Ayracon V Almaraz
2024.04.25
21:05:41-05'00'

21 N New Warrington Rd
Pensacola, FL 32506
Office: (850) 220-6533

COLUMBIA COUNTY, FL
BUILDING DEPARTMENT

P-24492
DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS, FL 32096

To Whom It May Concern:

A proposed solar system is planned for the residential home referenced above. This is an evaluation of the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar array. A site visit at the project address was performed by Meraki Installers, LLC. Documentation of the existing structure has been provided by Meraki Installers, LLC. Solar design drawings of the proposed system including a site plan, roof plan, and connection details for the proposed solar array are included for addtional information.

A. GOVERNING CODES:

FBC 8TH EDITION (2023), ASCE 7-22

B. SITE ASSESSMENT INFORMATION:

RISK CATEGORY CLASSIFICATION = II
RISK CATEGORY = WIND
EXPOSURE OF ROOF = FULLY EXPOSED
EXPOSURE CATEGORY = C
BASIC WIND SPEED, V (mph) = 120
GROUND SNOW LOAD, pg (lb/ft^2) = 0

C. STRUCTURE DESCRIPTION: CONTRACTOR SHALL INFORM THIS OFFICE IF ANY ITEM DIFFERS

NUMBER OF STORIES = 1
ROOF MATERIAL = TRAP METAL
ROOF FRAMING = MANUFACTURED TRUSS
ASSUMED TRUSS FRAMING SPECIES = MIXED SOUTHERN PINE; G = 0.51
RAFTER/TOP CHORD SIZE (in) = 2X6
RAFTER/TOP CHORD SPACING (in) = 24
ROOF SLOPE, θ (°) = 24
SOLAR PANEL TILT, ω (°) = 0
MEAN ROOF HEIGHT, h (ft) = 13.34
ROOF TYPE = GABLE ROOF
EXISTING FOUNDATION = PERMANENT
METAL ROOF THICKNESS = 26 GA STEEL

D. LOADING CRITERIA USED:

SNOW LOAD CALCULATIONS WITH GROUND SNOW LOAD OF 0 PSF - NO SLIPPERY SLOPE:

EXPOSURE FACTOR, C_e = 0.9
THERMAL FACTOR, C_t = 1.1
SNOW IMPORTANCE FACTOR, I_s = 1
ROOF SLOPE FACTOR = 1
-NO SNOW LOAD FOR THIS PROJECT
FLAT ROOF SNOW LOAD, pf (lb/ft^2) = 0.7 x C_e x C_t x I_s x pg = 0

EXISTING ROOFING AND FRAMING WITH 20 PSF LIVE LOAD (NO PANELS):

ROOF TOP CHORD DEAD LOAD = 3.59 lb/ft^2 x 2221 ft^2 = 7963 lbs
ROOF TOP CHORD LIVE LOAD = 20 lb/ft^2 x 2221 ft^2 = 44420 lbs

NEW SOLAR PANELS AND RACKING:

DISTRIBUTED LOAD = 3 lb/ft^2 x 190.22 ft^2 = 570.66 lbs

FOR THE ANALYSIS BELOW, THE EXISTING ROOFING AND FRAMING IS ASSUMED TO BE CAPABLE OF SUPPORTING THE EXISTING LOADS STATED ABOVE

EXISTING GRAVITY LOAD WITH NO PANELS (lbs) = 52383
NEW GRAVITY LOAD WITH PANELS (lbs)* = 49149
*ROOF LIVE LOAD REDUCED TO 0 PSF FOR ROOF AREA UNDER PANELS
NEW LOADING <5% INCREASE = OK
WORST-CASE TRIBUTARY AREA AT 48" ATTACHMENT SPACING (ft^2) = 12.33
WORST-CASE POINT LOAD AT 48" ATTACHMENT SPACING (lbs) = 36.99

PER FBC, EXISTING BUILDING, 8TH EDITION (2023) 502.3, INCREASE IN DESIGN LOAD IS LESS THAN 5%;
PROJECT IS NOT REQUIRED TO MEET CODE REQUIREMENTS FOR NEW STRUCTURE - NO STRUCTURAL MODIFICATION REQUIRED-

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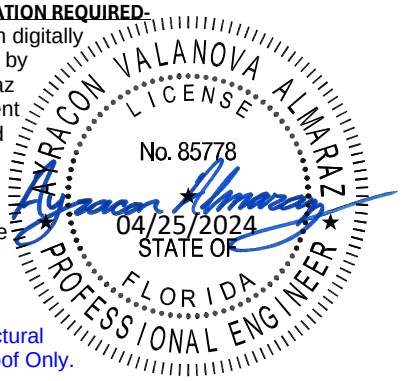

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MERAKI Installers, LLC
COA #36090

E. PROJECT REQUIREMENTS:

1. INSTALL PANELS PARALLEL TO ROOF STRUCTURE WITH A 2° (DEGREE) TOLERANCE.
2. GAP SPACING BETWEEN PANELS TO BE A MINIMUM OF 0.25 INCHES.
3. LONGEST DIMENSION OF PANEL IS NOT TO EXCEED 6.7 FT.
4. PANEL HEIGHT ABOVE ROOF SURFACE NOT TO EXCEED 10 INCHES.
5. RAILS, PANELS, AND ANCHORAGE: **INSTALL PER MANUFACTURER INSTRUCTIONS.**
6. STAGGER PANEL SUPPORT CONNECTIONS TO DISTRIBUTE LOAD.

PV MODULE COUNT = 9
ATTACHMENT LOCATION = GABLE ROOF
ATTACHMENT TYPE* = PROTEA BRACKET

SCREW QUANTITY PER ATTACHMENT = 4
SCREW ø (in) = 0.25

***ATTACHMENT NOT TO BE USED ON ROOFS THINNER THAN 26GA. ROOF MATERIAL TO BE STEEL. INSTALL ON TOP OF OR AS CLOSE TO SUPPORTING RAFTER AS POSSIBLE.**

CONTRACTOR TO INFORM THIS OFFICE IF ANY ITEM ABOVE DIFFERS FROM SITE CONDITIONS.

MAX ALLOWABLE RAIL SPACING (in) IRONRIDGE XR-100			
Zone	**EDGE**	**EXPOSED**	**NON-EXPOSED**
1	72	90	116
1'	N/A	N/A	N/A
2	55	72	93
2'	N/A	N/A	N/A
2e	N/A	N/A	N/A
2n	N/A	N/A	N/A
2r	N/A	N/A	N/A
3	45	66	87
3'	N/A	N/A	N/A
3e	N/A	N/A	N/A
3r	N/A	N/A	N/A

CONTRACTOR SHALL ADAPT THE WORK TO THE ACTUAL CONDITIONS AT THE PROJECT SITE. REFERENCE THE ATTACHED MAX ALLOWABLE ATTACHMENT SPACING TABLE FOR ATTACHMENT SPACING REQUIREMENTS AND INCREASE ATTACHMENT QUANTITY FROM THE VALUES SHOWN ON THE DRAWINGS AS NECESSARY. IF SITE ROOF DIMENSIONS DIFFER FROM THOSE SHOWN ON THE PLANS AND/OR A PANEL IS FOUND TO BE LOCATED IN A ROOF ZONE WHERE THE MAX ALLOWABLE ATTACHMENT SPACING TABLE STATES ATTACHMENTS, RAILS, OR PANELS CAN'T BE INSTALLED, THEN CONTRACTOR IS TO NOTIFY THIS OFFICE BEFORE PROCEEDING WITH THE INSTALLATION.

THE ANALYSIS ABOVE DOES NOT INCLUDE CAPACITY FOR THE COMPLETE MOUNTING SYSTEM. FOR CAPACITY OF THE COMPLETE MOUNTING SYSTEM, PLEASE SEE MANUFACTURER'S RECOMMENDATIONS.

IF DURING SOLAR PANEL INSTALLATION, THE ROOF FRAMING MEMBERS OR ROOF COVERING APPEAR UNSTABLE OR DEFLECT NON-UNIFORMLY, CONTRACTOR SHALL NOTIFY THIS OFFICE BEFORE PROCEEDING WITH THE INSTALLATION.

Based on the above evaluation and on information supplied at the time of this report, this office certifies with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. Should you have any questions regarding the above or if you require further information, please do not hesitate to contact me.

Regards,

Ayracon Almaraz

Ayracon Almaraz, PE
Florida License No 85778

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AYRACON VALANOVA ALMARAZ
LICENSE
No. 85778
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
04/25/2024

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COA #36090

21 N New Warrington Rd
Pensacola, FL 32506
Office: (850) 220-6533

COLUMBIA COUNTY, FL
BUILDING DEPARTMENT

P-24492
DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS, FL 32096

PROTEA BRACKET ON 24° GABLE ROOF			
MAX ALLOWABLE ATTACHMENT SPACING (in)			
ZONE	EDGE[1][4]	EXPOSED[2][4]	NON-EXPOSED[3][4]
1	48	48	48
1'	N/A	N/A	N/A
2	**24***	**24***	48
2'	N/A	N/A	N/A
2e	N/A	N/A	N/A
2n	N/A	N/A	N/A
2r	N/A	N/A	N/A
3	**24***	**24***	48
3'	N/A	N/A	N/A
3e	N/A	N/A	N/A
3r	N/A	N/A	N/A

*INCREASE ATTACHMENT QUANTITY AS REQUIRED.

DNI-A = DO NOT INSTALL PANEL IN ROOF ZONE FOR CONDITION SHOWN. EXCEEDS ATTACHMENT STRENGTH.

DNI-R = DO NOT INSTALL PANEL IN ROOF ZONE FOR CONDITION SHOWN. EXCEEDS RAIL STRENGTH.

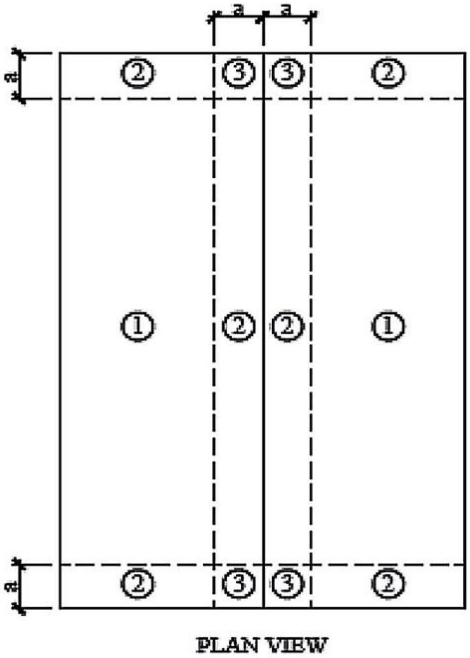
(1)EDGE ATTACHMENT SPACING FOR WHEN EDGE OF PANEL IS INSTALLED WITHIN 8" OF ROOF EDGE OR GABLE/HIP RIDGE.

(2)EXPOSED ATTACHMENT SPACING FOR PANELS INSTALLED IN EXPOSED CONDITIONS.

(3)NON-EXPOSED ATTACHMENT SPACING TO BE USED FOR PANELS INSTALLED IN NON-EXPOSED CONDITIONS.

(4)REFERENCE FIGURES ON NEXT PAGE TO DETERMINE EDGE, EXPOSED, AND NON-EXPOSED PANEL CONDITIONS.

ASCE 7-22 - FIGURE 30.3-2C - GABLE ROOF - a (ft) = 4.9



PLAN VIEW

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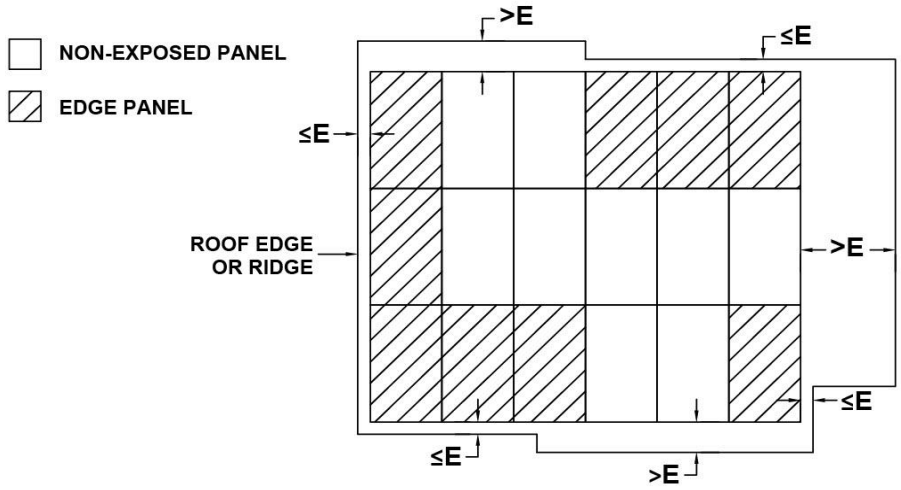
MAX ALLOWABLE ATTACHMENT SPACING FOR EDGE PANELS SHALL BE REQUIRED IF A SOLAR PANEL IS WITHIN DISTANCE E OR LESS FROM ROOF EDGE, RIDGE, OR GABLE/HIP RIDGE

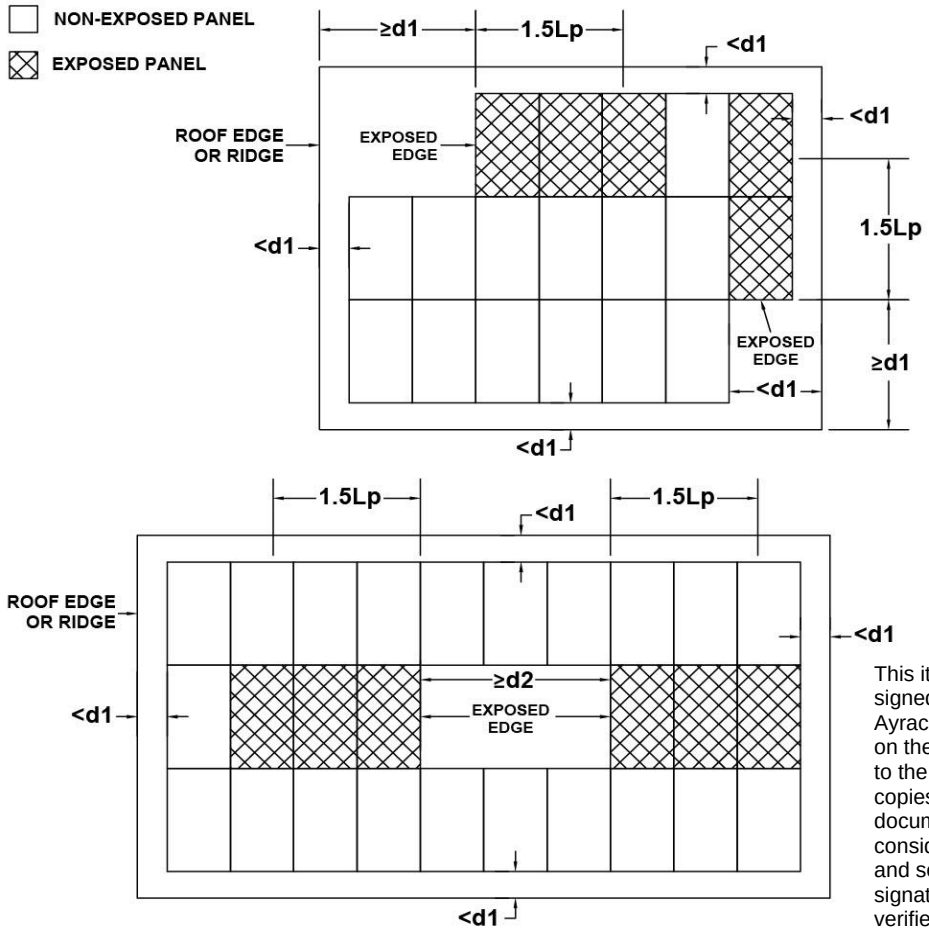
E= 8"



MAX ALLOWABLE ATTACHMENT SPACING FOR EXPOSED PANELS SHALL BE REQUIRED IF A SOLAR PANEL MEETS ANY OF THE FOLLOWING CRITERIA:

1. IF DISTANCE d1 IS GREATER THAN 6'-8" FROM THE EDGE OF PANEL TO ROOF EDGE OR GABLE/HIP RIDGE.
2. IF d2 IS GREATER THAN 4'-0 TO THE ADJACENT PANEL/ARRAY.
3. IF PANEL IS WITHIN A DISTANCE OF 9'-3" (1.5Lp) FROM THE END OF A ROW AT AN EXPOSED EDGE.

d1= 6'-8" d2= 4'-0" 1.5Lp= 9'-3"



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AYRACON VALANOVI ALMARAZ LICENSE No. 85778 STATE OF FLORIDA PROFESSIONAL ENGINEER 04/25/2024

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MERAKI Installers, LLC
COA #36090

PROJECT INFORMATION	PROJECT NUMBER: P-24492

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096
UTILITY: SUWANNEE VALLEY ELECTRIC CO-OP

SHEET INDEX	
PV01	COVER SHEET
PV02	NOTES AND LEGEND
PV03	SITE PLAN
PV04	ROOF PLAN
PV05	ATTACHMENT DETAILS
PV06	ELECTRICAL DIAGRAM
PV07	ELECTRICAL CALCS
PV08	LABELS
PV09	PLACARD

AERIAL VIEW:

STREET VIEW:

PROPOSED SYSTEM INFORMATION				STRUCTURAL INFORMATION
DC SYSTEM SIZE: 3.690 KW		AC SYSTEM SIZE: 2.610 KW		ROOF MATERIAL: TRAP METAL
MODULES:	QPEAK DUO ML-G10+ 410W	QTY:	9	ATTACHMENT: PROTEA BRACKET
INVERTER(S):	ENPHASE IQ8PLUS-72-2-US	QTY:	9	RAIL: IRONRIDGE XR-100

DESCRIPTION OF DESIGN:
INSTALLATION OF GRID-TIED,
UTILITY INTERACTIVE
PHOTOVOLTAIC SYSTEM

SITE SPECIFICATIONS:
OCCUPANCY: R-3
ZONING: RESIDENTIAL

APPLICABLE GOVERNING CODES:
FBC 2023 8TH EDITION
NEC 2020
FFPC 2020

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV01 - COVER SHEET
DESIGNED BY: J. CUENO
DATE: 4/25/2024 REV: ----
CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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AYRACON VALANOVA ALMARAZ ★ LICENSE ★ No. 85778 ★ 04/25/2024 STATE OF FLORIDA ★ PROFESSIONAL ENGINEER ★

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MERAKI Installers, LLC
COA #36090

MERAKI

GENERAL NOTES:

1. INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING.
2. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110.
3. ALL WIRES, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250
4. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES.
5. ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
6. DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
7. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE.
8. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
9. INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741.
10. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
11. ALL EQUIPMENT LOCATED OUTDOORS TO BE NEMA 3R OR NEMA 4R.

GROUNDING & ELECTRICAL NOTES:

1. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
2. DC GEC AND AC EGC TO REMAIN SPLICED TO EXISTING ELECTRODE
3. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
4. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.

INTERCONNECTION NOTES:

1. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9] & [NEC 230.95]
2. SUPPLY SIDE INTERCONNECTION ACCORDING TO [NEC705.12]

DISCONNECT NOTES

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED. THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

SITE AND ROOF PLAN LEGEND

EXISTING ELECTRICAL

- EXISTING PV MODULE
- M — EXISTING UTILITY METER
- MSP — EXISTING MAIN SERVICE PANEL
- ENPH IQ — EXISTING ENPHASE IQ COMBINER
- EXISTING INVERTER
- AC — EXISTING AC DISCONNECT
- C — EXISTING COMBINER PANEL
- SP — EXISTING SUB PANEL
- PV — EXISTING PV METER

NEW ELECTRICAL

- NEW PV MODULE
- M — NEW UTILITY METER
- MSP — NEW MAIN SERVICE PANEL
- ENPH IQ — NEW ENPHASE IQ COMBINER
- NEW INVERTER
- AC — NEW AC DISCONNECT
- C — NEW COMBINER PANEL
- SP — NEW SUB PANEL
- PV — NEW PV METER
- JB — NEW JUNCTION BOX

SITE CONDITIONS AND STRUCTURAL

- FIRE ACCESS PATHWAY
- ROOF ATTACHMENT
- B — BALLAST BAY
- RAIL
- PROPERTY BOUNDARY
- TRENCHING
- OBSTRUCTION
- TREE
- FENCE
- GATE

ELECTRICAL DIAGRAM LEGEND

(N) = NEW

(E) = EXISTING

NOTE: ALL SYMBOLS SHOWN IN LEGEND MAY NOT BE PRESENT IN PLANS

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV02 - NOTES AND LEGEND

DESIGNED BY: J. CUENO

DATE: 4/25/2024 REV: ----

CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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04/25/2024
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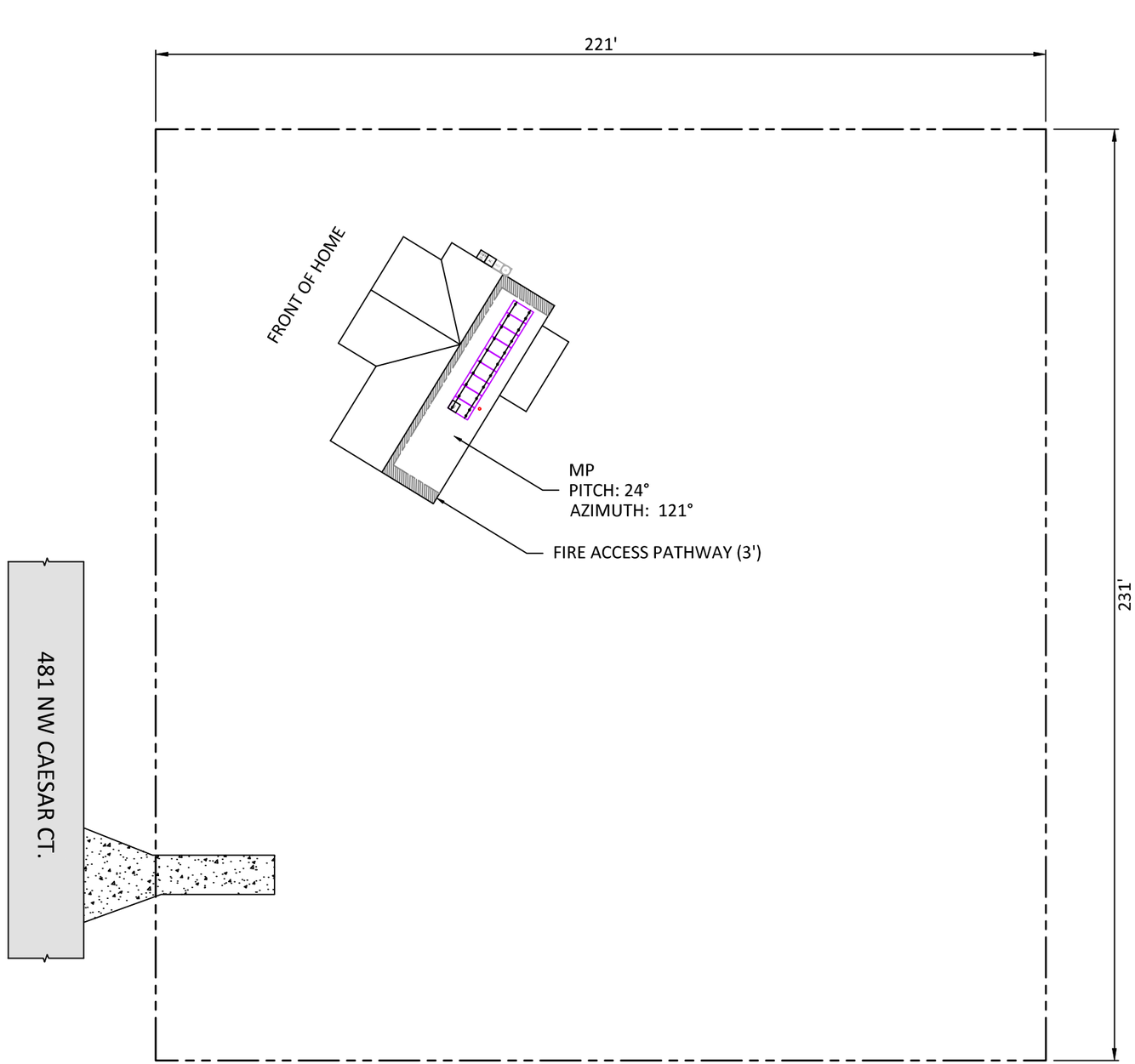
PROFESSIONAL ENGINEER

Designed for Structural Attachments to Roof Only.

MERAKI Installers, LLC
COA #36090

MERAKI



N

SCALE = 1/32" = 1'-0"

EQUIPMENT:
PV MODULE(S): (9) QPEAK DUO ML-G10+ 410W PV MODULES x 410W = 3.690kW DC
INVERTER(S): (9) ENPHASE IQ8PLUS-72-2-US (240V) INVERTER(S) x 290W = 2.610 kW AC

NOTES:
1. ARRAY AREA IS 9% PLAN VIEW TOTAL ROOF AREA.
2. VISIBLE, LOCKABLE, LABELED AC DISCONNECT.
3. PRODUCTION METER (IF REQUIRED) IS TO BE INSTALLED WITHIN 10FT OF THE UTILITY METER, IF THEY ARE NOT SIDE BY SIDE.

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV03 - SITE PLAN

DESIGNED BY: J. CUENO

DATE: 4/25/2024 REV: ----

CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

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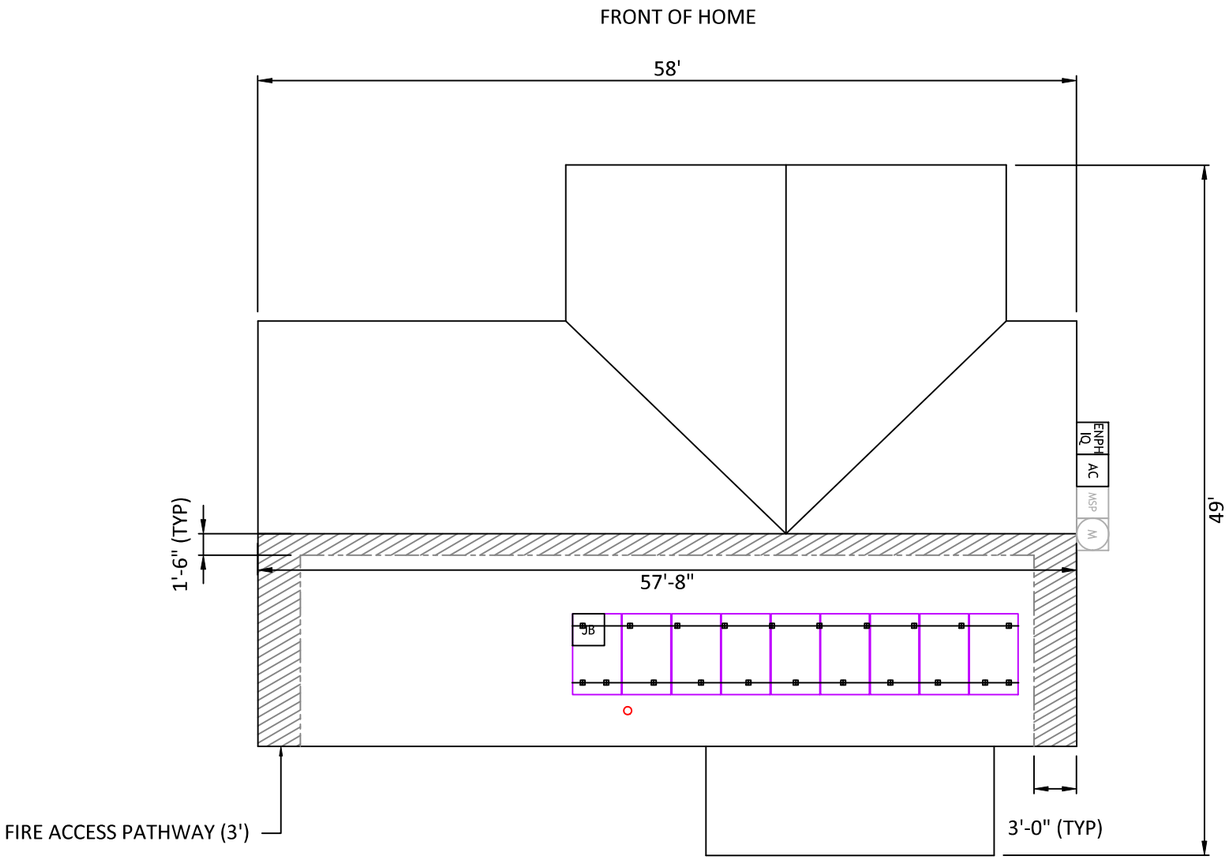
COA #36090

MERAKI



PV04 ROOF PLAN A

SCALE = 3/32" = 1'-0"

EQUIPMENT INFORMATION:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:		ROOF INFO:	
RAIL MANUFACTURER	IRONRIDGE	PV MODULE COUNT	9	ROOF MATERIAL	TRAP METAL
RAIL PART NUMBER	XR-100	ARRAY AREA (FT²)	MODULE COUNT * 21.21 = 190.89	ROOF FRAMING	MANUFACTURED TRUSS
ATTACHMENTS	PROTEA BRACKET	ROOF AREA (FT²)	2221	RAFTER/TOP CHORD SIZE	2X6
ATTACHMENT QTY	21	ARRAY WEIGHT	MODULE COUNT * 50LBS = 450	RAFTER/TOP CHORD SPACING	24"
SPLICE QTY	4	POINT LOAD	ARRAY LBS/ATTACHMENTS = 21.43	ATTACHMENT SPACING	SEE ENGINEER'S MAX ALLOWABLE ATTACHMENT SPACING TABLE
MIDCLAMP QTY	16	DISTRIBUTED LOAD	ARRAY LBS/AREA = 2.36 LBS/FT²		
ENDCLAMP QTY	4				

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV04 - ROOF PLAN
DESIGNED BY: J. CUENO
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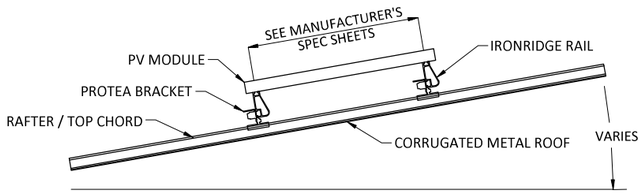
COA #36090

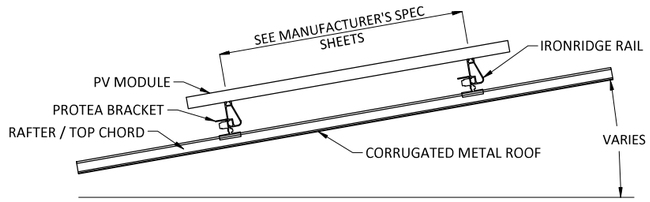
MERAKI

LANDSCAPE ORIENTATION



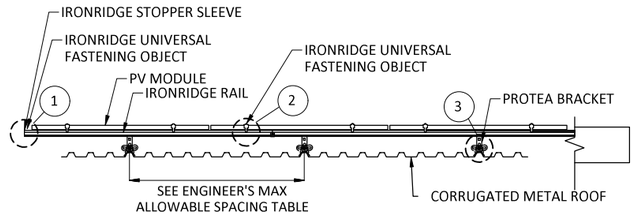
SIDE VIEW

PORTRAIT ORIENTATION



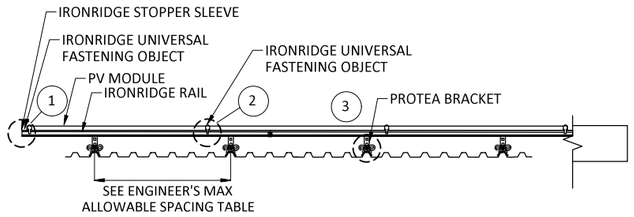
SIDE VIEW

INSTALL ATTACHMENT ON TOP OF OR AS CLOSE TO SUPPORTING RAFTER AS POSSIBLE.

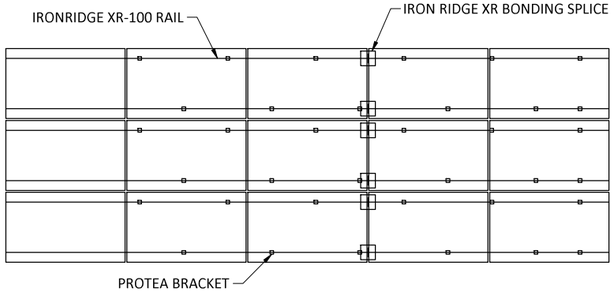


LANDSCAPE FRONT VIEW

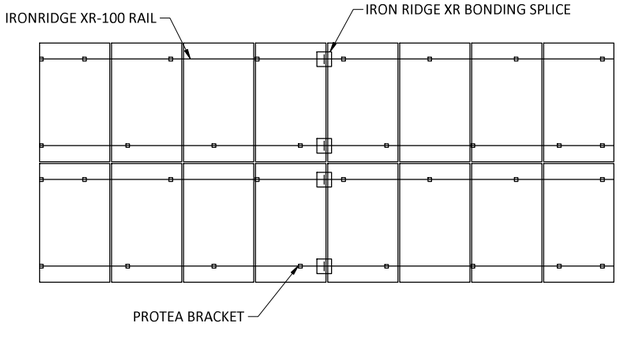
INSTALL ATTACHMENT ON TOP OF OR AS CLOSE TO SUPPORTING RAFTER AS POSSIBLE.



PORTRAIT FRONT VIEW

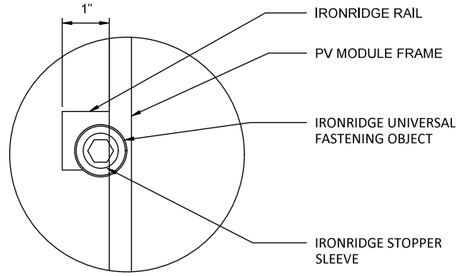


PLAN VIEW LANDSCAPE MODULE



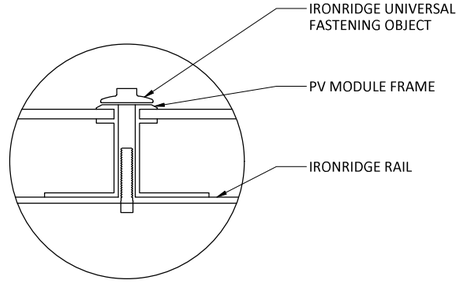
PLAN VIEW PORTRAIT MODULE

1



IRONRIDGE UNIVERSAL FASTENING OBJECT WITH STOPPER SLEEVE

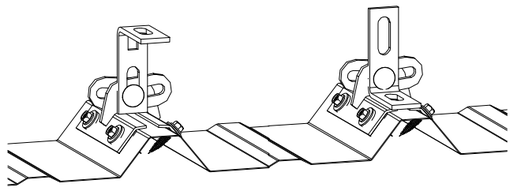
2



IRONRIDGE UNIVERSAL FASTENING OBJECT

3

SCREW SPECIFICATIONS:
1/4" (6.3MM) DIAMETER - 1" (25MM) LENGTH
SELF TAPPING SHEET METAL SCREW - 5/16"
(8MM) HEX HEAD WITH EPDM RUBBER SEALING WASHER



PROTEA BRACKET ATTACHMENT

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET:	PV05 - ATTACHMENT DETAILS
DESIGNED BY:	J. CUENO
DATE: 4/25/2024	REV: ----
CONTRACTOR:	MERAKI INSTALLERS, LLC LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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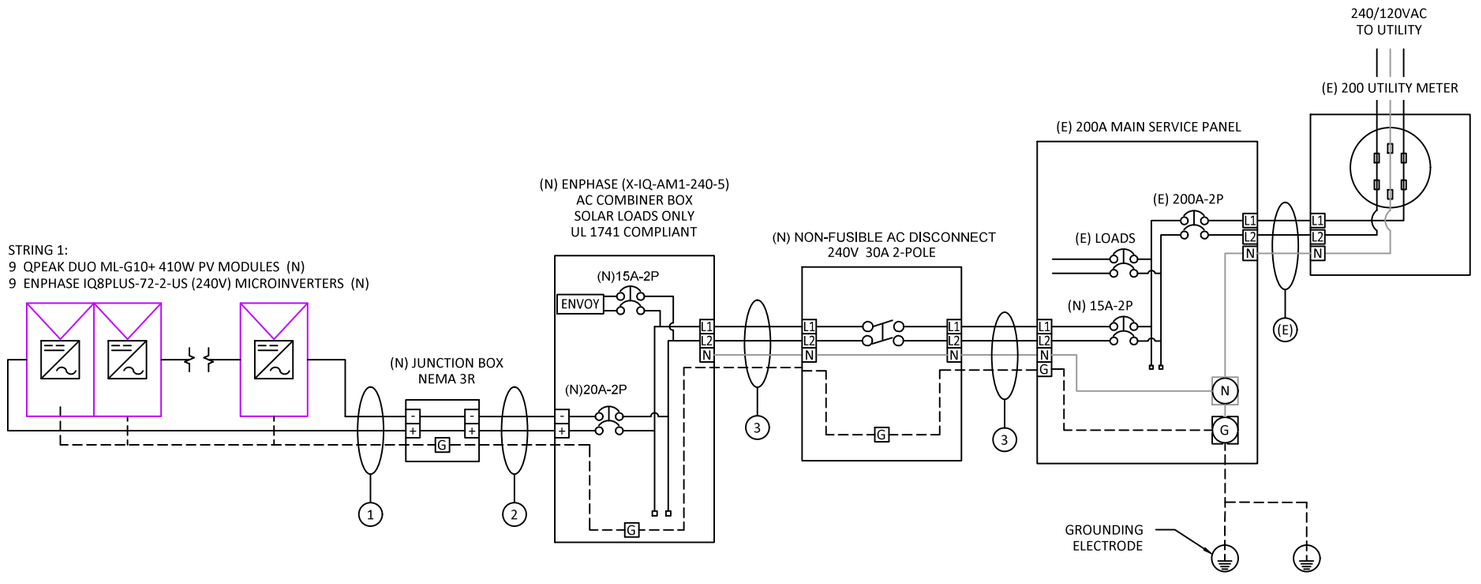
Designed for Structural Attachments to Roof Only.

AYRACON VALANOVA ALMARAZ
LICENSE
No. 85778
04/25/2024
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

MERAKI Installers, LLC
COA #36090

MERAKI

CONDUCTOR & CONDUIT SCHEDULE									
TAG	QTY	WIRE GAUGE	DESCRIPTION	CONDUIT SIZE	CONDUCTOR RATING (A)	CONDUCTOR TEMP. RATE	AMBIENT TEMP	TEMP. DERATE	# OF CONDUCTORS DERATE	CONDUCTOR RATING W/DERATES
①	2 1	12-2 6 AWG	PV-WIRE, USE-2, COPPER (POSITIVE +, NEGATIVE -) BARE, COPPER (GROUND)	N/A	30	90°C	34°C	0.96	1	28.8A
②	2 1	10 AWG 10 AWG	UF-B COPPER (POSITIVE +, NEGATIVE -) UF-B COPPER (GROUND)	N/A	30	60°C	34°C	0.96	1	28.8A
③	3 1	10 AWG 10 AWG	THHN, THWN-2 COPPER (L1 ,L2, NEUTRAL) THHN, THWN-2 COPPER (GROUND)	3/4"	35	75°C	34°C	0.94	1	32.9A



EQUIPMENT:
PV MODULE(S): (9) QPEAK DUO ML-G10+ 410W PV MODULES x 410W = 3.690kW DC
INVERTER(S): (9) ENPHASE IQ8PLUS-72-2-US (240V) INVERTER(S) x 290W = 2.610 kW AC

NOTES:
1. VISIBLE, LOCKABLE, LABELED AC DISCONNECT.
2. SUBJECT PV SYSTEM HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2020, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING- MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER.
3. ALL PV EQUIPMENT TO BE INSTALLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
4. GROUNDING ELECTRODE TO BE FIELD VERIFIED BY CONTRACTOR TO BE IN COMPLIANCE WITH 250.50 - 53.

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV06 - ELECTRICAL DIAGRAM

DESIGNED BY: J. CUENO

DATE: 4/25/2024 REV: ----

CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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AYRACON VALANOVA ALMARAZ
LICENSE
No. 85778
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
04/25/2024

Designed for Structural Attachments to Roof Only.

MERAKI Installers, LLC
COA #36090

MERAKI

EQUIPMENT SCHEDULE			
TYPE	QTY	DESCRIPTION	RATING
MODULES:	9	QPEAK DUO ML-G10+ 410W	410W
INVERTER(S):	9	ENPHASE IQ8PLUS-72-2-US	290W
AC DISCONNECT(S):	1	PV AC DISCONNECT, 240V, 2-POLE	30A

STRING CALCULATIONS					
ENPHASE IQ8PLUS-72-2-US	STRING #1				
MAX AC CURRENT:	10.9A				
MLPE IN SERIES	9				
NOMINAL STRING VOLTAGE:	240V				
MAX AC OUTPUT POWER	2610W				
ARRAY DC POWER:	3690W				
TOTAL MAX AC CURRENT:	10.9A				

SYSTEM OCPD CALCULATIONS	
INVERTER MODEL(S):	ENPHASE IQ8PLUS-72-2-US
# OF INVERTERS:	9
MAX OUTPUT CURRENT:	10.9A
(# OF INVERTERS) X (MAX OUTPUT CURRENT) X 125% <= OCPD RATING	
(9 X 1.21A X 1.25) = 13.6A <= 15A, OK	

BUSBAR CALCULATIONS - 120% RULE	
MAIN BUSBAR RATING:	200A
MAIN BREAKER RATING:	200A
PV OCPD RATING:	15A
(MAIN BUSBAR RATING X 120%) - MAIN BREAKER RATING >= PV OCPD RATING	
(200A X 1.2) - 200A = 40.0A, >= 15A, OK	

QPEAK DUO ML-G10+410	
NOMINAL POWER (PMAX)	410W
OPEN CIRCUIT VOLTAGE (VOC)	45.31V
SHORT CIRCUIT CURRENT (ISC)	11.11A
MAX POWER VOLTAGE (VMP)	38.48V
MAX POWER CURRENT (IMP)	10.65A
MAXIMUM SERIES FUSE	21A

ENPHASE IQ8PLUS-72-2-US SPECS	
MAX INPUT VOLTAGE	60V
MAX DC SHORT CIRCUIT CURRENT	15A
MAXIMUM OUTPUT POWER	290W
MAXIMUM OUTPUT CURRENT	1.21A
NOMINAL OUTPUT VOLTAGE	240V
MAX UNITS PER 20A CIRCUIT	13
1-PHASE, 60 HZ, UL1741 LISTED	

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV07 - ELECTRICAL CALCS

DESIGNED BY: J. CUENO

DATE: 4/25/2024 REV: ----

CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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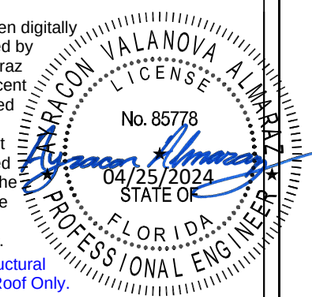
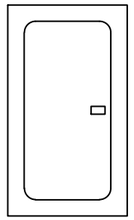


MERAKI Installers, LLC
COA #36090

MAIN SERVICE PANEL



⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

NEC 690.13(B)

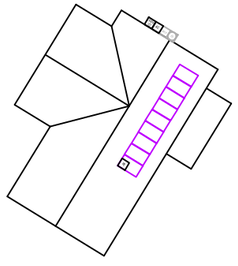
⚠ WARNING
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

NEC 705.12(B)(2)(3)(c)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

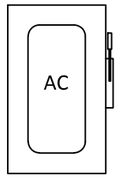
NEC 705.10(C)

Caution:
MULTIPLE SOURCES OF POWER



NEC 2020 705.10

FUSIBLE & NON-FUSIBLE
AC DISCONNECT(S)



MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT
RATED AC OUTPUT CURRENT: 10.89 A
NOMINAL OPERATING AC VOLTAGE 240 V

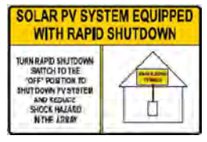
NEC 690.54

⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

NEC 690.13(B)

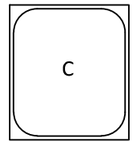
WARNING
IN CASE OF EMERGENCY, CONTACT:
MERAKI SOLAR
PH:(850) 378-1257

NFPA 11.12.2.1.5



NEC 690.56(C)(1)(A)

COMBINER PANEL



RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.56(C)(2)

⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

NEC 690.13(B)

⚠ WARNING
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

NEC 705.12(B)(2)(3)(c)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC 705.10(C)

CONDUITS & JUNCTION BOX(ES)

WARNING: PHOTOVOLTAIC POWER SOURCE

NEC 690.31(D)(2)

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET: PV08 - LABELS

DESIGNED BY: J. CUENO

DATE: 4/25/2024 REV: ----

CONTRACTOR: MERAKI INSTALLERS, LLC
LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
850-220-6533

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Designed for Structural Attachments to Roof Only.

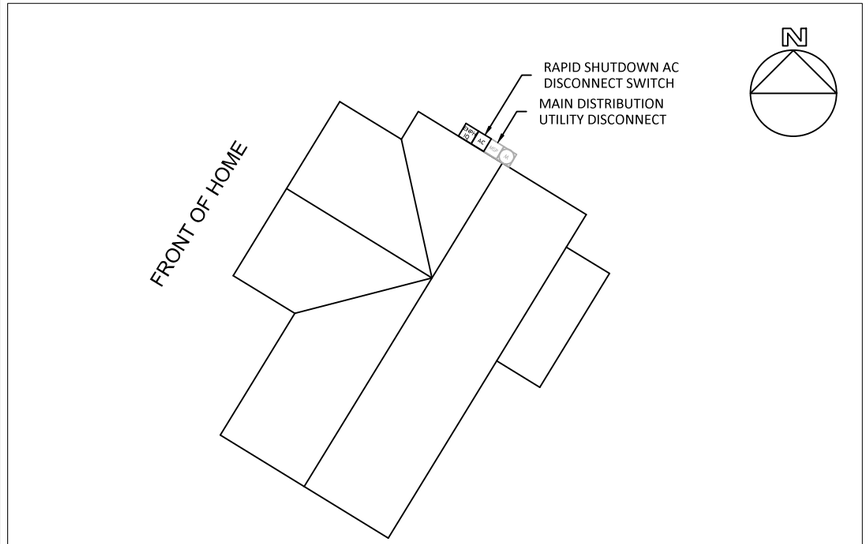
AYRACON VALANOVA ALMARAZ
LICENSE
No. 85778
04/25/2024
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

MERAKI Installers, LLC
COA #36090

MERAKI

CAUTION

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



DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])

PROPOSED SYSTEM INFORMATION

DAVID REDISKE
481 NW CAESAR CT.
WHITE SPRINGS FL 32096

DC SYSTEM SIZE: 3.690 KW
AC SYSTEM SIZE: 2.610 KW
MODULE: (9) QPEAK DUO ML-G10+ 410W
INVERTER: (9) ENPHASE IQ8PLUS-72-2-US
ATTACHMENT: PROTEA BRACKET
RAIL: XR-100

SHEET:	PV09 - PLACARD
DESIGNED BY:	J. CUENO
DATE: 4/25/2024	REV: ----
CONTRACTOR:	MERAKI INSTALLERS, LLC LICENSE # CVC57201,EC13010723

MERAKI SOLUTIONS LLC.
21 N. NEW WARRINGTON RD.
PENSACOLA, FL 32506
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AYRACON VALANOVA ALMARAZ ★ LICENSE ★ No. 85778 ★ 04/25/2024 ★ STATE OF FLORIDA ★ PROFESSIONAL ENGINEER ★

Designed for Structural Attachments to Roof Only.

MERAKI Installers, LLC
COA #36090

MERAKI

Q.PEAK DUO BLK ML-G10+ SERIES

395 - 415 Wp | 132 Cells
21.1 % Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10.a+
Q.PEAK DUO BLK ML-G10+

Breaking the 21 % efficiency barrier

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.1 %.

A reliable investment

Inclusive 25-year product warranty and 25-year linear performance warranty[1].

Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology[2] and 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.

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

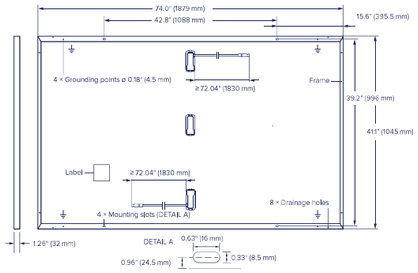
The ideal solution for:

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; (+) ≥ 72.04 in (1830 mm), (−) ≥ 72.04 in (1830 mm)
Connector	Stäubli MC4; IP68

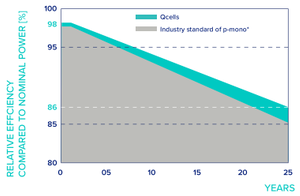


Electrical Characteristics

POWER CLASS				395	400	405	410	415
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	395	400	405	410	415
	Short Circuit Current[1]	I_{SC}	[A]	11.02	11.05	11.08	11.11	11.14
	Open Circuit Voltage[1]	V_{OC}	[V]	45.20	45.24	45.27	45.31	45.34
	Current at MPP	I_{MPP}	[A]	10.48	10.54	10.60	10.65	10.71
	Voltage at MPP	V_{MPP}	[V]	37.68	37.95	38.22	38.48	38.74
	Efficiency[1]	η	[%]	≥20.1	≥20.4	≥20.6	≥20.9	≥21.1
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	296.4	300.1	303.9	307.6	311.4
	Short Circuit Current	I_{SC}	[A]	8.88	8.91	8.93	8.95	8.98
	Open Circuit Voltage	V_{OC}	[V]	42.63	42.66	42.69	42.73	42.76
	Current at MPP	I_{MPP}	[A]	8.25	8.30	8.35	8.40	8.45
	Voltage at MPP	V_{MPP}	[V]	35.93	36.16	36.39	36.61	36.84

[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

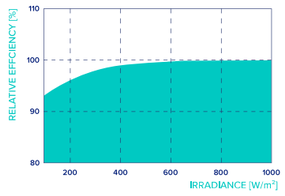


At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

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

UL61730-1 & UL61730-2, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),

www.tuv.com
ID 1111220277

*Contact your Qcells Sales Representative for details regarding the module's eligibility to be Buy American Act (BAA) compliant.

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 I TEL +1 949 748 59 96 I EMAIL hqc-inquiry@qcells.com I WEB www.qcells.com

ENPHASE

DATASHEET

X-IQ-AM1-240-5
X-IQ-AM1-240-5C

IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, along with IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provides you with a complete grid-agnostic Enphase Energy System.

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

IQ System Controller 3/3G
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters

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

Enphase 5 year limited warranty
5-year limited warranty

UL LISTED

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install

- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entry
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth based Wi-Fi provisioning for easy Wi-Fi setup

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKUs
- UL1741 listed

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (± 2.5%) and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05)[1]. Includes a silver solar shield to deflect heat
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance and management of the Enphase IQ System
Busbar	125A busbar with support for 1 x IQ Gateway breaker and 4 x 20A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Prewired revenue-grade solid core CT, accurate up to 0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to 2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to 2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for CTRL board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers Supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with hold-down kit
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (More details in "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B series circuit breakers (with screws)
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault curent rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

[1] A plug-and-play industrial-grade cell modem 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.)

IQC-5-5C-DSH-00007-2.0-EN-US-2023-09-27

MECHANICAL DATA	
Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75" x 19.5" 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°F 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
Communication (In-premise connectivity)	Built-in CTRL board for wired communication with IQ Battery 5P and IQ System Controller 3/3G. Integrated Power Line Communication for IQ Series Microinverters
Altitude	Up to 2,600 meters (8,530 feet)
COMMUNICATION INTERFACES	
Integrated Wi-Fi	802.11b/g/n (dual band 2.4 GHz/5 GHz), for connecting the Enphase cloud via the internet
Wi-Fi range (recommended)	10 m
Bluetooth	BLE4.2, 10 m range to configure Wi-Fi SSID
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud via the internet
Mobile Connect	CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with IQ Combiner 5C)
Digital I/O	Digital input/output for grid operator control
USB 2.0	For Mobile Connect
Access point (AP) mode	For connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one IQ Battery CT, and one Production CT
Power line communication	90-110 kHz
Web API	Refer to https://developer-v4.enphase.com
Local API	Refer to guide for local API
COMPLIANCE	
IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003
IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.) IEEE 2030.5/CSIP Compliant Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
COMPATIBILITY	
IQ System Controller 3/3G	SC200D111C240US01, SC200G111C240US01
IQ Battery 5P	IQBATTERY-5P-1P-NA
Microinverter	IQ6, IQ7, and IQ8 Series Microinverters

Accessories

Enphase Mobile Connect

4G-based LTE-M1 cellular modem with a 5-year data plan
(CELLMODEM-M1-06-SP-05 for Sprint and CELLMODEM-M1-06-AT-05 for AT&T)

Circuit breakers

BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210
BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215
BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220
BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support
BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support

CT-200-SOLID

200 A revenue grade solid core Production CT with <0.5% error rate (replacement SKU)

CT-200-CLAMP

200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

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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

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

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.

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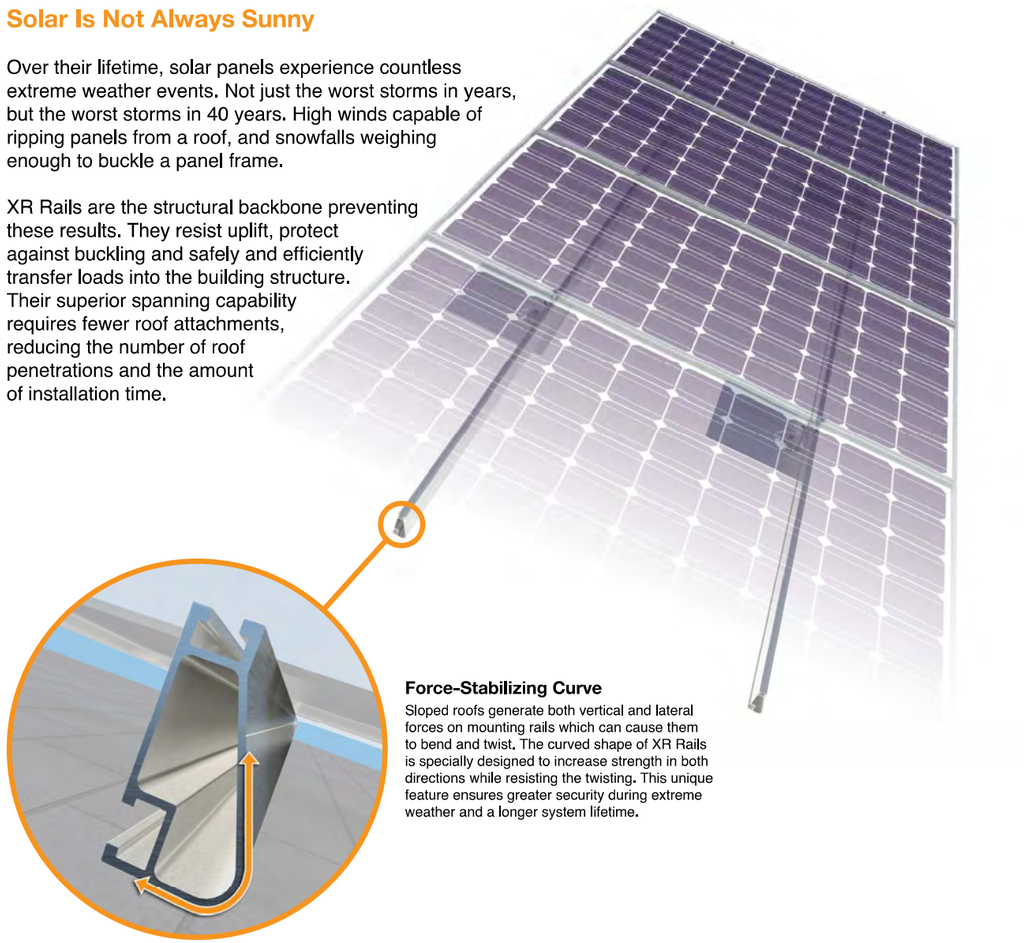
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

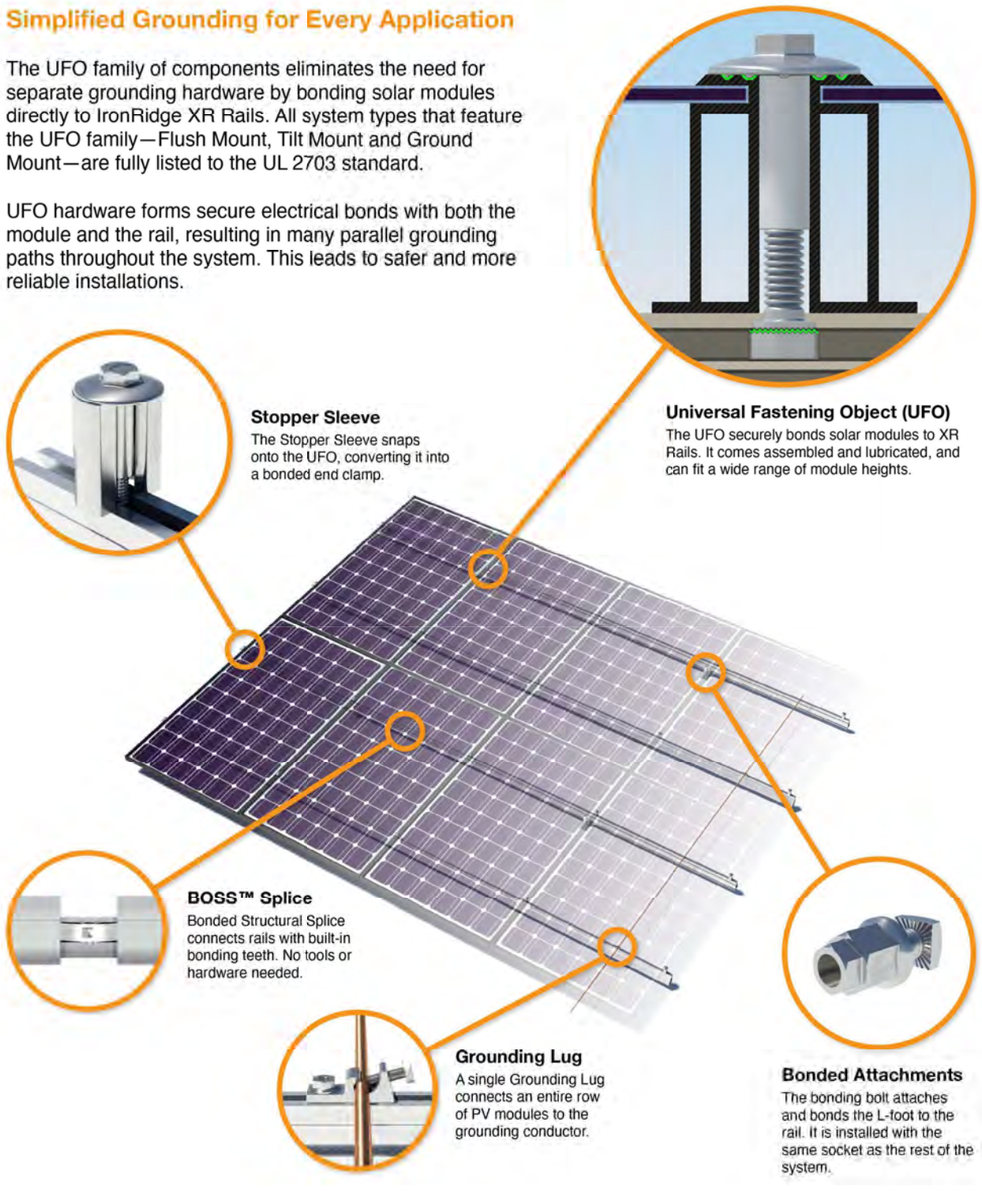
Tech Brief

UFO Family of Components

Simplified Grounding for Every Application

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

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



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

Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.

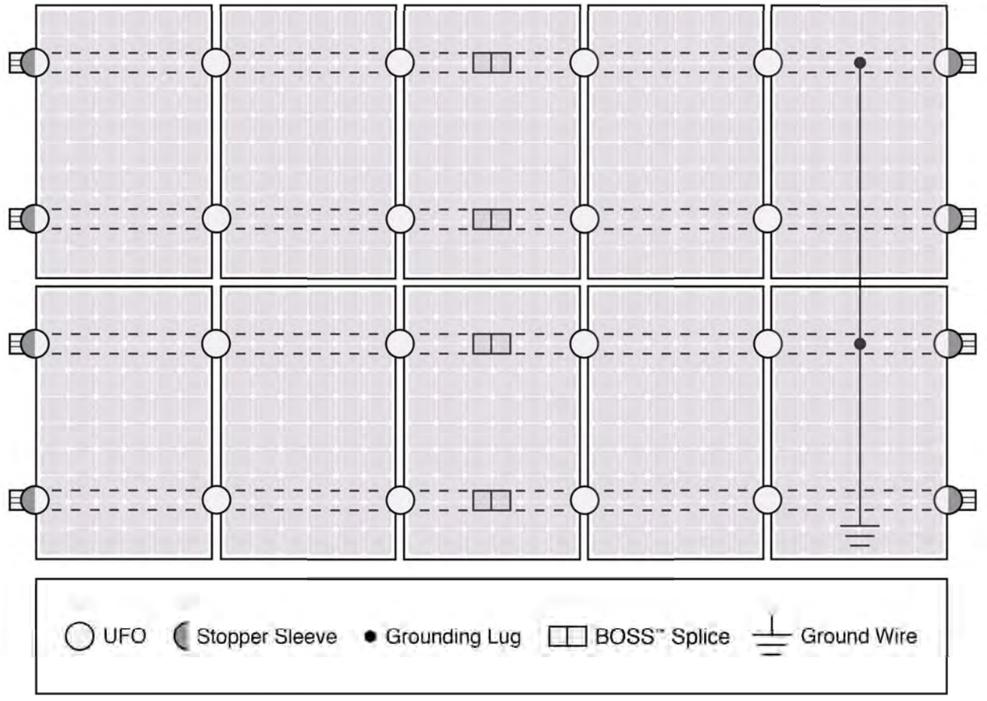
BOSS™ Splice
Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.

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

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

Tech Brief

System Diagram



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

UL Certification

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

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

Go to IronRidge.com/UFO

Cross-System Compatibility			
Feature	**Flush Mount**	**Tilt Mount**	**Ground Mount**
XR Rails	✔	✔	XR100 & XR1000
UFO/Stopper	✔	✔	✔
BOSS™ Splice	✔	✔	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

S-5!®

The Right Way!

The right way to attach almost anything to metal roofs!

ProteaBracket™

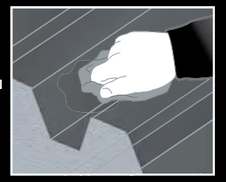
ProteaBracket™ is the most versatile standing seam metal roof attachment solution on the market, fitting most trapezoidal sheet profiles with and without intermediate insulation. It features an adjustable attachment base and multiple solar module attachment options (illustrated on back) to accommodate varying widths and heights. There are no messy sealants to apply and no chance for leaks; the ProteaBracket comes with factory-applied, adhesive rubber sealant to ensure quick installation and a weather-proof fit.

Installation is simple! The ProteaBracket is mounted directly onto the crown of the panel, straddling the profile. No surface preparation is necessary; simply wipe away excess oil and debris, align, and apply. Secure ProteaBracket through its pre-punched holes, using the hardened drill point S-5!® screws.

ProteaBracket is the perfect match for our S-5-PV Kit and spares you the hassle of cold-bridging! For a solar attachment solution that is both economical and easy to use, choose ProteaBracket.*

*When ProteaBracket is used in conjunction with the S-5-PV Kit, an additional nut is required during installation.

1



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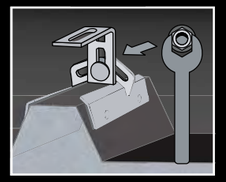

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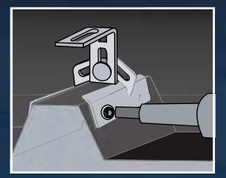

ProteaBracket™

S-5!® ProteaBracket™ is a versatile bracket that adjusts easily to most trapezoidal roof profiles.

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S-5!®

The Right Way!

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal exposed-fastened metal roof profiles! No messy sealants to apply. The factory-applied adhesive rubber sealant weather-proofs and makes installation easy!

Each **ProteaBracket™** comes with a factory-applied, adhesive rubber sealant on the base. A structural A2 stainless steel bimetal attachment bracket, ProteaBracket is compatible with most common metal roofing materials. All four pre-punched holes must be used to achieve tested strength. Mounting hardware is furnished with the ProteaBracket. For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications. S-5!® holding strength is unmatched in the industry.

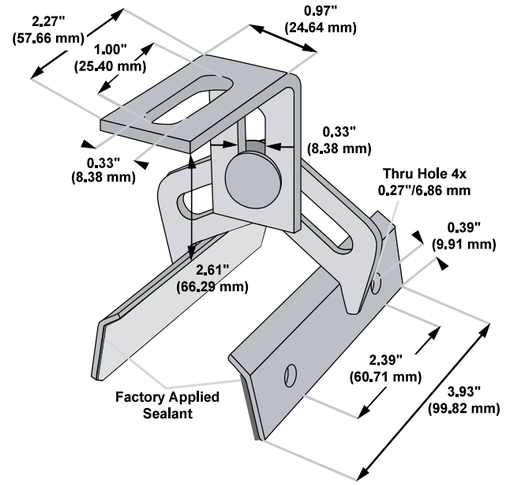
Multiple Attachment Options:

Side Rail Option

Top Rail Option

S-5-PV Kit Option

ProteaBracket™



Please note: All measurements are rounded to the second decimal place.

Example Applications

S-5-PV Kit demonstrated with a ProteaBracket on a trapezoidal profile.

Example Profile

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

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at www.S-5.com.

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