

PROJECT DESCRIPTION:

18 x SILFAB SLA-M 300 MODULES
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
 SYSTEM SIZE: 5.40 kW DC STC
 ARRAY AREA: ROOF #1 - 316.44 SQ FT.

EQUIPMENT SUMMARY

- 18 SILFAB SLA-M 300 MODULES
- 18 SOLAREEDGE POWER OPTIMIZER P320
- 01 SOLAREEDGE SE5000H-US INVERTER

APPLICABLE CODES & STANDARDS

BUILDING: IBC 2012, IRC 2012.
 ELECTRICAL: NEC 2017

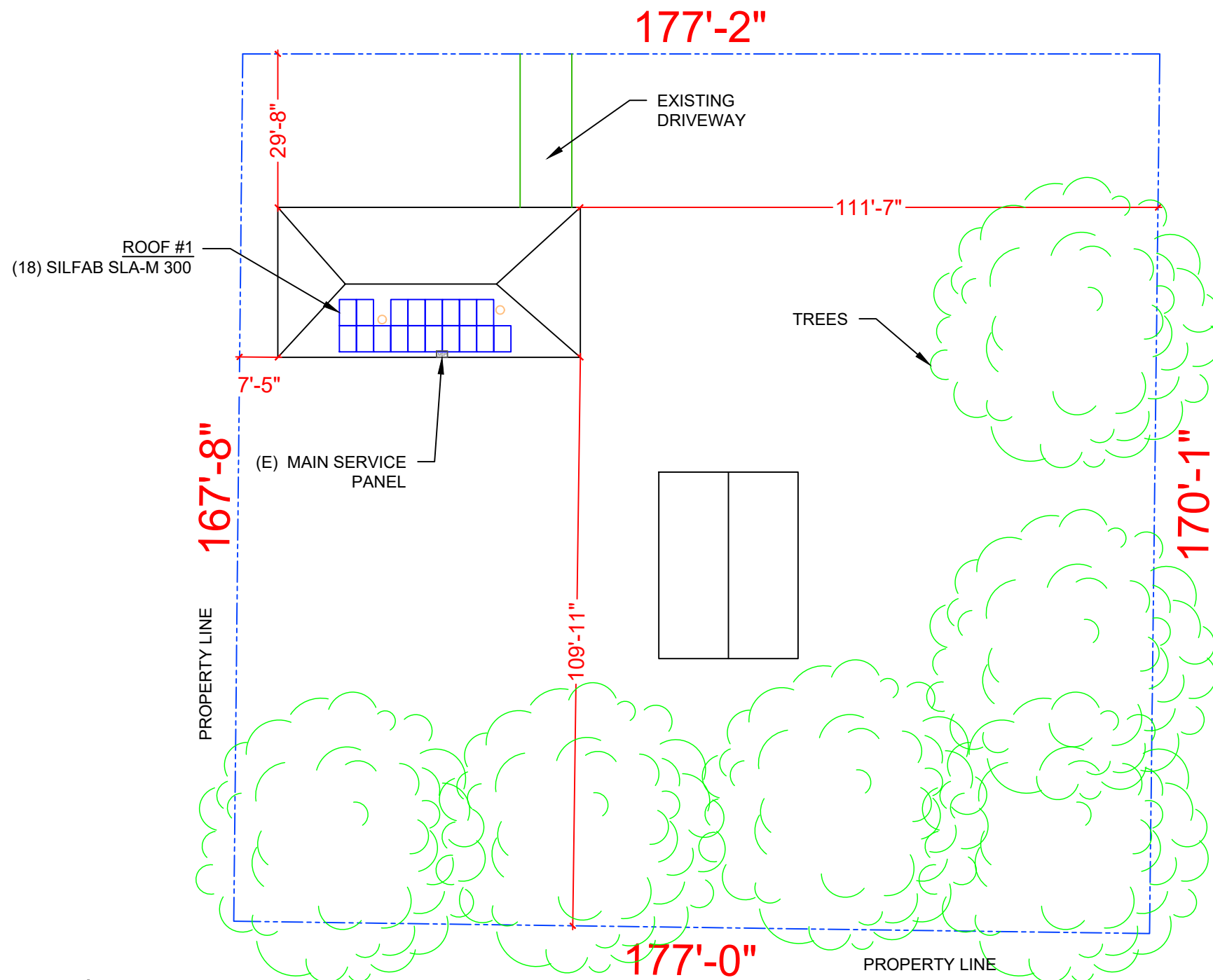
DESIGN SPECIFICATION

OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER
 WIND EXPOSURE: REFER STRUCTURAL LETTER
 WIND SPEED: REFER STRUCTURAL LETTER

AUTHORITIES HAVING JURISDICTION

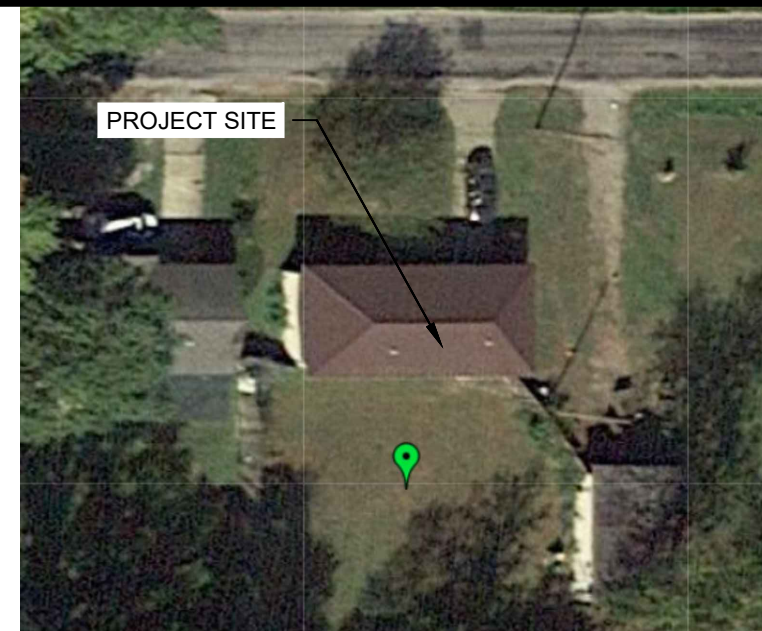
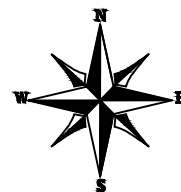
BUILDING: JEFFERSON COUNTY
 ZONING: JEFFERSON COUNTY
 UTILITY: AMEREN ILLINOIS.

MEADOWBROOK RD.



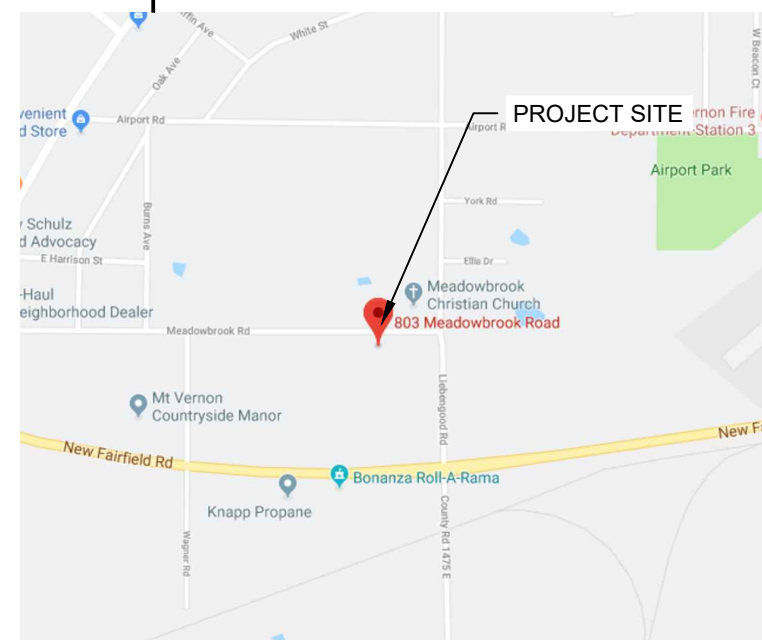
1 PLOT PLAN WITH ROOF PLAN

PV-1 SCALE: 1/26"=1'-0"



2 HOUSE PHOTO

PV-1 SCALE: NTS



3 VICINITY MAP

PV-1 SCALE: NTS

SHEET INDEX

- PV-1 PLOT PLAN & VICINITY MAP
- PV-2 ROOF PLAN & MODULES
- PV-2A STRING LAYOUT
- PV-3 ATTACHMENT DETAIL
- PV-4 ELECTRICAL LINE DIAGRAM
- PV-5 WIRING CALCULATIONS
- PV-6 SOLAREEDGE OPTIMIZER CHART
- PV-7 to 11 EQUIPMENT SPECIFICATIONS

POWERHOME SOLAR & ROOFING
 POWER HOME SOLAR, LLC
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 Email: info@powerhome.com
 Web: www.powerhome.com

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

DATE: 08/26/2019

PROJECT NAME & ADDRESS

**ROBERT SHAFER
 RESIDENCE**
 803 MEADOWBROOK ROAD,
 MT VERNON, IL 62864.

DESIGNED BY
PHS

SHEET NAME
**PLOT PLAN &
 VICINITY MAP**

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

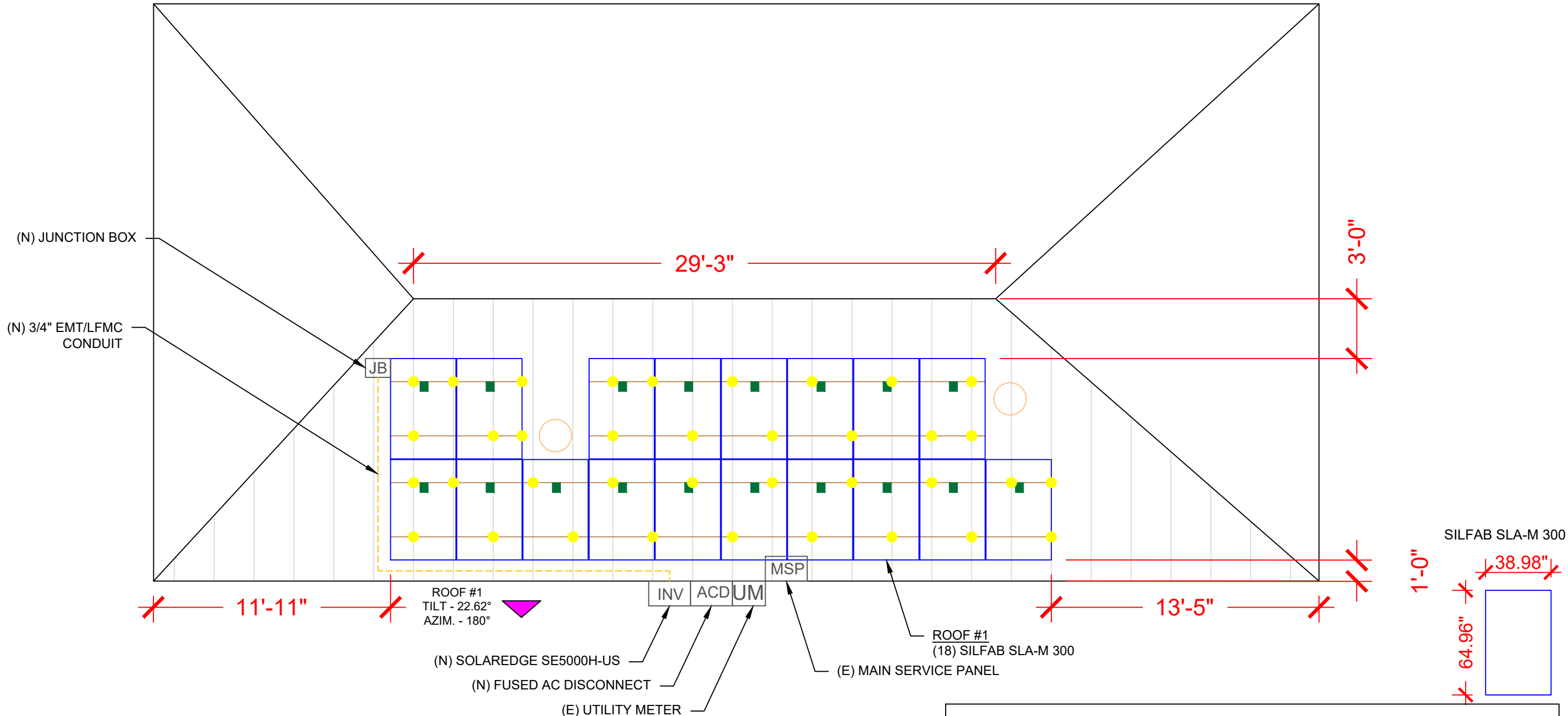
SHEET NUMBER
PV-1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 18 MODULES
 MODULE TYPE = SILFAB SLA-M 300 MODULES
 MODULE WEIGHT = 41.89 LBS / 19 KG.
 MODULE DIMENSIONS = 64.96"x 38.98" = 17.58 SF

ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	18	316.44	621.38	51

ROOF DESCRIPTION				
ROOF TYPE		METAL CORRUGATED		
ROOF LAYER		1 LAYER		
ROOF	ROOF TILT	AZIMUTH	FRAME SIZE	FRAME SPACING
#1	22.62°	180°	REFER STRUCTURAL LETTER	



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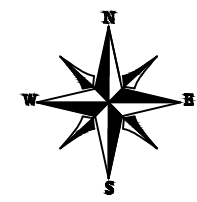
PROJECT NAME & ADDRESS
ROBERT SHAFER RESIDENCE
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 MT VERNON, IL 62864.

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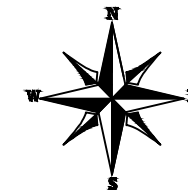
SHEET NAME
ROOF PLAN & MODULES

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

SHEET NUMBER
PV-2



[JB]	- JUNCTION BOX	○ □	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
[INV]	- INVERTER	☀	- ROOF ATTACHMENT
[DC]	- INTEGRATED DC DISCONNECT	---	- RAFTERS
[SLD]	- SOLAR LOAD CENTER	- - - -	- CONDUIT
[PM]	- PRODUCTION METER	[CB]	- COMBINER BOX
[MSP]	- MAIN SERVICE PANEL		



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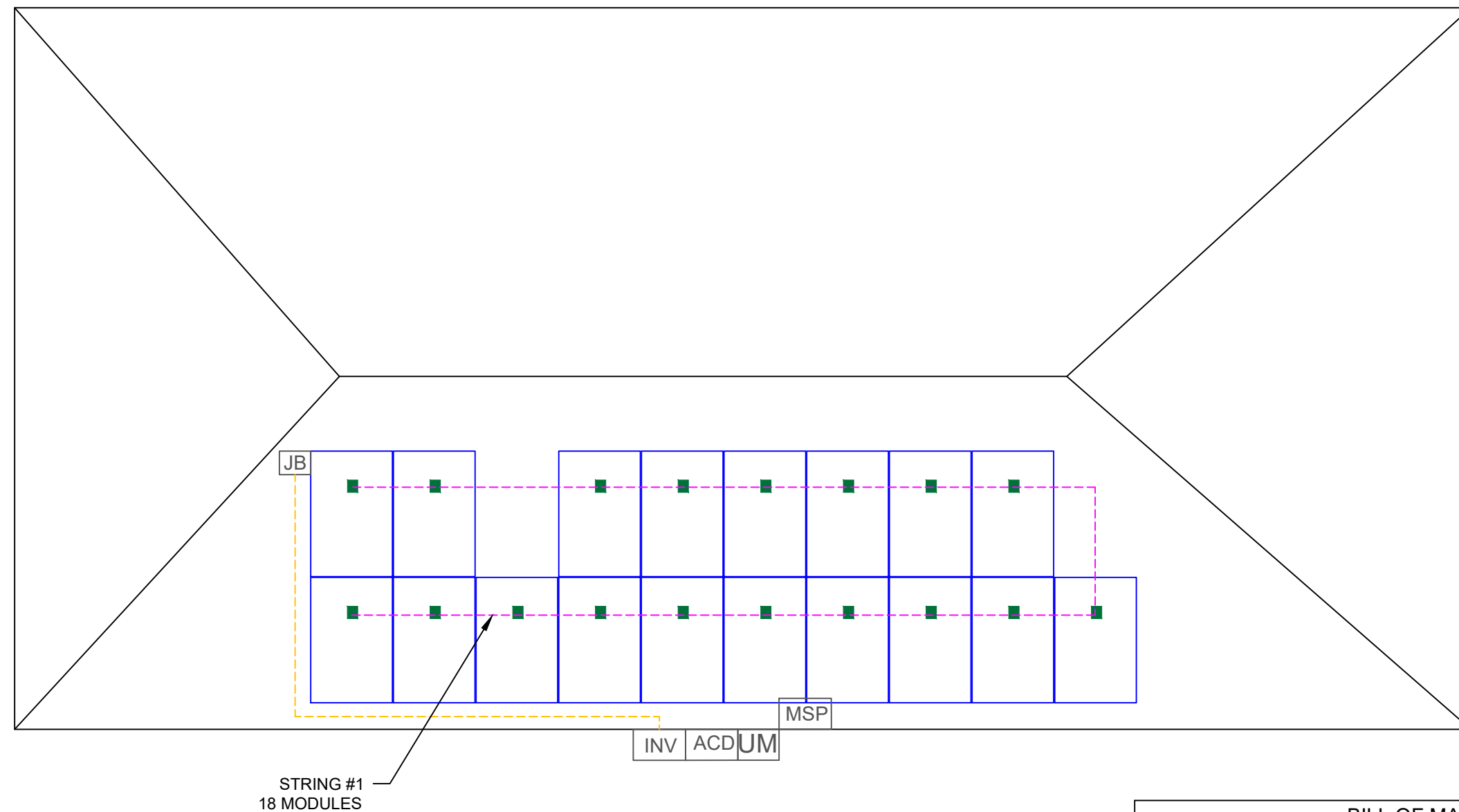
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 MT VERNON, IL 62864.

DESIGNED BY
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SHEET NAME
STRING LAYOUT

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

SHEET NUMBER
PV-2A



BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	18	SILFAB SLA-M 300
OPTIMIZER	18	SOLAREGE POWER OPTIMIZER P320
INVERTER	01	SOLAREGE SE5000H-US INVERTER
AC DISCONNECT	1	30A FUSED, (2) 30A FUSES, 240V, NEMA 3R, UL LISTED
SOLADECK	1	SOLADECK
RAILS	14	IRONRIDGE XR10 RAIL 168" (14 FEET) BLACK
BONDED SPLICE	8	SPLICE KIT
MODULE CLAMPS	42	UNIVERSAL MODULE CLAMPS
GROUNDING LUG	3	IRONRIDGE GROUNDING LUG
END CLAMPS	12	END CLAMPS / STOPPER SLEEVE
ATTACHMENT	40	S-5! PROTEA BRACKET
SQUARE-BOLT	40	SQUARE-BOLT BONDING ATTACHMENT HARDWARE

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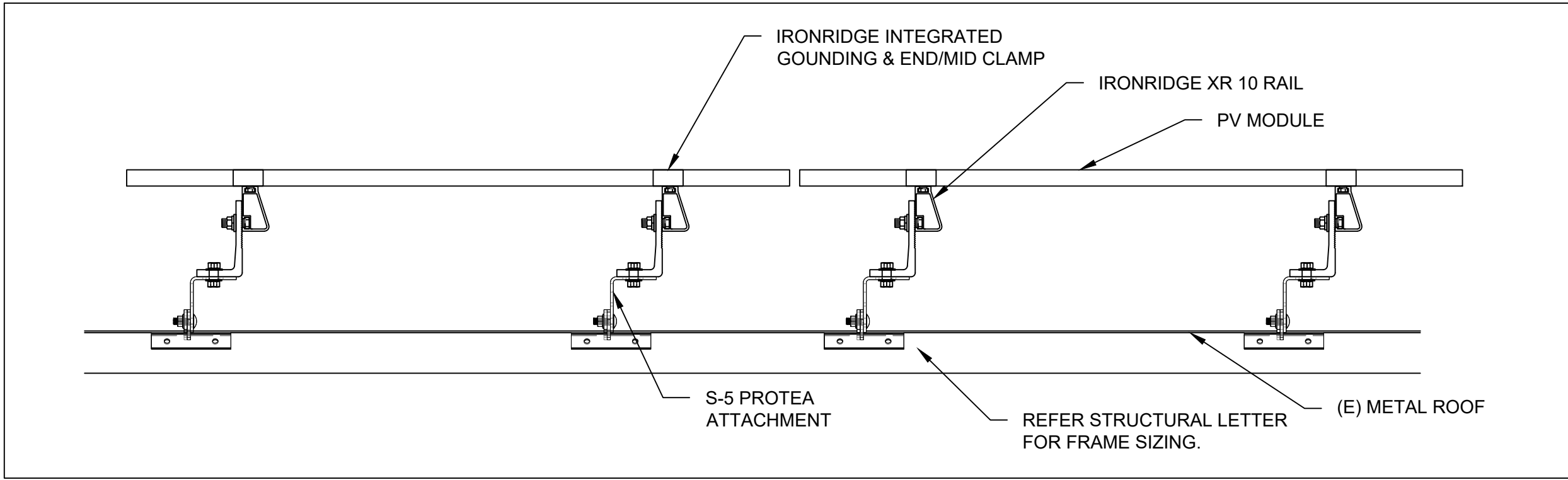
**ROBERT SHAFER
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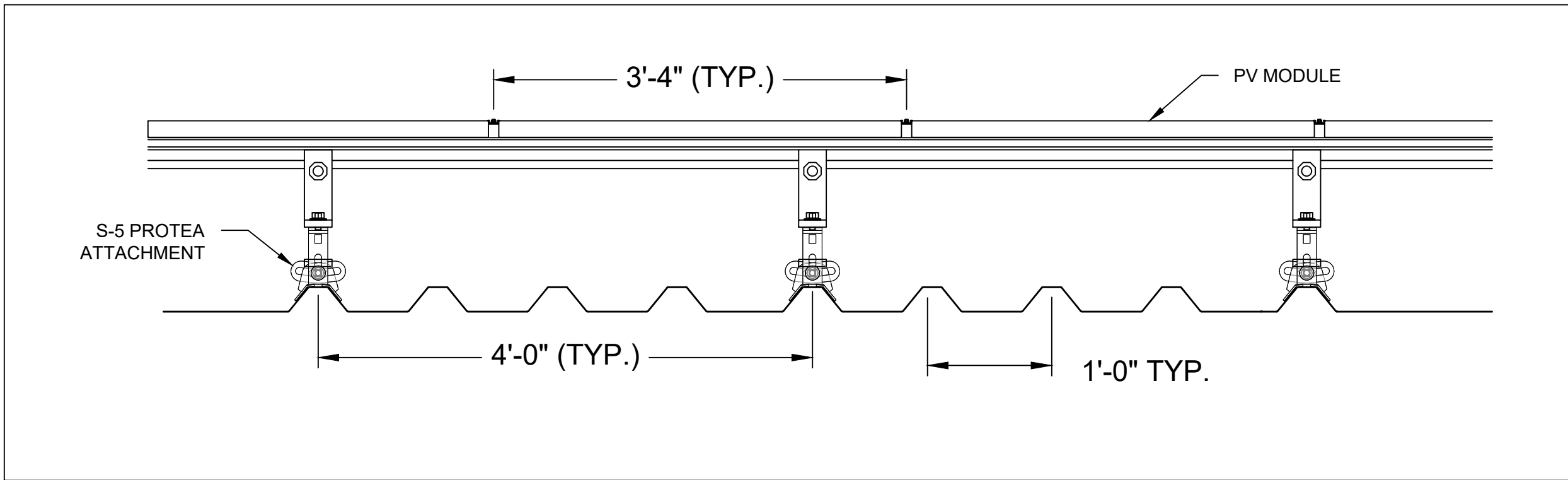
SHEET NAME
**ATTACHMENT
DETAIL**

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

SHEET NUMBER
PV-3

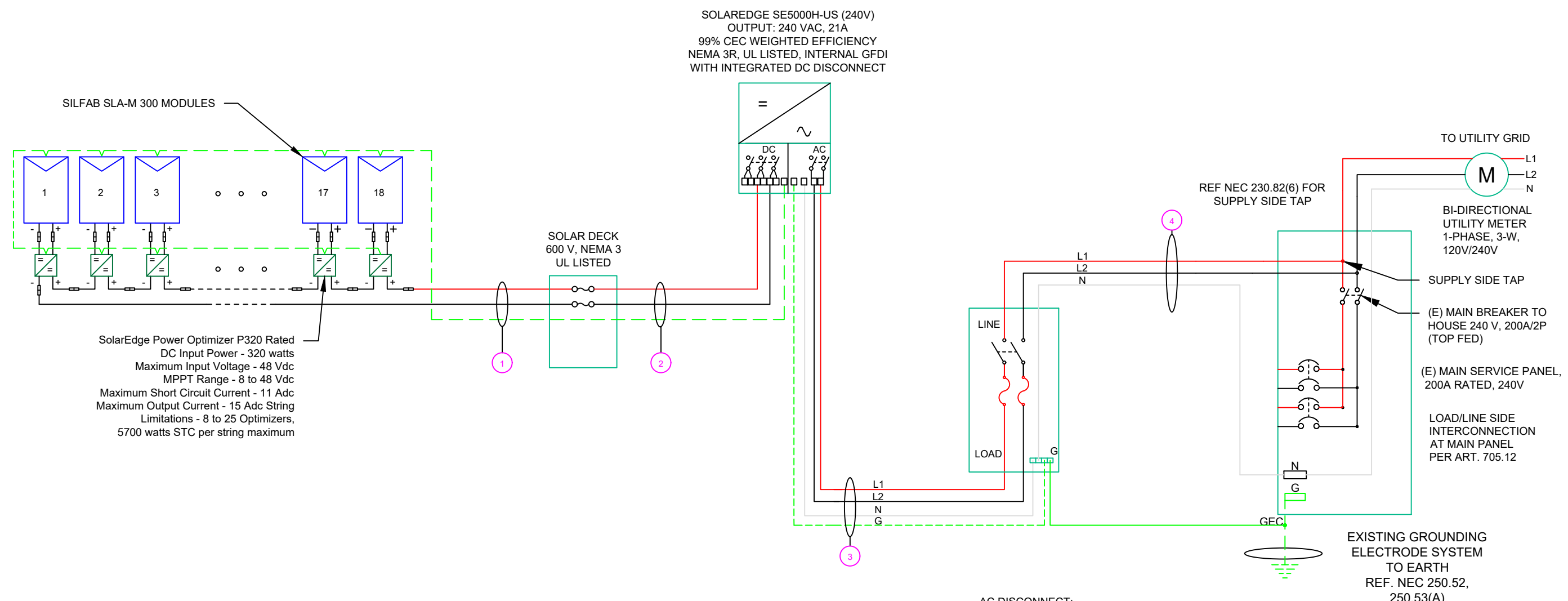


1 ATTACHMENT DETAIL
PV-3 SCALE: 1" = 1'-0"



2 ATTACHMENT DETAIL (enlarged view)
PV-3 SCALE: NTS

(18) SILFAB SLA-M 300 MODULES
 (1) STRING OF 18 MODULES
 CONNECTED IN SERIES



- ! WARNING: PHOTOVOLTAIC POWER SOURCE**
 LABEL 1
 ON ALL CONDUITS SPACED AT MAX 10FT
- ! CAUTION ! SOLAR ELECTRIC SYSTEM CONNECTED AND ENERGIZED**
 LABEL 2
 AT INVERTER
- ! WARNING ! SOLAR ELECTRIC SYSTEM CONNECTED AND ENERGIZED**
 LABEL 5
 AT EACH AC DISCONNECT
- ! WARNING ! DUAL POWER SOURCES SECOND SOURCE IS PV SYSTEM**
 LABEL 7
 AT MEP
- ! CAUTION ! SOLAR POINT OF INTERCONNECTION**
 LABEL 9
 AT UTILITY METER
- ! WARNING ! SOLAR SYSTEM CONNECTED AND ENERGIZED**
 LABEL 8
 AT MEP
- ! WARNING ! SOLAR SYSTEM CONNECTED AND ENERGIZED**
 LABEL 6
 AT EACH AC DISCONNECT
- ! WARNING ! THE SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM**
 LABEL 10
 AT UTILITY METER
- PHOTOVOLTAIC DC DISCONNECT**
 LABEL 4
 AT DC DISCONNECT
- PHOTOVOLTAIC AC DISCONNECT**
 LABEL 6
 AT EACH AC DISCONNECT

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(2)	#10AWG - PV WIRE/USE-2	N/A	N/A
(1)	#6AWG - BARE COPPER IN FREE AIR	N/A	N/A
(2)	#10AWG - THWN-2	EMT OR LFMC IN ATTIC	3/4"
(1)	#6AWG - THWN-2 GND	PVC, LFNC OR LFMC	3/4"
(3)	#6AWG - THWN-2	PVC, LFNC OR LFMC	3/4"
(1)	#6AWG - THWN-2 GND	PVC, LFNC OR LFMC	3/4"
(3)	#6AWG - THWN-2	PVC, LFNC OR LFMC	3/4"

SERVICE INFO	
UTILITY PROVIDER:	AMEREN ILLINOIS
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	
MAIN SERVICE PANEL:	200A
MAIN CIRCUIT BREAKER RATING:	200A
MAIN SERVICE LOCATION:	SOUTH
SERVICE FEED SOURCE:	UNDERGROUND

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DESCRIPTION	DATE	REV

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 MT VERNON, IL 62864.

DESIGNED BY
PHS

SHEET NAME
ELECTRICAL LINE DIAGRAM

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

SHEET NUMBER
PV-4

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	SILFAB SLA-M 300
VMP	32.8V
IMP	9.16A
VOC	39.85V
ISC	9.71A
TEMP. COEFF. VOC	-0.30%/°C
MODULE DIMENSION	64.96"L x 38.98"W x 1.49"D (In Inch)

INVERTER #1 SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREEDGE SE5000H-US
NOMINAL AC POWER	5.0 KW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	21A

POWER OPTIMIZER (OPTIMIZER P320-2NM4ARS)	
MAXIMUM INPUT POWER	320W
MINIMUM INPUT VOLTAGE	8 VDC
MAXIMUM INPUT VOLTAGE	48VDC
MAXIMUM MODULE ISC	11 ADC
MAXIMUM OUTPUT CURRENT	15 ADC

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN	EMT
.80	4-6	
.70	7-9	
.50	10-20	

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-11°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	56°
CONDUCTOR TEMPERATURE RATE	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.30%/°C

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX:

EXPECTED WIRE TEMP (In Celsius)	56°
TEMP. CORRECTION PER TABLE (310.16)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.750A
1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	40A
Result should be greater than (18.750A) otherwise less the entry for circuit conductor size and ampacity	

DC CONDUCTOR AMPACITY CALCULATIONS: FROM JUNCTION BOX TO INVERTER:

AMBIENT TEMPERATURE ADJUSTMENT FOR EXPOSED CONDUIT PER NEC 310.15(B)(2)(c)	+22°
EXPECTED WIRE TEMP (In Celsius)	34°+22° = 56°
TEMP. CORRECTION PER TABLE (310.16)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.750A
1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	40A
Result should be greater than (18.750A) otherwise less the entry for circuit conductor size and ampacity	

AC CONDUCTOR AMPACITY CALCULATIONS:

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE (310.16)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY	75A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B)	26.25 A
1.25 X MAX INVERTER OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
TEMP. CORRECTION PER TABLE (310.16) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	72A
Result should be greater than (26.25 A) otherwise less the entry for circuit conductor size and ampacity	



REVISIONS		
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**ROBERT SHAFER
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803 MEADOWBROOK ROAD,
MT VERNON, IL 62864.

DESIGNED BY

PHS

SHEET NAME

**WIRING
CALCULATIONS**

SHEET SIZE

**ANSI B
11" X 17"**

SHEET NUMBER

PV-5

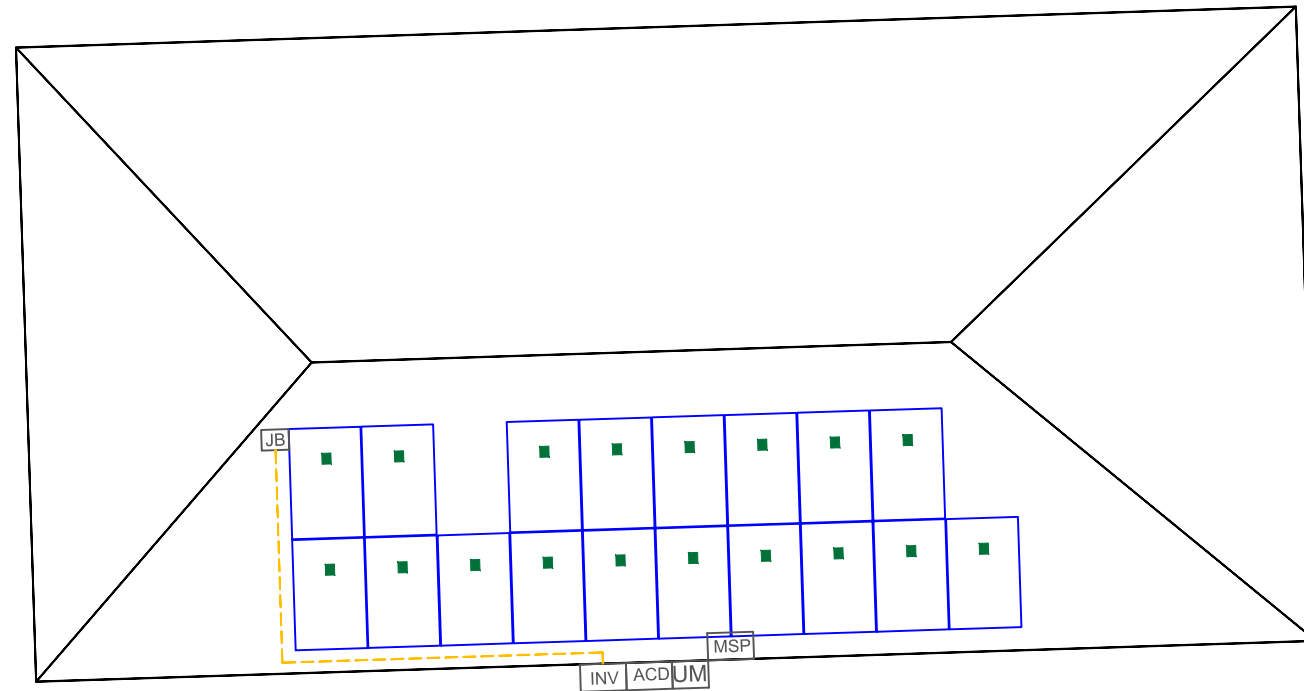
ELECTRICAL NOTES

- 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 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 G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- 10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

1-10 11-20 21-30 31-40 41-50 51-60

1
2
3
4
5
6
7
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9
10

SOLAREEDGE OPTIMIZER CHART



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SHEET NAME
**SOLAREEDGE
 OPTIMIZER CHART**

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

SHEET NUMBER
PV-6



SLA-M Monocrystalline



300 Wp 60 Cell Monocrystalline PV Module

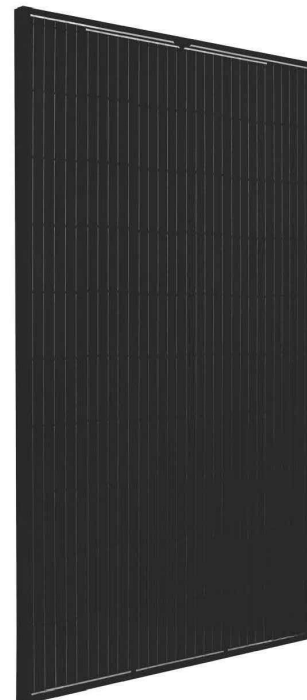
100% MAXIMUM POWER DENSITY
Silfab's SLA-M 300 ultra-high-efficiency modules are optimized for both Residential and Commercial projects where maximum power density is preferred.

100% NORTH AMERICAN QUALITY MATTERS

Silfab's fully-automated manufacturing facility ensures precision engineering is applied at every stage. Superior reliability and performance combine to produce one of the highest quality modules with the lowest defect rate in the industry.

NORTH AMERICAN CUSTOMIZED SERVICE

Silfab's 100% North American based team leverages just-in-time manufacturing to deliver unparalleled service, on-time delivery and flexible project solutions.



ENSURES MAXIMUM EFFICIENCY

60 of the highest efficiency, premium quality monocrystalline cells result in a maximum power rating of 300Wp.

ADVANCED PERFORMANCE WARRANTY

25-year linear power performance guarantee to 82%

ENHANCED PRODUCT WARRANTY

12-year product/workmanship warranty

BUILT BY INDUSTRY EXPERTS

With over 35 years of industry experience, Silfab's technical team are pioneers in PV technology and are dedicated to an innovative approach that provides superior manufacturing processes including: infra-red cell sorting, glass washing, automated soldering and meticulous cell alignment.

POSITIVE TOLERANCE

(-0/+5W) All positive module sorting ensures maximum performance

44 PPM DEFECT RATE*

Total automation ensures strict quality control during each step of the process at our certified ISO manufacturing facility.
*As of December 31, 2016

LIGHT AND DURABLE

Over-engineered to weather low load bearing structures up to 5400 Pa. Light-weight frame exclusively designed with wide-ranging racking compatibility and durability.

PID RESISTANT

Proven in accordance to IEC 62804-1

AVAILABLE IN

All Black



Electrical Specifications		SILFAB SLA Monocrystalline	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	300	227
Maximum power voltage (Vpmax)	V	32.8	29.5
Maximum power current (Ipmax)	A	9.16	7.69
Open circuit voltage (Voc)	V	39.85	36.9
Short circuit current (Isc)	A	9.71	7.96
Module efficiency	%	18.4	17.3
Maximum system voltage (VDC)	V		1000
Series fuse rating	A		15
Power Tolerance	Wp		+/- 1

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
• Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by +/- 1.

Temperature Ratings		SILFAB SLA Monocrystalline	
Temperature Coefficient Isc	%/K		0.03
Temperature Coefficient Voc	%/K		-0.30
Temperature Coefficient Pmax	%/K		-0.38
NOCT (± 2°C)	°C		45
Operating temperature	°C		-40/+85

Mechanical Properties and Components		SILFAB SLA Monocrystalline	
Module weight (± 1 kg)	kg		19
Dimensions (H x L x D; ± 1mm)	mm		1650 x 990 x 38
Maximum surface load (wind/snow)*	N/m ²		5400
Hail impact resistance			Ø 25 mm at 83 km/h
Cells			60 - Si monocrystalline - 4 or 5 busbar - 156.75 x 156.75 mm
Glass			3.2 mm high transmittance, tempered, antireflective coating
Backsheet			Multilayer polyester-based
Frame			Anodized Al
Bypass diodes			3 diodes-45V/12A, IP67/IP68
Cables and connectors (See installation manual)			1200 mm Ø 5.7 mm (4 mm ²), MC4 compatible

Warranties		SILFAB SLA Monocrystalline	
Module product warranty			12 years
			25 years
			≥ 97% end of 1 st year
			≥ 90% end of 12 th year
			≥ 82% end of 25 th year
Linear power performance guarantee			

Certifications		SILFAB SLA Monocrystalline	
Product			ULC ORD C1703, UL 1703, IEC 61215, IEC 61730, IEC 61701, CEC listed
			UL Fire Rating: Type 2 (Type 1 on request)
Factory			ISO 9001:2008



Warning: Read the installation and User Manual before handling, installing and operating modules.

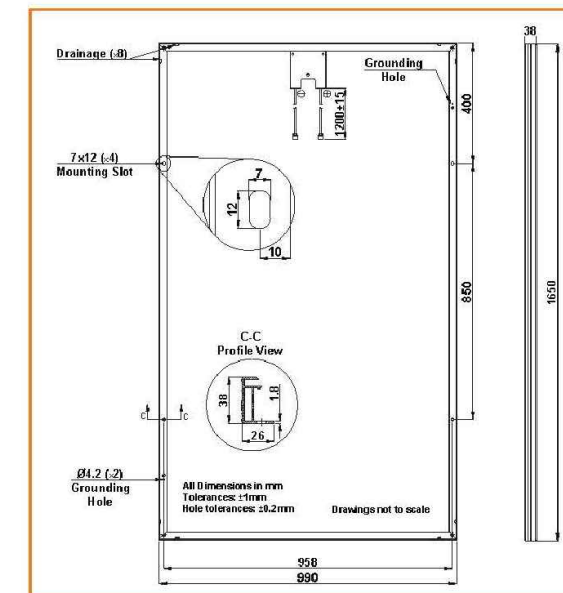
Third-party generated pan files from PV Evolution Labs available for download at:
www.silfab.ca/downloads



- Pallet Count: 26
- Container Count: 936



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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

Single Phase Inverter with HD-Wave Technology

for North America

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



12-25
YEAR
WARRANTY

INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

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

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER								SEXXXXH-XXXXXBXX4
OUTPUT								
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 ⁰⁾							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							
INPUT								
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 ⁽²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k _a Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional ⁽³⁾							
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							
STANDARD COMPLIANCE								
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							
INSTALLATION SPECIFICATIONS								
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			in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6			lb / kg	
Noise	< 25				< 50			dBA
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁴⁾							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							



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REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 08/26/2019

PROJECT NAME & ADDRESS

ROBERT SHAFER
RESIDENCE
803 MEADOWBROOK ROAD,
MT VERNON, IL 62864.

DESIGNED BY

PHS

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8



Power Optimizer

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

www.solaredge.us



Power Optimizer

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)	
INPUT						
Rated Input DC Power ⁽¹⁾	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					%
Weighted Efficiency	98.8			98.6		%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)						
Maximum Output Current	60		15		85	Adc
Maximum Output Voltage						Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
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	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 ⁽²⁾					
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					C / F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

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

⁽²⁾ For other connector types please contact SolarEdge.

PV SYSTEM DESIGN USING A SOLAREEDGE INVERTER ⁽³⁾⁽⁴⁾	SINGLE PHASE HD-WAVE		SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
	P320, P370, P400 (Power Optimizers)	P405 / P505 (Power Optimizers)				
Minimum String Length	8	6		10	18	
Maximum String Length	25	25		25	50 ⁽⁵⁾	
Maximum Power per String	5700 (6000 with SE7600-US - SE11400-US)	5250	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations	Yes					

⁽¹⁾ For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf.

⁽²⁾ It is not allowed to mix P405/P505 with P320/P370/P400/P600/P700/P800 in one string.

⁽³⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.



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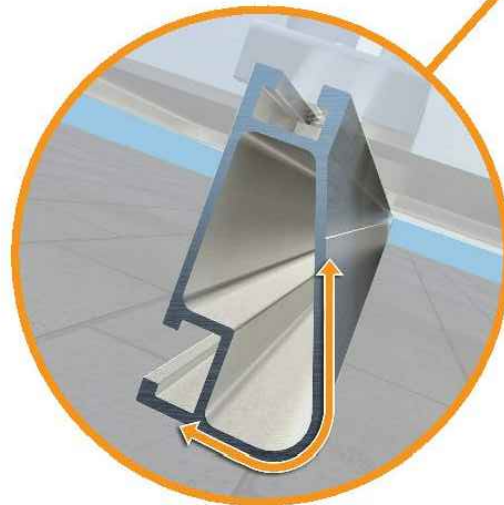
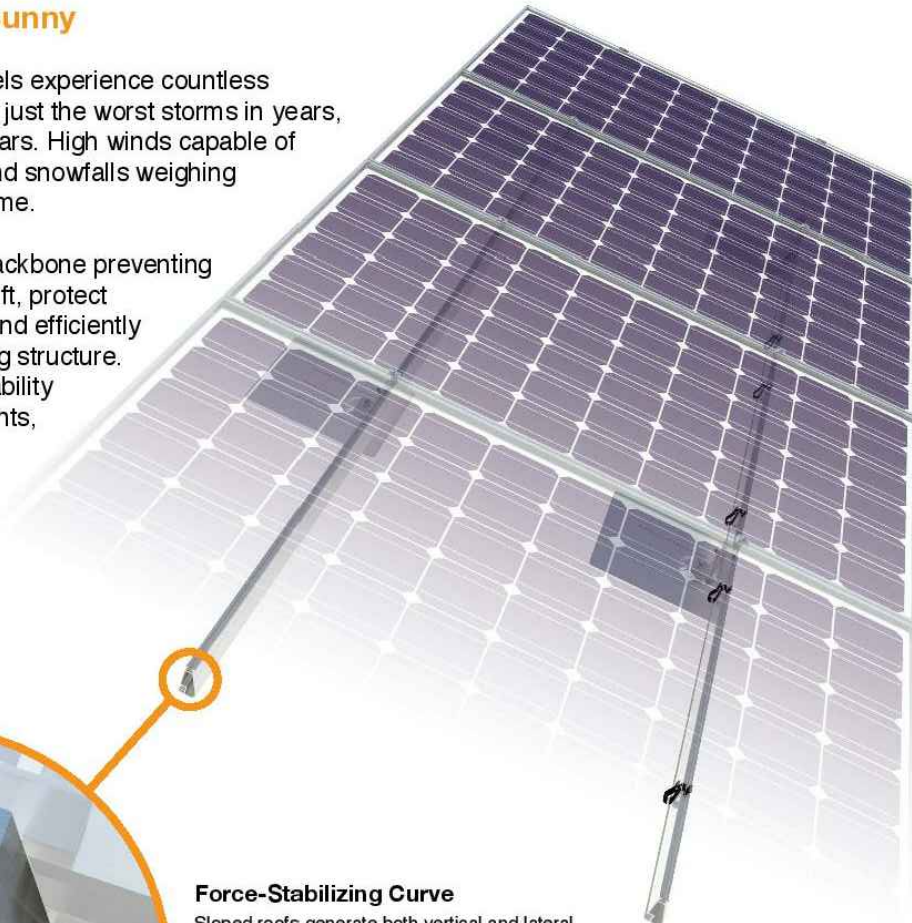
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail: XR10		Flush Mount System Span Table (inches) Portrait Installation (Maximum Module Length 67.5") Exposure C																													
Wind Speed (mph)	Roof Slope (degs.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf		
		Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
110	0-7	83	72	55	81	72	55	68	68	55	67	67	55	60	60	55	54	54	54	50	50	50	46	46	46	43	43	43	41	41	41
	8-27	85	72	56	80	72	56	67	67	56	66	66	56	60	60	56	54	54	54	50	50	50	46	46	46	43	43	43	41	41	41
	28-45	81	79	79	76	76	76	66	66	66	65	65	65	61	61	61	57	57	57	53	53	53	50	50	50	47	47	47	45	45	45
115	0-7	84	66	53	81	66	53	68	66	53	67	66	53	60	60	53	54	54	53	50	50	50	46	46	46	43	43	43	41	41	41
	8-27	84	66	54	80	66	54	67	66	54	66	66	54	60	60	54	54	54	53	50	50	50	46	46	46	43	43	43	41	41	41
	28-45	79	76	76	74	74	74	65	65	65	64	64	64	60	60	60	56	56	56	53	53	53	50	50	50	47	47	47	45	45	45
120	0-7	81	64	50	81	64	50	68	64	50	67	64	50	60	60	50	54	54	50	50	50	46	46	46	43	43	43	41	41	41	
	8-27	84	64	51	80	64	51	67	64	51	66	64	51	60	60	51	54	54	51	50	50	50	46	46	46	43	43	43	41	41	41
	28-45	76	73	73	73	73	73	64	64	64	64	64	64	59	59	59	55	55	55	52	52	52	50	50	50	47	47	47	45	45	45
130	0-7	77	58	46	77	58	46	68	58	46	67	58	46	60	58	46	54	54	46	50	50	46	46	46	46	43	43	43	41	41	41
	8-27	80	59	47	79	59	47	66	59	47	65	59	47	60	58	47	54	54	47	50	50	47	46	46	46	43	43	43	41	41	41
	28-45	72	68	68	72	68	68	64	64	64	61	61	61	57	57	57	54	54	54	51	51	51	49	49	49	47	47	47	45	45	45
140	0-7	73	54	43	73	54	43	68	54	43	67	54	43	60	54	43	54	54	43	50	50	43	46	46	43	43	43	41	41	41	
	8-27	74	54	44	74	54	44	65	54	44	64	54	44	59	54	44	54	54	44	50	50	44	46	46	44	43	43	43	41	41	41
	28-45	67	64	64	67	64	64	60	60	60	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	46	46	46	44	44	44
150	0-7	68	50	40	68	50	40	68	50	40	67	50	40	60	50	40	54	50	40	50	50	40	46	46	40	43	43	40	41	41	40
	8-27	72	51	41	72	51	41	64	51	41	64	51	41	57	51	41	53	51	41	50	50	41	46	46	41	43	43	41	41	41	41
	28-45	64	59	59	64	59	59	58	58	58	57	57	57	54	54	54	51	51	51	49	49	49	47	47	47	45	45	45	43	43	43
160	0-7	64	48	38	64	48	38	64	48	38	64	48	38	60	48	38	54	48	38	50	48	38	46	46	38	43	43	38	41	41	38
	8-27	65	48	39	65	48	39	64	48	39	61	48	39	56	48	39	53	48	39	49	48	39	46	46	39	43	43	39	41	41	39
	28-45	60	55	55	60	55	55	56	55	55	55	55	55	52	52	52	50	50	50	48	48	48	46	46	46	44	44	44	42	42	42
170	0-7	60	44	35	60	44	35	60	44	35	60	44	35	60	44	35	54	44	35	50	44	35	46	44	35	43	43	35	41	41	35
	8-27	61	45	36	61	45	36	61	45	36	60	45	36	55	45	36	52	45	36	49	45	36	46	45	36	43	43	36	41	41	36
	28-45	57	52	52	57	52	52	54	52	52	54	52	52	51	51	51	48	48	48	46	46	46	45	45	45	43	43	43	42	42	42
180	0-7	56	42	33	56	42	33	56	42	33	56	42	33	56	42	33	54	42	33	50	42	33	46	42	33	43	42	33	41	41	33
	8-27	58	42	34	58	42	34	58	42	34	58	42	34	54	42	34	51	42	34	48	42	34	46	42	34	43	42	34	41	41	34
	28-45	54	50	50	54	50	50	52	50	50	52	50	50	49	49	49	47	47	47	45	45	45	44	44	44	42	42	42	41	41	41

Legend: Green = min 72" span, Blue = min 64" span, Yellow = min 48" span, Grey = Note: additional installation requirement on UFO middle clamps. Please refer to Note 10 on Page 2 for details.

REV 5/09/2018

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 DATE: 08/26/2019

PROJECT NAME & ADDRESS

ROBERT SHAFER RESIDENCE
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DESIGNED BY

PHS

SHEET NAME

EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B 11" X 17"

SHEET NUMBER

PV-10

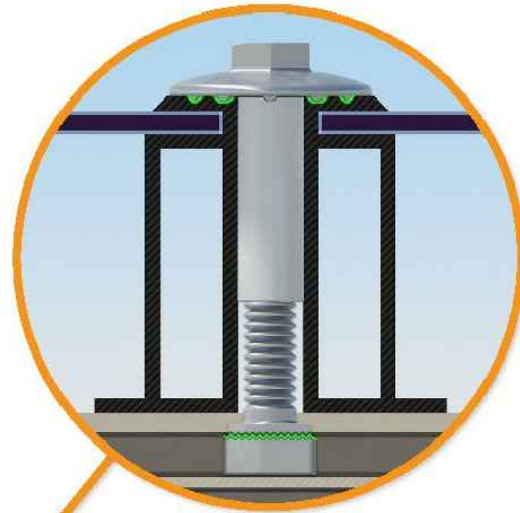


UFO Family of Components

Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

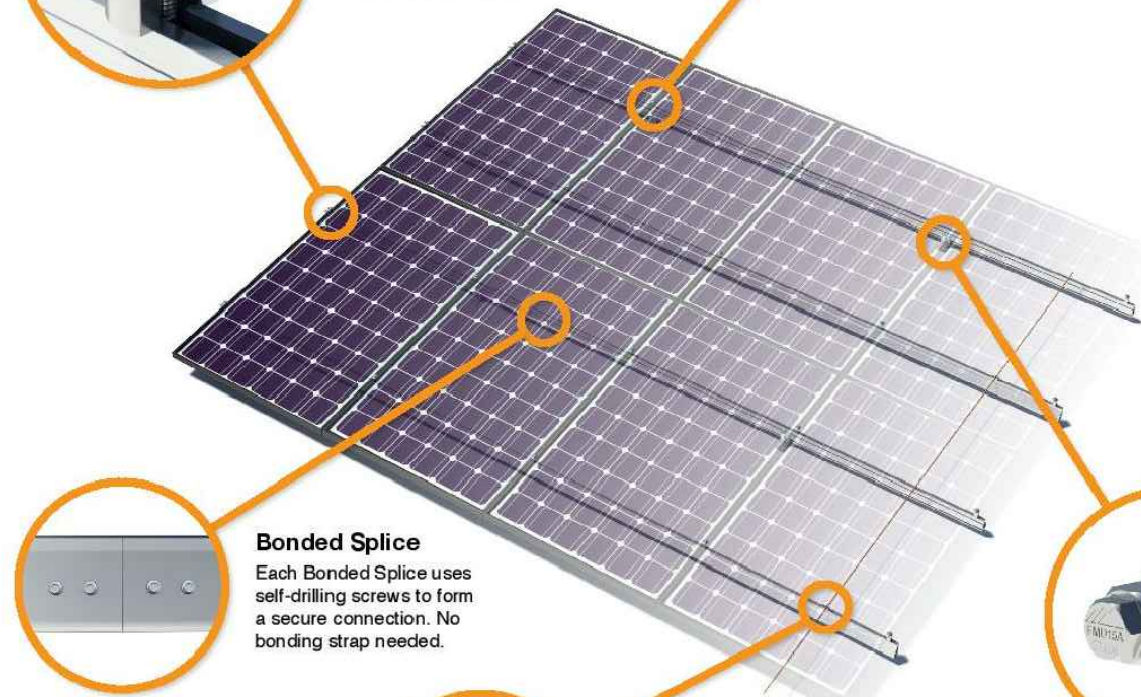
UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



Bonded Splice
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

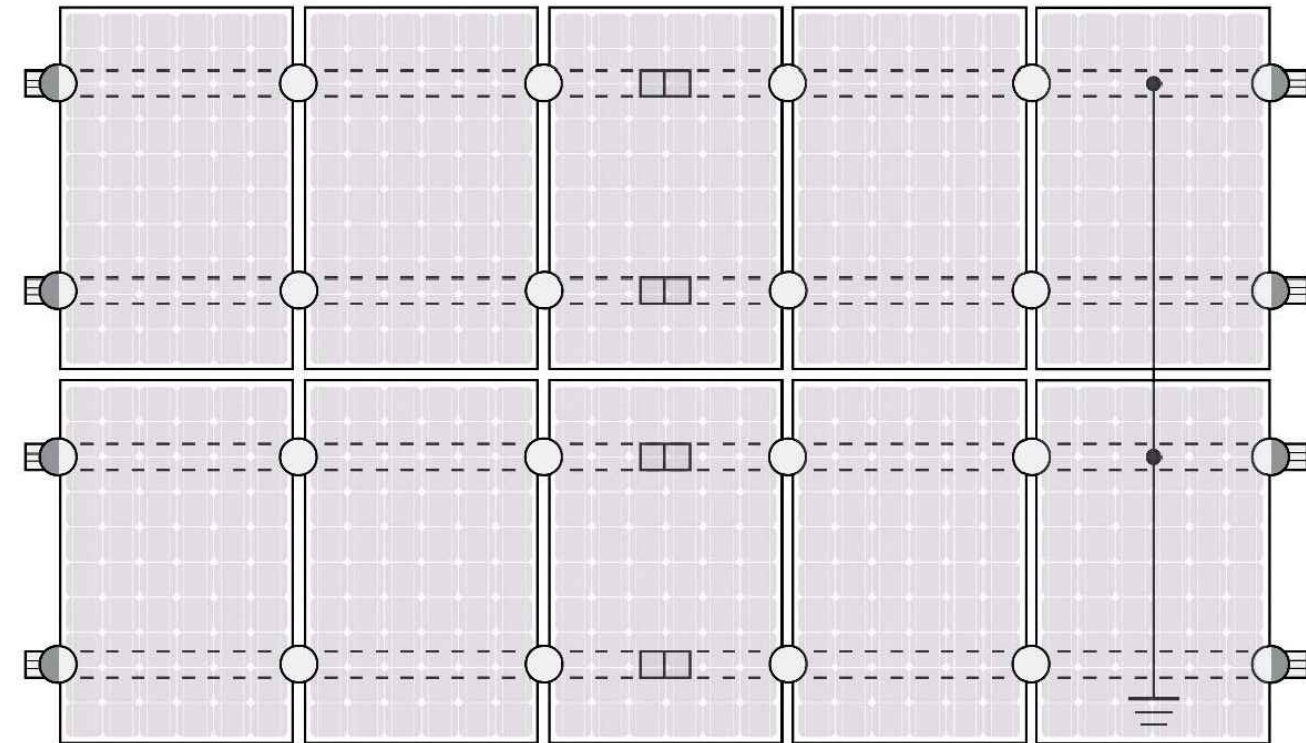


Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



Bonded Attachments
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

System Diagram



○ UFO ◐ Stopper Sleeve ● Grounding Lug ◻ Bonded Splice ≡ Ground Wire

⚠ Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to IronRidge.com/UFO

Feature	Cross-System Compatibility		
	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		



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**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-11

S-5!®

The Right Way

The right way to attach almost anything to metal roofs!

ProteaBracket™

ProteaBracket™ is the most versatile attachment solution on the market, fitting most metal trapezoidal and "continuous" tile sheet profiles with and without intermediate insulation. It features an adjustable attachment base and multiple solar module attachment options (illustrated on back) to accommodate varying widths and heights. There are no messy sealants to apply and no chance for leaks; the ProteaBracket comes with factory-applied, adhesive rubber sealant to ensure quick installation and a weather-proof fit.

The ProteaBracket is mounted directly onto the crown of the panel, straddling the profile. No surface preparation is necessary; simply wipe away excess oil and debris, align, and apply. Secure ProteaBracket through all 4 pre-punched holes.

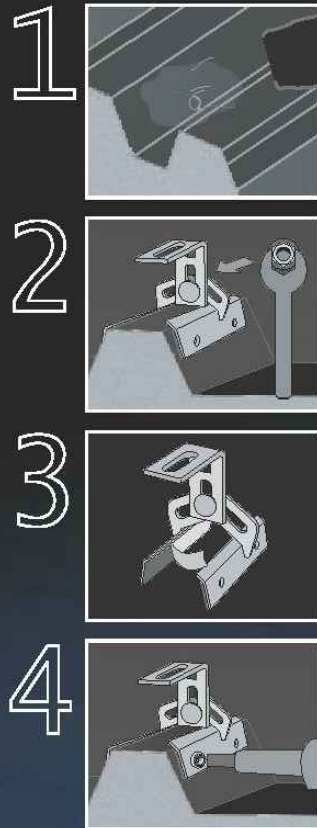
ProteaBracket is the perfect match for the S-5-PV Kit, for a solar attachment solution that is both economical and easy to use.

S-5!® ProteaBracket™ is a versatile bracket that adjusts easily to most trapezoidal roof profiles.

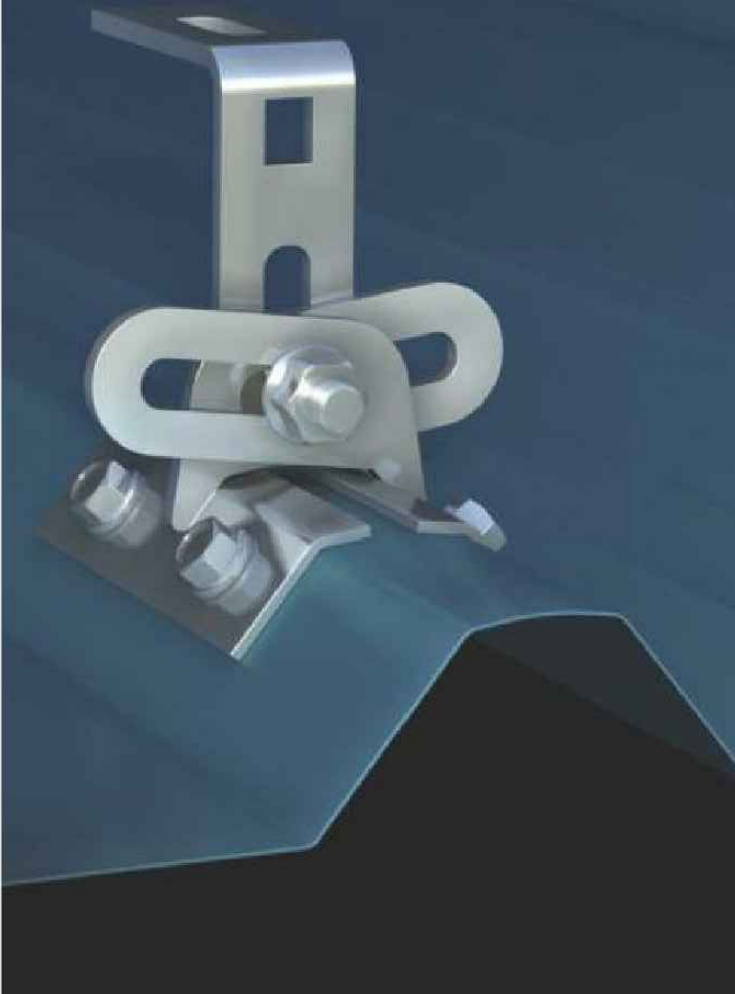
S-5! PV kits have an M8 bolt and are suitable for use with all S-5! clamps except

- Standard size K-Grip

The above uses M10 bolts for heavier duty applications, and is suitable for use with rail-mounted PV systems.



ProteaBracket™



S-5!®

The Right Way

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal exposed-fastened metal roof profiles. No messy sealants to apply: the factory-applied adhesive rubber sealant weather-proofs and makes installation easy.

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

Each ProteaBracket™ comes with a factory-applied, adhesive rubber sealant on the base. A structural A2 stainless steel bimetal attachment bracket, ProteaBracket is compatible with most common metal roofing materials.

All four pre-punched holes must be used to achieve tested strength. For design assistance, contact Safintra South Africa (and see our website www.safintra.co.za), 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 S-5! website for more information including metallurgical compatibilities and specifications.

Multiple Attachment Options:

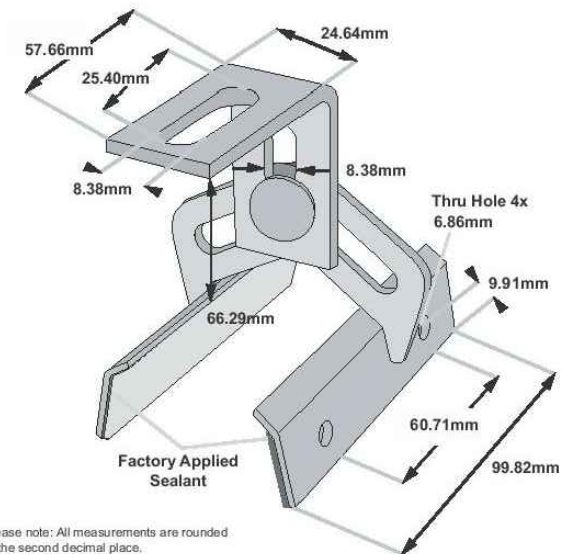
ProteaBracket™ with Top Rail option for PV attachment



ProteaBracket™ with S-5-PV Kit option (if not using a rail)



ProteaBracket™



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

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

Copyright 2013, Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! Aggressively protects its patents, trademarks and copyrights.

Published April 2014

Sole Agents for Africa:



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SHEET NUMBER

PV-11(2)