



BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE

PRODUCT: TSM-XXXDEG21C.20

POWER RANGE: 645-665W

665W

MAXIMUM POWER OUTPUT

0~+5W

BINNING TOLERANCE

21.4%

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 Mono Perc up to 665W

- Up to 21.4% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



High reliability

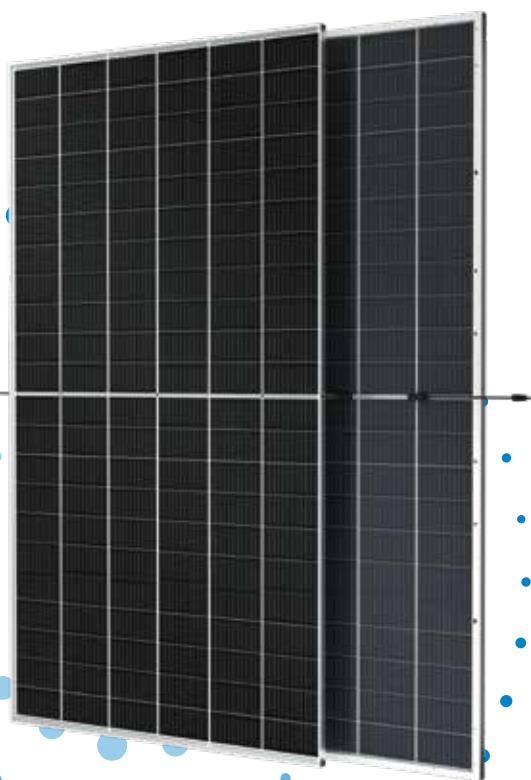
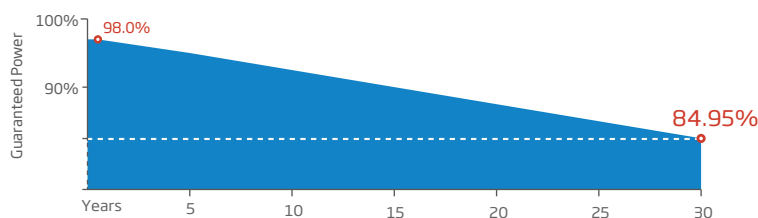
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control and fire class A or C
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance 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
- Up to 25% additional power gain from back side depending on albedo

Trina Solar's Vertex Bifacial Dual Glass Performance Warranty



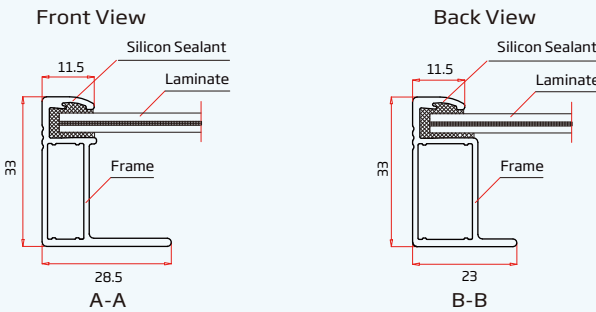
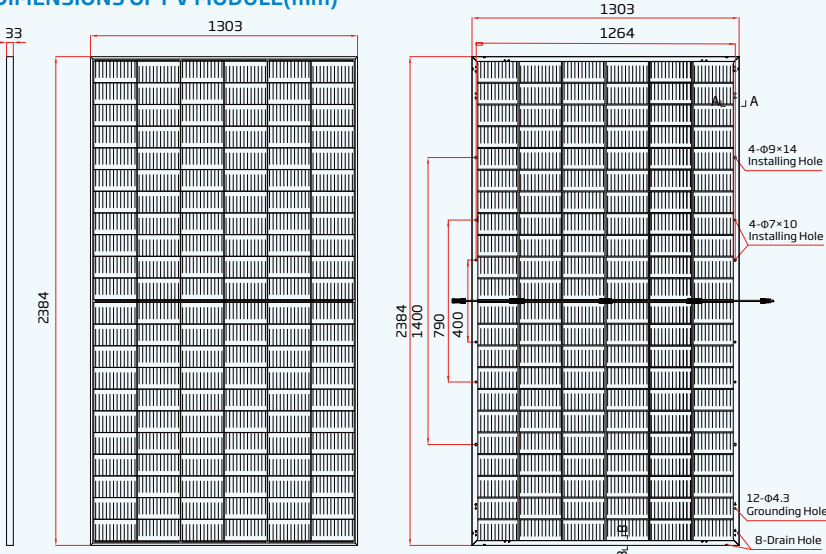
Comprehensive Products and System Certificates



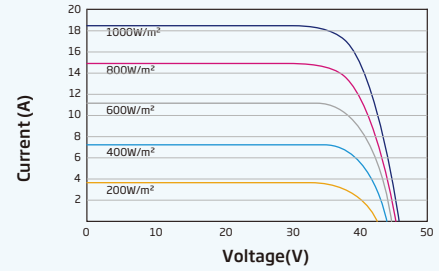
IEC61215/IEC61730/IEC61701/IEC62716/UL61730
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System



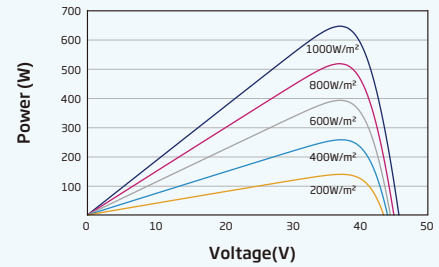
DIMENSIONS OF PV MODULE(mm)



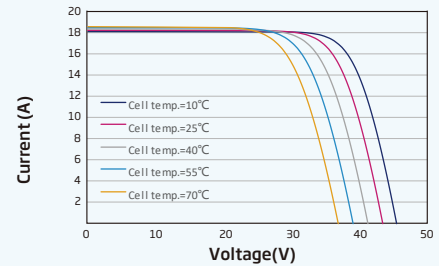
I-V CURVES OF PV MODULE(650 W)



P-V CURVES OF PV MODULE(650W)



I-V CURVES OF PV MODULE(650 W)



ELECTRICAL DATA (STC) TSM-XXXDEG21C.20(XXX=640-665)

Peak Power Watts-P _{MAX} (Wp)*	645	650	655	660	665
Binning Tolerance-P _{MAX} (W)	0 ~ +5				
Maximum Power Voltage-V _{MPP} (V)	37.5	37.7	37.9	38.1	38.3
Maximum Power Current-I _{MPP} (A)	17.23	17.27	17.31	17.35	17.39
Open Circuit Voltage-V _{OC} (V)	45.3	45.5	45.7	45.9	46.1
Short Circuit Current-I _{SC} (A)	18.31	18.35	18.40	18.45	18.50
Module Efficiency η _m (%)	20.8	20.9	21.1	21.2	21.4

STC: Irradiance 1000W/m², 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 _{MAX} (Wp)	690	696	701	706	712
Maximum Power Voltage-V _{MPP} (V)	37.5	37.7	37.9	38.1	38.3
Maximum Power Current-I _{MPP} (A)	18.44	18.48	18.52	18.56	18.60
Open Circuit Voltage-V _{OC} (V)	45.3	45.5	45.7	45.9	46.1
Short Circuit Current-I _{SC} (A)	19.59	19.63	19.69	19.74	19.79
Irradiance ratio (rear/front)	10%				

Power Bifaciality:70±5%.

ELECTRICAL DATA (NOCT)

Maximum Power-P _{MAX} (Wp)	488	492	495	499	504
Maximum Power Voltage-V _{MPP} (V)	34.9	35.1	35.2	35.4	35.6
Maximum Power Current-I _{MPP} (A)	13.98	14.01	14.05	14.10	14.16
Open Circuit Voltage-V _{OC} (V)	42.7	42.9	43.0	43.2	43.4
Short Circuit Current-I _{SC} (A)	14.75	14.79	14.83	14.87	14.91

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	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 ² (0.006 inches ²), Portrait: 350/280 mm(13.78/11.02 inches) Length can be customized
Connector	Staubli MC4 EVO2 / TS4

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	35A

WARRANTY

12 year Product Workmanship Warranty
30 year Power Warranty
2% first year degradation
0.45% Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

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