

# Vertex

## BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE21

POWER RANGE: 650 -670W

### 670W

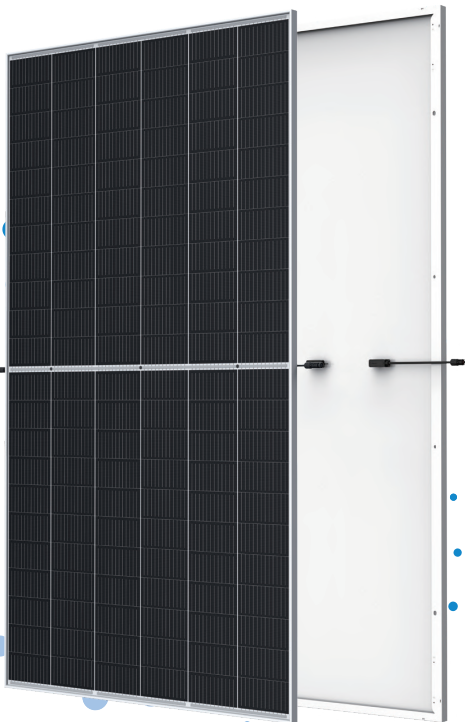
MAXIMUM POWER OUTPUT

### 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

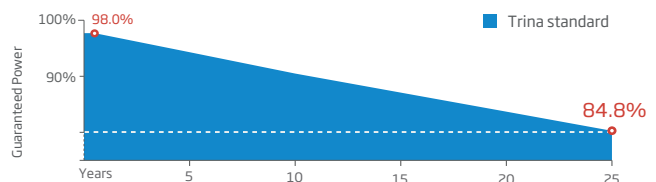
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive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



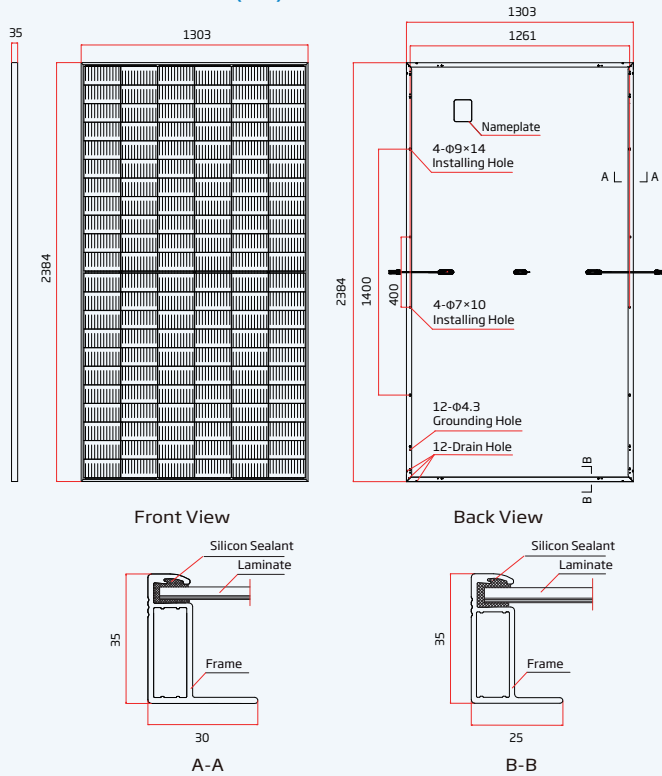
#### Comprehensive Products and System Certificates



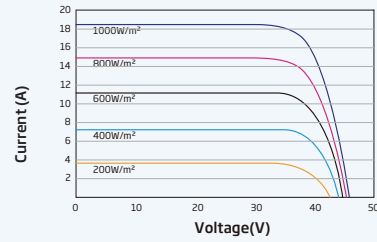
IEC61215/IEC61730/IEC61701/IEC62716  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse Gases Emissions Verification  
 ISO45001: Occupational Health and Safety Management System



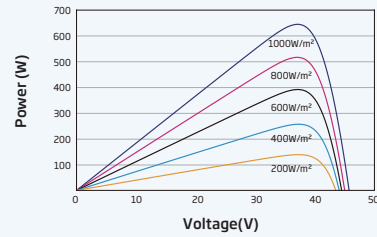
**DIMENSIONS OF PV MODULE(mm)**



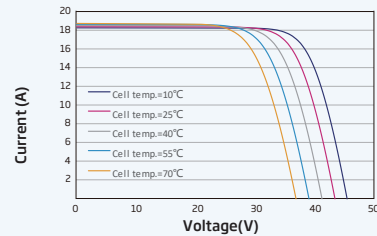
**I-V CURVES OF PV MODULE(655 W)**



**P-V CURVES OF PV MODULE(655W)**



**I-V CURVES OF PV MODULE(655 W)**



**ELECTRICAL DATA (STC)**

Peak Power Watts- $P_{MAX}$ (W)*	650	655	660	665	670
Power Tolerance- $P_{MAX}$ (W)	0 ~ +5				
Maximum Power Voltage- $V_{MPP}$ (V)	37.4	37.6	37.8	38.0	38.2
Maximum Power Current- $I_{MPP}$ (A)	17.39	17.43	17.47	17.51	17.55
Open Circuit Voltage- $V_{oc}$ (V)	45.3	45.5	45.7	45.9	46.1
Short Circuit Current- $I_{sc}$ (A)	18.44	18.48	18.53	18.57	18.62
Module Efficiency $\eta_m$ (%)	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: ±3%.

**ELECTRICAL DATA (NOCT)**

Maximum Power- $P_{MAX}$ (Wp)	492	496	500	504	508
Maximum Power Voltage- $V_{MPP}$ (V)	34.9	35.1	35.3	35.4	35.6
Maximum Power Current- $I_{MPP}$ (A)	14.09	14.13	14.17	14.22	14.26
Open Circuit Voltage- $V_{oc}$ (V)	42.7	42.9	43.0	43.2	43.4
Short Circuit Current- $I_{sc}$ (A)	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	33.3 kg (73.4 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 6B rated
Cables	Photovoltaic Technology Cable 4.0mm <sup>2</sup> (0.006 inches <sup>2</sup> ), Portrait: 350/280 mm(13.78/11.02 inches) Length can be customized
Connector	MC4 EVO2 / TS4*

\*Please refer to regional datasheet for specified connector.

**TEMPERATURE RATINGS**

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of $P_{MAX}$	-0.34%/°C
Temperature Coefficient of $V_{oc}$	-0.25%/°C
Temperature Coefficient of $I_{sc}$	0.04%/°C

**MAXIMUM RATINGS**

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC) 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