WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

76 North Meadowbrook Drive
Alpine, UT 84004
office (201) 874-3483
swyssling@wysslingconsulting.com

February 22, 2024

BYLD Better
1213 W Moorehead Street Suite 500
Charlotte, NC 28208

Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, S=Utah, L=Alpine, O=Wyssling Consulting PLLC, CN ="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location:
Date: 2024.02.23 10:11:27-07'00'
Foxit PDF Editor Version: 13.0.0

Re: Engineering Services
Cruz Residence
5680 Old US Highway 421, Lillington, NC
7.900 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.
3. During installation, please avoid stacking multiple panels/equipment on roof at any single location. If absolutely necessary, do not exceed a maximum of (2) panels at any single location.

B. Description of Structure:

Roof Framing: Assumed prefabricated wood trusses at 24" on center. All truss members are constructed of 2x2 dimensional lumber.
Roof Material: Composite Asphalt Shingles
Roof Slopes: 15 degrees
Attic Access: Inaccessible
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 = 117 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 North Carolina Residential Code, 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 Ironridge 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. The maximum allowable withdrawal for a ¼" wood screw in ½" plywood is 55 lbs per screw (per APA technical note E830d). Connection on the roof is utilizing four (6) ¼" wood screws into the existing decking to resist uplift forces. Contractor to verify installation to be performed in accordance with the manufacturer's recommendations. Based on four (6) ¼" wood screws into ½" plywood, 220 lbs of uplift resistance is provided per attachment.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 24" on center for roof zones 2n, 3r, and 3e, no greater than 36" on center for roof zones 2r, and no greater than 48" on center in roof zones 1 and 2e.

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 North Carolina Residential Code*, current industry standards and practice, 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
North Carolina COA P-2308

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

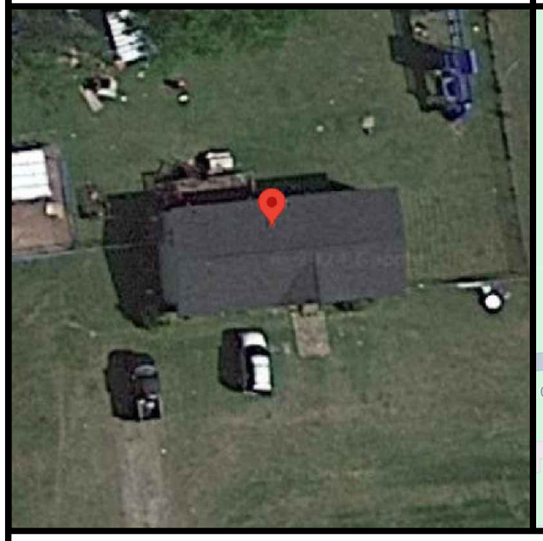
Signed 2/22/2024

NEW PV ROOFTOP SYSTEM DESIGN

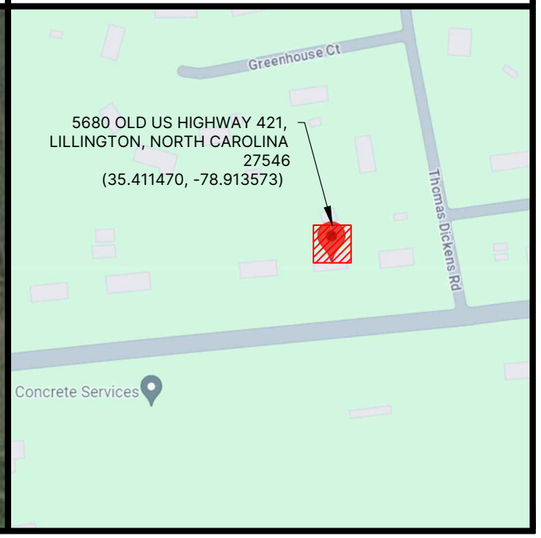
20 MODULES - 7.900 KW DC & 7.600 KW AC SYSTEM SIZE

RIVERA CRUZ RESIDENCE - 5680 OLD US HIGHWAY 421, LILLINGTON, NORTH CAROLINA 27546

AERIAL MAP



VICINITY MAP



SHEET INDEX

PV-1	COVER SHEET
PV-2	SITE PLAN
PV-3	MOUNTING PLAN
S-1	STRUCTURAL DETAILS
E-1	ELECTRICAL DIAGRAM
E-2	EQUIPMENT INFORMATION
E-3	PV LABELS
PV-4	SITE PHOTOS
SPECS 1-6	MANUFACTURER'S SPECS

SCOPE OF WORK

INSTALL 7.900 KW DC ROOF MOUNTED
PV SYSTEM UTILIZING
(20) MISSION SOLAR PERC 66 MSE395SX9R (395W)
(1) TESLA INVERTER 7.6KW
(8) TESLA MCI
(1) 60A UTILITY AC DISCONNECT
IRONRIDGE AIRE RACKING WITH
IRONRIDGE - HUG MOUNTS
EXISTING 200 A BUSBAR WITH 200 A MAIN BREAKER
INTERCONNECTION METHOD: LOAD SIDE BREAKER
ROOF TYPE: COMP SHINGLE
NUMBER OF STORIES: 1

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
2. ALL COMPONENTS SHALL BE NEW AND LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY AND LISTED FOR THEIR SPECIFIC APPLICATION.
3. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER.
4. ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
5. CONTRACTOR SHALL OBTAIN ELECTRICAL PERMITS PRIOR TO INSTALLATION AND SHALL COORDINATE ALL INSPECTIONS, TESTING COMMISSIONING, AND ACCEPTANCE WITH THE CLIENT, UTILITY CO. AND CITY INSPECTORS AS NEEDED.
6. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER THE MANUFACTURER'S REQUIREMENTS. ALL PV MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CANNOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
7. DC CONDUCTORS SHALL BE RUN IN EMT AND/OR MC (METAL CLAD CABLE) AND SHALL BE LABELED. ALL DC CONDUCTORS RUN INSIDE OF THE STRUCTURE SHALL BE INSTALLED A MINIMUM OF 18" BELOW THE ROOF DECK.
8. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE NEC.
9. CONFIRM LINE SIDE VOLTAGE AT THE ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
10. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER CODE.
11. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.
12. ALL ROOF PENETRATIONS MUST BE SEALED OR FLASHED.
13. EQUIPMENT MAY BE SUBSTITUTED FOR SIMILAR EQUIPMENT BASED ON AVAILABILITY. SUBSTITUTED EQUIPMENT SHALL COMPLY WITH DESIGN CRITERIA.
14. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTORS.
15. WHENEVER A DISCREPANCY IN THE QUALITY OF EQUIPMENT ARISES ON THE DRAWING OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS TO ENSURE COMPLETE COMPLIANCE AND LONGEVITY OF THE OPERABLE SYSTEM REQUIRED BY THE ENGINEERS.

CONTRACTOR

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CODE REFERENCE

AHJ: LILLINGTON

2020 NORTH CAROLINA NATIONAL ELECTRIC CODE (NEC)
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE

DESIGN CRITERIA

ASCE 7-10 WIND SPEED: 117 MPH
EXPOSURE CATEGORY C
GROUND SNOW LOAD: 15 PSF

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

COVER SHEET

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Signed 2/22/2024

SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO. 46546

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

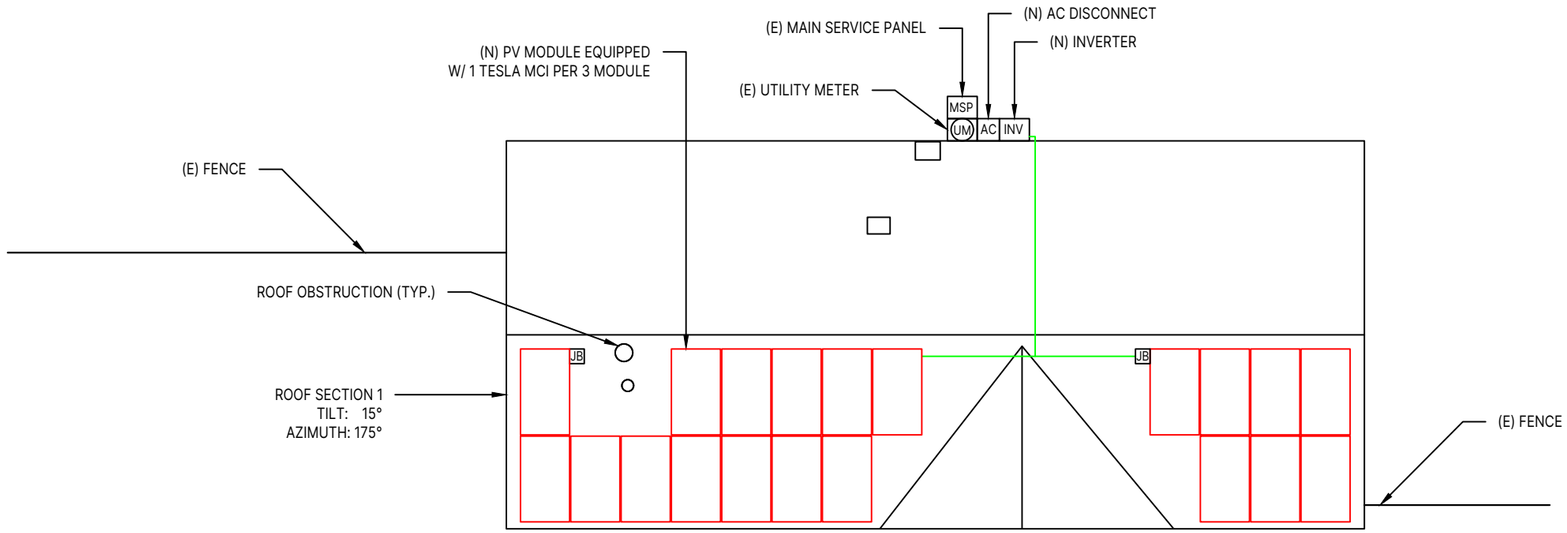
PV-1

SITE PLAN LEGEND

UTILITY METER	(UM)
MAIN SERVICE PANEL	MSP
GAS METER	GM
AC DISCONNECT	AC
DC DISCONNECT	DC
AC COMBINER PANEL	COM
INVERTER	INV
IQ SYSTEM CONTROLLER	IQ
BACKUP INTERFACE	BI
BATTERY	B
PRODUCTION METER	PM
SUBPANEL	SUB
JUNCTION BOX	JB
FIRE PATHWAY	
SATELLITE DISH	
PROPERTY LINE	
ATTIC RUN CONDUIT	
EXTERNAL CONDUIT	
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	
ROOF VENT (TYP.)	

UTILITY: DUKE ENERGY PROGRESS

INVERTER	
MANUFACTURER/ MODEL	TESLA INVERTER 7.6KW
MAX AC OUTPUT	32 A
AC OUTPUT VOLTAGE	240 V
MAX DC INPUT VOLTAGE	600 V
MAX INPUT CURRENT	11 A
WEIGHTED CEC EFFICIENCY	97.50%
INVERTER WATTAGE	7600 W



MODULE SPEC AND ROOF INFO:

PV MODULE TYPE - MISSION SOLAR PERC 66 MSE395SX9R (395W)
WEIGHT OF INDIVIDUAL PANEL - 48.50 LBS
INDIVIDUAL SOLAR PANEL AREA - 21.64 SQ FT
ROOF AREA - 1649.5 SQ FT

ROOF COVERAGE - 26.2%

EQUIPMENT LIST:

(N) (20) MISSION SOLAR PERC 66 MSE395SX9R (395W)
(N) (1) TESLA INVERTER 7.6KW
(N) (8) TESLA MCI
(N) (1) 60A UTILITY AC DISCONNECT
IRONRIDGE AIRE RACKING WITH IRONRIDGE - HUG MOUNTS

SITE PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCAKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
6. 3/4" OR GREATER CONDUIT RUN (7/8" ABOVE ROOF SURFACE)
7. ROOF ACCESS POINTS 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 IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

FRONT OF HOME

OLD US HIGHWAY 421

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

SCALE: 3/32" = 1'-0"

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

SITE PLAN

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Signed 2/22/2024

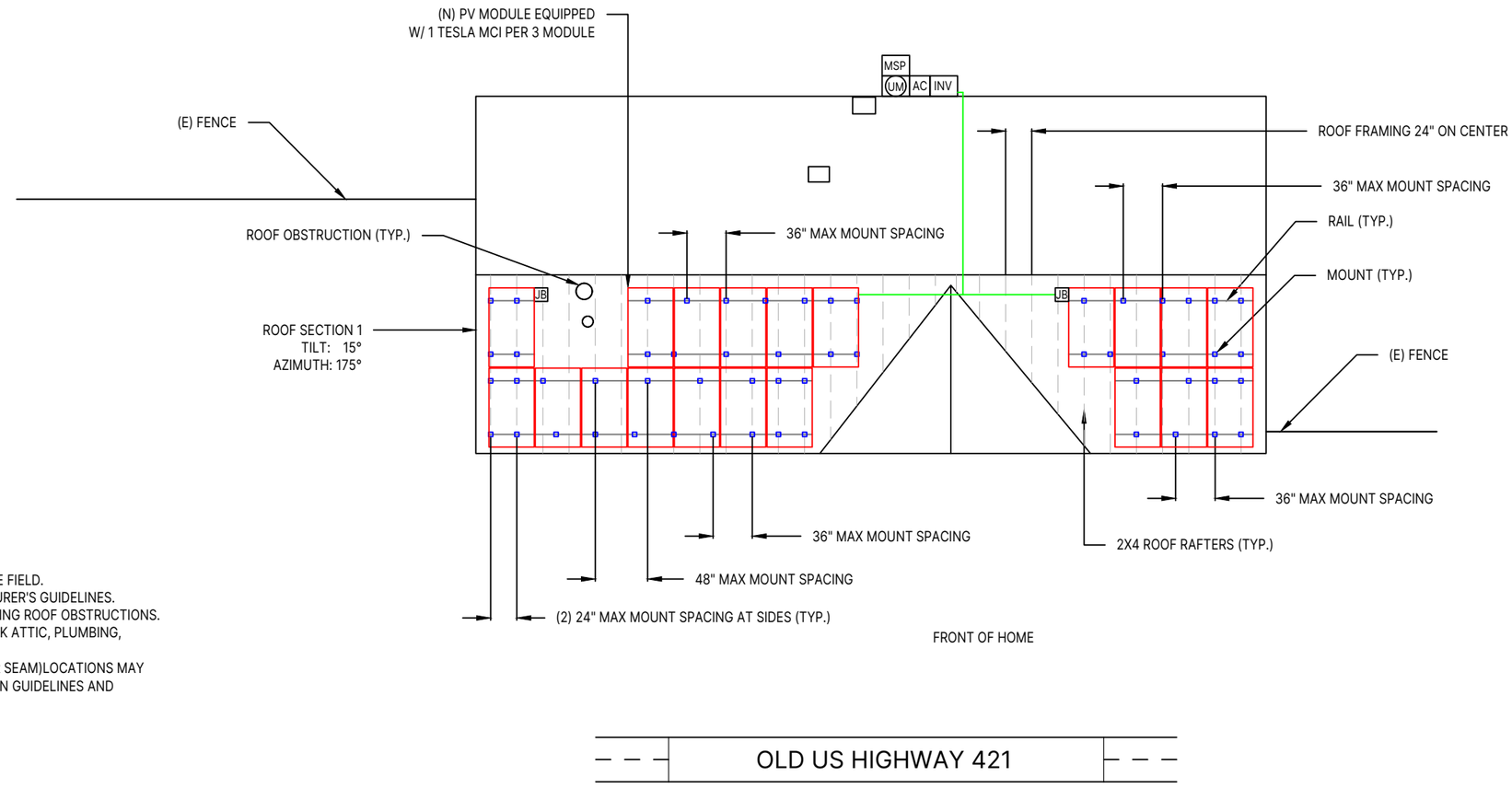
SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO. 46546

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

PV-2

MOUNTING PLAN LEGEND

UTILITY METER	UM
MAIN SERVICE PANEL	MSP
GAS METER	GM
AC DISCONNECT	AC
DC DISCONNECT	DC
AC COMBINER PANEL	COM
INVERTER	INV
IQ SYSTEM CONTROLLER	IQ
BACKUP INTERFACE	BI
BATTERY	B
PRODUCTION METER	PM
SUBPANEL	SUB
JUNCTION BOX	JB
SATELLITE DISH	
PROPERTY LINE	
ATTIC RUN CONDUIT	
EXTERNAL CONDUIT	
RAIL	
MOUNT	
ROOF FRAMING	
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	
ROOF VENT (TYP.)	



MOUNTING PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. ACTUAL ROOF CONDITIONS AND ROOF FRAMING (OR SEAM)LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S)INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

MOUNT QUANTITY:

1. (55) IRONRIDGE - HUG ATTACHMENTS
DISTRIBUTED LOAD - (ARRAY) WEIGHT/AREA = 2.24 lbs/ ft²
TOTAL WEIGHT OF SYSTEM - 970 lbs

	TILT	AZIMUTH	# OF MODULES	ROOF FRAMING	FRAMING SPACING	ROOF TYPE	MAX MOUNT SPACING	MOUNT TYPE
ROOF SECTION 1	15°	175°	20	2X2 - TRUSSES	24"	COMP SHINGLE	24", 36" & 48"	IRONRIDGE - HUG

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

SCALE: 3/32" = 1'-0"

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MOUNTING PLAN

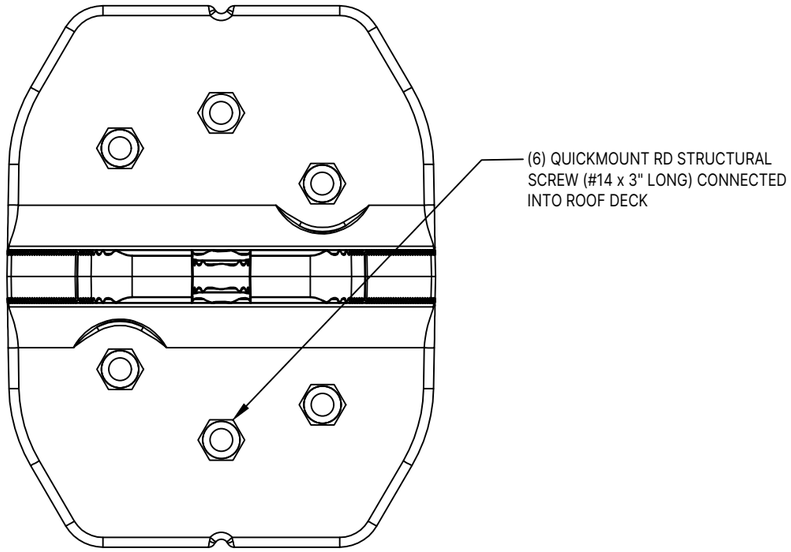
NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Signed 2/22/2024

SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO. 46546

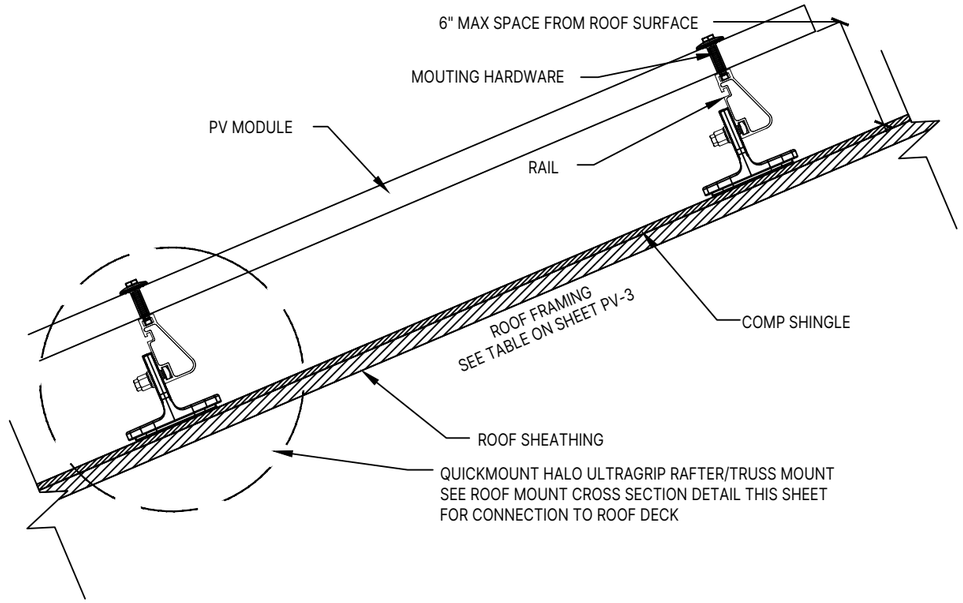
DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

PV-3



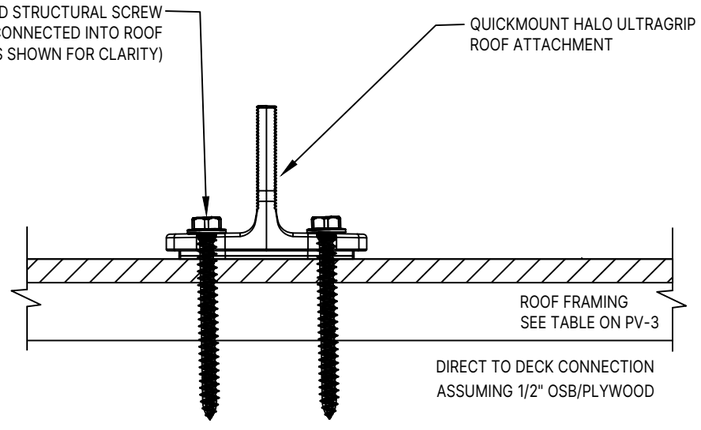
ROOF MOUNT PLAN VIEW DETAIL

NTS



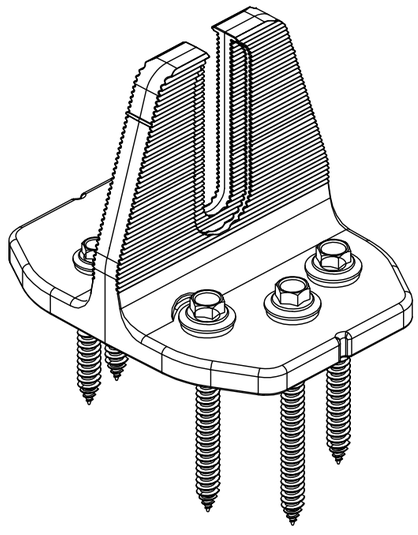
GENERAL ROOF MOUNT DETAIL

NTS



ROOF MOUNT CROSS SECTION DETAIL

NTS



ROOF MOUNT

NTS

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

MOUNT INSTALLATION NOTES

1. CONTRACTOR IS TO FOLLOW THE PLAN FOR INSTALLING ROOF MOUNTS.
2. IF THE CONTRACTOR IDENTIFIES THE ROOF FRAMING IS DIFFERENT FROM WHAT IS IDENTIFIED ON THIS PLAN, CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH INSTALLATION.
3. CONTRACTOR IS TO LOCATE THE ROOF FRAMING BY UTILIZING A HAMMER.
4. WHEN THE ROOF FRAMING IS LOCATED, CONTRACTOR IS TO DRILL A PILOT HOLE TO CONFIRM CENTER OF ROOF FRAMING. IF THE ROOF FRAMING IS MISSED, AND A NEW PILOT HOLE IS TO BE DRILLED, CONTRACTOR TO UTILIZE SILICON/CAULK TO SEAL THE ORIGINAL PILOT HOLE.
5. DIRECT TO DECK MOUNTS ARE ONLY TO BE USED WITH APPROVED DESIGN BY THE ENGINEER. DIRECT TO DECK MOUNT INSTALLATION IS NOT A SUBSTITUTION FOR LAG SCREWS INTO ROOF FRAMING.
6. CONTRACTOR TO FOLLOW MANUFACTURERS SPECIFICATIONS FOR INSTALLATION AND REQUIRED SCREWS.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

STRUCTURAL DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Signed 2/22/2024

SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO. 46546

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

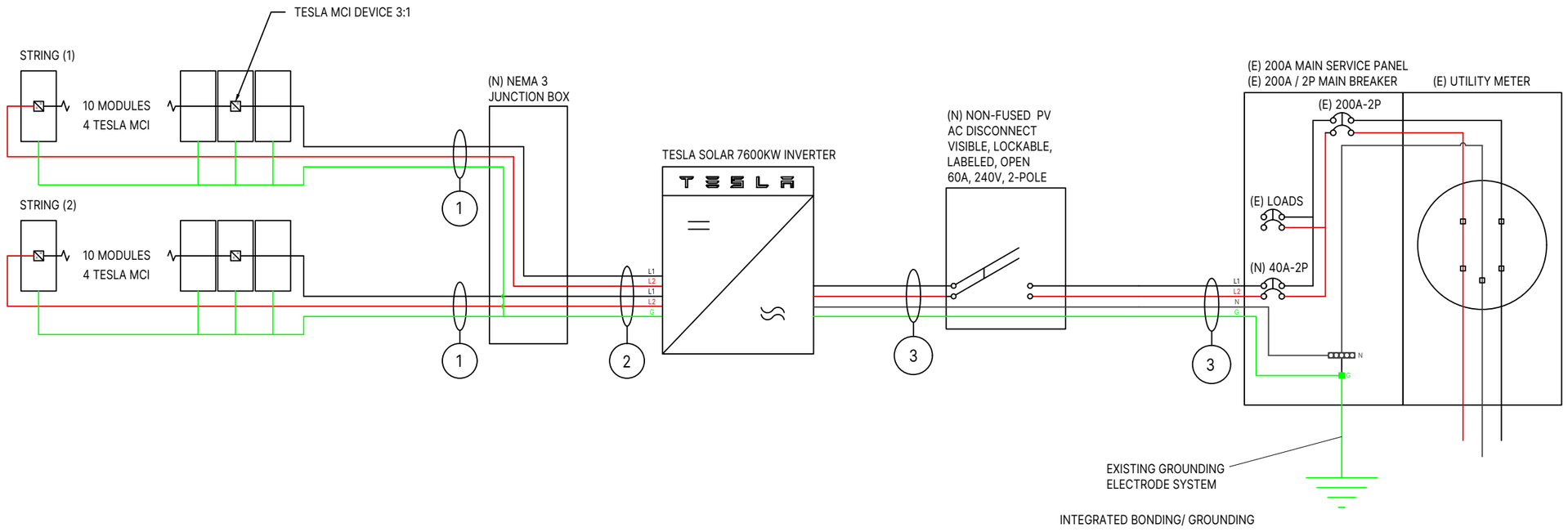
S-1

CONDUCTOR SCHEDULE

	CONDUCTORS				GROUND		CONDUIT
TAG ID	WIRES IN CONDUIT	WIRE AWG	TYPE, MATERIAL	AMPACITY	SIZE	TYPE, MATERIAL	
1	3	#10 AWG	PV CABLE	30	#6 AWG	BARE, CU	
2	5	#10 AWG	THWN-2, CU	30	#10 AWG	THHW, CU	3/4" CONDUIT
3	4	#8 AWG	THWN-2, CU	50	#10 AWG	THHW, CU	3/4" CONDUIT

EQUIPMENT LIST:

(N) (20) MISSION SOLAR PERC 66 MSE395SX9R (395W)
(N) (1) TESLA INVERTER 7.6KW
(N) (8) TESLA MCI
(N) (1) 60A UTILITY AC DISCONNECT
IRONRIDGE AIRE RACKING WITH IRONRIDGE - HUG MOUNTS
MODULE WATTAGE : 395W



GENERAL NOTES

1. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
2. 3/4" OR GREATER CONDUIT RUN (7/8" ABOVE ROOF SURFACE
3. GAS METER LOCATED IN PROXIMITY OF THE PV INSTALLATION, LOAD CENTER, AND/OR DISCONNECTS. DISCONNECTS SHALL BE LOCATED IN COMPLIANCE WITH UTILITY AND THE AHJ (AUTHORITY HAVING JURISDICTION).
4. PER NEC REQUIREMENTS GROUNDING CONDUCTORS SMALLER THAN #6 AWG SHALL BE PROTECTED IN A CONDUIT, RACEWAY, OR ARMORED PROTECTIVE SHEATHING (NEC 250.64).
5. THE WORKING CLEARANCES AROUND THE EXISTING ELECTRICAL EQUIPMENT AS WELL AS THE NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
6. ANY CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT. (NEC300.6 C1, 310.8 D).
7. ROOM FOR EQUIPMENT WITHIN 5 FEET FROM MSP.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

ELECTRICAL DIAGRAM

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

E-1

INTERCONNECTION CALCULATIONS

ITEM	UNIT	PANEL
BUS RATING	AMPS	200A
MAIN OCPD	AMPS	200A
ALLOWED PV PER NEC	AMPS	40A

CONDUCTOR CALCULATIONS

TAG 1 (SEE E-1)	TAG 2 (SEE E-1)	TAG 3 (SEE E-1)
UNDER MODULES, NOT IN CONDUIT	#10 AWG MAX CURRENT = 30A	#8 AWG MAX CURRENT = 50A
#10 AWG MAX CURRENT = 30A		
		TESLA INVERTER 7.6KW MAX OUTPUT = 32 A
TESLA INVERTER 7.6KW MAX CIRCUIT CURRENT	TESLA INVERTER 7.6KW MAX CIRCUIT CURRENT	32 A * 1.25 A = 40
15 A FOR CIRCUIT 1	15 A FOR CIRCUIT 1	RECOMMENDED OCPD = 40A
15 A FOR CIRCUIT 2	15 A FOR CIRCUIT 2	

EQUIPMENT INFORMATION

MODULE	
MANUFACTURER/ MODEL	MISSION SOLAR PERC 66 MSE395SX9R
PMAX	395 W
VOC	45.18 V
VMP	36.99 V
IMP	10.68 A
ISC	11.24 A
TEMPERATURE COOEFFICIENT OF PMAX	-0.367 %/°C
TEMPERATURE COEFFICIENT OF VOC	-0.259 %/°C

INVERTER	
MANUFACTURER/ MODEL	TESLA INVERTER 7.6KW
MAX AC OUTPUT	32 A
AC OUTPUT VOLTAGE	240 V
MAX DC INPUT VOLTAGE	600 V
MAX INPUT CURRENT	11 A
WEIGHTED CEC EFFICIENCY	98.00%
INVERTER WATTAGE	7600 W

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

EQUIPMENT INFORMATION

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: 32
NOMINAL OPERATING AC VOLTAGE: 240

AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS [NEC 690.54]

⚠WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHTOVOLTAIC SYSTEM

AT POINT OF INTERCONNECTION. [NEC 705.12(C), 690.59]

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

EACH PV SYSTEM DISCONNECTING MEANS SHALL PLAINLY INDICATE WHETHER IN THE OPEN (OFF) OR CLOSED (ON) POSITION AND BE PERMANENTLY MARKED [NEC. 690.13(B)]

PHOTOVOLTAIC
DC DISCONNECT

AT EACH DC DISCONNECTING MEANS [NEC 690.13(B)]

PHOTOVOLTAIC
AC DISCONNECT

AT EACH AC DISCONNECTING MEANS [NEC 690.13(B)]

WARNING: PHOTOVOLTAIC POWER SOURCE

AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS [NEC 690.31(D)(2)]

⚠WARNING
ELECTRICAL SHOCK HAZARD
DO NO TOUCH TERMINALS
TERMINALS ON BOTH LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION

AT BUILDING OR STRUCTURE MAIN DISCONNECTING MEANS. [NEC 690.12(E), NEC 690.13(B)]

⚠WARNING
THE EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR

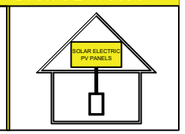
PERMANENT WARNING LABELS SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT

⚠WARNING
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

A PERMANENT WARNING LABEL SHALL BE APPLIED TO THE DISTRIBUTION EQUIPMENT ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER. [NEC 705.12(B)(3)(2)]

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



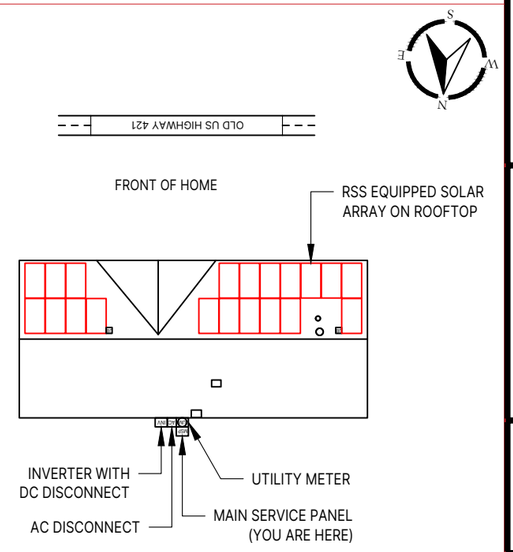
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY: THE TITLE "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" SHALL UTILIZE CAPITALIZED CHARACTERS WITH A MINIMUM HEIGHT OF 3/8 IN. IN BLACK ON YELLOW BACKGROUND, AND THE REMAINING CHARACTERS SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16 IN. IN BLACK ON WHITE BACKGROUND. [NEC 690.56(C)(1)(A)]

RAPID SHUTDOWN SWITCH FOR SOLAR PV

A RAPID SHUTDOWN SWITCH SHALL HAVE A LABEL LOCATED ON OR NO MORE THAN 3 FT FROM THE SWITCH THAT INCLUDES THIS WORDING. THE LABEL SHALL BE REFLECTIVE, WITH ALL LETTERS CAPITALIZED AND HAVING A MINIMUM HEIGHT OF 3/8 IN., IN WHITE ON RED BACKGROUND.[NEC 690.56(C)(2)]

CAUTION

MULTIPLE SOURCES OF POWER



5680 OLD US HIGHWAY 421, LILLINGTON, NORTH CAROLINA 27546

LABEL LOCATION: MSP CODE REF: NEC 2020 - 705.10

LABELING NOTES:

1. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
2. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
4. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

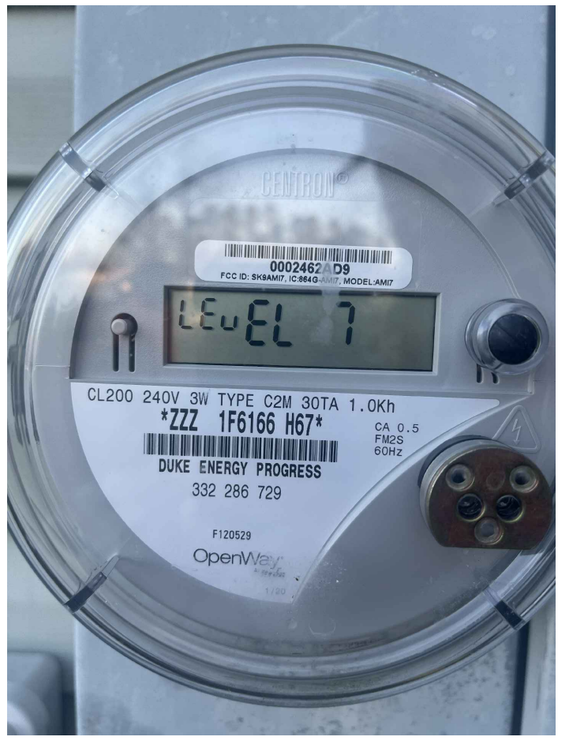
REVISIONS

NO	DATE:	COMMENTS
1		
2		

PV LABELS

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

E-3



ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

SITE PHOTOS

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

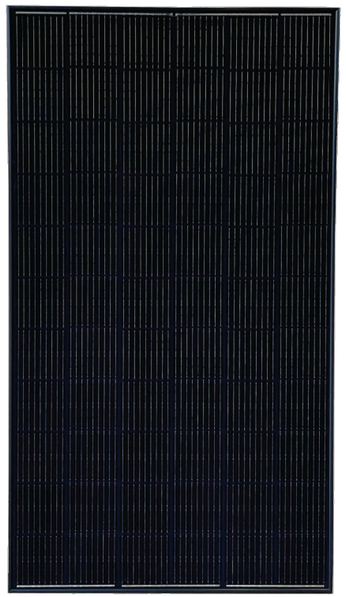
PV-4

MSE PERC 66

MISSION SOLAR ENERGY

395W Positive Power Tolerance

Class leading power output **-0 to +3%**



FRAME-TO-FRAME WARRANTY

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

CERTIFICATIONS

CEC | TÜV SÜD | c UL us LISTED

UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

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

True American Quality
True American Brand

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

Demand the best. Demand Mission Solar Energy.

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

Advanced Technology
- 9 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications

Extreme Weather Resilience
- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame

BAA Compliant for Government Projects
- Buy American Act
- American Recovery & Reinvestment Act

Modules Assembled & Designed & Engineered IN THE USA OF U.S. AND NON-U.S. PARTS

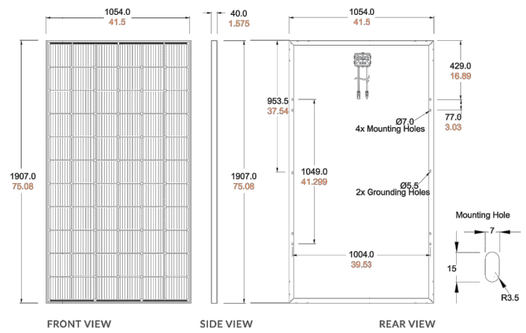
25 YEAR FRAME-TO-FRAME WARRANTY

Class Leading
390-400W

MSE PERC 66

BASIC DIMENSIONS

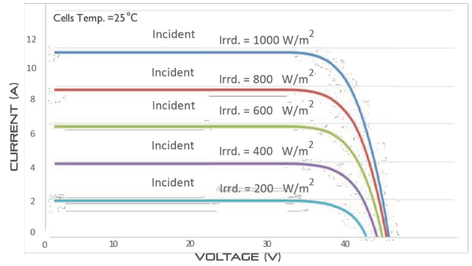
[UNITS: MM/IN]



CURRENT-VOLTAGE CURVE

MSE385SX9R: 385WP, 66 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730

TÜV SÜD | CEC | c UL us LISTED

Mission Solar Energy
8303 S. New Braunfels Ave., San Antonio, Texas 78235
www.missionsolar.com | info@missionsolar.com

Mission Solar Energy reserves the right to make specification changes without notice.
C-SA2-MKTG-0027 REV 4 03/18/2022

ELECTRICAL SPECIFICATION

PRODUCT TYPE	MSExxxSX9R (xxx = P_{max})				
Power Output	P_{max}	W_p	390	395	400
Module Efficiency		%	19.4	19.7	19.9
Tolerance		%	0/+3	0/+3	0/+3
Short Circuit Current	I_{sc}	A	11.19	11.24	11.31
Open Circuit Voltage	V_{oc}	V	45.04	45.18	45.33
Rated Current	I_{mp}	A	10.63	10.68	10.79
Rated Voltage	V_{mp}	V	36.68	36.99	37.07
Fuse Rating		A	20	20	20
System Voltage		V	1,000	1,000	1,000

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	43.75°C (±3.7%)
Temperature Coefficient of Pmax	-0.367%/°C
Temperature Coefficient of Voc	-0.259%/°C
Temperature Coefficient of Isc	0.033%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1*
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the 'Fire Class' Rating is designated for the fully-installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,054mm x 40mm
Weight	48.5 lbs. (22 kg)
Front Glass	3.2mm tempered, low-iron, anti-reflective
Frame	40mm Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm2 (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	390W Bin
53'	Most States	30	780	304.20 kW
Double Stack	CA	26	676	263.64 kW

PALLET [26 PANELS]

Weight	Height	Width	Length
1,300 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in (195.58 cm)

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MODULE SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-1

SOLAR INVERTER

3.8 kW | 7.6 kW

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall 2 technology for exceptional efficiency and reliability
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- Designed to integrate with Tesla Powerwall and Tesla App
- 3.8 kW and 7.6 kW models available

SOLAR INVERTER

Tesla Solar Inverter provides DC to AC conversion and integrates with the Tesla ecosystem, including Solar Panels, Solar Roof, Powerwall, and vehicle charging, to provide a seamless sustainable energy experience.

KEY FEATURES

- Integrated rapid shutdown, arc fault, and ground fault protection
- No neutral wire simplifies installation
- 2x the standard number of MPPTs for high production on complex roofs

ELECTRICAL SPECIFICATIONS

OUTPUT (AC)	3.8 kW	7.6 kW
Nominal Power	3,800 W	7,600 W
Maximum Apparent Power	3,328 VA at 208 V 3,840 VA at 240 V	6,656 VA at 208 V 7,680 VA at 240 V
Maximum Continuous Current	16 A	32 A
Breaker (Overcurrent Protection)	20 A	40 A
Nominal Power Factor	1 - 0.85 (leading / lagging)	
THD (at Nominal Power)	<5%	
INPUT (DC)		
MPPT	2	4
Input Connectors per MPPT	1-2	1-2-1-2
Maximum Input Voltage	600 VDC	
DC Input Voltage Range	60 - 550 VDC	
DC MPPT Voltage Range[1]	60 - 480 VDC	
Maximum Current per MPPT (I_{mp})	11 A	
Maximum Short Circuit Current per MPPT (I_{sc})	15 A	

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)
Weight	52 lb[4]
Mounting options	Wall mount (bracket)

[4] Door and bracket can be removed for a mounting weight of 37 lb.

PERFORMANCE SPECIFICATIONS

Peak Efficiency[2]	97.5%	98.0%
CEC Efficiency[2]	97.5%	
Allowable DC/AC Ratio	1.4	
Customer Interface	Tesla Mobile App	
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G)[3]	
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n), RS-485	
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown	
Supported Grid Types	60 Hz, 240 V Split Phase 60 Hz, 208 V Wye	
Required Number of Tesla Solar Shutdown Devices per Solar Module	See *Solar Shutdown Device Requirements per Module* on page 3	
Warranty	12.5 years	

[1] Maximum current.
[2] Expected efficiency pending final CEC listing.
[3] Cellular connectivity subject to network operator service coverage and signal strength.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature[5]	-30°C to 45°C (-22°F to 113°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	Type 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

[5] For the 7.6 kW Solar Inverter, performance may be de-rated to 6.2 kW at 240 V or 5.37 kW at 208 V when operating at temperatures greater than 45°C.

COMPLIANCE INFORMATION

Grid Certifications	UL 1741, UL 1741 SA, IEEE 1547, IEEE 1547.1
Safety Certifications	UL 1699B, UL 1741, UL 1998 (US)
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

INVERTER SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-2

SOLAR SHUTDOWN DEVICE

The Tesla Solar Shutdown Device is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with the Tesla Solar Inverter, the PVRSS is initiated by any loss of AC power.

ELECTRICAL SPECIFICATIONS

Nominal Input DC Current Rating (I_{MP})	12 A
Maximum Input Short Circuit Current (I_{SC})	15 A
Maximum System Voltage	600 V DC

RSD MODULE PERFORMANCE

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally open
Maximum Power Consumption	7 W
Warranty	25 years

COMPLIANCE INFORMATION

Certifications	UL 1741 PVRSS PVRSA (Photovoltaic Rapid Shutdown Array)

PVRSS

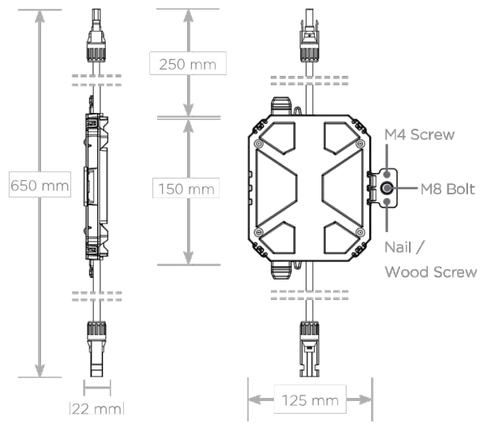
RSD Initiation Method	Loss of AC power
Compatible Equipment	Tesla Solar Inverter

ENVIRONMENTAL SPECIFICATIONS

Ambient Temperature	-40°C to 50°C (-40°F to 122°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Enclosure Rating	NEMA 4 / IP65

MECHANICAL SPECIFICATIONS

Electrical Connections	MC4 Connector
Housing	Plastic
Dimensions	125 mm x 150 mm x 22 mm (5 in x 6 in x 1 in)
Weight	350 g (0.77 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw



SOLAR SHUTDOWN DEVICE REQUIREMENTS PER MODULE

The following modules have been certified as part of a PV Rapid Shutdown Array (PVRSA) when installed together with the Tesla Solar Inverter and Tesla Solar Shutdown Devices. See the Tesla Solar Inverter Installation Manual for guidance on installing Tesla Solar Inverter and Solar Shutdown Devices with other modules.

Brand	Model	Required Solar Shutdown Devices
Tesla	Solar Roof V3	1 Solar Shutdown Device per 10 modules
Hanwha	Q.PEAK DUO BLK-G5	1 Solar Shutdown Device per 3 modules
Hanwha	Q.PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

DESIGN ENGINEER
WYSSLING CONSULTING
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

RSD SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-3

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

Datasheet

IRONRIDGE

Aire® Flush Mount System

Breathe easy with accelerated installations.

The Aire® racking system has been carefully engineered to streamline every part of the installation process. We've eliminated tiresome hassles, so that you get off the roof and on to your next project faster than ever.

Aire® retains the strength and reliability that IronRidge installers depend on. It also takes wire management to the next level with the first (and only) NEC-compliant rail, formally approved and listed as a cable tray.

Strength Tested
All components have been evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters are available online for most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof structure.

Approved Cable Tray
Open channel listed to NEMA VE 1, certified to hold PV and DG cables.

UL 2703 Listed System
Entire system and components meet the latest effective UL 2703 standards.

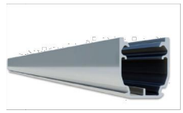
25-Year Warranty
Products are guaranteed to arrive without any impairing defects.

One-Tool System - 1/2" Hex-Head Components

Datasheet

Rails

Aire® A1 Rail



The lighter, open Aire® rail for standard conditions.
- 6' spanning capability
- Wire management tray
- Mill or anodized black

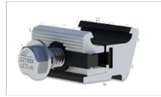
Aire® A2 Rail

The tougher, open Aire® rail for higher load capacity.
- 8' spanning capability
- Wire management tray
- Mill or anodized black

Aire® Rail Ties

Structurally connect and bond Aire™ Rails together.
- Reinstallable, up to 5x
- Internal splice design
- No more splice rules

Aire® Dock



Connects Aire® Rails to attachments with ease.
- Clicks on, slides easily
- Drops into open slots
- Anodized assembly

Clamps & Grounding

Aire® Lock Mids

Securely bond between modules to Aire® Rails.
- Fits 30-40mm modules
- Utilizes UFO® design
- Minimal 1/2" gap

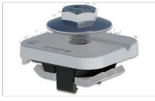
Aire® Lock Ends

Securely bond modules to Aire® Rails along ends.
- Fits 30-40mm modules
- Easy rail engagement
- Clean aesthetics

Aire® Lock Stealth®

Securely bonds modules to rail ends, entirely hidden.
- Angled for easy install
- Robust tether leash
- Fits most modules

Aire® Lug



Bonds Aire® Rails to grounding conductors.
- Simplified with single bolt
- Low-profile form factor
- Works with 10-6 AWG

Accessories

Aire® Caps

Block entry and provide a finished look to Aire® Rails.
- Stay secure on rail ends
- Symmetrical, with drain
- Cover rough-cut ends

Aire® Clip

Keeps wiring contained in open Aire® Rail channels.
- No module interference
- Simple press-in design
- Slot for easy removal

Aire® MLPE Mount

Securely bonds MLPE and accessories to Aire® Rails.
- Glove-friendly installation
- Lays flush in rail channel
- Low profile form factor

Aire® All Tile Hook

Attaches rails to tile roofs, with Aire® Dock included.
- Works on flat, S, & W tiles
- Single-socket installation
- Optional deck flashing

Resources

Design Assistant
Quickly go from rough layout to fully engineered system.
Go to IronRidge.com/design

Approved for FL Hurricane Zones
Aire® has Florida Product Approval. Additional details can be found on the Florida Building Code website.
Learn More at bit.ly/florida-aire

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

RAIL SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-4

Tech Brief

IRONRIDGE

QuickMount® HUG

The Respect Your Roof Deserves

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

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

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

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

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

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

Rafter Mount

Deck Mount

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

Tech Brief

Adaptive, Rafter-Friendly Installation

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

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

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

Trusted Strength & Less Hassle

25-Year Warranty
Product guaranteed free of impairing defects.

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

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

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

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

Attachment Loading

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

Structural Design

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

Water Seal Ratings

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

UL 2703 System

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

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MOUNTING SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-5

Product data sheet

Specifications

Safety switch, general duty, non fusible, 60A, 2 pole, 10hp, 240VAC, NEMA 3R, bolt on provision

DU222RB

Product availability: Stock - Normally stocked in distribution facility

Price*: 353.00 USD

Main

Product	Single Throw Safety Switch
Duty Rating	General duty
Device Application	Residential
Disconnect Type	Non-fusible disconnect switch
Factory Installed Neutral	None
Phase	3 phase
Number Of Poles	2
Current Rating	60 A
Voltage Rating	240 V AC
Enclosure Rating Nema	NEMA 3R
Motor Power Hp	10 hp at 240 V AC 60 Hz for 1 phase motors

Complementary

Mounting Type	Surface
Electrical Connection	Lugs
Wiring Configuration	2 wires
Wire Size	AWG 12...AWG 3 aluminium AWG 14...AWG 3 copper
Tightening Torque	35 lbf.in (3.95 N.m) 0.00…0.01 in² (2.08…5.26 mm²) (AWG 14...AWG 10) 35 lbf.in (3.95 N.m) (AWG 14...AWG 10) 45 lbf.in (5.08 N.m) 0.01 in² (8.37 mm²) (AWG 8) 45 lbf.in (5.08 N.m) 0.02…0.03 in² (12.3…21.12 mm²) (AWG 6...AWG 4) 50 lbf.in (5.65 N.m) 0.04 in² (26.67 mm²) (AWG 3)
Depth	3.75 in (95.25 mm)
Width	7.75 in (196.85 mm)
Height	9.63 in (244.60 mm)
Net Weight	16.98 lb(US) (7.7 kg)

Environment

Certifications	UL listed file E2875

Ordering and shipping details

Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CRUZ, RIVERA
5680 OLD US HIGHWAY 421
LILLINGTON, NC 27546
7.900 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

AC DISCONNECT SPEC SHEET

DATE:	2/22/2024
DRAWN BY:	NNC
REVIEWED BY:	ATF

SPECS-6

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA