

HISTORIC AND DESIGN REVIEW COMMISSION

April 06, 2016

Agenda Item No: 11

HDRC CASE NO: 2016-129
ADDRESS: 143 MAGNOLIA DR
LEGAL DESCRIPTION: NCB 6530 BLK 2 LOT 12, & W 25 FT OF 13
ZONING: R4-CD H RIO-1
CITY COUNCIL DIST.: 1
DISTRICT: River Road Historic District
APPLICANT: Margo Prevost/Sustain Sales & Marketing
OWNER: Edward Piner
TYPE OF WORK: Installation of solar panels
REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to install a solar panel system on the rear roof at 143 Magnolia Drive.

APPLICABLE CITATIONS:

Historic Design Guidelines, Chapter 3, Guidelines for Additions

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 property at 143 Magnolia Drive is located in the River Road Historic District. The applicant has proposed to install a solar panel system on the rear and side rear roof slopes of the primary historic structure as well as the front facing roof slope of the rear accessory structure.
- b. The primary historic structure features a side gable roof near the front façade that transitions into a hip roof creating a lower roof profile that is not seen from the public right of way. Within this roof valley, the applicant has proposed to mount various solar panels in different locations, all of which will not be seen from the public right of way. At the rear of the property, the applicant has proposed to install solar panels on the roof of the rear accessory structure. While the applicant has proposed to mount these on the front facing gable, staff finds that they will not be seen from the public right of way due to the primary historic structure's size. The applicant's proposed mounting location is consistent with the Guidelines for Additions 6.C.i.

RECOMMENDATION:

Staff recommends approval as submitted based on findings a and b.

CASE MANAGER:

Edward Hall



Flex Viewer

Powered by ArcGIS Server

Printed: Mar 30, 2016

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CITY OF SAN ANTONIO
NOTICE OF HEARING
WATER & SEWER
WATER COMMISSION

ADDRESS: [REDACTED]
REQUEST: [REDACTED]
HEARING DATE: [REDACTED]
TIME: 3:00 P.M.
FOR MORE INFORMATION CONTACT
JIM BERRY
ALL MEETINGS TAKE PLACE AT 900 S. ALAMO

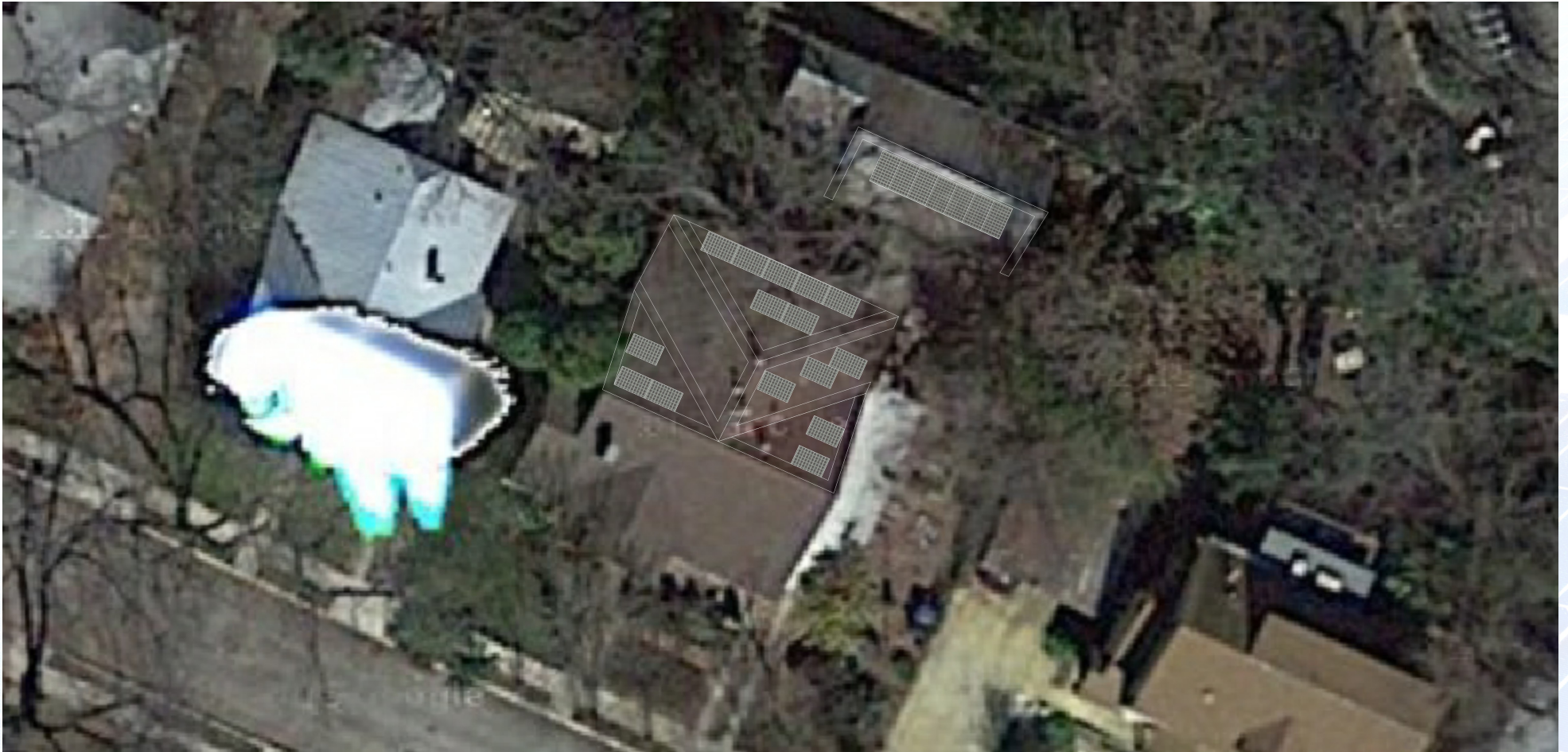


South Texas Solar Systems
Sales Representative
10203 Kotzebue St, Suite 226
San Antonio, TX 78217



Edward Neil Piner

22 Panels



143 Magnolia Drive
San Antonio, Tx 78212

www.txsolarsystems.com

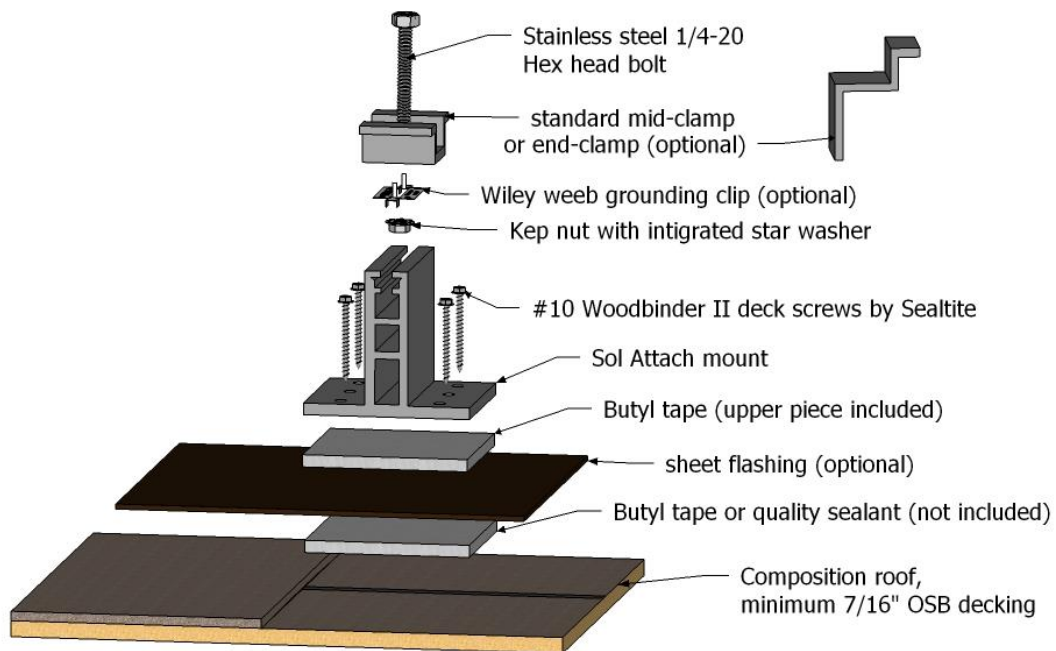
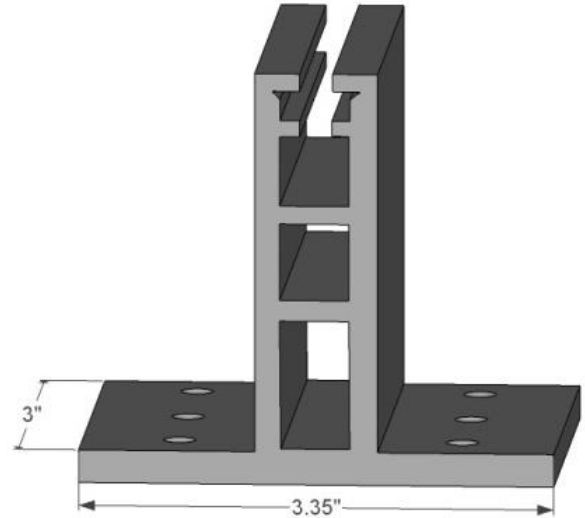
SOL ATTACH

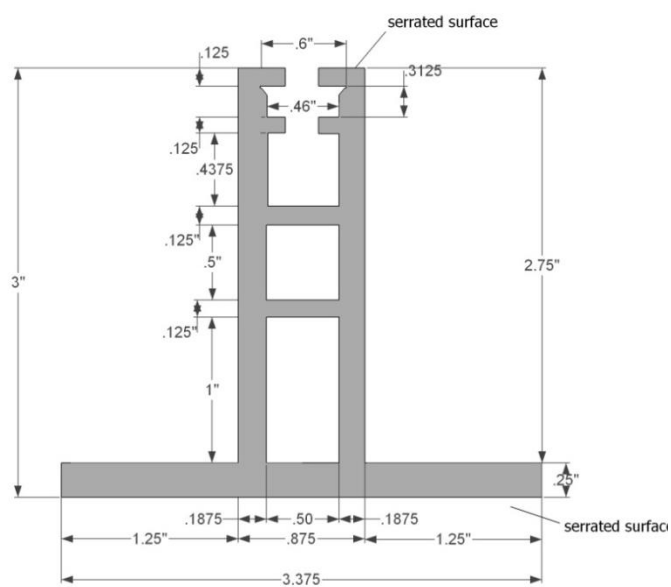
Sol Attach, LLC

Composition roof mounting foot

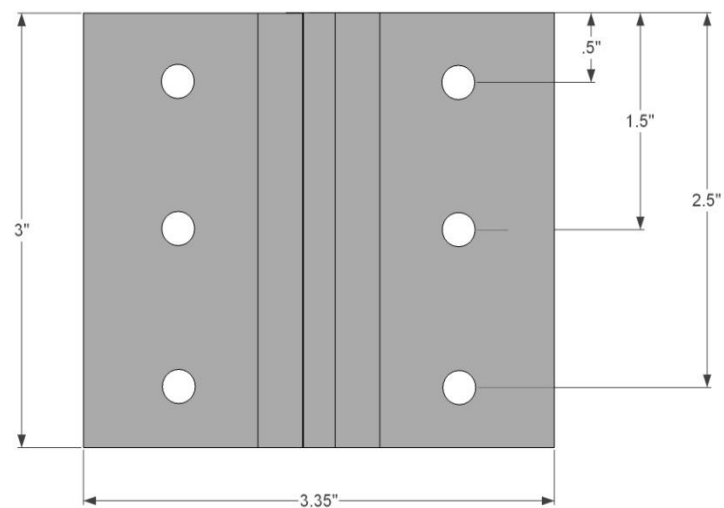
Extrusions made of 6061-T6 alloy

Patent Pending



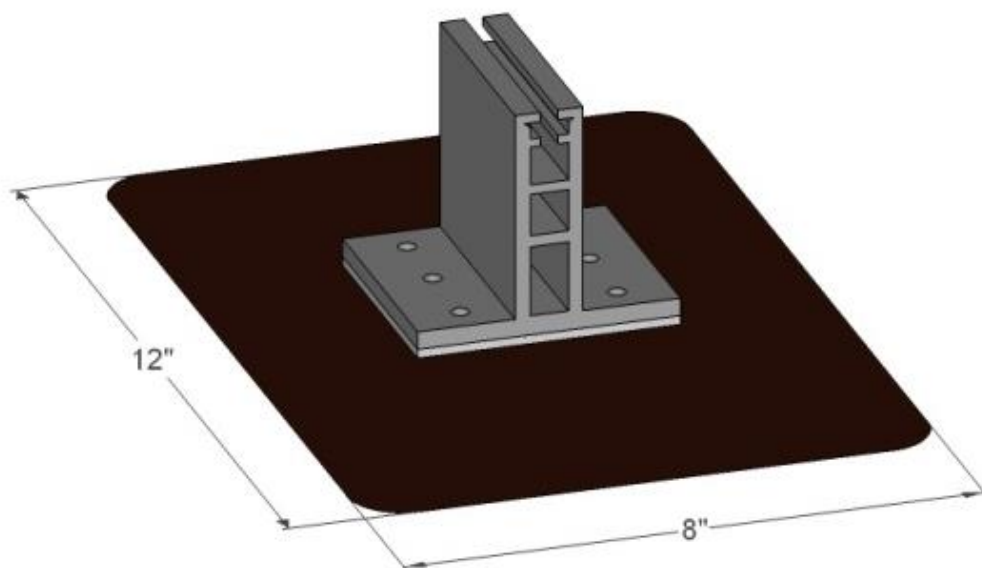


Front View



Top View

Flat flashing



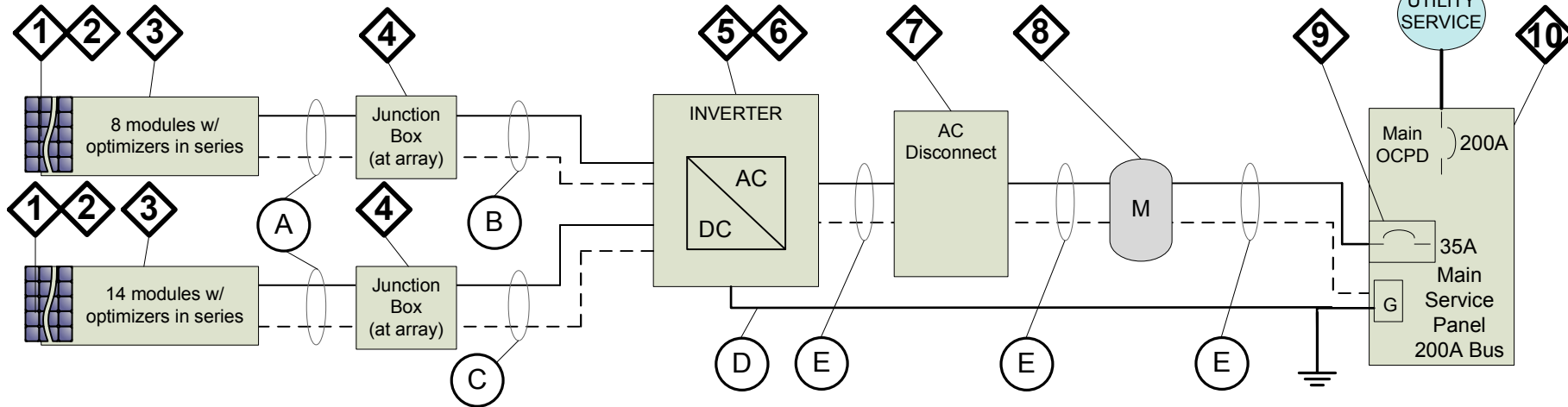
System Information			
PV Module Ratings		Inverter Ratings	
Module Make	Axitec Solar	Inverter Make	SolarEdge
Module Model	AC-310P	Inverter Model	SE6000A-US
Max Power	= 310 W	Max. Output Power	= 6000 W
Open Circuit Voltage	= 45.52 V	Max. DC Voltage	= 500 V
Max Power Point Voltage	= 37.02 V	Normal AC Voltage	= 240 V
Short Circuit Current	= 8.89 A	Max. AC Current	= 25 A
Max Power Point Current	= 8.39 A	CEC Inverter Efficiency	= 97.5%

Labels	
Photovoltaic DC Disconnect	
Rated MPP Current	= 18.0 A
Rated MPP Voltage	= 350.0 V
Max. System Voltage	= 500.0 V
Max. System Current	= 30.0 A
Photovoltaic AC Disconnect	
AC Output Current	= 25 A
Nominal AC Voltage	= 240 V



10203 Kotzebue St
Suite 226
San Antonio, TX 78217

PV System meets requirements for Rapid Shutdown as defined in 690.12.



EQUIPMENT SCHEDULE			
REF	DESCRIPTION	PN	NOTES
1	SOLAR PV MODULE	AC-310P/156-72S	AXITEC 310W POLYCRYSTALLINE MODULE
2	PV MODULE OPTIMIZER	P400	SOLAREGE 400W PV MODULE OPTIMIZER
3	ARRAY MOUNTING HARDWARE	TBD	FLUSH ROOF RACKING SYSTEM
4	JUNCTION BOX	SDS-P-3-DC	SAFE-D 3-CIRCUIT PASS-THRU BOX
5	AC/DC INVERTER	SE6000A-US	SOLAREGE 6.0KW INVERTER W/ AC/DC DISCONNECT
6	WIRELESS COMM	SE1000-ZBGW	SOLAREGE ZIGBEE WIRELESS COMMUNICATIONS
7	MAIN AC DISCONNECT	DU222NRB	SQUARE D, SAFETY SWITCH, 240V, 60A 2-POLE, UNFUSED
8	PV METER	TBD	
9	MAIN SOLAR OCPD	TBD	240V, 35A, 2-POLE CIRCUIT BREAKER (BACK-FED)
10	MAIN SERVICE PANEL	NA	240V, 200A MAINS AND MAIN BREAKER (SERVICE UPGRADE)

CONDUIT & CONDUCTOR SCHEDULE					
REF	DESCRIP. /CONDUCTOR TYPE	CONDUCTOR GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
A	PV-WIRE & BARE GROUND	#12 / #6	2 / 1		
B	THWN-2	#10 / #6	2 / 1	EMT	3/4"
C	THWN-2	#10 / #6	2 / 1	EMT/PVC	3/4"
D	BARE GROUND	#6	1		
E	THWN-2	#8 / #10	3 / 1	EMT	3/4"

Notes:

- All equipment, conductors and conduit as listed or equivalent.
- Expected nominal string voltage: 350Vdc.
- Expected nominal optimizer output voltage:
String of 8 – 43.8Vdc
String of 14 – 25.0Vdc

ONE-LINE STANDARD ELECTRICAL DIAGRAM
PROJECT REF: Edward Piner
SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212
SYSTEM SIZE: 6.82 kW
1 String of 8 & 1 String of 14 Modules/Optimizers (Axitec 310W, SolarEdge P400)
Sheet 1 of 9
Date: December 15, 2015

NOT TO SCALE

SAN ANTONIO INTL AP



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San Antonio, TX 78217

Elev.	High Temp		Distance above roof			Extreme
	0.4%	2% Avg.	0.5"	3.5"	12"	
247 m	38 °C	36 °C	58 °C	53 °C	50 °C	-6 °C

Correction Temperatures

$$\Delta T_{\text{cold}} = -6^{\circ}\text{C} - 25^{\circ}\text{C} = -31^{\circ}\text{C}$$

Flush roof mount

$$\Delta T_{\text{hot}} = (36^{\circ}\text{C} + 35^{\circ}\text{C}) - 25^{\circ}\text{C} = 46^{\circ}\text{C}$$

Module Voltage Calculations

Axitec 310W Poly

$$V_{\text{oc}} = 45.52\text{V}$$

$$V_{\text{mp}} = 37.02\text{V}$$

$$V_{\text{oc Temp Coefficient}} = -0.33\%/^{\circ}\text{C}$$

$$I_{\text{sc}} = 8.89\text{A}$$

$$I_{\text{mp}} = 8.39\text{A}$$

$$P_{\text{max Temp Coefficient}} = -0.44\%/^{\circ}\text{C}$$

$$\text{Cold } V_{\text{oc}} = 45.52\text{V} + (45.52\text{V} \times -0.33\%/^{\circ}\text{C} \times -31^{\circ}\text{C}) = 45.52\text{V} + 4.66\text{V} = \mathbf{50.2\text{V}}$$

$$\text{Hot } V_{\text{mp}} = 37.02\text{V} + (37.02\text{V} \times -0.44\%/^{\circ}\text{C} \times 46^{\circ}\text{C}) = 37.02\text{V} - 7.49\text{V} = \mathbf{29.5\text{V}}$$

SolarEdge P400 Optimizer

Maximum Power per String: 5250W

Max Input DC Power: 400W

Max Input DC Voltage: 80V

MPPT Operating Range: 8-80V

Max Input Isc Current: 10A

Maximum DC Output: 15A

Min/Max Input String Length: 8/25

String Sizing

$$8 \times 310\text{W} = 2480\text{W}$$

$$14 \times 310\text{W} = 4340\text{W}$$

SolarEdge SE6000A-US Inverter

Max DC Input (V): 500V

Max DC Input (A): 18.0A

Nominal DC Input: 350V

Output voltage: 240Vac

Max Output current: 25.0A

Label Calculations

MPPT DC Current:

$$310\text{W} \times 22 \div 350\text{V} = 19.5\text{A} - \text{limited to 18A by the inverter.}$$

Conductor Ampacity

PV Source Circuit (Optimizer Output):

$$15\text{A} \times 125\% = 18.8\text{A (continuous duty)}$$

$$18.8\text{A} \div 1.00 = 18.8\text{A (PV Wire in free air)}$$

#12 AWG (rated for 35A into 75° terminals in free air)

$$18.8\text{A} \div 0.71 = 26.5\text{A (conditions of use - temp and conduit fill)}$$

#10 AWG (rated for 35A into 75° terminals)

Inverter Output Circuit:

$$25.0\text{A} \times 125\% = 31.3\text{A}$$

#8 AWG (rated for 50A into 75° terminals and required OCPD)

OCPD & Disconnects

DC fusing not required. Each string lands on a separate set of terminals in the inverter and there are only two strings.

DC/AC Disconnect functions integral to inverter.

Inverter OCPD and Disconnect:

$$25.0\text{A} \times 125\% = 31.3\text{A} \rightarrow 35\text{A Back-Fed Circuit Breaker}$$

60A, 2-Pole, 240V Unfused Disconnect

If sourcing a 35A circuit breaker is an issue, the OCPD may be upsized to a maximum of 40A per the manufacturer. Conductors will still be protected.

Voltage Drop calculations:

Worst case combination of distance and amperage:

PV Nominal String Voltage: 350Vdc

$$\text{PV MPPT String Current: } 310\text{W} \times 9 \div 350\text{V} = 8.0\text{A}$$

DC conductor run is 80 ft (estimated)

DC Voltage Drop

$$(2 \times 80\text{ft} \times 8.0\text{A} \times 1.24\Omega/\text{kft} \times 100) / (1000\text{ft}/\text{kft} \times 350\text{V}) = 0.45\%$$

Inverter Output is 240Vac, 25A

AC conductor run is 20 ft (estimated)

AC Voltage Drop

$$(2 \times 20\text{ft} \times 25.0\text{A} \times 0.778\Omega/\text{kft} \times 100) / (1000\text{ft}/\text{kft} \times 240\text{V}) = 0.32\%$$

ELECTRICAL CALCULATIONS

PROJECT REF: Edward Piner

SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212

SYSTEM SIZE: 6.82 kW

1 String of 8 & 1 String of 14 Modules/Optimizers
(Axitec 310W, SolarEdge P400)

Sheet 2 of 9

Date: December 14, 2015

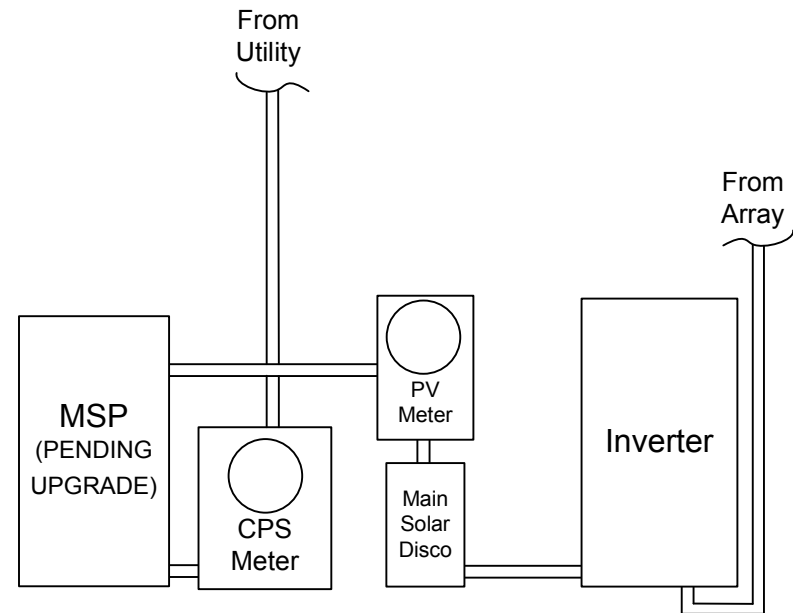
Notes:

- PV System meets requirements for Rapid Shutdown as defined in 690.12.
- Each PV module is connected to a dedicated optimizer. The voltage generated by a string of modules/optimizers is controlled to 350Vdc at the inverter DC inputs.
- Calculations for the System Labeling based on SolarEdge Tech Note, *PV Power Source Labeling in a SolarEdge system*.
- Inverter, PV meter and AC Disconnect located at the SE corner of the residence near the service entrance.
- Ensure clearances around the inverter comply with Chapter 3 of the Solar Edge Installation Guide. The inverter should be installed to minimize exposure to sunlight, rainfall and direct water spray.
- Each module/optimizer string is run to a separate input on the inverter.
- Existing service to be upgraded to a 200A bus with a 200A main breaker.
- Interconnection to the main service via a back-fed breaker in the main service panel. Interconnection in compliance with 705.12.
- Layout/location of array may be adjusted to avoid vent stacks, skylights and other roof protrusions. Adequate clearances should be maintained from roof eaves and ridge to allow for safe access. Minimum spacing between module rows should be 1/4 inch to allow for thermal expansion of module frames.
- Conductor sizing listed is minimum required based on NEC ampacity calculations for CU conductors and a conduit fill of not more than 4 current carrying conductors. Minimum conductor size required for REC meter base typically #6 AWG.
- DC conductors must be rated for 600V or greater.
- Conduit sizing is based upon NABCEP recommended maximum conduit fill of 25%. Conduit sizing may be decreased to comply with Annex C of NEC.
- Voltage drop calculations should be verified on-site based on actual wire run lengths. Recommended worst case system voltage drop – 2% total.
- All electrical work must be made in accordance with the local and applicable *National Electrical Code ANSI/NFPA 70*.
- PV System to be installed and labeled per National Electric Code 2014. Specifically:
 - 690.4(B)(1),(2) and (3)
 - 690.4(H)
 - 690.5
 - 690.17
 - 690.31
 - 690.35(C) and (F)
- Inverter listed to UL-1741 for grid-interactive use and GFDI protection.
- All equipment used UL listed.
- Equipment, conductors and conduit as listed or equivalent.

Solar Access: Some Tree Trimming may be required to achieve proper array exposure during peak solar hours.



10203 Kotzebue St
Suite 226
San Antonio, TX 78217



Preliminary Equipment
Wall Layout
(not to scale)

SPECIAL NOTES
PROJECT REF: Edw ard Piner
SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212
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1 String of 8 & 1 String of 14 Modules/Optimizers (Axitec 310W, SolarEdge P400)
Sheet 4 of 9 Date: December 15, 2015



10203 Kotzebue St
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AXIpower

72 cell/polycrystalline photovoltaic modules

High performance photovoltaic modules

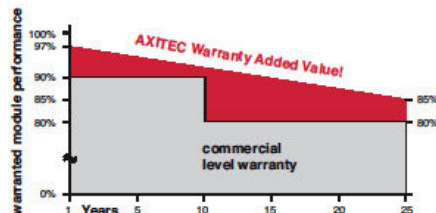
The advantages:

- 12 Years** 12 years manufacturer's warranty
- +** Guaranteed positive power tolerance from 0.5 Wp by individual measurement
- 2,400 Pa** Maximum 2400 Pa snow load
- 100%** 100% electroluminescence inspection
- Soft-Grip** High stability due to AXITEC-Soft-Grip-Seam aluminium frame construction
- IP 67** High quality junction box and connector systems
- Imp** Sorting by Imp



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



Electrical data (at standard conditions (STC) irradiance 1000 watt/m², spectrum AM 1.5 at a cell temperature of 25° C)

Type	Nominal output Pmp	Nominal voltage Ump	Nominal current Imp	Short circuit current Isc	Open circuit voltage Uoc	Module conversion efficiency
AC-300P/156-72S	300 Wp	36.73 V	8.18 A	8.71 A	45.48 V	15.46 %
AC-305P/156-72S	305 Wp	36.85 V	8.28 A	8.81 A	45.50 V	15.72 %
AC-310P/156-72S	310 Wp	37.02 V	8.39 A	8.89 A	45.52 V	15.98 %

Design

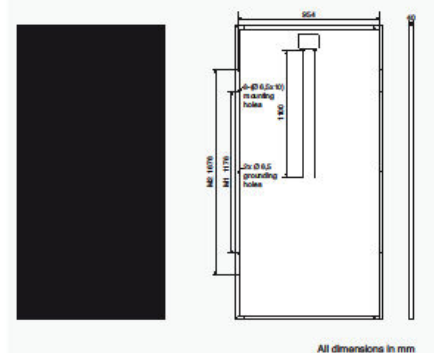
Frontside	3,2 mm hardened, low-reflection white glass
Cells	72 polycrystalline high efficiency cells 156 mm x 156 mm (6")
Backside	Composite film
Frame	40 mm silver anodized aluminium frame

Mechanical data

L x W x H	1956 x 962 x 40 mm
Weight	25 kg with frame

Power connection

Socket	Protection Class IP65 (3 bypass diodes)
Wire	approx. 1.1 m, 4 mm²
Plug-in system	Plug/lockat IP67



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



Limit values

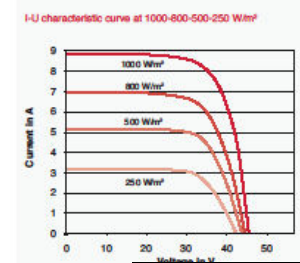
System voltage	1000 VDC
NOCT (nominal operating cell temperature)*	45°C ±2K
Max. load-carrying capacity	2400 Nm²
Reverse current load IR	16.0 A

(No external voltages greater than Vo 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	-0.33 %/K
Current Isc	0.06 %/K
Output Pmp	-0.44 %/K



Example for AC-300P
The measurement tolerance

SPECIFICATIONS
PROJECT REF: Edw ard Piner
SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212
SYSTEM SIZE: 6.82 kW
1 String of 8 & 1 String of 14 Modules/Optimizers (Axitec 310W, SolarEdge P400)
Sheet 5 of 9
Date: December 14, 2015



SolarEdge Single Phase Inverters For North America

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



The best choice for SolarEdge enabled systems

- Integrated arc fault protection (Type 1) for NEC 2011 690.11 compliance
- Superior efficiency (98%)
- Small, lightweight and easy to install on provided bracket
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Outdoor and indoor installation
- Fixed voltage inverter, DC/AC conversion only
- Pre-assembled Safety Switch for faster installation
- Optional – revenue grade data, ANSI C12.1

USA - GERMANY - ITALY - FRANCE - JAPAN - CHINA - AUSTRALIA - THE NETHERLANDS - ISRAEL

www.solaredge.us

INVERTERS



Single Phase Inverters for North America

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

OUTPUT	SE3000A-US	SE3800A-US	SE5000A-US	SE6000A-US	SE7600A-US	SE10000A-US	SE11400A-US	
Nominal AC Power Output	3000	3800	5000	6000	7600	9980 @ 208V	11400	VA
Max. AC Power Output	3300	4150	5400 @ 208V	6000	8350	10900 @ 208V	12000	VA
AC Output Voltage Min-Nom-Max ⁽¹⁾	-	-	✓	-	-	✓	-	
183 - 208 - 228 Vdc								
AC Output Voltage Min-Nom-Max ⁽¹⁾	✓	✓	✓	✓	✓	✓	✓	
211 - 240 - 264 Vdc								
AC Frequency Min-Nom-Max ⁽¹⁾	59.3 - 60 - 60.3	59.3 - 60 - 60.3	59.3 - 60 - 60.3	59.3 - 60 - 60.3	59.3 - 60 - 60.3	59.3 - 60 - 60.3	59.3 - 60 - 60.3	Hz
Max. Continuous Output Current	12.5	16	21 @ 240V	25	32	52 @ 240V	47.5	A
GFDI Threshold	1	1	1	1	1	1	1	A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INPUT								
Maximum DC Power (STC)	4000	5100	6750	8100	10250	13300	15350	W
Transformer-less, Ungrounded	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Max. Input Voltage	500	500	500	500	500	500	500	Vdc
Nom. DC Input Voltage	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	325 @ 208V / 350 @ 240V	Vdc
Max. Input Current ⁽¹⁾	9.5	13	16.5 @ 208V	18	23	33 @ 208V	34.5	Adc
Max. Input Short Circuit Current	45	45	45	45	45	45	45	Adc
Reverse-Polarity Protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Ground-Fault Isolation Detection	77.7	88.2	88.3	88.3	88.3	88.3	88.3	%
CEC Weighted Efficiency	97.5	98	97.5 @ 208V	97.5	97.5	97.5 @ 208V	97.5	%
Nighttime Power Consumption	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	RS485, RS232, Ethernet, ZigBee (optional)	
Revenue Grade Data, ANSI C12.1	Optional ⁽²⁾	Optional ⁽²⁾	Optional ⁽²⁾	Optional ⁽²⁾	Optional ⁽²⁾	Optional ⁽²⁾	Optional ⁽²⁾	
Rapid Shutdown – NEC 2014 690.12	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽³⁾	
STANDARD COMPLIANCE								
Safety	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	UL1741, UL1699B, UL1998, CSA 22.2	
Grid Connection Standards	IEEE1547	IEEE1547	IEEE1547	IEEE1547	IEEE1547	IEEE1547	IEEE1547	
Emissions	FCC part15 class B	FCC part15 class B	FCC part15 class B	FCC part15 class B	FCC part15 class B	FCC part15 class B	FCC part15 class B	
INSTALLATION SPECIFICATIONS								
AC output conduit size / AWG range	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	3/4" minimum / 16-6 AWG	
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	3/4" minimum / 1-2 strings / 16-6 AWG	
Dimensions with Safety Switch (HxWxD)	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	30.3 x 12.5 x 10.5 / 773 x 315 x 269	in / mm
Weight with Safety Switch	51.2 / 23.2	51.2 / 23.2	51.2 / 23.2	51.2 / 23.2	51.2 / 23.2	51.2 / 23.2	51.2 / 23.2	lb / kg
Cooling	Natural Convection	Natural Convection	Natural Convection	Natural Convection	Natural Convection	Natural Convection	Natural Convection	
Noise	< 25	< 25	< 25	< 25	< 25	< 25	< 25	dBA
Min-Max. Operating Temperature	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	-13 to +140 / -23 to +60 (-40 to +60 version available ⁽⁴⁾)	°F / °C
Protection Rating	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	



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10203 Kotzebue St
Suite 226
San Antonio, TX 78217

SPECIFICATIONS

PROJECT REF: Edward Piner

SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212

SYSTEM SIZE: 6.82 kW

1 String of 8 & 1 String of 14 Modules/Optimizers (Axitec 310W, SolarEdge P400)

Sheet 6 of 9
Date: December 14, 2015



SolarEdge Power Optimizer

Module Add-On For North America

P300 / P320 / P400 / P405

POWER OPTIMIZER



PV power optimization at the module-level

- 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
- Module-level voltage shutdown for installer and firefighter safety

USA - GERMANY - ITALY - FRANCE - JAPAN - CHINA - ISRAEL - AUSTRALIA

www.solaredge.us



SolarEdge Power Optimizer

Module Add-On for North America

P300 / P320 / P400 / P405

	P300 (for 60-cell modules)	P320 (for high-power 60-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	
INPUT					
Rated Input DC Power ⁽¹⁾	300	320	400	405	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		80	125	Vdc
MPPT Operating Range	8 - 48		8 - 80	12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	10	11		10	Adc
Maximum DC Input Current	12.5	13.75		12.5	Adc
Maximum Efficiency		99.5			%
Weighted Efficiency		98.8			%
Overvoltage Category		II			
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)					
Maximum Output Current		15			Adc
Maximum Output Voltage		60		85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)					
Safety Output Voltage per Power Optimizer		1			Vdc
STANDARD COMPLIANCE					
EMC		FCC Part 15 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 27.5 / 5 x 5.97 x 1.08	128 x 152 x 35 / 5 x 5.97 x 1.37	128 x 152 x 48 / 5 x 5.97 x 1.89	mm / in
Weight (including cables)		770 / 1.7	930 / 2.05	930 / 2.05	g / lb
Input Connector		MC4 Compatible			
Output Wire Type / Connector		Double Insulated, MC4 Compatible			
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 40% power tolerance allowed.

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER ⁽¹⁾	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	8	10	18	
Maximum String Length (Power Optimizers)	25	25	50	
Maximum Power per String Parallel Strings of Different Lengths or Orientations	5250	6000	12750	W

⁽¹⁾ It is not allowed to mix P405 with P300/P400/P405/P700 in one string.



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10203 Kotzebue St
Suite 226
San Antonio, TX 78217

SPECIFICATIONS

PROJECT REF: Edw ard Pner

SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX
78212

SYSTEM SIZE: 6.82 kW

1 String of 8 & 1 String of 14 Modules/Optimizers
(Axitec 310W, SolarEdge P400)

Sheet 7 of 9
Date: December 14, 2015



10203 Kotzebue St
Suite 226
San Antonio, TX 78217

Project:

Edward Piner
Monday, December 14, 2015 10:25 AM
143 Magnolia Dr
San Antonio, TX 78212

San Antonio Intl for weather

Location:

San Antonio, Texas, United States

System data:

Installed power: 6.82 kWp
Max achieved DC power: 7.03 kW
Inverter active power: 6.00 kW
Maximum apparent power: 6.00 kVA

PV Array # 1: PV Array # 1

Tilt	Azimuth	Mounting
24°	205°	Co-planar with roof
Axitec, AC-310P/156-72S, 310.00 W		

PV Array # 2: PV Array # 2

Tilt	Azimuth	Mounting
24°	205°	Co-planar with roof
Axitec, AC-310P/156-72S, 310.00 W		

Inverter design

Inverter 1: SE6000A-US

String 1: PV Array # 1: 14 x P400
String 2: PV Array # 2: 8 x P400

Power optimizer extreme operating conditions

P400

	Calculated	Limit	
Max input power	310 W	400 W	✓
Min input voltage	38 V	8 V	✓
Max input voltage	50 V	80 V	✓
Max input current	9 A	10 A	✓
Max output current	13 A	15 A	✓

* Calculated values are the absolute min/max of all arrays using this power optimizer configuration.

STRING SIZING TOOL REPORT

PROJECT REF: Edward Piner

SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212

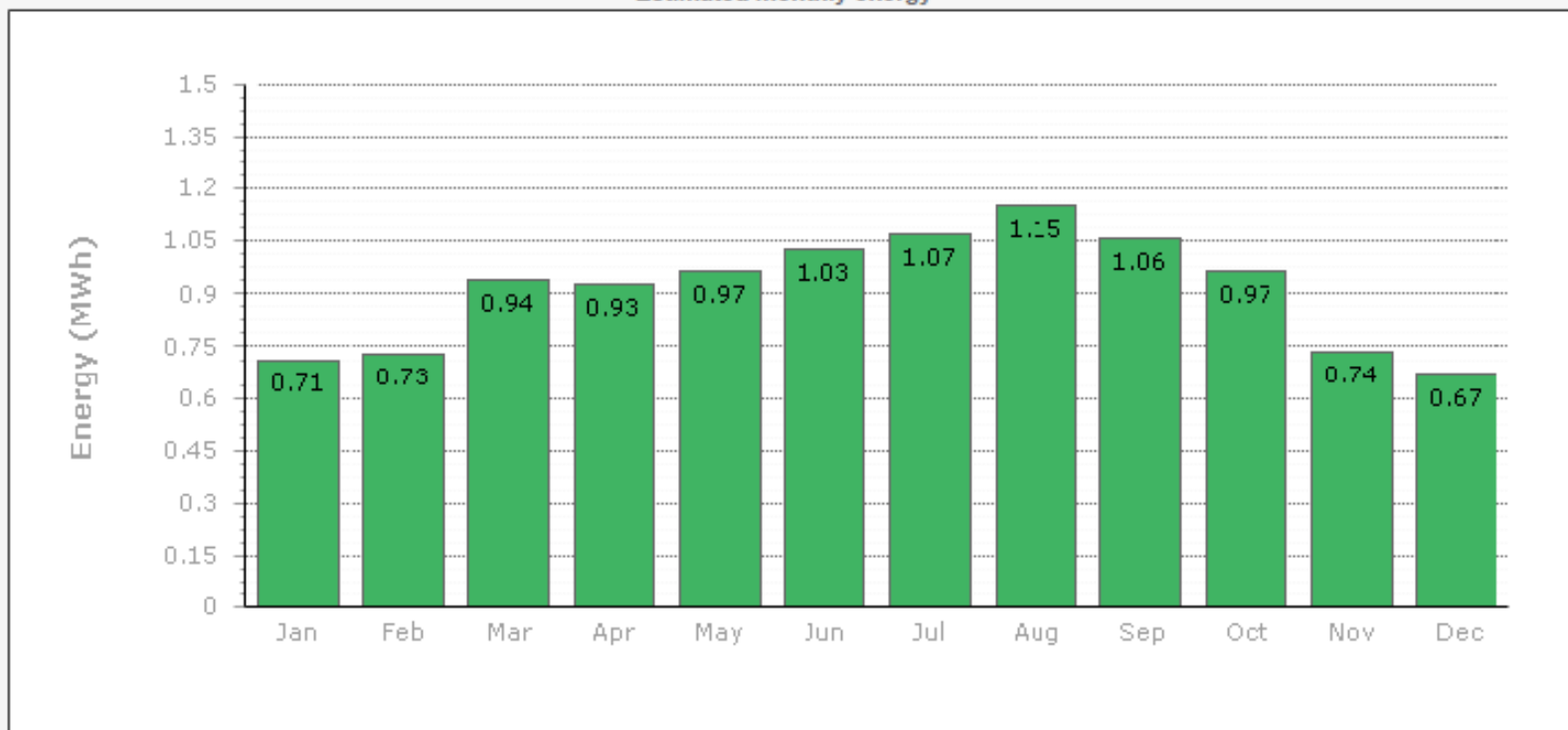
SYSTEM SIZE: 6.82 kW

1 String of 8 & 1 String of 14 Modules/Optimizers
(Axitec 310W, SolarEdge P400)

Sheet 8 of 9
Date: December 14, 2015

Energy estimation

Estimated monthly energy



Estimated yearly energy: 10.968 MWh

Energy yields are an approximation; they are not guaranteed by SolarEdge.

STRING SIZING TOOL REPORT

PROJECT REF: Edward Piner

SITE ADDRESS: 143 Magnolia Dr, San Antonio, TX 78212

SYSTEM SIZE: 6.82 kW

1 String of 8 & 1 String of 14 Modules/Optimizers
(Axitec 310W, SolarEdge P400)

Sheet 9 of 9

Date: December 14, 2015