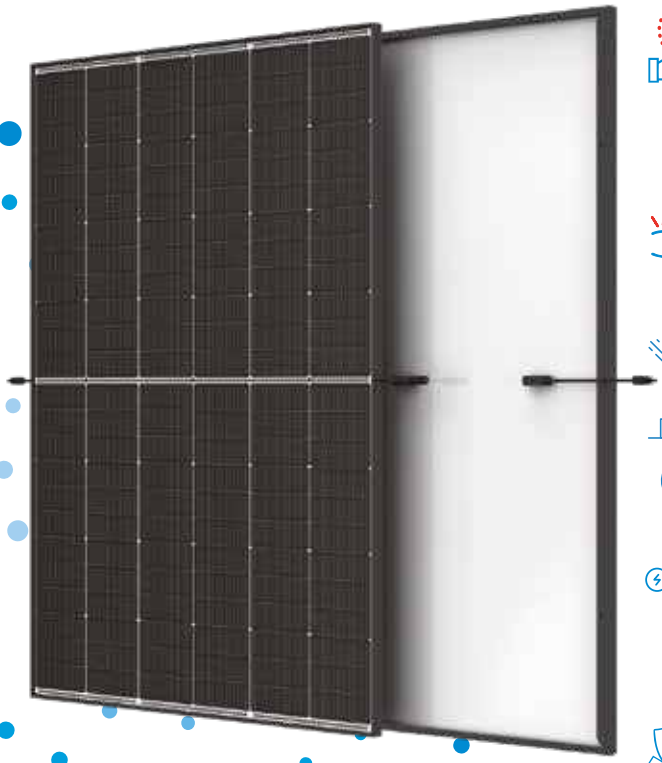
Vertex S+ Shield

DUAL GLASS N type i-TOPCon Ultra MODULE

PRODUCT: TSM-NED9R.28

POWER RANGE: 450-475 W

475 W	0/+5 W	23.8 %
MAXIMUM POWER OUTPUT	POSITIVE POWER TOLERANCE	MAXIMUM EFFICIENCY



Small in size, bigger on power

- High module power: Up to 475 W, 23.8 % module efficiency with n type i-TOPCon technology
- Reduces installation cost with higher power bin and efficiency

Dual-glass Design, High Reliability

- Excellent fire rating and resistance to harsh environmental conditions

Key Features

- VKF HW4 Hail Test
- Standard load capacity: +7000/-5000 Pa,
- Fire rating (IEC 61730-2): Class A+A

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

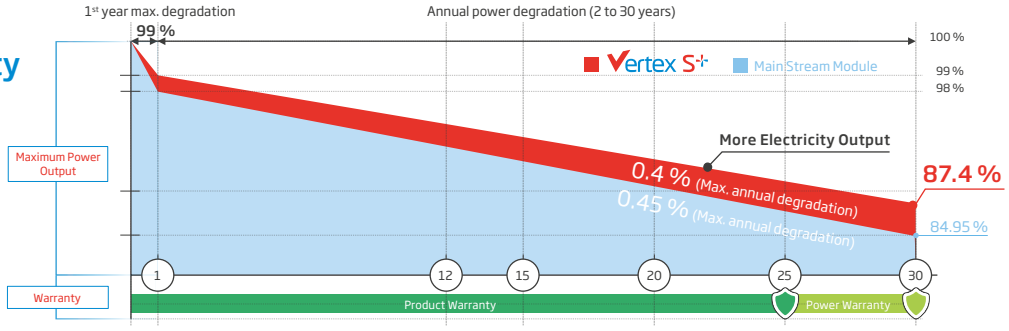
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Flexible installation solutions for system deployment

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

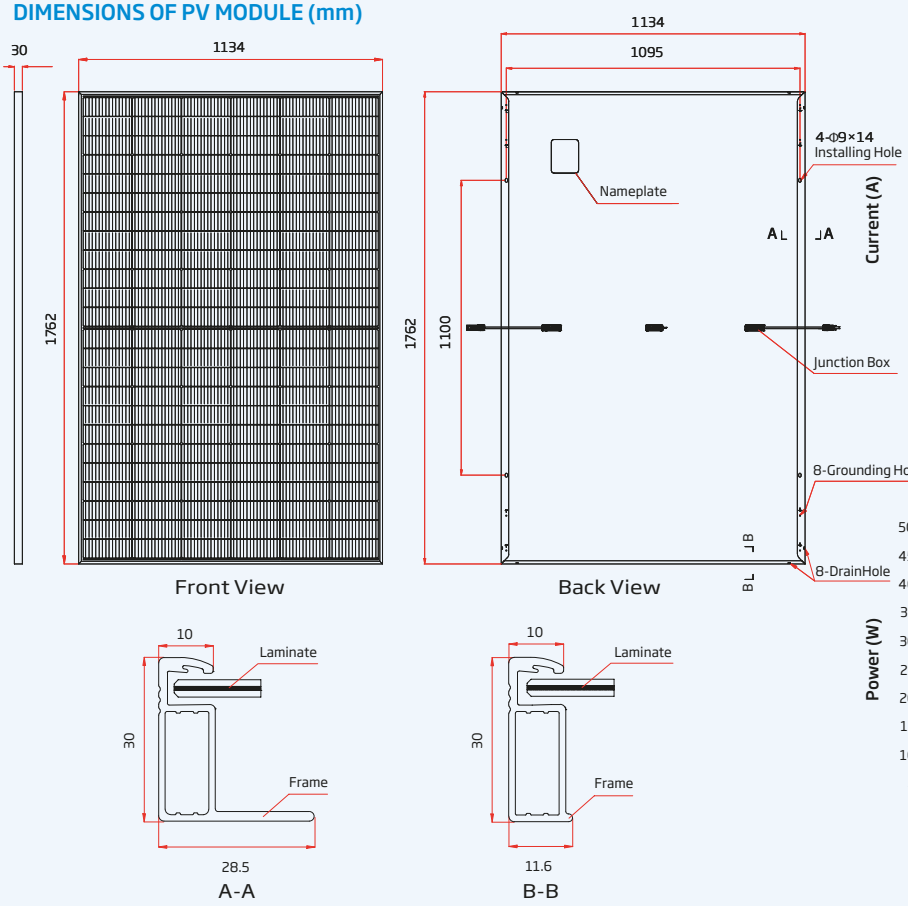
IEC61215/IEC61730/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse Gases Emissions Verification
ISO45001: Occupational Health and Safety Management System

Trinasolar

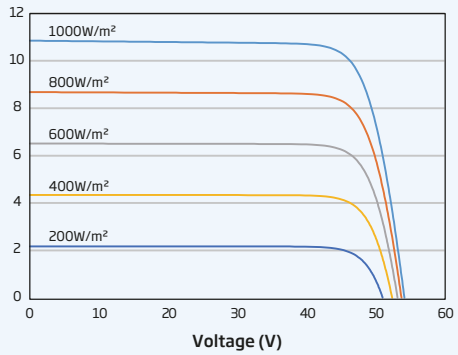
Vertex S+ Shield

DUAL GLASS N type i-TOPCon Ultra MODULE

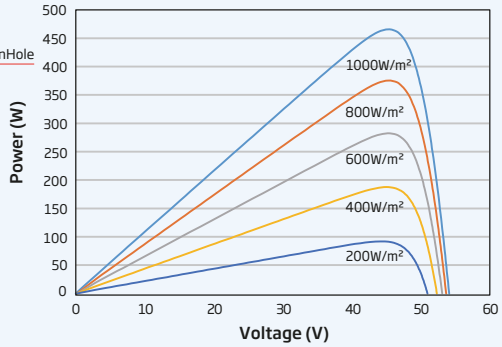
DIMENSIONS OF PV MODULE (mm)



I-V CURVES OF PV MODULE (465 W)



P-V CURVES OF PV MODULE (465 W)



ELECTRICAL DATA (STC)

	TSM-450 NED9R.28	TSM-455 NED9R.28	TSM-460 NED9R.28	TSM-465 NED9R.28	TSM-470 NED9R.28	TSM-475 NED9R.28
Peak Power Watts-PMAX (Wp)*	450	455	460	465	470	475
Power Selection (W)**			0/+5			
Maximum Power Voltage-VMPP (V)	44.6	45.0	45.4	45.7	46.1	46.4
Maximum Power Current-IMPP (A)	10.09	10.11	10.14	10.16	10.19	10.24
Open Circuit Voltage-VOC (V)	52.9	53.4	53.8	54.2	54.6	55.0
Short Circuit Current-ISC (A)	10.74	10.77	10.81	10.85	10.89	10.93
Module Efficiency η m (%)	22.5	22.8	23.0	23.3	23.5	23.8

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

ELECTRICAL DATA (NOCT)

	TSM-450 NED9R.28	TSM-455 NED9R.28	TSM-460 NED9R.28	TSM-465 NED9R.28	TSM-470 NED9R.28	TSM-475 NED9R.28
Maximum Power-PMAX (Wp)	344	348	352	355	359	362
Maximum Power Voltage-VMPP (V)	42.0	42.3	42.7	42.8	43.2	43.4
Maximum Power Current-IMPP (A)	8.19	8.22	8.25	8.28	8.31	8.35
Open Circuit Voltage-VOC (V)	50.2	50.6	51.0	51.4	51.7	52.1
Short Circuit Current-ISC (A)	8.66	8.68	8.71	8.74	8.78	8.79

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	27 kg
Front Glass	2.5 mm AR Coating Heat Strengthened Glass
Back Glass	2.0 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 mm² 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 PMAX	-0.29 %/°C
Temperature Coefficient of VOC	-0.24 %/°C
Temperature Coefficient of ISC	0.04 %/°C

MAXIMUM RATINGS

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

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:	828 pieces

Trinasolar

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

© 2026 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_2026_A

www.trinasolar.com