CBP3 ViPER

High Efficiency Bifacial P-type Multicrystalline Silicon Solar Cell

Production Technology and Properties

The new photovoltaic frontier is called **ViPER**, the **bifacial** high efficiency P-type multicrystalline silicon solar cell up to **18,6%** front efficiency (**23,3%** efficiency with **30% rear side contribution**) developed in collaboration with the **RCT Konstanz**.

Bifacial
85% of bifaciality factor ($\varepsilon_{ff\ rear} = \varepsilon_{ff\ front} \times 0{,}85$)

High Efficiency
18,4% front efficiency, 23% total efficiency with 30% rear side contribution

P-Type
P-type multicrystalline solar cell

Low Insolation
Excellent performance at low insolation due to the high shunt resistance, measured on each cell

Fill Factor
High Fill Factor and low series resistance to reduce the cell to module losses

Compatible with Standard Modules Machineries
100% compatible with common module assembly lines

Electrical Performance
Stable Electrical performance over time

Hot Spot Protect
100% measurement of insulation resistance in dark condition to prevent the Hot Spot

Fraunhofer ISE
Cells calibrated by Fraunhofer ISE

Made In Italy
Engineered in Italy

Certificates
ISO 9001:2008

Engineered with ViPER

Production and quality control

- 100% Quality control of the wafers used in production, performed at each step of the production process, from raw wafer acceptance test to the electrical testing of the cell. • Use of a MES System for total control, traceability and production improvement.
- Soft handling production to reduce the microcrack generation, breakage rate and mechanical stress.
- Innovative integrated treatment system with zero discharge capable to recover 97% of the waste process water.

MegaCell™ NEXT SOLAR GENERATION

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Front STC* electrical characteristics

Efficiency [%]	Pmpp [W]	Isc [A]	Voc [V]	Impp [A]	Vmpp [V]	FF
17,80%	4,332	8,57	0,636	8,158	0,531	79,4%
18,00%	4,380	8,62	0,638	8,219	0,533	79,7%
18,20%	4,429	8,67	0,640	8,279	0,535	79,8%
18,40%	4,478	8,73	0,642	8,339	0,537	79,9%
18,60%	4,526	8,77	0,646	8,398	0,539	79,9%

**STC (1000 W/m² , AM 1,5 - 25°C) IEC 60904-3 Ed.2*
Measurement tolerances: ± 1.5 % rel. (P_{MPP}); ± 5 % rel. (I_{SC}, V_{OC})
Only positive maximum power classification

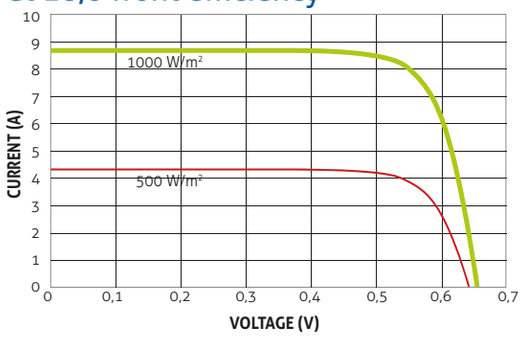
Typical rear side contribution at 18,60% front cell efficiency (Pmpp 4.53 W and Isc 8.85 A)

Additional irradiation from rear side (% of front side illumination)	10%	15%	20%	25%	30%
Bifacial gain	**9,7%**	**14,0%**	**18,3%**	**22,6%**	**26,9%**
Equivalent efficiency	**20,2%**	**21,0%**	**21,8%**	**22,6%**	**23,3%**
Pmpp (W)	4,9	5,1	5,3	5,5	5,7
Isc (A)	9,52	9,89	10,26	10,63	11,01

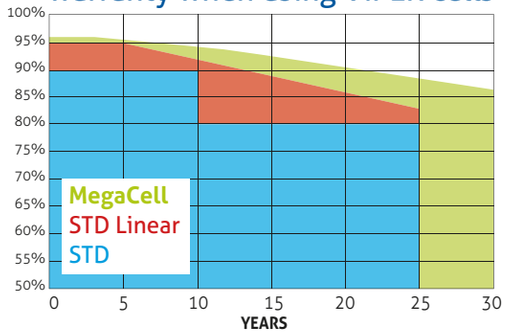
Physical Characteristics

	Front	Back
Product	Multicrystalline Silicon Cell using P type wafer	
Dimensions	156 x 156 +/- 0,5 mm	
Materials	Acid texturized surface Blue & Light Blue silicon nitride AR coating	
Bus bar	**Negative pole** (-), three bus bar 1,50 +/- 0,1mm Distance axis: 52 mm	**Positive pole** (+), three bus bar 1,50 +/- 0,1 mm Distance axis: 52 mm
Thickness (Si)	180 - 200 +/-20 µm	

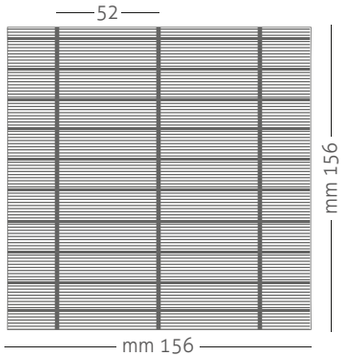
Typical I-V curve at 18,6 front efficiency



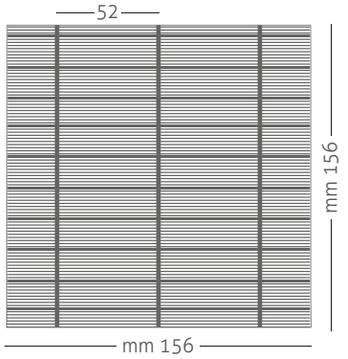
Expected glass-glass module warranty when using ViPER cells



Layout front



Layout rear



Processing recommendation

Solder joint Copper ribbons coated with:
- 10 – 15 µm:
- 60 % Sn / 38 % Pb / 2 % Ag
- 60 % Sn / 40 % Pb

Cells per bypass diode:
- Maximum 24 cells per bypass diode.

Storage remarks

Keep the cells at room temperature and in a dry and clean atmosphere (25°C ± 5°C).

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REV0/2015

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