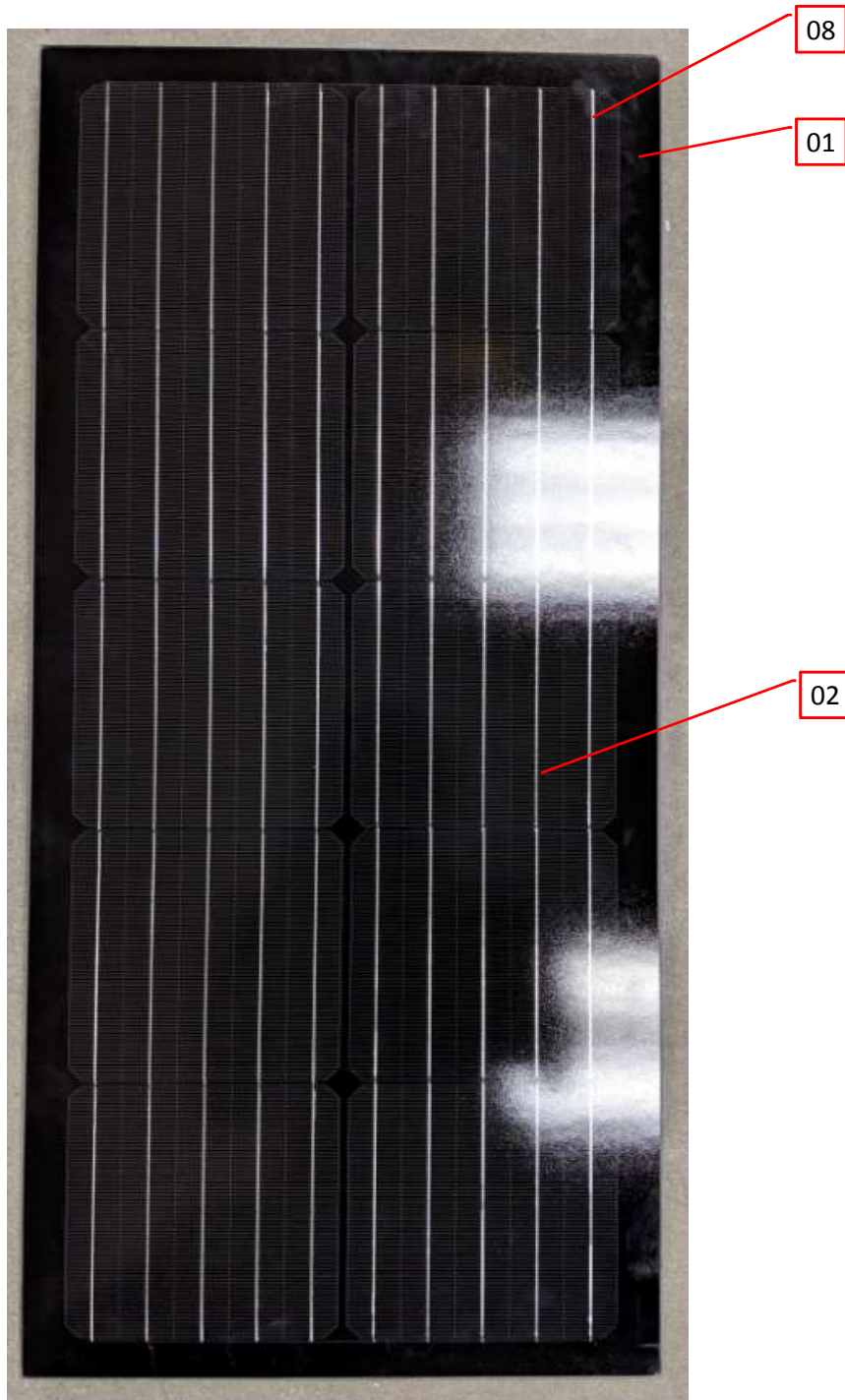


1.0 Reference and Address			
Report Number	103849501LAX-001	Original Issued: 1-Jul-2019	Revised: None
Standard(s)	Standard For Flat-Plate Photovoltaic Modules And Panels [UL 1703:2002 Ed.3+R:13Sep2017] Flat Plate Photovoltaic Modules And Panels [ULC ORD C1703:2018 Ed.2 ]		
Applicant	<u>3 in 1 Roof, Inc.</u>	Manufacturer	<u>Suzhou Fermi Power Co Ltd</u>
Address	532 SW Natura Ave Deerfield Beach, Florida 33441	Address	Yangyuan Industrial Park Changshu, Jiangsu 215000
Country	USA	Country	China
Contact	Carmen Bellavia	Contact	Yang Shi Letty Zuniga
Phone	833-3N1-ROOF	Phone	86 134 0211 7212 951-342-3050
FAX	NA	FAX	NA
Email	<u>INFO@3in1roof.com</u>	Email	yyshi@fermipower.com luead23@gmail.com

2.0 Product Description							
Product	Building Integrated Photovoltaic						
Brand name	Fermi Power						
Description	<p>The basic construction consists of a laminated assembly of individual solar cells and interconnecting ribbons encapsulated within an insulating material. This encapsulated assembly is sandwiched between a rigid transparent top surface (superstrate) and an insulating back surface (substrate). Field wiring connections to the module are made through the factory installed junction box with polarized mating cables and connectors. The laminates are shipped from the factory fully assembled. The laminates are installed onto a tile to form the solar tile. Caulking is applied along the perimeter of the laminate once placed on the tile and six GAF mechanical fasteners are used to secure the laminate to the tile.</p>						
Models	SSM50						
Model Similarity	NA						
Ratings	<b>Model Number</b>	<b>Pmax</b>	<b>Voc</b>	<b>Isc</b>	<b>Vmp</b>	<b>Imp</b>	<b>MSV</b>
		<b>[W]</b>	<b>[V]</b>	<b>[A]</b>	<b>[V]</b>	<b>[A]</b>	<b>[V]</b>
	SSM50	50	6.61	9.63	5.49	9.11	1000
	Pmax = Rated Maximum Power at STC, W Voc = Open Circuit Voltage at STC, V dc Isc = Short Circuit Current at STC, A dc Vmp = Rated Voltage at STC, V dc Imp = Rated Current at STC, A dc MSV = Maximum System Voltage, V dc						
Other Ratings	Maximum Series Fuse Rating: 15 A Fire Class Rating: Class A Mechanical Load Rating - 30 psf						

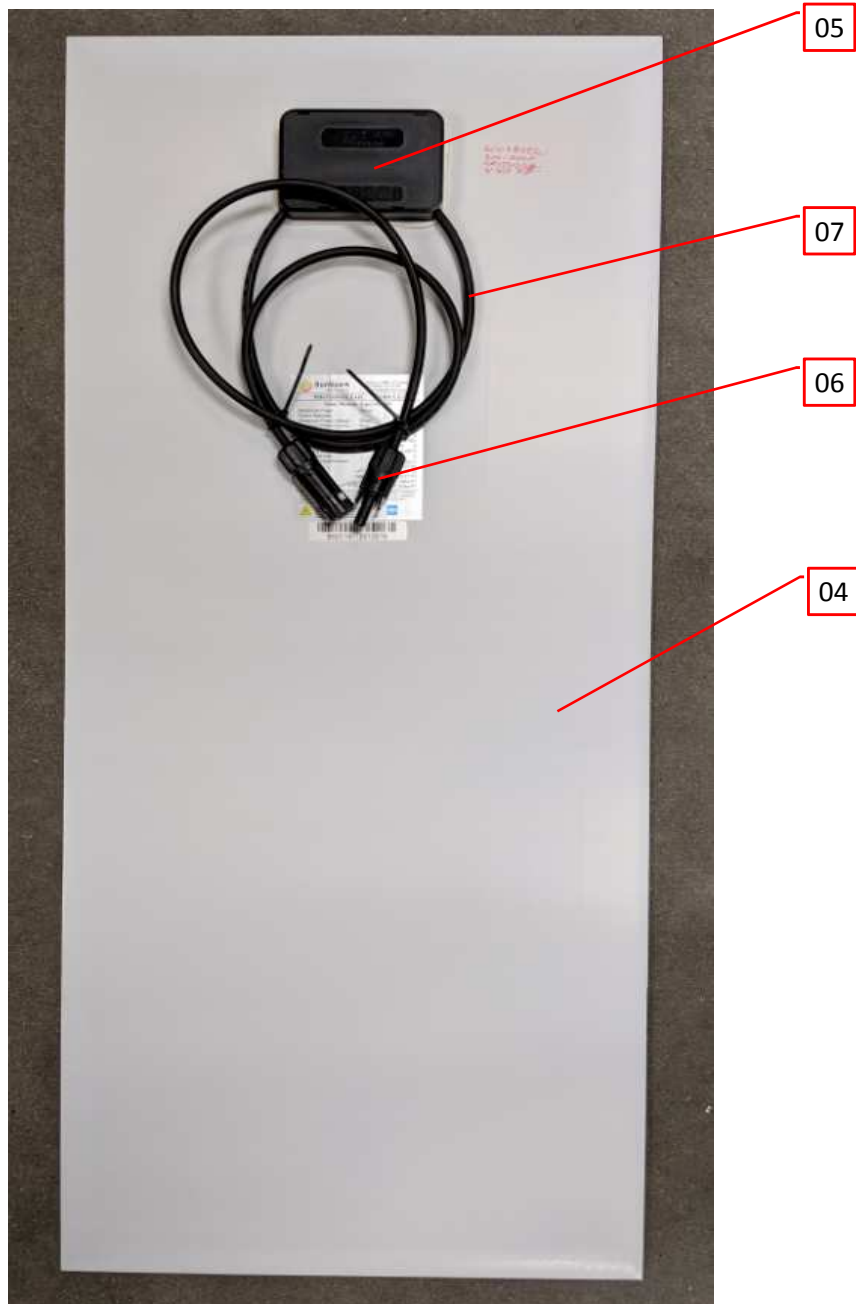
**3.0 Product Photographs**

**Photo 1 - Front of Laminate**



**3.0 Product Photographs**

**Photo 2 - Backside of Laminate**



**3.0 Product Photographs**

**Photo 3 - Junction Box**



**Photo 4 - Connectors and Cables**



4.0 Critical Components						
Photo #	Item no. <sup>1</sup>	Name	Manufacturer/ trademark <sup>2</sup>	Type / model <sup>2</sup>	Technical data and securement means	Mark(s) of conformity <sup>3</sup>
1	1	Superstrate	Jiangsu Liangsheng Solar Glass Technology Co.Ltd	Various	Low Iron Tempered Glass 3.2mm Thickness	NR
			Wujiang Csg Glass Co.,Ltd	Various	Low Iron Tempered Glass 3.2mm Thickness	
1	2	Cell	Ha Noi Solar Technology Limited	HN-156M	Monocrystalline Silicon 156 x 156 (mm x mm) Thickness: 200 ±20 (mm)	NR
1	3	Encapsulant (Not Shown)	Hangzhou First Pv Material Co Ltd [E File: E326347]	F406S	Encapsulants: Ethylene Vinyl Acetate (E/VAC), furnished as rolls or sheets. Used on top of cells. 0.45 mm nominal thickness	UR
				F806	Encapsulants: Ethylene Vinyl Acetate (E/VAC), furnished as rolls or sheets. Used on bottom of cells. 0.45 mm nominal thickness	
2	4	Substrate	Cybrid Technology Inc [E File: E333414]	Cynagard 205A	PVDF/PET/Fluorine resin coating, furnished as sheets. White, 0.28 mm nominal thickness.	UR

4.0 Critical Components						
Photo #	Item no. <sup>1</sup>	Name	Manufacturer/ trademark <sup>2</sup>	Type / model <sup>2</sup>	Technical data and securement means	Mark(s) of conformity <sup>3</sup>
2,3	5	Junction Box	QC Solar (Suzhou) Corp [E File: E312223]	QC0816431-6	Max Current: 20A Max Voltage: 1000V	UR
2,4	6	Connectors	QC Solar (Suzhou) Corp [E File: E34004]	QC4.10-a5c12	Max Voltage: 1500V 12 AWG	cURus
2,4	7	Cables	QC Solar (Suzhou) Corp [E File: E335336]	PV Wire	Sunlight resistant, 90°C wet or dry, 2000V, 12AWG conductor size	UR
1	8	Cell Interconnect	Various	Various	Copper strips plated with Solder (Sn60%Pb40%) 4 bus strips in parallel, each 1.2 mm wide, 0.25 mm thick minimum.	NR
1	9	Bus Interconnect (Not Shown)	Various	Various	Copper strips plated with Solder (Sn60%Pb40%), 6 mm wide, 0.35 mm min. thick.	NR
1	10	Insulation Sheet (Not Shown)	Cybrid Technologies Inc [E File: E333414]	MPM Cynagard 115E	0.28 mm nominal thick. Located between string tabbing on the top of the module	UR
1	11	Junction Box Pottant (Not Shown)	Jiangsu Minghao New Material Sci-Tech Corporation [E File: E335929]	MH-3667	Rated V-0, HAI=0, HWI=0, CTI=0 at minimum thickness of 3.0 mm, RTI=105°C	UR

4.0 Critical Components						
Photo #	Item no. <sup>1</sup>	Name	Manufacturer/ trademark <sup>2</sup>	Type / model <sup>2</sup>	Technical data and securement means	Mark(s) of conformity <sup>3</sup>
1	12	Junction Box Adhesive (Not Shown)	Jiangsu Minghao New Material Sci-Tech Corporation [E File: E335929]	MH-3668	Rated HB, HAI=1, HWI=0, CTI=0 at minimum thickness of 1.8 mm, RTI=105°C).	UR
			Goloho Chemical Industrial Ltd [E File: E254532]	GOLOHO-63	Rated V-0, HAI=0, HWI=0, CTI=0 at minimum thickness of 3.0 mm, RTI=105°C	
1	13	Label (Not Shown)	Suzhou Xingchen Printing Co Ltd [E File: MH46266]	XC-011	Used for the Marking and Serial Label.	cURus
NOTES: 1) Not all item numbers are indicated (called out) in the photos, as their location is obvious. 2) "Various" means any type, from any manufacturer that complies with the "Technical data and securement means" and meets the "Mark(s) of conformity" can be used. 3) Indicates specific marks to be verified, which assures the agreed level of surveillance for the component. "NR" - indicates Unlisted and only visual examination is necessary. "See 5.0" indicates Unlisted components or assemblies to be evaluated periodically refer to section 5.0 for details.						



**5.0 Critical Unlisted CEC Components**

No Unlisted CEC components are used in this report.

## 6.0 Critical Features

Recognized Component - A component part, which has been previously evaluated by an accredited certification body with restrictions and must be evaluated as part of the basic product considering the restrictions as specified by the Conditions of Acceptability.

Listed Component - A component part, which has been previously Listed or Certified by an accredited Certification Organization with no restrictions and is used in the intended application within its ratings.

Unlisted Component - A part that has not been previously evaluated to the appropriate designated component standard. It may also be a Listed or Recognized component that is being used outside of its evaluated Listing or component recognition.

Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

Construction Details - For specific construction details, reference should be made to the photographs and descriptions. All dimensions are approximate unless specified as exact or within a tolerance. In addition to the specific construction details described in this Report, the following general requirements also apply.

1. Spacing - In primary circuits, 15.9 mm minimum spacing are maintained through air and over surfaces of insulating material between current-carrying parts of opposite polarity in the wiring terminal, and 25.4 mm minimum between such current-carrying parts and accessible edge of module.
2. Mechanical Assembly - Components such as switches, fuseholders, connectors, wiring terminals and display lamps are mounted and prevented from shifting or rotating by the use of lockwashers, starwashers, or other mounting format that prevents turning of the component.
3. Accessibility of Live Parts - All uninsulated live parts in primary circuitry are housed within a non-metallic enclosure constructed with no openings and not intended for servicing.
4. Grounding - This product is not provided with a means of grounding as it is a frameless module and has not exposed dead-metal parts.
5. Schematics - Refer to Illustration No 2 for schematics requiring verification during Field Representative Inspection Audits.

## 6.0 Critical Features

6. Markings - The product is marked on UL 969 approved label material as shown in Section 4.0, Item 13. See illustration 3 for example of marking label.
- 1) Brand name/Trademark.
  - 2) Model number.
  - 3) Electrical ratings including:
    - (a) Open-circuit voltage
    - (b) Rated operating voltage
    - (c) Maximum power
    - (d) Short-circuit current
    - (e) Operating rated current
    - (f) Maximum system voltage
    - (g) Series Fuse Rating
  - 4) The statement "See module literature for appropriate mating connectors"
  - 5) The statement "System Fire Class Rating: See Installation Instructions for Installation Requirements to Achieve a Specified System Fire Class Rating with this Product"
  - 6) The statement "Pour les connexions sur le terrain, utilisez des fils de cuivre No. 12 AWG isolés pour un minimum de 194°F. Voir la documentation du module pour connaître les connecteurs appropriés. Indice de classement du système: Reportez-vous aux instructions d'installation pour connaître les exigences permettant d'obtenir une classification de classe d'incendie du système spécifiée avec ce produit."
7. Installation, Operating and Safety Instructions - Instructions for installation and use of this product are provided by the manufacturer. See illustrations 1a, 1b, 1c, 1d, 1e, 1f for statements to verify.

## 7.0 Illustrations

### Illustration 1a - Installation Instructions

# Conditions for Use



- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The module is considered to be in compliance with UL 1703 only when the module is mounted in the manner specified by the mounting instructions below.
- Any module without a frame (laminated) shall not be considered to comply with the requirements of UL 1703 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by a field inspection certifying that the installed module complies with the requirements of UL 1703
- The electrical characteristics are within  $\pm 10$  percent of the indicated values of ISC, VOC, and Pmax under standard test conditions (irradiance of 100 mW/cm<sup>2</sup>, AM 1.5 spectrum, and a cell temperature of 25°C (77°F)). This statement needs to be included below the electrical ratings for the model.

## 7.0 Illustrations

### Illustration 1b - Installation Instructions

## Conditions for Use (cont.)



- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, the values of ISC and VOC marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- The mating connector for these modules is model **QC4.10-a5c12** manufactured by **QC Solar (Suzhou) Corp.** These connectors may be purchased directly from the QC Solar website at <http://www.qc-solar.com/> or from your local solar component distributor.

## 7.0 Illustrations

### Illustration 1c - Installation Instructions

# Conditions d'utilisation



- La résistance au feu de ce module n'est valable que si elle est montée de la manière spécifiée dans les instructions de montage mécanique.
- Le module est considéré conforme à la norme UL 1703 uniquement s'il est monté de la manière spécifiée dans les instructions de montage ci-dessous..
- Un module sans cadre (stratifié) ne doit pas être considéré comme conforme aux exigences de la norme UL 1703 à moins que le module ne soit monté avec du matériel qui a été testé et évalué avec le module dans le cadre de cette norme ou par un contrôle sur site certifiant que le module installé est conforme, avec les exigences de la norme UL 1703.
- Les caractéristiques électriques correspondent à  $\pm 10\%$  des valeurs indiquées de l'ISC, du COV et du Pmax dans des conditions de test standard (éclairage énergétique de  $100 \text{ mW} / \text{cm}^2$ , spectre AM 1,5 et une température de cellule de  $25^\circ \text{C}$ ). "Cette déclaration doit être incluse ci-dessous les estimations électriques pour le modèle.



## 7.0 Illustrations

### Illustration 1d - Installation Instructions

## Conditions d'utilisation (a continué)

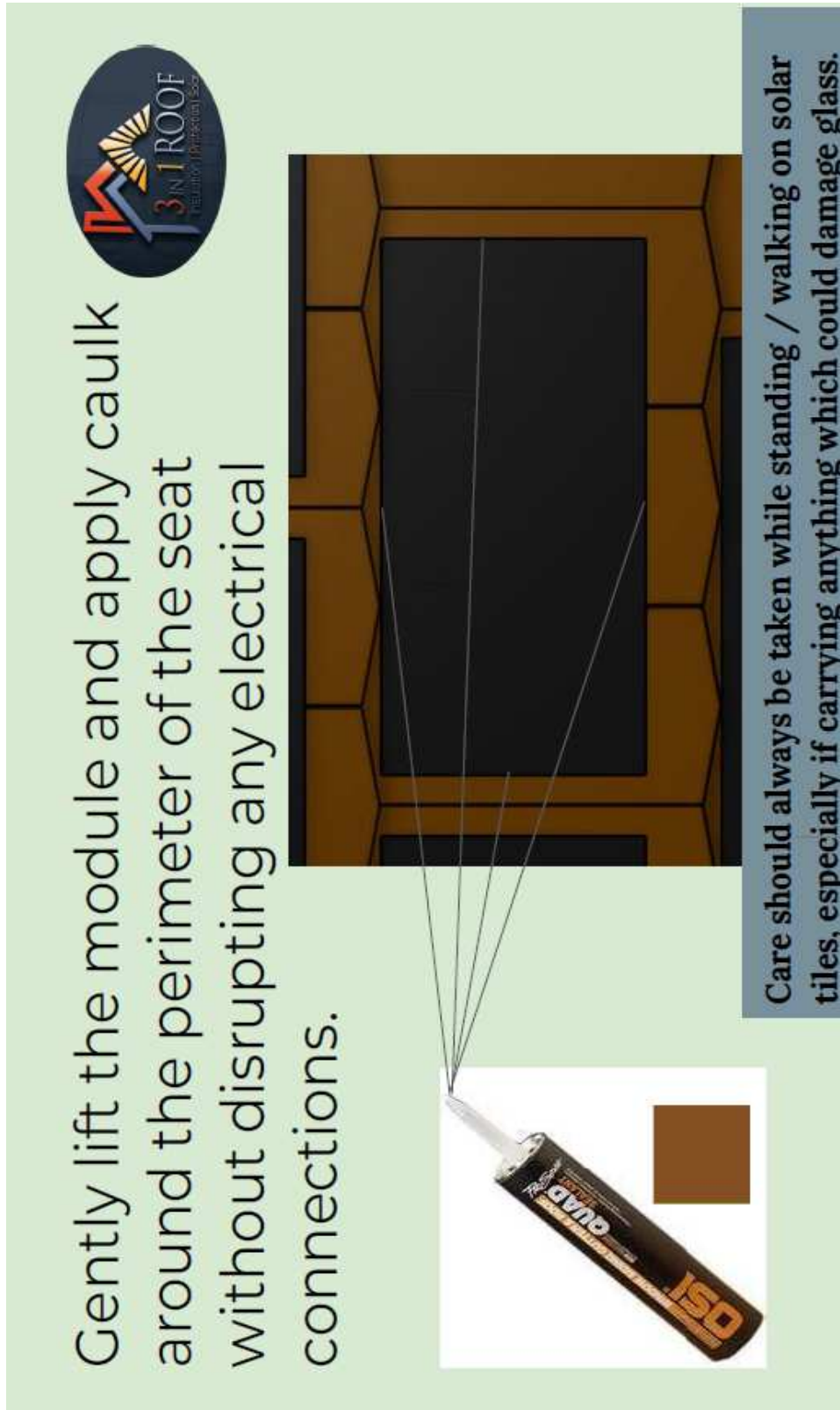


- Dans des conditions normales, un module photovoltaïque est susceptible de rencontrer des conditions produisant plus de courant et / ou de tension que les conditions de test standard. Les exigences du Code national de l'électricité (NEC) à l'article 690 doivent être suivies pour faire face à ces rendements accrus. Dans les installations ne répondant pas aux exigences du NEC, les valeurs d'ISC et de COV indiquées sur ce module doivent être multipliées par un facteur de 1.25 lors de la détermination de la tension nominale des composants, de l'ampérage des conducteurs, de la puissance nominale du dispositif à maximum de courant et de la taille des commandes connectées à la sortie PV.
- La lumière du soleil artificiellement concentrée ne doit pas être dirigée sur le module ou le panneau.
- Le connecteur correspondant à ces modules est le modèle **QC4.10-a5c12** fabriqué par **QC Solar (Suzhou) Corp.** Ces connecteurs peuvent être achetés directement sur le site Web de QC Solar à l'adresse <http://www.qc-solar.com/> ou auprès de votre distributeur de composants solaires local.

**7.0 Illustrations**

**Illustration 1e** - Installation Instructions

Gently lift the module and apply caulk around the perimeter of the seat without disrupting any electrical connections.



Care should always be taken while standing / walking on solar tiles, especially if carrying anything which could damage glass.



**7.0 Illustrations**

Illustration 1f - Installation Instructions

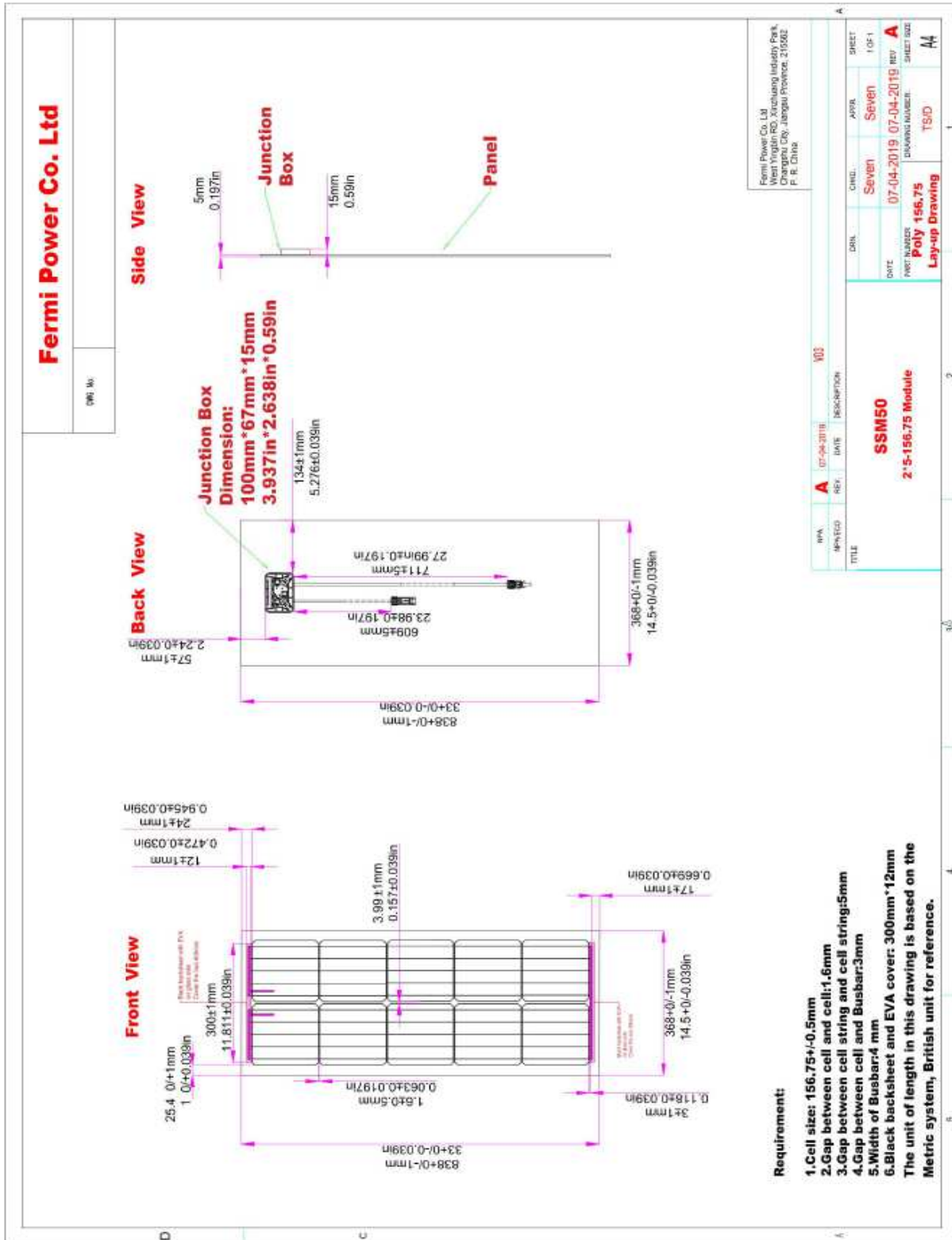
Install 6x mechanical fasteners for each Solar tile and Combiner tile.

**Mechanical Fasteners**

Care should always be taken while standing / walking on solar tiles, especially if carrying anything which could damage glass.


**7.0 Illustrations**

**Illustration 2 - Module schematics**



**7.0 Illustrations**

Illustration 3 - Example of marking label



Designed in *California*  
 Manufactured by  
**Fermi Power**


PHOTOVOLTAIC MODULE

Module Type: **SSM50**

Maximum Power	(Pmax)	50W
Power Tolerance		0~5W
Maximum Power Voltage	(Vmp)	5.49V
Maximum Power Current	(Imp)	9.11A
Open Circuit Voltage	(Voc)	6.61V
Short circuit Current	(Isc)	9.63A
Maximum System Voltage		1000VDC
Maximum Series Fuse Rating		15A
Operating Temperature		- 104°F ~ +185°F
Application Class		A
Module Fire performance		Type 2
Weight		6.05 lbs
Dimension		33"14.5"0.787 in
STC		1000W/m <sup>2</sup> , AM 1.5, 77°F
Wind Load		30 lbs/ft <sup>2</sup>
Snow Load		30 lbs/ft <sup>2</sup>



For field connections, use minimum No. 12 AWG copper wires insulated for a minimum of 194°F. See module literature for appropriate mating connectors. System Fire Class Rating: See Installation Instructions for requirements to Achieve a Specified System Fire Class Rating with this Product.

Pour les connexions sur le terrain, utilisez des fils de cuivre No. 12 AWG isolés pour un minimum de 194 °F. Voir la documentation du module pour connaître les connecteurs appropriés. Indice de classement du système: Reportez-vous aux instructions d'installation pour connaître les exigences permettant d'obtenir une classification de classe d'incendie du système spécifiée avec ce produit.



Solar modules generate electricity as soon as they are exposed to light. One module on its own is below the safety extra low volt level, but multiple Modules connected in series (summing the voltage) represent a danger.

<b>8.0 Test Summary</b>			
Evaluation Period	03/20/2019 to 07/01/2019		Project No. G103849501
Sample Rec. Date	4-Apr-2019	Condition	Prototype
Sample ID	LAN1904041509		
Test Location	25791 Commercentre Drive, Lake Forest, CA 92630		
Test Procedure	Testing Lab		
Determination of the result includes consideration of measurement uncertainty from the test equipment and methods. The product was tested as indicated below with results in conformance to the relevant test criteria.			
The following tests were performed:			
	Test Description	UL 1703	ULC ORD-C1703
	Leakage Current Test	21	5.4
	Dielectric Voltage Withstand Test	26	5.9
	Wet Insulation Test	27	5.1
	Impact Test	30	5.13
	Humidity Test	36	5.18
	Mechanical Loading Test	41	5.23
	Wiring Compartment Securement	42	5.24

<b>8.1 Signatures</b>			
A representative sample of the product covered by this report has been evaluated and found to comply with the applicable requirements of the standards indicated in Section 1.0.			
Completed by:	Abhinav Prakash	Reviewed by:	Faraz Ebneali
Title:	Engineer	Title:	Reviewer
Signature:		Signature:	

<b>9.0 Correlation Page For Multiple Listings</b>	
The following products, which are identical to those identified in this report except for model number and Listee name, are authorized to bear the ETL label under provisions of the Intertek Multiple Listing Program.	
<b>BASIC LISTEE</b>	3 in 1 Roof, Inc.
<b>Address</b>	532 SW Natura Ave Deerfield Beach, Florida 33441
<b>Country</b>	USA
<b>Product</b>	Building Integrated Photovoltaic

<b>MULTIPLE LISTEE 1</b>	None
<b>Address</b>	
<b>Country</b>	
<b>Brand Name</b>	
<b>ASSOCIATED MANUFACTURER</b>	
<b>Address</b>	
<b>Country</b>	
<b>MULTIPLE LISTEE 1 MODELS</b>	
<b>BASIC LISTEE MODELS</b>	

<b>MULTIPLE LISTEE 2</b>	None
<b>Address</b>	
<b>Country</b>	
<b>Brand Name</b>	
<b>ASSOCIATED MANUFACTURER</b>	
<b>Address</b>	
<b>Country</b>	
<b>MULTIPLE LISTEE 2 MODELS</b>	
<b>BASIC LISTEE MODELS</b>	

<b>MULTIPLE LISTEE 3</b>	None
<b>Address</b>	
<b>Country</b>	
<b>Brand Name</b>	
<b>ASSOCIATED MANUFACTURER</b>	
<b>Address</b>	
<b>Country</b>	
<b>MULTIPLE LISTEE 3 MODELS</b>	
<b>BASIC LISTEE MODELS</b>	

## **10.0 General Information**

The Applicant and Manufacturer have agreed to produce, test and label ETL Listed products in accordance with the requirements of this Report. The Manufacturer has also agreed to notify Intertek and to request authorization prior to using alternate parts, components or materials.

### COMPONENTS

Components used shall be those itemized in this Intertek report covering the product, including any amendments and/or revisions.

### LISTING MARK

The ETL Listing mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the mark is subject to the control of Intertek.

The mark must include the following four items:

- 1) applicable country identifiers "US" and/or "C" or "US", "C" and "EU"
- 2) the word "Listed" or "Classified" or "Recognized Component" (whichever is appropriate)
- 3) a control number issue by Intertek
- 4) a product descriptor that identifies the standards used for certification. Example:

**For US standards**, the words, "Conforms to" shall appear with the standard number along with the word, "Standard" or "Std." Example: "Conforms to ANSI/UL Std. XX."

**For Canadian standards**, the words "Certified to CAN/CSA Standard CXX No. XX." shall be used, or abbreviated, "Cert. to CAN/CSA Std. CXX No. XX."

Can be used together when both standards are used.

**Note: A facsimile must be submitted to Intertek, Attn: Follow-up Services for approval prior to use.**

The facsimile need not have a control number. A control number will be issued **after signed Certification Agreements** have been received by the Follow-up Services office, approval of the facsimile of your proposed Listing Mark, satisfactory completion of the Listing Report, and scheduling of a factory assessment in your facility.

### MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

### FOLLOW-UP SERVICE

Periodic unannounced audits of the manufacturing facility (and any locations authorized to apply the mark) shall be scheduled by Intertek. An audit report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the ETL mark with the requirements of this Report and the Certification Agreement.
3. Manufacturing changes.
4. Performance of specified Manufacturing and Production Tests.

In the event that the Intertek representative identifies non-conformance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the ETL Mark from non-conforming product.
3. Contact the issuing product safety evaluation center for instructions.

### **10.1 Evaluation of Unlisted Components**

Because Unlisted Components are uncontrolled, and they do not fall under a third party follow up program, Intertek may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process. The Unlisted Components in Section 5.0 require testing and/or evaluation as indicated.

**Note to Intertek Follow Up Inspector: The Component Evaluation Center, CEC, will notify you in writing when these components must be selected and sent to the CEC for re-evaluation**

Ship the samples to:

Intertek Testing Services NA Inc.  
ETL Component Evaluation Center  
45000 Helm Street, Suite 150  
Plymouth Twp., MI 48170 USA  
Attn: Component Evaluation Center

Sample Disposition: Due to the destructive nature of the testing, all samples will be discarded at the conclusion of testing unless, the manufacturer specifically requests the return of the samples. The request for return must accompany the initial component shipment.

**11.0 Manufacturing and Production Tests**

The manufacturer agrees to conduct the following Manufacturing and Production Tests as specified:

**Required Tests**

- Factory Dielectric Voltage-Withstand Test
- Factory Voltage, Current, and Power Measurements Test

**11.1 Dielectric Voltage Withstand Test**

Method

In accordance with Section 43 of ANSI/UL 1703, one hundred percent of production of the products covered by this Report shall be subjected to a routine production line dielectric withstand test.

The test shall be conducted when the module is fully assembled, complete and ready for packing, or when it is complete except for covers or other parts that may interfere with the performance of the test.

The dc test voltage specified below shall be applied between parts involving a risk of electric shock and accessible conductive parts. The dc test voltage may be gradually increased to the specified value but must be maintained at the specified value for one second or one minute as required.

Test Equipment

The test equipment shall include a means of indicating the test voltage that is being applied to the product under test. The test equipment is also to include an audible and/or visual indicator of dielectric breakdown. The indication is to remain active and conspicuous until the test equipment is manually reset.

The test potential may be obtained from any convenient source having a capacity of at least 500VA.

The test equipment shall incorporate a voltmeter in the output circuit to indicate directly the applied test potential if the rated output of the test equipment is less than 500VA.

If the rated output of the test equipment is 500VA or more, the applied test potential may be indicated by either:

- 1 - a voltmeter;
- 2 - a selector switch marked to indicate the test potential; or
- 3 - a marking in a readily visible location to indicate the test potential for test equipment having a single test potential output.

In cases 2 and 3, the test equipment shall include a lamp or other visual means to indicate that the test potential is present at the test equipment output. All test equipment shall be maintained in current calibration.

The test equipment shall be capable of detecting performance within 0.5 seconds if the leakage current at the test voltage exceeds 50  $\mu$ A.

**Products Requiring Dielectric Voltage Withstand Test:**

<u>Product</u>	<u>Test Voltage</u>	<u>Test Time</u>
All products covered by this Report.	3000V	60 s
	or	
	3600V	1 s



### **11.2 Factory Voltage, Current, and Power Measurements Test**

#### **Method**

The short-circuit current ( $I_{sc}$ ), maximum power ( $P_{max}$ ), and open-circuit voltage ( $V_{oc}$ ) of each production module is to be measured.

- 1) Place the reference device in the test plane with its active surface within  $\pm 5^\circ$  normal to the center line of the beam.
- 2) Set the irradiance at the test plane so that the reference device produces its calibrated short-circuit current or maximum power at the desired irradiance level using method A, B or C.

Method A: The design of the device under test shall be identical with the reference device with respect to dimensions and electrical properties. For modules, this requirement concerns the cell type and cell interconnection circuit. The reference device and the device under test shall be placed at the same position in the test area.

Method B: The distribution of irradiance in the test plane may not be completely uniform. The effective irradiance is the averaged irradiance across a device's active area. For a reference device smaller than the test device, the reference device should be measured at different locations within the envelope of the test device. A position that yields the average value of the reference device measurements should be used for positioning the reference device.

Method C: The distribution of irradiance in the test plane may not be completely uniform. The effective irradiance is the averaged irradiance across a device's active area. For a reference device larger than the test device, the test device should be measured at different locations within the envelope of the reference device. A position that yields the average value of the test device measurements should be used for positioning the test device during subsequent tests.

- 3) Connect the specimen to the necessary instrumentation.
- 4) If necessary, allow the test module and reference device to stabilize within  $\pm 1^\circ\text{C}$  of the ambient air temperature.
- 5) Record the current-voltage characteristic and temperature of the specimen (or ambient temperature, if it is the same). The time interval between the data points shall be sufficiently long to ensure that the response time of the test specimen and the rate of data collection will not introduce errors.

The recorded values of  $I_{sc}$ ,  $P_{max}$ , and  $V_{oc}$  shall be within the marked tolerance as specified in the Installation and Assembly Instructions of the indicated values of  $I_{sc}$ ,  $V_{oc}$ , and  $P_{max}$ .

#### **Products Requiring Factory Voltage, Current, and Power Measurements Test:**

All products covered by this Report.

<b>12.0 Revision Summary</b>				
The following changes are in compliance with the declaration of Section 8.1:				
Date/ Proj # Site ID	Project Handler/ Reviewer	Section	Item	Description of Change
				None