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November 2, 2022

Scott  
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LGCY Solar  
 3333 Digital Drive #600  
 Lehi, UT 84043

Re: Engineering Services  
 Raynor Residence  
 107 Paul Clayton Circle COATS, NC  
 8.360 kW System

To Whom it May Concern,

Pursuant to your request, we have reviewed the following information regarding ground mount solar panel installation at the above referenced location:

1. Product documentation prepared by IronRidge Corp detailing the IronRidge ground mount system being utilized for the proposed ground mount system.
2. Design drawings of the proposed system including a site plan, and details for the solar panels. This information was prepared by Legacy Solar and will be utilized for approval and construction of the proposed system.

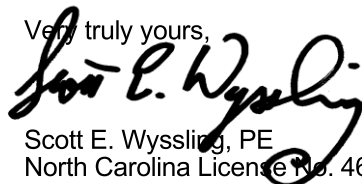
Based on our review of the Photovoltaic Array installed at 4 modules high and 5 modules wide. The PV array shall have a pier spacing of 9' max North/South and 6' East/West. Based on a wind speed of 110 mph, Exposure C and a ground snow load of 20 PSF, it was determined that the minimum required footing depth is 4' below grade with a 16" diameter pier footing with 2" Dia schedule 40 post. The footing size based upon the worst case loading due to horizontal and vertical wind loading.

Based on the above evaluation, it is the opinion of this office that with appropriate construction the footing and post assembly will adequately support the proposed solar array. This evaluation is in conformance with the 2018 IBC, current industry and standards, and based on information supplied to us at the time of this report.

This certification is specific to the footing design for the solar system and does not include the racking system. Racking system and components designed and specified by the manufacturer (IronRidge).

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,

  
 Scott E. Wyssling, PE  
 North Carolina License No. 46546



Wyssling Consulting, PLLC  
 76 N Meadowbrook Drive Alpine UT 84004  
 North Carolina COA # P-2308

11/2/2022

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**SCOPE OF WORK:**

TO INSTALL A GROUND MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 107 PAUL CLAYTON CIR COATS, NC 27521. THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT. THE PV SYSTEM DOES NOT INCLUDE STORAGE BATTERIES

**EQUIPMENT SUMMARY**

- 19 APTOS SOLAR DWA-120-MF10-440 MODULES
- 19 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

**GENERAL NOTES:**

- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
- ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT SITE.
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAINS ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
- DAMAGE CAUSED TO THE EXISTING STRUCTURE, PIPES, DUCTS, WINDOWS, WALL, FLOORS, ETC. SHALL BE REPAIRED TO THE ORIGINAL CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
- NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL OF THE ARCHITECT.
- CONTRACTOR SHALL OBTAIN BUILDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE NC BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING.
- THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- ALL EXPOSED PLUMBING, HVAC, ELECTRICAL DUCTWORK, PIPING AND CONDUITS ARE TO BE PAINTED BY GENERAL CONTRACTOR.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIFY UPON COMPLETION OF WORK.

**ELECTRICAL NOTES:**

- THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PEOPLE. A QUALIFIED PERSON IS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECEIVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (NEC 690.4(E) AND 705.6)
- LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION. FOR A LINE SIDE TAP CONNECTION, UTILITY NEEDS TO BE NOTIFIED WELL IN ADVANCE TO COORDINATE BUILDING ELECTRICAL SHUT OFF.
- NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. SUBCONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
- ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
- ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERTIGHT AND APPROVED FOR USE IN WET LOCATIONS. (NEC 314.15A).
- WIRING METHODS FOR PV SYSTEM CONDUCTORS AREN'T PERMITTED WITHIN 10 IN. OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE THAT'S COVERED BY PV MODULES AND ASSOCIATED EQUIPMENT WIRING
- BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
- ALL CONDUCTORS AND WIRE TIES EXPOSED TO SUNLIGHT ARE LISTED AS UV RESISTANT.
- CONTRACTOR SHALL FOLLOW ALL ELECTRICAL EQUIPMENT LABELING REQUIREMENTS IN NEC 690 AND IFC 2018
- MEASURE THE LINE-TO-LINE AND LINE-TO-NEUTRAL VOLTAGE OF ALL SERVICE ENTRANCE CONDUCTORS PRIOR TO INSTALLING ANY SOLAR EQUIPMENT. THE VOLTAGES FOR THE 240VAC RATED.

**GOVERNING CODES**

- 2017 NATIONAL ELECTRICAL CODE
- 2018 INTERNATIONAL FIRE CODE
- 2018 INTERNATIONAL BUILDING CODE
- 2018 INTERNATIONAL RESIDENTIAL CODE
- 2018 NORTH CAROLINA STATE BUILDING CODE

AUTHORITY HAVING JURISDICTION (AHJ): HARNETT COUNTY

**WIRING AND CONDUIT NOTES:**

- ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG \*USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8 (A)(1) & (B)(1)]; [NEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS
- ALL PV/DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(C)] BLACK ONLY
- EXPOSED ROOF PV/DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER NEC 2008 OR 1000V PER NEC 2011
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2% FOR DC CIRCUITS AND 1% FOR AC CIRCUITS
- AC CONDUCTORS -4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

**Scott Wyssling, PE**

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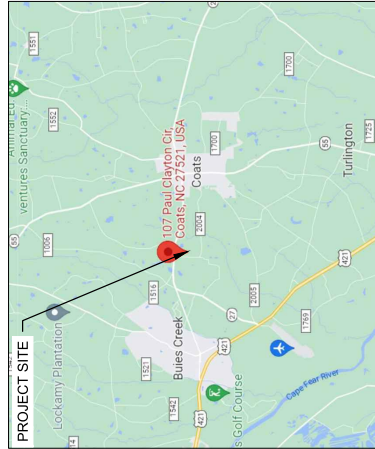


SYSTEM RATING	
8.36 KWDC	
5.51 KWAC	

SHEET INDEX	
PV-0	COVER PAGE
PV-1	SITE PLAN
PV-2	ROOF-PLAN & MODULES
PV-3	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM & CALCS.
PV-4A	ELECTRICAL PHOTOS
PV-4B	SPECIFICATIONS & CALCULATION
PV-5	LABELS
PV-5A	JOB HAZARD ANALYSIS
PV-6+	EQUIPMENT SPECIFICATIONS



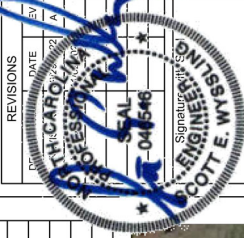
1 HOUSE PHOTO  
SCALE: NTS



2 VICINITY MAP  
SCALE: NTS

**LGCCY POWER**  
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ELECTRICAL LIC. U.21468



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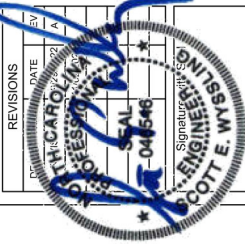
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 COATS, NC 27521  
 PH NO. (919) 625-7661

EMAIL ID: mraynor@hammettk12.nc.us

DATE: 11/02/2022
SHEET NAME
<b>COVER PAGE</b>
SHEET SIZE
<b>ANSI B</b> 11" X 17"
SHEET NUMBER
<b>PV-0</b>

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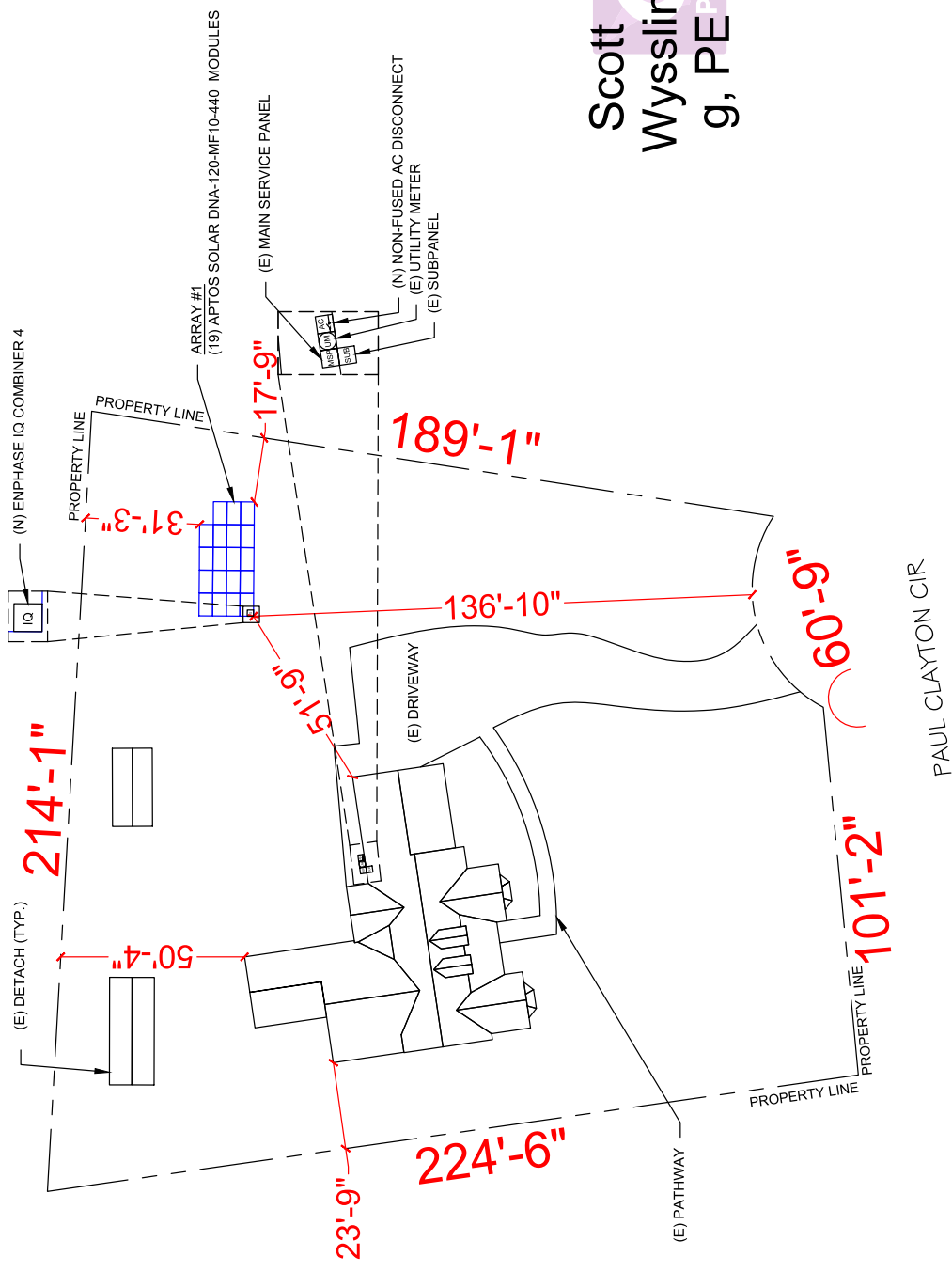
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 EMAIL ID: rraynor@harnett.k12.nc.us

DATE: 11/02/2022
SHEET NAME
<b>SITE PLAN</b>
SHEET SIZE
ANSI B 11" X 17"
SHEET NUMBER
<b>PV-1</b>

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1 | PLOT PLAN WITH ROOF PLAN  
 PV-1  
 SCALE: 1/32" = 1'-0"









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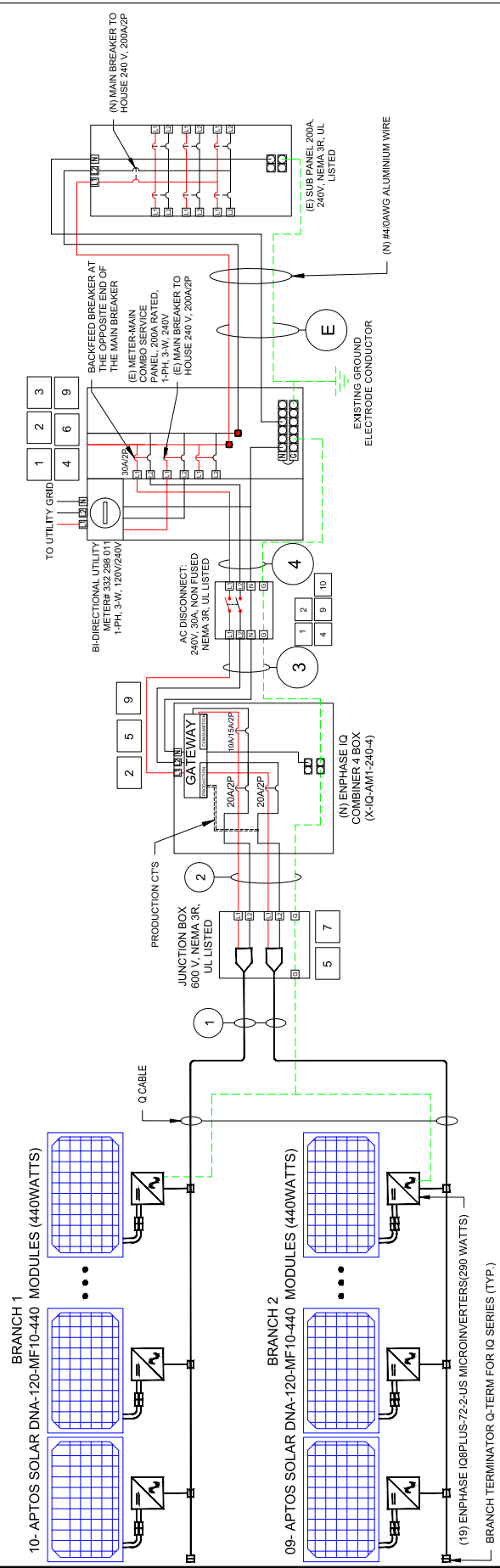
DATE: 11/02/2022  
 SHEET NAME  
**ELECTRICAL LINE & CALCS.**

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

**PV-4**

ID	TYPICAL	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	CONDUCTOR	CONDUIT	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CONDUIT	CONDUIT FILL PERCENT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	LENGTH	VOLTAGE DROP
1	2	BRANCH	JUNCTION BOX	12 AWG Q CABLE	-	1	2	N/A	N/A	6 AWG COPPER	0.71 (95°C)	N/A	12.1A	15.1A	N/A	75°C	55FT	0.46%	
2	1	JUNCTION BOX	IQ COMBINER BOX	10 AWG THWN-2 COPPER	MIN 0.75" Dia EMT	2	4	19.09%	20A	10 AWG THWN-2 COPPER	0.96 (34°C)	0.8	12.1A	15.1A	40A	75°C	5FT	0.07%	
3	1	IQ COMBINER BOX	NON-FUSED AC DISCONNECT	6 AWG THWN-2 COPPER	MIN 0.75" Dia PVC	1	3	36.77%	N/A	10 AWG THWN-2 COPPER	0.96 (34°C)	1	23.0A	28.7A	75A	75°C	85FT	0.80%	
4	1	NON-FUSED AC DISCONNECT	MSP	6 AWG THWN-2 COPPER	MIN 0.75" Dia EMT	1	3	36.77%	30A	10 AWG THWN-2 COPPER	0.96 (34°C)	1	23.0A	28.7A	75A	75°C	5FT	0.05%	

NOTE:- WIRE BETWEEN JB WILL FLOW INSIDE THE ATTIC



**INTERCONNECTION**  
 120% RULE - NEC 705.12(B)(2)(3)(d)  
 UTILITY FEED + SOLAR BACKFEED  
 200 A + 30A = 230A  
 BUS RATING x 120%  
 200 A x 120% = 240A

**SERVICE INFO**  
 UTILITY PROVIDER: DUKE ENERGY PROGRESS  
 MAIN SERVICE VOLTAGE: 240V  
 MAIN CIRCUIT BREAKER RATING: 200A  
 MAIN SERVICE PANEL: 200A  
 MAIN SERVICE LOCATION: NORTH  
 SERVICE FEED SOURCE: UNDERGROUND

**1 ELECTRICAL LINE DIAGRAM**  
 SCALE: NTS  
 PV-4

**LGCY POWER**  
 LGCY POWER  
 3333 DIGITAL DR#600, LEHI,  
 UT 84043, UNITED STATES  
 PHONE: 855-353-4899

*Ricky Raynor Jr.*  
 ELECTRICAL LIC. U.21498

REVISIONS		
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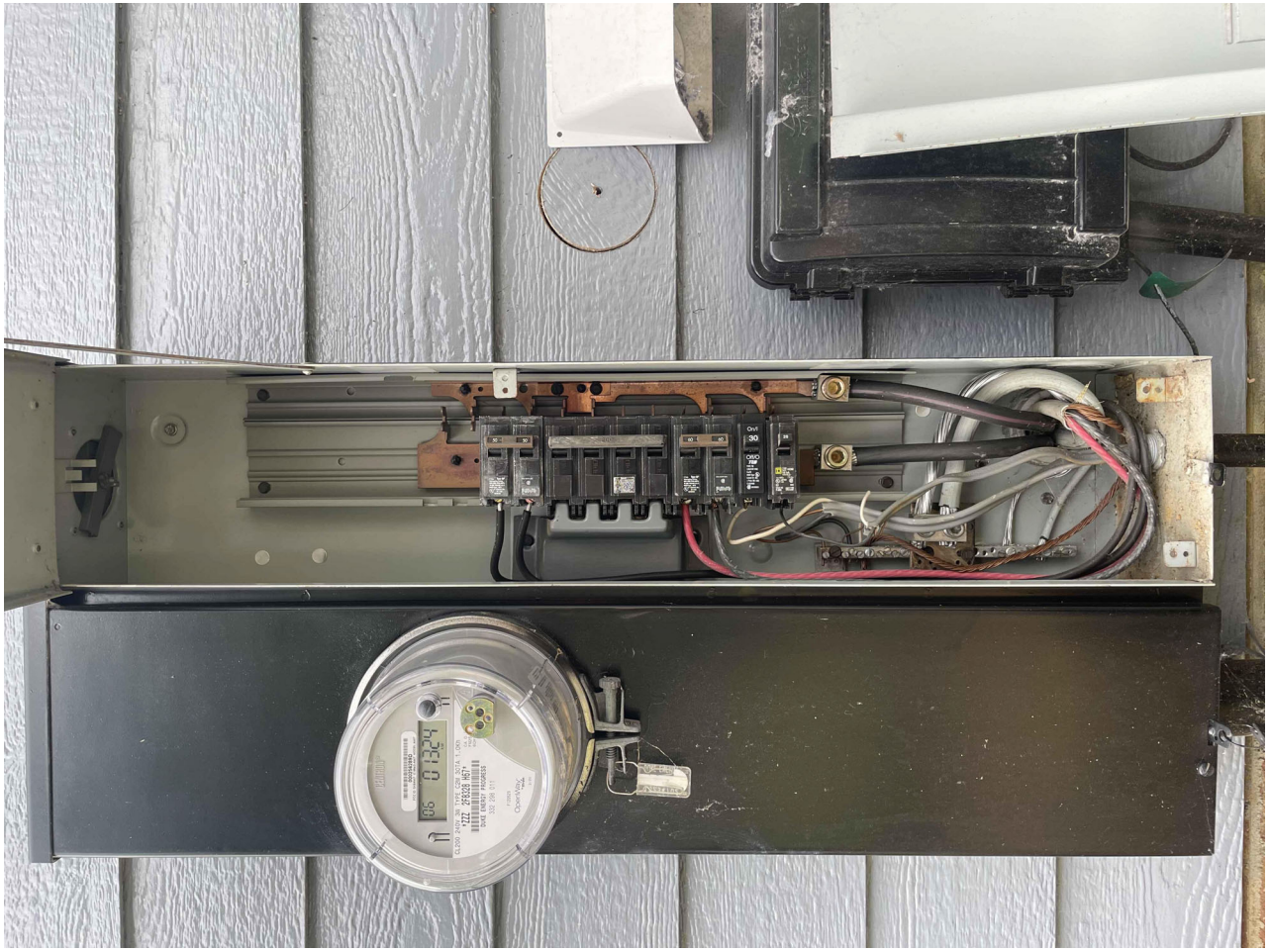
PROJECT NAME & ADDRESS  
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 PH NO. (919) 625-7661  
 EMAIL ID: rraynor@harnett.k12.nc.us**

DATE: 11/02/2022

SHEET NAME  
**ELECTRICAL  
 PHOTOS**

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

SHEET NUMBER  
**PV-4A**



SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	APTOS SOLAR DNA-120-MIF10-440
VMP	33.82 V
IMP	13.01 A
VOC	40.8V
ISC	13.61A
TEMP. COEFF. VOC	-0.31%/°K
MODULE DIMENSION	74.92" (L) x 44.65" (W)
MODULE PTC RATING	406 W
PANEL WATTAGE	440W

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8PLUS-72-2-US
MAX DC SHORT CIRCUIT CURRENT	15 A
CONTINUOUS OUTPUT CURRENT	1.21A (240V)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-12°C
AMBIENT TEMP (HIGH TEMP 2%)	34°C
CONDUIT HEIGHT	7/8"
ROOF TOP TEMP	90°C
CONDUCTOR TEMPERATURE RATE	56°C
MODULE TEMPERATURE COEFFICIENT OF VOC	-0.29%/°K

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN LEMT
0.80	4-6
0.70	7-9
0.50	10-20

### **Voltage rise in Q Cable from the Microinverters to the Junction Box**

For branch circuit #1 of 10 IQ 8+Micros, the voltage rise on the 240 VAC Q Cable is 0.46%  
 For branch circuit #2 of 09 IQ 8+Micros, the voltage rise on the 240 VAC Q Cable is 0.38%

### **Voltage rise from the Junction Box to the IQ Combiner box**

$VRise = (\text{amps/inverter} \times \text{number of inverters}) \times (\text{resistance in } \Omega/\text{ft}) \times (2\text{-way wire length in ft.})$   
 $= (1.21 \text{ amp} \times 10) \times (0.00129 \Omega/\text{ft}) \times (5 \text{ ft} \times 2)$   
 $= 12.1 \text{ amps} \times 0.00129 \Omega/\text{ft} \times 10 \text{ ft}$   
 $= 0.16 \text{ volts}$

$\%VRise = 0.16 \text{ volts} \div 240 \text{ volts} = 0.07\%$

The voltage rise from the Junction Box to the IQ Combiner Box is 0.07%

### **Voltage rise from the IQ Combiner box to AC Disconnect**

$VRise = (\text{amps/inverter} \times \text{number of inverters}) \times (\text{resistance in } \Omega/\text{ft.}) \times (2\text{-way wire length in ft.})$   
 $= (1.21 \text{ amp} \times 19) \times (0.000491 \Omega/\text{ft}) \times (85 \text{ ft.} \times 2)$   
 $= 23.0 \text{ amps} \times 0.000491 \Omega/\text{ft} \times 170 \text{ ft.}$   
 $= 1.91 \text{ volts}$

$\%VRise = 1.91 \text{ volts} \div 240 \text{ volts} = 0.80\%$

The voltage rise from the IQ Combiner Box to the AC Disconnect is 0.80%

### **Voltage rise from the AC Disconnect to the MSP**

$VRise = (\text{amps/inverter} \times \text{number of inverters}) \times (\text{resistance in } \Omega/\text{ft.}) \times (2\text{-way wire length in ft.})$   
 $= (1.21 \text{ amp} \times 19) \times (0.000491 \Omega/\text{ft}) \times (5 \text{ ft.} \times 2)$   
 $= 23.0 \text{ amps} \times 0.000491 \Omega/\text{ft} \times 10 \text{ ft.}$   
 $= 0.11 \text{ volts}$

$\%VRise = 0.11 \text{ volts} \div 240 \text{ volts} = 0.05\%$

The voltage rise from the AC Disconnect to the MSP is 0.05%

### **Total system voltage rise for all three wire sections**

$0.46\% + 0.07\% + 0.80\% + 0.05\% = 1.38\%$

**LGCY POWER**  
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*Colin R. Spawson Jr.*  
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DATE: 11/02/2022

SHEET NAME  
**SPECIFICATION & CALCS.**

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

**PV-4B**



**LOGGY POWER**  
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*Charles R. Swanson Jr.*  
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DATE: 11/02/2022  
 SHEET NAME  
 LABELS  
 SHEET SIZE  
 ANSIB  
 11" X 17"  
 SHEET NUMBER  
 PV-5

**CAUTION**  
 DUAL POWER SOURCE  
 SECOND SOURCE US  
 PHOTOVOLTAIC

LABEL LOCATION:  
 MAIN SERVICE DISCONNECT, AC DISCONNECT/  
 MAIN SERVICE PANEL/ REVENUE METER/ AC  
 COMBINER  
 PER CODE: NEC 705.12(B)(3)

**PHOTOVOLTAIC SYSTEM  
 UTILITY DISCONNECT SWITCH**

LABEL LOCATION:  
 AC DISCONNECT  
 2017 NEC 690.56(C)(3)

9

**CAUTION: SOLAR ELECTRIC  
 SYSTEM CONNECTED**

LABEL LOCATION:  
 POINT OF INTERCONNECTION & INVERTER  
 PER CODE: NEC 690.15 & 690.13(B)

**WARNING - Electric Shock Hazard**  
 No user serviceable parts inside  
 Contact authorized service provider for assistance

LABEL LOCATION:  
 INVERTER & JUNCTION BOXES (ROOF)  
 PER CODE: NEC 690.13 (G)(3) & 690.13 (G)(4)

10

**WARNING: PHOTOVOLTAIC  
 POWER SOURCE**

LABEL LOCATION:  
 CONDUIT  
 PER CODE: 2017 NEC 690.31(G)(3)

6

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**  
 RATED AC OUTPUT CURRENT 23.0 AMPS  
 NOMINAL OPERATING AC VOLTAGE 240 VOLTS

LABEL LOCATION:  
 MAIN SERVICE PANEL/MAIN SERVICE DISCONNECT/AC DISCONNECT  
 PER CODE: NEC 690.13(B)

7

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

LABEL LOCATION:  
 POINT OF INTERCONNECTION, MAIN SERVICE  
 DISCONNECT, AC DISCONNECT, AC COMBINER,  
 INVERTER  
 PER CODE: NEC 690.13(B)

8

**WARNING**  
 INVERTER OUTPUT CONNECTION DO NOT  
 RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
 INVERTER LABEL AT P.O.C. TO SERVICE DISTRIBUTION  
 EQUIPMENT (I.E. MAIN PANEL (AND SUBPANEL IF  
 APPLICABLE))  
 PER CODE: NEC705.12(D)(2)(b)

3

**SOLAR PV SYSTEM EQUIPPED  
 WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN  
 SWITCH TO "OFF" POSITION TO  
 SHUT DOWN PV SYSTEM  
 AND REDUCE  
 SHOCK HAZARD  
 IN THE ARRAY

LABEL LOCATION:  
 MAIN SERVICE DISCONNECT IF MSD IS OUTSIDE  
 PLACE IT THERE / IF MSD IS INSIDE PLACE ON THE  
 AC DISCONNECT  
 PER CODE: NEC 690.56(C)(1)(a)

4

**CAUTION: SOLAR CIRCUIT**

LABEL LOCATION:  
 MARKINGS PLACED ON ALL INTERIOR AND EXTERIOR CONDUIT, RACEWAYS,  
 ENCLOSURES, AND CABLE ASSEMBLIES AT LEAST EVERY 10 FT. AT TURNS AND  
 ABOVE/BELow PENETRATIONS AND ALL COMBINER/JUNCTION BOXES  
 PER CODE: IPC 606.11.1.4

5

**CAUTION**  
 POWER TO THIS BUILDING IS SUPPLIED FROM  
 THE FOLLOWING SOURCES WITH DISCONNECTS  
 LOCATED AS SHOWN

PAUL CLAYTON CIR

ADHESIVE FASTENED SIGNS:  
 • ANSIZ535.4-2011 PRODUCT SAFETY SIGNS AND LABELS, PROVIDES GUIDELINES FOR SUITABLE FONT SIZES, WORDS, COLORS, SYMBOLS, AND LOCATION REQUIREMENTS FOR LABELS. NEC 110.21(B)(1).  
 • THE LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED. NEC 110.21(B)(3).  
 • ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT.



**FIELD DESIGN REQUEST FORM**

**JOB INFORMATION**

JOB NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

**CHANGE REQUEST:**

WHO AUTHORIZED THE CHANGE: \_\_\_\_\_

DESCRIBE THE NEEDED CHANGE & WHY: \_\_\_\_\_

**NEW DESIGN LAYOUT:**

DRAW THE MOUNTING PLANE SHOWING THE NEW MODULE LAYOUT:

INSTALLER NAME (PRINT) \_\_\_\_\_

I UNDERSTAND AND AGREE TO THE CHANGES MADE ABOVE

CUSTOMER NAME \_\_\_\_\_ CUSTOMER SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_



**JOB HAZARD ANALYSIS**

CUSTOMER NAME/JOB ID: \_\_\_\_\_

CUSTOMER ADDRESS: \_\_\_\_\_

INSTALL DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ am/pm

HAZARD CATEGORY	HAZARD TYPE	HAZARD CONTROL MEASURES
LADDER SAFETY	<ul style="list-style-type: none"> <li>LOCATION</li> <li>CONDITION</li> <li>WORKING CLEARANCE</li> </ul>	
FALL PROTECTION	<ul style="list-style-type: none"> <li>WORKING 6' OR HIGHER</li> </ul>	
ELECTRICAL SAFETY	<ul style="list-style-type: none"> <li>ARCH FLASH</li> <li>ELECTRIC</li> <li>SHOCK/ELECTROCUTION</li> </ul>	
WEATHER CONDITIONS	<ul style="list-style-type: none"> <li>HEAT/COLD TEMP</li> <li>RAINY/WINDY</li> </ul>	
PUBLIC SAFETY	<ul style="list-style-type: none"> <li>WORK/OBJECTS OVERHEAD</li> <li>SLIPS/TRIPS/FALLS</li> <li>ACCESS TO LIVE ELECTRICAL</li> </ul>	

NEAREST EMERGENCY FACILITY \_\_\_\_\_

CONTACT IMMEDIATELY IN EMERGENCY (911 AND/OR) \_\_\_\_\_

**GENERAL SITE DESCRIPTION/NOTES**

\_\_\_\_\_

**CREW MEMBERS ON SITE FOR INSTALL**

NAME	SIGNATURE
FMU/LMD-	

ELECTRICAL COMPLETION PHOTOS QR CODE

ROOFTOP INSTALLATION PHOTOS QR CODE

MPU COMPLETION PHOTOS QR CODE

**LGCY POWER**

LGCY POWER  
 3333 DIGITAL DR#600, LEHI,  
 UT 84043, UNITED STATES  
 PHONE: 855-353-4899

*Collette R. Swanson Jr.*  
 ELECTRICAL LIC. U.21498

**REVISIONS**

DESCRIPTION	DATE	REV
REVISION	09/20/2022	A
REVISION	11/02/2022	B

Signature with Seal \_\_\_\_\_

**PROJECT NAME & ADDRESS**

RICKY RAYNOR  
 RESIDENCE  
 107 PAUL CLAYTON CIR  
 COATS, NC 27521  
 PH NO. (919) 625-7661  
 EMAIL ID: mraynor@harnett.k12.nc.us

DATE: 11/02/2022

SHEET NAME  
**JOB HAZARD ANALYSIS**

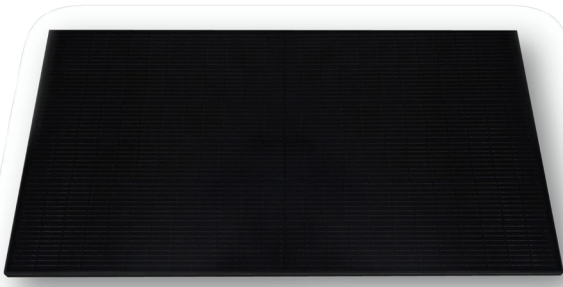
SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-5A**

# DNA™ 120

Solar for Innovators

Residential | Commercial



Features



**Advanced Technology**  
Patented DNA™ technology boosts power performance & module efficiency



**Maximum Panel Density**  
Advanced split cell technology with 9 ultra-thin busbars allows for less resistance and more photon capture



**Durable Design**  
Robust product design is resilient in extreme weather. Up to 5400 Pa snow load and 5400 Pa wind load



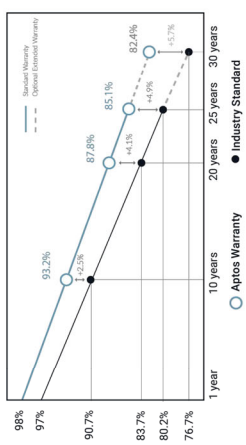
**A Safe Investment**  
Industry leading 30 year warranty

## Designed & Engineered in Silicon Valley

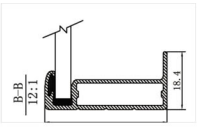
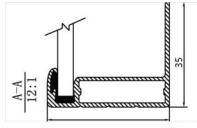
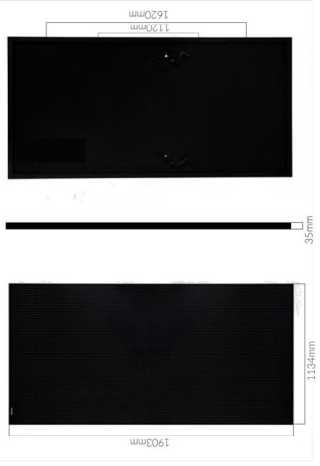
### 440W | 435W | 430W

Our DNA Split Cell Series uses advanced selective emitter PERC technology with thin film layers to improve heat tolerance, increase photon capture, minimize resistive loss, and use 5% more of the available active area for optimal power performance. Our panels exceed IEC standards and come with an industry leading, 30-year warranty.

### Linear Performance Warranty



# DNA™ 120



Electrical Specifications	DNA-120-HP10-440W	DNA-120-HP10-445W	DNA-120-HP10-450W
STC Rated Output $P_{max}$ (W)	440W	445W	450W
Module Efficiency	20.39%	20.62%	20.85%
Open Circuit Voltage $V_{oc}$ (V)	40.80	41.10	41.34
Short Circuit Current $I_{sc}$ (A)	13.61	13.70	13.80
Rated Voltage $V_{max}$ (V)	33.82	34.02	34.16
Rated Voltage $V_{nom}$ (V)	13.01	13.09	13.17

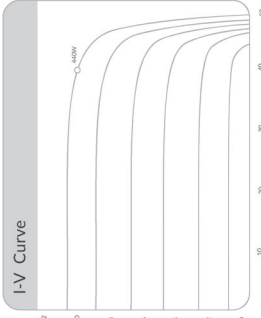
Standard Test Conditions for front face of panel: 1000 W/m<sup>2</sup> Irr. 25°C measurement uncertainty ±5%

Temperature Coefficients	Value
Temperature Coefficients $P_{max}$	-0.35%/°C
Temperature Coefficients $V_{oc}$	+0.06%/°C
Temperature Coefficients $I_{sc}$	-0.31%/°C
Nominal Operating Cell Temperature (NOCT)	45°C

Test Operating Conditions	Value
Maximum Series Fuse	25A
Maximum System Voltage	1500 VDC (UL181E1)
Maximum Load Capacity (Per UL 1703)	5400 PA Snow Load / 5400 PA Wind Load
Fire Performance Class	Class C/Type 1

Packaging Configuration	Value
Number of Modules per Pallet	31
Number of Pallets per 40ft. Container	24
Pallet Dimensions	2030 X 1220 X 1200
Pallet Weight (kg)	76.6
Container Weight (kg)	16,384

Mechanical Properties	Value
Cell Type	Monocrystalline
Glass	3.2mm, tempered, low iron, tempered glass transmission, low iron, tempered glass
Frame	Anodized Aluminum Alloy
Junction Box	IP68
Dimensions	1903 X 1134 X 35 mm
Output Cable	4mm <sup>2</sup> (EU)2AWG-39-37m (1200mm)
Weight	52.9lbs (24kg)
Cable Length	1200mm
Encapsulant	POE



Certifications

UL61730-1, UL61730-2

**LGCY POWER**  
LGCY POWER  
3333 DIGITAL DR#600, LEHI,  
UT 84043, UNITED STATES  
PHONE: 855-353-4899

*Collette R. Swanson Jr.*  
ELECTRICAL LIC. U.21498

REVISIONS	DESCRIPTION	DATE	REV
A		09/20/2022	A
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Signature with Seal

**PROJECT NAME & ADDRESS**  
RICKY RAYNOR  
RESIDENCE  
107 PAUL CLAYTON CIR  
COATS, NC 27521  
PH NO. (919) 625-7661  
EMAIL ID: mraynor@harnett.k12.nc.us

DATE: 11/02/2022  
SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-6**



Aptos Solar Technology reserves the right to make specification changes without notice



3140 De La Cruz Blvd., Ste 200  
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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 in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



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



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



IQ8 Series Microinverters are UL Listed as PV Rapid Shut-Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included O-DCC-2 adapter cable with plug-n-play MCA connectors.

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# IQ8 and IQ8+ Microinverters

INPUT DATA (1)	109-89-2-US	109-89-2-US	109-89-2-US	109-89-2-US
Commonly used module pairings <sup>2</sup>	W	235 - 350	235 - 440	60-cell/72-cell and 72-cell/144-half-cell
Module compatibility		60-cell/72D half-cell		
MPP1 voltage range	V	27 - 37	29 - 45	
Operating range	V	25 - 48	25 - 58	
Min/max start voltage	V	30 / 48	30 / 58	
Max input DC voltage	V	50	60	
Max DC current <sup>3</sup> (module loc)	A	15	15	
Overvoltage class DC port	II			
DC port backfeed current	0			
PV array configuration	1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
<b>OUTPUT DATA (1)</b>				
Peak output power	VA	245	300	
Max continuous output power	VA	240	290	
Nominal (L-L) voltage/range <sup>3</sup>	V	240 / 271 - 264		
Max continuous output current	A	1.0	1.21	
Nominal frequency	Hz	60		
Extended frequency range	Hz	50 - 68		
AC short circuit fault current over 3 cycles	A <sub>max</sub>	2		
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	13	
Total harmonic distortion	%	<5%		
Overvoltage class AC port	III			
AC port backfeed current	mA	30		
Power factor setting		1.0		
Grid-tied power factor (adjustable)		0.85 leading - 0.85 lagging		
Peak efficiency	%	97.5	97.6	
CEC weighted efficiency	%	97	97	
Night-time power consumption	mW	60		
<b>REMARKS DATA</b>				
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)		
Relative humidity range		4% to 100% (condensing)		
DC Connector type		MCA		
Dimensions (h/WxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")		
Weight		1.08 kg (2.38 lbs)		
Cooling		Natural convection - no fans		
Approved for wet locations		Yes		
Pollution degree		PD3		
Enclosure		Class II double-insulated corrosion resistant polymeric enclosure		
Environ. category / UV exposure rating		NEMA Type 6 / outdoor		
<b>COMPLIANCE</b>				
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL 1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 1071-01		

(1) No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/module-compatibility>  
(2) Maximum continuous input DC current is 10.0A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Units may vary, refer to local requirements to define the number of microinverters per branch in your area.

**LG CY POWER**  
 LG CY POWER  
 3333 DIGITAL DR#600, LEHI,  
 UT 84043, UNITED STATES  
 PHONE: 855-353-4899

*Charles R. Spawson Jr.*  
 ELECTRICAL LIC. U.21498

REVISIONS	DESCRIPTION	DATE	REV
		09/20/2022	A
		11/02/2022	B

Signature with Seal

PROJECT NAME & ADDRESS  
**RICKY RAYNOR RESIDENCE**  
 107 PAUL CLAYTON CIR  
 COATS, NC 27521  
 PH NO. (919) 625-7661  
 EMAIL ID: rraynor@harnett.k12.nc.us

DATE: 11/02/2022
SHEET NAME <b>EQUIPMENT SPECIFICATION</b>
SHEET SIZE <b>ANSI B 11" X 17"</b>
SHEET NUMBER <b>PV-7</b>



# Enphase IQ Combiner 4/4C

## X-IQ-AM1-240-4

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



X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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 (GELLMODEM-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

## Enphase IQ Combiner 4/4C

### MODEL NUMBER

IQ Combiner 4 (X-IQ-AM1-240-4)

IQ Combiner 4C (X-IQ-AM1-240-4C)

IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (AMS C12.20 v1.0.3) and consumption metering (v1.2.3.3). Includes a silver solder attached revenue grade PV production system and IQ System Controller 2 and to sufficient heat.

IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (AMS C12.20 v1.0.3) and consumption metering (v1.2.3.3). Includes Enphase Mobile Connect cellular modem (GELLMODEM-M1-06-SP-05), a plug-and-play inverter-grade modem for systems up to 100 microinverters, available in the US, Canada, Mexico, Puerto Rico and the US Virgin Islands. All parts are to adequate cellular service in the applicable region. All parts are to meet the IQ Battery and IQ System Controller and the applicable data sheets.

### ACCESSORIES AND REPLACEMENT PARTS

Enphase Communications Kit  
GELLMODEM-M1-06-SP-05  
GELLMODEM-M1-06-SP-05  
GELLMODEM-M1-06-SP-05  
-48 based LTE-M1 cellular modem with 5-year ATX data plan  
-48 based LTE-M1 cellular modem with 5-year ATX data plan  
Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, BR260, and BR260 circuit breakers.  
Circuit Breaker, 2 pole, 10A, Eaton BR210  
Circuit Breaker, 2 pole, 15A, Eaton BR215  
Circuit Breaker, 2 pole, 20A, Eaton BR220  
Circuit Breaker, 2 pole, 25A, Eaton BR230  
Circuit Breaker, 2 pole, 30A, Eaton BR240  
Circuit Breaker, 2 pole, 35A, Eaton BR250  
Circuit Breaker, 2 pole, 40A, Eaton BR260  
Power line carrier (communication bridge path), quantity: one pair  
EPLC-01  
Power line carrier (communication bridge path), quantity: one pair  
XA-SOLARSHIELD-ES  
Replacement solar shield for IQ Combiner 4/4C  
XA-PLUG-10B-3  
Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)  
XA-ENVPCBA-3  
Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C  
X-IR-NA-HB-125A  
Hold down kit for Eaton circuit breaker with screws.

### ELECTRICAL SPECIFICATIONS

Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton IIR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from P/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (input and/or storage)	Up to four 2-pole Eaton IIR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 80A with IQ Gateway busbar included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption metering CT (CT-200-SP-LUT)	A pair of 200 A split core current transformers.

### MECHANICAL DATA

Dimensions (WxHxD)	37.5 x 48.5 x 16.6 cm (14.75" x 19.09" x 6.53") Height to 21.06" (83.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° F to 140° F (-40° C to 115° F)
Coating	Neutral connection, pilot heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	<ul style="list-style-type: none"> <li>20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>Main lug combined output: 10 to 2/0 AWG copper conductors</li> <li>Maximum conductor length: 100 ft (30.5 m)</li> <li>Always follow local code requirements for conductor sizing.</li> </ul>
Altitude	To 2000 meters (6,560 feet)

### INTERNET CONNECTION OPTIONS

Integrated Wi-Fi	802.11b/g/n
Cellular	GELLMODEM-M1-06-SP-05, GELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Enphase installations.
Ethernet	Optional, 800.3, Cat5E (or Cat 6) UTP Ethernet cable (not included).

### COMPLIANCE

Compliance, IQ Combiner	UL 1941, CAN/CSA C22.2 No. 1971, 47 CFR, Part 15, Class B, FCC 1500 (for 2000 MHz and below), CE, EN 50173, EN 50174, EN 50175, EN 50176, EN 50177, EN 50178, EN 50179, EN 50180, EN 50181, EN 50182, EN 50183, EN 50184, EN 50185, EN 50186, EN 50187, EN 50188, EN 50189, EN 50190, EN 50191, EN 50192, EN 50193, EN 50194, EN 50195, EN 50196, EN 50197, EN 50198, EN 50199, EN 50200, EN 50201, EN 50202, EN 50203, EN 50204, EN 50205, EN 50206, EN 50207, EN 50208, EN 50209, EN 50210, EN 50211, EN 50212, EN 50213, EN 50214, EN 50215, EN 50216, EN 50217, EN 50218, EN 50219, EN 50220, EN 50221, EN 50222, EN 50223, EN 50224, EN 50225, EN 50226, EN 50227, EN 50228, EN 50229, EN 50230, EN 50231, EN 50232, EN 50233, EN 50234, EN 50235, EN 50236, EN 50237, EN 50238, EN 50239, EN 50240, EN 50241, EN 50242, EN 50243, EN 50244, EN 50245, EN 50246, EN 50247, EN 50248, EN 50249, EN 50250, EN 50251, EN 50252, EN 50253, EN 50254, EN 50255, EN 50256, EN 50257, EN 50258, EN 50259, EN 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REVISIONS	DESCRIPTION	DATE	REV
REVISION		09/20/2022	A
REVISION		11/02/2022	B

Signature with Seal

PROJECT NAME & ADDRESS  
**RICKY RAYNOR RESIDENCE**  
 107 PAUL CLAYTON CIR  
 COATS, NC 27521  
 PH NO. (919) 625-7661  
 EMAIL ID: mraynor@harnett.k12.nc.us

DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-9**

Datasheet



# Ground Mount System



## Mount on all terrains, in no time.

The IronRidge Ground Mount System combines our XR1000 rails with locally-sourced steel pipes, or mechanical tubing, to create a cost-effective structure capable of handling any site or terrain challenge. Installation is simple with only a few structural components and no drilling, welding, or heavy machinery required. In addition, the system works with a variety of foundation options, including concrete piers and driven piles.



**Rugged Construction**  
 Engineered steel and aluminum components ensure durability.



**PE Certified**  
 Pre-stamped engineering letters available in most states.



**Simple Assembly**  
 Just a few simple components and no heavy equipment.



**Design Software**  
 Online tool generates engineering values and bill of materials.



**Flexible Architecture**  
 Multiple foundation and array configuration options.



**20 Year Warranty**  
 Twice the protection offered by competitors.

Datasheet



**360° Product Tour**  
 Visit [ironridge.com](http://ironridge.com)

### Substructure

#### Top Caps



Connect vertical and cross pipes.

#### Bonded Rail Connectors



Attach and bond Rail Assembly to cross pipes.

#### Diagonal Braces



Optional Brace provides additional support.

#### Cross Pipe & Piers



Steel pipes or mechanical tubing for substructure.

### Rail Assembly

#### XR100/XR1000 Rails



Curved rails increase spanning capabilities.

#### UFOs



Universal Fastening Objects bond modules to rails.

#### Stopper Sleeves



Snap onto the UFO to turn into a bonded end clamp.

#### CAMO



Bond modules to rails while staying completely hidden.

### Resources



**Design Assistant**  
 Go from rough layout to fully engineered system. For free. Go to [ironridge.com/design](http://ironridge.com/design)

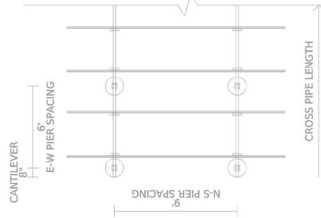
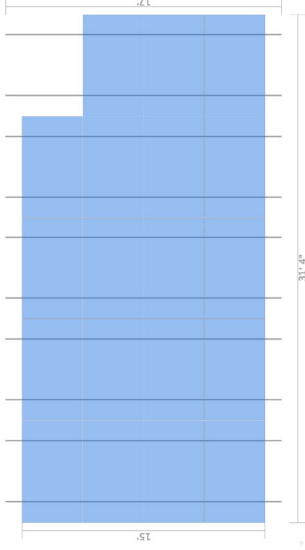


**NABCEP Certified Training**  
 Earn free continuing education credits while learning more about our systems. Go to [ironridge.com/training](http://ironridge.com/training)

Project Details	
Name	Ricky Raynor
Date	11/02/2022
Location	107 Paul Clayton Circle, Coats, NC 27521
Total modules	19
Module	Custom Panels: APTOS-DMA-120-MF10-440W
Dimensions	Dimensions: 74.92" x 44.65" x 1.38" (1903.0mm x 1134.0mm x 35.0mm)
Total watts	8,360 W
ASCE code	7.16
Wind speed	110 mph
Snow load	20 psf
Wind exposure	C
Piers	12
Concrete	2.48 yd <sup>3</sup>

Substructure & Foundation	
Tilt	20°
Pipe/tubing diameter	2"
Foundation type	Concrete
South facing grade	0°
Soil class	4
Hole diameter	16"

Sub array #1	
Rows	4
Area	31' 4" (EW) x 15' 2" (NS)
E/W spacing	6'
Piers/array	12
Total cross pipes	2 (31' 4")
Shear	635 lbs
Columns	5
Rail type	XRL1000
Rail cantilever	3' 9"
Total south piers	6 (5' 1")
Total pipe length	143' 2"
Moment	0 ft-lbs
Uplift	-1,227 lbs
# Arrays	1
Diagonal bracing	yes
Pipe cantilever	8"
Total north piers	6 (8' 4")
Cut back modules	1



**LGCY POWER**  
3333 DIGITAL DR#600, LEHI,  
UT 84043, UNITED STATES  
PHONE: 855-353-4899

*Charles R. Spawson Jr.*  
ELECTRICAL LIC. U.21498

DESCRIPTION	DATE	REV
REVISION	09/20/2022	A
REVISION	11/02/2022	B

Signature with Seal

PROJECT NAME & ADDRESS

**RICKY RAYNOR**  
**RESIDENCE**  
107 PAUL CLAYTON CIR  
COATS, NC 27521  
PH NO. (919) 625-7661  
EMAIL ID: rraynor@harnett.k12.nc.us

DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT**  
**SPECIFICATION**

SHEET SIZE

**ANSI B**  
**11" X 17"**

SHEET NUMBER

**PV-10**

REVISIONS	DESCRIPTION	DATE	REV
REVISION	09/20/2022	A	
REVISION	11/02/2022	B	

Signature with Seal

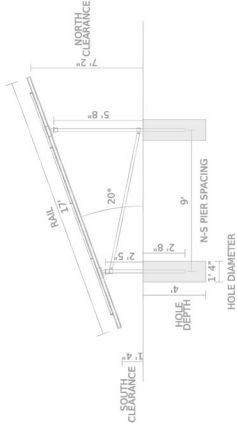
PROJECT NAME & ADDRESS  
**RICKY RAYNOR  
RESIDENCE  
107 PAUL CLAYTON CIR  
COATS, NC 27521  
PH NO. (919) 625-7661  
EMAIL ID: rraynor@harnett.k12.nc.us**

DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

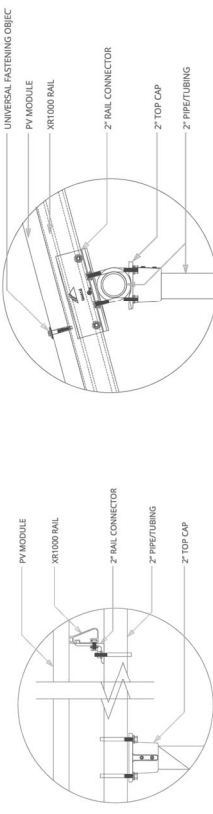
SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-11**

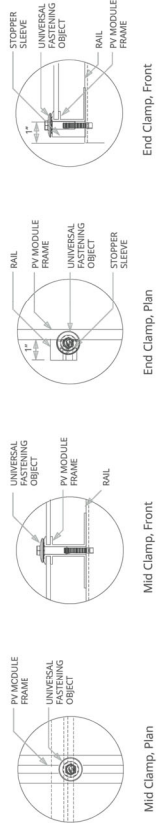


**Pipe Fitting Detail**

**XRL1000 Rail**

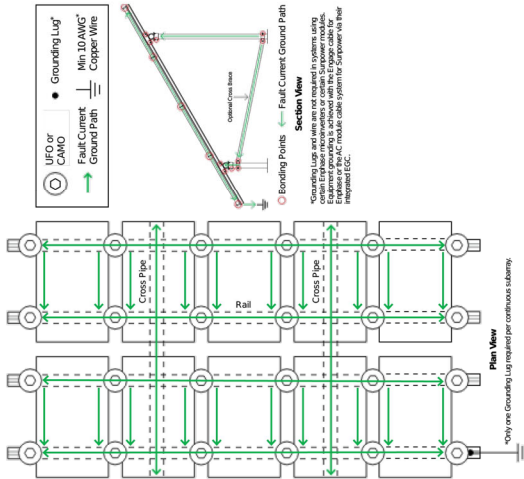


**Clamp Detail**





**Grounding Diagram**



**Bill of Materials**

Part	Spares	Total Qty
<b>Rails</b>		
XR-1000-204A XR1000, Rail 204" (17 Feet) Clear	0	10
<b>Clamps &amp; Grounding</b>		
UFO-CL-03-A1 Universal Module Clamp, Clear	0	48
UFO-STP-35MM-M1 Stopper Sleeve, 35MM, Mill	0	20
XR-LLG-03A.1 Grounding Lug, Low Profile	0	1
<b>Substructure</b>		
70-0200-SCA SGA 700 Cap 8" Z"	0	12
GM-BIC-002 Ground Mount Bonded Rail Connector - 2"	0	20
70-0205-CBR SGA 2" Brace Assembly (S-Panel) (bulk)	0	6

Signature with Seal

PROJECT NAME & ADDRESS

**RICKY RAYNOR**  
RESIDENCE  
107 PAUL CLAYTON CIR  
COATS, NC 27521  
PH NO. (919) 625-7661  
EMAIL ID: rraynor@harnett.k12.nc.us

DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-12**



# ELECTRICAL GROUNDING W/ SPlice & THERMAL BREAK

## ENPHASE MICROINVERTER FOR INSTALLATION GUIDE

**LG CY POWER**  
 LG CY POWER  
 3333 DIGITAL DR#600, LEHI,  
 UT 84043, UNITED STATES  
 PHONE: 855-353-4899  
*Collette R. Spawson 7c*  
 ELECTRICAL LIC. U.21498

REVISIONS	DESCRIPTION	DATE	REV
1	REVISION	09/20/2022	A
2	REVISION	11/02/2022	B

Signature with Seal

PROJECT NAME & ADDRESS  
**RICKY RAYNOR RESIDENCE**  
 107 PAUL CLAYTON CIR  
 COATS, NC 27521  
 PH NO. (919) 625-7661  
 EMAIL ID: mraynor@harnett.k12.nc.us

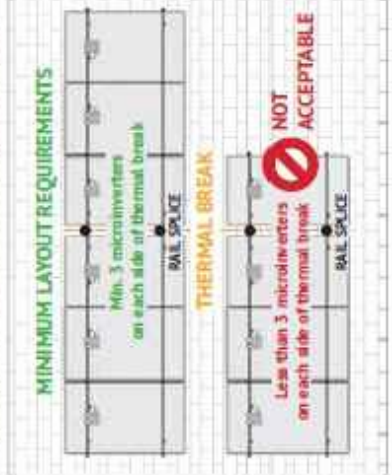
DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT SPECIFICATION**

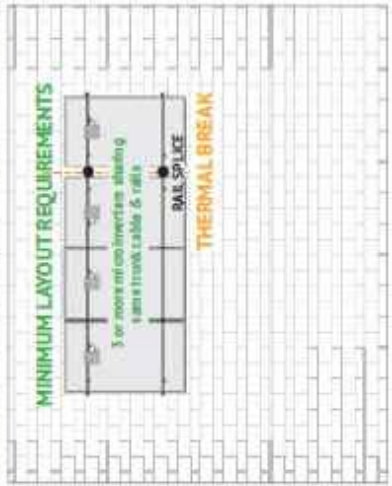
SHEET SIZE  
**ANSI B 11" X 17"**

SHEET NUMBER  
**PV-13**

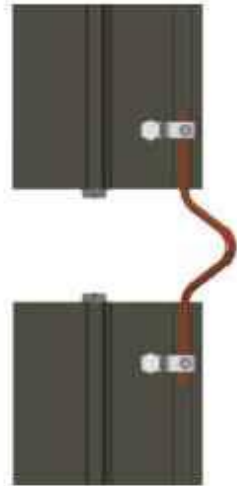
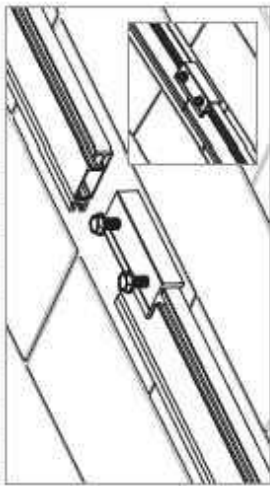
**EXPANSION JOINT W/ ELECTRICAL BONDING CONNECTION**  
 Enphase Microinverter (MI) Requirements  
 (Model No. M215 & M250)  
 Min. 3 Microinverters on each side of thermal break



**EXPANSION JOINT W/ GROUNDING LUGS & COPPER JUMPER**  
 Enphase Microinverter (MI) Requirements  
 (Model No. M215 & M250)  
 3 or more Microinverters sharing same trunk cable & rails



**CONTINUOUS RAIL & ELECTRICAL BONDING SPlice**  
 Enphase Microinverter (MI) Requirements  
 (Model No. M215 & M250)  
 3 Microinverters sharing same trunk cable & rails



**EXPANSION JOINT USED AS THERMAL BREAK W/O ELECTRICAL BONDING CONNECTION**

**EXPANSION JOINT USED AS THERMAL BREAK W/ GROUNDING LUGS & COPPER JUMPER**

**ELECTRICAL BONDING SPlice**

NOTE: THE ABOVE IMAGES ARE SAMPLE CONFIGURATIONS TO ILLUSTRATE THE REQUIREMENTS FOR A SYSTEM GROUNDING THROUGH ENPHASE MICROINVERTERS DESCRIBED ON PAGE 1

DESCRIPTION	DATE	REV
REVISION	09/20/2022	A
REVISION	11/02/2022	B

Signature with Seal

PROJECT NAME & ADDRESS

RICKY RAYNOR  
 RESIDENCE  
 107 PAUL CLAYTON CIR  
 COATS, NC 27521  
 PH NO. (919) 625-7661  
 EMAIL ID: mraynor@harnett.k12.nc.us

DATE: 11/02/2022

SHEET NAME  
**EQUIPMENT  
 SPECIFICATION**

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

SHEET NUMBER  
**PV-14**



**Components and Cladding Roof Zones:**  
 The Components and Cladding Roof Zones shall be determined based on ASCE 7-05 and ASCE 7-10 Component and Cladding design.

- Notes:**
- 1) U-builder Online tool analysis is only for Unirac SM SOLARMOUNT Rail Flush systems only and do not include roof capacity check.
  - 2) Risk Category II per ASCE 7-10.
  - 3) Topographic factor, kzt is 1.0.
  - 4) Average parapet height is 0.0 ft.
  - 5) Wind speeds are LRFD values.
  - 6) Attachment spacing(s) apply to a seismic design category E or less.

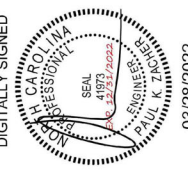
**Design Responsibility:**  
 The U-Builder design software is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, this U-builder software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder software.

This letter certifies that the Unirac SM SOLARMOUNT Rails Flush, when installed according to the U-Builder engineering report and the manufacture specifications, is in compliance with the above codes and loading criteria.

- This certification excludes evaluation of the following components:
- 1) The structure to support the loads imposed on the building by the array, including, but not limited to: strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the structure.
  - 2) The attachment of the SM SOLARMOUNT Rails to the existing structure.
  - 3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of the certification of this racking system. If you have any questions on the above, do not hesitate to call.



DIGITALLY SIGNED  
 03/28/2022

Prepared by:  
 PZSE, Inc. – Structural Engineers  
 Roseville, CA

1478 Stone Point Drive, Suite 190, Roseville, CA 95661  
 T 916.961.3960 F 916.961.3965 W www.pzse.com  
 Experience | Integrity | Empowerment



March 28, 2022  
 Unirac  
 1411 Broadway Blvd. NE  
 Albuquerque, NM 87102

Attn.: Unirac - Engineering Department

Re: Engineering Certification for the Unirac U-Builder 2.0 SOLARMOUNT Flush Rail

PZSE, Inc. - Structural Engineers has reviewed the Unirac SOLARMOUNT rails, proprietary mounting system constructed from modular parts which is intended for rooftop installation of solar photovoltaic (PV) panels; and has reviewed the U-builder Online tool. This U-Builder software includes analysis for the SOLARMOUNT LIGHT rail, SOLARMOUNT STANDARD rail, and SOLARMOUNT HEAVY DUTY rail with Standard and Pro Series hardware. All information, data and analysis contained within are based on, and comply with the following codes and typical specifications:

1. Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-05 and ASCE/SEI 7-10
2. 2006-2015 International Building Code, by International Code Council, Inc.
3. 2006-2015 International Residential Code, by International Code Council, Inc.
4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.
5. 2015 Aluminum Design Manual, by The Aluminum Association, 2015

Following are typical specifications to meet the above code requirements:

**Design Criteria:**  
 Ground Snow Load = 0 - 100 (psf)  
 Basic Wind Speed = 85 - 190 (mph)  
 Roof Mean Height = 0 - 60 (ft)  
 Roof Pitch = 0 - 45 (Degrees)  
 Exposure Category = B, C & D  
 Per U-builder Engineering report.

**Attachment Spacing:**  
 Maximum cantilever length is L/3, where "L" is the span noted in the U-Builder online tool.

**Clearance:**  
 2" to 10" clear from top of roof to top of PV panel.

**Tolerance(s):**  
 1.0" tolerance for any specified dimension in this report is allowed for installation.

**Installation Orientation:**  
 See SOLARMOUNT Rail Flush Installation Guide.  
 Landscape - PV Panel long dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the long side.  
 Portrait - PV Panel short dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the short side.

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