

450 W

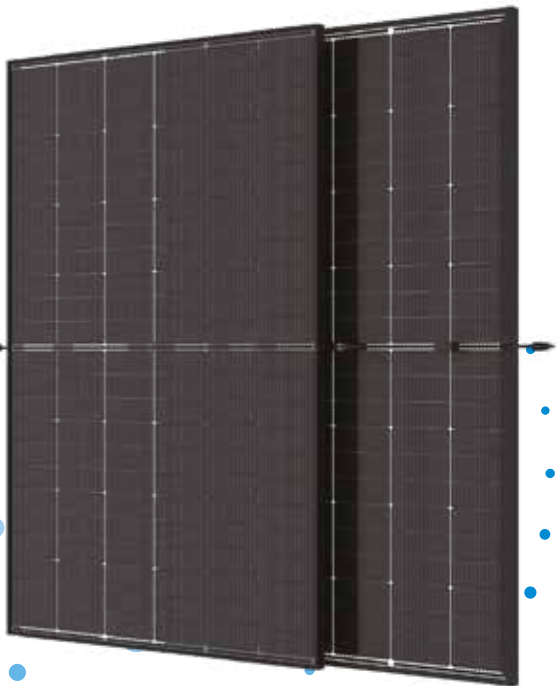
MAXIMUM POWER OUTPUT

0/+5 W

POSITIVE POWER TOLERANCE

22.5 %

MAXIMUM EFFICIENCY



Small in size, bigger on power

- Generates up to 450 W, 22.5 % 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

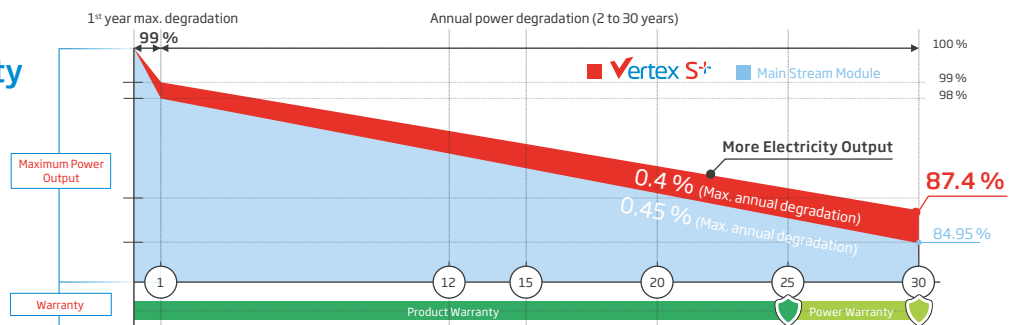
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling

Extended Vertex S+ Warranty

1 %
1st year max. degradation

0.4 %
Max. annual degradation from year 2 to 30

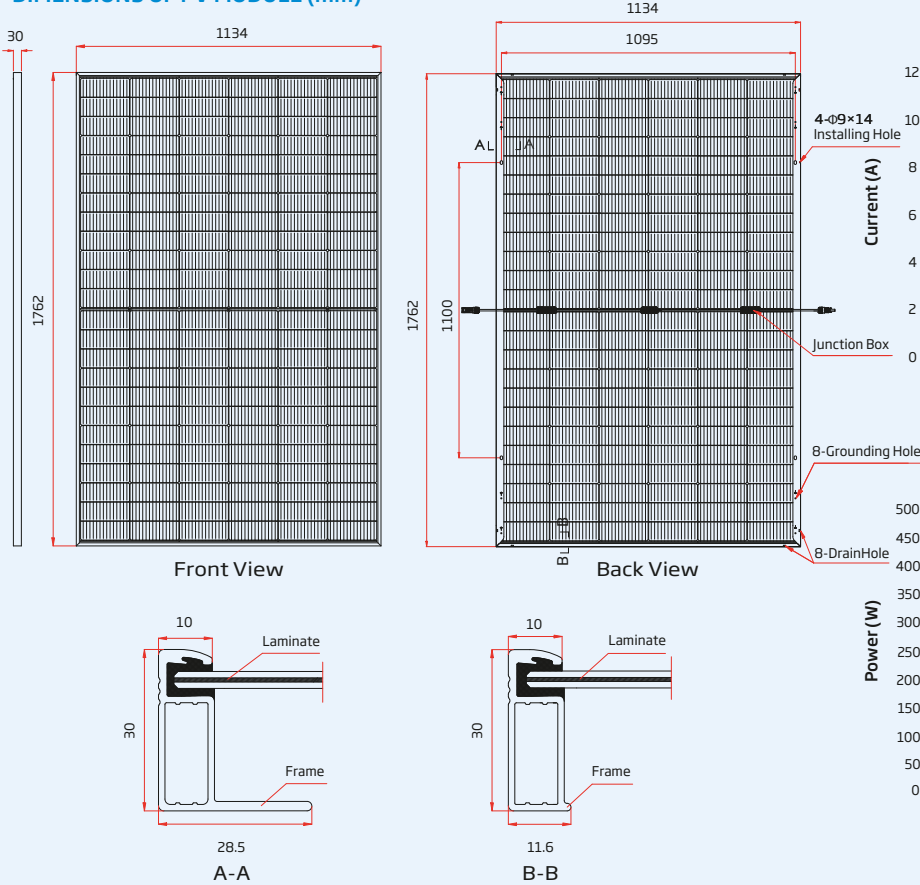
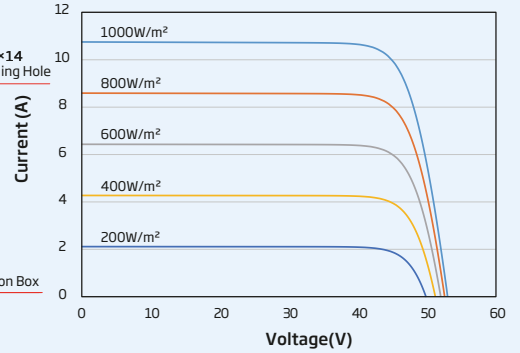
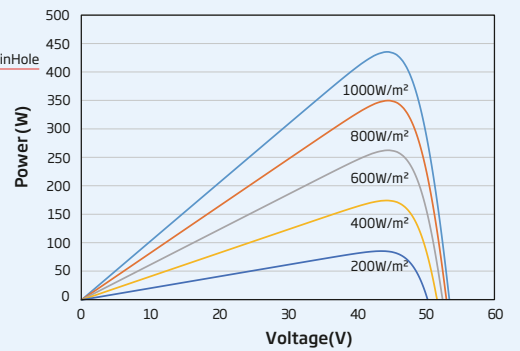
25 Years
Product Workmanship Warranty



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
 ISO45001: Occupational Health and Safety Management System
 ISO14067: Product Carbon Footprint Limited Assurance
 ISO14025: Environmental Product Declaration

DIMENSIONS OF PV MODULE (mm)

I-V CURVES OF PV MODULE (440 W)

P-V CURVES OF PV MODULE (440 W)

MECHANICAL DATA

Solar Cells	N-type i-TOPCon Monocrystalline	Frame	30 mm Anodized Aluminium Alloy, Black
No. of cells	144 cells	J-Box	IP 68 rated, 3 bypass diodes
Module Dimensions	1762×1134×30 mm	Cables	Photovoltaic Technology Cable 4.0 mm ² Landscape: 1100/1100 mm Portrait: 280/350 mm*
Weight	21.0 kg	Connector	TS4 Plus / TS4 / MC4 EVO2*
Front Glass	1.6 mm, AR Coating Heat Strengthened Glass		
Back Glass	1.6 mm, Heat Strengthened Glass		

*Special order only

ELECTRICAL DATA (STC & NOCT & BNPI)	TSM-425 NEG9RC.27			TSM-430 NEG9RC.27			TSM-435 NEG9RC.27			TSM-440 NEG9RC.27			TSM-445 NEG9RC.27			TSM-450 NEG9RC.27		
	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI
Testing Condition	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI	STC	NOCT	BNPI
Peak Power Watts-P _{MAX} (Wp)*	425	325	471	430	329	476	435	333	482	440	337	488	445	341	493	450	344	499
Power Selection (W)**	0 ~ +5																	
Maximum Power Voltage-V _{MPP} (V)	42.9	40.4	42.9	43.2	40.7	43.2	43.6	41.0	43.6	44.0	41.4	44.0	44.3	41.7	44.3	44.6	42.0	44.6
Maximum Power Current-I _{MPP} (A)	9.92	8.06	10.98	9.96	8.08	11.03	9.99	8.12	11.05	10.01	8.14	11.08	10.05	8.17	11.13	10.09	8.19	11.18
Open Circuit Voltage-V _{OC} (V)	50.9	48.3	50.9	51.4	48.7	51.4	51.8	49.1	51.8	52.2	49.5	52.2	52.6	49.9	52.6	52.9	50.2	52.9
Short Circuit Current-I _{SC} (A)	10.56	8.51	11.70	10.59	8.54	11.73	10.64	8.58	11.79	10.67	8.60	11.82	10.71	8.63	11.87	10.74	8.66	11.90
Module Efficiency η _m (%)	21.3			21.5			21.8			22.0			22.3			22.5		

 STC: Irradiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM1.5. NOCT: Irradiance at 800 W/m², Ambient Temperature 20 °C, Wind Speed 1 m/s. BNPI: Irradiance front 1000 W/m², rear 135 W/m², Temperature 25 °C, Air Mass AM1.5. *Measuring tolerance: ±3%. **Power selection up to: +3%

ELECTRICAL CHARACTERISTICS WITH DIFFERENT POWER BIN (reference to 5% & 10% backside power gain)

	5%		10%		5%		10%		5%		10%		5%		10%		5%		10%	
	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
Backside Power Gain	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
Total Equivalent power -P _{MAX} (Wp)	446	468	452	473	457	479	462	484	467	490	473	495	478	500	483	505	488	510	493	515
Maximum Power Voltage-V _{MPP} (V)	42.9	42.9	43.2	43.2	43.6	43.6	44.0	44.0	44.3	44.3	44.6	44.6	44.9	44.9	45.2	45.2	45.5	45.5	45.8	45.8
Maximum Power Current-I _{MPP} (A)	10.42	10.91	10.46	10.96	10.49	10.99	10.51	11.01	10.55	11.06	10.59	11.10	10.63	11.14	10.67	11.18	10.71	11.22	10.75	11.26
Open Circuit Voltage-V _{OC} (V)	50.9	50.9	51.4	51.4	51.8	51.8	52.2	52.2	52.6	52.6	52.9	52.9	53.3	53.3	53.7	53.7	54.1	54.1	54.5	54.5
Short Circuit Current-I _{SC} (A)	11.09	11.62	11.12	11.65	11.17	11.70	11.20	11.74	11.25	11.78	11.28	11.81	11.33	11.85	11.37	11.89	11.41	11.93	11.45	11.97

Power Bifaciality: 80 ±5%.

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 ~ +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

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

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