# Vertex S+

## DUAL GLASS N type i-TOPCon MODULE

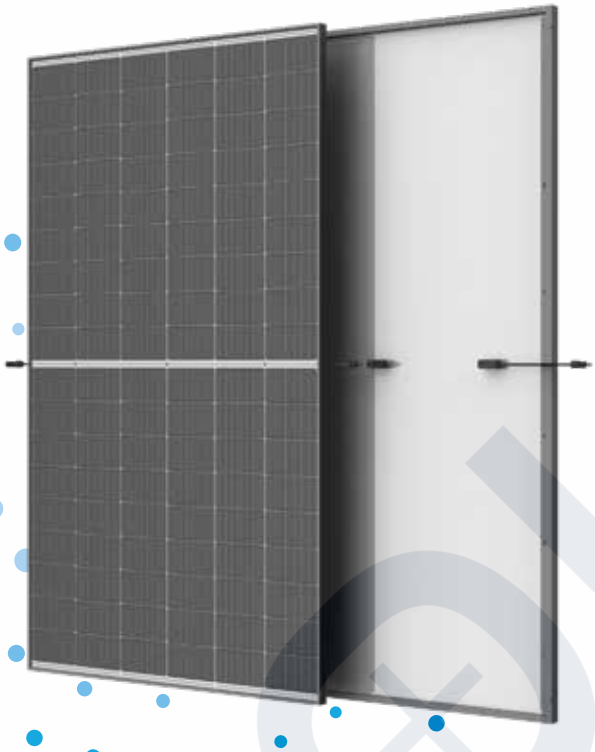
PRODUCT: TSM-NEG18R.28

POWER RANGE: 475-505 W

**505 W**
MAXIMUM POWER OUTPUT

**0/+5 W**
POSITIVE POWER TOLERANCE

**22.7 %**
MAXIMUM EFFICIENCY



### Optimal Size for Commercial & Industrial Rooftops

- Compact module design with medium size for lower total system cost and shorter payback time
- Low voltage design for high string power

### Lightweight Dual-glass Design, High Reliability

- Excellent fire resistance; durability in harsh environmental conditions and high temperature or high humidity areas
- Up to 5,400 Pa snow load and 2,400 Pa wind load (test loads)
- 25 years product warranty

### Maximized Energy Harvest

- High module power: Up to 505 W, 22.7 % module efficiency with n type i-TOPCon technology
- Maximum 1 % first-year degradation and 0.4 % annual degradation
- 30 years power warranty

### Universal Solution for Rooftop Systems

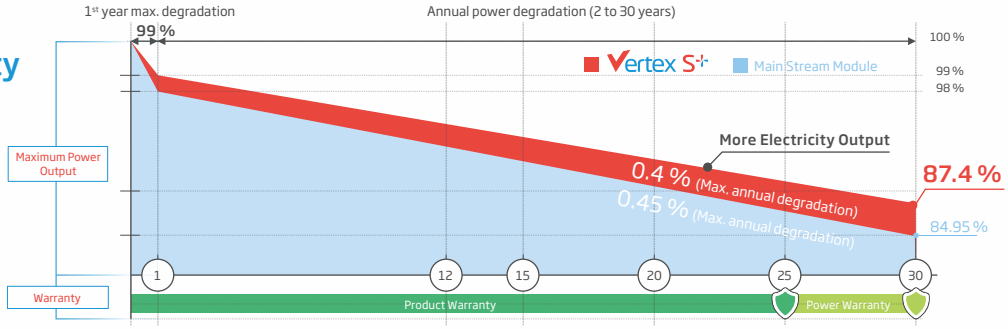
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Easy to handle (length below 2 meters) and install on roofs with excellent size and light weight
- Flexible installation solutions for system deployment

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

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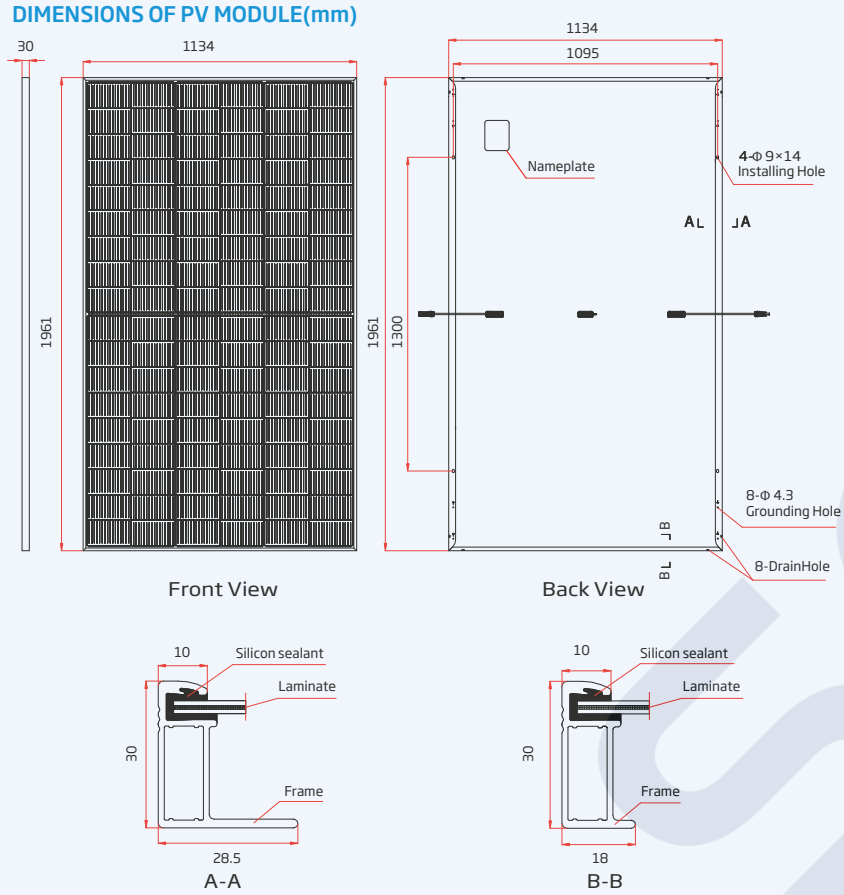
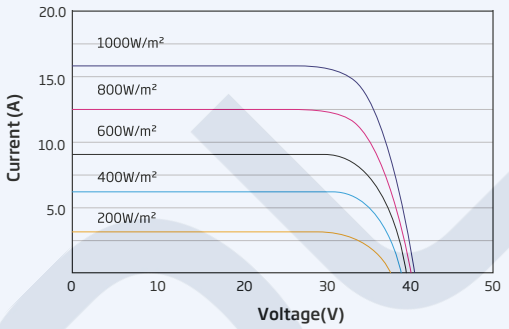
# Vertex S+

**DUAL GLASS** N type i-TOPCon MODULE

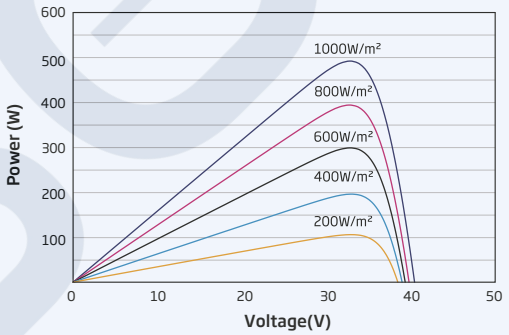
## DIMENSIONS OF PV MODULE(mm)




## I-V CURVES OF PV MODULE (490 W)




## P-V CURVES OF PV MODULE (490 W)




## ELECTRICAL DATA (STC)

| | TSM-475 NEG18R.28 | TSM-480 NEG18R.28 | TSM-485 NEG18R.28 | TSM-490 NEG18R.28 | TSM-495 NEG18R.28 | TSM-500 NEG18R.28 | TSM-505 NEG18R.28 |
|---|---|---|---|---|---|---|---|
| Peak Power Watts-$P_{MAX}$ (Wp)* | 475 | 480 | 485 | 490 | 495 | 500 | 505 |
| Power Tolerance-$P_{MAX}$ (W) | | | | 0/+5 | | | |
| Maximum Power Voltage-$V_{MPP}$ (V) | 32.3 | 32.5 | 32.7 | 32.9 | 33.1 | 33.3 | 33.5 |
| Maximum Power Current-$I_{MPP}$ (A) | 14.72 | 14.77 | 14.84 | 14.91 | 14.97 | 15.03 | 15.09 |
| Open Circuit Voltage-$V_{OC}$ (V) | 39.0 | 39.2 | 39.4 | 39.6 | 39.8 | 40.1 | 40.3 |
| Short Circuit Current-$I_{SC}$ (A) | 15.68 | 15.72 | 15.76 | 15.80 | 15.83 | 15.86 | 15.89 |
| Module Efficiency $\eta_m$ (%) | 21.4 | 21.6 | 21.8 | 22.0 | 22.3 | 22.5 | 22.7 |

STC: Irrdiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM 1.5. *Measuring tolerance: ±3 %.

## ELECTRICAL DATA (NOCT)

| | TSM-475 NEG18R.28 | TSM-480 NEG18R.28 | TSM-485 NEG18R.28 | TSM-490 NEG18R.28 | TSM-495 NEG18R.28 | TSM-500 NEG18R.28 | TSM-505 NEG18R.28 |
|---|---|---|---|---|---|---|---|
| Maximum Power-$P_{MAX}$ (Wp) | 363 | 367 | 371 | 375 | 378 | 382 | 386 |
| Maximum Power Voltage-$V_{MPP}$ (V) | 30.4 | 30.6 | 30.8 | 31.0 | 31.3 | 31.5 | 31.8 |
| Maximum Power Current-$I_{MPP}$ (A) | 11.94 | 11.98 | 12.02 | 12.06 | 12.08 | 12.11 | 12.15 |
| Open Circuit Voltage-$V_{OC}$ (V) | 36.9 | 37.2 | 37.4 | 37.6 | 37.7 | 38.0 | 38.3 |
| Short Circuit Current-$I_{SC}$ (A) | 12.64 | 12.67 | 12.70 | 12.74 | 12.76 | 12.78 | 12.81 |

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

## MECHANICAL DATA

| | |
|---|---|
| Solar Cells | Monocrystalline |
| No. of cells | 108 cells |
| Module Dimensions | 1961×1134×30 mm |
| Weight | 23.5 kg |
| Front Glass | 1.6 mm, High Transmission, AR Coated Heat Strengthened Glass |
| Encapsulant material | POE/EVA |
| Back Glass | 1.6 mm, Heat Strengthened Glass |
| Frame | 30 mm Anodized Aluminium Alloy, Black |
| J-Box | IP 68 rated |
| Cables | Photovoltaic Technology Cable 4.0 mm²<br>Landscape: 1300/1300 mm<br>Portrait: 280/350 mm* |
| Connector | TS4 / MC4 EVO2* |

*Special order only.

## TEMPERATURE RATINGS

| | |
|---|---|
| NOCT(Nominal Operating Cell Temperature) | 43°C (±2°C) |
| Temperature Coefficient of $P_{MAX}$ | -0.29%/°C |
| Temperature Coefficient of $V_{OC}$ | -0.24%/°C |
| Temperature Coefficient of $I_{SC}$ | 0.04%/°C |

## MAXIMUM RATINGS

| | |
|---|---|
| Operational Temperature | -40 to +85 °C |
| Maximum System Voltage | 1500 V DC (IEC) |
| Max Series Fuse Rating | 30 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: | 864 pieces |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CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.


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