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PV-3	SINGLE-LINE DIAGRAM
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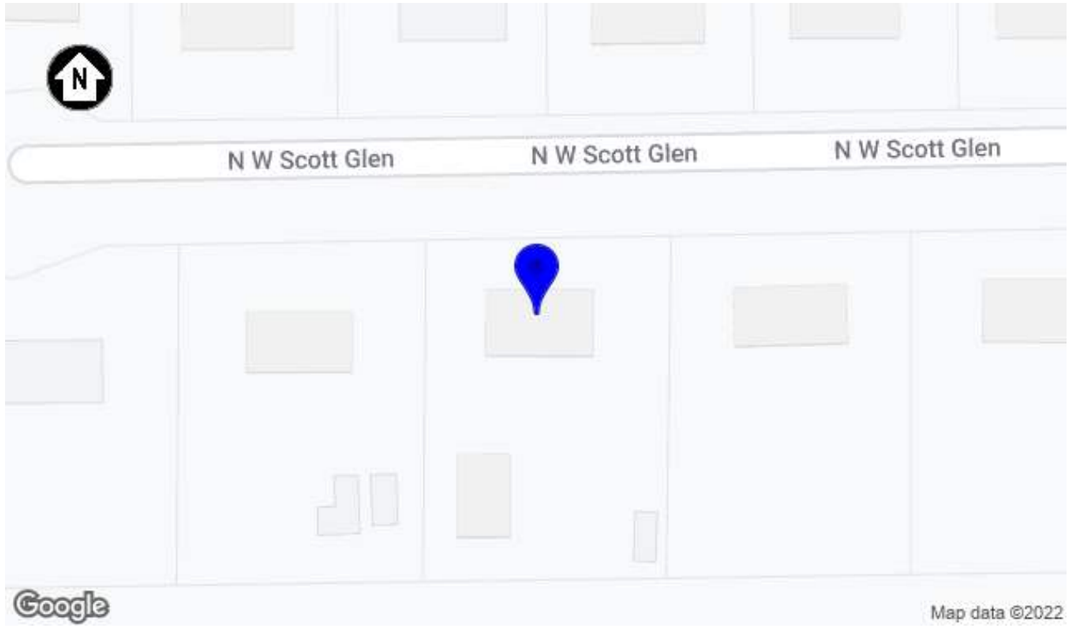
PV-7	FIRE SAFETY PLAN
APPENDIX	MODULE DATASHEET
	INVERTER DATASHEET
	ARRAY WIRING BOX DATASHEET
	DISCONNECT DATASHEET
	MOUNTING SYSTEM DATASHEET
	MOUNTING SYSTEM ENGINEERING LETTER
	UL 2703 CLASS A FIRE CERTIFICATION
	UL 2703 GROUNDING AND BONDING CERTIFICATION
	ANCHOR DATASHEET

PROJECT DETAILS	
PROPERTY OWNER	NATALIE DAVID
PROPERTY ADDRESS	280 N W SCOTT GLEN, LAKE CITY, FL 32055
APN	N/A
ZONING	RESIDENTIAL
USE AND OCCUPANCY CLASSIFICATION	ONE- OR TWO-FAMILY DWELLING GROUP (GROUP R3)
AHJ	COUNTY OF COLUMBIA
UTILITY COMPANY	FLORIDA POWER & LIGHT CO
ELECTRICAL CODE	2017 NEC (NFPA 70)
FIRE CODE	2020 FFPC
OTHER BUILDING CODES	2020 FL BUILDING CODE



1 PV-1 PARCEL
SCALE: NTS

2 PV-1 LOCALE
SCALE: NTS

I REYES M RUIZ DONATE PE# 88991 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE.

SCOPE OF WORK

THIS PROJECT INVOLVES THE INSTALLATION OF A GRID-INTERACTIVE PV SYSTEM. PV MODULES WILL BE MOUNTED USING A PREENGINEERED MOUNTING SYSTEM. THE MODULES WILL BE ELECTRICALLY CONNECTED WITH DC TO AC POWER INVERTERS AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

THIS DOCUMENT HAS BEEN PREPARED TO DESCRIBE THE DESIGN OF A PROPOSED PV SYSTEM WITH ENOUGH DETAIL TO DEMONSTRATE COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS. THE DOCUMENT SHALL NOT BE RELIED UPON AS A SUBSTITUTE FOR FOLLOWING MANUFACTURER INSTALLATION INSTRUCTIONS. THE SYSTEM SHALL COMPLY WITH ALL MANUFACTURERS INSTALLATION INSTRUCTIONS, AS WELL AS ALL APPLICABLE CODES. NOTHING IN THIS DOCUMENT SHALL BE INTERPRETED IN A WAY THAT OVERRIDES THEM. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL DETAILS IN THIS DOCUMENT.

SYSTEM DETAILS	
DESCRIPTION	NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO ENERGY STORAGE
DC RATING OF SYSTEM	16.18KW
AC OUTPUT RATINGS	11.31KW, 47.2A
INVERTER(S)	39 X ENPHASE IQ8PLUS-72-2-US
MODULE	MISSION SOLAR MSE415SX6Z
ARRAY WIRING	(3) BRANCH OF 13 IQ8PLUS-72-2-US MICROINVERTERS

INTERCONNECTION DETAILS	
POINT OF INTERCONNECTION	NEW SUPPLY SIDE AC CONNECTION PER NEC 705.12(A)
UTILITY SERVICE	120/240V 1Φ
INSIDE PANELBOARD	FUSED EATON DG222NRB DISCONNECT, 2-POLE, 60A, 240VAC

SITE DESIGN PARAMETERS	
ASHRAE EXTREME LOW	-5°C (23°F)
ASHRAE 2% HIGH	34°C (94°F)
CLIMATE DATA SOURCE	GAINESVILLE REGIONAL
WIND (ASCE 7-16)	117 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

LICENSE No 88991 STATE OF FLORIDA PROFESSIONAL ENGINEER REYES MANUEL RUIZ DONATE

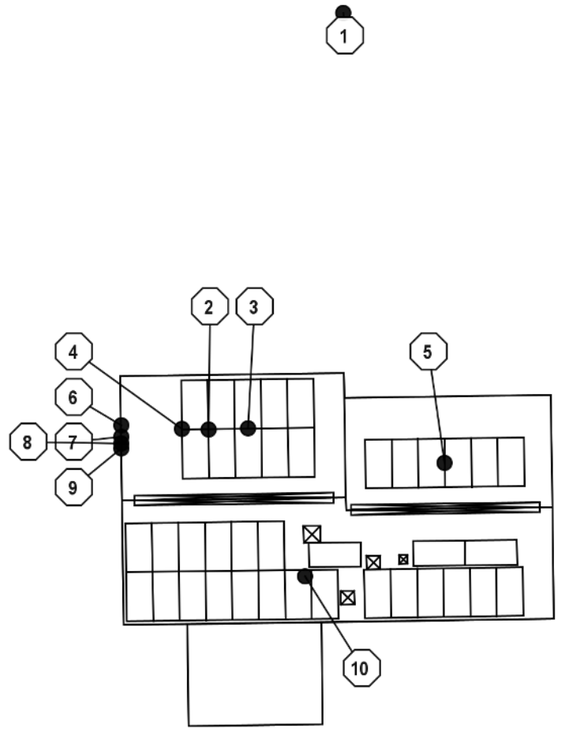
Digitally signed by Reyes Manuel Ruiz Donate
Reason: Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.
Date: 2022.07.21 07:46:13 -04'00'

PROJECT SUMMARY

DOC ID: 8C6AB3-1
DATE: 7/21/22
CREATOR: R.R.
REVIEWER:

REVISIONS

PV-1



GENERAL NOTES	
1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MINIMUM WORKING CLEARANCES PER NEC 110.26.
2	24/7 UNESCORTED KEYLESS ACCESS SHALL BE PROVIDED TO ALL FLORIDA POWER & LIGHT CO EQUIPMENT.
3	CONTRACTOR SHALL USE ONLY COMPONENTS LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY FOR THE INTENDED USE.
4	CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL EQUIPMENT, CABLES, ADDITIONAL CONDUITS, RACEWAYS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETE AND OPERATIONAL PV SYSTEM.
5	ALL EMT CONDUIT FITTINGS SHALL BE LISTED AS WEATHERPROOF FITTINGS AND INSTALLED TO ENSURE A RAINTIGHT FIT, PER NEC 358.42.

1	ROADWAY
2	(N) TRANSITION BOX (JB2), OUTDOOR, OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN EMT CONDUIT THROUGH THE INTERIOR OF THE BUILDING
3	(N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 4/12 (20.0°) SLOPED ROOF, 10 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 359° AZIMUTH
4	(N) TRANSITION BOX (JB1), OUTDOOR, OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN EMT CONDUIT THROUGH THE INTERIOR OF THE BUILDING
5	(N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 4/12 (20.0°) SLOPED ROOF, 6 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 359° AZIMUTH
6	(E) MAIN SERVICE PANEL (MSP), INDOOR
7	(N) AC COMBINER (C1), OUTDOOR, OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN EMT CONDUIT OVER ROOF NO CLOSER THAN 7/8" ABOVE ROOF SURFACE
8	(E) UTILITY METER, OUTDOOR
9	(N) VISIBLE-OPEN TYPE, LOCKABLE, READILY ACCESSIBLE, LABELED PV SYSTEM AC DISCONNECT LOCATED WITHIN 10 FT OF UTILITY METER (SW1), OUTDOOR
10	(N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 4/12 (20.0°) SLOPED ROOF, 23 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 179° AZIMUTH
11	ALL ARRAY CIRCUITS SHALL BE ROUTED THROUGH THE INTERIOR OF THE BUILDING, AND WHERE POSSIBLE, ALONG THE BOTTOM OF LOAD BEARING MEMBERS. NO CONDUIT SHALL BE INSTALLED ABOVE THE ROOF.

THIS LAYOUT IS SUBJECT TO CHANGE DUE TO ROOF OBSTRUCTIONS.

THIS ROOF CAN STAND THE LOAD OF THE WIND AND THE DEAD LOAD.

1 PV-2 SITE PLAN
SCALE: 1" = 20'

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

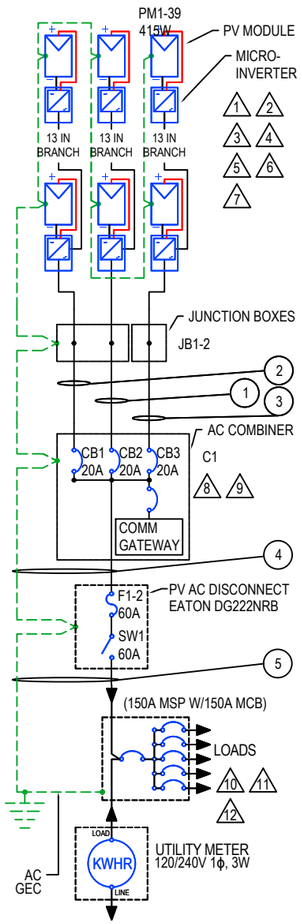
REYES MANUEL RUIZ-DONATE
LICENSE
No 88991
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SITE PLAN

DOC ID: 8C6AB3-1
DATE: 7/21/22
CREATOR: R.R.
REVIEWER:

REVISIONS

PV-2



MODULES										
REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-39	39	MISSION SOLAR MSE415SX6Z	415W	386W	10.91A	10.35A	48.9V	40.1V	-0.1281V/°C (-0.26%/°C)	20A

INVERTERS									
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-39	39	ENPHASE IQ8PLUS-72-2-US	240V	NOT SOLIDLY GROUNDED	290W	1.2A	15.0A	60V	97.0%

PASS-THRU BOXES AND COMBINERS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
JB2	1	GENERIC GEN-AWB-TB-1-4X OR EQUIV.	30A	240VAC / 600VDC
JB1	1	GENERIC GEN-AWB-TB-2-4X OR EQUIV.	30A	240VAC / 600VDC
C1	1	ENPHASE IQ COMBINER 3 OR EQUIV.	64A	240VAC

DISCONNECTS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	EATON DG222NRB OR EQUIV.	60A	240VAC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-3	3	20A	240VAC
F1-2	2	60A	240VAC

SYSTEM SUMMARY			
	BRANCH 1	BRANCH 2	BRANCH 3
INVERTERS PER BRANCH	13	13	13
MAX AC CURRENT	15.73A	15.73A	15.73A
MAX AC OUTPUT	3,770W	3,770W	3,770W
ARRAY STC POWER	16,185W		
ARRAY PTC POWER	15,058W		
MAX AC CURRENT	47A		
MAX AC POWER OUTPUT	11,310W		
DERATED AC POWER OUTPUT	11,310W		

NOTES

1. RAPID SHUTDOWN DEVICES COMPLIANT WITH REQUIREMENTS AS PER NEC 690.12(B)(2). PV CIRCUIT CONDUCTORS LOCATED OUTSIDE THE ARRAY BOUNDARY (DEFINED AS 3 FEET FROM THE POINT OF PENETRATION INTO A BUILDING OR MORE THAN 3 FEET FROM AN ARRAY) SHALL BE LIMITED TO NOT MORE THAN 30V WITHIN 30 SECONDS OF RAPID SHUTDOWN INITIATION. CONDUCTORS LOCATED INSIDE OF THE ARRAY BOUNDARY SHALL BE LIMITED TO NOT MORE THAN 80 VOLTS WITHIN 30 SECONDS OF SHUTDOWN.
2. ENPHASE SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B)(2).
3. THE DC AND AC CONNECTORS OF THE ENPHASE IQ8PLUS-72-2-US AND ARE LISTED TO MEET REQUIREMENTS AS A DISCONNECT MEANS AS ALLOWED BY NEC 690.15(D). MATING CONNECTORS SHALL COMPLY WITH NEC 690.33.
4. THE ENPHASE IQ8PLUS-72-2-US HAS A CLASS II DOUBLE-INSULATED RATING AND DOES NOT REQUIRE GROUNDING ELECTRODE CONDUCTORS (GEC) OR EQUIPMENT GROUNDING CONDUCTORS (EGC). THE RATING INCLUDES GROUND FAULT PROTECTION (GFP). TO SUPPORT GFP, USE ONLY PV MODULES EQUIPPED WITH DC CABLES LABELED PV WIRE OR PV CABLE.
5. DC PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR GRAY-COLORED
6. ALL METAL ENCLOSURES, RACEWAYS, CABLES AND EXPOSED NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT SHALL BE GROUNDED TO EARTH AS REQUIRED BY NEC 250.4(B) AND PART III OF ARTICLE 250 AND DC EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45. THE GROUNDING ELECTRODE SYSTEM SHALL ADHERE TO NEC 690.47(A) AND NEC 250.169 AND INSTALLED IN COMPLIANCE WITH NEC 250.64.
7. MAX DC VOLTAGE OF PV MODULE IS EXPECTED TO BE 52.7V AT -5°C (-4.8°C - 25°C) X -0.128V/C + 48.9V = 52.7V).
8. AC AGGREGATION PANEL BUSBAR AND THE OVERCURRENT PROTECTION PROTECTING THE BUSBAR SHALL BE SIZED IN ACCORDANCE WITH NEC 705.12(B)(2)(3)(C).
9. THE ENPHASE IQ COMBINER 3 CONTAINS A FACTORY-INSTALLED COMMUNICATIONS GATEWAY WITH AN OCPD RATED NO MORE THAN 15A.
10. POINT-OF-CONNECTION IS ON THE SUPPLY SIDE OF SERVICE DISCONNECT, INSIDE PANELBOARD ENCLOSURE USING UNUSED TERMINALS, TERMINALS THAT ARE SUITABLE FOR DOUBLE LUGGING, OR USING OTHER LOCALLY-APPROVED METHODS AND HARDWARE, IN COMPLIANCE WITH NEC 705.12(A). THE PANELBOARD SHALL HAVE SUFFICIENT SPACE TO ALLOW FOR ANY TAP HARDWARE AS REQUIRED BY NEC 110.3 AND NEC 312.8(A)
11. PV SYSTEM AC DISCONNECT SHALL BE A VISIBLE KNIFE-BLADE TYPE DISCONNECT THAT IS ACCESSIBLE AND LOCKABLE BY THE UTILITY. THE DISCONNECT SHALL BE LOCATED WITHIN 10 FT OF UTILITY METER. DISCONNECT SHALL BE GROUPED IN ACCORDANCE WITH NEC 230.72.
12. PV SYSTEM AC DISCONNECT MEETS NEC 690.12(C) REQUIREMENT FOR A RAPID SHUTDOWN INITIATION DEVICE

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS													
ID	TYP	CONDUCTOR	CONDUIT / CABLE	CURRENT-CARRYING CONDUCTORS IN CONDUIT/CABLE.	OCPD	EGC	TEMP. CORR. FACTOR	FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERM. TEMP. RATING
1	1	10 AWG THWN-2, COPPER	0.75" DIA. EMT	4	20A	10 AWG THWN-2, COPPER	0.76 (54°C)	0.8	15.73A	19.66A	40A	24.32A	90°C	40A
2	1	10 AWG THWN-2, COPPER	0.75" DIA. EMT	4	20A	10 AWG THWN-2, COPPER	0.76 (54°C)	0.8	15.73A	19.66A	40A	24.32A	90°C	40A
3	1	10 AWG THWN-2, COPPER	0.75" DIA. EMT	2	20A	10 AWG THWN-2, COPPER	0.76 (54°C)	1.0	15.73A	19.66A	40A	30.4A	90°C	40A
4	1	6 AWG THWN-2, COPPER	0.75" DIA. EMT	3	60A	10 AWG THWN-2, COPPER	0.96 (34°C)	1.0	47.19A	58.99A	75A	72A	75°C	65A
5	1	6 AWG THWN-2, COPPER	0.75" DIA. EMT	3	60A	N/A	0.96 (34°C)	1.0	47.19A	58.99A	75A	72A	75°C	65A

GENERAL ELECTRICAL NOTES

1. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
3. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

GROUNDING NOTES

1. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
2. PV MODULES SHALL BE GROUNDED TO MOUNTING RAILS USING MODULE LUGS OR RACKING INTEGRATED GROUNDING CLAMPS AS ALLOWED BY LOCAL JURISDICTION. ALL OTHER EXPOSED METAL PARTS SHALL BE GROUNDED USING UL-LISTED LAY-IN LUGS.
3. INSTALLER SHALL CONFIRM THAT MOUNTING SYSTEM HAS BEEN EVALUATED FOR COMPLIANCE WITH UL 2703 "GROUNDING AND BONDING" WHEN USED WITH PROPOSED PV MODULE.
4. IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
5. AC SYSTEM GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE A MINIMUM SIZE #8AWG WHEN INSULATED, #6AWG IF BARE WIRE.
6. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC ARTICLE 690.45, AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE, AND #6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE
7. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN, OR MARKED GREEN IF #4AWG OR LARGER

1 / PV-3 SINGLE-LINE DIAGRAM
SCALE: NTS

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES MANUEL RUIZ-DONATE LICENSE No 88991 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Reyes Manuel Ruiz Donate
Reason: Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.
Date: 2022.07.21 07:46:34 -04'00'

SINGLE-LINE DIAGRAM

PROJECT ID: 8C6AB3-1
DATE: 07/21/22
CREATED BY: R.R.
CHECKED BY:

REVISIONS

PV-3

C1 - AC COMBINER
(ENPHASE IQ COMBINER 3)

3

SW1 - DISCONNECT
(EATON DG222NRB)

1 4 5 6 7 8

MSP - MAIN SERVICE PANEL
(MODEL NOT SPECIFIED)

1 2 8

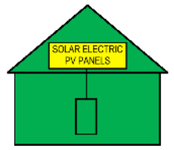
M1
(MODEL NOT SPECIFIED)

2

1 SEE NOTE NO. 4 (SW1, MSP)

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM IS
EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN THE ENTIRE PV SYSTEM.



NEC690.56(C)(1) AND FFPC11.12.2.1.1.1.1,11.12.2.1.4

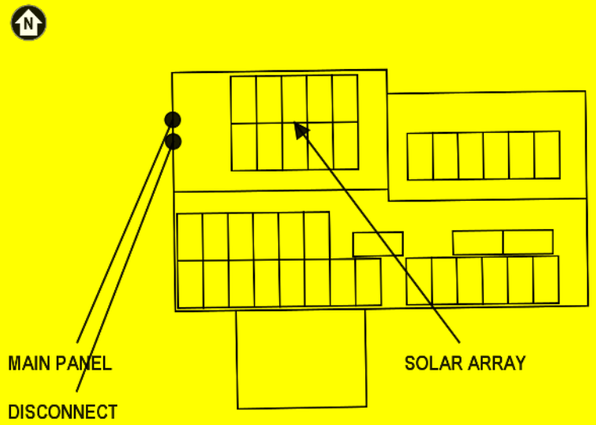
3 AC COMBINER PANEL (C1)

! WARNING !
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

NEC705.12(B)(2)(3)(C)

2 POINT-OF-INTERCONNECTION OR AT MAIN SERVICE DISCONNECT (MSP, M1)

! CAUTION !
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF-MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN



NEC690.56(B),705.10

4 EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (SW1)

! WARNING !
ELECTRIC SHOCK HAZARD. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

NEC690.13(B)

5 AC SOLAR DISCONNECT (SW1 IN NULL)

PV SYSTEM DISCONNECT

NEC690.13(B)

6 AC DISCONNECT (SW1 IN NULL)

MAXIMUM AC OPERATING CURRENT: 47.2A
MAXIMUM AC OPERATING VOLTAGE: 240V

NEC690.54

7 SEE NOTE NO. 5 (SW1)

RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM

NEC690.56(C)(3) AND FFPC11.12.2.1.1.6,11.12.2.1.1.7

8 ANY AC ELECTRICAL PANEL THAT IS FED BY BOTH THE UTILITY AND THE PHOTOVOLTAIC SYSTEM (SW1, MSP)

! WARNING !
DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.

NEC705.12(B)(3)

LABELING NOTES

1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2017 NEC AND 2020 FFPC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD HEADER COLORS, HEADER TEXT, AND SAFETY ALERT SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAN THE BODY TEXT, IN ACCORDANCE WITH NEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH NEC 690.56(B).
4	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN THE ENTIRE PV SYSTEM," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND
5	LABEL(S) WITH MARKING, "RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM," SHALL BE LOCATED WITHIN 3 FT OF RAPID SHUTDOWN SWITCH THE LABEL SHALL HAVE 3/8" TALL LETTERS AND BE REFLECTIVE WITH WHITE TEXT ON A RED BACKGROUND

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES, MANUEL RUIZ-DONATE
LICENSE
No 88991
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SAFETY LABELS

DOC ID: 8C6AB3-1
DATE: 7/21/22
CREATOR: R.R.
REVIEWER:

REVISIONS

PV-4

STRUCTURAL DESIGN PARAMETERS	
SEISMIC	0.091 S_{DS}
WIND (ASCE 7-16)	117 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

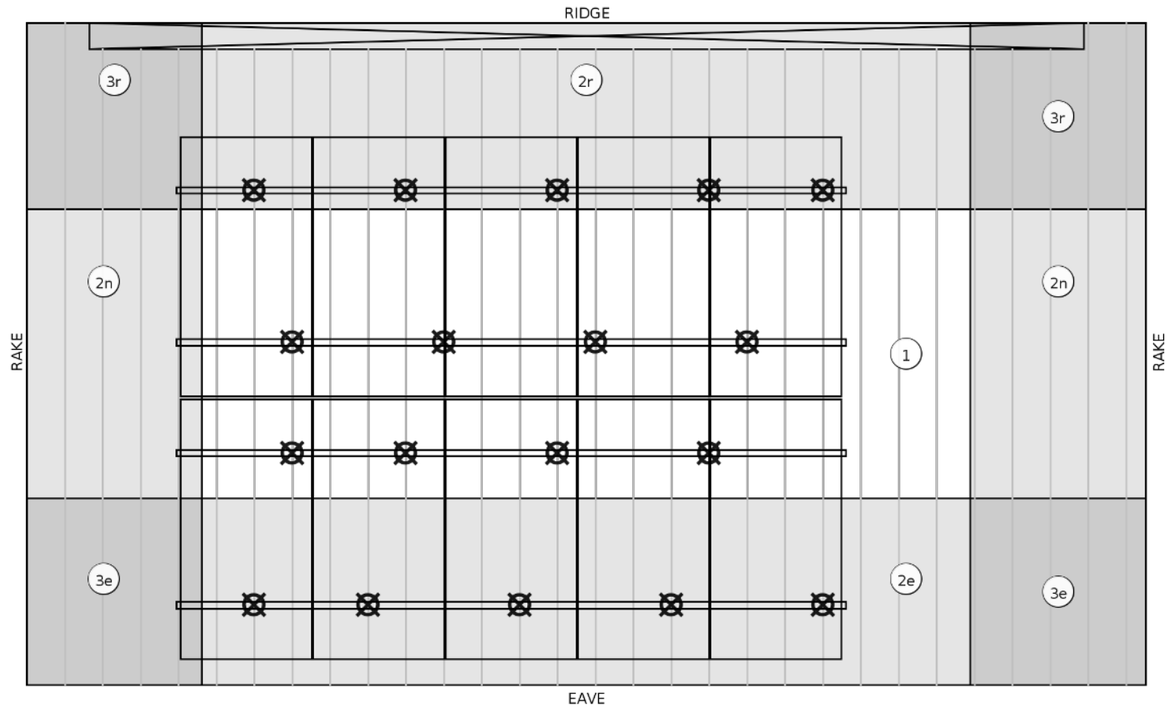
ROOF PROPERTIES	
ROOF MATERIAL	TRAPEZOIDAL METAL (11-13IN)
SLOPE	4/12 (20.0°)
MEAN ROOF HEIGHT	12.8FT
ROOF DECKING	15/32" OSB
CONSTRUCTION	TRUSSES (2X4 TOP-CHORD), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	MISSION SOLAR MSE415SX6Z
DIMENSIONS (AREA)	82.1IN X 41.5IN X 1.6IN (23.7 SQ FT)
WEIGHT	51.6LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	IRONRIDGE XR100
ANCHOR MODEL	S-5! SOLARFOOT, 1.25IN AIR GAP
FASTENING METHOD	EMBEDMENT IN ROOF DECKING WITH 4 FASTENERS
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

DEAD LOAD CALCULATIONS			
LOAD	QTY	LBS	TOTAL LBS
MODULES	10	51.6	515.9
MICROINVERTERS	10	1.1	10.8
LINEAR FEET OF RAIL	71 FT	0.7	48.0
ANCHORS	18	0.1	2.3
MISC. HARDWARE		8.4	8.4
TOTAL ARRAY WEIGHT			585.4 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	10	23.7	237.0
POINT LOAD (585.4 LBS / 18 ATTACHMENTS)			32.5 LBS
DIST. LOAD (585.4 LBS / 237.0 SQFT)			2.47 PSF

NOTES	
1	TRUSS LOCATIONS ARE APPROXIMATE. CONTRACTOR MAY NEED TO MAKE MINOR ADJUSTMENTS TO ANCHOR LOCATIONS. IN NO CASE SHALL THE ANCHOR SPACING EXCEED "MAX. ANCHOR SPACING"



ANCHOR PLACEMENT PARAMETERS (ASCE 7-16)				
WIND PRESSURE ZONE	MODULE WIND EXPOSURE	MAX. ALLOWABLE RAIL SPAN	MAX. ANCHOR SPACING	MAX. ALLOWABLE CANTILEVER
ZONES 1, 2E	NORMAL	119.0IN	48.0IN	47.6IN
ZONES 2N, 2R, 3E	NORMAL	107.0IN	48.0IN	42.8IN
ZONE 3R	NORMAL	96.0IN	48.0IN	38.4IN

DISTANCE α IS EQUAL TO 10% OF THE BUILDING'S LEAST HORIZONTAL DIMENSION ("LHD") OR 40% OF THE MEAN ROOF HEIGHT, WHICHEVER IS SMALLER, BUT NOT LESS THAN 4% OF THE LHD OR 3 FT. THESE SETBACKS ARE APPLIED TO THE BUILDING FOOTPRINT AND PROJECTED TO THE ROOF PLANES IN ACCORDANCE WITH GUIDANCE PROVIDED BY ASCE 7-16 FIGURES 30.3-2B–I.

α = MAX(MIN(0.4 * MEAN ROOF HEIGHT, 0.1 * LHD), 0.04 * LHD, 3 FT)

4.6 ft = max(min(0.4 * 12.8 ft, 0.1 * 46.2 ft), 0.04 * 46.2 ft, 3 ft)

1 PV-5.1 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/4" = 1'

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

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280 N W SCOTT GLEN
LAKE CITY, FL 32055

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STATE OF FLORIDA
PROFESSIONAL ENGINEER

ATTACHMENT PLAN

DOC ID: 8C6AB3-1
DATE: 7/21/22
CREATOR: R.R.
REVIEWER:

REVISIONS

PV-5.1

STRUCTURAL DESIGN PARAMETERS	
SEISMIC	0.091 S_{DS}
WIND (ASCE 7-16)	117 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

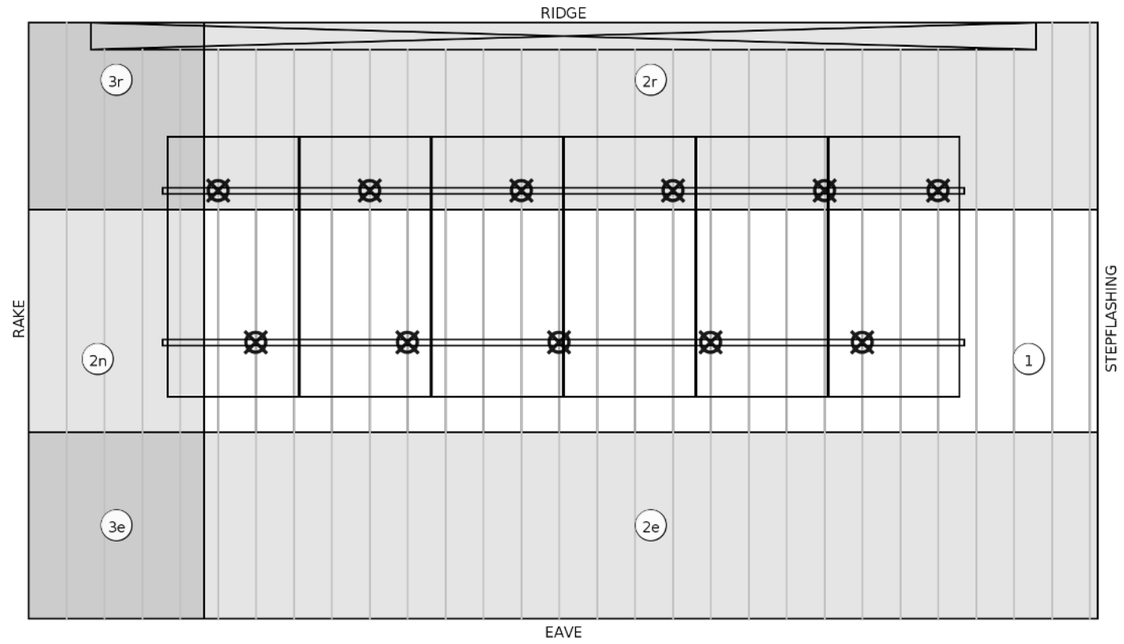
ROOF PROPERTIES	
ROOF MATERIAL	TRAPEZOIDAL METAL (11-13IN)
SLOPE	4/12 (20.0°)
MEAN ROOF HEIGHT	12.5FT
ROOF DECKING	15/32" OSB
CONSTRUCTION	TRUSSES (2X4 TOP-CHORD), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	MISSION SOLAR MSE415SX6Z
DIMENSIONS (AREA)	82.1IN X 41.5IN X 1.6IN (23.7 SQ FT)
WEIGHT	51.6LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	IRONRIDGE XR100
ANCHOR MODEL	S-5! SOLARFOOT, 1.25IN AIR GAP
FASTENING METHOD	EMBEDMENT IN ROOF DECKING WITH 4 FASTENERS
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

DEAD LOAD CALCULATIONS			
LOAD	QTY	LBS	TOTAL LBS
MODULES	6	51.6	309.5
MICROINVERTERS	6	1.1	6.5
LINEAR FEET OF RAIL	42 FT	0.7	28.8
ANCHORS	11	0.1	1.4
MISC. HARDWARE		5.0	5.0
TOTAL ARRAY WEIGHT			351.2 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	6	23.7	142.2
POINT LOAD (351.2 LBS / 11 ATTACHMENTS)			31.9 LBS
DIST. LOAD (351.2 LBS / 142.2 SQFT)			2.47 PSF

NOTES	
1	TRUSS LOCATIONS ARE APPROXIMATE. CONTRACTOR MAY NEED TO MAKE MINOR ADJUSTMENTS TO ANCHOR LOCATIONS. IN NO CASE SHALL THE ANCHOR SPACING EXCEED "MAX. ANCHOR SPACING"



ANCHOR PLACEMENT PARAMETERS (ASCE 7-16)				
WIND PRESSURE ZONE	MODULE WIND EXPOSURE	MAX. ALLOWABLE RAIL SPAN	MAX. ANCHOR SPACING	MAX. ALLOWABLE CANTILEVER
ZONES 1, 2E	NORMAL	119.0IN	48.0IN	47.6IN
ZONES 2N, 2R, 3E	NORMAL	107.0IN	48.0IN	42.8IN
ZONE 3R	NORMAL	96.0IN	48.0IN	38.4IN

DISTANCE α IS EQUAL TO 10% OF THE BUILDING'S LEAST HORIZONTAL DIMENSION ("LHD") OR 40% OF THE MEAN ROOF HEIGHT, WHICHEVER IS SMALLER, BUT NOT LESS THAN 4% OF THE LHD OR 3 FT. THESE SETBACKS ARE APPLIED TO THE BUILDING FOOTPRINT AND PROJECTED TO THE ROOF PLANES IN ACCORDANCE WITH GUIDANCE PROVIDED BY ASCE 7-16 FIGURES 30.3-2B–I.

α = MAX(MIN(0.4 * MEAN ROOF HEIGHT, 0.1 * LHD), 0.04 * LHD, 3 FT)

4.6 ft = max(min(0.4 * 12.5 ft, 0.1 * 46.2 ft), 0.04 * 46.2 ft, 3 ft)

1 / PV-5.2 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/4" = 1'

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES MANUEL RUIZ-DONATE
LICENSE
No 88991
STATE OF FLORIDA
PROFESSIONAL ENGINEER

ATTACHMENT PLAN

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PV-5.2

STRUCTURAL DESIGN PARAMETERS	
SEISMIC	0.091 S_{DS}
WIND (ASCE 7-16)	117 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

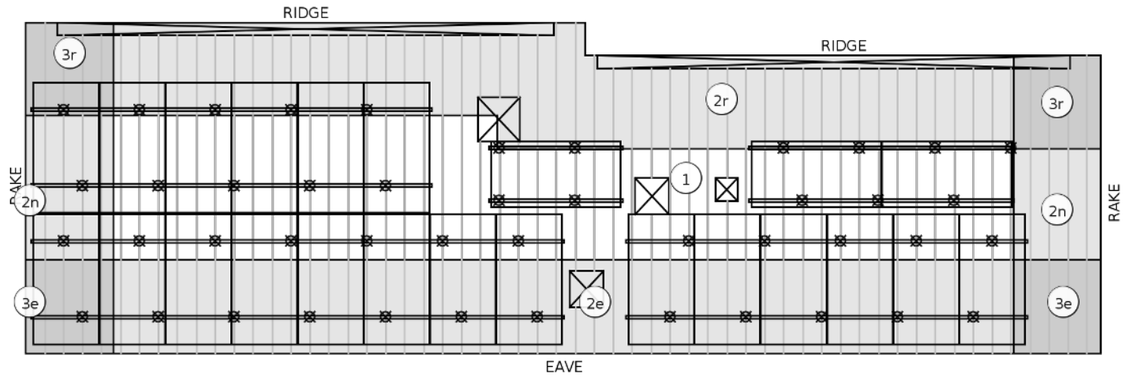
ROOF PROPERTIES	
ROOF MATERIAL	TRAPEZOIDAL METAL (11-13IN)
SLOPE	4/12 (20.0°)
MEAN ROOF HEIGHT	12.8FT
ROOF DECKING	15/32" OSB
CONSTRUCTION	TRUSSES (2X4 TOP-CHORD), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	MISSION SOLAR MSE415SX6Z
DIMENSIONS (AREA)	82.1IN X 41.5IN X 1.6IN (23.7 SQ FT)
WEIGHT	51.6LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	IRONRIDGE XR100
ANCHOR MODEL	S-5! SOLARFOOT, 1.25IN AIR GAP
FASTENING METHOD	EMBEDMENT IN ROOF DECKING WITH 4 FASTENERS
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

DEAD LOAD CALCULATIONS			
LOAD	QTY	LBS	TOTAL LBS
MODULES	23	51.6	1186.5
MICROINVERTERS	23	1.1	24.8
LINEAR FEET OF RAIL	183 FT	0.7	124.4
ANCHORS	45	0.1	5.8
MISC. HARDWARE		20.5	20.5
TOTAL ARRAY WEIGHT			1362.1 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	23	23.7	545.1
POINT LOAD (1362.1 LBS / 45 ATTACHMENTS)			30.3 LBS
DIST. LOAD (1362.1 LBS / 545.1 SQFT)			2.5 PSF

NOTES	
1	TRUSS LOCATIONS ARE APPROXIMATE. CONTRACTOR MAY NEED TO MAKE MINOR ADJUSTMENTS TO ANCHOR LOCATIONS. IN NO CASE SHALL THE ANCHOR SPACING EXCEED "MAX. ANCHOR SPACING"



ANCHOR PLACEMENT PARAMETERS (ASCE 7-16)				
WIND PRESSURE ZONE	MODULE WIND EXPOSURE	MAX. ALLOWABLE RAIL SPAN	MAX. ANCHOR SPACING	MAX. ALLOWABLE CANTILEVER
ZONES 1, 2E	NORMAL	119.0IN	48.0IN	47.6IN
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α = MAX(MIN(0.4 * MEAN ROOF HEIGHT, 0.1 * LHD), 0.04 * LHD, 3 FT)

4.6 ft = max(min(0.4 * 12.8 ft, 0.1 * 46.2 ft), 0.04 * 46.2 ft, 3 ft)

1 / PV-5.3 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/8" = 1'

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES MANUEL RUIZ-DONATE
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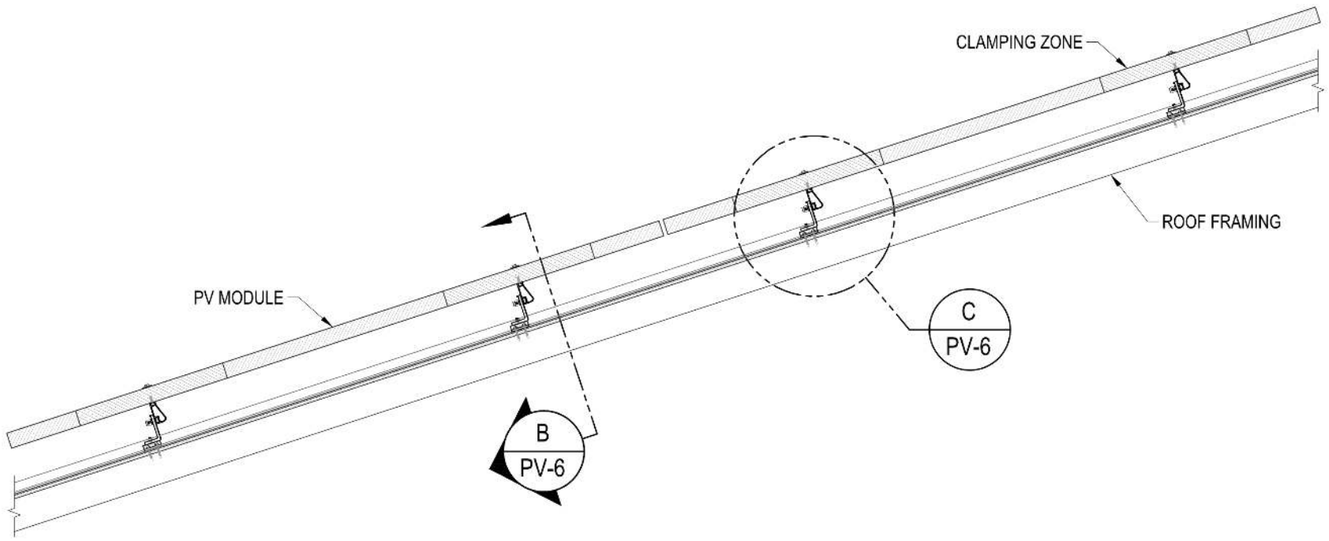
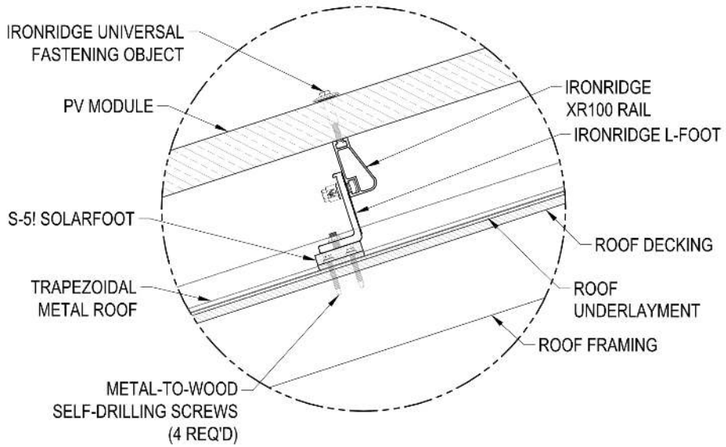
REVISIONS

PV-5.3

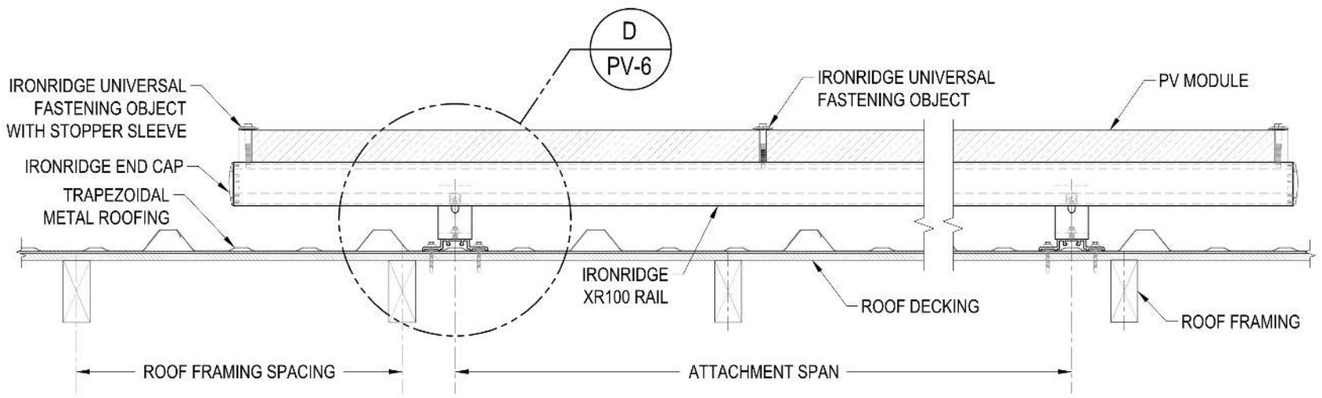
MOUNTING SYSTEM NOTES	
1	FLASHING SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
2	IF THERE IS ANY CONFLICT BETWEEN WHAT IS DEPICTED HERE AND INSTRUCTIONS PROVIDED BY A MANUFACTURER, THE MANUFACTURER'S INSTRUCTIONS SHALL SUPERCEDE.





A PV-6 RACKING ELEVATION (TRANSVERSE VIEW)

SCALE: NTS

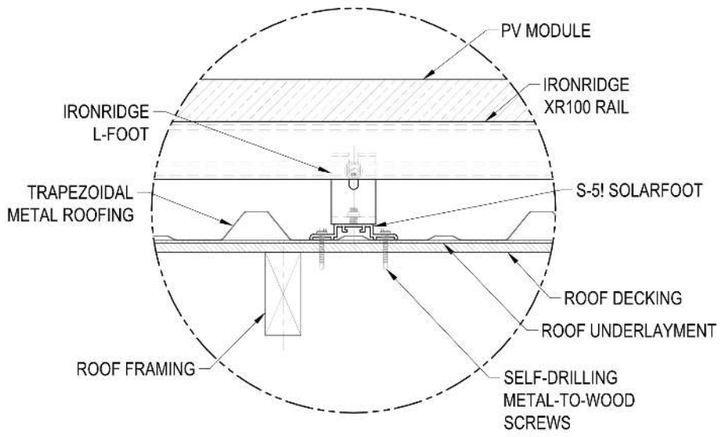


B PV-6 RACKING ELEVATION (LONGITUDINAL VIEW)

SCALE: NTS

C PV-6 ATTACHMENT DETAIL (TRANSVERSE VIEW)

SCALE: NTS



D PV-6 ATTACHMENT DETAIL (LONGITUDINAL VIEW)

SCALE: NTS

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES, MANUEL RUIZ-DONATE
LICENSE
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STATE OF FLORIDA
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ATTACHMENT DETAILS

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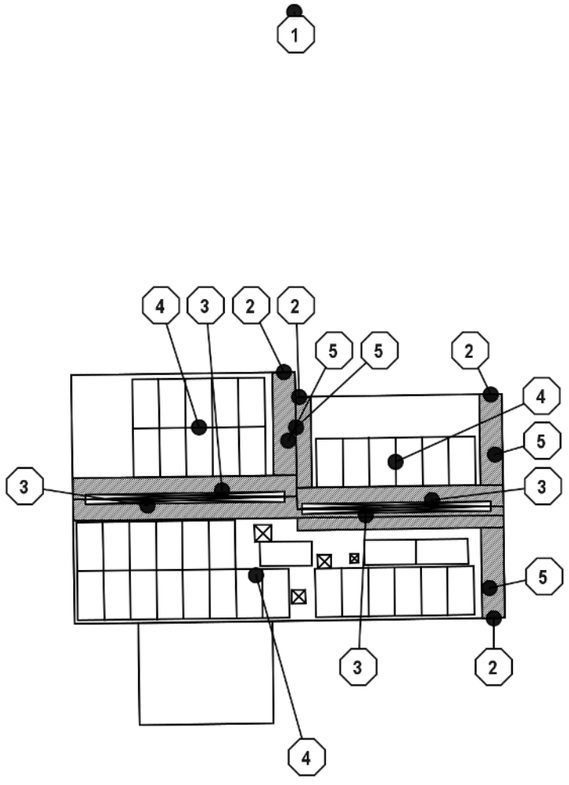
PV-6



GENERAL NOTES	
1	ACCESS AND SPACING REQUIREMENTS SHALL BE REQUIRED TO PROVIDE EMERGENCY ACCESS TO THE ROOF, PROVIDE PATHWAYS TO SPECIFIC AREAS OF THE ROOF, PROVIDE FOR SMOKE VENTILATION OPPORTUNITY AREAS, AND TO PROVIDE EMERGENCY EGRESSION FROM THE ROOF. THE AHJ SHALL BE PERMITTED TO MODIFY ROOF ACCESS BASED UPON FIRE DEPARTMENT VENTILATION PROCEDURES OR ALTERNATIVE METHODS THAT ENSURE ADEQUATE ACCESS, PATHWAYS, AND SMOKE VENTILATION. (FFPC 11.12.2.2.1)
2	NOT LESS THAN TWO 3' WIDE PATHWAYS ON SEPARATE ROOF PLANES, FROM GUTTER TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS. ONE PATHWAY SHALL BE PROVIDED ON THE STREET OR DRIVEWAY SIDE OF THE ROOF. FOR EACH ROOF PLAN WITH A PV ARRAY, A 3' WIDE PATHWAY FROM GUTTER TO RIDGE SHALL BE PROVIDED ON THE SAME ROOF PLANE AS THE PV ARRAY, ON AN ADJACENT ROOF PLANE, OR STRADDLING THE SAME AND ADJACENT ROOF PLANES. PATHWAYS SHALL BE LOCATED IN AREAS WITH MINIMAL OBSTRUCTIONS SUCH AS VENT PIPES, CONDUIT, OR MECHANICAL EQUIPMENT. (FFPC 11.12.2.2.2.1)
3	FOR PV ARRAYS OCCUPYING MORE THAN 33% OF THE PLAN VIEW ROOF AREA, A MIN. 3' PATHWAY SHALL BE PROVIDED ON EITHER SIDE OF A HORIZONTAL RIDGE. (FFPC 11.12.2.2.2.2)

1	ROADWAY
2	ROOF ACCESS POINT
3	3.0' WIDE SMOKE-VENTILATION SETBACK, PER FFPC 11.12.2.2.2.2
4	PV MODULES INSTALLED ON ROOF WITH IRONRIDGE ROOF MOUNTING SYSTEM. THE MOUNTING SYSTEM IS UL 2703 CLASS A FIRE RATED ON THIS STEEP-SLOPED ROOF WHEN INSTALLED WITH TYPE 1 OR 2 MODULES. THE MISSION SOLAR MSE415SX6Z IS UL 1703 CERTIFIED TYPE 1.
5	3.0' WIDE FIRE ACCESS PATHWAY, PER FFPC 11.12.2.2.2.1
6	TOTAL PLAN VIEW ARRAY AREA IS 867.2 SQ.FT, WHICH REPRESENTS 43.1% OF TOTAL PLAN VIEW ROOF AREA (2010.1 SQ.FT)
7	THIS SYSTEM UTILIZES MICROINVERTERS. THERE ARE NO DC CIRCUITS OUTSIDE OF THE ARRAY PERIMETER OR INSIDE THE BUILDING.
8	ALL ARRAY CIRCUITS SHALL BE ROUTED THROUGH THE INTERIOR OF THE BUILDING, AND WHERE POSSIBLE, ALONG THE BOTTOM OF LOAD BEARING MEMBERS. NO CONDUIT SHALL BE INSTALLED ABOVE THE ROOF.

1 / PV-7 FIRE SAFETY PLAN
SCALE: 1" = 20'

P-416FBA

GRID-TIED SOLAR POWER SYSTEM

DAVID RESIDENCE
280 N W SCOTT GLEN
LAKE CITY, FL 32055

REYES MANUEL RUIZ-DONATE
LICENSE
No 88991
STATE OF FLORIDA
PROFESSIONAL ENGINEER

FIRE SAFETY PLAN

DOC ID: 8C6AB3-1
DATE: 7/21/22
CREATOR: R.R.
REVIEWER:

REVISIONS

PV-7

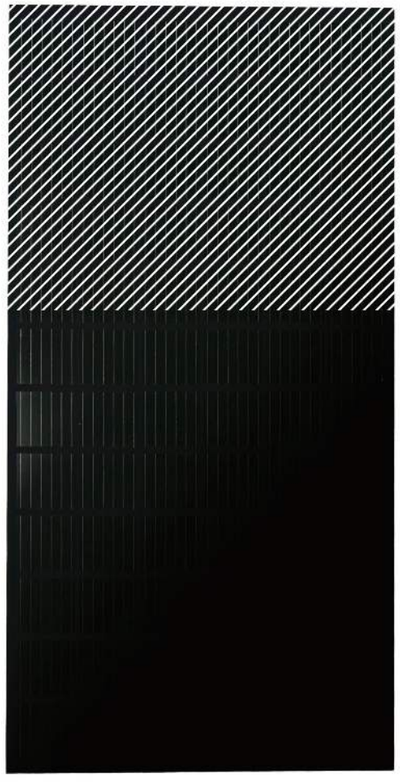
MSE PERC 72

MISSION SOLAR ENERGY

415W

Class leading power output

Positive Power Tolerance **-0 to +3%**



FRAME-TO-FRAME WARRANTY

Degradation guaranteed not to exceed 2% in year one and 0.58% annually from years two to 30 with 84.08% guaranteed in year 25.
For more information visit www.missionsolar.com/warranty

CERTIFICATIONS

CEC

UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy

True American Quality
True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas, where we manufacture our modules. We produce American, high quality solar modules ensuring the highest in-class power output and best in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.

Certified Reliability
- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion

Advanced Technology
- 6 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications

Extreme Weather Resilience
- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame

BAA Compliant for Government Projects
- Buy American Act
- American Recovery & Reinvestment Act

MODULES ASSEMBLED DESIGNED & ENGINEERED IN THE USA

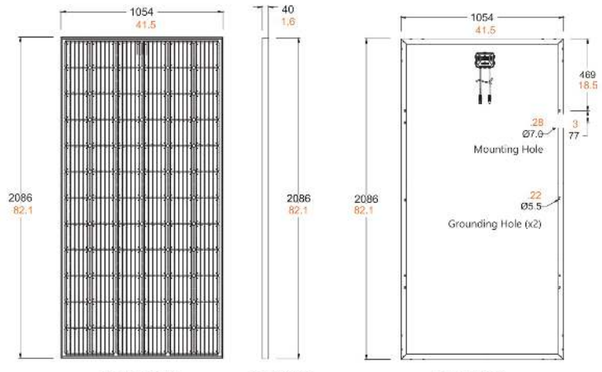
25 YEAR FRAME-TO-FRAME WARRANTY

Class Leading
410-420W

MSE PERC 72

BASIC DIMENSIONS

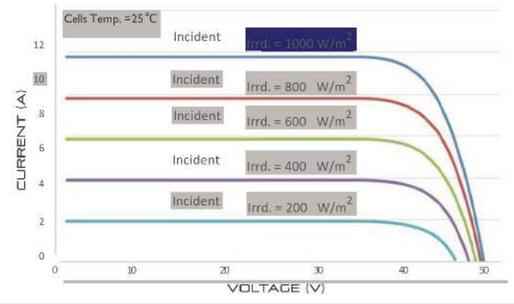
[UNITS: MM/IN]



CURRENT-VOLTAGE CURVE

MSE415SX6Z: 415WP, 72 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730

CEC

Mission Solar Energy
8303 S. New Braunfels Ave., San Antonio, Texas 78235
www.missionsolar.com | info@missionsolar.com

ELECTRICAL SPECIFICATION

PRODUCT TYPE	MSExxxSX6Z (xxx = P_{max})				
Power Output	P_{max}	W_p	410	415	420
Module Efficiency		%	18.6	18.9	19.1
Tolerance		%	0/+3	0/+3	0/+3
Short Circuit Current	I_{sc}	V	10.85	10.91	10.97
Open Circuit Voltage	V_{oc}	A	48.70	48.91	49.13
Rated Current	I_{mp}	V	10.28	10.35	10.42
Rated Voltage	V_{mp}	V	39.88	40.09	40.29
Fuse Rating		A	20	20	20
System Voltage		V	1,500	1,500	1,500

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	44.69°C (±3.7%)
Temperature Coefficient of Pmax	-0.359%/°C
Temperature Coefficient of Voc	-0.261%/°C
Temperature Coefficient of Isc	0.044%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,500Vdc
Operating Temperature Range	-40°C (-40°F) to +85°C (185°F)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1
Front & Back Load (UL Standard)	5400 Pa front and 3600 Pa back load Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	72 cells (6x12)
Module Dimension	2086mm x 1054mm x 40mm
Weight	23.4 kg (49 lbs.)
Front Glass	3.2mm, tempered, low-iron, anti-reflective
Frame	Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm2 (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	415 W Bin
53'	Most States	28	728	302.12 kW
Double Stack	CA	25	650	269.75 kW

PALLET [26 PANELS]

Weight	Height	Width	Length
1450 lbs. (657 kg)	47.5 in (120.65 cm)	46 in (116.84 cm)	83.75 in (212.72 cm)

C-SA2-MKTG-0028 REV 2 05/05/2021

www.missionsolar.com | info@missionsolar.com

ENPHASE

DATA SHEET

IQ8 Series 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 super-fast 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 Enphase IQ Battery, Enphase 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 Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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) requirements

IQ8 Series Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US[1]
Commonly used module pairings[2]	W	235 – 350	235 – 440	260 – 460	295 – 500	320 – 540+	295 – 500+
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell and 72-cell/144 half-cell				
MPPT voltage range	V	27 – 37	29 – 45	33 – 45	36 – 45	38 – 45	38 – 45
Operating range	V	25 – 48	25 – 58				
Min/max start voltage	V	30 / 48	30 / 58				
Max input DC voltage	V	50	60				
Max DC current[3] [module Isc]	A	15					
Overvoltage class DC port		II					
DC port backfeed current	mA	0					
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit					
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**	**IQ8M-72-2-US**	**IQ8A-72-2-US**	**IQ8H-240-72-2-US**	**IQ8H-208-72-2-US**
Peak output power	VA	245	300	330	366	384	366
Max continuous output power	VA	240	290	325	349	380	360
Nominal (L-L) voltage/range[4]	V	240 / 211 – 264					208 / 183 – 250
Max continuous output current	A	1.0	1.21	1.35	1.45	1.58	1.73
Nominal frequency	Hz	60					
Extended frequency range	Hz	50 – 68					
Max units per 20 A (L-L) branch circuit[5]		16	13	11	11	10	9
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	%	97.5	97.6	97.6	97.6	97.6	97.4
CEC weighted efficiency	%	97	97	97	97.5	97	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 (HxWxD)		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					
Acoustic noise at 1 m		<60 dBA					
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, UL1741/IEEE1547, 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 Shut Down 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) The IQ8H-208 variant will be operating in grid-tied mode only at 208V AC. (2) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility (3) Maximum continuous input DC current is 10.6A (4) Nominal voltage range can be extended beyond nominal if required by the utility. (5) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

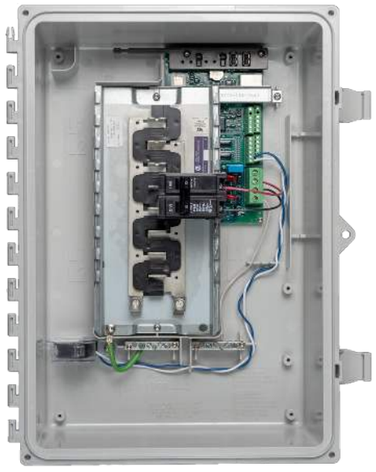
IQ8SE-DS-0001-01-EN-US-2021-10-19

Data Sheet
Enphase Networking

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3**™ with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

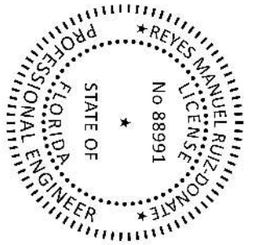
Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty
- UL listed

LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE



Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G / 12-year data plan) CELLMODEM-01 (3G / 5-year data plan) CELLMODEM-M1 (4G based LTE-M / 5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity 2
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741 CAN/CSA C22.2 No. 107.1 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

* Consumption monitoring is required for Enphase Storage Systems.

To learn more about Enphase offerings, visit **enphase.com**

2018-09-13

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Datasheet

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 25-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 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

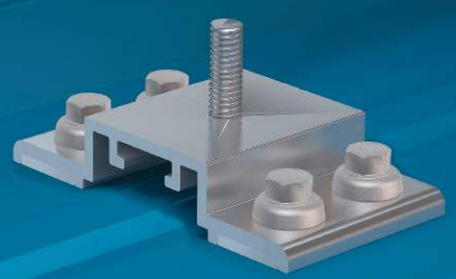
S-5!®

The Right Way!

NEW PRODUCT
SolarFoot™

Introducing the new SolarFoot™ for exposed fastener metal roofing with the strength, testing, quality, and time-proven integrity you expect from S-5!. The SolarFoot provides an ideal mounting platform to attach the L-Foot (not included) of a rail-mounted PV system to the roof. This solution is The Right Way to secure rail-mounted solar systems to exposed fastener metal such as AG-Panel or R-Panel.

The right way to attach almost anything to metal roofs!

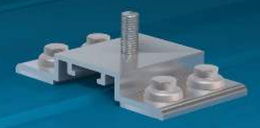


SolarFoot Features:

- Manufactured in the U.S.A. from certified raw material
- Fabricated in our own ISO 9001:2015 certified factory
- All aluminum and stainless components
- 25yr limited warranty
- Compatible with all commercial L-Foot products on the market
- Factory applied 40-year isobutylene/ isoprene crosslink polymer sealant for reliable weathertightness
- Sealant reservoir to prevent over-compression of sealant
- Load-to-failure tested Normal to Seam by a nationally accredited laboratory on numerous metal roof materials and substrates
- Four points of attachment into structure or deck with tested holding strength for engineered applications
- Integrated M8-1.25x17mm stud and M8-1.25 stainless steel hex flange nut included

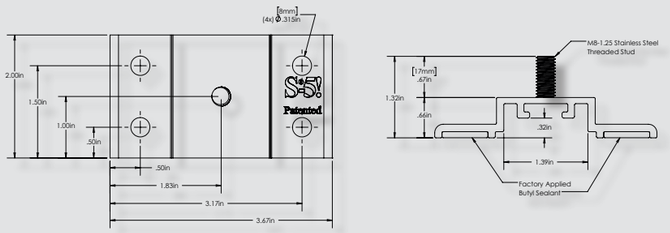
888-825-3432 | www.S-5.com | MADE IN THE USA

S-5!®
The Right Way!



SolarFoot™ Mounting for Exposed Fastener Roofing

The SolarFoot is a simple, cost-effective pedestal for L-Foot (not included) attachment of rail-mounted solar PV. The unique design is compatible with all rail producer L-Foot components. The new SolarFoot assembly ensures a durable weathertight solution for the life of the roof. Special factory applied butyl co-polymeric sealant contained in a reservoir is The Right Way, allowing a water-tested seal. Stainless integrated stud and hex flange lock-nut secure the L-Foot into position. A low center of gravity reduces the moment arm commonly associated with L-Foot attachments. Direct attachment of the SolarFoot to the structural member or deck provides unparalleled holding strength.



**Fasteners sold separately. Fastener type varies with substrate. Contact S-5! on how to purchase fasteners and obtain our test results. L-Foot also sold separately.*

Fastener Selection

Metal to Metal:
1/4-14 Self Drilling Screw
1-1/2" to 2-1/2"

Metal to Wood:
1/4-14 Type 17 AB Milled Point
1-1/2" to 2-1/2"

To source fasteners for your projects, contact S-5!

When other brands claim to be "just as good as S-5!", tell them to PROVE IT.

SolarFoot Advantages:

- Exposed fastener mounting platform for solar arrays attached via L-Foot and Rails
- Weatherproof attachment to exposed fastener roofing
- Butyl sealant reservoir provides long-term waterproof seal
- M8-1.25x17mm stud with M8 hex flange nut for attachment of all popular L-Foot/rail combinations
- Tool: 13 mm Hex Socket or ½" Hex Socket
- Tool Required: Electric screw gun with hex drive socket for self-tapping screws.
- Low Center of Gravity reduces moment arm commonly associated with L-Foot/Rail solar mounting scenarios
- Attaches directly to structure or deck for optimal holding strength
- S-5! Recommended substrate-specific (e.g. steel purlin, wood 2x4, OSB, etc.) fasteners provide excellent waterproofing and pull-out strength
- Fastener through-hole locations comply with NDS (National Design Specification)for Wood Construction

S-5!® Warning! Please use this product responsibly!

The independent lab test data found at www.S-5.com can be used for load-critical designs and applications.

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, fastener torque, patents, and trademarks, visit the S-5! website at www.S-5.com. Copyright 2017, Metal Roof Innovations, Ltd. S-5! products are patent protected.

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