

## Advantages of CIGS

- **Strong Light Absorption**

CIGS PV draws on the best characteristics of copper, indium, gallium, and selenium. It absorbs light over the widest spectral range, not only within the visible light spectrum in the same manner as crystalline silicon and

amorphous, but also absorb light in the infrared range, from 700-1,200 nm. This means that CIGS PV can capture light for a longer period of time during a given day, a crucial advantage for high latitudes and altitudes where sunlight may be limited, or for short winter days.

- **Stable Energy Generation**

Crystalline silicon PV exhibits light diffusion and photo deterioration when exposed to the sun for long periods of time, thus causing their power generation capability to gradually decline. CIGS PV does not suffer from these phenomena. Thus, from the long-term perspective, CIGS PV offers more stable energy generation and requires less maintenance costs.

- **High Transfer Efficiency, High Overall Electrical Output**

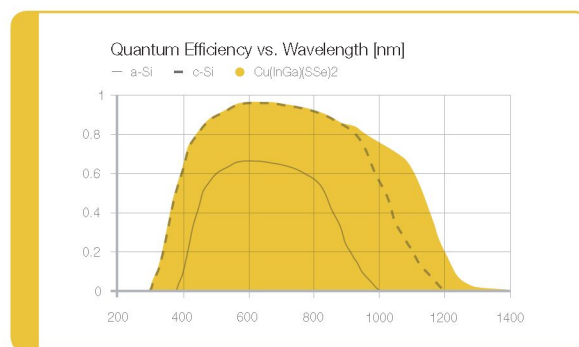
According to the National Renewable Energy Labs (NREL), CIGS PV can currently attain up to a 19.9% efficiency rate. However, the highest rate recorded in the industry has been up to 16%, with an average rate of 12%. It is worth noting that when crystalline silicon (efficiency of 16%) and CIGS are tested together outdoors, the latter generates 1.2 times more energy than the former. Even though the current in use CIGS PV's efficiency be lower than that of silicon-based, CIGS PV absorbs more sunlight per day and so produces more energy in total.

- **Low Production Costs**

The main cost of CIGS PV lies in its raw materials—copper, indium, gallium and selenium. However, it requires only ordinary soda glass as opposed to special ultra-white or thin-film conductive glass. While the aforementioned metals are precious metals, CIGS PV requires no more than a 3  $\mu\text{m}$  ( $1 \mu\text{m} = 1/1000\text{mm}$ ) coat, giving it a competitive per unit cost.

- **Short Energy Payback**

Time Renewable energy offers many benefits. However, manufacturing the technology to produce such energy is itself resource-intensive. Thus, in assessing whether a particular type of renewable energy is genuinely sustainable, one needs to look at not only its efficiency but also how long it takes for the renewable energy produced to offset the resources needed to produce that facility. This is known as "EPBT"(energy payback time). According to the U.S. Department of Energy, assuming a 30-year lifespan for solar installments, the EPBT of crystalline silicon PV has been estimated to be about 2-4 years. By contrast, CIGS PV is estimated only 1-2 years. In other words, any of the PV systems above mentioned would have a roughly 26-29 year lifespan of truly pollution-free use. In a nutshell, CIGS comes out on top.





## Designed specially for rooftops

Integrates with roofing surface

- No mounting hardware
- No roof penetrations
- No wind load

Flexible module

- Fits many roof types
- Durable, non-breakable

Light weight

- 3.5 kg/m<sup>2</sup> (0.5 lb/ft<sup>2</sup>) with adhesive
- No structural reinforcement required

## More energy per roof

High efficiency CIGS

- 10.4% to 12.7% aperture efficiency
- 50% more efficient than flexible a-Si

High performance

- Performs in all light conditions
- Shade tolerant

Covers entire roof area

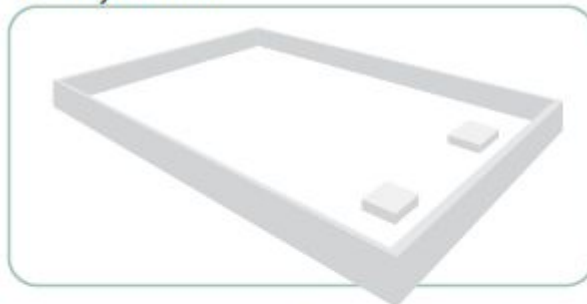
- Lays flat. No tilt required
- Minimum module spacing required
- More energy per roof

## Lower installed system costs

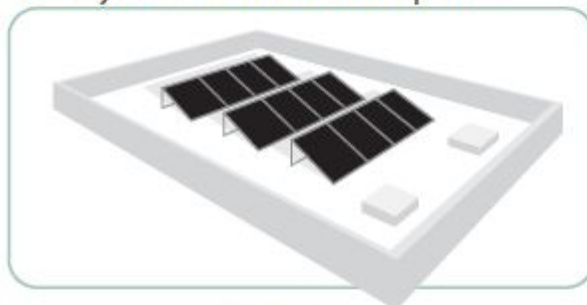
- Large format module
- 82-100 Watts
- 2.0m x 0.49m dimensions
- 30% to 40% savings in BOS & installation costs

More power per roof with lower BOS & installation costs

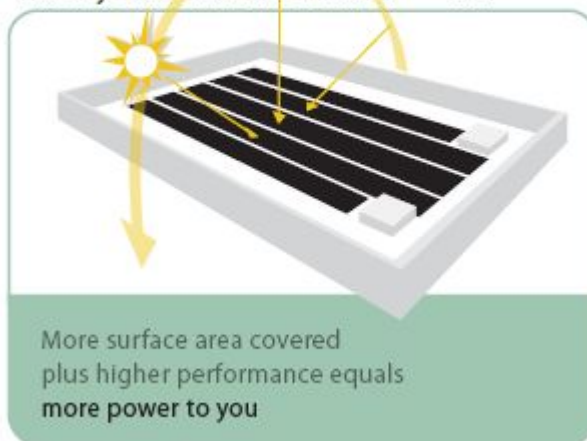
This is your roof



This is your roof with tilted solar panels



This is your roof with PowerFlex™ BIPV



More surface area covered  
plus higher performance equals  
more power to you



## SR-FLEX BIPV - 90/100W

### Electrical Specifications

Capacity rating	P max	90 W	100 W
Tolerance of Pmax	%	± 7%	± 7%
Module aperture area efficiency	%	11.4%	12.7%
Rated voltage	V <sub>mpp</sub>	16.5 V	17.8 V
Rated current	I <sub>mpp</sub>	5.4 A	5.6 A
Open circuit voltage	V <sub>oc</sub>	22.0 V	23.3 V
Short circuit current	I <sub>sc</sub>	6.3 A	6.4 A

### Temperature Coefficients

Maximum power	P max	-0.43 % / °C
Maximum voltage	V <sub>max</sub>	-0.38 % / °C
Open circuit voltage	V <sub>oc</sub>	-0.33 % / °C
Short circuit current	I <sub>sc</sub>	-0.03 % / °C

### Mechanical Specifications

Dimensions	2015 x 492 x 3.5 mm (83 x 19.5 x 0.13 in)
Weight	3.0 kg without adhesive (3.0 kg/m <sup>2</sup> ) 3.5 kg with adhesive (3.6 kg/m <sup>2</sup> )
Junction Box	TE Connectivity SOLARLOK™ Micro Junction Box
Cables	4 mm <sup>2</sup> dual rated with SOLARLOK™ connectors
Front Sheet	E T F E
Solar Cells	36 CIGS cells (210 x 100 mm)
Adhesive	ADCO HelioBond™ PVA 600BT butyl mastic
Hot Spot Protection	2 bypass diodes at each cell; 1 at junction box
Materials	Lead free and exempt from RoHS requirements
Maximum Series Fuse Rating	10 Amp
Color Options	Black (B) or White (W) backsheet behind cells

Materials and workmanship - 5 years

Power output - 25 years (90% @ 10 yrs; 80% @ 25 yrs)



## SR-FLEX BIPV - BIPV 250/275/300W

### Electrical Specifications \*

Capacity rating	P max	275 W	250 W
Tolerance of Pmax	%	± 7%	± 7%
Module aperture area efficiency	%	11.5%	10.5%
Rated voltage	V <sub>mpp</sub>	51.5 V	48.6 V
Rated current	I <sub>mpp</sub>	5.3 A	5.1 A
Open circuit voltage	V <sub>oc</sub>	67.6 V	65.4 V
Short circuit current	I <sub>sc</sub>	6.3 A	6.2 A

### Temperature Coefficients

Maximum power	P max	-0.43 % / °C
Voltage at Maximum Power	V <sub>max</sub>	-0.38 % / °C
Open circuit voltage	V <sub>oc</sub>	-0.33 % / °C
Short circuit current	I <sub>sc</sub>	-0.03 % / °C

### Mechanical Specifications

Dimensions	5745 x 492 x 3 mm (226 x 19.3 x 0.12 in)
Weight	7.2 kg (nominal without adhesive) or 2.6 kg/m <sup>2</sup> 9.3 kg (nominal with adhesive) or 3.3 kg/m <sup>2</sup>
Junction Box	TE Connectivity SOLARLOK™ Micro Junction Box
Cables	4 mm <sup>2</sup> dual rated with SOLARLOK™ connectors
Front Sheet	Non-stick ETFE
Solar Cells	108 CIGS cells (210 x 100 mm)
Adhesive	ADCO HelioBond™ PVA 600BT butyl mastic
Hot Spot Protection	2 bypass diodes at each cell; 1 at junction box
Materials	Lead free and exempt from RoHS requirements
Maximum Series Fuse Rating	10 Amp
Color Options	Black (B) or White (W) backsheet behind cells

### Operating Conditions

Temperature Range	-40°C to + 85°C
Maximum System Voltage	1000VDC IEC, 600VDC UL

Materials and workmanship - 5 years

Power output - 25 years (90% @ 10 yrs; 80% @ 25 yrs)