MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address: 7112 Sycamore Ave., Takoma Park

Resource: Contributing Resource
Takoma Park Historic District

Applicant: Thomas LaLonde

Review: HAWP

Case Number: 37/03-18HH

Proposal: Roof Solar Panel Installation

Meeting Date: 5/9/18
Report Date: 5/2/18
Public Notice: 4/25/18
Tax Credit: n/a
Staff: Dan Bruechert

STAFF RECOMMENDATION
Staff recommends the HPC approve with one (1) condition the HAWP application.

1. The proposed location of the inverter box is too prominent. The inverter box must be installed below the level of the window sills on the north wall and any additional electrical conduit needs to be painted to match the historic house.

ARCHITECTURAL DESCRIPTION
SIGNIFICANCE: Contributing to the Takoma Park Historic District
STYLE: Craftsman
DATE: c.1910

The subject property is a one-and-a-half story Craftsman bungalow with a three-tab asphalt-shingled side gable roof and prominent shed dormer. The house is two bays wide with a full-width porch covered by the gable porch overhang. The house is clad in stucco with shingle siding on the shed dormer and under the gables on the upper floor.
**PROPOSAL**
The applicant proposes to install 32 roof-mounted solar panels on the front and rear shed dormers.

**APPLICABLE GUIDELINES**
When reviewing alterations and new construction within the Takoma Park Historic District several documents are to be utilized as guidelines to assist the Commission in developing their decision. These documents include the historic preservation review guidelines in the approved and adopted amendment for the Takoma Park Historic District (*Guidelines*), Montgomery County Code Chapter 24A (*Chapter 24A*), and the Secretary of the Interior’s Standards for Rehabilitation (*Standards*). The pertinent information in these documents is outlined below.

**Takoma Park Historic District Design Guidelines**
There are two very general, broad planning and design concepts which apply to all categories. These are:

The design review emphasis will be restricted to changes that are at all visible from the public right-of-way, irrespective of landscaping or vegetation (it is expected that the majority of new additions will be reviewed for their impact on the overall district), and,

The importance of assuring that additions and other changes to existing structures act to reinforce and continue existing streetscape, landscape, and building patterns rather than to impair the character of the district.

Contributing Resources should receive a more lenient review than those structures that have been classified as Outstanding. This design review should emphasize the importance of the resource to the overall streetscape and its compatibility with existing patterns rather than focusing on a close scrutiny of architectural detailing. In general, however, changes to Contributing Resources should respect the predominant architectural style of the resource. As stated above, the design review emphasis will be restricted to changes that are *at all visible from the public right-of-way*, irrespective of landscaping or vegetation.
Some of the factors to be considered in reviewing HAWPs on Contributing Resources include:

All exterior alterations, including those to architectural features and details, should be generally consistent with the predominant architectural style and period of the resource and should preserve the predominant architectural features of the resource; exact replication of existing details and features is, however, not required.

Minor alterations to areas that do not directly front on a public right-of-way such as vents, metal stovepipes, air conditioners, fences, skylights, etc. – should be allowed as a matter of course; alterations to areas that do not directly front on a public way-of-way which involve the replacement of or damaged to original ornamental or architectural features are discouraged, but may be considered and approved on a case-by-case basis.

Some non-original building materials may be acceptable on a case-by-case basis; artificial siding on areas visible to the public right-of-way is discouraged where such materials would replace or damage original building materials that are in good condition.

All changes and additions should respect existing environmental settings, landscaping, and patterns of open space.

Montgomery County Code, Chapter 24A Historic Resources Preservation

(b) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to insure conformity with the purposes and requirements of this chapter, if it finds that:

(1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or

(2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter.

STAFF DISCUSSION

The applicant proposes to install 32 roof-mounted solar panels and related electrical equipment. All of the panels will be placed on the front and rear shed dormers. The panels will be installed using a rack system that projects approximately 4” (four inches) above the roof surface. The panels selected for this project are all black with matte black frames. Staff finds that this proposed work complies with the Guidelines and recommends approval.

Eighteen of the solar panels will be placed on the rear shed dormer and will only be minimally visible from the public right-of-way. This change will not impact historic materials or the massing of the historic features of the house and Staff supports its approval.

The remaining 14 solar panels are proposed for the front shed dormer in a single array. Staff initially had concerns about the visibility of solar panels in this location. However, due to the low (7 degree) slope of the dormer, Staff finds that this installation will have limited visual impact on the massing of the roof form, the historic building, and surrounding district. Additionally, as this proposal calls for a single array that will extend almost to the edges of the dormer (see Circle:
the installation will result in a more uniform appearance that will not detract in the way multiple clusters of solar panels would.

Staff’s only concerns about the current proposal is the highly visible location identified for the new electrical hardware: specifically the inverter and its conduit. The rendering shown in Circle: shows a bright white inverter box installed prominently at the front right corner of the house with a new black electrical conduit. The placement of the inverter near the electric box seems reasonable to Staff due it its proximity to the electric meter. However, Staff finds the placement of the inverter to be too high, and that it will visually detract from the appearance of the historic building in this prominent location. Staff recommends the Historic Preservation Commission including a condition for approval that lowers the inverter box and limits its placement to be no higher than the window sill on the north side of the house. Staff further recommends that the HPC require any new conduit associated with the installation of the inverter on this wall to be painted to match the historic house (as was done for the electric meter in the same approximate location).

STAFF RECOMMENDATION
Staff recommends the HPC approve with one (1) conditions the HAWP application;

1. The proposed location of the inverter box is too prominent. The inverter box must be installed below the level of the window sills on the north wall and any additional electrical conduit needs to be painted to match the historic house.

and with the general condition applicable to all Historic Area Work Permits that the applicant will present 3 permit sets of drawings to HPC staff for review and stamping prior to submission for permits (if applicable). After issuance of the Montgomery County Department of Permitting Services (DPS) permit, the applicant will arrange for a field inspection by calling the DPS Field Services Office at 240-777-6370 prior to commencement of work and not more than two weeks following completion of work.
APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact: Email: tlampros@solarenergyworld.com  
Contact Person: Tom Lampros  
Daytime Phone No.: 410.579.5177

Tax Account No.: 13-01073307  
Name of Property Owner: Thomas A. LaLonde  
Daytime Phone No.: 301.920.0236

Address: 7112 Sycamore Ave., Takoma Park, MD 20912  
City:  
State:  
Zip Code: 

Contractor: Solar Energy World, LLC  
Contractor Registration No.:  
Agent for Owner: Mike Kirby  
Daytime Phone No.: 410.409.0228

LOCATION OF BUILDING ALTERATION

House Number: 7112  
Street: Sycamore Ave.

Town/City: Takoma Park  
Nearest Cross Street: 
Lot: 11  
Block: 21  
Subdivision: 

PART ONE: TYPE OF PERMIT AND ALTERATION

1A. CHECK ALL APPLICABLE

☐ Construct  ☐ Extend  ☐ Alter/Remodel  ☐ AC  ☐ Sub  ☐ Room Addition  ☐ Porch  ☐ Deck  ☐ Shed  
☐ Move  ☐ Install  ☐ Wreck/Raze  ☐ Solar  ☐ Fireplace  ☐ Woodburning Stove  ☐ Single Family  
☐ Revision  ☐ Repair  ☐ Rebuild  ☐ Removeable  ☐ Fence/Wall (complete Section 4)  ☐ Other:

1B. Construction cost estimate: $ ______________________

1C. If this is a revision of a previously approved active permit, see Permit # ______________________

PART TWO: COMPLIANCE WITH CONSTRUCTION AND EXTERIOR ADDITIONS

2A. Type of sewage disposal:  
☐ 01 WSSC  ☐ 02 Septic  ☐ 03 Other: ______________________

2B. Type of water supply:  
☐ 01 WSSC  ☐ 02 Well  ☐ 03 Other: ______________________

PART THREE: COMPLIANCE WITH FIRE RETAINING WALL

3A. Height: ______ feet  
3B. Notes: ______________________

3C. Indicate whether the fence or retaining wall is to be constructed on one of the following locations:

☐ On property line/property line  ☐ Entirely on land of owner  ☐ On public right of way/basement

I hereby certify that I have the authority to make the foregoing application, that the application is correct, and that the construction will comply with plans approved by all agencies listed and I hereby acknowledge and accept this to be a condition for the issuance of this permit.

Signed: Thomas A. LaLonde  
Date: 4/9/18

Approved: ____________________  
For Chairperson, Historic Preservation Commission

Disapproved: ____________________  
Signature:  
Date: 

Application/Permit No.: ____________________  
Date Filed:  
Date Issued: ____________________
Historic Area Work Permit Application for a Solar Electric System
on the home of
Thomas LaLonde, 7112 Sycamore Ave., Takoma Park, MD 20912

1. Written description of the project
   a. The existing structure is a Craftsman-style bungalow, one-story in front and two-story in
      the rear. It was constructed in 1921. The neighborhood is of the same vintage.
   b. The proposed solar system will be flush-mounted to the rear (south facing) and front
      (north facing) roofs of dormers on the primary section of the home. The majority of the
      solar panels will be on the rear of the building. The height and tilt of the roof will pose
      little disruption to the environment of the neighborhood, as it will be nearly
      unnoticeable from the street level.

2. Site Plan
   a. Please see attached Solar Panel Layout
   b. 2 copies, 11”x17”

3. Plans & Elevations
   a. N/A

4. Materials Specifications
   a. Please see attached spec sheets for module and inverter

5. Photographs
   a. Please see photos below

6. Tree Survey – no trees will be disturbed or removed as part of this work

7. Addresses of Adjacent and Confronting Property Owners

<table>
<thead>
<tr>
<th>Owner’s mailing address</th>
<th>Owner’s agent mailing address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas LaLonde &amp; Julia D Zito</td>
<td>Solar Energy World</td>
</tr>
<tr>
<td>7112 Sycamore Ave.</td>
<td>5681 Main St.</td>
</tr>
<tr>
<td>Takoma Park, MD 20912</td>
<td>Elkridge, MD 21075</td>
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</table>

<table>
<thead>
<tr>
<th>Adjacent and confronting property owners mailing addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 10, Block 21</td>
</tr>
<tr>
<td>Adjoining</td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Lot 12, Block 21</td>
</tr>
<tr>
<td>Adjoining</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td>Lot 9, Block 21</td>
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<td>Confronting</td>
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<td></td>
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<tr>
<td>Lot 50, Block 21</td>
</tr>
<tr>
<td>Rear-adjointing</td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>
Existing Property Condition Photographs

Front view

East view
West view

Equipment Location, Before and After Installation
March 26, 2018

To: Solar Energy World
   5681 Main Street
   Elkridge, MD 21075

Subject: Structural Certification for Solar Panels Installation on Roof of
   Tom Lalonde Residence, 7112 Sycamore Avenue, Takoma Park, MD 20912

To whom it may concern,

A design check of the existing roof support framing system at the subject residence was performed for installation of solar panels.

Field measurements / inspection of the roof support framing system, by the client’s auditors, are as follows:

The roof structure consists of asphalt shingles on 1” thick wood panels supported on timber rafters.

The roof section “S1” has a maximum projected horizontal span of 24’-2” between load bearing walls, and a roof slope of 7°. The maximum unsupported projected horizontal span of the roof rafters is approximately 12.1 ft. The roof rafters are timber 2”x6” spaced at 24” OC.

The above existing roof support framing system “S1” is judged to be adequate subject to all code specified design loads and additional loading imposed by the installation of the solar panels. No reinforcement is required.

The spacing of the solar "L Feet" should be as specified in drawing titled “Solar Panel Footing Plan”, with a staggered pattern to ensure proper distribution of imposed loads.

I further certify that all applicable loads required by the current codes and design criteria listed below were applied and analyzed. Furthermore, the installation crews have been thoroughly trained to install the solar panels following all the installation recommendations specified by Unirac Solarmount for the racking system and Ecofasten for the connecting to the roof. Finally, I accept the certifications provided by the solar panel manufacturer for the ability of the panels to withstand design wind and snow loads.

**Design Criteria:**

- Applicable Design Codes = 2015 IBC / IRC, ASCE 7-10, and NDS-2015
- Roof Dead Load = 10.1 psf
- Ultimate Design Wind Speed = 115 mph, Exposure B
- Ground Snow Load = 30 psf
- Sloped Roof Design Snow Load = 22.7 psf
If any condition is found to be different from what is shown on the drawings or there appears to be any damage to the structure, please halt the solar panel installation and notify our office.

Should you have any question or concerns regarding this project, please feel free to contact me.

Sincerely,

Rabi Shankar Singh Yadava, PhD, PE, PMP
Structural Engineer
StruDes Consulting, Inc.

DocuSigned by:

Professional Certification: I hereby certify that these plans were prepared or approved by me, and I am duly licensed professional engineer under the laws of the State of Maryland. License No. 28331. Expiration Date: November 05, 2019.
Project Property Owner

Tom Lalonde

Address

7112 Sycamore Avenue, Takoma Park, MD 20912

I reviewed the design of the photovoltaic (PV) system, as designed by the manufacturer, and the design criteria utilized for the mounting equipment and panel mounting assembly (rack system) for the installation 32 nos. panels supported by the rack system, as shown on the drawings prepared for the above referenced address. I certify that the configurations and design criteria meet the standards and requirements of the International Residential Code (IRC) and International Existing Building Code (IEBC) adopted by Montgomery County in COMCOR 08.00.02.

The attachment of the rack system to the building at the above address, including the location, number, and type of attachment points; the number of fasteners per attachment point; and the specific type of fasteners (size, diameter, length, minimum embedment into structural framing, etc.) meets the standards and requirements of the IRC and IEBC adopted by Montgomery County in COMCOR 08.00.02.

I evaluated the existing roof structure of the building at the above address and analyzed its capacity to support the additional loads imposed by the PV system. I certify that no structural modifications of the existing roof structure are required. The existing roof structure meets the standards and requirements of the IRC and IEBC, adopted by Montgomery County in COMCOR 08.00.02, necessary to support the PV system.

I evaluated the existing roof structure of the building at the above address and analyzed its capacity to support the additional loads imposed by the PV system. Structural modifications of the existing roof structure are required. I certify that the roof structure, as modified on the drawings for this project, will support the additional loads imposed by the PV system. I further certify that design of the modified roof structure meets the standards and requirements of the IRC and IEBC, adopted by Montgomery County in COMCOR 08.00.02.

I prepared or approved the construction documents for the mounting equipment, rack system, roof structure for this project.

Maryland PE License Number

Date: 3 – 26 – 2018

DocuSigned by:

Seal & Signature
NOTES:
1. THE SYSTEM SHALL INCLUDE (20) TRINA SOLAR TSM-II500SQA2G060G MODULES.
2. UPFRONT SOLARMOUNT MPL WILL BE INSTALLED IN ACCORDANCE WITH UPFRONT INSTALLATION MANUAL 227.3.
3. DIMENSIONS MARKED (*) ARE ALONG ROOF SLICE.
4. REFER TO STRUCTURAL DRAWINGS FOR SECTIONS MARKED AND ADDITIONAL NOTES.
NOTE:
EQUIPMENT LOCATION PLAN IS APPROXIMATE. EXACT LOCATION TO BE VERIFIED WITH INSTALLATION CREW AND HOME OWNER AT THE TIME OF INSTALLATION.
THE
ALLMAX™ Plus
FRAMED 60-CELL MODULE

60 CELL
MONOCRISTALLINE MODULE

300W
POWER OUTPUT RANGE

18.3%
MAXIMUM EFFICIENCY

-5~+3%W
POWER TOLERANCE

Founded in 1997, Trina Solar is the world’s leading comprehensive solutions provider for solar energy, we believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, reliable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

Comprehensive Products
And System Certificates
IEC61215/IEC61701/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO 14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

Maximize limited space with top-end efficiency
- Up to 192W/m² power density
- Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 100% EL double inspection
- Selective emitter, advanced surface texturing

Certified to withstand the most challenging environmental conditions
- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

LINEAR PERFORMANCE WARRANTY
10 Year Product Warranty • 25 Year Linear Power Warranty

Additional value from Trina Solar’s linear warranty
### Electrical Data (STC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Peak Power Watts-Peak (Wp)*</td>
<td>300</td>
</tr>
<tr>
<td>Power Output Tolerance (Vp%)*</td>
<td>5% ~ 15%</td>
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<tr>
<td>Maximum Power Voltage-Vmp (V)</td>
<td>32.6</td>
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<tr>
<td>Maximum Power Current-Imp (A)</td>
<td>9.19</td>
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<tr>
<td>Open Circuit Voltage-Voc (V)</td>
<td>39.8</td>
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<tr>
<td>Short Circuit Current-Isc (A)</td>
<td>0.77</td>
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<tr>
<td>Module Efficiency-% (η)</td>
<td>18.3</td>
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</tbody>
</table>

*STC: Standard Test Conditions, modules at 1000W/m², Cell Temperature 25°C, AM 1.5G, Module Angle 0°.

### Electrical Data (NOCT)

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>Maximum Power-Peak (Wp)</td>
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<tr>
<td>Maximum Power Voltage-Vmp (V)</td>
<td>34.2</td>
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<tr>
<td>Maximum Power Current-Imp (A)</td>
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<td>Open Circuit Voltage-Voc (V)</td>
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<tr>
<td>Short Circuit Current-Isc (A)</td>
<td>7.69</td>
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</table>

NOCT: modules at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

### Mechanical Data

<table>
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<tr>
<th>Component</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Solar Cells</td>
<td>Monocrystalline 156.75 x 156.75 mm (6 inches)</td>
</tr>
<tr>
<td>Cell Orientation</td>
<td>60 cells (6 x 10)</td>
</tr>
<tr>
<td>Module Dimensions</td>
<td>1650 x 992 x 35 mm (65.0 x 39.1 x 1.4 inches)</td>
</tr>
<tr>
<td>Weight</td>
<td>18.6 kg (41.00 lb)</td>
</tr>
<tr>
<td>Glass</td>
<td>3.2 mm (0.13 inches), High Transmission, AR Coated Tempered Glass</td>
</tr>
<tr>
<td>Backsheet</td>
<td>Black (DDOSA.05(i))</td>
</tr>
<tr>
<td>Frame</td>
<td>Black Anodized Aluminium Alloy</td>
</tr>
<tr>
<td>J-Box</td>
<td>IP 67 or IP 68 rated</td>
</tr>
<tr>
<td>Cables</td>
<td>Photovoltaic Technology Cable 4.0mm² (0.006 inches²), 1000mm² (98.4 inches²)</td>
</tr>
<tr>
<td>Connector</td>
<td>MC4 or Amphenol UTX</td>
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<tr>
<td>Fire Type</td>
<td>Type 1 or Type 2</td>
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</table>

### Temperature Ratings

<table>
<thead>
<tr>
<th>Condition</th>
<th>Tmp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOCT (Normal Operating Cell Temp)</td>
<td>44°C (±2°C)</td>
</tr>
<tr>
<td>Temperature Coefficient of Pmp</td>
<td>-0.39%/°C</td>
</tr>
<tr>
<td>Temperature Coefficient of Voc</td>
<td>-0.24%/°C</td>
</tr>
<tr>
<td>Temperature Coefficient of Isc</td>
<td>0.056%/°C</td>
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### Maximum Ratings

<table>
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<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Operational Temperature</td>
<td>-40° to +85°C</td>
</tr>
<tr>
<td>Maximum System Voltage</td>
<td>1000V DC (IEC)</td>
</tr>
<tr>
<td>Max Series Fuse Rating</td>
<td>20A</td>
</tr>
</tbody>
</table>

(Do not connect Fuse to Converter Box with two or more strings in parallel configuration)

### Warranty

<table>
<thead>
<tr>
<th>Warranty</th>
<th>Details</th>
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<tbody>
<tr>
<td>10 year Product Workmanship</td>
<td>Warranty</td>
</tr>
<tr>
<td>25 year Linear Power Warranty</td>
<td>(Please refer to product warranty for details)</td>
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### Packaging Configuration

<table>
<thead>
<tr>
<th>Packaging</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>Modules per box</td>
<td>30 pieces</td>
</tr>
<tr>
<td>Modules per 40 container</td>
<td>840 pieces</td>
</tr>
</tbody>
</table>
SolarEdge Single Phase Inverters
for North America

Optimized installation with HD-Wave technology
- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small and easy to install outdoors or indoors
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

www.solaredge.us
### Single Phase Inverters for North America


<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Rated AC Power Output</td>
<td>3000</td>
<td>3800</td>
<td>5000</td>
<td>6000</td>
<td>7600</td>
</tr>
<tr>
<td>Max. AC Power Output</td>
<td>3000</td>
<td>3800</td>
<td>5000</td>
<td>6000</td>
<td>7600</td>
</tr>
<tr>
<td>Output Voltage Min.-Nom.-Max. (183 - 208 - 229)</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>AC Frequency (Nominal)</td>
<td>59.3 - 60 - 60.6 Hz</td>
<td>59.3 - 60 - 60.6 Hz</td>
<td>59.3 - 60 - 60.6 Hz</td>
<td>59.3 - 60 - 60.6 Hz</td>
<td>59.3 - 60 - 60.6 Hz</td>
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<tr>
<td>Maximum Continuous Output Current 208V</td>
<td>24</td>
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<td>Maximum Continuous Output Current 240V</td>
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<td>Country Configurable Thresholds</td>
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<td>INPUT</td>
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<tr>
<td>Maximum DC Power</td>
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<td>5900</td>
<td>7750</td>
<td>9900</td>
<td>11800</td>
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<td>Transformer-less, Ungrounded</td>
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<td>Maximum Input Voltage</td>
<td>480</td>
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<tr>
<td>Nominal DC Input Voltage</td>
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<tr>
<td>Maximum Input Current 208V</td>
<td>13.4</td>
<td>13.4</td>
<td>13.4</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>Maximum Input Current 240V</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Max. Input Short Circuit Current</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Reverse-Polarity Protection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ground-Fault Isolation Detection</td>
<td>6000V Sensitivity</td>
<td>6000V Sensitivity</td>
<td>6000V Sensitivity</td>
<td>6000V Sensitivity</td>
<td>6000V Sensitivity</td>
</tr>
<tr>
<td>Maximum Inverter Efficiency</td>
<td>95.2</td>
<td>95.2</td>
<td>95.2</td>
<td>95.2</td>
<td>95.2</td>
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<tr>
<td>Nominal Power Consumption</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
</tr>
</tbody>
</table>

### ADDITIONAL FEATURES

- Supported Communication Interfaces: RS485, Ethernet, ZigBee (optional), Cellular (optional)
- Rapid Shutdown - NEC 2014 and 2017 690.12: Automatic Rapid Shutdown upon AC Grid Disconnect

### STANDARD COMPLIANCE

- Safety: UL1741, UL1741 SA, UL6998, CSA C22.2, Canadian AFCI according to T.L.L. M-07
- Grid Connection Standards: IEEE1547, Rule 23, Rule 34 (Hi)
- Emissions: FCC Part 15 Class B

### INSTALLATION SPECIFICATIONS

- AC Input Conduit Size / AWG Range: 0.75-1" Conduit / 14-6 AWG
- DC Input Conduit Size / # of Strings / AWG Range: 0.75-1" Conduit / 1-2 strings / 14-6 AWG
- Dimensions with Safety Switch (Hz/Wd): 17.7 x 14.6 x 6.6 / 250 x 370 x 174
- Weight with Safety Switch: 22 / 10
d- Noise: <25

### Cooling

- Natural Convection

### Operating Temperature Range

- –33 to +140 / –25 to +60°C / –40°F to +140°F (option)°

### Protection Rating

- NEMA SR (Inverter with Safety Switch)

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- **B** - MODULE COMPATIBILITY
- **C** - SYSTEM LAYOUT
- **D** - FIRE SYSTEM COMPLIANCE NOTES
- **E** - ROOF ATTACHMENT & L-FEET
- **F** - SPICE & THERMAL BREAK
- **G** - ATTACH RAIL TO L-FEET
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- **K** - BONDING MIDCLAMP & TRIM
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- **M** - BONDING CONNECTION GROUND PATHS
- **N** - BONDING CONNECTION GROUND PATHS - MAINTENANCE
- **O** - TRIM RETROFIT INSTALLATION
**Wrenches and Torque**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Wrench Size</th>
<th>Recommended Torque (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>7/16&quot;</td>
<td>10</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>9/32&quot;</td>
<td>50</td>
</tr>
<tr>
<td>#12</td>
<td>5/32&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>

Torques are not designed for use with wood connectors.

**Anti-Seize**

Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood:
1. Apply minimum lubricant to bolts, preferably Anti-Seize commonly found at auto parts stores
2. Shade hardware prior to installation, and
3. Avoid spinning stainless nuts onto bolts at high speed.

**NOTE - POSITION INDICATOR:** T-bolts have a slot in the hardware end corresponding to the direction of the T-Head.
PLANNING YOUR SOLARMOUNT INSTALLATIONS

The installation can be laid out with rails parallel to the rafters or perpendicular to the rafters. Note that SOLARMOUNT rails make excellent straight edges for doing layouts.

Center the installation area over the structural members as much as possible.

Leave enough room to safely move around the array during installation. Some building codes and fire codes require minimum clearances around such installations, and the installer should check local building code requirements for compliance.

The length of the installation area is equal to:
- the total width of the modules,
- plus ¼ inch for each space between modules (for mid-clamp),
- plus approximately 3 inches (1 ½ inches for each Endclamp)

LAYING OUT L-FEET FOR TOP CLAMPS

L-feet, in conjunction with proper flashing equipment and techniques, can be used for attachment through existing roofing material, such as asphalt shingles, sheathing or sheet metal to the building structure.

Locate and mark the positions of the L-foot lag screw holes within the installation area as shown below. Follow manufacturer module guide for rail spacing based on appropriate mounting locations.

If multiple rows are to be installed adjacent to one another, it is not likely that each row will be centered above the rafters. Adjust as needed, following the guidelines below as closely as possible.

Refer to Unirac Solarmount D&E Guide & U-Builder for allowable spans and cantilevers.

RAILS MAY BE PLACED PARALLEL OR PERPENDICULAR TO RAFTERS

LAYOUT WITH RAILS PERPENDICULAR TO RAFTERS (RECOMMENDED)

Note: Modules must be centered symmetrically on the rails (1/2")
SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SOLAR_MOUNT Installation Guide. SOLAR_MOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLAR_MOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLAR_MOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes ≥ 2 inches per foot, or 9.5 degrees). There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLAR_MOUNT. Module Types & System Level Fire Ratings are listed below:

<table>
<thead>
<tr>
<th>Rail Type</th>
<th>Module Type</th>
<th>System Level Fire Rating</th>
<th>Rail Direction</th>
<th>Module Orientation</th>
<th>Mitigation Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Rail</td>
<td>Type 1, Type 2, Type 3 &amp; Type 10</td>
<td>Class A, Class B &amp; Class C</td>
<td>East-West</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td>Light Rail</td>
<td>Type 1 &amp; Type 2</td>
<td>Class A, Class B &amp; Class C</td>
<td>East-West</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
</tbody>
</table>

UL2703 CERTIFICATION MARKING LABEL

UniRac SOLAR_MOUNT is listed to UL 2703. Marking Labels are shipped with the Midclamps. After the racking system is fully assembled, a single Marking Label should be applied to the SOLAR_MOUNT rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.
ROOF PREPARATION: Layout and install flashing at rafter locations determined per Design and Engineering Guide.

DRILL PILOT HOLES: Center the roof attachment over the rafter and drill a pilot hole(s) for the lag bolt(s).

NOTE: Determine lag bolt size and embedment depth.

Quick Tip: Pre-drill the pilot hole through the flat flashing lag bolt location for easier installation.

FLAT FLASHING INSTALLATION: Insert the Flat Flashing so the top part is under the next row of shingles and the hole lines up with the pilot hole.

INSTALL LAG BOLTS & L-FOOT: Insert the lag bolt through the L-Foot in the order shown in the illustration. Verify proper orientation before tightening lag bolts.

See Uni-Rac Flat Flashing Manual for Additional Details.

2 PIECE ALUMINUM STANDOFF WITH FLASHING & L-FOOT:
- If necessary cut an opening in the roofing material over a rafter to accommodate the flashing riser.
- Install the standoff, ensuring that both lag bolts are screwed into the rafter.
- Insert the flashing under the shingle above and over the shaft of the standoff. (No-Caulk™ collar does not require sealing of the flashing and standoff shaft)
- Add L-Foot to top with bolt that secures the EPDM washer to the top of the standoff.

See Standoffs & Flashings Installation Manual 907.2 for Additional Details.

TOP MOUNT TILE HOOK & L-FOOT:
- Remove or slide up the roof tile, position the roof hook above the roof rafter
- Place Tile Hook in the middle of the underlying interlocking tile's valley. Drill 3/16 inch pilot holes through the underlayment into the center of the rafters. Securely fasten each tile hook to the rafters with two 5/16" x 3/4" lag screws. Slide down or re-insert the tile.
- Attach L-Foot to tile roof hook.

See Tile Hook Universal Mount Installation Manual for Additional Information.
SPlice & Thermal Break
Installation Guide

SPlice Installation (If Required Per System Design)
If your installation uses SOLARMOUNT splice bars, attach the rails together before mounting to the L-feet/footings. Use splice bars only with flush installations or those that use low-profile tilt legs. A rail should always be supported by more than one footing on both sides of the splice. There should be a gap between rails, up to 3/16" at the splice connections. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice.

Torque Value (See Note on Pg. A)
Hex head socket size 5/16" - Do not exceed 10 ft-lbs. Do not use Anti-Seize.
Max length of spliced rail is 40 ft. An expansion joint is required > 40 ft.

Expansion Joint Used as Thermal Break
Expansion joints prevent buckling of rails due to thermal expansion. Splice bars may be used for thermal expansion joints. To create a thermal expansion joint, slide the splice bar into the footing slots of both rail lengths. Leave approximately 1/8" between the rail segments. Secure the splice bar with two screws on one side only. Footings (such as L-feet or standoffs) should be secured normally on both sides of the splice. No PV module or mounting hardware component should straddle the expansion joint. Modules must clearly end before the joint with mounting hardware (top mount Endclamps) terminating on that rail. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice. The next set of modules would then start after the splice with mounting hardware beginning on the next rail. A thermal break is required every 40 feet of continuously connected rail. For additional concerns on thermal breaks in your specific project, please consult a licensed structural engineer. Runs of rail less than 40 feet in length, with more than two pairs spliced together, are an acceptable installation for the SOLARMOUNT systems.

Bonding connection for splice used as a thermal break. Option shown uses two fish plates (Model No. GBL-4DBT P/N GBL-4DBT - see product data sheet for more details) and solid copper wire.

SECURE T-BOLT: Apply Anti-Seize to bolt. Rotate T-bolt into position.

SM STANDARD RAIL: Use either slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Standard rail.

SM LIGHT RAIL: For a lower profile array when using SM Light rail, rotate the L-foot to orient the side with only one (1) slot against the rail. Only use the slot location closest to the rail to connect the lag bolt to the flashing / roof on the side with two (2) slots.

NOTE: Use only the top slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Light rail.

ALIGN RAILS: Align one pair of rail ends to the edge of the installation area. The opposite pair of rail ends will overhang installation area. Do not Trim them off until the installation is complete. If the rails are perpendicular to the rafters, either end of the rails can be aligned, but the first module must be installed at the aligned end.

If the rails are parallel to the rafters, the aligned end of the rails must face the lower edge of the roof. Securely tighten all hardware after alignment is complete.

Mount modules to the rails as soon as possible. Large temperature changes may bow the rails within a few hours if module placement is delayed.

ALIGN POSITION INDICATOR: Hand tighten nut until rail alignment is complete. Verify that position indicator on bolt is vertical (perpendicular to rail)

TORQUE VALUE (See Note on PG. A) 3/8" nut to 30 ft-lbs
INSTALL MICROINVERTER MOUNT T-BOLT: Apply Anti-Seize and install pre-assembled 1/4” dia. bonding T-bolts into top 1/4” rail slot at microinverter locations. Rotate bolts into position.

INSTALL MICROINVERTER: Install microinverter on to rail. Engage with bolt.

INSTALL MICROINVERTER: TORQUE VALUE (See Note on PG. A) 1/4” nut to 10 ft-lbs w/Anti-Seize

ALIGN POSITION INDICATOR: Verify that position indicator on bolt is perpendicular to rail.
SM EQUIPMENT GROUNDING THROUGH ENPHASE MICROINVERTERS

The Enphase M215 and M230 microinverters have integrated grounding capabilities built in. In this case, the DC circuit is isolated from the AC circuit, and the AC equipment grounding conductor (EGC) is built into the Enphase Engage integrated grounding (IG) cabling.

In order to ground the SOLARMOUNT racking system through the Enphase microinverter and Engage cable assembly, there must be a minimum of three PV modules connected to the same trunk cable within a continuous row. Continuous row is defined as a grouping of modules installed and bonded per the requirements of this installation guide sharing the same two rails. The microinverters are bonded to the SOLARMOUNT rail via the mounting hardware. Complete equipment grounding is achieved through the Enphase Engage cabling with integrated grounding (IG). No additional EGC grounding cables are required, as all fault current is carried to ground through the Engage cable.

SOLARMOUNT INTEGRATED BONDING ADVANTAGE

LOSE ALL THE COPPER & LUGS
CONTINUOUS RAIL & ELECTRICAL BONDING SPlice

**Emphase Microinverter (M2) Requirements**
(Model No. M215 & M250)

3 Microinverters sharing same trunk cable & rails

**MINIMUM LAYOUT REQUIREMENTS**

- Min. 3 microinverters sharing same trunk cable & rails
- Min. 3 microinverters sharing same trunk cable & rails

R.AIL SPLICE

ELECTRICAL BONDING SPLICE

EXPANSION JOINT W/ ELECTRICAL BONDING CONNECTION

**Emphase Microinverter (M2) Requirements**
(Model No. M215 & M250)

3 or more Microinverters sharing same trunk cable & rails

**MINIMUM LAYOUT REQUIREMENTS**

- 3 or more microinverters sharing same trunk cable & rails
- Min. 3 microinverters on each side of thermal break

R.AIL SPLICE

THERMAL BREAK

EXPANSION JOINT W/ THERMAL BREAK W/ GROUNDING LUGS & COPPER JUMPER

**MINIMUM LAYOUT REQUIREMENTS**

- Less than 3 microinverters on each side of thermal break
- Min. 3 microinverters on each side of thermal break

R.AIL SPLICE

THERMAL BREAK

EXPANSION JOINT W/ THERMAL BREAK W/ GROUNDING LUGS & COPPER JUMPER

NOT ACCEPTABLE

---

**NOTE:** THE ABOVE IMAGES ARE SAMPLE CONFIGURATIONS TO ILLUSTRATE THE REQUIREMENTS FOR SM SYSTEM GROUNDING THROUGH ENPHASE MICROINVERTERS DESCRIBED ON PAGE 1-2.
ONLY ONE LUG PER ROW OF MODULES:
Only one lug per row of modules is required. See Page F for additional lugs required for expansion joints.

GROUNDING LUG MOUNTING DETAILS:
Details are provided for both the WEEB and Ilsco products. The WEEBlug has a grounding symbol located on the lug assembly. The Ilsco lug has a green colored set screw for grounding indication purposes. Installation must be in accordance with NFPA NEC 70, however the electrical designer of record should refer to the latest revision of NEC for actual grounding conductor cable size. Required if not using approved integrated grounding microinverters.

GROUNDING LUG - BOLT SIZE & DRILL SIZE

<table>
<thead>
<tr>
<th>GROUND LUG</th>
<th>BOLT SIZE</th>
<th>DRILL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEBlug</td>
<td>1/4&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Ilsco Lug</td>
<td>#10-32</td>
<td>7/32&quot;</td>
</tr>
</tbody>
</table>

- Torque value depends on conductor size.
- See product data sheet for torque value.

WEEBlug Conductor - UNIRAC P/N 0080025:
Apply Anti-Sieze and insert a bolt in the aluminum rail and through the clearance hole in the stainless steel flat washer. Place the stainless steel flat washer on the bolt, oriented so the dimples will contact the aluminum rail. Place the lug portion on the bolt and stainless steel flat washer. Install stainless steel flat washer, lock washer and nut. Tighten the nut until the dimples are completely embedded into the rail and lug. TORQUE VALUE 10 ft-lbs. See product data sheet for more details, Model No. WEEB-LUG-6.7.

ILSCO Lay-in Lug Conductor - UNIRAC P/N 0080099:
Alternate Grounding Lug - Drill, deburr hole and bolt thru both rail walls per table. TORQUE VALUE 5 ft-lbs. See product data sheet for more details, Model No. GBL-4DBT.

NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION.
INSTALL MODULE ENDCLAMPS: The Endclamp is supplied as an assembly with a T-bolt, serrated flange nut, and washer. The washer retains the clamp at the top of the assembly. This will enable the clamp to remain upright for module installation.

INSERT ENDCLAMP T-BOLT: Insert 1/4" T-bolt into rail.

ROTATE ENDCLAMP T-BOLT: Rotate T-bolt into position. Verify that the position indicator & T-bolt shaft are angled in the correct position.

End clamps are positioned on rails prior to the first end module and installed after the last end module.

INSTALL FIRST MODULE: Install the first end module onto rails. Engage module frame with Endclamps. Verify that the position indicator & T-bolt shaft are angled in the correct position.

POSITION INDICATOR - SERRATED T-BOLT: Verify the T-bolt position indicator is perpendicular to the rail.

TORQUE VALUE (See Note on PG. A) 1/4" nuts to 10 ft-lbs w/Anti Seize

TRIM INSTALLATION INSTRUCTIONS

TRIM ENDCLAMPS: Install Endclamps on Trim in like manner to module endclamps per install instructions above.

TORQUE VALUE (See Note on PG. 1) 1/4" nuts to 10 ft-lbs w/Anti Seize
INSTALL MIDCLAMPS: Midclamp is supplied as an assembly with a T-bolt for module installation. Clamp assemblies may be positioned in rail near point of use prior to module placement.

INSERT MIDCLAMP T-BOLT: Apply Anti-Seize and insert 1/4" T-bolt into rail.

ROTATE MIDCLAMP T-BOLT: Rotate bolt into position and slide until bolt and clamp are against module frame. Do not tighten nut until next module is in position. Verify that the position indicator & T-bolt shaft are angled in the correct position.

TRIM INSTALLATION INSTRUCTIONS

POSITION INDICATOR - SERRATED T-BOLT: Verify the T-bolt position indicator is perpendicular to the rail.

TRIM MIDCLAMPS: Ensure Trim lip is in contact with module face and verify alignment marks on T-bolts are in proper position, tighten midclamp on Trim, repeat at each gap between modules.

TORQUE VALUE (See Note on PG. 1)
1/4" nuts to 10 ft-lbs w/ Anti Seize
INSTALL REMAINING MID-CLAMPS:
Proceed with module installation. Engage each module with previously positioned Midclamp assemblies.
NOTE: Apply Anti-Seize to each Midclamp prior to installation.

POSITION T-BOLT ALIGNMENT MARKS:
Verify that the position indicator(s) & T-bolt shaft(s) are angled in the correct position.
TORQUE VALUE (See Note on PG.A)
1/4" nuts to 10 ft-lbs. w/Anti Seize

INSTALL ENDCLAMPS:
Apply Anti-Seize and install final Endclamps in same manner as first Endclamps. Slide clamps against module.
TORQUE VALUE (See Note on PG.A)
1/4" nuts to 10 ft-lbs. w/Anti Seize

POSITION T-BOLT ALIGNMENT MARKS & CUT RAIL:
Verify that the position indicator(s) & T-bolt shaft(s) are angled in the correct position. Trim off any excess rail, being careful not to cut into the roof. Allow 1/2" between the Endclamp and the end of the rail.

FINISH MODULE INSTALLATION:
Proceed with module installation. Engage each module with the previously positioned clamp assembly:
- Install second module
- Install remaining Midclamps & modules & position alignment marks
- Install Endclamps & position alignment marks
- Cut rail to desired length

TRIM INSTALLATION INSTRUCTIONS
FINISH TRIM INSTALLATION, INSTALL ENDCLAMP & CUT EXCESS RAIL:
Install final endclamp & Cut away excess Trim at end of array or where required for proper cantilevers. See D&E Guide or U-Builder for allowable cantilevers.
TORQUE VALUE (See Note on PG.1)
1/4" nuts to 10 ft-lbs w/Anti Seize
**BONDING MIDCLAMP ASSEMBLY**

1. Stainless steel Midclamp points, 2 per module, piece module frame anodization to bond module to module through clamp.
2. Serated flange nut bonds stainless steel clamp to stainless steel T-bolt.
3. Serated T-bolt head penetrates rail anodization to bond T-bolt, nut, clamp, and module to grounded SH rail.

**ENDCLAMP ASSEMBLY**

1. Serated flange nut bonds aluminum Endclamp to stainless steel T-bolt.
2. Serated T-bolt head penetrates rail anodization to bond T-bolt, nut, and Endclamp to grounded SH rail.
3. Note: End clamp does not bond to module frame.

**BONDING RAIL SPlice BAR**

1. Stainless steel rail sliding screws drill and tap into splice bar and rail, creating bond between splice bar and each rail section.
2. Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.

**RAIL TO L-FOOT w/BONDING T-BOLT**

1. Serated flange nut removes L-foot anodization to bond L-foot to stainless steel T-bolt.
2. Serated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SH rail.

**BONDING MICROINVERTER MOUNT**

1. Use nut with captive lock washer; bonds metal microinverter flange to stainless steel T-bolt.
2. Serated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SH rail.

**RACK SYSTEM GROUND**

1. Use washer dished flare anodized rail to create bond between rail and lug.
2. Solid copper wire connected to lug is routed to provide final system-ground connection.

NOTE: Stainless tag can also be used when secured to the side of the rail. See page 1-3 for details.
**TEMPORARY BONDING CONNECTION DURING ARRAY MAINTENANCE**

When removing modules for replacement or system maintenance, any module left in place that is secured with a bonding midclamp will be properly grounded. If a module adjacent to the end module of a row is removed or if any other maintenance condition leaves a module without a bonding mid clamp, a temporary bonding connection must be installed as shown:

- Attach Ilsco SGB4 to wall of rail
- Attach Ilsco SGB4 to module frame
- Install solid copper wire jumper to Ilsco lugs

**ELECTRICAL CONSIDERATIONS**

SOLARMOUNT is intended to be used with PV modules that have a system voltage less than or equal to 1000 VDC. For standard system grounding a minimum 10AWG, 105°C copper grounding conductor should be used to ground a 1000 VDC system, according to the National Electric Code (NEC). It is the installer's responsibility to check local codes, which may vary. See below for interconnection information.

**INTERCONNECTION INFORMATION**

There is no size limit on how many SOLARMOUNT & PV modules can be mechanically interconnected for any given configuration, provided that the installation meets the requirements of applicable building and fire codes.

**GROUNDING NOTES**

The installation must be conducted in accordance with the National Electric Code (NEC) and the authority having jurisdiction. Please refer to these resources in your location for required grounding lug quantities specific to your project.

The grounding/bonding components may overhang parts of the array so care must be made when walking around the array to avoid damage.

Conductor fastener torque values depend on conductor size. See product data sheets for correct torque values.
PREPARATION: At front edge of array, ensure at least 3.25 inches of space between modules and roof surface and that modules are aligned to within 1/8". Plan for Trim length so that Endclamps can be properly installed.

1ST MIDCLAMP: Position Trim in front of array. Insert Midclamp into the Trim slot, aligned with the gap between the 1st two modules at either end of array. NOTE: Apply Anti-Seize to each Midclamp prior to installation.

MOUNT TRIM: Position Trim beneath modules by sliding T-bolt into gap between modules and tighten. Midclamp should stay in position and support Trim. Tighten snugly enough so that Trim is held firmly in place. TORQUE VALUE: Do not exceed specified torque value (10 ft-lbs).

CLEAR T-BOLT SLOT: Rotate unattached end of Trim out and away from array so T-bolt slot (at next T-bolt insertion point) is clear of modules. This may require force to deflect the Trim slightly. Deflect only enough to insert T-bolt.

INSERT MIDCLAMPS: Insert T-bolt into slot and slide clamp (rotating Trim) into position between modules and leave loose. Continue to work down array, inserting Midclamps and positioning in gaps between modules.

FASTEN MIDCLAMPS: Return to each inserted Midclamp. Ensuring Trim lip is in contact with module face and verifying alignment marks on T-bolts are in proper position, tighten clamp. TORQUE VALUE (See Note on PG. 1) 1/4" nuts to 10 ft-lbs w/ Anti Seize

ENDCLAMPS: Install Endclamps per previous Endclamp install instructions. TORQUE VALUE (See Note on PG. 1) 1/4" nuts to 10 ft-lbs w/ Anti Seize

CUT EXCESS TRIM: Mark excess Trim and cut at end of array or where required for proper cantilevers.