

## SPRUCE LINE™ photovoltaic modules



## 190W module



Born in the USA

A high quality polycrystalline solar panel for on-grid markets offering exceptional performance, extraordinary versatility and industry-leading environmental credentials based on our cutting-edge String Ribbon™ wafer technology.

- Superior performance under real field conditions
- Get up to 102.5% of rated power, with a guaranteed minimum of 98%
- 5 year workmanship and 25 year power warranty for ultimate peace of mind\*
- More installation versatility with our extensive range of mounting options
- Higher strength with wind speeds guaranteed up to 130 mph and snow loads up to 80 lbs/ft<sup>2</sup>
- Qualified to all major industry certifications and regulatory standards
- Smallest carbon foot-print leading the fight against global warming
- Quickest energy payback time for the maximum energy conservation
- Cardboard-free packaging for minimal on-site waste and disposal cost
- Industry-first paid return and re-use program for product packaging

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

This product is qualified to UL 1703, UL Fire Safety Class C, IEC 61215 Ed.2, TÜV Safety Class 2 and CE  
String Ribbon and Spruce Line are trademarks of Evergreen Solar Inc. String Ribbon is also a patented technology of Evergreen Solar Inc.

## Electrical Characteristics

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

ES-190 RL, SL, TL or VL*		
$P_{mp}^2$	(W)	190
$P_{tolerance}$	(%)	-2%/+2.7%
$P_{mp, max}$	(W)	194.9
$P_{mp, min}$	(W)	186.2
$P_{ptc}^3$	(W)	168.8
$V_{mp}$	(V)	26.7
$I_{mp}$	(A)	7.12
$V_{oc}$	(V)	32.8
$I_{sc}$	(A)	8.05

### Nominal Operating Cell Temperature Conditions (NOCT)<sup>4</sup>

$P_{mp}$	(W)	136.7
$V_{mp}$	(V)	23.8
$I_{mp}$	(A)	5.75
$V_{oc}$	(V)	30.3
$I_{sc}$	(A)	6.46
$T_{NOCT}$	(°C)	45.9

<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> At PV-USA Test Conditions: 1000 W/m<sup>2</sup>, 20°C ambient temperature, 1 m/s wind speed

<sup>4</sup> 800 W/m<sup>2</sup>, 20°C ambient temperature, 1m/s wind speed, AM 1.5 spectrum

\* RL model made in Germany without cell texturing; SL model made in USA without cell texturing; TL model made in Germany with cell texturing; VL model made in USA with cell texturing

### Low Irradiance

The typical relative reduction of module efficiency at an irradiance of 200W/m<sup>2</sup> in relation to 1000W/m<sup>2</sup> both at 25°C cell temperature and spectrum AM 1.5 is 0%.

### Temperature Coefficients

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

### System Design

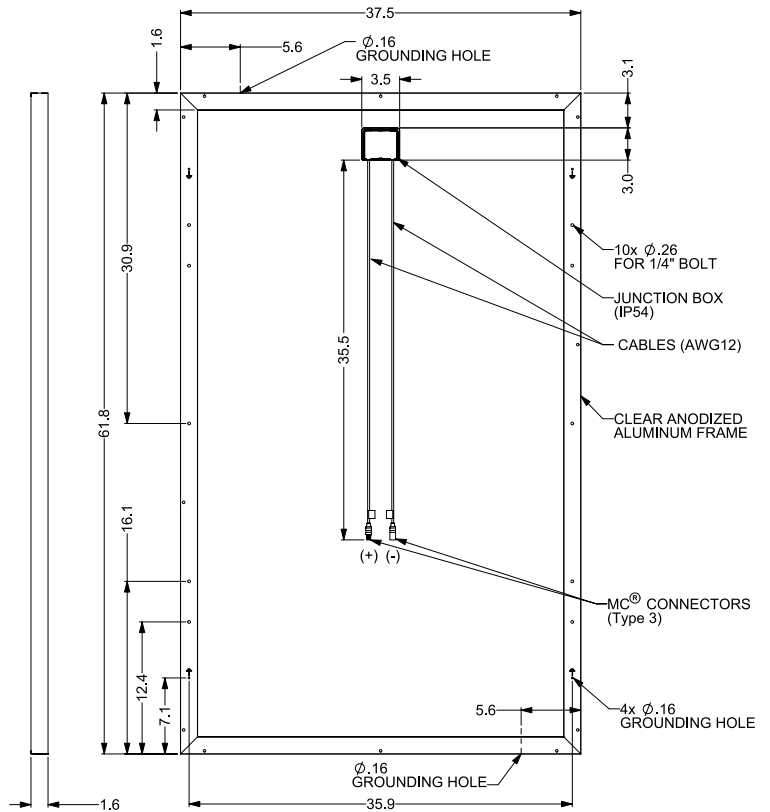
Series Fuse Rating <sup>5</sup>	15 A
UL Rated System Voltage	600 V

<sup>5</sup> Also known as Maximum Reverse Current



ELECTRICAL EQUIPMENT  
CHECK WITH YOUR INSTALLER

## Mechanical Specifications



All dimensions in inches; module weight 40.1 lbs

Product constructed with 108 polycrystalline silicon solar cells, anti-reflective tempered solar glass, EVA encapsulant, Tedlar<sup>®</sup> back-skin and a double-walled anodized aluminum frame. Product packaging tested to International Safe Transit Association (ISTA) Standard 2B. 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:

S190i\_US\_010707; effective July 1st 2007