

## SCOPE OF WORK

NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO BATTERY STORAGE

SYSTEM SIZE: DC STC: 14.00KW  
AC RATING OF SYSTEM: 11.20KW

MODULES: (35) HANWHA Q.PEAK DUO  
BLK ML-G10+ 400

INVERTER: (1) SOLAREEDGE SE11400H-US  
OPTIMIZER:(35) SOLAREEDGE POWER  
OPTIMIZER P400

ARRAY WIRING: 2 STRINGS OF 12  
1 STRING OF 11

## SITE DETAILS

ASHRAE EXTREME LOW: -10°C (14°F)  
ASHRAE 2% HIGH: 35°C (95°F)  
CLIMATE DATA SOURCE: FORT BRAGG/SIMMONS  
WIND SPEED: 120 MPH  
RISK CATEGORY: II  
WIND EXPOSURE CATEGORY: B  
GROUND SNOW LOAD: 10 PSF

## SHEET INDEX

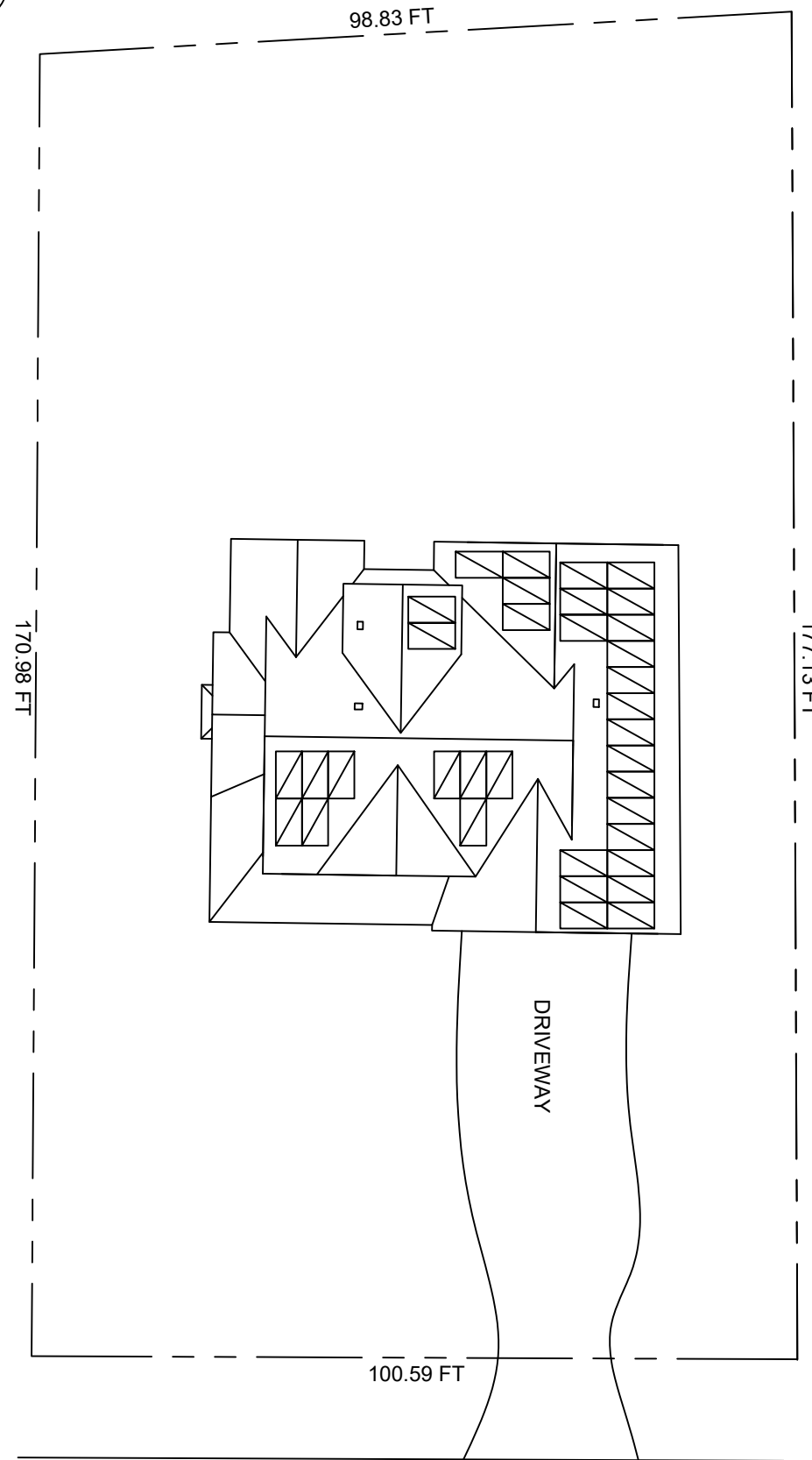
PV-1 COVER SHEET  
PV-2 ROOF PLAN  
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## INTERCONNECTION DETAILS

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

UTILITY SERVICE: 120/240V  $\phi$

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



A PLOT PLAN  
PV-1

## PROJECT DETAILS

PROPERTY OWNER: REBECCA LOVEGREEN  
PROPERTY ADDRESS: 65 DERBY LN

BUILDING INFORMATION: 2 STORY HOUSE  
OCCUPANCY: RESIDENTIAL GROUP R-3  
ROOF TYPE: COMP SHINGLES  
ROOF RAFTER: 2X6 @ 16" O.C.

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

AHJ: HARNETT COUNTY

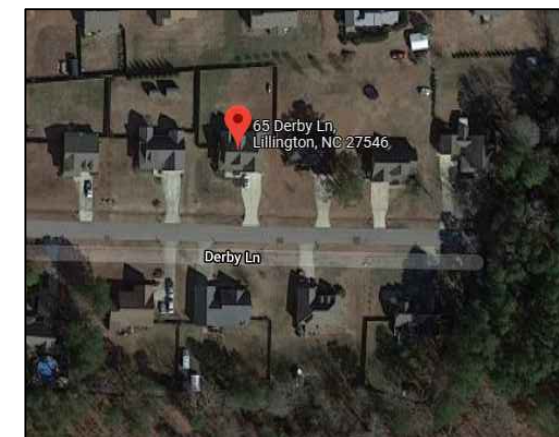
CODE SUMMARY  
ELECTRICAL CODE: 2017 NEC (NFPA 70)  
FIRE CODE: 2018 IFC  
OTHER BUILDING CODES:  
2018 NC BUILDING CODE  
2018 NC RESIDENTIAL CODE  
2018 NC PLUMBING CODE  
2018 NC MECHANICAL CODE

## CONTRACTOR INFORMATION

COMPANY: EMPWR SOLAR

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

PHONE NUMBER: (866) 337-1104  
www.empwrsolar.com/  
LICENSE NUMBER: L.3428



B LOCALE  
PV-1 NOT TO SCALE

65-2021

**EMPWR**  
SOLAR

GRID-TIED SOLAR POWER SYSTEM

LOVEGREEN RESIDENCE

65 DERBY LN

LILLINGTON, NC 27546



## PROJECT SUMMARY

DOC ID

DATE: 9/30/21

CREATED BY: M.M.

REVIEWED BY:

## REVISIONS

1 DB 11/19/21

**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).

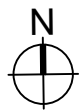
## MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULE: 35 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: 2.8 PSF

## ARRAY AREA

| ARRAY | # OF MODULES | ARRAY AREA (SQFT) | ROOF TILT | AZIMUTH |
|-------|--------------|-------------------|-----------|---------|
| 1     | 20           | 429.4             | 45°       | 91°     |
| 2     | 9            | 195.6             | 36°       | 181°    |
| 3     | 2            | 43.5              | 45°       | 91°     |
| 4     | 4            | 87                | 45°       | 271°    |

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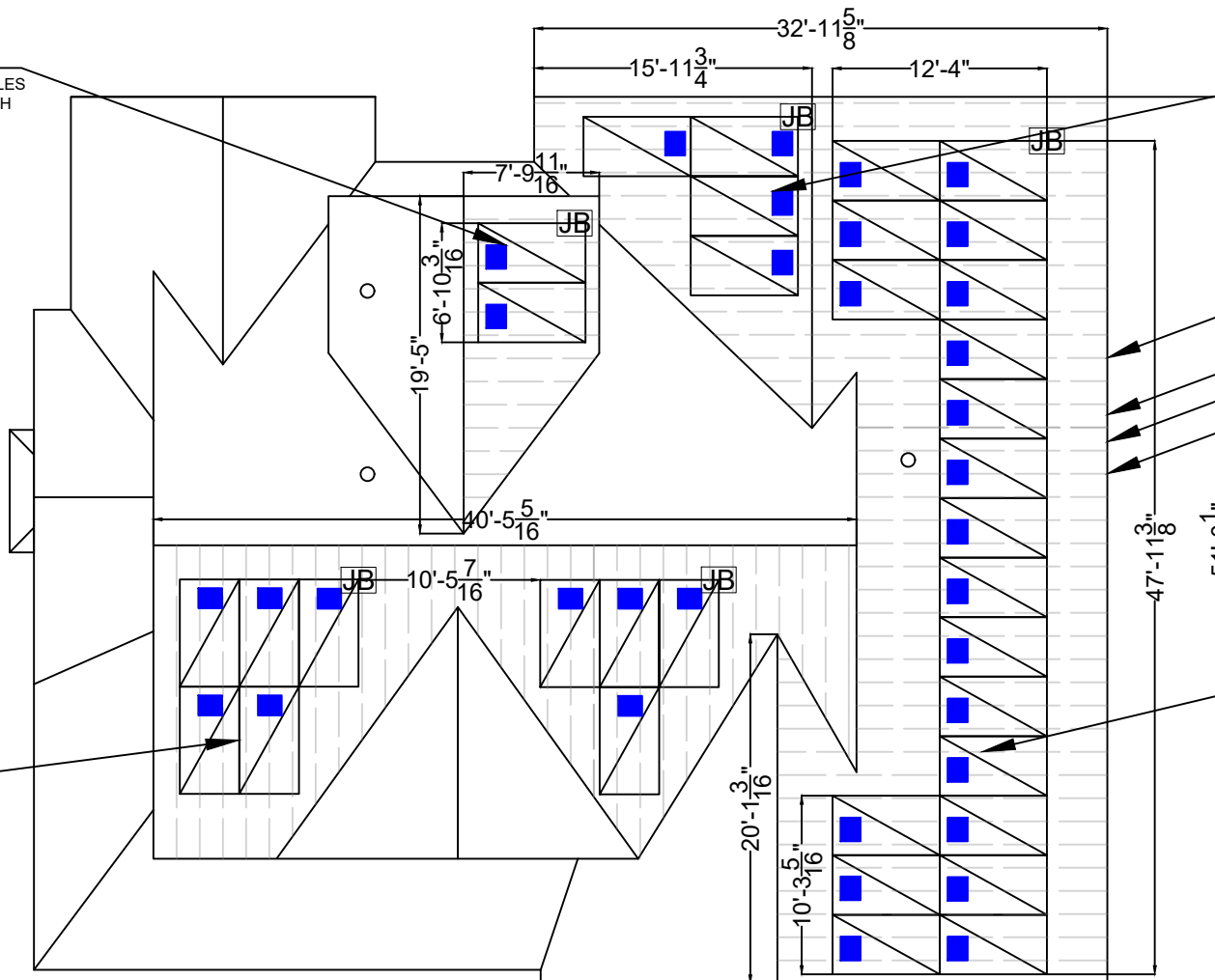
ARRAY 3  
 (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 12/12 (45°) SLOPED ROOF, 2 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 91° AZIMUTH

ARRAY 4  
 (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 12/12 (45°) SLOPED ROOF, 4 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 271° AZIMUTH

- (N) VISIBLE, LOCKABLE, LABELED AC DISCONNECT LOCATED WITHIN 10 FT OF UTILITY METER (SW1), OUTDOOR
- (N) INVERTER (11), OUTDOOR
- (E) MAIN SERVICE PANEL (MSP), OUTDOOR
- (E) UTILITY METER, OUTDOOR

ARRAY 2  
 (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 9/12 (36°) SLOPED ROOF, 9 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 181° AZIMUTH

ARRAY 1  
 (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 12/12 (45°) SLOPED ROOF, 20 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 91° AZIMUTH



GRID-TIED SOLAR POWER SYSTEM

LOVEGREEN RESIDENCE

65 DERBY LN

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## ROOF PLAN

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DATE: 9/30/21

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REVIEWED BY:

## REVISIONS

1 DB 11/19/21

# PV-2

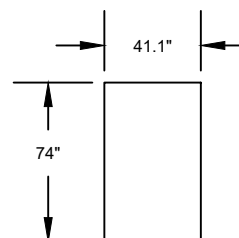
● ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR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

● 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)

HANWHA Q. PEAK DUO  
 BLK ML-G10+ 400  
 MODULE



## LEGEND

- JB** - JUNCTION BOX
- MSP** - MAIN SERVICE PANEL
- AC** - AC DISCONNECT
- INV** - INVERTER
- PVM** - PRODUCTION METER
- - ROOF ATTACHMENT
- - RAFTERS 2X6 @ 16" O.C.
- - -** - CONDUIT

**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: SIEMENS  
 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 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.
- 6 MAX DC VOLTAGE OF ARRAY FIXED BY THE INVERTER AT 350V 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 PV SYSTEM DISCONNECT SHALL BE A VISIBLE KNIFE-BLADE TYPE DISCONNECT THAT IS ACCESSIBLE AND LOCKABLE BY THE UTILITY. THE DISCONNECT SHALL BE LOCATED WITHIN 10 FT OF UTILITY METER. DISCONNECT SHALL BE GROUPED IN ACCORDANCE WITH NEC 230.72
- 8 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".

**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  |

65-2021



GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
 65 DERBY LN  
 LILLINGTON, NC 27546

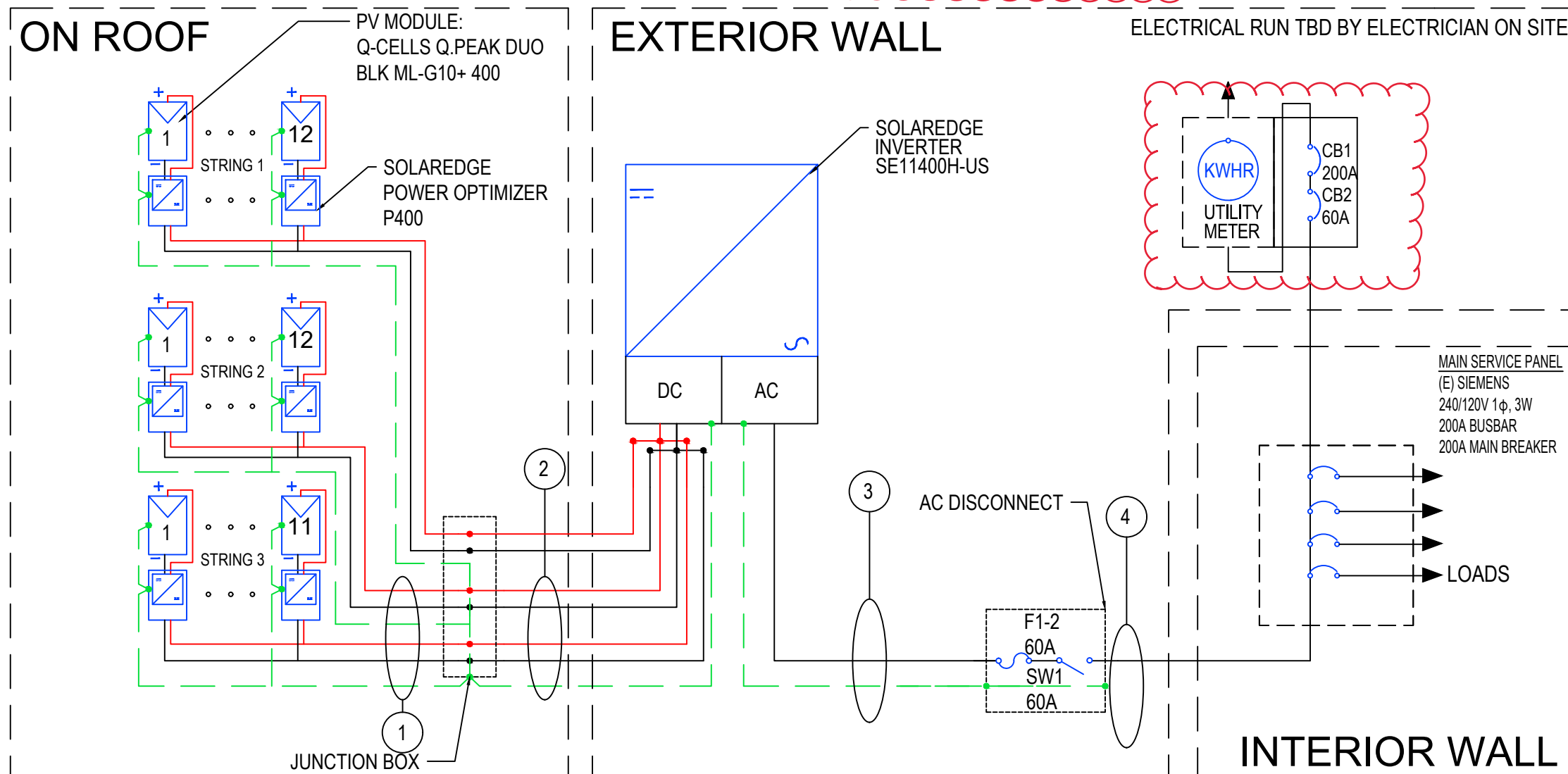
**SINGLE LINE DIAGRAM**

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**REVISIONS**

1 DB 11/19/21

**PV-3**



65-2021



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| 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 |
| PM1-35  | 35   | 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         |

| 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 SE11400H-US | 240V       | NOT SOLIDLY GROUNDED | 11,400W     | 47.5A              | 30.5A             | 480V              | 99%                     |

| OPTIMIZERS |      |                 |                   |                    |               |                |                     |
|------------|------|-----------------|-------------------|--------------------|---------------|----------------|---------------------|
| REF.       | QTY. | MODEL           | RATED INPUT POWER | MAX OUTPUT CURRENT | MAX INPUT ISC | MAX DC VOLTAGE | WEIGHTED EFFICIENCY |
| PO1-35     | 35   | SOLAR EDGE P400 | 400W              | 15A                | 10.1A         | 80V            | 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    | 60A           | 240VAC      |
| F 1-2 | 1    | 60A           | 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  | 3       | 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       | 8 AWG THWN-2, COPPER   | 1" DIA. LFMC    | 7  | N/A  | 12 AWG THWN-2, COPPER | 0.96 (33°C)        | 0.8         | 15A           | 18.75A              | 55A       | 42.24A       | 90°C               | 55A                       |
| 3  | 1       | 6 AWG THWN-2, COPPER   | 0.75" DIA. LFMC | 3  | 60A  | 10 AWG THWN-2, COPPER | 0.96 (33°C)        | 1.0         | 47.5A         | 59.37A              | 75A       | 72A          | 75°C               | 65A                       |
| 4  | 1       | 6 AWG THWN-2, COPPER   | 0.75" DIA. LFMC | 3  | 60A  | 10 AWG THWN-2, COPPER | 0.96 (33°C)        | 1.0         | 47.5A         | 59.37A              | 75A       | 72A          | 75°C               | 65A                       |

| SYSTEM SUMMARY            |          |          |          |
|---------------------------|----------|----------|----------|
|                           | STRING 1 | STRING 2 | STRING 3 |
| DC SOURCE CIRCUIT CURRENT | 15A      | 15A      | 15A      |
| NUMBER OF OPTIMIZERS      | 12       | 12       | 11       |
| NOMINAL STRING VOLTAGE    | 400V     | 400V     | 400V     |
| ARRAY OPERATING CURRENT   | 10.2A    | 10.2A    | 9.3A     |
| ARRAY STC POWER           | 14,000W  |          |          |
| ARRAY PTC POWER           | 13,195W  |          |          |
| MAX AC CURRENT            | 47.5A    |          |          |
| MAX AC POWER OUTPUT       | 11,400W  |          |          |
| DERATED AC POWER OUTPUT   | 11,400W  |          |          |

| MATERIALS       |     |                                   |
|-----------------|-----|-----------------------------------|
| EQUIPMENT       | QTY | DESCRIPTION                       |
| SOLAR PV MODULE | 35  | HANWHA Q.PEAK DUO BLK ML-G10+ 400 |
| INVERTERS       | 1   | SOLAREEDGE SE11400H-US            |
| OPTIMIZER       | 35  | SOLAREEDGE POWER OPTIMIZER P400   |
| PV METER        | 0   | PRODUCTION METER                  |
| ATTACHMENT      | 72  | IRONRIDGE FLASH FOOT 2 ATTACHMENT |
| RAILS           | 18  | IRONRIDGE XR-100 168"             |
| RAILS           | 6   | IRONRIDGE XR-100 204"             |
| RAIL SPLICE     | 4   | SPLICE KIT                        |
| MID CLAMPS      | 90  | MID CLAMP                         |
| END CLAMPS      | 40  | END CLAMP                         |
| GROUNDING LUG   | 10  |                                   |
| BREAKER         | 1   |                                   |

**WIRING CALCULATIONS**

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| REVISIONS |             |
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| 1         | DB 11/19/21 |

**PV-4**



GRID-TIED SOLAR POWER SYSTEM

LOVEGREEN RESIDENCE  
65 DERBY LN  
LILLINGTON, NC 27546

**SAFETY LABELS**

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**PV-5**

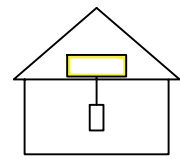
**LABELING NOTES**

|          |  |
|----------|--|
| <b>1</b> | ALL PLAQUES AND SIGNAGE REQUIRED BY 2017 NEC AND 2018 IFC WILL BE INSTALLED AS REQUIRED.   |
| <b>2</b> | 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).  |
| <b>3</b> | 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).   |
| <b>4</b> | 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. |
| <b>5</b> | 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)

**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)

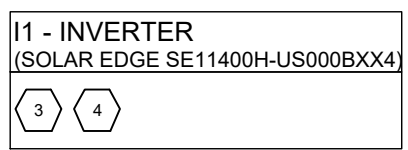
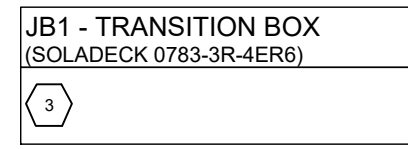
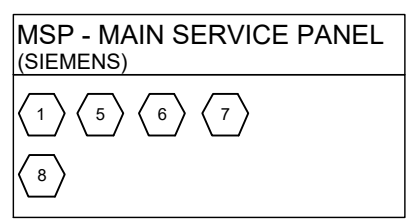
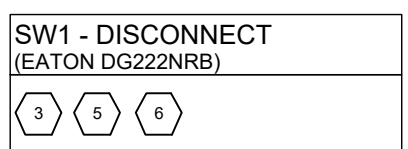
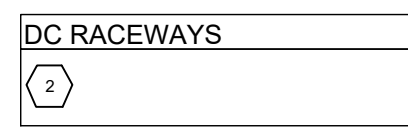
**! WARNING !**  
DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.

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)



65-2021



GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
 65 DERBY LN  
 LILLINGTON, NC 27546



**ATTACHMENT PLAN**

DOC ID  
 DATE: 9/30/21  
 CREATED BY: M.M.  
 REVIEWED BY:

| REVISIONS |             |
|-----------|-------------|
| 1         | DB 11/19/21 |
|           |             |
|           |             |

**PV-6.1**

**ROOF PROPERTIES**

|                |                        |
|----------------|------------------------|
| ROOF MATERIAL  | COMP SHINGLES          |
| SLOPE          | 12/12                  |
| DECK SHEATHING | 15 / 32" OSB           |
| CONSTRUCTION   | RAFTERS 2X6 @ 16" O.C. |

**MODULE MECHANICAL PROPERTIES**

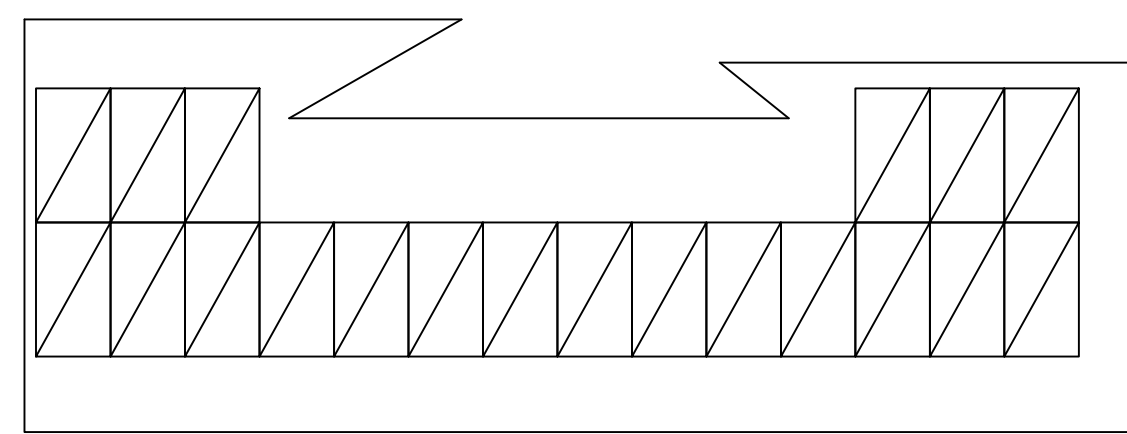
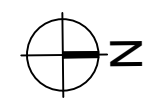
|                   |                                    |
|-------------------|------------------------------------|
| MODULE            | Q-CELLS Q.PEAK DUO BLK ML-G10+ 400 |
| DIMENSIONS (AREA) | 74IN X41.1IN X 1.26IN (21.1 SQ FT) |
| WEIGHT            | 48.5LB                             |

**MOUNTING SYSTEM PROPERTIES**

|                        |  |
|------------------------|--|
| MAX. ALLOW. RAIL SPAN  | 100 IN (ZONES 1,2, AND 3)                            |
| MAX. MOUNT SPACING     | 48 IN (ZONES 1,2, AND 3)                             |
| MAX. ALLOW. CANTILEVER | 36 IN (ZONES 1,2, AND 3)                             |
| GROUNDING AND BONDING  | INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS |

**NOTES**

|          |   |
|----------|---|
| <b>1</b> | 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" |
|----------|---|



65-2021



GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
 65 DERBY LN  
 LILLINGTON, NC 27546



**ATTACHMENT PLAN**

DOC ID  
 DATE: 9/30/21  
 CREATED BY: M.M.  
 REVIEWED BY:

| REVISIONS |             |
|-----------|-------------|
| 1         | DB 11/19/21 |
|           |             |
|           |             |

**PV-6.2**

**ROOF PROPERTIES**

|                |                        |
|----------------|------------------------|
| ROOF MATERIAL  | COMP SHINGLES          |
| SLOPE          | $\frac{9}{12}$         |
| DECK SHEATHING | 15 / 32" OSB           |
| CONSTRUCTION   | RAFTERS 2X6 @ 16" O.C. |

**MODULE MECHANICAL PROPERTIES**

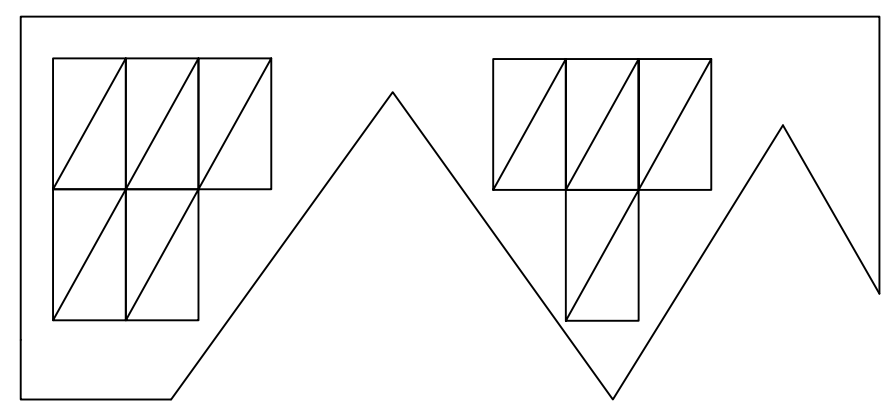
|                   |                                    |
|-------------------|------------------------------------|
| MODULE            | Q-CELLS Q.PEAK DUO BLK ML-G10+ 400 |
| DIMENSIONS (AREA) | 74IN X41.1IN X 1.26IN (21.1 SQ FT) |
| WEIGHT            | 48.5LB                             |

**MOUNTING SYSTEM PROPERTIES**

|                        |  |
|------------------------|--|
| MAX. ALLOW. RAIL SPAN  | 99 IN (ZONES 1,2, AND 3)                             |
| MAX. MOUNT SPACING     | 48 IN (ZONES 1,2, AND 3)                             |
| MAX. ALLOW. CANTILEVER | 36 IN (ZONES 1,2, AND 3)                             |
| GROUNDING AND BONDING  | INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS |

**NOTES**

- 1 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"



65-2021



GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
 65 DERBY LN  
 LILLINGTON, NC 27546



**ATTACHMENT PLAN**

DOC ID  
 DATE: 9/30/21  
 CREATED BY: M.M.  
 REVIEWED BY:

**REVISIONS**

1 DB 11/19/21

**PV-6.3**

**ROOF PROPERTIES**

|                |                        |
|----------------|------------------------|
| ROOF MATERIAL  | COMP SHINGLES          |
| SLOPE          | 12/12                  |
| DECK SHEATHING | 15 / 32" OSB           |
| CONSTRUCTION   | RAFTERS 2X6 @ 16" O.C. |

**MODULE MECHANICAL PROPERTIES**

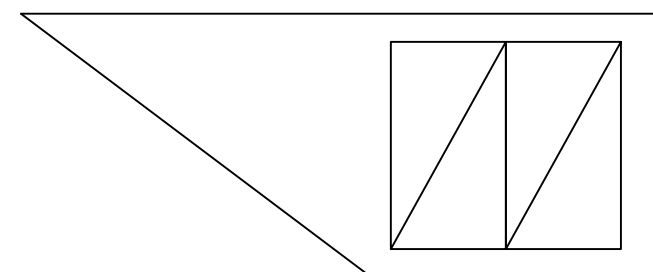
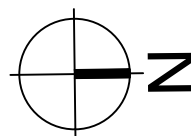
|                   |                                    |
|-------------------|------------------------------------|
| MODULE            | Q-CELLS Q.PEAK DUO BLK ML-G10+ 400 |
| DIMENSIONS (AREA) | 74IN X41.1IN X 1.26IN (21.1 SQ FT) |
| WEIGHT            | 48.5LB                             |

**MOUNTING SYSTEM PROPERTIES**

|                        |  |
|------------------------|--|
| MAX. ALLOW. RAIL SPAN  | 100 IN (ZONES 1,2, AND 3)                            |
| MAX. MOUNT SPACING     | 48 IN (ZONES 1,2, AND 3)                             |
| MAX. ALLOW. CANTILEVER | 36 IN (ZONES 1,2, AND 3)                             |
| GROUNDING AND BONDING  | INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS |

**NOTES**

- 1 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"





65-2021



GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
 65 DERBY LN  
 LILLINGTON, NC 27546



**ATTACHMENT PLAN**

DOC ID  
 DATE: 9/30/21  
 CREATED BY: M.M.  
 REVIEWED BY:

| REVISIONS |             |
|-----------|-------------|
| 1         | DB 11/19/21 |
|           |             |
|           |             |

**PV-6.4**

**ROOF PROPERTIES**

|                |                        |
|----------------|------------------------|
| ROOF MATERIAL  | COMP SHINGLES          |
| SLOPE          | 12/12                  |
| DECK SHEATHING | 15 / 32" OSB           |
| CONSTRUCTION   | RAFTERS 2X6 @ 16" O.C. |

**MODULE MECHANICAL PROPERTIES**

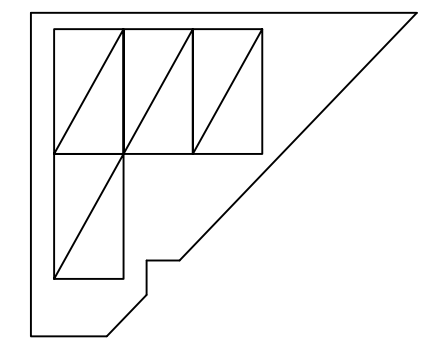
|                   |                                    |
|-------------------|------------------------------------|
| MODULE            | Q-CELLS Q.PEAK DUO BLK ML-G10+ 400 |
| DIMENSIONS (AREA) | 74IN X41.1IN X 1.26IN (21.1 SQ FT) |
| WEIGHT            | 48.5LB                             |

**MOUNTING SYSTEM PROPERTIES**

|                        |  |
|------------------------|--|
| MAX. ALLOW. RAIL SPAN  | 100 IN (ZONES 1,2, AND 3)                            |
| MAX. MOUNT SPACING     | 48 IN (ZONES 1,2, AND 3)                             |
| MAX. ALLOW. CANTILEVER | 36 IN (ZONES 1,2, AND 3)                             |
| GROUNDING AND BONDING  | INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS |

**NOTES**

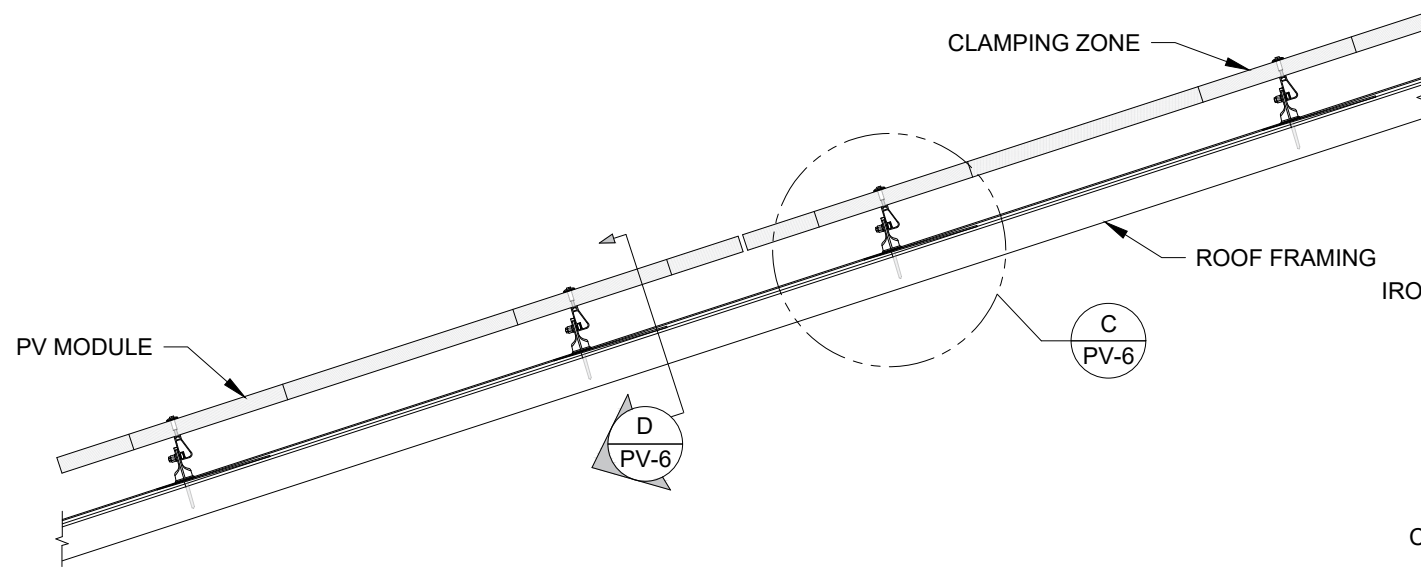
|          |   |
|----------|---|
| <b>1</b> | RAFTER LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING" |
|----------|---|



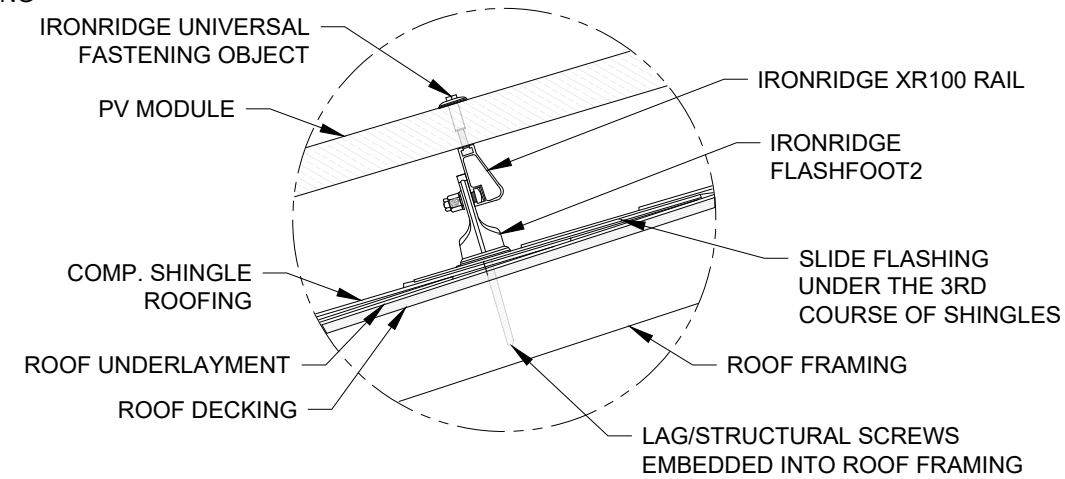
**MOUNTING SYSTEM NOTES**

- 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.

65-2021

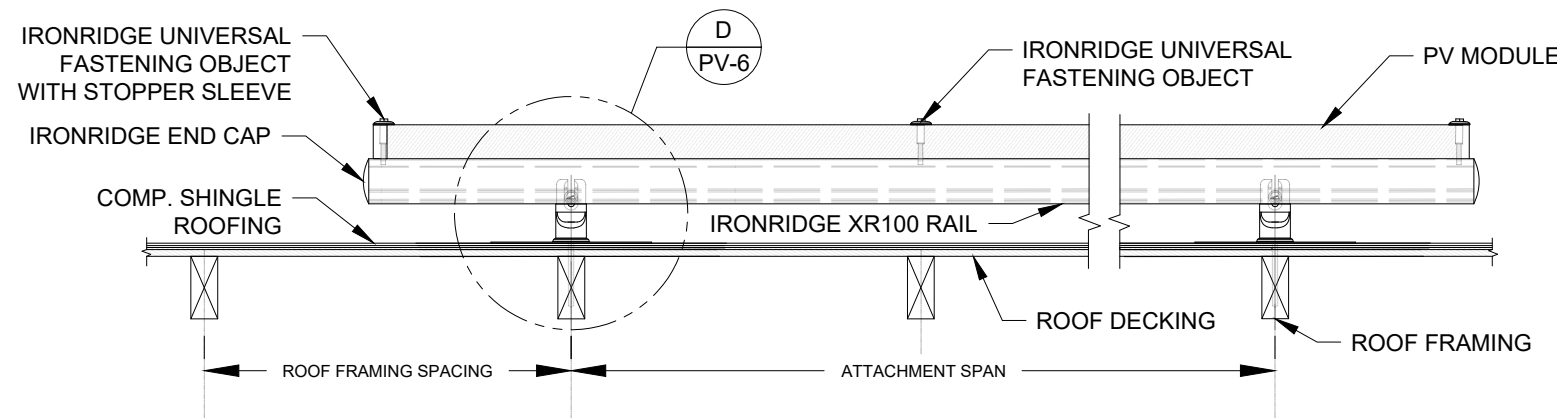


LAGSCREW DIAMETER: 5/16"  
MINIMUM EMBEDMENT: 2-1/2"

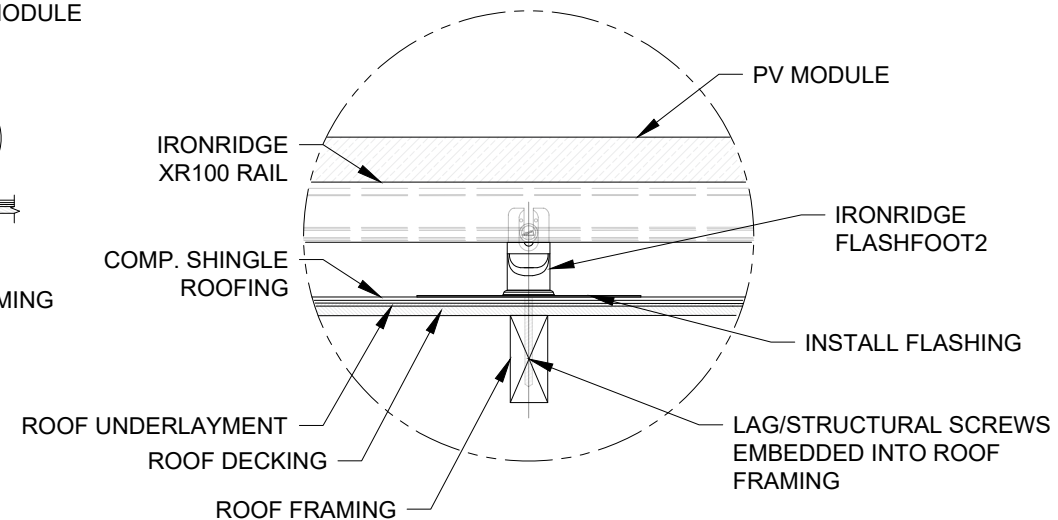


**A** RACKING ELEVATION (TRANSVERSE VIEW)  
PV-6 SCALE: NTS

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



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



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

GRID-TIED SOLAR POWER SYSTEM  
**LOVEGREEN RESIDENCE**  
65 DERBY LN  
LILLINGTON, NC 27546



**ATTACHMENT DETAILS**

DOC ID  
DATE: 9/30/21  
CREATED BY: M.M.  
REVIEWED BY:

**REVISIONS**

1 DB 11/19/21

**PV-7**

# 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).



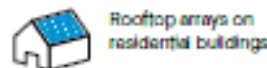
### A RELIABLE INVESTMENT

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

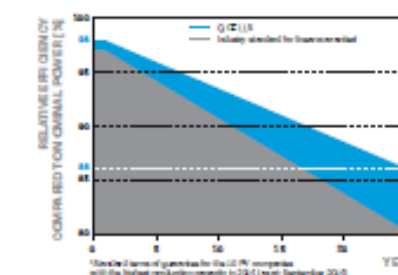
|              |   |
|--------------|---|
| Format       | 74.0 in x 41.1 in x 1.26 in (including frame)<br>(1879 mm x 1045 mm x 32 mm)                              |
| Weight       | 48.5 lbs (22.0 kg)  |
| Front Cover  | 0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology                             |
| 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<br>(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

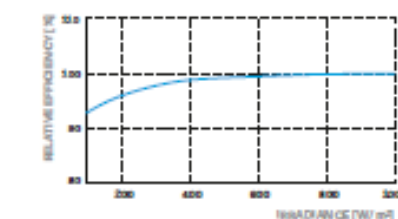
### Q CELLS PERFORMANCE WARRANTY



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<br>(-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), GC PV Certification ongoing.



### PACKAGING INFORMATION

|                      |                    |                    |                    |                    |               |               |               |
|----------------------|--------------------|--------------------|--------------------|--------------------|---------------|---------------|---------------|
| Horizontal packaging | 76.4 in<br>1940 mm | 43.3 in<br>1100 mm | 48.0 in<br>1220 mm | 1656 lbs<br>751 kg | 24<br>pallets | 24<br>pallets | 32<br>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

# 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 / NEMA6P  |                                       |  |                                  |                                  |                                   |         |
| 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

# 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.



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:

- [Eaton's Volume 2-Commercial Distribution](#)
- [Eaton Specification Sheet - DG222NRB](#)

### Certifications:

- UL Listed



# 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<br>3300 @ 208V | 5000        | 6000 @ 240V<br>5000 @ 208V | 7600  | 10000                               | 11400 @ 240V<br>10000 @ 208V | VA      |         |
| Maximum AC Power Output  | 3000  | 3800 @ 240V<br>3300 @ 208V | 5000        | 6000 @ 240V<br>5000 @ 208V | 7600  | 10000                               | 11400 @ 240V<br>10000 @ 208V | VA      |         |
| AC Output Voltage Min.-Nom.-Max.<br>(211 - 240 - 264)                        | ✓   | ✓                          | ✓           | ✓                          | ✓     | ✓                                   | ✓                            | Vac     |         |
| AC Output Voltage Min.-Nom.-Max.<br>(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,<br>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<br>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 AFCl 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



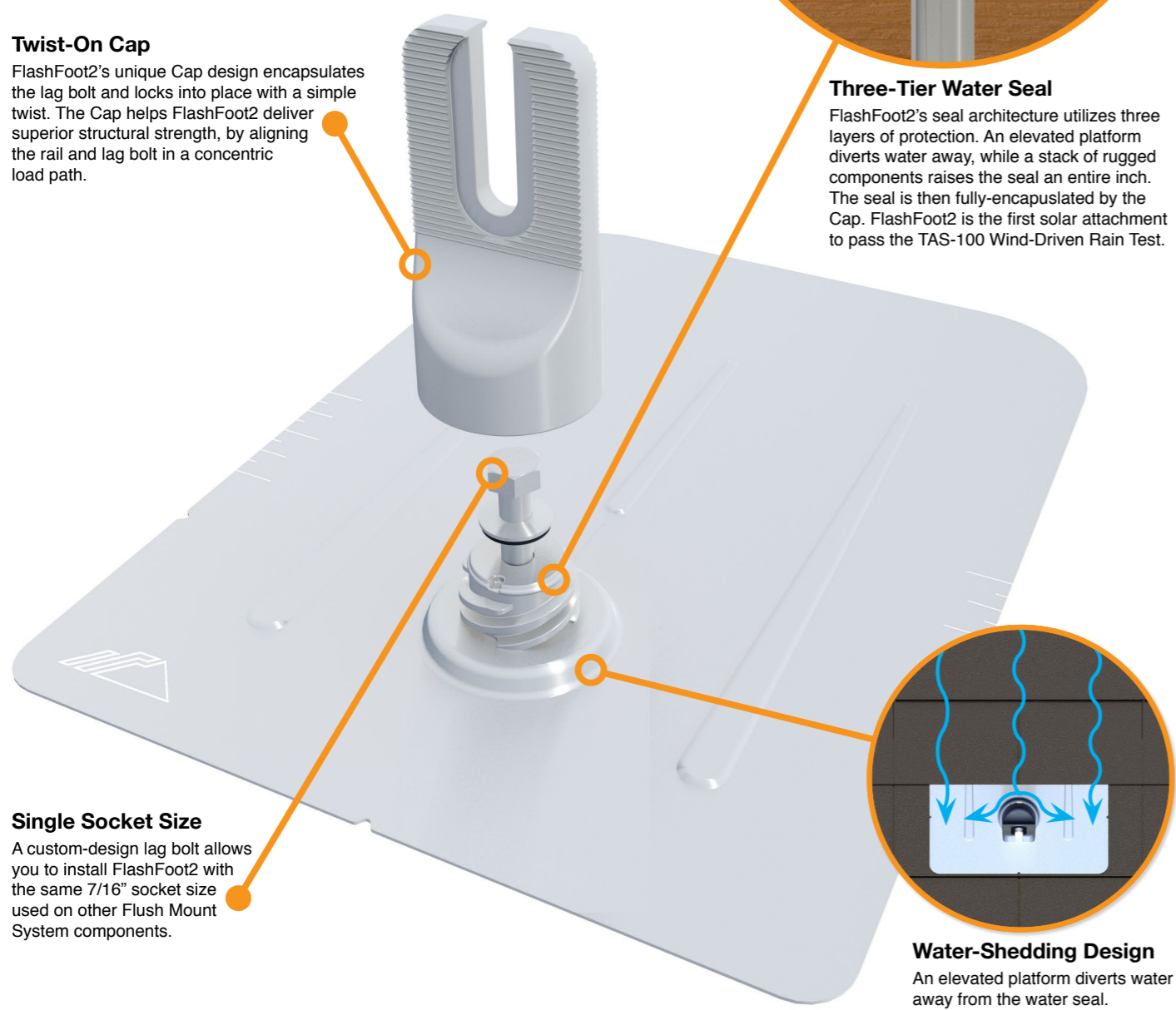
# FlashFoot2

## 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.

### 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.



### 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-encapsulated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

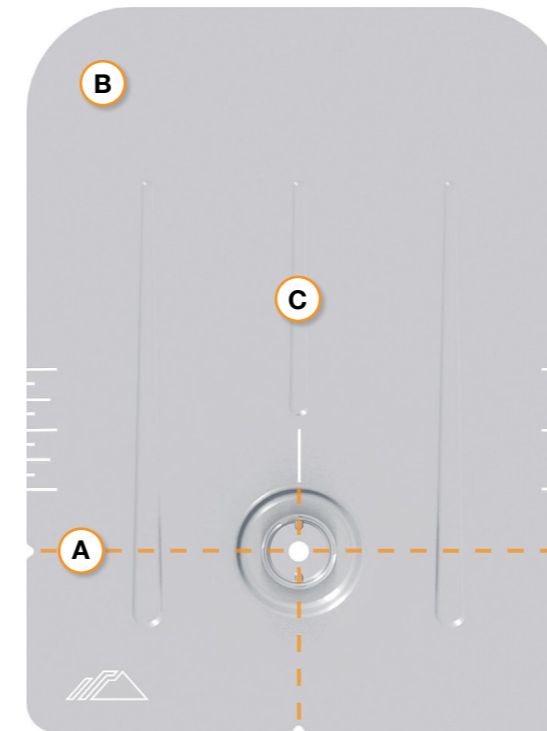
### Single Socket Size

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.

## 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.

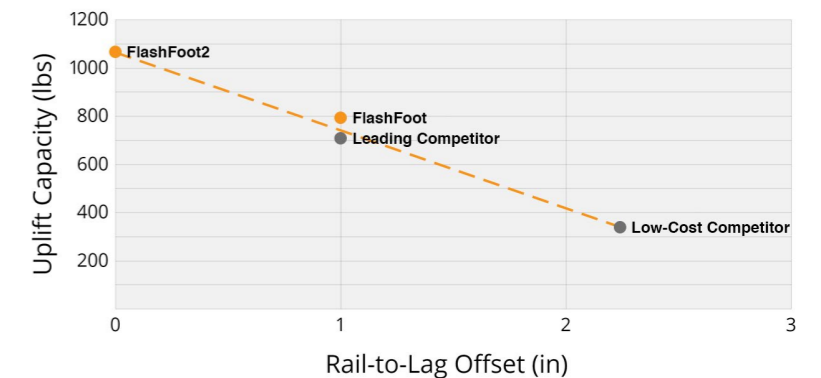
### C Reinforcement Ribs

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.

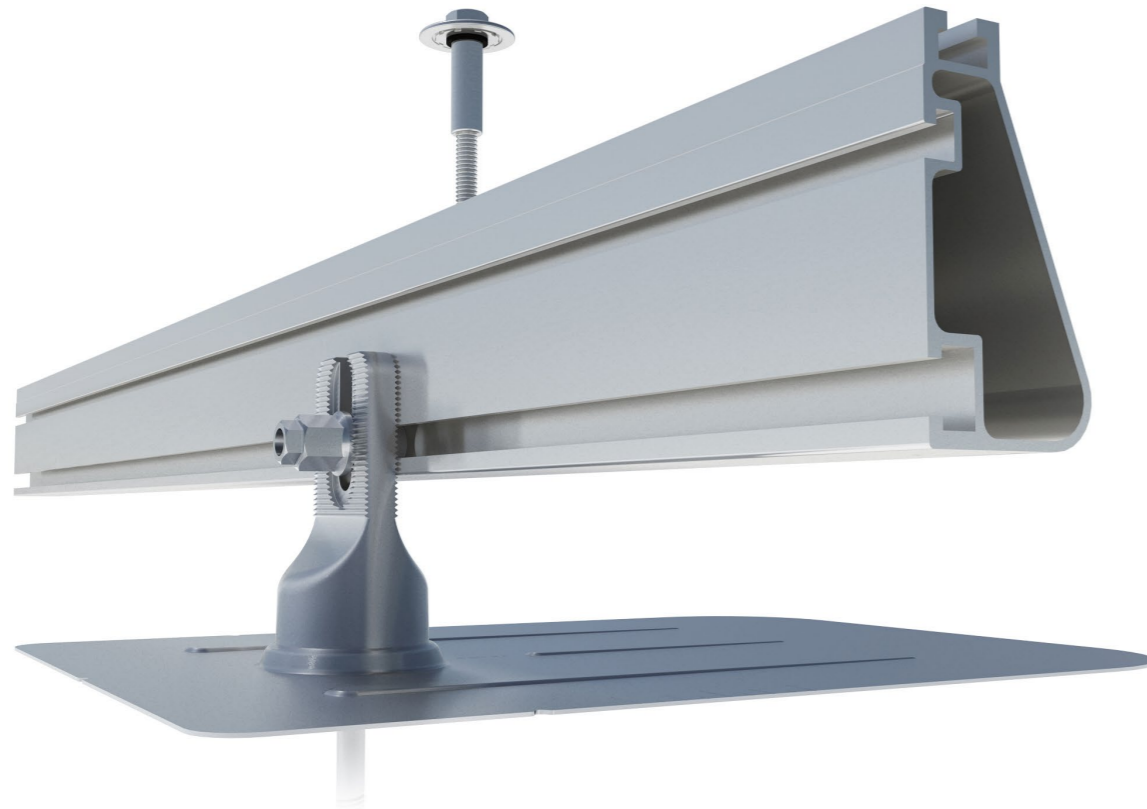
### Water Seal Ratings

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.

# 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.

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

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

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

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

**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

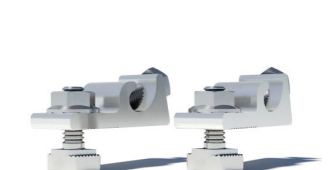
### CAMO



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



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

**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