Vertex S+

N-type i-TOPCon Ultra

DUAL GLASS MONOCRYSTALLINE MODULE

TSM-NEG9R.28 **440-470W**



470W / MAXIMUM POWER OUTPUT

23.5% / 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
- Excellent fire rating, weather resistance, sustainable in harsh environments and extreme weather conditions
- Certified resistance against salt spray, sand dust, ammonia, PID
- Up to 25 years product warranty and 30 years power warranty

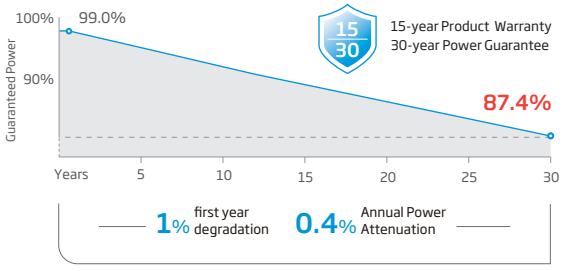
High power up to 470W

- Up to 23.5% 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 product warranty for details

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
ISO14067: Product Carbon Footprint Limited Assurance

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

N-type i-TOPCon Ultra DUAL GLASS MONOCRYSTALLINE MODULE

ELECTRICAL DATA (STC)

Peak Power Watts-PMAX(Wp)*	440	445	450	455	460	465	470
Power Selection (W)**				0 ~ +5			
Maximum Power Voltage-VMPP (V)	44.00	44.30	44.60	45.00	45.40	45.80	46.10
Maximum Power Current-IMPP (A)	10.01	10.05	10.09	10.11	10.14	10.16	10.20
Open Circuit Voltage-VOC (V)	52.20	52.60	52.90	53.40	53.80	54.20	54.60
Short Circuit Current-ISC (A)	10.67	10.71	10.74	10.77	10.81	10.85	10.89
Module Efficiency η m (%)	22.0	22.3	22.5	22.8	23.0	23.3	23.5

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

ELECTRICAL DATA (NOCT)

Peak Power Watts-PMAX(Wp)	337	341	344	348	352	355	358
Maximum Power Voltage-VMPP (V)	41.40	41.70	42.00	42.30	42.70	42.80	43.10
Maximum Power Current-IMPP (A)	8.14	8.17	8.19	8.22	8.25	8.28	8.31
Open Circuit Voltage-VOC (V)	49.50	49.90	50.20	50.60	51.00	51.40	51.80
Short Circuit Current-ISC (A)	8.60	8.63	8.66	8.68	8.71	8.74	8.76

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

TEMPERATURE RATINGS

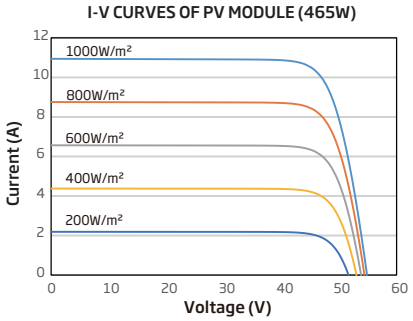
NOCT (Nominal Operating Cell Temperature)	43℃ (±2℃)
Temperature Coefficient of PMAX	- 0.29% /℃
Temperature Coefficient of VOC	- 0.24% /℃
Temperature Coefficient of ISC	0.04% /℃

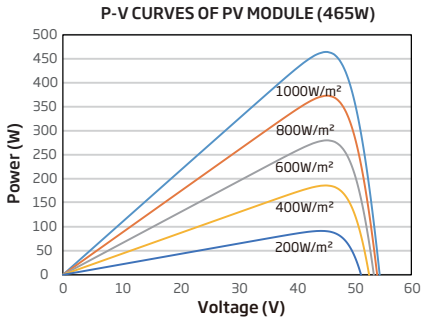
Due to different testing methods, the actual performances might differ from the declared specifications.

APPLICATION CONDITIONS

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

CURVES OF PV MODULE

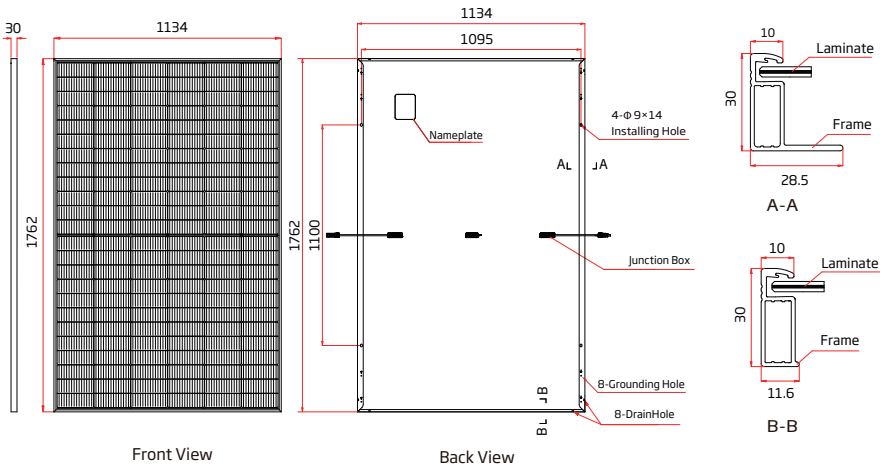




MECHANICAL DATA

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 Coating 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 4.0mm² (0.006 inches²) Portrait:200/320 mm(7.87/12.60inches) Length can be customized
Connector	TS4 Plus / TS4 / MC4 EVO2*
Packaging	Modules per box: 36 pieces Modules per 40' container: 936pieces

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



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