.52	10.01,10.05,10.08, 10.12,10.17,10.21, 10.23,10.25,10.56, 10.59,10.63,11.26, 11.32,11.38	8.91, 9.00, 9.09, 9.18, 9.27, 9.34, 9.43, 9.52	10.01,10.05,10.08,10.12, 10.17,10.21,10.23,10.25, 10.56,10.59,10.63,11.26, 11.32,11.38
Rated Open Circuit Voltage [V].....	37.45, 37.69, 37.93, 38.17, 38.41, 38.65, 38.90, 39.14	38.52,38.75,39.01,39.27, 39.52,39.78,40.07,40. 37,40.23,40.51,40.83, 39.78,40.08,40.38	37.45, 37.69, 37.93, 38.17, 38.41, 38.65, 38.90, 39.14	38.52,38.75,39.01,39.27,39.52, 39.78,40.07,40.37,40.23,40.51, 40.83,39.78,40.08,40.38
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	15	20	15	20
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)		1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)	
Module area [m ²].....	1.65/1.66/1.70/1.85/1.82/1.69		1.65/1.66/1.70/1.85/1.82/1.69	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	120		120	
Cells per bypass diode	40		40	
Serial/parallel connection of cells	SP		SP	
Module family D: ½ cut Mono c-Si cell type				
Type Name or Model No.	CHSM72M-HC-xxx (mono 144 cells)		CHSM72M/LV-HC-xxx (mono 144 cells)	
Maximum System Voltage [VDC]	1500		1000	



ASTRONERGY

Rated Maximum Power [W]	330, 335, 340, 345, 350, 355	360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475	*520, 525, 530, 535, 540, 545, 550, 555	330, 335, 340, 345, 350, 355	360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475	*520, 525, 530, 535, 540, 545, 550, 555
Rated Short Circuit Current [A].....	9.30, 9.36, 9.41, 9.46, 9.52, 9.57	9.64, 9.71, 9.80, 9.88, 9.95, 10.02, 10.10, 10.17, 10.24, 10.31, 10.38, 10.45, 10.52, 11.03, 11.10, 11.16, 11.24, 11.30, 11.37, 11.44, 11.51, 11.56, 11.61, 11.66	13.34, 13.43, 13.52, 13.61, 13.72, 13.81, 13.90, 13.98	9.30, 9.36, 9.41, 9.46, 9.52, 9.57	9.64, 9.71, 9.80, 9.88, 9.95, 10.02, 10.10, 10.17, 10.24, 10.31, 10.38, 10.45, 10.52, 11.03, 11.10, 11.16, 11.24, 11.30, 11.37, 11.44, 11.51, 11.56, 11.61, 11.66	13.34, 13.43, 13.52, 13.61, 13.72, 13.81, 13.90, 13.98
Rated Open Circuit Voltage [V].....	45.30, 45.61, 45.91, 46.21, 46.52, 46.83	47.13, 47.44, 47.64, 47.89, 48.18, 48.47, 48.70, 48.98, 49.25, 49.53, 49.80, 50.06, 50.32, 47.73, 47.99, 48.25, 48.50, 48.80, 49.05, 49.35, 49.65, 49.95, 50.25, 50.51	48.90, 49.10, 49.30, 49.50, 49.70, 49.90, 50.10, 50.30	45.30, 45.61, 45.91, 46.21, 46.52, 46.83	47.13, 47.44, 47.64, 47.89, 48.18, 48.47, 48.70, 48.98, 49.25, 49.53, 49.80, 50.06, 50.32, 47.73, 47.99, 48.25, 48.50, 48.80, 49.05, 49.35, 49.65, 49.95, 50.25, 50.51	48.90, 49.10, 49.30, 49.50, 49.70, 49.90, 50.10, 50.30
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3			3 / 5 / 3		
Over-current protection rating[A]:	15	20	25 (with junction box: CHS2x/PV-HBE4x/CHS3xyz)	15	20	25 (with junction box: CHS2x/PV-HBE4x/CHS3xyz)
Classification (IEC 61730).....	Class II			Class II		
Fire rating.....	Class C			Class C		
Pollution degree.....	I			I		
Dimensions (l x w x h) [mm].....	1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35(30)	2256x1133x35/ 30 2279x1134x35/ 30 2278x1134x35/ 30	1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35(30)	2256x1133x35/ 30 2279x1134x35/ 30 2278x1134x35/ 30		
Module area [m ²].....	1.97/1.98/2.02/2.20/ 2.21/2.17/2.01	2.56/2.58	1.97/1.98/2.02/2.20/ 2.21/2.17/2.01	2.56/2.58		
Min- creepage distance [mm].....	10.4			10.4		
Number of solar cells	144			144		
Cells per bypass diode	48			48		
Serial/parallel connection of cells	SP			SP		
Type Name or Model No.	CHSM60M-HC-xxx (mono 120 cells)			CHSM60M/LV-HC-xxx (mono 120 cells)		



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Maximum System Voltage [VDC]	1500			1000		
Rated Maximum Power [W]	275, 280, 285, 290, 295	300, 305,310,315,320,325, 330,335, 340, 345,350, 355, 360, 365, 370, 375, 380,385, 390, 395	*590,595,600, 605,610	275, 280, 285, 290, 295	300, 305, 310, 315,320,325, 330, 335, 340, 345,350, 355, 360, 365, 370, 375, 380, 385, 390, 395	*590,595,600, 605,610
Rated Short Circuit Current [A].....	9.28, 9.36, 9.43, 9.51, 9.59	9.64, 9.73, 9.82, 9.90,9.98, 10.06, 10.14,10.22,10.30, 10.38, 10.46,11.15, 11.21, 11.29, 11.35, 11.42, 11.49, 11.54,11.59,11.64	18.42,18.47, 18.52,18.57, 18.62	9.28, 9.36, 9.43, 9.51, 9.59	9.64, 9.73, 9.82, 9.90,9.98, 10.06, 10.14, 10.22,10.30,10.38, 10.46,11.15, 11.21, 11.29, 11.35, 11.42, 11.49,11.54,11.59, 11.64	18.42,18.47, 18.52,18.57, 18.62
Rated Open Circuit Voltage [V].....	38.18, 38.50, 38.79, 39.09, 39.39	39.75, 39.84, 40.11,40.42, 40.72, 41.03, 41.32, 41.61, 41.88, 42.16, 42.44, 39.80, 40.14, 40.41, 40.75, 41.05, 41.34, 41.64,41.94, 42.20	41.10,41.30, 41.50,41.70, 41.90	38.18, 38.50, 38.79, 39.09, 39.39	39.75, 39.84, 40.11,40.42, 40.72, 41.03, 41.32, 41.61, 41.88, 42.16, 42.44, 39.80, 40.14, 40.41, 40.75, 41.05, 41.34, 41.64,41.94, 42.20	41.10,41.30, 41.50,41.70, 41.90
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3			3 / 5 / 3		
Over-current protection rating[A]:	15	20	30 (with junction box: CHS2x/PV-HBE4x/CH S3xyz)	15	20	30 (with junction box: CHS2x/PV-HBE4x/CHS 3xyz)
Classification (IEC 61730).....	Class II			Class II		
Fire rating.....	Class C			Class C		
Pollution degree.....	I			I		
Dimensions (l x w x h) [mm].....	1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)		2172x1303 x35	1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)		2172x1303 x35
Module area [m ²].....	1.65/1.66/1.70/1.85/1.82/1.69		2.83	1.65/1.66/1.70/1.85/1.82/1.69		2.83
Min- creepage distance [mm].....	10.4			10.4		
Number of solar cells	120			120		
Cells per bypass diode	40			40		
Serial/parallel connection of cells	SP			SP		

*Remarks:

- Power range of model type CHSM72M-HC-xxx / CHSM72M/LV-HC-xxx from 425W to 475W is with cell dimension 166mmx83mm, from 520W to 555W is with cell dimension 182mmx91mm.



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- Power range of model type CHSM60M-HC-xxx / CHSM60M/LV-HC-xxx from 590W to 610W is with cell dimension 210mmx105mm.

Type Name or Model No.....	CHSM66M-HC-xxx (mono 132 cells)		
Maximum System Voltage [VDC]	1500		1500
Rated Maximum Power [W].....	395, 400, 405, 410, 415	480, 485, 490, 495, 500,505, 510	645,650,655,660,665,670,675
Rated Short Circuit Current [A].....	11.21, 11.27, 11.34, 11.41, 11.49	13.41, 13.50, 13.60, 13.71, 13.81,13.90, 14.00	18.38,18.43,18.48,18.53,18.58,18.63,18.68
Rated Open Circuit Voltage [V].....	43.95, 44.27, 44.58, 44.89, 45.18	44.98, 45.18, 45.38, 45.58, 45.78,45.98, 46.18	45.08,45.28,45.48,45.68,45.88,46.08,46.28
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3
Over-current protection rating[A]:	20	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)
Classification (IEC 61730)	Class II		Class II
Fire rating	Class C		Class C
Pollution degree.....	I		I
Dimensions (l x w x h) [mm]	2096x1038x35(30)	2073x1133x35 2094x1134x35	2384x1303 x35
Module area [m ²].....	2.18	2.35/2.37	3.11
Min- creepage distance [mm].....	10.4		10.4
Number of solar cells	132		132
Cells per bypass diode	44		44
Serial/parallel connection of cells	SP		SP
Type Name or Model No.....	CHSM66M/LV-HC-xxx (mono 132 cells)		
Maximum System Voltage [VDC]	1000		1000
Rated Maximum Power [W].....	395, 400, 405, 410, 415	480, 485, 490, 495, 500,505, 510	645,650,655,660,665,670,675
Rated Short Circuit Current [A].....	11.21, 11.27, 11.34, 11.41, 11.49	13.41, 13.50, 13.60, 13.71, 13.81,13.90	18.38,18.43,18.48,18.53,18.58,18.63,18.68
Rated Open Circuit Voltage [V].....	43.95, 44.27, 44.58, 44.89, 45.18	44.98, 45.18, 45.38, 45.58, 45.78,45.98	45.08,45.28,45.48,45.68,45.88,46.08,46.28
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3
Over-current protection rating[A]:	20	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)
Classification (IEC 61730)	Class II		Class II



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Fire rating	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm]	2096x1038x35(30)	2073x1133x35 2094x1134x35	2384x1303 x35	
Module area [m ²].....	2.18	2.35/2.37	3.11	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	132		132	
Cells per bypass diode	44		44	
Serial/parallel connection of cells	SP		SP	
*Remark: - Power range of model type CHSM66M-HC-xxx / CHSM66M/LV-HC-xxx from 395W to 415W is with cell dimension 166mm x83mm; Power range from 480W to 505W is with cell dimension 182mmx91mm; Power range from 645W to 675W is with cell dimension 210mmx105mm.				
Type Name or Model No.....	CHSM54M-HC-xxx (mono 108 cells)	CHSM54M/LV-HC-xxx (mono 108 cells)	CHSM60M-HC-xxx (mono 120 cells)	CHSM60M/LV-HC-xxx (mono 120 cells)
Maximum System Voltage [VDC]	1500	1000	1500	1000
Rated Maximum Power [W].....	390,395,400,405,410,415		435,440,445,450,455,460, 465	
Rated Short Circuit Current [A]	13.40,13.52,13.65,13.76,13.88,13.99		13.38,13.48,13.59,13.71,13.81,13.91,13.98	
Rated Open Circuit Voltage [V]	36.60,36.80,37.00,37.20,37.40,37.60		40.85,41.05,41.25,41.45,41.65,41.85,42.05	
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730)	Class II		Class II	
Fire rating	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm]	1708 x 1133 x 30/35 1722 x 1134 x 30/35		1890 x1133 x30 1903x1134x30	
Module area [m ²].....	1.94/1.95		2.14/2.16	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	108		120	
Cells per bypass diode	36		40	
Serial/parallel connection of cells	SP		SP	



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*Remark: Power range of model type CHSM54M-HC-xxx / CHSM54M/LV-HC-xxx from 390W to 415W is with cell dimension 182mmx91mm. Power range of model type CHSM60M-HC-xxx / CHSM60M/LV-HC-xxx from 435W to 465W is with cell dimension 182mmx91mm.						
Type Name or Model No.....	CHSM55M-HC-xxx (mono 110 cells)	CHSM55M/LV-HC-xxx (mono 110 cells)	CHSM50M-HC-xxx (mono 100 cells)	CHSM50M/LV-HC-xxx (mono 100 cells)		
Maximum System Voltage [VDC]	1500	1000	1500	1000		
Rated Maximum Power [W].....	535,540,545,550,555,560,565		490,495,500,505,510			
Rated Short Circuit Current [A]	18.31,18.37,18.43,18.49,18.55,18.61,18.67		18.32,18.37,18.42,18.47,18.52			
Rated Open Circuit Voltage [V]	37.32,37.55,37.78,38.01,38.24,38.49,38.75		34.08,34.28,34.48,34.68,34.88			
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3			
Over-current protection rating[A]:	30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)			
Classification (IEC 61730)	Class II		Class II			
Fire rating	Class C		Class C			
Pollution degree.....	I		I			
Dimensions (l x w x h) [mm]	2384x1096 x35		2172 x1096 x 35			
Module area [m ²].....	2.61		2.38			
Min- creepage distance [mm].....	10.4		10.4			
Number of solar cells	110		100			
Cells per bypass diode.....	44/22/44		40/20/40			
Serial/parallel connection of cells	SP		SP			
*Remark: Power range of model type CHSM55M-HC-xxx/CHSM55M/LV-HC-xxx from 535W to 565W is with cell dimension 210mmx105mm. Power range of model type CHSM50M-HC-xxx/CHSM50M/LV-HC-xxx from 490W to 510W is with cell dimension 210mmx105mm.						
Type Name or Model No.....	CHSM72M(BLH)-HC-xxx (mono 144 cells)			CHSM72M(BL)-HC-xxx (mono 144 cells)		
Maximum System Voltage [VDC]	1500			1000		
Rated Maximum Power [W].....	330, 335, 340, 345, 350, 355	360, 365, 370, 375, 380, 385, 390, 395,400,405, 410,415,420,425,430, 435,440,445,450,455	*520, 525, 530, 535, 540, 545	330, 335, 340, 345, 350, 355	360, 365, 370, 375, 380, 385, 390, 395, 400,405,410,415, 420,425,430,435, 440,445,450,455	*520, 525, 530, 535, 540, 545
Rated Short Circuit Current [A]	9.30, 9.36,	9.64, 9.71, 9.80, 9.88, 9.95, 10.02, 10.10,	13.34, 13.43, 13.52, 13.61, 13.72, 13.81	9.30, 9.36, 9.41, 9.46,	9.64, 9.71, 9.80, 9.88, 9.95, 10.02,	13.34, 13.43, 13.52, 13.61, 13.72, 13.81



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	9.41, 9.46, 9.52, 9.57	10.17,10.24,10.31, 10.38,10.45,10.52, 11.03,11.10,11.16, 11.24, 11.30, 11.37, 11.44		9.52, 9.57	10.10,10.17,10.24, 10.31,10.38,10.45, 10.52,11.03,11.10, 11.16,11.24, 11.30, 11.37, 11.44	
Rated Open Circuit Voltage [V]	45.30, 45.61, 45.91, 46.21, 46.52, 46.83	47.13, 47.44, 47.64, 47.89, 48.18, 48.47, 48.70, 48.98, 49.25, 49.53,49.80,50.06, 50.32,47.73,47.99, 48.25,48.50, 48.80, 49.05, 49.35	48.90, 49.10, 49.30, 49.50, 49.70, 49.90	45.30, 45.61, 45.91, 46.21, 46.52, 46.83	47.13, 47.44, 47.64, 47.89, 48.18, 48.47, 48.70, 48.98, 49.25, 49.53,49.80,50.06, 50.32,47.73,47.99, 48.25,48.50, 48.80, 49.05, 49.35	48.90, 49.10, 49.30, 49.50, 49.70, 49.90
Tolerance of Rating Pmax / Isc / Voc [%]	3 / 5 / 3			3 / 5 / 3		
Over-current protection rating[A]:	15	20	25 (with junction box: CHS2x/ PV-HBE4x/ CHS3xyz)	15	20	25 (with junction box: CHS2x/ PV-HBE4x/ CHS3xyz)
Classification (IEC 61730)	Class II			Class II		
Fire rating	Class C			Class C		
Pollution degree	I			I		
Dimensions (l x w x h) [mm]	1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35/30	2256x1133x35/ 30 2279x1134x35/ 30 2278x1134x35/ 30	1986x992x40 (45/35/30), 2000x992x40 (45/35/30), 2018x1002x40 (45/35/30) 2108x1046x40 (45/35/30) 2108x1048x40 (45/35/30) 2094x1038x40 (45/35/30) 2008x1002x35/30	2256x1133x 35/30 2279x1134x 35/30 2278x1134x 35/30		
Module area [m ²]	1.97/1.98/2.02/2.20/2.21/2.17/2.01		2.56/2.58	1.97/1.98/2.02/2.20/2.21/2.17/2.01		2.56/2.58
Min- creepage distance [mm]	10.4			10.4		
Number of solar cells	144			144		
Cells per bypass diode	48			48		
Serial/parallel connection of cells	SP			SP		
Type Name or Model No	CHSM60M(BLH)-HC-xxx (mono 120 cells)			CHSM60M(BL)-HC-xxx (mono 120 cells)		
Maximum System Voltage [VDC]	1500			1000		
Rated Maximum Power [W]	275, 280, 285, 290, 295	300, 305, 310, 315, 320,325,330,335,340, 345,350,355,360,365,	435,440, 445,450	275, 280, 285, 290, 295	300, 305, 310, 315, 320,325,330,335,340, 345,350,355,360,365,	435,440, 445,450



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		370,375,380			370,375,380	
Rated Short Circuit Current [A]	9.28, 9.36, 9.43, 9.51, 9.59	9.64, 9.73, 9.82, 9.90, 9.98,10.06,10.14,10.22, 10.30,10.38,10.46,11.15, 11.21,11.29, 11.35,11.42, 11.49	13.38,13.48, 13.59.13.71	9.28, 9.36, 9.43, 9.51, 9.59	9.64, 9.73, 9.82, 9.90, 9.98,10.06,10.14,10.22, 10.30,10.38,10.46,11.15,1 1.21,11.29, 11.35, 11.42, 11.49	13.38,13.48, 13.59.13.71
Rated Open Circuit Voltage [V]	38.18, 38.50, 38.79, 39.09, 39.39	39.75, 39.84, 40.11, 40.42, 40.72, 41.03,41.32,41.61, 41.88,42.16, 42.44,39.80, 40.14,40.41, 40.75, 41.05, 41.34	40.85,41.05, 41.25,41.45	38.18, 38.50, 38.79, 39.09, 39.39	39.75, 39.84, 40.11, 40.42, 40.72, 41.03, 41.32,41.61,41.88, 42.16, 42.44,39.80, 40.14,40.41, 40.75, 41.05, 41.34	40.85,41.05, 41.25,41.45
Tolerance of Rating Pmax / Isc / Voc [%]	3 / 5 / 3			3 / 5 / 3		
Over-current protection rating[A]:	15	20	25 (with junction box: CHS2x/ PV-HBE4x/ CHS3xyz)	15	20	25 (with junction box: CHS2x/ PV-HBE4x/ CHS3xyz)
Classification (IEC 61730)	Class II			Class II		
Fire rating	Class C			Class C		
Pollution degree.....	I			I		
Dimensions (l x w x h) [mm]	1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)	1890x1133x3 5/30 1903x1134x3 5/30		1666x992x35 (40/30) 1675x992x35 (40/30) 1692x1002x35 (40/30) 1768x1046x35 (40/30) 1765 x1048x35 (40/30) 1755x1038x35(30) 1684x1002x35(30)	1890x1133x35/ 30 1903x1134x35/ 30	
Module area [m ²].....	1.65/1.66/1.70/1.85/1.82/1.69		2.14	1.65/1.66/1.70/1.85/1.82/1.69		2.14
Min- creepage distance [mm].....	10.4			10.4		
Number of solar cells	120			120		
Cells per bypass diode	40			40		
Serial/parallel connection of cells	SP			SP		
*Remarks						
- Power range of model type CHSM72M(BLH)-HC-xxx / CHSM72M(BL)-HC-xxx from 425W to 455W is with cell dimension 166mmx83mm; Power range from 520W to 545W is with cell dimension 182mmx91mm.						
- Power range of model type CHSM60M(BLH)-HC-xxx / CHSM60M(BL)-HC-xxx from 435W to 450W is with cell dimension 182mmx91mm.						
Type Name or Model No.....	CHSM54M(BLH)-HC-xxx (mono 108 cells)	CHSM54M(BL)-HC-xxx (mono 108 cells)		CHSM78M-HC-xxx (mono 156 cells)	CHSM78M/LV-HC-xxx (mono 156 cells)	



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Maximum System Voltage [VDC]	1500	1000	1500	1000
Rated Maximum Power [W].....	390,395,400,405		585,590,595,600,605	
Rated Short Circuit Current [A].....	13.40,13.52,13.65,13.76		13.68,13.77,13.85,13.93,14.01	
Rated Open Circuit Voltage [V].....	36.60,36.80,37.00,37.20		53.84,54.04,54.24,54.44,54.64	
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm].....	1708 x 1133 x 30/35 1722 x 1134 x 30/35		2465 x 1134 x 35	
Module area [m ²].....	1.94/1.95		2.8	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	108		156	
Cells per bypass diode	36		52	
Serial/parallel connection of cells	SP		SP	
*Remark: -Power range of model type CHSM54M(BLH)-HC-xxx / CHSM54M(BL)-HC-xxx from 390W to 405W is with cell dimension 182mmx91mm. -Power range of model type CHSM78M-HC-xxx / CHSM78M/LV-HC-xxx from 565W to 605W is with cell dimension 182mmx91mm.				
Module family E: ½ cut N-type Mono c-Si cell type				
Type Name or Model No.....	CHSM66N-HC-xxx (mono 132 cells)	CHSM66N/LV-HC-xxx (mono 132 cells)	CHSM60N-HC-xxx (mono 120 cells)	CHSM60N/LV-HC-xxx (mono 120 cells)
Maximum System Voltage [VDC]	1500V	1000V	1500V	1000V
Rated Maximum Power [W].....	655,660,665,670,675,680,685,690		595,600,605,610,615,620,625	
Rated Short Circuit Current [A].....	17.64,17.72,17.80,17.88,17.96,18.03,18.11,18.19		17.60,17.68,17.77,17.85,17.94,18.02,18.10	
Rated Open Circuit Voltage [V].....	45.84,46.04,46.24,46.44,46.64,46.84,47.04,47.24		41.74,41.94,42.14,42.34,42.54,42.74,42.94	
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		30 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730).....	Class II		Class II	
Fire rating.....	Class C		Class C	



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Pollution degree.....	I		I	
Dimensions (l x w x h) [mm]	2384x1303 x35		2172 x 1303 x 35	
Module area [m ²].....	3.11		2.83	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	132		120	
Cells per bypass diode	44		40	
Serial/parallel connection of cells	SP		SP	
Remark: Power range of model type CHSM66N-HC-xxx/CHSM66N/LV-HC-xxx from 655W to 690W is with N-type cell dimension 210mmx105mm. Power range of model type CHSM60N-HC-xxx/ CHSM60N/LV-HC-xxx from 600W to 625W is with N-type cell dimension 210mmx105mm.				
Type Name or Model No.....	CHSM78N-HC-xxx (mono 156 cells)	CHSM78N/LV-HC-xxx (mono 156 cells)	CHSM72N-HC-xxx (mono 144 cells)	CHSM72N/LV-HC-xxx (mono 144 cells)
Maximum System Voltage [VDC]	1500V	1000V	1500V	1000V
Rated Maximum Power [W].....	585,590,595,600,605,610,615		550,555,560,565	
Rated Short Circuit Current [A]	13.54,13.62,13.70,13.78,13.86,13.95,14.03		13.70,13.80,13.90,14.00	
Rated Open Circuit Voltage [V]	54.02,54.22,54.42,54.62,54.82,55.02,55.22		50.25,50.40,50.55,50.70	
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730)	Class II		Class II	
Fire rating	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm]	2465x1134 x35		2278x1134x35	
Module area [m ²].....	2.80		2.58	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	156		144	
Cells per bypass diode	52		48	
Serial/parallel connection of cells	SP		SP	
Remark: Power range of model type CHSM78N-HC-xxx/ CHSM78N/LV-HC-xxx from 585W to 615W is with N-type cell dimension 182mmx91mm. Power range of model type CHSM72N-HC-xxx/ CHSM72N/LV-HC-xxx from 550W to 565W is with N-type cell dimension 182mmx91mm.				
Type Name or Model	CHSM54N-HC-xxx	CHSM54N/LV-HC-xxx	CHSM60N-HC-xxx	CHSM60N/LV-HC-xxx



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No.....	(mono 108 cells)	(mono 108 cells)	(mono 120 cells)	(mono 120 cells)
Maximum System Voltage [VDC]	1500V	1000V	1500V	1000V
Rated Maximum Power [W]	405,410,415,420,425		450,455,460,465,470	
Rated Short Circuit Current [A]	13.41,13.58,13.76,13.87,13.98		13.60,13.71,13.81,13.91,14.01	
Rated Open Circuit Voltage [V]	37.76,37.78,37.80,38.00,38.20		41.35,41.55,41.75,41.95,42.15	
Tolerance of Rating Pmax / Isc / Voc [%]	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730)	Class II		Class II	
Fire rating	Class C		Class C	
Pollution degree.....	I		I	
Dimensions (l x w x h) [mm]	1722x1134 x30		1903x1134x30	
Module area [m ²].....	1.95		2.16	
Min- creepage distance [mm].....	10.4		10.4	
Number of solar cells	108		120	
Cells per bypass diode	36		40	
Serial/parallel connection of cells	SP		SP	

Remark:

Power range of model type CHSM54N-HC-xxx/ CHSM54N/LV-HC-xxx from 405W to 425W is with N-type cell dimension 182mmx91mm.

Power range of model type CHSM60N-HC-xxx/ CHSM60N/LV-HC-xxx from 450W to 470W is with N-type cell dimension 182mmx91mm.

Type Name or Model No.....	CHSM72N(BLH)-HC-xxx (mono 144 cells)	CHSM72N(BL)-HC-xxx (mono 144 cells)	CHSM54N(BLH)-HC-xxx (mono 108 cells)	CHSM54N(BL)-HC-xxx (mono 108 cells)
Maximum System Voltage [VDC]	1500V	1000V	1500V	1000V
Rated Maximum Power [W]	545,550,555,560		410,415,420	
Rated Short Circuit Current [A]	13.60,13.70,13.80,13.90		13.58,13.76,13.87	
Rated Open Circuit Voltage [V].....	50.10,50.25,50.40,50.55		37.78,37.80,38.00	
Tolerance of Rating Pmax / Isc / Voc [%]	3 / 5 / 3		3 / 5 / 3	
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)	
Classification (IEC 61730).....	Class II		Class II	
Fire rating	Class C		Class C	



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Pollution degree	I		I
Dimensions (l x w x h) [mm].....	2278x1134x35		1722x1134 x30
Module area [m ²].....	2.58		1.95
Min- creepage distance [mm].....	10.4		10.4
Number of solar cells	144		108
Cells per bypass diode	48		36
Serial/parallel connection of cells	SP		SP
Type Name or Model No.	CHSM60N(BLH)-HC-xxx (mono 120cells)	CHSM60N(BL)-HC-xxx (mono 120 cells)	-
Maximum System Voltage [VDC]	1500V	1000V	-
Rated Maximum Power [W]	455,460,465		-
Rated Short Circuit Current [A]	13.71,13.81,13.91		-
Rated Open Circuit Voltage [V].....	41.55,41.75,41.95		-
Tolerance of Rating Pmax / Isc / Voc [%].....	3 / 5 / 3		-
Over-current protection rating[A]:	25 (with junction box: CHS2x/ PV-HBE4x/CHS3xyz)		-
Classification (IEC 61730).....	Class II		-
Fire rating	Class C		-
Pollution degree	I		-
Dimensions (l x w x h) [mm].....	1903x1134x30		-
Module area [m ²].....	2.16		-
Min- creepage distance [mm].....	10.4		-
Number of solar cells	120		-
Cells per bypass diode	40		-
Serial/parallel connection of cells	SP		-
Remark: Power range of model type CHSM72N(BLH)-HC-xxx/ CHSM72N(BL)-HC-xxx from 545W to 560W is with N-type cell dimension 182mmx91mm. Power range of model type CHSM54N(BLH)-HC-xxx/ CHSM54N(BL)-HC-xxx from 410W to 420W is with N-type cell dimension 182mmx91mm. Power range of model type CHSM60N(BLH)-HC-xxx/ CHSM60N(BL)-HC-xxx from 455W to 465W is with N-type cell dimension 182mmx91mm.			



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P_{mp} ~ I_{ma} are measured under STC (irradiance = 1000 mW/cm², AM = 1.5, and cell temperature = 25°C)