

470 W

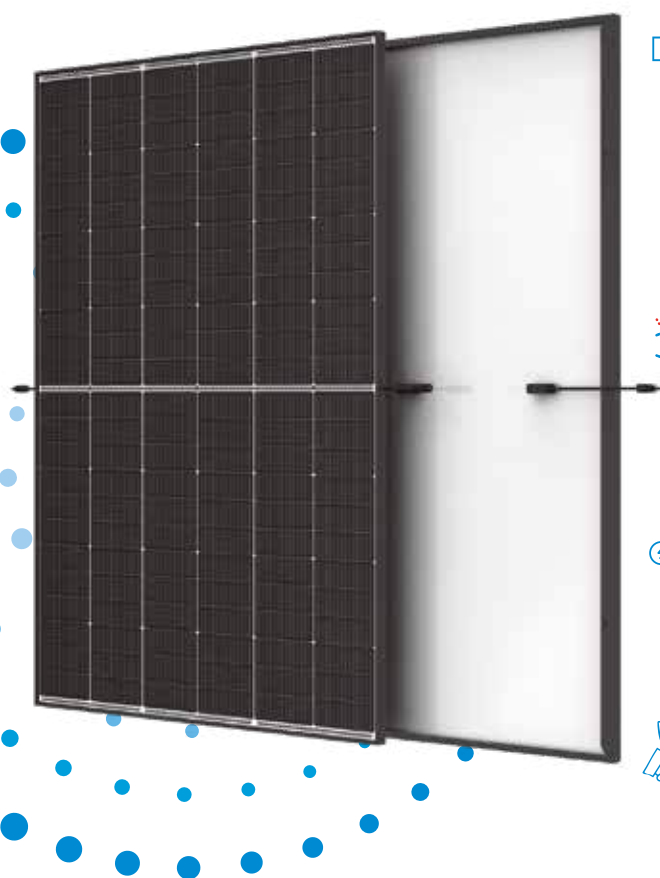
MAXIMUM POWER OUTPUT

0/+5 W

POSITIVE POWER TOLERANCE

23.5 %

MAXIMUM EFFICIENCY



Small in size, bigger on power

- Generates up to 470 W, 23.5 % module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Reduces installation cost with higher power bin and efficiency



Dual-glass Design, High Reliability

- Excellent fire rating and resistance to harsh environmental conditions
- 5,400 Pa snow load and 4,000 Pa wind load (test loads)



Maximize Energy Harvest

- Up to 25 years product warranty and 30 years power warranty
- 1 % first-year degradation and 0.4 % annual degradation enabled by N-type technology



Universal solution for residential and C&I rooftops

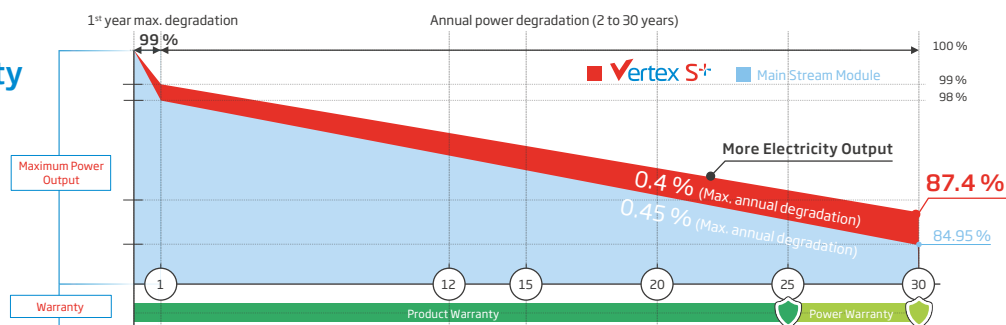
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Flexible installation solutions for system deployment

Extended Vertex S⁺ Warranty

1 %
1st year max. degradation

0.4 %
Max. annual degradation from year 2 to 30

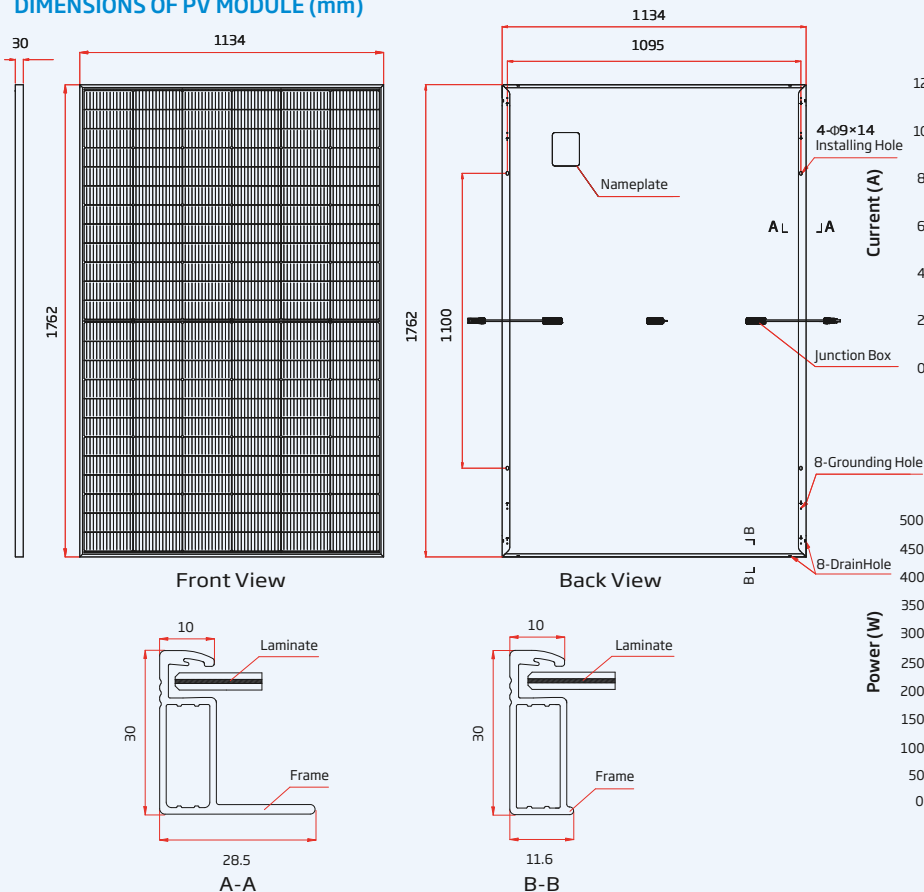
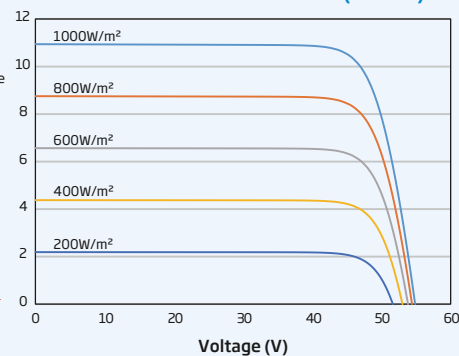
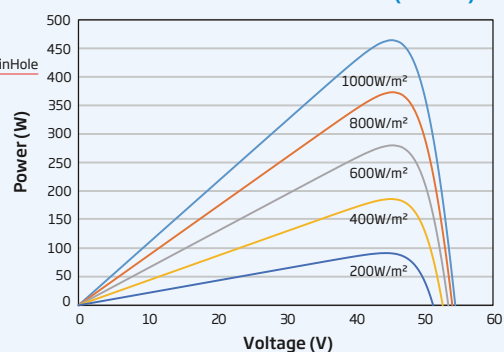
25 Years
Product Workmanship Warranty



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
 ISO14067: Product Carbon Footprint Limited Assurance
 ISO14025: Environmental Product Declaration

DIMENSIONS OF PV MODULE (mm)

I-V CURVES OF PV MODULE (465 W)

P-V CURVES OF PV MODULE (465 W)

ELECTRICAL DATA (STC)

	TSM-440 NEG9R.28	TSM-445 NEG9R.28	TSM-450 NEG9R.28	TSM-455 NEG9R.28	TSM-460 NEG9R.28	TSM-465 NEG9R.28	TSM-470 NEG9R.28
Peak Power Watts- P_{MAX} (Wp)*	440	445	450	455	460	465	470
Power Selection (W)**	0/+5						
Maximum Power Voltage- V_{MPP} (V)	44.0	44.3	44.6	45.0	45.4	45.8	46.1
Maximum Power Current- I_{MPP} (A)	10.01	10.05	10.09	10.11	10.14	10.16	10.20
Open Circuit Voltage- V_{OC} (V)	52.2	52.6	52.9	53.4	53.8	54.2	54.6
Short Circuit Current- I_{SC} (A)	10.67	10.71	10.74	10.77	10.81	10.85	10.89
Module Efficiency η_m (%)	22.0	22.3	22.5	22.8	23.0	23.3	23.5

STC: Irradiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM 1.5. *Measuring tolerance: $\pm 3\%$. **Power Selection up to: $\pm 3\%$

ELECTRICAL DATA (NOCT)

	TSM-440 NEG9R.28	TSM-445 NEG9R.28	TSM-450 NEG9R.28	TSM-455 NEG9R.28	TSM-460 NEG9R.28	TSM-465 NEG9R.28	TSM-470 NEG9R.28
Maximum Power- P_{MAX} (Wp)	337	341	344	348	352	355	358
Maximum Power Voltage- V_{MPP} (V)	41.4	41.7	42.0	42.3	42.7	42.8	43.1
Maximum Power Current- I_{MPP} (A)	8.14	8.17	8.19	8.22	8.25	8.28	8.31
Open Circuit Voltage- V_{OC} (V)	49.5	49.9	50.2	50.6	51.0	51.4	51.8
Short Circuit Current- I_{SC} (A)	8.60	8.63	8.66	8.68	8.71	8.74	8.76

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

MECHANICAL DATA

Solar Cells	N-type i-TOPCon Monocrystalline
No. of cells	144 cells
Module Dimensions	1762×1134×30 mm
Weight	21.0 kg
Front Glass	1.6 mm, AR Coating Heat Strengthened Glass
Back Glass	1.6 mm, Heat Strengthened Glass
Frame	30 mm Anodized Aluminium Alloy, black
J-Box	IP 68 rated, 3 bypass diodes
Cables	Photovoltaic Technology Cable 4.0 mm ² Landscape: 1100/1100 mm Portrait: 200/320 mm*
Connector	TS4 Plus / TS4 / MC4 EVO2*

*Special order only

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43 °C (± 2 °C)
Temperature Coefficient of P_{MAX}	-0.29 %/°C
Temperature Coefficient of V_{OC}	-0.24 %/°C
Temperature Coefficient of I_{SC}	0.04 %/°C

MAXIMUM RATINGS

Operational Temperature	-40 to +70 °C
Maximum System Voltage	1500 V DC (IEC)
Max Series Fuse Rating	25 A

PV module 98th percentile operating temperature: 70 °C

WARRANTY

25 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:	36 pieces
Modules per 40' container:	936 pieces

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

© 2025 Trina Solar Co., Ltd. All rights reserved. Specifications included in this datasheet are subject to change without notice. The right of final interpretation belongs to Trina Solar Co., Ltd

Version number: TSM_EN_2025_D