


# PHOTOVOLTAIC ROOF MOUNT SYSTEM

21 MODULES-ROOF MOUNTED - 8.925 kW DC, 6.090 kW AC  
 213 WINDSWEPT WY, FUQUAY-VARINA, NC 27526



**EMPWR SOLAR**  
 1007 JOHNNIE DODDS  
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## PROJECT DATA

PROJECT ADDRESS: 213 WINDSWEPT WY, FUQUAY-VARINA, NC 27526  
 OWNER: STEPHEN SZABO  
 PARCEL ID: 0652-67-0018.000  
 DESIGNER: ESR  
 SCOPE: 8.925 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH  
 21 JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES WITH  
 21 ENPHASE IQ8PLUS-72-M-US (290W) MICROINVERTERS

AUTHORITIES HAVING JURISDICTION:  
 BUILDING: HARNETT COUNTY  
 ZONING: HARNETT COUNTY  
 UTILITY: DUKE ENERGY PROGRESS

## SHEET INDEX

|        |                          |
|--------|--------------------------|
| PV-1   | COVER SHEET              |
| PV-2   | PLOT PLAN WITH ROOF PLAN |
| PV-3   | ROOF PLAN & MODULES      |
| PV-4   | ELECTRICAL PLAN          |
| PV-5   | ATTACHMENT DETAIL        |
| PV-6   | ELECTRICAL LINE DIAGRAM  |
| PV-7   | WIRING CALCULATION       |
| PV-8   | LABELS                   |
| PV-9   | PLACARD                  |
| PV-10  | MICROINVERTER CHART      |
| PV-11+ | EQUIPMENT SPECIFICATIONS |

NOTICE TO CONTRACTOR  
 All construction must comply with current NC Building Codes and is subject to field inspection and verification.

APPROVED  
 Limited liability only review  
 Permit holder responsible for full compliance with the code

02/21/2025



## GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2020.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2020 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
- MODULE DOES NOT EXCEED THE SLOPE OF ROOF

## VICINITY MAP



## HOUSE PHOTO



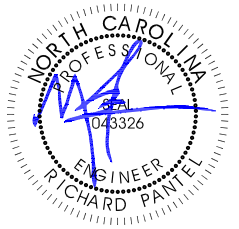
## CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

- 2020 NATIONAL ELECTRICAL CODE (NEC)
- 2018 NORTH CAROLINA FIRE CODE (NCFC)
- 2018 NORTH CAROLINA RESIDENTIAL CODE (NCRC)
- 2018 NORTH CAROLINA BUILDING CODE (NCBC)
- 2018 NORTH CAROLINA ENERGY CONSERVATION CODE (NCECC)

### REVISIONS

| DESCRIPTION | DATE | REV |
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Reviewed and approved  
 Richard Pantel, P.E.  
 NC Lic. No. 043326  
 02/14/2025

DATE:02/13/2025

### PROJECT NAME & ADDRESS

STEPHEN SZABO  
 RESIDENCE  
 213 WINDSWEPT WY,  
 FUQUAY-VARINA,  
 NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**COVER SHEET**

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

SHEET NUMBER  
**PV-1**

# PROJECT DESCRIPTION:

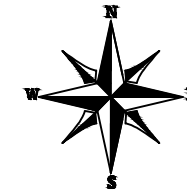
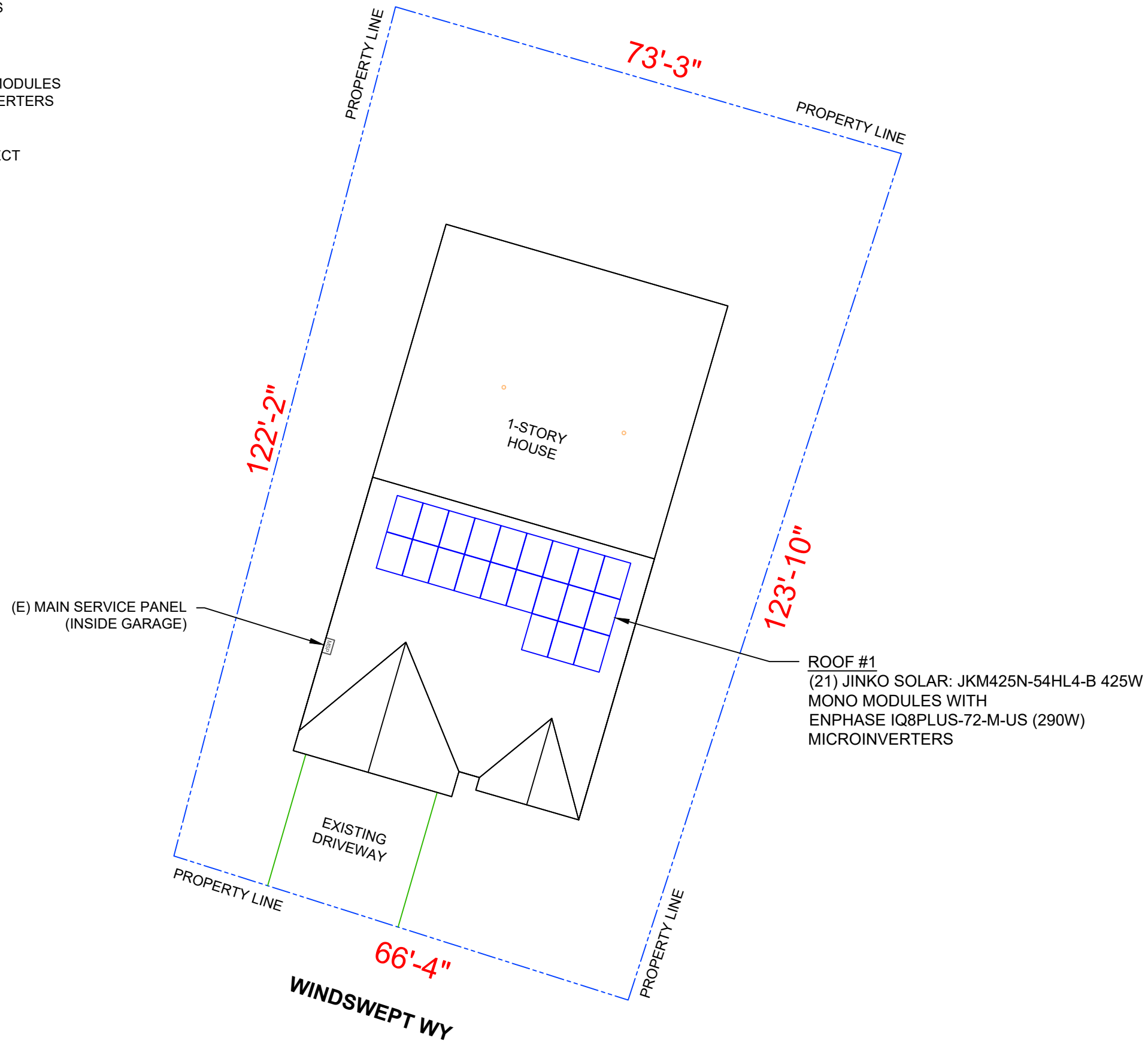
21 x JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
 DC SYSTEM SIZE: 8.925kW DC  
 AC SYSTEM SIZE: 6.090kW AC

## EQUIPMENT SUMMARY

21 JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES  
 21 ENPHASE IQ8PLUS-72-M-US (290W) MICRO-INVERTERS

ROOF ARRAY AREA #1:- 441.21 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT  
 LOCATED WITHIN 10' OF UTILITY METER



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 ESR

SHEET NAME  
 PLOT PLAN WITH  
 ROOF PLAN

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-2

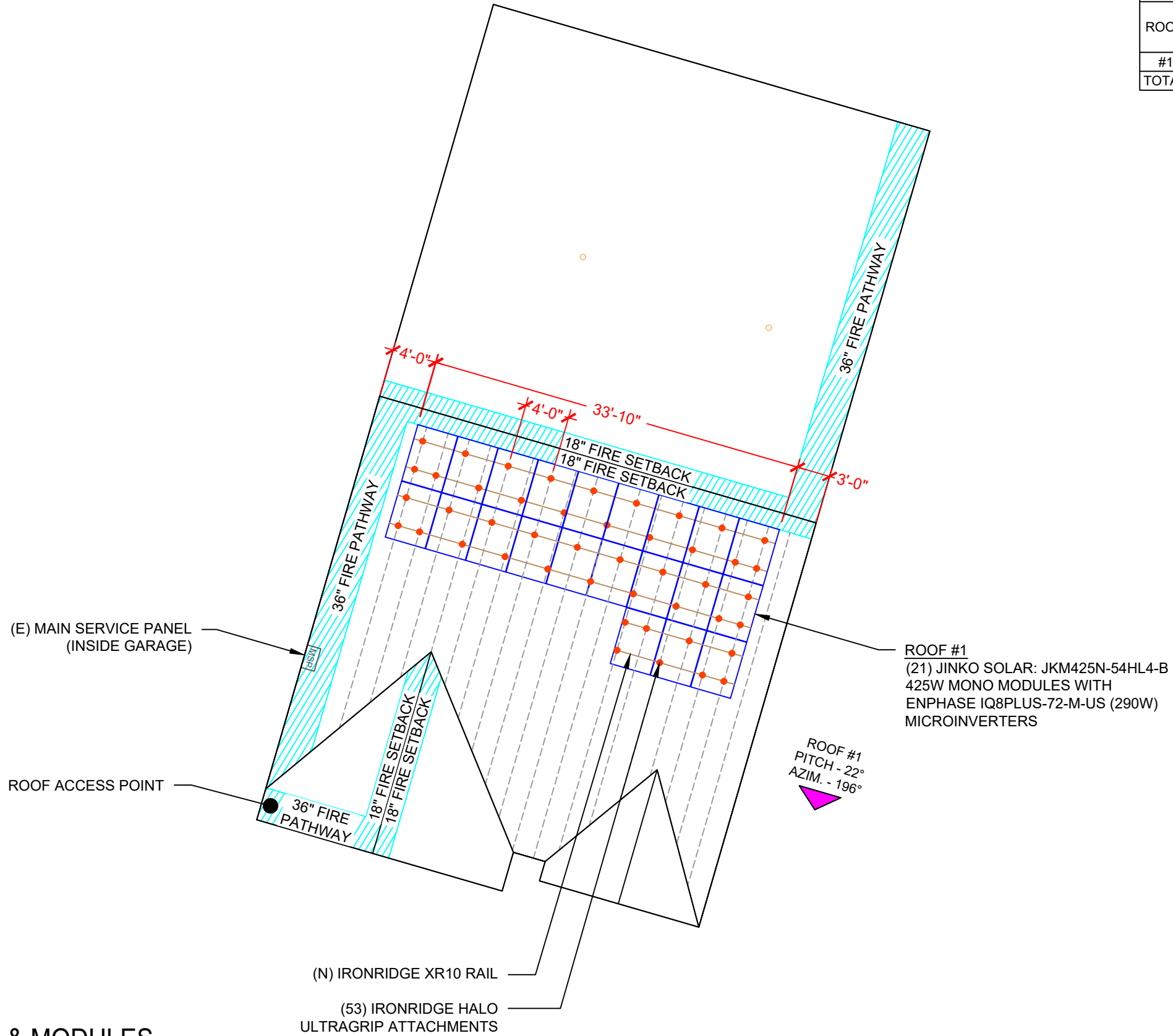
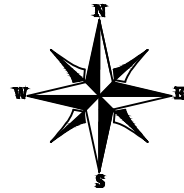
# 1 PLOT PLAN WITH ROOF PLAN

PV-2

SCALE: 1/16" = 1'-0"

**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 21 MODULES  
 MODULE TYPE = JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES  
 MODULE WEIGHT = 46.3 LBS / 21.0 KG.  
 MODULE DIMENSIONS = 67.79" x 44.65" = 21.01 SF

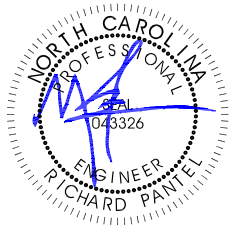


| ROOF DESCRIPTION |            |                 |            |               |
|------------------|------------|-----------------|------------|---------------|
| ROOF TYPE        |            | ASPHALT SHINGLE |            |               |
| ROOF             | ROOF PITCH | AZIMUTH         | TRUSS SIZE | TRUSS SPACING |
| #1               | 22°        | 196°            | 2"X6"      | 24"           |

| ARRAY AREA & ROOF AREA CALC'S |              |                      |                     |                                |
|-------------------------------|--------------|----------------------|---------------------|--------------------------------|
| ROOF                          | # OF MODULES | ARRAY AREA (Sq. Ft.) | ROOF AREA (Sq. Ft.) | ROOF AREA COVERED BY ARRAY (%) |
| #1                            | 21           | 441.21               | 1226.76             | 36                             |
| TOTAL                         | 21           | 441.21               | 3078.25             | 14                             |

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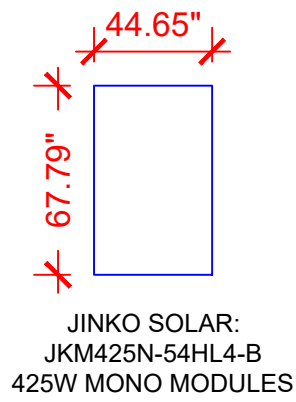
STEPHEN SZABO RESIDENCE  
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 FUQUAY-VARINA,  
 NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**ROOF PLAN & MODULES**

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

SHEET NUMBER  
**PV-3**

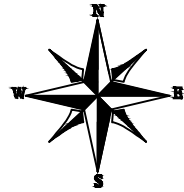


**LEGEND**

- MSP - MAIN SERVICE PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- - ROOF ATTACHMENT
- — — - TRUSS

| CIRCUIT LEGENDS  |            |
|--|------------|
|  | CIRCUIT #1 |
|  | CIRCUIT #2 |

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT LOCATED WITHIN 10' OF UTILITY METER

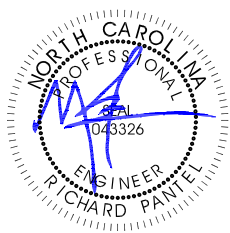


| BILL OF MATERIALS |     |  |
|-------------------|-----|--|
| EQUIPMENT         | QTY | DESCRIPTION                                    |
| SOLAR PV MODULES  | 21  | JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES |
| MICRO INVERTERS   | 21  | ENPHASE IQ8PLUS-72-M-US (290W) MICROINVERTERS  |
| JUNCTION BOX      | 1   | JUNCTION BOX                                   |
| RAIL              | 14  | IRONRIDGE XR10 RAIL                            |
| SPLICE            | 8   | SPLICE KIT                                     |
| MID MODULE CLAMPS | 36  | MID MODULE CLAMPS                              |
| END CLAMPS        | 12  | END CLAMPS / STOPPER SLEEVE                    |
| ATTACHMENTS       | 53  | IRONRIDGE HALO ULTRAGRIP ATTACHMENTS           |

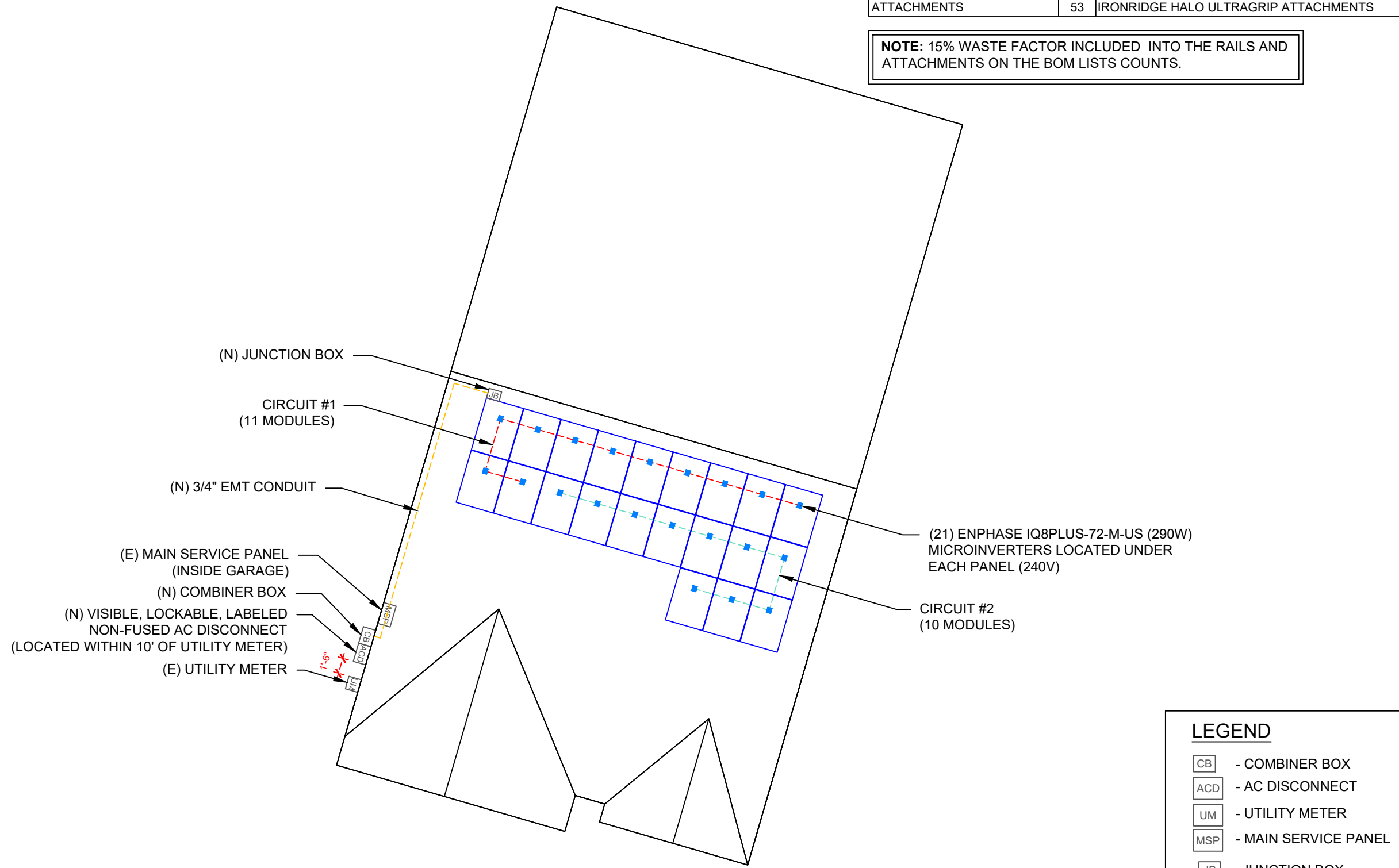
**NOTE:** 15% WASTE FACTOR INCLUDED INTO THE RAILS AND ATTACHMENTS ON THE BOM LISTS COUNTS.







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| LEGEND  |                      |
|---|----------------------|
|  | - COMBINER BOX       |
|  | - AC DISCONNECT      |
|  | - UTILITY METER      |
|  | - MAIN SERVICE PANEL |
|  | - JUNCTION BOX       |
|  | - CONDUIT            |

DATE:02/13/2025

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DRAWN BY  
**ESR**

SHEET NAME  
**ELECTRICAL PLAN**

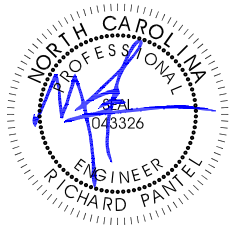
SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-4**



REVISIONS

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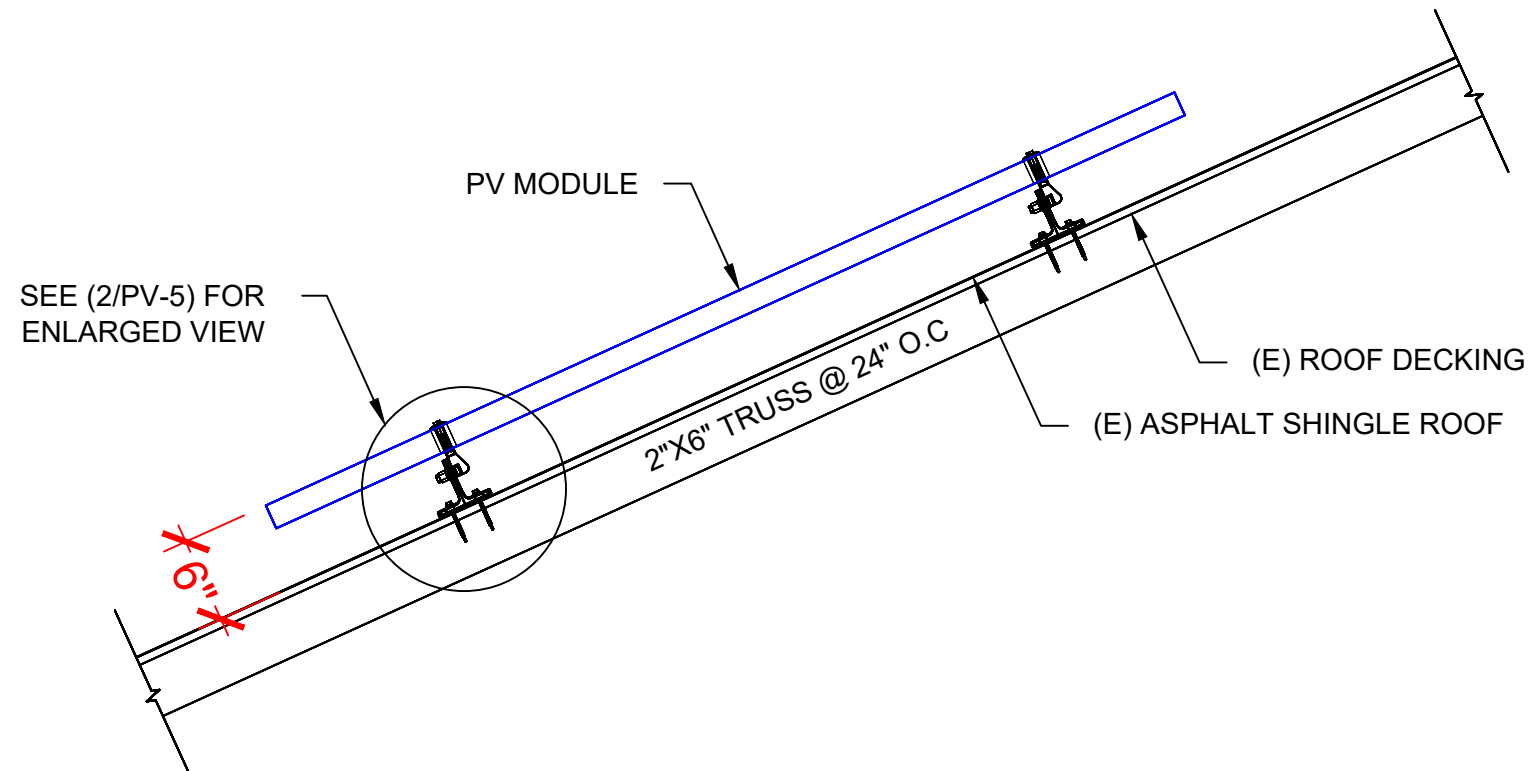
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SHEET NAME  
**ATTACHMENT  
 DETAIL**

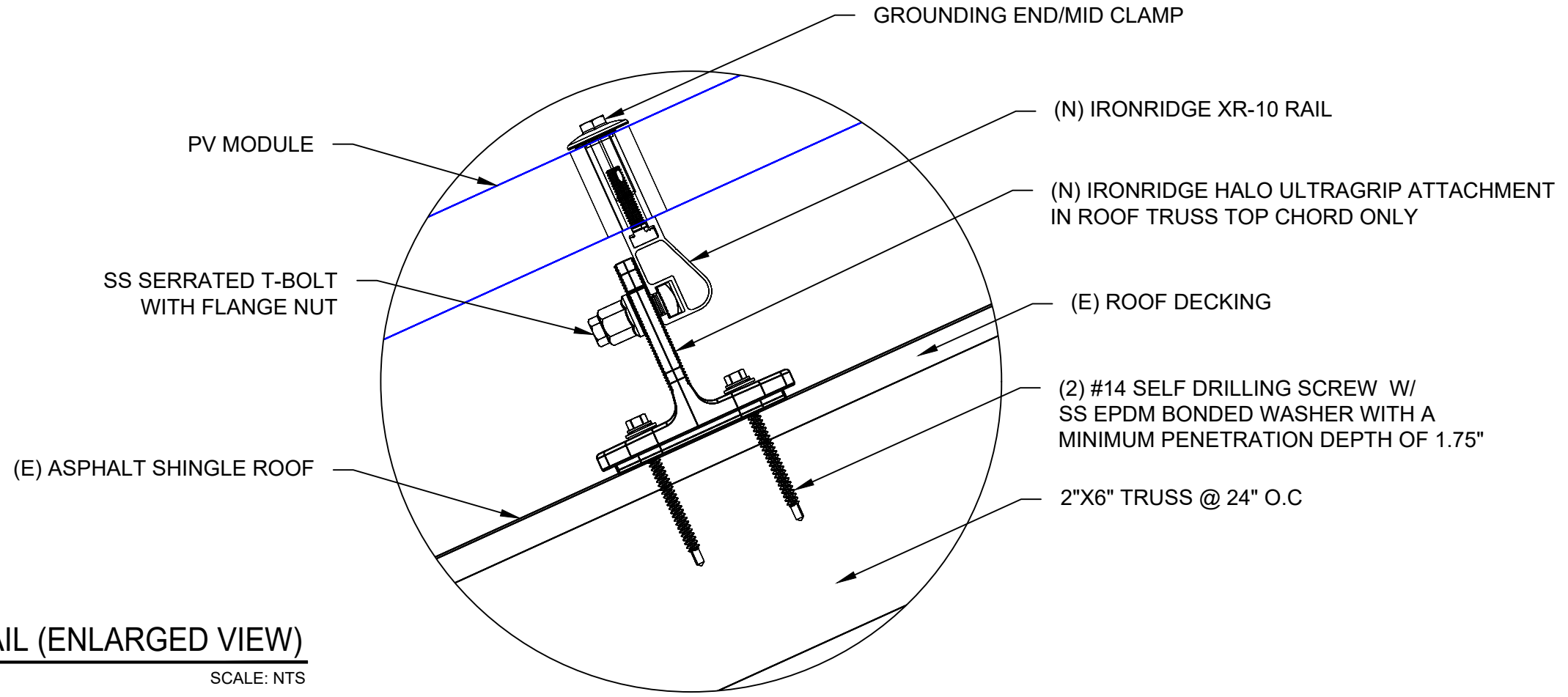
SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-5**



**1 ATTACHMENT DETAIL**

PV-5 SCALE: N.T.S



**2 ATTACHMENT DETAIL (ENLARGED VIEW)**

PV-5 SCALE: NTS

DC SYSTEM SIZE: 8.925 KW DC  
AC SYSTEM SIZE: 6.090 KW AC

(21) JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES WITH  
(21) ENPHASE IQ8PLUS-72-M-US (290W) MICROINVERTERS

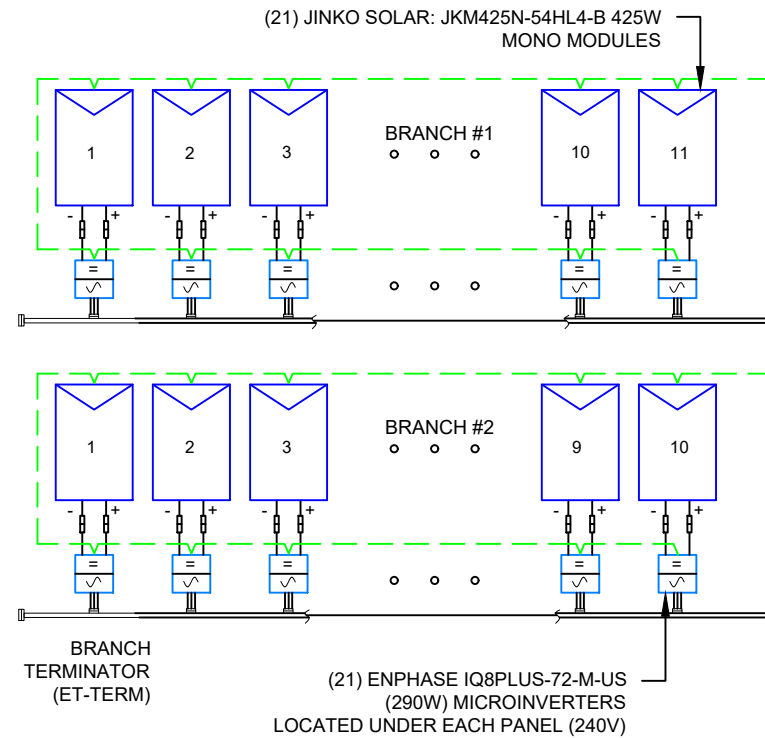
(1) BRANCH CIRCUIT OF 11 MODULES AND  
(1) BRANCH CIRCUIT OF 10 MODULES ARE CONNECTED IN PARALLEL

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT  
LOCATED WITHIN 10' OF UTILITY METER

120% RULE CHECK:  
120% X 225A = 270A  
21 MICRO-INVERTERS X 1.21A X 1.25 = 31.76A  
270A - 200A = 70A > 31.76A, OKAY

NOTE: CONDUIT TO BE UL LISTED FOR  
WET LOCATIONS AND UV PROTECTED  
(EX- EMT, PVC, OR EQUIVALENT)

MODULE RATED POWER (P<sub>MAX</sub>): 425W



**GROUNDING & GENERAL NOTES:**

1. A SECOND FACILITY GROUNDING ELECTRODE IS NOT REQUIRED PER [NEC 690.47(C)(3)]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [NEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.

**INSTALLER/ELECTRICIAN NOTE:**

EC IS TO MEASURE VOLTAGE BEFORE STARTING WORK.  
IF RESULT IS ANY OTHER VOLTAGE MEASURED THAN 120/240V IS OBSERVED, DO NOT PROCEED. CONTACT ENGINEER

**INTERCONNECTION NOTES:**

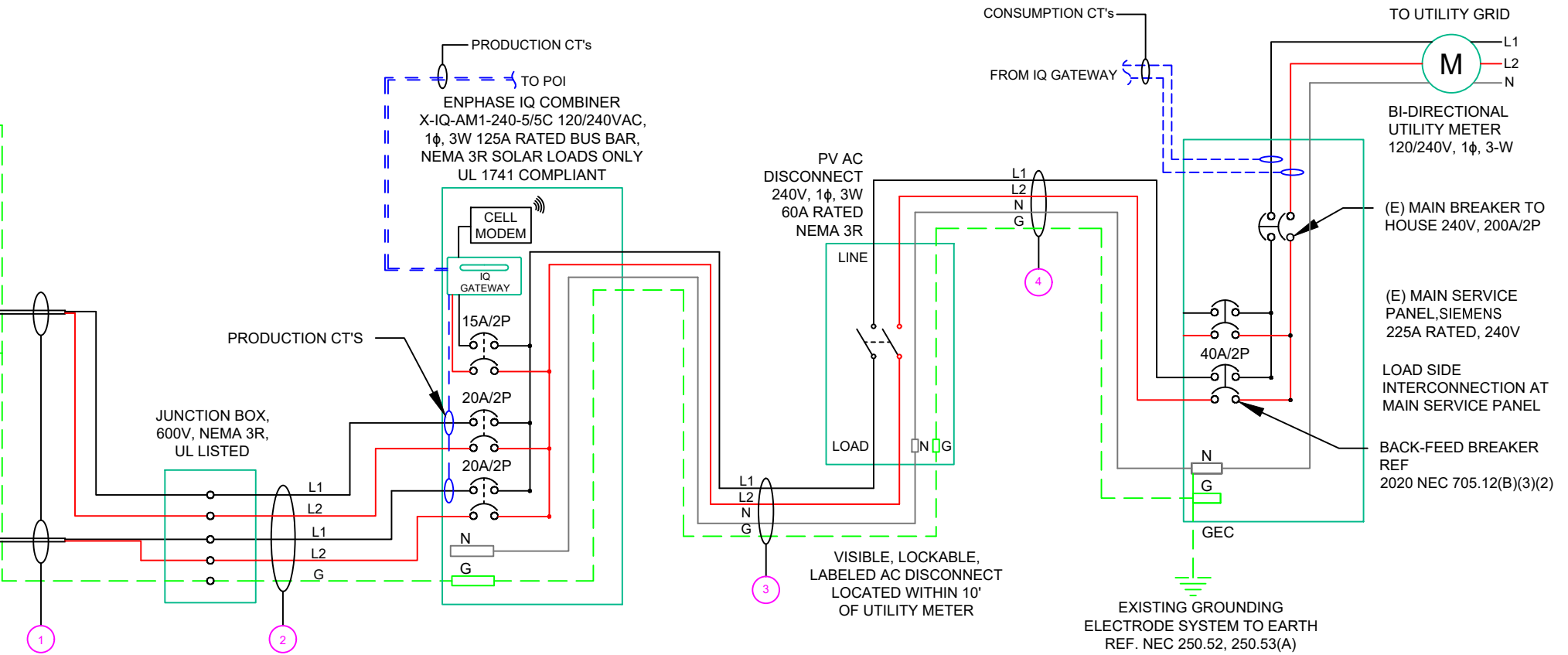
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.64].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95] AND [NEC 690.5].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

**DISCONNECT NOTES:**

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

**RACKING NOTE:**

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

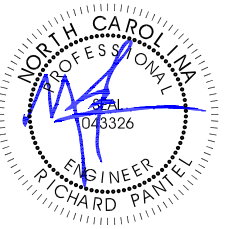


| QTY | CONDUCTOR INFORMATION |   | CONDUIT TYPE         | CONDUIT SIZE |
|-----|-----------------------|---|----------------------|--------------|
| (4) | CU #12AWG             | ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL) | N/A                  | N/A          |
| (1) | CU #6AWG              | BARE COPPER IN FREE AIR                   |                      |              |
| (4) | CU #10AWG             | THWN-2 (L1,L2)                            | EMT OR LFMC IN ATTIC | 3/4"         |
| (1) | CU #10AWG             | THWN-2 GND                                |                      |              |
| (3) | CU #8AWG              | THWN-2 (L1,L2 & N)                        | EMT OR LFMC          | 3/4"         |
| (1) | CU #10AWG             | THWN-2 GND                                |                      |              |
| (3) | CU #8AWG              | THWN-2 (L1,L2 & N)                        | EMT OR LFMC          | 3/4"         |
| (1) | CU #10AWG             | THWN-2 GND                                |                      |              |



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DRAWN BY  
ESR

SHEET NAME  
ELECTRICAL LINE  
DIAGRAM

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-6

1 ELECTRICAL LINE DIAGRAM

PV-6


SCALE: NTS

| INVERTER SPECIFICATIONS   |  |
|---------------------------|--|
| MANUFACTURER / MODEL #    | ENPHASE IQ8PLUS-72-M-US (290W) MICROINVERTER |
| MIN/MAX DC VOLT RATING    | 22V MIN/ 58V MAX                             |
| MAX INPUT POWER           | 235W-440W +                                  |
| NOMINAL AC VOLTAGE RATING | 240V/ 211-264V                               |
| MAX AC CURRENT            | 1.21A  |
| MAX MODULES PER CIRCUIT   | 13 (SINGLE PHASE)                            |
| MAX OUTPUT POWER          | 290 VA                                       |

| SOLAR MODULE SPECIFICATIONS |  |
|-----------------------------|--|
| MANUFACTURER / MODEL #      | JINKO SOLAR: JKM425N-54HL4-B 425W MODULE |
| VMP                         | 32.37V                                   |
| IMP                         | 13.13A                                   |
| VOC                         | 38.95V                                   |
| ISC                         | 13.58A                                   |
| TEMP. COEFF. VOC            | -0.25%/°C                                |
| MODULE DIMENSION            | 67.79"L x 44.65"W x 1.38"D (In Inch)     |

| AMBIENT TEMPERATURE SPECS             |          |
|---------------------------------------|----------|
| RECORD LOW TEMP                       | -9°      |
| AMBIENT TEMP (HIGH TEMP 2%)           | 38°      |
| CONDUCTOR TEMPERATURE RATE            | 90°      |
| MODULE TEMPERATURE COEFFICIENT OF Voc | -0.25%/C |

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




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| AC FEEDER CALCULATIONS |                     |             |                          |              |                |              |                    |                |                   |                   |                    |                                |                   |  |   |                           |                   |                      |                                |                         |              |                  |
|------------------------|---------------------|-------------|--------------------------|--------------|----------------|--------------|--------------------|----------------|-------------------|-------------------|--------------------|--------------------------------|-------------------|--|---|---------------------------|-------------------|----------------------|--------------------------------|-------------------------|--------------|------------------|
| CIRCUIT ORIGIN         | CIRCUIT DESTINATION | VOLTAGE (V) | FULL LOAD AMPS "FLA" (A) | FLA*1.25 (A) | OC PD SIZE (A) | NEUTRAL SIZE | GROUND SIZE        | CONDUCTOR SIZE | 75°C AMPACITY (A) | AMPACITY CHECK #1 | AMBIENT TEMP. (°C) | TOTAL CC CONDUCTORS IN RACEWAY | 90°C AMPACITY (A) | DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(1) | DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(C)(1) | 90°C AMPACITY DERATED (A) | AMPACITY CHECK #2 | FEEDER LENGTH (FEET) | CONDUCTOR RESISTANCE (OHM/KFT) | VOLTAGE DROP AT FLA (%) | CONDUIT SIZE | CONDUIT FILL (%) |
| CIRCUIT 1              | JUNCTION BOX        | 240         | 13.31                    | 16.6375      | 20             | N/A          | BARE COPPER #6 AWG | CU #12 AWG     | 25                | PASS              | 38                 | 2                              | 30                | 0.91   | 1   | 27.3                      | PASS              |                      |                                | 0.55                    | N/A          | #N/A             |
| CIRCUIT 2              | JUNCTION BOX        | 240         | 12.1                     | 15.125       | 20             | N/A          | BARE COPPER #6 AWG | CU #12 AWG     | 25                | PASS              | 38                 | 2                              | 30                | 0.91   | 1   | 27.3                      | PASS              |                      |                                | 0.46                    | N/A          | #N/A             |
| JUNCTION BOX           | COMBINER BOX        | 240         | 13.31                    | 16.6375      | 20             | N/A          | CU #10 AWG         | CU #10 AWG     | 35                | PASS              | 38                 | 4                              | 40                | 0.91   | 0.8   | 29.12                     | PASS              | 41                   | 1.24                           | 0.564                   | 3/4" EMT     | 19.79362         |
| COMBINER BOX           | AC DISCONNECT       | 240         | 25.41                    | 31.7625      | 40             | CU #8 AWG    | CU #10 AWG         | CU #8 AWG      | 50                | PASS              | 38                 | 2                              | 55                | 0.91   | 1   | 50.05                     | PASS              | 2                    | 0.778                          | 0.033                   | 3/4" EMT     | 24.5591          |
| AC DISCONNECT          | POI                 | 240         | 25.41                    | 31.7625      | 40             | CU #8 AWG    | CU #10 AWG         | CU #8 AWG      | 50                | PASS              | 38                 | 2                              | 55                | 0.91   | 1   | 50.05                     | PASS              | 2                    | 0.778                          | 0.033                   | 3/4" EMT     | 24.5591          |

|                        |       |
|------------------------|-------|
| Circuit 1 Voltage Drop | 1.180 |
| Circuit 2 Voltage Drop | 1.090 |



Reviewed and approved  
Richard Pantel, P.E.  
NC Lic. No. 043326  
02/14/2025

DATE:02/13/2025

PROJECT NAME & ADDRESS

STEPHEN SZABO  
RESIDENCE  
213 WINDSWEEP WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**WIRING  
CALCULATIONS**

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

SHEET NUMBER  
**PV-7**

**ELECTRICAL NOTES**

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE RATED UPTO 600V FOR RESIDENTIAL AND 1000V FOR COMMERCIAL AND 90 DEGREE C WET ENVIRONMENT.
- 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.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.

**CAUTION:  
AUTHORIZED SOLAR  
PERSONNEL ONLY!**

LABEL-1:  
LABEL LOCATION:  
AC DISCONNECT

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

LABEL- 2:  
LABEL LOCATION:  
AC DISCONNECT  
COMBINER  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
CODE REF: NEC 705.20(7) & 690.13(B)

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

LABEL- 3:  
LABEL LOCATION:  
UTILITY METER  
MAIN SERVICE PANEL  
SUBPANEL  
CODE REF: NEC 705.30(C) & NEC 690.59

**WARNING**  
**TURN OFF PHOTOVOLTAIC AC  
DISCONNECT PRIOR TO  
WORKING INSIDE PANEL**

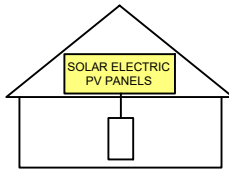
LABEL- 4:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
COMBINER  
CODE REF: NEC 110.27(C) & OSHA 1910.145(f)(7)

**WARNING**  
POWER SOURCE OUTPUT  
CONNECTION. DO NOT  
RELOCATE THIS  
OVERCURRENT DEVICE

LABEL- 5:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12 (B)(2)

**SOLAR PV 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



LABEL- 6:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: IFC 605.11.3.1(1) & 690.12(D)

**RAPID SHUTDOWN SWITCH  
FOR SOLAR PV SYSTEM**

LABEL- 7:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.12(D)(2)

**PHOTOVOLTAIC  
AC DISCONNECT**

|                              |                |
|------------------------------|----------------|
| NOMINAL OPERATING AC VOLATGE | <b>240 V</b>   |
| RATED AC OUTPUT CURRENT      | <b>25.41 A</b> |

LABEL- 8:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
AC DISCONNECT  
CODE REF: NEC 690.54

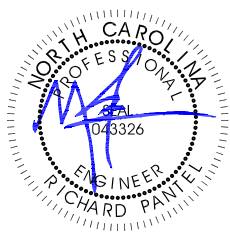
**CAUTION**  
**PHOTOVOLTAIC SYSTEM CIRCUIT IS  
BACKFEED**

LABEL- 9:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3-4) & NEC 690.59



**EMPWR SOLAR**  
1007 JOHNNIE DODDS  
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SC 29464  
TEL: 854-999-4837  
EMAIL : info@empwrsolar.com

| REVISIONS   |      |     |
|-------------|------|-----|
| DESCRIPTION | DATE | REV |
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|             |      |     |
|             |      |     |



Reviewed and approved  
Richard Pantel, P.E.  
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02/14/2025

DATE:02/13/2025

PROJECT NAME & ADDRESS  
**STEPHEN SZABO  
RESIDENCE  
213 WINDSWEPT WY,  
FUQUAY-VARINA,  
NC 27526**

DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

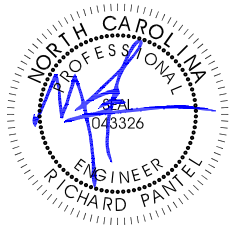
SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-8**



REVISIONS

| DESCRIPTION | DATE | REV |
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PROJECT NAME & ADDRESS

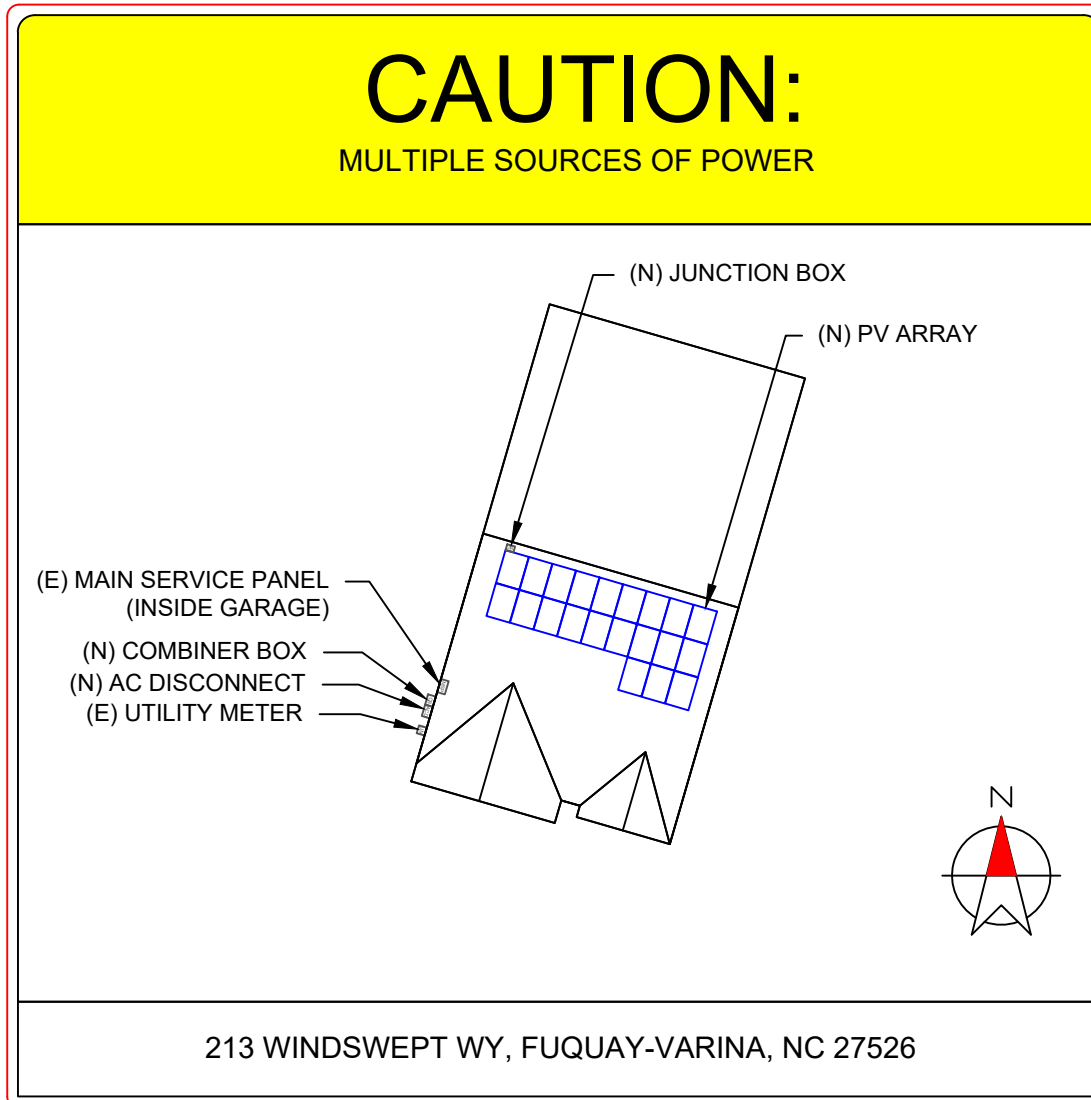
STEPHEN SZABO  
RESIDENCE  
213 WINDSWEPT WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
ESR

SHEET NAME  
PLACARD

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-9



DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN:  
NEC 690.56(A)(B), NEC 705.10)

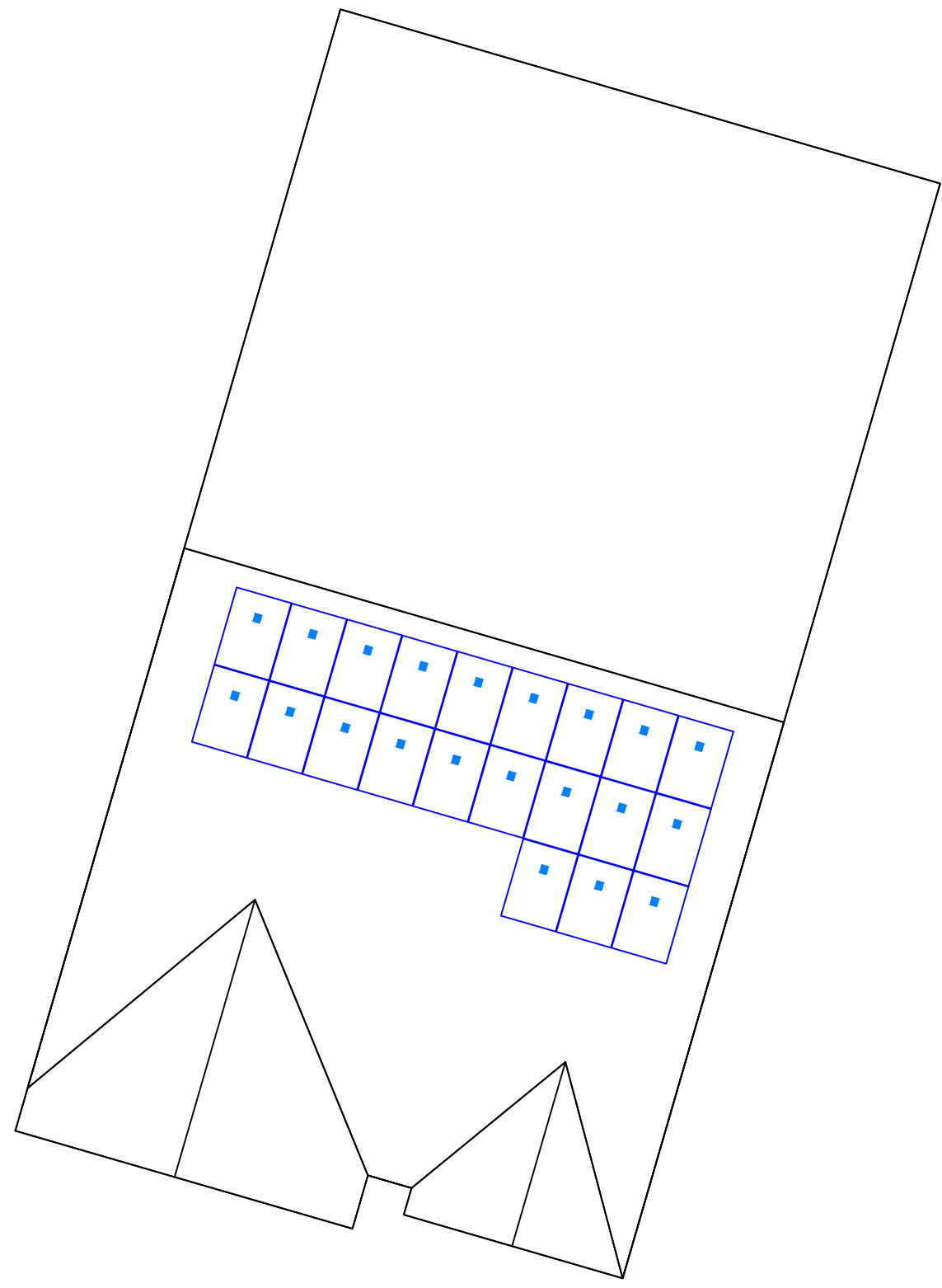
LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

1-10    11-20    21-30    31-40    41-50    51-60    61-70

|    |  |  |  |  |  |  |
|----|--|--|--|--|--|--|
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| 9  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

# MICRO INVERTER CHART



**EMPWR SOLAR**  
 1007 JOHNNIE DODDS  
 BLVD SUITE 111  
 CHARLESTON,  
 SC 29464  
 TEL: 854-999-4837  
 EMAIL : info@empwrsolar.com

| REVISIONS   |      |     |
|-------------|------|-----|
| DESCRIPTION | DATE | REV |
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Reviewed and approved  
 Richard Pantel, P.E.  
 NC Lic. No. 043326  
 02/14/2025

DATE:02/13/2025

PROJECT NAME & ADDRESS  
**STEPHEN SZABO**  
**RESIDENCE**  
**213 WINDSWEPT WY,**  
**FUQUAY-VARINA,**  
**NC 27526**

DRAWN BY  
**ESR**

SHEET NAME  
**MICRO INVERTER  
 CHART**

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

SHEET NUMBER  
**PV-10**



# THE MOST DEPENDABLE SOLAR PRODUCT

## EAGLE® 54 G6R

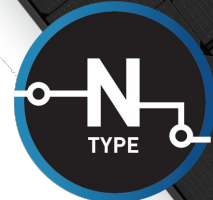
420-440 WATT • N-TYPE TOPCON

Positive power tolerance of 0~+3%

- NYSE-listed since 2010, Bloomberg Tier 1 manufacturer
- Top performance in the strictest 3<sup>rd</sup> party labs
- Automated manufacturing utilizing artificial intelligence
- Vertically integrated, tight controls on quality
- Premium solar factories in USA, Vietnam, and Malaysia

### KEY FEATURES

- Superior Aesthetics**  
Black backsheet and black frame create ideal look for residential applications.
- N-Type Technology**  
N-type cells with Jinko's in-house TOPCon technology offers better performance and improved reliability.
- Thick and Tough**  
Fire Type 1 rated module engineered with a thick frame, 3.2mm front side glass, and thick backsheet for added durability.
- Shade Tolerant**  
Twin array design allows continued performance even with shading by trees or debris.
- Protected Against All Environments**  
Certified to withstand humidity, heat, rain, marine environments, wind, hailstorms, and packed snow.
- Warranty**  
25-year product and 30-year linear power warranty.



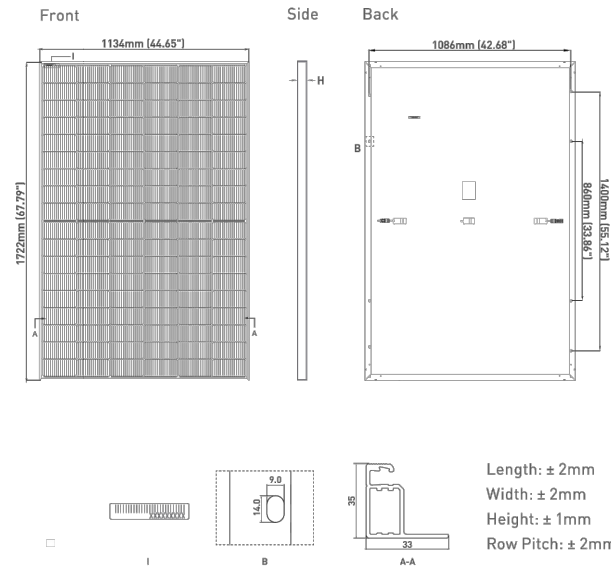
- ISO9001:2015 Quality Standards
- ISO14001:2015 Environmental Standards
- IEC61215, IEC61730 certified products
- ISO45001:2018 Occupational Health & Safety Standards
- UL1730 certified products



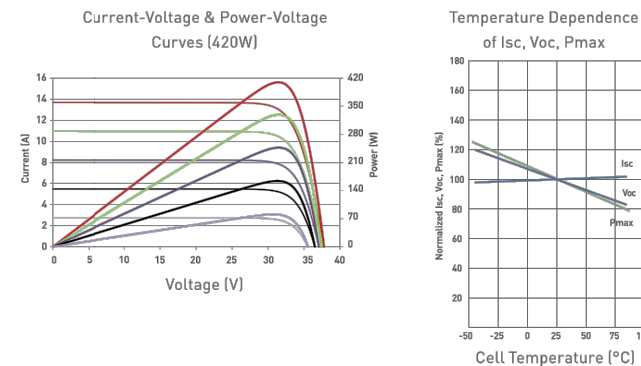
BUILDING YOUR TRUST IN SOLAR. [WWW.JINKOSOLAR.US](http://WWW.JINKOSOLAR.US)



### ENGINEERING DRAWINGS



### ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



### ELECTRICAL CHARACTERISTICS

| Module Type                 | JKM420N-54HL4-B |        | JKM425N-54HL4-B |        | JKM430N-54HL4-B |        | JKM435N-54HL4-B |        | JKM440N-54HL4-B |        |
|-----------------------------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|
|                             | STC             | NOCT   | STC             | NOCT   | STC             | NOCT   | STC             | NOCT   | STC             | NOCT   |
| Maximum Power [Pmax]        | 420Wp           | 316Wp  | 425Wp           | 320Wp  | 430Wp           | 323Wp  | 435Wp           | 327Wp  | 440Wp           | 331Wp  |
| Maximum Power Voltage [Vmp] | 32.16V          | 29.95V | 32.37V          | 30.19V | 32.58V          | 30.30V | 32.78V          | 30.50V | 32.99V          | 30.73V |
| Maximum Power Current [Imp] | 13.06A          | 10.55A | 13.13A          | 10.60A | 13.20A          | 10.66A | 13.27A          | 10.72A | 13.34A          | 10.77A |
| Open-circuit Voltage [Voc]  | 38.74V          | 36.80V | 38.95V          | 37.00V | 39.16V          | 37.20V | 39.36V          | 37.39V | 39.57V          | 37.59V |
| Short-circuit Current [Isc] | 13.51A          | 10.91A | 13.58A          | 10.96A | 13.65A          | 11.02A | 13.72A          | 11.08A | 13.80A          | 11.14A |
| Module Efficiency STC [%]   | 21.51%          |        | 21.76%          |        | 22.02%          |        | 22.28%          |        | 22.53%          |        |

\*STC: Irradiance 1000W/m<sup>2</sup>  
NOCT: Irradiance 800W/m<sup>2</sup>

Cell Temperature 25°C  
Ambient Temperature 20°C

AM = 1.5  
Wind Speed 1m/s

\*Power measurement tolerance: ±3%

The company reserves the final right for explanation on any of the information presented hereby. JKM400-420N-54HL4-B-F4-US

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### MECHANICAL CHARACTERISTICS

|                   |   |
|-------------------|---|
| No. of Half Cells | 108 (2 x 54)  |
| Dimensions        | 1722 × 1134 × 35mm (67.79 × 44.65 × 1.38 inch)                                |
| Weight            | 21.0kg (46.3lbs)  |
| Front Glass       | 3.2mm, Anti-Reflection Coating<br>High Transmission, Low Iron, Tempered Glass |
| Frame             | Anodized Aluminum Alloy   |
| Junction Box      | IP68 Rated  |
| Output Cables     | 12 AWG, 1400mm (55.12in) or Customized Length                                 |
| Connector         | Staubli MC4   |
| Fire Type         | Type 1  |
| Pressure Rating   | 5400Pa (Snow) & 2400Pa (Wind)*  |

\*see Supplemental Installation Manual for higher wind pressure rating solutions

### TEMPERATURE CHARACTERISTICS

|   |           |
|---|-----------|
| Temperature Coefficients of Pmax          | -0.29%/°C |
| Temperature Coefficients of Voc           | -0.25%/°C |
| Temperature Coefficients of Isc           | 0.045%/°C |
| Nominal Operating Cell Temperature (NOCT) | 45±2°C    |

### MAXIMUM RATINGS

|                            |             |
|----------------------------|-------------|
| Operating Temperature [°C] | -40°C~+85°C |
| Maximum System Voltage     | 1000VDC     |
| Maximum Series Fuse Rating | 25A         |

### PACKAGING CONFIGURATION

(Two pallets = One stack)  
31pcs/pallets, 62pcs/stack, 806pcs/40 HQ Container

### WARRANTY

25-year product and 30-year linear power warranty  
1<sup>st</sup> year degradation not to exceed 1%, each subsequent year not to exceed 0.4%, minimum power at year 30 is 87.4% or greater.



EMPWR SOLAR  
1007 JOHNNIE DODDS  
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SC 29464  
TEL: 854-999-4837  
EMAIL: info@empwrsolar.com

### REVISIONS

| DESCRIPTION | DATE | REV |
|-------------|------|-----|
|             |      |     |
|             |      |     |
|             |      |     |

DATE:02/13/2025

### PROJECT NAME & ADDRESS

STEPHEN SZABO  
RESIDENCE  
213 WINDSWEEP WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-11





DATA SHEET

## IQ8 and IQ8+ Microinverters

| INPUT DATA (DC)                                      |      | UNITS  | IQ8-60-M-US  | IQ8PLUS-72-M-US |
|--|------|--|--|-----------------|
| Commonly used module pairings <sup>1</sup>           | W    |  | 235-350  | 235-440         |
| Module compatibility                                 | –    | To meet compatibility, PV modules must be within the following maximum input DC voltage and maximum module $I_{sc}$ . Module compatibility can be checked at <a href="https://enphase.com/installers/microinverters/calculator">https://enphase.com/installers/microinverters/calculator</a> . |  |                 |
| MPPT voltage range                                   | V    |  | 27-37  | 27-45           |
| Operating range                                      | V    |  | 16-48  | 16-58           |
| Minimum/Maximum start voltage                        | V    |  | 22/48  | 22/58           |
| Maximum input DC voltage                             | V    |  | 50   | 60              |
| Maximum continuous input DC current                  | A    |  | 10   | 12              |
| Maximum input DC short-circuit current               | A    |  |  | 25              |
| Maximum module ( $I_{sc}$ )                          | A    |  |  | 20              |
| Overvoltage class DC port                            | –    |  |  | II              |
| DC port backfeed current                             | mA   |  |  | 0               |
| PV array configuration                               | –    | Ungrounded array; no additional DC side protection required; AC side protection requires max. 20 A per branch circuit  |  |                 |
| OUTPUT DATA (AC)                                     |      | UNITS  | IQ8-60-M-US  | IQ8PLUS-72-M-US |
| Peak output power                                    | VA   |  | 245  | 300             |
| Maximum continuous output power                      | VA   |  | 240  | 290             |
| Nominal grid voltage (L-L)                           | V    |  | 240, split-phase (L-L), 180°                                       |                 |
| Minimum and Maximum grid voltage <sup>2</sup>        | V    |  | 211-264  |                 |
| Maximum continuous output current                    | A    |  | 1.0  | 1.21            |
| Nominal frequency                                    | Hz   |  | 60   |                 |
| Extended frequency range                             | Hz   |  | 47-68  |                 |
| AC short circuit fault current over three cycles     | Arms |  | 2  |                 |
| Max units per 20 A (L-L) branch circuit <sup>3</sup> | –    |  | 16   | 13              |
| Total harmonic distortion                            | %    |  | <5   |                 |
| Overvoltage class AC port                            | –    |  | III  |                 |
| AC port backfeed current                             | mA   |  | 30   |                 |
| Power factor setting                                 | –    |  | 1.0  |                 |
| Grid-tied power factor (adjustable)                  | –    |  | 0.85 leading ... 0.85 lagging                                      |                 |
| Peak efficiency                                      | %    |  | 97.7   |                 |
| CEC weighted efficiency                              | %    |  | 97   |                 |
| Nighttime power consumption                          | mW   |  | 23   | 25              |
| MECHANICAL DATA                                      |      |  |  |                 |
| Ambient temperature range                            |      |  | -40°C to 60°C (-40°F to 140°F)                                     |                 |
| Relative humidity range                              |      |  | 4% to 100% (condensing)  |                 |
| DC connector type                                    |      |  | Stäubli MC4  |                 |
| Dimensions (H x W x D)                               |      |  | 212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")                     |                 |
| Weight   |      |  | 1.1 kg (2.43 lbs)  |                 |
| Cooling  |      |  | Natural convection—no fans   |                 |
| Approved for wet locations                           |      |  | Yes  |                 |
| Pollution degree                                     |      |  | PD3  |                 |
| Enclosure  |      |  | Class II double-insulated, corrosion-resistant polymeric enclosure |                 |
| Environmental category/UV exposure rating            |      |  | NEMA Type 6/outdoor  |                 |

(1) No enforced DC/AC ratio.  
 (2) Nominal voltage range can be extended beyond nominal if required by the utility.  
 (3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

## IQ8 and IQ8+ Microinverters

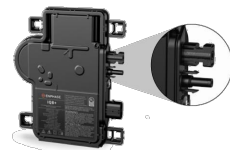
Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC), which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built using advanced 55-nm technology with high-speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to the IQ8 Series Microinverters that have integrated MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with various regulations when installed according to manufacturer's instructions.

\* Meets UL 1741 only when installed with IQ System Controller 2 or 3.  
 \*\* IQ8 and IQ8+ support split-phase, 240 V installations only.

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IQ8SP-MC4-DSH-00206-3.0-EN-US-2024-02-09

### Easy to install

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation with simple two-wire cabling

### High productivity and reliability

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

### Microgrid-forming

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB)

### NOTE:

- IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Microinverters ship with default settings that meet North America's IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative according to the IEEE 1547 interconnection standard. An IQ Gateway is required to make these changes during installation.



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### REVISIONS

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DATE:02/13/2025

### PROJECT NAME & ADDRESS

STEPHEN SZABO  
 RESIDENCE  
 213 WINDSWEEP WY,  
 FUQUAY-VARINA,  
 NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
 SPECIFICATION**

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

SHEET NUMBER  
**PV-12**

IQ8SP-MC4-DSH-00206-3.0-EN-US-2024-02-09





X-IQ-AM1-240-5  
X-IQ-AM1-240-5C

## IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provide a complete grid-agnostic Enphase Energy System.



**IQ Series Microinverters**  
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) simplify the installation process.



**IQ System Controller 3/3G**  
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.



**IQ Battery 5P**  
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters.



**IQ Load Controller**  
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.



5-year limited warranty



\*For country-specific warranty information, see the <https://enphase.com/installers/resources/warranty> page.

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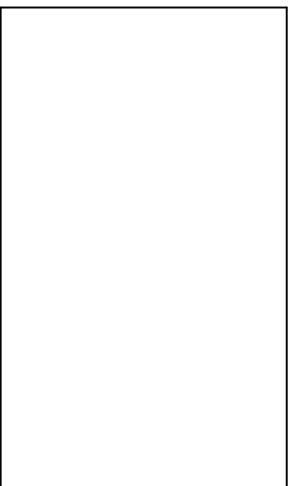
IQC-5-5C-DSH-00007-3.0-EN-US-2024-03-01

## IQ Combiner 5/5C

| MODEL NUMBER   |   |
|--|---|
| IQ Combiner 5 (X-IQ-AM1-240-5)                                     | IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (± 2.5%), and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat.  |
| IQ Combiner 5C (X-IQ-AM1-240-5C)                                   | IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05) <sup>1</sup> . Includes a silver solar shield to deflect heat. |
| WHAT'S IN THE BOX  |   |
| IQ Gateway printed circuit board                                   | IQ Gateway is the platform for total energy management for comprehensive, remote maintenance, and management of the Enphase Energy System   |
| Busbar   | 80 A busbar with support for 1 × IQ Gateway breaker and 4 × 20 A breaker for installing IQ Series Microinverters and IQ Battery 5P  |
| IQ Gateway breaker   | Circuit breaker, 2-pole, 10 A/15 A  |
| Production CT  | Pre-wired revenue-grade solid-core CT, accurate up to ±0.5%   |
| Consumption CT   | Two consumption metering clamp CTs, shipped with the box, accurate up to ±2.5%  |
| IQ Battery CT  | One battery metering clamp CT, shipped with the box, accurate up to ±2.5%   |
| CTRL board   | Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P  |
| Enphase Mobile Connect (only with IQ Combiner 5C)                  | 4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan   |
| Accessories kit  | Spare control headers for the COMMS-KIT-02 board  |
| ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY) |   |
| CELLMODEM-M1-06-SP-05  | 4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan   |
| CELLMODEM-M1-06-AT-05  | 4G-based LTE-M1 cellular modem with a 5-year AT&T data plan   |
| Circuit breakers (off-the-shelf)                                   | Supports Eaton BR2XX, Siemens Q2XX and GE/ABB THQL21XX Series circuit breakers (XX represents 10, 15, 20, 30, 40, 50, or 60). Also supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with the hold-down kit.  |
| Circuit breakers (provided by Enphase)                             | BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (more details in the "Accessories" section)   |
| XA-SOLARSHIELD-ES  | Replacement solar shield for IQ Combiner 5/5C   |
| XA-ENV2-PCBA-5   | IQ Gateway replacement printed circuit board (PCB) for IQ Combiner 5/5C   |
| X-IQ-NA-HD-125A  | Hold-down kit compatible with Eaton BR-B Series circuit breakers (with screws)  |
| XA-COMMS2-PCBA-5   | Replacement COMMS-KIT-02 printed circuit board (PCB) for IQ Combiner 5/5C   |
| ELECTRICAL SPECIFICATIONS  |   |
| Rating   | 80 A  |
| System voltage and frequency                                       | 120/240 VAC, 60 Hz  |
| Busbar rating  | 125 A   |
| Fault current rating   | 10 kAIC   |
| Maximum continuous current rating (input from PV/storage)          | 64 A  |
| Branch circuits (solar and/or storage)                             | Up to four 2-pole Eaton BR, Siemens Q, or GE/ABB THQL Series distributed generation (DG) breakers only (not included)   |
| Maximum total branch circuit breaker rating (input)                | 80 A of distributed generation/95 A with IQ Gateway breaker included  |
| IQ Gateway breaker   | 10 A or 15 A rating GE/Siemens/Eaton included   |
| Production metering CT   | 200 A solid core pre-installed and wired to IQ Gateway  |
| Consumption monitoring CT (CT-200-CLAMP)                           | A pair of 200 A clamp-style current transformers is included with the box   |
| IQ Battery metering CT   | 200 A clamp-style current transformer for IQ Battery metering, included with the box  |

1. A plug-and-play industrial-grade cell modem for systems of up to 60 microinverters. Available in the United States, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.

| REVISIONS   |      |     |
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DATE:02/13/2025

PROJECT NAME & ADDRESS  
**STEPHEN SZABO  
RESIDENCE  
213 WINDSWEEP WY,  
FUQUAY-VARINA,  
NC 27526**

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

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

SHEET NUMBER  
**PV-13**

IQC-5-5C-DSH-00007-3.0-EN-US-2024-03-01

| MECHANICAL DATA                         |   |
|---|---|
| Dimensions (W × H × D)                  | 37.5 cm × 49.5 cm × 16.8 cm (14.75" × 19.5" × 6.63"). Height is 21.06" (53.5 cm) with mounting brackets   |
| Weight                                  | 7.5 kg (16.5 lbs)   |
| Ambient temperature range               | -40°C to 46°C (-40°F to 115°F)  |
| Cooling                                 | Natural convection, plus heat shield  |
| Enclosure environmental rating          | Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction   |
| Wire sizes                              | <ul style="list-style-type: none"> <li>20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>Main lug combined output: 10 to 2/0 AWG copper conductors</li> <li>Neutral and ground: 14 to 1/0 copper conductors</li> <li>Always follow local code requirements for conductor sizing</li> </ul> |
| Communication (in-premise connectivity) | Built-in CTRL board for wired communication with IQ Battery 5P and IQ System Controller 3/3G. Integrated power line communication for IQ Series Microinverters  |
| Altitude                                | Up to 2,600 meters (8,530 feet)   |

| COMMUNICATION INTERFACES  |   |
|---------------------------|---|
| Integrated Wi-Fi          | 802.11b/g/n (dual band 2.4 GHz/5 GHz), for connecting the Enphase Cloud through the internet                                  |
| Wi-Fi range (recommended) | 10 m (32.8 feet)  |
| Bluetooth                 | BLE4.2, 10 m range to configure Wi-Fi SSID  |
| Ethernet                  | Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud through the internet |
| Cellular/Mobile Connect   | CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with IQ Combiner 5C)   |
| Digital I/O               | Digital input/output for grid operator control  |
| USB 2.0                   | Mobile Connect, COMMS-KIT-01 for IQ Battery 3/3T/10/10T, COMMS-KIT-02 for IQ Battery 5P                                       |
| Access point (AP) mode    | For connection between the IQ Gateway and a mobile device running the Enphase Installer App                                   |
| Metering ports            | Up to two Consumption CTs, one IQ Battery CT, and one Production CT   |
| Power line communication  | 90-110 kHz  |
| Web API                   | See <a href="https://developer-v4.enphase.com">https://developer-v4.enphase.com</a>   |
| Local API                 | See <a href="#">guide for local API</a>   |

| COMPLIANCE                  |   |
|-----------------------------|---|
| IQ Combiner with IQ Gateway | UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003, NOM-208-SCFI-2016, UL 60601-1/CANCSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.), IEEE 2030.5/CSIP Compliant, Production metering: ANSI C12.20 accuracy class 0.5 (PV production) |

| COMPATIBILITY             |                        |  |
|---------------------------|------------------------|--|
| PV                        | Microinverters         | IQ6, IQ7, and IQ8 Series Microinverters                                    |
|                           | IQ System Controller   | EP200G101-M240US00   |
| COMMS-KIT-01 <sup>2</sup> | IQ System Controller 2 | EP200G101-M240US01   |
|                           | IQ Battery             | ENCHARGE-3-1P-NA, ENCHARGE-10-1P-NA, ENCHARGE-3T-1P-NA, ENCHARGE-10T-1P-NA |
| COMMS-KIT-02 <sup>3</sup> | IQ System Controller 3 | SC200D111C240US01, SC200G111C240US01                                       |
|                           | IQ Battery             | IQBATTERY-5P-1P-NA   |

2. For information about IQ Combiner 5/5C compatibility with the 2<sup>nd</sup>-generation batteries, refer to the [compatibility matrix](#).  
3. IQ Combiner 5/5C comes pre-equipped with COMMS-KIT-02.

## Accessories



**Mobile Connect**  
4G-based LTE-M1 cellular modem with a 5-year data plan  
(CELLMODEM-M1-06-SP-05 for Sprint and CELLMODEM-M1-06-AT-05 for AT&T)



**Circuit breakers**  
BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210  
BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215  
BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220  
BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support  
BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support



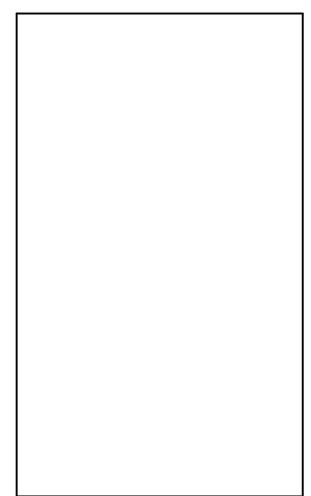
**CT-200-SOLID**  
200 A revenue-grade solid core Production CT with <0.5% error rate (replacement SKU)



**CT-200-CLAMP**  
200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

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DATE:02/13/2025

PROJECT NAME & ADDRESS  
STEPHEN SZABO RESIDENCE  
213 WINDSWEPT WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-14**





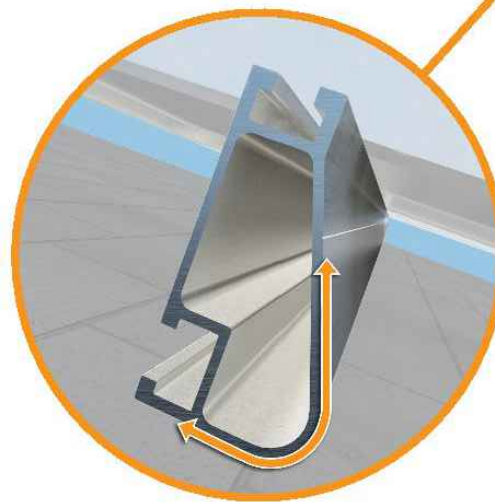
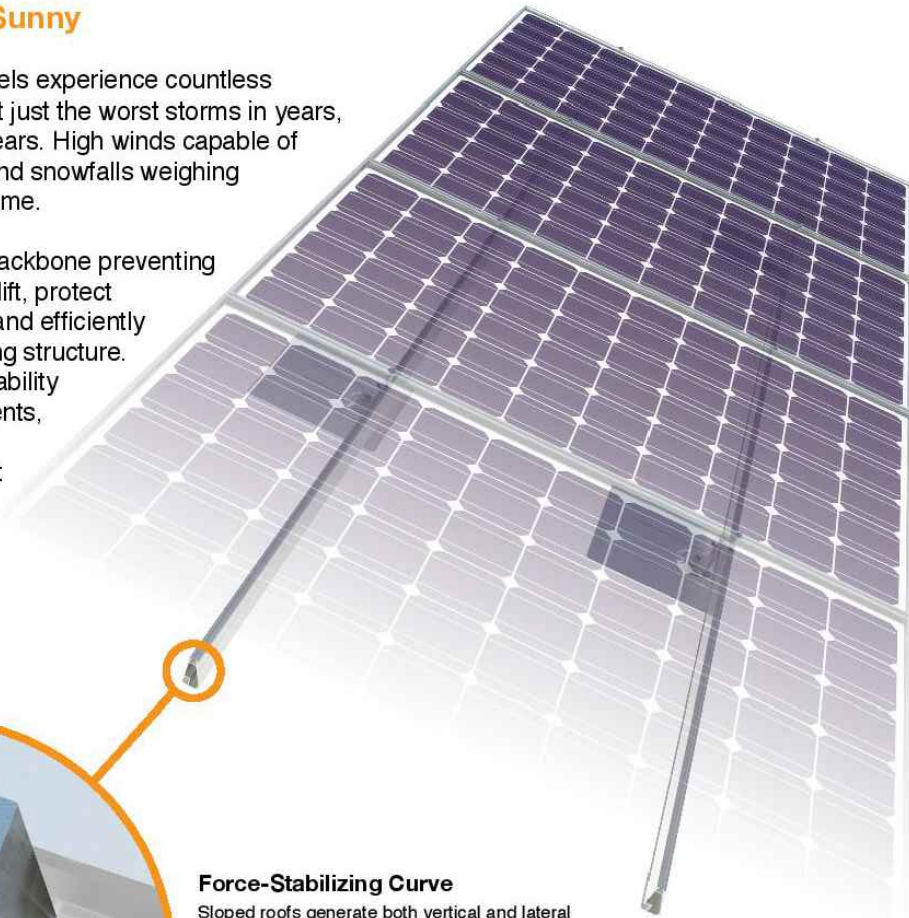
Tech Brief

## XR Rail Family

### Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



#### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

#### Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

#### Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



#### XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available



#### XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



#### XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

## Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.\* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

| Load       |            | Rail Span |       |       |    |        |     |
|------------|------------|-----------|-------|-------|----|--------|-----|
| Snow (PSF) | Wind (MPH) | 4'        | 5' 4" | 6'    | 8' | 10'    | 12' |
| None       | 90         |           |       |       |    |        |     |
|            | 120        |           |       |       |    |        |     |
|            | 140        | XR10      |       | XR100 |    | XR1000 |     |
|            | 160        |           |       |       |    |        |     |
| 20         | 90         |           |       |       |    |        |     |
|            | 120        |           |       |       |    |        |     |
|            | 140        |           |       |       |    |        |     |
|            | 160        |           |       |       |    |        |     |
| 30         | 90         |           |       |       |    |        |     |
|            | 160        |           |       |       |    |        |     |
| 40         | 90         |           |       |       |    |        |     |
|            | 160        |           |       |       |    |        |     |
| 80         | 160        |           |       |       |    |        |     |
|            | 160        |           |       |       |    |        |     |

\*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.



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DATE:02/13/2025

#### PROJECT NAME & ADDRESS

STEPHEN SZABO  
RESIDENCE  
213 WINDSWEEP WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

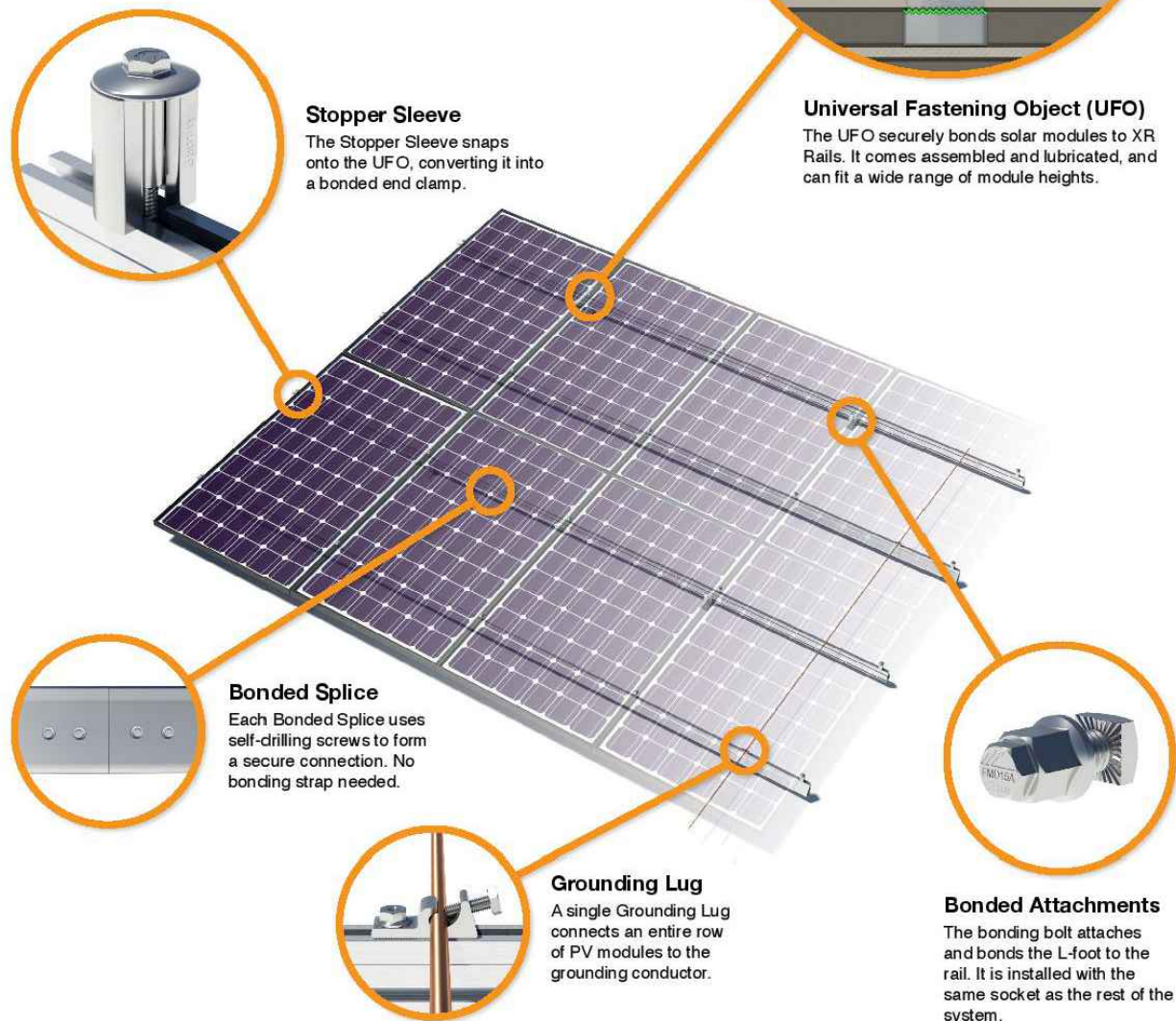
SHEET NUMBER  
PV-15



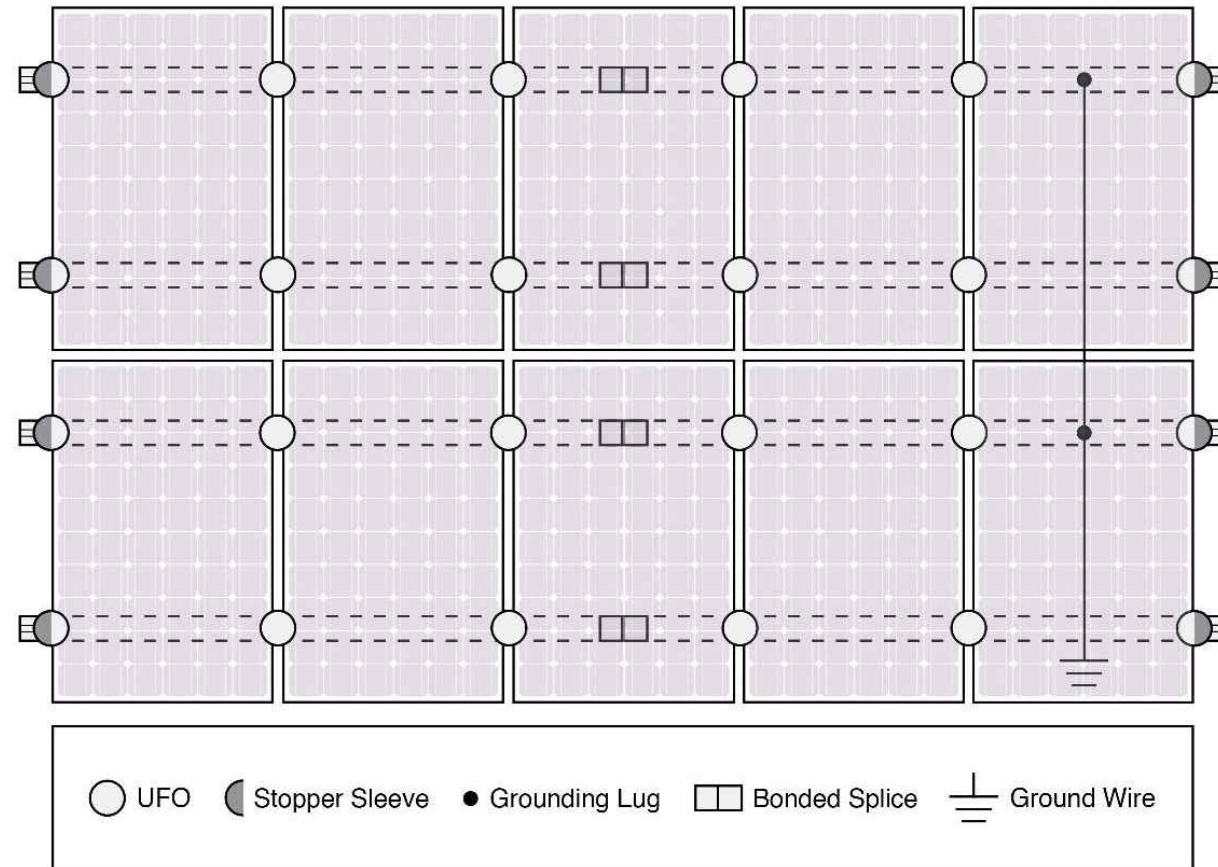
## Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



## System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

## UL Certification

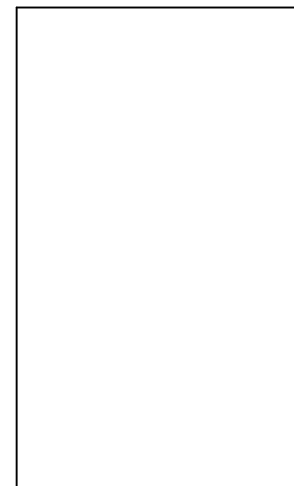
The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

[Go to IronRidge.com/UFO](http://www.ironridge.com/UFO)

| Cross-System Compatibility        |   |            |              |
|-----------------------------------|---|------------|--------------|
| Feature                           | Flush Mount   | Tilt Mount | Ground Mount |
| XR Rails                          | ✓   | ✓          | XR1000 Only  |
| UFO/Stopper                       | ✓   | ✓          | ✓            |
| Bonded Splice                     | ✓   | ✓          | N/A          |
| Grounding Lugs                    | 1 per Row   | 1 per Row  | 1 per Array  |
| Microinverters & Power Optimizers | Enphase - M250-72, M250-60, M215-60, C250-72<br>Darfon - MIG240, MIG300, G320, G640<br>SolarEdge - P300, P320, P400, P405, P600, P700, P730 |            |              |
| Fire Rating                       | Class A   | Class A    | N/A          |
| Modules                           | Tested or Evaluated with over 400 Framed Modules<br>Refer to installation manuals for a detailed list.                                      |            |              |

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PROJECT NAME & ADDRESS

STEPHEN SZABO  
RESIDENCE  
213 WINDSWEEP WY,  
FUQUAY-VARINA,  
NC 27526

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-16





# QuickMount® Halo UltraGrip

Cut Sheet

Cut Sheet

| ITEM NO | DESCRIPTION                      | QTY IN KIT |
|---------|----------------------------------|------------|
| 1       | QM Halo UltraGrip(Mill or Black) | 1          |

| PART NUMBER  | DESCRIPTION            |
|--------------|------------------------|
| QM-HUG-01-M1 | Halo UltraGrip - Mill  |
| QM-HUG-01-B1 | Halo UltraGrip - Black |

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QM-HUG-01-B1 or QM-HUG-01-M1 Cut Sheet Rev 1.0

| Property | Value                 |
|----------|-----------------------|
| Material | 3000 Series Aluminium |
| Finish   | Mill or Black         |

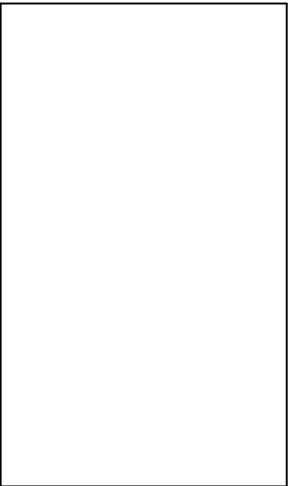
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QM-HUG-01-B1 or QM-HUG-01-M1 Cut Sheet Rev 1.0



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**STEPHEN SZABO**  
**RESIDENCE**  
**213 WINDSWEEP WY,**  
**FUQUAY-VARINA,**  
**NC 27526**

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT SPECIFICATION**

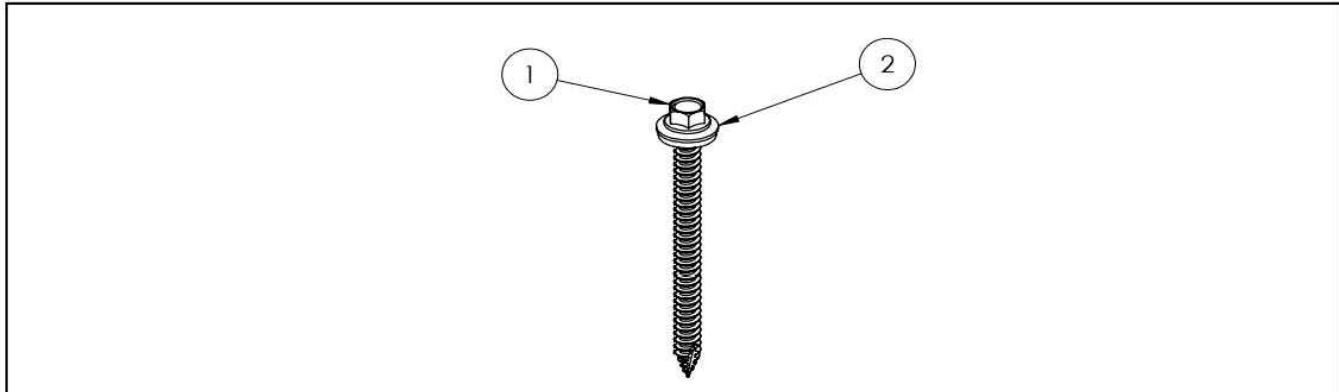
SHEET SIZE  
**ANSI B**  
**11" X 17"**

SHEET NUMBER  
**PV-17**



# QuickMount® RD Structural Screw

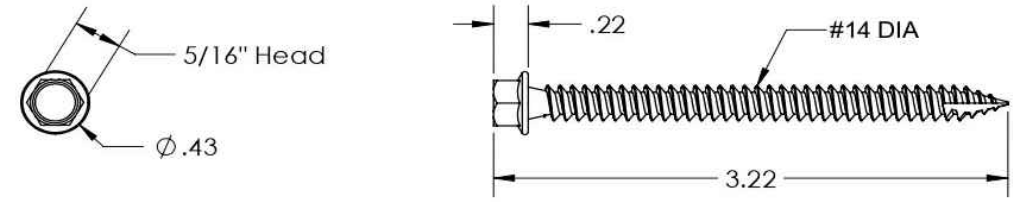
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 SC 29464  
 TEL: 854-999-4837  
 EMAIL : info@empwrsolar.com



| ITEM NO | DESCRIPTION                        | QTY IN KIT |
|---------|------------------------------------|------------|
| 1       | Self Drilling Screw, #14, Wood Tip | 1          |
| 2       | Washer, EPDM Backed                | 1          |

| PART NUMBER   | DESCRIPTION         |
|---------------|---------------------|
| RD-1430-01-M1 | RD Structural Screw |

1. Self Drilling Screw, #14, Wood Tip



| Property | Value                      |
|----------|----------------------------|
| Material | 300 Series Stainless Steel |
| Finish   | Clear                      |

2. Washer, EPDM Backed

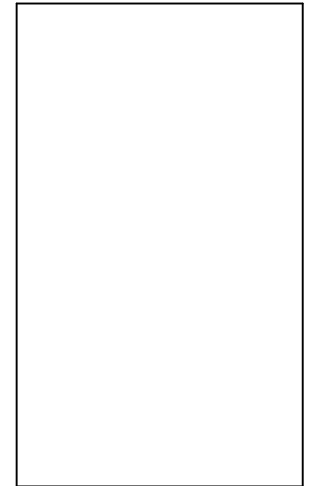


| Property | Value                      |
|----------|----------------------------|
| Material | 300 Series Stainless Steel |
| Finish   | Clear                      |

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QM-RD-1430-01-M1 Cut Sheet Rev 1.0

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|-------------|------|-----|
| DESCRIPTION | DATE | REV |
|             |      |     |
|             |      |     |
|             |      |     |



DATE:02/13/2025

PROJECT NAME & ADDRESS

STEPHEN SZABO  
 RESIDENCE  
 213 WINDSWEEP WY,  
 FUQUAY-VARINA,  
 NC 27526

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
 SPECIFICATION**

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

SHEET NUMBER  
**PV-18**