HISTORIC AND DESIGN REVIEW COMMISSION

July 17, 2019

HDRC CASE NO:	**2019-381**
ADDRESS:	534 MISSION ST
LEGAL DESCRIPTION:	NCB 2878 BLK 3 LOT 18
ZONING:	RM-4,H
CITY COUNCIL DIST.:	1
DISTRICT:	King William Historic District
APPLICANT:	Curtis Muller
OWNER:	THOMAS JOSHUA & JERNIGAN MEGAN H
TYPE OF WORK:	Installation of solar panels
APPLICATION RECEIVED:	June 11, 2019
60-DAY REVIEW:	August 10, 2019
CASE MANAGER:	Stephanie Phillips

REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to:

1. Install sixteen (16) solar panels on the primary structure.
2. Install ten (10) solar panels on the rear accessory structure.

APPLICABLE CITATIONS:

Historic Design Guidelines, Chapter 3,Guidelines for Additions

6. Designing for Energy Efficiency
C. SOLAR COLLECTORS
i. *Location*—Locate solar collectors on side or rear roof pitch of the primary historic structure to the maximum extent feasible to minimize visibility from the public right-of-way while maximizing solar access. Alternatively, locate solar collectors on a garage or outbuilding or consider a ground-mount system where solar access to the primary structure is limited.
ii. *Mounting (sloped roof surfaces)*—Mount solar collectors flush with the surface of a sloped roof. Select collectors that are similar in color to the roof surface to reduce visibility.
iii. *Mounting (flat roof surfaces)*—Mount solar collectors flush with the surface of a flat roof to the maximum extent feasible. Where solar access limitations preclude a flush mount, locate panels towards the rear of the roof where visibility from the public right-of-way will be minimized.

FINDINGS:

a. The primary structure located at 534 Mission St is a 1-story single family home constructed circa 1928 in the Craftsman Bungalow style. The home features a primary side gable roof with a front dormer, a prominent full-width front porch, multi-lite wood windows, and battered columns. The structure is contributing to the King William Historic District.
b. LOCATION – The applicant is requesting approval to install 16 solar panels on the east (rear) and south portions of the roof of the primary structure and 10 solar panels on the rear accessory structure. No panels will be located on the front façade of the primary structure. According to the Historic Design Guidelines for Additions 6.C.i, solar collectors should be located on a side or rear roof pitch to the maximum extent possible to minimize the visibility from the public right-of-way. While the panels on the primary structure will be visible from Barbe St, staff finds the proposed location appropriate given their placement behind the front side gable and the site-specific restrictions regarding efficient placement for maximum sun exposure.
c. PITCH – The panels will be installed flush with the roof pitch. Staff finds the proposal consistent with the Guidelines.

RECOMMENDATION:

Staff recommends approval based on findings a through c with the following stipulations:

i. That the solar panels maintain at least 18” of separation from the roof eaves.

City of San Antonio One Stop

April 9, 2019

User drawn lines

CoSA Addresses

BCAD Parcels

1:1,000

0 0.01 0.02 0.04 mi

0 0.0175 0.035 0.07 km


TEXAS
LBD-6598

LOCATION MAP

N

(N) AXITECH AC-300M/156-60S PV MODULE

(EXISTING) UTILITY METER/PANELBOARD & INTERCONNECTION

(N) PRODUCTION METER
(N) PV AC DISCONNECT (RAPID SHUTDOWN)
(N) SOLAREDGE SE7600H-US INVERTER

MISSION STREET

BARBE STREET

BARBE STREET

MISSION STREET

THOMAS RESIDENCE

534 MISSION ST
SAN ANTONIO,
TX 78210

UTILITY: CPS

PHOTOVOLTAIC PROJECT INFO

PV MODULE:
(25) AXITECH AC-300M/156-60S

INVERTER:
SOLAREDGE SE7600H-US

7.5 kW (DC) / 7.5 kW (AC)

ARRAY AZIMUTH: 68, 158, 248°
ARRAY TILT: 20°

NEC 2017 / IRC 2015 / IBC 2015

Veteran SOLAR

VETERAN SUPPLY SERVICES, LLC
DBA VETERAN SOLAR

4242 WOODCOCK DRIVE
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(512) 953-3450

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Joshua Berrad
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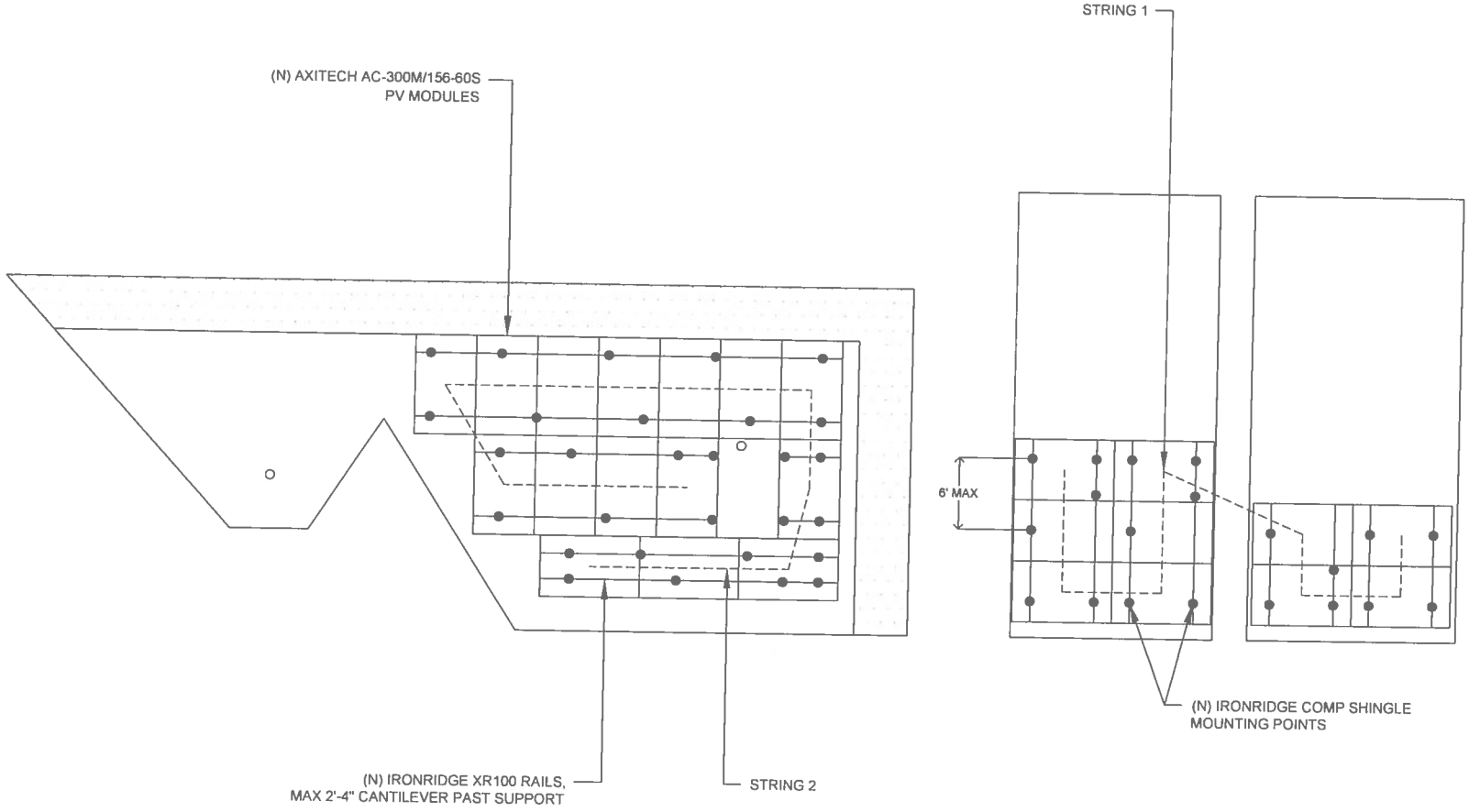
3' FIRECODE SETBACK

COVER SHEET



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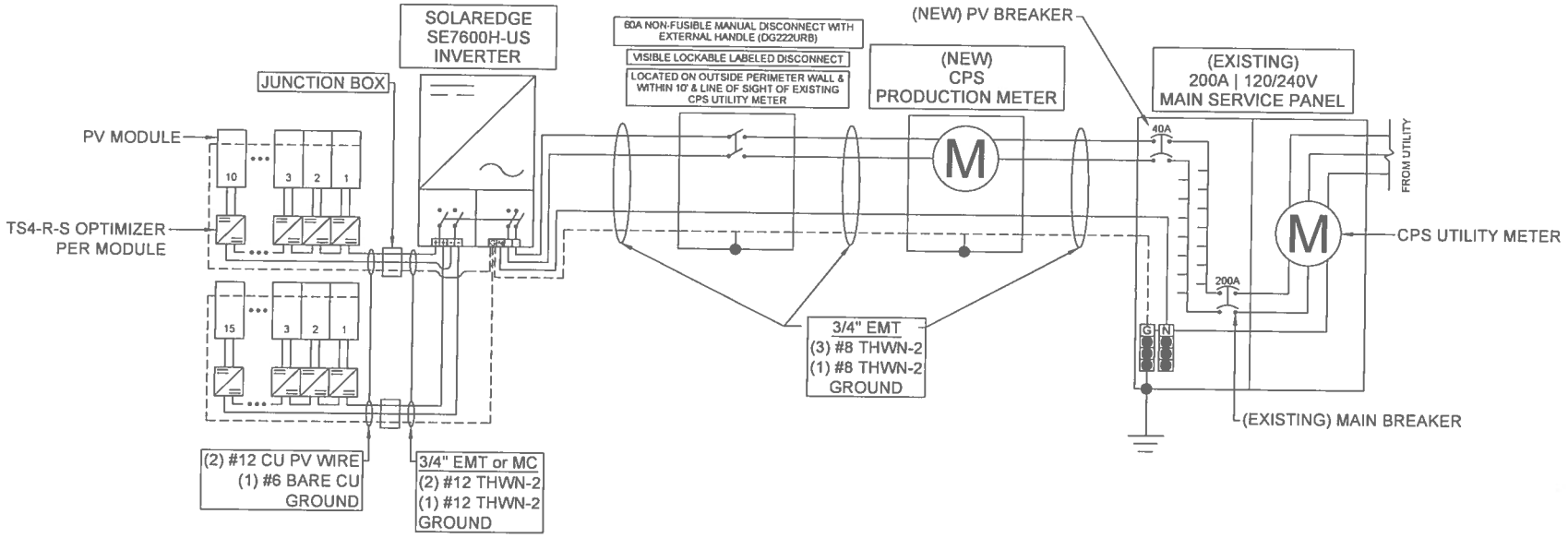
ROOF LAYOUT PLAN



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PV MODULES - UL 1703

MANUFACTURER: AXITECH

MODEL: AC-300M/156-60S

ELECTRICAL SPECIFICATIONS

RATED POWER OUTPUT @STC	300W
OPEN CIRCUIT VOLTAGE (VOC)	40.0V
MAX POWER VOLTAGE (VMP)	32.6V
SHORT CIRCUIT CURRENT (ISC)	9.94A
MAX POWER CURRENT (IMP)	9.37A
VOC CORRECTION FACTOR (%/deg C)	-0.39%
VMP/PMP CORRECTION FACTOR	-0.29%

INVERTER - UL 1741

MANUFACTURER: SOLAREDGE

MODEL : SE7600H-US

ELECTRICAL SPECIFICATIONS

MAX POWER OUTPUT	7600WAC
NOMINAL VOLTAGE	240VAC
EFFICIENCY	99%
MAX INPUT VOLTAGE	480VDC
MAX INPUT CURRENT	20ADC
MAX OUTPUT CURRENT	32AAC

POWER OPTIMIZER - UL 1741

MANUFACTURER: SOLAREDGE

MODEL : TS4-R-S

ELECTRICAL SPECIFICATIONS

RATED INPUT DC POWER	320WDC
MAX INPUT VOLTAGE	48VDC
MAX INPUT CURRENT	13.75ADC
MAX OUTPUT VOLTAGE	60VDC
MAX OUTPUT CURRENT	15ADC

PV MODULE COUNT: 25
SYSTEM SIZE (KW DC): 7.5kW
SYSTEM SIZE (KW AC): 7.5kW

TOTAL SYSTEM OUTPUT VOLTS: 240VAC
TOTAL SYSTEM OUTPUT AMPS: 40AAC

BUSBAR RATING: 200A
MAIN BREAKER RATING: 200A

ELECTRICAL SCHEMATIC

PV SYSTEM DC DISCONNECT
(2017 NEC ARTICLE: 690.53)

MAXIMUM VOLTAGE	480 VDC
MAXIMUM CIRCUIT CURRENT	15 ADC
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)	15 ADC

PV SYSTEM AC DISCONNECT
(2017 NEC ARTICLE: 690.13 (B))

PV SYSTEM AC DISCONNECT	
RATED AC OUTPUT CURRENT:	40 AAC
NOMINAL OPERATING AC VOLTAGE:	240 VAC

PV METER SOCKET

PV METER

CPS ENERGY REVENUE METER SOCKET

REVENUE METER

INVERTER OUTPUT CONNECTION
(2017 NEC ARTICLE: 705.12 (B)(2)(3)(b))

WARNING: INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

RAPID SHUTDOWN SWITCH:
(2017 NEC ARTICLE 690.12 (C))

RAPID SHUTDOWN SWITCH FOR SOLAR SYSTEM

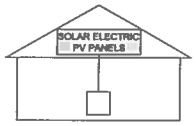
RACEWAYS/ENCLOSURES CONTAINING
DC CONDUCTORS:

WARNING: PHOTOVOLTAIC POWER SOURCE

SYSTEMS THAT SHUTDOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY.

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



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ELECTRICAL SCHEMATIC

- EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER MANUFACTURER'S REQUIREMENTS. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.

- ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER & SUNLIGHT RESISTANT, & CANNOT BE HANDWRITTEN (NEC110.21 (B)).

- DC CONDUCTORS SHALL BE RUN IN EMT AND SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIV. EVERY 5 FT.

- EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A).

- CONFIRM LINE SIDE VOLTAGE AT ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.

- OUTDOOR EQUIPMENT SHALL BE NEMA-3R RATED OR BETTER.

- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

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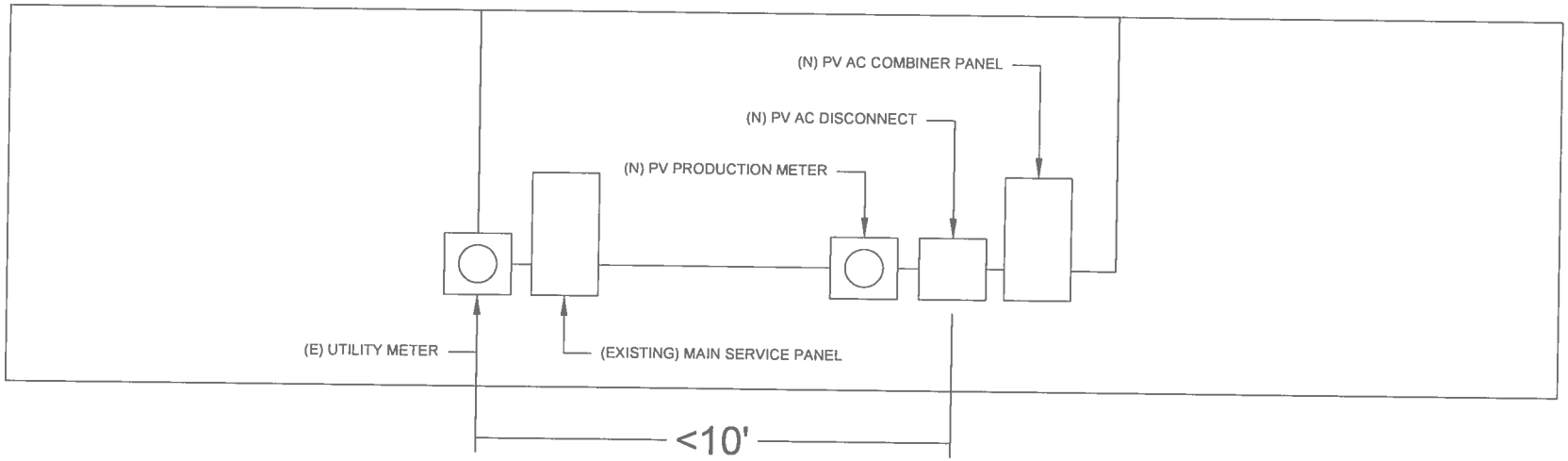
ADDITIONAL NOTES



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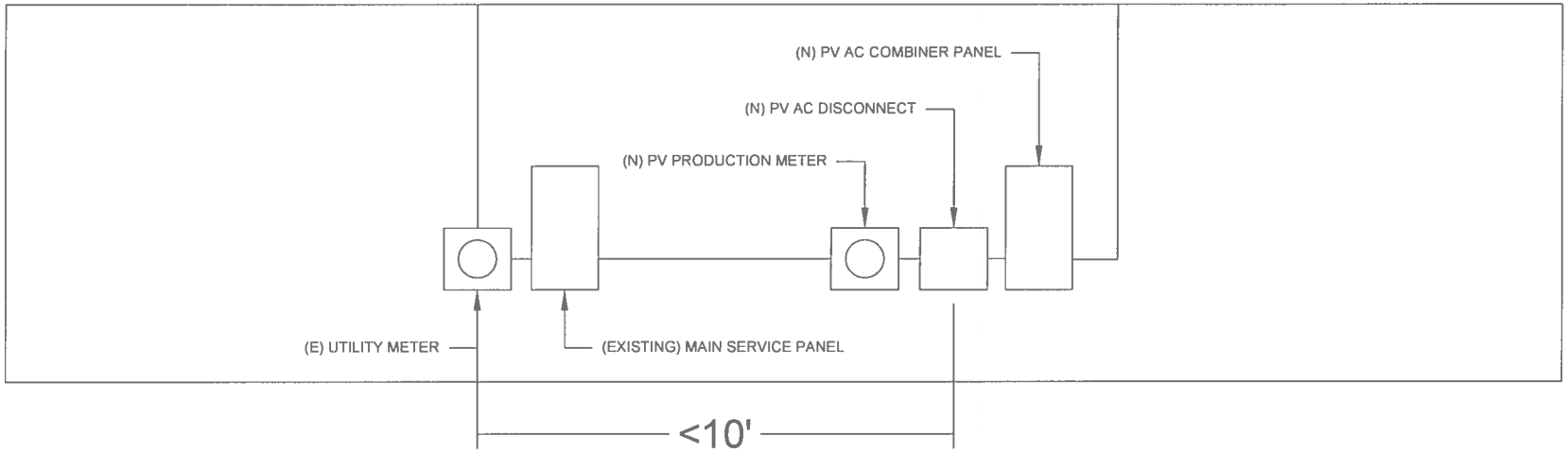
ELEVATION DIAGRAM



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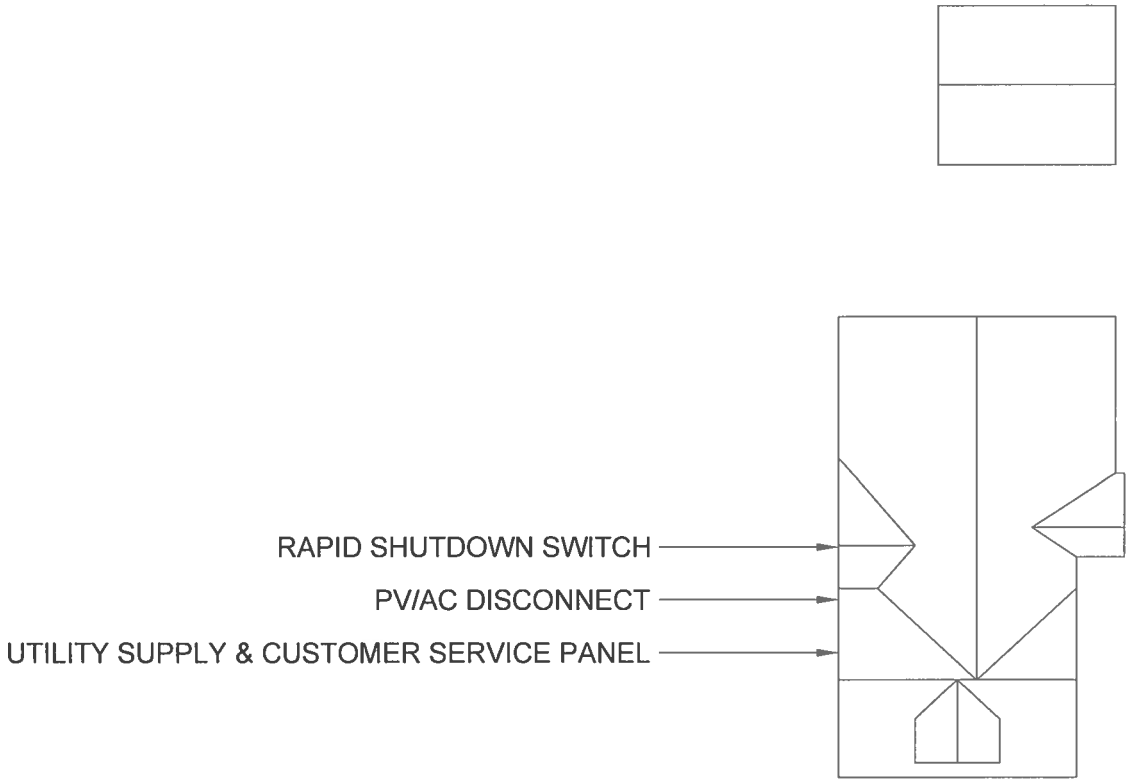
ELEVATION DIAGRAM

CUSTOMER SERVICE PANEL; PV/AC DISCONNECT AND RAPID SHUTDOWN SWITCH: 2017 NEC ARTICLE 705.10

CAUTION

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



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DIRECTIONAL PLACARD

AC-280M/156-60S AC-300M/156-60S
AC-285M/156-60S AC-305M/156-60S
AC-290M/156-60S AC-310M/156-60S
AC-295M/156-60S

www.axitecsolar.com

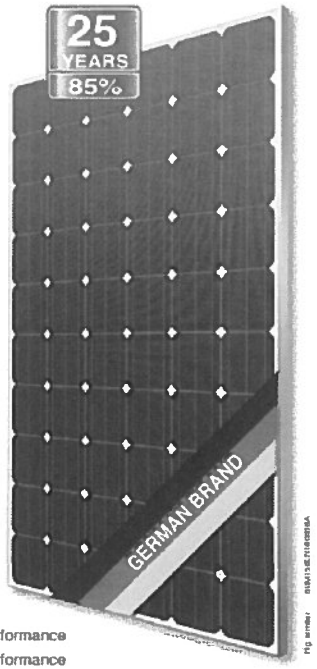
AXITEC
high quality german solar brand

AXIpremium

60 cell monocrystalline
High performance solar module

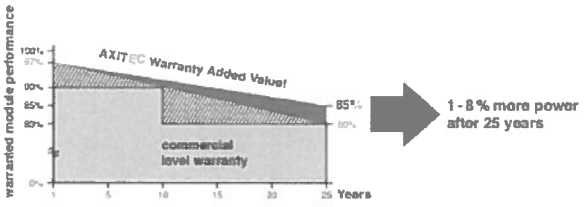
The advantages:

- 15 years manufacturer's warranty
- Highest performance due to specifically selected technologies and materials
- Guaranteed positive power tolerance from 0-5 Wp by individual measurement
- Maximum 5400 Pa snow load
- 100% electroluminescence inspection
- High stability due to AXITEC-Soft-Grip-Seam aluminium frame construction
- High quality junction box and connector systems



Exclusive linear AXITEC high performance guarantee!

- 15 years manufacturer's guarantee on 90% of the nominal performance
- 25 years manufacturer's guarantee on 85% of the nominal performance



1 - 8 % more power after 25 years

AXI premium

AC-280M/156-60S AC-300M/156-60S
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AC-295M/156-60S

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AXITEC
high quality german solar brand

CE

Electrical data (at standard conditions (STC) irradiance 1000 watt/m², spectrum AM 1,5 at a cell temperature of 25°C)

Type	Nominal output Pmpp	Nominal voltage Umpp	Nominal current Impp	Short circuit current Isc	Open circuit voltage Uoc	Module conversion efficiency
AC-280M/156-60S	280 Wp	31.50 V	8.95 A	9.55 A	39.45 V	17.21 %
AC-285M/156-60S	285 Wp	31.59 V	9.00 A	9.68 A	39.56 V	17.52 %
AC-290M/156-60S	290 Wp	31.71 V	9.16 A	9.70 A	39.70 V	17.83 %
AC-295M/156-60S	295 Wp	31.80 V	9.28 A	9.76 A	39.85 V	18.13 %
AC-300M/156-60S	300 Wp	32.16 V	9.34 A	9.82 A	40.08 V	18.44 %
AC-305M/156-60S	305 Wp	32.49 V	9.39 A	9.89 A	40.14 V	18.75 %
AC-310M/156-60S	310 Wp	32.88 V	9.43 A	9.98 A	40.22 V	19.05 %

Design

Frontside	3,2 mm hardened, low-reflection white glass
Cells	60 monocrystalline high efficiency cells 156 mm x 156 mm (6")
Backside	Composite film
Frame	35 mm silver anodized aluminium frame

Mechanical data

L x W x H	1640 x 992 x 35 mm
Weight	18.0 kg with frame

Power connection

Socket	Protection Class IP67 (3 bypass diodes)
Wire	approx. 1,1 m, 4 mm²
Plug in system	Plug/socket IP67

Limit values

System voltage	1000 VDC
NOCT (nominal operating cell temperature)*	45°C ± 2K
Max. load-carrying capacity	5400 N/m²
Reverse current load IR	16.0 A
Permissible operating temperature	-40°C to 85°C / -40F to 185F

(No external voltages greater than Uoc may be applied to the module)

* NOCT: irradiance 800 W/m² AM 1.5, wind speed 1 m/s, Temperature 20°C

Temperature coefficients

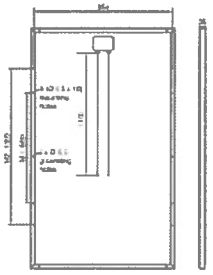
Voltage Uoc	-0,30 %/K
Current Isc	0,04 %/K
Output Pmpp	-0,40 %/K

Low-light performance (Example for AC-300M/156-60S)

I-U characteristic curve	Current Imp	Voltage Ump
200 W/m²	2.15 A	30.17 V
400 W/m²	3.71 A	31.20 V
600 W/m²	6.05 A	31.81 V
800 W/m²	7.57 A	32.10 V
1000 W/m²	9.34 A	32.16 V

Packaging

Module pieces per pallet	30
Module pieces per HC-container	840



All dimensions in mm

Technical data are subject to change without prior notice, errors excepted.

The measurement tolerances are +/-3%.

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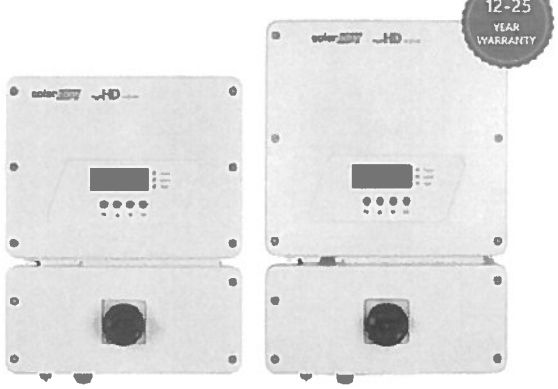
ADDITIONAL NOTES

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 efficiency
- 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)

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/ 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	
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[1]							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
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	-		15300	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	600kΩ Sensitivity							
Maximum Inverter Efficiency	99			99.2				%
CEC Weighted Efficiency	99						98.5 @ 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]							
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 (-40°F / -40°C option)[4]							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

RoHS

THOMAS RESIDENCE

534 MISSION ST
SAN ANTONIO,
TX 78210

UTILITY: CPS

PHOTOVOLTAIC PROJECT INFO

PV MODULE:
(25) AXITECH AC-300M/156-60S

INVERTER:
SOLAREDGE SE7600H-US

7.5 kW (DC) / 7.5 kW (AC)

ARRAY AZIMUTH: 68, 158, 248°
ARRAY TILT: 20°

NEC 2017 / IRC 2015 / IBC 2015

Veteran SOLAR

VETERAN SUPPLY SERVICES, LLC
DBA VETERAN SOLAR

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(512) 953-3450

TECL 30827

NABCEP CERTIFIED PV Installation Professional

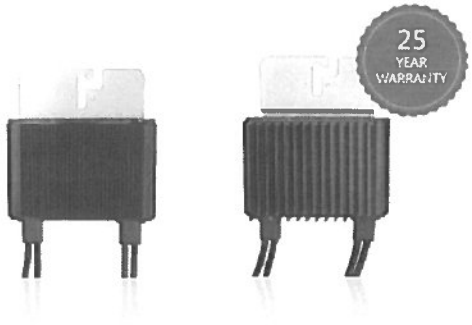
The North American Board of Certified Energy Practitioners
Joshua Bernal
PV Installation Professional

ADDITIONAL NOTES

Power Optimizer

For North America

P320 / P340 / 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
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

/ Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (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	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125[2]	83[2]	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 SOLAREDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60			80		85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE 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 35 / 5 x 5.97 x 1.37	128 x 152 x 48 / 5 x 5.97 x 1.88	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						
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] NEC 2017 requires max input voltage be not more than 80V.
* For other connector types please contact SolarEdge.

PV System Design Using a SolarEdge Inverter[3]		Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8		10	18	
	P405	8		8	14	
Maximum String Length (Power Optimizers)		25		25	50[4]	
Maximum Power per String		5700 (6000 with SE7600H-US)	12750	6000	12750	W
Parallel Strings of Different Lengths or Orientations		Yes				

[3] For detailed string sizing information refer to http://www.solaredge.us/files/pdfs/string_sizing_na.pdf
[4] It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string.
[5] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.
[6] For SE14.4kUS/SE43.2kUS it is allowed to install up to 6,000 W per string when 3 strings are connected to the inverter (3 strings per unit for SE14.4kUS, and when the maximum power difference between the strings is up to 1,000W).
[7] For SE66.5kUS/SE100kUS it is allowed to install up to 13,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.5kUS/SE100kUS, and when the maximum power difference between the strings is up to 1,000W).

CE RoHS

THOMAS RESIDENCE

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UTILITY: CPS

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This Person certifies that
Joshua Barrad
PV Installation Professional

ADDITIONAL NOTES

Tech Brief

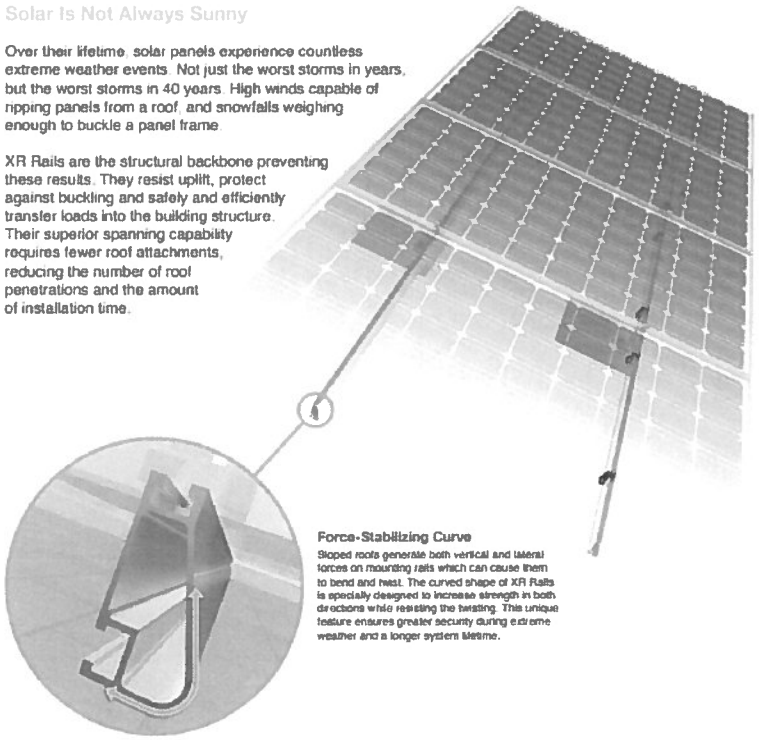
IRONRIDGE

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

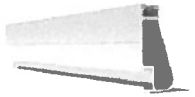
XR Rail Family

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.

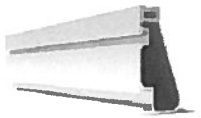
- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



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 Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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ADDITIONAL NOTES

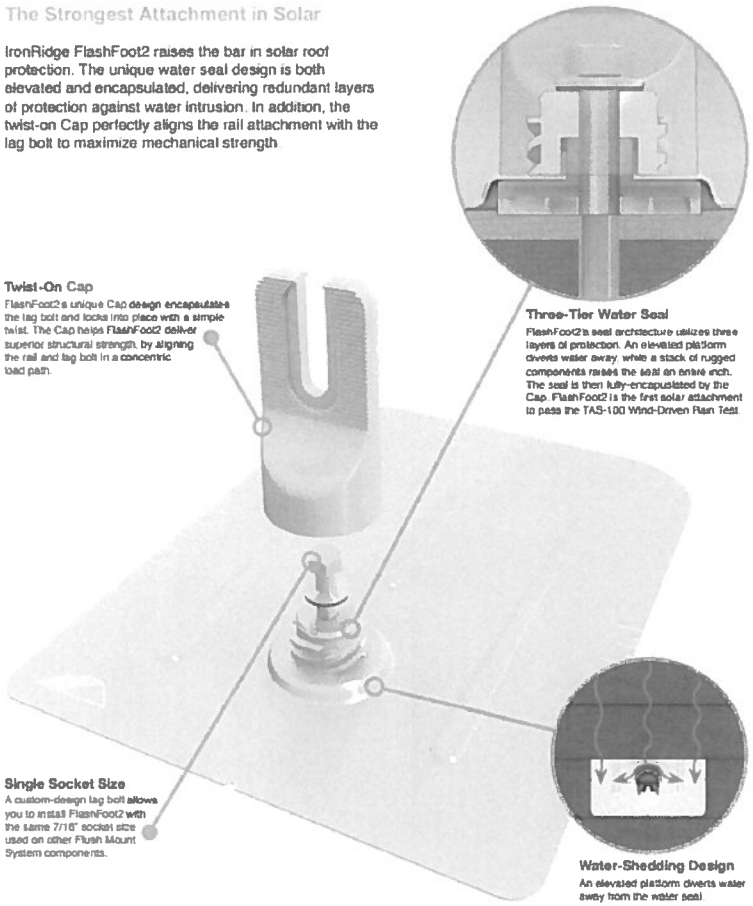
Tech Brief

IRONRIDGE

FlashFoot2

The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.



Twist-On Cap
FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.

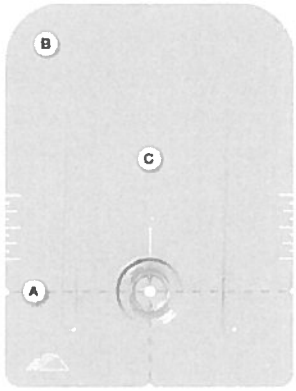
Three-Tier Water Seal
FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapsulated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

Single Socket Size
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design
An elevated platform diverts water away from the water seal.

Tech Brief

Installation Features



A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

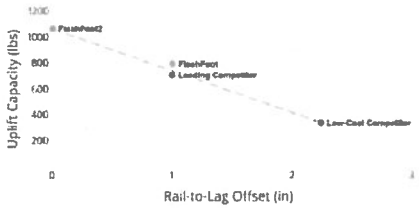
C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



Testing & Certification

Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2.12 and 12:12.

UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

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ADDITIONAL NOTES

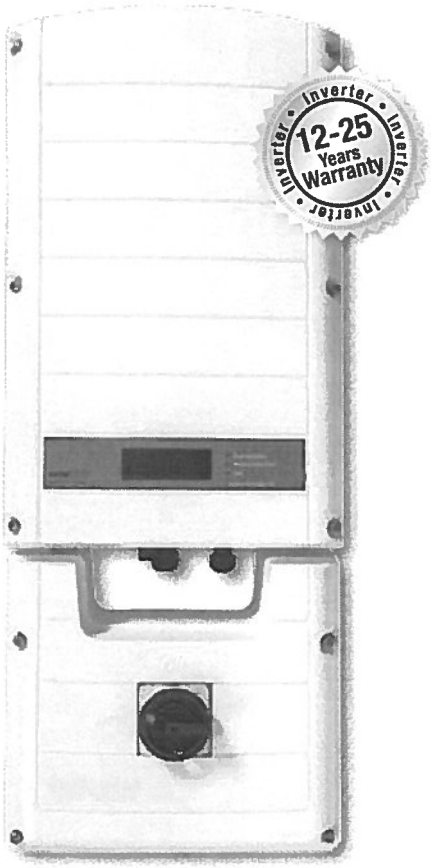
solaredge

SolarEdge Single Phase Inverters

For North America

SE3000A-US / SE3800A-US / SE5000A-US / SE6000A-US /
SE7600A-US / SE10000A-US / SE11400A-US

INVERTERS



The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Superior efficiency (98%)
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight and easy to install outdoors or indoors on provided bracket
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Fixed voltage inverter for longer strings
- Optional – revenue grade data, ANSI C12.1

Single Phase Inverters for North America

SE3000A-US / SE3800A-US / SE5000A-US / SE6000A-US / SE7600A-US / SE10000A-US / SE11400A-US

	SE3000A-US	SE3800A-US	SE5000A-US	SE6000A-US	SE7600A-US	SE10000A- US	SE11400A-US	
OUTPUT								
Nominal AC Power Output	3000	3800	5000	6000	7600	9980 @ 208V 10000 @240V	11400	VA
Max. AC Power Output	3300	4150	5400 @ 208V 5450 @240V	6000	8350	10800 @ 208V 10950 @240V	12000	VA
AC Output Voltage Min.-Nom.-Max.[1] 183 - 208 - 229 Vac	-	-	✓	-	-	✓	-	
AC Output Voltage Min.-Nom.-Max.[1] 211 - 240 - 264 Vac	✓	✓	✓	✓	✓	✓	✓	
AC Frequency Min.-Nom.-Max.[1]	59.3 - 60 - 60.5							Hz
Max. Continuous Output Current	12.5	16	24 @ 208V 21 @ 240V	25	32	48 @ 208V 42 @ 240V	47.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							Yes
INPUT								
Maximum DC Power (STC)	4050	5100	6750	8100	10250	13500	15350	W
Transformer-less, Ungrounded	Yes							
Max. Input Voltage	500							Vdc
Nom. DC Input Voltage	325 @ 208V / 350 @ 240V							Vdc
Max. Input Current[2]	9.5	13	16.5 @ 208V 15.5 @ 240V	18	23	33 @ 208V 30.5 @ 240V	34.5	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	97.7	98.2	98.3	98.3	98	98	98	%
CEC Weighted Efficiency	97.5	98	97 @ 208V 98 @ 240V	97.5	97.5	97 @ 208V 97.5 @ 240V	97.5	%
Nighttime Power Consumption	< 2.5					< 4		W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, RS232, Ethernet, ZigBee (optional)							
Revenue Grade Data, ANSI C12.1	Optional[3]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect[5]							
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 part15 class B							
INSTALLATION SPECIFICATIONS								
AC output conduit size / AWG range	3/4" minimum / 16-6 AWG					3/4" minimum / 8-3 AWG		
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 16-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	30.5 x 12.5 x 7.2 / 775 x 315 x 184					30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight with Safety Switch	51.2 / 23.2		54.7 / 24.7			88.4 / 40.1		lb / kg
Cooling	Natural Convection				Natural convection and internal fan (user replaceable)	Fans (user replaceable)		
Noise	< 25					< 50		dBA
Min.-Max. Operating Temperature Range	-13 to +140 / -25 to +60 (-40 to +60 version available[4])							°F / °C
Protection Rating	NEMA 3R							

(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 values stated.
(3) Revenue grade inverter P/N: SExxxxA-US000NNR2 (for 7600W inverter:SE7600A-US002NNR2).
(4) -40 version P/N: SExxxxA-US000NNU4 (for 7600W inverter:SE7600A-US002NNU4).
(5) P/Ns SExxxxA-US0xxxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

RoHS

280 - 300 Wp

www.axitecsolar.com

AXITEC
high quality german solar brand

AXIblackpremium

60 cell monocrystalline
High performance solar module

The advantages:

- 15 years manufacturer's warranty
- Highest performance due to specifically selected technologies and materials
- Guaranteed positive power tolerance from 0-5 Wp by individual measurement
- Maximum 5400 Pa snow load
- 100 % electroluminescence inspection
- High stability due to AXITEC-Soft-Grip-Seam aluminium frame construction
- High quality junction box and connector systems

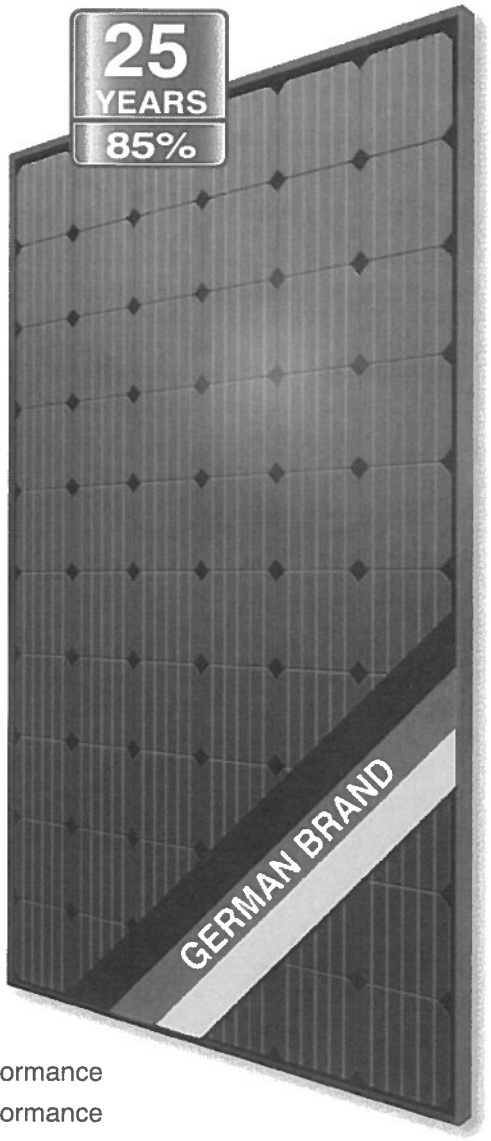
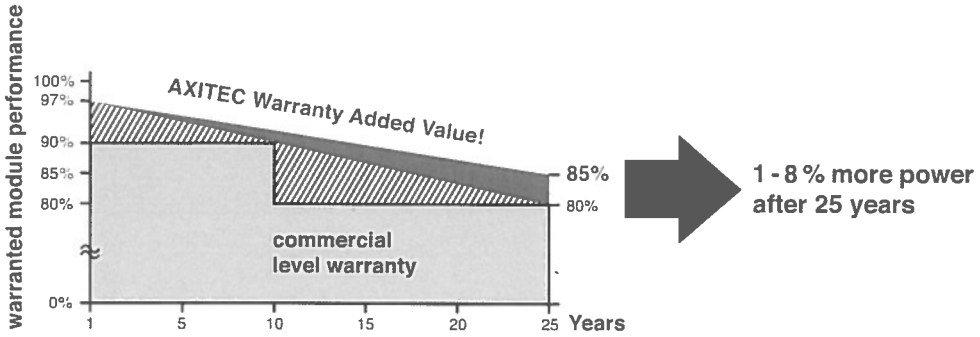


Fig. similar 60MEN180802A

Exclusive linear AXITEC high performance guarantee!

- 15 years manufacturer's guarantee on 90 % of the nominal performance
- 25 years manufacturer's guarantee on 85 % of the nominal performance



www.axitecsolar.com

AXITEC
high quality german solar brand

AXIblackpremium 280 - 300 Wp

Electrical data (at standard conditions (STC) irradiance 1000 watt/m², spectrum AM 1,5 at a cell temperature of 25°C)

Type	Nominal output Pmpp	Nominal voltage Umpp	Nominal current Impp	Short circuit current Isc	Open circuit voltage Uoc	Module conversion efficiency
AC-280M/60S	280 Wp	31,68 V	8,84 A	9,36 A	39,05 V	17,21 %
AC-285M/60S	285 Wp	31,81 V	8,91 A	9,43 A	39,24 V	17,52 %
AC-290M/60S	290 Wp	32,01 V	9,06 A	9,54 A	39,42 V	17,83 %
AC-295M/60S	295 Wp	32,25 V	9,15 A	9,67 A	39,56 V	18,13 %
AC-300M/60S	300 Wp	32,37 V	9,27 A	9,74 A	39,72 V	18,44 %

Design

Frontside	3,2 mm hardened, low-reflection white glass
Cells	60 monocrystalline high efficiency cells 156 mm x 156 mm (6")
Backside	Composite film
Frame	35 mm black anodized aluminium frame

Mechanical data

L x W x H	1640 x 992 x 35 mm
Weight	18,0 kg with frame

Power connection

Socket	Protection Class IP67 (3 bypass diodes)
Wire	approx. 1,1 m, 4 mm²
Plug-in system	Plug/socket IP67

Limit values

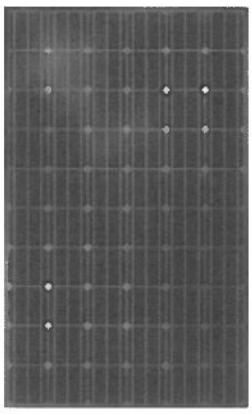
System voltage	1000 VDC
NOCT (nominal operating cell temperature)*	45°C +/-2K
Max. load-carrying capacity	5400 N/m²
Reverse current feed IR	20,0 A
Permissible operating temperature	-40°C to 85°C / -40F to 185F

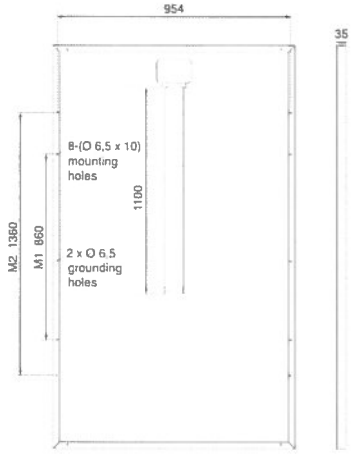
(No external voltages greater than Uoc may be applied to the module)

* NOCT, irradiance 800 W/m²; AM 1,5; wind speed 1 m/s; Temperature 20°C

Temperature coefficients

Voltage Uoc	-0,29 %/K
Current Isc	0,04 %/K
Output Pmpp	-0,39 %/K





All dimensions in mm

Low-light performance (Example for AC-300M/60S)

I-U characteristic curve	Current Ipp	Voltage Upp
200 W/m²	2,15 A	30,17 V
400 W/m²	3,71 A	31,20 V
600 W/m²	6,05 A	31,81 V
800 W/m²	7,57 A	32,10 V
1000 W/m²	9,27 A	32,37 V

Packaging

Module pieces per pallet	30
Module pieces per HC-container	840