GENERAL NOTES

CODES AND STANDARDS

1. ALL WORK SHALL COMPLY WITH 2017 NATIONAL ELECTRIC CODE (NEC), 2018 NORTH CAROLINA STATE BUILDING CODE (NCSBC), 2015 INTERNATIONAL PLUMBING CODE (IPC), 2012 INTERNATIONAL RESIDENTIAL CODE (IRC), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES.
2. DRAWINGS HAVE BEEN DETAILED ACCORDING TO UL LISTING REQUIREMENTS.

SITE NOTES / OSHA REGULATION

1. A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
3. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
4. ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SHALL SERVE TO PROTECT THE BUILDING OR STRUCTURE.

SOLAR CONTRACTOR

1. MODULE CERTIFICATIONS WILL INCLUDE UL1703, IEC61646, IEC61730.
2. IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.
3. AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.
4. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
5. CONDUIT POINT OF PENETRATION FROM EXTERIOR TO INTERIOR TO BE INSTALLED AND SEALED WITH A SUITABLE SEALING COMPOUND.
6. DC WIRING LIMITED TO MODULE FOOTPRINT W/ ENPHASE AC SYSTEM.
7. ENPHASE WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.
8. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.
9. ALL INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, DC COMBINERS, DC-TO-DC CONVERTERS,SOURCE CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (B).
10. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE.

EQUIPMENT LOCATIONS

1. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26].
2. EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY [NEC 690.31 (A)-(B)] AND [NEC TABLE 310.15 (B)].
3. ADDITIONAL AC DISCONNECTS SHALL BE PROVIDED WHERE THE INVERTER IS NOT ADJACENT TO THE UTILITY AC DISCONNECT, OR NOT WITHIN SIGHT OF THE UTILITY AC DISCONNECT.
4. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
5. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

PROFESSIONAL CERTIFICATION

DIVISION OF PROFESSIONAL CERTIFICATIONS

THIS DOCUMENT REPRESENTS A COLLABORATIVE DESIGN. THIS SEAL COVERS THE QUALIFICATION OF MOUNTING PLANES FOR THE ADDITION OF NEW SOLAR PANELS. PE CERTIFIES THAT THE STRUCTURE IN THOSE AREAS SHOULD ADEQUATELY SUPPORT THE ADDITIONAL WEIGHT - BASED ON THE METHODS DESCRIBED IN THE STRUCTURAL CALCULATIONS (SUBMITTED SEPARATELY). STRUCTURAL RETROFITS, IF REQUIRED, ARE SPECIFIED HEREIN.

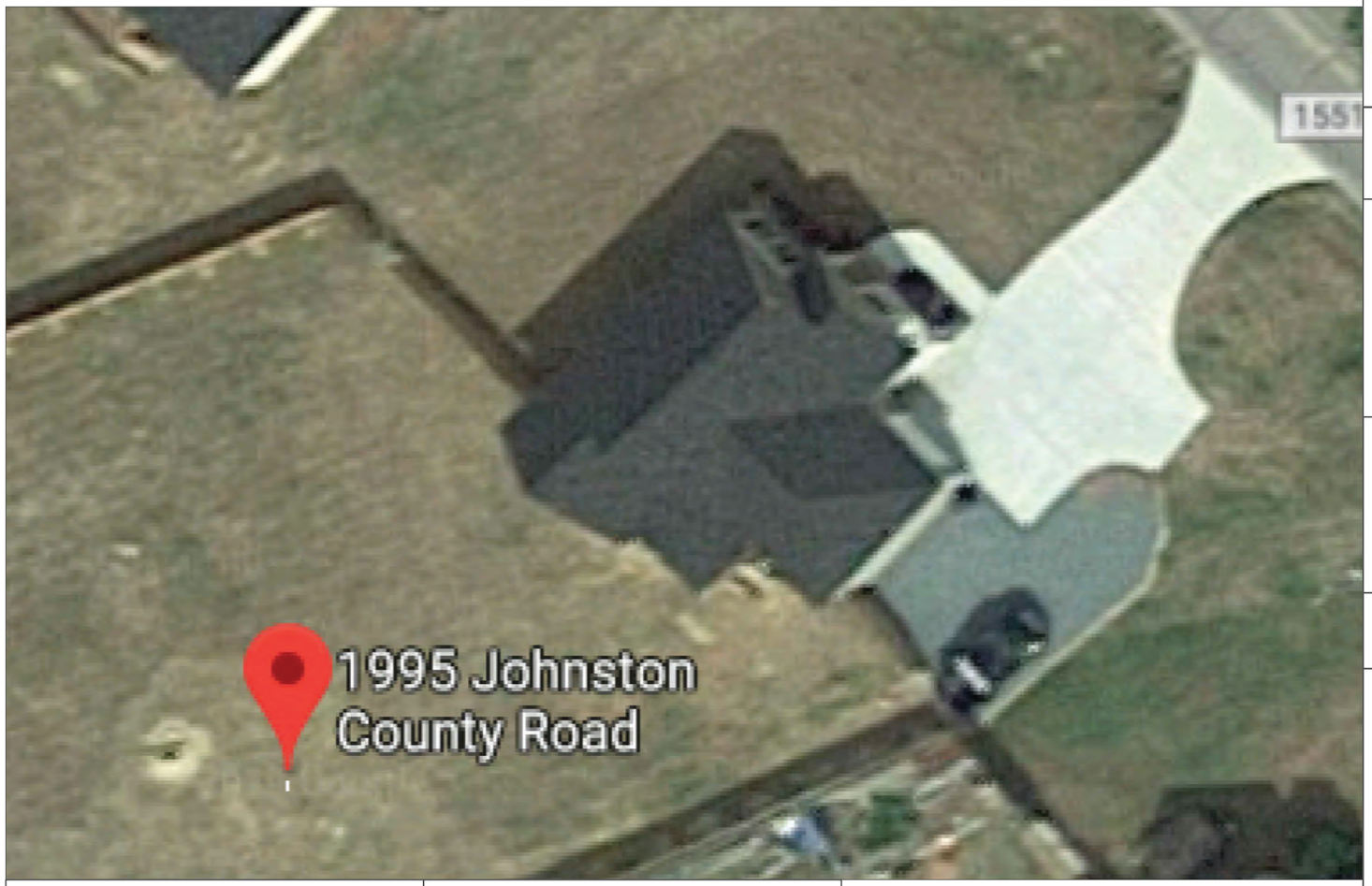
ELECTRONIC CERTIFICATION

THIS DOCUMENT HAS BEEN CERTIFIED ELECTRONICALLY USING A UNIQUE *DIGITAL IDENTIFICATION CERTIFICATE* ISSUED BY A *CERTIFICATE AUTHORITY* APPROVED BY ADOBE (AATL) AND RECOGNIZED BY OTHER STANDARD PDF EDITORS. IT IS HOUSED ON A CRYPTOGRAPHIC HARDWARE KEY, RETAINED BY THE SIGNER, THAT PREVENTS UNAUTHORIZED USE. READER MAY ADD STAMPS AND COMMENTS TO THIS DOCUMENT WITHOUT VOIDING THE CERTIFICATION.

NORTH CAROLINA PROFESSIONAL SEAL 047821 ENGINEER RYAN HILLSTROM

SIGNED BY: ON: 05/31/2019
RYAN HILLSTROM, PE IN RESPONSIBLE CHARGE

AERIAL VIEW



DESIGN CRITERIA

ASCE 7 WIND SPEED: 116 MPH
GROUND SNOW LOAD: 15 PSF
EXPOSURE CATEGORY: C
SEISMIC DESIGN CATEGORY: B

SITE SPECIFICATIONS

OCCUPANCY - R3
CONSTRUCTION - V-B
ZONING: RESIDENTIAL

SCOPE OF WORK

INSTALLATION OF UTILITY INTERACTIVE PHOTOVOLTAIC SOLAR SYSTEM

8.4 kW DC PHOTOVOLTAIC SOLAR ARRAY
ROOF TYPE: Comp Shingle
MODULES: (28) Trinasolar 300 TSM-DD05A.05(II)
INVERTER(S): Enphase IQ7-60-2-US,----
RACKING: Unirac Sunframe Microrail

SHEET INDEX

BLUE RAVEN SOLAR

1403 N RESEARCH WAY, BUILDING J
OREM, UT 84097

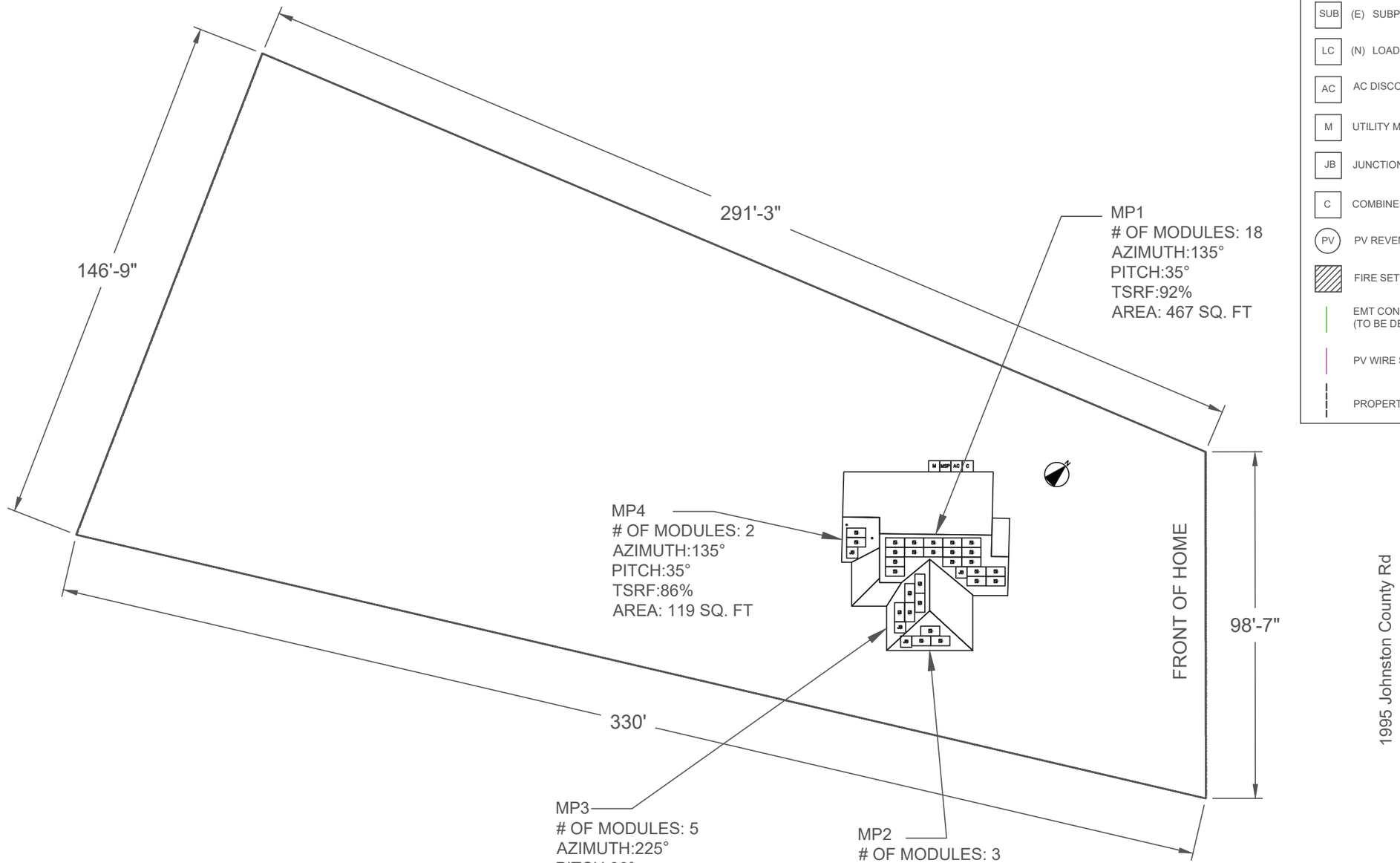
800-377-4480
WWW.BLUERAVENSOLAR.COM

NABCEP CERTIFIED
PV INSTALLATION PROFESSIONAL
Scott Gurney
PV-011719-015866

CONTRACTOR:
BRS FIELD OPS
385.498.6700

SITE INFORMATION:
Wesley Kimble
1995 Johnston County Rd
Angier, North Carolina 27501
DC SYSTEM SIZE: 8.4 kW DC

DRAWING BY: Eliza Snyder
DATE: May 29, 2019
PROJECT NUMBER: 61685422
SHEET NAME: COVER SHEET
PAGE NUMBER: PV1
REVISION: 0



DC SYSTEM SIZE: 8.4 kW DC
ROOF TYPE: Comp Shingle

(28) Trinasolar 300 TSM-DD05A.05(II)
Enphase IQ7-60-2-US,----INVERTER

LEGEND

INV	INVERTER & DC DISCONNECT
SUB	(E) SUBPANEL
LC	(N) LOAD CENTER
AC	AC DISCONNECT
M	UTILITY METER / SERVICE PANEL
JB	JUNCTION BOX
C	COMBINER BOX
PV	PV REVENUE METER
	FIRE SETBACK
	EMT CONDUIT RUN (TO BE DETERMINED IN FIELD)
	PV WIRE STRING
	PROPERTY LINE

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DC SYSTEM SIZE: 8.4 kW DC

DRAWING BY
Eliza Snyder

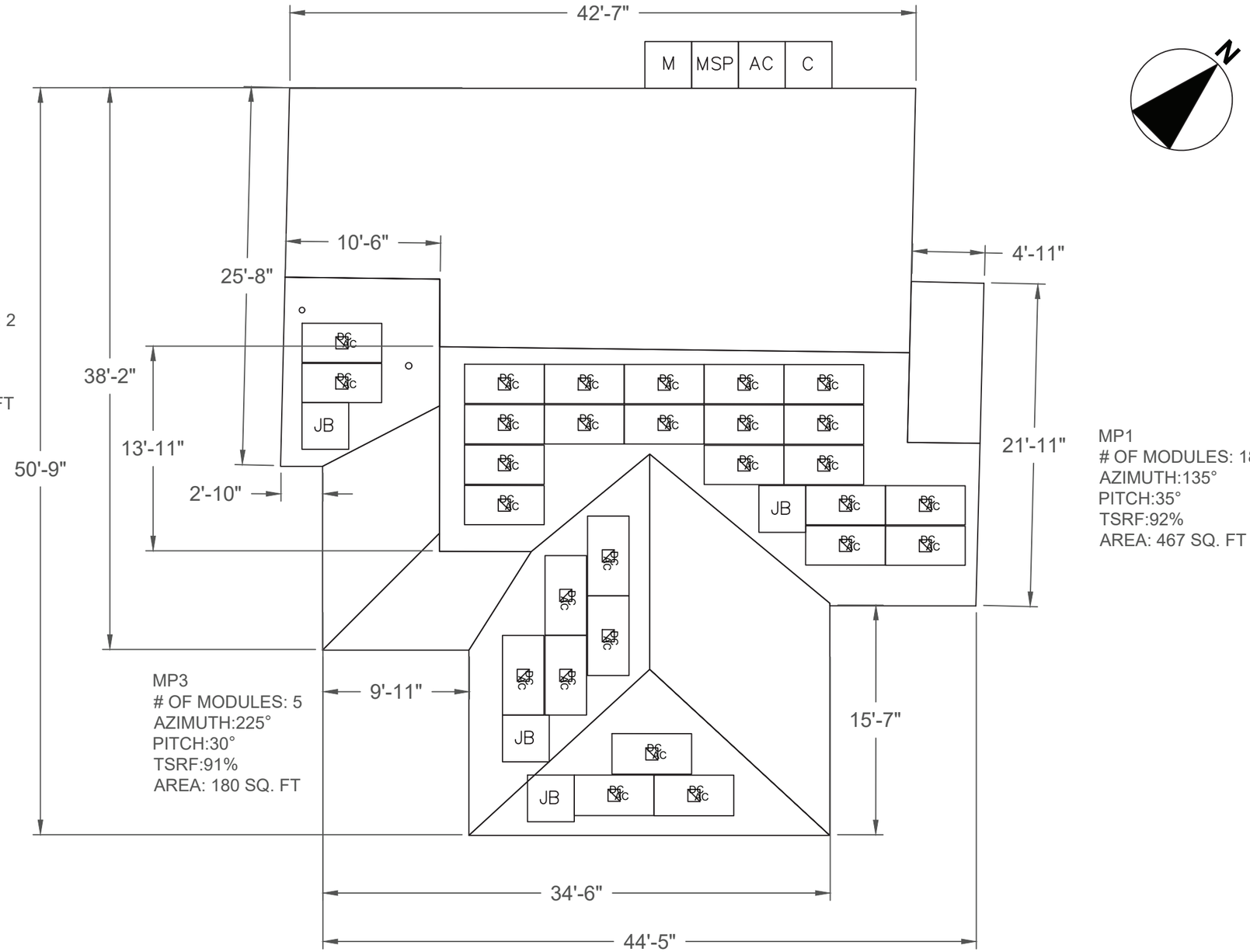
DATE
May 29, 2019

PROJECT NUMBER
61685422

SHEET NAME
PROPERTY PLAN

PAGE NUMBER
PV2

REVISION
0



MP4
OF MODULES: 2
AZIMUTH:135°
PITCH:35°
TSRF:86%
AREA: 119 SQ. FT

MP1
OF MODULES: 18
AZIMUTH:135°
PITCH:35°
TSRF:92%
AREA: 467 SQ. FT

MP3
OF MODULES: 5
AZIMUTH:225°
PITCH:30°
TSRF:91%
AREA: 180 SQ. FT

MP2
OF MODULES: 3
AZIMUTH:135°
PITCH:32°
TSRF:93%
AREA: 138 SQ. FT

DC SYSTEM SIZE: 8.4 kW DC
ROOF TYPE: Comp Shingle

(28) Trinasolar 300 TSM-DD05A.05(II)
Enphase IQ7-60-2-US,----INVERTER

FRONT OF HOME

LEGEND

- INV — INVERTER & DC DISCONNECT
- SUB — (E) SUBPANEL
- LC — (N) LOAD CENTER
- AC — AC DISCONNECT
- M — UTILITY METER / SERVICE PANEL
- JB — JUNCTION BOX
- C — COMBINER BOX
- PV — PV REVENUE METER
- FIRE SETBACK
- EMT CONDUIT RUN (TO BE DETERMINED IN FIELD)
- PV WIRE STRING
- PROPERTY LINE

SCALE: 1/8" = 1'-0"
0' 2' 4' 8' 16'

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NORTH CAROLINA PROFESSIONAL SEAL 047821 ENGINEER RYAN HILLSTROM

SIGNED BY: RYAN HILLSTROM, PE IN RESPONSIBLE CHARGE
ON: 05/31/2019

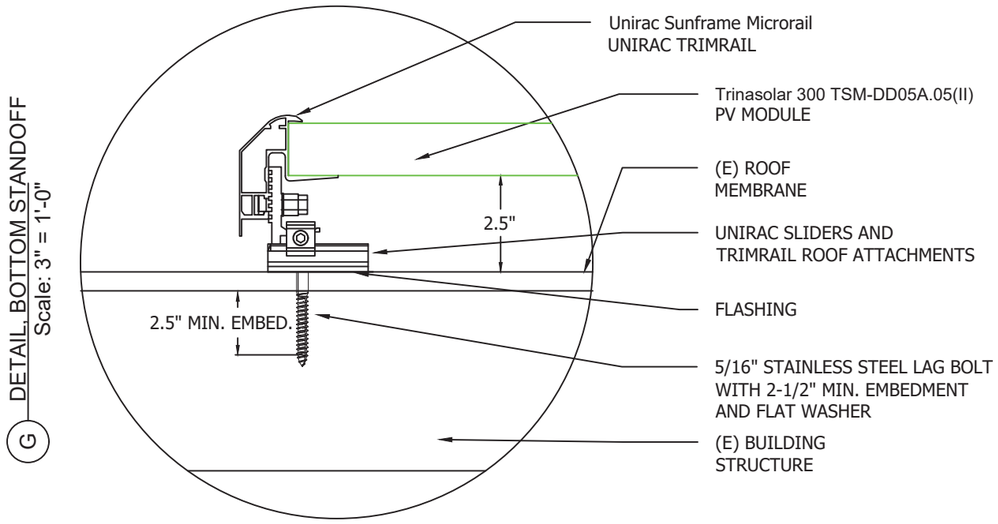
SEE PV1 - FOR DIVISION OF PROFESSIONAL CERTIFICATIONS & STRUCTURAL DESIGN BASIS.

SITE INFORMATION:
Wesley Kimble
1995 Johnston County Rd
Angier, North Carolina 27501
DC SYSTEM SIZE: 8.4 kW DC

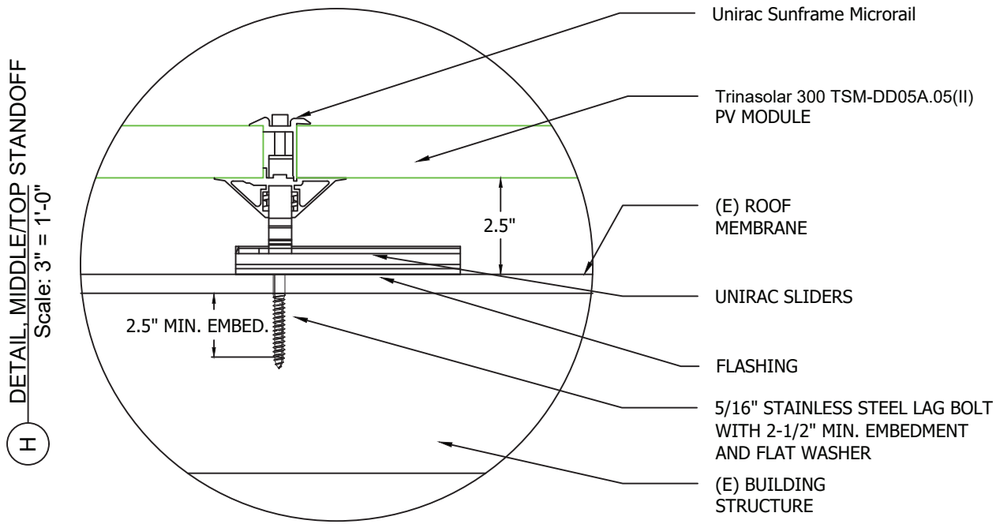
DRAWING BY: Eliza Snyder
DATE: May 29, 2019
PROJECT NUMBER: 61685422
SHEET NAME: SITE PLAN
PAGE NUMBER: PV3
REVISION: 0

PV ARRAY INFORMATION

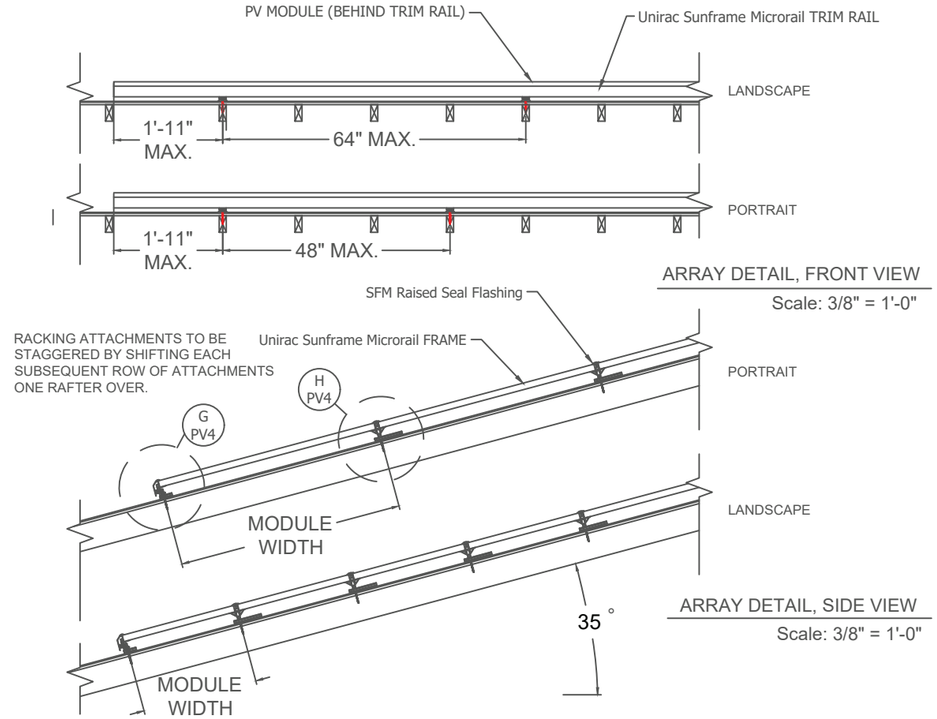
PV MODULE COUNT:	28 MODULES
# OF ATTACHMENT POINTS:	62
ARRAY AREA:	Module Count x 17.51ft² = 490.3ft²
ROOF AREA:	1992.0ft²
% OF ARRAY/ROOF:	24.6%
ARRAY WEIGHT:	Module Count x 50lbs = 1400.0lbs
DISTRIBUTED LOAD:	Array Weight ÷ Array Area = 2.86 lbs/ft²
POINT LOAD:	Array Weight ÷ Attachments = 22.6lbs/attachment



G DETAIL, BOTTOM STANDOFF
Scale: 3" = 1'-0"



H DETAIL, MIDDLE/TOP STANDOFF
Scale: 3" = 1'-0"



ROOF TYPE: Comp Shingle

ROOF FRAMING TYPE: Rafter

RAFTER OR TOP CHORD(TRUSS) 2x8 @ 16"O.C.
CEILING JOIST OR BOTTOM CHORD(TRUSS) 2x8 @ 16"O.C.

SIGNED BY: ON: 05/31/2019
RYAN HILLSTROM, PE IN RESPONSIBLE CHARGE

SEE PV1 - FOR DIVISION OF PROFESSIONAL CERTIFICATIONS & STRUCTURAL DESIGN BASIS.

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SITE INFORMATION:
Wesley Kimble
1995 Johnston County Rd
Angier, North Carolina 27501
DC SYSTEM SIZE: 8.4 kW DC

DRAWING BY
Eliza Snyder

DATE
May 29, 2019

PROJECT NUMBER
61685422

SHEET NAME
EQUIP. DETAIL

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PV4

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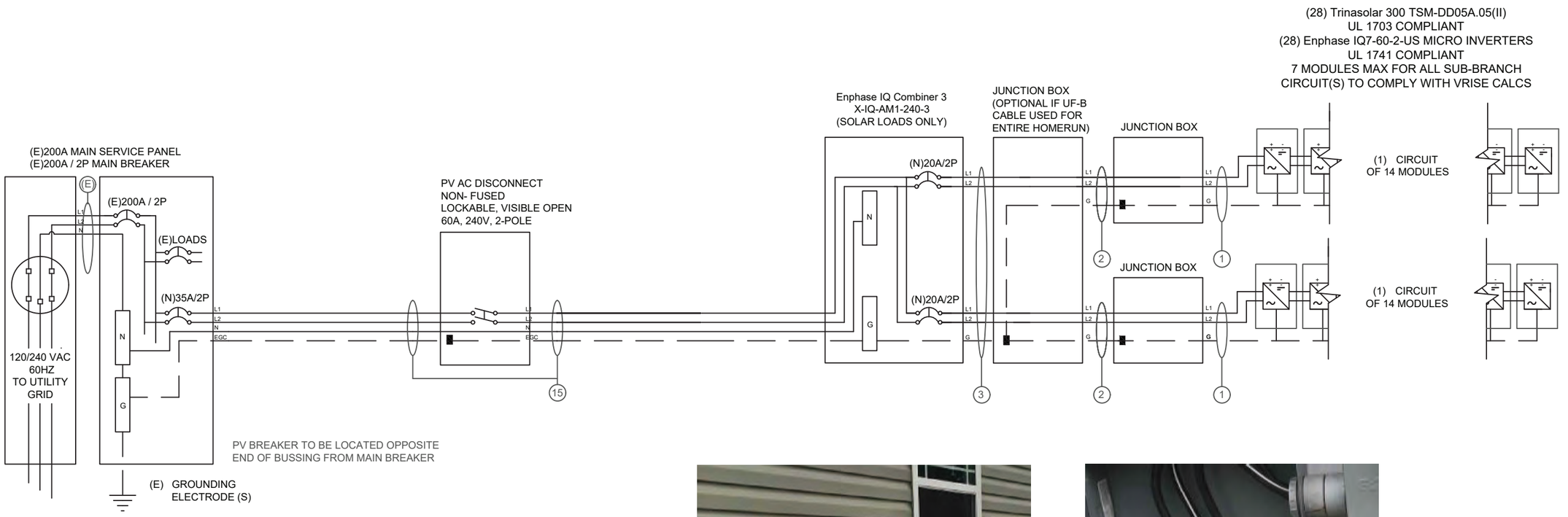
0

15	(1) 8 AWG THHN/THWN-2, CU., BLACK (L1) (1) 8 AWG THHN/THWN-2, CU., RED (L2) (1) 10 AWG THHN/THWN-2, CU., WHITE (N) (1) 10 AWG THHN/THWN-2, CU., GREEN (EGC) (1) 3/4 INCH EMT	28.0 A AC 240 V AC EXTERIOR	3	(2) 10 AWG THHN/THWN-2, CU., BLACK (L1) (2) 10 AWG THHN/THWN-2, CU., RED (L 2) (1) 10 AWG THHN/THWN-2, CU., GREEN (EGC) (1) 3/4 INCH EMT	MAX 14.0 A AC 240 V AC EXTERIOR	2	(1) 10 - 2 UF-B W/G, THHN/THWN-2, SOLID CU.	MAX 14.0 A AC 240 V AC INTERIOR	1	(1) 12-2 TC-ER,THWN-2, CU. (1) 6 AWG BARE, CU (EGC)	MAX 14.0 A AC 240 V AC EXTERIOR

28 INVERTERS x 240 W AC = 6.72 kW AC

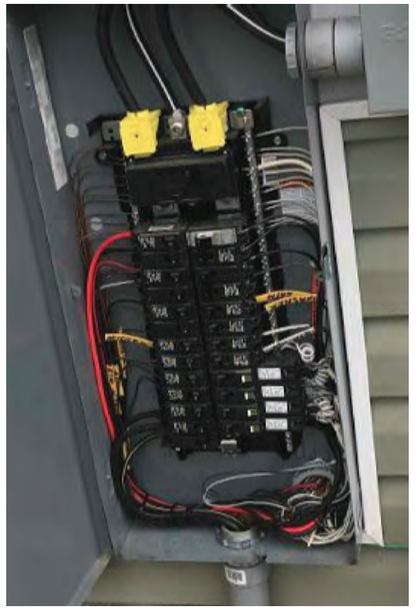


INTERCONNECTION NOTES

1. ONE OF THE METHODS THAT FOLLOWS SHALL BE USED TO DETERMINE THE RATINGS OF BUSBARS AND PANELBOARDS. (a) THE SUM OF 125 PERCENT OF THE INVERTER(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED THE AMPACITY OF THE BUS BAR. (b) WHERE TWO SOURCES, ONE THE UTILITY AND THE OTHER AN INVERTER ARE LOCATED AT OPPOSITE ENDS OF A BUSBAR THAT CONTAINS LOADS, THE SUM OF 125 PERCENT OF THE INVERTER(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR [NEC 705.12].

DISCONNECT NOTES

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH



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SITE INFORMATION:
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1995 Johnston County Rd
Angier, North Carolina 27501

DC SYSTEM SIZE: 8.4 kW DC

DRAWING BY
Eliza Snyder

DATE
May 29, 2019

PROJECT NUMBER
61685422

SHEET NAME
ELEC. 3 LINE DIAG.

PAGE NUMBER
PV5

REVISION
0

MODULE SPECIFICATIONS	Trinasolar 300 TSM-DD05A.05(II)
RATED POWER (STC)	300 W
MODULE VOC	40 V DC
MODULE VMP	33 V DC
MODULE IMP	9.2 A DC
MODULE ISC	9.8 A DC
VOC CORRECTION (%/°C)	-0.3 °C
VMP CORRECTION (%/°C)	-0.4 °C
SERIES FUSE RATING	15 A DC
ADJ. MODULE VOC @ ASHRAE LOW TEMP	43.8 V DC
ADJ. MODULE VMP @ ASHRAE 2% AVG. HIGH TEMP	27.3 V DC

MICROINVERTER SPECIFICATIONS	Enphase IQ7-60-2-US
POWER POINT TRACKING (MPPT) MIN/MAX	22 - 48 V DC
MAXIMUM INPUT VOLTAGE	48 V DC
MAXIMUM DC SHORT CIRCUIT CURRENT	15 A DC
MAXIMUM USABLE DC INPUT POWER	350 W
MAXIMUM OUTPUT CURRENT	1 A AC
AC OVERCURRENT PROTECTION	20 A
MAXIMUM OUTPUT POWER	240 W
CEC WEIGHTED EFFICIENCY	97 %

AC PHOTOVOLATIC MODULE MARKING (NEC 690.52)	
NOMINAL OPERATING AC VOLTAGE	240 V AC
NOMINAL OPERATING AC FREQUENCY	47 - 68 HZ AC
MAXIMUM AC POWER	240 VA AC
MAXIMUM AC CURRENT	1.0 A AC
MAXIMUM OCPD RATING FOR AC MODULE	20 A AC

DESIGN LOCATION AND TEMPERATURES	
TEMPERATURE DATA SOURCE	ASHRAE 2% AVG. HIGH TEMP
STATE	North Carolina
CITY	Angier
WEATHER STATION	SEYMOUR-JOHNSON AFB
ASHRAE EXTREME LOW TEMP (°C)	-10
ASHRAE 2% AVG. HIGH TEMP (°C)	35

SYSTEM ELECTRICAL SPECIFICATIONS	CIR 1	CIR 2	CIR 3	CIR 4	CIR 5	CIR 6
NUMBER OF MODULES PER MPPT	14	14				
DC POWER RATING PER CIRCUIT (STC)	4200	4200				
TOTAL MODULE NUMBER	28 MODULES					
STC RATING OF ARRAY	8400W DC					
AC CURRENT @ MAX POWER POINT (IMP)	14.0	14.0				
MAX. CURRENT (IMP X 1.25)	17.5	17.5				
OCPD CURRENT RATING PER CIRCUIT	20	20				
MAX. COMB. ARRAY AC CURRENT (IMP)	28.0					
MAX. ARRAY AC POWER	6720W AC					

AC VOLTAGE RISE CALCULATIONS	DIST (FT)	VRISE(V)	VEND(V)	%VRISE	IQ7-7
VRISE SEC. 1 (MICRO TO JBOX)	25.2	0.71	240.71	0.30%	
VRISE SEC. 2 (JBOX TO COMBINER BOX)	80	2.84	242.84	1.19%	
VRISE SEC. 3 (COMBINER BOX TO POI)	5	0.22	240.22	0.09%	
TOTAL VRISE				1.57%	

PHOTOVOLTAIC AC DISCONNECT OUTPUT LABEL (NEC 690.54)	
AC OUTPUT CURRENT	28.0 A AC
NOMINAL AC VOLTAGE	240 V AC

CONDUCTOR SIZE CALCULATIONS				
MICROINVERTER TO JUNCTION BOX (1)	MAX. SHORT CIRCUIT CURRRENT (ISC) =	14.0 A AC		
	MAX. CURRENT (ISC X1.25) =	17.5 A AC		
	CONDUCTOR (TC-ER, COPPER (90°C)) =	12 AWG		
	CONDUCTOR RATING =	30 A		
	AMB. TEMP. AMP. CORRECTION =	0.96		
	ADJUSTED AMP. =	28.8	>	17.5
JUNCTION BOX TO JUNCTION BOX (2)	MAX. SHORT CIRCUIT CURRRENT (ISC) =	14.0 A AC		
	MAX. CURRENT (ISC X1.25) =	17.5 A AC		
	CONDUCTOR (UF-B, COPPER (60°C)) =	10 AWG		
	CONDUCTOR RATING =	30 A		
	CONDUIT FILL DERATE =	1		
	AMB. TEMP. AMP. CORRECTION =	0.96		
	ADJUSTED AMP. =	28.8	>	17.5
JUNCTION BOX TO COMBINER BOX (3)	MAX. SHORT CIRCUIT CURRRENT (ISC) =	14.0 A AC		
	MAX. CURRENT (ISC X1.25) =	17.5 A AC		
	CONDUCTOR (UF-B, COPPER (60°C)) =	10 AWG		
	CONDUCTOR RATING =	30 A		
	CONDUIT FILL DERATE =	0.8		
	AMB. TEMP. AMP. CORRECTION =	0.96		
	ADJUSTED AMP. =	23.04	>	17.5
COMBINER BOX TO MAIN PV OCPD (15)	INVERTER RATED AMPS =	28.0 A AC		
	MAX. CURRENT (RATED AMPS X1.25) =	35 A AC		
	CONDUCTOR (THWN-2, COPPER (75°C TERM.)) =	8 AWG		
	CONDUCTOR RATING =	50 A		
	CONDUIT FILL DERATE =	1		
	AMB. TEMP. AMP. CORRECTION =	0.96		
	ADJUSTED AMP. =	48	>	35.0

GROUNDING NOTES

1. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH [NEC 690-47] AND [NEC 250-50] THROUGH [NEC 250-60] SHALL BE PROVIDED. PER NEC, GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO AT THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, OR IS ONLY METALLIC WATER PIPING, A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT GROUND ROD WITH ACORN CLAMP.
2. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE BETWEEN THE GROUNDING ELECTRODE AND THE PANEL (OR INVERTER) IF SMALLER THAN #6 AWG COPPER WIRE PER NEC 250-64B. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT PER [NEC 250.64C.].
3. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO GREATER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
4. PV SYSTEM SHALL BE GROUNDED IN ACCORDANCE TO [NEC 250.21], [NEC TABLE 250.122], AND ALL METAL PARTS OR MODULE FRAMES ACCORDING TO [NEC 690.46].
5. MODULE SOURCE CIRCUITS SHALL BE GROUNDED IN ACCORDANCE TO [NEC 690.42].
6. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER MODULE.
7. EACH MODULE WILL BE GROUNDED USING THE SUPPLIED CONNECTIONS POINTS IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
8. ENCLOSURES SHALL BE PROPERLY PREPARED WITH REMOVAL OF PAINT/FINISH AS APPROPRIATE WHEN GROUNDING EQUIPMENT WITH TERMINATION GROUNDING LUGS.
9. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR DIRECT BURIAL.
10. GROUNDING AND BONDING CONDUCTORS SHALL BE COPPER, SOLID OR STRANDED, AND BARE WHEN EXPOSED.
11. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZE ACCORDING TO [NEC 690.45] AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE (#6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE).
12. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN (OR MARKED GREEN IF #4 AWG OR LARGER)
13. ALL CONDUIT BETWEEN THE UTILITY AC DISCONNECT AND THE POINT OF CONNECTION SHALL HAVE GROUNDED BUSHINGS AT BOTH ENDS.
14. SYSTEM GEC SIZED ACCORDING TO [NEC 690.47], [NEC TABLE 250.66], DC SYSTEM GEC SIZED ACCORDING TO [NEC 250.166], MINIMUM #8AWG WHEN INSULATED, #6AWG WHEN EXPOSED TO DAMAGE.
15. EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A) REGARDLESS OF VOLTAGE.

WIRING & CONDUIT NOTES

1. ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS
2. BOLTED CONNECTION REQUIRED IN DC DISCONNECTS ON THE WHITE GROUNDED CONDUCTOR (USE POLARIS BLOCK OR NEUTRAL BAR)
3. ANY CONNECTION ABOVE LIVE PARTS MUST BE WATERTIGHT. REDUCING WASHERS DISALLOWED ABOVE LIVE PARTS, MEYERS HUBS RECOMMENDED
4. UV RESISTANT CABLE TIES(NOT ZIP TIES) USED FOR PERMANENT WIRE MANAGEMENT OFF THE ROOF SURFACE IN ACCORDANCE WITH NEC 110.2,110.3(A-B). 300.4
5. SOLADECK JUNCTION BOXES MOUNTED FLUSH W/ROOF SURFACE TO BE USED FOR WIRE MANAGEMENT AND AS FLASHED ROOF PENETRATIONS FOR INTERIOR CONDUIT RUNS.
6. ALL PV CABLES AND HOMERUN WIRES BE TYPE USE-2, AND SINGLE-CONDUCTOR CABLE LISTED AND IDENTIFIED AS PV WIRE, TYPE TC-ER, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
7. ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8] FOR MULTIPLE CONDUCTORS
8. ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE INSTALLED AT LEAST 7/8" ABOVE THE ROOF SURFACE AND DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(a), NEC TABLE 310.15(B)(3)(a),& NEC 310.15(B)(3)(c)].
9. EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
10. PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V
11. 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS.
12. ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
13. VOLTAGE DROP LIMITED TO 2% FOR DC CIRCUITS AND 3% FOR AC CIRCUITS
14. NEGATIVE GROUNDED SYSTEMS DC CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS: DC POSITIVE- RED (OR MARKED RED), DC NEGATIVE- GREY (OR MARKED GREY)
15. POSITIVE GROUNDED SYSTEMS DC CONDUCTORS COLOR CODED: DC POSITIVE- GREY (OR MARKED GREY), DC NEGATIVE- BLACK (OR MARKED BLACK)
16. AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY
* USE-2 IS NOT INDOOR RATED BUT PV CABLE IS RATED THWN/THWN-2 AND MAY BE USED INSIDE
** USE-2 IS AVAILABLE AS UV WHITE
17. RIGID CONDUIT, IF INSTALLED, (AND/OR NIPPLES) MUST HAVE A PULL BUSHING TO PROTECT WIRES.
18. IF CONDUIT DETERMINED TO BE RAN THROUGH ATTIC IN FIELD THEN CONDUIT WILL BE EITHER EMT, FMC, OR MC CABLE IF DC CURRENT COMPLYING WITH NEC 690.31, NEC 250.118(10). DISCONNECTING MEANS SHALL COMPLY WITH 690.13 AND 690.15
19. CONDUIT RAN THROUGH ATTIC WILL BE AT LEAST 18" BELOW ROOF SURFACE COMPLYING WITH NEC 230.6(4) AND SECURED NO GREATER THAN 6' APART PER NEC 330.30(B).

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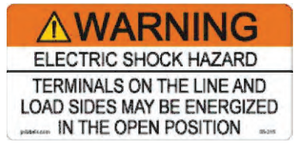
PV-011719-015866

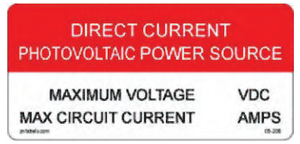
CONTRACTOR:
BRS FIELD OPS
385.498.6700

SITE INFORMATION:
Wesley Kimble
1995 Johnston County Rd
Angier, North Carolina 27501
DC SYSTEM SIZE: 8.4 kW DC

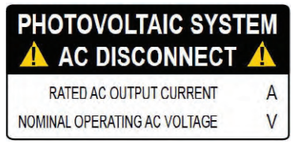
DRAWING BY: Eliza Snyder
DATE: May 29, 2019
PROJECT NUMBER: 61685422
SHEET NAME: ELEC. CALCS.
PAGE NUMBER: PV6
REVISION: 0



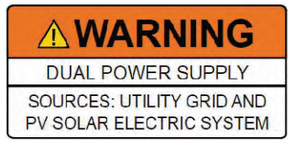
LABEL 1
FOR PV DISCONNECTING MEANS WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION.
[NEC 690.13(B), NEC 705.22]



LABEL 2
AT EACH DC DISCONNECTING MEANS, INCLUDING THE DC DISCONNECT AT THE INVERTER.
[NEC 690.53, NEC 690.13(B)]



LABEL 3
AT POINT OF INTERCONNECTION, MARKED AT AC DISCONNECTING MEANS.
[NEC 690.54, NEC 690.13 (B)]

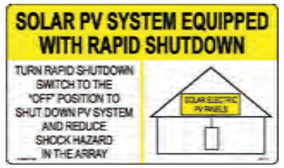


LABEL 4
AT POINT OF INTERCONNECTION FOR EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUTS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FORM MULTIPLE SOURCES, EACH SERVICE EQUIPMENT AND ALL ELECTRIC POWER PRODUCTION SOURCE LOCATIONS.
[NEC 705.12(B)(3)]

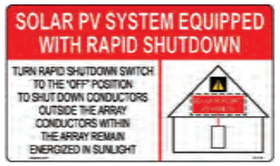
LABEL 5
PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(b)]

LABEL 6
(ONLY IF 3 OR MORE SUPPLY SOURCES TO A BUSBAR)
SIGN LOCATED AT LOAD CENTER IF IT CONTAINS 3 OR MORE POWER SOURCES.
[NEC 705.12(B)(2)(3)(C)]

LABEL 7
AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)(3&4)]

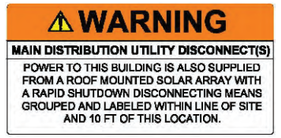


LABEL 8
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(A)]

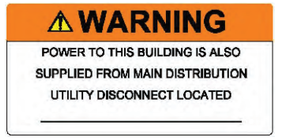


LABEL 9
FOR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(B)]

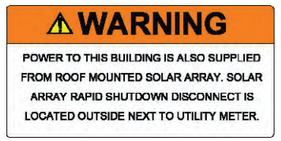
LABEL 10
SIGN LOCATED AT RAPID SHUT DOWN DISCONNECT SWITCH [NEC 690.56(C)(3)].



LABEL 11
PERMANENT DIRECTORY TO BE LOCATED AT MAIN SERVICE EQUIPMENT LOCATION IF ALL ELECTRICAL POWER SOURCE DISCONNECTING MEANS (SOLAR ARRAY RAPID SHUTDOWN SWITCH) ARE GROUPED AND IN LINE OF SITE OF MAIN SERVICE DISCONNECTING MEANS.
[NEC 690.56(C) & NEC 705.10].

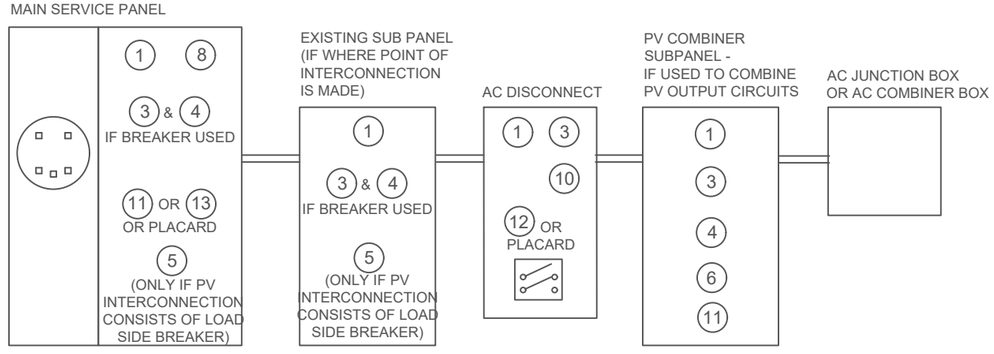


LABEL 12
PERMANENT DIRECTORY TO BE LOCATED AT SOLAR ARRAY RAPID SHUTDOWN SWITCH DENOTING THE LOCATION OF THE SERVICE EQUIPMENT LOCATION IF SOLAR ARRAY RAPID SHUT DOWN DISCONNECT SWITCH IS NOT GROUPED AND WITHIN LINE OF SITE OF MAIN SERVICE DISCONNECTING MEANS.
[NEC 705.10]

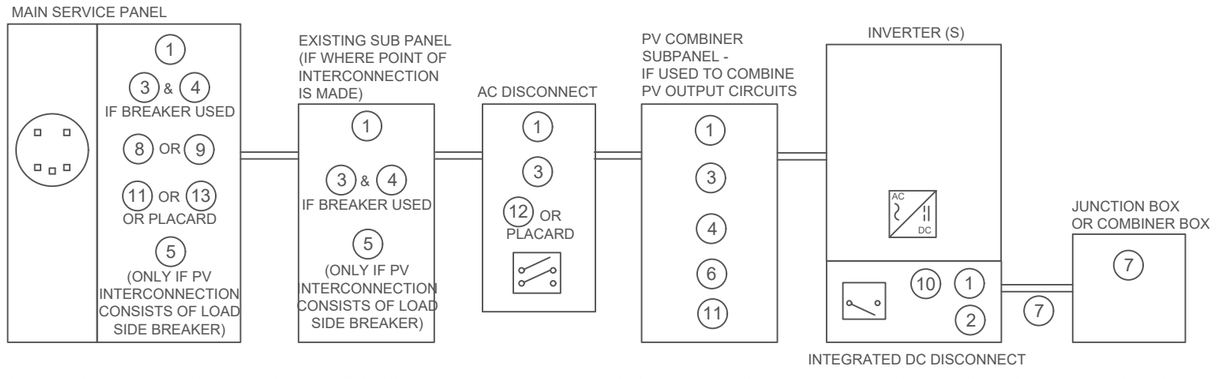


LABEL 13
PERMANENT DIRECTORY TO BE LOCATED AT MAIN SERVICE EQUIPMENT DENOTING THE LOCATION OF THE PV RAPID SHUTDOWN SYSTEM DISCONNECTING MEANS IF SOLAR ARRAY RAPID SHUT DOWN DISCONNECT SWITCH IS NOT GROUPED AND WITHIN LINE OF SITE OF MAIN SERVICE DISCONNECTING MEANS. [NEC 705.10, NEC 690.56(C)(1)]

LABELING DIAGRAM FOR MICRO INV.:



LABELING DIAGRAM FOR STRING INV. / DC OPTIMIZER INV.:



LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

*ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VERY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ON PV5 OF 3 LINE DIAGRAM. PV5 LINE DIAGRAM TO REFLECT ACTUAL REPRESENTATION OF PROPOSED SCOPE OF WORK.

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SITE INFORMATION:
Wesley Kimble
1995 Johnston County Rd
Angier, North Carolina 27501
DC SYSTEM SIZE: 8.4 kW DC

DRAWING BY
Eliza Snyder

DATE
May 29, 2019

PROJECT NUMBER
61685422

SHEET NAME
LABELS

PAGE NUMBER
PV8

REVISION
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Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready Enphase IQ 7 Micro™ and Enphase IQ 7+ Micro™ dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ 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)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* 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)

* The IQ 7+ Micro is required to support 72-cell modules.

To learn more about Enphase offerings, visit enphase.com

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Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	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**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 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)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US)	Friends PV2 (MC4 intermateable). Adaptors for modules with MC4 or UTX connectors: - PV2 to MC4: order ECA-S20-S22 - PV2 to UTX: order ECA-S20-S25			
Dimensions (WxHxD)	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 required by NEC 690.			
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 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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

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2018-05-24

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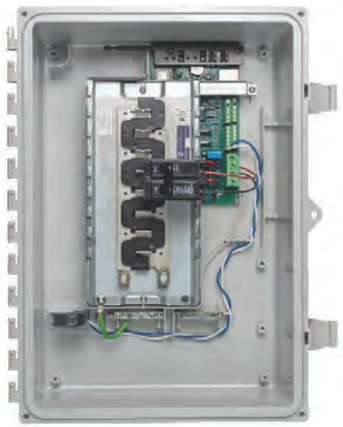
Data Sheet
Enphase Networking

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3**™ with Enphase IQ Envoy™ 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
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

- Reduced size from previous combiner
- 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 warranty
- UL listed

LISTED

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

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Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G / 12-year data plan) CELLMODEM-01 (3G / 5-year data plan) CELLMODEM-M1 (4G based LTE-M / 5-year data plan)	Plug and play industrial grade cellular modem with data plan 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.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
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 2
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 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. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" 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
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (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)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

* Consumption monitoring is required for Enphase Storage Systems.

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

2018-09-13

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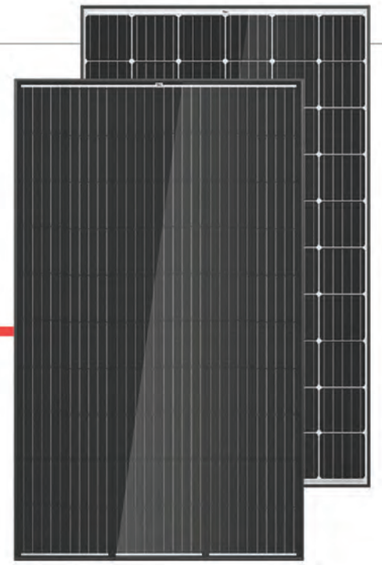
Mono Multi Solutions

THE

ALLMAX M PLUS

FRAMED 60-CELL MODULE



60 CELL
MONOCRYSTALLINE MODULE

275-315W
POWER OUTPUT RANGE

19.2%
MAXIMUM EFFICIENCY

0~+5W
POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. we believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

Trinasolar

Maximize limited space with top-end efficiency

- Up to 192W/m² power density
- Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control

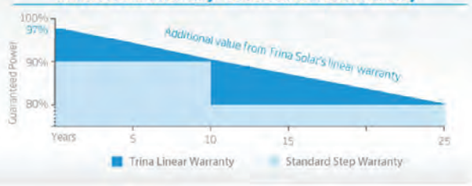
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 100% EL double inspection
- Selective emitter, advanced surface texturing

Certified to withstand the most challenging environmental conditions

- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty · 25 Year Linear Power Warranty

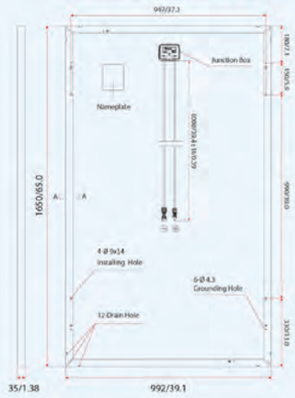


ALLMAX M PLUS

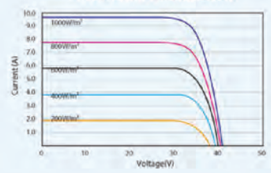
FRAMED 60-CELL MODULE

PRODUCTS	POWER RANGE
TSM-DD05A.08(II)	280-315W
TSM-DD05A.05(II)	275-310W

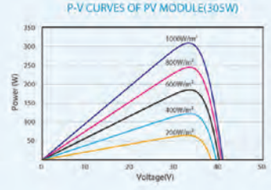
DIMENSIONS OF PV MODULE(mm/inches)



I-V CURVES OF PV MODULE(305W)



P-V CURVES OF PV MODULE(305W)



ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	275	280	285	290	295	300	305	310	315
Power Output Tolerance-P_{MAX} (W)	0 ~ +5								
Maximum Power Voltage-V_{MPP} (V)	31.4	31.7	31.8	32.2	32.5	32.6	32.9	33.1	33.3
Maximum Power Current-I_{MPP} (A)	8.76	8.84	8.97	9.01	9.08	9.19	9.28	9.37	9.46
Open Circuit Voltage-V_{OC} (V)	38.4	38.4	38.5	38.9	39.6	39.8	40.0	40.2	40.5
Short Circuit Current-I_{SC} (A)	9.24	9.42	9.51	9.65	9.68	9.77	9.85	9.94	10.0
Module Efficiency η_m (%)	16.8	17.1	17.4	17.7	18.0	18.3	18.6	18.9	19.2

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.
*Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Maximum Power-P_{MAX} (Wp)	205	209	212	216	220	223	227	231	235
Maximum Power Voltage-V_{MPP} (V)	29.1	29.4	29.5	29.9	30.1	30.2	30.5	30.7	30.9
Maximum Power Current-I_{MPP} (A)	7.04	7.10	7.21	7.24	7.30	7.38	7.46	7.53	7.60
Open Circuit Voltage-V_{OC} (V)	35.7	35.7	35.8	36.2	36.8	37.0	37.2	37.4	37.6
Short Circuit Current-I_{SC} (A)	7.46	7.61	7.68	7.80	7.82	7.89	7.95	8.03	8.10

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline 156.75 × 156.75 mm (6 inches)
Cell Orientation	60 cells (6 × 10)
Module Dimensions	1650 × 992 × 35 mm (65.0 × 39.1 × 1.38 inches)
Weight	18.6 kg (41.0 lb)
Glass	3.2 mm (0.13 inches), High Transmission, AR Coated Tempered Glass
Backsheet	White [DD05A.08(II)]; Black [DD05A.05(II)]
Frame	Black Anodized Aluminium Alloy [DD05A.08(II), DD05A.05(II)]
J-Box	IP 67 or IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), 1000 mm (39.4 inches)
Connector	Trina TS4
Fire Type	Type 1 or Type 2

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	44°C (±2°C)
Temperature Coefficient of P_{MAX}	- 0.39%/°C
Temperature Coefficient of V_{OC}	- 0.29%/°C
Temperature Coefficient of I_{SC}	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC (IEC)
	1000V DC (UL)
Max Series Fuse Rating	15A (Power ≤285W)
	20A (Power ≥290W)

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

10 year Product Workmanship Warranty
25 year Linear Power Warranty

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 840 pieces

Trinasolar

Version number: TSM_EN_2018_A
www.trinasolar.com

BLUE RAVEN SOLAR
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OREM, UT 84097
800-377-4480
WWW.BLUERAVENSOLAR.COM

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PV INSTALLATION PROFESSIONAL
Scott Gurney
PV-011719-015866

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SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included

SolaDeck Model SD 0783

SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3" fixed Din Rail)
Model SD 0786 - (6" slotted Din Rail)

SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Claire, WI 54703
For product information call 1(866) 367-7782

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SFM SUN FRAME MICRORAIL™

SYSTEM BONDING & GROUNDING

INSTALLATION GUIDE

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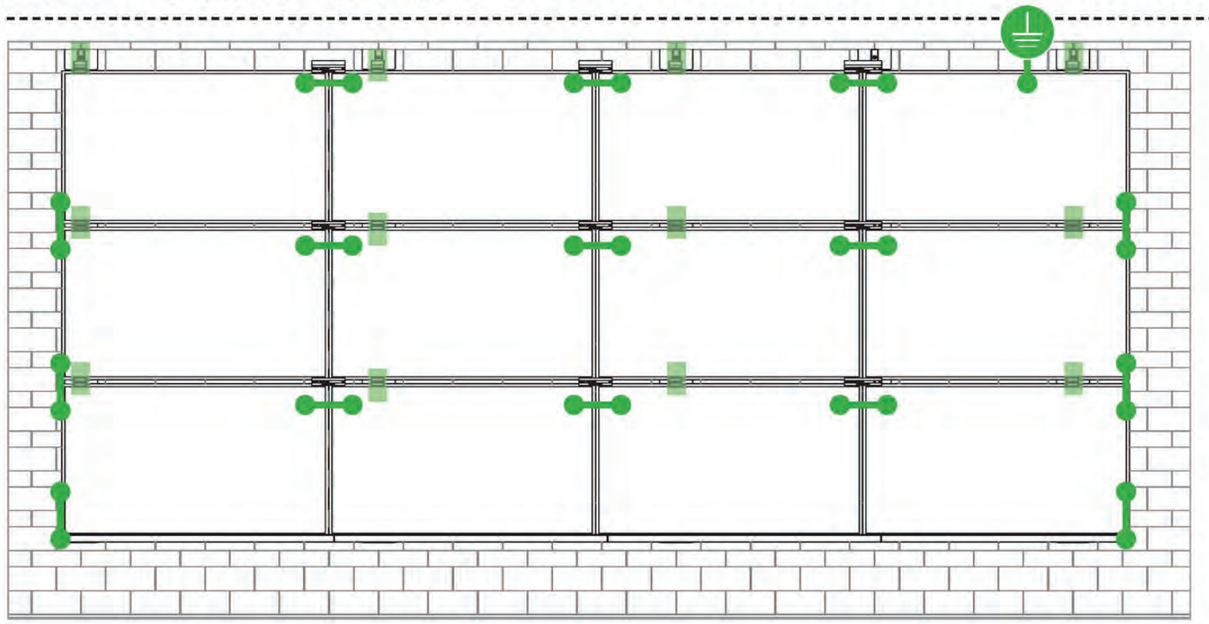
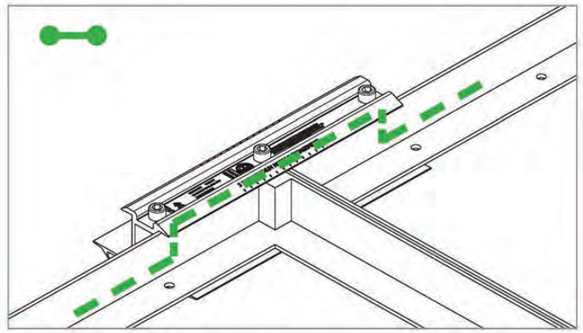




E-W BONDING PATH: E-W module to module bonding is accomplished with 2 pre-installed bonding clips which engage on the secure side of the Microrail™ and splice.

Star Washer is Single Use Only

TERMINAL TORQUE, Install Conductor and torque to the following:
4-6 AWG: 35in-lbs
8 AWG: 25 in-lbs
10-14 AWG: 20 in-lbs

LUG DETAIL & TORQUE INFO
Ilsco Lay-In Lug (GBL-4DBT)
- 10-32 mounting hardware
- Torque = 5 ft-lb
- AWG 4-14 - Solid or Stranded

TERMINAL TORQUE, Install Conductor and torque to the following:
4-14 AWG: 35in-lbs

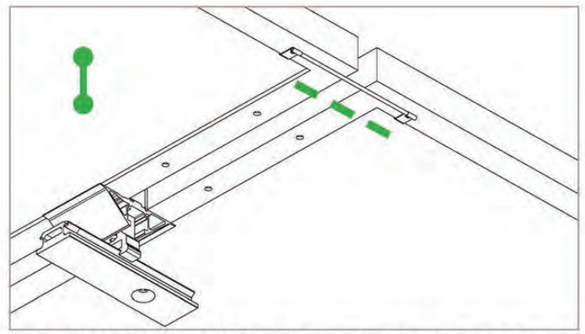
LUG DETAIL & TORQUE INFO
Ilsco Flange Lug(SGB-4)
- 1/4" mounting hardware
- Torque = 75 in-lb
- AWG 4-14 - Solid or Stranded

WEEBLUG Single Use Only

TERMINAL TORQUE, Install Conductor and torque to the following:
6-14 AWG: 7ft-lbs

LUG DETAIL & TORQUE INFO
Wiley WEEBLug (6.7)
- 1/4" mounting hardware
- Torque = 10 ft-lb
- AWG 6-14 - Solid or Stranded

NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION



N-S BONDING PATH: N-S system bonding is accomplished through a N-S bonding clip. Insert each end of the N-S bonding clip onto a module frame flange. **System is bonded with a single array edge, however it is recommended that N-S bonding clips be installed on both edges for ease of maintenance (see also: Maintenance Page S)**

System bonding is accomplished through modules. System grounding accomplished by attaching a ground lug to any module at a location on the module specified by the module manufacturer.

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AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant:	Unirac, Inc	**Manufacturer:**	Jiaxing Pacific Energy Equipment Corp.
Address:	1411 Broadway Blvd NE Albuquerque, NM 87102	**Address:**	No. 8 Haiwan Ave Hangzhou Bay Bdao New Area Haiyan Economic Development Area Jiaxing City, Zhejiang Province
Country:	USA	**Country:**	China
Contact:	Klaus Nicolaedis Jason Mayfield	**Contact:**	Lili Zeng George Huang
Phone:	505-462-2190 505-400-2949	**Phone:**	510-979-1920 650-799-7627
FAX:	NA	**FAX:**	NA
Email:	klaus.nicolaedis@unirac.com jasonm@unirac.com	**Email:**	lzeng@ccmfg.com george@ccmfg.com

Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Lake Forest, CA

Control Number: 5003278 **Authorized by:** Rebecca Martinez
for Dean Davidson, Certification Manager

ETL LISTED US
Intertek

This document supersedes all previous Authorizations to Mark for the noted Report Number.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

Standard(s):	UL 2703 Issued: 2015/01/28 Ed: 1 Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
Product:	Photovoltaic Mounting System, Sun Frame Micro Rail- Installed Using Unirac Installation Manual, Rev PUB2017FEB16
Brand Name:	Unirac
Models:	Unirac SFM

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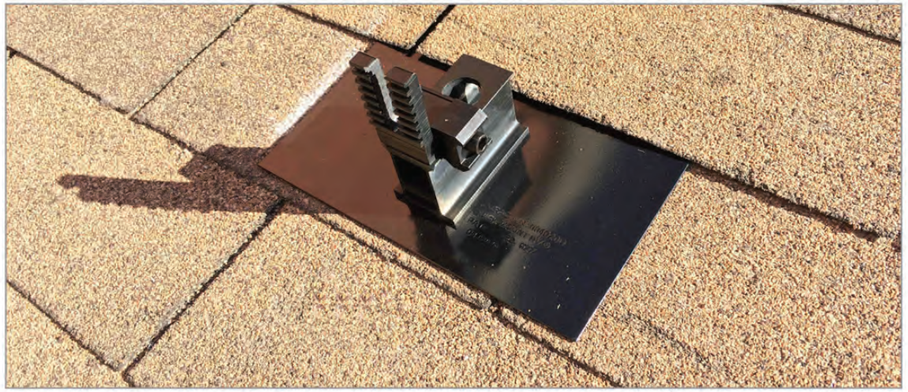
SUNFRAME MICRORAIL RAISED SEAL FLASHING INSTALLATION GUIDE



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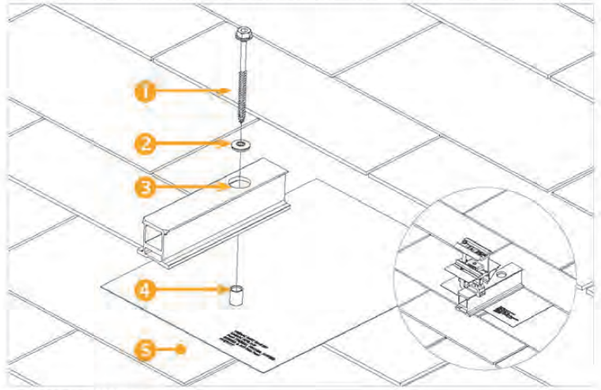
SUNFRAME MICRORAIL RAISED SEAL FLASHING — TOOLS & ASSEMBLY DETAILS — TECHNICAL DATA SHEET — 1 PAGE

TOOLS REQUIRED OR RECOMMENDED FOR LAYOUT & INSTALLATION:

- TAPE MEASURE
- CHALK LINE
- ROOFING CRAYON
- HAMMER
- COMPATIBLE SEALANT AND DISPENSER
- DRILL WITH EITHER 1/8" BIT FOR GRK AND
- UNIRAC CUSTOM STRUCTURAL SCREW, OR 7/32" BIT FOR LAG BOLT
- IMPACT DRIVER WITH ½" SOCKET (OPTIONAL ¼" HEX DRIVER FOR UNIRAC CUSTOM STRUCTURAL SCREW)

SFM RAISED SEAL FLASHING COMPONENTS:

1. FASTENER:
   - LAG BOLT, 5/16"
   - UNIRAC CUSTOM STRUCTURAL SCREW, 5/16"
   - GRK STRUCTURAL SCREW, 5/16"
2. 5/16" ID EDPM SEALING WASHER
3. SFM MOUNT ASSEMBLY (VARIOUS) WITH SLIDER
4. SFM RAISED SEAL FLASHING
5. COMP SHINGLE ROOF



INSTALLATION NOTES:

A. It is not necessary or advisable to use nails or other fasteners to secure the perimeter of the flashing.

B. The SFM Raised Seal Flashing is made to work with standard and high-definition composition/asphalt and wood shingle roofs with 5" to 5-5/8" courses.

C. Mounts should not be installed in areas of the roof susceptible to ice damming. Ponding water can travel upward under shingles and reach the bolt penetration.

D. Fastener length specification and capacity verification are the responsibility of the installer.

SUNFRAME MICRORAIL RAISED SEAL FLASHING — QUICK INSTALLATION STEPS — INSTALLATION GUIDE — 2 PAGE

PREPARING SHINGLES: Use roofing bar to break seals between 1st and 2nd, and 2nd and 3rd shingle courses. Be sure to remove all nails to allow correct placement of flashing. See SFM installation guide for proper flashing placement.

DRILL PILOT HOLES: Holding the drill square to the rafter, drill 3" deep pilot hole into center of rafter using 1/8" aircraft extension bit for 5/16" GRK or Unirac Custom Structural Screw, or 7/32" aircraft extension bit for 5/16" lag.

ROOF SEALANT: Fill pilot hole with appropriate sealant.

OPTIONAL SEALANT ON FLASHING: Apply a circle shaped bead of sealant around the attachment hardware hole of the flashing before insertion. Do not use excessive sealant.

POSITION FLASHING: Slide the flashing up underneath the 2nd course of shingles, so that the bottom edge of the flashing does not overhang the downslope edge of the 1st course of shingles.

PLACE SLIDER: Place slider with assembly over the flashing flute, ensuring that the slider sits flat on the flashing surface.

INSTALL FASTENER & TIGHTEN: Install fastener with sealing washer. Swivel the slider to gauge proper torque when driving the fastener. Tighten until slider stops swiveling easily.

COMPLETE FLASHING INSTALLATION: Repeat previous steps to install all mounts.

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