



## N-type i-TOPCon Monofacial Dual Glass MONOCRYSTALLINE MODULE

PRODUCT: TSM-NEG9R.28

PRODUCT RANGE: 425-450W

# 450W

MAXIMUM POWER OUTPUT

# 0~+5W

POSITIVE POWER TOLERANCE

# 22.5%

MAXIMUM EFFICIENCY



### Small in size, bigger on power

- Up to 450W, 22.5% 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

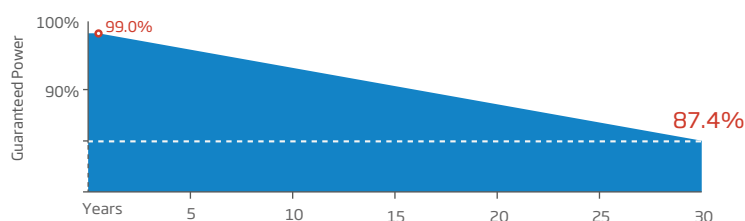
- First-year degradation 1% and annual degradation at 0.4%
- Up to 15/25 years product warranty and 30 years power warranty



### 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 Vertex Monofacial Dual Glass Performance Warranty



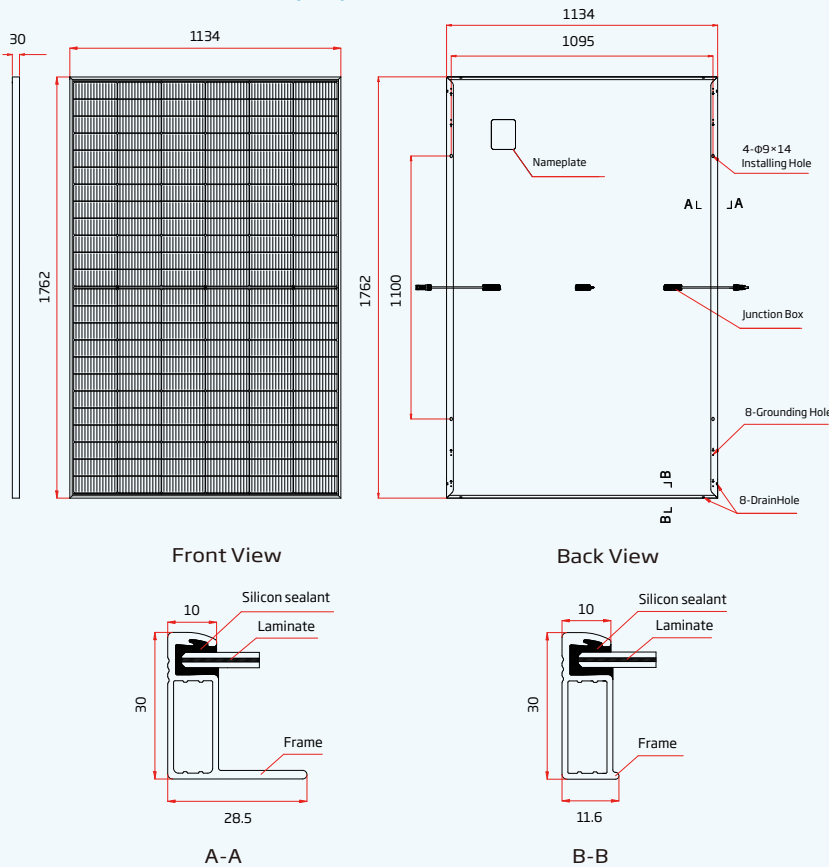
### Comprehensive Products and System Certificates



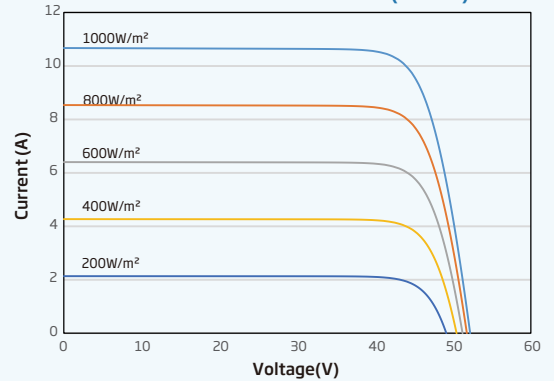
IEC61215/IEC61730/IEC61701/IEC62716  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse Gases Emissions Verification  
 ISO45001: Occupational Health and Safety Management System



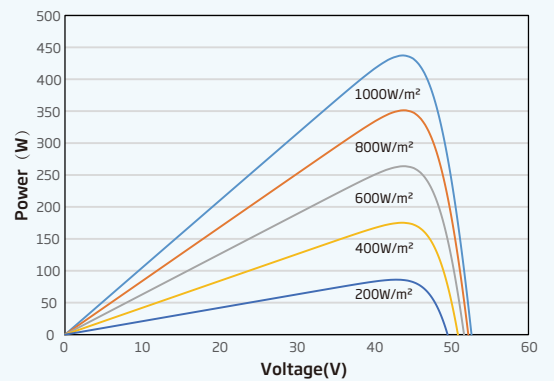
#### DIMENSIONS OF PV MODULE(mm)



#### I-V CURVES OF PV MODULE(440W)



#### P-V CURVES OF PV MODULE(440W)



#### ELECTRICAL DATA (STC)

Peak Power Watts-P <sub>MAX</sub> (Wp)*	425	430	435	440	445	450
Power Tolerance-P <sub>MAX</sub> (W)	0 ~ +5					
Maximum Power Voltage-V <sub>MPP</sub> (V)	42.9	43.2	43.6	44.0	44.3	44.6
Maximum Power Current-I <sub>MPP</sub> (A)	9.92	9.96	9.99	10.01	10.05	10.09
Open Circuit Voltage-V <sub>OC</sub> (V)	50.9	51.4	51.8	52.2	52.6	52.9
Short Circuit Current-I <sub>SC</sub> (A)	10.56	10.59	10.64	10.67	10.71	10.74
Module Efficiency $\eta_m$ (%)	21.3	21.5	21.8	22.0	22.3	22.5

STC: Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Air Mass AM1.5. \*Measuring tolerance: ±3%.

#### ELECTRICAL DATA (NOCT)

Maximum Power-P <sub>MAX</sub> (Wp)	325	328	332	336	339	343
Maximum Power Voltage-V <sub>MPP</sub> (V)	40.1	40.5	40.8	41.1	41.4	41.7
Maximum Power Current-I <sub>MPP</sub> (A)	8.09	8.11	8.15	8.17	8.20	8.24
Open Circuit Voltage-V <sub>OC</sub> (V)	48.3	48.8	49.2	49.5	49.9	50.2
Short Circuit Current-I <sub>SC</sub> (A)	8.51	8.53	8.57	8.60	8.63	8.65

NOCT: Irradiance at 800W/m<sup>2</sup>, Ambient Temperature 20°C, Wind Speed 1m/s.

#### MECHANICAL DATA

Solar Cells	N-type Monocrystalline
No. of cells	144 cells
Module Dimensions	1762×1134×30 mm (69.06×43.15×1.18 inches)
Weight	21.0kg (46.30 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 (0.06 inches) Anodized Aluminium Alloy, Black
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm <sup>2</sup> (0.006 inches <sup>2</sup> ), Portrait: 350/280 mm(13.78/11.02 inches) Length can be customized
Connector	TS4 Plus / TS4

#### TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P <sub>MAX</sub>	-0.29%/°C
Temperature Coefficient of V <sub>OC</sub>	-0.24%/°C
Temperature Coefficient of I <sub>SC</sub>	0.04%/°C

#### MAXIMUM RATINGS

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

#### WARRANTY

15 / 25* year Product Workmanship Warranty
30 year Power Warranty
1% first year degradation
0.4% Annual Power Attenuation

(\*upon request. Please refer to product warranty for details)

#### PACKAGING CONFIGURATION

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