

# Datasheet • Solar panels

## 5<sup>th</sup> generation a-Si solar panels



### IEC 1646 Certified

Free Energy solar panels are fully certified by TÜV Rheinland in April/May 2004, according to the IEC 1646 standard for amorphous silicon solar panels.

### Reliable cell technology

Free Energy produces stable and reliable amorphous silicon cells. After initial stabilization during the first two months of outdoor use, the amorphous silicon cell will be stable for decades. The expected lifetime of the advanced amorphous silicon solar cells is at least 20 years.

### High energy yield

The amorphous silicon solar cells, produced by Free Energy, function better than crystalline silicon solar cells in partial or indirect sunlight. Tests have shown that the annual energy output is approximately 15% higher per rated Watt-peak power.

### Outdoor performance

Free Energy applies an injected polymer frame, with a very high moisture barrier. This advanced framing technology is unique to the Free Energy solar panels and makes them reliable for outdoor use with 10 years warranty on power output.

$$S_{\text{utile}} = 0,29 \times 0,25 \text{ m}^2$$



Free Energy solar panel product range:

- 5 Watt solar panel • FEE-5-12C
- 7 Watt solar panel • FEE-7-12C
- 14 Watt solar panel • FEE-14-12C
- 19 Watt solar panel • FEE-20-12C

**free energy europe**

Address: Parc de la Croisette • 2, Rue Léon Droux, B.P. 66 • 62302 Lens Cedex • France

Email: [info@freeenergyeurope.com](mailto:info@freeenergyeurope.com) • Website: [www.freeenergyeurope.com](http://www.freeenergyeurope.com)

Telephone: +33 (0)3 21 79 30 60 • Fax: +33 (0)3 21 43 65 88

N° SIRET: 49125885100014 • Code APE: 321C • S.A.S. au Capital de 37000 € • N° TVA: FR 81491258851

## Specifications

Main characteristics	FEE-20-12C	FEE-14-12C	FEE-7-12C	FEE-5-12C
Cell technology	tandem aSi	single aSi	single aSi	single aSi
Module framing	5 <sup>th</sup> generation	5 <sup>th</sup> generation	5 <sup>th</sup> generation	5 <sup>th</sup> generation
Encapsulation	Glass-to-glass encapsulation with moulded polymer injection framing.			
Expected lifetime	> 20 years			
Operating conditions	-40 °C to +85 °C			

### Maximum power electrical characteristics

at Standard Test Conditions <sup>1</sup>	FEE-20-12C	FEE-14-12C	FEE-7-12C	FEE-5-12C
Maximum peak power	19 Watt	14 Watt	7 Watt	5 Watt
Maximum current at 16V	1.18 Ampere	0.87 Ampere	0.43 Ampere	0.29 Ampere
Short circuit	1.45 Ampere	1.05 Amp	0.52 Ampere	0.35 Ampere
Open circuit	22.8 Volt	22.0 Volt	22.0 Volt	22.0 Volt

1) Data refers to Standard Test Conditions (STC), an approximation of operation in full sunlight (STC: 1000 W/m<sup>2</sup> irradiance, 25 °C cell temperature, spectrum AM 1.5). Rated parameters may vary +/- 10%.

### Stabilized electrical characteristics

at Standard Test Conditions <sup>1</sup>	FEE-20-12C	FEE-14-12C	FEE-7-12C	FEE-5-12C
Stabilized peak power	16 Watt	12 Watt	6 Watt	4 Watt
Current at 16V	0.99 Ampere	0.75 Ampere	0.38 Ampere	0.25 Ampere
Short circuit current	1.22 Ampere	0.90 Ampere	0.45 Ampere	0.30 Ampere
Open circuit voltage	22.8 Volt	22.0 Volt	22.0 Volt	22.0 Volt

2) Data refers to Standard Test Conditions (STC), an approximation of operation in full sunlight (STC: 1000 W/m<sup>2</sup> irradiance, 25 °C cell temperature, spectrum AM 1.5). Rated parameters may vary +/- 10%.

### Stabilized electrical characteristics

at Average Operating Conditions <sup>3</sup>	FEE-20-12C	FEE-14-12C	FEE-7-12C	FEE-5-12C
Peak power	18 Watt	14 Watt	6.9 Watt	4.6 Watt

3) Data refers to real annual average irradiation in the Netherlands, normalized on average performance of crystalline silicon technology. Rated parameters may vary +/- 10%.

Dimensions	FEE-20-12C	FEE-14-12C	FEE-7-12C	FEE-5-12C
Dimensions (H X W)	1015 x 312 mm	930 x 317 mm	495 x 317 mm	343 x 317 mm
Thickness	14.3 mm	12.5 mm	12.5 mm	12.5 mm
Weight	4.6 kg	4.1 kg	2.1 kg	1.5 kg
Fixation	4 clips	4 clips	4 holes	4 holes

### Temperature coefficients

Voltage	- 0.29% / °C
Current	+ 0.08% / °C
Normal operating cell temperature	45°C (at 800 W/m <sup>2</sup> , ambient temperature 21°C)

### Special options (on request)

- 6 Volt version
- 5 m cable
- premounted special connectors