



## Product Overview

SF145-S

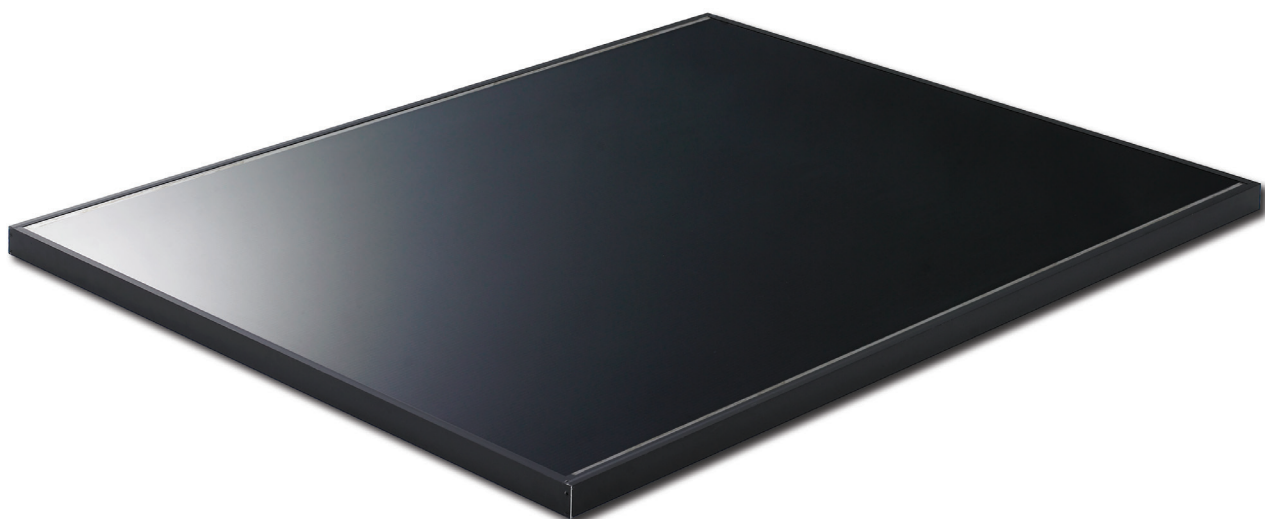
SF150-S

SF155-S

SF160-S

SF165-S

SF170-S

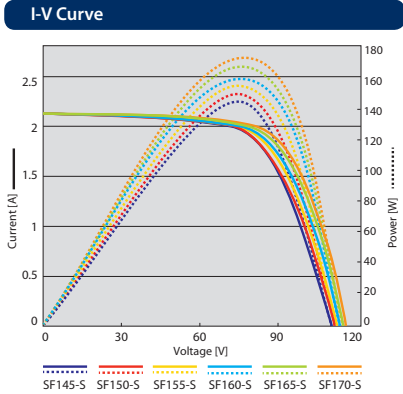


### Next Generation CIS

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 20.9 % 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



### 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 | Impp | 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 %.

### Certificates and Guarantee

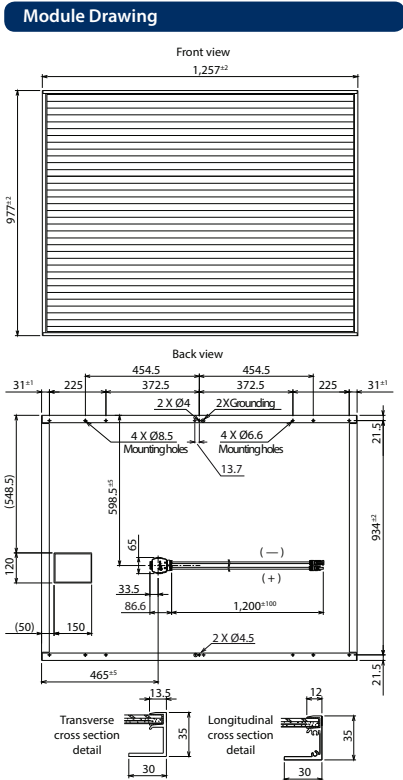


All new product classes are subject to immediate certification  
 Product guarantee: 5 years (extended guarantee upon request)  
 Power output guarantee: 90 % for 10 years, 80 % for 25 years

### 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 | Impp | 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  | α | +0.01 %/K |
| Temperature coefficient of Voc  | β | -0.30 %/K |
| Temperature coefficient of Pmax | δ | -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) |

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