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997 MORRISON DR SUITE #200,  
CHARLESTON, SC 29403, USA

**Need on-site installation support?**

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InstallHotline@Palmetto.com

David C. Hernandez Digitally signed by David C. Hernandez  
Date: 2023.05.16 06:25:28 -04:00



# RESIDENTIAL SOLAR PHOTOVOLTAIC SYSTEM

## 355 HUNTING WOOD DR ANGIER, NC 27501

4.050 kW DC-STC / 3.800 kW AC  
15/MAY/23

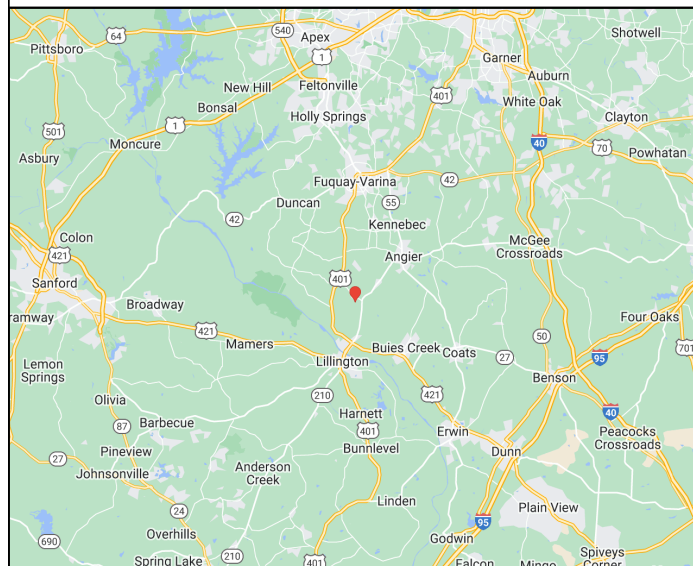


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### SYSTEM SPECIFICATIONS

SYSTEM SIZE: 4.050 kW  
MODULE: VSUN 405-108BMH 405W  
NUMBER OF PANELS: 10  
INVERTER: SE3800H-US (240V)  
OPTIMIZER: S440  
RACKING SYSTEM: IRONRIDGE XR-10-168M

AHJ: HARNETT COUNTY, NC  
UTILITY: DUKE ENERGY PROGRESS (DEP) (NC)  
GOVERNING CODE:  
2018 NORTH CAROLINA STATE BUILDING CODE  
IBC 2018  
2018 NC FIRE PREVENTION CODE  
NEC 2017

C1 - COVER PAGE

GENERAL NOTES:

THE INSTALLATION OF PV SYSTEM SHALL BE IN ACCORDANCE WITH THE MOST RECENT NATIONAL ELECTRICAL AND BUILDING CODES AND STANDARDS, AS AMENDED BY JURISDICTION

- PV SYSTEMS SHALL BE PERMITTED TO SUPPLY A BUILDING OR OTHER STRUCTURE IN ADDITION TO ANY OTHER ELECTRICAL SUPPLY SYSTEM(S) [NEC 690.4(A)]
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- EXISTING PLUMBING VENTS, SKYLIGHTS, EXHAUST OUTLETS, VENTILATIONS INTAKE AIR OPENINGS SHALL NOT BE COVERED BY THE SOLAR PHOTOVOLTAIC SYSTEM
- INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, SOURCE-CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN PV SYSTEMS SHALL BE LISTED OR FIELD LABELED FOR THE PV APPLICATION [NEC 690.4(B)]
- 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
- FOR PV MODULES, EQUIPMENT GROUNDING CONDUCTORS SMALLER THAN 6AWG SHALL COMPLY WITH NEC 250.12(C) [NEC 690.46]
- ALL PV SYSTEM DC CIRCUIT AND INVERTER OUTPUT CONDUCTORS AND EQUIPMENT SHALL BE PROTECTED AGAINST OVERCURRENT UNLESS STATED OTHERWISE IN NEC 690.9(A)
- OVERCURRENT DEVICES USED IN PV SYSTEM DC CIRCUITS SHALL BE LISTED FOR USE IN PV SYSTEMS [NEC 690.9(B)]
- 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 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
- CONNECTORS SHALL REQUIRE A TOOL TO OPEN AND BE MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING". [NEC 690.33(E)]
- ALL GROUNDED CONDUCTORS SHALL BE PROPERLY COLOR IDENTIFIED AS WHITE. [NEC 200.6]
- PV SYSTEM CONNECTED ON THE LOAD SIDE OF THE SERVICE DISCONNECTING MEANS OF THE OTHER SOURCE(S) AT ANY DISTRIBUTION EQUIPMENT ON THE PREMISES SHALL MEET THE FOLLOWING [NEC 705.12(B)]:
  1. EACH SOURCE CONNECTION SHALL BE MADE AT A DEDICATED CIRCUIT BREAKER OF FUSIBLE DISCONNECTING MEANS. [NEC 705.12(B)(1)]
  2. 125 PERCENT OF THE POWER SOURCE OUTPUT CIRCUIT CURRENT SHALL BE USED IN AMPACITY CALCULATIONS. [NEC 705.12(B)(2)]
  3. EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUS BAR OR CONDUCTOR SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES. [NEC 705.12(B)(3)]
  4. CIRCUIT BREAKER, IF BACK FED, SHALL BE SUITABLE FOR SUCH OPERATION [NEC 705.12(B)(4)]

- WHEN A BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, THE BREAKER SHALL BE INSTALLED AT THE OPPOSITE END OF THE BUS BAR OF THE MAIN BREAKER.
- TO REDUCE FIRE HAZARDS, DC PV SYSTEMS WILL BE EQUIPPED WITH A GROUND FAULT PROTECTION SYSTEM IN ACCORDANCE WITH NEC 690.41(B)
- WHERE GROUND-FAULT PROTECTION IS USED, THE OUTPUT OF AN INTERACTIVE SYSTEM SHALL BE CONNECTED TO THE SUPPLY SIDE OF THE GROUND FAULT PROTECTION [NEC 705.32]
- ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF NATIONAL ELECTRICAL CODE. LABEL SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED IN A CONTRASTING COLOR TO THE PLAQUE. PLAQUE SHALL BE UV RESISTANT IF EXPOSED TO SUNLIGHT
- ALL THE NEC REQUIRED WARNING SIGNS, MARKINGS, AND LABELS SHALL BE POSTED ON EQUIPMENT AND DISCONNECTS PRIOR TO ANY INSPECTIONS TO BE PERFORMED BY THE BUILDING DEPARTMENT.
- CONNECTORS SHALL BE OF LATCHING OR LOCKING TYPE. CONNECTORS THAT ARE READILY ACCESSIBLE AND OPERATING AT OVER 30 VOLTS SHALL REQUIRE TOOL TO OPEN AND MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING". [NEC 690.33(C) & (E)(2)]
- FLEXIBLE, FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH TERMINALS, LUGS, DEVICES, OR CONNECTORS IN ACCORDANCE WITH NEC 110.14
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3)
- ALL EXTERIOR CONDUITS, FITTINGS AND BOXES SHALL BE RAIN-TIGHT AND APPROVED FOR USE IN WET LOCATIONS PER NEC 314.15.
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER MANUFACTURER'S REQUIREMENTS. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
- DC CONDUCTORS SHALL BE RUN IN EMT AND SHALL BE LABELED "CAUTION DC CIRCUIT" OR EQUIV. EVERY 5 FT
- CONFIRM LINE SIDE VOLTAGE AT ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
- SERVING UTILITY TO BE NOTIFIED BEFORE ACTIVATION OF PV SYSTEM.
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
- THE HOMEOWNER IS RESPONSIBLE FOR ENSURING ALL EQUIPMENT OUTSIDE THE SCOPE OF WORK IS NEC COMPLIANT.



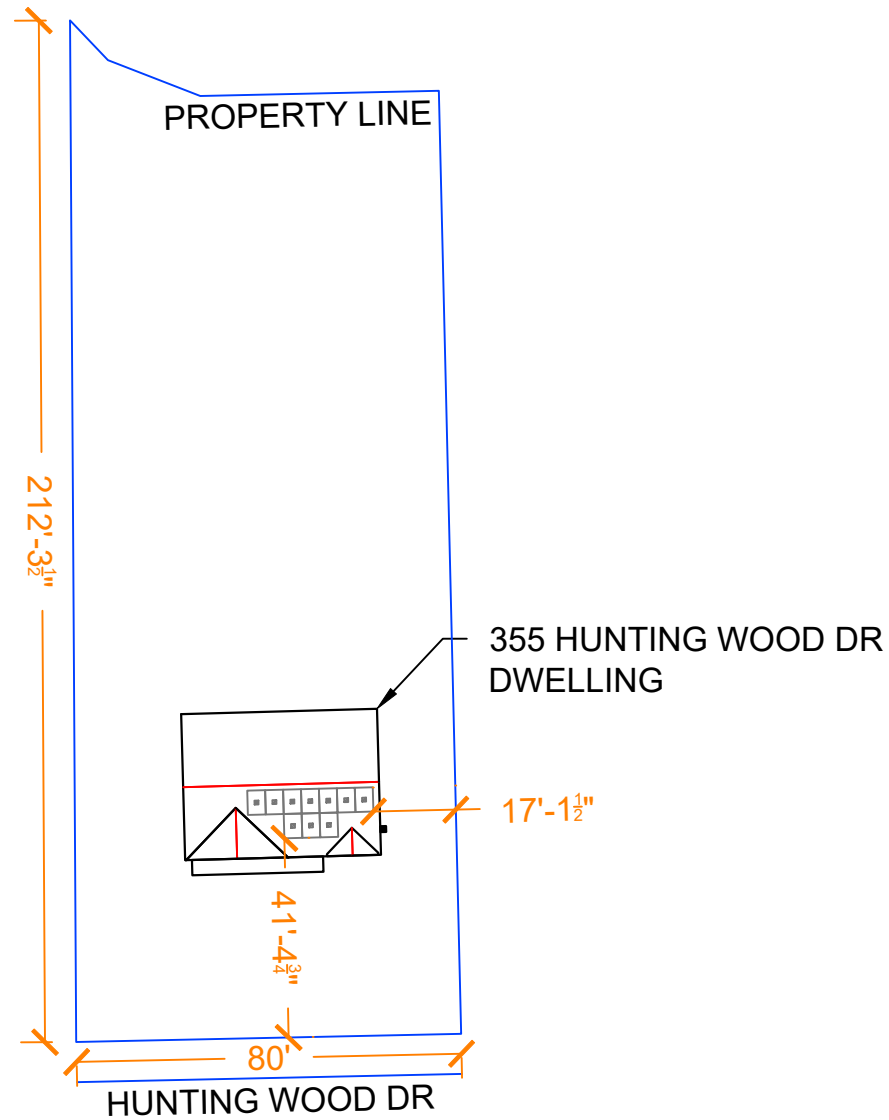
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ZIP CODE: 27501  
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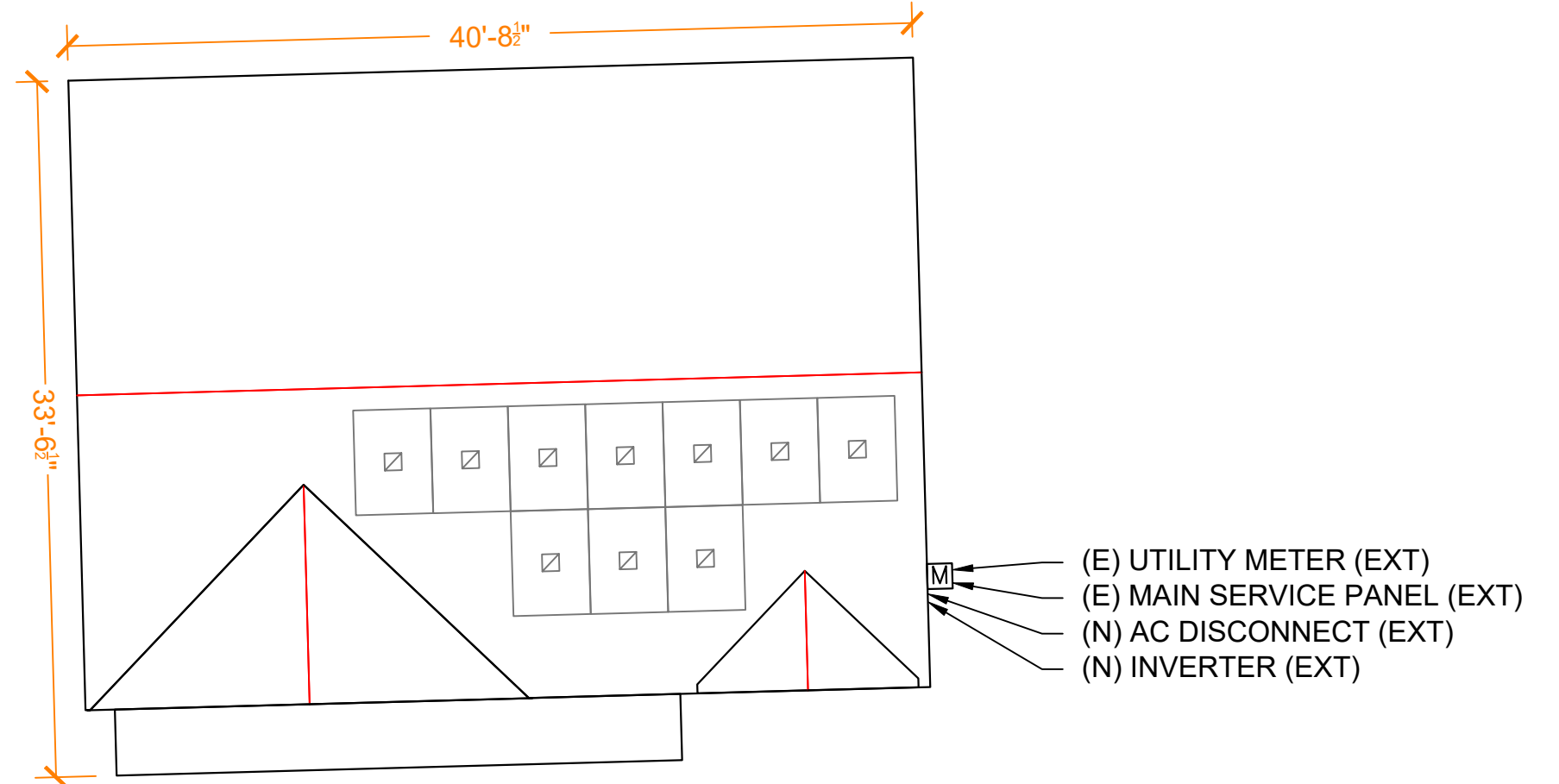
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REV: -

N1 - GENERAL NOTES  
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SCALE: 1"=40'



SCALE: 1"=8'

NOTES:

- SCALE AS SHOWN
- ALL DIMENSIONS IN FEET UNLESS OTHERWISE STATED

SAFETY PLAN:

- INSTALLERS SHALL DRAW IN DESIGNATED SAFETY AREA AROUND HOME
- INSTALLERS SHALL UPDATE NAME, ADDRESS, AND PHONE NUMBER OF NEAREST URGENT CARE FACILITY RELATIVE TO THE SITE BEFORE STARTING WORK

NEAREST URGENT CARE FACILITY

NAME:  
ADDRESS:  
PHONE NUMBER:



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G1 - SITE PLAN  
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### SITE INFORMATION

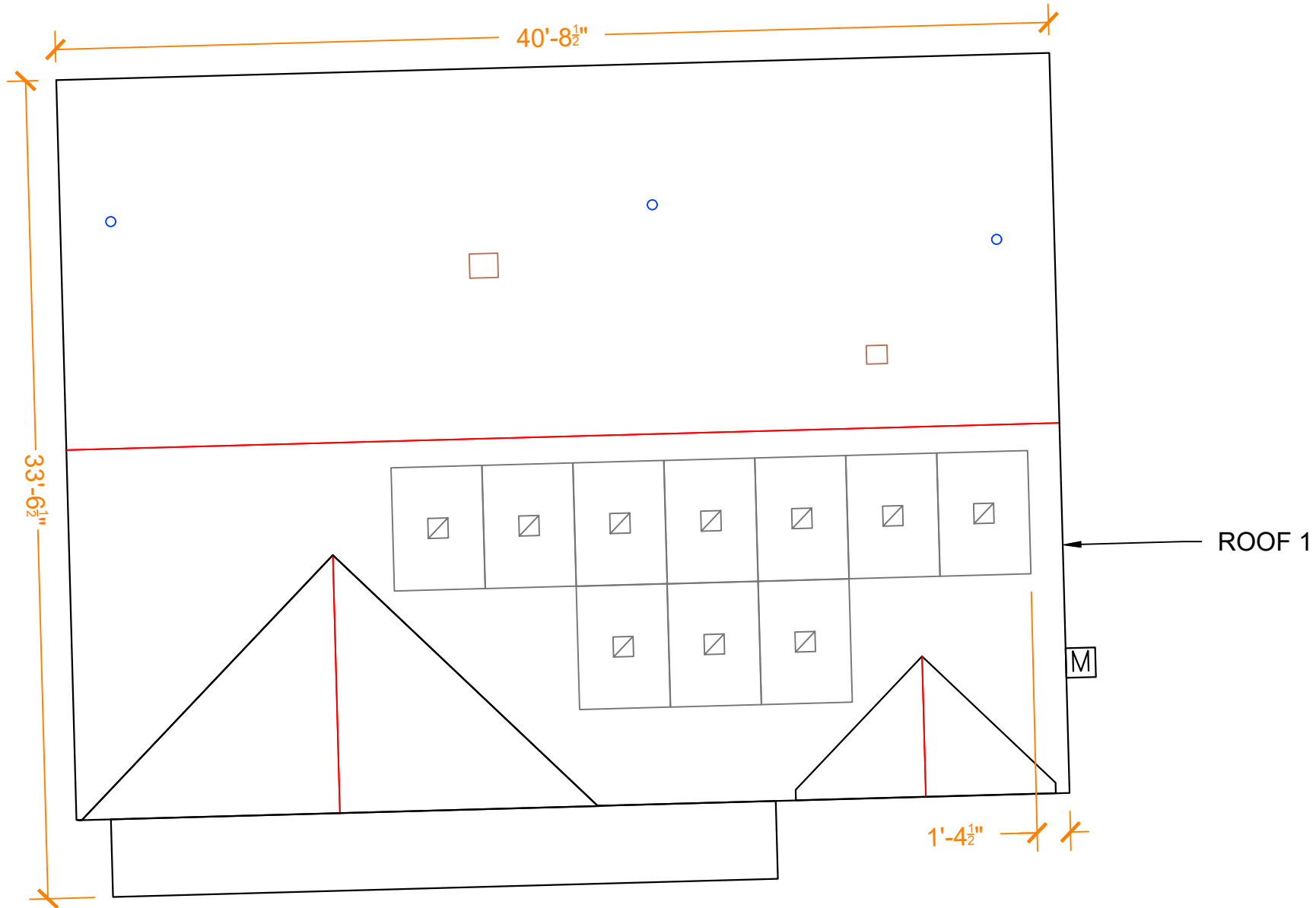
ARRAY	AZIMUTH	PITCH	NO. OF PANELS	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT	FRAME SIZE & FRAME TYPE	FRAME SPACING	MAX ATTACHMENT SPAN	OVERHANG
ROOF 1	178°	27°	10	210.23	SHINGLE	QUICK MOUNT L-MOUNT	2" X 4" PRE FABRICATED TRUSSES	2'-0"	4'-0"	1'-4"

### PANELS DATA

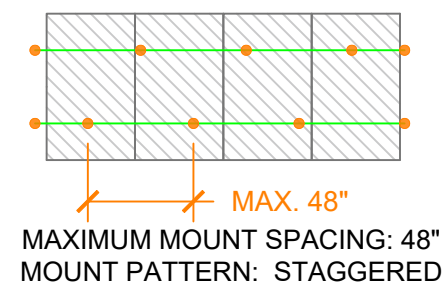
PANEL TYPE	VSUN 405-108BMH 405 W
NO. OF PANELS	10
PANEL SIZE	67.80" X 44.65"
PANEL WEIGHT (LBS)	47.18
PANEL AREA (FT <sup>2</sup> )	21.02
UNIT WEIGHT OF AREA (LBS/FT <sup>2</sup> )	2.24

### LEGEND

- M METER
- PVC VENT
- ⊗ METAL VENT
- VENT BOX
- STRUCTURAL DELIMITER
- SERVICE MAST
- SATELLITE
- △ ANTENNA
- SNOW GUARD
- DOWNSPOUT
- MOUNT
- RAIL
- TOP CHORD
- CHIMNEY



### MOUNTING PATTERN SAMPLE



ALL HARDWARE, INCLUDING MOUNTING AND RACKING, TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.

SCALE: 1"=6'

TOTAL ROOF AREA: 1481.93 FT<sup>2</sup>  
 TOTAL ARRAY AREA: 210.23 FT<sup>2</sup>  
 TOTAL ARRAY PERCENT COVERAGE: 14.19%

MODULE WATTAGE: 405 W  
 NUMBER OF PANELS: 10  
 SYSTEM SIZE: 4.050 kW

NOTES:  
 - SOLAR PANEL LAYOUT SUBJECT TO CHANGE ACCORDING TO EXISTING CONDITIONS  
 - SCALE AS SHOWN  
 - ALL DIMENSIONS IN FEET UNLESS OTHERWISE STATED

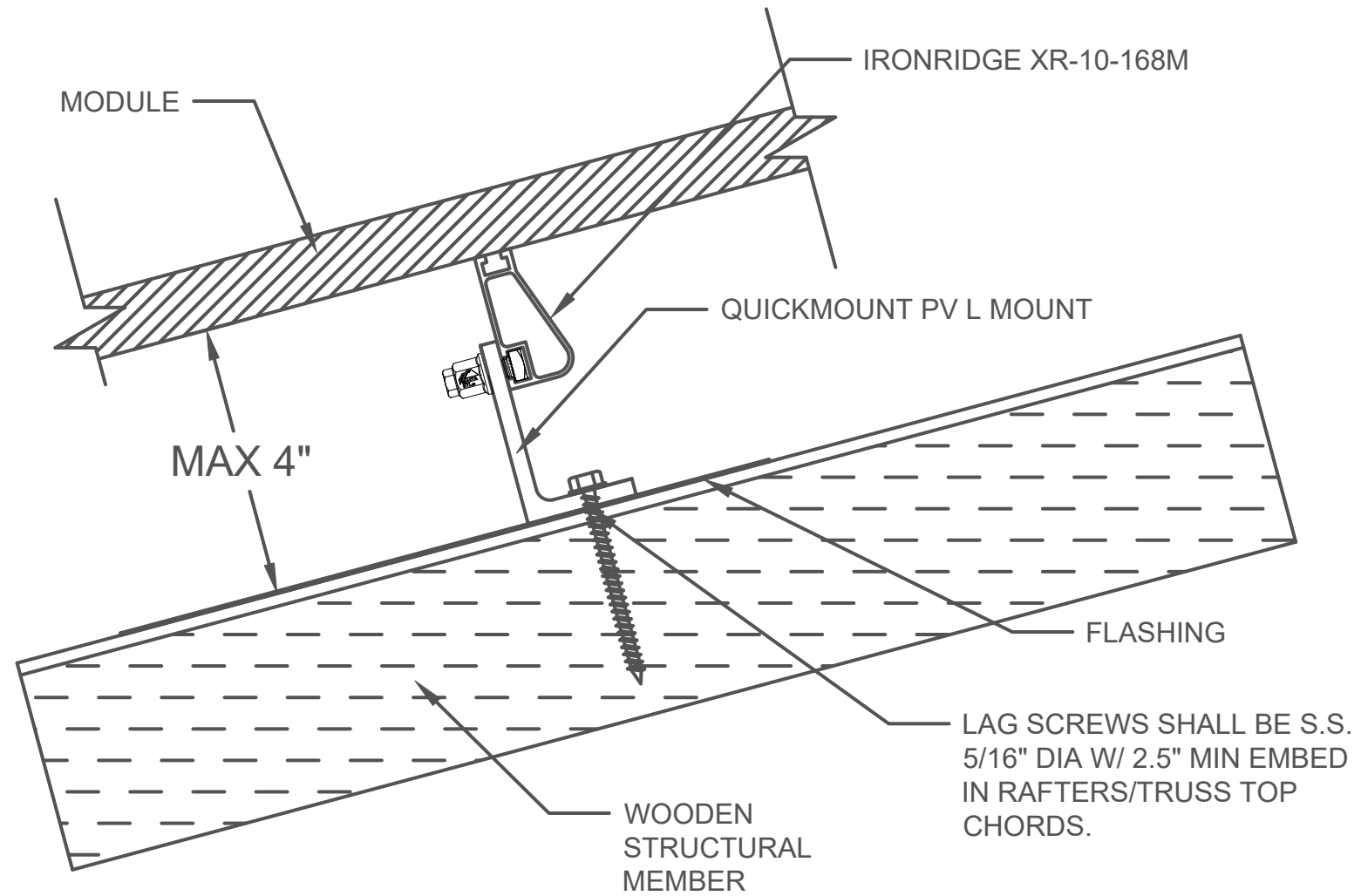
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G2 - PANEL LAYOUT  
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SCALE: NTS

PANEL TYPE: VSUN 405-108BMH 405W  
 PANEL SIZE: 67.80" X 44.65"  
 RACKING TYPE: IRONRIDGE XR-10-168M  
 MOUNT TYPE: QUICK MOUNT L-MOUNT  
 SOLAR SYSTEM DEAD LOAD: 3.0 PSF

NOTES:

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- ALL DIMENSIONS IN FEET UNLESS OTHERWISE STATED



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G3 - MOUNTING DETAIL  
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UTILITY METER NUMBER: 322529049

NABCEP PV PROFESSIONAL LICENSE: PV-102415-012615

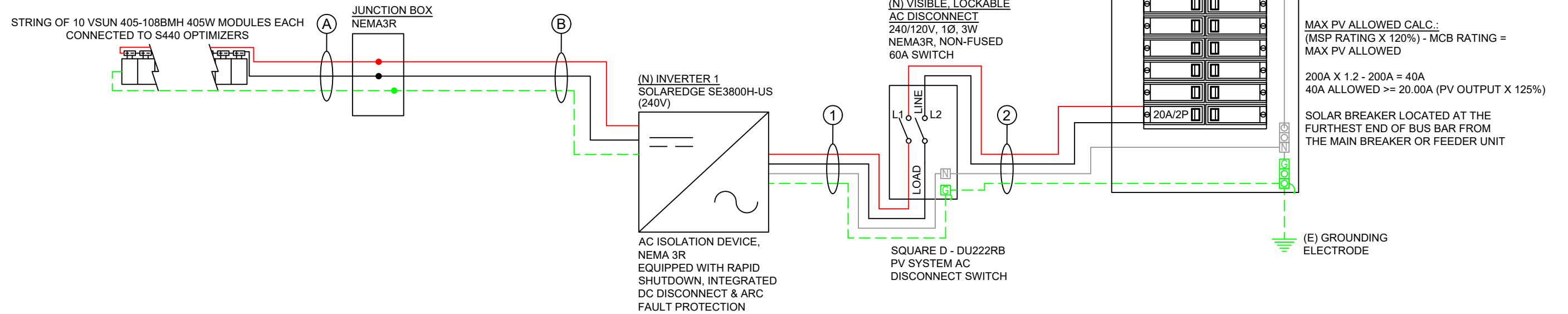
ELECTRICAL CONTRACTOR LICENSE: U.32289

NOTE:

**4.0500kW DC SYSTEM SIZE (STC)**  
**MODULES: 10 X 405W = 4.050kW DC (STC)**

**INVERTER: 1X SOLAREEDGE SE3800H-US INVERTER**  
**= 3.800kW AC SYSTEM**

**(10) VSUN 405-108BMH 405W PANELS**  
**(10) SOLAREEDGE S440 OPTIMIZER**  
**(1) SOLAREEDGE SE3800H-US INVERTER**



**AC CONDUCTOR SCHEDULE**

ID	From	To	Phase	AC Voltage	Circuit Current	80% or 100% Rated OCPD?	Circuit Current x 125%	OCPD (If Present)	Material	Conductor Type	# of CCCs	Fill Factor	Ambient Temp.	Temp. Factor	Conductor Size	Ampacity @ 75°C	Max Ampacity	Derated Ampacity	# of Neutrals	Neutral Size	Ground	Ground Material	Ground Type	Ground Size	Conduit Type	Conduit Size
1	SolarEdge Inverter 1	AC Disconnect	1Ø	240 (V)	16.0 (A)	80%	20.0 (A)	20 (A)	CU	THWN-2	2	1.00	32.9 (°C)	0.96	10 AWG	35 (A)	40 (A)	38.4 (A)	1	10 AWG	EGC	CU	THWN-2	10 AWG	EMT	0.75 (in.)
2	AC Disconnect	POI	1Ø	240 (V)	16.0 (A)	80%	20.0 (A)	20 (A)	CU	THWN-2	2	1.00	32.9 (°C)	0.96	10 AWG	35 (A)	40 (A)	38.4 (A)	1	10 AWG	EGC	CU	THWN-2	10 AWG	EMT	0.75 (in.)

**SOLAREEDGE DC CONDUCTOR SCHEDULE**

(A) FREE AIR  
 \*TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 32.9°C WITH A 0°C TEMPERATURE ADDER THEREFORE RACEWAYS MUST BE AT LEAST 0.875 INCHES ABOVE ROOF AS PER NEC 310.15(B)(3)(C)

Number of Strings	Conductor Material	Conductor Type	Conductor Size	Base Ampacity @ 90°C	*Temperature Factor	Fill Factor	Derated Ampacity	Circuit Current	Min. OCPD (If Required)	EGC Material	EGC Type	EGC Size	Conduit
No Limit	CU	PV Wire	10 AWG	40A	0.96	1.00	38.40A	15.00A	20A	CU	BARE	6 AWG	N/A - Free Air

(B) IN CONDUIT  
 \*TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 32.9°C WITH A 0°C TEMPERATURE ADDER THEREFORE RACEWAYS MUST BE AT LEAST 0.875 INCHES ABOVE ROOF AS PER NEC 310.15(B)(3)(C)  
 \*\*CALCULATIONS ARE BASED ON THE LARGEST CIRCUIT CURRENT (WORST CASE SCENARIO).  
 \*\*\*TABLE ASSUMES ONE EGC PER CONDUIT. MINIMUM ONE EGC IS REQUIRED PER INVERTER PER CONDUIT.

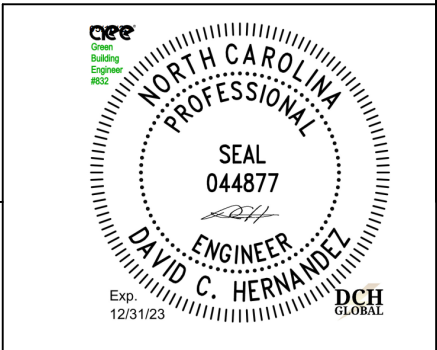
Number of Strings	Conductor Material	Conductor Type	Conductor Size	Base Ampacity @ 90°C	*Temperature Factor	Fill Factor	Derated Ampacity	**Circuit Current	Min. OCPD (If Required)	EGC Material	EGC Type	EGC Size	Min. EMT Size
1	CU	THWN-2	10 AWG	40A	0.96	1.00	38.40A	15.00A	20A	CU	THWN-2	10 AWG	0.50 in.

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E1 - LINE DIAGRAM  
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### WARNING

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

CODE REF: [NEC 690.13(B)]  
LOCATION: PLACE ON **ALL** DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

### WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

CODE REF: [NEC 110.27(C) & OSHA 1910.14(f)(7)]  
LOCATION: PLACE ON **ALL** COMBINER BOX/ENCLOSURES, MAIN SERVICE DISCONNECT, BREAKER PANEL & PULL BOXES

### WARNING

**THIS EQUIPMENT FED BY MULTIPLE SOURCES**

TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR

CODE REF: [NEC 705.12(B)(2)(3)(c)]  
LOCATION: PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL OR SUB-PANEL) IF APPLICABLE

### WARNING

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

CODE REF: [NEC 690.31(I)]  
LOCATION: PLACE ON **ALL** DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

### WARNING

**DUAL POWER SOURCE**  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

CODE REF: [NEC 705.12(B)(3) & 690.59]  
LOCATION: PLACE LABEL ON ALL EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTORS SUPPLIED FROM MULTIPLE SOURCES

### WARNING

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

CODE REF: [NEC 705.12(B)(2)(3)(b)]  
LOCATION: PLACE LABEL ON ALL EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTORS SUPPLIED FROM MULTIPLE SOURCES

### CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

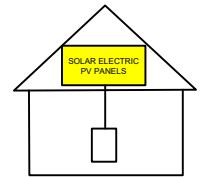
CODE REF: [NEC 705.12(B)(4) & 690.59]  
LOCATION: PLACE LABEL ON ALL EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTORS SUPPLIED FROM MULTIPLE SOURCES

### RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

CODE REF: [NEC 690.56(C)(3)]  
LOCATION: PLACE NO MORE THAN 1m (3FT) FROM SWITCH

### 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.



CODE REF: [NEC 690.56(C)]  
LOCATION: PLACE AT MAIN SERVICE PANEL

### WARNING: PHOTOVOLTAIC POWER SOURCE

CODE REF: [NEC 690.31 (G)(3) & 690.31 (G)(4)]  
LOCATION: PLACE ON ALL JUNCTION BOXES. EXPOSED RACEWAYS EVERY 10'

MAXIMUM VOLTAGE 480 V  
MAXIMUM CIRCUIT CURRENT 10.5 A  
MAX RATED OUTPUT CURRENT OF DC-TO-DC CONVERTER (IF INSTALLED) 15 A

CODE REF: [NEC 690.53]  
LOCATION: PLACE AT INVERTER 1

### DO NOT DISCONNECT UNDER LOAD

CODE REF: [NEC 690.15(C) & 690.33(E)(2)]  
LOCATION: PLACE ON **ALL** DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

### PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT 16A  
NOMINAL OPERATING AC VOLTAGE 240V

CODE REF: [NEC 690.54]  
LOCATION: PLACE AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT / AC DISCONNECT / PULL BOXES

### PHOTOVOLTAIC

### AC DISCONNECT

CODE REF: [NEC 690.13(B)]  
LOCATION: PLACE AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT / AC DISCONNECT / PULL BOXES

### PHOTOVOLTAIC

### DC DISCONNECT

CODE REF: [NEC 690.13(B)]  
LOCATION: PLACE ON DC DISCONNECT

#### NOTES:

- ALL LABELING USED OUTDOORS MUST BE ENGRAVED METAL, UV STABILIZED ENGRAVED PLASTIC OR OF A MATERIAL SUFFICIENTLY DURABLE TO WITHSTAND THE ENVIRONMENT INVOLVED. VALUES HAND WRITTEN OR IN WRITTEN IN MARKER ARE NOT ACCEPTABLE PER NEC 2017.
- LABELS USED INDOORS MAY BE MADE OF DURABLE VINYL OR PAPER
- DO NOT COVER ANY EXISTING MANUFACTURER APPLIED LABELS WITH INSTALLATION SPECIFIC LABELS
- LABEL COLORS CHOSEN PER NFPA 70 2017 DIRECTION THAT ANSI Z535-2011 BE USED
- REQUIREMENTS COMPLY WITH NEC 2017
- ADDITIONALLY, IT IS HIGHLY RECOMMENDED THAT THE INSTALLER ATTACH A LABEL WITH THE COMPANY NAME AND CONTACT INFORMATION AT THE INVERTER
- ALL WARNING SIGNS OR LABELS SHALL COMPLY WITH NEC 110.21(B)

#### FORMAT

- WHITE LETTERING ON A RED BACKGROUND
- MINIMUM 3/8 INCHES LETTER HEIGHT
- ALL LETTERS SHALL BE CAPITALIZED
- ARIAL OR SIMILAR FONT (NON-BOLD)

#### MATERIAL

REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (USE UL-969 AS STANDARD FOR WEATHER RATING). DURABLE ADHESIVE MATERIALS



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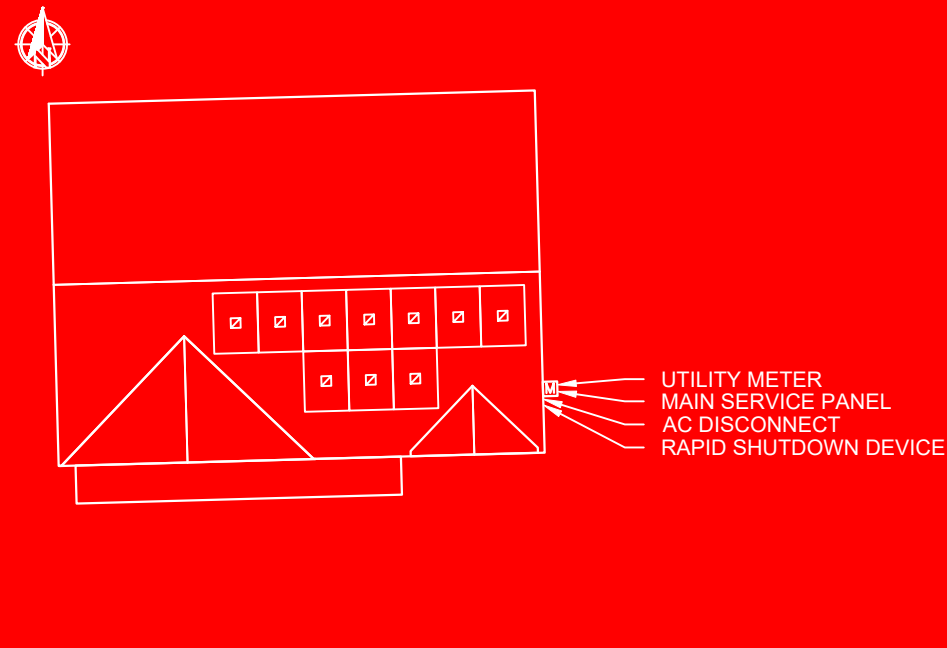
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E2 - WARNING LABELS  
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# CAUTION: MULTIPLE SOURCES OF POWER

POWER TO THIS SERVICE IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN



[NEC 705.10 & NEC 706.11] CUSTOMER SERVICE PANEL, PV/AC DISCONNECT AND RAPID SHUTDOWN DEVICE



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E3 - PLACARD  
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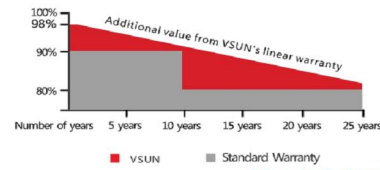
# VSUN405-108BMH

**405W**  
Highest power output

**20.74%**  
Module efficiency

**25years**  
Material & Workmanship warranty

**30years**  
Linear power output warranty



**VSUN405-108BMH** VSUN400-108BMH  
**VSUN395-108BMH** VSUN390-108BMH



- MBB technology with Circular Ribbon
- Higher output power
- Half-cell Technology
- Positive tolerance offer

- Micro Gap
- Up to 30% extra power generation yield from the back side
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa
- Lower LCOE

VSUN, a BNEF Tier-1 PV module manufacturer invested by Fuji Solar, has been committed to providing greener, cleaner and more intelligent renewable energy solutions. VSUN is dedicated to bringing reliable, customized and high-efficient products into various markets and customers worldwide



Engineered in Japan  
[www.vsun-solar.com](http://www.vsun-solar.com)

### Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN405-108BMH	VSUN400-108BMH	VSUN395-108BMH	VSUN390-108BMH
Maximum Power - Pmax (W)	405	400	395	390
Open Circuit Voltage - Voc (V)	37.36	37.2	37.03	36.84
Short Circuit Current - Isc (A)	13.78	13.68	13.59	13.5
Maximum Power Voltage - Vmpp (V)	31.36	31.17	31	30.82
Maximum Power Current - Imp (A)	12.92	12.84	12.75	12.66
Module Efficiency	20.74%	20.48%	20.23%	19.97%

Standard Test Conditions (STC): irradiance 1,000 W/m<sup>2</sup>; AM 1.5; module temperature 25°C. Pmax Sorting: 0-5W. Measuring Tolerance: ±3%.  
Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

### Electrical Characteristics with different rear side power gain(reference to 400 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Imp (A)	Pmax gain
420	37.1	14.36	31.17	13.48	5%
440	37.1	15.05	31.17	14.12	10%
479	37.2	16.42	31.12	15.41	20%
499	37.2	17.10	31.12	16.05	25%

### Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.27%/°C
Current Temperature Coefficient	+0.048%/°C
Power Temperature Coefficient	-0.32%/°C

### Maximum Ratings

Maximum System Voltage [V]	1500
Series Fuse Rating [A]	30
Bifaciality	70%±10%

### Material Characteristics

Dimensions	1722×1134×30mm (L×W×H)
Weight	21.4kg
Frame	Black anodized aluminum profile
Front Glass	White toughened safety glass, 3.2 mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate) or POE
Back Sheet	Transparent black-mesh backsheet
Cells	12×9 pieces monocrystalline solar cells series strings
Junction Box	IP68, 3 diodes
Cable&Connector	Portrait: 500 mm (cable length can be customized, 1×4 mm <sup>2</sup> , compatible with MC4)

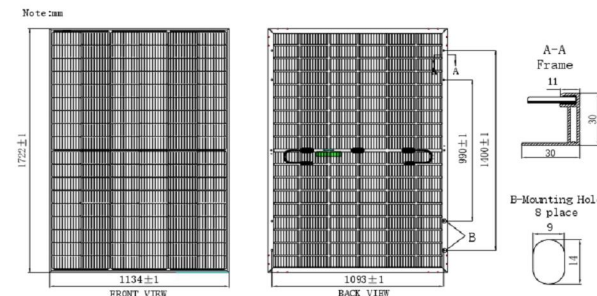
### Packaging

Dimensions(L×W×H)	1760×1125×1253mm
Container 20'	216
Container 40'	468
Container 40'HC	936

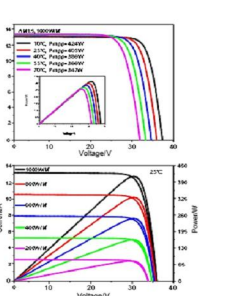
### System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

### Dimensions



### IV-Curves



# Certificate of Compliance

Certificate: 80098025 Master Contract: 265697  
Project: 80156103 Date Issued: 2023-02-07  
Issued to: VIETNAM SUNERGY JOINT STOCK COMPANY  
Lot III-Dong Vang Area, Dinh Tram Industrial Zone,  
Hoang Ninh Commune, Viet Yen District, 230000 Bac Giang Province,  
VIETNAM

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only



Issued by: Qiang (Sean) Jiang  
Qiang (Sean) Jiang

### PRODUCTS

CLASS 5311 10 - POWER SUPPLIES - Photovoltaic Modules and Panels  
CLASS 5311 90 - POWER SUPPLIES - Photovoltaic Modules and Panels - Certified to U.S. Standards  
Photovoltaic modules with Fire Performance (USA) Type 29, maximum system voltage of 1500 V dc, model series: VSUNxxx-144BMH-DG (xxx=510-580, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 29, maximum system voltage of 1500 V dc, model series: VSUNxxx-132BMH-DG (xxx=475-520, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 29, maximum system voltage of 1500 V dc, model series: VSUNxxx-120BMH-DG (xxx=430-470, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 29, maximum system voltage of 1500 V dc, model series: VSUNxxx-108BMH-DG (xxx=390-410, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 1, maximum system voltage of 1500 V dc, model series: VSUNxxx-144BMH (xxx=510-580, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 1, maximum system voltage of 1500 V dc, model series: VSUNxxx-132BMH (xxx=475-520, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 1, maximum system voltage of 1500 V dc, model series: VSUNxxx-120BMH (xxx=430-470, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 1, maximum system voltage of 1500 V dc, model series: VSUNxxx-108BMH (xxx=390-410, in steps of 5), Fuse rating 30A.  
Photovoltaic modules with Fire Performance (USA) Type 1, maximum system voltage of 1500 V dc, model series: VSUNxxx-144MH-BB (xxx=510-580, in steps of 5), Fuse rating 30A.



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MUNICIPALITY: ANGIER, NC  
ZIP CODE: 27501  
CLIENT: JENNIFER LEE  
4.050 KW DC-STC / 3.800 KW AC

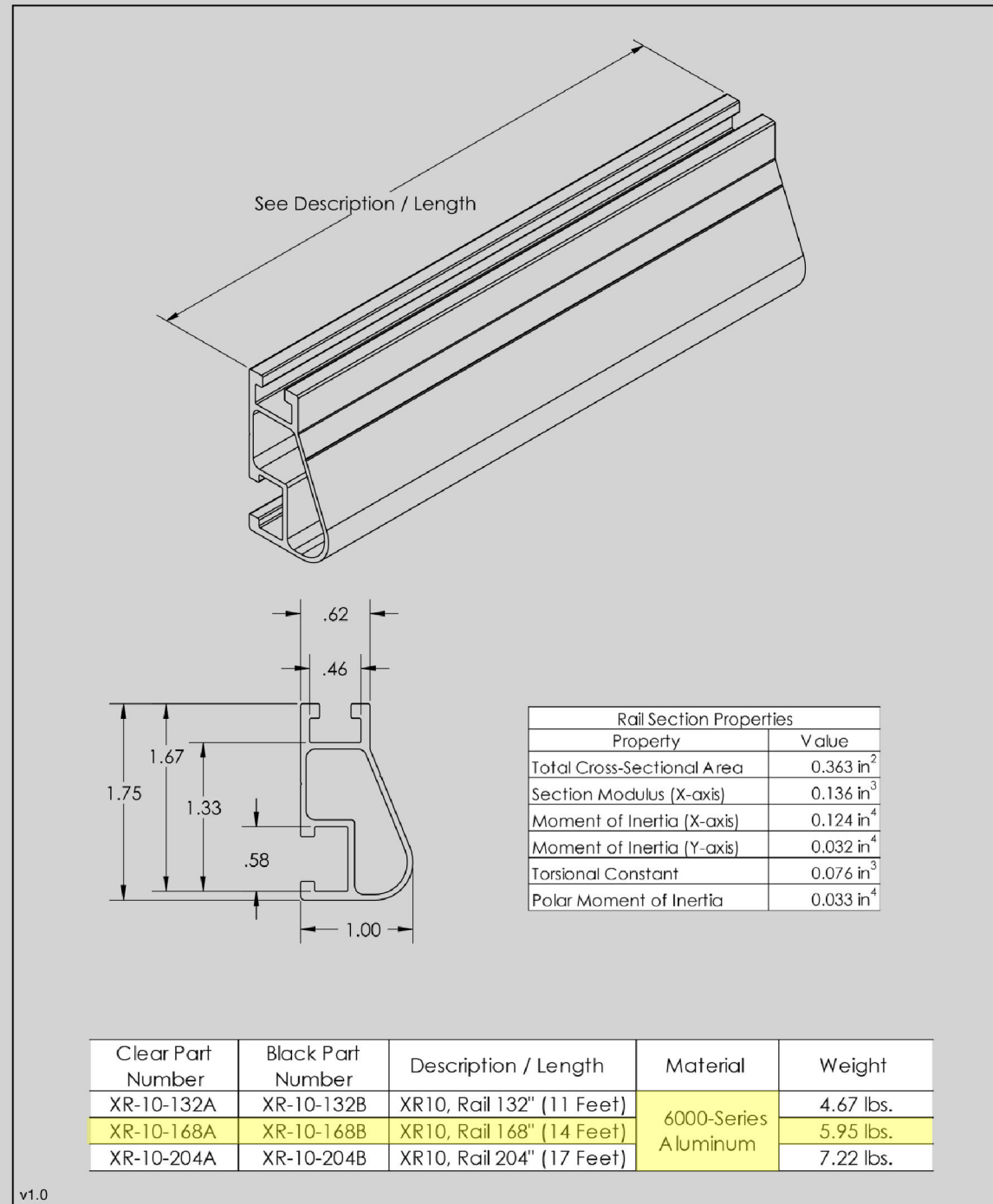
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A1 - PANEL SPECIFICATIONS  
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# XR10 Rail



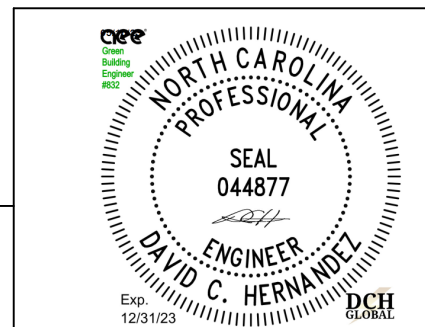
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**UL Certification**

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://IronRidge.com/UFO)



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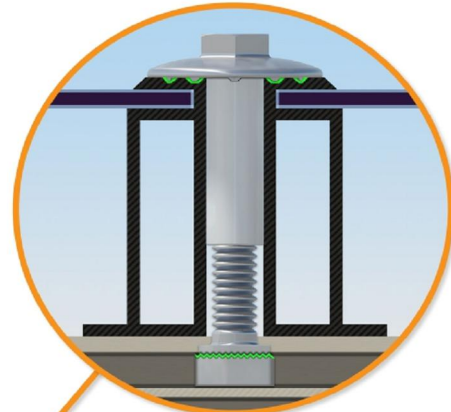
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A2 - RACKING SPECIFICATIONS  
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## Simplified Grounding for Every Application

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.



**BOSS™ Splice**  
Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.

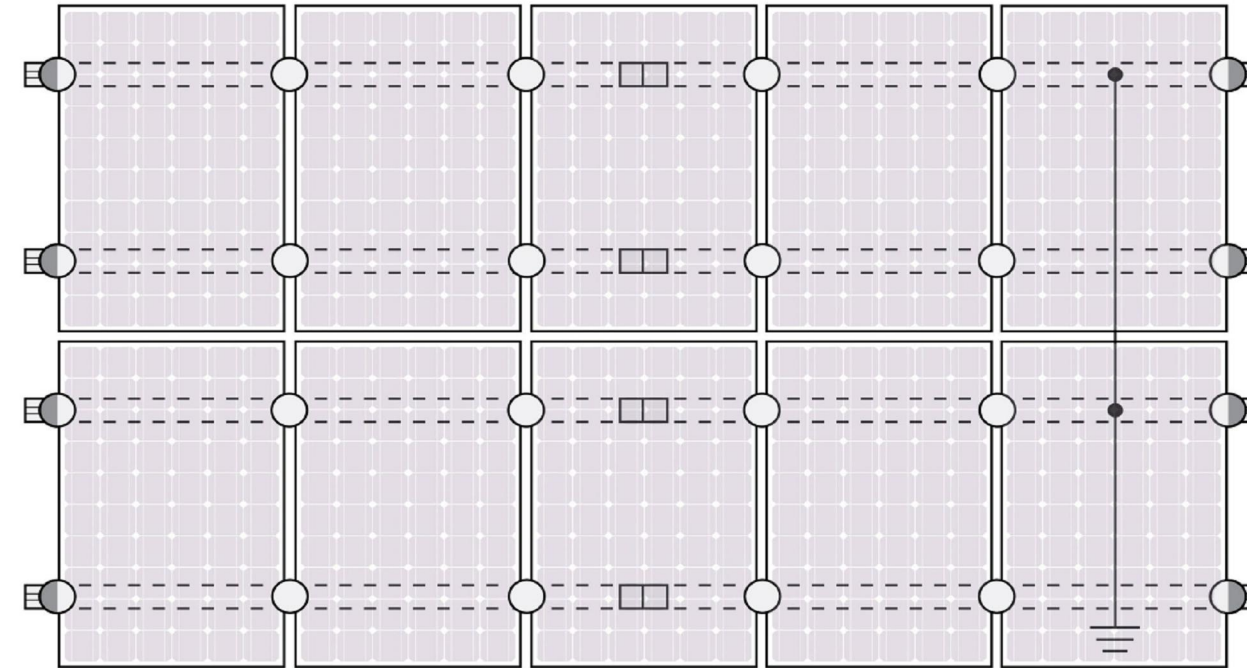


**Grounding Lug**  
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



**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



○ UFO   ◐ Stopper Sleeve   ● Grounding Lug   ◻ BOSS™ Splice   ≡ Ground Wire

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://www.ironridge.com/UFO)

## Cross-System Compatibility

Feature	Flush Mount	Tilt Mount	Ground Mount
<b>XR Rails</b>	✓	✓	XR1000 Only
<b>UFO/Stopper</b>	✓	✓	✓
<b>BOSS™ Splice</b>	✓	✓	N/A
<b>Grounding Lugs</b>	1 per Row	1 per Row	1 per Array
<b>Microinverters &amp; Power Optimizers</b>	Compatible with most MLPE manufacturers. Refer to system installation manual.		
<b>Fire Rating</b>	Class A	Class A	N/A
<b>Modules</b>	Tested or Evaluated with over 400 Framed Modules. Refer to installation manuals for a detailed list.		

VSUN

VSUN modules with 30, 35 and 40 mm frames

VSUNxxx-YYz-aa

Where "YY" can be 60, 72, 108, 120, or 144; "z" can be M, P, MH, PH, or **BMH**; and "aa" can be blank, BB, BW, or DG



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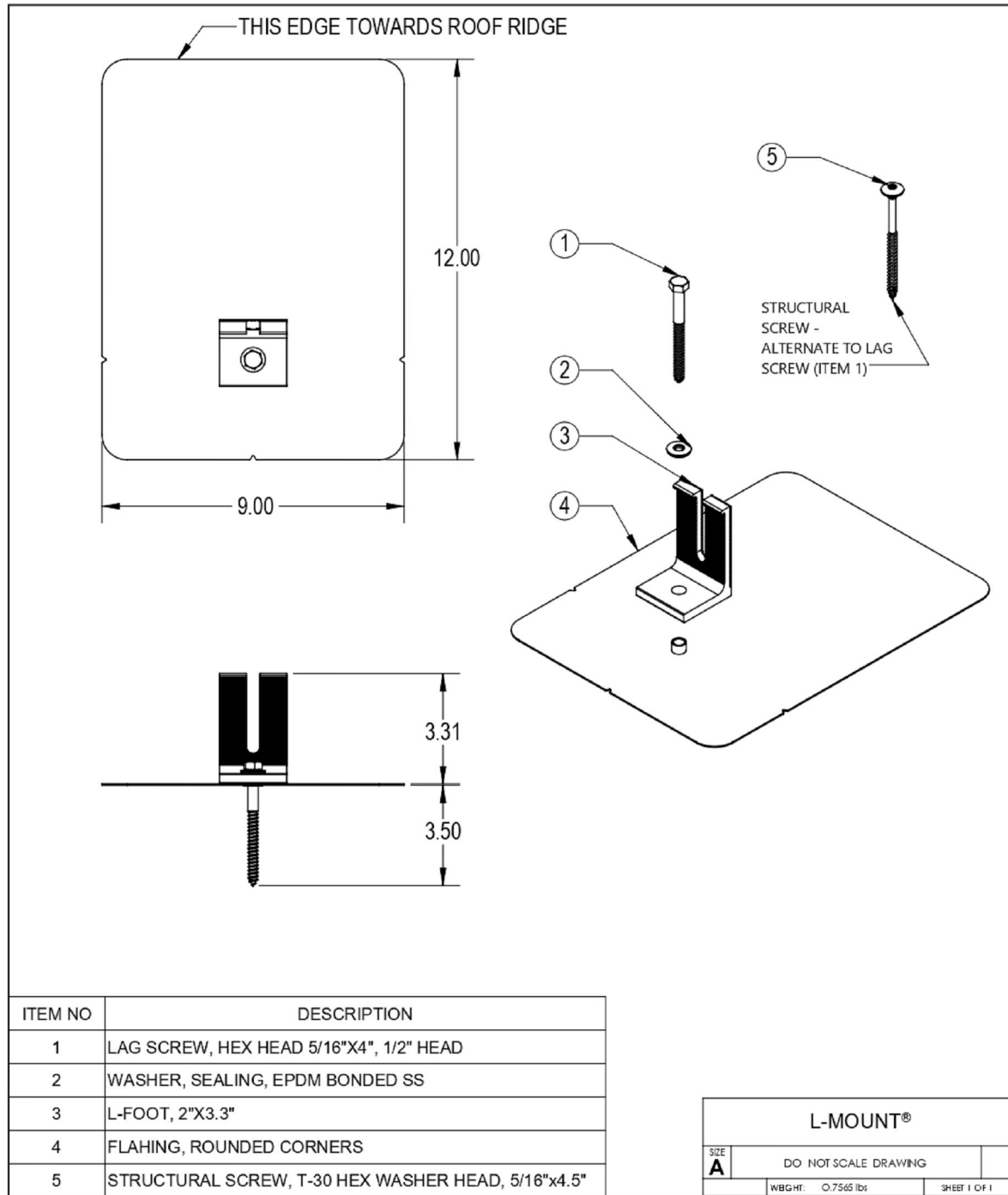
A3 - BONDING AND GROUNDING SPECIFICATIONS  
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### L-Mount® Installation Instructions

**Installation Tools Required:** tape measure, roofing bar, chalk line, stud finder, caulking gun, sealant compatible with roofing materials, drill with 7/32" or 1/8" bit, drill or impact gun with 1/2" socket.

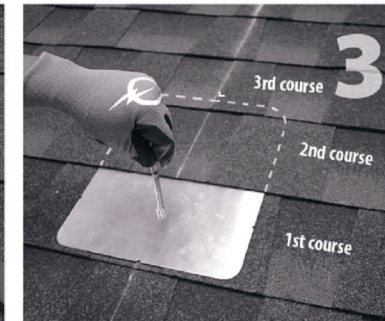
**WARNING:** Quick Mount® products are NOT designed for and should NOT be used to anchor fall protection equipment.



1 Locate, choose, and mark centers of rafters to be mounted. Select the courses of shingles where mounts will be placed.



2 Carefully lift composition roof shingle with roofing bar, just above placement of mount. Remove nails as required and backfill holes with approved sealant. See "Proper Flashing Placement" on next page.



3 Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least 3/4" higher than the butt-edge of the 3rd course and lower flashing edge is above the butt-edge of 1st course. Mark center for drilling.



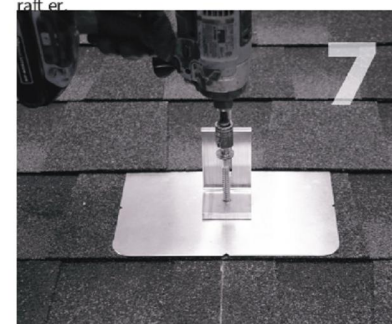
4 If attaching with lag bolt use a 1/4" bit (Lag). Use a 1/8" bit (ST) for attaching with the structural screw. Drill pilot hole into roof and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill a 2" deep hole into rafter.



5 Clean off any sawdust, and fill hole with sealant compatible with roofing materials.



6 Place L-foot onto elevated flute and rotate L-foot to desired orientation.



7 Prepare lag bolt or structural screw with sealing washer. Using a 1/2-inch socket on an impact gun, drive prepared lag bolt through L-foot until L-foot can no longer easily rotate. **DO NOT over-torque.** NOTE: Structural screw can be driven with T-30 hex head bit.



8 You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer. NOTE: Make sure top of L-Foot makes solid contact with racking.

All roofing manufacturers' written instructions must also be followed by anyone modifying a roof system. Consult the roof manufacturer's specs and instructions prior to working on the roof.



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A4 - MOUNTING SPECIFICATIONS  
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# Single Phase Inverter with HD-Wave Technology for North America

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



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



## 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							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	600ku Sensitivity								
Maximum Inverter Efficiency	99		99.2					%	
CEC Weighted Efficiency	99					99 @ 240V 98.5 @ 208V		%	
Nighttime Power Consumption	< 2.5							W	
<b>ADDITIONAL FEATURES</b>									
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)								
Revenue Grade Metering, ANSI C12.20 Consumption metering	Optional <sup>3)</sup>								
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 AFCI 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				in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				lb / kg	
Noise	< 25				< 50				dBA
Cooling	Natural Convection								
Operating Temperature Range	-40 to +140 / -40 to +60 <sup>4)</sup>							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

<sup>3)</sup> Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNH4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box.  
<sup>4)</sup> Full power up to at least 50°C / 122°F; for power derating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-napdf>



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4.050 KW DC-STC / 3.800 KW AC

AUTHOR: EE  
DATE: 15/MAY/23  
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A5 - INVERTER SPECIFICATIONS  
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# Power Optimizer For North America

S440, S500



POWER OPTIMIZER

## PV power optimization at the module level

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

\* Expected availability in 2022

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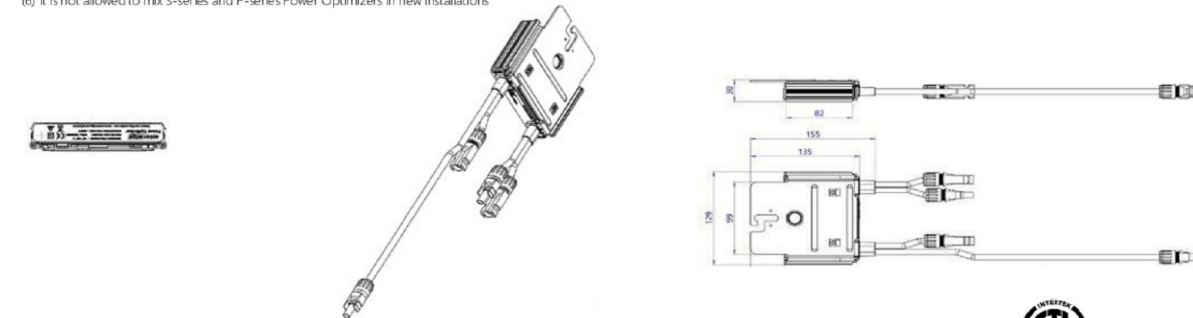
## Power Optimizer For North America S440, S500

	S440	S500	Unit
<b>INPUT</b>			
Rated Input DC Power <sup>(1)</sup>	440	500	W
Absolute Maximum Input Voltage (Voc)		60	Vdc
MPPT Operating Range		8 - 60	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency		99.5	%
Weighted Efficiency		98.6	%
Overtoltage Category		II	
<b>OUTPUT DURING OPERATION</b>			
Maximum Output Current		15	Adc
Maximum Output Voltage		60	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</b>			
Photovoltaic Rapid Shutdown System		NEC 2014, 2017 & 2020	
EMC		FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3	
Safety		IEC62109-1 (class II safety), UL1741	
Material		UL94 V-0, UV Resistant	
RoHS		Yes	
Fire Safety		VDE-AR-E 2100-712:2013-05	
<b>INSTALLATION SPECIFICATIONS</b>			
Maximum Allowed System Voltage		1000	Vdc
Dimensions (W x L x H)		129 x 153 x 30 / 5.07 x 6.02 x 1.18	mm / in
Weight (including cables)		655 / 1.5	gr / lb
Input Connector		MC4 <sup>(2)</sup>	
Input Wire Length		0.1 / 0.32	m / ft
Output Connector		MC4	
Output Wire Length		(+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32	m / ft
Operating Temperature Range <sup>(3)</sup>		-40 to +85	°C
Protection Rating		IP68 / NEMA6P	
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 other connector types please contact SolarEdge  
 (3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter	Single Phase HD-Wave	Three Phase for 208V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500 8	10	18	
Maximum String Length (Power Optimizers)	25	50 <sup>(4)</sup>	50 <sup>(4)</sup>	
Maximum Nominal Power per String	5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected Power per String <sup>(5)</sup> (Permitted only when the difference in connected power between strings is 1000W or less)	Refer to Footnote 5	One string 7200 Two strings or more 7800	15000	W
Parallel Strings of Different Lengths or Orientations		Yes		

(4) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement  
 (5) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>  
 (6) It is not allowed to mix S-series and P-series Power Optimizers in new installations



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A6 - OPTIMIZER SPECIFICATIONS  
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