Shell Solar

Shell PowerMax™ solar modules for off-grids markets*

1st edition 2004

General

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

Shell PowerMax™ Ultra 85-P and 80-P products contain 36 series connected 125mm x 125mm mono-crystalline solar cells, which can generate a peak power of 85 and 80 watts at 17.2 and 16.9V respectively.

Qualifications and Certificates

The Shell PowerMax™ Ultra 85-P and 80-P products meet the following requirements:

- **IEC 61215**
- **UL - Listing 1703**
- **FM (Pending)**
- **TUV Safety Class 2 (Pending)**

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

Limited Warranties

- **Peak Power for 25 years**
- **Product workmanship 2 years**

***See Shell Solar Limited Warranty for PV-Modules**

*North America only

Shell PowerMax™ Ultra 85-P/80-P

ELECTRICAL EQUIPMENT, CHECK WITH YOUR INSTALLER

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

References in this Product Brochure to 'Shell Solar' are to companies and other organizational 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 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.**
- **Industry leading max power current.**

Proven Reliability

- **Module design proven over 30 years of field operations with field failure rates less than 0.1%.**
- **Extended limited power warranties backed by a company you can trust.**
- **UL 1703 and IEC 61215.**

Safety by Design

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

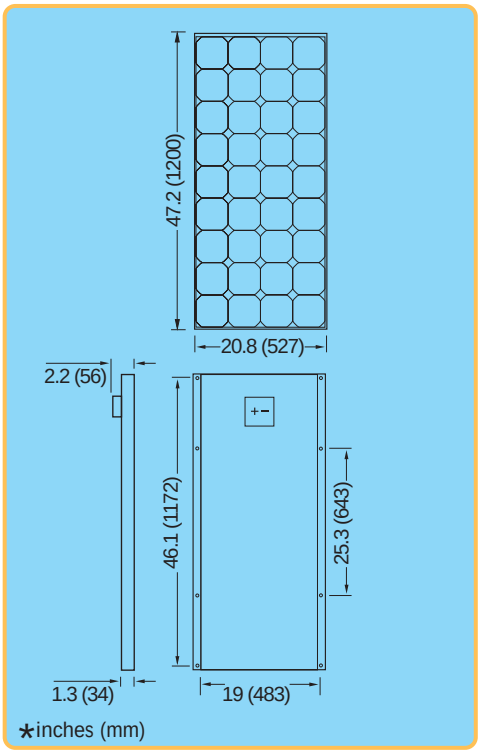
Easy to Install

- **Conduit ready junction box.**
- **20A series fuse rating.**

Shell PowerMax™ Ultra 85-P/80-P

Mechanical Specifications

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)	47.2 x 20.8
Thickness (inc. junction box) (in)	2.2
Thickness (exc. junction box) (in)	1.3
Weight (lbs)	16.7
Junction box type	ProCharger™ IP54
Junction box dimensions (in)	5 x 4.4 x 1.8

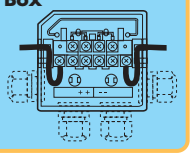
The junction box allows for easy field replacement of diodes and cables assemblies.

ProCharger™-CR Junction Box

Maximum conductor cross-section: 4 mm²

Type of protection: IP54

Number of by-pass diodes: 2



Electrical Characteristics

Data at Standard Test Conditions (STC)

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

	Shell PowerMax™	Ultra 80-P	Ultra 85-P
Rated power	P_r	80W	85W
Peak power	P_{mpp}*	80W	85W
Module efficiency	η	12.7%	13.4%
Maximum system voltage	V_{sys}	600V (UL); 715V (TUV);	600V (UL); 715V (TUV);
Peak power voltage	V_{mpp}	16.9V	17.2V
Peak power current	I_{mpp}	4.76A	4.95A
Open circuit voltage	V_{oc}	21.8V	22.2V
Short circuit current	I_{sc}	5.35A	5.45A
Series fuse rating	I_{fuse}	20A	20A
Minimum peak power	$P_{mpp\ min}$	76W	80.75W
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	T_{noct}	45.5°C	45.5°C
Peak power	P_{mpp}	59W	63W
Peak power voltage	V_{mpp}	15.8V	16.4V
Open circuit voltage	V_{oc}	20. 0V	20.1V
Short circuit current	I_{sc}	4.20A	4.25A

Temperature coefficients

αP_{mpp}	%/°C	-0.43	-0.43
αV_{mpp}	mV/°C	-72.5	-72.5
αI_{sc}	mA/°C	0.8	0.8
αV_{oc}	mV/°C	-72.5	-72.5

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 AM 1.5 spectrum is 8%.

For further information on all Shell Solar products contact:

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