

DIRECTORY OF PLAN PAGES	
PV1	PROJECT INFORMATION
PV2	SITE PLAN
PV-3A PV-3B PV-3C	SINGLE-LINE DIAGRAM
PV4	PLACARDS
PV-5A	ATTACHMENT PLAN (ARRAY #1)
PV-5B	ATTACHMENT PLAN (ARRAY #2)
PV-5C	ATTACHMENT PLAN (ARRAY #3)
PV-6A	IRON RIDGE QUICKMOUNT HUG DATASHEET
PV-6B	IRON RIDGE QUICKMOUNT HUG CUTSHEET
PV-6C	RACKING DATASHEET
PV-6D	CLASS A FIRE RATING DATASHEET
PV-6E	STATE OF MARYLAND ENGINEERING LETTER (IRONRIDGE RACKING)
PV-6F	GROUNDING DETAILS (IRON RIDGE RACKING)
PV7	PV MODULE DATASHEET
PV-8A	HYBRID INVERTER DATASHEET
PV-8B	HYBRID INVERTER (UL 1741 CERTIFICATION)
PV-8C	HYBRID INVERTER (UL 3141 CERTIFICATION)
PV-9A	BATTERY MODULE DATASHEET
PV-9B	BATTERY MODULE (UL CERTIFICATION)
PV-10A	TIGO TS4-A-F MODULE-LEVEL RAPID SHUTDOWN DATASHEET
PV-10B	TIGO TS4-A-2F MODULE-LEVEL RAPID SHUTDOWN DATASHEET

PROJECT DETAILS	
PROPERTY OWNER	(INFO WITHHELD FOR PUBLIC SAMPLE)
OWNER PHONE	(INFO WITHHELD FOR PUBLIC SAMPLE)
OWNER EMAIL	(INFO WITHHELD FOR PUBLIC SAMPLE)
PROPERTY ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
TAX ACCOUNT #	(INFO WITHHELD FOR PUBLIC SAMPLE)
AHJ	(INFO WITHHELD FOR PUBLIC SAMPLE)
ZONING	RESIDENTIAL
CONST. TYPE	FLUSH ROOF-MOUNTED PHOTOVOLTAIC ARRAY
UTILITY COMPANY	PEPCO
OBSERVED CODES	2018 INTERNATIONAL BUILDING CODE (IBC) AND SUBTITLE 4 2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC) 2018 NFPA 1 FIRE CODE MARYLAND STATE FIRE PREVENTION CODE 2017 NFPA 70 NATIONAL ELECTRICAL CODE AND SUBTITLE 9 PRINCE GEORGE'S COUNTY ELECTRICAL CODE 2018 INTERNATIONAL ENERGY CONSERVATION CODE 2018 INTERNATIONAL RESIDENTIAL CODE 2018 INTERNATIONAL BUILDING CODE AND SUBTITLE 4 PRINCE GEORGE'S COUNTY BUILDING CODE 2018 INTERNATIONAL EXISTING BUILDING CODE OSHA 29 CFR 1910.269 UNDERWRITERS LABORATORIES (UL) STANDARDS
STRUCT. METHOD	ASCE7-16

OWNER-BUILDER INFORMATION	
OWNER-BUILDER	(INFO WITHHELD FOR PUBLIC SAMPLE)
ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
PHONE	(INFO WITHHELD FOR PUBLIC SAMPLE)
EMAIL	(INFO WITHHELD FOR PUBLIC SAMPLE)
OWNER-BUILDER SIGNATURE	

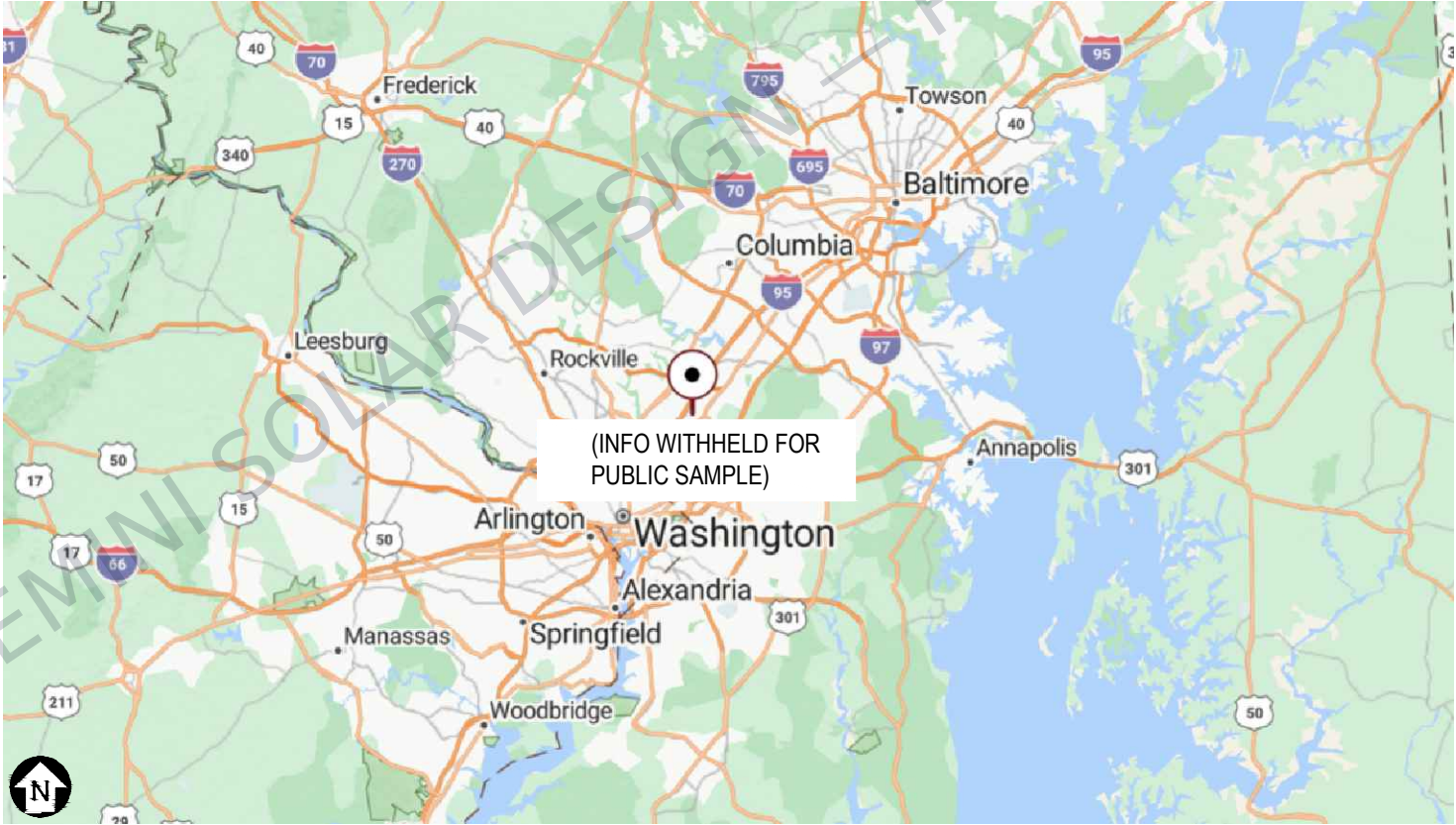
PLAN DESIGNER INFORMATION	
COMPANY	GEMINI SOLAR DESIGN, LLC.
NAME	SANJAY CHRISTOPHER MALLIPUDI
ADDRESS	495 HOWARD HEIGHTS ROAD FRESHWATER, CA 95503
PHONE	(609) 802-5743
PLAN DESIGNER SIGNATURE	Sanjay Mallipudi

SYSTEM DETAILS	
DC RATING OF SYSTEM	16,500W
MAX. CONTINUOUS OUTPUT CURRENT	50A @ 240VAC
HYBRID INVERTER	(1) EG4 18KPV-12LV
SOLAR MODULE	(30) APTOS SOLAR DNA-144-BF10-550W-DG
BATTERY MODULE	(4) EG4@ LIFEPOWER4 48V LITHIUM BATTERY
MODULE-LEVEL RAPID SHUTDOWN	(14) TIGO TS4-A-2F (2) TIGO TS4-A-F
PROJECT TYPE	GRID-TIED WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)

SITE SPECIFICATIONS	
UTILITY SERVICE	120 / 240VAC, 1-Ø, 3-WIRE
MAIN SERVICE PANEL ("BACKED-UP LOADS PANEL")	100A RATED BUSBAR 100A / 2P MAIN BREAKER
ASHRAE EXTREME ANNUAL MEAN MINIMUM DENSITY DRY BULB TEMP.	-12°C
ASHRAE 2% ANNUAL DRY DENSITY BULB TEMP.	34°C
DESIGN WIND SPEED	115 MPH
GROUND SNOW LOAD	30 PSF
WIND EXPOSURE CATEGORY	B
SEISMIC EXPOSURE CATEGORY	B
RISK CATEGORY	II



1 PLOT
PV-1 SCALE: NTS



2 LOCALE
PV-1 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. THE PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED ON THE RESIDENTIAL ZONED PROPERTY IN THE CENSUS-DESIGNATED PLACE (CDP) OF BELTSVILLE IN PRINCE GEORGE'S COUNTY, MARYLAND. THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT.	
THE PROJECT WILL INCLUDE DC-COUPLED BATTERY STORAGE WITH A WHOLE-HOME BACKUP SOLUTION.	

OWNER-BUILDER	
NAME: (INFO WITHHELD)	
PHONE: (INFO WITHHELD)	
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GRID-TIED SOLAR SYSTEM 16.50kW DC WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)	
(INFO WITHHELD FOR PUBLIC SAMPLE)	
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
PROJECT INFO	
PROJECT NO: GSD-20251115-SCM	
DRAWN BY: SCM	
DATE: 11/15/2025	
PV-1	

- 1 STRING OF 6 MODULES (APTOS SOLAR DNA-144-BF10-550W-DG, STRING #1, MPPT #1)
- 1 STRING OF 6 MODULES (APTOS SOLAR DNA-144-BF10-550W-DG, STRING #2, MPPT #1)
- 1 STRING OF 9 MODULES (APTOS SOLAR DNA-144-BF10-550W-DG, MPPT #2)
- 1 STRING OF 9 MODULES (APTOS SOLAR DNA-144-BF10-550W-DG, MPPT #3)

(N) HYBRID INVERTER
MODEL: EG4 18KPV-12LV
(LOC. INTERIOR OF BASEMENT)

(N) EG4 LIFEPOWER4 48V 100AH LITHIUM IRON PHOSPHATE BATTERY
20.48KWH, 4 SERVER RACK BATTERIES WITH PRE-ASSEMBLED
ENCLOSED RACK WITH DOOR & WHEELS, BUSBAR COVERS
(LOC. INTERIOR OF BASEMENT)

(N) PV ARRAY #1
(9) APTOS SOLAR DNA-144-BF10-550W-DG
(4) TIGO POWER TS4-A-2F (RAPID SHUTDOWN MLPE)
(1) TIGO POWER TS4-A-F (RAPID SHUTDOWN MLPE)
271° AZIMUTH, 4:12 PITCH

(N) PV ARRAY #2
(9) APTOS SOLAR DNA-144-BF10-550W-DG
(4) TIGO POWER TS4-A-2F (RAPID SHUTDOWN MLPE)
(1) TIGO POWER TS4-A-F (RAPID SHUTDOWN MLPE)
91° AZIMUTH, 4:12 PITCH

(N) RAPID SHUTDOWN INITIATOR WITH
ONE NORMALLY CLOSED SWITCH
(LOC. ON EXTERIOR)

(N) 200A LOAD CENTER
120 / 240VAC, 1- ϕ , 3-WIRE, NEMA 3R
200A RATED BUSBAR, MAIN LUG ONLY
SERVICE-ENTRANCE RATED
(LOC. ON EXTERIOR)

(E) UTILITY METER
(LOC. ON EXTERIOR)

(N) BACKED-UP LOADS PANEL
120 / 240VAC, 1- ϕ , 3-WIRE, NEMA 1
100A RATED BUSBAR
100A MAIN BREAKER
(LOC. INTERIOR OF BASEMENT)

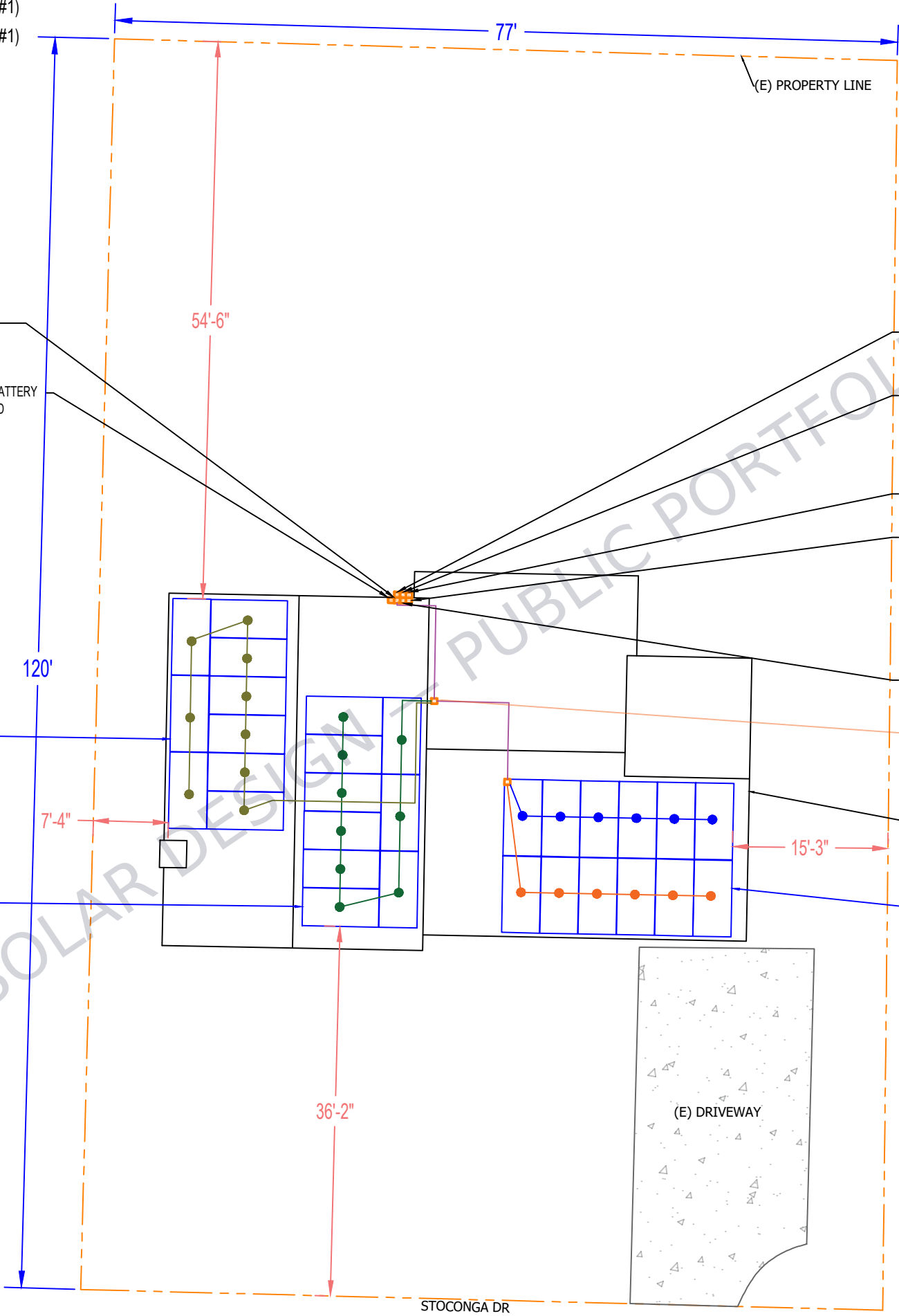
(N) 100A MANUAL TRANSFER SWITCH
(LOC. INTERIOR OF BASEMENT)

(N) NEMA 3R JUNCTION BOX
TRANSITION FROM PV WIRE TO #10 THWN-2
CONDUCTORS RAN INSIDE 0.75" DIA. EMT CONDUIT
RAN OVER ROOF SURFACE TO HYBRID INVERTER

(E) SINGLE FAMILY DWELLING

(N) PV ARRAY #3
(12) APTOS SOLAR DNA-144-BF10-550W-DG
(6) TIGO POWER TS4-A-2F (RAPID SHUTDOWN MLPE)
181° AZIMUTH, 4:12 PITCH

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	DC CONDUCTORS EITHER DO NOT ENTER BUILDING OR ARE RUN IN METALLIC RACEWAYS OR ENCLOSURES TO THE FIRST ACCESSIBLE DC DISCONNECTING MEANS PER NEC ARTICLE 690.1(E)
4	ARRAYS SHALL BE INSTALLED IN A WAY THAT ENSURES THAT PV SOURCE CONDUCTORS SHALL NOT BE READILY ACCESSIBLE.



OWNER-BUILDER	
NAME: (INFO WITHHELD)	
PHONE: (INFO WITHHELD)	
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GRID-TIED SOLAR SYSTEM 16.50kW DC WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)	
(INFO WITHHELD FOR PUBLIC SAMPLE)	
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	
SITE PLAN	
PROJECT NO: GSD-20251115-SCM	
DRAWN BY: SCM	
DATE: 11/15/2025	
PV-2	

PHOTOVOLTAIC MODULE									
REF.	TYP.	MODULE	STC POWER	ISC	IMP	VOC	VMP	FUSE RATING	
PM1-30	30	APTOS SOLAR DNA-144-BF10-550W-DG	550W	13.99A	13.11A	49.80V	41.95V	30A	
HYBRID INVERTER									
TYP.	HYBRID INVERTER	MPPT OPERATING VOLTAGE RANGE	NUMBER OF MPPT/ MAX SOLAR STRINGS PER MPPT	MAX. USABLE INPUT CURRENT (I_MP) PER MPPT	MAX DC VOLTAGE (V_OC)	NOMINAL POWER OUTPUT	BACKUP/UPS AC OUTPUT DATA (PEAK POWER)	MAX. EFFICIENCY @ PV TO GRID	RAPID SHUTDOWN COMPLIANT AS PER NEC 690.12
1	EG4 18KPV-12LV	140-500VDC	3 MPPT IN TOTAL 2 STRINGS (MPPT 1) 1 STRING (MPPT 2 & 3)	25A / 15A / 15A	600VDC	12,000W @ 240VAC	WITH PV: 14.7KW (10 MIN) 15.5KW (5 MIN) WITHOUT PV: 13.5KW (10 MIN)	97.5%	YES
BATTERY MODULE									
TYP.	BATTERY	CHEMISTRY	NOMINAL VOLTAGE	CAPACITY	TOTAL ENERGY STORAGE	COMMUNICATION PROTOCOL	MAXIMUM CHARGING CURRENT	MAXIMUM DISCHARGING CURRENT	STATE OF CHARGE CUTOFF
4	EG4® LIFEPOWER4 48V LITHIUM BATTERY	LiFePO4	51.2VDC (48VDC)	100AH	5.12kWh	RS485/CAN	100A (30A - 50A RECOMMENDED)	100A	MINIMUM OF 20%

MODULE LEVEL RAPID SHUTDOWN									
TYP.	MODEL	NEC 690.12 COMPLIANT	MAXIMUM POWER	MAXIMUM INPUT VOLTAGE (PER INPUT)	OPEARTING VOLTAGE RANGE	MAXIMUM INPUT CURRENT (Imp)	COMMUNICATION	RECOMMENDED FUSE RATING	
14	TIGO TS4-A-2F	YES	1000W (500W PER INPUT)	80VDC	16VDC - 80VDC	15A PER INPUT	PLC	30A	
2	TIGO TS4-A-F	YES	500W	80VDC	16VDC - 80VDC	15A PER INPUT	PLC	30A	

SYSTEM SUMMARY	
ARRAY STC POWER	16,500W
ARRAY CIRCUITS	2 X 6 (MPPT #1) 1 X 9 (MPPT #2) 1 X 9 (MPPT #3)
ARRAY VMP @ STC (25°C)	251.7VDC (MPPT #1) 377.55VDC (MPPT #2) 377.55VDC (MPPT #3)
ARRAY VOC @ STC (25°C)	298.8VDC (MPPT #1) 448.2VDC (MPPT #2) 448.2VDC (MPPT #3)
MAXIMUM ARRAY VOC @ MIN. TEMP (-12°C)	332.0VDC (MPPT #1) 498.0VDC (MPPT #2) 498.0VDC (MPPT #3)
ARRAY I_MP @ STC (SELF-LIMITING OVER 25A FOR MPPT 1, 15A FOR MPPT 2 & MPPT 3)	26.22A (MPPT #1) 13.11A (MPPT #2) 13.11A (MPPT #3)
ARRAY I_SC (MAX) (MAXIMUM INPUT OF 31A FOR MPPT 1, 19A FOR MPPT 2 & MPPT 3)	27.98A (MPPT #1) 13.99A (MPPT #2) 13.99A (MPPT #3)
MAXIMUM CONTINUOUS OUTPUT CURRENT	12,000W, 50A @ 240VAC

OCPD SCHEDULE				
REF.	TYPE OF OCPD	POLES	CURRENT RATING	RATED VOLTAGE
CB1 (BACKFED CIRCUIT BREAKER, HYBRID INVERTER)	CIRCUIT BREAKER	2	100A	240VAC
CB2 (FEEDER CIRCUIT BREAKER TO MANUAL TRANSFER SWITCH)	CIRCUIT BREAKER	2	100A	240VAC
CB3 (MAIN CIRCUIT BREAKER, BACKED-UP LOADS PANEL)	CIRCUIT BREAKER	2	100A	240VAC

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLAN DESIGNER INFORMATION
COMPANY
NAME
ADDRESS
PHONE
PLAN DESIGNER SIGNATURE

GEMINI SOLAR DESIGN, LLC.
SANJAY CHRISTOPHER MALLIPUDI
495 HOWARD HEIGHTS ROAD
FRESHWATER, CA 95503
(609) 802-5743
Sanjay Mallipudi

SINGLE-LINE DIAGRAM

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-3B

JUNCTION BOX

1JUNCTION BOX

⚠️ WARNING ⚠️

ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF
THIS PHOTOVOLTAIC SYSTEM
ARE UNGROUNDED AND
MAY BE ENERGIZED

NEC 690.35(F)

3JUNCTION BOX

⚠️ WARNING ⚠️

PHOTOVOLTAIC
POWER SOURCE

NEC 690.35

HYBRID INVERTER

4HYBRID INVERTER

NEC 690.53

PHOTOVOLTAIC SYSTEM
DC DISCONNECT

RATED MPP VOLTAGE

377.55 VDC

RATED MPP CURRENT
(MPPT #1 / MPPT #2 / MPPT #3)

26.22 A
13.11 A
13.11 A

MAX SYSTEM VOLTAGE

498.0 VDC

6HYBRID INVERTER

⚠️ WARNING ⚠️

ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF
THIS PHOTOVOLTAIC SYSTEM
ARE UNGROUNDED AND
MAY BE ENERGIZED

NEC 690.35(F)

8HYBRID INVERTER

SOLAR INVERTER
MAXIMUM RATING

OPERATING CURRENT

50 AMPS

OPERATING VOLTAGE

240 VAC

NEC 690.54

2JUNCTION BOX

⚠️ DO NOT
DISCONNECT
UNDER LOAD ⚠️

NEC 690.16(B)

5HYBRID INVERTER

SOLAR DC DISCONNECT

NEC 690.13(B)

7HYBRID INVERTER

⚠️ WARNING ⚠️

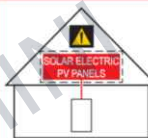
ELECTRIC SHOCK HAZARD
IF GROUND FAULT IS INDICATED
ALL NORMALLY GROUNDED
CONDUCTORS MAY BE
UNGROUNDED AND ENERGIZED

NEC 690.5(C)

9HYBRID INVERTER

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



RACEWAYS

10RACEWAYS, CABLES PER 10 FT.

⚠️ WARNING ⚠️

PHOTOVOLTAIC
POWER SOURCE

NEC 690.31(E)(3),(4)

100A LOAD CENTER
(BACKED UP LOADS PANEL)

11100A LOAD CENTER (BACKED UP LOADS PANEL)

⚠️ WARNING ⚠️

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

NEC 690.17.4

12100A LOAD CENTER (BACKED UP LOADS PANEL)

BATTERY
BACKED UP
ELECTRICAL
PANEL

13100A LOAD CENTER (BACKED UP LOADS PANEL)

⚠️ WARNING ⚠️

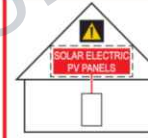
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND
PV SOLAR ELECTRIC SYSTEM

NEC 690.56(B)

14100A LOAD CENTER (BACKED UP LOADS PANEL)

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



BATTERY BANK

15BATTERY BANK

⚠️ MAIN BATTERY ⚠️

SYSTEM
DISCONNECT

ESS RAPID SHUTDOWN SWITCH

16ESS RAPID SHUTDOWN SWITCH

⚠️ MAIN BATTERY ⚠️

SYSTEM
DISCONNECT

17ESS RAPID SHUTDOWN SWITCH

⚠️ WARNING ⚠️

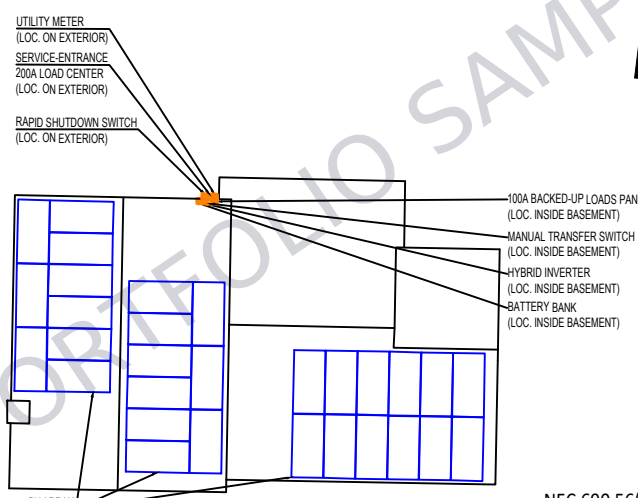
BATTERY SYSTEM RAPID
SHUTDOWN SWITCH. TURN
DIAL TO OFF POSITION TO
SHUTDOWN ESS

DIRECTORY PLACARD

18DIRECTORY PLACARD

⚠️ CAUTION ⚠️

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



NEC 690.56(B)

SIGNAGE REQUIREMENTS	
1	ALL PLACARDS AND SIGNAGE REQUIRED BY THE 2017 NFPA 70 NATIONAL ELECTRICAL CODE AND SUBTITLE 9 PRINCE GEORGE'S COUNTY ELECTRICAL CODE, 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

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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DESIGN AND INSTALLATION OF THE PV SYSTEM
REPRESENTED IN THIS PLAN.

GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLAN DESIGNER INFORMATION

COMPANY

GEMINI SOLAR DESIGN, LLC.

NAME

SANJAY CHRISTOPHER MALLIPUDI

ADDRESS

495 HOWARD HEIGHTS ROAD
FRESHWATER, CA 95503

PHONE

(609) 802-5743

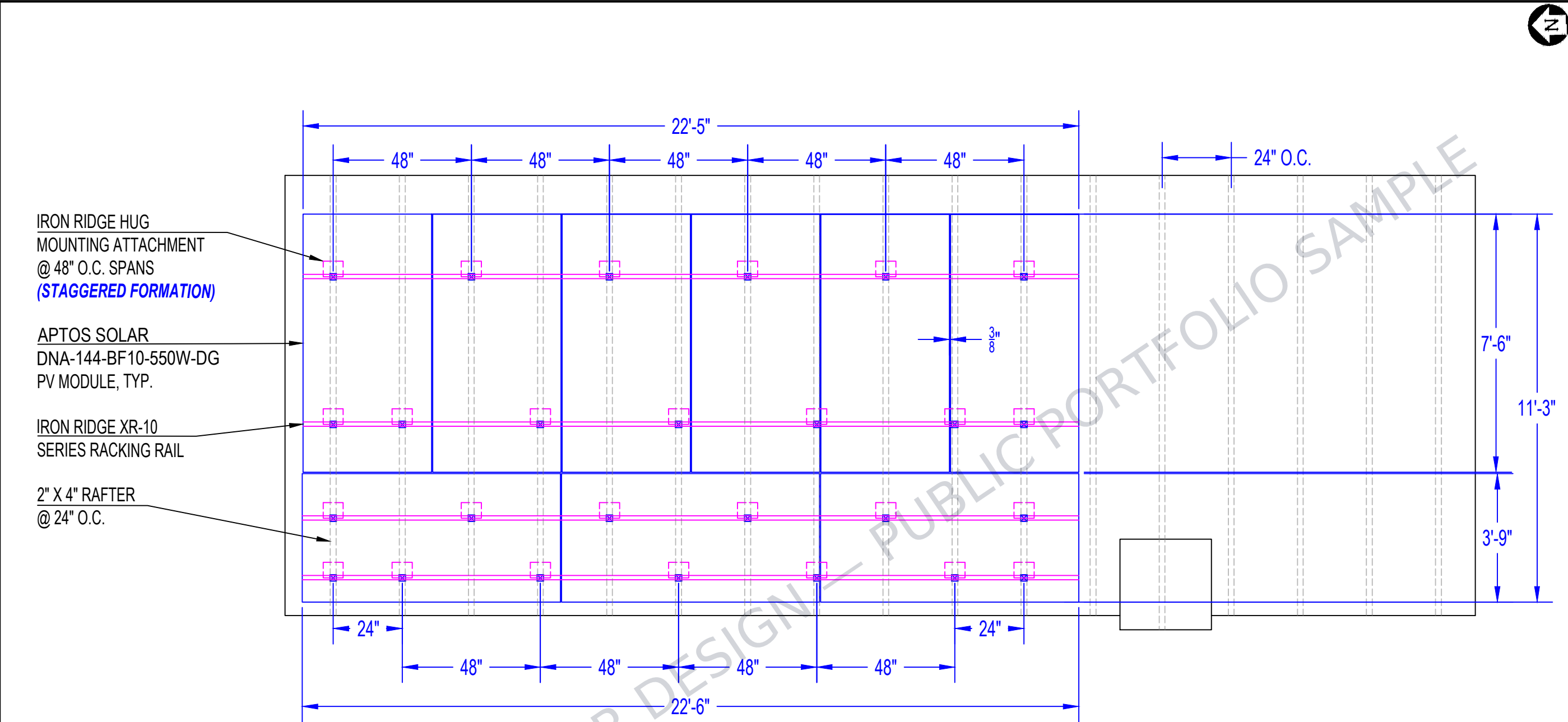
PLAN DESIGNER
SIGNATURE



PLACARDS

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-4



OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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REPRESENTED IN THIS PLAN.

GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(*WHOLE-HOME BACKUP APPLICATION*)

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLAN DESIGNER INFORMATION

COMPANY

NAME

ADDRESS

PHONE

PLAN DESIGNER SIGNATURE

GEMINI SOLAR DESIGN, LLC.

SANJAY CHRISTOPHER MALLIPUDI

495 HOWARD HEIGHTS ROAD
FRESHWATER, CA 95503

(609) 802-5743

Sanjay Mallipudi

ATTACHMENT PLAN

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-5A

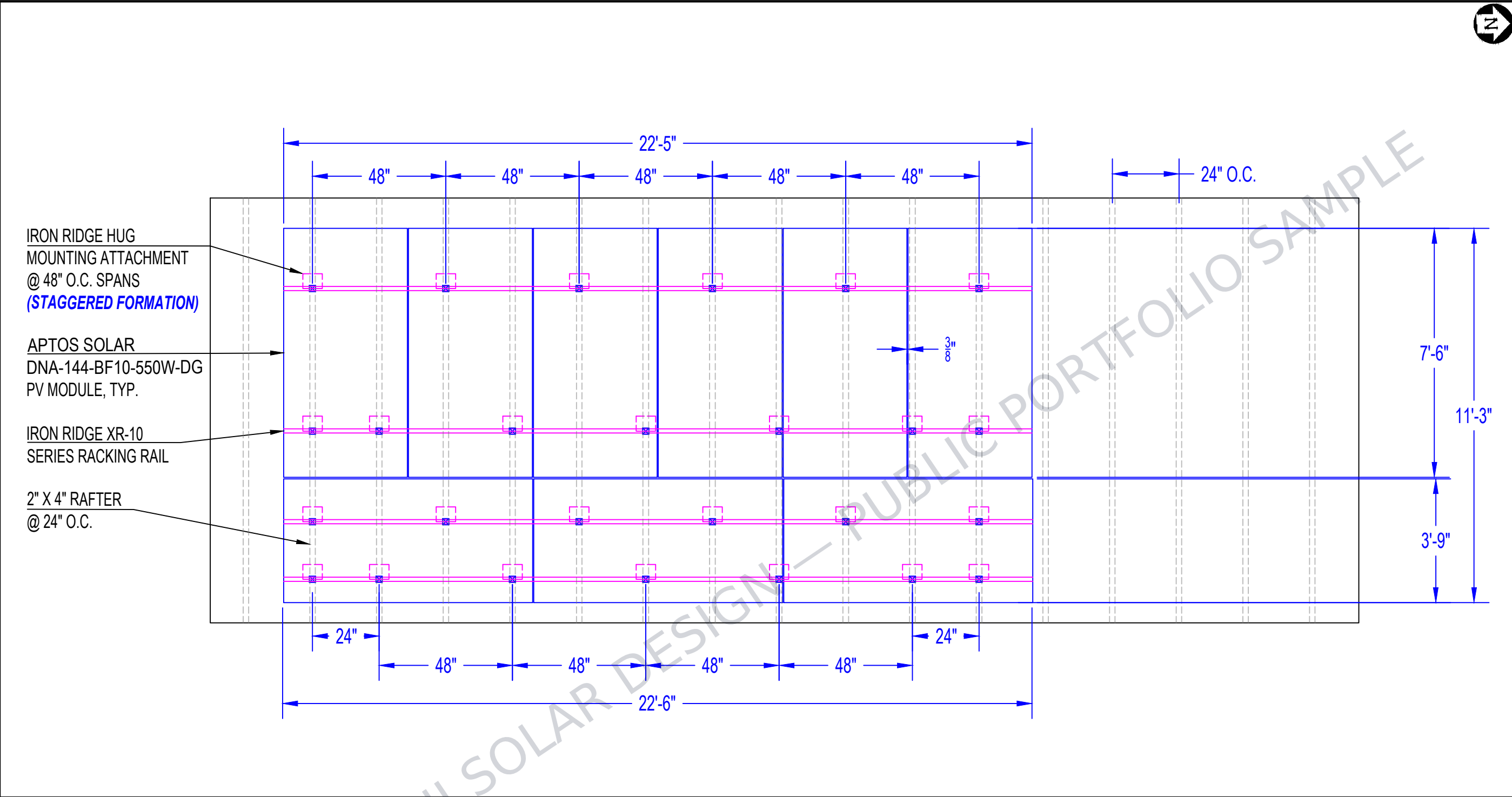
ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"

LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	9
AREA	253.4 SQ. FT
AZIMUTH	271°
TOTAL WEIGHT OF ARRAY	712.7 LBS
DEAD LOAD	2.82 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
SEISMIC DESIGN CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	115 MPH
GROUND SNOW LOAD	30 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-6E FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER (PE).



ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"
LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	9
AREA	253.4 SQ. FT
AZIMUTH	91°
TOTAL WEIGHT OF ARRAY	712.7 LBS
DEAD LOAD	2.82 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
SEISMIC DESIGN CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	115 MPH
GROUND SNOW LOAD	30 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-6E FOR A STRUCTURAL CERTIFICATION LETTER FOR THE IRON RIDGE FLUSH MOUNT SYSTEM. LETTER IS STAMPED BY A STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER (PE).

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLAN DESIGNER INFORMATION

COMPANY

NAME

ADDRESS

PHONE

PLAN DESIGNER SIGNATURE

GEMINI SOLAR DESIGN, LLC.

SANJAY CHRISTOPHER MALLIPUDI

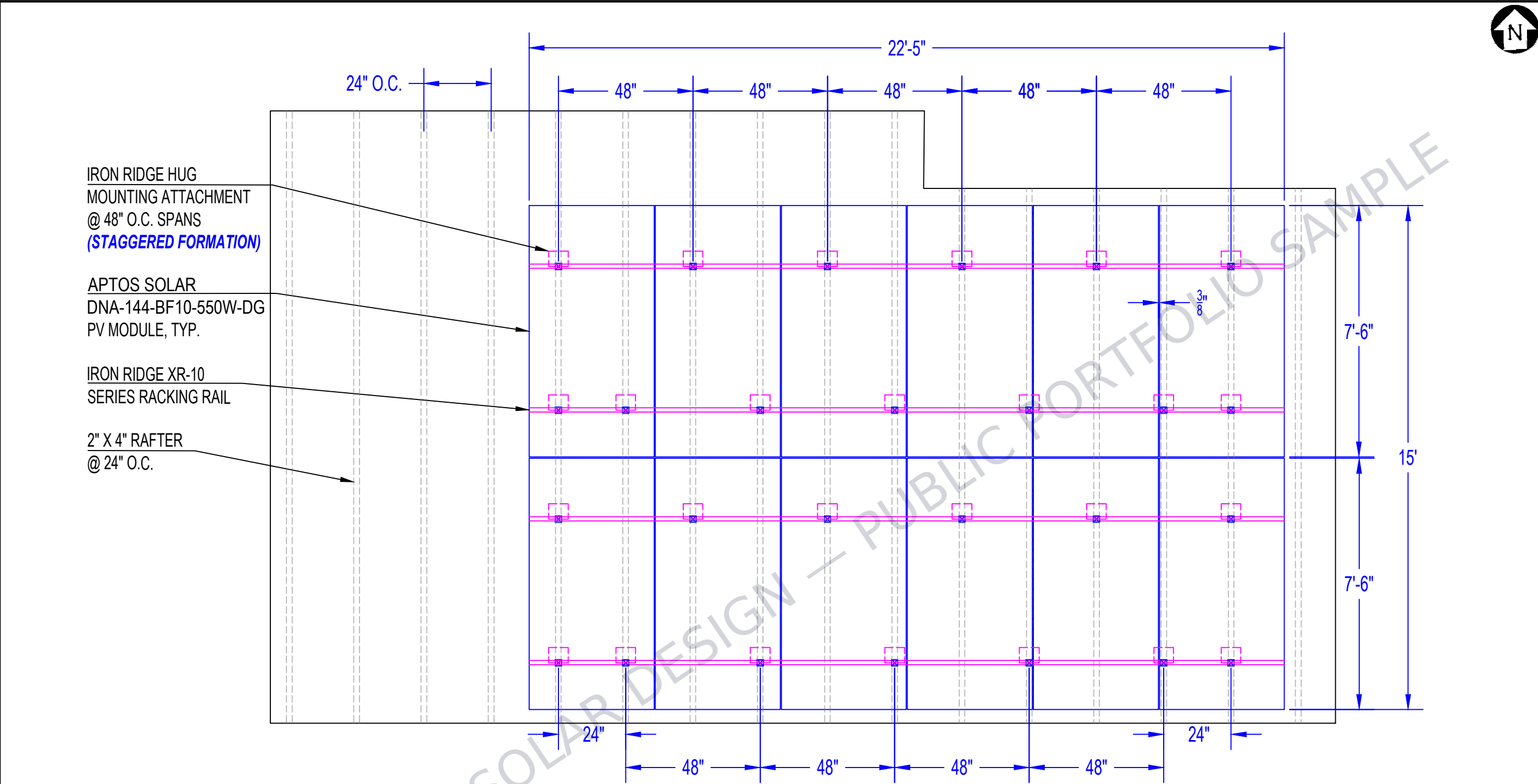
495 HOWARD HEIGHTS ROAD
FRESHWATER, CA 95503

(609) 802-5743

ATTACHMENT PLAN

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-5B



OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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	

ROOF INFORMATION	
ROOF TYPE	COMPOSITE SHINGLE
PITCH	4:12
RAFTER SPACING	24" O.C.
RAFTER DIMENSIONS	2" X 4"
LAYOUT SPECIFICATIONS	
NUMBER OF MODULES	12
AREA	337.8 SQ. FT
AZIMUTH	181°
TOTAL WEIGHT OF ARRAY	950.2 LBS
DEAD LOAD	2.82 PSF

LOCAL DESIGN CRITERIA	
WIND EXPOSURE CATEGORY	B
SEISMIC DESIGN CATEGORY	B
RISK CATEGORY	II
DESIGN WIND SPEED	115 MPH
GROUND SNOW LOAD	30 PSF
PV MODULES AND IRON RACKING SYSTEM HAVE A CLASS A FIRE RATING CLASSIFICATION.	

ATTACHMENT PLAN NOTES	
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ATTACHMENT PLAN

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-5C



Tech Brief

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.™



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).

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.

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.

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.

OWNER-BUILDER

NAME: (INFO WITHHELD)

PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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

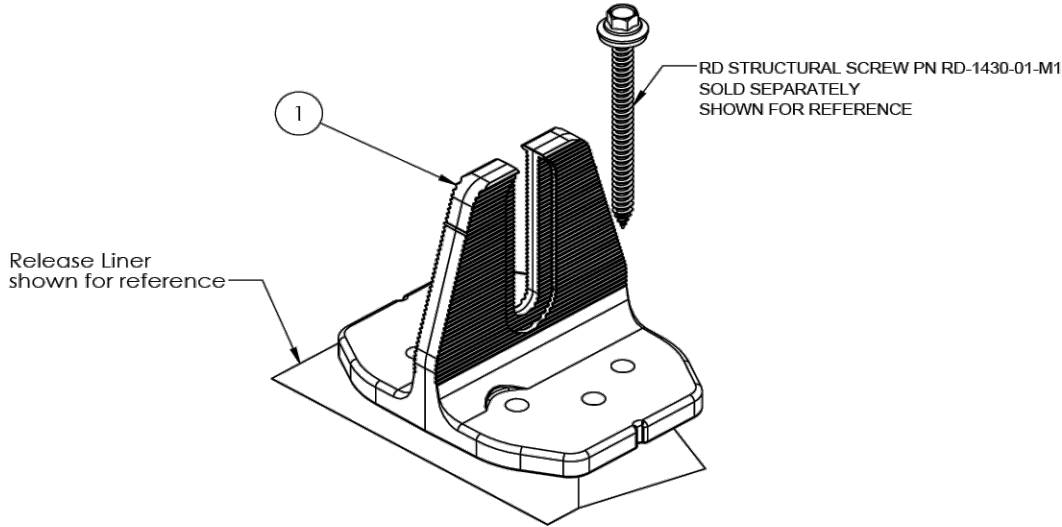
MOUNTING DETAIL

PROJECT NO: GSD-20251115-SCM

DRAWN BY: SCM

DATE: 11/15/2025

PV-6A



RD STRUCTURAL SCREW PN RD-1430-01-M1
SOLD SEPARATELY
SHOWN FOR REFERENCE

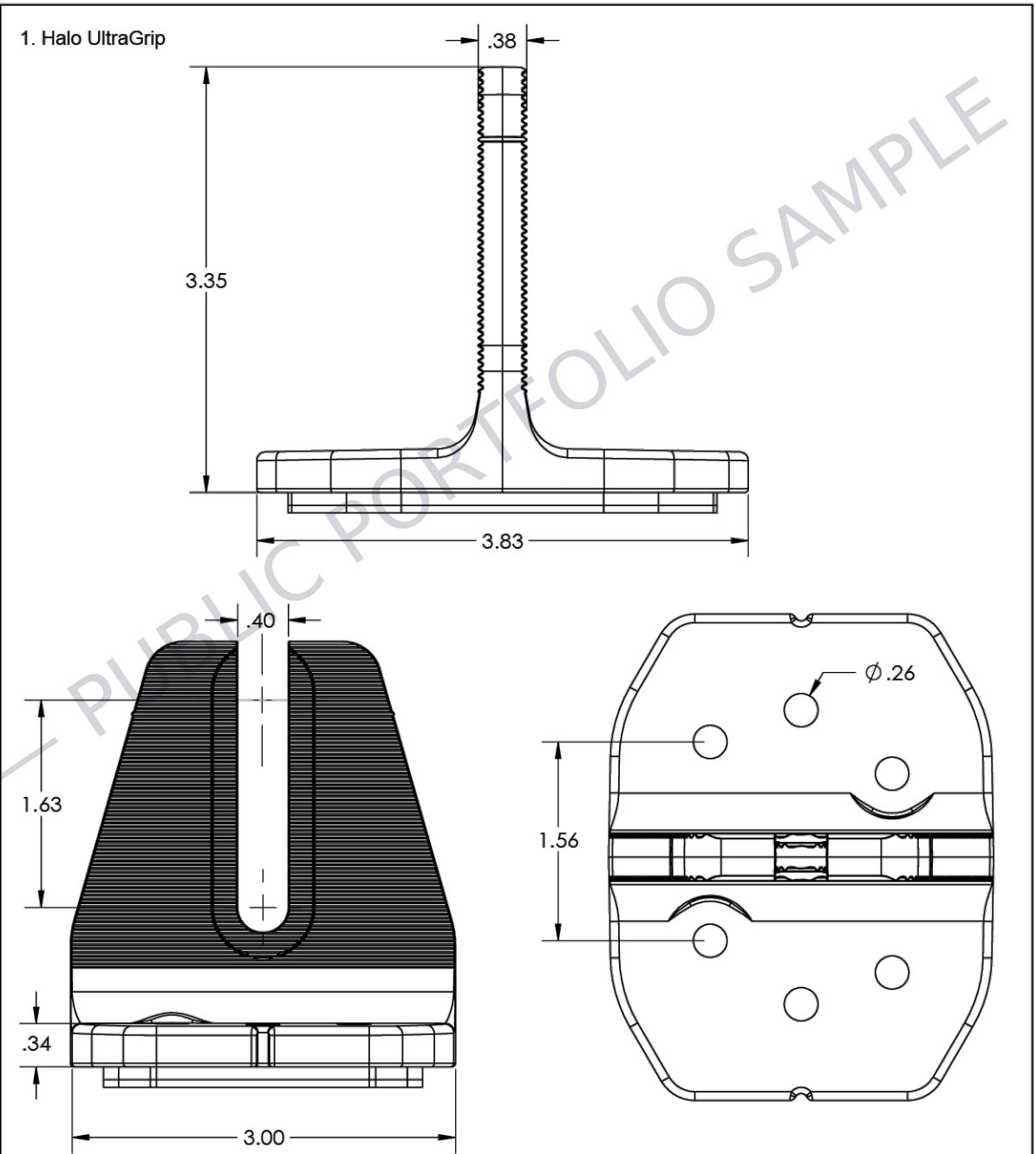
Release Liner
shown for reference

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

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



1. Halo UltraGrip

Dimensions: 3.35, .38, 3.83, 1.63, .40, .34, 3.00, 1.56, $\phi .26$

Property	Value
Material	300 Series Aluminium
Finish	Mill or Black

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

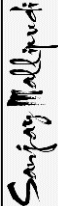
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GRID-TIED SOLAR SYSTEM 16.50kW DC
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PLAN DESIGNER SIGNATURE	

MOUNTING DETAIL

PROJECT NO: GSD-20251115-SCM
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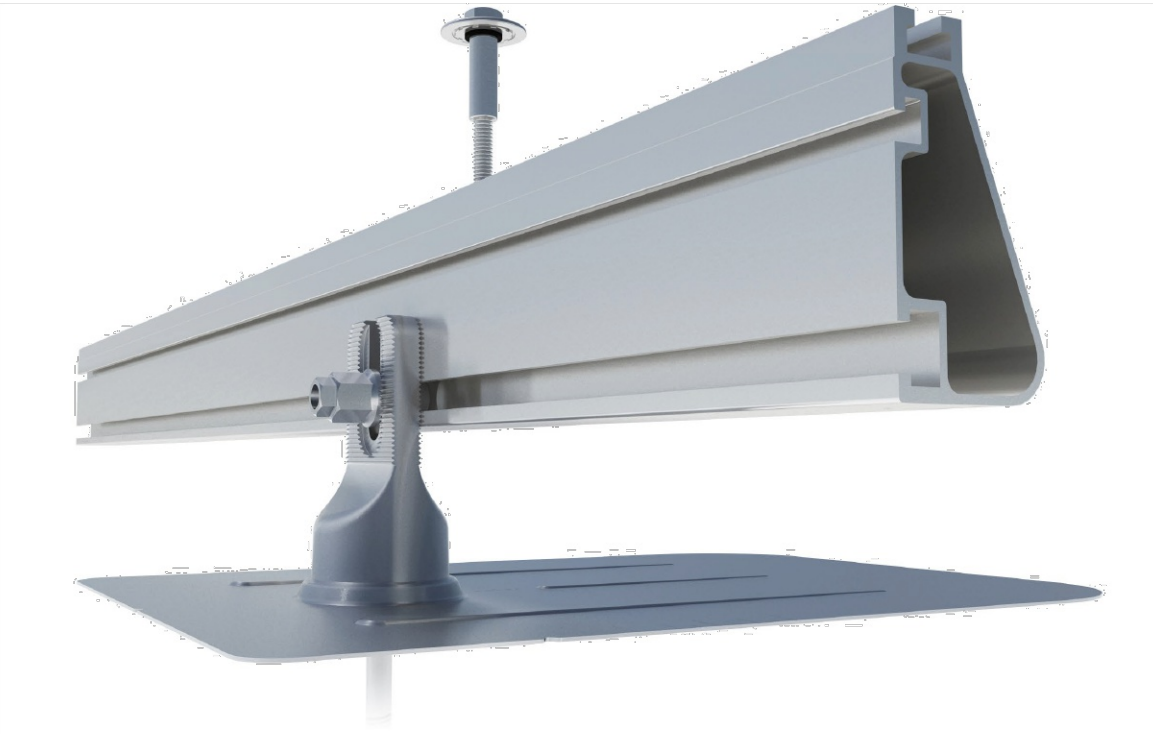
PV-6B



Flush Mount System

Datasheet

Datasheet



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.

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

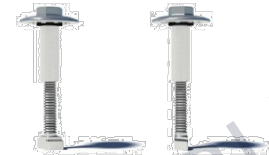


All rails use internal splices for seamless connections.

- 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

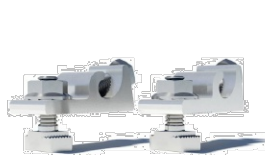
CAMO



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

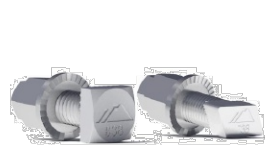
Slotted L-Feet



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



NABCEP Certified Training

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

Go to IronRidge.com/training

© 2018 IronRidge, Inc. All rights reserved. U.S. Patents: #8,695,290; #9,819,303; #9,665,936; Others Pending. Version 1.60

OWNER-BUILDER

NAME: (INFO WITHHELD)

PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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

RACKING DATASHEET

PROJECT NO: GSD-20251115-SCM

DRAWN BY: SCM

DATE: 11/15/2025

PV-6C



Tech Brief

Class A Fire Rating



8431 Murphy Drive
Middleton, WI 53562 USA

Telephone: 608.836.4400
Facsimile: 608.831.9279
www.intertek.com

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.

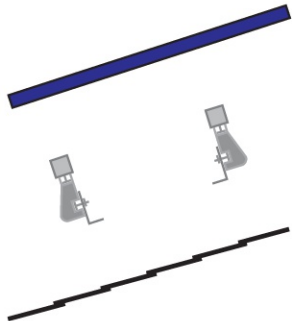
Fire Testing Process

Test Setup

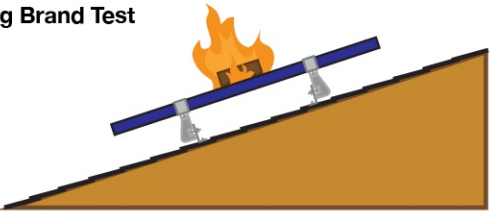
Solar Modules
Solar modules are given a Type classification based on their materials and construction.

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.

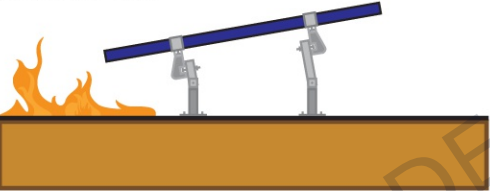


Burning Brand Test



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.

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.

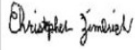
Completed by:

Chris Zimbrich
Technician II, Fire Resistance

Reviewed by:

Chad Naggs
Technician I, Fire Resistance

Signature:



Signature:



Date:

05/25/2016

Date:

05/25/2016

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



CLASS A FIRE RATING DATASHEET
SCALE: NTS

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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(INFO WITHHELD FOR PUBLIC SAMPLE)

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NAME	SANJAY CHRISTOPHER MALLIPUDI
ADDRESS	495 HOWARD HEIGHTS ROAD FRESHWATER, CA 95503
PHONE	(609) 802-5743
PLAN DESIGNER SIGNATURE	

CLASS A FIRE RATING

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-6D



Attn: Sean McDonald, CEO, IronRidge Inc.
Date: May 15th, 2025

Re: Report #7.16 XR10: Engineering Certification and Span Tables for the IronRidge XR10 Rail Flush Mount System, for Gable and Hip roofs, Rev B.

This letter certifies the loading criteria and design basis used for the structural analysis of the IronRidge XR System as shown in Report # 7.16 XR10 " Engineering Certification and Span Tables for the IronRidge XR10 Rail Flush Mount System, for Gable and Hip roofs, Rev B". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications. The Span Tables provided in the referenced report may be used when all conditions of the design criteria provided therein are met. Requirements for loading conditions that are not certified in this letter can be determined by using the online Design Assistant at [IronRidge.com](https://www.ironridge.com).

- Building Codes:
- ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
 - 2021 International Building Code (IBC-2021)
 - AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
 - Aluminum Design Manual 2020, by The Aluminum Association, Inc.
 - ANSI/AWC NDS-2018, National Design Specification for Wood Construction, by the American Wood Council

Please note our evaluation only applies to IronRidge products and excludes the structural adequacy of the chosen roof attachments, PV modules, or underlying roof supporting members. It shall be the responsibility of the installer or system designer to verify the structural capacity and adequacy of the referenced system components with respect to the applied or resultant loads of the chosen array configuration.

Sincerely,



Nancy Schubert, P.E.

Nancy Schubert

Digitally signed by
Nancy Schubert
Date: 2025.05.15
11:20:29 -04'00'

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 60820, Expiration Date: 3/27/2027.



Re: Report #7.16 XR10: Engineering Certification and Span Tables for the IronRidge XR10 Rail Flush Mount System, for Gable and Hip Roofs, Rev B.

This report addresses the structural performance and code compliance of IronRidge's XR Rail Flush Mount System. The contents of the report shall be reviewed in its entirety before application to any project design. The XR Rail 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 roof attachment with 3/8" stainless steel bonding hardware and the attachment is secured directly to the underlying roof structure. Assembly details of a typical XR Rail Flush Mount System installation and its core components are shown in Exhibit EX-0015.

The IronRidge XR Rail 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.

- Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16
- SEAO (Structural Engineers Association of California) report PV2-2017 Wind Design for Solar Arrays
- AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
- Aluminum Design Manual (ADM) 2015/2020, by the Aluminum Association, Inc.

The span tables provided in this report 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 report 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.

The span tables included in this report provide the maximum allowable spans of XR Rail Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones provided in ASCE 7 for enclosed and partially enclosed gable & hip roof profiles with roof slopes of 8° to 60°.

The tabulated spans are applicable when the following conditions are met:

- Span* is the distance between two adjacent attachment points and is to be measured with respect to the center of the attachment fastener.
- 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 are conservatively deemed applicable for 3 rail systems.
- The underlying roof slope, measured between the roof surface and horizontal plane, is 8° to 60°.
- The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade for roofs with pitches above 10 degrees and defined as the eave height for roofs with pitches less than or equal to 10 degrees, does not exceed 30 feet.

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
[IronRidge.com](https://www.ironridge.com)

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (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.

GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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				

ENGINEERING LETTER

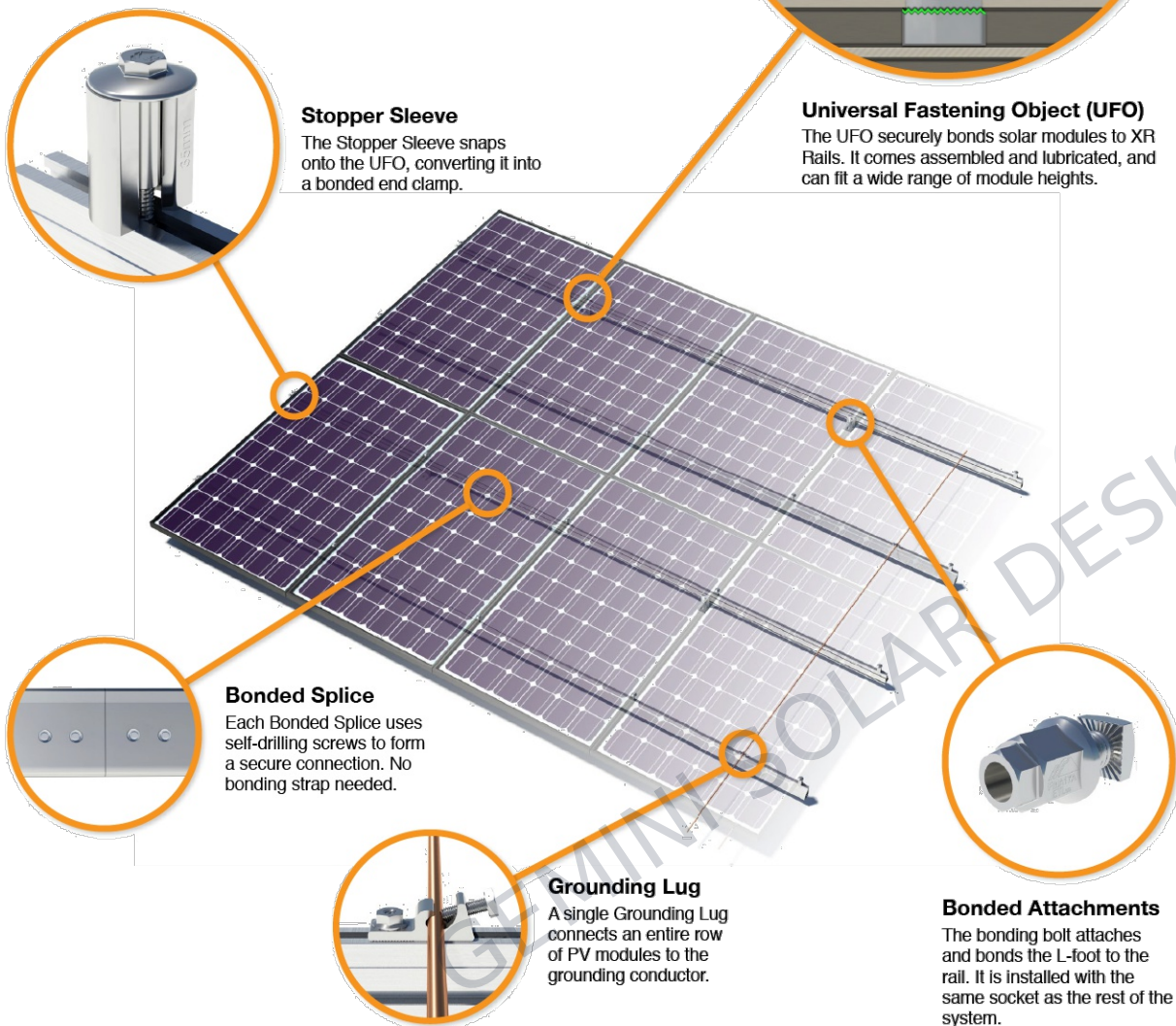
PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-6E

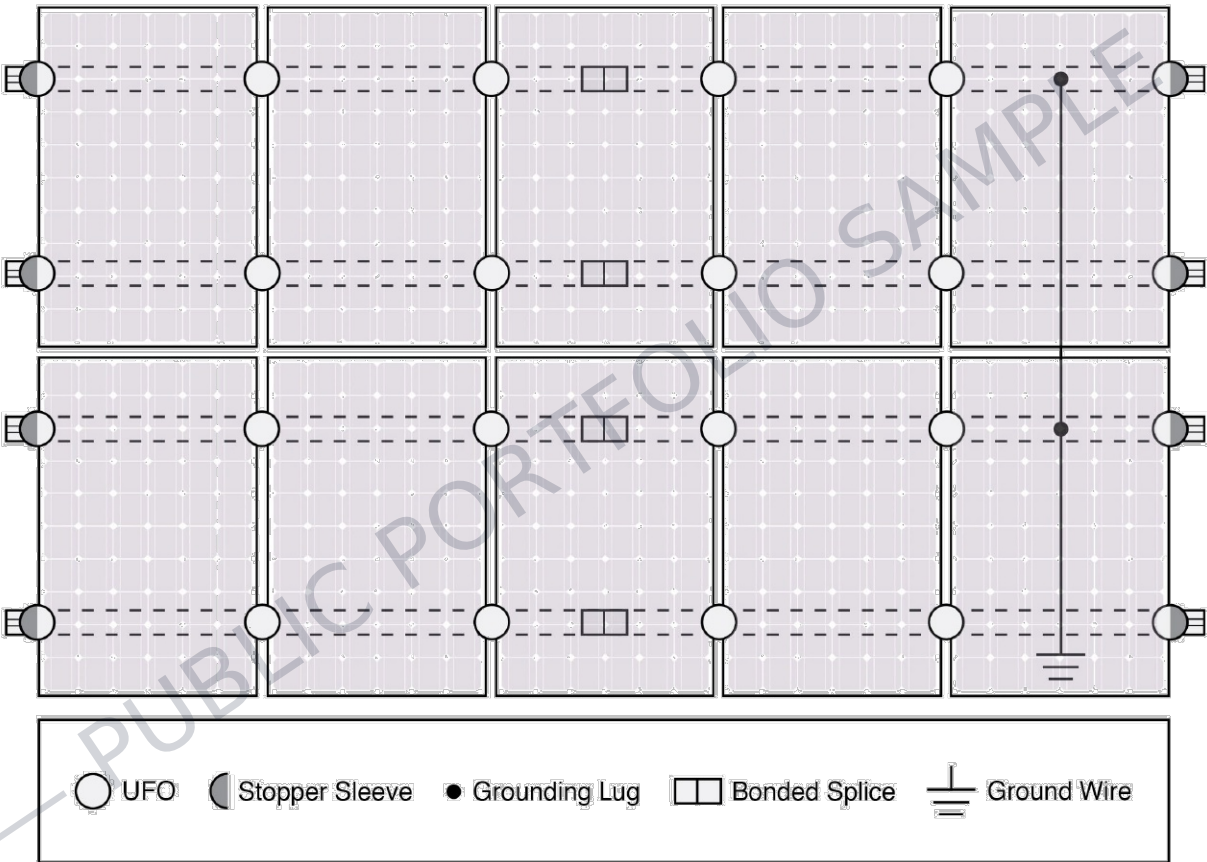
Simplified Grounding for Every Application

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

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



System Diagram



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.		

OWNER-BUILDER
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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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	

GROUNDING DETAILS

PROJECT NO: GSD-20251115-SCM
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DATE: 11/15/2025

PV-6F



DNA™ 144-Bifacial Dual Glass

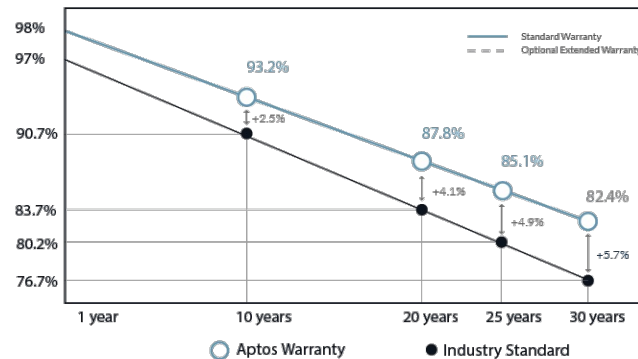
Solar for Innovators

540W | 545W | 550W

DNA-144-BF10-550W-DG
Residential | Commercial

Our DNA Split Cell Series uses advanced selective emitter PERC technology with thin film layers to improve heat tolerance, maximize energy harvest, minimize resistive loss, and use 5% more of the available active area for optimal power performance.

Linear Performance Warranty



Designed & Engineered In
Silicon Valley

Key Features



Advanced Technology
Patented DNA™ technology boosts power performance & module efficiency.



Aesthetics
All black design with advanced split cell technology features 10 ultra-thin busbars that allow for less resistance and greater energy harvest.



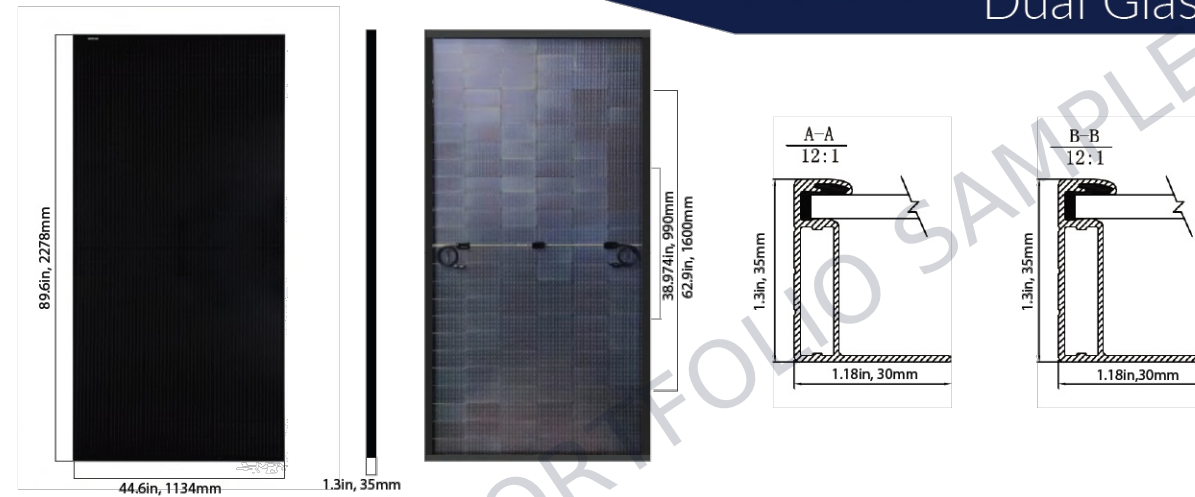
Durable Design
Robust product design is resilient in extreme weather. Up to 5400 Pa snow load and 4000 Pa wind load



Awards
Winners of the Leadership in Solar Energy award for three consecutive years and listed as one of the Top Solar Products from 2021-2022.



Bankable Investment
Comprehensive warranty that covers both 30-year product and 30-year power performance.



Electrical Specifications	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
STC Rated Output P _{mp} (W)	540W	545W	550W
Module Efficiency	20.90%	21.09%	21.29%
Open Circuit Voltage V _{oc} (V)	49.50	49.65	49.80
Short Circuit Current I _{sc} (A)	13.85	13.92	13.99
Rated Voltage V _{mp} (V)	41.65	41.80	41.95
Rated Voltage I _{mp} (A)	12.97	13.04	13.11

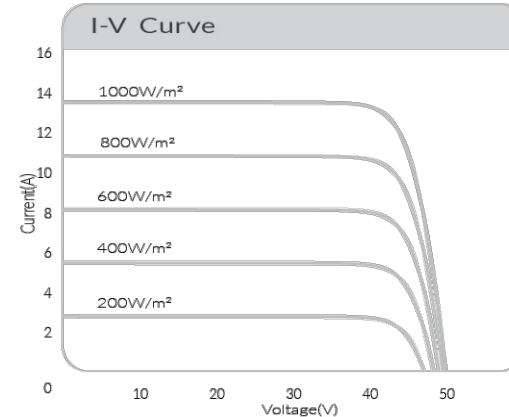
Bifacial Output-Rearside Power Gain	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
5%-Maximum Power (P _{max})	567W	572W	578W
5%-Module Efficiency STC(%)	21.94%	22.14%	22.35%
15%-Maximum Power (P _{max})	621W	627W	633W
15%-Module Efficiency STC(%)	24.03%	24.27%	24.50%
25%-Maximum Power (P _{max})	675W	682W	688W
25%-Module Efficiency STC(%)	26.12%	26.40%	26.63%

Test Operating Conditions	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
Maximum Series Fuse	30A		
Maximum System Voltage	1,500 VDC (UL&IEC)		
Maximum Load Capacity (Per UL 1703)	5400 PA Snow Load / 4000 Pa Wind Load		
Fire Performance Class	Class C/Type 29		

Temperature Coefficients	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
Temperature Coefficients P _{mp}	-0.390%/°C	-0.390%/°C	-0.390%/°C
Temperature Coefficients I _{sc}	+0.06%/°C	+0.06%/°C	+0.06%/°C
Temperature Coefficients V _{oc}	-0.300%/°C	-0.300%/°C	-0.300%/°C
Normal Operating Cell Temperature (NOCT)	45°C±2°C		

2081 Business Center Drive, Ste 100
Irvine, CA 92612
www.aptossolar.com | sales@aptossolar.com

Mechanical Properties	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
Cell Type	Monocrystalline		
Glass	AR Coating, High Transmission, Low Iron, Semi-Tempered Dual Glass		
Frame	Anodized Aluminum Alloy		
Junction Box	IP68		
Dimensions	89.68 X 44.6 X 1.3 in, 2278 X 1134 X 35 mm		
Weight	71.20 lbs		
Output Cable	4mm2 (EU)12AWG,(1200mm)		
Cable Length	47.2in, 1200mm		
Connector Type	Staubli EVO2		



Packaging Configuration	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
Modules per Pallet	31		
Pallets per 40ft. Container	20		
Pallet Dimensions	91.06 X 44.48 X 49.76 in		
Pallet Weight (lbs)	2208		
Modules per 40ft. Container	620		

Certifications	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
UL	C222 No.61730-1-19 C222 No.61730-2-19		
TUV	IEC61730-1 IEC61730-2		
CE			

Aptos Solar Technology reserves the right to make specification changes without notice.

OWNER-BUILDER
NAME: (INFO WITHHELD)
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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

PLAN DESIGNER INFORMATION	DNA-144-BF10-540W-DG	DNA-144-BF10-545W-DG	DNA-144-BF10-550W-DG
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		

MODULE DATASHEET

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-7



EG4® 18KPV-12LV Hybrid Inverter/Charger

The EG4® 18KPV is a 48V split phase, hybrid inverter/charger capable of utilizing 18kW of PV and efficiently outputting 12kW of power while charging your battery bank. You can parallel up to 10 units for 120kW of AC power and control multiple stations and units using the new EG4® monitoring software.

AC Coupling
Capability

Remote Adjustments
via EG4® Software

10-Year Warranty

All-In-One Hybrid Inverter

Capable of running entirely off the grid, using grid electricity, or selling power back to the grid.

600VDC Max

The extra high voltage enables lower cable sizing for the 3 MPPTs and a maximum recommended PV input of 21,000W. Eliminating the need for a combiner box.

Mountable Wi-Fi Device

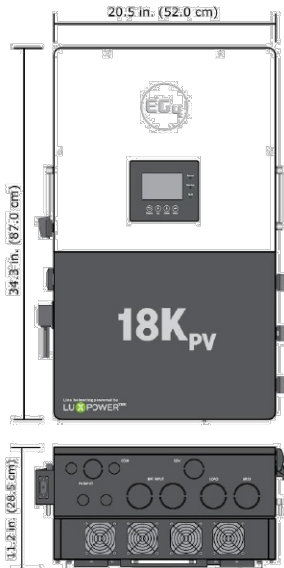
Enables wireless connection between our new monitoring platform and the 18KPV through the app or online website.

Closed-Loop Communications

Able to communicate with EG4® 48V batteries and other battery brands. *A firmware update is required for closed-loop communications with LifePower4 batteries.

High Frequency, Split Phase Output

Allows for 120/240V with a single unit or 120/208VAC service operation.



EG4® 18KPV-12LV Hybrid Inverter/Charger

AC Input Data	
Nominal AC Voltage	240 208VAC
Frequency	50/60Hz
Max. Continuous AC Current	50A
AC Grid Output Data	
Max. Continuous Output Current	50A
AC Bypass (Grid)	200A
Rated Voltage	240VAC
Operating Voltage Range	180–270VAC
Nominal Power Output (W)	@ 240V 12kW / @ 208V 10.4kW
Operating Frequency	50/60Hz
Phase Shift	0.99@ full load
Reactive Power Adjust Range	(-0.8) – (+0.8) leading adjustable
Sync Inrush Current	35A
Backup/UPS AC Output Data	
Rated Output Current (240V/208V)	50A
AC Bypass (Generator)	90A
Nominal Output Voltage (V)	240 120/240 120/208 VAC
Rated Output Power (W)	@ 240VAC 12kW / @ 208VAC 10.4kW
Max Cont. Line Wattage	8kW per 120V
Peak Power (W)	With PV: 14.7kW (10 min), 15.5kW (5 min) Without PV: 13.5kW (10 min)
Operating Frequency	50/60Hz
THDV (Total Harmonic Distortion Voltage)	<5%
Switching Time	10ms
PV Input Data	
Number of MPPTs	3
Inputs per MPPT	2/1/1
Max. Usable Input Current	25/15/15A
Max. Short Circuit Input Current	31/19/19A
DC Input Voltage Range	100–600 VDC
Unit Startup Voltage	100 VDC
Load Output Minimum Voltage	>140 VDC
MPP Operating Voltage Range	120–500 VDC
Full Power MPPT Voltage Range	230–500 VDC
Nominal MPPT Voltage	360 VDC
Maximum Utilized Solar Power	18kW
Recommended Maximum Solar Input	21kW



EG4® 18KPV-12LV Hybrid Inverter/Charger

Standards and Certifications	
Safety	
UL1741SB Rule 21	Yes
Rapid Shut Down (RSD) NEC 2020:690.12	Yes
Arc-Fault Circuit Interrupter (AFCI) NEC 2020:690.11 / UL1699B	Yes
Ground Fault Monitoring (GFDI) NEC 2020:690.41(B)	Yes
CSA 22.2.107.1	Yes
CSA 22.2.330	Yes
Grid Connection	
IEEE 1547.1:2020; IEEE 1547:2018	Yes
Hawaii Rule 14H	Yes
California Rule 21 Phase I, II, III	Yes
EMC	
FCC Part 15 Class B	Yes
Outdoor Rating	
NEMA 4X / IP65	Yes



OWNER-BUILDER

NAME: (INFO WITHHELD)

PHONE: (INFO WITHHELD)

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TO ANYONE EXCEPT THOSE INVOLVED IN THE
DESIGN AND INSTALLATION OF THE PV SYSTEM
REPRESENTED IN THIS PLAN.

GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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*

INVERTER DATASHEET

PROJECT NO: GSD-20251115-SCM

DRAWN BY: SCM

DATE: 11/15/2025

PV-8A



AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: EG4 Electronics LLC **Manufacturer:** Shenzhen Sea Star Industry Co., Ltd.

Address: 1130 Como Street South Sulphur Springs, TX 75482 **Address:** No.10, JinLong 1st Road, Baolong Community, Longgang District, ShenZhen, China

Country: USA **Country:** China

Party Authorized To Apply Mark: Same as Manufacturer

Report Issuing Office: Intertek Testing Services Shenzhen Limited Guangzhou Branch

Control Number: 5025969 **Authorized by:** [Signature] for L. Matthew Snyder, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement and in this Authorization to Mark. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow-up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement; they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

Grid Support Utility Interactive Inverters and Converters Based Upon IEEE 1547:2018 & IEEE 1547.1:2020 - Supplement SB to UL 1741:2021 Ed.3 - Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3 (Supplement SB)]

Power Conversion Equipment [CSA C22.2#107.1:2016 Ed.4]

Photovoltaic Rapid Shutdown Systems [CSA C22.2#330:2017 Ed.1]

Standard(s):

IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces [IEEE 1547:2018]

IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces [IEEE 1547.1:2020]

Hawaiian Electric IEEE 1547.1-2020 Standard Source Requirements Document Version 2.0 [HECO SRD-IEEE-1547.1:2020 Ed.2.0]

Product:

Grid Support Hybrid inverter

Brand Name:

EG4 ELECTRONICS

Models:

18KPV-12LV

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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	[Signature: Sanjay Mallipudi]

INVERTER UL CERT.

PROJECT NO: GSD-20251115-SCM

DRAWN BY: SCM

DATE: 11/15/2025

PV-8B



Test Verification of Conformity

Verification Number: 250702156GZU-VOC004

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

Applicant Name & Address:	EG4 Electronics LLC 1130 Como Street South, Sulphur Springs, TX 75482
Product Description:	Grid Support Hybrid inverter
Ratings & Principle Characteristics:	Max input voltage (dc):600V Battery voltage operating range (dc):40-60V Nominal AC voltage:208Vac/240Vac Nominal AC frequency:60Hz
Models/Type References:	18KPV-12LV or IV-12000-HYB-AW- may be followed by 00-99, 18KPV-11.4LV or IV-11400-HYB-AW- may be followed by 00-99
Brand Names:	EG4 ELECTRONICS
Specification<s>/Standards:	Outline of Investigation for Power Control Systems [UL 3141 Issue Number: 1 January 11, 2024] Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3] CRD for Power Control Systems (PCS) issued on March 8, 2019
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
Date of Tests:	06 Jul. 2025 - 20 Jul. 2025
Test Report Number(s):	250702156GZU-004, 18 Aug2025

Jason Fu

Signature

Name: Jason Fu
Position: Manager
Date: 19 August 2025

This Verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Verification. Only the Client is authorized to permit copying or distribution of this Verification. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Verification are relevant only to the sample tested/inspected. This Verification by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

OWNER-BUILDER	
NAME: (INFO WITHHELD)	
PHONE: (INFO WITHHELD)	
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GRID-TIED SOLAR SYSTEM 16.50kW DC WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)	(INFO WITHHELD FOR PUBLIC SAMPLE)
PLAN DESIGNER INFORMATION	COMPANY
	NAME
	ADDRESS
	PHONE
	PLAN DESIGNER SIGNATURE
INVERTER UL CERT.	
PROJECT NO: GSD-20251115-SCM	
DRAWN BY: SCM	
DATE: 11/15/2025	
PV-8C	

EG4® LiFePower4 48V
LITHIUM BATTERY



EG4 LiFePower4 batteries offer second to none price to performance. Get peace of mind knowing these batteries are designed to last more than 7000 deep charge and discharge cycles: beyond 15 years with an 80% depth of discharge daily!

5.12 kWh
STORAGE
CAPACITY

BUILT-IN BMS

UL 1973
LISTED
UL 9540A

CLOSED LOOP COMMUNICATIONS

Compatible with EG4, Schneider, and Growatt inverters.

PC MONITORING SOFTWARE

See real-time statistics of your battery.

PARALLEL UP TO 16 BATTERIES

Get the most power possible! Up to 81.9 kWh while maintaining BMS communications.

DUAL ON-BOARD FIRE ARRESTORS & BUILT-IN CIRCUIT BREAKER

Offers fail-safe operation in high-risk environments and protects against rare hardware failure when using high voltage solar charge controllers.

RACK-MOUNT DESIGN

4U server rack mounting makes the battery convenient to store and use.

EG4 ELECTRONICS

TECHNICAL SPECIFICATIONS

MODULE OPERATING PARAMETERS			
TOTAL ENERGY STORAGE			5.12kWh
VOLTAGE			51.2V
CAPACITY			100Ah
CHARGING VOLTAGE (BULK/ABSORB)			56.2V (+/- 0.2V)
FLOAT			54V (+/- 0.2V)
SOC CUTOFF			20%*
MAX. CHARGING CURRENT			100A (30 - 50A recommended)
MAX. DISCHARGING CURRENT			100A
ENVIRONMENTAL PARAMETERS			
CHARGING RANGE			32°F - 122°F (0°C - 50°C)
DISCHARGING RANGE			-4°F - 131°F (-20°C - 55°C)
STORAGE RANGE (OPTIMAL)			32°F - 113°F (0°C - 45°C)
INGRESS PROTECTION			IP21
ALTITUDE			<9843ft. (3000m)
BMS PARAMETERS			
CHARGE	SPEC	DELAY	RECOVERY
CELL VOLTAGE PROTECTION	3.65V	1 sec	3.6V
MODULE VOLTAGE PROTECTION	58.4V	1 sec	57.6V
CHARGE OVER CURRENT 1	>100A	20 sec	
CHARGE OVER CURRENT 2	≥120A	2 sec	
TEMPERATURE PROTECTION	<32°F or >131°F (<0°C or >55°C)	1 sec	
DISCHARGE	SPEC	DELAY	RECOVERY
CELL VOLTAGE PROTECTION	2.5V	1 sec	2.7V
MODULE VOLTAGE PROTECTION	40.0V	1 sec	43.2V
DISCHARGE OVER CURRENT 1	>100A	10 sec	60 sec
DISCHARGE OVER CURRENT 2	>150A	3 sec	60 sec
SHORT CIRCUIT	>250A	1 sec	
TEMPERATURE PROTECTION	<-4°F or >140°F (<-20°C or >60°C)	1 sec	
BMS		PARAMETER	CONDITION
PCB TEMPERATURE PROTECTION		>203°F (>95°C) Delay: 1 sec	Recovery: <167°F (<75°C)
CELL BALANCE		100mA Passive Balance	Cell Voltage Difference: >40mV
TEMPERATURE ACCURACY		3% Cycle Measurement	Measuring Range -40°F - 212°F (-40°C - 100°C)
VOLTAGE ACCURACY		0.5% Cycle Measurement	For Cells & Module
CURRENT ACCURACY		3% Cycle Measurement	Measuring Range: -200 - 200A
SOC		5% -	Integral Calculation
POWER CONSUMPTION		Sleep & Off Mode <300uA Delay: 1 sec	Storage/Transport
		Operating Mode <14mA	Charging/Discharging
COMMUNICATION PORTS		RS485	Can be Customized
PRODUCT DIMENSIONS			
EXTERIOR DIMENSIONS (H×W×D)		6.1 in.×17.4 in.×18.5 in. (155mm×442mm×470mm)	
WEIGHT		102 lbs. (46.3kg)	
*EG4 recommends this value be set no lower than 20% to maintain the recommended 80% depth of discharge.			

OWNER-BUILDER
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PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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

BATTERY MODULE

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-9A

CERTIFICATE OF COMPLIANCE

Certificate Number MH65889
Report Reference MH65889-20220920
Issue Date 2022-SEPTEMBER-20

Issued to: EG4 ELECTRONICS LLC
1130 COMO ST S
SULPHUR SPRINGS, TX, 75482-4502 UNITED STATES

This certificate confirms that
representative samples of

COMPONENT - BATTERIES FOR USE IN STATIONARY
AND MOTIVE AUXILIARY POWER APPLICATIONS
Module: PPS-ME21-51.2V100AH,
EG4-LifePower4 Lithium Battery 48V100AH

Have been evaluated by UL in accordance with the
component requirements in the Standard(s) indicated on
this Certificate. UL Recognized components are incomplete
in certain constructional features or restricted in
performance capabilities and are intended for installation in
complete equipment submitted for investigation to UL LLC.

Standard(s) for Safety: ANSI/UL 1973 - Standard for Batteries for Use in Stationary,
Vehicle Auxiliary Power and Light Electric Rail (LER)
Applications. UL 991 - Test for Safety-Related Controls
Employing Solid-State Devices. ANSI/UL 1998 - Standard
for Software in Programmable Components

Additional Information: See UL Product iQ® at <https://iq.ulprospector.com> for
additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification
report have met the requirements for UL certification. It does not provide authorization to apply the UL Recognized


Bruce Mahrenholz, Conformity Assessment Director
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please
contact UL Customer Service at <http://ul.com/aboutul/locations/>



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Component Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing
surveillance provides authorization to apply the UL Mark.

Only those products bearing the UL Recognized Component Mark should be considered as being UL Certified
and covered under UL's Follow-Up Services.

Look for the UL Recognized Component Mark on the product.


Bruce Mahrenholz, Conformity Assessment Director
UL LLC

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OWNER-BUILDER	
NAME: (INFO WITHHELD)	
PHONE: (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.	
GRID-TIED SOLAR SYSTEM 16.50kW DC WITH DC-COUPLED BATTERY STORAGE (WHOLE-HOME BACKUP APPLICATION)	
(INFO WITHHELD FOR PUBLIC SAMPLE)	
PLAN DESIGNER INFORMATION	GEMINI SOLAR DESIGN, LLC. SANJAY CHRISTOPHER MALLIPUDI 495 HOWARD HEIGHTS ROAD FRESHWATER, CA 95503 (609) 802-5743 Sanjay Mallipudi
BATTERY UL CERT.	
PROJECT NO: GSD-20251115-SCM	
DRAWN BY: SCM	
DATE: 11/15/2025	
PV-9B	



TS4-A-F
Module-level rapid shutdown

The TS4-A-F (Fire Safety) is the advanced add-on rapid shutdown solution that brings smart module functionality to standard PV modules for higher reliability. Ensure safety by upgrading existing PV systems or by adding safety features to new installations.

The TS4-A-F complies with NEC 2017, 2020, and 2023 690.12 Rapid Shutdown specifications when installed with the Tigo RSS Transmitter or an inverter with a built-in Tigo certified transmitter.

Features

- High input current rating – now rated for 20 A I_{MP} /25 A I_{SC} to better accommodate bifacial and high-current modules
- Simple, fast installation – snaps to a standard PV module frame or mounts to racking
- Power-line communications (PLC) signaling – rapid shutdown signaling over PV conductors
- Automatic shutdown – PV array enters rapid shutdown mode in the event of AC grid loss
- UL Standards-certified – tested and certified with hundreds of top inverter models
- 25-year warranty

Specifications

	20 A	25 A
Electrical		
Maximum current (I_{MP}/I_{SC})	15 A/20 A	20 A/25 A
Input voltage range (V_{MP})	16 – 80 V	
Maximum input voltage	80 V	
Maximum system voltage (V_{MAX})	1000 V/1500 V*	
Maximum output current (I_{MAX})	15 A	
Maximum output power (P_{MAX})	700 W	
Maximum fuse rating	25 A	30 A
Maximum efficiency	99.9%	
Rapid Shutdown		
TS4 conductor AWG	12	
Rapid shutdown time limit	<30 sec.	
PVRSE-controlled conductor limits	≤ 240 VA, ≤ 8 A, ≤ 30 V _{DC}	
UL 1741-compliant PVRSE	Yes	
Communications	PLC	
Connections		
Input (from module) cable lengths	0.12/0.62 m	
Output (to string) cable lengths	1.2/2 m	
Connectors	MC4/EVO2	

* Depending on UL/IEC certification



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Specifications

	20 A	25 A
Environmental		
Operating temperature range	-40 – 85 °C (-40 – 185 °F)	
Storage temperature range	-40 – 85 °C (-40 – 185 °F)	
Maximum elevation	3000 m (9840 ft.)	
Outdoor IP rating	IP68/NEMA 3R	
Mechanical		
Dimensions (H/W/D)	139.7 x 138.4 x 22.9 mm (5.4 x 5.5 x 0.9 in.)	
Weight	490 g (1.1 lb.)	
General		
Standards compliance	UL 1741 PVSRE, UL 1741 PVRSS, CSA 22.2, IEC 62109, NEC 690.12	
Warranty	25 years	

* 20 A UL rating: -30 – 75 °C (-22 – 167 °F)

Ordering Information

Part Number	V _{MAX}	Certifications UL/IEC	Cable Lengths	Connectors
20 A I _{SC}				
481-00252-20		1500 V/1000 V	1.2/2 m	MC4
481-00252-32		1500 V/1000 V	0.12/1.2 m	MC4
481-00252-62		1500 V/1000 V	0.62/1.2 m	MC4
481-00261-32		1500 V/1500 V	0.12/1.2 m	EVO2
481-00261-62		1500 V/1500 V	0.62/1.2 m	EVO2
481-01252-32		1500 V/1000 V	0.12/1.2 m	MC4
481-01252-62		1500 V/1000 V	0.62/1.2 m	MC4
481-01261-32		1500 V/1500 V	0.12/1.2 m	EVO2
481-01261-62		1500 V/1500 V	0.62/1.2 m	EVO2
25 A I _{SC}				
486-00252-32		1500 V/1000 V	0.12/1.2 m	MC4
486-00252-62		1500 V/1000 V	0.62/1.2 m	MC4
486-00261-32		1500 V/1500 V	0.12/1.2 m	EVO2
486-00261-62		1500 V/1500 V	0.62/1.2 m	EVO2
488-00252-32		1000 V*	0.12/1.2 m	MC4
488-00252-62		1000 V*	0.62/1.2 m	MC4
488-00261-32		1500 V*	0.12/1.2 m	EVO2
488-00261-62		1500 V*	0.62/1.2 m	EVO2

* IEC certified only

More Resources



tigoenergy.com

TS4-A-F Specifications and Ordering Information

OWNER-BUILDER
NAME: (INFO WITHHELD)
PHONE: (INFO WITHHELD)

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GRID-TIED SOLAR SYSTEM 16.50kW DC
WITH DC-COUPLED BATTERY STORAGE
(WHOLE-HOME BACKUP APPLICATION)

(INFO WITHHELD FOR PUBLIC SAMPLE)

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

RAPID SHUTDOWN

PROJECT NO: GSD-20251115-SCM
DRAWN BY: SCM
DATE: 11/15/2025

PV-10A



Tigo®

TS4-A-2F

Module-level PV Rapid Shutdown for two modules

The TS4-A-2F (Fire Safety) is the advanced add-on rapid shutdown solution that brings smart module functionality to standard PV modules for higher reliability. Ensure safety by upgrading existing PV systems or by adding safety features to new installations.

The TS4-A-2F complies with NEC 2017 & 2020 690.12 Rapid Shutdown specifications when installed with the Tigo RSS Transmitter or an inverter with built-in Tigo certified transmitter.

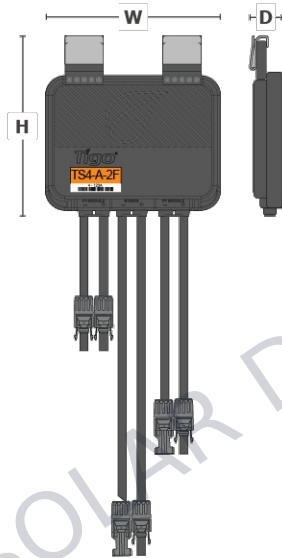
Features

- High input current rating**
Now rated for 20A Imp/ 25A Isc to better accommodate bifacial and high current modules
- Simple, Fast Installation**
Snap to standard PV module frame or remove clips for rack mounting
- PLC Signaling**
Rapid shutdown signaling over PV conductors
- Automatic Shutdown**
PV array enters rapid shutdown in the event of AC grid loss
- PVRSS Certified**
Tested and UL certified with hundreds of top inverter models

Quick Specs

TS4-A-2F		
Dimensions (W x H x D)	138.4 x 139.7 x 22.9mm (5.4 x 5.5 x 0.9in)	
Weight	590g (1.3lbs)	
Max Current (Imp/Isc)*	15A	20A/25A
Max Wattage	1000W	1400W

*Use local codes/requirements to calculate maximum current.



Standard
Warranty



NEC Rapid Shutdown
Compliant

Tigo®

tigoenergy.com

PN: 002-00092-00 | Rev. 2.1 2022.11.3

Electrical Data	15A	25A
Maximum input voltage (per input)	80V	
Operating voltage range ¹	16 - 80V	
Maximum input current (Isc)	N/A	25A per input
Maximum input current (Imp)	15A per input	20A per input
Maximum wattage (total)	1000W (500W per input)	1400W (700W per input)

¹Maximum output voltage of the TS4 is dependent on the PV module voltage. Refer to PV modules nameplate.

Connections

Module Conductor lengths ²	0.12/1.2/1.3m, options available ²
String Conductor lengths	2.2/2.4m, options available ²
Connectors ²	MC4, EVO2, options available ²

²Contact sales for additional connector and conductor length options. MOQ may apply.

General Data

Operating temperature range	-30°C to +80°C (-22°F to +176°F)
Storage temperature range	-40°C to +85°C (-40°F to +185°F)

Recommended fuse rating 30A

Outdoor rating IP68

Maximum altitude 3000m

Efficiency 99.9%

Communication PLC

Rapid Shutdown UL Listed (NEC 2017 & 2020 690.12) Yes

Rapid Shutdown Time Limit 30 secs or less³

Conductor AWG Range 10-12 AWG

PVRSE Controlled Conductors ≤30 Vdc, ≤240VA, ≤8A³

³Limits are based on NEC 690.12 rapid shutdown requirements.

Warranty

25 years

Ordering Information

		UL/IEC	IEC
484-00252-22	TS4-A-2F, 15A, 1000W, 1500V UL/ 1000V IEC, 2.2m Cable, MC4	•	
484-00252-24	TS4-A-2F, 15A, 1000W, 1500V UL/ 1000V IEC, 1.2/1.3/2.4m Cable, MC4	•	
484-00261-22	TS4-A-2F, 15A, 1000W, 1500V UL / IEC, 2.2m Cable, EVO2	•	
484-00261-24	TS4-A-2F, 15A, 1000W, 1500V UL / IEC, 1.2/1.3/2.4m Cable, EVO2	•	
485-00252-22	TS4-A-2F, 25A, 1400W, 1500V UL / 1000V IEC, 0.12/0.2/2.2M Cable, MC4	•	
485-00252-24	TS4-A-2F, 25A, 1400W, 1500V UL / 1000V IEC, 1.2/1.3/2.4m Cable, MC4	•	
485-00261-22	TS4-A-2F, 25A, 1400W, 1500V UL / IEC, 0.12/0.2/2.2m Cable, EVO2	•	
485-00261-24	TS4-A-2F, 25A, 1400W, 1500V UL / IEC, 1.2/1.3/2.4m Cable, EVO2	•	
487-00252-22	TS4-A-2F, 25A, 1400W, 1500V IEC, 0.12/0.2/2.2m Cable, MC4		•
487-00252-24	TS4-A-2F, 25A, 1400W, 1000V IEC, 1.2/1.3/2.4m Cable, MC4		•
487-00261-22	TS4-A-2F, 25A, 1400W, 1500V IEC, 0.12/0.2/2.2M Cable, EVO2		•
487-00261-24	TS4-A-2F, 25A, 1400W, 1500V IEC, 1.2/1.3/2.4m Cable, EVO2		•

Additional resources



Tigo TS4-A-2F



Tigo RSS



Support



Community

Tigo®

Certifications

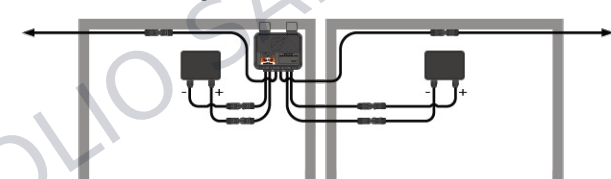
UL1741, PVRSS, CSA22.2, IEC 62109



PVRSS certified inverters

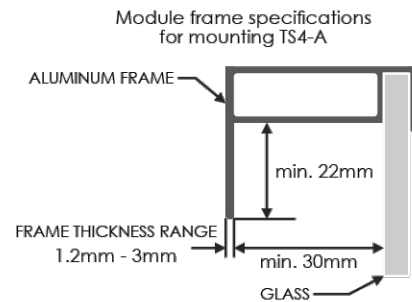
For a list of all PVRSS certified inverters, please see: www.tigoenergy.com/ul-pvrss

Installation example



Installation example: Serial connection of two PV modules to a TS4-A-2F

Module mounting requirements



OWNER-BUILDER

NAME: (INFO WITHHELD)

PHONE: (INFO WITHHELD)

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PHONE (609) 802-5743

PLAN DESIGNER SIGNATURE Sanjay Mallipudi

RAPID SHUTDOWN

PROJECT NO: GSD-20251115-SCM

DRAWN BY: SCM

DATE: 11/15/2025

PV-10B