

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

26 MODULES-ROOF MOUNTED - 10.270 kW DC, 10.000 kW AC

3128 ASHE AVE, DUNN, NC 28334



TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

## PROJECT DATA

PROJECT ADDRESS: 3128 ASHE AVE, DUNN, NC 28334

OWNER: CAM GRANTHAM

DESIGNER: ESR

SCOPE: 10.270 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 26 MISSION SOLAR: MSE395SX9R 395W PV MODULES WITH 26 SOLAREEDGE: S440 POWER OPTIMIZERS AND 01 SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER

AUTHORITIES HAVING JURISDICTION:  
BUILDING: HARNETT COUNTY  
ZONING: HARNETT COUNTY  
UTILITY: DUKE ENERGY PROGRESS

## SHEET INDEX

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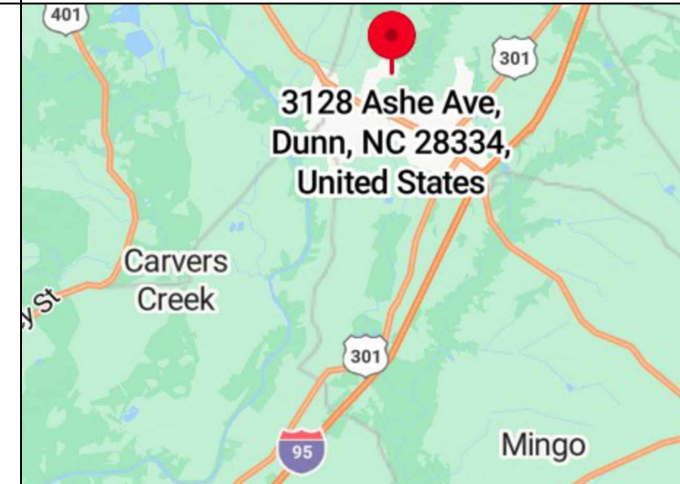
## SIGNATURE



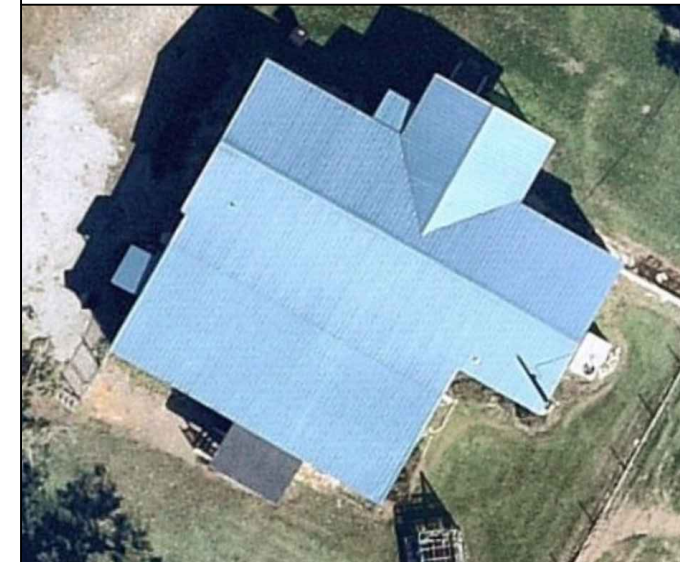
## GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND CEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2017.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH CEC 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SINAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

## VICINITY MAP



## HOUSE PHOTO

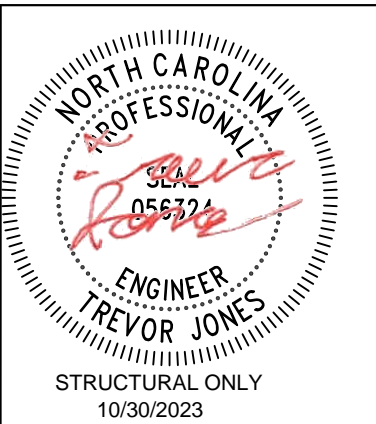


## CODE REFERENCES

2018 NORTH CAROLINA BUILDING CODE  
2018 NORTH CAROLINA RESIDENTIAL CODE  
2018 NORTH CAROLINA FIRE CODE  
2017 NATIONAL ELECTRICAL CODE



REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	10/30/2023	



## PROJECT NAME & ADDRESS

CAM GRANTHAM  
RESIDENCE  
3128 ASHE AVE,  
DUNN, NC 28334

DRAWN BY

ESR

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-1

# PROJECT DESCRIPTION:

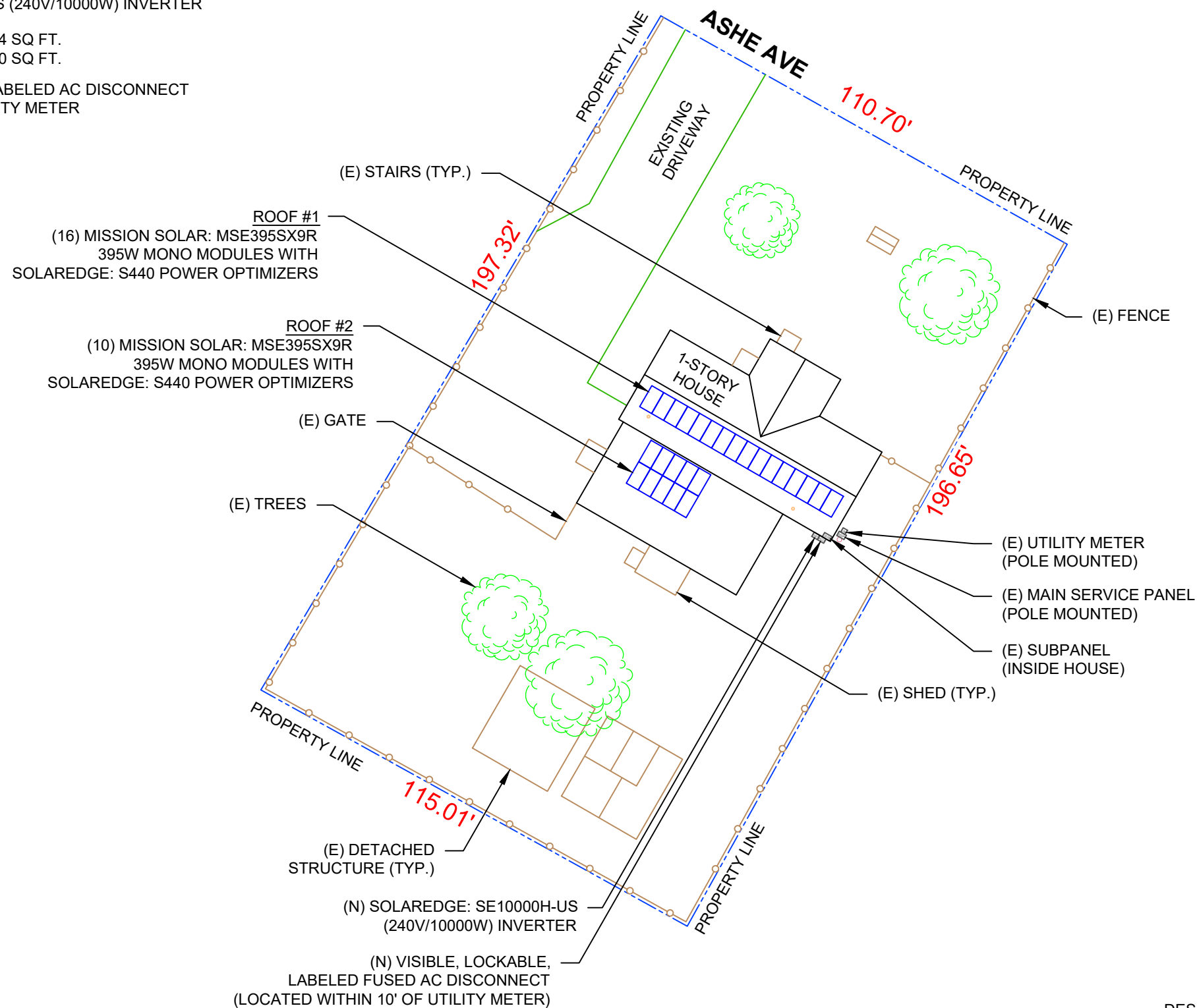
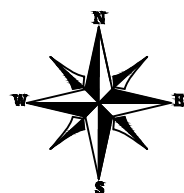
26 X MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
 DC SYSTEM SIZE: 10.270 kW DC  
 AC SYSTEM SIZE: 10.000 kW AC

## EQUIPMENT SUMMARY

26 MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 26 SOLAREEDGE: S440 POWER OPTIMIZERS  
 01 SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER

ROOF ARRAY AREA #1:- 346.24 SQ FT.  
 ROOF ARRAY AREA #2:- 216.40 SQ FT.

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



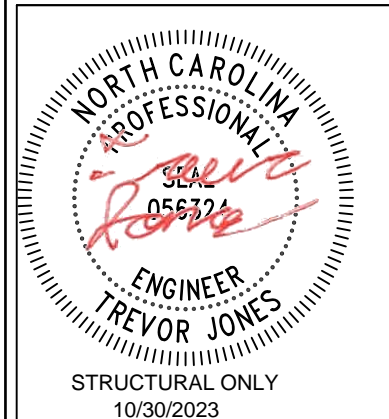
**DESIGN SPECIFICATION**  
 OCCUPANCY: II  
 CONSTRUCTION: SINGLE-FAMILY  
 ZONING: RESIDENTIAL  
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER  
 WIND EXPOSURE: REFER STRUCTURAL LETTER  
 WIND SPEED: REFER STRUCTURAL LETTER



## TOP TIER SOLAR SOLUTIONS

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**CAM GRANTHAM  
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 DUNN, NC 28334

DRAWN BY  
**ESR**

SHEET NAME  
**SITE PLAN**

SHEET SIZE  
**ANSI B  
 11" X 17"**

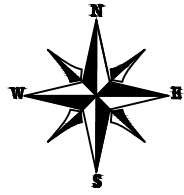
SHEET NUMBER  
**PV-2**

# 1 | SITE PLAN

PV-2 | SCALE: 1/32" = 1'-0"

**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 26 MODULES  
 MODULE TYPE = MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 MODULE WEIGHT = 48.5 LBS / 22.0 kg.  
 MODULE DIMENSIONS = 75.08" x 41.50" = 21.64 SF



ROOF DESCRIPTION				
ROOF TYPE				METAL ROOF
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	SEAM SPACING
#1	16	12°	210°	9"
#2	10	4°	210°	9"

ARRAY AREA & ROOF AREA CALC'S		
TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
562.64	2934.57	19

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**NORTH CAROLINA PROFESSIONAL ENGINEER**  
 SEAL  
 056324  
**TREVOR JONES**  
 STRUCTURAL ONLY  
 10/30/2023

PROJECT NAME & ADDRESS

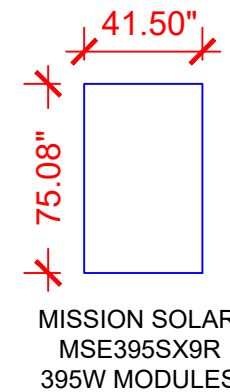
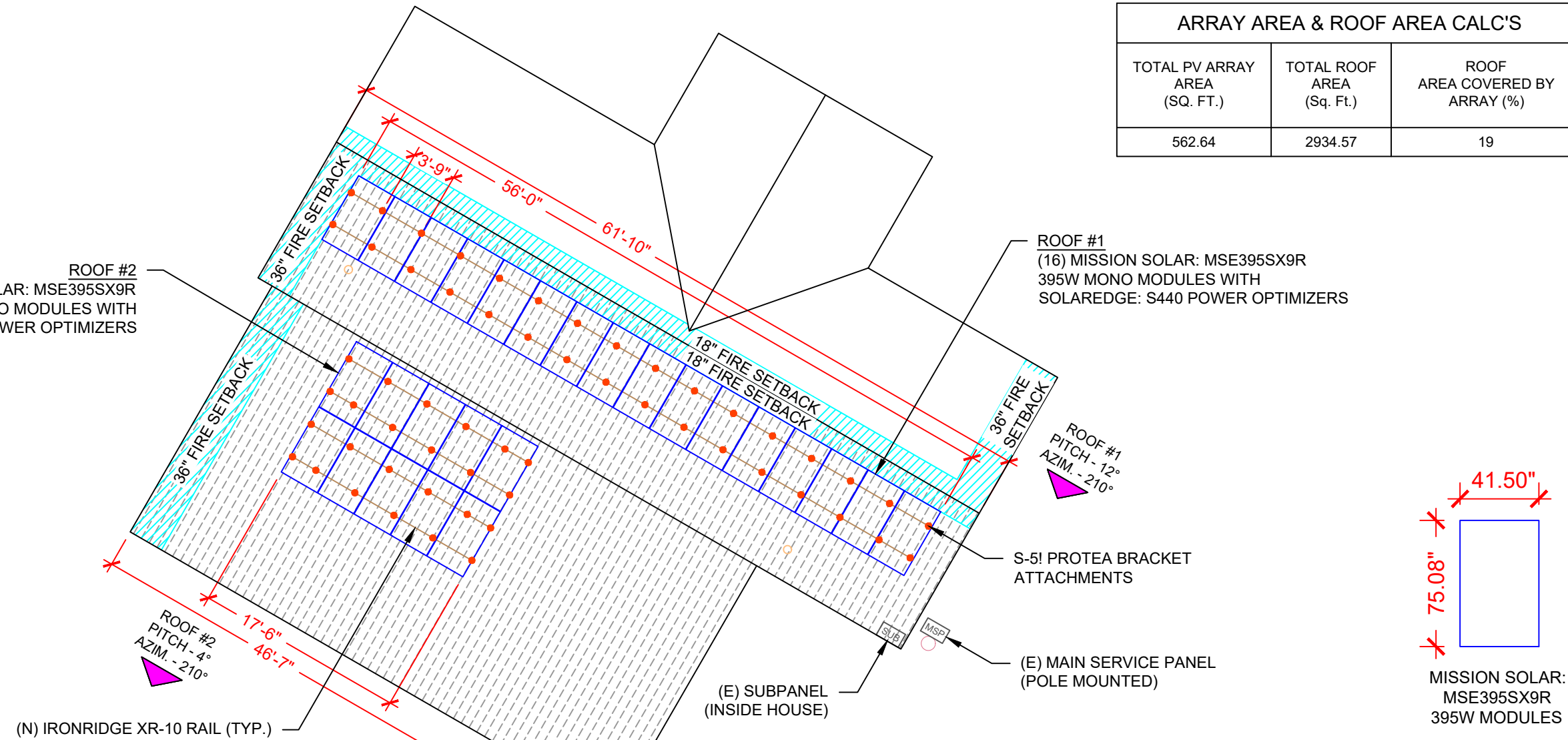
**CAM GRANTHAM RESIDENCE**  
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**ESR**

SHEET NAME  
**ROOF PLAN & MODULES**

SHEET SIZE  
**ANSI B  
 11" X 17"**

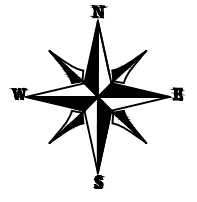
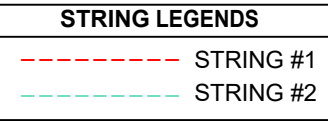
SHEET NUMBER  
**PV-3**



**LEGEND**

- JB - JUNCTION BOX
- INV - INVERTER
- ACD - AC DISCONNECT
- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- SUB - SUB PANEL
- - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- - ROOF ATTACHMENT
- — — - SEAM
- — — - CONDUIT

DC SYSTEM SIZE: 10.270 kW DC  
 AC SYSTEM SIZE: 10.000 kW AC  
 (26) MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 WITH (26) SOLAREEDGE: S440 POWER OPTIMIZERS  
 LOCATED UNDER EACH PANEL AND  
 01 SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER

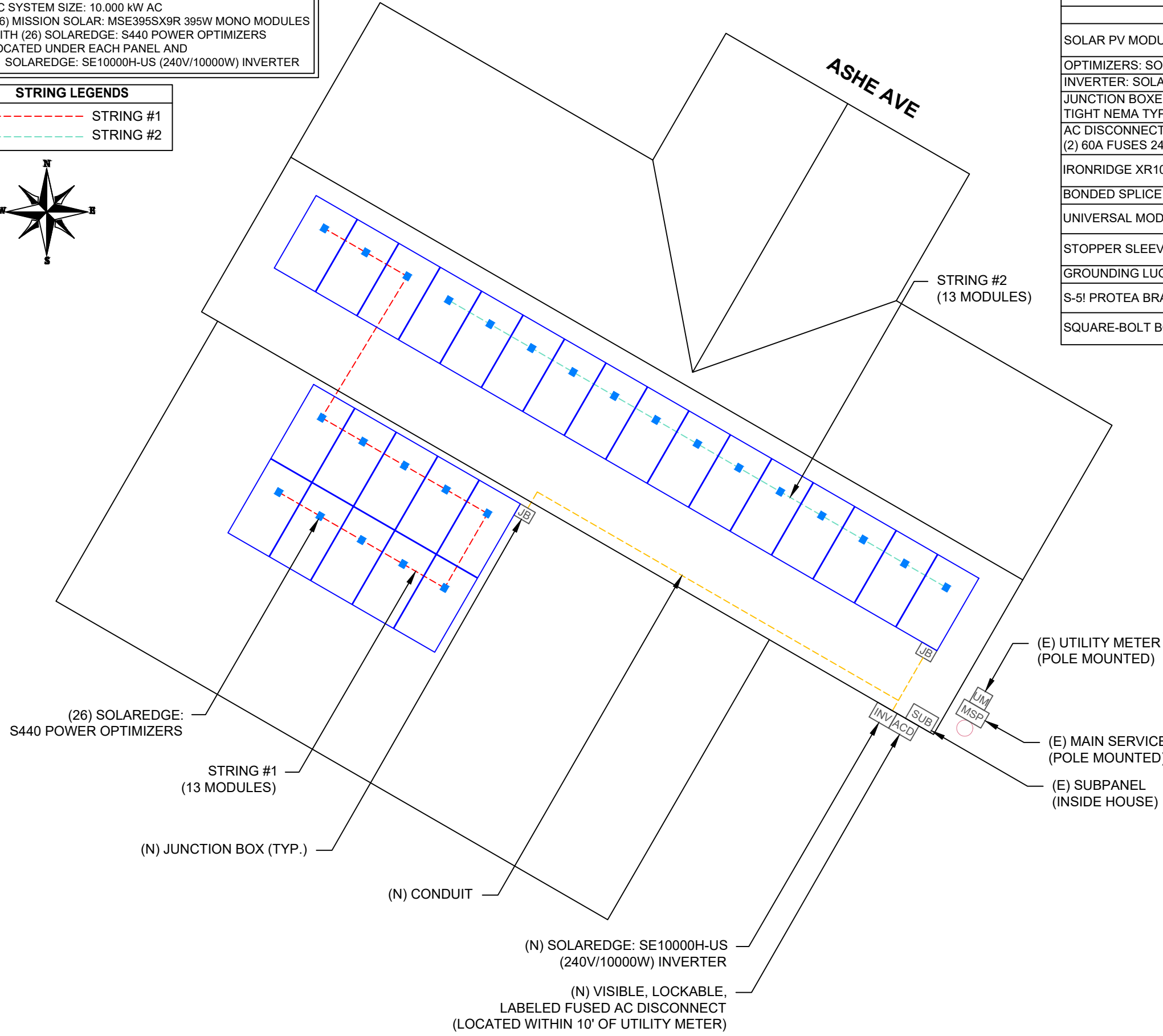


BILL OF MATERIALS	
EQUIPMENT DESCRIPTION	QTY
SOLAR PV MODULES: MISSION SOLAR: MSE395SX9R 395W MODULE	26
OPTIMIZERS: SOLAREEDGE: S440 POWER OPTIMIZERS	26
INVERTER: SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER	01
JUNCTION BOXES: 6"X6"X4" UL LISTED, STEEL WATER TIGHT NEMA TYPE 3R, UL LISTED	2
AC DISCONNECT: FUSED AC DISCONNECT, 60A FUSED, (2) 60A FUSES 240V NEMA 3R, UL LISTED	1
IRONRIDGE XR10 RAIL (RAIL 168" (14 FEET) CLEAR) (XR-10-168A)	16
BONDED SPLICE, XR10 (XR10-BOSS-01-M1)	10
UNIVERSAL MODULE CLAMP, CLEAR (UFO-CL-01-A1)	58
STOPPER SLEEVE, 40MM, MILL (UFO-STP-40MM-M1)	12
GROUNDING LUG (XR-LUG-03-A1)	3
S-5! PROTEA BRACKET ATTACHMENTS	53
SQUARE-BOLT BONDING HARDWARE (BHW-SQ-02-A1)	53

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- MSP - MAIN SERVICE PANEL
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- VENT, ATTIC FAN (ROOF OBSTRUCTION)
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- SEAM
- CONDUIT

PROJECT NAME & ADDRESS

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SHEET NAME  
**ELECTRICAL PLAN**

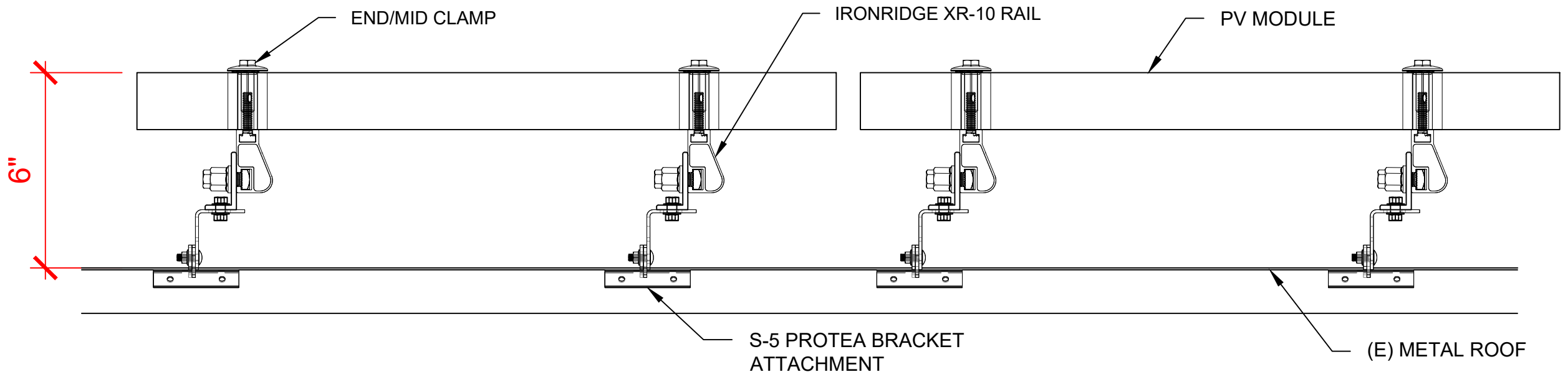
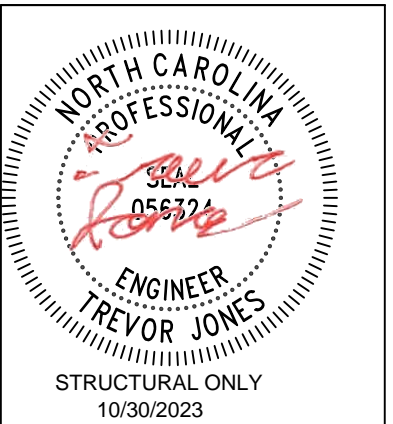
SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-4**

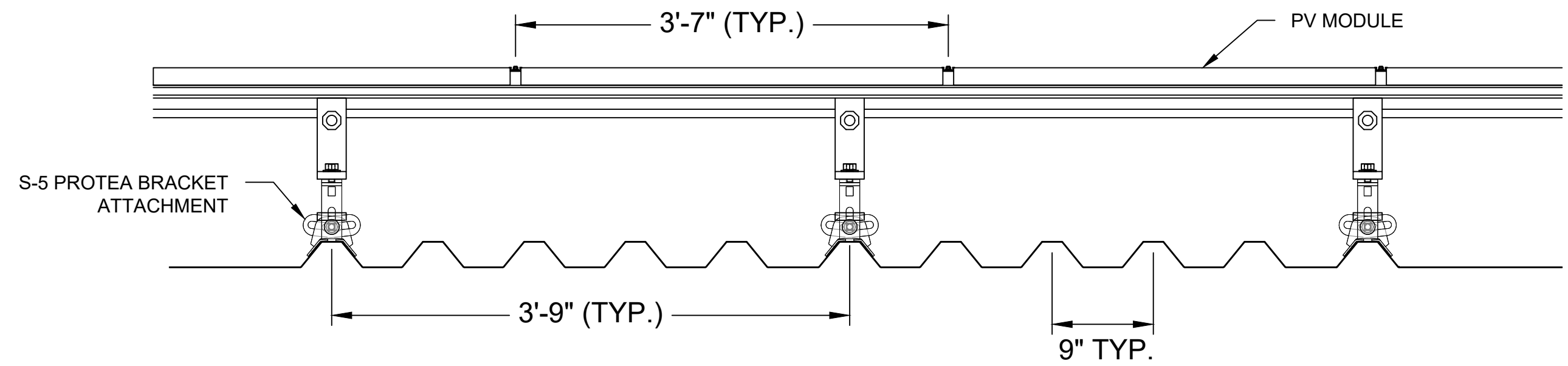


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**1** | **STRUCTURAL ATTACHMENT (Side view)**  
 PV-5 | SCALE: N.T.S



**2** | **ATTACHMENT DETAIL (FRONT VIEW)**  
 PV-5 | SCALE: N.T.S

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**ESR**

SHEET NAME  
**STRUCTURAL DETAIL**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-5**

DC SYSTEM SIZE: 10.270 kW DC  
AC SYSTEM SIZE: 10.000 kW AC

(26) MISSION SOLAR: MSE395SX9R 395W MONO MODULES WITH (26) SOLAREEDGE: S440 POWER OPTIMIZERS LOCATED UNDER EACH PANEL (240V) AND (01) SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER (2) STRINGS OF 13 MODULES ARE CONNECTED IN SERIES

**INTERCONNECTION NOTES:**

1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

**DISCONNECT NOTES:**

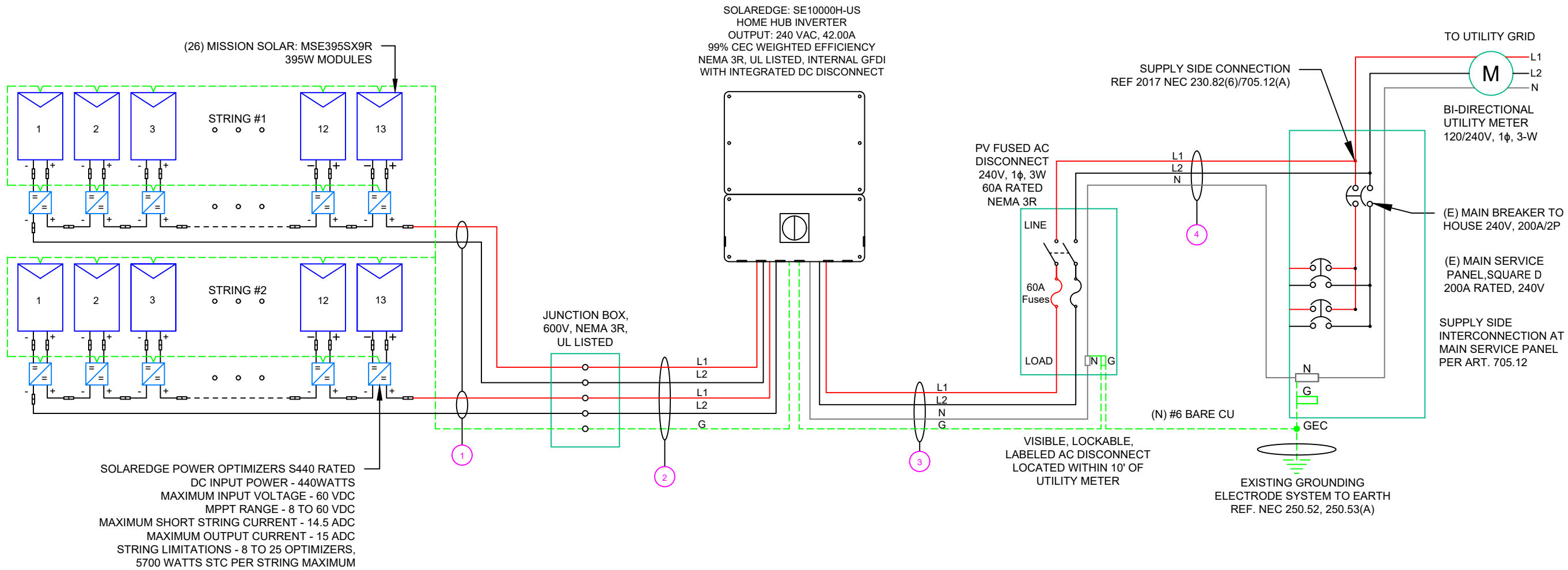
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

**GROUNDING & GENERAL NOTES:**

1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH [NEC 690.43]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.

**RACKING NOTE:**

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER



SOLAREEDGE POWER OPTIMIZERS S440 RATED  
DC INPUT POWER - 440WATTS  
MAXIMUM INPUT VOLTAGE - 60 VDC  
MPPT RANGE - 8 TO 60 VDC  
MAXIMUM SHORT STRING CURRENT - 14.5 ADC  
MAXIMUM OUTPUT CURRENT - 15 ADC  
STRING LIMITATIONS - 8 TO 25 OPTIMIZERS,  
5700 WATTS STC PER STRING MAXIMUM

SOLAREEDGE: SE10000H-US  
HOME HUB INVERTER  
OUTPUT: 240 VAC, 42.00A  
99% CEC WEIGHTED EFFICIENCY  
NEMA 3R, UL LISTED, INTERNAL GFDI  
WITH INTEGRATED DC DISCONNECT

NOTE: CONDUIT TO BE UL LISTED FOR WET LOCATIONS AND UV PROTECTED

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
1 (4)	#10AWG - PV WIRE/USE-2	N/A	N/A
1 (1)	#6AWG - BARE COPPER IN FREE AIR		
2 (4)	#10AWG - CU, THWN-2	EMT OR LFMC	3/4"
1 (1)	#10AWG - CU, THWN-2 GND		
3 (2)	#6AWG - CU, THWN-2	EMT, LFMC OR PVC	3/4"
1 (1)	#6AWG - CU, THWN-2 N		
4 (1)	#6AWG - CU, THWN-2 GND	EMT, LFMC OR PVC	3/4"
1 (2)	#6AWG - CU, THWN-2		
4 (1)	#6AWG - CU, THWN-2 N		

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3128 ASHE AVE,  
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DRAWN BY  
**ESR**

SHEET NAME  
**ELECTRICAL LINE DIAGRAM**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-6**

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	MISSION SOLAR: MSE395SX9R 395W MODULE
VMP	36.99V
IMP	10.68A
VOC	45.18V
ISC	11.24A
TEMP. COEFF. VOC	-0.259%/°C
MODULE DIMENSION	75.08"L x 41.50"W x 1.57"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREEDGE: SE10000H-US (240V/10000W) INVERTER
NOMINAL AC POWER	10.000 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	42.00A

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

AMBIENT TEMPERATURE SPECS	
AMBIENT TEMP (HIGH TEMP 2%)	38°
RECORD LOW TEMPERATURE	-9°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.259%/°C



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DC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1	JUNCTION BOX	380	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.049	N/A	#N/A
STRING 2	JUNCTION BOX	380	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.049	N/A	#N/A
JUNCTION BOX	INVERTER	380	15.00	18.75	20	CU #10 AWG	CU #10 AWG	35	PASS	38	4	40	0.91	0.8	29.12	PASS	15	1.24	0.147	3/4" EMT	19.79362

String 1 Voltage Drop	0.196
String 2 Voltage Drop	0.196

AC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
INVERTER	AC DISCONNECT	240	42	52.5	60	CU #6 AWG	CU #6 AWG	CU #6 AWG	65	PASS	38	2	75	0.91	1	68.25	PASS	5	0.491	0.086	3/4" EMT	38.0488
AC DISCONNECT	POI	240	42	52.5	60	CU #6 AWG	N/A	CU #6 AWG	65	PASS	38	2	75	0.91	1	68.25	PASS	5	0.491	0.086	3/4" EMT	28.5366

CUMULATIVE VOLTAGE DROP	0.172
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PROJECT NAME & ADDRESS

CAM GRANTHAM  
RESIDENCE

3128 ASHE AVE,  
DUNN, NC 28334

ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
- TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.

DRAWN BY

ESR

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-7

**PHOTOVOLTAIC POWER SOURCE**

EVERY 10' ON CONDUIT & ENCLOSURES

LABEL- 1:  
 LABEL LOCATION:  
 EMT/CONDUIT RACEWAY  
 SOLADECK / JUNCTION BOX  
 CODE REF: NEC 690.31 (D)(2)

**⚠ WARNING**

**ELECTRIC SHOCK HAZARD**

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: NEC 690.13(B)

**⚠ WARNING**

**DUAL POWER SUPPLY**

SOURCE: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL- 3:  
 LABEL LOCATION:  
 MAIN SERVICE PANEL  
 CODE REF: NEC 705.12(C) & NEC 690.59

**SOLAR PV BREAKER:**

**BREAKER IS BACKFED  
 DO NOT RELOCATE**

LABEL-4:  
 LABEL LOCATION:  
 MAIN SERVICE PANEL  
 CODE REF: NEC 705.12(C) & NEC 690.59

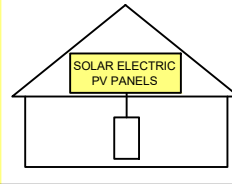
**⚠ WARNING**

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

LABEL- 5:  
 LABEL LOCATION:  
 MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
 SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
 CODE REF: NEC 705.12(B)(3)(2)

**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 THE ARRAY



LABEL- 6:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: [NEC 690.56(C)(1)(A)]

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

LABEL- 7:  
 LABEL LOCATION:  
 AC DISCONNECT  
 MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
 CODE REF: NEC 690.56(C)(2)

**DC DISCONNECT**

LABEL- 8:  
 LABEL LOCATION:  
 INVERTER  
 CODE REF: NEC 690.13(B)

**AC DISCONNECT PHOTOVOLTAIC SYSTEM POWER SOURCE**

NOMINAL OPERATING AC VOLATGE **240 V**

RATED AC OUTPUT CURRENT **42.00 A**

LABEL- 9:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: NEC 690.54

MAXIMUM VOLTAGE **480 V**

MAXIMUM CIRCUIT CURRENT **30.00 A**

MAXIMUM RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)

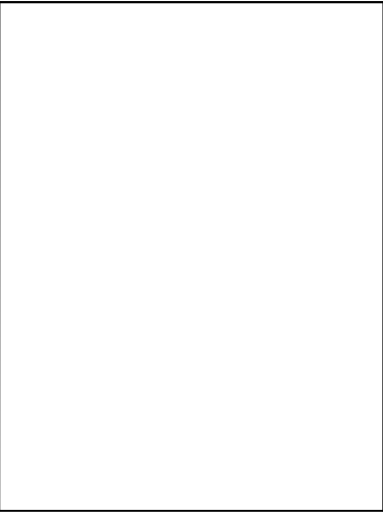
LABEL- 10:  
 LABEL LOCATION:  
 ON THE RIGHT SIDE OF THE INVERTER (PRE-EXISTING ON THE INVERTER)  
 CODE REF: NEC 690.53



**TOP TIER SOLAR SOLUTIONS**

1530 CENTER PARK DR #2911,  
 CHARLOTTE, NC 28217,  
 UNITED STATES

REVISIONS		
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INITIAL DESIGN	10/30/2023	



PROJECT NAME & ADDRESS

**CAM GRANTHAM RESIDENCE**

**3128 ASHE AVE,  
 DUNN, NC 28334**

DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-8**

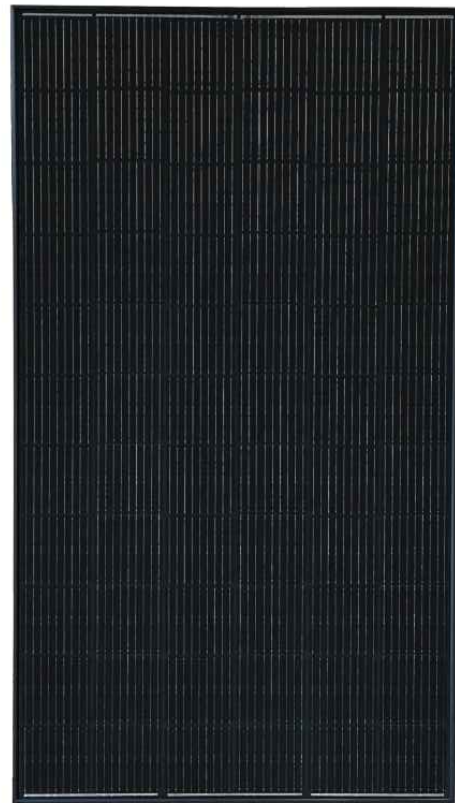


MSE PERC 66

MISSION SOLAR ENERGY



**395W** Positive Power Tolerance  
Class leading power output -0 to +3%



## True American Quality True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.



### Certified Reliability

- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion



### Advanced Technology

- 9 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications



### Extreme Weather Resilience

- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame



### BAA Compliant for Government Projects

- Buy American Act
- American Recovery & Reinvestment Act

### CERTIFICATIONS

CEC



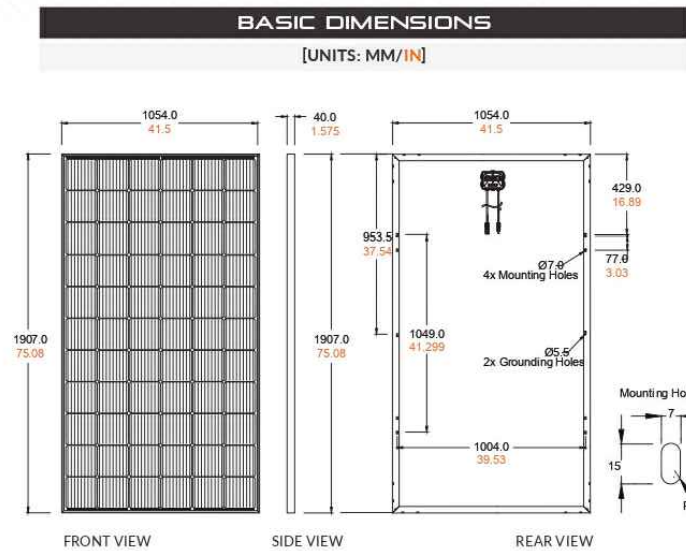
UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.



Class Leading  
390-400W

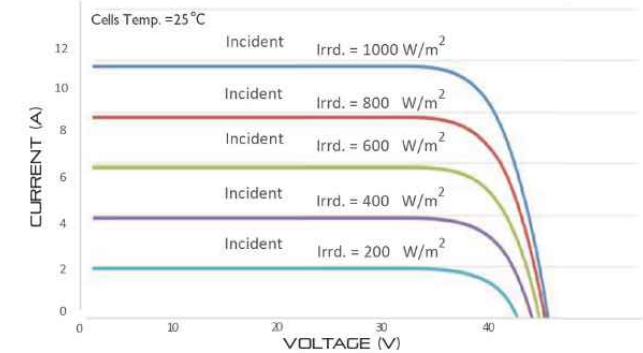
MSE PERC 66



### CURRENT-VOLTAGE CURVE

MSE385SX9R: 385WP, 66 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



### CERTIFICATIONS AND TESTS

IEC 61215, 61730, 61701

UL 61730



CEC



## Mission Solar Energy

8303 S. New Braunfels Ave., San Antonio, Texas 78235  
www.missionsolar.com | info@missionsolar.com

Mission Solar Energy reserves the right to make specification changes without notice.  
C-SA2-MKTG-0027 REV 4 03/18/2022

ELECTRICAL SPECIFICATION					
PRODUCT TYPE	MSE <sub>XXX</sub> SX9R (XXX = P <sub>max</sub> )				
Power Output	P <sub>max</sub>	W <sub>p</sub>	390	395	400
Module Efficiency	%		19.4	19.7	19.9
Tolerance	%		0/+3	0/+3	0/+3
Short Circuit Current	I <sub>sc</sub>	A	11.19	11.24	11.31
Open Circuit Voltage	V <sub>oc</sub>	V	45.04	45.18	45.33
Rated Current	I <sub>mp</sub>	A	10.63	10.68	10.79
Rated Voltage	V <sub>mp</sub>	V	36.68	36.99	37.07
Fuse Rating	A		20	20	20
System Voltage	V		1,000	1,000	1,000

TEMPERATURE COEFFICIENTS	
Normal Operating Cell Temperature (NOCT)	43.75°C (±3.7%)
Temperature Coefficient of P <sub>max</sub>	-0.367%/°C
Temperature Coefficient of V <sub>oc</sub>	-0.259%/°C
Temperature Coefficient of I <sub>sc</sub>	0.033%/°C

OPERATING CONDITIONS	
Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1*
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

\*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the Fire Class Rating is designated for the fully-installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

MECHANICAL DATA	
Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,054mm x 40mm
Weight	48.5 lbs. (22 kg)
Front Glass	3.2mm tempered, low-iron, anti-reflective
Frame	40mm Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm <sup>2</sup> (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

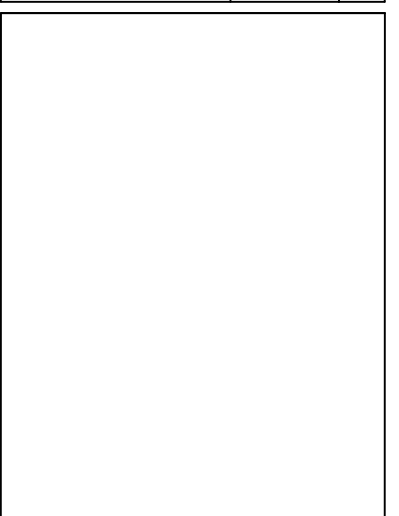
SHIPPING INFORMATION				
Container Feet	Ship To	Pallet	Panels	390W Bin
53'	Most States	30	780	304.20 kW
Double Stack	CA	26	676	263.64 kW
PALLET [26 PANELS]				
Weight	Height	Width	Length	
1,300 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in	(195.58 cm)

**TOP TIER**  
SOLAR SOLUTIONS

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RESIDENCE

3128 ASHE AVE,  
DUNN, NC 28334

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-9

# Power Optimizer For Residential Installations

S440 / S500 / S500B / S650B



POWER OPTIMIZER

## Enabling PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Detects abnormal PV connector behavior, preventing potential safety issues\*
- Faster installations with simplified cable management and easy assembly using a single bolt
- Module-level voltage shutdown for installer and firefighter safety
- Flexible system design for maximum space utilization
- Superior efficiency (99.5%)
- Compatible with bifacial PV modules

\*Functionality subject to inverter model and firmware version

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



## Power Optimizer For Residential Installations

S440 / S500 / S500B / S650B

	S440	S500	S500B	S650B	UNIT
<b>INPUT</b>					
Rated Input DC Power <sup>(1)</sup>	440	500		650	W
Absolute Maximum Input Voltage (Voc)	60		125	85	Vdc
MPPT Operating Range	8 – 60		12.5 – 105	12.5 – 85	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5		15		Adc
Maximum Efficiency		99.5			%
Weighted Efficiency		98.6			%
Overvoltage Category		II			
<b>OUTPUT DURING OPERATION</b>					
Maximum Output Current		15			Adc
Maximum Output Voltage	60		80		Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)</b>					
Safety Output Voltage per Power Optimizer		1 ± 0.1			Vdc
<b>STANDARD COMPLIANCE<sup>(2)</sup></b>					
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011				
Safety	IEC62109-1 (class II safety), UL1741				
Material	UL94 V-0, UV Resistant				
RoHS	Yes				
Fire Safety	VDE-AR-E 2100-712:2018-12				
<b>INSTALLATION SPECIFICATIONS</b>					
Maximum Allowed System Voltage		1000			Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 165 x 45		mm
Weight	720		790		gr
Input Connector		MC4 <sup>(3)</sup>			
Input Wire Length		0.1			m
Output Connector		MC4			
Output Wire Length		(+) 2.3, (-) 0.10			m
Operating Temperature Range <sup>(4)</sup>		-40 to +85			°C
Protection Rating		IP68			
Relative Humidity		0 – 100			%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed.

(2) For details about CE compliance, see [Declaration of Conformity - CE](#).

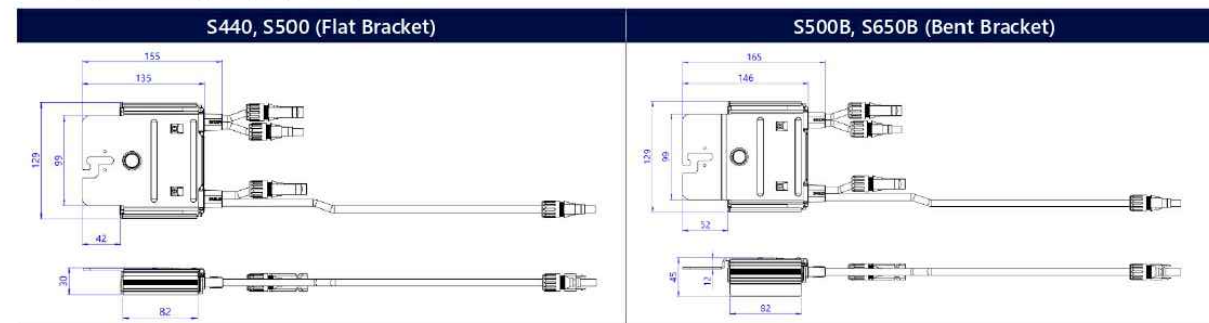
(3) For other connector types please contact SolarEdge.

(4) Power de-rating is applied for ambient temperatures above +85°C for S440 and S500, and for ambient temperatures above +75°C for S500B. Refer to the [Power Optimizers Temperature De-Rating Technical Note](#) for details.

PV System Design Using a SolarEdge Inverter <sup>(5)</sup>	SolarEdge Home Wave Inverter Single Phase	SolarEdge Home Short String Inverter Three Phase	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500: 8 S500B, S650B: 6	9 8	16	18	
Maximum String Length (Power Optimizers)	25	20	50	50	
Maximum Continuous Power per String	5700	5625	11250	12750	W
Maximum Allowed Connected Power per String (In multiple string designs, the maximum is permitted only when the difference in connected power between strings is 2,000W or less)	See <sup>(6)</sup>	See <sup>(6)</sup>	13500	15000	W
Parallel Strings of Different Lengths or Orientations	Yes				

(5) It is not allowed to mix S-series and P-series Power Optimizers in new installations in the same string.

(6) If the inverter's rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverter's maximum input DC power. Refer to [Application Note: Single String Design Guidelines](#).



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CE RoHS

**TOP TIER**  
SOLAR SOLUTIONS

TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	10/30/2023	

PROJECT NAME & ADDRESS

CAM GRANTHAM  
RESIDENCE

3128 ASHE AVE,  
DUNN, NC 28334

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-10

# SolarEdge Home Hub Inverter For North America

SE3800H-US / SE5700H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US<sup>(1)</sup>



12-25  
YEAR  
WARRANTY

HOME BACKUP

## Optimized battery storage with HD-Wave technology

- Record-breaking 99% weighted efficiency with 200% DC oversizing
- Small, lightweight, and easy to install
- Modular design, future ready with optional upgrades to:
  - DC-coupled storage for full or partial home backup
  - Built-in consumption monitoring
  - Direct connection to the SolarEdge Home EV Charger
- Multi-inverter, scalable storage solution, with enhanced battery power up to 10kW
- Integrated arc fault protection and rapid shutdown for NEC 2014 – 2023, per article 690.11 and 690.12
- Embedded revenue grade production data, ANSI C12.20 Class 0.5

## / SolarEdge Home Hub Inverter For North America

SE3800H-US / SE5700H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US<sup>(1)</sup>

Applicable to inverters with part number	SEXXXXH-USMNBXXXX / SEXXXXH-USSNBBXXXX						Units
	SE3800H-US	SE5700H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
<b>OUTPUT – AC ON GRID</b>							
Rated AC Power	3800 @ 240V 3300 @ 208V	5760 @ 240V 5000 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	W
Maximum AC Power Output	3800 @ 240V 3300 @ 208V	5760 @ 240V 5000 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	W
AC Output Voltage (Nominal)	208 / 240						Vac
AC Output Voltage (Range)	183 – 264						Vac
AC Frequency Range (min - nom - max)	59.3 – 60 – 60.5 <sup>(2)</sup>						Hz
Maximum Continuous Output Current @ 240V	16	24	25	32	42	47.5	A
Maximum Continuous Output Current @ 208V	16	24	24	-	-	48	A
GFDI Threshold	1						A
Total Harmonic Distortion (THD)	< 3						%
Power Factor	1, adjustable -0.85 to 0.85						
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes						
Charge Battery from AC (if allowed)	Yes						
Typical Nighttime Power Consumption	< 2.5						W
<b>OUTPUT – AC BACKUP<sup>(3)</sup></b>							
Rated AC Power in Backup Operation <sup>(4)</sup>	7600	5760	6000	7600 11400*	10000 11400*	11400	W
AC L-L Output Voltage Range in Backup	211 – 264						Vac
AC L-N Output Voltage Range in Backup	105 – 132						Vac
AC Frequency Range in Backup (min - nom - max)	55 – 60 – 65						Hz
Maximum Continuous Output Current in Backup Operation	32	24	25	32 47.5	42 47.5	47.5	A
GFDI	1						A
THD	< 5						%
<b>OUTPUT – SOLAREGE HOME EV CHARGER AC</b>							
Rated AC Power	9600						W
AC Output Voltage Range	211 – 264						Vac
On-Grid AC Frequency Range (min - nom - max)	59.3 – 60 – 60.5						Hz
Maximum Continuous Output Current @240V (grid, PV and battery)	40						Aac
<b>INPUT – DC (PV AND BATTERY)</b>							
Transformer-less, Ungrounded	Yes						
Max Input Voltage	480						Vdc
Nom DC Input Voltage	380						Vdc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	600kΩ Sensitivity						
<b>INPUT – DC (PV)</b>							
Maximum DC Power @ 240V	7600	11520	12000	15200	20000	22800	W
Maximum DC Power @ 208V	6600	10000	10000	-	-	20000	W
Maximum Input Current <sup>(5)</sup> @ 240V	20	16	16.5	20 30	30	30	Adc
Maximum Input Current <sup>(5)</sup> @ 208V	9	13.5	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45						
Maximum Inverter Efficiency	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V
2-pole Disconnection	Yes						

\* Supported with PN SExxxxH-USMNBxxxx.

(1) These specifications apply to inverters with part numbers SExxxxH-USMNBxxxx or SExxxxH-USSNBBxxxx and connection unit model number DCD-1PH-US-PxH-F-x.

(2) For other regional settings please contact SolarEdge support.

(3) Not designed for standalone applications and requires AC for commissioning. Backup functionality is only supported for 240V grid.

(4) Rated AC power in Backup Operation is valid for installations with multiple inverters. For a single backup inverter operation, rated AC power in Backup is 90% of the value stated.

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

**TOP TIER**  
SOLAR SOLUTIONS

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INITIAL DESIGN	10/30/2023	

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CAM GRANTHAM  
RESIDENCE

3128 ASHE AVE,  
DUNN, NC 28334

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-11

# / SolarEdge Home Hub Inverter

## For North America

SE3800H-US / SE5700H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US<sup>(1)</sup>

Applicable to inverters with part number	SEXXXXH-USMNBXXXX / SEXXXXH-USSNBXXXX						Units
	SE3800H-US	SE5700H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
<b>OUTPUT – DC (BATTERY)</b>							
Supported Battery Types	SolarEdge Home Battery, LG RESU Prime						
Number of Batteries per Inverter	Up to 3 SolarEdge Home Battery, up to 2 LG RESU Prime						
Continuous Power <sup>(6)</sup>	7600 @ 240V 3800 @ 208V	5760 @ 240V 5000 @ 208V	6000	11400	11400 @ 240V 10000 @ 208V	W	
Peak Power <sup>(6)</sup>	7600 @ 240V 3800 @ 208V	5760 @ 240V 5000 @ 208V	6000	11400	11400 @ 240V 10000 @ 208V	W	
Max Input Current	20	26.5				Adc	
2-pole Disconnection	Up to inverter rated backup power						
<b>SMART ENERGY CAPABILITIES</b>							
Consumption Metering	Built-in <sup>(7)</sup>						
Backup & Battery Storage	With Backup Interface (purchased separately) for service up to 200A; up to 3 inverters						
EV Charging	Direct connection to SolarEdge Home EV Charger						
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, Cellular <sup>(8,9)</sup> , Wi-Fi <sup>(9)</sup> , SolarEdge Home Network						
Revenue Grade Metering, ANSI C12.20	Built-in <sup>(7)</sup>						
Integrated AC, DC and Communication Connection Unit	Yes						
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi Access Point for local connection						
DC Voltage Rapid Shutdown (PV and Battery)	Yes, according to NEC 2014 – 2023 per article 690.11 and 690.12						
<b>STANDARD COMPLIANCE</b>							
Safety	UL1741, UL1741 SA, UL1741 SB, UL1741 PCS, UL1699B, UL1998, UL9540, CSA 22.2						
Grid Connection Standards	IEEE1547-2018, Rule 21, Rule 14H, CSA C22.3 No. 9						
Emissions	FCC part 15 class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output and EV AC Output Conduit Size / AWG Range	1" maximum / 14-4 AWG						
DC Input (PV and Battery) Conduit Size / AWG Range	1" maximum / 14-6 AWG						
Dimensions with Connection Unit (H x W x D)	17.7 x 14.6 x 6.8 / 450 x 370 x 174	17.7 x 14.6 x 6.8 / 450 x 370 x 174**	21.06 x 14.6 x 7.3 / 535 x 370 x 185**	21.06 x 14.6 x 8.2 / 535 x 370 x 208***	21.06 x 14.6 x 8.2 / 535 x 370 x 208***	in / mm	
Weight with Connection Unit	30.8 / 14	30.8 / 14**	41.7 / 18.9**	44.9 / 20.3***	44.9 / 20.3***	lb / kg	
Noise	< 50						
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 <sup>(10)</sup>						
Protection Rating	NEMA 4X						

\*\* Supported with PN SEXXXXH-USSNBXXXX or SEXXXXH-USMNBXXXX4.

\*\*\* Supported with PN SEXXXXH-USSNBXXXX5 or SEXXXXH-USMNBXXXX5.

(6) Discharge power is limited up to the inverter rated AC power for on-grid and backup applications, as well as up to the installed batteries' rating.

(7) For consumption metering current transformers should be ordered separately: SECT-SPL-225A-T-20 or SEACT0750-400NA-20 units per box. Revenue grade metering is only for production metering.

(8) Information concerning the Data Plan's terms & conditions is available in the following link: [SolarEdge Communication Plan Terms and Conditions](#).

(9) The part number SEXXXXH-USXNBXXXX only supports the Wi-Fi communication interface, and the part number SEXXXXH-USXNBXXXX only supports the cellular communication interface.

(10) Full power up to at least 50°C / 122°F; for power de-rating information refer to the [Temperature Derating Technical Note for North America](#).



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RESIDENCE**

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DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-12**

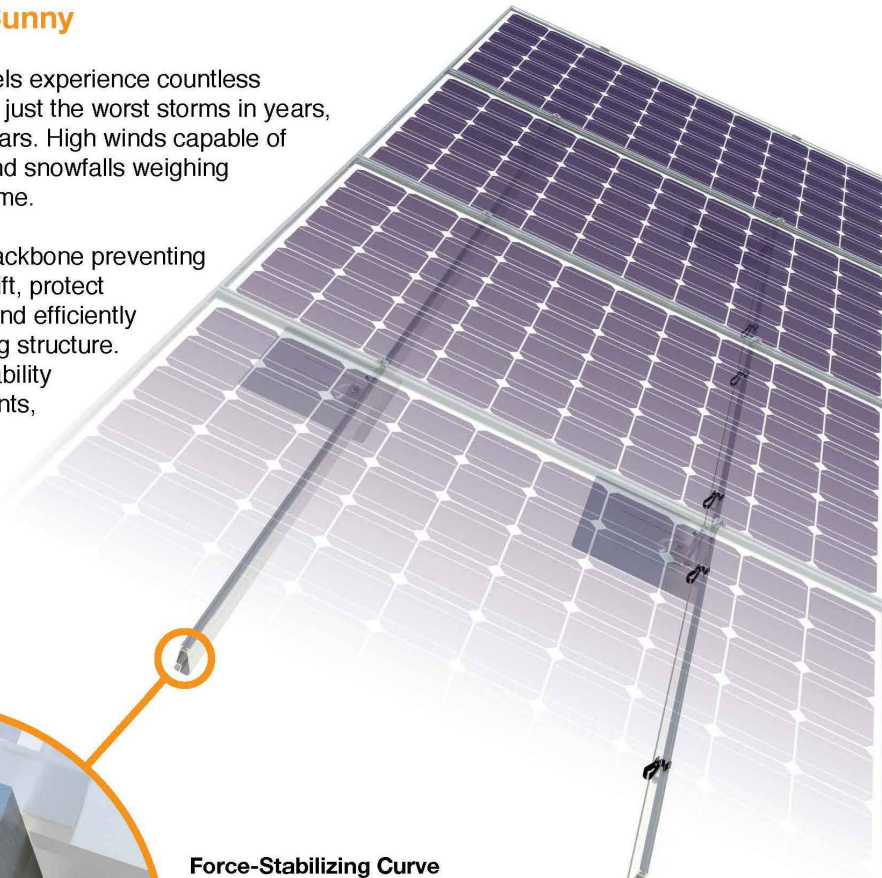


## XR Rail Family

### Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



#### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

#### Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

#### Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



**XR10**

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



**XR100**

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



**XR1000**

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

### Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit [IronRidge.com](http://IronRidge.com) for detailed span tables and certifications.

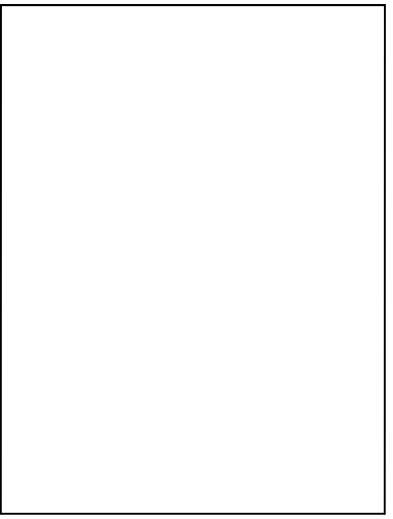
Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100						
	120						
	140	XR10		XR100		XR1000	
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						



### TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	10/30/2023	



PROJECT NAME & ADDRESS	
CAM GRANTHAM RESIDENCE	3128 ASHE AVE, DUNN, NC 28334

DRAWN BY <b>ESR</b>
------------------------

SHEET NAME <b>EQUIPMENT SPECIFICATION</b>
--

SHEET SIZE <b>ANSI B 11" X 17"</b>
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SHEET NUMBER <b>PV-13</b>
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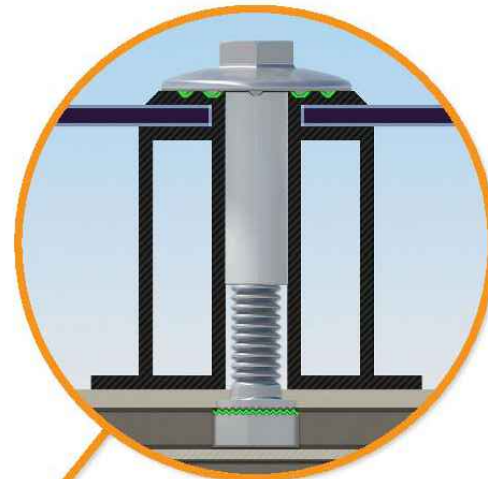


## UFO Family of Components

### Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



#### Universal Fastening Object (UFO)

The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



#### Stopper Sleeve

The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



#### Bonded Splice

Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.



#### Grounding Lug

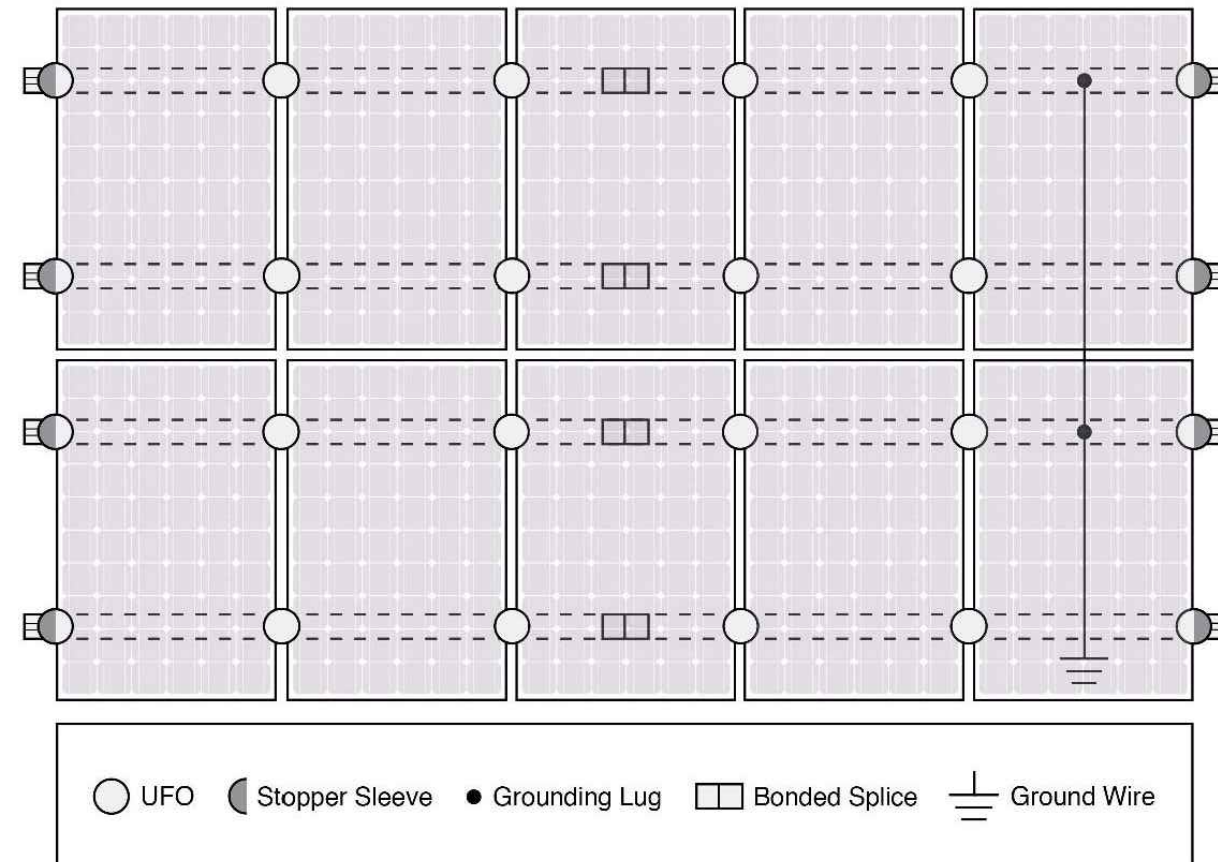
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



#### Bonded Attachments

The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

### System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

### UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

[Go to IronRidge.com/UFO](http://Go to IronRidge.com/UFO)

### Cross-System Compatibility

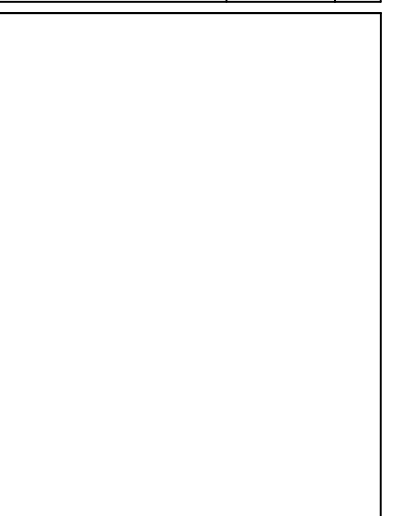
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		



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DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-14

# S-5!<sup>®</sup>

## The Right Way!

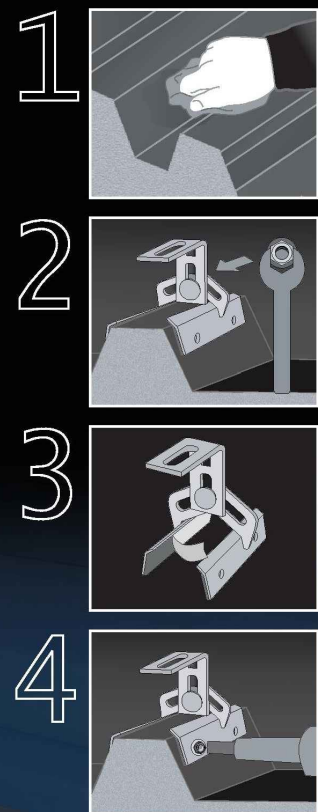
### ProteaBracket™

ProteaBracket™ is the most versatile standing seam metal roof attachment solution on the market, fitting most trapezoidal sheet profiles with and without intermediate insulation. It features an adjustable attachment base and multiple solar module attachment options (illustrated on back) to accommodate varying widths and heights. There are no messy sealants to apply and no chance for leaks; the ProteaBracket comes with factory-applied, adhesive rubber sealant to ensure quick installation and a weather-proof fit.

Installation is simple! The ProteaBracket is mounted directly onto the crown of the panel, straddling the profile. No surface preparation is necessary; simply wipe away excess oil and debris, align, and apply. Secure ProteaBracket through its pre-punched holes, using the hardened drill point S-5!<sup>®</sup> screws.

ProteaBracket is the perfect match for our S-5-PV Kit and spares you the hassle of cold-bridging! For a solar attachment solution that is both economical and easy to use, choose ProteaBracket.\*

\*When ProteaBracket is used in conjunction with the S-5-PV Kit, an additional nut is required during installation.



ProteaBracket™



S-5!<sup>®</sup> ProteaBracket™ is a versatile bracket that adjusts easily to most trapezoidal roof profiles.

888-825-3432 | www.S-5.com

# S-5!<sup>®</sup>

## The Right Way!

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal exposed-fastened metal roof profiles! No messy sealants to apply. The factory-applied adhesive rubber sealant weather-proofs and makes installation easy!

Each ProteaBracket™ comes with a factory-applied, adhesive rubber sealant on the base. A structural A2 stainless steel bimetal attachment bracket, ProteaBracket is compatible with most common metal roofing materials. All four pre-punched holes must be used to achieve tested strength. Mounting hardware is furnished with the ProteaBracket. For design assistance, ask your distributor, or visit [www.S-5.com](http://www.S-5.com) for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications. S-5!<sup>®</sup> holding strength is unmatched in the industry.

### Multiple Attachment Options:

Side Rail Option



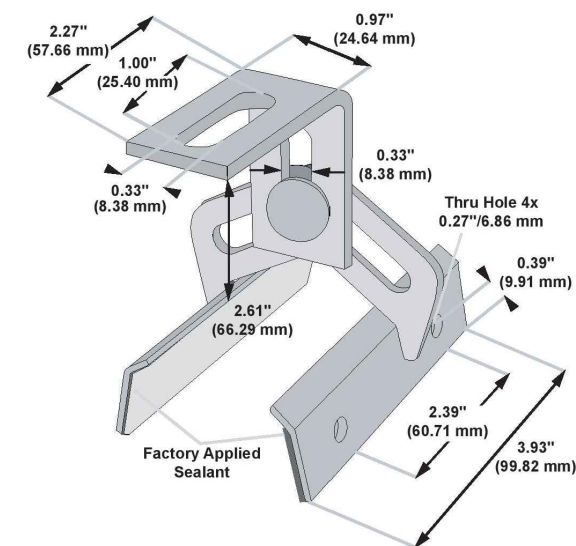
Top Rail Option



S-5-PV Kit Option

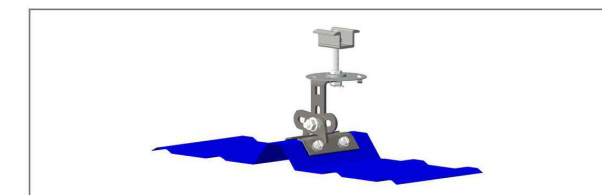


### ProteaBracket™



Please note: All measurements are rounded to the second decimal place.

### Example Applications



S-5-PV Kit demonstrated with a ProteaBracket on a trapezoidal profile.

### Example Profile



#### S-5!<sup>®</sup> Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5!<sup>®</sup> website at [www.S-5.com](http://www.S-5.com).

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