



HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Jeffrey Hains
Chair

Date: March 16, 2026

MEMORANDUM

TO: Rabbiah Sabbakhan
Department of Permitting Services
FROM: Devon Murtha
Historic Preservation Section
Maryland-National Capital Park & Planning Commission
SUBJECT: Historic Area Work Permit #1145456 –Solar panel installation

The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **Approved** at the March 11, 2026 HPC meeting.

The HPC staff has reviewed and stamped the attached submission materials.

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Jeremiah Frueauf; Tina Crouse (Agent)
Address: 7013 Poplar Avenue, Takoma Park, MD 20912

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete, the applicant will contact Devon Murtha at 301-495-1328 or devon.murtha@montgomeryplanning.org to schedule a follow-up site visit.



Description of Property: Please describe the building and surrounding environment. Include information on significant structures, landscape features, or other significant features of the property:

Description of Work Proposed: Please give an overview of the work to be undertaken:

APPROVED
Montgomery County
Historic Preservation Commission



Work Item 1: _____	
Description of Current Condition:	Proposed Work:

Work Item 2: _____	
Description of Current Condition:	Proposed Work:

Work Item 3: _____	
Description of Current Condition:	Proposed Work:

APPROVED
Montgomery County
Historic Preservation Commission



HISTORIC AREA WORK PERMIT CHECKLIST OF APPLICATION REQUIREMENTS

	Required Attachments						
Proposed Work	I. Written Description	2. Site Plan	3. Plans/ Elevations	4. Material Specifications	5. Photographs	6. Tree Survey	7. Property Owner Addresses
New Construction	*	*	*	*	*	*	*
Additions/ Alterations	*	*	*	*	*	*	*
Demolition	*	*	*		*		*
Deck/Porch	*	*	*	*	*	*	*
Fence/Wall	*	*	*	*	*	*	*
Driveway/ Parking Area	*	*		*	*	*	*
Grading/Excavation/ Landscaping	*	*		*	*	*	*
Tree Removal	*	*		*	*	*	*
Siding/ Roof Changes	*	*	*	*	*		*
Window/ Door Changes	*	*	*	*	*		*
Masonry Repair/ Repoint	*	*	*	*	*		*
Signs	*	*	*	*	*		*





Front of Home



Back of Home





Right side of Home



Left side of Home





Before Install





After Installation





DAVID C. HERNANDEZ, PE

513-418-8812  4912 Prospect Ave., Blue Ash OH 45242  davehernandezpe@gmail.com 

DATE: December 19, 2025

RE: 7013 Poplar Ave, Takoma Park, MD 20912, USA

To Whom It May Concern,

As per your request, Exactus Energy has conducted a site assessment of the building at the above address.

PV solar panels are proposed to be installed on roof areas as shown in the submitted plans. The panels are attached to the roof decking with a rail-less mounting system. The PV system (PV modules, racking, mounting hardware, etc.) shall be installed according to the manufacturer's approved installation specifications. The Engineer of Record and Exactus Energy claim no responsibility for misuse or improper installation.

It was found that the roof systems satisfactorily meet the applicable standards included in the IBC 2021, IRC 2021, and ASCE 7-16 as well as the design criteria shown below:

Design Criteria:

Risk Category	= II
Exposure Category	= B
Wind speed	= 115 mph
Ground snow load	= 30 psf
Roof dead load	= 12 psf
Solar system dead load	= 3 psf

Overall, the roof system integrity is adequate to support the PV alteration with no modifications or reinforcements required.

This letter was completed in accordance to recognized design standards, professional engineering experience, and judgement. Prior to installation, the on-site contractor must notify Exactus Energy if there are any discrepancies, or damages to the members, that was not addressed in the plan set.

If you have any further questions, please do not hesitate to contact me.

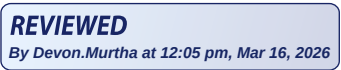
Acknowledged by:

David C. Hernandez, PE

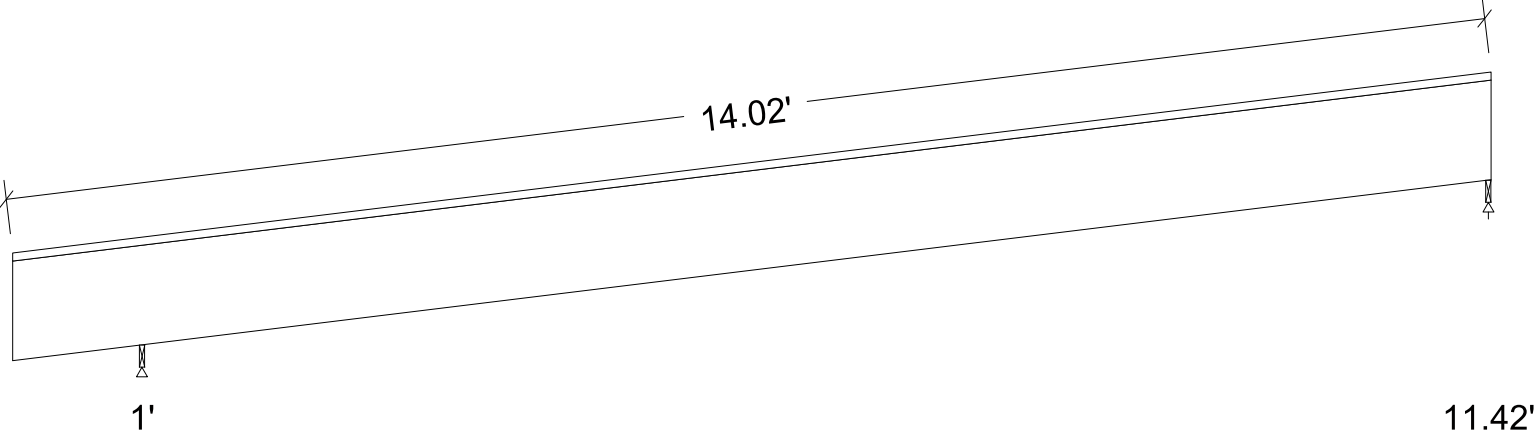
Digitally signed by David C. Hernandez, PE
Date: 2025.12.19 17:37:28 -05:00



PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 49993, EXP. 10/06/2026.



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

 WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY Dec. 19, 2025 09:13	PROJECT 7013 Poplar Ave - Roof 1.wwbu																																																																																																									
Design Check Calculation Sheet WoodWorks Sizer 13.3																																																																																																											
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Lumber-soft, S-P-F, No.1/No.2, 2x10 (1-1/2"x9-1/4") Supports: All - Timber-soft Beam, D.Fir-L No.2 Roof joist spaced at 16.0" c/c; Total length: 14.57'; Clear span(horz): 0.979', 10.378'; Volume = 1.4 cu.ft.; Pitch: 8.5/12 Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help); This section PASSES the design code check.																																																																																																											



Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 18	Fv' = 155	psi	fv/Fv' = 0.12
Bending(+)	fb = 323	Fb' = 1273	psi	fb/Fb' = 0.25
Bending(-)	fb = 14	Fb' = 576	psi	fb/Fb' = 0.02
Deflection:				
Interior Live	0.05 = < L/999	0.64 = L/240	in	0.09
Total	0.16 = L/984	0.85 = L/180	in	0.18
Cantil. Live	-0.02 = L/913	0.12 = L/120	in	0.13
Total	-0.05 = L/314	0.16 = L/90	in	0.29

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	135	1.15	1.00	1.00	-	-	-	-	1.00	1.00	3
Fb'+	875	1.15	1.00	1.00	1.000	1.100	-	1.15	1.00	1.00	3
Fb'-	875	1.15	1.00	1.00	0.452	1.100	-	1.15	1.00	1.00	3
Fcp'	425	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.4 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	3
Emin'	0.51 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	3

CRITICAL LOAD COMBINATIONS:

Shear : LC #3 = D + S
Bending(+): LC #3 = D + S
Bending(-): LC #3 = D + S
Deflection: LC #3 = D + S (live)
LC #3 = D + S (total)
Bearing : Support 1 - LC #3 = D + S
Support 2 - LC #3 = D + S
Load Types: D=dead S=snow Lr=roof live
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4

CALCULATIONS:

V max = 193, V design = 166 (NDS 3.4.3.1(a)) lbs
M(+) = 576 lbs-ft; M(-) = 24 lbs-ft
EI = 138.50e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow...)
Total deflection = 1.50 permanent + "live"
Bearing: Allowable bearing at an angle F'theta calculated for each support as per NDS 3.10.3
Lateral stability(-): Lu = 12.75' Le = 20.69' RB = 32.0; Lu based on full span

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
5. SLOPED BEAMS: level bearing is required for all sloped beams.
6. The critical deflection value has been determined using maximum back-span deflection. Cantilever deflections do not govern design.





COMPANY

Dec. 19, 2025 09:12

PROJECT

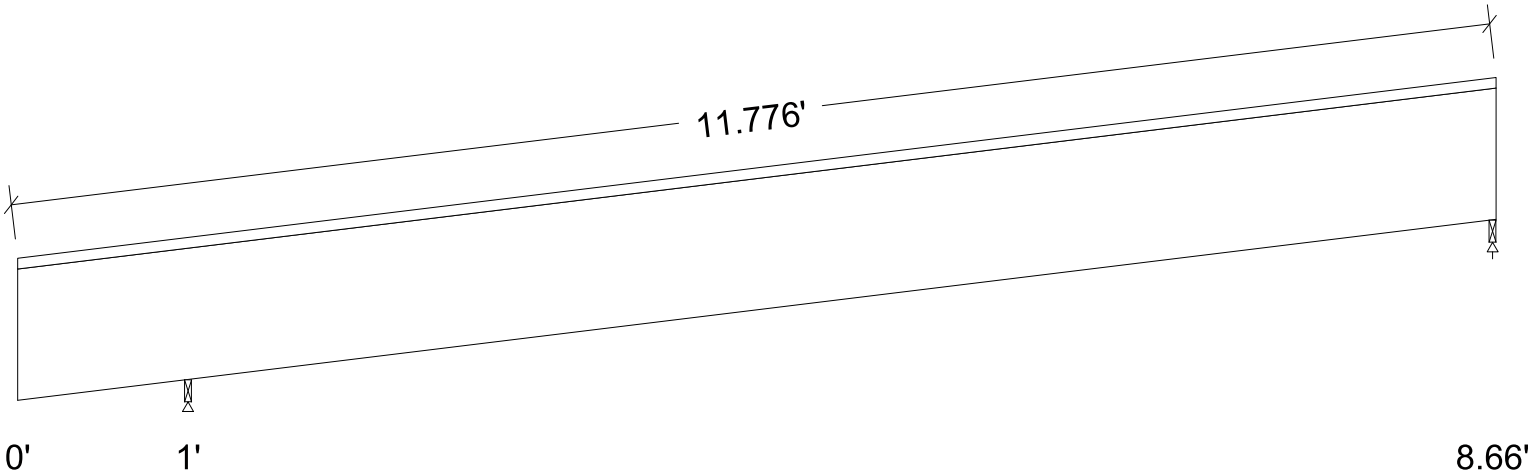
7013 Poplar Ave - Roof 2 & Roof 3.wwbu

Design Check Calculation Sheet
WoodWorks Sizer 13.3

Loads:

Load	Type	Distribution	Pat- tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
DL-WOOD	Dead	Full Area	No			12.00 (16.0")		psf
DL-PV	Dead	Partial Area	No	0.50	8.00	3.00 (16.0")		psf
SL1	Snow	Partial Area	No	0.00	0.50	19.19 (16.0")		psf
SL-PV	Snow	Partial Area	No	0.50	8.00	10.40 (16.0")		psf
SL2	Snow	Partial Area	No	8.00	8.68	19.19 (16.0")		psf
LL1	Roof constr.	Partial Area	No	0.00	0.50	20.00 (16.0")		psf
LL2	Roof constr.	Partial Area	No	8.00	8.68	20.00 (16.0")		psf

Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:				
Dead		129		100
Snow		74		60
Roof Live		15		17
Factored:				
Combined		203		160
Bearing:				
F'theta		616		616
Capacity				
Joist		808		462
Support		586		586
Des ratio				
Joist		0.25		0.35
Support		0.35		0.27
Load comb		#3		#3
Length		0.50*		0.50*
Min req'd		0.50*		0.50*
Cb		1.75		1.00
Cb min		1.75		1.00
Cb support		1.25		1.25
Fcp sup		625		625

*Minimum bearing length setting used: 1/2" for end supports and 1/2" for interior supports



Lumber-soft, S-P-F, No.1/No.2, 2x10 (1-1/2"x9-1/4")
Supports: All - Timber-soft Beam, D.Fir-L No.2
Roof joist spaced at 16.0" c/c; Total length: 12.48'; Clear span(horz): 0.979', 7.618'; Volume = 1.2 cu.ft.; Pitch: 11/12
Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);
This section **PASSES** the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 11	Fv' = 155	psi	fv/Fv' = 0.07
Bending(+)	fb = 163	Fb' = 1273	psi	fb/Fb' = 0.13
Bending(-)	fb = 13	Fb' = 679	psi	fb/Fb' = 0.02
Deflection:				
Interior Live	0.01 = < L/999	0.52 = L/240	in	0.03
Total	0.05 = < L/999	0.69 = L/180	in	0.08
Cantil. Live	-0.01 = < L/999	0.14 = L/120	in	0.04
Total	-0.02 = L/752	0.18 = L/90	in	0.12

Additional Data:

FACTORS: F/E(psi) CD CM Ct CL CF Cfu Cr Cfrt Ci LC#
Fv' 135 1.15 1.00 1.00 - - - - 1.00 1.00 3
Fb'+ 875 1.15 1.00 1.00 1.000 1.100 - 1.15 1.00 1.00 3
Fb'- 875 1.15 1.00 1.00 0.534 1.100 - 1.15 1.00 1.00 3
Fcp' 425 - 1.00 1.00 - - - - 1.00 1.00 -
E' 1.4 million 1.00 1.00 - - - - 1.00 1.00 3
Emin' 0.51 million 1.00 1.00 - - - - 1.00 1.00 3

CRITICAL LOAD COMBINATIONS:
Shear : LC #3 = D + S
Bending(+): LC #3 = D + S
Bending(-): LC #3 = D + S
Deflection: LC #3 = D + S (live)
LC #3 = D + S (total)
Bearing : Support 1 - LC #3 = D + S
Support 2 - LC #3 = D + S
Load Types: D=dead S=snow Lr=roof live
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4

CALCULATIONS:
V max = 118, V design = 100 (NDS 3.4.3.1(a)) lbs
M(+) = 290 lbs-ft; M(-) = 23 lbs-ft
EI = 138.50e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow...)
Total deflection = 1.50 permanent + "live"
Bearing: Allowable bearing at an angle F'theta calculated for each support as per NDS 3.10.3
Lateral stability(-): Lu = 10.38' Le = 17.25' RB = 29.2; Lu based on full span

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
5. SLOPED BEAMS: level bearing is required for all sloped beams.
6. The critical deflection value has been determined using maximum back-span deflection. Cantilever deflections do not govern design.



ASCE 7 - 16 WIND CALCULATION FOR: Roof 1
Project Address: 7013 Poplar Ave, Takoma Park, MD 20912, USA

DESIGN CRITERIA

Ultimate Wind Speed: 115 mph	Array Edge Factor, γ_E : 1
Exposure Category: B	Solar Array Dead Load: 3 psf
a: 3 ft	Mean Roof Height: 16 ft
Velocity Pressure Exposure Coefficient, K_z : 0.59	Roof Pitch: 35°
Topographic Factor, K_{zt} : 1	Roof Type: Gable
Wind Directionality Factor, K_d : 0.85	Module Name, Dimensions, Area: LONGI LR5-54HPB-405M, 44.6in X 67.8in, 3023.88 sqin
Ground Elevation Factor, K_e : 1	
Solar Array Pressure Equalization Factor, γ_a : 0.61	

CALCULATION

Velocity Pressure Due to Wind:	$q_h = 0.00256(K_z)(K_{zt})(K_d)(I)(V^2)$	(Ch 26. Eq 26.10 – 1)
Actual Uplift Pressure:	$p = 0.6D + 0.6W$	(Ch 2.4.1 LC #7/a)
Wind Uplift Pressure:	$p = q_h (GC_p)(\gamma_E)(\gamma_a)$	(Ch 29. Eq 29.4 – 7)

Landscape / Portrait Panels

Roof Zone	1	2e	2n	2r	3e	3r
Mount Spacing	67.8"	67.8"	67.8"	67.8"	67.8"	67.8"
External Pressure Coefficient (GC_p)	-1.78	-1.78	-1.98	-1.78	-2.47	-1.98
Actual Uplift Pressure (p)	-16 psf	-16 psf	-16 psf	-16 psf	-16 psf	-16 psf
Tributary Area (AT)	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft
Uplift Force (P)	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs

Uplift Capacity

Attachment Type = 4 pcs of #14 Wood Screw TopSpeed Mount Assembly	Hardware Pullout Capacity = 258 lbs
Embedment Depth = 0.5 in	Safety Factor = 1.5
	Duration Factor = 1.6

Maximum Uplift Force = 167.993 lbs

Allowable Pullout Capacity = 258 lbs

Allowable Pullout Capacity = 258 lbs > Uplift Force per Bolt = 167.99 lbs, Therefore OK.



ASCE 7 - 16 WIND CALCULATION FOR: Roof 2 & Roof 3
Project Address: 7013 Poplar Ave, Takoma Park, MD 20912, USA

DESIGN CRITERIA

Ultimate Wind Speed: 115 mph	Array Edge Factor, γ_E : 1
Exposure Category: B	Solar Array Dead Load: 3 psf
a: 3 ft	Mean Roof Height: 16 ft
Velocity Pressure Exposure Coefficient, K_z : 0.59	Roof Pitch: 43°
Topographic Factor, K_{zt} : 1	Roof Type: Gable
Wind Directionality Factor, K_d : 0.85	Module Name, Dimensions, Area: LONGI LR5-54HPB-405M, 44.6in X 67.8in, 3023.88 sqin
Ground Elevation Factor, K_e : 1	
Solar Array Pressure Equalization Factor, γ_a : 0.61	

CALCULATION

Velocity Pressure Due to Wind:	$q_h = 0.00256(K_z)(K_{zt})(K_d)(I)(V^2)$	(Ch 26. Eq 26.10 – 1)
Actual Uplift Pressure:	$p = 0.6D + 0.6W$	(Ch 2.4.1 LC #7/a)
Wind Uplift Pressure:	$p = q_h (GC_p)(\gamma_E)(\gamma_a)$	(Ch 29. Eq 29.4 – 7)

Landscape / Portrait Panels

Roof Zone	1	2e	2n	2r	3e	3r
Mount Spacing	67.8"	67.8"	67.8"	67.8"	67.8"	67.8"
External Pressure Coefficient (GC_p)	-1.78	-1.78	-1.98	-1.78	-2.47	-1.98
Actual Uplift Pressure (p)	-16 psf	-16 psf	-16 psf	-16 psf	-16 psf	-16 psf
Tributary Area (AT)	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft	10.5 sqft
Uplift Force (P)	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs	-167.99 lbs

Uplift Capacity

Attachment Type = 4 pcs of #14 Wood Screw TopSpeed Mount Assembly	Hardware Pullout Capacity = 258 lbs
Embedment Depth = 0.5 in	Safety Factor = 1.5
	Duration Factor = 1.6

Maximum Uplift Force = 167.993 lbs

Allowable Pullout Capacity = 258 lbs

Allowable Pullout Capacity = 258 lbs > Uplift Force per Bolt = 167.99 lbs, Therefore OK.



Project Roof Mounted Solar PV Installation Property Owner Jeremiah Frueauf

Address 7013 Poplar Ave, Takoma Park, MD 20912, USA

- 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 of (14) 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) 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 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, 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, 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.

Re-installations:

- I certify that the reinstallation of the photovoltaic system (PV) as shown on the approved drawings for permit (show original permit #) does not alter the approval under the permit or make the PV system, attachment to the building, and roof framing unsafe.

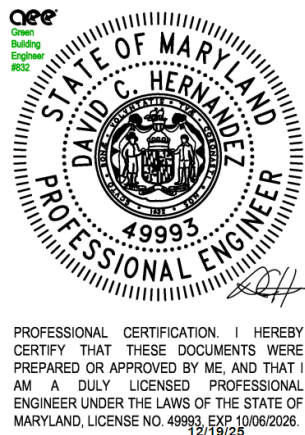
49993

Maryland PE License Number

Date December 19, 2025

Seal

Signature David C. Hernandez, PE Digitally signed by David C. Hernandez, Date: 2025.12.19 17:37:28 -05:00



Updated 11/14/2024





Property Owners Name: Jeremiah Frueauf

Property Owners Address: 7013 Poplar Avenue, Takoma Park, MD 20912

Address of Installation if different than owner's address:

I certify that:

- ☒ I prepared or approved the electrical drawings and related documents for the photovoltaic (PV) system at the above location.
- ☒ The design of the PV System, and all the electrical Installations and equipment, meets the standards and requirements of the National Electrical Code as adopted by Montgomery County in COMCOR 17.02.01
- ☒ I reviewed and completed the Worksheet for PV System, which was attached to the permit application for the PV system at the above location.

40780-State of MD Master Electrician License

Santos M. Andrade

Signature: 

Date: 01//06/2026



City of Takoma Park

Housing and Community Development Department

Main Office 301-891-7119
Fax 301-270-4568
www.takomaparkmd.gov



7500 Maple Avenue
Takoma Park, MD 20912

MUNICIPALITY LETTER

January 07, 2026

To: Jeremiah Frueauf
7013 Poplar Avenue, Takoma Park, MD 20912
fru1shop@gmail.com 703-919-6064

To: Department of Permitting Services
2425 Reedie Drive, 7th floor
Wheaton, Maryland 20902

From: Planning and Development Services Division

THIS IS NOT A PERMIT – For Informational Purposes Only

VALID FOR ONE YEAR FROM DATE OF ISSUE

The property owner is responsible for obtaining all required permits from Montgomery County and the City of Takoma Park. If this property is in the **Takoma Park Historic District**, it is subject to Montgomery County Historic Preservation requirements.

Representative Name: Tina Crouse-SEW tcrouse@solarenergyworld.com 410-570-4157

Location of Project: 7013 Poplar Avenue, Takoma Park, MD 20912

Proposed Scope of Work: Install (14) roof mounted solar panels, 5.67 kW

The purpose of this municipality letter is to inform you that the City of Takoma Park has regulations and city permit requirements that may apply to your project. This municipality letter serves as notification that, in addition to all Montgomery County requirements, you are required to comply with all City permitting requirements, including:

- Tree Impact Assessment/Tree Protection Plan
- Stormwater management
- City Right of Way

Failure to comply with these requirements could result in the issuance of a Stop Work Order and other administrative actions within the provisions of the law. Details of Takoma Park's permit requirements are attached on page 2.

The issuance of this letter does not indicate approval of the project nor does it authorize the property proceed with the project. The City retains the right to review and comment on project plans during the Montgomery County review process.



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

City Of Takoma Park

The City of Takoma Park permits for the following issues:

Tree Impact Assessment/Tree Protection Plan/Tree Removal Application:

Construction activities that occur within 50 feet of any urban forest tree (7 and 5/8" in trunk diameter or greater), located on the project property or on an adjacent property, may require a Tree Impact Assessment and possibly a Tree Protection Plan Permit. Make sure to submit a request for a Tree Impact Assessment and schedule a site visit with the City's Urban Forest Manager if any urban forest tree is in the vicinity of proposed construction activities. See the Tree Permits section of the City website for the specific conditions in which a Tree Impact Assessment is required. Depending on the Urban Forest Manager's conclusion following the Tree Impact Assessment, you may need to prepare a full Tree Protection Plan and apply for a Tree Protection Plan Permit as well. Separately, the removal of any urban forest tree will require a Tree Removal Permit application. The tree ordinance is detailed in the City Code, section 12.12. For permit information check: <https://takomaparkmd.gov/services/permits/tree-permits>. The City's Urban Forest Manager can be reached at 301-891-7612 or urbanforestmanager@takomaparkmd.gov.

Stormwater Management:

If you plan to develop or redevelop property, you may be required to provide appropriate stormwater management measures to control or manage runoff, as detailed in City Code section 16.04. All commercial or institutional development in the city must apply for a Stormwater Management Permit regardless of the size of the land disturbance. Additions or modifications to existing detached single-family residential properties do not require a Stormwater Management permit if the project does not disturb more than 5,000 square feet of land area. For more information visit: <https://takomaparkmd.gov/government/public-works/stormwater-management-program/>. The City Engineer should be contacted to determine if a City permit is required. The City Engineer can be reached at 301-891-7620.

City Right of Way:

- To place a **construction dumpster or storage container** temporarily on a City right of way (usually an adjacent road), you will need to obtain a permit. A permit is not required if the dumpster is placed in a privately-owned driveway or parking lot.
- If you plan to install a new **driveway apron**, or enlarge or replace an existing driveway apron, you need a Driveway Apron Permit.
- If you plan to construct a **fence** in the City right of way, you need to request a Fence Agreement. If approved, the Agreement will be recorded in the Land Records of Montgomery County.

For more information and applications for City permits, see: <https://takomaparkmd.gov/services/permits/> or contact the Department of Public Works at 301-891-7633.

Failure to comply with the City's permitting requirements could result in the issuance of a Stop Work Order and other administrative actions within the provisions of the law.

eSigned via GovOS.com
Tina Crouse
Key: 38b2056622713c0b979ea7ee94776a

Tina Crouse

01-06-2026

eSigned via GovOS.com
Takoma Park Planning Division
Key: 19fe84f123e68a3ff4576219059d5fbc

01-07-2026



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels

COMPANY

SUNRUN SOUTH LLC, DBA SNAPNRACK
775 Fiero Ln
Suite 200
San Luis Obispo, CA 93401 United States

E359313

Cat. No.	Investigated for Bonding	Investigated for Mechanical Loading	System Fire Classification (A, B or C)	Tested in Combination With
Photovoltaic mounting system				



Series 200 - Consisting of the Following Components: Kee Klamp Tee, Speed Rail Tee, Speed Rail Single Swivel, Threaded Pipe Coupler, Pipe Clamp Assembly, Ground Rail, Mid Clamp, X End Clamp, Universal End Clamp, Speed Rail Tee – 2” Posts, Speed Rail Single Swivel – 2” Posts, Speed Rail Cross Assembly for 2” Posts, Ground Rail Splice Clamp	Y*	Y – Minimum mechanical load ratings defined by UL 2703 for all modules listed	N	Listed PV Modules, where XXX is the wattage value. All wattage values are covered: Aptos Solar: DNA-120-MF23-XXX DNA-120-BF23-XXX DNA-144-MF23-XXX DNA-144-BF23-XXX DNA-120-MF26-XXXW, DNA-120-MF26-XXXW, DNA-144-MF26-XXXW DNA-120-BF26-XXXW DNA-144-BF26-XXXW Boviet Solar: BVM6610P-XXX BVM6610M-XXX BVM6612P-XXX BVM6612M-XXX BVM7612M-XXX-H-HC-BF-DG Canadian Solar: CS6K-XXX-M CS6K-XXX-M-SD CS6K-XXX-P CS6K-XXX-P-SD CS6K-XXX-MS CS6P-XXX-M CS6P-XXX-P CS6P-XXX-P-SD CS6V-XXX-M CS3W-XXX-P CS6V-XXX-P CS6X-XXX-P CS3K-XXX-P CS3K-XXX-MS CS3U-XXX-MS CS3U-XXX-P CS1K-XXX-MS CS1H-XXX-MS CS1H-XXX-MS-AB CS3N-XXX-MS CS1Y-XXX-MS CS6.1-54TM-XXXH CS3W-XXXMB-AG CS3Y-XXXMB-AG CS6W-XXXMB-AG CS6R-XXXMS-HL CS3W-xxxMS CS3W-xxxP, where xxx is 385 to 450 CertainTeed - CTXXXHC11-06, CTXXXHC11-06, CTM10XXXHC11-06 Chint Solar: CHSM6612M-XXX CHSM6612M/HV-XXX CHSM6612M(BL)-XXX **CHSM72M-HC-XXX (Astro 4) **CHSM72M-HC-XXX (Astro 5)
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				Crossroads Solar: Crossroads Solar xxx Dehui Solar: DH-M760B-XXXW DH-M760W-XXXW DH-M772W-XXXW DH-M760F-XXXW DH-M772F-XXXW ET Solar: ET-P660XXXBB ET-P660XXXWB ET-P660XXXWW ET-P660XXXWWG P660XXXWB/WW P660XXXWWG M660XXXBB M660XXXWW Freedom Forever Procurement: FF-MP-BBB-xxx, where xxx is 365 to 410. Hansol Technics HAXXXAA-NNEA0 where XXX is 420 to 440 Hanwha/Q Cells: Q.PEAK BLK-G3.1-XXX Q.PEAK G3.1-XXX Q.PLUS BFR-G3.1-XXX B.LINE PLUS BFR-G4.1-XXX B.LINE PRO BFR-G4.1-XXX Q.BASE GY-XXX Q.PEAK BFR-G4-XXX Q.PEAK BFR-G4.1-XXX Q.PEAK BLK-G4.1-XXX Q.PEAK BLK-G4.1/TAA-XXX Q.PEAK G4-XXX Q.PEAK G4.1-XXX Q.PEAK G4.1/MAX-XXX Q.PEAK G4.1/TAA-XXX Q.PLUS BFR-G4-XXX Q.PLUS BFR-G4.1-XXX Q.PLUS BFR-G4.1/TAA-XXX Q.PLUS G4-XXX Q.PLUS GY-XXX Q.PLUS BFR-GY-XXX Q.PRO BFR-G4-XXX Q.PRO BFR-G4.1-XXX Q.PRO BFR-G4.3-XXX Q.PRO BFR-GY-XXX Q.PRO BLK-GY-XXX Q.PRO G4-XXX Q.PRO GY-XXX Q.PRO GY/SC-XXX Q.PEAK DUO-G6+-XXX Q.PEAK DUO-BLK-G6+-XXX Q.PEAK DUO-G6-XXX Q.PEAK DUO-BLK-G6-XXX Q.PEAK DUO-G8+-XXX Q.PEAK DUO-BLK-G8+-XXX
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UR-40 Mounting and Bonding Systems for use with Photovoltaic Modules, consisting of the following components: UR-40 Rail, Mid Clamp, X End Clamp, Universal End Clamp, UR-40 Splice, UR-40 Composition Mount Kits, SpeedSeal Foot Mount Kit, SpeedSeal Deckfoot Mount Kit for UR-40, Standard Standoff for UR-40, Four Hole Standoff for UR-40, Heavy Duty Standoff for UR-40, OmniBase Standoff for UR-40, Metal Roof Base Standoff for UR-40, UR-40 Corrugated Block, Standard Base Seam Clamp for UR-40, Wide Base Seam Clamp for UR-40, UR-40 Universal Tile Hook, UR-40 Flat Tile Hook, UR-40 Tile Hook F, UR-40 Tile Hook WS, Flat Tile Replacement Kit for UR-40, S Tile Replacement Kit for UR-40, W Tile Replacement Kit for UR-40, UR-40 Hanger Bolt Clamp, UR-40 Tilt Kits, SnapNrack Ground Lug Models 242-02101 or 242-92202, IIsco Ground Lug Models GBL-4DBT or SGB-4, UR-40 Skirt Assembly, MLPE Frame Attachment Kit, MLPE Rail Attachment Kit, Smart Clips, Tilt Kits, Seam Clamp Simple Tilt Kits, Adjustable Tile Hook, OmniShield	Y*	Y – Minimum mechanical load ratings defined by UL 2703 for all modules listed	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	Q.PEAK DUO-G8-XXX Q.PEAK DUO-BLK-G8-XXX Q.PLUS L-G4-XXX Q.PLUS L-G4.1-XXX Q.PLUS L-G4.2-XXX Q.PEAK L-G4.1-XXX Q.PEAK L-G4.2-XXX Q.PLUS DUO-L-G5-XXX Q.PLUS DUO-L-G5.1-XXX Q.PLUS DUO-L-G5.2-XXX Q.PLUS DUO-L-G5.3-XXX Q.PEAK DUO-L-G5.2-XXX Q.PEAK DUO-L-G5.3-XXX Q.PEAK DUO-L-G7-XXX Q.PEAK DUO-L-G7.1-XXX Q.PEAK DUO-L-G7.2-XXX Q.PEAK DUO-L-G7.3-XXX Q.PEAK DUO-L-G6-XXX Q.PEAK DUO-L-G6.2-XXX Q.PEAK DUO-L-G6.3-XXX Q.PEAK DUO-L-G8-XXX Q.PEAK DUO-L-G8.1-XXX Q.PEAK DUO-G5-XXX Q.PEAK DUO-BLK-G5-XXX Q.PLUS DUO-G5-XXX Q.PEAK DUO-G7-XXX Q.PEAK DUO-BLK-G7-XXX Q.PEAK DUO-G7.2-XXX Q.PEAK DUO BLK-G6+/AC-XXX Q.PEAK DUO-ML-G9-XXX Q.PEAK DUO BLK-G5/TS-XXX Q.PEAK DUO G6+/TS-XXX Q.PEAK DUO BLK-G6+/TS-XXX Q.PEAK DUO XL-G9.3-XXXQ.PEAK DUO-L-G8.2-XXX Q.PEAK DUO-L-G8.3-XXX Q.PEAK DUO-G5/SC-XXX Q.PEAK DUO-BLK-G5/SC-XXX Q.PEAK DUO-G6+/SC-XXX Q.PEAK DUO-BLK-G6+/SC-XXX Q.PEAK DUO-BLK-ML-G9-XXX Q.PEAK DUO-G5/TS-XXX Q.PEAK DUO-G6/TS-XXX Q.PEAK DUO BLK-G6/TS-XXX Q.PEAK DUO XL-G9.2-XXX Q.PEAK DUO BLK-G9-XXX Q.PEAK DUO ML-G9+-XXX Q.PEAK DUO BLK-G9+-XXX Q.PEAK DUO BLK ML-G9+-XXX Q.PEAK DUO XL-G10.2-XXX Q.PEAK DUO XL-G10.3-XXX Q.PEAK DUO XL-G10.d-XXX Q.PEAK DUO L-G8.3/BGT-XXX Q.PEAK DUO BLK ML-G10+-XXX Q.PEAK DUO BLK ML-G10-XXX Q.PEAK DUO BLK ML-G10.a+-XXX Q.PEAK DUO BLK ML-G10.a-XXX Q.PEAK DUO XL-G9.3/BFG-XXX Q.PEAK DUO XL-G10.3/BFG-XXX Q.PEAK DUO XL-G10.c-XXX Q.PEAK DUO L-G8.3/BFG-XXX Q.TRON_XL-G2.3/BFG-XXX
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Q.PEAK DUO ML-G10-XXX
Q.PEAK DUO ML-G10+-XXX
Q.PEAK DUO ML-G10.a+-XXX
Q.PEAK DUO ML-G10.a-XXX
Q.PEAK DUO BLK ML-G10.a+/TS-XXX,
Q.PEAK DUO G10-XXX, Q.PEAK DUO BLK-G10-XXX, Q.PEAK DUO G10+-XXX, Q.PEAK DUO BLK-G10+-XXX
Q.TRON-G1+ XXX
Q.TRON BLK-G1+ XXX
Q.PEAK DUO BLK G10+/AC XXX
Q.PEAK DUO BLK G10+/HL XXX
Q.PEAK DUO XL-G11.3 XXX
Q.PEAK DUO XL-G11.3 BFG XXX
Q.Tron BLK M-G2+ XXX,
Q.Tron M-G2+ XXX,
Q.PEAK DUO BLK ML-G10+/t XXX
Q.PEAK DUO XL-G10.d/BFG
Q.TRON BLK M-G2+/AC XXX

HT-SAAE:
HT60-166M-XXX where XXX is 340-390;
HT60-182M-XXX

Hanwha Solar One:
HSL60P6-PB-2-XXXQ
HSL60P6-PB-4-XXXQ

Heliene:
60M-XXX
60P-XXX
72M-XXX
72P-XXX

Runergy:
HY-DH108N8
HY-DH108P8-XXX(Y)
HY-DH144N8
HY-DH144P8

Hyundai:
HiS-MXXXRG
HiS-SXXXRG
HiS-SXXXRW
HiA-SXXXMS
HiS-MXXXMG
HiS-SXXXMG
HiD-SXXXRG
HiS-SXXXXY
HiS-SXXXYI
HiS-SxxxYH
HiN-SxxxXG(BK)
All may be followed by (BK)

JA Solar:
JAM6-60-XXX/SI
JAP6-60-XXX/3BB
JAM60S09-XXX/PR
JAM60S10-XXX/MR
JAM60S10-XXX/PR
JAM60S12-XXX/PR
JAM60S17-XXX/MR



JAP72S01-XXX/SC
JAM72S09-XXX/PR
JAM72S10-XXX/MR
JAM72S10-XXX/PR
JAM72S12-XXX/PR
JAP6(k)-72-XXX/4BB
JAM54S30-XXX/MR where XXX is 400-410,
JAM54S31-XXX/MR
JAM72D30-XXX/MB
JAM72D10-XXX/MB

Jinko Solar:
JKMXXXM-60
JKMXXXP-60
JKMXXXP-60-J4
JKMXXXP-60-V
JKMXXXP-60B-J4
JKMXXXPP-60
JKMXXXPP-60-V
JKMXXXM-60HL
JKMXXXM-60L
JKMXXXM-60HBL
JKMXXXM-72
JKMXXXP-72
JKMXXXP-72-V
JKMXXXPP-72
JKMXXXPP-72-V
JKMSXXXP-72
JKMXXXM-72HL-V
JKMXXXM-72HL-TV
JKMXXXM-72L-V
JKMXXXM-72HBL
JKMXXXM-6TL3-B
JKMXXXM-6RL3-B
JKMXXXM-7RL3-V
JKMXXXM-7RL3-TV
JKMXXXM-72HL4-V
JKMXXXM-72HL4-TV
JKMXXN-54HL4-B

KB Solar LLC:
MODULE-KBS-375-MONO
MODULE-KBS-375-MONO-BF
MODULE-KBS-450-MONO
MODULE-KBS-450-MONO-BF

Kyocera:
KUXXX-6YYY
KUXXX-8YYY

LG:
LGXXN1C-A5
LGXXN1K-A5
LGXXQ1C-A5
LGXXQ1K-A5
LGXXS1C-A5
LGXXN2C-B3
LGXXN2W-B3
LGXXN1C-G4
LGXXN1K-G4
LGXXS1C-G4
LGXXN2C-G4



LGXXN2K-G4
LGXXN2W-G4
LGXXS2C-G4
LGXXS2W-G4
LGXXN1C-V5
LGXXN1W-V5
LGXXN2T-V5
LGXXN2T-J5
LGXXN1T-V5
LGXXA1C-V5
LGXXM1C-L5
LGXXN1C-N5
LGXXM1K-L5
LGXXN1K-L5
LGXXN1C-A6
LGXXQ1C-A6
LGXXM1K-A6
LGXXA1C-A6
LGXXN1K-A6
LGXXN1W-A6
LGXXQ1K-A6
LGXXM1C-A6
LGXXQAK-A6
LGXXN2W-E6
LGXXN1K-E6
LGXXQAC-A6
LGXXN1K-B6
LGXXN2T-E6
LGXXN3K-V6

Longi:
LR6-60-XXXM
LR6-60BK-XXXM
LR6-60HV-XXXM
LR6-60PB-XXXM
LR6-60PE-XXXM
LR6-60PH-XXXM
LR6-60HPB-XXXM
LR6-60HPH-XXXM
LR4-72HPH-XXXM
LR4-60HIB-XXXM
LR4-60HIH-XXXM
LR4-60HPB-XXXM
LR4-60HPH-XXXM
LR6-60HIB-XXXM
LR6-60HIH-XXXM
LR5-54HPB-XXXM
LR5-54HABB-XXXM

Maxon Solar Technologies, LTD.
SPR-MAX3-XXX-BLK-R where xxx is 395-420

Meyer Burger:
Meyer Burger Black **
Meyer Burger White **

Mission Solar:
MSEXXXSO5T
MSEXXXSO5K
MSEXXXSQ5T
MSEXXXSQ5K



				MSEXXXMM4J MSEXXXMM6J MSEXXXSO6W MSEXXXSO4J MSEXXXSO6J MSEXXXSQ6S MSEXXXSQ4S MSEXXXSR8K MSEXXXSR8T MSEXXXSR9S MSE60AXXX MSEXXXTS60 MSEXXXSX5K MSEXXXSX5T MSEXXXSX6S MSEXXXSX6W TXI6-XXX120BB MSExxxSX5R, where xxx is 375 to 390 TXI10-XXX108BB MSEXXXHT0B where XXX is 390 to 410 MSEXXXSX9R where XXX is 380 to 400
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Mitrex Inc:
Mxxx-I3H
M390-A1F

Next Energy Alliance:
USNEA-XXXM3-60
USNEA-XXXM3B-60
USNEA-XXXM3-72
USNEA-XXXM3B-72

Panasonic:
VBHNXXXKA01
VBHNXXXKA02
VBHNXXXSA16
VBHNXXXKA03
VBHNXXXKA04
VBHNXXXSA17
VBHNXXXSA18
VBHNXXXSA17E
VBHXXXRA18N
VBHXXXRA03K
EVPVXXXPK
EVPVXXXHK
EVPVXXXHK2 where XXX is 420 to 430

Phono Solar:
PSXXXM-20/U
PSXXXMH-20/U
PSxxxM8GF-24/TH where xxx is 520 to 550,
PSxxxM8GFH-24/TH, where xxx is 520 to 550,
PSxxxM8GF-18/VH, where xxx is 390 to 410,
PSxxxM8GFH-18/VH, where xxx is 390 to 410,
PSxxxM6-24/TH, where xxx is 510 to 550.

REC:
RECXXXPE



UR-60 Mounting and Bonding Systems for use with Photovoltaic Modules, consisting of the following components: UR-60 Rail, Mid Clamp, X End Clamp, Universal End Clamp, UR-60 Splice, UR-60 Composition Mount Kits, SpeedSeal Foot Mount Kit, Standard Standoff for UR-60, Four Hole Standoff for UR-60, Heavy Duty Standoff for UR-60, OmniBase Standoff for UR-60, Metal Roof Base Standoff for UR-60, UR-60 Corrugated Block, Standard Base Seam Clamp for UR-60, Wide Base Seam Clamp for UR-60, UR-60 Universal Tile Hook, UR-60 Flat Tile Hook, UR-60 Tile Hook F, UR-60 Tile Hook WS, Flat Tile Replacement Kit for UR-60, S Tile Replacement Kit for UR-60, W Tile Replacement Kit for UR-60, UR-60 Hanger Bolt Clamp, UR-60 Tilt Kits, SnapNrack Ground Lug Models 242-02101 or 242-92202, Ilsco Ground Lug Models GBL-4DBT or SGB-4, UR-40 Skirt Assembly, MLPE Frame Attachment Kit, MLPE Rail Attachment Kit, Smart Clips, Tilt Kits, Adjustable Tile Hook.	Y*	Y – Minimum mechanical load ratings defined by UL 2703 for all modules listed	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	RECXXXPE-BLK RECXXXTTP RECXXXTTP-BLK RECXXXTTP IQ RECXXXTTP2 RECXXXTTP2-BLK RECXXXNP RECXXXTTP2M RECXXXTTP72 RECXXXPE72 RECXXXPE72XV RECXXXTTP2M 72 RECXXXTTP2M 72 BLK RECXXXTTP2M 72 BLK2 RECXXXTTP2SM 72 RECXXXTTP2SM 72 BLK RECXXXTTP2SM 72 BLK2 RECXXXAA RECXXXTTP3 RECXXXTTP3M RECXXXTTP4 RECXXXAA Pure RECXXXNP2 RECxxxAA PURE 2 RECxxxAA PURE-RX - All may be followed by BLK or BLACK Renesola: JCXXXM-24/Bb JCXXXM-24/BBh SEG Solar: SEG-XXX-BMB-HV, SEG-xxx-BMB-TB SEG-xxx-BMD-HV & SEG-xxx-BMD-TB, where xxx can be 370-425 SEG-XXX-BTD-BG where xxx is 420-435 Silfab: SLAXXX-M SLAXXX-P SSAXXX-M SSAXXX-P SLGXXX-M SLGXXX-P SSGXXX-M SSGXXX-P SILXXXBL SILXXXML SILXXXNT SILXXXHL SILXXXNL SILXXXBK SILXXXNX SILXXXNU SILXXXHC SILXXXHN SILXXXBG SILXXXQD SILXXXQM
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SIL-xxxHC+,
SIL-xxxHM.

S-Energy:
SL65-54BGJ-XXXV
SL65-54BHJ-XXXV

Solaria:
Solaria PowerXT-XXXR-PX
Solaria PowerXT-XXXR-BX
Solaria PowerXT-XXXR-AC
Solaria PowerXT-XXXR-PM
Solaria PowerXT-XXXR-PM-AC

SolarJuice (Solar4America)
S4AXXX72H5BB,
S4AXXX72H5BW,
S4AXXX72M5BB,
S4AXXX72M5BW,
where XXX is 375-420.
S4AXXX60M5BB,
S4AXXX60M5BW,
S4AXXX60H5BB,
S4AXXX60H5BW,
where XXX is 320-345.
S4AXXX-108MH10SB,
S4AXXX-108MH10SW,
S4AXXX-108MH10BB,
S4AXXX-108MH10BW,
Where XXX is 385-410.
S4AXXX-108TH10BB
where XXX is 425 to 440
S4AXXX-144MH10STT,
S4AXXX-144MH10BTT,
where XXX is 530-565.
S4AXXX-144TH10STT
S4AXXX-144TH16STT
where XXX is 565 to 590

SolarWorld:
SWXXX-Mono
SWXXX-Mono XL

Suniva:
MVX-XXX-60-5-701
MVX-XXX-60-5-7B1
OPT-XXX-60-4-100
OPT-XXX-60-4-1B0
OPT-XXX-60-4-800
OPT-XXX-60-4-8B0

Sunpower:
SPR-EYY-XXX
SPR-EYY-XXX
SPR-XYX-XXX
SPR-XYX-XXX
SPR-AXXX-G-AC
SPR-AXXX
SPR-AXXX-BLK-G-AC
SPR-AXXX-BLK
SPR-MXXX-H-AC
SPR-MXXX



SPR-MXXX-BLK-H-AC
SPR-MXXX-BLK

SunSpark:
SST-XXXM3-60
SST-XXXM3B-60
SST-XXXM3-72
SST-XXXM3B-72

Talesun:
TP660M-XXX
TP660P-XXX
TP672M-XXX
TP672P-XXX

Tesla:
TXXXS
TXXXH

Trina:
TSM-XXXDD05(II)
TSM-XXXDD05A.05(II)
TSM-XXXDD05A.08(II)
TSM-XXXDD05A.082(II)
TSM-XXXPA05
TSM-XXXPA05.05
TSM-XXXPA05.08
TSM-XXXPD05
TSM-XXXPD05.002
TSM-XXXPD05.05
TSM-XXXPD05.05S
TSM-XXXPD05.08
TSM-XXXPD05.082
TSM-XXXPD05.08D
TSM-XXXPD05.08S
TSM-XXXDD05H.05(II)
TSM-XXXDD06M.05(II)
TSM-XXXDE15H(II)
TSM-XXXDE15M(II)
TSM-XXXDE06X.05(II)
TSM-XXXDE09.05
TSM-XXXDE15V(II)
TSM-XXXDE19
TSM-XXXDEG15VC.20(II)
TSM-XXXDEG18MC.20(II)
TSM-XXXDEG19C.20
TSM-XXXDEG21C.20
TSM-XXXDE09C.05
TSM-XXXDE09C.07

URECO
FAMxxxE7G-BB
FBMxxxMFG-BB

Vikram Solar:
Somera VSMHBB.60.XXX.05
SOMERA VSMH.72.XXX.05
PREXOS VSMDHT.60.XXX.05
PREXOS VSMDHT.72.XXX.05

VSUN Solar:
VSUNXXX-144BMH-DG,



VSUNXXX-120BMH,
VSUNXXX-108BMH
VSUNXXX-132BMH where xxx is 475-520

Yingli:
YLXXXA-29b
YLXXXP-29b

ZNShine:
ZXM6-60-XXX/M
ZXM6-NH120-XXXM, ZXM6-NH144-XXXM
ZXM7-SH108-XXX/M
**ZXM7-SHLDD144-XXX/M

REC Solar, model
RECxxxAA Pure-R, where
xxx can be 390-430

REC Solar, model
RECxxxNP3, where xxx
can be 380-410

Trina Solar, model
TSM-xxxNE09RC.05,
where xxx can be 365-430

Aptos Solar, model
DNA-108-MF10-xxxW, where
xxx can be 390-415

NRTL Listed Module Level Power
Electronics:

Rapid Shutdown Devices:

AP Smart:
Model RSD-S-PLC

Celestica International:
DG-006-F001201x
DG-006-F001401x

Delta Electronics:
GPI00010105

Ginlong Technologies:
Solis-RSD-1G
Solis-MLRSD-R1-1G
Solis-MLRSD-R2-1G

SMA:
RSB-2S-US-10

Microinverters:

Enphase:
M250
M215
C250
IQ6-60-2-US
IQ6PLUS-72-2-US
IQ7-60-2-US



UR-45 Mounting and Bonding System for use with Photovoltaic Modules. All components are interchangeable between the UR-40 and UR-45 except for the UR-45 specific UR-45 Rail.	Y*	Y – Minimum mechanical load ratings defined by UL 2703 for all modules listed	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	IQ7-60-B-US IQ7PLUS-72-2-US IQ7PLUS-72-B-US IQ8-60 IQ8PLUS-72 IQ8A-72 IQ8H-208-72 IQ8H-240-72 Optimizers: Generac – Optimizer model S2502 Lunar Energy – Lunar Optimizer SolarEdge: P300-5NC4ARS P320-5NC4ARS P370-5NC4AFS P400-5NC4AFS P320 P340 P370 P400 P401 P405 P485 P505 P730 P800p P850 P860 P950 S440 S500 P1100 P1101 Monitoring Devices: Tigo: TS4-R-F TS4-R-M TS4-R-O TS4-R-S TS4-R-M-DUO TS4-R-O-DUO TS4-R-S-DUO TS4-A-F TS4-A-2F TS4-A-O TS4-A-S Philadelphia Solar: **PS-M144(HCBF)-XXXW PS-M108(HCBF)0XXXW PS-M108(HC)-XXXW PS-M144(HC)-XXXW Thornova:
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11/19/24, 4:30 PM

QIMS.E359313 - Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules a...

TS-BB54(XXX)
TS-BB60(XXX)
**TS- BG54(XXX)
TS-BG60(XXX)
**TS-BG72(XXX)



MightyMount Comp-S consisting of the following: Comp-S Track, Ultra Rail Mid Clamp, Ultra Rail End Clamp, Wire Management Clips, Ground Lugs, MLPE Rail Attachment Kit and MLPE Frame Attachment Kit.	Y	N	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	
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11/19/24, 4:30 PM

QIMS.E359313 - Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules a...

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MightyMount – Metal-T consisting of the following: Track, Short Leg, Tall Leg, Pinned Channel Nut, Ultra Rail Mid Clamp, Ultra Rail End Clamp, Wire Management Clips, Ground Lugs, MLPE Rail Attachment Kit and MLPE Frame Attachment Kit, OmniShield.	Y	N	Y – Class A when mounted with Type 1, 2 or 3 modules per Exception of 11.1 of UL 2703	Listed PV Modules, where XXX is the wattage value. All wattage values are covered: Aptos Solar: DNA-120-MF23-XXX DNA-120-BF23-XXX DNA-144-MF23-XXX DNA-144-BF23-XXX DNA-120-MF26-XXXW, DNA-120-MF26-XXXW, DNA-144-MF26-XXXW DNA-120-BF26-XXXW DNA-144-BF26-XXXW Boviet Solar: BVM6610P-XXX BVM6610M-XXX BVM6612P-XXX BVM6612M-XXX BVM7612M-XXX-H-HC-BF-DG Canadian Solar: CS6K-XXX-M CS6K-XXX-M-SD CS6K-XXX-P CS6K-XXX-P-SD CS6K-XXX-MS CS6P-XXX-M CS6P-XXX-P CS6P-XXX-P-SD CS6V-XXX-M CS3W-XXX-P CS6V-XXX-P CS6X-XXX-P CS3K-XXX-P CS3K-XXX-MS CS3U-XXX-MS CS3U-XXX-P CS1K-XXX-MS CS1H-XXX-MS CS1H-XXX-MS-AB CS3N-XXX-MS CS1Y-XXX-MS CS6.1-54TM-XXXH CS3W-XXXMB-AG CS3Y-XXXMB-AG CS6W-XXXMB-AG CS6R-XXXMS-HL CS3W-xxxMS CS3W-xxxP, where xxx is 385 to 450 CertainTeed - CTXXXHC11-06, CTXXXHC11-06, CTM10XXXHC11-06 Chint Solar: CHSM6612M-XXX CHSM6612M/HV-XXX CHSM6612M(BL)-XXX **CHSM72M-HC-XXX (Astro 4) **CHSM72M-HC-XXX (Astro 5)
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Crossroads Solar:
Crossroads Solar xxx

Dehui Solar:
DH-M760B-XXXW
DH-M760W-XXXW
DH-M772W-XXXW
DH-M760F-XXXW
DH-M772F-XXXW

ET Solar:
ET-P660XXXBB
ET-P660XXXWB
ET-P660XXXWW
ET-P660XXXWWG
P660XXXWB/WW
P660XXXWWG
M660XXXBB
M660XXXWW

Freedom Forever Procurement:
FF-MP-BBB-xxx, where xxx is 365 to 410.

Hansol Technics
HAXXXAA-NNEA0
where XXX is 420 to 440

Hanwha/Q Cells:
Q.PEAK BLK-G3.1-XXX
Q.PEAK G3.1-XXX
Q.PLUS BFR-G3.1-XXX
B.LINE PLUS BFR-G4.1-XXX
B.LINE PRO BFR-G4.1-XXX
Q.BASE GY-XXX
Q.PEAK BFR-G4-XXX
Q.PEAK BFR-G4.1-XXX
Q.PEAK BLK-G4.1-XXX
Q.PEAK BLK-G4.1/TAA-XXX
Q.PEAK G4-XXX
Q.PEAK G4.1-XXX
Q.PEAK G4.1/MAX-XXX
Q.PEAK G4.1/TAA-XXX
Q.PLUS BFR-G4-XXX
Q.PLUS BFR-G4.1-XXX
Q.PLUS BFR-G4.1/TAA-XXX
Q.PLUS G4-XXX
Q.PLUS GY-XXX
Q.PLUS BFR-GY-XXX
Q.PRO BFR-G4-XXX
Q.PRO BFR-G4.1-XXX
Q.PRO BFR-G4.3-XXX
Q.PRO BFR-GY-XXX
Q.PRO BLK-GY-XXX
Q.PRO G4-XXX
Q.PRO GY-XXX
Q.PRO GY/SC-XXX
Q.PEAK DUO-G6+-XXX
Q.PEAK DUO-BLK-G6+-XXX
Q.PEAK DUO-G6-XXX
Q.PEAK DUO-BLK-G6-XXX
Q.PEAK DUO-G8+-XXX
Q.PEAK DUO-BLK-G8+-XXX



Q.PEAK DUO-G8-XXX
Q.PEAK DUO-BLK-G8-XXX
Q.PLUS L-G4-XXX
Q.PLUS L-G4.1-XXX
Q.PLUS L-G4.2-XXX
Q.PEAK L-G4.1-XXX
Q.PEAK L-G4.2-XXX
Q.PLUS DUO-L-G5-XXX
Q.PLUS DUO-L-G5.1-XXX
Q.PLUS DUO-L-G5.2-XXX
Q.PLUS DUO-L-G5.3-XXX
Q.PEAK DUO-L-G5.2-XXX
Q.PEAK DUO-L-G5.3-XXX
Q.PEAK DUO-L-G7-XXX
Q.PEAK DUO-L-G7.1-XXX
Q.PEAK DUO-L-G7.2-XXX
Q.PEAK DUO-L-G7.3-XXX
Q.PEAK DUO-L-G6-XXX
Q.PEAK DUO-L-G6.2-XXX
Q.PEAK DUO-L-G6.3-XXX
Q.PEAK DUO-L-G8-XXX
Q.PEAK DUO-L-G8.1-XXX
Q.PEAK DUO-G5-XXX
Q.PEAK DUO-BLK-G5-XXX
Q.PLUS DUO-G5-XXX
Q.PEAK DUO-G7-XXX
Q.PEAK DUO-BLK-G7-XXX
Q.PEAK DUO-G7.2-XXX
Q.PEAK DUO BLK-G6+/AC-XXX
Q.PEAK DUO-ML-G9-XXX
Q.PEAK DUO BLK-G5/TS-XXX
Q.PEAK DUO G6+/TS-XXX
Q.PEAK DUO BLK-G6+/TS-XXX
Q.PEAK DUO XL-G9.3-XXX
Q.PEAK DUO-L-G8.2-XXX
Q.PEAK DUO-L-G8.3-XXX
Q.PEAK DUO-G5/SC-XXX
Q.PEAK DUO-BLK-G5/SC-XXX
Q.PEAK DUO-G6+/SC-XXX
Q.PEAK DUO-BLK-G6+/SC-XXX
Q.PEAK DUO-BLK-ML-G9-XXX
Q.PEAK DUO-G5/TS-XXX
Q.PEAK DUO-G6/TS-XXX
Q.PEAK DUO BLK-G6/TS-XXX
Q.PEAK DUO XL-G9.2-XXX
Q.PEAK DUO BLK-G9-XXX
Q.PEAK DUO ML-G9+ -XXX
Q.PEAK DUO BLK-G9+ -XXX
Q.PEAK DUO BLK ML-G9+ -XXX
Q.PEAK DUO XL-G10.2-XXX
Q.PEAK DUO XL-G10.3-XXX
Q.PEAK DUO XL-G10.d-XXX
Q.PEAK DUO L-G8.3/BGT-XXX
Q.PEAK DUO BLK ML-G10+ -XXX
Q.PEAK DUO BLK ML-G10-XXX
Q.PEAK DUO BLK ML-G10.a+ -XXX
Q.PEAK DUO BLK ML-G10.a-XXX
Q.PEAK DUO XL-G9.3/BFG-XXX
Q.PEAK DUO XL-G10.3/BFG-XXX
Q.PEAK DUO XL-G10.c-XXX
Q.PEAK DUO L-G8.3/BFG-XXX
Q.TRON_XL-G2.3/BFG-XXX



Q.PEAK DUO ML-G10-XXX
Q.PEAK DUO ML-G10+-XXX
Q.PEAK DUO ML-G10.a+-XXX
Q.PEAK DUO ML-G10.a-XXX
Q.PEAK DUO BLK ML-G10.a+/TS-XXX,
Q.PEAK DUO G10-XXX,
Q.PEAK DUO BLK-G10-XXX,
Q.PEAK DUO G10+-XXX,
Q.PEAK DUO BLK-G10+-XXX
Q.TRON-G1+ XXX
Q.TRON BLK-G1+ XXX
Q.PEAK DUO BLK G10+/AC XXX
Q.PEAK DUO BLK G10+/HL XXX
Q.PEAK DUO XL-G11.3 XXX
Q.PEAK DUO XL-G11.3 BFG XXX
Q.Tron BLK M-G2+ XXX,
Q.Tron M-G2+ XXX,
Q.PEAK DUO BLK ML-G10+/t XXX
Q.PEAK DUO XL-G10.d/BFG
Q.TRON BLK M-G2+/AC XXX

HT-SAAE:
HT60-166M-XXX where XXX is 340-390;
HT60-182M-XXX

Hanwha Solar One:
HSL60P6-PB-2-XXXQ
HSL60P6-PB-4-XXXQ

Heliene:
60M-XXX
60P-XXX
72M-XXX
72P-XXX

Runergy:
**HY-DH108N8
HY-DH108P8-XXX(Y)
**HY-DH144N8
**HY-DH144P8

Hyundai:
HiS-MXXXRG
HiS-SXXXRG
HiS-SXXXRW
HiA-SXXXMS
HiS-MXXXMG
HiS-SXXXMG
HiD-SXXXRG
HiS-SXXXXY
HiS-SXXXXYI
HiS-SxxxYH
HiN-SxxxXG(BK)
All may be followed by (BK)

JA Solar:
JAM6-60-XXX/SI
JAP6-60-XXX/3BB
JAM60S09-XXX/PR
JAM60S10-XXX/MR
JAM60S10-XXX/PR
JAM60S12-XXX/PR



JAM60S17-XXX/MR
JAP72S01-XXX/SC
JAM72S09-XXX/PR
JAM72S10-XXX/MR
JAM72S10-XXX/PR
JAM72S12-XXX/PR
JAP6(k)-72-XXX/4BB
JAM54S30-XXX/MR where XXX is 400-410,
JAM54S31-XXX/MR
JAM72D30-XXX/MB
JAM72D10-XXX/MB

Jinko Solar:
JKMXXXM-60
JKMXXXP-60
JKMXXXP-60-J4
JKMXXXP-60-V
JKMXXXP-60B-J4
JKMXXXPP-60
JKMXXXPP-60-V
JKMXXXM-60HL
JKMXXXM-60L
JKMXXXM-60HBL
JKMXXXM-72
JKMXXXP-72
JKMXXXP-72-V
JKMXXXPP-72
JKMXXXPP-72-V
JKMSXXXP-72
JKMXXXM-72HL-V
JKMXXXM-72HL-TV
JKMXXXM-72L-V
JKMXXXM-72HBL
JKMXXXM-6TL3-B
JKMXXXM-6RL3-B
JKMXXXM-7RL3-V
JKMXXXM-7RL3-TV
JKMXXXM-72HL4-V
JKMXXXM-72HL4-TV
JKMXXN-54HL4-B

KB Solar LLC:
MODULE-KBS-375-MONO
MODULE-KBS-375-MONO-BF
MODULE-KBS-450-MONO
MODULE-KBS-450-MONO-BF

Kyocera:
KUXXX-6YYY
KUXXX-8YYY

LG:
LGXXN1C-A5
LGXXN1K-A5
LGXXQ1C-A5
LGXXQ1K-A5
LGXXS1C-A5
LGXXN2C-B3
LGXXN2W-B3
LGXXN1C-G4
LGXXN1K-G4



- LGXXXS1C-G4
- LGXXN2C-G4
- LGXXN2K-G4
- LGXXN2W-G4
- LGXXS2C-G4
- LGXXS2W-G4
- LGXXN1C-V5
- LGXXN1W-V5
- LGXXN2T-V5
- LGXXN2T-J5
- LGXXN1T-V5
- LGXXA1C-V5
- LGXXM1C-L5
- LGXXN1C-N5
- LGXXM1K-L5
- LGXXN1K-L5
- LGXXN1C-A6
- LGXXQ1C-A6
- LGXXM1K-A6
- LGXXA1C-A6
- LGXXN1K-A6
- LGXXN1W-A6
- LGXXQ1K-A6
- LGXXM1C-A6
- LGXXQAK-A6
- LGXXN2W-E6
- LGXXN1K-E6
- LGXXQAC-A6
- LGXXN1K-B6
- LGXXN2T-E6
- LGXXN3K-V6

Longi:

- LR6-60-XXXM
- LR6-60BK-XXXM
- LR6-60HV-XXXM
- LR6-60PB-XXXM
- LR6-60PE-XXXM
- LR6-60PH-XXXM
- LR6-60HPB-XXXM
- LR6-60HPH-XXXM
- LR4-72HPH-XXXM
- LR4-60HIB-XXXM
- LR4-60HIH-XXXM
- LR4-60HPB-XXXM
- LR4-60HPH-XXXM
- LR6-60HIB-XXXM
- LR6-60HIH-XXXM
- LR5-54HPB-XXXM
- LR5-54HABB-XXXM

Maxeon Solar Technologies, LTD.
SPR-MAX3-XXX-BLK-R where xxx is 395-420

Meyer Burger:
Meyer Burger Black **
Meyer Burger White **

Mission Solar:
MSEXXSO5T
MSEXXSO5K
MSEXXSQ5T



TopRail Mounting System	Y	N	Y – Class A for Type 1, Type 2, and Type 29 modules.	MSEXXXSQ5K MSEXXXMM4J MSEXXXMM6J MSEXXXSO6W MSEXXXSO4J MSEXXXSO6J MSEXXXSQ6S MSEXXXSQ4S MSEXXXSR8K MSEXXXSR8T MSEXXXSR9S MSE60AXXX MSEXXXTS60 MSEXXXSX5K MSEXXXSX5T MSEXXXSX6S MSEXXXSX6W TXI6-XXX120BB MSExxxSX5R, where xxx is 375 to 390 TXI10-XXX108BB MSEXXXHT0B where XXX is 390 to 410 MSEXXXSX9R where XXX is 380 to 400 Mitrex Inc: Mxxx-I3H Next Energy Alliance: USNEA-XXXM3-60 USNEA-XXXM3B-60 USNEA-XXXM3-72 USNEA-XXXM3B-72 Panasonic: VBHNXXXKA01 VBHNXXXKA02 VBHNXXXSA16 VBHNXXXKA03 VBHNXXXKA04 VBHNXXXSA17 VBHNXXXSA18 VBHNXXXSA17E VBHXXXRA18N VBHXXXRA03K EVPVXXX(K) EVPKXXXPK EVPVXXXHK EVPVXXXHK2 where XXX is 420 to 430 Phono Solar: PSXXXM-20/U PSXXXMH-20/U PSxxxM8GF-24/TH where xxx is 520 to 550, PSxxxM8GFH-24/TH, where xxx is 520 to 550, PSxxxM8GF-18/VH, where xxx is 390 to 410, PSxxxM8GFH-18/VH, where xxx is 390 to 410, PSxxxM6-24/TH, where xxx is 510 to 550. REC:
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RECXXXPE
RECXXXPE-BLK
RECXXXTTP
RECXXXTTP-BLK
RECXXXTTP IQ
RECXXXTTP2
RECXXXTTP2-BLK
RECXXXNP
RECXXXTTP2M
RECXXXTTP72
RECXXXPE72
RECXXXPE72XV
RECXXXTTP2M 72
RECXXXTTP2M 72 BLK
RECXXXTTP2M 72 BLK2
RECXXXTTP2SM 72
RECXXXTTP2SM 72 BLK
RECXXXTTP2SM 72 BLK2
RECXXXAA
RECXXXTTP3
RECXXXTTP3M
RECXXXTTP4
RECXXXAA Pure
RECXXXNP2
RECxxxAA PURE 2
RECxxxAA PURE-RX

- All may be followed by BLK or BLACK

Renesola:
JCXXXM-24/Bb
JCXXXM-24/BBh

SEG Solar:
SEG-XXX-BMB-HV,
SEG-xxx-BMB-TB
SEG-xxx-BMD-HV &
SEG-xxx-BMD-TB,
where xxx can be 370-425
SEG-XXX-BTD-BG where xxx is 420-435

Silfab:
SLAXXX-M
SLAXXX-P
SSAXXX-M
SSAXXX-P
SLGXXX-M
SLGXXX-P
SSGXXX-M
SSGXXX-P
SILXXXBL
SILXXXML
SILXXXNT
SILXXXHL
SILXXXNL
SILXXXBK
SILXXXNX
SILXXXNU
SILXXXHC
SILXXXHN
SILXXXBG
SILXXXQD



SILXXXQM
SIL-xxxHC+,
SIL-xxxHM.

S-Energy:
SL65-54BGJ-XXXV
SL65-54BHJ-XXXV
SL65-54TEP-XXXV

Solaria:
Solaria PowerXT-XXXR-PX
Solaria PowerXT-XXXR-BX
Solaria PowerXT-XXXR-AC
Solaria PowerXT-XXXR-PM
Solaria PowerXT-XXXR-PM-AC

SolarWorld:
SWXXX-Mono
SWXXX-Mono XL

SolarJuice (Solar4America)
S4AXXX72H5BB,
S4AXXX72H5BW,
S4AXXX72M5BB,
S4AXXX72M5BW,
where XXX is 375-420.
S4AXXX60M5BB,
S4AXXX60M5BW,
S4AXXX60H5BB,
S4AXXX60H5BW,
where XXX is 320-345
S4AXXX-108MH10SB,
S4AXXX-108MH10SW,
S4AXXX-108MH10BB,
S4AXXX-108MH10BW,
Where XXX is 385-410.
S4AXXX-108TH10BB,
where XXX is 425 to 440.
S4AXXX-144MH10STT,
S4AXXX-144MH10BTT,
where XXX is 530-565.
S4AXXX-144TH10STT,
S4AXXX-144TH16STT,
where XXX is 565 to 590.

Suniva:
MVX-XXX-60-5-701
MVX-XXX-60-5-7B1
OPT-XXX-60-4-100
OPT-XXX-60-4-1B0
OPT-XXX-60-4-800
OPT-XXX-60-4-8B0

Sunpower:
SPR-EYY-XXX
SPR-EYY-XXX
SPR-XYX-XXX
SPR-XYX-XXX
SPR-AXXX-G-AC
SPR-AXXX
SPR-AXXX-BLK-G-AC
SPR-AXXX-BLK



SPR-MXXX-H-AC
SPR-MXXX
SPR-MXXX-BLK-H-AC
SPR-MXXX-BLK

SunSpark:
SST-XXXM3-60
SST-XXXM3B-60
SST-XXXM3-72
SST-XXXM3B-72

Talesun:
TP660M-XXX
TP660P-XXX
TP672M-XXX
TP672P-XXX

Tesla:
TXXXS
TXXXH

Trina:
TSM-XXXDD05(II)
TSM-XXXDD05A.05(II)
TSM-XXXDD05A.08(II)
TSM-XXXDD05A.082(II)
TSM-XXXPA05
TSM-XXXPA05.05
TSM-XXXPA05.08
TSM-XXXPD05
TSM-XXXPD05.002
TSM-XXXPD05.05
TSM-XXXPD05.05S
TSM-XXXPD05.08
TSM-XXXPD05.082
TSM-XXXPD05.08D
TSM-XXXPD05.08S
TSM-XXXDD05H.05(II)
TSM-XXXDD06M.05(II)
TSM-XXXDE15H(II)
TSM-XXXDE15M(II)
TSM-XXXDE06X.05(II)
TSM-XXXDE09.05
TSM-XXXDE15V(II)
TSM-XXXDE19
TSM-XXXDEG15VC.20(II)
TSM-XXXDEG18MC.20(II)
TSM-XXXDEG19C.20
TSM-XXXDEG21C.20
TSM-XXXDE09C.05
TSM-XXXDE09C.07

URECO
FAMxxxE7G-BB
FBMxxxMFG-BB

Vikram Solar:
Somera VSMHBB.60.XXX.05
SOMERA VSMH.72.XXX.05
PREXOS VSMDHT.60.XXX.05
PREXOS VSMDHT.72.XXX.05



						VSUN Solar: VSUNXXX-144BMH-DG, VSUNXXX-120BMH, VSUNXXX-108BMH
						Yingli: YLXXXA-29b YLXXXP-29b
						ZNShine: ZXM6-60-XXX/M ZXM6-NH120-XXXM, ZXM6-NH144-XXXM ZXM7-SH108-XXX/M **ZXM7-SHLDD144-XXX/M
						REC Solar, model RECxxxAA Pure-R, where xxx can be 390-430
						REC Solar, model RECxxxNP3, where xxx can be 380-410
						Trina Solar, model TSM-xxxNE09RC.05, where xxx can be 365-430
						Aptos Solar, model DNA-108-MF10-xxxW, where xxx can be 390-415
						NRTL Listed Module Level Power Electronics:
						Rapid Shutdown Devices:
						AP Smart: Model RSD-S-PLC
						Celestica International: DG-006-F001201x DG-006-F001401x
						Delta Electronics: GPI00010105
						Ginlong Technologies: Solis-RSD-1G Solis-MLRSD-R1-1G Solis-MLRSD-R2-1G
						SMA: RSB-2S-US-10
						Microinverters:
						Enphase: M250 M215 C250 IQ6-60-2-US IQ6PLUS-72-2-US



IQ7-60-2-US
IQ7-60-B-US
IQ7PLUS-72-2-US
IQ7PLUS-72-B-US
IQ8-60
IQ8PLUS-72
IQ8A-72
IQ8H-208-72
IQ8H-240-72

Optimizers:

Generac – Optimizer model S2502

Lunar Energy – Lunar Optimizer

SolarEdge:

P300-5NC4ARS
P320-5NC4ARS
P370-5NC4AFS
P400-5NC4AFS
P320
P340
P370
P400
P401
P405
P485
P505
P730
P800p
P850
P860
P950
S440
S500
P1100
P1101

Monitoring Devices:

Tigo:

TS4-R-F
TS4-R-M
TS4-R-O
TS4-R-S
TS4-R-M-DUO
TS4-R-O-DUO
TS4-R-S-DUO
TS4-A-F
TS4-A-2F
TS4-A-O
TS4-A-S

Philadelphia Solar:

**PS-M144(HCBF)-XXXW
PS-M108(HCBF)0XXXW

PS-M108(HC)-XXXW
PS-M144(HC)-XXXW



Thornova:
TS-BB54(XXX)
TS-BB60(XXX)
**TS- BG54(XXX)
TS-BG60(XXX)
**TS-BG72(XXX)



11/19/24, 4:30 PM

QIMS.E359313 - Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules a...

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RL Universal Mounting System USL - Mounting and Bonding Systems for use with Photovoltaic Modules, consisting of the following components: Mount Assembly, Ridge Mount Assembly, Umbrella Flashing Assembly, SpeedSeal Track Assembly, SpeedSeal Decktrack Assembly, Link Assembly, Wire Management Clips, Ground Lugs, MLPE Rail Attachment Kit and MLPE Frame Attachment Kit.	Y*	N	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	Aptos Solar: DNA-120-MF23-XXX DNA-120-BF23-XXX DNA-144-MF23-XXX DNA-144-BF23-XXX DNA-120-MF26-XXXW, DNA-120-MF26-XXXW, DNA-144-MF26-XXXW DNA-120-BF26-XXXW DNA-144-BF26-XXXW DNA-120-BF10-xxx, where xxx is 435 to 455, DNA-108-BF10-xxx, where xxx is 385 to 410 Boviet Solar: BVM7612M-XXX-H-HC-BF-DG Canadian Solar: CS6K-XXX-M CS6K-XXX-M-SD CS6K-XXX-P CS6K-XXX-P-SD CS6K-XXX-MS CS3K-XXX-P CS3W-XXX-P CS3N-XXX-MS CS3K-XXX-MS CS3U-XXX-MS CS3U-XXX-P CS1K-XXX-MS CS1H-XXX-MS CS1H-XXX-MS-AB CS1Y-XXX-MS CS6.1-54TM-XXXH CS3W-XXXMB-AG CS3Y-XXXMB-AG CS6W-XXXMB-AG CS6R-XXXMS-HL CS3W-xxxMS CS3W-xxxP, where xxx is 385 to 450 CertainTeed CTXXXHC11-06, CTXXXHC11-06, CTXXXHC11-06 Chint Solar: CHSM6612M-XXX CHSM6612M/HV-XXX CHSM6612M(BL)-XXX **CHSM72M-HC-XXX (Astro 4) **CHSM72M-HC-XXX (Astro 5) Crossroads Solar: Crossroads Solar xxx Dehui Solar: DH-M760B-XXXW DH-M760W-XXXW DH-M772W-XXXW DH-M760F-XXXW DH-M772F-XXXW
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Freedom Forever Procurement:
FF-MP-BBB-xxx, where xxx is 365 to 410.

Hansol Technics
HAXXXAA-NNEA0
where XXX is 420 to 440

Hanwha/Q Cells:
Q.PEAK DUO-G5-XXX
Q.PEAK DUO-BLK-G5-XXX
Q.PLUS DUO-G5-XXX
Q.PEAK DUO-G7-XXX
Q.PEAK DUO-BLK-G7-XXX
Q.PEAK DUO-G7.2-XXX
Q.PEAK DUO-G6+-XXX
Q.PEAK DUO-BLK-G6+-XXX
Q.PEAK DUO-G6-XXX
Q.PEAK DUO-XL-G9.3-XXX
Q.PEAK DUO-BLK-G6-XXX
Q.PEAK DUO-G8+-XXX
Q.PEAK DUO-BLK-G8+-XXX
Q.PEAK DUO-G8-XXX
Q.PEAK DUO-BLK-G8-XXX
Q.PEAK DUO BLK-G6+/AC-XXX
Q.PEAK DUO-ML-G9-XXX
Q.PEAK DUO-BLK-ML-G9-XXX 365-385
Q.PEAK DUO XL-G9.2-XXX
Q.PEAK DUO BLK-G9-XXX
Q.PEAK DUO ML-G9+-XXX
Q.PEAK DUO BLK-G9+-XXX
Q.PEAK DUO BLK ML-G9+-XXX
Q.PEAK DUO XL-G10.2-XXX
Q.PEAK DUO XL-G10.3-XXX
Q.PEAK DUO XL-G10.d-XXX
Q.PEAK DUO L-G8.3/BGT-XXX
Q.PEAK DUO BLK ML-G10+-XXX
Q.PEAK DUO BLK ML-G10-XXX
Q.PEAK DUO BLK ML-G10.a+-XXX
Q.PEAK DUO BLK ML-G10.a-XXX
Q.PEAK DUO XL-G9.3/BFG-XXX
Q.PEAK DUO XL-G10.3/BFG-XXX
Q.PEAK DUO XL-G10.c-XXX
Q.PEAK DUO L-G8.3/BFG-XXX
Q.TRON_XL-G2.3/BFG-XXX
Q.PEAK DUO ML-G10-XXX
Q.PEAK DUO ML-G10+-XXX
Q.PEAK DUO ML-G10.a+-XXX
Q.PEAK DUO ML-G10.a-XXX,
Q.PEAK DUO G10-XXX,
Q.PEAK DUO BLK-G10-XXX,
Q.PEAK DUO G10+-XXX,
Q.PEAK DUO BLK-G10+-XXX
Q.TRON-G1+ XXX
Q.TRON BLK-G1+ XXX
Q.PEAK DUO BLK G10+/AC XXX
Q.PEAK DUO BLK G10+/HL XXX
Q.PEAK DUO XL-G11.3 XXX
Q.PEAK DUO XL-G11.3 BFG XXX
Q.Tron BLK M-G2+ XXX,
Q.Tron M-G2+ XXX,
Q.PEAK DUO BLK ML-G10+/t XXX
Q.PEAK DUO XL-G10.d/BFG



Q .TRON BLK M-G2+/AC XXX

HT-SAAE:
HT60-166M-XXX where XXX is 340-390;
HT60-182M-XXX

Heliene:
60M-XXX
60P-XXX
72M-XXX
72P-XXX

Runergy:
HY-DH108N8-XXX
HY-DH108P8-XXX(Y)
HY-DH144N8-XXX
HY-DH144P8-XXX

Hyundai:
HiA-SXXXMS
HiS-SXXXXY
HiS-SXXXXI
HiS-SxxxYH
HiN-SxxxXG(BK)
All may be followed by (BK)

JA Solar:
JAM60S09-XXX/PR
JAM72S09-XXX/PR
JAM60S10-XXX/MR
JAM72S10-XXX/MR
JAM60S10-XXX/PR
JAM72S10-XXX/PR
JAM60S12-XXX/PR
JAM72S12-XXX/PR
JAM60S17-XXX/MR
JAM54S30-XXX/MR where XXX is 400-410,
JAM54S31-XXX/MR
JAM72D30-XXX/MB
JAM72D10-XXX/MB

Jinko Solar:
JKMXXXM-60
JKMXXXP-60
JKMXXXP-60-J4
JKMXXXP-60-V
JKMXXXP-60B-J4
JKMXXXPP-60
JKMXXXPP-60-V
JKMXXXM-60HL
JKMXXXM-60L
JKMXXXM-60HBL
JKMXXXM-72
JKMXXXP-72
JKMXXXP-72-V
JKMXXXPP-72
JKMXXXPP-72-V
JKMSXXXP-72
JKMXXXM-72HL-V
JKMXXXM-72HL-TV
JKMXXXM-72L-V



JKMXXXM-72HBL
JKMXXXM-6TL3-B
JKMXXXM-6RL3-B
JKMXXXM-7RL3-V
JKMXXXM-7RL3-TV
JKMXXXM-72HL4-V
JKMXXXM-72HL4-TV
JKMXXXN-54HL4-B

KB Solar LLC:
MODULE-KBS-375-MONO
MODULE-KBS-375-MONO-BF
MODULE-KBS-450-MONO
MODULE-KBS-450-MONO-BF

LG:
LGXXXN1C-A5
LGXXXN1K-A5
LGXXXQ1C-A5
LGXXXQ1K-A5
LGXXXS1C-A5
LGXXXN2C-B3
LGXXXN2W-B3
LGXXXN1C-G4
LGXXXN1K-G4
LGXXXS1C-G4
LGXXXN2C-G4
LGXXXN2K-G4
LGXXXN2W-G4
LGXXXS2C-G4
LGXXXS2W-G4
LGXXXN1C-V5
LGXXXN1W-V5
LGXXXN2T-V5
LGXXXN2T-J5
LGXXXN1T-V5
LGXXXA1C-V5
LGXXXM1C-L5
LGXXXN1C-N5
LGXXXN1C-A6
LGXXXQ1C-A6
LGXXXM1K-A6
LGXXXA1C-A6
LGXXXN1K-A6
LGXXXN1W-A6
LGXXXQ1K-A6
LGXXXM1C-A6
LGXXXQAK-A6
LGXXXN2W-E6
LGXXXN1K-E6
LGXXXQAC-A6
LGXXXN1K-B6
LGXXXN2T-E6
LGXXXN3K-V6

Longi:
LR6-60-XXXM
LR6-60BK-XXXM
LR6-60HV-XXXM
LR6-60PB-XXXM
LR6-60PE-XXXM
LR6-60PH-XXXM



LR6-60HPB-XXXM
LR6-60HPH-XXXM
LR4-72HPH-XXXM
LR4-60HIB-XXXM
LR4-60HIH-XXXM
LR6-60HIB-XXXM
LR4-60HPB-XXXM
LR4-60HPH-XXXM
LR6-60HIH-XXXM
LR5-54HPB-XXXM
LR5-54HABB-XXXM

Maxeon Solar Technologies, LTD.
SPR-MAX3-XXX-BLK-R where xxx is 395-420

Meyer Burger:
**Meyer Burger Black
**Meyer Burger White

Mission Solar:
MSEXXXSO5T
MSEXXXSO5K
MSEXXXSQ5T
MSEXXXSQ5K
MSEXXXMM4J
MSEXXXMM6J
MSEXXXSO6W
MSEXXXSO4J
MSEXXXSO6J
MSEXXXSQ6S
MSEXXXSQ4S
MSEXXXSR8K
MSEXXXSR8T
MSEXXXSR9S
MSE60AXXX
MSEXXXSX5T MSEXXXSX5K
MSEXXXSX6W
MSEXXXSX6S
TXI6-XXX120BB
MSExxxSX5R, where xxx is 375 to 390
TXI10-XXX108BB
MSEXXXHT0B
where XXX is 390 to 410
MSEXXXSX9R
where XXX is 380 to 400

Mitrex Inc:
Mxxx-I3H

Next Energy Alliance:
USNEA-XXXM3-60
USNEA-XXXM3B-60
USNEA-XXXM3-72
USNEA-XXXM3B-72

Panasonic:
VBHNXXXKA03
VBHNXXXKA04
VBHNXXXSA17
VBHNXXXSA18
VBHNXXXSA17E



				VBHXXXRA18N VBHXXXRA03K EVPVXXX(K) EVPVXXXH EVPVXXXPK EVPVXXXHK EVPVXXXHK2 where XXX is 420 to 430 Phono Solar: PSXXXM-20/U PSXXXMH-20/U PSxxxM8GF-24/TH where xxx is 520 to 550, PSxxxM8GFH-24/TH, where xxx is 520 to 550, PSxxxM8GF-18/VH, where xxx is 390 to 410, PSxxxM8GFH-18/VH, where xxx is 390 to 410, PSxxxM6-24/TH, where xxx is 510 to 550. REC: RECXXTP2 RECXXTP2-BLK RECXXTP2M RECXXTP2M 72 RECXXTP2M 72 BLK RECXXTP2M 72 BLK2 RECXXTP2SM 72 RECXXTP2SM 72 BLK RECXXTP2SM 72 BLK2 RECXXXAA RECXXTP3M RECXXNP RECXXTP4 RECXXXAA Pure RECXXNP2 RECxxxAA PURE 2 RECxxxAA PURE-RX - All may be followed by BLK or BLACK SEG Solar: SEG-XXX-BMB-HV, SEG-xxx-BMB-TB
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SEG-xxx-BMD-HV &
SEG-xxx-BMD-TB, where
xxx can be 370-425 SEG-XXX-BTD-BG
where xxx is 420-435

Silfab:
SLAXXX-M
SLAXXX-P
SSAXXX-M
SSAXXX-P
SLGXXX-M
SLGXXX-P
SSGXXX-M
SSGXXX-P
SILXXXBL
SILXXXML
SILXXXNT
SILXXXHL
SILXXXNL



TopSpeed Mounting System USL - Mounting and Bonding Systems for use with Photovoltaic Modules, consisting of the following components: Mount, Row Link, Skirt Assembly, Wire Management Clips, Ground Lugs, MLPE Frame Attachment Kit.	Y*	N	Y – Class A with and without skirt assembly for Type 1, Type 2 and Type 29 modules	SILXXXBK SILXXXNX SILXXXNU SILXXXHC SILXXXHN SILXXXBG SILXXXQD SILXXXQM SIL-xxxHC+ SIL-xxxHM S-Energy: SL65-54BGJ-XXXV SL65-54BHJ-XXXV Solaria: Solaria PowerXT-XXXR-PX Solaria PowerXT-XXXR-BX Solaria PowerXT-XXXR-AC Solaria PowerXT-XXXR-PM Solaria PowerXT-XXXR-PM-AC SolarJuice (Solar4America) S4AXXX72H5BB, S4AXXX72H5BW, S4AXXX72M5BB, S4AXXX72M5BW, where XXX is 375-420. S4AXXX60M5BB, S4AXXX60M5BW, S4AXXX60H5BB, S4AXXX60H5BW, where XXX is 320-345 S4AXXX-108MH10SB, S4AXXX-108MH10SW, S4AXXX-108MH10BB, S4AXXX-108MH10BW, Where XXX is 385-410. S4AXXX-108TH10BB, where XXX is 425 to 440. S4AXXX-144MH10STT, S4AXXX-144MH10BTT, where XXX is 530-565 S4AXXX-144TH10STT, S4AXXX-144TH16STT, where XXX is 565 to 590. SunPower: SPR-AXXX-G-AC SPR-AXXX SPR-AXXX-BLK-G-AC SPR-AXXX-BLK SPR-MXXX-H-AC SPR-MXXX SPR-MXXX-BLK-H-AC SPR-MXXX-BLK SunSpark: SST-XXXM3-60 SST-XXXM3B-60 SST-XXXM3-72 SST-XXXM3B-72
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Talesun:
TP660M-XXX
TP660P-XXX
TP672M-XXX
TP672P-XXX

Trina:
TSM-XXXDD05(II)
TSM-XXXDD05A.05(II)
TSM-XXXDD05A.08(II)
TSM-XXXDD05A.082(II)
TSM-XXXPA05
TSM-XXXPA05.05
TSM-XXXPA05.08
TSM-XXXPD05
TSM-XXXPD05.002
TSM-XXXPD05.05
TSM-XXXPD05.05S
TSM-XXXPD05.08
TSM-XXXPD05.082
TSM-XXXPD05.08D
TSM-XXXPD05.08S
TSM-XXXDD05H.05(II)
TSM-XXXDD06M.05(II)
TSM-XXXDE15H(II)
TSM-XXXDE15M(II)
TSM-XXXDE06X.05(II)
TSM-XXXDE09.05
TSM-XXXDE15V(II)
TSM-XXXDE19
TSM-XXXDEG15VC.20(II)
TSM-XXXDEG18MC.20(II)
TSM-XXXDEG19C.20
TSM-XXXDEG21C.20
TSM-XXXDE09C.05
TSM-XXXDE09C.07

URECO
FAMxxxE7G-BB
FBMxxxMFG-BB

Vikram Solar:
SOMERA VSMHBB.60.XXX.05
SOMERA VSMH.72.XXX.05
PREXOS VSMDHT.60.XXX.05
PREXOS VSMDHT.72.XXX.05

VSUN Solar:
VSUNXXX-144BMH-DG,
VSUNXXX-120BMH,
VSUNXXX-108BMH

ZNShine:
ZXM6-60-XXX/M
ZXM6-NH120-XXXM, ZXM6-NH144-XXXM,
ZXM7-SH108-XXX/M
**ZXM7-SHLDD144-XXXM

REC Solar, model
RECxxxAA Pure-R,



where xxx can be 390-430

REC Solar, model
RECxxxNP3, where
xxx can be 380-410

Trina Solar, model
TSM-xxxNE09RC.05, where
xxx can be 365-430

Aptos Solar, model
DNA-108-MF10-xxxW, where
xxx can be 390-415

NRTL Listed Module Level Power
Electronics:

Rapid Shutdown Devices:

AP Smart:
Model RSD-S-PLC

Celestica International:
DG-006-F001201x
DG-006-F001401x

Delta Electronics:
GPI00010105

Ginlong Technologies:
Solis-RSD-1G
Solis-MLRSD-R1-1G
Solis-MLRSD-R2-1G

SMA:
RSB-2S-US-10

Microinverters:

Enphase:
M250
M215
C250
IQ6-60-2-US
IQ6PLUS-72-2-US
IQ7-60-2-US
IQ7-60-B-US
IQ7PLUS-72-2-US
IQ7PLUS-72-B-US
IQ8-60
IQ8PLUS-72
IQ8A-72
IQ8H-208-72
IQ8H-240-72

Optimizers:

Lunar Energy – Lunar Optimizer

SolarEdge:
P300-5NC4ARS
P320-5NC4ARS



P370-5NC4AFS
P400-5NC4AFS
P320
P340
P370
P400
P401
P405
P485
P505
P730
P800p
P850
P860
P950
S440
S500
P1100
P1101

Monitoring Devices:

Tigo:
TS4-R-F
TS4-R-M
TS4-R-O
TS4-R-S
TS4-R-M-DUO
TS4-R-O-DUO
TS4-R-S-DUO
TS4-A-F
TS4-A-2F
TS4-A-O
TS4-A-S

Generac – Optimizer model S2502

Philadelphia Solar:
**PS-M144(HCBF)-XXXW
PS-M108(HCBF)0XXXW

PS-M108(HC)-XXXW
PS-M144(HC)-XXXW

:

Thornova:
TS-BB54(XXX)
TS-BB60(XXX)
**TS- BG54(XXX)
TS-BG60(XXX)
**TS-BG72(XXX)



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Photovoltaic Ground Lug - Bolt-through Design - Tested in Combina

Cat. No.	Max OCPD (A)	Standard Mounting Hardware Provided	Investigated for			Mounting Surface				Mounting Screw		Mounting-hole Range		Field-w	
			Bonding	Mounting	Min Profile (w x l)	Min Thk	Max Thk	Mtl	Surface Prep	Size	Tightening Torque (lbs-in.)	Min	Max	Wire Type (Mtl)	Wire Type
242-02101	20	Y	Y	N	1.5 in. x 1.5 in.	Mounted on Snaprack Ground or Standard Rails	AL	Anodized	5/16-18	16	N/A	N/A	CU	Solid	
242-92202	20	Y	Y	N	0.5 in. x 0.5 in	Mounted on RL Leverlock Slider Assembly Rails	AL	Anodized	5/16-18	8 ft-lb	N/A	N/A	CU	Solid	

Photovoltaic Bonding Device: MLPE Frame Attachment Kit

Cat. No.	Max OCPD (A)	Frame Thickness	MLPE Thickness	MLPE Thickness	MLPE Slot Width	Torque Value	Tested in Combination With:
		Anodized AL (mm)	AL (mm)	SS 304 (mm)	(mm)		
242-02151	20	0.8 - 2.4	2.0 - 3.2	2.0	8.1 - 8.5	10 ft.lb.	PV Modules Described in Mounting Systems noted above with frame thickness limitations.

The following components have been tested for roof penetration utilizing the Wind-Driven Rain Test from UL Subject 2582:



Cat. No.	Tested with the Following Seal/Sealant & Specific Location		
	Tested with the Following Securement Means	Tested with the Following Roof Deck Construction	
Photovoltaic mounting system component			
RL Universal Mounting System - Umbrella Bolt Flashing consisting of Composition flashing, Flash Track PRC, Flash Track End Caps, Umbrella Bolt; SpeedSeal Track.	Lag Bolt	No sealant	Asphalt shingles
UR-40 Mounting System - Consisting of the following components: Composition flashing, Umbrella L-foot, Umbrella Bolt; SpeedSeal Foot Assembly kit	Lag Bolt	No sealant	Asphalt shingles
UR-60 Mounting System - Consisting of the following components: Composition flashing, Umbrella L-foot, Umbrella Bolt, and SpeedSeal Foot Assembly kit	Lag Bolt	No sealant	Asphalt shingles

* - Not all components have been evaluated for bonding. See UL report and instruction manual for details.

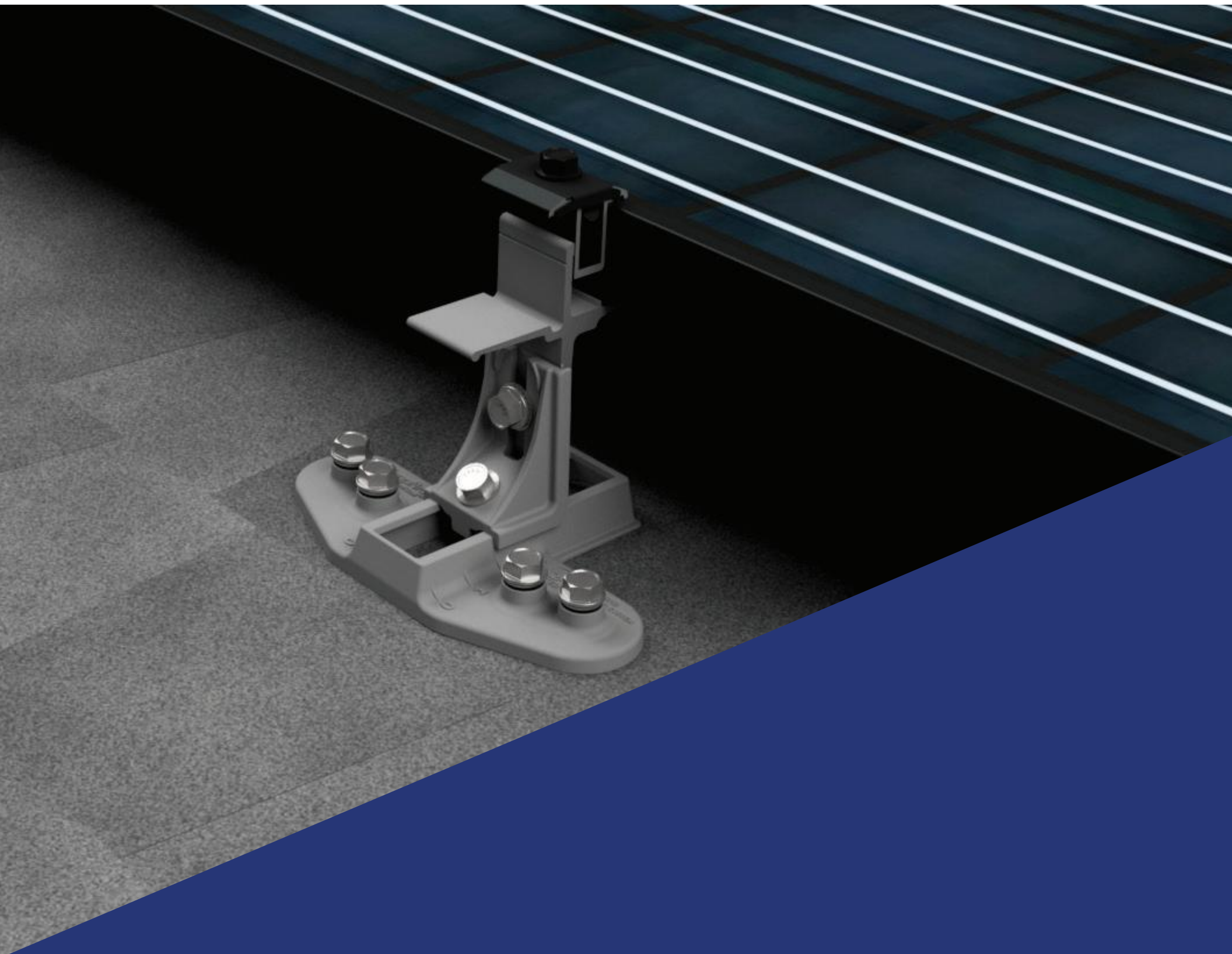
** - Modules with this mark do not have the correct fire typing to meet system fire classification requirements.

Trademark and/or Tradename: "SNAPNRACK"

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SnapNrack™

Solar Mounting Solutions

TopSpeed™ Mounting System

Installation Manual

snapnrack.com



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

SnapNrack’s primary goal is to provide our customers with the lowest possible installed cost for mounting residential solar modules, without compromising the values the industry has come to expect: ease of use, quality, aesthetics, and safety. Designing with this goal in mind, we are proud to present the SnapNrack TopSpeed™ mounting system with SpeedSeal™ Technology.

SnapNrack has created a ground breaking system combining great features and benefits we are known for, with our TopSpeed™ System and the most up to date technical innovation in the industry, thus reducing parts while driving down labor, material, and total installation costs. Designed to work with standard module frames, achieving UL 2703 Listing for Grounding/ Bonding and Fire Classification, providing integrated wire management, aesthetics and our industry leading "Snap-In" features, SnapNrack is providing the simplest and most cost effective solar mounting solution on the market with TopSpeed™ including integrated fasteners and SpeedSeal™ Technology.

Advantages of Installing the SnapNrack TopSpeed™ System

Modules are installed with a minimum number of parts
This elimination of parts leads to a lower estimated system cost for both the installer and home owner.

Built in Wire Management and Aesthetics
Extensive wire management solutions have been designed specifically for the system that adapts to multiple possible mounting positions.

The system is designed to be aesthetically pleasing and sturdy with a skirt that provides considerable strength at the leading edge and an elegant look for those seeking high end looking systems.

SnapNrack TopSpeed™ includes SpeedSeal™ Technology
SpeedSeal™ Technology features integrated flashing. This eliminates loosening layers of composition and removing nails with a pry bar, leading to less damage to the roof, minimized potential roof leaks, and much faster installs.

TopSpeed™ Mounts attach Directly to the Decking
As well as all of the benefits associated with the standard SpeedSeal™ Technology, TopSpeed™ attaches to the roof sheathing and does not require rafter attachment. Simply attaching to the roof sheathing removes the requirement for finding rafters and drilling pilot holes, creating potential rafter misses that can cause leaks.



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Certification Details

SnapNrack TopSpeed™ mounting system has been evaluated by Underwriters Laboratories (UL) and Listed to UL Standard 2703 for Grounding/Bonding, and Fire Classification.

Grounding/Bonding

Only specific components have been evaluated for bonding, and are identified as being in the ground path. The TopSpeed™ components that have been evaluated for bonding are the Mount Assembly (Mount Clamp Top, Module Clamp Tower, Angle Bracket), Clamp Assembly, Universal Skirt, Universal Skirt Clamp, Ground Lugs, and Smart Clips.

Universal Skirt Spacers, Mount Channel Nut, and Mount Base are not required to be bonded to the system based on the exceptions in clause 9.1 of UL 2703 1st Ed. Wire management clips are utilized to route conductors away from these components and must be assembled according to the instructions.

This mounting system may be used to ground and/or mount a PV module complying with UL 1703 or UL 61703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. See Appendix A for the list of modules tested for use with the TopSpeed™ System for integrated grounding.

Ground Lugs have been evaluated to both UL 467 and UL 2703 Listing requirements. The following ground lugs have been approved for use: SnapNrack model 242-92202, and Ilsco models GBL-4DBT and SGB-4.

The following components have been evaluated for bonding as the fault current ground path: TopSpeed™ Mount Assembly, (Mount Clamp Top, Module Clamp Tower, Angle Bracket), Clamp Assembly, Wire Management Clips, and Ground Lugs. In order to maintain the Listing for bonding, wire management clips must be assembled to route conductors away from parts that have not been evaluated for bonding.

A Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-92202, is attached to the module frame flange for the normal attachment of a Grounding Electrode Conductor, which provides bonding within the system and eventual connection to a Grounding Electrode, as required by the U.S. NEC. Details of part no. 242-92202 can be found in Volume 1, Section 4, and Volume 2, Section 2. When this method is used, the grounding symbol is stamped onto the body of the ground lug to identify the grounding terminal.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, Ilsco (E34440 and E354420) model SGB-4 is attached to the module frame flange. When this method is used, the grounding terminal is identified by the green colored screws of the lug.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, Ilsco (E34440 and E354420) model GBL-4BDT is attached to the module frame flange through the specified hardware and torque values. When this method is used, the grounding terminal is identified by the green colored set screw of the lug.

An alternate method of grounding, Enphase R/C (QIKH2)(QIMS2) model M250, M215 & C250 is bonded to the Listed PV module frame by the Enphase R/C (QIMS2) Model EFM-XXMM anodization piercing mounting/clamping kit. The total roof-mounted PV system is bonded (modules and microinverters) together and the assembly is bonded to ground through the Enphase R/C (QIMS2) Engage Cables; Model ETXX-240, ETXX-208 or ETXX-277, when properly grounded at the service entrance. R/C (QIMS2), Dynoraxx (E357716) photovoltaic bonding device cat. no. Dynobond is an optional component that may be used with this system. The Dynobond device has been evaluated to provide module to module bonding. The Dynobond device attaches to the frame flange of adjacent modules Listed (QIMS), SnapNrack MLPE Frame Attachment Kit model 242-02151 has been investigated to bond approved MLPE device back plates to frames of modules.



Fire

SnapNrack TopSpeed™ has been investigated for a Class A System Fire Classification for Steep-Sloped and low sloped roofs with Type 1 and Type 2 modules. Because the system was tested at 5 inches above the test roof fixture, TopSpeed™ can be installed without any height restrictions due to System Fire Classification. See Appendix A for potential module-specific height restrictions due to module temperature. The Skirt is considered an optional component with respect to Fire Classification, as SnapNrack TopSpeed™ maintains the same Fire Classification Rating both with and without the skirt.

NOTE: Modules with an asterisk* have a fire rating that is different from Type 1, Type 2 or Type 29. SNR systems have only been evaluated for use with Type 1, Type 2, or Type 29 modules. Modules with a different fire type rating should be considered to not have been evaluated for use with SNR systems with respect to a system fire rating.

Inspection Practices

SnapNrack recommends a periodic re-inspection of the completed installation for loose components, loose fasteners, and any corrosion, such that if found, the affected components are to be immediately replaced.



Component Details

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TopSpeed™ Structural Components



TopSpeed™ Mount

SnapNrack TopSpeed™ Mount assembly including SpeedSeal™ base, clamp top, and (4) SnapNrack #14 SS Wood Screws with 1/2" Hex Head.



TopSpeed™ Clamp

SnapNrack TopSpeed™ Clamp assembly including including Link bottom, Link top, and springs.



Universal Skirt

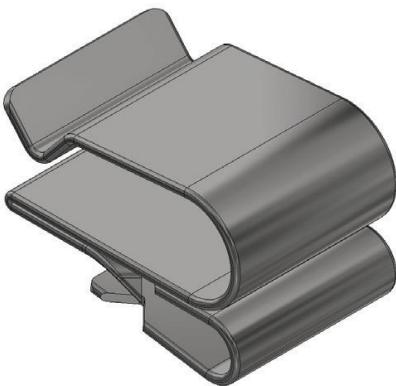
SnapNrack Universal Skirt in double portrait or single landscape lengths.

Wire Managements Components



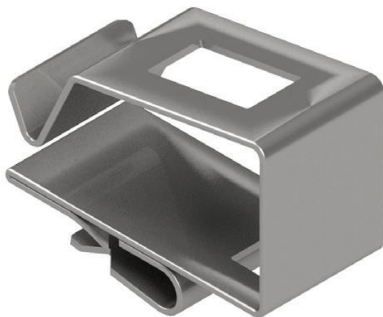
Skirt Spacers

SnapNrack Universal Skirt Spacer for 40mm, 38mm, 35mm, 32mm, and 30mm modules.



Smart Clip

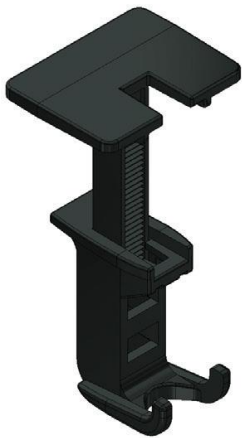
Module frame cable clip, holds two PV wires or Enphase IQ-Cables.



Smart Clip XL

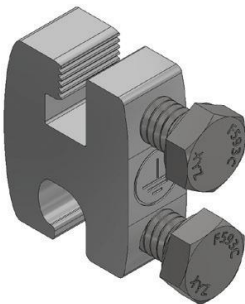
Module frame cable clip, holds six PV wires or four Enphase IQ-Cable.

Grounding/MLPE Components



Wire Saver

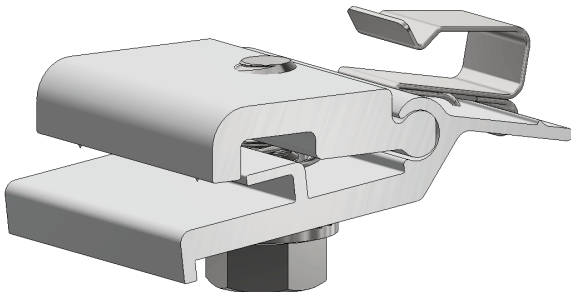
Designed to secure conductors that become loose and hang below the array, holds one conductor.



Ground Lug

SnapNrack Ground Lug assembly used for attaching the Equipment Grounding Conductor on to one module or any TopSpeed™ Mount per array.

5



MLPE Frame Attachment Kit

Attaches MLPEs (Module Level Performance Enhancers) and other related equipment to the module frame.



Hardware Torque Specifications

The recommended torque to be applied to components for proper assembly and bonding are as follows:

Hardware Description	Torque Specification
All TopSpeed™ ½” bolts; System Leveling Bolt, TopSpeed™ Mount Clamping Bolt, Clamp Bolt	16 ft-lb
Ground Lug model 242-92202 to Module Frame or anywhere on the TopSpeed™ Mount, and Ground Lug model 242-92202 to Grounding Electrode Conductor (6-12 SOL)	8 ft-lb
MLPE Frame Attachment Kit, MLPE Rail Attachment Kit	10 ft-lb
SolarEdge Frame Mounted Microinverter Bracket to Module Frame	11 ft-lb
Enphase Frame Mounted Microinverter Bracket to Module Frame	13 ft-lb
Ground Lug model SGB-4 to module	75 in-lb
Ground Lug model SGB-4 to Grounding Electrode Conductor (4-14 SOL or STR)	35 in-lb
Ground Lug model GBL-4DBT to module	35 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (10-14 SOL or STR)	20 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (8 SOL or STR)	25 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (4-6 SOL or STR)	35 in-lb

Pre-Installation Requirements

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Site Survey

- Measure the roof surfaces and develop an accurate drawing, including any obstacles such as chimneys and roof vents.
- If plans for the roof structure are available, verify that the plans match the final structure.
- Identify any roof access or setback areas as required by the local AHJ.
- Identify any construction issues that may complicate the process of locating rafters from the roof surface.
- If you find structural problems such as termite damage or cracked rafters that may compromise the structure’s integrity consult a structural engineer.

Design Guidance

- PV Designers should account for the 0.75 inch spacing between rows and columns of modules when creating the layout.
- Determine site conditions for calculating the engineering values, confirm site conditions and code versions comply with local AHJ requirements.
- Reference site conditions and system specifications in TopSpeed™ Structural Engineering Report to determine the number of attachments per module side.
- Insert SnapNrack installation details into design plan set specific to the project requirements.
- Draw roof attachment locations on plan set layout based on TopSpeed™ Structural Engineering.

Best Practice:

If environmental load conditions require three TopSpeed™ attachments per module side this is only required when modules share attachments.

- Identify homerun and Junction Box locations based on rooftop wiring requirements.
- Mark distance from array edge to identifiable roof feature in x and y axes.

Safety Guidance

- Always wear appropriate OSHA approved safety equipment when at active construction site.
- Appropriate fall protection or prevention gear should be used. Always use extreme caution when near the edge of a roof.
- Use appropriate ladder safety equipment when accessing the roof from ground level.

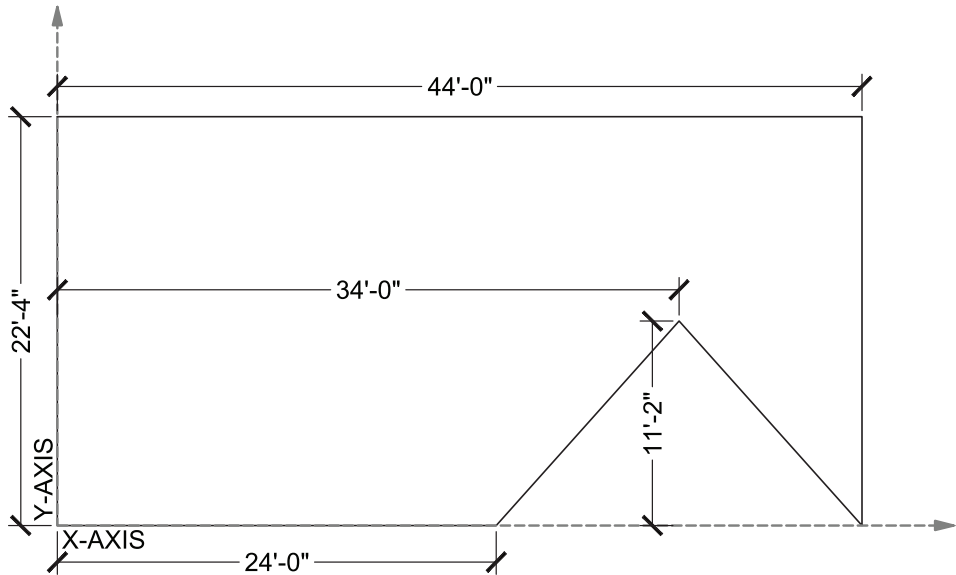


Image note: X-Axis described in this manual is cross-slope on the roof, Y-Axis is in line with the roof slope.

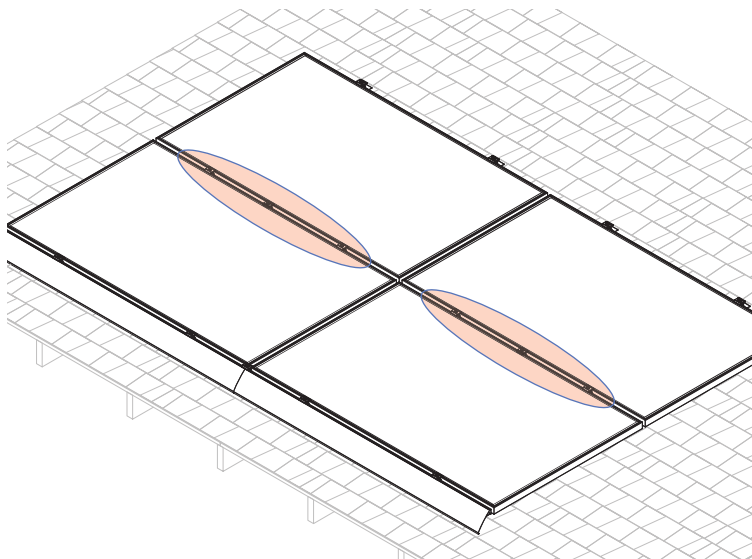
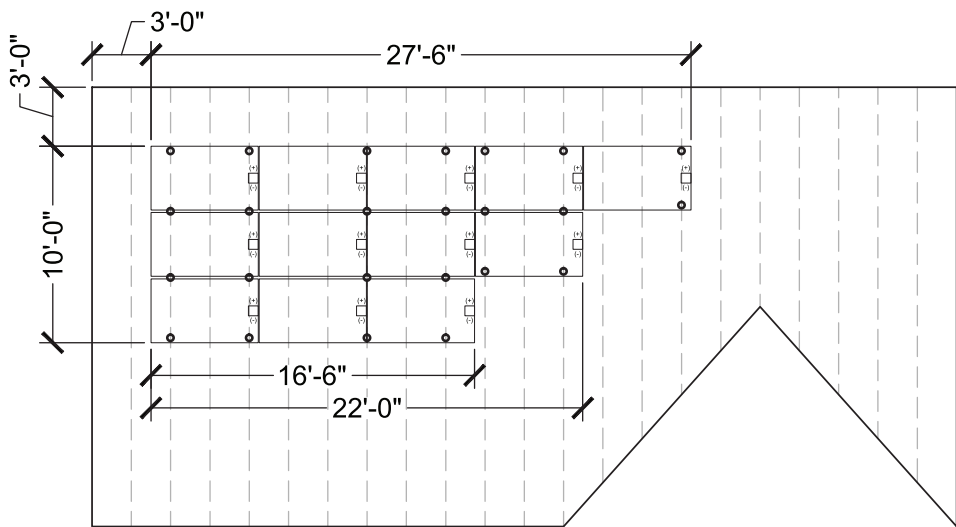


Image note: This four module array is installed in a high load configuration with three attachments per side where two modules share attachments. See highlighted area. As shown, three attachments are never required at the skirt or the top of the array.

Safety Guidance Continued

- Safety equipment should be checked periodically for wear and quality issues.
- Always wear proper eye protection when required.



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

TopSpeed™ Mount to Module Frame Installation

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Required Tools

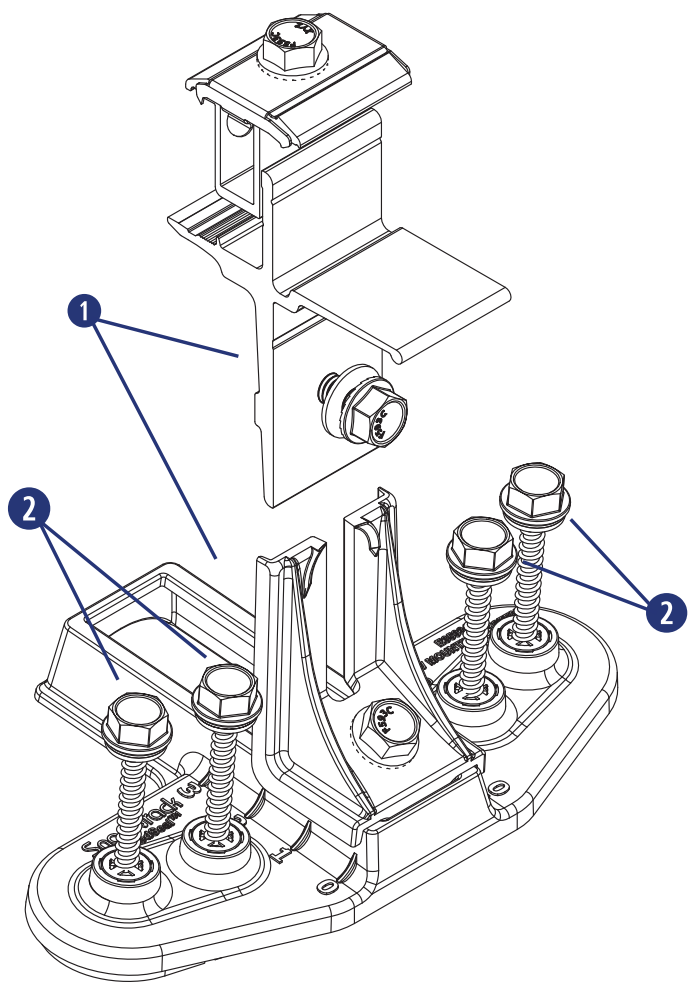
- Socket Wrench/Impact Driver
- Torque Wrench
- 1/2” Socket

Materials Included - TopSpeed™ System with SpeedSeal™ Technology

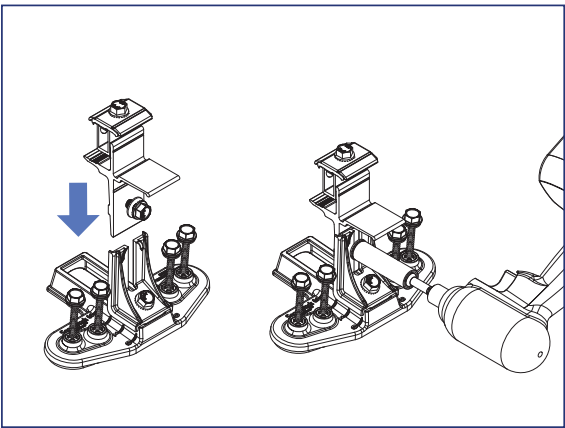
- 1 (1) SnapNrack TopSpeed™ Mount
- 2 (4) SnapNrack #14 Wood Screw with 1/2” Hex Head & sealing washer

Best Practice:

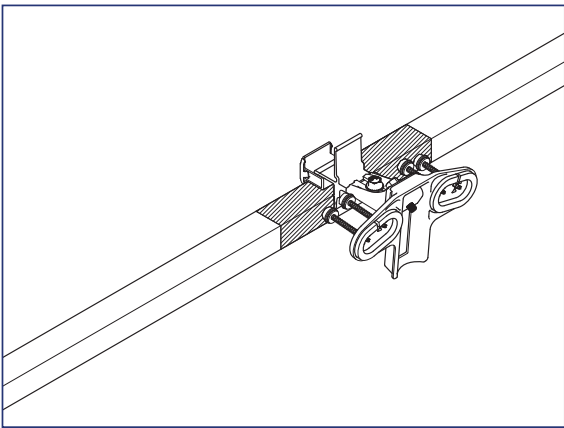
Attach all TopSpeed™ mounts as the modules are being prepped with MLPEs on the ground. Attach Mounts before attaching MLPEs to simplify wire management.



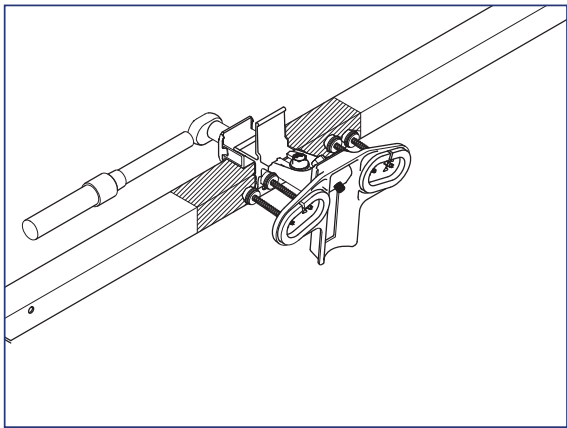
INSTALLATION INSTRUCTIONS



1) Assemble all TopSpeed™ Mounts required for the installation. Slide the clamp tower assembly into the angle bracket riser and tighten the leveling bolt to 16 ft-lbs.



2) Position TopSpeed™ Mount clamp on the module frame within the module manufacturers required clamping zone.



3) Tighten 1/2” clamping bolt to 16 ft-lb. Only two Mounts are required per module on one side.



Install Note:

For high load conditions add a third attachment in the middle of the module frame.

TopSpeed™ Universal Skirt Layout

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Required Tools

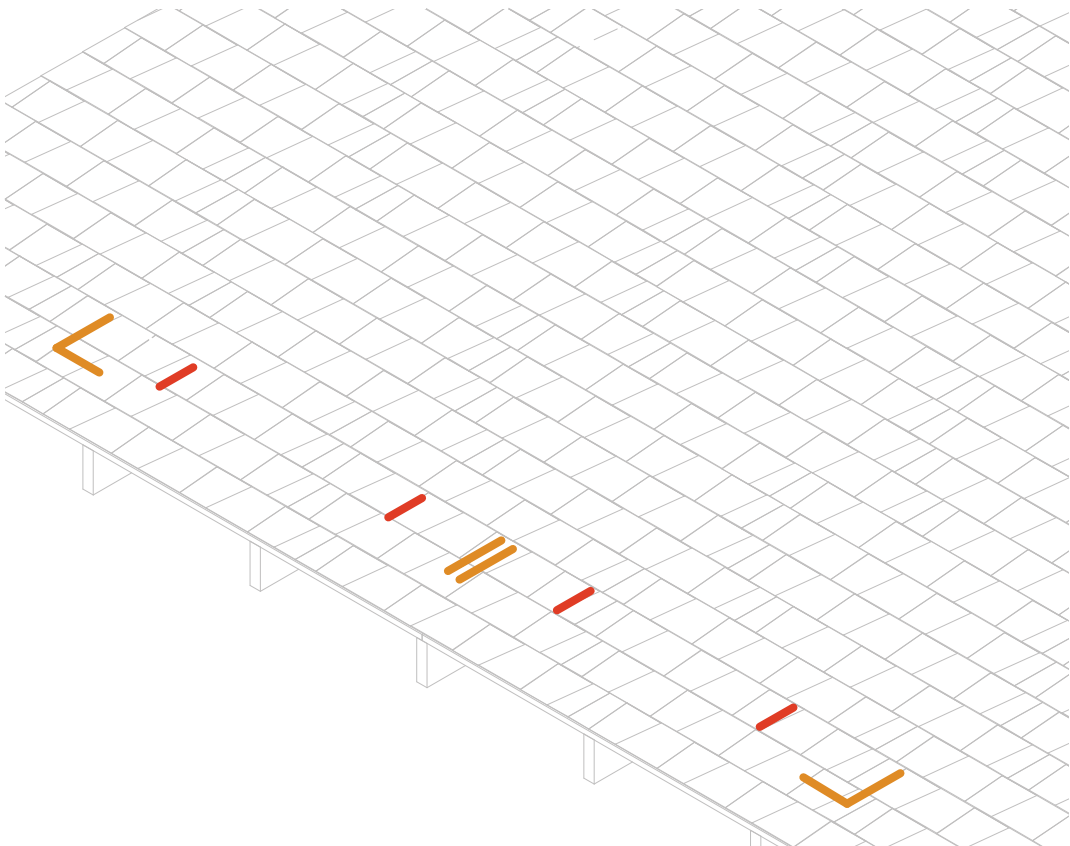
- Roof Marking Crayon or Chalk
- Tape Measure

LAYOUT INSTRUCTIONS

- 1) Use a tape measure to verify that all modules will fit properly on the roof surface.
- 2) On the roof draw the layout for the skirt installation including module gaps (recommended 0.75 inch gap), bottom corners, and locations of the two TopSpeed™ attachments per module that clamp to the skirt. Three attachments per module is never required at the skirt.

⚙️ Install Note:

If environmental load conditions require three TopSpeed™ attachments per module side this is only required when modules share attachments.



TopSpeed™ Mount: Skirt Installation

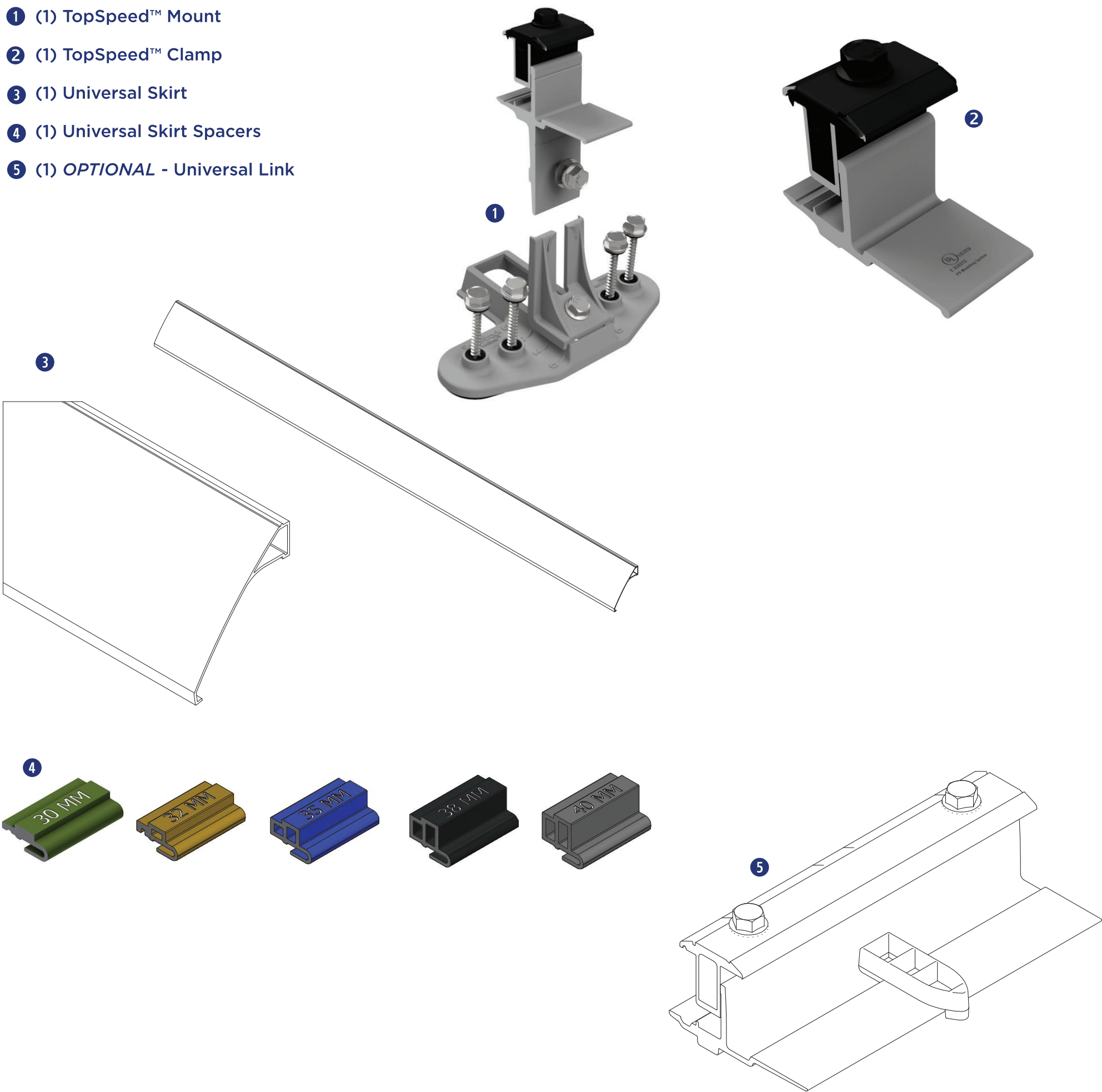
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Required Tools

- Socket Wrench/Impact Driver
- Torque Wrench
- 1/2" Socket
- Roofing sealant

Materials Included - TopSpeed™ Mount with SpeedSeal™ Technology

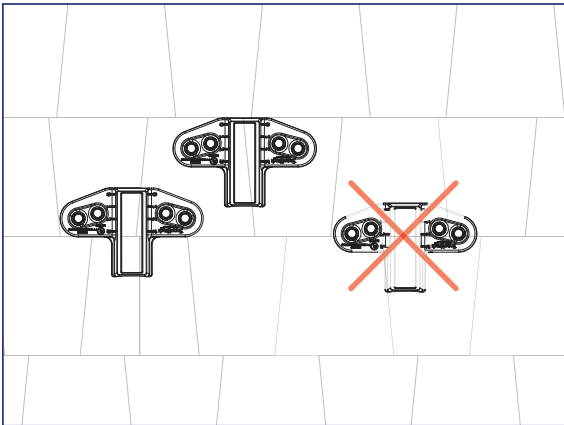
- 1 (1) TopSpeed™ Mount
- 2 (1) TopSpeed™ Clamp
- 3 (1) Universal Skirt
- 4 (1) Universal Skirt Spacers
- 5 (1) *OPTIONAL* - Universal Link



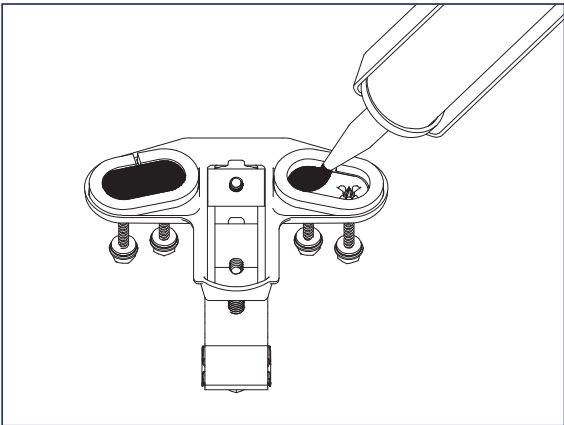
TopSpeed™ Mount Skirt Installation

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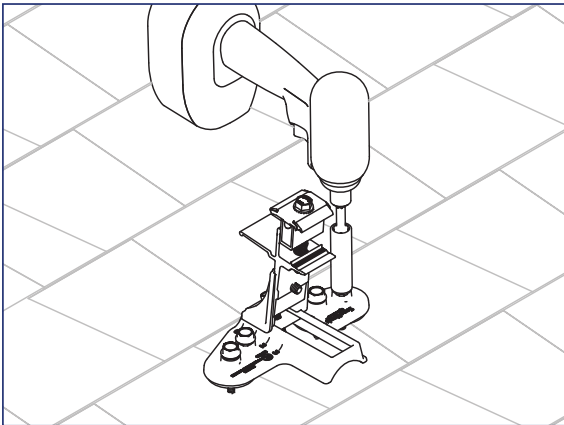
INSTALLATION INSTRUCTIONS



1) Install TopSpeed™ Mounts at locations drawn during the skirt layout. Mounts must be installed entirely on one course of composition.



2) Fill both cavities on bottom of TopSpeed™ Mount created by SpeedSeal™ gasket with roof sealant to ensure a watertight seal.

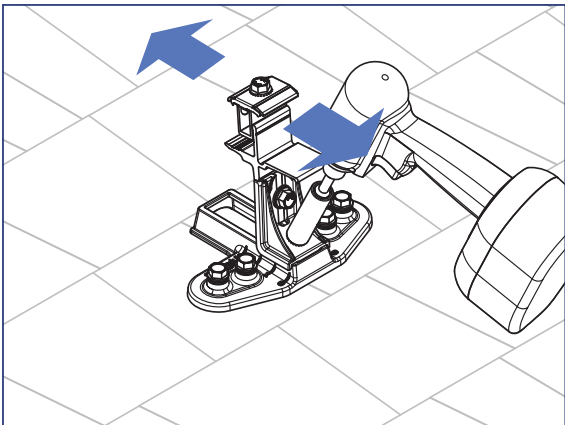


3) Attach TopSpeed™ Mount to roof using the (4) SnapNrack #14 Wood Screws with 1/2" hex head that are captured in the Mount.

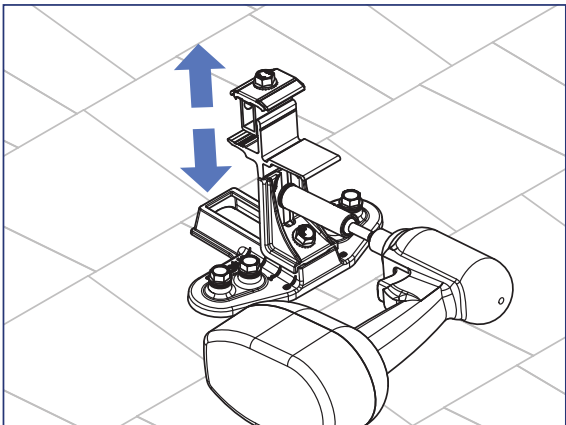


Install Note:

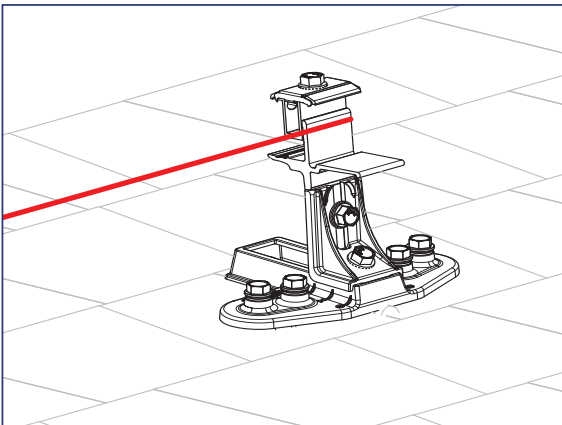
Roof sealant should be expelled from both vents of the TopSpeed™ Mount as it is installed to assure the proper amount of roof sealant has been applied. If sealant is not expelled from all four vents, remove TopSpeed™ Mount, add more sealant to the cavity, then reinstall.



4) Loosen Course Adjustment bolt and adjust end Mounts up or down until aligned with bottom edge of array as marked on the roof, then tighten the Course Adjustment bolt.



5) To set the TopSpeed™ Mount level loosen the Leveling bolt and move the clamp up or down, then tighten the Leveling bolt and torque to 16 ft-lb.



6) Pull string line tight from one corner mount to opposite corner mount to align and level all TopSpeed™ Mounts between the end mounts.



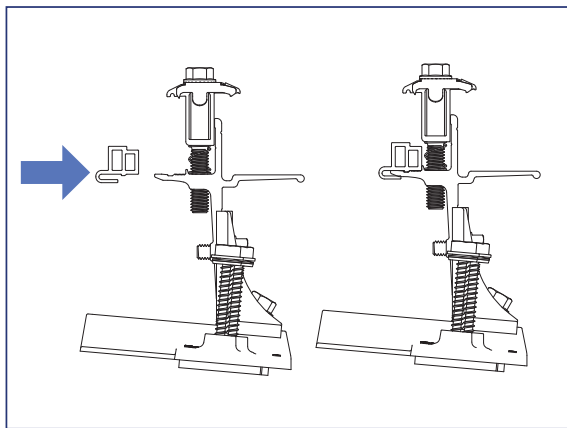
Install Note:

Use the string line alignment feature on Mounts to level and align the Mounts.

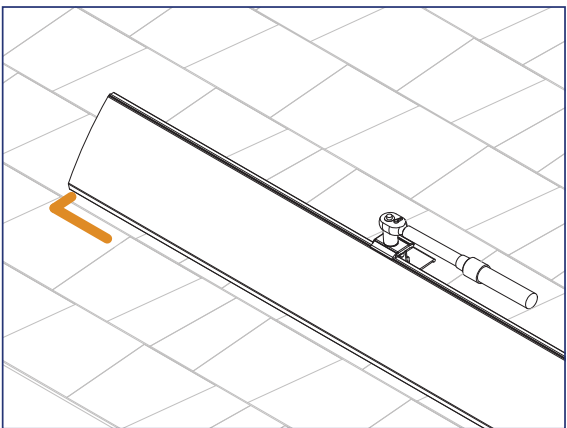
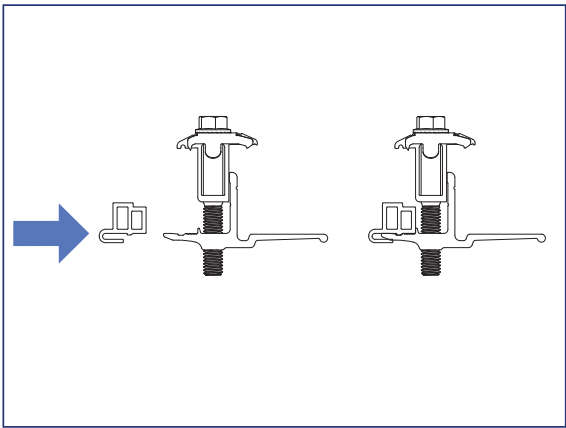
TopSpeed™ Mount Skirt Installation

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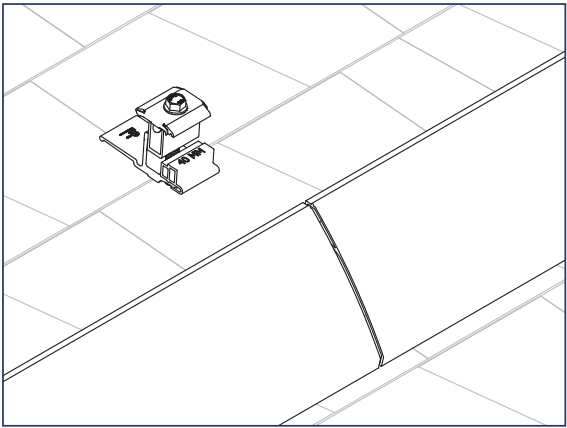
INSTALLATION INSTRUCTIONS



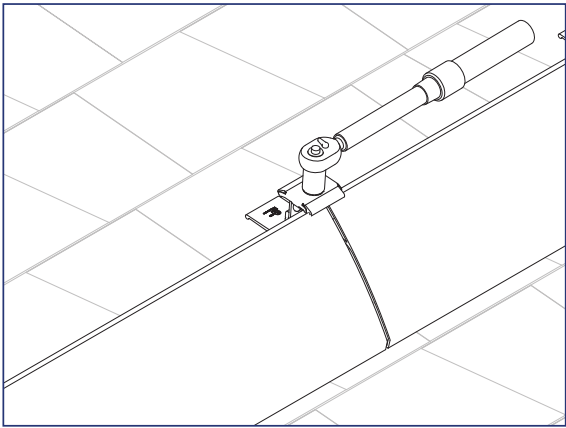
7) Universal Spacers will need to be added to Mounts and Clamps where Skirt will be installed.



8) Install Universal Skirt by holding the skirt in Mount, sliding Skirt to align with array layout marks, and clamping skirt into mount.



9) Use TopSpeed™ Clamps to connect multiple lengths of Array Skirt.



Install Note:

Optionally use Universal Links to connect lengths of Array Skirt.

Wire Management

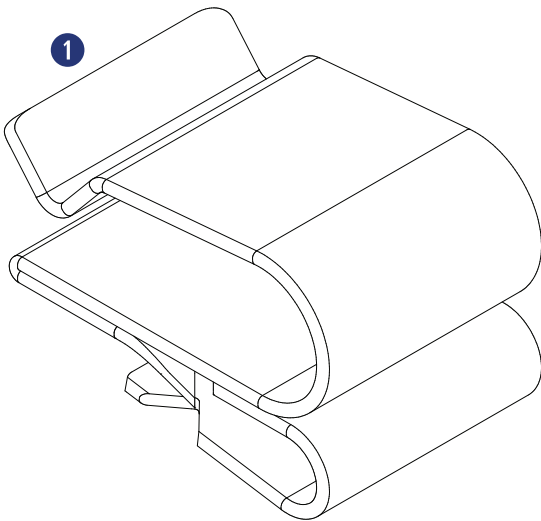
Required Tools

- Socket Wrench
- Torque Wrench
- 1/2” Socket
- Electrician Tools

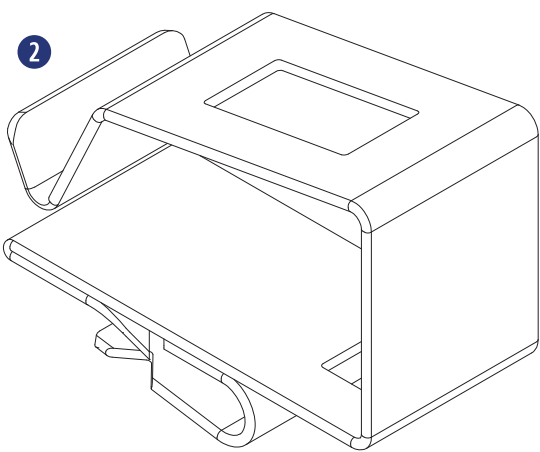
Materials Included

Smart Clips

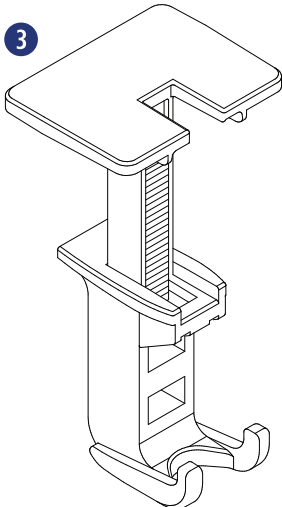
- 1 (1) Smart Clip [(2) PV Wire, (1) Enphase IQ Cable]
- 2 (1) Smart Clip XL [(6) PV Wire, (4) Enphase IQ]
- 3 (1) Wire Saver [(1) PV Wire]



Smart Clip



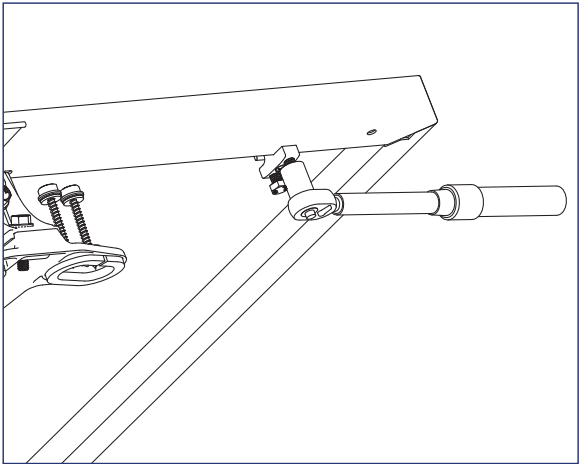
Smart Clip XL



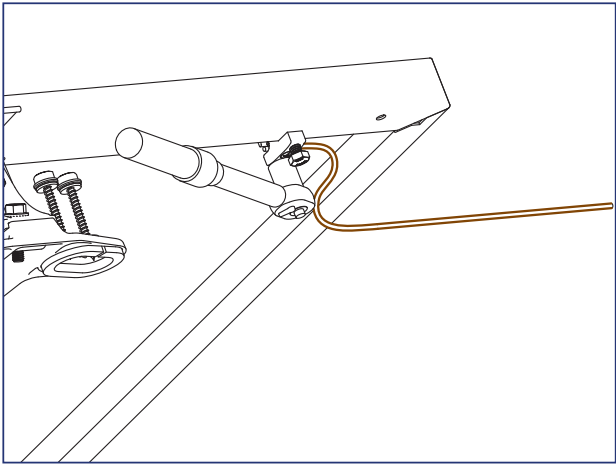
Wire Saver

INSTALLATION INSTRUCTIONS - GROUND LUG

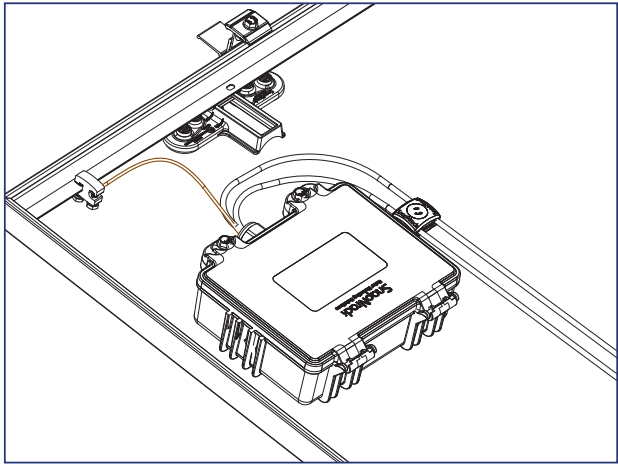
The SnapNrack Ground Lug to be used in accordance with the National Electric Code, ANSI/NFPA 70.



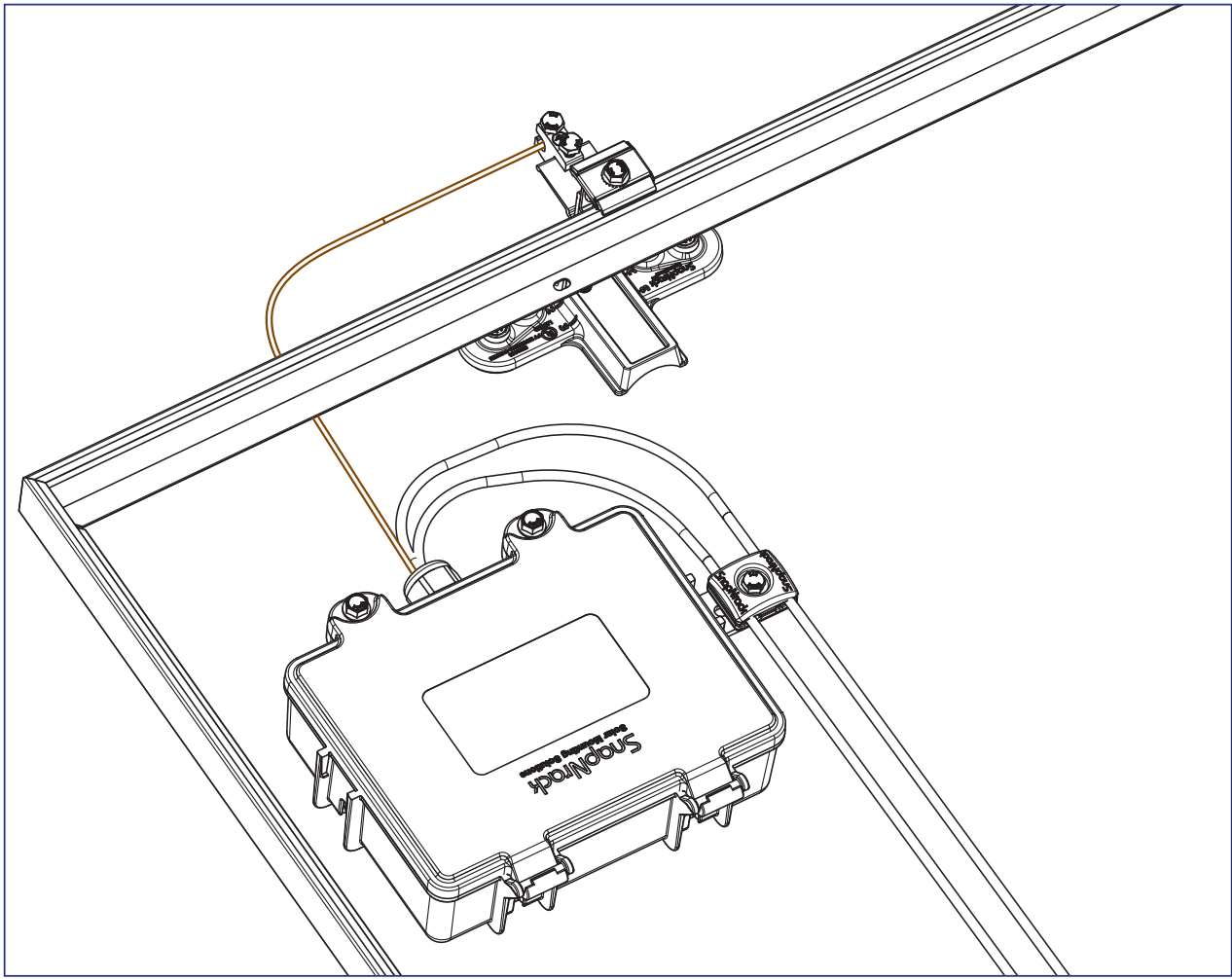
1) Ground Lug (242-92202) can be attached anywhere along the module frame or any TopSpeed™ Mount near the Junction Box. Torque module clamping bolt to 8 ft-lb.



2) Run 10 - 6 AWG, solid, bare copper GEC into Ground Lug channel, torque wire clamping bolt to 8 ft-lb.



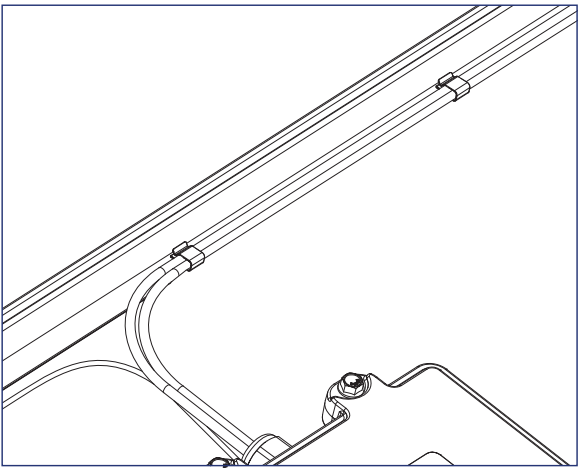
3) Run bare, solid EGC from Ground Lug R to Junction Box, bond bare EGC to stranded EGC in Junction Box. For details on installing the Junction Box reference the **Junction Box Installation Manual**.



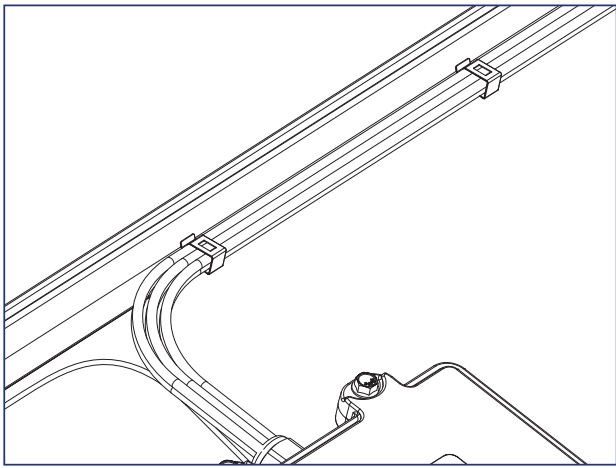
4) Optionally; Install Ground Lug on the Mount Landing Pad at the top of the array. Run bare copper between ground lug and Junction Box.

INSTALLATION INSTRUCTIONS - SMART CLIPS

SmartClip and SmartClip XL should be used to route conductors in a neat and workmanlike manner away from all non-bonded components and support the conductors adequately to eliminate potential damage.



1) Use SnapNrack Smart Clip II to manage up two PV wires inside the module frame while prepping out the modules on the ground or installing modules on the roof.



2) Use SnapNrack Smart Clip XL to manage larger bundles of PV wire; up to 6 PV wires per clip

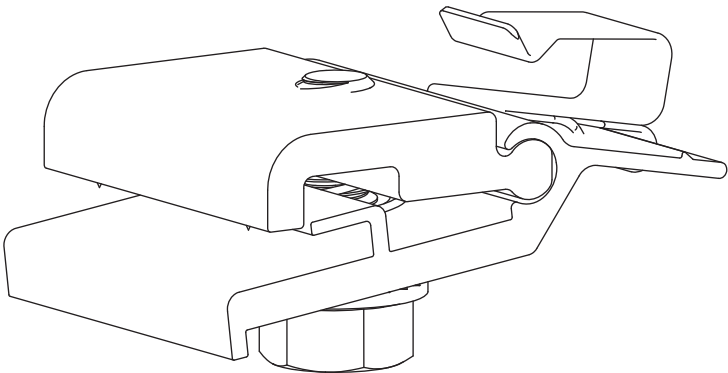
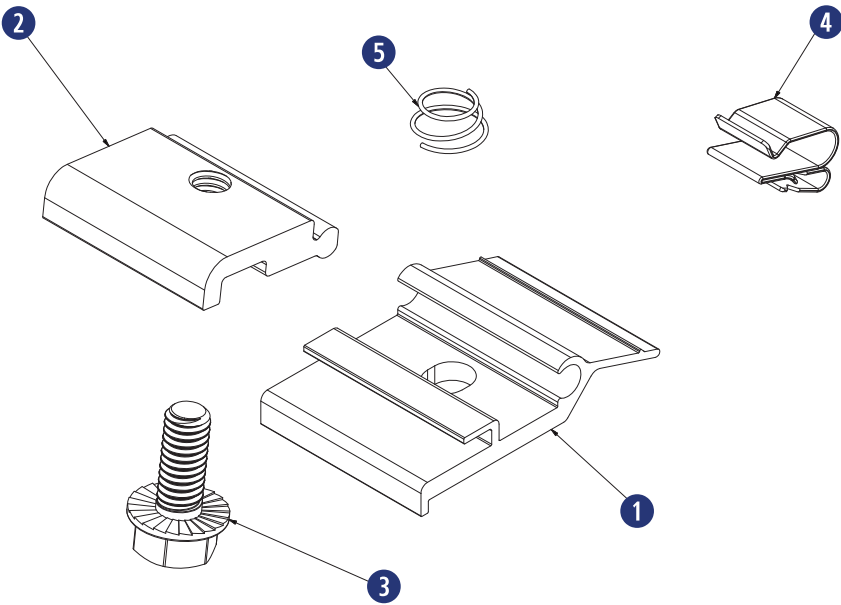
MLPE & RSD Installation

Required Tools

- Socket Wrench
- Torque Wrench
- 1/2” Socket

Materials Included - MLPE Rail Attachment Kit

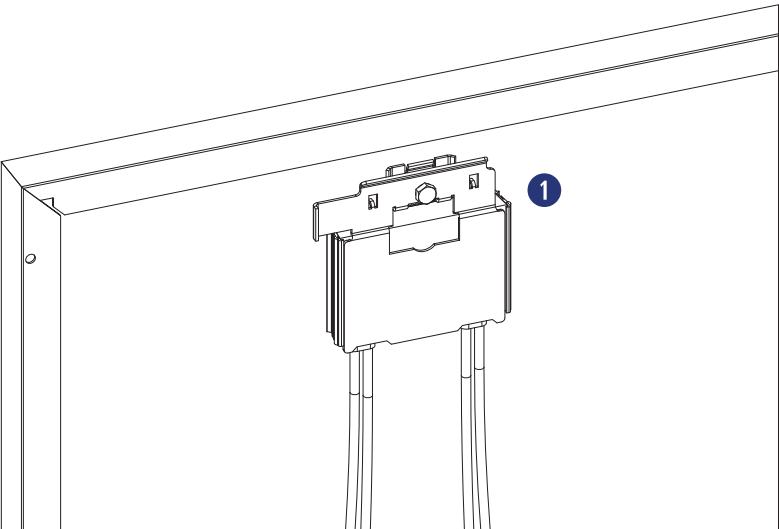
- 1 (1) SnapNrack MLPE Frame Attachment Top
- 2 (1) SnapNrack MLPE Frame Attachment Bottom
- 3 (1) 5/16”-18 X 3/4” Serrated Flange Bolt SS
- 4 (1) SnapNrack Smart Clip
- 5 (1) SnapNrack MLPE Frame Attachment Coil Spring SS



Materials Included

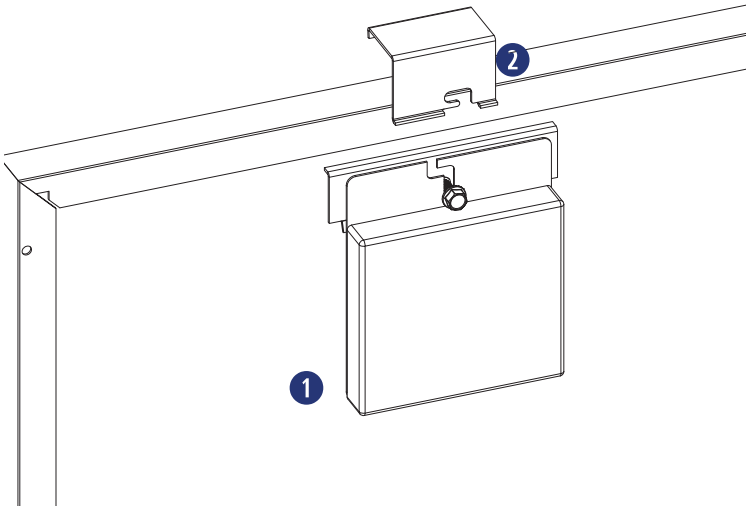
SolarEdge Frame Mount

- 1 (1) SolarEdge Optimizer w/ Frame-Mounted Module Add-On



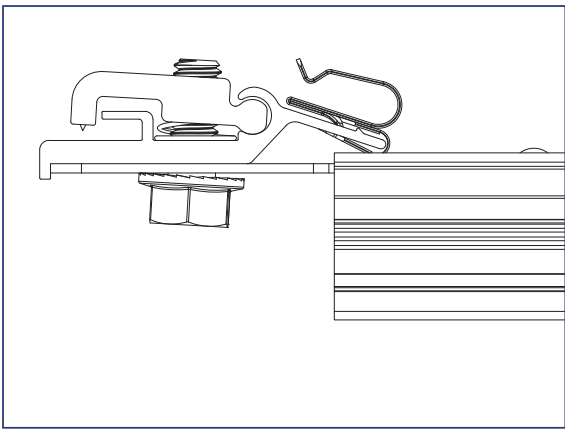
Enphase Frame Mount

- 1 (1) Enphase Microinverter
- 2 (1) Enphase Frame Mount

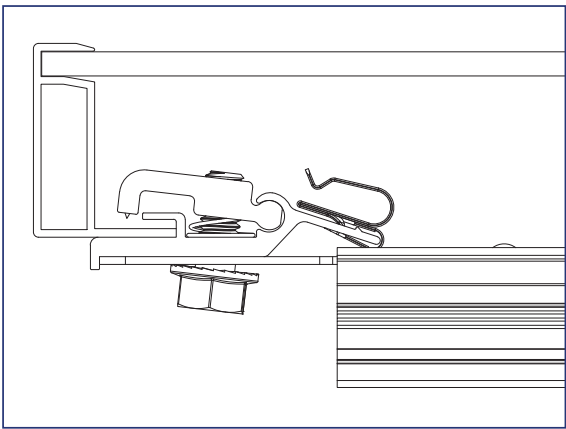


INSTALLATION INSTRUCTIONS - SNAPNRACK MLPE FRAME ATTACHMENT KIT

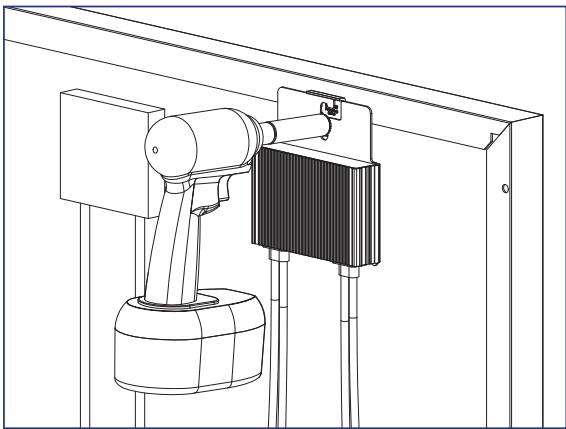
SnapNrack MLPE Frame Attachment kit are used to attach module level performance enhancing devices, and other devices such as an SRD (rapid shutdown device), directly to module frames, and provide integrated grounding/bonding for Devices grounded through metal back plate. (Refer to the list of tested MLPE devices on page XX of this manual).



1) Slide the backplate channel of the MLPE device under the MLPE Frame Attachment Kit bolt. The MLPE mounting plate should rest against the MLPE mounting plate backstop on the MLPE Frame Attachment Kit.



2) Position the MLPE Frame Attachment Kit on the module frame flange in a location that will not interfere with mounting system components. The module frame flange should rest against the module flange backstop on the MLPE Frame Attachment Kit.



3) Tighten the mounting bolt on the MLPE Frame Attachment Kit to 12 lb-ft (144 lb-in).



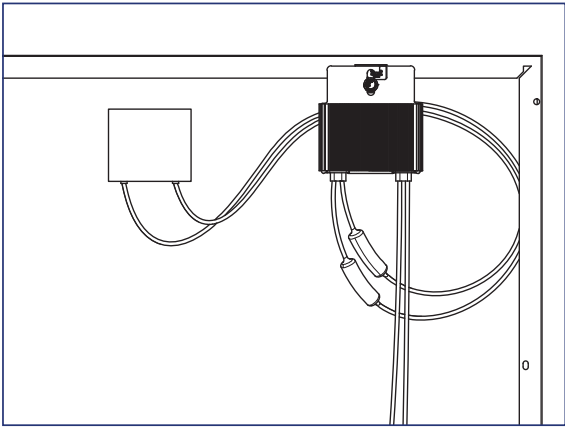
Install Note:

The MLPE Frame Attachment Kit bonds the following components: Module Frame, MLPE backplate and Smart Clip.



Install Note:

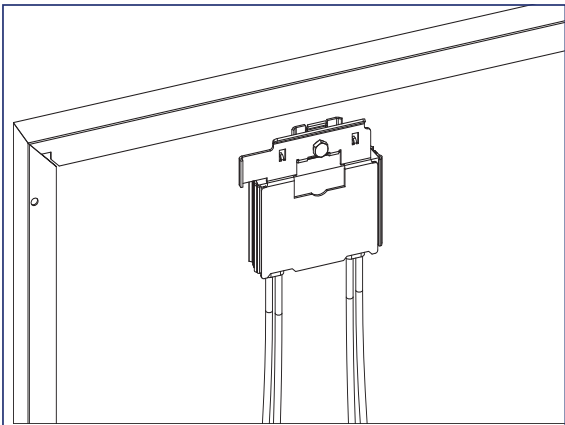
Avoid blocking module frame drainage holes when installing the MLPE Frame Attachment Kit.



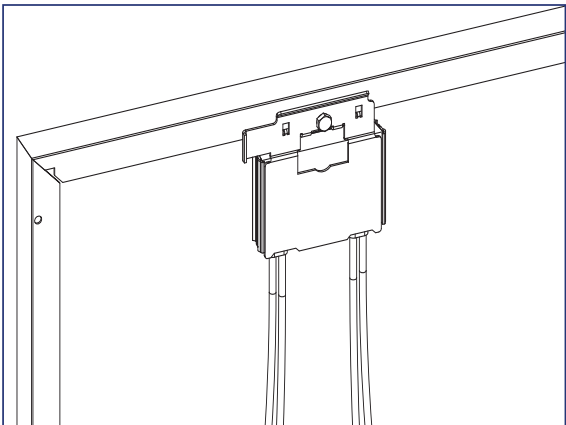
4) Connect the module leads to the input connectors on the MLPE device and manage conductors with the integrated Smart Clip.

MLPE & RSD Installation

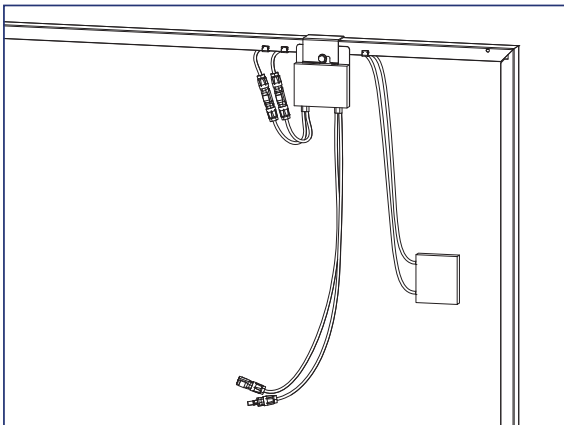
INSTALLATION INSTRUCTIONS - SOLAREEDGE FRAME MOUNT



1) Locate the SolarEdge optimizer with Frame-Mounted Module Add-On at a location on the module frame that will not interfere with the TopSpeed™ Mounts.



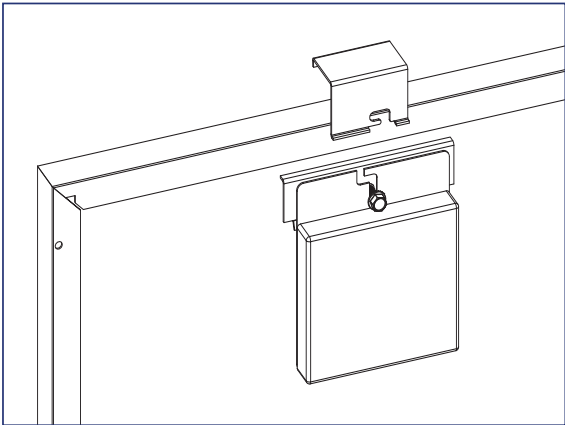
2) Install the optimizer mounting plate onto the module frame and tighten hardware to 11 ft-lbs.



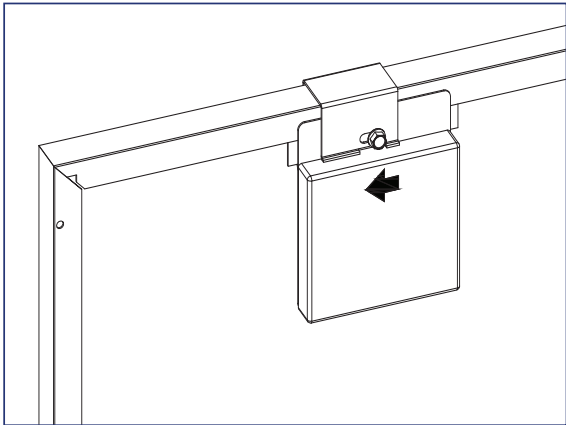
3) Connect the module leads to the input connectors on the optimizer and manage conductors with SnapNrack Smart Clips.

Install Note:
If module is mounted in portrait, install MLPE on long side, short side for landscape.

INSTALLATION INSTRUCTIONS - ENPHASE FRAME MOUNT

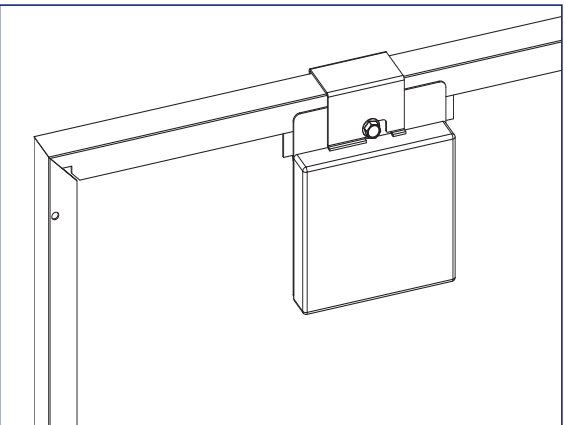


1) Locate the Enphase Frame Mount bracket clamp at a location on the module frame that will not interfere with the TopSpeed™ Mounts.



2) Slide the microinverter unit onto the bracket clamp, then move it slightly to the left.

Install Note:
The microinverter mounting flange should be on the outside of the module frame.



3) Tighten the hardware to 13 ft-lbs.

4) Connect module leads to microinverter DC connectors.

Install Note:
Refer to the Enphase Frame Mount installation guide for additional instructions.

Module Installation

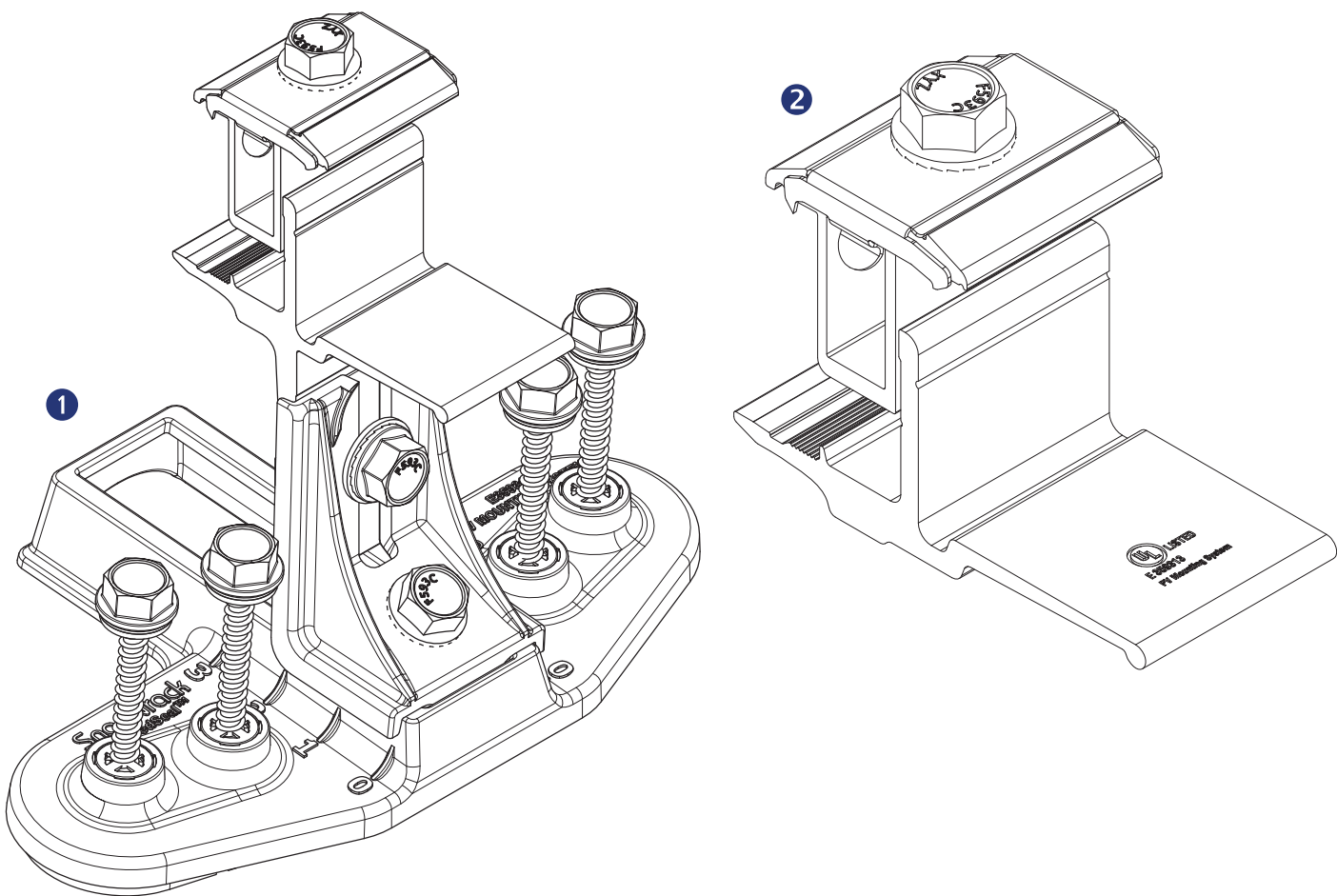
snapnrack.com

Required Tools

- Socket Wrench
- Torque Wrench
- 1/2” Socket
- Roofing Sealant

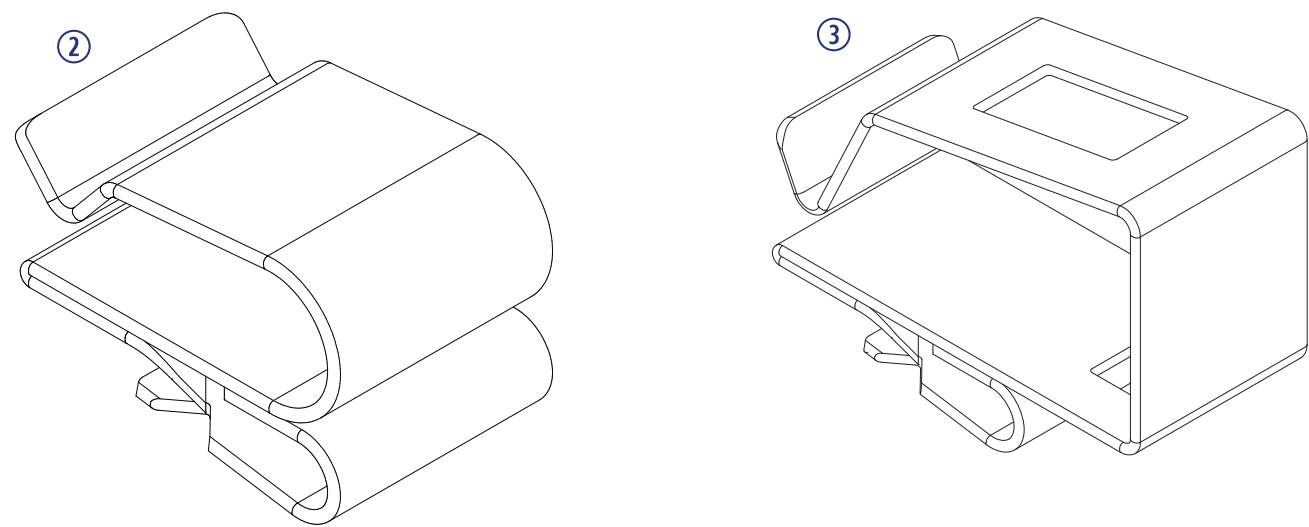
Materials Included

- ① SnapNrack TopSpeed™ Mount
- ② SnapNrack TopSpeed™ Clamp



Other Materials Required

- ② SnapNrack Smart Clip (2-5 per module)
See Wire Management section for details
- ③ SnapNrack Smart Clip XL (10-20 per array)
See Wire Management section for details



Module Installation

INSTALLATION INSTRUCTIONS - BOTTOM ROW

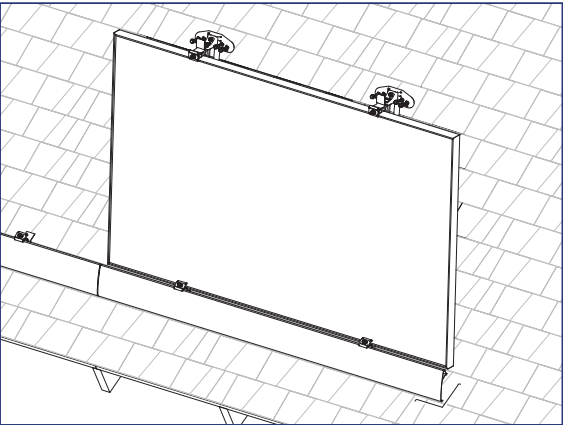
⚙️ Recommended Best Practice:

Attach all TopSpeed™ mounts as the modules are being prepped with MLPEs on the ground. Attach Mounts before attaching MLPEs to simplify wire management.

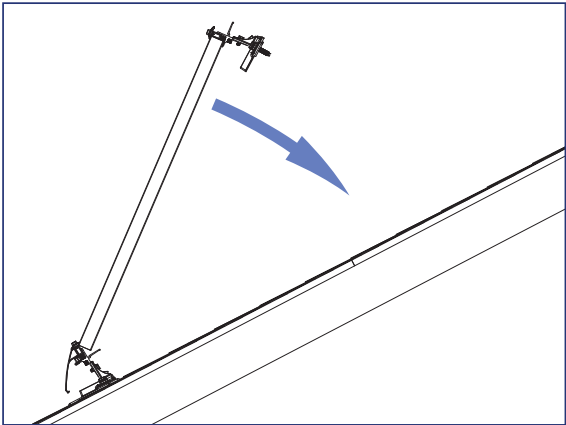
⚙️ Install Note:

It is recommended that module leads and connectors are prepared for installation using SnapNrack Smart Clips before being brought to the rooftop.

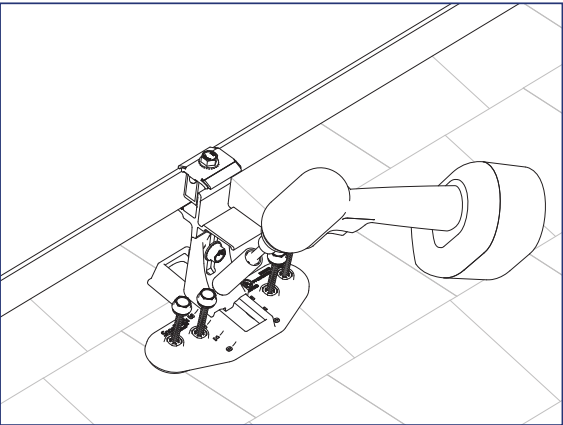
- With no MLPE, secure module leads to module frame to allow access to connectors while modules are installed
- Secure MLPE device to module frame with SnapNrack MLPE Frame Attachment Kit and connect module leads to MLPE, and manage leads by positioning connectors to allow access during installation



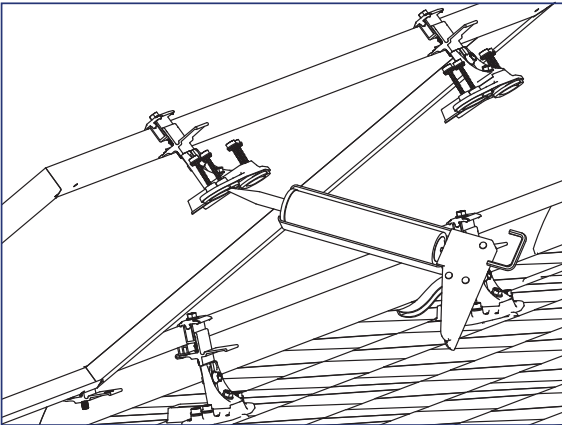
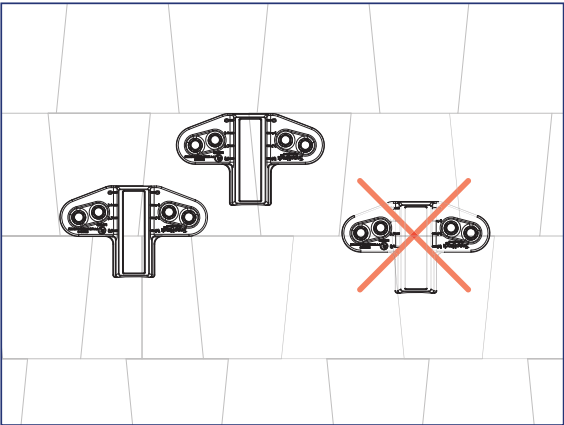
1) Rest downslope edge of module on the Mounts and/or Clamps position module so side edge is flush with marked edge of array layout or Skirt.



2) Lower upslope edge of module while simultaneously applying slight pressure to seat module into Mounts and/or Clamps.



3) When module is level with roof verify the Speedseal™ portion of the TopSpeed™ Mounts are positioned entirely on one course of composition. If required listen the 1/2" nut and adjust the base as needed then tighten the bolt.

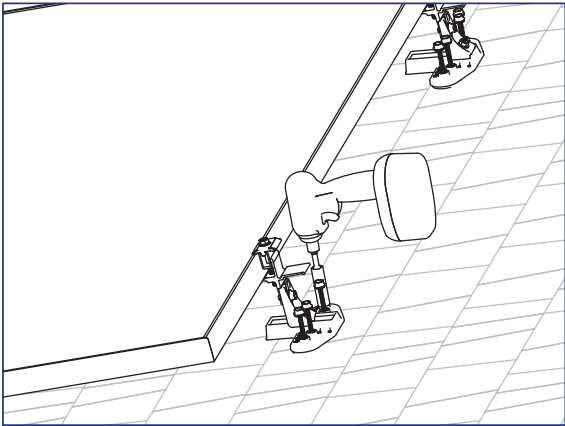


4) Lift the upslope edge of the module and fill the SpeedSeal™ reservoir with roofing sealant.

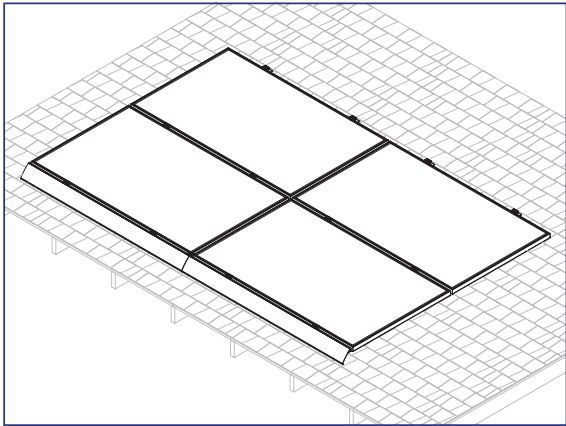
⚙️ Install Note:

Roof sealant should be expelled from both vents of the TopSpeed™ Mount as it is installed to assure the proper amount of roof sealant has been applied. If sealant is not expelled from all four vents, remove TopSpeed™ Mount, add more sealant to the cavity, then reinstall.

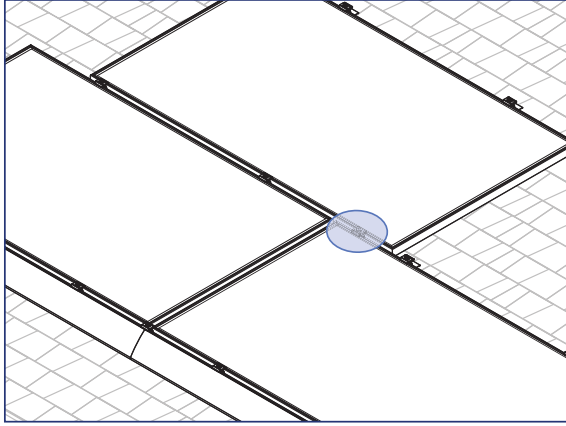
INSTALLATION INSTRUCTIONS - BOTTOM ROW



5) Lower the module to the roof and drive the (4) pre installed Snapnrack #14 Wood Screws with 1/2" hex head into the roof sheathing.



6) Repeat steps 1 through 5 for additional modules in the array.



7) For staggered arrays and arrays with mixed orientation, use the TopSpeed™ Clamp as needed to support the modules.

Install Note:

Roof sealant should be expelled from both vents of the TopSpeed™ Mount as it is installed to assure the proper amount of roof sealant has been applied. If sealant is not expelled from both vents, remove TopSpeed™ Mount, add more sealant to the cavity, then reinstall.

When installing a TopSpeed™ Clamp for support of an over cantilevered module, the clamp shall be installed 2-6" from the edge of the upslope (cantilevered) module.

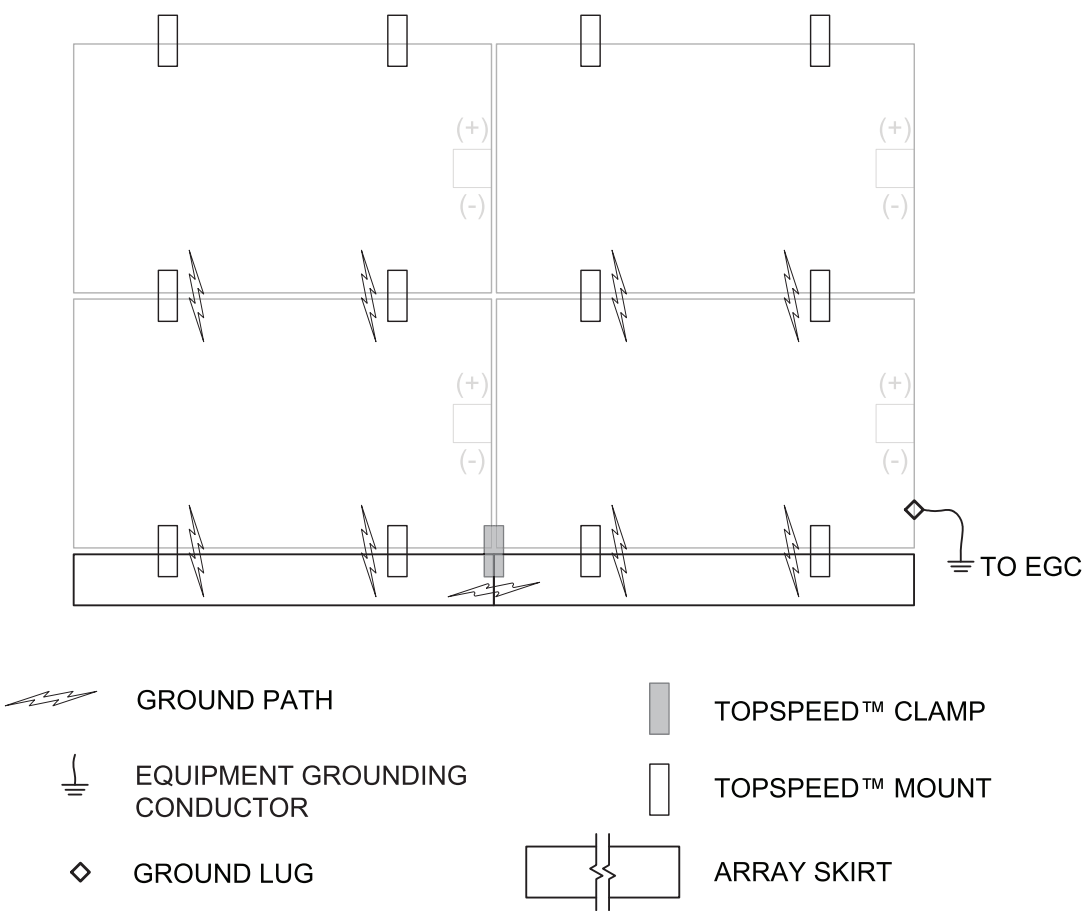
Grounding Specifications

GROUND PATH DETAILS

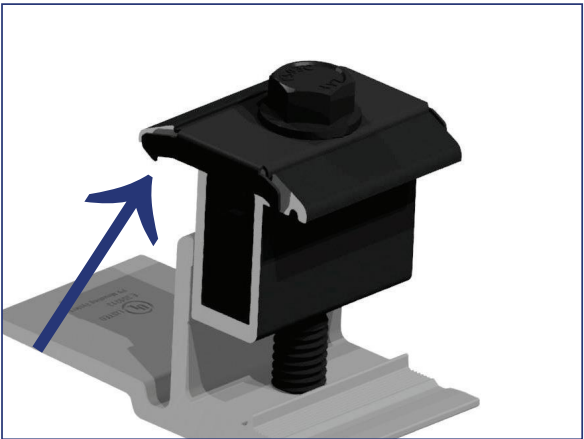
All TopSpeed™ components in the fault current ground path have been Certified to be used multiple times for grounding/bonding. The UL 2703 Listing does not specify a maximum number of uses for the Mount, Link, or Ground Lug. Review the requirements of the National Electrical Code (NEC) Article 250 to select the appropriate Equipment Grounding Conductor size based on the short-circuit current of the PV system.

When using Ground Lug R the following components are part of the fault current ground path:

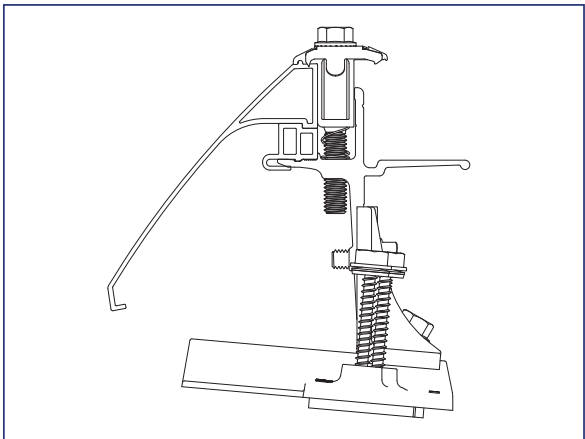
- SnapNrack, TopSpeed™ Mount
- SnapNrack, TopSpeed™ Clamp



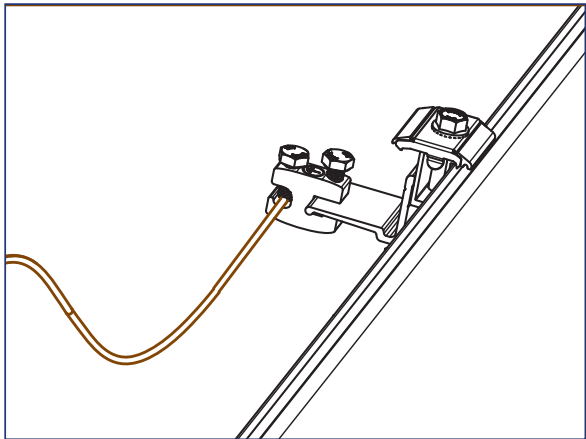
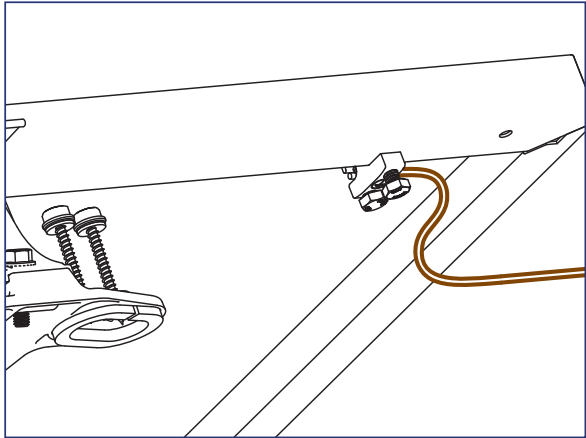
GROUNDING METHOD DETAILS



1) Row to row module bonding provided by bonding clips in Mount assembly and Clamp assembly.

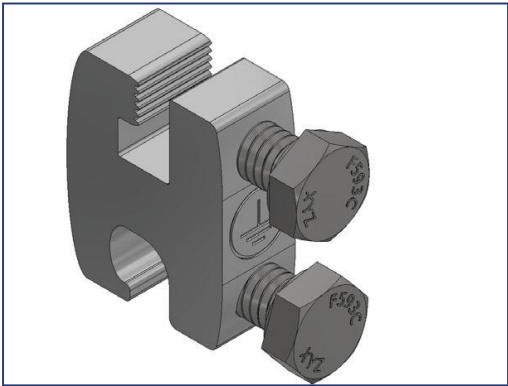


2) Column to column bonding provided by Universal Skirt and bonding clips in the Clamp assembly and/or the RL Universal Link assembly. Module heights evaluated for bonding with Link Bonding Clamps: 40mm, 38mm, 35mm, 32mm, 30mm



3) Each continuous array is connected to Equipment Grounding Conductor through Ground Lug (242-92202) installed on one module per array.

Optionally; Install Ground Lug on the Mount Landing Pad at the top of the array.



GROUNDING MARKING DETAILS

The Ground Lug is marked with the ground symbol.

Maintaining the Grounding Bonding When Removing a Module

INSTRUCTION FOR MAINTAINING THE GROUNDING BONDING WHEN REMOVING A MODULE FOR SERVICING

CAUTION: Module removal may disrupt the bonding path and could introduce the risk of electric shock. Additional steps may be required to maintain the bonding path. Modules should only be removed by qualified persons in compliance with the instructions in this manual.

Module removal is not presented as a frequently expected occurrence and will not be required as part of routine maintenance.

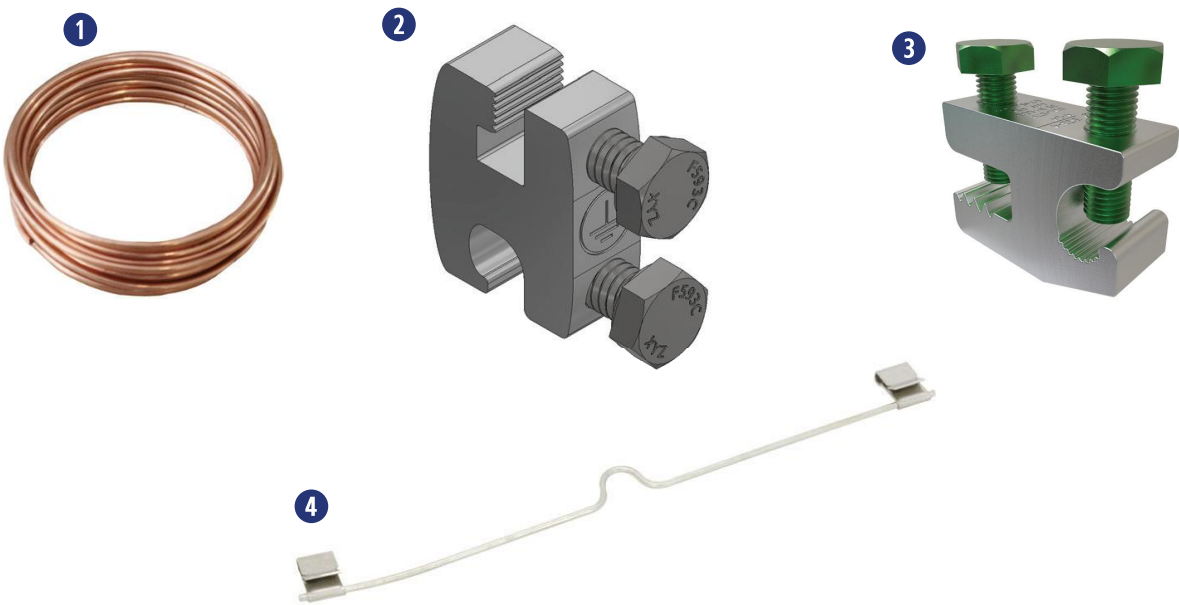
Scenarios that could result in a disruption of the bonding path are described, for example irregularly-shaped arrays, arrays consisting of individual rows, and any other scenario where module removal could disrupt the bonding path. In most cases, the removal of a module for servicing will not disturb or break grounding continuity. If a module is to be removed that will break continuity, these are the steps that must be taken to maintain a continuously bonded SnapNrack TopSpeed™ System.

Required Tools

- Socket Wrench
- Torque Wrench
- 1/2” Socket
- 7/16” Socket

Required Materials

- ① #10 Or Larger Bare Copper Conductor
- ② SnapNrack Ground Lug part no. 242-92202
- ③ Ilsco Part No. SGB-4
- ④ DnoRaxx Dynobond™

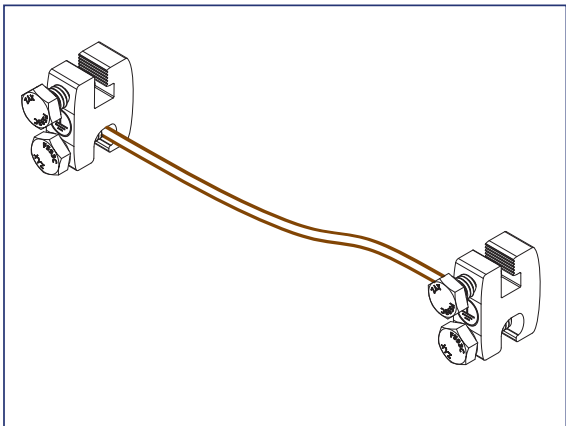


Maintaining the Grounding Bonding When Removing a Module

JUMPER ASSEMBLY INSTRUCTION & INSTALLATION

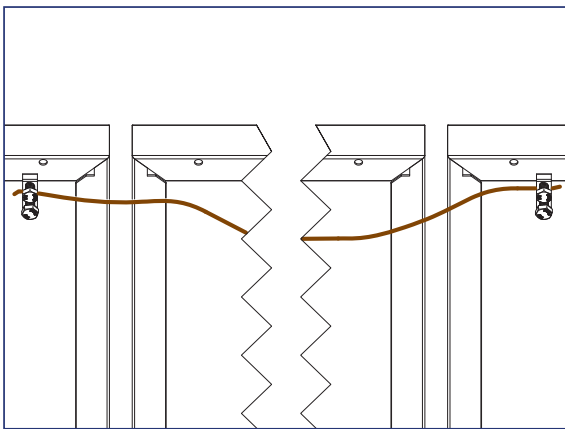
CAUTION: Do Not Remove the Module until the Jumper is installed

1) Identify the existing ground path at the location of module removal and choose an appropriate length of #10 bare copper to bridge the soon to be broken ground path.



Example of assembled bonding jumper using (2) SnapNrack Ground Lugs

- 2) Attach one ground lug to each end of #10 bare copper wire. See recommended options below:
1. (2) SnapNrack Ground Lug part no. 242-922022
 2. (2) Ilsco part no. SGB-4
 3. (1) DroRaxx DynoBond™



3) Before the module is removed, attach the assembled bonding jumper. Depending on where the module will be removed and choice of ground lug, jumper attachment locations will vary.

- SnapNrack Ground Lug part no. 242-92202 or Ilsco SGB-4 lugs can be attached to module frames or anywhere on the TopSpeed™ Mount.
- DynoRaxx DynoBond™ is approved and appropriate when a short bonding jumper is needed from module to module.

4) Service the array. With the bonding jumper installed, it is now safe to remove the module for service or maintenance.

5) After Servicing the array reinstall the module and original ground path. Only then Remove the bonding jumper.

Caution: Do not remove the bonding jumper until original ground path is established.

APPROVED MODULE & MLPE INFORMATION

SnapNrack TopSpeed™ System has been tested with the following UL Listed module series: The SnapNrack TopSpeed™ System employs top-down clamps and links which have been evaluated for frame-to-system bonding, at specific mounting torques and with the specific module series listed below. All wattage values are covered.

Module manufacturer approval letters can be found at www.snapnrack.com.

Manufacturer	Model	
Aptos Solar	DNA-120-MF23-XXX	DNA-120-BF26-XXXW
	DNA-120-BF23-XXX	DNA-144-BF26-XXXW
	DNA-144-MF23-XXX	DNA-108-BF10-xxxW
	DNA-144-BF23-XXX	DNA-120-BF10-xxxW
	DNA-120-MF26-XXXW	DNA-108-MF10-xxxW
	DNA-144-MF26-XXXW	
Boviet Solar	BVM7612M-XXX-H-HC-BF-DG	
Canadian Solar	CS6K-XXX-M	CS1H-XXX-MS
	CS6K-XXX-M-SD	CS1H-XXX-MS-AB
	CS6K-XXX-P	CS3W-XXX-P
	CS6K-XXX-P-SD	CS3N-XXX-MS
	CS6K-XXX-MS	CS1Y-XXX-MS
	CS3K-XXX-P	CS3W-MB-AG
	CS3K-XXX-MS	CS3Y-MB-AG
	CS3U-XXX-MS	CS6W-XXXMB-AG
	CS3U-XXX-P	CS6R-XXXMS-HL
	CS1K-XXX-MS	CS3W-XXX-MS
CertainTeed	CTXXXHC11-06	
Chint Solar	CHSM6612M-XXX	CHSM72M-HC-XXX* (Astro 4)
	CHSM6612M(BL)-XXX	CHSM72M-HC-XXX* (Astro 5)
	CHSM6612M/HV-XXX	
Dehui Solar	DH-M760B-XXXW	DH-M760F-XXXW
	DH-M760W-XXXW	DH-M772F-XXXW
	DH-M772W-XXXW	
Freedom Forever	FF-MP-BBB-xxx	
Hanwha Q Cells	Q.PEAK DUO-G5-XXX	Q.PEAK DUO G10-XXX
	Q.PEAK DUO-BLK-G5-XXX	Q.PEAK DUO BLK G10-XXX
	Q.PLUS DUO-G5-XXX	Q.PEAK DUO G10+-XXX
	Q.PEAK DUO-G7-XXX	Q.PEAK DUO BLK G10+-XXX
	Q.PEAK DUO-BLK-G7-XXX	Q.PEAK DUO XL-G10.3-XXX
	Q.PEAK DUO-G7.2-XXX	Q.PEAK DUO XL-G10.c-XXX
	Q.PEAK DUO-G6+-XXX	Q.PEAK DUO XL-G10.d-XXX
	Q.PEAK DUO-BLK-G6+-XXX	Q.PEAK DUO L-G8.3/BFG-XXX
	Q.PEAK DUO-G6-XXX	Q.PEAK DUO L-G8.3/BGT-XXX
	Q.PEAK DUO-BLK-G6-XXX	Q.PEAK DUO ML-G10-XXX
	Q.PEAK DUO-G8+-XXX	Q.PEAK DUO BLK ML-G10+-XXX
	Q.PEAK DUO-BLK-G8+-XXX	Q.PEAK DUO ML-G10+-XXX



Manufacturer	Model	
Hanwha Q Cells	Q.PEAK DUO-G8-XXX	Q.PEAK DUO BLK ML-G10-XXX
	Q.PEAK DUO-BLK-G8-XXX	Q.PEAK DUO ML-G10.a+-XXX
	Q.PEAK DUO BLK-G6+/AC-XXX	Q.PEAK DUO BLK ML-G10.a+-XXX
	Q.PEAK DUO-ML-G9-XXX	Q.PEAK DUO ML-G10.a-XXX
	Q.PEAK DUO-BLK-ML-G9-XXX	Q.PEAK DUO BLK ML-G10.a-XXX
	Q.PEAK DUO-BLK-G9-XXX	Q.PEAK DUO BLK G10+/AC XXX
	Q.PEAK DUO-BLK-ML-G9+-XXX	Q.PEAK DUO BLK G10+/HL XXX
	Q.PEAK DUO-ML-G9+-XXX	Q.PEAK DUO BLK ML-G10+/t-XXX
	Q.PEAK DUO-BLK-ML-G9+-XXX	Q.PEAK DUO XL-G11.3 XXX
	Q.PEAK DUO XL-G9.2-XXX	Q.PEAK DUO XL-G11.3 BFG XXX
	Q.PEAK DUO XL-G9.3-XXX	Q.TRON-G1+ XXX
	Q.PEAK DUO XL-G9.3/BFG-XXX	Q.TRON BLK-G1+ XXX
	Q.PEAK DUO XL-G10.2-XXX	Q.TRON M-G2+ XXX
	Q.PEAK DUO XL-G10.3/BFG-XXX	Q.TRON BLK M-G2+ XXX
HT-SAAE	HT60-166M-XXX	HT60-182M-XXX
Heliene	60M-XXX	72M-XXX
	60P-XXX	72P-XXX
"Hyundai (All may be followed by "BK")"	HiA-SXXXMS	HiS-SXXXYI
	HiS-SXXXXY	HiS-SXXXXYH(BK)
	HiN-SxxxXG(BK)	
Hyperion/Runergy	HY-DH108P8-XXX(Y)	HY-DH144N8-XXX
	HY-DH144P8-XXX	HY-DH108N8-XXX
JA Solar	JAM60S09-XXX/PR	JAM72S10-XXX/PR
	JAM60S10-XXX/MR	JAM72S12-XXX/PR
	JAM60S10-XXX/PR	JAM60S17-XXX/MR
	JAM60S12-XXX/PR	JAM54S30-XXX/MR
	JAM72S09-XXX/PR	JAM54S31-XXX/MR
	JAM72S10-XXX/MR	JAM72D30-XXX/MB
Jinko Solar	JKMXXXM-60	JKMXXXP-72-V
	JKMXXXM-60L	JKMXXXPP-72
	JKMXXXM-60HL	JKMXXXPP-72-V
	JKMXXXM-60HBL	JKMSXXXP-72
	JKMXXXP-60	JKMXXXM-72HL-V
	JKMXXXP-60-J4	JKMXXXM-72HL-TV
	JKMXXXP-60-V	JKMXXXM-72HBL
	JKMXXXP-60B-J4	JKMXXXM-6TL3-B
	JKMXXXPP-60	JKMXXXM-6RL3-B
	JKMXXXPP-60-V	JKMXXXM-7RL3-V
	JKMXXXM-72	JKMXXXM-7RL3-TV
	JKMXXXM-72L-V	JKMXXXM-72HL4-V
	JKMXXXP-72	JKMXXXM-72HL4-TV
LG	LGXXXN1C-A5	LGXXXA1C-V5
	LGXXXN1K-A5	LGXXXM1C-L5
	LGXXXQ1C-A5	LGXXXM1K-L5
	LGXXXQ1K-A5	LGXXXN1C-N5



Appendix A

snapnrack.com

Manufacturer	Model	
LG	LGXXXS1C-A5	LGXXXN1K-L5
	LGXXXN2C-B3	LGXXXN1K-A6
	LGXXXN2W-B3	LGXXXN1C-A6
	LGXXXN1C-G4	LGXXXN1W-A6
	LGXXXN1K-G4	LGXXXQ1C-A6
	LGXXXS1C-G4	LGXXXQ1K-A6
	LGXXXN2C-G4	LGXXXM1K-A6
	LGXXXN2K-G4	LGXXXM1C-A6
	LGXXXN2W-G4	LGXXXA1C-A6
	LGXXXS2C-G4	LGXXXQAC-A6
	LGXXXS2W-G4	LGXXXQAK-A6
	LGXXXN1C-V5	LGXXXN1K-B6
	LGXXXN1W-V5	LGXXXN2W-E6
	LGXXXN2T-V5	LGXXXN2T-E6
	LGXXXN2T-J5	LGXXXN1K-E6
	LGXXXN1T-V5	LGXXXN3K-V6
Longi	LR6-60-XXXM	LR4-60HPB-XXXM
	LR6-60BK-XXXM	LR4-60HIB-XXXM
	LR6-60HV-XXXM	LR4-60HPH-XXXM
	LR6-60PB-XXXM	LR4-60HIH-XXXM
	LR6-60PE-XXXM	LR6-60HIH-XXXM
	LR6-60PH-XXXM	LR6-60HIB-XXXM
	LR6-60HPB-XXXM	LR4-72HPH-XXXM
	LR6-60HPH-XXXM	
Meyer Burger	Meyer Burger Black*	Meyer Burger White*
mSolar	TXI6-XXX120BB	
Mission Solar	MSEXXXSO5T	MSEXXXSQ4S
	MSEXXXSO5K	MSEXXXSR8K
	MSEXXXSQ5T	MSEXXXSR8T
	MSEXXXSQ5K	MSEXXXSR9S
	MSEXXXMM4J	MSE60AXXX
	MSEXXXMM6J	MSEXXXSX5K
	MSEXXXSO6W	MSEXXXSX5T
	MSEXXXSO4J	MSEXXXSX6S
	MSEXXXSO6J	MSEXXXSX6W
	MSEXXXSQ6S	MSEXXXSX5R
Next Energy Alliance	USNEA-XXXM3-60	USNEA-XXXM3-72
	USNEA-XXXM3B-60	USNEA-XXXM3B-72
Panasonic	VBHNXXXKA03	VBHXXXRA18N
	VBHNXXXKA04	VBHXXXRA03K
	VBHNXXXSA17	EVPVXXX(K)
	VBHNXXXSA18	EVPVXXXH
	VBHN325SA17E	EVPVXXXPK



Manufacturer	Model	
Philadelphia Solar	PS-M144(HCBF)-XXXW	PS-M108(HC)-XXXW
	PS-M108(HCBF)-XXXW	
Phono Solar	PSXXXM-20/U	PSxxxM8GF-18/VH
	PSXXXMH-20/U	PSxxxM8GFH-18/VH
	PSxxxM8GF-24/TH	PSxxxM6-24/TH
	PSxxxM8GFH-24/TH	
REC (All may be followed by “BLK” or “BLACK”)	RECXXTP2	RECXXTP2SM 72 BLK2
	RECXXTP2-BLK	RECXXAA
	RECXXNP	RECXXTP3M
	RECXXTP2M	RECXXTP4
	RECXXTP2M 72	RECXXAA Pure
	RECXXTP2M 72 BLK	RECXXAA Pure-R
	RECXXTP2M 72 BLK2	RECXXNP2
	RECXXTP2SM 72	RECXXNP3
	RECXXTP2SM 72 BLK	
SEG Solar	SEG-400-BMB-HV	SEG-xxx-BMD-HV
	SEG-400-BMB-TB	SEG-xxx-BMD-TB
Silfab	SLAXXX-M	SILXXXNT
	SLAXXX-P	SILXXXHL
	SSAXXX-M	SILXXXBK
	SSAXXX-P	SILXXXNX
	SILXXXBL	SILXXXNU
	SILXXXML	SILXXXHC
	SILXXXNL	SILXXXHN
	SLGXXX-M	SILXXXBG
	SLGXXX-P	SIL-xxxHC+
	SSGXXX-M	SIL-xxxHM
	SSGXXX-P	
Solaria	Solaria PowerXT-XXXR-PX	Solaria PowerXT-XXXR-PM
	Solaria PowerXT-XXXR-BX	Solaria PowerXT-XXXR-PM-AC
	Solaria PowerXT-XXXR-AC	
Sunpower	SPR-AXXX-G-AC	SPR-MXXX-H-AC
	SPR-AXXX	SPR-MXXX
	SPR-AXXX-BLK-G-AC	SPR-MXXX-BLK-H-AC
	SPR-AXXX-BLK	SPR-MXXX-BLK
SunSpark	SST-XXXM3-60	SST-XXXM3-72
	SST-XXXM3B-60	SST-XXXM3B-72
Talesun	TP660M-XXX	TP672M-XXX
	TP660P-XXX	TP672P-XXX
Thornova	TS-BB54(XXX)	TS-BG60(XXX)
	TS-BB60(XXX)	TS-BG72(XXX)
	TS-BG54(XXX)	

Manufacturer	Model	
Trina	TSM-XXXDD05(II)	TSMXXXDD05H.05(II)
	TSM-XXXDD05A.05(II)	TSM-XXXDD06M.05(II)
	TSM-XXXDD05A.08(II)	TSM-XXXDE15H(II)
	TSM-XXXDD05A.082(II)	TSM-XXXDE15M(II)
	TSM-XXXPA05	TSMXXXDE06X.05(II)
	TSM-XXXPA05.05	TSMXXXDE09.05
	TSM-XXXPA05.08	TSM-XXXDE15V(II)
	TSM-XXXPD05	TSM-XXXDEG15VC.20(II)
	TSM-XXXPD05.002	TSM-XXXDEG18MC.20(II)
	TSM-XXXPD05.05	TSM-XXXDEG19C.20
	TSM-XXXPD05.05S	TSM-XXXDEG21C.20
	TSM-XXXPD05.08	TSM-XXXDE09C.05
	TSM-XXXPD05.082	TSM-XXXDE09C.07
	TSM-XXXPD05.08D	TSM-xxxNE09RC.05
	TSM-XXXPD05.08S	
Vikram Solar	SOMERA VSMHBB.60.XXX.05	PREXOS VSMDHT.60.XXX.05
	SOMERA VSMH.72.XXX.05	PREXOS VSMDHT.72.XXX.05
VSUN	VSUNXXX-144BMH-DG	VSUNXXX-108BMH
	VSUNXXX-120BMH	
ZNShine	ZXM6-60-XXX/M	ZXM6-NH144-XXXM
	ZXM6-NH120-XXXM	ZXM7-SH108-XXXM
	ZXM7-SHLDD144-XXXM	

SnapNrack TopSpeed™ has been tested with the following Module Level Power Electronic (MLPE) devices:

SnapNrack TopSpeed™ mounting systems has been tested with the following UL/NRTL Listed Module Level Power Electronic (MLPE) Devices. The back plates of the MLPEs have been evaluated for bonding to TopSpeed™ through the SnapNrack MLPE Frame Attachment Kit, model 242-02151.

MLPE Manufacturer	Model	
AP Smart	RSD-S-PLC	
Celestica International	DG-006-F001201x	DG-006-F001401x
Delta Electronics	GPI00010105	
Enphase	C250	IQ7PLUS-72-2-US
	M215	IQ7PLUS-72-B-US
	M250	IQ8-60
	IQ6-60-2-US	IQ8PLUS-72
	IQ6PLUS-72-2-US	IQ8A-72
	IQ7-60-2-US	IQ8H-208-72
	IQ7-60-B-US	IQ8H-240-72
Generec	S2502	
Ginlong Technologies	Solis-RSD-1G	
	Solis-MLRSD-R1-1G	Solis-MLRSD-R2-1G

MLPE Manufacturer	Model	
SolarEdge	P300-5NC4ARS	P320-5NC4ARS
	P370-5NC4AFS	P400-5NC4AFS
	P320	P340
	P370	P400
	P401	P405
	P485	P505
	P730	P800p
	P850	P860
	P950	P1100
	P1101	S440
	S500	
SMA	RSB-2S-US-10	
Tigo	TS4-R-F	TS4-R-M
	TS4-R-O	TS4-R-S
	TS4-R-M-DUO	TS4-R-O-DUO
	TS4-R-S-DUO	TS4-A-F
	TS4-A-2F	TS4-A-O
	TS4-A-S	



Hi-MO 5m

LR5-54HPB 400~420M

- Suitable for distributed projects
- Advanced module technology delivers superior module efficiency
 - M10 Gallium-doped Wafer
 - Integrated Segmented Ribbons
 - 9-busbar Half-cut Cell
- Excellent outdoor power generation performance
- Aesthetic appearance with all black module design



12-year Warranty for
Materials and Processing



25-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

IEC62941: Guideline for module design qualification and type approval

LONGI



REVIEWED

By Devon.Murtha at 12:05 pm, Mar 16, 2026

21.5%
MAX MODULE
EFFICIENCY

0~3%
POWER
TOLERANCE

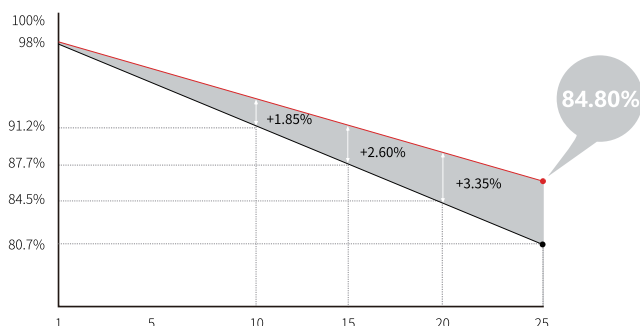
<2%
FIRST YEAR
POWER DEGRADATION

0.55%
YEAR 2-25
POWER DEGRADATION

HALF-CELL
Lower operating temperature

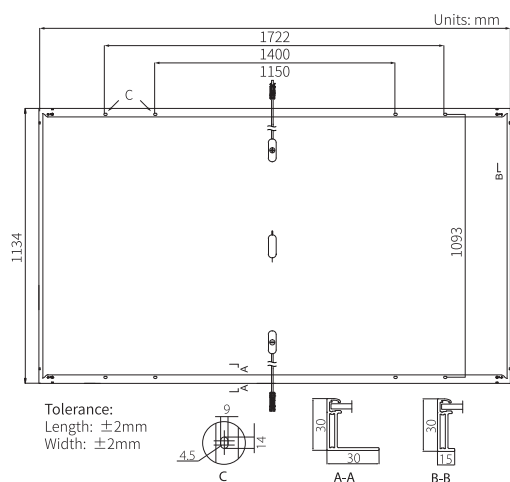
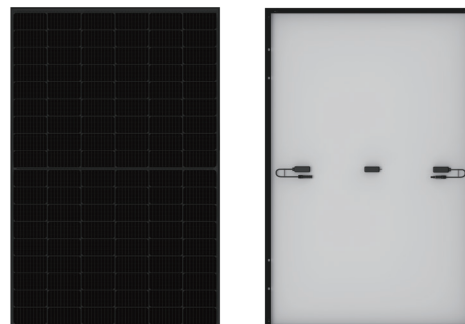
Additional Value

25-Year Power Warranty



Mechanical Parameters

Cell Orientation	108 (6×18)
Junction Box	IP68, three diodes
Output Cable	4mm ² , ±1200mm length can be customized
Glass	Single glass, 3.2mm coated tempered glass
Frame	Anodized aluminum alloy frame
Weight	20.8kg
Dimension	1722×1134×30mm
Packaging	36pcs per pallet / 216pcs per 20' GP / 936pcs per 40' HC



Electrical Characteristics

STC : AM1.5 1000W/m² 25°C NOCT : AM1.5 800W/m² 20°C 1m/s Test uncertainty for Pmax: ±3%

Module Type	LR5-54HPB-400M		LR5-54HPB-405M		LR5-54HPB-410M		LR5-54HPB-415M		LR5-54HPB-420M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	400	299.0	405	302.7	410	306.5	415	310.2	420	313.9
Open Circuit Voltage (Voc/V)	36.90	34.70	37.15	34.93	37.40	35.17	37.65	35.40	37.89	35.63
Short Circuit Current (Isc/A)	13.72	11.09	13.78	11.14	13.84	11.19	13.91	11.24	13.97	11.30
Voltage at Maximum Power (Vmp/V)	30.94	28.74	31.18	28.96	31.42	29.19	31.66	29.41	31.90	29.63
Current at Maximum Power (Imp/A)	12.93	10.40	12.99	10.45	13.05	10.50	13.11	10.55	13.17	10.59
Module Efficiency(%)	20.5		20.7		21.0		21.3		21.5	

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1000V (IEC/UL)
Maximum Series Fuse Rating	25A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Fire Rating	UL type 1 or 2 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.265%/°C
Temperature Coefficient of Pmax	-0.340%/°C



IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry’s first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC), which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built using advanced 55-nm technology with high-speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-and-play MC4 connectors.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with various regulations, when installed according to the manufacturer’s instructions.

Easy to install

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Compliant with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB)

NOTE:

- IQ8 Microinverters cannot be mixed with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Microinverters ship with default settings that meet North America’s IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative according to the IEEE 1547 interconnection standard. An IQ Gateway is required to make these changes during installation.

*Meets UL 1741 only when installed with IQ System Controller 2 or 3.
**IQ8 and IQ8+ support split-phase, 240 V installations only.
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Data subject to change.



IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		UNITS	IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings ¹	W	235–350		235–440
Module compatibility	—	To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I _{sc} listed below. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator .		
MPPT voltage range	V	27–37		27–45
Operating range	V	16–48		16–58
Minimum/Maximum start voltage	V	22/48		22/58
Maximum input DC voltage	V	50		60
Maximum continuous input DC current	A	10		12
Maximum input DC short-circuit current	A	25		
Maximum module (I _{sc})	A	20		
Overvoltage class DC port	—	II		
DC port backfeed current	mA	0		
PV array configuration	—	Ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit.		
OUTPUT DATA (AC)		UNITS	IQ8-60-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245		300
Maximum continuous output power	VA	240		290
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°		
Minimum and Maximum grid voltage ²	V	211-264		
Maximum continuous output current	A	1.0		1.21
Nominal frequency	Hz	60		
Extended frequency range	Hz	47–68		
AC short-circuit fault current over three cycles	Arms	2		
Maximum units per 20 A (L-L) branch circuit ³	—	16		13
Total harmonic distortion	%	<5		
Overvoltage class AC port	—	III		
AC port backfeed current	mA	30		
Power factor setting	—	1.0		
Grid-tied power factor (adjustable)	—	0.85 leading ... 0.85 lagging		
Peak efficiency	%	97.7		
CEC weighted efficiency	%	97		
Nighttime power consumption	mW	23		25
MECHANICAL DATA				
Ambient temperature range	–40°C to 60°C (–40°F to 140°F)			
Relative humidity range	4% to 100% (condensing)			
DC connector type	MC4			
Dimensions (H × W × D)	212 mm (8.3 in) × 175 mm (6.9 in) × 30.2 mm (1.2 in)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection—no fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion-resistant polymeric enclosure			
Environmental category/UV exposure rating	NEMA Type 6/Outdoor			

(1) No enforced DC/AC ratio.
(2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.



COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01. This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV Systems, for AC and DC conductors, when installed according to the manufacturer’s instructions.

IQ8SP-12A-DSH-00207-3.0-EN-US-2024-02-12



REVIEWED
By Devon.Murtha at 12:05 pm, Mar 16, 2026

Revision history

REVISION	DATE	DESCRIPTION
DSH-00207-3.0	February 2024	Updated the information about IEEE 1547 interconnection standard requirements.
DSH-00207-2.0	October 2023	Included NEC 2023 specification in the “Compliance” section.
DSH-00207-1.0	September 2023	Updated module compatibility specification.

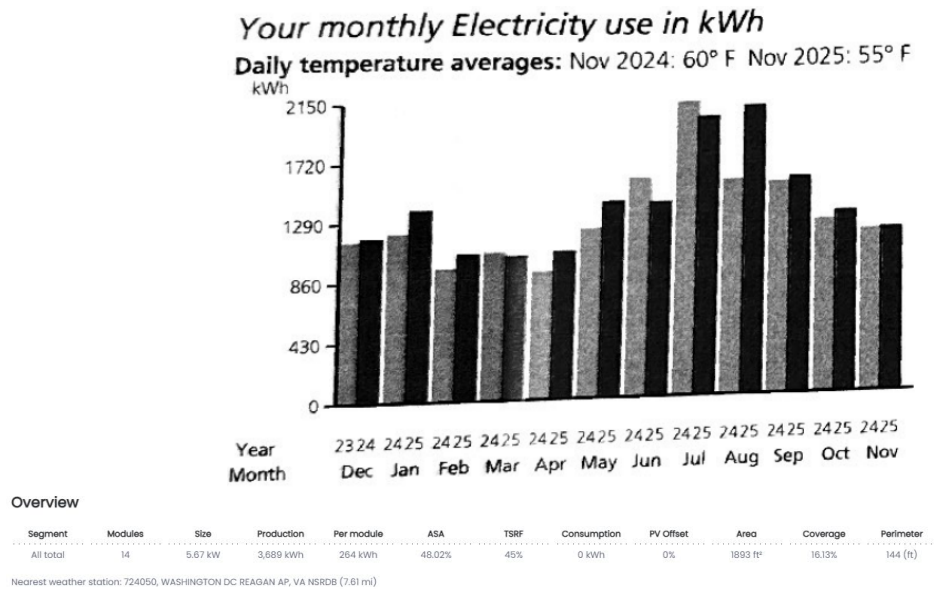


01/20/26

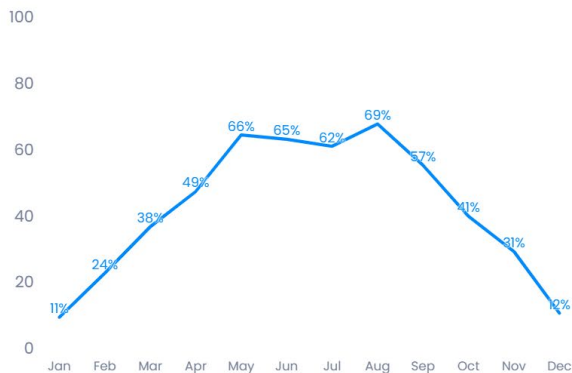
To whom it may concern,

- Justification of panels on the front of the house and heat map.

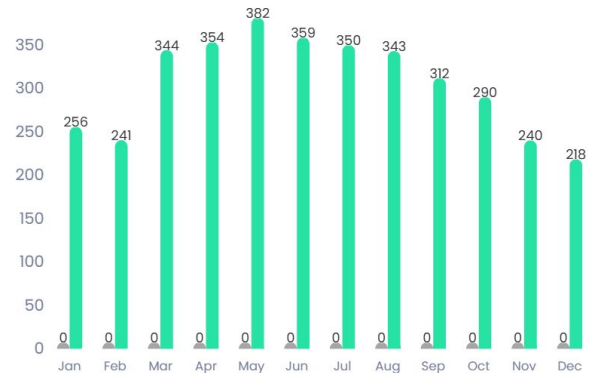
Monthly energy consumption for Address vs the proposed system monthly production



Monthly Average Solar Access



Monthly Consumption and Production (kWh)



- The home had an estimated annual usage of roughly 17,420 kWh in 2025. Our proposed system is estimated to have 3,689 kWh in annual production.

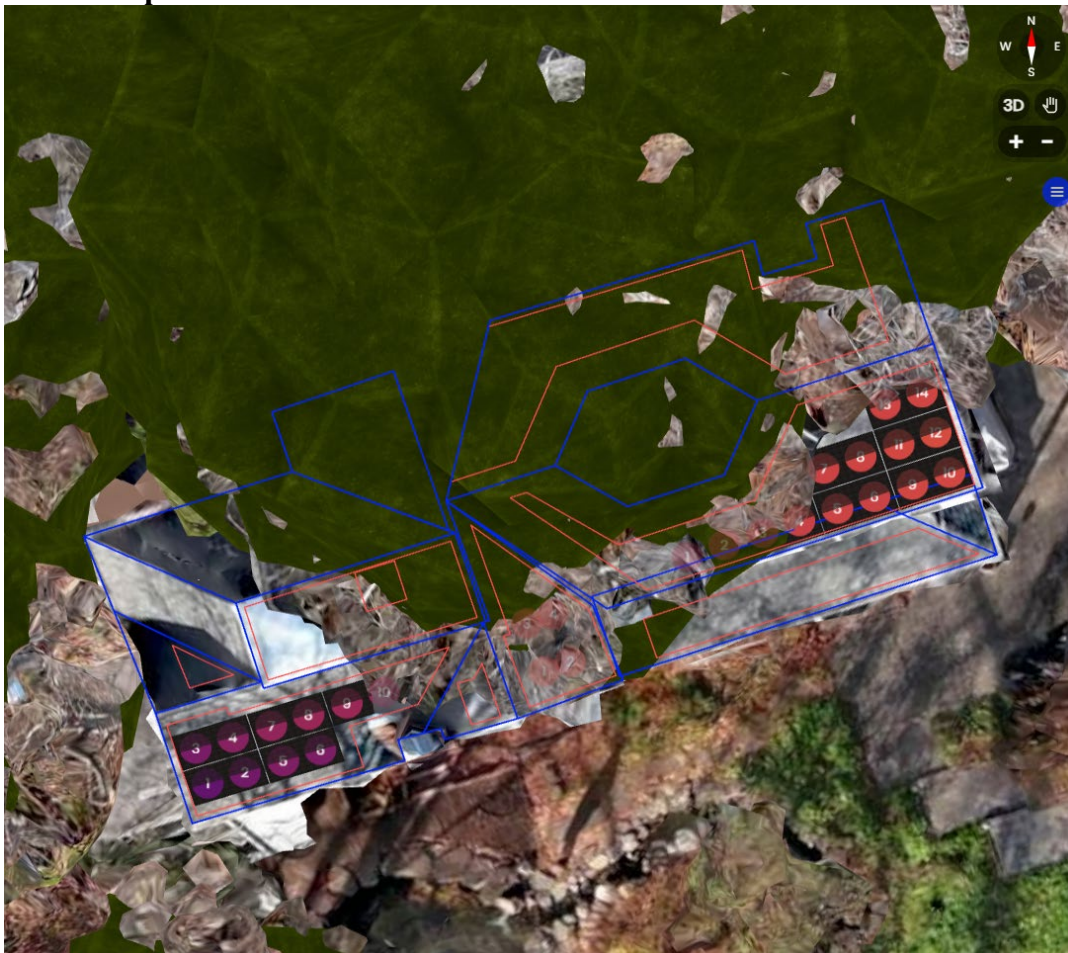
The panels will vary in production based on their location on the structure, but this estimated production for a **14**-panel system breaks down to roughly 264 kWh per panel annually.

- The 5 panels on the lower south facing roof plane have an average of 206 kWh per panel with an estimated annual production of 1,028 kWh. The 2 panels on the upper east facing roof plane have an average of 219 kWh per panel with an estimated annual production of 439 kWh. The 7 panels on the upper south facing roof plane have an average of 317 kWh per panel with an estimated annual production of 2,222 kWh.

Justification for the Placement of the panels.

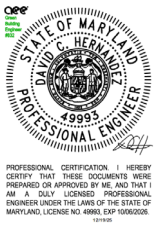
- As noted above, the panels on the upper south of the home have a higher average kWh per module compared to modules on the lower part of the house and on the side of the house.
- There are also trees on the front of the property that would be limiting visibility from the right-of-way

Shade Map.

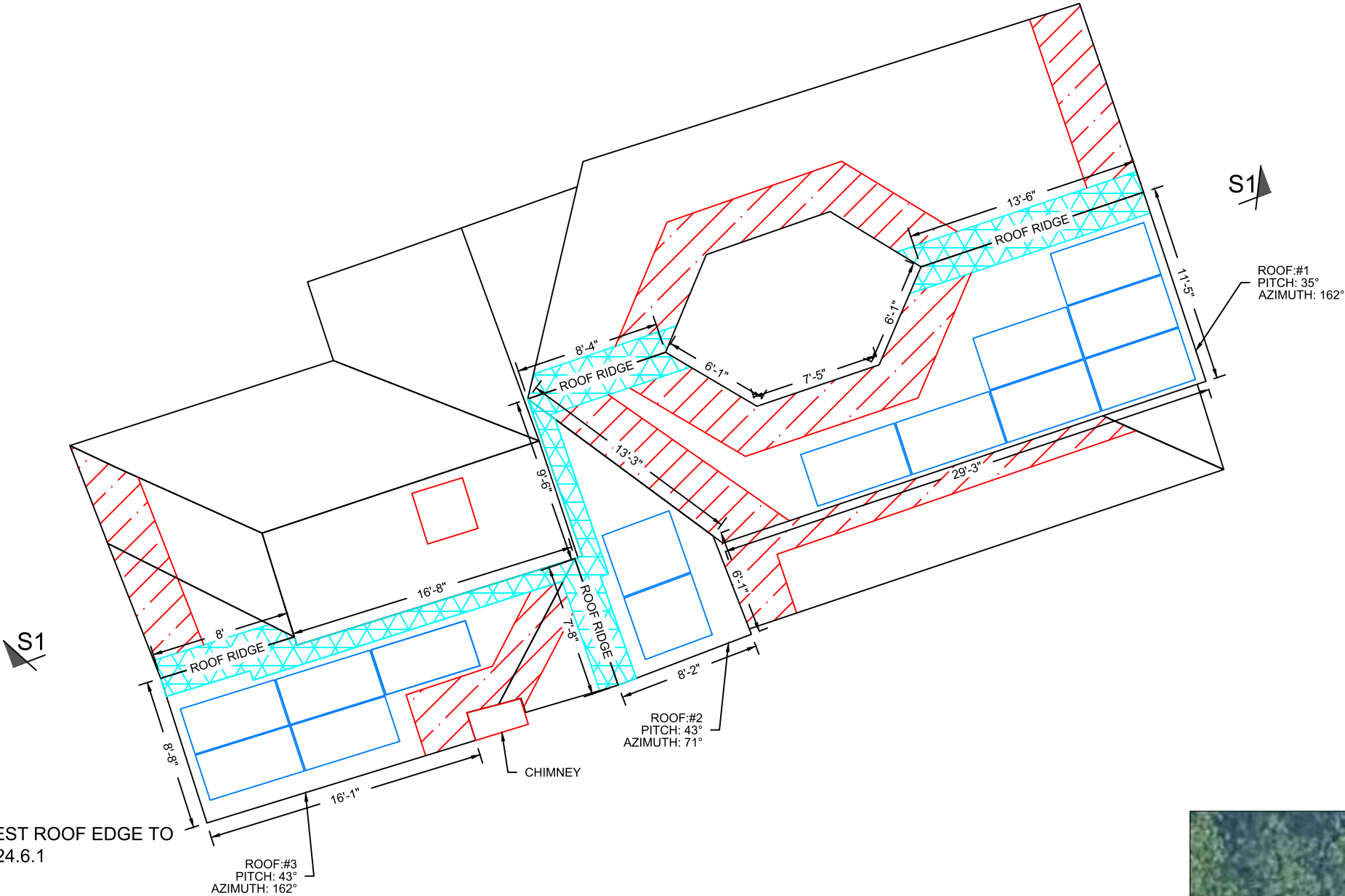


Thank you,
Andrew Tam
Design Engineer.

Critter Guard



David C. Hernandez, PE
Digitally signed by David C. Hernandez, PE
Date: 2025.12.19 17:37:28 -05:00



ROOF:#1
PITCH: 35°
AZIMUTH: 162°

ROOF:#2
PITCH: 43°
AZIMUTH: 71°

ROOF:#3
PITCH: 43°
AZIMUTH: 162°

SOLAR PANEL LAYOUT

Scale: 1/8" = 1'-0"

PLAN VIEW TOTAL ROOF AREA: 1893 SQFT

SOLAR ARRAY AREA: 294.28 SQFT

THE SOLAR ARRAY IS 15.5% OF THE PLAN VIEW TOTAL ROOF AREA

NOTES:

- THE SYSTEM SHALL INCLUDE (14) LONGI LR5-54HPB-405M.
- SNAPNRACK TOPSPEED WILL BE INSTALLED IN ACCORDANCE WITH SNAPNRACK INSTALLATION MANUAL.
- REFER TO STRUCTURAL DRAWING FOR SECTIONS MARKED AND ADDITIONAL NOTES.



Solar Energy World LLC.
14880 Sweitzer Lane
Laurel, MD 20707
(888) 497-3233

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Building Code
International Residential Code (IRC) 2021

Electrical Code
National Electrical Code (NEC) 2017

Wind Speed
115 MPH

Snow Load
30 PSF

Modules
(14) LONGi LR5-54HPB-405M

Inverter(s)
(14) IQ8+-72-M-US

DC System Size
5.670 kW

AC System Size
4.060 kW

Customer Information
Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

Permit/Lender
None

City
Montgomery

Utility
Pepco

Sheet Name
Solar Panel Layout

Drawn By
AO

Date
December 18, 2025

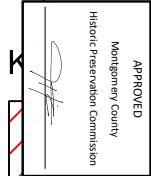
Scale
AS NOTED

Job Number
MD29711

Sheet
A-1

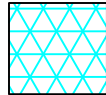


REVIEWED
By Devon Murtha at 12:05 pm, Mar 16, 2026

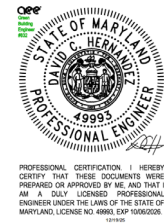


FIRE SAFETY ZONE

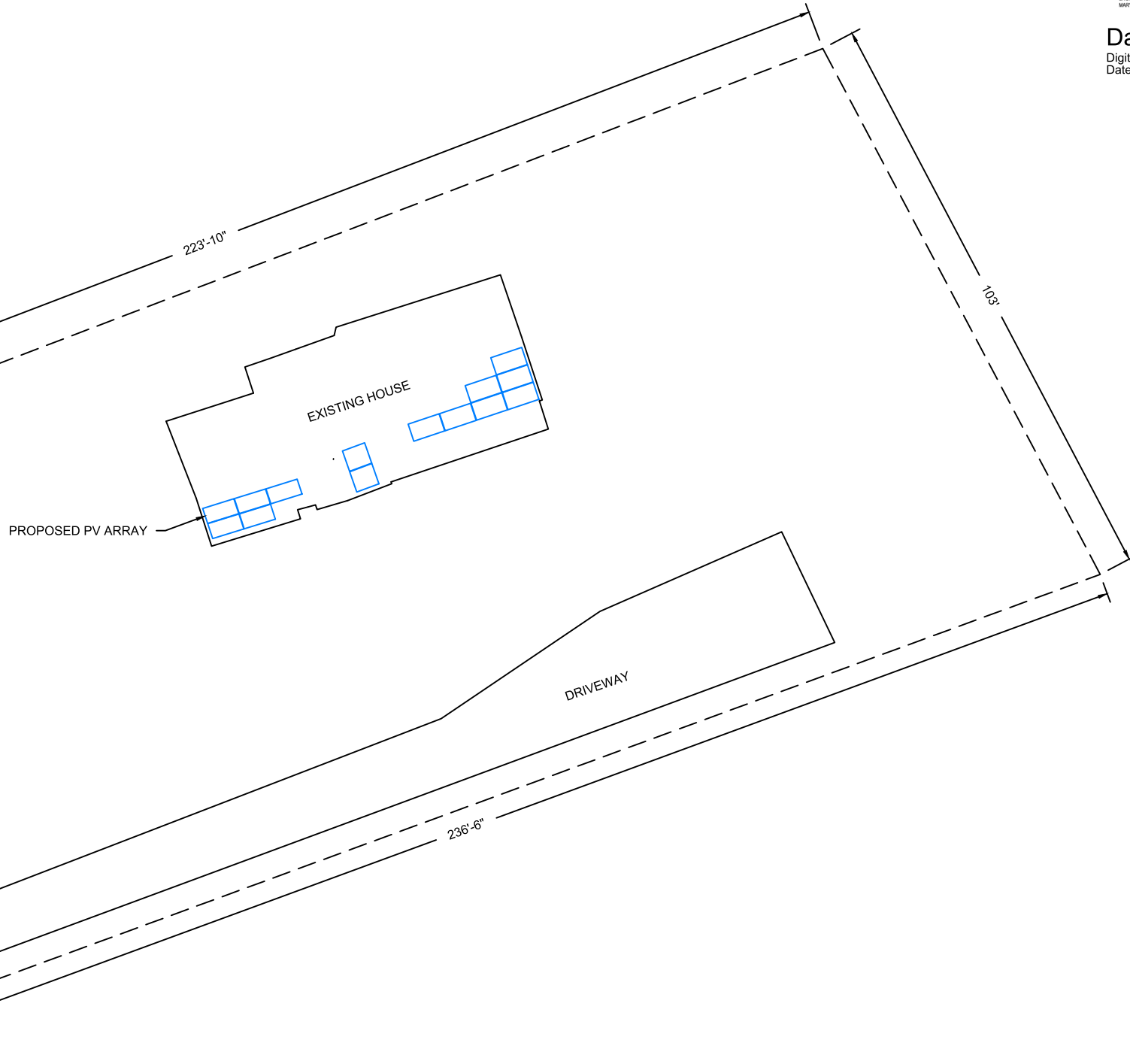
1'6" PATHWAYS FROM LOWEST ROOF EDGE TO RIDGE PROVIDED PER R324.6.1



1'6" PATHWAYS PROVIDED ON BOTH SIDES OF RIDGE PER R324.6.2



David C. Hernandez, PE
Digitally signed by David C. Hernandez, PE
Date: 2025.12.19 17:37:28 -05:00



SITE PLAN
Scale: 1" = 40'-0"

APPROVED
Montgomery County
Historic Preservation Commission



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Electrical Code
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Wind Speed 115 MPH	Snow Load 30 PSF
-----------------------	---------------------

Modules
(14) LONGi LR5-54HPB-405M

Inverter(s)
(14) IQ8+-72-M-US

DC System Size 5.670 kW	AC System Size 4.060 kW
----------------------------	----------------------------

Customer Information
Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

Partner/Lender
None

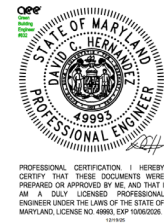
AVJ Montgomery	Utility Pepco
-------------------	------------------

Sheet Name
Site Plan

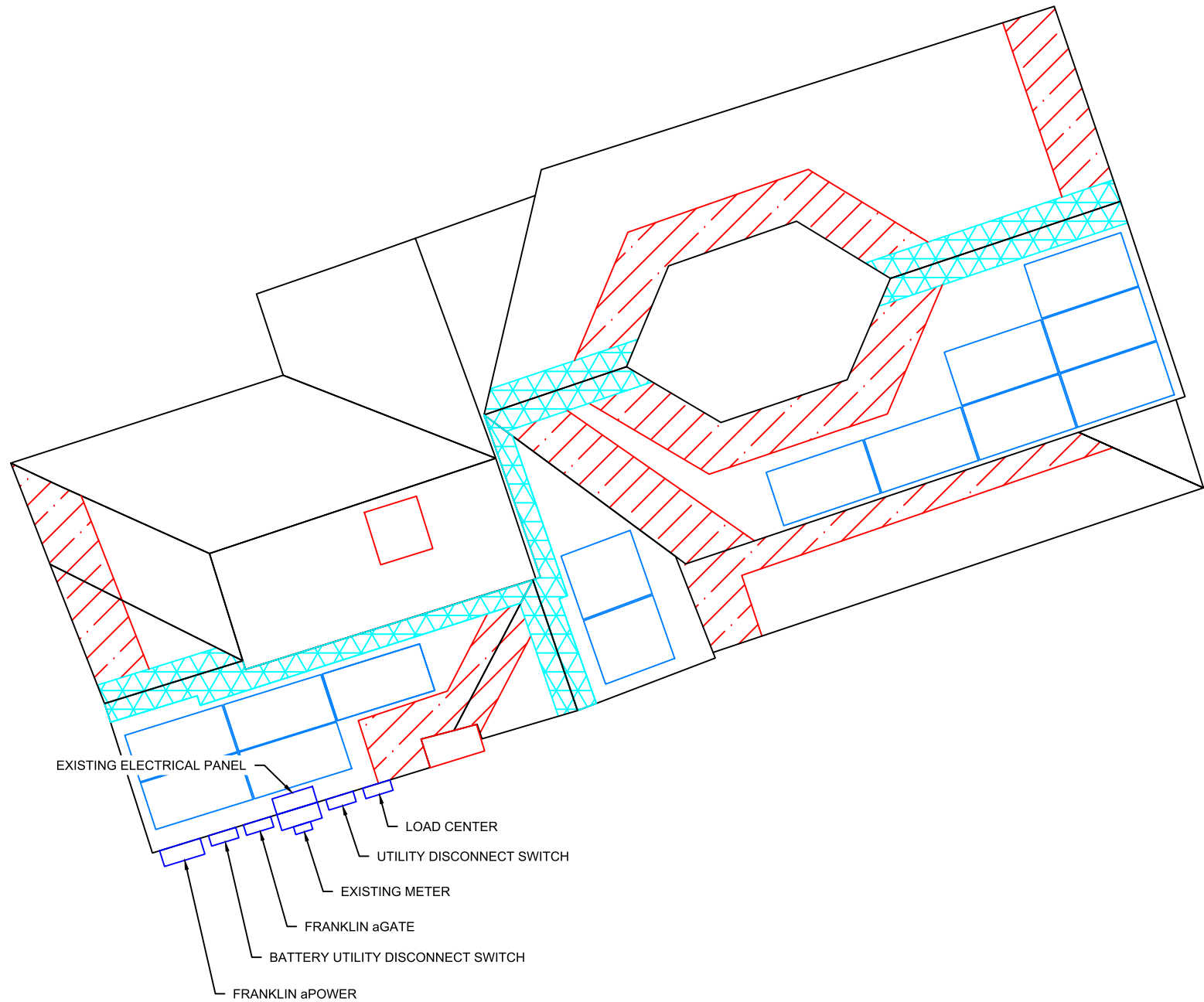
Drawn By AO	Date December 18, 2025
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Scale AS NOTED	Job Number MD29711	Sheet A-2
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REVIEWED
By Devon Murtha at 12:05 pm, Mar 16, 2026



David C. Hernandez, PE
Digitally signed by David C. Hernandez, PE
Date: 2025.12.19 17:37:28 -05:00



EQUIPMENT LOCATION PLAN
Scale: NTS

NOTE:
EQUIPMENT LOCATION PLAN IS APPROXIMATE, EXACT LOCATION TO BE VERIFIED WITH INSTALLATION CREW AND HOME OWNER AT THE TIME OF INSTALLATION.



SolarEnergyWorld
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Building Code
International Residential Code (IRC) 2021

Electrical Code
National Electrical Code (NEC) 2017

Wind Speed 115 MPH	Snow Load 30 PSF
-----------------------	---------------------

Modules
(14) LONGi LR5-54HPB-405M

Inverter(s)
(14) IQ8+-72-M-US

DC System Size 5.670 kW	AC System Size 4.060 kW
----------------------------	----------------------------

Customer Information
Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

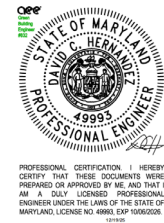
Permit/Lender
None

City Montgomery	Utility Pepco
--------------------	------------------

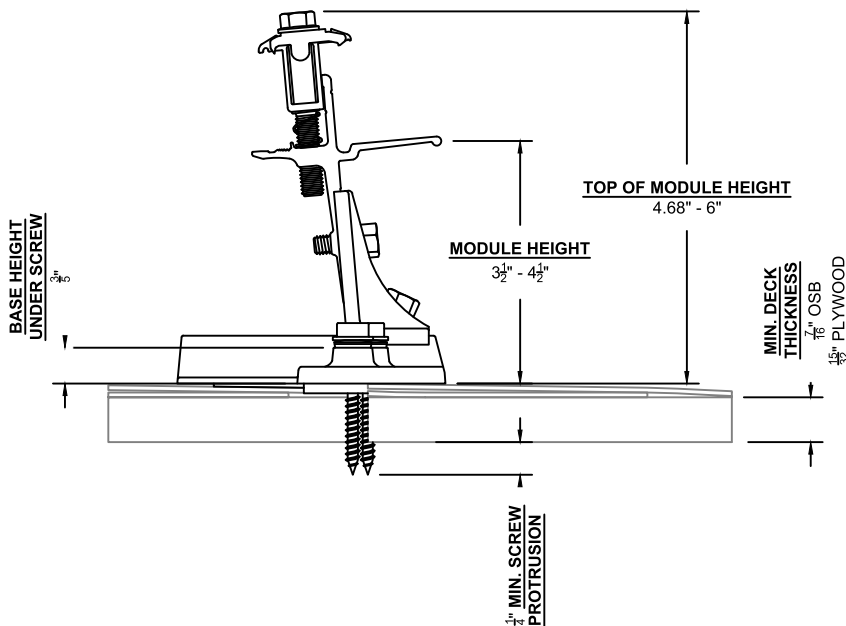
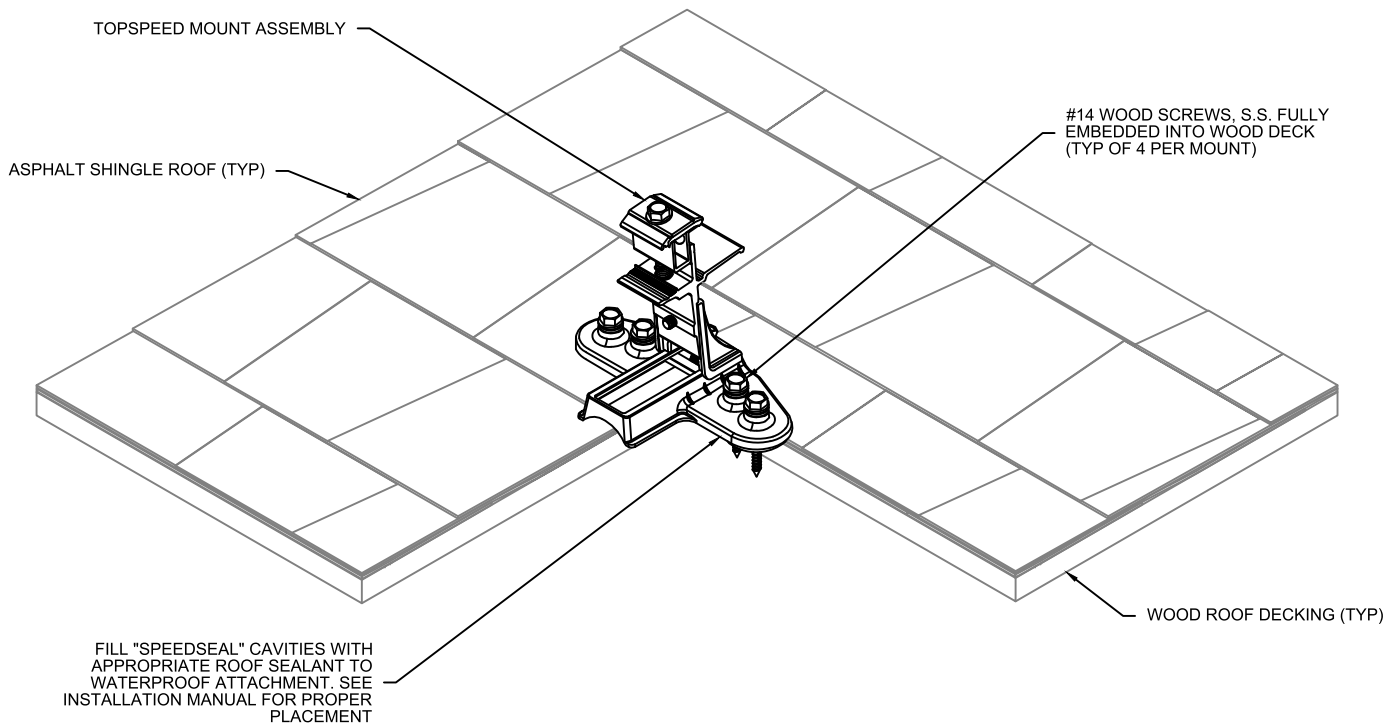
Sheet Name
Equipment Location Plan

Drawn By AO	Date December 18, 2025
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Scale AS NOTED	Job Number MD29711	Sheet E-1
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David C. Hernandez, PE
Digitally signed by David C. Hernandez, PE
Date: 2025.12.19 17:37:28 -05:00



Structural Details

After 2x10 O.C. 16"

NOTES:

- ALL WORK SHALL COMPLY WITH REQUIREMENTS OF INTERNATIONAL RESIDENTIAL CODE (IRC 2021), LOADING CODE (ASCE 7-16), WOOD DESIGN CODE (NDS 2015), AND LOCAL REQUIREMENTS.
- LOAD CRITERIA PER :
 - EXPOSURE CATEGORY "B"
 - GROUND SNOW LOAD, $P_g = 30$ PSF
 - LATERAL LOAD RISK CATEGORY "II"
 - ULTIMATE DESIGN WIND SPEED = 115 MPH
- SOLAR PANELS AND RACKING SYSTEMS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATION.
- FOLLOW ALL LOCAL AND FEDERAL SAFETY REQUIREMENTS.

STRUCTURAL ATTACHMENT DETAIL



SolarEnergyWorld
Because Tomorrow Matters

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Laurel, MD 20707
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Electrical Code
National Electrical Code (NEC) 2017

Wind Speed 115 MPH	Snow Load 30 PSF
-----------------------	---------------------

Modules
(14) LONGi LR5-54HPB-405M

Inverter(s)
(14) IQ8+-72-M-US

DC System Size 5.670 kW	AC System Size 4.060 kW
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Customer Information
Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

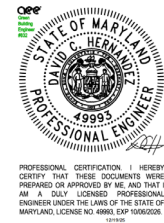
Permit/Lender
None

City Montgomery	Utility Peppo
--------------------	------------------

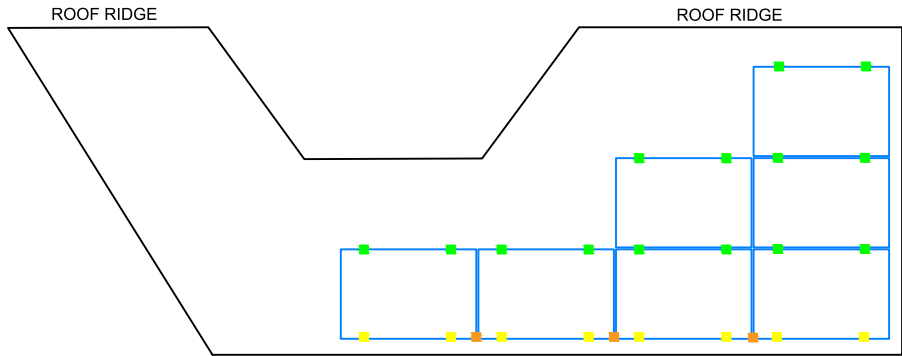
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Structural Attachment Details

Drawn By AO	Date December 18, 2025
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Scale AS NOTED	Job Number MD29711	Sheet S-1
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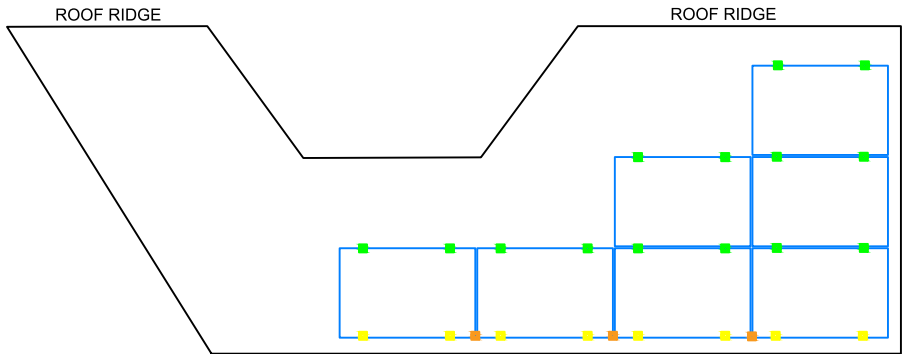


David C. Hernandez, PE
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Date: 2025.12.19 17:37:28 -05:00



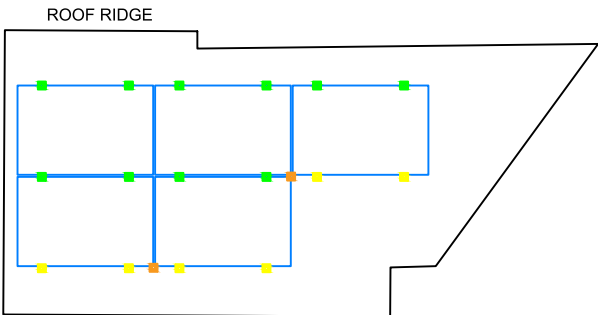
SOLAR PANEL FOOTING PLAN R1

Scale: 1/8" = 1'-0"



SOLAR PANEL FOOTING PLAN R2

Scale: 1/8" = 1'-0"



SOLAR PANEL FOOTING PLAN R3

Scale: 1/8" = 1'-0"

Bill Of Materials

Product	Count
Mounts Without Spacers	28
Mounts With Spacers	18
Clamps Without Spacers	0
Clamps With Spacers	6

CLAMPS WITHOUT SPACERS

CLAMPS WITH SPACERS

CLAMPS WITHOUT SPACERS

CLAMPS WITH SPACERS

NOTES:

- SNAPNRACK TOPSPEED SHALL BE INSTALLED IN ACCORDANCE WITH SNAPNRACK INSTALLATION MANUAL.
- ADD TOPSPEED CLAMP IF GREATER THAN (SOLAR PANEL LENGTH / 4) FOR LANDSCAPE OR (SOLAR PANEL WIDTH / 4) FOR PORTRAIT
- NO SOLAR PANEL SHALL CANTILEVER MORE THAN 1/4 SOLAR PANEL LENGTH OR WIDTH DEPENDING ON ORIENTATION. UNLESS FOR MANUFACTURER SPECIFIED CLAMPING ZONE



Solar Energy World LLC.
14880 Sweitzer Lane
Laurel, MD 20707
(888) 497-3233

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Building Code

International Residential Code (IRC) 2021

Electrical Code

National Electrical Code (NEC) 2017

Wind Speed

115 MPH

Snow Load

30 PSF

Modules

(14) LONGi LR5-54HPB-405M

Inverter(s)

(14) IQ8+-72-M-US

DC System Size

5.670 kW

AC System Size

4.060 kW

Customer Information

Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

Partner/Lender

None

AVU

Montgomery

Utility

Pepco

Sheet Name

Solar Panel Footing Plan

Drawn By

AO

Date

December 18, 2025

Scale

AS NOTED

Job Number

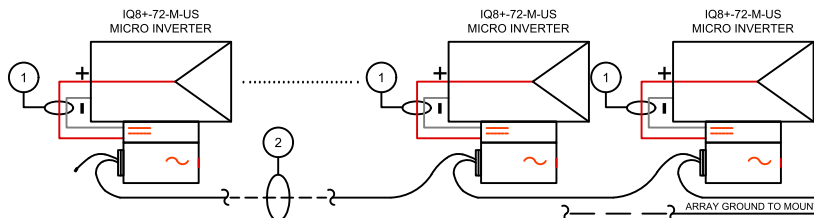
MD29711

Sheet

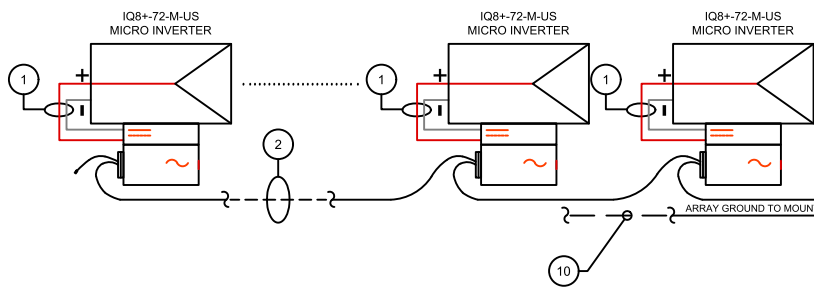
S-2

SMART INVERTERS

1 STRING OF 7 MODULES



1 STRING OF 7 MODULES



IQ COMBINER 5
(X-IQ-AM1-240-5-HDK)

ENVOY
(FACTORY INCLUDED)

AC DISCONNECT IS
LOCKABLE, TAGGABLE,
VISIBLE BREAK, 24/7
ACCESSIBLE

DU222RB
UTILITY
AC DISCONNECT
AMP RATING: 60A
VOLT RATING: 240V

25A PV BREAKER

FRANKLINWH
aGate 1.3

UTILITY
BI-DIRECTIONAL
ELECTRIC METER

METER IS RATED TO
MATCH THE 120/240V OF
THE XFMR FEEDING IT

DU222RB
BATTERY
DISCONNECT
AMP RATING: 60A
VOLT RATING: 240V

NFSS

MAIN SERVICE PANEL
200A, 240VAC, 1PH, 3W+G

MODES OF OPERATION:
SUPPORT FOR SOLAR
SELF-CONSUMPTION
TIME-BASED CONTROL &
BACKUP
CUSTOMER USING
BACKUP MODE
BATTERIES WILL NOT BE
EXPORTED TO THE GRID

3-LINE DIAGRAM

GENERAL ELECTRIC NOTES: NEC2017

- EQUIPMENT USED SHALL BE NEW, UNLESS OTHERWISE NOTED.
- EQUIPMENT USED SHALL BE UL LISTED, UNLESS OTHERWISE NOTED.
- EQUIPMENT SHALL BE INSTALLED PROVIDING ADEQUATE PHYSICAL WORKING SPACE AROUND THE EQUIPMENT AND SHALL COMPLY WITH NEC.
- COPPER CONDUCTORS SHALL BE USED AND SHALL HAVE AN INSULATION RATING OF 600V, 90°C, UNLESS OTHERWISE NOTED
- CONDUCTORS SHALL BE SIZED IN ACCORDANCE TO THE NEC. CONDUCTORS AMPACITY SHALL BE DE-RATED FOR TEMPERATURE INCREASE, CONDUIT FILL AND VOLTAGE DROP.
- ALL CONDUCTORS, EXCEPT PV WIRE SHALL BE INSTALLED IN APPROVED CONDUITS OR RACEWAY. CONDUITS SHALL BE ADEQUATELY SUPPORTED AS PER NEC.
- AC DISCONNECT SHOWN IS REQUIRED IF THE UTILITY REQUIRES VISIBLE-BLADE SWITCH.
- EXPOSED NON-CURRENT CARRYING METAL PARTS SHALL BE GROUNDED AS PER NEC.
- LINE SIDE INTER-CONNECTION SHALL COMPLY WITH NEC.
- SMS MONITORING SYSTEM AND IT'S CONNECTION SHOWN IS OPTIONAL. IF USED, REFER TO SMS INSTALLATION MANUAL FOR WIRING METHODS AND OPERATION PROCEDURE.
- ASHRAE FUNDAMENTAL OUTDOOR DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE U.S. (PHOENIX, AZ OR PALM SPRINGS, CA)
- FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF MOUNTED SUNLIGHT CONDUIT USING THE OUTDOOR TEMPERATURE OF 47°C
- 10AWG CONDUCTOR ARE GENERALLY ACCEPTABLE FOR MODULES WITH AN I_{sc} OF 9.6 AMPS WITH A 15 AMP FUSE.

WIRE SIZING FOR OCPD
EX ($I_{sc} * (1.25)/(1.25)$)/# OF STRINGS IN PARALLEL = WIRE AMPACITY OR USING NEC TABLE 690.8

BATTERY SPECIFICATIONS			
BATTERY MODEL #/ OF UNITS		[1] Franklin aPower 2 BATTERY	
APPROVED Montgomery County Historic Preservation Commission	PER UNIT	TOTAL	
	Y CAPACITY	15 kWh	15 kWh
	US OUTPUT POWER	10000 W	10000 W
	US OUTPUT CURRENT (DLTAGE OF 120/240V)	48 A	48 A
	PUT CURRENT (DLTAGE OF 120/240V)	150 A	150 A
	MODULE SPECIFICATIONS		
MODEL NUMBER		LR5-54HPB-405M	
PEAK POWER		405 W	
RATED VOLTAGE (Vmpp)		31.18 V	
RATED CURRENT (Imp)		12.99 A	
OPEN CIRCUIT VOLTAGE (Voc)		37.15 V	
SHORT CIRCUIT CURRENT (Isc)		13.78 A	
MAXIMUM SYSTEM VOLTAGE		1500VDC	
INVERTER SPECIFICATIONS			
MODEL NUMBER		IQ8PLUS-72-M-US	
MAXIMUM DC VOLTAGE		60 V	
MAXIMUM POWER OUTPUT		290 W	
NOMINAL AC VOLTAGE		240 VAC	
MAXIMUM AC CURRENT		1.21 A	
CEC EFFICIENCY		97.0%	
ARRAY DETAILS			
NO. OF MODULES PER STRING		7	
NO. OF STRINGS		2	
ARRAY WATTS AT STC		2835	

WIRE/CONDUIT SCHEDULE ARRAY			
TAG	DESCRIPTION	WIRE SIZE/TYPE	NOTES
1	Panel to Micro Inverter	PV Wire (Factory Made)	INTEGRATED
2	Micro Inverter to Micro Inverter	Pre-Manufactured Cable	
3	Micro Inverter to Transition Box	Pre-Manufactured Cable	
3A	Transition Box to Load Center	#10 THHN/THWN-2	
4	Load Center to Utility Disconnect	#10 Cu THHN/THWN-2	
5	Utility Disconnect to aGate	#10 Cu THHN/THWN-2	
6	aPower 2 to Battery Disconnect	#6 Cu THHN/THWN-2	
7	Battery Disconnect to aGate	#6 Cu THHN/THWN-2	
8	aGate to Main Service Panel	4/0 SER AL	
9	aGate to Meter	4/0 SEU AL	
10	Equipment Grounding Conductor	#8 Cu Bare Copper Wire	
11	Equipment Grounding Conductor	#8 Cu THHN/THWN-2	
12	Grounding Electrode Conductor	#6 Cu	



SolarEnergyWorld
Because Tomorrow Matters

Solar Energy World LLC.
14880 Sweitzer Lane
Laurel, MD 20707
(888) 497-3233

Disclaimer:
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Building Code International Residential Code (IRC) 2021	
Electrical Code National Electrical Code (NEC) 2017	
Wind Speed 115 MPH	Snow Load 30 PSF

Modules	
(14) LONGi LR5-54HPB-405M	
Inverter(s)	
(14) IQ8+-72-M-US	
DC System Size	AC System Size
5.670 kW	4.060 kW

Customer Information
Jeremiah Frueauf
7013 Poplar Ave
Takoma Park, MD 20912

Partner/Lender	
None	
AHJ	Utility
Montgomery	Pepco

Sheet Name Electrical 3-Line Diagram		
Drawn By AO	Date December 18, 2025	
Scale AS NOTED	Job Number MD29711	Sheet E-2



DEPARTMENT OF PERMITTING SERVICES

Marc Elrich
County Executive

Rabbiah Sabbakhan
Director

HISTORIC AREA WORK PERMIT APPLICATION

Application Date: 1/6/2026

Application No: 1145456
AP Type: HISTORIC
Customer No: 1408761

Affidavit Acknowledgement

The Contractor is the Primary applicant authorized by the property owner
This application does not violate any covenants and deed restrictions

Primary Applicant Information

Address 7013 POPLAR AVE
TAKOMA PARK, MD 20912

Othercontact Solar Energy World (Primary)

Historic Area Work Permit Details

Work Type ALTER

Scope of Work Install (14) roof mounted solar panels, 5.67 kW

