

DIRECTORY OF PLAN PAGES	
PV1	PROJECT INFORMATION
PV2	SITE PLAN
PV3	SINGLE-LINE DIAGRAM
PV4	PLACARDS
PV5	ATTACHMENT PLAN
PV-6A	IRON RIDGE FLASHFOOT2 MOUNTING DETAILS
PV-6B	
PV-6C	
PV7	RACKING DATASHEET
PV8	PV MODULE DATASHEET
PV9	MICROINVERTER DATASHEET
PV10	CLASS A FIRE RATING DATASHEET
PV11	STATE OF CALIFORNIA ENGINEERING LETTER (IRON RIDGE XR-10 RAILS)
PV12	GROUNDING DETAILS (IRON RIDGE RACKING)
PV13	RAPID SHUTDOWN DATASHEET
PV14	AC DISCONNECT DATASHEET
PV15	NEC STANDARD ELECTRICAL LOAD CALCULATIONS

PROJECT DETAILS	
PROPERTY OWNER	SAMPLE OWNER
PROPERTY ADDRESS	123 SAMPLE STREET SAMPLE CITY, USA
OWNER PHONE	(000) 000-0000
OWNER EMAIL	OWNER@SAMPLECLIENT.COM
APN	SAMPLE-APN
ZONE	CG
MOUNTING TYPE	FLUSH ROOF-MOUNTED PHOTOVOLTAIC ARRAY
AHJ	CITY OF SAMPLE CITY
UTILITY COMPANY	PACIFIC GAS & ELECTRIC COMPANY (PG&E)
OBSERVED CODES	2025 CALIFORNIA BUILDING CODE, TITLE 24, PART 2, VOL. 1 & 2 2025 CALIFORNIA RESIDENTIAL CODE, TITLE 24, PART 2.5 2025 CALIFORNIA ELECTRICAL CODE, TITLE 24, PART 3 2025 CALIFORNIA MECHANICAL CODE, TITLE 24, PART 4 2025 CALIFORNIA PLUMBING CODE, TITLE 24, PART 5 2025 CALIFORNIA ENERGY CODE, TITLE 24, PART 6 2025 CALIFORNIA FIRE CODE, TITLE 24, PART 9 TITLE 24 ENERGY REQUIREMENTS CALIFORNIA GREEN BUILDING STANDARDS CITY OF DAVIS MUNICIPAL CODE

OWNER-BUILDER INFORMATION	
COMPANY NAME	SAMPLE CLIENT COMPANY, LLC.
OWNER-BUILDER NAME	SAMPLE OWNER
ADDRESS	100 BUSINESS PARKWAY SAMPLE CITY, USA
PHONE	(000) 000-0000
EMAIL	OWNER@SAMPLECLIENT.COM
OWNER-BUILDER SIGNATURE	

PLAN DESIGNER INFORMATION	
COMPANY	GEMINI SOLAR DESIGN, LLC.
NAME	GSD DESIGN TEAM
ADDRESS	GEMINISOLARDESIGN.COM NATIONWIDE DESIGN SERVICES
PHONE	(000) 000-0000
PLAN DESIGNER SIGNATURE	Sanjay Mallapaty

SYSTEM DETAILS	
DC RATING OF SYSTEM	2,700W
AC OUTPUT CURRENT	8.7A
AC OUTPUT POWER	2,094W
MICROINVERTER	(6) ENPHASE IQ8AC-72-M-US
MODULE	(6) CANADIAN SOLAR HIKU CS3W-450MS
BRANCH CONFIGURATION	1 BRANCH OF 6 MICROINVERTERS
INTERCONNECTION	LOAD-SIDE BREAKER

SITE SPECIFICATIONS	
UTILITY SERVICE	120 / 240VAC, 1-Ø, 3-WIRE
METER / MAIN COMBINATION PANEL	200A RATED BUSBAR 200A / 2P MAIN BREAKER 15A / 2P BACKFED SOLAR BREAKER

DESIGN CRITERIA	
ASHRAE EXTREME ANNUAL MEAN MINIMUM DENSITY DRY BULB TEMP	1-3°C
ASHRAE 2% ANNUAL DRY DENSITY BULB TEMP	38°C
DESIGN WIND SPEED	115 MPH (3-SECOND GUST)
DESIGN SNOW LOAD	NONE (0 PSF)
WIND EXPOSURE CATEGORY	B
SEISMIC DESIGN CATEGORY	D
RISK CATEGORY	II
OCCUPANCY GROUP	R2
ZONE	CG
CONSTRUCTION TYPE	V-B
STORIES	TWO EACH
SPRINKLERS	DEFERRED APPROVAL

PROJECT LOCATION MAP
WITHHELD IN PUBLIC SAMPLE

VICINITY MAP
WITHHELD IN PUBLIC SAMPLE

CONSTRUCTION NOTES	
1	CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO INITIATING CONSTRUCTION.
2	CONTRACTOR SHALL REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
3	ALL EQUIPMENT SHALL BE LISTED BY THE U.L. (OR EQUAL) AND LISTED FOR ITS SPECIFIC APPLICATION.
4	ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
5	ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
6	ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
7	ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 VOLTS AND 90°C WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
8	WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
9	PV MODULES FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER G.E.C. PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
10	PV MODULES RACKING RAIL SHALL BE BONDED TO BARE COPPER G.E.C VIA WEEB LUG, ILSCO GBL-4DBT LAY-IN LUG, OR EQUIVALENT LISTED LUG.
11	GROUNDING ELECTRODE CONDUCTOR (G.E.C) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED
12	ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.
13	WORKING SPACE AROUND ELECTRICAL EQUIPMENT SHALL COMPLY WITH CEC SECTION 110.26.

SCOPE OF WORK DESCRIPTION	
THE PROPOSED SYSTEM IS A ROOF MOUNTED PHOTOVOLTAIC ARRAY UTILIZING MICROINVERTERS. THE PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED ON THE "CG" ZONED, OCCUPANCY GROUP "R2" STRUCTURE IN THE CITY OF SAMPLE CITY SAN JOAQUIN COUNTY, CALIFORNIA. THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A LOAD-SIDE BACKFED CIRCUIT BREAKER CONNECTION . THIS PROJECT DOES NOT INCLUDE STORAGE BATTERIES.	

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

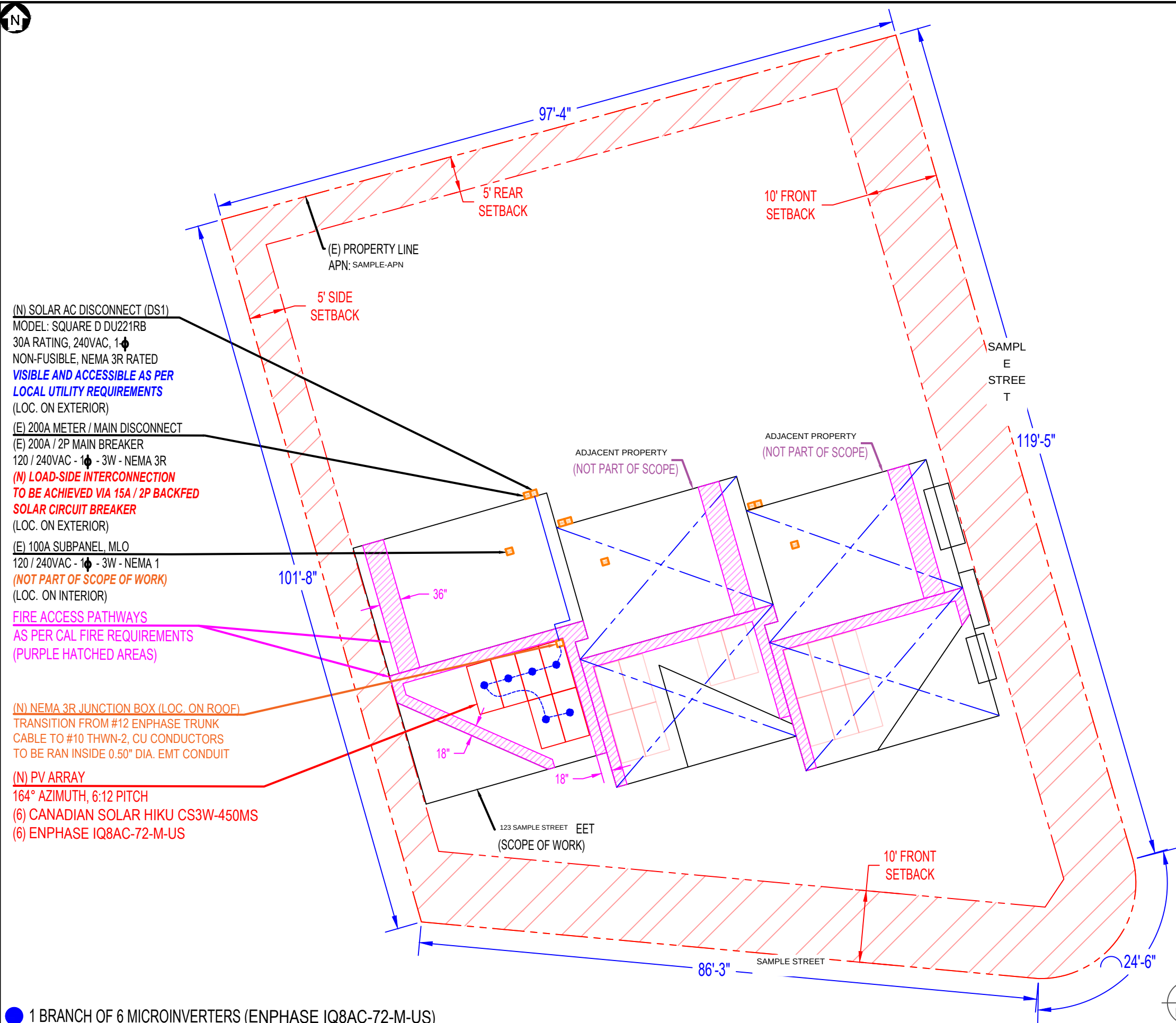
PROJECT INFO

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-1



(N) SOLAR AC DISCONNECT (DS1)
MODEL: SQUARE D DU221RB
30A RATING, 240VAC, 1- ϕ
NON-FUSIBLE, NEMA 3R RATED
**VISIBLE AND ACCESSIBLE AS PER
LOCAL UTILITY REQUIREMENTS**
(LOC. ON EXTERIOR)

(E) 200A METER / MAIN DISCONNECT
(E) 200A / 2P MAIN BREAKER
120 / 240VAC - 1- ϕ - 3W - NEMA 3R
**(N) LOAD-SIDE INTERCONNECTION
TO BE ACHIEVED VIA 15A / 2P BACKFED
SOLAR CIRCUIT BREAKER**
(LOC. ON EXTERIOR)

(E) 100A SUBPANEL, MLO
120 / 240VAC - 1- ϕ - 3W - NEMA 1
(NOT PART OF SCOPE OF WORK)
(LOC. ON INTERIOR)

**FIRE ACCESS PATHWAYS
AS PER CAL FIRE REQUIREMENTS
(PURPLE HATCHED AREAS)**

(N) NEMA 3R JUNCTION BOX (LOC. ON ROOF)
TRANSITION FROM #12 ENPHASE TRUNK
CABLE TO #10 THWN-2, CU CONDUCTORS
TO BE RAN INSIDE 0.50" DIA. EMT CONDUIT

(N) PV ARRAY
164° AZIMUTH, 6:12 PITCH
(6) CANADIAN SOLAR HIKU CS3W-450MS
(6) ENPHASE IQ8AC-72-M-US

● 1 BRANCH OF 6 MICROINVERTERS (ENPHASE IQ8AC-72-M-US)

CALIFORNIA FIRE CODE NOTES

1 IN ACCORDANCE WITH CFC 605.11.3.2.1, CFC ADDS A STATEMENT THAT
LADDER LOCATIONS CANNOT BE IN FRONT OF WINDOWS OR DOORS,
AND CANNOT CONFLICT WITH TREE LIMBS, WIRES, OR SIGNS.

SITE PLAN NOTES

1 CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT
RESISTANT PER CEC 319.0(D).
2 CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR
USE IN WET LOCATIONS PER CEC 310.8(C).
3 ARRAYS SHALL BE INSTALLED IN A WAY THAT ENSURES THAT PV
SOURCE CONDUCTORS SHALL NOT BE READILY ACCESSIBLE.

GEMINI SOLAR DESIGN

SAMPLE PROJECT

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PROJECT ADDRESS WITHHELD
UNITED STATES

SITE PLAN

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

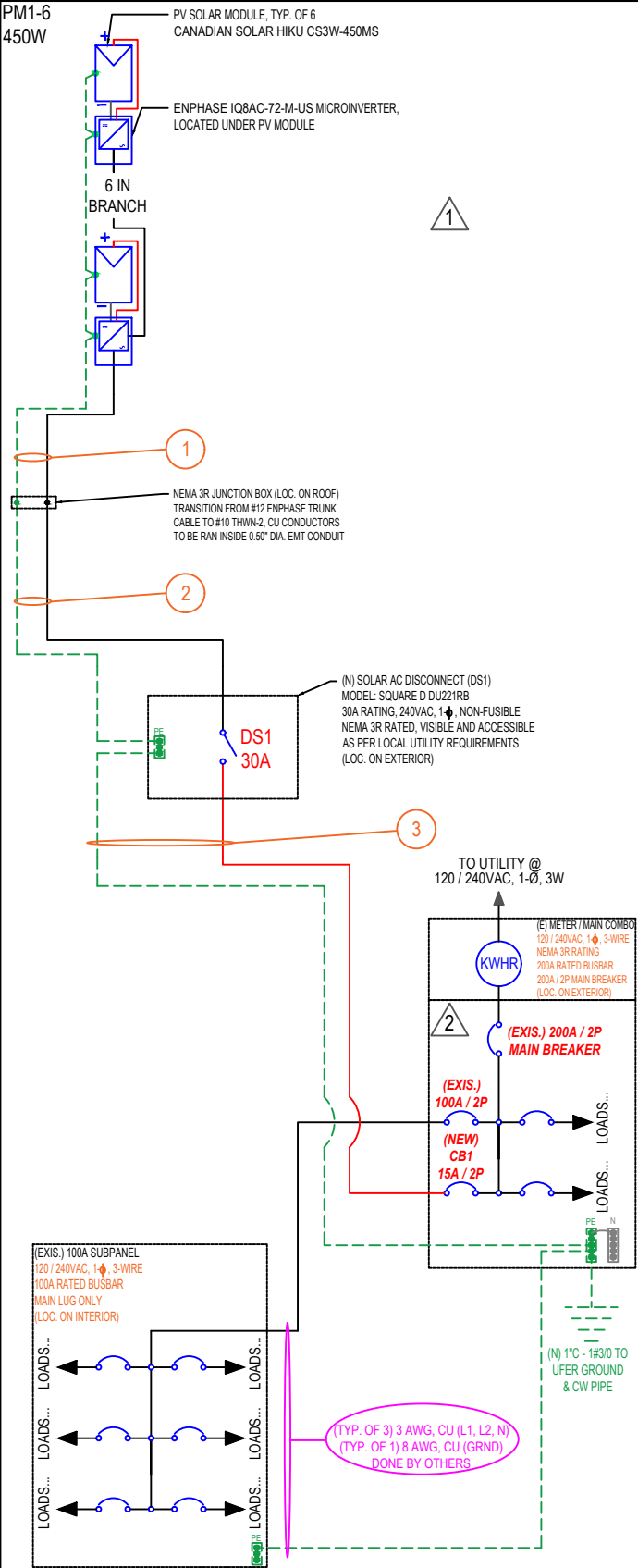
PV-2

A

SITE PLAN

PV-2

SCALE: 1" = 15'



PV MODULE									
REF.	TYP.	MODULE	STC POWER	PTC POWER	ISC	IMP	VOC	VMP	SERIES FUSE RATING
PM1-6	6	CANADIAN SOLAR HIKU CS3W-450MS	450W	419.2W	11.65A	11.12A	48.7V	40.5V	20A

MICROINVERTER										
REF.	TYP.	MICROINVERTER	GROUND	AC VOLTAGE	MAX OCPD SIZE	MAX OUTPUT POWER (CONTINUOUS)	MAX AC CURRENT	MAXIMUM CONTINUOUS INPUT DC CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-6	6	ENPHASE IQ8AC-72-M-US	INTEGRATED	240VAC	20A	349W	1.45A	14A	60VDC	97.0%

SYSTEM SUMMARY	
	BRANCH #1
INVERTERS PER BRANCH	6
ARRAY STC POWER	2,700W
ARRAY PTC POWER	2,515.2W
TOTAL MAXIMUM CONTINUOUS AC CURRENT	8.7A
TOTAL MAXIMUM CONTINOUS AC POWER	2,094W

OCPD SCHEDULE				
REF.	TYP.	POLES	CURRENT RATING	MAX. VOLTAGE
CB1 (BACKFED SOLAR BREAKER)	1	2	15A	240VAC

SOLAR AC DISCONNECT SCHEDULE				
REF.	TYP.	POLES	CURRENT RATING	MAX. VOLTAGE
DS1 (SQUARE D DU221RB)	1	2	30A	240VAC

CONDUCTOR SCHEDULE WITH CEC ELECTRICAL CALCULATIONS																
ID	TYP	DESCRIPTION	CONDUCTOR	CONDUIT	NO. OF CURRENT CARRYING CNDRS. IN CNDT.	FILL %	RATED AMPS	OCPD	EGC	TEMP. CORR. FACTOR @ 90°C TEMP. RATING	FILL ADJ. FACTOR	CONT. CURRENT	MAX. CURRENT	TERMINAL RATING CHECK (ASSUME 75°C) SHALL EXCEED 1.25X CONT. CURRENT	BASE AMPACITY @ 90°C TEMP. RATING	CONDITIONS OF USE (COU) @ 90°C TEMP. RATING
1	1	MICROINVERTER OUTPUT: MICROINVERTER TO JUNCTION BOX	12 AWG THWN-2 COPPER (ENPHASE IQ8AC TRUNK CABLE)	FREE AIR (DIRECT HOMERUN TO J-BOX LOCATED UNDER PV MODULE)	N/A	N/A	8.7A (BRANCH #1)	N/A	6 AWG BARE COPPER	0.71 (60°C)	1.0	8.7A (BRANCH #1)	10.88A (BRANCH #1)	25A > 10.88A PASS	40A (IN FREE AIR)	28.4A (IN FREE AIR)
2	1	MICROINVERTER OUTPUT (TRANSITIONED): JUNCTION BOX TO SOLAR AC DISCONNECT (DS1)	10 AWG THWN-2 COPPER	0.50" DIA. EMT	2 (L1, L2) X 1 (NO NEUTRAL FOR IQ8AC)	20.8%	8.7A (BRANCH #1)	30A (DS1)	10 AWG THWN-2 COPPER	0.71 (60°C)	1.0	8.7A (BRANCH #1)	10.88A (BRANCH #1)	35A > 10.88A PASS	40A (IN CONDUIT)	28.4A (IN CONDUIT)
3	1	SOLAR AC DISCONNECT (DS1) OUTPUT: SOLAR AC DISCONNECT (DS1) TO 200A METER / MAIN COMBO (LOAD-SIDE POINT OF INTERCONNECTION VIA BACKFED DOUBLE POLE CIRCUIT BREAKER)	10 AWG THWN-2 COPPER	0.50" DIA. EMT	3 (L1, L2, N) X 1	27.8%	8.7A	15A (CB1)	10 AWG THWN-2 COPPER	0.91 (38°C)	1.0	8.7A	10.88A	35A > 10.88A PASS	40A (IN CONDUIT)	36.4A (IN CONDUIT)

ALL CONDUCTORS, OCPD SIZES AND TYPES SPECIFIED ACCORDING TO CEC ARTICLES 690.8(A)(1), CEC ARTICLE 240, AND CEC ARTICLE 690.7.

SCHEMATIC NOTES	
⚠	THE FIRST AC CONNECTOR IN EACH MICROINVERTER BRANCH CIRCUIT IS SUITABLE AS A DISCONNECTING MEANS.
⚠	OUTPUT OF SOLAR AC DISCONNECT (DS1) IS CONNECTED TO UTILITY ON LOAD SIDE OF SERVICE DISCONNECT. OUTPUT SHALL BE BACKFED THROUGH A 15A / 2P CIRCUIT BREAKER INTO THE 200A RATED METER / MAIN COMBINATION PANEL LOCATED ON THE EXTERIOR OF THE STRUCTURE. SOLAR BACKFED BREAKER SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER DISCONNECT.

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

SINGLE-LINE DIAGRAM

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-3

JUNCTION BOX

1 JUNCTION BOX

⚠ WARNING ⚠
PHOTOVOLTAIC
POWER SOURCE

CEC 690.31(E)(3),(4)

2 JUNCTION BOX

⚠ DO NOT
DISCONNECT
UNDER LOAD ⚠

CEC 690.16(B)

RACEWAYS

3 RACEWAYS, CABLES PER 10 FT.

⚠ WARNING ⚠
PHOTOVOLTAIC
POWER SOURCE

CEC 690.31(E)(3),(4)

200A METER / MAIN COMBO

4 200A METER / MAIN COMBO

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

CEC 690.56(B)

6 200A METER / MAIN COMBO

⚠ WARNING ⚠
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

CEC 705.12(D)(7)

8 TOTAL SOLAR BACKFED CURRENT

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT 8.7 AMPS
OPERATING VOLTAGE 240 VOLTS

CEC 690.54

5 200A METER / MAIN COMBO

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

CEC 690.17.4

7 200A METER / MAIN COMBO

**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

DB 111

200A METER / MAIN COMBO

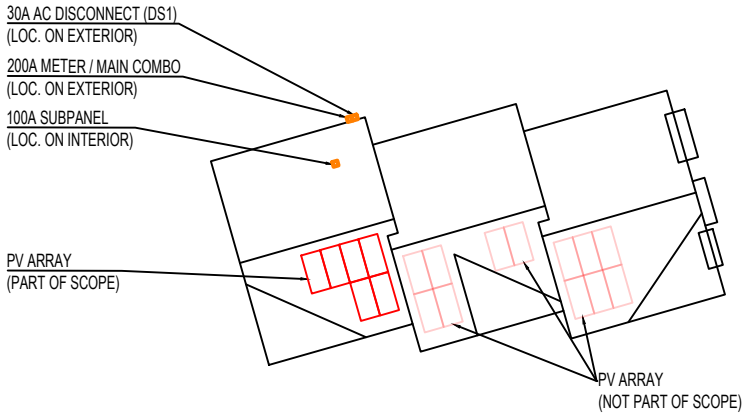
9 200A METER / MAIN COMBO



CAUTION



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



CEC 690.56(B)

AC DISCONNECT (DS1)

10 AC DISCONNECT (DS1)

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

CEC 690.17.4

11 AC DISCONNECT (DS1)

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT 8.7 AMPS
OPERATING VOLTAGE 240 VOLTS

CEC 690.54

GEMINI SOLAR DESIGN

SAMPLE PROJECT

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

PLACARDS

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

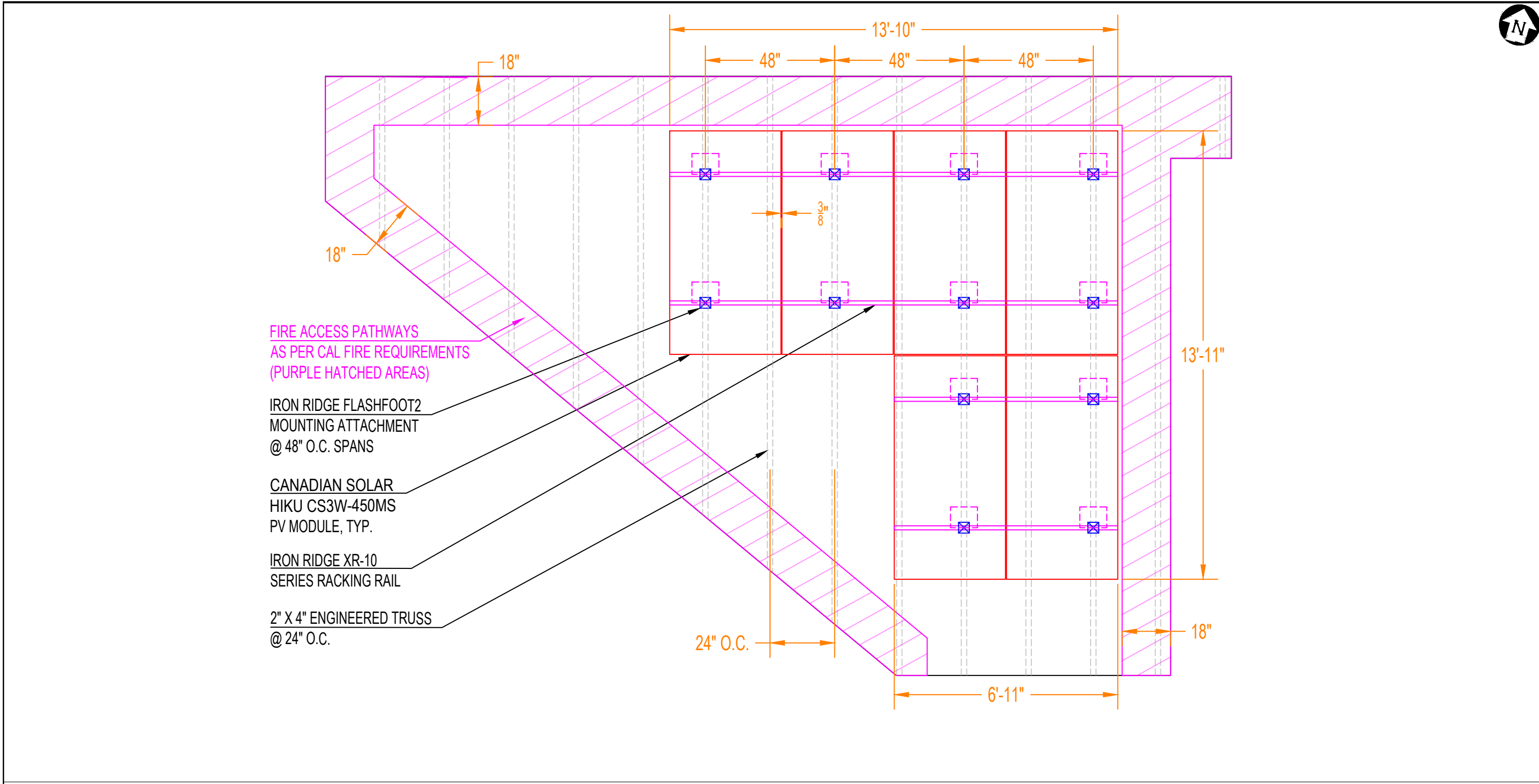
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PV-4

SIGNAGE REQUIREMENTS

1	ALL PLACARDS AND SIGNAGE REQUIRED BY THE 2022 CEC, AND ANY OTHER STATE CODES OR LOCAL ORDINANCES WILL BE INSTALLED AS REQUIRED.
2	RED BACKGROUND
3	WHITE LETTERING
4	MINIMUM 3/8" LETTER HEIGHT
5	ALL CAPITAL LETTERS
6	ARIAL OR SIMILAR FONT
7	WEATHER RESISTANT MATERIAL, PER UL 969

1 PLACARDS
PV-4 SCALE: NTS



GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

ATTACHMENT PLAN

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-5

ROOF INFORMATION	
ROOF MATERIAL TYPE	COMPOSITE SHINGLE
PITCH	6:12
TRUSS SPACING	24" O.C.
TRUSS DIMENSIONS	2" X 4"
TRUSS MATERIAL	WOOD
ARRAY MOUNTING TYPE	FLUSH-MOUNT

FASTENER SPECIFICATIONS	
TYPE OF BOLT	LAG BOLT
SIZE OF BOLT	5/16" X 4.75"
NUMBERS OF BOLTS PER MOUNT	1
MINIMUM EMBEDMENT DEPTH	2.5 INCHES

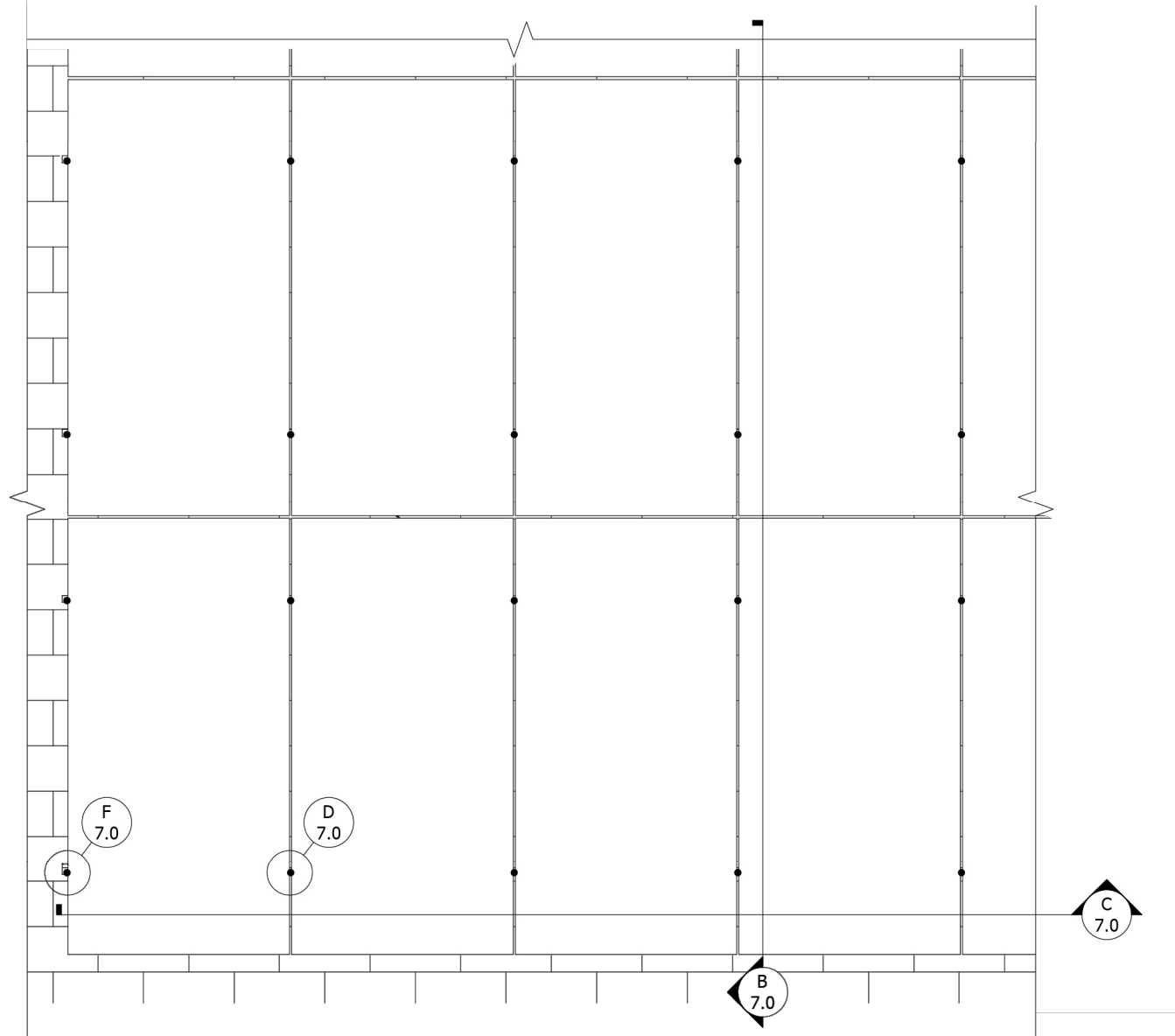
LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	6
NUMBER OF MID-CLAMPS	8
NUMBER OF END-CLAMPS	8
NUMBER OF ATTACHMENTS	12
AREA	144.9 SQ. FT
AZIMUTH	164°

PV MODULES AND IRON RACKING SYSTEM
HAVE A CLASS A FIRE RATING CLASSIFICATION.

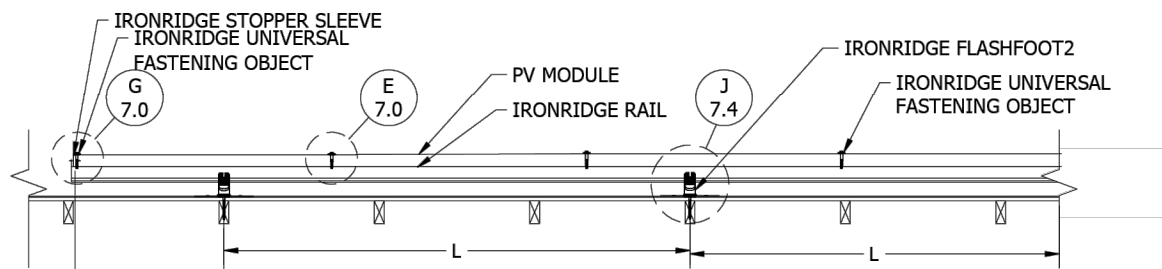
LOCAL DESIGN CRITERIA / BASIC LOAD CALCULATIONS	
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	115 MPH (3-SECOND GUST)
DESIGN SNOW LOAD	NONE (0 PSF)
TOTAL WEIGHT OF ARRAY	385.1 LBS
POINT LOAD	32.1 LBS
DEAD LOAD	2.66 PSF

ATTACHMENT PLAN NOTES	
1	ROOF MEMBERS AND PENETRATIONS TO BE DETERMINED IN THE FIELD.
2	THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
3	PLEASE SEE SHEETS PV-6A, PV-6B, AND PV-6C FOR DETAILS REGARDING THE MOUNTING ATTACHMENT TO BE USED, AS WELL AS THE RELEVANT INSTALLATION INSTRUCTIONS.
4	PLEASE SEE SHEET PV-11 FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A REGISTERED STATE OF CALIFORNIA PROFESSIONAL ENGINEER (PE).

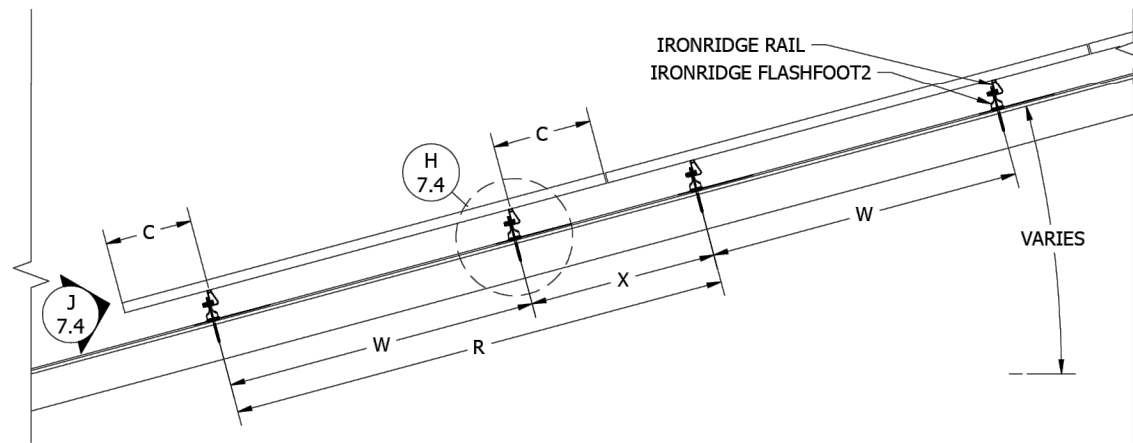
1 ATTACHMENT PLAN
PV-5 SCALE: 1" = 3'-3"



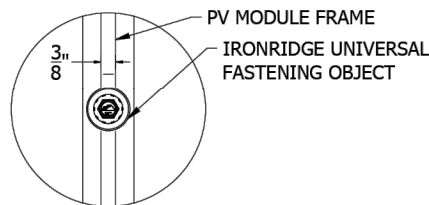
A PLAN VIEW, FLASHFOOT2 MOUNT, PORTRAIT MODULE
Scale: 1"=1'-0"



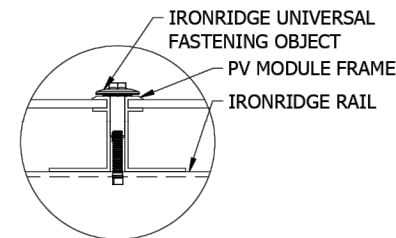
C FRONT VIEW, FLASHFOOT2 MOUNT, PORTRAIT MODULE
Scale: 1"=1'-0"



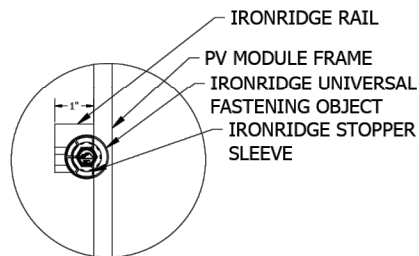
B SIDE VIEW, FLASHFOOT2 MOUNT, PORTRAIT MODULE
Scale: 1"=1'-0"



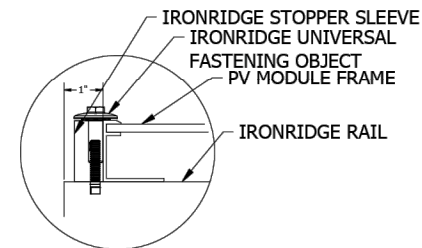
D DETAIL, MID CLAMP PLAN
Scale: 6"=1'-0"



E DETAIL, MID CLAMP FRONT
Scale: 6"=1'-0"



F DETAIL, END CLAMP (UFO) PLAN
Scale: 6"=1'-0"



G DETAIL, END CLAMP (UFO) FRONT
Scale: 6"=1'-0"



1485 ZEPHYR AVE. HAYWARD, CA 94544
800.227.9823 IRONRIDGE.COM

IRONRIDGE

CLIENT NAME

PROJECT NAME

PROJECT ADDRESS

SYSTEM KW DC

WIND SPEED, MPH

SNOW LOAD, PSF

EXPOSURE CAT

RISK CAT

MODULE TYPE

MODULE WDC

MODULE QTY

NOT FOR CONSTRUCTION

REVISION HISTORY

SHEET NAME
SLOPED ROOF
PV SYSTEM
DETAILS:
FLASHFOOT2
(UFO)

JOB NO. 3.1 SR
ISSUE DATE DEC 2018
SHEET NO. IR 7.0
SHEET SIZE 24X36

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

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NEW GRID-TIED SYSTEM 2.70kW

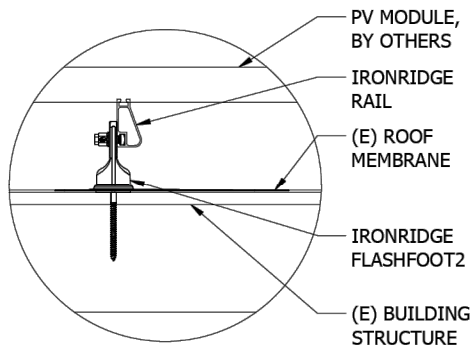
SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

MOUNTING DETAIL

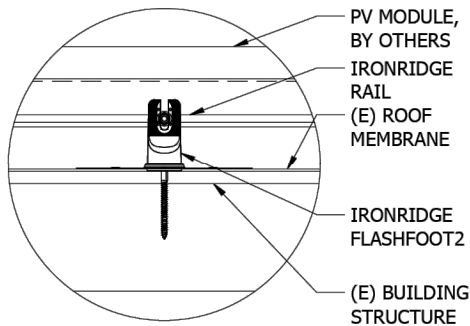
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DRAWN BY: GSD

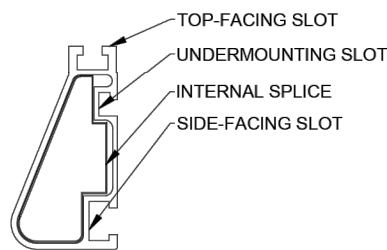
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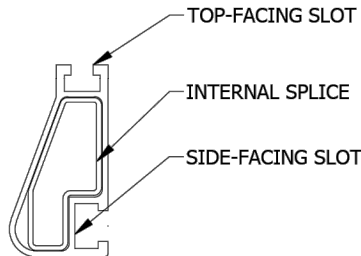
H FLASHFOOT2 DETAIL
Scale: 3"=1'-0"



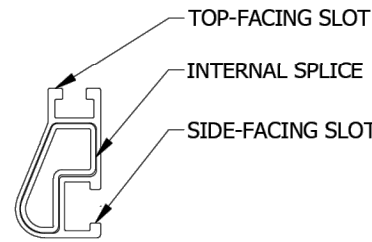
J FLASHFOOT2 DETAIL
Scale: 3"=1'-0"



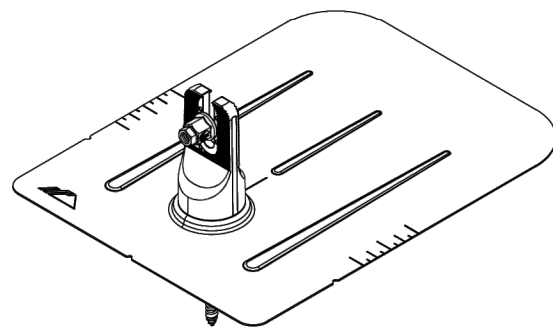
M DETAIL, SPLICE, XR1000
1'-0"=1'-0"



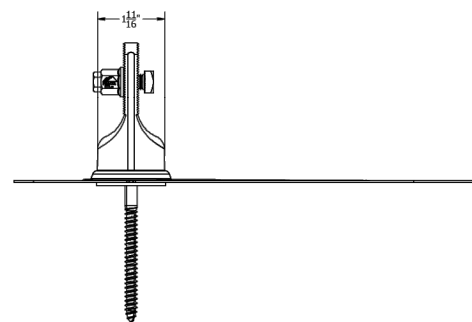
N DETAIL, SPLICE, XR100
1'-0"=1'-0"



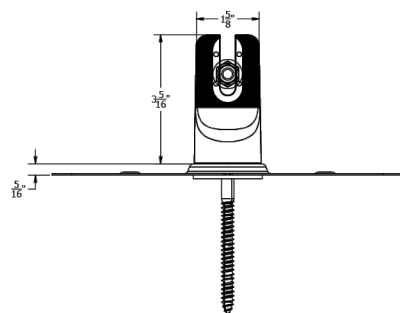
O DETAIL, SPLICE, XR10
1'-0"=1'-0"



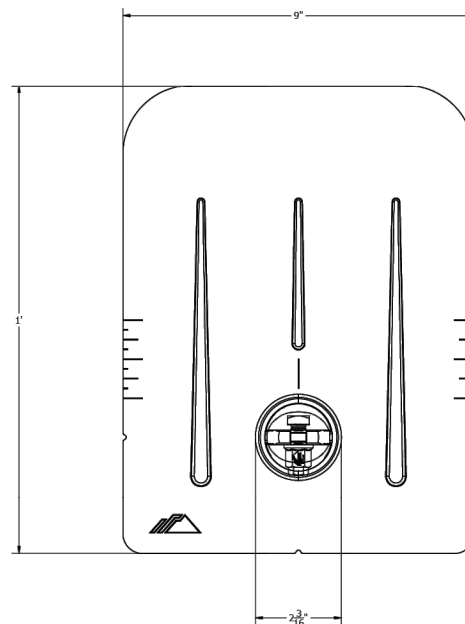
Q IRONRIDGE FLASHFOOT2



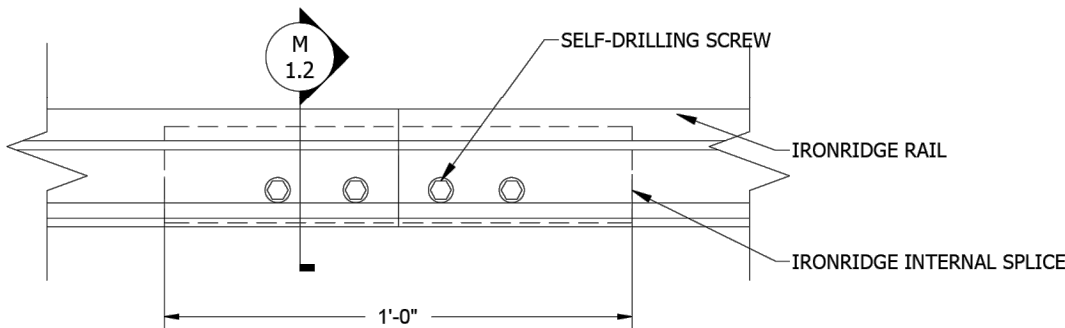
P IRONRIDGE FLASHFOOT2, SIDE VIEW



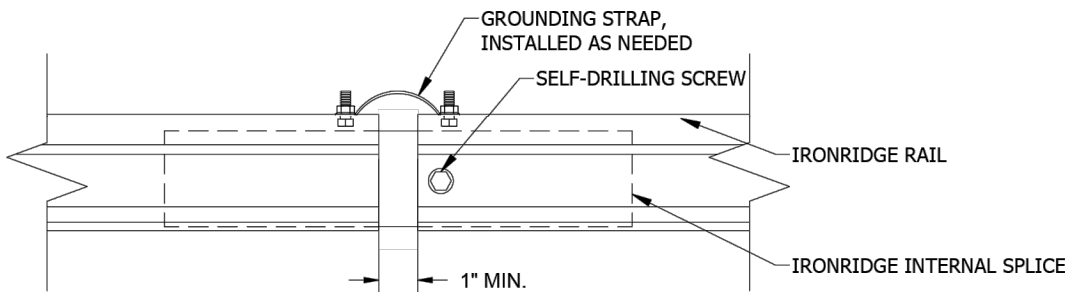
R IRONRIDGE FLASHFOOT2, FRONT VIEW



S IRONRIDGE FLASHFOOT2, PLAN VIEW



K DETAIL, SPLICE CONNECTION, XR1000
6"=1'-0"



L DETAIL, EXPANSION JOINT CONNECTION, XR1000
6"=1'-0"

IRONRIDGE

1485 ZEPHYR AVE. HAYWARD, CA 94544
800.227.9523 IRONRIDGE.COM

IRONRIDGE

CLIENT NAME

WIND SPEED, MPH

APPROVAL STATUS

REVISION HISTORY

SHEET NAME

SLOPED ROOF
PV SYSTEM
DETAILS:
FLASHFOOT2

JOB NO.

ISSUE DATE

SHEET NO.

SHEET SIZE

SLOPED ROOF MOUNT SYSTEM

PROJECT NAME

RISK CAT

72-CELL, GENERIC

3.1 SR

DEC 2018

IR 7.4

24X36

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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IN THIS DRAWING SET IS CONFIDENTIAL AND
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DESIGN AND INSTALLATION OF THE PV SYSTEM
REPRESENTED IN THIS PLAN.

NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

MOUNTING DETAIL

PROJECT NO: GSD-SAMPLE

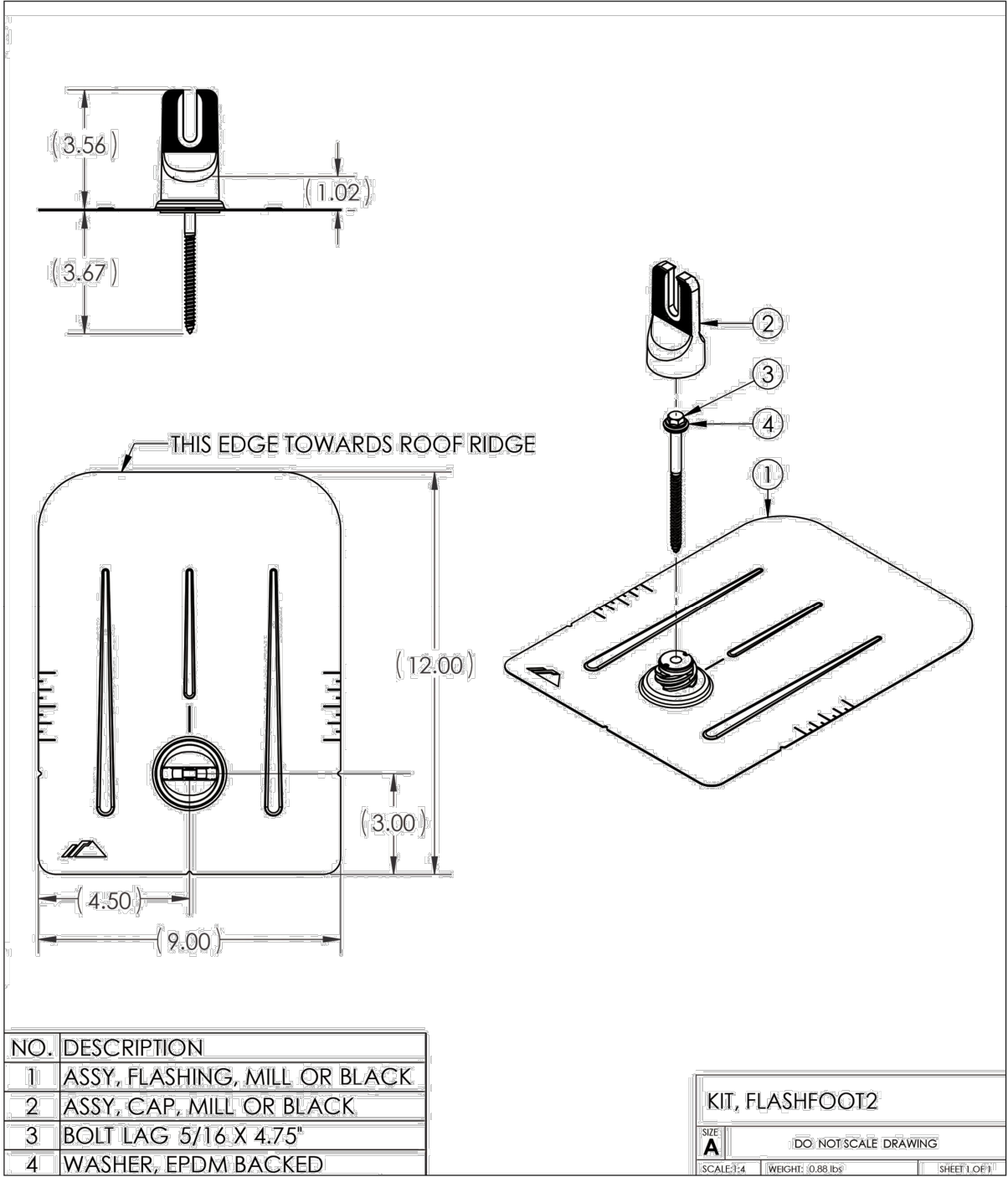
DRAWN BY: GSD

DATE: SAMPLE

PV-6B

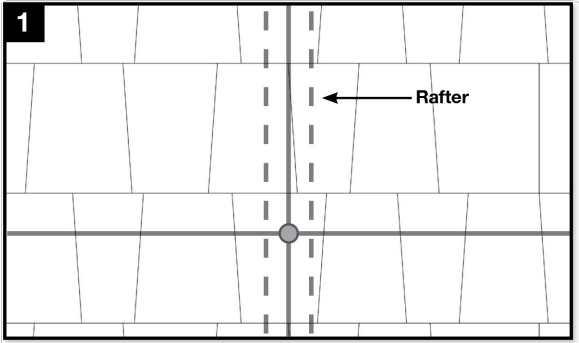
1
PV-6B

IRON RIDGE FLASHFOOT2 MOUNTING DETAILS
SCALE: NTS

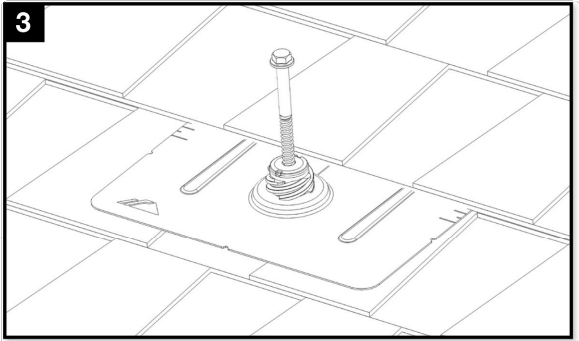


Installation

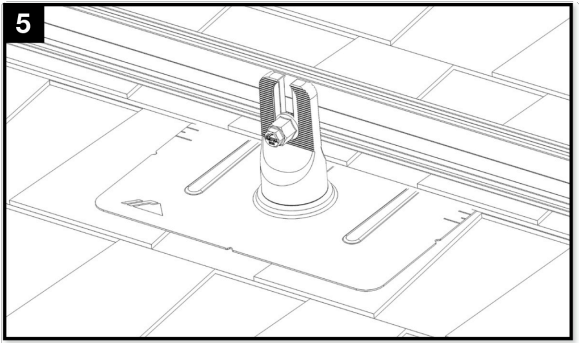
Tools Required: tape measure, chalk line, stud finder, roofing bar, caulking gun, driver with 1/4" bit and 7/16" hex socket.



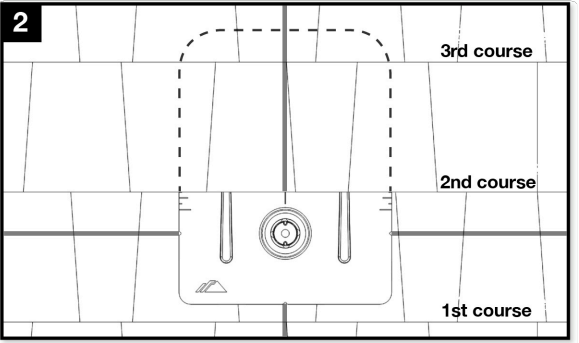
Locate rafters and snap vertical and horizontal lines to mark flashing locations. Drill 1/4" pilot holes, then fill with roofing manufacturer's approved sealant.



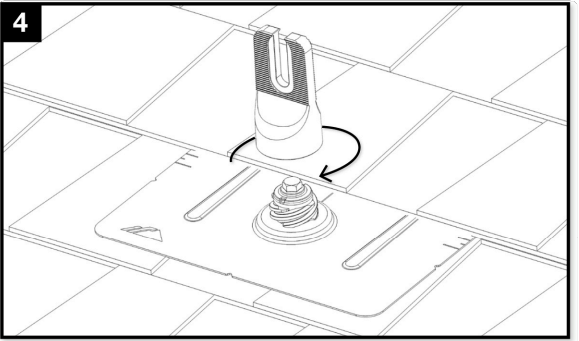
Line up pilot hole with flashing hole and insert lag bolt with bonded washer through flashing. Tighten lag bolt until fully seated.



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).



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.



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. Tested and evaluated without sealant. Any roofing manufacturer approved sealant is allowed.

UL 2703

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

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

INSTALLATION

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-6C



Flush Mount System



Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 20-year warranty.

Strength Tested

All components evaluated for superior structural performance.

Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof.

UL 2703 Listed System

Entire system and components meet newest effective UL 2703 standard.

PE Certified

Pre-stamped engineering letters available in most states.

Design Assistant

Online software makes it simple to create, share, and price projects.

25-Year Warranty

Products guaranteed to be free of impairing defects.

Datasheet

XR Rails ☺

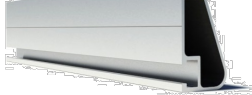
XR10 Rail



A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear and black finish

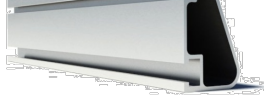
XR100 Rail



The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail



A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

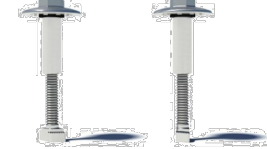


All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding ☺

UFOs



Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves



Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- Sized to match modules
- Clear and black finish

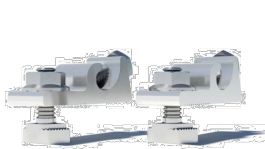
CAMO



Bond modules to rails while staying completely hidden.

- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs



Connect arrays to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Attachments ☺

FlashFoot2



Flash and mount XR Rails with superior waterproofing.

- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount



Flash and mount conduit, strut, or junction boxes.

- Twist-on Cap eases install
- Wind-driven rain tested
- Secures 3/4" or 1" conduit

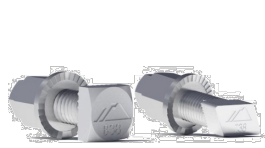
Slotted L-Feet



Drop-in design for rapid rail attachment.

- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware



Bond and attach XR Rails to roof attachments.

- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources



Design Assistant

Go from rough layout to fully engineered system. For free.

[Go to IronRidge.com/design](https://www.ironridge.com/design)



NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

[Go to IronRidge.com/training](https://www.ironridge.com/training)

© 2018 IronRidge, Inc. All rights reserved. U.S. Patents: #8,695,290; #9,819,303; #9,865,938; Others Pending. Version 1.60

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

RACKING DATASHEET

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-7



HiKu

SUPER HIGH POWER MONO PERC MODULE

425 W ~ 450 W

CS3W-425 | 430 | 435 | 440 | 445 | 450MS (IEC1000 V)

CS3W-425 | 430 | 435 | 440 | 445 | 450MS (IEC1500 V)

MORE POWER

- 26 % more power than conventional modules
- Up to 4.5 % lower LCOE
Up to 2.7 % lower system cost
- Low NMOT: 42 ± 3 °C
Low temperature coefficient (Pmax): -0.35 % / °C
- Better shading tolerance

MORE RELIABLE

- Lower internal current, lower hot spot temperature
- Cell crack risk limited in small region, enhance the module reliability
- Heavy snow load up to 5400 Pa, wind load up to 3600 Pa*

25 years linear power output warranty*

12 years enhanced product warranty on materials and workmanship*

*According to the applicable Canadian Solar Limited Warranty Statement.

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
UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / IEC 60068-2-68: SGS
Take-e-way



* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

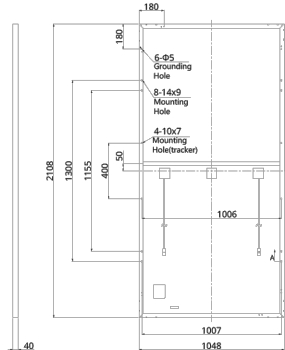
CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance/price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 38 GW deployed around the world since 2001.

* For detail information, please refer to Installation Manual.

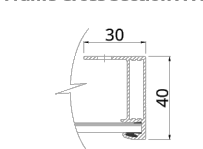
CANADIAN SOLAR INC.
Canadian Solar MSS (Australia) Pty Ltd., 44 Stephenson St, Cremorne VIC 3121, Australia
support@canadiansolar.com, www.canadiansolar.com/au

ENGINEERING DRAWING (mm)

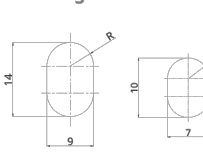
Rear View



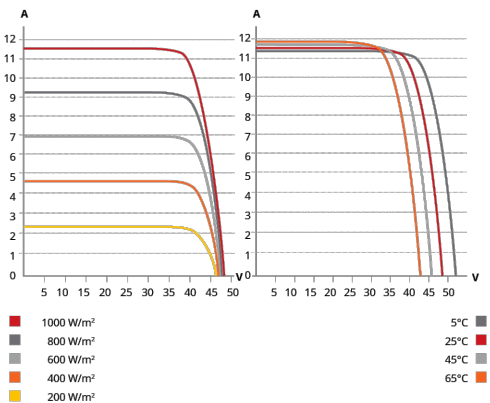
Frame Cross Section A-A



Mounting Hole



CS3W-435MS / I-V CURVES



ELECTRICAL DATA | STC*

CS3W	425MS	430MS	435MS	440MS	445MS	450MS
Nominal Max. Power (Pmax)	425 W	430 W	435 W	440 W	445 W	450 W
Opt. Operating Voltage (Vmp)	39.5 V	39.7 V	39.9 V	40.1 V	40.3 V	40.5 V
Opt. Operating Current (Imp)	10.76 A	10.84 A	10.91 A	10.98 A	11.05 A	11.12 A
Open Circuit Voltage (Voc)	47.7 V	47.9 V	48.1 V	48.3 V	48.5 V	48.7 V
Short Circuit Current (Isc)	11.37 A	11.42 A	11.47 A	11.53 A	11.59 A	11.65 A
Module Efficiency	19.24%	19.46%	19.69%	19.92%	20.14%	20.37%
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	20 A					
Application Classification	Class A					
Power Tolerance	0 ~ + 5 W					

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C. Measurement uncertainty: ±3 % (Pmax).

MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	144 [2 X (12 X 6)]
Dimensions	2108 X 1048 X 40 mm (83.0 X 41.3 X 1.57 in)
Weight	24.9 kg (54.9 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy, crossbar enhanced
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 500 mm (19.7 in) (+) / 350 mm (13.8 in) (-); landscape: 1400 mm (55.1 in); leap-frog connection: 1670 mm (65.7 in)*
Connector	T4-PC-1 (IEC 1000 V) or PV-KST4/xy-UR, PV-KBT4/xy-UR (IEC 1000 V) or T4-PPE-1 (IEC 1500 V) or PV-KST4-EVO2/XY, PV-KBT4-EVO2/XY (IEC 1500 V) or UTXCFA4AM, UTXCMA4AM (IEC 1500 V)
Per Pallet	27 pieces
Per Container (40' HQ)	594 pieces

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

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.35 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION



* 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 adjustment 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.

CANADIAN SOLAR INC.
Canadian Solar MSS (Australia) Pty Ltd., 44 Stephenson St, Cremorne VIC 3121, Australia
support@canadiansolar.com, www.canadiansolar.com/au

February 2020 All rights reserved, PV Module Product Datasheet V5.587_AU

* Manufactured and assembled in China and Thailand.

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

MODULE DATASHEET

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-8

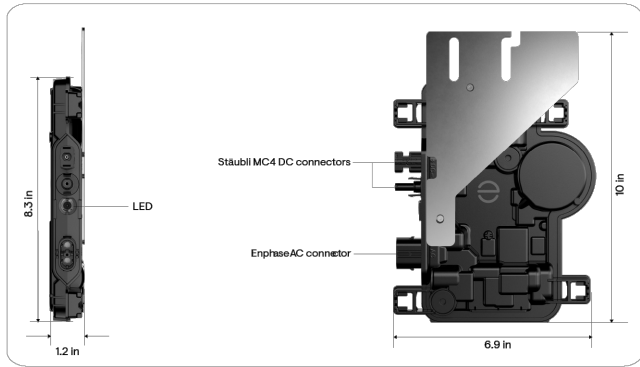


IQ8AC Microinverter

Our newest IQ8 Series Microinverters^{1,2,3} are the industry’s first microgrid-forming⁴, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently.



Key specifications	IQ8AC-72-M-US @240 VAC	IQ8AC-72-M-US @208 VAC
Peak output power	366 VA	350 VA
Nominal grid voltage (L-L)	240 V split-phase (L-L), 180°	208 V single-phase (L-L), 120°
Nominal frequency	60 Hz	60 Hz
CEC weighted efficiency	97.0%	96.5%
Maximum input DC voltage	60 V	60 V
MPPT voltage range	28–45 V	28–45 V
Maximum module I _{sc}	20 A	20 A
Ambient temperature range	–40°C to 65°C (–40°F to 149°F)	



¹ IQ8 Series Microinverters can be added to existing IQ7 systems on the same IQ Gateway only in the following grid-tied configurations: Solar Only or Solar + Battery (IQ Battery 3T/10T and IQ Battery 5P) without backup.
² IQ7 Series Microinverters cannot be added to a site with existing IQ8 Series Microinverters on the same gateway. Mixed system of IQ7 and IQ8 will not support IQ8-specific PCS features and grid-forming capabilities.
³ IQ Microinverters ship with default settings that meet North America’s IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative, according to the IEEE 1547 interconnection standard. Use an IQ Gateway to make these changes during installation.
⁴ Meets UL 1741 only when installed with IQ System Controller 2 or 3.

- Simple

 - Lightweight and compact with plug-and-play connectors
 - Power line communication (PLC) between components
 - Faster installation with simple two-wire cabling
- Reliable

 - Produces power even when the grid is down⁴
 - More than one million cumulative hours of testing
 - Industry-leading limited warranty of up to 25 years
 - Class II double-insulated enclosure
 - Optimized for the latest high-powered PV modules
- Microgrid-forming

 - Complies with the latest advanced grid support
 - Remote automatic updates for the latest grid requirements
 - Configurable to support a wide range of grid profiles
 - Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Input data (DC)	Units	IQ8AC-72-M-US	
Commonly used module pairings ⁵	W	295–500	
Module compatibility	–	To meet compatibility, PV modules must be within the following maximum input DC voltage and maximum module I _{sc} . Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator .	
MPPT voltage range	V	28–45	
Operating range	V	18–58	
Minimum/Maximum start voltage	V	22/58	
Maximum input DC voltage	V	60	
Maximum continuous input DC current	A	14	
Maximum input DC short-circuit current	A	25	
Maximum module I _{sc}	A	20	
Overvoltage class DC port	–	II	
DC port backfeed current	mA	0	
PV array configuration	–	Ungrounded array; no additional DC side protection required; AC side protection requires a maximum of 20 A per branch circuit	
Output data (AC)	Units	IQ8AC-72-M-US @240 VAC	IQ8AC-72-M-US @208 VAC
Peak output power	VA	366	350
Maximum continuous output power	VA	349	345
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	208, single-phase (L-L), 120°
Minimum and maximum grid voltage ⁶	V	211–264	183–229
Maximum continuous output current	A	1.45	1.66
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short-circuit fault current over three cycles	A _{rms}	2.70	
Maximum units per 20 A (L-L) branch circuit ⁷	–	11	9
Total harmonic distortion	%	<5	
Overvoltage class AC port	–	III	
AC port backfeed current	mA	18	
Power factor setting	–	1.0	
Grid-tied power factor (adjustable)	–	0.85 leading ... 0.85 lagging	
Peak efficiency	%	97.3	97.2
CEC weighted efficiency	%	97.0	96.5
Nighttime power consumption	mW	30	22
Mechanical data		IQ8AC-72-M-US	
Ambient temperature range		–40°C to 65°C (–40°F to 149°F)	
Relative humidity range		4% to 100% (condensing)	
DC connector type		Stäubli MC4	

⁵ No enforced DC/AC ratio.
⁶ Nominal voltage range can be extended beyond nominal if required by the utility.
⁷ Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

INVERTER DATASHEET

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-9



8431 Murphy Drive
Middleton, WI 53562 USA

Telephone: 608.836.4400
Facsimile: 608.831.9279
www.intertek.com

Test Verification of Conformity

In the basis of the tests undertaken, the sample(s) of the below product have been found to comply with the requirements of the referenced specifications at the time the tests were carried out.

Applicant Name & Address:

IronRidge, Inc.
1495 Zephyr Ave.
Hayward, CA 94544
USA

Product Description:

Flush Mount System with XR Rails.

Ratings & Principle Characteristics:

Fire Class Resistance Rating:
-Flush Mount (Symmetrical). Class A Fire Rated for Low Slope applications when using Type 1, 2 and 3, listed photovoltaic modules. Class A Fire Rated for Steep Slope applications with Type1, 2 and 3, listed photovoltaic modules. Tested with a 5” gap (distance between the bottom the module frame and the roof covering), per the standard this system can be installed at any gap allowed by the manufacturers installation instructions. No perimeter guarding is required. This rating is applicable with any IronRidge or 3’rd party roof anchor.

Models:

IronRidge Flush Mount with XR Rails

Brand Name:

IronRidge Flush Mount

Relevant Standards:

UL 2703 (Section 15.2 and 15.3) Standard for Safety Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels, First Edition dated Jan. 28, 2015 Referencing UL1703 Third Edition dated Nov. 18, 2014, (Section 31.2) Standard for Safety for Flat-Plate Photovoltaic Modules and Panels.

Verification Issuing Office:

Intertek Testing Services NA, Inc.
8431 Murphy Drive
Middleton, WI 53562

Date of Tests:

08/27/2014 to 03/17/2015

Test Report Number(s):

101769343MID-001r1, 101769343MID-001a, 101915978MID-001 & 101999492MID-001ar1-cr1.

This verification is part of the full test report(s) and should be read in conjunction with them. This report does not automatically imply product certification.

Completed by:

Chris Zimbrich

Reviewed by:

Chad Naggs

Title:

Technician II, Fire Resistance

Title:

Technician I, Fire Resistance

Signature:

Signature:

Date:

05/25/2016

Date:

05/25/2016

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GFT-OP-11a (24-MAR-2014)



Tech Brief

Class A Fire Rating

Background

All roofing products are tested and classified for their ability to resist fire.

Recently, these fire resistance standards were expanded to include solar equipment as part of the roof system. Specifically, this requires the modules, mounting hardware and roof covering to be tested together as a system to ensure they achieve the same fire rating as the original roof covering.

These new requirements are being adopted throughout the country in 2016.

IronRidge Certification

IronRidge was the first company to receive a Class A Fire Rating—the highest possible rating—from Intertek Group plc., a Nationally Recognized Testing Laboratory.

IronRidge Flush Mount and Tilt Mount Systems were tested on sloped and flat roofs in accordance with the new UL 1703 & UL 2703 test standards. The testing evaluated the system's ability to resist flame spread, burning material and structural damage to the roof.

Refer to the table below to determine the requirements for achieving a Class A Fire Rating on your next project.

System	Roof Slope	Module	Fire Rating*
Flush Mount 	Any Slope	Type 1, 2, & 3	Class A
Tilt Mount 	≤ 6 Degrees	Type 1, 2, & 3	Class A

*Class A rated PV systems can be installed on Class A, B, and C roofs.

Fire Testing Process

Test Setup

Solar Modules

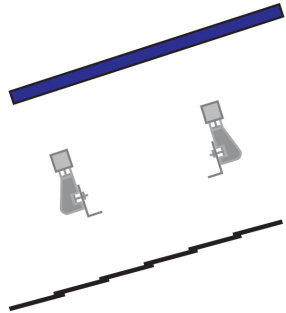
Solar modules are given a Type classification based on their materials and construction.

Mounting System

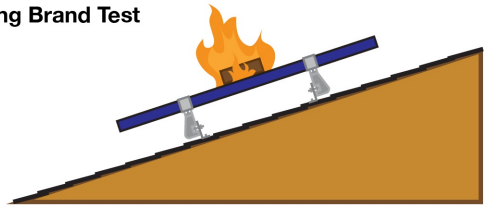
Mounting is tested as part of a system that includes type-tested modules and fire-rated roof covering.

Roof Covering

Roof covering products are given a Fire Class Rating of A, B or C based on their tested fire resistance.

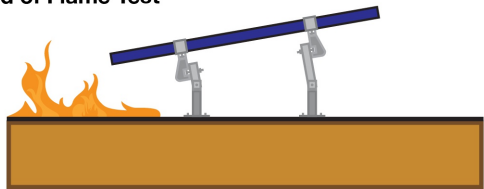


Burning Brand Test



A burning wooden block is placed on module as a fan blows at 12 mph. Flame cannot be seen on underside of roof within 90 minutes.

Spread of Flame Test



Flame at southern edge of roof is aimed up the roof as a fan blows at 12 mph. The flame cannot spread 6 feet or more in 10 minutes.

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DRAWING SET IS CONFIDENTIAL AND SHALL NOT BE DISCLOSED IN FULL OR IN PART TO ANYONE EXCEPT THOSE INVOLVED IN THE DESIGN AND INSTALLATION OF THE PV SYSTEM REPRESENTED IN THIS PLAN.

NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

CLASS A FIRE RATING

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-10



Attn: Sean McDonald, CEO, IronRidge Inc.
Date: November 16th, 2022

Re: Structural Certification and Span Tables for the IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge’s Flush Mount System. The contents of the letter shall be read in its entirety before applying to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8” stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-16 Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)
- 2021 International Building Code (IBC-2021)
- 2022 California Building Code (CBC-2022)
- 2020 Aluminum Design Manual (ADM-2020)
- Report SEAOC (Structural Engineer Association of California) PV2-2017 Wind Design for Solar Arrays

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones provided in ASCE 7-16 for gable & hip roof profiles, and roof slopes of 8° to 45°. The tabulated spans are applicable when the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener).
2. Each module shall be supported by 2 rails (2 rail system) or 3 rails (3 rail system). Spans are calculated based on 2 rail systems, and conservatively deemed acceptable for 3 rail systems.
3. The underlying roof slope, measured between the roof surface and horizontal plane, is 8° to 45°.
4. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.
5. A clearance from the underside of the array to the roof surface of 2” minimum shall be provided and the height of the array, the distance from the module top surface to the roof surface (defined as h_2), shall not exceed 10”.
6. Module length and area shall not exceed the maximum values listed on the respective span tables.
7. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge’s *Flush Mount Installation Manual* and other applicable standards for the general roof construction practice.

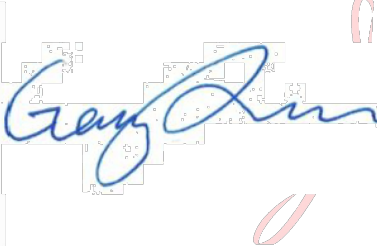


The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration. This letter certifies the IronRidge products referenced within this document and provides no determination of the project specific conditions including site loads, building profile, & roof zones, which remain the responsibility of the installer or system designer.

Sincerely,



Gang Xuan, SE
Senior Structural Engineer



Digitally signed
by Gang Xuan
Date: 2022.11.18
10:55:51 -08'00'



STATE OF CALIF. ENGINEERING LETTER (IRON RIDGE XR-10 RAILS)
SCALE: NTS

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

ENGINEERING LETTER

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-11



UFO Family of Components

Tech Brief

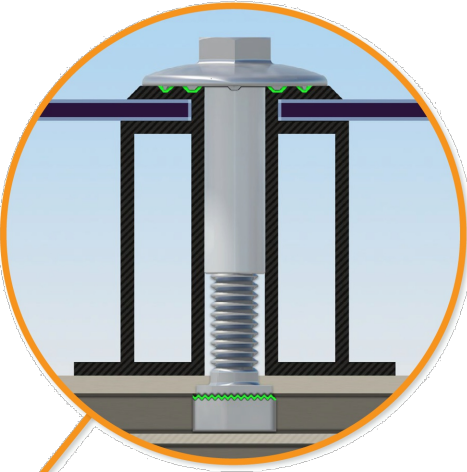
Simplified Grounding for Every Application

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.



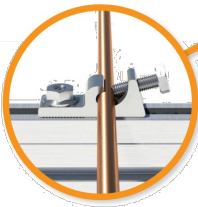
Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



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.



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

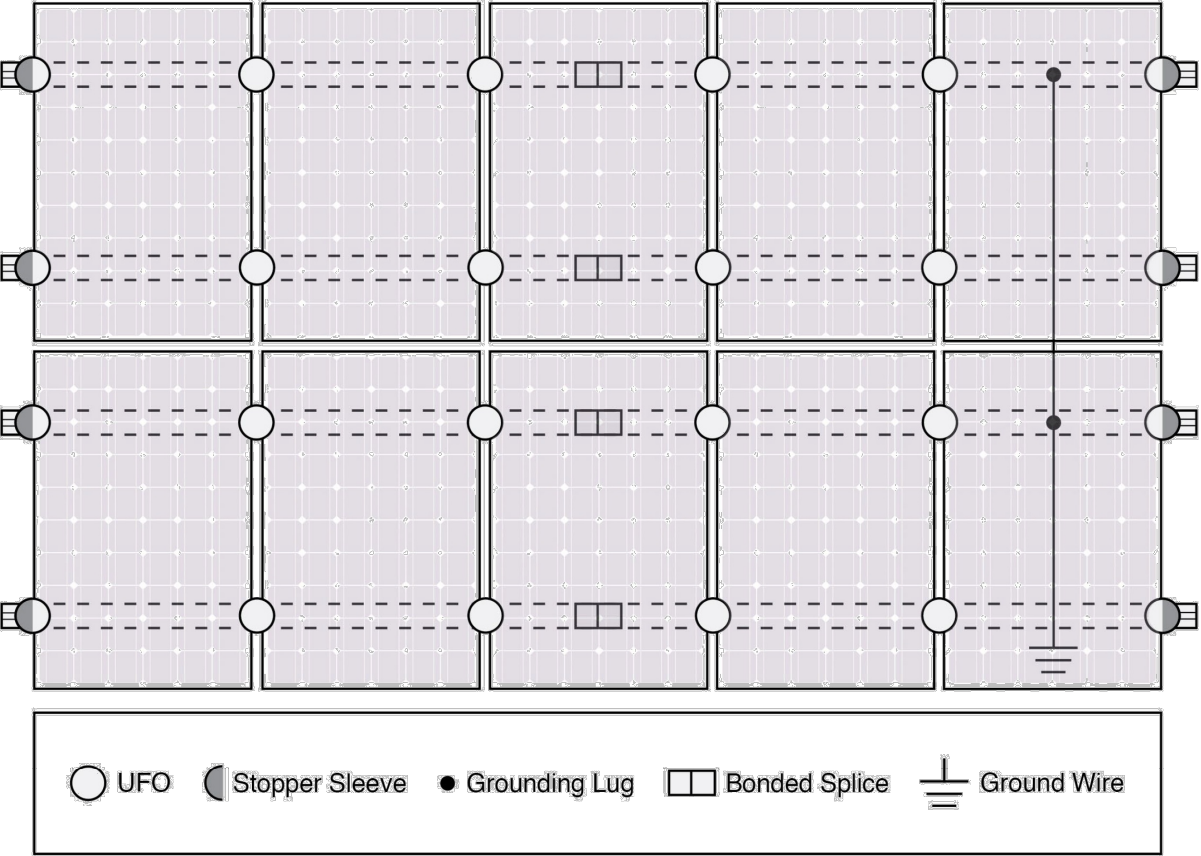


Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



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

System Diagram



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

UL Certification

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

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

Go to [IronRidge.com/UFO](https://www.ironridge.com/UFO)

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

Tech Brief

GEMINI SOLAR DESIGN

SAMPLE PROJECT

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

GROUNDING DETAILS

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-12

Rapid shutdown is built-in

The 2014 and 2017 editions of the National Electrical Code (NEC 2014/NEC 2017) added new rapid shutdown requirements for PV systems installed on buildings. Enphase Microinverters fully meet rapid shutdown requirements in the new code without the need to install any additional electrical equipment.

What's new in Section 690.12?
NEC 2014/2017, Section 690.12 applies to PV conductors over 10 feet from the PV array and requires that the conductors power down to 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

String inverters require work arounds for rapid shutdown

Work around.

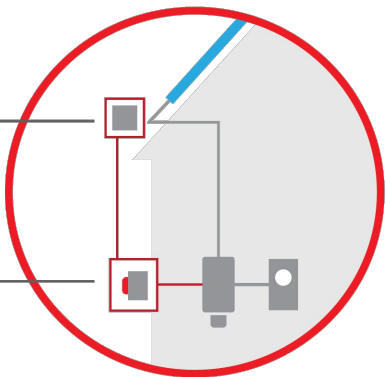
Specialized Rapid Shutdown electrical box installed on the roof within 10 feet of array.

Work around.

Shutoff switch that is easily accessible to first responders on the ground.

Work around.

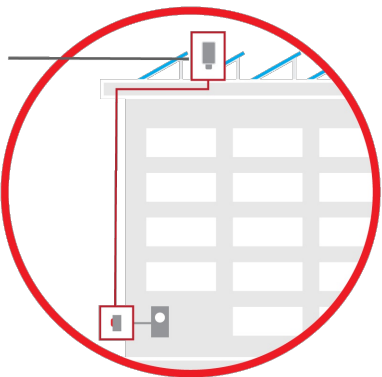
Extra conduit in installation.



Residential String Inverter

Work around.

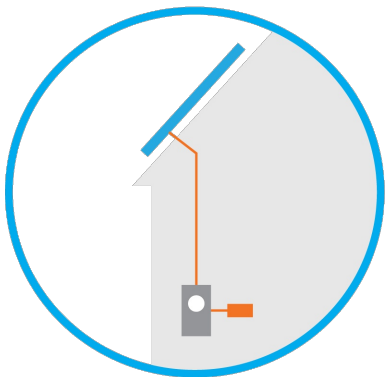
String inverter installed on roof, a hostile environment that string inverters are not built to live in.



Commercial String Inverter

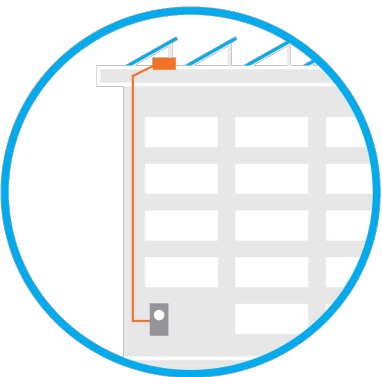
Enphase comes standard with rapid shutdown capability

All Enphase microinverters, even those that were previously installed, inherently meet rapid shutdown requirements, no additional equipment or workarounds needed



Residential Microinverter

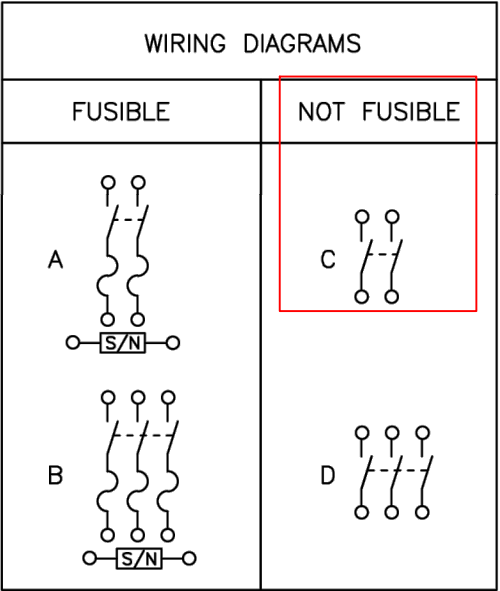
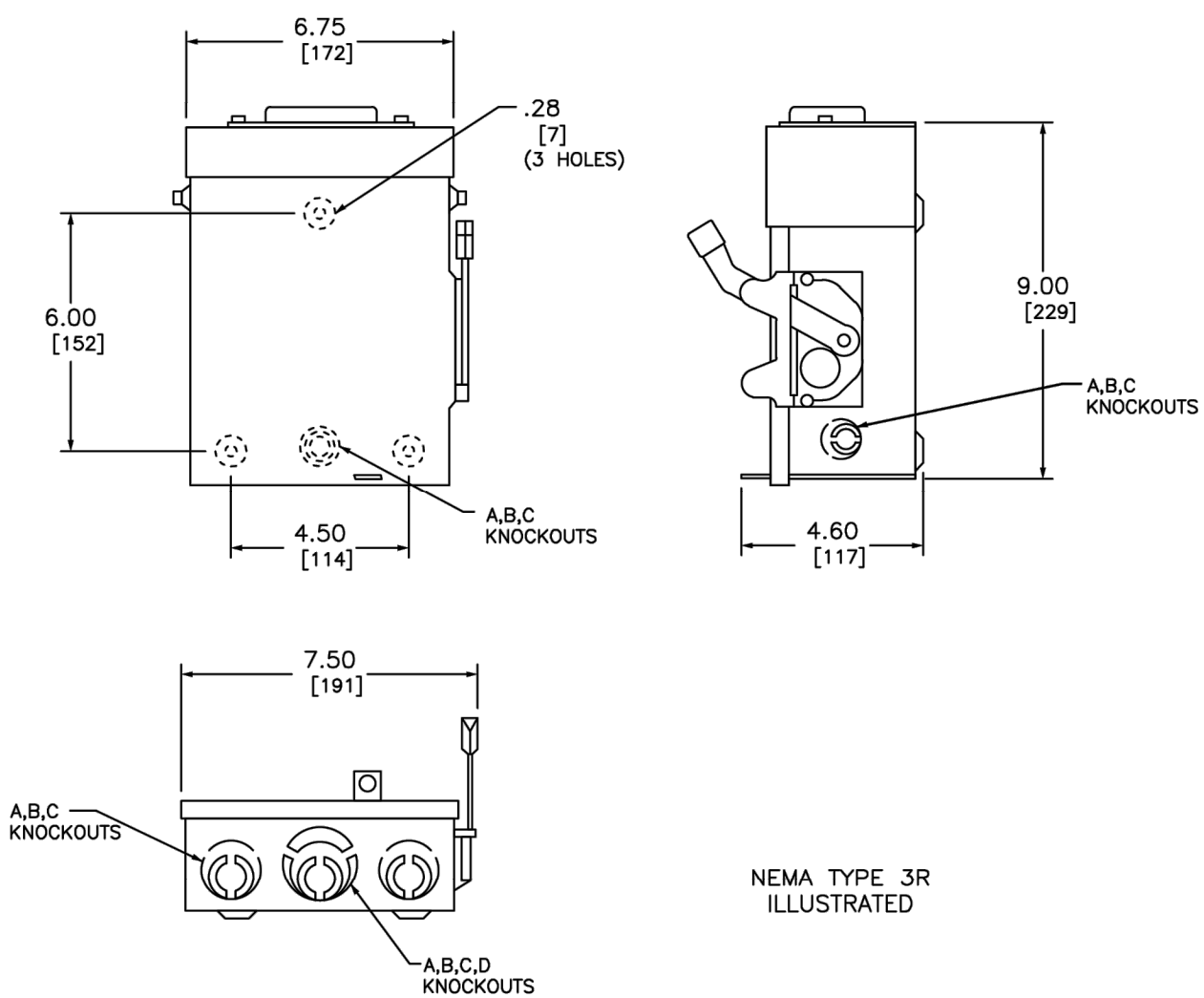
Enphase microinverters can safely shut down automatically, leaving only low-voltage DC electricity isolated to the PV module



Commercial Microinverter

To learn more, visit enphase.com





TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
30	# 6 AWG	# 12 AWG	AL
	# 6 AWG	# 14 AWG	CU

KNOCKOUTS				
SYMBOL	A	B	C	D
CONDUIT SIZE	.50	.75	1	1.25

DUAL DIMENSIONS: INCHES
MILLIMETERS

CATALOG NUMBER	VOTAGE RATINGS	WIRING DIAG.	HORSEPOWER RATINGS					
			120VAC		240VAC			
			STD.	MAX.	STD.		MAX.	
			1 Ø	1 Ø	1 Ø	3 Ø	1 Ø	3 Ø
D211NRB●■	240VAC	A	1/2	2	1 1/2	—	3	—
D221NRB	240VAC	A	—	—	1 1/2	3*	3	7 1/2*
D321NRB	240VAC	B	—	—	1 1/2	3	3	7 1/2
DU221RB	240VAC	C	—	—	—	—	3	—
DU321RB	240VAC	D	—	—	—	—	3	7 1/2

NOTES:
FINISH — GRAY BAKED ENAMEL ELECTRODEPOSITED OVER CLEANED PHOSPHATIZED STEEL.
UL LISTED — FILE E-2875
ALL NEUTRALS — INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
TOP OF NEMA TYPE 3R SWITCHES HAVE PROVISIONS FOR MAXIMUM 2 1/2" BOLT-ON HUB.
SHORT CIRCUIT CURRENT RATINGS:
● 10,000 AMPERES.
■ 10,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS H OR K FUSES.
■ 100,000 AMPERES WITH CLASS R FUSES.
* FOR CORNER GROUNDED DELTA SYSTEMS.
■ PLUG FUSES
‡ LUGS SUITABLE FOR 60°C OR 75° CONDUCTORS.

GENERAL DUTY SAFETY SWITCHES
VISIBLE BLADE TYPE
30 AMPERE
ENCLOSURE — NEMA TYPE 3R RAINPROOF

SQUARE D
by **Schneider Electric**

DWG# 1852
NO.

REF DWG #1852

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

PROJECT INFO WITHHELD

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

AC DISCONNECT

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-14

1500 sq. ft. RESIDENCE @ 3.0 volt-amperes 45,000 volt-amperes

2-Small Appliance Circuits, 3000 volt-amperes

Laundry, 1200 volt-amperes

Total Connected Load 6000 volt-amperes

First 3 kva at 100 % Demand 3,000 volt-amperes

3000 kva at 35 % Demand 1050 volt-amperes

Adjusted Total Connected Load 4050 volt-amperes

Dishwasher 1200 volt-amperes

Dryer 5000 Volt-amperes

Range 12000 volt-amperes

HEAT PUMP 12000 volt-amperes

Garbage Disp. 300 volt-amperes

Fut EV Charging 7000 volt-amperes

TOTAL CONNECTED LOAD 29,550 volt-amperes

Service Rating (Connected Load 220V) ÷ 135 amps

USE 200 AMP 110/220V SGL PH SERVICE

TYPICAL APPLIANCE WATTAGE, VOLTAGE, WIRE SIZE AND BREAKER					
LOAD	TYPICAL WATTAGE	VOLTS	AWG WIRE SIZE (COPPER)	CIRCUIT BREAKER	COMMENTS
KITCHEN					
RANGE	12,000	120/240	4 NO. 8 WG	50A - 3P	SEPARATE CIRCUIT
BULT-IN OVEN	5,000	120/240	3 NO. 10 WG	30A - 2P	SEPARATE CIRCUIT
RANGE TOP	6,800	120/240	3 NO. 8 WG	40A - 2P	SEPARATE CIRCUIT
DISHWASHER	1,200	120	2 NO. 12 WG	30A - 1P	SEPARATE CIRCUIT
WASTE DISPOSAL	300	120	2 NO. 12 WG	20A - 1P	COMBINE WITH DISHWASHER
COFFEE MAKER	100	120	2 NO. 12 WG	20A - 1P	KITCHEN RECEP. CIRCUIT
EXHAUST FAN	300	120	2 NO. 12 WG	15A - 1P	COMBINE WITH BATH LIGHT CIRCUIT
KITCHEN RECEPTACLES	1,920	120	2 NO. 12 WG	20A - 1P	MIN. TWO CIRCUITS 120/240 3-WIRE
REFRIGERATOR	300	120	2 NO. 12 WG	20A - 1P	SEPARATE CIRCUIT
FREEZER	350	120	2 NO. 12 WG	20A - 1P	SEPARATE CIRCUIT
LAUNDRY					
WASHER	1,200	120	2 NO. 12 WG	20A - 1P	UTILITY RM.
DRYER	5,000	120/240	4 NO. 10	30A - 2P	SEPARATE CIRCUIT
BULT-IN IRON	1,000	120	2 NO. 12 WG	20A - 1P	UTILITY RM
HVAC	6,000	120	2 NO. 12 WG	20 A 1P	SEPARATE CIRCUIT
FUT EV CHARGER	7,000	120/240	4 NO. 6 WG	40 A 2P	SEPARATE CIRCUIT
HVAC					
AC, COMP	12,000	120/240	4 NO. 8	50A - 1P	SEPARATE CIRCUIT

GEMINI SOLAR DESIGN

SAMPLE PROJECT

CONTACT: ON FILE

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NEW GRID-TIED SYSTEM 2.70kW

SAMPLE RESIDENCE
PROJECT ADDRESS WITHHELD
UNITED STATES

NEC LOAD CALCS

PROJECT NO: GSD-SAMPLE

DRAWN BY: GSD

DATE: SAMPLE

PV-15