

**CONTRACTOR:** [REDACTED] **CLASS B** [REDACTED]  
 [REDACTED] [REDACTED] [REDACTED]

**GENERAL SYSTEM INFO**  
 Residential, Roof Mounted  
 Grid-tied, Microinverter System  
 7.5 kW DC STC Size

**SCOPE OF WORK**

Install utility interactive photovoltaic system using UL 1741 listed solar panels, inverter(s), DC disconnect(s), lockable AC disconnect(s) when required and sub-panel (when required) to generate supplemental electricity.

Solar panels will be attached to existing roof members using support racking certified California compliant by a licensed structural engineer retained by racking manufacturer. Racking support leg "pull-out" load calcs. and spacing based on 4' and 6' increments. Leg base attached using 5/16"x3.5" lag screw.

Dead-load for panels and racking does not exceed 3.15 psf. (see attached specs. from solar panel manufacturer)

Solar system generated output will be connected using a properly sized OCPD located in service panel. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor per NEC 750.12(D)(2)

No guardrails are required for installed solar energy devices pursuant to LAMC 91.1013.5.

The roof mounted photovoltaic modules, panels or solar voltaic roll roofing material shall have the same or better listed fire-resistance rating than the building roof-covering material.

All roof penetrations shall be sealed using approved methods and products to prevent water leakage.

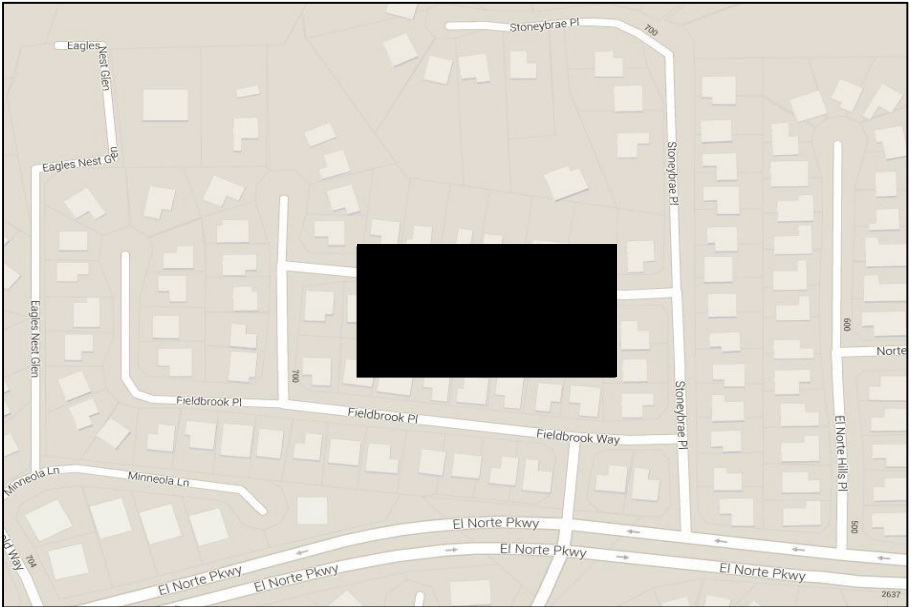
A ladder shall be in place for inspection in compliance with CAL-OSHA regulations

**APPLICABLE CODES**

- 2013 California Building Code
- 2013 California Residential Code
- 2013 California Electrical Code
- 2011 National Electrical Code

**GENERAL ELECTRICAL NOTES**

1. Exposed non-current carrying metal parts of array to be grounded per NEC 250.134
2. Inverter grounded to existing AC grounding electrode per NEC 250.50
3. The inverter shall automatically de-energize its output to the connected electrical grid network upon loss of voltage until network voltage has been restored per NEC 690.61
4. All exterior EMT conduit shall be raintight (threadless). EMT shall be clamped within 3' of enclosure and every 10' beyond per NEC 358.30
5. Outdoor enclosures shall be NEMA 3R rated.
6. Working clearances maintained around all electrical equipment in accordance with NEC 110.26
7. Any conductors exposed to sunlight shall be listed as sunlight resistant per NEC 300.6(C)(1) & NEC 310.10(D)
8. Junction boxes will be located so that the wiring contained in them can be accessible directly per NEC 690.34.
9. All metallic raceways and equipment shall be bonded electrically continuous per NEC 250.90 & NEC 250.96
10. Grounded DC arrays shall be provided with DC ground-fault protection meeting the requirements of NEC 690.5(A) through (C) to reduce fire hazards.
11. DC GEC (grounding electrode conductor) sized per NEC 250.166
12. DC GEC is continuous except for irreversible splices or joints at busbars within listed equipment per NEC 250.64(C)
13. OCPDs used for backfeed from inverter(s) installed at the opposite end of busbar from main OCPD per NEC 705.12(D)(7)
14. Backfed solar breaker will not read "line and load"
15. Live parts in PV source circuits and PV output circuits over 150 Volts to ground shall not be accessible to other than qualified persons while energized.
16. All PV modules and associated equipment and wiring material shall be protected from any physical damage.
17. Buildings or structures with both utility service and a photovoltaic system shall have a permanent plaque or directory providing the location of the service disconnecting means and the photovoltaic system disconnecting means if not located at the same location per NEC 690.56(B)
18. A permanent plaque or directory, denoting all electric power sources on or in the premises, shall be installed at each service equipment location and at locations of all electric power production sources capable of being interconnected per NEC 705.10



**VICINITY MAP**

**NOTES**

**Contractor or Homeowner will obtain "Permission to Operate" from utility prior to permanent activation of PV system**  
**Smoke and carbon-monoxide alarms are required in house to meet R314.1 & R315.1 of the CRC**

City inspector to inspect all accessible structural connections and house current side of the electrical system. All other equipment to be UL listed and approved.

**ATTACHED SUPPORT DOCUMENTS**

1. PV module specifications
2. Inverter specifications
3. Standoff specifications
4. Rail specifications
5. Bonding specifications

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[REDACTED]		[REDACTED]	
DRAWN	Jan/21/2014	<b>TITLE PAGE</b>	
REVISIONS		[REDACTED]	
DRAWN BY	ISTVAN D SZABO	SCALE	NA
			SHEET <b>1</b> OF 11

**Module specifications**

65.94" x 39.41" x 1.22"  
 60 cells per module  
 46.7 lbs per module

(N) AC Disconnect, NEMA 3R,  
 Mounted on roof, horizontally on rail

(N) EMT conduit ran over roof.  
 Roof penetrations flashed

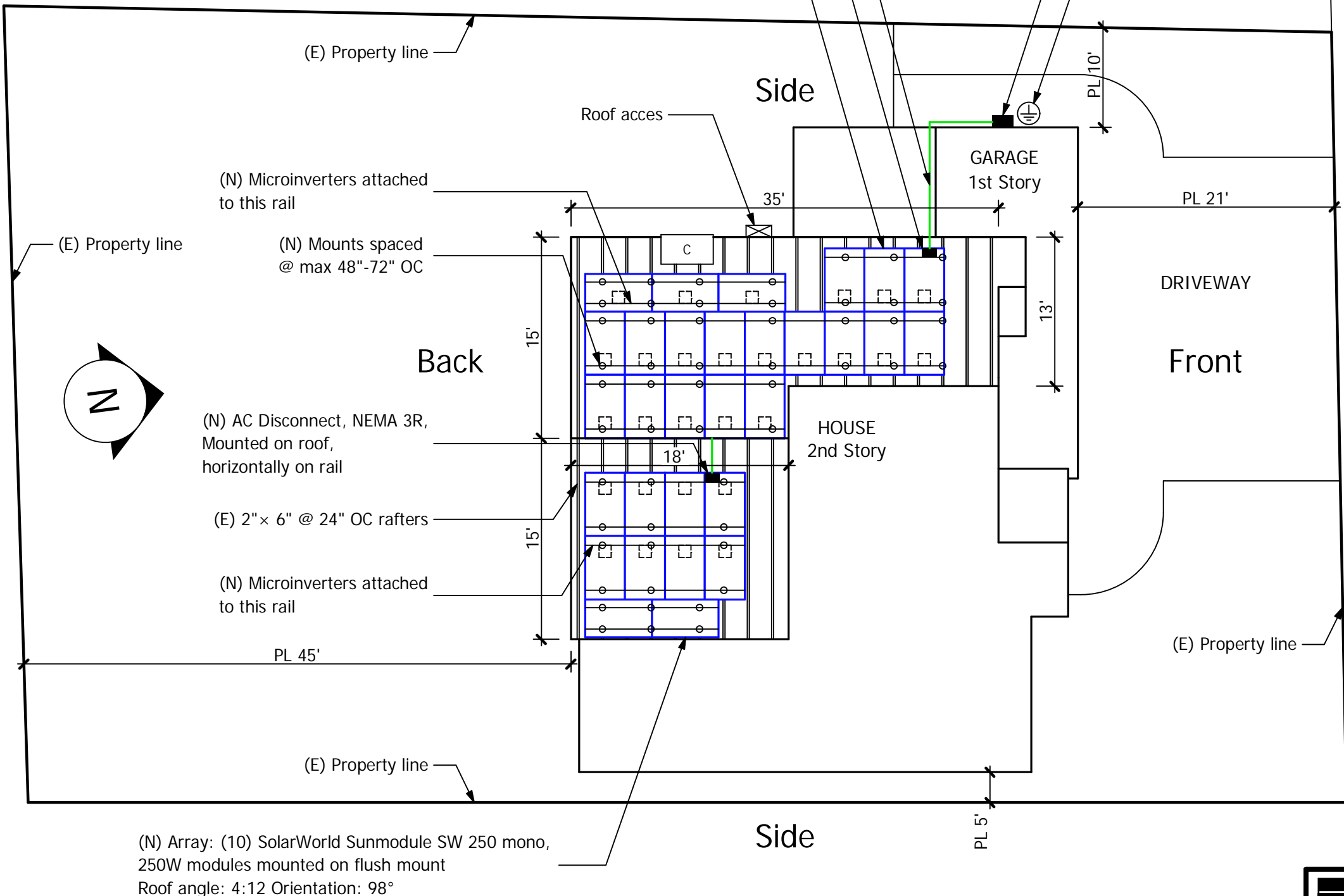
(N) Array: (20) SolarWorld Sunmodule SW 250 mono,  
 250W modules mounted on flush mount  
 Roof angle: 4:12 Orientation: 278°

(E) Main service panel  
 & Utility Meter

(E) Ground Rod

**Project Description**

- 1) Modules: (30) SolarWorld Sunmodule SW 250 mono, 250 W
- 2) Microinverters: (30) Enphase M215-60-2LL-60
- 3) System size: 7,500 STC W
- 4) Curved concrete tile roof @ 4:12 pitch
- 5) 2-story building
- 6) 2" x 6" @ 24" OC rafters plus plywood sheathing over
- 7) 3.5" lagscrews at max 48-72" OC
- 8) Monitoring system with Enphase monitoring device
- 9) Standard components include: racking and mounting components, wiring, conduit, and over-current protection, roofing sealant or flashing, as needed
- 10) No battery back-up systems
- 11) Main electrical panel, inverter and controller panels will be labeled with warning labels (See page #5)
- 12) This drawing is diagrammatic in some respect. Field verify exact conditions prior to beginning work
- 13) Panel layout subject to changes based on field conditions



(N) Microinverters attached  
 to this rail

(N) Mounts spaced  
 @ max 48"-72" OC

(N) AC Disconnect, NEMA 3R,  
 Mounted on roof,  
 horizontally on rail

(E) 2" x 6" @ 24" OC rafters

(N) Microinverters attached  
 to this rail

(N) Array: (10) SolarWorld Sunmodule SW 250 mono,  
 250W modules mounted on flush mount  
 Roof angle: 4:12 Orientation: 98°

**Dead-Load Sys. Weight**

1401	lbs Panels
48.0	lbs Mounts
150.0	lbs Racks
132.0	lbs Microinverters
1731.0	lbs Total Weight
551,39	sq ft Array
3.14	lbs/sq ft (psf)
<b>3.14 psf &lt; 3.15 psf OK</b>	

**Legend**

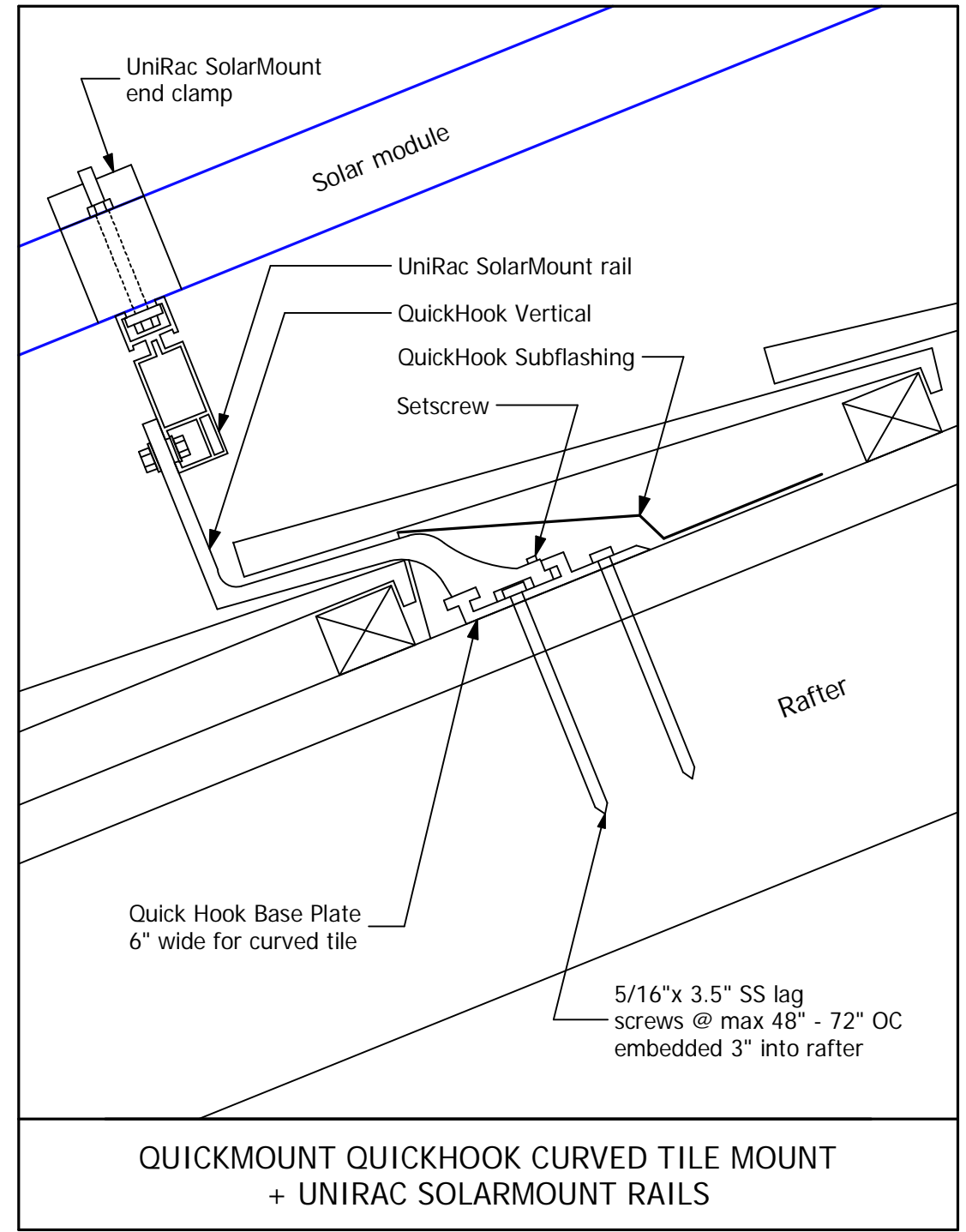
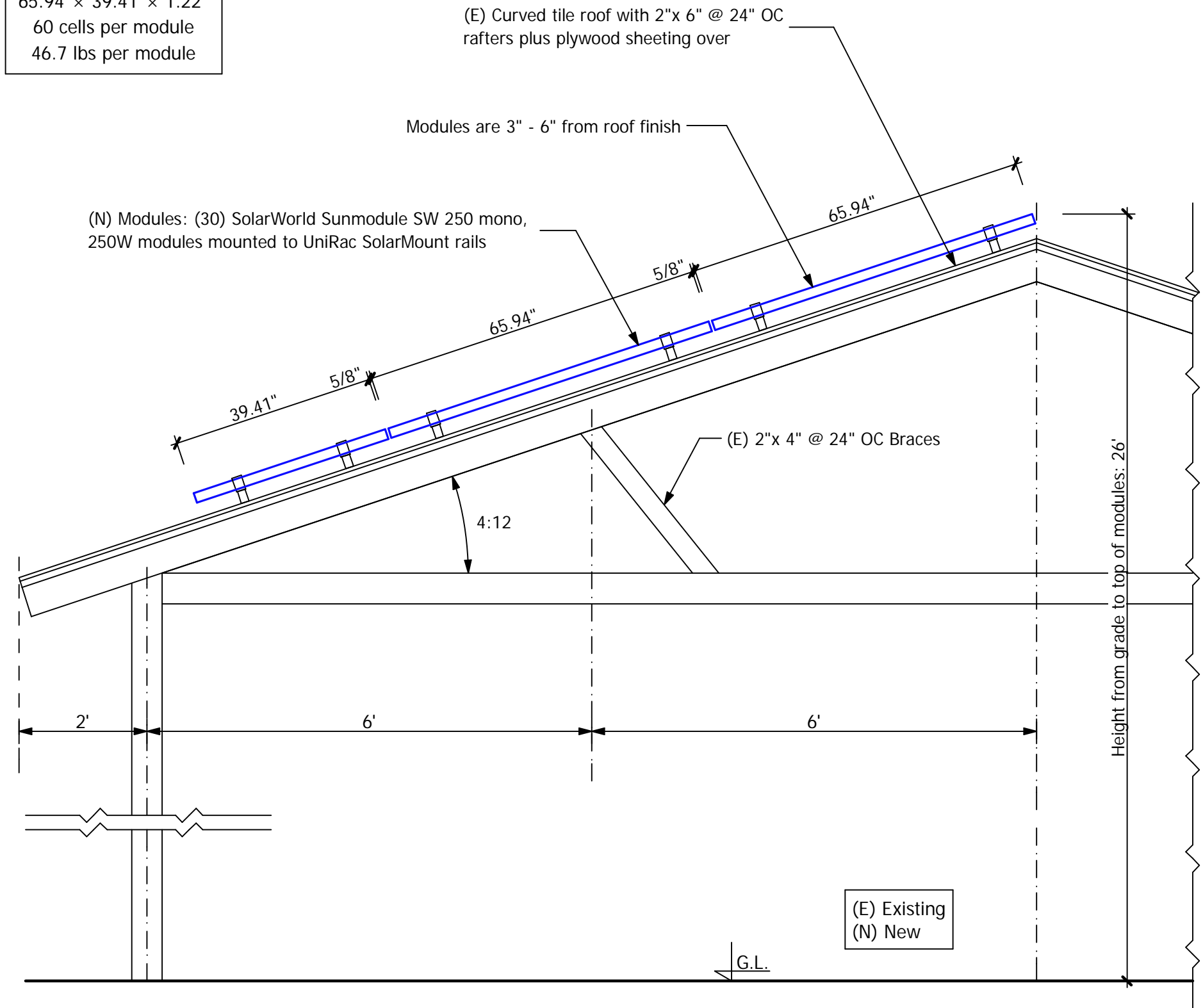
(E)	Existing
(N)	New
[SL]	Skylight
[C]	Chimney
[V]	Vents
[□]	Microinverter
[—]	Conduit run

"PL" distances are from house walls closest to property lines

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DRAWN		Jan/21/2014		<b>SITE PLAN</b>	
REVISIONS					
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				SHEET 2 OF 11	

**Module specifications**  
 65.94" x 39.41" x 1.22"  
 60 cells per module  
 46.7 lbs per module

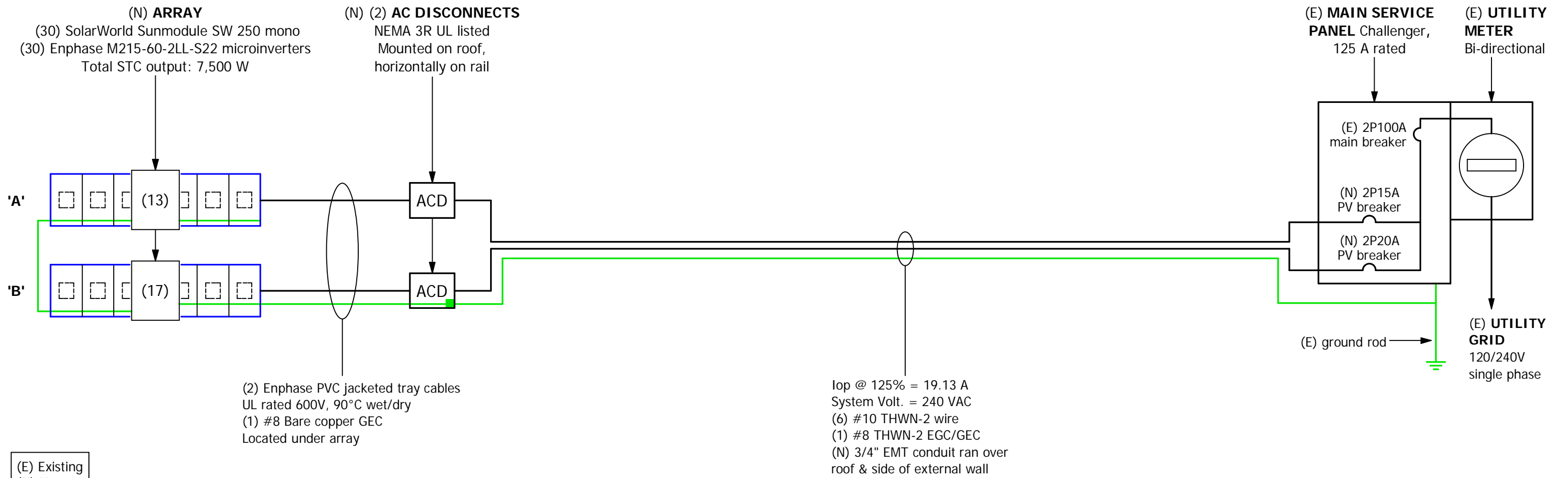


**QUICKMOUNT QUICKHOOK CURVED TILE MOUNT + UNIRAC SOLARMOUNT RAILS**

ROOF SECTION  
 1/2" = 1'

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DRAWN		Jan/21/2014	<b>STRUCTURAL DRAWINGS</b>	
REVISIONS				
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				SHEET 3 OF 11



(E) Existing  
 (N) New

SPECS & AMPERAGE CALCULATIONS for SolarWorld Sunmodule SW 250 mono with Enphase M215-60-2LL-S22 microinverters			
Panels (DC)		Microinverter (AC)	
Pmax	250 W	Vop	240 VAC
Vmp	31.1 VDC	Iop	0.90 A
Imp	8.05 A		
Voc	37.8 VDC		
Isc	8.28 A		
<b>'A' (13) Inverter Branch</b>			
Vop	240 VAC		
Iop	13 x 0.90 =	11.70 A	
Iop max	11.70 @ 125% =	<b>14.63 A</b>	
<b>'B' (17) Inverter Branch</b>			
Vop	240 VAC		
Iop	17 x 0.90 =	15.30 A	
Iop max	15.30 @ 125% =	<b>19.13 A</b>	

AMPACITY CALCULATIONS
Local average high temperature measured 1/2" above roof = <b>51°C</b> Temperature correction factor per NEC table 310.15(3)(b) = <b>0.76</b>
<b>After AC Disconnect</b> Inverter Output: 17 x 0.90A x 1.25 = <b>19.13 A</b> Derated Conduct.: 40A x 0.76 x 0.8 = <b>24.32 A</b>
<b>19.13 A &lt; 24.32 A</b> Wire sizes are OK

- SLD NOTES for MICROINVERTER SYSTEM**
- 1) All conductor sizes are as indicated or larger
  - 2) All photovoltaic system conductors will be 90°C rated
  - 3) Conductor sizes meet criteria of 125% continuous use factor, temperature derating factors, conduit fill derating factors & rooftop conduit adjustment factors
  - 4) 240V AC conductors run from array to main service panel breaker
  - 5) The system is grid-intertie only and has no batteries or back ups
  - 6) Individual modules inverted from DC to AC with microinverters located under each module
  - 7) All equipment is bonded by a mechanical means or by a grounding conductor
  - 8) The system is grounded at the neutral buss in the main panel
  - 9) The inverter grounding electrode conductor (GEC) is connected directly to the building grounding electrode (GE) or irreversibly connected to the building GEC
  - 10) Inverter source breaker (PV breaker) is at furthest slot from main breaker on busbar and should be labelled per 705.12(D)(7). See signage sheet

DRAWN		Jan/21/2014	<b>SINGLE LINE DIAGRAM</b>	
REVISIONS				
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LABELS - Per NEC the following signs at a minimum should be installed

NEC 690.5(C) - Apply on inverter (or at GFI)

**WARNING**  
 ELECTRIC SHOCK HAZARD.  
 IF A GROUND FAULT IS INDICATED  
 NORMALLY GROUNDED CONDUCTORS  
 MAY BE UNGROUNDED AND ENERGIZED

NEC 690.17 - Apply on all disconnects,  
 serviceable panels or boxes

**WARNING**  
 ELECTRIC SHOCK HAZARD.  
 DO NOT TOUCH TERMINALS.  
 TERMINALS ON BOTH THE LINE AND  
 LOAD SIDE MAY BE ENERGIZED IN  
 THE OPEN POSITION.

NEC 705.12(D)(7)  
 Apply at Distribution Equipment

**WARNING**  
 INVERTER OUTPUT CONNECTION  
 DO NOT RELOCATE THIS  
 OVERCURRENT DEVICE.

NEC 690.54 - Apply at point of interconnection  
 (AC Disconnect and/or PV AC breaker)

**RATED AC OUTPUT CURRENT** 11.70 A  
**NOMINAL OPERATING AC VOLTAGE** 240 VAC

**RATED AC OUTPUT CURRENT** 15.30 A  
**NOMINAL OPERATING AC VOLTAGE** 240 VAC

Apply at Main Service Panel

**CAUTION**  
 SOLAR ELECTRIC SYSTEM CONNECTED

Apply on Photovoltaic Disconnecting means

**CAUTION:**  
 PHOTOVOLTAIC AC DISCONNECT

**LABEL NOTES**  
 All labels and markings shall be attached according to requirements by NEC and the local AHJ. The AHJ may have special label requirements beyond the scope of this document. This may encompass language including, but not limited to, that found in NEC articles 690.5(C), 690.14(C)(2), 690.17, 690.53,690.35(F), 705.12(D)(7) and 705.10

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DRAWN		Jan/21/2014		<b>SIGNAGE</b>	
REVISIONS					
DRAWN BY		ISTVAN D SZABO		SCALE	
				NA	
				SHEET 5 OF 11	





# Sunmodule<sup>+</sup> SW 250 mono / Version 2.0 and 2.5 Frame

### World-class quality

Fully-automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

### SolarWorld Plus-Sorting

Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

### 25 years linear performance guarantee and extension of product warranty to 10 years

SolarWorld guarantees a maximum performance depression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry. In addition, SolarWorld is offering a product warranty, which has been extended to 10 years.\*

\*in accordance with the applicable SolarWorld Limited Warranty at purchase. [www.solarworld.com/warranty](http://www.solarworld.com/warranty)

[www.solarworld.com](http://www.solarworld.com)



# Sunmodule<sup>+</sup> SW 250 mono / Version 2.0 and 2.5 Frame

SW-02-5001US 07-2012

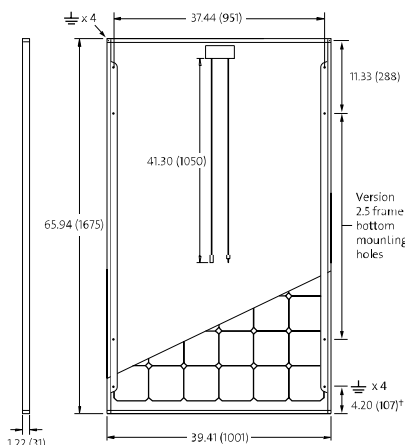
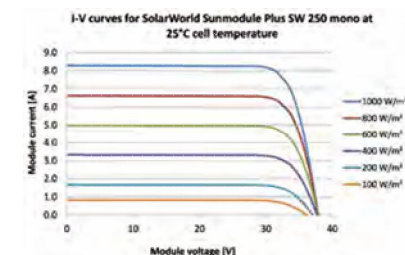
### PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)\*

		SW 250
Maximum power	$P_{max}$	250 Wp
Open circuit voltage	$V_{oc}$	37.8 V
Maximum power point voltage	$V_{mppt}$	31.1 V
Short circuit current	$I_{sc}$	8.28 A
Maximum power point current	$I_{mppt}$	8.05 A

\*STC: 1000W/m<sup>2</sup>, 25°C, AM 1.5

### THERMAL CHARACTERISTICS

NOCT	46 °C
TC $I_{sc}$	0.004 %/K
TC $V_{oc}$	-0.30 %/K
TC $P_{mppt}$	-0.45 %/K
Operating temperature	-40°C to 85°C



1) Sunmodules dedicated for the United States and Canada are tested to UL 1703 Standard and listed by a third party laboratory. The laboratory may vary by product and region. Check with your SolarWorld representative to confirm which laboratory has a listing for the product.  
2) Measuring tolerance traceable to TUV Rheinland: +/- 2% (TUV Power Controlled).  
3) All units provided are imperial. SI units provided in parentheses.

SolarWorld AG reserves the right to make specification changes without notice.

### PERFORMANCE AT 800 W/m<sup>2</sup>, NOCT, AM 1.5

		SW 250
Maximum power	$P_{max}$	183.3 Wp
Open circuit voltage	$V_{oc}$	34.6 V
Maximum power point voltage	$V_{mppt}$	28.5 V
Short circuit current	$I_{sc}$	6.68 A
Maximum power point current	$I_{mppt}$	6.44 A

Minor reduction in efficiency under partial load conditions at 25°C: at 200W/m<sup>2</sup>, 95% (+/-3%) of the STC efficiency (1000 W/m<sup>2</sup>) is achieved.

### COMPONENT MATERIALS

Cells per module	60
Cell type	Mono crystalline
Cell dimensions	6.14 in x 6.14 in (156 mm x 156 mm)
Front	tempered glass (EN 12150)
Frame	Clear anodized aluminum
Weight	46.7 lbs (21.2 kg)

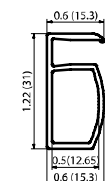
### SYSTEM INTEGRATION PARAMETERS

Maximum system voltage SC II	1000 V	
Max. system voltage USA NEC	600 V	
Maximum reverse current	16 A	
Number of bypass diodes	3	
UL Design Loads*	Two rail system	113 psf downward 64 psf upward
UL Design Loads*	Three rail system	170 psf downward 64 psf upward
IEC Design Loads*	Two rail system	113 psf downward 50 psf upward

\*Please refer to the Sunmodule installation instructions for the details associated with these load cases.

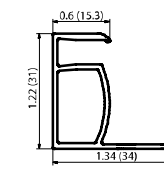
### ADDITIONAL DATA

Power tolerance <sup>2)</sup>	-0 Wp / +5 Wp
J-Box	IP65
Connector	MC4
Module efficiency	14.91 %
Fire rating (UL 790)	Class C



#### VERSION 2.0 FRAME

- Compatible with "Top-Down" mounting methods
- Grounding locations: 4 corners of the frame



#### VERSION 2.5 FRAME

- Compatible with both "Top-Down" and "Bottom" mounting methods
- Grounding locations: 4 corners of the frame, 4 locations along the length of the module in the extended flange<sup>3)</sup>

DRAWN		Jan/21/2014		DATASHEETS - MODULES	
REVISIONS					
DRAWN BY		ISTVAN D SZABO		SCALE	
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				SHEET 6 OF 11	

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M215™ MICROINVERTER



The Enphase Energy Microinverter System improves energy harvest, increases reliability, and dramatically simplifies design, installation and management of solar power systems.

The Enphase System includes the microinverter, the Envoy Communications Gateway™, and Enlighten®, Enphase's monitoring and analysis software.

- PRODUCTIVE**
  - Maximum energy production
  - Resilient to dust, debris and shading
  - Performance monitoring per module
- RELIABLE**
  - System availability greater than 99.8%
  - No single point of system failure
- SMART**
  - Quick and simple design, installation and management
  - 24/7 monitoring and analysis
- SAFE**
  - Low voltage DC
  - Reduced fire risk



enphase.com

M215 — MICROINVERTER TECHNICAL DATA

Input Data (DC) M215-60-2LL-S22/S23/S24 and M215-60-2LL-S22-NA/S23-NA (Ontario)

Recommended input power (STC)	190 - 270W
Maximum input DC voltage	45V
Peak power tracking voltage	22V - 36V
Operating range	16V - 36V
Min./Max. start voltage	22V/45V
Max. DC short circuit current	15A
Max. input current	10.5A

Output Data (AC) @208 Vac @240 Vac

Maximum output power	215W	215W
Nominal output current	1.0A (arms at nominal duration)	0.9A (arms at nominal duration)
Nominal voltage/range	208V/183-229V	240V/211-264V
Extended voltage/range	208V/179-232V	240V/206-269V
Nominal frequency/range	60.0/59.3-60.5 Hz	60.0/59.3-60.5 Hz
Extended frequency range	60.0/59.2-60.6 Hz	60.0/59.2-60.6 Hz
Power Factor	>0.95	>0.95
Maximum units per 20A branch circuit	25 (three phase)	17 (single phase)
Maximum output fault current	1.05 Arms, over 3 cycles; 25.2 Apeak, 1.74ms duration	

Efficiency

CEC weighted efficiency	96.0%
Peak inverter efficiency	96.3%
Static MPPT efficiency (weighted, reference EN50530)	99.6%
Dynamic MPPT efficiency (fast irradiation changes, reference EN50530)	99.3%
Night time power consumption	46mW

Mechanical Data

Ambient temperature range	-40°C to + 65°C
Operating temperature range (internal)	-40°C to + 85°C
Dimensions (WxHxD)	17.3 cm x 16.4 cm x 2.5 cm (6.8" x 6.45" x 1.0")*
Weight	1.6 kg (3.5 lbs)
Cooling	Natural convection - No fans
Enclosure environmental rating	Outdoor - NEMA 6 * without mounting bracket

Features

Compatibility	Pairs with most 60-cell PV modules
Communication	Power line
Warranty	25-year limited warranty
Monitoring	Free lifetime monitoring via Enlighten software
Compliance	UL1741/IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01

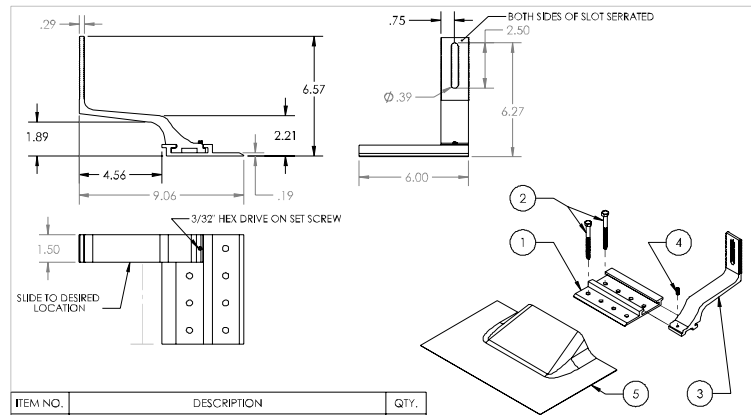
Enphase Energy, Inc.  
1420 N. McDowell Boulevard  
Petaluma, CA 94954  
P: 877-797-4743  
info@enphaseenergy.com  
http://www.enphase.com

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DRAWN		Jan/21/2014	DATASHEETS - INVERTERS	
REVISIONS				
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				SHEET 7 OF 11

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# Quick Hook USA™ – Curved Tile Mount | QMCTH



ITEM NO.	DESCRIPTION	QTY.
1	BASE PLATE, QUICK HOOK USA, 6" WIDE - 6063-T6, MILL	1
2	LAG SCREW, HEX HEAD, 5/16" x 3-1/2", 18-8SS	2
3	QUICK HOOK USA, VERTICAL, 6061-T6, MILL	1
4	SET SCREW, HEX SOCKET, 10-32x5/8", 18-8 SS	1
5	SUBFLASHING, QUICK HOOK USA, V2-6" BASE, 9" X 14" X .032"-3003-MILL	1

**Quick Mount PV**  
 TITLE: QMCTH: QUICK HOOK USA-CURVED TILE MOUNT  
 UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TO FRACTIONS: 1/8 TWO PLACE DECIMAL 1/8 THREE PLACE DECIMAL 1/16  
 SIZE: A DATE: 2/5/2013 DRAWN BY: RAD REV: 3  
 SCALE: 1/8 WEIGHT: 1.85 SHEET 1 OF 2

### Quick Hook USA Failure Test Results

Configuration	Source Document	Average Ultimate Load Capacities (lb) in Douglas Fir			
		Pullout	Compression	Shear Parallel to Rafter	Shear Perpendicular to Rafter
<b>Centered:</b> All base plate sizes with hook positioned directly over the lag screws (see Appendix A & B of referenced report for test setup)	AME Report #112540C "Quick Hook USA-Flat Tile Mount" with 1.5 Base Plate <i>This report shows results for Quick Hook USA, both Flat and Curved Tile models, when the hook is positioned directly over the lag screws.</i>	876	685	1058	583
<b>Offset 4.5" Base Plate:</b> 4.5" wide base plate with hook positioned at opposite end of base plate from lag screws (see Appendix A & B of referenced report for test setup)	AME Report #112540C "Quick Hook USA-Curved Tile Mount" with 4.5" Base Plate <i>This report shows results for our Quick Hook USA-Flat Tile Mount.</i>	1064	712	1219	532
<b>Offset 6" Base Plate:</b> 6" wide base plate with hook positioned at opposite end of base plate from lag screws (see Appendix A & B of referenced report for test setup)	AME Report #112540C "Quick Hook USA-Curved Tile Mount" with 6" Base Plate <i>This report shows results for our Quick Hook USA-Curved Tile Mount.</i>	1246	692	1341	584

Notes:  
 1) Thread must be embedded in a rafter or other structural roof member.  
 2) See IBC for required edge distances.

**IMPORTANT:** To maintain waterproofing of substrate it is important to make sure the aluminum sub-flashing is properly placed over the base plate and under the course of paper above. If the paper above does not reach, due to layout, place an additional piece of roofing paper over the sub-flashing and under the next course of paper above. (See instructions on reverse)



BI 7.2.3-16

Feb-2013, Rev 6

1 of 3

# Quick Hook USA™ Curved Tile Mounting Instructions - Rafter Installation

**Installation Tools Required:** stud finder, tape measure, utility knife, 3/32" hex key, drill with 7/32" bit, impact drill with 1/2" socket, caulking gun, one tube of appropriate sealant compatible with roofing material, roofing bar, hand broom, stapler, 18" wide piece of underlayment or materials for 3-course method during deck flashing installation.

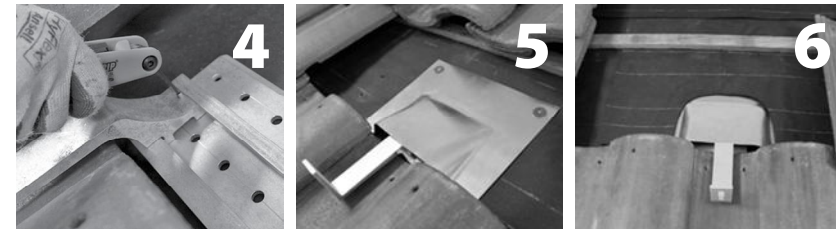
**WARNING:** Quick Mount PV products are NOT designed and should NOT be used for anchoring fall protection equipment.



Remove the tile at selected location of the mount. Locate and mark the center of the rafter.

Rest the base plate (item 1) over center of rafter and mark center of holes. Drill two 7/32" pilot holes and fill with sealant compatible with roofing material.

Connect hook (item 3) to base plate and drive lag screws (item 2) into rafter through the two holes to a solid, snug fit. DO NOT over tighten lag screws, this may compromise their holding strength.



Slide hook into desired position within valley of the tile. The hook must not overhang the side edges of the base plate. Tighten set screw (item 4) with hex key.

Carefully clean the underlayment then apply bead of sealant compatible with roofing material in the shape of an upside down U on the backside of the sub-flashing (item 5) and install flashing over mount. Fasten sub-flashing to deck with one roofing nail in each top corner. Do not nail bottom corners.

Proceed with weatherproofing using three-course method or lapped paper method. When using paper method, cut a piece of underlayment 18" wide to slide under the course above and over the sub-flashing. If course above is too high, you must use additional underlayment to ensure proper overlapping.



Replace the tile above the hook. If necessary, notch the bottom of the tile to make space for the raised hook.

Bolt the side-mounted rail of your choice to the hook, using the rail manufacturer's hardware.

You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer.  
  
 All roofing manufacturers' written instructions must also be followed by anyone modifying a roof system. Please consult the roof manufacturer's specs and instructions prior to touching the roof.

\* For more details on underlayment waterproofing please visit our website: <http://www.quickmountpv.com/tile-waterproofing>



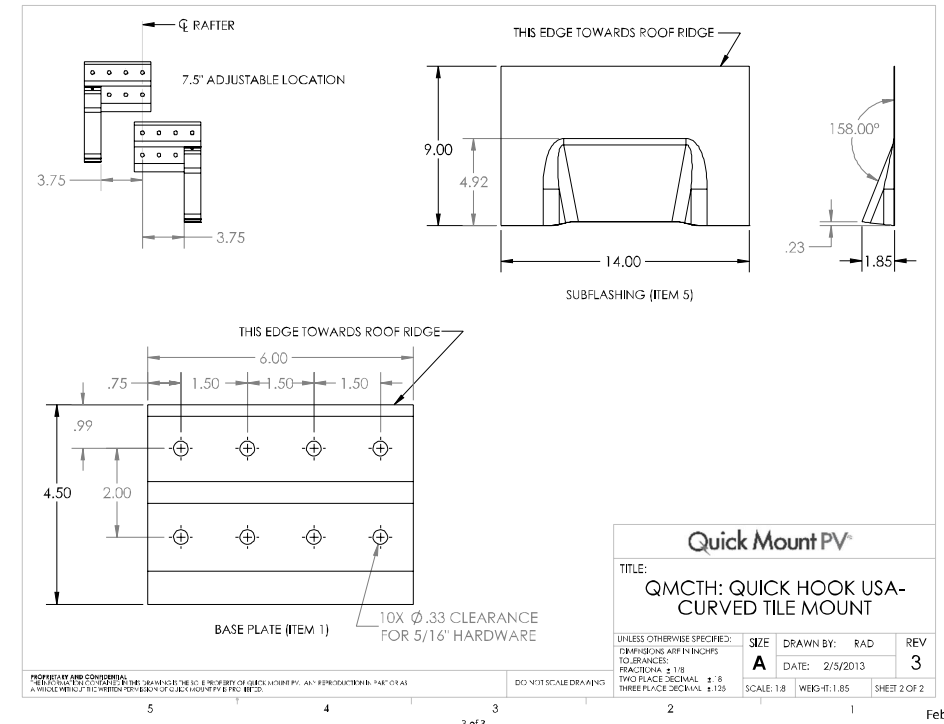
BI 7.2.3-16

925-478-8269 • [www.quickmountpv.com](http://www.quickmountpv.com) • [info@quickmountpv.com](mailto:info@quickmountpv.com)  
 2700 Mitchell Dr., Bldg. 2 • Walnut Creek, CA 94598

Feb-2013, Rev 6

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# Quick Hook USA™ Curved Tile Mount | QMCTH Additional Dimensions



**Quick Mount PV**  
 TITLE: QMCTH: QUICK HOOK USA-CURVED TILE MOUNT  
 UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TO FRACTIONS: 1/8 TWO PLACE DECIMAL 1/8 THREE PLACE DECIMAL 1/16  
 SIZE: A DATE: 2/5/2013 DRAWN BY: RAD REV: 3  
 SCALE: 1/8 WEIGHT: 1.85 SHEET 2 OF 2

BI 7.2.3-15

Feb-2013, Rev 6

DRAWN		Jan/21/2014	DATASHEETS - STANDOFFS	
REVISIONS				
DRAWN BY		ISTVAN D SZABO	SCALE	NA
				SHEET 8 OF 11

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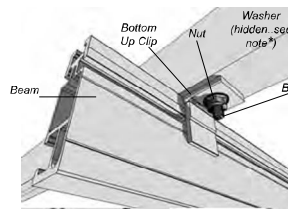


**SolarMount Technical Datasheet**  
Pub 11018-1td V1.0 August 2011

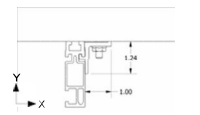
SolarMount Module Connection Hardware ..... 1  
 Bottom Up Module Clip..... 1  
 Mid Clamp ..... 2  
 End Clamp ..... 2  
 SolarMount Beam Connection Hardware..... 3  
 L-Foot ..... 3  
 SolarMount Beams ..... 4

**SolarMount Module Connection Hardware**

**SolarMount Bottom Up Module Clip**  
Part No. 302000C



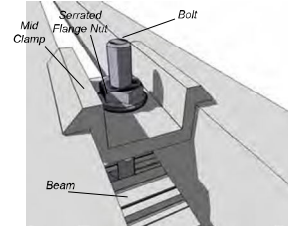
- **Bottom Up Clip material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear Anodized
- **Bottom Up Clip weight:** ~0.031 lbs (14g)
- Allowable and design loads are valid when components are assembled with SolarMount series beams according to authorized UNIRAC documents
- Assemble with one 1/4"-20 ASTM F593 bolt, one 1/4"-20 ASTM F594 serrated flange nut, and one 1/4" flat washer
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Module edge must be fully supported by the beam
- \* **NOTE ON WASHER:** Install washer on bolt head side of assembly. **DO NOT** install washer under serrated flange nut



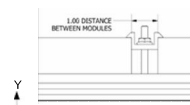
Dimensions specified in inches unless noted

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor,
Tension, Y+	1596 (6967)	686 (3052)	2.28	1038 (4615)	0.662
Transverse, X±	1126 (5019)	329 (1463)	3.43	497 (2213)	0.441
Sliding, Z±	66 (292)	27 (119)	2.44	41 (181)	0.619

**SolarMount Mid Clamp**  
Part No. 302101C, 302101D, 302103C, 302104D, 302105D, 302106D



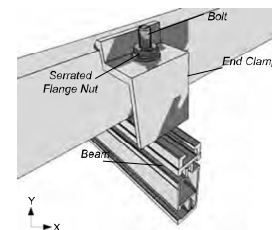
- **Mid clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **Mid clamp weight:** 0.050 lbs (23g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single mid clamp assembly when used with a SolarMount series beam to retain a module in the direction indicated
- Assemble mid clamp with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory



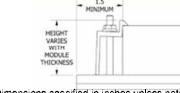
Dimensions specified in inches unless noted

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor,
Tension, Y+	2020 (8987)	891 (3983)	2.27	1348 (5994)	0.667
Transverse, Z±	526 (2313)	229 (1017)	2.27	346 (1539)	0.665
Sliding, X±	1194 (5312)	490 (2178)	2.44	741 (3295)	0.620

**SolarMount End Clamp**  
Part No. 302001C, 302002C, 302002D, 302003C, 302003D, 302004C, 302004D, 302005C, 302005D, 302006C, 302006D, 302007D, 302008C, 302008D, 302009C, 302009D, 302010C, 302011C, 302012C



- **End clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **End clamp weight:** varies based on height: ~0.058 lbs (26g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single end clamp assembly when used with a SolarMount series beam to retain a module in the direction indicated
- Assemble with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Modules must be installed at least 1.5 in from either end of a beam

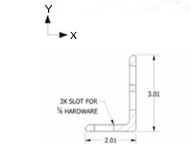
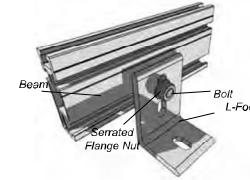


Dimensions specified in inches unless noted

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor,
Tension, Y+	1321 (5876)	529 (2352)	2.50	800 (3557)	0.606
Transverse, Z±	63 (279)	14 (61)	4.58	21 (92)	0.330
Sliding, X±	142 (630)	52 (231)	2.72	79 (349)	0.556

**SolarMount Beam Connection Hardware**

**SolarMount L-Foot**  
Part No. 304000C, 304000D



Dimensions specified in inches unless noted

- **L-Foot material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **L-Foot weight:** varies based on height: ~0.215 lbs (98g)
- Allowable and design loads are valid when components are assembled with SolarMount series beams according to authorized UNIRAC documents
- **For the beam to L-Foot connection:**
  - Assemble with one ASTM F593 3/8"-16 hex head screw and one ASTM F594 3/8" serrated flange nut
  - Use anti-seize and tighten to 30 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory

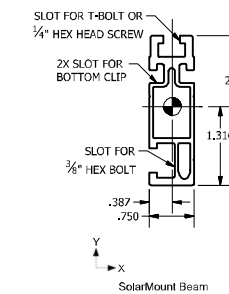
**NOTE:** Loads are given for the L-Foot to beam connection only; be sure to check load limits for standoff, lag screw, or other attachment method

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor,
Sliding, Z±	1766 (7856)	755 (3356)	2.34	1141 (5077)	0.648
Tension, Y+	1859 (8289)	707 (3144)	2.63	1069 (4755)	0.575
Compression, Y-	3258 (14492)	1325 (5893)	2.46	2004 (8913)	0.615
Transverse, X±	486 (2152)	213 (949)	2.28	323 (1436)	0.664

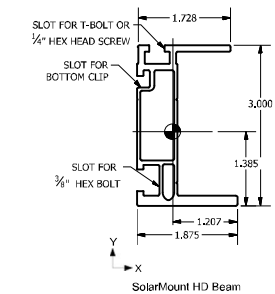
**SolarMount Beams**

Part No. 310132C, 310132C-B, 310168C, 310168C-B, 310168D, 310208C, 310208C-B, 310240C, 310240C-B, 310240D, 410144M, 410168M, 410204M, 410240M

Properties	Units	SolarMount	SolarMount HD
Beam Height	in	2.5	3.0
Approximate Weight (per linear ft)	plf	0.811	1.271
Total Cross Sectional Area	in <sup>2</sup>	0.676	1.059
Section Modulus (X-Axis)	in <sup>3</sup>	0.353	0.898
Section Modulus (Y-Axis)	in <sup>3</sup>	0.113	0.221
Moment of Inertia (X-Axis)	in <sup>4</sup>	0.464	1.450
Moment of Inertia (Y-Axis)	in <sup>4</sup>	0.044	0.257
Radius of Gyration (X-Axis)	in	0.286	1.170
Radius of Gyration (Y-Axis)	in	0.254	0.502



SolarMount Beam



SolarMount HD Beam

Dimensions specified in inches unless noted

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DRAWN		Jan/21/2014		DATASHEETS - RAILS	
REVISIONS					
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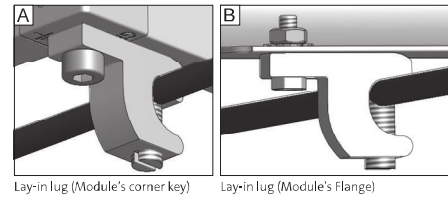
## Grounding of module and frame in US and Canada

28.01.2013 EN

### Traditional Grounding Methods:

The module can be grounded by connecting hardware and copper wire to the grounding holes using lay in lug. The lug can be fixed:

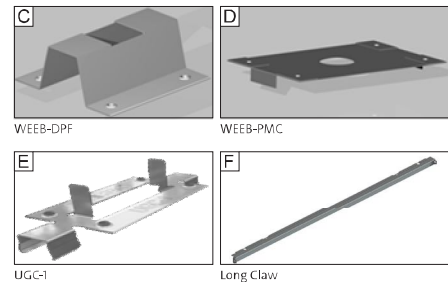
- A) At the module corner by using a socket head cap screw or
- B) At the hole provided in the flange by using a screw with a serrated washer, a washer and a nut.



Lay-in lug (Module's corner key) Lay-in lug (Module's Flange)

The module also can be grounded to the rail utilizing the following hardware:

- C) WEEB-DPF for SolarWorld Sunfix Ground Mount and Sunfix Plus mounting systems.
- D) WEEB-PMC for SolarWorld Sunfix Ground Mount and Professional Solar mounting systems.
- E) UGC-1 for Unirac Solar Mount mounting system.
- F) Long Claw for Panel Claw mounting system.



UGC-1 Long Claw

### Note:

These grounding methods have been tested by Intertek Laboratory in accordance to UL 1703 using SolarWorld's modules.

### Recommended components and their appropriate tightening torque for grounding in US and Canada:

Item	Manufacturer/Description	Tightening torque
Lay-In lug	Ilco GBL-4DBT	35 lbf-in, 4-6 AWG str 25 lbf-in, 8 AWG str 20 lbf-in, 10-14 AWG sol/str
Socket head cap screw	10-24, 5/8", SS 18-8	62 lbf-in (7.0 Nm)
Bolt	#6-32, SS	
Serrated washer	M5, SS	
Washer	ID 9/64", OD 3/8", SS	38 lbf-in (4.3 Nm)
Nut	#6-32, SS	
Grounding Clip	Burndy WEEB-DPF	12 lbf-ft (16.3 Nm)
	Burndy WEEB-PMC	12 lbf-ft (16.3 Nm)
	Unirac UGC-1	10 lbf-ft (13.5 Nm)
Grounding Claw	Panel Claw Long Claw	18-20 lbf-ft (24.4-27.1 Nm)

\* SolarWorld's modules required tightening torque for the mounting hardware is 15 lbf-ft (20 Nm). Choose the higher required torque of the values specified by the installation guide for grounding and SolarWorld's module torque requirement.

### Note:

1. Use general purpose anti-seize compound on fastener threads when installing WEEBs.
2. The NEC section 690.43 states, «Exposed non-current carrying metal parts of module frames, equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage.»
3. WEEBs are intended for SINGLE USE ONLY. Functionality will not be guaranteed if reused.



www.solarworld.com

### Sunfix Ground Mount:

- » Use WEEB-PMC at end clamp locations to bond solar module frames to module mounting beam.
- » Use WEEB-DPF at mid-clamp locations on outer-beams to bond solar module frames to module mounting beams.

### Sunfix plus:

- » Use WEEB-DPF at mid-clamp locations on outer-beams to bond solar module frames to module mounting beams.

### Professional Solar:

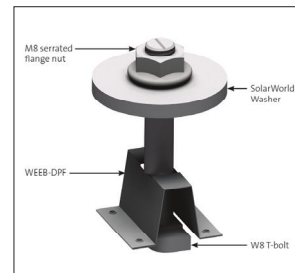
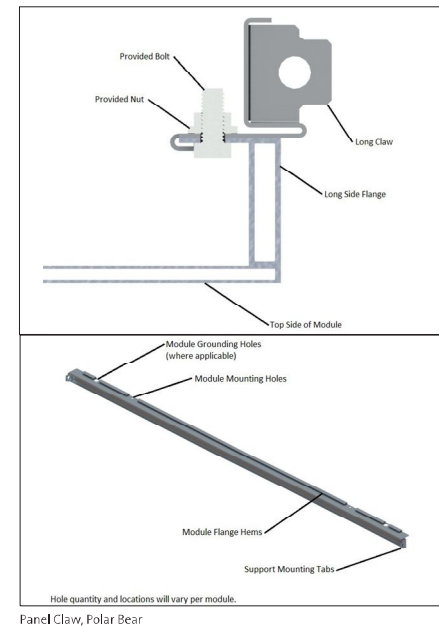
- » Use WEEB-PMC at mid-clamp locations on outer-beams to bond solar module frames to module mounting beams.

### Unirac SolarMount:

- » Use UGC-1 at mid-clamp and end-clamp locations on outer-beams to bond solar module frames to module mounting beams.

### Panel Claw, Polar Bear:

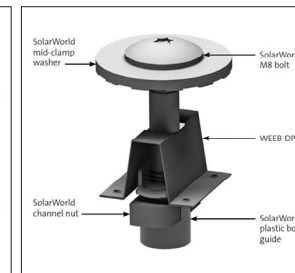
- » This Claw is used for PV modules that are not compatible with flange clamp style Claws. The Long Claw attaches at the module mounting holes. Please see the module manufacturer's installation guide for screw torque specifications.



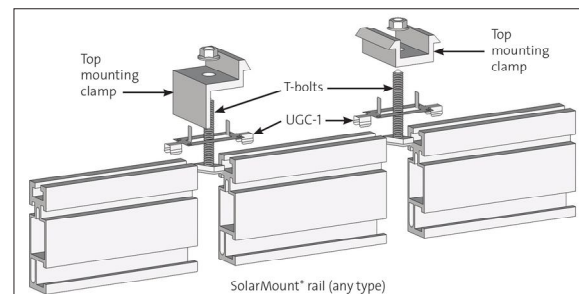
Sunfix Ground Mount Module Clamp



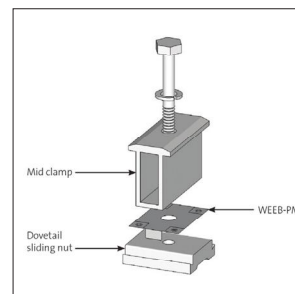
Sunfix Ground Mount End Clamp



Sunfix Plus Module Clamp



Unirac SolarMount



Professional Solar

[REDACTED]		[REDACTED]	
DRAWN	Jan/21/2014	DATASHEETS - MODULE BONDING	
REVISIONS		[REDACTED]	
		[REDACTED]	
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