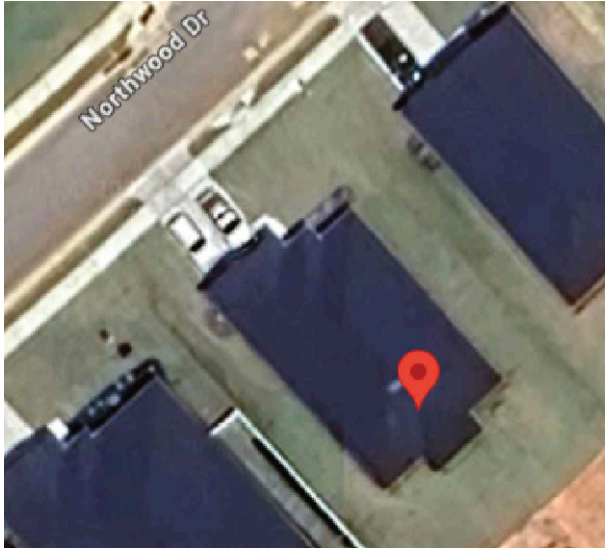
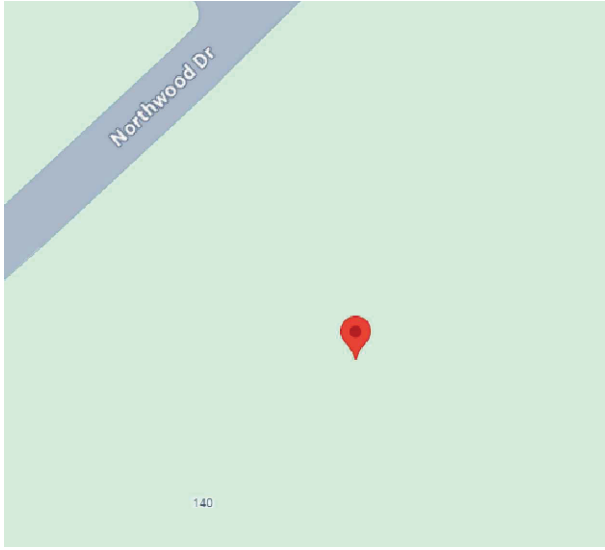


AERIAL PHOTO



VICINITY MAP



SHEET INDEX

- PV-1.0 COVER SHEET
- PV-2.0 SITE PLAN
- PV-2.1 ROOF PLAN
- PV-2.2 STRING MAP
- PV-3.0 STRUCTURAL
- PV-4.0 ELECTRICAL 3LD
- PV-4.1 ELECTRICAL SLD
- PV-4.2 ELECTRICAL CALCULATION
- PV-5.0 SIGNAGE
- PV-6.0 BOM
- PV-7.0 MICROINVERTER CHART
- PV-8.0+ SPECS

ROOF MOUNT SOLAR PERMIT PACKAGE

PETER BRAZLE

11.00 KW DC & 8.00 KW AC GRID TIED PHOTOVOLTAIC SYSTEM

152 NORTHWOOD DR, FUQUAY-VARINA, NC 27526

CODE INFORMATION

2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA FIRE PREVENTION CODE
2018 NORTH CAROLINA ENERGY CONSERVATION CODE
2018 NORTH CAROLINA MECHANICAL CODE
2018 NORTH CAROLINA PLUMBING CODE
2018 NORTH CAROLINA EXISTING BUILDING CODE
2018 NORTH CAROLINA FUEL GAS CODE
2018 NORTH CAROLINA ACCESSIBILITY CODE
2020 NATIONAL ELECTRICAL CODE

BUILDING INFO

1 STORY HOUSE
CONSTRUCTION TYPE: V-B
SINGLE FAMILY RESIDENCE
OCCUPANCY: R3/U
ROOF TYPE : COMP SHINGLE

DESIGN CRITERIA

WIND SPEED	117 MPH
SNOW LOAD	15 PSF
WIND EXPOSURE	C

GENERAL NOTES

1. NOTIFY LOCAL UTILITY PROVIDER BEFORE ACTIVATION OF ANY PV INSTALLATION.
2. THIS PROJECT SHALL COMPLY WITH LOCAL ORDINANCES.
3. PROPER ACCESS AND WORKING CLEARANCE WILL BE PROVIDED.
4. ELECTRICAL WORK SHOWN ON PLANS WILL BE COMPLETED BY UNDERSIGNED.
5. PV EQUIPMENT COMPLIES WITH UL2703, UL1741, AND UL1703.
6. SEAL ROOF PENETRATIONS WITH HIGH-PERFORMANCE SEALANT (E.G., GEOCEL 2300).
7. THE SYSTEM WILL NOT BE INTERCONNECTED UNTIL APPROVAL FROM JURISDICTION AND UTILITY.
8. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY ROOF VENTS.
9. INSTALL SUPPLEMENTAL GROUNDING ELECTRODE IF MAIN PANEL LACKS GROUNDING.
10. GROUND EACH MODULE USING UL2703 OR UL1703 APPROVED CONNECTIONS.
11. PROVIDE LADDER FOR INSPECTION PER OSHA REGULATIONS.
12. MAX HEIGHT OF MODULES OFF OF ROOF FACE : <6".
13. PHOTOVOLTAIC SYSTEM WILL COMPLY WITH 2020 NEC.
14. INVERTER IS UNGROUNDED PER 690.35.
15. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
16. INVERTER CONFORM TO AND IS LISTED UNDER UL 1741.
17. EQUIPMENT TO BE LISTED, LABELED, AND INSTALLED PER CEC AND MANUFACTURER'S INSTRUCTIONS.
18. CONDUITS EXPOSED TO SUNLIGHT ON ROOF MUST BE LESS THAN 7/8" ABOVE ROOF.
19. USE CONDUIT FOR EXPOSED WIRING OR CABLE RATED FOR EXPOSURE; TYPE NM CABLE ALLOWED IN PROTECTED LOCATIONS.

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 FRAMING THAT HAS NOT BEEN ADDRESSED IN THE APPROVED CONSTRUCTION DOCUMENTS AND NOTIFY THE E.O.R. OF ANY CONCERNS.



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1760 CHICAGO AVE SUITE J-13, RIVERSIDE CA 92507
PHONE: (951)405-1733. WWW.CRENG.CO

CONTRACTOR INFO



EMPWR SOLAR

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

CUSTOMER INFO

NAME	PETER BRAZLE
ADDRESS	152 NORTHWOOD DR, FUQUAY-VARINA, NC 27526
COORDINATES	35.458417, -78.812806
APN NO.	652517840
AHJ	HARNETT COUNTY
UTILITY	DUKE ENERGY

PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

REV.	DESCRIPTION	DATE
0	INITIAL DESIGN	9/17/2025
A	UPDATED DESIGN	9/18/2025
B		

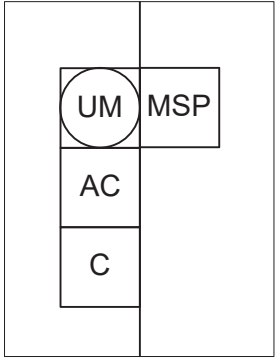
PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
COVER SHEET	PV-1.0

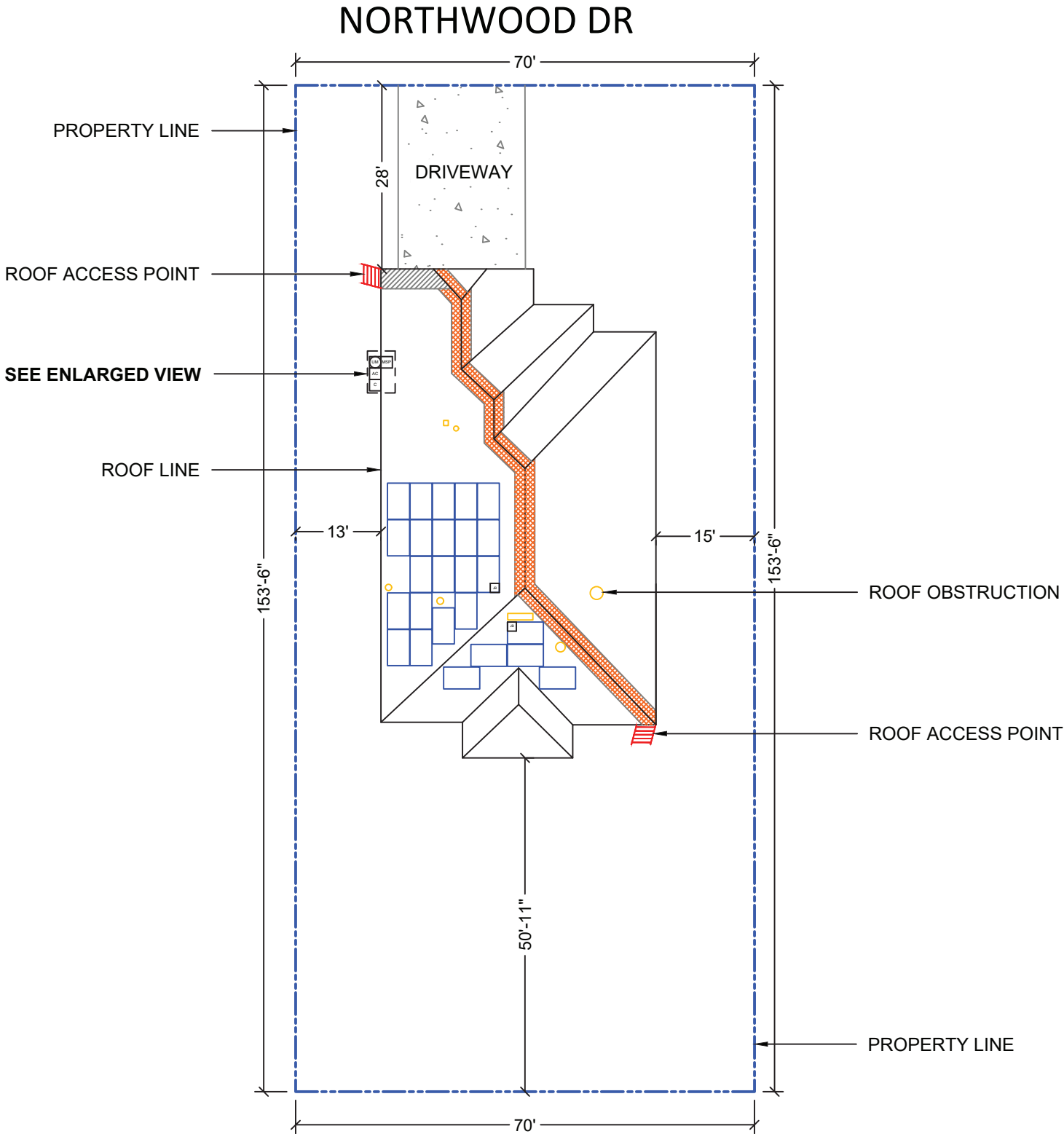
TOTAL ARRAY AREA (SQ. FT.)	537.69
TOTAL ROOF AREA (SQ. FT.)	2857.30
% ARRAY AREA IN ROOF	18.82 %

- NOTES:**
1. MINOR FIELD ADJUSTMENTS ALLOWED BASED ON ACTUAL SITE CONDITION AND MEASUREMENTS.
 2. THE 30 SECOND SHUTDOWN REQUIREMENT IS INCORPORATED INTO THE 2020 NEC AND UL STANDARD 1741.
 3. EXISTING ROOF VENT SHOULD NOT BE COVERED.

NOTE:
NO FENCES OR GATES SURROUND THE PROPERTY.



ENLARGE VIEW



LEGEND

- UM UTILITY METER
- MSP MAIN SERVICE PANEL
- C COMBINER
- JB JUNCTION BOX
- AC AC DISCONNECT
- MODULE
- ROOF OBSTRUCTIONS
- 36" ACCESS PATHWAYS
- 18" ACCESS PATHWAYS
- ROOF ACCESS POINT



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UTILITY	DUKE ENERGY

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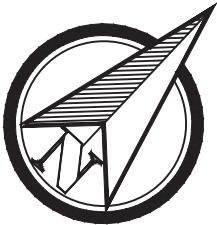
DC SIZE: 11 kW
AC SIZE: 8 kW
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MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

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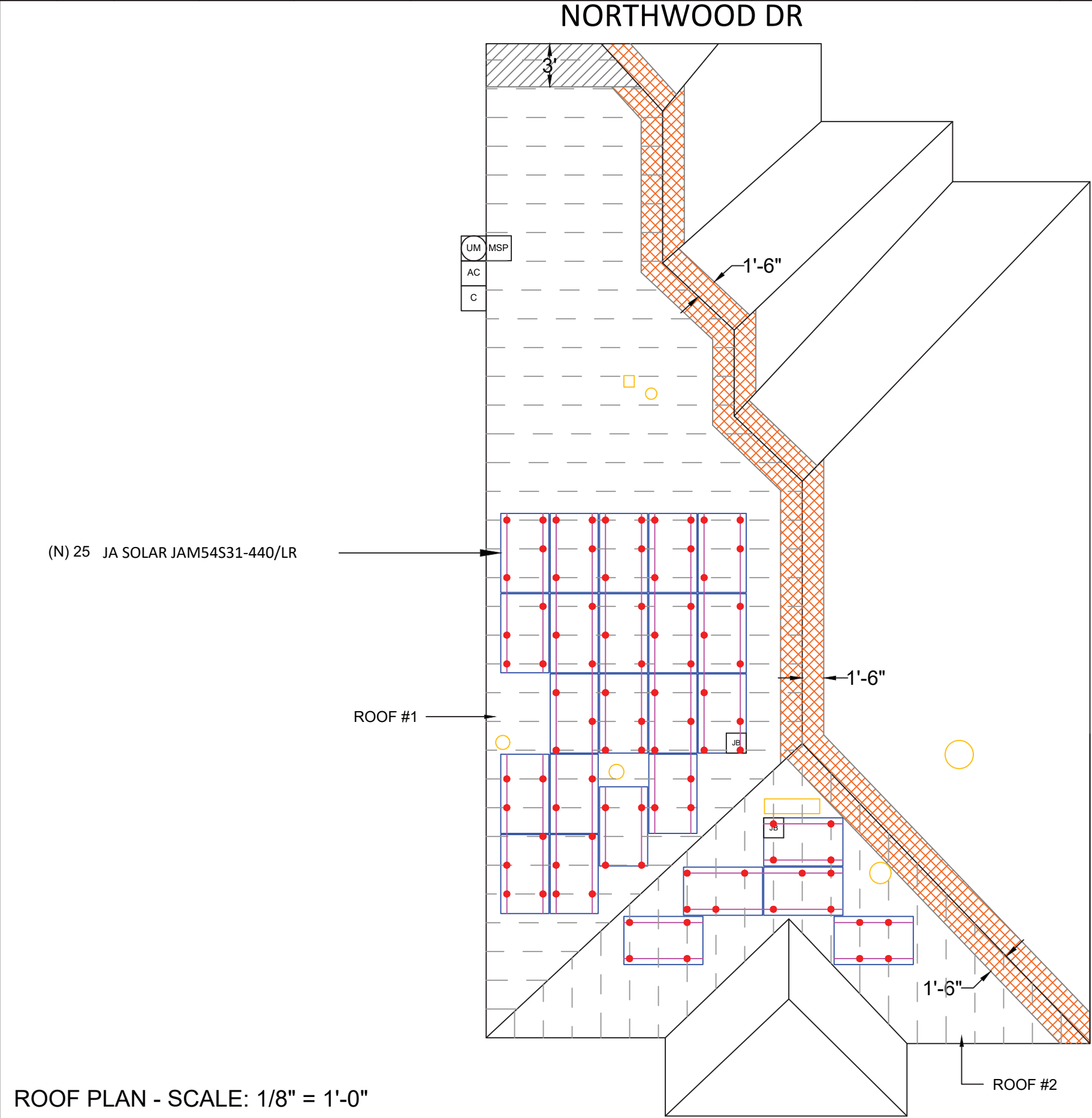
PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
SITE PLAN	PV-2.0

SITE PLAN - SCALE: 3/64" = 1'-0"



ROOF NO.	ROOF TILT	AZIMUTH	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOFING TYPE	FRAMING TYPE	OC SPACING	PENETRATION TYPE	MAX PENETRATION SPACING	MAX OVERHANG
#1	30°	227°	20	430.15	COMP SHINGLE	FRAMING	24"	FULLY STAGGERED	48"	24"
#2	30°	137°	5	107.54	COMP SHINGLE	FRAMING	24"	FULLY STAGGERED	48"	24"



LEGEND

UM

MSP

C

JB

AC

UTILITY METER

MAIN SERVICE PANEL

COMBINER

JUNCTION BOX

AC DISCONNECT

MODULE

ROOF OBSTRUCTIONS

36" ACCESS PATHWAYS

18" ACCESS PATHWAYS

RAIL

FRAMING

ATTACHMENT

NORTH CAROLINA

PROFESSIONAL

SEAL

047345

Exp. 12/31/2025

ENGINEER

METHODE MANIRAGUHA

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Current Renewables Engineering

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APN NO.	652517840
AHJ	HARNETT COUNTY
UTILITY	DUKE ENERGY

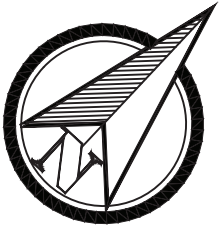
PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE IQ8MC-72-M-US

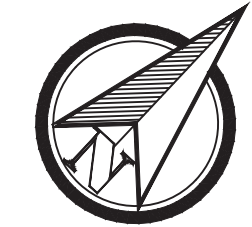
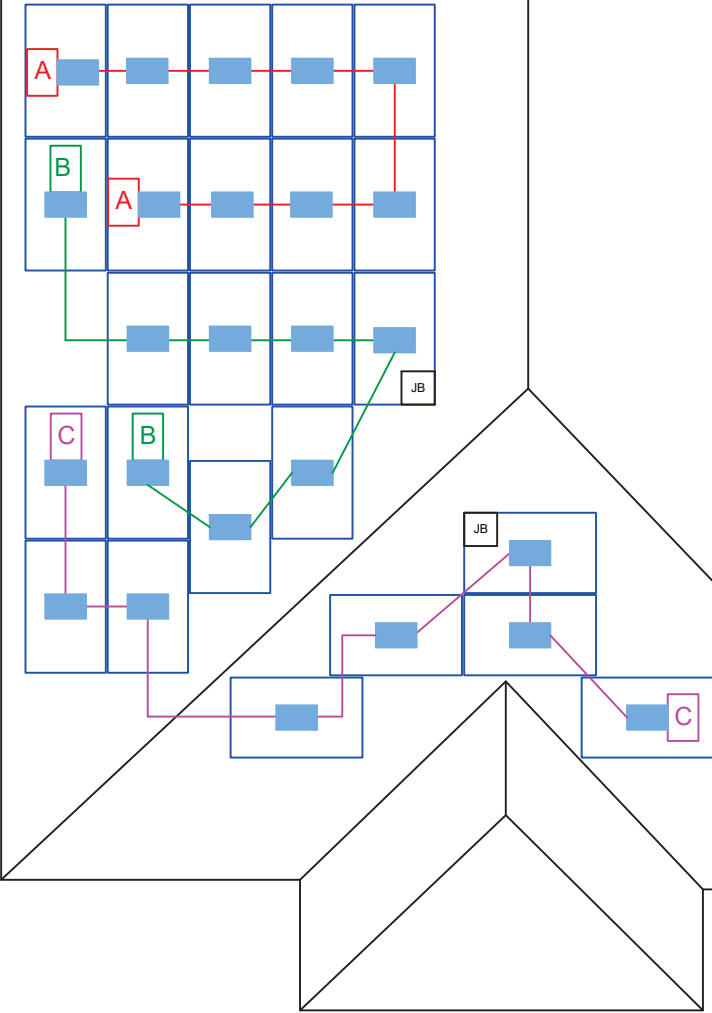
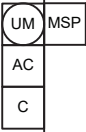
REV.	DESCRIPTION	DATE
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A	UPDATED DESIGN	9/18/2025
B		

PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
ROOF PLAN	PV-2.1



NORTHWOOD DR



LEGEND

- MODULE
- STRING A - 9 MODULES
- STRING B - 8 MODULES
- STRING C - 8 MODULES
- #25- MICROINVERTERS

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UTILITY	DUKE ENERGY

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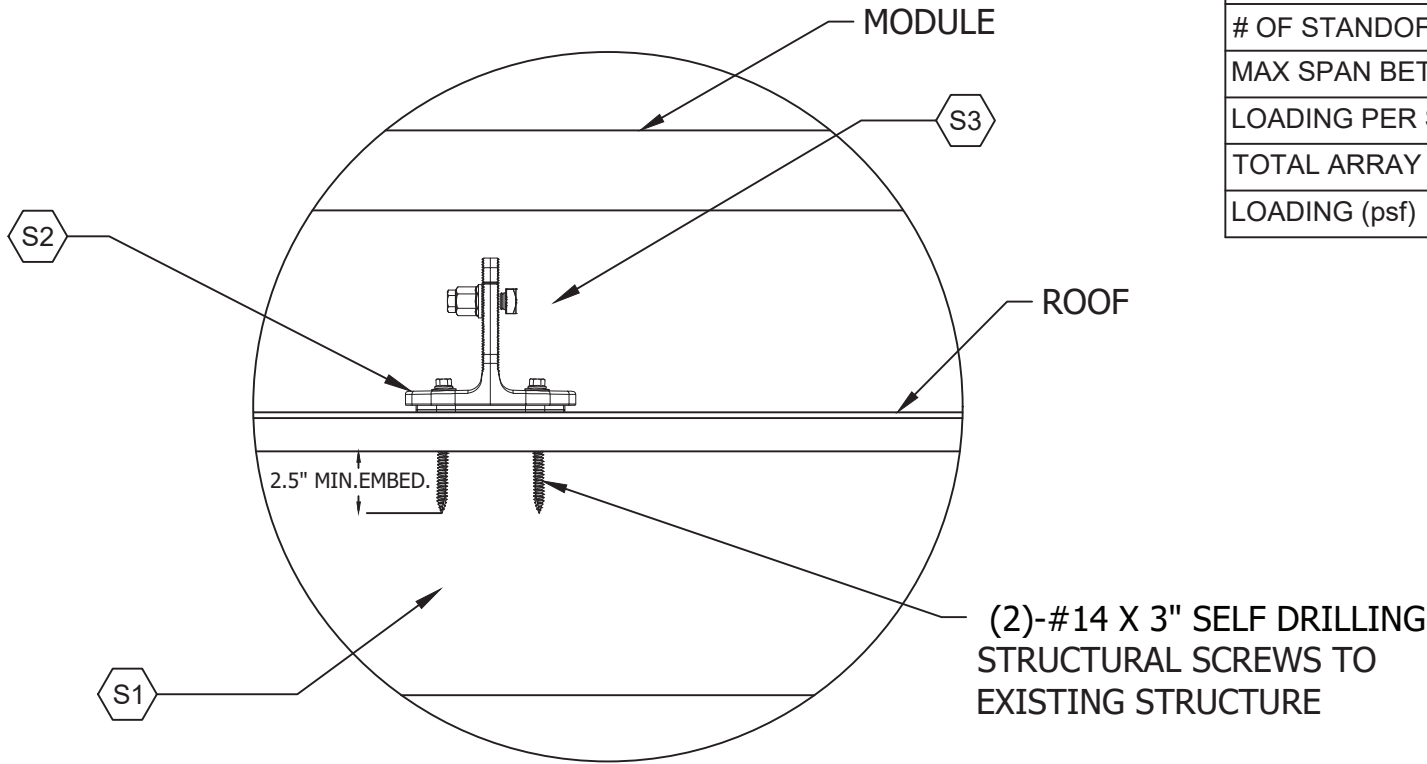
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A	UPDATED DESIGN	9/18/2025
B		

PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

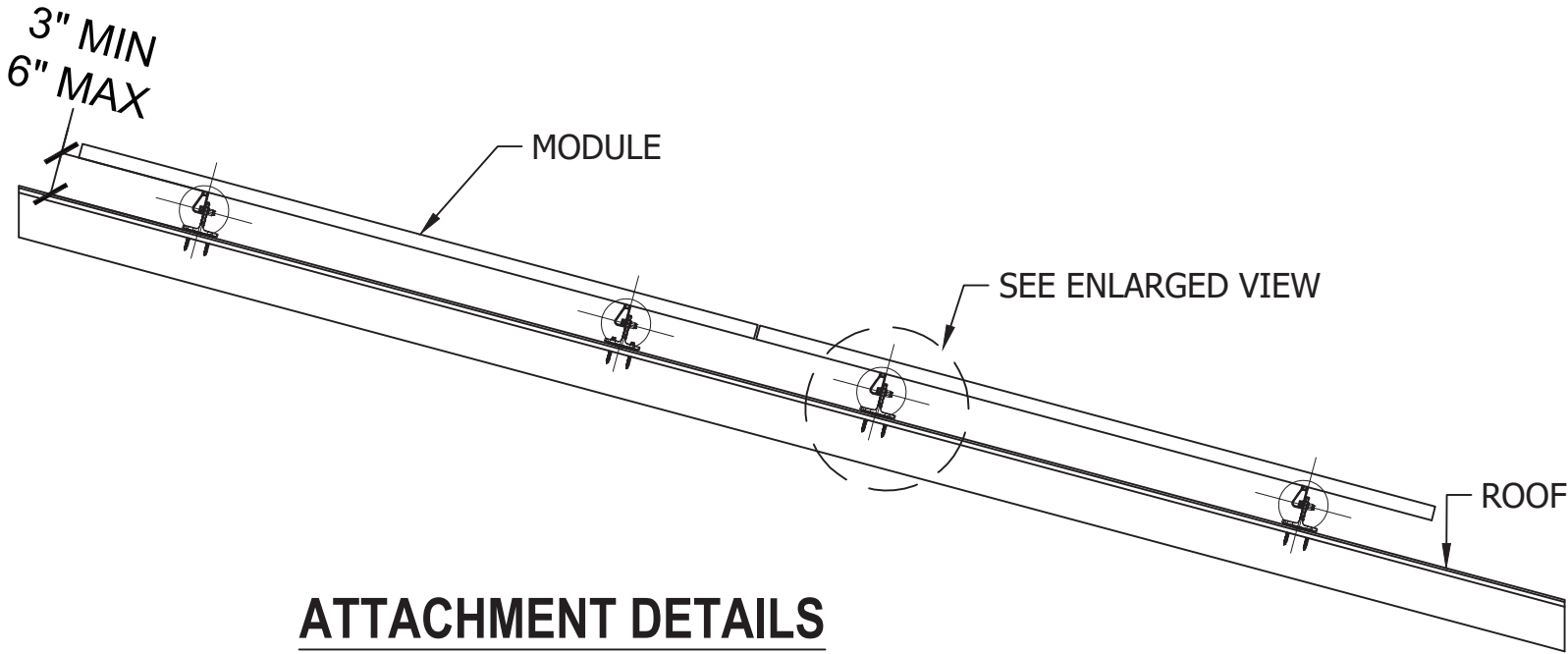
SHEET NAME	SHEET #
STRING MAP	PV-2.2

STRING MAP - SCALE: 1/8" = 1'-0"

TABLE 1		
S1	FRAMING TYPE	FRAMING
S2	ATTACHMENT	IRONRIDGE QUICKMOUNT HALO ULTRA GRIP
S3	RAIL	IRONRIDGE XR-100 RAIL



ENLARGED VIEW



ATTACHMENT DETAILS

WEIGHT LOAD CALCULATION	
MODULE WEIGHT (lbs)	44.00
# OF MODULES	25
TOTAL MODULE WEIGHT (lbs)	1100.00
RACK WEIGHT (lbs)	220.00
MICROINVERTER WEIGHT (lbs)	60.75
TOTAL SYSTEM WEIGHT (lbs)	1380.75
# OF STANDOFFS	90
MAX SPAN BETWEEN STANDOFFS (inch)	48
LOADING PER STANDOFF (lbs)	15.34
TOTAL ARRAY AREA (sq.ft.)	537.69
LOADING (psf)	2.57



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UTILITY	DUKE ENERGY

PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54531-440/LR
MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

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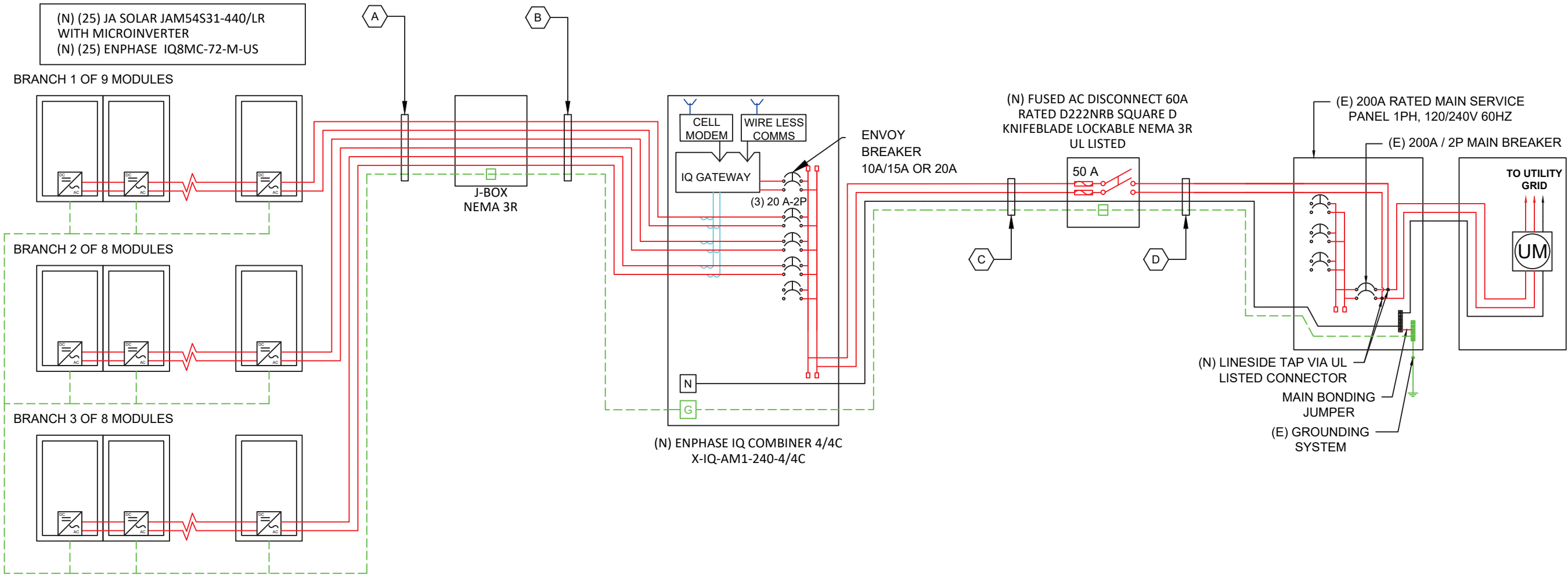
PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
STRUCTURAL	PV-3.0

MODULE SPECIFICATION		INVERTER SPECIFICATION	
JA SOLAR JAM54S31-440/LR		ENPHASE IQ8MC-72-M-US	
IMP	13.81 A	OUTPUT POWER	320 W
VMP	31.86 V	NOMINAL VOLTAGE	240 V
VOC	38.45 V	MAX OUTPUT CURRENT	1.33 A
ISC	14.58 A	MAX INPUT POWER	460 W
PMAX	440 W		

NOTES:

- CONDUIT AND CONDUCTORS SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
- ALL CONDUCTORS NOT UNDER ARRAY ARE TO BE IN CONDUIT MINIMUM 7/8" ABOVE ROOF WITH PROPER JUNCTION BOX AT EACH END PER 690.31A.



TAG	WIRE QTY.	WIRE SIZE(AWG)	DESCRIPTION	CONDUIT SIZE & TYPE
A	2	12	ENPHASE Q CABLE	N/A FREE AIR
	1	6	BARE COPPER- (GROUND)	
B	6	10	THWN-2 COPPER- (L1,L2)	3/4" EMT
	1	10	THWN-2 COPPER- (GROUND)	
C	3	8	THWN COPPER- (L1,L2,N)	3/4" EMT
	1	8	THWN COPPER- (GROUND)	
D	3	6	THWN COPPER- (L1,L2,N)	3/4" EMT
	1	8	THWN COPPER- (GROUND)	

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UTILITY	DUKE ENERGY

PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE IQ8MC-72-M-US

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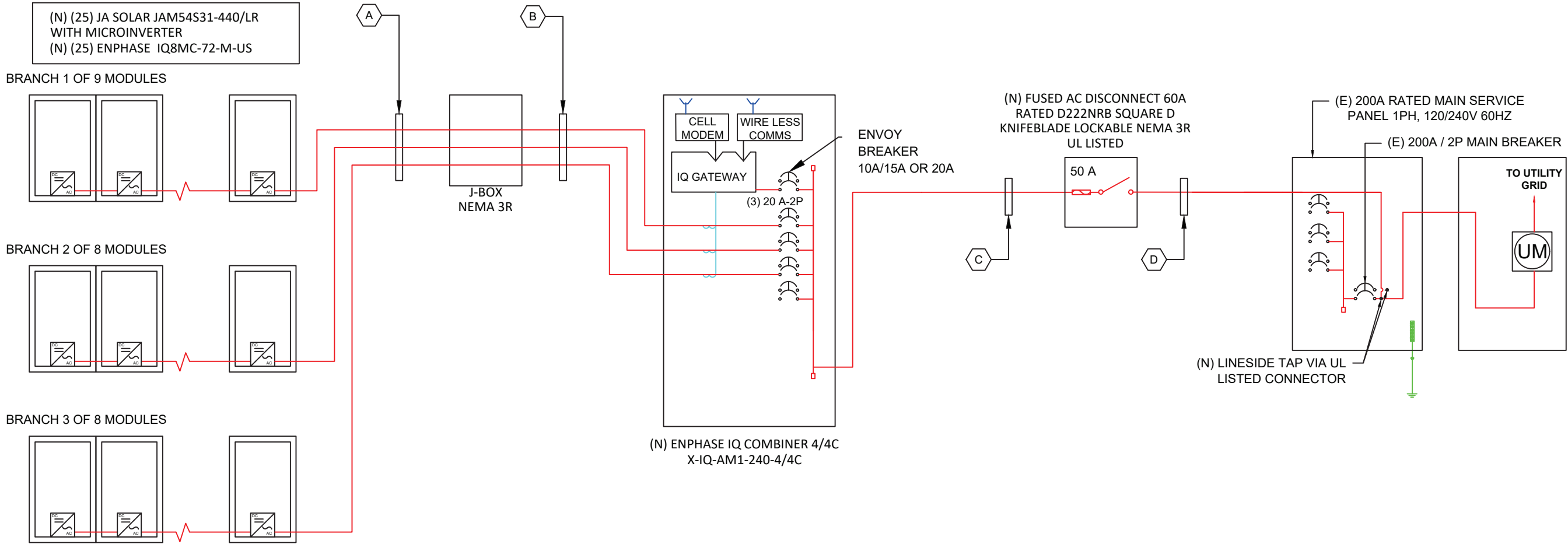
PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
ELECTRICAL 3LD	PV-4.0

MODULE SPECIFICATION		INVERTER SPECIFICATION	
JA SOLAR JAM54S31-440/LR		ENPHASE IQ8MC-72-M-US	
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VMP	31.86 V	NOMINAL VOLTAGE	240 V
VOC	38.45 V	MAX OUTPUT CURRENT	1.33 A
ISC	14.58 A	MAX INPUT POWER	460 W
PMAX	440 W		

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TAG	WIRE QTY.	WIRE SIZE(AWG)	DESCRIPTION	CONDUIT SIZE & TYPE
A	2	12	ENPHASE Q CABLE	N/A FREE AIR
	1	6	BARE COPPER- (GROUND)	
B	6	10	THWN-2 COPPER- (L1,L2,N)	3/4" EMT
	1	10	THWN-2 COPPER- (GROUND)	
C	3	8	THWN COPPER- (L1,L2,N)	3/4" EMT
	1	8	THWN COPPER- (GROUND)	
D	3	6	THWN COPPER- (L1,L2,N)	3/4" EMT
	1	8	THWN COPPER- (GROUND)	

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AC SIZE: 8 kW
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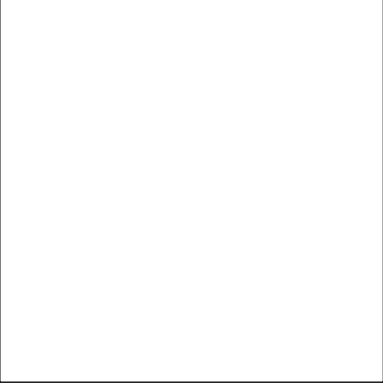
PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
ELECTRICAL SLD	PV-4.1

NO. OF CURRENT CARRYING CONDUCTORS		PERCENT OF VALUES		BACKFEED FUSE SIZING							
				MAX. CONTINUOUS OUTPUT 1.33A @ 240V							
				33.25	X	1.25	=	41.56AMPS	50A FUSES - OK		
4-6		0.80									
7-9		0.70									
10-20		0.50									
WIRE CALCULATION											
TAG	WIRE QTY.	WIRE SIZE(AWG)	DESCRIPTION	CONDUIT SIZE & TYPE	WIRE AMPACITY	WIRE TEMP. RATING (°C)	STARTING CURRENT (A)	TEMP. CORRECTION FACTOR	ADJUSTMENT FACTOR	ADJUSTED CONDUCTOR AMPACITY	MAX CURRENT (A)
A	2	12	ENPHASE Q CABLE	N/A FREE AIR	30	90°	11.97	0.96	1	28.80	14.96
	1	6	BARE COPPER- (GROUND)								
B	6	10	THWN-2 COPPER- (L1,L2)	3/4" EMT	40	90°	11.97	0.96	0.8	30.72	14.96
	1	10	THWN-2 COPPER- (GROUND)								
C	3	8	THWN COPPER- (L1,L2,N)	3/4" EMT	50	75°	33.25	0.94	1	47.00	41.56
	1	8	THWN COPPER- (GROUND)								
D	3	6	THWN COPPER- (L1,L2,N)	3/4" EMT	65	75°	33.25	0.94	1	61.10	41.56
	1	8	THWN COPPER- (GROUND)								

ELECTRICAL NOTES:

1. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER SECTION 310.10(D).
2. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER SECTION 310.10(C).
3. ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERTIGHT AND APPROVED FOR USE IN WET LOCATIONS. (SECTION 314.15A).
4. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
5. CONDUCTORS ARE SIZED PER SECTION TABLE 310.15(B)(16).
6. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH SECTION 110.26.
7. ALL CONDUCTORS NOT UNDER ARRAY ARE TO BE IN CONDUIT MINIMUM 7/8" ABOVE FROM ROOF SURFACE.
8. BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.



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EMPWR
SOLAR

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CHARLESTON, SC 29464
PHONE: 854-999-4837
EMAIL : info@empwrsolar.com

CUSTOMER INFO	
NAME	PETER BRAZLE
ADDRESS	152 NORTHWOOD DR, FUQUAY-VARINA, NC 27526
COORDINATES	35.458417, -78.812806
APN NO.	652517840
AHJ	HARNETT COUNTY
UTILITY	DUKE ENERGY

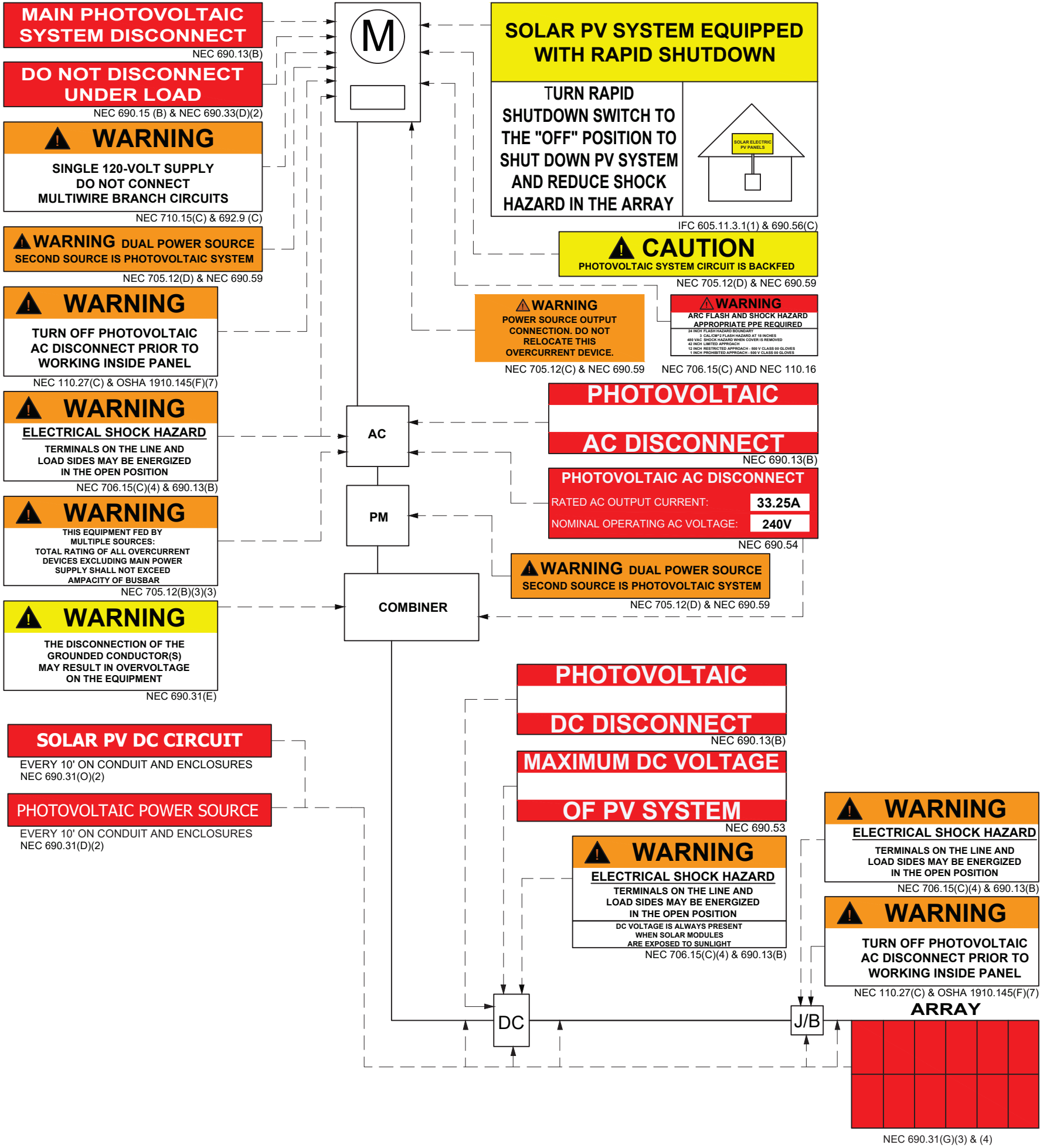
PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54531-440/LR
MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

REV.	DESCRIPTION	DATE
0	INITIAL DESIGN	9/17/2025
A	UPDATED DESIGN	9/18/2025
B		

PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
ELECTRICAL CALCS	PV-4.2



- NOTES:**
- NEC ARTICLES 690 AND 705 AND NEC SECTION R324 MARKINGS SHOWN HEREON.
 - ALL MARKING SHALL CONSIST OF THE FOLLOWING:
 - UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
 - RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
 - AERIAL FONT.
 - ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
 - SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

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PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
SIGNAGE	PV-5.0

MATERIAL LIST

ELECTRICAL EQUIPMENT

QTY.	PART TYPE	PART NUMBER	DESCRIPTION
25	MODULE	JAM54S31-440/LR	JA SOLAR JAM54S31-440/LR
2	JUNCTION BOX	480-276	600VDC NEMA 3R UL LISTED JUNCTION BOX
25	MICROINVERTER	IQ8MC-72-M-US	ENPHASE IQ8MC-72-M-US
1	AC DISCONNECT	DU222RB	60A RATED 240VAC NEMA 3R UL LISTED
1	COMBINER	X-IQ-AM1-240-4/4C	ENPHASE IQ COMBINER 4/4C
2	TAP CONNECTOR	IPC TAP	IPC INSULATION PIERCING CONNECTORS

BREAKER/FUSES

QTY	PART TYPE	PART NUMBER	DESCRIPTION
1	FUSES	50A FUSES	GENERAL 50A FUSES
3	COMBINER BREAKER	20A 2-POLE BREAKER(S)	GENERAL 20A 2-POLE BREAKER(S)

RACKING

QTY	PART TYPE	PART NUMBER	DESCRIPTION
23	RAIL	IRIDG XR-100-168M-US	DOMESTIC XR100 RAIL 168" - MILL
10	SPLICE	IRIDG XR100-BOSS-01-M1-US	DOMESTIC XR100 SPLC BAR BONDED
28	CLAMP	IRIDG UFO-CL-01-B1	UFO CLAMP BLK BULK (200) (NON DOMESTIC)
44	MOUNT	IRIDG QM-HUG-01-M1	DSC - HALO ULTRA GRIP MILL (20) (NON DOMESTIC)
11	SCREW	IRIDG HW-RD1430-01-M1	HUG DECK SCREWS (NON DOMESTIC)
90	LUG	IRIDG XR-LUG-03-A1	GROUNDING LUG (NON DOMESTIC)
11	TBOLT	IRIDG BHW-MI-01-A1	MICRO/OPT MNT BULK (NON DOMESTIC)

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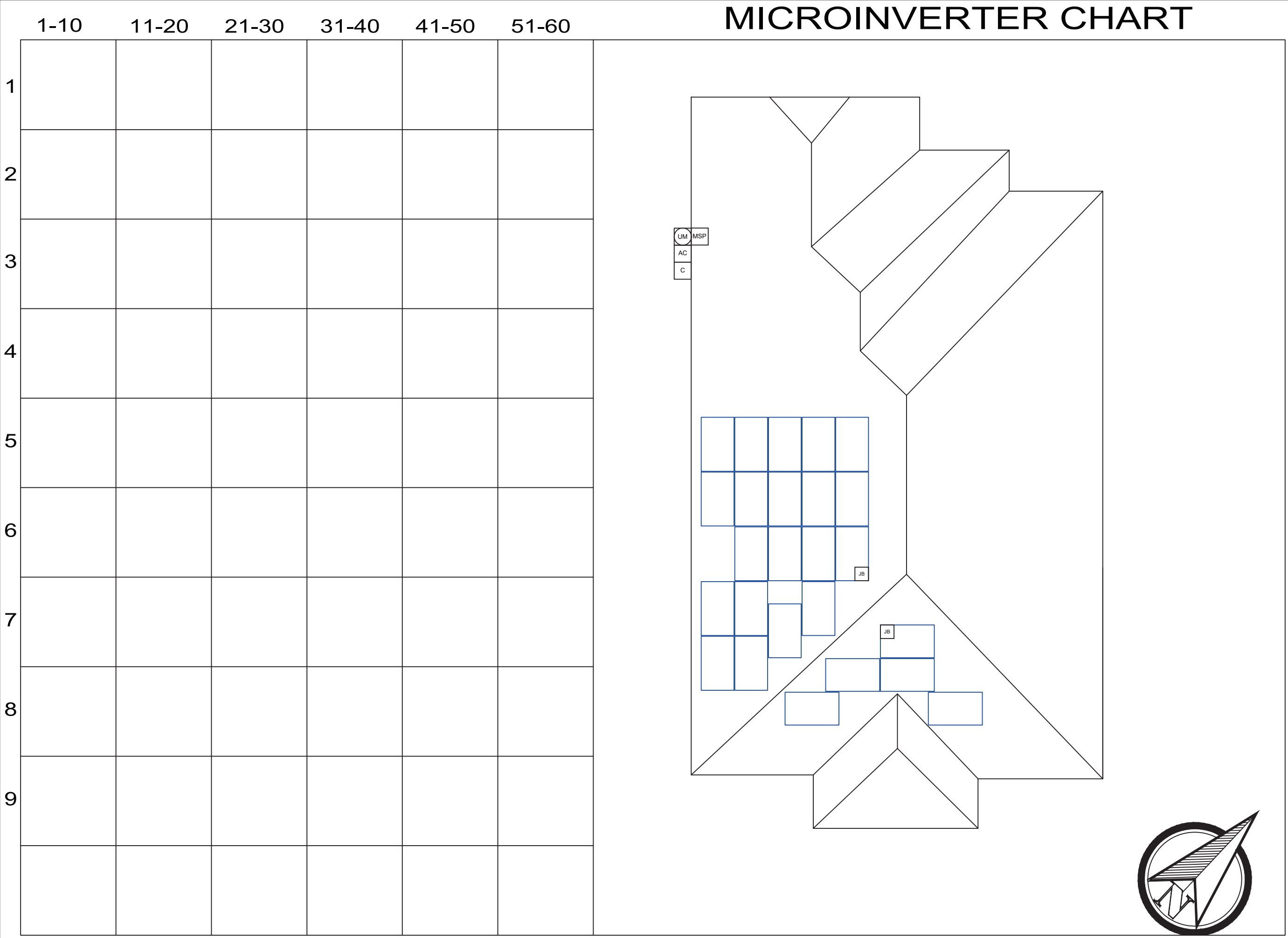
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AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE IQ8MC-72-M-US

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PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
BOM	PV-6.0



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PV SUMMARY

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AC SIZE: 8 kW
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MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

REV.	DESCRIPTION	DATE
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PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
MICROINVERTER CHART	PV-7.0

Harvest the Sunshine

440W

JAM54S31 LR

Black Module

p-type Monofacial Modules

Premium Cells

P-

Percium+

11BB

MBB Half-Cell Technology

24%

Up To

Cell Conversion Efficiency

Premium Modules

W

Higher output power

\$

Lower LCOE

Less shading and lower resistive loss

Better mechanical loading tolerance

100%

98%

97.5%

94.8%

83.1%

— New linear power warranty

— Standard Module Linear Performance Warranty

1

5

10

15

20

25

+1.7%

0.55% Annual Degradation Over 25 years

12

12-year product warranty

25

25-year linear power output warranty

Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing

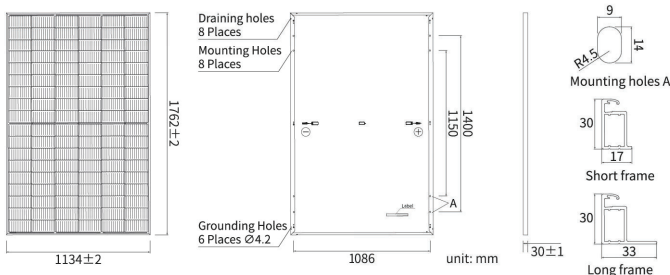


JA SOLAR



JAM54S31 LR

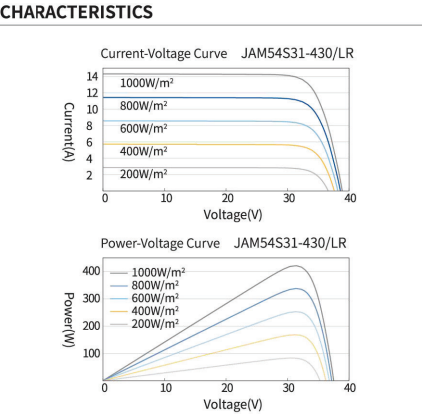
p-type Monofacial Modules



MECHANICAL PARAMETERS	
Cell	Mono
Weight	20kg
Dimensions	1762±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm²(IEC), 12 AWG(UL)
No. of cells	108(6×18)
Junction Box	IP68, 3diodes
Connector	QC4.10-351/ MC4-EVO2A
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-) Landscape: 1200mm(+)/1200mm(-)
Front Glass	2.8mm
Packaging Configuration	36pcs/Pallet, 936pcs/40ft Container
Remark: customized frame color and cable length available upon request	

ELECTRICAL PARAMETERS AT STC							
TYPE	JAM54S31 415/LR	JAM54S31 420/LR	JAM54S31 425/LR	JAM54S31 430/LR	JAM54S31 435/LR	JAM54S31 440/LR	
Rated Maximum Power(Pmax) [W]	415	420	425	430	435	440	
Open Circuit Voltage (Voc) [V]	37.55	37.73	37.91	38.09	38.27	38.45	
Maximum Power Voltage(Vmp) [V]	30.92	31.11	31.30	31.49	31.68	31.86	
Short Circuit Current(Isc) [A]	14.17	14.25	14.33	14.42	14.50	14.58	
Maximum Power Current(Imp) [A]	13.42	13.50	13.58	13.65	13.73	13.81	
Module Efficiency [%]	20.8	21.0	21.3	21.5	21.8	22.0	
Power Tolerance	0~+3%						
Temperature Coefficient of Isc(α_{Isc})	+0.045%/°C						
Temperature Coefficient of Voc (β_{Voc})	-0.275%/°C						
Temperature Coefficient of Pmax(γ_{Pmp})	-0.350%/°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.							

ELECTRICAL PARAMETERS AT NOCT		JAM54S31 415/LR	JAM54S31 420/LR	JAM54S31 425/LR	JAM54S31 430/LR	JAM54S31 435/LR	JAM54S31 440/LR
TYPE							
Rated Max Power(Pmax) [W]		314	318	322	326	329	333
Open Circuit Voltage(Voc) [V]		35.53	35.70	35.87	36.04	36.21	36.38
Max Power Voltage(Vmp) [V]		29.26	29.44	29.62	29.80	29.98	30.15
Short Circuit Current(Isc) [A]		11.33	11.40	11.47	11.53	11.60	11.67
Max Power Current(Imp) [A]		10.74	10.80	10.86	10.92	10.99	11.05
NOCT		Irradiance 800W/m², ambient temperature 20°C, wind speed 1m/s, AM1.5G					



OPERATING CONDITIONS	
Maximum System Voltage	1000V/1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	25A
Maximum Static Load, Front	5400Pa(112 lb/ft²)
Maximum Static Load, Back	2400Pa(50 lb/ft²)
NOCT	45±2°C
Safety Class	Class II
Fire Performance	UL Type 1/Class C

JA SOLAR

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Specifications subject to technical changes and tests.
JA Solar reserves the right of final interpretation.
Version No. : Global-EN-20240716A

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UTILITY	DUKE ENERGY

PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE IQ8MC-72-M-US

REV.	DESCRIPTION	DATE
0	INITIAL DESIGN	9/17/2025
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PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
MODULE SPEC	PV-8.0



DATA SHEET



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.

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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

- Produces 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, etc.) in the same system.
- IQ Gateway is required to change the default grid profile at the time of installation to meet the local Authority Having Jurisdiction (AHJ) requirements.

IQ8MC-MC4-DSH-00049-3.0-EN-US-2023-10-18

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/nstallers/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 _{rms}		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				
Certifications	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 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.

IQ8MC-MC4-DSH-00049-3.0-EN-US-2023-10-18

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SHEET NAME	SHEET #
MICROINVERTER SPEC	PV-8.1

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C



To learn more about Enphase offerings, visit enphase.com



The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

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SHEET NAME	SHEET #
COMBINER SPEC	PV-8.2



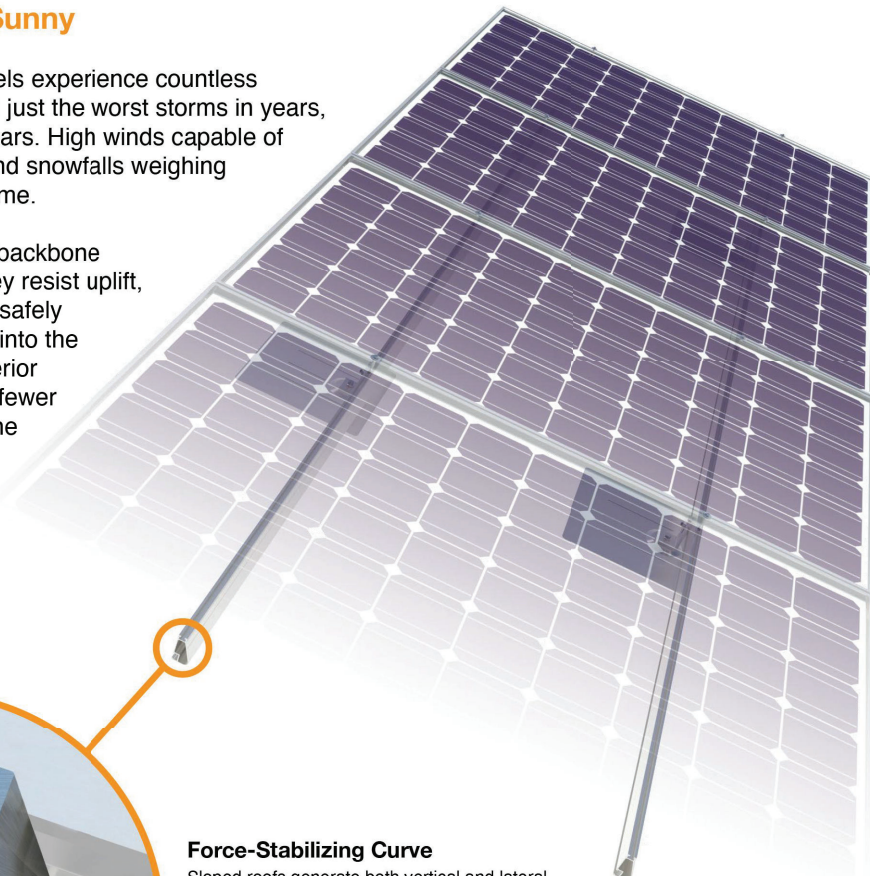
Tech Brief

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



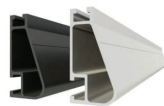
XR Rails® are compatible with FlashFoot® and other pitched roof attachments.



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 a residential and commercial 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.

Tech Brief

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CURRENT RENEWABLES ENGINEERING INC.
1760 CHICAGO AVE SUITE J-13, RIVERSIDE CA 92507
PHONE: (951)-405-1733, WWW.CRENG.CO

CONTRACTOR INFO



EMPWR SOLAR

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

CUSTOMER INFO

NAME	PETER BRAZLE
ADDRESS	152 NORTHWOOD DR, FUQUAY-VARINA, NC 27526
COORDINATES	35.458417, -78.812806
APN NO.	652517840
AHJ	HARNETT COUNTY
UTILITY	DUKE ENERGY

PV SUMMARY

DC SIZE: 11 kW
AC SIZE: 8 kW
MODULES : (25) JA SOLAR JAM54S31-440/LR
MICROINVERTER : (25) ENPHASE
IQ8MC-72-M-US

REV.	DESCRIPTION	DATE
0	INITIAL DESIGN	9/17/2025
A	UPDATED DESIGN	9/18/2025
B		

PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
RAIL SPEC	PV-8.3



The Respect Your Roof Deserves

When integrating with a home, solar attachments must be dependable for the lifetime of the rooftop. Due to recent innovations, many asphalt shingles have bonded courses. A mount that protects without the need to pry shingles can really speed things up.

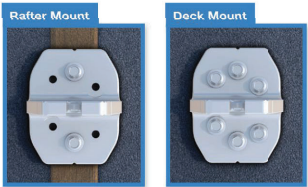
Halo UltraGrip®(HUG®) is here to respect the roof. Its Halo is a cast-aluminum barrier that encases the UltraGrip, our industrial-grade, foam-and-mastic seal. This allows HUG to accelerate the installation process and provide the utmost in waterproofing protection. Give your roof a HUG.®



UltraGrip® Seal Technology
HUG UltraGrip utilizes a state-of-the-art seal design that uses a unique, foam-and-mastic combination. The foam-backed adhesive provides an entirely new flashing system that conforms and adheres to every nook and cranny of composition shingles, filling gaps and shingle step-downs (up to 1/8" in height).

Multi-Tiered Waterproofing
HUG® utilizes a multi-tiered stack of components to provide revolutionary waterproofing protection. The Halo cast-aluminum, raised-perimeter foundation surrounds the UltraGrip base—a foam-backed mastic seal combination that prevents water intrusion by adhering and sealing with the shingle surface.

Halo UltraGrip™ is part of the QuickMount® product line.



Rafter & Deck Mounting Options
Mount HUG® to the roof rafters, the roof deck, or both with our custom-engineered RD (rafter-or-deck) Structural Screw. The RD Structural Screw anchors HUG to the roof with an EPDM sealing washer, completing the stack of waterproofing barriers. See backside for more installation information.

ETL Intertek
Triple Rated & Certified to Respect the Roof™
UL 2703, 441 (27)
TAS 100(A)-95

Tech Brief



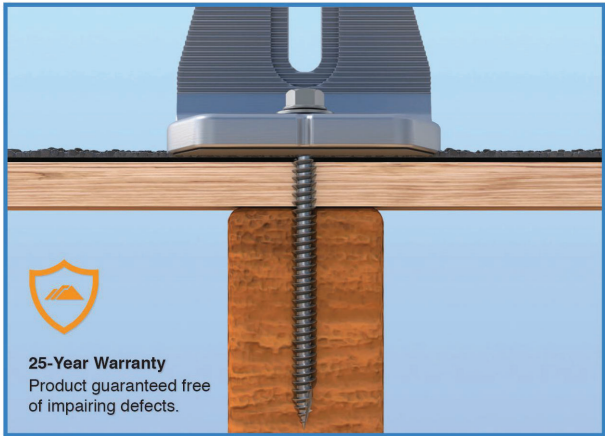
Adaptive, Rafter-Friendly Installation

Hit the rafter? Good to go!
When you find a rafter, you can move on. Only 2 RD Structural Screws are needed.

Miss the rafter? Try it again.
Place another screw to the left or right. If rafter is found, install 3rd and final screw.

Still no luck? Install the rest.
If more than 3 screws miss the rafter, secure six screws to deck mount it.

Trusted Strength & Less Hassle



Structural capacities of HUG® were reviewed in many load directions, with racking rail running cross-slope or up-slope in relation to roof pitch.

For further details, see the HUG certification letters for attaching to rafters and decking.

IronRidge designed the HUG, in combination with the RD Structural Screw to streamline installs, which means the following:

- No prying shingles
- No roof nail interference
- No pilot holes necessary
- No sealant (in most cases)
- No butyl shims needed

Attachment Loading

The rafter-mounted HUG has been tested and rated to support 1004 (lbs) of uplift and 368 (lbs) of lateral load.

Structural Design

Parts are designed and certified for compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

HUG passed both the UL 441 Section 27 “Rain Test” and TAS 100(A)-95 “Wind Driven Rain Test” by Intertek.

UL 2703 System

Systems conform to UL 2703 mechanical and bonding requirements. See Flush Mount Manual for more info.

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REV.	DESCRIPTION	DATE
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A	UPDATED DESIGN	9/18/2025
B		

PROJECT ID	NA
DRAWN BY	E.R
SHEET SIZE	ANSI B 11" X 17"

SHEET NAME	SHEET #
ATTACHMENT SPEC	PV-8.4