

## Product Overview

**SF140-L**

**SF145-L**

**SF150-L**

**SF155-L**



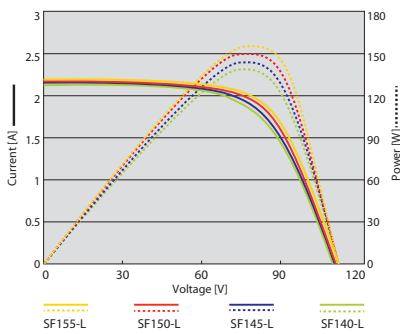
### Next Generation CIS

Solar Frontier's new SF140-155 module series offers the highest conversion efficiency of any mass-produced thin-film module, up to 12.6 %. The modules feature the light-soaking effect unique to Solar Frontier's CIS technology, which provides higher output than initially specified. 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. SF140-155 modules are shipped in cardboard-free, reusable packaging and use recyclable corner pieces.

### Product & Technology Highlights

- Highest efficiency mass-production thin-film module, up to 12.6 %
- World record 17.8 % achieved in laboratory (30 cm x 30 cm module)
- Up to 10 % extra kWh/kWp vs crystalline modules
- Light soaking effect boosts output after installation
- Based on proprietary R&D since 1978
- Cadmium and lead free
- Energy Payback Time under one year

### I-V Curve

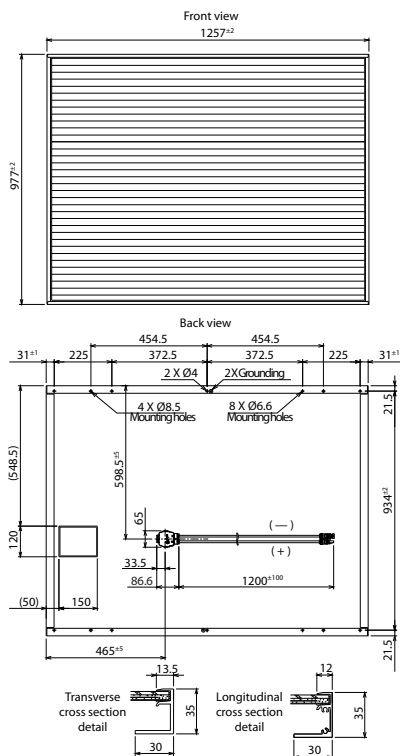


### Certificates, Compliance, Warranty



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

### Module Drawing



### Contact Information

**Solar Frontier K.K.**  
 (HQ, Asian Sales Office)  
 Tokyo, Japan  
 Tel: +81-3-5531-5626

**Solar Frontier Americas Inc.**  
 Santa Clara, CA, USA  
 Tel: +1-408-916 4150

**Solar Frontier Europe GmbH**  
 Grünwald bei München  
 Germany  
 Tel: +49 89 92 86 142 - 0

[www.solar-frontier.com](http://www.solar-frontier.com)

### STC Characteristics

		SF 140-L	SF145-L	SF150-L	SF155-L
Maximum power Pmax	W	140	145	150	155
Tolerance of Pmax		+10 %/-5 %			
Module efficiency		11.4 %	11.8 %	12.2 %	12.6 %
Open circuit voltage Voc	V	109.0	110.0	110.0	108.0
Short circuit current Isc	A	2.10	2.10	2.10	2.20
Voltage at maximum power Vmpp	V	77.0	78.0	79.0	80.0
Current at maximum power Impp	A	1.82	1.86	1.90	1.95

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 after light soaking due to its unique characteristics.

### NOCT Characteristics

		SF 140-L	SF145-L	SF150-L	SF155-L
Maximum power	W	102	106	109	113
Open circuit voltage	V	97.8	98.7	98.7	96.9
Short circuit current	A	1.66	1.66	1.66	1.74
Voltage at maximum power	V	72.7	73.6	74.5	75.5
Current at maximum power	A	1.41	1.44	1.47	1.50

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 3.0 %. The standard deviation for the reduction of efficiency is 2.6 %.

### 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)	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: IP 67 (with bypass diode)
Adhesive	Silicone
Output cables (conductor)	2.5 mm <sup>2</sup> /14 AWG (halogen free)
Cable lengths (symmetrical)	1,200 mm (47.2 in.)
Connectors	MC 4 compatible
Packing information	25 panels/pallet • 36 pallets/40' container (900 panels)

\* 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.