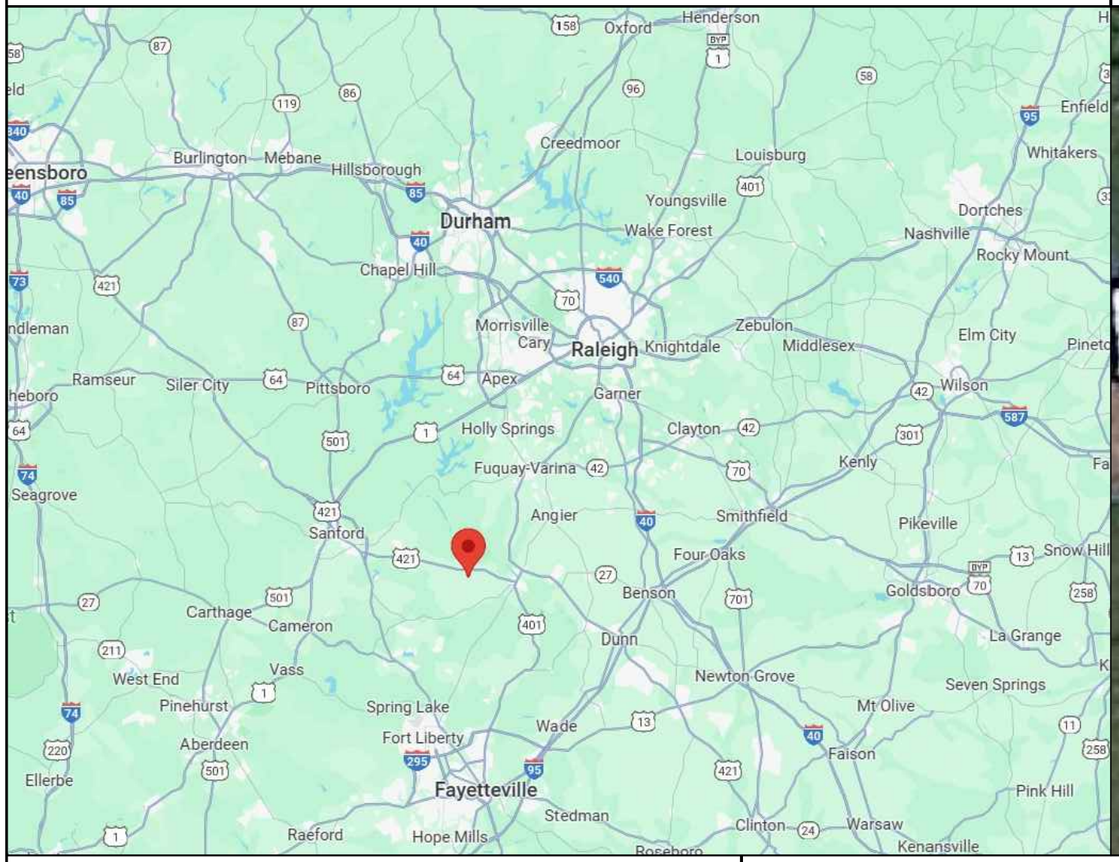
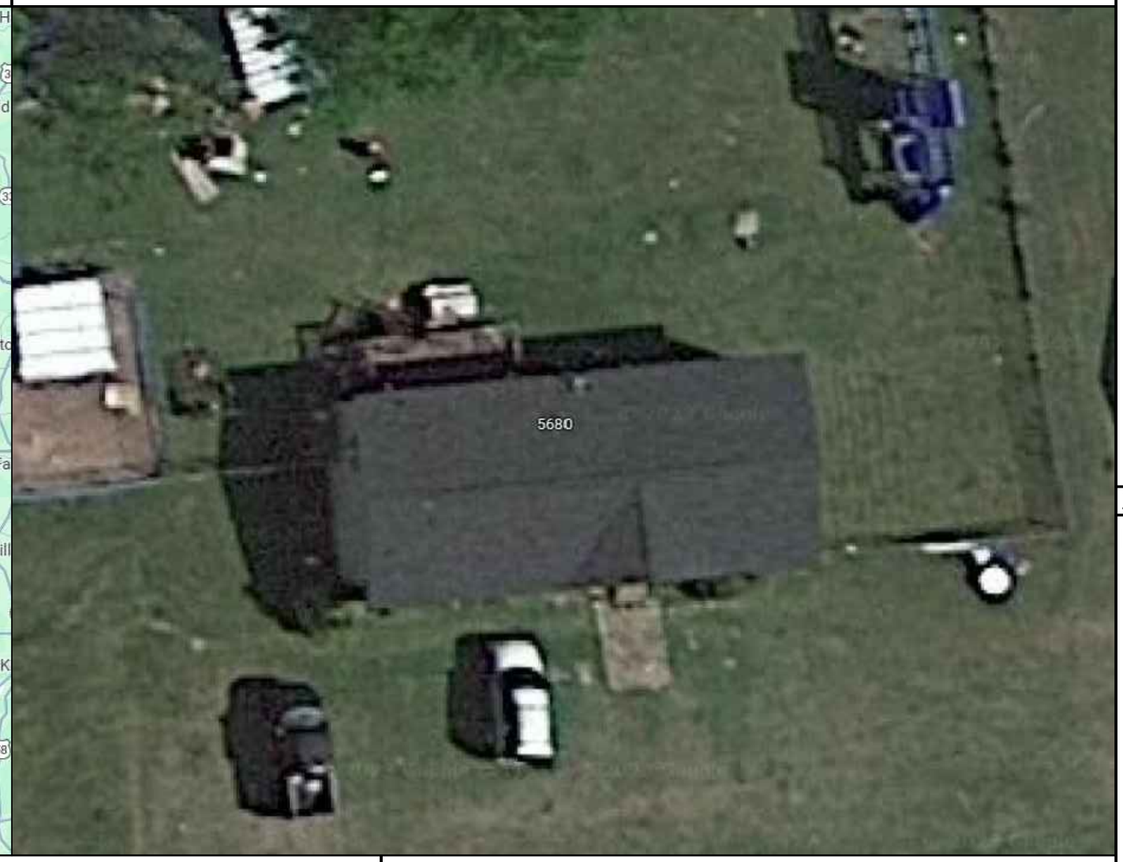
VICINITY MAP



PROPERTY MAP



SCOPE OF WORK

(20) MISSION SOLAR MSE395SX9R
(1) TESLA 1538000-XX-Y INVERTER
(8) TESLA MCI- 1
ROOF MOUNT: ROOF TECH INC. RT MINI
MOUNTING RAILS: QUICKMOUNT PV QMR-RL14-A60

SITE CONDITION

ASCE 7-10 WIND SPEED - 117 MPH
EXPOSURE CATEGORY - B
RISK CATEGORY - II
SNOW LOAD - 15 LBS/SQFT

SHEET INDEX

INTERCONNECTIONS TYPE

BACK FEED BREAKER

CODE REFERENCES

2017 NATIONAL ELECTRIC CODE
2018 NORTH CAROLINA FIRE CODE
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE

UTILITY COMPANY

DUKE ENERGY PROGRESS

NOTICE TO CONTRACTOR
All construction must comply with current NC Building Codes and is subject to field inspection and verification.
APPROVED
Limited building only review
Permit holder responsible for full compliance with the code
01/11/2024
Harnett COUNTY NORTH CAROLINA

LEGEND

- DISCONNECT SWITCH
- FUSE
- CIRCUIT BREAKER
- GND — EQUIP. GROUND

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035609 ENGINEER ANDREW W. KING 1/10/24

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM
7.900 kW DC INPUT
7.600 kW AC EXPORT

Rusbel Cruz
5680 Old Hwy 421,
Lillington, NC 27546

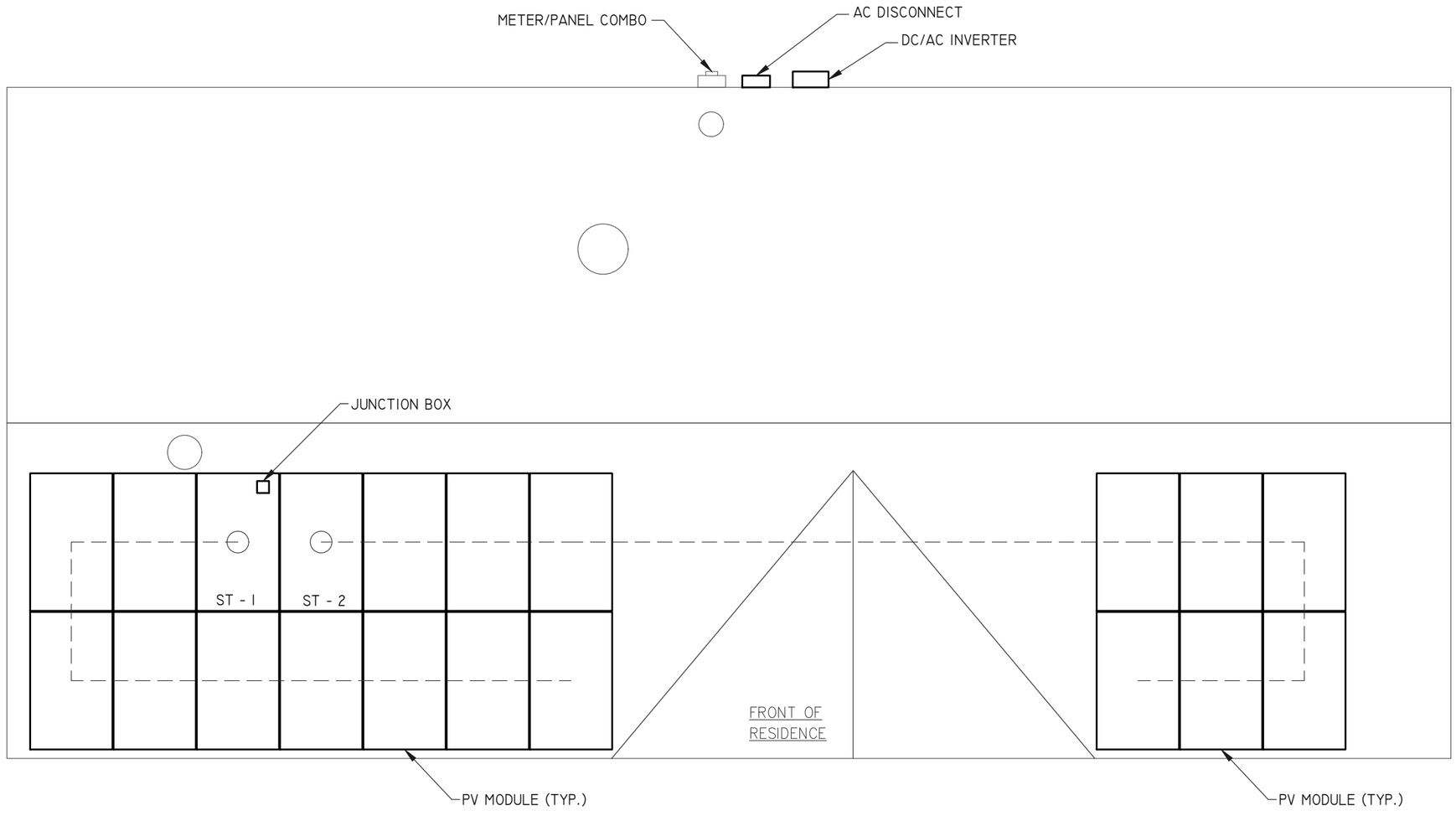
CLIENT:

EMERALDENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
PERMIT	01/09/24

PROJECT INFORMATION

PV1.1



NOTE: PROVIDE ADDITIONAL JUNCTION BOXED AS REQUIRED TO COMBINE MODULES ON DIFFERENT ARRAYS INTO A SINGLE STRING

1 SITE PLAN
SCALE: 3/16" = 1' -0"

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 1/10/24

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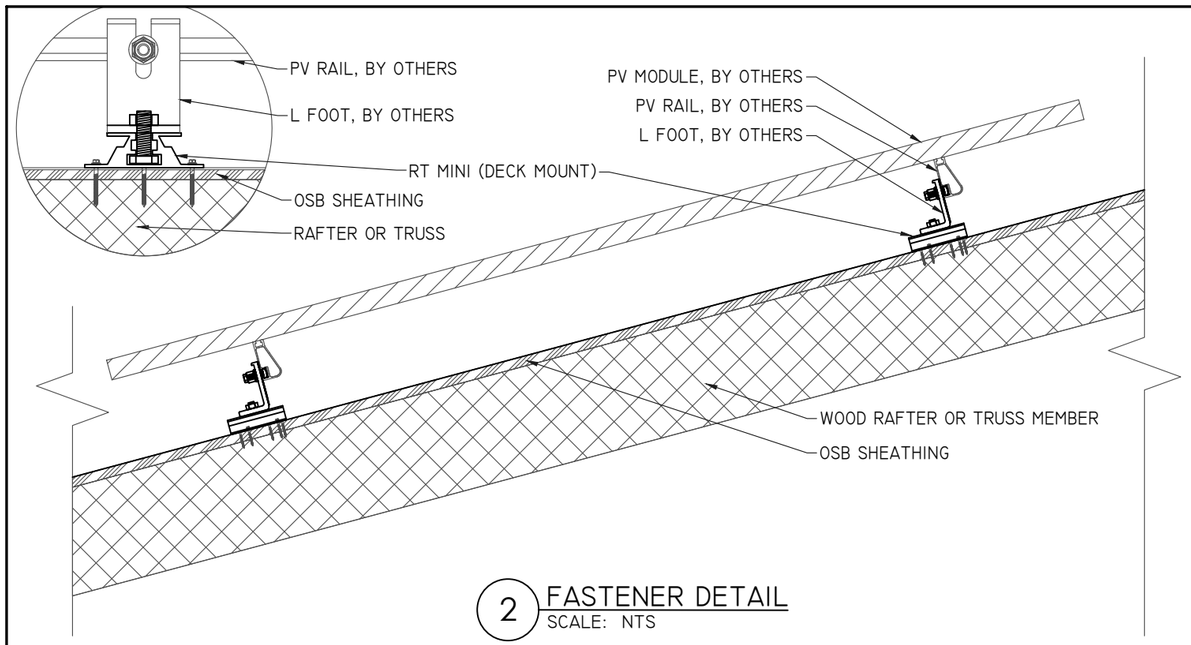
SITE INFORMATION

PV2.1



2 FASTENER DETAIL
SCALE: NTS

ARRAY SUMMARY	
# MODULES	20
# ROOF MOUNTS	72
RAIL LENGTH	146 FT.
ARRAY AREA	433 SQFT.
ARRAY WEIGHT	1058 LBS.
AZIMUTH @ SN	175°
TILT ANGLE	23°

MOUNTING RAILS	
MAKE	QRAIL
MODEL	QMR-RL14-A60
MATERIAL	ALUMINUM
WEIGHT	0.60 LBS/SQFT
SPACING	34''

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED:

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16''
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	24''
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	24''
▩ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24''

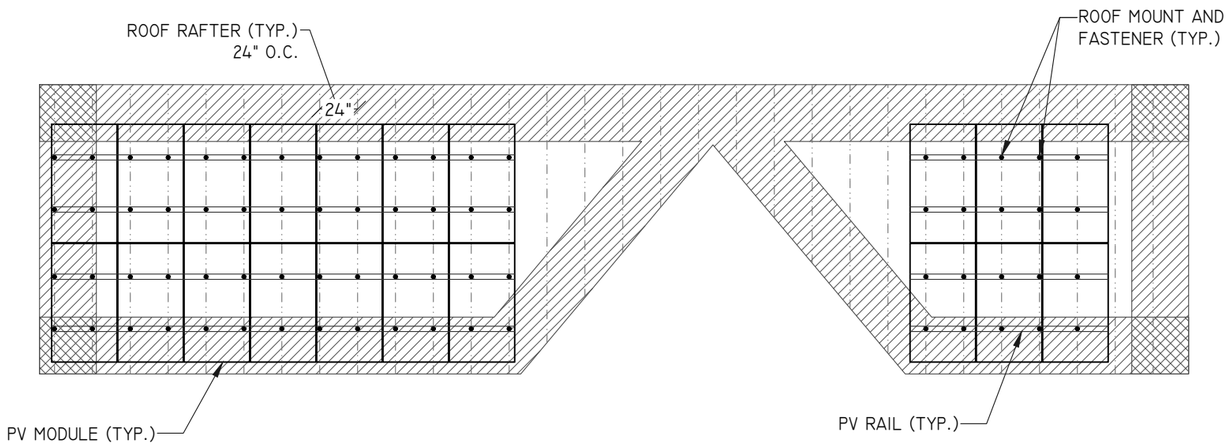
PV MODULES	
MAKE	MISSION SOLAR
MODEL	MSE395SX9R
WIDTH	41.5''
LENGTH	75.1''
THICKNESS	1.6''
WEIGHT	49 LBS

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	ROOF TECH INC.
MODEL	RT-MINI
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	RT2-04-SD5-60
MATERIAL	304 SS
SIZE	5MM X 60MM
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	5 PER MOUNT
MAX. PULL-OUT FORCE	356 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	178 LBS.

- FASTENERS EMBEDDED FULLY INTO ½" OF OSB SHEATHING

ROOF LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-23.0 LBS/SQFT
UPLIFT ZONE 2	-38.0 LBS/SQFT
UPLIFT ZONE 3	-57.1 LBS/SQFT
DOWNWARD	13.6 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-144 LBS
UPLIFT ZONE 2	-238 LBS
UPLIFT ZONE 3	-357 LBS
DOWNWARD	85 LBS

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSS
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24''
EFF. SPAN	14'-2"
PITCH	5/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.



1 ROOF PLANAR VIEW
SCALE: 1/8" = 1' -0"

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 1/10/24

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STRUCTURAL INFORMATION

PV3.1

PV MODULES	
MAKE	MISSION SOLAR
MODEL	MSE395SX9R
TECHNOLOGY	MONO-CRYST.
NOM. POWER (PNOM)	395 WATTS
NOM. VOLT. (VMP)	36.99 VOLTS
O.C. VOLT. (VOC)	45.18 VOLTS
MAX. SYS. VOLT.	1000 V (UL)
TEMP. COEF. (VTC)	-0.259 %/°C
NOM. CURR. (IMP)	10.68 AMPS
S.C. CURR. (ISC)	11.24 AMPS
MAX. SERIES FUSE	20 AMPS

RAPID SHUT DOWN SYSTEM	
MAKE	TESLA
MODEL	MCI -1
PV DC INPUT:	
MAX. NUM. DEVICES PER STRING	5
MAX. CURRENT	15A
NOM. CURRENT	12A
DC OUTPUT:	
MAX. VOLT.	MODULE VOC
MAX. SYSTEM VOLT.	600 VOLTS

DC/AC INVERTER	
MAKE	TESLA
MODEL	1850000-XX-Y
TECHNOLOGY	TRANS-LESS
DC INPUT:	
MAX. VOLT	600 VOLTS
NOM. VOLT.	60-480 VOLTS
MAX. CURRENT	13 AMPS
MAX. SCC	17 AMPS
STRINGS INPUTS	4 STRINGS
AC OUTPUT:	
RATED POWER	7600 WATTS
MAX. POWER	7600 WATTS
NOM. VOLT.	240 VOLTS
MAX. CURR.	32 AMPS
OCPD	50 AMPS
BATTERY:	
USABLE ENERGY	13.5 KWH
CONT. POWER INPUT	5 KW
CONT. POWER INPUT	5 KW
GFP (Y/N)	YES
GFCI (Y/N)	YES
RPP (Y/N)	YES
AFCI (Y/N)	YES
RAPID SHUTDOWN (Y/N)	YES
PROTECT. RATING	NEMA 3R

MAXIMUM DC CURRENT CALCULATION:

ISC MAX= ISC*TCX
ISC MAX= 11.24*1.25
ISC MAX= 14.05 AMPS

MAXIMUM DC VOLTAGE CALCULATION:

VOCMAX= VOC*[1+(TMIN-TSTC)*(TKVOC/100)]
VOCMAX= 45.18*[1+((-10.9)-25)*(-0.259/100)] = 49.38 V
VOCMAX/STRING= VOCMAX*# OF MODULES IN STRING
VOCMAX/STRING= 49.38*10 = 493.8 V
493.8 V < 600 V

CONDUCTOR SCHEDULE

TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY				NOTES
	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	LOCATION	
C1	2	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	BARE WIRE	-	-	-	FREE AIR	1
C2	4	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	3/4"	FMC/EMT/MC	EXT/INT	2,4
C3	3	8 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	3/4"	NOTE 5	EXTERIOR	2,4,5
XC	-	-	-	-	-	-	-	-	-	-	-	-	3

NOTES:

1. MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
2. CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED
3. EXISTING CONDUCTORS, FIELD VERIFY
4. EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR
5. PVC, EMT, ROMEX, LFNMC & FMC ARE ACCEPTABLE WHEN USED IN ACCORDANCE WITH ARTICLES 330, 334, 348, 350, 352, 356, & 358 OF THE 2017 NEC

JUNCTION BOX	
MAKE	SOLADECK
MODEL	0783-3R
PRO. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
AMP RATING	120 AMPS
UL LISTING	UL 50

AC DISCONNECT	
MAKE	GENERIC
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	60 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	NO
FUSE RATING	N/A

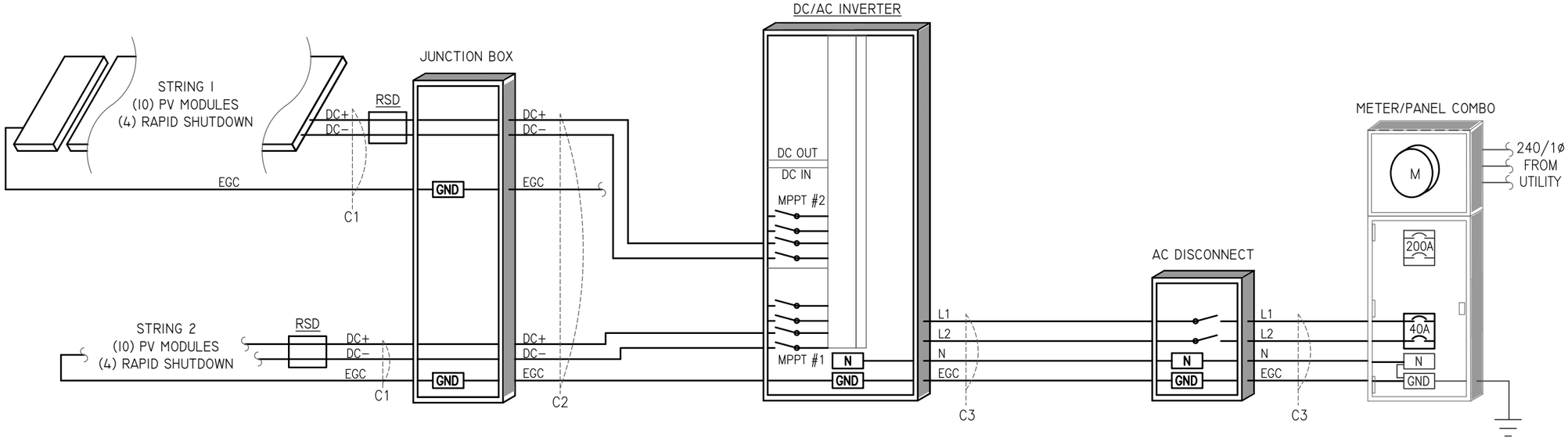
NOTES:

- LOAD-BREAK RATED
- VISIBLE OPEN
- LOCKABLE IN OPEN POSITION
- INSTALL ADJACENT TO METER
- DISCONNECT TO BE READILY ACCESSIBLE TO UTILITY COMPANY PERSONNEL AT ALL TIMES

METER/PANEL COMBO (EXISTING)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS

NOTES:

- MAIN BREAKER SERVES AS SERVICE DISCONNECT SWITCH
- BACK-FEED SOLAR OUTPUT VIA (1) 40A BREAKER AT THE OPPOSITE END OF THE BUS BAR FROM THE MAIN BREAKER.



1 PV SYSTEM ELECTRICAL WIRING SCHEMATIC
SCALE: NTS

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 1/9/24

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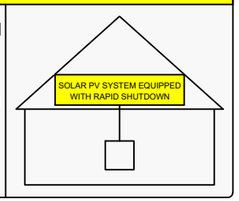
ELECTRICAL INFORMATION

PV4.1

EQUIPMENT LABELS

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



NEC 690.56 (C)(1)(a)
PLACE WITHIN 3FT OF SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATIONS OF RAPID SHUTDOWN SWITCHES

PV SYSTEM DISCONNECT

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

⚠WARNING

DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

NEC 705.12 (B)(3)
PLACE ON ALL EQUIPMENT THAT IS SUPPLIED BY BOTH POWER SOURCES

⚠WARNING

ELECTRIC SHOCK HAZARD

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

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

⚠WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12 (B)(2)(3)(b)
PLACE ADJACENT TO BACK-FED BREAKER

WARNING: PHOTOVOLTAIC POWER SOURCE

NEC 690.31 (G)(3)&(4)
PLACE ON ALL JUNCTION BOXES, EXPOSED RACEWAYS, AND OTHER WIRING METHODS EVERY 10' AND ON EVERY SECTION SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.56 (C)(3)
PLACE ON RAPID SHUTDOWN SWITCH OR EQUIPMENT WITH INTEGRATED RAPID SHUTDOWN *REFLECTIVE*

⚠WARNING

FED BY MULTIPLE POWER SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING UTILITY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR

NEC 705.12 (B)(2)(3)(c)
PLACE ADJACENT TO BACK-FED BREAKER

EQUIPMENT LABEL NOTES

1. LABELS SHOWN ARE 1/2 THEIR ACTUAL REQUIRED SIZE.
2. LABEL MATERIAL SHALL BE SUITABLE FOR THE EQUIPMENT ENVIRONMENT.
3. CONDUIT SHALL BE MARKED WITH REQUIRED LABEL EVERY 10 FEET.

DIRECT CURRENT PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE	600	VDC
MAX CIR. CURRENT	30	AMPS

NEC 690.53
PLACE ON ALL DC DISCONNECTING MEANS

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLT.	240	VAC
MAXIMUM OPERATING AC OUTPUT CURRENT	32	AMPS

NEC 690.54
PLACE ON INTERCONNECTION DISCONNECTING MEANS

CONSTRUCTION NOTES

1. ALL WORK AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL, STATE, AND LOCAL CODES AND ORDINANCES
2. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST PRACTICES, AND SPECIFICATIONS
3. WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS
4. THE PHOTOVOLTAIC SYSTEM SHALL NOT EXCEED 600 VOLTS OR 800 AMPS
5. EACH ELECTRICAL APPLIANCE SHALL BE PROVIDED WITH A NAMEPLATE GIVING THE IDENTIFYING NAME AND THE RATING IN VOLTS AND AMPERES, OR VOLTS AND WATTS. IF THE APPLIANCE IS TO BE USED ON A SPECIFIC FREQUENCY OR FREQUENCIES, IT SHALL BE SO MARKED. WHERE MOTOR OVERLOAD PROTECTION EXTERNAL TO THE APPLIANCES IS REQUIRED, THE APPLIANCE SHALL BE SO MARKED
6. WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE
7. IN ONE- AND TWO-FAMILY DWELLINGS, LIVE PARTS IN PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OVER 150 VOLTS TO GROUND, SHALL ONLY BE ACCESSIBLE TO QUALIFIED PERSONS WHILE ENERGIZED.
8. PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.
9. EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT
10. WHERE ALL TERMINALS OF A DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECT
11. A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED BY THE INSTALLED AT THE DC DISCONNECT MEANS
12. A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES SERVING THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL POWER PRODUCTION SOURCES.
13. A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED DENOTING THE LOCATIONS OF THE SERVICE DISCONNECT MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECT MEANS IF THEY ARE NOT LOCATED AT THE SAME LOCATION.
14. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC SECTION 690.4 (C)

ENGINEER:

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ELECTRICAL INFORMATION

PV4.2

MSE PERC 66

MISSION SOLAR ENERGY

395W Positive Power Tolerance

Class leading power output -0 to +3%

True American Quality
True American Brand

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

Demand the best. Demand Mission Solar Energy.

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

Advanced Technology
- 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

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 SUD · cULus LISTED

UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

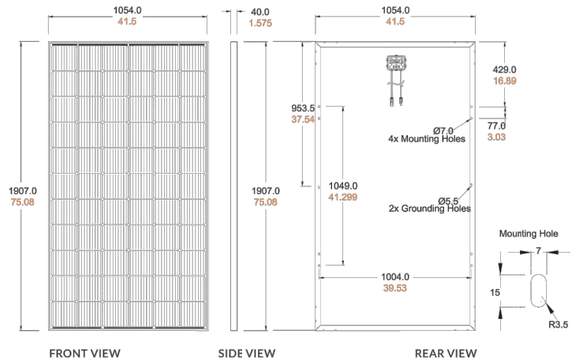
If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

Class Leading
390-400W

MSE PERC 66

BASIC DIMENSIONS

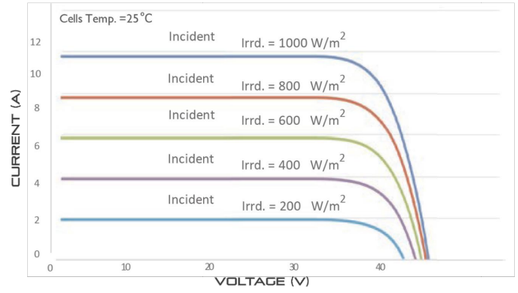
[UNITS: MM/IN]



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 SUD · CEC · cULus LISTED

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)

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.

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035609 ENGINEER ANDREW W. KING 1/9/24

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

7.900 kW DC INPUT
7.600 kW AC EXPORT

Rusbel Cruz
5680 Old Hwy 421,
Lillington, NC 27546

CLIENT:

EMERALD ENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
PERMIT	01/09/24

LABELS, DETAILS & SPECS

PV5.1

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

MODEL NUMBER	1534000-xx-y	1538000-xx-y
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 - 0.9 (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	60 - 480 VDC[1]	
Maximum Current per MPPT (I_{mp})	13 A	
Maximum Short Circuit Current per MPPT (I_{sc})	15 A	

PERFORMANCE SPECIFICATIONS

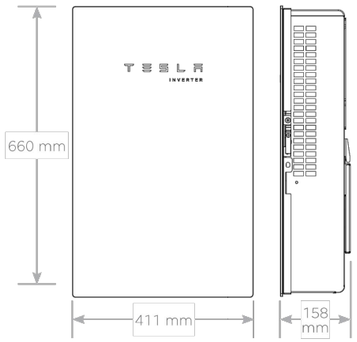
Peak Efficiency	98% at 208 V 98.1% at 240 V	98.4% at 208 V 98.6% at 240 V
CEC Efficiency	97.5% at 208 V 97.5% at 240 V	97.5% at 208 V 98.0% at 240 V
Allowable DC/AC Ratio	1.7	
Customer Interface	Tesla Mobile App	
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G)[2]	
AC 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	

[1] Maximum current.
[2] Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)
Weight	52 lb[3]
Mounting options	Wall mount (bracket)

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



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30°C to 45°C (-22°F to 113°F)[4]
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

[4] 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 1741 PVRSS, UL 1699B, UL 1998 (US), UL 3741
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

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, solar array shutdown 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

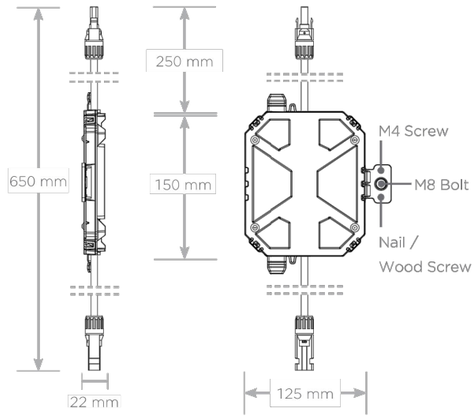
Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	PV System AC Breaker or Switch
Compatible Equipment	*See Compatibility Table below*

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



UL 3741 PV HAZARD CONTROL (AND PVRSA) COMPATIBILITY

Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with the Tesla Solar Inverter and Solar Shutdown Devices. See the Tesla Solar Inverter Installation Manual for detailed instructions and 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
Tesla	Tesla TxxxS (where xxx = 405 to 450 W, increments of 5)	1 Solar Shutdown Device per 3 modules[1]
Tesla	Tesla TxxxH (where xxx = 395 to 415 W, increments of 5)	1 Solar Shutdown Device per 3 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

[1] **Exception**: Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 165 V shall be limited to two modules between MCIs.

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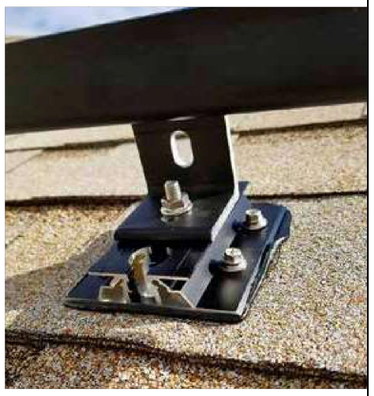
EQUIPMENT SPEC SHEETS

PV5.2

RT-MINI

Self-flashing base for asphalt & metal roof-top PV mounting systems

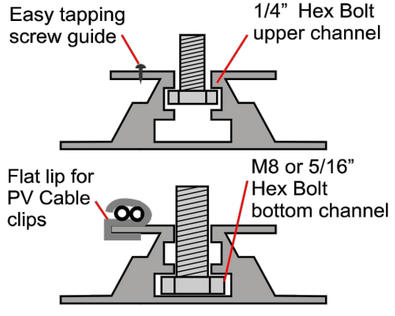
RT-MINI is suitable for mounting any rail system with a conventional L-Foot.



Dual bolt design: M8 or 5/16” for L-Foot & 1/4” for EMC

Installation Manual

ICC ESR 3575



Roof Tech

The Standard for Waterproof Flexible Flashing Since 1994

www.roof-tech.us info@roof-tech.us

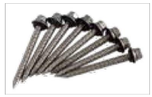
RT-MINI

Flexible Flashing certified by the International Code Council (ICC)

Engineered to ASTM D 1761 (Standard Test Methods for Mechanical Fasteners in Wood)

Components

RT2-00-MINIBK

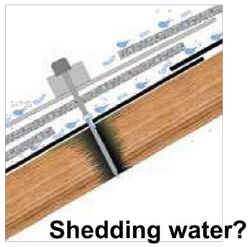


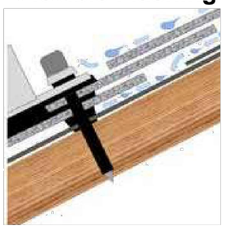
MINI base : 20 ea.
Screw : 40 ea.
Extra RT-Butyl : 10 ea.

Optional item
5 x 60mm Mounting screw (RT2-04-SD5-60) : 100 ea./Bag
5/16” Hex bolt, washer & nut set (RT-04-BN30SL-US) : 100 ea./Bag
RT-Butyl (RT2-04-BUTYLT) : 10 ea./Box

RT-Butyl is Roof Tech’s flexible flashing used in one million residential PV systems for the last 26 years. It is the first PV mounting system with Flexible Flashing certified by the ICC. Engineered to withstand wind speeds up to 180 mph and ground snow up to 90 psf.

Metal Flashing Retrofit **Flexible Flashing**

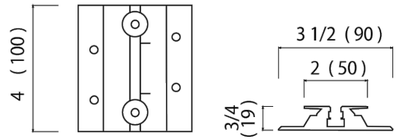




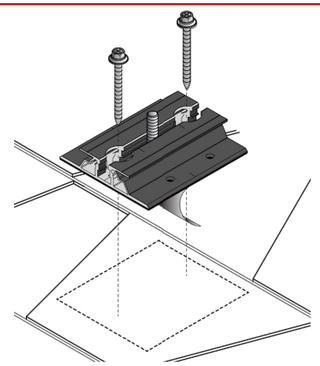
Shedding water? **100% Waterproof**

ICC ESR-3575 ASTM2140 testing UV testing (7500 hrs.)

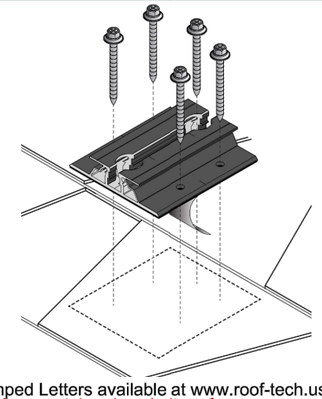
Dimensions in (mm)



Rafter installation



Deck installation



P.E. Stamped Letters available at www.roof-tech.us/support
TAS 100 A on metal and asphalt roof.

Roof Tech Inc.
www.roof-tech.us info@roof-tech.us
10620 Treena Street, Suite 230, San Diego, CA 92131
858.935.6064

March 2020

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EQUIPMENT SPEC SHEETS

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Complete Mounting & Racking System for All Roof Types

QRail™ System

Product	Description	Ordering Part Number		
		Item Code	Mill	Black
 **QRail™ Series** QMR-RL- *Light* QMR-RS- *Standard* QMR-RH- *Heavy*	QRail Series available in Light, Standard & Heavy rails and in 14ft (168in) or 17.3ft (208in) lengths.	QMR-RL14 *(light)*	800	805
		QMR-RL17.3 *(light)*	801	806
		QMR-RS14 *(standard)*	810	815
		QMR-RS17.3 *(standard)*	811	816
		QMR-RH14 *(heavy)*	820	825
		QMR-RH17.3 *(heavy)*	821	826
 **QSplice™ Internal Splice** QMR-ISL- *Light* QMR-ISS- *Standard* QMR-ISH- *Heavy*	Internal splices available for Light, Standard & Heavy QRails. Tool-free installation, integrated bonding, & structural.	QMR-ISL *(light)*	830	n/a
		QMR-ISS *(standard)*	831	n/a
		QMR-ISH *(heavy)*	832	n/a
 **QSplice™ External Splice** QMR-ESS- *Standard* QMR-ESH- *Heavy*	External splices available for Standard & Heavy QRails.	QMR-ESS *(standard)*	834	n/a
		QMR-ESH *(heavy)*	835	n/a
 **End Caps** QMR-CPL- *Light* QMR-CPS- *Standard* QMR-CPH- *Heavy*	End Caps available for Light, Standard, & Heavy QRails.	QMR-CPL *(light)*	n/a	885
		QMR-CPS *(standard)*	n/a	886
		QMR-CPH *(heavy)*	n/a	887
 **Universal Bonded Mid Clamps** *with QClick™ Technology* QMR-UMC	Universal Mid Clamp with QClick Technology available in 30-45mm & 38-50mm sizes. Hardware is pre-assembled.	QMR-UMC3045BP 1.2	872	877
		QMR-UMC3850BP 1.2	873	878
 **Universal End Clamps** *with QClick™ Technology* QMR-UE	Universal End Clamp with QClick Technology available in 30-45mm & 38-50mm sizes and with optional bonding clip. Hardware is pre-assembled.	QMR-UEC3045	860	865
		QMR-UEC3850	861	866
		QMR-UEC3045BP	862	867
		QMR-UEC3850BP	863	868

All hardware included. All exposed hardware stainless steel. Additional hardware kits available. Twenty-five (25) year warranty on all products listed.

QRail™ Accessories

Product		Description	Item Code	Ordering Part Number
	**T-Bolt** QMR-TB	T-Bolt and nut. Engagement indication line on bolt must be vertical to show the bolt is fully engaged in the t-bolt channel.	QMR-TB	stainless steel 880
				Mill | Black
	**L-Foot** QMC-LF	Available in mill or black.	QMC-LF	692 | 693
	**Grounding Lug** QMR-GL	Pre-assembled lay-in lug. Engagement indication line on bolt must be vertical to show the bolt is fully engaged in the t-bolt channel.	QMR-GL	890
	**Wire Clip** QMR-WC	Wire clip for PV or trunk cables.	QMR-WC	stainless steel 892
	**WEEB BMC** QMR-ECW	Optional WEEB BMC for use with End-Clamps.	QMR-ECW	stainless steel 891

Quick Mount PV®

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EQUIPMENT SPEC SHEETS

PV5.4

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Customer: Rusbel Cruz
Installer: Emerald Energy
Subject: PV System Structural Compliance
Date: 01/09/24

To whom it may concern:

Model Energy, PLLC has reviewed the installation details of the proposed PV system that is to be installed by Emerald Energy at 5680 Old Hwy 421, Lillington, NC 27546. The conditions of the existing structure have been reviewed and validated by Model Energy, PLLC. The existing roof structure has been designed to support the additional loads of the proposed PV system. In addition, the racking and fastening system shall be capable of securing the system to the structure under design conditions when installed properly and in accordance with the racking and fastening arrangement detailed within the accompanying permit set. The installation design is compliant with current 2018 North Carolina state and national building codes.

Thank you,

Andrew King, PE