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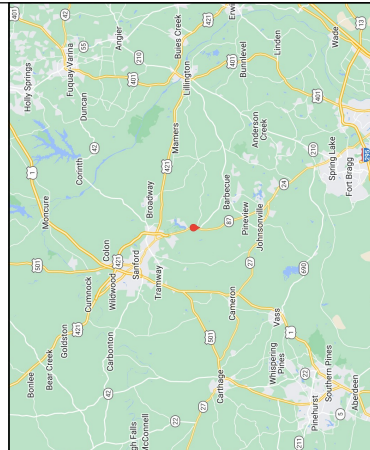
David C. Hernandez

Digitally signed by David C. Hernandez
Date: 2023.03.09 15:40:14 -05:00

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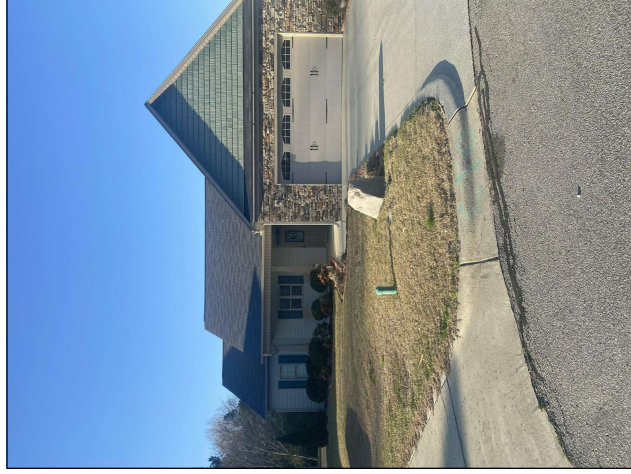


GBE
Green Building
Engineer No. 832
David C. Hernandez
NC PE No. 044877



RESIDENTIAL SOLAR PHOTOVOLTAIC SYSTEM 88 PITCH PINE CT SANFORD, NC 27332

5.265 kW DC-STC / 3.800 kW AC
09/MAR/23



SYSTEM SPECIFICATIONS

SYSTEM SIZE: 5.265 kW
MODULE: VSUN 405-108BMH 405 W
NUMBER OF PANELS: 13
INVERTER: SE3800H-US (240V)
OPTIMIZER: S440
RACKING SYSTEM: IRONRIDGE XR-10-168M

UTILITY: DUKE ENERGY PROGRESS (DEP) (NC)

GOVERNING CODE:

2018 NORTH CAROLINA STATE BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE FOR
ONE AND TWO-FAMILY DWELLINGS
2018 NORTH CAROLINA FIRE PREVENTION CODE
NEC 2017



EXACTUS ENERGY
NEW AGE ENGINEERING

+1 833 392 2887

208-888 DUPONT STREET

TORONTO, ON

SHEET INDEX

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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 UL 1703
- 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.



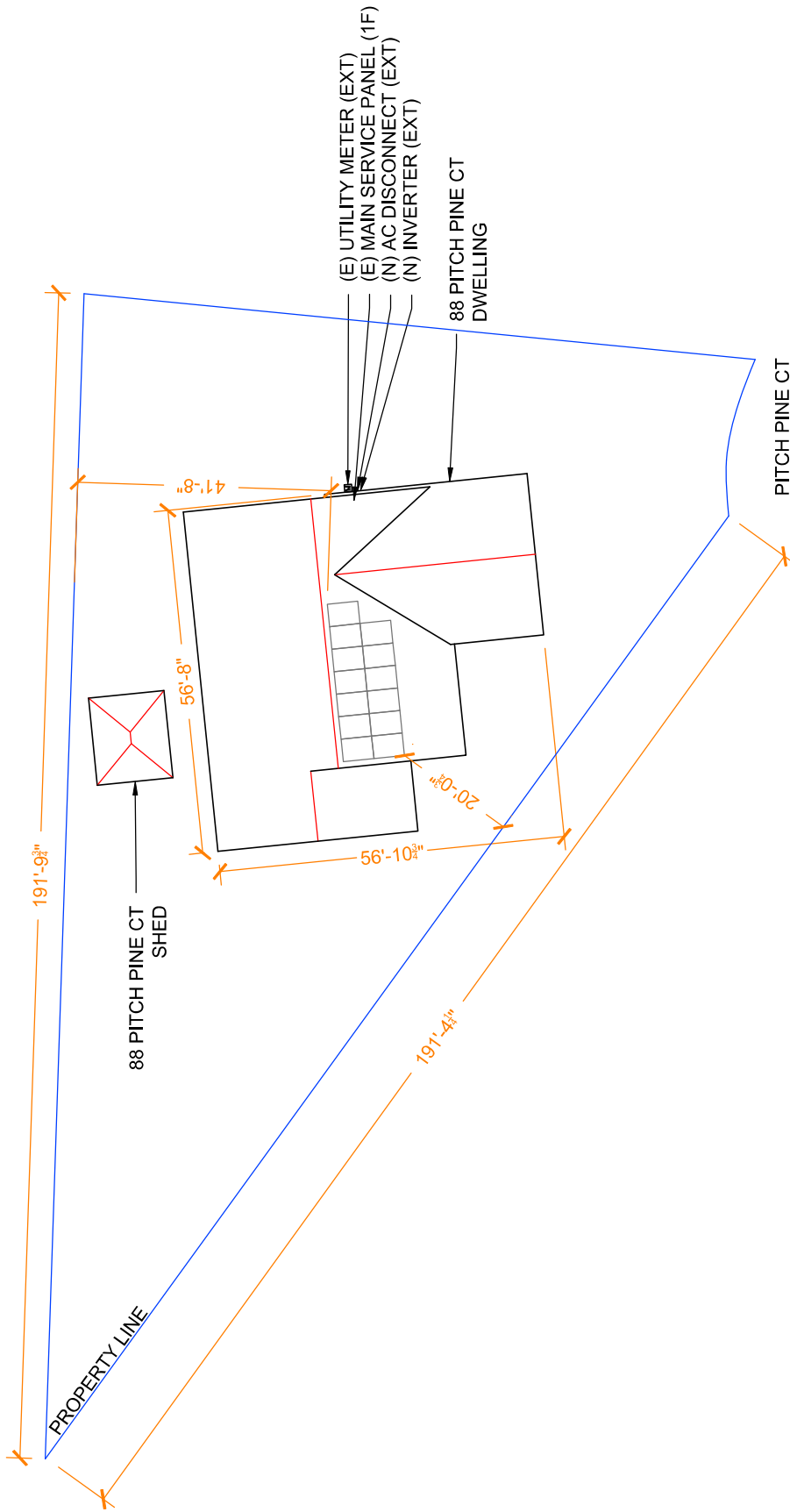
N1 - GENERAL NOTES
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AUTHOR: EE
DATE: 09/MAR/23
REV.: -

PROJECT: 88 PITCH PINE CT
MUNICIPALITY: SANFORD, NC
ZIP CODE: 27332
CLIENT: MRS DONNA WORKMAN
 5.265 KW DC-STC / 3.800 KW AC

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SCALE: 1"=18'

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	174°	27°	13	273.30	COMPOSITE SHINGLE	QUICK MOUNT L-MOUNT	2" X 4" PRE FABRICATED TRUSSES	2'-0"	4'-0"	1'-4"



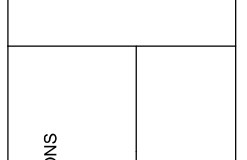
LEGEND	
	METER
	PVC VENT
	METAL VENT
	VENT BOX
	STRUCTURAL DELIMITER
	SERVICE MAST
	SATELLITE
	ANTENNA
	SNOW GUARD
	DOWNSPOUT
	MOUNT
	RAIL
	TOP CHORD
	CHIMNEY

SCALE: 1"=10'

PANELS DATA	
PANEL TYPE	YSUN 405-108BMH 405 W
NO. OF PANELS	13
PANEL SIZE	67.80" X 44.65"
PANEL WEIGHT (LBS)	47.18
PANEL AREA (FT ²)	21.02
UNIT WEIGHT OF AREA (LBS/FT ²)	2.24



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



080823
 David C. Hernandez
 Engineer No. 044877
 State of North Carolina
 N.C.P.E. No. 044877

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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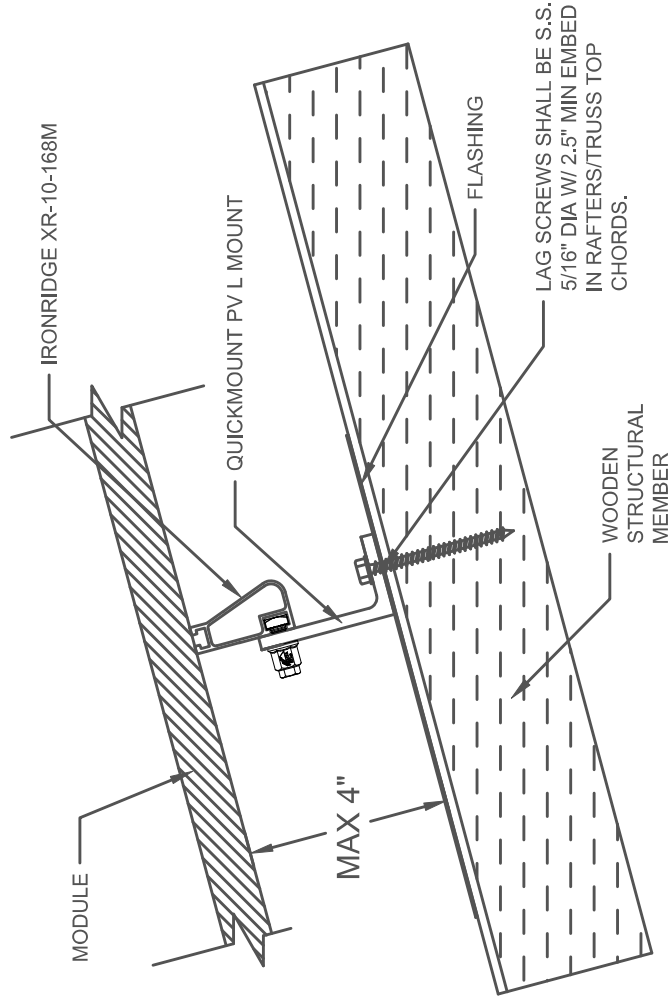
G2 - PANEL LAYOUT
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MODULE WATTAGE: 405 W
 NUMBER OF PANELS: 13
 SYSTEM SIZE: 5.265 kW

PROJECT: 88 PITCH PINE CT
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SCALE: NTS

PANEL TYPE: VSUN 405-108BMH 405 W
 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



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 5:265 KW DC-STC / 3:800 KW AC

NOTES:
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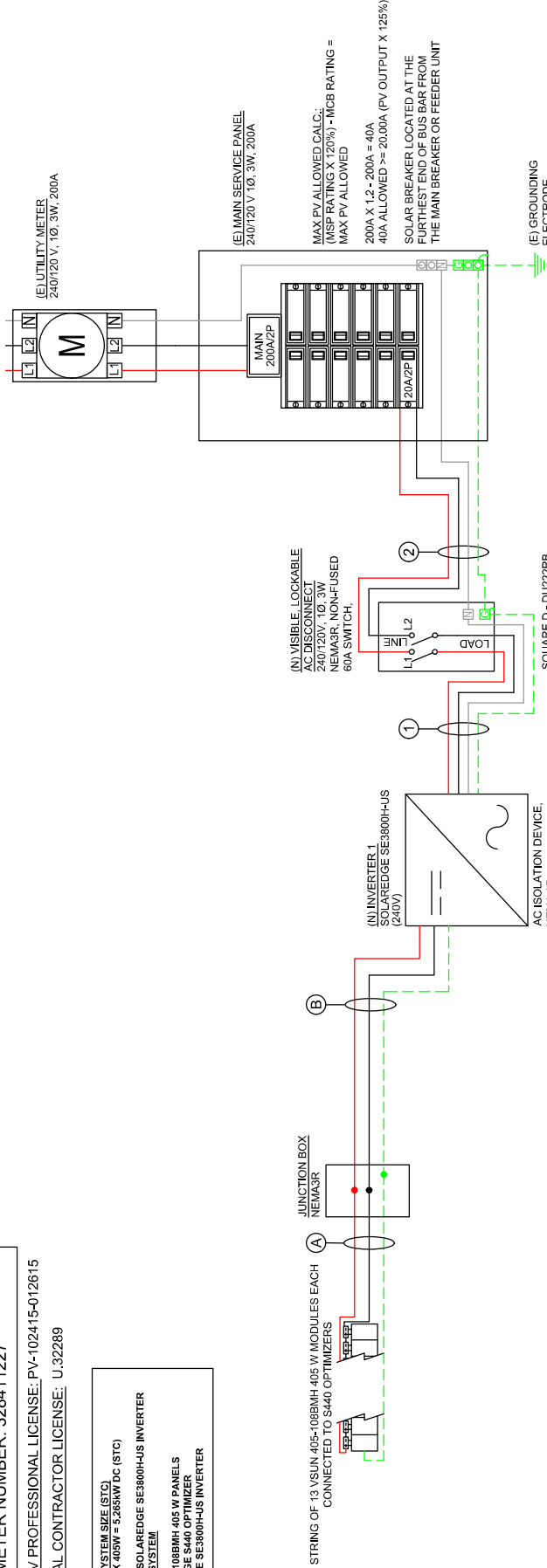
G3 - MOUNTING DETAIL
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UTILITY METER NUMBER: 328411227

NABCEP PV PROFESSIONAL LICENSE: PV-102415-012615
 ELECTRICAL CONTRACTOR LICENSE: U.32289

NOTE:
 5.265KW DC SYSTEM SIZE (STC)
 MODULES: 13 X 405W = 5.265KW DC (STC)
 INVERTER: 1X SOLAREEDGE SE3800H-US INVERTER
 = 3.800KW AC SYSTEM
 (13) VSUN 405-108MH 405 W PANNELS
 (13) SOLAREEDGE S440 OPTIMIZER
 (1) SOLAREEDGE SE3800H-US INVERTER



MAX PV ALLOWED CALC:
 (MSP RATING X 20%) - MCB RATING =
 MAX PV ALLOWED
 200A X 1.2 - 200A = 40A
 40A ALLOWED >= 20.00A (PV OUTPUT X 125%)
 SOLAR BREAKER LOCATED AT THE
 FURTHEST END OF BUS BAR FROM
 THE MAIN BREAKER OR FEEDER UNIT

AC CONDUCTOR SCHEDULE

ID	From	To	Phase	AC Voltage	Circuit Current	80% or 100% Rated/OCBP?	Circuit Current x 125% (If Present)	OCBP (If Present)	Material	Conductor Type	# of CCCs	Fill Factor	Ambient Temp.	Temp. Factor	Conductor Size @ 75°C	Conductor Ampacity @ 75°C	Max Ampacity	Derated Ampacity	# of Neutrals	Neutral Size	Ground Material	Ground Type	Ground Size	Ground Type	Conduit Size	Conduit Type	Conduit Size	Conduit Type
1	SolarEdge Inverter 1	AC Disconnect	1Ø	240 (V)	16.0 (A)	80%	20.0 (A)	20 (A)	CU	THWN-2	2	1.00	32.7 (°C)	0.96	10AWG	35 (A)	40 (A)	38.4 (A)	1	10 AWG	EGC	THWN-2	10 AWG	EMT	0.75 (in.)	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	32.7 (°C)	0.96	10AWG	35 (A)	40 (A)	38.4 (A)	1	10 AWG	EGC	THWN-2	10 AWG	EMT	0.75 (in.)	EMT	0.75 (in.)	

SOLAREEDGE DC CONDUCTOR SCHEDULE

(A) FREE AIR

**TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 32.7°C WITH A 0°C TEMPERATURE ADDED 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	Min. OCPD (If Required)	Min. OCPD (If Present)	Material	Conductor Type	# of CCCs	Fill Factor	Ambient Temp.	Temp. Factor	Conductor Size	Conductor Ampacity @ 75°C	Max Ampacity	Derated Ampacity	EGC Type	EGC Size	Conduit Type	Conduit Size
No Limit	CU	PV Wire	10 AWG	40A	0.96	1.00	38.40A	20A	CU	BARE	2	1.00	32.7 (°C)	0.96	10 AWG	35 (A)	40 (A)	38.4 (A)	6 AWG	N/A - Free Air		

(B) IN CONDUIT

**TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 32.7°C WITH A 0°C TEMPERATURE ADDED 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	Min. OCPD (If Required)	Min. OCPD (If Present)	Material	Conductor Type	# of CCCs	Fill Factor	Ambient Temp.	Temp. Factor	Conductor Size	Conductor Ampacity @ 75°C	Max Ampacity	Derated Ampacity	EGC Type	EGC Size	Conduit Type	Conduit Size
1	CU	THWN-2	10 AWG	40A	0.96	1.00	38.40A	20A	CU	THWN-2	2	1.00	32.7 (°C)	0.96	10 AWG	35 (A)	40 (A)	38.4 (A)	10 AWG	10 AWG	EMT	0.50 in.



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AUTHOR: EE
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 REV: -

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
CIRCUITS SUPPLYING POWER TO
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(07)]
LOCATION: PLACE ON ALL COMBINER
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 CAPACITY OF BUSBAR

CODE REF: [NEC 705.12(B)(2)(b)]
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
GROUNDING CONDUCTOR(S)
MAY RESULT IN OVERVOLTAGE
ON THE EQUIPMENT

CODE REF: [NEC 690.31(f)]
LOCATION: PLACE ON ALL DISCONNECTING
CIRCUITS SUPPLYING POWER TO
MEANS WHERE ENERGIZED IN AN OPEN
POSITION

WARNING

DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC
SYSTEM

CODE REF: [NEC 705.12(B)(3) & 690.39]
LOCATION: PLACE LABEL ON ALL EQUIPMENT
CONTAINING OVERCURRENT DEVICES IN
CIRCUITS SUPPLYING POWER TO
MEANS WHERE ENERGIZED IN AN OPEN
POSITION

WARNING

POWER SOURCE OUTPUT
CONNECTION

DO NOT RELOCATE THIS OVERCURRENT
DEVICE
CODE REF: [NEC 705.12(B)(2)(b)]
LOCATION: PLACE LABEL ON ALL EQUIPMENT
CONTAINING OVERCURRENT DEVICES IN
CIRCUITS SUPPLYING POWER TO
MEANS WHERE ENERGIZED IN AN OPEN
POSITION

CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS
BACKFEED

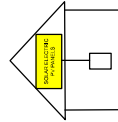
CODE REF: [NEC 705.12(B)(4) & 690.39]
LOCATION: PLACE LABEL ON ALL EQUIPMENT
CONTAINING OVERCURRENT DEVICES IN
CIRCUITS SUPPLYING POWER TO
MEANS WHERE ENERGIZED IN AN OPEN
POSITION

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
SHUTDOWN THE SYSTEM
AND REDUCE
SHOCK HAZARD
IN THE ARRAY.



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

WARNING: PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE 480 V

MAXIMUM CIRCUIT CURRENT 10.5 A

MAX RATED OUTPUT CURRENT OF DC-TO-DC CONVERTER (IF INSTALLED) 15

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

DO NOT DISCONNECT UNDER LOAD

CODE REF: [NEC 690.15(C) & 690.31(E)(2)]
LOCATION: PLACE ON ALL DISCONNECTING
MEANS WHERE ENERGIZED IN AN OPEN POSITION

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT 16.0A

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)



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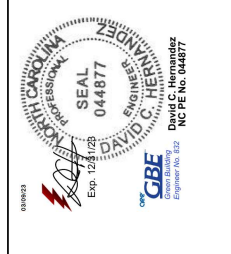
E2 - WARNING LABELS
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FORMAT

- 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



GBE
Group B Electrical
Engineer No. 132
N.C. PE No. 044877

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

UTILITY METER
 MAIN SERVICE PANEL
 AC DISCONNECT
 RAPID SHUTDOWN
 DEVICE

(NEC 706.10 & NEC 706.11) CUSTOMER SERVICE PANEL, P-VAC DISCONNECT AND RAPID SHUTDOWN DEVICE



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E3 - PLACARD
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VSUN405-108BMH

405W

Highest power output

20.74%

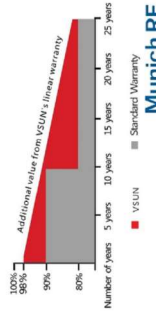
Module efficiency

25years

Material & Workmanship warranty

30years

Linear power output warranty



PERC 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



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WWW.PALMETTO.COM

PROJECT: 88 PITCH PINE CT
MUNICIPALITY: SANFORD, NC
ZIP CODE: 27332
CLIENT: MRS DONNA WORKMAN
5:285 KW DC-STC / 3.800 KW AC

AUTHOR: EE
DATE: 09/MAR/23
REV: -

A1 - PANELS SPECIFICATIONS
Need on-site installation support?
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InstallHotline@Palmetto.com

最も信頼出来る再エネパートナー

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)	13.68	13.68	13.59	13.5
Maximum Power Voltage - Vmp (V)	31.16	31.17	31.12	31.05
Maximum Power Current - Imp (A)	12.82	12.84	12.75	12.66
Module Efficiency	20.74%	20.68%	20.23%	19.97%

Standard Test Conditions (STC): irradiance 1000 W/m²; 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)	Vmp (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 (L2+Q)	Maximum System Voltage [V]
Voltage Temperature Coefficient	-0.27%/°C	30
Current Temperature Coefficient	+0.048%/°C	70%±10%
Power Temperature Coefficient	-0.32%/°C	

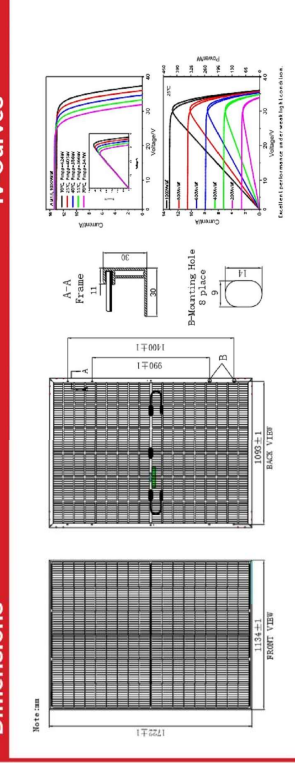
Material Characteristics

Dimensions: 1722x1134x30mm (LxWxH)
Weight: 21.4kg
Frame: Black anodized aluminum profile
Front Glass: White toughened safety glass, 3.2 mm
Cell Encapsulation: T/A (Ethylene Vinyl Acetate) or POE
Back Sheet: T/A (Ethylene Vinyl Acetate) or POE
Cells: 12-9 junction monocrystalline solar cells series strings
Junction Box: IP68, 3 diodes
Cable&Connector: Pozziat: 500 mm (cable length can be customized, 1-4 mm², compatible with MC4)

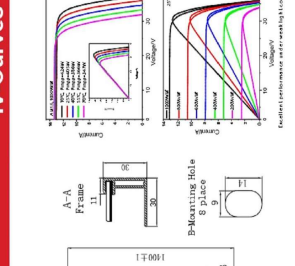
Packaging

Dimensions (LxWxH): 1760x1125x1253mm
Container 20: 216
Container 40: 468
Container 40'HC: 936
Temperature Range: -40 °C to + 85 °C
Withstanding Hill: Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load: 5,400 Pa
Application class: class A

Dimensions

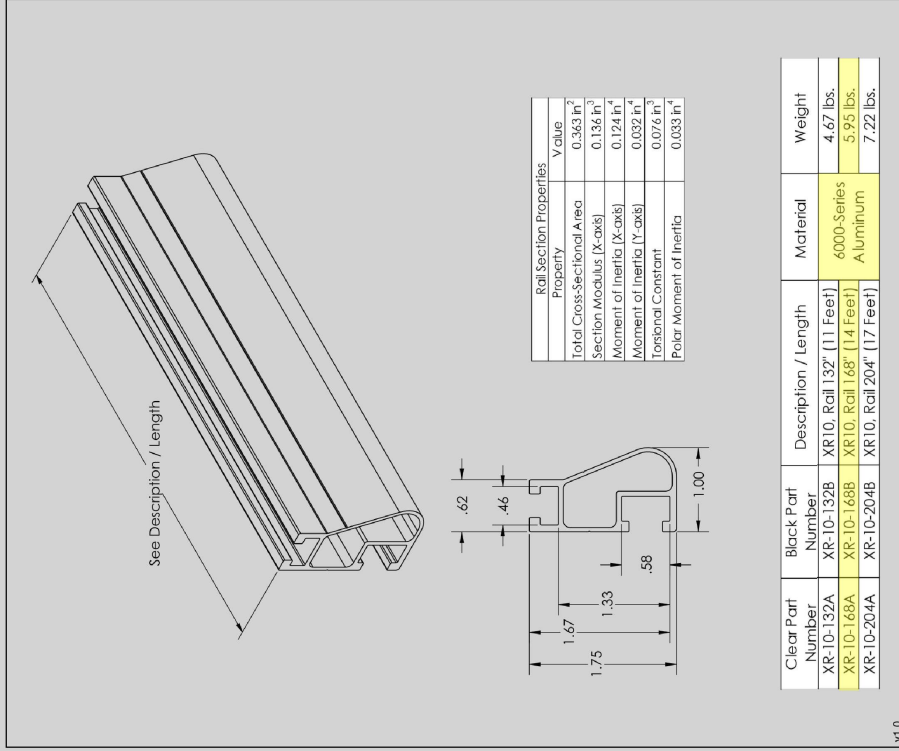


IV-Curves





XR10 Rail



Rail Section Properties Property	Value
Total Cross-Sectional Area	0.363 in ²
Section Modulus (X-axis)	0.136 in ³
Moment of Inertia (X-axis)	0.124 in ⁴
Moment of Inertia (Y-axis)	0.032 in ⁴
Torsional Constant	0.076 in ⁴
Polar Moment of Inertia	0.033 in ⁴

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-10-132A	XR-10-132B	XR10, Rail 132" (11 Feet)	6000-Series	4.67 lbs.
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)	Aluminum	5.95 lbs.
XR-10-204A	XR-10-204B	XR10, Rail 204" (17 Feet)	Aluminum	7.22 lbs.

v1.0

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



A2 - RACKING SPECIFICATIONS
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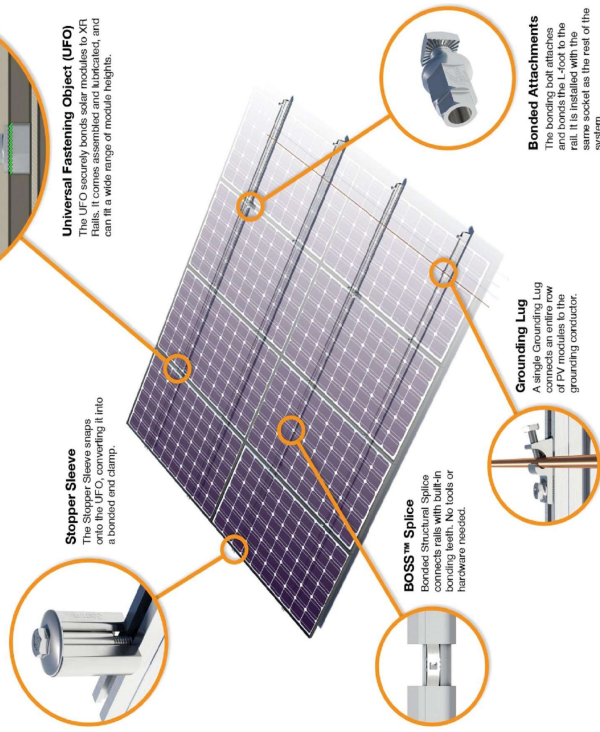
UFO Family of Components

Tech Brief

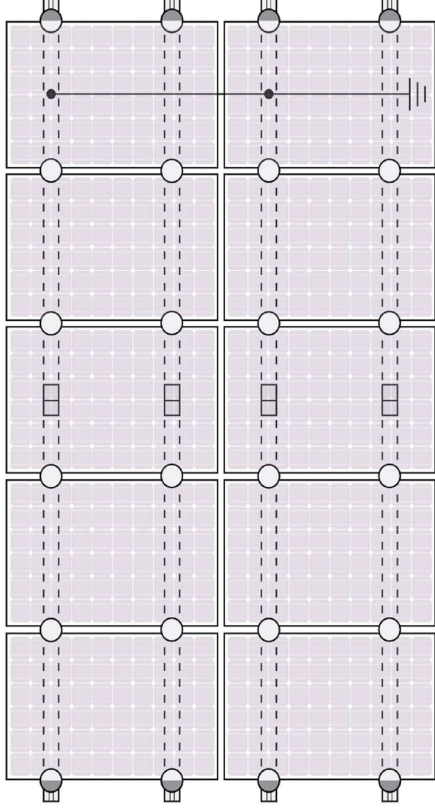
Simplified Grounding for Every Application

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.



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 Enphase 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

Feature	Cross-System Compatibility		
	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
BOSS™ Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.		
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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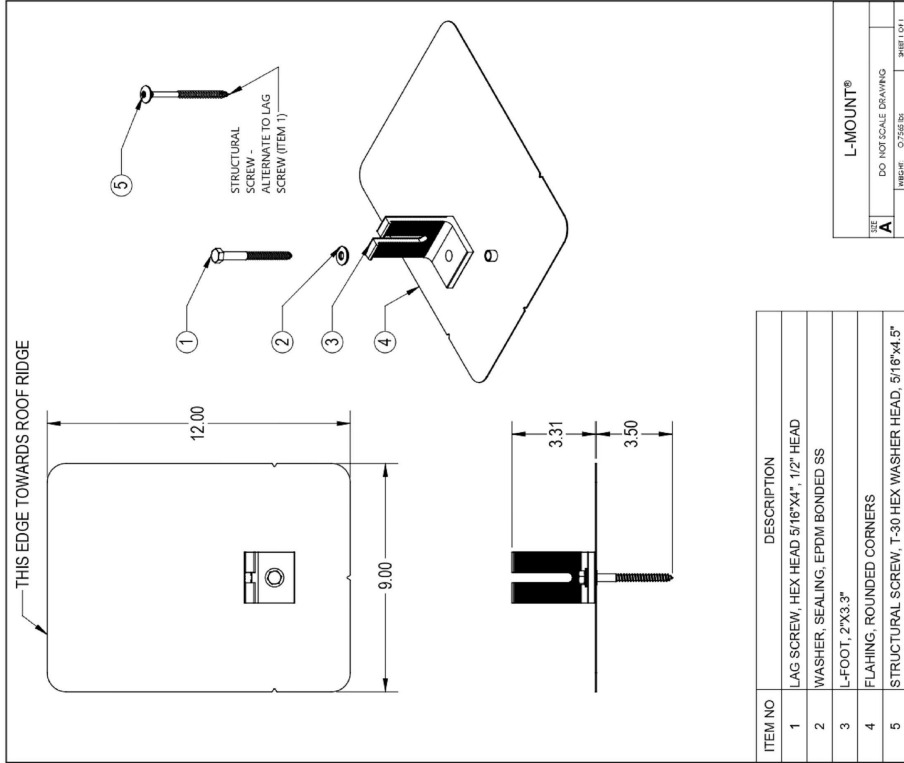
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A3 - BONDING AND GROUNDING SPECIFICATIONS
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L-Mount MNI Rev 1.12

L-Mount® Installation Instructions

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

WARNING: QuickMount® 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 single with roofing bar, just above placement of mount. Remove nails as required and backfill holes with approved material. See "Proper Flashing Placement" on next page.

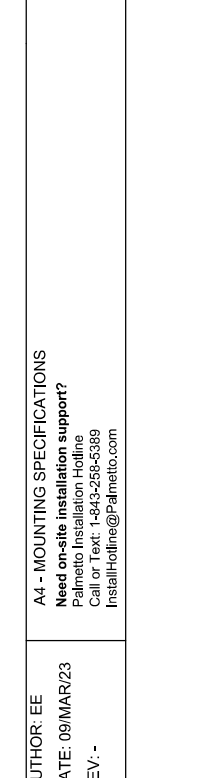


3. Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least 1/4" higher than the butt-edge of the 3rd course and lower than the butt-edge of 1st course. Mark center for drilling.

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L-Mount MNI Rev 1.12

4. If attaching with lag bolt, use a 1/4" bit (Lag). Use a 3/8" bit (S1) 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 out any sawdust, and fill hole with sealant compatible with roofing materials.



6. Place L-foot onto elevated flange 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 rock of your choice. Follow all the directions of the rock 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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AUTHOR: EE
DATE: 09/MAR/23
REV: -

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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
- Derects 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

solaredge.com



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ZIP CODE: 27332
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AG - OPTIMIZERS SPECIFICATIONS
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Power Optimizer

For North America

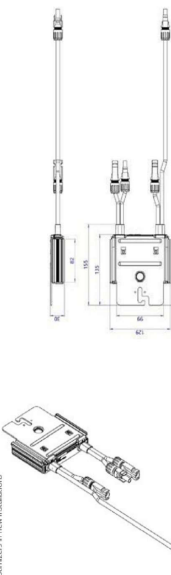
S440, S500

INPUT	S440	S500	Unit
Rated Input DC Power*	440	500	W
Absolute Maximum Input Voltage (Voc)	60	60	Vdc
MPIPT Operating Range	8 - 60	8 - 60	Vdc
Maximum Short-Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency	99.5	99.5	%
Weighted Efficiency	99.6	99.6	%
Overvoltage Category	II	II	
OUTPUT DURING OPERATION			
Maximum Output Current	15	15	Adc
Maximum Output Voltage	60	60	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)			
Safety Output Voltage per Power Optimizer	17	01	Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020		
EAC	FCC Part 15 Class B, IEC 60066-6-2, IEC 61000-6-3		
Safety	IEC 60361-1 (Class 1 safety), UL 9741		
UL Listed	UL 9741 for Inverter		
RoHS	RoHS		
Fire Safety	VDE-AR-E 2800-732:2013-05		
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage	600		Vdc
Dimensions (W x L x H)	129 x 133 x 30 / 5.07 x 6.02 x 1.18		mm / in
Weight (including cable)	6.55 / 1.5		g / lb
Input Connector	MC4*		
Input Wire Length	0.1 / 0.32		m / ft
Output Connector	MC4		
Output Wire Length	(+1.2, (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range**	-40 to +85		°C
Protection Rating	IP68 / NEMA6P		
Power Factor	0.95		%

* Based on the module's STC cell temperature. Power optimizer rated input DC power. Modules with up to +5% power tolerance are allowed.
** For ambient temperature above +30°C / +86°F, power derating is applied. Refer to Power Optimizer's Temperature Derating Technical sheet for more details.
† For other connector types, please contact SolarEdge.

PV System Design Using a SolarEdge Inverter	Single Phase for 120V Grid	Three Phase for 208V Grid	Three Phase for 277V/480V Grid
Maximum String Length (Power Optimizers)	5440, S500	8	18
Maximum String Length (Power Optimizers)	25	10	18
Maximum Nominal Power per String (Power Optimizers)	5700 (6000 with SE7000-US-SE1800-LU)	6000	12750
Maximum Nominal Power per String (Inverters only with the difference in connected power between strings is 1.00kw or less)	Refer to Footnote 5	One string 7200	15000
Maximum Number of Strings per Inverter	Refer to Footnote 5	Two strings or more (800)	15

† For other connector types, please contact SolarEdge.
** For ambient temperature above +30°C / +86°F, power derating is applied. Refer to Power Optimizer's Temperature Derating Technical sheet for more details.
† For other connector types, please contact SolarEdge.
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