

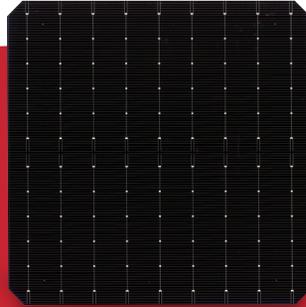
# V-Cell

## Halfcut Series



### TSSB9

Mono c-Si Solar Cell  
(Bi-Facial)



#### Physical Characteristics

Dimensions 166mm X 166mm ± 0.5mm  
Diagonal 223mm± 0.5mm

Thickness(Si) 170μm ± 50μm

Front(-) Alkaline texturized surface with silicon nitride anti-reflecting coating  
9 X 0.07mm ± 0.05mm bus bars  
Distance between bus bars : 18mm

Back(+) Local aluminum back surface field  
9 X12 soldering pads, 1.3mm±0.3mm wide bus bars  
Distance between bus bars : 18mm

#### Features

- High Cell-To- Module ratio through precise cell conversion efficiency sorting, classified efficiency grade by both minimum power and current.
- Excellent electrical long-term stability and reliability by using of best raw materials and through strict quality inspection control.
- Low breakage rate by using high qualified and stable wafers.
- High quality homogeneous appearance by sorting into defined color classes.
- 100% screened for reverse current and shunt resistance.
- Excellent passivation quality of the rear side compared to the traditional solar cell is clearly visible in the long wavelength regime.
- The best solution for PV module with above 360W outputs.

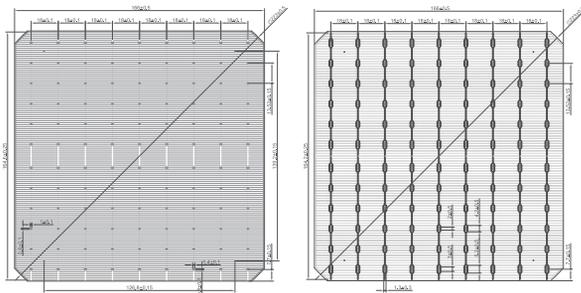
#### Quality Control and Professional Service

- Regular calibration of test equipment using Fraunhofer ISE reference cell.
- Environmental friendly due to REACH-SVHC and RoHS compliances.
- Professional on-site service and support for module certification.
- Regular light source AAA class calibration for stable conversion efficiency.
- Lowest LID by periodic monitoring and superior wafer incoming control.

#### Electrical Characteristics

| Efficiency Code       |                     | 229    | 228    | 227    | 226    | 225    | 224    | 223    | 222    | 221    | 220    | 219    |
|-----------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Efficiency            | Eff(%)              | 22.90  | 22.80  | 22.70  | 22.60  | 22.50  | 22.40  | 22.30  | 22.20  | 22.10  | 22.00  | 21.90  |
| Power                 | Pmpp(W)             | 6.28   | 6.25   | 6.22   | 6.20   | 6.17   | 6.14   | 6.11   | 6.09   | 6.06   | 6.03   | 6.00   |
| Max. Power Current    | I <sub>mp</sub> (A) | 10.543 | 10.510 | 10.494 | 10.478 | 10.463 | 10.447 | 10.431 | 10.415 | 10.399 | 10.383 | 10.367 |
| Short Circuit Current | I <sub>sc</sub> (A) | 11.249 | 11.235 | 11.216 | 11.210 | 11.198 | 11.195 | 11.194 | 11.180 | 11.173 | 11.153 | 11.148 |
| Max. Power Voltage    | V <sub>mp</sub> (V) | 0.596  | 0.595  | 0.593  | 0.592  | 0.590  | 0.588  | 0.586  | 0.585  | 0.583  | 0.581  | 0.579  |
| Open Circuit Voltage  | V <sub>oc</sub> (V) | 0.690  | 0.689  | 0.688  | 0.686  | 0.685  | 0.683  | 0.682  | 0.681  | 0.680  | 0.680  | 0.678  |

Standard test condition: AM1.5, 1000W/m<sup>2</sup>, 25°C  
Average accuracy of all tests is +/-1.5% rel.



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Mono c-Si Solar Cell  
(Bi-Facial)

## Temperature Coefficients

|                                 |                   |            |
|---------------------------------|-------------------|------------|
| Current Temperature Coefficient | $\alpha(I_{SC})$  | 0.0414%/K  |
| Voltage Temperature Coefficient | $\beta(V_{OC})$   | -0.2847%/K |
| Power Temperature Coefficient   | $\gamma(P_{max})$ | -0.3451%/K |

Standard test condition: AM1.5, 1000W/m<sup>2</sup>, 25°C

## Processing Recommendations

Solder Joint

Copper ribbons coated with 15~25µm:  
62%Sn/36%Pb/2%Ag or 60%Sn/40%Pb

Standard test condition: AM1.5, 1000W/m<sup>2</sup>, 25°C

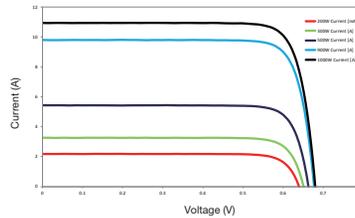
## Solderability

Peel Strength Minimum

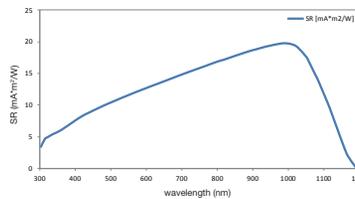
> 1.25 N/mm

Soldering results may differ due to different flux, ribbons, soldering methods, and parameters.

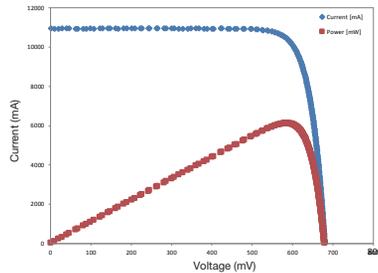
## Typical Current-Voltage Curve



## Typical Spectral Response

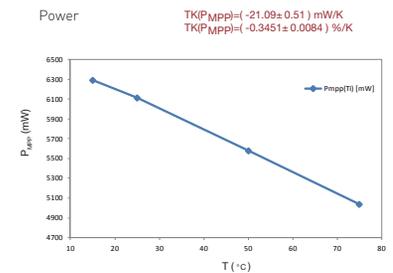
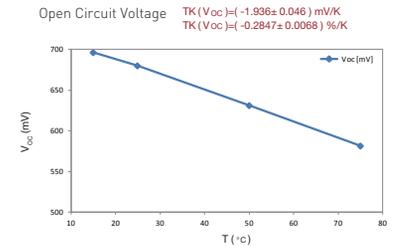
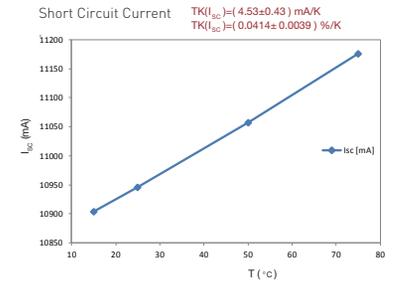


## Typical IV-Power Curve



\* All data measured under standard testing condition (STC):  
1000 W/m<sup>2</sup>, AM 1.5, 25 °C.  
\* All figures bear ±2% tolerance.  
\* Reference cell are under testing by Fraunhofer ISE in Freiburg.

## Calculated Temperature Coefficients



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