

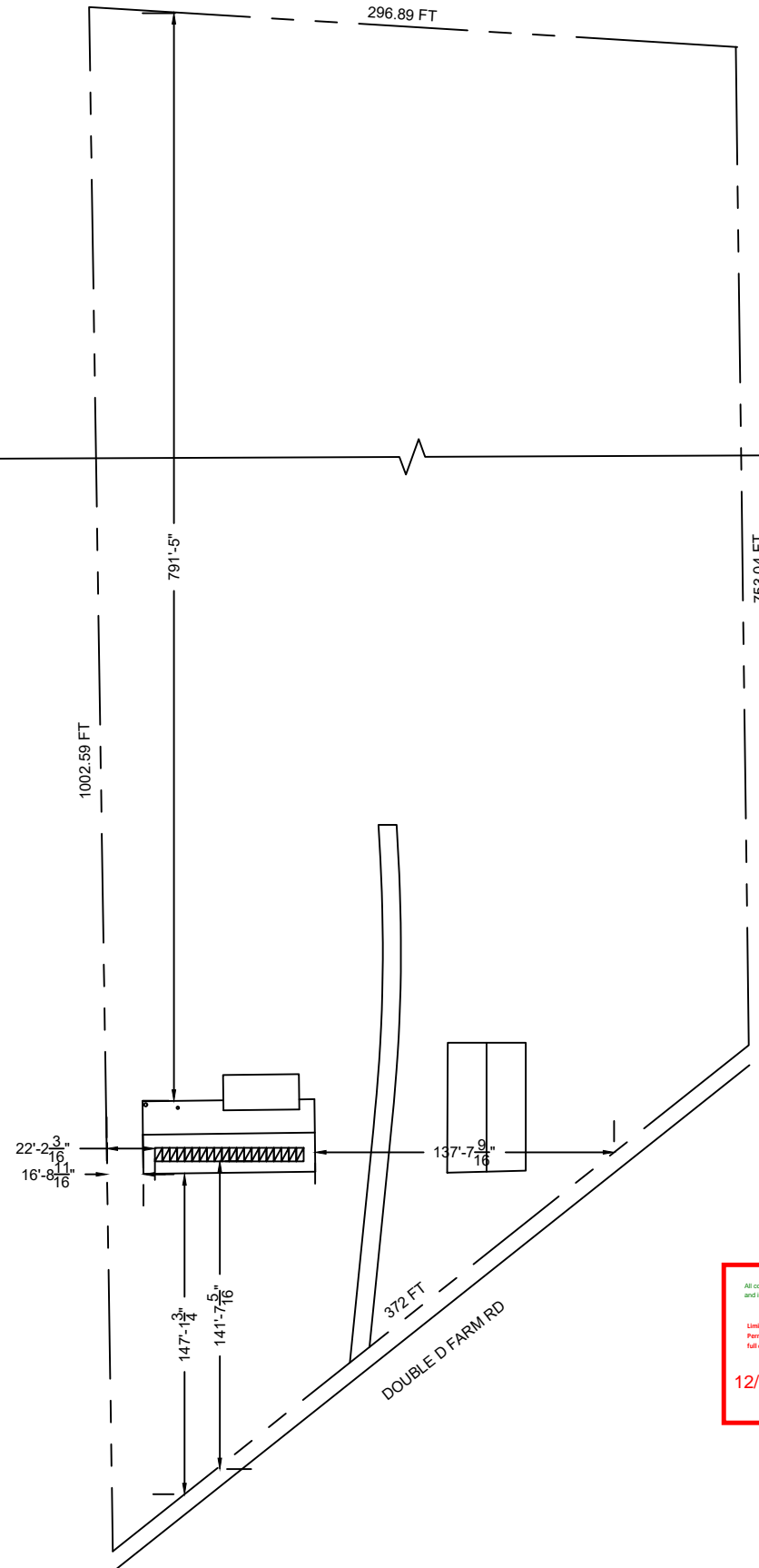
## SCOPE OF WORK

NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO BATTERY STORAGE

SYSTEM SIZE: DC STC: 8.00KW  
AC RATING OF SYSTEM: 7.60KW

MODULES: (20) HANWHA Q.PEAK DUO  
BLK ML-G10+ 400  
INVERTER: (1) SOLAREEDGE SE7600H-US  
OPTIMIZER:(20) SOLAREEDGE POWER  
OPTIMIZER P400

ARRAY WIRING: 2 STRINGS OF 10



A PLOT PLAN  
PV-1

## PROJECT DETAILS

109-2021

PROPERTY OWNER: DIANE FORSYTH  
PROPERTY ADDRESS: 109 DOUBLE D FARM RD

BUILDING INFORMATION: 1 STORY HOUSE  
OCCUPANCY: RESIDENTIAL GROUP R-3  
ROOF TYPE: TRAPEZOIDAL METAL  
9 INCH METAL SPACING  
ROOF RAFTER: 2X6 @ 24" O.C.  
ELECTRICAL INFORMATION  
UTILITY COMPANY: DUKE PROGRESS  
MAIN SERVICE AMPERAGE: 200A

AHJ: HARNETT COUNTY

CODE SUMMARY  
ELECTRICAL CODE: 2017 NEC (NFPA 70)  
FIRE CODE: 2018 IFC  
OTHER BUILDING CODES:  
2018 NC BUILDING CODE  
2018 NC RESIDENTIAL CODE  
2018 NC PLUMBING CODE  
2018 NC MECHANICAL CODE

## CONTRACTOR INFORMATION

COMPANY: EMPWR SOLAR

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

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



GRID-TIED SOLAR POWER SYSTEM

FORSYTH RESIDENCE  
109 DOUBLE D FARM RD  
ANGIER, NC 27501

## SITE DETAILS

ASHRAE EXTREME LOW: -10°C (95°F)  
ASHRAE 2% HIGH: 35°C (95°F)  
CLIMATE DATA SOURCE: FORT BRAGG  
WIND SPEED: 120 MPH  
RISK CATEGORY: II  
WIND EXPOSURE CATEGORY: B  
GROUND SNOW LOAD: 15 PSF

## SHEET INDEX

PV-1 COVER SHEET  
PV-2 ROOF PLAN  
PV-3 SINGLE LINE DIAGRAM  
PV-4 WIRING CALCULATIONS  
PV-5 SAFETY LABELS  
PV-6 ATTACHMENT DETAILS  
PV-7 IRONRIDGE REPORT  
MODULE DATASHEET  
OPTIMIZER DATASHEET  
ARRAY WIRING BOX DATASHEET  
DISCONNECT DATASHEET  
INVERTER DATASHEET  
MOUNTING SYSTEM DATASHEET  
MOUNTING SYSTEM ENGINEERING LETTER  
UL 2703 GROUND & BONDING CERTIFICATION  
ANCHOR DATASHEET

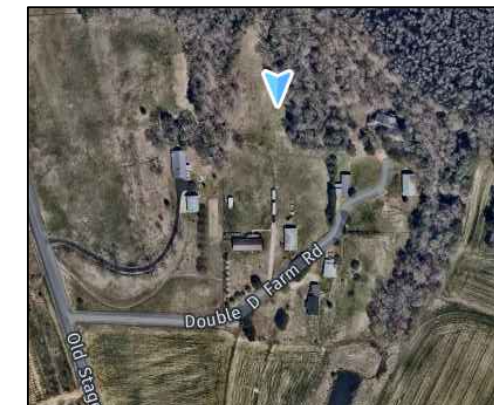
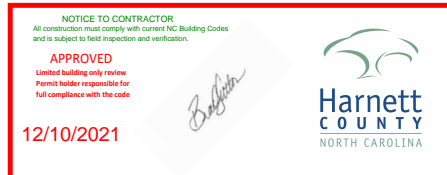
APPENDIX

## INTERCONNECTION DETAILS

POINT OF CONNECTION: NEW LOAD SIDE AC  
CONNECTION PER NEC 705.12 (B)(3)(2) AT MSP

UTILITY SERVICE: 120/240V φ

LOCATION: MAIN SERVICE PANEL W/ 200A  
BUSBAR 200A MCB



B LOCALE  
PV-1 NOT TO SCALE ↑



## PROJECT SUMMARY

DOC ID  
DATE: 11/12/21  
CREATED BY: M.M.  
REVIEWED BY:

## REVISIONS

PV-1

### 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).

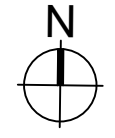
### ARRAY AREA

ARRAY	# OF MODULES	ARRAY AREA (SQFT)	ROOF TILT	AZIMUTH
1	20	427.4	30°	179°

### ROOF PROPERTIES

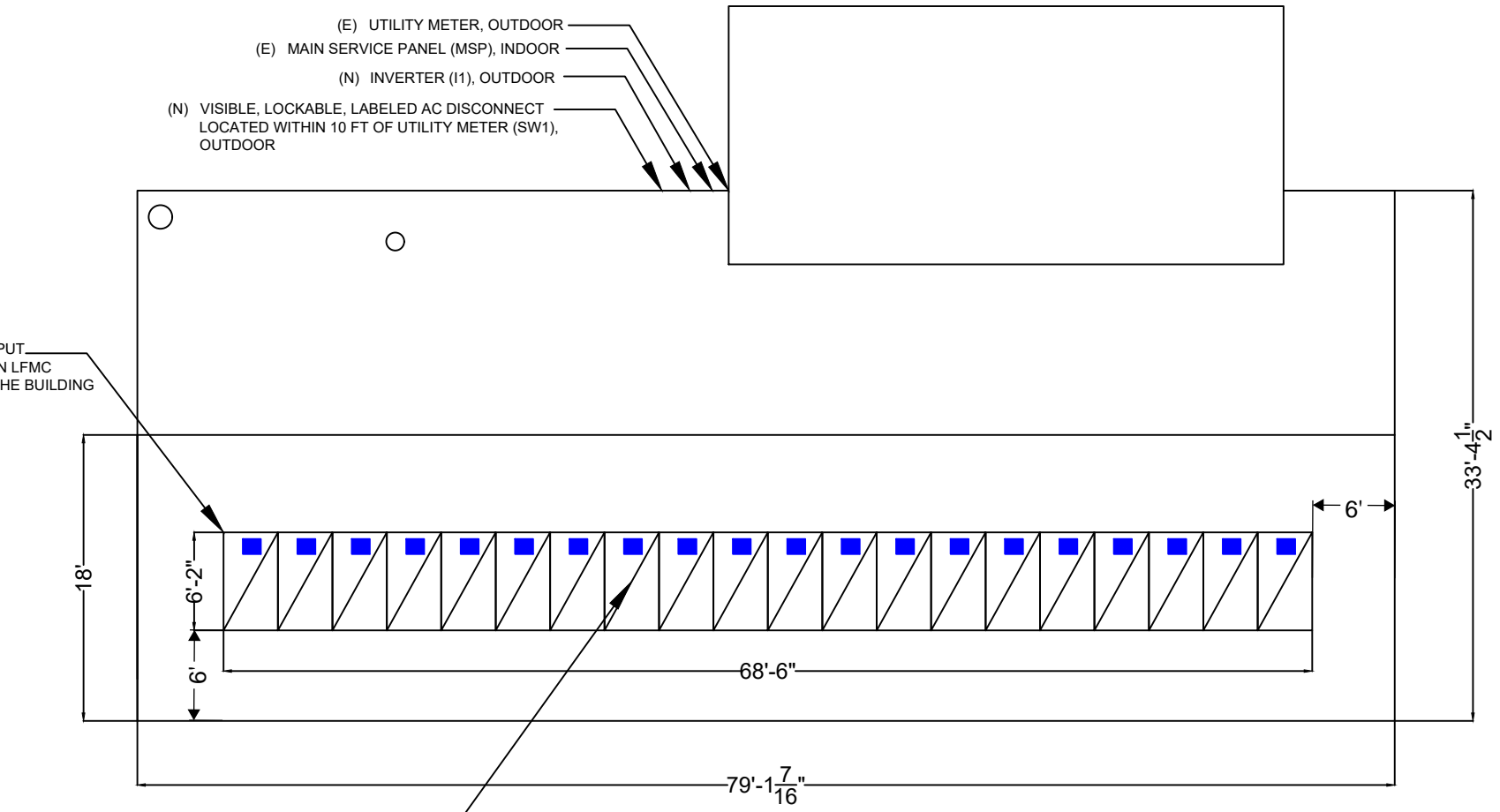
ROOF MATERIAL	TRAPEZOIDAL METAL
SLOPE	7/12
DECK SHEATHING	15 / 32" OSB
CONSTRUCTION	RAFTERS 2X6, 24" MAX

109-2021



- (E) UTILITY METER, OUTDOOR
- (E) MAIN SERVICE PANEL (MSP), INDOOR
- (N) INVERTER (I1), OUTDOOR
- (N) VISIBLE, LOCKABLE, LABELED AC DISCONNECT LOCATED WITHIN 10 FT OF UTILITY METER (SW1), OUTDOOR

(N) TRANSITION BOX (JB1), OUTDOOR. OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN LFMC CONDUIT THROUGH THE INTERIOR OF THE BUILDING



(N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 7/12 (30 °) SLOPED ROOF, 20 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 179 ° AZIMUTH

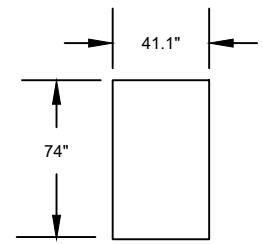
GRID-TIED SOLAR POWER SYSTEM  
**FORSYTH RESIDENCE**  
**109 DOUBLE D FARM RD**  
**ANGIER, NC 27501**



### ROOF PLAN

LEGEND	
<b>JB</b> -JUNCTION BOX	• -ROOF ATTACHMENT
<b>MSP</b> -MAIN SERVICE PANEL	--RAFTERS
<b>AC</b> -AC DISCONNECT	---CONDUIT
<b>INV</b> -INVERTER	
<b>PVM</b> PRODUCTION METER	

**MODULE TYPE, DIMENSIONS & WEIGHT**  
 NUMBER OF MODULE: 20 MODULES  
 MODULE TYPE: HANWHA Q.PEAK DUO BLK ML-G10+ 400  
 WEIGHT: 48.5 LBS/22 KG  
 DIMENSIONS: 74 IN X 41.1 IN=21.1 SF  
 UNIT WEIGHT OF ARRAY: 2.6 PSF



- 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"
- ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF 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.
- AT LEAST TWO 36"-WIDE PATHWAYS ON SEPARATE ROOF PLANES, FROM LOWEST ROOF EDGE TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS. THERE SHALL BE AT LEAST ONE PATHWAY ON THE STREET OR DRIVEWAY SIDE OF THE ROOF. FOR EACH ROOF PLANE WITH A PV ARRAY, AT LEAST ONE SUCH PATHWAY SHALL BE PROVIDED ON THE SAME ROOF PLANE, OR ON AN ADJACENT ROOF PLANE, OR STRADDLING THE SAME AND ADJACENT ROOF PLANES. (IFC 1204.2.1.1)
- FOR PV ARRAYS OCCUPYING MORE THAN 1/3 OF THE PLAN VIEW TOTAL ROOF AREA, A MIN. 3'-WIDE SETBACK IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE.(IFC 1204.2.1.2)
- PV MODULES SHALL NOT BE INSTALLED ON THE PORTION OF A ROOF THAT IS BELOW AN EMERGENCY ESCAPE AND RESCUE OPENING. A 36"-WIDE PATHWAY SHALL BE PROVIDED TO THE EMERGENCY ESCAPE AND RESCUE OPENING. (IFC 1204.2.2)

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### 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 UTILITY  
 MAIN SERVICE VOLTAGE: 240V  
 MSP MANUFACTURER: SQUARE D HOMELINE  
 MAIN SERVICE PANEL: 200A  
 MAIN CIRCUIT RATING: 200A

**NOTES**

- ⚠ MATING CONNECTORS SHALL COMPLY WITH NEC 690.33.
- ⚠ SOLAR EDGE SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B).
- ⚠ 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.
- ⚠ DC PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR GRAY-COLORED
- ⚠ 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.
- ⚠ 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).
- ⚠ POINT-OF-CONNECTION IS ON LOAD SIDE OF SERVICE DISCONNECT, IN COMPLIANCE WITH NEC 705.12(B)(3)(2). OUTPUT IS BACKFED THROUGH BREAKER IN METER MAIN COMBO.
- ⚠ THE BREAKER SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER. THE BREAKER SHALL NOT BE MARKED FOR "LINE" AND "LOAD".
- ⚠ 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.

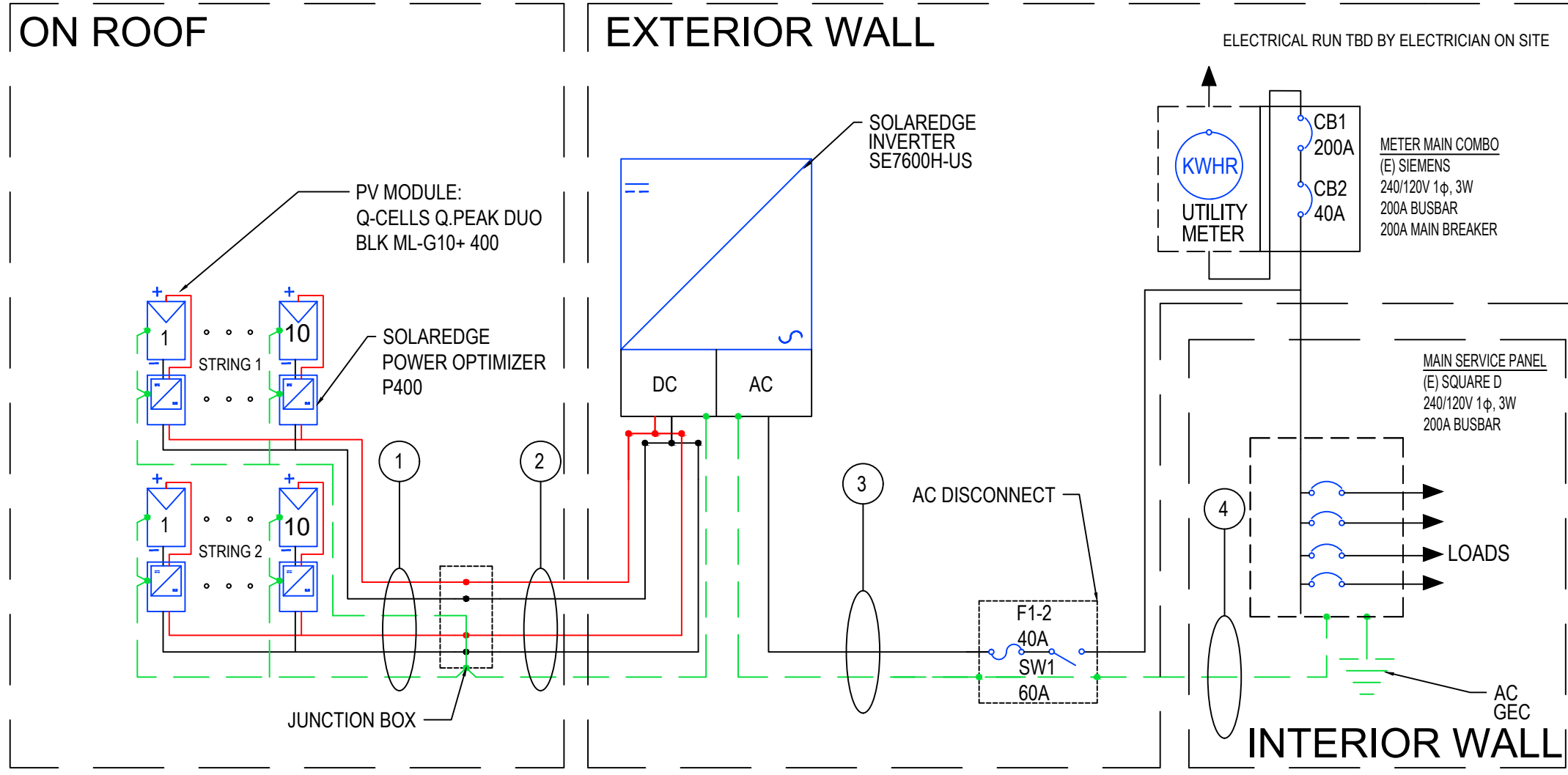
**GROUNDING NOTES**

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

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GRID-TIED SOLAR POWER SYSTEM  
**FORSYTH RESIDENCE**  
**109 DOUBLE D FARM RD**  
**ANGIER, NC 27501**



**SINGLE LINE DIAGRAM**

DOC ID  
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 CREATED BY: M.M.  
 REVIEWED BY:

**REVISIONS**

**PV-3**

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GRID-TIED SOLAR POWER SYSTEM  
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**109 DOUBLE D FARM RD**  
**ANGIER, NC 27501**

MODULES											
REF.	QTY.	MAKE AND MODEL	P <sub>MAX</sub>	P <sub>TC</sub>	I <sub>SC</sub>	I <sub>MP</sub>	V <sub>OC</sub>	V <sub>MP</sub>	TEMP. COEFF. OF V <sub>OC</sub>	FUSE RATING	P <sub>TC</sub> POWER
PM1-20	20	Q-CELLS Q.PEAK DUO BLK ML-G10+ 400	400W	377W	11.14A	10.77A	45.30V	37.13V	-0.11V/°C (-0.27%/°C)	20A	7,540W

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	SOLAREEDGE SE7600H-US	240V	NOT SOLIDLY GROUNDED	7,600W	32A	20A	480V	99%

OPTIMIZERS							
REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-20	20	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	
CB2	1	40A	240VAC	
F 1-2	1	40A	240VAC	

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS														
ID	TYPICAL	CONDUCTOR	CONDUIT / CABLE	CURRENT-CARRYING CONDUCTORS IN CONDUIT / CABLE	OCPD	EGC	TEMP. CORR. FACTOR	FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERM. TEMP. RATING
1	2	10 AWG PV WIRE, COPPER	FREE AIR	N/A	N/A	6 AWG BARE, COPPER	0.71 (56°C)	1.0	15A	18.75A	55A	39.05A	75°C	50A
2	1	10 AWG THWN-2, COPPER	0.75" DIA. LFMC	5	N/A	10 AWG THWN-2, COPPER	0.96 (33°C)	0.8	15A	18.75A	40A	42.24A	90°C	40A
3	1	8 AWG THWN-2, COPPER	0.75" DIA. LFMC	3	40A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	32A	40A	55A	72A	75°C	50A
4	1	6 AWG THWN-2, COPPER	0.75" DIA. LFMC	3	40A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	32A	40A	75A	72A	75°C	65A

**8.00KW SYSTEM**  
**(20) Q-CELLS Q.PEAK DUO ML-G10+ 400: 400W PANELS**  
**(1) SOLAREEDGE SE7600H-US : 7,600W INVERTER**

**WIRING CALCULATIONS**

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**PV-4**



GRID-TIED SOLAR POWER SYSTEM

FORSYTH RESIDENCE  
109 DOUBLE D FARM RD  
ANGIER, NC 27501

SAFETY LABELS

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PV-5

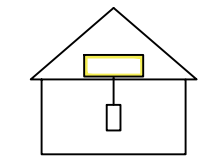
LABELING NOTES

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 HAVE 3 / 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.



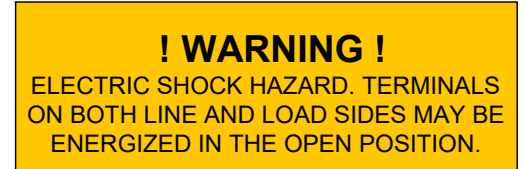
NEC 690.56(C)(1) AND IFC 1204.5.1

2 SEE NOTE NO. 5 (DC RACEWAYS)



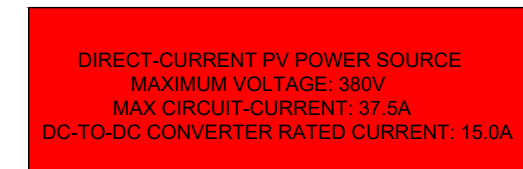
NEC 690.31(G)(3)

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



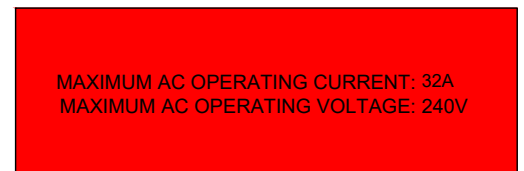
NEC 690.13(B)

4 DC DISCONNECT (I1)



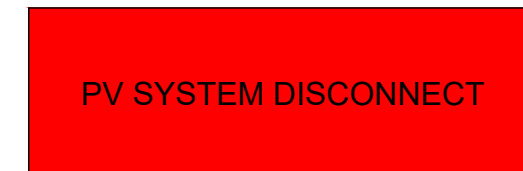
NEC 690.53

5 AC DISCONNECT (SW1, CB1 IN MSP)



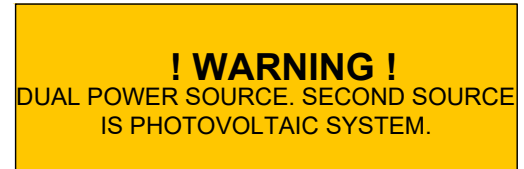
NEC 690.54

6 AC SOLAR DISCONNECT (SW1, CB1 IN MSP)



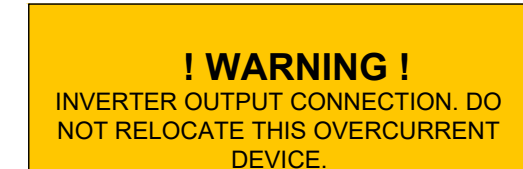
NEC 690.13(B)

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

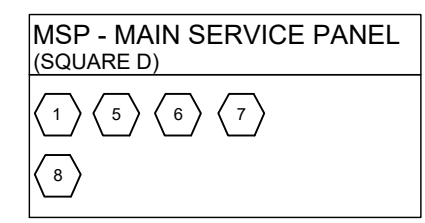
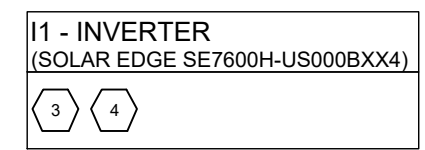
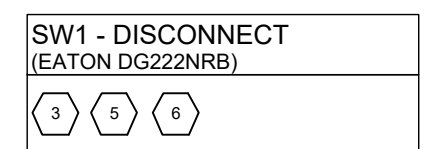
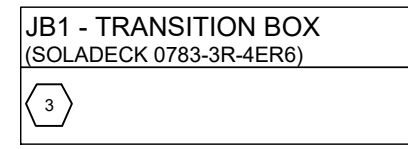
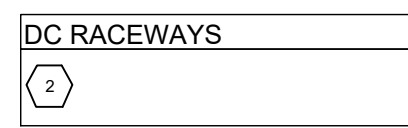


NEC 705.12(B)(3)

8 SOLAR BREAKER (MSP)

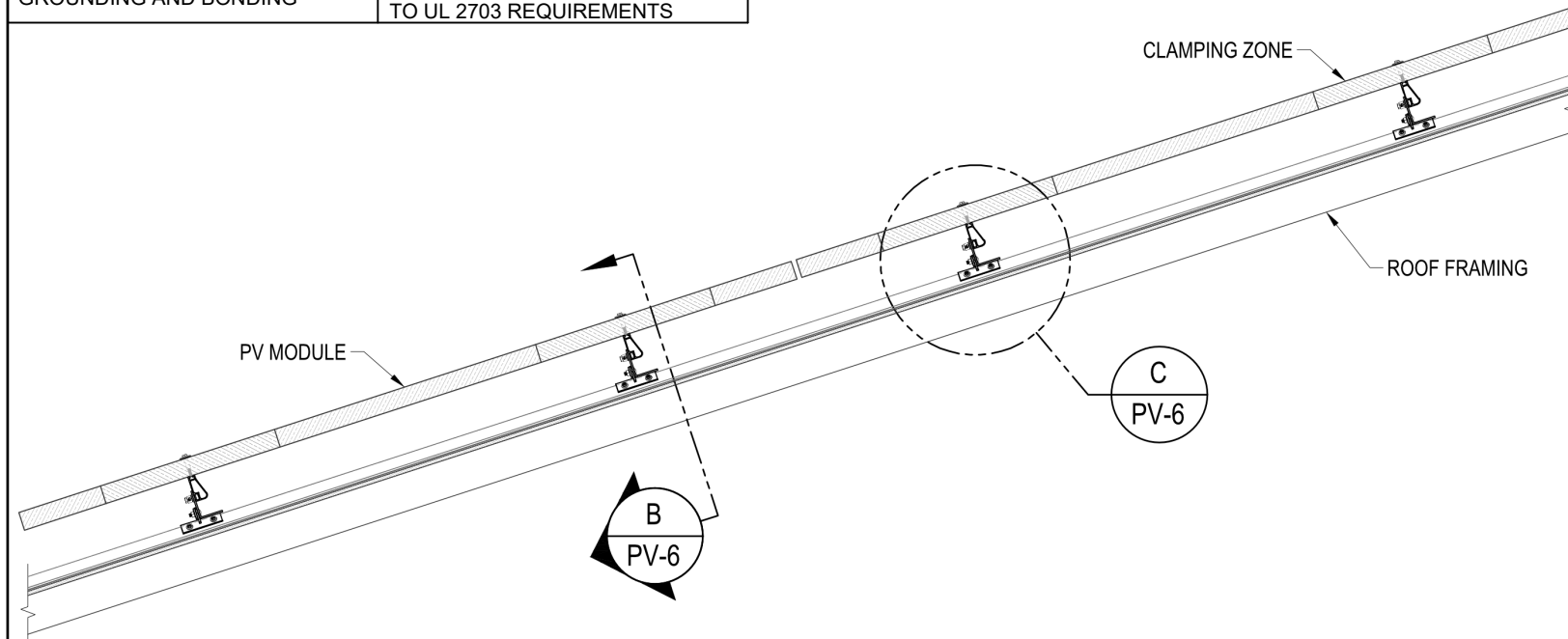


NEC 705.12(B)(2)(3)(B)



# MOUNTING SYSTEM PROPERTIES

MAX. MOUNT SPACING	36 IN (ZONES 1,2, AND 3)
MAX. ALLOW. CANTILEVER	9 IN (ZONES 1,2, AND 3)
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS



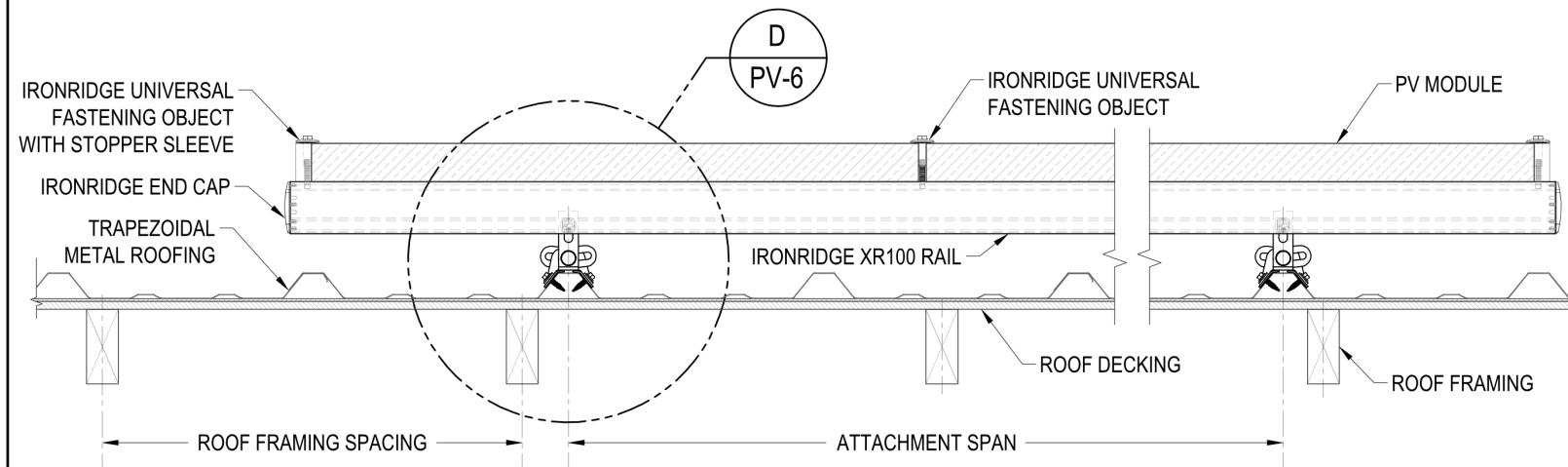
MOUNTING SYSTEM NOTES	
1	FLASHING SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
2	IF THERE IS ANY CONFLICT BETWEEN WHAT IS DEPICTED HERE AND INSTRUCTIONS PROVIDED BY A MANUFACTURER, THE MANUFACTURER'S INSTRUCTIONS SHALL SUPERCEDE.

109-2021



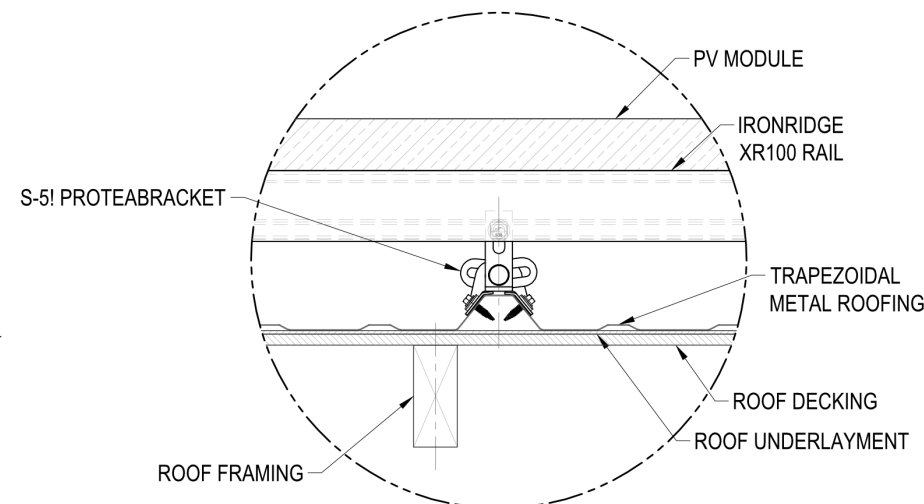
GRID-TIED SOLAR POWER SYSTEM  
**FORSYTH RESIDENCE**  
**109 DOUBLE D FARM RD**  
**ANGIER, NC 27501**

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



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

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



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



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DATE: 11/12/21
CREATED BY: M.M.
REVIEWED BY:

REVISIONS

**PV-6**

Project Details		Date	
<b>Name</b>	109 Double D Farm Road	<b>Date</b>	11/12/2021
<b>Location</b>	109 Double D Farm Road, Angier, NC 27501	<b>Total modules</b>	20
<b>Module</b>	Hanwha Q.Cells: Q.PEAK DUO BLK ML-G10+ 400 (32mm)	<b>Total watts</b>	8,000
<b>Dimensions</b>	73.98" x 41.14" x 1.26" (1879.0mm x 1045.0mm x 32.0mm)	<b>Attachments</b>	36
<b>ASCE</b>	7-16	<b>Rails per row</b>	2

Bill of Materials		
Part	Spares	Total Qty
<b>Rails &amp; Splices</b>		
XR-100-168B XR100, Rail 168" (14 Feet) Black	0	10
XR100-BOSS-01-M1 Bonded Splice, XR100	0	8

System Weight	
<b>Total system weight</b>	1,124.3 lbs
<b>Weight/attachment</b>	31.2 lbs
<b>Racking weight</b>	154.3 lbs
<b>Distributed weight</b>	2.6 psf

Load Assumptions	
<b>Wind exposure</b>	B
<b>Wind speed</b>	118 mph
<b>Ground snow load</b>	15 psf
<b>Attachment spacing portrait</b>	4.0'
<b>Site Elevation</b>	257.0 ft
<b>Sps</b>	0.136

Clamps & Grounding		
UFO-CL-01-B1 Universal Module Clamp, Black	0	42
UFO-STP-32MM-B1 Stopper Sleeve, 32MM, Black	0	4
XR-LUG-03-A1 Grounding Lug, Low Profile	0	1
<b>Attachments</b>		
FF2-01-B2 FlashFoot2, Black	0	36
BHW-SQ-02-A1 Square-Bolt Bonding Hardware	0	36

Roof Information			
<b>Roof Material Family</b>	Comp Shingle	<b>Roof material</b>	Comp Shingle
<b>Building height</b>	30 ft	<b>Roof attachment</b>	Flashfoot2
<b>Roof slope</b>	30 °	<b>Attachment hardware</b>	Square
<b>Risk category</b>	II		
<b>Roof shape</b>	Gable		

Span Details XR100 - Portrait			
Zone	Module Position	Max span	Max cantilever
Zone 1/2e/2r	Normal	7' 7"	3'
Zone 2n/3r	Normal	7' 7"	3'
Zone 3e	Normal	7' 7"	3'

Reaction Forces XR100 - Portrait				
Zone	Module Position	Down (lbs)	Uplift (lbs)	Lateral (lbs)
Zone 1/2e/2r	Normal	187	176	69
Zone 2n/3r	Normal	187	201	69
Zone 3e	Normal	187	255	69

Roof Section 1		
Definition	Roof Section Weights	Roof Section (all segments)
20 modules	Total weight: 1,124.3 lbs	Provided rail: 140' [10 x 14']
East-West rail orientation	Weight/attachment: 31.2 lbs	Attachments: 36
Portrait module orientation	Total Area: 427.4 sq ft	Splices: 8
Graphical entry	Distributed weight: 2.6 psf	Clamps: 42



Segments						
Columns	Length	Cantilever	Rail	Attachments	Splices	Clamps
20	69' 4"	8"	140' [10 x 14']	36	8	42

109-2021



GRID-TIED SOLAR POWER SYSTEM  
 FORSYTH RESIDENCE  
 109 DOUBLE D FARM RD  
 ANGIER, NC 27501



**IRONRIDGE REPORT**

DOC ID  
 DATE: 11/12/21  
 CREATED BY: M.M.  
 REVIEWED BY:

**REVISIONS**

**PV-7**

powered by

**Q.ANTUM DUO Z**

# Q.PEAK DUO BLK ML-G10+

## 385-405

ENDURING HIGH PERFORMANCE



### 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<sup>1</sup>, 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).



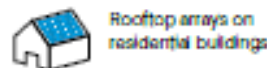
### A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty<sup>2</sup>.

<sup>1</sup> APT test conditions according to IEC/ TS 62804-1:2015, method A (-1500V, 96h)

<sup>2</sup> See data sheet on rear for further information.

### THE IDEAL SOLUTION FOR:



Rooftop arrays on residential buildings

Engineered in Germany



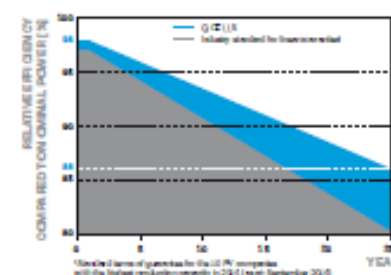
Format	74.0 in x 41.1 in x 1.26 in (including frame) (1879 mm x 1045 mm x 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 x 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in x 1.26-2.36 in x 0.59-0.71 in (53-101 mm x 32-60 mm x 15-18 mm), IP67, with bypass diodes
Cable	4 mm <sup>2</sup> 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 <sup>1</sup> (POWER TOLERANCE +5 W / -0 W)							
Minimum	Power at MPP <sup>1</sup>	P <sub>MPP</sub> [W]	385	390	395	400	405
	Short Circuit Current <sup>1</sup>	I <sub>sc</sub> [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage <sup>1</sup>	V <sub>oc</sub> [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I <sub>MPP</sub> [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V <sub>MPP</sub> [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency <sup>1</sup>	η [%]	≥ 19.6	≥ 19.9	≥ 20.1	≥ 20.4	≥ 20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT <sup>2</sup>							
Minimum	Power at MPP	P <sub>MPP</sub> [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I <sub>sc</sub> [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V <sub>oc</sub> [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I <sub>MPP</sub> [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V <sub>MPP</sub> [V]	34.59	34.81	35.03	35.25	35.46

<sup>1</sup> Measurement tolerances P<sub>MPP</sub> ± 3%; I<sub>sc</sub>; V<sub>oc</sub> ± 5% at STC: 1000W/m<sup>2</sup>, 25 ± 2°C, AM 1.5 according to IEC 60904-3 • 780W/m<sup>2</sup>, NMOT, spectrum AM 1.5

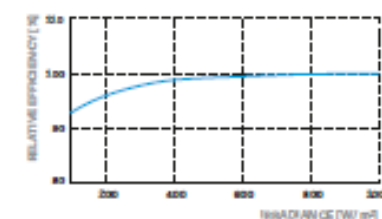
### Q CELLS PERFORMANCE WARRANTY



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, 1000W/m<sup>2</sup>)

### TEMPERATURE COEFFICIENTS

Temperature Coefficient of I <sub>sc</sub>	α [%/K]	+0.04	Temperature Coefficient of V <sub>oc</sub>	β [%/K]	-0.27
Temperature Coefficient of P <sub>MPP</sub>	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3°C)

### PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V <sub>sys</sub>	[V]	1000 (EC) / 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 <sup>2</sup>	[lbs/ft <sup>2</sup> ]	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 <sup>2</sup>	[lbs/ft <sup>2</sup> ]	113 (5400 Pa) / 84 (4000 Pa)		

<sup>2</sup> 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 (cell cell), GCVP 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
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**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

Specifications are subject to technical changes. © Q CELLS Q.PEAK DUO BLK ML-G10+ 385-405\_2021-05\_Rev01\_1A



# 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

## 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)	
<b>INPUT</b>							
Rated Input DC Power <sup>(1)</sup>	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125 <sup>(2)</sup>	83 <sup>(2)</sup>	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	%
Overtoltage Category	II						
<b>OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)</b>							
Maximum Output Current	15						Adc
Maximum Output Voltage	60			85			Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)</b>							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
<b>STANDARD COMPLIANCE</b>							
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741						
RoHS	Yes						
<b>INSTALLATION SPECIFICATIONS</b>							
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 <sup>(3)</sup>						
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 / NEMAGP						
Relative Humidity	0 - 100						%

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

PV System Design Using a SolarEdge Inverter <sup>(4)(5)</sup>	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 <sup>(6)</sup>	
Maximum Power per String	5700 (6000 with SE7600-US - SE11400-US)	5250	6000 <sup>(7)</sup>	12750 <sup>(8)</sup>	W
Parallel Strings of Different Lengths or Orientations	Yes				

<sup>(4)</sup> For detailed string sizing information refer to: [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf)  
<sup>(5)</sup> It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string  
<sup>(6)</sup> A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement  
<sup>(7)</sup> 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  
<sup>(8)</sup> 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



Powering Business Worldwide

[pe.eaton.com](http://pe.eaton.com)

Product compliance: No Data

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## 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



# 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.

# Single Phase Inverter with HD-Wave Technology

for North America

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



## 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 <sup>(1)</sup>							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 <sup>(2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V <sup>(2)</sup>	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600k $\Omega$ 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 <sup>(3)</sup>								
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 <sup>(4)</sup> (-40°F / -40°C option) <sup>(5)</sup>							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

<sup>(1)</sup> For other regional settings please contact SolarEdge support

<sup>(2)</sup> A higher current source may be used; the inverter will limit its input current to the values stated

<sup>(3)</sup> Revenue grade inverter P/N: SExxxH-US000NNC2

<sup>(4)</sup> For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

<sup>(5)</sup> -40 version P/N: SExxxH-US000NNU4

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

# S-5!<sup>®</sup>

## The Right Way!<sup>™</sup>

### ProteaBracket<sup>™</sup>

A versatile bracket for mounting solar PV to trapezoidal roof profiles

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

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

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

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

**ProteaBracket\* can be used for rail mounting or "direct-attach" with S-5! PVKIT<sup>™</sup>**

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

**NOW AVAILABLE  
IN ALUMINUM**



**NEW**

ProteaBracket<sup>™</sup>

### Features and Benefits

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

\*See [www.S-5.com](http://www.S-5.com) for details.



888-825-3432 | [www.S-5.com](http://www.S-5.com) |



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

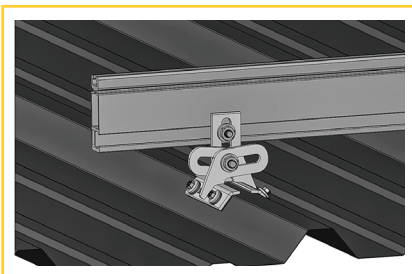
ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

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

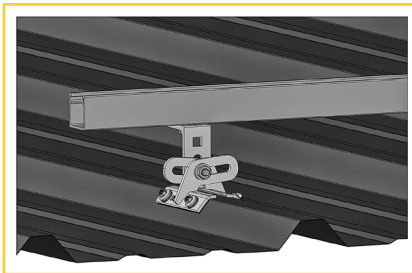
For design assistance, ask your distributor, or visit [www.S-5.com](http://www.S-5.com) for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

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

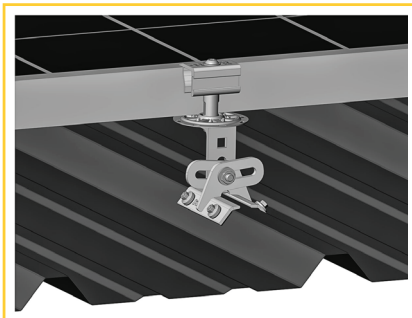
### Multiple Attachment Options:



*Side  
Mount Rail*



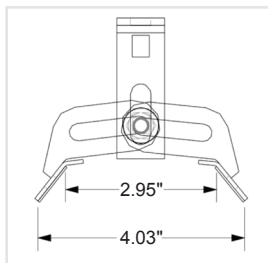
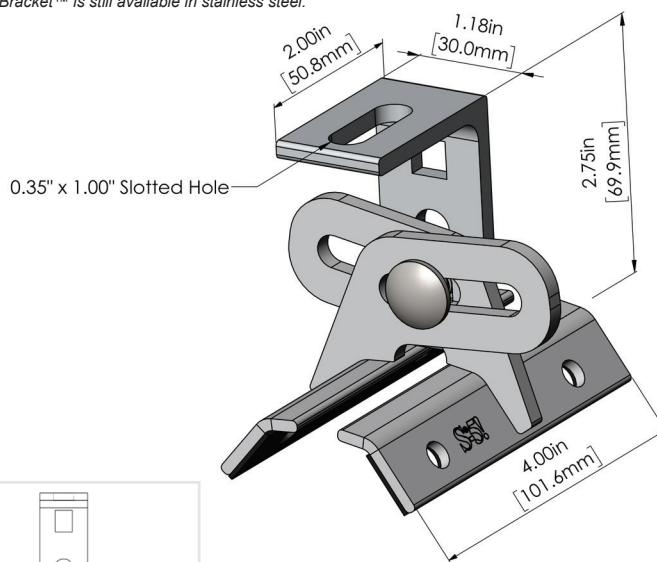
*Bottom  
Mount Rail*



*w/ S-5!  
PVKIT™  
(rail-less)*

## ProteaBracket™

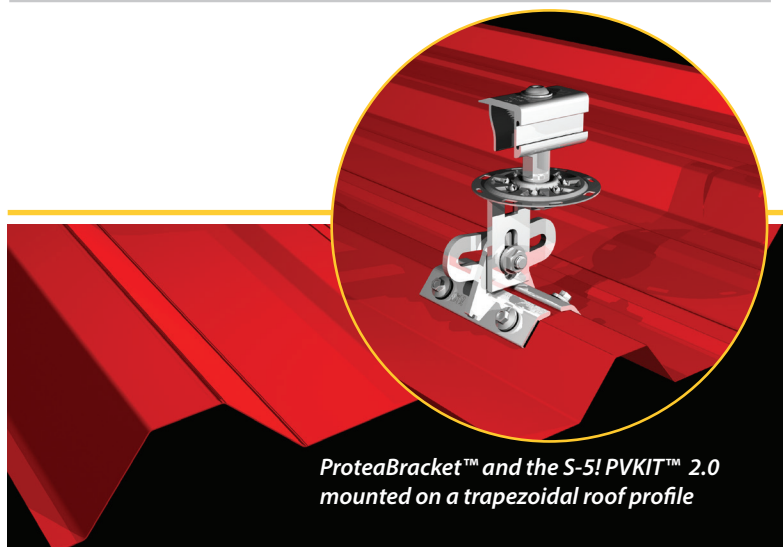
*ProteaBracket™ is still available in stainless steel.*



**ProteaBracket fits profiles up to 3 inches**

### INSTALLATION:

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



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

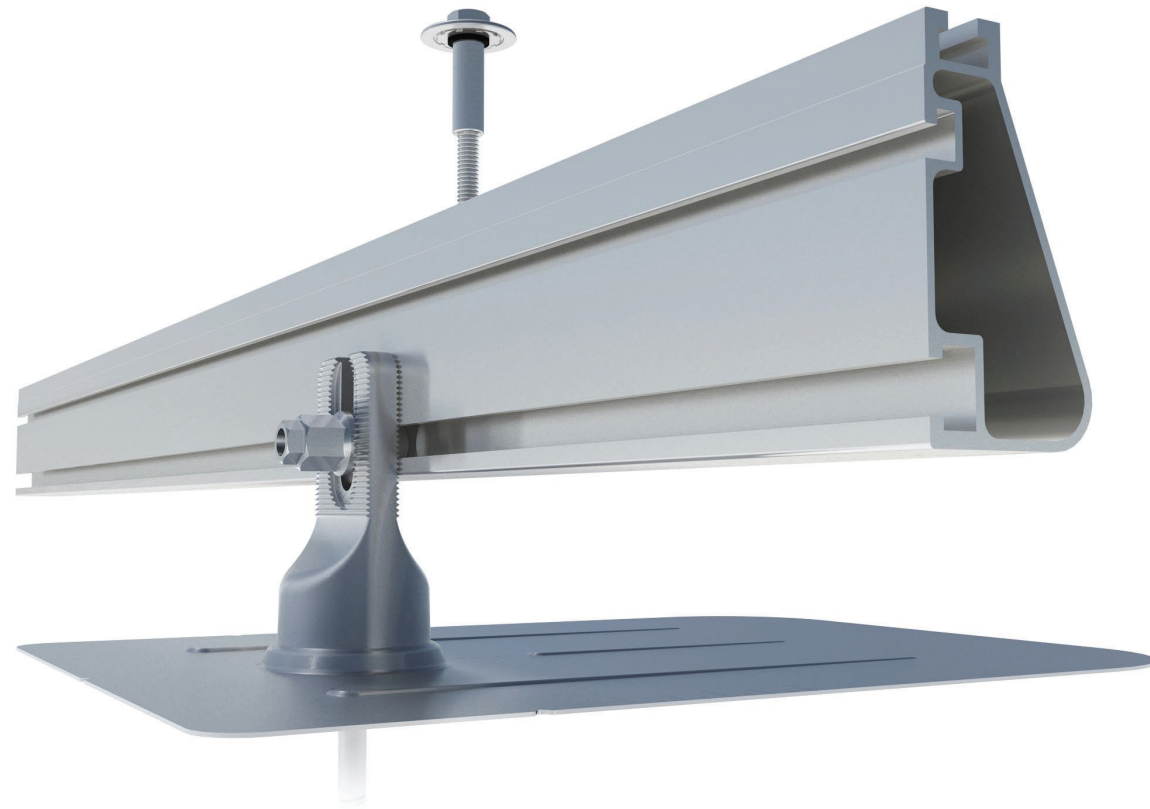
### S-5!® Warning! Please use this product responsibly!

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

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Distributed by

# 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.

## 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

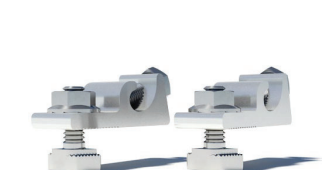
### CAMO



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 3/4" 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](https://www.ironridge.com/design)



### NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

[Go to IronRidge.com/training](https://www.ironridge.com/training)





28375 Industrial Blvd.  
Hayward, CA 94545  
1-800-227-9523  
IronRidge.com



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**Attn:** Corey Geiger, COO, IronRidge Inc.

**Date:** May 18<sup>th</sup>, 2020

**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)
- 2015 South Carolina 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 8° to 45°. 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 pitch, measured between roof surface and horizontal plane, is 45° or less.
3. 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.
4. Module length shall not exceed the listed maximum dimension provided for the respective span table and module width shall not exceed 42".
5. 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.

Sincerely,



Gang Xuan, PE  
Senior Structural Engineer