

## N-type i-TOPCon Ultra

DUAL GLASS MONOCRYSTALLINE MODULE

TSM-NEG9R.25Z 460-480W

**480W** MAXIMUM POWER OUTPUT

**24.0%** MAXIMUM EFFICIENCY



### Premium full black aesthetic

- Uniform, all-black, full-screen high density interconnection for a seamless design with no cell gaps



### High power & efficiency

- Up to 480 W and 24% efficiency with high-voltage, low-current architecture for more power on limited roof space



### Optimised performance

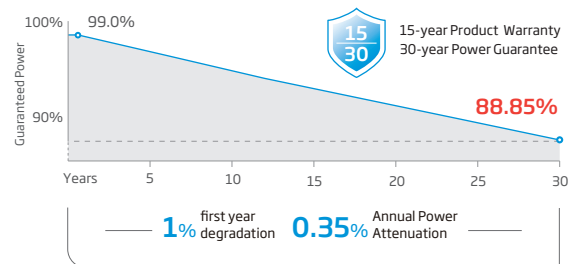
- Lower temperature coefficient and strong low-irradiance performance maximises power generation on rooftops



### Long-term value for residential homes

- Low annual degradation backed by up to 30 year power warranty and 25 year product warranty

### Performance Warranty



\* Please refer to product warranty for details

### Comprehensive Products and System Certificates

- ISO 9001: Quality Management System
- ISO 14001: Environmental Management System
- ISO14064: Greenhouse Gases Emissions Verification
- ISO45001: Occupational Health and Safety Management System



**ELECTRICAL DATA (STC)**

|                                     |        |       |       |       |       |
|-------------------------------------|--------|-------|-------|-------|-------|
| Peak Power Watts- $P_{MAX}(Wp)^*$   | 460    | 465   | 470   | 475   | 480   |
| Power Selection (W)**               | 0 ~ +5 |       |       |       |       |
| Maximum Power Voltage- $V_{MPP}(V)$ | 46.60  | 46.90 | 47.20 | 47.60 | 47.90 |
| Maximum Power Current- $I_{MPP}(A)$ | 9.89   | 9.93  | 9.96  | 9.99  | 10.03 |
| Open Circuit Voltage- $V_{oc}(V)$   | 55.20  | 55.50 | 55.80 | 56.20 | 56.50 |
| Short Circuit Current- $I_{sc}(A)$  | 10.59  | 10.62 | 10.65 | 10.68 | 10.71 |
| Module Efficiency $\eta_m(\%)$      | 23.0   | 23.3  | 23.5  | 23.8  | 24.0  |

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

**ELECTRICAL DATA (NOCT)**

|                                     |       |       |       |       |       |
|-------------------------------------|-------|-------|-------|-------|-------|
| Peak Power Watts- $P_{MAX}(Wp)$     | 349   | 353   | 357   | 361   | 364   |
| Maximum Power Voltage- $V_{MPP}(V)$ | 43.30 | 43.60 | 44.00 | 44.30 | 44.60 |
| Maximum Power Current- $I_{MPP}(A)$ | 8.07  | 8.10  | 8.13  | 8.15  | 8.17  |
| Open Circuit Voltage- $V_{oc}(V)$   | 52.10 | 52.40 | 52.80 | 53.20 | 53.50 |
| Short Circuit Current- $I_{sc}(A)$  | 8.52  | 8.55  | 8.58  | 8.61  | 8.63  |

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

**TEMPERATURE RATINGS**

|   |             |
|---|-------------|
| NOCT (Nominal Operating Cell Temperature) | 43°C (±2°C) |
| Temperature Coefficient of $P_{MAX}$      | -0.26% /°C  |
| Temperature Coefficient of $V_{oc}$       | -0.24% /°C  |
| Temperature Coefficient of $I_{sc}$       | 0.04% /°C   |

Due to different testing methods, the actual performances might differ from the declared specifications.

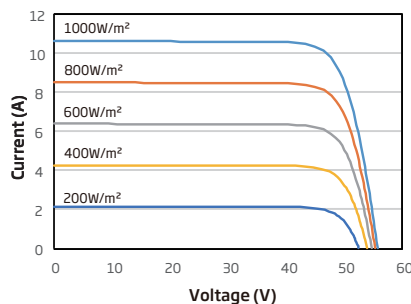
**APPLICATION CONDITIONS**

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

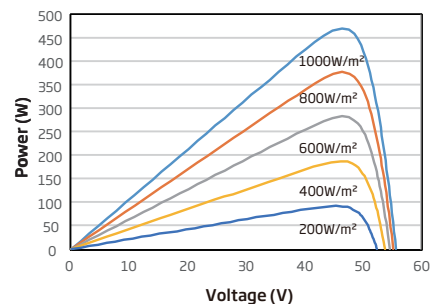
\*PV module 98th percentile operating temperature: 70°C.

**CURVES OF PV MODULE**

I-V CURVES OF PV MODULE (470W)



P-V CURVES OF PV MODULE (470W)



**MECHANICAL DATA**

|                   |  |
|-------------------|--|
| Solar Cells       | N-type i-TOPCon Monocrystalline  |
| No. of cells      | 150 cells  |
| Module Dimensions | 1762×1134×30 mm<br>(69.37×44.65×1.18 inches)   |
| Weight            | 21.1 kg (46.52lb)  |
| Front Glass       | 1.6mm (0.06inches),<br>AR Coating Heat Strengthened Glass  |
| Back Glass        | 1.6mm (0.06inches),<br>Heat Strengthened Glass   |
| Frame             | 30mm(1.18inches)<br>Anodized Aluminium Alloy, Black  |
| J-Box             | IP 68 rated  |
| Cables            | Photovoltaic Technology<br>Cable 6.0mm <sup>2</sup> (0.009inches <sup>2</sup> )<br>Landscape :1100/1100 mm(43.31/43.31 inches)<br>Length can be customized |
| Connector         | TS4 Plus / TS4 / MC4 EVO2*   |
| Packaging         | Modules per box: 37 pieces<br>Modules per 40' container: 962 pieces  |

\*The connector names listed are general names; specific types are subject to the certification documents.

