



N-type i-TOPCon

DUAL GLASS MONOCRYSTALLINE MODULE

TSM-XXXNEG9R.28 425-460W

460_W / MAXIMUM POWER OUTPUT

23.0% / MAXIMUM EFFICIENCY



High Customer Value

- Suitable for residential and C&I rooftop
- Perfect size and low weight for handling and installation
- Compatible with mainstream inverters and diverse mounting systems
- Mechanical test load up to 5400 Pa front side and 4000 Pa back side
- Certified lifetime carbon footprint assessment



High reliability with light double glass

- Less prone to micro-cracks and scratches on the back side
- Fire Class rating C
- Up to 25 years product warranty and 30 years power warranty



High power up to 460W

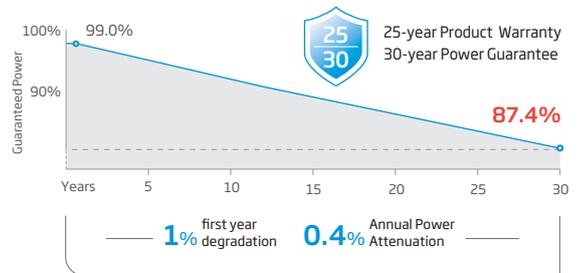
- Up to 23.0% module efficiency, on 210 innovative platform
- Patented i-TOPCon technology with continuous efficiency improvement, including contact resistance reduction, rear reflection enhancement and edge quality repairment



High energy yield

- Excellent low irradiation performance, validated by 3rd party
- Lower temperature efficient (-0.29%/°C) and lower working temperature

Performance Warranty



(**Please refer to Limited Warranty Supplement that applies to the TSM-***NEG9R.28, TSM-***NEG9RC.27, Products supplied after 1st Jan 2024 and installed within Australia & New Zealand market.)

Comprehensive Products and System Certificates

IEC61215/IEC61730

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



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

© 2024 Trina Solar Co., Ltd. All rights reserved. Specifications included in this datasheet are subject to change without notice.

Version number: TSM_EN_2024_Aus_C
Country of Origin: China



ELECTRICAL DATA (STC) TSM-XXXNEG9R.28 (XXX=425-460)

Peak Power Watts- $P_{MAX}(Wp)$ *	425	430	435	440	445	450	455	460
Binning Tolerance- $P_{MAX}(Wp)$	0 ~ +5							
Maximum Power Voltage- $V_{MPP}(V)$	42.9	43.2	43.6	44.0	44.3	44.6	45.0	45.4
Maximum Power Current- $I_{MPP}(A)$	9.92	9.96	9.99	10.01	10.05	10.09	10.11	10.14
Open Circuit Voltage- $V_{oc}(V)$	50.9	51.4	51.8	52.2	52.6	52.9	53.4	53.8
Short Circuit Current- $I_{sc}(A)$	10.56	10.59	10.64	10.67	10.71	10.74	10.77	10.81
Module Efficiency η_m (%)	21.3	21.5	21.8	22.0	22.3	22.5	22.8	23.0

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

ELECTRICAL DATA (NOCT)

Peak Power Watts- $P_{MAX}(Wp)$	325	329	333	337	341	344	348	352
Maximum Power Voltage- $V_{MPP}(V)$	40.1	40.7	41.0	41.4	41.7	42.0	42.3	42.7
Maximum Power Current- $I_{MPP}(A)$	8.07	8.08	8.12	8.14	8.17	8.19	8.22	8.25
Open Circuit Voltage- $V_{oc}(V)$	48.3	48.7	49.1	49.5	49.9	50.2	50.6	51.0
Short Circuit Current- $I_{sc}(A)$	8.51	8.54	8.58	8.60	8.63	8.66	8.68	8.71

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

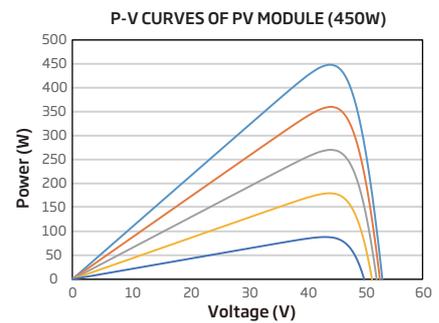
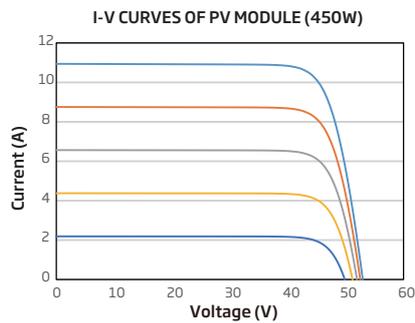
TEMPERATURE RATINGS

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

CURVES OF PV MODULE



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	21.0 kg (46.30lb)
Front Glass	1.6 mm (0.06 inches) AR Coated Heat Strengthened Glass
Back Glass	1.6 mm (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) Length: 1300/1300 mm(43.3/43.3 inches)
Connector	Stabuli MC4 EVO2
Packaging	Modules per box: 36 pieces Modules per 40' container: 936pieces

