

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

48 MODULES-ROOF MOUNTED - 15.360 kW DC, 11.400 kW AC, ADDRESS

## PHOTOVOLTAIC SYSTEM SPECIFICATIONS:

SYSTEM SIZE: 15.360 kW DC  
11.400 kW AC

MODULE TYPE & AMOUNT: (48) CANADIAN SOLAR CS3K-320MS

MODULE DIMENSIONS: (L/W/H) 65.9"/39.1"/1.38"

INVERTER: (01) SOLAREEDGE SE11400H-US

OPTIMIZER: (48) SOLAREEDGE P320

INTERCONNECTION METHOD: LOAD BREAKER

## GOVERNING CODES

ALL WORK SHALL CONFORM TO THE FOLLOWING CODES

- 2019 CA BUILDING CODE
- 2019 CA ELECTRICAL CODE
- 2019 CA FIRE CODE TITLE 24 SUPPLEMENT
- 2019 CA RESIDENTIAL CODE
- ANY OTHER LOCAL AMENDMENTS

## GENERAL NOTES:

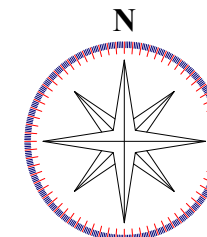
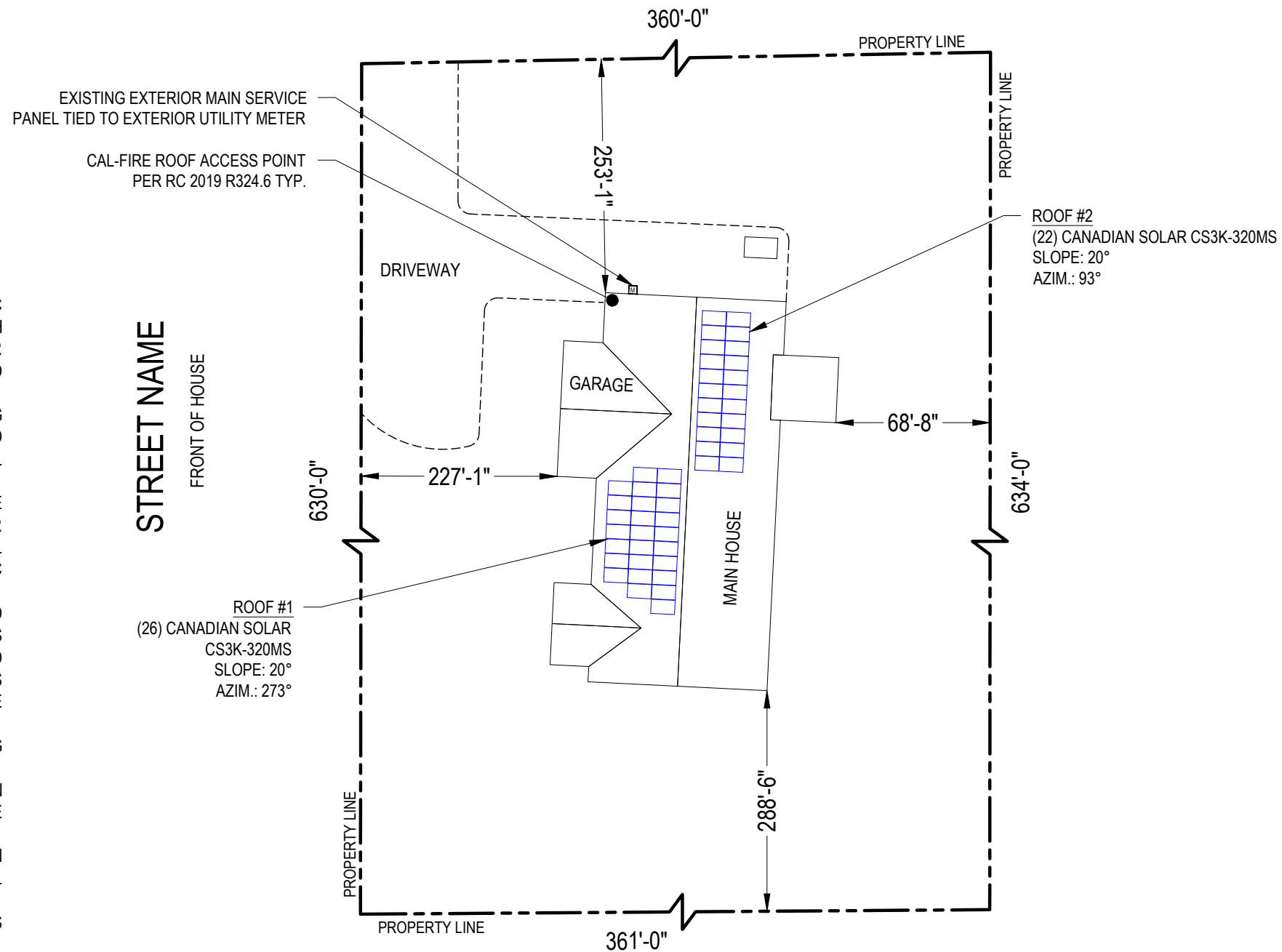
- INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110.
- ALL CONDUCTORS, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES.
- ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
- DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE.
- PV MODULES TO BE RATED UL 1703 CLASS C FIRE RATING OR BETTER.
- ALL EQUIPMENT TO BE CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LABORATORY.

## SHEET INDEX:

PV 0.0: COVER SHEET  
PV 1.0: SITE PLAN  
S 1.1: MOUNT DETAILS  
E 1.1: 3-LINE DIAGRAM  
E 1.2: NOTES  
E 1.3: WARNING LABELS  
E 1.4: OPTIMIZER CHART  
E 1.5+: DATA SHEET

## ROOF ACCESS POINT

ROOF ACCESS POINT SHALL NOT BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.



2 HOUSE PHOTO

PV 0.0 SCALE: NTS



3 VICINITY MAP

PV 0.0 SCALE: NTS

LOGO

COMPANY NAME  
ADDRESS  
PHONE NO.

## REVISIONS

Description	Date	Rev
Initial Design	M/D/YYYY	00

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CUSTOMER NAME  
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Sheet Name

COVER SHEET

Sheet Size

ANSI B  
11" X 17"

Sheet Number

PV 0.0

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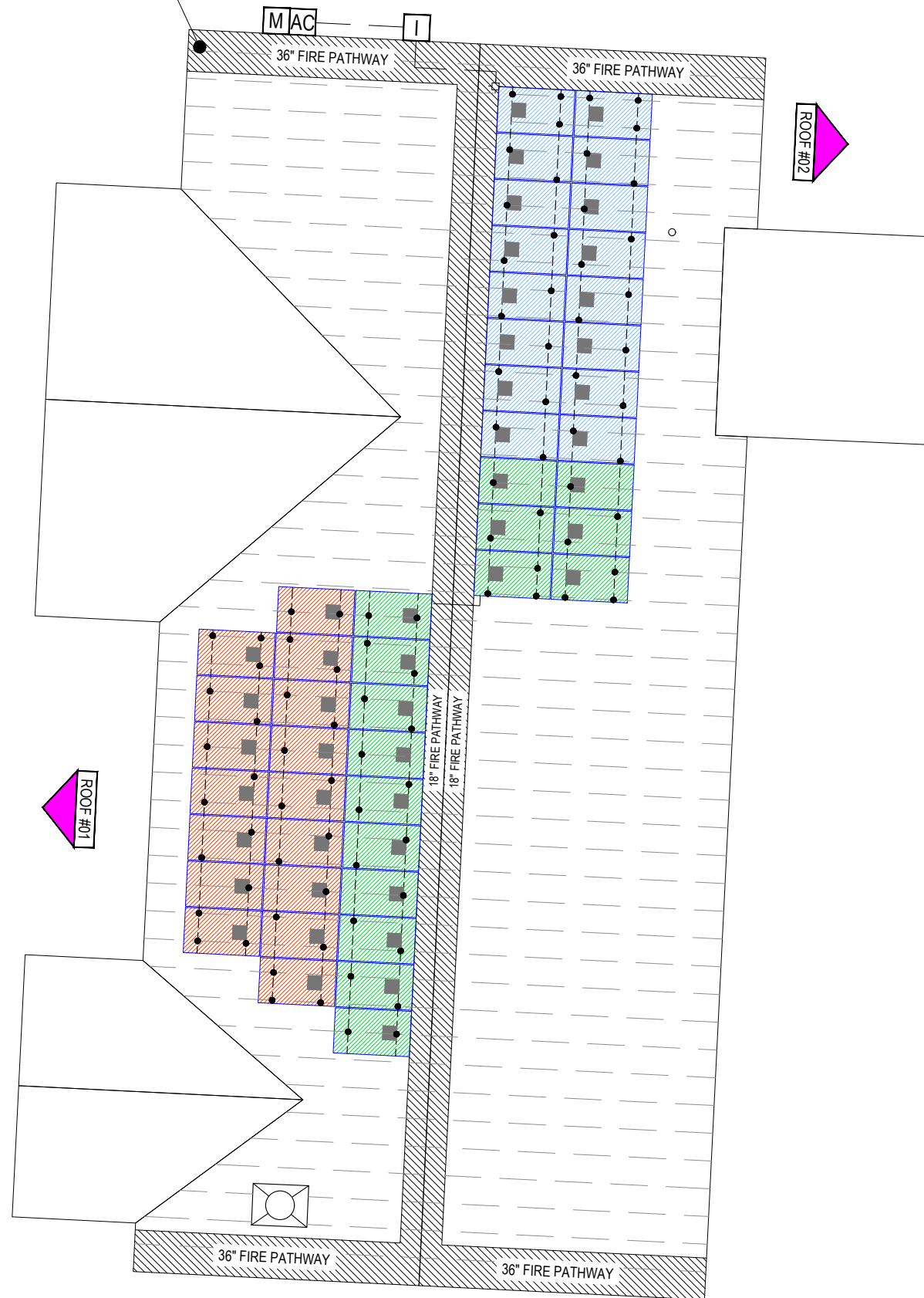
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1 PLOT PLAN

PV 0.0 SCALE: 1/32" = 1'-0"

CAL-FIRE ROOF ACCESS POINT  
PER RC 2019 R324.6 TYP.

STREET NAME  
FRONT OF HOUSE



MODULE, ARRAY WEIGHT (LOAD CALC'S)		
Number of Modules	48	
Module Weight	40.8	LBS
Total Module (Array) Weight	1958.40	LBS
Number of Attachment point	91	
Mounting System Weight <small>(Per Module)</small>	1.5	LBS
Mounting System Weight	136.50	LBS
Total System Weight <small>(Module Weight + Mounting System Weight)</small>	2094.90	LBS
Weight at Each Attachment Point <small>(Array Weight / Number of Attachment Point)</small>	21.52	LBS
Module Area (65.9"x39.1")	17.89	SqFt
Total Array Area	858.90	SqFt
Distributed Load <small>(Total System Weight / Total Array Area)</small>	2.36	Per SqFt
Total Roof Area	4353.71	SqFt
Total Percentage or Roof Covered <small>Total Array Area / Total Roof Area * 100</small>	19.73%	

SYSTEM LEGEND

- M** EXISTING EXTERIOR MAIN SERVICE PANEL TIED TO EXTERIOR UTILITY METER
- AC** NEW PHOTOVOLTAIC UTILITY DISCONNECT SWITCH. LOCATED WITHIN 10' OF MSP.
- 48 NEW CANADIAN SOLAR CS3K-320MS MODULES WITH (48) SOLAREEDGE OPTIMIZER 320 MOUNTED ON THE BACK OF EACH MODULES.
- I** NEW 01 - SOLAREEDGE SE11400H-US INVERTER.
- = FIRE PATHWAY
- = ROOF OBSTRUCTIONS
- = ATTACHMENT POINTS
- = TRUSS
- = RACKING SYSTEM
- = EXTERIOR RUN
- = ATTIC RUN
- = JUNCTION BOX
- = CONDUIT ATTIC RUN JUNCTION BOX

ROOF SECTIONS

- ROOF #01** MODULE - 26  
SLOPE - 20°  
AZIMUTH - 273°  
MATERIAL - COMPOSITE SHINGLE  
TRUSS SIZE & SPACING - 2X6 @ 24 O.C.
- ROOF #02** MODULE - 22  
SLOPE - 20°  
AZIMUTH - 93°  
MATERIAL - COMPOSITE SHINGLE  
TRUSS SIZE & SPACING - 2X6 @ 24 O.C.

STRING(S)

- STRING #1 - 16 MODULES
- STRING #2 - 16 MODULES
- STRING #3 - 16 MODULES

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SITE PLAN

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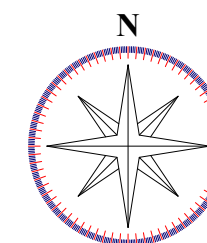
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SITE PLAN

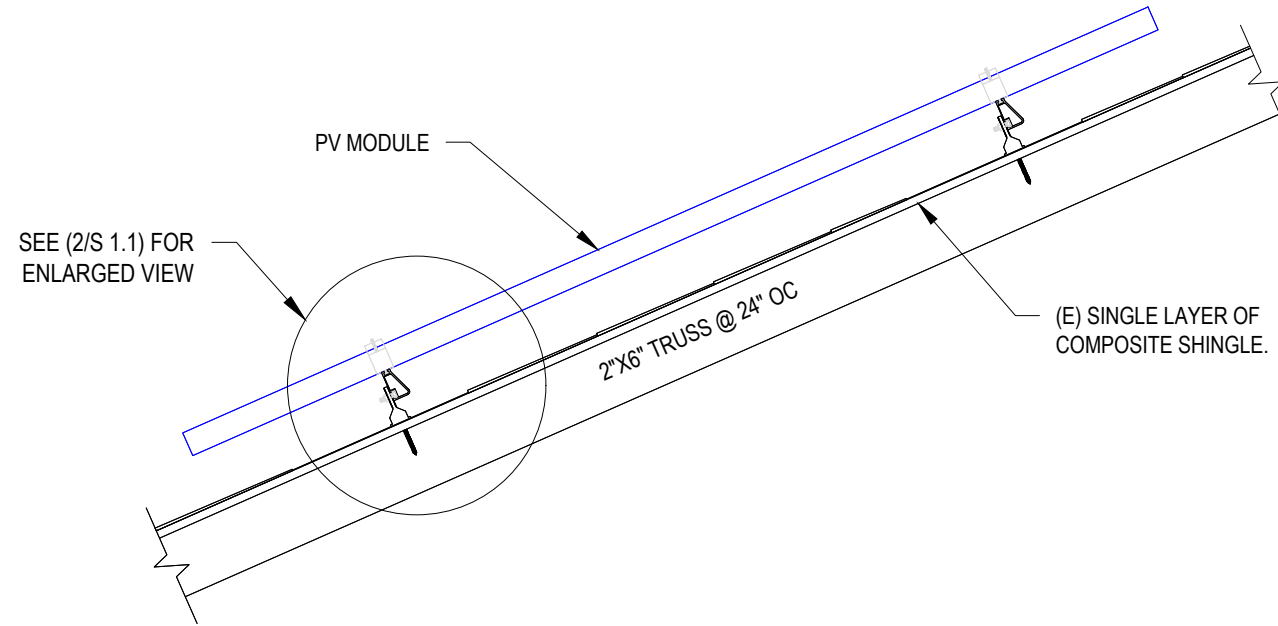
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SCALE: 3/32" = 1'-0"

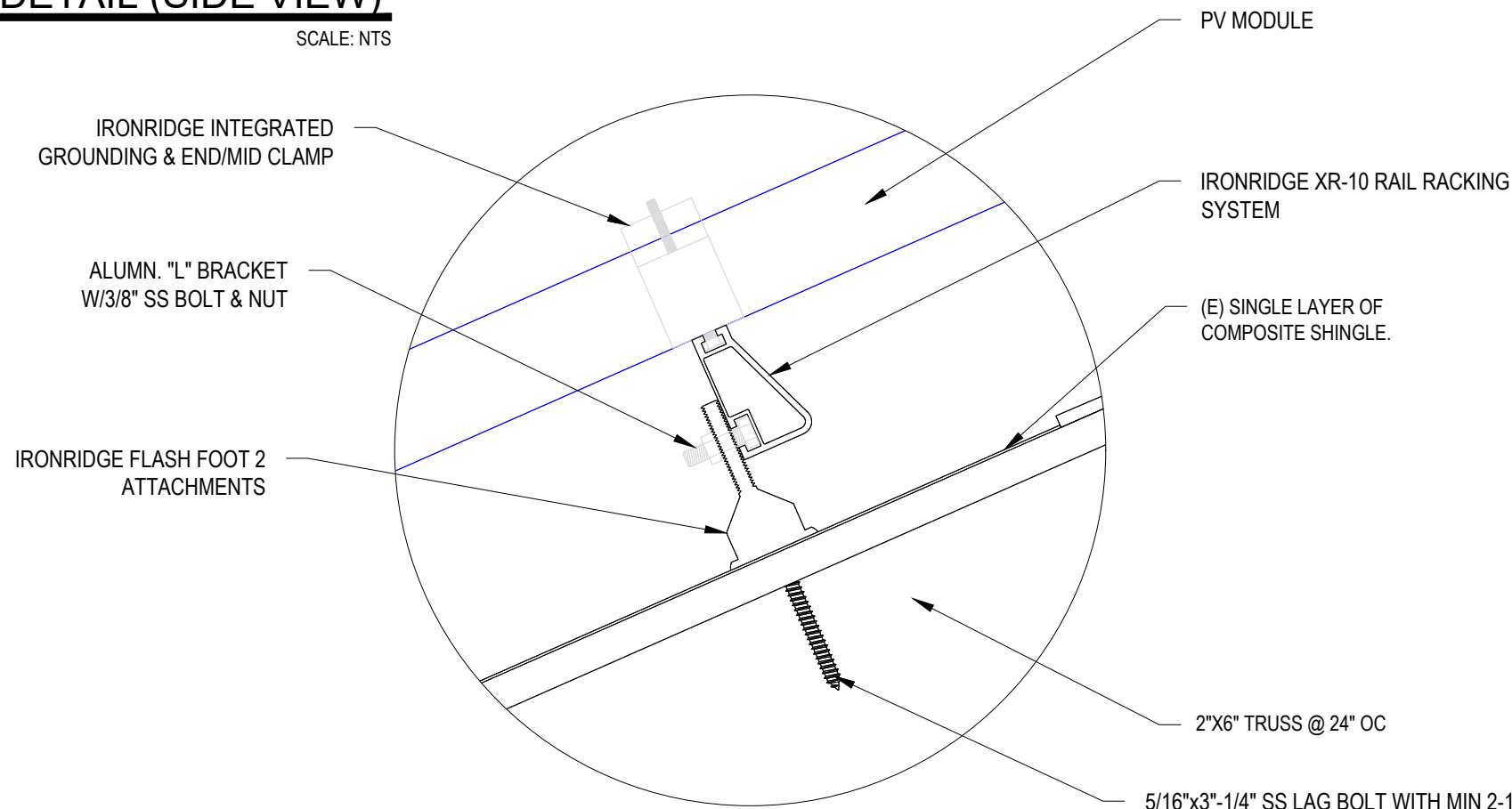


**GENERAL STRUCTURAL NOTES:**

1. THE SOLAR PANELS ARE TO BE MOUNTED TO THE ROOF FRAMING USING THE IRONRIDGE XR-10 RAIL WITH COMPOSITE SHINGLE ATTACHMENTS
2. THE MOUNTING FEET ARE TO BE SPACED AS SHOWN IN THE DETAILS, AND MUST BE STAGGERED TO ADJACENT FRAMING MEMBERS TO SPREAD OUT THE ADDITIONAL LOAD.
3. UNLESS NOTED OTHERWISE, MOUNTING ANCHORS SHALL BE 5/16" LAG SCREWS WITH A MINIMUM OF 2-1/2" PENETRATION INTO ROOF FRAMING.
4. THE PROPOSED PV SYSTEM ADDS 2.6 psf TO THE ROOF FRAMING SYSTEM.
5. ROOF LIVE LOAD = 2.28 psf TYPICAL, 0 psf UNDER NEW PV SYSTEM.
6. GROUND SNOW LOAD = 0 psf
7. WIND SPEED = 110 mph
8. EXPOSURE CATEGORY = II



**1 ATTACHMENT DETAIL (SIDE VIEW)**  
S 1.1 SCALE: NTS



**2 ATTACHMENT DETAIL ENLARGED VIEW**  
S 1.1 SCALE: NTS

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**MOUNT DETAIL**

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INVERTER CHARACTERISTICS - SOLAREEDGE SE 11400H-US		
MAX OUTPUT POWER	11400	W
SYSTEM OPERATING VOLTAGE	400	V
MAX CONTINUOUS OUTPUT CURRENT	47.5	A
MAX INPUT VOLTAGE	480	V
SYSTEM SHORT CIRCUIT CURRENT	15	A
MAX EFFICIENCY	99	%

PV MODULE RATING @ STC	
MANUFACTURER	CANADIAN SOLAR CS3K-320MS
MAX. POWER-POINT CURRENT (IMP)	9.61 AMPS
MAX. POWER-POINT VOLTAGE (VMP)	33.3 VOLTS
OPEN-CIRCUIT VOLTAGE (VOC)	40.1 VOLTS
SHORT-CIRCUIT CURRENT (ISC)	10.14 AMPS
NOM. MAX. POWER AT STC (P <sub>MAX</sub> )	320 WATT
MAX. SYSTEM VOLTAGE	1000V
VOC TEMPERATURE COEFFICIENT	-0.29 %/°C

Rooftop conductor ampacities designed in compliance with art. 690.8, Tables 310.15(B)(2)(a), 310.15(B)(3)(a), 310.15(B)(3)(c), 310.15(B)(16), Chapter 9 Table 4, 5, & 9. Location specific temperature obtained from ASHRAE 2017 data tables

RECORD LOW TEMP	-3°
AMBIENT TEMP (HIGH TEMP 2%)	38°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	60°
CONDUCTOR TEMPERATURE RATE	90°

OPTIMIZER SPECIFICATIONS	
MANUFACTURER	SOLAREEDGE P320
DC INPUT POWER	320 W
DC MAX INPUT VOLTAGE	48V
DC MAX INPUT CURRENT	13.75A
DC MAX OUTPUT CURRENT	15A
MAX INPUT VOLTAGE	480A

120% RULE
BUS BAR RATING X 120% - MAIN BREAKER RATING = MAX. PV OCPD
(200A x 120%) - 175 = 65A

PHOTOVOLTAIC SYSTEM	
DC SYSTEM SIZE (WATTS)	15360W
AC SYSTEM SIZE (WATTS)	11400W
TOTAL NUMBER OF MODULES	48
NOMINAL AC VOLTAGE	240V

**SYSTEM NOTES:**

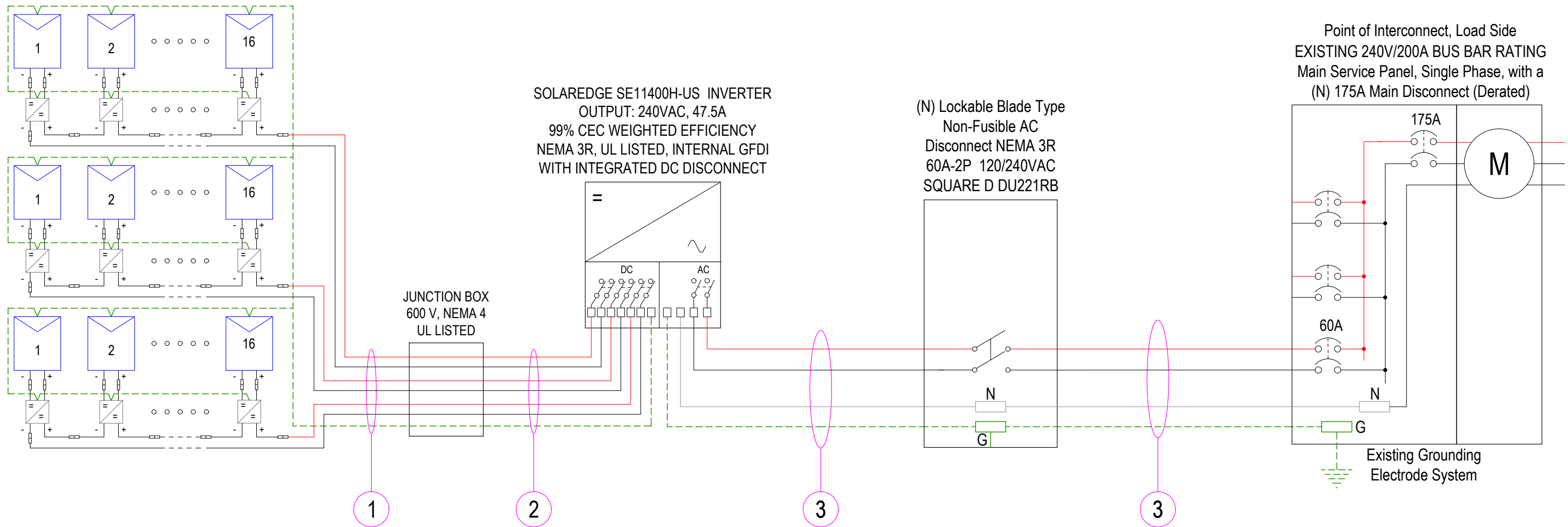
1. PV SYSTEM IS UNDERGROUND
2. MODULES ARE BONDED TO RAIL USING IRONRIDGE INTEGRATED GROUNDING.
3. RAILS ARE BONDED USING UL 2703 RATED LAY-IN LUGS
4. BARE COPPER IS TRANSITIONED TO THHN/THWN-2 VIA IRREVERSIBLE CRIMP; GEC TO BE CONTINUOUS PER CEC 250.64(C)

**SOLAREEDGE NOTES:**

1. STRING OPERATING VOLTAGE IS CONTROLLED BY INVERTER AND MAINTAINED AT NOMINAL 400 VDC.
2. STRING VOLTAGE IS LIMITED BY INVERTER TO A MAXIMUM OF 480VDC
3. SOLAREEDGE DC/DC OPTIMIZERS ARE ALL RUN IN SERIES PER STRING (FIXED SOURCE CIRCUIT VOLTAGE - DC/DC CONVERTERS)
4. STRING CURRENT IS CONTROLLED BY OPTIMIZERS AND IS LIMITED TO 15ADC MAX (PER STRING).
5. INTEGRATED SOLAREEDGE DC SWITCH DISCONNECTS BOTH POSITIVE AND NEGATIVE CONDUCTORS AS REQUIRED BY NEC 690.35(A).
6. SOLAREEDGE INVERTERS ARE ALL RAPID SHUTDOWN READY PER NEC 690.12
7. SOLAREEDGE INVERTER IS SMART INVERTER COMPLIANT PER CALIFORNIA RULE 21.

**NOTE: -**

1. MAIN DISCONNECT DERATED FROM 200A TO 175A.



WIRE TAG #	WIRE FROM --	CONDUIT	WIRE QTY	WIRE GAUGE:	WIRE TYPE	TEMP RATING:	WIRE AMP	TEMP DE-RATE:	CONDUIT FILL:	WIRE OCP:	TERMINAL 75°C RATING:	STRING WATTAGE	OPERATING VOLTAGE	STRING AMPS	MAX SYSTEM VOLTAGE	GRND SIZE	GRND WIRE TYPE	
①	ARRAY TO JUNCTION BOX	IN AIR	6	#10	PV WIRE	90°	40A	x 0.91A	x 0.80A	= 29.12A	35A	5120	/ 400	= 12.80	x 1.25 = 16.00A	480	#10	SBC
②	JUNCTION BOX TO INVERTER	3/4" EMT	6	#10	THWN-2	90°	40A	x 0.71A	x 0.80A	= 22.72A	35A	5120	/ 400	= 12.80	x 1.25 = 16.00A	480	#10	THWN-2
③	INVERTER TO MSP	3/4" EMT	3	#6	THWN-2	75°	75A	x 0.88A	x 1.00A	= 66.00A	65A		/	= 47.5	x 1.25 = 59.38A	240	#10	THWN-2

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3-LINE  
DIAGRAM

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**NOTES**

1. THIS SYSTEM SHALL COMPLY WITH ALL APPLICABLE CODES INCLUDING: THE 2019 CALIFORNIA BUILDING CODE, CALIFORNIA FIRE CODE, CALIFORNIA ELECTRIC CODE, CALIFORNIA MECHANICAL CODE CALIFORNIA RESIDENTIAL CODE, CALIFORNIA PLUMBING CODE, CALIFORNIA BUILDING STANDARDS CODE, CALIFORNIA HEALTH AND SAFETY CODE, IEEE STANDARD 929, UL STANDARD 1741, 2019 RESIDENTIAL CODE, AND THE MANUFACTURERS' LISTINGS AND INSTALLATION INSTRUCTIONS.
2. ALL WORK TO COMPLY WITH CEC ARTICLE 690
3. UTILITY SHALL BE NOTIFIED BEFORE ACTIVATION OF PV SYSTEM
4. REMOVAL OF A UTILITY-INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BUILDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PV SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTOR
5. ALL PV SYSTEM COMPONENTS SHALL BE LISTED BY A RECOGNIZED TESTING AGENCY
6. WIRING MATERIALS SHALL COMPLY WITH MAXIMUM CONTINUOUS CURRENT OUTPUT AT 25° C; WIRE SHALL BE WET RATED AT 90°C
7. EXPOSED PHOTOVOLTAIC SYSTEM CONDUCTORS ON THE ROOF WILL BE USE-2 OR PV TYPE WIRE.
8. ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE RAIN-TIGHT AND APPROVED FOR USE IN WET LOCATIONS (NEC 314.15)
9. ALL METALLIC RACEWAYS AND EQUIPMENT SHALL BE BONDED AND ELECTRICALLY CONTINUOUS (NEC 250.90, 250.96)
10. FOR UNGROUNDED SYSTEMS, THE PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUITS SHALL BE PROVIDED WITH A GROUND-FAULT PROTECTION DEVICE OR SYSTEM THAT DETECTS A GROUND FAULT, INDICATES THAT FAULT HAS OCCURED, AND AUTOMATICALLY DISCONNECTS ALL CONDUCTORS OR CAUSES THE INVERTER TO AUTOMATICALLY CEASE SUPPLYING POWER TO OUTPUT CIRCUITS (CEC 690.35(C))
11. ANY REQUIRED GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT (CEC 250.64C)
12. ALL PV MODULES AND ASSOCIATED EQUIPMENT SHALL BE PROTECTED FROM ANY PHYSICAL DAMAGE
13. ALL FIELD-INSTALLED JUNCTION, PULL, AND OUTLET BOXES LOCATED BEHIND MODULES SHALL BE ACCESSIBLE DIRECTLY OR BY DISPLACEMENT OF A MODULE SECURED BY REMOVABLE FASTENERS
14. FOR GROUNDED SYSTEMS, THE INVERTER IS EQUIPPED WITH GROUND FAULT PROTECTION AND A GFI FUSE PORT FOR GROUND FAULT INDICATION
15. WHEN BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, THE BREAKERS SHALL NOT READ "LINE AND LOAD"
  
16. THE INSTALLED SOLAR SYSTEM HAS A DISTRIBUTED WEIGHT OF LESS THAN 4 PSF
17. THE CONCENTRATED LOAD FOR EACH VERTICAL SUPPORT IS LESS THAN 45 LBS
18. AC DISCONNECT IS A "KNIFE BLADE" TYPE DISCONNECT
19. THE WORKING CLEARANCES AROUND THE EXISTING ELECTRICAL EQUIPMENT AS WELL AS THE NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26
20. THE PHOTOVOLTAIC INVERTER WILL BE LISTED AS UL 1741 COMPLIANT
21. SMOKE ALARMS AND CARBON MONOXIDE ALARMS ARE REQUIRED TO BE RETROFITTED ONTO THE EXISTING DWELLING AS PER THE 2019 CRC. THESE SMOKE ALARMS ARE REQUIRED TO BE IN ALL BEDROOMS, OUTSIDE EACH BEDROOM, AND AT LEAST ONE ON EACH FLOOR OF THE HOUSE. CARBON MONOXIDE ALARMS ARE REQUIRED TO BE RETROFITTED OUTSIDE EACH BEDROOM AND AT LEAST ONE ON EACH FLOOR OF THE HOUSE. THESE ALARMS MAY BE SOLELY BATTERY OPERATED IF THE PHOTOVOLTAIC PROJECT DOES NOT INVOLVE THE REMOVAL OF INTERIOR WALL AND CEILING FINISHES INSIDE THE HOME; OTHERWISE, THE ALARMS MUST BE HARD WIRED AND INTERCONNECTED. (CRC R314, R315)
22. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER CRC SECTIONS R314 AND 315 TO BE VERIFIED AND INSPECTED BY THE INSPECTOR IN THE FIELD.
23. WHEN APPLYING THE 120% RULE OF CEC 705.12(D)(2), THE SOLAR BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUS FROM THE MAIN BREAKER PER 705.12(D)(7)
24. PLUMBING AND MECHANICAL VENTS THROUGH THE ROOF SHALL NOT BE COVERED BY SOLAR MODULES - NO BUILDING, PLUMBING, OR MECHANICAL VENTS TO BE COVERED OR OBSTRUCTED

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**NOTES**

Sheet Size

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**11" X 17"**

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**! WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS. TERMINALS ON LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:  
INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).  
PER CODE(S): CEC 2019: 690.17(B).

**! WARNING**  
ELECTRICAL SHOCK HAZARD  
IF GROUND FAULT IS INDICATED ALL NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

LABEL LOCATION:  
INVERTER(S), ENPHASE ENVOY ENCLOSURE (IF APPLICABLE).  
PER CODE(S): CEC 2019: 690.15.

**! WARNING**  
ELECTRICAL SHOCK HAZARD  
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

LABEL LOCATION:  
INVERTER(S), DC DISCONNECTS.  
PER CODE(S): CEC 2019: 690.35(F).

**! WARNING**  
DUAL POWER SUPPLY  
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL LOCATION:  
UTILITY SERVICE METER AND MAIN SERVICE PANEL.  
PER CODE(S): NEC 2014: 705.12(D)(3),  
NEC 2011: 705.12(D)(4)

**! WARNING**  
INVERTER OUTPUT CONNECTION  
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
ADJACENT TO PV BREAKER (IF APPLICABLE).  
PER CODE(S): CEC 2019: 705.12(B).

**! WARNING**  
PHOTOVOLTAIC SYSTEM COMBINER PANEL  
DO NOT ADD LOADS

LABEL LOCATION:  
PHOTOVOLTAIC AC COMBINER (IF APPLICABLE).  
PER CODE(S): CEC 2019: 705.12(D)(2)(3)(c).

**WARNING: PHOTOVOLTAIC POWER SOURCE**

LABEL LOCATION:  
INTERIOR AND EXTERIOR DC CONDUIT EVERY 10 FT, AT EACH TURN, ABOVE AND BELOW PENETRATIONS, ON EVERY JB/PULL BOX CONTAINING DC CIRCUITS.  
PER CODE(S): CEC 2019: 690.13.

**PHOTOVOLTAIC AC DISCONNECT**  
MAXIMUM AC OPERATING CURRENT: 47.5 AMPS  
NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION:  
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.  
PER CODE(S): CEC 2019: 690.53.

INVERTER 1

**PHOTOVOLTAIC DC DISCONNECT**  
RATED MAXIMUM POWER-POINT CURRENT: 12.80 ADC  
RATED MAXIMUM POWER-POINT VOLTAGE: 400 VDC  
MAXIMUM SYSTEM VOLTAGE: 480 VDC  
MAXIMUM SHORT CIRCUIT CURRENT: 15 ADC

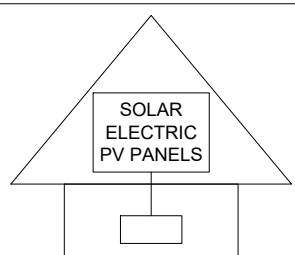
LABEL LOCATION:  
INVERTER(S), DC DISCONNECT(S).  
PER CODE(S): CEC 2019: 690.53.

NOTES AND SPECIFICATIONS:

- SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF THE CEC 2019 ARTICLE 110.21(B), UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED BY SECTION 690, OR IF REQUESTED BY THE LOCAL AHJ.
- SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
- LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
- LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
- SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
- DO NOT COVER EXISTING MANUFACTURER LABELS.

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

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

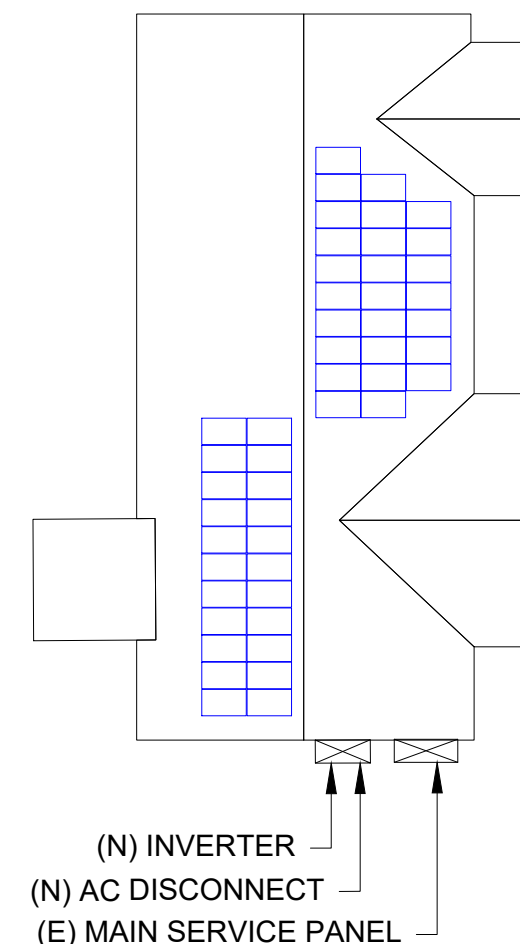
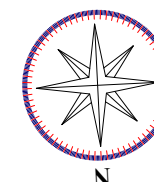


**PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

LABEL LOCATION:  
WEATHER RESISTANT MATERIAL, DURABLE PLAQUE, UL969 AS STANDARD TO WEATHER RATING (UL LISTING OF MARKINGS NOT REQUIRED), MIN 3/8" LETTER HEIGHT ARIAL OR SIMILAR FONT NON-BOLD, PLACED WITHIN THE MAIN SERVICE DISCONNECT, PLACED ON THE OUTSIDE OF THE COVER WHEN DISCONNECT IS OPERABLE WITH SERVICE PANEL CLOSED. (PER CODE: CEC690.12, 690.56(C))

**CAUTION:**

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



STREET NAME  
FRONT OF HOUSE

LOGO

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Description	Date	Rev
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CUSTOMER NAME  
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Sheet Name  
WARNING LABELS

Sheet Size  
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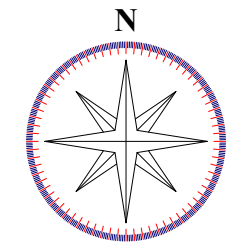
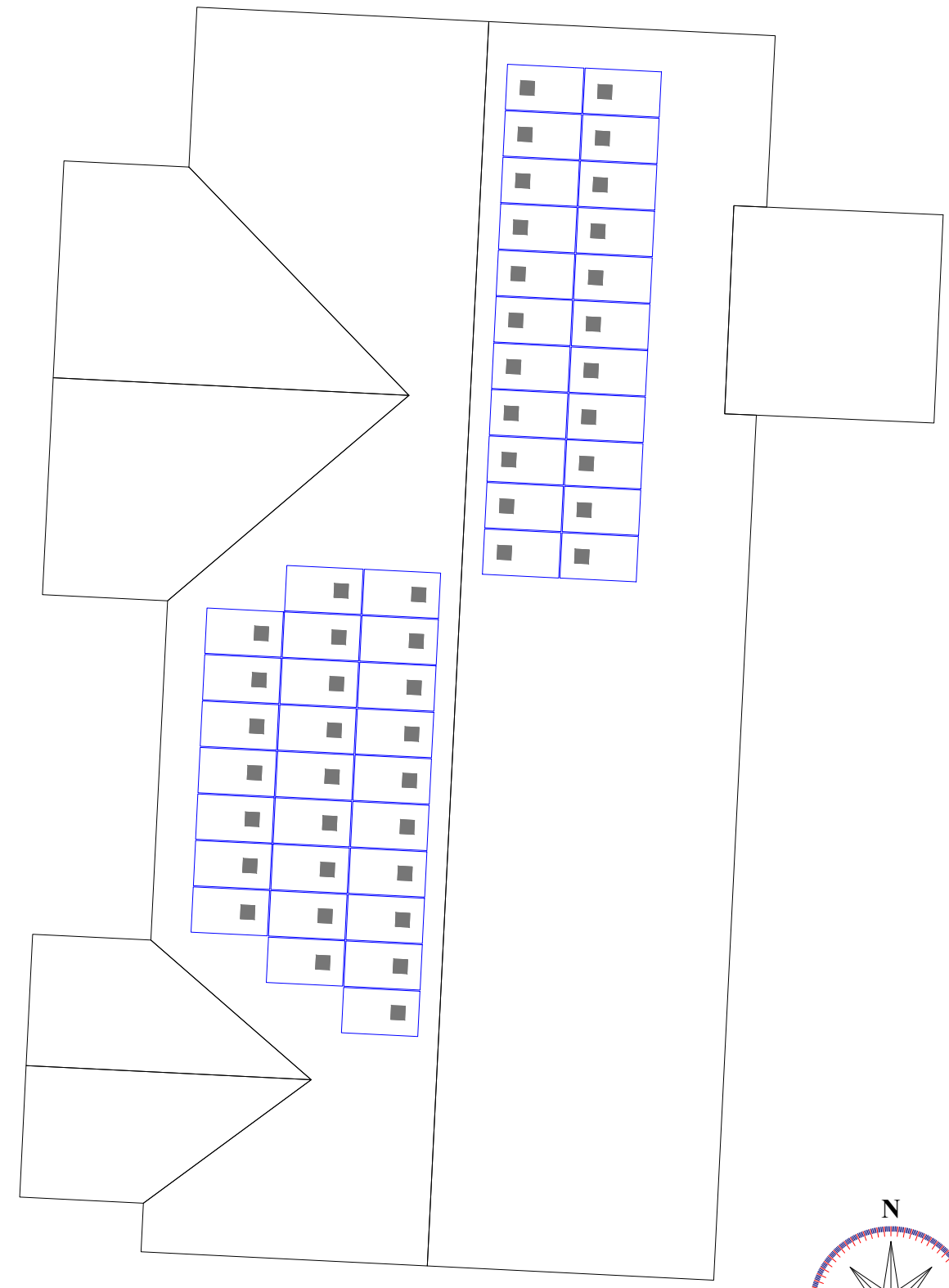
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1-10    11-20    21-30    31-40    41-50    51-60

# SOLAREEDGE OPTIMIZER CHART

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2					
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9					
10					

STREET NAME  
FRONT OF HOUSE



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OPTIMIZER CHART

Sheet Size

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# KuPower

## HIGH EFFICIENCY MONO PERC MODULE

### CS3K-315 | 320 | 325 | 330MS

#### (1000 V / 1500 V)



#### MORE POWER



Low power loss in cell connection



Low NMOT:  $41 \pm 3^\circ\text{C}$   
Low temperature coefficient (Pmax):  $-0.37\% / ^\circ\text{C}$



Better shading tolerance



High PTC rating of up to: 93.11 %

#### MORE RELIABLE



Lower hot spot temperature



Minimizes micro-cracks



Heavy snow load up to 6000 Pa,  
wind load up to 4000 Pa\*



25 years linear power output warranty



10 years product warranty on materials and workmanship

#### MANAGEMENT SYSTEM CERTIFICATES

ISO 9001:2015 / Quality management system  
ISO 14001:2015 / Standards for environmental management system  
OHSAS 18001:2007 / International standards for occupational health & safety

#### PRODUCT CERTIFICATES\*

IEC 61215 / IEC 61730: VDE / CE / MCS / CEC AU  
UL 1703 / IEC 61215 performance: CEC listed (US) / FSEC (US Florida)  
UL 1703: CSA / IEC61701 ED2: VDE / IEC62716: VDE / IEC60068-2-68: SGS  
Take-e-way



\*We can provide this product with special BOM specifically certified with salt mist, ammonia and sand blowing tests. Please talk to our local technical sales representatives to get your customized solutions.

**CANADIAN SOLAR (USA), INC.** is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance/price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 30 GW deployed around the world since 2001.

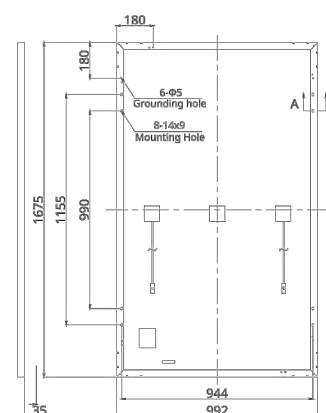
\* For detailed information, please refer to the Installation Manual.

**CANADIAN SOLAR (USA), INC.**

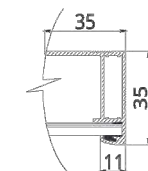
3000 Oak Road, Suite 400, Walnut Creek, CA 94597, USA | [www.canadiansolar.com/na](http://www.canadiansolar.com/na) | [sales.us@canadiansolar.com](mailto:sales.us@canadiansolar.com)

#### ENGINEERING DRAWING (mm)

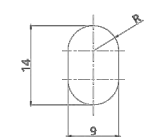
##### Rear View



##### Frame Cross Section A-A



##### Mounting Hole



#### ELECTRICAL DATA | STC\*

CS3K	315MS	320MS	325MS	330MS
Nominal Max. Power (Pmax)	315 W	320 W	325 W	330 W
Opt. Operating Voltage (Vmp)	33.1 V	33.3 V	33.5 V	33.7 V
Opt. Operating Current (Imp)	9.52 A	9.61 A	9.71 A	9.80 A
Open Circuit Voltage (Voc)	39.9 V	40.1 V	40.3 V	40.5 V
Short Circuit Current (Isc)	10.06 A	10.14 A	10.22 A	10.30 A
Module Efficiency	18.96%	19.26%	19.56%	19.86%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)			
Module Fire Performance	TYPE 1 (UL 1703) or CLASS C (IEC 61730)			
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 ~ + 5 W			

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

#### ELECTRICAL DATA | NMOT\*

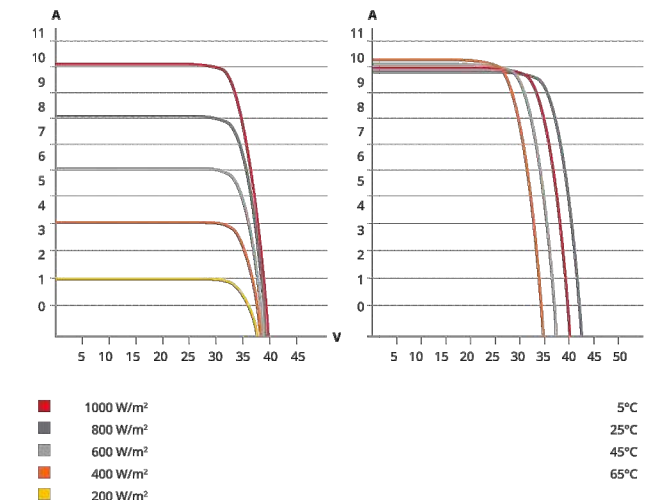
CS3K	315MS	320MS	325MS	330MS
Nominal Max. Power (Pmax)	235 W	239 W	243 W	246 W
Opt. Operating Voltage (Vmp)	30.7 V	30.9 V	31.1 V	31.3 V
Opt. Operating Current (Imp)	7.65 A	7.73 A	7.80 A	7.88 A
Open Circuit Voltage (Voc)	37.5 V	37.7 V	37.9 V	38.1 V
Short Circuit Current (Isc)	8.11 A	8.18 A	8.24 A	8.31 A

\* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

\* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Canadian Solar Inc. reserves the right to make necessary adjustments to the information described herein at any time without further notice. Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

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#### CS3K-315MS / I-V CURVES



#### MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	120 [2 X (10 X 6)]
Dimensions	1675 X 992 X 35 mm (65.9 X 39.1 X 1.38 in)
Weight	18.5 kg (40.8 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm <sup>2</sup> (IEC), 12 AWG (UL)
Cable Length	1160 mm (45.7in)
Connector	T4 series
Per Pallet	30 pieces
Per Container (40' HQ)	840 pieces

\* For detailed information, please contact your local Canadian Solar sales and technical representatives.

#### TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.37 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	41 ± 3°C

#### PARTNER SECTION



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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 and 2017, 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	<b>SE11400H-US</b>	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXXBXX4							
<b>OUTPUT</b>								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>1)</sup>							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
<b>INPUT</b>								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage				480				Vdc
Nominal DC Input Voltage	380					400		Vdc
Maximum Input Current @240V <sup>2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V <sup>2)</sup>	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600ku Sensitivity							
Maximum Inverter Efficiency	99					99.2		%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

<sup>1)</sup> For other regional settings please contact SolarEdge support  
<sup>2)</sup> A higher current source may be used; the inverter will limit its input current to the values stated

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# Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P485 / P505



POWEROPTIMIZER

## PV power optimization at the module-level

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

solaredge.com



## Power Optimizer For North America

P320 / P340 / P370 / P400 / P405 / P485 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P505 (for higher current modules)		
<b>INPUT</b>									
Rated Input DC Power <sup>1)</sup>	320	340	370	400	405	485	505	W	
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125 <sup>2)</sup>		83 <sup>2)</sup>	Vdc	
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105		12.5 - 83	Vdc	
Maximum Short Circuit Current (Isc)		11			10.1		14	Adc	
Maximum DC Input Current		13.75			12.5		17.5	Adc	
Maximum Efficiency				99.5				%	
Weighted Efficiency				98.8			98.6	%	
Overvoltage Category				II					
<b>OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)</b>									
Maximum Output Current				15				Adc	
Maximum Output Voltage		60				85		Vdc	
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)</b>									
Safety Output Voltage per Power Optimizer				1 ± 0.1				Vdc	
<b>STANDARD COMPLIANCE</b>									
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3								
Safety	IEC62109-1 (class II safety), UL1741								
Material	UL94 V-0, UV Resistant								
RoHS	Yes								
<b>INSTALLATION SPECIFICATIONS</b>									
Maximum Allowed System Voltage	1000								
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters								
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3					mm / in
Weight (including cables)	630 / 1.4	750 / 1.7	845 / 1.9	1064 / 2.3					gr / lb
Input Connector	MC4 <sup>3)</sup>					Single or dual MC4 <sup>3)/4)</sup>	MC4 <sup>3)</sup>		
Input Wire Length	0.16 / 0.52								m / ft
Output Wire Type / Connector	Double Insulated / MC4								
Output Wire Length	0.9 / 2.95	1.2 / 3.9	1.2 / 3.9	1.2 / 3.9	1.2 / 3.9				m / ft
Operating Temperature Range <sup>5)</sup>	-40 - +85 / -40 - +185								°C / °F
Protection Rating	IP68 / NEMA6P								
Relative Humidity	0 - 100								%

<sup>1)</sup> Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed  
<sup>2)</sup> NEC 2017 requires max input voltage be not more than 80V  
<sup>3)</sup> For other connector types please contact SolarEdge  
<sup>4)</sup> For dual version for parallel connection of two modules use the P485. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer  
<sup>5)</sup> For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details.

PV System Design Using a SolarEdge Inverter <sup>6)/7)</sup>	Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400 P405, P485, P505	8	10	18	
Maximum String Length (Power Optimizers)		6	8	14	
Maximum Power per String		25	25	50 <sup>8)</sup>	W
Parallel Strings of Different Lengths or Orientations		5700 (6000 with SE7600-US - SE11400-US)	5250	6000 <sup>9)</sup>	12750 <sup>10)</sup>
			Yes		

<sup>6)</sup> For detailed string sizing information refer to: [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf)  
<sup>7)</sup> It is not allowed to mix P405/P485/P505 with P320/P340/P370/P400 in one string  
<sup>8)</sup> A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement  
<sup>9)</sup> For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W  
<sup>10)</sup> For 277/480V grid: it is allowed to install up to 17,550W per string when the maximum power difference between each string is 2,000W

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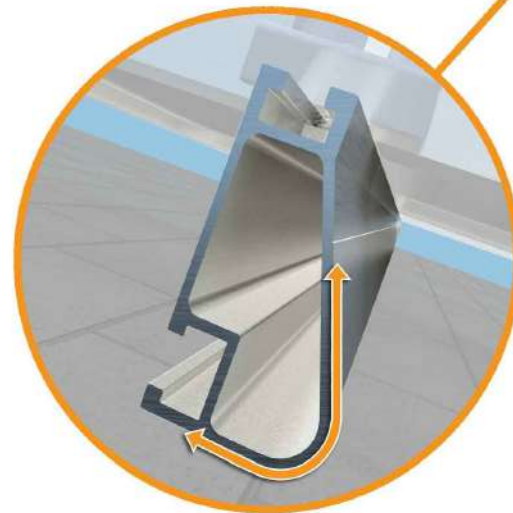
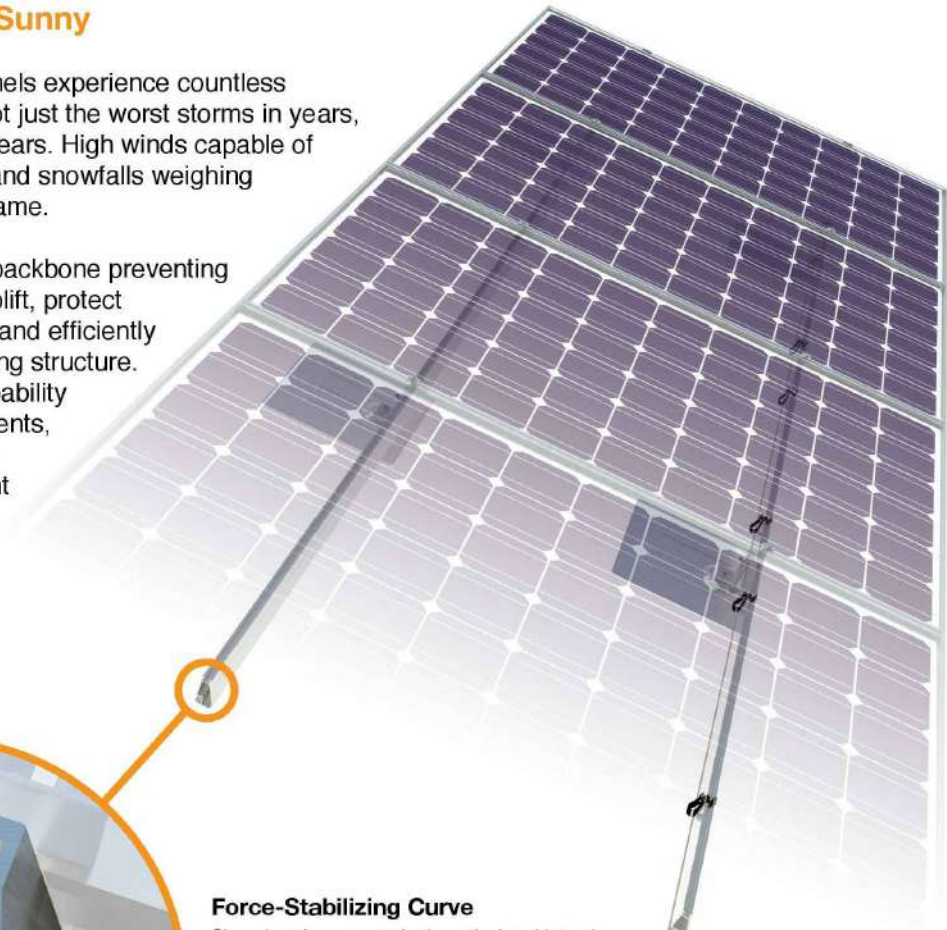
Tech Brief

## 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.



Tech Brief

## 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, perfectly matched to regions without snow. It achieves 6 foot spans, while also staying 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.

- 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	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100			XR100		XR1000	
	120						
	140						
	160						
30-40	100						
	120						
	140						
	160						
50-70	160						
80-90	160						

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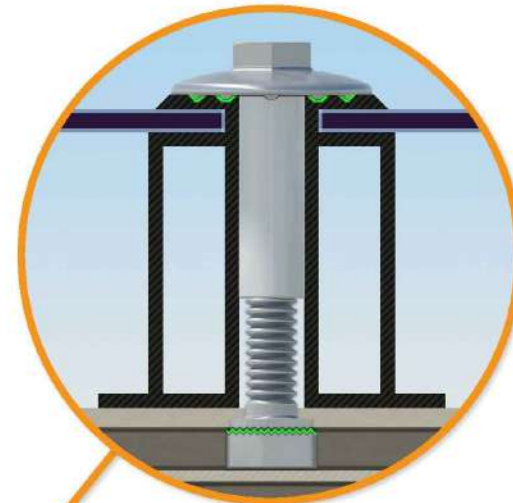
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## Simplified Grounding for Every Application

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.

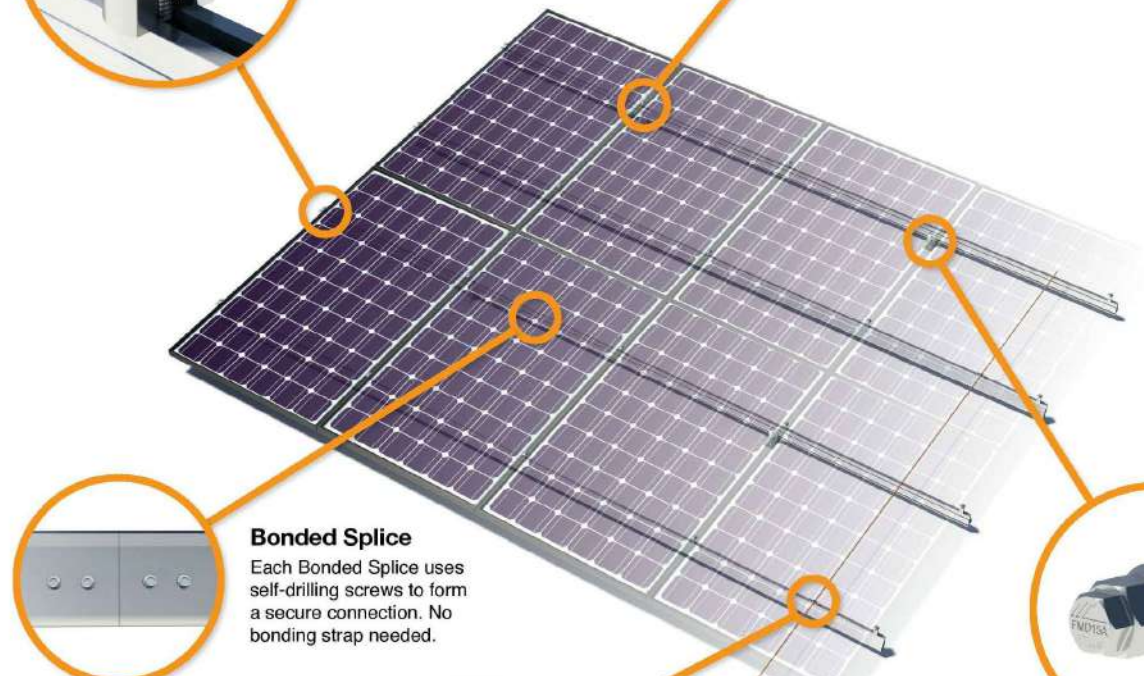
UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



**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.



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

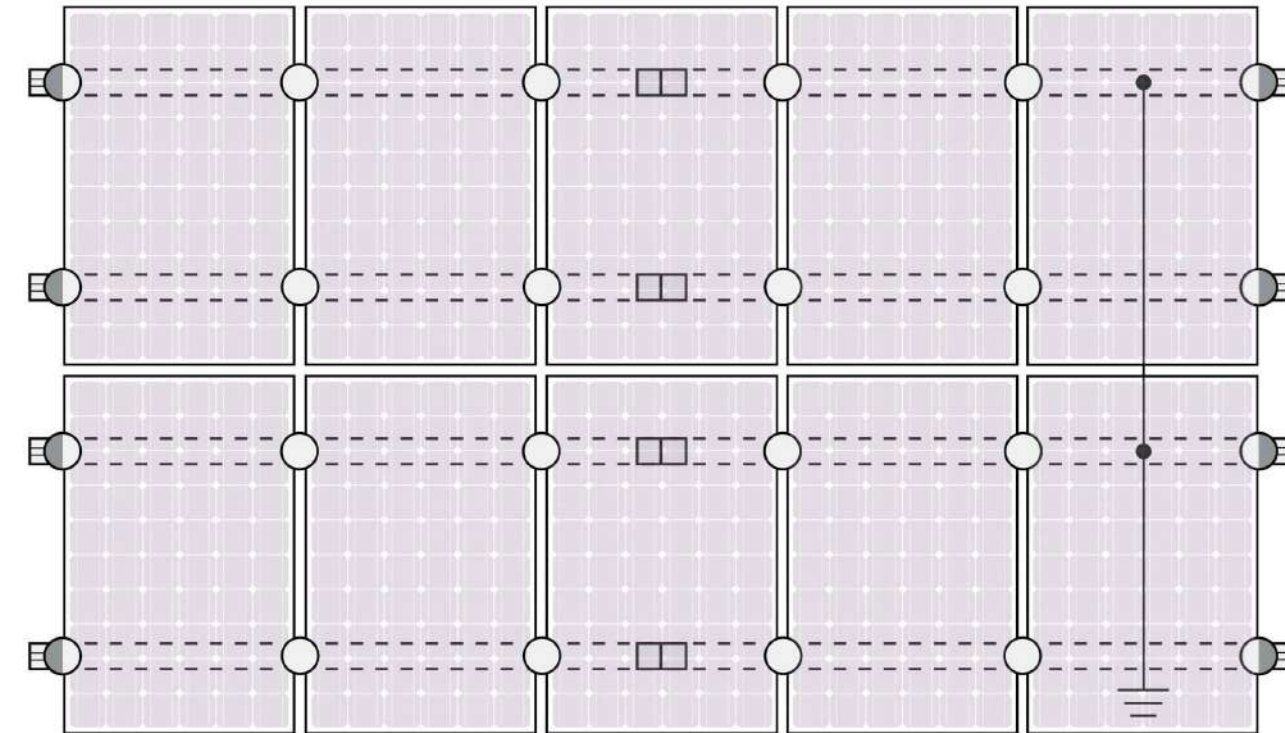


**Grounding Lug**  
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



**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



○ UFO    ◐ Stopper Sleeve    ● Grounding Lug    □ Bonded 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://IronRidge.com/UFO)

Feature	Cross-System Compatibility		
	Flush Mount	Tilt Mount	Ground Mount
<b>XR Rails</b>	✓	✓	XR1000 Only
<b>UFO/Stopper</b>	✓	✓	✓
<b>Bonded Splice</b>	✓	✓	N/A
<b>Grounding Lugs</b>	1 per Row	1 per Row	1 per Array
<b>Microinverters &amp; Power Optimizers</b>	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
<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.		

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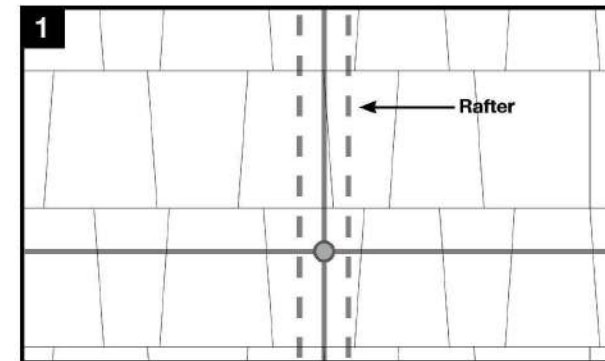
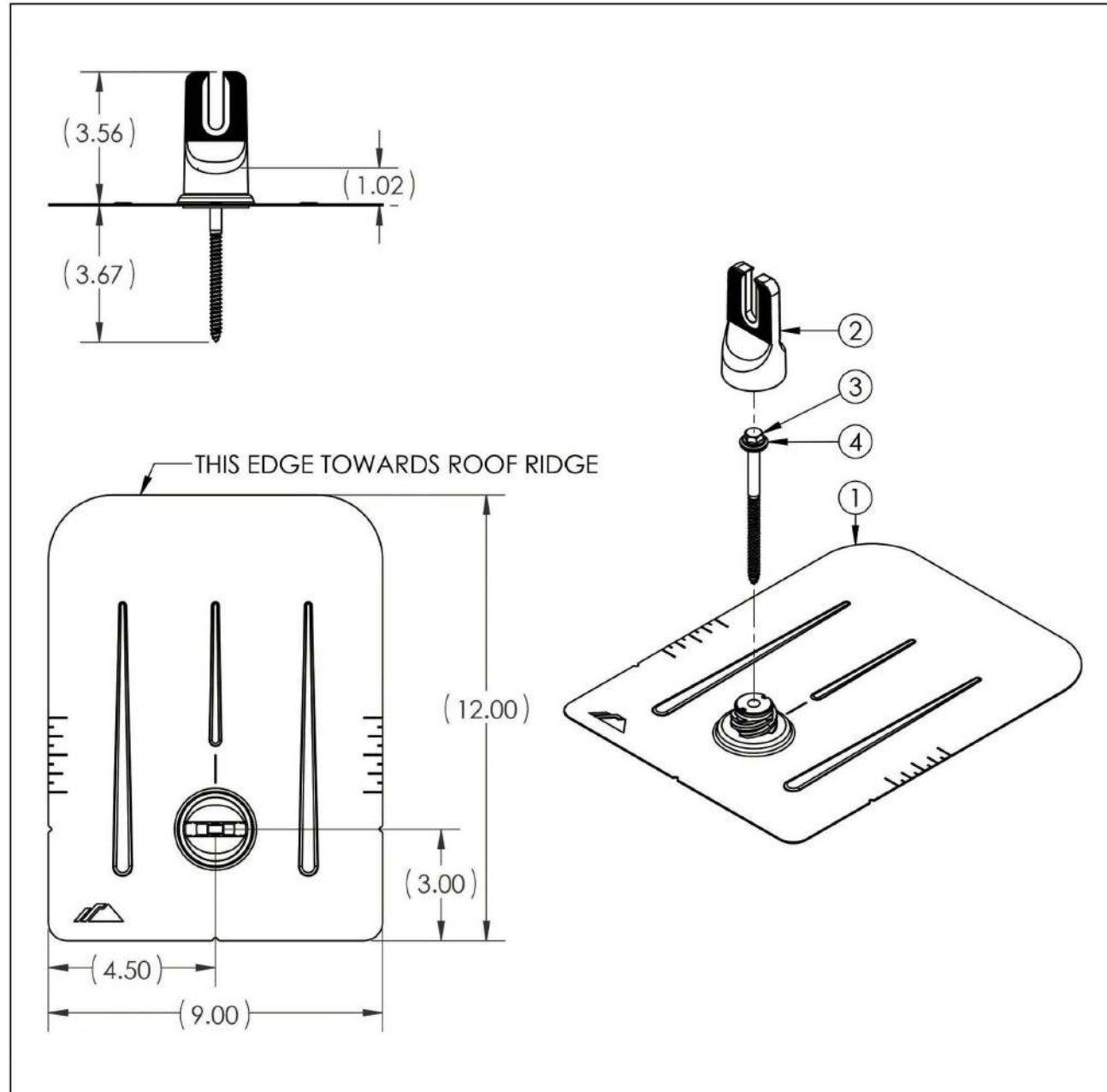
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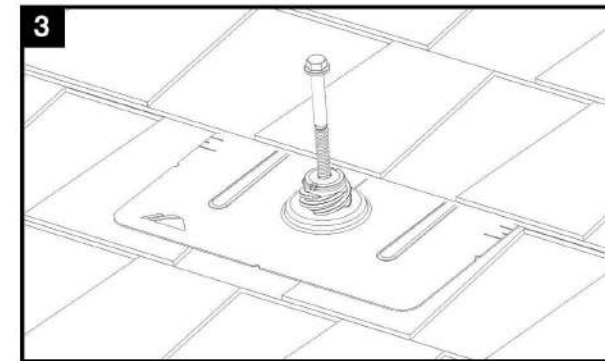
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## Installation

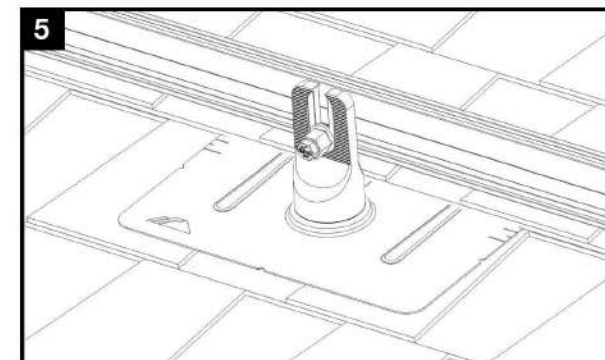
**Tools Required:** tape measure, chalk line, stud finder, roofing bar, caulking gun, driver with 1/4" bit and 7/16" hex socket.



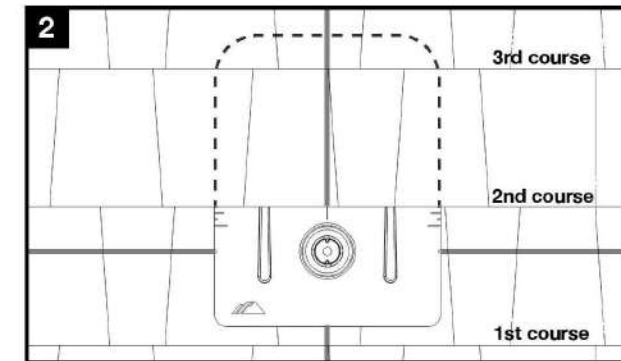
1 Locate rafters and snap vertical and horizontal lines to mark flashing locations. Drill 1/4" pilot holes, then fill with roofing manufacturer's approved sealant.



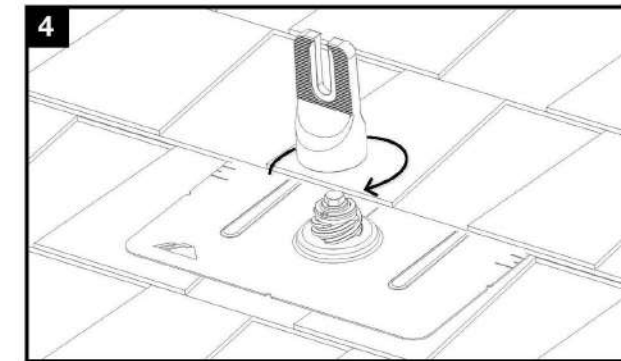
3 Line up pilot hole with flashing hole and insert lag bolt with bonded washer through flashing. Tighten lag bolt until fully seated.



5 Attach rails to either side of the open slot using bonding hardware. Level rail at desired height, then torque to 250 in-lbs (21 ft-lbs).



2 Slide flashing, between 1st and 2nd course, so the top is at least 3/4" above the edge of the 3rd course and the bottom is above the edge of the 1st course.



4 Place Cap onto flashing in desired orientation for E/W or N/S rails and rotate 180 degrees. FlashFoot 2 is now installed and ready for IronRidge XR Rails.

**Structural Certification**  
Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

**Water Seal Ratings**  
Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

**UL 2703**  
Conforms to UL 2703 Mechanical and Bonding Requirements. See IronRidge Flush Mount Installation Manual for full ratings.

NO.	PART NUMBER	DESCRIPTION	QTY.
1	FM-100-006	ASSY, FLASHING, MILL	1
2	FM-100-008	ASSY, CAP, MILL	1
3	23-3118-475LGF	SCREW, LAG, HEX, 5/16. W/ CUSTOM HEAD, 7/16 HEX W/ FLANGE 4.75L	1
4	25-3102-000S	WASHER, EPDM BACKED	1

KIT, FLASHFOOT 2

SCALE: 1:4    WEIGHT: 0.88 lbs    SHEET 1 OF 1

\* Bill of materials shown is for a single FlashFoot 2 assembly.

### REVISIONS

Description	Date	Rev
Initial Design	M/D/YYYY	00

Signature with Seal

Project Name & Address

CUSTOMER NAME  
ADDRESS  
APN  
PHONE NO.

Sheet Name

DATA SHEET

Sheet Size

ANSI B  
11" X 17"

Sheet Number

E 2.0

QC BY