

## SPRUCE LINE™ PHOTOVOLTAIC MODULES

### SUPERIOR PERFORMANCE

- **Maximum power up to 4% above rated, minimum power only 2% below rated**
- Anti-reflection cover glass delivers more energy
- Power calibrated by three renowned independent tests laboratories



### EXTREME DURABILITY

- **Backed by a 25 year limited power warranty; 2 year workmanship warranty\***
- A rigid, double walled, deep frame with integrated water drainage holes
- Crimped frame corners – no screws to ever come loose
- Sealed junction box never needs field maintenance

### LEADING ENVIRONMENTAL CREDENTIALS

- Low energy – an energy payback time as rapid as 18 months, up to 40% faster than other leading crystalline technologies
- Low carbon – only 30g of carbon dioxide emissions per equivalent kWh of electricity generated, up to 33% less than other leading crystalline technologies
- Low lead – use of lead-free solder for all String Ribbon solar cell inter-connections

### CUSTOMER FRIENDLY PACKAGING

- **New bulk packaging eliminates cardboard boxes and minimizes waste**
- Horizontal stacking makes handling of modules easier in the field
- Fully tested to ISTA\*\* standards – the world leader in performance tests for packaged goods

### GLOBALLY QUALIFIED



- Certified to the new, stringent IEC 61215 Edition 2 design standard
- Maximum UL system voltage rating 600V
- UL, cUL and CEC Listed
- Fire Safety Class C Rated

### ABOUT EVERGREEN SOLAR

Producing our own wafers, cells and modules “under one roof” assures that the highest quality components go into every one of our panels. And since they are made with String Ribbon™ technology, our panels take advantage of one of the newest, fastest growing manufacturing processes in the world.

Evergreen Solar is a publicly listed (NASDAQ) company with over 10 years experience in the solar industry. Our commitment to solar energy is matched only by our commitment to our customers. If you want the best in solar, make the pure choice...Evergreen Solar panels.

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

\*\* International Safe Transit Association, Standard 2B

# SPRUCE LINE 170 / 180 / 190

Delivering the best in performance and dependability from our patented String Ribbon technology

## ELECTRICAL SPECIFICATIONS<sup>1</sup>

	ES-170-SL or -RL*	ES-180-SL or -RL*	ES-190-SL or -RL*
P <sub>p</sub> (W)	170	180	190
P <sub>p, Max</sub> (W)	176.3	186.1	195.9
P <sub>p, Min</sub> (W)	166.6	176.4	186.2
P <sub>ptc</sub> <sup>2</sup> (W)	148.8	157.8	166.8
V <sub>p</sub> (V)	25.3	25.9	26.7
I <sub>p</sub> (A)	6.72	6.95	7.12
V <sub>oc</sub> (V)	32.4	32.6	32.8
I <sub>sc</sub> (A)	7.55	7.78	8.05
Number of Cells	108		
Series Fuse Rating <sup>3</sup>	15A		
UL Rated System Voltage	600V		

Specifications subject to change without notice.

1 At Standard Test Conditions: 1000 W/m<sup>2</sup>, 25°C cell temperature, AM 1.5 spectrum

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

3 Also known as Maximum Reverse Current

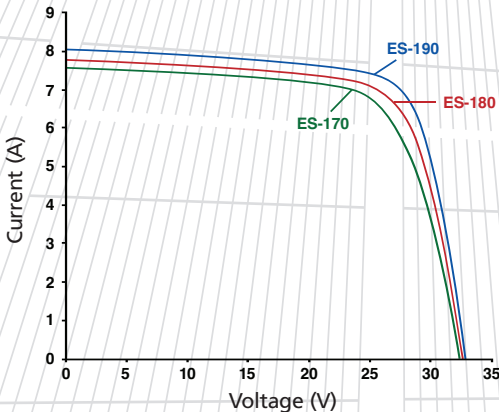
\* -SL model made in the USA; -RL model made in Germany

## TEMPERATURE EFFECTS

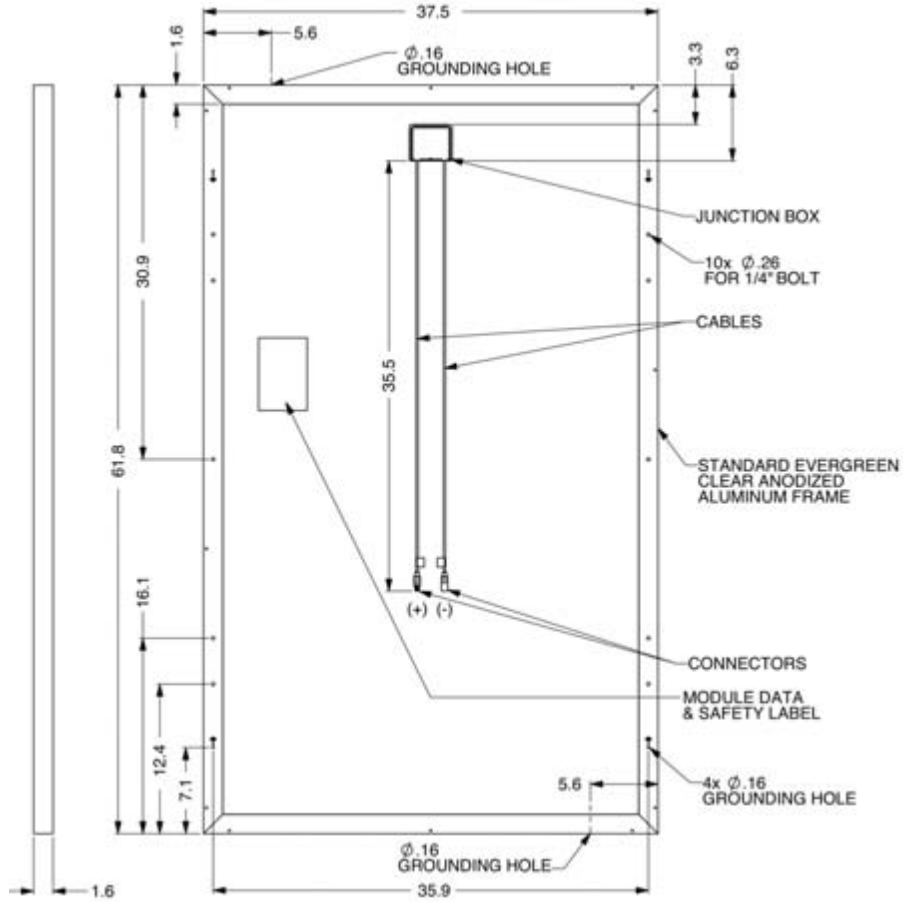
T <sub>NOCT</sub> <sup>4</sup>	[°C]	47
α P <sub>p</sub>	[%/°C]	-0.51%
α V <sub>p</sub>	[%/°C]	-0.49%
α I <sub>p</sub>	[%/°C]	-0.03%
α V <sub>oc</sub>	[%/°C]	-0.35%
α I <sub>sc</sub>	[%/°C]	0.05%

4 Nominal Operating Cell Temperature

## I-V CHARACTERISTICS<sup>1</sup>



## MECHANICAL SPECIFICATIONS



Weight: 40.1 lbs.

Dimensions: inches

See the **Evergreen Solar Installation and Operation Manual** for further info on approved installation and use of this product.

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