

## SPRUCE LINE™ photovoltaic modules



## New 195W module

- Highest power and efficiency yet
- Best available tolerance -0 / +2.5%

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

- Best-in-class performance ratings proven by field installations
- 98% of rated power guaranteed for 180, 190W product; 100% guaranteed for 195W product
- 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 and snow loads guaranteed up to 3.8 kN/m<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

\*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-180 RL or TL*	ES-190 RL or TL*	ES-195 RL or TL*
$P_{mp}^2$	(W)	180	190	195
$P_{tolerance}$	(%)	-2%	-2%	-0%
$P_{mp, max}$	(W)	186.1	194.9	199.9
$P_{mp, min}$	(W)	176.4	186.2	195.0
$V_{mp}$	(V)	25.9	26.7	27.1
$I_{mp}$	(A)	6.95	7.12	7.20
$V_{oc}$	(V)	32.6	32.8	32.9
$I_{sc}$	(A)	7.78	8.05	8.15

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

		129.0	136.7	140.1
$P_{mp}$	(W)			
$V_{mp}$	(V)	23.3	23.8	23.9
$I_{mp}$	(A)	5.53	5.75	5.86
$V_{oc}$	(V)	29.8	30.3	30.5
$I_{sc}$	(A)	6.20	6.46	6.59
$T_{NOCT}$	(°C)	45.9	45.9	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> 800 W/m<sup>2</sup>, 20°C ambient temperature, 1m/s wind speed, AM 1.5 spectrum

\* RL without cell texturing, TL 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

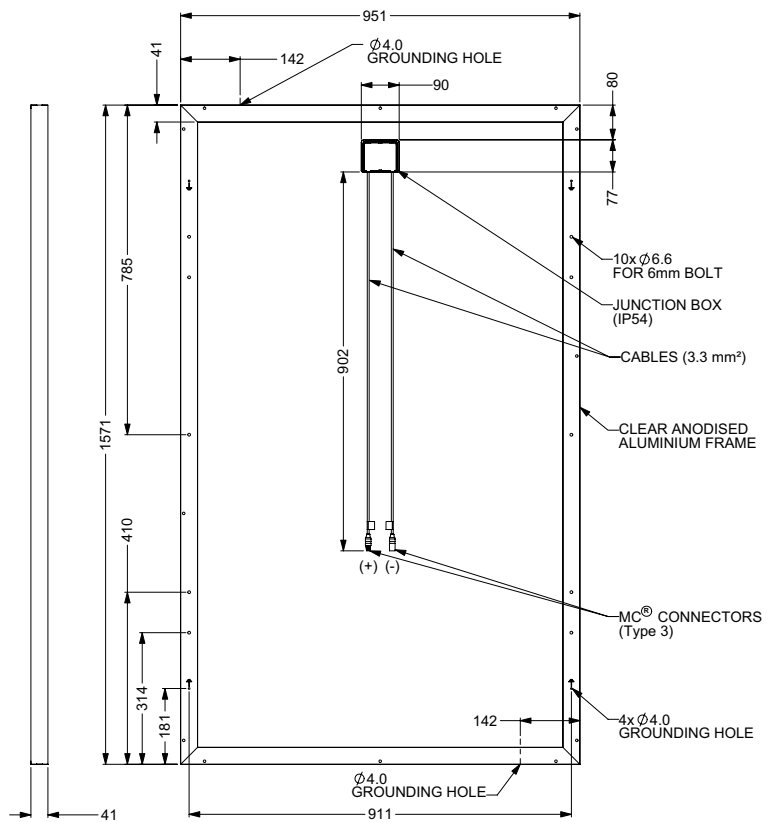
### System Design

Maximum Reverse Current <sup>4</sup>	15 A
TÜV Rated System Voltage	1000 V

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

ELECTRICAL EQUIPMENT  
CHECK WITH YOUR INSTALLER

## Mechanical Specifications



All dimensions in mm; module weight 18.2kg

Product constructed with 108 poly-crystalline silicon solar cells, anti-reflective tempered solar glass, EVA encapsulant, Tedlar® 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:

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