

Vertex S

BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE09R.05
POWER RANGE: 405-425 W

425 W+

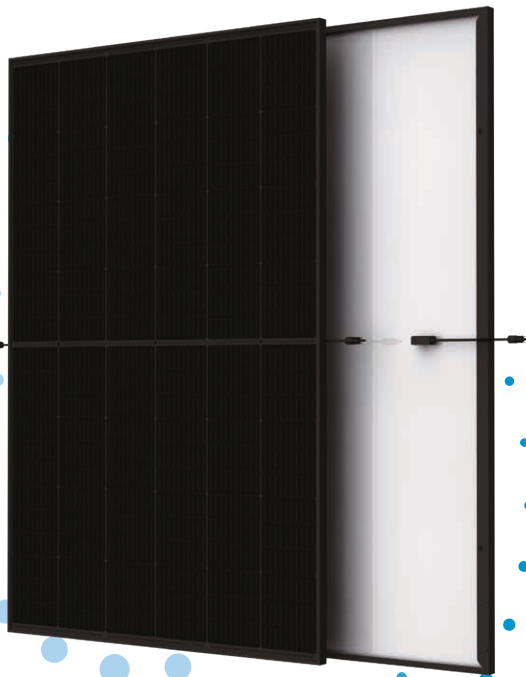
MAXIMUM POWER OUTPUT

0/+5 W

POSITIVE POWER TOLERANCE

21.3 %

MAXIMUM EFFICIENCY



Outstanding Visual Appearance

- Designed with aesthetics in mind
- Ultra-thin, virtually invisible busbars
- Excellent cell color control by machine selection



Small in size, big on power

- Generates up to 425 W, 21.3 % module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Excellent low light performance (IAM) with cell process and module material optimization



Optimal solution for residential rooftops

- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Reduces installation cost with higher power bin and efficiency
- Flexible installation solutions for system deployment



High Reliability

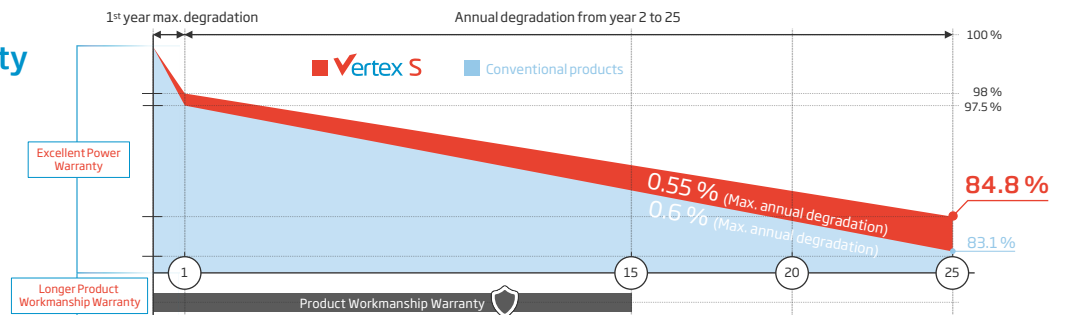
- Positive load up to 6,000 Pa (snow)
- Negative load up to 4,000 Pa (wind)

Extended Vertex S Warranty

2 %
1st year max. degradation

0.55 %
Max. annual degradation from year 2 to 25

15 Years
Product Workmanship Warranty

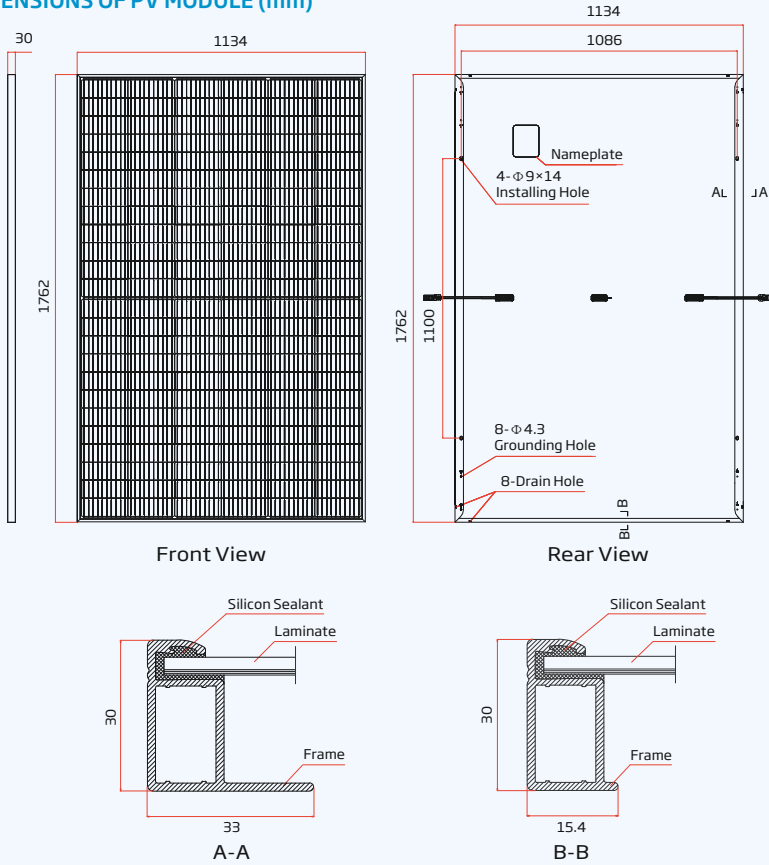


Comprehensive Product and System Certificates

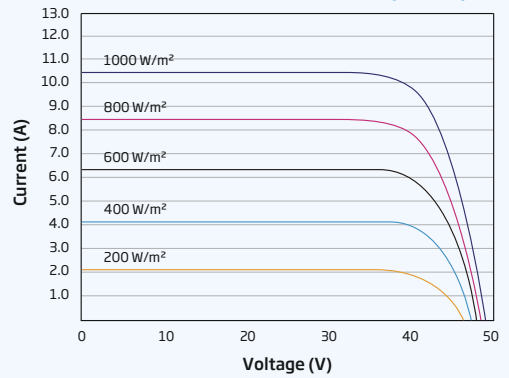


IEC61215/IEC61730/IEC61701/IEC62716
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System

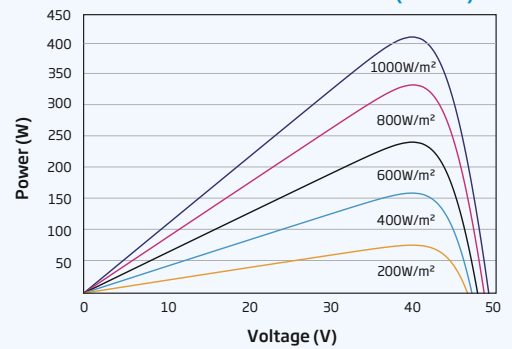
DIMENSIONS OF PV MODULE (mm)



I-V CURVES OF PV MODULE (410W)



P-V CURVES OF PV MODULE (410W)



ELECTRICAL DATA (STC)

| | TSM-405 DE09R.05 | TSM-410 DE09R.05 | TSM-415 DE09R.05 | TSM-420 DE09R.05 | TSM-425 DE09R.05 |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Peak Power Watts- P_{MAX} (Wp)* | 405 | 410 | 415 | 420 | 425 |
| Power Tolerance- P_{MAX} (W) | 0/+5 | 0/+5 | 0/+5 | 0/+5 | 0/+5 |
| Maximum Power Voltage- V_{MPP} (V) | 40.6 | 40.8 | 41.0 | 41.3 | 41.5 |
| Maximum Power Current- I_{MPP} (A) | 9.99 | 10.05 | 10.11 | 10.17 | 10.24 |
| Open Circuit Voltage- V_{oc} (V) | 49.0 | 49.2 | 49.4 | 49.7 | 49.9 |
| Short Circuit Current- I_{sc} (A) | 10.52 | 10.58 | 10.64 | 10.69 | 10.74 |
| Module Efficiency η_m (%) | 20.3 | 20.5 | 20.8 | 21.0 | 21.3 |

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

MECHANICAL DATA

| | |
|----------------------|---|
| Solar Cells | Monocrystalline |
| No. of cells | 144 cells |
| Module Dimensions | 1762×1134×30 mm |
| Weight | 21.8 kg |
| Glass | 3.2 mm, High Transmission, AR Coated Heat Strengthened Glass |
| Encapsulant material | EVA/POE |
| Backsheet | Black-White |
| Frame | 30 mm Anodized Aluminium Alloy |
| 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

ELECTRICAL DATA (NOCT)

| | TSM-405 DE09R.05 | TSM-410 DE09R.05 | TSM-415 DE09R.05 | TSM-420 DE09R.05 | TSM-425 DE09R.05 |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Maximum Power- P_{MAX} (Wp) | 306 | 310 | 313 | 317 | 321 |
| Maximum Power Voltage- V_{MPP} (V) | 38.2 | 38.3 | 38.5 | 38.8 | 39.1 |
| Maximum Power Current- I_{MPP} (A) | 8.03 | 8.08 | 8.13 | 8.17 | 8.21 |
| Open Circuit Voltage- V_{oc} (V) | 46.1 | 46.3 | 46.5 | 46.7 | 46.9 |
| Short Circuit Current- I_{sc} (A) | 8.48 | 8.53 | 8.58 | 8.62 | 8.66 |

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

TEMPERATURE RATINGS

| | |
|--|-------------|
| NOCT(Nominal Operating Cell Temperature) | 43°C (±2 K) |
| Temperature Coefficient of P_{MAX} | -0.34%/K |
| Temperature Coefficient of V_{oc} | -0.25%/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 | 20 A |

WARRANTY

- 15 Year product workmanship warranty
- 25 Year power warranty
- 2% First year degradation
- 0.55% Annual power degradation

(Please refer to the applicable limited warranty for details)

PACKAGING CONFIGURATION

| | |
|---------------------------|------------|
| Modules per box | 36 pieces |
| Modules per 40' container | 936 pieces |