

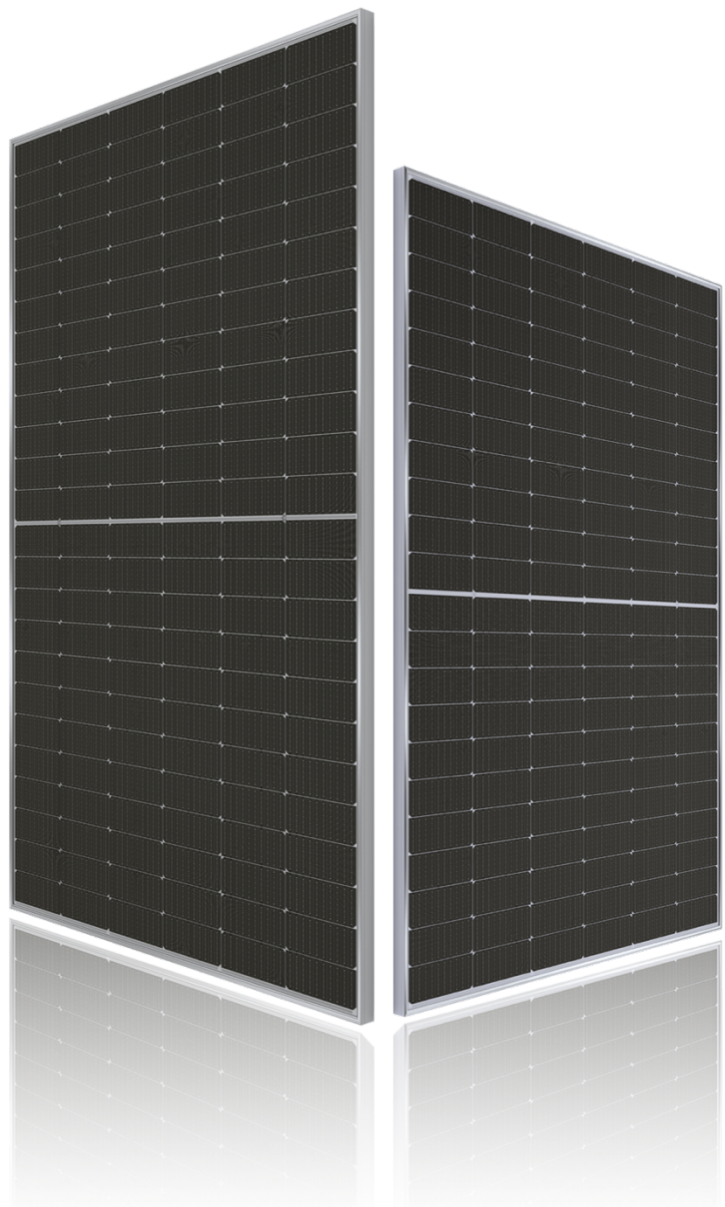
LESSO

LESSO GROUP

STOCK CODE: 2128.HK

Solar modules

Installation and Maintenance Guide



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1. Overview

- First of all, thank you for choosing Photovoltaic module (also known as solar panel, hereinafter referred to as “module”) of Guangdong LESSO Banhao New Energy Technology Group Co., Ltd. (LESSO Solar). The guide is mainly to show installation methods and safe handling of LESSO modules.
- The Guide should be read and understood before installation, operation or maintenance. It is only for reference, if any information unmentioned or unclear below, please contact professionals or LESSO’s Sales Department for further explanation.
- LESSO module is designed in accordance with international standards IEC61215/EN IEC61215 and IEC61730/EN IEC 61730, which is applicable to public accessible system and systems over 50 DC or 240 W. It has passed IEC 61215/ EN IEC 61215 and IEC61730/ EN IEC 61730, which meets the requirements of protection against electrical shock with Class II.
- Before installing PV systems, the installer should be familiar with mechanical and electrical requirements locally.
- Fail to follow the instructions in the guide will lead to the invalidity of product’s limited warranty. Please keep the Guide for further reference.

2. Disclaimer

- No responsibility is assumed by LESSO for any infringement of patents or other rights of the third parties, which happened during the use of LESSO modules.
- Because the installation, operation, usage and maintenance of modules are beyond LESSO ’s control, LESSO does not assume any responsibility for power loss, module damage, casualty and other extra costs which caused by improper installation, operation, usage or maintenance.
- The Guide is edited based on LESSO technicians' experience, but such information including product specification and suggestions does not constitute a warranty. LESSO reserves the right to update the installation guide, solar products, specification and product information without prior notice.

3. General Safety

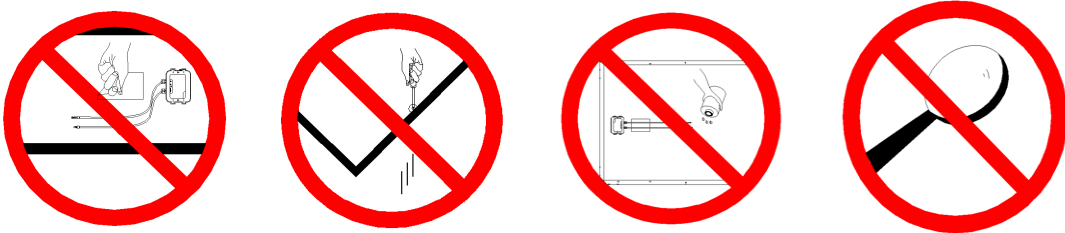
- Mechanical Installation and electrical Installation of the PV modules should refer to the related regulations, including electrical regulations, architecture law and power connection request. As for the specific terms, please contact the local authorities and

obtain the corresponding license. The installer should conform to all applicable safety precautions and local regulations listed in this guide when installing the PV modules.

- Under normal operating conditions, the output power, current, voltage and other data of modules may differ from those under standard test conditions listed in the label. A photovoltaic module is likely to experience conditions that produce higher current and/or voltage than reported at standard test conditions. Factors to consider include module temperature and front side irradiance and, for bifacial modules, ground or roof albedo, row spacing, and installation height). Accordingly, the values of V_{OC} and I_{SC} (or for bifacial modules, $I_{SC-aBSI}$) marked on this PV module should be multiplied by a factor of 1.25 when determining voltage and current ratings for components connected to the PV output. When the Modules are connected in series, the voltage of each string shall not be higher than the maximum voltage of the system. Reference equation of the maximum number of modules in serial connection is $\text{Maximum number of modules} = V_{max}/[(CV_{OC} \times V_{OC})]$, where $CV_{OC} = [1 - \beta \times (25 - T_{min})]\%$. T_{min} is the lowest expected ambient temperature at the system location. $\beta(\%/^{\circ}C)$ is the temperature coefficient of the selected module's V_{OC} (Refer to corresponding datasheet). When connected in parallel, the current output is equal to the sum of each string's current. Fuse is necessary for each module string. Take reference to the local regulation. The safety factor of 1.25 given for the minimum voltage rating of the components in the example statement above may be modified during the design of a system according to the minimum temperature of the location of the installation and the temperature coefficient for V_{OC} . The safety factor of 1.25 given for conductor current ratings values for I_{SC} (or for bifacial modules, $I_{SC-aBSI}$) may be adjusted based on the maximum values of irradiance incident on the front side of the module (and the rear side for bifacial modules). To this purpose, a full simulation for the specific location and module orientation (and for bifacial modules, ground albedo, row spacing and installation height) is required. Further guidance for the choice of a safety factor other than 1.25 is given in IEC 62548.
- Only the same type of modules could be used in one system, while inverters, connectors, cables, mounting system or other related equipment should be dedicated to PV systems. It is recommended to use the inverter with integrated PID effect restore function at night in order to avoid PID effect in power station. Observe the instructions and safety precautions for all other components used in the PV system, including wiring and cables, connectors, DC-breakers, mounting hardware, inverters, batteries, etc.
- Modules could generate direct current when exposed to the sunlight. It has a risk of electric shock when touching the electriferous parts. Touching the terminal blocks of

junction boxes are prohibited. Be cautious when carrying modules or connecting cables between modules.

- Do not use mirror or other magnifiers to artificially concentrate sunlight on the module. Completely cover all modules with an opaque material during installation to prevent electricity from being generated.
- Prohibit demounting modules under loads. Disassemble the module or remove any attached labels or components are forbidden. Modules should not be marked by using sharp objects. Meanwhile, painting or pasting on the surface is prohibited.
- Make sure not to use sharp-pointed objectives to wipe the surface of the modules. Prohibit scratching or hitting PV modules, for the avoidance of damage. Do not use or install broken modules to prevent the hazard of fire, electric shock and injury.
- Keep children well away from the PV system while transporting and installing mechanical and electrical components.
- The accessible PV module surface shall be smooth and free from sharp edges, burrs, etc.
- Do not expose PV module to sunlight concentrated with mirrors, lenses or similar means.



4. Transportation, Storage and Handling

- LESSO Solar PV modules should transport in the supplied package only and kept in the package until they are ready to be installed.
- Please protect the package to prevent damage.
- To ensure pallets from falling over.
- Do not exceed the maximum height as what indicated on the pallet package.
- Please place pallets in shaded, dry and flat location. Do not open the package until you need to use the PV modules.

- For temporary storage, modules should be placed in dry and ventilated room, stacked well to avoid sliding. At most 31 pieces' modules are put in each pallet when using a metal pallet.



Figure1 - Pallet of PV modules

- LESSO Solar PV modules are heavy, and should be handled with care.
- For unpacking PV modules from LESSO supplied package, first remove the pallet lid and packing belts. Taking out the modules in turn and removing the first module in order of modules, and take out the remaining modules in order from the carton. Please pay attention to the rest of modules in the package in case that they fall over to one side.

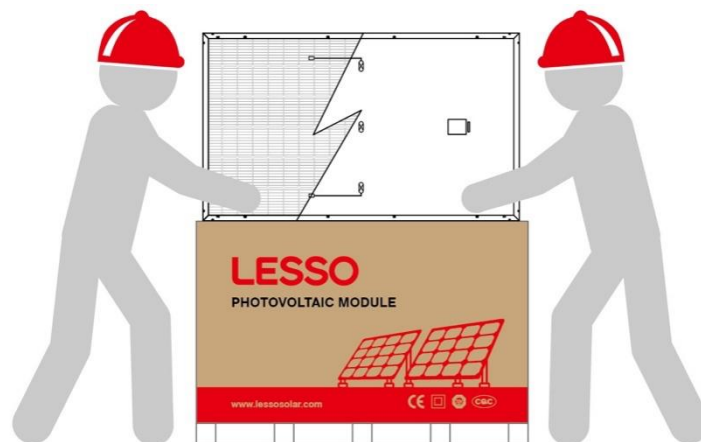
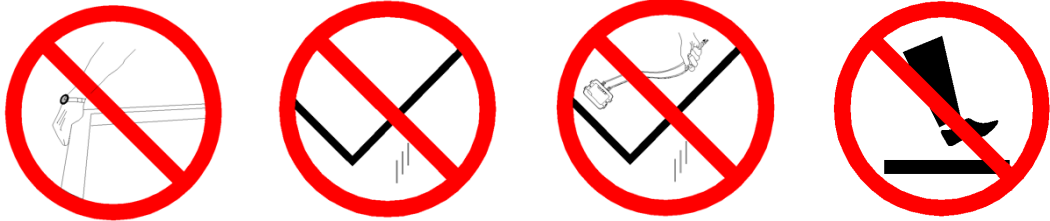


Figure 2 - Removing PV modules from a pallet

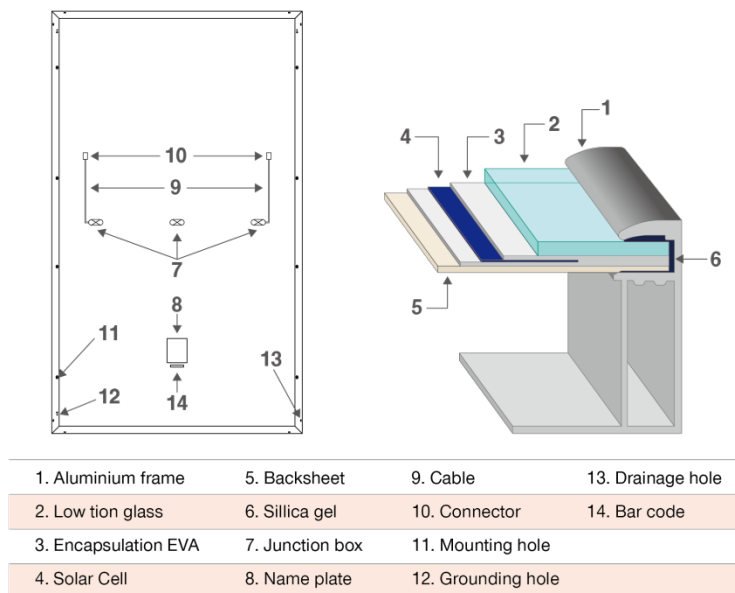
- Watches and rings must not be worn to prevent from scratching PV modules when carrying them.
- Prevent bumping and collision during carrying and installation. Lay down the module lightly. Do not hold the junction box or cables to lift the module.

- Don't stand or step on the module. Prevent one PV module falling on the other PV module.
- Do not place any heavy objects on PV modules. Broken glass can result in personal injury. PV modules with broken glass cannot be used and should be special handling.
- Broken or damaged PV modules must be handled carefully and disposed properly.

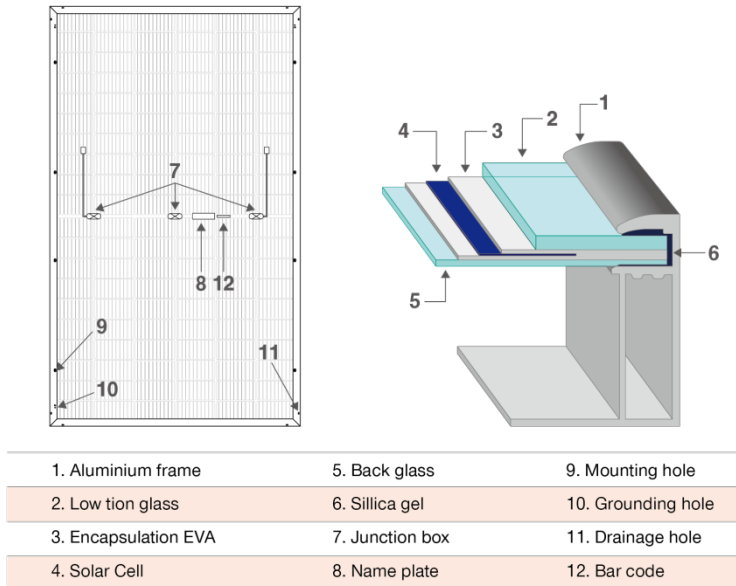


- Check PV modules for damage due to transportation before they are installed.
- PV module surfaces are susceptible to damage that could affect the performance or safety of the PV module. Contact the sales service department of LESSO in order to obtain information on making claims for defective PV modules.
- For your safety, do not disassemble or modify LESSO PV modules in any way. Doing so may degrade performance or cause irreparable damage and will invalidate any applicable warranty.
- Do not lift the module by holding the junction box or wires in any cases.

5. Product Identifications



(a) Typical mechanical drawing of mono-facial modules



(b) Typical modules mechanical drawing of bifacial modules (with frame)

Figure 3 - LESSO Solar PV module structure

- Each module has a label on its rear side providing the following information: the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, test conditions (STC and BNPI & BSI or aBSI for bifacial PV modules), and weight, dimension, the maximum system voltage, maximum fuse rating and so on.
- Each module has several serial numbers for traceability. One is permanently sealed up in the interior of the module, which is visible when viewing from the front of the module. The rest are pasted in frame and back sheet. The serial number coding is as follow:

BH H061 LAC 220101 01 0001

- BH: Denotes the company code of LESSO (BH)
- H061: Denotes the factory code (H061)
- L: Denotes the workorder type code
- A: Denotes the solar cell type code
- C: Denotes the product type code
- 220101: Denotes the date code (220101 means 2022-01-01)
- 01: Denotes the workorder flow code

- 0001:Denotes the order number (0001-9999)

- **Module external dimension as below:**

Dimension	Module Type	Module Format
2174/1960/1909mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	A series	60 (Half-cell)
2174/1960/1909mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	B series	60 (Full-cell)
2279/2278/2256mm(L) x1134mm(W) x 35mm/30mm(H)	C series	72 (Half-cell)
2279/2278/2256mm(L) x1134mm(W) x 35mm/30mm(H)	D series	72 (Full-cell)
2384/2382/2094mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	E series	66 (Half-cell)
2384/2382/2094mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	F series	66 (Full-cell)
2465mm(L) x1134mm(W) x 35mm/30mm(H)	G series	78 (Half-cell)
1964/1960/1724/1722mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	H series	54 (Half-cell)
1964/1960/1724/1722mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	I series	54 (Full-cell)
1762mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	J series	48 (Half-cell)
1762mm(L) x1303/1134mm(W) x 35mm/33mm/30mm(H)	K series	48 (Full-cell)
-	L series	27 (Full-cell)
2382mm(L) x1134mm(W) x 35mm/30mm(H)	M series	66 (Quarter-cell)

6. Installation Environment

- LESSO PV modules are suitable for ground installation in areas below 2000 meters above sea level, which cannot be used in outer space.
- LESSO suggests modules are installed in a working ambient temperature of -40 °C to

the upper limit set by a 98th percentile module operating temperature of 70 °C and humidity less than RH85% environment. The working ambient temperature is the monthly average maximum temperature and minimum temperature of installation site. If modules are long-term exposed beyond the upper working ambient temperature limit of -40°C ~85 °C, damage and power loss may occur earlier.

- The designed mechanical load for the product is 3600Pa on the front and 1600 Pa on the back with safety factor is 1.5.
- Modules should be installed in areas with plenty irradiation, rather than shaded or partial shaded area.
- Modules should be protected against thunder and lightning while installation and operation, especially in frequent thunder and lightning area. Otherwise, modules are possible to be struck by lightning.
- LESSO modules have passed the IEC61701 salt spray corrosion test, but the corrosion may still occur on where the modules frame is connected to the bracket or where the grounding is connected. LESSO modules can be installed 50m - 500 m away from the ocean side, but stainless steel or aluminum material are needed to be used in where connecting PV modules and apply anti-corrosion measurement on the connection point.
- Do not install modules near facilities or in places where inflammable gases can be generated or converged.
- Do not install modules in water immersed place, and place with water heating or water spray devices.

7. Mechanical Installation

7.1 General Rules

- Solar system installation requires professional knowledge and skills, and it should be operated by qualified personnel with specialized and licensed tools. Module installation personnel take all risks which may cause injuries, such as electric shock.
- Module installation has to refer to local and state applicable laws and regulations. If necessary, installation permission for architecture electric system should be obtained.
- Solar modules convert solar energy into DC current, which is designed for outdoor installation on ground, mounting system or rooftop. System designer and installer are responsible for designing a proper mounting system.
- The whole process of system installation should be under dry conditions with dry

tools. Do not carry or transport wet modules unless wearing appropriate protective equipment. Please stop installing in the rain, snow, or windy weather.

- Do not wear metallic jewelry while installation and maintenance.
- Do not touch modules with bare hands, as glass surface and frame may be hot, there is a risk of burns and electric shock.



- Because of heat-expansion and cold-contraction effect of module frames, there should be at least 10 mm distance between two adjacent modules.
- Please use the mounting holes that have been set on the aluminum frames for mounting with bolts. The most commonly used mounting method is to use the central 4 mounting holes on frames. In places with frequent snow and wind days, it is suggested to use 8 mounting holes.

7.2 Installation Direction and Tilt Angle Selection

- For maximum system efficiency, when installed in the northern hemisphere, modules should face south direction, while in the south hemisphere, modules should face north direction.
- Modules can be installed by long side frames or short frames. Before installation, make sure the cable length is enough. If extra cables needed, make sure to choose cables with the same type of connector.
- To get the correct installation tilt angle, please refer to standard PV module installation guide or consult with professional installer or expert. LESSO recommends that the installation angle should be not less than 10° , so modules can be self - cleaned during the rain.
- Modules in the same series should be installed at the same tilt angle. Different installation tilt angles shall cause unmatched current because absorption of different irradiation, which lead to reduced efficiency of solar system.
- Installation inclination refers to the angle between the solar photovoltaic module and the ground plane, as shown in Figure 4.

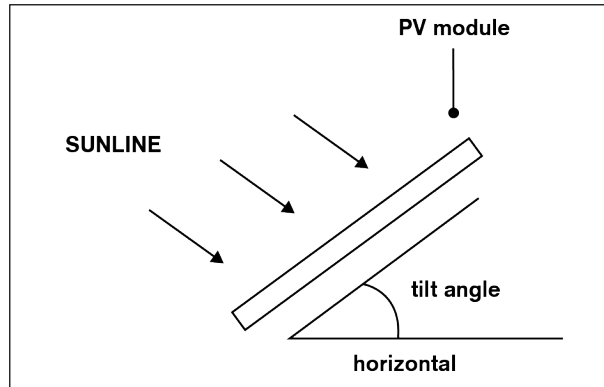


Figure 4 – Tilt angle

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

Table 1 - Recommended tilt angle for fixed systems

7.3 Mounting System Selection

- Always observe the instructions and safety precautions of mounting systems to be used with modules. Choosing proper mounting system to meet load requirement, which is calculated by system designer or installer.
- Mounting systems must be made of anti-abrasion, anti-corrosion and UV-resistant materials.
- Do not drill holes in the aluminum frame of modules, otherwise, the warranty will be invalidated.

7.4 Ground Installation

- Ensure proper installation height, tilt angle and distance of mounting system to prevent the bottom of modules are not flooded by rain or buried by snow. Meanwhile, ensure the lowest part of the module is high enough to avoid being shaded by plants, buildings and obstructions and to avoid being damaged by sand and stone driven by wind.

7.5 Rooftop Installation

- It is recommended to install modules on a roof or building under the weather of no

winds or breeze, or it may cause accident in the weather of strong wind.

- When the module is installed on the roof or the building, it is necessary to ensure that the roof structure is fixed firmly and will not be damaged by heavy wind or heavy snow.
- Ensure the roof construction is suitable to install modules.
- System designer need to set up corresponding mounting system according to the special structure of the rooftop. In addition, any roof penetration required to fix the module must be properly sealed to prevent leakage.
- Adequate ventilation space should be provided under the module for cooling (10 cm minimum interval between modules and rooftop).

7.6 Installation Methods

7.6.1 Mounting with bolt

- LESSO offers one type of installation, bolts installation (install through the mounting holes).
- Each module has eight mounting holes at the aluminum frames used to fix the modules by M8 bolt on the mounting system.

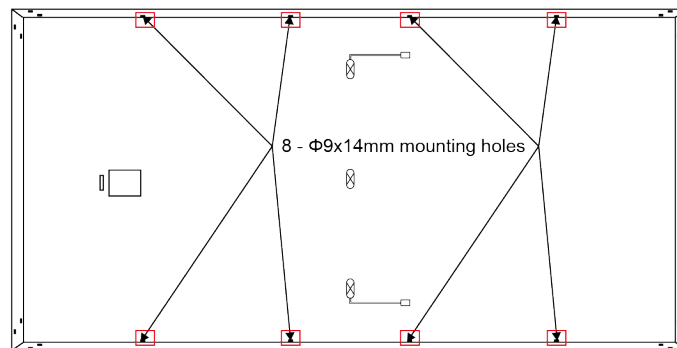


Figure 5 - Eight mounting holes at the aluminum frames and GFRP composite frame

- The designed mechanical load for the product is 3600 Pa on the front and 1600 Pa on the back with safety factor is 1.5.

The designed mechanical load for LESSO module is as follow:

Module Name / Type	On the front	On the back	Safety factor
xxxD(HPM)xx(182)	3600 Pa	1600 Pa	1.5
xxxC(HPM)xx(182)	3600 Pa	1600 Pa	1.5
xxxC(HBB)xx(182)	3600 Pa	1600 Pa	1.5

xxxD(HPM)xx(210)	3600 Pa	1600 Pa	1.5
xxxC(HPM)xx(210)	3600 Pa	1600 Pa	1.5
xxxC(HPM)xx(210R)	3600 Pa	1600 Pa	1.5
xxxD(BPM)xx(182)	3600 Pa	1600 Pa	1.5
xxxC(BPM)xx(182)	3600 Pa	1600 Pa	1.5
xxxD(HBD)xx(182)	3600 Pa	1600 Pa	1.5
xxxC(HBD)xx(182)	3600 Pa	1600 Pa	1.5
xxxC(BBD)xx(182)	3600 Pa	1600 Pa	1.5
xxxD(HBD)xx(210)	3600 Pa	1600 Pa	1.5
xxxC(HBD)xx(210)	3600 Pa	1600 Pa	1.5
xxxC(HBD)xx(210R)	3600 Pa	1600 Pa	1.5
xxxC(QBD)xx(210R)	3600 Pa	1600 Pa	1.5

- **Mounting methods and positions**

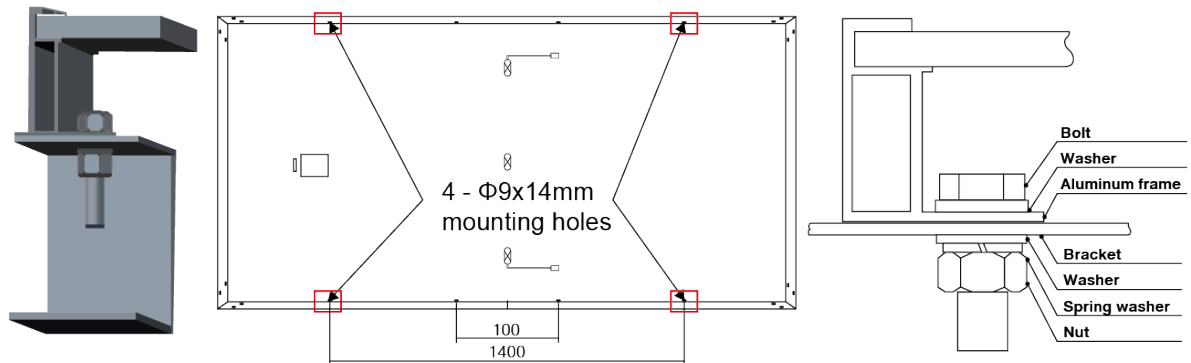
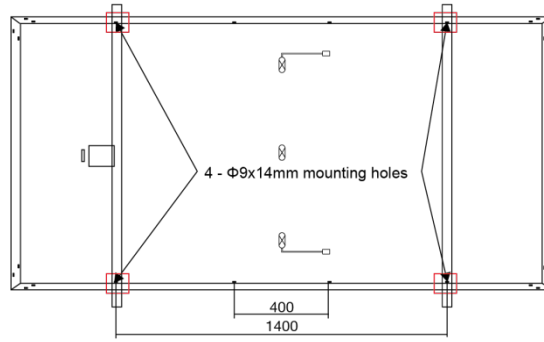
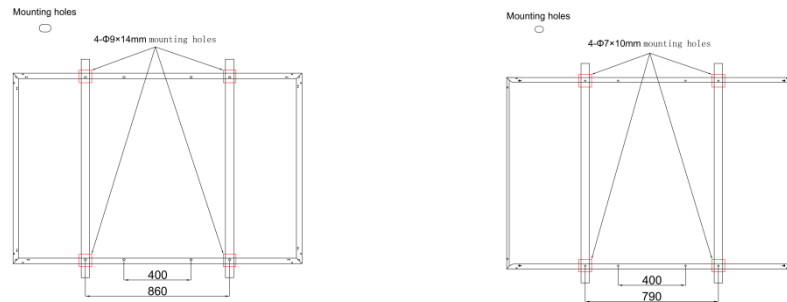


Figure 6 - Mounting methods and positions

7.6.2 Mounting with Bolt - Transversal



(a)



(b)

Figure 7 - Installation with bolts into 4 outer holes, beam perpendicular to long sides

number	Module Name/Type	Frame thickness	Distance of long side beams
(a)	xxxD(HPM)xx(182),(xx=72,66,60)	35 mm/30 mm	1400 mm±25 mm
	xxxC(HPM)xx(182),(xx=72,66,60)		
	xxxC(HBB)xx(182),(xx=72,66,60)		
	xxxD(HPM)xx(210),(xx=66,60)	35 mm/33mm/30 mm	
	xxxC(HPM)xx(210),(xx=66,60,48)	35 mm/33mm/30 mm	
	xxxC(HPM)xx(210R),(xx=66,60,48)	35 mm/30 mm	
	xxxD(BPM)xx(182),(xx=72,66,60)		
	xxxC(BPM)xx(182),(xx=72,66,60)		
	xxxD(HBD)xx(182),(xx=72,66,60)		
	xxxC(HBD)xx(182),(xx=78,72,66,60)	35 mm/33mm/30 mm	
	xxxC(BBD)xx(182),(xx=78,72,66,60)		
	xxxD(HBD)xx(210),(xx=66,60)	35 mm/33mm/30 mm	
	xxxC(HBD)xx(210),(xx=66,60,48)	35 mm/33mm/30 mm	
	xxxC(HBD)xx(210R),(xx=66,60,48)	35 mm/30 mm	
xxxC(QBD)xx(210R),(xx=66,60,48)	35 mm/30 mm		
(b)	xxxD(HPM)54(182)	35 mm/30 mm	860 mm/790 mm±25 mm
	xxxC(HPM)54(182)		
	xxxC(HBB)54(182)		

xxxD(HPM)54(210)	35 mm/33mm/30 mm
xxxC(HPM)54(210)	35 mm/33mm/30 mm
xxxC(HPM)48(210)	35 mm/33mm/30 mm
xxxC(HPM)54(210R)	35 mm/30 mm
xxxC(HPM)48(210R)	
xxxD(BPM)54(182)	
xxxC(BPM)54(182)	
xxxD(HBD)54(182)	
xxxC(HBD)54(182)	
xxxC(BBD)54(182)	
xxxD(HBD)54(210)	35 mm/33mm/30 mm
xxxC(HBD)54(210)	35 mm/33mm/30 mm
xxxC(HBD)48(210)	35 mm/33mm/30 mm
xxxC(HBD)xx(210R),(xx=54,48)	35 mm/30 mm
xxxC(QBD)xx(210R),(xx=54,48)	35 mm/30 mm

Recommended accessories are as below:

Accessories	Model	Material	Note
Bolt	M8 (full thread recommended)	Q235B/SUS304	Accessories material selection should be based on application environment.
Washer	2pcs, thickness ≥ 1.5 mm and outside diameters=16 mm	Q235B/SUS304	
Spring washer	8	Q235B/SUS304	
Nut	M8	Q235B/SUS304	

Suggestion: M8 bolt tightening torque range: 12-16 N • m.

- **Mounting details**
- **GFRP Composite Frame**

Due to the difference between the transverse and longitudinal mechanical strength of the composite material frame, and the lower elastic modulus than the aluminum frame, special C -type structural parts are required to assist the installation, the specific installation steps are as follows:

Step 1: Insert the C-type structural parts into the long side of the composite frame and align their mounting holes with those of the frame, as shown in Figure 8:

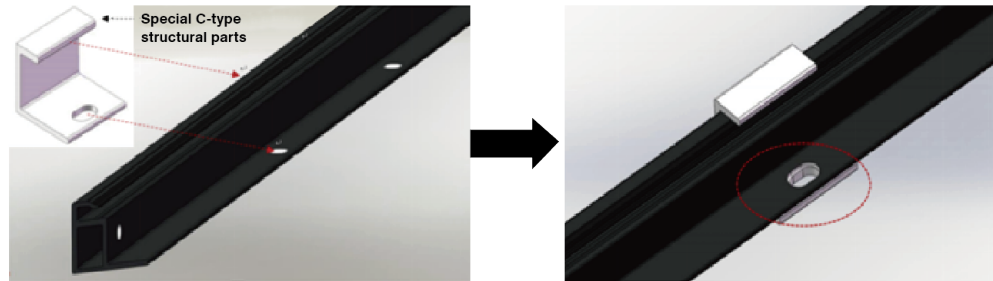


Figure 8 - C-type structure and frame combination diagram

Step 2: Install the combined C-type structural parts and photovoltaic modules on the bracket, and the installation method after combination is consistent with the installation of conventional bolts, as shown in Figure 9:

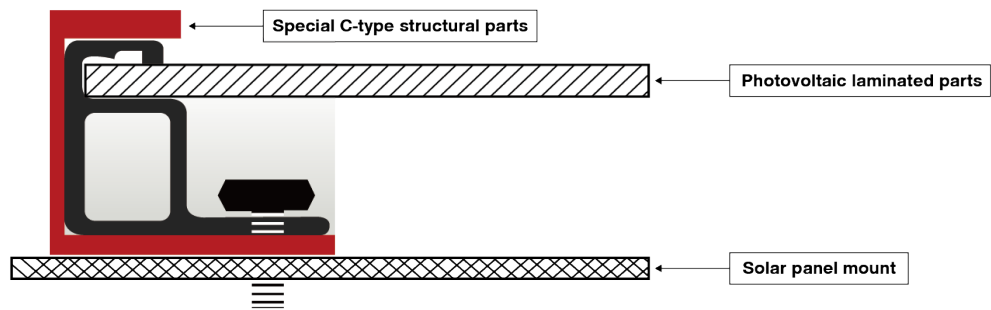


Figure 9 - Installation diagram

The designed mechanical load for LESSO module is as follow:

Module Name / Type	On the front	On the back	Safety factor
xxxC(HBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxD(HBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxC(BBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxC(QBD)XX(210R)	3600 Pa	1600 Pa	1.5
xxxC(HBD)XX(210R)	3600 Pa	1600 Pa	1.5
xxxD(HBD)XX(210)	3600 Pa	1600 Pa	1.5
xxxC(HBD)XX(210)	3600 Pa	1600 Pa	1.5

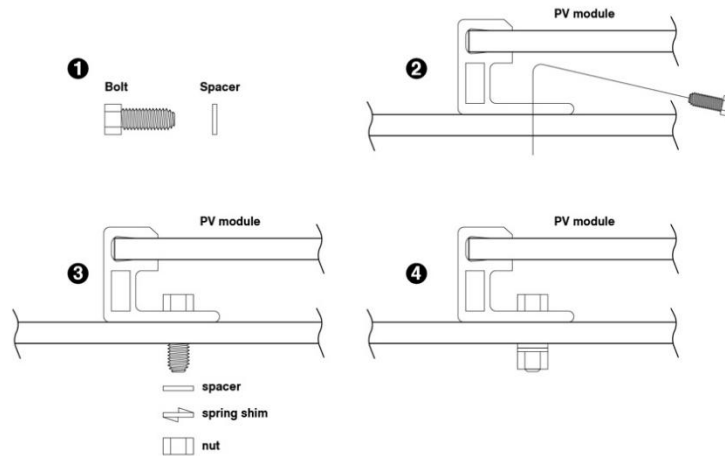
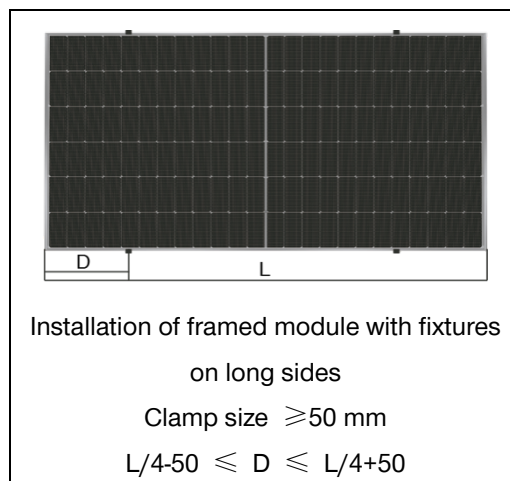


Figure 10 - Screwing mounting

7.6.3 Mounting with clamp

- Under no circumstances should the clamp touch the glass or deform the frame.
- The interface of the clamp to the front of the frame must be smooth and flat to prevent frame or other components from being damaged.
- Make sure no shadowing effect of the clamp.
- The drain hole cannot be blocked by the clamp.
- For framed PV module, the clamp must maintain an overlap of 8-11 mm with the frame of the module (you can change the cross section of the clamp if the module is securely installed).
- **Mounting methods and positions**



- **Mounting details**

The module can be mounted by a dedicated clamp, as shown in Figure 11:

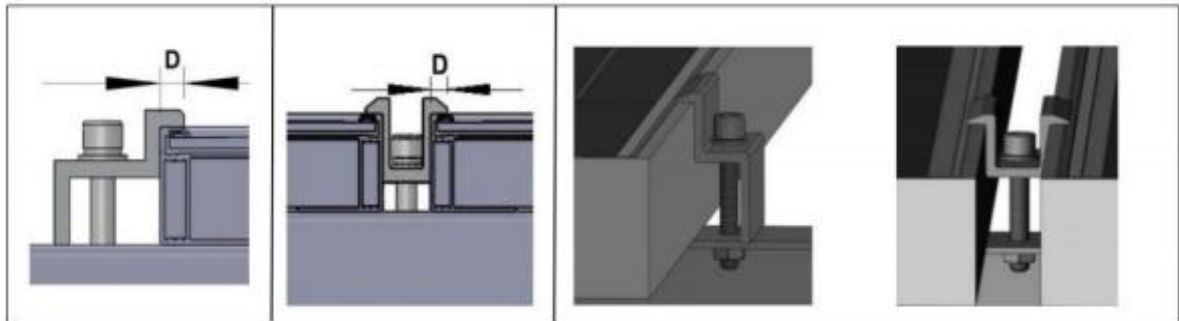
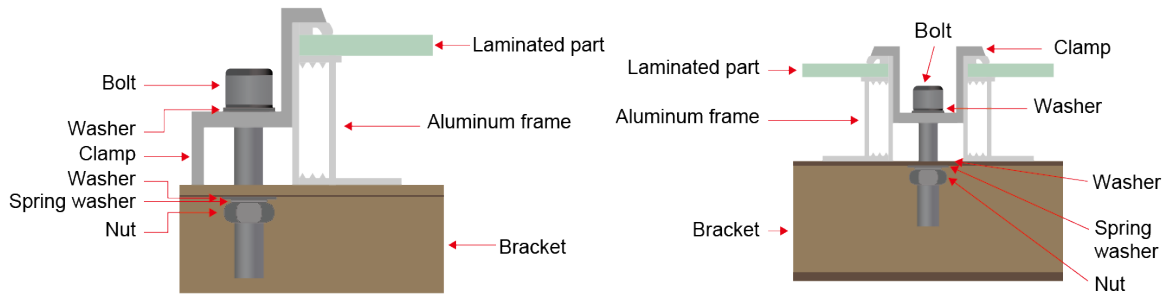


Figure 11 - Mounting with clamp

- **GFRP Composite Frame**

The composite frame exhibits a yield strength of approximately 1000 MPa. Upon release of stress below the yield strength, the frame undergoes 100% rebound.

The key point of the specially designed mounting block is the corner on side A, but the installation of the special mounting block is no different from that of the conventional mounting block, see Figure 12.

The composite frame can be made of conventional blocks when the load requirements are not high.

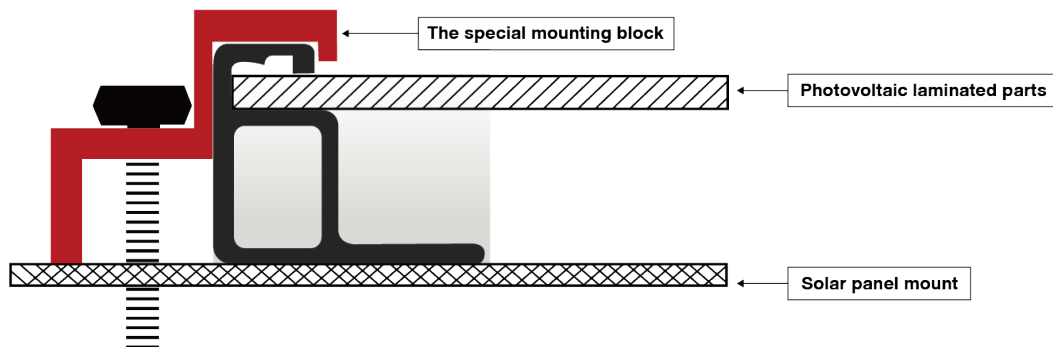


Figure 12 - Installation diagram

The designed mechanical load for LESSO module is as follow:

Module Name / Type	On the front	On the back	Safety factor
xxxC(HBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxD(HBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxC(BBD)XX(182)	3600 Pa	1600 Pa	1.5
xxxC(QBD)XX(210R)	3600 Pa	1600 Pa	1.5
xxxC(HBD)XX(210R)	3600 Pa	1600 Pa	1.5
xxxD(HBD)XX(210)	3600 Pa	1600 Pa	1.5
xxxC(HBD)XX(210)	3600 Pa	1600 Pa	1.5

NOTE: a. Each PV module needs to be fixed with at least four clamp, and the applied torque is 16 N · m ~ 20 N · m;
b. Ensure that the clamp overlaps with the A side of the module frame by $8 \text{ mm} \leq D \leq 11 \text{ mm}$;
c. Recommended M8 bolt, Nut, Flat washer, Spring washer, clamp are made of anti-corrosion firmware.

8. Electrical Installation

8.1 General Installation

- Under normal conditions, modules may generate more power than standard test conditions.
- When selecting solar system equipment's parameters, such as rated voltage, rated current, fuse model, power output related parameters, actual installation environment and conditions should be considered.
- Please make sure connector, inverter and other electrical components are in disconnected state during the installation.
- Please refer to the regional and national regulations to determine the wires size, type and temperature. To prevent the cables and the connectors from overheating, the cross-sectional area of cable and the capacity of connector must be selected to suit the system short circuit current and temperature when they are exposed to sunlight, otherwise the cable and connector will be overheated under large current.
- The cable delivered with modules is $1 \times 4.0 \text{ mm}^2$ which was certified according to IEC 62930 and/or EN 50618. The connector delivered with 1500 V system voltage modules is which was certified according to IEC 62852 and /or EN 62852.
- The Suppliers and types of connectors should be in accordance with the Standard IEC 62852. For more details, please see below:

Junction box combination 1:			
	Manufacturer	Type / model	Standard
Junction box	SUZHOU UKT NEW ENERGY TECHNOLOGY CO.,LTD.	PV-JB12x (x=A or C or E or H or A-1 or T or A-25 or L or N1 or S1)	IEC 62790:2020 EN IEC 62790:2020
Connector 1	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	PV-CO02-xy (x=1 or 2 or 3 or 4, y= A)	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 2:			
Junction box	QC Solar (Suzhou) Corporation.	Type: 3Qxy (x = 3 or 4 or 5, y = 1 or 2 or 3 or 4 or 6 or 7)	IEC 62790:2020 EN IEC 62790:2020
Connector 1	QC Solar (Suzhou) Corporation.	QC4.10-cds	IEC 62852:2014+A1 EN 62852:2015+A1
Connector 2	Amphenol Technology (Shenzhen) Co., Ltd.	UTXCFabcde / UTXCMabcde (a=A, b=4, c=A, d=A to Z, e=Blank or A or Z)	IEC 62852:2014+A1 EN 62852:2015+A1
Connector 3	Staubli Electrical connectors AG.	PV-KST4-EVO 2A/xy & PV-KBT4-EVO 2A/xy	IEC 62852:2014+A1 EN 62852:2015+A1
Connector 4	Changshu Tlian Co., Ltd.	T4-PPE-1 / T4-PC-1	IEC 62852:2014+A1 EN 62852:2015+A1
Connector 5	Tyco Electronics Austria GmbH.	PV4-Syx / PV4-Slyx	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 3:			
Junction box	Guangdong Lesso Electric Co., Ltd.	PV-LS01	IEC 62790:2020 EN IEC 62790:2020

Connector 1	Guangdong Lesso Electric Co., Ltd.	PV-01	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 4:			
Junction box	Guangdong Lesso Electric Co., Ltd.	PV-LS01B	IEC 62790:2020 EN IEC 62790:2020
Connector 1	Guangdong Lesso Electric Co., Ltd.	PV-01	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 5:			
Junction box	Jiangxi Jinko PV Material Co., Ltd.	PV-JK09Exy(x=R2, y=3 or 4)	IEC 62790:2020 EN IEC 62790:2020
Connector 1	Jiangxi Jinko PV Material Co., Ltd.	Type: PV-JK03M/xy(x=2, y=A or B or C or D)	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 6:			
Junction box	Shanghai JA solar Technology Co., Ltd.	PVJB-JA-005	IEC 62790:2020 EN IEC 62790:2020
Connector 1	QC Solar Corporation.	QC4.10-35, QC4.10-45, QC4.10-351.	IEC 62852:2014+A1 EN 62852:2015+A1
Junction box combination 7:			
Junction box	SUZHOU UKT NEW ENERGY TECHNOLOGY CO.,LTD.	PVJB04x	IEC 62790:2020 EN IEC 62790:2020
Connector 1	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	PV-CNT03-xy (x=1 or 2 or 3 or 4, y=A)	IEC 62852:2014+A1 EN 62852:2015+A1

Junction box combination 8:			
Junction box	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd.	PV-ZH01A	IEC 62790:2020 EN IEC 62790:2020
Connector 1	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd.	PV-ZH202B	IEC 62852:2014+A1 EN 62852:2015+A1

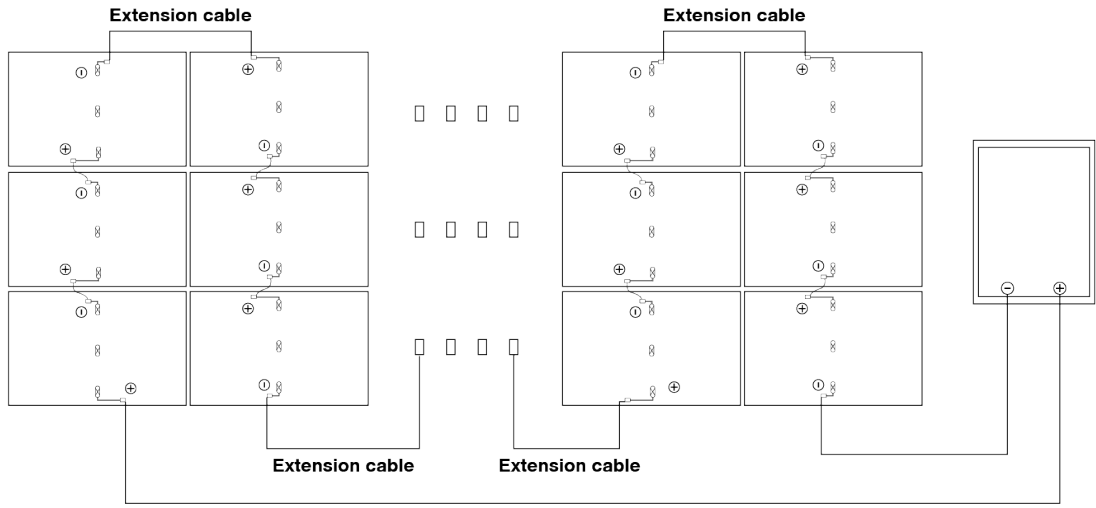
- In places with frequent thunder and lightning, arrester device must be installed for solar system to reduce the risk of lightning damage, loop area should be kept as small as possible when laying cables.
- It is necessary to avoid mechanical damage of cables and modules when fixing cables on support frames.
- When fixing the cable in a proper way, it should be fixed with light resistant binding wire and avoid direct sunlight and water immersion.

8.2 Grid-connected Electrical System

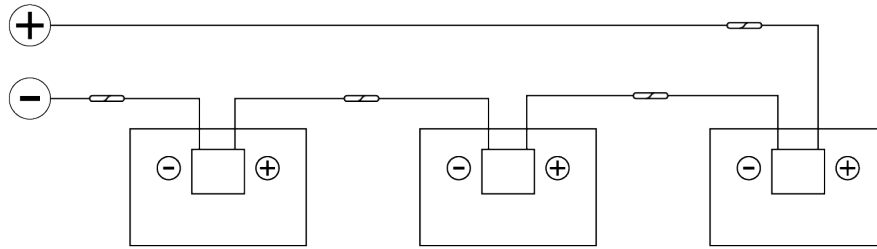
- DC generated by solar system can be converted into AC and connected to a public grid system.
- Because the policy of connecting PV systems to the public grid varies in different regions, please consult with a qualified system engineer to design a system. Typically, the installation of this system requires confirmation, acceptance and formal approval from the public sector.

8.3 Electrical Connect Methods

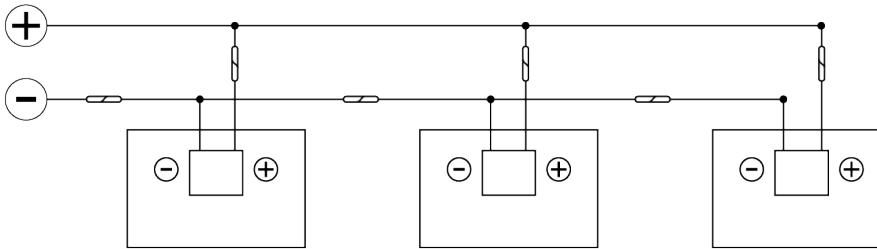
- Several PV modules are connected in series and then connected in parallel to form a PV array, which is especially for application with a high operation voltage.
- If modules are connected in series, the total voltage is equal to the sum of individual voltages.
- For applications requirement of high current, several modules can be connected in parallel, and the total current of the array is equal to the sum of the currents of each module.
- The maximum quantity of modules in series and in parallel must be calculated based on the related regulations.
- The open-circuit voltage (V_{OC}) under the expected lowest local temperature and the



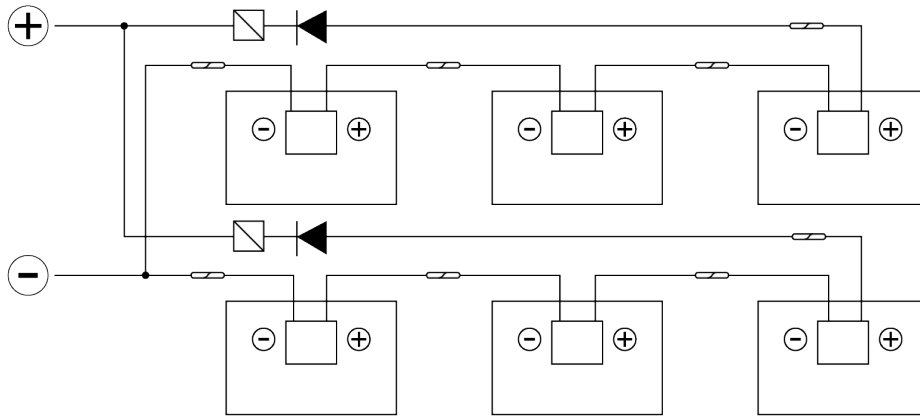
(b) Typical modules mechanical drawing of bifacial modules (with frame)



(c) Series connection



(d) Parallel connection



(e) Parallel-series connection

Figure 13 - Connecting in series and in parallel

Note: The extra extended cable is required for connection at the turn-back corner of wiring as shown below.

8.4 Grounding

- To avoid the risk of electric shock or fire, module frames should be grounded before operation of solar system.
- For grounding and installation requirements, please refer to the regional and national safety and electrical installation standards.
- Proper grounding way is to connect metal devices which are not used for conductive purpose with grounding device or support frames integrated with grounding device.
- Grounding holes set on aluminum frames (Ø4) and grounding signs cannot be used for fixing modules, do not try to drill holes on modules.
- Ground screw, washer, and nut should be made of stainless steel, grounding cables in Ω shape fix between screw head and washer, and screw pass through grounding holes.
- A toothed washer is required to make proper and reliable grounding connection with the anodized aluminum frame.

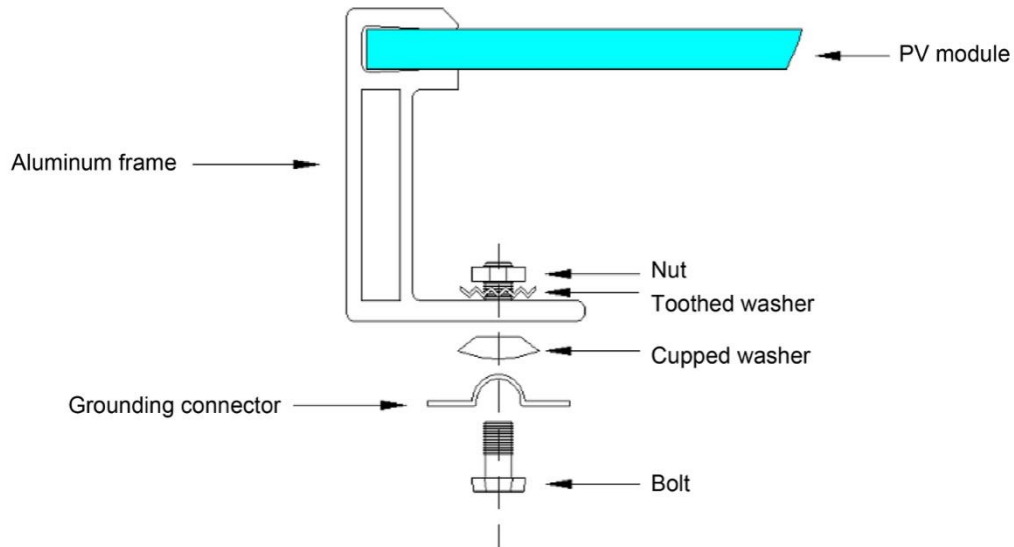


Figure 14 - Grounding methods and positions

- PV modules can be grounded by connecting to support frames integrated with grounding device or to separate grounding device.
- Make sure grounding measure is safe and effective, and do not cause electrochemical corrosion of different metals and aluminum frames.
- To get the most output power and avoid PID effect, the DC negative electrode of the array is supposed to be grounded when installation. If not, the output power may decrease.

8.5 Fusing and Temperature coefficient

- Module over current protection is rated for DC use.
- Please refer to the application requirements of local standard to determine the fuse.
- If reverse current which exceed the Max. Series fuse current pass-through modules, over current protective device of the same specifications should be used to protect the modules.
- If modules in parallel exceed 2 strings, each string must be installed with an over current protective device.
- Fuse should be installed rated for the maximum direct current voltage and connected to each ungrounded pole of the array. In other words, if the system is not grounded, the fuse should be connected to the positive and negative poles.
- The maximum rating of a fuse in series with an array string for different modules and the temperature coefficient for different modules are as follows:

Module Name / Type	The maximum rating of a fuse (A)	Current temperature coefficient α (%/°C)	Voltage temperature coefficient β (%/°C)	Power temperature coefficient δ (%/°C)
xxxD(HPM)xx(182)	25	0.048	-0.26	-0.34
xxxC(HPM)xx(182)	25	0.043	-0.25	-0.30
xxxC(HBB)xx(182)	30	0.043	-0.25	-0.30
xxxC(HPM)xx(210R)	35	0.043	-0.25	-0.30
xxxD(HPM)xx(210)	30	0.048	-0.26	-0.34
xxxC(HPM)xx(210)	35	0.043	-0.25	-0.30
xxxD(BPM)xx(182)	35	0.048	-0.26	-0.34
xxxC(BPM)xx(182)	35	0.043	-0.25	-0.30
xxxD(HBD)xx(182)	25	0.048	-0.26	-0.34
xxxC(HBD)xx(182)	25 or 30	0.043	-0.25	-0.30
xxxC(BBD)xx(182)	25 or 30	0.043	-0.25	-0.30
xxxD(HBD)xx(210)	35	0.048	-0.26	-0.34
xxxC(HBD)xx(210)	35	0.043	-0.25	-0.30
xxxC(HBD)xx(210R)	35	0.043	-0.25	-0.30
xxxC(QBD)xx(210R)	35	0.043	-0.25	-0.30

9. Adjustment and Maintenance

LESSO Solar recommends the following adjustment and maintenance items to ensure optimum performance of the module:

- Electrical and mechanical connections should be checked at least once half a year by qualified personnel to verify they are clean, secure and undamaged. Pay attention to observe the maintenance instructions for all components used in the system, such as mounting systems, inverters, PV combiner box, batteries, etc.
- As time goes on, dirt and dust may accumulate on the surface of modules, which will lead to the decrease of output power. It is recommended to clean modules at least once a year

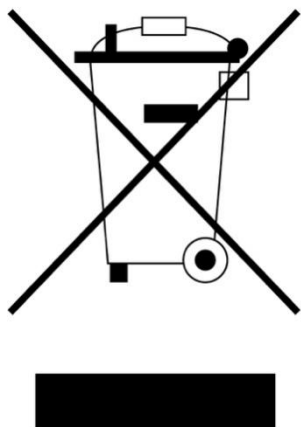
to ensure the maximum output power, especially in low rainfall areas.

- It is suggested to clean modules when sunshine is not strong.
- Do not touch glass surface with bare hand to avoid leaving fingerprint and other dirt on the glass.
- Please use dry duster or dishcloth to remove dirt from the surface of modules, and then use soft sponge or dishcloth to clean modules with water. Mild, non-abrasive cleansers (ethyl alcohol, methyl alcohol etc.) can be used to remove stubborn dirt.
- Do not use water with high mineral content and excessive water pressure to clean modules. Normal water supply is applicable.
- If modules installed in dusty places, blow dust first when cleaning modules. To clean snow on modules, do not try to scrape the frozen snow and ice with too much force.
- Do not clean modules with broken glass or bare cables, there is electric shock hazard.
- If any problems arise, please arrange qualified personnel for inspection.

10. Others

Meaning of crossed – out wheeled dustbin:

- Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.
- When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge.



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11. The appendix

Product Information

- All electrical data should be measured under below test conditions:

STC: AM= 1.5, E= 1000 W/m² , Tc=25 °C;

The additional test conditions for Bifacial PV modules:

BNPI: E= 1000 W/m² + φ • 135 W/m²

BSI: E= 1000 W/m² + φ • 300 W/m²

Pmax of any individual module will be within ±3% tolerance of these specified values.

Voc of any individual module will be within ±3% tolerance of these specified values.

Isc of any individual module will be within ±4% tolerance of these specified values.

Specifications and electric characteristics in Table 1 and 2 is subject to technical and product innovations.

Information in this document is subject to change without notice.

Table 1: The specifications for LESSO Single-Glass PV Module under STC

ModelType	Maximum Power (Pmax)[W]	Open Circuit Voltage (Voc)[V]	Short Circuit Current (Isc)[A]	Voltage at Maximum Power (Vmp)[V]	Current at Maximum Power (Imp)[A]	Fuse Rating [A]	Maximum System Voltage (Vsys)[V]
xxxD(HPM)66(210) (xxx=640-685, in steps of 5,132 cells)	640	45.14	18.34	37.08	17.26	30	1500
	645	45.34	18.38	37.28	17.30	30	1500
	650	45.54	18.42	37.49	17.34	30	1500
	655	45.74	18.46	37.69	17.38	30	1500
	660	45.94	18.50	37.89	17.42	30	1500
	665	46.14	18.54	38.09	17.46	30	1500
	670	46.34	18.60	38.29	17.50	30	1500
	675	46.54	18.66	38.48	17.54	30	1500
	680	46.74	18.72	38.68	17.58	30	1500
xxxD(HPM)60(210) (xxx=585-620, in steps of 5,120 cells)	585	40.74	18.28	33.68	17.37	30	1500
	590	40.94	18.36	33.89	17.41	30	1500
	595	41.14	18.44	34.10	17.45	30	1500
	600	41.34	18.48	34.29	17.50	30	1500
	605	41.54	18.56	34.49	17.54	30	1500
	610	41.74	18.64	34.70	17.58	30	1500
	615	41.94	18.72	34.90	17.62	30	1500
	620	42.14	18.80	35.11	17.66	30	1500
xxxD(HPM)54(210)	525	37.14	18.34	30.09	17.45	30	1500
	530	37.34	18.38	30.29	17.50	30	1500

(xxx=525-560, in steps of 5,108 cells)	535	37.54	18.42	30.49	17.55	30	1500
	540	37.74	18.46	30.68	17.60	30	1500
	545	37.94	18.50	30.88	17.65	30	1500
	550	38.14	18.54	31.07	17.70	30	1500
	555	38.34	18.58	31.27	17.75	30	1500
	560	38.54	18.62	31.46	17.80	30	1500
xxxD(HPM)72(182) (xxx=520-565, in steps of 5,144 cells)	520	49.15	13.63	40.78	12.75	25	1500
	525	49.35	13.68	40.98	12.81	25	1500
	530	49.55	13.74	41.18	12.87	25	1500
	535	49.75	13.79	41.41	12.92	25	1500
	540	49.95	13.85	41.60	12.98	25	1500
	545	50.15	13.91	41.80	13.04	25	1500
	550	50.35	13.97	42.00	13.10	25	1500
	555	50.55	14.03	42.17	13.16	25	1500
	560	50.75	14.09	42.36	13.22	25	1500
xxxD(HPM)66(182) (xxx=480-515, in steps of 5,132 cells)	565	50.95	14.15	42.51	13.29	25	1500
	480	45.20	13.64	37.59	12.77	25	1500
	485	45.40	13.70	37.77	12.84	25	1500
	490	45.60	13.77	37.99	12.90	25	1500
	495	45.80	13.83	38.20	12.96	25	1500
	500	46.00	13.89	38.37	13.03	25	1500
	505	46.20	13.95	38.58	13.09	25	1500
	510	46.40	14.01	38.78	13.15	25	1500
xxxD(HPM)60(182) (xxx=435-470, in steps of 5,120 cells)	515	46.60	14.07	38.99	13.21	25	1500
	435	41.25	13.69	33.91	12.83	25	1500
	440	41.45	13.76	34.11	12.90	25	1500
	445	41.65	13.83	34.31	12.97	25	1500
	450	41.85	13.90	34.51	13.04	25	1500
	455	42.05	13.97	34.71	13.11	25	1500
	460	42.25	14.04	34.90	13.18	25	1500
xxxD(HPM)54(182) (xxx=390-420, in steps of 5,108 cells)	465	42.45	14.11	35.09	13.25	25	1500
	470	42.65	14.18	35.29	13.32	25	1500
	390	37.10	13.64	30.54	12.77	25	1500
	395	37.30	13.71	30.74	12.85	25	1500
	400	37.50	13.79	30.94	12.93	25	1500
	405	37.70	13.87	31.13	13.01	25	1500
	410	37.90	13.95	31.32	13.09	25	1500
xxxC(HPM)72(182) (xxx=545-600, in steps of 5,144 cells)	415	38.10	14.03	31.54	13.16	25	1500
	420	38.30	14.11	31.75	13.23	25	1500
	545	51.03	13.87	41.47	13.15	25	1500
	550	51.23	13.95	41.62	13.22	25	1500
	555	51.43	14.03	41.77	13.29	25	1500
	560	51.63	14.11	41.92	13.36	25	1500
	565	51.83	14.19	42.07	13.43	25	1500
	570	52.08	14.27	42.23	13.50	25	1500
	575	52.23	14.35	42.38	13.57	25	1500
	580	52.43	14.43	42.53	13.64	25	1500
	585	52.63	14.51	42.67	13.71	25	1500
xxxC(HPM)66(182) (xxx=500-550, in steps of 5,132 cells)	590	52.83	14.59	42.82	13.78	25	1500
	595	53.03	14.67	42.97	13.85	25	1500
	600	53.23	14.75	43.12	13.92	25	1500
	500	46.06	13.85	38.13	13.12	25	1500
	505	46.11	13.93	38.27	13.20	25	1500
	510	46.16	14.01	38.41	13.28	25	1500
	515	46.21	14.09	38.55	13.36	25	1500

	520	46.26	14.17	38.69	13.44	25	1500
	525	46.31	14.25	38.83	13.52	25	1500
	530	46.36	14.33	38.97	13.60	25	1500
	535	46.41	14.41	39.11	13.68	25	1500
	540	46.46	14.49	39.24	13.76	25	1500
	545	46.51	14.57	39.39	13.84	25	1500
	550	46.56	14.65	39.53	13.92	25	1500
xxxC(HPM)60(182) (xxx=455-500, in steps of 5,120 cells)	455	41.86	13.87	34.70	13.12	25	1500
	460	42.02	13.95	34.86	13.20	25	1500
	465	42.18	14.03	35.02	13.28	25	1500
	470	42.34	14.11	35.18	13.36	25	1500
	475	42.50	14.19	35.35	13.44	25	1500
	480	42.67	14.27	35.51	13.52	25	1500
	485	42.83	14.35	35.66	13.60	25	1500
	490	42.99	14.43	35.82	13.68	25	1500
	495	43.15	14.51	35.99	13.76	25	1500
	500	43.31	14.59	36.15	13.84	25	1500
xxxC(HPM)54(182) (xxx=410-450, in steps of 5,108 cells)	410	37.78	13.89	31.25	13.12	25	1500
	415	37.97	13.97	31.44	13.20	25	1500
	420	38.16	14.05	31.63	13.28	25	1500
	425	38.35	14.13	31.81	13.36	25	1500
	430	38.54	14.21	32.00	13.44	25	1500
	435	38.73	14.29	32.18	13.52	25	1500
	440	38.92	14.37	32.35	13.60	25	1500
	445	39.11	14.45	32.54	13.68	25	1500
	450	39.30	14.53	32.72	13.76	25	1500
xxxC(HPM)66(210R) (xxx=575-625, in steps of 5, 132 cells)	575	47.52	15.39	39.57	14.54	35	1500
	580	47.65	15.47	39.69	14.62	35	1500
	585	47.78	15.55	39.81	14.70	35	1500
	590	47.91	15.63	39.93	14.78	35	1500
	595	48.04	15.71	40.05	14.86	35	1500
	600	48.17	15.79	40.17	14.94	35	1500
	605	48.30	15.88	40.30	15.02	35	1500
	610	48.44	15.97	40.43	15.09	35	1500
	615	48.57	16.06	40.55	15.17	35	1500
	620	48.70	16.14	40.69	15.24	35	1500
	625	48.83	16.23	40.81	15.32	35	1500
xxxC(HPM)60(210R) (xxx=525-565, in steps of 5, 120 cells)	525	43.55	15.51	35.88	14.64	35	1500
	530	43.67	15.60	36.02	14.72	35	1500
	535	43.87	15.69	36.16	14.80	35	1500
	540	43.99	15.77	36.30	14.88	35	1500
	545	44.11	15.86	36.44	14.96	35	1500
	550	44.24	15.95	36.58	15.04	35	1500
	555	44.36	16.04	36.72	15.12	35	1500
	560	44.48	16.12	36.86	15.20	35	1500
	565	44.60	16.21	37.00	15.28	35	1500
xxxC(HPM)54(210R) (xxx=470-510, in steps of 5, 108 cells)	470	39.85	15.49	32.39	14.52	35	1500
	475	39.96	15.58	32.53	14.61	35	1500
	480	40.07	15.67	32.67	14.70	35	1500
	485	40.18	15.75	32.81	14.79	35	1500
	490	40.29	15.84	32.95	14.88	35	1500
	495	40.40	15.93	33.08	14.97	35	1500
	500	40.51	16.02	33.21	15.06	35	1500
	505	40.62	16.10	33.34	15.15	35	1500
	510	40.73	16.19	33.47	15.24	35	1500

xxxC(HPM)48(210R) (xxx=420-455, in steps of 5, 96 cells)	420	34.27	15.47	29.07	14.45	35	1500
	425	34.42	15.56	29.22	14.55	35	1500
	430	34.57	15.65	29.38	14.64	35	1500
	435	34.72	15.73	29.54	14.73	35	1500
	440	34.87	15.82	29.68	14.83	35	1500
	445	35.02	15.91	29.85	14.91	35	1500
	450	35.17	16.00	29.99	15.01	35	1500
	455	35.32	16.08	30.14	15.10	35	1500
xxxC(HBB)72(182) (xxx=540-585, in steps of 5, 144 cells)	540	51.91	13.93	41.30	13.08	30	1500
	545	52.11	13.99	41.45	13.15	30	1500
	550	52.31	14.05	41.61	13.22	30	1500
	555	52.51	14.11	41.75	13.30	30	1500
	560	52.71	14.17	41.90	13.37	30	1500
	565	52.91	14.23	42.05	13.44	30	1500
	570	53.11	14.30	42.20	13.51	30	1500
	575	53.31	14.36	42.35	13.58	30	1500
	580	53.51	14.42	42.50	13.65	30	1500
xxxC(HBB)66(182) (xxx=495-535, in steps of 5, 132 cells)	585	53.71	14.48	42.65	13.72	30	1500
	495	47.77	14.16	37.46	13.22	30	1500
	500	47.95	14.22	37.66	13.28	30	1500
	505	48.13	14.28	37.86	13.34	30	1500
	510	48.31	14.34	38.06	13.40	30	1500
	515	48.49	14.40	38.27	13.46	30	1500
	520	48.67	14.46	38.47	13.52	30	1500
	525	48.85	14.52	38.66	13.58	30	1500
	530	49.03	14.58	38.86	13.64	30	1500
xxxC(HBB)60(182) (xxx=450-485, in steps of 5, 120 cells)	535	49.21	14.64	39.06	13.70	30	1500
	450	43.57	14.34	33.98	13.25	30	1500
	455	43.74	14.40	34.20	13.31	30	1500
	460	43.91	14.46	34.41	13.37	30	1500
	465	44.08	14.52	34.63	13.43	30	1500
	470	44.25	14.58	34.85	13.49	30	1500
	475	44.42	14.64	35.06	13.55	30	1500
	480	44.59	14.70	35.27	13.61	30	1500
xxxC(HBB)54(182) (xxx=405-435, in steps of 5, 108 cells)	485	44.76	14.76	35.49	13.67	30	1500
	405	39.38	14.52	30.53	13.27	30	1500
	410	39.53	14.58	30.77	13.33	30	1500
	415	39.68	14.64	31.00	13.39	30	1500
	420	39.83	14.70	31.23	13.45	30	1500
	425	39.98	14.76	31.46	13.51	30	1500
	430	40.13	14.82	31.69	13.57	30	1500
xxxC(HPM)66(210) (xxx=625-720, in steps of 5, 132 cells)	435	40.28	14.88	31.92	13.63	30	1500
	625	44.70	18.70	35.10	17.81	35	1500
	630	44.90	18.74	35.32	17.84	35	1500
	635	45.10	18.78	35.54	17.87	35	1500
	640	45.30	18.82	35.76	17.90	35	1500
	645	45.50	18.87	35.98	17.93	35	1500
	650	45.70	18.91	36.20	17.96	35	1500
	655	45.90	18.95	36.41	17.99	35	1500
	660	46.10	18.99	36.63	18.02	35	1500
	665	46.30	19.03	36.85	18.05	35	1500
	670	46.50	19.07	37.06	18.08	35	1500
	675	46.70	19.11	37.28	18.11	35	1500
680	46.90	19.15	37.49	18.14	35	1500	
685	47.05	19.19	37.70	18.17	35	1500	

	690	47.20	19.23	37.92	18.20	35	1500
	695	47.35	19.27	38.12	18.24	35	1500
	700	47.50	19.31	38.32	18.27	35	1500
	705	47.65	19.35	38.53	18.30	35	1500
	710	47.80	19.39	38.74	18.33	35	1500
	715	47.95	19.43	38.95	18.36	35	1500
	720	48.10	19.48	39.16	18.39	35	1500
xxxC(HPM)60(210) (xxx=570-655, in steps of 5, 120 cells)	570	40.72	18.71	32.10	17.76	35	1500
	575	40.93	18.75	32.31	17.80	35	1500
	580	41.14	18.80	32.52	17.84	35	1500
	585	41.34	18.84	32.72	17.88	35	1500
	590	41.55	18.88	32.93	17.92	35	1500
	595	41.76	18.92	33.13	17.96	35	1500
	600	41.96	18.96	33.34	18.00	35	1500
	605	42.17	19.00	33.54	18.04	35	1500
	610	42.37	19.05	33.75	18.08	35	1500
	615	42.57	19.09	33.95	18.12	35	1500
	620	42.77	19.13	34.16	18.15	35	1500
	625	42.97	19.17	34.36	18.20	35	1500
	630	43.17	19.21	34.56	18.23	35	1500
	635	43.37	19.25	34.76	18.27	35	1500
	640	43.57	19.29	34.96	18.31	35	1500
	645	43.77	19.33	35.15	18.35	35	1500
650	43.97	19.37	35.35	18.39	35	1500	
655	44.17	19.41	35.54	18.43	35	1500	
xxxC(HPM)54(210) (xxx=515-590, in steps of 5, 108 cells)	515	37.20	18.70	29.34	17.56	35	1500
	520	37.39	18.74	29.52	17.62	35	1500
	525	37.57	18.78	29.70	17.68	35	1500
	530	37.76	18.82	29.88	17.74	35	1500
	535	37.95	18.86	30.06	17.80	35	1500
	540	38.13	18.90	30.24	17.86	35	1500
	545	38.32	18.94	30.42	17.92	35	1500
	550	38.50	18.98	30.60	17.98	35	1500
	555	38.68	19.02	30.77	18.04	35	1500
	560	38.86	19.06	30.96	18.09	35	1500
	565	39.04	19.10	31.13	18.15	35	1500
	570	39.22	19.14	31.31	18.21	35	1500
	575	39.40	19.18	31.49	18.26	35	1500
	580	39.58	19.22	31.68	18.31	35	1500
585	39.76	19.26	31.87	18.36	35	1500	
590	39.94	19.30	32.05	18.41	35	1500	
xxxC(HPM)48(210) (xxx=455-525, in steps of 5, 96 cells)	455	33.11	18.70	26.13	17.42	35	1500
	460	33.27	18.74	26.30	17.50	35	1500
	465	33.44	18.78	26.46	17.58	35	1500
	470	33.60	18.82	26.62	17.66	35	1500
	475	33.76	18.86	26.78	17.74	35	1500
	480	33.93	18.90	26.94	17.82	35	1500
	485	34.09	18.94	27.10	17.90	35	1500
	490	34.25	18.98	27.26	17.98	35	1500
	495	34.41	19.02	27.43	18.05	35	1500
	500	34.57	19.06	27.60	18.12	35	1500
	505	34.73	19.10	27.77	18.19	35	1500
	510	34.89	19.14	27.94	18.26	35	1500
	515	35.05	19.18	28.12	18.32	35	1500
520	35.21	19.22	28.28	18.39	35	1500	

	525	35.37	19.26	28.44	18.46	35	1500
xxxC(BPM)72(182) (xxx=535-600, in steps of 5, 144 cells)	535	50.82	13.63	41.39	12.93	25	1500
	540	50.96	13.71	41.55	13.00	25	1500
	545	51.10	13.79	41.71	13.07	25	1500
	550	51.24	13.87	41.87	13.14	25	1500
	555	51.38	13.95	42.02	13.21	25	1500
	560	51.52	14.03	42.17	13.28	25	1500
	565	51.66	14.11	42.33	13.35	25	1500
	570	51.80	14.18	42.48	13.42	25	1500
	575	51.94	14.26	42.63	13.49	25	1500
	580	52.08	14.34	42.78	13.56	25	1500
	585	52.22	14.42	42.94	13.63	25	1500
	590	52.36	14.50	43.07	13.70	25	1500
	595	52.50	14.58	43.22	13.77	25	1500
	600	52.64	14.66	43.36	13.84	25	1500
xxxC(BPM)66(182) (xxx=490-550, in steps of 5, 132 cells)	490	46.42	13.77	37.59	13.04	25	1500
	495	46.47	13.85	37.74	13.12	25	1500
	500	46.52	13.93	37.89	13.20	25	1500
	505	46.57	14.01	38.04	13.28	25	1500
	510	46.62	14.09	38.18	13.36	25	1500
	515	46.67	14.17	38.32	13.44	25	1500
	520	46.72	14.26	38.47	13.52	25	1500
	525	46.77	14.34	38.61	13.60	25	1500
	530	46.82	14.42	38.75	13.68	25	1500
	535	46.87	14.50	38.89	13.76	25	1500
	540	46.92	14.58	39.03	13.84	25	1500
	545	46.97	14.66	39.16	13.92	25	1500
	550	47.02	14.74	39.30	14.00	25	1500
	xxxC(BPM)60(182) (xxx=445-500, in steps of 5, 120 cells)	445	41.99	13.79	34.14	13.04	25
450		42.16	13.87	34.31	13.12	25	1500
455		42.33	13.95	34.48	13.20	25	1500
460		42.50	14.03	34.65	13.28	25	1500
465		42.67	14.11	34.81	13.36	25	1500
470		42.84	14.19	34.98	13.44	25	1500
475		43.01	14.28	35.14	13.52	25	1500
480		43.18	14.36	35.30	13.60	25	1500
485		43.35	14.44	35.46	13.68	25	1500
490		43.52	14.52	35.62	13.76	25	1500
495		43.69	14.60	35.77	13.84	25	1500
500		43.86	14.68	35.93	13.92	25	1500
xxxC(BPM)54(182) (xxx=400-450, in steps of 5, 108 cells)	400	38.37	13.65	31.07	12.88	25	1500
	405	38.56	13.73	31.26	12.96	25	1500
	410	38.75	13.81	31.45	13.04	25	1500
	415	38.94	13.89	31.64	13.12	25	1500
	420	39.13	13.97	31.82	13.20	25	1500
	425	39.32	14.05	32.01	13.28	25	1500
	430	39.51	14.13	32.20	13.36	25	1500
	435	39.70	14.21	32.38	13.44	25	1500
	440	39.89	14.29	32.55	13.52	25	1500
	445	40.08	14.37	32.73	13.60	25	1500
	450	40.27	14.45	32.90	13.68	25	1500
xxxD(BPM)72(182) (xxx=525-560, in steps of 5, 144 cells)	525	51.27	14.04	41.54	12.64	25	1500
	530	51.47	14.09	41.74	12.70	25	1500
	535	51.67	14.14	41.93	12.76	25	1500
	540	51.87	14.19	42.13	12.82	25	1500

	545	52.07	14.24	42.32	12.88	25	1500
	550	52.27	14.29	42.51	12.94	25	1500
	555	52.47	14.34	42.70	13.00	25	1500
	560	52.67	14.39	42.89	13.06	25	1500
xxxD(BPM)66(182) (xxx=480-510, in steps of 5, 132 cells)	480	46.67	14.02	38.16	12.58	25	1500
	485	46.87	14.07	38.34	12.65	25	1500
	490	47.07	14.12	38.47	12.74	25	1500
	495	47.27	14.17	38.65	12.81	25	1500
	500	47.47	14.22	38.82	12.88	25	1500
	505	47.67	14.27	39.00	12.95	25	1500
	510	47.87	14.32	39.18	13.02	25	1500
xxxD(BPM)60(182) (xxx=435-465, in steps of 5, 120 cells)	435	42.07	14.04	36.81	11.82	25	1500
	440	42.27	14.10	37.01	11.89	25	1500
	445	42.47	14.16	37.21	11.96	25	1500
	450	42.67	14.22	37.41	12.03	25	1500
	455	42.87	14.28	37.61	12.10	25	1500
	460	43.07	14.34	37.80	12.17	25	1500
	465	43.27	14.40	38.00	12.24	25	1500
xxxD(BPM)54(182) (xxx=390-420, in steps of 5, 108 cells)	390	37.79	14.05	33.08	11.79	25	1500
	395	37.99	14.10	33.28	11.87	25	1500
	400	38.19	14.15	33.48	11.95	25	1500
	405	38.39	14.20	33.67	12.03	25	1500
	410	38.59	14.25	33.86	12.11	25	1500
	415	38.79	14.30	34.05	12.19	25	1500
	420	38.99	14.35	34.23	12.27	25	1500

Table 2: The specifications for LESSO Bifacial-Glass PV Module under STC and BNPI

ModelType	Maximum Power (Pmax)[W]	Open Circuit Voltage (Voc)[V]	Short Circuit Current (Isc)[A]	Voltage at Maximum Power (Vmp)[V]	Current at Maximum Power (Imp)[A]	Fuse Rating [A]	Maximum System Voltage (Vsys)[V]
Under STC							
xxxD(HBD)72(182) (xxx=520-565, in steps of 5, 144 cells)	520	49.39	13.59	40.95	12.70	25	1500
	525	49.49	13.66	41.11	12.77	25	1500
	530	49.59	13.73	41.28	12.84	25	1500
	535	49.69	13.80	41.44	12.91	25	1500
	540	49.79	13.87	41.60	12.98	25	1500
	545	49.89	13.94	41.76	13.05	25	1500
	550	49.99	14.01	41.92	13.12	25	1500
	555	50.09	14.07	42.08	13.19	25	1500
	560	50.19	14.14	42.23	13.26	25	1500
	565	50.29	14.20	42.39	13.33	25	1500

xxxD(HBD)66(182) (xxx=480-515, in steps of 5, 132 cells)	480	45.04	13.64	37.65	12.75	25	1500
	485	45.14	13.71	37.83	12.82	25	1500
	490	45.24	13.78	38.01	12.89	25	1500
	495	45.36	13.85	38.20	12.96	25	1500
	500	45.48	13.92	38.37	13.03	25	1500
	505	45.62	13.99	38.55	13.10	25	1500
	510	45.77	14.06	38.72	13.17	25	1500
	515	45.92	14.13	38.90	13.24	25	1500
xxxD(HBD)60(182) (xxx=435-470, in steps of 5, 120 cells)	435	40.88	13.62	34.17	12.73	25	1500
	440	40.98	13.69	34.38	12.8	25	1500
	445	41.08	13.76	34.58	12.87	25	1500
	450	41.20	13.83	34.78	12.94	25	1500
	455	41.32	13.90	34.97	13.01	25	1500
	460	41.46	13.97	35.17	13.08	25	1500
	465	41.61	14.04	35.36	13.15	25	1500
	470	41.76	14.11	35.55	13.22	25	1500
xxxD(HBD)54(182) (xxx=390-420, in steps of 5, 108 cells)	390	36.76	13.60	30.78	12.68	25	1500
	395	36.86	13.67	30.91	12.78	25	1500
	400	36.96	13.74	31.13	12.85	25	1500
	405	37.08	13.81	31.35	12.92	25	1500
	410	37.20	13.88	31.56	12.99	25	1500
	415	37.34	13.95	31.78	13.06	25	1500
	420	37.49	14.02	31.99	13.13	25	1500
	xxxC(HBD)78(182) (xxx=595-650, in steps of 5, 156 cells)	595	55.41	13.86	45.45	13.10	30
600		55.56	13.94	45.59	13.17	30	1500
605		55.71	14.02	45.72	13.24	30	1500
610		55.86	14.10	45.85	13.31	30	1500
615		56.01	14.18	45.98	13.38	30	1500
620		56.16	14.26	46.11	13.45	30	1500
625		56.31	14.34	46.24	13.52	30	1500
630		56.46	14.42	46.37	13.59	30	1500
635		56.61	14.50	46.50	13.66	30	1500
640		56.76	14.58	46.63	13.73	30	1500
645		56.91	14.66	46.76	13.80	30	1500
650		57.06	14.74	46.89	13.87	30	1500
xxxC(HBD)72(182) (xxx=555-600, in steps of 5, 144 cells)	555	50.43	14.03	41.92	13.24	25 or 30	1500
	560	50.63	14.09	42.11	13.30	25 or 30	1500
	565	50.83	14.15	42.3	13.36	25 or 30	1500
	570	51.03	14.21	42.45	13.43	25 or 30	1500
	575	51.23	14.27	42.6	13.50	25 or 30	1500
	580	51.43	14.33	42.75	13.57	25 or 30	1500
	585	51.63	14.39	42.89	13.64	25 or 30	1500
	590	51.83	14.45	43.04	13.71	25 or 30	1500
	595	52.03	14.51	43.18	13.78	25 or 30	1500
	600	52.23	14.57	43.33	13.85	25 or 30	1500
xxxC(HBD)66(182) (xxx=510-550, in steps of 5, 132 cells)	510	45.97	14.25	38.29	13.32	25 or 30	1500
	515	46.17	14.31	38.5	13.38	25 or 30	1500
	520	46.37	14.37	38.7	13.44	25 or 30	1500
	525	46.57	14.43	38.89	13.50	25 or 30	1500
	530	46.77	14.49	39.09	13.56	25 or 30	1500
	535	46.97	14.56	39.29	13.62	25 or 30	1500
	540	47.17	14.61	39.49	13.68	25 or 30	1500
	545	47.37	14.67	39.69	13.74	25 or 30	1500
	550	47.57	14.73	39.89	13.80	25 or 30	1500
xxxC(HBD)60(182)	460	41.27	14.37	34.61	13.29	25 or 30	1500

(xxx=460-500, in steps of 5, 120 cells)	465	41.47	14.43	34.84	13.35	25 or 30	1500
	470	41.67	14.49	35.05	13.41	25 or 30	1500
	475	41.87	14.55	35.27	13.47	25 or 30	1500
	480	42.07	14.61	35.48	13.53	25 or 30	1500
	485	42.27	14.67	35.69	13.59	25 or 30	1500
	490	42.47	14.73	35.90	13.65	25 or 30	1500
	495	42.67	14.79	36.11	13.71	25 or 30	1500
	500	42.87	14.85	36.32	13.77	25 or 30	1500
xxxC(HBD)54(182) (xxx=410-450, in steps of 5, 108 cells)	410	36.57	14.49	30.94	13.25	25 or 30	1500
	415	36.77	14.55	31.18	13.31	25 or 30	1500
	420	36.97	14.61	31.42	13.37	25 or 30	1500
	425	37.17	14.67	31.65	13.43	25 or 30	1500
	430	37.37	14.73	31.88	13.49	25 or 30	1500
	435	37.57	14.79	32.11	13.55	25 or 30	1500
	440	37.77	14.85	32.34	13.61	25 or 30	1500
	445	37.97	14.91	32.57	13.67	25 or 30	1500
xxxD(HBD)66(210) (xxx=640-675, in steps of 5, 132 cells)	640	45.20	18.26	37.23	17.20	35	1500
	645	45.40	18.30	37.43	17.24	35	1500
	650	45.60	18.34	37.63	17.28	35	1500
	655	45.80	18.38	37.83	17.32	35	1500
	660	46.00	18.42	38.03	17.36	35	1500
	665	46.20	18.46	38.23	17.40	35	1500
	670	46.40	18.50	38.43	17.44	35	1500
	675	46.60	18.54	38.63	17.48	35	1500
xxxD(HBD)60(210) (xxx=580-610, in steps of 5, 120 cells)	580	41.00	18.21	33.73	17.20	35	1500
	585	41.20	18.25	33.93	17.25	35	1500
	590	41.40	18.29	34.13	17.29	35	1500
	595	41.60	18.33	34.33	17.34	35	1500
	600	41.80	18.37	34.53	17.38	35	1500
	605	42.00	18.41	34.73	17.43	35	1500
	610	42.20	18.45	34.93	17.47	35	1500
xxxD(HBD)54(210) (xxx=520-550, in steps of 5, 108 cells)	520	36.80	18.16	30.23	17.21	35	1500
	525	37.00	18.20	30.43	17.26	35	1500
	530	37.20	18.24	30.63	17.31	35	1500
	535	37.40	18.28	30.83	17.36	35	1500
	540	37.60	18.32	31.03	17.41	35	1500
	545	37.80	18.36	31.23	17.46	35	1500
	550	38.00	18.40	31.43	17.50	35	1500
xxxC(QBD)66(210R) (xxx=630-660, in steps of 5, 264 cells)	630	48.62	15.79	42.06	14.98	35	1500
	635	48.80	15.85	42.20	15.05	35	1500
	640	48.98	15.91	42.34	15.12	35	1500
	645	49.16	15.97	42.47	15.17	35	1500
	650	49.34	16.03	42.60	15.26	35	1500
	655	49.52	16.09	42.73	15.33	35	1500
	660	49.70	16.15	42.86	15.40	35	1500
xxxC(QBD)60(210R) (xxx=570-600, in steps of 5, 240 cells)	570	44.07	15.77	38.06	14.98	35	1500
	575	44.25	15.83	38.19	15.06	35	1500
	580	44.43	15.89	38.31	15.14	35	1500
	585	44.61	15.95	38.44	15.22	35	1500
	590	44.79	16.01	38.57	15.30	35	1500
	595	44.97	16.07	38.70	15.38	35	1500
	600	45.18	16.13	38.82	15.46	35	1500
	515	39.76	15.81	34.43	14.96	35	1500
	520	39.94	15.87	34.56	15.05	35	1500

xxxC(QBD)54(210R) (xxx=515-540, in steps of 5, 216 cells)	525	40.12	15.93	34.68	15.14	35	1500
	530	40.30	15.99	34.81	15.23	35	1500
	535	40.48	16.05	34.95	15.31	35	1500
	540	40.66	16.11	35.07	15.40	35	1500
xxxC(QBD)48(210R) (xxx=460-480, in steps of 5, 192 cells)	460	35.43	15.86	30.54	15.07	35	1500
	465	35.61	15.92	30.68	15.16	35	1500
	470	35.79	15.98	30.82	15.25	35	1500
	475	35.97	16.04	30.97	15.34	35	1500
xxxC(HBD)66(210R) (xxx=580-635, in steps of 5, 132 cells)	480	36.15	16.10	31.11	15.43	35	1500
	580	47.90	15.39	39.90	14.54	35	1500
	585	48.03	15.47	40.02	14.62	35	1500
	590	48.16	15.55	40.14	14.70	35	1500
	595	48.29	15.63	40.26	14.78	35	1500
	600	48.42	15.71	40.38	14.86	35	1500
	605	48.55	15.80	40.51	14.94	35	1500
	610	48.69	15.89	40.64	15.01	35	1500
	615	48.82	15.98	40.76	15.09	35	1500
	620	48.95	16.06	40.88	15.17	35	1500
xxxC(HBD)60(210R) (xxx=530-580, in steps of 5, 120 cells)	625	49.08	16.15	40.99	15.25	35	1500
	630	49.21	16.23	41.12	15.33	35	1500
	635	49.34	16.31	41.24	15.40	35	1500
	530	43.98	15.53	36.21	14.64	35	1500
	535	44.10	15.61	36.35	14.72	35	1500
	540	44.22	15.69	36.49	14.80	35	1500
	545	44.34	15.78	36.63	14.88	35	1500
	550	44.47	15.87	36.77	14.96	35	1500
	555	44.59	15.96	36.91	15.04	35	1500
	560	44.71	16.04	37.05	15.12	35	1500
xxxC(HBD)54(210R) (xxx=475-520, in steps of 5, 108 cells)	565	44.83	16.13	37.19	15.20	35	1500
	570	44.95	16.22	37.33	15.28	35	1500
	575	45.07	16.31	37.47	15.36	35	1500
	580	45.19	16.40	37.59	15.43	35	1500
	475	40.17	15.51	32.74	14.52	35	1500
	480	40.28	15.59	32.87	14.61	35	1500
	485	40.39	15.67	33.00	14.70	35	1500
	490	40.50	15.76	33.14	14.79	35	1500
	495	40.61	15.85	33.27	14.88	35	1500
	500	40.72	15.94	33.41	14.97	35	1500
xxxC(HBD)48(210R) (xxx=420-465, in steps of 5, 96 cells)	505	40.83	16.02	33.55	15.06	35	1500
	510	40.94	16.11	33.68	15.15	35	1500
	515	41.05	16.19	33.81	15.24	35	1500
	520	41.16	16.27	33.94	15.33	35	1500
	420	34.45	15.39	29.28	14.35	35	1500
	425	34.60	15.48	29.44	14.44	35	1500
	430	34.75	15.57	29.58	14.54	35	1500
	435	34.90	15.65	29.74	14.63	35	1500
	440	35.05	15.74	29.90	14.72	35	1500
	445	35.20	15.83	30.05	14.81	35	1500
xxxC(HBD)66(210) (xxx=660- 730, in steps of 5, 132 cells)	450	35.35	15.92	30.19	14.91	35	1500
	455	35.50	16.00	30.34	15.00	35	1500
	460	35.65	16.08	30.48	15.09	35	1500
	465	35.80	16.16	30.63	15.19	35	1500
	660	48.66	18.05	38.31	17.23	35	1500
	665	48.87	18.09	38.53	17.26	35	1500
	670	49.08	18.13	38.76	17.29	35	1500

	675	49.29	18.17	38.98	17.32	35	1500
	680	49.50	18.21	39.20	17.35	35	1500
	685	49.71	18.25	39.42	17.38	35	1500
	690	49.92	18.29	39.64	17.41	35	1500
	695	50.13	18.33	39.86	17.44	35	1500
	700	50.34	18.37	40.08	17.47	35	1500
	705	50.55	18.41	40.30	17.50	35	1500
	710	50.76	18.45	40.51	17.53	35	1500
	715	50.97	18.49	40.73	17.56	35	1500
	720	51.18	18.53	40.95	17.59	35	1500
	725	51.39	18.57	41.16	17.62	35	1500
	730	51.60	18.61	41.37	17.65	35	1500
xxxC(HBD)60(210) (xxx=600-665, in steps of 5, 120 cells)	600	44.28	18.02	34.87	17.21	35	1500
	605	44.49	18.06	35.08	17.25	35	1500
	610	44.71	18.10	35.29	17.29	35	1500
	615	44.93	18.14	35.49	17.33	35	1500
	620	45.15	18.18	35.70	17.37	35	1500
	625	45.36	18.22	35.90	17.41	35	1500
	630	45.58	18.26	36.11	17.45	35	1500
	635	45.80	18.30	36.31	17.49	35	1500
	640	46.02	18.34	36.51	17.53	35	1500
	645	46.24	18.38	36.72	17.57	35	1500
	650	46.45	18.42	36.92	17.61	35	1500
	655	46.67	18.46	37.12	17.65	35	1500
xxxC(HBD)54(210) (xxx=540-595, in steps of 5, 108 cells)	540	40.23	17.95	31.57	17.11	35	1500
	545	40.43	17.99	31.76	17.16	35	1500
	550	40.62	18.03	31.96	17.21	35	1500
	555	40.82	18.07	32.16	17.26	35	1500
	560	41.02	18.11	32.36	17.31	35	1500
	565	41.22	18.15	32.55	17.36	35	1500
	570	41.41	18.19	32.75	17.41	35	1500
	575	41.61	18.23	32.94	17.46	35	1500
	580	41.81	18.27	33.14	17.51	35	1500
	585	42.01	18.31	33.33	17.56	35	1500
	590	42.21	18.35	33.51	17.61	35	1500
	595	42.41	18.39	33.70	17.66	35	1500
xxxC(HBD)48(210) (xxx=480-530, in steps of 5, 96 cells)	480	35.79	17.96	28.16	17.05	35	1500
	485	35.96	18.00	28.33	17.12	35	1500
	490	36.13	18.04	28.50	17.20	35	1500
	495	36.31	18.08	28.67	17.27	35	1500
	500	36.49	18.12	28.84	17.34	35	1500
	505	36.66	18.16	29.01	17.41	35	1500
	510	36.83	18.20	29.18	17.48	35	1500
	515	37.00	18.24	29.35	17.55	35	1500
	520	37.18	18.28	29.52	17.62	35	1500
	525	37.35	18.32	29.69	17.69	35	1500
	530	37.52	18.36	29.85	17.76	35	1500
	xxxC(BBD)78(182) (xxx=595-650, in steps of 5, 156 cells)	595	54.39	13.95	45.21	13.17	30
600		54.53	14.03	45.34	13.24	30	1500
605		54.68	14.11	45.47	13.31	30	1500
610		54.83	14.19	45.60	13.38	30	1500
615		54.98	14.27	45.73	13.45	30	1500
	620	55.12	14.35	45.86	13.52	30	1500

	625	55.27	14.43	45.99	13.59	30	1500
	630	55.42	14.51	46.12	13.66	30	1500
	635	55.56	14.59	46.25	13.73	30	1500
	640	55.71	14.67	46.38	13.80	30	1500
	645	55.86	14.75	46.51	13.87	30	1500
	650	56.01	14.83	46.64	13.94	30	1500
xxxC(BBD)72(182) (xxx=550-600, in steps of 5, 144 cells)	550	49.93	14.05	41.60	13.23	25 or 30	1500
	555	50.13	14.11	41.75	13.30	25 or 30	1500
	560	50.33	14.17	41.90	13.37	25 or 30	1500
	565	50.53	14.23	42.05	13.44	25 or 30	1500
	570	50.73	14.30	42.20	13.51	25 or 30	1500
	575	50.92	14.36	42.35	13.58	25 or 30	1500
	580	51.12	14.42	42.50	13.65	25 or 30	1500
	585	51.32	14.48	42.65	13.72	25 or 30	1500
	590	51.52	14.55	42.80	13.79	25 or 30	1500
	595	51.71	14.61	42.95	13.86	25 or 30	1500
	600	51.91	14.67	43.10	13.93	25 or 30	1500
xxxC(BBD)66(182) (xxx=505-550, in steps of 5, 132 cells)	505	45.50	14.28	37.86	13.35	25 or 30	1500
	510	45.70	14.34	38.06	13.41	25 or 30	1500
	515	45.89	14.40	38.26	13.47	25 or 30	1500
	520	46.09	14.46	38.46	13.53	25 or 30	1500
	525	46.29	14.52	38.66	13.59	25 or 30	1500
	530	46.49	14.58	38.86	13.65	25 or 30	1500
	535	46.69	14.64	39.05	13.71	25 or 30	1500
	540	46.88	14.70	39.24	13.77	25 or 30	1500
	545	47.08	14.76	39.43	13.83	25 or 30	1500
	550	47.28	14.82	39.61	13.89	25 or 30	1500
xxxC(BBD)60(182) (xxx=460-500, in steps of 5, 120 cells)	460	41.02	14.46	34.41	13.37	25 or 30	1500
	465	41.22	14.52	34.63	13.43	25 or 30	1500
	470	41.42	14.58	34.85	13.49	25 or 30	1500
	475	41.62	14.64	35.06	13.55	25 or 30	1500
	480	41.82	14.70	35.27	13.61	25 or 30	1500
	485	42.02	14.76	35.49	13.67	25 or 30	1500
	490	42.22	14.82	35.70	13.73	25 or 30	1500
	495	42.42	14.88	35.92	13.79	25 or 30	1500
	500	42.62	14.94	36.13	13.85	25 or 30	1500
xxxC(BBD)54(182) (xxx=415-450, in steps of 5, 108 cells)	415	36.55	14.64	31.00	13.39	25 or 30	1500
	420	36.75	14.70	31.23	13.45	25 or 30	1500
	425	36.95	14.76	31.46	13.51	25 or 30	1500
	430	37.15	14.82	31.69	13.57	25 or 30	1500
	435	37.35	14.88	31.92	13.63	25 or 30	1500
	440	37.55	14.94	32.15	13.69	25 or 30	1500
	445	37.75	15.00	32.38	13.75	25 or 30	1500
	450	37.95	15.06	32.61	13.81	25 or 30	1500
Under BNPI							
xxxD(HBD)72(182) (xxx=572-617, in steps of 5, 144 cells)	572	50.12	15.77	42.69	13.40	25	1500
	577	50.18	15.84	42.84	13.47	25	1500
	582	50.24	15.90	42.98	13.54	25	1500
	587	50.30	15.97	43.13	13.61	25	1500
	592	50.36	16.03	43.28	13.68	25	1500
	597	50.42	16.10	43.42	13.75	25	1500
	602	50.48	16.17	43.56	13.82	25	1500
	607	50.54	16.23	43.70	13.89	25	1500
	612	50.60	16.30	43.87	13.95	25	1500

	617	50.66	16.37	44.01	14.02	25	1500
xxxD(HBD)66(182) (xxx=530-565, in steps of 5, 132 cells)	530	46.37	15.89	39.44	13.44	25	1500
	535	46.52	15.97	39.63	13.50	25	1500
	540	46.67	16.04	39.72	13.57	25	1500
	545	46.82	16.12	39.99	13.63	25	1500
	550	46.97	16.20	40.18	13.69	25	1500
	555	47.12	16.28	40.33	13.76	25	1500
	560	47.27	16.35	40.54	13.82	25	1500
	565	47.42	16.43	40.65	13.90	25	1500
xxxD(HBD)60(182) (xxx=479-514, in steps of 5, 120 cells)	479	42.06	15.78	35.93	13.33	25	1500
	484	42.21	15.86	36.12	13.40	25	1500
	489	42.36	15.93	36.30	13.47	25	1500
	494	42.51	16.01	36.51	13.53	25	1500
	499	42.66	16.08	36.69	13.60	25	1500
	504	42.81	16.16	36.92	13.65	25	1500
	509	42.96	16.24	37.13	13.71	25	1500
	514	43.11	16.31	37.25	13.80	25	1500
xxxD(HBD)54(182) (xxx=432-462, in steps of 5, 108 cells)	432	37.94	15.72	32.48	13.30	25	1500
	437	38.09	15.80	32.73	13.35	25	1500
	442	38.24	15.88	32.89	13.44	25	1500
	447	38.39	15.95	33.09	13.51	25	1500
	452	38.54	16.03	33.28	13.58	25	1500
	457	38.69	16.11	33.48	13.65	25	1500
	462	38.84	16.19	33.67	13.72	25	1500
xxxC(HBD)78(182) (xxx=660- 715, 156 cells)	660	56.22	15.00	46.85	14.09	30	1500
	665	56.39	15.09	46.98	14.16	30	1500
	670	56.56	15.17	47.11	14.23	30	1500
	675	56.74	15.26	47.24	14.29	30	1500
	680	56.91	15.35	47.37	14.36	30	1500
	685	57.08	15.43	47.49	14.43	30	1500
	690	57.26	15.52	47.62	14.49	30	1500
	695	57.43	15.61	47.75	14.56	30	1500
	700	57.60	15.69	47.87	14.63	30	1500
	705	57.78	15.78	48.00	14.69	30	1500
	710	57.95	15.86	48.13	14.76	30	1500
715	58.12	15.95	48.26	14.82	30	1500	
xxxC(HBD)72(182) (xxx=612,617,623, 628,634,639, 645,650,655, 660, 144 cells)	612	50.42	15.49	42.00	14.58	25 or 30	1500
	617	50.62	15.56	42.19	14.64	25 or 30	1500
	623	50.82	15.62	42.38	14.71	25 or 30	1500
	628	51.02	15.69	42.53	14.79	25 or 30	1500
	634	51.22	15.75	42.69	14.86	25 or 30	1500
	639	51.42	15.82	42.84	14.94	25 or 30	1500
	645	51.62	15.89	42.98	15.02	25 or 30	1500
	650	51.82	15.95	43.11	15.08	25 or 30	1500
	655	52.02	16.02	43.25	15.15	25 or 30	1500
	660	52.22	16.09	43.39	15.22	25 or 30	1500
xxxC(HBD)66(182) (xxx=562,568,573, 579,584,590, 595,601,607, 132 cells)	562	45.96	15.73	38.37	14.67	25 or 30	1500
	568	46.16	15.80	38.58	14.73	25 or 30	1500
	573	46.36	15.86	38.78	14.80	25 or 30	1500
	579	46.56	15.93	38.97	14.86	25 or 30	1500
	584	46.76	15.20	39.17	14.93	25 or 30	1500
	590	46.96	15.26	39.37	15.00	25 or 30	1500
	595	47.16	16.00	39.57	15.06	25 or 30	1500
	601	47.36	16.20	39.77	15.13	25 or 30	1500
607	47.56	16.26	39.97	15.19	25 or 30	1500	

xxxC(HBD)60(182) (xxx=507,513,518, 524,529,535, 540,546,551, 120 cells)	507	41.26	15.86	34.68	14.63	25 or 30	1500
	513	41.46	15.93	34.91	14.70	25 or 30	1500
	518	41.66	16.00	35.12	14.76	25 or 30	1500
	524	41.86	16.06	35.34	14.83	25 or 30	1500
	529	42.06	16.13	35.55	14.89	25 or 30	1500
	535	42.26	16.20	35.76	14.96	25 or 30	1500
	540	42.46	16.26	35.97	15.02	25 or 30	1500
	546	42.66	16.33	36.18	15.09	25 or 30	1500
xxxC(HBD)54(182) (xxx=452,457,463, 468,474,479, 485,491,496, 108 cells)	551	42.86	16.39	36.39	15.15	25 or 30	1500
	452	36.56	16.00	31.00	14.59	25 or 30	1500
	457	36.76	16.06	31.24	14.65	25 or 30	1500
	463	36.96	16.13	31.48	14.72	25 or 30	1500
	468	37.16	16.20	31.71	14.79	25 or 30	1500
	474	37.36	16.26	31.94	14.85	25 or 30	1500
	479	37.56	15.33	32.17	14.92	25 or 30	1500
	485	37.76	16.39	32.40	14.98	25 or 30	1500
xxxD(HBD)66(210) (xxx=702,708,713, 718,724,729, 735,740, 132 cells)	491	37.96	16.46	32.64	15.05	25 or 30	1500
	496	38.16	16.53	32.87	15.12	25 or 30	1500
	702	45.21	20.04	37.30	18.83	35	1500
	708	45.41	20.08	37.50	18.88	35	1500
	713	45.61	20.12	37.71	18.92	35	1500
	718	45.81	20.16	37.91	18.97	35	1500
	724	46.01	20.20	38.11	19.01	35	1500
	729	46.21	20.24	38.31	19.05	35	1500
xxxD(HBD)60(210) (xxx=636,642,647, 653,658,664,669, 120 cells)	735	46.41	20.28	38.51	19.10	35	1500
	740	46.61	20.34	38.71	19.14	35	1500
	636	41.01	19.98	33.80	18.83	35	1500
	642	41.21	20.02	34.00	18.89	35	1500
	647	41.41	20.06	34.20	18.93	35	1500
	653	41.61	20.11	34.40	18.99	35	1500
	658	41.81	20.14	34.60	19.03	35	1500
xxxD(HBD)54(210) (xxx=570,576,581, 587,592,598,603, 108 cells)	664	42.01	20.18	34.80	19.09	35	1500
	669	42.21	20.22	35.00	19.13	35	1500
	570	36.81	19.92	30.29	18.84	35	1500
	576	37.01	19.97	30.49	18.90	35	1500
	581	37.21	20.01	30.69	18.95	35	1500
	587	37.41	20.05	30.89	19.01	35	1500
	592	37.61	20.10	31.09	19.06	35	1500
xxxC(QBD)66(210R) (xxx=695,70,706,711,717,72 3, 264 cells)	598	37.81	20.14	31.29	19.12	35	1500
	603	38.01	20.18	31.49	19.16	35	1500
	695	48.61	17.43	42.14	16.49	35	1500
	701	48.79	17.5	42.3	16.58	35	1500
	706	48.97	17.56	42.44	16.64	35	1500
	711	49.15	17.63	42.55	16.71	35	1500
	717	49.33	17.7	42.69	16.8	35	1500
xxxC(QBD)60(210R) (xxx=629,634,640,645,651,6 57,662, 240 cells)	723	49.51	17.76	42.82	16.89	35	1500
	728	49.69	17.83	42.95	16.96	35	1500
	629	44.06	17.41	38.15	16.49	35	1500
	634	44.24	17.48	38.27	16.57	35	1500
	640	44.42	17.54	38.4	16.67	35	1500
	645	44.6	17.61	38.52	16.75	35	1500
	651	44.78	17.68	38.65	16.85	35	1500
568	657	44.96	17.74	38.78	16.94	35	1500
	662	45.17	17.81	38.9	17.02	35	1500
	568	39.75	17.45	34.49	16.47	35	1500

xxxC(QBD)54(210R) (xxx=568,574,579,585,590,596, 216 cells)	574	39.93	17.52	34.63	16.58	35	1500
	579	40.11	17.59	34.74	16.67	35	1500
	585	40.29	17.65	34.89	16.77	35	1500
	590	40.47	17.72	35.01	16.86	35	1500
	596	40.65	17.79	35.14	16.97	35	1500
xxxC(QBD)48(210R) (xxx=508,512,519,524,530, 192 cells)	508	35.42	17.51	30.6	16.6	35	1500
	512	35.6	17.58	30.74	16.66	35	1500
	519	35.78	17.64	30.9	16.8	35	1500
	524	35.96	17.71	31.03	16.89	35	1500
xxxC(HBD)66(210R) (xxx=639,644,650,655,661,667,673,679,685,688,695,701, 132 cells)	530	36.14	17.77	31.18	17	35	1500
	639	47.92	16.99	39.85	16.04	35	1500
	644	48.05	17.07	39.99	16.11	35	1500
	650	48.18	17.15	40.13	16.20	35	1500
	655	48.31	17.23	40.27	16.29	35	1500
	661	48.44	17.33	40.41	16.36	35	1500
	667	48.57	17.43	40.55	16.45	35	1500
	673	48.70	17.53	40.69	16.54	35	1500
	679	48.83	17.63	40.83	16.63	35	1500
	685	48.96	17.73	40.97	16.71	35	1500
xxxC(HBD)60(210R) (xxx=587,592,597,602,607,612,617,622,627,632,637 120 cells)	688	49.09	17.83	41.06	16.78	35	1500
	695	49.22	17.91	41.23	16.87	35	1500
	701	49.35	18.01	41.37	16.96	35	1500
	587	44.00	17.13	36.18	16.23	35	1500
	592	44.12	17.22	36.32	16.31	35	1500
	597	44.24	17.31	36.46	16.38	35	1500
	602	44.36	17.41	36.60	16.46	35	1500
	607	44.48	17.50	36.74	16.53	35	1500
	612	44.60	17.60	36.88	16.60	35	1500
	617	44.72	17.69	37.02	16.67	35	1500
xxxC(HBD)54(210R) (xxx=524,529,534,540,545,551,556,562,567,573 108 cells)	622	44.84	17.79	37.16	16.74	35	1500
	627	44.96	17.88	37.30	16.81	35	1500
	632	45.08	17.97	37.44	16.88	35	1500
	637	45.20	18.06	37.59	16.95	35	1500
	524	40.19	17.10	32.71	16.02	35	1500
	529	40.30	17.19	32.84	16.11	35	1500
	534	40.41	17.28	32.97	16.20	35	1500
	540	40.52	17.38	33.11	16.31	35	1500
	545	40.63	17.48	33.24	16.40	35	1500
xxxC(HBD)48(210R) (xxx=464,469,475,480,486,491,497,502,508,513 108 cells)	551	40.74	17.58	33.38	16.51	35	1500
	556	40.85	17.67	33.51	16.60	35	1500
	562	40.96	17.77	33.64	16.71	35	1500
	567	41.07	17.87	33.77	16.80	35	1500
	573	41.18	17.97	33.90	16.89	35	1500
	464	34.46	16.98	29.30	15.84	35	1500
	469	34.61	17.08	29.44	15.94	35	1500
	475	34.76	17.18	29.60	16.05	35	1500
	480	34.91	17.27	29.74	16.14	35	1500
	486	35.06	17.37	29.90	16.26	35	1500
	491	35.21	17.47	30.04	16.35	35	1500
	497	35.36	17.56	30.20	16.46	35	1500
	502	35.51	17.65	30.34	16.55	35	1500
	508	35.66	17.74	30.48	16.66	35	1500
	513	35.81	17.83	30.62	16.75	35	1500
	725	48.68	19.91	38.10	19.03	35	1500
	730	48.89	19.95	38.29	19.07	35	1500

xxxC(HBD)66(210) (xxx=725,730,735,740,745,750,755,760,765,770,775,780,785,790,795 132 cells)	735	49.10	20.00	38.47	19.11	35	1500
	740	49.31	20.04	38.66	19.15	35	1500
	745	49.52	20.09	38.84	19.19	35	1500
	750	49.73	20.13	39.02	19.23	35	1500
	755	49.94	20.17	39.20	19.27	35	1500
	760	50.15	20.22	39.38	19.31	35	1500
	765	50.36	20.26	39.56	19.35	35	1500
	770	50.57	20.31	39.73	19.39	35	1500
	775	50.78	20.35	39.91	19.43	35	1500
	780	50.99	20.39	40.09	19.46	35	1500
	785	51.20	20.44	40.27	19.50	35	1500
	790	51.41	20.48	40.46	19.54	35	1500
	795	51.62	20.53	40.64	19.58	35	1500
xxxC(HBD)60(210) (xxx=661,666,672,677,683,688,694,705,710,716,721,727,733 120 cells)	661	44.30	19.88	34.83	18.98	35	1500
	666	44.51	19.92	35.02	19.02	35	1500
	672	44.73	19.96	35.24	19.07	35	1500
	677	44.95	20.01	35.44	19.11	35	1500
	683	45.17	20.05	35.65	19.16	35	1500
	688	45.38	20.10	35.85	19.20	35	1500
	694	45.60	20.14	36.06	19.25	35	1500
	699	45.82	20.18	36.25	19.29	35	1500
	705	46.04	20.23	36.46	19.34	35	1500
	710	46.25	20.27	36.65	19.38	35	1500
	716	46.47	20.32	36.86	19.43	35	1500
	721	46.69	20.37	37.06	19.46	35	1500
	727	46.91	20.41	37.25	19.52	35	1500
733	47.12	20.45	37.44	19.58	35	1500	
xxxC(HBD)54(210) (xxx=595,600,606,611,617,622,628,633,639,644,650,655 108 cells)	595	40.25	19.80	31.54	18.87	35	1500
	600	40.45	19.84	31.72	18.92	35	1500
	606	40.64	19.89	31.93	18.98	35	1500
	611	40.84	19.93	32.11	19.03	35	1500
	617	41.04	19.98	32.32	19.09	35	1500
	622	41.24	20.02	32.50	19.14	35	1500
	628	41.43	20.07	32.71	19.20	35	1500
	633	41.63	20.11	32.89	19.25	35	1500
	639	41.83	20.16	33.10	19.31	35	1500
	644	42.03	20.20	33.27	19.36	35	1500
	650	42.23	20.25	33.48	19.42	35	1500
655	42.43	20.29	33.65	19.47	35	1500	
xxxC(HBD)48(210) (xxx=531,536,541,546,551,556,561,566,571,576,581,586 96 cells)	531	35.81	19.81	28.19	18.84	35	1500
	536	35.98	19.85	28.35	18.91	35	1500
	541	36.15	19.90	28.51	18.98	35	1500
	546	36.33	19.94	28.67	19.05	35	1500
	551	36.51	19.99	28.82	19.12	35	1500
	556	36.68	20.03	28.98	19.19	35	1500
	561	36.85	20.08	29.13	19.26	35	1500
	566	37.02	20.12	29.29	19.33	35	1500
	571	37.20	20.17	29.44	19.40	35	1500
	576	37.37	20.21	29.60	19.47	35	1500
581	37.54	20.26	29.74	19.54	35	1500	
xxxC(BBD)78(182) (xxx=660,665,670,675,680,685,690,695,700,705,710,715, 156 cells)	660	55.17	15.10	46.58	14.17	30	1500
	665	55.34	15.18	46.71	14.24	30	1500
	670	55.51	15.27	46.84	14.31	30	1500
	675	55.68	15.36	46.98	14.37	30	1500
	680	55.86	15.44	47.11	14.44	30	1500

	685	56.03	15.53	47.25	14.50	30	1500
	690	56.20	15.62	47.38	14.57	30	1500
	695	56.37	15.70	47.51	14.63	30	1500
	700	56.54	15.79	47.64	14.70	30	1500
	705	56.71	15.88	47.77	14.76	30	1500
	710	56.88	15.96	47.90	14.83	30	1500
	715	57.05	16.05	48.03	14.89	30	1500
xxxC(BBD)72(182) (xxx=610,615,620, 625,630,635, 640,645,650, 655,660, 144 cells)	610	52.31	14.78	43.38	14.07	25 or 30	1500
	615	52.52	14.85	43.54	14.13	25 or 30	1500
	620	52.73	14.91	43.70	14.19	25 or 30	1500
	625	52.94	14.98	43.85	14.26	25 or 30	1500
	630	53.15	15.05	44.01	14.32	25 or 30	1500
	635	53.35	15.11	44.16	14.38	25 or 30	1500
	640	53.56	15.17	44.31	14.45	25 or 30	1500
	645	53.77	15.24	44.47	14.51	25 or 30	1500
	650	53.98	15.31	44.62	14.57	25 or 30	1500
	655	54.18	15.37	44.78	14.63	25 or 30	1500
	660	54.39	15.44	44.94	14.69	25 or 30	1500
xxxC(BBD)66(182) (xxx=560,565,570, 575,580,585, 590,595,600,605, 132 cells)	560	47.77	14.98	40.04	13.99	25 or 30	1500
	565	47.98	15.04	40.25	14.04	25 or 30	1500
	570	48.18	15.10	40.46	14.09	25 or 30	1500
	575	48.39	15.17	40.67	14.14	25 or 30	1500
	580	48.60	15.23	40.88	14.19	25 or 30	1500
	585	48.81	15.29	41.09	14.24	25 or 30	1500
	590	49.02	15.36	41.30	14.29	25 or 30	1500
	595	49.22	15.42	41.50	14.34	25 or 30	1500
	600	49.43	15.48	41.71	14.39	25 or 30	1500
	605	49.64	15.54	41.92	14.44	25 or 30	1500
xxxC(BBD)60(182) (xxx=510,515,520, 525,530,535, 540,545,550, 120 cells)	510	43.14	15.10	36.62	13.93	25 or 30	1500
	515	43.35	15.17	36.85	13.98	25 or 30	1500
	520	43.56	15.23	37.07	14.03	25 or 30	1500
	525	43.77	15.29	37.30	14.08	25 or 30	1500
	530	43.98	15.35	37.52	14.13	25 or 30	1500
	535	44.19	15.42	37.74	14.18	25 or 30	1500
	540	44.40	15.48	37.96	14.23	25 or 30	1500
	545	44.61	15.54	38.18	14.28	25 or 30	1500
	550	44.82	15.60	38.40	14.33	25 or 30	1500
xxxC(BBD)54(182) (xxx=460,465,470, 475,480,485, 490,495, 108 cells)	460	38.51	15.24	33.15	13.88	25 or 30	1500
	465	38.72	15.30	33.39	13.93	25 or 30	1500
	470	38.93	15.36	33.63	13.98	25 or 30	1500
	475	39.14	15.42	33.87	14.03	25 or 30	1500
	480	39.35	15.48	34.10	14.08	25 or 30	1500
	485	39.56	15.55	34.34	14.13	25 or 30	1500
	490	39.77	15.61	34.58	14.18	25 or 30	1500
495	39.98	15.67	34.81	14.23	25 or 30	1500	