



## BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE21

POWER RANGE: 645-670W

# 670W

MAXIMUM POWER OUTPUT

# 0~+5W

POSITIVE POWER TOLERANCE

# 21.6%

MAXIMUM EFFICIENCY



### High customer value

- Lower LCOE (Levelized Cost Of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lowest guaranteed first year and annual degradation;
- Designed for compatibility with existing mainstream system components



### High power up to 670W

- Up to 21.6% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



### High reliability

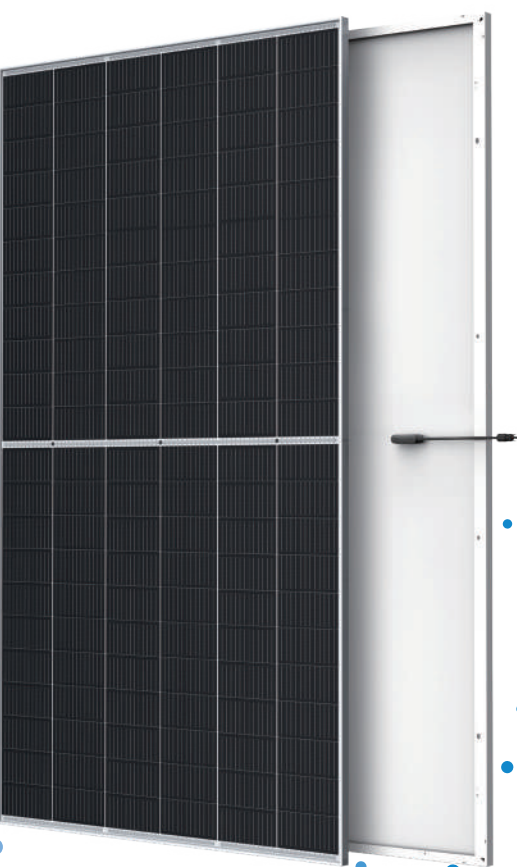
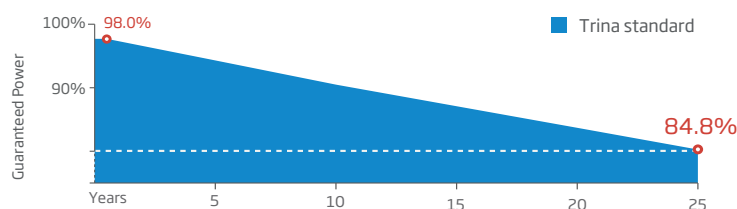
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load



### High energy yield

- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.34%) and operating temperature

### Trina Solar's Backsheet Performance Warranty



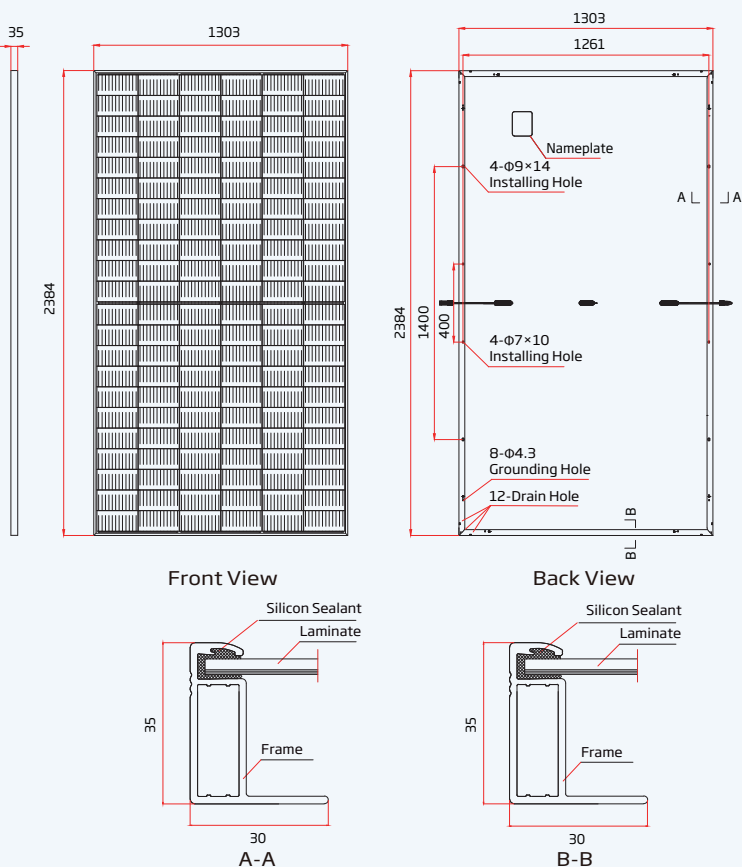
### Comprehensive Products and System Certificates



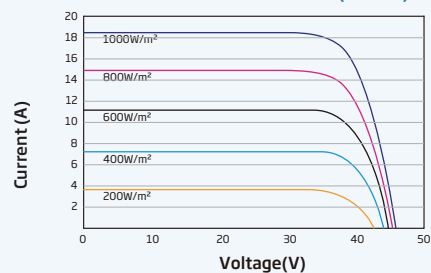
IEC61215/IEC61730/IEC61701/IEC62716  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse Gases Emissions Verification  
 ISO45001: Occupational Health and Safety Management System

# Trinasolar

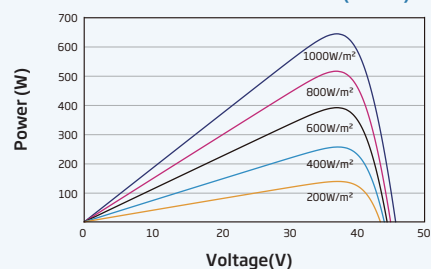
## DIMENSIONS OF PV MODULE(mm)



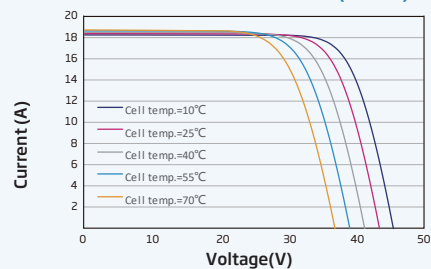
## I-V CURVES OF PV MODULE(650 W)



## P-V CURVES OF PV MODULE(650W)



## I-V CURVES OF PV MODULE(650 W)



## ELECTRICAL DATA (STC)

|                                            |        |       |       |       |       |       |
|--------------------------------------------|--------|-------|-------|-------|-------|-------|
| Peak Power Watts-P <sub>MAX</sub> (Wp)*    | 645    | 650   | 655   | 660   | 665   | 670   |
| Power Tolerance-P <sub>MAX</sub> (W)       | 0 ~ +5 |       |       |       |       |       |
| Maximum Power Voltage-V <sub>MPP</sub> (V) | 37.2   | 37.4  | 37.6  | 37.8  | 38.0  | 38.2  |
| Maximum Power Current-I <sub>MPP</sub> (A) | 17.35  | 17.39 | 17.43 | 17.47 | 17.51 | 17.55 |
| Open Circuit Voltage-V <sub>OC</sub> (V)   | 45.1   | 45.3  | 45.5  | 45.7  | 45.9  | 46.1  |
| Short Circuit Current-I <sub>SC</sub> (A)  | 18.39  | 18.44 | 18.48 | 18.53 | 18.57 | 18.62 |
| Module Efficiency $\eta_m$ (%)             | 20.8   | 20.9  | 21.1  | 21.2  | 21.4  | 21.6  |

STC: Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Air Mass AM1.5. \*Measuring tolerance:  $\pm 3\%$ .

## ELECTRICAL DATA (NOCT)

|                                            |       |       |       |       |       |       |
|--------------------------------------------|-------|-------|-------|-------|-------|-------|
| Maximum Power-P <sub>MAX</sub> (Wp)        | 488   | 492   | 496   | 500   | 504   | 508   |
| Maximum Power Voltage-V <sub>MPP</sub> (V) | 34.8  | 34.9  | 35.1  | 35.3  | 35.4  | 35.6  |
| Maximum Power Current-I <sub>MPP</sub> (A) | 14.05 | 14.09 | 14.13 | 14.17 | 14.22 | 14.26 |
| Open Circuit Voltage-V <sub>OC</sub> (V)   | 42.5  | 42.7  | 42.9  | 43.0  | 43.2  | 43.4  |
| Short Circuit Current-I <sub>SC</sub> (A)  | 14.82 | 14.86 | 14.89 | 14.93 | 14.96 | 15.01 |

NOCT: Irradiance at 800W/m<sup>2</sup>, Ambient Temperature 20°C, Wind Speed 1m/s.

## MECHANICAL DATA

|                      |                                                                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Solar Cells          | Monocrystalline                                                                                                                                     |
| No. of cells         | 132 cells                                                                                                                                           |
| Module Dimensions    | 2384×1303×35 mm (93.86×51.30×1.38 inches)                                                                                                           |
| Weight               | 33.6 kg (74.1 lb)                                                                                                                                   |
| Glass                | 3.2 mm (0.13 inches), High Transmission, AR Coated Heat Strengthened Glass                                                                          |
| Encapsulant material | EVA                                                                                                                                                 |
| Backsheet            | White                                                                                                                                               |
| Frame                | 35mm(1.38 inches) Anodized Aluminium Alloy                                                                                                          |
| J-Box                | IP 68 rated                                                                                                                                         |
| Cables               | Photovoltaic Technology Cable 4.0mm <sup>2</sup> (0.006 inches <sup>2</sup> ), Portrait: 280/280 mm(11.02/11.02 inches)<br>Length can be customized |
| Connector            | MC4 EV02 / TS4*                                                                                                                                     |

\*Please refer to regional datasheet for specified connector.

## TEMPERATURE RATINGS

|                                             |                                |
|---------------------------------------------|--------------------------------|
| NOCT (Nominal Operating Cell Temperature)   | 43°C ( $\pm 2^\circ\text{C}$ ) |
| Temperature Coefficient of P <sub>MAX</sub> | -0.34%/°C                      |
| Temperature Coefficient of V <sub>OC</sub>  | -0.25%/°C                      |
| Temperature Coefficient of I <sub>SC</sub>  | 0.04%/°C                       |

## MAXIMUM RATINGS

|                         |                                 |
|-------------------------|---------------------------------|
| Operational Temperature | -40~+85°C                       |
| Maximum System Voltage  | 1500V DC (IEC)<br>1500V DC (UL) |
| Max Series Fuse Rating  | 30A                             |

## WARRANTY

|                                      |
|--------------------------------------|
| 12 year Product Workmanship Warranty |
| 25 year Power Warranty               |
| 2% first year degradation            |
| 0.55% Annual Power Attenuation       |

(Please refer to product warranty for details)

## PACKAGING CONFIGURATION

|                                       |
|---------------------------------------|
| Modules per box: 31 pieces            |
| Modules per 40' container: 558 pieces |