

PHOTOVOLTAIC ROOF MOUNT SYSTEM

41 MODULES-ROOF MOUNTED - 15.990 kWDC, 13.000 kWAC
248 MOORE UNION CHURCH RD, BROADWAY, NC 27505, USA

SYSTEM SUMMARY:

- (N) 41 - CANADIAN SOLAR CS3N-390MS (390W) MODULES
- (N) 01 - SOLAREEDGE SE10000H-US INVERTER
- (N) 01 - SOLAREEDGE SE3000H-US INVERTER
- (N) 41 - SOLAREEDGE S440 POWER OPTIMIZERS
- (N) 02 - JUNCTION BOXES
- (E) 200A MAIN SERVICE PANEL WITH (N) 150A MAIN BREAKER
- (N) 100A NON-FUSED AC DISCONNECT
- (N) 125A SOLAR LOAD CENTER

INTERCONNECTION METHOD : BACKFEED BREAKER

DERATE: (E) 200A MAIN BREAKER TO BE DERATED TO (N) 150A TO ALLOW BACKFEED OF 70A

DESIGN CRITERIA:

ROOF TYPE: - METAL ROOF
ROOF FRAME: - 2"x4" RAFTERS @24" O.C.
SEAMS SPACING : SEAMS @ 12" O.C.
STORY: - ONE STORY
SNOW LOAD : - 15 PSF
WIND SPEED :- 117 MPH
WIND EXPOSURE:- C
RISK CATEGORY:- II
COORDINATE:- 35.419183, -78.977644



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

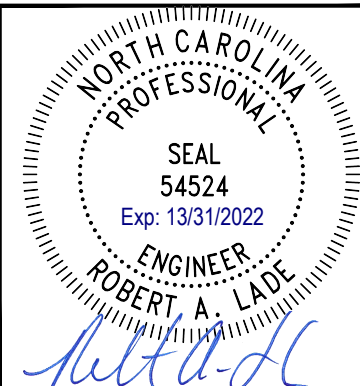
- 1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 & 75 DEGREE C WET ENVIRONMENT.
- 3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- 4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- 6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- 7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- 8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- 9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER E.G.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
- 10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE



1 | AERIAL PHOTO
PV-0 | SCALE: NTS



2 | VICINITY MAP
PV-0 | SCALE: NTS



DEL MAR, CA 92014, USA

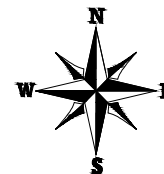
VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	11/10/2022	UR

PROJECT NAME
GILBERTO HOLGUIN
248 MOORE UNION CHURCH RD,
BROADWAY, NC 27505 USA
APN# 130600 0094 01
UTILITY: SOUTH RIVER EMC
AHJ: HARNETT COUNTY

SHEET NAME COVER SHEET
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-0

SHEET INDEX

PV-0	COVER SHEET
PV-1	SITE PLAN WITH ROOF PLAN
PV-2	ROOF PLAN WITH MODULES
PV-3	ATTACHMENT PLAN
PV-4	ELECTRICAL LINE DIAGRAM WITH CALCULATION
PV-4.1	ELECTRICAL LOAD CALCULATION
PV-5	WARNING LABELS & PLACARD
PV-6+	EQUIPMENT SPEC SHEETS

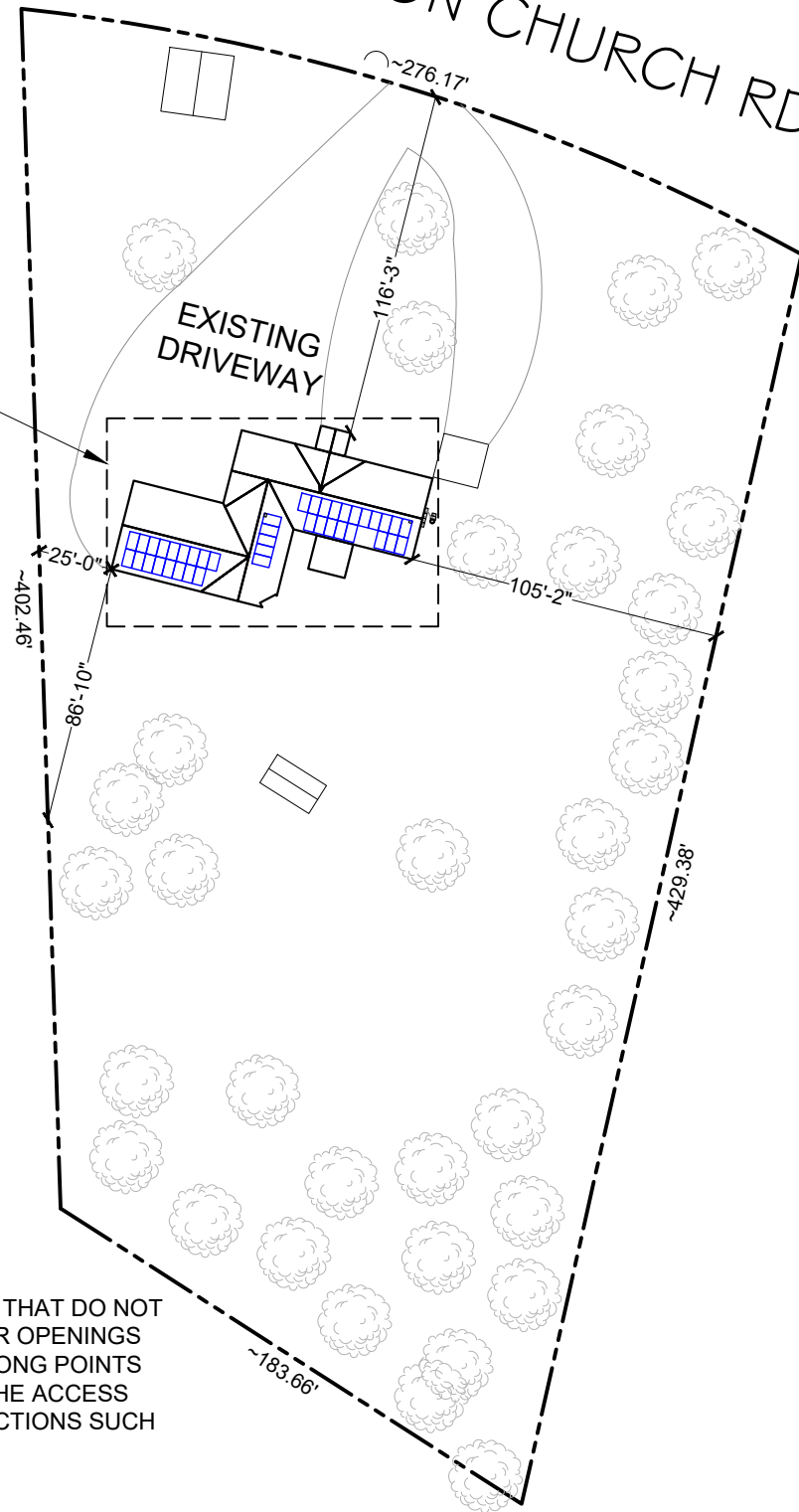


NOTE:

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

MOORE UNION CHURCH RD

SEE ENLARGED VIEW.



NOTE:
3/4" OR GREATER PV CONDUIT RUN INSIDE ATTIC

LEGEND

UM	UTILITY METER
MSP	MAIN SERVICE PANEL
ACD	AC DISCONNECT
INV	INVERTER
JB	JUNCTION BOX
SLC	SOLAR LOAD CENTER
—	PROPERTY LINE
🌳	TREES

● **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.

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

1

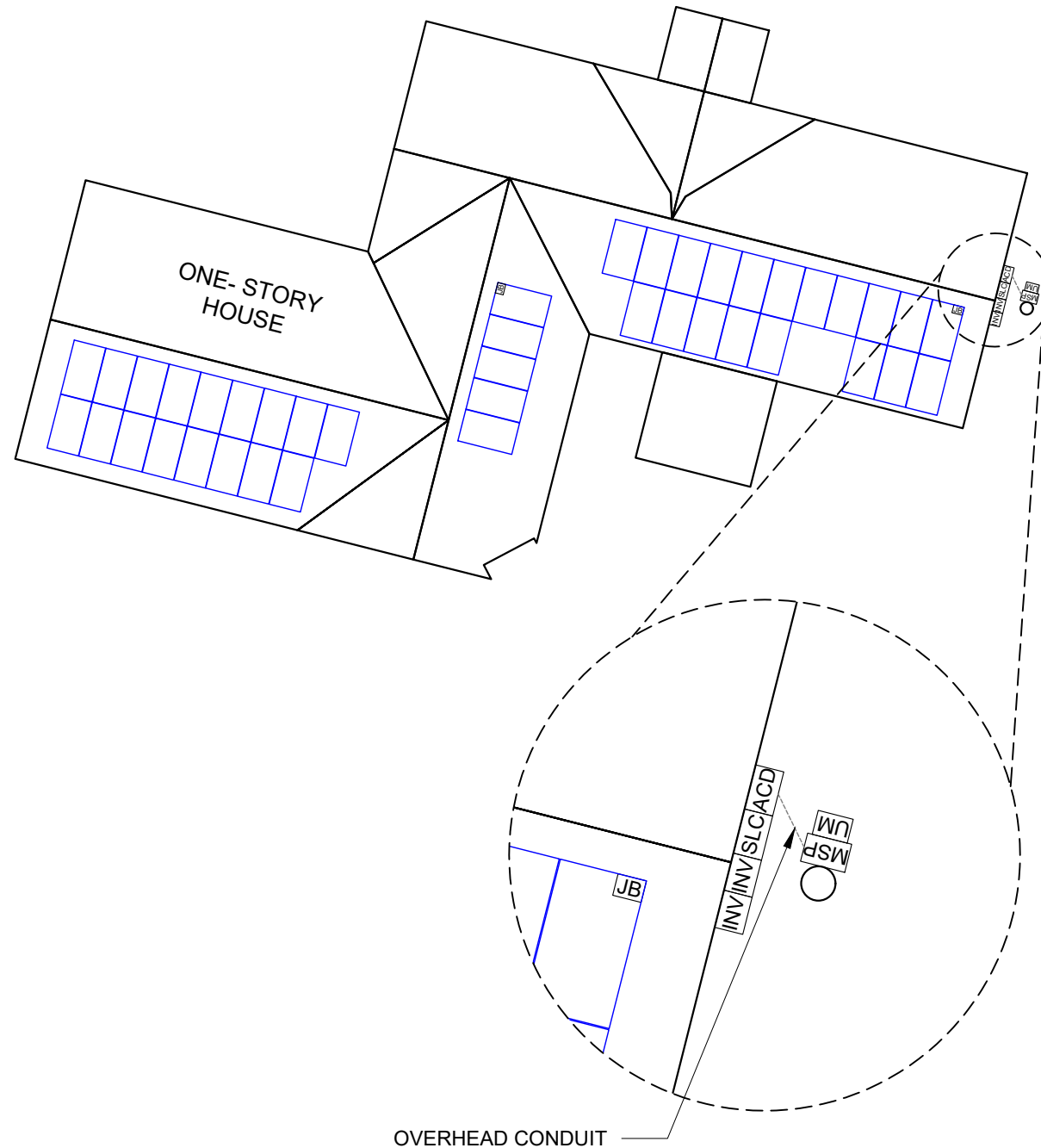
SITE PLAN WITH ROOF PLAN

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



NOTE :

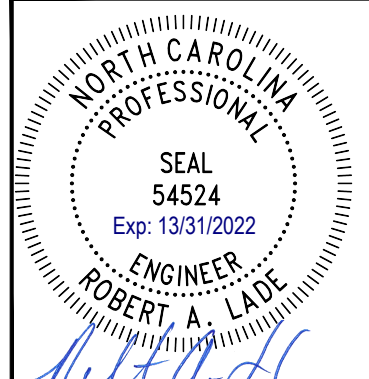
1. PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR SHALL VERIFY THE FRAMING SIZES, SPACINGS, AND SPANS NOTED IN THE STAMPED PLANS AND ACCOMPANYING CALCULATIONS AND NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES PRIOR TO STARTING CONSTRUCTION.
2. THESE PLANS ARE STAMPED FOR STRUCTURAL CODE COMPLIANCE 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.



OVERHEAD CONDUIT

ENLARGED VIEW

SCALE: NTS



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AHJ: HARNETT COUNTY

SHEET NAME
SITE PLAN WITH
ROOF PLAN

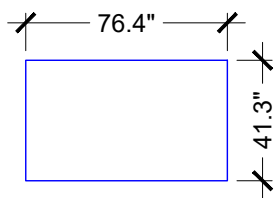
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

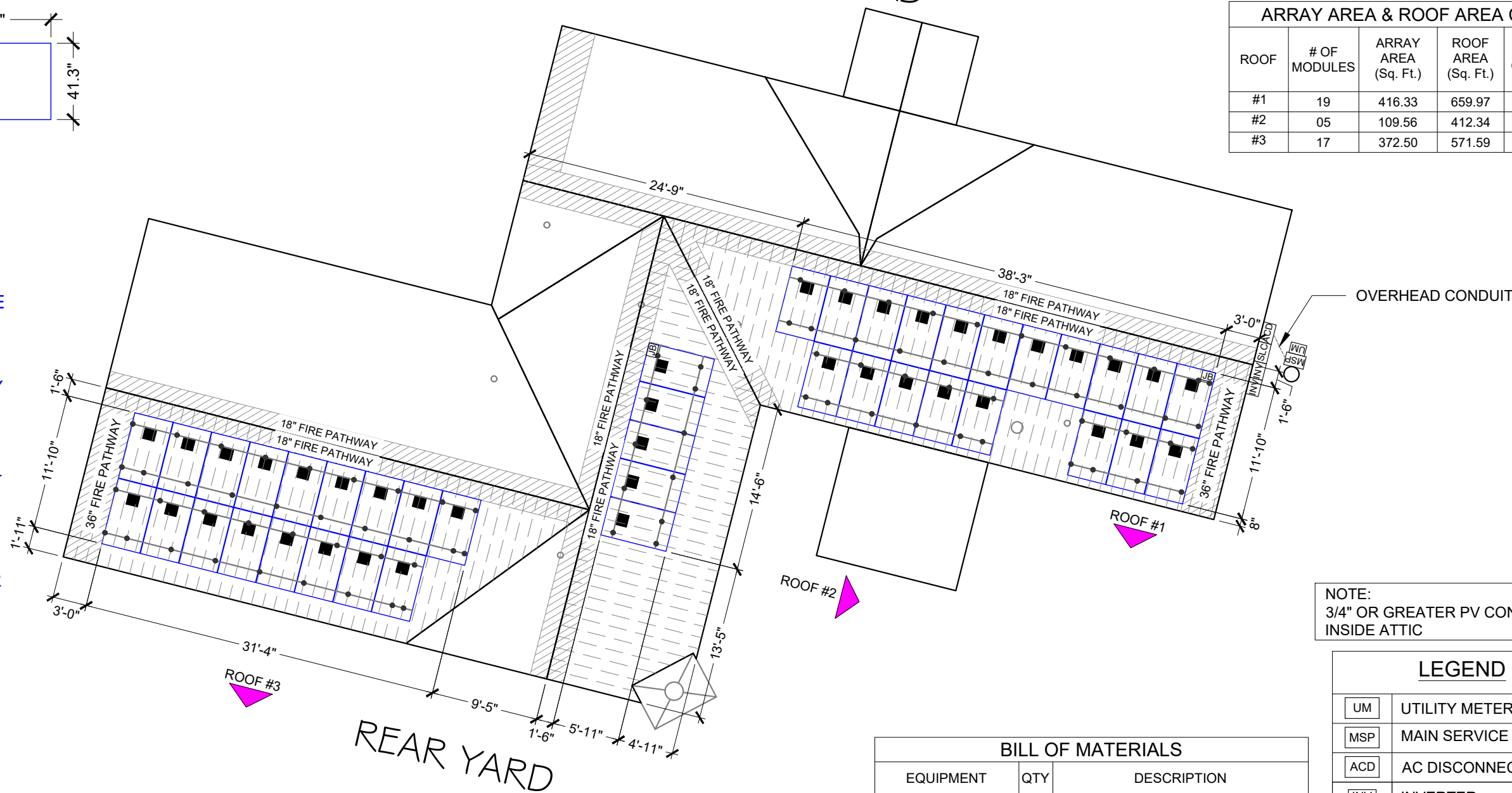
MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 41 MODULES
 MODULE TYPE = CANADIAN SOLAR CS3N-390MS (390W) MODULES
 MODULE WEIGHT = 51.6 LBS / 23.5 KG.
 MODULE DIMENSIONS = 76.4" X 41.3" = 21.91 SF
 UNIT WEIGHT OF ARRAY = 2.35 PSF

PHOTOVOLTAIC MODULES
 CANADIAN SOLAR CS3N-390MS (390W)

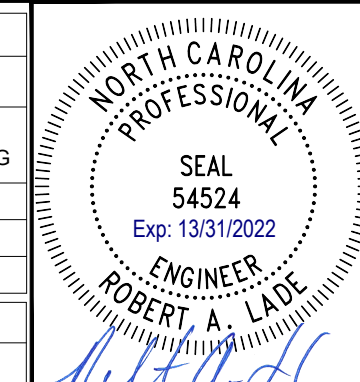


NOTE TO INSTALLERS:
 VERIFY THE ROOF FRAMING INFO BEFORE INSTALLATION AND NOTIFY THE EOR AT 951.405.1733 IF THERE IS ANY INCONSISTENCY BETWEEN SITE VERIFICATION AND FOLLOWING: 2x4 RAFTERS @ 24" OC SPACING WITH MAX UNSUPPORTED SPAN EQUAL OR LESS THAN 10 FT.



ROOF DESCRIPTION						
ROOF TYPE				METAL ROOF		
ROOF	# OF MODULES	ROOF TILT	AZIMUTH	RAFTERS SIZE	RAFTERS SPACING	SEAM SPACING
#1	19	22°	194°	2"x4"	24" O.C.	12"
#2	05	22°	104°	2"x4"	24" O.C.	12"
#3	17	22°	194°	2"x4"	24" O.C.	12"

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	19	416.33	659.97	63.08
#2	05	109.56	412.34	26.57
#3	17	372.50	571.59	65.17



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NOTE:
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LEGEND	
UM	UTILITY METER
MSP	MAIN SERVICE PANEL
ACD	AC DISCONNECT
INV	INVERTER
JB	JUNCTION BOX
SLC	SOLAR LOAD CENTER
—	RAIL
▨	FIRE SETBACK
■	OPTIMIZER
●	ROOF ATTACHMENT @ 48" O.C.
○	VENT, ATTIC FAN (ROOF OBSTRUCTION)
⊞	CHIMNEY
—	RAFTERS

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
RAIL	22	UNIRAC SM LIGHT RAIL 168" MILL
SPLICE	16	BND SPLICE BAR PRO SERIES MILL
MID CLAMP	70	UNIVERSAL AF MID CLAMPS
END CLAMP	24	UNIVERSAL AF END CLAMPS
ATTACHMENT	88	S-5! PROTEA BRACKET ATTACHMENTS
GROUNDING LUG	06	GROUND LUG

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

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

NOTE: APPROVED ROOF ATTACHMENT OPTIONS INDICATED ON PV-3 & PV-3.1 ATTACHMENT DETAILS PAGE(S)

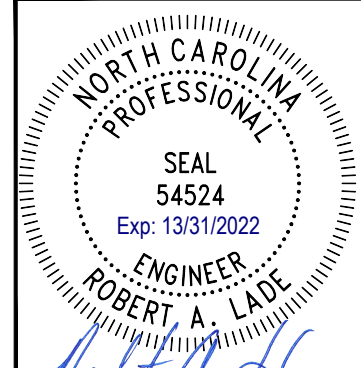
ARRAY AREA & ROOF AREA CALC'S		
AREA OF NEW ARRAY (Sq. Ft.)	AREA OF ROOF (PLAN VIEW) (Sq. Ft.)	TOTAL ROOF AREA COVERED BY ARRAY %
898.39	3705.27	24.25%
24%	ROOF AREA (ARRAY >33% OF ROOF AREA)	

1 ROOF PLAN WITH MODULES
 SCALE: 3/32" = 1'-0"

SHEET NAME
ROOF PLAN WITH MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2



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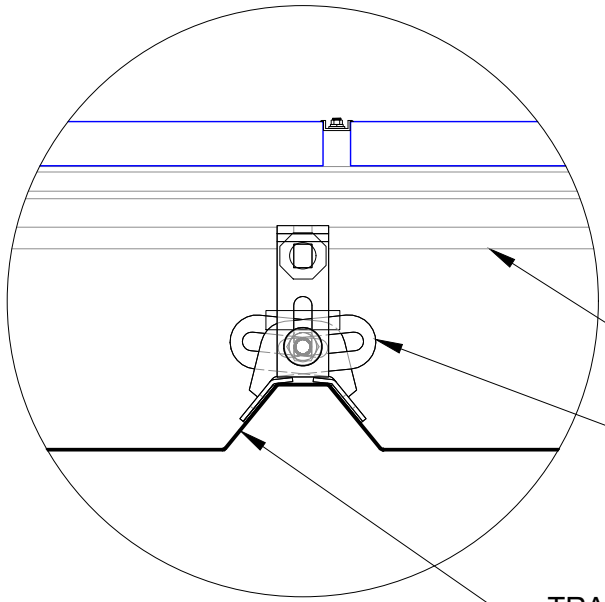
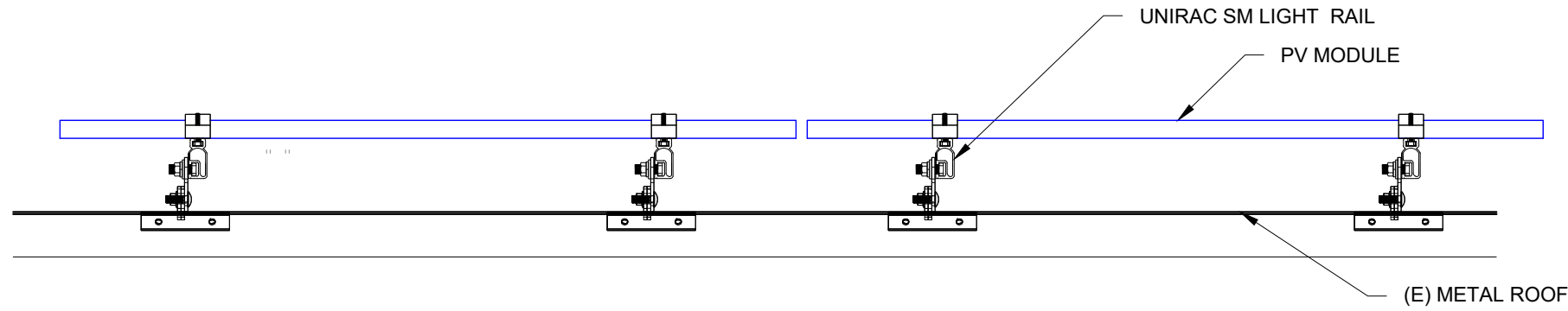
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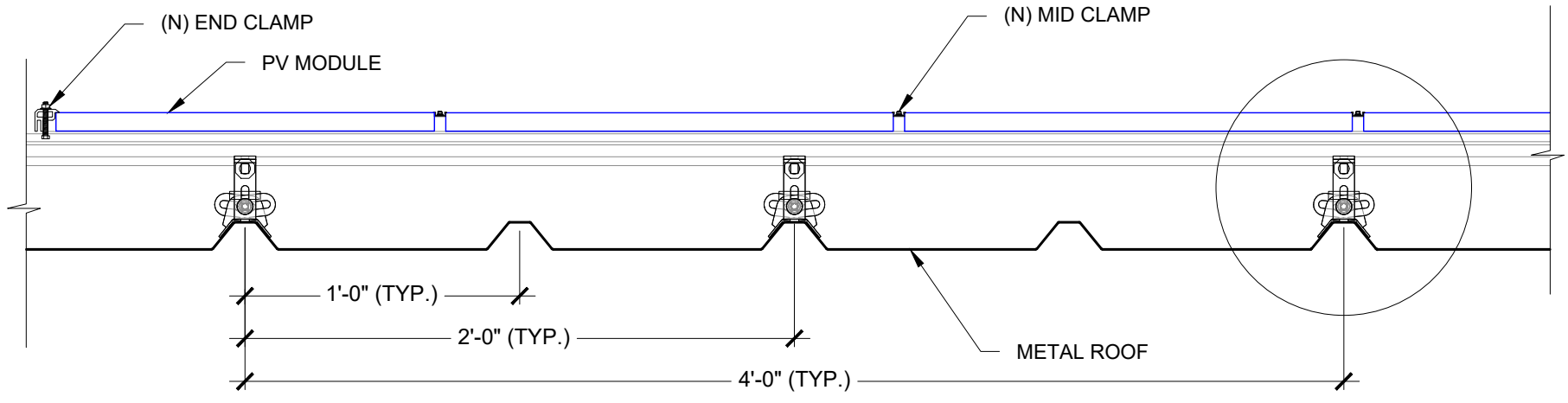
SHEET NAME
**ATTACHMENT
 DETAIL**

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

SHEET NUMBER
PV-3



ENLARGE DETAIL



SOLAR MODULE SPECIFICATIONS

MANUFACTURER / MODEL #	VMP	IMP	VOC	ISC	TEMPERATURE COEFFICIENT OF Voc	# OF MODULES
CANADIAN SOLAR CS3N-390MS (390W)	36.8	10.60	44.1	11.38	-0.26%/°C	41
MODULE DIMENSION	76.4" L x 41.3" W x 1.38" D					

AMBIENT TEMPERATURE SPECIFICATIONS

RECORD LOW TEMP	AMBIENT TEMP (HIGH TEMP 2%)	CONDUIT HEIGHT	CONDUCTOR TEMPERATURE RATE (ON ROOF)	CONDUCTOR TEMPERATURE RATE (OFF ROOF)
-12°	34°	IN ATTIC	90°	75°

INVERTER SPECIFICATIONS

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

INVERTER SPECIFICATIONS

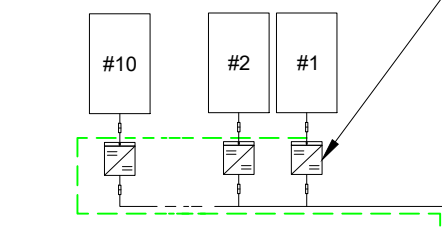
MANUFACTURER / MODEL #	QUANTITY	NOMINAL OUTPUT VOLTAGE	NOMINAL OUTPUT CURRENT
SOLAREEDGE SE3000H-US	01	240 VAC	12.5A

SYSTEM SIZE:- 41 x 390W = 15.99 kWDC
SYSTEM SIZE:- 13.000 kWAC

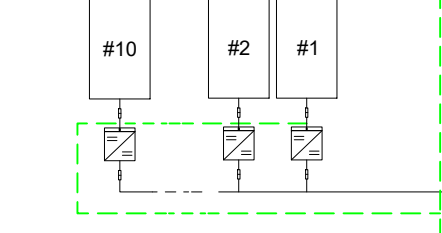
SOLAREEDGE POWER OPTIMIZER S440
RATED DC INPUT POWER - 440 WATTS
MAXIMUM INPUT VOLTAGE - 60 VDC
MPPT RANGE - 8 TO 60 VDC
MAXIMUM INPUT CURRENT - 14.50 ADC
MAXIMUM OUTPUT CURRENT - 15 ADC STRING
LIMITATIONS - 8 TO 25 OPTIMIZERS,
5700 WATTS STC PER STRING MAXIMUM
SOLAREEDGE OPTIMIZERS HAVE INTEGRATED
RAPID SHUT DOWN

INTERCONNECTION
120% RULE - NEC 705.12(B)(2)(3)(b)
UTILITY FEED + SOLAR BACKFEED
150A + 70A = 220A
BUSS RATING x 120%
200A x 120% = 240A

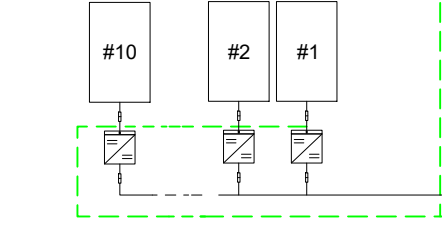
10 MODULES CONNECTED IN STRING #1



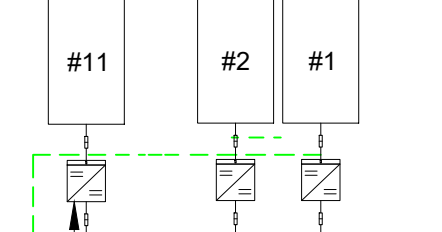
10 MODULES CONNECTED IN STRING #2



10 MODULES CONNECTED IN STRING #3

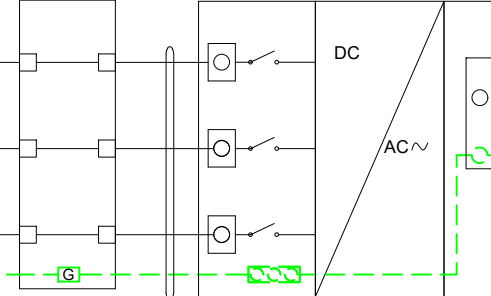


11 MODULES CONNECTED IN STRING #4

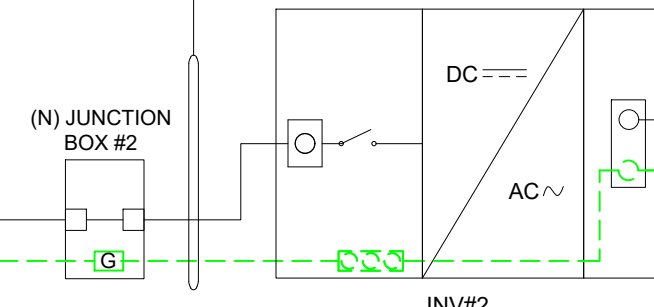


SOLAREEDGE POWER OPTIMIZER S440
RATED DC INPUT POWER - 440 WATTS
MAXIMUM INPUT VOLTAGE - 60 VDC
MPPT RANGE - 8 TO 60 VDC
MAXIMUM INPUT CURRENT - 14.50 ADC
MAXIMUM OUTPUT CURRENT - 15 ADC STRING
LIMITATIONS - 8 TO 25 OPTIMIZERS,
5700 WATTS STC PER STRING MAXIMUM
SOLAREEDGE OPTIMIZERS HAVE INTEGRATED
RAPID SHUT DOWN

(N) SOLAREEDGE SE10000H-US (240V)
OUTPUT: 240 VAC, 42.0A
99% CEC WEIGHTED EFFICIENCY
NEMA 3R, UL LISTED, INTERNAL GFDI
WITH INTEGRATED DC DISCONNECT



(N) SOLAREEDGE SE3000H-US (240V)
OUTPUT: 240 VAC, 12.5A
99% CEC WEIGHTED EFFICIENCY
NEMA 3R, UL LISTED, INTERNAL GFDI
WITH INTEGRATED DC DISCONNECT



DERATE: (E) 200A MAIN BREAKER TO BE DERATED TO (N) 150A TO ALLOW BACKFEED OF 70A

SERVICE INFO.
UTILITY PROVIDER: SOUTH RIVER EMC
MAIN SERVICE VOLTAGE: 240V
MAIN PANEL BRAND: N/A
MAIN SERVICE PANEL: (E) 200A
MAIN CIRCUIT BREAKER RATING: (N) 150A
MAIN SERVICE LOCATION: NORTH
SERVICE FEED SOURCE: OVERHEAD

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	6	10 AWG	PV WIRE	90°C	40	0.91	0.80	29.12	15.0	15.0	06 AWG	BARE CU GND
A1	OPEN AIR	2	10 AWG	PV WIRE	90°C	40	0.91	1.0	36.40	15.0	15.0	06 AWG	BARE CU GND
B	3/4" EMT	6	10 AWG	THWN-2	90°C	40	0.91	0.80	29.12	15.0	15.0	10 AWG	THWN-2
B1	3/4" EMT	2	10 AWG	THWN-2	90°C	40	0.91	1.0	36.40	15.0	15.0	10 AWG	THWN-2
C	3/4" EMT	3	6 AWG	THWN	75°C	65	0.88	1.0	57.20	42.0	42.0	10 AWG	THWN
D	3/4" EMT	3	10 AWG	THWN	75°C	35	0.88	1.0	30.80	12.5	12.5	10 AWG	THWN
E	1" EMT	3	4 AWG	THWN	75°C	85	0.88	1.0	74.80	(12.5+42.0)	54.50	8 AWG	THWN



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AHJ: HARNETT COUNTY

SHEET NAME
ELECTRICAL LINE DIAGRAM WITH CALCULATIONS
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

RESIDENTIAL LOAD CALCULATION FOR EXISTING DWELLINGS			
2,232	SQ. FT. X 3 VA (*includes 15A 1-pole breakers)	6696	VA
6	SMALL APPLIANCE BRANCH CIRCUITS (20A single pole breakers)	9000	VA
40	RANGE	7680	VA
30	DRYER	5760	VA
30	LOADS	5760	VA
30	WATER PUMP	5760	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
		0	VA
TOTAL LOAD GROSS (VA)		40656	TOTAL VA
FIRST 10,000VA, VA X 100%		10000	VA
REMAINDER ABOVE 10,000 VA X 40%		12262.4	VA
TOTAL LOAD NET (VA)		22262.4	VA
TOTAL LOAD (AMPS) (VA/240V)		92.8	AMPS
AIR CONDITIONING LOADS			
60	1-A/C MIN. CIRCUIT AMPS	11520	VA
	2-A/C MIN. CIRCUIT AMPS	0	VA
	3-A/C MIN. CIRCUIT AMPS	0	VA
	4-A/C MIN. CIRCUIT AMPS	0	VA
	HEAT PUMP MIN. CIRCUIT AMPS	0	VA
	AHU VA (Breaker Amps X Volts X 80%)	0	
TOTAL A/C LOAD (VA)		11520	TOTAL VA
TOTAL LOAD (AMPS) (VA/240V)		48	AMPS
TOTAL DEMAND (AMPS)		140.8	AMPS



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SHEET NAME
ELECTRICAL LOAD CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4.1

⚠ WARNING
ELECTRIC SHOCK HAZARD
 TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
 AC & DC DISCONNECT AND SUB PANEL
 (PER CODE: NEC 690.13(B))

⚠ 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
ELECTRIC SHOCK HAZARD
 IF GROUND FAULT IS INDICATED ALL NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

LABEL LOCATION:
 AC & DC DISCONNECT AND SUB PANEL
 (PER CODE: NEC 690.41(B))

⚠ WARNING DUAL POWER SOURCE
 SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
 MAIN SERVICE PANEL & NET METER
 (PER CODE: NEC 705.12(D)(3), NEC 705.12(B)(3-4) & NEC 690.59)

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

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

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

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

PHOTOVOLTAIC SYSTEM AC DISCONNECT
 RATED AC OPERATING CURRENT 54.5 AMPS
 AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
 AC DISCONNECT & INVERTER
 (PER CODE: NEC690.54)

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

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

WARNING:PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
 CONDUIT, COMBINER BOX
 (PER CODE: NEC 690.31(G)(3))

PHOTOVOLTAIC AC DISCONNECT

LABEL LOCATION:
 AC DISCONNECT
 NEC 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
 RAPID SHUTDOWN
 (PER CODE: NEC 690.56(C)(3))

⚠ CAUTION
 PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION:
 MSP
 (PER CODE: NEC 690.13 (F), NEC 705.12(B)(3-4) & NEC 690.59)

RATED MAXIMUM POWER-POINT CURRENT (I_{mp}) 29.25 A
 RATED MAXIMUM POWER-POINT VOLTAGE (V_{mp}) 400 V
 MAXIMUM SYSTEM VOLTAGE (VOC) 480 V
 MAXIMUM CIRCUIT CURRENT (I_{sc}) 45 A

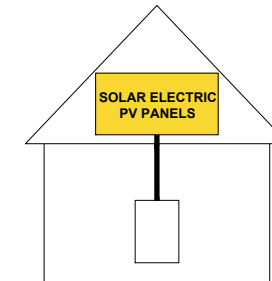
LABEL LOCATION:
 DC DISCONNECT, INVERTER
 (PER CODE: NEC690.53)

RATED MAXIMUM POWER-POINT CURRENT (I_{mp}) 11.29 A
 RATED MAXIMUM POWER-POINT VOLTAGE (V_{mp}) 380 V
 MAXIMUM SYSTEM VOLTAGE (VOC) 480 V
 MAXIMUM CIRCUIT CURRENT (I_{sc}) 15 A

LABEL LOCATION:
 DC DISCONNECT, INVERTER
 (PER CODE: NEC 690.53)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL LOCATION:
 AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION
 (PER CODE: 605.11.3.1(1) & 690.56(C)(1)(a))

CAUTION !

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN

(N) PV MODULES
 (N) INVERTERS
 (N) SOLAR LOAD CENTER
 (N) 100A NON-FUSED AC DISCONNECT
 (E) UTILITY METER
 (E) 200A MAIN SERVICE PANEL WITH (N) 150A MAIN BREAKER

248 MOORE UNION CHURCH RD



DEL MAR, CA 92014, USA

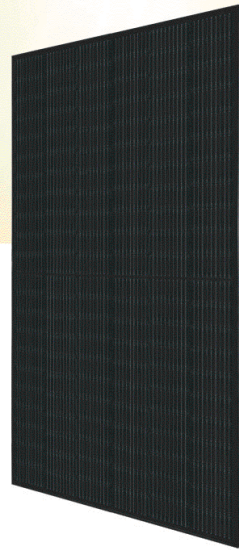
VERSION		
DESCRIPTION	DATE	REV
INITIAL RELEASE	11/10/2022	UR

PROJECT NAME
 GILBERTO HOLGUIN
 248 MOORE UNION CHURCH RD,
 BROADWAY, NC 27505 USA
 APN# 130600 0094 01
 UTILITY: SOUTH RIVER EMC
 AHJ: HARNETT COUNTY

SHEET NAME
 WARNING LABELS & PLACARD

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-5



HiKuBlack Mono PERC

BLACK FRAME ON BLACK BACKSHEET

F23 Frame

380 W ~ 410 W
CS3N-380 | 385 | 390 | 395 | 400 | 405 | 410MS

MORE POWER

410 W
Module power up to 410 W
Module efficiency up to 20.2 %

\$
Lower LCOE & BOS cost

Bar Chart
Comprehensive LID / LeTID mitigation technology, up to 50% lower degradation

+
Better shading tolerance

MORE RELIABLE

Shield
Minimizes micro-crack impacts

Heavy snow load up to 8100 Pa, enhanced wind load up to 6000 Pa*

25 Years Industry Leading Product Warranty on Materials and Workmanship*

25 Years Linear Power Performance Warranty*

1st year power degradation no more than 2%
Subsequent annual power degradation no more than 0.55%

*Subject to the terms and conditions contained in the applicable Canadian Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on residential rooftops in certain regions.

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



* 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.

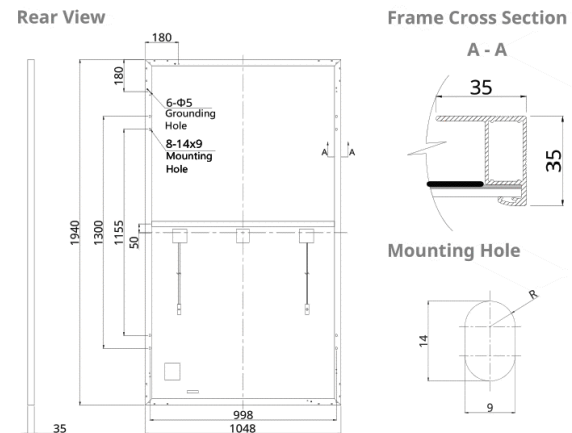
CSI SOLAR (USA) CO., LTD. is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 20 years, it has successfully delivered over 63 GW of premium-quality solar modules across the world.

* For detailed information, please refer to Installation Manual.

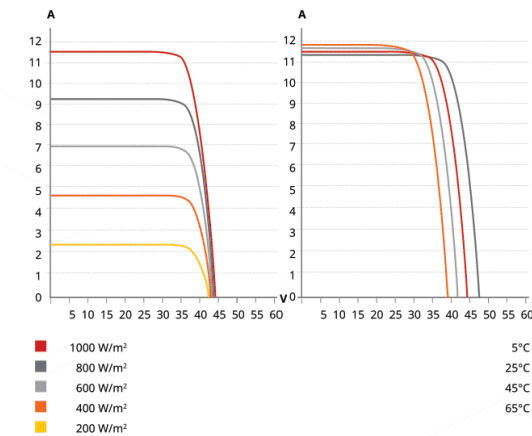
CSI SOLAR (USA) CO., LTD.

1350 Treat Blvd. Suite 500, Walnut Creek, CA 94598, USA | www.csisolar.com/na | service.ca@csisolar.com

ENGINEERING DRAWING (mm)



CS3N-400MS / I-V CURVES



ELECTRICAL DATA | STC*

CS3N	380MS	385MS	390MS	395MS	400MS	405MS	410MS
Nominal Max. Power (Pmax)	380 W	385 W	390 W	395 W	400 W	405 W	410 W
Opt. Operating Voltage (Vmp)	36.4 V	36.6 V	36.8 V	37.0 V	37.2 V	37.4 V	37.6 V
Opt. Operating Current (Imp)	10.44 A	10.52 A	10.60 A	10.68 A	10.76 A	10.83 A	10.92 A
Open Circuit Voltage (Voc)	43.7 V	43.9 V	44.1 V	44.3 V	44.5 V	44.7 V	44.9 V
Short Circuit Current (Isc)	11.26 A	11.32 A	11.38 A	11.44 A	11.50 A	11.56 A	11.62 A
Module Efficiency	18.7%	18.9%	19.2%	19.4%	19.7%	19.9%	20.2%
Operating Temperature	-40°C ~ +85°C						
Max. System Voltage	1000V (UL)						
Module Fire Performance	TYPE 2 (UL 61730 1000V)						
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	405MS	410MS
Nominal Max. Power (Pmax)	284 W	288 W	291 W	295 W	299 W	303 W	306 W
Opt. Operating Voltage (Vmp)	34.0 V	34.2 V	34.4 V	34.6 V	34.7 V	34.9 V	35.1 V
Opt. Operating Current (Imp)	8.35 A	8.42 A	8.48 A	8.54 A	8.60 A	8.66 A	8.73 A
Open Circuit Voltage (Voc)	41.2 V	41.4 V	41.6 V	41.8 V	41.9 V	42.1 V	42.3 V
Short Circuit Current (Isc)	9.08 A	9.13 A	9.18 A	9.23 A	9.28 A	9.33 A	9.37 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	23.4 kg (51.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-) (supply additional cable jumper: 2 lines/pallet); landscape: 1250 mm (49.2 in)*
Connector	T4 or MC4 series
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)	-0.34 % / °C
Temperature Coefficient (Voc)	-0.26 % / °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.

CSI SOLAR (USA) CO., LTD.

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DEL MAR, CA 92014, USA

VERSION

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INITIAL RELEASE	11/10/2022	UR

PROJECT NAME

GILBERTO HOLGUIN
248 MOORE UNION CHURCH RD,
BROADWAY, NC 27505 USA
APN# 130600 0094 01
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, NEC 2017 and NEC 2020 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	SE10000H-US	SE11400H-US
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4						
OUTPUT							
Rated AC Power Output	3000	3800 @ 240V / 3300 @ 208V	5000	6000 @ 240V / 5000 @ 208V	7600	10000	11400 @ 240V / 10000 @ 208V
Maximum AC Power Output	3000	3800 @ 240V / 3300 @ 208V	5000	6000 @ 240V / 5000 @ 208V	7600	10000	11400 @ 240V / 10000 @ 208V
AC Output Voltage Mn-Nom-Max (21 - 240 - 294)	✓	✓	✓	✓	✓	✓	✓
AC Output Voltage Mn-Nom-Max (180 - 208 - 229)	-	✓	-	✓	-	-	✓
AC Frequency (Nominal)	59.3 - 60 - 60.5 ⁽¹⁾						
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5
Power Factor	1, Adjustable -0.85 to 0.85						
GFDI Threshold	1						
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes						
INPUT							
Maximum DC Power @240V	4650	5800	7750	9300	11800	15500	17650
Maximum DC Power @208V	-	5100	-	7750	-	-	15500
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage	480						
Nominal DC Input Voltage	380						
Maximum Input Current @240V ⁽²⁾	8.5	13.5	13.5	16.5	20	27	30.5
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27
Max. Input Short Circuit Current	45						
Reverse Polarity Protection	Yes						
Ground-Fault Isolation Detection	600k Ω Sensitivity						
Maximum Inverter Efficiency	99				99.2		
CEC Weighted Efficiency				99			99 @ 240V / 98.5 @ 208V
Nighttime Power Consumption	< 2.5						

(1) For other regional settings please contact SolarEdge support.
(2) A higher current source may be used; the inverter will limit its input current to the value stated.

Single Phase Inverter with HD-Wave Technology for North America

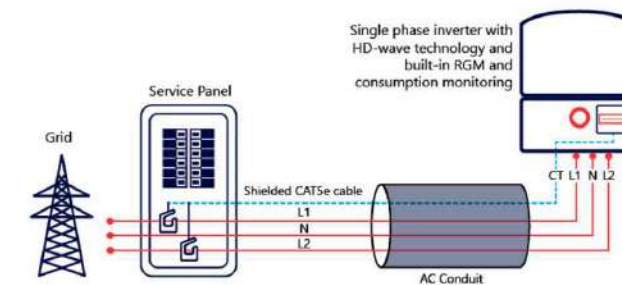
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS-485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ⁽¹⁾						
Consumption metering	Optional ⁽¹⁾						
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 16 (F)						
Emissions	FCC Part 15 Class B						
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum / 14-4 AWG		
DC Input Conduit Size / # of Strands / AWG Range	1" Maximum / 1-2 Strands / 14-6 AWG				1" Maximum / 1-3 Strands / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 451 x 370 x 174		26.2 / 11.9		21.3 x 14.6 x 7.3 / 540 x 370 x 185		n / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4		26.2 / 11.9		lb / kg
Noise	< 25				< 50		dBA
Cooling	Natural Convection						
Operating Temperature Range	-40 to +50 / -40 to +60 ⁽¹⁾						
Protection Rating	NEMA 4X Inverter with Safety Switch						

(1) Inverter with Revenue Grade Meter P/N: SE3000H-US028RNC4, Inverter with Revenue Grade Production and Consumption Meter P/N: SE3000H-US028RPA. For consumption metering, current transformers should be ordered separately: SEAC10150-208V-20 or SEAC10150-408V-20, 20 units per box. (4) Full power up to at least 10°C / 50°F; for power derating information refer to: <https://www.solaredge.com/sites/default/files/temperature-derating-note-no.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



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RoHS



DEL MAR, CA 92014, USA

VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	11/10/2022	UR

PROJECT NAME

GILBERTO HOLGUIN
248 MOORE UNION CHURCH RD,
BROADWAY, NC 27505 USA
APN# 130600 0094 01
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, S500B



POWER OPTIMIZER

Enabling PV power optimization at the module level

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

*Functionality subject to inverter model and firmware version

solaredge.com



Power Optimizer For Residential Installations

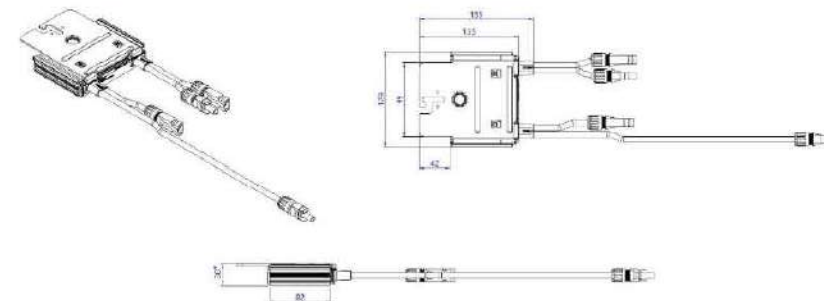
S440, S500, S500B

	S440	S500	S500B	UNIT
Rated Input DC Power ⁽¹⁾	440	500		W
Absolute Maximum Input Voltage (Voc)	60	125		Vdc
MPPT Operating Range	8 - 60	12.5 - 105		Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15		Adc
Maximum Efficiency		99.5		%
Weighted Efficiency		98.6		%
Overtolerance Category		II		
OUTPUT DURING OPERATION				
Maximum Output Current		15		Adc
Maximum Output Voltage	60		80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)				
Safety Output Voltage per Power Optimizer		1 +/- 0.1		Vdc
STANDARD COMPLIANCE				
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			
INSTALLATION SPECIFICATIONS				
Maximum Allowed System Voltage		1000		Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 155 x 45	mm
Weight (including cables)		655		gr
Input Connector	MC4 ⁽²⁾			
Input Wire Length	0.1			
Output Connector	MC4			
Output Wire Length	(+) 2.3, (-) 0.10			
Operating Temperature Range ⁽³⁾	-40 to +85			
Protection Rating	IP68			
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 power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for details.

PV System Design Using a SolarEdge Inverter ⁽⁴⁾	Single Phase HD-Wave	Three Phase SExxK-RWB	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500, S500B	8	9	16	18
Maximum String Length (Power Optimizers)		25	20		50
Maximum Continuous Power per String		5700	5625	11250	12750
Maximum Allowed Connected Power per String (Permitted only when the power difference between strings is less than 2,000W)		See ⁽⁵⁾	See ⁽⁵⁾	13500	15000
Parallel Strings of Different Lengths or Orientations				Yes	

(4) It is not allowed to mix S-series and P-series Power Optimizers in new installations.
 (5) If the inverter's rated AC power < maximum nominal power per string, then the maximum power per string will be able to reach up to the inverter's maximum input DC power. Refer to <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>.



*45 mm for S500B.

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CE RoHS



DEL MAR, CA 92014, USA

VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	11/10/2022	UR

PROJECT NAME

GILBERTO HOLGUIN
 248 MOORE UNION CHURCH RD,
 BROADWAY, NC 27505 USA
 APN# 130600 0094 01
 UTILITY: SOUTH RIVER EMC
 AHJ: HARNETT COUNTY

SHEET NAME

SPEC SHEETS

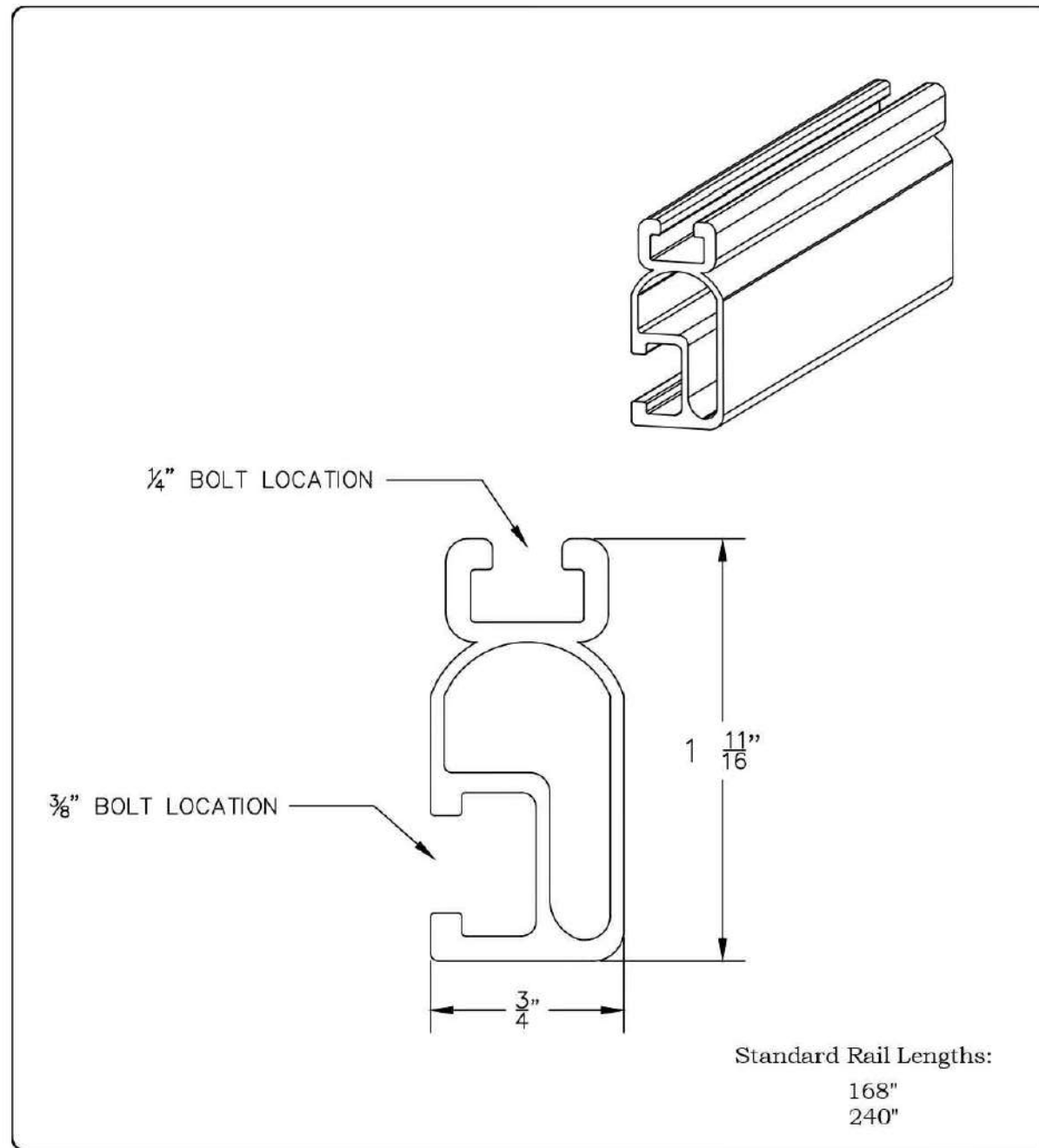
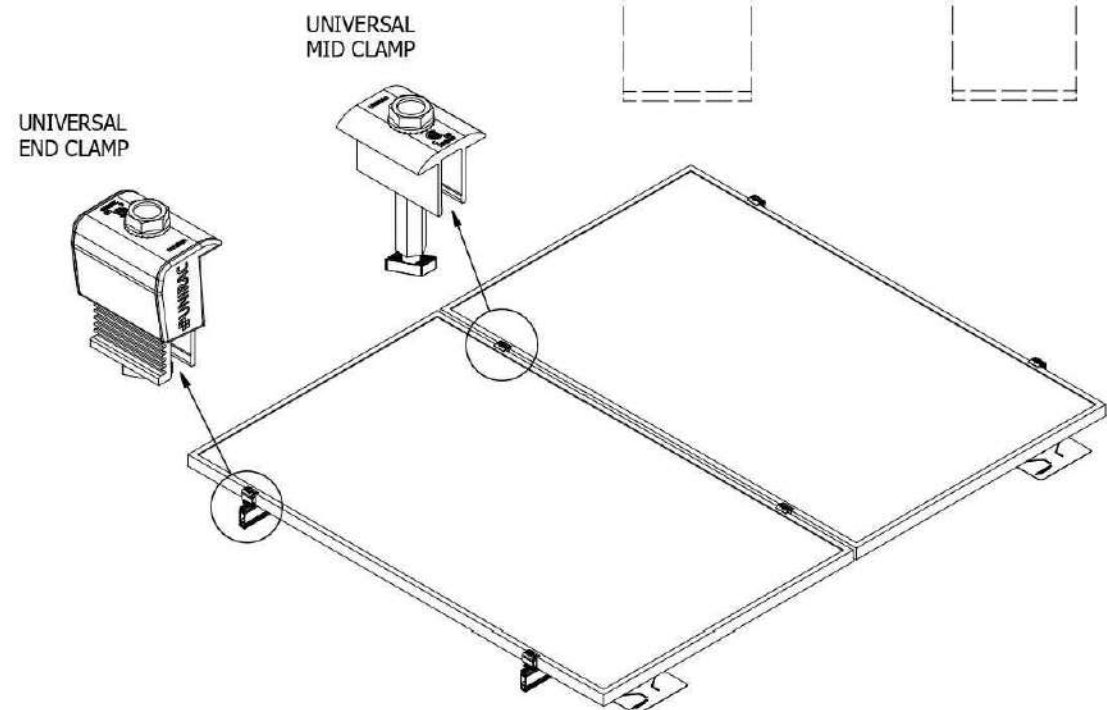
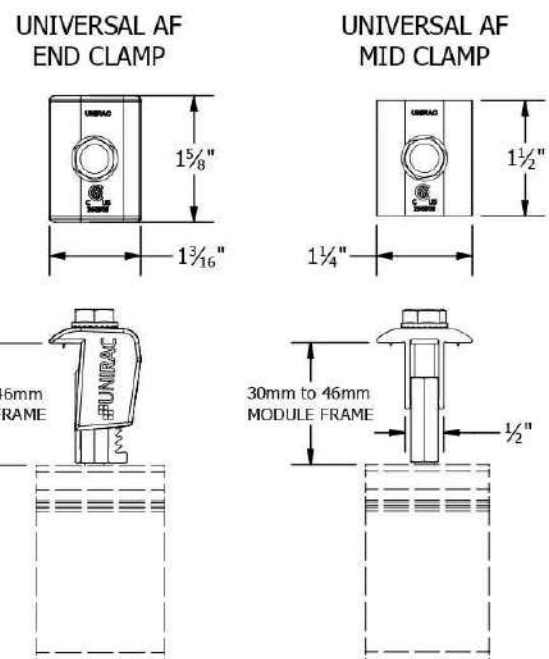
SHEET SIZE

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



UNIRAC
 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

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

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	October 2016

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		
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 248 MOORE UNION CHURCH RD,
 BROADWAY, NC 27505 USA
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 AHJ: HARNETT COUNTY

SHEET NAME
 SPEC SHEETS

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-9

S-5![®]

The Right Way![™]

NEW

**NOW AVAILABLE
IN ALUMINUM**

ProteaBracket[™]

ProteaBracket[™]

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket[™] is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot[™]
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT[™]

*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

*See www.S-5.com for details.

The right way to attach solar PV to trapezoidal roof profiles!

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

S-5![®]
The Right Way![™]

ProteaBracket[™] is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

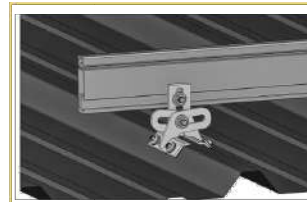
ProteaBracket[™] is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

For design assistance, ask your distributor, or visit www.S-5.com for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5![®] holding strength is unmatched in the industry.

Multiple Attachment Options:



**Side
Mount Rail**



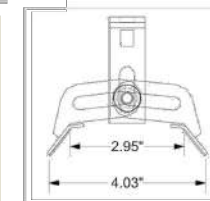
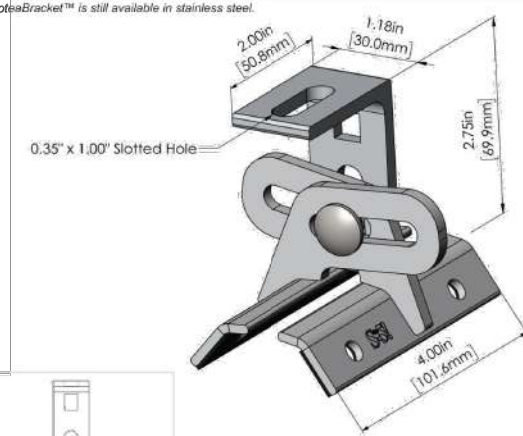
**Bottom
Mount Rail**



**w/ S-5!
PVKIT[™]
(rail-less)**

ProteaBracket[™]

ProteaBracket[™] is still available in stainless steel.



**ProteaBracket fits profiles
up to 3 inches**

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. (2) Peel off adhesive release paper. (3) Align and mount bracket directly onto crown of panel. (4) Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket[™] and the S-5! PVKIT[™] 2.0 mounted on a trapezoidal roof profile

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

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

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Distributed by



DEL MAR, CA 92014, USA

VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	11/10/2022	UR

PROJECT NAME

GILBERTO HOLGUIN
248 MOORE UNION CHURCH RD,
BROADWAY, NC 27505 USA
APN# 130600 0094 01
UTILITY: SOUTH RIVER EMC
AHJ: HARNETT COUNTY

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-10

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 UL2703. SOLARMOUNT has achieved system level performance for steep sloped roofs. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes > 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, and Mitigation Requirements are listed below:

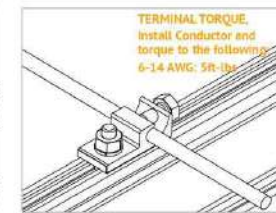
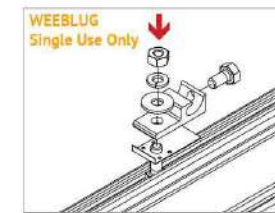
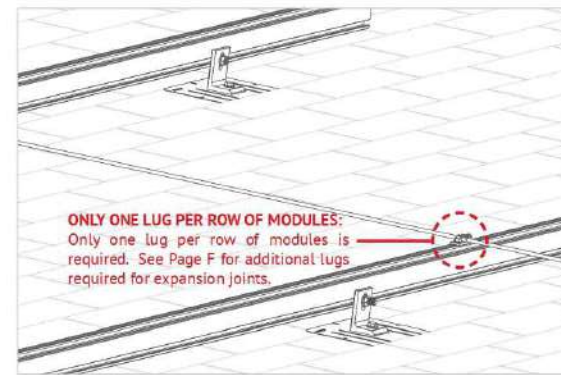
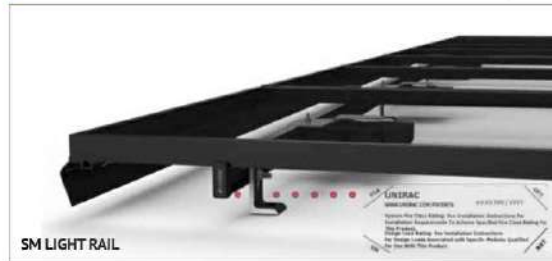
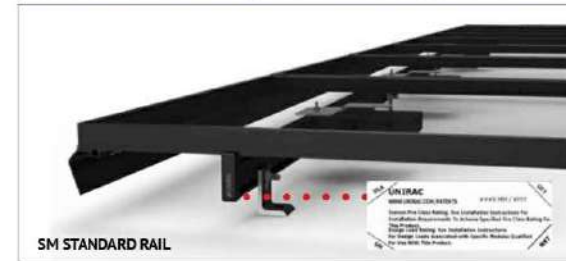
Rail Type	Module Fire Types	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard & HD Rails	1, 2, 3 with Metal Frame, 10 with Metal Frame, 19, 22, 25, 29, & 30	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	1 & 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Standard, Light, & HD Rails	4 & 5	Class A, Class B & Class C	East-West	Landscape OR Portrait	Trim Installation per Solar Mount Installation Guide

This racking system may be used to ground and/or mount a PV module complying with UL1703 or UL61730 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.

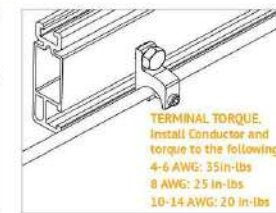
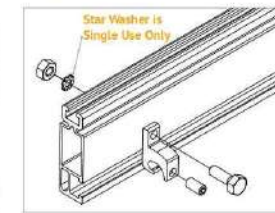
Note: The sticker label should be placed such that it is visible, but not outward facing.



GROUNDING LUG MOUNTING DETAILS:
Details are provided for both the WEEB and IlSCO products. The WEEBLug has a grounding symbol located on the lug assembly. The IlSCO lug has a green colored set screw for grounding indication purposes. Installation must be in accordance with NFPA NEC 70, however the electrical designer of record should refer to the latest revision of NEC for actual grounding conductor cable size.
Required if not using approved integrated grounding microinverters

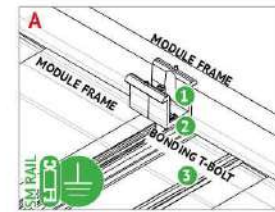
GROUNDING LUG - BOLT SIZE & DRILL SIZE		
GROUND LUG	BOLT SIZE	DRILL SIZE
WEEBLug	1/4"	N/A - Place In Top SM Rail Slot
ILSCO Lug	#10-32	7/32"

- Torque value depends on conductor size.
- See product data sheet for torque value.



ILSCO LAY-IN LUG CONDUCTOR - UNIRAC P/N 008009P: Alternate Grounding Lug - Drill, deburr hole and bolt thru both rail walls per table.
TORQUE VALUE 5 ft lbs. (See Note on PG. A)
See ILSCO product data sheet for more details, Model No. GBL-4DBT.

NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION

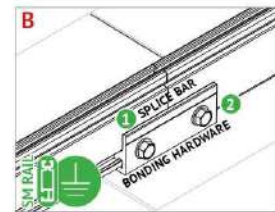


BONDING MIDCLAMP ASSEMBLY

- Aluminum mid clamp with stainless steel bonding pins that pierce module frame anodization to bond module to module through clamp
- Stainless steel nut bonds aluminum clamp to stainless steel T-bolt
- Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, clamp, and modules to SM rail.

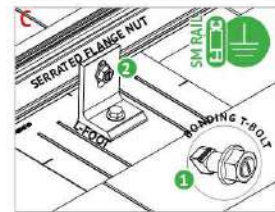


BONDING MIDCLAMP ASSEMBLY



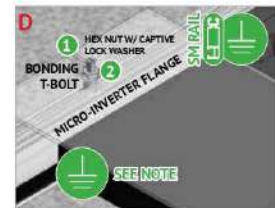
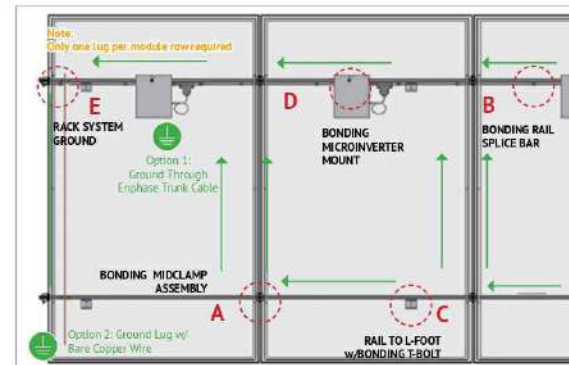
BONDING RAIL SPLICE BAR

- 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.



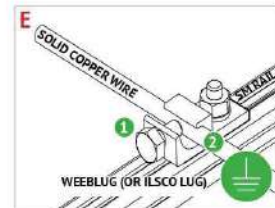
RAIL TO L-FOOT w/BONDING T-BOLT

- 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.



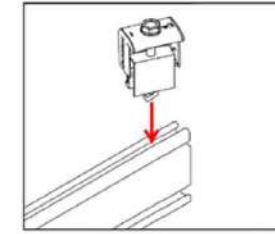
BONDING MICROINVERTER MOUNT

- 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.

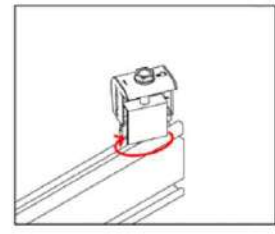


RACK SYSTEM GROUND

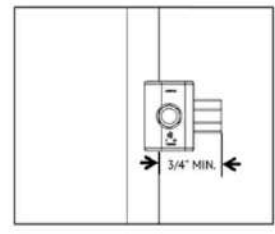
- WEEB washer dimples pierce anodized rail to create bond between rail and lug
- Solid copper wire connected to lug is routed to provide final system ground connection. NOTE: Size lugs can also be used when secured to the side of the rail. See page K for details.



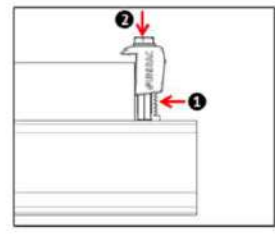
1. Position clamp to align T-bolt with rail slot. Lower clamp and insert T-bolt into rail slot.



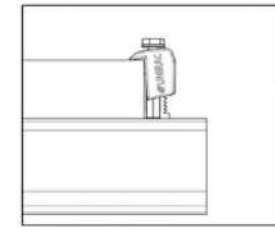
2. Rotate clamp clockwise 2/3 of a turn to engage T-bolt inside rail slot.



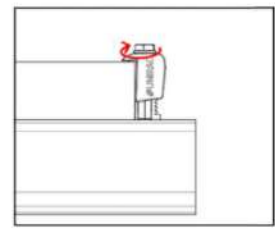
3. Place module at least 3/4" from end of rail and position clamp against module frame.



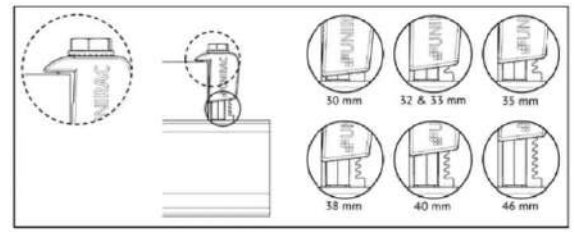
4. While applying pressure to hold the clamp against the module, push down on the module side of the clamp cap.



5. When the cap contacts the module frame, release and it will re-engage to the clamp base.



6. Tighten bolt and torque to 15 ft-lbs.



7. Confirm clamp is engaged in correct module height position and that the top of the cap is sitting level with the module frame.

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.



DEL MAR, CA 92014, USA

VERSION		
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BROADWAY, NC 27505 USA
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UTILITY: SOUTH RIVER EMC
AHJ: HARNETT COUNTY

SHEET NAME
SPEC SHEETS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11



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



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			Hyundai	KG, MG, RV, TG, RI, RG, TI, KI, HI Series HIA-SxxxHG, HID-SxxxRG(BK), HIS-S400PI
Aleo	P-Series & S-Series	Canadian Solar (cont.)	CSSA-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	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	Centrosolar America	C-Series & E-Series	Japan Solar	JPS-60 & JPS-72 Series
Astronergy	CHSM6612 M, M/MV CHSM6612P Series CHSM6612P/AV Series CHSM72M-HC CHSM72M(DG)/F-BH	Certainfeed	CT2xxxMxx-01, CT2xxxPxx-01, CTxxxMxx-01 CTxxxPxx-01, CTxxxMxx-02, CTxxxMxx-03 CTxxxMxx-04, CTxxxHC11-04	JA Solar	JAM72D30MB, JAM78D10MB JAP6 60-xxx JAM6(0)-60/xxx, JAP6(0)-72-xxx/4BB JAP72S#-xxx/** JAP6(0)-60-xxx/4BB, JAP60S#-xxx/** JAM6(0)-72-xxx/**, JAM72S#-xxx/** JAM6(0)-60-xxx/**, JAM60S#-xxx/** i.#: 01, 02, 03, 09, 10 IL **: SC, PR, BP, HIT, IB, MW, MR ** - Backsheet, # Cell technology
Auxin	AXN6M10T AXN6P610T AXN6M12T AXN6P612T	Eco Solargy	Orion 1000 & Apollo 1000	Jinko	JKM & JKMS Series JKMxxxM-72HL-V JKMxxxM-72HL4-(T)V JKMxxxM-7RL3-V
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)	ET Solar	ET AC Module, ET Module	Kyocera	KD-F & KU Series
Boviet	BVM6610, BVM6612	First Solar	FS-6XXX(A) FS-6XXX(A)-P, FS-6XXX(A)-P-1	LA Solar	LSxxxHC(166)
BYD	P6K & MHK-36 Series	Flextronics	FXS-xxxBB		
Canadian Solar	CS1(H/K/U/V)-MS CS3K-(M)B/AG/MS/P/P HE/PB-AG) CS3L-(M)S/P) CS3N-MS CS3U-(M)B/MB-AG/MS/P/P HE/PB/PB-AG) CS3W-(M)S/P/P-PB-AG)	FreeVolt	PVGrat	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-B6 LGxxxN1K-B6 LGxxx(N1C/N1K/N2T/N2W)-E6 LGxxx(N1C/N1K/N2W/S1C/S2W)-G4
		GCL	GCL-P6 & GCL-M6 Series		
		Hanwha SolarOne	HSL 60		
		Hansol	TD-AN3, TD-AN4 UB-AN1, UD-AN1		
		Helene	36M, 36P 60M, 60P, 72M & 72P Series 144HC M6		
		HT Solar	HT72-156(M/P) HT72-156P-C, HT72-156P(V)-C HT72-156(M/PD)-BF, HT72-156(M/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

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BROADWAY, NC 27505 USA
APN# 130600 0094 01
UTILITY: SOUTH RIVER EMC
AHJ: HARNETT COUNTY

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-12

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



Certificate of Compliance

Certificate: 70131735 Master Contract: 266909
 Project: 80128750 Date Issued: 2022-06-08
 Issued To: Unirac
 1411 Broadway NE
 Albuquerque, New Mexico, 87102
 United States

Attention: Rob D'Anastasio

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Michael Hoffnagle
 Michael Hoffnagle



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



Certificate: 70131735
 Project: 80128750

Master Contract: 266909
 Date Issued: 2022-06-08

Models:	SM	-	SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations.
	ULA	-	Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.

Solarmount

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless-steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3 (with metallic frame), 4 (with trim), 5 (with trim), 10(with metallic frame), 19, 22, 25, 29, or 30 for steep slope. Tested at 5" interstitial gap which allows installation at any stand-off height.

The grounding of the system is intended to comply with the latest edition of the National Electrical Code, to include NEC 250 & 690. Local codes compliance is required, in addition to national codes. All grounding/bonding connections are to be torqued in accordance with the Installation Manual and the settings used during the certification testing for the current edition of the project report.

The system may employ optimizers/micro-inverters and used for grounding when installed per installation instructions.

UL 2703 Mechanical Load ratings:

Downward Design Load (lb/ft ²)	113.5
Upward Design Load (lb/ft ²)	50.7
Down-Slope Load (lb/ft ²)	16.13

Test Loads:

Downward Load (lb/ft ²)	170.20
Upward Load (lb/ft ²)	76.07
Down-Slope Load (lb/ft ²)	24.2



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 APN# 130600 0094 01
 UTILITY: SOUTH RIVER EMC
 AHJ: HARNETT COUNTY

SHEET NAME
 SPEC SHEETS

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-13



March 28, 2022

Unirac
1411 Broadway Blvd. NE
Albuquerque, NM 87102

Attn.: Unirac - Engineering Department

Re: Engineering Certification for the Unirac U-Builder 2.0 SOLARMOUNT Flush Rail

PZSE, Inc. - Structural Engineers has reviewed the Unirac SOLARMOUNT rails, proprietary mounting system constructed from modular parts which is intended for rooftop installation of solar photovoltaic (PV) panels; and has reviewed the U-builder Online tool. This U-Builder software includes analysis for the SOLARMOUNT LIGHT rail, SOLARMOUNT STANDARD rail, and SOLARMOUNT HEAVY DUTY rail with Standard and Pro Series hardware. All information, data and analysis contained within are based on, and comply with the following codes and typical specifications:

1. Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-05 and ASCE/SEI 7-10
2. 2006-2015 International Building Code, by International Code Council, Inc.
3. 2006-2015 International Residential Code, by International Code Council, Inc.
4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.
5. 2015 Aluminum Design Manual, by The Aluminum Association, 2015

Following are typical specifications to meet the above code requirements:

Design Criteria: Ground Snow Load = 0 - 100 (psf)
Basic Wind Speed = 85 - 190 (mph)
Roof Mean Height = 0 - 60 (ft)
Roof Pitch = 0 - 45 (degrees)
Exposure Category = B, C & D

Attachment Spacing: Per U-builder Engineering report.

Cantilever: Maximum cantilever length is L/3, where "L" is the span noted in the U-Builder online tool.

Clearance: 2" to 10" clear from top of roof to top of PV panel.

Tolerance(s): 1.0" tolerance for any specified dimension in this report is allowed for installation.

Installation Orientation: See SOLARMOUNT Rail Flush Installation Guide.
Landscape - PV Panel long dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the long side.
Portrait - PV Panel short dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the short side.



Components and Cladding Roof Zones:

The Components and Cladding Roof Zones shall be determined based on ASCE 7-05 and ASCE 7-10 Component and Cladding design.

- Notes:
- 1) U-builder Online tool analysis is only for Unirac SM SOLARMOUNT Rail Flush systems only and do not include roof capacity check.
 - 2) Risk Category II per ASCE 7-10.
 - 3) Topographic factor, kzt is 1.0.
 - 4) Average parapet height is 0.0 ft.
 - 5) Wind speeds are LRFD values.
 - 6) Attachment spacing(s) apply to a seismic design category E or less.

Design Responsibility:

The U-Builder design software is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, this U-builder software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder software.

This letter certifies that the Unirac SM SOLARMOUNT Rails Flush, when installed according to the U-Builder engineering report and the manufacture specifications, is in compliance with the above codes and loading criteria.

This certification excludes evaluation of the following components:

- 1) The structure to support the loads imposed on the building by the array; including, but not limited to: strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the structure.
- 2) The attachment of the SM SOLARMOUNT Rails to the existing structure.
- 3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of the certification of this racking system.

If you have any questions on the above, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA

DIGITALLY SIGNED



03/28/2022



DEL MAR, CA 92014, USA

VERSION		
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INITIAL RELEASE	11/10/2022	UR

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SPEC SHEETS

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PV-14