

# Product specification of Solar Space P-type multi-crystalline silicon solar cells

## 1. Scope

This specification is applicable to Solar Space p-type(boron doping) multi-crystalline silicon solar cells, and specified the aforesaid solar cells characteristics and application conditions.

## 2. Normative references

Document number	Title
IEC 60904-1 Ed.2.0	Photovoltaic devices – Part 1: measurements of photovoltaic current-voltage characteristics
IEC 60904-3 Ed.2.0	Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data
IEC 60904-7 Ed.3.0	Photovoltaic devices – Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device
IEC 61215 Ed.2.0	Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval

## 3. Specification

### 3.1 Cell structure

Cell Structure see Table 1.

Tab 1 Cell Structure

Substrate material	P-type multi-crystalline silicon wafer
Cell thickness	200 $\mu\text{m}$ $\pm$ 20 $\mu\text{m}$ , 180 $\mu\text{m}$ $\pm$ 20 $\mu\text{m}$
Dimension	156.75 $\pm$ 0.25mm
Diagonal	220.2mm $\pm$ 0.5mm
Front(-)	Acid textured surface, blue silicon nitride AR coating, th:78-88nm n:2.05-2.18
	Silver busbars for the front electrodes, height >7 $\mu\text{m}$ (Zeta Microscope)
Back(+)	Aluminum back-surface field, height >3.6 $\mu\text{m}$ (Zeta Microscope)
	silver soldering pads for the backside electrodes

Front silver pastes : Samsung Series 87xx , Hereus Series 96xx.

Aluminum pastes : Rutech Series 8252 , Hoyi Series 13xx & 16xx

Back silver pastes : Sun technology Series U-8820.

### 3.2 Printing pattern and Electric characteristics

#### 3.2.1 Electrical Data

Grade	Unit	1890	1880	1870	1860	1850	1840	1830	1820
Voc	V	0.640	0.639	0.639	0.637	0.635	0.634	0.632	0.631
Isc	A	9.145	9.114	9.066	9.020	8.979	8.946	8.925	8.906
Vmp	V	0.545	0.544	0.544	0.542	0.541	0.539	0.537	0.534
Imp	A	8.671	8.631	8.584	8.540	8.501	8.469	8.446	8.419
Pmax	W	4.648	4.624	4.600	4.575	4.551	4.526	4.502	4.478
Efficiency	%	18.90	18.80	18.70	18.60	18.50	18.40	18.30	18.20

### Electrical Data of 5BB-H-F108 P-type multi-Crystalline silicon solar cells

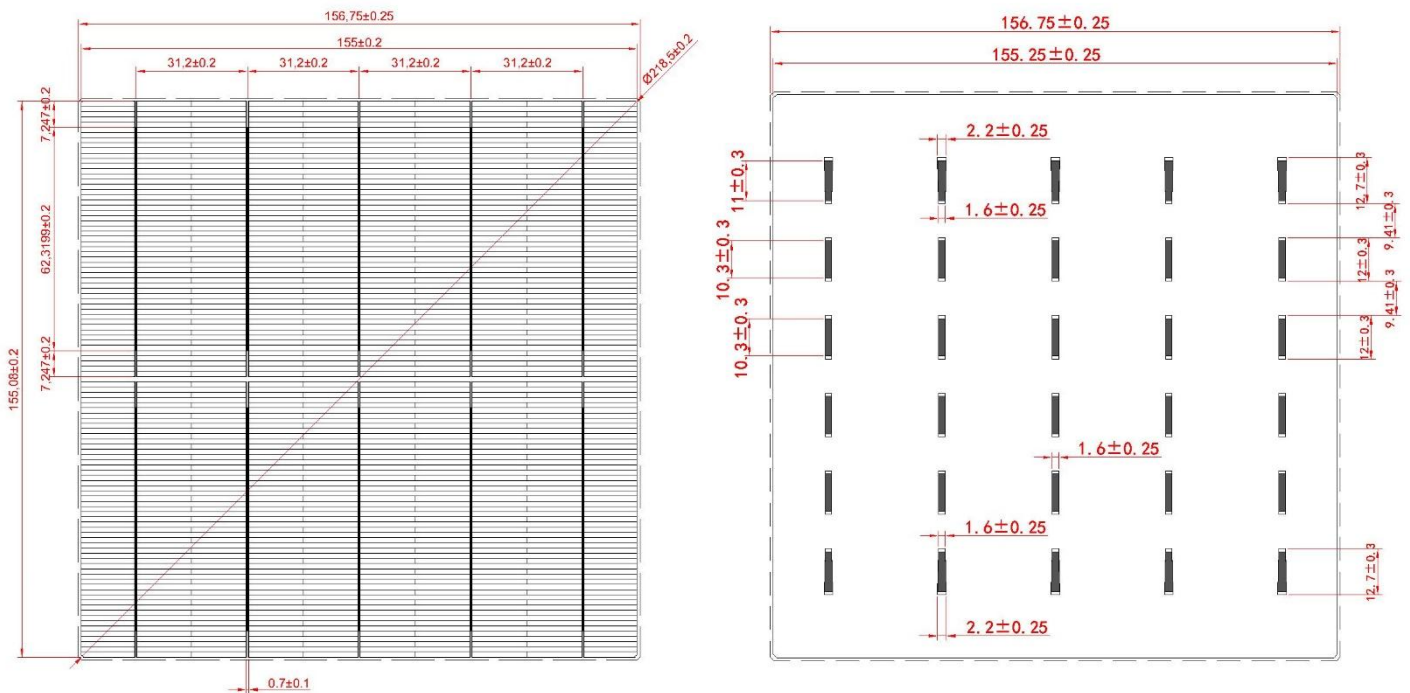
Irev2: <1A @-12V Rsh>20Ω

The electrical data apply to standard test conditions(STC):

Irradiance of  $1000W/m^2$ , with spectrum AM 1.5 and a cell temperature of  $25^\circ C$ .

The above data are average figures presently measured. Reference data are calibrated by Fraunhofer ISE. Just for reference.

### 3.2.2 Printing patterns and parameters



Patterns and parameters of 5BB-H-F108 P-type multi-Crystalline silicon solar cell

Temperature Coefficient (Typical data for reference)

Pmax.Temp.Coef	-(0.39±0.02) %/k
Voc.Temp.Coef	-(0.32±0.03) %/k
Isc.Temp.Coef	+(0.05±0.015) %/k

### 3.3 Light induced degradation test

Using Xenon lamp (Irradiance of 1000W/m<sup>2</sup>,with spectrum AM 1.5 ) to irradiate test cells, after a total irradiation of 5 kwh·m<sup>-2</sup> ,the degradation of maximum output power of cells is ≤2%.

### 3.4 CTM

Lower cell to module(CTM) power loss : <1%.

### 3.5 Anti-PID

Potential Induced Degradation(-1000V,96Hrs):<5%

## 4. Labeling, Packaging, Storage

### 4.1 Labeling

Internal box unit and outside package have to be labeled with the following data: cell type, cell class, efficiency, power, amount, color class, barcode and other related information.

Sign including breakable, upward, stack number limit, avoid wet, avoid radiation, avoid tumble, net weight, gross weight and Solar space logo are printed on the outside package.

### 4.2 Packaging

Solar cells are closely packed with soft sponge around and heat shrink is used around the box unit. Outer packing box must have shock buffer, to be suitable for long-distance delivery.



### 4.3 Storage

After packaging, cells should be stored indoors in the conditions of good ventilation, dry, humidity below 60%, and temperature ≤40 °C . Cells should be sampling inspected again if the storage time over 45 days.