

Vertex S⁺

N-type i-TOPCon DUAL GLASS
Monocrystalline module

PRODUCT: TSM-NEG9R.28

PRODUCT RANGE: 430-455W

435W

MAXIMUM POWER OUTPUT

0~+5W

POSITIVE POWER TOLERANCE

21.8 %

MAXIMUM EFFICIENCY



Small in size, bigger on power

- Up to 455W, 22.8% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Reduce installation cost with higher power bin and efficiency
- Boost performance in warm weather with low temperature coefficient and operating temperature



Dual-glass Design, more secure and sustainable

- Upgraded dual glass of Vertex S, less prone to micro-cracks and scratches on the back during installation
- Excellent fire rating, weather resistance, salt spray, sand dust, ammonia performance which is fully applicable in coastal, high temperature, humidity area and harsh environment



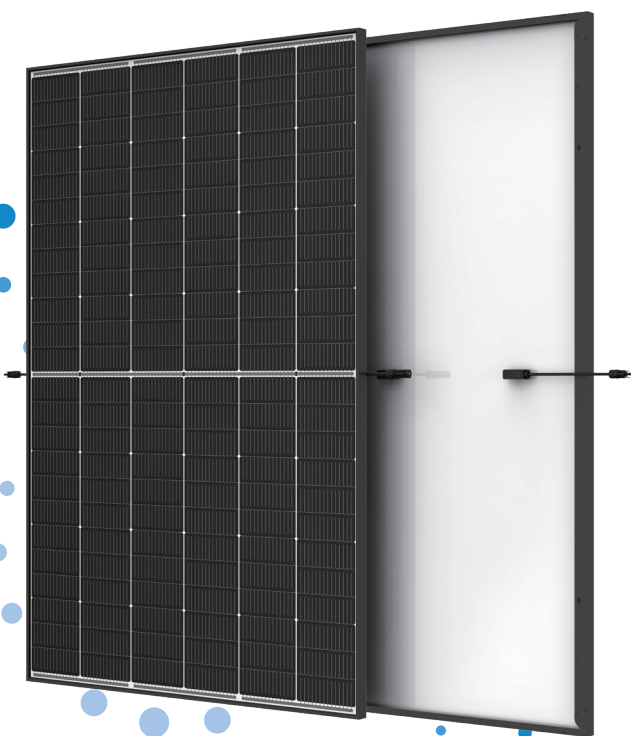
Ultra-low Degradation, longer warranty, higher output

- First-year degradation 1% and annual degradation at 0.4%
- Up to 15 years product warranty and 30 years power warranty

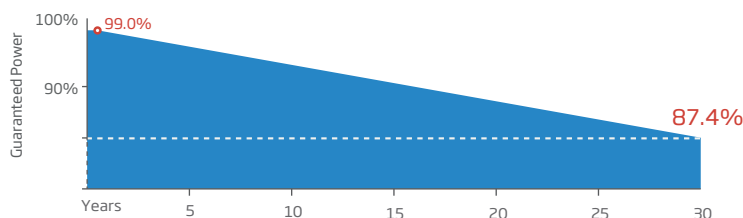


Universal solution for residential and C&I rooftops

- Easy for integration, designed for compatibility with existing mainstream inverters and diverse mounting systems
- Perfect size and low weight for handling and installation
- Most valuable solution on low load capacity rooftops (weight similar to backsheet version)
- Mechanical performance up to 5400 Pa positive load and 4000 Pa negative load



Trina Solar's Dual Glass Performance Warranty



Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716

ISO 9001: Quality Management System

ISO 14001: Environmental Management System

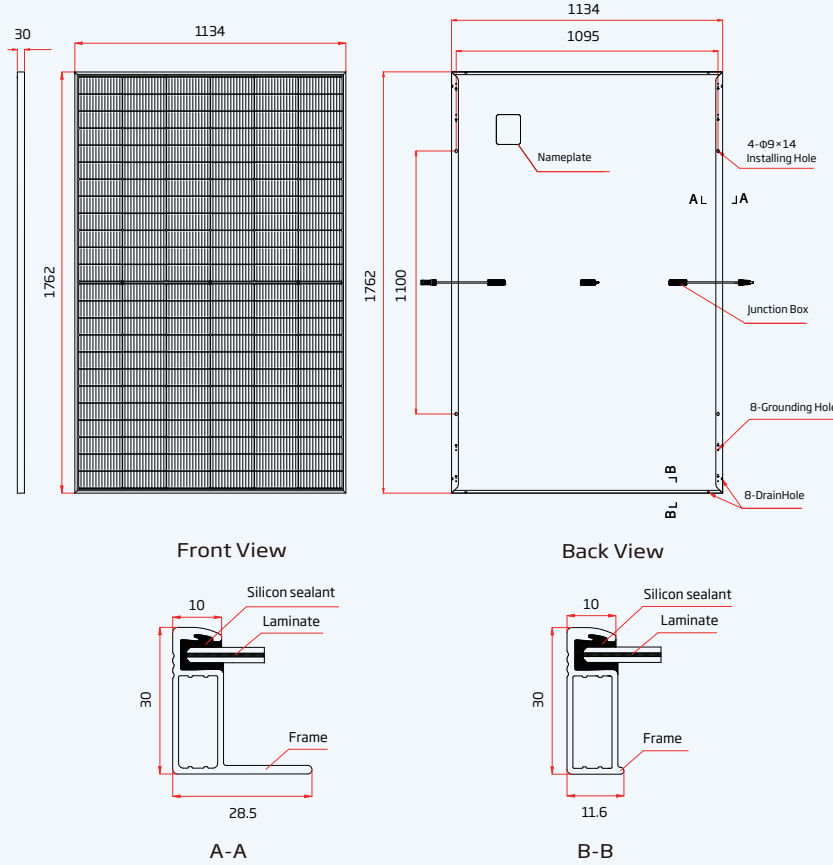


ISO14064: Greenhouse Gases Emissions Verification

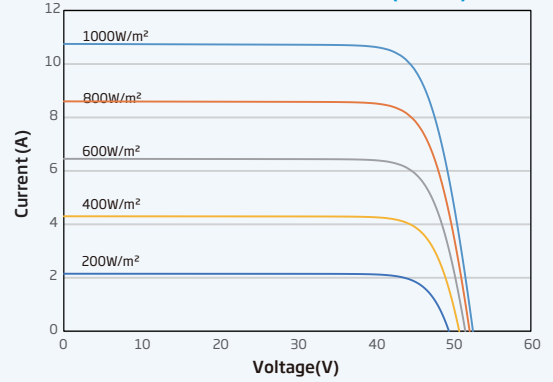
ISO45001: Occupational Health and Safety Management System



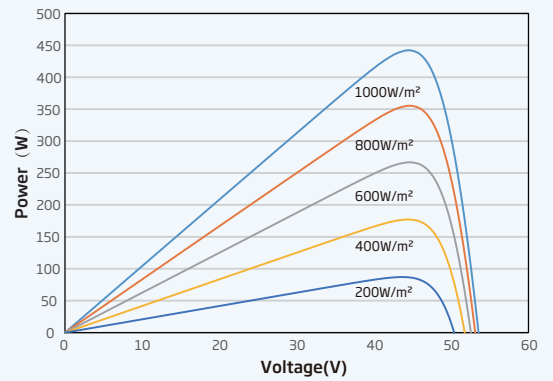
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(445W)



P-V CURVES OF PV MODULE(445W)



ELECTRICAL DATA (STC)

| | | | | | | |
|--------------------------------------|--------|-------|-------|-------|-------|-------|
| Peak Power Watts- P_{MAX} (Wp)* | 430 | 435 | 440 | 445 | 450 | 455 |
| Power Tolerance- P_{MAX} (W) | 0 ~ +5 | | | | | |
| Maximum Power Voltage- V_{MPP} (V) | 43.2 | 43.6 | 44.0 | 44.3 | 44.6 | 45.0 |
| Maximum Power Current- I_{MPP} (A) | 9.96 | 9.99 | 10.01 | 10.05 | 10.09 | 10.11 |
| Open Circuit Voltage- V_{OC} (V) | 51.4 | 51.8 | 52.2 | 52.6 | 52.9 | 53.4 |
| Short Circuit Current- I_{SC} (A) | 10.59 | 10.64 | 10.67 | 10.71 | 10.74 | 10.77 |
| Module Efficiency η_m (%) | 21.5 | 21.8 | 22.0 | 22.3 | 22.5 | 22.8 |

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

ELECTRICAL DATA (NOCT)

| | | | | | | |
|--------------------------------------|------|------|------|------|------|------|
| Maximum Power- P_{MAX} (Wp) | 329 | 333 | 337 | 341 | 344 | 348 |
| Maximum Power Voltage- V_{MPP} (V) | 40.7 | 41.0 | 41.4 | 41.7 | 42.0 | 42.3 |
| Maximum Power Current- I_{MPP} (A) | 8.08 | 8.12 | 8.14 | 8.17 | 8.19 | 8.22 |
| Open Circuit Voltage- V_{OC} (V) | 48.7 | 49.1 | 49.5 | 49.9 | 50.2 | 50.6 |
| Short Circuit Current- I_{SC} (A) | 8.54 | 8.58 | 8.60 | 8.63 | 8.66 | 8.68 |

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

MECHANICAL DATA

| | |
|----------------------|--|
| Solar Cells | N-type i-TOPCon Monocrystalline |
| No. of cells | 144 cells |
| Module Dimensions | 1762×1134×30 mm (69.37×44.65×1.18 inches) |
| Weight | 21.8kg (48.06 lb) |
| Front Glass | 1.6 mm (0.06 inches), High Transmission, AR Coated Heat Strengthened Glass |
| Encapsulant material | POE/EVA |
| Back Glass | 1.6mm(0.06 inches), Heat Strengthened Glass |
| Frame | 30mm (1.18 inches) Anodized Aluminium Alloy, Black |
| 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 | MC4 EVO2 / EVO2A / TS4 Plus / 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} | -0.29%/°C |
| Temperature Coefficient of V_{OC} | -0.24%/°C |
| Temperature Coefficient of I_{SC} | 0.04%/°C |

MAXIMUM RATINGS

| | |
|-------------------------|----------------|
| Operational Temperature | -40~+85°C |
| Maximum System Voltage | 1500V DC (IEC) |
| Max Series Fuse Rating | 25A |

WARRANTY

15 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