FUTURA ENERGI

SOLAR FRONTIER

PowerModules

SF145-S

SF150-S

SF155-S

SF160-S

SF165-S

SF170-S

Superior CIS technology

- EXCELLENT LOW-LIGHT BEHAVIOR
- HIGH SHADOW TOLERANCE
- LIGHT SOAKING EFFECT
- HIGH TEMPERATURE STABILITY

Quality Highlights

- Resistance to salt mist corrosion
- Resistance to ammonia corrosion
- No PID
- No hotspots
- No microcracks
- Robust glass / glass / back sheet
- No cadmium No lead
- Superior aesthetics

STC Characteristics [1]		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
Positive sorting effect		Module power up to 5 W higher than nominal power					
Module efficiency	%	11.8 %	12.2 %	12.6 %	13.0 %	13.4 %	13.8 %
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

NOCT Characteristics [2]		SF145-S	SF150-S	SF155-S	SF160-S	SF165-S	SF170-S
NOCT 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 NOCT power	*Vmpp*	76.0 V	76.4 V	77.4 V	78.8 V	80.2 V	82.1 V
Current at NOCT power	*Impp*	1.43 A	1.47 A	1.49 A	1.51 A	1.53 A	1.55 A

[1] *Values measured under Standard Test Conditions "STC" defined by IEC norm (1,000 W/m² irradiance, 25°C module temperature and air mass 1.5). Isc and Voc are within ±10% tolerance of the rated values at STC. If measured at a later point in time after shipping from the factory, Pmax may have a tolerance of +10% / –5%. Module efficiency at 200 W/m² irradiance is typically 98 % (±1.9 %) of efficiency under STC.*

[2] *Values measured under Nominal Operating Cell Temperature Conditions "NOCT" defined by IEC norm (Module operating temperature at 800 W/m² irradiance, 20°C air temperature and 1 m/s wind speed)*

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

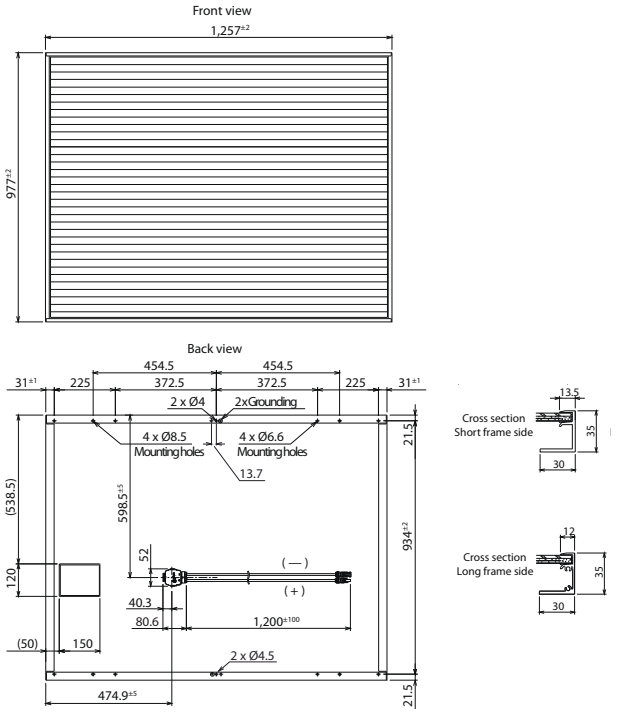
Characteristics for System Design	
Maximum system voltage	1,000 V DC
Limiting reverse current	7 A
Temperature range	–40°C to +85°C
Application class (IEC 61730)	Class A
Fire rating (IEC 61730)	Class C
Safety class (IEC 61140)	II

Mechanical Characteristics	
Dimensions (L x W x H)	1,257 x 977 x 35 mm
Weight	20 kg
Snow & wind load (IEC 61646)	2,400 Pa

Materials and Components	
Cell type	CIS (cadmium free) on glass substrate
Front cover	3.2 mm clear tempered glass
Encapsulant	EVA
Back sheet	Weatherproof plastic film
Frame	Black anodized aluminum alloy
Edge sealant	Butyl rubber
Junction box	Protection rating: IP67 (with bypass diode)
Adhesive	Silicone
Cables (length / cross section)	2 x 1,200 mm / 2.5 mm² (halogen free)
Connectors	MC4 compatible (waterproof, locking type)

Packaging	
Packaging material	cardboard free – reusable corner pieces
Modules per pallet	25
Pallets per container	36

MODULE DRAWING



CERTIFICATES

IEC 61646: Design qualification and type approval
IEC 61730: Photovoltaic module safety qualification
IEC 61701: Salt mist corrosion testing
IEC 62716: Ammonia corrosion testing

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GUARANTEES

25 years Power Output Guarantee

10 years Product Guarantee

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