Preliminary

Vertex

BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE21

PRODUCT RANGE: 635-660W

660W+	0~+5W	21.2%
MAXIMUM POWER OUTPUT	POSITIVE POWER TOLERANCE	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
- Higher return on Investment

High power up to 660W

- Up to 21.2% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection

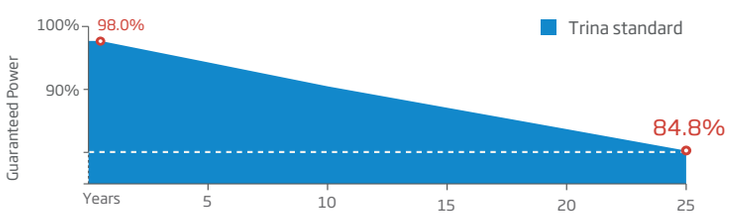
High reliability

- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- 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



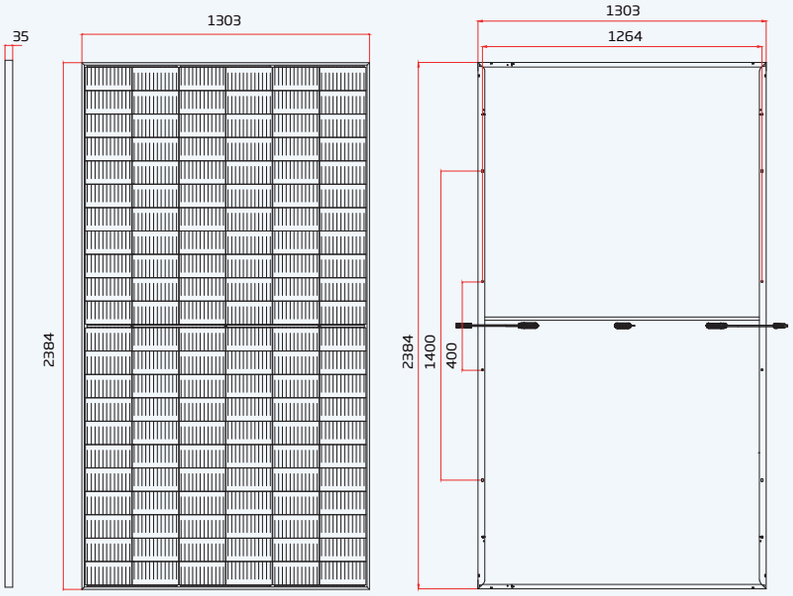
Comprehensive Products and System Certificates

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

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Vertex BACKSHEET MONOCRYSTALLINE MODULE

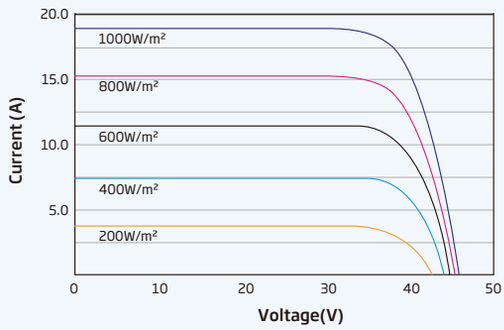
DIMENSIONS OF PV MODULE(mm)



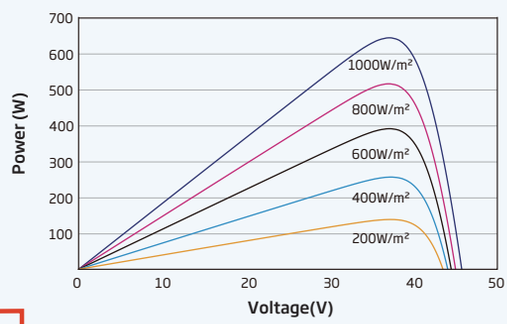
Front View

Back View

I-V CURVES OF PV MODULE(645 W)



P-V CURVES OF PV MODULE(645W)



Preliminary

ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	635	640	645	650	655	660
Power Tolerance-P_{MAX} (W)	0 ~ +5					
Maximum Power Voltage-V_{MPP} (V)	36.8	37.0	37.2	37.4	37.6	37.8
Maximum Power Current-I_{MPP} (A)	17.26	17.30	17.35	17.39	17.43	17.47
Open Circuit Voltage-V_{OC} (V)	44.7	44.9	45.1	45.3	45.5	45.7
Short Circuit Current-I_{SC} (A)	18.30	18.34	18.39	18.44	18.48	18.53
Module Efficiency η m (%)	20.4	20.6	20.8	20.9	21.1	21.2

STC: Irrdiance 1000W/m2, Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Maximum Power-P_{MAX} (Wp)	481	485	488	492	496	500
Maximum Power Voltage-V_{MPP} (V)	34.3	34.6	34.8	34.9	35.1	35.3
Maximum Power Current-I_{MPP} (A)	13.97	14.01	14.05	14.09	14.13	14.17
Open Circuit Voltage-V_{OC} (V)	42.1	42.3	42.5	42.7	42.9	43.0
Short Circuit Current-I_{SC} (A)	14.75	14.78	14.82	14.86	14.89	14.93

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	2384×1303×35 mm (93.86×51.30×1.38 inches)
Weight	33.9 kg (74.7 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 4.0mm² (0.006 inches²), Portrait: 280/280 mm(11.02/11.02 inches) Landscape: 1400/1400 mm(55.12/55.12 inches)
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

MAXIMUMRATINGS

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

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CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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