PHOTOVOLTAIC ROOF MOUNT SYSTEM

10 MODULES-ROOF MOUNTED - 4.85 kWDC, 5.00 kWAC
(E) 22 MODULES-ROOF MOUNTED - (E) 5.06 KWDC, (E) 5.00 KWAC
3217 PINEMOUNT RD, LAKE CITY, FL 32024 USA

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

solar impact
BARRY JACOBSON
4509 NW 23RD AVE, STE 20,
GAINESVILLE, FL 32606
TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

NEW SYSTEM SUMMARY:

(N) 10 - HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
(N) 01 - SUNNY BOY 5.0-US INVERTER
(N) 10 - SMA JMS-F SUNSPEC RAPID SHUTDOWN
(N) 01 - JUNCTION BOX
(E) 200A MAIN SERVICE PANEL WITH (E) 200A MAIN BREAKER
(N) TESLA BACKUP GATEWAY-2
(N) 02 - TESLA POWERWALL-2 AC BATTERIES
(N) 200A NON FUSED AC DISCONNECT

EXISTING SYSTEM SUMMARY:

(E) 22 - SUNPOWER 230 (230W) MODULES
(E) 01 - SUNPOWER SPR 5000M 240V INVERTER

DESIGN CRITERIA:

ROOF TYPE: - CORRUGATED METAL ROOF
ROOF FRAME: - 2"X4" RAFTERS @24" O.C.
SEAMS SPACING:- 12" O.C.
STORY: - ONE STORY
SNOW LOAD : - 0 PSF
WIND SPEED :- 130 MPH
WIND EXPOSURE:- B
ASCE CODE :- ASCE 7-16 (SECTION 29.4.4)
RISK CATEGORY = II

GOVERNING CODES:

2020 7TH EDITION FLORIDA BUILDING CODE : BUILDING
2020 7TH EDITION FLORIDA BUILDING CODE : RESIDENTIAL
2020 7TH EDITION FLORIDA BUILDING CODE : MECHANICAL
2020 7TH EDITION FLORIDA BUILDING CODE : PLUMBING
2020 7TH EDITION FLORIDA BUILDING CODE : FUEL GAS
2020 7TH EDITION FLORIDA BUILDING CODE : ENERGY CONSERVATION
2020 7TH EDITION FLORIDA BUILDING CODE : EXISTING BUILDING
2020 7TH EDITION FLORIDA BUILDING CODE : ACCESSIBILITY
2020 7TH EDITION FLORIDA FIRE PREVENTION CODE (NFPA)
2017 NATIONAL ELECTRIC CODE (NEC)

SHEET INDEX

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	12/13/2022	UR

BARRY M JACOBSON LICENSE No. 51093 STATE OF FLORIDA PROFESSIONAL ENGINEER

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2022.12.19 19:58:37 -05'00'

GENERAL NOTES:

1. APPLICABLE CODE: 2020 FLORIDA BUILDING CODE (7TH EDITION) & ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
2. LAG SCREW DIAMETER AND EMBEDMENT LENGTHS ARE DESIGNED PER 2020 FLORIDA BUILDING CODE (7TH EDITION) REQUIREMENTS. ALL BOLT CAPACITIES ARE BASED ON SOUTHER YELLOW PINE (SYP) RESIDENTIAL WOOD ROOF RAFTERS AS EMBEDMENT MATERIAL.
3. ALL WIND DESIGN CRITERIA AND PARAMETERS ARE FOR HIP AND GABLE RESIDENTIA ROOFS, CONSIDERING FROM A 7° TO A MAXIMUM 23° (5/12 TO A MAXIMUM 7/12 PITCH) ROOF IN SCHEDULE. CONTRACTOR TO FIELD VERIFY THAT MEAN ROOF HEIGHT DOES NOT EXCEED 30'-0".
4. ROOF SEALANTS SHALL CONFORM TO ASTM C920 AND ASTM 6511, AND IS THE RESPONSIBILITY OF THE CONTRACTOR TO PILOT DRILL AND FILL ALL HOLES.
5. ALL DISSIMILAR MATERIALS SHALL BE SEPARATED WITH NEOPRENE WASHERS, PADS, ETC OR SIMILAR.
6. ALL ALUMINIUM COMPONENTS SHALL BE ANODIZED ALUMINIUM 6105-T5 UNLESS OTHERWISE NOTED.
7. ALL LAG SCREW SHALL BE ASTM A276 STAINLESS STEEL UNLESS OTHERWISE NOTED.
8. ALL SOLAR RAILING AND MODULES SHALL BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
9. CONTRACTOR SHALL ENSURE ALL ROOF PENETRATIONS TO BE INSTALLED AND SEALED PER 2020 FLORIDA BUILDING CODE (7TH EDITION) OR LOCAL GOVERNING CODE

1 AERIAL PHOTO
PV-0 SCALE: NTS

2 VICINITY MAP
PV-0 SCALE: NTS

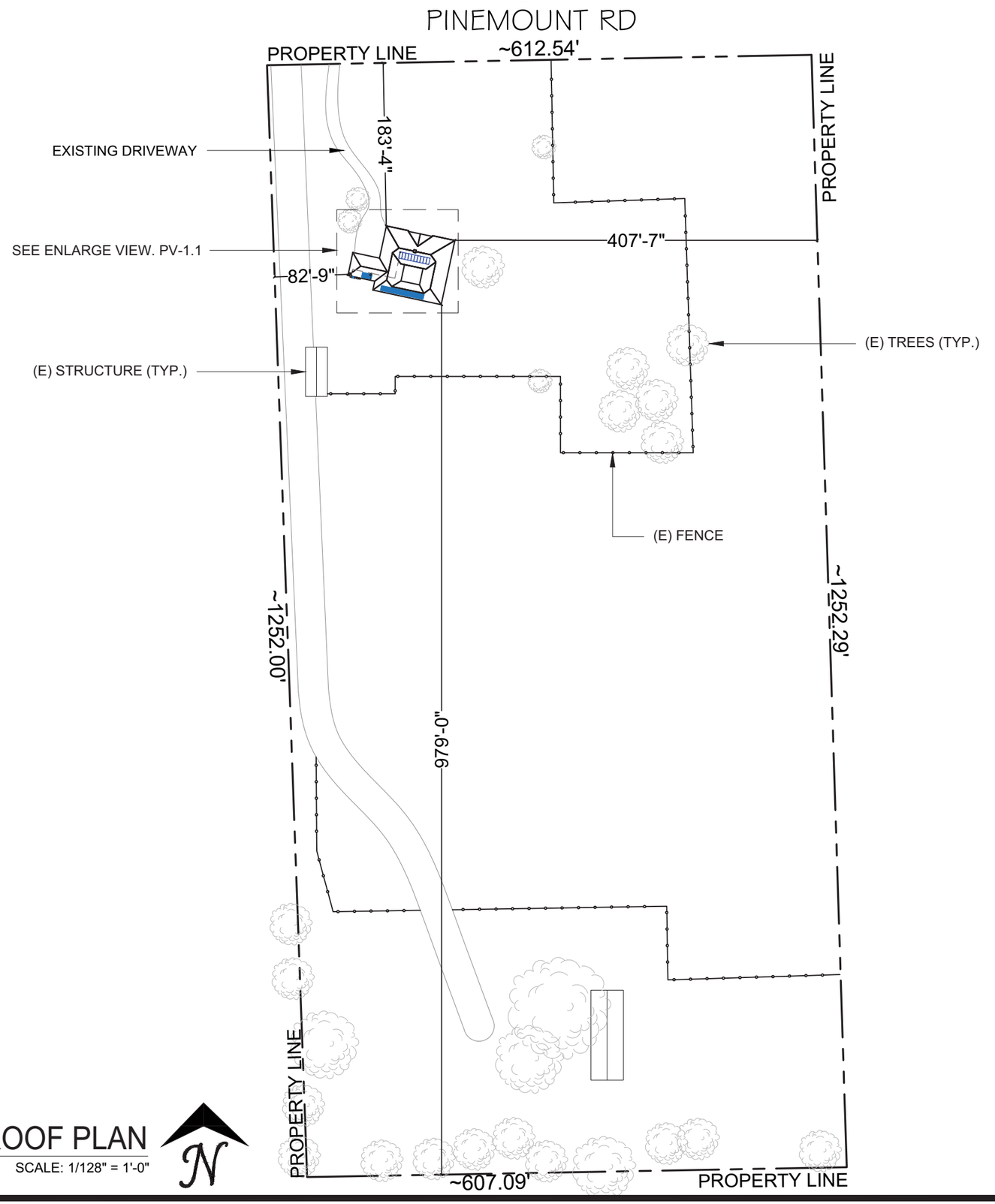
N W E S

PROJECT NAME
WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-0



1 SITE PLAN WITH ROOF PLAN

SCALE: 1/128" = 1'-0"

solar impact

BARRY JACOBSON
4509 NW 23RD AVE, STE 20,
GAINESVILLE, FL 32606
TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

DESCRIPTION	LICENSE	DATE	REV
INITIAL RELEASE		12/13/2022	UR

VERSION

BARRY M JACOBSON LICENSE No. 81402 STATE OF FLORIDA PROFESSIONAL ENGINEER

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2022.12.19 20:00:06 -05'00'

PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

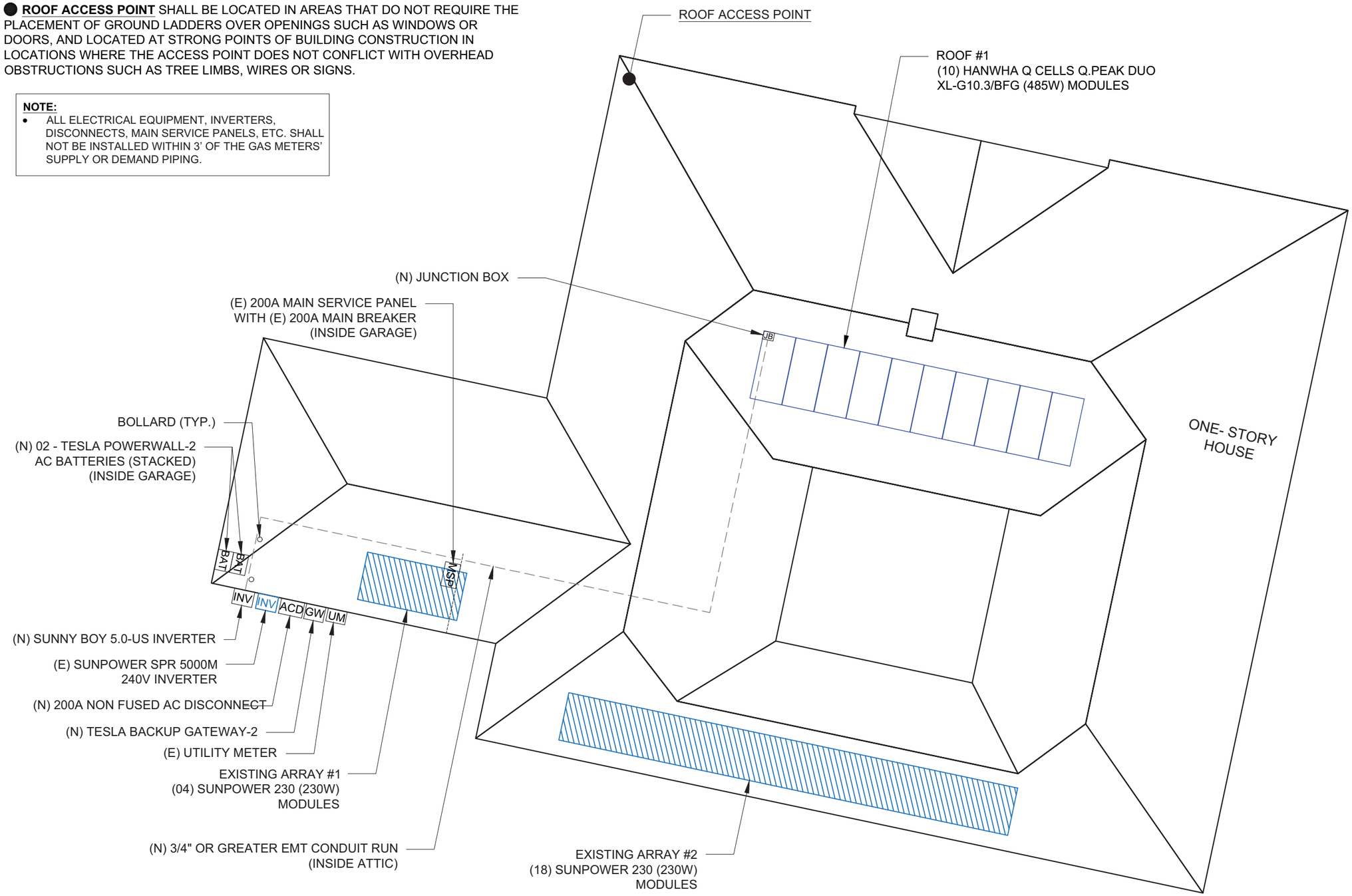
SHEET NAME
SITE PLAN WITH ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

● **ROOF ACCESS POINT** SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

NOTE:
- ALL ELECTRICAL EQUIPMENT, INVERTERS, DISCONNECTS, MAIN SERVICE PANELS, ETC. SHALL NOT BE INSTALLED WITHIN 3' OF THE GAS METERS' SUPPLY OR DEMAND PIPING.



1 ENLARGE VIEW
SCALE: 3/32" = 1'-0"

N

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BARRY JACOBSON
4509 NW 23RD AVE, STE 20,
GAINESVILLE, FL 32606
TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

DESCRIPTION	DATE	REV
INITIAL RELEASE	10/13/2022	UR

VERSION

BARRY M JACOBSON LICENSE No. 51402 STATE OF FLORIDA PROFESSIONAL ENGINEER

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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME

ENLARGE VIEW

SHEET SIZE

ANSI B
11" X 17"

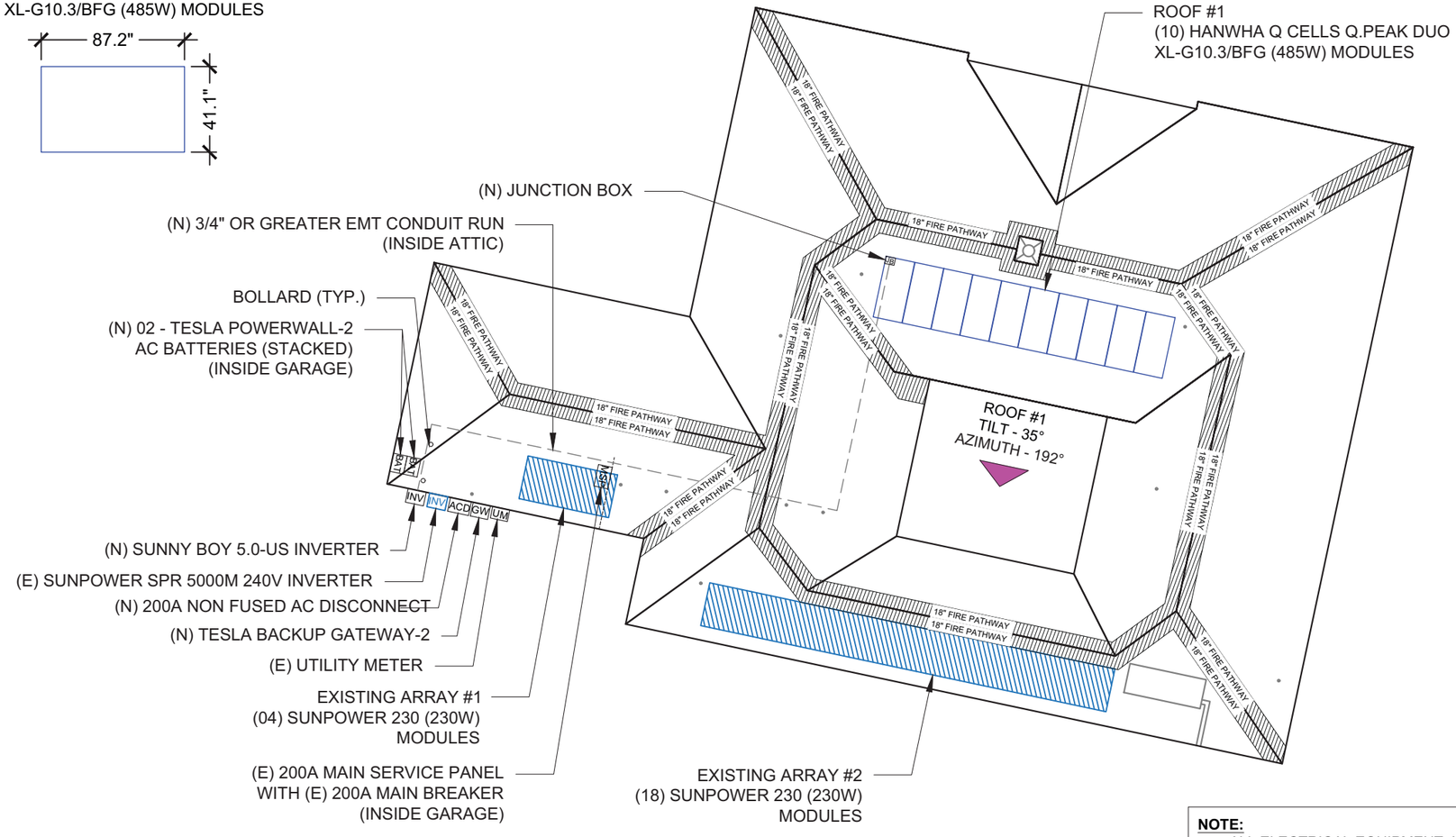
SHEET NUMBER

PV-1.1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 10 MODULES
MODULE TYPE = HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
MODULE WEIGHT = 64.2 LBS / 29.2 KG.
MODULE DIMENSIONS = 87.2"X 41.1" = 24.89 SF
UNIT WEIGHT OF ARRAY = 2.58 PSF

PHOTOVOLTAIC MODULES
HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES



NOTE: THE STRUCTURAL DESIGNS CALCULATIONS ARE SUPERSEDED BY THE STRUCTURAL DESIGN REPORT

- PLUMBING VENTS, SKYLIGHTS AND MECHANICAL VENTS SHALL NOT BE COVERED, MOVED, RE-ROUTED OR RE-LOCATED.

NOTE: ACTUAL ROOF CONDITIONS AND RAFTERS (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

1 ROOF PLAN WITH MODULES

SCALE: 1" = 16'-0"

N

NOTE:
- ALL ELECTRICAL EQUIPMENT, INVERTERS, DISCONNECTS, MAIN SERVICE PANELS, ETC. SHALL NOT BE INSTALLED WITHIN 3' OF THE GAS METERS' SUPPLY OR DEMAND PIPING.

BILL OF MATERIALS

EQUIPMENT	DESCRIPTION
RAIL	IRONRIDGE XR10 & XR100
SPLICE	XR-BONDED SPLICE
MID CLAMP	IRONRIDGE MID CLAMP-UFO
END CLAMP	IRONRIDGE END CLAMP-STOPPER SLEEVES
ATTACHMENT	S5! SOLAR FOOT
GROUNDING LUG	XR-LUG

ROOF DESCRIPTION

ROOF TYPE			CORRUGATED METAL ROOF		
ROOF	ROOF TILT	AZIMUTH	RAFTERS SIZE	RAFTERS SPACING	SEAMS SPACING
#1	35°	192°	2"x4"	24" O.C.	12" O.C.

ARRAY AREA & ROOF AREA CALC'S

ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	10	248.88	692.87	35.92

R324.6.2 - PROVING ARRAYS TAKE LESS THAN 33% OF TOTAL ROOF AREA.WHEN THE ARRAYS TAKE LESS THAN 33% WE CAN JUSTIFY AN 18" SETBACK ON BOTH SIDES OF THE RIDGE. WHEN IT TAKES MORE THAN 33% OF THE ROOF AREA WE MUST USE A 3' SETBACKS AT THE RIDGE.

TOTAL ROOF AREA:
6,205.25 sqft

(NEW)
AREA OF ARRAYS:
87.2"X 41.1" (PANEL DIMENSIONS)
87.2"X 41.1" = 24.89 sqft (PER PANEL)
24.89 $^{sqft}/_{panel}$ X 10 panels = 248.88 sqft (TOTAL PANEL AREA)

(EXISTING)
AREA OF ARRAYS:
61.39"X 31.42" (PANEL DIMENSIONS)
61.39"X 31.42" = 13.39 sqft (PER PANEL)
13.39 $^{sqft}/_{panel}$ X 22 panels = 294.69 sqft (TOTAL PANEL AREA)

PERCENTAGE OF TOTAL ROOF AREA:
(248.88+294.69) sqft / 6,205.25 sqft)(100)= 8.75%

THE PANELS USE 8.75% OF THE TOTAL ROOF AREA

LEGEND

- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- ACD - AC DISCONNECT
- INV - INVERTER
- INV - INVERTER
- JB - JUNCTION BOX
- GW - TESLA BACKUP GATEWAY
- BAT - TESLA POWERWALL 2
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- CONDUIT
- FIRE PATHWAY

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TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

DESCRIPTION	LICENSE	DATE	REV
INITIAL RELEASE		10/13/2022	UR

BARRY M JACOBSON LICENSE No. 81402 STATE OF FLORIDA PROFESSIONAL ENGINEER

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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 07-4S-16-02792-004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
ROOF PLAN WITH MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 10 MODULES
MODULE TYPE = HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
MODULE WEIGHT = 64.2 LBS / 29.2 KG.
MODULE DIMENSIONS = 87.2"X 41.1" = 24.89 SF
UNIT WEIGHT OF ARRAY = 2.58 PSF

IronRidge Website Info		XR10		XR100		Forces for
Zone	Type	Span Limits				4' span
1/2e	Normal	6 ft	3 in	9 ft	3 in	265 lbs
1/2e	Exposed	4 ft	1 in	6 ft	1 in	544 lbs
2n/2r/2e	Normal	5 ft	7 in	8 ft	8 in	307 lbs
2n/2r/2e	Exposed	3 ft	10 in	5 ft	6 in	627 lbs
3r	Normal	4 ft	11 in	7 ft	8 in	387 lbs
3r	Exposed	3 ft	4 in	4 ft	11 in	784 lbs

		XR10	XR100	XR10	XR100	XR10	XR100
Zone	Type	Span Limits		Cantilever Limits		Uplift	
1/2e	Normal	4 ft 0 in	4 ft 0 in	1 ft 7 in	1 ft 7 in	265 lb	265 lb
1/2e	Exposed	1 ft 11 in	1 ft 11 in	0 ft 9 in	0 ft 9 in	261 lb	261 lb
2n/2r/2e	Normal	3 ft 5 in	3 ft 5 in	1 ft 4 in	1 ft 4 in	262 lb	262 lb
2n/2r/2e	Exposed	1 ft 8 in	1 ft 8 in	0 ft 8 in	0 ft 8 in	261 lb	261 lb
3r	Normal	2 ft 9 in	2 ft 9 in	1 ft 1 in	1 ft 1 in	266 lb	266 lb
3r	Exposed	1 ft 4 in	1 ft 4 in	0 ft 6 in	0 ft 6 in	261 lb	261 lb

ROOF ZONES	
ZONE 1	-19.3520
ZONE 2e	-21.0740
ZONE 2r	-27.9620
ZONE 3	-27.4700

ROOF LAYOUT NOTE
ROOFSOLAR PANEL LAYOUT IS CONCEPTUAL, BUT AS PROVIDED, CONFORMS WITH THE REQUIREMENTS SET IN SHEET PV-3 CONTRACTOR MAY ADJUST PANEL LOCATION. SOLID CORNERS (4'X4') SHOWN THE PLAN IS WIND ZONE 3. SEE 2020 FLORIDA RESIDENTIAL CODE (7TH EDITION) FOR MORE DETAILS

APPLICABLE CODE: 2020 FLORIDA BUILDING CODE (7TH EDITION) & ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

LAG SCREW DIAMETER AND EMBEDMENT LENGTHS ARE DESIGNED PER 2020 FLORIDA BUILDING CODE (7TH EDITION) REQUIREMENTS.ALL BOLT CAPACITIES ARE BASED ON A SOUTHER YELLOW PINE (SYP) RESIDENTIAL WOOD ROOF RAFTERS AS EMBEDMENT MATERIAL.

ALL WIND DESIGN CRITERIA AND PARAMETERS ARE FOR HIP AND GABLE RESIDENTIAL ROOFS, CONSIDERING FROM A7° TO A MAXIMUM 23° (7/12 TO A MAXIMUM 7/12 PITCH) ROOF IN SCHEDULE. CONTRACTOR TO FIELD VERIFY THAT MEAN ROOF HEIGHT DOES NOT EXCEED 30'-0".

ROOF SEALANTS SHALL CONFORM TO ASTM C920 AND ASTM 6511, AND IS THE RESPONSIBILITY OF THE CONTRACTOR TO PILOT DRILL AND FILL ALL HOLES.

ALL DISSIMILAR MATERIALS SHALL BE SEPARATED WITH NEOPRENE WASHERS, PADS, ETC OR SIMILAR.

ALL ALUMINUM COMPONENTS SHALL BE ANODIZED ALUMINUM 6105-T5 UNLESS OTHERWISE NOTED.

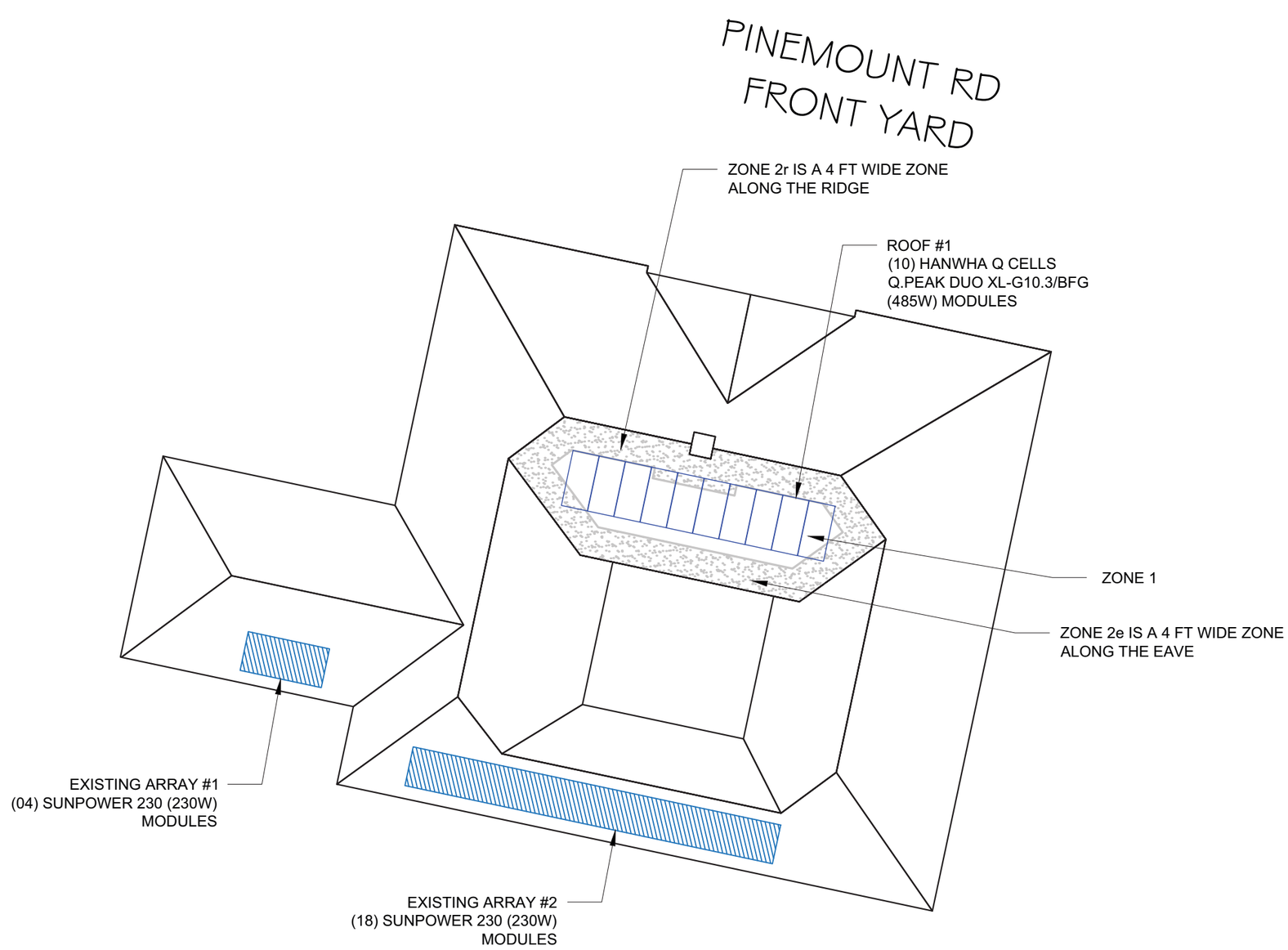
ALL LAG SCREW SHALL BE ASTM A276 STAINLESS STEEL UNLESS OTHERWISE NOTED.

ALL SOLAR RAILING AND MODULES SHALL BE INSTALLED PER MANUFACTURER INSTRUCTIONS.

CONTRACTOR SHALL ENSURE ALL ROOF PENETRATIONS TO BE INSTALLED AND SEALED PER 2020 FLORIDA BUILDING CODE (7TH EDITION) OR LOCAL GOVERNING CODE.

NOTE TO INSTALLER:
NOTE FIELD ADJUSTMENTS CAN BE MADE TO THE LAYOUT OF THE ARRAY.

PLUMBING VENTS, SKYLIGHTS AND MECHANICAL VENTS SHALL NOT BE COVERED, MOVED, RE-ROUTED OR RE-LOCATED.



1 ROOF ZONING PLAN
SCALE: 1/16" = 1'-0"

N

LEGEND
- WIND ZONE 2
- CORNER WIND ZONE 3

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GAINESVILLE, FL 32606
TEL: (352)281-5946
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Email barry@solarimpact.com

DESCRIPTION	DATE	REV
INITIAL RELEASE	10/13/2022	UR

BARRY M JACOBSON LICENSE No. 81402 STATE OF FLORIDA PROFESSIONAL ENGINEER

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PROJECT NAME
WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 07-4S-16-02792-004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

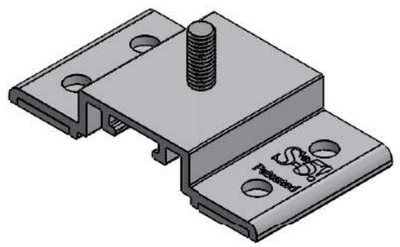
SHEET NAME
ROOF ZONING PLAN

SHEET SIZE
ANSI B
11" X 17"

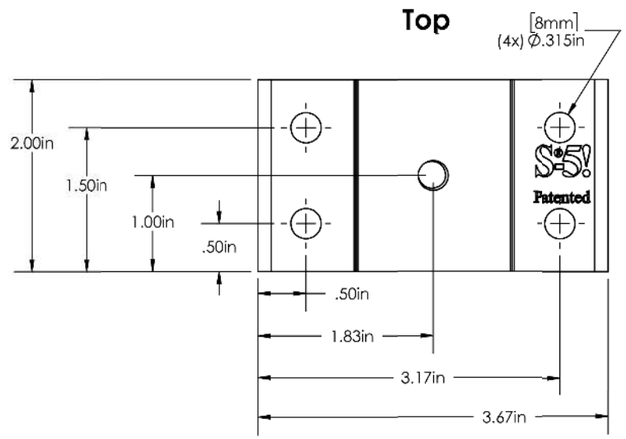
SHEET NUMBER
PV-3

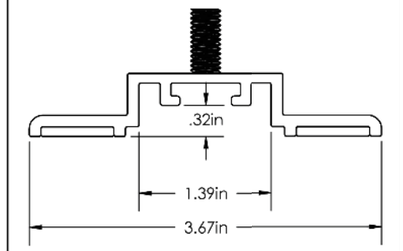
NOTE: ACTUAL ROOF CONDITIONS AND RAFTERS (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

SolarFoot



Top





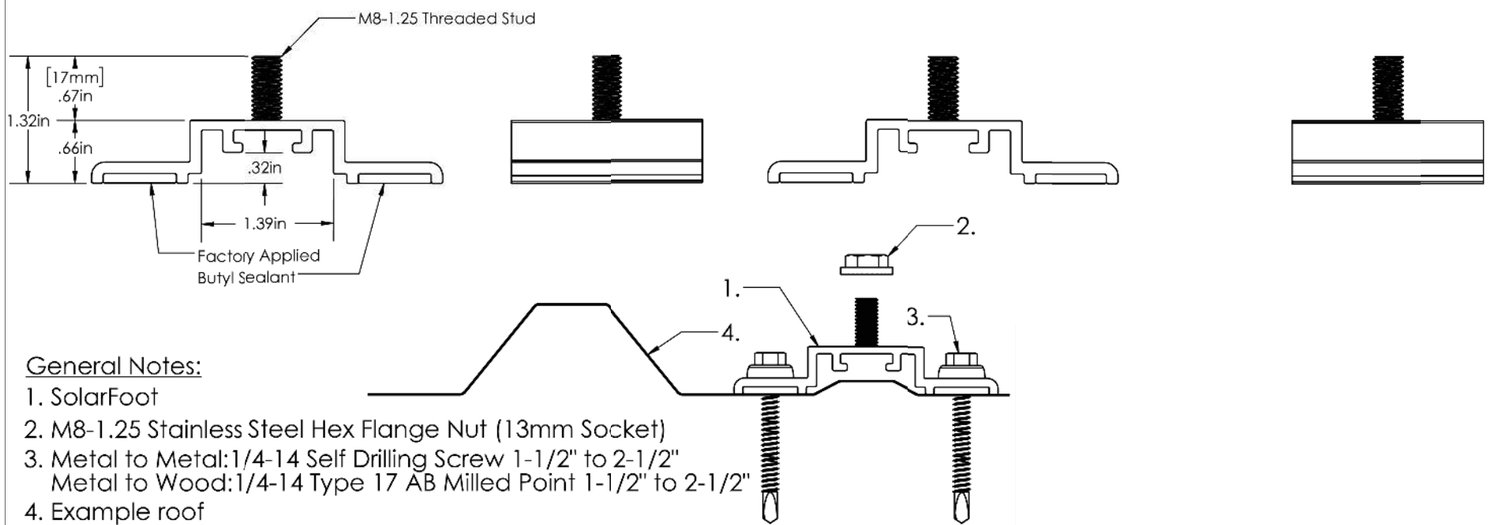
Scale 2:3

Back

Left

Front

Right



General Notes:

1. SolarFoot
2. M8-1.25 Stainless Steel Hex Flange Nut (13mm Socket)
3. Metal to Metal:1/4-14 Self Drilling Screw 1-1/2" to 2-1/2"
   Metal to Wood:1/4-14 Type 17 AB Milled Point 1-1/2" to 2-1/2"
4. Example roof

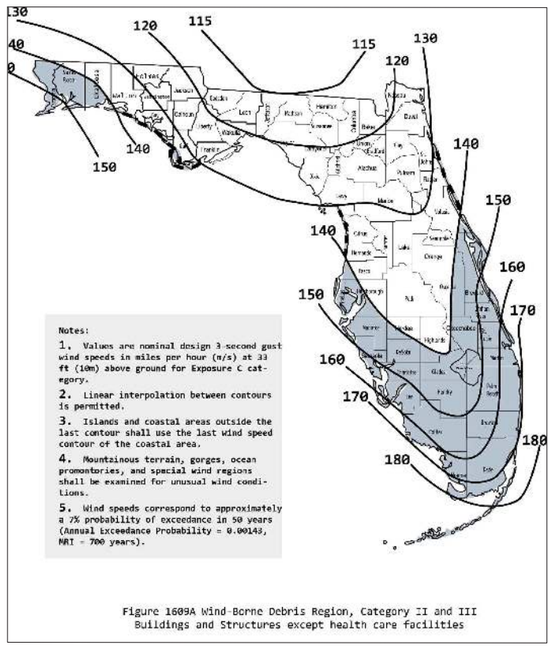


Figure 1609A Wind-Borne Debris Region, Category II and III Buildings and Structures except health care facilities

1 ATTACHMENT DETAIL

BARRY JACOBSON
4509 NW 23RD AVE, STE 20,
GAINESVILLE, FL 32606
TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	10/13/2022	UR

STATE OF FLORIDA
BARRY M. JACOBSON
LICENSE
No. 51402
PROFESSIONAL ENGINEER

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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

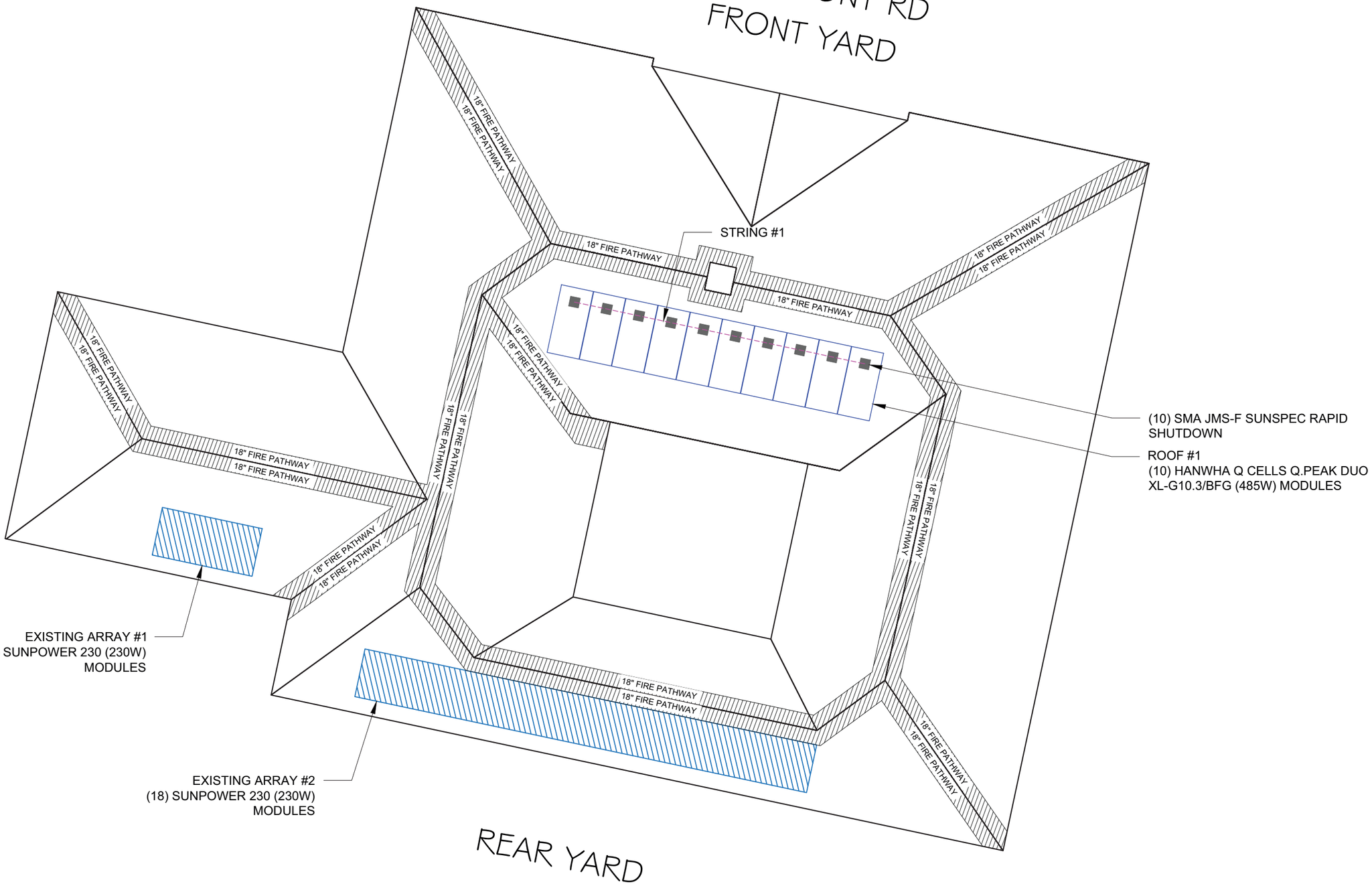
SHEET NAME
ATTACHMENT DETAILS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3.1

(10) HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
(10) SMA JMS-F SUNSPEC RAPID SHUTDOWN
(01) STRING OF 10 MODULES CONNECTED IN SERIES PER STRING

18" FIRE PATHWAY



1 STRING LAYOUT
SCALE: 3/32" = 1'-0"

N

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PROJECT NAME
WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
STRING LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

(10) HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
(10) SMA JMS-F SUNSPEC RAPID SHUTDOWN
(01) STRING OF 10 MODULES CONNECTED IN SERIES PER STRING

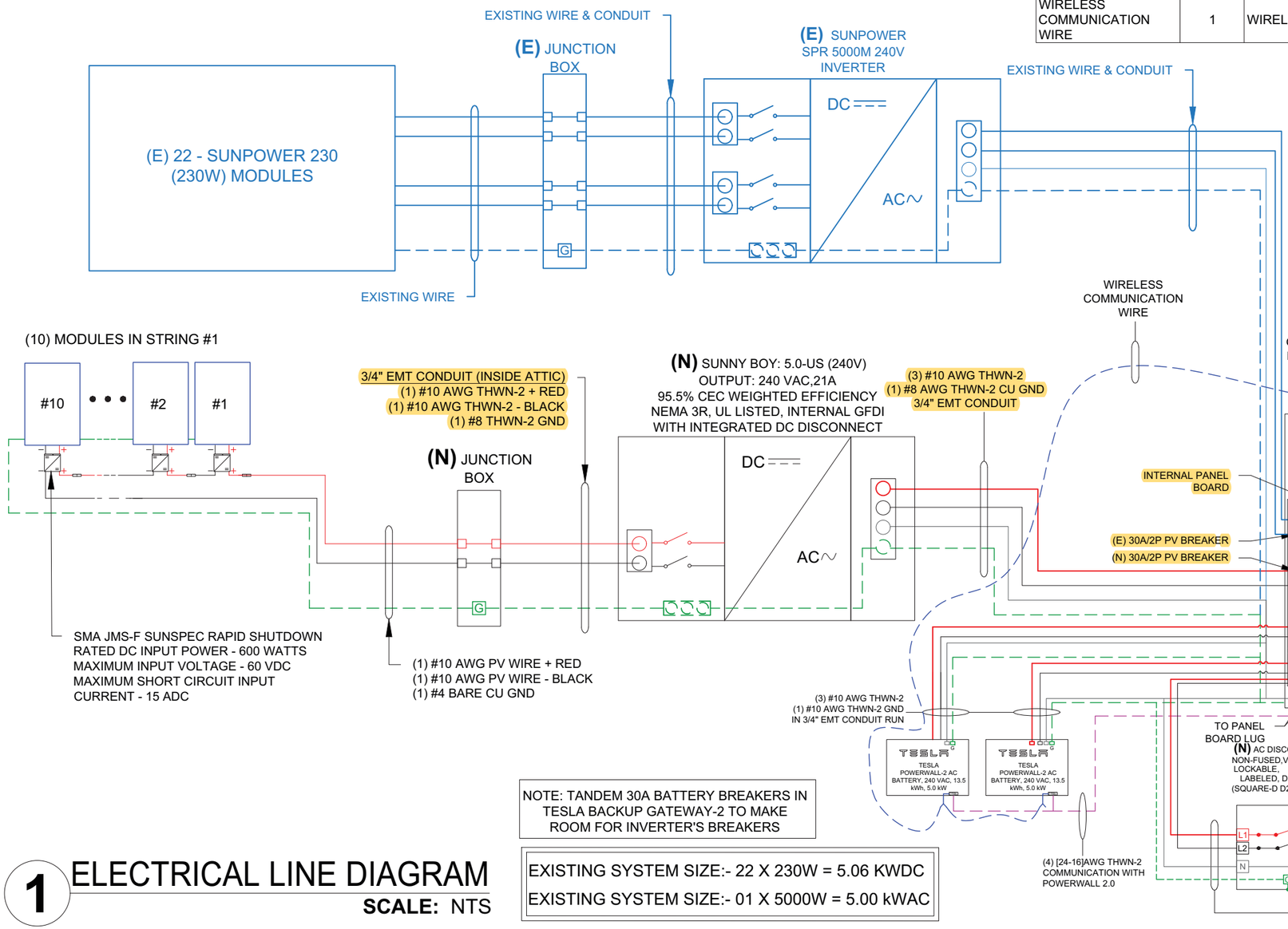
SYSTEM SIZE:- 10 x 485W = 4.85 kWDC

SYSTEM SIZE:- 01 X 5000W = 5.00 kWAC

TESLA CAN ADJUST.....A BUS".
EACH SYSTEM THAT INCLUDES POWERWALLS WILL BE "CONTROLLED VIA GATEWAY CONTROL LOGIC WHICH IS ONLY POSSIBLE IF SOLAR PRODUCTION IS MEASURED, IE, VIA A CT ON THE SOLAR INFEED TO THE GATEWAY. PLEASE REFLECT SUCH CT ON THE DESIGN DRAWINGS, WHEN PLACING THIS CT ON THE BOM, IT MUST BE NOTED THAT IT IS INCLUDED WITH THE GATEWAY SO SHOULD HAVE AN (E) NEXT TO IT. IN ADDITION, ALL SYSTEM PRODUCTION IS MONITORED VIA CELL OR WIRELESS MODEM. THIS REQUIRES AN ACTUAL INSTALLATION AND MUST BE REFLECTED ON THE DESIGN DRAWINGS CONNECTED TO AN INVERTER. BELIEVE UP TO 10 INVERTERS CAN BE "DAISY CHAINED" TO A SINGLE CELL OR OTHER WIRELESS MODEM. BRIAN WILL SUPPLY THE DETAILS.

BILL OF MATERIALS

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	10	HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W) MODULES
INVERTER	01	SUNNY BOY 5.0-US STRING - INVERTER, 240V
OPTIMIZER	10	SMA JMS-F SUNSPEC POWER OPTIMIZERS
JUNCTION BOX	01	600V, 55A MAX, 4 INPUTS, MOUNTED ON ROOF FOR WIRE & CONDUIT TRANSITION
BATTERY BREAKER	2	30A/2P BATTERY BREAKER (TANDEM)
PV BREAKER	2	01 - 30A/2P NEW PV BREAKER & 01 - 30A/2P EXISTING PV BREAKER
GATEWAY BREAKER	1	200A GATEWAY MAIN BREAKER
TESLA POWERWALL	2	TESLA POWERWALL-2 AC BATTERY, 240 VAC, 13.5 kWh, 5.0 kW
TESLA GATEWAY	1	200A TESLA BACKUP GATEWAY-2 NEMA 3R, UL LISTED (DUAL LUGGED)
CT CABLE	1	CURRENT TRANSFORMER CABLE
AC DISCONNECT	1	AC DISCONNECT 200A NON FUSED, VISIBLE, LOCKABLE, LABELED, DISCONNECT, 240 VAC
WIRELESS COMMUNICATION WIRE	1	WIRELESS COMMUNICATION WIRE



NOTE: TANDEM 30A BATTERY BREAKERS IN TESLA BACKUP GATEWAY-2 TO MAKE ROOM FOR INVERTER'S BREAKERS

EXISTING SYSTEM SIZE:- 22 X 230W = 5.06 KWDC

EXISTING SYSTEM SIZE:- 01 X 5000W = 5.00 kWAC

SERVICE INFO.

UTILITY PROVIDER:	FPL
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	SIEMENS
MAIN SERVICE PANEL:	(E) 200A
MAIN CIRCUIT BREAKER RATING:	(E) 200A
MAIN SERVICE LOCATION:	SOUTH-WEST
SERVICE FEED SOURCE:	OVERHEAD

1 ELECTRICAL LINE DIAGRAM

SCALE: NTS

solar impact
BARRY JACOBSON
4509 NW 23RD AVE, STE 20,
GAINESVILLE, FL 32606
TEL: (352)281-5946
CSLB # : CVC56761
Email barry@solarimpact.com

VERSION DESCRIPTION	LICENSE	DATE	REV
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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 07-4S-16-02792-004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HANWHA Q CELLS Q.PEAK DUO XL-G10.3/BFG (485W)MODULES
VMP	45.63
IMP	10.63
VOC	53.63
ISC	11.16
MODULE DIMENSION	87.2"L x 41.1"W x 1.38"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SUNNY BOY 5.0-US
NOMINAL AC POWER	5.00KW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	24A

AMBIENT TEMPERATURE SPECS	
WEATHER STATION: GAINESVILLE REGIONAL AP	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT HIEGHT	IN ATTIC
ROOF TOP TEMP	34°
CONDUCTOR TEMPERATURE RATE	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/°C

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

OPTIMIZER SPECIFICATIONS	
POWER OPTIMIZER	SMA JMS-F SUNSPEC
DC INPUT POWER	600W

ELECTRICAL NOTES

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.
3.) 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.
4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX:	
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	1.00
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X 1.25 X ISC OF MODULE	17.44A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(1) TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	38.40A
RESULT SHOULD BE GREATER THAN (17.44A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

DC CONDUCTOR AMPACITY CALCULATIONS: JUNCTION BOX TO INVERTER:	
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	1.00
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X 1.25 X ISC OF MODULE	17.44A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(1) TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	38.40A
RESULT SHOULD BE GREATER THAN (17.44A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

AC CONDUCTOR AMPACITY CALCULATIONS: INVERTER TO TESLA BACKUP GATEWAY 2:	
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	1.00
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) 1.25 X INVERTER OUTPUT CURRENT	26.25A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(1) TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	38.40A
RESULT SHOULD BE GREATER THAN (26.25A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

VOLTAGE DROP CALCULATIONS							
WIRE RUN	# OF INV	V (VOLTS)	I (AMPS)	L (FT)	VD (%)	WIRE SIZE*	RACEWAY
STRING #1 (MODULE) TO PASS THRU J. BOX	1	44.52	10.6	31	0.18%	10 AWG	FREE AIR
PASS THRU J. BOX TO INVERTER (MAX STRING)	1	44.52	10.6	85	0.50%	10 AWG	3/4" EMT
INVERTER TO INTERCONNECTION	1	240	24.0	5	0.12%	10 AWG	3/4" EMT
		MAX VOLTAGE DROP: 0.80%					

1 ELECTRICAL CALCULATION
SCALE: NTS

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PROJECT NAME
WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 07-4S-16-02792-004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
ELECTRICAL CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

⚠ WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
AC & DC DISCONNECT AND SUB PANEL
(PER CODE: NEC 690.13(B))

WARNING

ELECTRIC SHOCK HAZARD

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

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

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

WARNING

ELECTRIC SHOCK HAZARD

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

LABEL LOCATION:
AC & DC DISCONNECT AND SUB PANEL
(PER CODE: NEC 690.41(B))

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
MAIN SERVICE PANEL & NET METER
(PER CODE: NEC 705.12(D)(3), NEC 705.12(B)(3-4) & NEC 690.59)

WARNING

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

LABEL LOCATION:
INVERTER
(PER CODE: NEC 690.31(I)

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OPERATING CURRENT 21 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT & INVERTER
(PER CODE: NEC690.54)

⚠ WARNING

POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
SERVICE PANEL IF SUM OF BREAKERS EXCEEDS PANEL RATING
(PER CODE: NEC 705.12 (B)(2)(3)(b)

WARNING:PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
EMT / CONDUIT RACEWAYS
(PER CODE: NEC 690.31(G)(3)

PHOTOVOLTAIC

AC DISCONNECT

LABEL LOCATION:
AC DISCONNECT
NEC 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

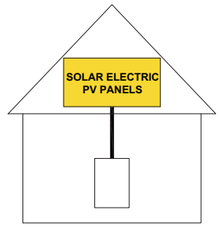
LABEL LOCATION:
RAPID SHUTDOWN
(PER CODE: NEC 690.56(C)(3)

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL LOCATION:
MAIN SERVICE DISCONNECT / UTILITY METER
(PER CODE: NEC 690.13(B))

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL LOCATION:
AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: 605.11.3.1(1) & 690.56(C)(1)(a))

2"

CAUTION

THIS PANEL HAS SPLICED FEED THROUGH CONDUCTORS LOCATION OF DISCONNECT AT BATTERY BACKUP LOAD PANEL

1"

LOCATION: BACK UP GATEWAY

MULTIPLE POWER SOURCES PRESENT. SECOND SOURCE IS A PV ARRAY. SUPPLY SIDE CONNECTION IN THIS PANEL. BATTERY INSIDE. AC DISCONNECT LOCATED IN GARAGE ESSENTIAL LOAD PANEL , RAPID SHUTDOWN INITIATION DEVICE LOCATED OUTSIDE NEXT TO METER .

1"

LOCATION: INTERCONNECTION PANEL

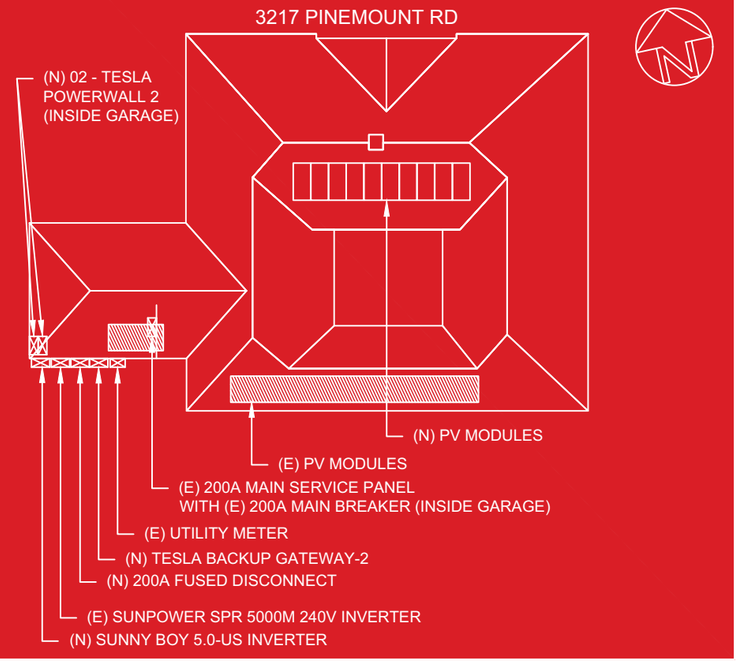
RATED MAXIMUM POWER-POINT CURRENT (Imp)	10.63	A
RATED MAXIMUM POWER-POINT VOLTAGE (Vmp)	456.3	V
MAXIMUM SYSTEM VOLTAGE (VOC)	600.7	V
MAXIMUM CIRCUIT CURRENT (Isc)	13.95	A

LABEL LOCATION:
DC DISCONNECT, INVERTER
(PER CODE: CEC690.53)

CAUTION !

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN AT: MAIN SERVICE PANEL, UTILITY METER, INVERTER, BREAKER DISCONNECT BATTERY & TESLA BACKUP GATEWAY-2

3217 PINEMOUNT RD



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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME

WARNING LABELS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

1. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER MANUFACTURER'S REQUIREMENTS. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.

2. ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF NATIONAL ELECTRICAL CODE. LABEL SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED IN A CONTRASTING COLOR TO THE PLAQUE. PLAQUE SHALL BE UV RESISTANT IF EXPOSED TO SUNLIGHT.

3. DC CONDUCTORS SHALL BE RUN IN EMT AND SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIV. EVERY 10 FT.

4. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A).

5. CONFIRM LINE SIDE VOLTAGE AT ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.

6. OUTDOOR EQUIPMENT SHALL BE NEMA-3R RATED OR BETTER.

7. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

8. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY AWAY OFF OF THE ROOF SURFACE. NEC 110.2 - 110.4 / 300.4

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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME
ADDITIONAL NOTES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

powered by Q.ANTUM DUO Z

Q.PEAK DUO XL-G10.3 / BFG

470-485

BIFACIAL DOUBLE GLASS MODULE WITH EXCELLENT RELIABILITY AND ADDITIONAL YIELD

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2020

Q CELLS Yield Security

BIFACIAL ENERGY YIELD GAIN OF UP TO 20%

Bifacial Q.ANTUM solar cells with zero gap cell layout make efficient use of light shining on the module rear-side for radically improved LCOE.

LOW ELECTRICITY GENERATION COSTS

Q.ANTUM DUO Z combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology for higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 21.2%.

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 and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

FRAME FOR VERSATILE MOUNTING OPTIONS

High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (2400 Pa).

A RELIABLE INVESTMENT

Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[2].

[1] APT test conditions according to IEC/TS 62804-1:2015 method B (−1500V, 168h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

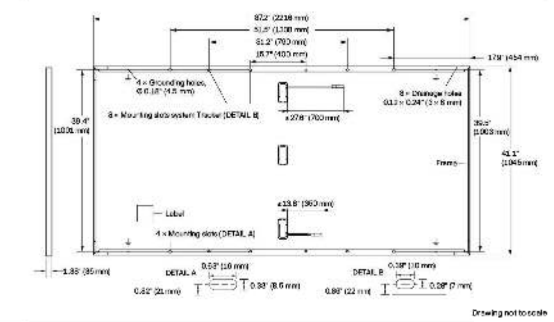
Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	87.2 in × 41.1 in × 1.38 in (including frame) (2216 mm × 1045 mm × 35 mm)
Weight	64.2 lbs (29.1 kg)
Front Cover	0.08 in (2.0 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.08 in (2.0 mm) semi-tempered glass
Frame	Anodized aluminum
Cell	6 × 26 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: (+) ≥27.6 in (700 mm), (−) ≥13.8 in (350 mm)
Connector	Stäubli MC4-Evo2, Hanwha Q CELLS HQC4, IP68



ELECTRICAL CHARACTERISTICS

POWER CLASS			470		475		480		485	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] AND BSTC[1] (POWER TOLERANCE +5 W / −0 W)										
				BSTC*		BSTC*		BSTC*		BSTC*
Minimum: Power at MPP[1]	P_{MPP}	[W]	470	514.1	475	519.6	480	525.0	485	530.5
Short Circuit Current[1]	I_{SC}	[A]	11.04	12.08	11.08	12.12	11.12	12.17	11.16	12.21
Open Circuit Voltage[1]	V_{OC}	[V]	52.91	53.10	53.15	53.34	53.39	53.58	53.63	53.82
Current at MPP	I_{MPP}	[A]	10.51	11.50	10.55	11.54	10.59	11.58	10.63	11.63
Voltage at MPP	V_{MPP}	[V]	44.73	44.72	45.03	45.02	45.33	45.32	45.63	45.62
Efficiency[1]	η	[%]	≥20.3	≥22.2	≥20.5	≥22.4	≥20.7	≥22.7	≥20.9	≥22.9

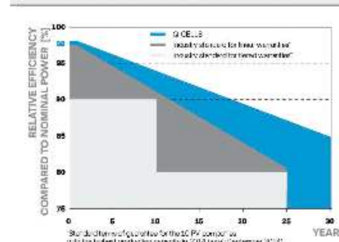
Bifaciality of P_{MPP} and I_{SC} 70% ±5% • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}, V_{OC} ±5% at STC: 1000 W/m²; *at BSTC: 1000 W/m² + φ × 135 W/m², φ = 70% ±5%, 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]						
Minimum: Power at MPP	P_{MPP}	[W]	353.8	357.6	361.4	365.1
Short Circuit Current	I_{SC}	[A]	8.89	8.92	8.96	8.99
Open Circuit Voltage	V_{OC}	[V]	50.04	50.27	50.49	50.72
Current at MPP	I_{MPP}	[A]	8.27	8.30	8.34	8.37
Voltage at MPP	V_{MPP}	[V]	42.77	43.06	43.35	43.63

[2] 800 W/m², NMOT, spectrum AM 1.5

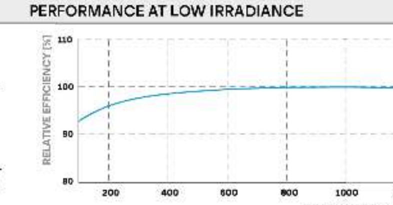
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.45% degradation per year. At least 93.95% of nominal power up to 10 years. At least 84.95% of nominal power up to 30 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]	108 ± 5.4 (42 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 29[4]
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 33 (1600 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) / 50 (2400 Pa)		

[3] See Installation Manual

[4] New Type is similar to Type 3 but with metallic frame

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells); Certification in process.

C Certified US UL 61730 — CE — TÜVRheinland CERTIFIED www.tuv.com ID 1111220277

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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PROJECT NAME

WARREN & ANGELA MARLOWE
3217 PINEMOUNT RD,
LAKE CITY, FL 32024 USA
APN# 074S1602792004
UTILITY: FPL
AHJ: COLUMBIA COUNTY

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-9

SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

SMA

Value-Added Improvements
- Superior integration with SMA's MLPE Power+ Solution
- World's first Secure Power Supply* now offers up to 2,000 W
- Full grid management capabilities ensure a utility-compliant solution for any market

Reduced Labor
- New Installation Assistant with direct access via smartphone minimizes time in the field
- Advanced communication interface with fewer components creates 50% faster setup and commissioning

Unmatched Flexibility
- SMA's proprietary OptiTrac™ Global Peak technology mitigates shade with ease
- Multiple independent MPPTs accommodate hundreds of stringing possibilities

Trouble-Free Servicing
- Two-part enclosure concept allows for simple, expedited servicing
- Equipped with SMA Smart Connected, a proactive service solution that is integrated into Sunny Portal

SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Reduce costs across your entire residential business model

The residential PV market is changing rapidly. Your bottom line matters more than ever—so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team, along with a wealth of improvements. Simple design, improved stocking and ordering, value-driven sales support and streamlined installation are just some of the ways that SMA helps your business operate more efficiently. And, Sunny Boy's superior integration with the innovative Power+ Solution means installers have even more flexibility in addressing their toughest challenges. Finally, SMA Smart Connected will automatically detect errors and initiate the repair and replacement process so that installers can reduce service calls and save time and money.

www.SMA-America.com

Technical data	Sunny Boy 3.0-US		Sunny Boy 3.8-US		Sunny Boy 5.0-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. PV power	4800 Wp		6144 Wp		8000 Wp	
Max. DC voltage	600 V					
Rated MPP voltage range	155 - 480 V		195 - 480 V		220 - 480 V	
MPPT operating voltage range	100 - 550 V					
Min. DC voltage / start voltage	100 V / 125 V					
Max. operating input current per MPPT	10 A					
Max. short circuit current per MPPT	18 A					
Number of MPPT tracker / string per MPPT tracker	2/1				3 / 1	
Output (AC)						
AC nominal power	3000 W	3000 W	3330 W	3840 W	5000 W	5000 W
Max. AC apparent power	3000 VA	3000 VA	3330 VA	3840 VA	5000 VA	5000 VA
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency	60 Hz / 50 Hz					
Max. output current	14.5 A	12.5 A	16.0 A	16.0 A	24.0 A	21.0 A
Power factor (cos ϕ)	1					
Output phases / line connections	1 / 2					
Harmonics	< 4 %					
Efficiency						
Max. efficiency	97.2 %	97.6 %	97.3 %	97.6 %	97.3 %	97.6 %
CEC efficiency	96.2 %	96.3 %	96.4 %	96.7 %	96.7 %	96.9 %
Protection devices						
DC disconnect device / DC reverse polarity protection	● / ●					
Ground fault monitoring / Grid monitoring	●					
AC short circuit protection	●					
All-pole sensitive residual current monitoring unit (RCMU)	●					
Arc fault circuit interrupter (AFCI)	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)					
Packaging dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)					
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)					
Temperature range: operating / non-operating	–25°C ...+60°C / –40°C ...+60°C					
Environmental protection rating	NEMA 3R					
Noise emission (typical)	39 dB(A)					
Internal power consumption at night	< 5 W					
Topology / Cooling concept	Transformerless / Convection					
Features						
Ethernet ports	2					
Secure Power Supply	●*					
Display (2 x 16 characters)	●					
2.4 GHz WLAN / External WLAN antenna	●/○					
Cellular (4G / 3G) / Revenue Grade Meter	○/○**					
Warranty: 10 / 15 / 20 years	●/○/○					
Certificates and approvals	UL 1741, UL 1741 SA incl. CA Rule 21 RSD, UL 1998, UL 1699B Ed. 1, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1, HECO Rule 14H, PV Rapid Shutdown System Equipment					
● Standard features ○ Optional features – Not available						
NOTE: US inverters ship with gray lids. Data at nominal conditions * Not compatible with the SunSpec Rapid Shutdown functionality **Standard in SBX.X-1TP-US-41						
Type designation	SB3.0-1SP-US-41 / SB3.0-1TP-US-41		SB3.8-1SP-US-41 / SB3.8-1TP-US-41		SB5.0-1SP-US-41 / SB5.0-1TP-US-41	

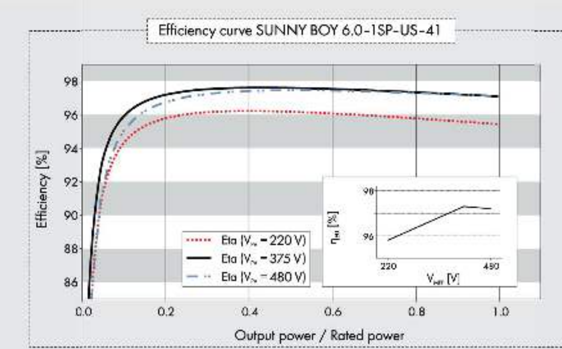
Accessories

External WLAN antenna EXTANT-US-40

SMA Rooftop Communication Kit ROOFCOMMKIT-P2-US

Revenue Grade Meter Kit RGM05KIT-US-10

Cellular Modem Kit CELLMODKIT-US-10



solar impact

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VERSION

DESCRIPTION	DATE	REV
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SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-10

SMA

JMS-F SUNSPEC RAPID SHUTDOWN DEVICE

Cost-effective

- Simple plug-and-play installation
- No additional components necessary, reducing balance of system costs

Simple and robust

- Power line based communication certified for compatibility with the SunSpec signal for rapid shutdown
- Shuts down PV module whenever SunSpec signal is interrupted

Safe and certified

- Certified and listed for compliance to:
  - » UL 1741 Rapid Shutdown System Equipment
  - » NEC 2017 690.12(B)(2) Module Level Shutdown

Reduced risk

- Technical support from SMA's #1 ranked service organization
- Fully SunSpec certified solution when paired with an SMA SunSpec certified inverter

JMS-F SUNSPEC RAPID SHUTDOWN DEVICE

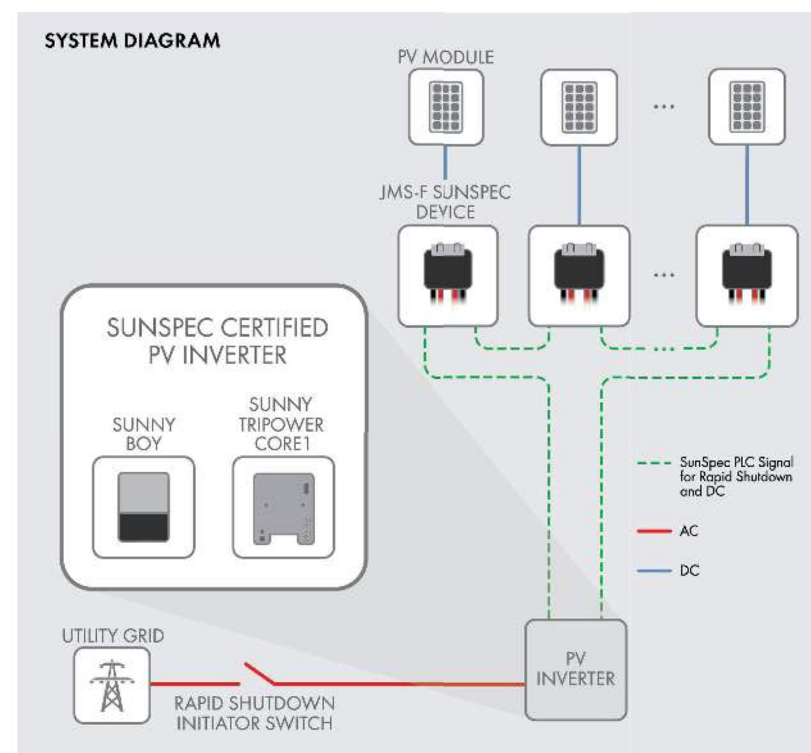
The easy module level rapid shutdown solution

The SunSpec Certified Rapid Shutdown System (model JMS-F), available from SMA, is the most cost-effective and reliable solution for fulfilling NEC 2017 module level shutdown requirements. The module-level device is certified for compatibility with the SunSpec communication signal and SMA inverters, making compliance simple and easy. By using the existing DC lines between the inverter and PV array for power line communications, installation and labor are significantly reduced. No additional wires or communication equipment is needed. The solution also features up to 50% fewer internal components vs alternatives, resulting in greater lifetime reliability.

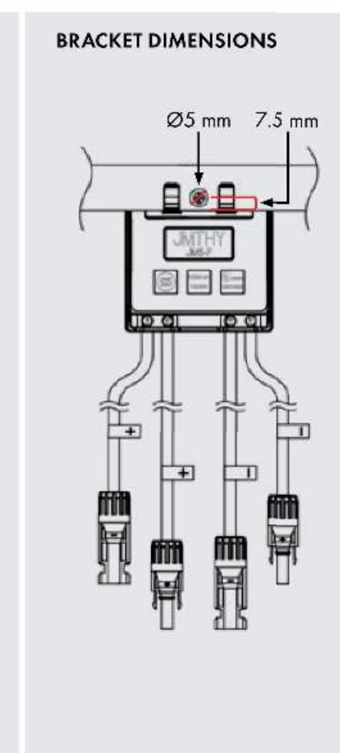
www.SMA-America.com

Technical data	JMS-F
Input (DC)	
Rated DC input power	600 Wp
Maximum PV module open circuit voltage	60 V
Minimum input voltage	10 V
Maximum continuous input current I_{MAX}	15 A
Maximum short-circuit input current I_{SC}	15 A
Output (DC)	
Output power range	0 W to 600 W
Maximum output voltage	60 V
Standby output voltage	1 V
Maximum system voltage	1500 V
Allowable series string connections	6 to 30 JMS-F devices
Mechanical	
Dimensions L / W / H in mm (in)	89 x 88.5 x 23.1 (3.5 x 3.48 x 0.9)
Weight (including cables)	0.95 lb (435 g)
Input / output connector	MC4
Output wire length	1.2 m
Operating temperature range	−40°C to +75°C (−40°F to +167°F)
Enclosure rating	Type 4X (as per UL 50E)
Relative humidity	0% to 100%
Features and compliance	
Certification	UL 1741 Rapid Shutdown Equipment
Communication mode	Power Line Communication (PLC)
SunSpec Rapid Shutdown Communication Protocol	SunSpec certified
Rapid shutdown time	10 seconds
Warranty (contact SMA Service Line)	25 years
SunSpec certified SMA inverters	Sunny Boy US (SBx.x-1SP-US-41) Sunny Tripower CORE1-US (STP xx-US-41)
Type designation	JMS-F
SMA part number	119814-00.01
Package quantity	40

SYSTEM DIAGRAM



BRACKET DIMENSIONS



Toll Free +1 888 4 SMA USA
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SMA America, LLC

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PV-11

Tech Brief

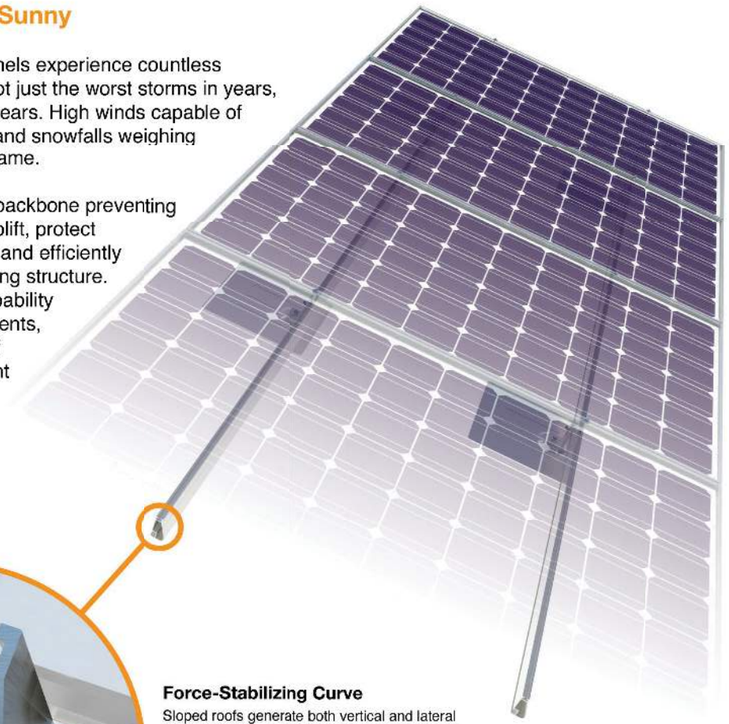
IRONRIDGE

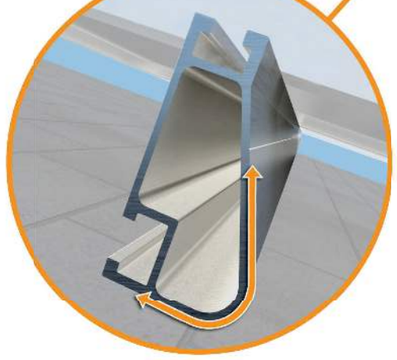
XR Rail Family

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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SHEET NAME
SPEC SHEETS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

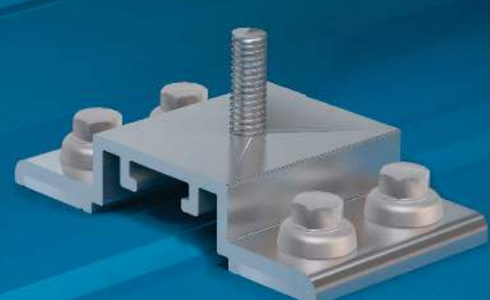
S-5!®

The Right Way!

NEW PRODUCT SolarFoot™

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

The right way to attach almost anything to metal roofs!

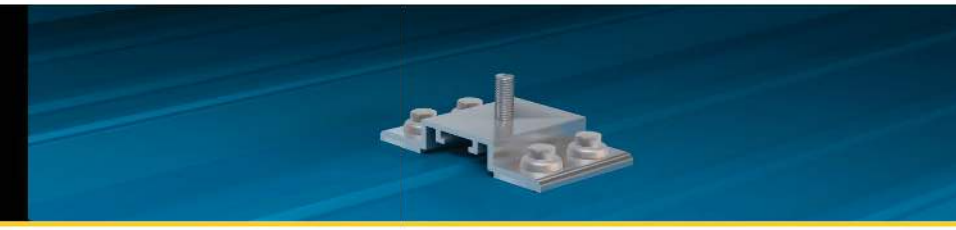


SolarFoot Features:

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

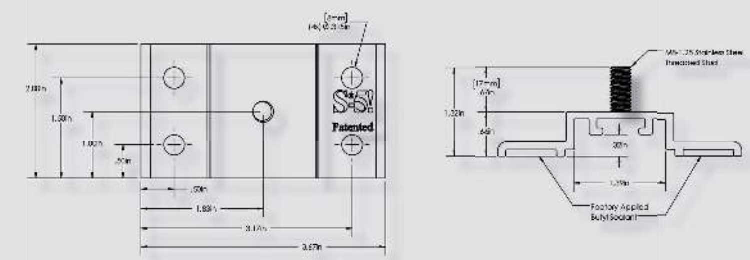
888-825-3432 | www.S-5.com |

S-5!® The Right Way!



SolarFoot™ Mounting for Exposed Fastener Roofing

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



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

Fastener Selection

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

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

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

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

SolarFoot Advantages:

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

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

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

Distributed by:

solar impact

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ANSI B
11" X 17"

SHEET NUMBER

PV-13

Tech Brief

IRONRIDGE

Class A Fire Rating

Background

All roofing products are tested and classified for their ability to resist fire.

Recently, these fire resistance standards were expanded to include solar equipment as part of the roof system. Specifically, this requires the modules, mounting hardware and roof covering to be tested together as a system to ensure they achieve the same fire rating as the original roof covering.

These new requirements are being adopted throughout the country in 2016.

IronRidge Certification

IronRidge was the first company to receive a Class A Fire Rating—the highest possible rating—from Intertek Group plc., a Nationally Recognized Testing Laboratory.

IronRidge Flush Mount and Tilt Mount Systems were tested on sloped and flat roofs in accordance with the new UL 1703 & UL 2703 test standards. The testing evaluated the system's ability to resist flame spread, burning material and structural damage to the roof.

Refer to the table below to determine the requirements for achieving a Class A Fire Rating on your next project.

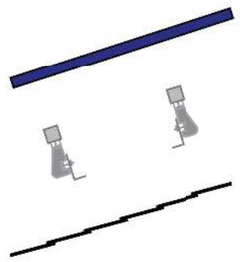
Fire Testing Process

Test Setup

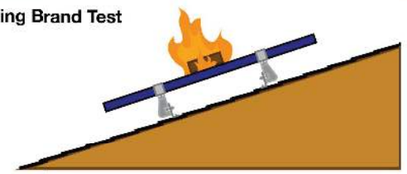
Solar Modules
Solar modules are given a Type classification based on their materials and construction.

Mounting System
Mounting is tested as part of a system that includes type-tested modules and fire-rated roof covering.

Roof Covering
Roof covering products are given a Fire Class Rating of A, B or C based on their tested fire resistance.

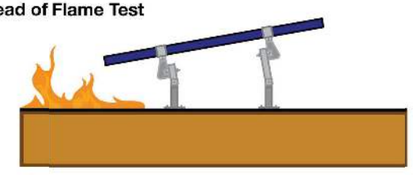


Burning Brand Test



A burning wooden block is placed on module as a fan blows at 12 mph. Flame cannot be seen on underside of roof within 90 minutes.

Spread of Flame Test



Flame at southern edge of roof is aimed up the roof as a fan blows at 12 mph. The flame cannot spread 6 feet or more in 10 minutes.

System	Roof Slope	Module	Fire Rating*
Flush Mount	Any Slope	Type 1, 2, & 3	Class A
Tilt Mount	≤ 6 Degrees	Type 1, 2, & 3	Class A

*Class A rated PV systems can be installed on Class A, B, and C roofs.

Tech Brief

Frequently Asked Questions

What is a "module type"?

The new UL1703 standard introduces the concept of a PV module type, based on 4 construction parameters and 2 fire performance parameters. The purpose of this classification is to certify mounting systems without needing to test it with every module.

What roofing materials are covered?

All fire rated roofing materials are covered within this certification including composition shingle, clay and cement tile, metal, and membrane roofs.

What if I have a Class C roof, but the jurisdiction now requires Class A or B?

Generally, older roofs will typically be "grandfathered in", and will not require re-roofing. However, if 50% or more of the roofing material is replaced for the solar installation the code requirement will be enforced.

Where is the new fire rating requirement code listed?

2012 IBC: 1509.7.2 Fire classification. Rooftop mounted photovoltaic systems shall have the same fire classification as the roof assembly required by Section 1505.

Where is a Class A Fire Rating required?

The general requirement for roofing systems in the IBC refers to a Class C fire rating. Class A or B is required for areas such as Wildland Urban Interface areas (WUI) and for very high fire severity areas. Many of these areas are found throughout the western United States. California has the most Class A and B roof fire rating requirements, due to wild fire concerns.

Are standard mid clamps covered?

Mid clamps and end clamps are considered part of the PV "system", and are covered in the certification.

What attachments and flashings are deemed compatible with Class A?

Attachments and their respective flashings are not constituents of the rating at this time. All code-compliant flashing methods are acceptable from a fire rating standpoint.

What mounting height is acceptable?

UL fire testing was performed with a gap of 5", which is considered worst case in the standard. Therefore, the rating is applicable to any module to roof gap.

Am I required to install skirting to meet the fire code?

No, IronRidge achieved a Class A fire rating without any additional racking components.

What determines Fire Classification?

Fire Classification refers to a fire-resistance rating system for roof covering materials based on their ability to withstand fire exposure.

Class A - effective against severe fire exposure
Class B - effective against moderate fire exposure
Class C - effective against light fire exposure

What if the roof covering is not Class A rated?

The IronRidge Class A rating will not diminish the fire rating of the roof, whether Class A, B, or C.

What tilts is the tilt mount system fire rated for?

The tilt mount system is rated for 1 degrees and up and any roof to module gap, or mounting height.

More Resources

Installation Manuals
Visit our website for manuals that include UL 2703 Listing and Fire Rating Classification.
Go to IronRidge.com

Engineering Certification Letters
We offer complete engineering resources and pre-stamped certification letters.
Go to IronRidge.com

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