DIRECTORY OF PLAN PAGES

PROJECT DETAILS

PROPERTY OWNER	(INFO WITHHELD FOR PUBLIC SAMPLE)
PROPERTY ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
PARCEL ID	(INFO WITHHELD FOR PUBLIC SAMPLE)
AHJ	(INFO WITHHELD FOR PUBLIC SAMPLE)
ZONING	RESIDENTIAL
CONST. TYPE	ROOF-MOUNTED PHOTOVOLTAIC ARRAY
OBSERVED CODES	**2023 NATIONAL ELECTRICAL CODE (NEC)** **2021 WASHINGTON ADMINISTRATIVE CODE (WAC)** 2021 WASHINGTON STATE ENERGY CODE - RESIDENTIAL 2021 INTERNATIONAL CODES REVISED CODE OF WASHINGTON (RCW) WASHINGTON BUILDING CODE & STATE AMENDMENTS APPLICABLE CITY CODE WHEN PRESENT OSHA 29 CFR 1910.269 UNDERWRITERS LABORATORIES (UL) STANDARDS
STRUCT. METHOD	ASCE7-16

CONTRACTOR INFORMATION

CONTRACTOR	(INFO WITHHELD FOR PUBLIC SAMPLE)
LICENSE NO.	(INFO WITHHELD FOR PUBLIC SAMPLE)
ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
PHONE	(INFO WITHHELD FOR PUBLIC SAMPLE)
CONTRACTOR SIGNATURE	

PLAN DESIGNER INFORMATION

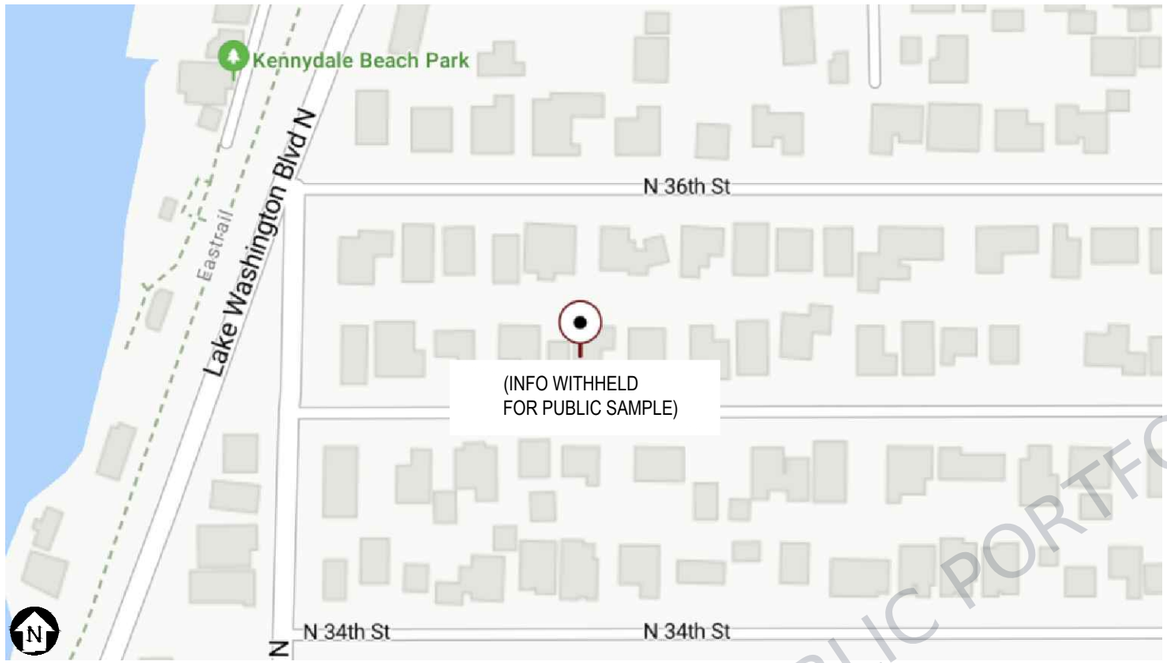
COMPANY	GEMINI SOLAR DESIGN, LLC.
NAME	SANJAY CHRISTOPHER MALLIPUDI
ADDRESS	495 HOWARD HEIGHTS ROAD FRESHWATER, CA 95503
PHONE	(609) 802-5743
PLAN DESIGNER SIGNATURE	Sanjay Mallipudi

SYSTEM DETAILS

DC RATING OF SYSTEM	20.240W
AC OUTPUT CURRENT	66.7A
MICROINVERTER	(46) ENPHASE IQ8A-72-2-US
MODULE	(46) SILFAB SOLAR SIL-440 QD
BRANCH CONFIGURATION	1 BRANCH OF 4 MICROINVERTERS 1 BRANCH OF 9 MICROINVERTERS 3 BRANCHES OF 11 MICROINVERTERS
INTERCONNECTION	LOAD-SIDE TAP

SITE SPECIFICATIONS

UTILITY SERVICE	120 / 240VAC, 1-Ø, 3-WIRE
(NEW UPGRADE)	***200A RATED BUSBAR***
METER / MAIN DISCONNECT	***200A / 2P MAIN BREAKER***
ASHRAE EXTREME ANNUAL MEAN MINIMUM DENSITY DRY BULB TEMP.	-7°C
ASHRAE 2% ANNUAL DRY DENSITY BULB TEMP.	29°C
DESIGN WIND SPEED	110 MPH
DESIGN SNOW LOAD	25 PSF
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II



1 PV-1 PLOT
SCALE: NTS

2 PV-1 LOCALE
SCALE: NTS

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 NEC 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 RESIDENTIAL ZONED PROPERTY IN THE CITY OF RENTON, KING COUNTY, WASHINGTON. 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 TAP POINT OF INTERCONNECTION.** THIS PROJECT DOES NOT INCLUDE STORAGE BATTERIES.

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

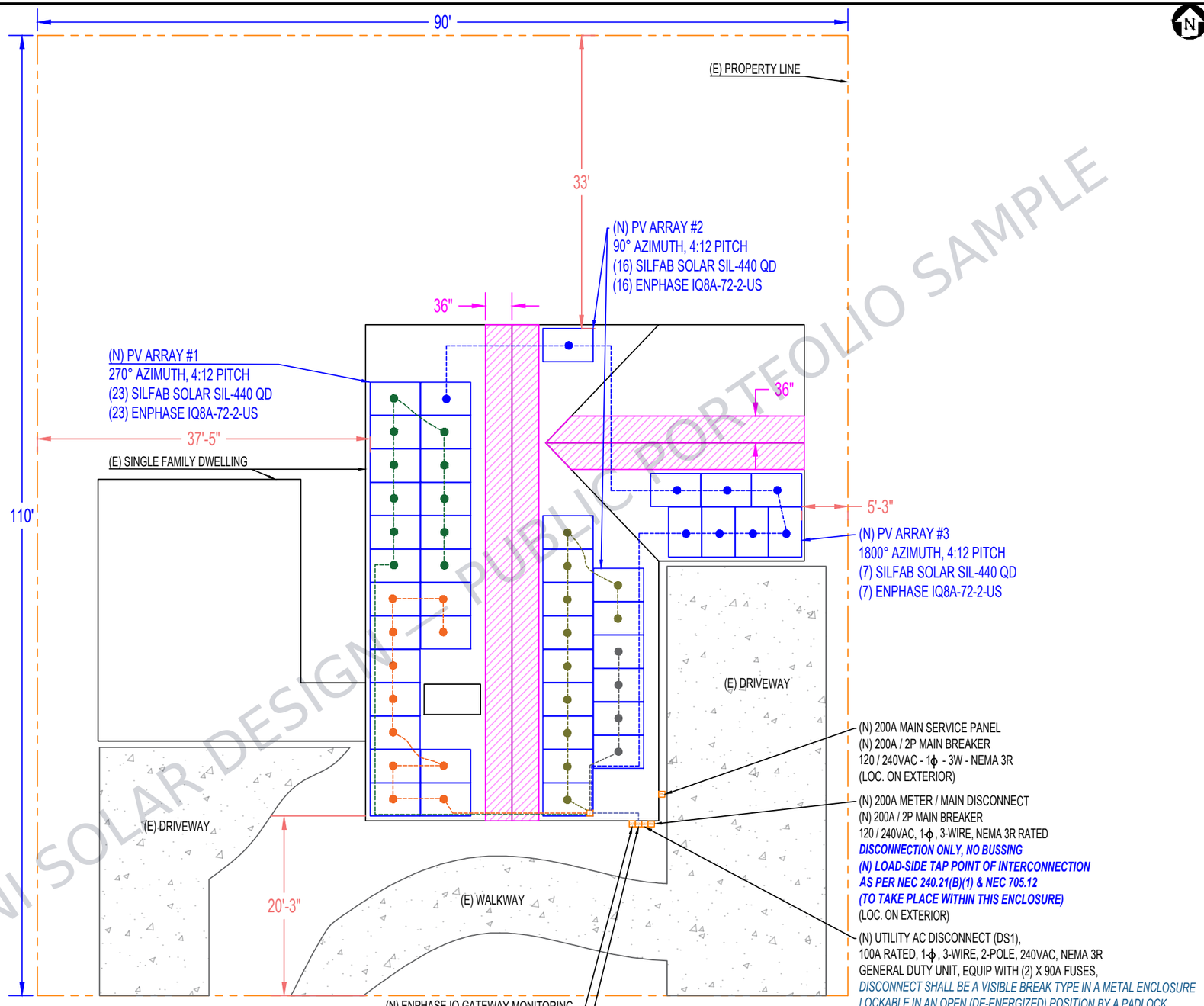
(INFO WITHHELD FOR PUBLIC SAMPLE)

PROJECT INFO

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-1

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



AREA OF ALL PV ARRAYS : 1,008 SQ. FT
AREA OF ROOF SURFACE : 2,648 SQ. FT
SOLAR PERCENT COVERAGE : ~38.1%

- 1 BRANCH OF 4 MICROINVERTERS (ENPHASE IQ8A-72-2-US)
- 1 BRANCH OF 9 MICROINVERTERS (ENPHASE IQ8A-72-2-US)
- 1 BRANCH OF 11 MICROINVERTERS (ENPHASE IQ8A-72-2-US)
- 1 BRANCH OF 11 MICROINVERTERS (ENPHASE IQ8A-72-2-US)
- 1 BRANCH OF 11 MICROINVERTERS (ENPHASE IQ8A-72-2-US)

A PV-2 SITE PLAN
SCALE: 1" = 13'

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

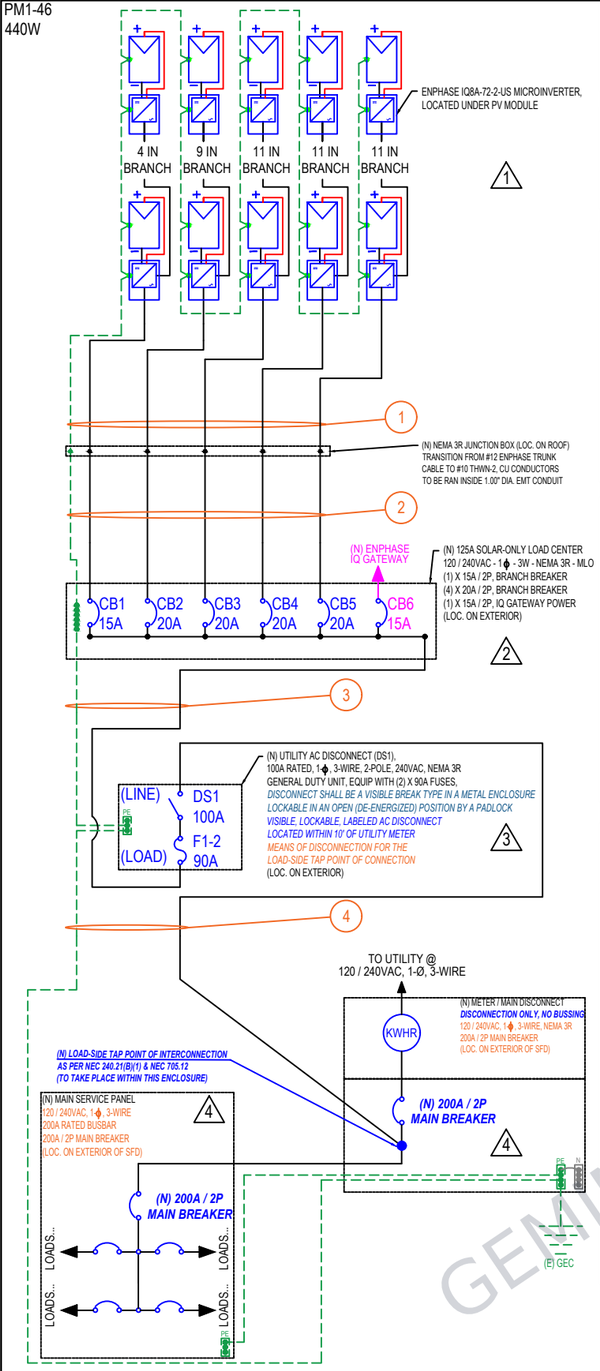
(INFO WITHHELD FOR PUBLIC SAMPLE)

SITE PLAN

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-2

PM1-46
440W



PV MODULE

REF.	TYP.	MODULE	STC POWER	ISC	IMP	VOC	VMP	SERIES FUSE RATING
PM1-46	46	SILFAB SOLAR SIL-440 QD	440W	14.22A	13.17A	38.97V	33.41V	25A

MICROINVERTER

REF.	TYP.	MICROINVERTER	GROUND	AC VOLTAGE	MAX OCPD SIZE	MAX OUTPUT POWER (CONTINUOUS)	MAX AC CURRENT	MAX. CONTINUOUS INPUT DC CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-46	46	ENPHASE IQ8A-72-2-US	INTEGRATED	240VAC	20A	349W	1.45A	12A	60VDC	97%

SYSTEM SUMMARY

	BRANCH #1	BRANCH #2	BRANCH #3	BRANCH #4	BRANCH #5
INVERTERS PER BRANCH	4	9	11	11	11
MAX AC CURRENT	5.8A	13.05A	15.95A	15.95A	15.95A
MAX AC OUTPUT POWER	1,396W	3,141W	3,839W	3,839W	3,839W
ARRAY STC POWER	20,240W				
TOTAL MAX AC CURRENT	66.7A				
TOTAL MAX AC POWER	16,054W				

OCPD SCHEDULE

REF.	TYP.	POLES	CURRENT RATING	MAX. VOLTAGE
CB1 (ENPHASE BRANCH CIRCUIT)	1	2	15A	240VAC
CB2 (ENPHASE BRANCH CIRCUIT)	1	2	20A	240VAC
CB3 (ENPHASE BRANCH CIRCUIT)	1	2	20A	240VAC
CB4 (ENPHASE BRANCH CIRCUIT)	1	2	20A	240VAC
CB5 (ENPHASE BRANCH CIRCUIT)	1	2	20A	240VAC
CB6 (ENPHASE IQ GATEWAY POWER)	1	2	15A	240VAC
F1-2 (UTILITY AC DISCONNECT FUSES)	2	N/A	90A	240VAC
MAIN BREAKER (200A METER / MAIN)	1	2	200A	240VAC
MAIN BREAKER (200A MSP)	1	2	200A	240VAC

SCHEMATIC NOTES

1. THE FIRST AC CONNECTOR IN EACH MICROINVERTER BRANCH CIRCUIT IS SUITABLE AS A DISCONNECTING MEANS.
2. OUTPUT OF THE (5) FIVE MICROINVERTER BRANCH CIRCUITS SHALL BE BACKFED INTO A 125A SOLAR-ONLY LOAD CENTER FOR COMBINATION PURPOSES. PLEASE SEE THE OCPD SCHEDULE FOR THE BREAKER SIZES FOR EACH BRANCH CIRCUIT, RESPECTIVELY.
3. THE UTILITY AC DISCONNECT SHALL BE A VISIBLE, LOCKABLE, KNIFE SWITCH DISCONNECT AS PER THE UTILITY.
4. LOAD-SIDE TAP POINT OF INTERCONNECTION SHALL TAKE PLACE AS PER NEC 240.21(B)(1) & NEC 705.12. LENGTH OF TAP CONDUCTORS SHALL NOT EXCEED 10 FEET.

UTILITY AC DISCONNECT SCHEDULE

REF.	OCPD TYPE	POLES	CURRENT RATING	MAX. VOLTAGE
UTILITY AC DISCONNECT (DS1) 2-POLE KNIFE TYPE, GENERAL DUTY	FUSIBLE	2	100A	240VAC

CONDUCTOR SCHEDULE WITH NEC 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	75°C TERMINAL RATING CHECK SHALL EXCEED 1.25X CONT. CURRENT	BASE AMPACITY @ 90°C TEMP. RATING	CONDITIONS OF USE (COU) @ 90°C TEMP. RATING
1	5	MICROINVERTER OUTPUT: MICROINVERTER TO JUNCTION BOX	12 AWG THWN-2 COPPER ***(ENPHASE IQ8A TRUNK CABLE)***	***FREE AIR*** ***(DIRECT HOMERUN TO J-BOX LOCATED UNDER PV MODULE)***	N/A	N/A	5.8A (BRANCH #1) 13.05A (BRANCH #2) 15.95A (BRANCH #3) 15.95A (BRANCH #4) 15.95A (BRANCH #5)	N/A	6 AWG BARE COPPER	0.76 (51°C)	1.0	5.8A (BRANCH #1) 13.05A (BRANCH #2) 15.95A (BRANCH #3) 15.95A (BRANCH #4) 15.95A (BRANCH #5)	7.25A (BRANCH #1) 16.32A (BRANCH #2) 19.94A (BRANCH #3) 19.94A (BRANCH #4) 19.94A (BRANCH #5)	25A > 19.94A PASS	***40A (IN FREE AIR)***	***40A (IN FREE AIR)***
2	1	MICROINVERTER OUTPUT (TRANSITIONED): JUNCTION BOX TO SOLAR-ONLY LOAD CENTER	10 AWG THWN-2 COPPER	***1.00" DIA. EMT***	***10 (L1, L2) X 5***	27.0%	5.8A (BRANCH #1) 13.05A (BRANCH #2) 15.95A (BRANCH #3) 15.95A (BRANCH #4) 15.95A (BRANCH #5)	15A (CB1) 20A (CB2) 20A (CB3) 20A (CB4) 20A (CB5)	10 AWG THWN-2 COPPER	0.76 (51°C)	0.5	5.8A (BRANCH #1) 13.05A (BRANCH #2) 15.95A (BRANCH #3) 15.95A (BRANCH #4) 15.95A (BRANCH #5)	7.25A (BRANCH #1) 16.32A (BRANCH #2) 19.94A (BRANCH #3) 19.94A (BRANCH #4) 19.94A (BRANCH #5)	35A > 19.94A PASS	***40A (IN CONDUIT)***	***20A (IN CONDUIT)***
3	1	COMBINED OUTPUT OF MICROINVERTERS: SOLAR-ONLY LOAD CENTER TO UTILITY AC DISCONNECT (DS1)	3 AWG THWN-2 COPPER	***1.00" DIA. EMT***	***3 (L1, L2, N) X 1***	38.2%	66.7A	90A (F1-2) 100A (DS1)	8 AWG THWN-2 COPPER	1.0 (29°C)	1.0	66.7A	83.38A	100A > 83.38A PASS	***110A (IN CONDUIT)***	***110A (IN CONDUIT)***
4	1	UTILITY AC DISCONNECT (DS1) OUTPUT: UTILITY AC DISCONNECT (DS1) TO ***LOAD-SIDE TAP P.O.C. (TO BE MADE AS PER NEC 240.21(B)(1) & NEC 705.12)***	3 AWG THWN-2 COPPER	***1.00" DIA. EMT***	***3 (L1, L2, N) X 1***	39.8%	66.7A	N/A	6 AWG THWN-2 COPPER	1.0 (29°C)	1.0	66.7A	83.38A	100A > 83.38A PASS	***110A (IN CONDUIT)***	***110A (IN CONDUIT)***

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

A PV-3 SINGLE-LINE DIAGRAM
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SINGLE-LINE DIAGRAM

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-3

OVERALL SYSTEM RATED AC CURRENT

PHOTOVOLTAIC SYSTEM
AC DISCONNECT
OPERATING CURRENT 66.7 AMPS
OPERATING VOLTAGE 240 VOLTS

NEC 690.14(C)(2) & NEC 690.54

WARNING

DUAL POWER SUPPLY

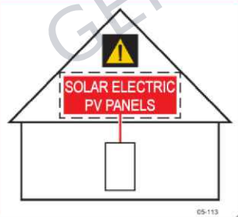
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NET METER

pvlabels.com 03-364

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY CONDUCTORS WITHIN THE ARRAY REMAIN ENERGIZED IN SUNLIGHT

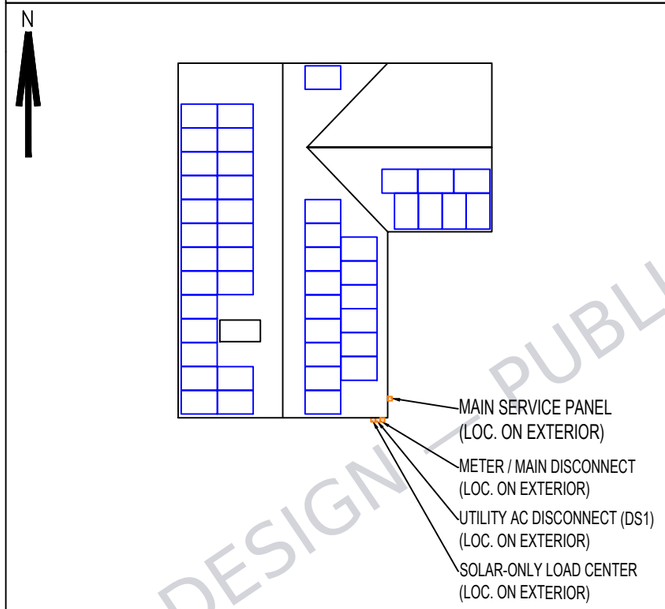


pvlabels.com 05-113

SITE OVERVIEW

CAUTION

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



NEC 690.56(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

pvlabels.com 07-316

1 PV-4 PLACARDS
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

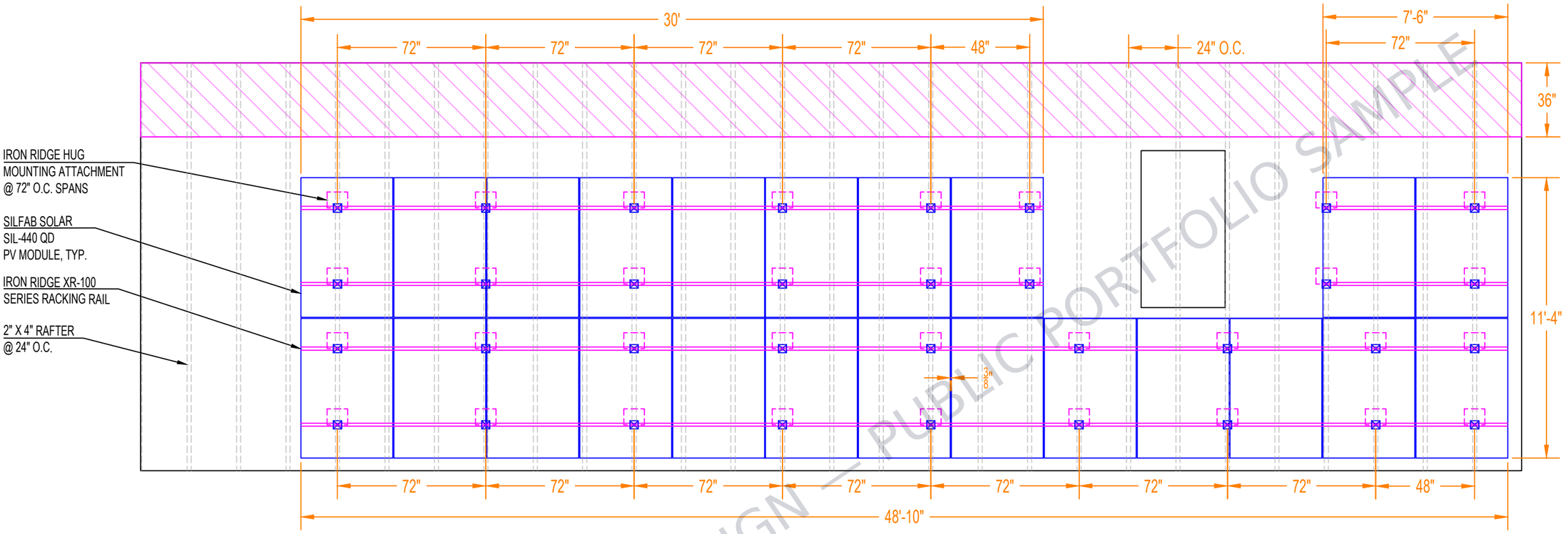
NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLACARDS

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-4



ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"

LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	23
AREA	488.4 SQ. FT
AZIMUTH	270°
TOTAL WEIGHT OF ARRAY	1,230.9 LBS
DEAD LOAD	2.52 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	110 MPH
DESIGN SNOW LOAD	25 PSF

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

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 AND PV-6B FOR DETAILS REGARDING THE MOUNTING ATTACHMENT TO BE USED, THE FLASHING TO BE USED, AS WELL AS THE RELEVANT CUTSHEETS.***
4	***PLEASE SEE SHEET PV-11 FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER (PE).***

1 / PV-5A ATTACHMENT PLAN (ARRAY #1)
SCALE: 1" = 4'-6"

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

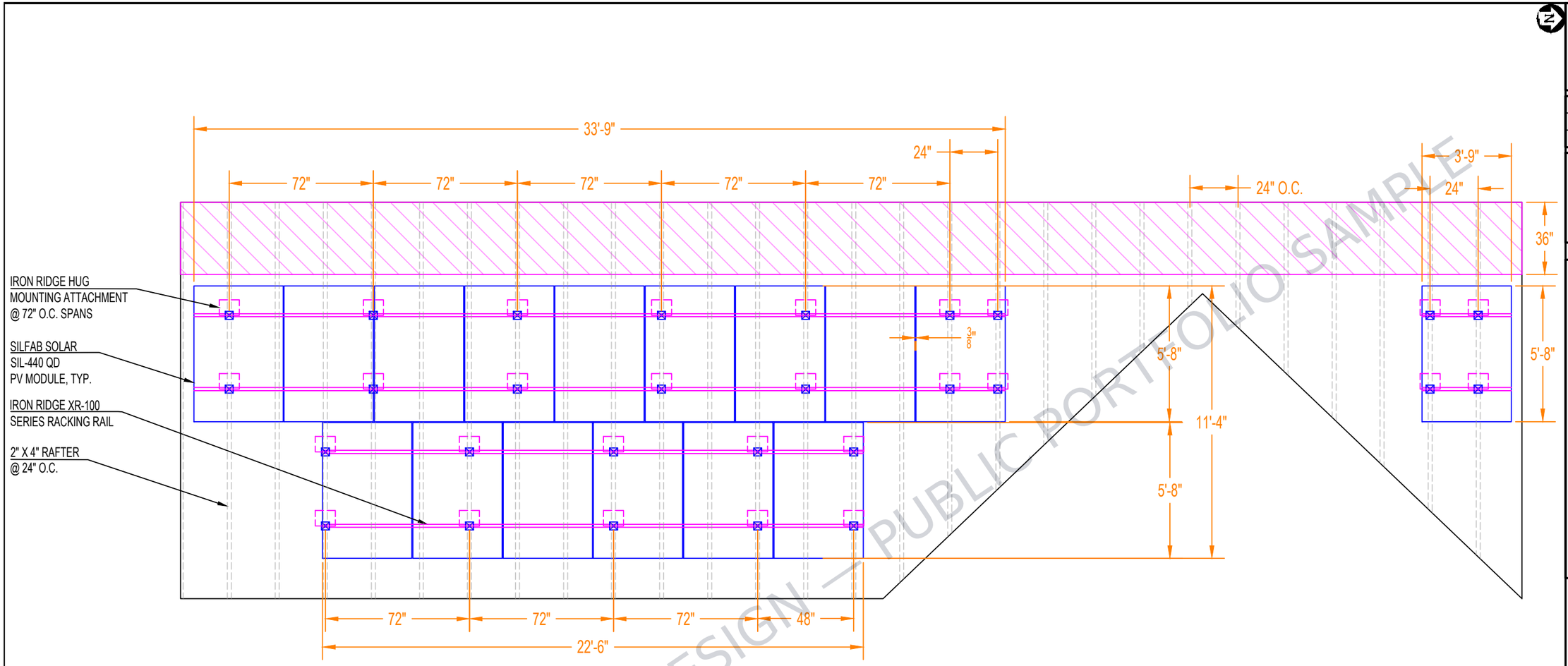
NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

ATTACHMENT PLAN

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-5A



ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"

LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	16
AREA	342.4 SQ. FT
AZIMUTH	90°
TOTAL WEIGHT OF ARRAY	904.0 LBS
DEAD LOAD	2.64 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	110 MPH
DESIGN SNOW LOAD	25 PSF

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

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 AND PV-6B FOR DETAILS REGARDING THE MOUNTING ATTACHMENT TO BE USED, THE FLASHING TO BE USED, AS WELL AS THE RELEVANT CUTSHEETS.***
4	***PLEASE SEE SHEET PV-11 FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER (PE).***

1 PV-5B ATTACHMENT PLAN (ARRAY #2)
SCALE: 1" = 4'-6"

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

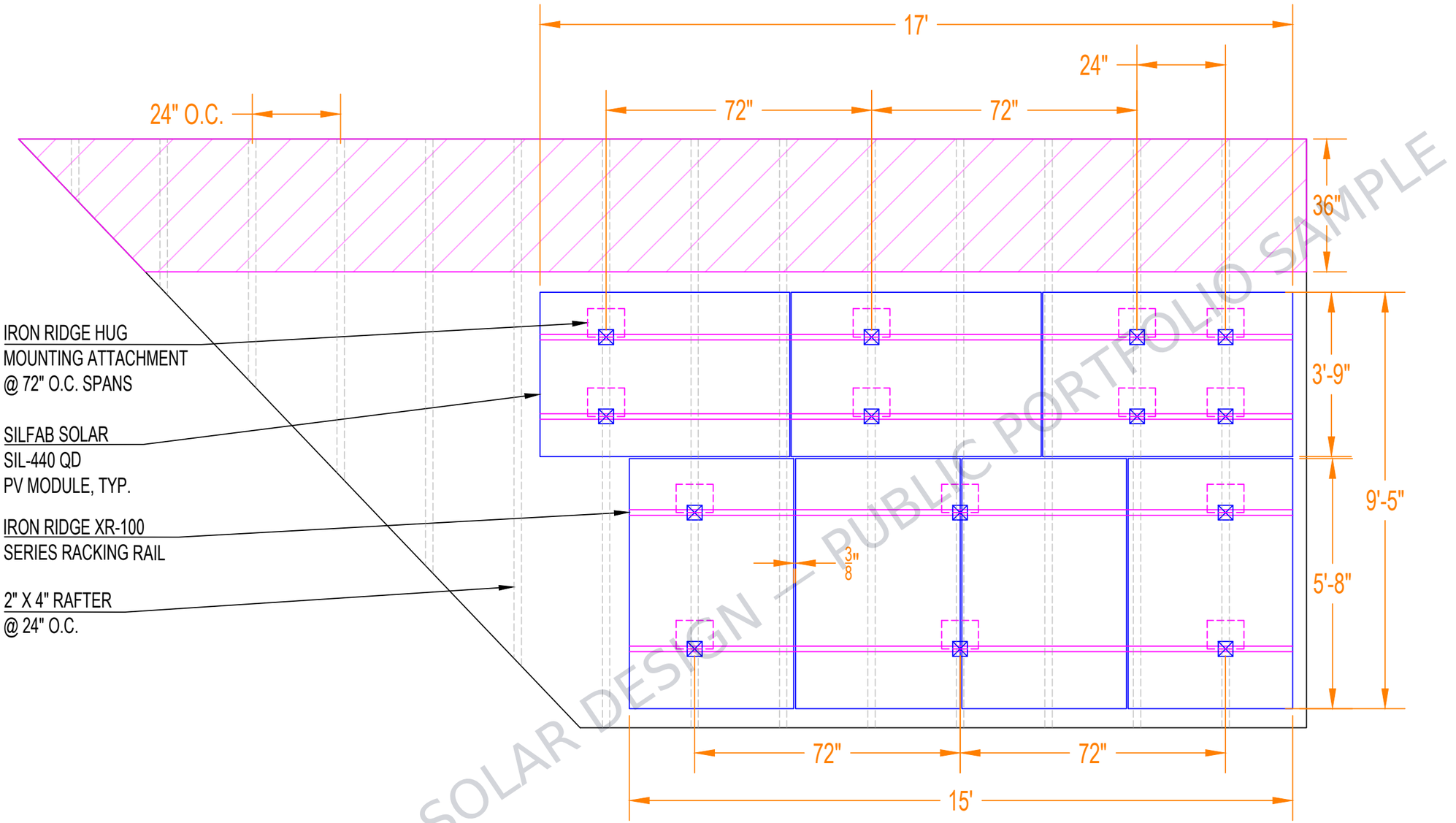
NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

ATTACHMENT PLAN

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-5B



ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"

LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	7
AREA	148.9 SQ. FT
AZIMUTH	180°
TOTAL WEIGHT OF ARRAY	378.2 LBS
DEAD LOAD	2.54 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	110 MPH
DESIGN SNOW LOAD	25 PSF

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

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 AND PV-6B FOR DETAILS REGARDING THE MOUNTING ATTACHMENT TO BE USED, THE FLASHING TO BE USED, AS WELL AS THE RELEVANT CUTSHEETS.***
4	***PLEASE SEE SHEET PV-11 FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER (PE).***

1 PV-5C ATTACHMENT PLAN (ARRAY #3)
SCALE: 1" = 2'-6"

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

ATTACHMENT PLAN

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-5C

Tech Brief

IRONRIDGE

QuickMount® HUG

The Respect Your Roof Deserves

When integrating with a home, solar attachments must be dependable for the lifetime of the rooftop. Due to recent innovations, many asphalt shingles have bonded courses. A mount that protects without the need to pry shingles can really speed things up.

Halo UltraGrip™ (HUG™) is here to respect the roof. Its Halo is a cast-aluminum barrier that encases the UltraGrip, our industrial-grade, foam-and-mastic seal. This allows HUG to accelerate the installation process and provide the utmost in waterproofing protection. Give your roof a HUG.™

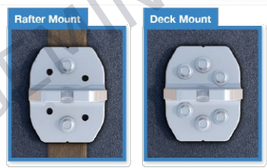
Multi-Tiered Waterproofing
HUG utilizes a multi-tiered stack of components to provide revolutionary waterproofing protection. The Halo cast-aluminum, raised-perimeter foundation surrounds the UltraGrip base—a foam-backed mastic seal combination that prevents water intrusion by adhering and sealing with the shingle surface.

Halo UltraGrip™ is part of the QuickMount® product line.

UltraGrip™ Seal Technology
HUG UltraGrip utilizes a state-of-the-art seal design that uses a unique, foam-and-mastic combination. The foam-backed adhesive provides an entirely new flashing system that conforms and adheres to every nook and cranny of composition shingles, filling gaps and shingle step-downs (up to 1/8" in height).

Intertek

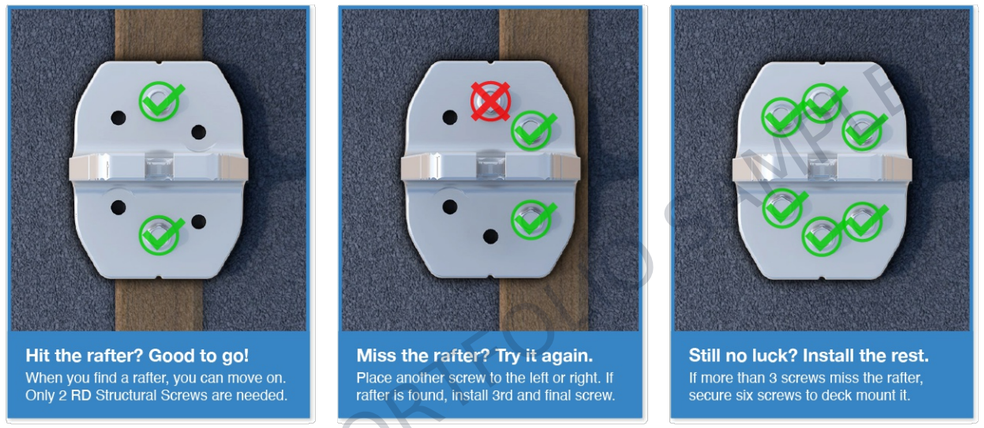
Triple Rated & Certified to Respect the Roof™
UL 2703, 441 (27)
TAS 100(A)-95



Rafter & Deck Mounting Options
Mount HUG to the roof rafters, the roof deck, or both with our custom-engineered RD (rafter-or-deck) Structural Screw. The RD Structural Screw anchors HUG to the roof with an EPDM sealing washer, completing the stack of waterproofing barriers. See backside for more installation information.

Tech Brief

Adaptive, Rafter-Friendly Installation



Hit the rafter? Good to go!
When you find a rafter, you can move on. Only 2 RD Structural Screws are needed.

Miss the rafter? Try it again.
Place another screw to the left or right. If rafter is found, install 3rd and final screw.

Still no luck? Install the rest.
If more than 3 screws miss the rafter, secure six screws to deck mount it.

Trusted Strength & Less Hassle

25-Year Warranty
Product guaranteed free of impairing defects.

Structural capacities of HUG™ were reviewed in many load directions, with racking rail running cross-slope or up-slope in relation to roof pitch.

For further details, see the HUG certification letters for attaching to rafters and decking.

IronRidge designed the HUG, in combination with the RD Structural Screw to streamline installs, which means the following:

- No prying shingles
- No roof nail interference
- No pilot holes necessary
- No sealant (in most cases)
- No butyl shims needed

Attachment Loading

The rafter-mounted HUG has been tested and rated to support 1004 (lbs) of uplift and 368 (lbs) of lateral load.

Structural Design

Parts are designed and certified for compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

HUG passed both the UL 441 Section 27 "Rain Test" and TAS 100(A)-95 "Wind Driven Rain Test" by Intertek.

UL 2703 System

Systems conform to UL 2703 mechanical and bonding requirements. See Flush Mount Manual for more info.

1 PV-6A IRON RIDGE QUICKMOUNT HUG DATASHEET
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

MOUNTING DETAIL

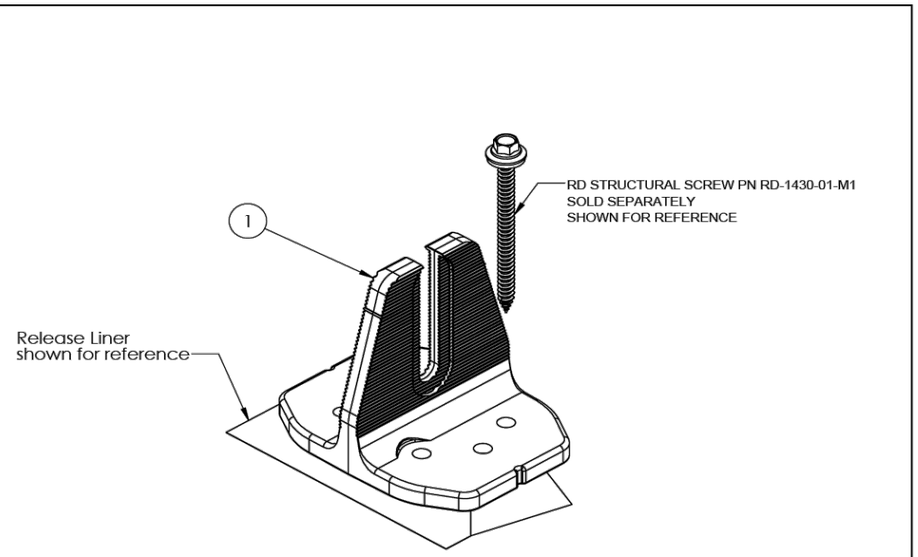
PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-6A

Cut Sheet

IRONRIDGE

QuickMount® Halo UltraGrip

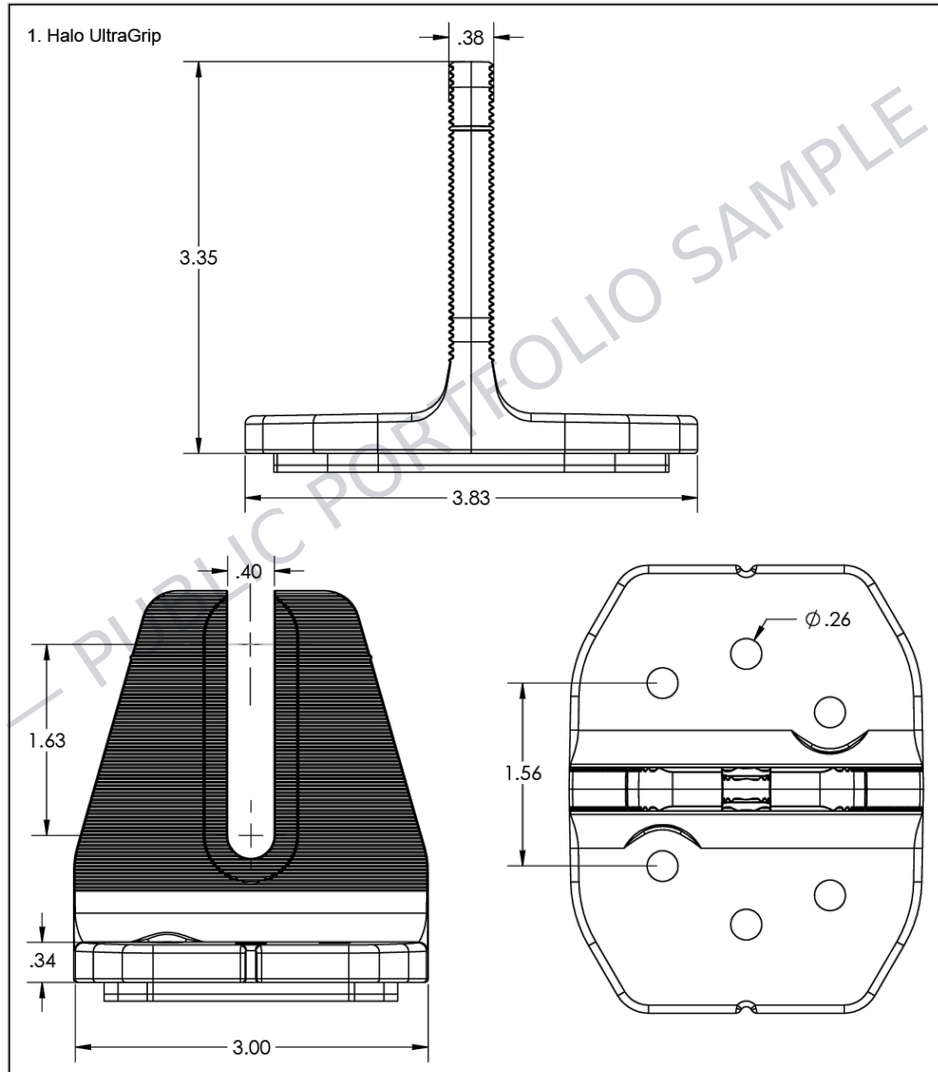


ITEM NO	DESCRIPTION	QTY IN KIT
1	QM Halo UltraGrip(Mill or Black)	1

PART NUMBER	DESCRIPTION
QM-HUG-01-M1	Halo UltraGrip - Mill
QM-HUG-01-B1	Halo UltraGrip - Black

Cut Sheet

1. Halo UltraGrip



Property	Value
Material	300 Series Aluminium
Finish	Mill or Black

QM-HUG-01-B1 or QM-HUG-01-M1 Cut Sheet Rev 1.0

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

MOUNTING DETAIL

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

1 PV-6B IRON RIDGE QUICKMOUNT HUG CUTSHEET
SCALE: NTS

PV-6B

Datasheet

IRONRIDGE

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.

PE Certified
Pre-stamped engineering letters available in most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof.

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

UL 2703 Listed System
Entire system and components meet newest effective UL 2703 standard.

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.

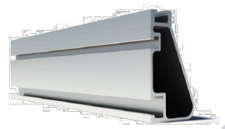
- 6' spanning capability
- Moderate load capability
- Clear and black finish

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

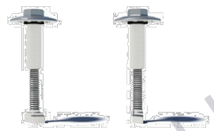
Bonded Splices

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 ¾" 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

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

1 PV-7 FLUSH MOUNT RACKING DATASHEET
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

RACKING DATASHEET

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-7

SILFAB PRIME NTC

SIL-440 QD

SILFAB SOLAR®

NEXT-GENERATION N-TYPE CELL TECHNOLOGY

- Improved Shade Tolerance
- Improved Low-Light Performance
- Increased Performance in High Temperatures
- Enhanced Durability
- Reduced Degradation Rate
- 25-Year Product Warranty/ 30-Year Performance Warranty

SILFABSOLAR.COM

ELECTRICAL SPECIFICATIONS		440	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	440	328.0
Maximum power voltage (Vpmax)	V	33.41	31.17
Maximum power current (Ipmax)	A	13.17	10.52
Open circuit voltage (Voc)	V	38.97	36.64
Short circuit current (Isc)	A	14.22	11.44
Module efficiency	%	22.6%	
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	25	
Power Tolerance	Wp	0 to +10	

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10 W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	21 kg ± 0.2 kg	46.3 lbs ± 0.4 lbs
Dimensions (H x L x D)	1721 mm x 1133 mm x 35 mm	67.8 in x 44.6 in x 1.37 in
Maximum surface load (wind/snow)*	4000 Pa rear load / 5400 Pa front load	83.5 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	108 Half cells - N-Type Silicon solar cell 182 mm x 91 mm	108 Half cells - N-Type Silicon solar cell 7.16 in x 3.58 in
Glass	3.2 mm high transmittance, tempered, antireflective coating	0.126 in high transmittance, tempered, antireflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53.1 in, ø 0.22 in (12 AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet	
Frame	Anodized aluminum (Black)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated, 3 diodes	

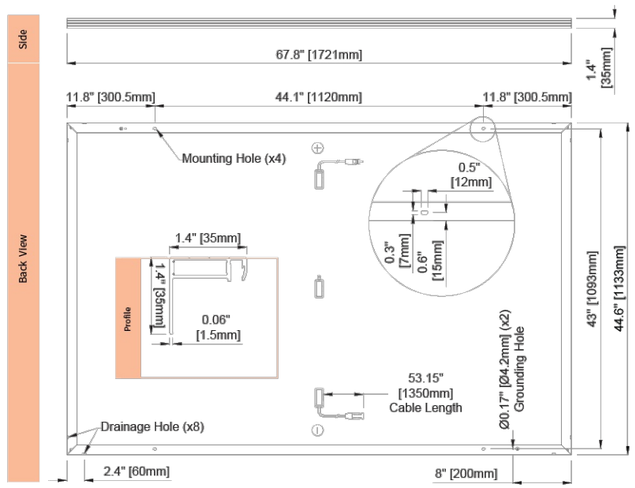
TEMPERATURE RATINGS	
Temperature Coefficient Isc	0.04 %/°C
Temperature Coefficient Voc	-0.24 %/°C
Temperature Coefficient Pmax	-0.29 %/°C
NOCT (± 2 °C)	45 °C
Operating temperature	-40/+85 °C

WARRANTIES	
Module product workmanship warranty	25 years**
Linear power performance guarantee	30 years
	≥ 98% end 1st yr ≥ 94.7% end 12th yr ≥ 90.8% end 25th yr ≥ 89.3% end 30th yr

CERTIFICATIONS	
Product	UL 61215, UL 61730, CSA C22.2#61730, IEC 61215, IEC 61730, IEC 61701 (Salt Mist Corrosion), IEC 62716 (Ammonia Corrosion), CEC Listed, UL Fire Rating: Type 2
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	26 or 26 (California)
Pallets Per Truck	32 or 30 (California)
Modules Per Truck	832 or 780 (California)

* ⚠ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.
** 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at silfabsolar.com.
PAN files generated from 3rd party performance data are available for download at: silfabsolar.com/downloads.



SILFAB SOLAR INC.

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Mississauga ON L5T 2Y3 Canada
T +1 905.255.2501
F +1 905.696.0267

1 PV-8 PV MODULE DATASHEET
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

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NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

MODULE DATASHEET

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-8

ENPHASE.

DATA SHEET

IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL listed as PV Rapid Shutdown Equipment and conform with various regulations, when installed according to manufacturer's instructions.

*Only when installed with IQ System Controller 2, meets UL 1741.
**IQ8M and IQ8A support split-phase, 240V installations only.

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- 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.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

IQ8M and IQ8A Microinverters

INPUT DATA (DC)		IQ8M-72-2-US	IQ8A-72-2-US
Commonly used module pairings[1]	W	260 – 460	295 – 500
Module compatibility		54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell	
MPPT voltage range	V	30 – 45	32 – 45
Operating range	V	16 – 58	
Min. / Max. start voltage	V	22 / 58	
Max. input DC voltage	V	60	
Max. continuous input DC current	A	12	
Max. input DC short-circuit current	A	25	
Max. module I_{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8M-72-2-US**	**IQ8A-72-2-US**
Peak output power	VA	330	366
Max. continuous output power	VA	325	349
Nominal (L-L) voltage / range[2]	V	240 / 211 – 264	
Max. continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	47 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max. units per 20 A (L-L) branch circuit[3]		11	
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN / CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shutdown Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at https://link.enphase.com/module-compatibility. (2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8MA-12A-DS-0069-03-EN-US-2022-12-27

1 PV-9 MICROINVERTER DATASHEET
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

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NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

INVERTER DATASHEET

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-9

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.

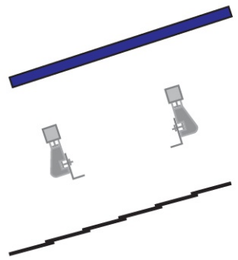
Fire Testing Process

Test Setup

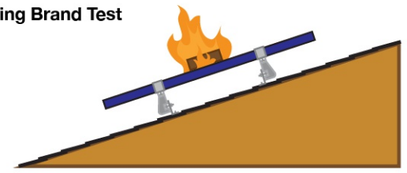
Solar Modules
Solar modules are given a Type classification based on their materials and construction.

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.

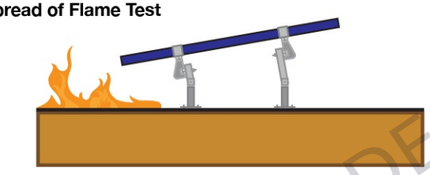


Burning Brand Test



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.

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.

Intertek
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

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

1 / PV-10 CLASS A FIRE RATING DATASHEET
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

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PHONE: (INFO WITHHELD)
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NEW GRID-TIED SYSTEM 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

CLASS A FIRE RATING

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-10

IRONRIDGE

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Sean McDonald, CEO, IronRidge Inc.
Date: May 31st, 2024

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)
- 2021 Washington State Building Code
- 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 8º to 45º.
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.

IRONRIDGE

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

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,

MATTHEW S KUZILA
STATE OF WASHINGTON
23015110
REGISTERED
PROFESSIONAL ENGINEER

Matthew S Kuzila, P.E.

Digitally Sealed 05.31.2024

1 PV-11 STATE OF WASHINGTON ENGINEERING LETTER (RACKING)
SCALE: NTS

(LOGO WITHHELD FOR SAMPLE)

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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 20.24kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

ENGINEERING LETTER

PROJECT NO: GSD-20250729-SCM
DRAWN BY: SCM
DATE: 7/29/2025

PV-11

Tech Brief

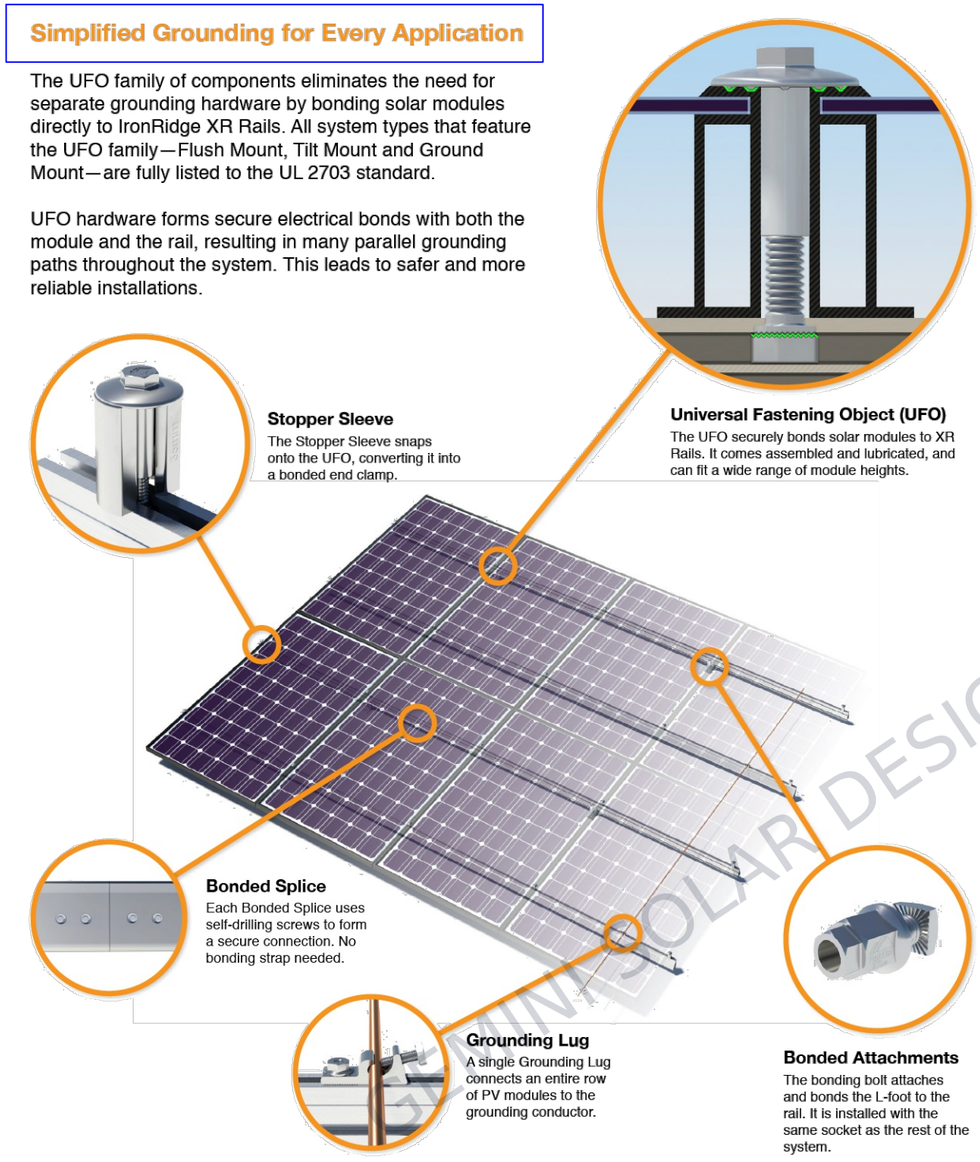
IRONRIDGE

UFO Family of Components

Simplified Grounding for Every Application

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

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



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.

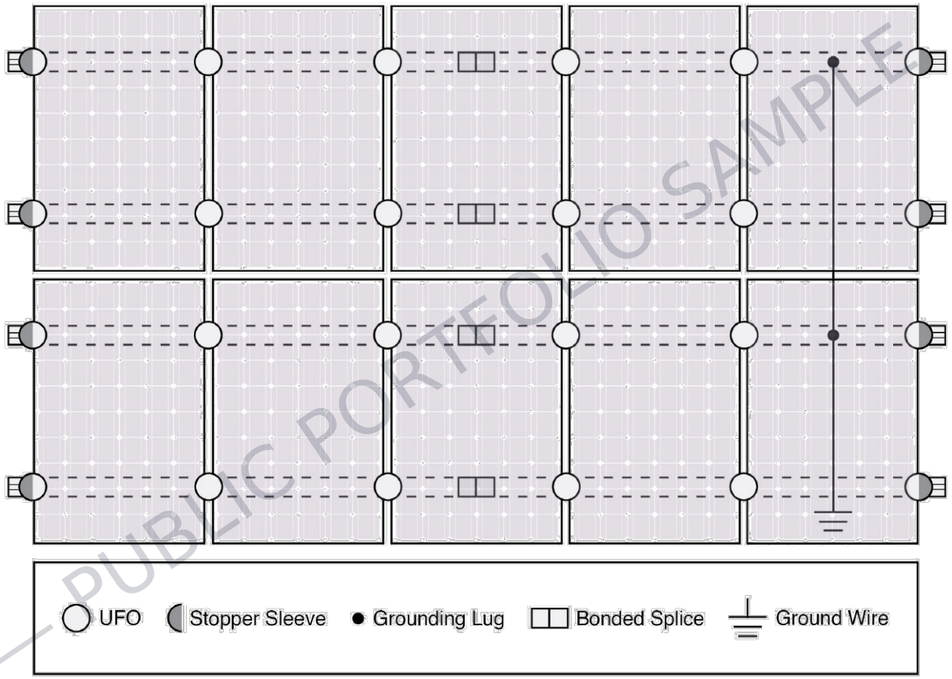
Bonded Splice
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

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.

Tech Brief

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

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.		

1 PV-12 GROUNDING DETAILS (IRON RIDGE RACKING)
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GROUNDING DETAILS

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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.

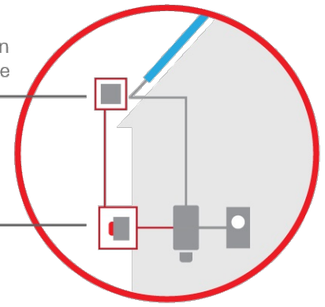
What's new in Section 690.12?
NEC 2014/2017, Section 690.12 applies to PV conductors over 10 feet from the PV array and requires that the conductors power down to 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

String inverters require work arounds for rapid shutdown

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

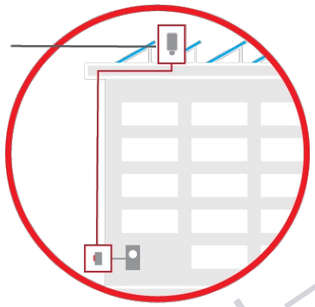
Work around.
Shutoff switch that is easily accessible to first responders on the ground.

Work around.
Extra conduit in installation.



Residential String Inverter

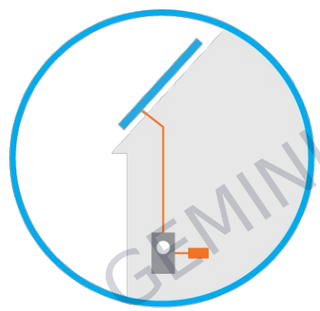
Work around.
String inverter installed on roof, a hostile environment that string inverters are not built to live in.



Commercial String Inverter

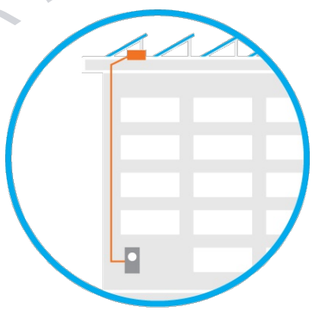
Enphase comes standard with rapid shutdown capability

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**

ENPHASE.

1 PV-13 RAPID SHUTDOWN DATASHEET
SCALE: NTS

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NEW GRID-TIED SYSTEM 20.24kW

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RAPID SHUTDOWN

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PV-13

ENPHASE.

DATA SHEET

IQ Gateway

The IQ Gateway delivers solar production and energy consumption data to Enphase Installer Portal monitoring and analysis software for comprehensive, remote maintenance, and management of Enphase systems.

With integrated production metering and optional consumption monitoring, the IQ Gateway is the platform for total energy management. It integrates with the IQ System Controller and IQ Battery.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) dramatically simplify the installation process.

IQ System Controller
Provides microgrid interconnect device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.

IQ Battery
All-in-one AC coupled storage system that is reliable, smart, simple, and safe. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.

Smart
- Enables web-based monitoring and control
- Provides bidirectional communications for remote upgrades
- Supports power export limiting and zero-export applications

Simple
- Easy system configuration using Enphase Installer App
- Flexible networking with Wi-Fi, Ethernet, or cellular

Reliable
- Designed for installation indoors or outdoors in a NEMA 3R rated enclosure
- 5-year limited warranty
- ENV2-IQ-AM1-240 complies with IEEE 1547:2018 (UL 1741-SB, 3rd Ed.)

Enphase 5 year limited warranty

UL LISTED

IQ Gateway

MODEL NUMBER	ENV-IQ-AM1-240, ENV2-IQ-AM1-240
IQ Gateway ENV-IQ-AM1-240 ENV2-IQ-AM1-240 (IEEE 1547:2018)	IQ Gateway integrates revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption metering (±2.5%), and battery metering (+- 2.5%) with IQ Battery 5P. Includes one 200 A continuous rated Production current transformer (CT).
ACCESSORIES - ORDER SEPARATELY	
Mobile Connect COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Consumption monitoring CT and IQ Battery 5P metering CT CT-200-SPLIT CT-200-CLAMP	Split-core and clamp style CTs with 2.5% accuracy enable whole home and IQ Battery 5P metering
Communications Kit COMMS-KIT-01 COMMS-KIT-02	Installed at the IQ Gateway. For communications with IQ Battery and IQ System Controller. Includes USB cable for connection to IQ Gateway or IQ Combiner and allows wireless communication with IQ Battery and IQ System Controller.
POWER REQUIREMENTS	
Power requirements	120/240 VAC split-phase maximum 20 A overcurrent protection required
Typical power consumption	5 W
CAPACITY	
Number of microinverters polled	Up to 300
MECHANICAL & ELECTRICAL DATA	
Dimensions (W×H×D)	21.3 cm × 12.6 cm × 4.5 cm (8.4 in × 5 in × 1.8 in)
Weight	1.09 lb
Ambient temperature range	-40°C to 65°C (-40°F to 149°F) [ENV-IQ-AM1-240] -40°C to 50°C (-40°F to 122°F) [ENV2-IQ-AM1-240] -40°C to 46°C (-40°F to 115°F) if installed in an enclosure
Environmental rating	IP30. For installation indoors or in an NRTL-certified, NEMA type 3R or better-rated enclosure, if installing outdoors.
Altitude	Up to 2,600 meters (8,530 feet)

COMMUNICATION INTERFACES	
Integrated WI-FI	802.11b/g/n (2.4 GHz, 5 GHz), for connecting the Enphase Cloud via the Internet.
WI-FI range (recommended)	10 m
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud via the Internet.
Mobile Connect	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (to be purchased separately, mandatory for sites with IQ Battery)
Digital I/O	Digital input/output for grid operator control
USB 2.0	For Mobile Connect and Communications Kit
Access point (AP) mode	For a connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one Production CT, and one battery CT (for IQ Battery 5P)
Power line communication (PLC)	90–110 kHz (Class B), to microinverters.
Web API	Refer to https://developer-v4.enphase.com
Local API	Refer to guide for local API
LED indicators	From top to bottom: Cloud connectivity, WI-FI access point mode, PV production state, PLC communications state
Configured via	Enphase Installer App and Enphase Installer Platform

IQ-G-DSH-00111-2.0-EN-US-2023-08-24

1 PV-14 ENPHASE IQ GATEWAY DATASHEET
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