

NEW

## ES-B SERIES photovoltaic panels



Provisional datasheet.  
Data subject to change. Certifications pending.

## 180, 190 & 195 W



Made in Germany

A range of high quality String Ribbon™ solar panels offering exceptional performance, cost effective installation and industry-leading environmental credentials made with our revolutionary wafer technology.

- **High field performance ratings**  
PTC/STC rating up to 88.8%
- **Tight power tolerances**  
98% of rated power guaranteed for 180, 190W panels; 100% guaranteed for 195W panels
- **Industry's lowest voltage per watt rating**  
Delivers the most cost-effective installs
- **New extended length cables**  
Eliminates home-run wiring
- **New clickable MC® Type 4 connectors**  
Makes connections between panels quickly and reliably
- **Most extensive range of mounting options**  
Allows installs virtually anywhere and anyhow
- **Smallest carbon footprint of any manufacturer**  
Delivers the biggest offset to global warming and climate change
- **Quickest energy payback**  
15 month payback that maximizes energy conservation
- **100% cardboard-free packaging**  
Minimizes job site waste and disposal costs
- **5 year workmanship and 25 year power warranty\***

\*For full details see the **Evergreen Solar Limited Warranty** available on request or online.

This product is designed to meet UL 1703, UL 4703, UL Fire Safety Class C, IEC 61215 Ed.2 and IEC 61730 Class A standards.

**String Ribbon** is a trademark of Evergreen Solar, Inc. Evergreen Solar's wafer manufacturing technology is patented in the United States and other countries.

## Electrical Characteristics

### Standard Test Conditions (STC)<sup>1</sup>

	ES-B-180 -fa1/fb1*	ES-B-190 -fa1/fb1*	ES-B-195 -fa1/fb1*	
$P_{mp}^2$	180	190	195	W
$P_{tolerance}$	-2/+3	-2/+2.5	-0/+2.5	%
$P_{mp, max}$	186.1	194.9	199.9	W
$P_{mp, min}$	176.4	186.2	195.0	W
$V_{mp}$	17.1	17.4	17.6	V
$I_{mp}$	10.53	10.92	11.08	A
$V_{oc}$	21.3	21.5	21.7	V
$I_{sc}$	11.64	11.95	12.11	A

### Nominal Operating Cell Temperature Conditions (NOCT)<sup>3</sup>

$T_{NOCT}$	45.9	45.9	45.9	°C
$P_{max}$	129.0	136.7	140.1	W
$V_{mp}$	15.4	15.5	15.6	V
$I_{mp}$	8.38	8.82	8.98	A
$V_{oc}$	19.45	19.83	20.12	V
$I_{sc}$	9.28	9.59	9.79	A

<sup>1</sup> 1000 W/m<sup>2</sup>, 25°C cell temperature, AM 1.5 spectrum;

<sup>2</sup> Maximum power point or rated power

<sup>3</sup> 800 W/m<sup>2</sup>, 20°C ambient temperature, 1 m/s wind speed, AM 1.5 spectrum

\*f – framed, a – low voltage (does not require electrical grounding), b – low voltage (requires hard grounding of the DC negative pole), 1 – plain blue cells

### Temperature Coefficients

$\alpha P_{mp}$	-0.49	%/°C
$\alpha V_{mp}$	-0.47	%/°C
$\alpha I_{mp}$	-0.02	%/°C
$\alpha V_{oc}$	-0.34	%/°C
$\alpha I_{sc}$	+0.06	%/°C

### System Design

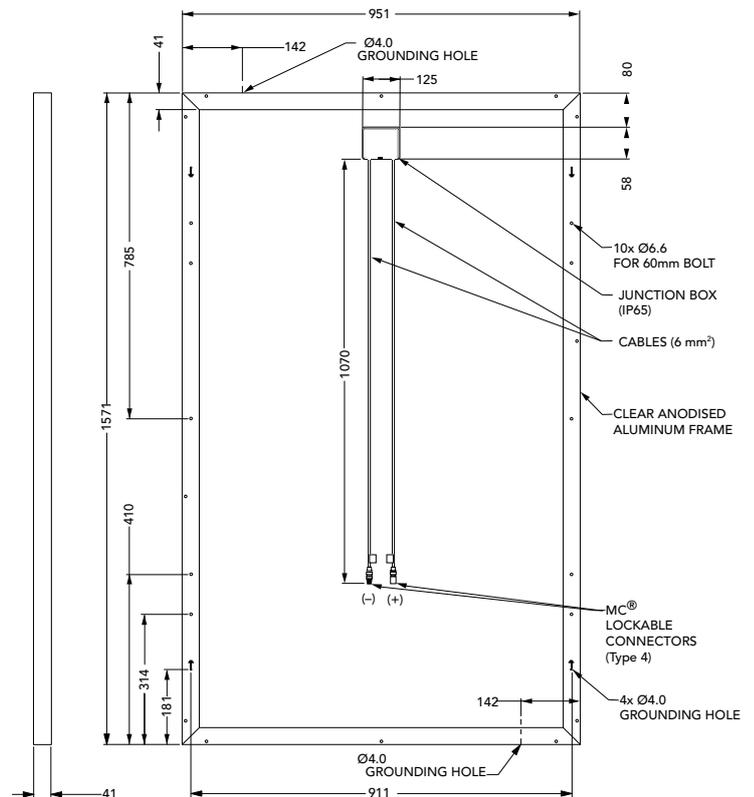
Maximum Reverse Current <sup>4</sup>	20 A
Maximum System Voltage	1000 V <sub>DC</sub>
Hard Grounding of DC Negative Pole <sup>5</sup>	"fb1" panel type only

<sup>4</sup> Also known as Series Fuse Rating.

<sup>5</sup> See **Safety, Installation and Operation Manual** for more detailed information



## Mechanical Specifications



All dimensions in millimeters; panel weight 18.2 kg

Product constructed with 108 poly-crystalline silicon solar cells, anti-reflective tempered solar glass, EVA encapsulant, polymer back-skin and a double-walled anodized aluminum frame. Product packaging tested to International Safe Transit Association (ISTA) Standard 2B and DIN EN ISO Standards 12048, 13355, 2244, 10531. All specifications in this product information sheet conform to EN50380. See the **Evergreen Solar Safety, Installation and Operation Manual** and **Mounting Design Guide** for further information on approved installation and use of this product.

Due to continuous innovation, research and product improvement, the specifications in this product information sheet are subject to change without notice. No rights can be derived from this product information sheet and Evergreen Solar assumes no liability whatsoever connected to or resulting from the use of any information contained herein.

### Partner:

ES-B\_EN\_195\_190\_180\_011108; effective November 1<sup>st</sup> 2008