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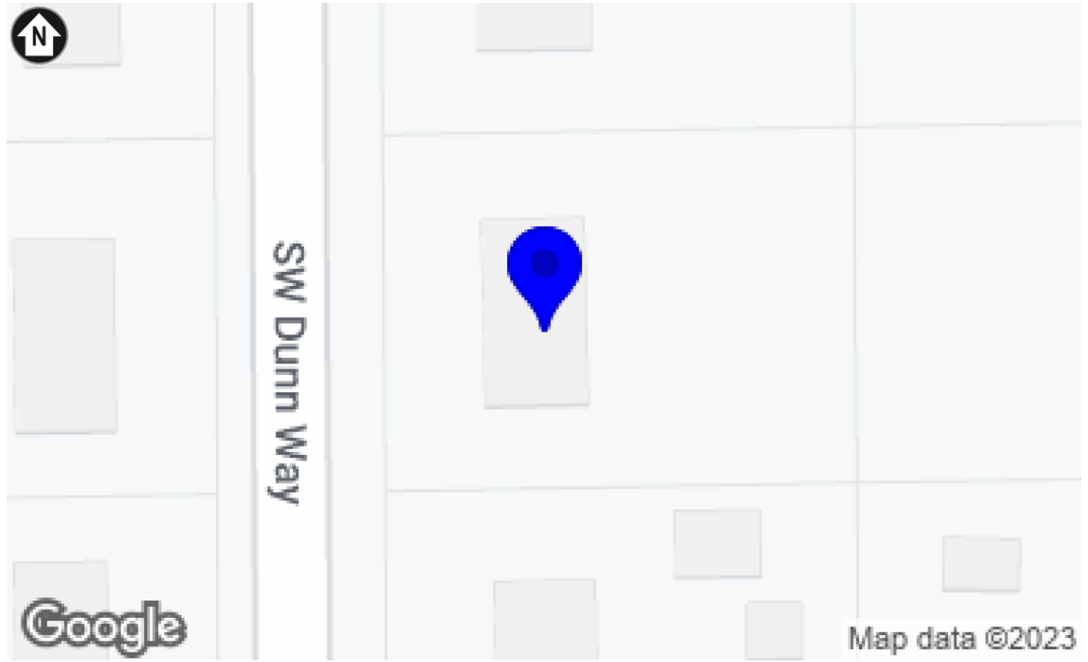
	UL 2703 CLASS A FIRE CERTIFICATION
	UL 2703 GROUNDING AND BONDING CERTIFICATION

PROJECT DETAILS

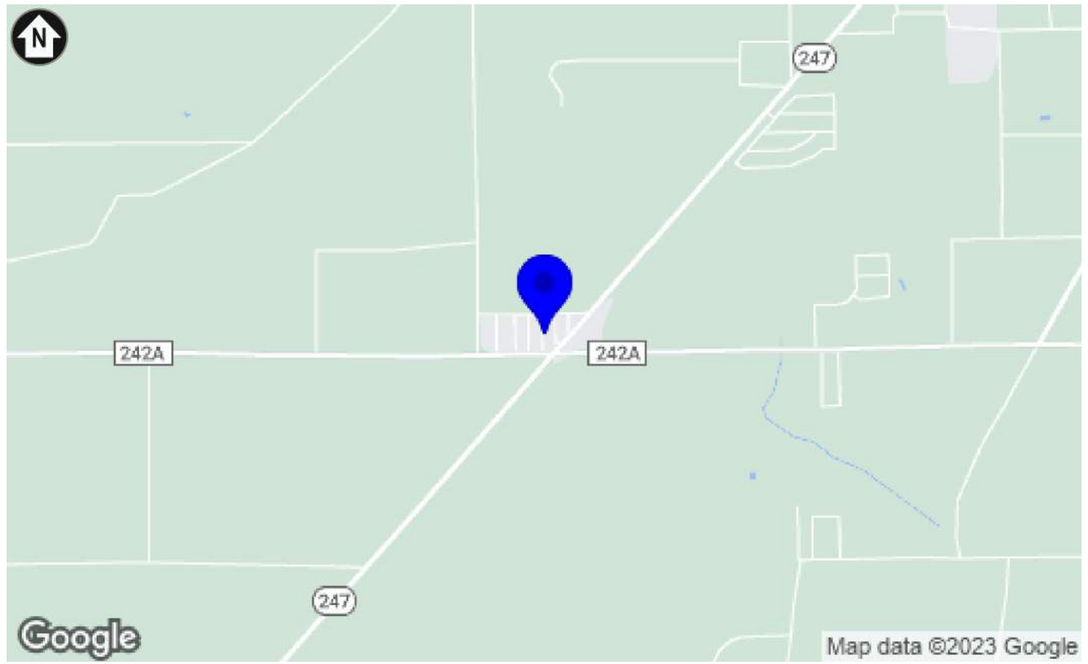
PROPERTY OWNER	EDITH HATCH
PROPERTY ADDRESS	197 SW DUNN WAY, LAKE CITY, FL 32024
APN	N/A
ZONING	RESIDENTIAL
USE AND OCCUPANCY CLASSIFICATION	ONE- OR TWO-FAMILY DWELLING GROUP (GROUP R3)
AHJ	COUNTY OF COLUMBIA
UTILITY COMPANY	FLORIDA POWER & LIGHT CO
ELECTRICAL CODE	2017 NEC (NFPA 70)
FIRE CODE	2020 FFPC
OTHER BUILDING CODES	2020 FL BUILDING CODE

CONTRACTOR INFORMATION

COMPANY	AFFORDABLE SOLAR, ROOF & AIR
ADDRESS	4914 CREEKSIDE DR, CLEARWATER, FL 33760
PHONE NUMBER	(800) 515-1254
CONTRACTOR SIGNATURE	



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	9.20KW
AC OUTPUT RATINGS	7.47KW, 31.1A
INVERTER(S)	23 X ENPHASE IQ8M-72-2-US
MODULE(S)	23 X Q-CELLS Q.PEAK DUO BLK ML-G10 400
ARRAY WIRING	(2) BRANCH OF 8 IQ8M-72-2-US MICROINVERTERS (1) BRANCH OF 7 IQ8M-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	-6°C (20°F)
ASHRAE 2% HIGH	34°C (93°F)
CLIMATE DATA SOURCE	CROSS CITY AIRPORT
WIND (ASCE 7-16)	130 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

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

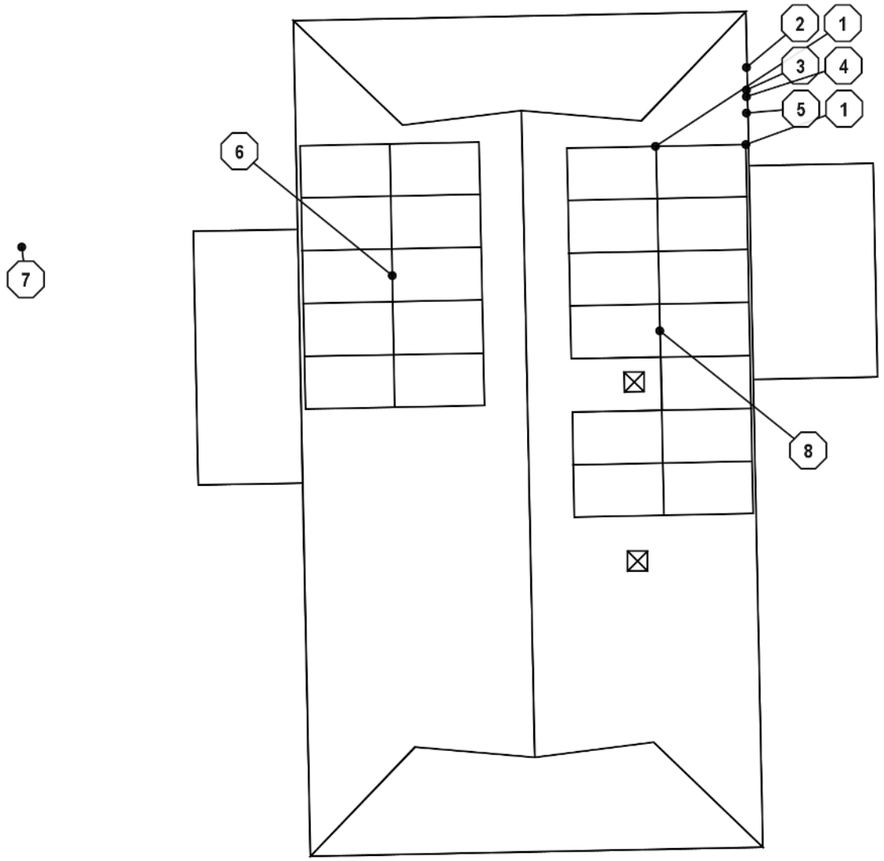
Digitally signed by Reyes Manuel Ruiz Donate
Reason: This item has been digitally signed and sealed by Reyes Ruiz Donate, PE.Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.
Date: 2023.07.17 21:27:04 -04'00'

PROJECT SUMMARY

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

PV-1



GENERAL NOTES	
1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MIN. 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 EXPOSED PV ROOFTOP CONDUCTORS NOT UNDER THE ARRAY SHALL BE PROTECTED BY A RACEWAY WITH A LISTED JUNCTION BOX AT BOTH ENDS AND COMPLY WITH NEC 690.31(A).

1. (N) TRANSITION BOX, OUTDOOR, OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN PVC-40 CONDUIT OVER ROOF NO CLOSER THAN 7/8" ABOVE ROOF SURFACE
2. (N) VISIBLE-OPEN TYPE, LOCKABLE, READILY ACCESSIBLE, LABELED PV SYSTEM AC DISCONNECT LOCATED WITHIN 10 FT OF UTILITY METER (SW1), OUTDOOR
3. (N) AC COMBINER (C1), OUTDOOR
4. (E) UTILITY METER, OUTDOOR
5. (E) MAIN SERVICE PANEL (MSP), INDOOR
6. (N) PROPOSED ROOF-MOUNTED PV ARRAY. 4/12 (18.0°) SLOPED ROOF, (10) Q-CELLS Q.PEAK DUO BLK ML-G10 400 MODULES (BLACK FRAME, BLACK BACKSHEET), 268° AZIMUTH
7. ROADWAY
8. (N) PROPOSED ROOF-MOUNTED PV ARRAY. 4/12 (18.0°) SLOPED ROOF, (13) Q-CELLS Q.PEAK DUO BLK ML-G10 400 MODULES (BLACK FRAME, BLACK BACKSHEET), 89° AZIMUTH

1 PV-2 SITE PLAN
SCALE: 1" = 10'

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

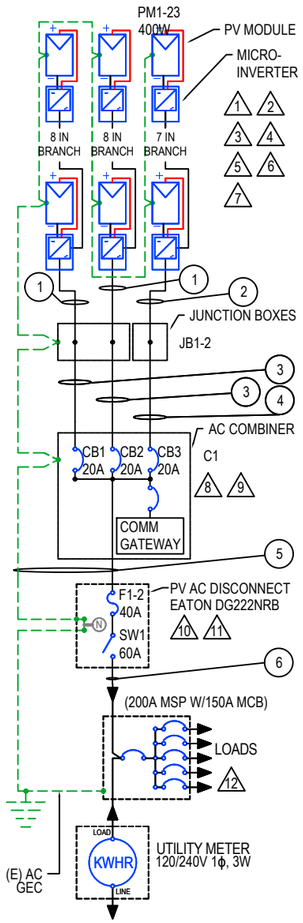
REYES MANUEL RUIZ-DONATE
LICENSE
No 88991
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SITE PLAN

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

PV-2



MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-23	23	Q-CELLS Q.PEAK DUO BLK ML-G10 400	400W	372W	11.14A	10.77A	45.3V	37.1V	-0.1219V/°C (-0.27%/°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
I1-23	23	ENPHASE IQ8M-72-2-US	240V	NOT SOLIDLY GROUNDED	325W	1.35A	15.0A	60V	97.0%

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	40A	240VAC

PASS-THRU BOXES AND COMBINERS

REF.	QTY	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
JB2	1	TRANSITION BOX FOR 1 CIRCUIT	30A	240VAC / 600VDC
JB1	1	TRANSITION BOX FOR 2 CIRCUITS	30A	240VAC / 600VDC
C1	1	ENPHASE IQ COMBINER 3 W/ IQ GATEWAY FOR PRODUCTION MONITORING	64A	240VAC

SYSTEM SUMMARY

	BRANCH 1	BRANCH 2	BRANCH 3
INVERTERS PER BRANCH	8	8	7
MAX AC CURRENT	10.80A	10.80A	9.45A
MAX AC OUTPUT	2,600W	2,600W	2,275W
ARRAY STC POWER	9,200W		
ARRAY PTC POWER	8,544W		
MAX AC CURRENT	31A		
MAX AC POWER OUTPUT	7,475W		
DERATED AC POWER OUTPUT	7,475W		

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 IQ8M-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 IQ8M-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. MICROINVERTER BRANCH CIRCUIT CONDUCTORS ARE MANUFACTURED ENPHASE Q CABLES LISTED FOR USE IN 20A OR LESS CIRCUITS OF ENPHASE IQ MICROINVERTERS. THEY ARE ROHS, OIL RESISTANT, AND UV RESISTANT. THEY CONTAIN TWO 12 AWG CONDUCTORS OF TYPE THHN/THWN-2 DRY/WET AND CERTIFIED TO UL 3003 AND UL 9703.
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 49.1V AT -6°C (-6.4°C - 25°C) X -0.122V/C + 45.3V = 49.1V).
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 20A.
10. 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.
11. PV SYSTEM AC DISCONNECT MEETS NEC 690.12(C) REQUIREMENT FOR A RAPID SHUTDOWN INITIATION DEVICE
12. 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)

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	LEN.	V.D.
1	2	12 AWG THHN/THWN-2 IN ENPHASE Q CABLE, COPPER	CABLE	2	20A	6 AWG BARE, COPPER	0.71 (56°C)	1.0	10.8A	13.5A	30A	21.3A	90°C	40A	105FT	0.93%
2	1	12 AWG THHN/THWN-2 IN ENPHASE Q CABLE, COPPER	CABLE	2	20A	6 AWG BARE, COPPER	0.71 (56°C)	1.0	9.45A	11.81A	30A	21.3A	90°C	40A	45.9FT	0.71%
3	2	10 AWG THWN-2, COPPER	0.75" DIA. PVC-40	4	20A	10 AWG THWN-2, COPPER	0.96 (34°C)	0.8	10.8A	13.5A	40A	31A	90°C	40A	33.1FT	0.18%
4	1	10 AWG THWN-2, COPPER	0.75" DIA. PVC-40	2	20A	10 AWG THWN-2, COPPER	0.96 (34°C)	1.0	9.45A	11.81A	40A	38.4A	90°C	40A	8.5FT	0.08%
5	1	6 AWG THWN-2, COPPER	0.75" DIA. PVC-40	3	40A	6 AWG THWN-2, COPPER	0.96 (34°C)	1.0	31.05A	38.81A	75A	72A	75°C	65A	48IN	0.05%
6	1	6 AWG THWN-2, COPPER	0.75" DIA. PVC-40	3	40A	N/A	0.96 (34°C)	1.0	31.05A	38.81A	75A	72A	75°C	65A	48IN	0.05%

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-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

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

Digitally signed by Reyes Manuel Ruiz Donate
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Date: 2023.07.17 21:27:18 -04'00'

SINGLE-LINE DIAGRAM

PROJECT ID: 0E98AA-1
DATE: 7/14/23
CREATED BY: S.S.
CHECKED BY:

REVISIONS

PV-3

AC COMBINER

3

SW1 - DISCONNECT
(EATON DG222NRB)

1 4 5 6 7 8

UTILITY METER

2

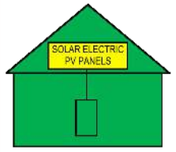
MAIN SERVICE PANEL

1 2 8

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.



NEC 690.56(C)(1), FFPC 11.12.2.1.1.1.1, AND FFPC 11.12.2.1.1.2

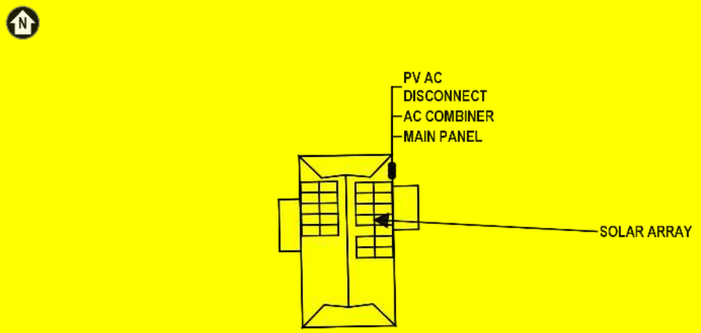
3 AC COMBINER PANEL (C1)

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

NEC 705.12(B)(2)(3)(C)

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

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



INSTALLED BY AFFORDABLE SOLAR, ROOF & AIR • (800) 515-1254

NEC 690.56(B) AND NEC 705.10

4 AC DISCONNECT (SW1)

MAXIMUM AC OPERATING CURRENT: 31.1A
MAXIMUM AC OPERATING VOLTAGE: 240V

NEC 690.54

5 SEE NOTE NO. 5 (SW1)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.56(C)(3), FFPC 11.12.2.1.1.6, AND FFPC 11.12.2.1.1.7

6 EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (SW1)

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

NEC 690.13(B)

7 PV SYSTEM DISCONNECT (SW1)

PV SYSTEM DISCONNECT

NEC 690.13(B)

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.

NEC 705.12(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 RED 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-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

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

SAFETY LABELS

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

PV-4

STRUCTURAL DESIGN PARAMETERS	
SEISMIC	0.089 S_{DS}
WIND (ASCE 7-16)	130 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

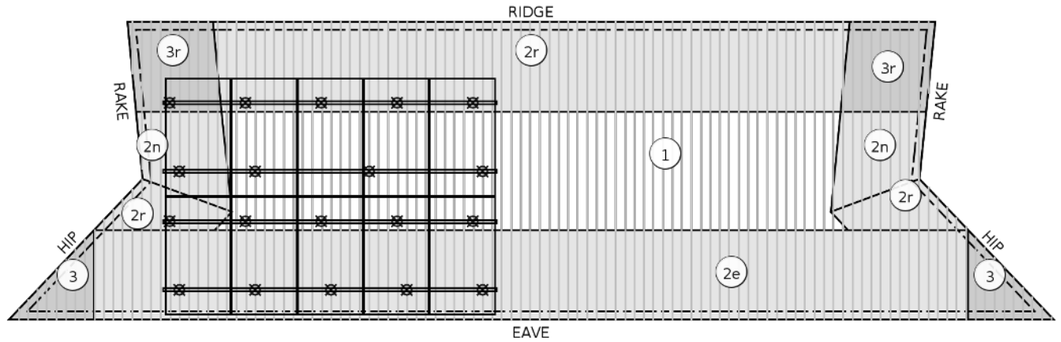
ROOF PROPERTIES	
ROOF MATERIAL	TRAPEZOIDAL METAL (5-7IN)
SLOPE	4/12 (18.0°)
MEAN ROOF HEIGHT	12.3FT
ROOF DECKING	15/32" OSB
CONSTRUCTION	TRUSSES (2X4 TOP-CHORD), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	Q-CELLS Q.PEAK DUO BLK ML-G10 400
DIMENSIONS (AREA)	74.0IN X 41.1IN X 1.3IN (21.1 SQ FT)
WEIGHT	48.5 LBS

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	K2 CROSSRAIL 44-X
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	48.5	485.0
MICROINVERTERS	10	2.4	23.8
LINEAR FEET OF RAIL	70 FT	0.5	33.1
ANCHORS	19	0.1	2.5
MISC. HARDWARE		10.0	10.0
TOTAL ARRAY WEIGHT			554.4 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	10	21.1	211.0
POINT LOAD (554.4 LBS / 19 ATTACHMENTS)			29.2 LBS
DIST. LOAD (554.4 LBS / 211.0 SQFT)			2.63 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
ZONE 1	NORMAL	72.0IN	72.0IN	24.0IN
ZONE 2E	EDGE	48.0IN	48.0IN	16.0IN
ZONES 2E, 2R, 3R	NORMAL	48.0IN	48.0IN	16.0IN

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)

4.5 FT = MAX(MIN(0.4 * 12.3 FT, 0.1 * 44.9 FT), 0.04 * 44.9 FT, 3 FT)

EDGE MODULES = DISTANCE TO ROOF EDGE < 2 * (AIR GAP + MODULE THICKNESS)

5.0 IN = 2 * (1.25 IN + 1.26 IN)

1 PV-5.1 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/8" = 1'

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

ATTACHMENT PLAN

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

PV-5.1

STRUCTURAL DESIGN PARAMETERS	
SEISMIC	0.089 S_{DS}
WIND (ASCE 7-16)	130 MPH, EXPOSURE CATEGORY B, RISK CATEGORY II
GROUND SNOW LOAD	0 PSF

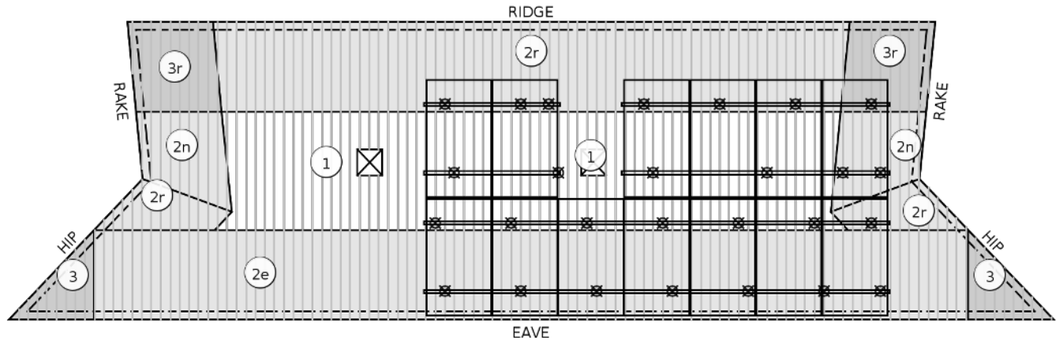
ROOF PROPERTIES	
ROOF MATERIAL	TRAPEZOIDAL METAL (5-7IN)
SLOPE	4/12 (18.0°)
MEAN ROOF HEIGHT	12.3FT
ROOF DECKING	15/32" OSB
CONSTRUCTION	TRUSSES (2X4 TOP-CHORD), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	Q-CELLS Q.PEAK DUO BLK ML-G10 400
DIMENSIONS (AREA)	74.0IN X 41.1IN X 1.3IN (21.1 SQ FT)
WEIGHT	48.5 LBS

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	K2 CROSSRAIL 44-X
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	13	48.5	630.5
MICROINVERTERS	13	2.4	31.0
LINEAR FEET OF RAIL	92 FT	0.5	43.1
ANCHORS	27	0.1	3.5
MISC. HARDWARE		13.8	13.8
TOTAL ARRAY WEIGHT			721.9 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	13	21.1	274.3
POINT LOAD (721.9 LBS / 27 ATTACHMENTS)			26.7 LBS
DIST. LOAD (721.9 LBS / 274.3 SQFT)			2.63 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
ZONE 1	NORMAL	72.0IN	72.0IN	24.0IN
ZONE 2E	EDGE	48.0IN	48.0IN	16.0IN
ZONES 2E, 2R, 3R	NORMAL	48.0IN	48.0IN	16.0IN

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)

4.5 FT = MAX(MIN(0.4 * 12.3 FT, 0.1 * 44.9 FT), 0.04 * 44.9 FT, 3 FT)

EDGE MODULES = DISTANCE TO ROOF EDGE < 2 * (AIR GAP + MODULE THICKNESS)

5.0 IN = 2 * (1.25 IN + 1.26 IN)

1 PV-5.2 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/8" = 1'

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

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

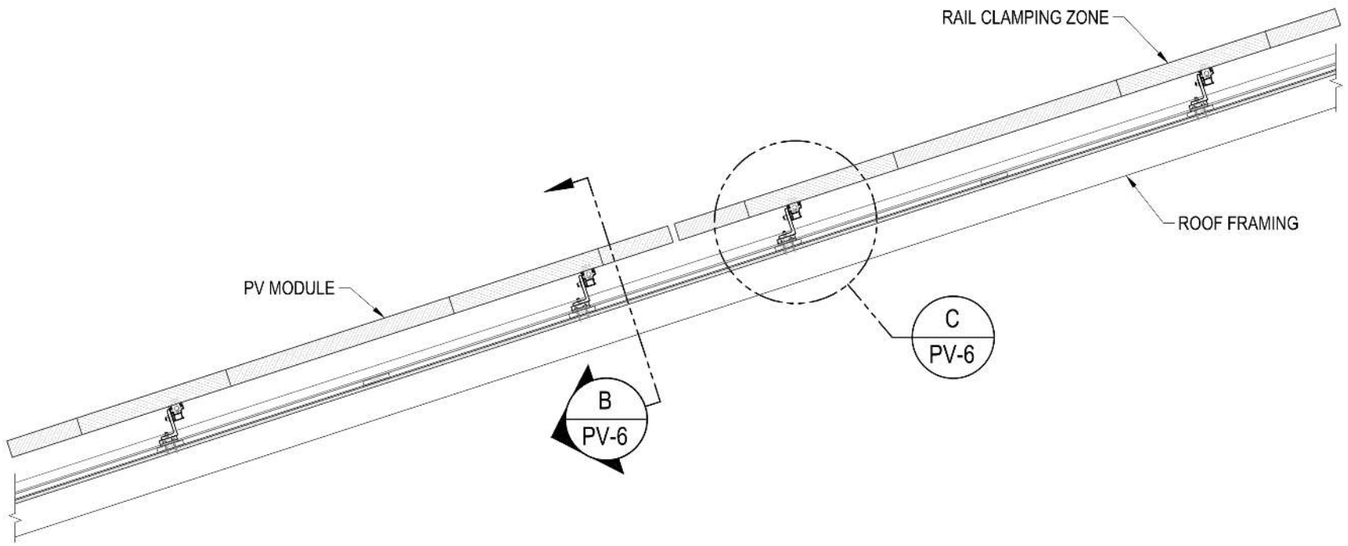
ATTACHMENT PLAN

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

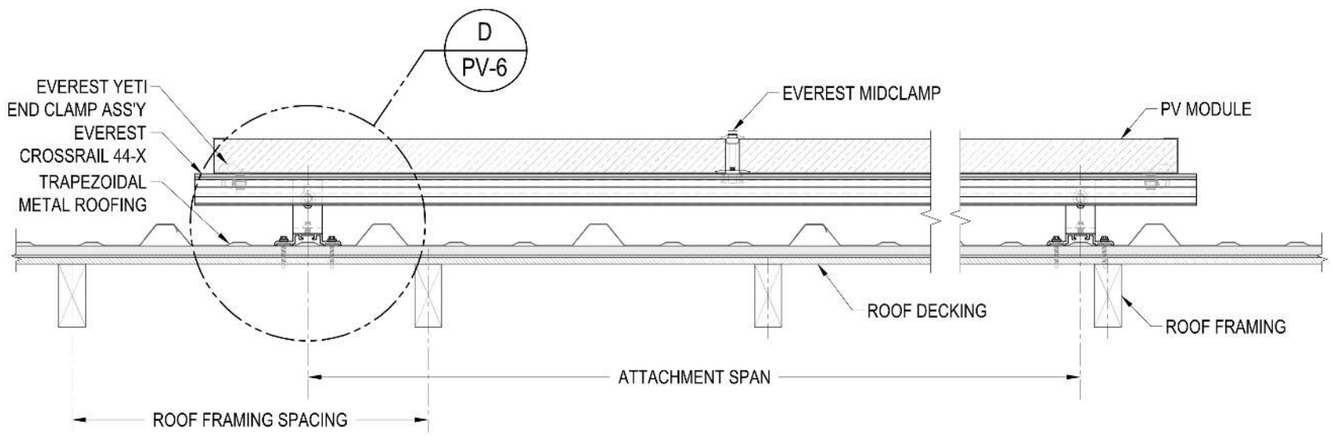
PV-5.2

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.



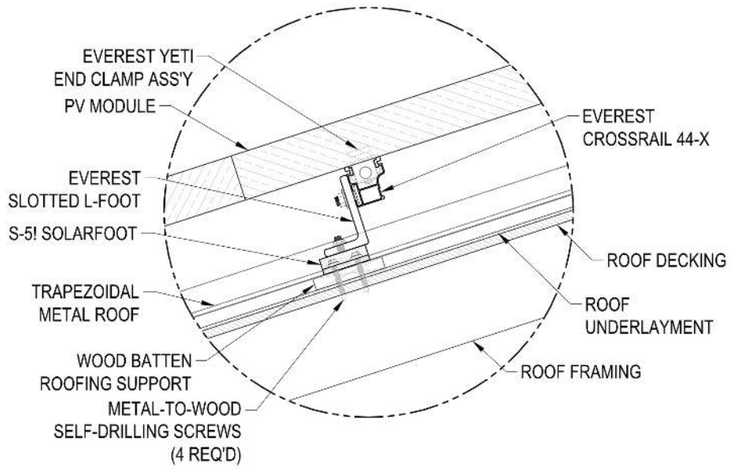
A PV-6 RACKING ELEVATION (TRANSVERSE VIEW)

SCALE: NTS



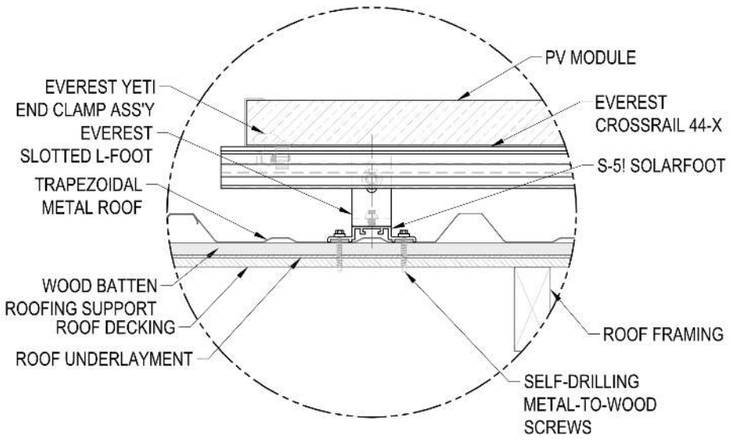
B PV-6 RACKING ELEVATION (LONGITUDINAL VIEW)

SCALE: NTS



C PV-6 ATTACHMENT DETAIL (TRANSVERSE VIEW)

SCALE: NTS



D PV-6 ATTACHMENT DETAIL (LONGITUDINAL VIEW)

SCALE: NTS

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

REYES MANUEL RUIZ-DONATE
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No 88991
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ATTACHMENT DETAILS

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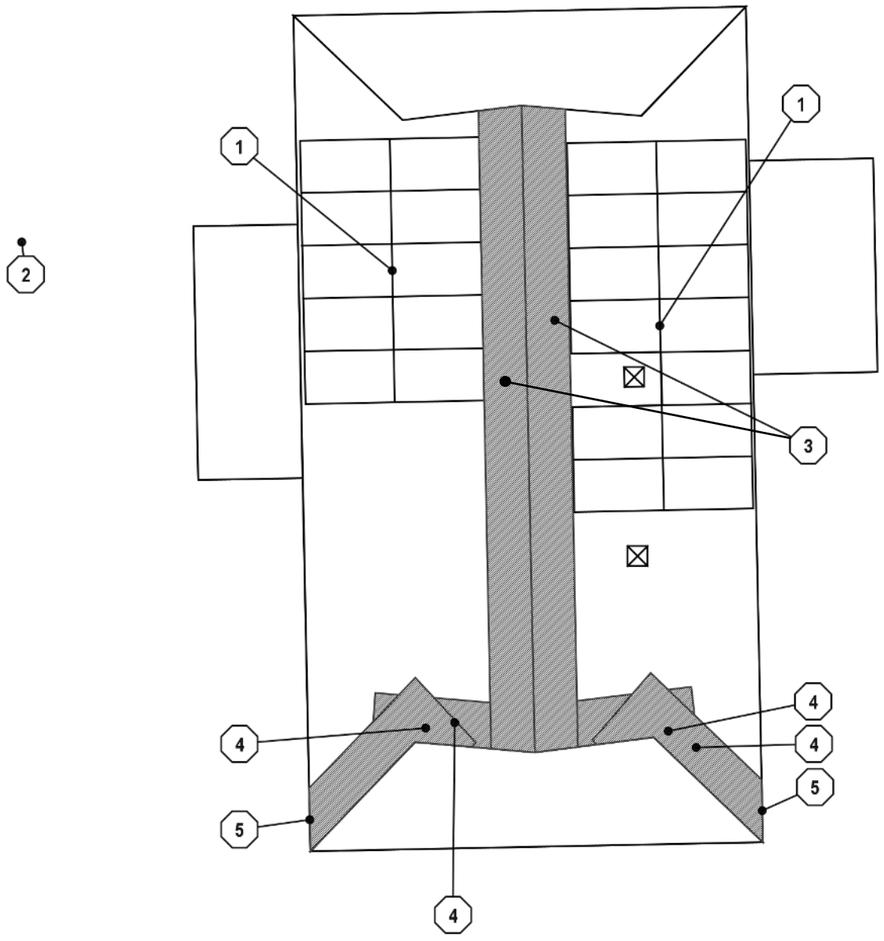
PV-6



1 FIRE SAFETY PLAN
PV-7 SCALE: 1" = 10'

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 UP TO 33% OF THE PLAN VIEW ROOF AREA, A MIN. 18" PATHWAY SHALL BE PROVIDED ON EITHER SIDE OF A HORIZONTAL RIDGE. (FFPC 11.12.2.2.2.2)
4	ROOF FACES WITH NO PV ARE DESIGNATED FOR FIRE VENTILATION AND ACCESS

1 PV MODULES INSTALLED ON ROOF WITH K2 CROSSRAIL MOUNTING SYSTEM. THE MOUNTING SYSTEM IS UL 2703 CLASS A FIRE RATED ON THIS STEEP-SLOPED ROOF WHEN INSTALLED WITH TYPE 1, 2, OR 3 MODULES. THE Q-CELLS Q.PEAK DUO BLK ML-G10 400 IS UL 61730-1 CERTIFIED TYPE 2.

2 ROADWAY

3 3.0' WIDE SMOKE-VENTILATION SETBACK, PER FFPC 11.12.2.2.2.2

4 3.0' WIDE FIRE ACCESS PATHWAY, PER FFPC 11.12.2.2.2.1

5 ROOF ACCESS POINT

6 BUILDING IS 1-STORY, GROUP R3

7 TOTAL PLAN VIEW ARRAY AREA IS 462.3 SQ.FT, WHICH REPRESENTS 24.6% OF TOTAL PLAN VIEW ROOF AREA (1875.6 SQ.FT)

8 THIS SYSTEM UTILIZES MICROINVERTERS. THERE ARE NO DC CIRCUITS OUTSIDE OF THE ARRAY PERIMETER OR INSIDE THE BUILDING.

9 CABLES, WHEN RUN BETWEEN ARRAYS, SHALL BE ENCLOSED IN CONDUIT.

P-22998E

GRID-TIED PV SYSTEM

HATCH RESIDENCE
197 SW DUNN WAY
LAKE CITY, FL 32024

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

FIRE SAFETY PLAN

DOC ID: 0E98AA-1
DATE: 7/14/23
CREATOR: S.S.
REVIEWER:

REVISIONS

PV-7

Q.PEAK DUO BLK ML-G10 SERIES

385 - 405 Wp | 132 Cells
20.6 % Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10

Breaking the 20 % efficiency barrier

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.6 %.

Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology[1], Hot-Spot Protect.

Extreme weather rating

High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

A reliable investment

Inclusive 12-year product warranty and 25-year linear performance warranty[2].

The most thorough testing programme in the industry

Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (−1500 V, 96 h)
[2] See data sheet on rear for further information.

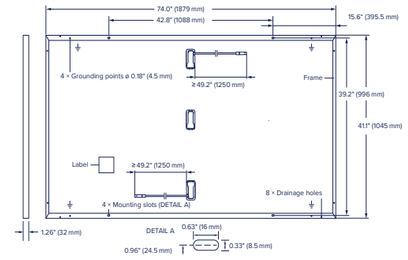
The ideal solution for:

Rooftop arrays on residential buildings

Q.PEAK DUO BLK ML-G10 SERIES

Mechanical Specification

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 49.2 in (1250 mm), (−) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

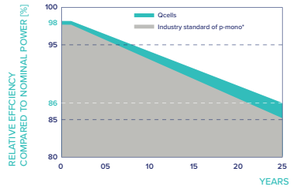


Electrical Characteristics

POWER CLASS		385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)						
Minimum — Power at MPP[1]	P_{MPP}	385	390	395	400	405
Minimum — Short Circuit Current[1]	I_{SC}	11.04	11.07	11.10	11.14	11.17
Minimum — Open Circuit Voltage[1]	V_{OC}	45.19	45.23	45.27	45.30	45.34
Minimum — Current at MPP	I_{MPP}	10.59	10.65	10.71	10.77	10.83
Minimum — Voltage at MPP	V_{MPP}	36.36	36.62	36.88	37.13	37.39
Minimum — Efficiency[1]	η	≥ 19.6	≥ 19.9	≥ 20.1	≥ 20.4	≥ 20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]						
Minimum — Power at MPP	P_{MPP}	288.8	292.6	296.3	300.1	303.8
Minimum — Short Circuit Current	I_{SC}	8.90	8.92	8.95	8.97	9.00
Minimum — Open Circuit Voltage	V_{OC}	42.62	42.65	42.69	42.72	42.76
Minimum — Current at MPP	I_{MPP}	8.35	8.41	8.46	8.51	8.57
Minimum — Voltage at MPP	V_{MPP}	34.59	34.81	35.03	35.25	35.46

[1] Measurement tolerances P_{MPP} ±3 %; I_{SC}; V_{OC} ±5 % at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

Qcells PERFORMANCE WARRANTY

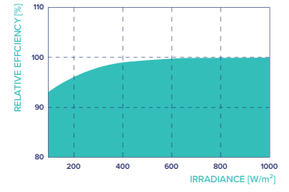


At least 98 % of nominal power during first year. Thereafter max. 0.5 % degradation per year. At least 93.5 % of nominal power up to 10 years. At least 86 % of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organisation of your respective country.

*Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	109 ± 5.4 (43 ± 3 °C)

Properties for System Design

Maximum System Voltage	V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating		[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]		[lbs / ft²]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]		[lbs / ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

Qualifications and Certificates

Quality Controlled PV - TÜV Rheinland; IEC 61215:2016; IEC 61730:2016. This data sheet complies with DIN EN 50380.

Certified UL 61730

www.tuv.com ID 111220277

Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com

ENPHASE

DATA SHEET

IQ8M and IQ8A Microinverters

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

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

Enphase 25 year limited warranty

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

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

UL CERTIFIED SAFETY

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

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

Easy to install

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

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

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

Note:

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

IQ8M and IQ8A Microinverters

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

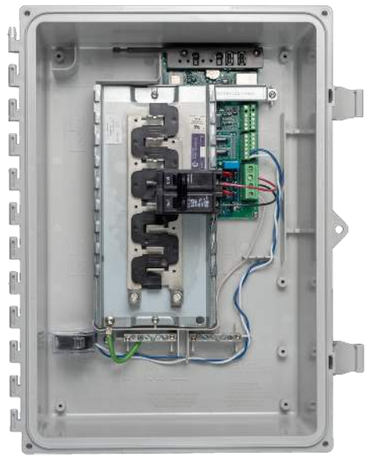
(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at https://link.enphase.com/module-compatibility. (2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements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

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

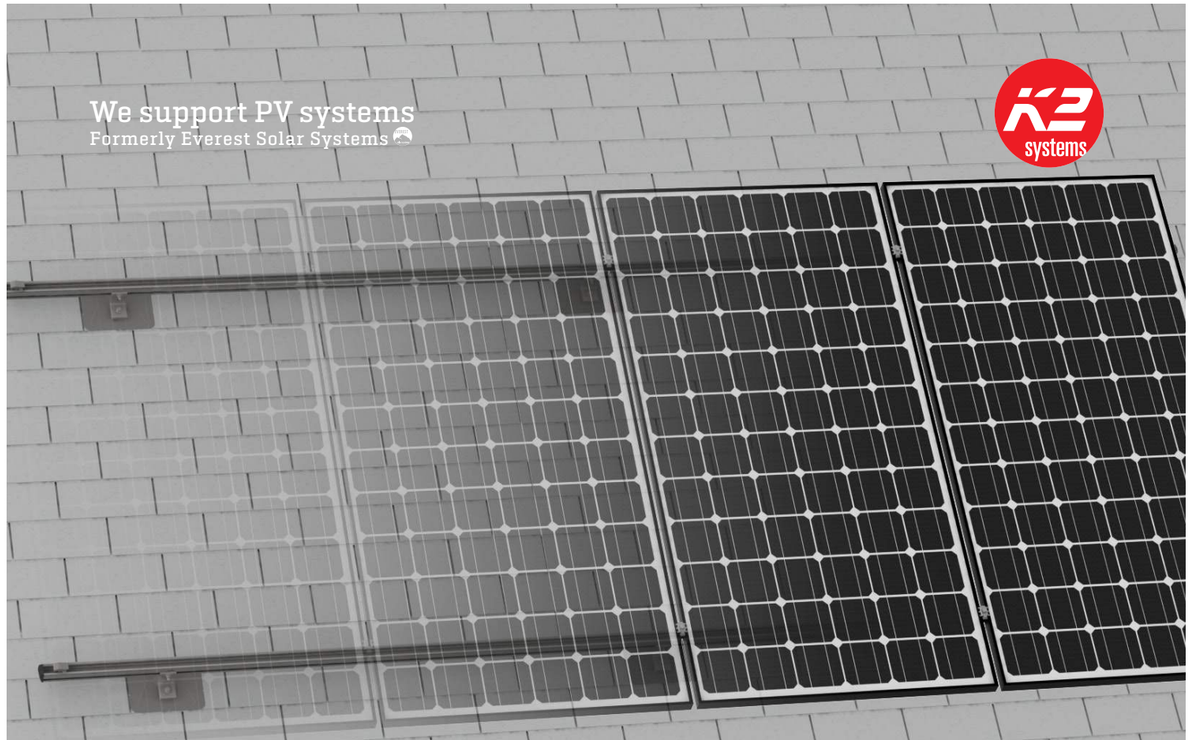
MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase 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

ENPHASE



CrossRail System

PRODUCT SHEET

High quality, German-engineered system for residential and commercial installations

4 rail sizes available to suit all structural conditions

Universal components for all rail types

Use 2 innovative components to turn this system into Shared Rail or Tilt Up

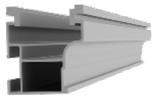
MK3 technology provides highest rail engagement

Roof attachments for all roof types

100% code compliant, structural validation for all solar states

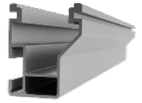
Fast installation with minimal component count result in low total installed cost

Components



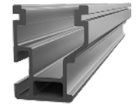
CrossRail 44-X

Part Number	Description
4000019	CrossRail 44-X, 166", Mill
4000020	CrossRail 44-X, 166", Dark
4000021	CrossRail 44-X, 180", Mill
4000022	CrossRail 44-X, 180", Dark



CrossRail 48-X

Part Number	Description
4000662	CrossRail 48-X, 166", Mill
4000663	CrossRail 48-X, 166", Dark
4000675	CrossRail 48-X, 180", Mill
4000665	CrossRail 48-X, 180", Dark



CrossRail 48-XL

Part Number	Description
4000695	CrossRail 48-XL, 166", Mill
4000705	CrossRail 48-XL, 166", Dark

CrossRail 80

Part Number	Description
4000508	CrossRail 80, 168", Mill

CrossRail Mid Clamp

Part Number	Description
4000601-H	CR MC Silver, 30-47mm, 13mm Hex
4000602-H	CR MC Dark, 30-47mm, 13mm Hex
4000688-H	SR MC Silver, 30-50mm, 13mm Hex
4000689-H	SR MC Silver, 30-50mm, 13mm Hex

CrossRail End Clamp

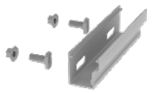
Part Number	Description
4000429	CR EC Silver 30-50mm, SR 30-45mm
4000430	CR EC Dark 30-50mm, SR 30-45mm
4000003	SR EC Silver 46-50mm
4000004	SR EC Dark 46-50mm

Yeti Clamp

Part Number	Description
4000050-H	Yeti Hidden EC for CR, Mill, 13mm Hex

Aluminum End Clamp

Part Number	Description
4005344	CrossRail EC Silver, AL 32-33mm
4005169	CrossRail EC Silver, AL 34-36mm
4005290	CrossRail EC Silver, AL 37-38mm
4005170	CrossRail EC Silver, AL 39-41mm
4005291	CrossRail EC Silver, AL 42-44mm
4005171	CrossRail EC Silver, AL 45-47mm
4005292	CrossRail EC Silver, AL 48mm
4005172	CrossRail EC Silver, AL 49-50mm



CrossRail Rail Connector

Part Number	Description
4000051	Rail Connector CR 44-X, Set, Mill
4000052	Rail Connector CR 44-X, Set, Dark
4000385	RailConn CR48-X,48-XL Struct Set, Mill
4000386	RailConn CR48-X,48-XL Struct Set, Dark
4001196	Rail Connecctor UL 2703 Set, CR80, Mill

L-Foot & T-Foot

Part Number	Description
4000630	L-Foot Slotted Set, Mill
4000631	L-Foot Slotted Set, Dark
4000080	T-Foot X, Set, Mill

Tile Hooks

Part Number	Description
4000034	Flat Tile Hook
4001294	Tile Hook 3S
4000521	SingleHook

Standing Seam PowerClamps

Part Number	Description
4000016	Standing Seam PowerClamp, Mini
4000017	Standing Seam PowerClamp, Standard

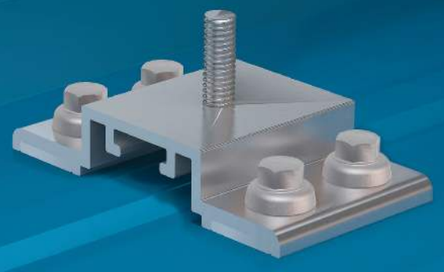
S-5!®

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

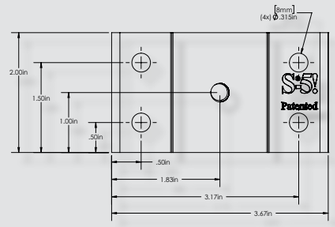
MADE IN THE USA

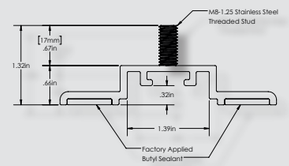
888-825-3432 | www.S-5.com |

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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