



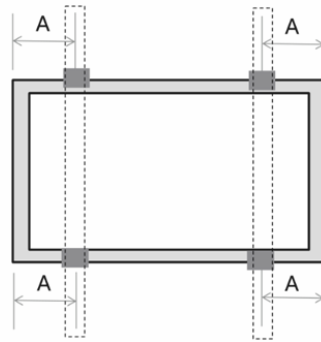
INSTALLATION MANUAL
OF PHOTOVOLTAIC
MODULE

SOLUSOL

Table 4: Overlap depth and length in clamp mounting method

Overlap between	Dimension type	Minimum overlap dimension	Applies to
Module frame and clamp	Depth	10 mm (0.4 in)	CS6W, CS6.1-72TB, CS6.1-72TD, CS7L and CS7N types
		5 mm (0.2 in)	Other module types
	Length	80 mm (3.15 in)	Uplift load > 2400 Pa
		40 mm (1.57 in)	Uplift load ≤ 2400 Pa
Module frame bottom flange and mounting rail	Depth	15 mm (0.59 in)	CS6W, CS6.1-72TB, CS6.1-72TD, CS7L, and CS7N types
		10 mm (0.4 in)	Other double glass modules
		15 mm (0.59 in)	All single glass modules

6.2.1 Clamp mounting on long side of frame and rails perpendicular to the long side frame



Module Types	Max Mechanical Load (Pa)*						
	+1800/ -1800	+2000/ -2000	+2400/ -2400	+3600/ -2400	+5400/ -2400	+5400/ -3600	+7000/ -5000
	A Range (mm)						
CS6L-MS	60-200 ^o	/	/	300-600	400-500	/	/
CS6R-MS / CS6RB-MS	/	20-100	100-600	200-500	300-400	/	/
CS6RA-MS	/	/	/	20-100	200-400	/	/
CS6R-MS-HL / CS6R-MB-HL	/	/	0-100	100-600	250-550	/	400-500
CS6W-MS (F35A ¹ Frame)/ CS7L-MS	/	/	300-600	/	400-500	/	/
CS6W-MS (F45 ¹ Frame)/ CS6W-T/ CS7N-MS (F53A ² &F56 ³ Frame)	/	/	300-600	/	450-550	/	/
CS7N-MS (F63 ² Frame)	/	/	/	300-600	450-550 ⁴	/	/
CS7L-MS (F63 ² Frame)	/	/	/	300-600	400-500	/	/
CS6R-T	/	20-100	100-600	200-500	300-400	/	/
CS6W-MB-AG CS6W-TB-AG	/	/	/	300-600	400-500	/	/
CS6.1-72TB/ CS6.1-72TD CS7N-MB-AG CS7N-TB-AG	/	/	/	/	450-550	/	/
CS7L-MB-AG CS7L-TB-AG CS6.1-60TB (Preliminary)	/	/	/	/	400-500	/	/
CS6.1-54TD (Preliminary)	/	/	/	/	300-400	/	/
CS6R-H-AG	/	/	/	400-550	/	400-500	/
CS6RA-H-AG	/	/	/	300-450	/	350-400	/

¹: with 30 mm height frame;

²: with 35 mm height frame;

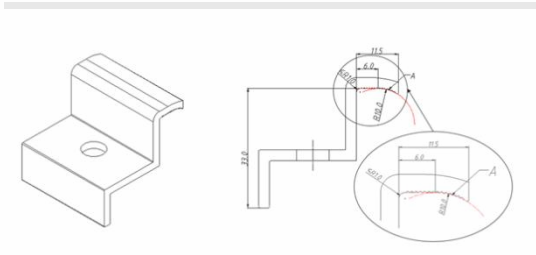
³: with 33 mm height frame and a hooked clamp, which is shown below.

⁴: only if the clamp length was extended to 60 mm or if a hooked clamp was used. Please consult Canadian Solar's technical service if you need to use clamps with different sizes.

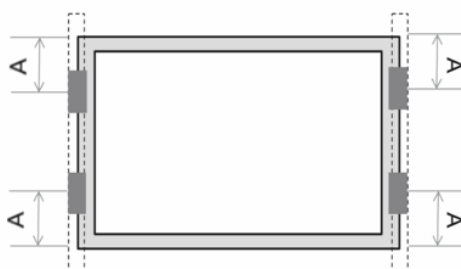
*: test loads, please refer to section 6

◇: clamp overlap length should be at least 80 mm.

Hooked clamp diagram



6.2.2 Clamp mounting on short side of frame and rails perpendicular to the long side frame.



Module Types	A Range (mm)		
	0-200	60-250	200-250
	Max Mechanical Load (Pa)*		
CS6L-MS/ CS6W-MS (F45 ¹ Frame)/CS6W-T CS6R-MS/CS6R-T CS6RA-MS/CS6RA-T CS6RB-MS/CS6RB-T CS6R-H-AG/CS6RA-H-AG	/	+1800/-1800 [◊]	/
CS6R-MS-HL/CS6R-MB-HL	+2400/-2400	/	+2600/-2400
CS6W-MB-AG (F42 ² Frame)	+1000/-1000	/	/

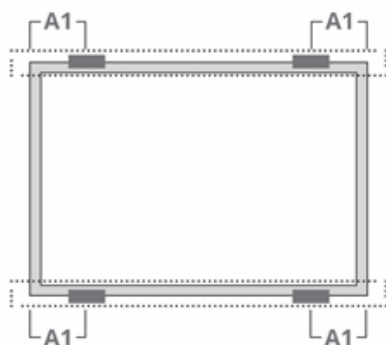
◊: clamp overlap length should be at least 80 mm;

¹: with 30 mm height frame;

²: with 35 mm height frame;

*: test loads, please refer to section 6

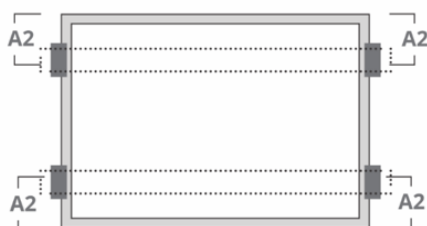
6.2.3 Clamp mounting on long side of frame and rails parallel to the long side frame.



Module Types	Max Mechanical Load (Pa)*							
	+1800/ -1800	+2200/ -2200	+2800/ -2400	+3200/ -2400	+3600/ -2400	+4000/ -2400	+4000/ -3200	+5400/ -2400
	A1 Range (mm)							
CS6L-MS	/	100-500	/	/	300-500	/	/	/
CS6R-MS/CS6RB-MS	/	/	/	200-600	/	200-300	/	/
CS6RA-MS	/	/	/	/	/	200-400	/	/
CS6R-MS-HL/CS6R- MB-HL	/	/	/	/	/	100-600	/	450-550
CS6W-MS (F45 ¹ Frame)/CS6W-T	60-250	/	400-500	/	/	/	/	/
CS6R-T	/	/	/	200-600	/	200-300	/	/
CS6W-MB-AG	0-250	/	/	/	/	/	400-500	/
CS7N-MB-AG (F43 ² frame) / CS7L-MB-AG (F43 ² frame) / CS6R-H-AG	/	/	/	/	400-500	/	/	/
CS7N-MB-AG (F46 ³ frame) / CS7L-MB-AG (F46 ³ frame)	/	/	400-500	/	/	/	/	/
CS6W-TB-AG	/	/	/	/	/	/	400-500	/
CS7N-TB-AG CS7L-TB-AG	/	/	400-500	/	/	/	/	/
CS6RA-H-AG	/		/	/	300-400	/	/	/

1: with 30 mm height frame; 2: with 35 mm height frame; 3: with 33 mm height frame; *: test loads, please refer to section 6

6.2.4 Four clamps on short side of frame and rails parallel to the long side frame.

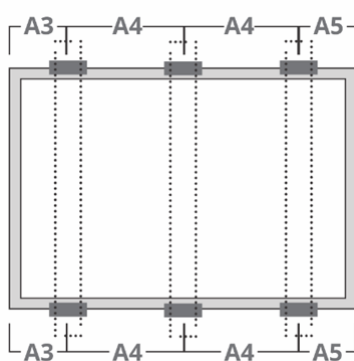


Module Types	A2 Range (mm)			
	0-200	60-250	200-250	250-300
	Max Mechanical Load (Pa)*			
CS6R-MS / CS6R-T CS6RA-MS / CS6RA-T CS6RB-MS / CS6RB-T CS6R-H-AG / CS6RA-H-AG	/	+2200/-1800 [◊]	+2400/-1800 [◊]	/
CS6R-MS-HL / CS6R-MB-HL	+2400/-2400	/	/	+5400/-2400

◊: clamp overlap length should be at least 80 mm;

*: test loads, please refer to section 6

6.2.5 Six clamps on long side of frame and rails perpendicular to the long side frame



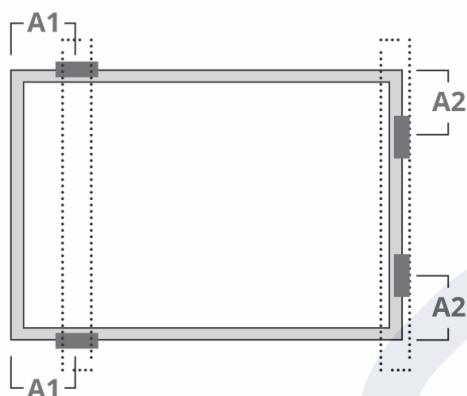
Module Types	Max Mechanical Load (Pa)*				
	+5400/-2400	+5400/-2800	+6000/-3600	+6000/-4000	+8100/-5000
	A3 & A5 Range (mm)				
CS6R-MS / CS6RA-MS / CS6RB-MS / CS6R-T / CS6R-H-AG	/	/	80-380	/	/
CS6R-MS-HL / CS6R-MB- HL	100-600	/	/	300-550	350-450
CS6W-MB-AG (F47 ¹ frame) CS6W-TB-AG	/	/	300-500	/	/
CS6W-MB-AG (F42 ² frame)	/	350-450	/	/	/
CS6RA-H-AG	/	/	60-300	/	/

¹: 30 mm height frame;

²: with 35 mm height frame;

*: test loads, please refer to section 6

6.2.6 Two clamps on the long side and two clamps on the short side of frame. Rails run perpendicular to the long side frame.

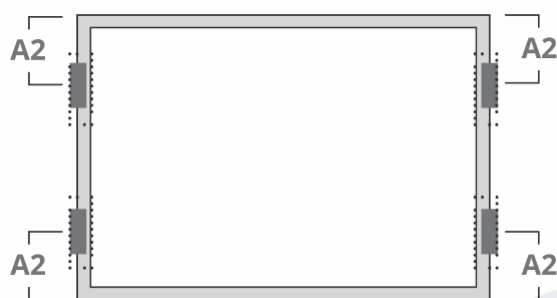


Module Types	Max Mechanical Load (Pa)*					
	+2400/-2000		+2400/-2200		+2400/-2400	
	A1 Range (mm)	A2 Range (mm)	A1 Range (mm)	A2 Range (mm)	A1 Range (mm)	A2 Range (mm)
CS6L-MS	/	/	/	/	500-600	200-250
CS6R-MS / CS6R-T / CS6R-H-AG	/	/	/	/	400-600	200-250
CS6RA-MS	/	/	/	/	300-450	200-250
CS6RB-MS	/	/	/	/	400-600	100-200
CS6R-MS-HL / CS6R-MB-HL	/	/	/	/	350-650	100-300
CS6W-MS (F45 ¹ Frame) / CS6W-T	600-800	200-250	/	/	/	/
CS6W-MB-AG	/	/	600-700	200-250	/	/

¹: with 30 mm height frame;

*: test loads, please refer to section 6

6.2.7 Four clamps mounting on the short side of frame.

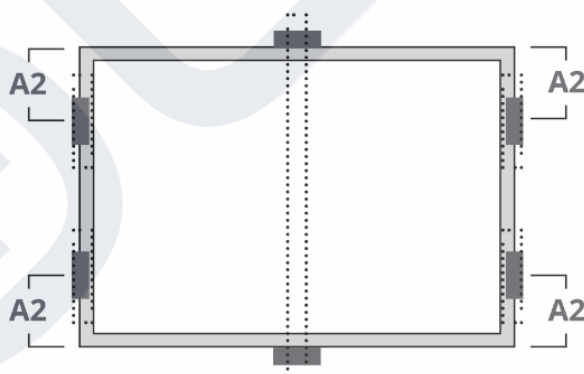


Module Types	Max Mechanical Load (Pa)*		
	+1800/-1800	+2400/-2400	+2600/-2400
	A2 Range (mm)		
CS6L-MS CS6R-MS / CS6R-T CS6RA-MS / CS6RA-T CS6RB-MS / CS6RB-T CS6R-H-AG	60-250 [◊]	/	/
CS6R-MS-HL / CS6R-MB-HL	/	0-200	200-250

[◊]: clamp overlap length should be at least 80 mm;

*: test loads, please refer to section 6

6.2.8 Four clamps mounting on short side of frame, and an additional support bar placed below the center of the module.

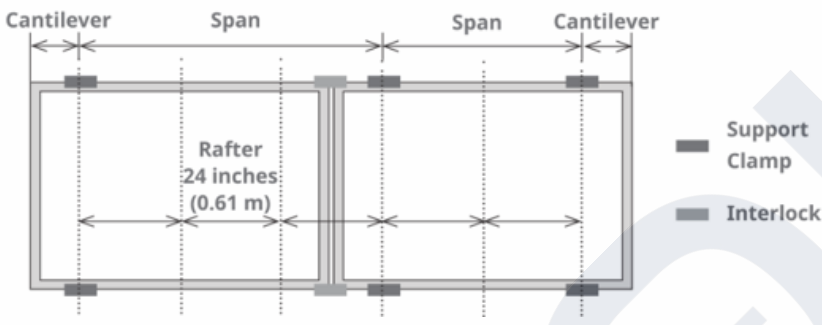
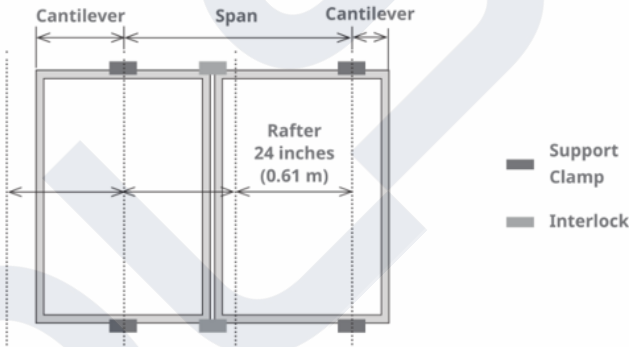


Module Types	Max Mechanical Load (Pa)*		
	+4000/-3000	+4000/-4000	+5400/-3000
	A2 Range (mm)		
CS6R-MS / CS6RA-MS / CS6RB-MS / CS6R-T	0-200	/	/
CS6R-MS-HL / CS6R-MB-HL	/	0-200	/
CS6R-H-AG	/	/	200-250

*: test loads, please refer to section 6

6.2.9 Rail-less clamping

The following methods are recommended only for single glass monofacial modules. Note that clamp overlap length of 40mm (or 1.50 in) when uplift load > 2400 Pa is allowed.

 <p style="text-align: center;">Landscape installation, clamping on long side frame</p>				
Module Type	Max Span	Max Cantilever length	Downforce*	Uplift*
CS6R-MS-HL / CS6R-MB-HL	72 inches (1.83 m)	24 inches (0.61 m)	2650 Pa	2400 Pa
	64 inches (1.63 m)	21.3 inches (0.54 m)	2800 Pa	2400 Pa
	48 inches (1.22 m)	16 inches (0.41 m)	3600 Pa	3600 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	4000 Pa	3600 Pa
 <p style="text-align: center;">Portrait installation, clamping on short side frame</p>				
Module Type	Max Span	Max Cantilever length	Downforce*	Uplift*
CS6R-MS-HL/CS6R-MB-HL	48 inches (1.22 m)	16 inches (0.41 m)	1800 Pa	1800 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	1800 Pa	1800 Pa
	24 inches (0.61 m)	8 inches (0.2 m)	2000 Pa	2000 Pa

*: test loads, please refer to section 6

6.3 INSERTION SYSTEM

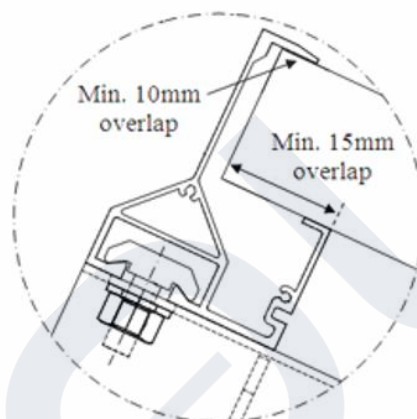
- Insertion Method C shown below is recommended only for monofacial modules.
- The mechanical load test with these mounting methods were performed according to IEC 61215.
- Insertion methods can vary and depend on the mounting structures. The installer needs to follow the mounting guidelines recommended by the mounting

system supplier. Each module must be securely maintained through all its length on two opposite sides. Install and tighten the insertion profiles to the support structure using the hardware and instructions provided by the mounting system manufacturer. The system designer and installer are solely responsible for load calculations and for the proper design of support structure.

• When installing insertion profiles, please take the following measures into account:

1. Do not bend the module frame.
2. Do not touch the front glass or cast shadows onto it.
3. Do not damage the surface of the frame.
4. Ensure that the insertion profiles overlap the module frame by at least 10 mm (0.39 in).
5. Ensure that the module frame (C-shape) overlaps the insertion profiles by at least 15 mm (0.59 in).
6. Ensure insertion profile thickness and tolerances suit module thickness.

improper insertion systems or unsuitable installation methods are used.



• Canadian Solar warranty may be void in cases where

Insertion Method A	Insertion Method B	Insertion Method C
Two insertion profiles run parallel to long side frame.	Two insertion profiles run perpendicularly to long side frame.	An additional support bar used with clamps

Installation Method / Module Types	Insertion Method A	Insertion Method B	Insertion Method C
CS6L-MS CS6R-H-AG / CS6RA-H-AG	+3600 Pa/-2400 Pa	+1800 Pa/-1800 Pa	/
CS6R-MS / CS6R-T CS6RA-MS / CS6RA-T CS6RB-MS / CS6RB-T	+4000 Pa/-2400 Pa	+1800 Pa/-1800 Pa	/
CS6R-MS-HL / CS6R-MB-HL	+5400 Pa/-2400 Pa	+2400 Pa/-2400 Pa	+5400 Pa/-2400 Pa
CS6W-MS (F35A ¹ Frame)	+4000 Pa/-2400 Pa	+1800 Pa/-1800 Pa	+5400 Pa/-2400 Pa
CS6W-MS (F45 ¹ Frame)/ CS6W-T	+3600 Pa/-2400 Pa	+1800 Pa/-1800 Pa	+5400 Pa/-2400 Pa
CS6W-MB-AG (F47 ¹ Frame)	+3600 Pa/-2400 Pa*	/	/

¹: with 30 mm height frame;

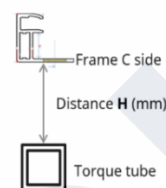
²: with 35mm height frame.

The loads in the table are test loads, please refer to section 6

*: Just for CWF 0% overhang- insertion profile completely wraps the frame without cantilever. Rail distance must be ≥ 50% frame from the short end of one side of the module.

6.4 MOUNTING METHOD: SINGLE-AXIS TRACKER

- The following mounting methods are only recommended for double glass modules.
- The bolts and clamps used in this section should follow the requirements described in chapter 6.0.
- Under any conditions the junction box should not come in contact with the subjacent racking structure except for the torque tube under high loading. For any single axis tracker installation configured with one module in portrait rows, bearing houses cannot be located under the module junction boxes.
- If any racking structures, especially bearing house, must be located under the modules, any racking structure shall not be higher than frame C side.



- If your tracker design cannot meet the above distance requirement, please contact Canadian Solar technical support department in writing for advice.

Tracker 1P Bolting method

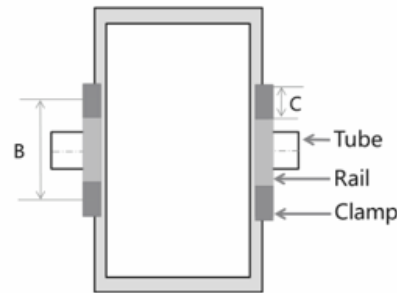
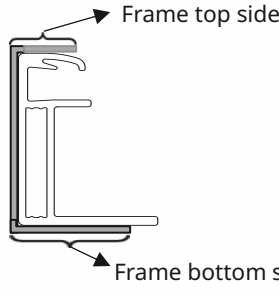
- Install and tighten the module clamps to the mounting rails using the torque stated by the mounting hardware manufacturer. M6 × 1 (1/4") or M8 × 1.25 (5/16") bolt and nut are used for this bolting method.
- The tightening torques should be 6~9 Nm (4.5~6.6 ft-lbs) M6 × 1 (1/4") coarse thread bolts for 10 × 7 mounting hole, depending on bolt class. M8 × 1.25 (5/16") for 14 × 9 mounting hole.

	Module type	Mounting hole space (mm)	Fixed mounting hole location	Plain washer outer diameter (mm)	Distance H (mm)	Test load (Pa)
	CS6W-MB-AG (F42 ² frame)	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2000/-1800
			B1, B2, B3, B4	16	65±5	+2400/-2200
	CS6W-MB-AG (F47 ¹ frame)	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-2100
			B1, B2, B3, B4	16	65±5	+2800/-2400
	CS6W-TB-AG	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-2100
			B1, B2, B3, B4	16	65±5	+2800/-2400
	CS7L-TB-AG	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-1900
			B1, B2, B3, B4	16	65±5	+2500/-1900
	CS7N-TB-AG	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-1900
			B1, B2, B3, B4	16	65±5	+2300/-1900
	CS7L-MB-AG	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-1900
			B1, B2, B3, B4	16	65±5	+2500/-1900
	CS7N-MB-AG	A1-A3: 400 B1-B3: 790	A1, A2, A3, A4	16	65±5	+2100/-1900
			B1, B2, B3, B4	16	65±5	+2300/-1900

¹: with 30 mm height frame;

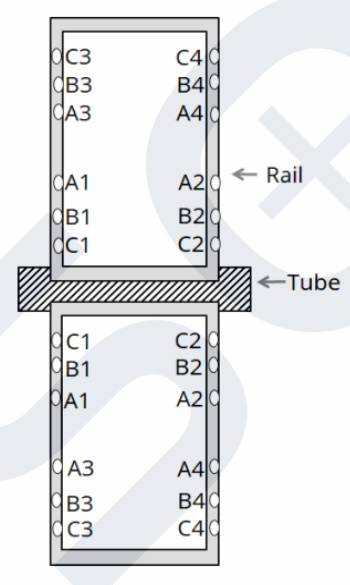
²: with 35 mm height frame

Tracker 1P Clamping method

	Module type	B Value (mm)	Clamp length C (mm)	Test load (Pa)
	<p>Overlap width between clamp and frame: Frame top side ≥ 10 mm Frame bottom side ≥ 15 mm</p> 	CS6W-MB-AG	≥400	≥40
CS7L-MB-AG		≥400	≥40	+1600/-1600
CS7N-MB-AG		≥400	≥40	+1500/-1500
CS6W-TB-AG		≥400	≥40	+1800/-1800
CS7L-TB-AG		≥400	≥40	+1600/-1600
CS7N-TB-AG		≥400	≥40	+1500/-1500

The height of the rail should be 50±10 mm.

Tracker 2P Bolting method

	Module type	Mounting hole space (mm)	Mounting hole location	Plain washer outer diameter (mm)	Test load (Pa)
	<p>← Rail</p>	CS6W-MB-AG (F47 ¹ Frame)	A1-A3: 400	B1, B2, A3, A4	16
B1-B3: 790			B1, B2, B3, B4	16	+2600/-2200
<p>← Tube</p>	CS6W-MB-AG (F42 ² Frame)	A1-A3: 400	B1, B2, A3, A4	16	+1800/-1600
		B1-B3: 790	B1, B2, B3, B4	16	+2200/-2000
	CS7L-MB-AG CS7N-MB-AG	A1-A3: 400	B1, B2, A3, A4	16	+1800/-1600
			B1, B2, B3, B4	16	+2000/-1800
	CS7L-TB-AG CS7N-TB-AG	B1-B3: 790	B1, B2, B3, B4	16	+2000/-1800
	CS6W-TB-AG	A1-A3: 400	B1, B2, A3, A4	16	+1900/-1900
			B1-B3: 790	B1, B2, B3, B4	16

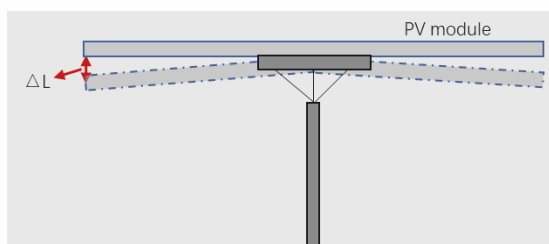
¹: with 30mm height frame;

²: with 35mm height frame

- The maximum allowable twist angle of the module is 0.5 degree.
- Please contact the tracker manufacturer and Canadian Solar’s technical support department for details in

regard to specific projects.

- Please verify the approved loads in the table with the racking suppliers.
- The maximum deflection (ΔL shown in the below picture) is measured at the module corners under its own weight with a typical tracker mounting system. The maximum allowable deflection of the module is 25mm.



7 MAINTENANCE

- **Do not** make modifications to any component of the PV module (diode, junction box, connectors or others).
- Regular maintenance is required to keep modules clear of snow, bird droppings, seeds, pollen, leaves, branches, dirt spots, and dust.
- Modules with sufficient tilt (at least 15°), generally may not require cleaning (rain will have a self-cleaning effect). If the module has become soiled, wash with water and a non-abrasive cleaning implement (sponge) during the cool part of the day. Do not scrape or rub dry dirt away, as this may cause micro scratches.
- Snow should be removed using a soft brush.
- Periodically inspect the system to check the integrity of all wiring and supports.
- To protect against electric shock or injury, electrical or mechanical inspections and maintenance should be performed by qualified personnel only.

8 MODULE CLEANING GUIDELINES

This manual covers the requirements for the cleaning procedure of Canadian Solar photovoltaic modules. The purpose of these cleaning guidelines is to provide general information for cleaning Canadian Solar modules. System users and professional installers should read these guidelines carefully and strictly follow these instructions.

Failure to follow these instructions may result in death,

injury or damage to the photovoltaic modules. Damages induced by inappropriate cleaning procedures will void Canadian Solar warranty.



SAFETY WARNING

- Cleaning activities create a risk of damaging the modules and array components, as well as increasing the potential electric shock hazard.
- Cracked or broken modules represent an electric shock hazard due to leakage currents, and the risk of shock is increased when modules are wet. Before cleaning, thoroughly inspect modules for cracks, damage, and loose connections.
- The voltage and current present in an array during daylight hours are sufficient to cause a lethal electrical shock.
- Ensure that the circuit is disconnected before starting the cleaning procedure, as contact with leakage of electrically active parts can result in injury.
- Ensure that the array has been disconnected to other active components (such as inverter or combiner boxes) before starting with the cleaning.
- Wear suitable protection (clothes, insulated gloves, etc.).
- **Do not** immerse the module, partially or totally, in water or any other cleaning solution.
- Rear side cleaning of the modules is not required, if cleaning the rear of a module is desired, care should be taken to ensure there is no damage caused to the module, especially the soft surface of the backsheet, by simply clearing the contaminant by hand or with a soft sponge.

HANDLING NOTICE

NOTICE

- Use a proper cleaning solution and suitable cleaning equipment.
- **Do not** use abrasive or electric cleaners on the module.
- Particular attention should be taken to avoid the module rear glass or frame coming in contact with

sharp objects, as scratches may directly affect product safety.

- **Do not** use abrasive cleaners, de-greasers or any unauthorized chemical substance (e.g. oil, lubricant, pesticide, Gasoline, white flower oil, active oil, mold temperature oil, machine oil (such as KV46), grease (such as Molykote EM-SOL, etc.), lubricating oil, anti-rust oil, stamping oil, butter, cooking oil, propyl alcohol, ethyl alcohol, essential oil, bone-setting water, Tianna water, mold release agent (such as Pelicoat S-6, etc.), glue and potting glue that can generate oxime gas (such as KE200, CX-200, Chemlok, etc.), TBP (plasticizer), cleaning agents, pesticide, paint strippers, adhesives, antirust agent, disincrustant, emulsifying agent, cutting oils and cosmetics, etc.) on the module.
- **Do not** use cleaning corrosive solutions containing hydrofluoric acid, alkali, acetone, or industrial alcohol. Only substances explicitly approved by Canadian Solar are allowed to be used for cleaning modules.
- For cleaning methods using rotating brush, please consult with Canadian Solar's technical support before using.
- Dirt must never be scraped or rubbed away when dry, as this will cause micro-scratches on the glass surface. The module damage due to improper dry cleaning method will void Canadian Solar's warranty.
- Improper cleaning equipment design may cause localized heavy loads onto the module. Localized heavy loads may cause severe micro-cracks at cell level, which in turn may compromise module reliability and void Canadian Solar's warranty. Please consult the Canadian Solar technical support department for information on the use of cleaning solutions and loading specifications. .

OPERATION PREPARATION

- Noticeable dirt must be rubbed away by gentle cleaning implement (soft cloth, sponge or brush with soft bristles).
- Ensure that brushes or agitating tools are not abrasive to glass, EPDM, silicone, aluminum, or steel.
- Avoid cleaning during the hottest hours of the day, in order to prevent thermal stress on the module.

CLEANING METHODS

Method A: Compressed Air

Canadian Solar recommends cleaning the soft dirt (like dust) on modules just with air pressure. This technique can be applied as long as the method is efficient enough considering the existing conditions.

Method B: Wet cleaning

If excessive soiling is present on the module surface, a non-conductive brush, sponge, or other mild agitating method may be used with caution.

- Ensure that any brushes or agitating tools are constructed with non-conductive materials to minimize risk of electric shock and that they are not abrasive to the glass or the aluminum frame.
- If grease is present, an environmentally friendly cleaning agent may be used with caution.
- Canadian Solar recommends the following to be used:
 - Water with low mineral content
 - Near neutral pH water
 - The maximum water pressure recommended is 4 MPa (40 bar)

ANNEX A: GUIDANCE ON MODULE TEMPERATURE FOR SEVERAL LOCATIONS

- The operational temperature of a PV module changes during the day and also from day to day throughout the year. The 98th-percentile temperature represents the temperature that is larger than 98% of all the temperatures, and consequently it is met or exceeded only 2% of the time.
- The 98th-percentile temperature is to be determined from measurements taken on hourly-basis, or even more frequently. For a standard year, the 98th-percentile temperature would be met or exceeded 175.2 hours.
- The operational module temperature is influenced by the environmental temperature but also by how the module is installed (e.g. mounting distance to roof, array size, array spacing and anti-nesting features), as it may allow a more efficient ventilation. The graphics below from IEC 63126 show this influence, the maps presented here are a general guidance and assumed conservative, please contact your local sales representative for further information.
- The operational temperature is influenced by the minimum distance between the module bottom and the surface of roof or wall. The distance is related to the climate. Figure A.2 shows climate area distribution of the Köppen climate types for the period from 1901 to 2010. In any climate regions except for BWh area, the minimum distance should be 10.2 cm (4.0 in). If you want to determine a specific distance on your project located in the BWh climate area, please contact Canadian Solar's technical service team. For more information about Köppen climate types, please refer to <http://hanschen.org/koppen>.

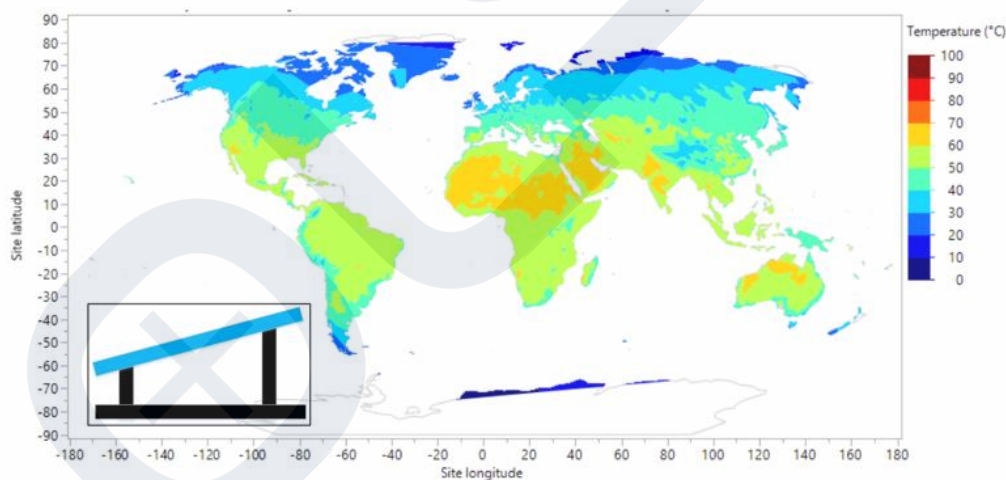


Figure A.1 – 98th-percentile temperature for an open-rack, or thermally unrestricted

World map of Köppen climate classification for 1901–2010

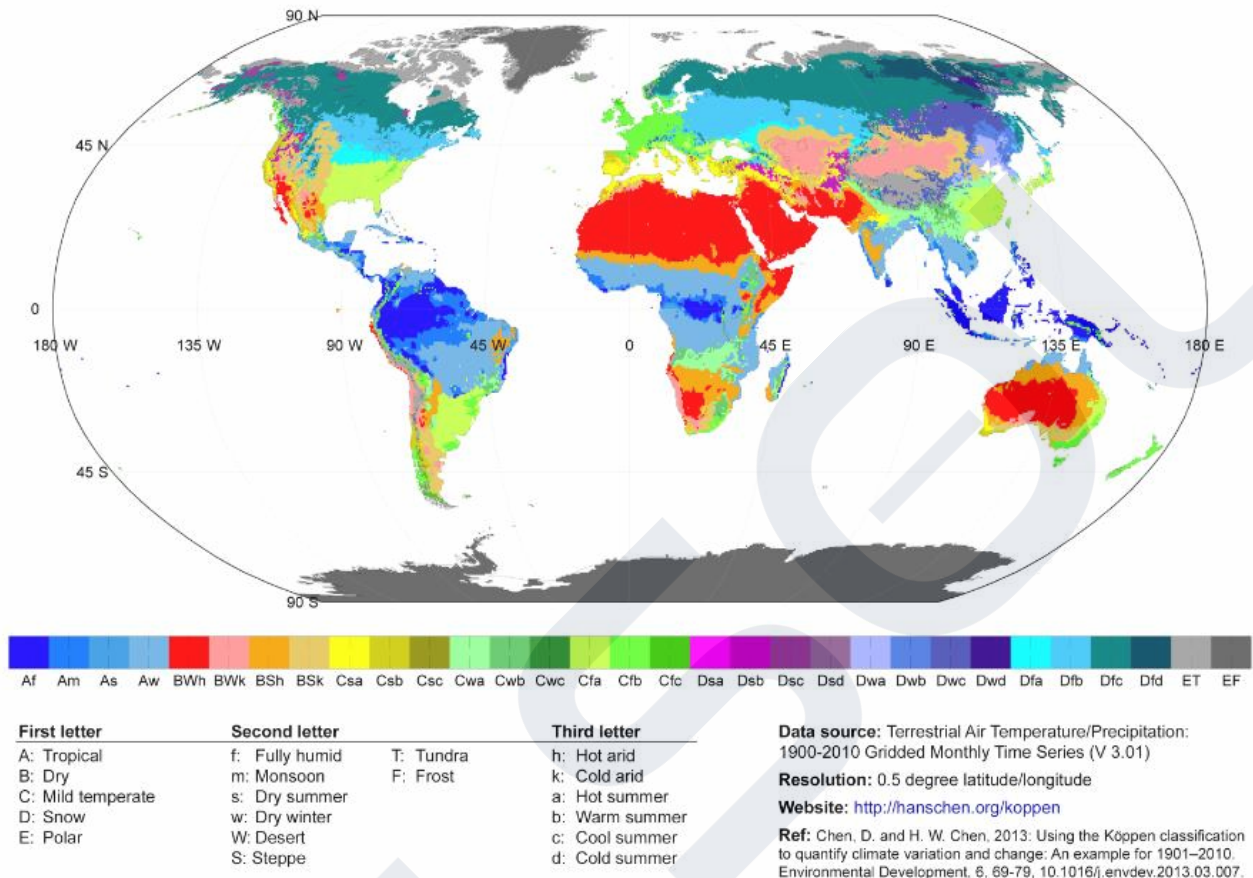


Figure A.2 Spatial distribution of the Köppen climate types for the period from 1901 to 2010

ANNEX B: INSTALLATIONS USING MODULE LEVEL POWER ELECTRONICS

- This section is applicable to CS6R-MB-HL and all Canadian Solar monofacial module types referred to in this installation manual.
- Module-level power electronics (MLPE) are devices that can be incorporated into a solar system to improve its performance in certain conditions (especially where shade is present) and to reduce shock hazard for emergency responders. MLPE devices can be supplied as a 'retro-fit' system made by third-party supplier.
- Module certification testing does not include MLPE devices.
- When installing MLPE devices with Canadian Solar modules, follow the instructions of the MLPE supplier and the specific requirements given below. Ensure electrical parameters and limitations of the MLPE devices and the Canadian Solar modules are suitable for one another.
- Failure to comply with these instructions will void the Canadian Solar warranty.
- When choosing to mount the MLPE device to the module frame, follow the MLPE supplier instructions to ensure optimal mounting of the MLPE device and prevent any slippage during operation.
- Canadian Solar recommends the MLPE device be installed close to a corner of the module frame.
- When choosing to mount the MLPE device to the mounting structure, please refer to the instructions provided by the MLPE supplier.
- **Do not** cover the module nameplate or junction boxes when installing the MLPE devices on the rear of the modules.
- **Do not** use frame mounting holes to install the MLPE device.
- **Do not** drill extra holes in the frame to install the MLPE device.
- The distance between the MLPE device and the module backsheet should be larger than 20mm.

INSTALLATION

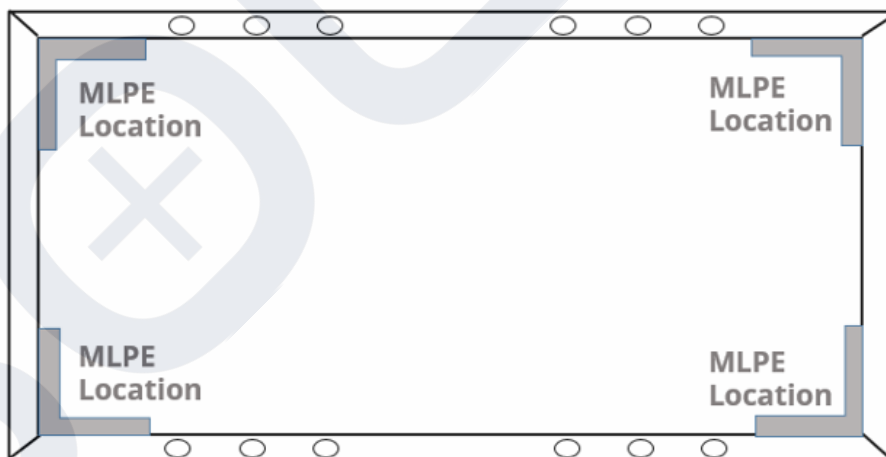


Figure B.1 - MLPE device installation zones

ANNEX C: COASTAL AREA ANTI-CORROSION INSTALLATION GUIDELINES

C.1.0 GENERAL INFORMATION

- According to the specific conditions stipulated in the Canadian Solar installation manual and general warranty statement, Canadian Solar PV modules are not allowed install in coastal areas. Coastal areas state that the places located within 100 m of the defined coastline.
- This annex has been created to facilitate approval for customer PV installations located within 20 m and 100 m of the coastline. It lays down general requirements to ensure that Canadian Solar PV modules are installed properly and reliably in coastal areas, which include but are not limited to relevant anti-corrosion principles for both the modules and associated mounting systems. This annex summarizes the key technical requirements stipulated by well-known international standards and explains how they apply to photovoltaic systems.
- Please read this annex carefully and strictly follow any relevant instructions prior to installing Canadian Solar modules in coastal areas. Failure to follow these instructions and other general anti-corrosion principles may result in corrosion damage to the photovoltaic modules and/or their racking systems, and will void the Canadian Solar limited product and performance warranty. For further inquiries, please contact our customer service department or our local representatives for more information.
- The reliability of photovoltaic modules strongly depends on their distance from the coastline. Different coastal land areas are defined according to how far away from the coastline they are; Canadian Solar generally classifies seashore PV installations according to four different groups:

Distance from the coastline (X: meters)	Requirements
$X \leq 20$ m	Installations are strictly prohibited by Canadian Solar due to concerns over salt-mist corrosion.
$20\text{m} < X \leq 100$ m	Installations must comprise Canadian Solar "special-anti-corrosion" modules. These installations must comply with the instructions listed under sections C.2.1/C.2.2/C.2.3/C3.0.
$100\text{m} < X \leq 500$ m	Installation of Canadian Solar "special-anti-corrosion" modules is recommended. It is recommended to follow the instructions listed under sections C.2.1/C.2.2/C.2.3/C.3.0.
> 500 m	Please follow section 7.0

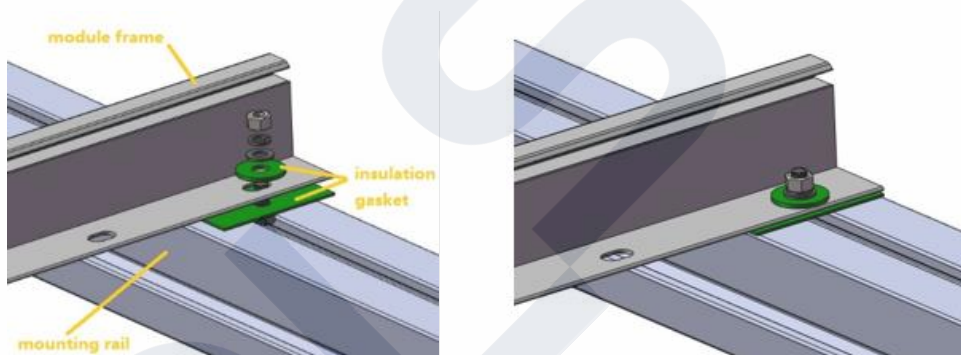
- Local conditions strongly influence the salt deposition rate, which is particularly, but not exclusively, dependent on specific regions and local wind patterns. Canadian Solar reserves the right to adapt the above definition to individual cases. Please contact your local representative to confirm which category your PV system falls under.
- The word "coastline" in this manual refers to the area where the land meets the sea during high tide.
- In this manual, "distance to the coastline" refers to the shortest distance between the photovoltaic module array and the coastline.
- Please consult the Canadian Solar technical support department or your local representative for more information on installing "special anti-corrosion" modules.

C.2.1 GENERAL ANTI-CORROSION METHODS

- Do not scratch or break the corrosion-resistant coating on the modules or mounting systems during installation.
- Do not change the structure of the module, e.g. by drilling holes into the module frame.
- Process specifications for the different components must comply with relevant international anti-corrosion standards.
- All general requirements listed in the Canadian Solar manual should be applied when installing “special-anti-corrosion” modules.

C.2.2 SPECIAL ANTI-CORROSION METHODS FOR MOUNTING

- Use mounting components that contain the same metals or metals with a similar electrochemical



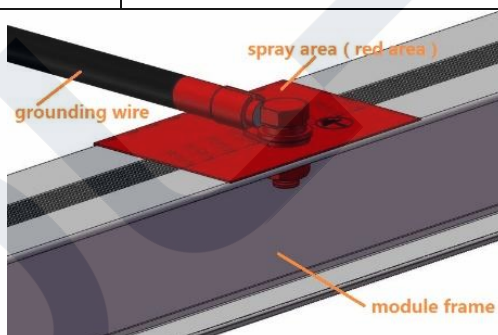
potential. The metal's coating also should be taken into account. There may be a big difference between the electrochemical potentials of two different coating materials.

- If mounting components consist of two metals with a big difference in electrochemical potential, please add insulating washers (e.g. bi-metallic washers or insulation gaskets) to isolate the metals from each other.
- Copper/aluminum bi-metallic washers are commonly available to prevent electrochemical corrosion. These washers are made in a process called explosion welding.
- Concerning insulation gaskets, we recommend mica laminate, or other silicone or fluoride-based insulating materials.

C.2.3 ANTI-CORROSION METHODS FOR GROUNDING

- We recommend two special anti-corrosion methods for protecting the system's grounding devices. Please refer to the instructions in the table below:

Item	Method A	Method B
Coating components	Fluorocarbon varnish (one layer)	Layer 1 (metal side): epoxy zinc rich primer Layer 2 (middle layer): fluorocarbon finish paint Layer 3 (air side): fluorocarbon varnish
Coating thickness	40 μm	Layer 1 (metal side): 40 μm Layer 2 (middle layer): 40 μm Layer 3 (air side): 40 μm
Painting interval	/	Follow the supplier's general requirements when painting the three coating layers. Apply the middle layer 24 hours after painting layer 1. Paint the air side layer 6 hours later after painting the middle layer.
General requirements	Clean the grounding components and make sure that they are dry and clean. The coating must cover all the grounding components and junction areas of the module frame or mounting system. Please refer to the figure below for more details. The coating should be applied in a dry atmosphere (at least 24 hours) under the following conditions: relative humidity $\text{RH} \leq 75\%$, ambient temperature $T > 5^\circ\text{C}$.	
Maintenance period	Three months	Five years



C.3.0 ANTI-CORROSION SUGGESTIONS FOR THE RACKING SYSTEM

- Suggestions for the racking system are provided below. The warranty does not cover the damage to the mounting system caused by corrosion if the mounting system is not provided by Canadian Solar. The requirements below apply to two main mounting systems: aluminum alloy-based racking for rooftops and galvanized steel-based structures for ground-mounted solar farms. To prevent salt-mist corrosion, Canadian Solar requires strict compliance with the following principles:
- Use approved corrosion-resistant materials (e.g. stainless steel SUS 316 or carbon steel with a hot-dip

galvanized coating) for any racking or BOS components used in coastal areas.

- Process specifications for the different components must comply with relevant international anti-corrosion standards.
- Minimum coating thicknesses for hot-dip galvanized and anodizing oxide components must comply with the standard minimum requirements stipulated in JIS8641 and JIS8601.

Process	Minimum coating thickness	Standard
Hot-dip galvanizing (carbon steel)	HDZ55 (76um)	ISO 1461 JIS8641
Anodizing oxide (aluminum alloy)	AA20 (20um)	ISO 7599 JIS8601

- Use mounting components that contain the same metals or metals with a similar electrochemical potential. The metal's coating should also be taken into account. There may be a big difference between the electrochemical potentials of two different coating materials.

C.4.0 Precautions and General Safety



Before installing any modules, contact the appropriate authorities to obtain any relevant approvals and learn of any site, installation and inspection requirements.

- When applying coating materials, workers must follow applicable health and safety legislation and apply all respective preventive and proactive measures described within.

C.5.0 LIMITATION OF LIABILITY

- Canadian Solar shall not be held responsible for damages of any kind, including but not limited to, bodily harm, injury and damage to property as a result of handling modules, installing systems, or compliance or non-compliance with the instructions set forth in this manual.

AMENDED EDITIONS AND DATES

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