

## HISTORIC AND DESIGN REVIEW COMMISSION

April 06, 2016

Agenda Item No: 13

**HDRC CASE NO:** 2016-117  
**ADDRESS:** 305 E EUCLID AVE  
**LEGAL DESCRIPTION:** NCB 811 BLK 1 LOT 1 & 2  
**ZONING:** O2 HS  
**CITY COUNCIL DIST.:** 1  
**LANDMARK:** Delgado House  
**APPLICANT:** Advanced Solar & Electric, LLC  
**OWNER:** Morris Stribling  
**TYPE OF WORK:** Solar panels  
**REQUEST:**

The applicant is requesting a Certificate of Appropriateness for approval to install 59 solar panels to the roof of the non-historic structure located on 305 E Euclid.

### 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:

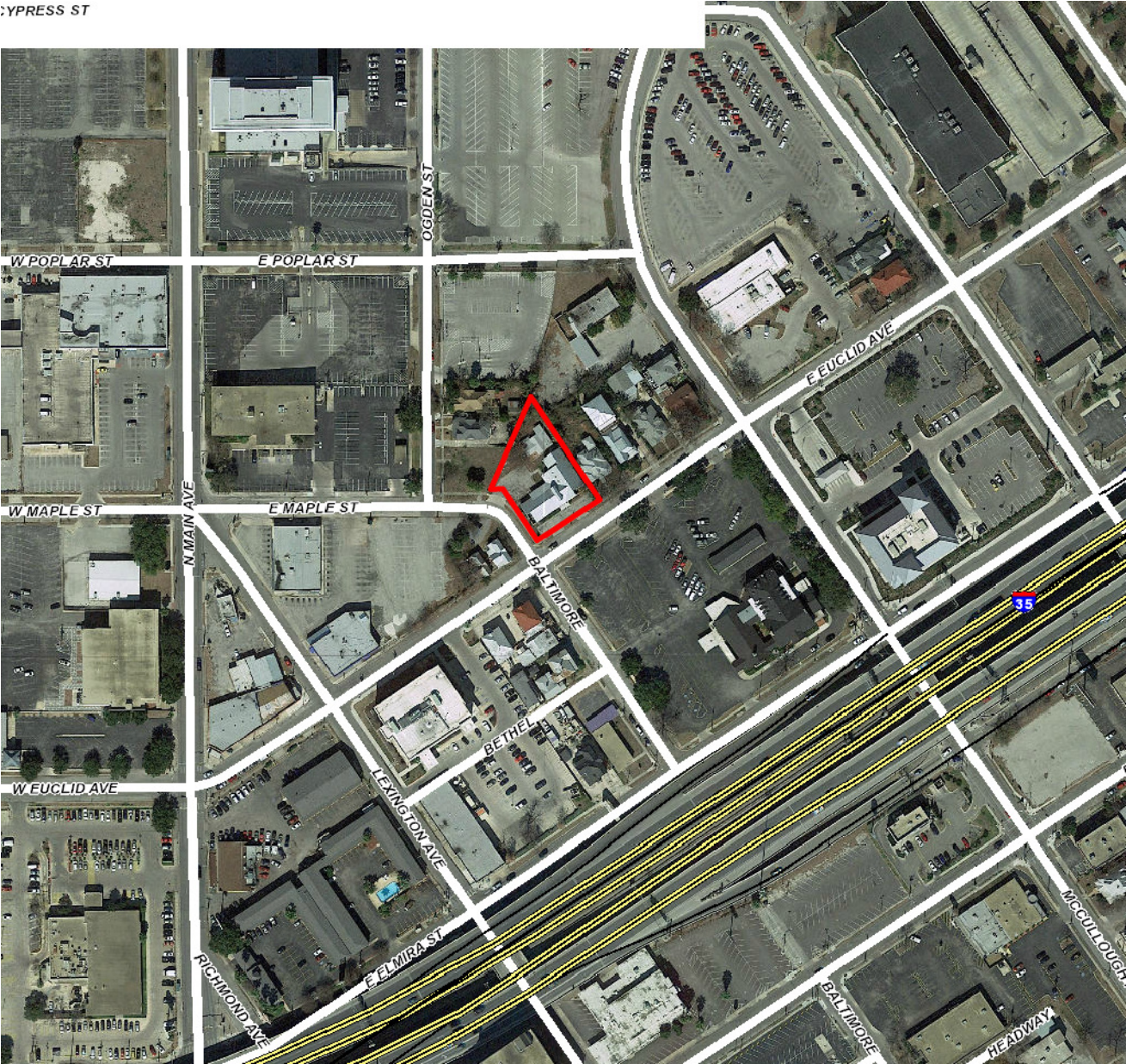
- a. There are two structures located at 305 E Euclid. One structure is a non-historic commercial building built in 1985; another is the Delgado House, a historic landmark, in the north corner of the lot along the rear property line.
- b. The Delgado House is a local landmark.
- c. The applicant is only proposing to install solar panels on the non-historic structure. There are no requests to alter the historic Delgado House.
- d. Staff made a site visit March 25, 2016, and found that the historic structure is surrounded by commercial, non-historic development. The lot at 305 E Euclid is cornered by E Euclid and Baltimore Ave. Across E Euclid, there is a parking lot that fronts the entire block. Across Baltimore Ave, there are two commercial buildings and a parking lot.
- e. The applicant is proposing to install 59 solar panels on the standing seam metal roof of the non-historic structure. There will be five sub-arrays, all mounted on pitched roof with clamps screwed into the roof membrane. The panels will be flush mounted on each pitch; the clamps and rail system forces the panels to sit about 4" above the standing seam metal roof.

### RECOMMENDATION:

Staff recommends approval based on findings a through d.

### CASE MANAGER:

Lauren Sage



305 E Euclid

Solar Panels

Printed:Mar 14, 2016

The City of San Antonio does not guarantee the accuracy, adequacy, completeness or usefulness of any information. The City does not warrant the completeness, timeliness, or positional, thematic, and attribute accuracy of the GIS data. The GIS data, cartographic products, and associated applications are not legal representations of the depicted data. Information shown on these maps is derived from public records that are constantly undergoing revision. Under no circumstances should GIS-derived products be used for final design purposes. The City provides this information on an "as is" basis without warranty of any kind, express or implied, including but not limited to warranties of merchantability or fitness for a particular purpose, and assumes no responsibility for anyone's use of the information.





historic landmark

Non-contributing structure

305 E Euclid Ave

Morris A. Stribling, DPM

Las Colchas

Ogden St

Ogden St

Bethel Alley

Baltimore Ave

Baltimore Ave

E Euclid Ave

E Euclid Ave





Las Colchas

Ogden St

Ogden St

Historic landmark

305 E Euclid Ave

Morris A. Stribling, DPM

Baltimore Ave

E Euclid Ave

E Euclid Ave

E Euclid Ave

E Euclid Ave

Baltimore Ave

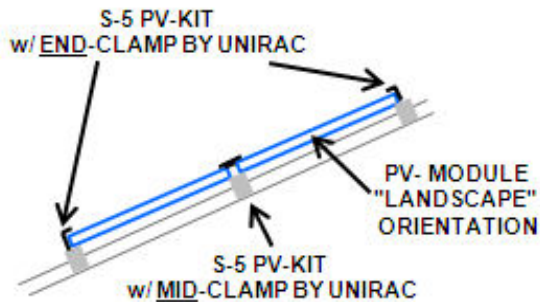
Bethel All





PV SITE LAYOUT

**STANDING SEAM ROOF MOUNT APPLICATION**  
**S-5 BRAND STANDING SEAM ROOF CLAMP W/PV**  
**MOUNTING KIT ALL COMPONENTS**  
**ARE STAINLESS OR ALUMINUM**



MOUNTING METHOD

**CONSTRUCTION NOTES:**

1. ALL EQUIPMENT TO BE LISTED OR LABELED FOR ITS APPLICATION.
2. INSTALLATION TO BE COMPLIANT WITH THE NEC.
3. MODULE GROUNDING METHOD SHALL BE WEEB UGC AND WEEB LUGS.
4. ALL CONDUCTORS ARE COPPER, UNLESS OTHERWISE SPECIFIED.
5. 3.0 PSF MAX DEAD LOAD CONTRIBUTED FROM SOLAR ARRAY

LABELS FOR JUNCTION BOXES, COMBINER BOXES, SOLAR LOAD CENTERS, AND DISCONNECTS:  
"WARNING: ELECTRICAL SHOCK HAZARD. DO NOT TOUCH THE TERMINALS. TERMINALS ON BOTH THE LINE & LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION"

LABEL FOR SOLAR A/C DISCONNECT:  
"SOLAR AC DISCONNECT"

LABEL FOR SOLAR BACK-FEED BREAKER:  
"SOLAR INPUT BREAKER. DO NOT MOVE"

**SIGNAGES PER NEC 690.17 & 705.10:**

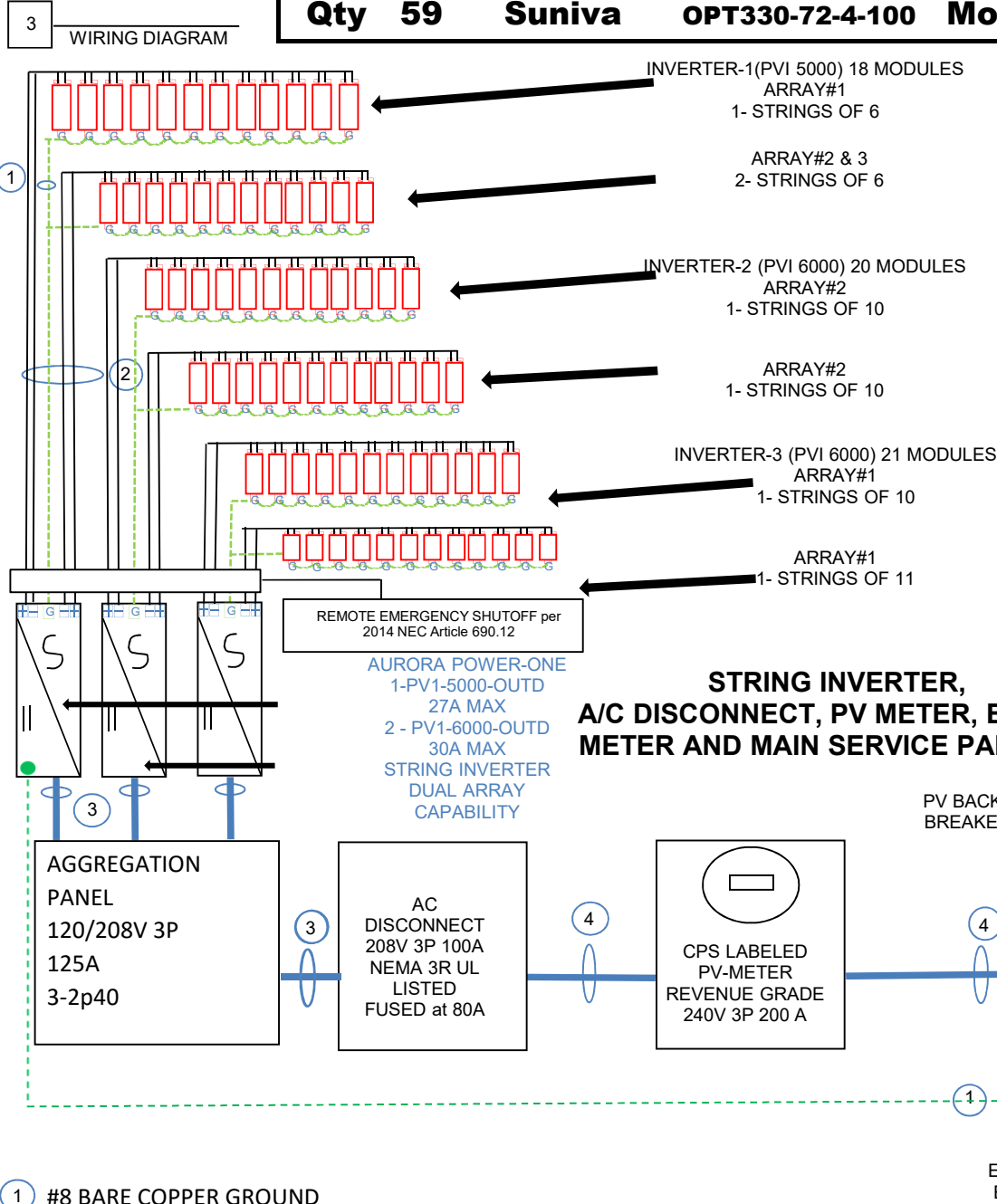
LABEL FOR LOAD BOX "SECOND SOURCES IS A PHOTOVOLTAIC SYSTEM"

LABEL FOR LOAD BOX:  
"OPERATING VOLTAGE:  
MAXIMUM SYSTEM VOLTAGE:  
MAXIMUM SYSTEM CURRENT:  
MAXIMUM INVERTER OUTPUT:"

DESCRIPTION	DATE	REV
ORIGINAL	1/31/2016	A
REVISED		B
REVISED		C
Mstr Elect#	96107	

**DESIGN & DRAFTING BY:**  
**Advanced Solar and Electric llc**  
**Master Electrician:**  
**James D. Flores, Sr**

**Commercial SOLAR ARRAY 19.47 KW D/C**  
**Qty 59 Suniva OPT330-72-4-100 Modules**



**LEGEND**

- = EQUIPMENT GROUNDING CONDUCTORS
- = CIRCUIT CONDUCTORS
- L1 = LINE 1 TERMINAL (PHASED BLACK)
- L2 = LINE 2 TERMINAL (PHASED RED)
- N = NEUTRAL TERMINAL (PHASED WHITE)
- G = GROUND TERMINAL (PHASED GREEN)
- ⊕ = POSITIVE TERMINAL (PHASED BLACK)
- ⊖ = NEGATIVE TERMINAL (PHASED WHITE)
- ⊗ = FUSE
- ⊔ = CIRCUIT BREAKER

**Foot Care of Central S.A.**  
**305 East Euclid**  
**San Antonio TX 78212**  
**Commercial Application**  
**TECL #27328**

**SHEET TITLE:**  
**PHOTOVOLTAIC**  
**INSTALLATION**  
**PAGE NUMBER:**  
**PV-1**

These drawings are the instruments of service and are the property of **ADVANCED SOLAR AND ELECTRIC LLC**. All designs and other information contained on these drawings are for use on the specified project and shall not be used on other projects, or for additions to this project, or for the completion of this project, by others without the expressed written consent of **ADVANCED SOLAR AND ELECTRIC LLC**, nor are they to be assigned to any third party without said written permission and consent.



# **Advanced Solar and Electric L.L.C.**

105 W. Loop 539, Cibola, Texas 78108 (210) 556-1399 [www.advancedsolar.com](http://www.advancedsolar.com) [sales@advancedsolar.com](mailto:sales@advancedsolar.com)

TECL# 27328

## **Site Survey Worksheet**

<b>CUSTOMER:</b>	Foot Care of Central S.A.	<b>DATE:</b>	January 19, 2016	
<b>JOB SITE:</b>	305 East Euclid	<b>w Phone:</b>		
<b>CITY / ST / ZIP</b>	San Antonio TX 78212	<b>c Phone:</b>	210 295-5895	
<b>EMAIL</b>	mstribling1@me.com	<b>1 or 2 Story:</b>	Other	
<b>Proposed System</b>	19.47 (D/C KW capacity)	<b>AHJ:</b>	COSA	
<b>Panel Configuration</b>	QTY 59	330	Suniva OPT330-72-4-100	
<b>Inverter Configuration</b>	QTY 2	Power-1	PVI-5000-OUTD-US	
	QTY 1	Power-1	PVI-6000-OUTD-US	
<b>Other Info</b>	Drawn By: Wes		Rep: Wes	
<b>All Arrays</b>	<b>Array #1</b>	<b>Array #2</b>	<b>Array #3</b>	<b>Array #4</b>
<b>Tilt:</b>	39.0	29.0	10.0	
<b>Azimuth:</b>	145	235	325	
<b>Qty:</b>	59	27	26	6
<b>KW</b>	19.47	8.91	8.58	1.98
<b>NREL Default kWh</b>	26869	12296	11840	2732
<b>NREL Actual kWh:</b>	24917	11364	11219	2334
<b>% Default</b>	92.74%	92.42%	94.75%	85.42%



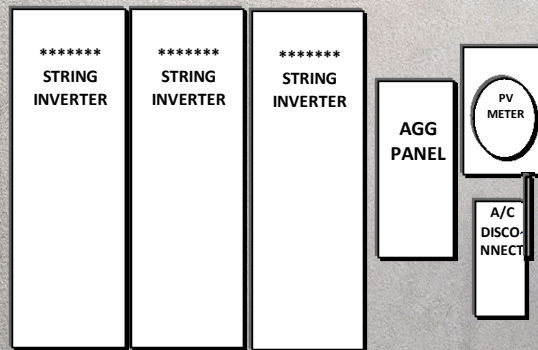


# **Advanced Solar and Electric L.L.C.**

105 W. Loop 539, Cibola, Texas 78108 (210) 556-1399 [www.advancedsolar.com](http://www.advancedsolar.com) [sales@advancedsolar.com](mailto:sales@advancedsolar.com)

## **Site Survey Worksheet**

<b>CUSTOMER:</b>	<b>Foot Care of Central S.A.</b>	<b>DATE: #VALUE!</b>
<b>JOB SITE:</b>	<b>305 East Euclid</b>	<b>PHONE #1: 210 295-5895</b>
<b>CITY / ST / ZIP</b>	<b>San Antonio TX</b>	<b>PHONE #2: 210 295-5895</b>
<b>EMAIL</b>	<b>mstribling1@me.com</b>	<b>TYPE: Commercial</b>



All safe working distances will be met



## ABB string inverters

### PVI-5000/6000-TL-OUTD

5kW to 6kW



Designed for residential and small commercial PV installations, this inverter fills a specific niche in the ABB product line to cater for those installations producing between 5kW and 20kW.

**This inverter includes dual input section to process two strings with independent Multiple Power Point Tracker (MPPT).**

The high-speed and precise MPPT algorithm offers real-time power tracking and energy harvesting. Flat efficiency curves ensure high-efficiency at all output levels ensuring consistent and stable performance across the entire input voltage and output power range.

This outdoor inverter has been designed as a completely sealed unit to withstand the harshest environmental conditions.

**The wide input voltage range makes the inverter suitable for low-power installations with reduced string size.**

The transformerless operation offers high performance efficiencies of up to 97.1 percent.

Free remote monitoring capability is available with every installation. This enables homeowners to view their energy production and offers installers a proactive and economic way of maintaining and troubleshooting the system.

#### Highlights

- Single-phase and three-phase output grid connection
- Wide input-voltage range for increased stringing flexibility
- The high-speed and precise MPPT algorithm offers real-time power tracking and improved energy harvesting
- Outdoor NEMA 4X rated enclosure for unrestricted use under any environmental conditions
- Integrated DC disconnect switch in compliance with international Standards (-S Version)



### Additional highlights

- RS-485 communication interface (for connection to laptop or data logger)
- Available with the optional VSN300 Wifi Logger Card for easy and affordable wireless monitoring
- Compliant with NEC 690.12 when used with ABB's Rapid Shutdown device
- Comes standard with DC Arc Fault Circuit Interruptor (AFCI) to comply with NEC 690.11

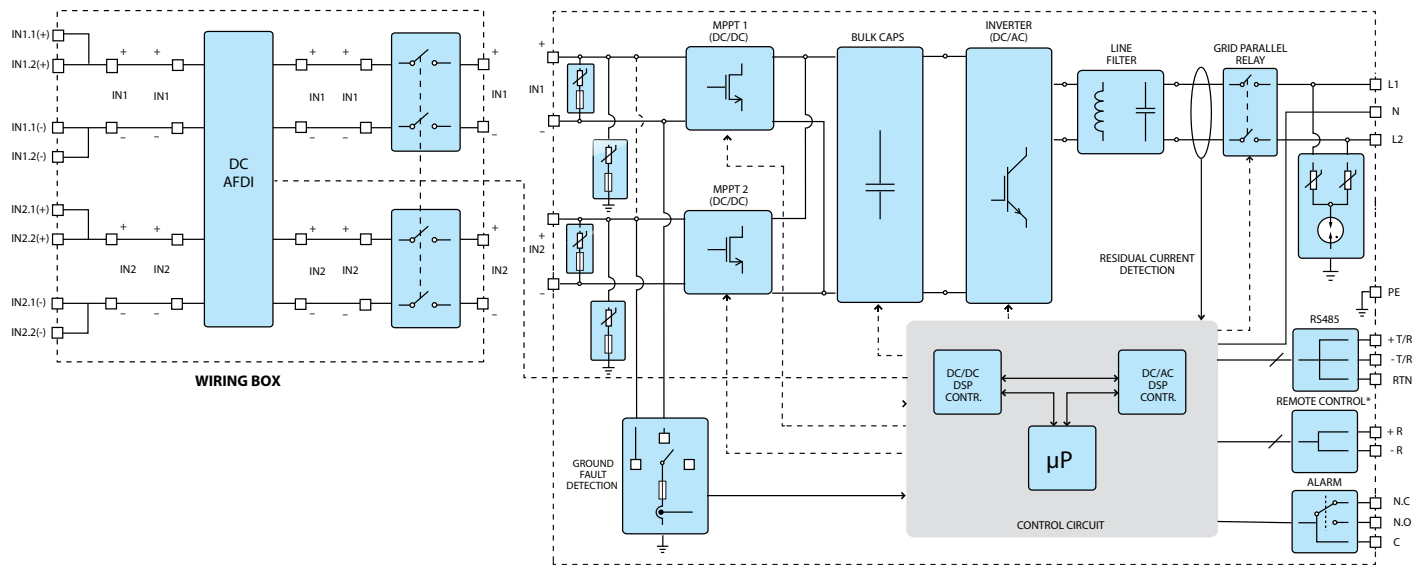


### Technical data and types

Type code	PVI-5000-OUTD-US			PVI-6000-OUTD-US		
General Specifications						
Nominal output power	5000W			6000W		
Maximum output power	5000W			6000W		
Rated grid AC voltage	208V	240V	277V	208V	240V	277V
Input side (DC)						
Number of independent MPPT channels	2			2		
Maximum usable power for each channel	4000W			4000W		
Absolute maximum voltage (Vmax)	600V			600V		
Start-up voltage (Vstart)	200V (adj. 120-350)			200V (adj. 120-350)		
Full power MPPT voltage range	145-530V			175-530V		
Operating MPPT voltage range	0.7 x Vstart - 580V (≥90V)			0.7 x Vstart - 580V (≥90V)		
Maximum current (Idcmax) for both MPPT in parallel	36A			36A		
Maximum usable current per channel	18A			18A		
Maximum short circuit current per channel	22A			22A		
Number of wire landing terminals per channel	2 Pairs			2 Pairs		
Array wiring termination	Terminal block, pressure clamp, AWG20-AWG6					
Output side (AC)						
Grid connection type	1Ø/2W	Split-Ø/3W	1Ø/2W	1Ø/2W	Split-Ø/3W	1Ø/2W
Adjustable voltage range (Vmin-Vmax)	183-228V	221-264V	244-304V	183-228V	211-264V	244-304V
Grid frequency	60Hz					
Adjustable grid frequency range	57-60.5Hz					
Maximum current (Iac,max) A <sub>RMS</sub>	27A	23A	20A	30A	28A	24A
Power factor	> 0.995 (adjustable to ±0.8)					
Total harmonic distortion at rated power	< 2%					
Contributory fault current <sup>1</sup>	36.25 A <sub>pk</sub> / 25.63A <sub>RMS</sub>	36.5 A <sub>pk</sub> / 25.81A <sub>RMS</sub>	31.75 A <sub>pk</sub> / 22.45A <sub>RMS</sub>	36.25 A <sub>pk</sub> / 25.63A <sub>RMS</sub>	36.5 A <sub>pk</sub> / 25.81A <sub>RMS</sub>	31.75 A <sub>pk</sub> / 22.45A <sub>RMS</sub>
Grid wiring termination type	Terminal block, pressure clamp, AWG20-AWG4					
Input						
Reverse polarity protection	Yes					
Over-voltage protection type	Varistor, 2 for each channel					
PV array ground fault detection	Pre start-up R <sub>iso</sub> and dynamic GFDI (requires floating arrays)					
Output						
Anti-islanding protection	Meets UL1741 / IEEE1547 requirements					
Over-voltage protection type	Varistor, 2 (L <sub>1</sub> - L <sub>2</sub> / L <sub>1</sub> - G)					
Maximum AC OCPD rating	35A	30A	25A	40A	35A	30A
Efficiency						
Maximum efficiency	97.1%					
CEC efficiency	96%	96.5%	96.5%	96%	96.5%	96.5%
User interface	Graphic display					
Operating performance						
Stand-by consumption	<8W <sub>RMS</sub>			<8W <sub>RMS</sub>		
Nighttime consumption	<0.6W <sub>RMS</sub>			<0.6W <sub>RMS</sub>		
Communication						
User-interface	16 characters x 2 lines LCD display					
Remote monitoring (1xRS485 incl.)	VSN700 Data Logger (opt.), VSN300 Wifi Logger Card (opt.)					
Environmental						
Ambient air operating temperature range	-13°F to +140°F (-25°C to +60°C)			-13°F to +140°F (-25°C to +60°C) with derating above 122°F (50°C)		
Ambient air storage temperature range	-40°F to +176°F (-40°C to +80°C)			-40°F to +176°F (-40°C to +80°C)		
Relative humidity	0-100% RH condensing			0-100% RH condensing		
Acoustic noise emission level	< 50 db (A) @1m			< 50 db (A) @1m		
Maximum operating altitude without derating	6560ft (2000m)			6560ft (2000m)		

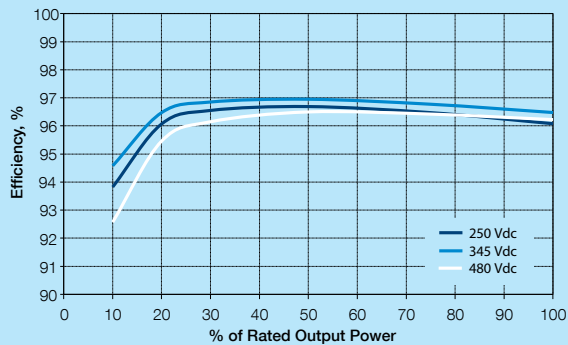


## Block diagram of PVI-5000/6000-TL-OUTD

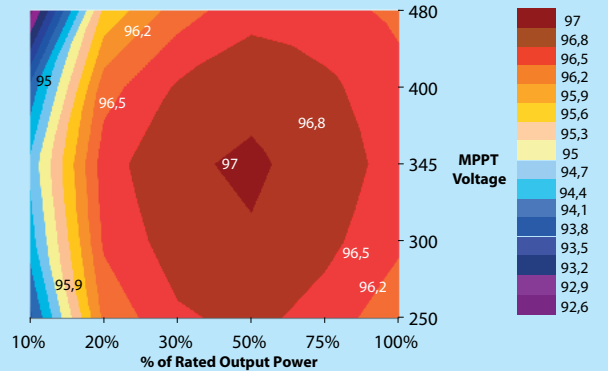


\* Remote control function not available on -A version

PVI-5000/6000-OUTD-US



PVI-5000/6000-OUTD-US



## Technical data and types

### Type code

### PVI-5000-OUTD-US

### PVI-6000-OUTD-US

Mechanical specifications	
Enclosure rating	NEMA 4X
Cooling	Natural convection
Dimensions H x W x D	41.4x12.8x8.6 in (1052 x 325 x 218 mm)
Weight	<59.5lb (27.0kg)
Shipping weight	<78lb (35.4kg)
Mounting system	Wall bracket
Conduit connections	Bottom: (2) pre-drilled opening for ¾ inch conduits and concentric markings for 1 inch (both sides) and 1½ inch conduit (DC side only) Sides: (2) pre-drilled opening for ¾ inch conduits with concentric markings for 1 inch (both sides) and 1½ inch conduit (DC side only) Back: (2) concentric markings for ¾ inch and 1 inch conduits
DC switch rating (per contact)	25A / 600V
Safety and Compliance	
Isolation level	Transformerless (floating array)
Safety and EMC standard	UL 1741, UL1741SA (draft), IEEE1547.1, IEEE1547.2, CSA-C22.2 N. 107.1-01, UL1998 UL 1699B, FCC Part 15 Class B
Safety approval	CSA-US or cTUV-US
Regional Compliance	Rule 21, HECO, NEC 2014 690.11, NEC 2014 690.12 with ABB Rapid Shutdown device
Available models	
With DC switch, wiring box and arc fault detector and interruptor	PVI-5000-OUTD-US-A PVI-6000-OUTD-US-A
All data is subject to change without notice	



### Support and service

ABB supports its customers with a dedicated, global service organization in more than 60 countries, with strong regional and national technical partner networks providing a complete range of life cycle services.

For more information please contact your local ABB representative or visit:

**[www.abb.com/solarinverters](http://www.abb.com/solarinverters)**

**[www.abb.com](http://www.abb.com)**

© Copyright 2015 ABB. All rights reserved. Specifications subject to change without notice.



This inverter is marked with one of the two certification marks shown here (TuV or CSA).



## ABB solar system accessories

### Rapid Shutdown for residential and small commercial



ABB now offers the only family of rapid shutdown products for string inverters today. This product provides a fail-safe solution for emergency responders to eliminate voltage at the PV array in compliance with NEC 2014 Rapid Shutdown code requirements.

**The ABB Rapid Shutdown system requires no extra conduit; minimizing additional material cost and associated labor.**

Shutdown occurs at the rooftop box when utility power is lost or when the PV system's AC disconnect switch is opened. In jurisdictions requiring a dedicated activation switch, an optional emergency stop button is available. The Rapid Shutdown box can mount directly to the PV mounting rail and lay parallel to the roofing surface. The NEMA 4X design permits installation angles from 0-90° while maintaining its water-tight seal from mounted snow or driven rain.

**Three models are available to cover all system configurations; including, a two-string pass through, a two-string combined and a four-string combined box.**

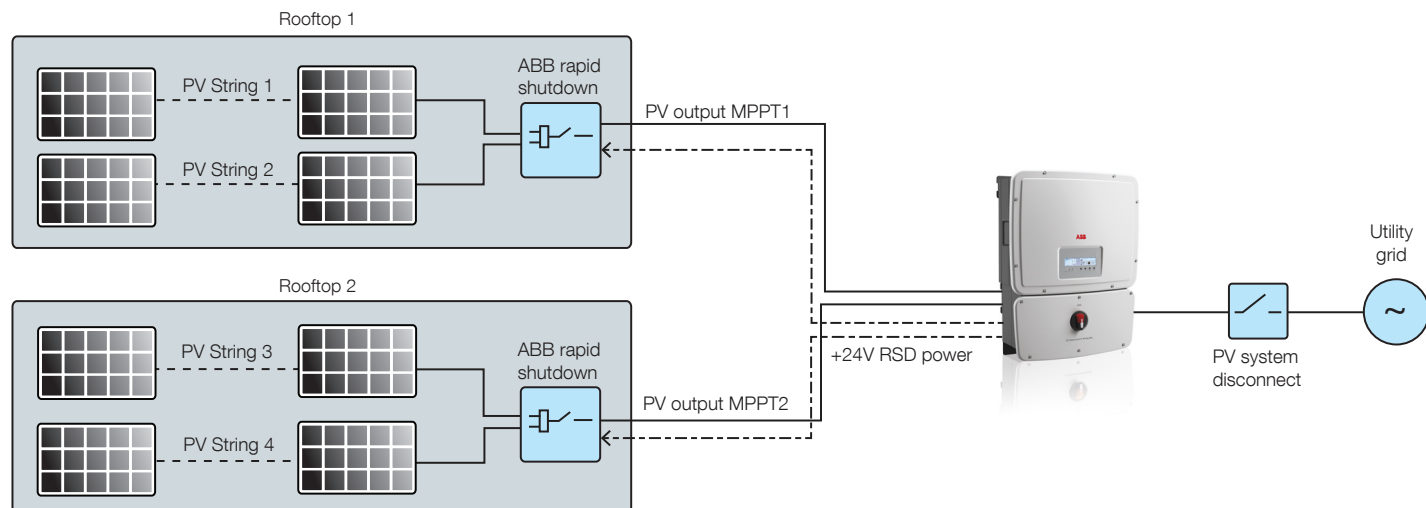
The unique features of each box can be used to maintain the specific configuration of the PV system. Dual outputs in the box maintain the benefits of ABB's dual MPPT inverter channels, while the single output box is perfect for small PV arrays utilizing one MPPT channel or systems requiring two rapid shutdown boxes.

To further reduce system cost, string combining models reduce the number of output conductors between the rooftop box and the inverter. The applicable rapid shutdown boxes include disconnect switches to comply with NEC 2014 690.15(C) *Direct-Current Combiner Disconnects*.

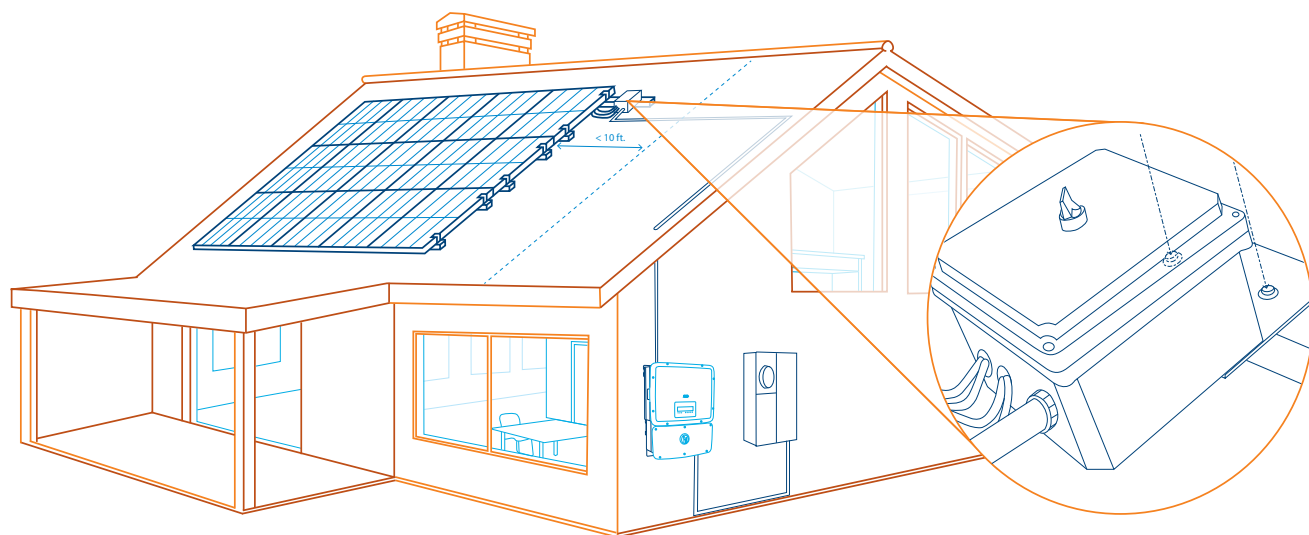
#### Highlights:

- Meets NEC 690.12 while avoiding the cost of additional conduit making this solution the most cost-effective rapid shutdown product available
- Immediately eliminates voltage and current upon activation
- NEMA 4X enclosure provides added protection from the harshest rooftop conditions
- Multiple string combining models available provide additional savings by reducing the number of DC conductors to the inverter
- Equipment disconnect included in string combining models provide safety and compliance with NEC 2014 combiner-disconnect requirements

## Rapid shutdown wiring diagram: 2-RSD system



Two RS2-1CN6 boxes may be powered by one power supply. For PV systems requiring two RSD boxes order the RS2-1CN6- kit and one RS2-1CN6 box.



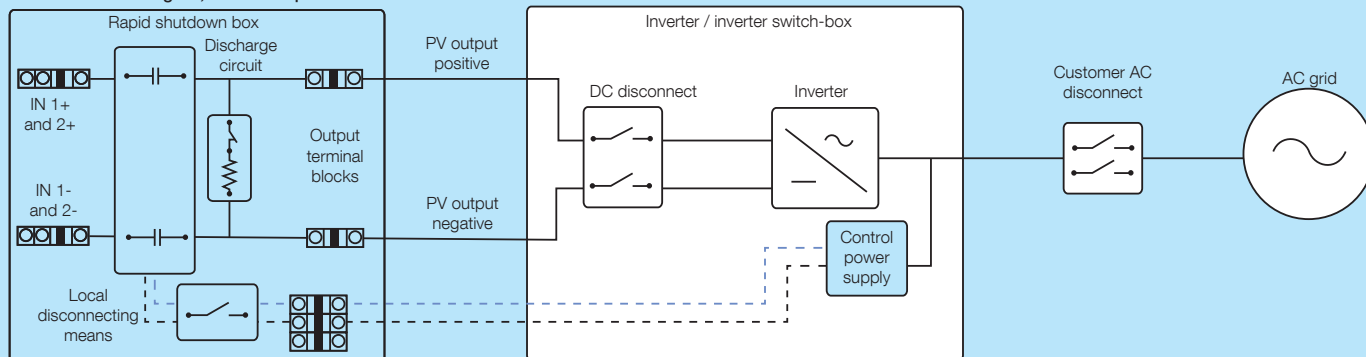
## Technical data and types

Type code	2-String pass-through	2-String combined	4-String combined
<b>PV source conductor input</b>			
Max input current (per string)		11.25A	
Max input voltage		600V	
Number of input strings	2	2	4
Conductor size		14-8 AWG	
<b>PV output conductors output</b>			
Number of output circuits	2	1	2
Conductor size		12-6 AWG	
DC disconnect	N/A	Yes	Yes
<b>Control power</b>			
Power consumption	<5W, 24V/0.2A	<2.5W, 24V/0.1A	<5W, 24V/0.2A
Maximum power conductor size		12 AWG	
E-stop button		Optional	
<b>Environmental</b>			
Mounting angle		0-90°	
Dimensions H x W x D		10.54"x8.54"x5.32" (without mounting bracket)	
Weight	6lb	5.8lb	6.2lb
Operating temperature range		-25°C to +70°C	
Enclosure rating		NEMA 4X	
Certifications		UL1741:2010, FCC Part 15 Class B	
<b>Warranty</b>			
Standard warranty		10 Years	
<b>Available models</b>			
Rapid shutdown kit	RS2-2PN6-kit	RS2-1CN6-kit	RS4-2CN6-kit
Rapid shutdown rooftop box for 2-box system	N/A	RS2-1CN6	N/A
Optional emergency stop		1SFA611821R1026	

Information in this document is subject to change without notice

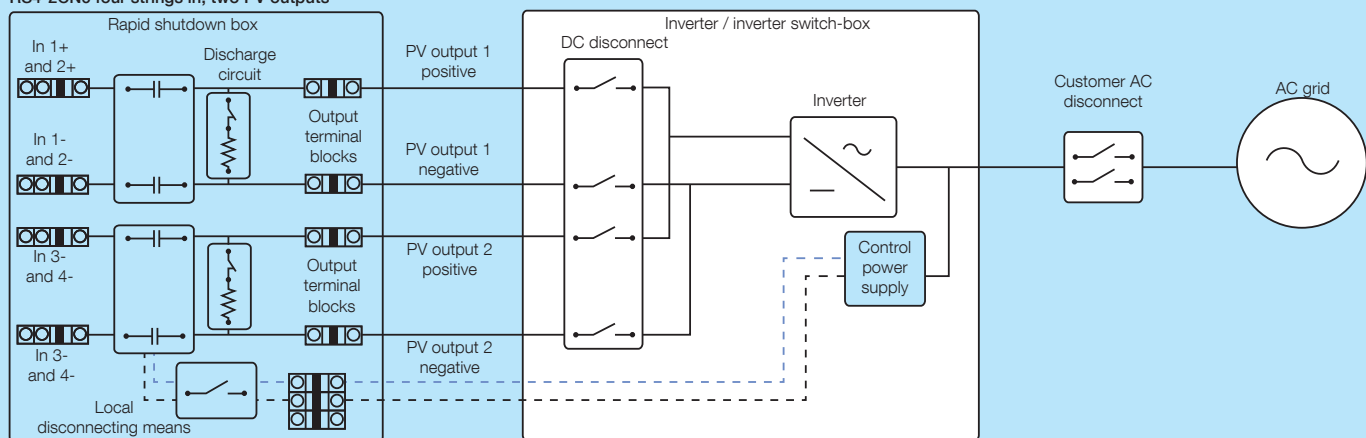


**RS2-1CN6 two strings in, one PV output**



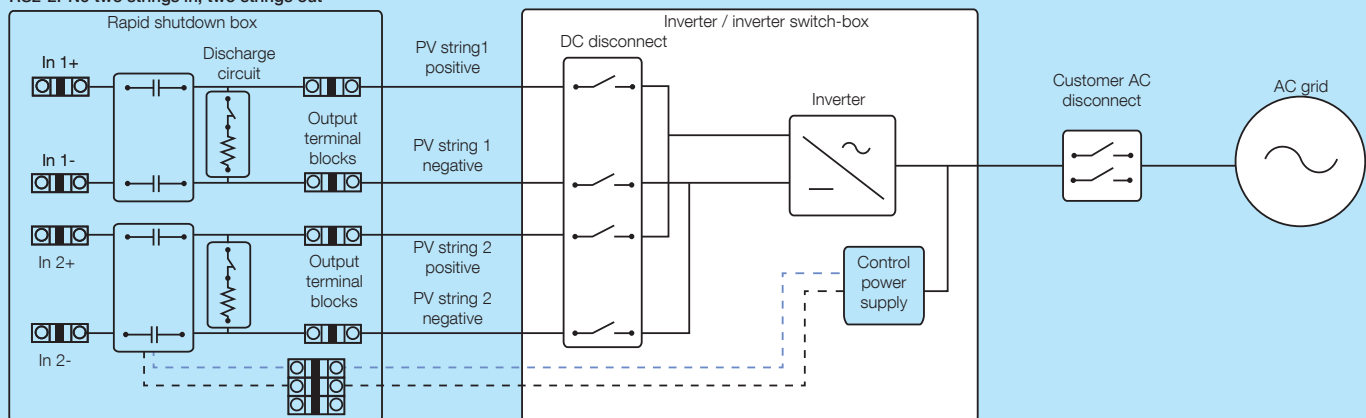
This 2-string model combines the strings to one PV output circuit. The RS2-1CN6 includes a disconnect switch on the front cover to disconnect the PV output conductors from the equipment downstream. Auxillary terminals are provided for connecting an emergency stop button, if desired.

**RS4-2CN6 four strings in, two PV outputs**



This 4-string model combines 2-strings together in two separate PV output circuits. The RS4-2CN6 includes a disconnect switch on the front cover to disconnect the PV output conductors from the equipment downstream. Auxillary terminals are provided for connecting an emergency stop button, if desired.

**RS2-2PN6 two strings in, two strings out**



The RS2-2PN6 is a 2-string pass-through with no string combining and no local disconnecting means included. Auxillary terminals are provided for connecting an emergency stop button, if desired.

### Support and service

ABB supports its customers with a dedicated, global service organization in more than 60 countries, with strong regional and national technical partner networks providing a complete range of life cycle services.

For more information please contact your local ABB representative or visit:

**[www.abb.com/solarinverters](http://www.abb.com/solarinverters)**

**[www.abb.com](http://www.abb.com)**

© Copyright 2015 ABB. All rights reserved. Specifications subject to change without notice.



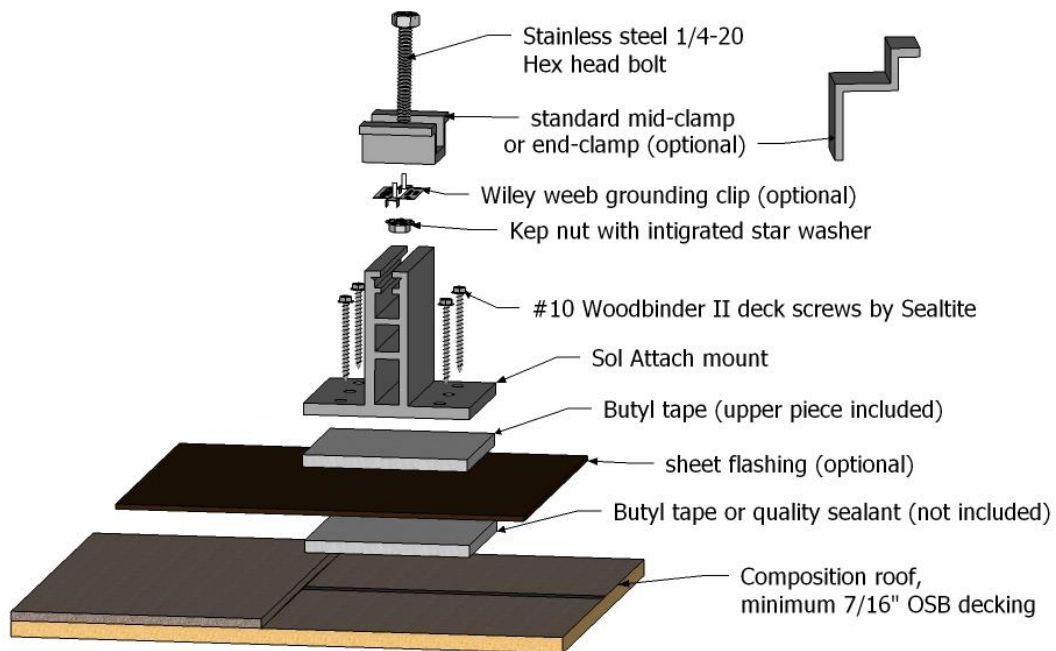
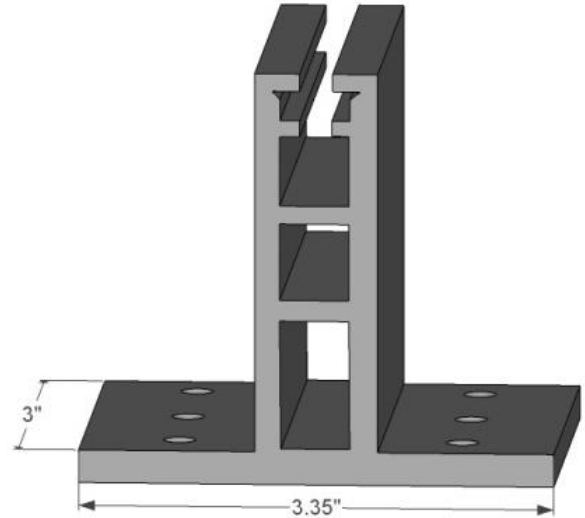
# SOL ATTACH

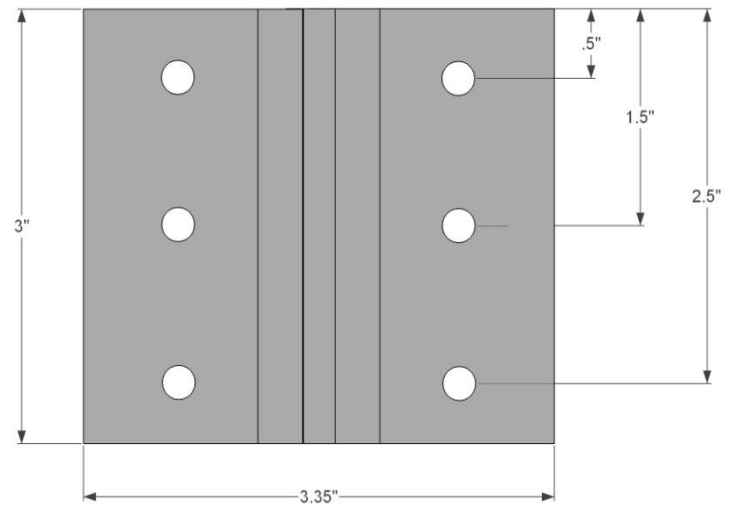
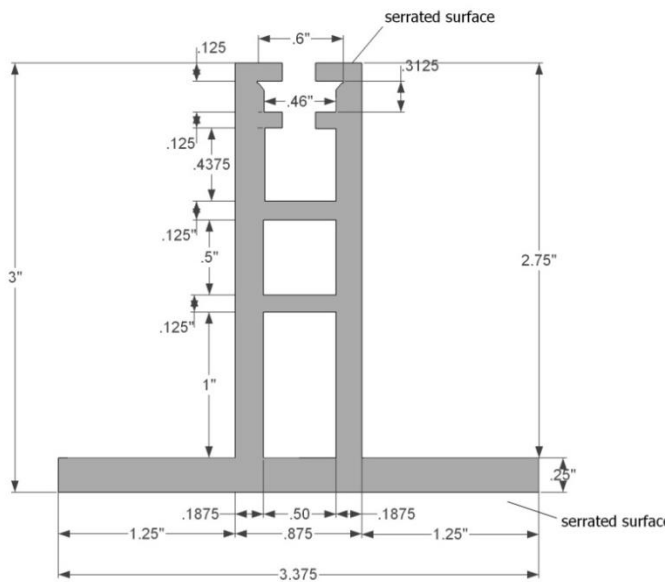
Sol Attach, LLC

## **Composition roof mounting foot**

Extrusions made of 6061-T6 alloy

Patent Pending

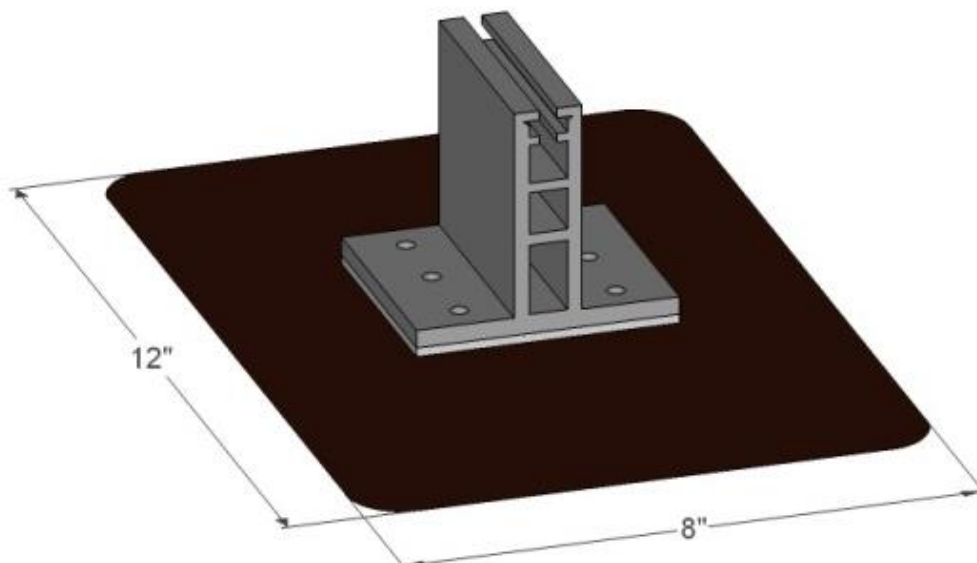




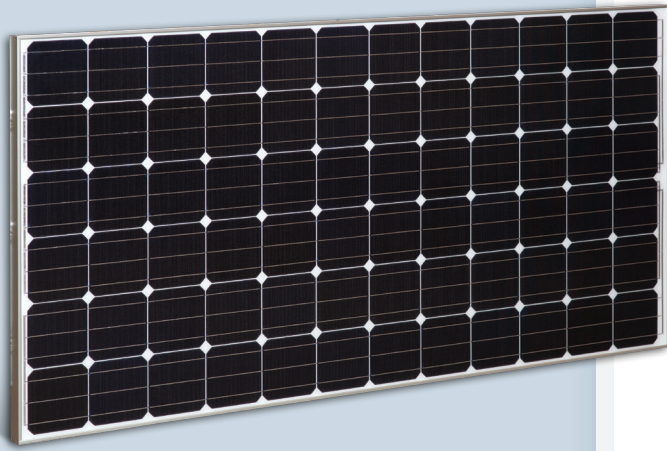
### Weights:

Each single mount	6.6 oz
One mount with 4 deck screws and butyl tape	8.6 oz
One mount with screws, butyl, and mid-clamp	10.1 oz
One mount with screws, butyl, mid-clamp, and flashing	12.6 oz

## Flat flashing







## SUNIVA OPTIMUS® SERIES MONOCRYSTALLINE SOLAR MODULES

OPT SERIES: OPT 72 CELL MODULES (SILVER FRAME)

### ENGINEERING EXCELLENCE

- Built exclusively with **Suniva's premium ARTisun Select cells**, providing one of the highest power outputs per square meter at an affordable price
- **The leading US-born, US-operated crystalline silicon cell and module manufacturer**, spun out of Georgia Tech's University Center of Excellence in Photovoltaics; one of only two such research centers in the U.S.
- Suniva's state-of-the art manufacturing and module lab facilities feature the most advanced equipment and technology

### QUALITY & RELIABILITY

- Suniva Optimus modules are manufactured and warranted to our specifications assuring consistent high performance and high quality.
- Rigorous in-house quality management tests beyond standard UL and IEC standards
- Performance longevity with advanced polymer backsheet
- UL1703 listed Type 2 PV module
- Passed the most stringent salt spray tests based on IEC 61701
- Passed enhanced stress tests<sup>1</sup> based on IEC 61215 conducted at Fraunhofer ISE<sup>2</sup>
- PAN files are independently validated



**Optimus® modules are known for their superior quality and long-term reliability.** These high-powered modules consist of Suniva's premium ARTisun® Select cell technology and are designed and manufactured in the U.S.A. and North America using our pioneering ion implantation technology. Suniva's high power-density Optimus modules provide excellent performance and value.

### FEATURES

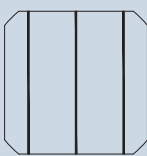
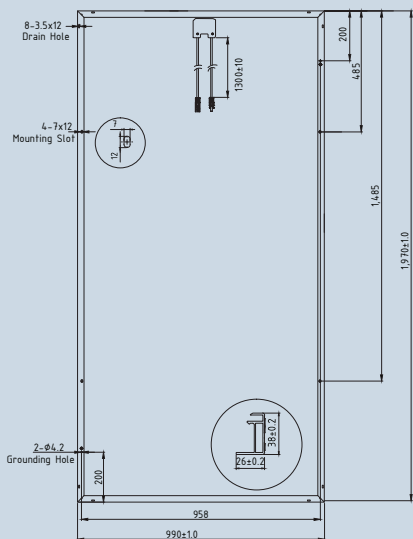
- ☀ Utilizes our premier American-made cell technology, ARTisun Select®
- ☀ Superior performance and reliability; enhanced stress tests conducted at Fraunhofer ISE
- ☀ Module families ranging from 325-340W
- ☀ Positive only power tolerance
- ☀ Marine grade aluminum frame with hard anodized coating
- ☀ Certified PID-free by PV Evolution Labs (PVEL)
- ☀ Made in North America
- ☀ Qualifies for Ex-Im Financing
- ☀ 1000V UL
- ☀ 25 year linear power warranty; 10 year product warranty



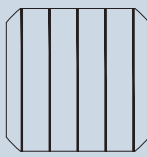
### CERTIFICATIONS



[www.suniva.com](http://www.suniva.com)



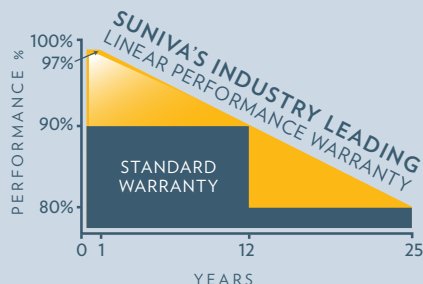
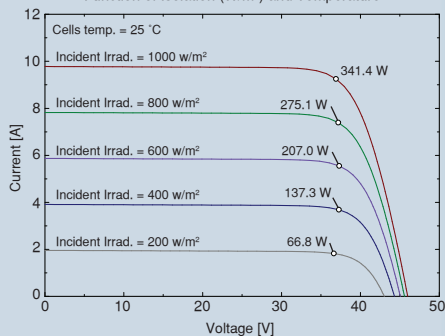
3 busbar cell



5 busbar cell

#### PV module: Suniva, OPT340-72-4-100

Current-Voltage (IV) as a  
Function of Isolation (W/m<sup>2</sup>) and Temperature



PLEASE RECYCLE

AUGUST 19, 2015 (REV. 6) [SAMD\_0051]

## OPTIMUS SERIES: OPT 72 CELL MODULES

### ELECTRICAL DATA (NOMINAL)

The rated power may only vary by -0/+10W and all other electrical parameters by  $\pm 5\%$

Module Type	OPT325-72-4-100	OPT330-72-4-100	OPT335-72-4-100	OPT340-72-4-100
Power Classification (Pmax)	325 W	330 W	335 W	340 W
Module Efficiency (%)	16.66%	16.92%	17.18%	17.43%
Voltage at Max. Power Point (Vmp)	37.5 V	37.6 V	37.7 V	37.8 V
Current at Max. Power Point (Imp)	8.67 A	8.78 A	8.89 A	8.99 A
Open Circuit Voltage (Voc)	45.8 V	45.9 V	45.9 V	46.0 V
Short Circuit Current (Isc)	9.42 A	9.54 A	9.66 A	9.78 A

The electrical data apply to standard test conditions (STC): Irradiance of 1000 W/m<sup>2</sup> with AM 1.5 spectra at 25°C.

### CHARACTERISTIC DATA

Type of Solar Cell	High-efficiency ARTisun Select cells, 3 and 5 busbar options available
Frame	Silver anodized aluminum alloy
Glass	Tempered (low-iron), anti-reflective coating
Junction Box	NEMA IP67 rated; 6 internal diodes
Cable & Connectors	12 AWG (4 mm <sup>2</sup> ) PV Wire with multiple connector options available; cable length 1300 mm

### MECHANICALS

Cells / Module	72 (6 x 12)
Module Dimensions	1970 x 990 mm (77.6 x 39 in.)
Module Thickness (Depth)	38 mm (1.5 in.)
Approximate Weight	23 kg (50.7 lbs.)

### TEMPERATURE COEFFICIENTS

Voltage	$\beta$ , Voc (%/°C)	-0.335
Current	$\alpha$ , Isc (%/°C)	+0.047
Power	$\gamma$ , Pmax (%/°C)	-0.420
NOCT Avg	(+/- 2 °C)	46.0

### LIMITS

Max. System Voltage	1000 VDC for IEC, 1000 VDC for UL
Max Series Fuse Rating	15 Amps
Operating Module Temperature	-40°C to +85°C (-40°F to +185°F)
Storm Resistance/Static Load	Tested to IEC 61215 for loads of 2400 Pa (50 psf); hail and wind resistant

Suniva® reserves the right to change the data at any time. View manual at [suniva.com](http://suniva.com).

<sup>1</sup>UV 90 kWh, TC 400, DH 2000. <sup>2</sup>Tests were conducted on module type OPT 60 silver frame.

Please read installation manual before installing or working with module.

#### HEADQUARTERS

Product	Modules per pallet:	Modules per full 53 ft. truck load, double stacked
OPT - 72 cell	22	660

5765 Peachtree Industrial Blvd.,  
Norcross, Georgia 30092 USA  
Tel: +1 404 477 2700

[www.suniva.com](http://www.suniva.com)

**Suniva**  
The Brilliance of Solar Made Sensible®



FRONT FACING BALTIMORE AVE  
AND INTERIOR OF LOT









CORNER FACING  
BALTIMORE AND  
EUCLID





FACING BALTIMOR AVE AND  
INTERIOR OF LOT





GABLE CLOSEST TO  
HISTORIC STRUCTURE





FACING EUCLID





FACING EUCLID





FACING BALTIMORE





FACING EUCLID















