Shell Solar

Shell PowerMax™ solar modules for off-grid markets

2nd edition 2005

General

Shell PowerMax™ is a new range of dependable, high performance solar products – with designs created specifically for off-grid applications.

Shell PowerMax™ Ultra 175-P and 165-P products contain 72 series connected 125mmx125mm mono-crystalline solar cells, which can generate a peak power of 175 and 165 watts at 35.4 and 35 volts respecitvely.

Qualifications and Certificates

The Shell PowerMax™ Ultra 175-P and 165-P products meet the following requirements:

- **IEC 61215**
- **UL-Listing 1703**
- **FM approved**
- **TÜV Safety Class 2 (pending)**

All these Shell Solar modules are produced in ISO 9001:2000 certified factories.

Limited Warranties*

- Peak Power for 25 years (category D)
- Product workmanship 2 years

* See Shell Solar Limited Warranty for PV-Modules

Shell PowerMax™ Ultra SQ175-P/165-P

ELECTRICAL EQUIPMENT, CHECK WITH YOUR INSTALLER

Due to continuous research and product improvement the specifications in this Product Information Sheet are subject to change without notice. Specifications can vary slightly. For installation and operation instructions, see the applicable manuals. No rights can be derived from this Product Information Sheet and Shell Solar assumes no liability whatsoever connected to or resulting from the use of any information contained herein.

References in this Product Information Sheet to ‚Shell Solar' are to companies and other organisational entities within the Royal Dutch/Shell Group of Companies that are engaged in the photovoltaic solar energy business. Shell Solar was set up in 1999 and has its principal office in Amsterdam, the Netherlands.

The Shell PowerMax™ advantage

Exceptional Performance

- High efficiency crystalline silicon solar cell technology; enhanced by TOPS™ and new silicon nitride anti-reflection coatings.
- One of the industry's leading energy yields in a wide variety of climates.
- Products rated on fully stabilized initial power so you get the power you pay for.

Proven Reliability

- Module design proven over 30 years of field operations with reliability in excess of 99.9%
- Extended limited power warranties backed by a company you can trust.
- UL 1703, IEC 61215, FM and TÜV Safety Class 2 certifications.

Safety by Design

- Suitable for high snow and wind loads
- UL fire safety class C

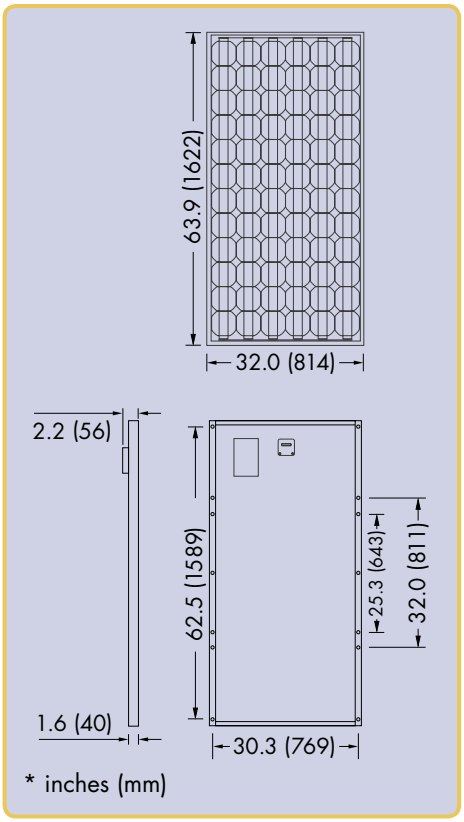
Easy to install

- Conduit ready junction box
- 12 mounting holes per product; 4 grounding holes
- 20A series fuse rating

PowerMax™ Ultra SQ165-P/175-P Photovoltaic Solar Modules

Mechanical Specifications Modules

A torsion and corrosion-resistant anodized aluminium frame ensures dependable performance, even under harsh weather conditions. Pre-drilled mounting holes are provided for ease of installation.



* inches (mm)

Outside dimensions (in/mm)	63.9 x 32.0/1622 x 814
Thickness (inc. junction box) (in/mm)	2.2/56
Thickness (exc. junction box) (in/mm)	1.6/40
Weight (lbs/kg)	40/18.4
Junction box type	ProCharger™ IP54
Junction box size (in/mm)	5 x 4.4 x 1.8 /126 x 111 x 46

The junction box allows for easy field replacement of diodes.

For installation instructions, please refer to the Shell Solar Installation and Safety Instructions.

Electrical Characteristics

Data at Standard Test Conditions (STC)

STC: irradiance level 1000W/m², spectrum AM 1.5 and cell temperature 25°C.

	PowerMax™	Ultra 165-P	Ultra 175-P
Rated power [W]	P_r	165	175
Peak power* [W]	P_{mpp}*	165	175
Module efficiency [%]	η	12.5	13.3
Maximum system voltage	V_{sys}	600V (UL)/715V (TÜV)	600V (UL)/715V (TÜV)
Peak power voltage [V]	V_{mpp}	35.0	35.4
Peak power current [A]	I_{mpp}	4.72	4.95
Open circuit voltage [V]	V_{oc}	44.5	44.6
Short circuit current [A]	I_{sc}	5.40	5.43
Series fuse rating [A]	I_{fuse}	20	20
Minimum peak power [W]	$P_{mpp\ min}$	156.75	166.25
*Tolerance on Peak Power [%]	%	+/-5	+/-5

* The abbreviation 'mpp' stands for Maximum Power Point.

Typical Data at Nominal Operating Cell Temperature (NOCT) conditions

NOCT: irradiance level 800W/m², spectrum AM 1.5 , wind velocity 1m/s, T_{amb} 20°C.

Temperature [°C]	T_{NOCT}	45.5	45.5
Mpp power [W]	P_{mpp}	120	127
Mpp voltage [V]	V_{mpp}	31.6	32.2
Open circuit voltage [V]	V_{oc}	40.0	40.4
Short circuit current [A]	I_{sc}	4.20	4.25

Temperature coeff icients

α P_{mpp} [%/°C]	-0,43	-0,43
α V_{mpp} [mV/°C]	-145	-145
α I_{sc} [mA/°C]	1.4	1.4
α V_{oc} [mV/°C]	-129	-129

Typical data at low irradiance

The relative reduction of module efficiency at an irradiance of 200W/m² in relation to 1000W/m² both at 25°C cell temperature and spectrum AM 1.5 is 8%.

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V1/PowerMax/Off-Grid24V/165-P/175-P/US/04/05