

November 30, 2022

Encōr Solar, LLC  
 3049 Executive Pkwy, Ste 300  
 Lehi, UT 84043

RE: Engineering Services  
 Faison Residence  
 61 Tradewinds Dr, Spring Lake, NC  
 7.6 kW System  
 Solo Job #2884368

To Whom It May Concern,

We have reviewed the following information regarding the solar panel installation for this project. Alterations to these documents or plans shall not be made without direct written consent of the Engineer of Record.

**A. Assumptions from Field Observation provided by Encōr Solar, LLC**

The following structural design regarding the proposed alterations have been prepared from these assumptions. The verification of the field observations is the responsibility of the contractor. **Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the sealed plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies.**

	<u>Roof</u>
Roof Finish :	Asphalt Shingle
Roof Underlayment :	OSB
Roof Profile :	Gable
Roof Structural System :	Metal Plate Trusses
Truss Top Chord/Setup :	2 x 4 / Attic
Chord/Rafter Wood Grade :	Southern Pine #2 or better
Truss/Rafter Spacing :	24" o.c.
Roof Slope :	25 deg
Max Top Chord/Rafter Span :	5.87 ft
Bearing Wall Type :	Convl Lt-Frame Constr
Foundation :	Permanent Concrete
Stories :	Single

**B. Building Design Criteria**

Code : 2018 NCRC (ASCE 7-10)	Risk Category : II
Roof Live Load : 20 psf (0 psf at panels)	Occupancy Class : R-3
Ground Snow Load : 10 psf	Roof Dead Load : 6.5 psf
Ult Wind Speed : 120 mph	PV Dead Load : <u>3 psf</u>
Exposure Category : C	Total Dead Load : 9.5 psf

**C. Summary of Existing Structure Results**

Roof

After review of the field observations and based on our calculations and in accordance with the applicable building codes and current industry standards, the existing roof structure supporting the proposed alterations consisting of the solar array has been determined to be:

- Adequate to support the additional imposed loads. **No structural upgrades are required.**

**D. Solar Panel Support Bracket Anchorage**

- 1. Solar panels shall be designed, mounted, and installed in accordance with the most recent "SnapNrack Manual", which can be found on the SnapNrack website (<http://snapnrack.com/>).
- 2. Manufacturer's Panel Bracket Connection to Roof Chord/Rafter Member:

Fastener : (1) 5/16" Lag Screw per Bracket  
 NDS Withdrawl Value : 307 lbs/inch  
 Min. Thread Length and Penetration Depth : 2.5"

- 3. Considering the existing roof's slope, size, spacing, condition, and calculated loads, the panel bracket supports shall be placed no greater than 48 in. o/c.
- 4. Panel supports connections shall be staggered to distribute load to adjacent trusses.

**E. Overall Summary**

Based on the information supplied to us at the time of this report, on the evaluation of the existing structure, and solar array panel bracket connection, it is our opinion that the roof system will adequately support the additional loads imposed by the solar array. This evaluation conforms to 2018 NCRC and current industry standards.

Should you have any questions regarding this letter or if you require further information, do not hesitate to contact me.

Sincerely,

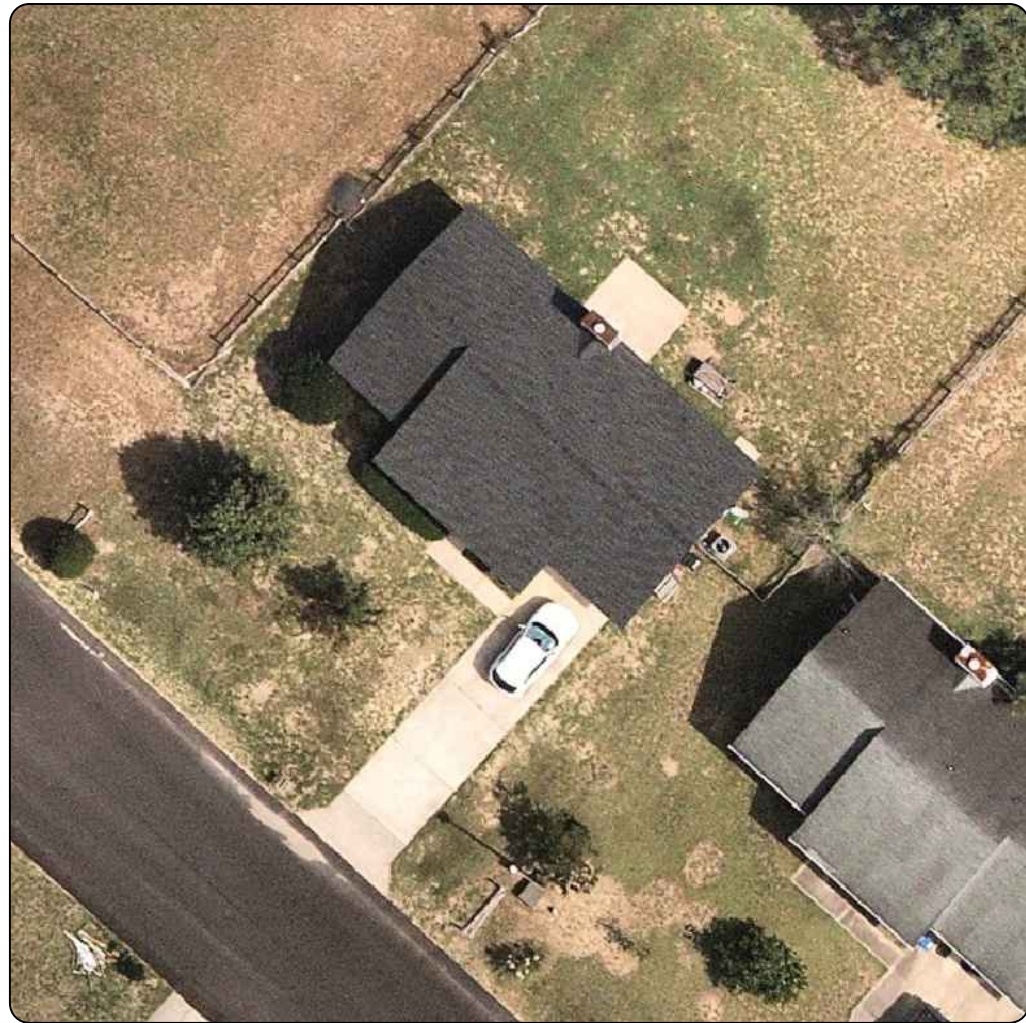


Nicholas J. Bowens, PE  
License No. 55156

**Limits of Scope of Work and Liability**

The existing structure is assumed to have been designed and constructed following appropriate codes at the time of erection and assumed to have appropriated permits. The calculations performed are only for the roof framing supporting the solar array installation referenced in the stamped plans and were completed according to generally recognized structural analysis standards and procedures, professional engineering, and design experience opinions and judgements. Existing deficiencies which are unknown or were not observed during the time the site observation are not included in this scope of work. All solar panel modules, racking, and mounting equipment shall be designed and installed per the manufacturer's approved installation specifications. The Engineer of Record and the engineering consulting firm assume no responsibility for misuse or improper installation. This analysis is not stamped for water leakage. Framing was determined on information in provided plans and/or photos, along with engineering judgement. Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies prior to starting construction. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation. The contractor shall also verify that there are no damage/deficiencies (i.e., dry rot, water damage, termite damage, framing member/connection damage, etc.) to framing that was not addressed in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any concerns prior to starting construction.

**AERIAL VIEW:**



**STREET VIEW:**



**CONTRACTOR INFORMATION:**  
ENCOR SOLAR, LLC  
3049 Executive Parkway  
Suite 300  
Lehi, UT 84043  
License # 32830

**SITE INFORMATION**

**Teresa Faison**  
61 Tradewinds Dr  
Spring Lake, NC 28390  
AC System Size: 7.6 kW AC  
DC System Size: 8.4 kW DC  
Lat, 35.2440505  
Long, -78.8777399  
(21) United Renewable Energy (Ureco) URECO  
FBM400MFG-BB PV Modules  
(1) SolarEdge SE7600H-US (240V) Inverter(s)  
  
(21) SolarEdge S440 Optimizers

South River EMC

**SHEET INDEX:**

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- PV04 MOUNTING DETAIL
- PV05 LINE DIAGRAM
- PV06 ELECTRICAL CALCS
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- PV09 SITE PHOTOS

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DATE:  
November 17, 2022

COVER PAGE - PV01

**GENERAL NOTES**

1. INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING
2. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110
3. ALL WIRES, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250
4. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES
5. ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
6. DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
7. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE

**PHOTOVOLTAIC (PV) SYSTEM SPECIFICATIONS**

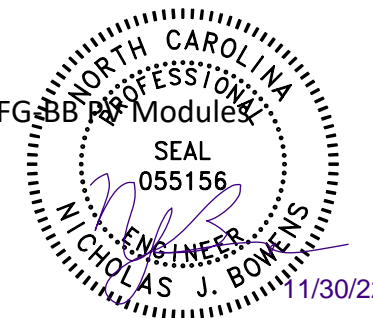
AC System Size: 7.6 kW AC  
DC System Size: 8.4 kW DC  
(21) United Renewable Energy (Ureco) URECO FBM400MFG-BB PV Modules  
(1) SolarEdge SE7600H-US (240V) Inverter(s)  
(21) SolarEdge S440 Optimizers  
Racking: Speedseal Foot - 48" O.C.

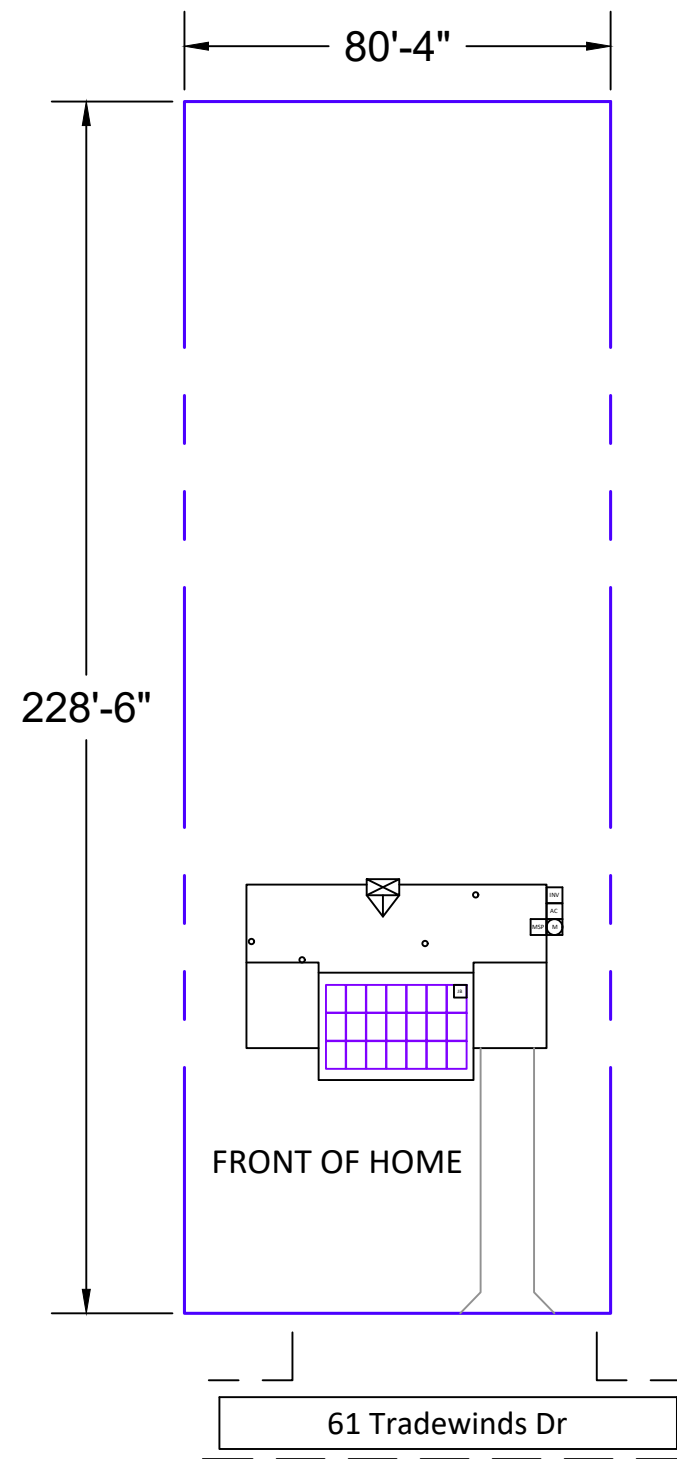
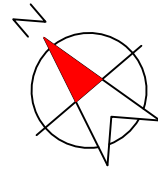
**APPLICABLE GOVERNING CODES**

2020 NATIONAL ELECTRICAL CODE  
2018 NORTH CAROLINA STATE BUILDING CODE: RESIDENTIAL  
2018 NORTH CAROLINA STATE BUILDING CODE: BUILDING  
2018 NORTH CAROLINA STATE BUILDING CODE: FIRE

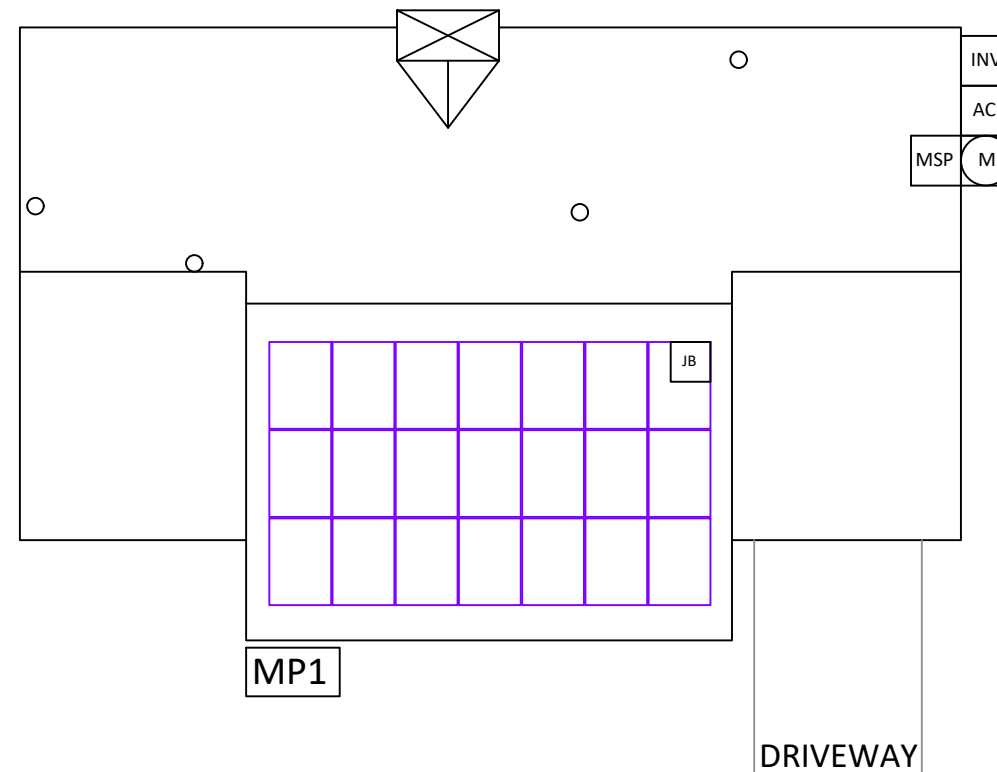
**SITE SPECIFICATIONS**

OCCUPANCY: R-3  
ZONING: RESIDENTIAL





**CLOSE UP OF HOME**



ARRAY DETAILS:		
MOUNTING PLANE:	AZIMUTH:	TILT:
MP1	222°	25°

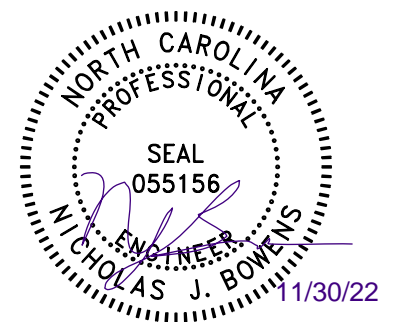


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South River EMC

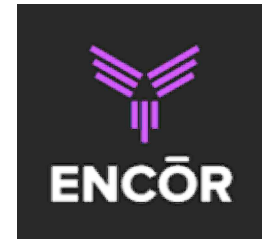
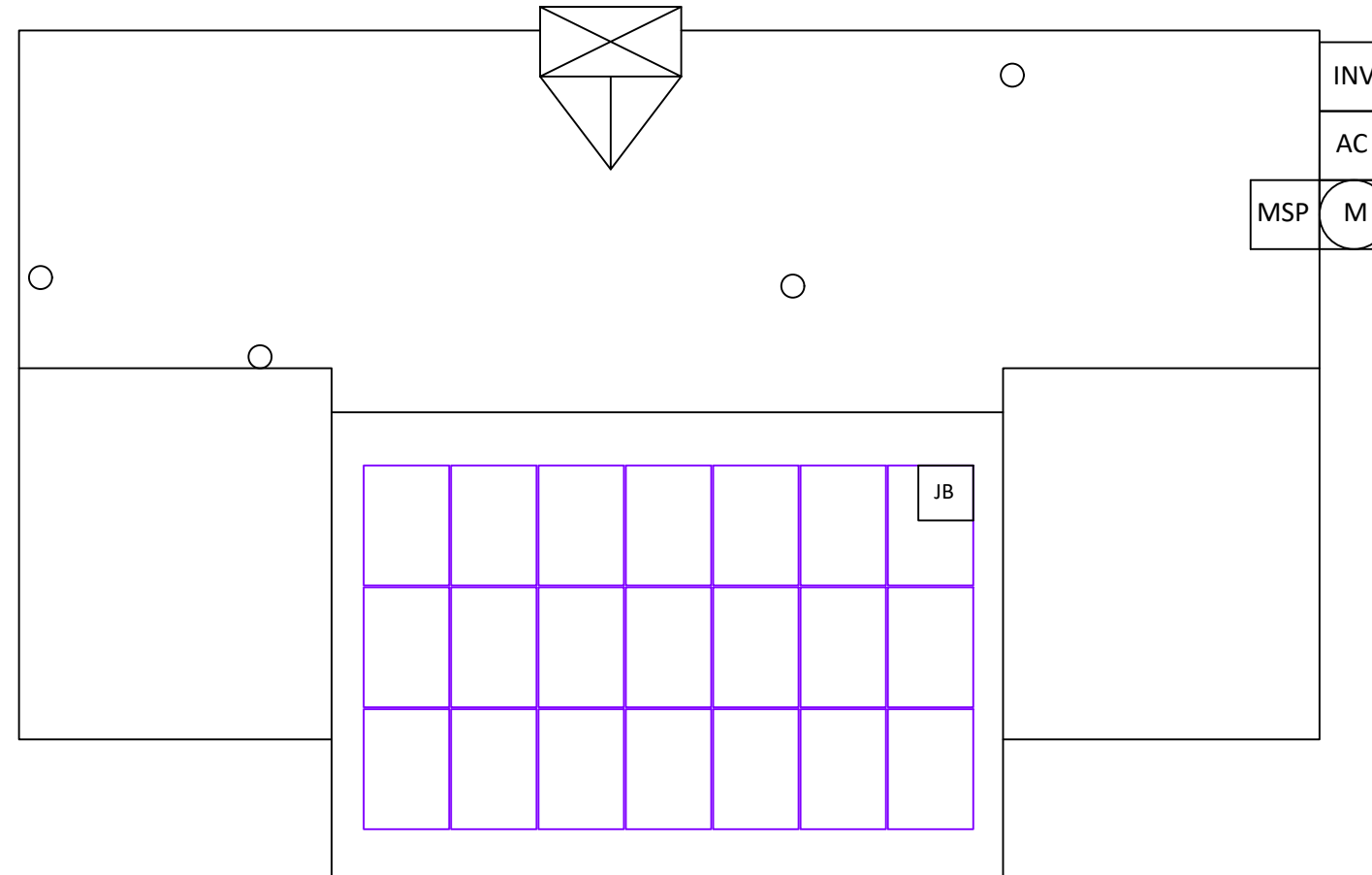
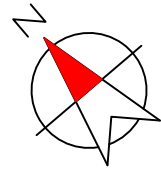


**EQUIPMENT LEGEND:**

- UTILITY METER
- VISIBLE, LOCKABLE, LABELED AC DISCONNECT
- INVERTER
- SUB PANEL
- SERVICE DISCONNECT
- PV MODULES
- FIRE ACCESS PATHWAY (3' TYP)
- MAIN SERVICE PANEL
- METER SOCKET (FOR UTILITY PV METER)
- COMBINER BOX
- LOAD CENTER
- BATTERY(IES)
- JUNCTION BOX
- PROPERTY LINE

VISIBLE, LOCKABLE,  
 LABELED AC DISCONNECT  
 LOCATED WITHIN 10'  
 OF UTILITY METER

**DRAWN BY: SoloCAD**  
 DATE:  
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 SITE PLAN - PV02



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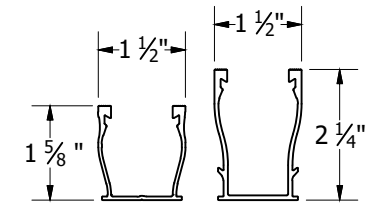
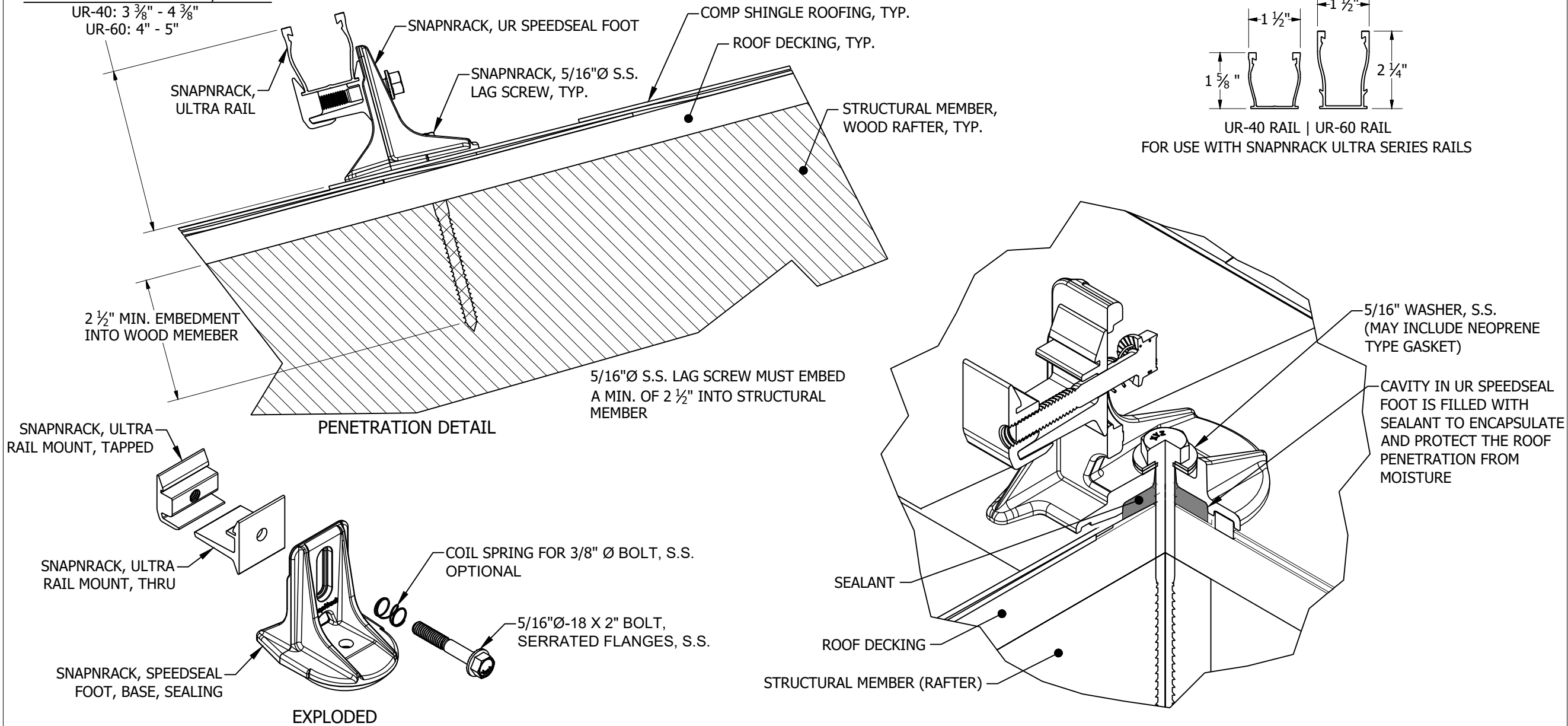
**ROOF ATTACHMENTS - PV03**

EQUIPMENT INFORMATION:		ROOF INFO:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:	
RAIL MANUFACTURER:	SnapNrack	ROOF TYPE:	Asphalt Shingle	PV MODULE COUNT:	21
RAIL PART NUMBER:	Ultra Rail UR-40	ROOF FRAMING:	Manufactured Truss	ARRAY AREA:	MODULE COUNT * 21.01 ft <sup>2</sup> = 441.21
ATTACHMENTS	Speedseal Foot	RAFTER/TOP CHORD SIZE:	2x4	ROOF AREA:	1920 ft <sup>2</sup>
ATTACHMENT QTY:	42	RAFTER/TOP CHORD SPACING:	24"	PERCENT OF ROOF COVERED:	23%
SPLICE QTY:	6	ATTACHMENT SPACING:	48"	ARRAY WEIGHT:	MODULE COUNT * 48 lbs = 1008 lbs
MIDCLAMP QTY:	36			POINT LOAD:	ARRAY LBS/ATTACHMENTS = 24
ENDCLAMP QTY:	12			DISTRIBUTED LOAD: (lbs/ft <sup>2</sup> )	(ARRAY) WEIGHT/AREA = 2.28 lbs/ft <sup>2</sup>

## SNAPNRACK UR SPEEDSEAL FOOT FOR COMPOSITION ROOF MOUNTING

MODULE HEIGHT OFF ROOF, RANGE:

UR-40: 3 3/8" - 4 3/8"  
UR-60: 4" - 5"



UR-40 RAIL | UR-60 RAIL  
FOR USE WITH SNAPNRACK ULTRA SERIES RAILS



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**MOUNTING DETAIL - PV04**

EQUIPMENT INFORMATION:		ROOF INFO:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:	
RAIL MANUFACTURER:	SnapNrack	ROOF TYPE:	Asphalt Shingle	PV MODULE COUNT:	21
RAIL PART NUMBER:	Ultra Rail UR-40	ROOF FRAMING:	Manufactured Truss	ARRAY AREA:	MODULE COUNT * 21.01 ft <sup>2</sup> = 441.21
ATTACHMENTS	Speedseal Foot	RAFTER/TOP CHORD SIZE:	2x4	ROOF AREA:	1920 ft <sup>2</sup>
ATTACHMENT QTY:	42	RAFTER/TOP CHORD SPACING:	24"	PERCENT OF ROOF COVERED:	23%
SPLICE QTY:	6	ATTACHMENT SPACING:	48"	ARRAY WEIGHT:	MODULE COUNT * 48 lbs = 1008 lbs
MIDCLAMP QTY:	36			POINT LOAD:	ARRAY LBS/ATTACHMENTS = 24
ENDCLAMP QTY:	12			DISTRIBUTED LOAD: (lbs/ft <sup>2</sup> )	(ARRAY) WEIGHT/AREA = 2.28 lbs/ft <sup>2</sup>

United Renewable Energy (Ureco) URECO FBM400MFG-BB Specs	
POWER MAX (P <sub>MAX</sub> ):	400 W
OPEN CIRCUIT VOLTAGE (VOC):	37.2 V
MAX POWER-POINT CURRENT (I <sub>MP</sub> ):	12.84 A
MAX POWER-POINT VOLTAGE (V <sub>MP</sub> ):	31.17 V
SHORT CIRCUIT CURRENT (ISC):	13.68 A
SERIES FUSE RATING:	20 A

SolarEdge SE7600H-US (240V) Specs	
MAX INPUT VOLTAGE:	480 V
MAX INPUT CURRENT:	20 A
NOMINAL DC INPUT VOLTAGE:	400 V
MAXIMUM OUTPUT POWER:	7600 W
NOM. OUTPUT VOLTAGE:	240 V
MAX OUTPUT CURRENT:	32 A
1-Phase, 60 HZ, UL 1741 Listed	

Equipment Schedule			
TYPE:	QTY:	DESCRIPTION:	RATING:
MODULES:	(21)	United Renewable Energy (Ureco) URECO FBM400MFG-BB	400 W
INVERTERS:	(1)	SolarEdge SE7600H-US (240V)	7600 W
AC DISCONNECT(S):	(1)	PV AC Disconnect, 240V, 2-Pole	60 A
DC OPTIMIZERS:	(21)	SolarEdge S440	15 Adc

Conduit & Conductor Schedule				
TAG	QTY	WIRE GAUGE	DESCRIPTION	CONDUIT SIZE
1	(2)	10 AWG	PV-WIRE, USE-2 ALUMINUM - (L1, L2)	N/A - FREE AIR
	(1)	6 AWG	BARE COPPER - (GROUND)	
2	(2)	10 AWG	THHN/THWN-2 COPPER - (L1, L2)	3/4" EMT
	(1)	10 AWG	THWN-2 COPPER - (GROUND)	
3	(4)	10 AWG	THHN/THWN-2 (L1, L2)	3/4" EMT
	(1)	10 AWG	THWN-2 COPPER -(GROUND)	
4	(3)	8 AWG	THWN-2 COPPER - (L1, L2, NEUTRAL)	3/4" EMT
	(1)	10 AWG	THWN-2 COPPER - (GROUND)	



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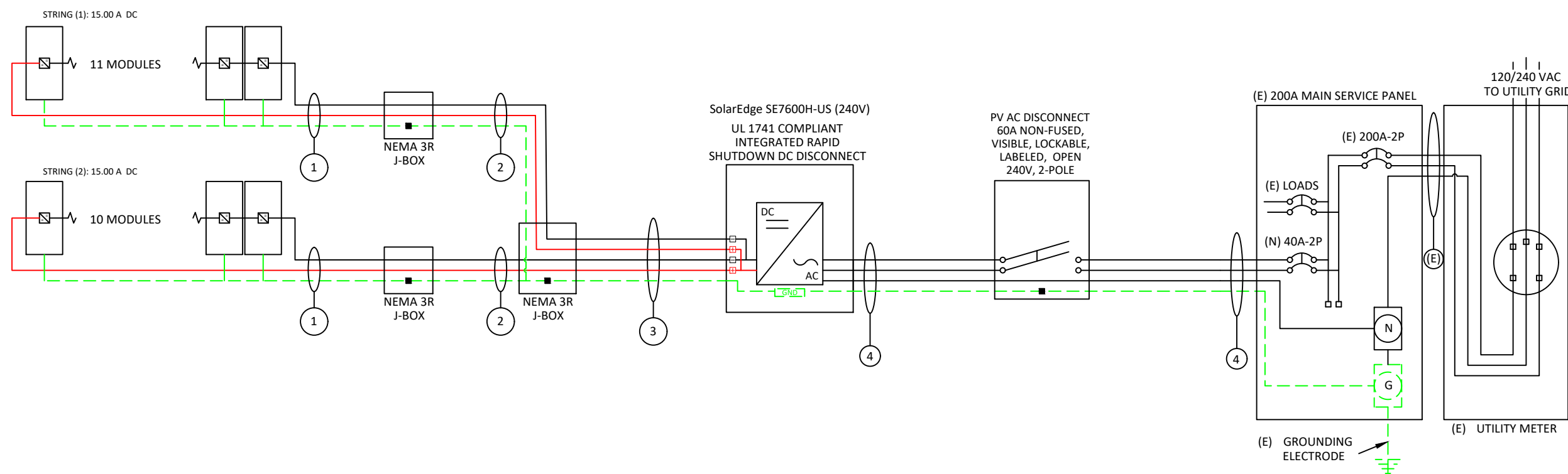
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**LINE DIAGRAM - PV05**



**VISIBLE, LOCKABLE,  
 LABELED AC DISCONNECT  
 LOCATED WITHIN 10'  
 OF UTILITY METER**

STRING CALCULATIONS		
SolarEdge SE7600H-US (240V)	STRING #1	STRING #2
OPTIMIZER MAX OUTPUT CURRENT	15A	15A
OPTIMIZERS IN SERIES:	11	10
NOMINAL STRING VOLTAGE:	400V	400V
ARRAY OPERATING CURRENT:	11A	10A
ARRAY DC POWER:	8400W	
TOTAL MAX AC CURRENT:	32.00A	

SYSTEM OCPD CALCULATIONS	
INVERTER MODEL(S):	SolarEdge SE7600H-US (240V)
# OF INVERTERS:	1
MAX OUTPUT CURRENT:	32A
(# OF INVERTERS) X (MAX OUTPUT CURRENT) X 125% <= OCPD RATING	
(1 X 32A X 1.25) = 40A <= 40A, OK	

NUMBER OF CURRENT CARRYING CONDUCTORS	PERCENT OF VALUES
4-6	.80
7-9	.70
10-20	.50

BUSBAR CALCULATIONS - 120% RULE	
MAIN BUSBAR RATING:	200A
MAIN DISCONNECT RATING:	200A
PV OCPD RATING:	40A
(MAIN BUS RATING X 120%) - MAIN DISCONNECT RATING >= OCPD RATING	
(200A X 1.2) - 200A = 40A, >= 40A, OK	

Conduit & Conductor Schedule											
TAG	QTY	WIRE GAUGE	DESCRIPTION	CONDUIT SIZE	CONDUCTOR RATING	CONDUCTOR TEMP. RATE	AMBIENT TEMP	TEMP. DERATE	# OF CONDUCTORS DERATE	CONDUCTOR RATING W/DERATES	CONDUIT FILL
1	(2)	10 AWG	PV-WIRE, USE-2 ALUMINUM - (L1, L2)	N/A - FREE AIR	35A	90°C	35°C	0.96	N/A - FREE AIR	33.6A	N/A - FREE AIR
	(1)	6 AWG	BARE COPPER - (GROUND)								
2	(2)	10 AWG	THHN/THWN-2 COPPER - (L1, L2)	3/4" EMT	40A	90°C	35°C	0.96	1	38.4A	11.9%
	(1)	10 AWG	THWN-2 COPPER - (GROUND)								
3	(4)	10 AWG	THHN/THWN-2 (L1, L2)	3/4" EMT	40A	90°C	35°C	0.96	0.8	30.72A	19.8%
	(1)	10 AWG	THWN-2 COPPER -(GROUND)								
4	(3)	8 AWG	THWN-2 COPPER - (L1, L2, NEUTRAL)	3/4" EMT	50A	75°C	35°C	0.94	1	47A	24.6%
	(1)	10 AWG	THWN-2 COPPER - (GROUND)								



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**ELECTRICAL CALCS - PV06**

**GROUNDING & GENERAL NOTES:**

- PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
- DC GEC AND AC EGC TO BE SPLICED TO EXISTING ELECTRODE
- ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
- JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
- AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.

**INTERCONNECTION NOTES:**

- INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12].
- GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95] AND [NEC 690.41]
- ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
- PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

**DISCONNECT NOTES:**

- DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
- AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH



# MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

**LABEL 1**  
 PLACED ON THE MAIN DISCONNECTING MEANS FOR THE PV SYSTEM.  
 [NEC 690.13(B)]

# PHOTOVOLTAIC AC DISCONNECT

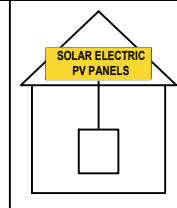
RATED AC OUTPUT CURRENT: 32  
 NOMINAL OPERATING AC VOLTAGE: 240

**LABEL 6**  
 MARKED AT AC DISCONNECTING MEANS.  
 [NEC 690.54]

# PHOTOVOLTAIC POWER SOURCE

## SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY



**LABEL 7**  
 AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.  
 [NEC 690.31(D)(2)]

**LABEL 8**  
 FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY:  
 SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.  
 [NEC 690.56(C)(1)]

# RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

**LABEL 9**  
 SIGN LOCATED ON OR NO MORE THAN 3FT FROM INITIATION DEVICE  
 [NEC 690.56(C)(2)].

**WARNING**  
**ELECTRIC SHOCK HAZARD**  
 TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

**LABEL 2**  
 FOR PV DISCONNECTING MEANS WHERE THE LINE AND LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN POSITION.  
 [NEC 690.13(B)]

**WARNING**  
 POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

**LABEL 3**  
 PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.  
 [NEC 705.12(B)(3)(2)]

**CAUTION**  
 MULTIPLE SOURCES OF POWER

**LABEL 4**  
 PLACED ON EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES  
 [NEC 705.10]

**WARNING**  
 THIS EQUIPMENT IS FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

**LABEL 5**  
 EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES.[NEC 705.12(B)(3)(3)]



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### SITE INFORMATION

**Teresa Faison**  
 61 Tradewinds Dr  
 Spring Lake, NC 28390  
 AC System Size: 7.6 kW AC  
 DC System Size: 8.4 kW DC  
 Lat, 35.2440505  
 Long, -78.8777399  
 (21) United Renewable Energy (Ureco) URECO FBM400MFG-BB PV Modules  
 (1) SolarEdge SE7600H-US (240V) Inverter(s)  
 (21) SolarEdge S440 Optimizers

South River EMC

**DRAWN BY: SoloCAD**

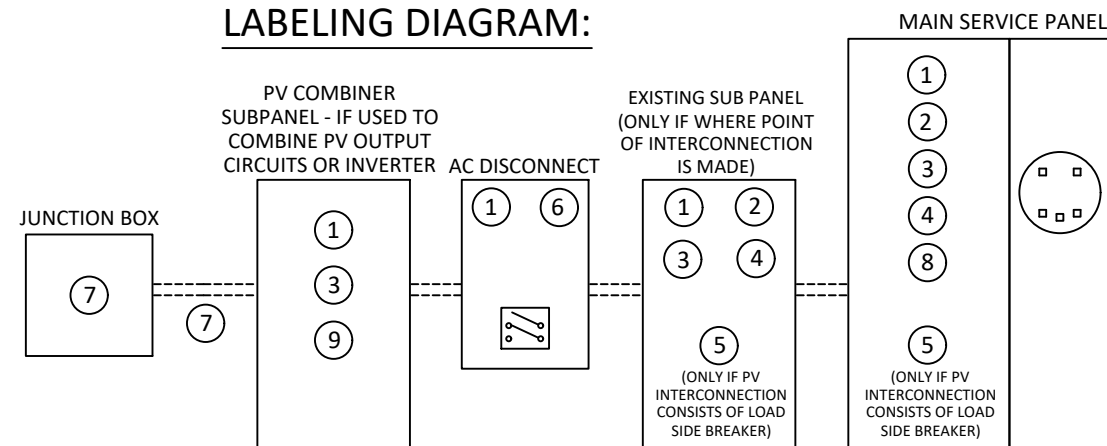
DATE:  
 November 17, 2022

**LABELS - PV07**

**LABELING NOTES:**

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [NEC 690.31(D)(2)]

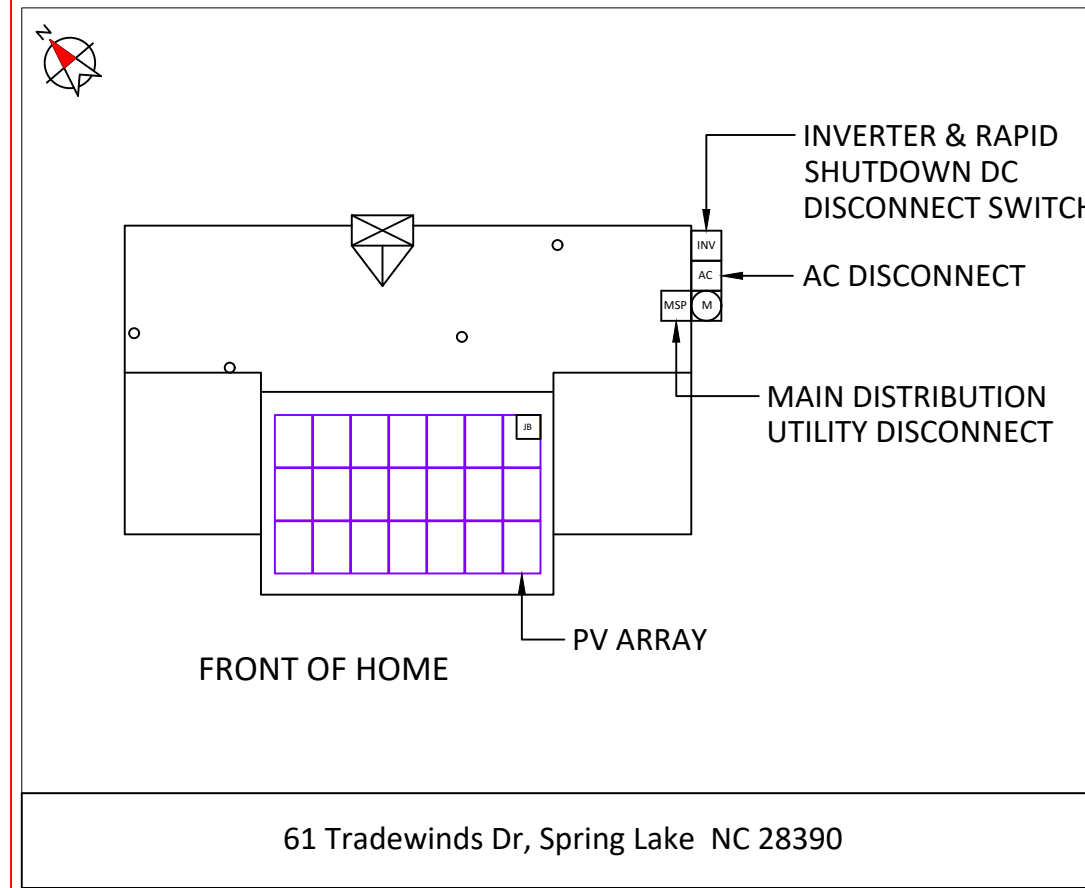
### LABELING DIAGRAM:



\*\* ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENTATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VARY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ELECTRICAL DIAGRAM PAGE. \*\*

# CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:



## DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN:  
NEC 690.56(B)&(C), [NEC 705.10])



## CONTRACTOR INFORMATION:

ENCOR SOLAR, LLC  
3049 Executive Parkway  
Suite 300  
Lehi, UT 84043  
License # 32830

## SITE INFORMATION

Teresa Faison

61 Tradewinds Dr  
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(21) SolarEdge S440 Optimizers

South River EMC

DRAWN BY: SoloCAD

DATE:  
November 17, 2022

PLACARD - PV08

**SITE PHOTOS:**



**CONTRACTOR INFORMATION:**  
**ENCOR SOLAR, LLC**  
 3049 Executive Parkway  
 Suite 300  
 Lehi, UT 84043  
 License # 32830

**SITE INFORMATION**

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 61 Tradewinds Dr  
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 (21) SolarEdge S440 Optimizers

South River EMC

**DRAWN BY: SoloCAD**

DATE:  
 November 17, 2022

**SITE PHOTOS - PV09**










FBM\_MFG-BB / 108 cells  
390W - 405 W  
Mono-Crystalline PV Module

URE Peach module uses URE state-of-the-art cell cutting technology, and advanced module manufacturing experiences.



## Key Features

-  Positive power tolerance +0 ~ +5 watt
-  100% EL inline inspection Better module reliability
-  Withstand heavy loading front load 5400 Pa & rear load 2400 Pa
-  Design for 1000 VDC Reduce the system BOS effectively
-  Excellent low light performance 3.5% relative eff. Reduction at low (200W/m<sup>2</sup>)

## Electrical Data

Model - STC		FBM390MFG-BB	FBM395MFG-BB	FBM400MFG-BB	FBM405MFG-BB
Maximum Rating Power (Pmax)	[W]	390	395	400	405
Module Efficiency	[%]	19.98	20.23	20.49	20.75
Open Circuit Voltage (Voc)	[V]	36.84	37.03	37.20	37.36
Maximum Power Voltage	[V]	30.82	31.00	31.17	31.36
Short Circuit Current (Isc)	[A]	13.50	13.59	13.68	13.78
Maximum Power Current	[A]	12.66	12.75	12.84	12.92

\*Standard Test Condition (STC): Cell Temperature 25 °C, Irradiance 1000 W/m<sup>2</sup>, AM 1.5  
\*Values without tolerance are typical numbers. Measurement tolerance: ± 3%

## Mechanical Data

Item	Specification
Dimensions	1723 mm (L) <sup>1</sup> x 1133 mm (W) <sup>1</sup> x 35 mm (D) <sup>2</sup> / 67.83" (L) <sup>1</sup> x 44.61" (W) <sup>1</sup> x 1.38" (D) <sup>2</sup>
Weight	21.7 kg / 47.84 lbs
Solar Cell	12x9 pieces monocrystalline solar cells series strings
Front Glass	White toughened safety glass, 3.2mm thickness
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Frame	Black anodized aluminum profile
Junction Box	IP≥ 68, 3 diodes
Cable & Connector	Potrait : 500 mm (cable length can be customized), 1 x 4 mm <sup>2</sup> compatible with MC4
Package Configuration	31 pcs Per Pallet, 806 pcs per 40' HQ container

<sup>1</sup> : With assembly tolerance of ± 2 mm [ ± 0.08" ]  
<sup>2</sup> : With assembly tolerance of ± 0.8 mm [ ± 0.03" ]

## Operating Conditions

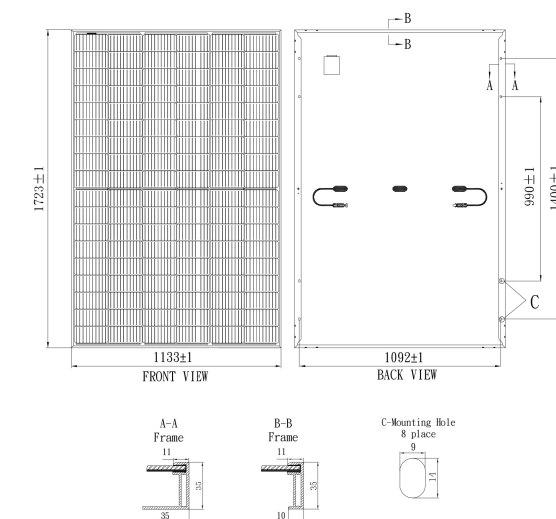
Item	Specification
Mechanical Load	5400 Pa
Maximum System Voltage	1000V
Series Fuse Rating	30 A
Operating Temperature	-40 to 85 °C

## Temperature Characteristics

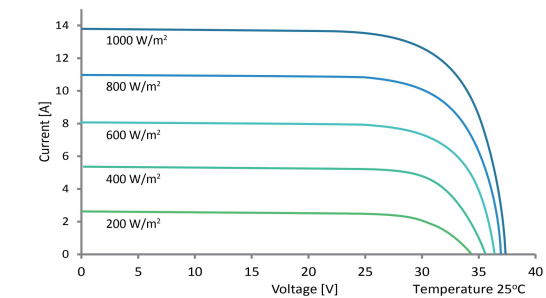
Item	Specification
Nominal Module Operating Temperature	45°C ± 2°C
Temperature Coefficient of Isc	0.048 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Pmax	-0.32 % / °C

\*Nominal module operating temperature (NMOT): Air mass AM 1.5, irradiance 800W/m<sup>2</sup>, temperature 20°C, windspeed 1 m/s.  
\*Reduction in efficiency from 1000W/m<sup>2</sup> to 200W/m<sup>2</sup> at 25°C: 3.5 ± 2%.

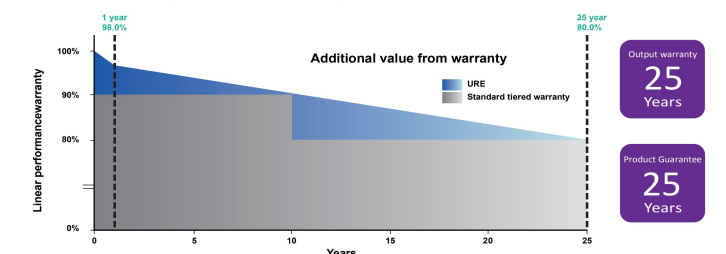
## Engineering Drawing (mm)



## Dependence on Irradiance



## Reliability with Warranty



For more information, please visit us at [www.urecorp.com](http://www.urecorp.com)

# Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

12-25  
YEAR  
WARRANTY



INVERTERS

## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

[solaredge.com](http://solaredge.com)



## Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US		
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4								
<b>OUTPUT</b>									
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac	
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>(1)</sup>							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
Power Factor	1, Adjustable - 0.85 to 0.85								
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
<b>INPUT</b>									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage				480				Vdc	
Nominal DC Input Voltage	380			400				Vdc	
Maximum Input Current @240V <sup>(2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V <sup>(2)</sup>	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600ka Sensitivity								
Maximum Inverter Efficiency	99	99.2							%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%	
Nighttime Power Consumption	< 2.5							W	

(1) For other regional settings please contact SolarEdge support

(2) A higher current source may be used; the inverter will limit its input current to the values stated

# / Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/  
SE7600H-US / SE10000H-US / SE11400H-US

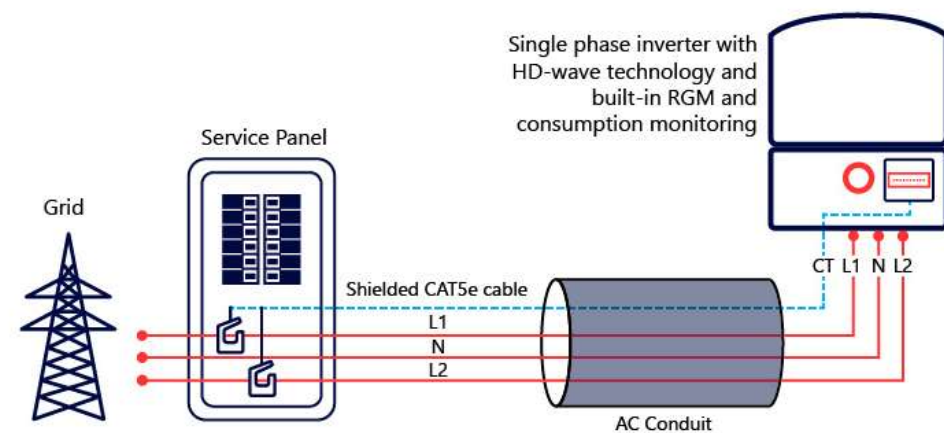
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional <sup>(3)</sup>						
Consumption metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
<b>STANDARD COMPLIANCE</b>							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCL according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)						
Emissions	FCC Part 15 Class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG			1" Maximum / 14-4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG			1" Maximum / 1-3 strings / 14-6 AWG			
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174			21.3 x 14.6 x 7.3 / 540 x 370 x 185			
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6			
Noise	< 25			< 50			
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 <sup>(4)</sup>						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

(3) Inverter with Revenue Grade Meter P/N: SExxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxH-US000BN4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20, 20 units per box

(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

## How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills



# Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505



POWER OPTIMIZER

## PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com



## / Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505


Optimizer model (typical module compatibility)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96- cell modules)	P401 (for high power 60 and 72 cell modules)	P485 (for high-voltage modules)	P505 (for higher current modules)		
<b>INPUT</b>							
Rated Input DC Power <sup>(1)</sup>	370	400	430	485	505	W	
Absolute Maximum Input Voltage (Voc at lowest temperature)	60	80	60	125 <sup>(2)</sup>	83 <sup>(2)</sup>	Vdc	
MPPT Operating Range	8 - 60	8 - 80	8-60	12.5 - 105	12.5 - 83	Vdc	
Maximum Short Circuit Current (Isc)	11	10.1	12.5	11	14	Adc	
Maximum DC Input Current	13.75	12.5	14.65	12.5	17.5		
Maximum Efficiency						99.5	%
Weighted Efficiency						98.8	%
Overtoltage Category						II	
<b>OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)</b>							
Maximum Output Current						15	Adc
Maximum Output Voltage				80		Vdc	
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)</b>							
Safety Output Voltage per Power Optimizer						1 ± 0.1	Vdc
<b>STANDARD COMPLIANCE</b>							
EMC						FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3	
Safety						IEC62109-1 (class II safety), UL1741, NEC/PVRSS	
Material						UL94 V-0, UV Resistant	
RoHS						Yes	
<b>INSTALLATION SPECIFICATIONS</b>							
Maximum Allowed System Voltage						1000	Vdc
Compatible inverters						All SolarEdge Single Phase and Three Phase inverters	
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 / 5.1 x 6 x 1.16	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3		mm / in
Weight (including cables)	630 / 1.4	750 / 1.7	655 / 1.5	845 / 1.9	1064 / 2.3		gr / lb
Input Connector						MC4 <sup>(3)</sup>	MC4 <sup>(3)</sup>
Input Wire Length						0.16 / 0.5	
Output Wire Type / Connector						Double Insulated / MC4	
Output Wire Length						1.2 / 3.9	
Operating Temperature Range <sup>(4)</sup>						-40 to +85 / -40 to +185	
Protection Rating						IP68 / Type6B	
Relative Humidity						0 - 100	

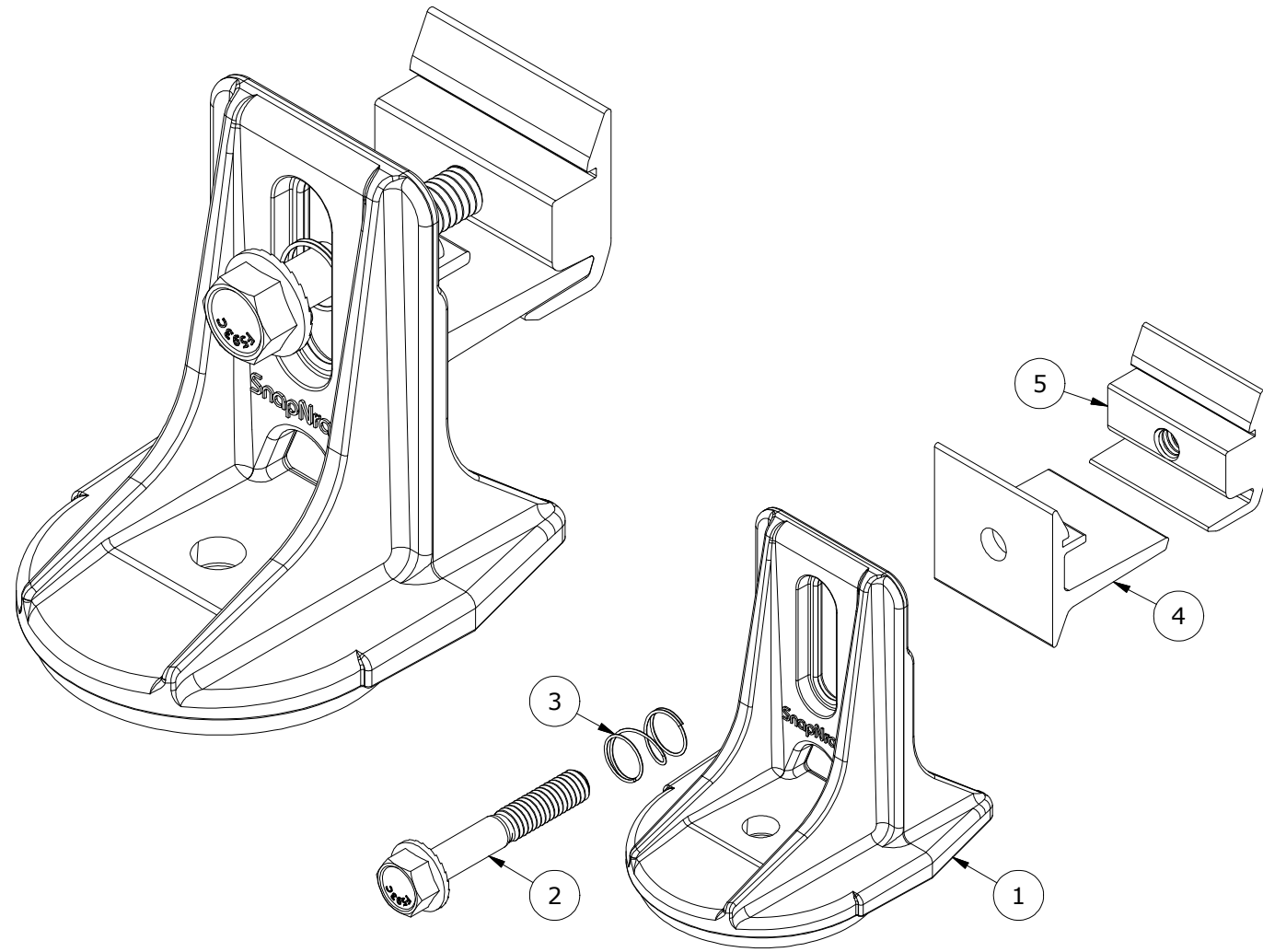
(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed  
 (2) NEC 2017 requires max input voltage be not more than 80V  
 (3) For other connector types please contact SolarEdge  
 (4) Longer inputs wire lengths are available for use. For 0.9m input wire length order P401-xxxLxxx  
 (5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

PV System Design Using a SolarEdge Inverter <sup>(6)(7)</sup>	Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid		
Minimum String Length (Power Optimizers)	P370, P400, P401 P485, P505	8	10	18		
Maximum String Length (Power Optimizers)		6	8	14		
		25	25	50		
Maximum Power per String		5700 <sup>(8)</sup> (6000 with SE7600-US - SE11400-US)	5250 <sup>(8)</sup>	6000 <sup>(9)</sup>	12750 <sup>(10)</sup>	
Parallel Strings of Different Lengths or Orientations						Yes

(6) For detailed string sizing information refer to: [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf)  
 (7) It is not allowed to mix P485/P505 with P370/P400/P401 in one string  
 (8) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement  
 (9) For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W  
 (10) For 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W




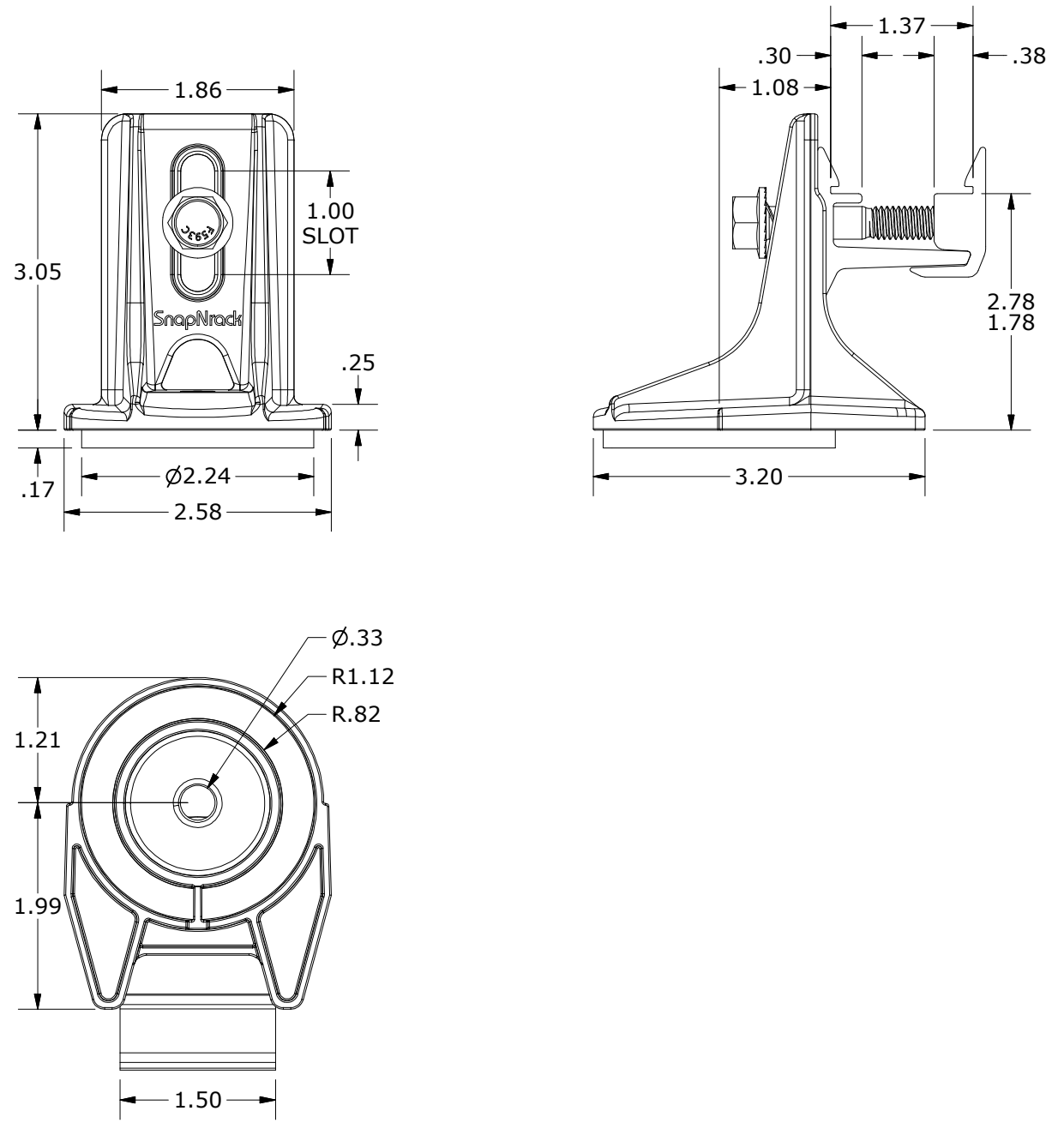
DESCRIPTION: <b>SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT</b>	DRAWN BY: mwatkins	 595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902 <small>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.</small>
PART NUMBER(S): <b>242-02163, 242-02167</b>	REVISION: <b>A</b>	



PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	SNAPNRACK, SPEEDSEAL FOOT, BASE, SEALING, SILVER / BLACK
2	1	BOLT, FLANGE, SERRATED, 5/16IN-18 X 2IN, SS
3	1	SNAPNRACK, RL UNIVERSAL, MOUNT SPRING, SS
4	1	SNAPNRACK, ULTRA RAIL MOUNT THRU PRC, CLEAR / BLACK
5	1	SNAPNRACK, ULTRA RAIL MOUNT TAPPED PRC, CLEAR / BLACK

MATERIALS:	DIE CAST A380 ALUMINUM, 6000 SERIES ALUMINUM, STAINLESS STEEL	
DESIGN LOAD (LBS):	802 UP, 1333 DOWN, 357 SIDE	OPTIONS:
ULTIMATE LOAD (LBS):	2118 UP, 4006 DOWN, 1331 SIDE	CLEAR / BLACK
TORQUE SPECIFICATION:	12 LB-FT	
CERTIFICATION:	UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM SUBJECT UL 2582	
WEIGHT (LBS):	0.45	

DESCRIPTION: <b>SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT</b>	DRAWN BY: mwatkins	 595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902 <small>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.</small>
PART NUMBER(S): <b>242-02163, 242-02167</b>	REVISION: <b>A</b>	



ALL DIMENSIONS IN INCHES



## SnapNrack SpeedSeal™ Foot

Patent Pending Lag Driven Sealant Solution for Ultra Rail



### A New Generation of Roof Attachments

- Innovative design incorporates flashing reliability into a single roof attachment
- 100% waterproof solution
- Sealing cavity with compressible barrier secures sealant in place & fills voids

### Maintain the Integrity of the Roof by Eliminating Disruption

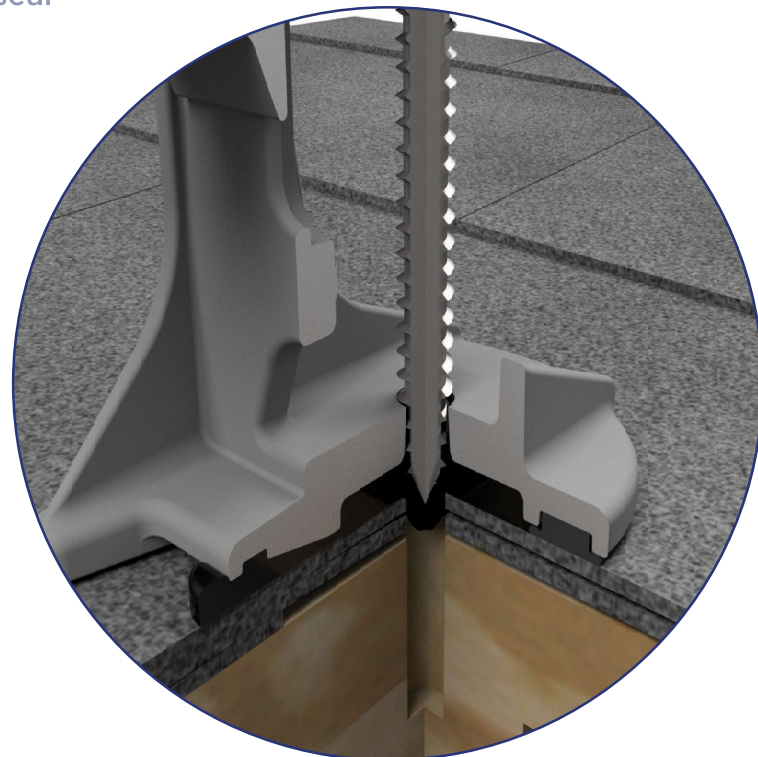
- Zero prying of shingles
- Zero removal of nails leaving holes in the roof
- Roof remains installed the way manufacturer meant it to be

### Lag Driven Sealant Waterproofing

- Time Tested Roof Sealant provides lasting seal
- Sealant is compressed into cavity and lag hole as attachment is secured to rafter
- Active sealant solidifies bond if ever touched by liquid
- Technology passes UL 2582 Wind Driven Rain Test and ASTM E2140 Water Column Testing standards. Patent Pending.

### Single Tool Installation

- SnapNrack was the first in the industry to develop a complete system that only requires a single tool. That tradition is continued as a ½" socket is still the only tool necessary to secure the mount as well as all other parts of the system.



Note: Sealant shown in white for illustration purposes only.

## SnapNrack SpeedSeal™ Foot

Fastest Roof Attachment in Solar

- Lag straight to a structural member, no in-between components such as flashings or bases.
- Simply locate rafter, fill sealant cavity & secure to roof. *It's that simple!*

### Integrated Flashings. No Questions.

- Sealant fills around lag screw keeping roof and structure sealed and intact
- No added holes from ripping up nails, staples and screws holding shingles on roof

### Less Time. Less Parts. Less Tools.

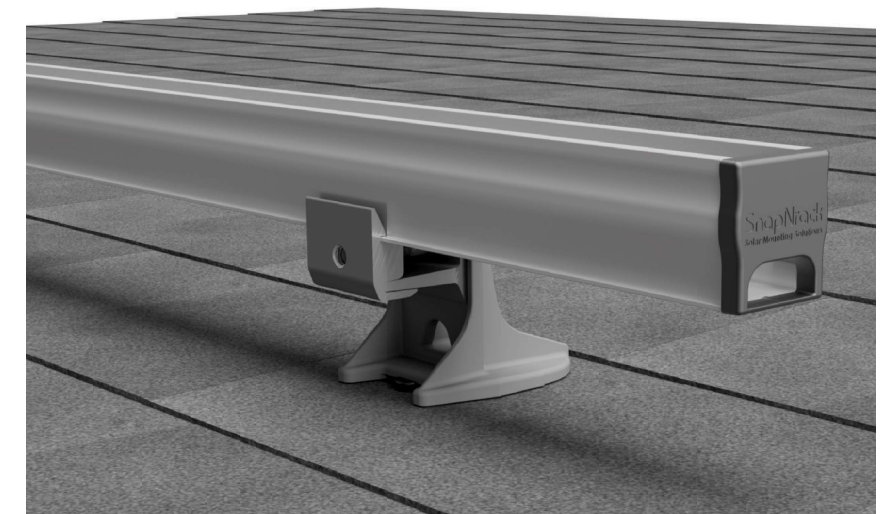
- No more need for a pry bar to rip up shingles
- No more proprietary lag screws
- Single Tool installation with ½" socket

### Total System Solution One Tool. One Warranty.

- SnapNrack Ultra Rail is a straightforward intuitive install experience on the roof without compromising quality, aesthetics & safety, all supported by a 25 year warranty.
- Built-in Wire Management & Aesthetically pleasing features designed for Ultra Rail result in a long-lasting quality install that installers and homeowners love.

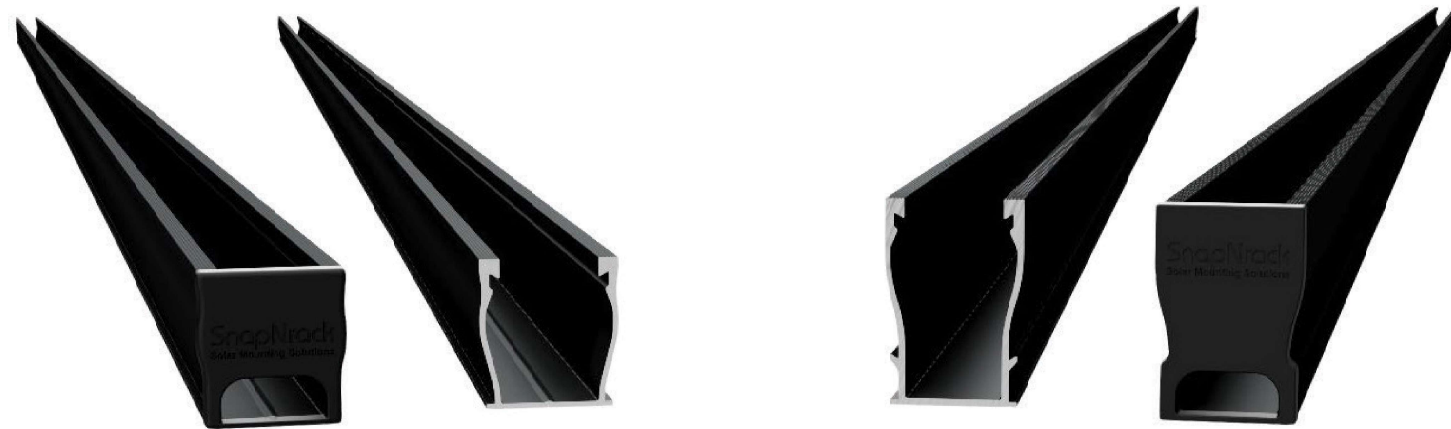
### Certifications

SnapNrack Ultra Rail System has been evaluated by Underwriters Laboratories (UL) and Listed to UL/ANSI Standard 2703 for Mechanical Loading and Fire. Additionally it is listed to UL 2582 for wind-driven rain and ASTM 2140.



# Ultra Rail

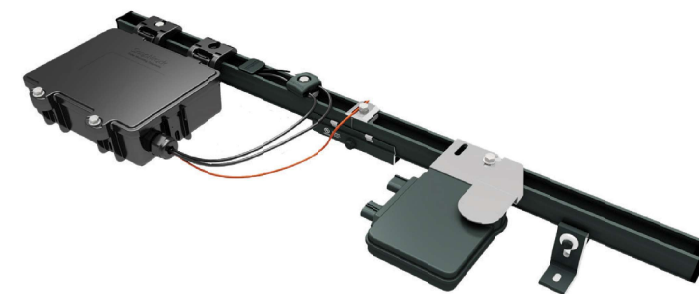
UR-40  
UR-60



**SnapNrack Ultra Rail System**  
A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail features two rail profiles; UR-40 is a lightweight rail profile that is suitable for most geographic regions and maintains all the great features of SnapNrack rail, while UR-60 is a heavier duty rail profile that provides a larger rail channel and increased span capabilities. Both are compatible with all existing mounts, module clamps, and accessories for ease of install.

**The Entire System is a Snap to Install**

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



**Unparalleled Wire Management**

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard

## The Ultimate Value in Rooftop Solar



Industry leading Wire Management Solutions



Mounts available for all roof types



Single Tool Installation



All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

**Heavy Duty UR-60 Rail**

- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience



**Start Installing Ultra Rail Today**

RESOURCES  
DESIGN  
WHERE TO BUY

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[snapnrack.com/configurator](http://snapnrack.com/configurator)  
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