



Welcome to the land of opportunity

With more US-based PV production than anyone, SolarWorld is powering the American dream for independent solar contractors throughout the nation.

Choosing the SolarWorld Sunmodule® not only ensures superior reliability and performance, it also secures manufacturing jobs for Americans because Sunmodules are made entirely in the USA from American components and materials. Call us at 1-800-947-6527 for a SolarWorld distributor in your area.

service@solarworld-usa.com

SolarWorld. And EveryDay is a SunDay.



www.solarworld-usa.com



New 500 MW facility in Hillsboro, OR.

SOLARWORLD

quick facts

SOLARWORLD is the third largest solar PV company in the world.

SOLARWORLD is the largest solar PV manufacturer in the U.S. and employs over 1,300 people.

SOLARWORLD is completely vertically integrated, from silicon to solar cells, modules, and solar systems integration.

SOLARWORLD is focused only on the solar-PV business and its customers.

SOLARWORLD factories are located in Germany, Sweden, and the U.S.

SOLARWORLD's U.S. facilities are located in Camarillo, CA (Ventura County, approx. 1 hour north of Los Angeles), Vancouver, WA and Hillsboro, OR, where SolarWorld has just opened a new 480,000 sq.ft. PV manufacturing site. This will ultimately add 500 MW to our production capacity.

SOLARWORLD has been in the U.S. since the early days of the PV industry under several well-known and respected company names:

- ARCO Solar (Atlantic Richfield) 1977 - 1989
- Siemens Solar 1990 - 2001
- Shell Solar (Royal Dutch Shell/ Shell Oil) 2001 - 2006

SOLARWORLD AG has been doing business in Germany since 1998.

SOLARWORLD purchased Shell Solar in 2006 and merged both firms worldwide.

SOLARWORLD AG stock is publicly traded on the Frankfurt Securities Exchange with a market cap of approximately \$4.2 Billion U.S. and is included in the German TecDAX and the Dow Jones STOXX 600 indexes.

SOLARWORLD sells to commercial customers and through distributors and dealers for residential and commercial markets, but not directly to homeowners.





Reliable partners for 30 years

SolarWorld California's factory began making sturdy, efficient modules and systems for off-grid homes in 1977, many of which are still in use today.

While our industry has grown and our products have improved over the last three decades, we still make the best quality PV modules around, and we still make them right here in Camarillo, California. As we celebrate our 30th anniversary, we extend our thanks to the true pioneers of solar energy who have depended on our products for the last three decades.

Call 1-800-94-SOLAR for assistance.

SolarWorld California
4650 Adohr Lane
Camarillo, CA 93012
service@solarworld-usa.com

SolarWorld. And EveryDay is a SunDay.



www.solarworld-usa.com

We've been leading the industry for over 30 years

SolarWorld is the largest PV manufacturer in the USA since 1977

- Vertically integrated from raw silicon to modules, kits and systems
- Financially stable with over \$1.2 billion in revenues
- Over 30 years of PV manufacturing experience

SolarWorld Sunmodules produce the most kWh

- Proven in independent real-world testing by Photon International
- Up to 10% more kWh/kW than other major brand modules
- Superior low-light performance through cell texturing
- Tight $\pm 3\%$ power tolerance

SolarWorld is an industry leader

- First to offer a 25 year warranty for PV modules
- First to manufacture UL listed PV modules
- First to fully recycle crystalline PV modules
- First to build 1 MW+ solar PV projects
- First to offer grid tied PV kits

SolarWorld products are the highest quality available

- Tested to 112 psf for IEC 61215 heavy load compliance
- NEC 2008 compliant module and connections
- Unsurpassed 25 year warranty

SolarWorld is a sustainable, socially responsible manufacturer

- Environmental impacts reported along side financial results
- Local manufacturing under strict environmental regulations
- Solar2World initiative supplies projects in developing nations
- Broken or obsolete modules are recycled



Silicon reprocessing - Vancouver, WA



Crystal growing, wafering and cell production - Hillsboro, OR



Module assembly and sales center for the Americas - Camarillo, CA



The best PV modules are made in the USA

What does it really mean to be made in America?

For SolarWorld, being made in America means more than simply assembling foreign components in the USA, which does little to benefit the economy. By carrying out the entire value chain in the USA, we are creating American manufacturing jobs not only at our factories but at our suppliers' factories as well.

American components and materials

- Raw silicon
- Tempered glass
- Aluminum module frames
- Back sheets and embedding
- Other direct and indirect materials

American manufacturing

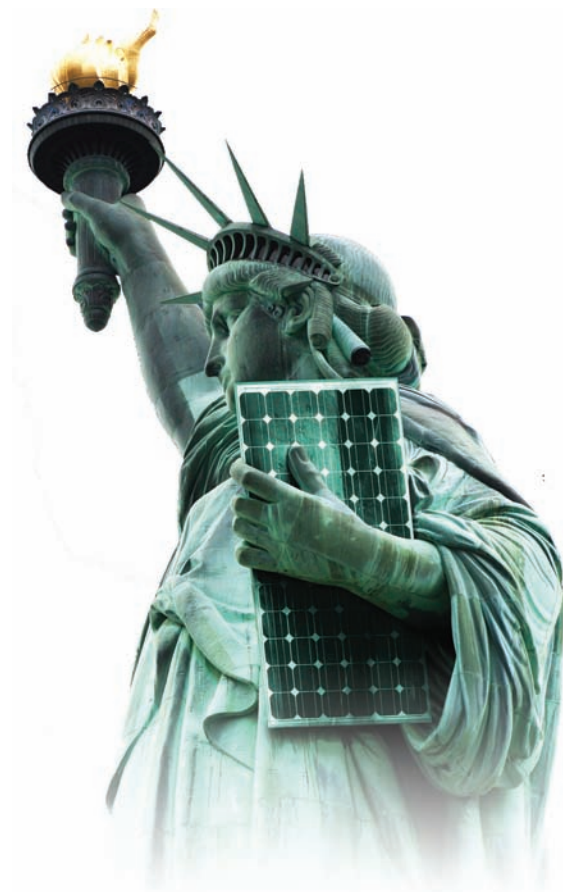
- Silicon reprocessing in Vancouver, WA
- Crystal growing and wafering in Hillsboro, OR
- Cell manufacturing in Hillsboro, OR
- Module assembly, sales & customer service in Camarillo, CA

Why made in America is important to our customers

- Highest quality products
- Reliable delivery schedules
- Local warranty and product support
- Real energy independence vs importing
- Meets and exceeds Buy America requirements
- Avoids environmental costs of overseas shipping
- Money spent stimulates the US economy and creates US jobs
- Processes meet stringent US labor and environmental policies

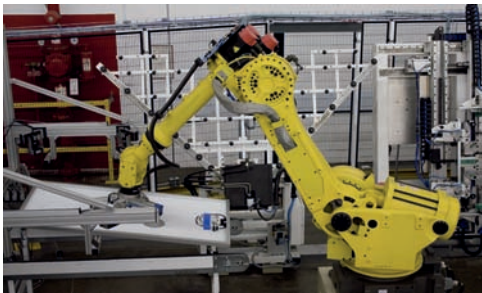
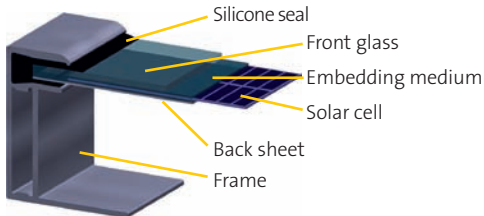
SolarWorld is investing over \$500 million to expand US-based manufacturing, which generates hundreds of millions of dollars each year for American workers, goods and services.

SolarWorld California
Sales: **1-800-947-6572**
4650 Adohr Lane
Camarillo, CA 93012
service@solarworld-usa.com



www.solarworld-usa.com

What makes the SolarWorld Sunmodule® the best in the industry.



The best design

- Robust module engineered with 30 years of industry experience
- Can be mounted in any orientation without frame shading
- Capable of withstanding 1 inch hailstones at over 50 mph

The best materials

- Materials are selected for quality and environmental sustainability
- Over 98% of the materials in the Sunmodule® come from the USA
- Internal recycling at every process step minimizes waste

The best cells

- Designed and manufactured for maximum energy production
- Textured to capture more sun - even in low-light conditions
- Fully automated US-based production ensures high quality
- Wafers cut from a single crystal of pure silicon
- Proven long life

The strongest frames

- Deep channel provides complete sealing and reinforcement
- Tested to 112 pounds per square foot vs. industry standard 50
- Stands up to high winds as well as sliding snow and ice

The toughest junction box

- Integrated connections are NEC 690.35D ungrounded system compliant
- Integrated connections meet UL and TUV safety class 2 requirements
- Integrated heat sinks keep bypass diodes cool in hot weather
- Integrated quick connectors audibly lock to seal out moisture

The best assembly techniques

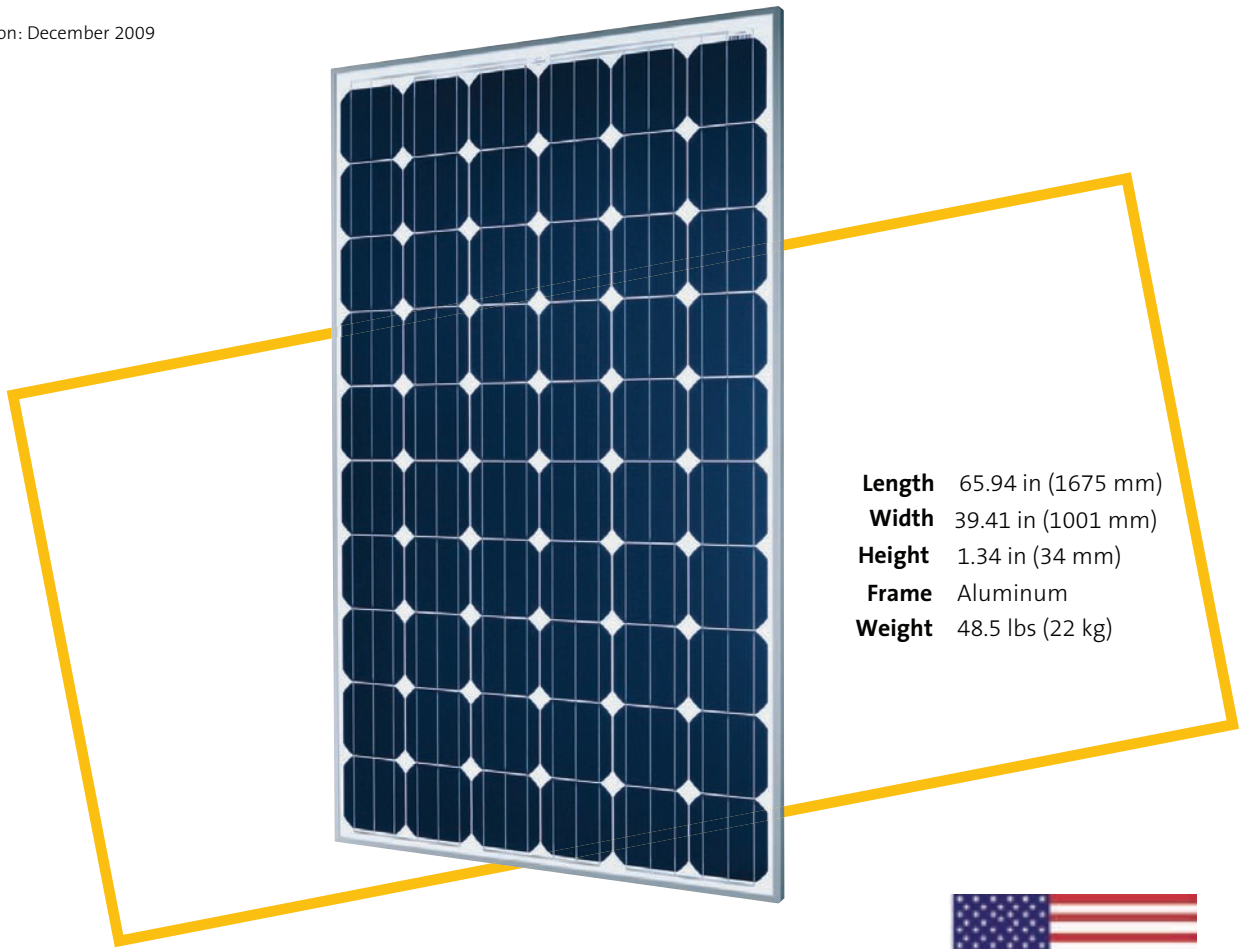
- California-based operations provide flexible delivery schedules
- Tight $\pm 3\%$ power tolerance ensures high performance
- Fully automated assembly ensures high quality

The lightest packaging

- Flexible pallet packaging reduces shipping costs and job site waste
- All packaging materials are fully recyclable

The best warranty

- SolarWorld was first in the industry with a 25 year power warranty
- SolarWorld's warranty exceeds industry standards
- Backed by the largest PV manufacturer in the USA since 1977



Length 65.94 in (1675 mm)
Width 39.41 in (1001 mm)
Height 1.34 in (34 mm)
Frame Aluminum
Weight 48.5 lbs (22 kg)



Sunmodule⁺ SW 220/225/230 mono

The Sunmodule Plus heralds an innovative new module concept from SolarWorld. The Plus-sort (based on a SolarWorld flash report) and five watt model stepping ensures true, highest system efficiency and dispenses with the time-consuming task of sorting the modules on site. The fully automated production process at the SolarWorld factories creates a module quality that is consistently high, which in turn will ensure high yields for the long term.

The glass is set deep into the module frame and they are firmly attached to each other by silicone that is applied with continuous precision. This guarantees exceptional rigidity for the entire module and stops any possible loosening of the frame as a result of strong outward forces in cases such as sliding of heavy snow. Tests carried out in accordance with IEC 61215, applying loads up to 113 lb/sf (5.4 kN/m²), confirm that the module can withstand high loads such as heavy accumulations of snow and ice.

The patented, flat and compact junction box provides perfect protection against corrosion, as well as a capacity to rapidly dissipate any excess heat providing lower operating temperature. The junction box is reliably connected by a solid, welded bond to guarantee lasting functionality. In addition, high-quality, robust cables with factory-equipped connectors are used. The ability to recycle the modules and a 25-year performance warranty are the finishing touches to this top-quality product.



SW 220/225/230 mono

Performance under standard test conditions (STC*)

		SW 220	SW 225	SW 230
Maximum power	P_{max}	220 Wp	225 Wp	230 Wp
Open circuit voltage	V_{oc}	37.2 V	37.3 V	37.4 V
Maximum power point voltage	V_{mpp}	29.4 V	29.7 V	30 V
Short circuit current	I_{sc}	8.10 A	8.13 A	8.16 A
Maximum power point current	I_{mpp}	7.50 A	7.59 A	7.68 A

*STC: 1000W/m², 25°C, AM 1.5

Performance at 800 W/m², NOCT, AM 1.5

		SW 220	SW 225	SW 230
Maximum power	P_{max}	159 Wp	163 Wp	167 Wp
Open circuit voltage	V_{oc}	33.5 V	33.7 V	33.9 V
Maximum power point voltage	V_{mpp}	26.5 V	26.8 V	27.2 V
Short circuit current	I_{sc}	6.53 A	6.56 A	6.58 A
Maximum power point current	I_{mpp}	6.00 A	6.07 A	6.14 A

Minor reduction in efficiency under partial load conditions at 25°C: at 220 W/m², 95% (+/- 3%) of the STC efficiency (1000 W/m²) is achieved.

Component materials

Cells per module	60
Cell type	monocrystalline silicon
Cell dimensions	156 x 156 mm ²

System integration parameters

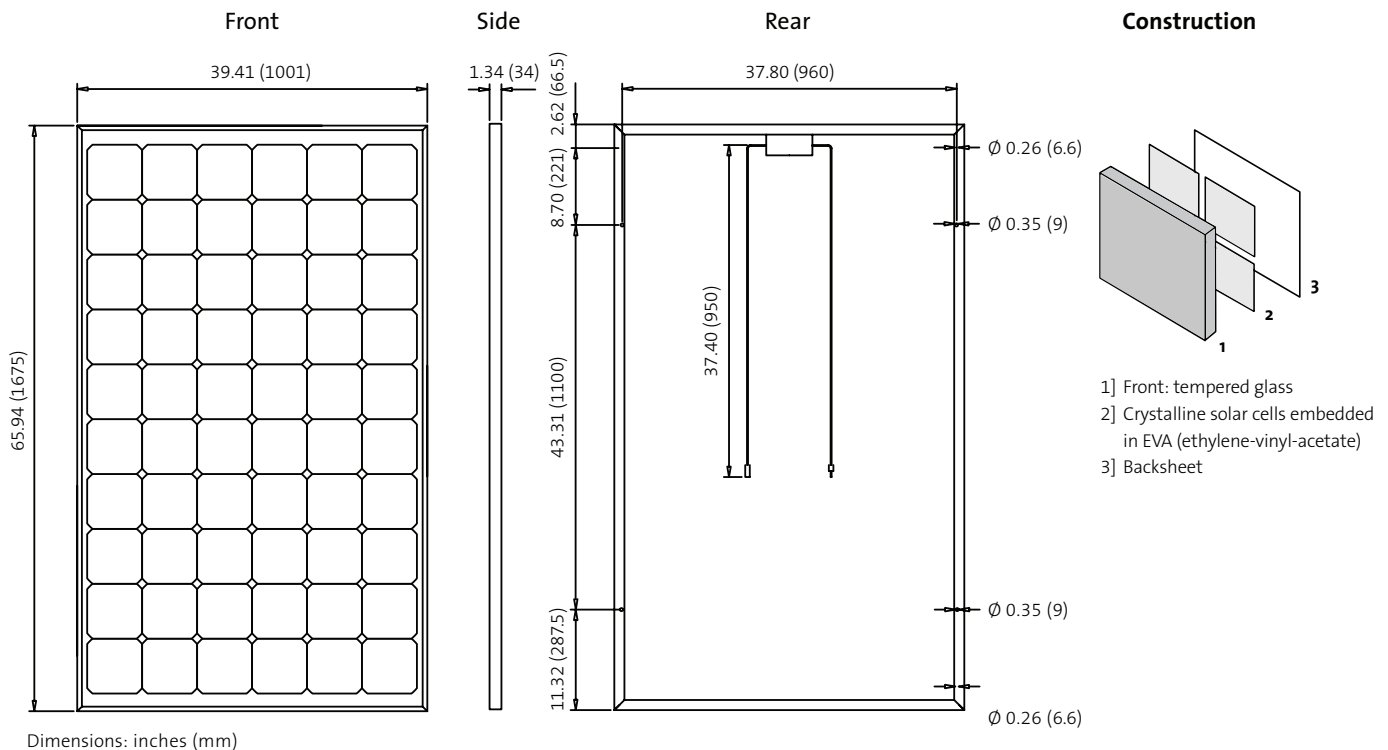
Maximum system voltage SC II	1000 V _{DC}
Maximum system voltage USA NEC	600 V _{DC}
Maximum series fuse rating	15 A
Maximum reverse current	Do not apply external voltages larger than V _{oc} to the module

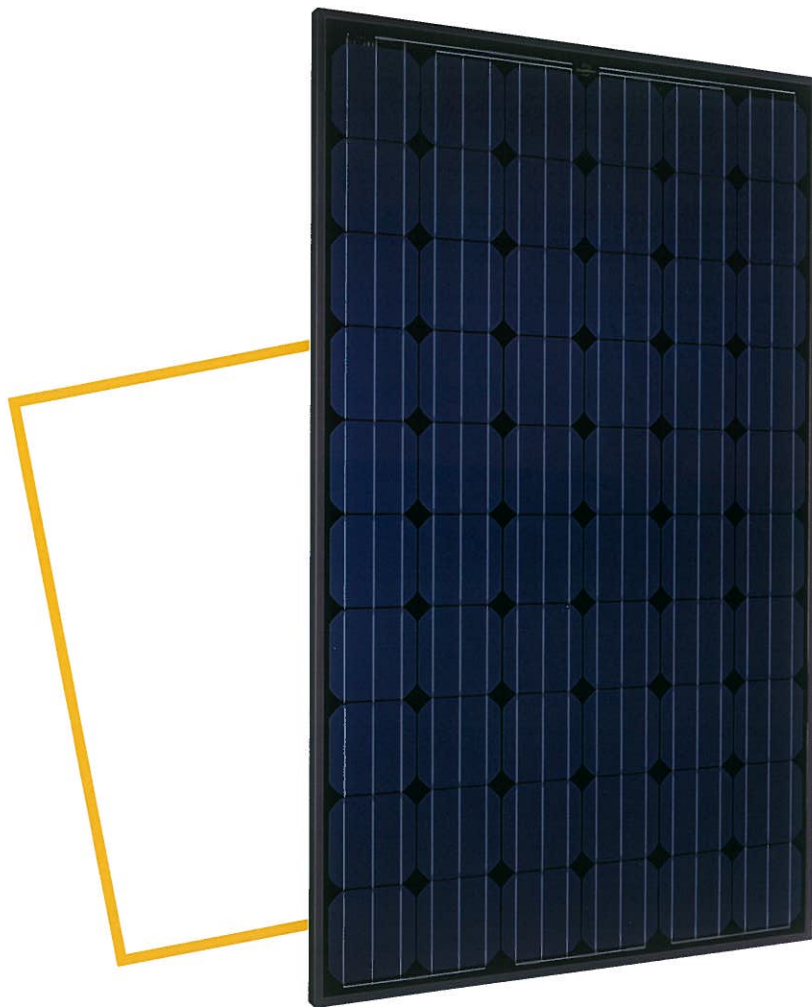
Thermal characteristics

NOCT	46°C
TC I _{sc}	0.042 %/K
TC V _{oc}	-0.33 %/K
TC P _{max}	-0.45 %/K

Additional data

Power tolerance	+/- 3 %
Junction box	IP 65
Connector	MC type 4





Length 65.94 in (1675 mm)
Width 39.41 in (1001 mm)
Height 1.34 in (34 mm)
Frame Aluminum
Weight 48.5 lbs (22 kg)

Sunmodule[®] SW 220/230 mono black

Provisional data sheet
Subject to change!
Product launch: Q1 2010

The Sunmodule from SolarWorld represents one of the best values in the PV industry. The Sunmodule's tight power tolerance of +/-3% ensures the highest system efficiency without the need for on-site module sorting. The fully automated manufacturing process at SolarWorld's ISO 9001-2000 factories produces modules with consistently high quality. Choosing the Sunmodule[®] will ensure high kWh yields for the long term.

To guarantee long term yields, Sunmodules are built to last. SolarWorld bonds the tempered glass laminate deep into the aluminum frame with a continuous bead of silicone adhesive. This method guarantees exceptional rigidity for the entire module and prevents the frame from loosening or pulling away from the glass in cases such as the sliding of heavy snow or handling. Tests carried out in accordance with IEC 61215, which applies loads of up to 113 lb/sf (5.4 kN/m²) demonstrate that the module can withstand high loads such as heavy accumulations of snow and ice.

The Sunmodule[®] features a patented, low profile junction box with integrated 25A Schottky bypass diodes that is completely sealed against corrosion. The ability to rapidly dissipate excess heat allows the diodes and junction box to operate at lower temperatures. The junction box is reliably connected by a solid, welded bond to guarantee lasting functionality and is factory-equipped with high-quality, robust cables and locking connectors. All Sunmodules carry a 25-year performance warranty and can be returned to SolarWorld at their end of life for recycling.



Sunmodule[®]

SW 220/230 mono black

Performance under standard test conditions

		SW 220	SW 230
Maximum power	P_{max}	220 Wp	230 Wp
Open circuit voltage	V_{oc}	36.6 V	36.9 V
Maximum power point voltage	V_{mpp}	29.3 V	29.6 V
Short circuit current	I_{sc}	8.18 A	8.42 A
Maximum power point current	I_{mpp}	7.51 A	7.76 A

Performance at 800 W/m², NOCT, AM 1.5

		SW 220	SW 230
Maximum power	P_{max}	157 Wp	164 Wp
Open circuit voltage	V_{oc}	33.1 V	33.4 V
Maximum power point voltage	V_{mpp}	26.3 V	26.6 V
Short circuit current	I_{sc}	6.76 A	6.96 A
Maximum power point current	I_{mpp}	5.98 A	6.18 A

Minor reduction in efficiency under partial load conditions at 25°C: at 220 W/m², 95% (+/- 3%) of the STC efficiency (1000 W/m²) is achieved.

Component materials

Cells per module	60
Cell type	monocrystalline silicon
Cell dimensions	6.14 x 6.14 in ² (156 x 156 mm ²)

System integration parameters

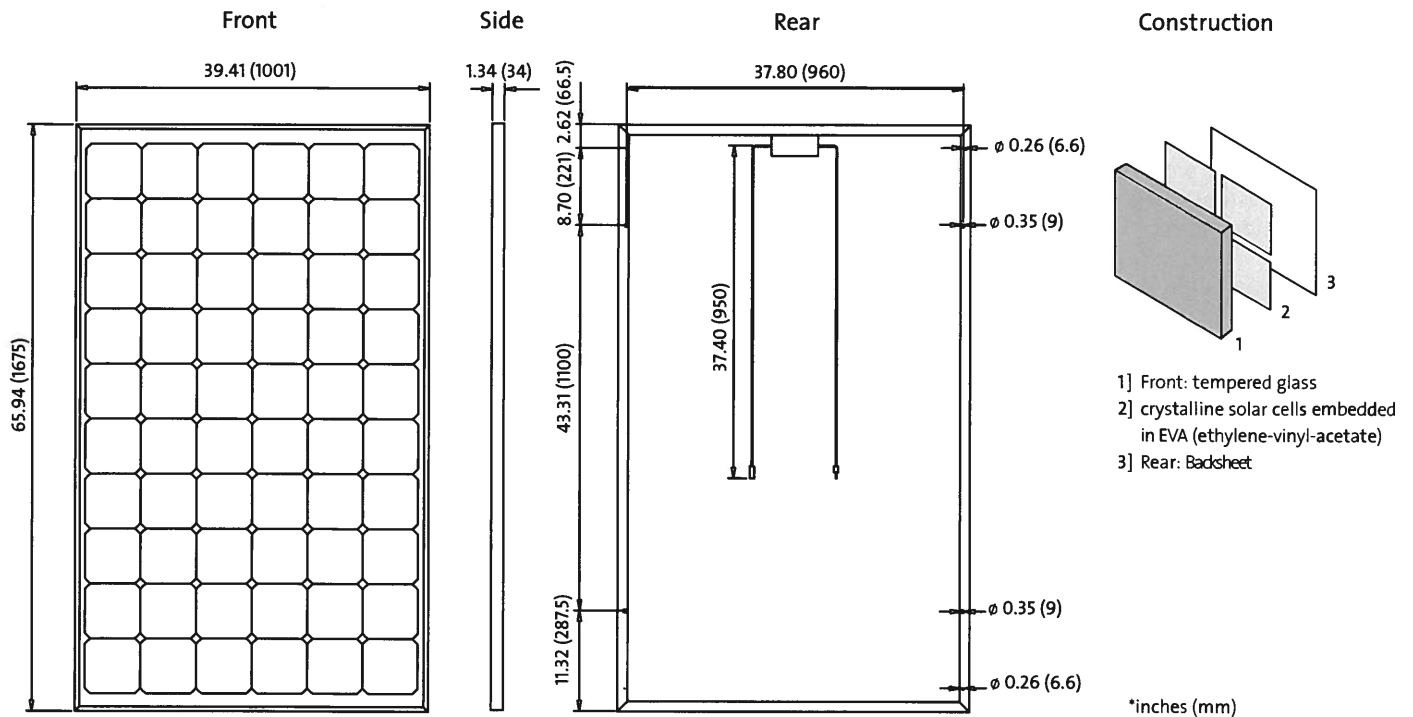
Maximum system voltage SC II	1,000 V _{DC}
Maximum system voltage USA NEC	600 V _{DC}
Maximum series fuse rating	15 A
Maximum reverse current	Do not apply external voltages larger than V _{oc} to the module

Thermal characteristics

NOCT	47 °C
TC I _{sc}	0.042 %/K
TC V _{oc}	-0.33 %/K
TC P _{max}	-0.45 %/K

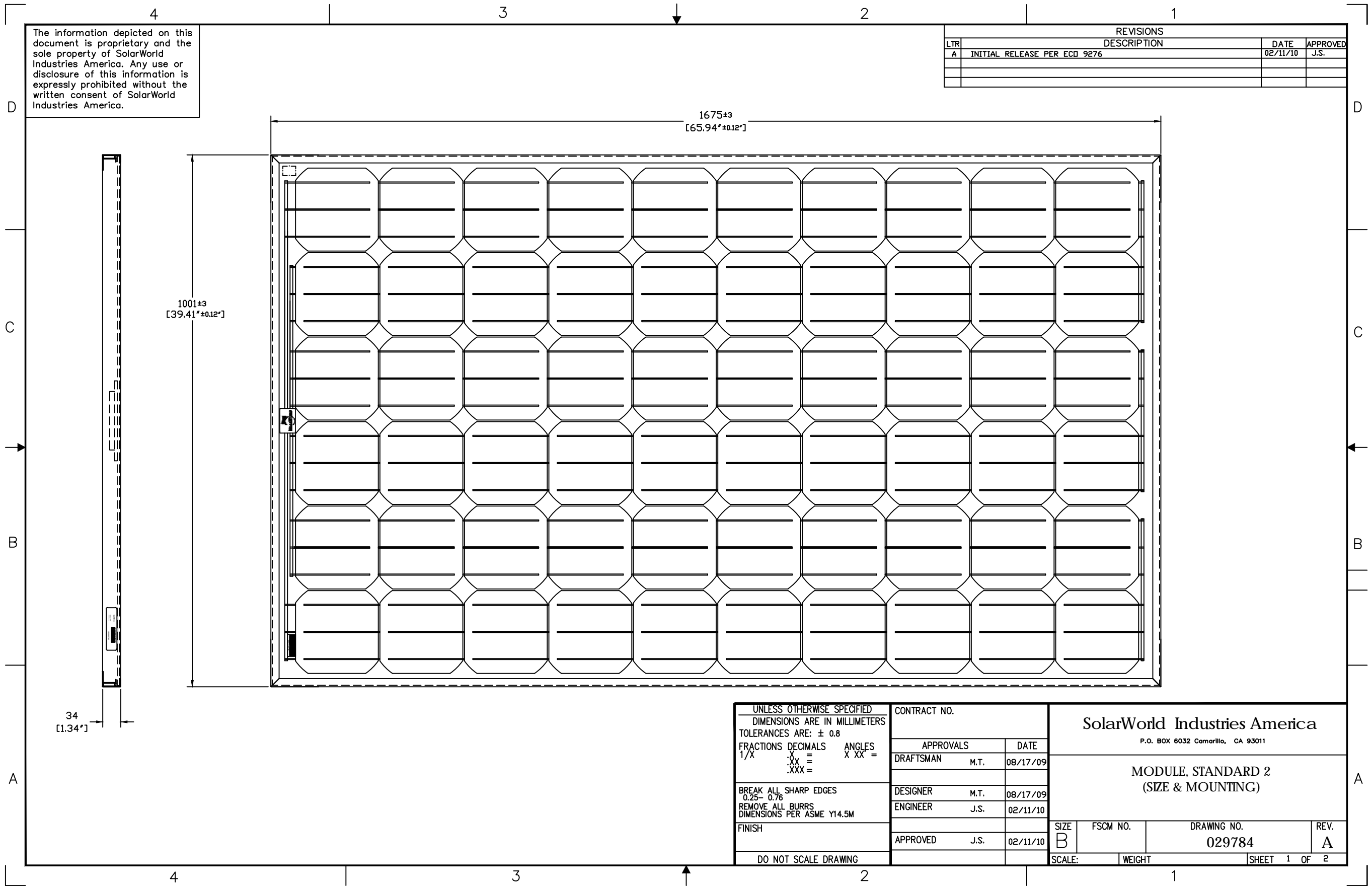
Additional data

Power tolerance	+/- 3 %
Junction box	IP 65
Connector	MC type 4



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REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE PER ECD 9276	02/11/10	J.S.



UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 TOLERANCES ARE: ± 0.8
 FRACTIONS DECIMALS ANGLES
 1/X = .X = X XX =
 .XX = .XXX =
 .XXX =
 BREAK ALL SHARP EDGES
 0.25- 0.76
 REMOVE ALL BURRS
 DIMENSIONS PER ASME Y14.5M
 FINISH
 DO NOT SCALE DRAWING

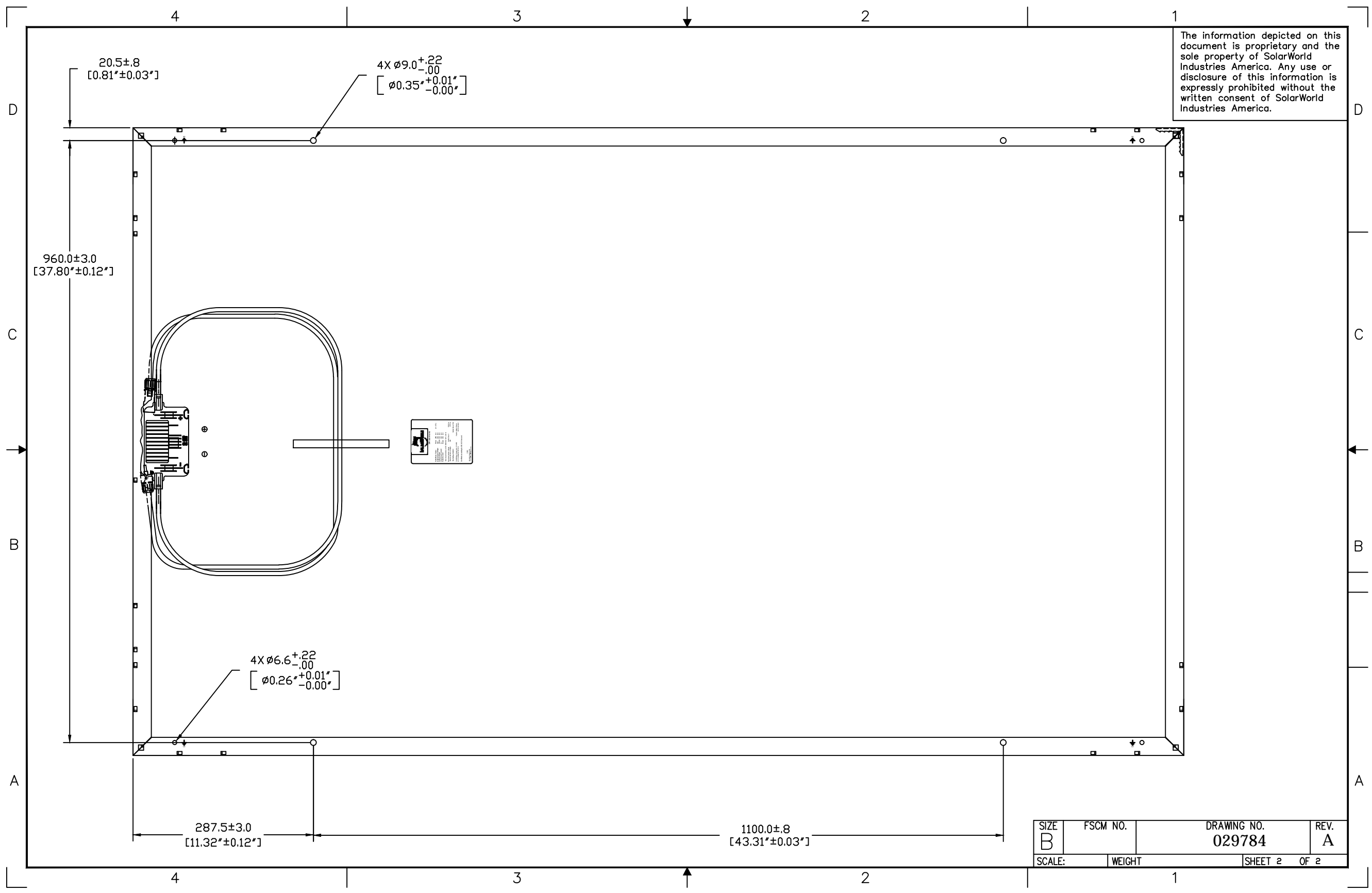
CONTRACT NO.	
APPROVALS	DATE
DRAFTSMAN M.T.	08/17/09
DESIGNER M.T.	08/17/09
ENGINEER J.S.	02/11/10
APPROVED J.S.	02/11/10

SolarWorld Industries America
 P.O. BOX 6032 Camarillo, CA 93011

MODULE, STANDARD 2
 (SIZE & MOUNTING)

SIZE B	FSCM NO.	DRAWING NO. 029784	REV. A
SCALE:	WEIGHT	SHEET 1 OF 2	

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20.5±.8
[0.81±0.03"]

4X Ø9.0^{+0.22}_{-.00}
[Ø0.35^{+0.01"}_{-0.00"}]

960.0±3.0
[37.80±0.12"]

4X Ø6.6^{+0.22}_{-.00}
[Ø0.26^{+0.01"}_{-0.00"}]

287.5±3.0
[11.32±0.12"]

1100.0±.8
[43.31±0.03"]

SIZE B	FSCM NO.	DRAWING NO. 029784	REV. A
SCALE:	WEIGHT	SHEET 2	OF 2

Sunbox[®]

SolarWorld junction box for solar modules

The Sunbox[®] is a junction box for solar modules that satisfies the highest quality requirements. The compact and extremely low-profile design guarantees highest performance in the case of partial shading. The Sunbox[®] is completely watertight and is resistant against high temperatures, UV radiation and microbes.

The Sunbox[®] is specially designed and adapted for automated production lines. Utilizing a special adhesive, the Sunbox[®] is mechanically mounted to the backside sheet. The four contacts inside can be soldered or welded in order to provide a solid electrical connection between the Sunbox[®] and the module ribbons.

The Sunbox[®] is fully assembled and ready to use. Each Sunbox[®] is individually tested before delivery. The high level workmanship of each product is certified through a stamp applied during the final quality test.

Edition: October 2006



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E-Mail: service@solarworld.de
www.solarworld.de



Technical performance

Sunbox

Max. system voltage (safety class II)	1000 V DC
Max. system voltage (US)	600 V DC
Max. module current	9 A
Bypass diodes	Schottky, 25 A / 45 V
Protection mode	IP2x (discrete) / IP65 (assembled)
Max. ambient temperature	-40°C ... +85°C
Flammability classification	5-V, according to IEC 61730-1:2004, 5.2
Installed bypass diodes	lead free soldered
Connection to module	soldering / welding
Properties	UV resistant, halogen free, flame retardant

Suncable

Insulation	polyolefin copolymer electron-beam cross-linked
Sheath	polyolefin copolymer electron-beam cross-linked
Conductor	tinned fine copper strands, 56 x 0.3 mm (IEC 60228, class 5)
Cross-section	1 x 4 mm ² (AWG 12)
Conductor diameter	2.6 mm
Outer diameter	7.2 mm
Max. temperature on conductor	+ 125 °C/20000 h
Max. conductor temperature at short circuit	280 °C / 5 s
Fire performance	IEC 60332-1, UL 1581 1061/VW1
Approvals	TÜV Rheinland 09/2005, UL 4703 03/2006
Length (L1 = L2)	950 mm

Connector

Type	Multi-Contact, PV-KST4 / PV-KBT4 - UR
Contact material	Tinned copper
Insulation material	PC / PA
Protection mode	IP2x (unmated) / IP67 (mated)
Approvals	IEC 61215, UL recognized, safety class II

Sunbox Qualification

According to:	IEC 61215 sec ed., UL 1703, safety class II
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SolarWorld Product Shipping Data

November-09

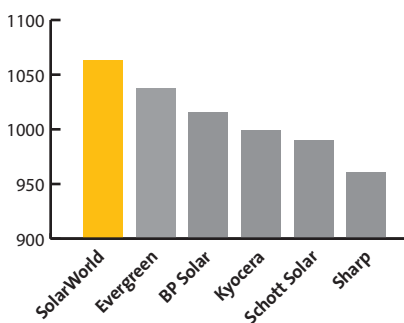
Sunmodule Model Number	Description	Modules per Box	Modules per Pallet	Pallet Dimensions L x W x H	Pallet Gross Weight (lbs)	Modules per 20' Container	Modules per 40' Container	Modules per 28' Dry Van	Modules per 48' Dry Van	Modules per 53' Dry Van	Modules per 45' Container (Hawaii)
SW230 mono	24 VDC		30	67 x 40 x 49.5	1600	180	420	300	480	540	480
SW220 mono	24 VDC		30	67 x 40 x 49.5	1600	180	420	300	480	540	480
SW175 mono	24 VDC		40	66 x 34 x 63	1425	280	560	400	680	760	640
SW165 mono	24 VDC		40	66 x 34 x 63	1425	280	560	400	680	760	640



SolarWorld outshines the competition

Independent real-world testing confirms what our customers have been telling us for over 30 years; the SolarWorld Sunmodule® produces more energy year over year than competing products.

The SolarWorld Sunmodule® generates more kWh per kW than other major brands.



Normalized annual output (kWh/kW), according to multi-year testing performed by Photon magazine

PV modules are sold based on their labeled capacity. However, it's their actual energy production which provides cost savings and avoids CO₂ emissions.

That's why we design our modules for maximum energy production year-round and apply tight $\pm 3\%$ power tolerances when labelling capacity.

Get more out of your PV installation by installing SolarWorld Sunmodules, proudly made in the USA.



SolarWorld California
Sales: **1-800-947-6527**
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Camarillo, CA 93012
service@solarworld-usa.com



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SELECTION CRITERIA FOR PV PROCUREMENTS

The following criteria can be used for the purpose of specifying solar modules for procurements in solar electric systems.

For Solar Modules:

The solar module shall have solar cells made of high efficiency mono crystal silicon and processed with a Texture Optimized Pyramidal Surface (TOPS) for maximum power delivered per day.

The solar modules shall be SolarWorld SunModules SW175, SW230 mono or equivalent, which when mounted properly can meet 50 lbs/sq/ft loading for high snow and wind loads.

Solar module shall have a power tolerance of +/- 3%.

The solar module shall meet UL 1703 requirements, shall be certified IEC 1215 test requirements, and shall carry the CE mark. Solar modules shall be certified to the "Design Qualification and Type approval for crystalline silicon terrestrial photovoltaic (PV) modules Standard" IEC 61215 1993-04 by the Arizona State University Photovoltaic Testing Laboratory (ASU-PTL).

The solar module will have a 25 year power performance warranty.

The solar module will be recyclable.

The solar modules including the solar wafers and solar cells will be manufactured in the U.S.A.

The solar cells shall have dual or triple bus bars on the front and rear surface to allow for interconnect ribbons to be soldered using a continuous flow process (not spot welds) to insure cell interconnection and enhance module reliability.

The solar laminate shall be constructed using a specially formulated EVA polymer to bond the solar cells to a special 3 mm tempered, low iron, water white glass for maximum protection and light transmission.

A white TPT back sheet shall be used in the lamination process to reduce cell temperature, enhance performance through light reflection between cells and act as a moisture barrier maximizing cell and module output.

The solar glass laminate will have a silicon sealant around the glass edge and the clear anodize aluminum frame will have drain holes to prevent moisture from being trapped. The glass shall be bonded to the module frame for added structural integrity.

The solar module shall incorporate the SunBox module interconnection terminal box. The terminal box shall have integral built-in bypass diode protection (to preserve array output power during periods of local shading). The SunBox junction box shall be weather-resistant, watertight, UV and microbe resistant and meet IEC 61215 edition 2 design. The SunBox junction box will have positive and negative, 12 AWG, dual insulated cables with UL and TUV safety class II approval. Cables will have Gen 4 MC audible locking connectors. Connectors will be IP65 designed and meet 2008 NEC standards.

The solar module shall be supplied by a manufacturer having ISO 9001 certified facilities and pass the environmental tests required by JPL specification 5101-161 (Block V).

Limited Warranty (valid from 01.01.2010)

By purchasing the Solar modules from SolarWorld California Inc. ("SolarWorld") (hereinafter referred to as: products), you have chosen a level of quality, which meets the highest requirements. SolarWorld assumes that use in accordance with this Limited Warranty will reliably maintain the function of the products to produce electricity (hereinafter referred to as: functional capability) as well as reliably maintaining the performance of the products. As a sign of our confidence in this quality, SolarWorld is happy to grant you as the end-user of the products (i.e. the person who put the products into operation correctly for the first time or the person who has legitimately purchased the products from such an end-customer without any modifications) a Five Year Limited Product Warranty and Twenty-Five Year Limited Service Warranty as presented below:

A Five Year Limited Product Warranty:

1. SolarWorld guarantees the functional capability of the products for five years beyond the purchase of the product and that the product

- > will not suffer from any mechanical adverse effects, which limit the stability of the solar module. A condition for this is correct installation and use in accordance with regulations, as described in the installation instructions enclosed with the product.
- > will not be subject to any clouding or discolouration of the glass.
- > with its cable and connector plug will remain safe and operational, if they are installed professionally and are not permanently positioned in water (puddle). However, damage to the cable, which is caused by abrasion on a rough lower surface owing to insufficient fixing or owing to unprotected running of the cable over sharp edges, is excluded. Any damage caused by animals (e.g. rodent bites, birds, insects) is also exempted.
- > with its aluminium frames will not freeze up when it is frosty if it is installed correctly.

The appearance of the product as well as any scratches, stains, mechanical wear, rust, mould, optical deterioration, discoloration and other changes, which occurred after delivery by SolarWorld, do not represent defects, insofar as the change in appearance does not lead to a deterioration in the functional capability of the product. A claim in the event of glass breakage arises only to the extent that there was no external influence.

2. If the products exhibit one of the above-mentioned defects during this period and this has an effect on the functional capability of the product, SolarWorld will repair the defective products, supply replacement products or provide the customer with an appropriate residual value of the products as compensation at its discretion.

B Twenty-Five Year Limited Service Warranty:

1. The products which you have purchased have a performance specification within a certain tolerance range of 3% with regard to the power output (the so-called effective output). The relevant effective output can be found on the nameplate on the reverse of the product. SolarWorld assumes that the actual output of the products will decline only slightly over a period of 25 years as of the purchase of the product.

2. SolarWorld guarantees that the actual output of the product will amount to at least 97% of effective output during the first year of operation of the product and as of the second year of the operation of the product, the effective output will decline annually by no more than 0.7% for a period of 24 years, so that by the end of the 25th year of operation an actual output of at least 80.2% of effective output will be achieved. In the event of a negative deviation of actual product performance from the so-called threshold values, SolarWorld will either supply you with replacement products, which make it possible to maintain actual performance, take other measures, which make it possible to achieve actual performance or reimburse you with the time value percentage of your product exclusively at its discretion.

3. When replacement products are supplied, there is no entitlement for the use of new products or those which are as good as new. On the contrary, SolarWorld is authorised to also supply used and/or repaired products as replacements.

C Further conditions of entitlement

1. The period of the Limited Service Warranty under B) is restricted to a period of 25 years as of the purchase of the product and will not be extended even in the event of a repair or exchange of a product.

2. The effective output and the actual output of the products are to be determined for the verification of any guarantee case using standard test conditions, as described under IEC 60904. The decisive measurement of performance is carried out by a recognised measuring institute or through SolarWorld's own measurements (the assessment of measurement tolerances is undertaken in accordance with EN 50380). The guarantee does not cover transport costs to return the products or for a new delivery of repaired or replacement products. It also does not cover the costs of the installation or re-installation of products, as well as other expenditure by the end-customer or seller.

3. All products which have been replaced pass to the ownership of SolarWorld.

4. The term of the rights granted to you in this Limited Warranty in paragraphs A) and B) starts with the original purchase of the products, insofar as they were purchased by the original end-customer after 01.01.2010. SolarWorld retains the right to adjust voluntary special services in accordance with this document at any time. However, any product purchases, which have already been concluded, remain unaffected by this – including the voluntary special services in accordance with this document. You can find out about the current status of this document at any time at www.solarworld-usa.com.

D Assertion of claims

The assertion of the services specified under A) and B) requires you (i) to inform the authorized seller/dealer of the product of the alleged defect in writing, or (ii) to send this written notification directly to the address mentioned in G), if the seller/dealer who should be informed no longer exists (e.g. owing to business closure or insolvency). Any notification of defects is to be added to the original sales receipt as evidence of the purchase and the time of the purchase of the SolarWorld products. The assertion should take place within 14 days of the occurrence of the defect. The return of products is permitted only after the written consent of SolarWorld has been obtained.

E Use in accordance with this Limited Warranty

1. The services described above can additionally be ensured only if the product is used and/or operated in accordance with this Limited Warranty as well as not having been dismantled and re-assembled in the meantime. Services provided by SolarWorld must therefore be with-

drawn if the defects to the product are not exclusively based on the products themselves. This is e.g. the case if:

- a Delays on your part or on the part of the fitter in observing the assembly, operational and maintenance instructions or information.
- b Exchange, repair or modification of the products by persons who were not authorised by SolarWorld.
- c Incorrect use of the products.
- d Vandalism, destruction through external influences and/or persons/animals.
- e Incorrect storage or inappropriate transport before installation.
- f Damage to the customer system or incompatibility of the customer's system equipment with the products.
- g Use of products on mobile units such as vehicles or ships.
- h Influences such as dirt or contamination on the face-plate; contamination or damage by e.g. smoke, extraordinary salt contamination, or other chemicals.
- i Force majeure such as flooding, fire, explosions, rock-falls, direct or indirect lightning strikes, or other extreme weather conditions such as hail, hurricanes, whirlwinds, sandstorms or other circumstances outside the control of SolarWorld.

2. The entitlements referred to under A) and B) will not be granted if and as soon as the manufacturer's labels or serial numbers on the PV modules have been changed, deleted, peeled off or made unrecognizable.

F Exclusion of liability

The remedies set forth in this Limited Warranty are the exclusive remedies available to you as a product purchaser. SolarWorld shall not be liable for damage, injury or loss arising out of or related to a product except as set forth in this Limited Warranty. In particular, under no circumstances shall SolarWorld be liable for incidental, consequential, special or other indirect damages in any way connected with a product. SolarWorld's aggregate liability, if any, shall be limited to a product's purchase price or any service furnished in connection with a product, as the case may be.

G Your contacts

To receive service under this Limited Warranty, please contact the authorized seller/dealer of your product or SolarWorld at the following address: Customer Service, SolarWorld California Inc., 4650 Adohr Lane, Camarillo, CA 93012, USA.

H Choice of law

The rights and responsibilities granted under this Limited Warranty shall be governed and construed in accordance with the laws of the State of California, without regard to its conflict of law principles.

I Validity

The following table contains all the current products to which this Limited Warranty is to be applied. Products, which do not appear in this list, are not subject to this Limited Warranty.

Sunmodule/Sunmodule Plus/laminate/black

SW 135 mono	SW 195 mono	SW 170 poly	SW 120 Compact poly
SW 140 mono	SW 200 mono	SW 175 poly	SW 125 Compact poly
SW 145 mono	SW 205 mono	SW 180 poly	SW 130 Compact poly
SW 150 mono	SW 210 mono	SW 185 poly	SW 135 Compact poly
SW 155 mono	SW 214 mono	SW 190 poly	SW 140 Compact poly
SW 160 mono	SW 215 mono	SW 195 poly	SW 145 Compact poly
SW 165 mono	SW 220 mono	SW 200 poly	SW 150 Compact poly
SW 170 mono	SW 225 mono	SW 205 poly	
SW 175 mono	SW 230 mono	SW 210 poly	
SW 180 mono	SW 235 mono	SW 214 poly	SW 130 Compact mono
SW 185 mono	SW 240 mono	SW 215 poly	SW 135 Compact mono
SW 190 mono	SW 245 mono	SW 220 poly	SW 140 Compact mono
		SW 225 poly	SW 145 Compact mono
		SW 230 poly	SW 150 Compact mono
		SW 235 poly	SW 155 Compact mono
		SW 240 poly	SW 160 Compact mono

J State Law

This Limited Warranty is expressly intended to exclude all other express or implied warranties, including without limitation the warranties of merchantability and fitness for a particular purpose, to the periods set forth herein. This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow limitations on implied warranties or the exclusion or limitation of damages, so some of the above limitations may not apply to you.

Revised January 2010



Kevin Kilkelly
President
SolarWorld California, LLC



Raju Yenamandra
Vice President, Sales and Marketing
SolarWorld California, LLC



BUREAU VERITAS
Certification



Site Certificate

to Certificate Number: **DE7000148(Rev.2)**

awarded to

SolarWorld California

4650 Adohr Lane, Camarillo, CA 93012, – USA

SolarWorld Industries America

4650 Adohr Lane, Camarillo, CA 93012, – USA

SolarWorld Industries America

12016 NE 95th Str., #720, Vancouver, WA 98682, - USA

Bureau Veritas Certification certifies that the Management System of the above organisation has been assessed and found to be in accordance with the requirements of the standards detailed below

Standard

DIN EN ISO 9001:2000

Scope of supply

The manufacturing and sales of Single Crystal Ingots,
Laminates, and Solar Modules.

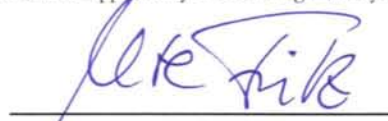
Original approval date: 25.11.2004

Subject to the continual satisfactory operation of the organisation's Management System, this certificate is valid from:

Date of certification: 16.03.2007

Valid until: 24.11.2009

To check this certificate validity you may contact Bureau Veritas Certification. Further clarifications regarding the scope of this certificate and the applicability of the Management Systems requirements may be obtained by consulting the organisation.


Date: 11.05.2009



Certificate number: **DE7000148(Rev.2)-08**

Bureau Veritas Certification Germany GmbH
Veritaskai 1 · D-21079 Hamburg

CERTIFICATE

TUV USA Inc.

hereby certifies that

SolarWorld Industries America LP

4650 Adohr Lane
Camarillo, CA 93012
USA

12016 Northeast 95th Street
Vancouver, WA 98682
USA

has established and applies
a quality system for the

The Design, Manufacture and Sales of Solar Cells, Laminates and Modules.

Proof has been furnished that the requirements according to

ISO 9001:2000

are fulfilled.

Further clarifications regarding the scope of this certificate and the applicability of
ISO 9001:2000 requirements may be obtained by consulting the organization.

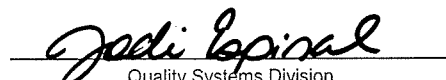
Certificate Registration No.

06-1118

The certificate is valid from
May 10, 2006

The certificate is valid until
May 9, 2009




Quality Systems Division
Salem, New Hampshire



QIGU.E242115 Photovoltaic Modules and Panels

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Photovoltaic Modules and Panels

[See General Information for Photovoltaic Modules and Panels](#)

SOLAR WORLD AG

E242115

MARTIN-LUTHER-KING STRASSE 24
53175 BONN, GERMANY

Photovoltaic modules. Models SW135 mono, SW140 mono, SW 145 mono, SW 150 mono, SW 155 mono, SW 160 mono, SW 165 mono, SW 170 mono, SW 175 mono, SW 180 mono, SW 185 mono, SW 190 mono, SW 195 mono, SW 200 mono, SW 205 mono, SW 210 mono, SW 215 mono, SW 220 mono, SW 225 mono, SW 230 mono, SW 235 mono, SW 240 mono, SW 200 poly, SW 205 poly, SW 210 poly, SW 215 poly, SW 220 poly, SW 225 poly, SW 230 poly, SW 235 poly, SW 240 poly. Models may be followed by /T or /P.

Models SW 220, SW 210, SW 200, followed by Poly, followed by /T.

[Last Updated](#) on 2009-07-15

[Questions?](#)

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Photovoltaic Modules and Panels Certified for Canada

[See General Information for Photovoltaic Modules and Panels Certified for Canada](#)

SOLAR WORLD AG

E242115

MARTIN-LUTHER-KING STRASSE 24
53175 BONN, GERMANY

Photovoltaic modules, Models SW135 mono, SW140 mono, SW 145 mono, SW 150 mono, SW 155 mono, SW 160 mono, SW 165 mono, SW 170 mono, SW 175 mono, SW 180 mono, SW 185 mono, SW 190 mono, SW 195 mono, SW 200 mono, SW 205 mono, SW 210 mono, SW 215 mono, SW 220 mono, SW 225 mono, SW 230 mono, SW 235 mono, SW 240 mono, SW 200 poly, SW 205 poly, SW 210 poly, SW 215 poly, SW 220 poly, SW 225 poly, SW 230 poly, SW 235 poly, SW 240 poly. Models may be followed by /T or /P.

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Quick Guide for Users

SolarWorld® solar modules

Last revised: January 2009

Carefully read through these installation instructions before installing, operating or servicing the photovoltaic (PV) system. Failure to follow these instructions may result in bodily injury or damage to property. Keep these instructions! Working on a PV system requires specialized knowledge and must therefore be carried out only by appropriately qualified and authorized personnel. Keep children away!

Warning notices

Danger of death from electric shock!

Solar modules generate electricity as soon as they are exposed to light. The voltage of a single module is less than 50VDC. When several modules are connected in series, the summed voltage can be dangerously high. When the modules are connected in parallel the currents are summed together. Although touch protection is provided in the form of the fully insulated plug contacts, the following points must be observed when handling the solar modules to avoid the risk of fire, arcing and fatal electric shock:

- The installation of higher voltage systems should be done by qualified, licensed professionals.
- Do not insert electrically conducting parts into the plugs or sockets!
- Do not wear metallic jewelry while performing mechanical or electrical installation.
- Do not fit solar modules and wiring with wet plugs and sockets! Tools and working conditions must be dry.
- Exercise extreme caution when carrying out work on wiring and use the appropriate safety equipment (insulated tools, insulated gloves, etc.)!
- Do not use damaged modules! Do not dismantle modules! Do not remove any part or label fitted by the manufacturer! Do not treat the rear of the laminate with paint, adhesives or mark it using sharp objects!

Danger of death from electric shock!

The inverter can produce dangerous, high voltages, even when not connected:

- Exercise extreme caution when working on wiring and the inverter.
- After switching off the inverter, it is essential to wait for the time interval specified by the manufacturer before beginning any further work. This allows the high voltage components time to discharge.
- Be sure carefully to follow the inverter manufacturer's installation instructions.

Danger of death from arcing!

Modules generate direct current (DC) when any amount of light shines on them. When breaking a connected string of modules (e.g. when disconnecting the DC line from the inverter under load), a lethally strong arc can occur:

- Never remove the solar generator from the inverter while it is still connected to the main grid!
- Ensure that the cable connections are in perfect condition (no cracking, soiling or other contamination)!

Unpacking the modules and storage

• Observe the warnings on the packaging!

The utmost care is required when handling the modules. Take care when unpacking, transporting, and storing them. Leave modules in packaging until they are to be installed. Carry modules with both hands. Do not use the connection socket as a handle. Do not stand modules on hard or rough ground. Do not stand modules on their corners. Ensure modules do not bow. Do not place modules on top of each other. Do not subject to load, do not stand on them, do not drop. Do not mark or work on them with sharp objects. Keep all electrical contacts clean and dry. In order to keep a record of your system, we recommend that you make a note of the serial numbers. If it is necessary to store the modules temporarily, a dry, ventilated room should be used.

General safety information

Ensure that the module is used for its intended purpose only. Pay attention to the local ordinances, building standards and accident- prevention regulations during installation. The safety information for other system components must also be followed.

Installation

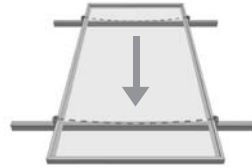
When installing the modules, please pay attention to:

• Safety during installation

Do not carry out installation work when there are strong winds. Secure yourself and other workers to avoid falling. Secure work materials to prevent articles from falling. Create a work zone to avoid accidents with other people.

• Keeping within the maximum permitted load

Make sure the support structure adheres to maximum permissible load requirements as prescribed by local ordinances, particularly in regions of high snow accumulations and high wind velocities. Take notice to possible bowing of the modules under high loads. Avoid installing fasteners, cable ties, etc. between the module backside and support structure (i.e. on mounting rails) as any sharp edges can damage module.



Drawing:

Bowing of the module under high mechanical front loads.

• Grounding of the module and frame

The company installing the PV module frame is also responsible for properly grounding. If the building is already equipped with an exterior lightning protection system the PV-installation must be integrated in the protection system against direct effects of lightning. Country specific standards must be adhered to.

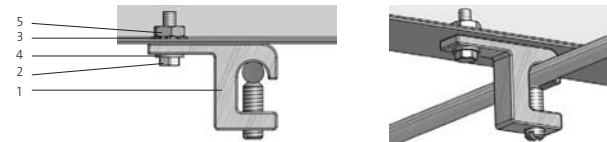
A grounding method authorized by UL is mandatory in the US and Canada.

Example UL:

The modules can be connected to the grounding holes using a lay-in lug and a screw with serrated washer, washer and nut.

Drawings:

Ground connection using a cable lug, a bolt, a serrated washer, a washer and a nut.



1) Lay-in lug
2) Bolt

3) Serrated washer
4) Washer

5) Nut

We recommend using the components as listed below. Any UL approved PV grounding method and components are also acceptable in the US and Canada.

Table: Recommended components

Item	Description	Manufacturer/ Distributor	Manufacturer Part Number
Grounding Lug	Lay-In Lug	IlSCO	GBL-4
Bolt	#6-32, SS	McMaster Carr	92314A148
Serrated washer	M5, SS	McMaster Carr	91120A140
Washer	ID 9/64", OD 3/8", SS	McMaster Carr	92141A007
Nut	#6-32, SS	McMaster Carr	91841A007

See: www.ilSCO.com; www.mcmaster.com

• Fire safety

The roof construction and installation may affect the fire safety of a building; improper installation may contribute to hazards in the event of fire. For roof application, the modules should be mounted over a fire resistant covering rated for the application. The module is "non-explosion-protected equipment". Hence it must not be installed in the proximity of highly flammable gases and vapors (e.g. filling stations, gas containers, paint spraying equipment). The module must not be installed near open flames or flammable materials.

• Suitable environmental conditions

The module is intended for use in temperate climatic conditions. The module must not be subjected to concentrated light. It must not be immersed in water or constantly exposed to water spray (e.g. from fountains). There is risk of corrosion with exposure to salt (it is recommended that modules are installed at least 500 m or 1700 ft from the sea) and sulfur (sulfur sources, volcanoes). The module may not be exposed to extremely corrosive chemicals (e.g. emissions from manufacturing plants).

• Suitable installation

Make sure the module meets the technical requirements of the system as a whole. Ensure that other system components do not exert damaging mechanical or electrical influences on the modules. When connected in series, modules must all have the same amperage. When connected in parallel, the modules must all have the same voltage. The modules must not be connected together to create a voltage higher than the permitted system voltage. Modules must not be fitted as overhead glazing or vertical glazing (façade). Ensure that the mounting system can also withstand the anticipated wind and snow loads. There are openings at the base of the module frame to allow water from precipitation to drain. Ensure that these openings are not blocked nor partially blocked by the module installation method.

• Optimum orientation and tilt

To obtain maximum yield from the system, we recommend that you determine the best direction and tilt angle for the modules. Conditions for generating electricity are considered ideal when the sun's rays strike the module perpendicular to its surface. To avoid performance drops in series circuits, ensure that all modules have the same orientation and tilt.

• Avoidance of shading

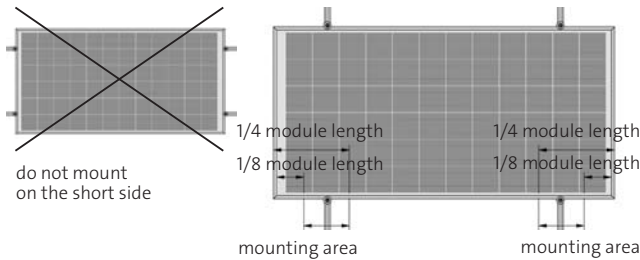
Even partial shading will cause a yield reduction. A module is "shade free" when the entire surface is shade free all year round and, even on the most unfavorable days of the year, receives unobstructed sunlight.

• Adequate ventilation

Ventilation of the module backside is necessary to avoid the build-up of heat that can reduce performance.

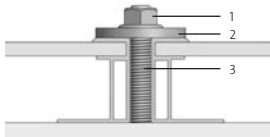
Mounting

Each module must be securely fastened at a minimum of 4 points. The frame has been stress tested for mounting by the long sides. The module should not be secured by its short sides.



PV modules can be mounted to the substructure by clamping on (Example A) at the front side or by screwing (Example B) at the back side.

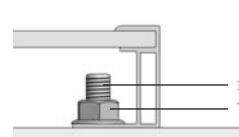
Example A: Clamping



- 1) Stainless steel serrated lock nut
- 2) Stainless steel washer
- 3) Stainless steel M8 (5/16 inch) T-head bolt

The clamping area (Example A) of the washer must cover at least 135 mm² or 0.21 in². A torque wrench must be used for assembly. In the examples shown, the tightening torque (using stainless steel M8 or 5/16 inch bolts) must be 20 Nm or 11.8 ft-lbf. Use the existing holes for securing the module; do not drill any additional holes (doing so would void the warranty). Use appropriate corrosion-proof fastening materials.

Example B: Bolting



Wiring

The module is provided from the factory with pre-connectorized cables. Under no circumstances should the junction box be opened.

For the wiring, pay attention to:

• Correct wiring scheme

In order to decrease voltage caused by indirect lightning strikes, all connecting cables should be as short as possible. Check that the wiring is correct before commissioning the system. If the measured open circuit voltage differs from the specifications, then there is a wiring fault. Ensure that the polarity is correct.

• Correct plug connections

Make connections only in dry conditions. Ensure that connections are secure and tight.

• Use of suitable materials

Use special solar cable and suitable connectors only. Ensure that they are in perfect electrical and mechanical condition. Use only single wire cables. Select a suitable conductor diameter to minimize voltage drop.

• Cable protection

We recommend securing the cables to the mounting system using UV-resistant cable ties. Protect exposed cables from damage using suitable precautions (e.g. laying them in plastic pipes). Avoid direct exposure to sunlight.

Underwriters Laboratories Information (U.S. and Canada)

- The solar module electrical characteristics are within +/-10% of the module label indicated values of Isc, Voc, and Pmpp under Standard Test Conditions (irradiance of 100 mW/cm², AM 1.5 spectrum, and a cell temperature of 25°C/77°F)
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of Isc and Voc marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the PV output.

- Refer to section 690-8 of the National Electric Code (NEC) for an additional multiplying factor of 125% (80% de-rating) which may be applicable
- Over-current protection shall be in accordance with the requirements of Article 240 of the NEC
- Conductor recommendations: 8-14 AWG (1.5-10 mm²) USE-2 (nonconduit)/ THWN-2 (conduit), 90°C wet rated
- Cable conduits should be used in locations where the wiring is accessible to children or small animals
- Modification or tampering of diodes by unqualified personnel is not permitted. Please consult a SolarWorld Service Center for additional information regarding diode replacement/repair.

Maintenance and cleaning

Given a sufficient tilt (at least 15°), it is generally not necessary to clean the modules (rainfall will have a self-cleaning effect). In case of heavy soiling, we recommend cleaning the modules using plenty of water (from a hose) without any cleaning agents and using a gentle cleaning implement (a sponge). Dirt must never be scraped or rubbed away when dry, as this may cause micro-scratches.

We recommend that the system be inspected at regular intervals to ensure:

1. All mounting points are tight and secure and free of corrosion.
2. All cable connections are secure, tight, clean and free of corrosion.
3. Cables are not damaged in any way.
4. The conductivity of module frame to earth ground.

Disclaimer of liability

Since compliance with this guide and the conditions and methods of installation, operation, use and maintenance of the modules are not checked or monitored by SolarWorld AG, SolarWorld AG accepts no liability for damage arising through improper use or incorrect installation, operation, use or maintenance.

Furthermore, liability for infringements of patent law or of other third party rights arising from the use of the modules is excluded unless we are automatically liable by law.

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