

KANEKA Thin Film PV
Installation Manual

MODULE TYPE: U-EA Type






KANEKA CORPORATION









3-2-4, NAKANOSHIMA, KITA-KU

OSAKA 530-8288, JAPAN

Warning

Meaning of signs

	Not Allowed		No Disassembly		No Touching	
	Procedures Must be Followed.			Beware of Electric Shock		

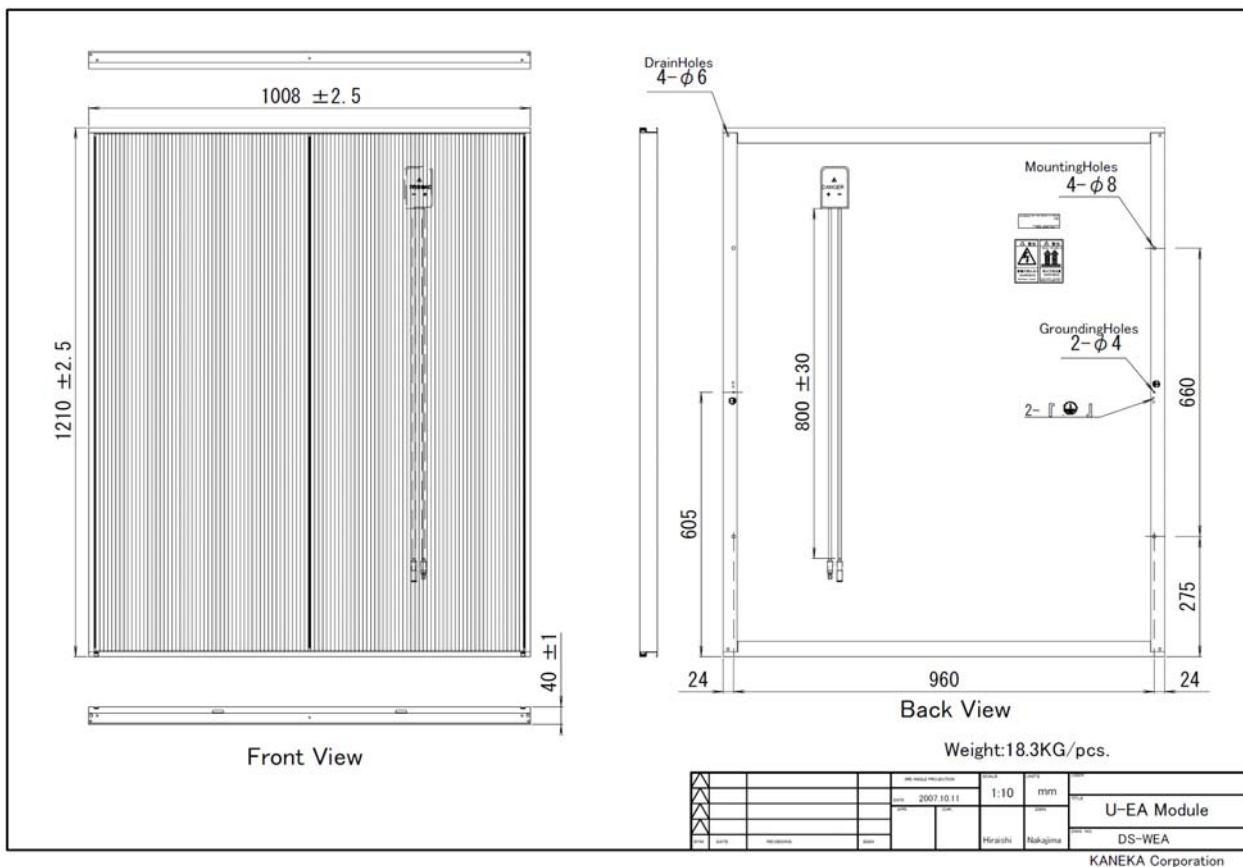
<p>Do not disassemble Kaneka thin-film silicon photovoltaic module(s) (hereinafter referred to as the MODULE(S)), as this may cause fire, electric shock, and injury.</p> 	<p>Do not shock the MODULES (e.g. by stepping on it), as this may break the glass part and cause malfunction, electric shock and injury.</p> 
<p>Follow the procedure in this manual when installing the MODULE and its platform.</p> 	<p>Beware of electric shock and short-circuit, as the MODULE generates high-tension current when exposed to light.</p> 
<p>Wear a safety belt, protection footwear, and protection gloves when installing the MODULE to prevent falling and electric shock. (Install safety fence and scaffolding to prevent falling.)</p> 	<p>The platform, connection box, and the inverter (power conditioner) must be grounded based on the regulation about grounding method.</p> 
<p>Do not expose the MODULE to the artificially concentrated sunlight.</p> 	<p>Installers should be qualified personnel who are experienced with electrical work and the installation of PV systems.</p> 

0. General

This manual provides installation instructions for KANEKA thin film PV module U-EA type (U-EA095, U-EA100, U-EA105, U-EA110, etc.).

Conditions of warranty are described separately in another document: Limited Warranty issued by KANEKA.

1. Dimensions



SPECIFICATION LISTS	UNIT	value
Dimension	mm	$1210.0 \pm 2.5 \times 1008.0 \pm 2.5$
Depth	mm	40.0 ± 1.0
Weight	kg	18
Mechanical load (IEC61646)	Pa	2,400
Fire Rating (ANSI/UL790)	-	Class C

2. Electrical Characteristics of MODULES

The types in bellow table are typical example and the values are subject to change. Please refer to “Specification” for U-EA type to be used.

SPECIFICATION LISTS	UNIT	U-EA110	U-EA105	U-EA100	REMARK
Performance at STC (stabilized)					
Nominal Power (Pmax)	W	110	105	100	
Open Circuit Voltage (Voc)	V	71.0	71.0	71.0	
Short Circuit Current (Isc)	A	2.50	2.40	2.25	
Voltage at Pmax (Vpm)	V	54.0	53.5	53.5	
Current at Pmax (Ipm)	A	2.04	1.96	1.87	
Max. System Voltage	V	600			
Maximum over-current protection rating	A	3.5			
Application class (IEC61730)	-	Class A			
(Reference)					
Initial performance at STC					
Power (Pmax)	W	126	120	114	(typical)
Open Circuit Voltage (Voc)	V	71	71	71	
Short Circuit Current (Isc)	A	2.5	2.4	2.2	
Voltage at Pmax (Vpm)	V	55	55	55	
Current at Pmax (Ipm)	A	2.3	2.2	2.1	

(REMARK)

1. The Electrical characteristics are within $\pm 10\%$ of the indicated values of Isc and Voc, and within $+10/-5\%$ of that of Pmax under standard test conditions (irradiance of $100\text{mW}/\text{cm}^2$, AM1.5 spectrum, and a cell temperature of 25°C). Even though we don't define the tolerances of Ipm and Vpm, those tolerances are close to $\pm 10\%$ according to the tolerances of Isc and Voc.
2. The nominal output value is defined as average value for modules using Kaneka's original evaluate method.
3. The performance at STC of the thin film silicon photovoltaic module at the outdoor use has seasonal variations. The amount of solar radiation also fluctuates monthly. The annual average of output could be estimated in consideration of both the variations.

4. Specifications subject to change without notice.
5. Under normal conditions, the MODULES may experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of I_{sc} and V_{oc} marked on the MODULES should be multiplied by a factor of 125% when determining component voltage ratings, conductor capacities, fuse sizes and size of controls connected to the MODULE output. Refer to section 12.7 of IEC 61730-1 for an additional multiply factor of 125%, which may be applicable.
6. The over current protection rating is 3.5A. Bypass Diode rating is 3.5 A and that is factory-installed in the each modules.
7. The MODULE is applied to application class A. Application class A for PV-modules is defined as follows:
 Class A: General access hazardous voltage, hazardous power applications.
 Module rated for use in this application class may be used in systems operating at greater than 50 V DC or 240 W, where general contact access is anticipated. Modules qualified for safety through this part of IEC 61730-1 and IEC 61730-2 and within this application class are considered to meet the requirements for safety class II.
9. The MODULES are certified for IEC 61646, IEC61730-1 and IEC 61730-2.

3. Installation of the MODULES

The assembly is to be mounted over a fire resistant roof covering rated for the application.

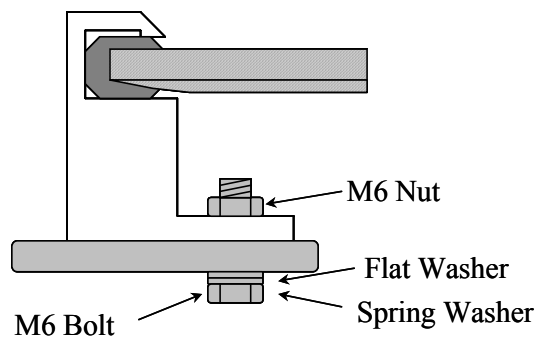
5 in/ft (127mm/305mm) required to maintain UL fire class rating.

Artificially concentrated sunlight shall not be directed on the MODULE.

See the Attachment A: Instruction for using U-type (IEC grade).

Method (1)

Fix the MODULES to rails with M6 bolts and nuts (4 pairs per module). The platform of the MODULES should have sufficient strength.

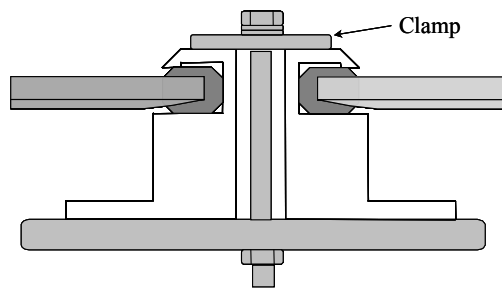
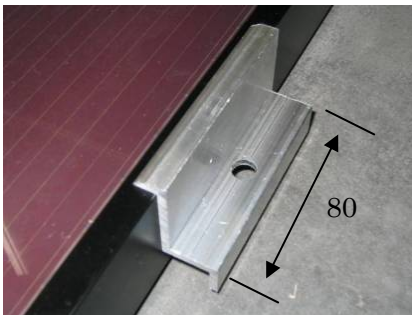


[the MODULE mounting diagram 1]

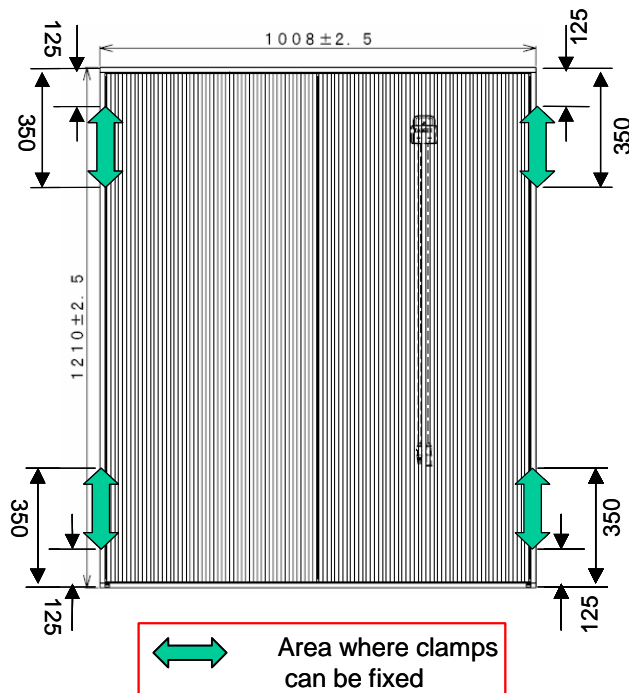
Method (2)

Fix the MODULES to rails with clamps as shown in the picture below, Module mounting diagram 2 and Clamping Method. The clamp length shall be 80mm or more.

Optimise the tightness of the cramps with greatest care so that the MODULES will not come off and so that the cramps will not break the frames of the MODULES and/or glasses.



[MODULE mounting diagram 2]



←→ Area where clamps can be fixed

Clamping Method

Handling Instruction to install a mounting system

*Do not shock the MODULES (e.g. by stepping on it), as this may break the glass part and

electric shock.

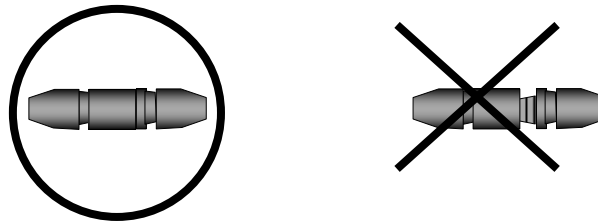
- *Wear a safety belt, protection footwear, and protection gloves when installing the module and mounting system to prevent falling and electric shock.
- * Beware of electric shock as the MODULE generates high- tension current when exposed to light.

4. Connecting cables

All wiring should be done in accordance with applicable electrical codes.

Use 2.0 mm² (14 AWG) minimum, insulated for 90°C minimum cables, Stranded Copper only.

When connecting cables, push the plus and minus connectors against each other while twisting them until they are fully engaged.



Plus cable connector: PV-KST3II (Multi-Contact)

Minus cable connector: PV-KBT3II (Multi-Contact)

The MODULES have MC Connector system for photovoltaic, which is supplied from Multi-Contact. You can use the same connector as written above.

The MODULES employ factory assembled Multi-Contact connectors for interconnection between the MODULES during array assembly in the field.

More than six (6) MODULES should not be connected in series.

When the MODULES are connected in parallel, each string should have a blocking diode or a fuse, which has 3.5 A capacity.

See the Attachment A: Instruction for using U-type (IEC grade).

5. Ground-connecting

5-1. Grounding of Module frames

Grounding should be done in accordance with the applicable regional and local codes. All the MODULES should be ground-connected with the ground holes of the MODULES.

Routine maintenance of the MODULES shall not involve breaking or disturbing the bonding path. A bolt, screw, or other part used for bonding purposes within a module or panel shall not be

intended for securing the complete device to the supporting surface or frame.

Bonding shall be by a positive means, such as clamping, riveting, bolted or screwed connections, or welding, soldering or brazing. The bonding connection shall penetrate all nonconductive coatings, such as paint, anodized coatings or vitreous enamel.

All joints in the bonding path shall be mechanically secure, independently of any soldering.

If the bonding connection depends upon screw threads, two or more screws or two full threads of a single screw shall engage the metal.

The diameter of the grounding screw or bolt shall be sized appropriately to the gauge of the bonding conductor, as per Table 2 of IEC 61730-1.

A ferrous metal part in the grounding path shall be protected against corrosion by metallic or non-metallic coatings, such as painting, galvanizing, or plating. Stainless steel is acceptable without additional coating.

A metal-to-metal multiple-bearing pin-type hinge is considered to be an acceptable means for bonding.

5-2. Grounding of PV array

Only the inverter with transformer must be used for the MODULES. And the negative (-) pole of the PV array have to be grounded.

This grounding should be done in accordance with the applicable regional and local codes. If a resistor is needed for the negative pole grounding, maximum 100 kΩ resistor is recommended.

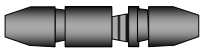

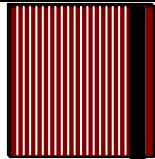
6. Maintenance



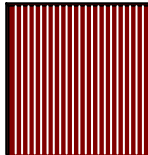
Under the normal use maintenance is not necessary. The dirt on the surface of the MODULES will be washed away by rain.


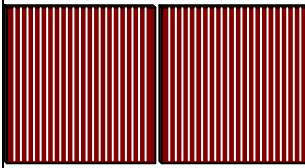
7. Limitation

See the Attachment A: Instruction for using U-type (IEC grade).


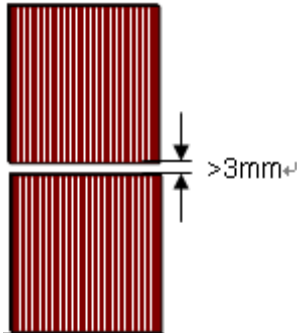
Attachment A : Instruction for using U-type (IEC grade)

Item	Prohibited acts	Assumed risks	Importance	Remarks
Installation and maintenance	Connecting PV MODULES to the inverter with reverse polarity.	It breaks MODULE or/and inverter.	Prohibited	You must make sure the correct cable polarity in connecting MODULES to the inverter.
	Stepping on the glass portion of MODULE	It breaks MODULE.	Prohibited	You should avoid stepping directly on the modules at all times – if necessary use rubber-soled shoes and step on the frames only.
	Cleaning the PV MODULES with solvents	It causes deterioration of the glass, EVA and a cover film.	Prohibited	Please consult with Kaneka in order to check if the usage of solvent is allowed.
	Dismantlement of the PV MODULES	It causes an electrical hazard or an injury.	Prohibited	You must not dismantle the PV MODULES.
	Installation of broken PV MODULES	It causes insulation defectives, which cause fatal PV system errors.	Prohibited	You must replace broken PV MODULES with normal PV MODULES.
	Touching the top of the connector	It causes an electrical shock.	Prohibited	You must not touch it especially with wet hands.
	Incomplete cable connecting 	It causes electric disconnection or electric shock.	Prohibited	You must connect cables firmly. 
	 Covering the entire solar cell area.	It causes damage to cell	Prohibited	Avoid completely covering the cell in sunny conditions.

Item	Prohibited acts	Assumed risks	Importance	Remarks
Design	<p>Installation with angle less than 5°</p> 	It causes dirt accumulation on the glass or inside of frames that cause deterioration of durability.	Prohibited	Installation with angle more than 15° is recommended to avoid dirt accumulation on the glass or inside of frames.
	<p>Installing without completing an accurate load assessment.</p>	It causes a lack of the strength or the durability.	Prohibited	Proper wind load calculations must be completed. Maximum loading of MODULE is 2400 Pa (= 2400 N/m ²)
	<p>Installation in heavy snowfall area</p>	In case that snow is piling up on MODULE more than MODULE's loading capacity, the MODULE breaks.	Prohibited	You must install PV system, considering the strength of PV system design against snowfall. Maximum loading of MODULE is 2400 Pa (= 2400 N/m ²)
	 <p>Installation of the MODULES with the cells horizontally.</p>	In case that accumulated dirt covers up a cell and power generation of the cell stops completely, the power of the MODULE declines a lot, which makes durability deterioration.	Prohibited	 <p>You must set the MODULES with the cells vertically.</p>
	<p>Installation of the MODULES upside down</p>	Drains holes are located in the frames at the bottom of MODULES. Installing in reverse direction without drain holes could cause premature deterioration.	Prohibited	You must follow the instruction "INSTALL THIS SIDE UP" indicated in the labels of the rear side of the MODULES.

Item	Prohibited acts	Assumed risks	Importance	Remarks
Design	 Putting furniture or clips whose shade cover up whole cell(s) completely for a long time	It causes great decline of power or durability deterioration.	Prohibited	The degree of decline fluctuates according to the quantity of scattered light.
	Overlapping MODULES that may shade completely one or more cells for an extended period of time.	It causes great decline of power.	Prohibited	 You must set the MODULES without overlap each other.
	Connecting more than 6 MODULES in series.	The system voltage may exceed the certified maximum system voltage	Prohibited	Max system voltage of the MODULES is 600V. The values of Voc marked on the MODULES should be multiplied by a factor of 125% when determining component voltage ratings, size of controls connected to the MODULE output. (requirement of IEC61730-1)
	Use inverter without transformer	It causes potential problem to the modules.	Prohibited	High negative or positive voltage from ground level will occur.
	Connecting without fuse or blocking diode in each string.	It does not block reverse current and causes damage on the modules.	Not recommended	Please follow all local and national electric codes.

Item	Prohibited acts	Assumed risks	Importance	Remarks
Design	Connecting some strings in parallel without overcurrent protection in each string.	It causes high reverse current and causes damage on the modules.	Not recommended	Please follow all local and national electric codes.
	Installation without the ground of the MODULE-frames	It causes an electrical hazard.	Not recommended	The MODULE-frames must be electrically grounded according to national laws and regulations.
	Using central earth system and connect more than 6 modules in series	The system voltage may exceed the certified maximum system voltage	Prohibited	Please use modules within the certificated maximum system voltage, which is 600V.
	Grounding of positive (+) pole of PV. Or without grounding of negative (-) pole of PV array.	Loading negative potential to the MODULES brings damage easily.	Prohibited	Negative (-) of PV array must be grounded

Item	Prohibited acts	Assumed risks	Importance	Remarks
Installation and environmental condition	 <p>Installation method that makes the frames holds rainwater around the MODULES by blocking up the drain hole of the frames.</p>	<p>It causes decline of power by accumulated dirt on the glass or great influence on the MODULES with accumulated dirt into the frame. It also causes that rainwater stay inside of the frames and thus causes deterioration of durability.</p>	Prohibited	<p>You must make holes in the rails so that rainwater can drain well.</p> <p>You must also keep apart the vertically adjoining MODULES at least by 3 mm for the sake of the drainage of the MODULE-frames.</p> 
	Installation nearby the seashore	It damages MODULES from salty breeze or salt water.	Prohibited	You must install PV system at least 500m away from the seashore.
	Installation in the area where corrosive gasses and/or liquid is produced such as animal farming houses	Corrosive gasses and/or liquid such as ammonium cause the problem of the modules.	Prohibited	Installation on the roof of animal farming house such as a pig house is prohibited.