



ZONERGY

# ZPM645~670PMB

## Shingled bifacial module



### 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.



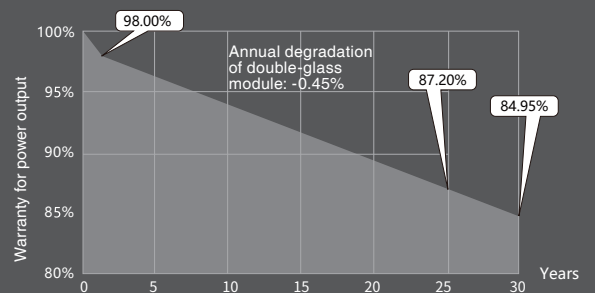
#### Eco-friendly

Adhering to green philosophy, no fluorine and low lead.

### Linear Power Output Warranty

**15** 15-year warranty for materials.

**30** 30-year warranty for linear power output.



### 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



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## Electrical Characteristics (STC)

|                                |       |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Module type:                   | 670   | 665   | 660   | 655   | 650   | 645   |
| Maximum power - Pm (W)         | 670   | 665   | 660   | 655   | 650   | 645   |
| Open circuit voltage - Voc (V) | 47.1  | 47.0  | 46.9  | 46.8  | 46.7  | 46.6  |
| Short circuit current Isc (A)  | 18.26 | 18.16 | 18.06 | 17.97 | 17.84 | 17.74 |
| Maximum Power Voltage-Vm (V)   | 39.1  | 39.0  | 38.9  | 38.8  | 38.8  | 38.7  |
| Maximum Power Current-Im (A)   | 17.16 | 17.07 | 16.98 | 16.89 | 16.77 | 16.68 |
| Module Efficiency-η (%)        | 21.6  | 21.4  | 21.2  | 21.1  | 20.9  | 20.8  |

## Electrical Characteristics (NMOT)

|                                |       |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Maximum power - Pm (W)         | 504   | 501   | 497   | 493   | 489   | 486   |
| Open circuit voltage - Voc (V) | 44.9  | 44.8  | 44.7  | 44.5  | 44.4  | 44.3  |
| Short circuit current Isc (A)  | 14.71 | 14.63 | 14.55 | 14.47 | 14.37 | 14.29 |
| Maximum Power Voltage-Vm (V)   | 37.3  | 37.2  | 37.1  | 37.0  | 37.0  | 36.9  |
| Maximum Power Current-Im (A)   | 13.54 | 13.46 | 13.39 | 13.32 | 13.25 | 13.17 |

\* 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], Isc[A], Vm[V] and Im[A] test tolerance: ±3%  
 \* Bifaciality: 70%±5%;

## Comparison of Rear Power Gains (650W)

|                               |       |       |       |       |       |       |
|-------------------------------|-------|-------|-------|-------|-------|-------|
| Power Gain-PG                 | 5%    | 10%   | 15%   | 20%   | 25%   | 30%   |
| Maximum Power-Pm (W)          | 693   | 726   | 759   | 792   | 825   | 858   |
| Open Circuit Voltage-Voc (V)  | 46.9  | 46.9  | 46.9  | 47.0  | 47.0  | 47.0  |
| Short Circuit Current-Isc (A) | 18.97 | 19.87 | 20.77 | 21.68 | 22.58 | 23.48 |
| Maximum Power Voltage-Vm (V)  | 38.9  | 38.9  | 38.9  | 39.0  | 39.0  | 39.0  |
| Maximum Power Current-Im (A)  | 17.83 | 18.68 | 19.53 | 20.38 | 21.23 | 22.07 |

## Mechanical Parameters

|                  |   |
|------------------|---|
| Dimensions       | 2384x1303x35mm (LxWxH)  |
| Weight           | 38.5kg  |
| Front Glass      | Tempered glass, 2.0mm   |
| Frame            | Anodized aluminum profile   |
| Cells            | Mono-crystalline solar cell   |
| Cell Orientation | 414 (69°6)  |
| Junction Box     | IP68, three diodes  |
| Cable            | 4mm <sup>2</sup> , +500mm/-1000mm(Vertical), +220mm/-180mm (Horizontal) |
| Packaging mode   | 31pcs/ box; 558pcs/ 40' HQ; 744pcs/ flat car                            |

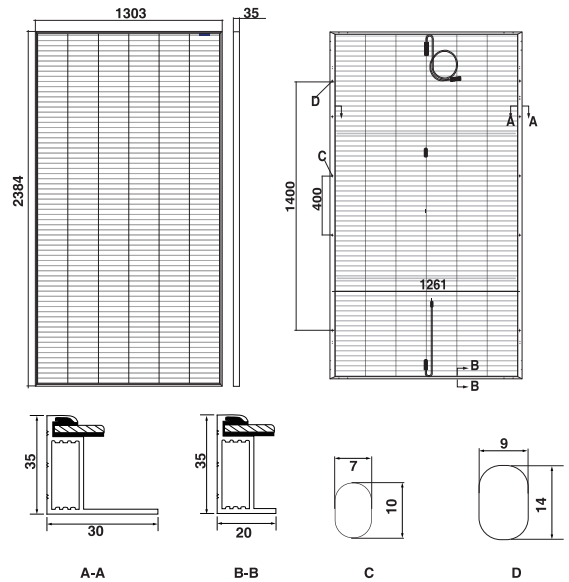
## Temperature Parameters

|                                |              |
|--------------------------------|--------------|
| NMOT                           | 42.3°C(±2°C) |
| Temperature Coefficient of Voc | -0.27%/°C    |
| Temperature Coefficient of Isc | 0.04%/°C     |
| Temperature Coefficient of Pm  | -0.34%/°C    |

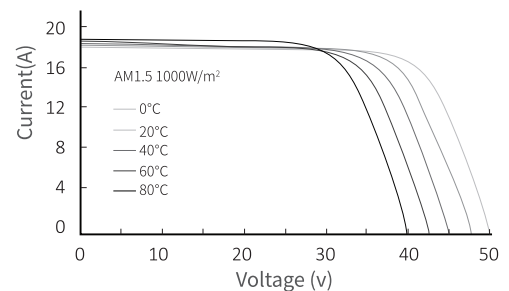
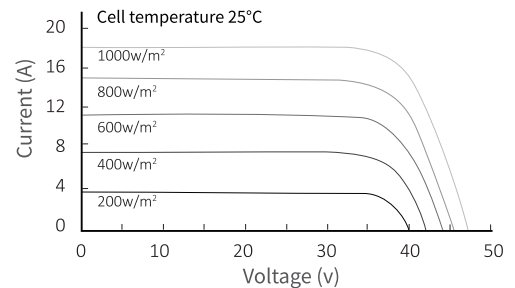
## Maximum Rated Parameters

|                            |   |
|----------------------------|---|
| Maximum System Voltage (V) | DC1500  |
| Series Fuse Rating (A)     | 30  |
| Surface Load Capacity (Pa) | Front5400/ Back2400   |
| Temperature Range (°C)     | -40~+ 85  |
| Withstanding Hail          | Maximum diameter of 25 mm with impact speed of 23 m·s <sup>-1</sup> |

## Drawings



## I-V Curve



## Declaration:

With the technical progress and product updates, there exists a deviation between the technical parameter of the Zonergy Solar's future products and the technical parameter in this specification. The Zonergy Solar reserves the right to adjust the technical parameter at any time without notifying the customers. Zonergy Solar reserves the final right of interpretation.