

440 W

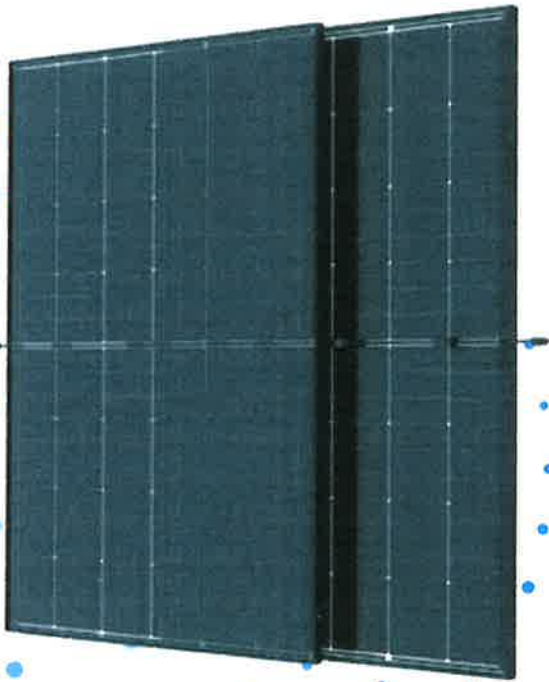
MAXIMUM POWER OUTPUT

0/+5 W

POSITIVE POWER TOLERANCE

22.0 %

MAXIMUM EFFICIENCY



Small in size, bigger on power

- Generates up to 440 W, 22.0 % module efficiency with high density interconnect technology
- Boost performance at high temperature environments with better thermal behavior



Transparent Dual-glass Design

- Designed with aesthetics in mind
- Excellent fire rating and resistance to harsh environmental conditions
- 5,400 Pa snow load and 4,000 Pa wind load (test loads)



Maximize Energy Harvest

- Higher bifaciality up to 85 %
- Up to 25 years product warranty and 30 years power warranty
- 1 % first-year degradation and 0.4 % annual degradation enabled by N-type technology



Universal solution for residential and C&I rooftops

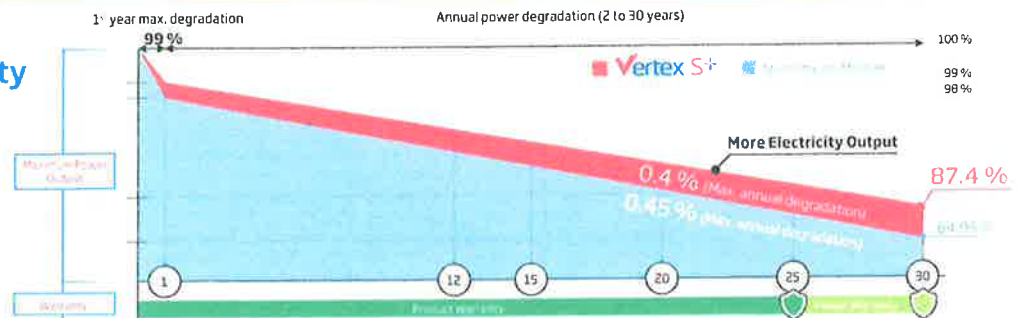
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling

Extended Vertex S+ Warranty

1 %
1st year max. degradation

0.4 %
Max. annual degradation from year 2 to 30

25 Years
Product Workmanship Warranty

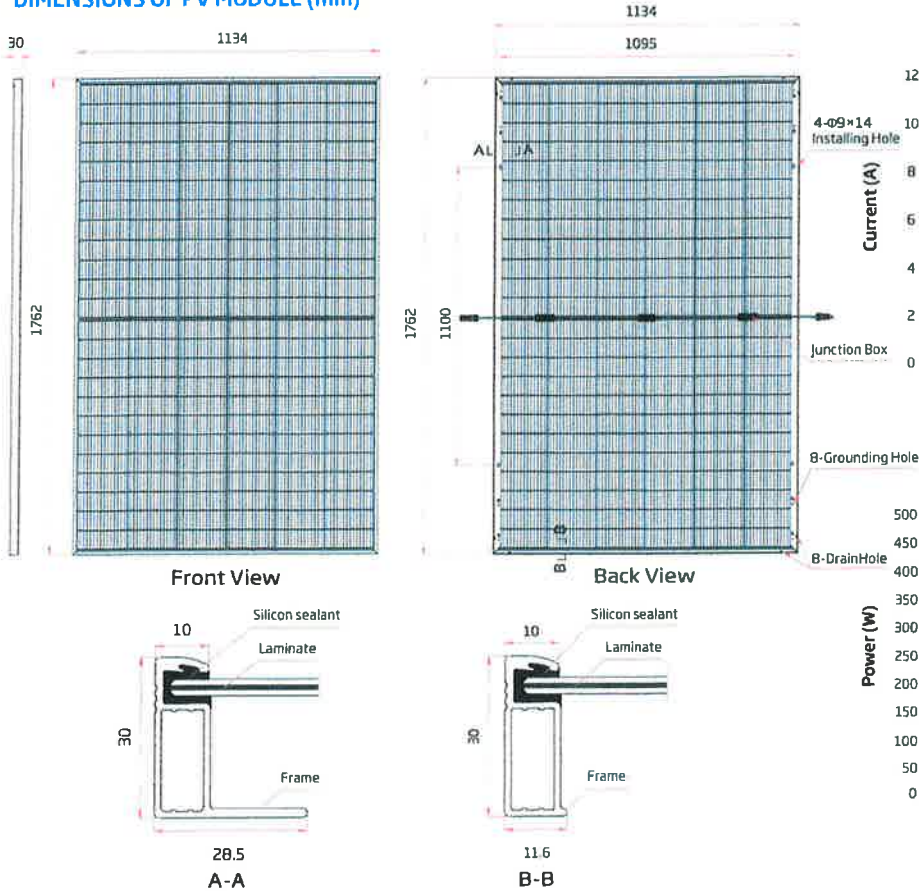


Comprehensive Products and System Certificates

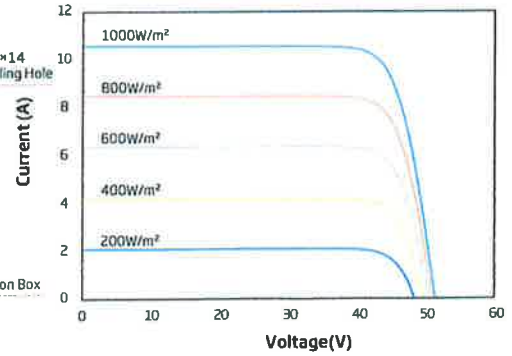


IEC61215/IEC61730/IEC61701/IEC62716/UL61730
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification

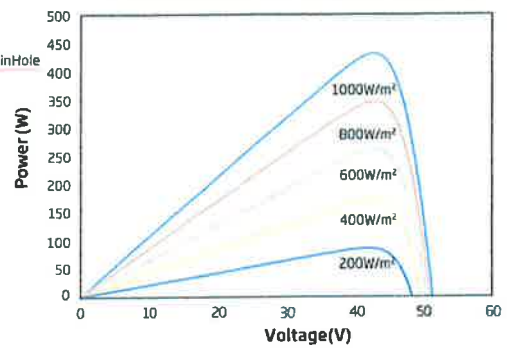
DIMENSIONS OF PV MODULE (mm)



I-V CURVES OF PV MODULE (430 W)



P-V CURVES OF PV MODULE (430 W)



| ELECTRICAL DATA (STC) | TSM-415 | TSM-420 | TSM-425 | TSM-430 | TSM-435 | TSM-440 |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 |
| Peak Power Watts- P_{MAX} (Wp)* | 415 | 420 | 425 | 430 | 435 | 440 |
| Power Tolerance- P_{MAX} (W) | 0/+5 | | | | | |
| Maximum Power Voltage- V_{MPP} (V) | 42.1 | 42.5 | 42.9 | 43.2 | 43.6 | 44.0 |
| Maximum Power Current- I_{MPP} (A) | 9.86 | 9.89 | 9.92 | 9.96 | 9.99 | 10.01 |
| Open Circuit Voltage- V_{oc} (V) | 50.1 | 50.5 | 50.9 | 51.4 | 51.8 | 52.2 |
| Short Circuit Current- I_{sc} (A) | 10.50 | 10.53 | 10.56 | 10.59 | 10.64 | 10.67 |
| Module Efficiency η_m (%) | 20.8 | 21.0 | 21.3 | 21.5 | 21.8 | 22.0 |

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

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

| | | | | | | |
|---|-------|-------|-------|-------|-------|-------|
| Total Equivalent power - P_{MAX} (Wp) | 448 | 454 | 459 | 464 | 470 | 475 |
| Maximum Power Voltage- V_{MPP} (V) | 42.1 | 42.5 | 42.9 | 43.2 | 43.6 | 44.0 |
| Maximum Power Current- I_{MPP} (A) | 10.65 | 10.68 | 10.71 | 10.76 | 10.79 | 10.81 |
| Open Circuit Voltage- V_{oc} (V) | 50.1 | 50.5 | 50.9 | 51.4 | 51.8 | 52.2 |
| Short Circuit Current- I_{sc} (A) | 11.34 | 11.37 | 11.40 | 11.44 | 11.49 | 11.52 |
| Irradiance ratio (rear/front) | 10% | | | | | |

Power Bifaciality: 80 ±5 %

| ELECTRICAL DATA (NOCT) | TSM-415 | TSM-420 | TSM-425 | TSM-430 | TSM-435 | TSM-440 |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 | NEG9RC 27 |
| Maximum Power- P_{MAX} (Wp) | 316 | 320 | 324 | 328 | 332 | 335 |
| Maximum Power Voltage- V_{MPP} (V) | 39.3 | 39.7 | 40.0 | 40.4 | 40.7 | 41.0 |
| Maximum Power Current- I_{MPP} (A) | 8.03 | 8.07 | 8.09 | 8.11 | 8.15 | 8.17 |
| Open Circuit Voltage- V_{oc} (V) | 47.5 | 47.8 | 48.2 | 48.7 | 49.1 | 49.4 |
| Short Circuit Current- I_{sc} (A) | 8.46 | 8.49 | 8.51 | 8.53 | 8.57 | 8.60 |

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

MECHANICAL DATA

| | |
|----------------------|---|
| Solar Cells | Monocrystalline |
| No. of cells | 144 cells |
| Module Dimensions | 1762×1134×30 mm |
| Weight | 21.0 kg |
| Front Glass | 1.6 mm, High Transmission, AR Coated Heat Strengthened Glass |
| Encapsulant material | POE/EVA |
| Back Glass | 1.6 mm, High Transmission, Heat Strengthened Glass |
| Frame | 30 mm Anodized Aluminium Alloy, Black |
| J-Box | IP 68 rated |
| Cables | Photovoltaic Technology Cable 4.0 mm ² Landscape: 1100/1100 mm Portrait: 280/350 mm* |
| Connector | TS4 / MC4 EVO2* |

*Special order only

TEMPERATURE RATINGS

| | |
|---|--------------|
| NOCT (Nominal Operating Cell Temperature) | 43 °C (±2 K) |
| Temperature Coefficient of P_{MAX} | -0.30 %/K |
| Temperature Coefficient of V_{oc} | -0.24 %/K |
| Temperature Coefficient of I_{sc} | 0.04 %/K |

MAXIMUM RATINGS

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

WARRANTY

| |
|--------------------------------------|
| 25 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 |