

# DANNY RICHARDS - 10.350kW DC, 9.145kW AC, 8.871kW CEC AC, 10.500kWH STORAGE SYSTEM

## SITE PLAN


NOTE: CONDUIT RUN IS IN ATTIC

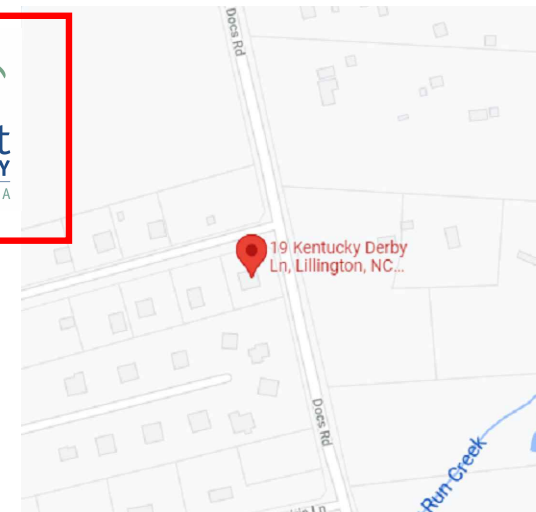
TOTAL AREA OF ROOF	2567.12 SQFT
TOTAL ARRAY AREA	594.90 SQFT
TOTAL AREA OF ROOF COVERED IN ARRAY	23.17%

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

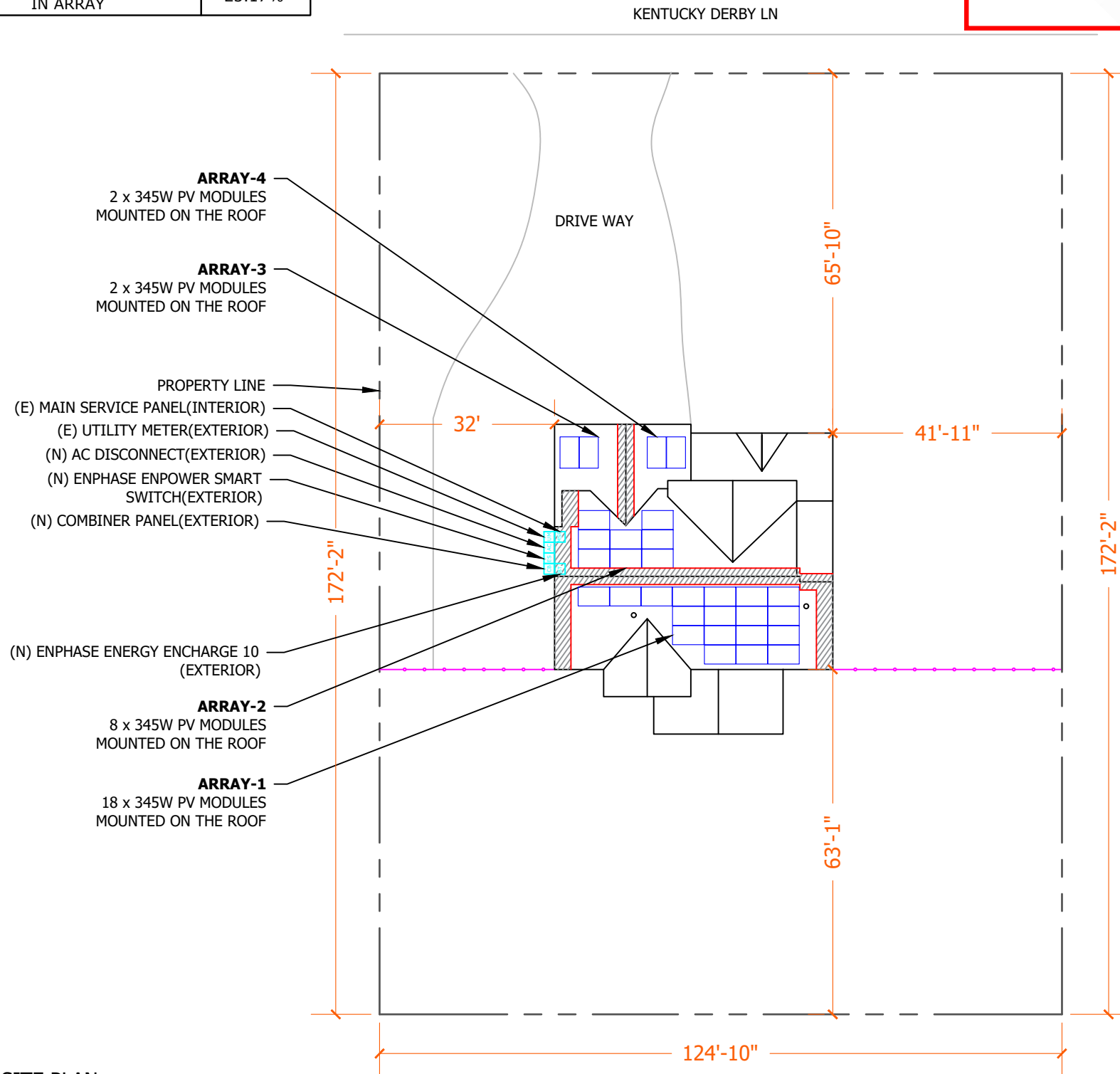
**APPROVED**  
Limited building only review  
Permit holder responsible for full compliance with the code

03/17/2022



**A1** VICINITY MAP  
PV-1.0 SCALE: NTS



GENERAL INFORMATION	
ELECTRIC CODE	NEC 2020
FIRE CODE	NCFC 2018
RESIDENTIAL CODE	NCRC 2018
BUILDING CODE	NCBC 2018
WIND SPEED	106 MPH
SNOW LOAD	15 PSF

INDEX	
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PV-6.0+	SPEC SHEET(S)



### SYSTEM INFORMATION

DC SYSTEM SIZE : 10350W  
 AC SYSTEM SIZE : 9145W  
 CEC AC SYSTEM SIZE : 8871W  
 MODULES:  
 (30) MISSION SOLAR PREC 60 MSE345SX5T 345W  
 INVERTER:  
 (30) ENPHASE IQ7PLUS-72-E-US  
 BATTERY:  
 (1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH BRANCH  
 DETAILS:  
 3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)  
 ESTIMATED FIRST YEAR PRODUCTION:12,412 kWh

### ENGINEER OF RECORD

### CUSTOMER INFORMATION

NAME & ADDRESS:  
 DANNY RICHARDS  
 19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
 35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

### SITE PLAN

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
 DM/

SCALE:AS NOTED

PAPER SIZE:17"x11"

DATE:2/8/22

REV:A

PV- 1.0

**A** SITE PLAN  
 PV-1.0 SCALE: 1"=25'-0"

## GENERAL NOTES

### GENERAL NOTES

1. MODULES ARE LISTED UNDER UL 1703 AND CONFORM TO THE STANDARDS.
2. INVERTERS ARE LISTED UNDER UL 1741 AND CONFORM TO THE STANDARDS.
3. DRAWINGS ARE DIAGRAMMATIC, INDICATING GENERAL ARRANGEMENT OF THE PV SYSTEM AND THE ACTUAL SITE CONDITION MIGHT VARY.
4. WORKING CLEARANCES AROUND THE NEW PV ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26(A)(1).
5. ALL GROUND WIRING CONNECTED TO THE MAIN SERVICE GROUNDING IN MAIN SERVICE PANEL/ SERVICE EQUIPMENT.
6. ALL CONDUCTORS SHALL BE 600V, 75°C STANDARD COPPER UNLESS OTHERWISE NOTED.
7. WHEN REQUIRED, A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
8. THE SYSTEM WILL NOT BE INTERCONNECTED BY THE CONTRACTOR UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND/OR THE UTILITY.
9. ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREES, WIRES OR SIGNS.
10. PV ARRAY COMBINER/JUNCTION BOX PROVIDES TRANSITION FROM ARRAY WIRING TO CONDUIT WIRING

### EQUIPMENT LOCATION:

11. ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26(A)(1).
12. WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31(A),(C) AND NEC TABLES 310.15(B)(2)(A) AND 310.15(B)(3)(C).
13. JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
14. ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
15. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
16. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

### STRUCTURAL NOTES:

17. RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.
18. JUNCTION BOX WILL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.
19. ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED WITH APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
20. ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.
21. WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

### WIRING & CONDUIT NOTES:

22. ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
23. CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.
24. DC WIRING LIMITED TO MODULE FOOTPRINT. MICRO INVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY WITH SUITABLE WIRING CLIPS.
25. AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE\*\*, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

### INTERCONNECTION NOTES:

26. LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64(B)]
27. THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].
28. WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(D)(2)(3)].
29. AT MULTIPLE PV OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVER CURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVER CURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12(D)(2)(3)(C).
30. FEEDER TAP INTER CONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12(D)(2)(1) SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12(A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42 BACK FEEDING BREAKER FOR UTILITY-INTERACTIVE INVERTER OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12(D)(5)].

### GROUNDING NOTES:

31. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
32. PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC 250.122.
33. METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).
34. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICRO INVERTER MANUFACTURER'S INSTRUCTIONS.
35. EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.
36. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
37. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]
38. THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.
39. GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.5 IN GENERAL AND NEC 690.5(A)(1) SPECIFICALLY.
40. DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:
41. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
42. DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
43. RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 10 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS ≤30V AND ≤240VA [NEC 690.12]. LOCATION OF LABEL ACCORDING TO AHJ.
44. ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9 AND 240.
45. MICRO INVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B). 2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.



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## GENERAL NOTES

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
 DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-2.0



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**MOUNTING DETAILS**

PROJECT NUMBER:  
 DESIGNER/CHECKED BY:  
 DM/  
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 DATE:2/8/22 REV:A PV-3.0

**MODULES DATA**

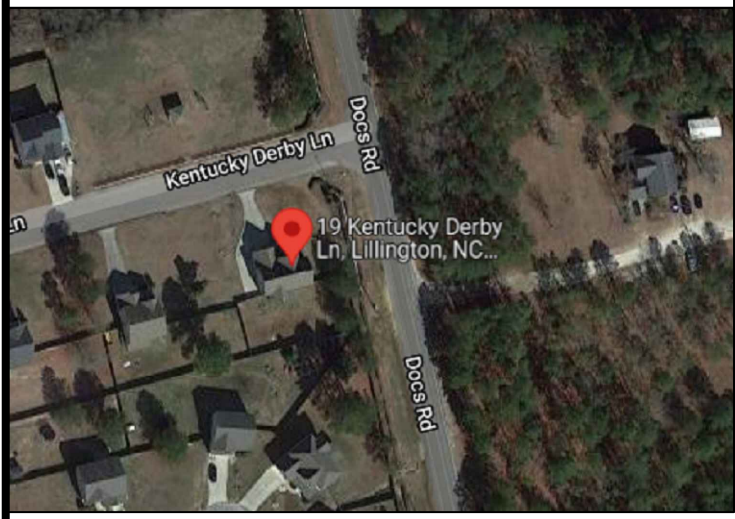
MISSION SOLAR PREC 60 MSE345SX5T 345W	
MODULE DIMS	68.8"x41.5"x1.6"
LAG SCREWS	5/16"x3.5":2.5"MIN EMBEDMENT

**FIRE SETBACK**

MINIMUM FIRE ACCESS PATHWAYS PER CFC 2019  
 RIDGE TO ARRAY: 1'-6"  
 EAVE TO ARRAY : 3'-0"  
 HIP/VALLEY W/ ADJACENT ARRAY: 1'-6"  
 EACH SIDE HIP/VALLEY W/O ADJACENT ARRAY: 0'-0"

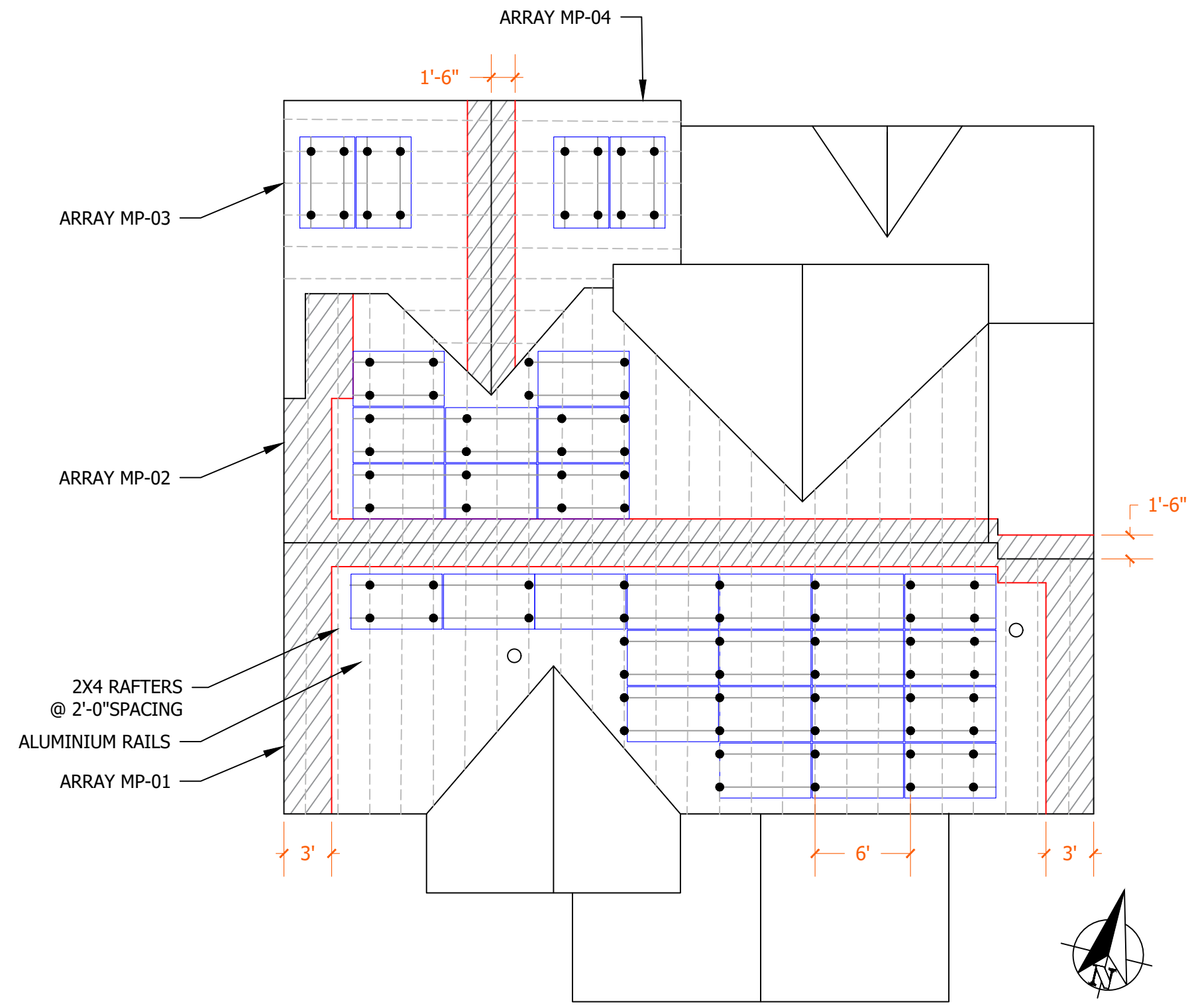
**NOTE:** INSTALLER TO VERIFY RAFTER SIZE, SPACING AND SLOPED SPANS, AND NOTIFY ANY DISCREPANCIES BEFORE PROCEEDING.

**AERIAL VIEW**



**SITE INFORMATION**

SR.NO	AZIMUTH	PITCH	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT	ROOF EXPOSURE	FRAME TYPE	FRAME SIZE	FRAME SPACING	MAX RAIL SPAN	OVER HANG
MP-01	166°	39.81°	18	356.94	COMPOSITION SHINGLE	UNIRAC FLASHKIT PRO	ATTIC	RAFTERS	2 X 4	2'-0"	6'-0"	2'-0"
MP-02	346°	39.81°	8	158.64	COMPOSITION SHINGLE	UNIRAC FLASHKIT PRO	ATTIC	RAFTERS	2 X 4	2'-0"	6'-0"	2'-0"
MP-03	256°	39.81°	2	39.66	COMPOSITION SHINGLE	UNIRAC FLASHKIT PRO	ATTIC	RAFTERS	2 X 4	2'-0"	6'-0"	2'-0"
MP-04	76°	39.81°	2	39.66	COMPOSITION SHINGLE	UNIRAC FLASHKIT PRO	ATTIC	RAFTERS	2 X 4	2'-0"	6'-0"	2'-0"



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**STRUCTURAL DETAILS**

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
 DM/

SCALE:AS NOTED

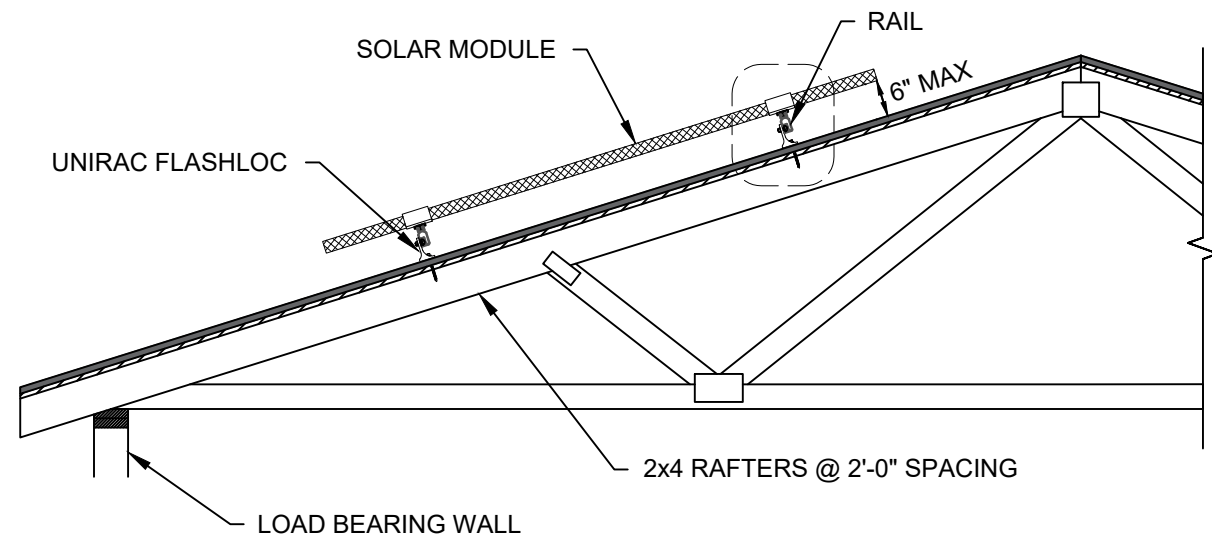
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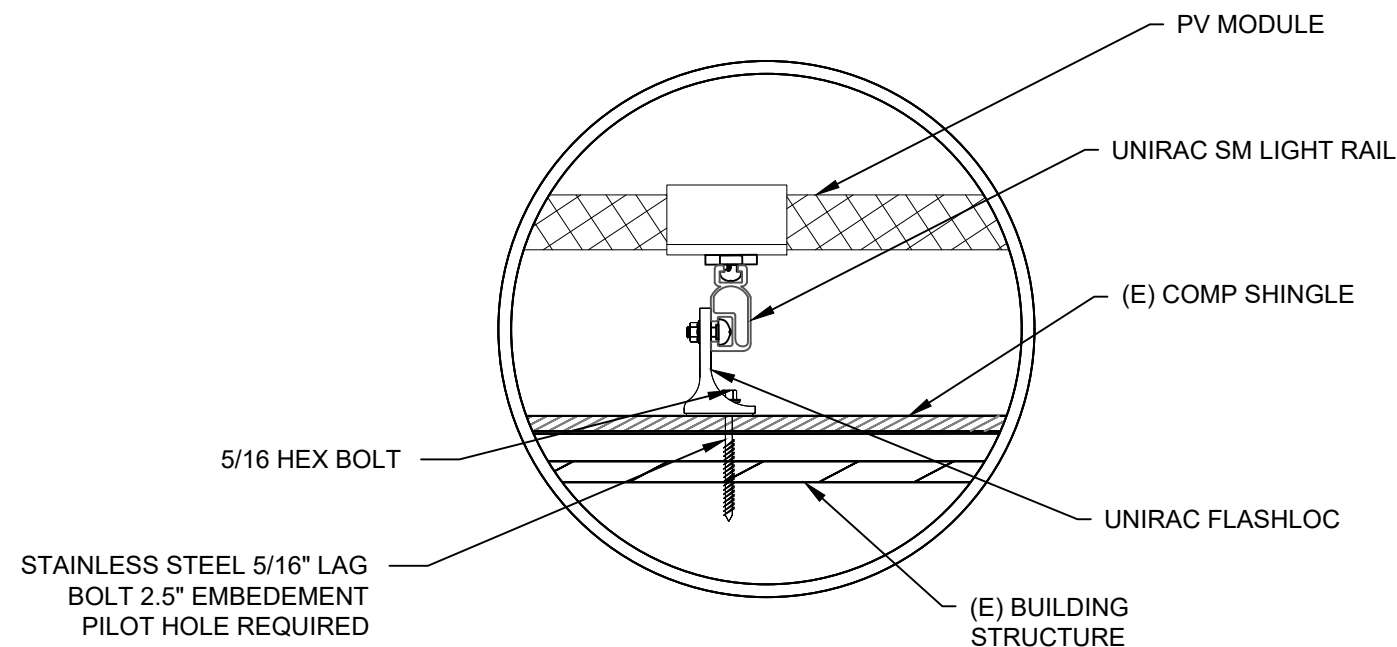
REV:A

PV-3.1

**ROOF FRAMING DETAIL**



**ATTACHMENT DETAIL**





**SINGLE LINE DIAGRAM: DC SYSTEM SIZE - 10.350kW DC, 9.145kW AC, 8.871kW CEC AC, 10.500kWH STORAGE SYSTEM**



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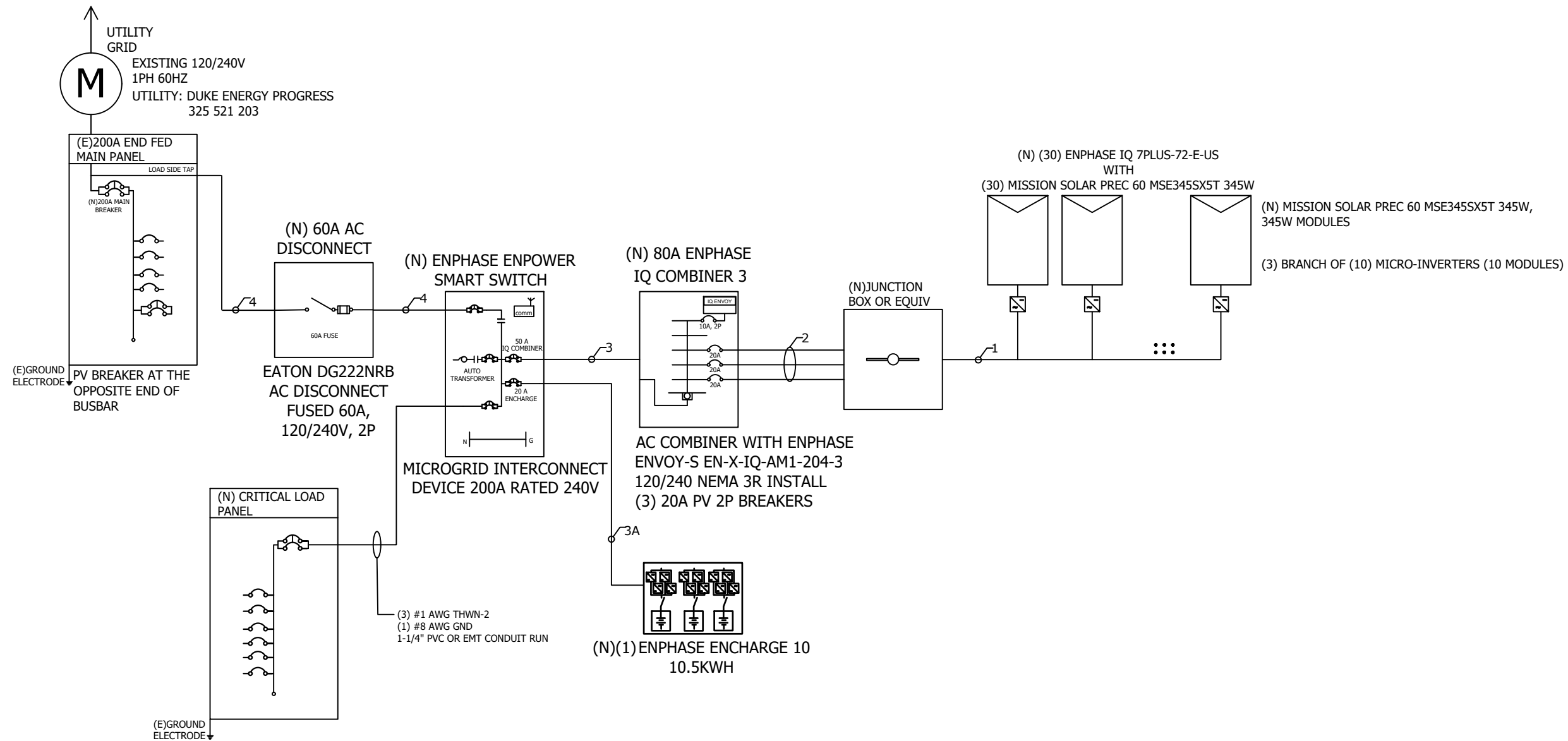
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REV:A

PV-4.0



**SINGLE LINE DIAGRAM: DC SYSTEM SIZE - 10.350kW DC, 9.145kW AC, 8.871kW CEC AC, 10.500kWH STORAGE SYSTEM**



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**OCPD CALCULATIONS:**

MAIN PANEL RATING:200A,  
 MAIN BREAKER RATING:200A  
 120% RULE: (200AX1.2)-200A=40A  
 =>ALLOWABLE BACKFEED IS 40A  
 INVERTER OVERCURRENT PROTECTION=  
 INVERTER O/P I X CONTINUOUS LOAD(1.25)X  
 #OF INVERTERS =1.21 x 1.25 x 30 =45.38A +  
 20A(BATTERY) = 65.38 <= PV BREAKER = 70A  
 ALLOWABLE BACKFEED 40A <= 70A PV BREAKER  
 (LINE SIDE TAP)  
 THE DESIGNED INTERCONNECTION MEETS THE  
 705.12(B)(2) REQUIREMENTS

**ELECTRICAL NOTES:**

1. MAXIMUM DC/AC VOLTAGE DROP SHALL BE NO MORE THAN 2%.
2. BREAKER/FUSE SIZES CONFORMS TO NEC 240.6 CODE SECTION.
3. AC GROUNDING ELECTRODE CONDUCTOR SIZED PER NEC 250.66.
4. AMBIENT TEMPERATURE CORRECTION FACTOR IS BASED ON NEC 690.31(A).
5. AMBIENT TEMPERATURE ADJUSTMENT FACTOR IS BASED ON NEC 310.15(B)(2)(C) AND 310.15(B)(2)(B)
6. AC SYSTEM VOLTAGE CORRECTION IS PER NEC 690.7(A)
7. CONDUCTORS ARE SIZED PER WIRE AMPACITY TABLE NEC 310.15(B)(16).
8. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC 310.10(D).
9. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC 310.10(C).

MICRO INVERTER SPECIFICATIONS	
MODEL	ENPHASE IQ7PLUS-72-E-US
POWER RATING	295VA
MAX OUTPUT CURRENT	1.21A
CEC WEIGHTED EFFICIENCY	97%
MAX NO OF MICRO INVERTERS/BRANCH	13
MAX DC VOLTAGE	60V

MODULE SPECIFICATION	
MODEL	MISSION SOLAR PREC 60 MSE345SX5T 345W
MODULE POWER @ STC	345W
OPEN CIRCUIT VOLTAGE: <b>Voc</b>	41.00V
MAX POWER VOLTAGE: <b>Vmp</b>	33.37V
SHORT CIRCUIT VOLTAGE: <b>Isc</b>	10.92A
MAX POWER CURRENT: <b>Imp</b>	10.34A

**CONDUIT SCHEDULE**

TAG ID	CONDUIT SIZE	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(2) 12AWG ENPHASE Q CABLE PER BRANCH CIRCUIT	NONE	(1) 4 AWG BARE COPPER
2	3/4"EMT OR EQUIV	(6) 10AWG THHN/THWN-2	NONE	(1) 10 AWG THHN/THWN-2
3	1/2"EMT OR EQUIV	(2) 10 AWG THHN/THWN-2	NONE	(1) 10 AWG THHN/THWN-2
3A	1/2"EMT OR EQUIV	(2) 10 AWG THHN/THWN-2	NONE	(1) 10 AWG THHN/THWN-2
4	3/4"EMT OR EQUIV	(2) 6 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2

**ELECTRICAL CALCULATION**

AC WIRE CALCULATIONS:- MATERIAL:COPPER & TEMPERATURE RATING:90°C

TAG ID	REQUIRED CONDUCTOR AMPACITY								CORRECTED AMPACITY CALCULATION								TERMINAL RATING CHECK				DERATED CONDUCTOR AMPACITY CHECK			
1	1.21	X	10	=	12.1	X	1.25	=	15.125A	30	X	0.71	X	1	=	21.3A	15.125A	<	20A	15.125A	<	21.3A		
2	1.21	X	10	=	12.1	X	1.25	=	15.125A	40	X	0.76	X	0.7	=	21.28A	15.125A	<	20A	15.125A	<	21.28A		
3A	16	X	1	=	16	X	1.25	=	20A	40	X	0.91	X	1	=	36.40A	20A	<	20A	20A	<	36.40A		
3	1.21	X	30	=	36.30	X	1.25	=	45.38A	75	X	0.91	X	1	=	68.25A	65.38A	<	70A	65.38A	<	68.25A		
	45.38		+	16 X 1.25		=	65.38A																	

**WARNING PLACARDS**



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**WARNING**

**ELECTRIC SHOCK HAZARD**  
 THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

LABEL LOCATION  
 DC DISCONNECT,INVERTER  
 [PER CODE: NEC 690.41]  
 [To be used when inverter is ungrounded]

**WARNING**

**ELECTRIC SHOCK HAZARD**  
 DO NOT TOUCH TERMINALS  
 TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION  
 AC DISCONNECT,POINT OF INTERCONNECTION  
 [PER CODE: NEC 690.13(B)]

**WARNING**

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 TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION  
 AC DISCONNECT,POINT OF INTERCONNECTION  
 [PER CODE: NEC 690.13(B)]

**WARNING-Electric Shock Hazard**  
**No User Serviceable Parts inside**  
**Contact authorized service provide for assistance**

LABEL LOCATION  
 INVERTER, JUNCTION BOXES(ROOF),  
 AC DISCONNECT  
 [PER CODE: NEC 690.13]

**WARNING:PHOTOVOLTAIC POWER SOURCE**

LABEL LOCATION  
 CONDUIT, COMBINER BOX  
 [PER CODE: NEC690.31(G)(3)]

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

LABEL LOCATION  
 POINT OF INTERCONNECTION  
 [PER CODE: NEC705.12(D)(4)]

**PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH**

RATED AC OPERATING CURRENT **36.30** AMPS AC  
 AC NOMINAL OPERATING VOLTAGE **240** VAC

LABEL LOCATION  
 AC DISCONNECT , POINT OF INTERCONNECTION  
 [PER CODE: NEC 690.54]

**WARNING**  
**INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVER-CURRENT DEVICE**

LABEL LOCATION  
 POINT OF INTERCONNECTION  
 (PER CODE: NEC 705.12(2)(b))  
[ Not Required if Panel board is rated not less than sum of ampere ratings of all overcurrent devices supplying it]

**CAUTION: SOLAR CIRCUIT**

LABEL LOCATION  
 MARKINGS PLACED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLES AT LEAST EVERY 10 FT, AT TURNS AND ABOVE/BELOW PENETRATIONS AND ALL COMBINER/JUNCTION BOXES.  
 (PER CODE: NEC1204.5)

**SOLAR DISCONNECT**

LABEL LOCATION  
 DISCONNECT, POINT OF INTERCONNECTION  
 [PER CODE: NEC 690.13(B)]

**CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED**

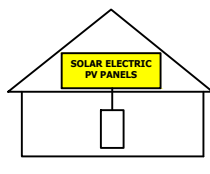
LABEL LOCATION  
 WEATHER RESISTANT MATERIAL, DURABLE ADHESDIVE, UL969 AS STANDARD TO WEATHER RATING (UL LISTING OF MARKINGS NOT REQUIRED), MIN 3/8" LETTER HEIGHT ARIAL OR SIMILAR FONT NON-BOLD,PLACED WITHIN THE MAIN SERVICE DISCONNECT,PLACED ON THE OUTSIDE OF THE COVER WHEN DISCONNECT IS OPERATED WITH THE SERVICE PANEL CLOSED.  
 (PWER CODE: NEC690.15 ,690.13(B))

**RAPID SHUTDOWN SWITCH FOR SOLAR SYSTEM**

LABEL LOCATION  
 INVERTER,POINT OF INTERCONNECTION  
 [PER CODE: NEC 690.56(C)(3)]

**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**

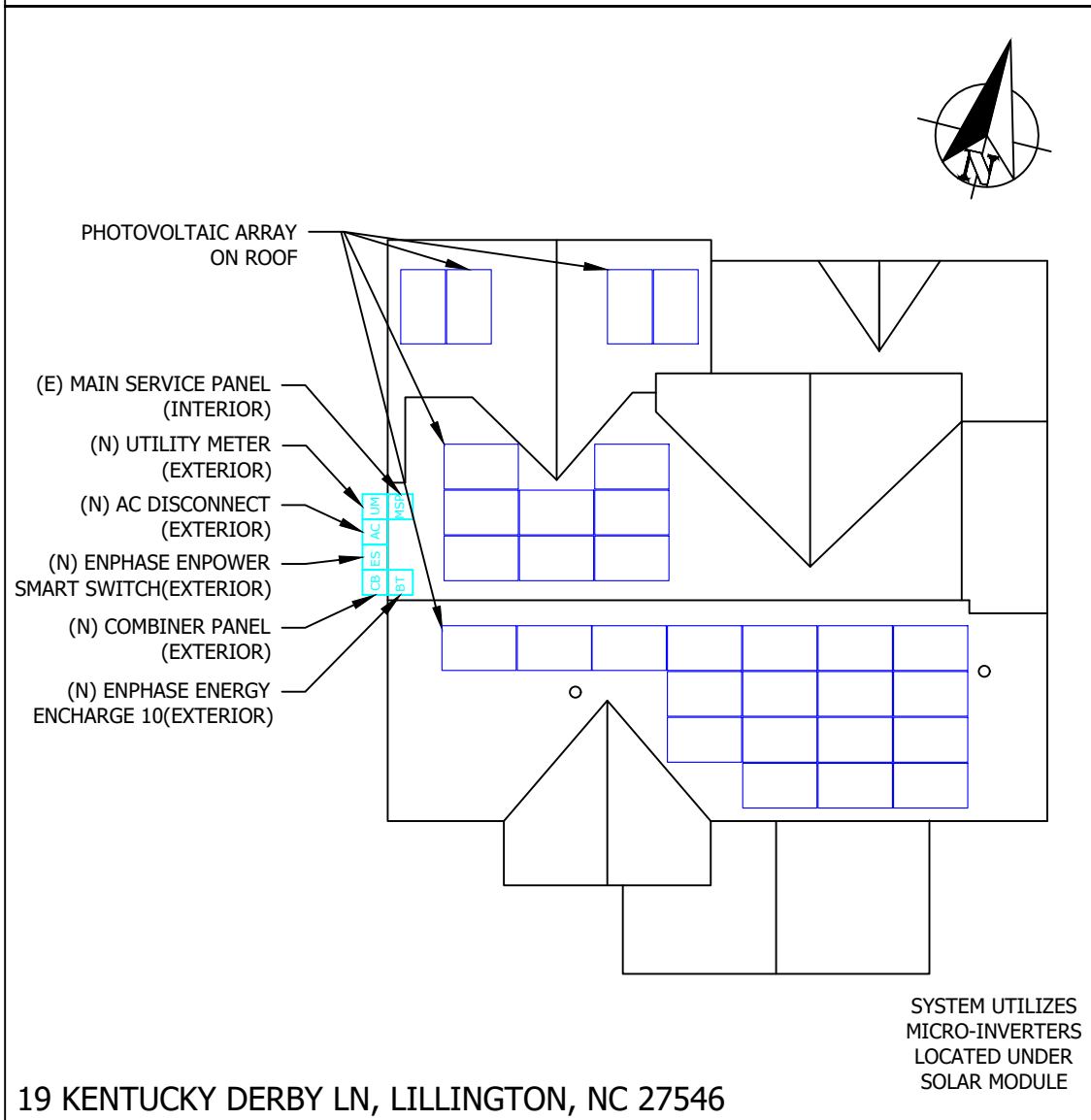


LABEL LOCATION  
 AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION  
 (PER CODE: NEC690.56(C)(1)(A))

ALL PLACARDS SHALL BE OF WEATHER PROOF CONSTRUCTION, BACKGROUND ON ALL PLACARDS SHALL BE RED WITH WHITE LETTERING U.O.N. PLACARD SHALL BE MOUNTED DIRECTLY ON THE EXISTING UTILITY ELECTRICAL SERVICE.FASTENERS APPROVED BY THE LOCAL JURISDICTION

NOTE:ALL SIGNAGE CANNOT BE HAND WRITTEN NEC 110.21

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





# MSE PERC 60

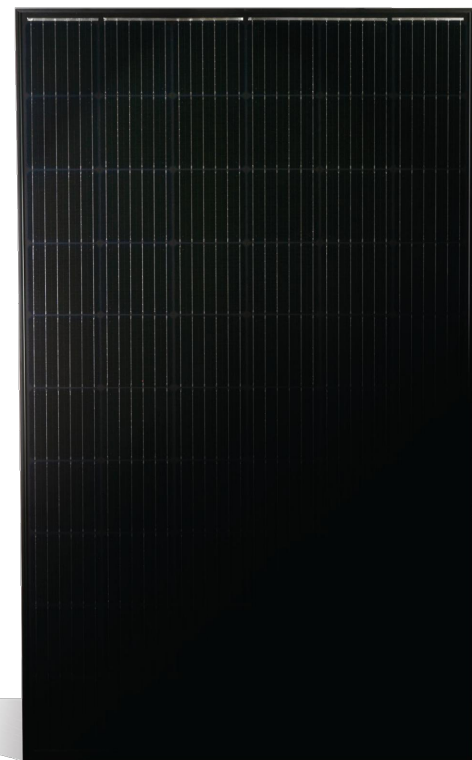
MISSION SOLAR ENERGY



## 345W

Positive Power Tolerance

Class leading power output -0 to +3%



## True American Quality True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.



### Certified Reliability

- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion



### Advanced Technology

- 6 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications



### Extreme Weather Resilience

- Up to 5,600 Pa front load & 5,631 Pa back load
- Tested load to UL 61730
- 40 mm frame



### BAA Compliant for Government Projects

- Buy American Act
- American Recovery & Reinvestment Act

### FRAME-TO-FRAME WARRANTY

Degradation guaranteed not to exceed 2% in year one and 0.58% annually from years two to 30 with 84.08% capacity guaranteed in year 25. For more information, visit [www.missionsolar.com/warranty](http://www.missionsolar.com/warranty)

### CERTIFICATIONS



UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

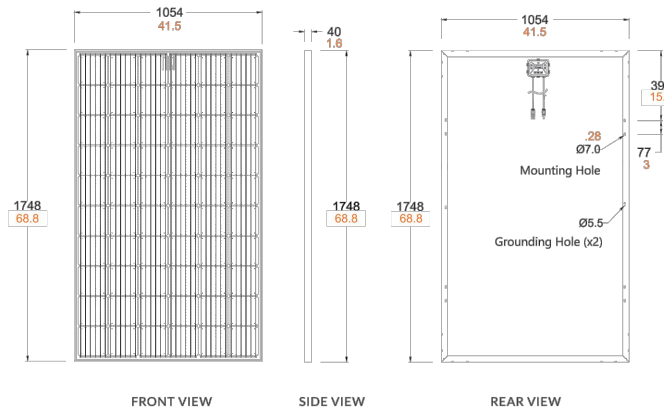


Class Leading  
340-350W

# MSE PERC 60

### BASIC DIMENSIONS

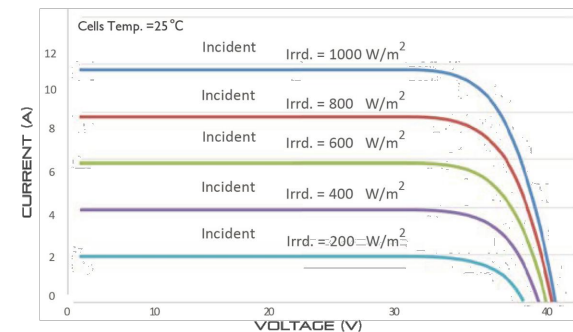
[UNITS: MM/IN]



### CURRENT-VOLTAGE CURVE

MSE345SX5T: 345WP, 60 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



### CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730



## Mission Solar Energy

8303 S. New Braunfels Ave., San Antonio, Texas 78235  
[www.missionsolar.com](http://www.missionsolar.com) | [info@missionsolar.com](mailto:info@missionsolar.com)

Mission Solar Energy reserves the right to make specification changes without notice.  
C-SA2-MKTG-0025 REV 4 05/05/2021

### ELECTRICAL SPECIFICATION

PRODUCT TYPE	MSExxxSX5T (xxx = P <sub>max</sub> )	340	345	350
Power Output	P <sub>max</sub> W <sub>p</sub>	340	345	350
Module Efficiency	%	18.5	18.7	19.0
Tolerance	%	0/+3	0/+3	0/+3
Short Circuit Current	I <sub>sc</sub> V	10.86	10.92	10.97
Open Circuit Voltage	V <sub>oc</sub> V	40.82	41.00	41.18
Rated Current	I <sub>mp</sub> V	10.24	10.34	10.44
Rated Voltage	V <sub>mp</sub> V	33.20	33.37	33.52
Fuse Rating	A	20	20	20
System Voltage	V	1,000	1,000	1,000

### TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	44.43°C (±3.7%)
Temperature Coefficient of P <sub>max</sub>	-0.361%/°C
Temperature Coefficient of V <sub>oc</sub>	-0.262%/°C
Temperature Coefficient of I <sub>sc</sub>	0.039%/°C

### OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°C (-40°F) to +85°C (185°F)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1
Front & Back Load (UL Standard)	Up to 5,600 Pa front and 5,631 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

### MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	60 cells (6x10)
Module Dimension	1,748mm x 1,054mm x 40mm
Weight	20.3 kg (44.8 lbs.)
Front Glass	3.2mm, tempered, low-iron, anti-reflective
Frame	Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.0m, Wire 4mm <sup>2</sup> (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

### SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	345 W Bin
53'	Most States	34	884	304.98 kW
Double Stack	CA	28	728	251.16 kW

PALLET [26 PANELS]			
Weight	Height	Width	Length
1,263 lbs. (573 kg)	47.5 in (120.65 cm)	46 in (116.84 cm)	70.25 in (178.43 cm)



Sustainable Energy & Lighting Solutions  
Your future is brighter with us!

## SYSTEM INFORMATION

DC SYSTEM SIZE : 10350W  
AC SYSTEM SIZE : 9145W  
CEC AC SYSTEM SIZE : 8871W  
MODULES:  
(30) MISSION SOLAR PREC 60 MSE345SX5T 345W  
INVERTER:  
(30) ENPHASE IQ7PLUS-72-E-US  
BATTERY:  
(1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH BRANCH  
DETAILS:  
3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)  
ESTIMATED FIRST YEAR PRODUCTION:12,412 kWh

## ENGINEER OF RECORD

## CUSTOMER INFORMATION

NAME&ADDRESS:  
DANNY RICHARDS  
19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

## MODULE SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-6.0



Data Sheet  
**Enphase Microinverters**  
 Region: AMERICAS

## Enphase IQ 7, IQ 7+, and IQ 7X Microinverters

with EN4 bulkhead

The high-powered smart grid-ready **Enphase IQ 7 Series Microinverters™** with Enphase EN4 bulkhead dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7, IQ 7+, and IQ 7X Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

### Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014, 2017, & 2020)
- Integrated Enphase EN4 bulkhead allows for direct connection to PV modules with TE PV4S SOLARLOK connectors or other intermatable connectors<sup>1</sup>

### Productive and Reliable

- Optimized for high-powered 60-cell, 72-cell<sup>2</sup>, and 96-cell<sup>3</sup> modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

### Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

1. Enphase adapters are available for use with other connectors. Consult Enphase for more information..
2. The IQ 7+ Microinverter is required to support 72-cell modules.
3. The IQ 7X Microinverter is required to support 96-cell modules.

## Enphase IQ 7 and IQ 7+ Microinverters with EN4 bulkhead

INPUT DATA (DC)	IQ7-60-E-US	IQ7PLUS-72-E-US	IQ7X-96-E-US
Commonly used module pairings <sup>4</sup>	235 W - 350 W +	235 W - 440 W +	320 W - 460 W +
Module compatibility	60-cell PV modules only	60-cell and 72-cell PV modules	96-cell PV modules
Maximum input DC voltage	48 V	60 V	79.5 V
Peak power tracking voltage	27 V - 37 V	27 V - 45 V	53 V - 64 V
Operating range	16 V - 48 V	16 V - 60 V	25 V - 79.5 V
Min/Max start voltage	22 V / 48 V	22 V / 60 V	33 V / 79.5 V
Max DC short circuit current (module Isc)	15 A	15 A	10 A
Overvoltage class DC port	II	II	II
DC port backfeed current	0 A	0 A	0 A
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit		

OUTPUT DATA (AC)	IQ 7 Microinverter	IQ 7+ Microinverter	IQ 7X Microinverter
Peak output power	250 VA	295 VA	320 VA
Maximum continuous output power	240 VA	290 VA	315 VA
Nominal (L-L) voltage/range <sup>5</sup>	240 V / 208 V / 211-264 V	240 V / 208 V / 211-264 V	240 V / 208 V / 211-264 V
Maximum continuous output current	1.0 A (240 V) 1.15 A (208 V)	1.21 A (240 V) 1.39 A (208 V)	1.31 A (240 V) 1.51 A (208 V)
Nominal frequency	60 Hz	60 Hz	60 HZ
Extended frequency range	47 - 68 Hz	47 - 68 Hz	47-68 Hz
AC short circuit fault current over 3 cycles	5.8 Arms	5.8 Arms	5.8 Arms
Maximum units per 20 A (L-L) branch circuit <sup>6</sup>	16 (240 VAC) 13 (208 VAC)	13 (240 VAC) 11 (208 VAC)	12 (240 VAC) 10 (208 VAC)
Overvoltage class AC port	III	III	III
AC port backfeed current	18mA	18mA	18 mA
Power factor setting	1.0	1.0	1.0
Power factor (adjustable)	0.85 leading ... 0.85 lagging	0.85 leading ... 0.85 lagging	0.85 leading ... 0.85 lagging

EFFICIENCY	@240 V	@208 V	@240 V	@208 V	@240 V	@208 V
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %	97.5 %	97.0 %

### MECHANICAL DATA

Ambient temperature range	-40°C to +65°C (-40°F to +149°F)	-40°C to +65°C (-40°F to +149°F)	-40°C to +60°C (-40°F to +140°F)
Relative humidity range	4% to 100% (condensing)		
Connector type	Enphase EN4 bulkhead		
Adapters <sup>7</sup> (optional)	1. ECA-EN4-S22: DC adapter, EN4 to Multi-Contact MC4 type, 150 mm (5.9in) 2. ECA-EN4-S22-L: DC adapter, EN4 to Multi-Contact MC4 type, 600 mm (23.6in) 3. ECA-EN4-FW: DC adapter, EN4 to unterminated cable, 150 mm (5.9in), for wiring of any DC connector type.		
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)		
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		
Environmental category / UV exposure rating	NEMA Type 6 / outdoor		

### FEATURES

Communication	Power Line Communication (PLC)
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect means required by NEC 690 and C22.1-2018 Rule 64-220.
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, 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 Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.

4. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.
5. Nominal voltage range can be extended beyond nominal if required by the utility.
6. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.
7. Adapters 1 and 2 are qualified per UL subject 9703. Adapter 3 requires installers to field install their choice of connector.

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

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## SYSTEM INFORMATION

DC SYSTEM SIZE : 10350W  
 AC SYSTEM SIZE : 9145W  
 CEC AC SYSTEM SIZE : 8871W  
 MODULES:  
 (30) MISSION SOLAR PREC 60 MSE345SX5T 345W  
 INVERTER:  
 (30) ENPHASE IQ7PLUS-72-E-US  
 BATTERY:  
 (1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH BRANCH  
 DETAILS:  
 3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)  
 ESTIMATED FIRST YEAR PRODUCTION:12,412 kWh

## ENGINEER OF RECORD

## CUSTOMER INFORMATION

NAME&ADDRESS:  
 DANNY RICHARDS  
 19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
 35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

## INVERTER SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
 DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-6.1



To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



## Enphase IQ Combiner 3-ES/3C-ES

X-IQ-AM1-240-3-ES  
X-IQ-AM1-240-3C-ES



The **Enphase IQ Combiner 3-ES/3C-ES™** with Enphase IQ Envoy™ and integrated LTE-M1 cell modem (included only with IQ Combiner 3C-ES) consolidates interconnection equipment into a single enclosure and streamlines PV 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 Envoy for communication and control
- Includes LTE-M1 cell modem (included only with IQ Combiner 3C-ES)
- Includes solar shield to match Ensemble esthetics 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

- Reduced size from IQ Combiner+ (X-IQ-AM1-240-2)
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A 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 Combiner SKU's
- UL listed

## Enphase IQ Combiner 3-ES / 3C-ES

### MODEL NUMBER

IQ Combiner 3-ES (X-IQ-AM1-240-3-ES)	IQ Combiner 3-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the Encharge storage system and Enpower smart switch and to deflect heat.
IQ Combiner 3C-ES (X-IQ-AM1-240-3C-ES)	IQ Combiner 3C-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect LTE-M1 (CELLMODEM-M1), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the Encharge storage system and Enpower smart switch and to deflect heat.

### ACCESSORIES and REPLACEMENT PARTS

Ensemble Communications Kit (COMMS-CELLMODEM-M1)	(not included, order separately)
Ensemble Communications Kit (COMMS-CELLMODEM-M1)	Includes COMMS-KIT-01 and CELLMODEM-M1 with 5-year data plan for Ensemble sites
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, 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
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for Combiner 3-ES / 3C-ES
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3-ES / 3C-ES (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3-ES / 3C-ES

### ELECTRICAL SPECIFICATIONS

Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Envoy breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Envoy
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers

### MECHANICAL DATA

Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 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° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	<ul style="list-style-type: none"> <li>• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>• Main lug combined output: 10 to 2/0 AWG copper conductors</li> <li>• Neutral and ground: 14 to 1/0 copper conductors</li> </ul> Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)

### INTERNET CONNECTION OPTIONS

Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06 4G based LTE-M1 cellular modem (included only with IQ Combiner 3C-ES). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)

### COMPLIANCE

Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)

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## SYSTEM INFORMATION

DC SYSTEM SIZE	: 10350W
AC SYSTEM SIZE	: 9145W
CEC AC SYSTEM SIZE	: 8871W
MODULES:	(30) MISSION SOLAR PREC 60 MSE345SX5T 345W
INVERTER:	(30) ENPHASE IQ7PLUS-72-E-US
BATTERY:	(1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH BRANCH
DETAILS:	3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)
ESTIMATED FIRST YEAR PRODUCTION:	12,412 kWh

## ENGINEER OF RECORD

## CUSTOMER INFORMATION

NAME&ADDRESS:  
DANNY RICHARDS  
19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

## COMBINER SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-6.2



To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)





## Enphase Encharge 10

The **Enphase Encharge 10™** all-in-one AC-coupled storage system is **reliable, smart, simple, and safe**. It is comprised of three base Encharge 3™ storage units, has a total usable energy capacity of 10.08 kWh and twelve embedded grid-forming microinverters with 3.84 kW power rating. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.



### Reliable

- Proven high reliability IQ Series Microinverters
- Ten-year limited warranty
- Three independent Encharge storage base units
- Twelve embedded IQ 8X-BAT Microinverters
- Passive cooling (no moving parts/fans)

### Smart

- Grid-forming capability for backup operation
- Remote software and firmware upgrade
- Mobile app-based monitoring and control
- Support for self consumption
- Utility time of use (TOU) optimization

### Simple

- Fully integrated AC battery system
- Quick and easy plug-and-play installation
- Interconnects with standard household AC wiring

### Safe

- Cells safety tested
- Lithium iron phosphate (LFP) chemistry for maximum safety and longevity

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



## Enphase Encharge 10

MODEL NUMBER	
ENCHARGE-10-1P-NA	Encharge 10 battery storage system with integrated Enphase Microinverters and battery management unit (BMU). Includes: - Three Encharge 3.36 kWh base units (B03-A01-US00-1-3) - One Encharge 10 cover kit with cover, wall mounting bracket, watertight conduit hubs, and interconnect kit for wiring between batteries (B10-C-1050-0)
ACCESSORIES	
ENCHARGE-HNDL-R1	One set of Encharge base unit installation handles
OUTPUT (AC) @ 240 VAC <sup>1</sup>	
Rated (continuous) output power	3.84 kVA
Peak output power	5.7 kVA (10 seconds)
Nominal voltage / range	240 / 211 – 264 VAC
Nominal frequency / range	60 / 57 – 61 Hz
Rated output current	16 A
Peak output current	24.6A (10 seconds)
Power factor (adjustable)	0.85 leading ... 0.85 lagging
Maximum units per 20 A branch circuit	1 unit (single phase)
Interconnection	Single-phase
Maximum AC short circuit fault current over 3 cycles	69.6 Arms
Round trip efficiency <sup>2</sup>	89%
BATTERY	
Total capacity	10.5 kWh
Usable capacity	10.08 kWh
Round trip efficiency	96%
Nominal DC voltage	67.2 V
Maximum DC voltage	73.5 V
Ambient operating temperature range	-15° C to 55° C (5° F to 131° F) non-condensing
Optimum operating temperature range	0° C to 30° C (32° F to 86° F)
Chemistry	Lithium iron phosphate (LFP)
MECHANICAL DATA	
Dimensions (WxHxD)	1070 mm x 664 mm x 319 mm (42.13 in x 26.14 in x 12.56 in)
Weight	Three individual 44.2 kg (97.4 lbs) base units plus 21.1 kg (48.7 lbs) cover and mounting bracket; total 154.7 kg (341 lbs)
Enclosure	Outdoor – NEMA type 3R
IQ 8X-BAT microinverter enclosure	NEMA type 6
Cooling	Natural convection – No fans
Altitude	Up to 2500 meters (8200 feet)
Mounting	Wall mount
FEATURES AND COMPLIANCE	
Compatibility	Compatible with grid-tied PV systems. Compatible with Enphase M215/M250 and IQ Series Micros, Enphase Enpower, and Enphase IQ Envoy for backup operation.
Communication	Wireless 2.4 GHz
Services	Backup, self-consumption, TOU, Demand Charge, NEM Integrity
Monitoring	Enlighten Manager and MyEnlighten monitoring options; API integration
Compliance	UL 9540, UN 38.3, UL 9540A, UL 1998, UL 991, NEMA Type 3R, AC156 EMI: 47 CFR, Part 15, Class B, ICES 003 Cell Module: UL 1973, UN 38.3 Inverters: UL 62109-1, IEC 62109-2, UL 1741SA, CAN/CSA C22.2 No. 107.1-16, and IEEE 1547
LIMITED WARRANTY	
Limited Warranty <sup>3</sup>	>70% capacity, up to 10 years or 4000 cycles

1. Supported in backup/off grid operations  
2. AC to Battery to AC at 50% power rating.  
3. Whichever occurs first. Restrictions apply.

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

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## SYSTEM INFORMATION

DC SYSTEM SIZE : 10350W  
AC SYSTEM SIZE : 9145W  
CEC AC SYSTEM SIZE : 8871W  
MODULES:  
(30) MISSION SOLAR PREC 60 MSE345SX5T 345W  
INVERTER:  
(30) ENPHASE IQ7PLUS-72-E-US  
BATTERY:  
(1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH  
BRANCH DETAILS:  
3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)

## ENGINEER OF RECORD

## CUSTOMER INFORMATION

NAME&ADDRESS:  
DANNY RICHARDS  
19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

## ENPHASE ENERGY ENCHARGE 10 SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-6.3

# Enphase Enpower

The **Enphase Enpower™** smart switch connects the home to grid power, the Encharge storage system, and solar PV. It provides microgrid interconnection device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.



### Reliable

- Durable NEMA type 3R enclosure
- Ten-year limited warranty

### Smart

- Controls safe connectivity to the grid
- Automatically detects grid outages
- Provides seamless transition to backup

### Simple

- Connects to the load or service equipment<sup>1</sup> side of the main load panel
- Centered mounting brackets support single stud mounting
- Supports conduit entry from the bottom, bottom left side, and bottom right side
- Supports whole home and partial home backup and subpanel backup
- Up to 200A main breaker support
- Includes neutral-forming transformer for split phase 120/240V backup operation

1. Enpower is not suitable for use as service equipment in Canada.

To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)



## Enphase Enpower

### MODEL NUMBER

EP200G101-M240US00	Enphase Enpower smart switch with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and storage installations.
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### ACCESSORIES and REPLACEMENT PARTS

XA-E3-PCBA-ENS	Replacement Enpower controller printed circuit board
Circuit breakers (as needed) <sup>2,3</sup>	Not included, must order separately:
BRK-100A-2P-240V	• Main breaker, 2 pole, 100A, 25kAIC, CSR2100N or CSR2100
BRK-125A-2P-240V	• Main breaker, 2 pole, 125A, 25kAIC, CSR2125N
BRK-150A-2P-240V	• Main breaker, 2 pole, 150A, 25kAIC, CSR2150N
BRK-175A-2P-240V	• Main breaker, 2 pole, 175A, 25kAIC, CSR2175N
BRK-200A-2P-240V	• Main breaker, 2 pole, 200A, 25kAIC, CSR2200N
BRK-20A-2P-240V-B	• Circuit breaker, 2 pole, 20A, 10kAIC, BR220B
BRK-30A-2P-240V	• Circuit breaker, 2 pole, 30A, 10kAIC, BR230B
BRK-40A-2P-240V	• Circuit breaker, 2 pole, 40A, 10kAIC, BR240B
BRK-60A-2P-240V	• Circuit breaker, 2 pole, 60A, 10kAIC, BR260
BRK-80A-2P-240V	• Circuit breaker, 2 pole, 80A, 10kAIC, BR280
EP200G-HNDL-R1	Enpower installation handle kit (order separately)

### ELECTRICAL SPECIFICATIONS

Assembly rating	Continuous operation at 100% of its rating
Nominal voltage / range (L-L)	240 VAC / 100 - 310 VAC
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)
Nominal frequency / range	60 Hz / 56 - 63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160A
Maximum output overcurrent protection device	200A
Maximum input overcurrent protection device	200A
Maximum overcurrent protection device rating for storage branch circuit <sup>4</sup>	80A
Maximum overcurrent protection device rating for PV combiner branch circuit <sup>4</sup>	80A
Neutral Forming Transformer (NFT)	<ul style="list-style-type: none"> <li>• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral</li> <li>• Continuous rated power: 3600VA</li> <li>• Maximum continuous unbalance current: 30A @ 120V</li> <li>• Peak rated power: 8800VA for 30 seconds</li> <li>• Peak unbalanced current: 80A @ 120V for 30 seconds</li> </ul>

### MECHANICAL DATA

Dimensions (WxHxD)	50cm x 91.6cm x 24.6cm (19.7 in x 36 in x 9.7 in)
Weight	38.5 kg (85 lbs)
Ambient temperature range	-40° C to +50° C (-40° F to 122° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction
Altitude	To 2500 meters (8200 feet)

### WIRE SIZES

Connections	<ul style="list-style-type: none"> <li>• Main lugs, backup load lugs, and CSR breakers</li> <li>• BR breakers (wire provided)</li> <li>• AC combiner lugs, Encharge lugs, and generator (reserved for future use) lugs</li> <li>• Neutral (large lugs)</li> </ul>	<ul style="list-style-type: none"> <li>Cu/AL: 2 AWG - 300 KCMIL</li> <li>6 AWG</li> <li>14 AWG - 2 AWG</li> </ul>
Neutral and ground bars	<ul style="list-style-type: none"> <li>Large holes (5/16-24 UNF)</li> <li>Small holes (10-32 UNF)</li> </ul>	<ul style="list-style-type: none"> <li>14 AWG - 1/0 AWG</li> <li>14 AWG - 6 AWG</li> </ul>

### COMPLIANCE

Compliance	UL 1741, UL 1741 SA, UL1998, UL869A <sup>5</sup> , UL67 <sup>5</sup> , UL508 <sup>5</sup> , UL50E <sup>5</sup> , CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156.
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2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.  
3. The kAIC of Enpower is the same as the kAIC of the main breaker being installed as listed.  
4. Not included. Installer must provide properly rated breaker per circuit breaker list above.  
5. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)

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## SYSTEM INFORMATION

DC SYSTEM SIZE	: 10350W
AC SYSTEM SIZE	: 9145W
CEC AC SYSTEM SIZE	: 8871W
MODULES:	(30) MISSION SOLAR PREC 60 MSE345SX5T 345W
INVERTER:	(30) ENPHASE IQ7PLUS-72-E-US
BATTERY:	(1) ENPHASE ENERGY ENCHARGE 10, 10.5KWH BRANCH
DETAILS:	3 BRANCH OF 10 MICRO INVERTERS(10 MODULES)
ESTIMATED FIRST YEAR PRODUCTION:	12,412 kWh

## ENGINEER OF RECORD

## CUSTOMER INFORMATION

NAME&ADDRESS:  
DANNY RICHARDS  
19 KENTUCKY DERBY LN, LILLINGTON, NC 27546  
35°32'87.7"N 78°99'49.9"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

## ENPHASE ENERGY ENPOWER SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:  
DM/

SCALE:AS NOTED PAPER SIZE:17"x11"

DATE:2/8/22 REV:A PV-6.4



DESCRIPTION:

SNAPNRACK, ULTRA RAIL COMP KIT

DRAWN BY:

mwatkins

REVISION:

B

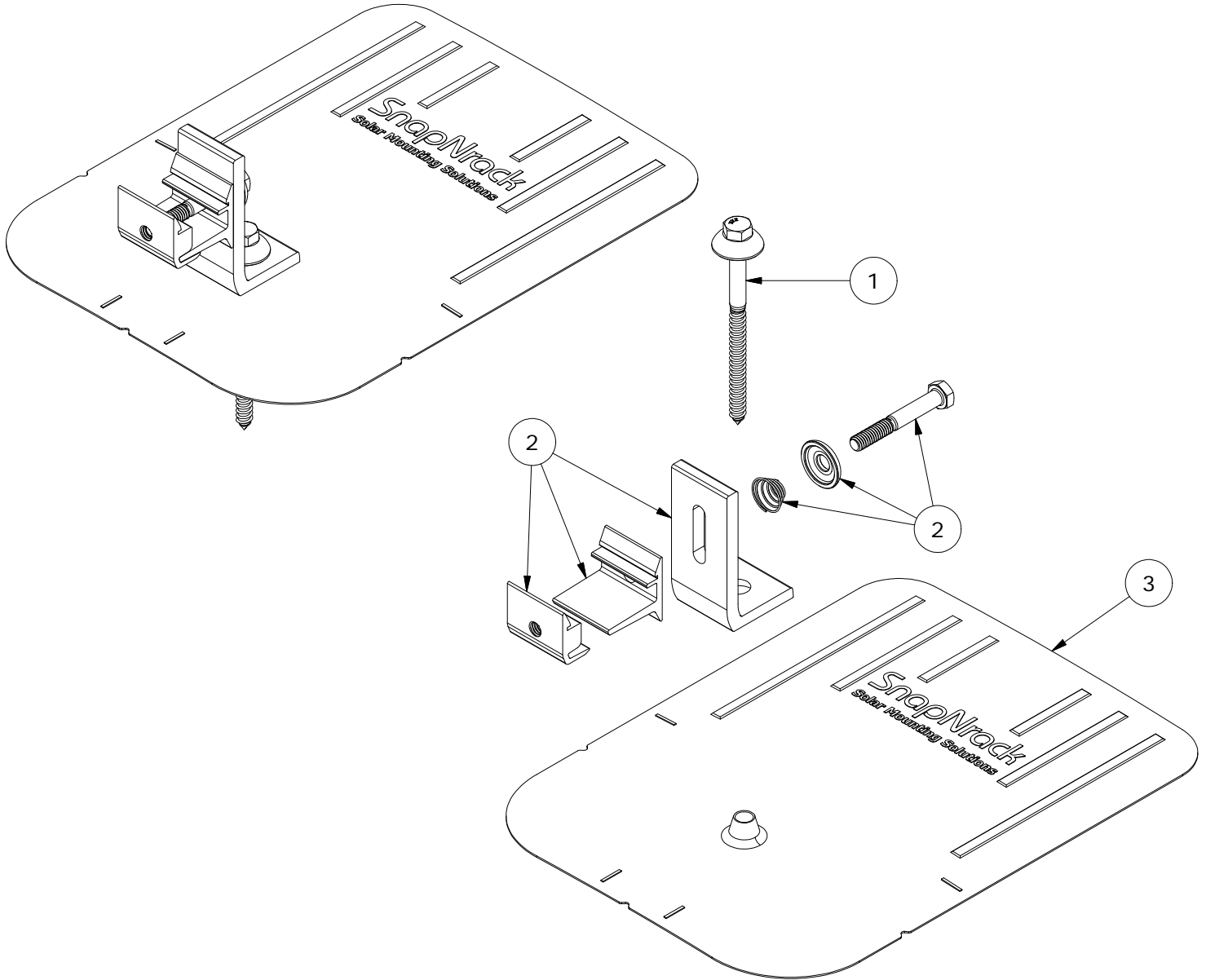
**SnapNrack™**  
Solar Mounting Solutions

PART NUMBER(S):

SEE BELOW

595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA  
PHONE (415) 580-6900 • FAX (415) 580-6902

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PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	242-92266	SNAPNRACK, UMBRELLA LAG, TYPE 3, 4IN, SS
2	1	242-01219, 242-01220	SNAPNRACK, ULTRA FOOT FOR U FLASHING, SILVER / BLACK
3	1	232-01375, 232-01376	SNAPNRACK, COMP FLASHING, 9IN X 12IN, SILVER / BLACK ALUM

MATERIALS:

6000 SERIES ALUMINUM, STAINLESS STEEL, RUBBER

DESIGN LOAD (LBS):

802 UP, 1333 DOWN, 356 SIDE

ULTIMATE LOAD (LBS):

2005 UP, 4000 DOWN, 1070 SIDE

TORQUE SPECIFICATION:

12 LB-FT

CERTIFICATION:

UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM UL SUBJECT 2582

WEIGHT (LBS):

0.80

DESCRIPTION:

SNAPNRACK, ULTRA RAIL COMP KIT

DRAWN BY:

mwatkins

SnapNrack™  
Solar Mounting Solutions

PART NUMBER(S):

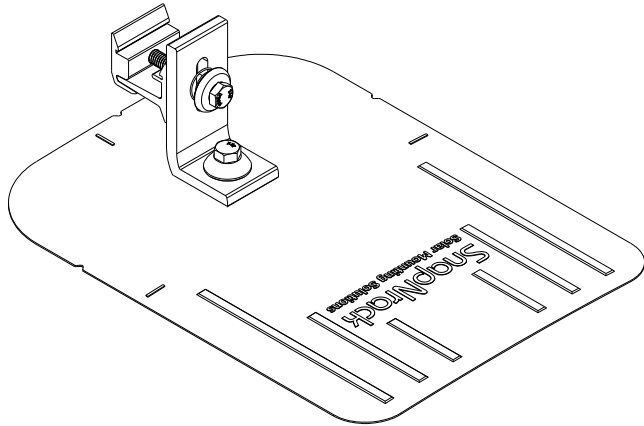
SEE BELOW

REVISION:

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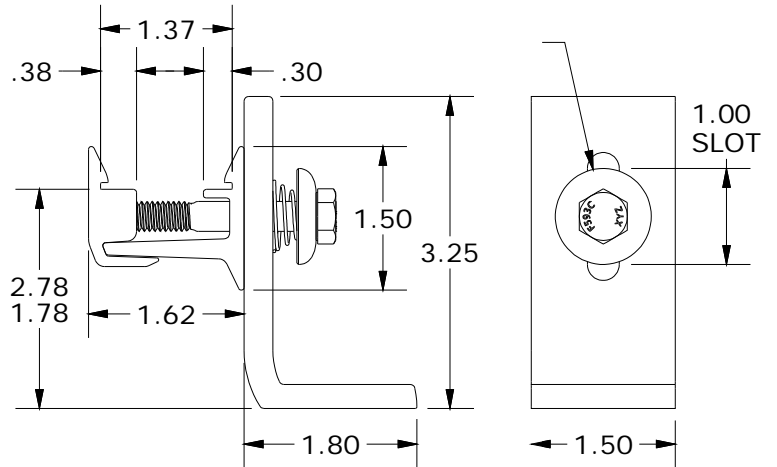
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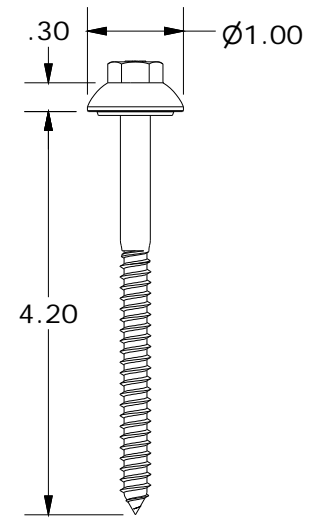
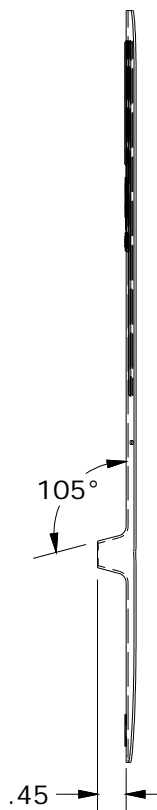
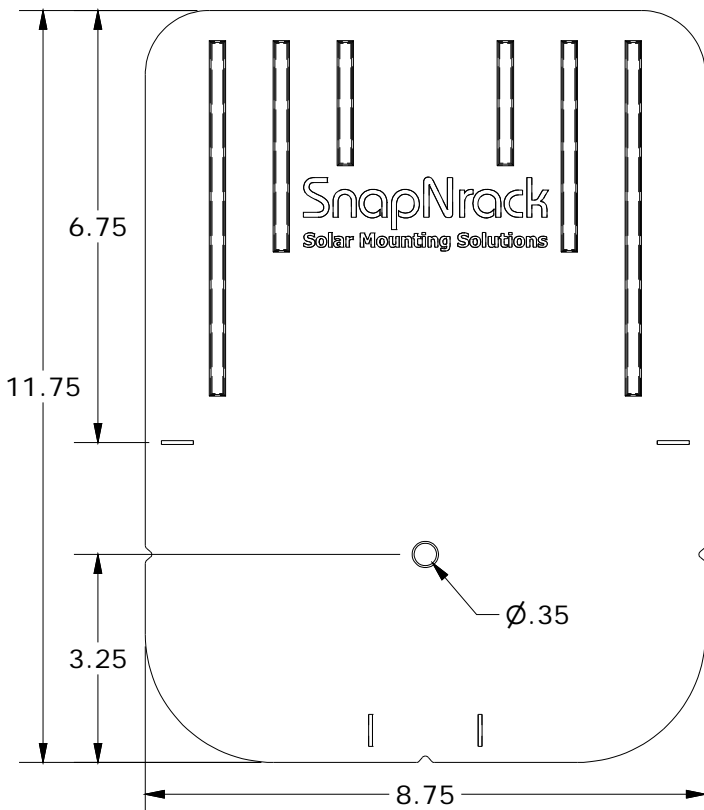
UMBRELLA L FOOT PROPERTIES

SKU	DESCRIPTION
242-01219	ULTRA RAIL UMBRELLA L FOOT, SILVER
242-01220	ULTRA RAIL UMBRELLA L FOOT, BLACK



COMP FLASHING PROPERTIES

SKU	DESCRIPTION
232-01375	COMP FLASHING, 9" X 12", BLACK ALUM
232-01376	COMP FLASHING, 9" X 12", SILVER ALUM



ALL DIMENSIONS IN INCHES



April 23, 2019

Page 3 of 4

**Statewide Uniform Requirement of Inspection Procedures  
for Solar Photovoltaic Systems Installed on Residential Rooftops  
Option No. 1**

**1. Application for Electrical and Building Permit must include:**

- a. Sketch of the electrical design that complies with the NEC
- b. Sketch of the equipment's structural mounting design. A North Carolina registered design professional will be required to seal the structural design at the time of application if any of the following exist and are attested to by the applicant:
  - i. The weight of the PV system exceeds three (3) pounds per square foot (psf),
  - ii. The roof possesses more than one (1) layer of asphalt shingles,
  - iii. The roofing material consists of a type other than asphalt shingles or metal, or
  - iv. The roof is located in a 140 mph or greater wind zone

**2. Electrical Rough-in Inspection at the Project's Location includes:**

- a. PV equipment must be present on-site with the manufacturer's instructions
- b. Listing and labeling of all parts to be assembled on the roof
- c. Detailed instructions for the rapid shutdown of the system at the roof
- d. Inverter location
- e. Type and size of conductors to be used
- f. Details for how the metal frame(s) and the PV electrical system is to be grounded

**3. Electrical Final Inspection Requirements:**

- a. All equipment exceeding 8 feet above grade must be clearly photographed or recorded to show the following: (Hard copy provided to field inspector at final inspection, to be kept on file)
  - i. All connections (splices, terminations, joints, etc.)
  - ii. The measurement of any items that have a distance value within the NEC
  - iii. Mounting hardware
  - iv. The equipment in the photographs are actually located at the property where the work is being inspected (neighboring or landmark items in some of the images should be noted)
- b. All electrical equipment not exceeding 8 feet from grade shall be inspected in the usual manner

**4. Building Final Inspection Requirements:**

- a. A field inspection of the installation has been performed by a North Carolina registered design professional or a person under the direct supervisory control of the registered design professional. This field inspection must be definitively acknowledged in the required document below.
- b. Present a signed written document from a North Carolina registered design professional with a valid seal stating all of the following:
  - i. The PV equipment's structural installation has been designed and inspected,
  - ii. The equipment will not create a negative impact on the building's structural design, including any additional loads imposed (dead, snow, wind), and
  - iii. The installation is in compliance with the North Carolina Residential Code

April 23, 2019

Page 4 of 4

**Statewide Uniform Requirement of Inspection Procedures  
for Solar Photovoltaic Systems Installed on Residential Rooftops  
Option No. 2**

**1. Application for Electrical and Building Permit must include:**

- a. Sketch of the electrical design that complies with the NEC
- b. Electrical details of the equipment including:
  - i. Manufacturer's instructions
  - ii. Documentation that the equipment is listed by a qualified evaluation laboratory
  - iii. Instructions for the rapid shutdown of the system at the roof
  - iv. Inverter location
  - v. Type and size of conductors to be used
  - vi. How the metal frame(s) and the PV electrical system is to be grounded
- c. Sketch of the equipment's structural mounting design. A North Carolina registered design professional will be required to seal the structural design at the time of application if any of the following exist and are attested to by the applicant:
  - i. The weight of the PV system exceeds three (3) pounds per square foot (psf),
  - ii. The roof possesses more than one (1) layer of asphalt shingles,
  - iii. The roofing material consists of a type other than asphalt shingles or metal, or
  - iv. The roof is located in a 140 mph or greater wind zone

**2. Electrical Final Inspection Requirements:**

- a. All equipment exceeding 8 feet above grade must be clearly photographed or recorded to show the following: (Hard copy provided to field inspector at final inspection, to be kept on file)
  - i. Verification of all details described in Part 1.b. of the electrical permit application procedure (this includes photos of the listing laboratory's marking(s) on the equipment)
  - ii. All connections (splices, terminations, joints, etc.)
  - iii. The measurement of any items that have a distance value within the NEC
  - iv. Mounting hardware
  - v. The equipment in the photographs are actually located at the property where the work is being inspected (neighboring or landmark items in some of the images should be noted)
- b. All electrical equipment not exceeding 8 feet from grade shall be inspected in the usual manner

**3. Building Final Inspection Requirements:**

- a. A field inspection of the installation has been performed by a North Carolina registered design professional or a person under the direct supervisory control of the registered design professional. This field inspection must be definitively acknowledged in the required document below.
- b. Present a signed written document from a North Carolina registered design professional with a valid seal stating all of the following:
  - i. The PV equipment's structural installation has been designed and inspected,
  - ii. The equipment will not create a negative impact on the building's structural design, including any additional loads imposed (dead, snow, wind), and
  - iii. The installation is in compliance with the North Carolina Residential Code