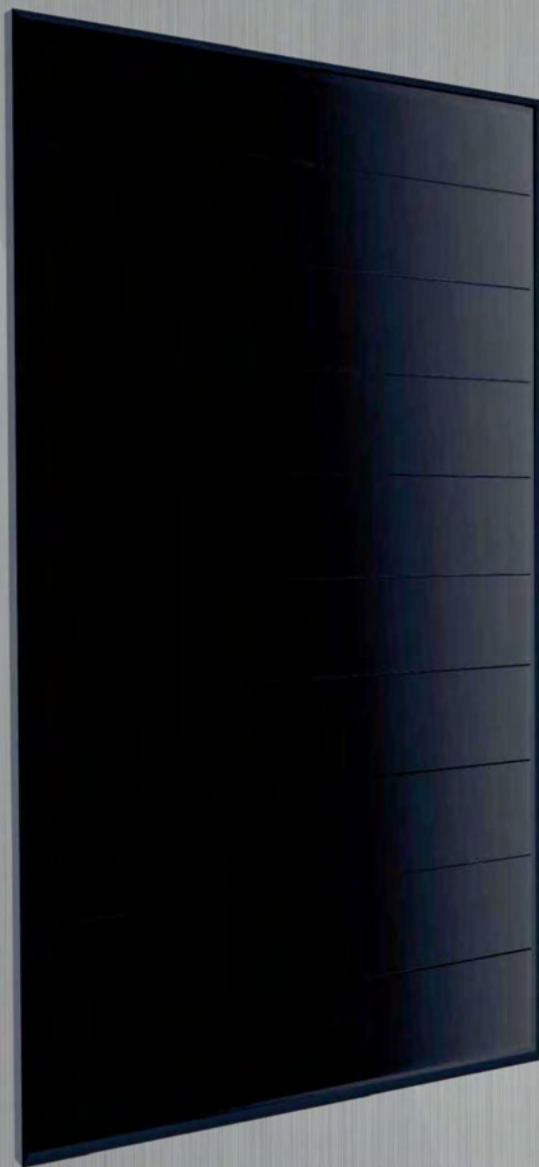


Shingled  
monofacial module

**MSMDxxxM6-PMB5**

**60SBF** (All Black)



Features of Module



**Shingling Technology**  
Innovative structure, low-temperature adhesive bonding, high-density layout.



**Beautiful Appearance**  
Uniform layout, better aesthetic



**Superior Safety and Reliability**  
No hidden welding crack, low operating temperature, high pressure resistance.



**Low System Cost**  
High module efficiency, reducing system cost.



**Low Hot Spot Risk**  
Parallel circuit design reduces shading loss.



**Low Shading Loss**  
Full parallel arrangement brings high effective power generation hours.



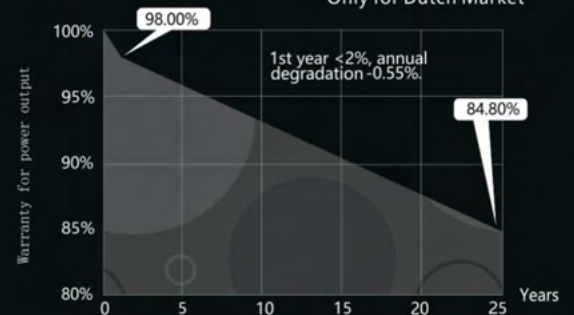
**Eco-friendly**  
Adhering to green philosophy, no fluorine and low lead.

Linear Power Output Warranty

**25** 25-year warranty for materials.

**25** 25-year warranty for linear power output.

\* Only for Dutch Market



Quality Management System and Product Certification

IEC61215/61730, IEC62804(PID), IEC61701(Salt), IEC62716 (Ammonia) IEC60068-2-68(Sand)  
ISO 9001:2015 / quality management system  
ISO 14001:2015 / environmental management system  
ISO 45001:2018 / occupation health safety management system  
ISO 50001:2011 / energy management system  
IEC TS 62941—2016 / PV industry quality management system





## MSMDxxxM6-PMB5-60SBF(All Black)

### Electrical Characteristics (STC)

Module type: TH***PMB5-60SBF	415	410	405	400	395	390	385	380
Maximum power - Pm (W)	415	410	405	400	395	390	385	380
Open circuit voltage - Voc (V)	46.7	46.6	46.5	46.4	46.3	46.3	46.2	46.1
Short circuit current I <sub>sc</sub> (A)	11.12	11.07	11.02	10.97	10.92	10.87	10.82	10.77
Voltage at maximum power point- V <sub>m</sub> (V)	38.9	38.8	38.7	38.6	38.5	38.5	38.4	38.3
Current at maximum power point - I <sub>m</sub> (A)	10.67	10.57	10.47	10.36	10.26	10.13	10.03	9.92
Module efficiency -η (%)	21.2	20.9	20.7	20.4	20.2	19.9	19.6	19.4

### Electrical Characteristics (NMOT)

Maximum power - Pm (W)	312	309	305	301	297	294	290	286
Open circuit voltage - Voc (V)	44.5	44.4	44.3	44.2	44.1	44.1	44.0	43.9
Short circuit current I <sub>sc</sub> (A)	8.97	8.93	8.89	8.85	8.81	8.77	8.73	8.69
Voltage at maximum power point V <sub>m</sub> (V)	37.1	37.0	36.9	36.8	36.7	36.7	36.6	36.5
Current at maximum power point I <sub>m</sub> (A)	8.43	8.35	8.27	8.18	8.10	8.00	7.92	

\* STC: Irradiation 1000W/m<sup>2</sup> AM1.5; environmental temperature 25°C; tested according to EN 60904-3;  
 \* NMOT: irradiation 800W/m<sup>2</sup>; wind speed 1m/s; environmental temperature 20°C;  
 \* Pm tolerance: 0~+5W; power test uncertainty: ±3%; Voc[V], I<sub>sc</sub>[A], V<sub>m</sub>[V] and I<sub>m</sub>[A] test tolerance: ±3%

### Mechanical Parameters

Size	1719x1140x30mm (LXWXH)
Weight	21.0kg
Glass	3.2mm toughened glass
Frame	Anodic alumina profile
Cells	Monocrystalline silicon cell
Cell Orientation	340 (34*10)
Junction Box	Ip68, 2 diodes
Connectors Type	Staubli MC4
Cable	1200mm long, 4mm <sup>2</sup> cross section, customizable
Packaging mode	36pcs/box; 936pcs/40'cabinet; 1368pcs/truck

### Maximum Rated Parameters

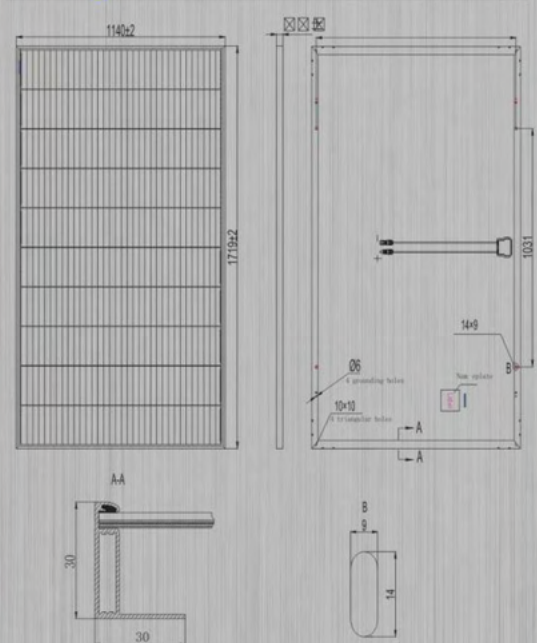
Maximum system voltage (V)	DC1500/1000 (IEC)
Maximum fuse rated current (A)	20
Maximum front static load (Pa)	5400
Working temperature (°C)	-40~+ 85
Hail resistance	Maximum diameter 25mm, impact speed 23m/s

### Temperature Parameters

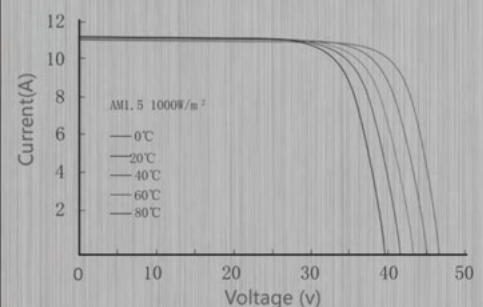
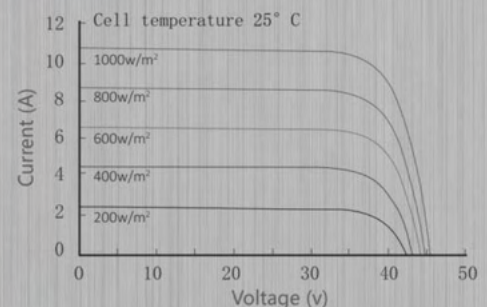
NMOT	42.30 °C (±2°C)
Open circuit voltage temperature coefficient	-0.27%/°C
Short circuit current temperature coefficient	+0.04%/°C
Maximum power temperature coefficient	-0.34%/°C



### Drawings



### I-V Curve



Statement:  
 With technological progress and product updates, there may be deviations between the technical parameters of Tongwei's module products and the technical parameters contained in this specification, and Tongwei Solar has the right to adjust the technical parameters at any time without notifying the customer, the final interpretation of the technical specification is vested in Tongwei Solar.