

NEW

ES-B SERIES photovoltaic panels



Provisional datasheet.
Data subject to change. Certifications pending.

180, 190 & 195 W

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
- **UL4703 certified cables**
For use with highest efficiency transformer-less inverters (ES-B "fa1" type only)
- **New extended length cables**
Eliminates home-run wiring
- **New lockable MC® Type 4 connectors***
Complies with the latest codes for accessible arrays
- **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****

*Locking sleeve not supplied with the panel. **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)¹

	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
P_{ptc} ³	159.7	168.8	173.3	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)⁴

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

¹ 1000 W/m², 25°C cell temperature, AM 1.5 spectrum;

² Maximum power point or rated power

³ At PV-USA Test Conditions: 1000 W/m², 20°C ambient temperature, 1 m/s wind speed

⁴ 800 W/m², 20°C ambient temperature, 1 m/s wind speed, AM 1.5 spectrum

* f – framed, a – low voltage (Evergreen Solar does not require electrical grounding of this panel type; can be used in electrically ungrounded systems with transformer-less inverters), b – low voltage (Evergreen Solar requires this panel type to be hard grounded at the DC negative pole; cannot be used in ungrounded systems with transformer-less inverters), 1 – plain black cells

Temperature Coefficients

αP_{mp}	-0.49	%/ °C
αV_{mp}	-0.47	%/ °C
αI_{mp}	-0.02	%/ °C
αV_{oc}	-0.34	%/ °C
αI_{sc}	+0.06	%/ °C

System Design

Series Fuse Rating ⁵	20 A
Maximum System Voltage	600 V _{DC}
Hard Grounding of DC Negative Pole ⁶	"fb1" panel type only

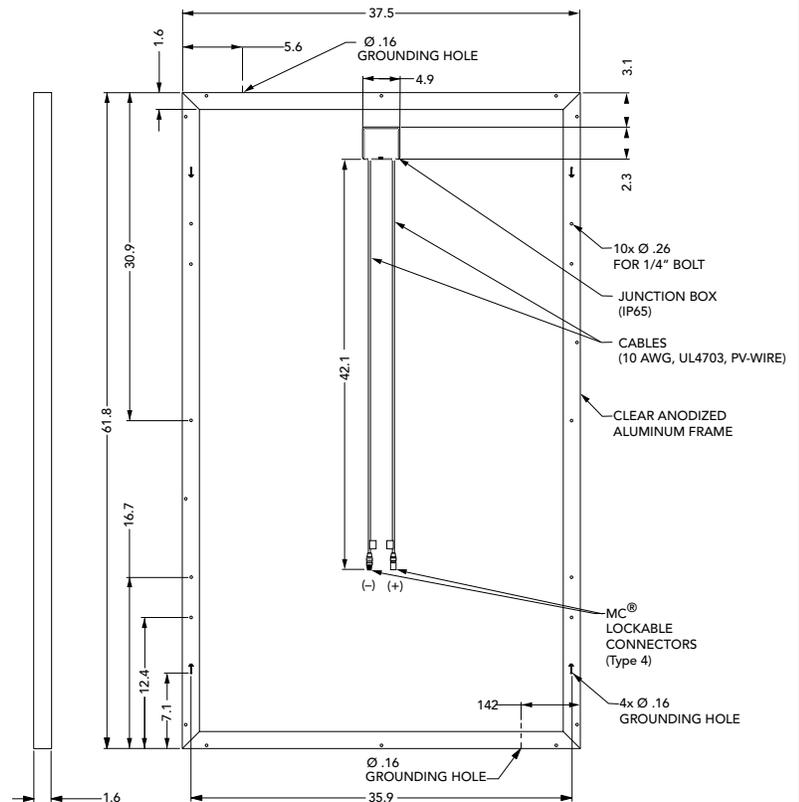
⁵ Also known as Maximum Reverse Current.

⁶ See **Safety, Installation and Operation Manual** for more detailed information. Local regulations may require electrical grounding of PV panels, irrespective of whether or not Evergreen Solar requires it.



ELECTRICAL EQUIPMENT
CHECK WITH YOUR INSTALLER

Mechanical Specifications

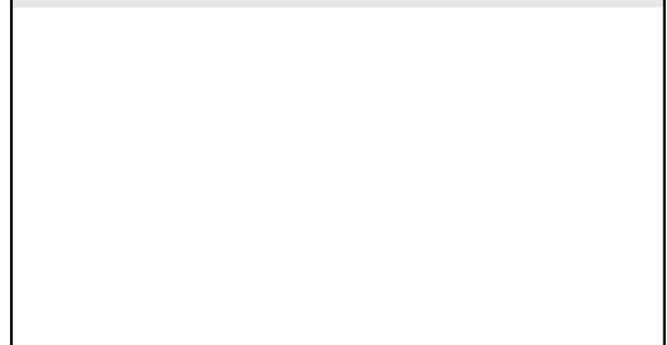


All dimensions in inches; Weight 40.1 lbs. (18.2 kg)

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_US_195_190_180_011108; effective November 1st 2008