

TEXAS SOLAR POWER COMPANY

1703 West Koenig Lane, Austin, Texas 78756

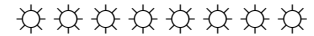
Phone: 512.459.9494 Fax: 512.451.5934

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Web: txspc.com

Email: info@txspc.com

Texas Solar Power Company (TXPSC) specializes in the design and installation of renewable energy systems. We provide an alternative, sustainable source of power for residential, commercial & government clients. TXSPC offers outstanding service using high quality products delivered at competitive prices.



**Photovoltaic (PV) is clean energy from the fuel source belonging to all of us
THE SUN.**



We carry everything you need for your renewable energy project. TXSPC is an authorized dealer of SolarWorld, Sharp Solar and Kyocera modules as well as SMA and Fronius products. Technology in the renewable energy industry is dynamic, so we are constantly evaluating products and manufacturers to offer the best package to the environmentally and energy conscious public.



14kW installation at Alori Properties retail center
Five Oaks Plaza, 13000 N. IH 35

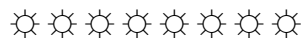
Our services are available around the world—wherever there is a need for photovoltaics.



Sales • Design • Installation

Owners Craig Overmiller, Architect, and Joe Garcia have been in the renewable energy field since 1995 helping home and business owners towards energy independence. The TXSPC team of designers and installers are committed to professional presentation and quality work.

Residential • Commercial



Texas Solar Power Company headquarters is a working example of integrating both a wind turbine as well as a hybrid, grid-tie solar system.

- The 1st floor has an SMA Sunny Island grid-tie system with back-up batteries.
- The 3rd floor features an Outback stand-alone system.
- We also have two Air 403 wind generators on the roof for additional power.



Owner is NABCEP certified

At Texas Solar Power Company, YOU have the POWER.





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SAMPLE PROPOSAL
 AUSTIN ENERGY SERVICE AREA

Date: January 1, 2010

To: Austin Energy Customer

Project: Grid tie PV System
 3850 DC Watts
 Turn-key Installation

Item No.	Description	Amount
1	3,850 Watts DC Solar System	\$ 11,647.30
2	<i>Components of this turn-key system include:</i>	
3	22 - SunTech Modules (2 strings of 11 modules)	
4	SMA 4000 Inverter	
5	Array Frames	
6	DC/AC Disconnect	
7	Two-pole Breaker	
8	Combiner Box	
9	Wire, Conduit and Connectors	
10	Permits and integration with local energy provider	
11		
12	If electrical upgrade needed, price would increase by \$1,200	
13		
14		
15		
16		

Pricing may vary due to product supply and market fluctuation.

Subtotal	\$	11,647.30
Sales Tax 0.0825	\$	960.90
Labor	\$	6,415.26
Total	\$	19,023.46
Austin Energy Rebate	\$	9,471.00
Customer Out-of-Pocket	\$	9,552.46
Federal Incentive*	\$	2,865.74
Final Cost	\$	6,686.72

A signed proposal and an application submitted to Austin Energy does not guarantee a rebate.

If you have any questions concerning this proposal, call:
 Craig Overmiller, TXSPC Secretary/Treasurer 512-459-9494

I agree to the terms of this proposal. I authorize Texas Solar Power Company to schedule the next available TXSPC professional to begin work on my project.

X _____

*Customer is responsible for checking with their tax professional to determine the value of any federal incentive program.



A Performance Calculator for Grid-Connected PV Systems

NREL's PV Watts™ calculator determines the energy production and cost savings of grid-connected photovoltaic (PV) energy systems throughout the world. It allows homeowners, installers, manufacturers, and researchers to easily develop estimates of the performance of hypothetical PV installations.

The PV Watts calculator works by creating hour-by-hour performance simulations that provide estimated monthly and annual energy production in kilowatts and energy value. Users can select a location and choose to use default values or their own system parameters for size, electric cost, array type, tilt angle, and azimuth angle. In addition, the PV Watts calculator can provide hourly performance data for the selected location.

Using typical meteorological year weather data for the selected location, the PVWatts calculator determines the solar radiation incident on the PV array and the PV cell temperature for each hour of the year. The DC energy for each hour is calculated from the PV system DC rating and the incident solar radiation and then corrected for the PV cell temperature. The AC energy for each hour is calculated by multiplying the DC energy by the overall DC-to-AC derate factor and adjusting for inverter efficiency as a function of load. Hourly values of AC energy are then summed to calculate monthly and annual AC energy production.

The PV Watts calculator is available in two versions. Version 1 allows users to select a location from a map or text list of pre-determined locations throughout the world. Version 2 allows users to select any location in the United States.

The PV Watts calculator was developed by NREL's Electric Systems Center Resource Integration Section.



AC Energy & Cost Savings



Station Identification	
City:	Austin
State:	Texas
Latitude:	30.30° N
Longitude:	97.70° W
Elevation:	189 m
PV System Specifications	
DC Rating:	3.8 kW
DC to AC Derate Factor:	0.770
AC Rating:	3.0 kW
Array Type:	Fixed Tilt
Array Tilt:	30.3°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	10.6 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	4.32	381	40.39
2	4.96	388	41.13
3	5.47	469	49.71
4	5.52	446	47.28
5	5.54	454	48.12
6	5.93	465	49.29
7	6.21	495	52.47
8	6.22	497	52.68
9	5.77	459	48.65
10	5.65	467	49.50
11	4.60	377	39.96
12	3.96	347	36.78
Year	5.35	5246	556.08

Output Hourly Performance Data

Output Results as Text

*

[About the Hourly Performance Data](#)

[Saving Text from a Browser](#)

Run [PVWATTS v.1](#) for another US location or an International location
Run [PVWATTS v.2](#) (US only)

Please send questions and comments regarding PVWATTS to [Webmaster](#)

[Disclaimer and copyright notice](#)



[Return to RReDC home page \(http://rredc.nrel.gov\)](http://rredc.nrel.gov)



**TEXAS SOLAR
POWER COMPANY**

YEAR	COST	FINAL COST	ENERGY SAVINGS	CASH FLOW	ANNUAL ROR
1	\$19,023.46	\$ 6,686.72			
2			\$ 583.88	\$ (6,015.25)	9%
3			\$ 613.08	\$ (5,310.21)	9%
4			\$ 643.73	\$ (4,569.92)	10%
5			\$ 675.92	\$ (3,792.61)	10%
6			\$ 709.71	\$ (2,976.44)	11%
7			\$ 745.20	\$ (2,119.46)	11%
8			\$ 782.46	\$ (1,219.63)	12%
9			\$ 821.58	\$ (274.81)	12%
10			\$ 862.66	\$ 717.25	13%
11			\$ 905.80	\$ 1,758.92	14%
12			\$ 951.09	\$ 2,852.66	14%
13			\$ 998.64	\$ 4,001.10	15%
14			\$ 1,048.57	\$ 5,206.96	16%
15			\$ 1,101.00	\$ 6,473.11	16%
16			\$ 1,156.05	\$ 7,802.57	17%
17			\$ 1,213.85	\$ 9,198.50	18%
18			\$ 1,274.55	\$10,664.22	19%
19			\$ 1,338.27	\$12,203.24	20%
20			\$ 1,405.19	\$13,819.20	21%
21			\$ 1,475.45	\$15,515.96	22%
22			\$ 1,549.22	\$17,297.57	23%
23			\$ 1,626.68	\$19,168.25	24%
24			\$ 1,708.01	\$21,132.46	26%
25			\$ 1,793.41	\$23,194.89	27%

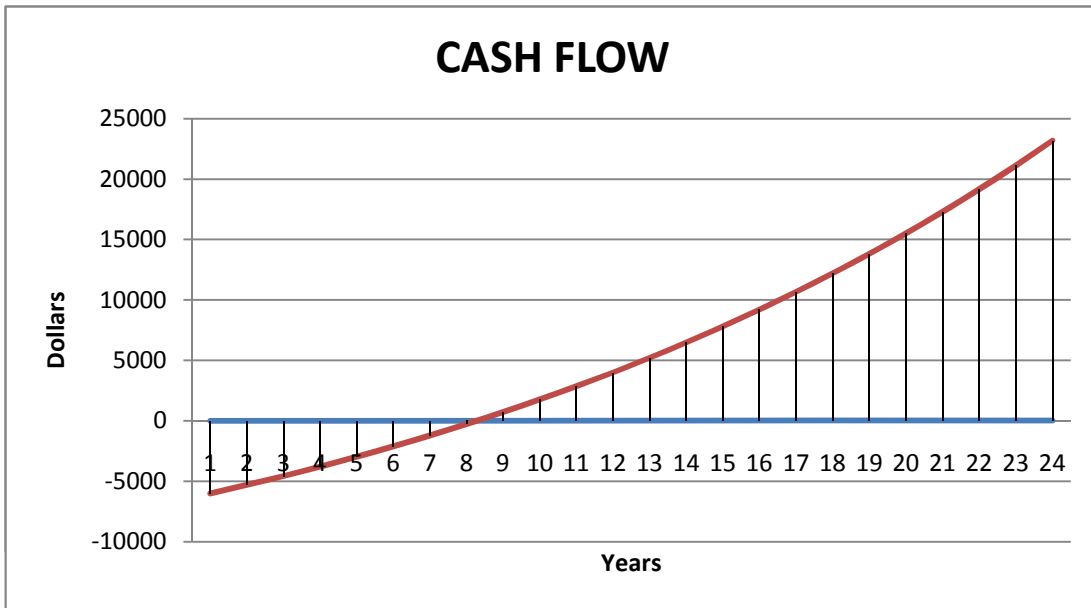
ACCUMULATED SAVINGS \$ 23,195

PAYBACK PERIOD (YEARS) 9

AVERAGE RATE OF RETURN 16%

- Assumption is made that utility rates will increase 5% each year.
- Cash Flow based on comparing the solar investment to a similar 25 year bond assuming a 15% capital gain obligation
- Final Cost based on Total Cost less Austin Energy Rebate and Federal Incentive

*Customer is responsible for checking with their tax professional to determine the value of any federal incentive program.





How Much Solar Power Do I Need?

Step #1: First things first, CONSERVATION.

Before you begin to “size” a solar system for your existing home, Texas Solar Power Company recommends that you implement several energy management and conservation techniques in order to reduce your overall need for energy:

- Change all incandescent and halogen light sources to compact fluorescent lighting (CFLs). Home Depot is a great source for these indoor or outdoor lamps and fixtures. Most compact fluorescent lamps will fit into existing lamp sockets. This will result in double savings – fewer watts used to light a space AND less A/C used to cool down the air around those little heat lamps!
- Wherever possible, add additional insulation to your attic walls and floors. Use pipe insulation on heated water pipes. Insulate your hot water heater.
- Add shading devices and/or solar screens to your east, south, and west-facing windows. However, during winter months, you may want to take off the south-facing screens in order to *gain* solar heat.
- If you have old appliances, consider upgrading. Today’s appliances are *much* more energy efficient than those made as few as 5 years ago. We highly recommend that you purchase only Energy Star rated appliances and air conditioning equipment.
- Use natural gas or propane appliances where possible for cooking, central heating, water heating, and for your clothes dryer. Better yet, dry your clothes via solar (clothesline)!

Step #2: What do you want to do with the power?

If you are already served by a power company, it is considerably cheaper to purchase a “grid-tie” system. If you want to be totally independent of your energy company and/or you need electricity in a location that is not yet served by your energy company and it would be very expensive to connect, you will want to consider a “Battery Stand-Alone” system. A “Battery Back-up” system is a combination of the two systems, where batteries are used as a back up for a power outage in an emergency situation.

- ❑ **Grid-tie:** You generate power during the day (while the sun is out) so if you’re producing more than you’re using, your meter will run backwards. Your energy company supplies the power you use at night, so your meter will run forwards. This push-pull will “net” at the end of the month with a balance either in the customer’s favor or in the electric company’s favor. In this dynamic, the power company acts as a huge energy storage device/battery.
- ❑ **Battery Stand-Alone:** Along with the solar panels and support system, you will need to purchase batteries. Your solar panels charge the batteries and you then draw energy needed for your house from the batteries. You would need to determine all energy needs and make sure your system is large enough to acquire and store enough energy.
- ❑ **Battery Back-Up:** This is a hybrid system that is useful when power goes out. You can pre-determine which appliances should never be without energy, and then store that needed power. For example, you might have emergency back up for your refrigerator, computer, and 4 lights.

Step #3: Consider how much power you actually use.

Realistically, you will probably look to *supplement* your power needs via solar (“grid-tie” as described above) rather than use a Battery Stand-Alone system. If you want more information about battery back up and true system sizing, please let us know – we have an overview you can use to determine your full power needs. However, if you simply want an understanding of how much electricity you use and how much a solar system will produce, follow the steps below.

One way to look at the math:

1. Solar systems are generally sized in 1 kW – 6 kW (and larger) systems. A typical size is 3 kW.
2. 3 kW, or 3 kilowatts = 3,000 watts
3. A 3 kW system will generate around 3,000 DC watts per hour
4. Multiply the per hour generation by 5.4 which is an average number of sun hours in a day (3,000 x 5.4 = 16,200)
5. Multiply the new total by the average number of days in a month (16,200 x 30.5 = 487,620)
6. Multiply the new total by .77. This is the “derating” factor, or the amount of energy lost when DC current is turned into AC current. (487,620 x .77 = 375,467)
7. So, a 3 kW system will generate about 375,467 watt-hours per month, or about 375 kWh.
8. Now compare this number with the kWh usage noted in your electric bill. How many kWh do you use in a typical month? Twice this amount? Then you would save roughly ½ your electric bill if you installed a 3 kW system.
9. Consider how much money you save per month to figure out how long it will take to pay off your system.

Another way to look at the math – in reverse:

If you want to get all of your energy needs met through solar power (and get a “0” bill from your electric company) calculate how large a system you will need by following the steps below. Before you start, choose an average electric bill. Look for how many “kilowatt hours” you consumed. This is generally expressed as “kWh”.

Direction	Example	YOUR info
Note the average number of kWh you use per month	550	
kWh X 1000 = total AC Watts used per month	550,000	
Total AC Watts / 30.5 (days in a month) = AC Watts used per day	18,033	
AC Watts used per day / Sun Hours per day (Central Texas = 5.4)	3339	
AC Watts needed per hour per day X 1.29 (AC to DC conversion factor)	4307	
Solar array in DC Watts to reach a Zero electric bill	4307	
Solar array in kilowatts, or kW	4.3	

Step #4: Information to keep in mind when considering a solar system.

- A. Review your electric bill. Some power companies charge a higher rate the more energy you consume (i.e. Tiered Pricing). Solar will impact the most expensive rate of charge for consumption, thus having the potential to “shave off” the highest tier.
- B. Up to 30% of the total cost of installation can be taken as a federal tax credit. Previous versions of this credit had a cap of \$2,000; there is no longer a cap.
- C. The most productive system is located on a South- or West-facing roof (or area) that is shade-free from 9 am – 3 pm every day of the year.
- D. Generally speaking, you will need ~ 1 square foot of space for every 10 watts. So a 3 kW system would take ~ 300 square feet; a 4 kW system would take ~ 400 square feet.
- E. You do not need to size a system to meet all your energy needs. You will remain a customer of your electric company, so you can use more (or less) power as needed.
- F. When considering “payback” time, think about the price of electricity per kWh. Has it increased in the past? Will it increase in the future? By how much? We do not know the answer either, but the question should be factored in to your decision-making.
- G. All energy providers are obligated to allow “net-metering” which means that the electric meter must be able to run backwards (i.e. when you are generating electricity). However, they are not obligated to pay you a set \$ amount, or anything at all, if you generate more energy than you use in a month. Check with your energy provider to find out their particular “Tariff Agreement”.
- H. Be sure to check with your Homeowners’ Association before committing to a solar PV installation. For some odd reason that we simply cannot imagine, some are opposed to the “look” of solar.

TEXAS SOLAR POWER COMPANY



Example of a 6kW system consisting of 30 panels at 200 Watts each.



Example of components used to tie into your standard power grid.

These will be added (l to r):

1. DC Disconnect
2. Inverter
3. PV Meter
4. AC Disconnect

These are pre-existing on your home:

1. Cable/phone box (perhaps)
2. Revenue Meter
3. Breaker Box, or Load Center



Example of battery back-up system.



1703 W. Koenig Lane

Austin, TX 78756

Phone:(512) 459-9494 Fax:(512) 451-5934 Email:Info@txspc.com

WARRANTIES

Solar Panels
25 Year Prorated Warranty

Charge Controller
2 Year Limited Warranty

Inverter
10 Year Limited Warranty

Batteries
As per Manufacturer

Solar Hot Water
5 Year Limited Warranty

Installation
5 Year Unlimited Labor and Material

If for any reason any equipment fails during this five year period Texas Solar Power Company will replace or repair at no cost to the customer. This warranty is transferable in the event of sale of home or office.

Texas Solar Power Company will extend all manufacturer warranties for a period of ten years from the date of system installation (excluding batteries and charge controllers).

EMERGENCY PHONE NUMBERS

Office Address: 1703 West Koenig Lane
Austin, Texas 78756

Office Hours:
Monday through Friday 9:00 a.m. to 6:00 p.m.

Office Phone: 512-459-9494
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Toll Free: 866-459-9494

Craig Overmiller
Cell Phone: 512-632-3237
Email: craig@txspc.com

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Residential Solar Tax Credit – Overview*

<i>Incentive Type:</i>	Personal Tax Credit
<i>Eligible Technologies include:</i>	Solar Water Heat, Solar Photovoltaics (i.e. electricity production), Wind
<i>Applicable Sectors:</i>	Residential
<i>Amount:</i>	30%
<i>Maximum Incentive:</i>	Placed in service AFTER 1/1/09: No maximum for solar-electric systems, solar water-heating systems, or wind turbines. Placed in service BEFORE 1/1/09: Maximum for solar-electric and solar water heating, \$2,000. Maximum for wind turbines, \$4,000.
<i>Carryover Provisions:</i>	Excess credit may be carried forward to succeeding tax year.
<i>Eligible System Size:</i>	Not specified
<i>Equipment/Installation Requirements:</i>	Solar water heating property must be certified by SRCC or by comparable entity endorsed by the state in which the system is installed. At least half the energy used to heat the dwelling's water must be from solar in order for the solar water-heating property expenditures to be eligible.
<i>Authority 1:</i>	26 USC § 25D
<i>Date Enacted:</i>	8/8/2005 (subsequently amended)
<i>Effective Date:</i>	1/1/2006
<i>Expiration Date:</i>	12/31/2016
<i>Authority 2:</i>	H.R. 1424 (The Energy Improvement and Extension Act of 2008)
<i>Date Enacted:</i>	10/3/2008
<i>Effective Date:</i>	1/1/2008
<i>Expiration Date:</i>	12/31/2016
<i>Authority 3:</i>	H.R. 1: Div. B, Sec. 1122 (The American Recovery and Reinvestment Act of 2009)
<i>Date Enacted:</i>	2/17/2009
<i>Effective Date:</i>	1/1/2009
<i>Authority 4:</i>	IRS Form 5695 & Instructions: Residential Energy Credits

Summary

Established by the federal *Energy Policy Act of 2005*, the federal tax credit for residential energy property initially applied to solar-electric systems, solar water heating systems and fuel cells. *The Energy Improvement and Extension Act of 2008* (H.R. 1424) extended the tax credit to small wind-energy systems and geothermal heat pumps, effective January 1, 2008. Other key revisions included an eight-year extension of the credit to December 31, 2016, the ability to take the credit against the alternative minimum tax, and the removal of the \$2,000 credit limit for solar-electric systems beginning in 2009. The credit was further enhanced in February 2009 by *The American Recovery and Reinvestment Act of 2009*, which removed the maximum credit amount for all eligible technologies (except fuel cells) placed in service after 2008.

A taxpayer may claim a credit of 30% of qualified expenditures for a system that serves a dwelling unit located in the U.S. used as a residence by the taxpayer. Expenditures with respect to the equipment are treated as made when the installation is completed. If the installation is on a new home, the "placed in service" date is the date of occupancy by the homeowner. Expenditures include labor costs for onsite preparation, assembly, or original system installation and for piping or wiring to interconnect a system to the home. If the federal tax credit exceeds tax liability, the excess amount may be carried forward to the succeeding taxable year. The maximum allowable credit, equipment requirements, and other details vary by technology as outlined below.

Significantly, The American Recovery and Reinvestment Act of 2009 repealed a previous limitation on the use of the credit for eligible projects also supported by "subsidized energy financing." For projects placed in service after December 31, 2008, this limitation no longer applies.

Solar electric property

- **There is *no maximum credit* for systems placed in service after 2008.**
- For systems placed in service before 1/1/2009, the maximum credit is \$2,000.
- Systems must be placed in service from 1/1/2006, through 12/31/ 2016.
- The home served by the system does not have to be the taxpayer's principal residence.

Solar water heating property

- **There is *no maximum credit* for systems placed in service after 2008.**
- For systems placed in service before 1/1/2009, the maximum credit is \$2,000.
- Systems must be placed in service from 1/1/2006, through 12/21/ 2016.
- Equipment must be certified for performance by the Solar Rating Certification Corporation (SRCC) or a comparable entity endorsed by the government of the state in which the property is installed.
- At least half the energy used to heat the dwelling's water must be from solar in order for the solar water-heating property expenditures to be eligible.
- The tax credit does not apply to solar water-heating property for swimming pools or hot tubs.
- The home served by the system does not have to be the taxpayer's principal residence.

Small wind-energy property

- **There is *no maximum credit* for systems placed in service after 2008.**
- For systems placed in service in 2008, the maximum credit is \$500 per half kilowatt, not to exceed \$4,000.
- Systems must be placed in service from 1/1/2008, through 12/21/ 2016
- The home served by the system does not have to be the taxpayer's principal residence.

History

The federal [Energy Policy Act of 2005](#) established a 30% tax credit up to \$2,000 for the purchase and installation of residential solar electric and solar water heating property and a 30% tax credit up to \$500 per 0.5 kilowatt for fuel cells. Initially scheduled to expire at the end of 2007, the tax credits were extended through December 31, 2008, by the [Tax Relief and Health Care Act of 2006](#).

In October 2008, the [Energy Improvement and Extension Act of 2008](#) extended the tax credits once again (until December 31, 2016), and a new tax credit for small wind-energy systems and geothermal heat pump systems was created. In February 2009, *The American Recovery and Reinvestment Act of 2009* removed the maximum credit amount for all eligible technologies (except fuel cells) placed in service after 2008.

***This information is from the Database of State Incentives for Renewable Energy (DSIRE) website:**

http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US37F&State=federal¤tpageid=1&ee=1&re=1 This is slightly edited (for brevity) by Texas Solar Power Company. Please refer to the link and consult with your personal tax accountant to see how these credits impact your situation. On the www.dsireusa.org version, you will find hot links to the actual bills and pertinent IRS forms.

Austin Energy Residential Rebate

The residential solar rebate is \$2.50 per watt. Annual rebate amounts are limited to \$15,000 per site. The maximum rebate for a residential solar energy system is \$50,000.

In order to qualify to receive solar rebates from the Austin Energy solar rebate program, a home must meet efficiency standards.

Solar Rebates – Existing Homes

Homes constructed prior to January 1, 2009 must meet one of the following within the past 10 years (if verified no additional energy improvements are needed).

- Homes meeting all applicable solar access and energy efficiency requirements verified by Austin Energy Power Saver staff will have their applications forwarded to Austin Energy Solar Program for Letter Of Intent processing pending funding approval.
 - Home has completed the following recommended measures through the [Austin Energy Home Performance with ENERGY STAR®](#) program or meets the following minimum efficiency standards verified by an [Energy Conservation Audit and Disclosure Ordinance \(ECAD\)](#) Audit:
 - Solar screens or window treatments are required for all sun facing windows and glass doors receiving at least one hour of direct sunlight in the summer and on 40% or more of the glass area.
 - Attic insulation shall be no less than a rated value of R-22.
 - Home comprehensive air seal testing is required.
 - Ideally, the house should have between 0.35 and 0.45 Air Changes/Hour (ACHn).
 - Mechanical air ventilation is recommended for houses that are tighter than 0.35 ACHn. The homeowner should be advised when this condition exists.
 - NOTE: blower door test must be performed in addition to ECAD audit.
 - Air duct system performance testing must prove that there is 10% or less leakage.
 - Home has received energy-efficiency improvements through the Austin Energy [Free Home Improvements](#) program (Austin Energy offers free home-energy improvements only to customers with low-to-moderate incomes.); or
 - Home has received an [Austin Energy Green Building](#) 3-Star Rating or better using version 8.0 or newer or home has received an Austin Energy Green Building 5-Star rating (any version).
- NOTE: All dates related to participation in an Austin Energy Home Performance with ENERGY STAR® program or Free Home Improvements program will be the calendar year of participation.
- Home Water Heating Systems must comply with one of following requirements:

- Homes that use an electric water heater are required to have an Austin Energy approved water heater timer installed.
- Homes with three or more bedrooms that use an electric water heater are required to install a rebated solar hot water system in accordance with the [Solar Hot Water Rebate Program](#) Guidelines or an ENERGY STAR® qualified water heater listed at <http://www.energystar.gov>
- Homes using heat pump water heaters or currently using heat recovery water heaters with electric water heaters will also be acceptable technologies.

New Construction Residential Homes and Major Renovations

Newly built homes must meet the following requirements:

- Texas Climate Vision code compliance calculator must prove that the home's performance exceeds Austin Energy Code by a minimum of 10% before water heater efficiency is considered. The calculator can be found at <http://tcv.tamu.edu/#>
- Water Heating System must comply with one of the following requirements:
 - Solar hot water system in accordance with the Solar Hot Water Rebate Program Guidelines, or
- ENERGY STAR® qualified water heater with an Austin Energy approved water heater timer on electric units.

For full information about Austin Energy's rebates for efficiency measures, solar power and solar thermal installation, see: www.austinenergy.com and click on "Power Saver Program."

- > Certified to the new UL1741/IEEE 1547
- > 10 yr. standard warranty
- > Improved CEC efficiency
- > Integrated load-break rated DC disconnect switch
- > Integrated fused series string combiner
- > Sealed electronics enclosure & Opticool
- > Comprehensive SMA communications and data collection options
- > Ideal for residential or light commercial applications
- > Rugged cast aluminum outdoor rated enclosure



Sunny Boy 3000 / 4000

The best in their class

SMA is proud to introduce our new line of inverters updated with our latest technology and designed specifically to meet the new IEEE 1547 requirements. Compact design makes them ideal for residential use and the integrated DC disconnect makes installation more cost effective. They are field-configurable for positive ground systems making them more versatile than ever. Increased efficiency means better performance and shorter payback periods. With over 500,000 fielded units, Sunny Boy has become the benchmark for PV inverter performance and reliability throughout the world.

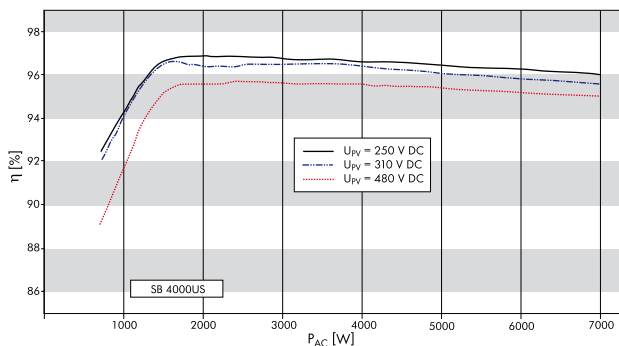


Technical Data

Sunny Boy 3000 / 4000

	SB 3000US	SB 4000US
Input Data (DC)		
Max. Recommended Array Input Power (DC @ STC)	3750 W	5000 W
Max. DC Voltage	500 V	600 V
Peak Power Tracking Voltage	180 - 400 V @ 208 V 200 - 400 V @ 240 V	220 - 480 V @ 208 V 250 - 480 V @ 240 V
DC Max. Input Current	17 A	18 A
DC Voltage Ripple	< 5%	< 5%
Number of Fused String Inputs	4	4
PV Start Voltage (adjustable)	228 V	285 V
Output Data (AC)		
AC Nominal Power	3000 W	3500 W @ 208 V / 4000 W @ 240 V
AC Maximum Output Power	3000 W	4000 W
AC Maximum Output Current	15 A @ 208 V, 12.5 A @ 240 V	17 A @ 208 V, 16.6 A @ 240 V
AC Nominal Voltage / Range	183 - 229 V @ 208 V 211 - 264 V @ 240 V	183 - 229 V @ 208 V 211 - 264 V @ 240 V
AC Frequency / Range	60 Hz / 59.3 Hz - 60.5 Hz	60 Hz / 59.3 Hz - 60.5 Hz
Power Factor	1	1
Efficiency		
Peak Inverter Efficiency	96.6 %	96.8 %
CEC weighted Efficiency	95.0 % @ 208 V 95.5 % @ 240 V	95.5 % @ 208 V 96.0 % @ 240 V
Mechanical Data		
Dimensions W x H x D in inches	17.8 x 13.8 x 9.3	17.8 x 13.8 x 9.3
Weight / Shipping Weight	88 lbs / 94 lbs	88 lbs / 94 lbs
Ambient temperature range	-13 to +113 °F	-13 to +113 °F
Power Consumption: standby / nighttime	< 7 W / 0.1 W	< 7 W / 0.1 W
Topology	PWM, true sinewave, current source	PWM, true sinewave, current source
Cooling Concept	Convection, regulated fan cooling	Convection, regulated fan cooling
Mounting Location Indoor / Outdoor (NEMA 3R)	● / ●	● / ●
Features		
LCD Display	●	●
Lid Color: aluminum / red / blue / yellow	● / ○ / ○ / ○	● / ○ / ○ / ○
Communication: RS485 / Wireless	○ / ○	○ / ○
Warranty: 10-year	●	●
Compliance: IEEE-929, IEEE-1547, UL 1741, UL 1998, FCC Part 15 A & B	●	●
Specifications for nominal conditions	● Included ○ Option – Not available	

Efficiency Curves



175 Watt MONO-CRYSTALLINE SOLAR PANEL

Features

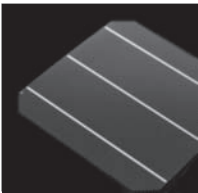
- High conversion efficiency based on innovative photovoltaic technologies
- High reliability with guaranteed +/-3% power output tolerance
- Withstands high wind-pressure and snow load, and extreme temperature variations

Quality and Safety

- 25-year power output transferable warranty
- Rigorous quality control meeting the highest international standards
- ISO 9001:2000 (Quality Management System) and ISO 14001:2004 (Environmental Management System) certified factories manufacturing world class products
- UL listings: UL1703, cULus, Class C fire rating, conformity to CE

Recommended Applications

- Residential roof top systems
- On-grid utility systems
- On-grid commercial systems



Suntech's technology yields improvements to BSF structure and anti-reflective coating to increase conversion efficiency



Unique design on drainage holes and rigid construction prevents frame from deforming or breaking due to freezing weather and other forces



The panel provides more field power output through an advanced cell texturing and isolation process, which improves low irradiance performance



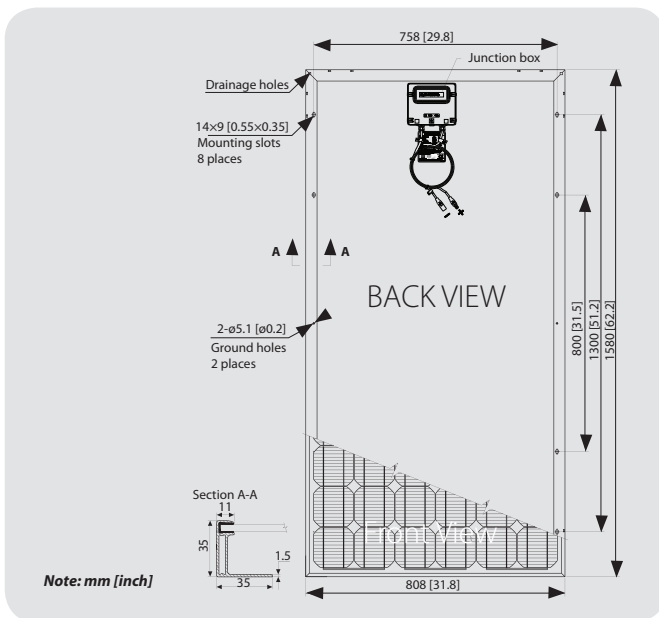
Suntech was named Frost and Sullivan's 2008 Solar Energy Development Company of the Year

Electrical Characteristics

STP180S - 24/Ab -1
 STP175S - 24/Ab -1
 STP170S - 24/Ab -1
 STP165S - 24/Ab -1
 STP160S - 24/Ab -1

Characteristics	STP180S-24/Ab-1	STP175S-24/Ab-1	STP170S-24/Ab-1	STP165S-24/Ab-1	STP160S-24/Ab-1
Open - Circuit Voltage (Voc)	44.4V	44.2V	43.8V	43.6V	43.2V
Optimum Operating Voltage (Vmp)	35.6V	35.2V	35.2V	34.8V	34.4V
Short - Circuit Current (Isc)	5.4A	5.2A	5.14A	5.04A	5A
Optimum Operating Current (Imp)	5.05A	4.95A	4.83A	4.74A	4.65A
Maximum Power at STC (Pmax)	180Wp	175Wp	170Wp	165Wp	160Wp
Operating Temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Maximum System Voltage	600V DC	600V DC	600V DC	600V DC	600V DC
Maximum Series Fuse Rating	15 AMPS	15 AMPS	15 AMPS	15 AMPS	15 AMPS
Power Tolerance	±3 %	±3 %	±3 %	±3 %	±3 %

STC: Irradiance 1000W/m², Module temperature 25°C, AM=1.5



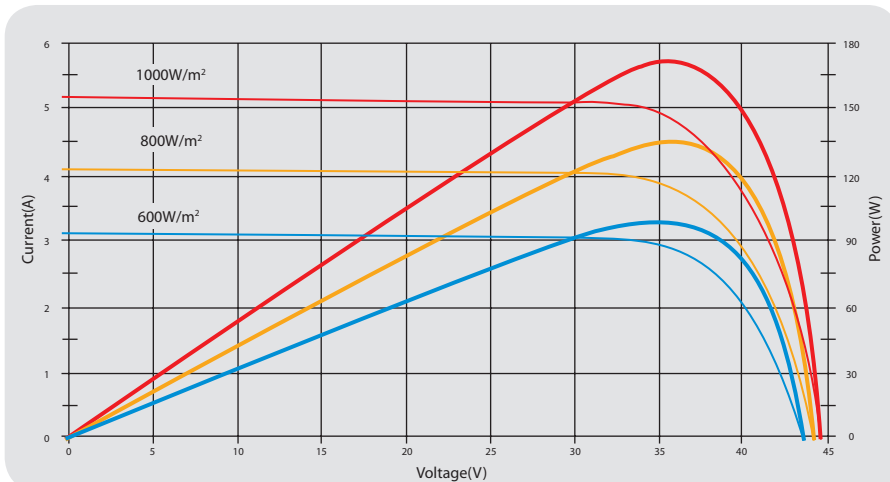
Mechanical Characteristics

Solar Cell	Mono-crystalline 125x125mm (5inch)
No. of Cells	72 (6x12)
Dimensions	1580x808x35mm (62.2x31.8x1.4inch)
Weight	15.5kg (34.1lbs.)
Front Glass	3.2 mm (0.13inch) tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP65 rated
Output Cables	AIW (12AWG), asymmetrical lengths (-) 1200mm (47.2inch) and (+) 800mm (31.5inch), MC Plug Type IV connectors

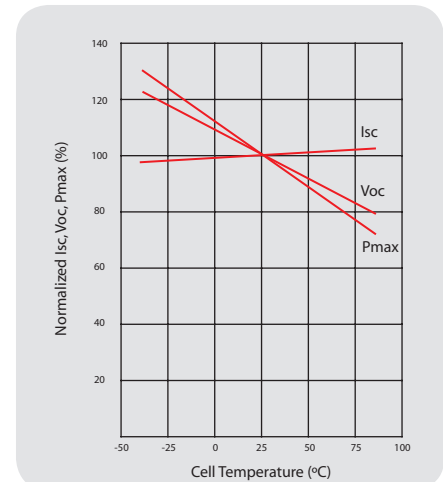
Temperature Coefficients

Nominal Operating Cell Temperature (NOCT)	45°C±2°C
Temperature Coefficient of Pmax	-0.48 %/°C
Temperature Coefficient of Voc	-0.34 %/°C
Temperature Coefficient of Isc	0.017 %/°C

Current-Voltage & Power-Voltage Curve (170W)



Temperature Dependence of Isc, Voc, Pmax



Solar References – Commercial Clients:

Alori Properties

Jason Aldridge
409 West 38th Street, Austin, TX
alori@alori.net
512-452-3690
Total 215 KW Grid-tie Systems on 16 properties

Iron Knot Retreat Center

Michael Bradfute
Silver City, New Mexico
ironknot@ironknot.org
505-301-3388
21.1 KW Grid tie battery backup
4 Outback 3648 Inverters
64 Deka Solar 8A8D Batteries

Community Clinical Research

Dr. David Brown
8334 Cross Park Dr., Austin, TX
512-323-2622
20 KW Grid tie battery backup
4 Fronius 5100 IG Inverters
2 Outback 3648 Inverters
16 Trojan 8A8D Batteries

Trinity Episcopal Church

Contact: Dale Blankenship
Ph: 512-472-9592
dblankenship@trinitykids.com
47.25 kW grid tied system
270 SolarWorld 175 modules
(6) SMA SB7000 inverters

El Buen Samaritano Episcopal Mission

Sandra Freitag
7000 Woodhue Drive, Austin, TX
512-439-0747
23.6 KW Grid-tie System
(3) 7KW SMA Inverters

Office Depot

Carl Cruz
2620 Anderson Lane, Austin, TX
561-420-9723
23.6 KW Grid-tie System
(3) 7KW SMA Inverters

Sportsman's Finest

Charles Dorrance
12434 FM 2244, Bee Caves, TX
512-263-1888
14 KW Grid-tie System
(2) SMA 6000 Watt Inverters

Employee Incentive Plans

Bruce Rice
8009 Muley Dr., Austin, TX
512-258-4040
24 KW Grid-tie System

Solar References – Institutional Projects:

Austin Independent School District

16 individual schools at 3.2 kW each

Contact: Leslie Libby

Ph: 512- 482-5390

Leslie.libby@austinenergy.com

Total of 50.4 kW

Grid tied systems with SolarWorld 175 modules and SMA SB3000 inverters

Texas National Guard Armory – Bee Caves

Contact: Ted Wilson

Ph: 512-782-6212

ted.wilson@tx.ngb.army.mil

47.25 kW grid tied system

405 SolarWorld 175 modules with (9) SMA SB7000 inverters

Texas National Guard Armory –Ellington Field

Contact: Ted Wilson

Ph: 512-782-6212

ted.wilson@tx.ngb.army.mil

70.8 kW grid tied system

405 SolarWorld 175 modules with (9) SMA SB7000 inverters

Texas A & M University

Contact: Jesse Hernandez

Ph: 979-862-2756

(1st system)

4 kW PV Array with Xantrex SW 4048

4 Deka 8A31 AGM Batteries

(2nd system)

2 wind generators. Air-x and H80, SW wind

Xantrex SW 2448

2 Deka 8A31 AGM batteries

Austin Water Utility's Glen Bell Service Center

Contact: Paul Martinez, Austin Energy
paul.martinez@austinenergy.com

136 kW system using Uni-Solar thin film rolled PV

2 Solectria 82kw Inverters

Wild Basin Preserve

Contact: David Burgos

Phone: 482-5368

David.burgos@austinenergy.com

8 kW grid tied system

2-Omnion 5 KW Inverters

Austin Community College

Contact: Brian Morrow

Ph: 512- 223-1121

11.6 kW grid-tied system

66 SolarWorld 175 modules with (2) SMA SB6000 inverters

Austin Travis County Mental Health, Mental Retardation (MHMR)

Contact: Donna Spencer

Phone: 512-445-7723

23.4 kW grid tied system

117 Canadian Solar 200W modules with (3) SMA SB7000 inverter

Metz Recreation Center

Contact: David Burgos

Phone: 482-5368

David.burgos@austinenergy.com

3 kW grid tied system

3000 Watt SMA Inverter

Pflugerville Parks Department

Contact: Glenn Holtzer

Phone: 512-990-4360

glennh@cityofpflugerville.com

2.3 kW solar system

11 Kyocera KD210W modules with Fronius IG 3000 inverter

Solar References – Residential Customers:

Dale Bulla

dalebulla@earthlink.net
7202 Foxtree Cove, Austin, TX
512-345-9502
5,166-Watt PV System
SMA Inverter, Fronius Inverter and Kyocera Modules

Rob Warnke

warnderob@yahoo.com
1010 Tumbleweed, Killeen, Texas
808-255-6198
5,040-Watt PV System
Fronius Inverter and Kyocera Modules

David Murphy

davidmurphy02@yahoo.com
9015 Spicebrush Dr., Austin, TX
512-418-1706
3,150-Watt PV System
SMA Inverter and Solar World Modules

Lewis & Dona Marquardt

lmarquardtl@austin.rr.com
7116 Foxtree Cove, Austin, TX
512- 512-795-8922
6,300-Watt PV System
SMA Inverter and Kyocera Modules

Dan Mackay

dmackay@austin.rr.com
609 Furlong Dr., Austin, TX
512-327-5632
6,300-Watt PV System
(2) SMA Inverters and Solar World Modules

Frank Curry

fcurry@studiopenumbra.com
4601 Banister Lane
512-472-4773
3,150-Watt PV System
Xantrex Inverter and Kyocera Modules

David Wesley

davwes1948@aol.com
1418 Amber Road, Killeen, TX 76543-7105
254-690-0505
3,150-Watt PV System
SMA Inverter and Solar World Modules

James & Nancy Kennedy (visible from front of house)

nancy@kenndy-rs.com
4600 Colorado Crossing, Austin, TX
512-697-8741
3,150-Watt PV System
SMA Inverter and Solar World Modules

Memberships and Certifications

North American Board of Certified Energy Practitioners (NABCEP)
Texas Electrical Contract #23170
Historically Underutilized Business (HUB) Certified – State of Texas
Austin Chamber of Commerce
Hispanic Chamber of Commerce
Better Business Bureau Accredited
American Institute of Architects (AIA)
Texas Solar Energy Society (TSES)
Texas Renewable Energy Industries Association (TREIA)
Solar Energy Industries Association (SEIA)
American Solar Energy Society (ASES)
Solar Electric Power Association (SEPA)
Solar Austin