SCOPE OF WORK

NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO BATTERY STORAGE

DC STC (KW):	13.60
AC RATING (KW):	11.40
MODULE:	(34) Q.PEAK DUO BLK ML-G10+ 400
INVERTER:	(1) SE11400H-US
OPTIMIZER:	(34) P400

SHEET INDEX

SITE DETAILS

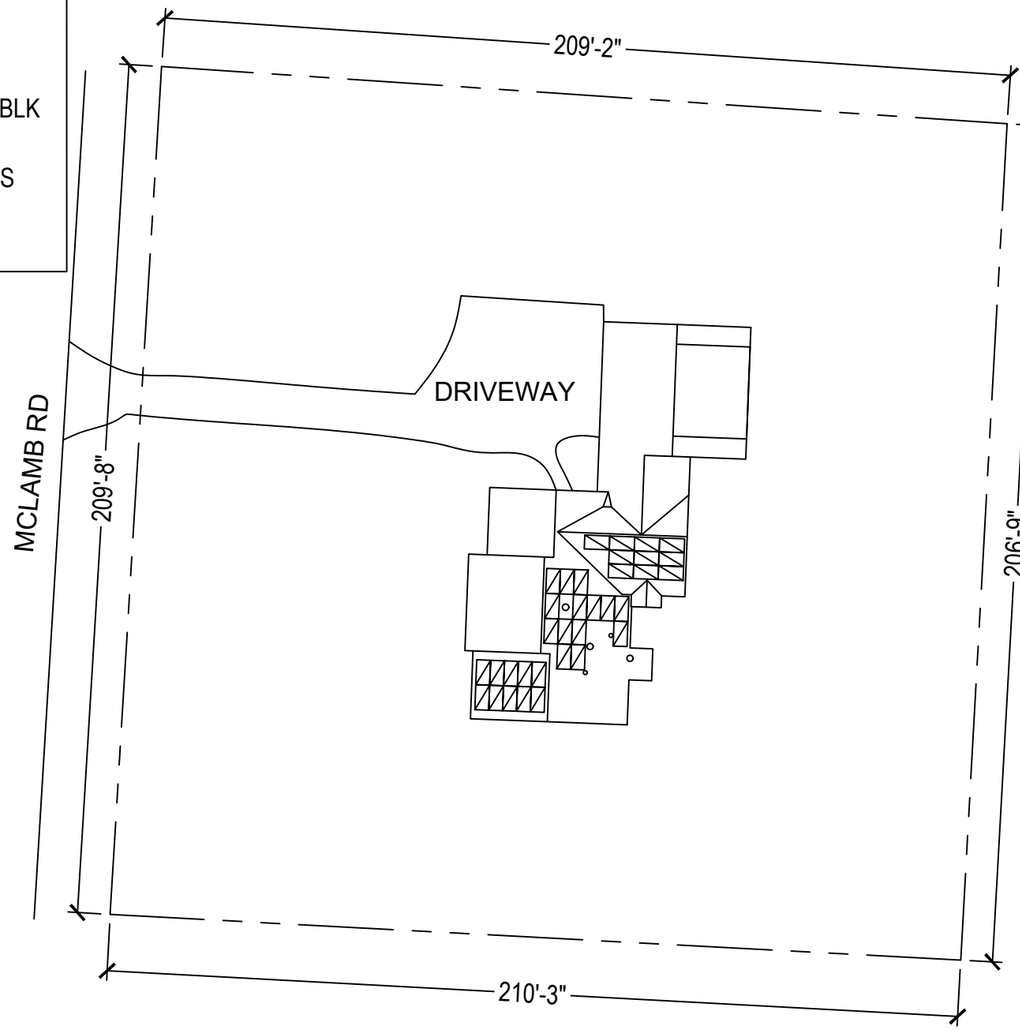
ASHRAE EXTREME LOW: -10°C
ASHRAE 2% HIGH: 36°C
CLIMATE DATA SOURCE: POPE AFB
WIND SPEED: 120 MPH
RISK CATEGORY: II
WIND EXPOSURE CATEGORY: B
GROUND SNOW LOAD: 15 PSF

INTERCONNECTION DETAILS

POINT OF INTERCONNECTION: NEW LINE SIDE TAP
CONNECTION PER NEC 705.12 (A)

UTILITY SERVICE: 120/240V

LOCATION: LINE SIDE TAP WITHIN SERVICE DISCONNECT



A PLOT PLAN
NOT TO SCALE

PROJECT DETAILS

PROPERTY OWNER: SAMANTHA & JAMES GRIMES
PROPERTY ADDRESS: 213 MCLAMB RD
COATS, NC 27521

BUILDING INFORMATION: TWO STORY HOUSE
OCCUPANCY: RESIDENTIAL GROUP R-3

ELECTRICAL INFORMATION
UTILITY COMPANY: DUKE ENERGY
MAIN SERVICE AMPERAGE: 200A

AHJ: HARNETT COUNTY

APPLICABLE CODES:

ELECTRICAL	2017 NC ELECTRICAL CODE (2017 NEC)
FIRE	2018 NC FIRE CODE (2018 IFC)
BUILDING	2018 NC BUILDING CODE (2018 IBC)
PLUMBING	2018 NC PLUMBING CODE (2018 IPC)
DWELLING	2018 NC RESIDENTIAL CODE (2018 IRC)

CONTRACTOR INFORMATION

COMPANY: EMPWR SOLAR

ADDRESS: 1007 JOHNNIE DODDS BLVD
SUITE 111
MT. PLEASANT, SC 29464

PHONE NUMBER: (866) 337-1104
www.empwrsolar.com/

B AERIAL VIEW
NOT TO SCALE

213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM
SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521
13.6KW DC 11.4KW AC

NORTH CAROLINA PROFESSIONAL SEAL 027575 ENGINEER PETER J HAZEL
3/30/2022

PROJECT SUMMARY

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-1

ROOF PROPERTIES

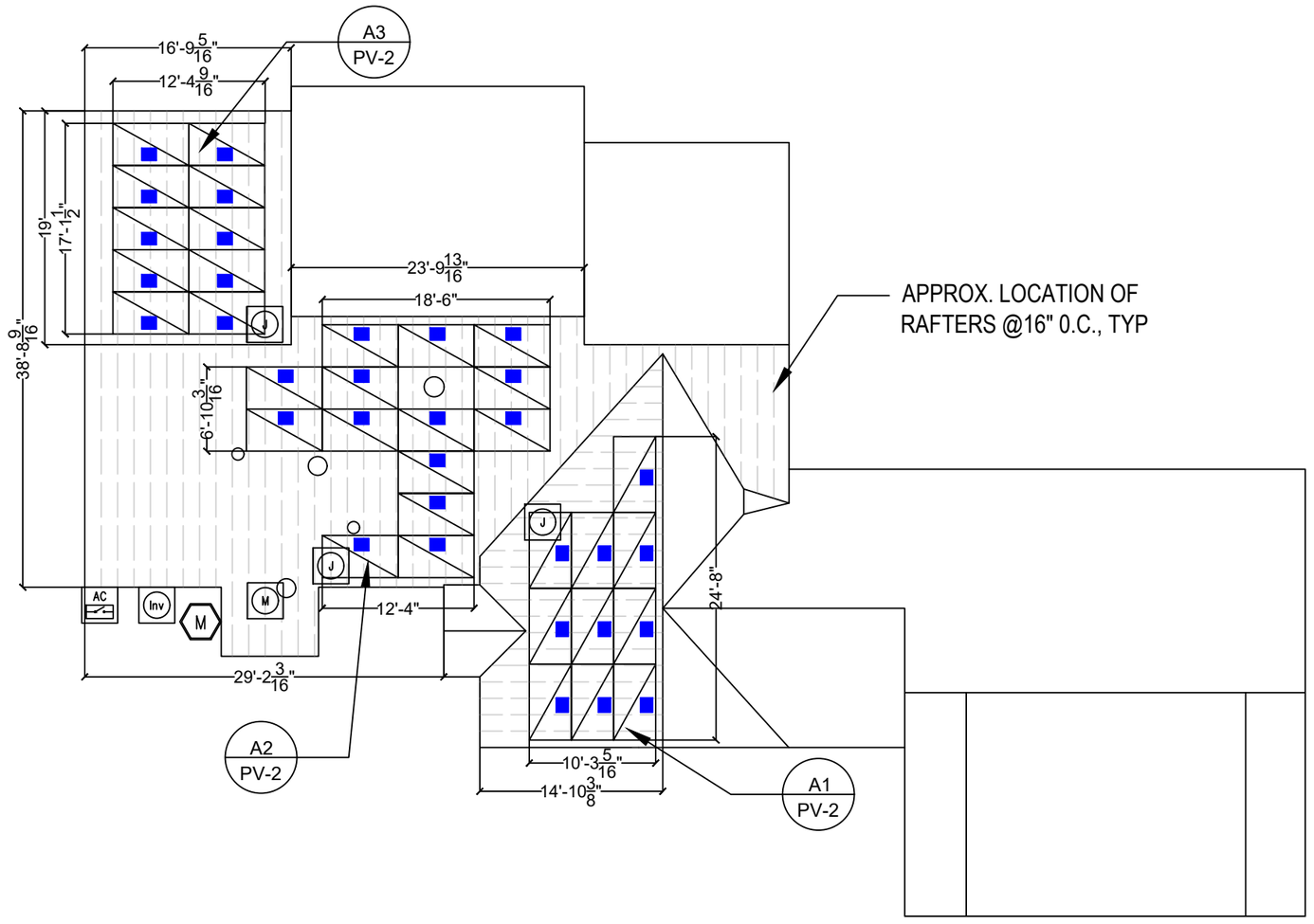
ROOF MATERIAL	COMP SHINGLE
SLOPE	30, 37°
MEAN ROOF HEIGHT	30FT
DECK SHEATHING	15 / 32" OSB
CONSTRUCTION	2X8@16"O.C.

ARRAY AREA

ARRAY	# OF MODULES	ARRAY AREA (SQFT)	ROOF TILT	AZIMUTH
A1	10	214.4000	37°	182°
A2	14	301.4000	30°	92°
A3	10	216.3000	30°	272°

GENERAL NOTES

1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MINIMUM WORKING CLEARANCES PER NEC 110.26.
2	CONTRACTORS SHALL USE ONLY COMPONENTS LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY FOR THE INTENDED USE.
3	CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL EQUIPMENT, CABLES, ADDITIONAL CONDUITS, RACEWAYS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETE AND OPERATIONAL PV SYSTEM.
4	WHERE DC PV SOURCE OR DC PV OUTPUT CIRCUITS ARE RUN INSIDE THE BUILDING, THEY SHALL BE CONTAINED IN METAL RACEWAYS, TYPE MC METAL-CLAD CABLE, OR METAL ENCLOSURES FROM THE POINT OF PENETRATION INTO THE BUILDING TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS, PER NEC 690.31 (G).
5	RAFTER LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING"



ARRAY PLAN

NTS

SITE PLAN LEGEND

- M — SERVICE ENTRANCE AND 200A MAIN PANEL
- Inv — INVERTER
- LC — PV COMBINER LOAD CENTER
- M — METER
- J — JUNCTION BOX
- P — PULLBOX
- DC — DC DISCONNECT
- AC — AC DISCONNECT
- S — FACILITY SUBPANEL
- B — BATTERY
- ESS — ENERGY STORAGE SYSTEM
- ATS — AUTO TRANSFER SWITCH
- RAFTERS
- CONDUIT

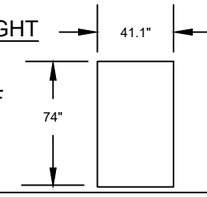
N E S W

MODULE TYPE, DIMENSIONS & WEIGHT

WEIGHT: 48.5 LBS/22 KG

DIMENSIONS: 74 IN X 41.1 IN=21.1 SF

UNIT WEIGHT OF ARRAY: 3.0 PSF



213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

NORTH CAROLINA PROFESSIONAL SEAL 027575 ENGINEER PETER J HAZEL

3/30/2022

ROOF PLAN

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-2

GENERAL ELECTRICAL NOTES

1	UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2	MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
3	CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICL 310.10 (D)
4	CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

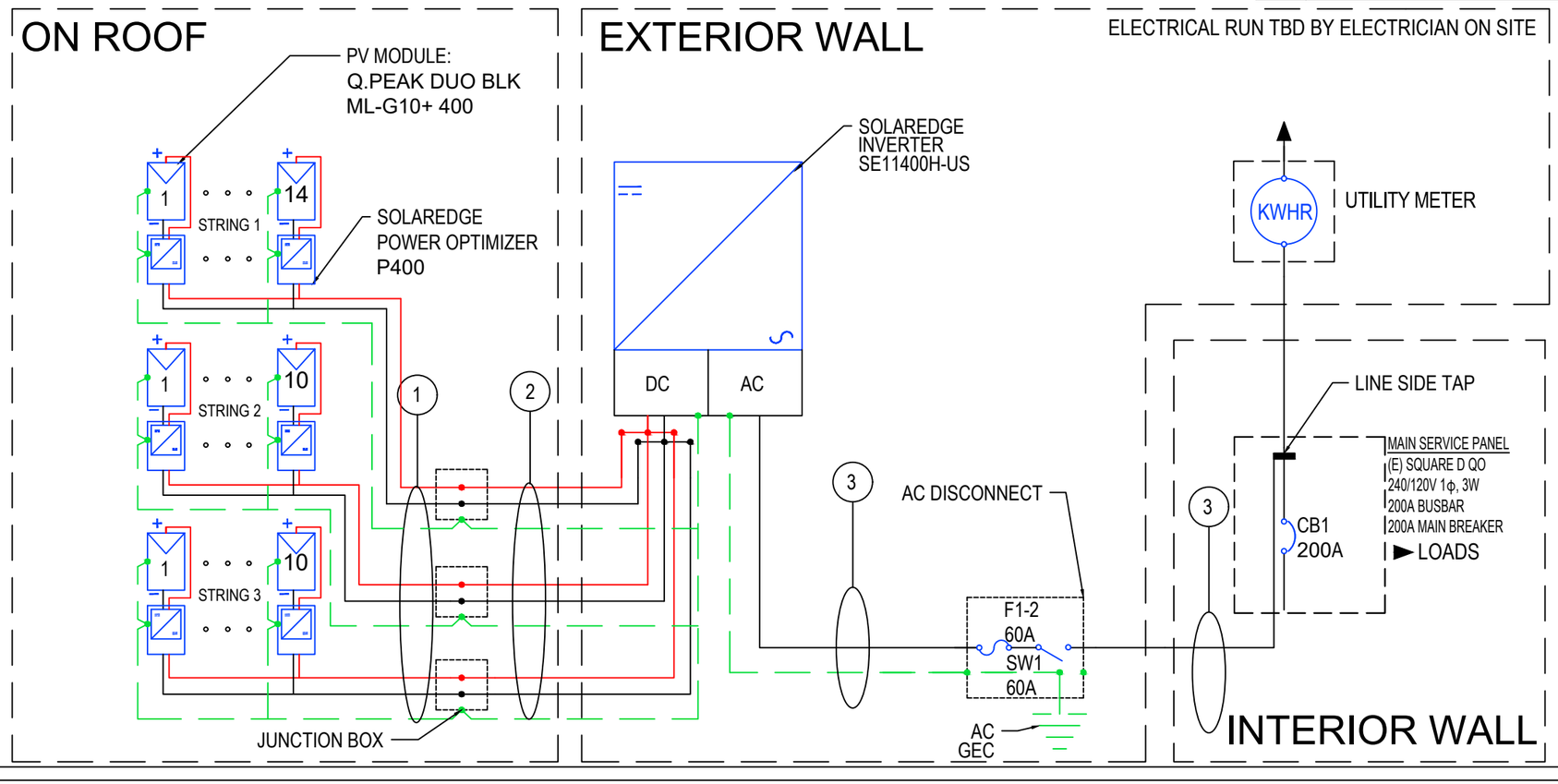
SERVICE INFORMATION
UTILITY COMPANY: DUKE ENERGY
MAIN SERVICE VOLTAGE: 240V
MSP MANUFACTURER: SQUARE D QO
MAIN SERVICE PANEL: 200A
MAIN CIRCUIT RATING: 200A

NOTES

1	MATING CONNECTORS SHALL COMPLY WITH NEC 690.33.
2	SOLAR EDGE SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B).
3	THE SPECIFIED OPTIMIZER CAN BE SUBSTITUTED WITH A P370 OR P505. THESE OPTIMIZERS HAVE AN INPUT VOLTAGE WINDOW WIDE ENOUGH TO ACCOMMODATE THE OUTPUT VOLTAGE RANGE OF THE MODULE AT THE DESIGN TEMPERATURES, HAVE A MAX INPUT CURRENT RATING THAT IS ABOVE THE MAX OUTPUT CURRENT OF THE MODULE, AND A MAX POWER INPUT THAT IS ABOVE THE RATED POWER OUTPUT OF THE MODULE.
4	D PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR- GRAY COLORED
5	ALL METAL ENCLOSURES, RACEWAYS, CABLES AND EXPOSED NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT SHALL BE GROUNDED TO EARTH AS REQUIRED BY NEC 250.4(A) AND PART III OF ARTICLE 250 AND EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45. THE GROUNDING ELECTRODE SYSTEM SHALL ADHERE TO NEC 690.47(A) AND NEC 250.169. THE DC GROUNDING ELECTRODE SHALL BE SIZED ACCORDING TO NEC 250.166 AND INSTALLED IN COMPLIANCE WITH NEC 250.64.
6	MAX DC VOLTAGE OF ARRAY FIXED BY THE INVERTER AT 400V REGARDLESS OF TEMPERATURE. THE MAX DC VOLTAGE OF THE MODULE AT -17°C IS 45.3V (-17°C - 25°C) X -0.11V/C + 40.66V = 45.3V).
7	POINT-OF-CONNECTION IS ON LINE SIDE OF SERVICE DISCONNECT, IN COMPLIANCE WITH NEC 705.12(A)
8	PV SYSTEM DISCONNECT SHALL BE A VISIBLE KNIFE-BLADE TYPE DISCONNECT THAT IS ACCESSIBLE AND LOCKABLE BY THE UTILITY IN ACCORDANCE WITH NEC 690.13(E). THE DISCONNECT SHALL BE LOCATED WITHIN 10 FT OF UTILITY METER AND INSTALLED IN COMPLIANCE WITH NEC 705.20 AND GROUPED AS REQUIRED BY NEC 230.72.

GROUNDING NOTES

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



213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

SINGLE LINE DIAGRAM

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-3

MODULES

REF.	QTY	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-34	34	HANWHA Q.PEAK DUO BLK ML-G10+ 400	400W	377W	11.14A	10.77A	45.30V	37.13V	-0.27%/C°	20A

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1	1	SOLAR EDGE SE11400H-US	240V	NOT SOLIDLY GROUNDED	11400W	47.5A	30.5A	480V	99%

OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-34	34	SOLAR EDGE P400	400W	15A	10.1A	48V	98.8%

DISCONNECTS

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

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	200A	240VAC
F1-2	1	60A	240VAC

EQUIPMENT SCHEDULE

DC WIRE AND CONDUIT SCHEDULE / **DC AMPACITY CALCULATIONS**

ID	CIRCUIT DESCRIPTION	ORIGIN	DESINATION	CONDUIT TYPE	CONDUIT SIZE	CONDUIT FILL %	CONDUCTOR QTY PER CONDUIT	CONDUCTOR SIZE	CONDUCTOR MATERIAL	CONDUCTOR INSULATION	EGC	AMBIENT TEMP.	AMBIENT TEMP. CORRECTION FACTOR	# CONDUIT ADJUSTMENT FACTOR	MAX. CIRCUIT CURRENT (AMPS)	MIN. CONDUCTOR AMPACITY	DERATED AMPACITY	CONDUCTOR AMAPCITY	OCPD RATING	VOLTAGE DROP PERCENTAGE
1	ARRAY WIRING	OPT	JBOX	FREE AIR	N/A	N/A	3	#10	CU	PV WIRE	#6, BARE, CU	34	0.94	1.00	15	18.75	32.9	35	20	0.39%
2	JBOX TO INVERTER	JBOX	INV	LFMC	3/4"	31.11%	5	#10	CU	THWN-2	#12	34	0.94	0.80	15	18.75	26.32	35	20	0.26%

AC WIRE AND CONDUIT SCHEDULE / **AC AMPACITY CALCULATIONS**

ID	CIRCUIT DESCRIPTION	ORIGIN	DESINATION	CONDUIT TYPE	CONDUIT SIZE	CONDUIT FILL %	CONDUCTOR QTY PER CONDUIT	CONDUCTOR SIZE	CONDUCTOR MATERIAL	CONDUCTOR INSULATION	EGC	AMBIENT TEMP.	AMBIENT TEMP. CORRECTION FACTOR	# CONDUIT ADJUSTMENT FACTOR	MAX. CIRCUIT CURRENT (AMPS)	MIN. CONDUCTOR AMPACITY	DERATED AMPACITY	CONDUCTOR AMAPCITY	OCPD RATING	VOLTAGE DROP PERCENTAGE
3	INVERTER TO ACD TO MSP	INV	MSP	LFMC	1"	26.54%	2	#6	CU	THWN-2	#10	34	0.94	1.00	47.50	59.38	61.1	65	60	0.19

WIRE AND CONDUIT CALCULATIONS

213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

WIRING CALCULATIONS

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-4

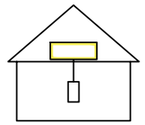
LABELING NOTES

1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2017 NEC AND 2018 IFC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKINGS SHALL COMPLY WITH ANSI Z5354, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAT THE BODY TEXT, IN ACCORDANCE WITH NEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH NEC 690.56(B).
4	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3 / 8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3 /16" IN BLACK ON WHITE BACKGROUND.
5	LABEL(S) WITH MARKING, "WARNING PHOTOVOLTAIC POWER SOURCE," SHALL BE LOCATED AT EVERY 10 FEET OF EACH DC RACEWAY AND WITHIN ONE FOOT OF EVERY TURN OR BEND AND WITHIN ONE FOOT ABOVE AND BELOW ALL PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS AND BARRIERS. THE LABEL SHALL HAVE3 / 8" TALL LETTERS AND BE REFLECTIVE WITH WHITE TEXT ON A RED BACKGROUND.

(1) SEE NOTE NO. 4 (MSP)

PHOTOVOLTAIC 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.



NEC 690.56(C)(1) AND IFC 1204.5.1

(2) SEE NOTE NO. 5 (DC RACEWAYS)

WARNING
PHOTOVOLTAIC POWER SOURCE

NEC 690.31(G)(3)

(3) EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (JB1, SW1, I1)

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

NEC 690.13(B)

(4) DC DISCONNECT (I1)

DIRECT-CURRENT PV POWER SOURCE
MAXIMUM VOLTAGE: 380V
MAX CIRCUIT-CURRENT: 37.5A
DC-TO-DC CONVERTER RATED CURRENT: 15.0A

NEC 690.53

(5) AC DISCONNECT (SW1, CB1 IN MSP)

MAXIMUM AC OPERATING CURRENT: 47.5A
MAXIMUM AC OPERATING VOLTAGE: 240V

NEC 690.54

(6) AC SOLAR DISCONNECT (SW1, CB1 IN MSP)

PV SYSTEM DISCONNECT

NEC 690.13(B)

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

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

NEC 705.12(B)(3)

(8) SOLAR BREAKER (MSP)

! WARNING !
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

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

DC RACEWAYS
2

JB1 - TRANSITION BOX (SOLADECK 0783-3R-4ER6)
3

SW1 - DISCONNECT (EATON DG222NRB)
3 5 6

I1 - INVERTER (SOLAR EDGE SE11400H-US)
3 4

MSP - MAIN SERVICE PANEL (SQUARE D QO)
1 5 6 7 8

213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

SAFETY LABELS

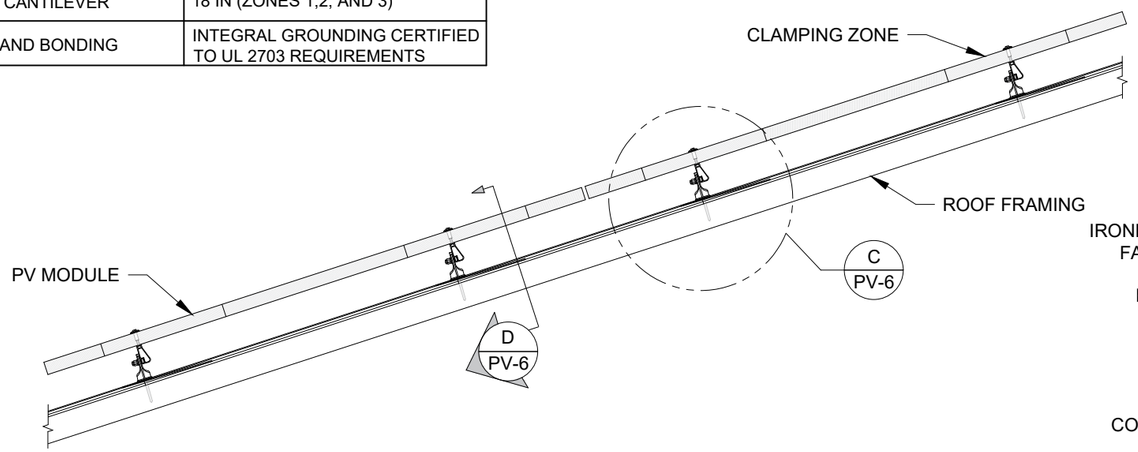
DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-5

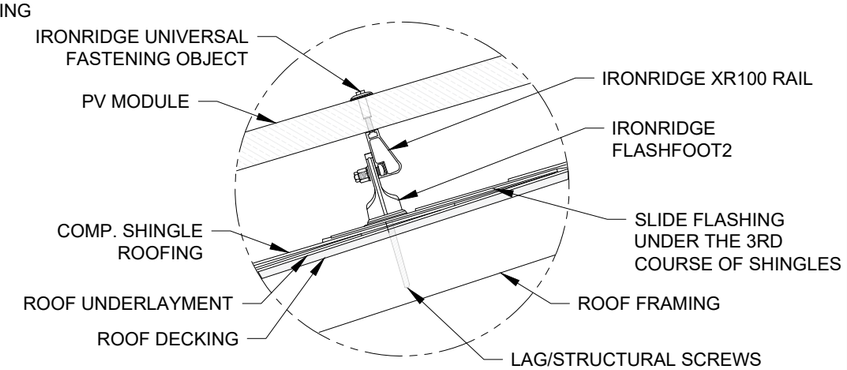
MOUNTING SYSTEM PROPERTIES	
MAX. MOUNT SPACING	72 IN (ZONES 1,2, AND 3)
MAX. ALLOW. CANTILEVER	18 IN (ZONES 1,2, AND 3)
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

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

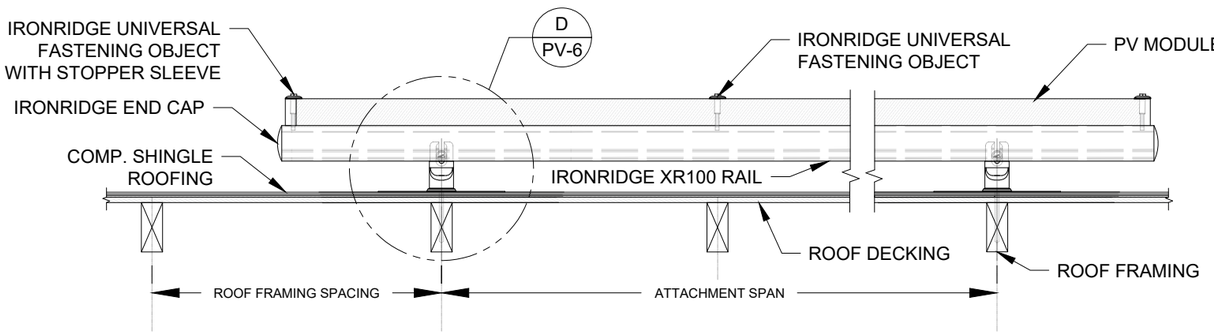


LAGSCREW DIAMETER: 5/16"
MINIMUM EMBEDMENT: 2-1/2"

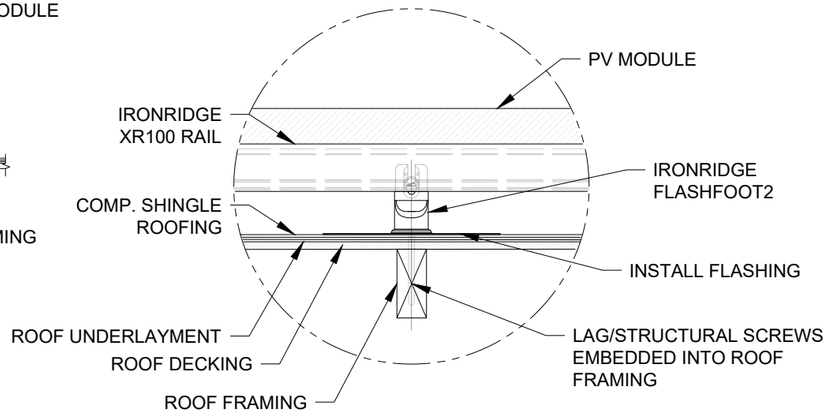
A PV-6 RACKING ELEVATION (TRANSVERSE VIEW)
SCALE: NTS



C PV-6 ATTACHMENT DETAIL (TRANSVERSE VIEW)
SCALE: NTS



B PV-6 RACKING ELEVATION (LONGITUDINAL VIEW)
SCALE: NTS



D PV-6 ATTACHMENT DETAIL (LONGITUDINAL VIEW)
SCALE: NTS

213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

NORTH CAROLINA PROFESSIONAL SEAL 027575 ENGINEER PETER J HAZEL
3/30/2022

ATTACHMENT DETAILS

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-6

Project Details

Name	213 McLamb Road	**Date**	03/30/2022
Location	213 McLamb Road, Coats, NC 27521	**Total modules**	24
Module	Hanwha Q.CELLS: Q.PEAK DUO BLK ML-G10+ 400 (32mm)	**Total watts**	9,600
Dimensions	Dimensions: 73.98" x 41.14" x 1.26" (1879.0mm x 1045.0mm x 32.0mm)	**Attachments**	72
ASCE	7-16	**Rails per row**	2

System Weight

Total system weight	1,547.5 lbs
Weight/attachment	21.5 lbs
Racking weight	383.5 lbs
Distributed weight	3.0 psf

Load Assumptions

Wind exposure	B
Wind speed	119 mph
Ground snow load	15 psf
Attachment spacing landscape	6.0'
Site Elevation	269.0 ft
S_{DS}	0.138

Roof Information

Roof Material Family	Comp Shingle	**Roof material**	Comp Shingle
Building height	30 ft	**Roof attachment**	Flashfoot2
Roof slope	30 °	**Attachment hardware**	Square
Risk category	II		
Roof shape	Gable		

Span Details XR100 - Landscape

Zone	Module Position	Max span	Max cantilever
Zone 1/2e/2r	Normal	9' 3"	3'
Zone 2n/3r	Normal	9' 3"	3'
Zone 3e	Normal	9' 3"	3'

Reaction Forces XR100 - Landscape

Zone	Module Position	Down (lbs)	Uplift (lbs)	Lateral (lbs)
Zone 1/2e/2r	Normal	156	164	57
Zone 2n/3r	Normal	156	184	57
Zone 3e	Normal	156	234	57

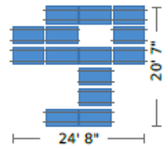
Bill of Materials

Part	Spares	Total Qty
Rails & Splices		
XR-100-168A XR100, Rail 168" (14 Feet) Clear	0	28
XR100-BOSS-01-M1 Bonded Splice, XR100	0	4
Clamps & Grounding		
UFO-CL-01-A1 Universal Module Clamp, Clear	0	72
UFO-STP-32MM-M1 Stopper Sleeve, 32MM, Mill	0	48
XR-LUG-03-A1 Grounding Lug, Low Profile	0	12
Attachments		
FF2-01-M2 FlashFoot2, Mill	0	72
BHW-SQ-02-A1 Square-Bolt Bonding Hardware	0	72

Roof Section 1

Details		Weights
Panels: 14	Provided rail: 252' [18 x 14']	Total weight: 919.8 lbs
Rail orientation: East-West	Attachments: 42	Weight/attachment: 21.9 lbs
Panel orientation: Landscape	Splices: 4	Total Area: 301.4 sq ft
Entry type: Graphical	Clamps: 42	Distributed weight: 3.1 psf

Diagram



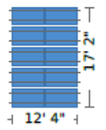
Segments

Identifier	Columns	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps
A	3	18' 9"	18' 9"	4"	**56' [4 x 14']**	**8**	**2**	**8**
B	2	12' 6"	12' 6"	3"	28' [2 x 14']	6	0	6
		Row segment totals (x 2) →		**56' [4 x 14']**	**12**	**0**	**12**	
C	1	6' 4"	6' 4"	2"	28' [2 x 14']	4	0	4
		Row segment totals (x 3) →		**84' [6 x 14']**	**12**	**0**	**12**	
D	4	24' 11"	24' 11"	6"	**56' [4 x 14']**	**10**	**2**	**10**

Roof Section 2

Details		Weights
Panels: 10	Provided rail: 140' [10 x 14']	Total weight: 627.7 lbs
Rail orientation: East-West	Attachments: 30	Weight/attachment: 20.9 lbs
Panel orientation: Landscape	Splices: 0	Total Area: 216.3 sq ft
Entry type: Graphical	Clamps: 30	Distributed weight: 2.9 psf

Diagram



Segments

Identifier	Columns	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps
A	2	12' 6"	12' 6"	3"	28' [2 x 14']	6	0	6
		Row segment totals (x 5) →		**140' [10 x 14']**	**30**	**0**	**30**	

213-2022

EMPWR SOLAR

GRID-TIED SOLAR POWER SYSTEM

SAMANTHA & JAMES GRIMES
213 MCLAMB RD
COATS, NC 27521

13.6KW DC 11.4KW AC

NORTH CAROLINA PROFESSIONAL SEAL 027575 ENGINEER PETER J HAZEL

3/30/2022

IRONRIDGE REPORTS

DOC ID
DATE: 3/30/2022
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

PV-7

Project Details

Name	213 McLamb Road	**Date**	03/30/2022
Location	213 McLamb Road, Coats, NC 27521	**Total modules**	10
Module	Hanwha Q.Cells: Q.PEAK DUO BLK ML-G10+ 400 (32mm)	**Total watts**	4,000
Dimensions	Dimensions: 73.98" x 41.14" x 1.26" (1879.0mm x 1045.0mm x 32.0mm)	**Attachments**	26
ASCE	7-16	**Rails per row**	2

System Weight

Total system weight	643.4 lbs
Weight/attachment	24.7 lbs
Racking weight	158.4 lbs
Distributed weight	3.0 psf

Load Assumptions

Wind exposure	B
Wind speed	119 mph
Ground snow load	15 psf
Attachment spacing landscape	6.0'
Site Elevation	269.0 ft
S_{DS}	0.138

Roof Information

Roof Material Family	Comp Shingle	**Roof material**	Comp Shingle
Building height	30 ft	**Roof attachment**	Flashfoot2
Roof slope	37 °	**Attachment hardware**	Square
Risk category	II		
Roof shape	Gable		

Span Details XR100 - Landscape

Zone	Module Position	Max span	Max cantilever
Zone 1/2e/2r	Normal	9' 3"	3'
Zone 2n/3r	Normal	9' 3"	3'
Zone 3e	Normal	9' 3"	3'

Reaction Forces XR100 - Landscape

Zone	Module Position	Down (lbs)	Uplift (lbs)	Lateral (lbs)
Zone 1/2e/2r	Normal	138	165	57
Zone 2n/3r	Normal	138	186	57
Zone 3e	Normal	138	235	57

Roof Section 1

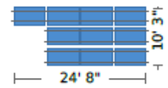
Details

Panels: 10 | Provided rail: 168' [12 x 14']
Rail orientation: East-West | Attachments: 26
Panel orientation: Landscape | Splices: 6
Entry type: Graphical | Clamps: 26

Weights

Total weight: 643.4 lbs
Weight/attachment: 24.7 lbs
Total Area: 214.4 sq ft
Distributed weight: 3.0 psf

Diagram



Segments

Identifier	Columns	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps
A	4	24' 11"	24' 11"	6"	**56' [4 x 14']**	**10**	**2**	**10**
B	3	18' 9"	18' 9"	4"	56' [4 x 14']	8	2	8
		Row segment totals (x 2) →		**112' [8 x 14']**	**16**	**4**	**16**	

Bill of Materials

Part	Spares	Total Qty
Rails & Splices		
XR-100-168A XR100, Rail 168" (14 Feet) Clear	0	12
XR100-BOSS-01-M1 Bonded Splice, XR100	0	6
Clamps & Grounding		
UFO-CL-01-A1 Universal Module Clamp, Clear	0	26
UFO-STP-32MM-M1 Stopper Sleeve, 32MM, Mill	0	12
XR-LUG-03-A1 Grounding Lug, Low Profile	0	3
Attachments		
FF2-01-M2 FlashFoot2, Mill	0	26
BHW-SQ-02-A1 Square-Bolt Bonding Hardware	0	26

213-2022

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REVISIONS

PV-7.1

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, 96 h)
[2] See data sheet on rear for further information.

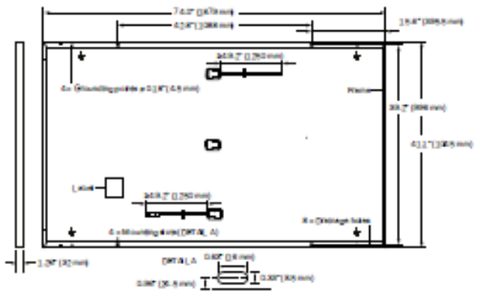
THE IDEAL SOLUTION FOR:

Rooftop arrays on residential buildings

Engineered in Germany

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

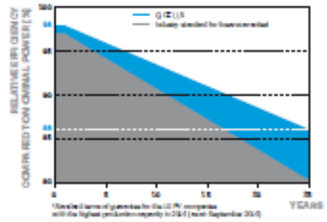


ELECTRICAL CHARACTERISTICS

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

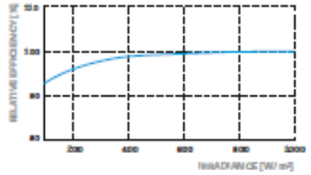
Q CELLS PERFORMANCE WARRANTY



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

Q CELLS

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

/ Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power[1]	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125[2]	83[2]	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1		14	Adc
Maximum DC Input Current	13.75			12.63		17.5	Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.8					98.6	%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60				85		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						
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage	1000						Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters						
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1			128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[3]						
Output Wire Type / Connector	Double Insulated; MC4						
Output Wire Length	0.95 / 3.0		1.2 / 3.9				m / ft
Input Wire Length	0.16 / 0.52						m / ft
Operating Temperature Range	-40 - +85 / -40 - +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

PV System Design Using a SolarEdge Inverter[4][5]		Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8		10	18	
	P405 / P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[6]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[7]	12750[8]	W
Parallel Strings of Different Lengths or Orientations		Yes				

[4] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string
[6] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
[7] For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
[8] For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

CE RoHS

INVERTERS

Single Phase Inverter with HD-Wave Technology

for North America

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

12-25 YEAR WARRANTY

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- 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)

/ Single Phase Inverter with HD-Wave Technology for North America

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

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
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
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
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional[3]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG					1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG					1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection							
Operating Temperature Range	-13 to +140 / -25 to +60[4] (-40˚F / -40˚C option)[5]							˚F / ˚C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

[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
[3] Revenue grade inverter P/N: SExxxxH-US000NNC2
[4] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
[5] -40 version P/N: SExxxxH-US000NNU4

RoHS

SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included

SolaDeck Model SD 0783

SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3” fixed Din Rail)
Model SD 0786 - (6” slotted Din Rail)

SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3” Fixed Din Rail fastened using Norlock System

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

Model SD 0786-41 6” Slotted Din Rail fastened using steel studs

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Cliare, WI 54703
For product information call 1(866) 367-7782

Powering Business Worldwide

pe.eaton.com

Eaton general duty cartridge fuse safety switch

DG222NRB

UPC:782113144221

Dimensions:

- **Height:** 14.38 IN
- **Length:** 14.8 IN
- **Width:** 9.7 IN

Weight:10 LB

Notes: Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase rating, UL listed.

Warranties:

- Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Specifications:

- **Type:** General duty, cartridge fused
- **Amperage Rating:** 60A
- **Enclosure:** NEMA 3R
- **Enclosure Material:** Painted galvanized steel
- **Fuse Class Provision:** Class H fuses
- **Fuse Configuration:** Fusible with neutral
- **Number Of Poles:** Two-pole
- **Number Of Wires:** Three-wire
- **Product Category:** General duty safety switch
- **Voltage Rating:** 240V

Supporting documents:

- Eatons Volume 2-Commercial Distribution
- Eaton Specification Sheet - DG222NRB

Certifications:

- UL Listed

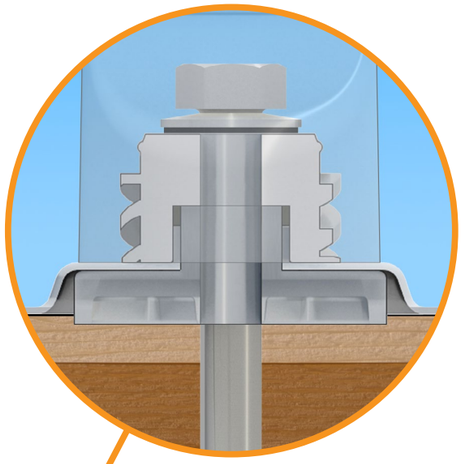
Product compliance: No Data

IRONRIDGE

FlashFoot2

The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

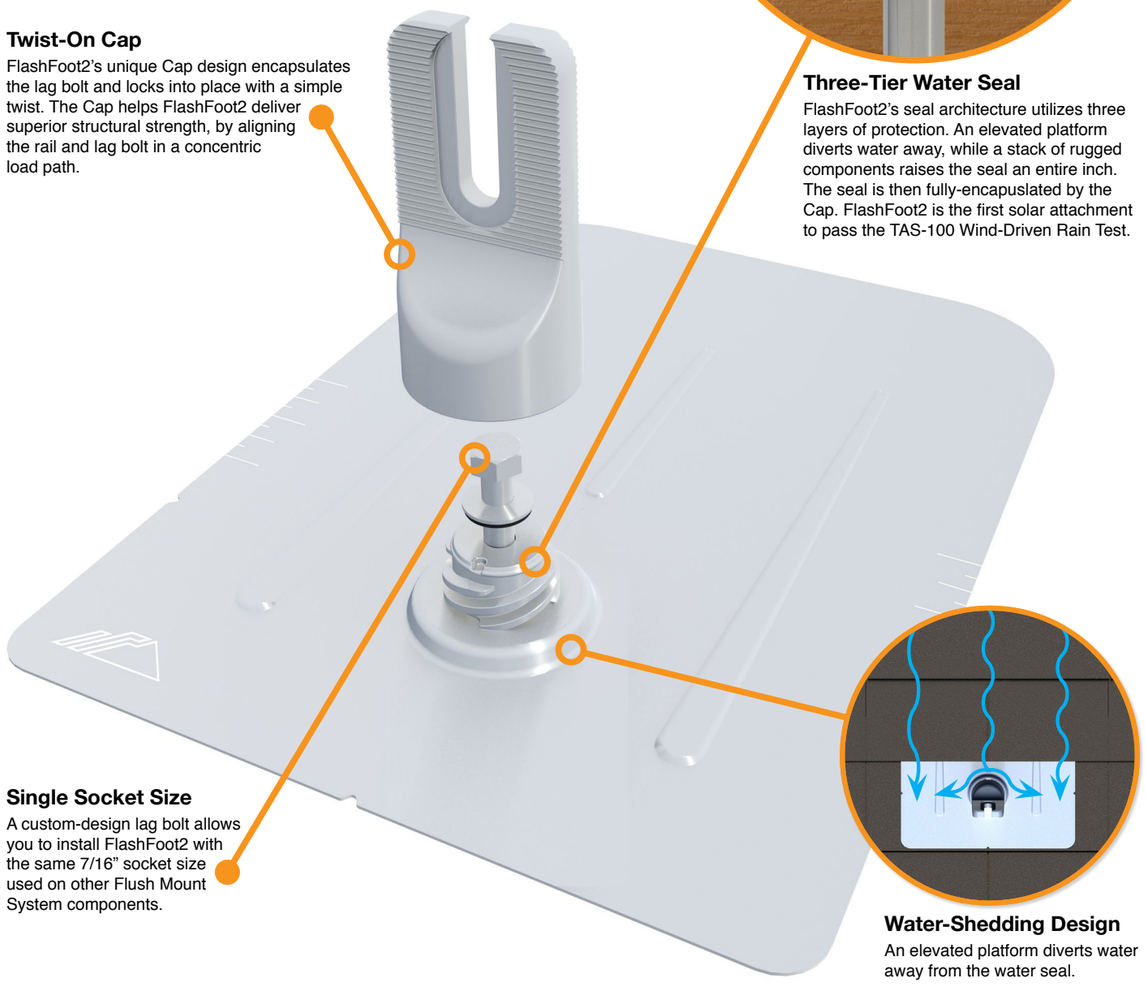


Three-Tier Water Seal

FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapuslated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

Twist-On Cap

FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.



Single Socket Size

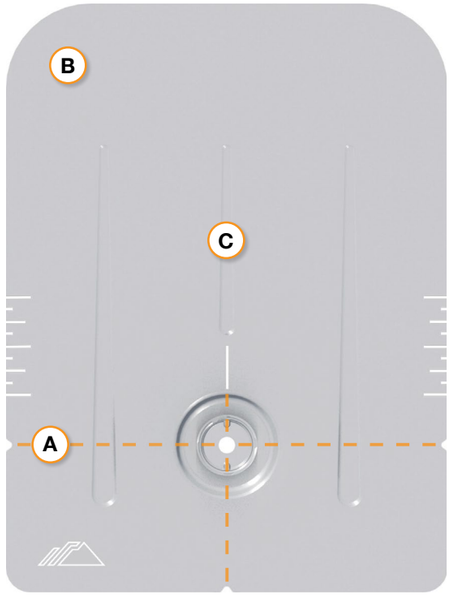
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design

An elevated platform diverts water away from the water seal.

Tech Brief

Installation Features



A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

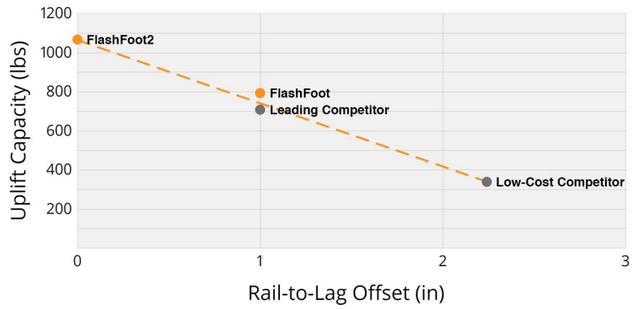
C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



Testing & Certification

Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

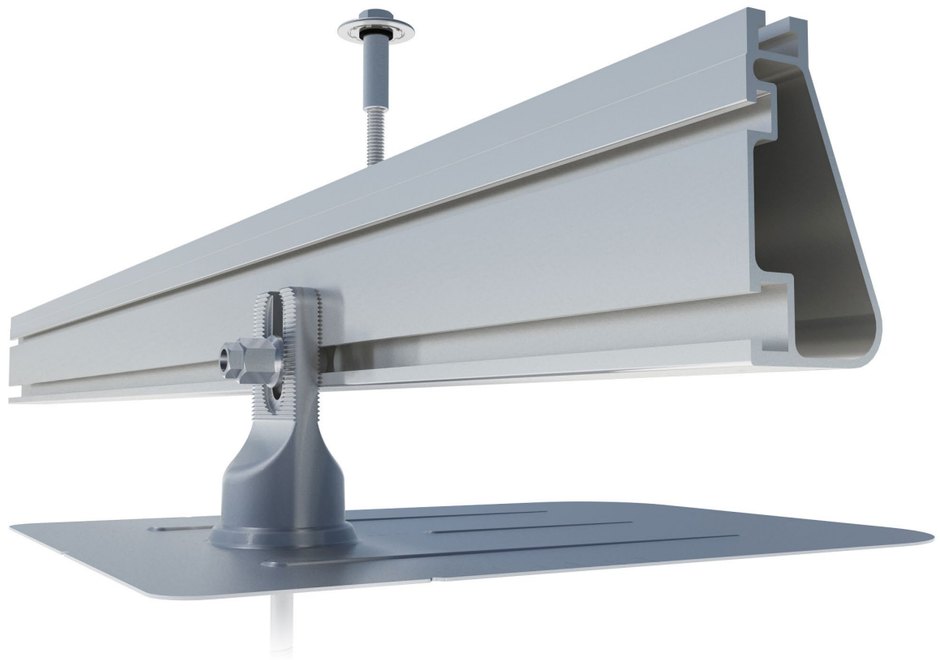
UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

Datasheet

IRONRIDGE

Flush Mount System



Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 25-year warranty.

Strength Tested
All components evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters available in most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof.

Design Assistant
Online software makes it simple to create, share, and price projects.

UL 2703 Listed System
Entire system and components meet newest effective UL 2703 standard.

25-Year Warranty
Products guaranteed to be free of impairing defects.

Datasheet

XR Rails

XR10 Rail

A low-profile mounting rail for regions with light snow.

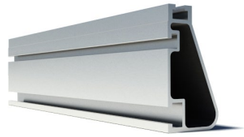
- 6' spanning capability
- Moderate load capability
- Clear and black finish

XR100 Rail

The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail



A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding

UFOs

Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves

Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- Sized to match modules
- Clear and black finish

CAMO

Bond modules to rails while staying completely hidden.

- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs

Connect arrays to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Attachments

FlashFoot2

Flash and mount XR Rails with superior waterproofing.

- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount

Flash and mount conduit, strut, or junction boxes.

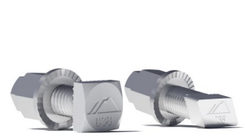
- Twist-on Cap eases install
- Wind-driven rain tested
- Secures ¾" or 1" conduit

Slotted L-Feet

Drop-in design for rapid rail attachment.

- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware



Bond and attach XR Rails to roof attachments.

- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to IronRidge.com/design

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Corey Geiger, COO, IronRidge Inc.
Date: August 31st, 2021

Re: Structural Certification and Span Tables for IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge's Flush Mount System. The contents of the letter shall be read in its entirety before being applied to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8" stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)
- 2015 International Building Code (IBC-2015)
- 2018 North Carolina State Building Code
- 2015 Aluminum Design Manual (ADM-2015)

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones 1, 2 & 3, and roof slopes from 8º to 45º. The span tables are applicable provided that the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener)

2. The underlying roof slope, measured between roof surface and horizontal plane, is 8º to 45º.

3. Each module shall be supported by 2 rails (2 rail system) or 3 rails (3 rail system). Spans are calculated based on 2 rail systems, and conservatively deemed acceptable for 3 rail systems.

4. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.

5. Module length and area shall not exceed the maximum values listed on the respective span tables.

6. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge's *Flush Mount installation manual* and other applicable standards for general roof construction practice.

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The parameters and adjustments allowed in the span tables are defined as the following:

1. The Flush Mount System is designed as a Risk Category II structure as defined by ASCE 7-10 Chart 1.5-1.

2. The wind speed selection shall conform to ASCE 7-10 Fig. 26.5-1A (Risk Category II wind) and any state & local county/city amendments to the IBC. No special wind topographic features are included in the span tables and the topographic coefficient (Kzt) is taken as 1.0.

3. The snow load used in the span tables is the *ground snow* and shall conform to ASCE 7-10 Fig. 7-1 and applicable state & local county/city amendments to the IBC. If the local jurisdiction specified snow load is in the format of a flat roof snow load, it shall first be converted to a ground snow following the local building code/amendment before the application of the attached span tables. No special snow conditions are considered including unbalanced, drifting, sliding, retention, or ponding snow. The span tables do not include buildings which are intentionally kept below freezing, kept just above freezing, or unheated.

4. The span tables reflect the ASCE 7 prescribed earthquake loads with the maximum magnitudes being:

    1) For ground snow no greater than 42psf: $S_s \leq 2.0g$ for Site Class A, B, C, or D.
    2) For ground snow greater than 65psf: $S_s \leq 1.0g$ for Site Class A, B, C, or D.
    3) For ground snow between 42 and 65psf: $S_s \leq 1.5g$ for Site Class A, B, C, or D.

5. Roof zone size and definition conforms to ASCE 7-10 Fig. 30.4-2A to 30.4-2C.

6. Allowable span length in the charts may be multiplied by a factor of 1.08 if the rails are continuous over a minimum of three spans.

7. The maximum rail cantilever length, measured from the rail end to the nearest attachment point, shall be the lesser of the following two conditions: 40% of the allowable span provided for the respective load & configuration condition from the span tables, or 36”.

8. An array to roof clearance of 2” minimum must be provided.

9. No splices are allowed in the rail cantilever. For each XR splice type install per the following requirements:

    a) XR Bonded Splice cannot be installed in the center 1/3 of interior spans, or the outer 2/3 of end spans.
    b) BOSS Splice can be installed at any location within a span.

10. Shaded cells of the span tables indicate conditions in which UFO Mid Clamp connection capacity is exceeded. If such conditions are encountered contact support@ironridge.com.

11. When a roof attachment listed in IronRidge’s Flush Mount *installation manual* is considered, the span values provided in this letter can be adjusted using IronRidge’s online Design Assistant by checking the capacity of the selected roof attachment against the reaction forces provided in Design Assistant.

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12. Systems using CAMO module clamps shall be installed with the following guidance:

    1) For single module installations (“orphan modules”) using modules with a length greater than 67.5”, CAMO clamps shall not be installed in regions that experience ground snow loads of 70psf and greater: such scenarios are shown by asterisks in the applicable span table.

    2) CAMO will function within a module’s design load ratings. Be sure the specific module being used with CAMO meets the dimensional requirements shown in the figure below and that the module selected is suitable for the environmental conditions of a particular project.

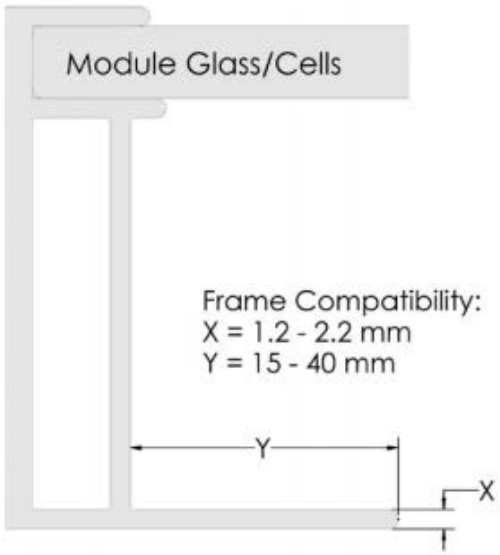

Figure 1: CAMO Module Frame Dimensional Requirements

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The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration.

Sincerely,

2021.08.31
18:04:27
-07'00'

Gang Xuan, PE
Senior Structural Engineer