

## PROJECT DESCRIPTION

THIS ROOF MOUNTED SOLAR PHOTOVOLTAIC (PV) SYSTEM SHALL BE INSTALLED AT THE SINGLE FAMILY RESIDENCE IN COLUMBUS , OH. THE ENERGY PRODUCED BY THIS PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A PV BREAKER IN THE MAIN PANEL. THIS SYSTEM DOES NOT INCLUDE STORAGE BATTERIES.

## NOTES

- 1) ALL DIMENSIONS SHALL BE FIELD VERIFIED BY INSTALLER PRIOR TO INITIATING CONSTRUCTION.
- 2) ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 3) ALL EQUIPMENT SHALL BE LISTED FOR ITS SPECIFIC APPLICATION BY UL OR EQUIVALENT AGENCY.
- 4) ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
- 5) ACCESS TO ELECTRICAL COMPONTS OVER 150 VOLTS-TO-GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
- 6) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 VOLTS AND 90 DEGREES C WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
- 7) UNSPECIFIED EQUIPMENT DIMENSIONS SHALL BE DETERMINED ACCORDING TO APPLICABLE CODES UPON INSTALLATION.
- 8) PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL PER THE MODULE MANUFACTURE'S LISTED INSTRUCTION SHEET.
- 9) PV MODULE RACKING RAIL SHALL BE BONDED TO BARE COPPER GEC VIA WEEB LUG OR EQUIVLENT LISTED EQUIPMENT.
- 10) GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED/WELDED.
- 11) ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN ACCESSIBLE LOCATIONS.
- 12) WORKING SPACE ARROUND ELECTRICAL EQUIPMENT SHALL COMPLY WITH 2017 NEC 110.26.

## SCOPE OF WORK

- ELECTRICAL EQUIPMENT
- (18) REC REC320NP (337 sq-ft)
  - (18) SOLAREEDGE P320 OPTIMIZERS
  - (1) SOLAREEDGE SE5000H-US INVERTER
  - (1) PV PRODUCTION METER
  - (1) INDR. AC DISCONNECT - FUSED
  - (1) EXT. AC DISCONNECT - FUSED

- MOUNTING AND RACKING
- (36) UNIRAC FLASH LOC
  - (12) UNIRAC END CLAMPS
  - (30) UNIRAC MID CLAMPS
  - (9) UNIRAC STANDARD RAIL (168 IN.)

## SITE SPECIFICATIONS

BUILDING DISCRIP: SINGLE FAMILY RESIDENCE  
 BUILDING TYPE: RESIDENTIAL  
 LANDSCAPE: SUBURBAN  
 UTILITY: AEP OHIO  
 AHJ:  
 OCCUPANCY CATEGORY: II  
 EXPOSURE CATEGORY: C  
 DESIGN WIND SPEED: 115 MPH (ASCE 7-10)  
 DESIGN SNOW LOAD: 20 PSF(ASCE 7-10)

## GOVERNING CODES

2017 NATIONAL ELECTRIC CODE  
 2017 OHIO BUILDING CODE  
 2014 OHIO FIRE CODE  
 2019 OHIO RESIDENTIAL CODE  
 UNDERWRITERS LABORATORIES (UL) STANDARDS  
 OSHA CFR 1910.272



762 W. UNION ST.  
 ATHENS, OH 45701  
 (740) 249-4533  
 www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
 227 NORTH ARDMORE RD  
 COLUMBUS , OH 43209

JOB NUMBER:  
 20-0003

PROJECT DETAILS:  
 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:



02/17/2020

SHEET TITLE:  
 COVER

SHEET NUMBER:  
 T1.0

SHEET SIZE:  
 ANSI B (17.00 X 11.00 INCHES)

### REVISIONS

Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT:  
 KATHRYN BIGLER

REVIEWED:

MARXEN, LEE  
 227 NORTH ARDMORE RD, COLUMBUS , OH 43209

18 REC 320 - 5.8 KWSTC

PROJECT MANAGER: ADAM BROWN

SOLAR CONSULTANT: JAMEY JONES

PHONE: 740-249-4533 ext. 134

SITE VISIT TECH: NICK BOLTON

EMAIL: jbrown@thirdsunsolar.com

DESIGN ENGINEER: KATHRYN BIGLER

651 W. GALENA PARK BLVD. STE. 101 DRAPER, UTAH 84020  
 PHONE (801) 990-1775  
 WWW.VECTORSE.COM

Firm License Number: 03392  
 VSE Project Number: U2513-0172-201

Vector Structural Engineering has reviewed the existing structure with loading from the solar array and lag screw connections to the existing framing. The design of the racking system, connections, and all other structure is by others. Mechanical, architectural, and all other nonstructural aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.

AERIAL MAP

ARRAY MAP

## SHEET INDEX

- T1.0 COVER
- A1.0 SITE PLAN
  - A1.1 PV LAYOUT-ROOF 1
- A2.0 MOUNTING & RACKING
  - E1.0 ELECTRICAL RISER
  - E2.0 ELECTRICAL CALCS
  - E3.0 SAFETY PLACARDS
- D1.0 PV MODULE DATASHEET
- D2.0 INVERTER DATASHEET
  - D2.1 OPTIMIZER DATASHEET
- D3.0 RACKING DATASHEET
- D4.0 GROUNDING DATASHEET



762 W. UNION ST.  
 ATHENS, OH 45701  
 (740) 249-4533  
 www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
 227 NORTH ARDMORE RD  
 COLUMBUS, OH 43209

JOB NUMBER:  
 20-0003

PROJECT DETAILS:  
 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE:  
 SITE PLAN

SHEET NUMBER:  
 A1.0

SHEET SIZE:  
 ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT:  
 KATHRYN BIGLER

REVIEWED:



ROOF SHOWN IN  
 PLANAR VIEW



(N) OPTIMIZERS MOUNTED  
 UNDER PV MODULES



02/17/2020

Firm License Number: 03392

VSE Project Number: U2513-0172-201

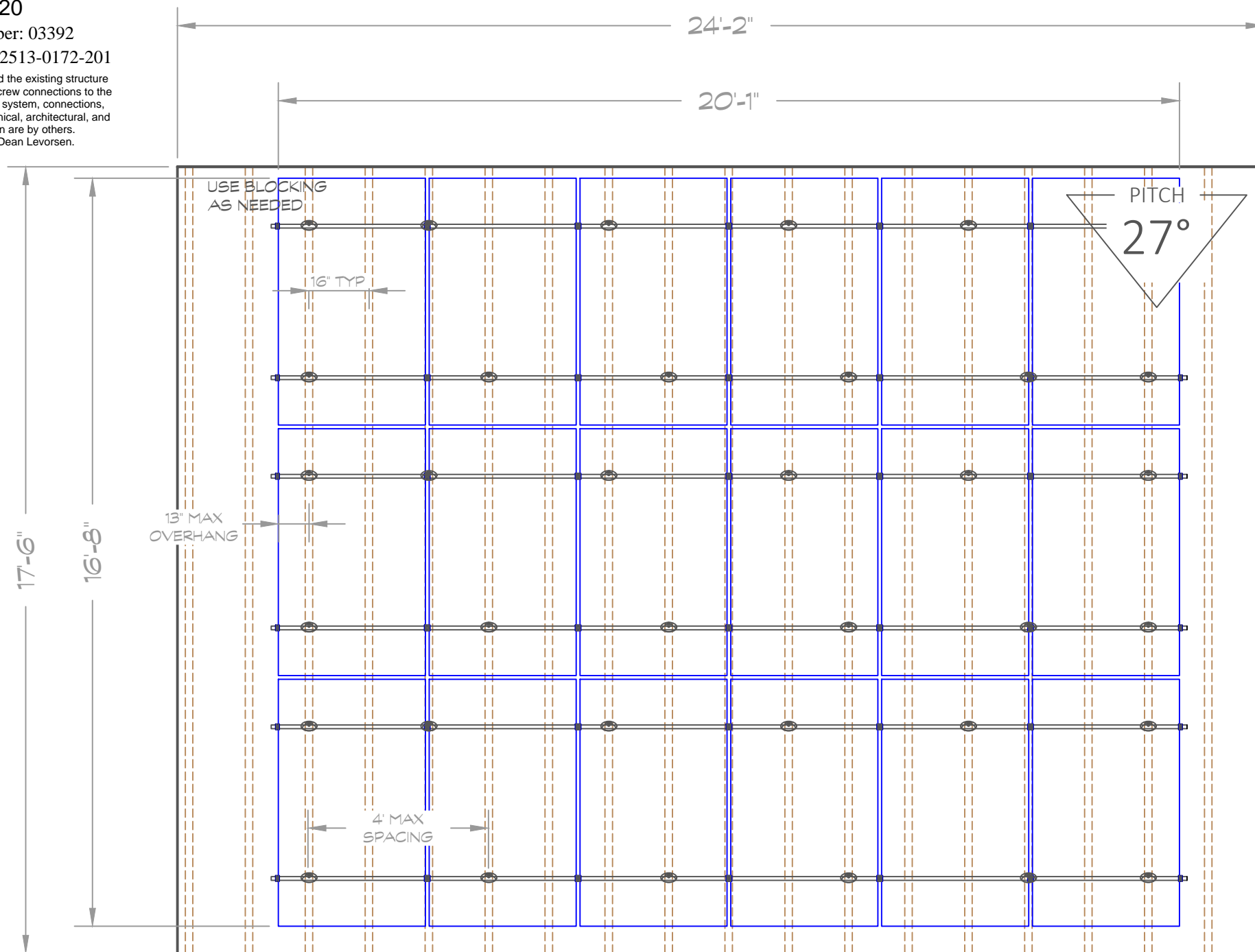
Vector Structural Engineering has reviewed the existing structure with loading from the solar array and lag screw connections to the existing framing. The design of the racking system, connections, and all other structure is by others. Mechanical, architectural, and all other nonstructural aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.

RACKING SCHEDULE		
UNIRAC FLASH LOC	36	COUNT
UNIRAC END CLAMPS	12	COUNT
UNIRAC MID CLAMPS	30	COUNT
UNIRAC STANDARD RAIL (168 IN.)	9	COUNT



651 W. GALENA PARK BLVD. STE. 101 DRAPER, UTAH 84020 PHONE (801) 990-1775 WWW.VECTORSE.COM

ROOF LOAD CALCS						
	QTY		WEIGHT		TOTAL	
PV MODULE	18	X	39.7	LBS	=	715 LBS
RACKING RAIL LN. FT.	126	X	0.85	LB/FT	=	107 LBS
CLAMPS	42	X	0.125	LBS	=	5 LBS
ATTACHMENTS	36	X	2	LBS	=	72 LBS
TOTAL WEIGHT					=	899 LBS
ARRAY AREA					=	337 SQFT
DEAD LOAD					=	3 LB/SQFT
POINT LOAD					=	25 LBS



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: PV LAYOUT

SHEET NUMBER: A1.1

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS				
Description	Date	Int	Rev	
ORIGINAL	02/04/20	KB	0	
REV. 1	02/13/20	KB	A	

DRAFT: KATHRYN BIGLER

REVIEWED:

THIS PAGE DEPICTS A STANDARD RACKING METHOD FOR A COMPOSITION SHINGLE ROOF. INCLUDED ARE MAXIMUM MINIMUM AND TYPICAL DIMENSIONS. ACTUAL DIMENSIONS MAY VARY ON INSTALL BUT MAXIMUM AND MINIMUM DIMENSIONS SHALL NOT BE EXCEEDED

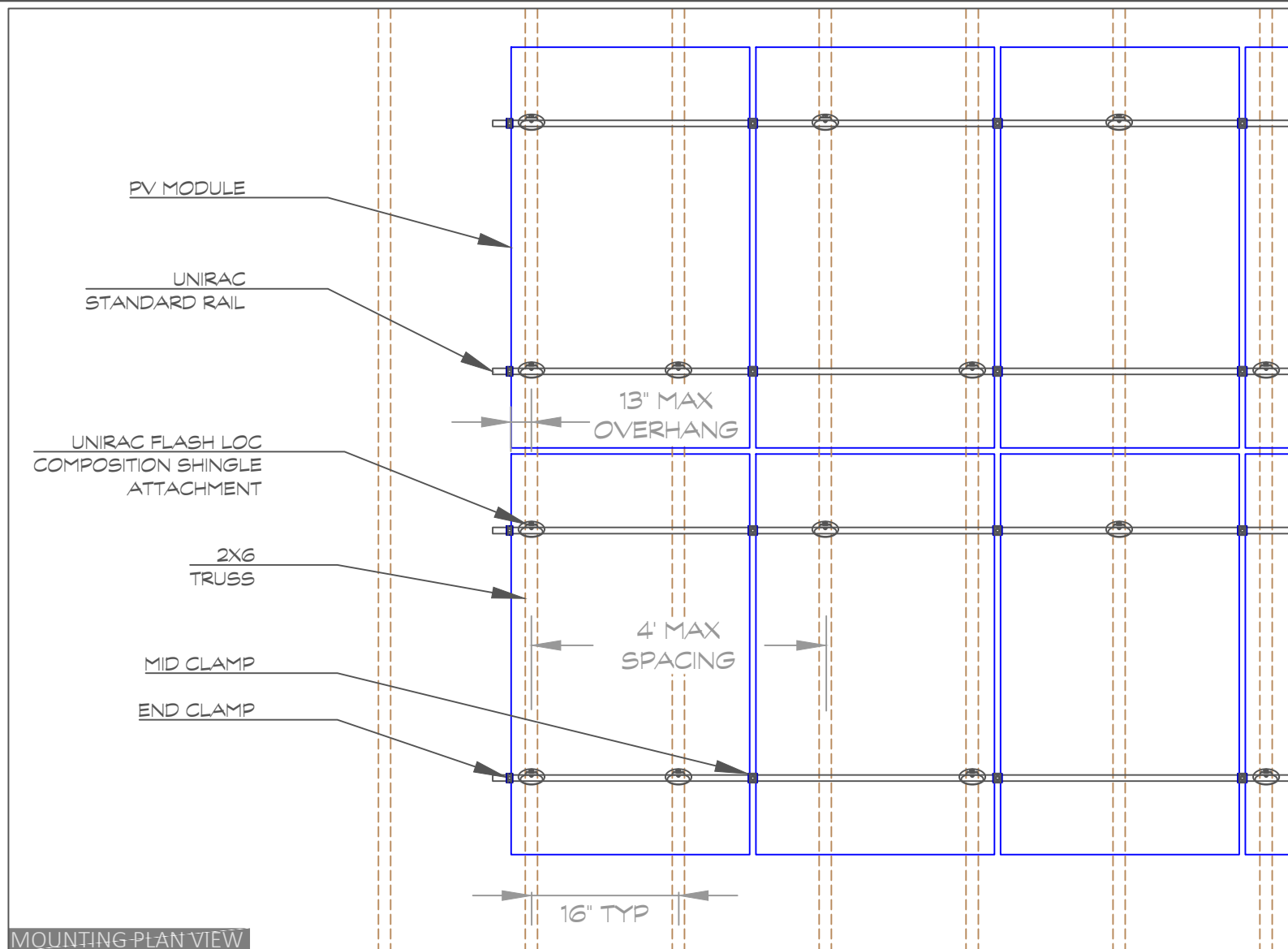


02/17/2020

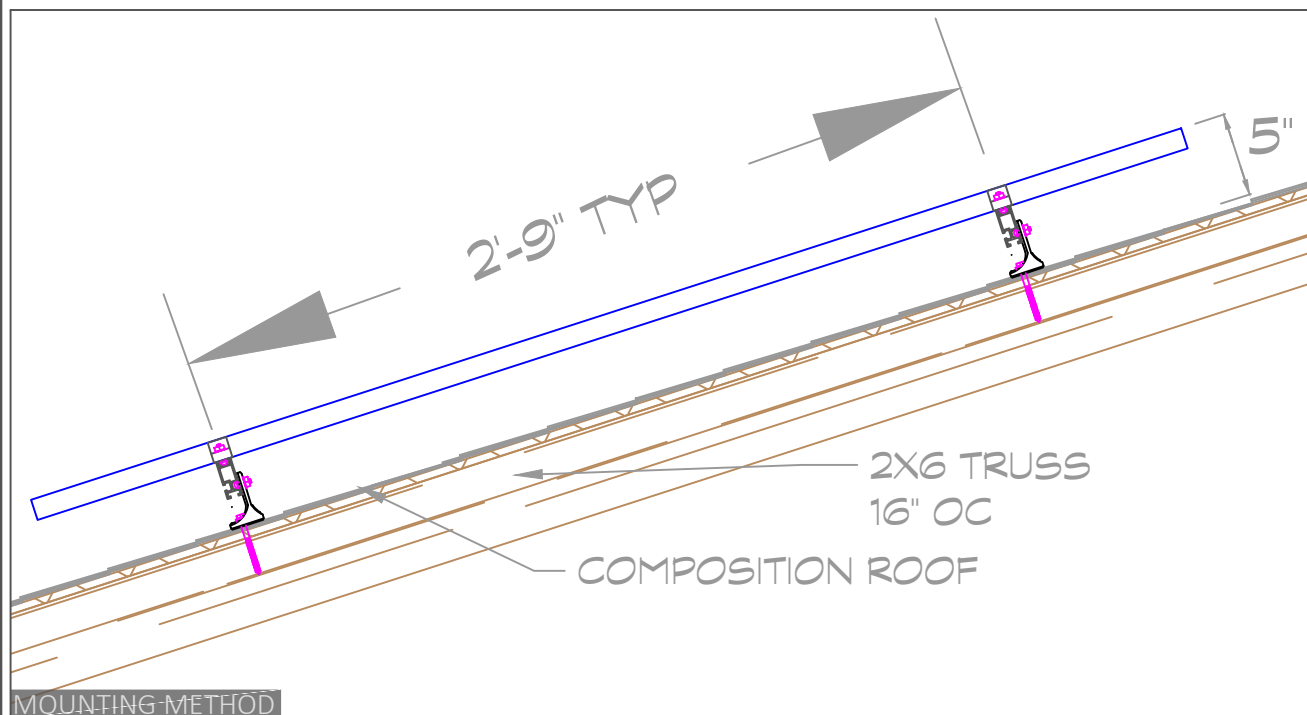
Firm License Number: 03392

VSE Project Number: U2513-0172-201

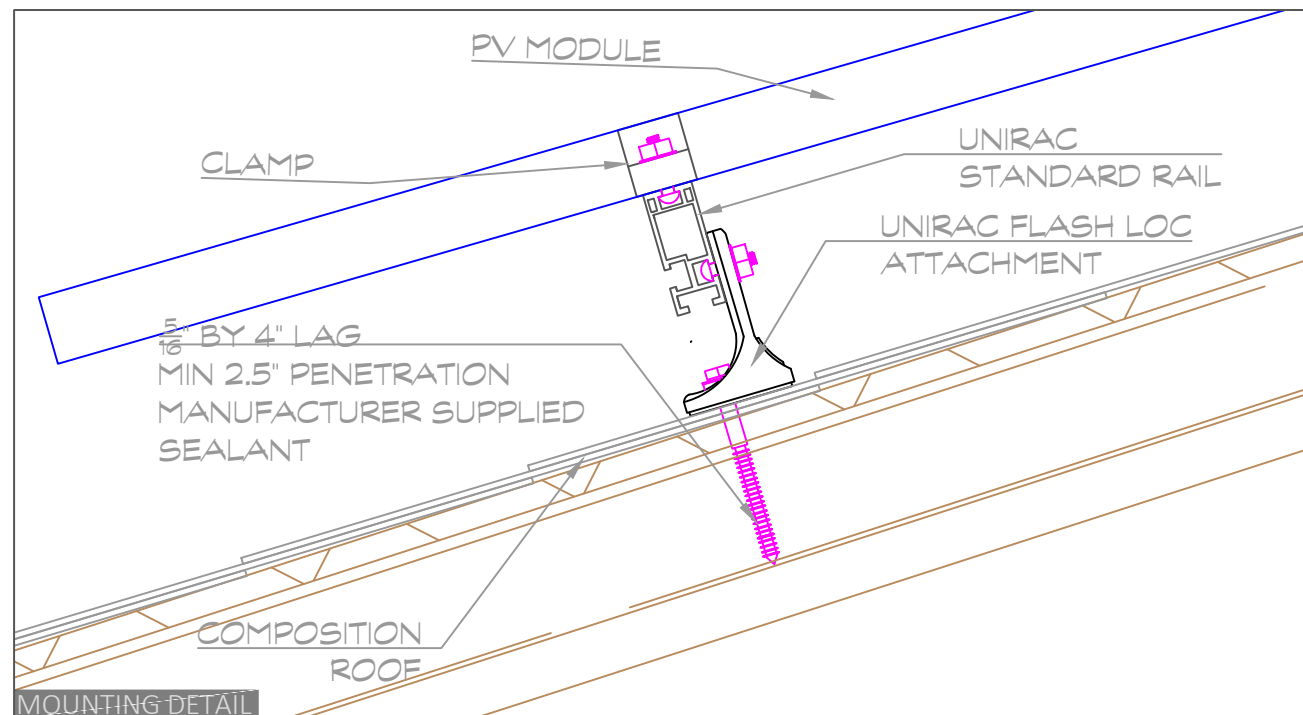
Vector Structural Engineering has reviewed the existing structure with loading from the solar array and lag screw connections to the existing framing. The design of the racking system, connections, and all other structure is by others. Mechanical, architectural, and all other nonstructural aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.



MOUNTING PLAN VIEW



MOUNTING METHOD



MOUNTING DETAIL



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER:  
20-0003

PROJECT DETAILS:  
5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE:  
MOUNTING & RACKING

SHEET NUMBER:  
A2.0

SHEET SIZE:  
ANSI B (17.00 X 11.00 INCHES)

REVISIONS				
Description	Date	Int	Rev	
ORIGINAL	02/04/20	KB	0	
REV. 1	02/13/20	KB	A	

DRAFT:  
KATHRYN BIGLER

REVIEWED:



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: ELECTRICAL RISER

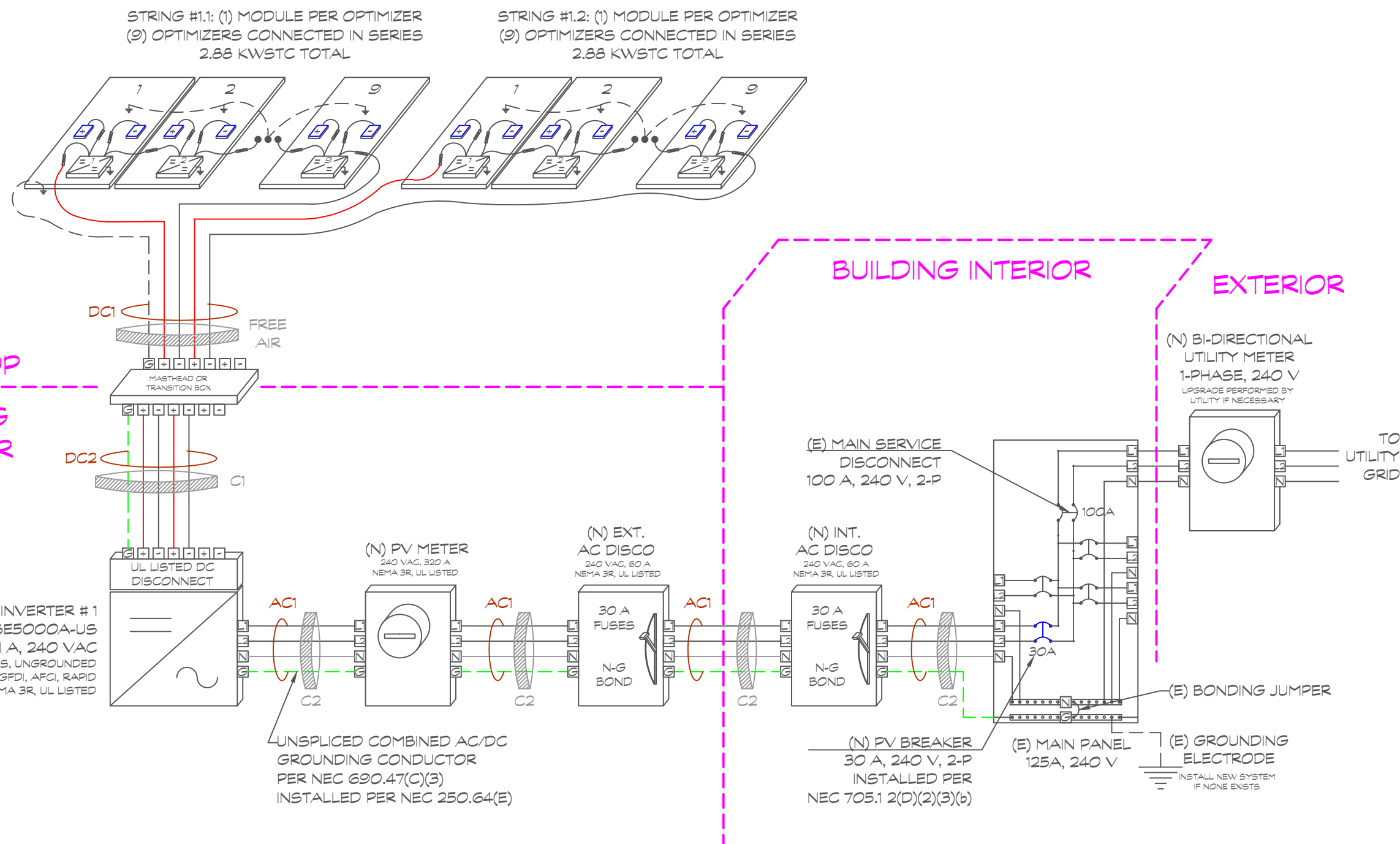
SHEET NUMBER: E1.0

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT: KATHRYN BIGLER

REVIEWED:



DC WIRE SCHEDULE										
MF	TAG	PHASE/NEUTRAL CONDUCTOR				GROUND CONDUCTOR				EST. DIST. (ft)
		QTY	MTL	SIZE	TYPE	QTY	MTL	SIZE	TYPE	
1	DC1	4	CU	AWG #10	PV Wire	1	CU	AWG #6	BARE	25
1	DC2	4	CU	AWG #10	THWN	1	CU	AWG #6	THWN-2	50

AC WIRE SCHEDULE										
MF	TAG	PHASE/NEUTRAL CONDUCTOR				GROUND CONDUCTOR				EST. DIST. (ft)
		QTY	MTL	SIZE	TYPE	QTY	MTL	SIZE	TYPE	
1	AC1	3	CU	AWG #6	THWN	1	CU	AWG #6	THWN	30

CONDUIT SCHEDULE				
MF	TAG	SIZE	TYPE	EST. DIST. (ft)
1	C1	1"	EMT	50
1	C2	1"	EMT	30



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: ELECTRICAL CALCS

SHEET NUMBER: E2.0

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS				
Description	Date	Int	Rev	
ORIGINAL	02/04/20	KB	0	
REV. 1	02/13/20	KB	A	

DRAFT: KATHRYN BIGLER

REVIEWED:

Inverter I.D.	Inv 1
Inverter AC Power (kW):	5
PV Power (kWstc):	5.76
Modules Total Qty:	18
Inverter DC/AC Ratio:	1.15
String Qty:	1
String Length:	9
Max Open Circuit Voltage:	480
Operating Voltage:	380
Max Short Circuit Current:	15
Operating Current:	7.6
Max Input Power:	2880
String Qty:	1
String Length:	9
Max Open Circuit Voltage:	480
Operating Voltage:	380
Max Short Circuit Current:	15
Operating Current:	7.6
Max Input Power:	2880

PV System Summary		
Number of Panels:	18	Count
Max DC Power:	5.76	kWstc
Max Voltage per 690.7(A):	480	Volts DC
Max Current per 690.8(A)(5):	15	Amps DC
AC System Summary		
Number of Inverters:	1	Count
Max AC Power:	5	KW AC
DC/AC Ratio:	1.15	W/W
Nominal System Voltage:	240	Volts AC
Max Current per 690.8(A)(3):	21	Amps AC
PV Module Specifications		
Model Number:	REC REC320NP	
Weight:	39.7	lbs
Dimensions:	65.9 x 39.25 x 1.1 (in)	
Power @ STC:	320	Watts
Voc:	40.3	Volts DC
Vmmp:	34.2	Volts DC
Isc:	10.22	Amps
Imp:	9.37	Amps
Voc Temp Coeff:	-0.27	%/°C
Isc Temp Coeff:	0.04	%/°C
Max Fuse Rating:	20	Amps
Power Optimizer Specifications		
Model Number:	SolarEdge P320	
Max Input Power:	320	Watts
Max Input Voc:	48	Volts DC
Max Input Isc:	11	Amps
Max Output Voltage:	60	Volts DC
Max Output Current:	15	Amps
Min. String Length:	8	Modules
Max. String Length:	25	Modules
Max. String Power:	5700	Watts

PV System Maximum Voltage Calculation per NEC 690.7(A)									
Local Record Low Temp:					-13	°C			
Data Source:	COLUMBUS PORT COLUMBUS INTL A								
Voc Temp Coefficient	x	25°C - Record Low Temp.	0	+	1	=	Voc Correction Factor		
-0.27%/°C	x	38	°C	+	1	=	1.1026		
Voc Correction Factor	x	Voc	x	Number of Modules in Series	=	Temp Corrected Open Circuit Voltage			
1.1026	x	40.3	x	1	=	44.4	Volts DC		
120% Rule per NEC 705.12(D)(2)(3)(b)									
Main Busbar Rating:	x	1.2	-	Main Breaker Rating:	=	Max PV Breaker Size			
125	x	1.2	-	100	=	50			

Inverter Specifications		
Model Number:	SolarEdge SE5000H-US	
Power Rating:	5000	Watts
Nominal Voltage:	240	Volts AC
Max Output Current:	21	Amps
CEC Efficiency:	99	%
Max DC Voltage:	480	Volts DC
Max DC Current:	45	Amps DC
Max DC Power:	7750	Watts

MF	Tag	Circuit Details					Conductor Specifications									
		Origin	Destination	Environment		Est. 1-Way Dist (ft)	MAX # Ungnd Cond	Mtl	Temp Rating	Trade Size	Wire Type	#   Set	Ampacity @ 30°C 310.15(B)(16)			
				Location	Exposure											
1	DC1	PV String	Transition Box	Rooftop	Free Air	25	4	CU	90°C	AWG #10	PV Wire	1	55	Amps		
2	DC2	Transition Box	Inverter #1	Interior	EMT Conduit	50	2	CU	75°C	AWG #10	THWN	1	35	Amps		
1	AC1	Inverter #1	Main Panel	Interior	EMT Conduit	30	2	CU	75°C	AWG #6	THWN	1	65	Amps		

MF	Tag	Req. Conductor Ampacity			Ampacity Check #1		Conductor Temperature Derating				Conduit Fill Derating		Corrected Ampacity Calculation			Ampacity Check #2														
		DC Amps	x	100% 690.8(A)(5)	x	125% 690.8(B)(1)	=	Max DC 690.8(B)(1)	<	Cond. Amps	Local 2% Avg. High Temp (°C)	Height Above Roof (in)	Temp Adder 310.15(B)(3)(c)	Operating Temp (°C)	Temp Derate 310.15(B)(2)(a)	# of Ungnd. Cond.	Fill Derate 310.15(B)(3)(a)	Cond. Amps	x	Temp Derate	x	Fill Derate	=	Derated Conductor Ampacity	>	Max Current 690.8(A)(2)				
1	DC1	15	x	1	x	1.25	=	18.75	A	<	55	A	32	3.5-12	17	49	0.82	N/A	1	55	x	0.82	x	1	=	45.1	A	>	15	A
2	DC2	15	x	1	x	1.25	=	18.75	A	<	35	A	32	N/A	0	32	0.94	2	1	35	x	0.94	x	1	=	32.9	A	>	15	A

MF	Tag	Req. Conductor Ampacity			Ampacity Check #1		Conductor Temperature Derating				Conduit Fill Derating		Corrected Ampacity			Ampacity Check #2														
		AC Amps	x	100% 690.8(A)(3)	x	125% 690.8(B)(1)	=	Max AC 690.8(B)(1)	<	Cond. Amps	Local 2% Avg. High Temp (°C)	Height Above Roof (in)	Temp Adder 310.15(B)(3)(c)	Operating Temp (°C)	Temp Derate 310.15(B)(2)(a)	# of Ungnd. Cond.	Fill Derate 310.15(B)(3)(a)	Cond. Amps	x	Temp Derate	x	Fill Derate	=	Derated Conductor Ampacity	>	Max Current 690.8(A)(2)				
1	AC1	21	x	1	x	1.25	=	26.25	A	<	65	A	32	N/A	0	32	0.94	2	1	65	x	0.94	x	1	=	61.1	A	>	21	A



762 W. UNION ST.  
 ATHENS, OH 45701  
 (740) 249-4533  
 www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
 227 NORTH ARDMORE RD  
 COLUMBUS, OH 43209

JOB NUMBER:  
 20-0003

PROJECT DETAILS:  
 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE:  
 SAFETY PLACARDS

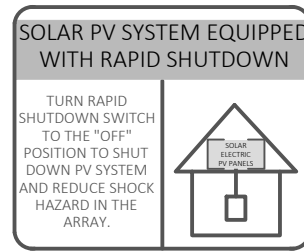
SHEET NUMBER:  
 E3.0

SHEET SIZE:  
 ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT:  
 KATHRYN BIGLER

REVIEWED:



REQ'D BY: NEC 690.12(B)(2)(1), 690.56(C)(1)  
 APPLY TO:  
 SERVICE DISCONNECT



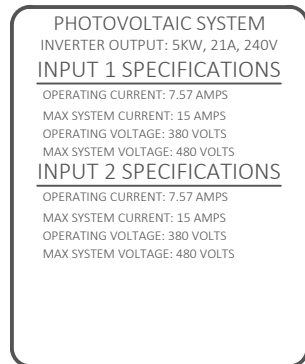
REQ'D BY: NEC 690.13(B)  
 APPLY TO:  
 DC DISCONNECT SWITCHES  
 \*MUST BE REFLECTIVE



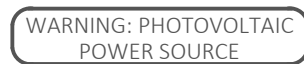
REQ'D BY: NEC 690.13(B)  
 APPLY TO:  
 AC DISCONNECT SWITCHES



REQ'D BY: NEC 690.56(C)(3)  
 APPLY TO:  
 RAPID SHUTDOWN SWITCH



REQ'D BY: NEC 690.53  
 APPLY TO:  
 INVERTER #1 AND DC DISCONNECTS



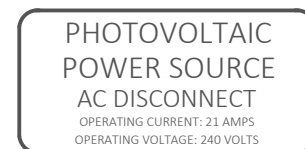
REQ'D BY: NEC 690.31(G)(3)  
 APPLY TO:  
 DC CIRCUIT JUNCTION BOXES, RACEWAYS, CABLE TRAYS, CONDUIT BODIES WITHIN AVAILABLE OPENINGS, EVERY 10', WITHIN 1' OF TURNS/PENETRATIONS



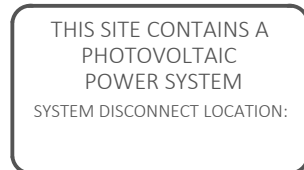
REQ'D BY: NEC 705.12(D)(3)  
 APPLY TO:  
 ANY/ALL ELECTRICAL PANELS CONNECTED TO MULTIPLE POWER SOURCES



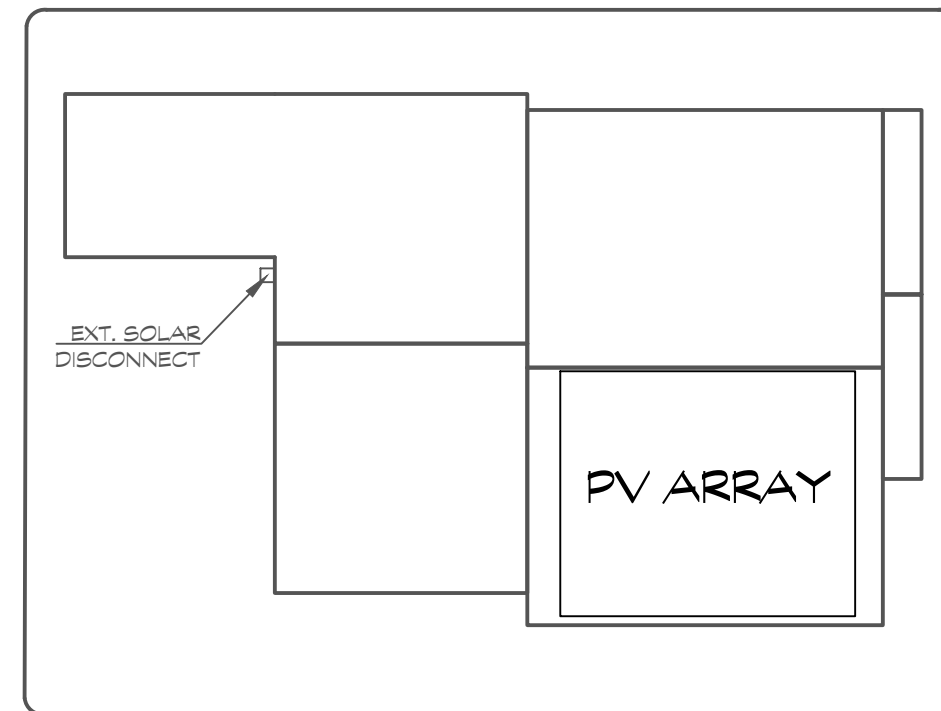
REQ'D BY: NEC 705.12(D)(2)(3)(b)  
 APPLY TO:  
 PV BACKFED CIRCUIT BREAKER(S)



REQ'D BY: NEC 690.54  
 APPLY TO:  
 AC DISCONNECTS, IF NOT APPLIED BY MFR



REQ'D BY: NEC 690.56(B)  
 APPLY TO:  
 APPLY NEAR SERVICE DISCONNECT IF NOT IN SAME LOCATION



REQ'D BY: NEC 690.56(A) & 705.10  
 APPLY TO:  
 APPLY NEAR SERVICE DISCONNECT & PV SYSTEM DISCONNECT IF NOT IN SAME LOCATION

SIGNAGE REQUIREMENTS

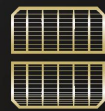
- 1) RED BACKGROUND
- 2) WHITE LETTERING
- 3) MIN 3/8" LETTER HEIGHT
- 4) ALL CAPITAL LETTERS
- 5) ARIAL OR SIMILAR FONT
- 6) WEATHER RESISTANT MATERIAL PER UL 969

SOLAR'S MOST TRUSTED



# REC N-PEAK BLACK SERIES

PREMIUM FULL BLACK MONO N-TYPE SOLAR PANELS WITH SUPERIOR PERFORMANCE



MONO N-TYPE: THE MOST EFFICIENT C-SI TECHNOLOGY



NO LIGHT INDUCED DEGRADATION



SUPER-STRONG FRAME UP TO 7000 PA SNOW LOAD



FLEXIBLE INSTALLATION OPTIONS



IMPROVED PERFORMANCE IN SHADED CONDITIONS

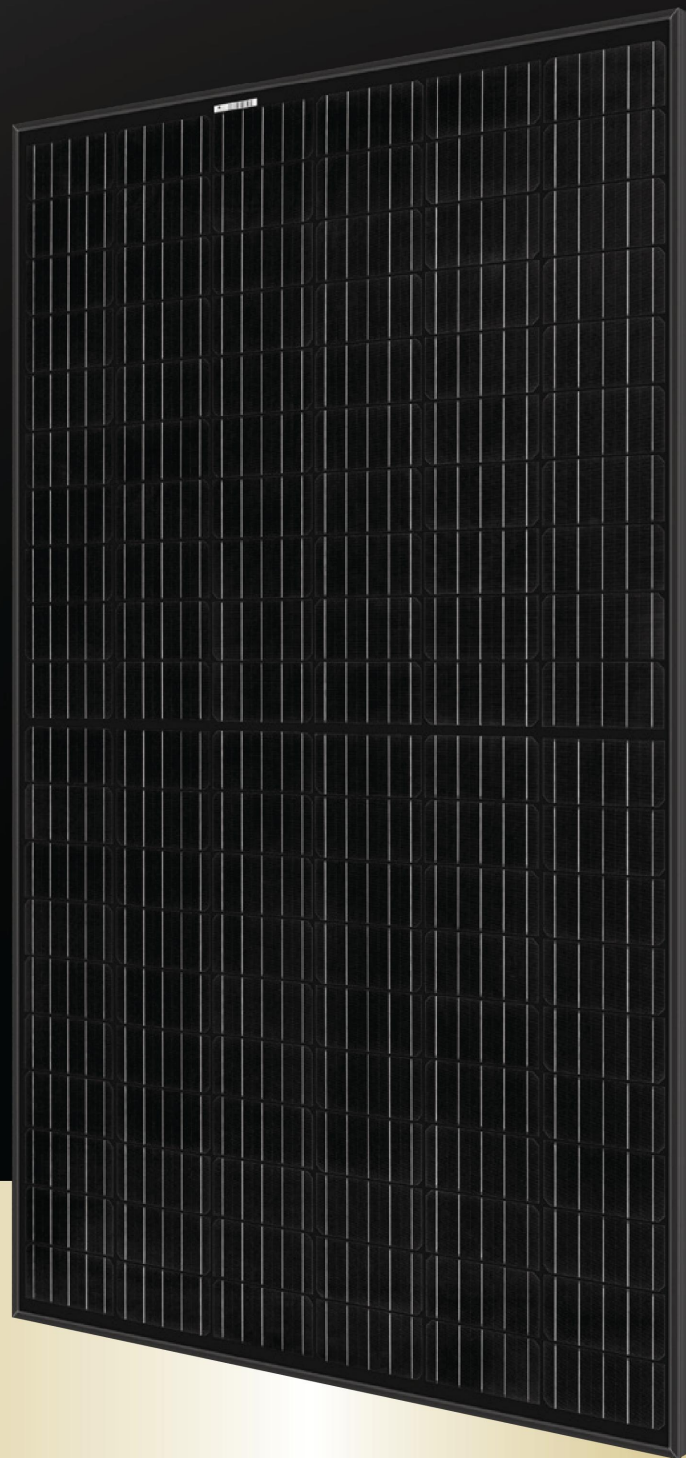


GUARANTEED HIGH POWER OVER LIFETIME

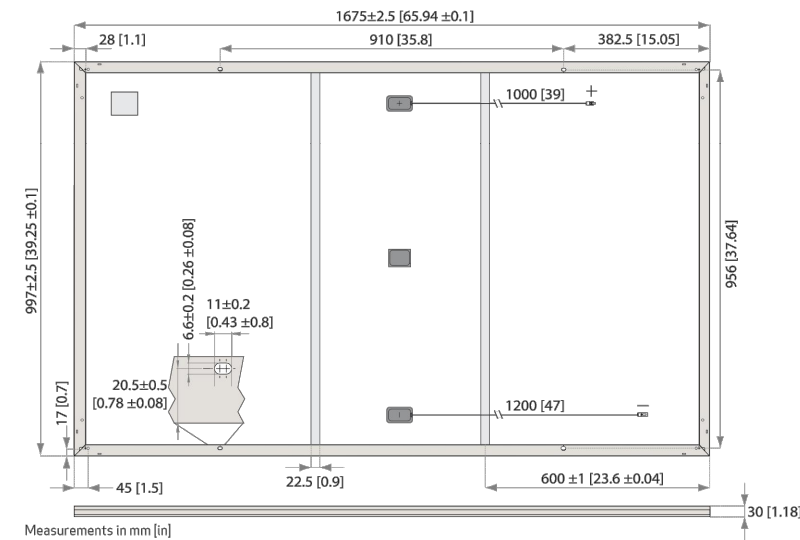
325 W<sub>P</sub> POWER

20 YEAR PRODUCT WARRANTY

25 YEAR POWER WARRANTY



## REC N-PEAK BLACK SERIES



Measurements in mm [in]

### ELECTRICAL DATA @ STC

	Product code*: RECxxxNP Black				
Nominal Power - P <sub>MPP</sub> (Wp)	305	310	315	320	325
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V <sub>MPP</sub> (V)	33.3	33.6	33.9	34.2	34.4
Nominal Power Current - I <sub>MPP</sub> (A)	9.17	9.24	9.31	9.37	9.46
Open Circuit Voltage - V <sub>OC</sub> (V)	39.3	39.7	40.0	40.3	40.7
Short Circuit Current - I <sub>SC</sub> (A)	10.06	10.12	10.17	10.22	10.28
Panel Efficiency (%)	18.3	18.6	18.9	19.2	19.5

Values at standard test conditions (STC: air mass AM1.5, irradiance 1000 W/m<sup>2</sup>, temperature 25°C), based on a production spread with a tolerance of V<sub>OC</sub> & I<sub>SC</sub> ±3% within one watt class. \* Where xxx indicates the nominal power class (P<sub>MPP</sub>) at STC above.

### ELECTRICAL DATA @ NOCT

	Product code*: RECxxxNP Black				
Nominal Power - P <sub>MPP</sub> (Wp)	214	217	221	224	228
Nominal Power Voltage - V <sub>MPP</sub> (V)	31.1	31.4	31.7	32.0	32.2
Nominal Power Current - I <sub>MPP</sub> (A)	6.86	6.91	6.97	7.01	7.08
Open Circuit Voltage - V <sub>OC</sub> (V)	36.7	37.1	37.4	37.7	38.0
Short Circuit Current - I <sub>SC</sub> (A)	7.53	7.57	7.61	7.65	7.69

Nominal operating cell temperature (NOCT: air mass AM1.5, irradiance 800 W/m<sup>2</sup>, temperature 20°C, windspeed 1 m/s). \*Where xxx indicates the nominal power class (P<sub>MPP</sub>) at STC above.

### CERTIFICATIONS



### WARRANTY

20 year product warranty  
25 year linear power output warranty, maximum degradation in performance of 0.5% p.a., giving 86% at end of year 25.  
See warranty conditions for further details.

### GENERAL DATA

Cell type: 120 half-cut n-type mono c-Si cells  
6 strings of 20 cells in series  
Glass: 0.13" (3.2mm) solar glass with anti-reflection surface treatment  
Backsheet: Highly reflective and resistant polymeric construction (black)  
Frame: Anodized aluminum (black)  
Junction box: 3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790  
Cable: 12 AWG (4 mm<sup>2</sup>) PV wire, 39+47" (1m+1.2m) in accordance with EN 50618  
Connectors: Stäubli MC4 PV-KBT4/KST4, 12 AWG (4 mm<sup>2</sup>) in accordance with IEC 62852 IP68 only when connected  
Origin: Made in Singapore

### MECHANICAL DATA

Dimensions: 65.9 x 39.25 x 1.1" (1675 x 997 x 30 mm)  
Area: 17.98 ft<sup>2</sup> (1.67 m<sup>2</sup>)  
Weight: 39.7 lbs (18 kg)

### MAXIMUM RATINGS

Operational temperature: -40 ... +85°C  
Maximum system voltage: 1000 V  
Design load (+): snow 4666 Pa (97.5 lbs/ft<sup>2</sup>)\*  
Maximum test load (+): 7000 Pa (146 lbs/ft<sup>2</sup>)\*  
Design load (-): wind 1600 Pa (33.4 lbs/ft<sup>2</sup>)\*  
Maximum test load (-): 2400 Pa (50 lbs/ft<sup>2</sup>)\*  
Max series fuse rating: 20 A  
Max reverse current: 20 A

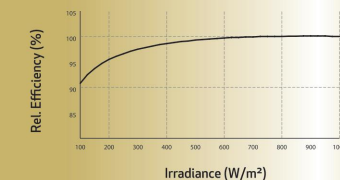
\* Calculated using a safety factor of 1.5  
\* See installation manual for mounting instructions

### TEMPERATURE RATINGS \*

Nominal Operating Cell Temperature: 44°C (+2°C)  
Temperature coefficient of P<sub>MPP</sub>: -0.35 %/°C  
Temperature coefficient of V<sub>OC</sub>: -0.27 %/°C  
Temperature coefficient of I<sub>SC</sub>: 0.04 %/°C  
\*The temperature coefficients stated are linear values

### LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC.



Founded in Norway in 1996, REC is a leading vertically integrated solar energy company. Through integrated manufacturing from silicon to wafers, cells, high-quality panels and extending to solar solutions, REC provides the world with a reliable source of clean energy. REC's renowned product quality is supported by the lowest warranty claims rate in the industry. REC is a Bluestar Elkem company with headquarters in Norway and operational headquarters in Singapore. REC employs around 2,000 people worldwide, producing 1.5 GW of solar panels annually.



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kW<sub>stc</sub>, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: PV MODULE DATASHEET

SHEET NUMBER: D1.0

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT: KATHRYN BIGLER

REVIEWED:

Ref: PM-DS-11-03-Rev. C 07/19 Specifications subject to change without notice.



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

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

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4							
<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			400				Vdc
Maximum Input Current @240V <sup>(2)</sup>	8.5	10.5	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

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Data, ANSI C12.20	Optional <sup>(3)</sup>						
Inverter Commissioning	with the SetApp mobile application using built-in Wi-Fi station 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 T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)						
Emissions	FCC Part 15 Class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output Conduit Size / AWG Range	3/4" minimum / 14-6 AWG			3/4" minimum /14-4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG			3/4" minimum / 1-3 strings / 14-6 AWG			
Dimensions with Safety Switch (HxWxD)	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>(4)</sup>						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

<sup>(3)</sup> Revenue grade inverter P/N: SExxxH-US000BNC4  
<sup>(4)</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-note-na.pdf>



762 W. UNION ST.  
 ATHENS, OH 45701  
 (740) 249-4533  
 www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
 227 NORTH ARDMORE RD  
 COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: INVERTER DATASHEET

SHEET NUMBER: D2.0

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT: KATHRYN BIGLER

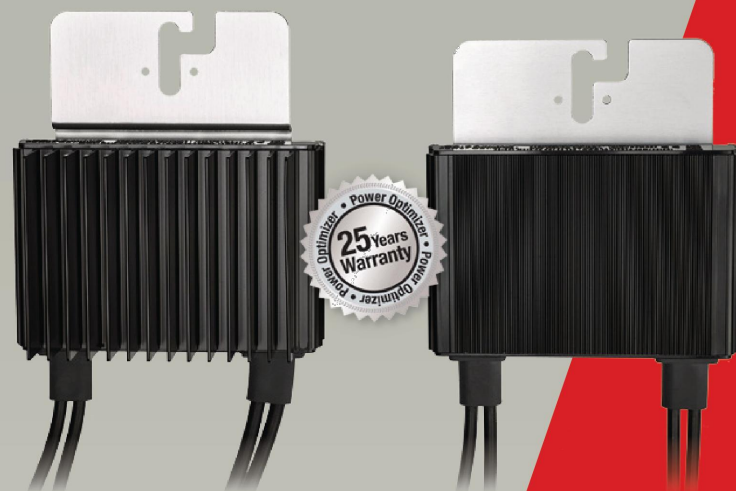
REVIEWED:



# SolarEdge Power Optimizer

Module Add-On For North America

P320 / P370 / P400 / P405 / P505



POWER OPTIMIZER

## PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Compliant with arc fault protection and rapid shutdown NEC requirements (when installed as part of the SolarEdge system)
- Module-level voltage shutdown for installer and firefighter safety

USA - CANADA - GERMANY - ITALY - FRANCE - JAPAN - CHINA - AUSTRALIA - THE NETHERLANDS - UK - ISRAEL - TURKEY - SOUTH AFRICA - BULGARIA - INDIA [www.solaredge.us](http://www.solaredge.us)



# SolarEdge Power Optimizer

Module Add-On for North America

P320 / P370 / P400 / P405 / P505

OPTIMIZER MODEL (typical module compatibility)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
<b>INPUT</b>						
Rated Input DC Power <sup>(1)</sup>	320	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48	60	80	125	83	Vdc
MPPT Operating Range	8 - 48	8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11		10.1		14	Adc
Maximum DC Input Current	13.75		12.63		17.5	Adc
Maximum Efficiency	99.5			98.6		%
Weighted Efficiency	98.8			98.6		%
Overvoltage Category	II					
<b>OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)</b>						
Maximum Output Current	15					Adc
Maximum Output Voltage	60		85			Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)</b>						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
<b>STANDARD COMPLIANCE</b>						
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
RoHS	Yes					
<b>INSTALLATION SPECIFICATIONS</b>						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1	128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32		mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4 <sup>(2)</sup>					
Output Wire Type / Connector	Double Insulated; MC4					
Output Wire Length	0.95 / 3.0	1.2 / 3.9				m / ft
Operating Temperature Range	-40 - +85 / -40 - +185					
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					

<sup>(1)</sup> Rated STC power of the module. Module of up to +5% power tolerance allowed.

<sup>(2)</sup> For other connector types please contact SolarEdge

PV SYSTEM DESIGN USING A SOLAREEDGE INVERTER <sup>(3)(4)</sup>		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	W
		Minimum String Length (Power Optimizers)	P320, P370, P400 P405 / P505	8	6	
Maximum String Length (Power Optimizers)		25	25	25	50 <sup>(5)</sup>	
Maximum Power per String		5700 (6000 with SE7600H-US)	5250	6000	12750	
Parallel Strings of Different Lengths or Orientations		Yes				

<sup>(3)</sup> For detailed string sizing information refer to: [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf).

<sup>(4)</sup> It is not allowed to mix P405/P505 with P320/P370/P400/P600/P700/P800 in one string.

<sup>(5)</sup> A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement



© 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: 02/2018/V01/ENG NAM. Subject to change without notice.



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
[www.thirdsunsolar.com](http://www.thirdsunsolar.com)

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: OPTIMIZER DATASHEET

SHEET NUMBER: D2.1

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT: KATHRYN BIGLER

REVIEWED:

# SOLARMOUNT



## OPTIMIZED COMPONENTS

### INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

## VERSATILITY

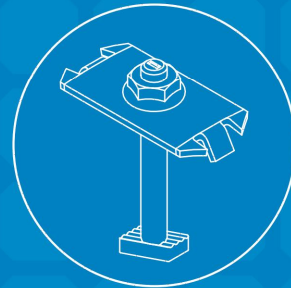
### ONE PRODUCT - MANY APPLICATIONS

Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low slope or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

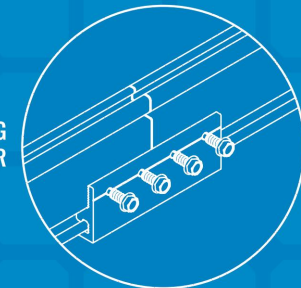
## AUTOMATED DESIGN TOOL

### DESIGN PLATFORM AT YOUR SERVICE

Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers: there's no need to print results and send to a distributor, just click and share.



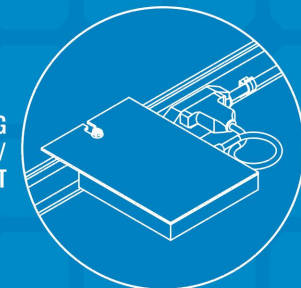
INTEGRATED BONDING MIDCLAMP



INTEGRATED BONDING SPLICE BAR



INTEGRATED BONDING L-FOOT w/ T-BOLT



INTEGRATED BONDING MICROINVERTER MOUNT w/ WIRE MANAGEMENT



## UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT



### TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

### CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

### BANKABLE WARRANTY

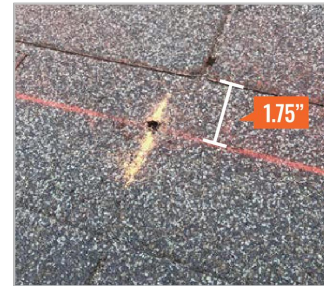
Dont leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a 10 year limited product warranty and a 5 year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

PUB2016MAY16 - PRINTED UPDATE

# 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 UNIRAC APPROVED SEALANTS: Chemlink Duralink 50 (included in kit) or Chemlink M-1

# FASTER INSTALLATION. 25-YEAR WARRANTY.

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



762 W. UNION ST.  
ATHENS, OH 45701  
(740) 249-4533  
www.thirdsunsolar.com

PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER: 20-0003

PROJECT DETAILS: 5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE: RACKING DATASHEET

SHEET NUMBER: D3.0

SHEET SIZE: ANSI B (17.00 X 11.00 INCHES)

REVISIONS				
Description	Date	Int	Rev	
ORIGINAL	02/04/20	KB	0	
REV. 1	02/13/20	KB	A	

DRAFT: KATHRYN BIGLER

REVIEWED:

## MISCELLANEOUS Lay-in Grounding Lugs

### Features

- Each lug takes a range of cable sizes
- Heavy duty slotted or hex head screw
- Aluminum lay-in lugs are suitable for use with copper or aluminum conductors
- Copper lay-in lugs are suitable for use with copper or aluminum conductors

### Standard Materials

Aluminum or Copper

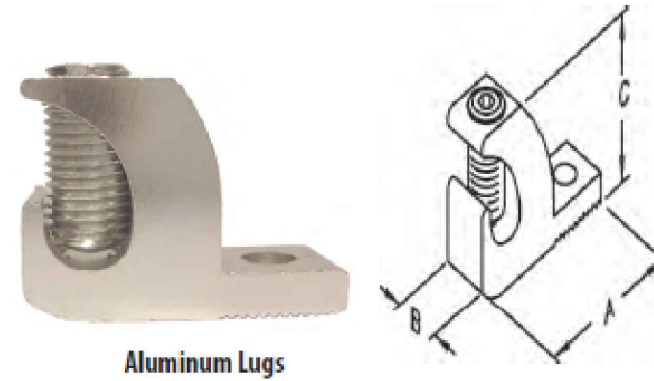
### Standard Finish

Aluminum lug - Zinc plated

Copper lug - Natural

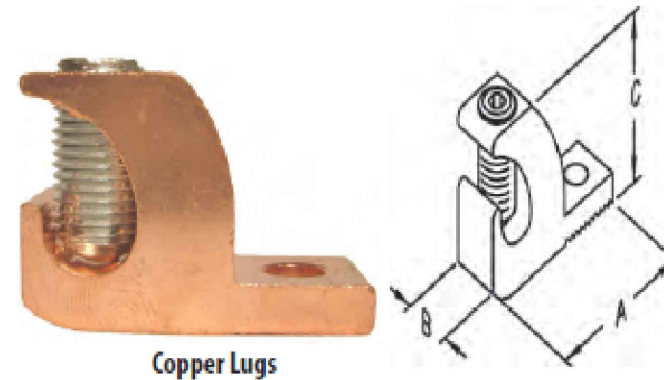
### Applicable Third Party Standards

- UL Standard: 467
- Fed. Spec. W-F-408E
- NEMA: FB-1
- UL Listed File # E212551



Aluminum Lugs

4/14AL and 1/0 - 8AL  
furnished with slotted  
screw. 3/0 - 6AL and  
250MCM - 6AL  
furnished with hex  
head screw

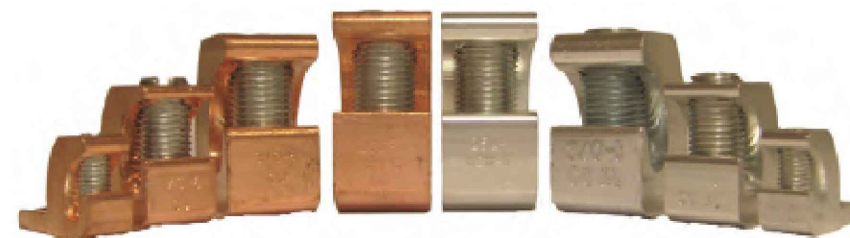


Copper Lugs

4/14CL and 1/0 - 8CL  
furnished with slotted  
screw. 3/0 - 6CL and  
250MCM - 6CL  
furnished with hex  
head screw

CATALOG NUMBER	LUG SIZE	DIM A	DIM B	DIM C	MASTER PACK	WEIGHT PER C
Aluminum Lugs						
4/14ALKON	4-14	1.063	0.375	0.75	100	1.9
1/0-8ALKON	1/0-8	1.5	0.625	1.125	100	6.6
3/0-6ALKON	3/0-6	2	0.813	1.5	50	16.4
250MCM-6ALKON <sup>^</sup>	250MCM-6	2.188	0.813	1.688	50	18.8
Copper Lugs						
4/14CLKON	4-14	1.063	0.375	0.75	100	4.4
1/0-8CLKON	1/0-8	1.5	0.625	1.125	100	15.9
3/0-6CLKON	3/0-6	2	0.813	1.5	50	40.0
250MCM-6CLKON <sup>^</sup>	250MCM-6	2.188	0.813	1.688	50	50.3

<sup>^</sup> Not UL Certified



PROJECT: MARXEN, LEE  
227 NORTH ARDMORE RD  
COLUMBUS, OH 43209

JOB NUMBER:  
20-0003

PROJECT DETAILS:  
5.8 kWstc, 5 kW AC

ENGINEERING APPROVAL:

SHEET TITLE:  
GROUNDING DATASHEET

SHEET NUMBER:  
D4.0

SHEET SIZE:  
ANSI B (17.00 X 11.00 INCHES)

REVISIONS			
Description	Date	Int	Rev
ORIGINAL	02/04/20	KB	0
REV. 1	02/13/20	KB	A

DRAFT:  
KATHRYN BIGLER

REVIEWED: