WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

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July 8, 2022

Sustainable Energy and Lighting Solutions
8351 Palmetto Commerce Parkway, Ste. 203
Ladson, SC 29456

Scott Wyssling, PE

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Re: Engineering Services
Skatell Residence
1565 Chicora Road, Dunn, NC
17.380 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: 2x6 dimensional lumber at 24” on center.
Roof Material: Metal Roofing
Roof Slope: 22.6 degrees
Attic Access: Accessible
Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
  - Existing Roofing and framing = 7 psf
  - New Solar Panels and Racking = 3 psf
  - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 15 psf
- **Wind Load** based on ASCE 7-10
  - Ultimate Wind Speed = 115 mph (based on Risk Category II)
  - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 NCRC, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent S-5! Installation Manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. System will be attached to the metal roofing material utilizing the patented S-5 connection. Installation of the connections shall be in accordance with the manufacturer's recommendations.
3. Considering the roof slopes, the size, spacing, condition of roof, the panel supports shall be placed no greater than 48" o/c.
4. Connection on the roof is utilizing (4) ½" or #14 screws into the existing decking to resist uplift forces. Contractor to verify installation to be performed in accordance with the Unirac recommendations. Pull out values per screw are based on National Design Specification values for CDX plywood and are identified as 208 lbs/inch. Based on ½" sheathing the value per screw would be 104 lbs providing 416 lbs uplift resistance per attachment.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 NCRC, current industry standards, and is based on information supplied to us at the time of this report.

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

Scott Wyssling, PE

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NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

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76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 7/8/2022

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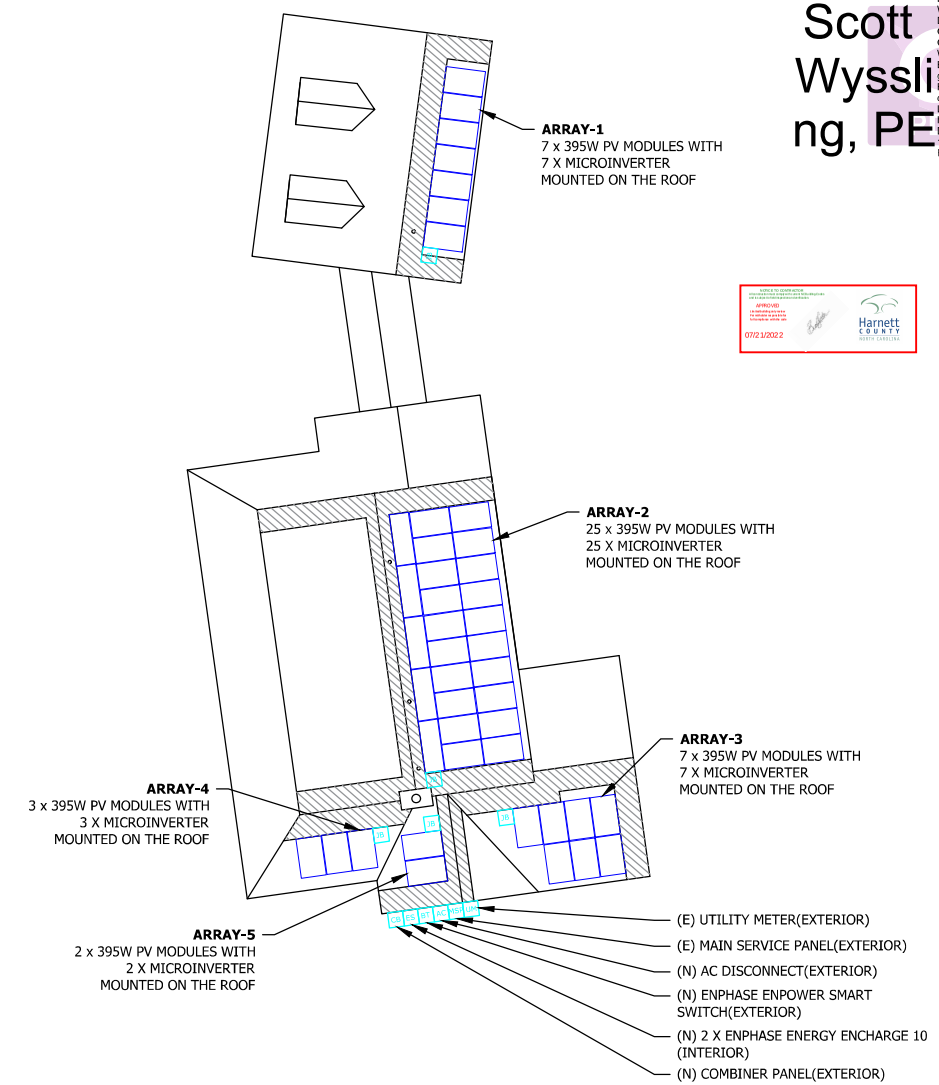
NICK SKATELL - 17.380KW DC, 12.760KW AC, 21.000KWH STORAGE SYSTEM

SITE PLAN

NOTE: CONDUIT RUN IS IN ATTIC



A	SITE PLAN
PV-1.0	SCALE: 1/16"=1'-0"

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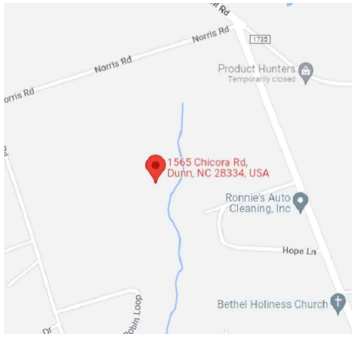
Harnett County
07/21/2022



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	115 MPH
SNOW LOAD	15 PSF

INDEX

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PV-3.1	STRUCTURAL DETAILS
PV-4.0	SINGLE LINE DIAGRAM
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PV-5.0	WARNING PLACARDS
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AC SYSTEM SIZE : 12760W
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BATTERY:
(2) ENPHASE ENERGY ENCHARGE 10, 10.5KWH
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4 BRANCH OF 11 MICRO INVERTERS(11 MODULES)

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CUSTOMER INFORMATION

NAME & ADDRESS:
NICK SKATELL
1565 CHICORA RD.,
DUNN, NC 28334
35°30'54.4"N 78°67'48.1"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

SITE PLAN

PROJECT NUMBER:

DESIGNER/CHECKED BY:
DM/

SCALE:AS NOTED	PAPER SIZE:17"x11"	
DATE:6/30/22	REV:A	PV-1.0

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 BACKFFED 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 DEVISES 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.

Scott Wyssling, PE

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SYSTEM INFORMATION

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AC SYSTEM SIZE : 12760W
MODULES:
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ENGINEER OF RECORD

NORTH CAROLINA PROFESSIONAL SEAL 040546 ENGINEER SCOTT E. WYSSLING

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76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

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35°30'54.4"N 78°67'48.1"W

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DM/

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MODULES DATA

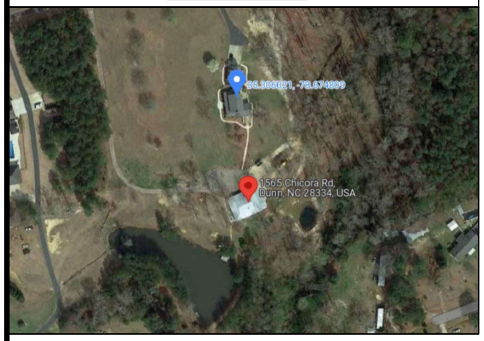
CANADIAN SOLAR CS1Y-395MS 395W	
MODULE DIMS	79.6"X39.2"X1.38"
LAG SCREWS	5/16"x3.5":2.5"MIN EMBEDMENT

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"

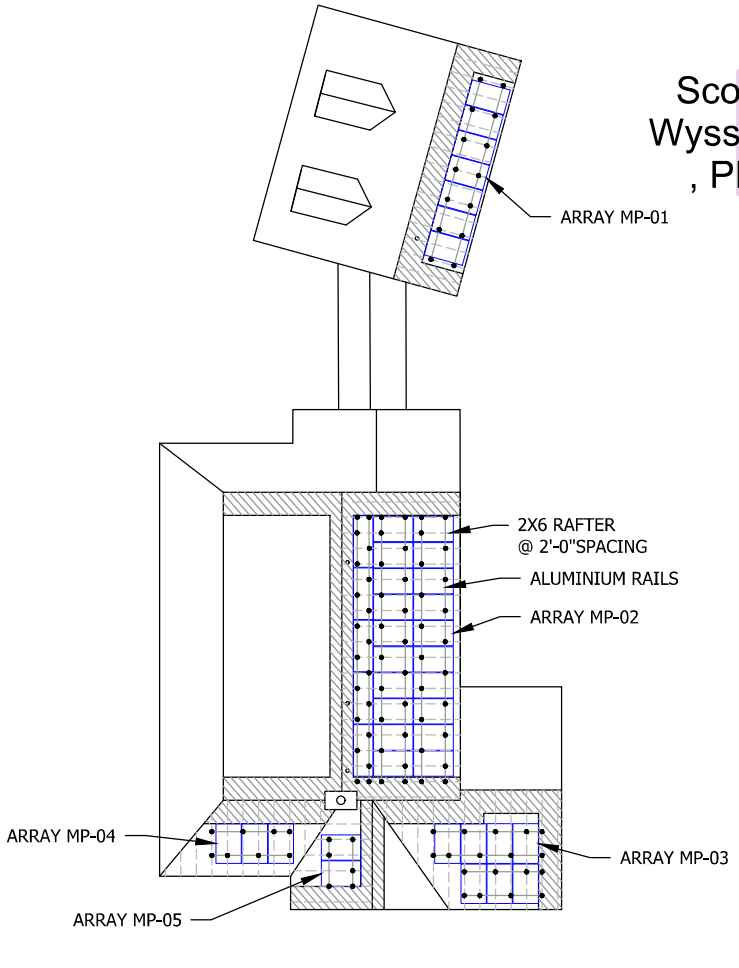
NOTE: INSTALLER TO VERIFY RAFTER SIZE, SPACING AND SLOPED SPANS, AND NOTIFY ANY DISCREPANCIES BEFORE PROCEEDING.

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	89°	22.62°	7	151.69	METAL	S-5! CORRUBRACKET	METAL DECK	RAFTERS	2 X 6	2'-0"	4'-0"	2'-0"
MP-02	82°	22.62°	25	541.75	METAL	S-5! CORRUBRACKET	METAL DECK	RAFTERS	2 X 6	2'-0"	4'-0"	2'-0"
MP-03	172°	22.62°	7	151.69	METAL	S-5! CORRUBRACKET	METAL DECK	RAFTERS	2 X 6	2'-0"	4'-0"	2'-0"
MP-04	172°	22.62°	3	65.01	METAL	S-5! CORRUBRACKET	METAL DECK	RAFTERS	2 X 6	2'-0"	4'-0"	2'-0"
MP-05	268°	22.62°	2	43.34	METAL	S-5! CORRUBRACKET	METAL DECK	RAFTERS	2 X 6	2'-0"	4'-0"	2'-0"



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B | MOUNTING DETAILS
PV-3.0 | SCALE: 1/16"=1'-0"

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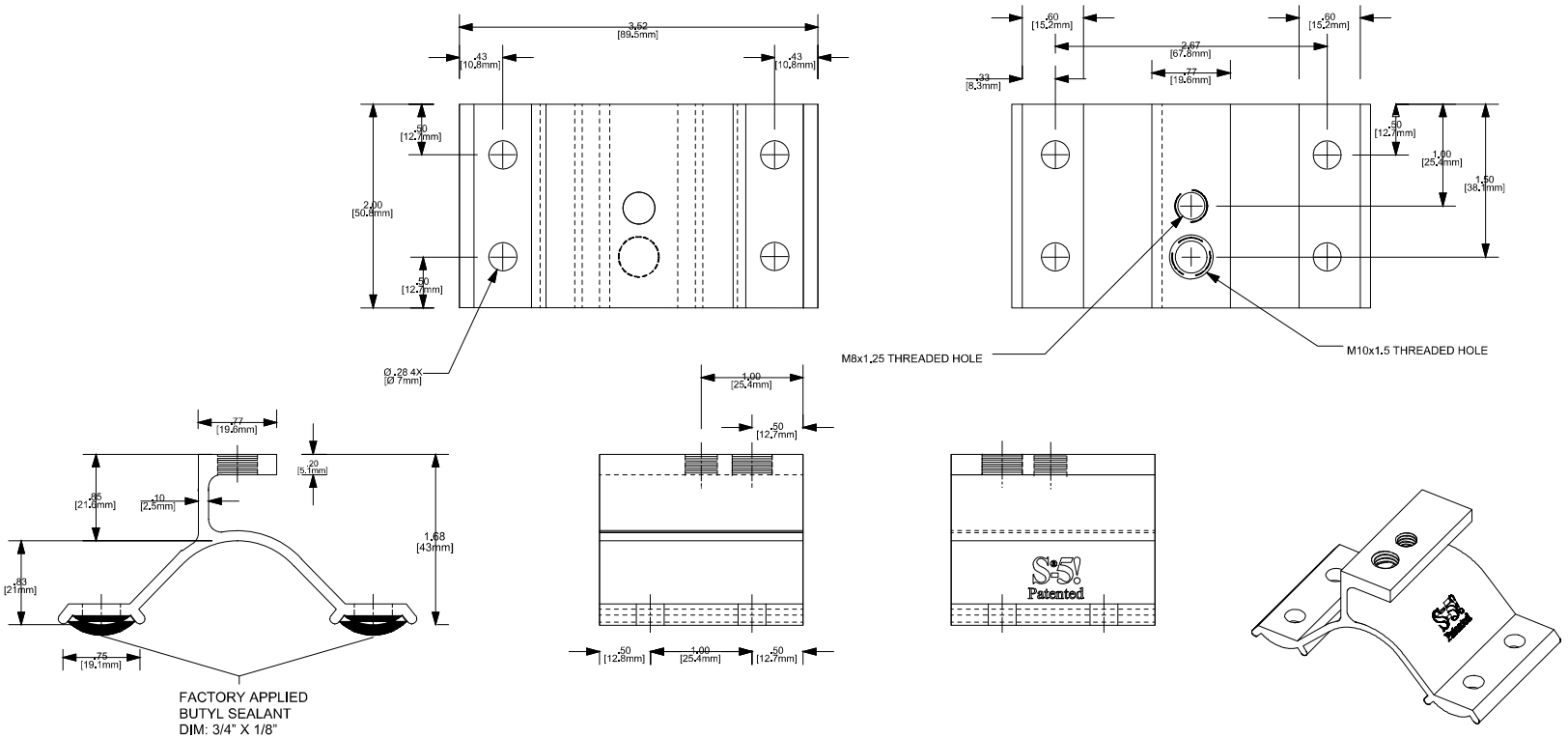

FACTORY APPLIED
BUTYL SEALANT
DIM: 3/4" X 1/8"

S-5! CORRUBRACKET

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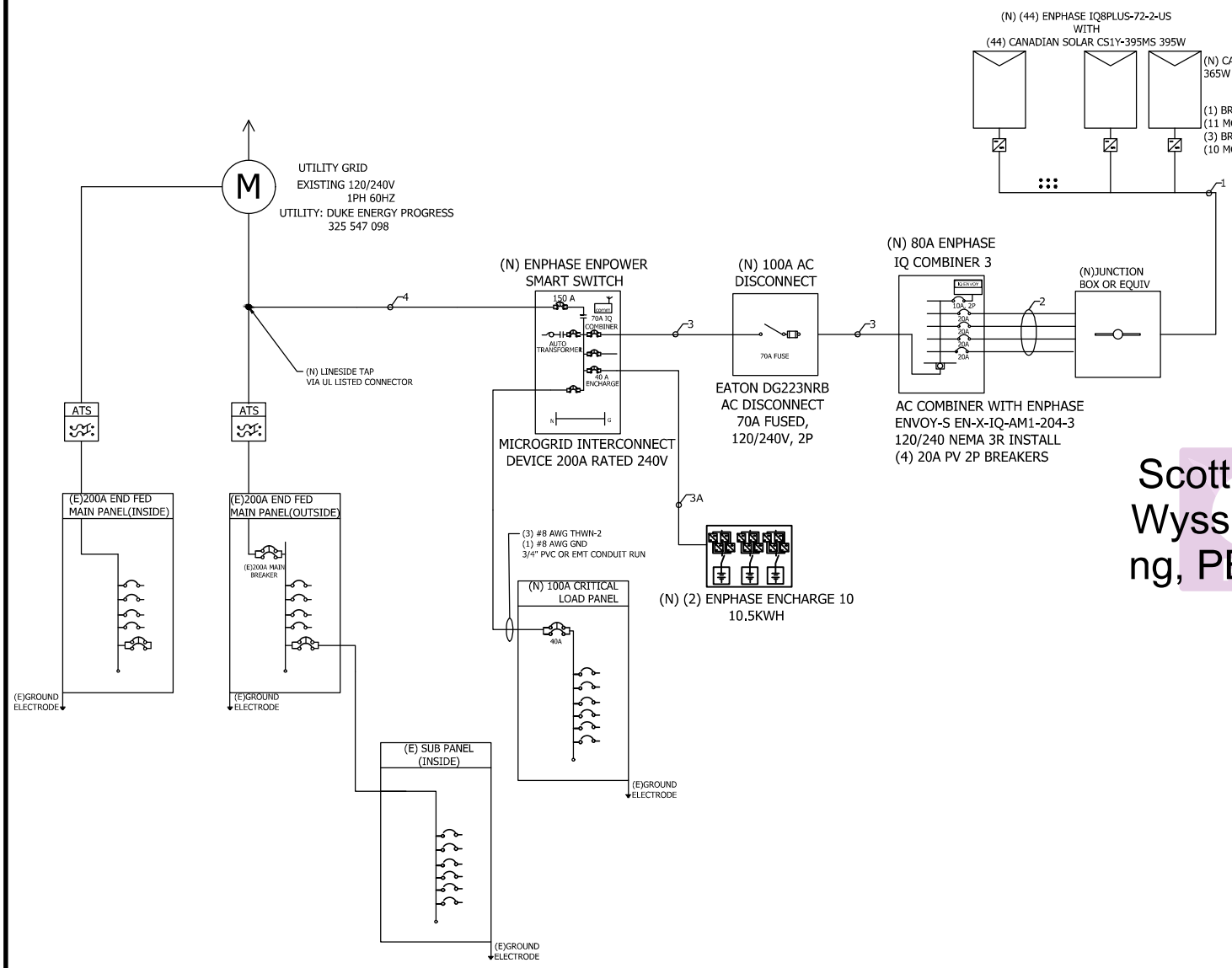
SINGLE LINE DIAGRAM: DC SYSTEM SIZE - 17.380KW DC, 12.760KW AC, 21.000KWH STORAGE SYSTEM



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North Carolina COA # P-2308

Signed 7/8/2022

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CUSTOMER INFORMATION

NAME & ADDRESS:
NICK SKATELL
1565 CHICORA RD.,
DUNN, NC 28334

35°30'54.4"N 78°67'48.1"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

SINGLE LINE DIAGRAM

PROJECT NUMBER:

DESIGNER/CHECKED BY:
DM/

SCALE:AS NOTED	PAPER SIZE:17"x11"	
DATE:6/30/22	REV:A	PV-4.0

SINGLE LINE DIAGRAM: DC SYSTEM SIZE - 17.380KW DC, 12.760KW AC, 21.000KWH STORAGE SYSTEM

MODULE SPECIFICATION	
MODEL	CANADIAN SOLAR CS1Y-395MS 395W
MODULE POWER @ STC	395W
OPEN CIRCUIT VOLTAGE:Voc	52.1V
MAX POWER VOLTAGE:Vmp	43.3V
SHORT CIRCUIT VOLTAGE:Isc	9.86A
MAX POWER CURRENT:Imp	9.13A

MICRO INVERTER SPECIFICATIONS	
MODEL	ENPHASE IQ8PLUS-72-2-US
POWER RATING	290VA
MAX OUTPUT CURRENT	1.21A
CEC WEIGHTED EFFICIENCY	97%
MAX NO OF MICRO INVERTERS/BRANCH	13
MAX DC VOLTAGE	60V

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"SCH 40 PVC	(8) 10AWG THHN/THWN-2	NONE	(1) 10 AWG THHN/THWN-2
3	1"EMT OR EQUIV	(2) 4 AWG THHN/THWN-2	(1) 4 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2
3A	1/2"EMT OR EQUIV	(2) 8 AWG THHN/THWN-2	NONE	(1) 8 AWG THHN/THWN-2
4	1-1/4"EMT OR EQUIV	(2) 1 AWG THHN/THWN-2	(1) 1 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2

ELECTRICAL CALCULATION

AC WIRE CALCULATIONS:- MATERIAL:COPPER & TEMPERATURE RATING:75°C

TAG ID	REQUIRED CONDUCTOR AMPACITY									CORRECTED AMPACITY CALCULATION							TERMINAL RATING CHECK			DERATED CONDUCTOR AMPACITY CHECK		
1	1.21	X	11	=	13.31	X	1.25	=	16.64A	25	X	0.91	X	1	=	22.75A	16.64A	<	20A	16.64A	<	22.75A
2	1.21	X	11	=	13.31	X	1.25	=	16.64A	35	X	0.91	X	0.7	=	22.30A	16.64A	<	20A	16.64A	<	22.30A
3A	16	X	2	=	32	X	1.25	=	40A	50	X	0.91	X	1	=	45.5A	40A	<	40A	40A	<	45.5A
4	1.21	X	44	=	53.24	X	1.25	=	66.55A	130	X	0.91	X	1	=	118.3A	106.55A	<	110A	106.55A	<	118.3A
	66.55			+	32 X 1.25			=	106.55A													

Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, S=Utah, L=Alpine, O=Wyssling Consulting, OU=Engineering, CN="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location: your signing location here
Date: 2022.07.08 11:35:54-06'00'
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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).

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INVERTER:
(44) ENPHASE IQ8PLUS-72-2-US
BATTERY:
(2) ENPHASE ENERGY ENCHARGE 10, 10.5KWH
BRANCH DETAILS:
4 BRANCH OF 11 MICRO INVERTERS(11 MODULES)

ENGINEER OF RECORD

NORTH CAROLINA PROFESSIONAL SEAL 040546 ENGINEER SCOTT E. WYSSLING

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

Signed 7/8/2022

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WARNING PLACARDS

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

ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
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 53.24 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

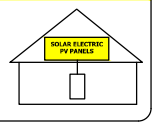
LABEL LOCATION
WEATHER RESISTANT MATERIAL, DURABLE ADHESDIVE, UL969 AS STANDARD TO WEATHER RATING (UL LISTING OF MARKINGS NOT REQUIRED), MIN ⅜" LETTER HEIGHT ARIAL OR SIMILAR FONT NON-BOLD,PLACED WITHIN THE MAIN SERVICE DISCONNECT,PLACED ON THE OUTSIDE OF THE COVER WHEN DISCONNECT IS OPERATED WITH THE 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



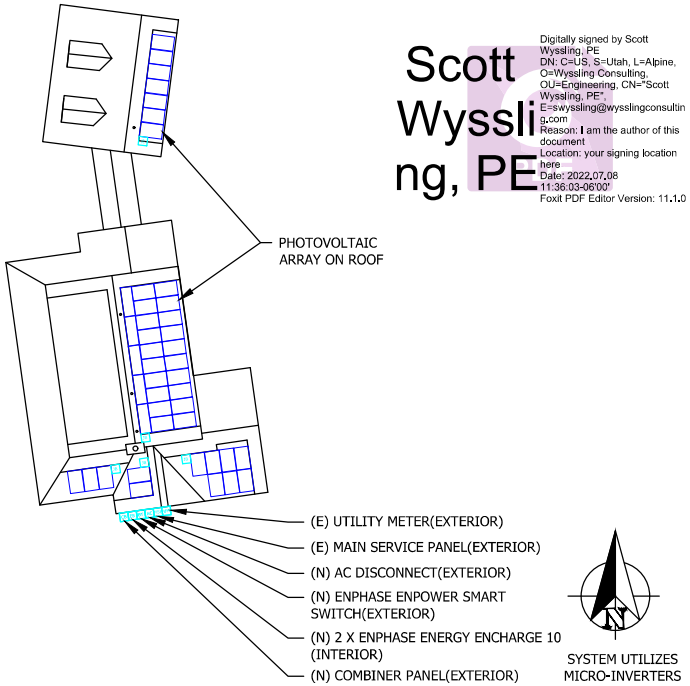
LABEL LOCATION
AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.56(C)(1)(A))

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



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NEW

CanadianSolar

HiDM5 (All-Black)

ALL-BLACK HIGH DENSITY MONO PERC MODULE

390 W ~ 405 W

CS1Y-390|395|400|405MS

MORE POWER

- Aesthetically pleasing design blends into your roof
- UP TO 20.1% — Maximize the light absorption area, module efficiency up to 20.1 %
- Low temperature coefficient (Pmax): -0.36 % / °C
- Better shading tolerance

MORE RELIABLE

- Lower internal current, lower hot spot temperature
- Minimizes micro-crack impacts
- Heavy snow load up to 7000 Pa, wind load up to 5400 Pa*

* For detailed information, please refer to Installation Manual.

15 years — **enhanced product warranty on materials and workmanship***

25 years — **linear power output warranty***

*According to the applicable Canadian Solar Limited Warranty Statement.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001: 2015 / Quality management system
ISO 14001: 2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730
UL 61730 / IEC 61701 / IEC 62716
Take-e-way

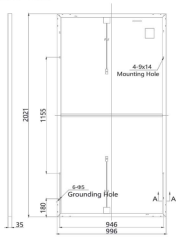
* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

Canadian Solar (USA) Inc. is committed to providing high quality solar products, solar system solutions and services to customers around the world. Canadian Solar was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey, and is a leading PV project developer and manufacturer of solar modules, with over 50 GW deployed around the world since 2001.

Canadian Solar (USA) Inc.
3000 Oak Road, Suite 400, Walnut Creek, CA 94597, USA, www.csisolar.com/na, service.ca@csisolar.com

ENGINEERING DRAWING (mm)

Rear View



Frame Cross Section A-A

Mounting Hole

ELECTRICAL DATA | STC*

CS1Y	390MS	395MS	400MS	405MS
Nominal Max. Power (Pmax)	390 W	395 W	400 W	405 W
Opt. Operating Voltage (Vmp)	43.1 V	43.3 V	43.5 V	43.7 V
Opt. Operating Current (Imp)	9.05 A	9.13 A	9.20 A	9.27 A
Open Circuit Voltage (Voc)	51.9 V	52.1 V	52.3 V	52.5 V
Short Circuit Current (Isc)	9.82 A	9.86 A	9.90 A	9.94 A
Module Efficiency	19.4%	19.6%	19.9%	20.1%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1000V (IEC/UL)			
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)			
Max. Series Fuse Rating	16 A			
Application Classification	Class A			
Power Tolerance	0 ~ + 10 W			

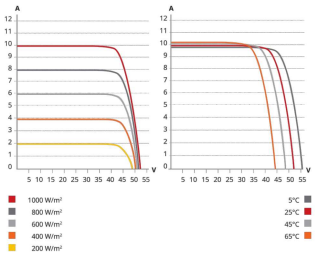
* Under Standard Test Conditions (STC) of irradiance of 1000 W/m2, spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NMOT*

CS1Y	390MS	395MS	400MS	405MS
Nominal Max. Power (Pmax)	289 W	293 W	297 W	300 W
Opt. Operating Voltage (Vmp)	39.9 V	40.1 V	40.3 V	40.4 V
Opt. Operating Current (Imp)	7.25 A	7.31 A	7.37 A	7.43 A
Open Circuit Voltage (Voc)	48.6 V	48.8 V	49.0 V	49.2 V
Short Circuit Current (Isc)	7.92 A	7.96 A	7.99 A	8.02 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m2, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

CS1Y-400MS / I-V CURVES



MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Dimensions	2021 x 996 x 35 mm (79.6 x 39.2 x 1.38 in)
Weight	24.0 kg (52.9 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy. crossbar enhanced
J-Box	IP68, 3 bypass diodes
Cable	4.0 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	740 mm (29.1 in) (without optimizer or micro-inverter) *, or 2000 mm (78.7 in) (+) / 1200 mm (47.2 in) (-) (with optimizer or micro-inverter) **
Connector	T4 series or MC4
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

* Adjacent two modules (portrait: left and right modules, landscape: up and down modules) need to be rotated 180 degrees.
** For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.36 % / °C
Temperature Coefficient (Voc)	-0.28 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	43 ± 3°C

PARTNER SECTION

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice.
Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

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ENPHASE

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.

Enphase 25 year limited warranty

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.

Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

UL CERTIFIED SAFETY

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

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

* Only when installed with IQ System Controller 2, meets UL 1741.
** IQ8 and IQ8Plus supports split phase, 240V installations only.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell
MPPT 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[2] [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range[3]	V	240 / 211 – 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	Arms	2	
Max units per 20 A (L-L) branch circuit[4]		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	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		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	
COMPLIANCE			
Certifications		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 to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility
(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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Data Sheet
Enphase Networking

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.

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

X-IQ-AM1-240-3-ES

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

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

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	(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	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
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

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SYSTEM INFORMATION

DC SYSTEM SIZE : 17380W
AC SYSTEM SIZE : 12760W
MODULES:
(44) CANADIAN SOLAR CS1Y-395MS 395W
INVERTER:
(44) ENPHASE IQ8PLUS-72-2-US
BATTERY:
(2) ENPHASE ENERGY ENCHARGE 10, 10.5KWH
BRANCH DETAILS:
4 BRANCH OF 11 MICRO INVERTERS(11 MODULES)

ENGINEER OF RECORD

CUSTOMER INFORMATION

NAME & ADDRESS:
NICK SKATELL
1565 CHICORA RD.,
DUNN, NC 28334

35°30'54.4"N 78°67'48.1"W

AHJ: HARNETT COUNTY

UTILITY: DUKE ENERGY PROGRESS

COMBINER SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:
DM/

SCALE:AS NOTED	PAPER SIZE:17"x11"	
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Data Sheet
Enphase Storage System

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
- 10-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**

ENPHASE.

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-O)
ACCESSORIES	
ENCHARGE-HNDL-R1	One set of Encharge base unit installation handles
OUTPUT (AC)	**@ 240 VAC[1]**
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[2]	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[3]	>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.

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4 BRANCH OF 11 MICRO INVERTERS(11 MODULES)

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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"	
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Data Sheet
Enphase Ensemble energy management system

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[1] 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**

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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.	
ACCESSORIES and **REPLACEMENT PARTS**		
XA-E3-PCBA-ENS	Replacement Enpower controller printed circuit board	
Circuit breakers (as needed)[2,3] BRK-100A-2P-240V BRK-125A-2P-240V BRK-150A-2P-240V BRK-175A-2P-240V BRK-200A-2P-240V BRK-20A-2P-240V-B BRK-30A-2P-240V BRK-40A-2P-240V BRK-60A-2P-240V BRK-80A-2P-240V	Not included, must order separately: • Main breaker, 2 pole, 100A, 25kAIC, CSR2100N or CSR2100 • Main breaker, 2 pole, 125A, 25kAIC, CSR2125N • Main breaker, 2 pole, 150A, 25kAIC, CSR2150N • Main breaker, 2 pole, 175A, 25kAIC, CSR2175N • Main breaker, 2 pole, 200A, 25kAIC, CSR2200N • Circuit breaker, 2 pole, 20A, 10kAIC, BR220B • Circuit breaker, 2 pole, 30A, 10kAIC, BR230B • Circuit breaker, 2 pole, 40A, 10kAIC, BR240B • Circuit breaker, 2 pole, 60A, 10kAIC, BR260 • 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[4]	80A	
Maximum overcurrent protection device rating for PV combiner branch circuit[4]	80A	
Neutral Forming Transformer (NFT)	• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral • Continuous rated power: 3600VA • Maximum continuous unbalance current: 30A @ 120V • Peak rated power: 8800VA for 30 seconds • Peak unbalanced current: 80A @ 120V for 30 seconds	
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	• Main lugs, backup load lugs, and CSR breakers • BR breakers (wire provided) • AC combiner lugs, Encharge lugs, and generator (reserved for future use) lugs • Neutral (large lugs)	Cu/AL: 2 AWG - 300 KCMIL 6 AWG 14 AWG – 2 AWG Cu/AL: 6 AWG - 300 KCMIL
Neutral and ground bars	Large holes (5/16-24 UNF) Small holes (10-32 UNF)	14 AWG – 1/0 AWG 14 AWG – 6 AWG
COMPLIANCE		
Compliance	UL 1741, UL 1741 SA, UL1998, UL869A[5], UL67[5], UL508[5], UL50E[5] CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156.	

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.

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ENGINEER OF RECORD

CUSTOMER INFORMATION

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UTILITY: DUKE ENERGY PROGRESS

ENPHASE ENERGY ENPOWER SPECSHEET

PROJECT NUMBER:

DESIGNER/CHECKED BY:
DM/

SCALE:AS NOTED	PAPER SIZE:17"x11"	
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S-5!®

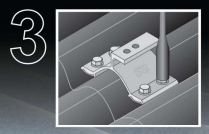
The Right Way!

CorruBracket™

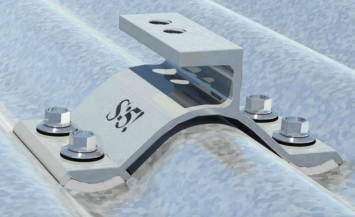
CorruBracket™ can be used to mount almost anything to corrugated metal roofing and is compatible with 7/8" and 3/4" corrugated roofing. No messy sealants to apply! No chance for leaks! The CorruBracket comes with factory-applied butyl sealant already in the base, and the S-5!® patented reservoir conceals the sealant, preventing UV degredation.

Installation is simple! CorruBracket is mounted directly into the supporting structure of the roof, i.e. roof decking, wood or steel purlins, or trusses. No surface preparation is necessary; simply wipe away excess oils and debris, peel the release paper, align, and apply. Secure through the pre-punched holes using the appropriate screws for the supporting structure.

CorruBracket is so strong, it will even support heavy-duty applications like snow retention. For corrugated profiles, the CorruBracket is the perfect match for our ColorGard® snow retention system. CorruBracket is economical and facilitates quick and easy installation.



CorruBracket™



S-5!® CorruBracket™ is the right way to attach almost anything to 7/8" and 3/4" corrugated roofing, including PV via DirectAttached™ or rail methods.

888-825-3432 | www.S-5.com

The right way to attach almost anything to metal roofs!

S-5!®

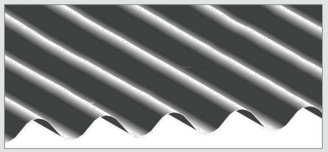
The Right Way!

CorruBracket™ is extremely versatile. It can be used for almost any attachment need on 7/8" and 3/4" corrugated metal roofing. No messy sealants to apply. The factory-applied butyl sealant waterproofs and makes installation a snap!

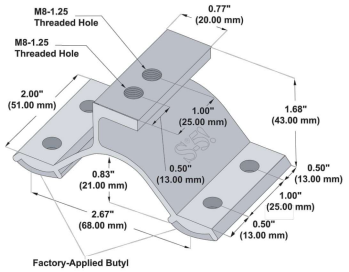
Each **CorruBracket™** comes with factory-applied butyl sealant in the base. CorruBracket is compatible with most common metal roofing materials. For design assistance, ask your distributor, or use our web-based calculator at **www.S-5.com** for job-specific system engineering and design of your next snow retention project. Also, please visit our website for more information including CAD details, metallurgical compatibilities and specifications.

The CorruBracket has been tested for load-to-failure results on wood decking, and metal and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profile



CorruBracket™

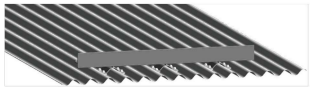


Please note: All measurements are rounded to the second decimal place. Contact your distributor for information about hardware requirements.

Example Applications

S-5-PV Kit (DirectAttached™ or Rail)

ColorGard®



S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents and trademarks visit the S-5! website at www.S-5.com.

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