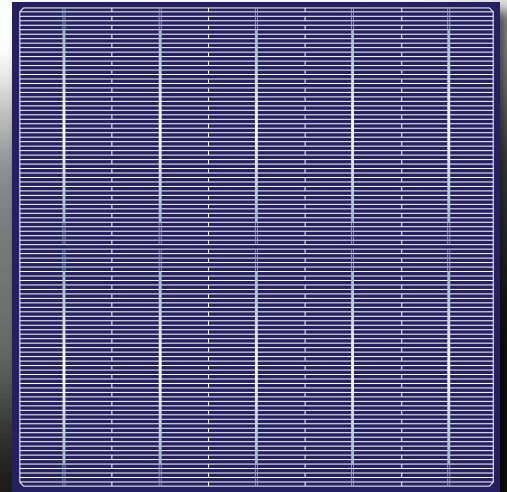


SAPPHIRE Series Black Silicon Cell

M-156-5 ver.J



Multicrystalline Solar Cell [Half-cut design]

Features

- High-efficiency solar cells with an isotropically etched surface
- Silicon nitride anti-reflection coating
- Silver front contact bars and full surface aluminum back contact field

Performance and Quality

- Proper handling from incoming inspection through production, outgoing inspection and packaging
- 100% checked for reverse current and visual appearance
- Calibrated against Fraunhofer ISE
- RoHS compliance
- **100% PID Resistance**

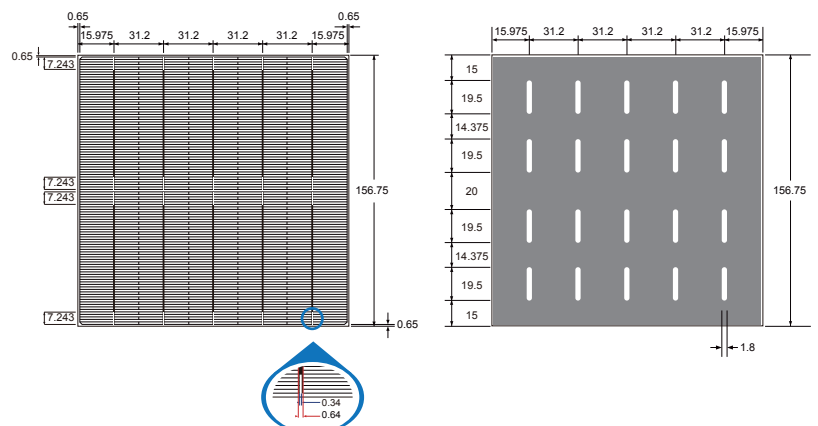
Packaging

- Minimize the risk of broken cells with special design
- Label with product information

Physical Characteristics

Dimension	156.75 mm x 156.75 mm ± 0.3 mm
Thickness (si)	180 μm - 20 / + 30 μm 200 μm ± 30 μm
Front Side (-)	Silicon nitride anti-reflection coating 0.64 mm silver busbar
Back Side (+)	Full surface aluminum back surface field 1.8 mm (silver) discontinuous soldering pads

Cell Layout





Black Silicon Cell M-156-5 ver.J



**Solartech
Energy Corp.**

Multicrystalline Solar Cell [Half-cut design]

Electrical Characteristics

Class	Efficiency Range (%)	Rated Power (Wp)	*Maximum Power Current (A)	*Short Circuit Current (A)	*Maximum Power Voltage (V)	*Open Circuit Voltage (V)
192	19.2-19.3	4.718	8.830	9.353	0.536	0.637
193	19.3-19.4	4.742	8.852	9.378	0.538	0.639
194	19.4-19.5	4.767	8.874	9.403	0.539	0.641
195	19.5-19.6	4.791	8.903	9.438	0.540	0.641
196	19.6-19.7	4.816	8.925	9.467	0.541	0.643
197	19.7-19.8	4.840	8.945	9.485	0.543	0.645
198	19.8-19.9	4.865	8.963	9.506	0.544	0.647
199	19.9-20.0	4.890	8.980	9.525	0.546	0.649
200	20.0-20.1	4.914	8.999	9.545	0.547	0.650
201	20.1-20.2	4.939	9.021	9.569	0.549	0.652
202	20.2-20.3	4.963	9.050	9.603	0.550	0.654
203	20.3-20.4	4.988	9.072	9.628	0.552	0.655
204	20.4-20.5	5.012	9.094	9.653	0.553	0.657
205	20.5-20.6	5.037	9.116	9.677	0.555	0.658

Test condition : 1000 W / m², AM 1.5, 25°C Power measuring tolerance: ±1.5% rel.

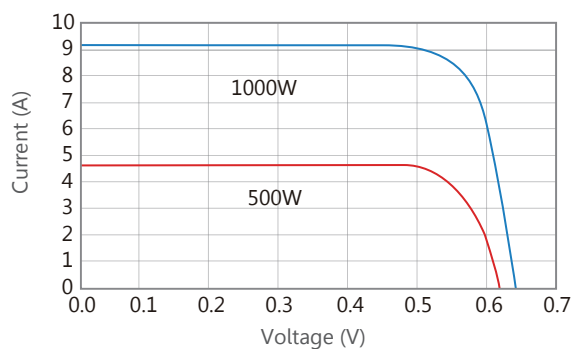
Temperature coefficients

Current (%/K)	0.0535
Voltage (%/K)	-0.3043
Power (%/K)	-0.3718

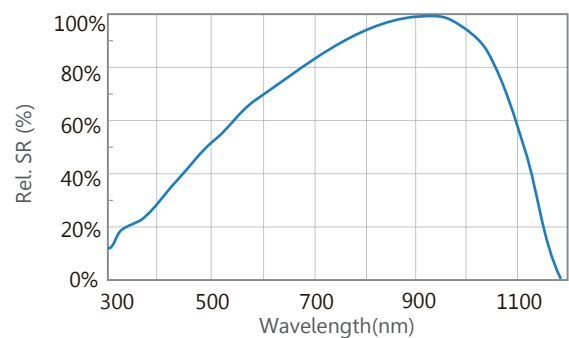
Light Intensity Dependence

Intensity [W/m ²]	V _{mpp}	I _{mpp}
1000	1.000	1.000
900	0.998	0.899
500	0.977	0.497
300	0.955	0.297
200	0.936	0.197

IV-Curve



Spectral Response



Solartech Energy Corp.



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