

# Vertex N

BIFACIAL DUAL GLASS N type i-TOPCon MODULE

PRODUCT: TSM-NEG21C.20

PRODUCT RANGE: 670-695W

## 695W

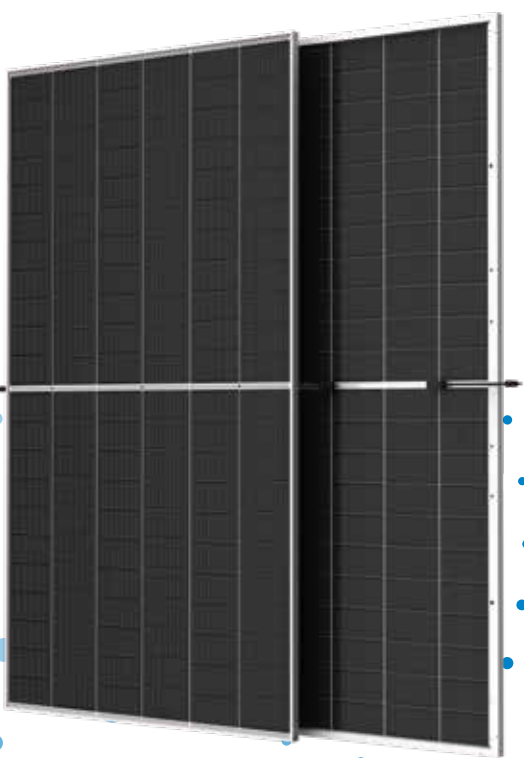
MAXIMUM POWER OUTPUT

## 0~+5W

POSITIVE POWER TOLERANCE

## 22.4%

MAXIMUM EFFICIENCY



### High customer value

- Lower LCOE (levelized cost of energy), reduced BOS (balance of system) cost, shorter payback time
- Guaranteed first year and annual degradation
- High module power; high string power and low voltage design



### High power up to 695W

- Up to 22.4% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



### High reliability

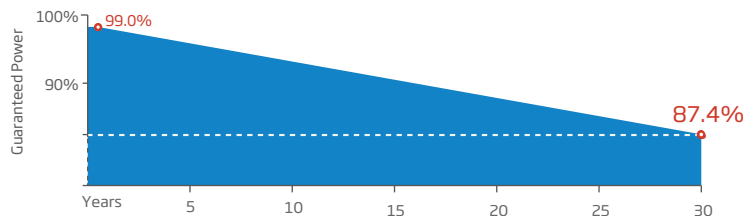
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive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



### High energy yield

- Excellent product bifaciality and low irradiation performance, validated by 3rd party
- Extremely low 1% first year degradation and 0.4% annual power attenuation
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.30%) and operating temperature
- Up to 30% additional power gain from back side depending on albedo

### Trina Solar's Vertex Bifacial Dual Glass Performance Warranty



### Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716

ISO 9001: Quality Management System

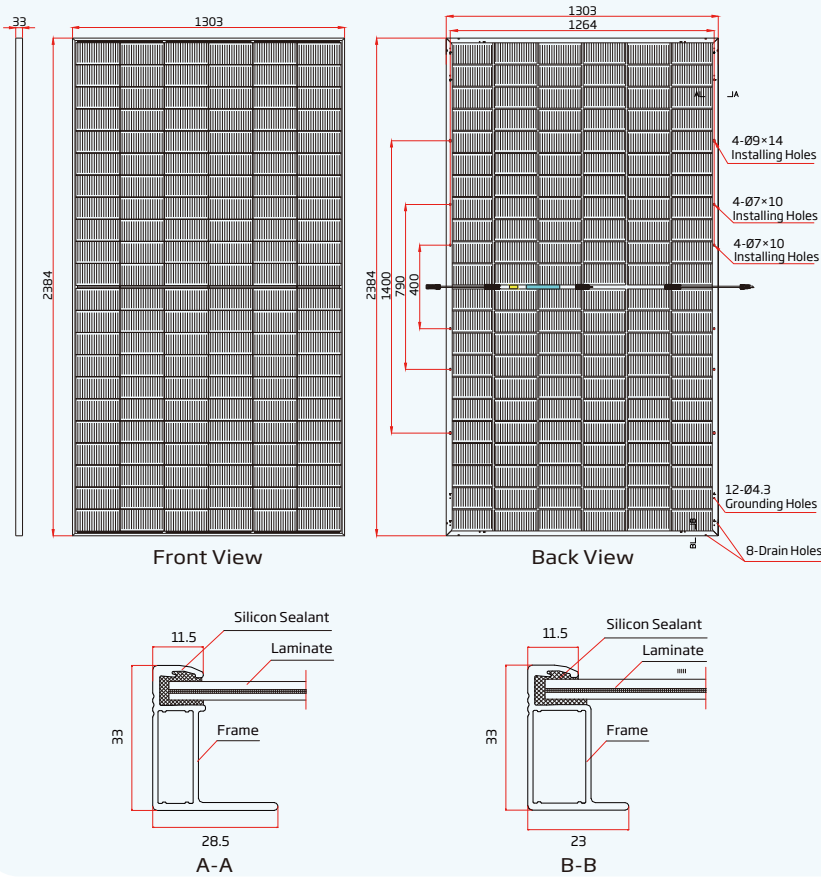
ISO 14001: Environmental Management System

ISO14064: Greenhouse Gases Emissions Verification

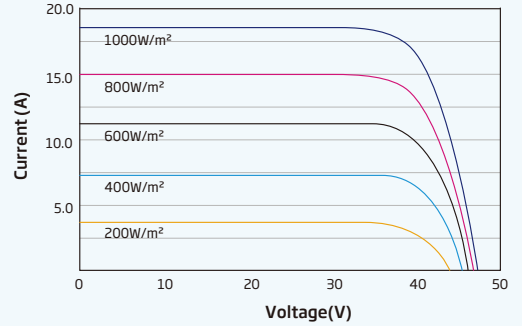
ISO45001: Occupational Health and Safety Management System



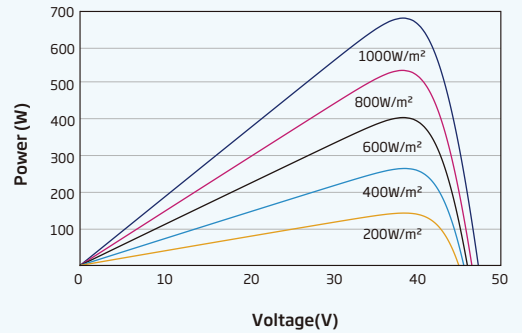
### DIMENSIONS OF PV MODULE(mm)



### I-V CURVES OF PV MODULE(680W)



### P-V CURVES OF PV MODULE(680 W)



### ELECTRICAL DATA (STC)

Peak Power Watts-P <sub>MAX</sub> (Wp)*	670	675	680	685	690	695
Power Tolerance-P <sub>MAX</sub> (W)	0 ~ +5					
Maximum Power Voltage-V <sub>MPP</sub> (V)	39.2	39.4	39.6	39.8	40.1	40.3
Maximum Power Current-I <sub>MPP</sub> (A)	17.09	17.12	17.16	17.19	17.23	17.25
Open Circuit Voltage-V <sub>OC</sub> (V)	47.0	47.2	47.4	47.7	47.9	48.3
Short Circuit Current-I <sub>SC</sub> (A)	18.10	18.14	18.18	18.21	18.25	18.28
Module Efficiency η <sub>m</sub> (%)	21.6	21.7	21.9	22.1	22.2	22.4

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

### Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power -P <sub>MAX</sub> (Wp)	724	729	734	740	745	751
Maximum Power Voltage-V <sub>MPP</sub> (V)	39.2	39.4	39.6	39.8	40.1	40.3
Maximum Power Current-I <sub>MPP</sub> (A)	18.46	18.49	18.53	18.57	18.61	18.63
Open Circuit Voltage-V <sub>OC</sub> (V)	47.0	47.2	47.4	47.7	47.9	48.3
Short Circuit Current-I <sub>SC</sub> (A)	19.55	19.59	19.63	19.67	19.71	19.74
Irradiance ratio (rear/front)	10%					

Product Bifaciality: 80±5%.

### ELECTRICAL DATA (NOCT)

Maximum Power-P <sub>MAX</sub> (Wp)	510	514	517	521	526	530
Maximum Power Voltage-V <sub>MPP</sub> (V)	36.8	37.0	37.2	37.3	37.7	37.8
Maximum Power Current-I <sub>MPP</sub> (A)	13.86	13.89	13.91	13.94	13.96	14.02
Open Circuit Voltage-V <sub>OC</sub> (V)	44.5	44.7	44.9	45.2	45.4	45.8
Short Circuit Current-I <sub>SC</sub> (A)	14.59	14.62	14.65	14.67	14.71	14.73

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

### MECHANICAL DATA

Solar Cells	N type Monocrystalline
No. of cells	132 cells
Module Dimensions	2384×1303×33 mm (93.86×51.30×1.30 inches)
Weight	38.3 kg (84.4 lb)
Front Glass	2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	POE/EVA
Back Glass	2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	33mm(1.30 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: 350/280 mm(13.78/11.02 inches) Length can be customized
Connector	TS4 / TS4 Plus

### TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P <sub>MAX</sub>	-0.30%/°C
Temperature Coefficient of Voc	-0.24%/°C
Temperature Coefficient of Isc	0.04%/°C

### MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	35A

### WARRANTY

- 12 year Product Workmanship Warranty
- 30 year Power Warranty
- 1% first year degradation
- 0.4% Annual Power Attenuation

(Please refer to product warranty for details)

### PACKAGING CONFIGURATION

- Modules per box: 33 pieces
- Modules per 40' container: 594 pieces