

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

33 MODULES-ROOF MOUNTED - 13.04 kWDC, 10.00 kWAC  
580 VALLEY OAK DR, BUNNLEVEL, NC 28328, USA

## SYSTEM SUMMARY:

- (N) 33 - CANADIAN SOLAR CS-3N-395MS (395W) MODULES
- (N) 01 - SOLAREEDGE SE10000H-US INVERTER
- (N) 33 - SOLAREEDGE S440 POWER OPTIMIZERS
- (N) JUNCTION BOX
- (E) 200A MAIN SERVICE PANEL WITH (E) 200A MAIN BREAKER
- (N) 60A FUSED AC DISCONNECT

## DESIGN CRITERIA:

ROOF TYPE: - COMP SHINGLE  
NUMBER OF LAYERS: - 01  
ROOF FRAME: - 2"X4" RAFTERS @ 24" O.C.  
STORY: - TWO STORY  
SNOW LOAD : - 10 PSF  
WIND SPEED :- 119 MPH  
WIND EXPOSURE:- C  
RISK CATEGORY:- II

## GOVERNING CODES:

THIS PROJECT SHALL COMPLY WITH THE FOLLOWING CODE  
2018 NORTH CAROLINA BUILDING CODE (NCBC)  
2018 NORTH CAROLINA RESIDENTIAL CODE (NCRC)  
2018 NORTH CAROLINA FIRE CODE (NCFC)  
2018 NORTH CAROLINA PLUMBING CODE (NCPC)  
2018 NORTH CAROLINA MECHANICAL CODE (NCMC)  
2018 NORTH CAROLINA FUEL GAS CODE (NCFGC)  
2018 NORTH CAROLINA ENERGY CONSERVATION CODE (NCECC)  
2020 NORTH CAROLINA ELECTRICAL CODE (NCEC)

## SHEET INDEX

PV-0	COVER SHEET
PV-1	SITE PLAN WITH ROOF PLAN
PV-2	ROOF PLAN WITH MODULES
PV-3	ATTACHMENT DETAILS
PV-4	ELECTRICAL LINE DIAGRAM
PV-5	PLACARDS & WARNING LABELS
PV-6+	EQUIPMENT SPEC SHEETS

## INTERCONNECTION METHOD - LINE SIDE TAP

## GENERAL NOTES

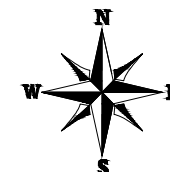
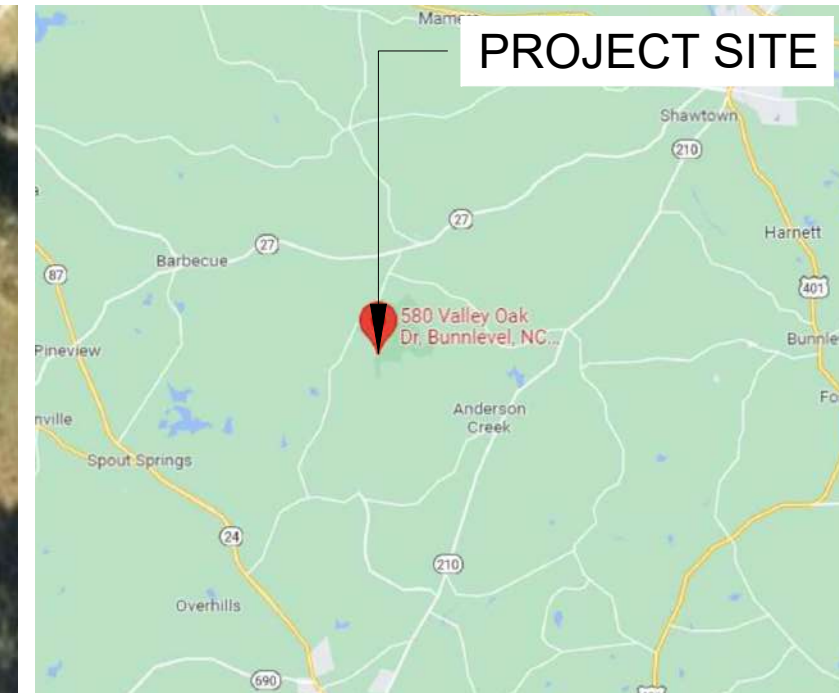
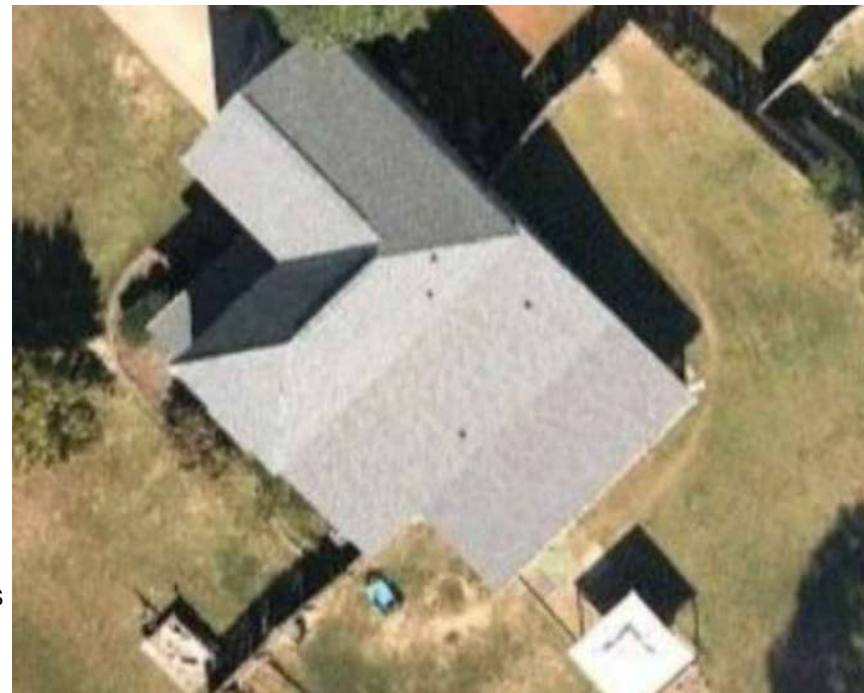
- THE CONTRACTOR/INSTALLER OF THE SOLAR PV SYSTEM OVER EXISTING ROOF SHALL CONFORM TO OSHA REQUIREMENTS DURING THE CONSTRUCTION PHASE. JOB SAFETY AND CONSTRUCTION PROCEDURES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR/INSTALLER.
- REFER TO ELECTRICAL DRAWING PV-4 FOR PANEL DETAILED INFORMATION.
- IN CASE OF CONFLICT BETWEEN STRUCTURAL DRAWINGS AND ELECTRICAL DRAWINGS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.
- THE CONTRACTOR/INSTALLER SHALL VERIFY ALL EXISTING BUILDING INFORMATION SHOWN (DIMENSIONS, ROOF TOP PROJECTIONS, ETC.) AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO INSTALLATIONS OF PV SYSTEM.
- THE CONTRACTOR/INSTALLER SHALL VERIFY AND COORDINATE EXISTING OPENINGS, ROOF TOP UNITS, VENT PIPES, ETC. SHOWN ON DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN DRAWINGS, IT IS THE CONTRACTORS/INSTALLER'S RESPONSIBILITY TO NOTIFY ENGINEER PRIOR TO PERFORMING THE WORK.
- ALL CONSTRUCTION IS TO BE PERFORMED IN STRICT CONFORMANCE WITH ALL APPLICABLE TOWN, COUNTY & STATE REGULATIONS AND/OR ANY OTHER GOVERNING BODIES.
- DO NOT SCALE THESE DRAWINGS, USE DIMENSIONS. CONTRACTOR MUST CONDUCT ROOF SURVEY TO VERIFY DIMENSIONS SHOWN ON PLAN PRIOR TO INSTALLATION. IF THERE IS A DISCREPANCY IT IS CONTRACTOR/INSTALLER'S RESPONSIBILITY TO NOTIFY THE ENGINEER IMMEDIATELY.

## ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER E.G.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

## NOTE :

1. PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR SHALL VERIFY THE FRAMING SIZES, SPACINGS, AND SPANS NOTED IN THE STAMPED PLANS AND ACCOMPANYING CALCULATIONS AND NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES PRIOR TO STARTING CONSTRUCTION.  
2. THESE PLANS ARE STAMPED FOR STRUCTURAL CODE COMPLIANCE OF THE ROOF FRAMING SUPPORTING THE PROPOSED PV INSTALLATION REFERENCED ONLY. THESE PLANS ARE NOT STAMPED FOR WATER LEAKAGE. PV MODULES, RACKING, AND ATTACHMENT COMPONENTS MUST FOLLOW MANUFACTURER GUIDELINES AND REQUIREMENTS.  
3. PLEASE SEE THE ACCOMPANYING STRUCTURAL CALCULATIONS REPORT FOR DETAILS REGARDING CALCULATIONS AS WELL AS LIMITS OF SCOPE OF WORK AND LIABILITY.



DEL MAR, CA 92014, USA

## VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

## PROJECT NAME

EFRAIN CARMONA MOTE  
580 VALLEY OAK DR,  
BUNNLEVEL, NC 28328, USA  
APN# 01053605 0028 52  
UTILITY: SOUTH RIVER EMC  
AHJ: HARNETT COUNTY

## SHEET NAME

COVER SHEET

## SHEET SIZE

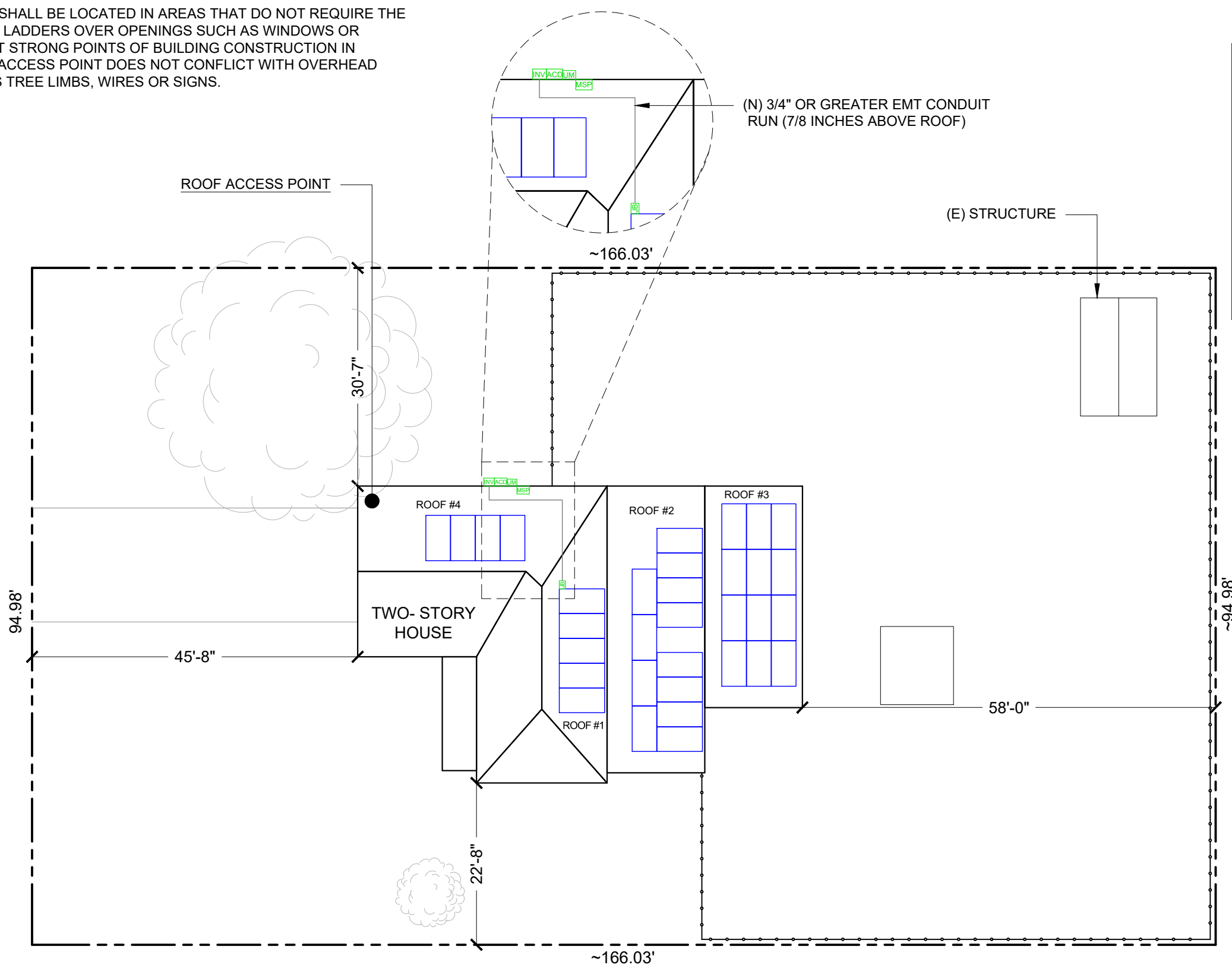
ANSI B  
11" X 17"

## SHEET NUMBER

PV-0

● **ROOF ACCESS POINT** SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

VALLEY OAK DR



**LEGEND**

- UM UTILITY METER
- MSP MAIN SERVICE PANEL
- ACD AC DISCONNECT
- INV INVERTER
- JB JUNCTION BOX
- FENCE
- CONDUIT
- TREES
- PROPERTY LINE



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME  
**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
**APN# 01053605 0028 52**  
**UTILITY: SOUTH RIVER EMC**  
**AHJ: HARNETT COUNTY**

BLUEBONNET OAK CT

**1** **SITE PLAN WITH ROOF PLAN**  
 SCALE: 1/16" = 1'-0"



**NOTE:**  
 • ALL ELECTRICAL EQUIPMENT, INVERTERS, DISCONNECTS, MAIN SERVICE PANELS, ETC. SHALL NOT BE INSTALLED WITHIN 3' OF THE GAS METERS' SUPPLY OR DEMAND PIPING.

SHEET NAME  
**SITE PLAN WITH ROOF PLAN**

SHEET SIZE  
**ANSI B**  
**11" X 17"**

SHEET NUMBER  
**PV-1**

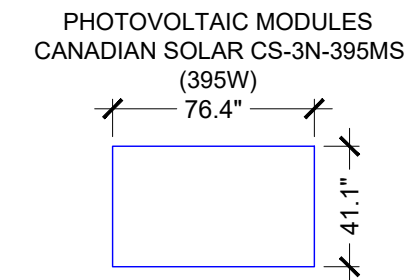
**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 33 MODULES  
 MODULE TYPE = CANADIAN SOLAR CS-3N-395MS (395W) MODULES  
 MODULE WEIGHT = 51.6 LBS / 23.5 KG.  
 MODULE DIMENSIONS = 76.4"X 41.1" = 21.81 SF  
 UNIT WEIGHT OF ARRAY = 2.37 PSF

**NOTE TO INSTALLERS:**  
 VERIFY THE ROOF FRAMING INFO BEFORE INSTALLATION AND NOTIFY THE EOR IF THERE IS ANY INCONSISTENCY BETWEEN SITE VERIFICATION AND FOLLOWING: 2x4 RAFTERS @ 24" OC SPACING WITH MAX UNSUPPORTED SPAN EQUAL OR LESS THAN 10 FT.

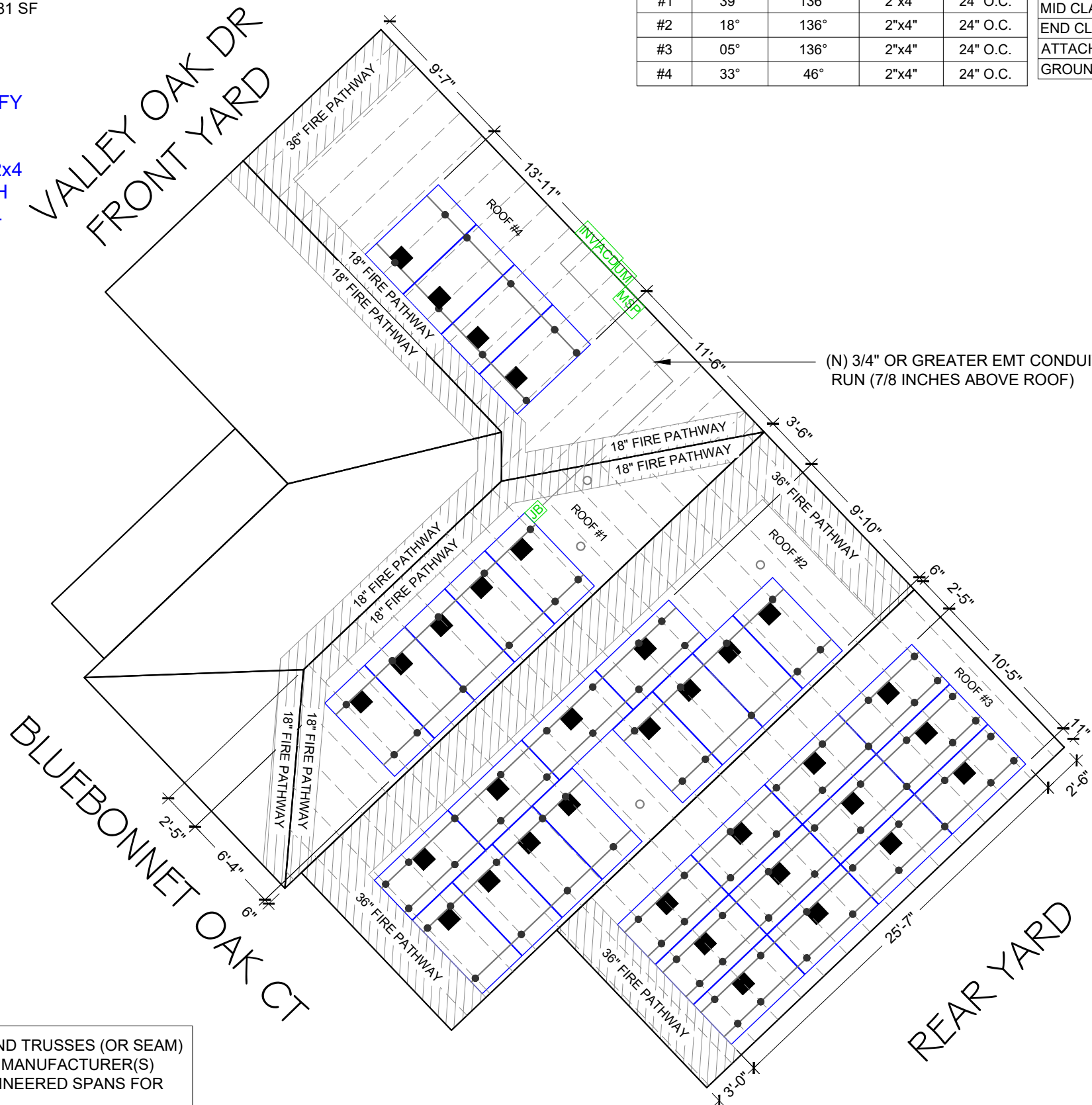
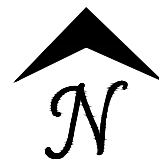


STAMPED 08/09/2022



**NOTE:** ACTUAL ROOF CONDITIONS AND TRUSSES (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

**1 ROOF PLAN WITH MODULES**  
 SCALE: 1/8" = 1'-0"



ROOF DESCRIPTION				
ROOF TYPE			COMP SHINGLE ROOF	
ROOF	ROOF TILT	AZIMUTH	RAFTERS SIZE	RAFTERS SPACING
#1	39°	136°	2"x4"	24" O.C.
#2	18°	136°	2"x4"	24" O.C.
#3	05°	136°	2"x4"	24" O.C.
#4	33°	46°	2"x4"	24" O.C.

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
RAIL	25	UNIRAC SM LIGHT RAIL 168" MILL
SPLICE	10	BND SPLICE BAR PRO SERIES MILL
MID CLAMP	50	UNIVERSAL AF MID CLAMPS
END CLAMP	32	UNIVERSAL AF END CLAMPS
ATTACHMENT	98	UNIRAC FLASHLOC
GROUNDING LUG	08	GROUND LUG

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	05	109.03	269.66	40.43
#2	12	261.67	551.56	47.44
#3	12	261.67	425.83	61.45
#4	04	87.22	376.46	23.17

**R324.6.2 - PROVING ARRAYS TAKE LESS THAN 33% OF TOTAL ROOF AREA. WHEN THE ARRAYS TAKE LESS THAN 33% WE CAN JUSTIFY AN 18" SETBACK ON BOTH SIDES OF THE RIDGE. WHEN IT TAKES MORE THAN 33% OF THE ROOF AREA WE MUST USE A 3' SETBACKS AT THE RIDGE.**  
 TOTAL ROOF AREA:  
 2216.83 sqft

AREA OF ARRAYS:  
 76.4"X 41.1" ( PANEL DIMENSIONS)  
 76.4"X 41.1" = 21.81 sqft (PER PANEL)  
 21.81 sqft/panel X 33 panels = 719.59 sqft (TOTAL PANEL AREA)

PERCENTAGE OF TOTAL ROOF AREA:  
 (719.59 sqft / 2216.83 sqft)(100)= 32.46%

THE PANELS USE 32.46% OF THE TOTAL ROOF AREA

**LEGEND**

- UM - UTILITY METER
- MM - METER MAIN PANEL
- MSP - MAIN SERVICE PANEL
- ACD - AC DISCONNECT
- INV - INVERTER
- JB - JUNCTION BOX
- SOLAREEDGE S440 OPTIMIZERS
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT @ 48" O.C.
- RAIL
- RAFTERS
- CONDUIT
- FIRE PATHWAY

• PLUMBING VENTS, SKYLIGHTS AND MECHANICAL VENTS SHALL NOT BE COVERED, MOVED, RE-ROUTED OR RE-LOCATED.



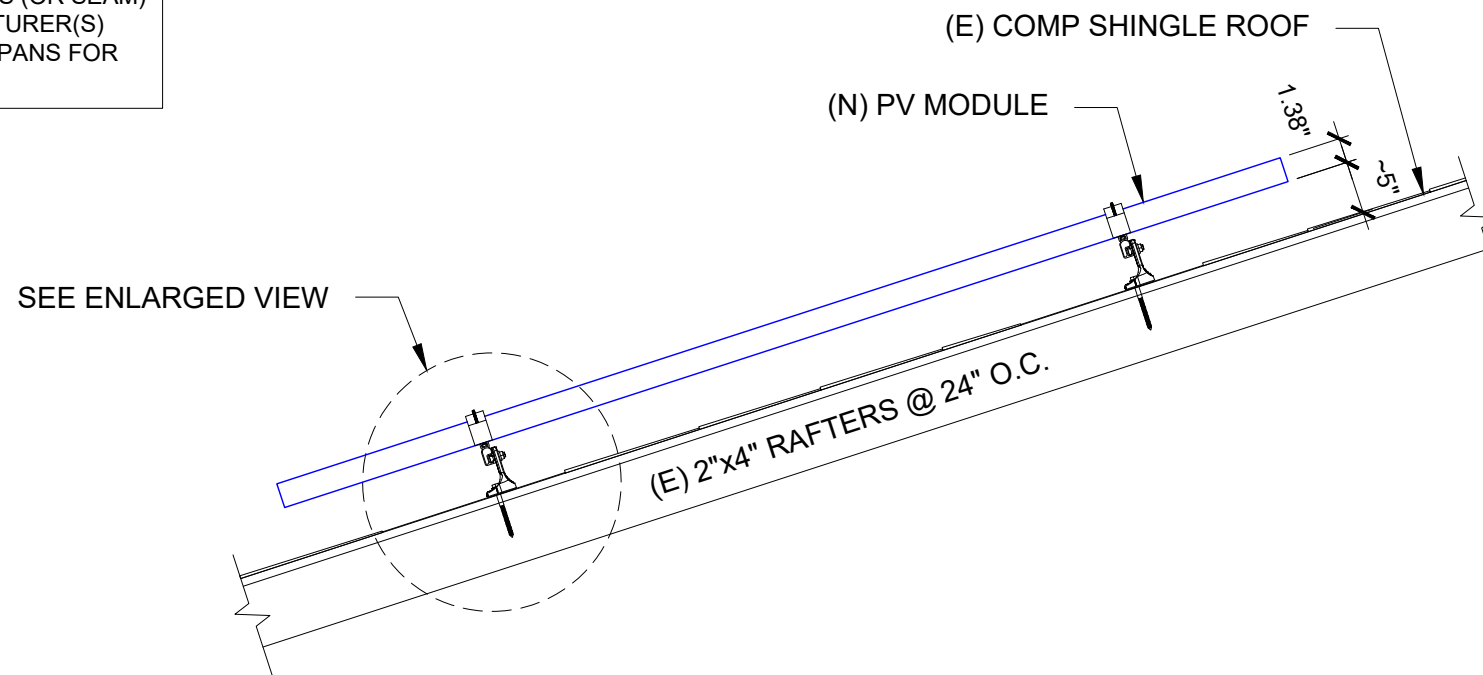
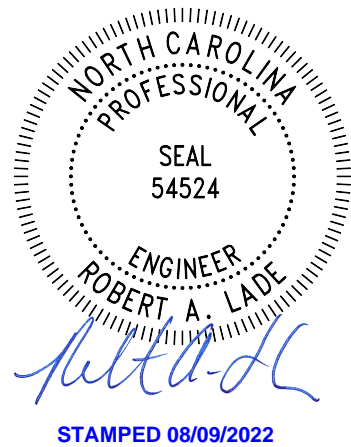
DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME  
**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

SHEET NAME	ROOF PLAN WITH MODULES
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-2

**NOTE:** ACTUAL ROOF CONDITIONS AND RAFTERS (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

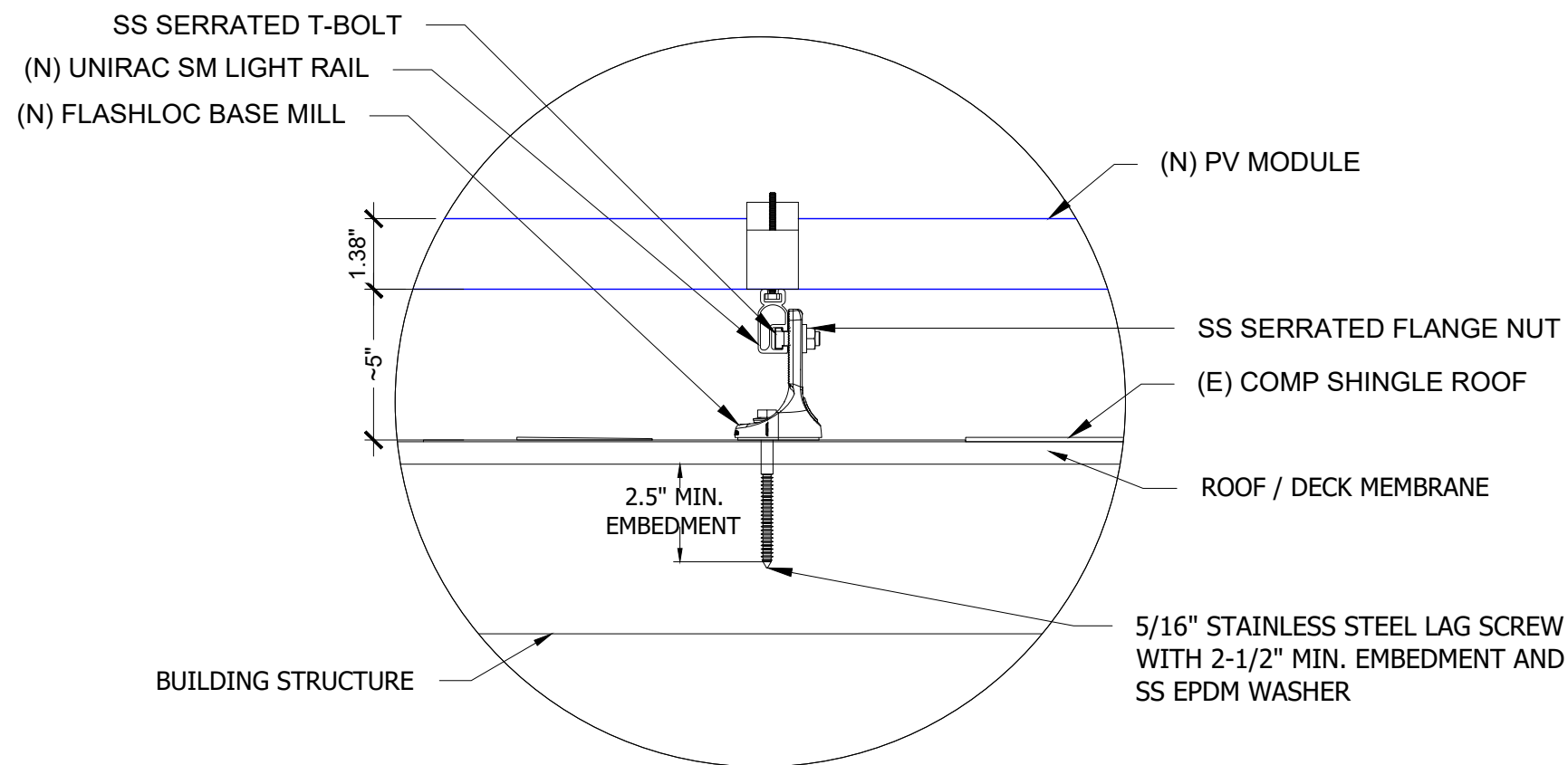


**NOTE TO INSTALLERS:**  
 VERIFY THE ROOF FRAMING INFO BEFORE INSTALLATION AND NOTIFY THE EOR IF THERE IS ANY INCONSISTENCY BETWEEN SITE VERIFICATION AND FOLLOWING: 2x4 RAFTERS @ 24" OC SPACING WITH MAX UNSUPPORTED SPAN EQUAL OR LESS THAN 10 FT.

**1 ATTACHMENT DETAIL**  
 SCALE: NTS



VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR



**2 ATTACHMENT DETAIL (ENLARGED VIEW)**  
 SCALE: NTS

PROJECT NAME  
 EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

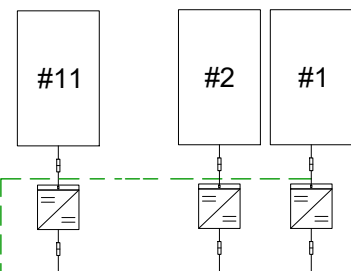
SHEET NAME ATTACHMENT DETAIL
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-3

SOLAR MODULE SPECIFICATIONS					
MANUFACTURER / MODEL #	VMP	IMP	VOC	ISC	TEMPERATURE COEFFICIENT OF Voc
CANADIAN SOLAR CS-3N-395MS (395W)	37.0	10.68	44.3	11.44	-0.26%/°C
MODULE DIMENSION	76.4" L x 41.1" W x 1.38" D				

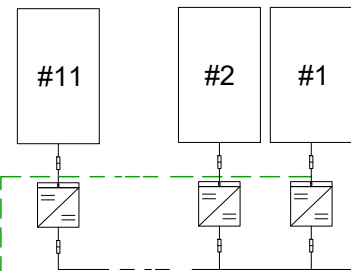
AMBIENT TEMPERATURE SPECIFICATIONS				
RECORD LOW TEMP	AMBIENT TEMP (HIGH TEMP 2%)	CONDUIT HEIGHT	CONDUCTOR TEMPERATURE RATE	
			ON ROOF	OFF ROOF
-10°	35°	7/8 INCHES ABOVE ROOF	90°	75°

INVERTER SPECIFICATIONS			
MANUFACTURER / MODEL #	QUANTITY	NOMINAL OUTPUT VOLTAGE	NOMINAL OUTPUT CURRENT
SOLAREEDGE SE10000H-US	01	240 VAC	42.0A

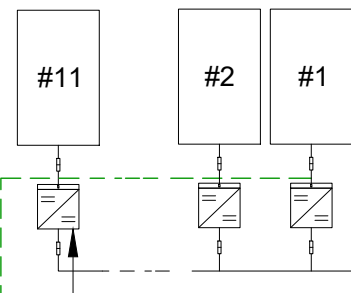
11 MODULES CONNECTED IN STRING #1



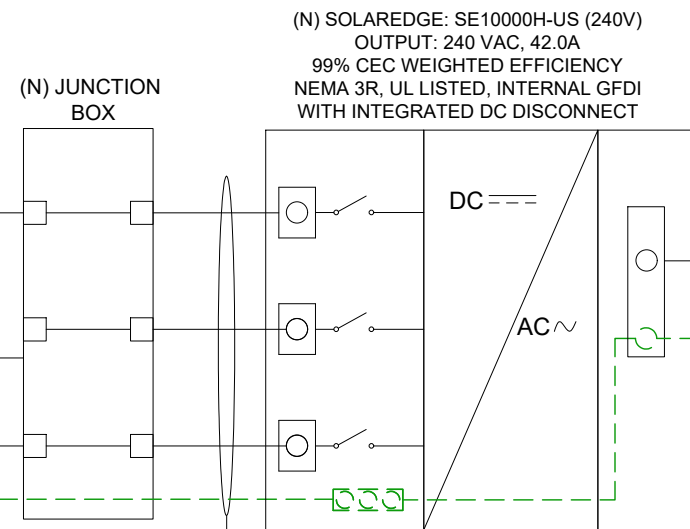
11 MODULES CONNECTED IN STRING #2



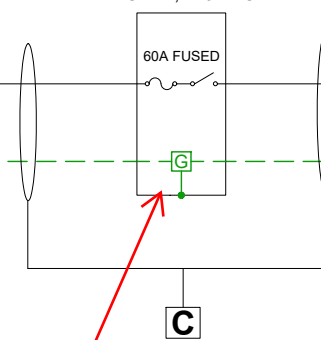
11 MODULES CONNECTED IN STRING #3



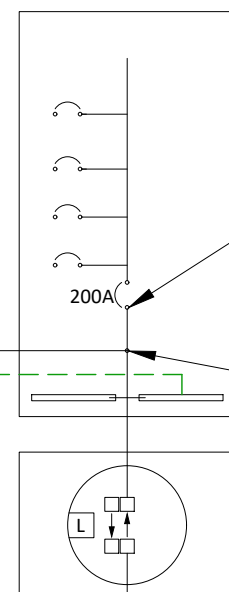
SOLAREEDGE POWER OPTIMIZER S440  
 RATED DC INPUT POWER - 440 WATTS  
 MAXIMUM INPUT VOLTAGE - 60 VDC  
 MPPT RANGE - 8 TO 60 VDC  
 MAXIMUM INPUT CURRENT - 14.5 ADC  
 MAXIMUM OUTPUT CURRENT - 15 ADC STRING  
 LIMITATIONS - 8 TO 25 OPTIMIZERS,  
 5700 WATTS STC PER STRING MAXIMUM  
 SOLAREEDGE OPTIMIZERS HAVE INTEGRATED  
 RAPID SHUT DOWN



(N) 60A FUSED AC DISCONNECT WITH 60A FUSES, 240 VAC



EXISTING GROUNDING SYSTEM



(E) 200A MAIN SERVICE PANEL WITH (E) 200A MAIN BREAKER (BOTTOM FED)

LINE SIDE TAP

BI-DIRECTIONAL UTILITY METER 1-PHASE, 3-W, 120V/240V, 60Hz

Shall be listed for use as SE

WIRE TAG	CONDUIT	WIRE QTY	WIRE GAUGE	WIRE TYPE	TEMP. RATING	WIRE AMPACITY (A)	TEMP. DERATE	CONDUIT FILL DERATE	DERATED AMPACITY (A)	ISC (A)	DESIGN CURRENT (A)	GROUND SIZE	GROUND WIRE TYPE
A	OPEN AIR	3	10 AWG	THWN-2	90°C	40	0.96	1.0	38.40	15.0	15.0	06 AWG	BARE CU GND
B	3/4" EMT	6	10 AWG	THWN-2	90°C	40	0.96	0.80	30.72	15.0	15.0	10 AWG	THWN-2
C	3/4" EMT	3	6 AWG	THWN	75°C	65	0.94	1.0	61.10	42.0	42.0	8 AWG	THWN



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME

EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

SHEET NAME  
 ELECTRICAL LINE DIAGRAM

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-4

# 1 ELECTRICAL LINE DIAGRAM

SCALE: NTS

**⚠ WARNING**  
ELECTRICAL SHOCK HAZARD

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

LABEL LOCATION:  
INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).  
PER CODE(S): NEC 2020: NEC 706.15 (C)(4) & NEC 690.13(B)

**RAPID SHUTDOWN FOR SOLAR PV SYSTEM**

LABEL LOCATION:  
UTILITY SERVICE ENTRANCE/METER, INVERTER/DC DISCONNECT IF REQUIRED BY LOCAL AHJ, OR OTHER LOCATIONS AS REQUIRED BY LOCAL AHJ.  
PER CODE(S): NEC 2020: 690.56(C)(2)

**⚠ WARNING**  
POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
SERVICE PANEL IF SUM OF BREAKERS EXCEEDS PANEL RATING  
NEC 705.12 (B)(3)(2)

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

LABEL LOCATION:  
POINT OF INTERCONNECTION  
PRODUCTION METER  
NEC 705.12(B)(3)(3) & NEC 690.59)

**PHOTOVOLTAIC AC DISCONNECT**

MAXIMUM AC OPERATING CURRENT: 42.0 AMPS  
NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION:  
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.  
PER CODE(S): NEC 2020: 690.54

**PHOTOVOLTAIC POWER SOURCE**

LABEL LOCATION:  
CONDUIT, COMBINER BOX  
(PER CODE: NEC690.31(D)(2))

**MAXIMUM DC VOLTAGE OF PV SYSTEM**

2020 NEC CODE 690.53

**MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**

LABEL LOCATION:  
MAIN SERVICE DISCONNECT / UTILITY METER  
(PER CODE: NEC 690.13(B))

**⚠ WARNING**

THIS EQUIPMENT FED BY MULTIPLE SOURCES: TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR

LABEL LOCATION:  
POINTS OF CONNECTION/BREAKER  
CODE: NEC 705.12(B)(3)(3)

**⚠ WARNING**  
ELECTRIC SHOCK HAZARD

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

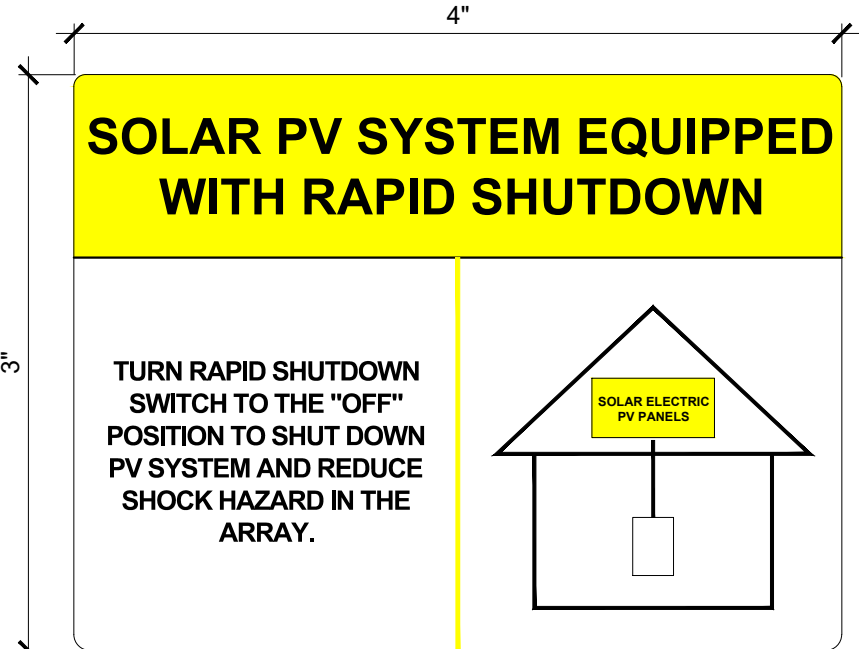
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

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

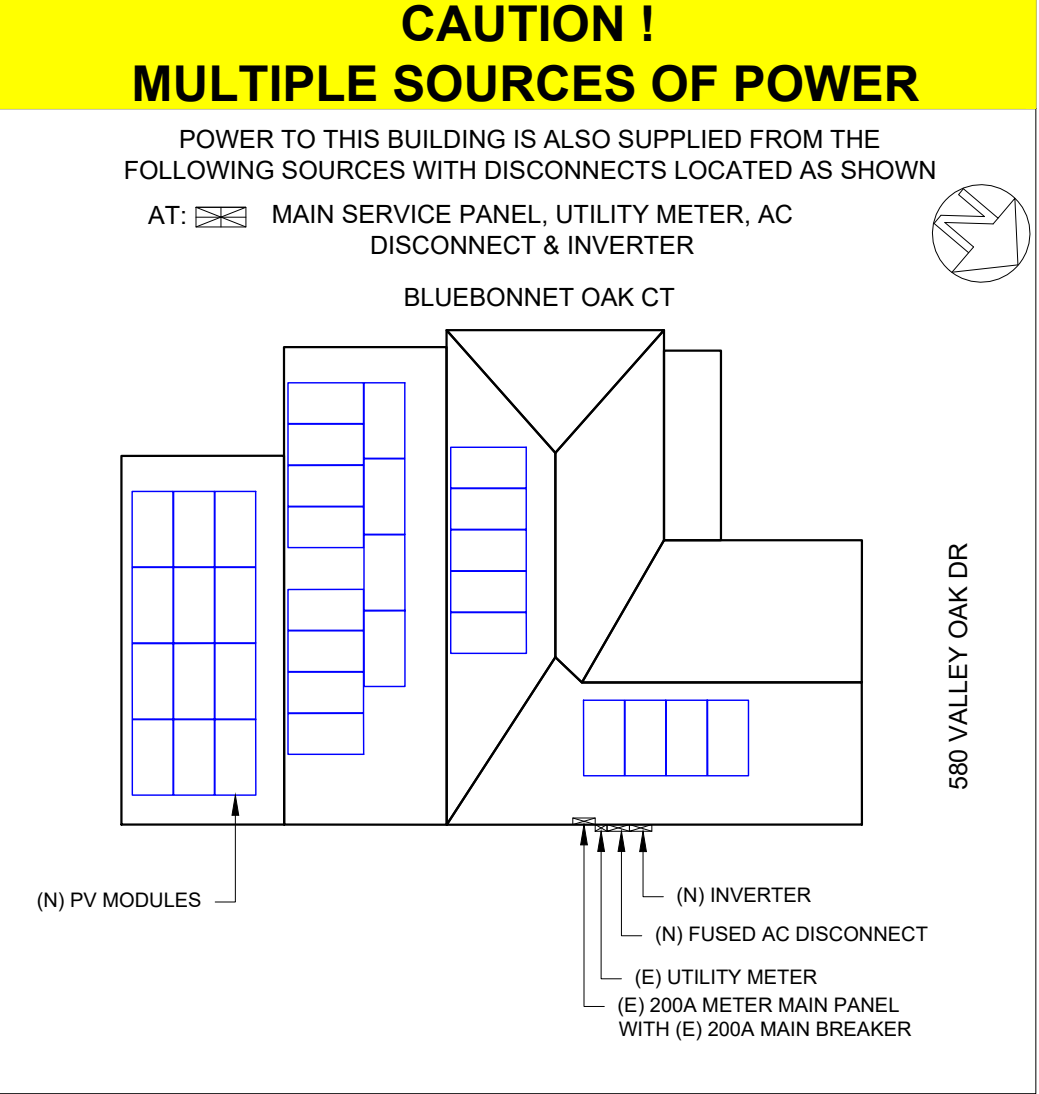
**⚠ WARNING**

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

LABEL LOCATION:  
INVERTER  
PER CODE: NEC 690.31(E)



LABEL LOCATION:  
ON OR NO MORE THAT 1 M (3 FT) FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED.  
PER CODE(S): NEC 2020: IFC 690.56(C)



VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME

EFRAIN CARMONA MOTE  
580 VALLEY OAK DR,  
BUNNLEVEL, NC 28328, USA  
APN# 01053605 0028 52  
UTILITY: SOUTH RIVER EMC  
AHJ: HARNETT COUNTY

SHEET NAME  
WARNING LABELS & PLACARD

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-5

- NOTES AND SPECIFICATIONS:
- SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF THE 2020 ARTICLE 110.21(B), UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED BY SECTION 690, OR IF REQUESTED BY THE LOCAL AHJ.
  - SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
  - LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
  - LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
  - SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
  - DO NOT COVER EXISTING MANUFACTURER LABELS.



# HiKu Mono PERC (All-Black)

## 380 W ~ 400 W

### CS3N-380 | 385 | 390 | 395 | 400MS

#### MORE POWER

- 425 W** Module power up to 400 W  
Module efficiency up to 19.7%
- \$** Lower LCOE & BOS cost
- Bar Chart** Comprehensive LID / LeTID mitigation technology, up to 50% lower degradation
- Calculator** Better shading tolerance

#### MORE RELIABLE

- Shield** Minimizes micro-crack impacts
- Snow** Heavy snow load up to 5400 Pa, enhanced wind load up to 2400 Pa\*

**12 Years** Enhanced Product Warranty on Materials and Workmanship\*

**25 Years** Linear Power Performance Warranty\*

**1<sup>st</sup> year power degradation no more than 2%**  
**Subsequent annual power degradation no more than 0.55%**

\*According to the applicable Canadian Solar Limited Warranty Statement.

#### MANAGEMENT SYSTEM CERTIFICATES\*

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

#### PRODUCT CERTIFICATES\*

IEC 61215 / IEC 61730 / CE  
FSEC (US Florida)  
UL 61730 / IEC 61701 / IEC 62716  
UNI 9177 Reaction to Fire: Class 1 / Take-e-way



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

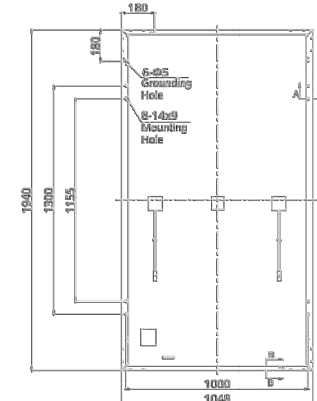
**Canadian Solar (USA) Inc.** is committed to providing high quality solar products, solar system solutions and services to customers around the world. Canadian Solar was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey, and is a leading PV project developer and manufacturer of solar modules, with over 52 GW deployed around the world since 2001.

\* For detailed information, please refer to the Installation Manual.

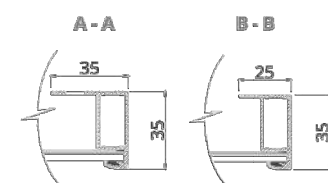
**Canadian Solar (USA) Inc.**  
3000 Oak Road, Suite 400, Walnut Creek, CA 94597, USA, [www.csisolar.com/na](http://www.csisolar.com/na), [service.ca@csisolar.com](mailto:service.ca@csisolar.com)

#### ENGINEERING DRAWING (mm)

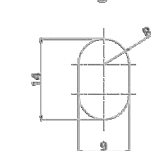
##### Rear View



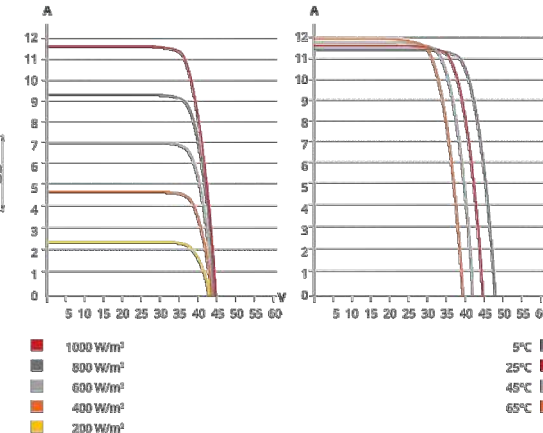
##### Frame Cross Section



##### Mounting Hole



#### CS3N-400MS / I-V CURVES



#### ELECTRICAL DATA | STC\*

CS3N	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	380 W	385 W	390 W	395 W	400 W
Opt. Operating Voltage (Vmp)	36.4 V	36.6 V	36.8 V	37.0 V	37.2 V
Opt. Operating Current (Imp)	10.44 A	10.52 A	10.60 A	10.68 A	10.76 A
Open Circuit Voltage (Voc)	43.7 V	43.9 V	44.1 V	44.3 V	44.5 V
Short Circuit Current (Isc)	11.26 A	11.32 A	11.38 A	11.44 A	11.50 A
Module Efficiency	18.7%	18.9%	19.2%	19.4%	19.7%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1000V (IEC/UL)				
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)				
Max. Series Fuse Rating	20 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

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

#### ELECTRICAL DATA | NMOT\*

CS3N	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	283 W	287 W	291 W	295 W	298 W
Opt. Operating Voltage (Vmp)	33.9 V	34.1 V	34.3 V	34.5 V	34.7 V
Opt. Operating Current (Imp)	8.36 A	8.42 A	8.49 A	8.56 A	8.6 A
Open Circuit Voltage (Voc)	41.1 V	41.3 V	41.5 V	41.7 V	41.9 V
Short Circuit Current (Isc)	9.08 A	9.13 A	9.18 A	9.23 A	9.28 A

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

#### MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	132 [2 X (11 X 6)]
Dimensions	1940 X 1048 X 35 mm (76.4 X 41.3 X 1.38 in)
Weight	22.5 kg (49.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-); landscape: 1250 mm (49.2 in)*
Connector	T4 series or MC4
Per Pallet	30 pieces
Per Container (40' HQ)	720 pieces

\* For detailed information, please contact your local Canadian Solar sales and technical representatives.

#### TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.35 % / °C
Temperature Coefficient (Voc)	-0.27 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

#### PARTNER SECTION



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

**Canadian Solar (USA) Inc.** May 2021 | All rights reserved | Module Product Datasheet v2.7\_F30\_J1\_NA



DEL MAR, CA 92014, USA

#### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

#### PROJECT NAME

**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
**APN# 01053605 0028 52**  
**UTILITY: SOUTH RIVER EMC**  
**AHJ: HARNETT COUNTY**

#### SHEET NAME

**SPEC SHEETS**

#### SHEET SIZE

**ANSI B**  
**11" X 17"**

#### SHEET NUMBER

**PV-6**

# Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US

INVERTERS



## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com



## Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	<b>SE10000H-US</b>	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER SEXXXXH-XXXXXBXX4								
<b>OUTPUT</b>								
Rated AC Power Output	3000	3800 @ 240V / 3300 @ 208V	5000	6000 @ 240V / 5000 @ 208V	7600	10000	11400 @ 240V / 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V / 3300 @ 208V	5000	6000 @ 240V / 5000 @ 208V	7600	10000	11400 @ 240V / 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	-	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>1)</sup>							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
<b>INPUT</b>								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380							Vdc
Maximum Input Current @240V <sup>2)</sup>	8.5	13.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V <sup>2)</sup>	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600ka Sensitivity							
Maximum Inverter Efficiency	99			99.2				%
CEC Weighted Efficiency			99				99 @ 240V / 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

<sup>1)</sup> For other regional settings please contact SolarEdge support  
<sup>2)</sup> A higher current source may be used; the inverter will limit its input current to the values stated

## Single Phase Inverter with HD-Wave Technology for North America

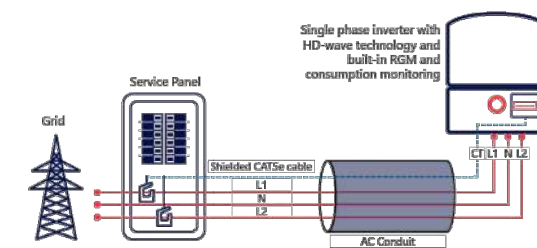
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / **SE10000H-US** / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	<b>SE10000H-US</b>	SE11400H-US
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional <sup>1)</sup>						
Consumption metering	Optional <sup>1)</sup>						
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
<b>STANDARD COMPLIANCE</b>							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to TLL M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)						
Emissions	FCC Part 15 Class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG			1" Maximum / 14-4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG			1" Maximum / 1-3 strings / 14-6 AWG			
Dimensions with Safety Switch (in/kWd)	17.7 x 14.6 x 6.8 / 450 x 370 x 174			21.3 x 14.6 x 7.3 / 540 x 370 x 185			
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6			
Noise	< 25			< 50			
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 <sup>2)</sup>						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

<sup>1)</sup> Inverter with Revenue Grade Meter P/N: SExxxxH-US0008NC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US0008N4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20, 20 units per box  
<sup>2)</sup> Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-ncle-na.pdf>

### How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills



© SolarEdge Technologies, Inc. All rights reserved. SOLAREGE, the SolarEdge logo, OPTIMIZED BY SOLAREGE are trademarks or registered trademarks of SolarEdge Technologies, Inc. All other trademarks mentioned herein are trademarks of their respective owners. Date: 01/20/2020/01/ENG NAM. Subject to change without notice.

RoHS



DEL MAR, CA 92014, USA

### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

### PROJECT NAME

**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
**APN# 01053605 0028 52**  
**UTILITY: SOUTH RIVER EMC**  
**AHJ: HARNETT COUNTY**

### SHEET NAME

SPEC SHEETS

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

PV-7



# Power Optimizer For Residential Installations

S440, S500



POWER OPTIMIZER

## Enabling PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Detects abnormal PV connector behavior, preventing potential safety issues\*
- Faster installations with simplified cable management and easy assembly using a single bolt
- Module-level voltage shutdown for installer and firefighter safety
- Flexible system design for maximum space utilization
- Superior efficiency (99.5%)
- Compatible with bifacial PV modules

\*Functionality subject to inverter model and firmware version

[solaredge.com](http://solaredge.com)



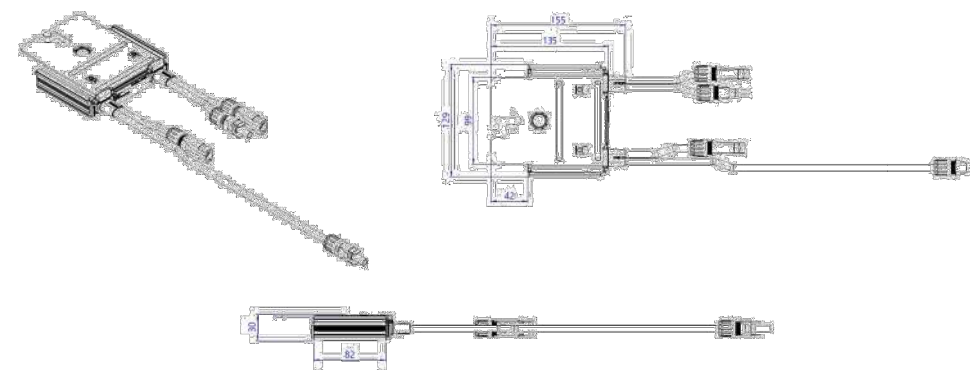
## Power Optimizer For Residential Installations S440, S500

	S440	S500	UNIT
Rated Input DC Power <sup>(1)</sup>	440	500	W
Absolute Maximum Input Voltage (Voc)		60	Vdc
MPPT Operating Range		8 - 60	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency		99.5	%
Weighted Efficiency		98.6	%
Overtoltage Category		II	
<b>OUTPUT DURING OPERATION</b>			
Maximum Output Current		15	Adc
Maximum Output Voltage		60	Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)</b>			
Safety Output Voltage per Power Optimizer		1	Vdc
<b>STANDARD COMPLIANCE</b>			
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
<b>INSTALLATION SPECIFICATIONS</b>			
Maximum Allowed System Voltage		1000	Vdc
Dimensions (W x L x H)		129 x 155 x 30	mm
Weight (including cables)		655 / 1.5	gr / lb
Input Connector		MC4 <sup>(2)</sup>	
Input Wire Length		0.1	m
Output Connector		MC4	
Output Wire Length		(+) 2.3, (-) 0.10	m
Operating Temperature Range <sup>(3)</sup>		-40 to +85	°C
Protection Rating		IP68 / NEMA6P	
Relative Humidity		0 - 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed  
 (2) For other connector types please contact SolarEdge  
 (3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to [Power Optimizers Temperature De-Rating Technical Note](#) for more details

PV System Design Using a SolarEdge Inverter	Single Phase HD-Wave	Three Phase	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500	8	16	18
Maximum String Length (Power Optimizers)		25	50	
Maximum Nominal Power per String <sup>(4)</sup>		5700	11250 <sup>(5)</sup>	12750 <sup>(6)</sup>
Parallel Strings of Different Lengths or Orientations			Yes	

(4) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>  
 (5) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W  
 (6) For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W  
 (7) It is not allowed to mix S-series and P-series Power Optimizers in new installations



© SolarEdge Technologies, Inc. All rights reserved. SOLAREEDGE, the SolarEdge logo, OPTIMIZED BY SOLAREEDGE are trademarks or registered trademarks of SolarEdge Technologies, Inc. All other trademarks mentioned herein are trademarks of their respective owners. Date: 12/2021 DS-000091-1.2-ENG. Subject to change without notice.

CE RoHS



DEL MAR, CA 92014, USA

### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

### PROJECT NAME

EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

### SHEET NAME

SPEC SHEETS

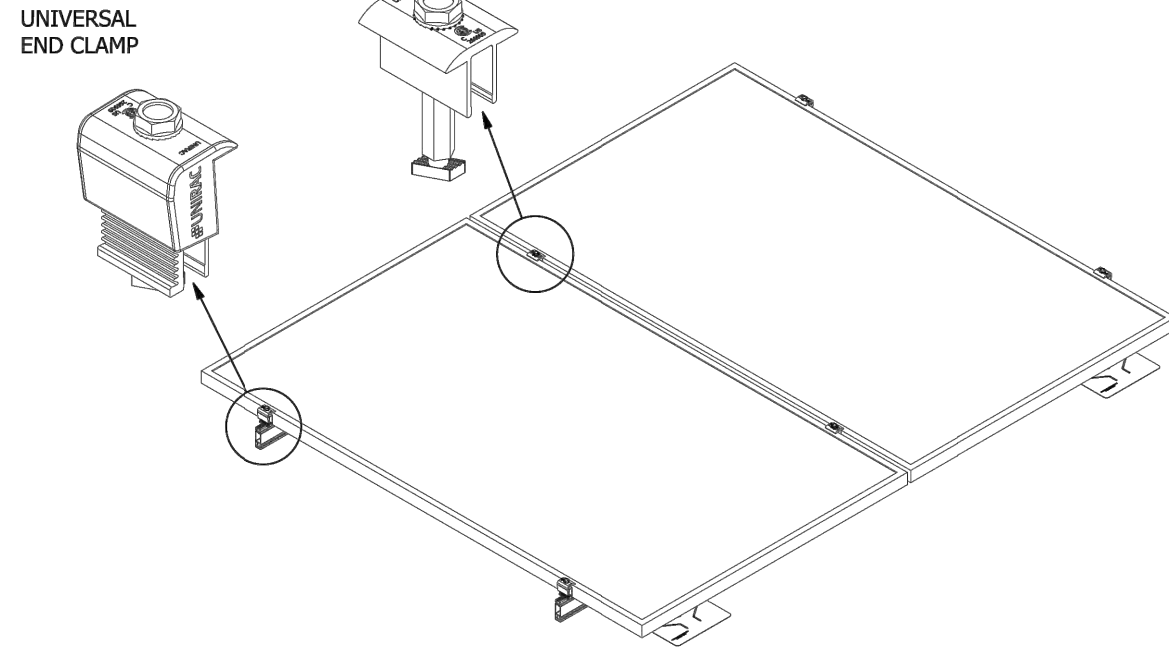
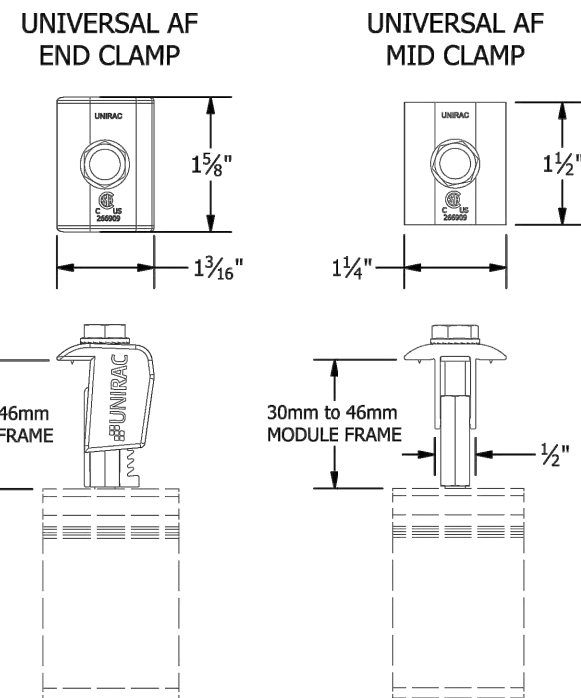
### SHEET SIZE

ANSI B  
 11" X 17"

### SHEET NUMBER

PV-8

PART # TABLE	
P/N	DESCRIPTION
302045M	UNIVERSAL AF MID CLAMP - MILL
302045D	UNIVERSAL AF MID CLAMP - DRK
302050M	UNIVERSAL AF END CLAMP - MILL
302050D	UNIVERSAL AF END CLAMP - DRK



1411 BROADWAY BLVD. NE  
ALBUQUERQUE, NM 87102 USA  
PHONE: 505.242.6411  
WWW.UNIRAC.COM

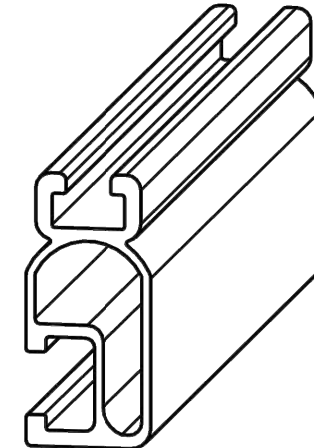
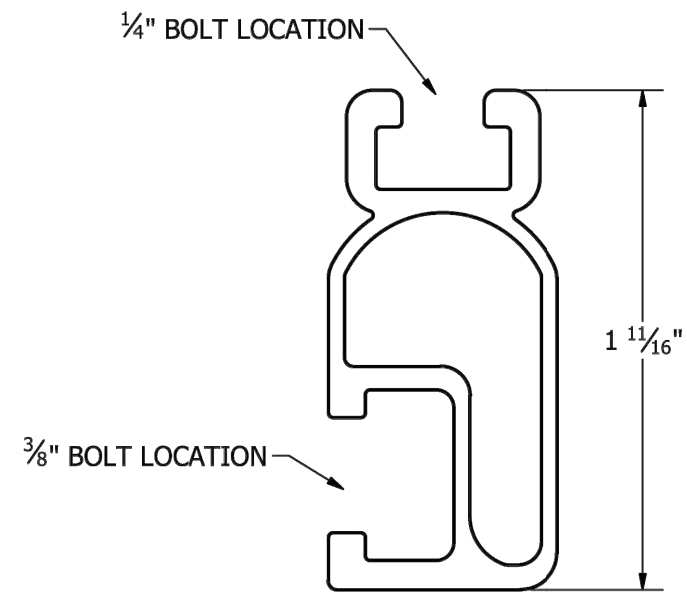
PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	UNIVERSAL AF CLAMPS
REVISION DATE:	9/28/2020

DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS

LEGAL NOTICE

**SM-A01B**  
SHEET



PART # TABLE		
P/N	DESCRIPTION	LENGTH
315168M	SM LIGHT RAIL 168" MILL	168"
315168D	SM LIGHT RAIL 168" DRK	168"
315240M	SM LIGHT RAIL 240" MILL	240"
315240D	SM LIGHT RAIL 240" DRK	240"

1411 BROADWAY BLVD. NE  
ALBUQUERQUE, NM 87102 USA  
PHONE: 505.242.6411  
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	9/11/2017

DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS

LEGAL NOTICE

**SM-P02**  
SHEET



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME

EFRAIN CARMONA MOTE  
580 VALLEY OAK DR,  
BUNNLEVEL, NC 28328, USA  
APN# 01053605 0028 52  
UTILITY: SOUTH RIVER EMC  
AHJ: HARNETT COUNTY

SHEET NAME	SPEC SHEETS
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-9

# FLASH LOC



**FLASHLOC** is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC's** patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC it out!**



### PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



### LOC OUT WATER

With an outer shield **1** contour-conforming gasket **2** and pressurized sealant chamber **3** the Triple-Loc Seal delivers a 100% waterproof connection.



### HIGH-SPEED INSTALL

Simply drive lag bolt and inject sealant into the port **4** to create a permanent pressure seal.

# FLASH LOC

## INSTALLATION GUIDE



### PRE-INSTALL

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice, then fill pilot hole with sealant.

NOTE: Space mounts per racking system install specifications. When down pressure is  $\geq 34$  psf, span may not exceed 2 ft.



### STEP 1: SECURE

Place **FLASHLOC** over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASHLOC** into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EPDM in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.



### STEP 2: SEAL

Insert tip of UNIRAC provided sealant into port. Inject until sealant exits both vents.

Continue array installation, attaching rails to mounts with provided T-bolts.

NOTE: When **FLASHLOC** is installed over gap between shingle or tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

Use only provided sealant.



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME  
**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
**APN# 01053605 0028 52**  
**UTILITY: SOUTH RIVER EMC**  
**AHJ: HARNETT COUNTY**

**FASTER INSTALLATION. 25-YEAR WARRANTY.**

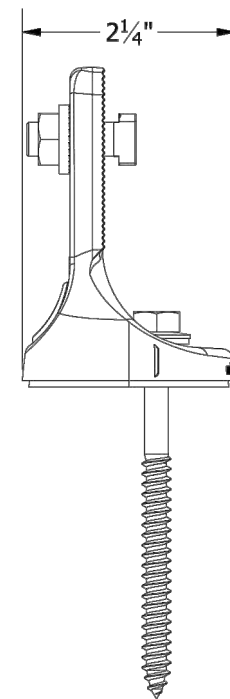
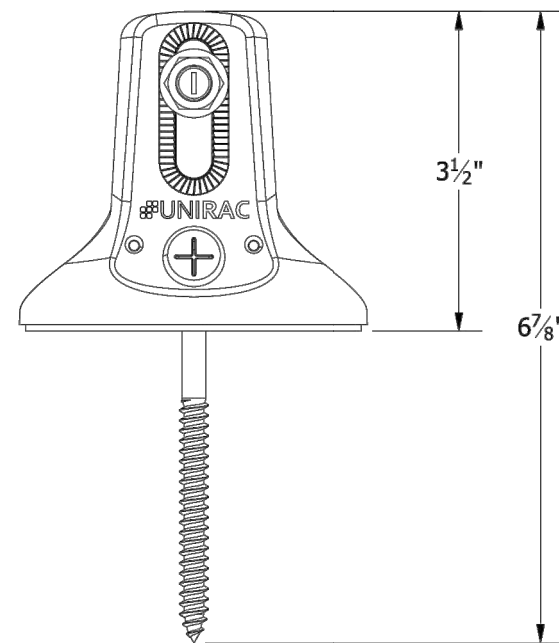
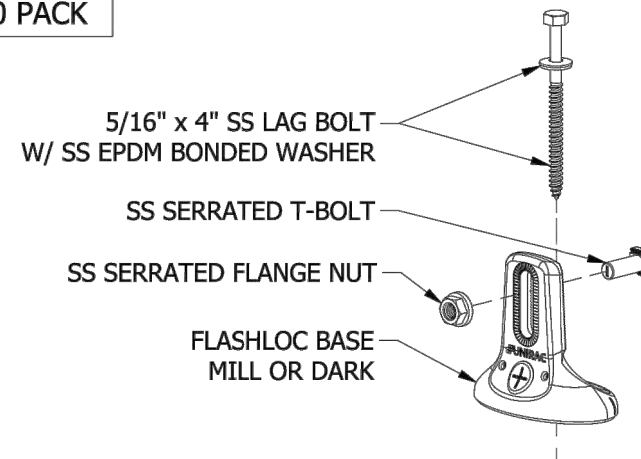
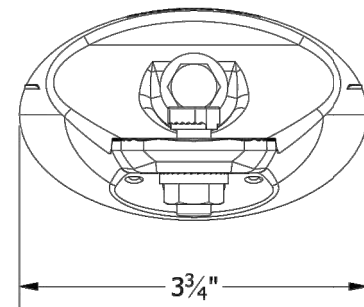
FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

**FASTER INSTALLATION. 25-YEAR WARRANTY.**

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

SHEET NAME
SPEC SHEETS
SHEET SIZE
ANSI B 11" X 17"
SHEET NUMBER
PV-10

PART TABLE	
P/N	DESCRIPTION
004085M	FLASHLOC COMP KIT MILL, 20 PACK
004085D	FLASHLOC COMP KIT DARK, 20 PACK



**UNIRAC**  
 1411 BROADWAY BLVD. NE  
 ALBUQUERQUE, NM 87102 USA  
 PHONE: 505.242.6411  
 WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DRAWING
DESCRIPTION:	FLASHLOC COMP KIT
REVISION DATE:	4/28/2020

DRAWING NOT TO SCALE  
 ALL DIMENSIONS ARE  
 NOMINAL

PRODUCT PROTECTED BY  
 ONE OR MORE US PATENTS  
 LEGAL NOTICE

FL-A01

SHEET



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME  
 EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

SHEET NAME  
 SPEC SHEETS

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-11

# UNIVERSAL AF

## EXPECT MORE

FROM A UNIVERSAL FASTENER.

### Ditch the Spacers

The Universal Aesthetic Fastener (Universal AF) accommodates every module between 30 and 46 mm without extra spacers, while providing the fast intuitive install experience that installers require, and a refined aesthetic home owners will love.

### More than just Universal

- Self standing, twist-and-lock install
- Guaranteed T-bolt engagement
- 1-tool installation
- Integrated bonding mid and end clamps

### Sleek Aesthetics

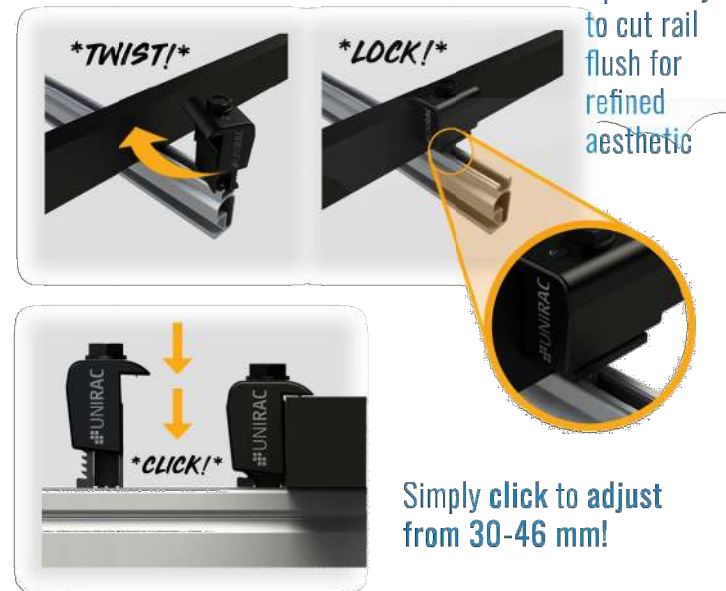
- Low profile hardware
- 1/2" module gap, end caps
- Optionality to cut rail flush
- Rail endcaps available for refined finish.

### Product Specifications

PART #	PRODUCT DESCRIPTION	LIST PRICE	PACK SIZE
#302045M	UNIVERSAL AF SERIES MID CLAMP MILL	\$2.33	20
#302045D	UNIVERSAL AF SERIES MID CLAMP DRK	\$2.52	20
#302050M	UNIVERSAL AF SERIES END CLAMP MILL	\$2.69	20
#302050D	UNIVERSAL AF SERIES END CLAMP DRK	\$2.90	20

## END-CLAMP

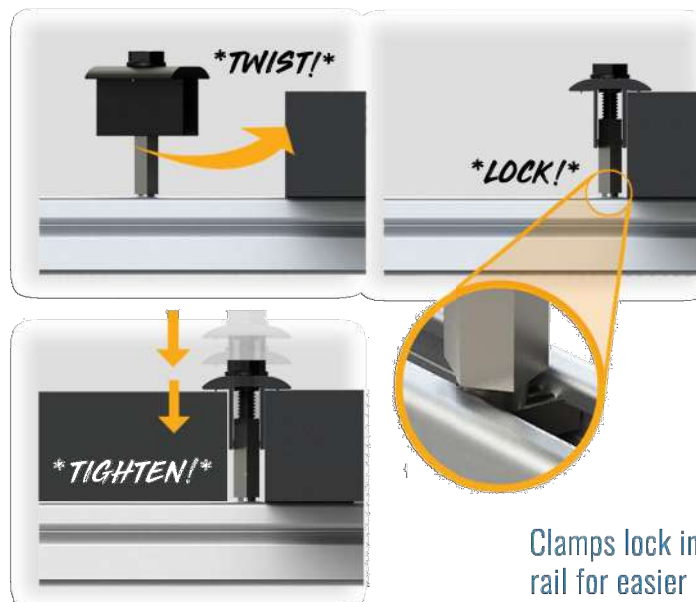
Twist and Lock engagement feature



Optionality to cut rail flush for refined aesthetic

## MID-CLAMP

Twist and Lock engagement feature



Clamps lock into rail for easier panel placement

Tighten to adjust from 30-46 mm!

CONTACT: 505-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM

**UNIRAC**  
BETTER SOLAR STARTS HERE



DEL MAR, CA 92014, USA

#### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

#### PROJECT NAME

EFRAIN CARMONA MOTE  
580 VALLEY OAK DR,  
BUNNLEVEL, NC 28328, USA  
APN# 01053605 0028 52  
UTILITY: SOUTH RIVER EMC  
AHJ: HARNETT COUNTY

#### SHEET NAME

SPEC SHEETS

#### SHEET SIZE

ANSI B  
11" X 17"

#### SHEET NUMBER

PV-12

### SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SOLARMOUNT Installation Guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLARMOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes  $\geq$  2 inches per foot, or 9.5 degrees). The system is to be mounted over fire resistant roof covering rated for the application. There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:

Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard Rail	Type 1, Type 2, Type 3 & Type 10	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	Type 1 & Type 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required

This racking system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

### UL2703 CERTIFICATION MARKING LABEL

Unirac SOLARMOUNT is listed to UL 2703. Certification marking is embossed on all mid clamps as shown. Labels with additional information will be provided. After the racking system is fully assembled, a single label should be applied to the SOLARMOUNT rail at the edge of the array. Before applying the label, the corners of the label that do not pertain to the system being installed must be removed so that only the installed system type is showing.

Note: The sticker label should be placed such that it is visible, but not outward facing.



**BONDING MIDCLAMP ASSEMBLY**

- Stainless steel Midclamp points, 2 per module, pierce module frame anodization to bond module to module through clamp.
- Serrated flange nut bonds stainless steel clamp to stainless steel T-bolt.
- Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, clamp, and modules to grounded SM rail.

**ENDCLAMP ASSEMBLY**

- Serrated flange nut bonds aluminum Endclamp to stainless steel T-bolt.
- Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, and Endclamp to grounded SM rail.

Note: End clamp does not bond to module frame.

**BONDING RAIL SPLICE BAR**

- Bonding Hardware creates bond between splice bar and each rail section.
- Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.

Note: Splice bar and bolted connection are non-structural. The splice bar function is rail alignment and bonding.

**RAIL TO L-FOOT w/BONDING T-BOLT**

- Serrated flange nut removes L-foot anodization to bond L-Foot to stainless steel T-bolt.
- Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SM rail.

**BONDING MICROINVERTER MOUNT**

- Hex nut with captive lock washer bonds metal microinverter flange to stainless steel T-bolt.
- Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SM rail. System ground including racking and modules may be achieved through the trunk cable of approved microinverter systems. See page 1 for details.

**RACK SYSTEM GROUND**

- WEEB washer dimples pierce anodized rail to create bond between rail and lug.
- Solid copper wire connected to lug is routed to provide final system ground connection.

NOTE: Ilaco lug can also be used when secured to the side of the rail. See page 7 for details.

- Position clamp to align T-bolt with rail slot. Lower clamp and insert T-bolt into rail slot.
- Rotate clamp clockwise 2/3 of a turn to engage T-bolt inside rail slot.
- Place module at least 3/4" from end of rail and position clamp against module frame.
- While applying pressure to hold the clamp against the module, push down on the module side of the clamp cap.
- When the cap contacts the module frame, release and it will re-engage to the clamp base.
- Tighten bolt and torque to 15 ft-lbs.
- Confirm clamp is engaged in correct module height position and that the top of the cap is sitting level with the module frame.

30 mm	32 & 33 mm	35 mm
38 mm	40 mm	46 mm

NOTE: When installing 46mm modules, loosen bolt by 1 turn before positioning clamp against module frame. Do not force clamp onto module frame as this may damage the bonding pin.

- Position clamp to align T-bolt with rail slot. Lower clamp and insert T-bolt into rail slot.
- Rotate clamp clockwise 2/3 of a turn to engage T-bolt inside rail slot.
- Slide clamp into position against module.
- Place second module.
- Tighten bolt and torque to 15 ft-lbs.

NOTE: If excessive force is applied in step 2, the cap may over-rotate causing it to be mis-aligned with the module frame. If this occurs, keep rotating the cap clockwise until it returns to the original position.



DEL MAR, CA 92014, USA

VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

PROJECT NAME

EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

SHEET NAME  
 SPEC SHEETS

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-13



## Descriptive Report and Test Results

**MASTER CONTRACT:** 266909  
**REPORT:** 70131735  
**PROJECT:** 80128750

**Edition 1:** September 20, 2017; Project 70131735– Albuquerque  
 Issued by Michael Hoffnagle

**Edition 17:** April 22, 2022; Project 80116723 - Irvine  
 Prepared By: Michael Hoffnagle  
 Authorized By: Michael Hoffnagle

**Edition 18:** June 8, 2022; Project 80128750 - Irvine  
 Prepared By: Michael Hoffnagle  
 Authorized By: Michael Hoffnagle

Report pages reissued

**Contents:** Certificate of Compliance - Pages 1 to 6  
 Supplement to Certificate of Compliance - Pages 1 to 3  
 Description and Tests - Pages 1 to 27  
 Att1 Installation Manual SM– Pages 1 to 36  
 Att2 Schematics SM/ULA– Pages 1 to 72  
 Att3 Installation Manual ULA– Pages 1 to 22  
 Att4 RM5\_Installation Guide - 1 to 19  
 Att5 RMDT\_Installation Guide - 1 to 20  
 Att6 RM series schematics – 1 to 32  
 Att7 Installation Manual, GFT Shared Rail – Pages 1 to 40  
 Att8 Installation Manual, GFT 4-Rail – Pages 1 to 39  
 Att9 GFT Schematics – Pages 1 to 42  
 Att10 NXT Horizon Installation Manual – Pages 1 to 22  
 Att11 Schematics NXT Horizon – Pages 1 to 13

### PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems  
 CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems -  
 Certified to US Standards

The reader is responsible for any liability arising from actions taken in interpreting or applying the results presented in this report. This report shall not be reproduced except in full, without written approval from CSA Group Testing & Certification Inc. The results of this report only relate to those items tested.

34 Bunsen, Irvine, CA, U.S.A. 92618  
 Telephone: 949.733.4300 1.800.463.6727 Fax: 949.733.4320 www.csagroup.org



DEL MAR, CA 92014, USA

#### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

#### PROJECT NAME

EFRAIN CARMONA MOTE  
 580 VALLEY OAK DR,  
 BUNNLEVEL, NC 28328, USA  
 APN# 01053605 0028 52  
 UTILITY: SOUTH RIVER EMC  
 AHJ: HARNETT COUNTY

#### SHEET NAME

SPEC SHEETS

#### SHEET SIZE

ANSI B  
 11" X 17"

#### SHEET NUMBER

PV-14



### Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the SOLARMOUNT system.

Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Series	
Aionrise	AION60G1, AION72G1	Canadian Solar (cont.)	CS5A-M CS6K-(M/MS/MS AllBlack/P/P HE) CS6P-(M/P) CS6U-(M/P/P HE) CS6X-P, CSX-P ELPS CS6(A/P)-MM	Hyundai	KG, MG, RW, TG, RI, RG, TI, KI, HI Series HiA-SxxxHG, HiD-SxxxRG(BK), HiS-S400PI	
Aleo	P-Series & S-Series		Centrosolar America	C-Series & E-Series	ITEK	IT-SE Series
Aptos Solar	DNA-120-MF10 DNA-120-(MF/BF)23 DNA-144-(MF/BF)23 DNA-120-(MF/BF)26 DNA-144-(MF/BF)26		CertainFeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-01 CTxxxPxx-01, CTxxxMxx-02, CTxxxMxx-03 CTxxxMxx-04, CTxxxHC11-04	Japan Solar	JPS-60 & JPS-72 Series
	Astronergy		CHSM6612 M, M/HV CHSM6612P Series CHSM6612P/HV Series CHSM72M-HC CHSM72M(DG)/F-BH	Eco Solargy	Orion 1000 & Apollo 1000	JA Solar
Auxin		AXN6M610T AXN6P610T AXN6M612T AXN6P612T	ET Solar	ET AC Module, ET Module	Jinko	
Axitec	AC-xxx(M/P)/60S, AC-xxx(M/P)/72S AC-xxxP/156-60S AC-xxxMH/120(S/V/SB/VB) AC-xxxMH/144(S/V/SB/VB)	First Solar	FS-6XXX(A) FS-6XXX(A)-P, FS-6XXX(A)-P-I	Kyocera	KD-F & KU Series	
	Boviet	BVM6610, BVM6612	Flextronics	FXS-xxxBB	LA Solar	
BYD	P6K & MHK-36 Series	FreeVolt	PVGraf	LG Electronics	LGxxx(E1C/E1K/N1C/N1K/N2T/N2W/S1C/ S2W/Q1C/Q1K)-A5 LGxxx(A1C/M1C/M1K/N1C/N1K/Q1C/Q1K/ QAC/QAK)-A6 LGxxxN2W-B3 LGxxxN2T-B5 LGxxxN1K-B6 LGxxx(N1C/N1K/N2T/N2W)-E6 LGxxx(N1C/N1K/N2W/S1C/S2W)-G4	
Canadian Solar	CS1(H/K/U/Y)-MS CS3K-(MB/MB-AG/MS/P/P HE/PB-AG) CS3L-(MS/P) <b>CS3N-MS</b> CS3U-(MB/MB-AG/MS/P/P HE/PB/PB-AG) CS3W-(MS/P/P-PB-AG)	GCL	GCL-P6 & GCL-M6 Series		Hansol	TD-AN3, TD-AN4 UB-AN1, UD-AN1
	HT Solar	36M, 36P 60M, 60P, 72M & 72P Series 144HC M6	Heliene			HT72-156(M/P) HT72-156P-C, HT72-156P(V)-C HT72-156M(PDV)-BF, HT72-156M(PD)-BF HT60-156M-C HT60-156M(V)-C

- Unless otherwise noted, all modules listed above include all wattages and specific models within that series. Variable wattages are represented as "xxx"
- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID
- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
- **Listed models can be used to achieve a Class A fire system rating for steep slope applications. See Appendix A, page A**



DEL MAR, CA 92014, USA

#### VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	08/06/2022	UR

#### PROJECT NAME

**EFRAIN CARMONA MOTE**  
**580 VALLEY OAK DR,**  
**BUNNLEVEL, NC 28328, USA**  
**APN# 01053605 0028 52**  
**UTILITY: SOUTH RIVER EMC**  
**AHJ: HARNETT COUNTY**

#### SHEET NAME

**SPEC SHEETS**

#### SHEET SIZE

**ANSI B**  
**11" X 17"**

#### SHEET NUMBER

**PV-15**







08-09-2022

Powur PBC

2683 Via De La Valle #321G

Subject: Structural Certification for Installation of Residential Solar  
re job: Efrain Carmona Mote

580 Valley Oak Dr, Bunnlevel, NC 28323, USA

Attn.: To Whom It May Concern

Observation of the condition of the existing framing system was performed by an audit team of Powur PBC

After review of the field observation data, structural capacity calculations were performed in accordance with applicable building codes to determine adequacy of the existing roof framing supporting the proposed panel layout. Please see full Structural Calculations report for details regarding calculations performed and limits of scope of work and liability. The design criteria and structural adequacy are summarized below:

**Design Criteria:**

Code: 2018 NCSBC, IBC 2015, ASCE 7-10, Ult Wind Speed: 119 mph, Ground Snow: 10 psf, Min Snow Roof: 0 psf

ROOF 1: Shingle roofing supported by 2x4 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 39 degrees and has a max beam span of 10.0 ft between supports. Roof is adequate to support the imposed loads. Therefore, no structural upgrades are required.

ROOF 2: Shingle roofing supported by 2x4 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 18 degrees and has a max beam span of 10.0 ft between supports. Roof is adequate to support the imposed loads. Therefore, no structural upgrades are required.

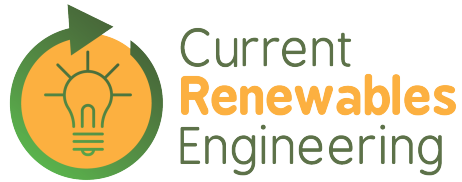
ROOF 3: Shingle roofing supported by 2x4 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 5 degrees and has a max beam span of 8.7 ft between supports. Roof is adequate to support the imposed loads. Therefore, no structural upgrades are required.

ROOF 4: Shingle roofing supported by 2x4 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 33 degrees and has a max beam span of 10.0 ft between supports. Roof is adequate to support the imposed loads. Therefore, no structural upgrades are required.

08-09-2022

Current Renewables Engineering Inc.  
Professional Engineer  
info@currentrenewableseng.com





08-09-2022

Powur PBC

2683 Via De La Valle #321G

Attn.: To Whom It May Concern

re job: Efrain Carmona Mote

580 Valley Oak Dr, Bunnlevel, NC 28323, USA

The following calculations are for the structural engineering design of the photovoltaic panels and are valid only for the structural info referenced in the stamped plan set. The verification of such info is the responsibility of others.

I certify that the roof structure has sufficient structural capacity for the applied PV loads.

All mounting equipment shall be designed and installed per manufacturer's approved installation specifications.

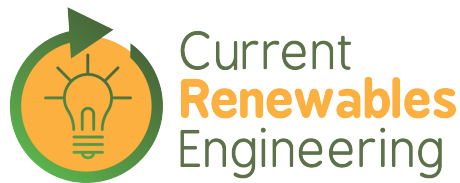
**Design Criteria:**

Code: 2018 NCSBC, IBC 2015, ASCE 7-10,  
Live Load: 0 psf  
Ult Wind Speed: 119 mph  
Exposure Cat: C  
Ground Snow: 10 psf  
Min Snow Roof: 0 psf

Current Renewables Engineering Inc.  
Professional Engineer  
info@currentrenewableseng.com

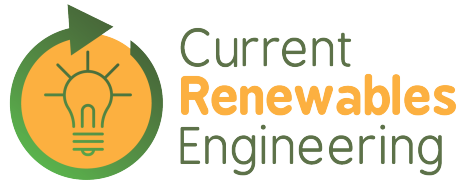
08-09-2022





**Roof Properties:**

	Roof 1	Roof 2	Roof 3	Roof 4
Roof Type =	Shingle	Shingle	Shingle	Shingle
Roof Pitch (deg) =	39.0	18.0	5.0	33.0
Mean Root Height (ft) =	23.0	23.0	23.0	23.0
Attachment Trib Width (ft) =	3.25	3.25	3.3	3.25
Attachment Spacing (ft) =	4.0	4.0	4.0	4.0
Framing Type =	Rafter	Rafter	Rafter	Rafter
Framing Size =	2x4	2x4	2x4	2x4
Framing OC Spacing (in.) =	24.0	24.0	24.0	24.0
Section Thickness, b (in) =	1.5	1.5	1.5	1.5
Section Depth, d (in) =	3.5	3.5	3.5	3.5
Section Modulus, S <sub>x</sub> (in <sup>3</sup> ) =	3.062	3.062	3.062	3.062
Moment of Inertia, I <sub>x</sub> (in <sup>4</sup> ) =	5.359	5.359	5.359	5.359
Unsupported Span (ft) =	10.0	10.0	8.7	10.0
Upper Chord Length (ft) =	13.1	15.1	10.7	12.2
Deflection Limit D+L (in) =	2.62	3.02	2.14	2.44
Deflection Limit S or W (in) =	1.747	2.013	1.427	1.627
Attachments Pattern =	Fully Staggered	Fully Staggered	Fully Staggered	Fully Staggered
Framing Upgrade =	No	No	No	No
Sister Size =	NA	NA	NA	NA
Wood Species =	DF	DF	DF	DF
Wood F <sub>b</sub> (psi) =	900.0	900.0	900.0	900.0
Wood F <sub>v</sub> (psi) =	180.0	180.0	180.0	180.0
Wood E (psi) =	1600000.0	1600000.0	1600000.0	1600000.0
C <sub>D</sub> (wind) =	1.6	1.6	1.6	1.6
C <sub>d</sub> (snow) =	1.15	1.15	1.15	1.15
C <sub>LS</sub> =	1.0	1.0	1.0	1.0
C <sub>M</sub> = C <sub>t</sub> = C <sub>L</sub> = C <sub>i</sub> =	1.0	1.0	1.0	1.0
C <sub>F</sub> =	1.5	1.5	1.5	1.5
C <sub>fu</sub> =	1.0	1.0	1.0	1.0
C <sub>r</sub> =	1.15	1.15	1.15	1.15
F'b wind (psi) =	2484.0	2484.0	2484.0	2484.0
F'b snow (psi) =	1785.37	1785.37	1785.37	1785.37
F'v wind (psi) =	288.0	288.0	288.0	288.0
F'v snow (psi) =	207.0	207.0	207.0	207.0
M allowable wind (lb-ft) =	633.94	633.94	633.94	633.94
M allowable snow (lb-ft) =	455.64	455.64	455.64	455.64
V allowable wind (lbs) =	1008.0	1008.0	1008.0	1008.0
V allowable snow (lbs) =	724.5	724.5	724.5	724.5
E' (psi) =	1600000.0	1600000.0	1600000.0	1600000.0



### Load Calculation:

<b>Dead Load Calculations:</b>	Roof 1	Roof 2	Roof 3	Roof 4
Panels Dead Load (psf) =	3.0	3.0	3.0	3.0
Roofing Weight (psf) =	3.0	3.0	3.0	3.0
Decking Weight (psf) =	2.0	2.0	2.0	2.0
Framing Weight (psf) =	0.602	0.602	0.602	0.602
Misc. Additional Weight (psf) =	1.0	1.0	1.0	1.0
Existing Dead Load (psf) =	6.602	6.602	6.602	6.602
Total Dead Load (psf) =	9.602	9.602	9.602	9.602

### **Wind Load Calculations:**

Ultimate Wind Speed (mph) =	119.0	119.0	119.0	119.0
Directionality Factor, $k_d$ =	0.85	0.85	0.85	0.85
Topographic Factor, $k_{zt}$ =	1.0	1.0	1.0	1.0
Velocity Press Exp Factor, $k_z$ =	0.929	0.929	0.929	0.929
Velocity Pressure, $q_z$ (psf) =	28.621	28.621	28.621	28.621
External Pressure Up, $GCp_1$ =	-0.94	-0.87	-0.97	-0.94
External Pressure Up, $GCp_2$ =	-1.14	-1.549	-1.589	-1.14
External Pressure Up, $GCp_3$ =	-1.14	-2.419	-2.288	-1.14
External Pressure Down, $GCp$ =	0.87	0.44	0.27	0.87
Design Pressure Up, $p_1$ (psf) =	-26.898	-24.897	-27.759	-26.898
Design Pressure Up, $p_2$ (psf) =	-32.622	-44.348	-45.487	-32.622
Design Pressure Up, $p_3$ (psf) =	-32.622	-69.245	-65.492	-32.622
Design Pressure Down, $p$ (psf) =	24.897	16.0	16.0	24.897

### **Snow Load Calculations:**

Ground Snow Load, $p_g$ (psf) =	10.0	10.0	10.0	10.0
Min Flat Snow, $p_{f\_min}$ (psf) =	0.0	0.0	0.0	0.0
Sloped Snow, $p_{s\_min}$ (psf) =	0.0	0.0	0.0	0.0
Snow Importance Factor, $I_c$ =	1.0	1.0	1.0	1.0
Exposure Factor, $C_e$ =	0.9	0.9	0.9	0.9
Thermal Factor, $C_t$ =	1.1	1.1	1.1	1.1
Flat Roof Snow, $p_f$ (psf) =	6.93	6.93	6.93	6.93
Slope Factor, $C_s$ =	1.0	1.0	1.0	1.0
Sloped Roof Snow, $p_s$ (psf) =	6.93	6.93	6.93	6.93

**Lag Screw Checks:**

	Roof 1	Roof 2	Roof 3	Roof 4
Ref. Withdrawal Value, W (lb/in) =	266.0	266.0	266.0	266.0
( $C_m = C_t = C_{eg} = 1.0$ ) CD =	1.6	1.6	1.6	1.6
Adjusted Withdrawal Value, W' (lb/in) =	425.6	425.6	425.6	425.6
Lag Penetration, p (in.) =	2.5	2.5	2.5	2.5
Allowable Withdrawal Force, W'p (lbs) =	1064.0	1064.0	1064.0	1064.0
Applied Uplift Force (lbs) =	-201.889	-276.924	-287.913	-200.449
Uplift DCR =	0.19	0.26	0.271	0.188
Ref. Lateral Value, Z (lbs) =	266.0	266.0	266.0	266.0
( $C_m = C_t = C_{\Delta} = C_{eg} = 1.0$ ) CD =	1.15	1.15	1.15	1.15
Adjusted Lateral Value, Z' (lbs) =	310.5	310.5	310.5	310.5
Applied Lateral Force (lbs) =	81.239	39.891	11.424	70.307
Angle of Resultant Force, $\alpha$ (deg) =	1.188	1.428	1.531	1.233
Adjusted Interaction Lateral Value, Z' $\alpha$ (lbs) =	795.11	1013.978	1059.957	840.547
Lateral DCR =	0.102	0.039	0.011	0.084



### Roof Framing Checks:

#### Force Checks:

##### LC1: D+S

	Roof 1	Roof 2	Roof 3	Roof 4
Applied Moment (lb-ft) =	326.0	311.0	264.0	345.0
Applied Shear (lbs) =	197.0	195.0	174.0	199.0
Allowable Moment (lb-ft) =	456.0	456.0	456.0	456.0
Allowable Shear (lbs) =	724.0	724.0	724.0	724.0
Moment DCR =	0.715	0.682	0.579	0.757
Shear DCR =	0.271	0.269	0.24	0.274

##### LC2: D+0.6W

Applied Moment (lb-ft) =	484.0	361.0	307.0	512.0
Applied Shear (lbs) =	292.0	227.0	202.0	295.0
Allowable Moment (lb-ft) =	634.0	634.0	634.0	634.0
Allowable Shear (lbs) =	1008.0	1008.0	1008.0	1008.0
Moment DCR =	0.763	0.569	0.484	0.808
Shear DCR =	0.29	0.225	0.2	0.293

##### LC3: D+0.75(S+0.6W)

Applied Moment (lb-ft) =	513.0	413.0	351.0	543.0
Applied Shear (lbs) =	309.0	260.0	231.0	313.0
Allowable Moment (lb-ft) =	634.0	634.0	634.0	634.0
Allowable Shear (lbs) =	1008.0	1008.0	1008.0	1008.0
Moment DCR =	0.809	0.652	0.554	0.856
Shear DCR =	0.307	0.258	0.229	0.31

##### LC4: 0.6D+0.6W

Applied Moment (lb-ft) =	408.0	289.0	245.0	432.0
Applied Shear (lbs) =	246.0	181.0	161.0	249.0
Allowable Moment (lb-ft) =	634.0	634.0	634.0	634.0
Allowable Shear (lbs) =	1008.0	1008.0	1008.0	1008.0
Moment DCR =	0.644	0.455	0.387	0.681
Shear DCR =	0.244	0.18	0.16	0.247

**Deflection Checks (Service Level):**

## LC1: D+L

Deflection (in.) = 1.129	1.172	0.636	1.083
Deflection Limit (in.) = 2.62	3.02	2.14	2.44
Deflection DCR = 0.431	0.388	0.297	0.444

## LC2: S

Deflection (in.) = 0.196	0.204	0.111	0.188
Deflection Limit (in.) = 1.747	2.013	1.427	1.627
Deflection DCR = 0.112	0.101	0.077	0.116

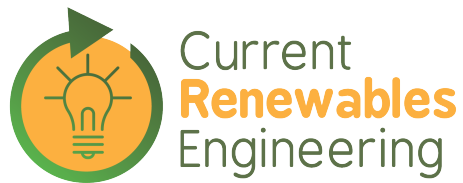
## LC3: W (Down)

Deflection (in.) = 0.296	0.197	0.107	0.284
Deflection Limit (in.) = 1.747	2.013	1.427	1.627
Deflection DCR = 0.169	0.098	0.075	0.174

## LC4: W (Up)

Deflection (in.) = 0.32	0.307	0.186	0.307
Deflection Limit (in.) = 1.747	2.013	1.427	1.627
Deflection DCR = 0.183	0.153	0.13	0.188





**Seismic Check:**

**Existing Weight:**

Wall Weight (psf) = 17.0  
Tributary Wall Area (ft<sup>2</sup>) = 3180.0  
Total Wall Weight (lbs) = 54060.0  
Roof Weight (psf) = 6.602  
Roof Area (ft<sup>2</sup>) = 2640.0  
Total Roof Weight (lbs) = 17428.125  
**Total Existing Weight (lbs) = 71488.125**

**Total Additional PV Weight (lbs) = 2123.55**

**Weight Increase:**

$$(\text{Existing W} + \text{Additional W}) / (\text{Existing W}) = 1.03$$

The increase in weight as a result of the solar system is less than 10% of the existing structure and therefore no further seismic analysis is required.

**Limits of Scope of Work and Liability:**

Existing structure is assumed to have been designed and constructed following appropriate codes at time of erection, and assumed to have appropriate permits. The calculations produced are only for the roof framing supporting the proposed PV installation referenced in the stamped planset and were completed according to generally recognized structural analysis standards and procedures, professional engineering and design experience, opinions and judgements. Existing deficiencies which are unknown or were not observable during time of inspection are not included in this scope of work. All PV modules, racking, and mounting equipment shall be designed and installed per manufacturer's approved installation specifications. The Engineer of Record and the engineering consulting firm assume no responsibility for misuse or improper installation. This analysis is not stamped for water leakage. Framing was determined based on information in provided plans and/or photos, along with engineering judgement. Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the stamped plans, calculations, and cert letter (where applicable) and notify the Engineer of Record of any discrepancies prior to starting construction. Contractor shall also verify that there is no damaged framing that was not addressed in stamped plans, calculations, and cert letter (where applicable) and notify the Engineer of Record of any concerns prior to starting construction.