

## Black22 Series

### Features Performance and Quality

- Industry-Leading efficiency of P-type mono-crystalline silicon solar cell
- Robust reliability performance for potential module benefit beyond 25 years
- Compatible with present mainstream module manufacturing process
- Standard cells calibrated by Fraunhofer ISE
- 100% in-line optical and electrical inspection

## NSFU 210mm Monocrystalline Silicon Solar Cell (PID FREE) Pattern Code 12BB-01B34

### PHYSICAL CHARACTERISTICS

Dimensions 210mm×210mm±0.25mm

Thickness (Si) 160±25 μm

Front 12 Bus-bars width 0.06 mm ± 0.04mm

Back 12 Bus-bars (Pad) width 2.2±0.4mm

Distance between bus-bars: 17.45 mm ± 0.1mm

Distance between bus-bars: 17.45 mm ± 0.1mm

### ELECTRICAL CHARACTERISTICS

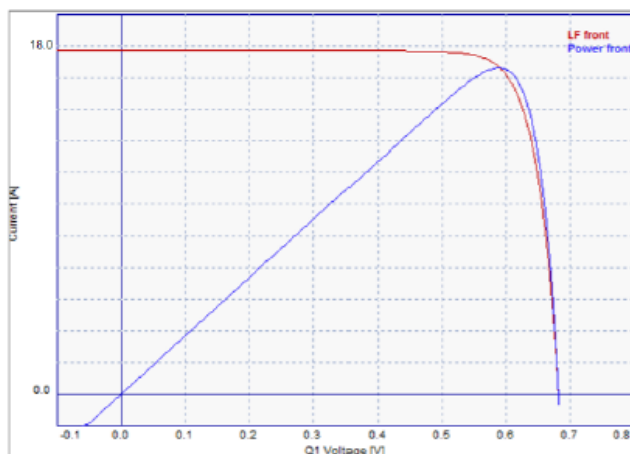
Code	23.1	23.0	22.9	22.8	22.7	22.6	22.5	22.4	22.3	22.2	22.1
Pmpp (W)	10.186	10.142	10.098	10.054	10.010	9.966	9.922	9.878	9.833	9.789	9.745
Umpp (V)	0.590	0.589	0.587	0.586	0.584	0.583	0.581	0.579	0.577	0.575	0.574
Impp (A)	17.261	17.216	17.206	17.151	17.140	17.101	17.074	17.064	17.036	17.026	16.986
Voc (V)	0.690	0.689	0.688	0.687	0.686	0.685	0.685	0.684	0.682	0.681	0.680
Isc (A)	18.186	18.166	18.140	18.125	18.108	18.088	18.062	18.049	18.030	18.016	17.995
FF (%)	81.15	81.01	80.93	80.71	80.58	80.46	80.18	80.02	79.94	79.79	79.68
Temperature coefficients	Current : + 0.07 %/K , Voltage : -0.36%/K , Power : -0.38%/K										

### Rear Efficiency

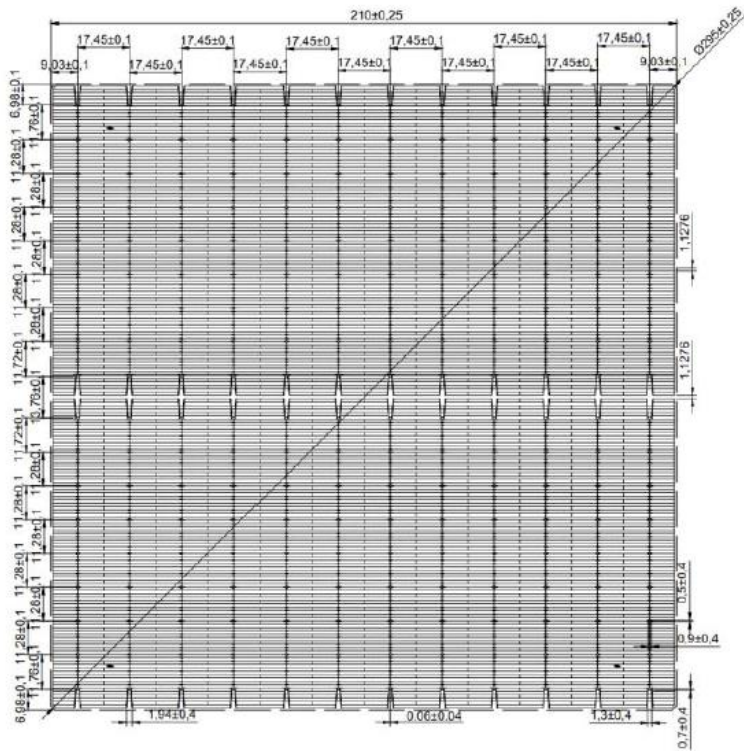
Code	16	15.7	15.2	14.8
Pmpp (W)	7.06	6.92	6.70	6.53
Umpp (V)	0.582	0.579	0.572	0.565
Impp (A)	12.130	11.952	11.713	11.558
Voc (V)	0.677	0.675	0.673	0.672
Isc (A)	13.361	13.352	13.244	13.124

The above data are average figures presently measured. Accuracy of eff. measurement is ±0.1%.  
Reference data are calibrated by Fraunhofer ISE Freiburg.

### IV-Curve



## APPEARANCE\_FRONT SIDE



## APPEARANCE\_BACK SIDE

