

PHOTOVOLTAIC ROOF MOUNT SYSTEM

16 MODULES-ROOF MOUNTED - 7.040 kW DC, 5.120 kW AC
98 KIPLING CRK DR, FUQUAY-VARINA, NC 27526

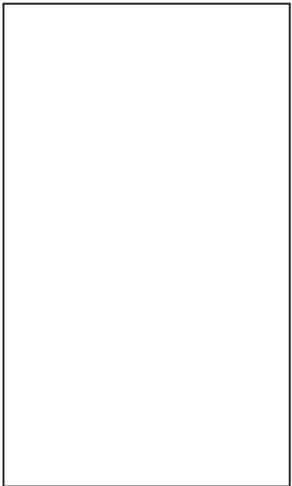
EMPWR
SOLAR

EMPWR SOLAR

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

PROJECT DATA	GENERAL NOTES	VICINITY MAP
PROJECT ADDRESS 98 KIPLING CRK DR, FUQUAY-VARINA, NC 27526 OWNER: ROBERT SHEPARD PARCEL ID: 0652418487.000 DESIGNER: ESR SCOPE: 7.040 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 16 JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES WITH 16 ENPHASE IQ8MC-72-M-US (320W) 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 NORTH CAROLINA PROFESSIONAL SEAL 047345 Exp. 12/31/2025 ENGINEER METHODE MANIRAGUHA STAMPED 09/18/2025	1. ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED. 2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2020. 3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION. 4. 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. 5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT. 6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24. 7. 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. 8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE. 9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING. MECHANICAL, OR BUILDING ROOF VENTS. 10. 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. 11. ALL SINAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ. 12. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)] 13. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES. 14. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250. 15. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41. 16. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12 17. 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)] 18. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31 19. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3). 20. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703 21. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC. 22. MODULE DOES NOT EXCEED THE SLOPE OF ROOF	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) NOTICE TO CONTRACTOR All construction must comply with current NC Building Codes and is subject to field inspection and verification. APPROVED Contract Building only. Permit holder responsible for full compliance with the code. 09/30/2025

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE
98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

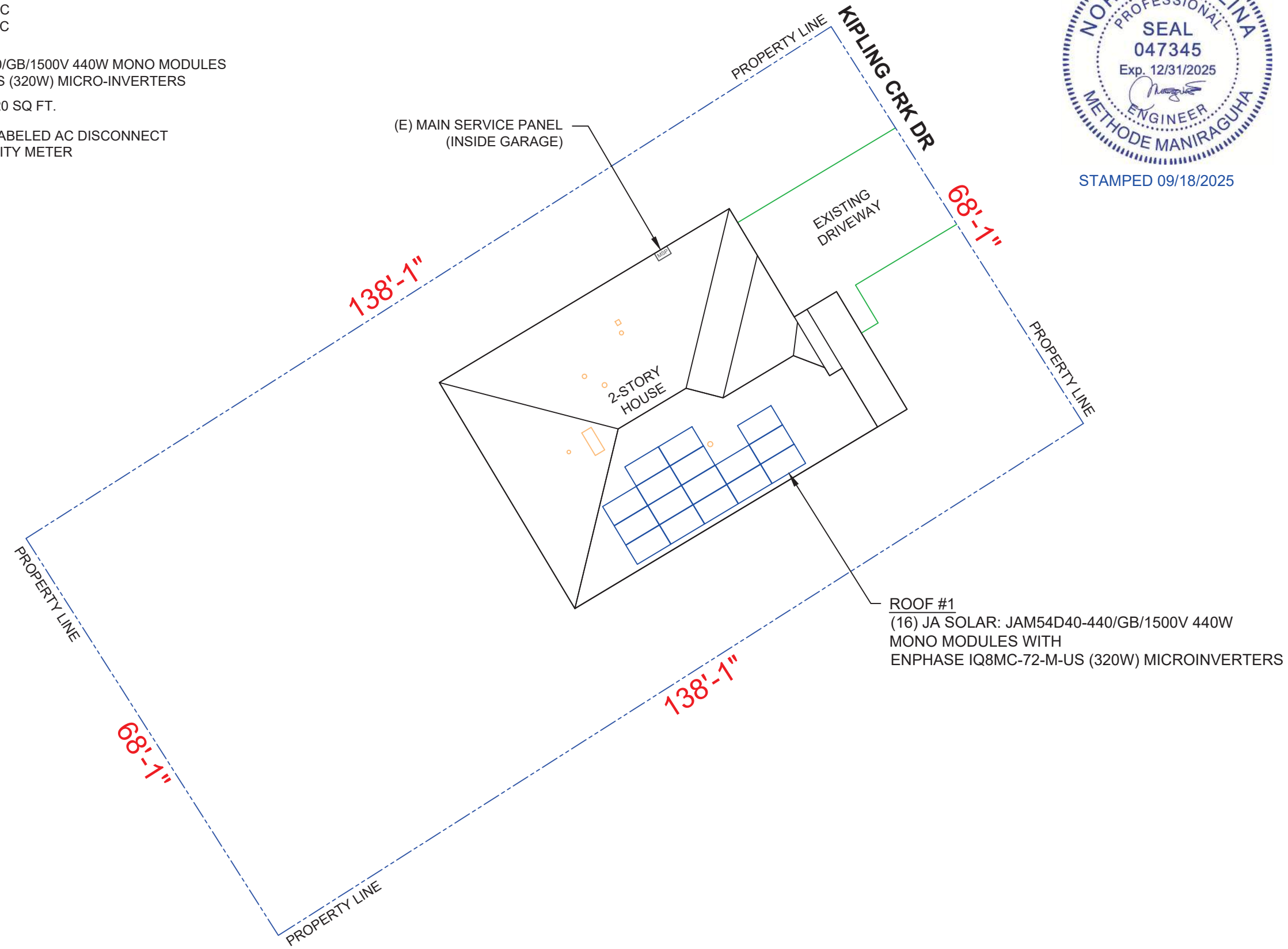
DRAWN BY ESR
SHEET NAME COVER SHEET
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-1

PROJECT DESCRIPTION:

16 x JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 7.040kW DC
AC SYSTEM SIZE: 5.120kW AC
EQUIPMENT SUMMARY
16 JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES
16 ENPHASE IQ8MC-72-M-US (320W) MICRO-INVERTERS

ROOF ARRAY AREA #1:- 291.20 SQ FT.

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



STAMPED 09/18/2025



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

REVISIONS		
DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
PLOT PLAN WITH
ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 16 MODULES
MODULE TYPE = JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES
MODULE WEIGHT = 47.39 LBS / 21.5 KG.
MODULE DIMENSIONS = 67.79" x 44.64" = 21.01 SF



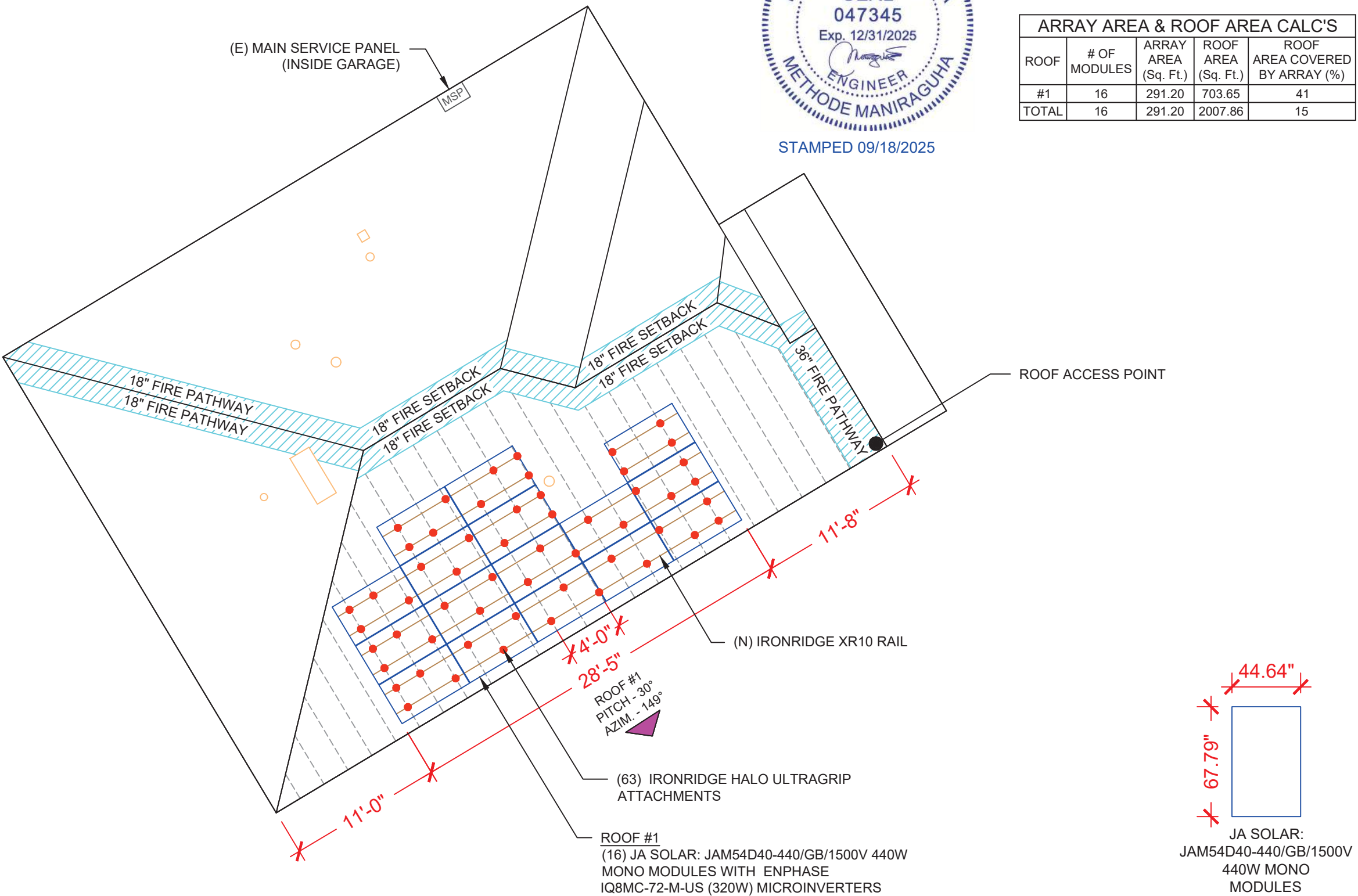
STAMPED 09/18/2025

ROOF DESCRIPTION				
ROOF TYPE			ASPHALT SHINGLE	
ROOF	ROOF PITCH	AZIMUTH	TRUSS	TRUSS SPACING
#1	30°	149°	FRAMING	24"

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	16	291.20	703.65	41
TOTAL	16	291.20	2007.86	15

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

REVISIONS		
DESCRIPTION	DATE	REV



LEGEND

MSP

- MAIN SERVICE PANEL

- VENT, ATTIC FAN (ROOF OBSTRUCTION)

- ROOF ATTACHMENT

- TRUSS

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

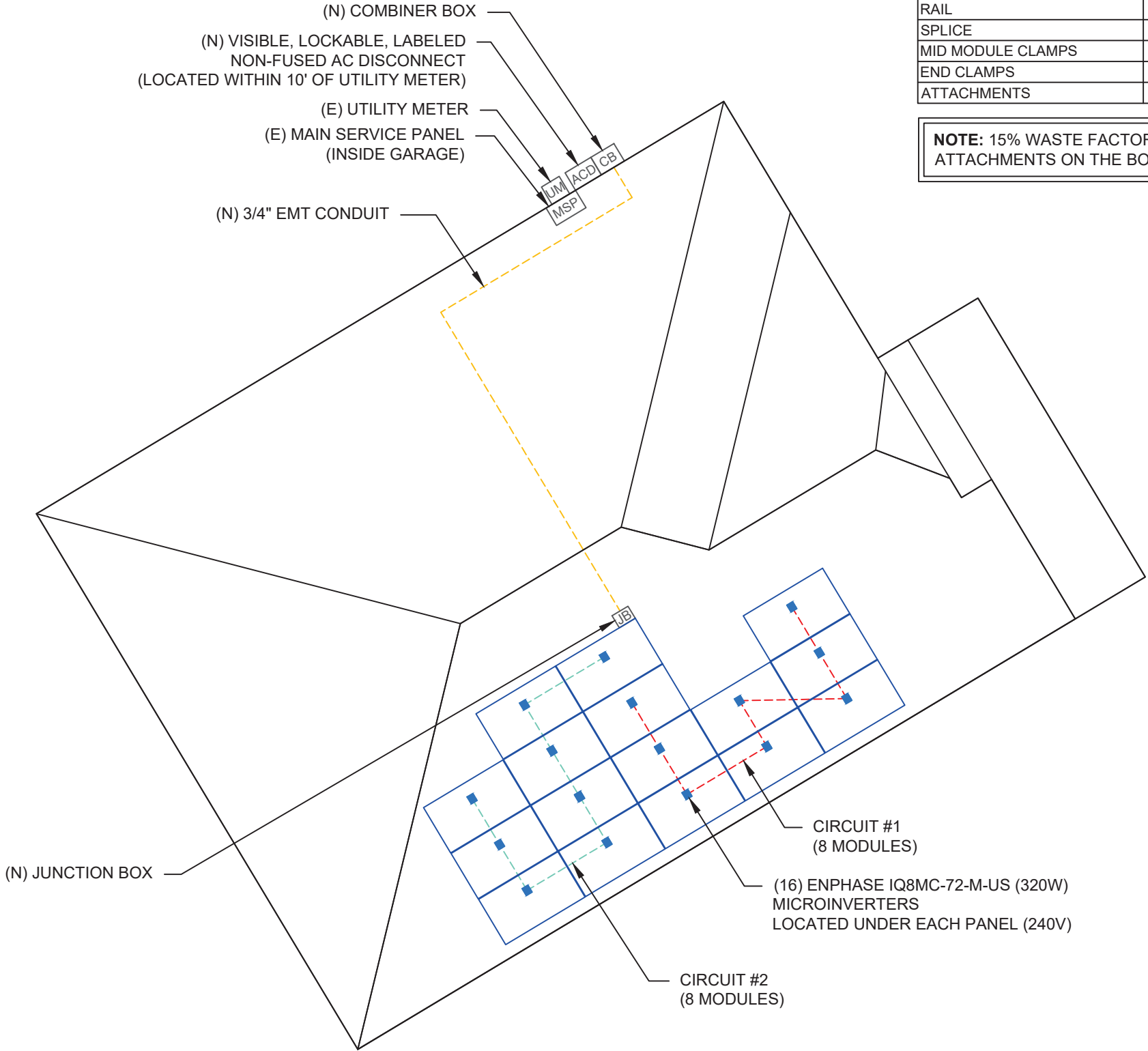
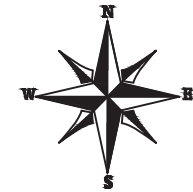
SHEET NAME
ROOF PLAN &
MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3

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

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



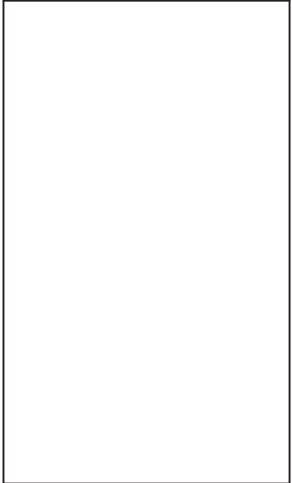
BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	16	JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES
MICRO INVERTERS	16	ENPHASE IQ8MC-72-M-US (320W) MICROINVERTERS
JUNCTION BOX	1	JUNCTION BOX
RAIL	15	IRONRIDGE XR10 RAIL
SPLICE	10	SPLICE KIT
MID MODULE CLAMPS	22	MID MODULE CLAMPS
END CLAMPS	20	END CLAMPS
ATTACHMENTS	63	IRONRIDGE HALO ULTRAGRIP ATTACHMENTS

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



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
**ELECTRICAL
PLAN**

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

SHEET NUMBER
PV-4

LEGEND

CB

- COMBINER BOX

ACD

- AC DISCONNECT

UM

- UTILITY METER

MSP

- MAIN SERVICE PANEL

JB

- JUNCTION BOX

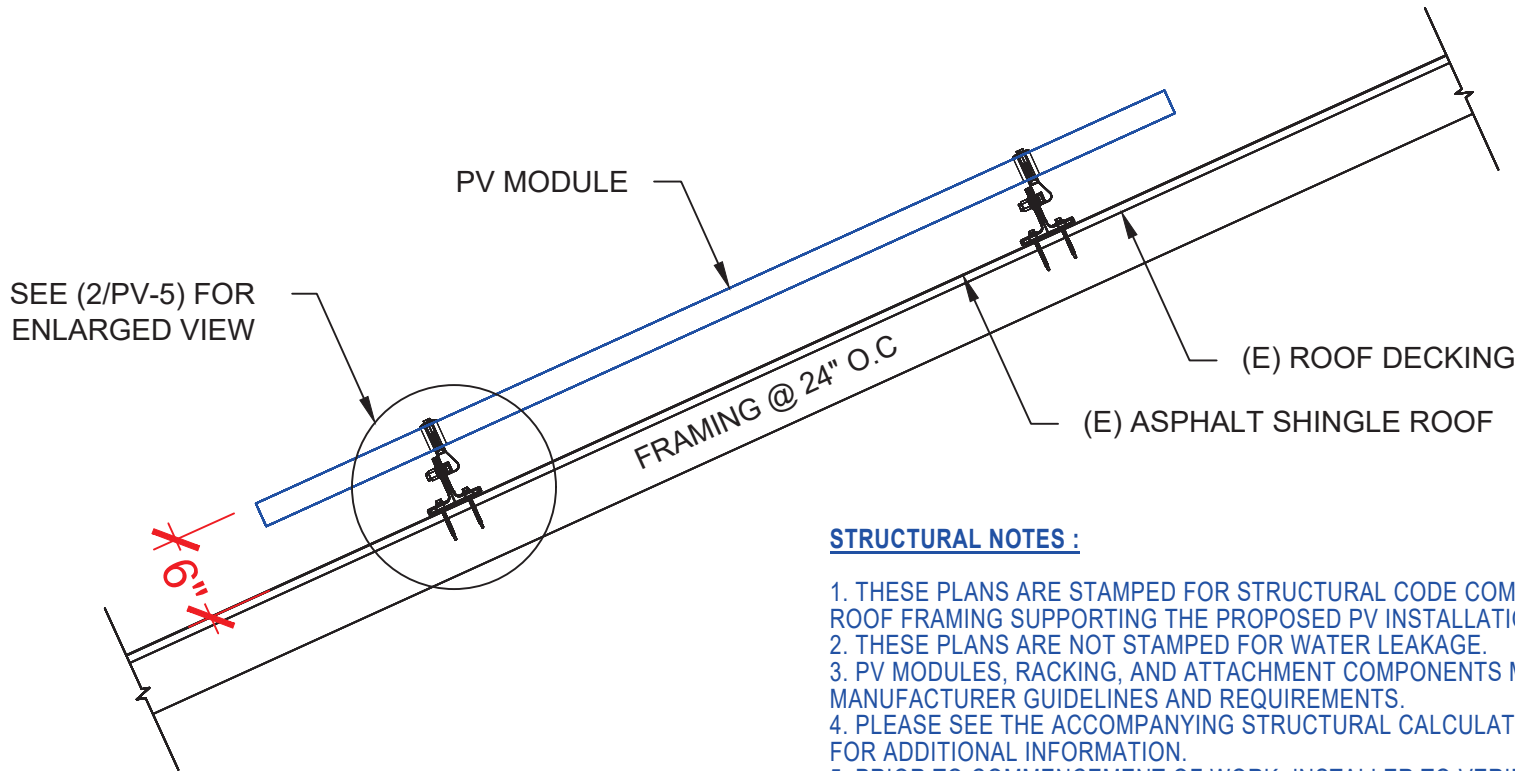
- CONDUIT

1

ATTACHMENT DETAIL

PV-5

SCALE: N.T.S



STRUCTURAL NOTES :

1. THESE PLANS ARE STAMPED FOR STRUCTURAL CODE COMPLIANCE OF THE ROOF FRAMING SUPPORTING THE PROPOSED PV INSTALLATION ONLY.
2. THESE PLANS ARE NOT STAMPED FOR WATER LEAKAGE.
3. PV MODULES, RACKING, AND ATTACHMENT COMPONENTS MUST FOLLOW MANUFACTURER GUIDELINES AND REQUIREMENTS.
4. PLEASE SEE THE ACCOMPANYING STRUCTURAL CALCULATIONS REPORT FOR ADDITIONAL INFORMATION.
5. PRIOR TO COMMENCEMENT OF WORK, INSTALLER TO VERIFY THE CONDITION OF THE FRAMING TO DETERMINE IF THERE IS ANY DAMAGED OR DISTRESSED FRAMING THAT HAS NOT BEEN ADDRESSED IN THE APPROVED CONSTRUCTION DOCUMENTS AND NOTIFY THE E.O.R. OF ANY CONCERNS.



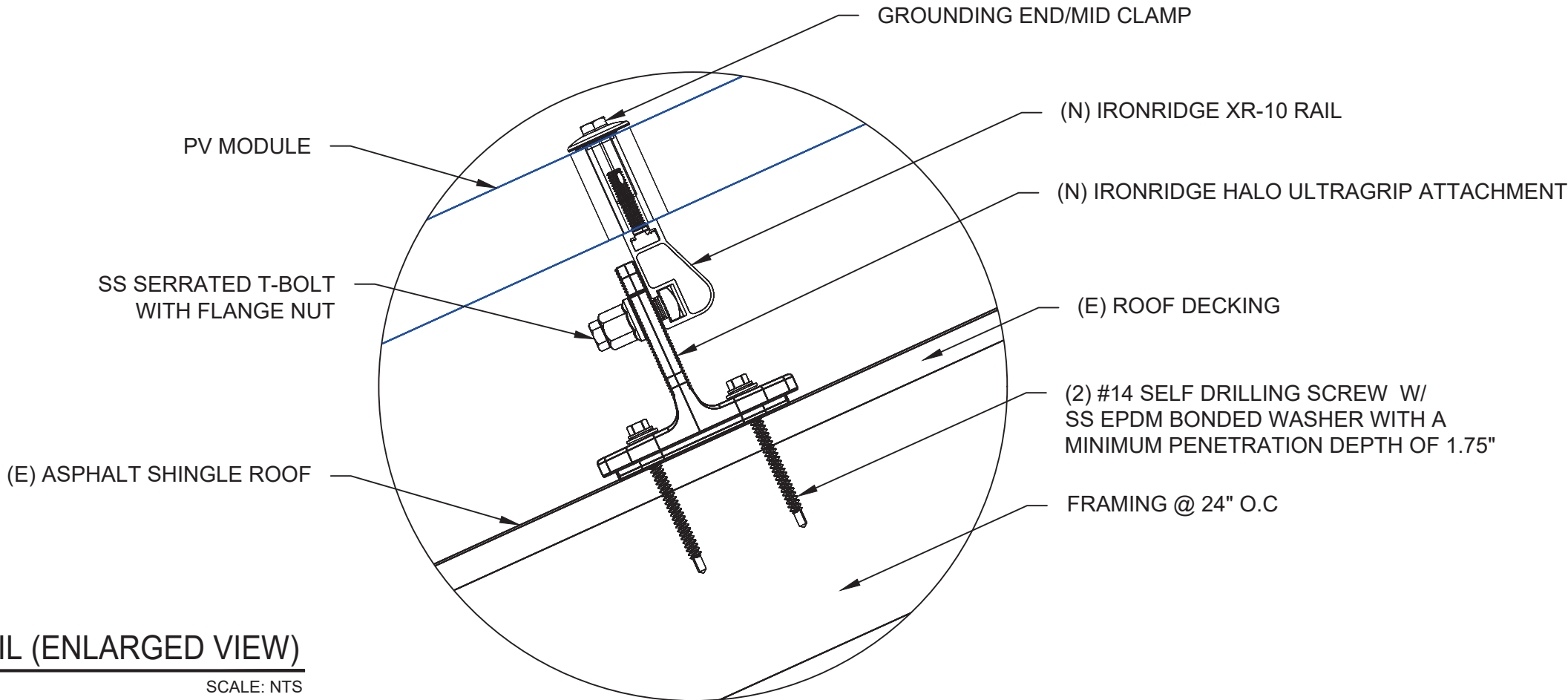
STAMPED 09/18/2025

2

ATTACHMENT DETAIL (ENLARGED VIEW)

PV-5

SCALE: NTS



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

REVISIONS		
DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY

ESR

SHEET NAME

ATTACHMENT
DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5

DC SYSTEM SIZE: 7.040 KW DC
AC SYSTEM SIZE: 5.120 KW AC

(16) JA SOLAR: JAM54D40-440/GB/1500V 440W MONO MODULES WITH
(16) ENPHASE IQ8MC-72-M-US (320W) MICROINVERTERS

(2) BRANCH CIRCUITS OF 8 MODULES ARE CONNECTED IN PARALLEL

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

120% RULE CHECK:
120% X 200A = 240A
16 MICRO-INVERTERS X 1.33A X 1.25 = 26.60A
240A - 200A = 40A > 26.60A, OKAY

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

(N) MODULE RATED POWER (P_{MAX}): 440W
(N) MICRO INVERTER WATTAGE: 320W

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:

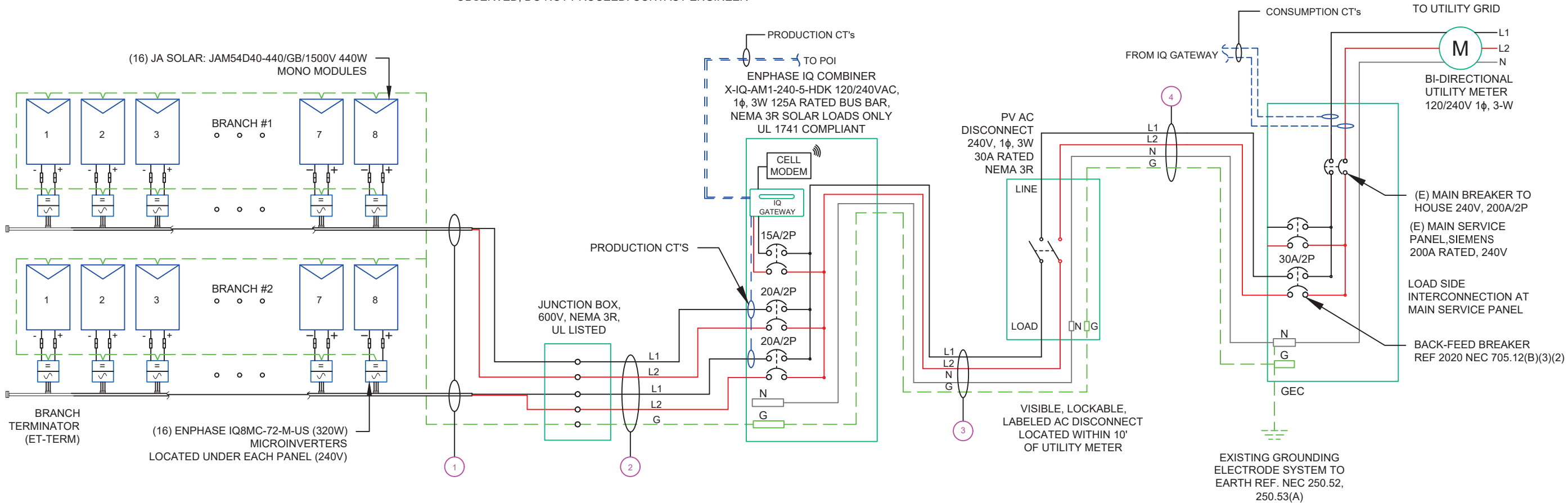
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95]
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE 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



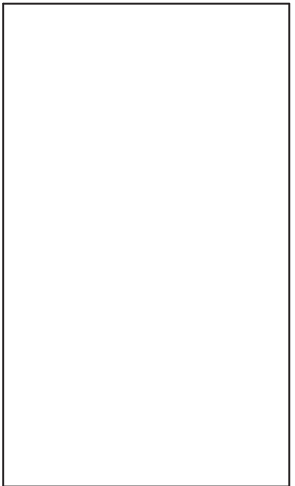
QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
(4)	CU #12AWG -	ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
(1)	CU #6AWG -	BARE COPPER IN FREE AIR		
(4)	CU #10AWG -	THWN-2 (L1,L2)	EMT IN ATTIC	3/4"
(1)	CU #10AWG -	THWN-2 GND		
(3)	CU #10AWG -	THWN-2 (L1,L2 & N)	EMT	3/4"
(1)	CU #10AWG -	THWN-2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

EMPWR
SOLAR

EMPWR SOLAR

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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS
**ROBERT SHEPARD
RESIDENCE**
98 KIPLING CRK DR,
FUQUAY-VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
**ELECTRICAL LINE
DIAGRAM**

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

SHEET NUMBER
PV-6

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8MC-72-M-US (320W) MICROINVERTER
MIN/MAX DC VOLT RATING	22V MIN/ 58V MAX
MAX INPUT POWER	260W-460W +
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.33A
MAX MODULES PER CIRCUIT	12 (SINGLE PHASE)
MAX OUTPUT POWER	320 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	JA SOLAR: JAM54D40-440/GB/1500V 440W MODULE
VMP	32.65V
IMP	13.48A
VOC	38.60V
ISC	14.36A
TEMP. COEFF. VOC	-0.260%/°C
MODULE DIMENSION	67.79"L x 44.64"W x 1.18"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	-0.260%/°C

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

AC FEEDER CALCULATIONS																								
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	CT WIRE SIZE (Twisted per pair)	CT WIRES IN RACEWAY	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)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	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	10.64	13.3	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	N/A	0	25	PASS	38	2	30	0.91	1	27.3	PASS			0.51	N/A	#N/A
CIRCUIT 2	JUNCTION BOX	240	10.64	13.3	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	N/A	0	25	PASS	38	2	30	0.91	1	27.3	PASS			0.51	N/A	#N/A
JUNCTION BOX	COMBINER BOX	240	10.64	13.3	20	N/A	CU #10 AWG	CU #10 AWG	N/A	0	35	PASS	38	4	40	0.91	0.8	29.12	PASS	60	1.24	0.660	3/4" EMT	19.79%
COMBINER BOX	AC DISCONNECT	240	21.28	26.6	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	CU #18 AWG	2	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.110	3/4" EMT	20.49%
AC DISCONNECT	POI	240	21.28	26.6	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	CU #18 AWG	2	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.110	3/4" EMT	20.49%
																					Circuit 1 Voltage Drop		1.390	
																					Circuit 2 Voltage Drop		1.390	

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE RATED UPTO 600V FOR RESIDENTIAL AND 1000V FOR COMMERCIAL 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 BOX, 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 ILSCO GBL-4DBT LAY-IN LUG.
10. 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.



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

REVISIONS		
DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
WIRING
CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7

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)

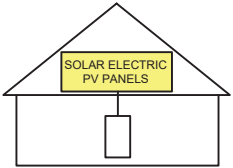
⚠ WARNING

**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 240 V

RATED AC OUTPUT CURRENT 21.28 A

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

⚠ CAUTION

**PHOTOVOLTAIC SYSTEM CIRCUIT IS
BACKFEED**

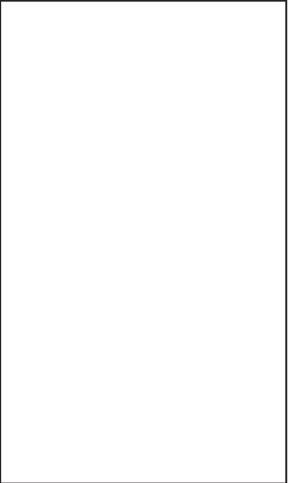
LABEL- 9:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3-4) & NEC 690.59

EMPWR
SOLAR

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

REVISIONS

DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE
98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

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

1

2

3

4

5

6

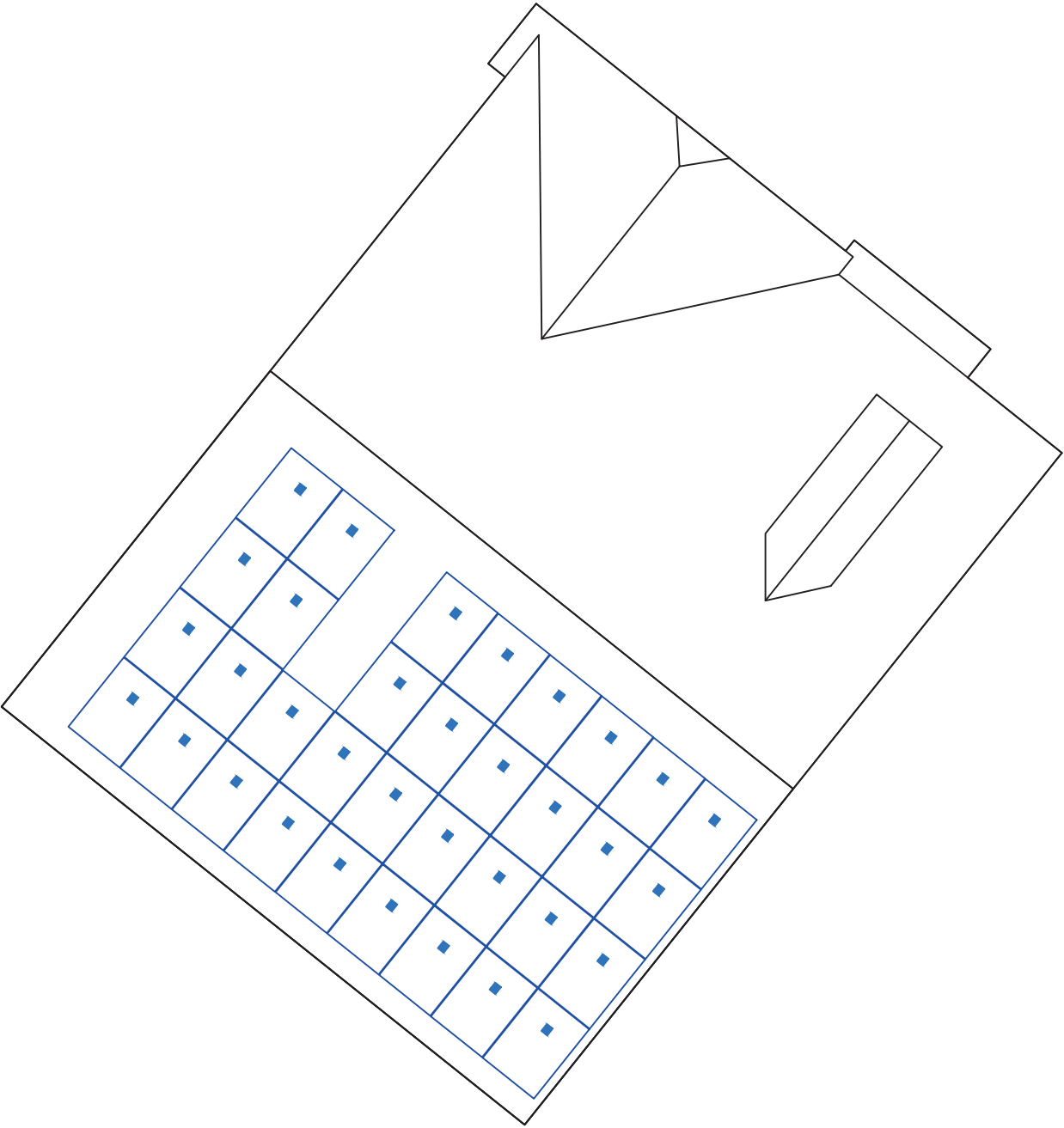
7

8

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

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
MICRO INVERTER
CHART

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

Harvest the Sunshine

DEEP BLUE 4.0

Mono

440W n-type Bifacial Double Glass
High Efficiency Mono Module
JAM54D40 415-440/GB/1500V Series

Introduction

Powered by the latest SMBB n-type solar cell and half-cell configuration, these modules have higher output power, lower LID, better weak illumination response, and better temperature coefficient.

Higher power generation
better LCOE

Better weak illumination response

Better Temperature Coefficient

Superior Warranty

12-year product warranty

30-year linear power output warranty

1% 1st-year Degradation

0.4% Annual Degradation Over 30 years

87.4%

83.1%

85.3%

86.3%

n-type Bifacial Double Glass Module
Linear Performance Warranty

Standard Module Linear
Performance Warranty

Comprehensive Certificates

IEC 61215, IEC 61730

ISO 9001: 2015 Quality management systems

ISO 14001: 2015 Environmental management systems

ISO 45001: 2018 Occupational health and safety management systems

www.jasolar.com

Specifications subject to technical changes and tests.
JA Solar reserves the right of final interpretation.
Shanghai JA Solar Technology Co., Ltd.

JA SOLAR

JAM54D40 415-440/GB/1500V Series

MECHANICAL DIAGRAMS

Remark: customized frame color and cable length available upon request.

SPECIFICATIONS

Cell	Mono-16BB
Weight	21.5kg
Dimensions	1722±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm² (IEC), 12 AWG(UL)
No. of cells	108(6×18)
Junction Box	IP68, 3 diodes
Connector	Stäubli MC4-EVO2A/ MC4-EVO2 QC Solar QC 4.10-351/ QC 4.10-35
Cable Length (Including Connector)	Portrait:200mm(+)/300mm(-); Landscape:1100mm(+)/1100mm(-)
Front Glass/Back Glass	1.6mm/1.6mm
Country of Manufacturer	China/Vietnam

ELECTRICAL PARAMETERS AT STC

TYPE	JAM54D40 -415/GB/1500V	JAM54D40 -420/GB/1500V	JAM54D40 -425/GB/1500V	JAM54D40 -430/GB/1500V	JAM54D40 -435/GB/1500V	JAM54D40 -440/GB/1500V
Rated Maximum Power(Pmax) [W]	415	420	425	430	435	440
Open Circuit Voltage(Voc) [V]	37.92	38.05	38.20	38.32	38.45	38.60
Maximum Power Voltage(Vmp) [V]	31.59	31.80	32.01	32.21	32.42	32.65
Short Circuit Current(Isc) [A]	14.02	14.09	14.16	14.23	14.30	14.36
Maximum Power Current(Imp) [A]	13.14	13.21	13.28	13.35	13.42	13.48
Module Efficiency [%]	21.3	21.5	21.8	22.0	22.3	22.5
Power Tolerance	0~+5W					
Temperature Coefficient of Isc(α_Isc)	+0.046%/°C					
Temperature Coefficient of Voc(β_Voc)	-0.260%/°C					
Temperature Coefficient of Pmax(γ_Pmp)	-0.300%/°C					
STC	Irradiance 1000W/m², cell temperature 25°C, AM1.5G					

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

Measurement tolerance at STC: Pmax +3%, Voc ±3% and Isc +4%.

ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM54D40 -415/GB/1500V	JAM54D40 -420/GB/1500V	JAM54D40 -425/GB/1500V	JAM54D40 -430/GB/1500V	JAM54D40 -435/GB/1500V	JAM54D40 -440/GB/1500V	OPERATING CONDITIONS
Rated Max Power(Pmax) [W]	448	454	459	464	470	475	Maximum System Voltage 1500V DC
Open Circuit Voltage(Voc) [V]	37.95	38.08	38.23	38.35	38.48	38.63	Operating Temperature -40°C~+85°C
Max Power Voltage(Vmp) [V]	31.58	31.79	32.00	32.21	32.41	32.64	Maximum Series Fuse Rating 30A
Short Circuit Current(Isc) [A]	15.14	15.22	15.29	15.37	15.44	15.51	Maximum Static Load,Front 2400Pa, 1.5 Maximum Static Load,Back 1600Pa, 1.5
Max Power Current(Imp) [A]	14.19	14.27	14.34	14.42	14.49	14.56	NOCT 45±2°C
Irradiation Ratio (rear/front)	10%						Bifaciality* 80%±10%
*Bifaciality=Pmax,rear/Rated Pmax,front							Fire Safety Class Class C

CHARACTERISTICS

Current-Voltage Curve JAM54D40-425/GB/1500V

Power-Voltage Curve JAM54D40-425/GB/1500V

Current-Voltage Curve JAM54D40-425/GB/1500V

Premium Cells, Premium Modules

Version No. : Global_EN_20221207A

EMPWR SOLAR

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

REVISIONS

DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE
98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10



IQ8MC Microinverter

Our newest IQ8 Series 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 in 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 IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.



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



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.



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

*Meets UL 1741 only when installed with IQ System Controller 2 and 3.

IQ8MC Microinverter

INPUT DATA (DC)		UNITS	IQ8MC-72-M-US	
Commonly used module pairings ¹		W	260–460	
wModule compatibility			To meet compatibility, PV modules must be within the following max. input DC voltage and max. module I _{sc} . Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator .	
MPPT voltage range		V	25–45	
Operating range		V	18–58	
Min./Max. start voltage		V	22/58	
Max. input DC voltage		V	60	
Max. continuous operating DC current		A	14	
Max. input DC short-circuit current		A	25	
Max. 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	IQ8MC-72-M-US @240 VAC		IQ8MC-72-M-US @208 VAC
Peak output power	VA	330		315
Max. continuous output power	VA	320		310
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°		208, single-phase (L-L), 120°
Min./Max. grid voltage ²	V	211–264		183–229
Max. continuous output current	A	1.33		1.49
Nominal frequency	Hz	60		
Extended frequency range	Hz	47–68		
AC short circuit fault current over three cycles	A _{mc}	2.70		
Max. units per 20 A (L-L) branch circuit ³		12		10
Total harmonic distortion	%	<5		
Overvoltage class AC port		III		
AC port backfeed current	mA	18		
Power factor setting		1.0		
Grid-tied power factor (adjustable)		0.85 leading ... 0.85 lagging		
Peak efficiency	%	97.4		97.2
CEC weighted efficiency	%	97.0		96.5
Nighttime power consumption	mW	33		25
MECHANICAL DATA		UNITS		
Ambient temperature range		–40°C to 65°C (–40°F to 149°F)		
Relative humidity range		4% to 100% (condensing)		
DC connector type		Stäubli MC4		
Dimensions (H × W × D); Weight		212 mm (8.3") × 175 mm (6.9") × 30.2 mm (1.2"); 1.1 kg (2.43 lbs)		
Cooling		Natural convection – no fans		
Approved for wet locations; Pollution degree		Yes; PD3		
Enclosure		Class II double-insulated, corrosion-resistant polymeric enclosure		
Environ. category; UV exposure rating		NEMA Type 6; outdoor		
COMPLIANCE				
CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01				
Certifications This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV systems for AC and DC conductors when installed according to the manufacturer's instructions.				

(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.

EMPWR
SOLAR

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

REVISIONS		
DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY

ESR

SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-11



DATA SHEET



X-IQ-AM1-240-5-HDK
X-IQ-AM1-240-5C-HDK
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.

© 2024 Enphase Energy. All rights reserved. Enphase, the e and CC logos, IQ, and certain other marks listed at <https://enphase.com/trademark-usage-guidelines> are trademarks of Enphase Energy, Inc. in the U.S. and other countries. Data subject to change.

IQC-5-5C-DSH-00007-6.0-EN-US-2024-09-30

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5/ X-IQ-AM1-240-5-HDK)	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-AM1-240-5-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the Accessories and Replacement Parts section.
IQ Combiner 5C (X-IQ-AM1-240-5C / X-IQ-AM1-240-5C-HDK)	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) ¹ . Includes a silver solar shield to deflect heat. IQ-AM1-240-5C-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the Accessories and Replacement Parts section.

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 one IQ Gateway breaker and four 20 A breakers 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-2 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). Not required for X-IQ-AM1-240-5-HDK/X-IQ-AM1-240-5C-HDK.
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-2 printed circuit board (PCB) for IQ Combiner 5/5C

ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC or 120/208 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

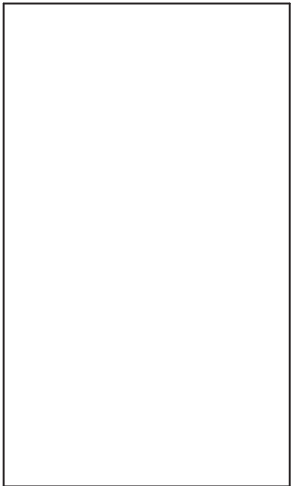
¹ A plug-and-play industrial-grade cell modem for systems of up to 60 microinverters. Available in the United States, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.

IQC-5-5C-DSH-00007-6.0-EN-US-2024-09-30



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS
**ROBERT SHEPARD
RESIDENCE**
98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-12

ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
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

MECHANICAL DATA	
Dimensions (W × H × D)	37.5 cm × 49.5 cm × 16.8 cm (14.75" × 19.5" × 6.63"). Height is 53.5 cm (21.06") with mounting brackets.
Weight	7.5 kg (16.5 lb)
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	20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors 60 A breaker branch input: 4 to 1/0 AWG copper conductors - Main lug combined output: 10 to 2/0 AWG copper conductors - Neutral and ground: 14 to 1/0 copper conductors - Always follow local code requirements for conductor sizing
Communication (in-premise connectivity)	Built-in CTRL board for wired communication with the IQ Battery 5P and the 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 the 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 https://developer-v4.enphase.com
Local API	See Guide for local API

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 61010-1, CAN/CSA 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 ²	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 ³	IQ System Controller 3	SC200D111C240US01, SC200G111C240US01
	IQ Battery	IQBATTERY-5P-1P-NA

² For information about IQ Combiner 5/5C compatibility with the 2nd-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 T-Mobile and CELLMODEM-M1-06-AT-05 for AT&T)

CT-200-SOLID



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

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-CLAMP

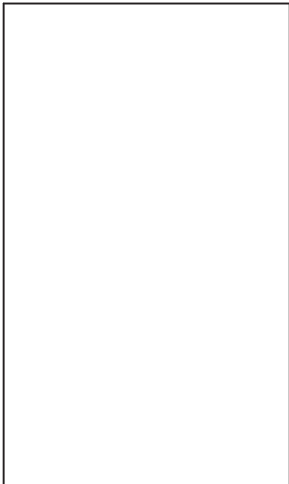


200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS	
ROBERT SHEPARD RESIDENCE	98 KIPLING CRK DR, FUQUAY-VARINA,NC 27526

DRAWN BY ESR

SHEET NAME EQUIPMENT SPECIFICATION
--

SHEET SIZE ANSI B 11" X 17"

SHEET NUMBER PV-13



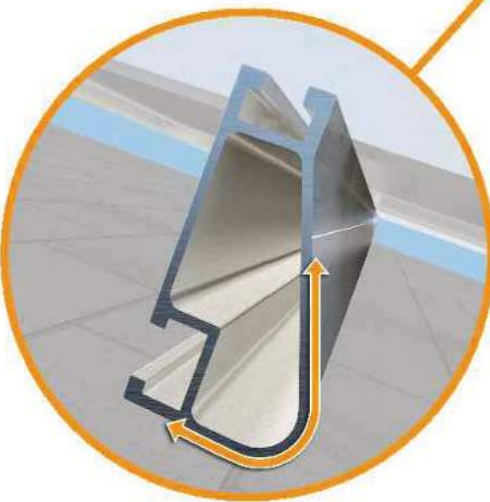
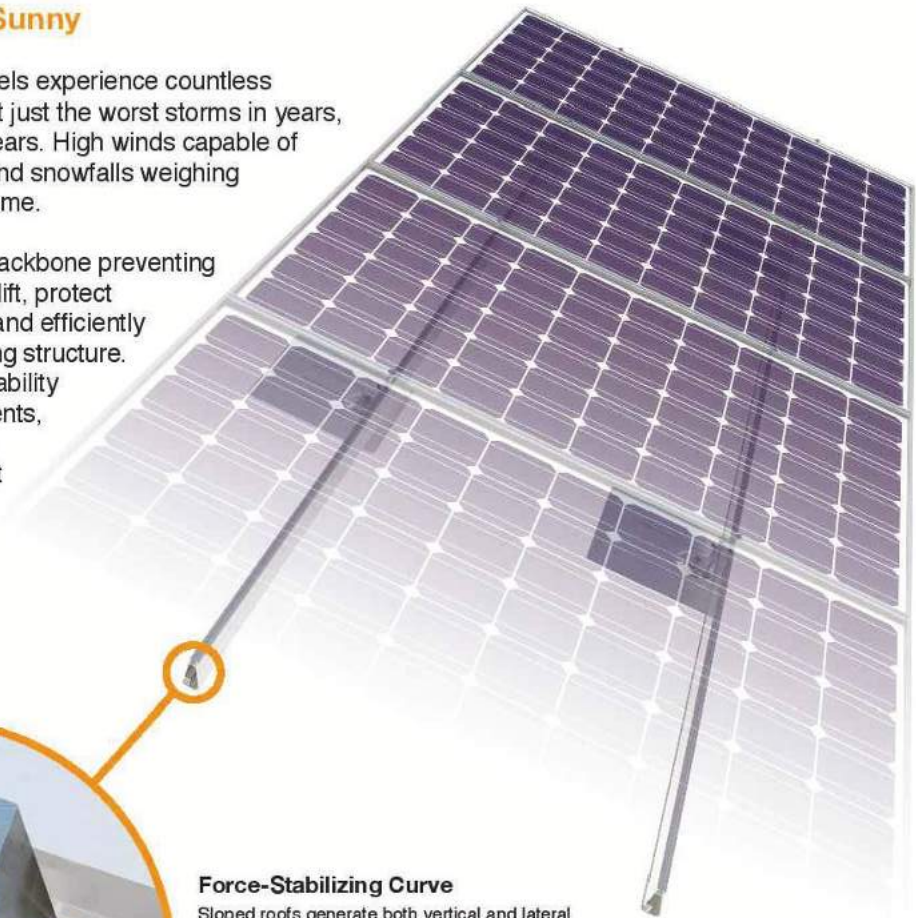
Tech Brief

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	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

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



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

REVISIONS

DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE
98 KIPLING CRK DR,
FUQUAY-VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

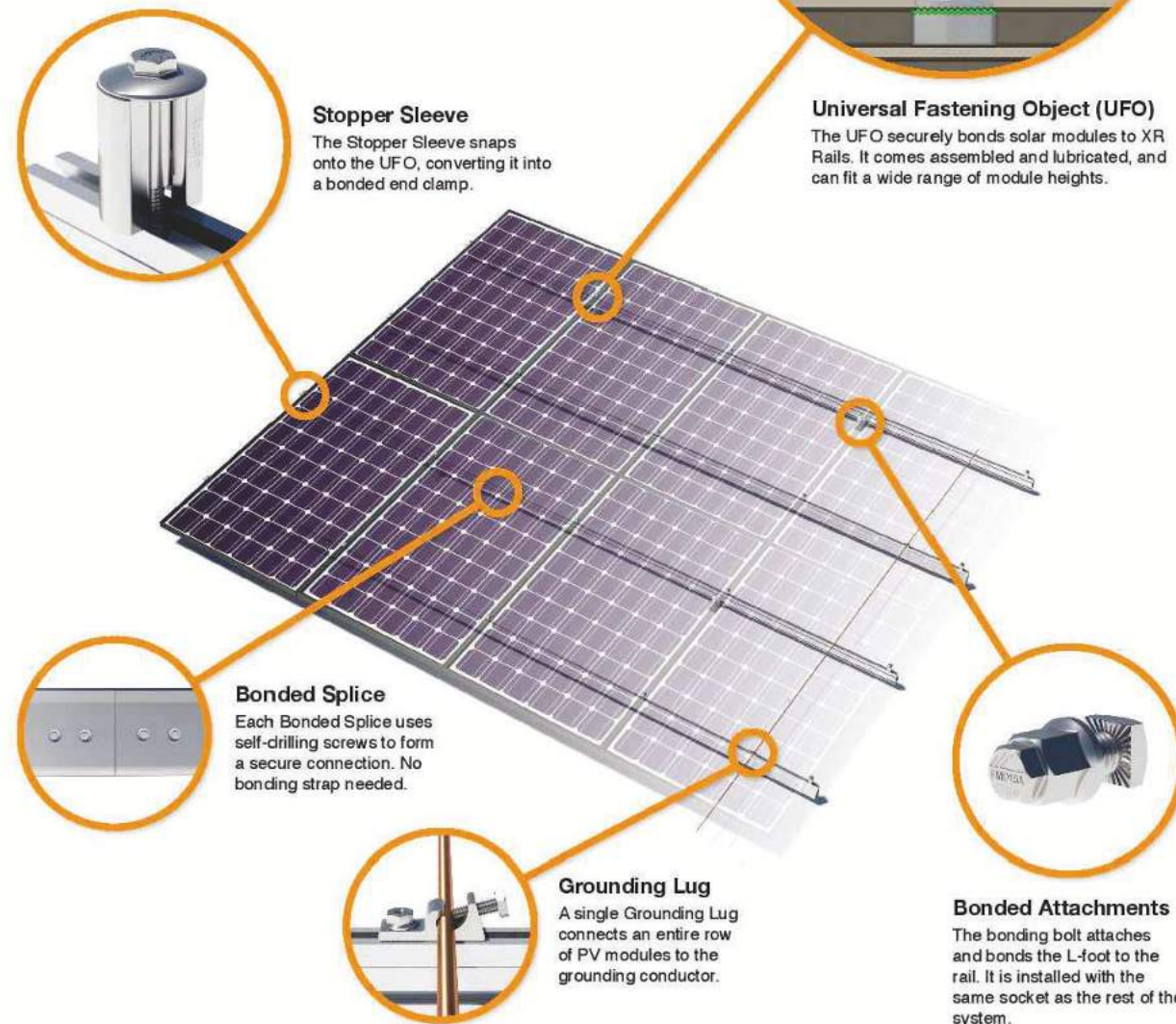
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

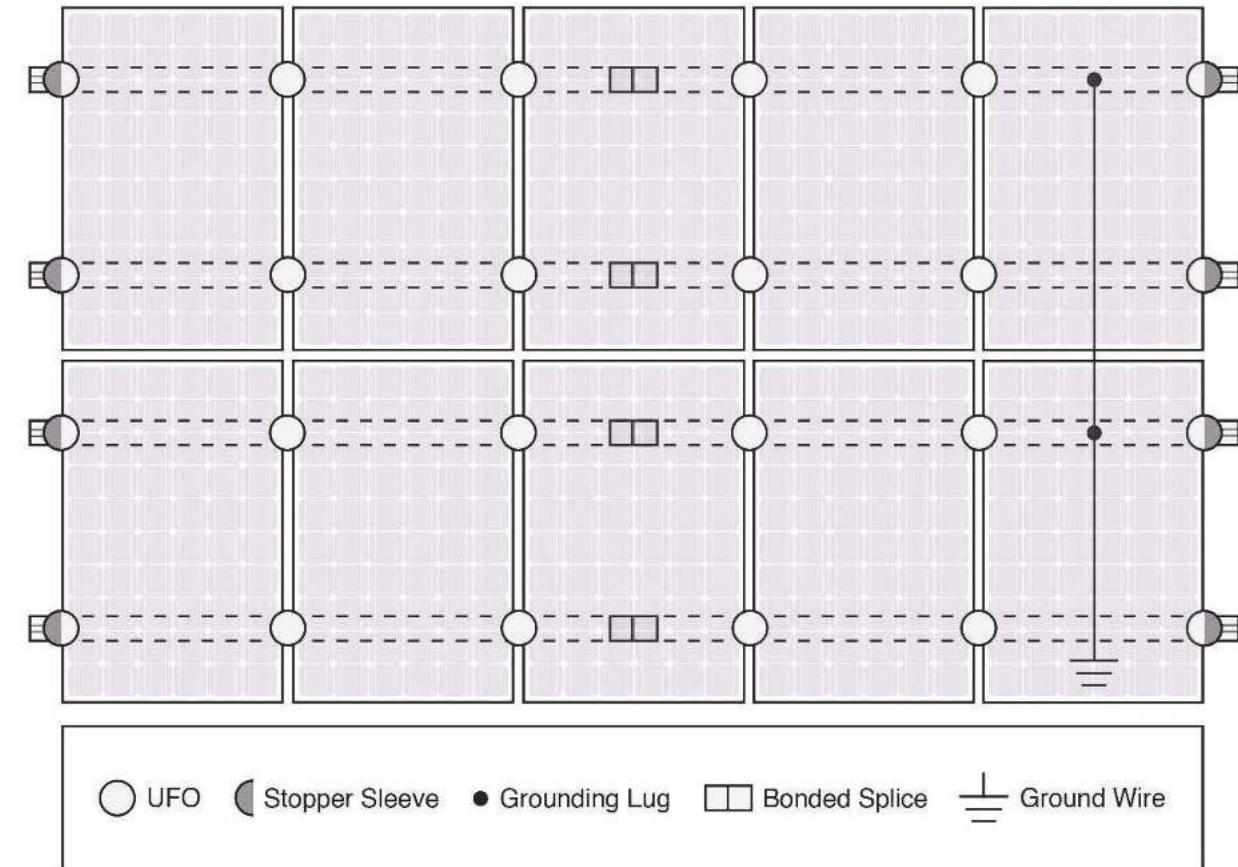
Simplified Grounding for Every Application

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](https://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 Darfon - MIG240, MIG300, G320, G640 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 Refer to installation manuals for a detailed list.		

REVISIONS

DESCRIPTION	DATE	REV

DATE:09/15/2025

PROJECT NAME & ADDRESS

**ROBERT SHEPARD
RESIDENCE**
98 KIPLING CRK DR,
FUQUAY-VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
**EQUIPMENT
SPECIFICATION**

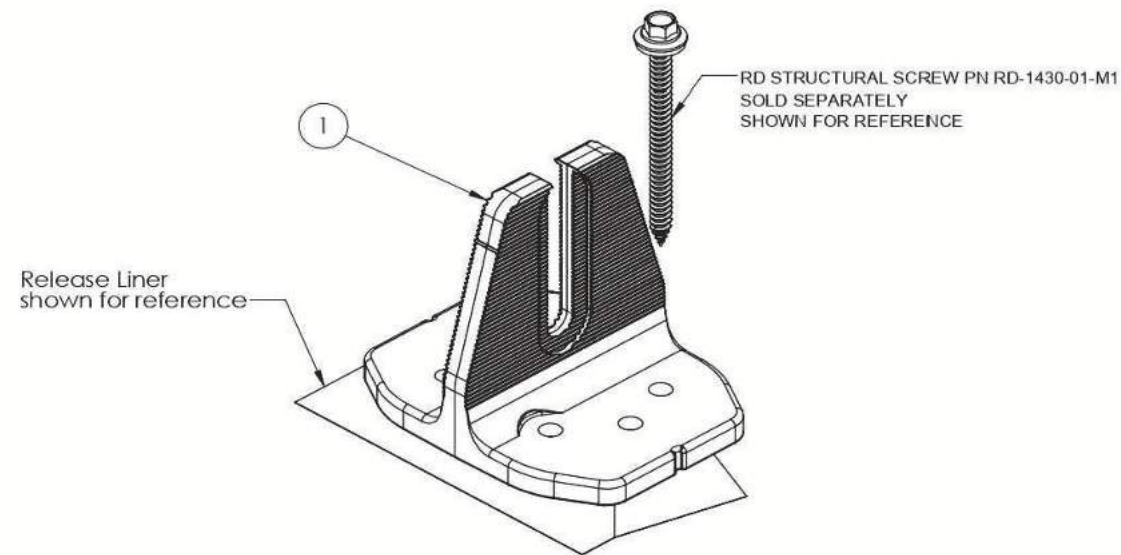
SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-15



QuickMount® Halo UltraGrip

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

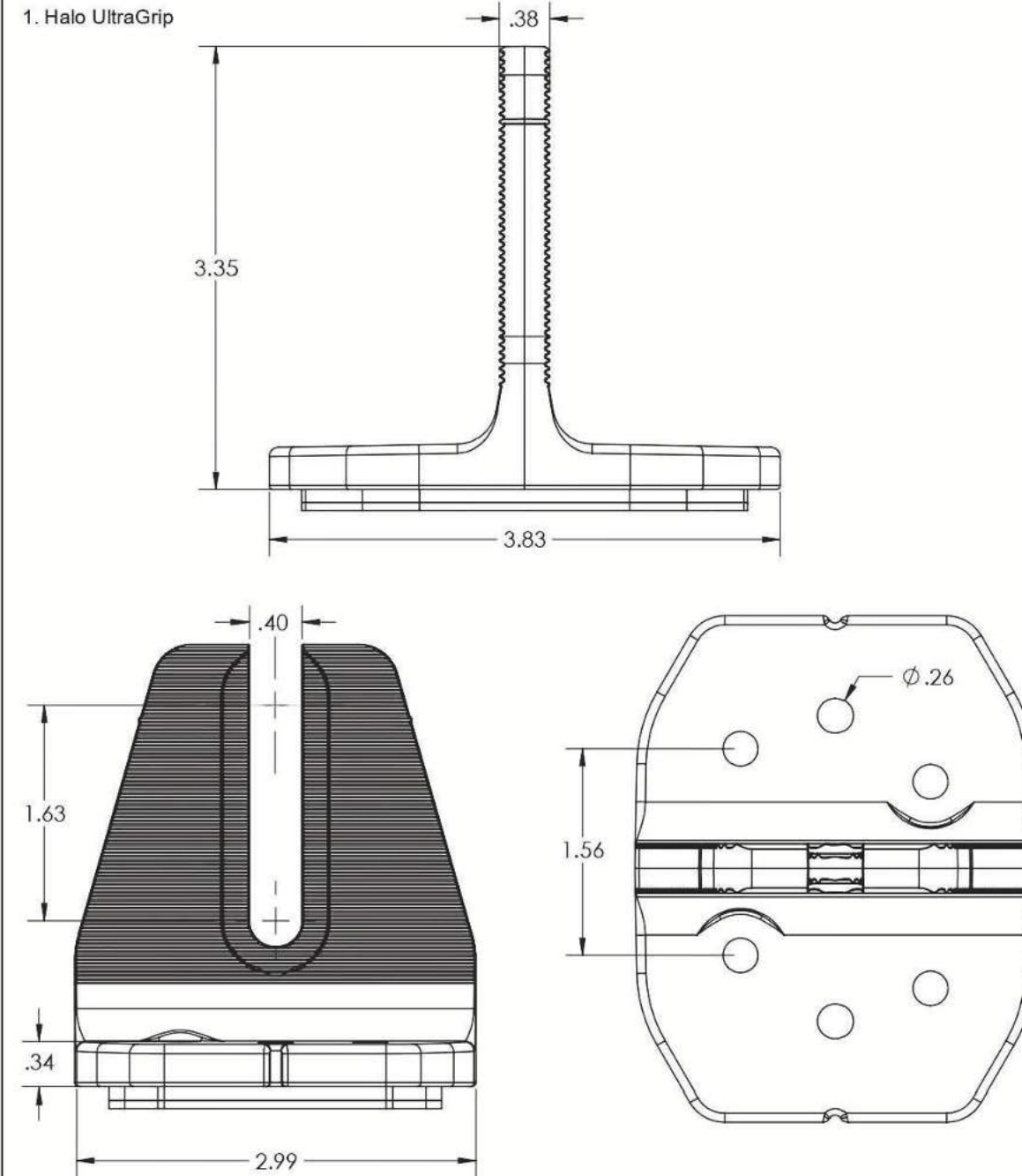


© 2022 IronRidge, Inc. All rights reserved. Visit www.ir-patents.com for patent information.

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

Cut Sheet

1. Halo UltraGrip



Property	Value
Material	3000 Series Aluminium
Finish	Mill or Black



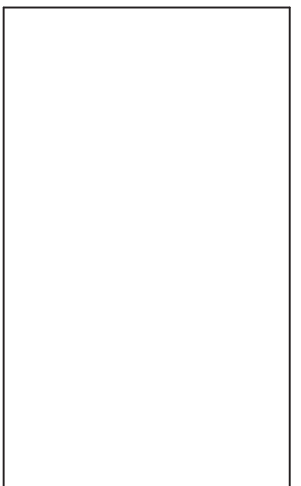
© 2022 IronRidge, Inc. All rights reserved. Visit www.ir-patents.com for patent information.

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



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS
**ROBERT SHEPARD
RESIDENCE**
98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

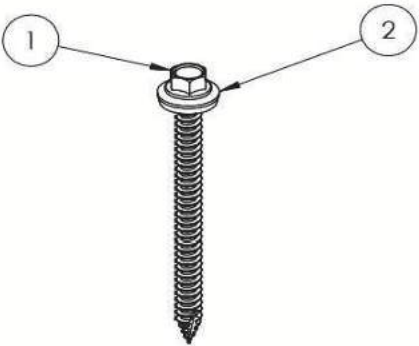
SHEET NAME
**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-16



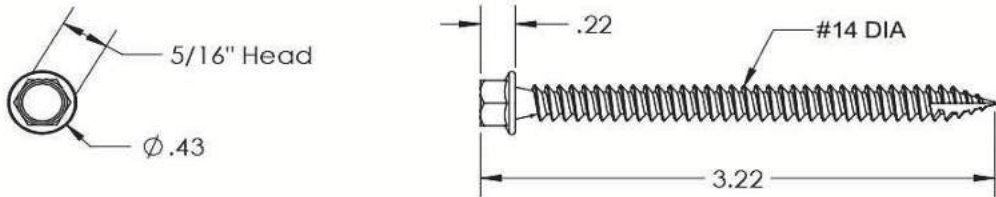
QuickMount® RD Structural Screw



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

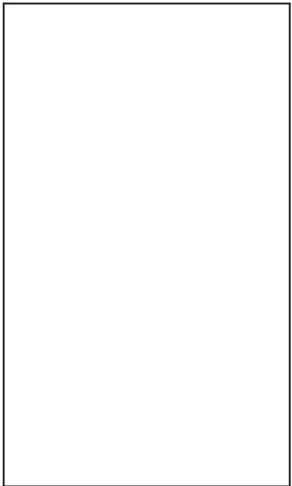


Property	Value
Material	300 Series Stainless Steel
Finish	Clear



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:09/15/2025

PROJECT NAME & ADDRESS

ROBERT SHEPARD
RESIDENCE

98 KIPLING CRK DR,
FUQUAY-VARINA,NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-17