

PHOTOVOLTAIC ROOF MOUNT SYSTEM

11 MODULES-ROOF MOUNTED - 4.675 kW DC, 3.190 kW AC

66 PECAN GRV LN, 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

REVISIONS		
DESCRIPTION	DATE	REV

NORTH CAROLINA

PROFESSIONAL

ENGINEER

RICHARD PANTEL

043326

Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

PROJECT DATA

PROJECT ADDRESS 66 PECAN GRV LN,
FUQUAY VARINA, NC 27526

OWNER: CHONG TING

PARCEL ID: 08065301 0007 84

DESIGNER: ESR

SCOPE: 4.675 KW DC ROOF MOUNT SOLAR PV
SYSTEM WITH
11 JINKO SOLAR: JKM425N-54HL4-B
425W MONO MODULES WITH
11 ENPHASE IQ8PLUS-72-M-US (290W)
MICROINVERTERS

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

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

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 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.
- 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)

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

APPROVED
Limited building only review
Permit holder responsible for
full compliance with the code
03/06/2025

Harnett
COUNTY
NORTH CAROLINA

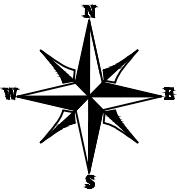
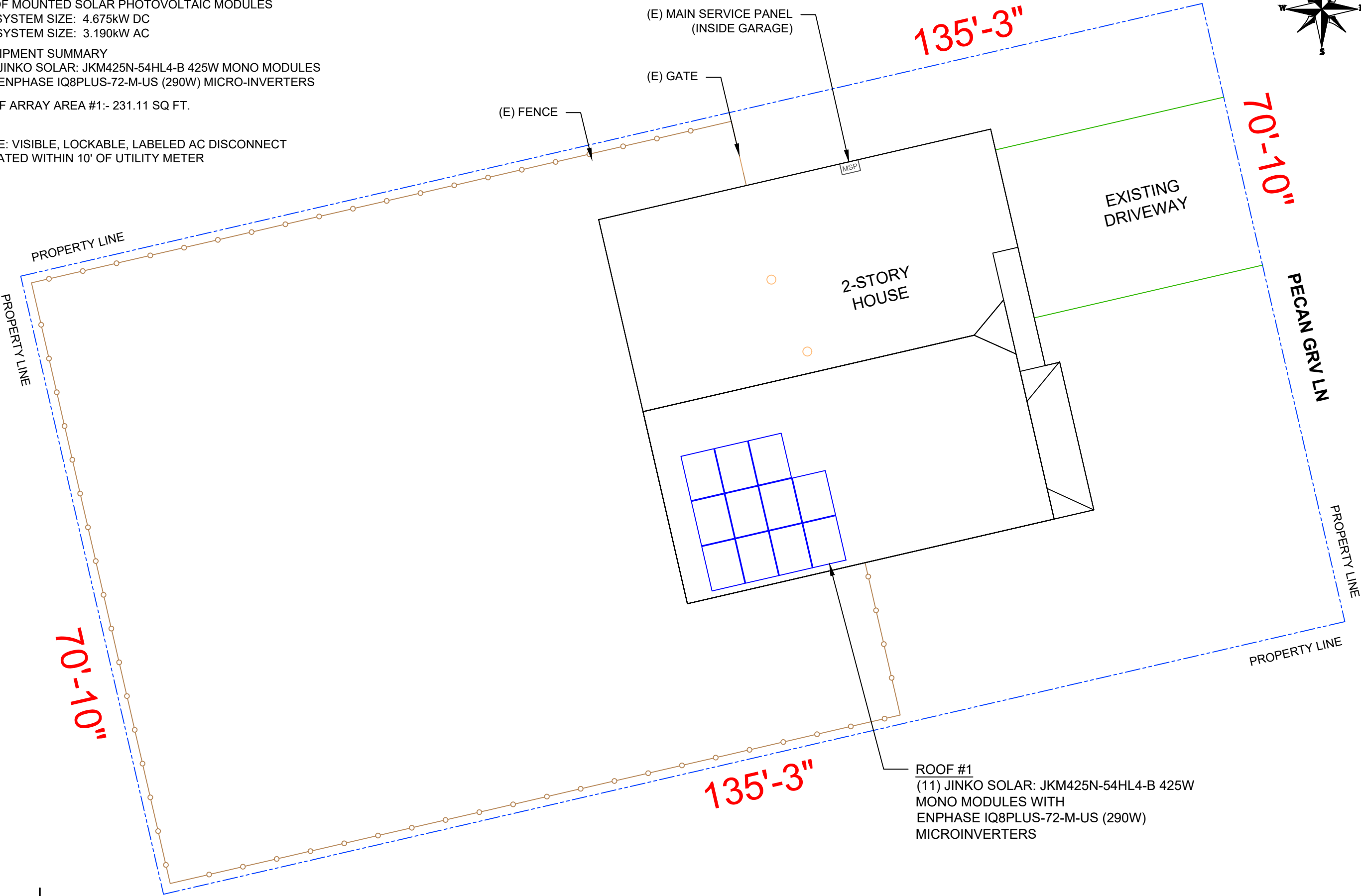
PROJECT DESCRIPTION:


11 x JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 4.675kW DC
AC SYSTEM SIZE: 3.190kW AC

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

ROOF ARRAY AREA #1:- 231.11 SQ FT.

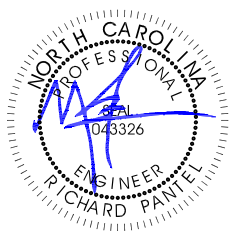
NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT
LOCATED WITHIN 10' OF UTILITY METER





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

REVISIONS		
DESCRIPTION	DATE	REV



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

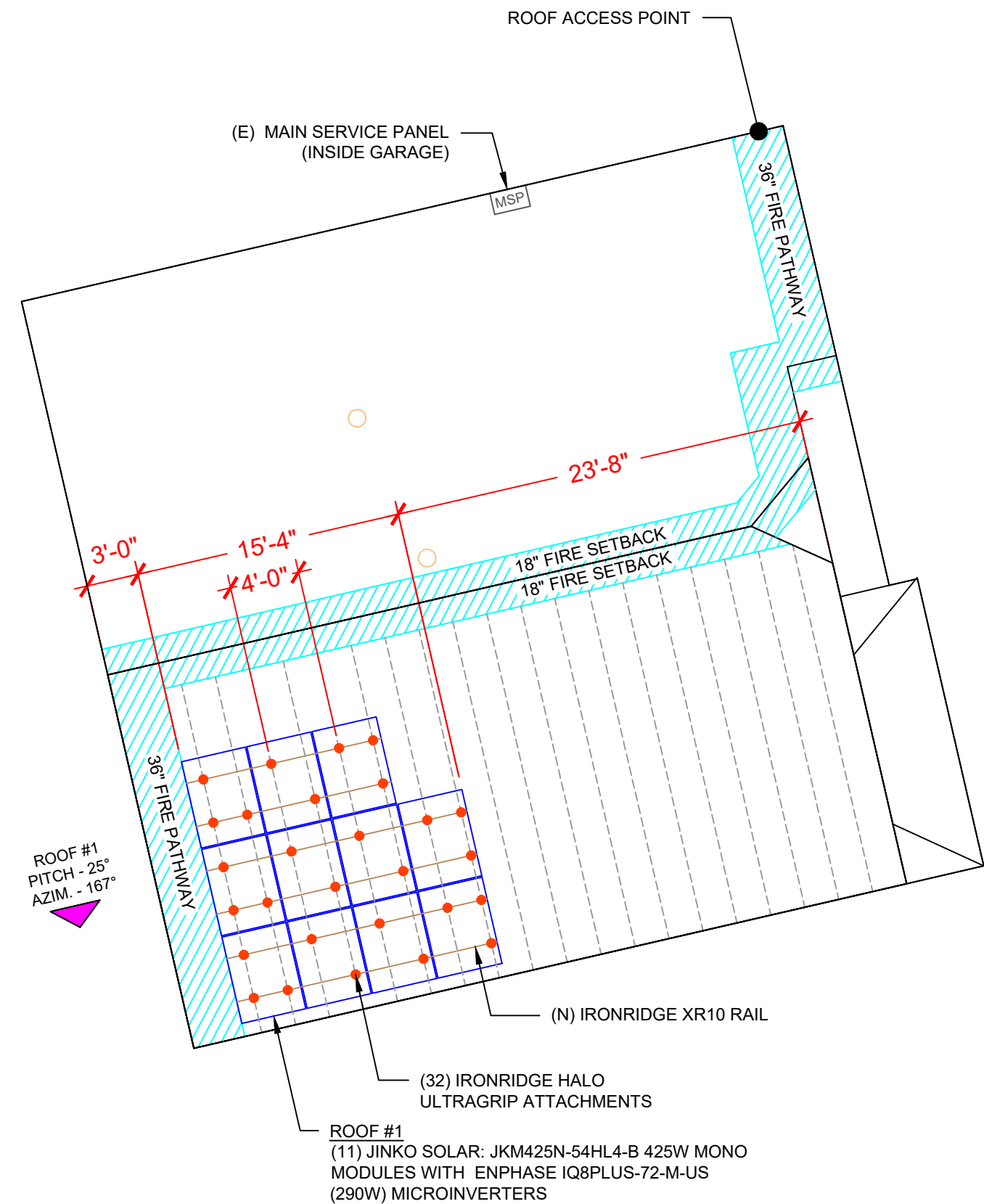
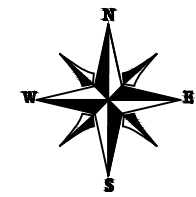
SHEET NAME
PLOT PLAN WITH
ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 11 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	25°	167°	2"X4"	24"

ARRAY AREA & ROOF AREA CALC'S

ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	11	231.11	917.6	25
TOTAL	11	231.11	2002.8	12

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

REVISIONS		
DESCRIPTION	DATE	REV

Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY

ESR

SHEET NAME

ROOF PLAN & MODULES

SHEET SIZE

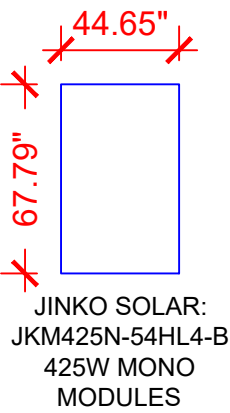
ANSI B
11" X 17"

SHEET NUMBER

PV-3

LEGEND

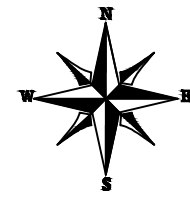
- MAIN SERVICE PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- TRUSS



JINKO SOLAR:
JKM425N-54HL4-B
425W MONO
MODULES

CIRCUIT LEGEND
<div><div></div></div> CIRCUIT #1

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



(N) COMBINER BOX
(N) VISIBLE, LOCKABLE, LABELED
NON-FUSED AC DISCONNECT
(LOCATED WITHIN 10' OF UTILITY METER)
(E) UTILITY METER
(E) MAIN SERVICE PANEL
(INSIDE GARAGE)

UMACDCB
MSP

(N) JUNCTION BOX

(N) 3/4" EMT CONDUIT

JB

(11) ENPHASE IQ8PLUS-72-M-US (290W)
LOCATED UNDER EACH PANEL (240V)

CIRCUIT #1
(11 MODULES)

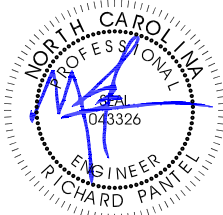
BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	11	JINKO SOLAR: JKM425N-54HL4-B 425W MONO MODULES
MICRO INVERTERS	11	ENPHASE IQ8PLUS-72-M-US (290W) MICROINVERTERS
JUNCTION BOX	1	JUNCTION BOX
RAIL	7	IRONRIDGE XR10 RAIL
SPLICE	4	SPLICE KIT
MID MODULE CLAMPS	16	MID MODULE CLAMPS
END CLAMPS	12	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	32	IRONRIDGE HALO ULTRAGRIP ATTACHMENTS

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

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



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,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

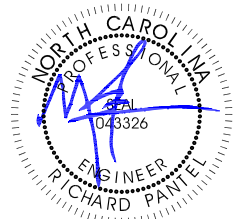
JB

- JUNCTION BOX

- CONDUIT

REVISIONS

DESCRIPTION	DATE	REV



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY

ESR

SHEET NAME

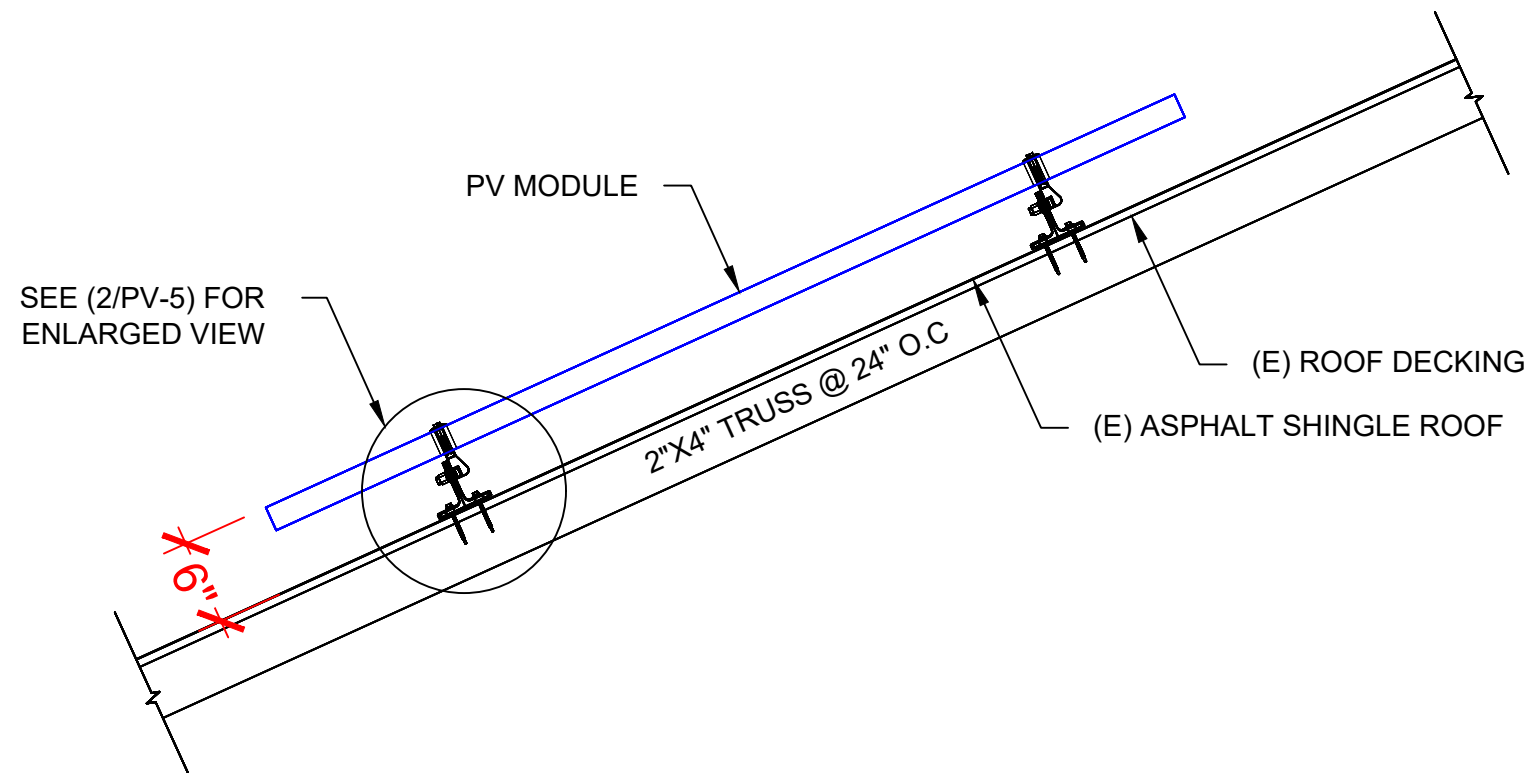
ATTACHMENT
DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5

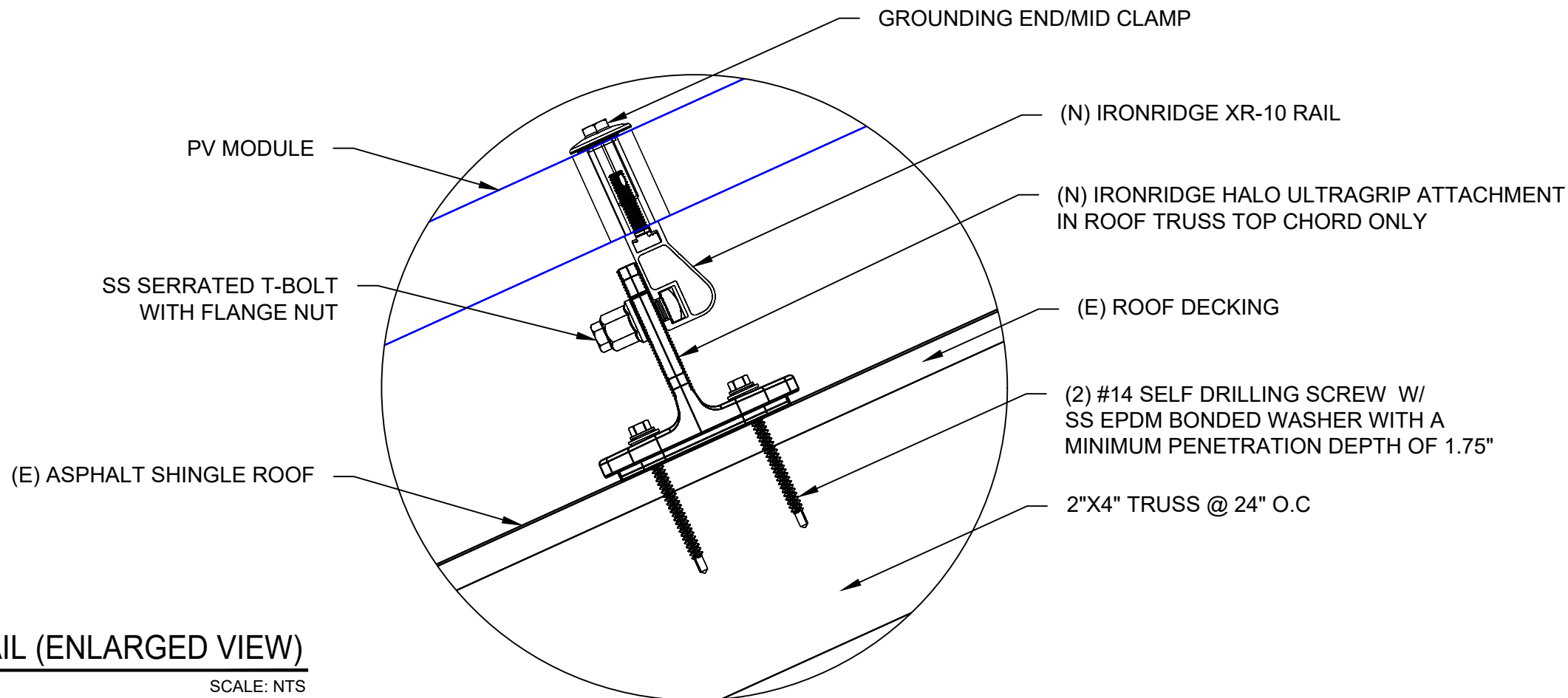


1

ATTACHMENT DETAIL

PV-5

SCALE: N.T.S



2

ATTACHMENT DETAIL (ENLARGED VIEW)

PV-5

SCALE: NTS

DC SYSTEM SIZE: 4.675 KW DC
AC SYSTEM SIZE: 3.190 KW AC

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

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

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

120% RULE CHECK:
120% X 225A = 270A
11 MICRO-INVERTERS X 1.21A X 1.25 = 16.64A
270A - 200A = 70A > 16.64A, OKAY

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

MODULE RATED POWER (P_{MAX}): 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. JUNCITON BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCITON 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:

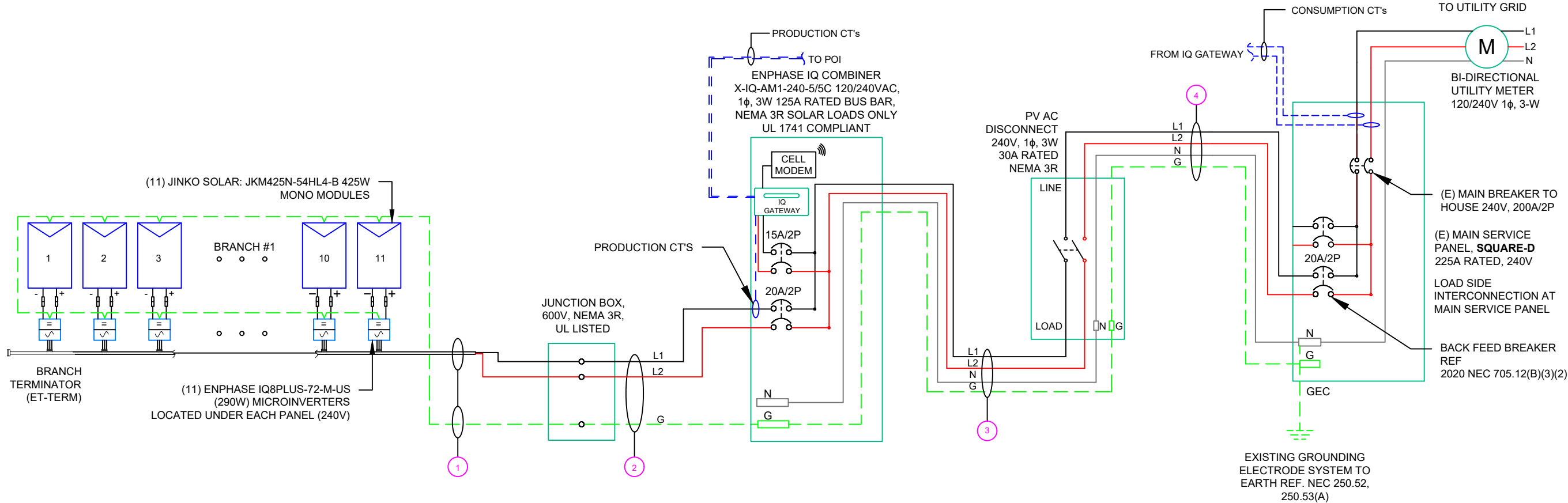
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95]
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE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

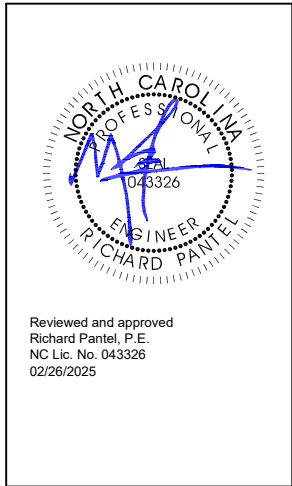
RACKING NOTE:

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER



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

REVISIONS		
DESCRIPTION	DATE	REV



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 1.26"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

CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD 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
JUNCTION BOX	COMBINER BOX	240	13.31	16.6375	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	69	1.24	0.949	3/4" EMT	11.87617
COMBINER BOX	AC DISCONNECT	240	13.31	16.6375	20	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.069	3/4" EMT	15.8349
AC DISCONNECT	POI	240	13.31	16.6375	20	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.069	3/4" EMT	15.8349

Circuit 1 Voltage Drop	1.637
------------------------	-------

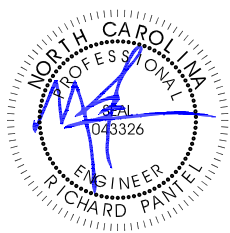
ELECTRICAL NOTES

- 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.



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

REVISIONS		
DESCRIPTION	DATE	REV



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,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)

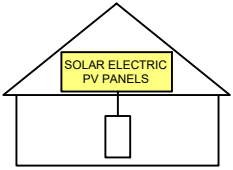
⚠ WARNING

**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 **13.31 A**

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

⚠ CAUTION

**PHOTOVOLTAIC SYSTEM CIRCUIT IS
BACKFEED**

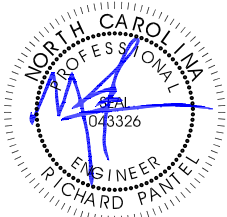
LABEL- 9:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3-4) & NEC 690.59

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



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

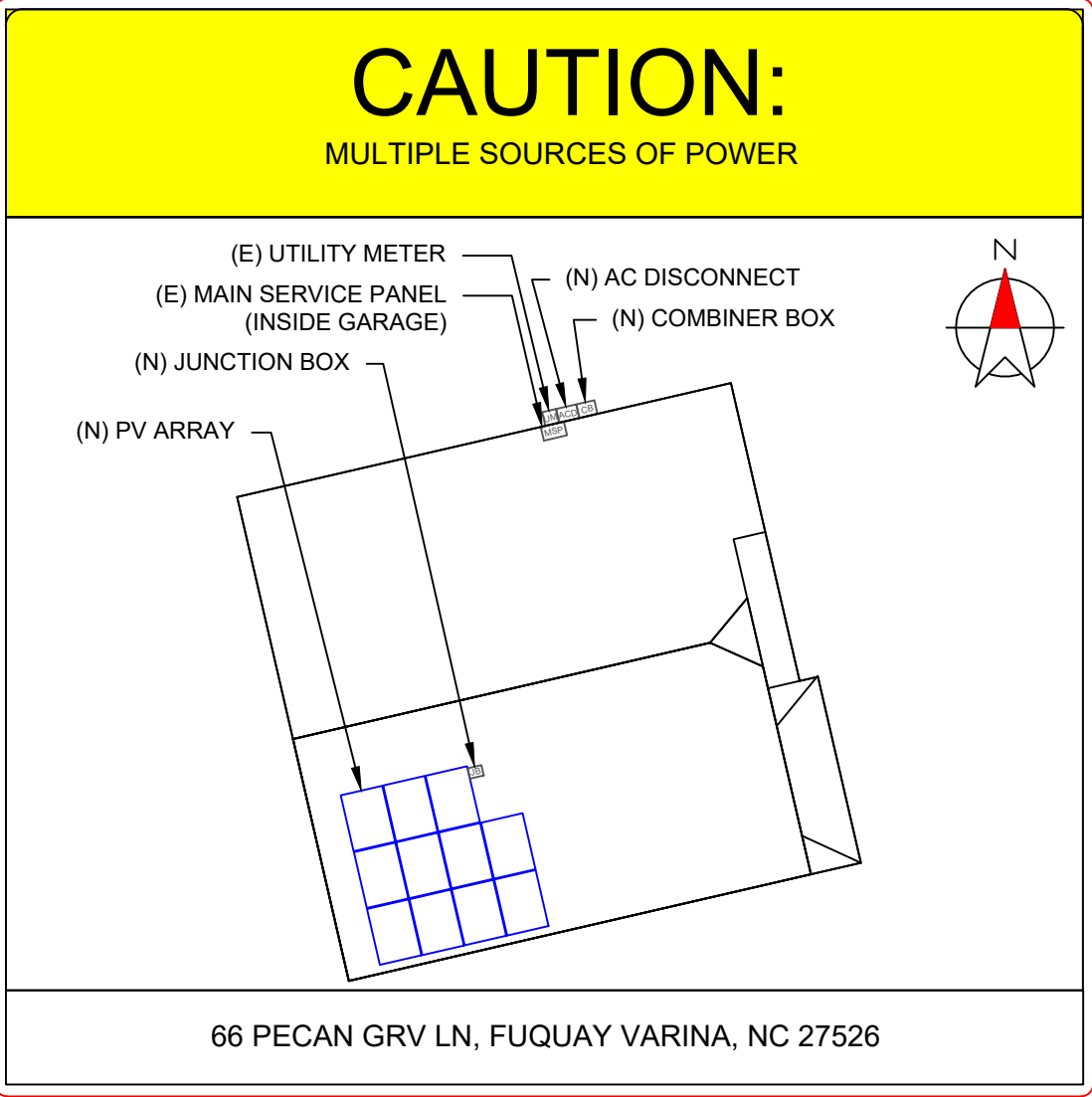
CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8



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]

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

Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

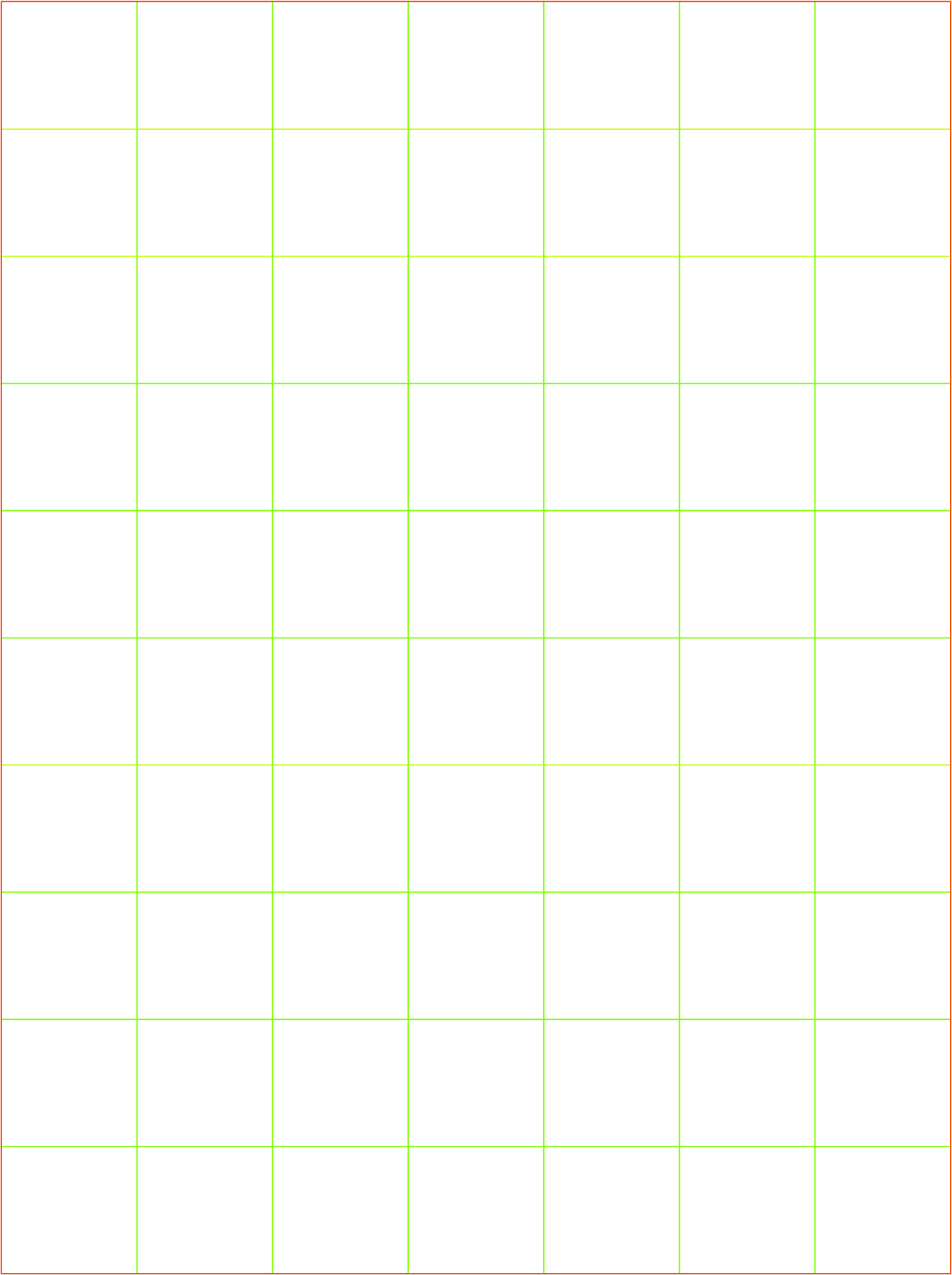
SHEET NAME
PLACARD

SHEET SIZE
ANSI B
11" X 17"

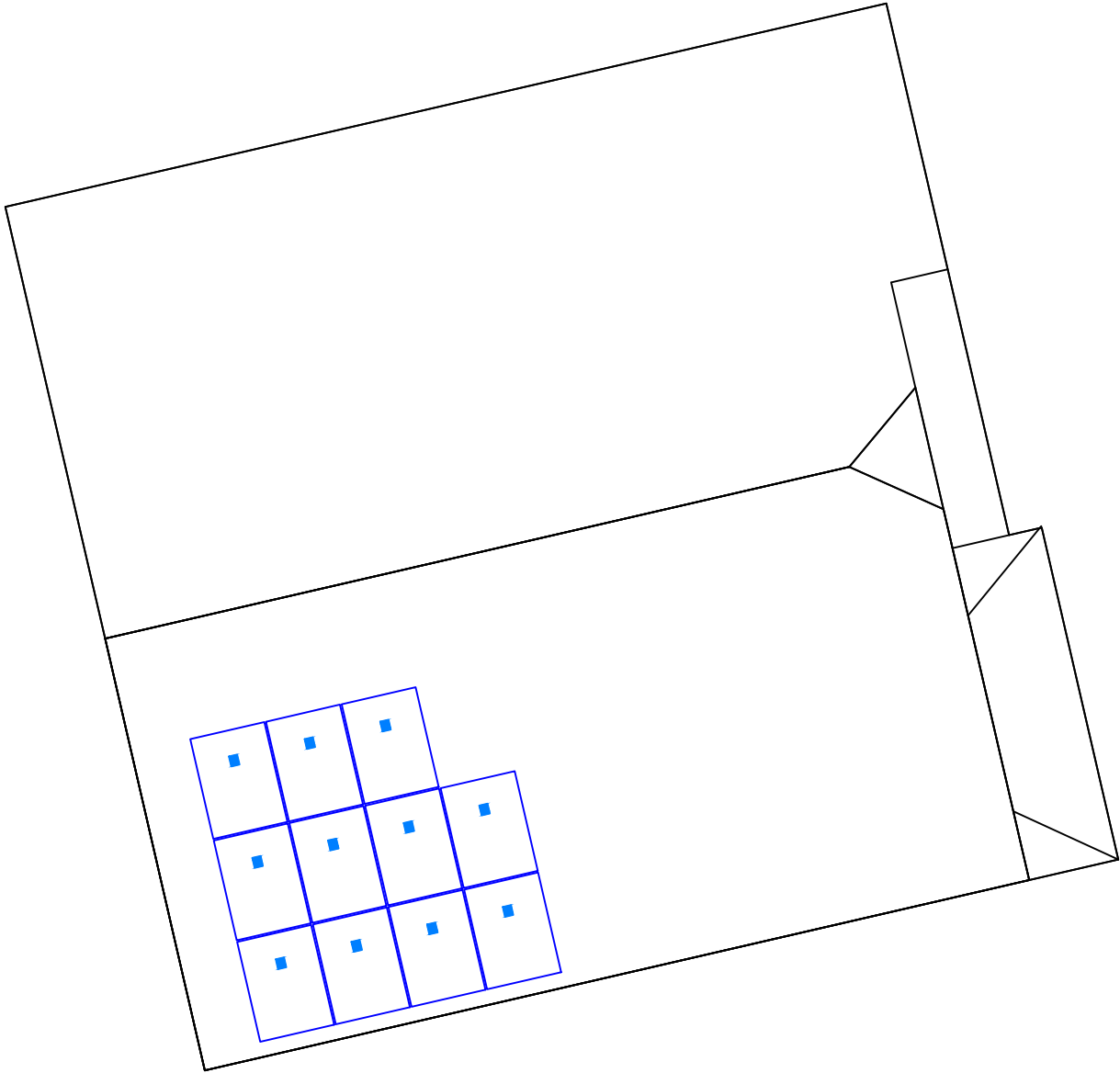
SHEET NUMBER
PV-9


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

1
2
3
4
5
6
7
8
9
10



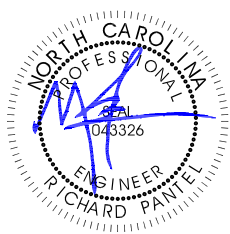
MICRO INVERTER CHART





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

REVISIONS		
DESCRIPTION	DATE	REV



Reviewed and approved
Richard Pantel, P.E.
NC Lic. No. 043326
02/26/2025

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,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 3rd 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.

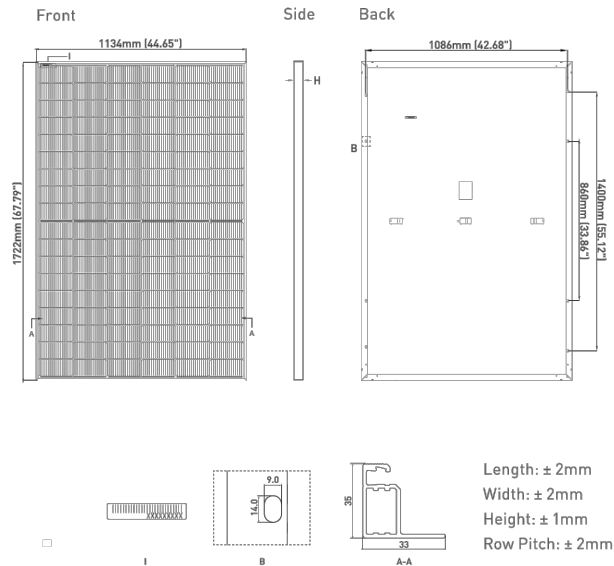
- ISO9001:2015 Quality Standards
- ISO14001:2015 Environmental Standards
- IEC61215, IEC61730 certified products
- ISO45001:2018 Occupational Health & Safety Standards
- UL61730 certified products



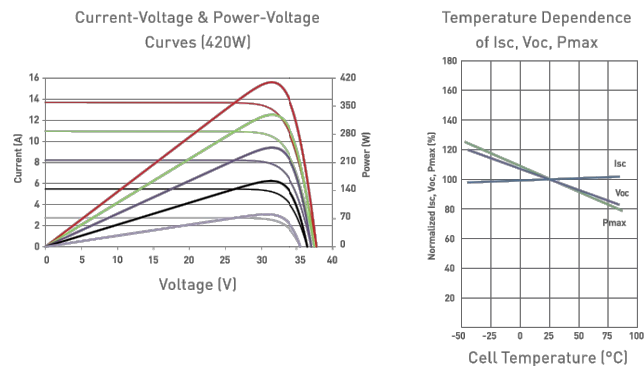
BUILDING YOUR TRUST IN SOLAR. WWW.JINKOSOLAR.US



ENGINEERING DRAWINGS



ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



MECHANICAL CHARACTERISTICS

No. of Half Cells	108 (2 x 54)
Dimensions	1722 x 1134 x 35mm (67.79 x 44.65 x 1.38 inch)
Weight	21.0kg (46.3lbs)
Front Glass	3.2mm, Anti-Reflection Coating 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
1st year degradation not to exceed 1%, each subsequent year not to exceed 0.4%, minimum power at year 30 is 87.4% or greater.

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/m²
NOCT: ☀ Irradiance 800W/m²

🌡 Cell Temperature 25°C
🌡 Ambient Temperature 20°C

☁ AM = 1.5
☁ 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

BUILDING YOUR TRUST IN SOLAR. WWW.JINKOSOLAR.US



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

REVISIONS

DESCRIPTION	DATE	REV

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,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

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.



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 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.

© 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.

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.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		UNITS	IQ8-60-M-US	IQ8PLUS-72-M-US
Commonly used module pairings ¹	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 https://enphase.com/installers/microinverters/calculator .		
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 ²	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 ³	–		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 × W × D)			212 mm (8.3") × 175 mm (6.9") × 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.

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



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

REVISIONS

DESCRIPTION	DATE	REV

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

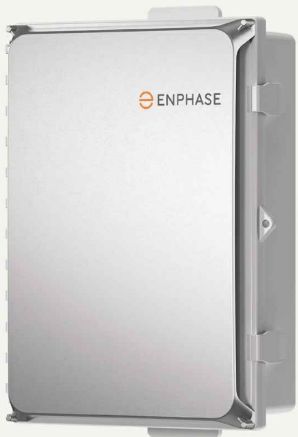
SHEET NAME
**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-12



DATA SHEET



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-00007-3.0-EN-US-2024-03-01

IQ Combiner 5/5C

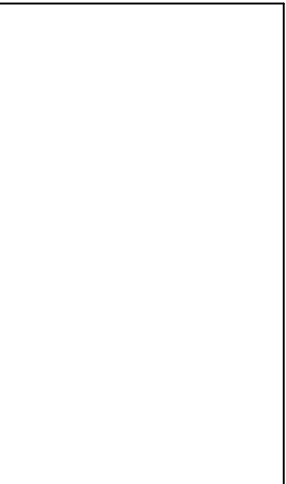
MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (± 2.5%), and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat.
IQ Combiner 5C (X-IQ-AM1-240-5C)	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) ¹ . 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.



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,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">20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors60 A breaker branch input: 4 to 1/0 AWG copper conductorsMain lug combined output: 10 to 2/0 AWG copper conductorsNeutral and ground: 14 to 1/0 copper conductorsAlways follow local code requirements for conductor sizing
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 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 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 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 Sprint 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:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY

ESR

SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-14



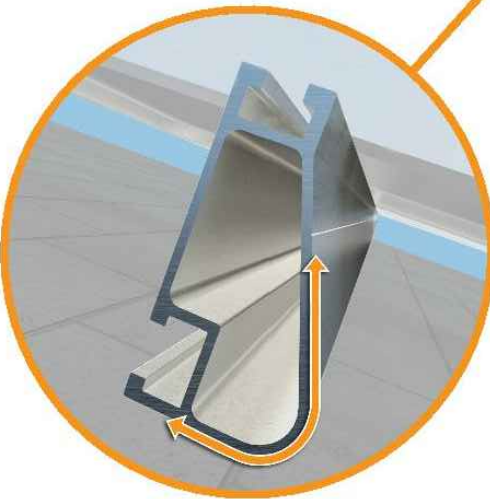
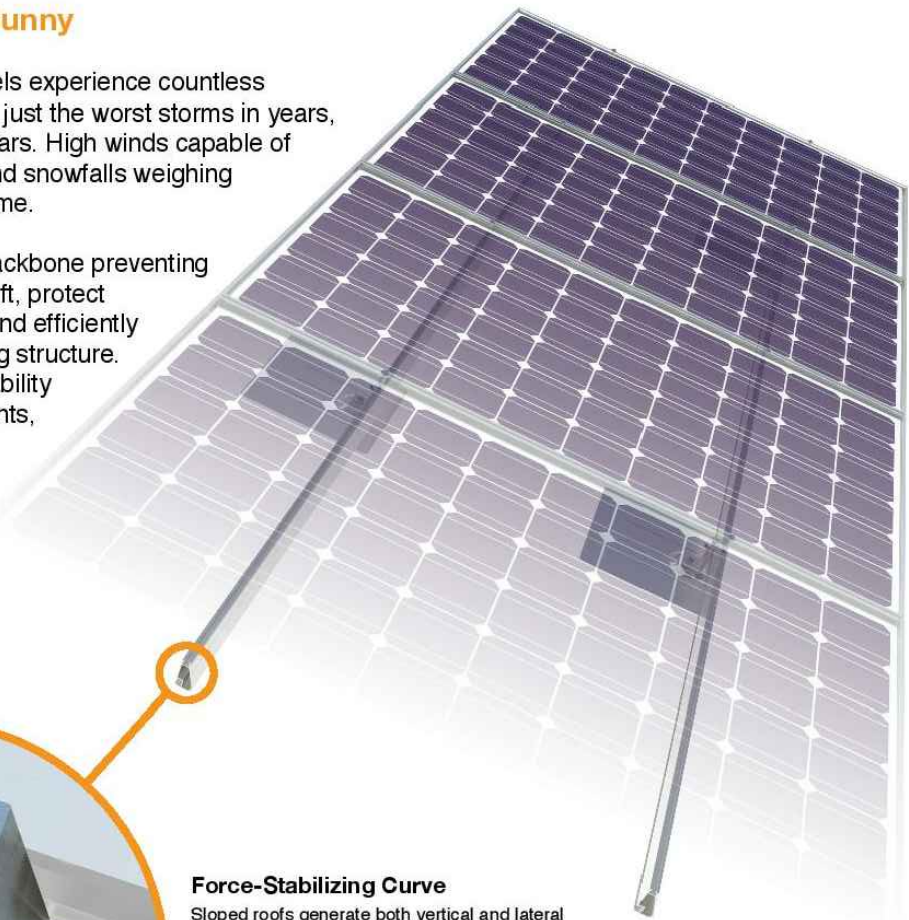
Tech Brief

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	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:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

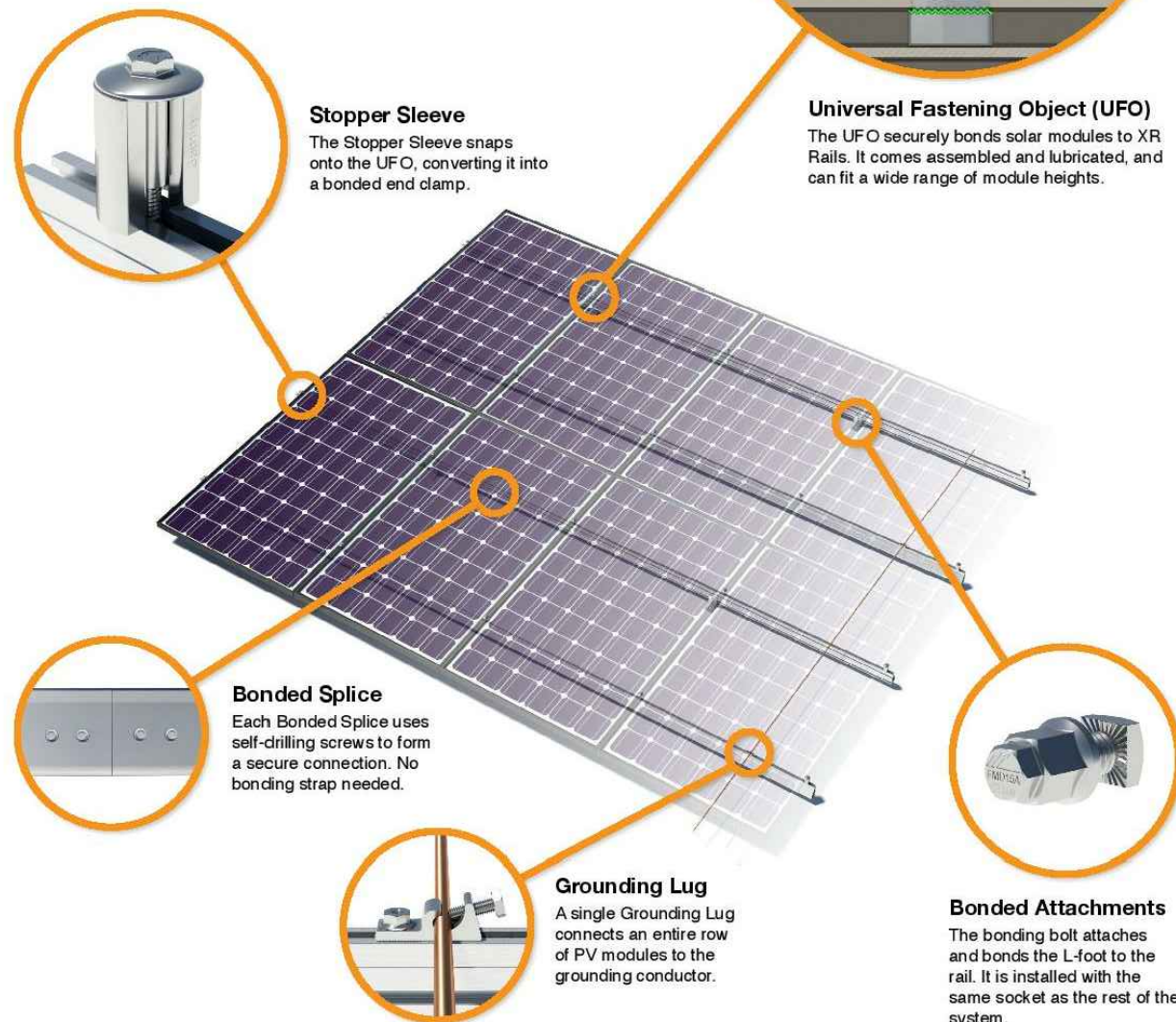
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-15

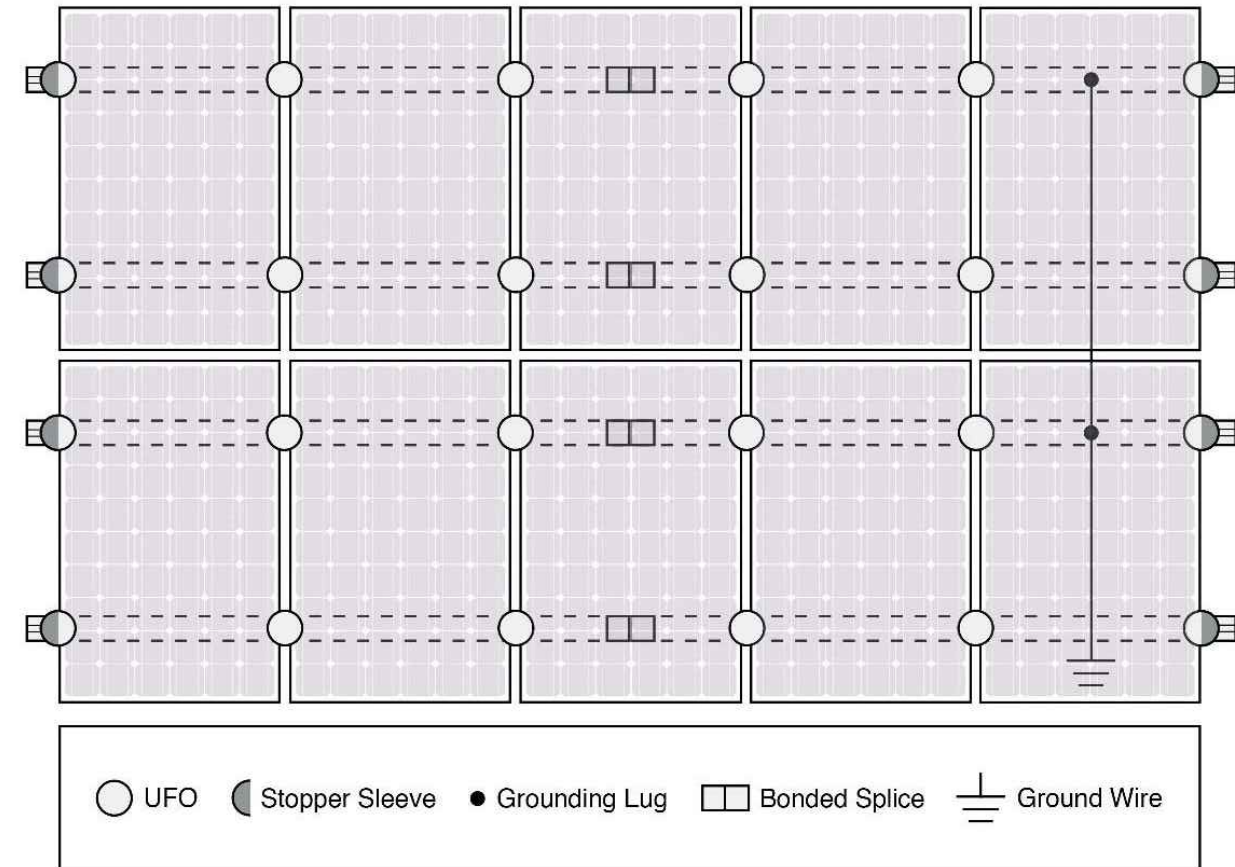
Simplified Grounding for Every Application

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](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:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

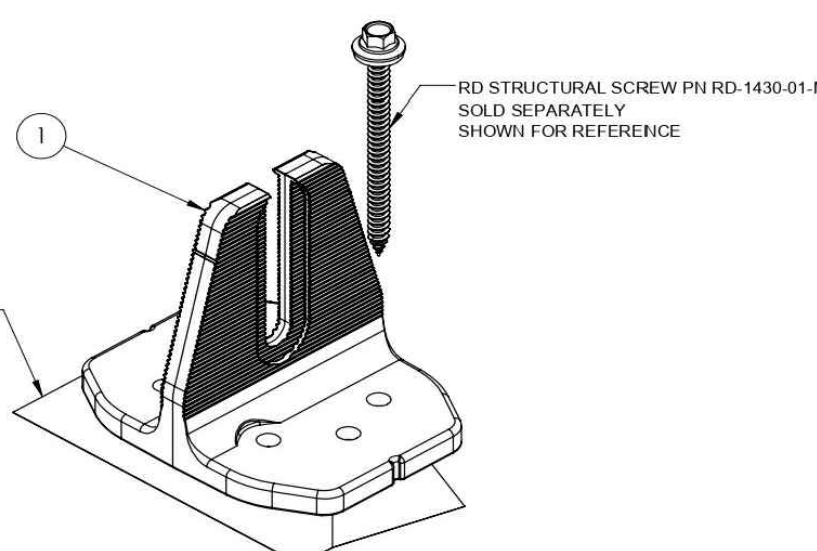
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-16



QuickMount® Halo UltraGrip

Cut Sheet



RD STRUCTURAL SCREW PN RD-1430-01-M1
SOLD SEPARATELY
SHOWN FOR REFERENCE

Release Liner
shown for reference

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



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

REVISIONS

DESCRIPTION	DATE	REV

DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE
66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

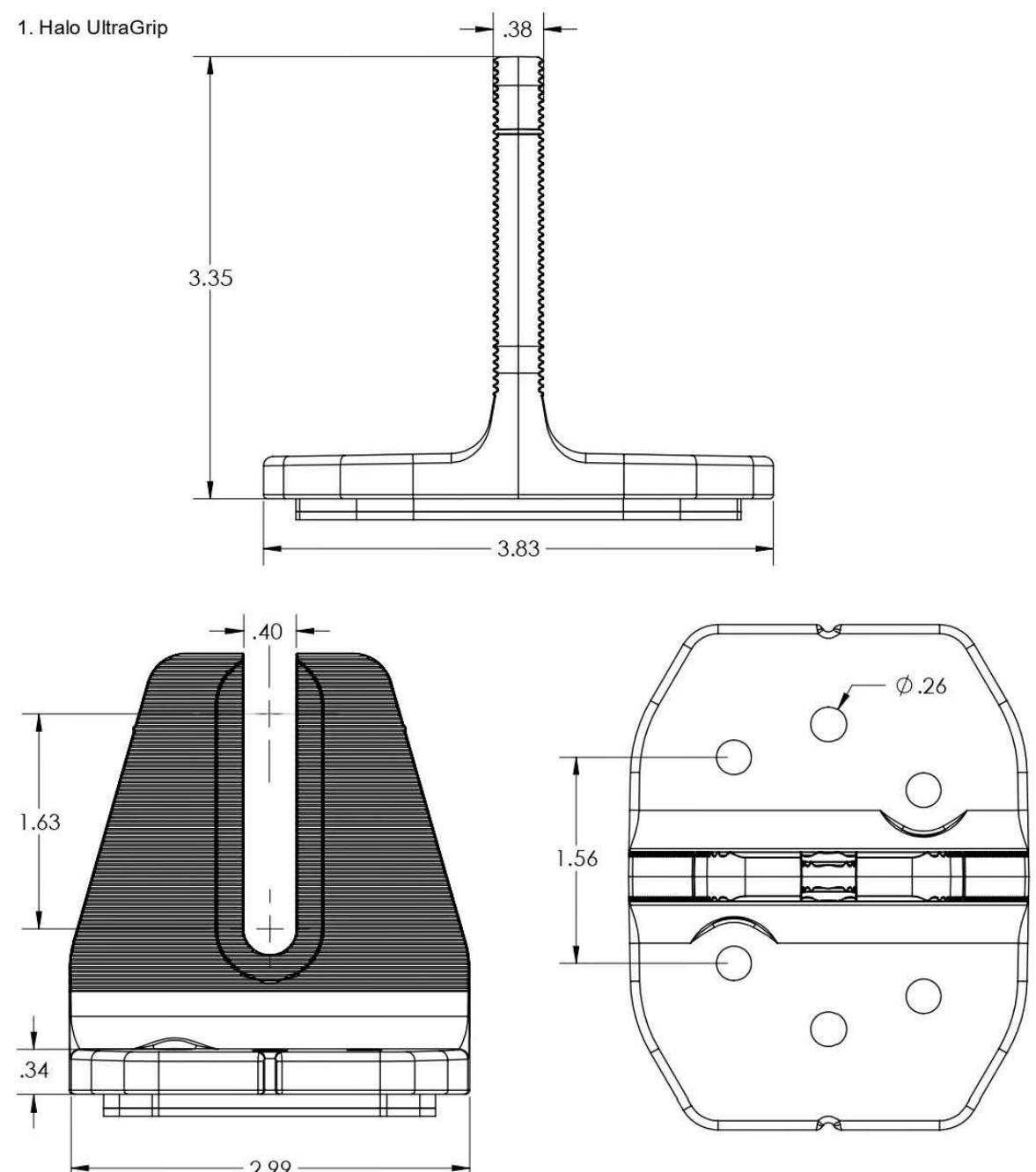
SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-17

Cut Sheet

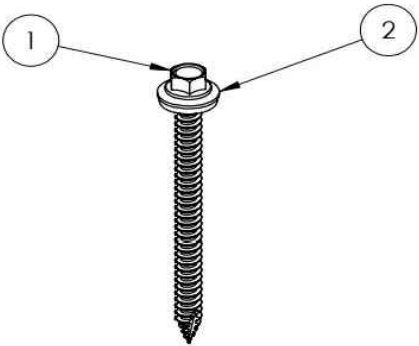
1. Halo UltraGrip



Property	Value
Material	3000 Series Aluminium
Finish	Mill or Black



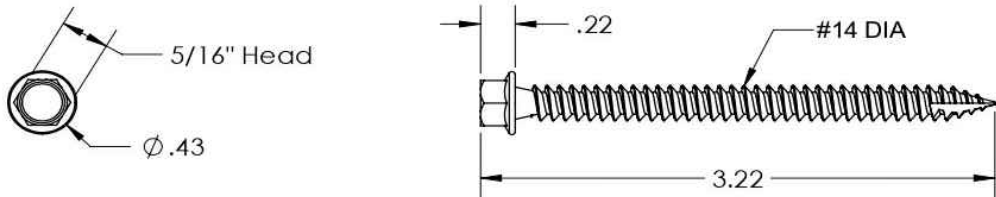
QuickMount® RD Structural Screw



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

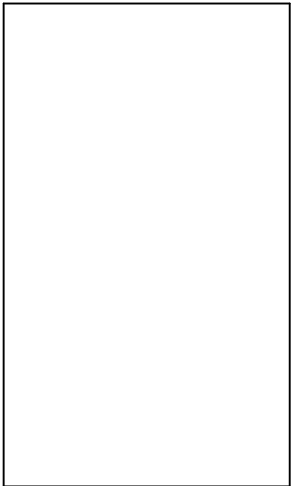


Property	Value
Material	300 Series Stainless Steel
Finish	Clear



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

REVISIONS		
DESCRIPTION	DATE	REV



DATE:02/25/2025

PROJECT NAME & ADDRESS

CHONG TING
RESIDENCE

66 PECAN GRV
LN,FUQUAY
VARINA, NC 27526

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-18