

Vertex S

BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE09R.08
POWER RANGE: 415-435 W

435 W+
MAXIMUM POWER OUTPUT

0/+5 W
POSITIVE POWER TOLERANCE

21.8 %
MAXIMUM EFFICIENCY



Small in size, big on power

- Generates up to 435 W, 21.8 % 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

Universal solution for residential and C&I rooftops

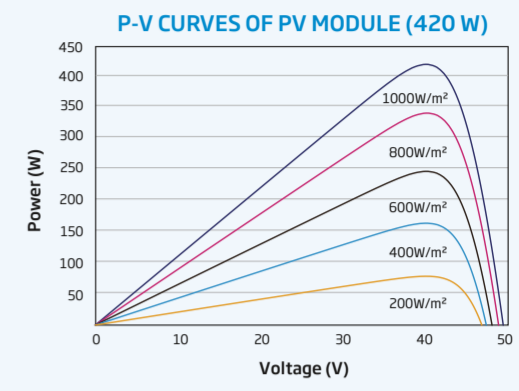
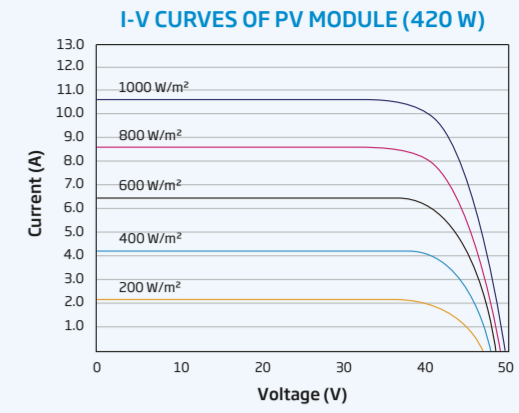
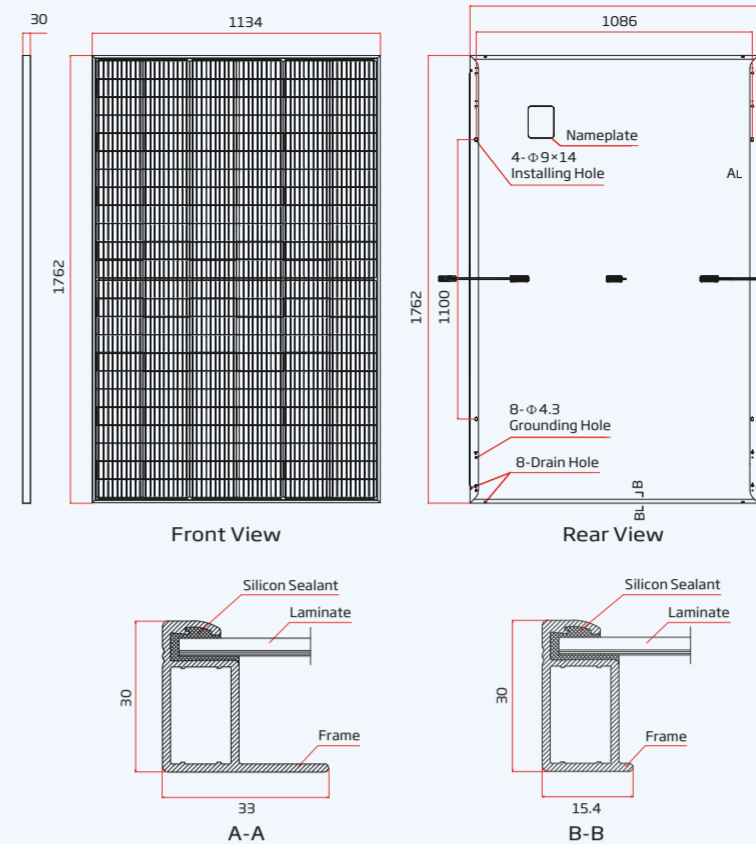
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Reduces installation cost with higher power bin and efficiency
- Flexible installation solutions for system deployment

High Reliability

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

Vertex S

DIMENSIONS OF PV MODULE (mm)



ELECTRICAL DATA (STC)	TSM-415 DE09R.08	TSM-420 DE09R.08	TSM-425 DE09R.08	TSM-430 DE09R.08	TSM-435 DE09R.08
Peak Power Watts- P_{MAX} (Wp)*	415	420	425	430	435
Power Tolerance- P_{MAX} (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Maximum Power Voltage- V_{MP} (V)	41.0	41.3	41.5	41.8	42.0
Maximum Power Current- I_{MP} (A)	10.11	10.17	10.24	10.30	10.36
Open Circuit Voltage- V_{OC} (V)	49.4	49.7	49.9	50.3	50.6
Short Circuit Current- I_{SC} (A)	10.64	10.69	10.74	10.81	10.86
Module Efficiency η_m (%)	20.8	21.0	21.3	21.5	21.8

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	144 cells
Module Dimensions	1762x1134x30 mm
Weight	21.8 kg
Glass	3.2 mm, High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Backsheet	White
Frame	30 mm Anodized Aluminium Alloy
J-Box	IP68 rated
Cables	Photovoltaic Technology Cable 4.0 mm ² Landscape: 1100/1100 mm Portrait: 280/350 mm*
Connector	TS4/MC4 EV02*

ELECTRICAL DATA (NOCT)	TSM-415 DE09R.08	TSM-420 DE09R.08	TSM-425 DE09R.08	TSM-430 DE09R.08	TSM-435 DE09R.08
Maximum Power- P_{MAX} (Wp)	313	317	321	325	329
Maximum Power Voltage- V_{MP} (V)	38.5	38.8	39.1	39.4	39.6
Maximum Power Current- I_{MP} (A)	8.13	8.17	8.21	8.26	8.30
Open Circuit Voltage- V_{OC} (V)	46.5	46.7	46.9	47.3	47.6
Short Circuit Current- I_{SC} (A)	8.58	8.62	8.66	8.71	8.75

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2K)
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

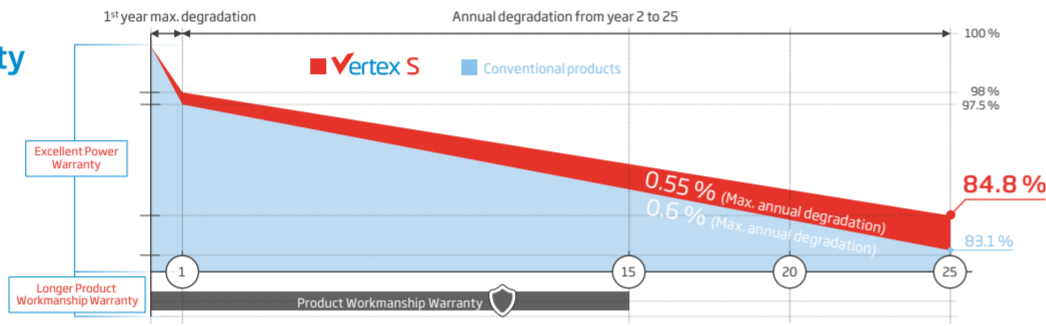
- 15 Year product workmanship warranty
- 25 Year power warranty
- 2% First year degradation
- 0.55% Annual power degradation

PACKAGING CONFIGURATION

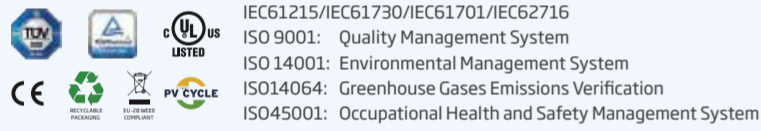
Modules per box	36 pieces
Modules per 40' container	936 pieces

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



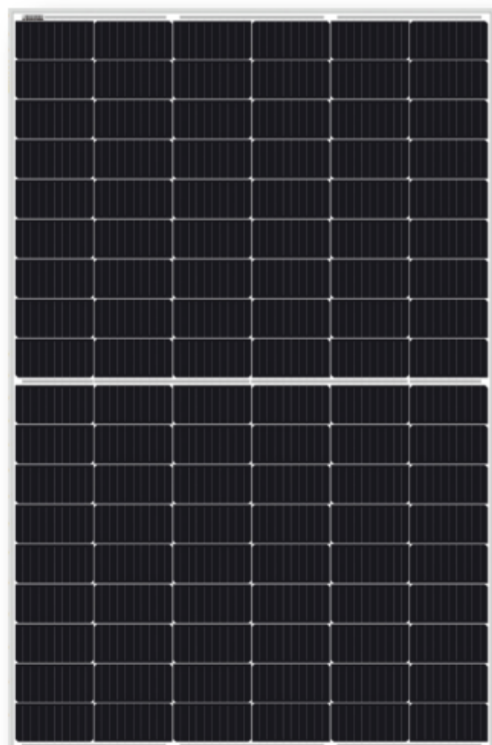
CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.
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www.trinasolar.com

Technical data sheet SOLARWATT Panel classic H 2.0 pure



PRODUCT



SOLARWATT Panel classic H 2.0 pure

Glass-Foil-Module

Best price-performance ratio

With the classic models, Solarwatt offers affordable, robust, high-performance solar modules of proven quality. They are durable and high-yielding as well as resistant to weather effects and environmental influences.

The classic-modules are produced on state-of-the-art production lines and meet the high Solarwatt quality standards. They will therefore generate solar power well beyond their warranty period.

The modules come with a solid 15-year product guarantee.



PRODUCT QUALITY

- ammonia resistant
- salt mist resistant
- LeTID tested
- PID protected
- 100% plus-sorting
- max. 5,400 / 2,400 Pa

SERVICE

Full Coverage insurance
optional (up to 1,000 kWp*)

simple returns policy
as per „Delivery terms for Solarwatt solar modules“

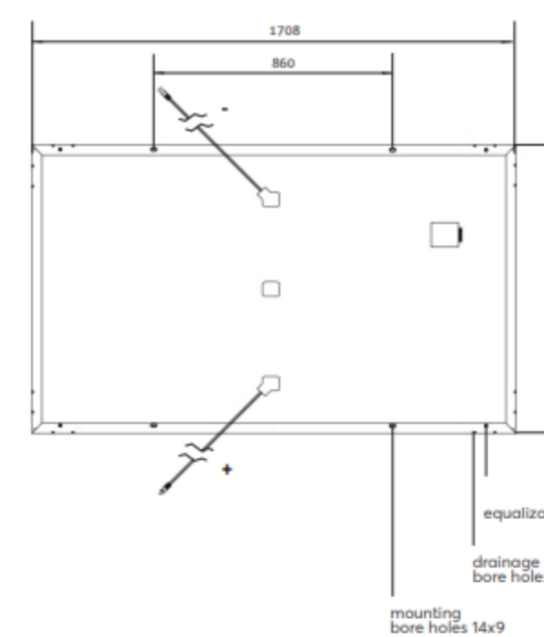
15 year product warranty
12 years product warranty outside Europe and Australia as per „Warranty conditions for Solarwatt solar modules“

25 year performance warranty
on 84.8% of nominal power as per „Warranty conditions for Solarwatt solar modules“

Technical data sheet SOLARWATT Panel classic H 2.0 pure



DIMENSIONS



GENERAL DATA

Module technology	Glass-foil laminate; aluminum frame
Covering material	Tempered solar glass with anti-reflective finish
Encapsulation	Solar cells in polymer encapsulation
Backing material	Multi-layer composite film, white
Solar cells	108 monocrystalline high power PERC solar cells
Cell dimensions	182 x 91 mm
L x W x H / Weight	1708 x 1134 ^{±0.2} x 30 ^{±0.2} mm / ca. 20.0 kg
Connection technology	Cables 2x 1.2 m / 4 mm ² Stäubli Electrical MC4-connectors
Bypass diodes	3
Max. system voltage	1,000 V
IP rating	IP68
Protection class	II (acc. to IEC 61140)
Fire class	C (acc. to IEC 61730)
Certified mechanical ratings as per IEC 61215	Pressure load up to 3,600 Pa (test load 5,400 Pa) Suction load up to 1,600 Pa (test load 2,400 Pa)
Recommended stress load as per Installation Instructions	Please refer to the specifications in the Installation Instructions and Warranty Conditions.
Qualifications	IEC 61215 (incl. LeTID) IEC 61730 2 PFG 2387 (PID) IEC 61701 IEC 62716 MCS 005

ELECTRICAL DATA (STC)

STC (Standard Test Conditions): Irradiation intensity 1,000 W/m², spectral distribution AM 1.5 | Temperature 25 ±2 °C, in accordance to EN 60904-3

Nominal power P_{MAX}	400 Wp	405 Wp	410 Wp
Nominal voltage V_{MP}	30.4 V	30.4 V	30.4 V
Nominal current I_{MP}	13.2 A	13.3 A	13.4 A
Open circuit voltage V_{OC}	37.2 V	37.3 V	37.5 V
Short circuit current I_{SC}	13.6 A	13.7 A	13.8 A
Module efficiency	20.8 %	21.0 %	21.3 %

Measurement tolerances: P_{MAX} ±5%; V_{OC} ±10%; I_{SC} ±10%; I_{MP} ±10%

Reverse-current power rating I_c : 20 A, operating modules with an external power source is only permissible if using a phase fuse with a tripping current of ≤ 20 A.

ELECTRICAL DATA (NMOT AND WEAK LIGHT)

NMOT (Nominal Module Operating Temperature): Irradiation intensity 800 W/m², spectral distribution AM 1.5, Temperature 20 °C
Weak light conditions: Irradiation intensity 200 W/m², Temperature 25 °C, Wind speed 1 m/s, load operation

Nominal power P_{MAX} (NMOT)	300 W	304 W	307 W
Nominal power P_{MAX} (weak light)	78.0 W	79.0 W	80.0 W

Measurement tolerances: P_{MAX} ±5%; V_{OC} ±10%; I_{SC} ±10%; I_{MP} ±10%

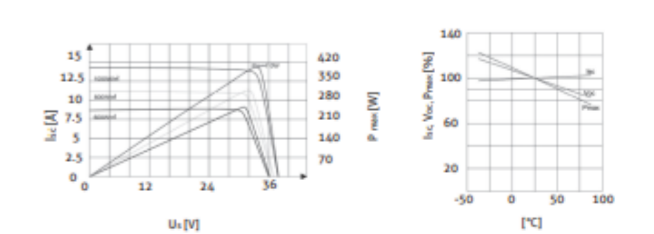
Reduction of module efficiency when irradiance is reduced from 1,000 W/m² to 200 W/m² (at 25 °C): 4 ±2% (relative) / -0.6±0.3% (absolute).

THERMAL FEATURES

Operating temperature range	-40 ... +85 °C
Ambient temperature range	-40 ... +45 °C
Temperature coefficient P_{MAX}	-0.33%/K
Temperature coefficient V_{OC}	-0.25%/K
Temperature coefficient I_{SC}	0.05%/K
NMOT	44 °C

CHARACTERISTIC LINES (Performance Class 410 Wp)

Voltage characteristic line at different temperatures and irradiances



TRANSPORT AND PACKAGING

Modules per pallet	36
Modules per container	936
Pallets per truck	14 / 28
Modules per truck	504 / 1,008
Gross weight per pallet	760 / 1,520 kg
Pallet dimensions (packing size)	1,750 x 1,130 x 1,250 mm