

HISTORIC AND DESIGN REVIEW COMMISSION

December 06, 2017

HDRC CASE NO: 2017-598
ADDRESS: 514 SHERMAN ST
LEGAL DESCRIPTION: NCB 515 BLK 17 LOT 10
ZONING: R-6 H
CITY COUNCIL DIST.: 2
DISTRICT: Dignowity Hill Historic District
APPLICANT: Selina Angel
OWNER: Arnulfo Lozoya
TYPE OF WORK: Installation of solar panels
APPLICATION RECEIVED: October 31, 2017
60-DAY REVIEW: December 30, 2017
REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to install a rooftop solar array to include 27 panels.

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 primary structure located at 514 Sherman is a 1-story single family home constructed circa 1910 in the Queen Anne cottage style. The home features a steeply-pitched hipped roof, front gable with scallop shingles, and a few original wood windows, despite being heavily modified over the years. The structure is contributing to the Dignowity Hill Historic District.
- b. LOCATION – The applicant is requesting approval to install 27 solar panels on the south (rear) and west portions of the roof. Seven will be located at the extreme rear of the home, eleven will be located on the rear pitch of the primary hipped roof, and nine will be located on the west portion of the hipped roof and front gable. 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. Staff finds that the proposal is overall consistent with the Guidelines, but finds that the two panels closest to the public right-of-way on the front gable should be relocated to minimize the visual impact from the street.
- 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 stipulation:

- i. That the two panels closest to the public right-of-way on the front gable be relocated to the rear or side of the

structure as noted in finding b.

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

CASE MANAGER:

Stephanie Phillips



Flex Viewer

Powered by ArcGIS Server

Printed: Nov 17, 2017

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October 17, 2017

Office of Historic Preservation,

Arnulfo Lozoya, property owner of 514 Sherman, San Antonio, TX 78202, lives in the Historic District of Dignowity Hill. Mr. Lozoya wants to go solar. He is interested in installing a 8.64kW system, 27 LG Electronics, LG320N1C-G4, on his home. This panel is a high efficiency panel with a sleek black frame with matching black glass. There will be no panels on the front of the house and all panels will not be visible from the street. 18 panels will be placed on the back of his home, south facing, and 9 panels on the side of his home, west facing. This will give Mr. Lozoya 92% coverage of his electric bill and an annual production of 13,276 kWh.

Thank You for your time,

SOUTH TEXAS SOLAR SYSTEMS

A handwritten signature in black ink, appearing to read "Selina Angel", written in a cursive style.

Selina Angel

Operations Manager





514







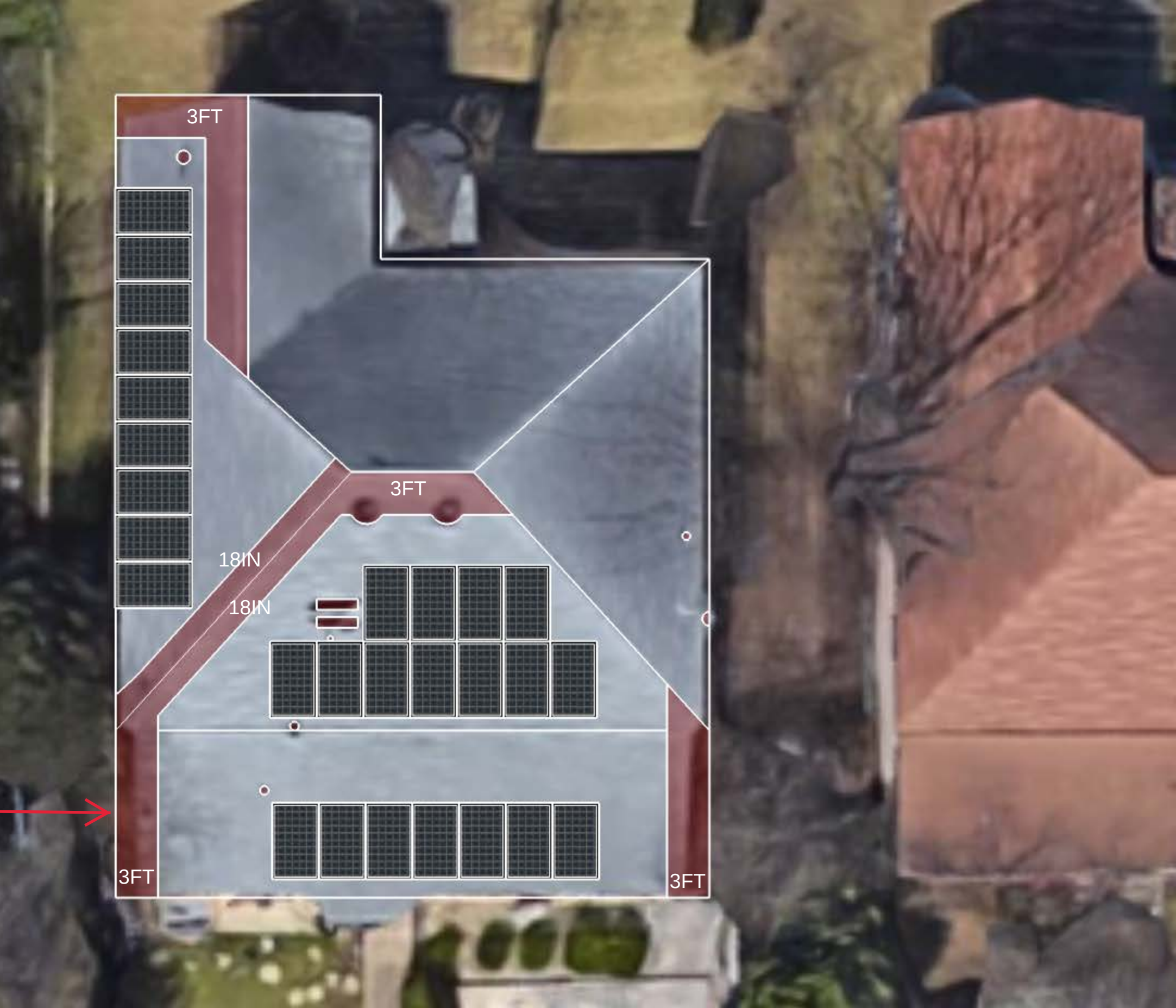






NORTH ^

Approximate location of Service Entrance, AC Disconnect, PV Meter, and Inverter

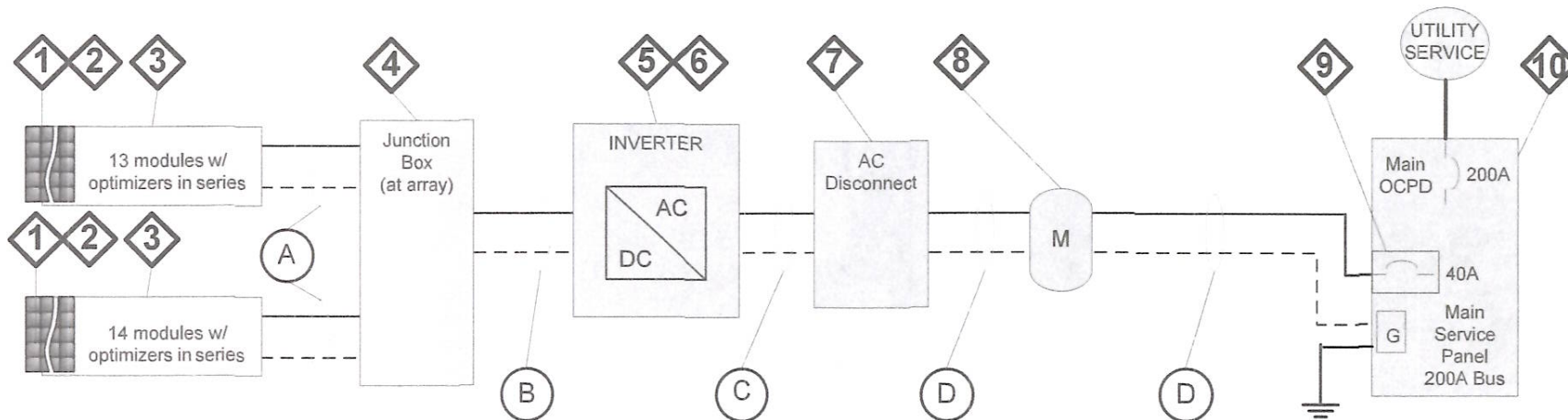


System Information			
PV Module Ratings		Inverter Ratings	
Module Make	LG Solar	Inverter Make	SolarEdge
Module Model	LG320N1C-G4	Inverter Model	SE7600A-US
Max Power	= 320 W	Max. Output Power	= 8350 W
Open Circuit Voltage	= 40.9 V	Max. DC Voltage	= 500 V
Max Power Point Voltage	= 33.6 V	Nominal AC Voltage	= 240 V
Short Circuit Current	= 10.05 A	Max. AC Current	= 32.0 A
Max Power Point Current	= 9.53 A	CEC Inverter Efficiency	= 97.5%

Labels	
Photovoltaic DC Disconnect	
Rated MPP Current	= 21.3 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	= 32.0 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	LG320N1C-G4	LG SOLAR 320W MONOCRYSTALLINE MODULE
2	PV MODULE OPTIMIZER	P400	SOLAREGE 400W PV MODULE OPTIMIZER
3	ARRAY MOUNTING HARDWARE	TBD	ROOF RACKING SYSTEM
4	JUNCTION BOX	SDS-P-3-DC	SAFE-D 3-CIRCUIT PASS-THRU BOX
5	AC/DC INVERTER	SE7600A-US	SOLAREGE 7.6KW 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, 40A, 2-POLE CIRCUIT BREAKER (BACK-FED)
10	MAIN SERVICE PANEL	NA	240V, 200A BUS & 200A MAIN BREAKER (PENDING UPGRADE)

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

Notes:

Equipment, conductors & conduit as listed or equivalent.
Expected nominal string voltage: 350Vdc.

ONE-LINE STANDARD ELECTRICAL DIAGRAM	
PROJECT REF: ARNULFO LOZOYA	
SITE ADDRESS: 514 SHERMAN SAN ANTONIO, TX 78202	
SYSTEM SIZE: 8.64 KW	
1 String of 13 and 1 string of 14 modules/ optimizers (LG 320W/SolarEdge)	

NOT TO SCALE





LG NeON™ 2

LG320N1C-G4

60 cell

LG's new module, LG NeON™ 2, adopts Cello technology. Cello technology replaces 3 busbars with 12 thin wires to enhance power output and reliability. LG NeON™ 2 demonstrates LG's efforts to increase customer's values beyond efficiency. It features enhanced warranty, durability, performance under real environment, and aesthetic design suitable for roofs.



Enhanced Performance Warranty

LG NeON™ 2 has an enhanced performance warranty. The annual degradation has fallen from -0.7%/yr to -0.6%/yr. Even after 25 years, the cell guarantees 2.4%p more output than the previous LG NeON™ modules.



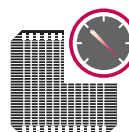
High Power Output

Compared with previous models, the LG NeON™ 2 has been designed to significantly enhance its output efficiency, thereby making it efficient even in limited space.



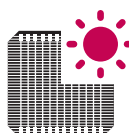
Aesthetic Roof

LG NeON™ 2 has been designed with aesthetics in mind; thinner wires that appear all black at a distance. The product may help increase the value of a property with its modern design.



Outstanding Durability

With its newly reinforced frame design, LG has extended the warranty of the LG NeON™ 2 for an additional 2 years. Additionally, LG NeON™ 2 can endure a front load up to 6000 Pa, and a rear load up to 5400 Pa.



Better Performance on a Sunny Day

LG NeON™ 2 now performs better on sunny days thanks to its improved temperature coefficient.



Double-Sided Cell Structure

The rear of the cell used in LG NeON™ 2 will contribute to generation, just like the front; the light beam reflected from the rear of the module is reabsorbed to generate a great amount of additional power.

About LG Electronics

LG Electronics is a global player who has been committed to expanding its capacity, based on solar energy business as its future growth engine. We embarked on a solar energy source research program in 1985, supported by LG Group's rich experience in semi-conductor, LCD, chemistry, and materials industry. We successfully released first Mono X® series to the market in 2010, which were exported to 32 countries in the following 2 years, thereafter. In 2013, NeON™ (previously known as Mono X® NeON) & 2015 NeON2 with CELLO technology won "Intersolar Award", which proved LG is the leader of innovation in the industry.

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	156.75 x 156.75 mm / 6 inches
# of Busbar	12 (Multi Wire Busbar) 
Dimensions (L x W x H)	1640 x 1000 x 40 mm 64.57 x 39.37 x 1.57 inch
Front Load	6000 Pa / 125 psf 
Rear Load	5400 Pa / 113 psf 
Weight	17.0 ± 0.5 kg / 37.48 ± 1.1 lbs
Connector Type	MC4, MC4 Compatible, IP67
Junction Box	IP67 with 3 Bypass Diodes
Length of Cables	2 x 1000 mm / 2 x 39.37 inch
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminum

Certifications and Warranty

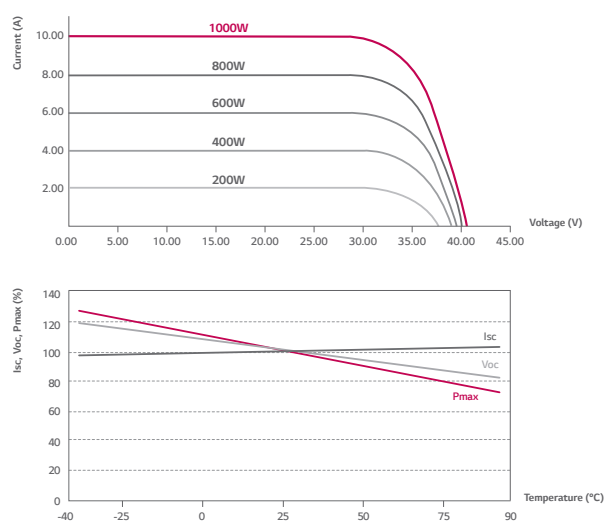
Certifications	IEC 61215, IEC 61730-1/-2
	IEC 62716 (Ammonia Test)
	IEC 61701 (Salt Mist Corrosion Test)
	ISO 9001
	UL 1703
Module Fire Performance (USA)	Type 2 (UL 1703)
Fire Rating (for CANADA)	Class C (ULC/ORD C1703)
Product Warranty	12 years 
Output Warranty of Pmax	Linear warranty* 

* 1) 1st year: 98%, 2) After 2nd year: 0.6%p annual degradation, 3) 83.6% for 25 years

Temperature Characteristics

NOCT	46 ± 3 °C
Pmpp	-0.38 %/°C 
Voc	-0.28 %/°C
Isc	0.03 %/°C

Characteristic Curves



Electrical Properties (STC *)

Module Type	320 W
MPP Voltage (Vmpp)	33.6
MPP Current (Impp)	9.53
Open Circuit Voltage (Voc)	40.9
Short Circuit Current (Isc)	10.05
Module Efficiency (%)	19.5
Operating Temperature (°C)	-40 ~ +90
Maximum System Voltage (V)	1000
Maximum Series Fuse Rating (A)	20
Power Tolerance (%)	0 ~ +3

* STC (Standard Test Condition): Irradiance 1000 W/m², Module Temperature 25 °C, AM 1.5

* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.

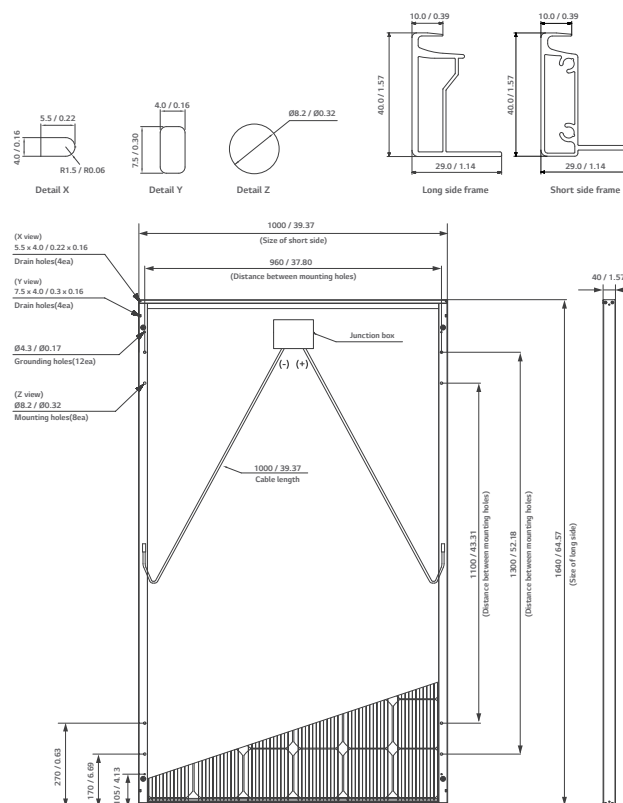
* The typical change in module efficiency at 200 W/m² in relation to 1000 W/m² is -2.0%.

Electrical Properties (NOCT*)

Module Type	320 W
Maximum Power (Pmax)	234
MPP Voltage (Vmpp)	30.7
MPP Current (Impp)	7.60
Open Circuit Voltage (Voc)	37.9
Short Circuit Current (Isc)	8.10

* NOCT (Nominal Operating Cell Temperature): Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Dimensions (mm/in)



* The distance between the center of the mounting/grounding holes.





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

- 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



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 (with HI country setting 57 - 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	600k Ω Sensitivity								
Maximum Inverter Efficiency	97.7	98.2	98.3	98.3	98	98	98	%	
CEC Weighted Efficiency	97.5	98	97.5 @ 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 690.12	Functionality enabled when SolarEdge rapid shutdown kit is installed ⁽⁴⁾								
STANDARD COMPLIANCE									
Safety	UL1741, UL1699B, UL1998 , CSA 22.2								
Grid Connection Standards	IEEE1547								
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 / 1-2 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 ⁽⁵⁾)							°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⁾ Rapid shutdown kit P/N: SE1000-RSD-S1.

⁽⁵⁾ -40 version P/N: SExxxxA-US000NNU4 (for 7600W inverter:SE7600A-US002NNU4).



RoHS



SolarEdge Power Optimizer

Module Add-On For North America

P300 / 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



SolarEdge Power Optimizer

Module Add-On for North America

P300 / P400 / P405

	P300 (for 60-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	
INPUT				
Rated Input DC Power ⁽¹⁾	300	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		Adc
Maximum DC Input Current		12.5		Adc
Maximum Efficiency		99.5		%
Weighted Efficiency		98.8		%
Overvoltage Category		II		
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)				
Maximum Output Current		15		Adc
Maximum Output Voltage	60		85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)				
Safety Output Voltage per Power Optimizer		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
Dimensions (W x L x H)	Pxxx-2 series	141 x 212 x 40.5 / 5.55 x 8.34 x 1.59		mm / in
	Pxxx-5 series	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
Weight (including cables)	Pxxx-2 series	950 / 2.1		gr / lb
	Pxxx-5 series	770 / 1.7	930 / 2.05	930 / 2.05
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	Pxxx-2 series	IP65 / NEMA4		
	Pxxx-5 series	IP68 / NEMA6P		
Relative Humidity	0 - 100			%

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

PV SYSTEM DESIGN USING A SOLAREEDGE INVERTER ⁽²⁾	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	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations		Yes		

⁽²⁾ It is not allowed to mix P405 with P300/P400/P600/P700 in one string.



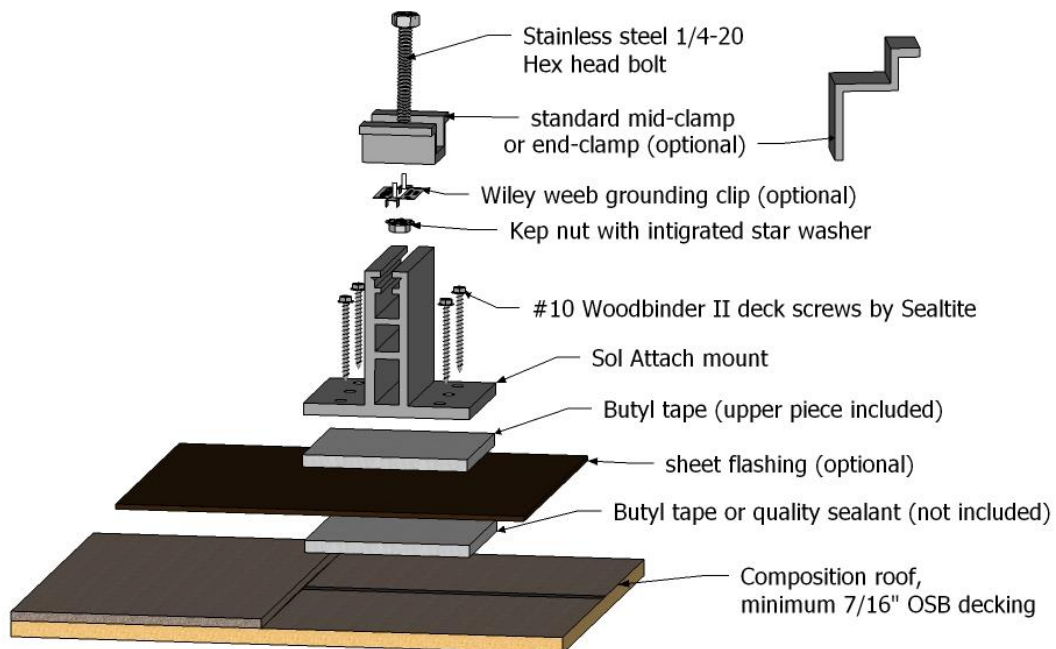
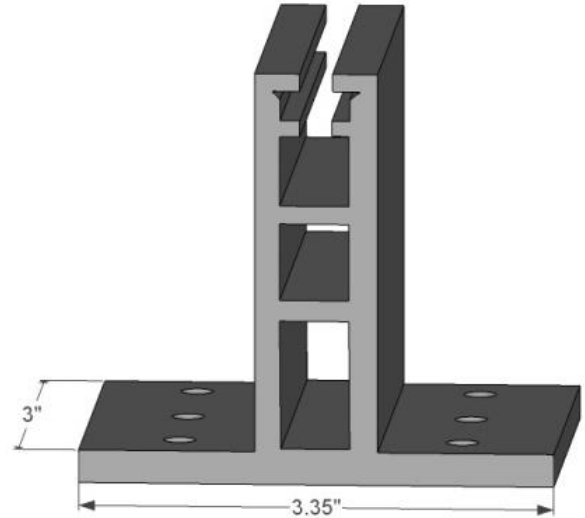
SOL ATTACH

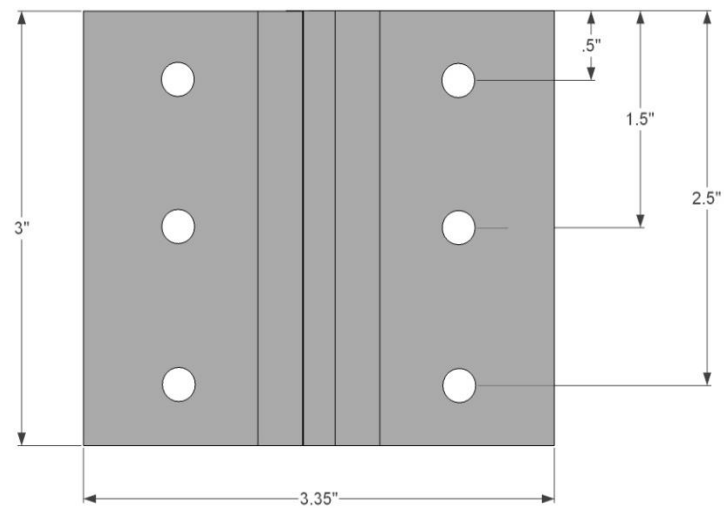
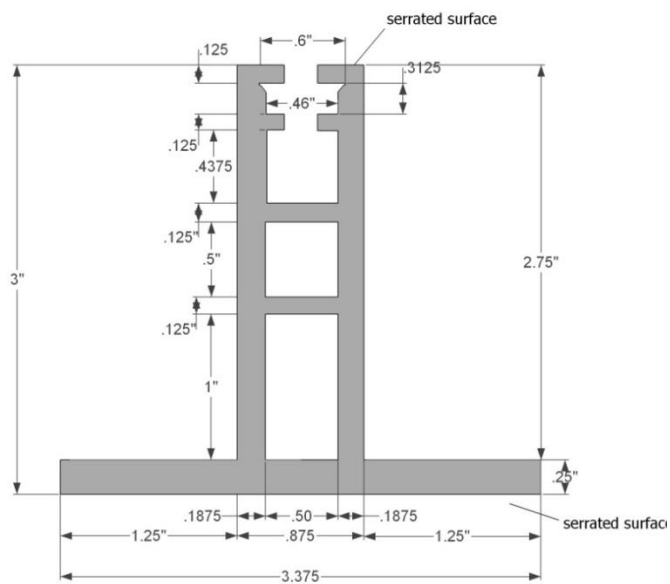
Sol Attach, LLC

Composition roof mounting foot

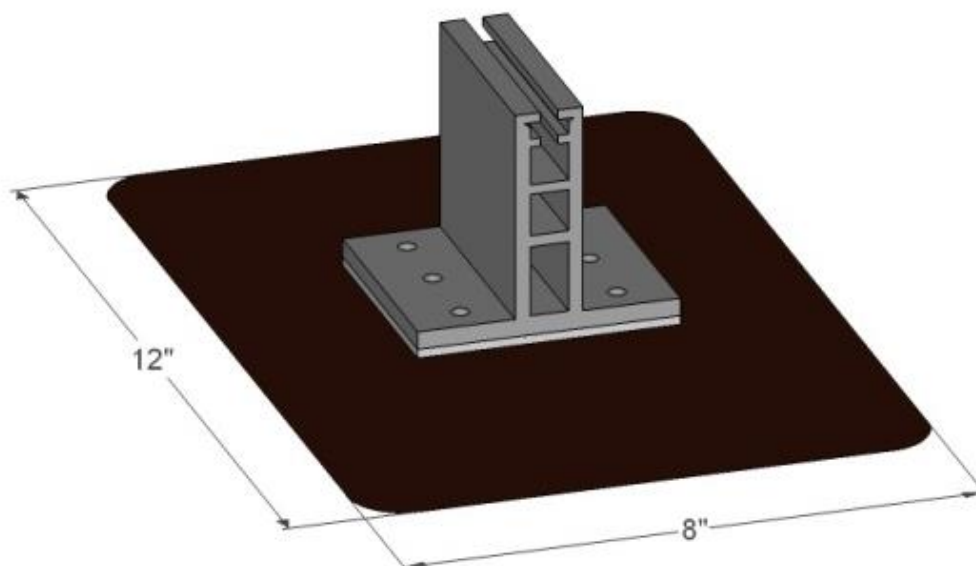
Extrusions made of 6061-T6 alloy

Patent Pending





Flat flashing



Flat flashing

August 25, 2016

Sol Attach
c/o Kevin Stapleton
535 Shady Hollow
New Braunfels, TX 78132



Re: Solar Mounting System for Pitched Rooftops with Sol Attach Roof Mounting System in **Texas**

To Whom It May Concern:

Anchor Engineering, Inc. has reviewed the Sol Attach Roof Mounting System for the design assumptions outlined below and we have concluded that the Sol Attach Roof Mounting System is in compliance with the following codes/standards.

1. ASCE 7-05 – Minimum Design Loads for Buildings and Other Structures, by ASCE/SEI, 2005.
2. ASCE 7-10 – Minimum Design Loads for Buildings and Other Structures, by ASCE/SEI, 2010.
3. 2006 IBC/ 2009 IBC/ 2012 IBC/ 2015 IBC, by International Code Council, 2006/2009/2012/2015.
4. 2006 IRC/ 2009 IRC/ 2012 IRC/ 2015 IRC, by International Code Council, 2006/2009/2012/2015.

Design Assumptions:

- Maximum mean roof height of no more than 30'-0" as defined by ASCE 7-05/ASCE 7-10.
- Importance Factor of no more than 1.0 as defined by ASCE 7-05/ASCE 7-10.
- Dry service conditions.
- Array may be located within roof zones 1, 2, or 3.
- Analysis of the mount is based upon the maximum effects of either the largest gravity loads or wind uplift loads. The point loads (either positive or negative) can act in either direction depending upon the type of loading (i.e. wind, snow...etc.).
- Fasteners installed per manufacturer specifications.
- When using the Sol Attach, four PV mounts per PV module such that adjacent modules share two PV mounts.
- Use two Sol Attach per side unless noted otherwise (See charts below).
- At end clamp locations the Sol Attach Mount is only activated by one half of the panel.
- Snow load = 5 psf.

Product Specifications:

- Aluminum alloy is 6061-T6.
- Kwikseal II Woodbinder Screws. The screws must penetrate the sheathing fully and have a minimum of three threads exposed.
- (3) screws per Sol Attach Mount at end clamp locations.

Module Specifications:

- Modules may be installed in landscape or portrait orientation.
- Modules may have a maximum short side dimension of 39.1".
- Modules may have a maximum long side dimension of 77.1".
- Modules may be a maximum of 59.5lb.

Roof Pitch: 7-27°

Wind Speed, (V_{ult})	Wind Speed, (V_{asd})	Exposure	Fastener Req'd per Sol Attach w/ 7/16" OSB
155 mph $\geq x$	120 mph $\geq x$	C	(6) Screws
155 mph $\geq x > 148$ mph	120 mph $\geq x > 115$ mph	B	(6) Screws
148 mph $\geq x$	115 mph $\geq x$	B	(4) Screws

Roof Pitch: 27-45°

Wind Speed, (V_{ult})	Wind Speed, (V_{asd})	Exposure	Fastener Req'd per Sol Attach w/ 7/16" OSB
155 mph $\geq x >$	120 mph $\geq x$	B, C	(4) Screws

Module Specifications:

- Modules may be installed in landscape or portrait orientation.
- Modules may have a maximum short side dimension of 39.1".
- Modules may have a maximum long side dimension of 77.1".
- Modules may be a maximum of 59.5lb.

Please see attached data sheets for the Sol Attach Roof Mounting System specification sheet.

The Sol Attach Roof Mounting System was evaluated for pull-out resistance of the fasteners and punching shear in the OSB. Review of any building structural element is outside the scope of this letter.

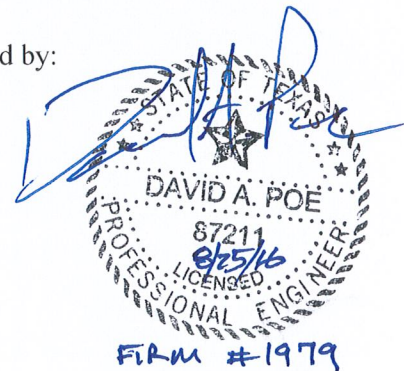
Should questions arise, or if further information is required, please contact our office.

Sincerely,
Anchor Engineering, Inc.



John J. Laur, E.I.
Project Manager

Reviewed by:



David A. Poe, P.E., S.E.
Principal Engineer