

# PROJECT DESCRIPTION:

24 X 320 HANWHA QCELL Q.PEAK DUO-G5 320 MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 7.68 kW DC STC  
 ARRAY AREA: ROOF#1 - 290.24 SQ FT  
 ARRAY AREA: ROOF#2 - 108.84 SQ FT  
 ARRAY AREA: ROOF#3 - 36.28 SQ FT

## AUTHORITIES HAVING JURISDICTION

BUILDING : HARNETT COUNTY  
 ZONING : HARNETT COUNTY  
 UTILITY : SOUTH RIVER EMC

## EQUIPMENT SUMMARY

24 HANWHA QCELL Q.PEAK DUO-G5 320 MODULES  
 04 GENERAC PV LINK S2502 POWER OPTIMIZERS  
 01 GENERAC PWRCELL X7602 INVERTER

## APPLICABLE CODES & STANDARDS

NCBC 2018  
 NEC 2017

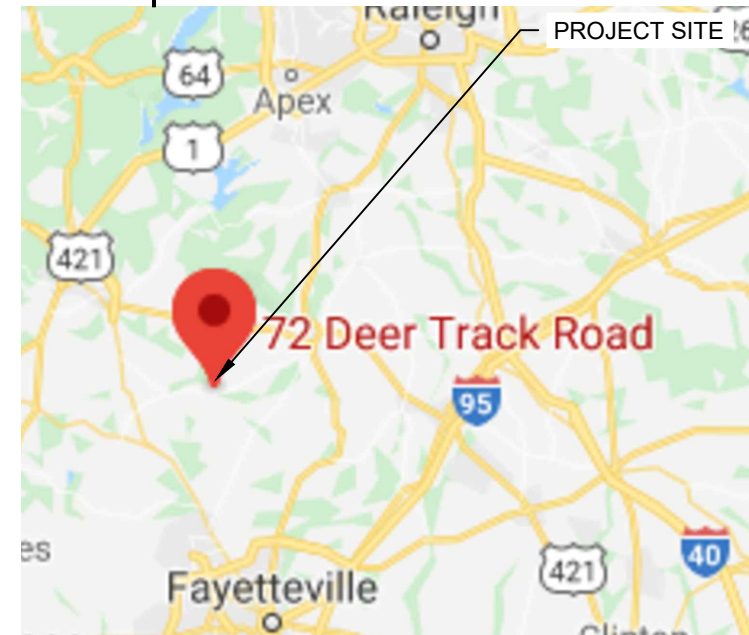
## DESIGN SPECIFICATIONS

OCCUPANCY : II  
 CONSTRUCTION : SINGLE-FAMILY  
 ZONING : RESIDENTIAL  
 GROUND SNOW LOAD : SEE STRUCTURAL LETTER  
 WIND EXPOSURE : SEE STRUCTURAL LETTER  
 WIND SPEED : SEE STRUCTURAL LETTER



**2 HOUSE PHOTO**

PV-1 SCALE: NTS

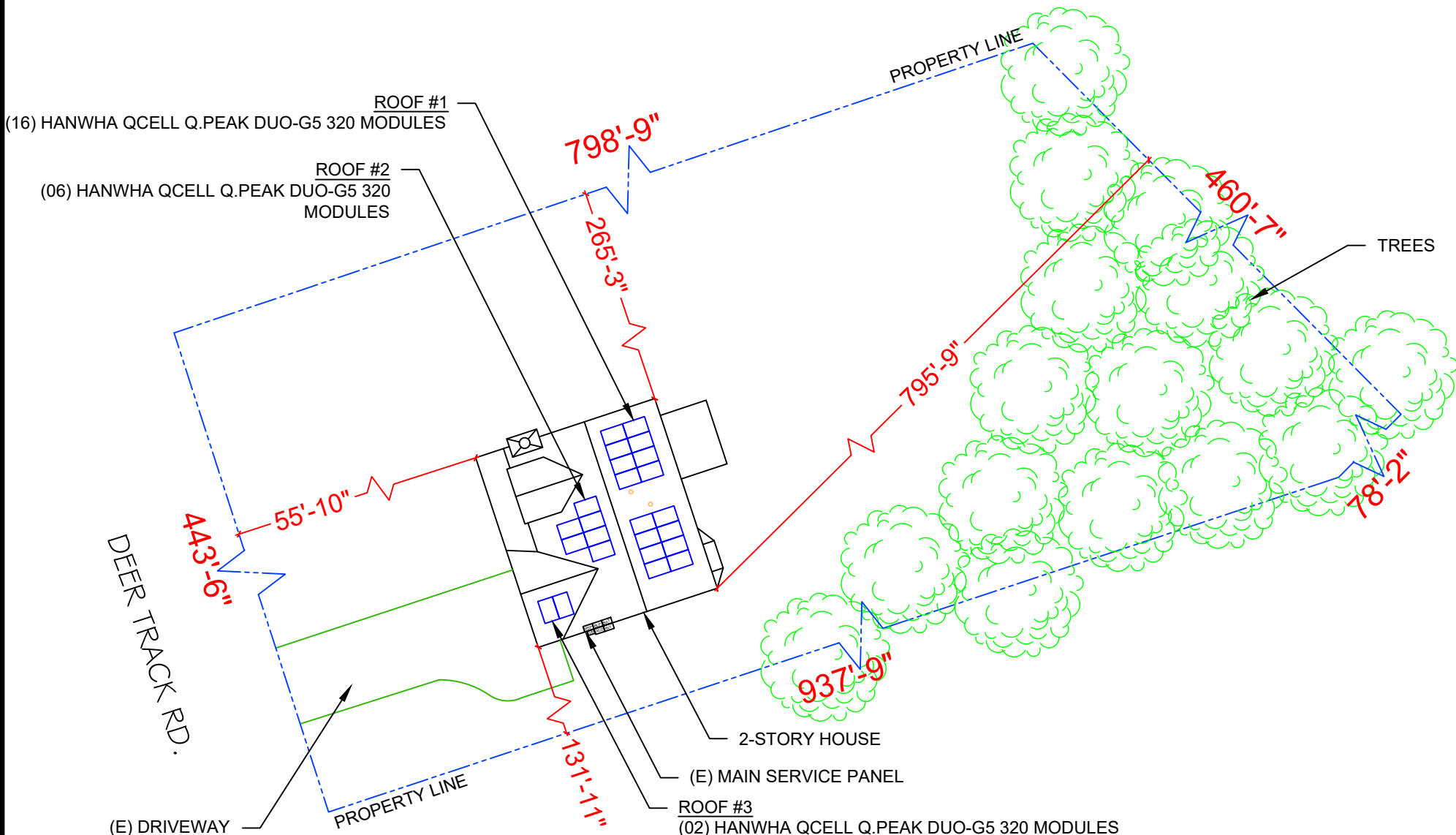


**3 VICINITY MAP**

PV-1 SCALE: NTS

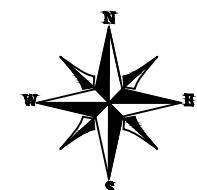
## SHEET INDEX

PV-1 PLOT PLAN & VICINITY MAP  
 PV-2 ROOF PLAN & MODULES  
 PV-2A STRING LAYOUT  
 PV-3 ATTACHMENT DETAIL  
 PV-4 ELECTRICAL LINE DIAGRAM  
 PV-5 WIRING CALCULATIONS  
 PV-6 to 12 EQUIPMENT SPECIFICATIONS



**1 PLOT PLAN & VICINITY MAP**

PV-1 SCALE: 1/30"=1'-0"



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Signature with Seal  
 DATE: 09/02/2020

PROJECT NAME & ADDRESS  
**DONALD BRYAN JONES**  
**RESIDENCE**  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

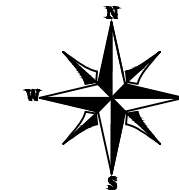
SHEET NAME  
**PLOT PLAN & VICINITY MAP**

SHEET SIZE  
**ANSI B**  
**11" X 17"**

SHEET NUMBER  
**PV-1**

# MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 24 MODULES  
 MODULE TYPE = HANWHA QCELL Q.PEAK DUO-G5 320 MODULES  
 MODULE WEIGHT = 41.2 LBS / 18.7 KG.  
 MODULE DIMENSIONS = 66.3"x 39.4" = 18.14 SF  
 UNIT WEIGHT OF ARRAY = 2.27 PSF



| ROOF DESCRIPTION |           |         |                       |                 |
|------------------|-----------|---------|-----------------------|-----------------|
| ROOF TYPE        |           |         | COMPOSITION SHINGLE   |                 |
| ROOF             | ROOF TILT | AZIMUTH | FRAMING SIZE          | FRAMING SPACING |
| #1               | 26.57°    | 72°     | SEE STRUCTURAL LETTER |                 |
| #2               | 26.57°    | 252°    |                       |                 |
| #3               | 26.57°    | 162°    |                       |                 |

| ARRAY AREA & ROOF AREA CALC'S |              |                      |                     |                                |
|-------------------------------|--------------|----------------------|---------------------|--------------------------------|
| ROOF                          | # OF MODULES | ARRAY AREA (Sq. Ft.) | ROOF AREA (Sq. Ft.) | ROOF AREA COVERED BY ARRAY (%) |
| #1                            | 16           | 290.24               | 690.24              | 42                             |
| #2                            | 06           | 108.84               | 532.61              | 20                             |
| #3                            | 02           | 36.28                | 140.22              | 26                             |

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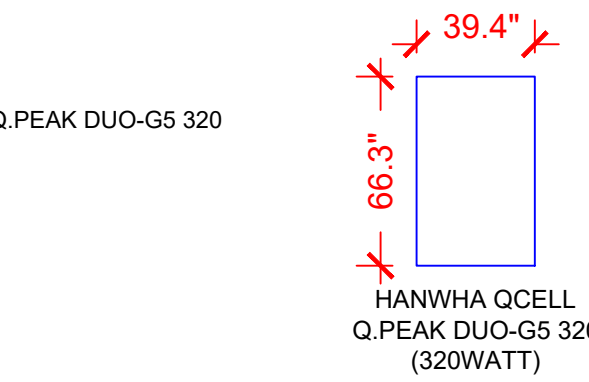
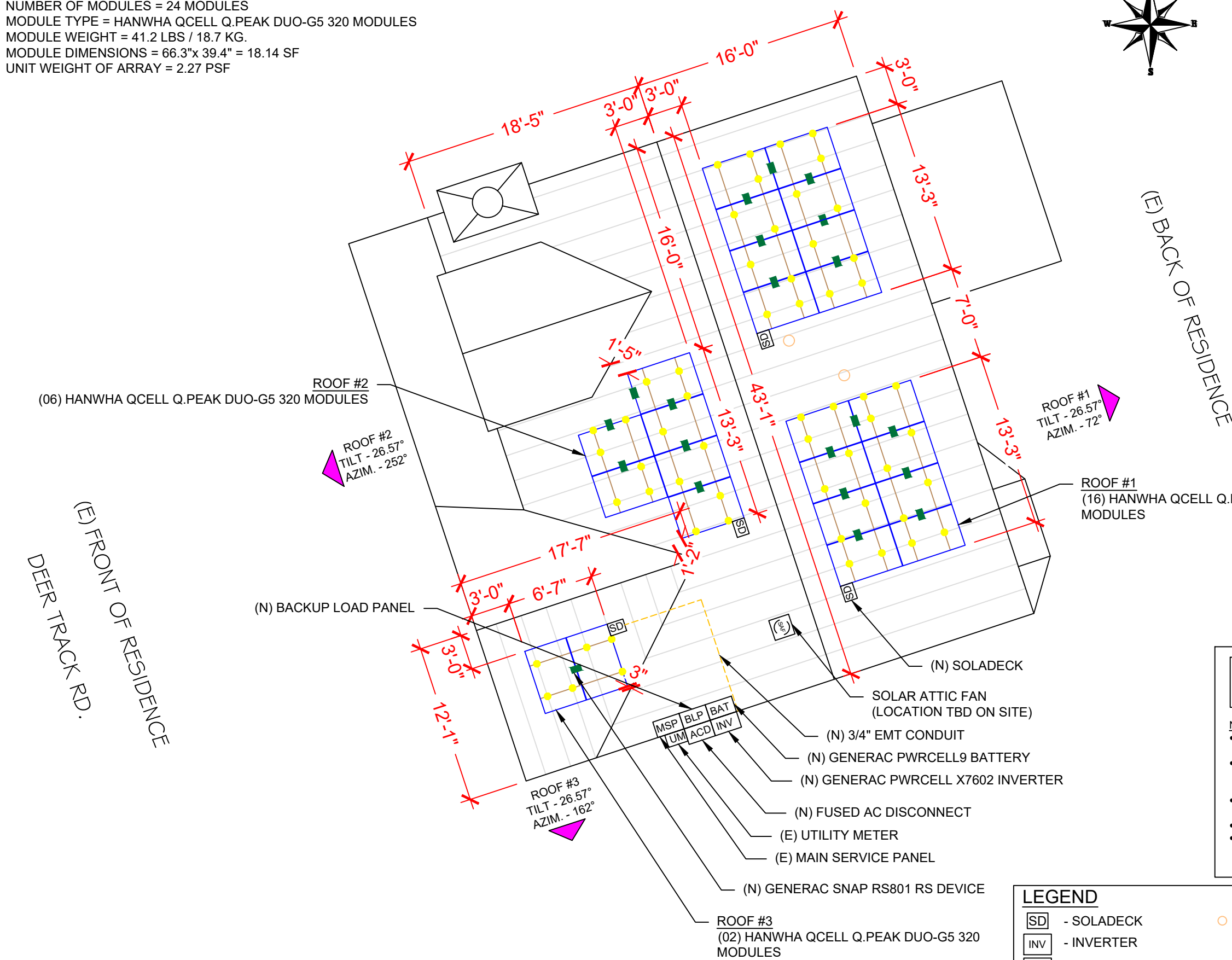
PROJECT NAME & ADDRESS

**DONALD BRYAN JONES  
 RESIDENCE**  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

SHEET NAME  
**ROOF PLAN & MODULES**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-2**



**(SAF) SOLAR ATTIC FAN**

**NOTES:**

- THE LOCATION OF THE SAF SHOULD BE DETERMINED ON SITE.
- THE SAF SHOULD BE LOCATED 30"-36" FROM THE PEAK OF THE ROOF OR ABOUT 5 ROWS DOWN FROM THE RIDGE.
- THE SAF SHOULD NOT BE MOUNTED ON ANY STRUCTURAL MEMBER LIKE TRUSS/RAFTER.
- "CAN VENTS" CAN BE REPLACED BY SAF.
- SAF CANNOT BE MOUNTED ON A METAL ROOF. PLEASE CARRY GABLE VENT FANS FOR METAL ROOF INSTALLATION (IF APPLICABLE).

| LEGEND               |                                      |
|----------------------|--------------------------------------|
| - SOLADECK           | - VENT, ATTIC FAN (ROOF OBSTRUCTION) |
| - INVERTER           | - ROOF ATTACHMENT                    |
| - AC DISCONNECT      | - RAFTERS                            |
| - MAIN SERVICE PANEL | - CONDUIT                            |
| - BACKUP LOAD PANEL  | - BATTERY                            |
| - PV LINK OPTIMIZER  | - RAPID SHUTDOWN                     |



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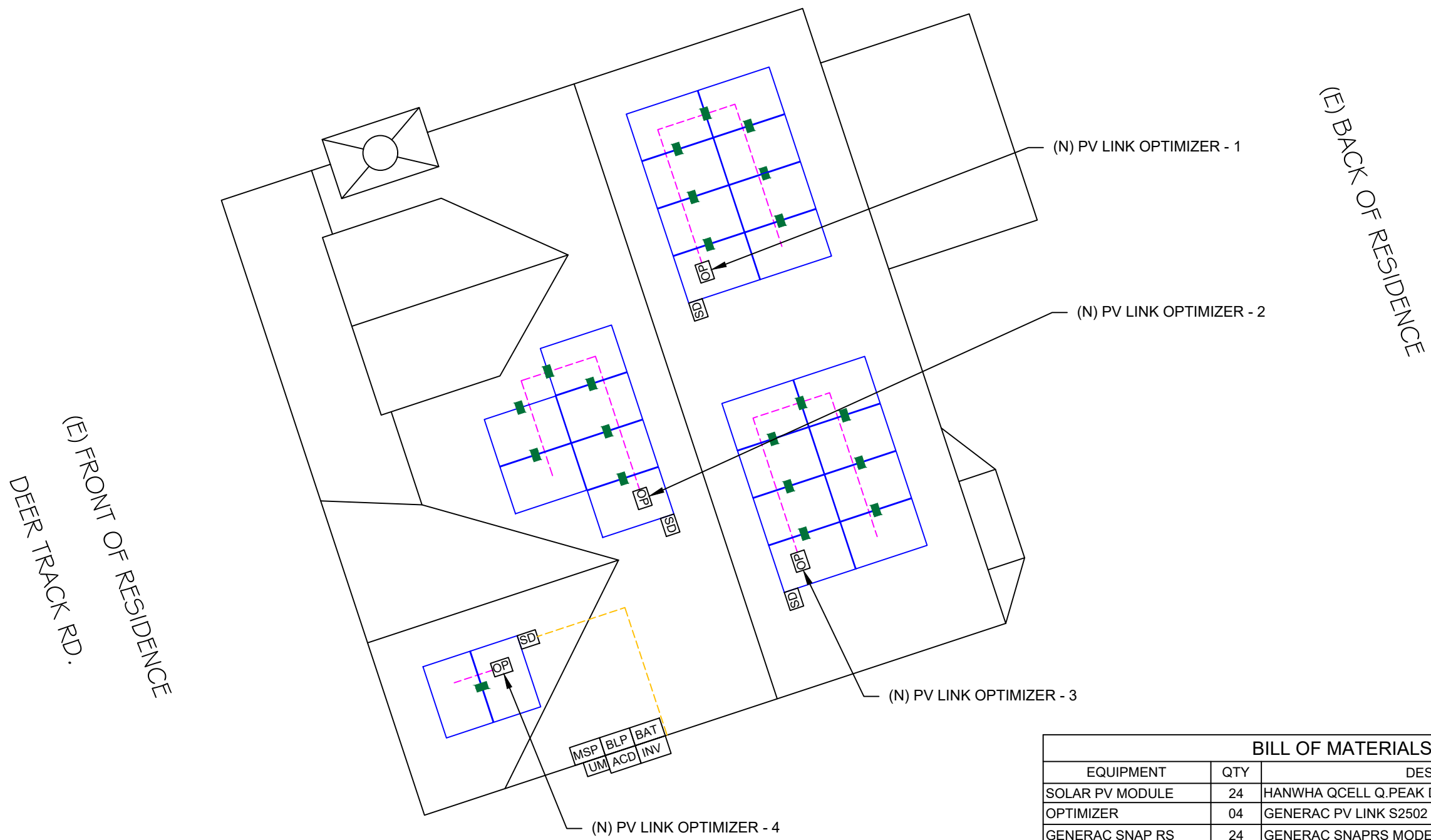
PROJECT NAME & ADDRESS

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**RESIDENCE**  
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 LILLINGTON, NC 27546

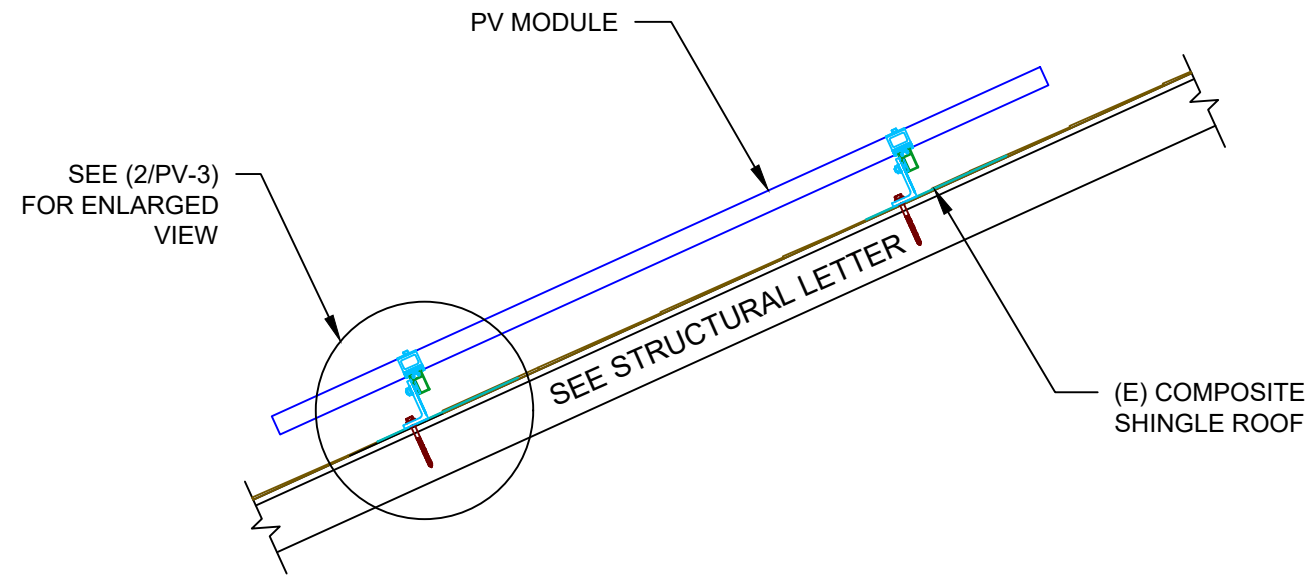
SHEET NAME  
**STRING LAYOUT**

SHEET SIZE  
**ANSI B  
 11" X 17"**

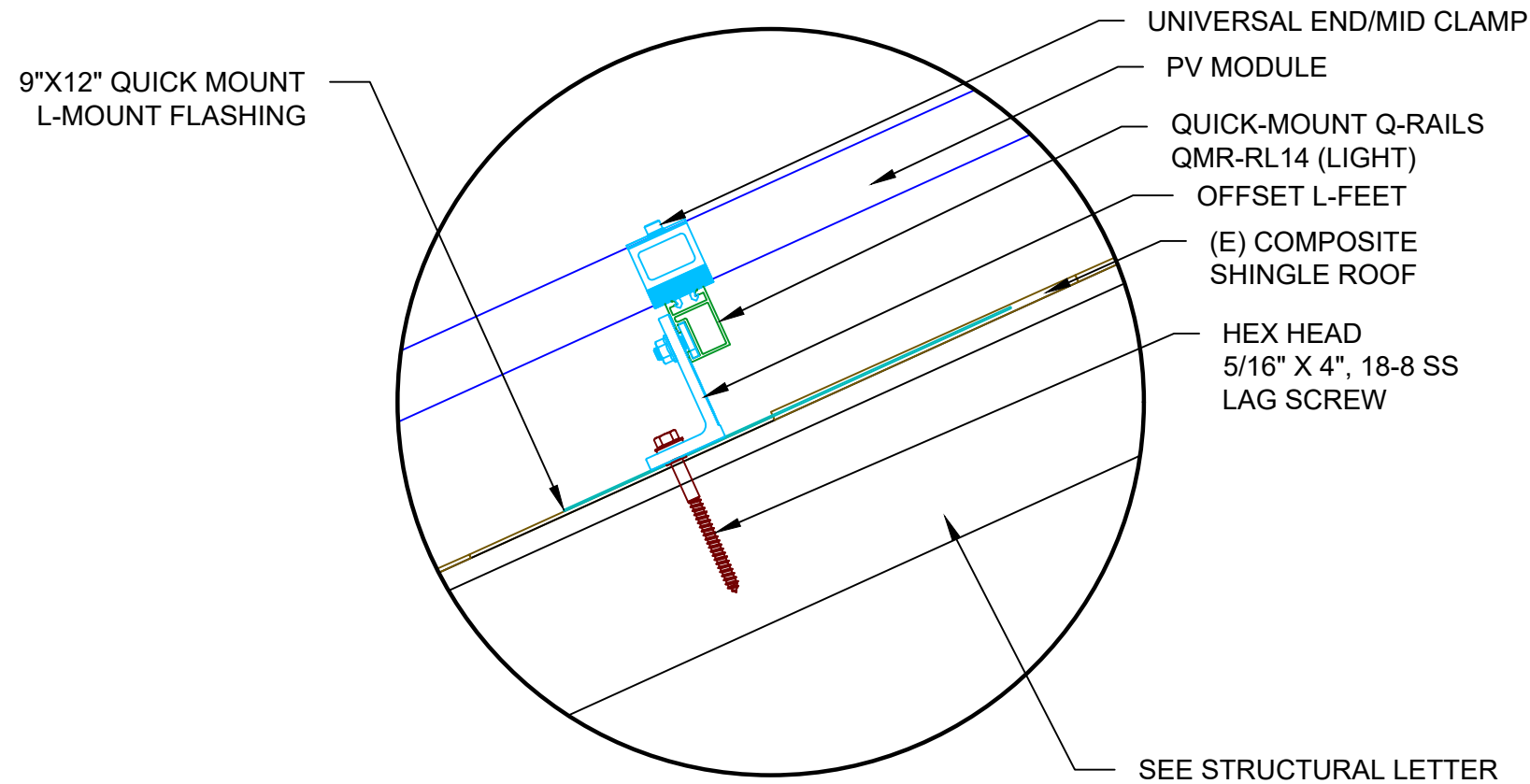
SHEET NUMBER  
**PV-2A**



| BILL OF MATERIALS |     |  |
|-------------------|-----|--|
| EQUIPMENT         | QTY | DESCRIPTION  |
| SOLAR PV MODULE   | 24  | HANWHA QCELL Q.PEAK DUO-G5 320 MODULES             |
| OPTIMIZER         | 04  | GENERAC PV LINK S2502 POWER OPTIMIZERS             |
| GENERAC SNAP RS   | 24  | GENERAC SNAPRS MODEL RS801                         |
| INVERTER          | 01  | GENERAC PWRCELL X7602 INVERTER                     |
| AC DISCONNECT     | 1   | 60A FUSED, (2) 40A FUSES, 240V, NEMA 3R, UL LISTED |
| SOLADECK          | 4   | SOLADECKS 600 V, NEMA 3R, UL LISTED                |
| BATTERY           | 1   | GENERAC PWRCELL9 BATTERY                           |
| BACKUP PANEL      | 1   | 125A, BACKUP PANEL, 240V                           |
| RAILS             | 12  | QRAIL LIGHT 14 FT. BLACK                           |
| SPLICE KIT        | 0   | QSPLICE INTERNAL LIGHT                             |
| WEEB BMC          | 0   | WEEB BMC MILL                                      |
| MODULE CLAMPS     | 34  | UNIVERSAL MID CLAMP                                |
| GROUNDING LUG     | 7   | WEEB LUG W/ T-BOLT                                 |
| END CLAMPS        | 28  | UNIVERSAL END CLAMPS                               |
| ATTACHMENT        | 59  | L-MOUNT ATTACHMENT (QUICKMOUNT)                    |
| T-BOLT            | 63  | T-BOLT W/ NUT M8 X 20MM                            |



**1** | **STRUCTURAL ATTACHMENT (SIDE VIEW)**  
 PV-3 | SCALE: NTS



**2** | **ATTACHMENT DETAIL (enlarged view)**  
 PV-3 | SCALE: NTS

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PROJECT NAME & ADDRESS  
  
**DONALD BRYAN JONES**  
**RESIDENCE**  
 72 DEER TRACK RD.,  
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SHEET NAME  
**ATTACHMENT  
 DETAIL**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-3**

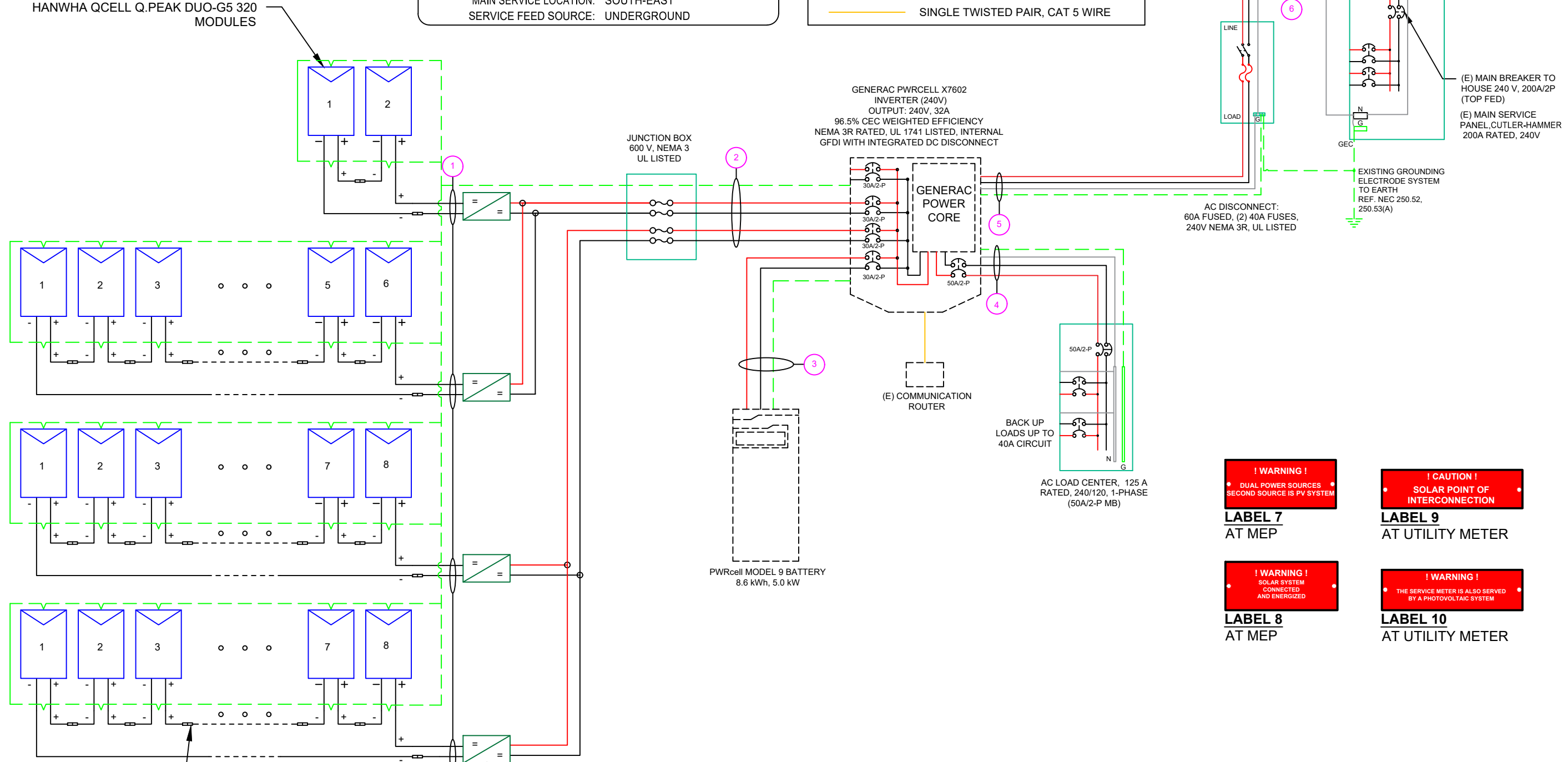
- (24) HANWHA QCELL Q.PEAK DUO-G5 320 MODULES
- (1) PV LINK OF 02 MODULES &
- (1) PV LINK OF 06 MODULES &
- (2) PV LINKS OF 08 MODULES CONNECTED IN SERIES

**SERVICE INFO**

UTILITY PROVIDER: SOUTH RIVER EMC  
 MAIN SERVICE VOLTAGE: 240V  
 MAIN PANEL BRAND: CUTLER-HAMMER  
 MAIN SERVICE PANEL: 200A  
 MAIN CIRCUIT BREAKER RATING: 200A  
 MAIN SERVICE LOCATION: SOUTH-EAST  
 SERVICE FEED SOURCE: UNDERGROUND

**WIRE LEGEND**

- PV ARRAY +VE CONDUCTOR AND L1
- PV ARRAY -VE CONDUCTOR AND L2
- NEUTRAL CONDUCTOR
- - - EGC AND GEC
- SINGLE TWISTED PAIR, CAT 5 WIRE

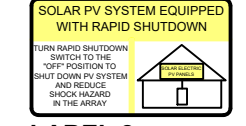


SNAP RS (RS801)  
 MAX INPUT CURRENT - 13 A  
 UL 1741 LISTED  
 MODULE LEVEL RAPID  
 SHUTDOWN (PVRSS)  
 COMPLIANT  
 NEMA 6P RATED

PVLINK SUBSTRING OPTIMIZER (S2502)  
 RATED POWER : 2500W  
 MPPT VOLTAGE RANGE: 60 TO 360 V  
 MAX OUTPUT VOLTAGE: 420V  
 MAX OUTPUT CURRENT: 8A  
 RAPID SHUTDOWN COMPLIANT  
 GROUND-FAULT PROTECTION COMPLIANT

**! WARNING !**  
 PHOTOVOLTAIC  
 POWER SOURCE

**LABEL 1**  
 ON ALL CONDUITS  
 SPACED AT MAX 10FT



**LABEL 2**  
 AT INVERTER

**! CAUTION !**  
 SOLAR ELECTRIC  
 SYSTEM CONNECTED  
 AND ENERGIZED

**LABEL 3**  
 AT INVERTER

**! PHOTOVOLTAIC  
 DC DISCONNECT**

**LABEL 4**  
 AT EACH DC  
 DISCONNECT

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

**LABEL 5**  
 AT EACH AC  
 DISCONNECT

**! PHOTOVOLTAIC  
 AC DISCONNECT**

**LABEL 6**  
 AT EACH AC  
 DISCONNECT

**! WARNING !**  
 DUAL POWER SOURCES  
 SECOND SOURCE IS PV SYSTEM

**LABEL 7**  
 AT MEP

**! CAUTION !**  
 SOLAR POINT OF  
 INTERCONNECTION

**LABEL 9**  
 AT UTILITY METER

**! WARNING !**  
 SOLAR SYSTEM  
 CONNECTED  
 AND ENERGIZED

**LABEL 8**  
 AT MEP

**! WARNING !**  
 THE SERVICE METER IS ALSO SERVED  
 BY A PHOTOVOLTAIC SYSTEM

**LABEL 10**  
 AT UTILITY METER

| QTY | CONDUCTOR INFORMATION           | CONDUIT TYPE         | CONDUIT SIZE |
|-----|---------------------------------|----------------------|--------------|
| (8) | #10AWG - PV WIRE/USE-2          | N/A                  | N/A          |
| (1) | #6AWG - BARE COPPER IN FREE AIR | N/A                  | N/A          |
| (4) | #10AWG - THWN-2                 | EMT OR FLEX IN ATTIC | 3/4"         |
| (1) | #6AWG - THWN-2 GND              | EMT OR FLEX          | 3/4"         |
| (2) | #10AWG - THWN-2                 | EMT OR FLEX          | 3/4"         |
| (1) | #10AWG - THWN-2 GND             | EMT OR FLEX          | 3/4"         |
| (3) | #6AWG - THWN-2                  | EMT OR FLEX          | 3/4"         |
| (1) | #6AWG - THWN-2 GND              | EMT OR FLEX          | 3/4"         |
| (3) | #6AWG - THWN-2                  | EMT OR FLEX          | 3/4"         |
| (1) | #6AWG - THWN-2 GND              | EMT OR FLEX          | 3/4"         |
| (3) | #6AWG - THWN-2                  | EMT OR FLEX          | 3/4"         |

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Signature with Seal

DATE: 09/02/2020

PROJECT NAME & ADDRESS

**DONALD BRYAN JONES**  
 RESIDENCE  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

SHEET NAME  
**ELECTRICAL LINE  
 DIAGRAM**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-4**

| SOLAR MODULE SPECIFICATIONS |  |
|-----------------------------|--|
| MANUFACTURER / MODEL #      | HANWHA QCELL Q.PEAK DUO-G5 320 MODULES |
| VMP                         | 33.32V                                 |
| IMP                         | 9.60A                                  |
| VOC                         | 40.13V                                 |
| ISC                         | 10.09A                                 |
| TEMP. COEFF. VOC            | -0.28%/°C                              |
| PTC RATING                  | 297W                                   |
| MODULE DIMENSION            | 66.3"L x 39.4"W x 1.26"D (In Inch)     |

| AMBIENT TEMPERATURE SPECS   |      |
|-----------------------------|------|
| RECORD LOW TEMP             | -20° |
| AMBIENT TEMP (HIGH TEMP 2%) | 34°  |
| CONDUIT HEIGHT              | 0.5" |
| ROOF TOP TEMP               | 56°  |

**DC CONDUCTOR AMPACITY CALCULATIONS:  
ARRAY TO JUNCTION BOX:**

|  |        |
|--|--------|
| EXPECTED WIRE TEMP (In Celsius)                        | 56°    |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)        | 0.71   |
| NO. OF CURRENT CARRYING CONDUCTORS                     | 8      |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)  | 0.7    |
| CIRCUIT CONDUCTOR SIZE                                 | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A    |

|   |        |
|---|--------|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)  | 10A    |
| 1.25 X I <sub>max</sub>   |        |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR   | 19.88A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X<br>CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X<br>CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) |        |
| Result should be greater than (10A) otherwise less the entry for circuit conductor size and ampacity  |        |

**FROM JUNCTION BOX TO INVERTER:**

|  |        |
|--|--------|
| EXPECTED WIRE TEMP (In Celsius)                        | 56°    |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)        | 0.71   |
| NO. OF CURRENT CARRYING CONDUCTORS                     | 4      |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)  | 0.8    |
| CIRCUIT CONDUCTOR SIZE                                 | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A    |

|   |        |
|---|--------|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)  | 20A    |
| 1.25 X I <sub>max</sub> X # of PV LINKS   |        |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR   | 22.72A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X<br>CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X<br>CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) |        |
| Result should be greater than (20A) otherwise less the entry for circuit conductor size and ampacity  |        |

| INVERTER SPECIFICATIONS               |                       |
|---------------------------------------|-----------------------|
| MANUFACTURER / MODEL #                | GENERAC PWRCELL X7602 |
| AC POWER OUTPUT (LOADS/GRID)          | 7600VA                |
| AC POWER OUTPUT (BACKUP)              | 8000VA                |
| NOMINAL OUTPUT VOLTAGE                | 240 VAC               |
| MAX OUTPUT CURRENT @240V (LOADS/GRID) | 32A                   |
| MAX OUTPUT CURRENT @240V (BACKUP)     | 50A                   |
| NOMINAL DC INPUT VOLTAGE              | 380Vdc                |
| MAX DC INPUT VOLTAGE                  | 420Vdc                |
| CEC WEIGHTED EFFICIENCY               | 96.5%                 |
| MAX DC POWER (PV)                     | 10000W                |
| MAX INPUT CURRENT (PV)                | 20Adc                 |
| CONT. PEAK POWER (BATTERY)            | 8000W                 |

| SERIES SUB STRING OPTIMIZER SPECIFICATIONS |               |
|--|---------------|
| MANUFACTURER / MODEL #                     | PV LINK S2502 |
| RATED POWER                                | 2500W         |
| MPPT VOLTAGE RANGE                         | 60-360 Vmp    |
| MAXIMUM INPUT VOLTAGE                      | 420Voc        |
| MAXIMUM OUTPUT                             | 420 Adc       |
| NOMINAL OUTPUT                             | 380 Vdc       |
| MAXIMUM OUTPUT CURRENT                     | 8 A           |
| MAXIMUM SHORT CIRCUIT CURRENT              | 18 A          |

| BATTERY SPECIFICATIONS       |                         |
|------------------------------|-------------------------|
| MANUFACTURER / MODEL #       | GENERAC PWRCELL BATTERY |
| USABLE ENERGY                | 8.6kW                   |
| RATED CONTINUOUS POWER       | 3.4Kw                   |
| POWER: 60 MINUTES            | 4.2kW                   |
| POWER: 2 MINUTES             | 5.0kW                   |
| REBUS VOLTAGE: INPUT/ OUTPUT | 360-420Vdc              |
| MODULE VOLTAGE               | 46.8Vdc                 |
| ROUND-TRIP EFFICIENCY        | 96.5%                   |

**ELECTRICAL NOTES**

- 1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- 3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- 4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- 6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- 7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- 8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- 9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
- 10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

**FROM BATTERY TO INVERTER:**

|  |        |
|--|--------|
| EXPECTED WIRE TEMP (In Celsius)                        | 34°    |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)        | 0.96   |
| NO. OF CURRENT CARRYING CONDUCTORS                     | 3      |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)  | 1      |
| CIRCUIT CONDUCTOR SIZE                                 | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A    |

|   |        |
|---|--------|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)  | 26.25A |
| 1.25 X I <sub>max</sub>   |        |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR   | 38.40A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X<br>CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X<br>CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) |        |
| Result should be greater than (26.25A) otherwise less the entry for circuit conductor size and ampacity   |        |

**AC CONDUCTOR AMPACITY CALCULATIONS:  
FROM INVERTER TO BACK-UP PANEL:**

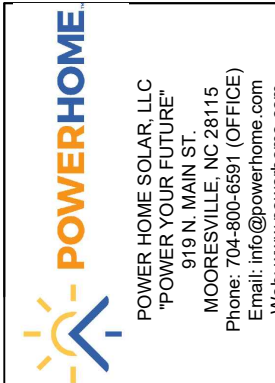
|  |       |
|--|-------|
| No. OF INVERTER  | 1     |
| EXPECTED WIRE TEMP (In Celsius)                        | 34°   |
| TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)         | 0.96  |
| NO. OF CURRENT CARRYING CONDUCTORS                     | 3     |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)  | 1     |
| CIRCUIT CONDUCTOR SIZE                                 | 6 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 75A   |

|   |       |
|---|-------|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)  | 42.5A |
| 1.25 X INVERTER OUTPUT CURRENT (BACKUP POWER)   |       |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR   | 72A   |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X<br>CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X<br>CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) |       |
| Result should be greater than (42.5A) otherwise less the entry for circuit conductor size and ampacity  |       |

**AC CONDUCTOR AMPACITY CALCULATIONS:  
FROM INVERTER TO MEP:**

|  |       |
|--|-------|
| No. OF INVERTER  | 1     |
| EXPECTED WIRE TEMP (In Celsius)                        | 34°   |
| TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)         | 0.96  |
| NO. OF CURRENT CARRYING CONDUCTORS                     | 3     |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)  | 1     |
| CIRCUIT CONDUCTOR SIZE                                 | 6 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 75A   |

|   |     |
|---|-----|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)  | 40A |
| 1.25 X MAX INVERTER OUTPUT CURRENT (LOADS/GRID)   |     |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR   | 72A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X<br>CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X<br>CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) |     |
| Result should be greater than (40A) otherwise less the entry for circuit conductor size and ampacity  |     |



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Signature with Seal

DATE: 09/02/2020

PROJECT NAME & ADDRESS

**DONALD BRYAN JONES**  
**RESIDENCE**  
72 DEER TRACK RD.,  
LILLINGTON, NC 27546

SHEET NAME  
**WIRING  
CALCULATIONS**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-5**



The new Q.PEAK DUO-G5 solar module from Q CELLS impresses thanks to innovative Q.ANTUM DUO Technology, which enables particularly high performance on a small surface. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions - both with low-intensity solar radiation as well as on hot, clear summer days.

- Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY**  
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.9%.
- INNOVATIVE ALL-WEATHER TECHNOLOGY**  
Optimal yields, whatever the weather with excellent low-light and temperature behavior.
- ENDURING HIGH PERFORMANCE**  
Long-term yield security with Anti LID and Anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.
- EXTREME WEATHER RATING**  
High-tech aluminum alloy frame, certified for high snow (5400Pa) and wind loads (4000Pa) regarding IEC.
- A RELIABLE INVESTMENT**  
Inclusive 12-year product warranty and 25-year linear performance guarantee<sup>2</sup>.
- STATE OF THE ART MODULE TECHNOLOGY**  
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

THE IDEAL SOLUTION FOR:



Engineered in Germany

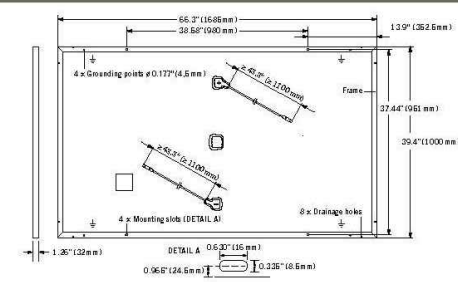


<sup>1</sup> APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168 h)  
<sup>2</sup> See data sheet on rear for further information.



MECHANICAL SPECIFICATION

|                     |   |
|---------------------|---|
| <b>Format</b>       | 66.3 in × 39.4 in × 1.26 in (including frame)<br>(1685 mm × 1000 mm × 32 mm)                        |
| <b>Weight</b>       | 41.2 lbs (18.7 kg)  |
| <b>Front Cover</b>  | 0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology                       |
| <b>Back Cover</b>   | Composite film  |
| <b>Frame</b>        | Black anodized aluminum   |
| <b>Cell</b>         | 6 × 20 monocrystalline Q.ANTUM solar half-cells   |
| <b>Junction box</b> | 2.76-3.35 in × 1.97-2.76 in × 0.51-0.83 in<br>(70-85 mm × 50-70 mm × 13-21 mm), decentralized, IP67 |
| <b>Cable</b>        | 4 mm <sup>2</sup> Solar cable; (+) ≥ 43.3 in (1100 mm), (-) ≥ 43.3 in (1100 mm)                     |
| <b>Connector</b>    | Multi-Contact MC4, IP68   |

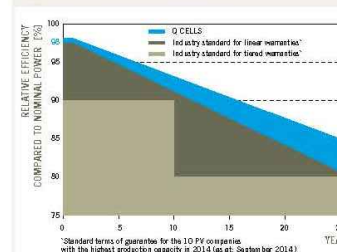


ELECTRICAL CHARACTERISTICS

| POWER CLASS   |  | 315                        | 320    | 325    | 330    |        |
|---|--|----------------------------|--------|--------|--------|--------|
| MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC <sup>1</sup> (POWER TOLERANCE +5 W / -0 W) |  |                            |        |        |        |        |
| Minimum   | <b>Power at MPP<sup>1</sup></b>          | <b>P<sub>MPP</sub></b> [W] | 315    | 320    | 325    | 330    |
|   | <b>Short Circuit Current<sup>1</sup></b> | <b>I<sub>sc</sub></b> [A]  | 10.04  | 10.09  | 10.14  | 10.20  |
|   | <b>Open Circuit Voltage<sup>1</sup></b>  | <b>V<sub>oc</sub></b> [V]  | 39.87  | 40.13  | 40.40  | 40.66  |
|   | <b>Current at MPP<sup>1</sup></b>        | <b>I<sub>MPP</sub></b> [A] | 9.55   | 9.60   | 9.66   | 9.71   |
|   | <b>Voltage at MPP<sup>1</sup></b>        | <b>V<sub>MPP</sub></b> [V] | 32.98  | 33.32  | 33.65  | 33.98  |
|   | <b>Efficiency<sup>1</sup></b>            | <b>η</b> [%]               | ≥ 18.7 | ≥ 19.0 | ≥ 19.3 | ≥ 19.6 |
| MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT <sup>2</sup>                           |  |                            |        |        |        |        |
| Minimum   | <b>Power at MPP</b>                      | <b>P<sub>MPP</sub></b> [W] | 235.3  | 239.0  | 242.8  | 246.5  |
|   | <b>Short Circuit Current</b>             | <b>I<sub>sc</sub></b> [A]  | 8.09   | 8.13   | 8.17   | 8.22   |
|   | <b>Open Circuit Voltage</b>              | <b>V<sub>oc</sub></b> [V]  | 37.52  | 37.77  | 38.02  | 38.27  |
|   | <b>Current at MPP</b>                    | <b>I<sub>MPP</sub></b> [A] | 7.52   | 7.56   | 7.60   | 7.64   |
|   | <b>Voltage at MPP</b>                    | <b>V<sub>MPP</sub></b> [V] | 31.30  | 31.62  | 31.94  | 32.25  |

<sup>1</sup> Measurement tolerances P<sub>MPP</sub> ± 3%; I<sub>sc</sub>, V<sub>oc</sub> ± 5% at STC: 1000 W/m<sup>2</sup>, 25 ± 2°C, AM 1.5 G according to IEC 60904-3 - 800 W/m<sup>2</sup>, NMOT, spectrum AM 1.5 G

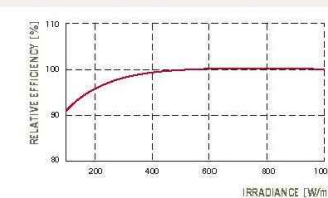
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% 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 organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m<sup>2</sup>).

TEMPERATURE COEFFICIENTS

|   |                |       |  |                  |                      |
|---|----------------|-------|--|------------------|----------------------|
| <b>Temperature Coefficient of I<sub>sc</sub></b>  | <b>α</b> [%/K] | +0.04 | <b>Temperature Coefficient of V<sub>oc</sub></b> | <b>β</b> [%/K]   | -0.28                |
| <b>Temperature Coefficient of P<sub>MPP</sub></b> | <b>γ</b> [%/K] | -0.37 | <b>Normal Module Operating Temperature</b>       | <b>NMOT</b> [°F] | 109 ± 5.4 (43 ± 3°C) |

PROPERTIES FOR SYSTEM DESIGN

|  |                        |                              |  |   |
|--|------------------------|------------------------------|--|---|
| <b>Maximum System Voltage V<sub>sys</sub></b>  | [V]                    | 1000 (IEC) / 1000 (UL)       | <b>Safety Class</b>                                    | II  |
| <b>Maximum Series Fuse Rating</b>              | [A DC]                 | 20                           | <b>Fire Rating</b>                                     | C (IEC) / TYPE 1 (UL)                     |
| <b>Max. Design Load, push<sup>2</sup></b>      | [lbs/ft <sup>2</sup> ] | 75 (3600 Pa) / 55 (2667 Pa)  | <b>Permitted module temperature on continuous duty</b> | -40°F up to +185°F<br>(-40°C up to +85°C) |
| <b>Max. Test Load, Push / Pull<sup>2</sup></b> | [lbs/ft <sup>2</sup> ] | 113 (5400 Pa) / 84 (4000 Pa) | <sup>2</sup> see installation manual                   |   |

QUALIFICATIONS AND CERTIFICATES

UL 1703; VDE Quality Tested; CE-compliant; IEC 61215:2016; IEC 61730:2011, application class A



PACKAGING INFORMATION

|  |  |
|--|--|
| <b>Number of Modules per Pallet</b>                  | 32   |
| <b>Number of Pallets per 53' Trailer</b>             | 30   |
| <b>Number of Pallets per 40' High Cube Container</b> | 26   |
| <b>Pallet Dimensions (L × W × H)</b>                 | 69.3 in × 45.3 in × 46.9 in<br>(1760 mm × 1150 mm × 1190 mm) |
| <b>Pallet Weight</b>                                 | 1415 lbs (642 kg)  |

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.  
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Specifications subject to technical changes © Hanwha Q CELLS Q.PEAK DUO-G5 315-330\_2019-03\_Rev03\_314



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DATE: 09/02/2020

PROJECT NAME & ADDRESS

DONALD BRYAN JONES  
RESIDENCE  
72 DEER TRACK RD.,  
LILLINGTON, NC 27546

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

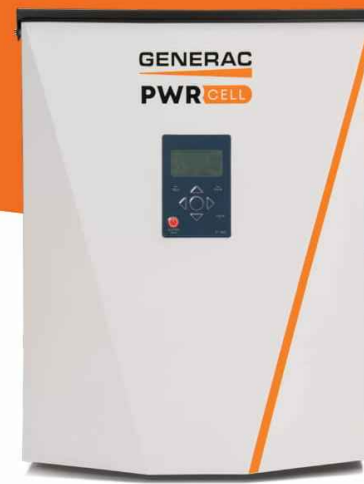
ANSI B  
11" X 17"

SHEET NUMBER

PV-6

# GENERAC<sup>®</sup> PWRCELL

7.6kW 1Ø, 11.4kW 3Ø PWRcell Inverter with CTs  
Model: APKE00014, APKE00013  
Certification Model Reference: X7602, X11402



Solar + storage is simple with the Generac PWRcell™ Inverter. This bi-directional, REbus™-powered inverter offers a simple, efficient design for integrating smart batteries with solar. Ideal for self-supply, backup power, zero-export and energy cost management, the PWRcell Inverter is the industry's most feature-rich line of inverters, available in single-phase and three-phase models.

## FEATURES & BENEFITS

- Single inverter for grid-tied solar with smart battery integration
- Simplified system design: No autotransformer or battery inverter needed
- User-selectable modes for backup power, self-supply, time-of-use and zero-export
- Free system monitoring included via PWRview™ Web Portal and Mobile App

| AC OUTPUT/GRID-TIE                   | MODEL APKE00014 | MODEL APKE00013 |
|--------------------------------------|-----------------|-----------------|
| RATED AC POWER OUTPUT:               | 7600W           | 11400W          |
| AC OUTPUT VOLTAGE:                   | 120/240, 1Ø VAC | 120/208, 3Ø VAC |
| AC FREQUENCY:                        | 60 Hz           | 60 Hz           |
| MAXIMUM CONTINUOUS OUTPUT CURRENT:   | 32 A, RMS       | 32 A, RMS       |
| GROUND-FAULT ISOLATION DETECTION:    | Included        | Included        |
| CHARGE BATTERY FROM AC:              | Yes             | Yes             |
| THD (CURRENT):                       | < 2%            | < 2%            |
| TYPICAL NIGHTTIME POWER CONSUMPTION: | < 7W            | < 7W            |

| DC INPUT                             | MODEL APKE00014 | MODEL APKE00013 |
|--------------------------------------|-----------------|-----------------|
| DC INPUT VOLTAGE RANGE:              | 360-420 VDC     | 360-420 VDC     |
| NOMINAL DC BUS VOLTAGE:              | 380 VDC         | 380 VDC         |
| MAX IMPORT CURRENT <sup>1</sup> :    | 20 A            | 30 A            |
| MAX INPUT CURRENT <sup>2</sup> :     | 30 A            | 30 A            |
| REVERSE-POLARITY PROTECTION:         | Yes             | Yes             |
| GROUND-FAULT ISOLATION DETECTION:    | Yes             | Yes             |
| TRANSFORMERLESS, UNGROUNDED:         | Yes             | Yes             |
| TYPICAL NIGHTTIME POWER CONSUMPTION: | < 7W            | < 7W            |

| AC OUTPUT/BACKUP                         | MODEL APKE00014 | MODEL APKE00013 |
|--|-----------------|-----------------|
| RATED AC BACKUP POWER OUTPUT (ISLANDED): | 8000W           | 8000W           |
| MAXIMUM AC BACKUP POWER OUTPUT:          | 10000W          | 10000W          |
| AC BACKUP OUTPUT VOLTAGE:                | 120/240, 1Ø VAC | 120/240, 1Ø VAC |
| AC FREQUENCY:                            | 60 Hz           | 60 Hz           |
| AC CIRCUIT BREAKER:                      | 50 A            | 50 A            |
| THD (VOLTAGE):                           | < 2%            | < 2%            |
| AUTOMATIC SWITCHOVER TIME:               | < 1 Seconds     | < 1 Seconds     |
| TYPICAL NIGHTTIME POWER CONSUMPTION:     | 30W             | 30W             |

| DC INPUT/ BATTERY                  | MODEL APKE00014 | MODEL APKE00013 |
|------------------------------------|-----------------|-----------------|
| MAXIMUM CONTINUOUS POWER:          | 8000W           | 8000W           |
| INTERNAL DC DISTRIBUTION BREAKERS: | 4x 2p30A        | 4x 2p30A        |
| DC FUSES ON PLUS AND MINUS:        | 40 A            | 40 A            |
| 2-POLE DISCONNECTION:              | Yes             | Yes             |

| EFFICIENCY               | MODEL APKE00014 | MODEL APKE00013 |
|--------------------------|-----------------|-----------------|
| PEAK EFFICIENCY:         | 97%             | 98%             |
| CEC WEIGHTED EFFICIENCY: | 96.50%          | 97.50%          |

<sup>1</sup>Inverter limits DC current import to AC power rating. Total DC current from multiple DC inputs may safely exceed this value up to Max. Input Current. The inverter safely limits the amount utilized  
<sup>2</sup>Per input, four DC inputs total

## Specifications

### FEATURES AND MODES

|                                       |     |
|---------------------------------------|-----|
| ISLANDING <sup>3</sup> :              | Yes |
| GRID SELL:                            | Yes |
| SELF CONSUMPTION:                     | Yes |
| PRIORITIZED CHARGING FROM RENEWABLES: | Yes |
| GRID SUPPORT - ZERO EXPORT:           | Yes |

### ADDITIONAL FEATURES

|  |   |
|--|---|
| SUPPORTED COMMUNICATION INTERFACES:    | REbus™, CANbus, RS485 <sup>4</sup> , Ethernet |
| SYSTEM MONITORING:                     | PWRview™ Web Portal and Mobile App            |
| BACKUP LOADS DISCONNECT <sup>5</sup> : | Yes   |
| MANUAL INVERTER BYPASS SWITCH:         | Automatic                                     |
| WARRANTY:                              | 10 Years                                      |

### STANDARDS COMPLIANCE

|                            |                                   |
|----------------------------|-----------------------------------|
| SAFETY:                    | UL1741 SA, CSA 22.2               |
| GRID CONNECTION STANDARDS: | IEEE1547, Rule 21, Rule 14H, CSIP |
| EMISSIONS:                 | FCC Part 15 Class B               |

### DIMENSIONS AND INSTALLATION SPECIFICATIONS

|   |  |
|---|--|
| ENCLOSURE KNOCKOUTS - QTY, SIZE - IN (MM):    | 6 x Combo 3/4" x 1" (19 x 25.4)<br>7 x Combo 1/2" x 3/4" (12.7 x 19) |
| DIMENSIONS L x W x H - IN (MM):               | 24.5" x 19.25" x 8" (622.3 x 488.9 x 203.2)                          |
| WEIGHT - LB (KG):                             | 62.7 (28.4)  |
| COOLING:                                      | Forced convection  |
| NOISE:  | < 40 dBA   |
| OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS): | -4 to 122 °F (-20 to 50 °C) <sup>5</sup>                             |
| PROTECTION RATING:                            | NEMA 3R  |

### INSTALLATION GUIDELINES

|   |  |
|---|--|
| BATTERY TYPES SUPPORTED:                  | PWRcell™ Battery                             |
| MODULE STRING SIZE PER PV LINK OPTIMIZER: | Varies, refer to PV Link Installation Manual |
| MAXIMUM RECOMMENDED DC POWER FROM PV:     | 15kW   |

<sup>3</sup>3Ø inverters offer islanding for 1Ø loads

<sup>4</sup>Modbus

<sup>5</sup>Reduced power at extreme temperatures

Generac Power Systems, Inc.  
S45 W29290 Hwy. 59, Waukesha, WI 53189

[www.Generac.com](http://www.Generac.com) | 888-GENERAC (436-3722)

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POWER HOME SOLAR, LLC  
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Email: [info@powerhome.com](mailto:info@powerhome.com)  
Web: [www.powerhome.com](http://www.powerhome.com)

### REVISIONS

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DATE: 09/02/2020

PROJECT NAME & ADDRESS

DONALD BRYAN JONES  
RESIDENCE  
72 DEER TRACK RD.,  
LILLINGTON, NC 27546

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-7



**GENERAC**

# SnapRS™

Inline Disconnect Switch  
 Model: APKE00011  
 Certification Model Reference: RS801



Generac SnapRS are a simple way to satisfy rapid shutdown compliance for solar + storage systems. Generac SnapRS are 2017/2020 NEC 690.12 compliant, don't require any extra hardware to mount, and need no pairing or fussy digital communications.

## FEATURES & BENEFITS

- Fast, easy, and simple to install
- One SnapRS device per PV module
- Achieves PVRSS Compliance
- Low cost, high efficiency solution

## SYSTEM DESIGN

Snap a Generac SnapRS disconnect device (RS) to the negative lead (-) of each module in the solar array for simple module-level rapid shutdown compliance. SnapRS devices isolate array voltage when a rapid shutdown is initiated at a PWRcell™ Inverter. When rapid shutdown is initiated, SnapRS units isolate each PV module in the array, reducing array voltage to <80V in seconds.

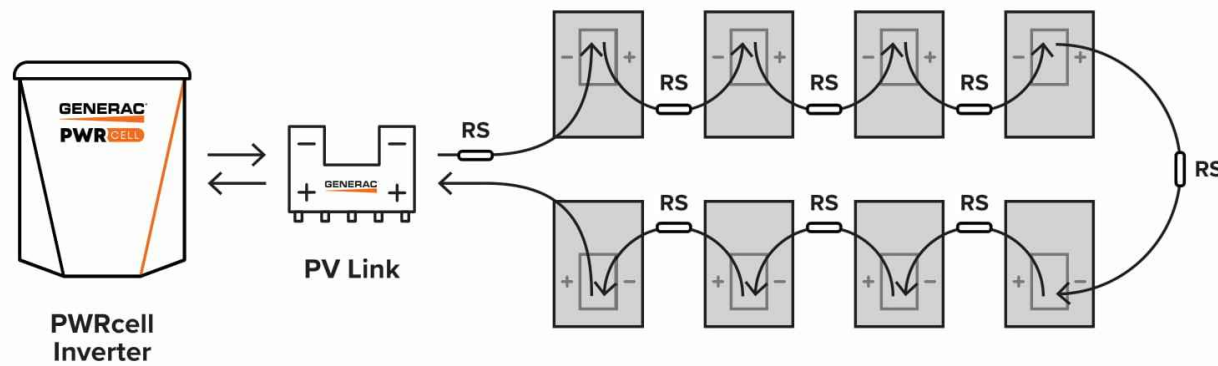


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

## Specifications

| SnapRS™ (APKE00011)                           |                                    |
|---|------------------------------------|
| PV MODULE MAX VOC:                            | 75 V                               |
| EFFICIENCY:                                   | 99.8%*                             |
| MAX INPUT CURRENT:                            | 13 A                               |
| SHUTDOWN TIME:                                | < 10 Seconds                       |
| ENCLOSURE RATING:                             | NEMA 6P                            |
| OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS): | -40 to 158 °F (-40 to 70 °C)       |
| CERTIFICATIONS:                               | UL1741                             |
| PROTECTIONS:                                  | PVRSE                              |
| WEIGHT - LB (KG):                             | 0.17 (0.08)                        |
| DIMENSIONS, L x W x H - IN (MM):              | 7" x 1" x 1" (177.8 x 25.4 x 25.4) |
| WARRANTY:                                     | 25 Years                           |

\*When used with a 50V panel

Connect one SnapRS device to the negative lead of each PV module in the PV Link controlled array for complete PV Rapid shutdown performance



Generac Power Systems, Inc.  
 S45 W29290 Hwy. 59, Waukesha, WI 53189  
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 MOORESVILLE, NC 28115  
 Phone: 704-800-6591 (OFFICE)  
 Email: info@powerhome.com  
 Web: www.powerhome.com

### REVISIONS

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Signature with Seal

DATE: 09/02/2020

PROJECT NAME & ADDRESS

DONALD BRYAN JONES  
 RESIDENCE  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

SHEET NAME  
 EQUIPMENT  
 SPECIFICATION

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-8

# GENERAC® PWRCELL

Model APKE00007, PWRcell Battery Cabinet  
 Model A0000391219, 2.85kWh PWRcell Battery Module  
 Certification Model Reference: BJ-DCB05ZKAX  
 Model APKE00008, PWRcell Spacer Kit  
 Model APKE00009, PWRcell Upgrade Kit  
 Certification Model Reference for Battery Configurations:  
 PWRcell 9, PWRcell 12, PWRcell 15, PWRcell 17

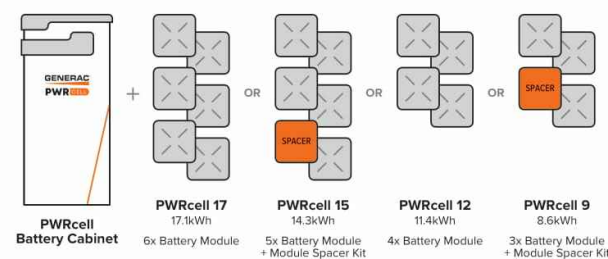
The PWRcell™ Battery Cabinet is a modular smart battery platform that allows for a range of configurations to suit any need, small or large. No other smart battery offers the power and flexibility of PWRcell. Whether for backup power or smart energy management, PWRcell has power and capacity options for every need, without sacrificing flexibility or function.



## PWRcell BATTERY CABINET DESIGN

The PWRcell Battery Cabinet allows system owners the flexibility to scale from the economical 8.6kWh PWRcell 9 to the massive 17.1kWh PWRcell 17 by installing additional battery modules to the PWRcell Battery Cabinet. When needs change, an existing PWRcell Battery Cabinet can be upgraded with additional modules. Use the graphic below and the chart on the back of this sheet to understand what components you need for your chosen PWRcell configuration.

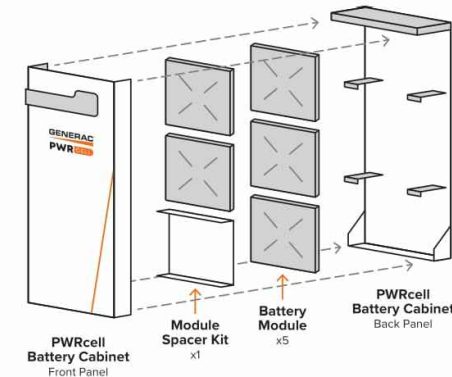
## BATTERY CONFIGURATION GUIDE



## FEATURES & BENEFITS

- Connect 2 PWRcell Battery Cabinets to a single PWRcell Inverter for 34.2kWh of storage
- Best-in-class battery backup power
- Plug-and-play with PWRcell Inverter and PV Link™
- Time-of-use (TOU) and zero-export ready
- Residential and commercial application ready

## BATTERY CABINET ASSEMBLY



## Specifications

| PWRcell™ BATTERY CONFIGURATIONS                         | 9                                   | 12        | 15        | 17        |
|---|-------------------------------------|-----------|-----------|-----------|
| BATTERY MODULES:  | 3                                   | 4         | 5         | 6         |
| USABLE ENERGY:  | 8.6kWh                              | 11.4kWh   | 14.3kWh   | 17.1kWh   |
| POWER - RATED CONTINUOUS:                               | 3.4kW                               | 4.5kW     | 5.6kW     | 6.7kW     |
| POWER - 60 MINUTES:                                     | 4.2kW                               | 5.6kW     | 7.0kW     | 8.4kW     |
| POWER - 2 MINUTES:                                      | 5.0kW                               | 6.7kW     | 8.4kW     | 10.0kW    |
| REbus™ VOLTAGE - INPUT/OUTPUT:                          | 360-420 VDC                         |           |           |           |
| MODULE VOLTAGE:   | 46.8 VDC                            |           |           |           |
| ROUND-TRIP EFFICIENCY:                                  | 96.50%                              |           |           |           |
| OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS):           | 41 to 113 °F (5 to 45 °C)           |           |           |           |
| RECOMMENDED AMBIENT TEMPERATURE - FAHRENHEIT (CELSIUS): | 55 to 86 °F (13 to 30 °C)           |           |           |           |
| MAXIMUM INSTALLATION ALTITUDE - FT (M):                 | 9834 (3000)                         |           |           |           |
| DIMENSIONS, L x W x H - IN (MM):                        | 22" x 10" x 68" (559 x 254 x 1727)  |           |           |           |
| WEIGHT, ENCLOSURE - LB (KG):                            | 115 (52)                            |           |           |           |
| WEIGHT, INSTALLED - LB (KG):                            | 280 (127)                           | 335 (152) | 390 (178) | 445 (202) |
| WARRANTY - LI-ION MODULES:                              | 10 Years, (7.56MWh)                 |           |           |           |
| WARRANTY - ELECTRONICS AND ENCLOSURE:                   | 10 Years                            |           |           |           |
| COMMUNICATION PROTOCOL:                                 | REbus™ DC Nanogrid™                 |           |           |           |
| COMPLIANCE:   | UL 9540, UL 1973, UL 1642, CSA 22.2 |           |           |           |

## UPGRADING PWRcell

Inside of the PWRcell Battery Cabinet, battery modules are stacked two deep on three levels, allowing for up to six modules to be connected in series. You can upgrade an existing PWRcell Battery Cabinet by adding Battery Modules and a Module Spacer (APKE00008) if required. PWRcell 9 and PWRcell 15 require a module spacer.

Generac offers a convenient PWRcell Battery Upgrade Kit (APKE00009) to help replace lost or misplaced hardware. A PWRcell Battery Upgrade Kit may be purchased from your Generac distributor.

Refer to the table to the right for material requirements related to upgrading the PWRcell Battery Cabinet.

## UPGRADE MATERIAL REQUIREMENTS

| STARTING CONFIGURATION | ENDING CONFIGURATION                  |                                       |                                       |
|------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
|                        | PWRcell 17                            | PWRcell 15                            | PWRcell 12                            |
| PWRcell 9              | + 3 x PWRCell Mod<br>+ 2 x APKE00009* | + 2 x PWRCell Mod<br>+ 1 x APKE00009* | + 1 x PWRCell Mod<br>+ 1 x APKE00009* |
| PWRcell 12             | + 2 x PWRCell Mod<br>+ 1 x APKE00009* | + 1 x PWRCell Mod<br>+ 1 x APKE00008  |                                       |
| PWRcell 15             | + 1 x PWRCell Mod<br>+ 1 x APKE00009* |                                       |                                       |

\*APKE00009 (Upgrade kit) only required if original hardware is unavailable

Generac Power Systems, Inc.  
 545 W29290 Hwy. 59, Waukesha, WI 53189  
[www.Generac.com](http://www.Generac.com) | 888-GENERAC (436-3722)

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DATE: 09/02/2020

### PROJECT NAME & ADDRESS

DONALD BRYAN JONES  
 RESIDENCE  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

SHEET NAME  
 EQUIPMENT  
 SPECIFICATION

SHEET SIZE

ANSI B  
 11" X 17"

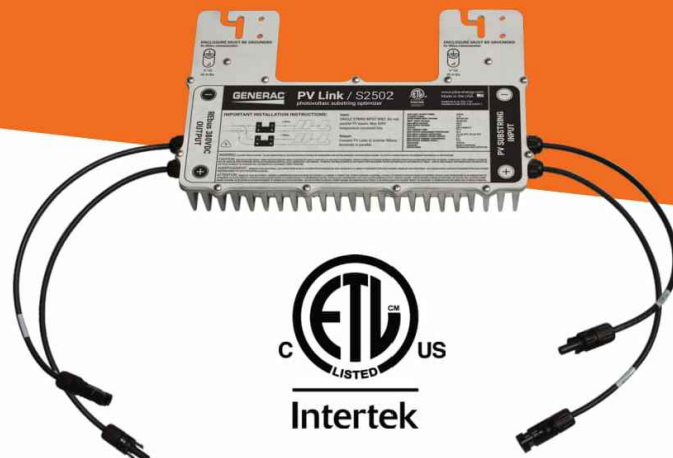
SHEET NUMBER

PV-9

**GENERAC**

# PV Link™

2500W MPPT Substring Optimizer  
 Model: APKE00010  
 Certification Model Reference: S2502



PV Link is the simple solar optimizer for quick installation and long-lasting performance. Connect PV modules to each PV Link to overcome shading and challenging roof lines.

## FEATURES & BENEFITS

- Fast, simple installation
- Lower failure risk than module-level optimizers
- 2017/2020 NEC rapid shutdown compliant with SnapRS™
- Quick connections with MC4 connectors
- Exports up to 2500W
- Compatible with PWRcell™ Inverters
- Cost-effective solution for high-performance PV
- Ground-fault protection

## SINGLE-STRING PV ARRAY WITH SnapRS DEVICES

Where PV module-level rapid shutdown is required (NEC 690.12), a SnapRS device (RS) is installed to negative (-) lead of each PV module.

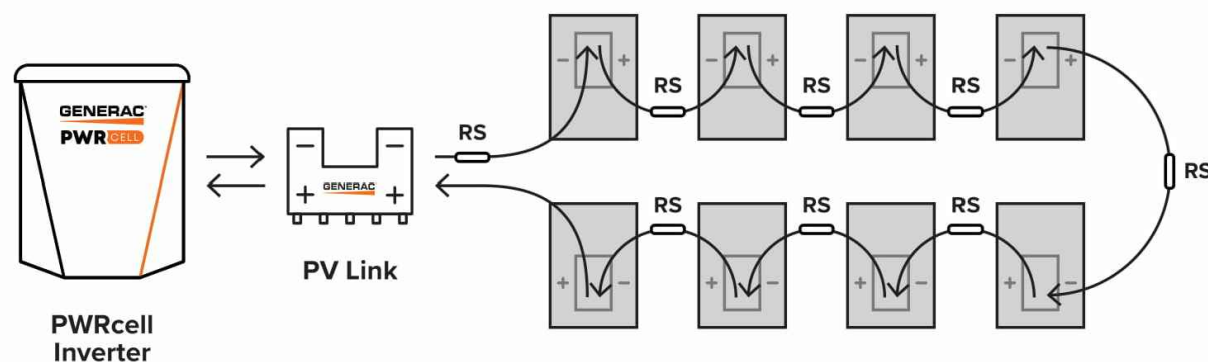


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

## Specifications

| PV Link™ (APKE00010)                     |  |
|--|--|
| RATED POWER*:                            | 2500W  |
| PEAK EFFICIENCY:                         | 99%  |
| MPPT VOLTAGE RANGE:                      | 60-360 VMP   |
| MAX INPUT VOLTAGE:                       | 420 VOC; max when cold   |
| MAX OUTPUT:                              | 420 VOC  |
| NOMINAL OUTPUT (REbus™):                 | 380 VDC  |
| MAX OUTPUT CURRENT (CONTINUOUS):         | 8 A  |
| MAX OUTPUT CURRENT (FAULT):              | 10 A   |
| MAX INPUT CURRENT (CONTINUOUS):          | 13 A @ 50°C, 10 A @ 70°C   |
| MAX INPUT SHORT CIRCUIT CURRENT (ISC):   | 18 A   |
| STANDBY POWER:                           | < 1 W  |
| PROTECTIONS:                             | Ground-fault, Arc-fault (Arc-fault Type 1 AFCI, Integrated), PVRSE |
| MAX OPERATING TEMP: FAHRENHEIT (CELSIUS) | 158 °F (70 °C)   |
| SYSTEM MONITORING:                       | PWRview™ Web Portal and Mobile App                                 |
| ENCLOSURE:                               | Type 3R  |
| WEIGHT - LB (KG):                        | 7.3 lb (3.3 kg)  |
| DIMENSIONS, L x W x H - IN (MM):         | 15.4" x 2" x 9.6" (391.2 x 50.8 x 243.8)                           |
| COMPLIANCE:                              | UL 1741, CSA 22.2  |
| WARRANTY:                                | 25 Years   |

\*PV Link can tolerate higher than rated power at its input if Max Input Voltage and Short Circuit Current specifications are not exceeded



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**GENERAC**



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DONALD BRYAN JONES  
 RESIDENCE  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

SHEET NAME  
**EQUIPMENT  
 SPECIFICATION**

SHEET SIZE

**ANSI B  
 11" X 17"**

SHEET NUMBER

**PV-10**



## QRail™ — Fully Integrated Mounting and Racking System

The QRail Series is a strong and versatile solar array mounting system that provides unrivaled benefits to solar designers and installers. Combined with Quick Mount PV's industry-leading waterproof mounts, QRail offers a complete racking solution for mounting solar modules on any roof.



Easily design array configurations with the QDesign software application. Generate complete engineering reports and calculate a precise bill of materials for all the mounting, racking and accessories needed for a complete solar array.

## Comprehensive, One-Source Solution

QRail, together with Quick Mount PV's waterproof mounting products, provides the benefit of a single-sourced, seamlessly integrated rooftop installation that works with all roof types — composition/asphalt shingles, flat or curved tile, metal shingle, shake, slate and low slope roofs. The QRail system also works with any roof attachment system for maximum flexibility.

## Superior Strength and Versatility

QRail is engineered for optimal structural performance. The system is certified to UL 2703, fully code compliant and backed by a 25-year warranty. QRail is available in Light, Standard and Heavy versions to match all geographic locations. QRail is compatible with virtually all modules and works on a wide range of pitched roof surfaces. Modules can be mounted in portrait or landscape orientation in standard or shared-rail configurations.

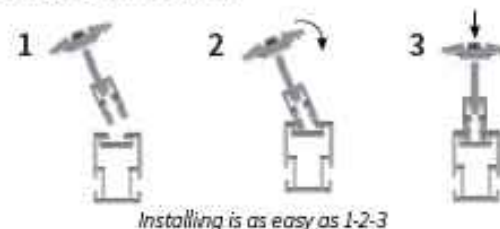


QRails come in two lengths — 168 inches (14 ft) and 208 inches (17.3 ft) Mill and Black Finish

## Fast, Simple Installation: It Just Clicks

### QClick Technology™

The universal mid and end clamps use QClick technology to simply "click" into the rail channel and remain upright, ready to accept the module. The pre-assembled clamps fit virtually all module frames and require no extra hardware, eliminating pre-loading and reducing installation time.



Installing is as easy as 1-2-3



**UNIVERSAL END CLAMP**  
2 clamps for modules from 30-45mm or 38-50mm thick

**UNIVERSAL BONDED MID CLAMP**  
2 clamps for modules from 30-45mm or 38-50mm thick

### QSplice™ Technology

QRail's innovative internal QSplice installs in seconds, requiring no tools or screws. Simply insert QSplice into the rail and slide the other rail on to create a fully structural, bonded splice. An external splice is also available.



Installs in seconds — no tools or hardware required

## Fully Integrated Electrical Bonding

The QRail system provides an integrated electrical bonding path, ensuring that all exposed metal parts and the solar module frames are electrically connected. All electrical bonds are created when the components are installed and tightened down.



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**DONALD BRYAN JONES**  
**RESIDENCE**  
72 DEER TRACK RD.,  
LILLINGTON, NC 27546

SHEET NAME

**EQUIPMENT  
SPECIFICATION**

SHEET SIZE

**ANSI B  
11" X 17"**

SHEET NUMBER

**PV-10A**

## QRail™ Configurations



| Item Code       | Part Number | Description                       | Finish |
|-----------------|-------------|-----------------------------------|--------|
| QMR-RL14 A 60   | 800         | QRail Light, 14 ft., 60 Pack      | Mill   |
| QMR-RL17.3 A 60 | 801         | QRail Light, 17.3 ft., 60 Pack    | Mill   |
| QMR-RL14 B 60   | 805         | QRail Light, 14 ft., 60 Pack      | Black  |
| QMR-RL17.3 B 60 | 806         | QRail Light, 17.3 ft., 60 Pack    | Black  |
| QMR-RS14 A 60   | 810         | QRail Standard, 14 ft., 60 Pack   | Mill   |
| QMR-RS17.3 A 60 | 811         | QRail Standard, 17.3 ft., 60 Pack | Mill   |
| QMR-RS14 B 60   | 815         | QRail Standard, 14 ft., 60 Pack   | Black  |
| QMR-RS17.3 B 60 | 816         | QRail Standard, 17.3 ft., 60 Pack | Black  |
| QMR-RH14 A 60   | 820         | QRail Heavy, 14 ft., 60 Pack      | Mill   |
| QMR-RH17.3 A 60 | 821         | QRail Heavy, 17.3 ft., 60 Pack    | Mill   |
| QMR-RH14 B 60   | 825         | QRail Heavy, 14 ft., 60 Pack      | Black  |
| QMR-RH17.3 B 60 | 826         | QRail Heavy, 17.3 ft., 60 Pack    | Black  |

## QSplice™ Internal Structural Splice



| Item Code    | Part Number | Description                         | Finish |
|--------------|-------------|-------------------------------------|--------|
| QMR-ISL A 15 | 830         | QSplice Internal, Light, 15 Pack    | Mill   |
| QMR-ISS A 15 | 831         | QSplice Internal, Standard, 15 Pack | Mill   |
| QMR-ISH A 15 | 832         | QSplice Internal, Heavy, 15 Pack    | Mill   |

## QSplice™ External Structural Splice



| Item Code    | Part Number | Description                         | Finish |
|--------------|-------------|-------------------------------------|--------|
| QMR-ESS A 15 | 834         | QSplice External, Standard, 15 Pack | Mill   |
| QMR-ESH A 15 | 835         | QSplice External, Heavy, 15 Pack    | Mill   |



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 EQUIPMENT  
 SPECIFICATION

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

PV-11

## Universal End Clamp with QClick™ Technology



Black

Mill

| Item Code          | Part Number | Description                                       | Finish |
|--------------------|-------------|---|--------|
| QMR-UEC3045 A 20   | 860         | Universal End Clamp, 30-45mm, 20 Pack             | Mill   |
| QMR-UEC3850 A 20   | 861         | Universal End Clamp, 38-50mm, 20 Pack             | Mill   |
| QMR-UEC3045 B 20   | 865         | Universal End Clamp, 30-45mm, 20 Pack             | Black  |
| QMR-UEC3850 B 20   | 866         | Universal End Clamp, 38-50mm, 20 Pack             | Black  |
| QMR-UEC3045BP A 20 | 862         | Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack | Mill   |
| QMR-UEC3850BP A 20 | 863         | Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack | Mill   |
| QMR-UEC3045BP B 20 | 867         | Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack | Black  |
| QMR-UEC3850BP B 20 | 868         | Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack | Black  |

## Mid Clamp with QClick™ Technology



Black

Mill

| Item Code              | Part Number | Description                                       | Finish |
|------------------------|-------------|---|--------|
| QMR-UMC3045BP 1.2 A 20 | 872         | Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack | Mill   |
| QMR-UMC3850BP 1.2 A 20 | 873         | Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack | Mill   |
| QMR-UMC3045BP 1.2 B 20 | 877         | Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack | Black  |
| QMR-UMC3850BP 1.2 B 20 | 878         | Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack | Black  |

## Single-Slot L-Foot



| Item Code   | Part Number | Description                 | Finish |
|-------------|-------------|-----------------------------|--------|
| QMC-LF A 12 | 692         | Single-slot L-foot, 12 Pack | Mill   |
| QMC-LF B 12 | 693         | Single-slot L-foot, 12 Pack | Black  |

## End Caps



Heavy

Standard

Light

| Item Code    | Part Number | Description               | Finish |
|--------------|-------------|---------------------------|--------|
| QMR-CPL B 50 | 885         | End Cap Light, 50 Pack    | Black  |
| QMR-CPS B 50 | 886         | End Cap Standard, 50 Pack | Black  |
| QMR-CPH B 50 | 887         | End Cap Heavy, 50 Pack    | Black  |



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 RESIDENCE  
 72 DEER TRACK RD.,  
 LILLINGTON, NC 27546

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EQUIPMENT  
 SPECIFICATION

### SHEET SIZE

ANSI B  
 11" X 17"

### SHEET NUMBER

PV-11A

## T-Bolt



| Item Code    | Part Number | Description             | Finish          |
|--------------|-------------|-------------------------|-----------------|
| QMR-TB A 300 | 880         | T-Bolt w/ Nut, 300 Pack | stainless steel |

## Grounding Lug



| Item Code   | Part Number | Description                 | Finish |
|-------------|-------------|-----------------------------|--------|
| QMR-GL A 50 | 890         | WEEB Lug w/ T-Bolt, 50 Pack | n/a    |

## Wire Clip



*Works with both PV and Trunk Cabling*

| Item Code   | Part Number | Description              | Finish          |
|-------------|-------------|--------------------------|-----------------|
| QMR-WCA 300 | 892         | Trunk/PV Cable, 300 Pack | stainless steel |

## WEEB BMC



| Item Code   | Part Number | Description       | Finish          |
|-------------|-------------|-------------------|-----------------|
| QMR-ECWA 50 | 891         | WEEB BMC, 50 Pack | stainless steel |



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 SPECIFICATION**

SHEET SIZE

**ANSI B  
 11" X 17"**

SHEET NUMBER

**PV-11B**

# L-Mount | QMLM / QMLM-ST

Elevated Water Seal Technology®

| ITEM NO. | DESCRIPTION   | QTY. |
|----------|---|------|
| 1        | FLASHING, ROUNDED CORNERS, 9" X 12" X .040", .438" HOLE, 5052, MILL               | 1    |
| 2        | L-FOOT, 2" X 3.30" FOR .438" O.D. FASTENER, 2-1/16" SLOT, 6061-T6/6005A-T61, MILL | 1    |
| 3        | WASHER, SEALING, 5/16" ID X 3/4" OD, EPDM BONDED SS                               | 1    |
| 4        | LAG SCREW, HEX HEAD, 5/16" X 4", 18-8 SS  | 1    |
| *5       | STRUCTURAL SCREW, QMPV, T-30 HEX WASHER HEAD, 5/16" X 4-1/2", 18-8SS              | 1    |

THIS EDGE TOWARDS ROOF RIDGE

AVAILABLE IN MILL AND BLACK FINISHES

Quick Mount PV®

TITLE: QMLM & QMLM-ST: L-MOUNT, 2-1/16" SLOT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES: FRACTIONAL ± 1/8, TWO PLACE DECIMAL ± .015, THREE PLACE DECIMAL ± .004

SCALE: 1:4 WEIGHT: 0.7565 SHEET 1 OF 1

SIZE: A DRAWN BY: AAP DATE: 4/4/2019 REV: 11

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## L-Mount Installation Instructions

**Installation Tools Required:** tape measure, roofing bar, chalk line, stud finder, caulking gun, sealant compatible with roofing materials, drill with 7/32" or 1/8" bit, drill or impact gun with 1/2" socket.

**WARNING:** Quick Mount PV products are NOT designed for and should NOT be used to anchor fall protection equipment.

- Locate, choose, and mark centers of rafters to be mounted. Select the courses of shingles where mounts will be placed.
- Carefully lift composition roof shingle with roofing bar, just above placement of mount. Remove nails as required and backfill holes with approved sealant. See "Proper Flashing Placement" on next page.
- Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least 3/4" higher than the butt-edge of the 3rd course and lower flashing edge is above the butt-edge of 1st course. Mark center for drilling.
- If attaching with lag bolt use a 7/32" bit (Lag). Use a 1/8" bit (ST) for attaching with the structural screw. Drill pilot hole into roof and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill a 2" deep hole into rafter.
- Clean off any sawdust, and fill hole with sealant compatible with roofing materials.
- Place L-foot onto elevated flute and rotate L-foot to desired orientation.
- Prepare lag bolt or structural screw with sealing washer. Using a 1/2-inch socket on an impact gun, drive prepared lag bolt through L-foot until L-foot can no longer easily rotate. **DO NOT over-torque.** NOTE: Structural screw can be driven with T-30 hex head bit.
- You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer. NOTE: Make sure top of L-Foot makes solid contact with racking.

Signature with Seal

DATE: 09/02/2020

PROJECT NAME & ADDRESS

DONALD BRYAN JONES  
RESIDENCE  
72 DEER TRACK RD.,  
LILLINGTON, NC 27546

All roofing manufacturers' written instructions must also be followed by anyone modifying a roof system. Consult the roof manufacturer's specs and instructions prior to working on the roof.

Prepare lag bolt or structural screw with sealing washer. Using a 1/2-inch socket on an impact gun, drive prepared lag bolt through L-foot until L-foot can no longer easily rotate. **DO NOT over-torque.** NOTE: Structural screw can be driven with T-30 hex head bit.

You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer. NOTE: Make sure top of L-Foot makes solid contact with racking.

Quick Mount PV®  
RESPECT THE ROOF

BI 7.2.3-44

Apr-2019 Rev 6

**POWERHOME**

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72 DEER TRACK RD.,  
LILLINGTON, NC 27546

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-12