Trinasolar

Vertex N PV Module
Introduction

210+N

Trinasolar

Power Beyond Solar

The World Leading PV and Smart Energy IoT Total Solution Provider

Trina Solar official website

Vertex Product information

For more information regrading Vertex module,
Please follow our social media accounts or scan the QR codes to visit us at our website.

Vertex N
PV Module

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COMPANY INTRODUCTION

Technology-driven, Reliable, and Open to Win-win Collaboration

Trinasolar is Committed to Becoming a Global Pioneer in Smart Energy

- **Driven by technological innovation**, scenario penetration, and a globalized ecosystem
- It aims to deliver **higher value** and **more reliable** green energy to all stakeholders
- As a key enabler of the future energy system, Trinasolar is dedicated to co-creating **a better net-zero world**

R&D STRENGTH

Ground-breaking Innovations

Through constant innovation, Trina Solar continues to push the PV industry forward by creating greater grid parity of PV power and popularizing renewable energy. So far, Trina Solar's SKL has set or broken 37 world records in terms of PV cell conversion efficiency and module output power.

Formulation of Standards

Industry standards led on or participated in **230**

Standards issued **170**

First to propose **IEC international standards**

R&D Results

Patent and software copyright applications **7600+**

Granted patents **3400+**

Paper published **Nature Communications**

A Total of 39 World Records in PV Cell Efficiency & Module Output

39 — April,2026 — THBC cell efficiency **28.0%**

38 — Jan,2026 — Perovskite/crystalline silicon tandem module **886W**

37 — Dec,2025 — Perovskite/crystalline silicon tandem module **865W**

36 — Dec,2025 — Perovskite/crystalline silicon tandem efficiency **32.6%**

35 — Jun,2025 — Perovskite/crystalline silicon tandem efficiency **841W**

34 — Jun,2025 — Large-area perovskite/crystalline silicon 2T tandem module **829W**

33 — Jun,2025 — Perovskite/crystalline tandem module efficiency **30.6%**

32 — Apr,2025 — 210 large-size perovskite/crystalline silicon 2T tandem tandem efficiency **31.1%**

31 — Mar,2025 — 210 large-size perovskite/crystalline silicon 2T tandem module **808W**

2026 — 2025

30 — Jan,2025 — Large-area high-efficiency n-type HJT module efficiency **25.44%**

29 — Dec,2024 — High-efficiency n-type fully passivated HJT solar cell efficiency **27.08%**

28 — Nov,2024 — High efficiency n-type bifacial i-TOPCon solar cell **26.58%**

27 — Oct,2024 — High efficiency N-type i-TOPCon solar cell **25.9%**

2024

26 — Apr,2024 — n-type i-TOPCon module **740.6W**

25 — Aug,2022 — 210mm high-efficiency n-type mono-crystalline module **24.24%**

24 — Jul,2022 — 210mm PERC monocrystalline cell **24.5%**

23 — Mar,2022 — 210mm n-type i-TOPCon cell **25.5%**

2022

22 — Aug,2021 — 210mm PERC monocrystalline cell **23.56%**

2021

21 — Jun,2021 — 210mm mono-crystalline module window **23.03%**

20 — Nov,2019 — N-type polycrystalline i-TOPCon cell **23.22%**

2019

19 — May,2019 — N-type mono-crystalline i-TOPCon cell **24.58%**

2018

18 — Feb,2018 — 156mm IBC cell **25.04%**

17 — Oct,2017 — IBC module **20.65%**

2017

16 — May,2017 — 6-inch IBC cell **24.13%**

15 — Dec,2016 — P-type mono-crystalline silicon PERC cell **22.61%**

2016

14 — Oct,2016 — Polycrystalline module window conversion efficiency **19.86%**

13 — Apr,2016 — 156mm IBC cell **23.5%**

12 — Dec,2015 — P-type mono-crystalline silicon cell **22.13%**

11 — Spet,2015 — Polycrystalline sillicon cell efficiency **21.5%**

2015

10 — Apr,2015 — Monocrystalline silicon module window efficiency **19.2%**

09 — Dec,2014 — Polycrystalline module **324.5W**

08 — Nov,2014 — IBC cell efficiency **22.9%**

07 — Nov,2014 — Monocrystalline sillicon cell efficiency **21.4%**

06 — Nov,2014 — Polycrystalline Sillicon Module effiency **20.76%**

05 — Oct, 2014 — Monocrystalline sillicon module **335.2W**

04 — Apr, 2014 — Monocrystalline module **326.3W**

2014

03 — Feb, 2014 — BC cell Efficiency **24.4%**

2012

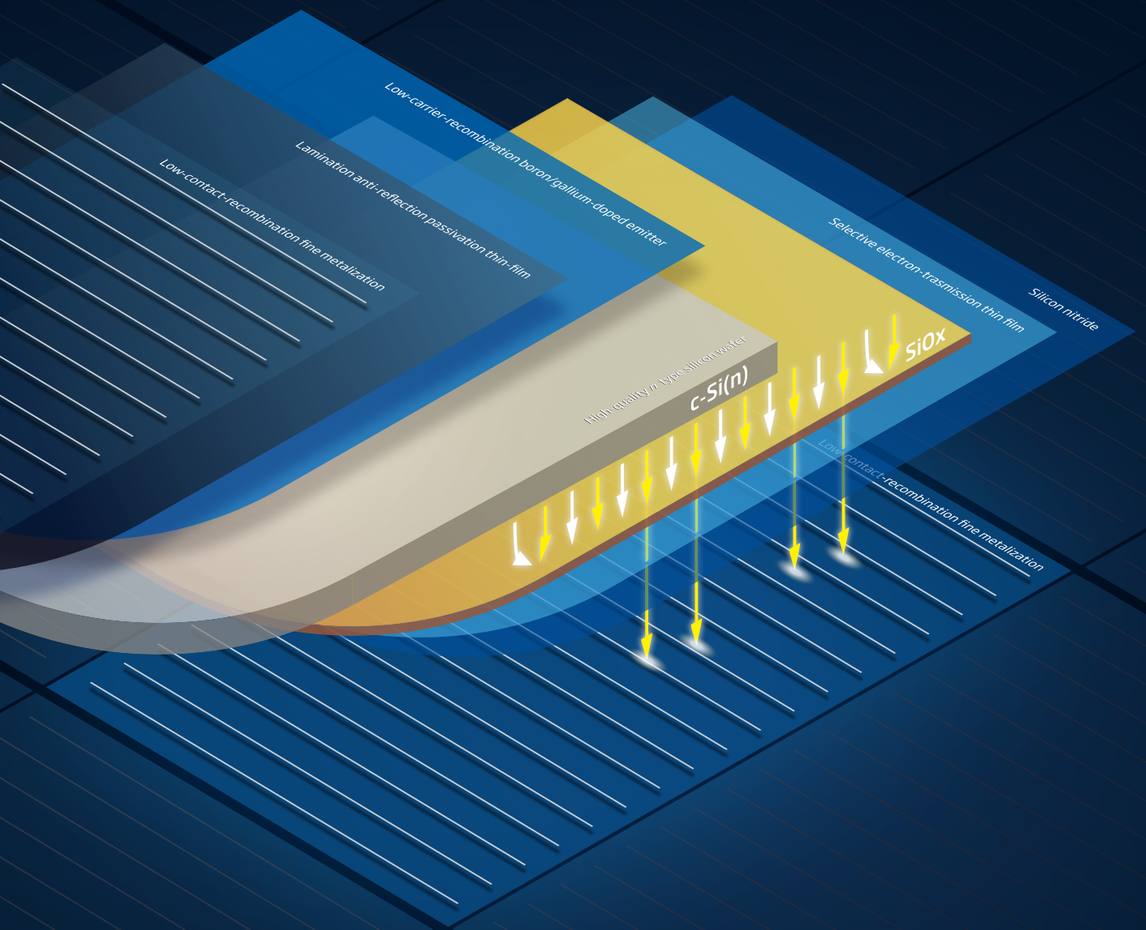
02 — May, 2012 — Polycrystalline Module **284.7W**

2011

01 — Spet, 2011 — Polycrystalline Module **274.3W**

210+N PRODUCT TECHNOLOGY

n type i-TOPCon Technology Overview



With *n* type silicon wafer as substrate, The minority carrier life is higher than P type silicon wafer

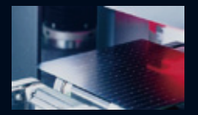
n type silicon wafer as substrate, No boron-oxygen composite pair combined with advanced Cell preparation technology, LID degradation is significantly lower than P-type cell.

The passivated contact structure is adopted on the back, and the carrier transmission is based on the quantum tunneling effect, so the Cell has better temperature performance

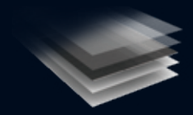
i-TOPCon Ultra Cell Technology

Marks a new milestone in TOPCon technology development.

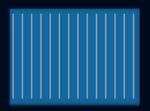
By applying advanced technologies such as full passivated contacts, suppression of parasitic optical absorption, and ultra-thin busbar, the composite and optical losses are significantly reduced, achieving higher open circuit voltages and pushing cell efficiency & module power to new heights.



full passivated contacts



suppression of parasitic optical absorption



ultra-thin busbar

Years of Dedication Continued Leadership

Trinasolar possesses profound expertise in n-type cell technology. In 2018, it was selected for the "Super Technology Leader" demonstration project, being among the first to achieve the industrialization of n-type i-TOPCon cells.

With the advent of the TOPCon 2.0 era, Trinasolar's Vertex N series modules, leveraging advantages such as high power, high efficiency, and high reliability, are fully applicable to utility, commercial, and residential applications, thereby fully addressing customers' diverse needs.

Vertex N SERIES

New generation n-type TOPCon technology

The new generation of n-type i-TOPCon Ultra leading cell technology, combined with SMBB technology, high-density encapsulation, integrated design of high transparency and anti-reflection, achieves higher power and higher efficiency.

01

Bifacial response

80% ± 5% bifacial rate, compared to mainstream BC components (around 70%), has significant advantages, especially suitable for C&I roofs and desert scenes with higher ground light reflection.

02

Excellent low irradiation response

In low irradiation scenarios such as cloudy, rainy, and hazy days, TOPCon modules maintain high power output.

03

Excellent UV resistance

Through the unique TOPCon deposition process and membrane design, coupled with strict quality control, the UV resistance performance is significantly enhanced, ensuring high reliability throughout the entire module lifecycle.

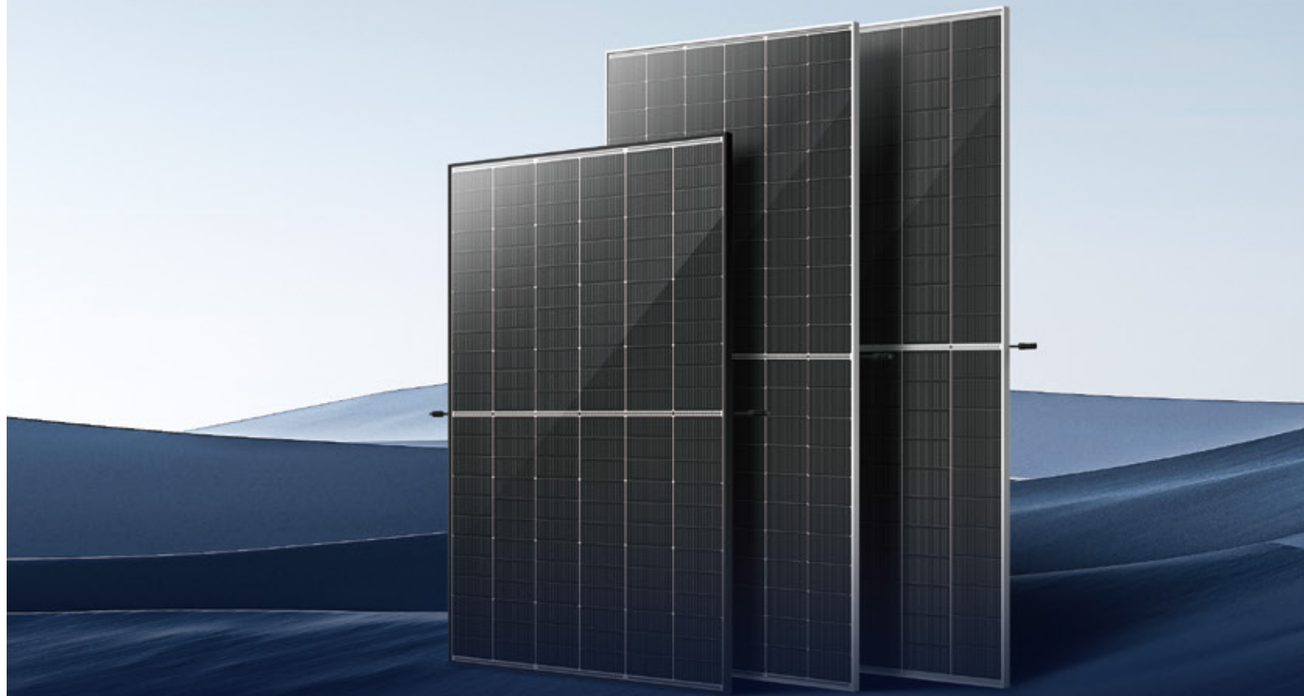
04

Full scenario application

The new generation of modules covers large, medium, and small formats, fully applicable to complex terrains and various scenarios such as large ground utilities, C&I, and mountains, fully meeting the diverse needs of customers

05

Classic High Power Modules



Vertex N Vertex S+

— i-TOPCon Ultra —

Small in Size, Bigger on Power

475W

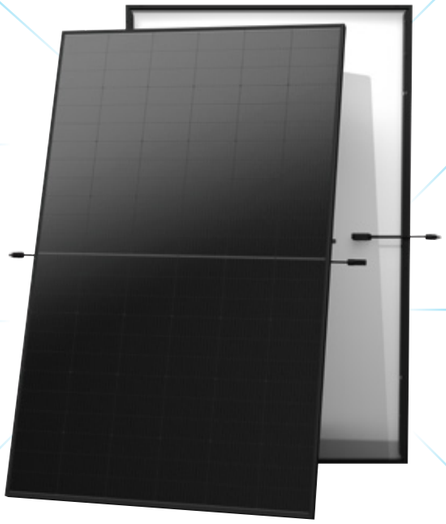
Monofacial Dual Glass

n type i-TOPCon technology with advanced 210mm innovative platform

Higher Power and Efficiency, More Energy Gain

Flexible Installation and Adaptation

1.6+1.6mm dual glass design



25 years product warranty, 30 years power warranty

Offer Full Black Aesthetic appearance option

Mechanical test load up to 5400 Pa front side and 4000 Pa back side

Red Dot Award winning products

Vertex S+

NEG9R.25/NEG9R.28

Electrical Data (STC)

Peak Power Watts-P_{MAX} (Wp)*	450	455	460	465	470	475
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	44.60	45.00	45.40	45.80	46.10	46.40
Maximum Power Current-I_{MPP} (A)	10.09	10.11	10.14	10.16	10.20	10.24
Open Circuit Voltage-V_{OC} (V)	52.90	53.40	53.80	54.20	54.60	55.00
Short Circuit Current-I_{SC} (A)	10.74	10.77	10.81	10.85	10.89	10.93
Module Efficiency ηm (%)	22.5	22.8	23.0	23.3	23.5	23.8

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

Ideal products for industrial and commercial applications

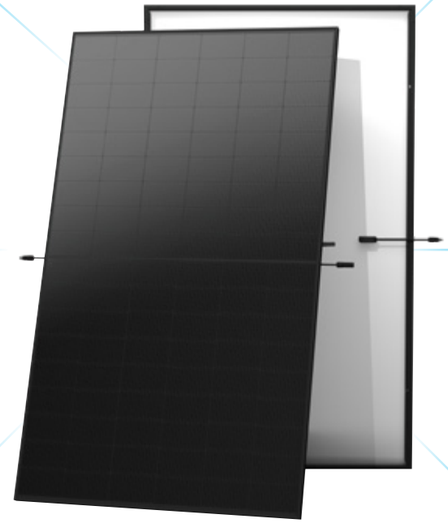
520W

Monofacial Dual Glass

n type i-TOPCon technology with advanced 210mm innovative platform

Lower LCOE (levelized cost of energy), reduced BOS (balance of system) cost

Designed for compatibility with existing mainstream system components



High module power, high string power and low voltage design

Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load

Offer Full Black Aesthetic appearance option

Vertex S+

NEG18R.25/NEG18R.28

Electrical Data (STC)

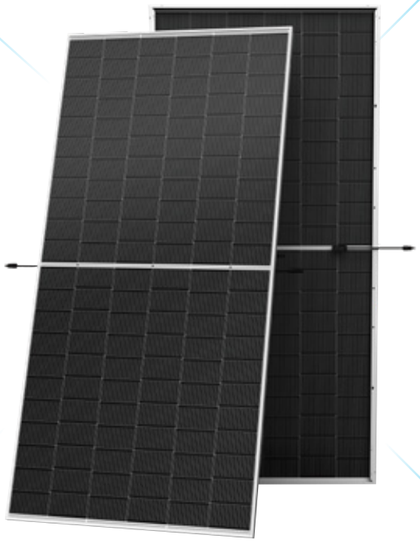
Peak Power Watts-P_{MAX} (Wp)*	490	495	500	505	510	515	520
Power Tolerance-P_{MAX} (W)	0~+5						
Maximum Power Voltage-V_{MPP} (V)	32.9	33.1	33.3	33.5	33.7	33.9	34.1
Maximum Power Current-I_{MPP} (A)	14.91	14.97	15.03	15.09	15.14	15.20	15.25
Open Circuit Voltage-V_{OC} (V)	39.6	39.8	40.1	40.3	40.6	40.9	41.2
Short Circuit Current-I_{SC} (A)	15.80	15.83	15.86	15.89	15.93	15.96	15.99
Module Efficiency ηm (%)	22.0	22.3	22.5	22.7	22.9	23.2	23.4

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

Excellent Balance Between Value and Compatibility

650W

Bifacial Dual Glass



High power up to 650W and high efficiency up to 24.1%

Achieves maximum loading capacity with nearly 99% container space utilization rate

i-TOPCon Ultra cell technology delivers higer efficiency

Golden-sized design adopted as an industry standard

Versatile to application in utility on complex terrain and C&I scenarios

Vertex N

NEG19RC.20

Electrical Data (STC)

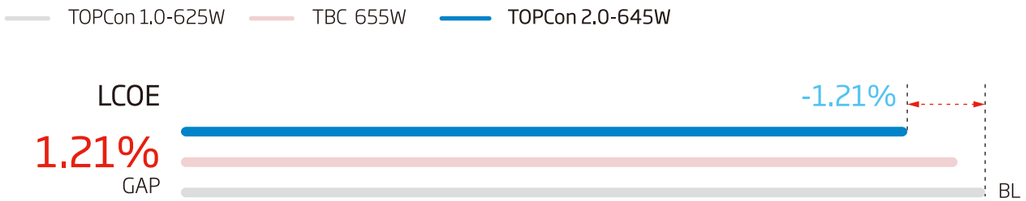
Peak Power Watts-P_{MAX} (Wp)*	625	630	635	640	645	650
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	40.46	40.68	40.84	41.06	41.22	41.43
Maximum Power Current-I_{MPP} (A)	15.45	15.49	15.55	15.60	15.65	15.69
Open Circuit Voltage-V_{OC} (V)	48.70	48.90	49.10	49.30	49.52	49.77
Short Circuit Current-I_{SC} (A)	16.32	16.38	16.44	16.51	16.55	16.59
Module Efficiency ηm (%)	23.1	23.3	23.5	23.7	23.9	24.1

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

BOS & LCOE Comparison

Location: Sungai Petani, Malaysia

	Module type	TOPCon 1.0-625W	TBC 655W	**TOPCon 2.0-645W**
C&I color steel tile rooftop	BOS($/W)	BL	-0.0021	-0.0015
	Power Generation	BL	-0.11%	0.93%
	LCOE GAP	BL	-0.19%	-1.21%



Excellent Compatibility for Tracking System

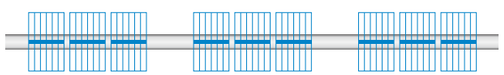
210RN-645W

1 tracker is connected with 3 strings (3 * 29), 18,7055W/string and 56,115W/tracker.The length of the tracker is about 101 meters

The string power is increased by 6.9%

210RN-625W

1 tracker is connected with 3 strings (3 * 29), 18,125W/string and 54,375W/tracker.The length of the tracker is about 101 meters



Baseline

Power comparison between Vertex N modules and typical 182*n* type modules

Designed For Optimal LCOE

740W

Bifacial Dual Glass

High power up to 740W and high efficiency up to 23.8%

Maximizes reduction in system BOS costs and LCOE

The industry's first mass-produced TOPCon module surpassing 700W

Golden-sized design, born as an industry standard

i-TOPCon Ultra cell technology delivers higer efficiency

High bifaciality, excellent low-irradiance performance, delivering, higher overall efficiency

Vertex N

NEG21C.20

Electrical Data (STC)

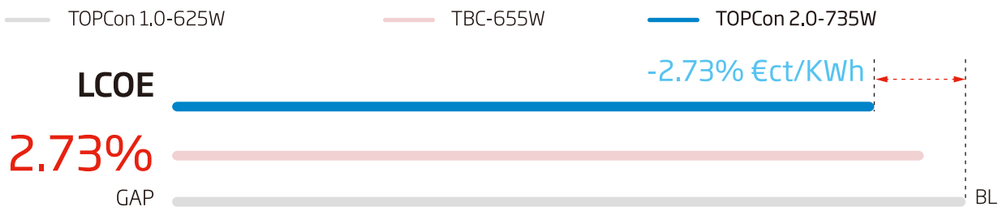
Peak Power Watts-P_{MAX} (Wp)*	715	720	725	730	735	740
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	41.10	41.30	41.50	41.70	41.90	42.10
Maximum Power Current-I_{MPP} (A)	17.40	17.44	17.47	17.51	17.55	17.58
Open Circuit Voltage-V_{OC} (V)	49.20	49.40	49.60	49.90	50.10	50.30
Short Circuit Current-I_{SC} (A)	18.44	18.49	18.54	18.58	18.62	18.66
Module Efficiency ηm (%)	23.0	23.2	23.3	23.5	23.7	23.8

STC: Irrdiance 1000W/m^2, Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

BOS & LCOE Comparison

Location: San Nicolas, Spain

Item	Module type	TOPCon 1.0-625W	TBC-655W	**TOPCon 2.0-735W**
Module	Module power	625W	655W	735W
	Module efficiency	80±5%	70±5%	85±5%
Mounting	Installation	1P Tracker	1P Tracker	1P Tracker
	Pitch	E-W 5.5 m	E-W 5.5 m	E-W 5.5 m
Inverter	Inverter type	SUN2000-330KTL-H1	SUN2000-330KTL-H1	SUN2000-330KTL-H1
	Inverter power (AC)	330 kW	330 kW	330 kW
	Inverter quantity	10	10	10
Layout	Module/string	29	29	29
	String power	18125W	18995W	21315W
	Rack configuration	1P×87 Mod	1P×87 Mod	1P×58 Mod
	String/Rack	3	3	2
	String quantity	201	171	192
	Module quantity	5829	5568	4959
	GCR	43.31%	43.31%	43.35%
Capacity	DC capacity (kWp)	3643.13	3647.04	3644.87
	AC capacity (kW)	3300	3300	3300
	DC/AC ratio	1.1	1.1	1.1
BOS Comparison	BOS Saving（€ct/W）	BL	-0.4666	-0.3936
LCOE Comparison	LCOE Saving	BL	-2.73%	-0.05%



Multi-Scenario Optimized Modules

Vertex N Vertex S+

— i-TOPCon Ultra —

Shield Module

Designed for Protection, Built to Last

475W

Monofacial Dual Glass

Higher Hail Resistance
VKF Swiss Hail HW4, IEC Hail test 45mm

Higher Fire Resistance
IEC A+A

Higher mechanical load
Up to +7000Pa/-5000Pa

Vertex S+

NED9RC.28

Electrical Data (STC)

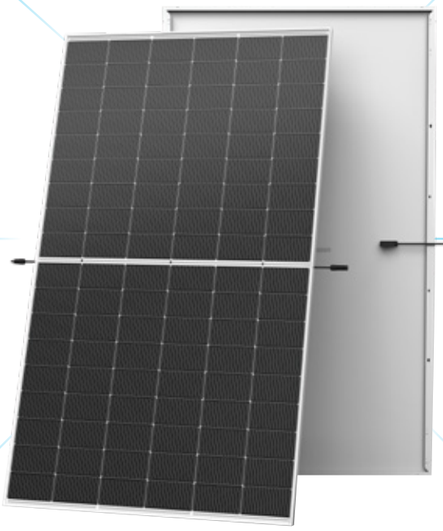
Peak Power Watts-P_{MAX} (Wp)*	450	455	460	465	470	475
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	44.60	45.00	45.40	45.80	46.10	46.40
Maximum Power Current-I_{MPP} (A)	10.09	10.11	10.14	10.16	10.20	10.24
Open Circuit Voltage-V_{OC} (V)	52.90	53.40	53.80	54.20	54.60	55.00
Short Circuit Current-I_{SC} (A)	10.74	10.77	10.81	10.85	10.89	10.93
Module Efficiency ηm (%)	22.5	22.8	23.0	23.3	23.5	23.8

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

Lightweight Module

Optimal Choice for Low-bearing Capacity Rooftops

520W
Backsheet



Ultra-light design, only 7.1kg/m²

High efficiency and Power Generation

Flexible Installation, Adaptable to Mainstream Inverters

i-TOPCon Technology, based on 210 Platform

No Roof Reinforcement, Solving the Scenario Problem

Stronger Structure, Higher Reliability

Vertex N

NEL18R

Electrical Data (STC)

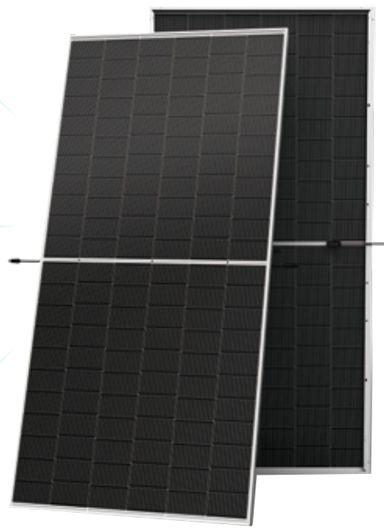
Peak Power Watts-P_{MAX} (Wp)*	495	500	505	510	515	520
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	33.10	33.30	33.50	33.70	33.90	34.10
Maximum Power Current-I_{MPP} (A)	14.97	15.03	15.09	15.14	15.20	15.25
Open Circuit Voltage-V_{OC} (V)	39.80	40.10	40.30	40.60	40.90	41.20
Short Circuit Current-I_{SC} (A)	15.83	15.56	15.89	15.93	15.93	15.99
Module Efficiency ηm (%)	22.3	22.5	22.7	22.9	23.2	23.4

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

Anti-glare Module

Glare-Free, High-Efficiency, Safe – Jointly Promote Green Transition

645W
Bifacial Dual Glass



Anti-glare for Airports, Highways & Urban PV

n-Type i-TOPCon technology with 210mm Innovative patform

Higher power generation, Lower LCOE

Excellent bifacial power generation performance

Ultra-Low Degradation

Ultra-high reliability , Longer warranty period

Vertex N

NEG19RC.20

Electrical Data (STC)

Peak Power Watts-P_{MAX} (Wp)*	620	625	630	635	640	645
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	40.24	40.46	40.68	40.84	41.06	41.22
Maximum Power Current-I_{MPP} (A)	15.41	15.45	15.49	15.55	15.60	15.65
Open Circuit Voltage-V_{OC} (V)	48.50	48.70	48.90	49.10	49.30	49.52
Short Circuit Current-I_{SC} (A)	16.26	16.32	16.38	16.44	16.51	16.55
Module Efficiency ηm (%)	23.0	23.1	23.3	23.5	23.7	23.9

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

Anti-dust Module

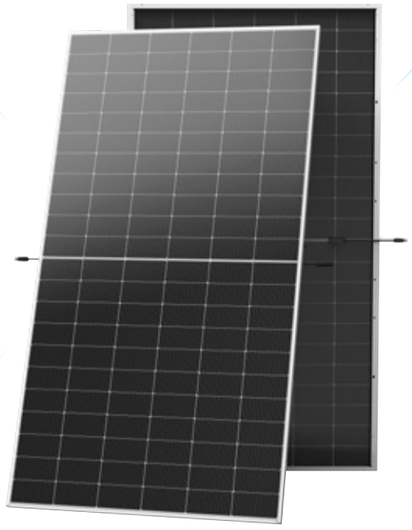
Unfazed by dust and wind, delivers long-lasting and efficient power generation

645W

Bifacial Dual Glass

Patented short-edge frame design reduces energy loss from soiling

Lowers cleaning frequency and O&M costs



Low-tilt installations minimize dust and snow

Higher bifaciality, enhancing total PV system energy output

Vertex N

NEG19RC.70

Electrical Data (STC)

Peak Power Watts-P_{MAX} (Wp)*	615	620	625	630	635	640
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	39.97	40.24	40.46	40.68	40.84	41.06
Maximum Power Current-I_{MPP} (A)	15.39	15.41	15.45	15.49	15.55	15.60
Open Circuit Voltage-V_{OC} (V)	48.29	48.50	48.70	48.90	49.10	49.30
Short Circuit Current-I_{SC} (A)	16.20	16.26	16.32	16.38	16.44	16.51
Module Efficiency ηm (%)	22.8	23.0	23.1	23.3	23.5	23.7

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

Shield Module

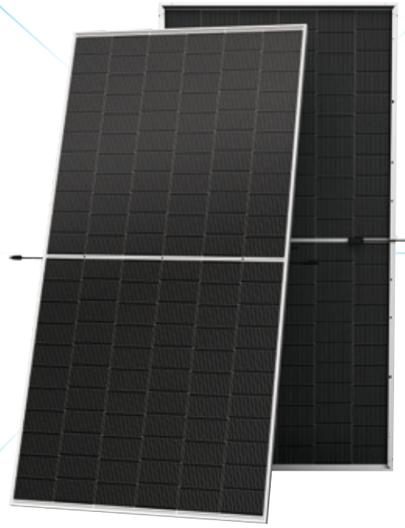
Built to Last, Engineered for Extremes

650W

Bifacial Dual Glass

Higher Hail Resistance

Higher power generation



Higher Wind Resistance

Higher Fire Resistance

Higher Snowfall Resistance

Enhanced Reliability Testing

Vertex N

NED19RC.20

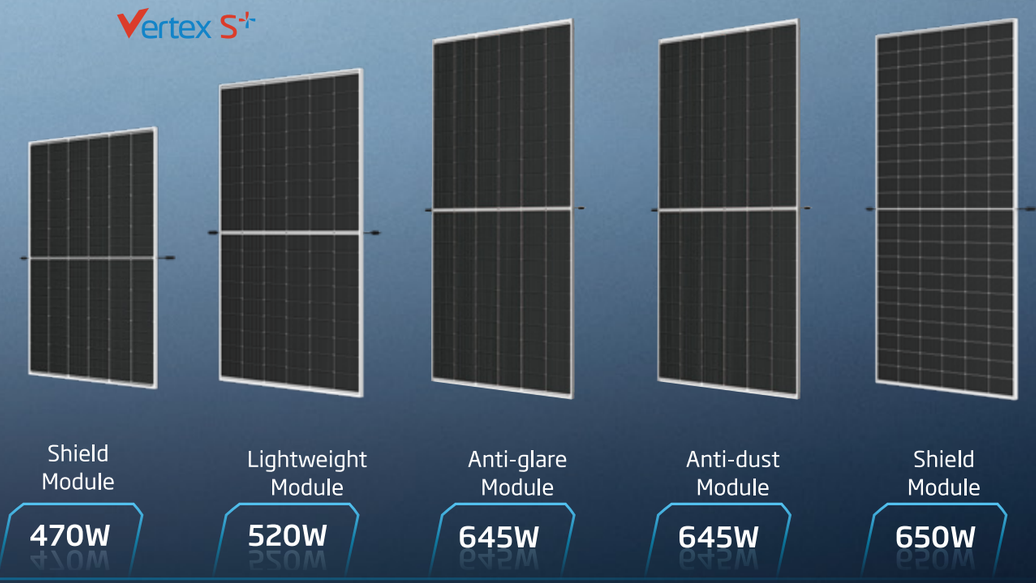
Electrical Data (STC)

Peak Power Watts-P_{MAX} (Wp)*	625	630	635	640	645	650
Power Tolerance-P_{MAX} (W)	0~+5					
Maximum Power Voltage-V_{MPP} (V)	40.46	40.68	40.84	41.06	41.22	41.43
Maximum Power Current-I_{MPP} (A)	15.45	15.49	15.55	15.60	15.65	15.69
Open Circuit Voltage-V_{OC} (V)	48.70	48.90	49.10	49.30	49.52	49.77
Short Circuit Current-I_{SC} (A)	16.32	16.38	16.44	16.51	16.55	16.59
Module Efficiency ηm (%)	23.1	23.3	23.5	23.7	23.9	24.1

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

Vertex N

475W | 520W | 650W | 740W



Shield Module 470W | Lightweight Module 520W | Anti-glare Module 645W | Anti-dust Module 645W | Shield Module 650W