

## Product Overview

**SF145-S**

**SF150-S**

**SF155-S**

**SF160-S**

**SF165-S**

**SF170-S**



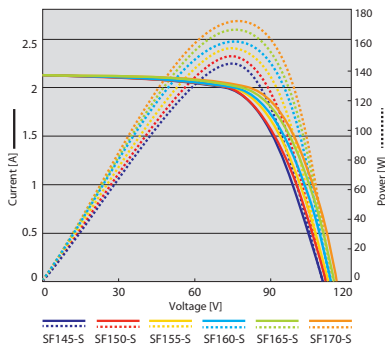
### Next Generation CIS

Solar Frontier's SF145-170 module series offers the highest conversion efficiency of any mass-produced thin-film module, up to 13.8 %. All modules are RoHS compliant and cadmium- and lead-free. Fewer production steps and raw materials also mean an industry-leading energy payback time of less than one year. SF145-170 modules are shipped in cardboard-free packaging and use recyclable corner pieces.

### Product & Technology Highlights

- Highest efficiency mass-production thin-film module, up to 13.8 %
- World record 19.7 % achieved in laboratory
- Light Soaking Effect raises output after installation
- Good low-light behavior
- High shadow tolerance
- High temperature stability
- Based on proprietary R&D since 1978
- Cadmium and lead free

### I-V Curve

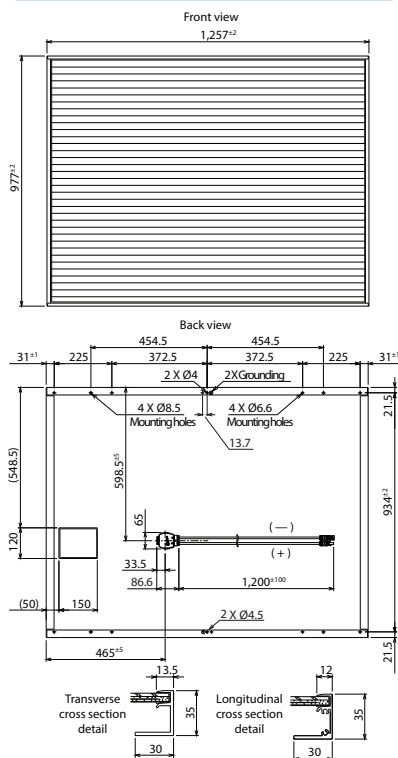


### Certificates and Guarantee



All new product classes are subject to immediate certification  
 Product guarantee: 5 years (extended guarantee upon request)  
 Power output guarantee: 90 % for 10 years, 80 % for 25 years

### Module Drawing



### Contact Information

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### STC Characteristics

		SF145-S	SF150-S	SF155-S	SF160-S	SF165-S	SF170-S
Nominal power	Pmax	145 W	150 W	155 W	160 W	165 W	170 W
Module efficiency	%	11.8 %	12.2 %	12.6 %	13.0 %	13.4 %	13.8 %
Power tolerance		+5 W/ 0 W					
Open circuit voltage	Voc	107.0 V	108.0 V	109.0 V	110.0 V	110.0 V	112.0 V
Short circuit current	Isc	2.20 A	2.20 A	2.20 A	2.20 A	2.20 A	2.20 A
Voltage at nominal power	Vmpp	81.0 V	81.5 V	82.5 V	84.0 V	85.5 V	87.5 V
Current at nominal power	Imp	1.80 A	1.85 A	1.88 A	1.91 A	1.93 A	1.95 A

Standard Test Conditions (STC): 1,000 W/m<sup>2</sup> irradiance, module temperature 25 °C, air mass 1.5. Isc and Voc are ±10 % tolerance of STC rated values. Module output may rise due to the Light Soaking Effect. Subject to simulator measurement uncertainty (using best-in-class AAA solar simulator and applying Solar Frontier preconditioning requirements): +10 %/ -5 %.

### NOCT Characteristics

		SF145-S	SF150-S	SF155-S	SF160-S	SF165-S	SF170-S
Nominal power	Pmax	108 W	111 W	115 W	119 W	123 W	126 W
Open circuit voltage	Voc	97.4 V	98.3 V	99.2 V	100.0 V	100.0 V	102.0 V
Short circuit current	Isc	1.76 A	1.76 A	1.76 A	1.76 A	1.76 A	1.76 A
Voltage at nominal power	Vmpp	76.0 V	76.4 V	77.4 V	78.8 V	80.2 V	82.1 V
Current at nominal power	Imp	1.43 A	1.47 A	1.49 A	1.51 A	1.53 A	1.55 A

Nominal Operating Cell Temperature Conditions: Module operating temperature at 800 W/m<sup>2</sup> irradiance, air temperature 20 °C, wind speed 1 m/s and open circuit condition.

### Performance at Low Irradiance

Efficiency reduction of maximum power from an irradiance of 1,000 W/m<sup>2</sup> to 200 W/m<sup>2</sup> at 25 °C is typically 2.0 %. The standard deviation for the reduction of efficiency is 1.9 %.

### Temperature Characteristics

NOCT		47 °C
Temperature coefficient of Isc	$\alpha$	+0.01 %/K
Temperature coefficient of Voc	$\beta$	-0.30 %/K
Temperature coefficient of Pmax	$\delta$	-0.31 %/K

### Mechanical Characteristics

Dimensions (L x W x H)	1,257 x 977 x 35 mm (49.5 x 38.5 x 1.4 in.)
Weight	20 kg (44.1 lbs)
Application class (IEC 61730)	Class A
Fire rating (IEC 61730)	Class C
Safety class (IEC 61140)	II
Snow/wind load*	2,400 Pa (IEC 61646) / 1,600 Pa design load (UL 1703)
Cell type	CIS glass substrate (cadmium free)
Front cover	Clear tempered glass, 3.2 mm
Encapsulant	EVA
Back sheet	Weatherproof plastic film (color: black & silver)
Frame	Anodized aluminum alloy (color: black)
Edge sealant	Butyl rubber
Junction box	Protection rating: IP67 (with bypass diode)
Adhesive	Silicone
Output cables (conductor)	2.5 mm <sup>2</sup> / AWG14 (halogen free)
Cable lengths (symmetrical)	1,200 mm (47.2 in.)
Connectors	MC4 compatible
Packing information	25 modules/pallet • 36 pallets/40' container (900 modules)

\* UL: 1.5 x design load is applied to the module, i.e. 2,400 Pa (50.1 lbs/ft<sup>2</sup>) is applied to meet the 1,600 Pa UL design load standard.

This preliminary data sheet is provided to assist you in evaluating this product that is under development. Solar Frontier reserves the right, at its sole discretion, to change, modify, add or delete portions of the content at any time without notice.