DAVIS RESIDENCE

9.600 kW DC STC- 7.600 kW AC PV SYSTEM

9393 SW TUSTENUGGEE AVE
LAKE CITY, FL 32034

Columbia County Building Department — Plans Reviewed for Code Compliance — State of Florida

PROJECT DESCRIPTION:

24x400 HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 9.600 kW DC STC - 7.600 kW AC
ARRAY AREA #1: 506.90 SQ. FT.

EQUIPMENT SUMMARY
24 HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES
01 SOLAREDGE SE7600H-US INVERTERS
24 SOLAREDGE POWER P401 OPTIMIZERS

RACKING: IRONRIDGE XR100
ATTACHMENT: S-5! PROTEA

DESIGN CRITERIA:
WIND SPEED (ULT): 120 MPH
WIND SPEED (ASD): 93 MPH
RISK CATEGORY: II
EXPOSURE: B

CODES AND STANDARDS

GOVERNING CODES :
FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC)
FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC)
FLORIDA BUILDING CODE, 7TH EDITION 2020 EDITION (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
NATIONAL ELECTRICAL CODE 2017 (NEC)
ASCE 7-16

STRUCTURAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7th ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS.

ELECTRICAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 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. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION

OWNER

DAVIS, KIMBERLY

INSTALLER

SUNSMART AMERICA
1404 HAMLIN AVE UNIT L,
ST CLOUD FL 34771
PH: (407)-904-0441.

ENGINEER

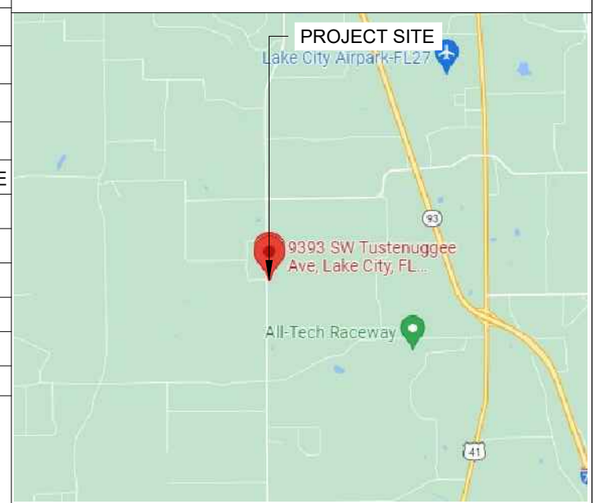
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250,Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

SHEET INDEX

SHEET #	SHEET DESCRIPTION
G-01	COVER SHEET
A-00	NOTES AND DESCRIPTION
A-01	ROOF PLAN
S-01	MODULE LAYOUT
S-01.1	PARTIAL PRESSURE AND MODULES EXPOSURE
S-02	ATTACHMENT DETAIL
S-02.1	STRUCTURE CALCULATION
E-01	ELECTRICAL LINE DIAGRAM
E-02	WIRING CALCULATIONS
E-03	SYSTEM LABELING
DS-01-06	DATA SHEETS

HOUSE PHOTO

VICINITY MAP



Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNSMART AMERICA

Signature with Digital ID — Digitally signed by: Ermocrates E Castillo
Date: 2022.08.30 15:16:33

PROJECT NAME

DAVIS RESIDENCE
9393 SW TUSTENUGGEE AVE,
LAKE CITY, FL 32034

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
G-01

Symbols:

Section..... X / X-XX — Sheet where section is located

Elevation ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... (Enlarged Plan) X / X-XX — Detail ID Letter; Area to be enlarged; Sheet where section is located

Keyed Notes ..... 1 — Keyed note designation on applicable sheet

Ground Terminal .....

Grounding Point/rod....

Solar Panel ..... or 00 — Module with Source Circuit number

Combiner Box ..... CB

AC Disconnect ..... ACD

Main Distribution Panel ..... MDP

Fuse .....

Overcurrent Breaker ..

Inverter .....

Transformer .....

Automatic ..... Transfer Switch ATS

Vent, Attic fan (Roof obstruction)

PV Roof Attachment

Trusses

Conduit

Fire Access

Abbreviations:

ACD	AC Disconnect
AC	Alternating Current
APPROX	Approximate
AWG	American Wire Gauge
BAT	Battery
CB	Combiner Box
DC	Direct Current
DISC	Disconnect
(E)	Existing
EL	Elevation
EQ	Equal
GP	Generation Panel
JB	Junction Box
MCB	Main Combiner Box
MFR	Manufacturer
MID	Microgrid Interconnect Device
MIN	Minimum
MISC	Miscellaneous
MDP	Main Distribution Panel
(N)	New
NAVD	North American Vertical datum
OCPD	Over Current Protection Device
POCC	Point Of Common Coupling
PV	Photovoltaic
SF	Squarefoot/feet
STC	Standard Test Conditions
SD	Soladeck
TBD	To Be Determined
TYP	Typical
UNO	Unless Noted Otherwise
UM	Utility meter
VIF	Verify In Field
WP	Weather Proof

System Description

This system is a grid-tied, PV system, with PV generation consisting of 24 HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES with a combined STC rated dc output power of 9600 W. The modules are connected into 01 SOLAREDGE SE7600H-US INVERTERS. The inverter has electronic maximum power point tracking to maximize energy captured by the PV modules. The inverter also has an internal ground fault detection and interruption device that is set to disconnect the array in the event that a ground fault that exceeds one ampere should occur. The inverter has DC and AC disconnect integrated system and labels are provided as required by the *National Electrical Code*

When the sun is shining, power from the PV array is fed into the inverter, where it is converted from DC to AC. The inverter output is then used to contribute to the power requirements of the occupancy. If PV power meets the requirements of the loads of the occupancy, any remaining PV power is sold back to the utility. When utility power is available, but PV power is not available, building loads are supplied by the utility.

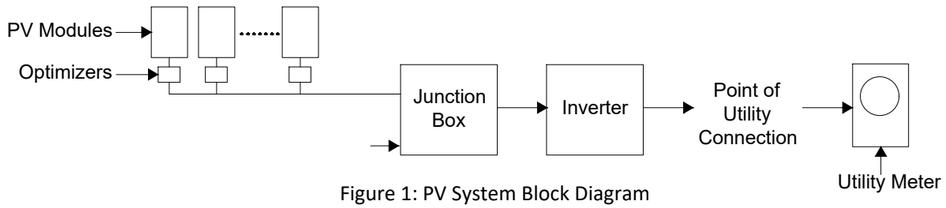


Figure 1: PV System Block Diagram

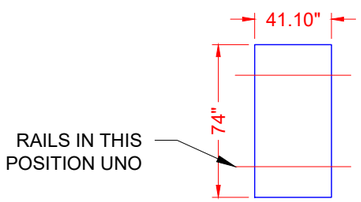
The inverter meets the requirements of IEEE 1547 and UL 1741.

FALL PROTECTION:
ANCHORAGES USED FOR ATTACHMENT OF PERSONAL FALL ARREST EQUIPMENT MUST BE INDEPENDENT OF ANY ANCHORAGE BEING USED TO SUPPORT OR SUSPEND PLATFORMS, AND CAPABLE OF SUPPORTING AT LEAST 5,000 POUNDS PER EMPLOYEE ATTACHED, OR MUST BE DESIGNED AND USED AS FOLLOWS:

- AS PART OF A COMPLETE PERSONAL FALL ARREST SYSTEM WHICH MAINTAINS A SAFETY FACTOR OF AT LEAST TWO.
- UNDER THE SUPERVISION OF A QUALIFIED PERSON

ADDITIONAL INFORMATION

- 29 CFR 1926 SUBPART M, FALL PROTECTION. OSHA STANDARD.
- 1926.502, FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES
  - 1926.502(D)(15)



HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES

ALLOWABLE DESIGN PRESSURE	PSF
DOWN PRESSURE	75.0
UPLIFT PRESSURE, 2 RAILS	55.0

Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNSMART AMERICA

Signature with Seal — Digitally signed by: Ermocrates E Castillo Date: 2022.08.30 15:16:33

PROJECT NAME

DAVIS RESIDENCE

9393 SW TUSTENUGGEE AVE, LAKE CITY, FL 32034

SHEET NAME

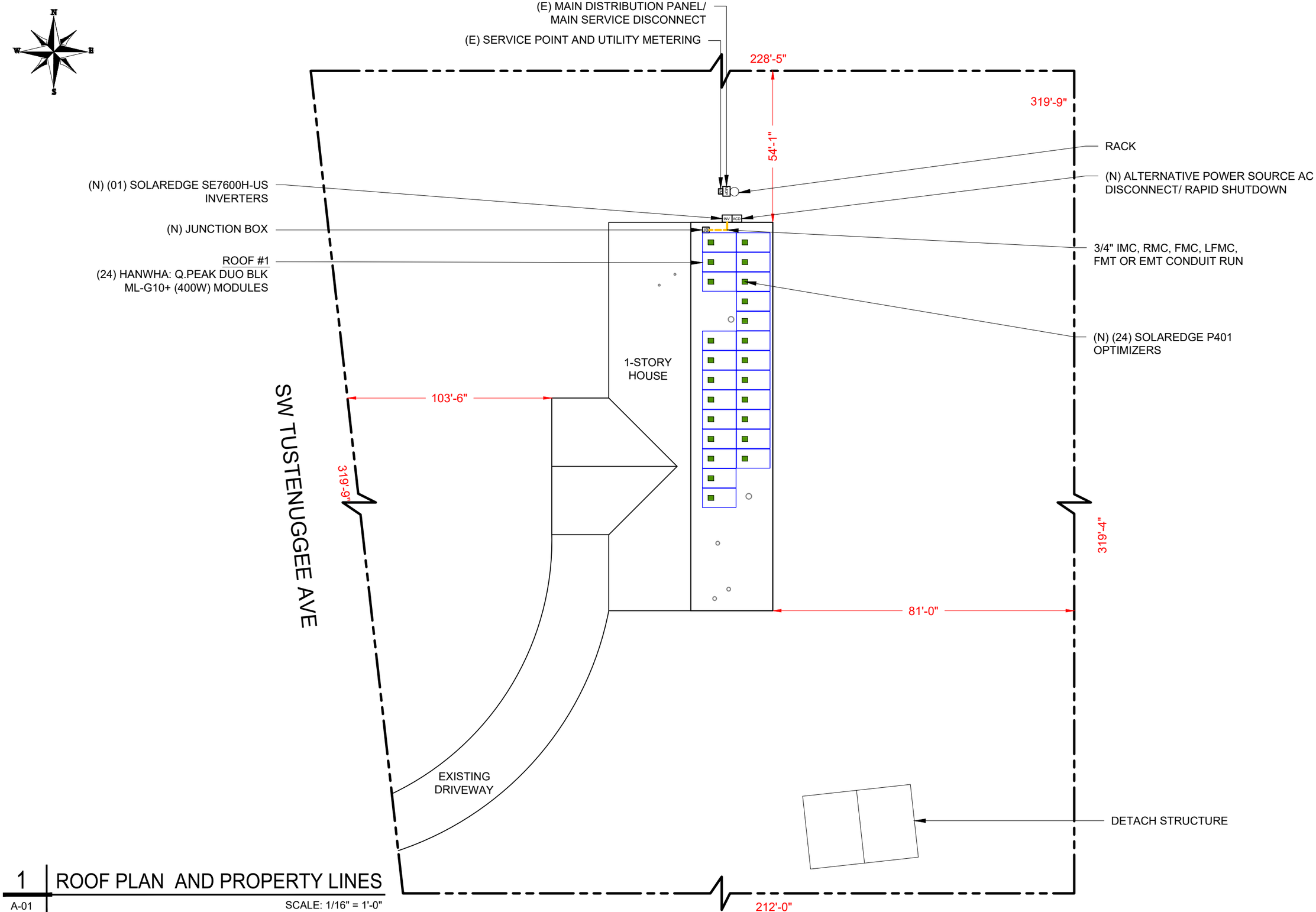
NOTES AND DESCRIPTION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

A-00



1 ROOF PLAN AND PROPERTY LINES

A-01

SCALE: 1/16" = 1'-0"

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ROOF PLAN

SHEET SIZE

ANSI B
11" X 17"

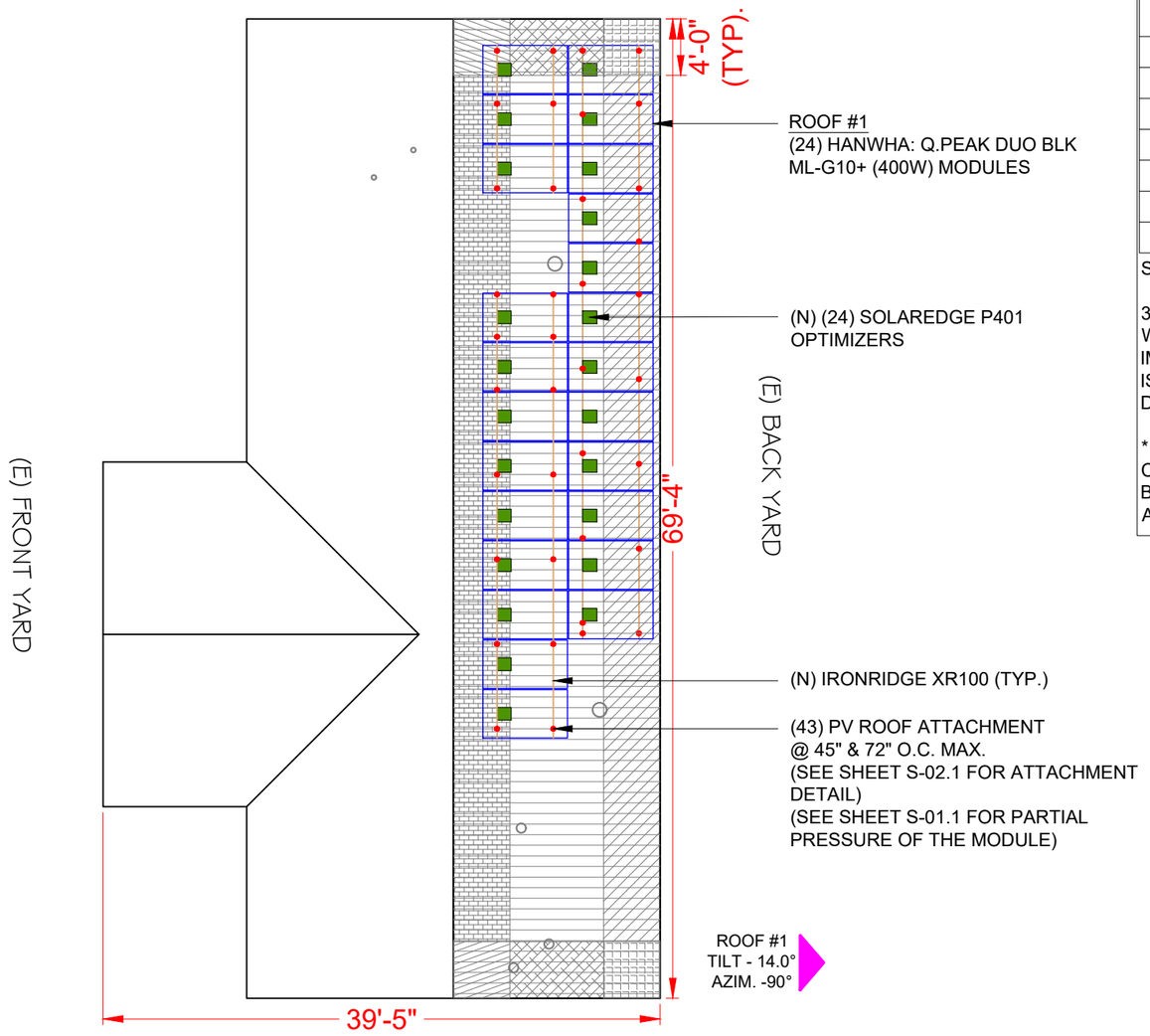
SHEET NUMBER

A-01

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 24 MODULES
MODULE TYPE = HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES
WEIGHT = 43.87 LBS / 19.9 KG.
MODULE DIMENSIONS = 74" x 41.10" = 21.12 SF
UNIT WEIGHT OF ARRAY = 2.08 PSF

ARRAY AREA CALC'S							
ROOF	ROOF TYPE	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)	TILT	AZIMUTH	SEAM SPACING
#1	METAL	506.90	1014.83	49.95	14.0°	90°	9" O.C.
	TOTAL PLAN VIEW	506.90	2277.91	22.25			



1 MODULE LAYOUT
S-01 SCALE: 3/32" = 1'-0"

GENERAL INSTALLATION PLAN NOTES:

1) STRUCTURE PROPERTIES
- ROOF FINISH: METAL ROOF
- MEAN ROOF HIEGHT: 15 FT.
- ROOF SLOPES: SEAMS
- WOOD SPECIES: SYP.
- TRUSS SPACING: 9" O.C.
- ROOF SHEATHING: 7/16" OSB

2) ROOF ATTACHMENTS TO SYP. SEAMS SHALL BE INSTALLED AS SHOWN IN SHEET S-02 AND AS FOLLOWS FOR EACH WIND ZONE::

WIND ZONES	NON - EXPOSED MODULES		EDGE / EXPOSED MODULES	
	SPAN	CANTILEVER	SPAN	CANTILEVER
ZONE 1	6'-0"	1'-4"	3'-9"	1'-4"
ZONE 1'	X	X	X	X
ZONE 2e	6'-0"	1'-4"	3'-9"	1'-4"
ZONE 2n	6'-0"	1'-4"	3'-9"	1'-4"
ZONE 2r	6'-0"	1'-4"	3'-9"	1'-4"
ZONE 3e	6'-0"	1'-4"	3'-9"	1'-4"
ZONE 3r	3'-9"	1'-4"	3'-0"	1'-0"

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS.

3) THE EXISTING ROOF AND STRUCTURE IS IN GOOD CONDITION AND WILL NOT BE ADVERSELY AFFECTED BY THE ADDITIONAL LOADS IMPOSED BY THE PV INSTALLATION. THE INSTALLER OR CONTRACTOR IS TO FIELD VERIFY AND REPORT TO THE ENGINEER IF THERE ARE ANY DISCREPANCIES BETWEEN THE PLANS AND IN FIELD CONDITIONS

* I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7th ED. CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES AND EQUIPMENT DEAD LOADS. *

LEGEND

- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

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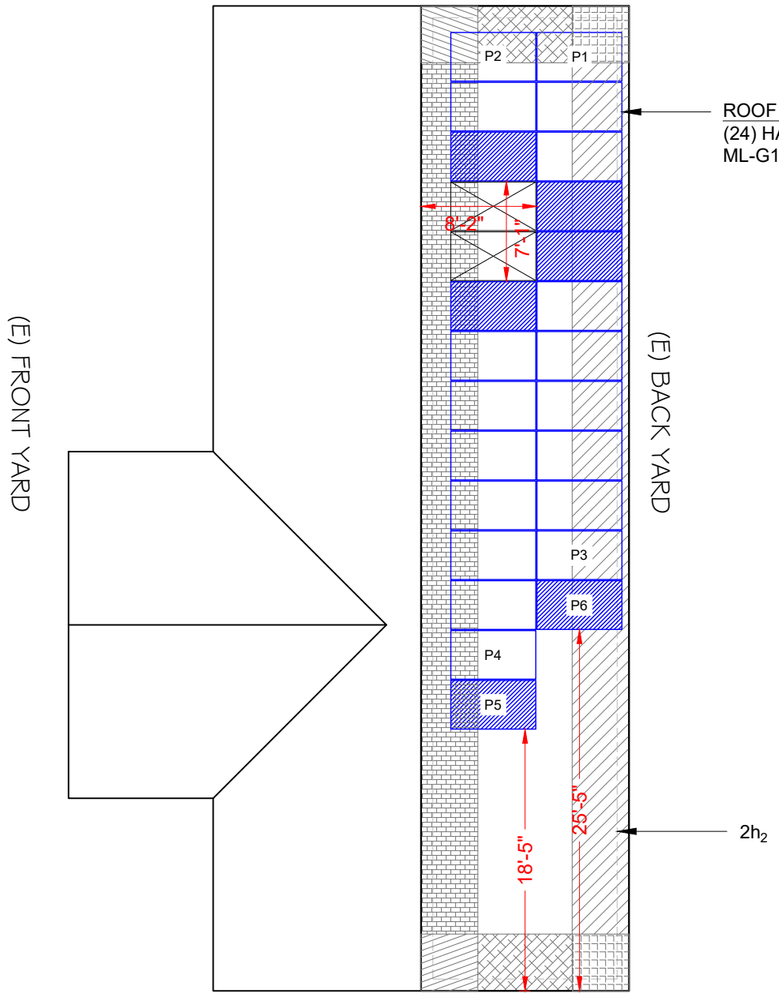

ROOF #1
(24) HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES

	1	1'	2e	2n	2r	3e	3r	
	16.00	0.00	16.00	18.30	18.30	18.30	21.80	
			Module Size		21.12	Sqft.		
Non-Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P1	3.31	0.00	4.68	5.44	0.00	7.69	0.00	17.43
P2	5.44	0.00	0.00	8.95	2.55	0.00	4.19	18.40
P3	8.75	0.00	12.37	0.00	0.00	0.00	0.00	16.00
P4	14.38	0.00	0.00	0.00	6.74	0.00	0.00	16.73

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 55 PSF

	1	1'	2e	2n	2r	3e	3r	
	21.10	0.00	21.10	27.40	27.40	27.40	32.60	
			Module Size		21.12	Sqft.		
Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P5	14.38	0.00	0.00	0.00	6.74	0.00	0.00	23.11
P6	8.75	0.00	12.37	0.00	0.00	0.00	0.00	21.10

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 55 PSF

$2h_2$ DISTANCE : 10"
0.5h DISTANCE : 7'-6"

NOTE : PARTIAL PRESSURES OF THE WIND ZONES ON ALL MODULES HAVE BEEN VERIFIED AND ARE WITHIN THE ALLOWABLE PER THE MANUFACTURER SPECIFICATION, INSTALLER SHOULD FOLLOW THE LAYOUT TO AVOID HIGHER ZONAL PARTIAL PRESSURES. ANY CHANGES IN LAYOUT SHOULD BE REPORTED BACK TO THE ENGINEER OF RECORD.

LEGEND

- EXPOSED MODULE
- EDGE MODULE
- NON- EXPOSED MODULE
- MISSING MODULE
- MIN. MODULE EDGE DISTANCE LINE
- MODULE EXPOSURE LINE
- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

1 PARTIAL PRESSURE AND MODULES EXPOSURE

S-01.1 SCALE: 3/32" = 1'-0"

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COA # 28345
620 N. WYMORE ROAD,
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PARTIAL PRESSURE AND MODULES EXPOSURE

SHEET SIZE

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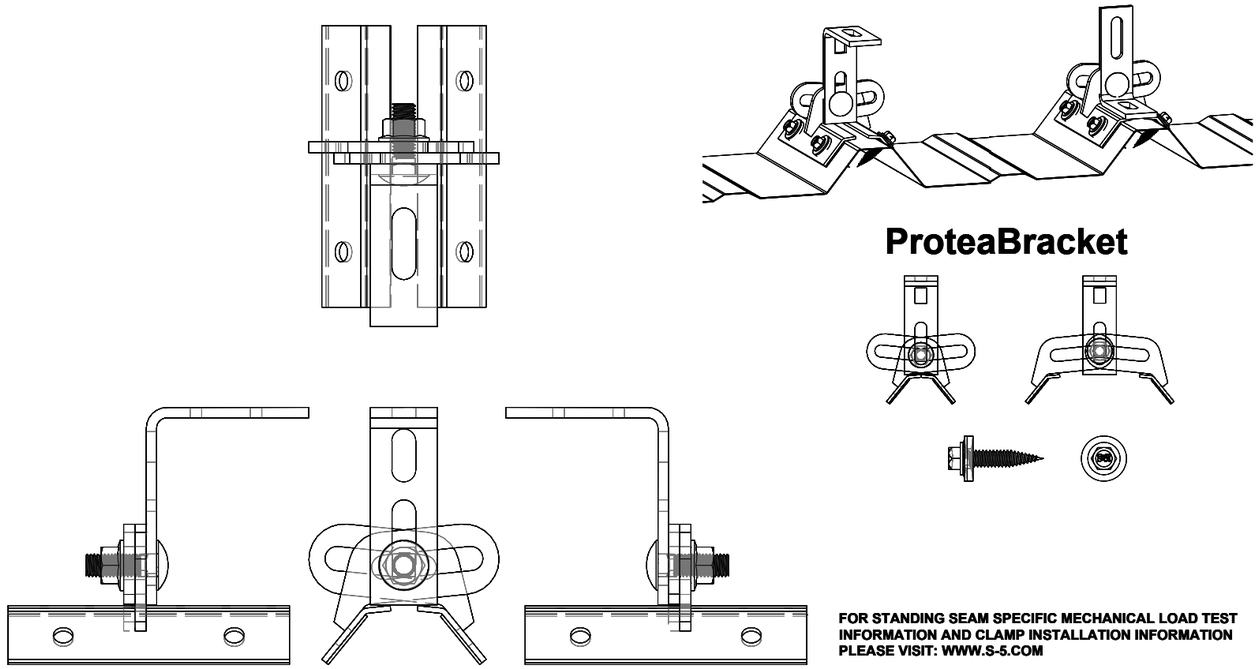
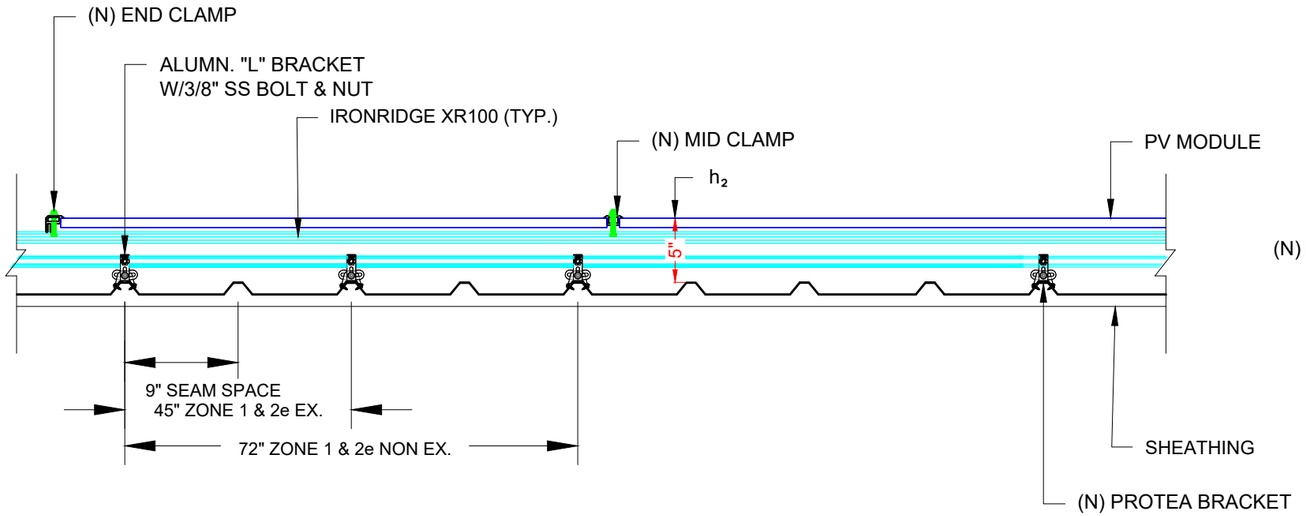
SHEET NUMBER

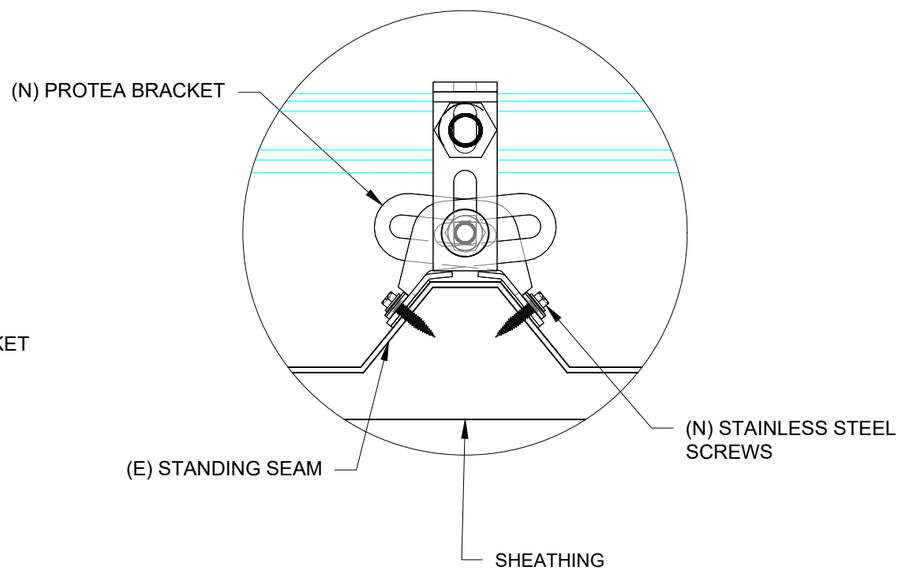
S-01.1



ProteaBracket

FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST INFORMATION AND CLAMP INSTALLATION INFORMATION PLEASE VISIT: WWW.S-5.COM





2 ATTACHMENT DETAIL (ENLARGED VIEW)

S-02 SCALE: 1" = 4"

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COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
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ATTACHMENT DETAIL

SHEET SIZE

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SHEET NUMBER

S-02

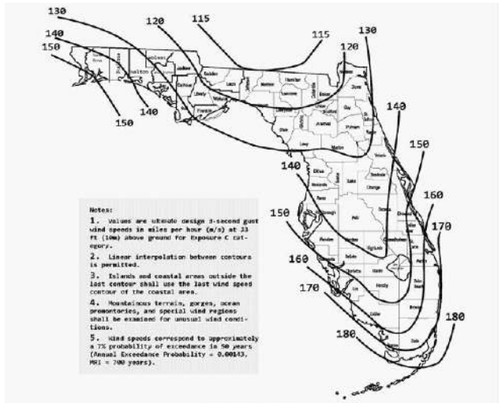

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

WIND LOAD CALCULATIONS FOR MODULES INSTALLED ON ROOFS WITH A HEIGHT LESS THAN 60'

SITE INFORMATION

FBC VERSION	2020	RISK CATEGORY	II	
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B	
ROOF LENGTH (ft)	69.3	ROOF SLOPE	3 /12	
ROOF WIDTH (ft)	39.4	ROOF SLOPE (°)	14.0	
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	GABLE	
MODULE LENGTH (in)	74	ULTIMATE WIND SPEED	120	mph
MODULE WIDTH (in)	41.10	NOMINAL WIND SPEED	93	mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C_e)	1.000	
MODULE AREA (sq. ft.)	21.12	TEMPERATURE FACTOR (C_t)	1.000	
GROUND SNOW LOAD (psf)	0.0	IMPORTANCE FACTOR (I_s)	1.000	
DEAD LOAD (psf)	3.0	SLOPE FACTOR (C_s)	0.910	
SLOPED ROOF SNOW LOAD (psf)	0.0	K_D	0.850	
EFFECTIVE WIND AREA (ft^2)	21.1	K_{ZT}	1.000	
GROUND ELEVATION (ft)	88.0	K_e	0.997	
HVHZ	NO	K_z	0.575	

DESIGN CALCULATIONS

VELOCITY PRESSURE (q) = $.00256*K_E K_z K_{ZT} K_D V^2$

VELOCITY PRESSURE(ASD) 10.8 psf

WIDTH OF PRESSURE COEFFICIENT	39.41' * 10%	=	3.941'	ZONE WIDTH A	4 FT	
	15' * 40%	=	6'	ZONE 2 WIDTH	N/A	(FOR (°) < 7°)
				ZONE 3 WIDTH	N/A	(FOR (°) < 7°)

EXTERNAL PRESSURE COEFFICIENT	ZONE 1	0.459	-1.949
	ZONE 1'	X	X
	ZONE 2e	0.459	-1.949
	ZONE 2n	0.459	-2.535
	ZONE 2r	0.459	-2.535
	ZONE 3e	0.459	-2.535
	ZONE 3r	0.459	-3.016

INTERNAL PRESSURE COEFFICIENT (+/-) 0

DESIGN PRESSURES

ROOF ZONE	DOWN	UP				
1	16.0	-21.0	psf			
1'	X	X	psf			
2e	16.0	-21.0	psf	Module allowable uplift pressure	55	psf
2n	16.0	-27.3	psf	Module allowable down pressure	75	psf
2r	16.0	-27.3	psf			
3e	16.0	-27.3	psf			
3r	16.0	-32.5	psf			

ARRAY FACTORS

ARRAY EDGE FACTOR (EXPOSED)	1.5	SOLAR PANEL PRESSURE EQUALIZATION FACTOR	0.6701
ARRAY EDGE FACTOR (NON-EXPOSED)	1		

ADJUSTED DESIGN PRESSURES

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)	
1	16.0	-21.1	-16.0	psf
1'	X	X	X	psf
2e	16.0	-21.1	-16.0	psf
2n	16.0	-27.4	-18.3	psf
2r	16.0	-27.4	-18.3	psf
3e	16.0	-27.4	-18.3	psf
3r	16.0	-32.6	-21.8	psf

ATTACHMENTS USED

ATTACHMENT MODEL	S-5 protea	
ATTACHMENT STRENGTH	422	lbs

MAX DESIGN LOADS ALLOWABLE

LIMIT MAX SPAN TO N/A in

RAFTER/SEAM SPACING 9 in **NO. OF RAILS** Exposed: 2 Non. Exp: 2

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)		SPANS (E)	SPANS (N.E)
1	296.0	244.0	296.0	lbs	45 in	72 in
1'	X	X	X	lbs	X in	X in
2e	296.0	244.0	296.0	lbs	45 in	72 in
2n	296.0	317.4	338.5	lbs	45 in	72 in
2r	296.0	317.4	338.5	lbs	45 in	72 in
3e	296.0	317.4	338.5	lbs	45 in	72 in
3r	185.0	302.0	251.7	lbs	36 in	45 in

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REVISIONS

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PROJECT INSTALLER

SUNSMART AMERICA

Signature with Seal

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DAVIS RESIDENCE
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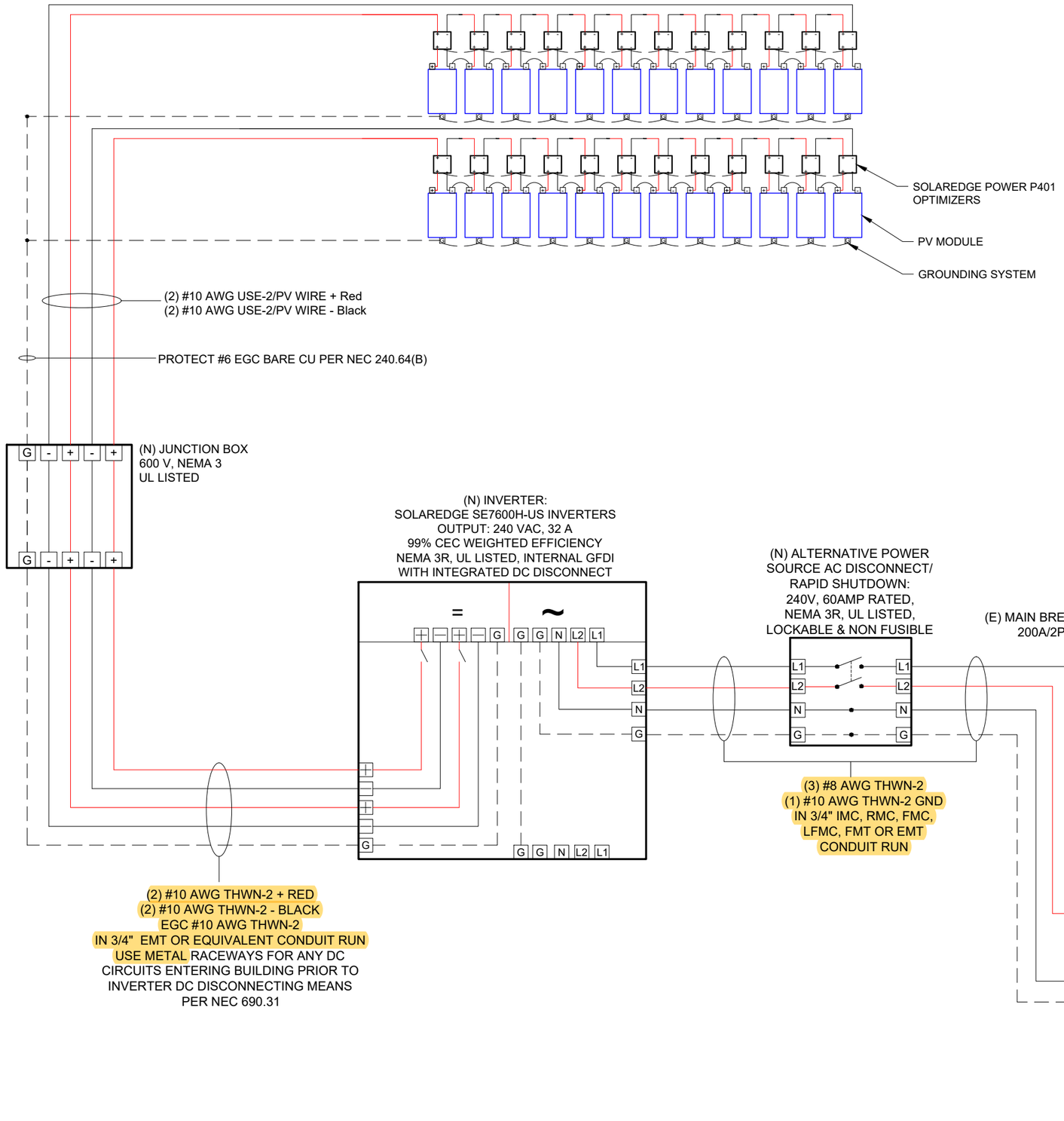
LAKE CITY, FL 32034

SHEET NAME
STRUCTURE CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.1



SOLAR ARRAY (9.600 KW-DC STC, 7.600 kW AC)
(24) HANWHA: Q.PEAK DUO BLK ML-G10+ (400W) MODULES
(02) BRANCHES OF 12 MODULES

NOTE:

1. SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, 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, AS APPLICABLE.
2. ALL PANELS DOWNSTREAM OF LOAD SIDE INTERCONNECTION TO BE PROTECTED BY A PRE-EXISTING OR AN ADDITIONAL OCPD SIZED PER NEC 408.36.

INTERCONNECTION
120% RULE - NEC 705.12(B)(2)(3)(b)

UTILITY FEED + SOLAR BACKFEED 200A + 40A = 240A
BUSS RATING x 120% 200A x 120% = 240A

1 | ELECTRICAL LINE DIAGRAM

E-01 | SCALE: NTS

Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNSMART AMERICA

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.30 15:16:34

PROJECT NAME

DAVIS RESIDENCE
9393 SW TUSTENUGGEE AVE,
LAKE CITY, FL 32034

SHEET NAME
ELECTRICAL
LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-01

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO INVERTER

EXPECTED WIRE TEMP (In Celsius)	35°
TEMP. CORRECTION PER TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	0.80
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X OUTPUT OF OPTIMIZER	18.75
DERATED AMPACITY OF CIRCUIT CONDUCTOR TEMP. CORRECTION PER TABLE 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	30.72A
Result should be greater than (18.75A) otherwise increase the size of the conductor and its ampacity	

AC CONDUCTOR AMPACITY CALCULATIONS INVERTER TO MAIN SERVICE PANEL

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	35°
TEMP. CORRECTION PER TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	8AWG
CIRCUIT CONDUCTOR AMPACITY	55A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) 1.25 X MAX INVERTER OUTPUT CURRENT [1.25(32)]	40.0
DERATED AMPACITY OF CIRCUIT CONDUCTOR TEMP. CORRECTION PER TABLE 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	52.80
Result should be greater than (40.0A) otherwise increase the size of the conductor and its ampacity	

DC PHOTOVOLTAIC POWER SOURCE TO BE INSTALLED AT INVERTER PER NEC 690.53 & 690.54

OPERATING CURRENT	15A
OPERATING VOLTAGE	400V
MAXIMUM SYSTEM VOLTAGE	480V
MAX INV INPUT CURRENT	20A

SOLAR MODULE SPECIFICATIONS

MANUFACTURER / MODEL #	HANWHAQ.PEAK DUO BLK ML-G10+ (400W) MODULE
VMP	37.13
IMP	10.77
VOC	45.30
ISC	11.14
MODULE DIMENSION	74"L x 41.10"W x 1.26"D (In Inch)

INVERTER SPECIFICATIONS

MANUFACTURER / MODEL #	SOLAREDGE SE7600H-US INVERTERS
NOMINAL AC POWER	7.6KW
NOMINAL OUTPUT VOLTAGE	240 V
NOMINAL OUTPUT CURRENT	32A

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

I ERMOCRATES CASTILLO PE# 52590 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. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION.

1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT. THE TERMINALS ARE RATED FOR 75 DEGREES C.
3.) THE WIRES ARE SIZED ACCORDING TO NEC 110.14 .
4.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
5.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
6.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
7.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
8.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
9.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
10.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
11.) UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
12.) MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
13.) RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
14.) CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
15.) CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).
16.) ALL CONDUITS TO BE INSTALLED A MIN OF 7/8" ABOVE THE ROOF SURFACE.

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620 N. WYMORE ROAD,
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TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNSMART AMERICA

Signature with Seal
STATE OF FLORIDA
PROFESSIONAL ENGINEER
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.30 15:16:34

PROJECT NAME

DAVIS RESIDENCE
9393 SW TUSTENUGGEE AVE,
LAKE CITY, FL 32034

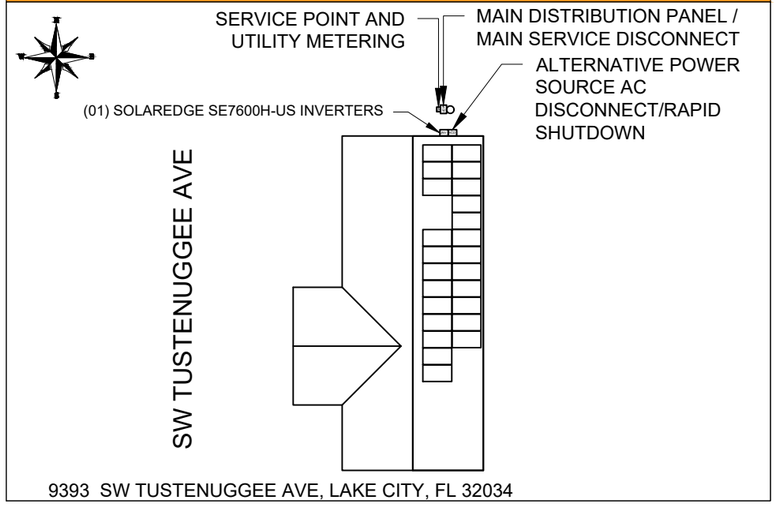
SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-02

CAUTION!

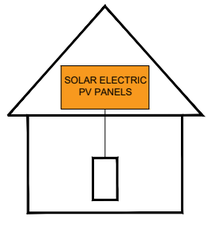
POWER TO THIS BUILDING
SUPPLIED FROM MULTIPLE SOURCES



LABEL LOCATION:
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL, PV DISCONNECT
LOCATED NO MORE THAN 3FT (1M) FROM THE SERVICE DISCONNECT
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")
PER CODE NEC 705.10

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN
SWITCH TO THE
"OFF" POSITION TO
SHUT DOWN PV SYSTEM
AND REDUCE
SHOCK HAZARD
IN THE ARRAY



LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.56(C)(1)(a), IFC 1204.5.1

⚠ WARNING

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

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.13(B))

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OPERATING CURRENT 32.0 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.54)

WARNING:

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

INVERTER

MAXIMUM SYSTEM VOLTAGE (VOC)	480	V
MAXIMUM CIRCUIT CURRENT (Isc)	20.0	A
MAXIMUM RATED OUTPUT OF DC TO DC CONVERTER (Idc)	15	A

LABEL LOCATION:
DC DISCONNECT, INVERTER
(PER CODE: NEC 690.53)

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
CONDUIT, COMBINER BOX
(ADDITIONAL EQUIPMENT THAT
CONTAINS PV SOURCE WIRES
(PER CODE: NEC 690.31(G)(3))

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC 690.56(C)(3))

ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE VISIBLE, REFLECTIVE AND SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED [NFPA 1, 11.12.2.1]
- WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
- ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

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SUNSMART AMERICA

Signature with Seal
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Date: 2022.08.30 15:16:35

PROJECT NAME

DAVIS RESIDENCE
9393 SW TUSTENUGGEE AVE,
LAKE CITY, FL 32034

SHEET NAME
SYSTEM LABELING

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE

25 YR Warranty Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS 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.

INNOVATIVE ALL-WEATHER TECHNOLOGY

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

ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING

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

A RELIABLE INVESTMENT

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

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96h)

[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

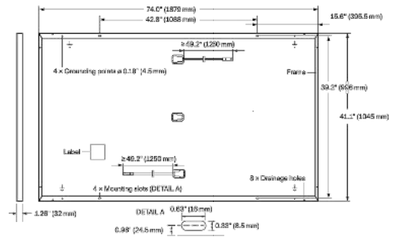
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

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 anodized aluminum
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

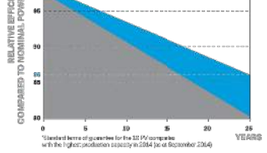


ELECTRICAL CHARACTERISTICS

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} [W]	385	390	395	400	405
	Short Circuit Current[1]	I_{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage[1]	V_{OC} [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I_{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V_{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	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} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I_{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V_{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I_{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V_{MPP} [V]	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

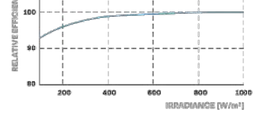
Q CELLS PERFORMANCE WARRANTY



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 Q CELLS sales organisation of your respective country.

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

UL 61730, CE-compliant, Quality Controlled PV – TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells), QCPV Certification ongoing.

PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use 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** inquiry@us.q-cells.com | **WEB** www.q-cells.us

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SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-01

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

INVERTERS

12-25 YEAR WARRANTY

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

solaredge.com

solaredge

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

Model Number	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXH-XXXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, adjustable -0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

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SUNSMART AMERICA

Signature with Seal

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LAKE CITY, FL 32034

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-02

Power Optimizer

Frame-Mounted

P370 / P401 / P404 / P500

POWER OPTIMIZER

Fast mount power optimizers with module-level optimization

- Specifically designed to work with SolarEdge inverters
- Quicker installation - Power optimizers can be mounted in advance saving installation time
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of modules mismatch-loss, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Next generation maintenance with module level monitoring
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

Power Optimizer

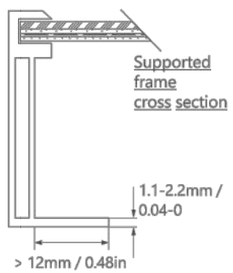
Frame-Mounted

P370 / P401 / P404 / P500

OPTIMIZER MODEL (TYPICAL MODULE COMPATIBILTY)	P370 (FOR HIGH-POWER 60-CELL AND FOR 72-CELL MODULES)	P401 (FOR HIGH POWER 63/72-CELL MODULES)	P404 (FOR 60-CELL AND 72-CELL, SHORT STRINGS)	P500 (FOR 96-CELL MODULES)	
INPUT					
Rated Input DC Power(1)	370	420	405	500	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60		80		Vdc
MPPT Operating Range	8 - 60		12.5 - 80	8 - 80	Vdc
Maximum Short Circuit Current (Isc)	11	12.5	11.75	10.1	Adc
Maximum Efficiency	99.5				%
Weighted Efficiency	98.8				%
Overvoltage Category	II				
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)					
Maximum Output Current	15				Adc
Maximum Output Voltage	60		80	60	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)					
Safety Output Voltage per Power Optimizer	1 ± 0.1				Vdc
STANDARD COMPLIANCE					
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3				
Safety	IEC62109-1 (class II safety), UL1741				
RoHS	Yes				
Fire Safety	VDE-AR-E 2100-712:2013-05				
INSTALLATION SPECIFICATIONS					
Maximum Allowed System Voltage	1000				Vdc
Dimensions (W x L x H)	139 x 165 x 40 / 5.5 x 6.5 x 1.6	129 x 153 x 29.5 / 5.08 x 6.02 x 1.16	139 x 165 x 48 / 5.5 x 6.5 x 1.9		mm / in
Weight (including cables)	775 / 1.7	655 / 1.5	895 / 2.0	870 / 1.9	gr / lb
Input Connector	MC4(2)				
Input Wire Length	0.16 / 0.52				m / ft
Output Connector	MC4				
Output Wire Length	1.2 / 3.9				m / ft
Operating Temperature Range(3)	-40 to +85 / -40 to +185				°C / °F
Protection Rating	IP68 / NEMA6P				
Relative Humidity	0 - 100				%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% Power tolerance are allowed
(2) For other connector types please contact SolarEdge
(3) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER(4)		SINGLE PHASE HD-WAVE	THREE PHASE SExxK-RWB	THREE PHASE 230/400V	THREE PHASE 277/480V	
Minimum String Length (Power Optimizers)	P370/ P401/ P500(5)	8	9	16	18	
	P404	6	8	14 (15 with SE30K)	14	
Maximum String Length (Power Optimizers)		25		50	50	
Maximum Nominal Power per String		5700(6)	5625(6)	11250(7)	12750	W
Parallel Strings of Different Lengths or Orientations		Yes				



(4) It is not allowed to mix P404 with P370/P401/P500 in one string
(5) The P370/P401/P500 cannot be used with the SE3K three phase inverter (available in some countries; refer to Three Phase Inverter SE3K-SE10K datasheet)
(6) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power Refer to: https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf
(7) For The 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W
(8) For The 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

CE

Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNSMART AMERICA

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.30 15:16:35

PROJECT NAME

DAVIS RESIDENCE
9393 SW TUSTENUGGEE AVE,
LAKE CITY, FL 32034

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-03

Tech Brief

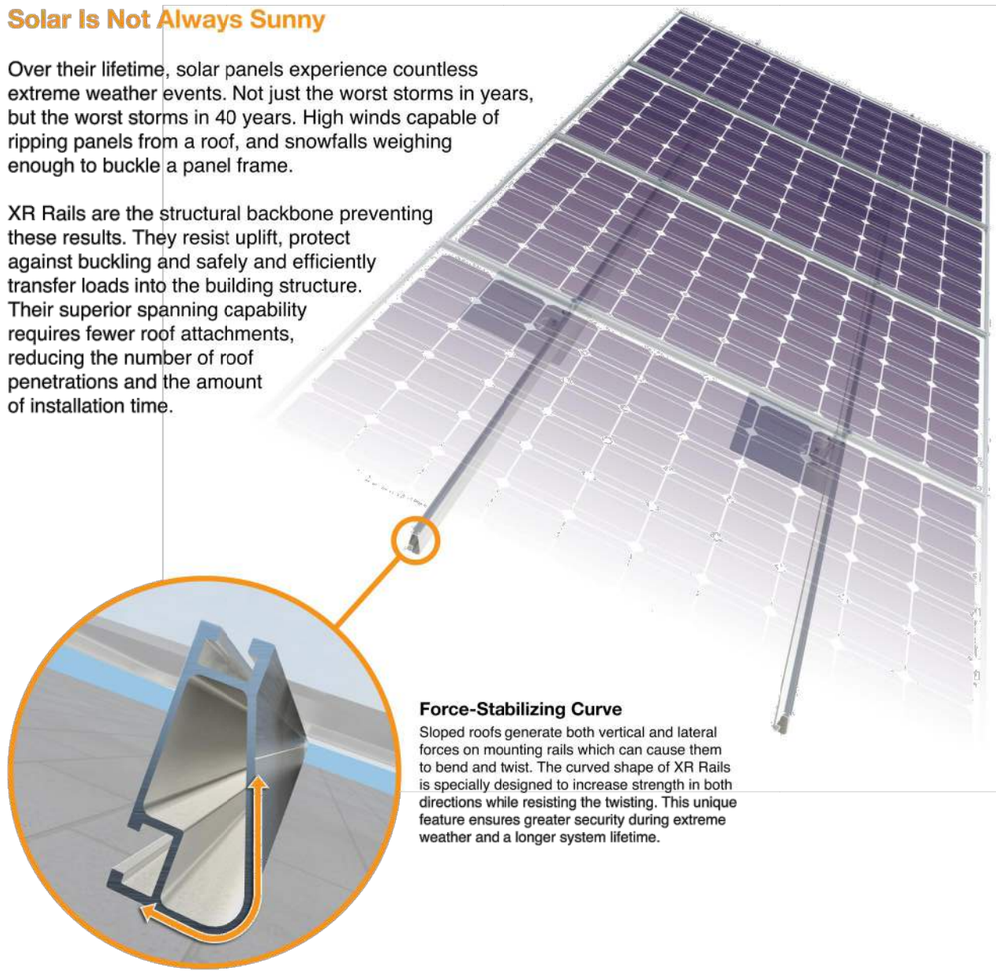
IRONRIDGE

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.

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CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

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Tech Brief

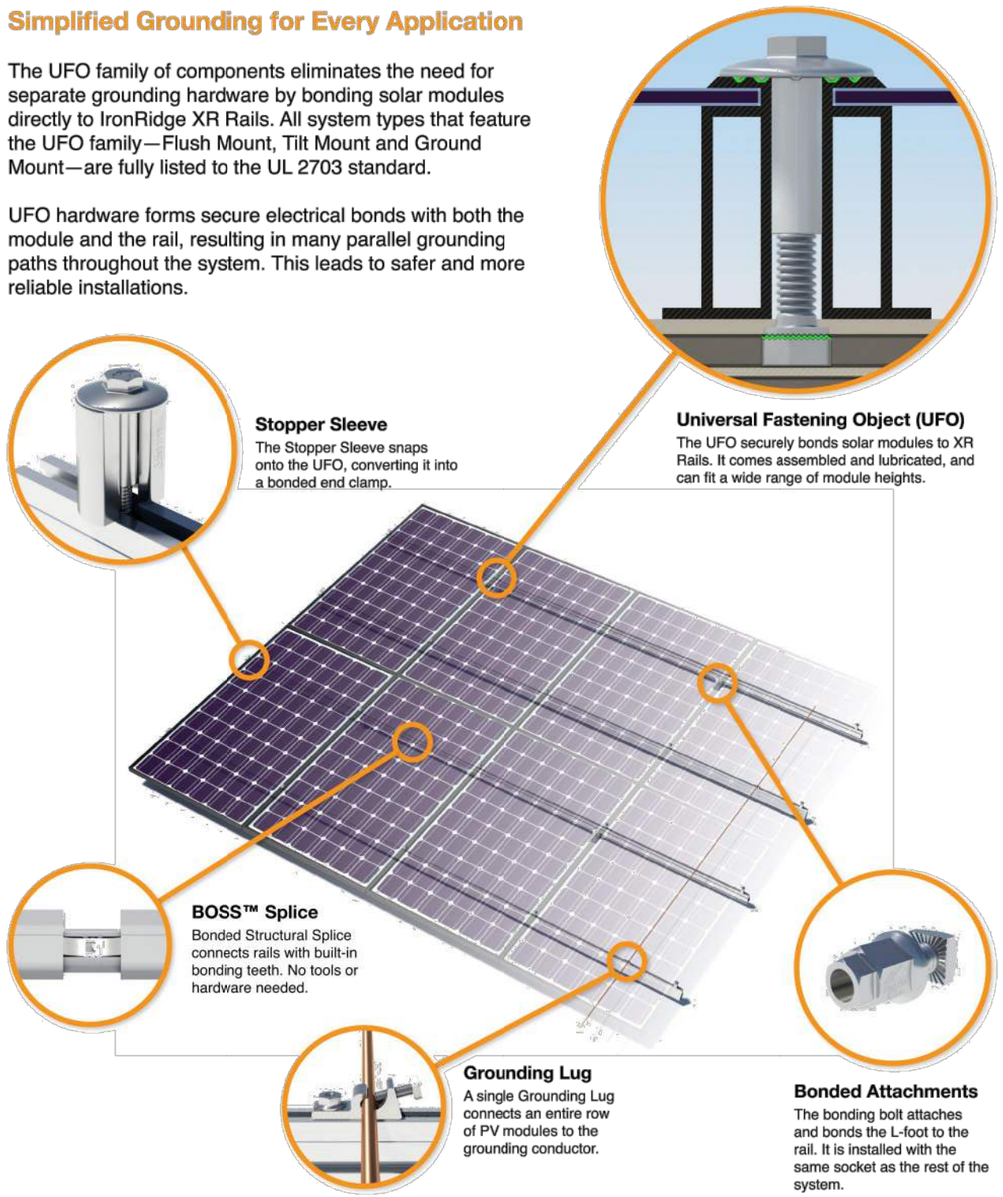
IRONRIDGE

UFO Family of Components

Simplified Grounding for Every Application

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

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



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

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

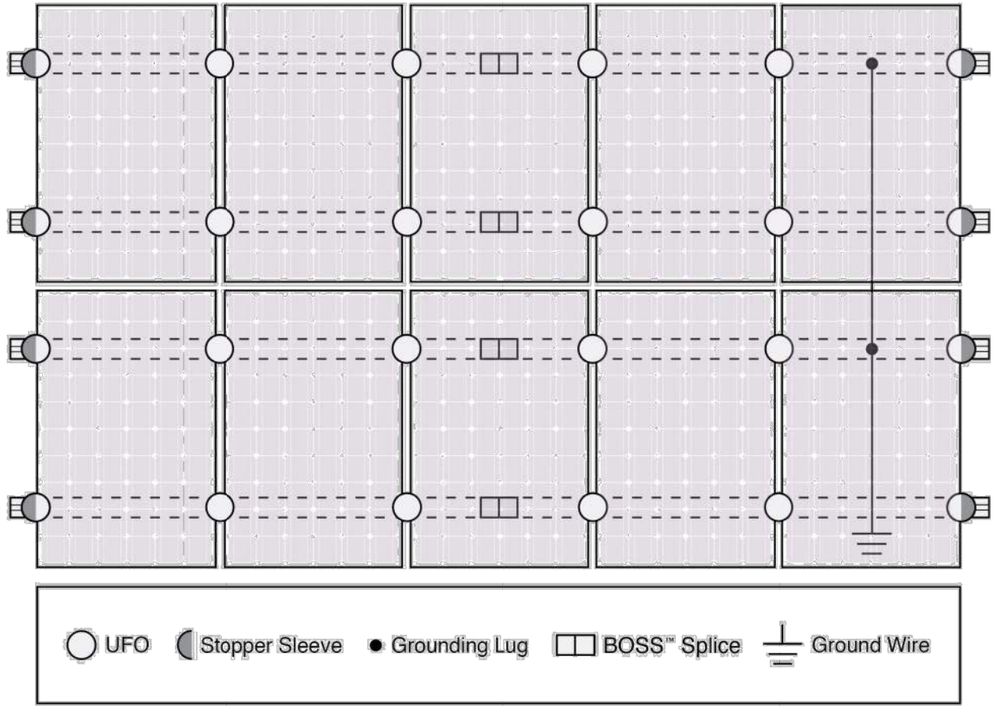
BOSS™ Splice
Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.

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 equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

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

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

Go to IronRidge.com/UFO

Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✔	✔	XR1000 Only
UFO/Stopper	✔	✔	✔
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.		

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S-5!®

The Right Way!™

ProteaBracket™

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT™

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

NEW

NOW AVAILABLE IN ALUMINUM

ProteaBracket™

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

*See www.S-5.com for details.

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

The right way to attach solar PV to trapezoidal roof profiles!

S-5!®

The Right Way!™

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

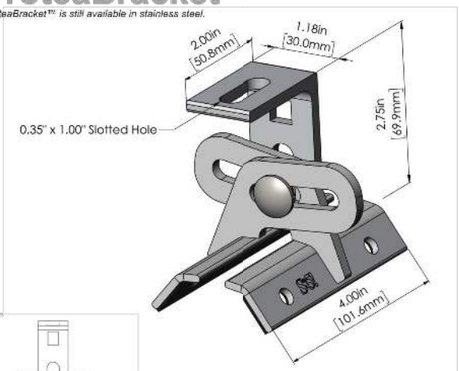
Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

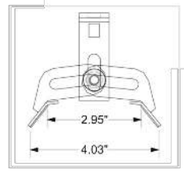
For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!® holding strength is unmatched in the industry.

ProteaBracket™

ProteaBracket™ is still available in stainless steel.

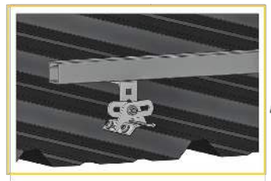




ProteaBracket fits profiles up to 3 inches

Multiple Attachment Options:

Side Mount Rail

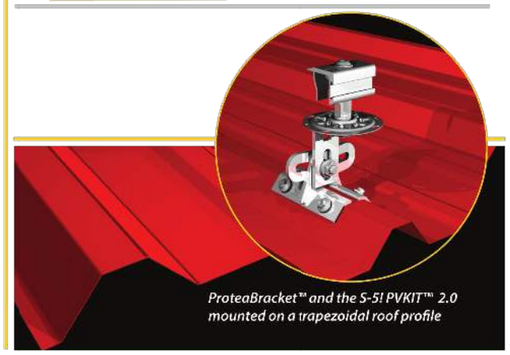


Bottom Mount Rail

w/ S-5! PVKIT™ (rail-less)

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. **(2)** Peel off adhesive release paper. **(3)** Align and mount bracket directly onto crown of panel. **(4)** Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof 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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