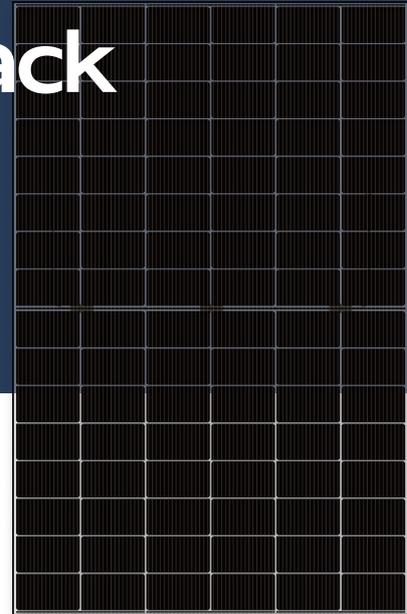


# Tangra™ S Pro HD Black

## 435-450W

N-Type High efficiency Bifacial Dual Glass Module



Bifacial technology enables additional energy harvesting from rear side (up to 30%)



30-year lifespan delivers 10-30% more power compared with conventional P-type modules



The natural lack of LID in the N-type solar cell can increase power generation



Excellent low irradiance performance



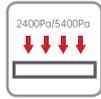
Better light trapping and current collection to improve module power output and reliability



Industry-leading, lowest thermal coefficient



Optimized electrical design and lower operating current for reduced hot spot loss and better temperature



Certified to withstand 2400 Pa of wind load and 5400 Pa of snow load



100% triple EL test, which greatly reduces the hidden cracks rate

## WARRANTY INSURANCE

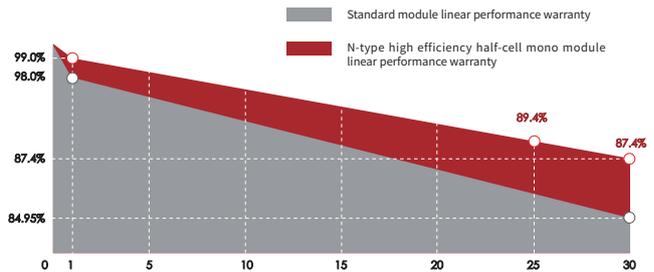


Warranty partner



\* Optional performance warranty insurance. Please contact our local sales staff for more information.

## LINEAR PERFORMANCE WARRANTY



**15** years

Product quality & process guarantee

**30** years

Linear power guarantee

**0.40**%

Annual degradation

## COMPREHENSIVE CERTIFICATES



ISO 9001: Quality Management System

ISO 14001: Environmental Management System Standard

ISO 45001: International Occupational Health and Safety Assessment System Standard

SA8000: 2014 Social Accountability Management System

\* Different markets have different certification requirements. Also, the products are under rapid innovation. Please confirm the certification status with regional sales representatives.

**ELECTRICAL CHARACTERISTICS**

Model of modules	TS-BGT48(435)-G11		TS-BGT48(440)-G11		TS-BGT48(445)-G11		TS-BGT48(450)-G11	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
Maximum power — $P_{mp}$ (W)	435	327	440	331	445	335	450	338
Open-circuit voltage — $V_{oc}$ (V)	34.49	32.77	34.67	32.94	34.85	33.11	35.03	33.28
Short-circuit current — $I_{sc}$ (A)	15.90	12.84	15.95	12.88	16.00	12.92	16.05	12.96
Maximum power voltage — $V_{mp}$ (V)	29.54	27.51	29.72	27.68	29.90	27.88	30.08	27.96
Maximum power current — $I_{mp}$ (A)	14.73	11.89	14.81	11.96	14.89	12.02	14.97	12.09
Module efficiency — $\eta_m$ (%)	21.8		22.0		22.3		22.5	

**STC** (Standard Testing Conditions): Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25 °C, Spectra at AM1.5

**NMOT** (Nominal Module Operating Temperature): Irradiance 800W/m<sup>2</sup>, Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/s

**ELECTRICAL CHARACTERISTICS WITH DIFFERENT POWER BIN (REFERENCE TO 13.5% IRRADIANCE RATIO)**

Peak Power ( $P_{max}$ ) (W)	482	488	493	499
Open Circuit Voltage ( $V_{oc}$ ) (V)	34.49	34.67	34.85	35.03
Short Circuit Current ( $I_{sc}$ ) (A)	17.62	17.67	17.73	17.78
MPP Voltage ( $V_{mp}$ ) (V)	29.54	29.72	29.90	30.08
MPP Current ( $I_{mp}$ ) (A)	16.32	16.41	16.50	16.59

**STRUCTURAL CHARACTERISTICS**

Module size (L*W*H)	1762 x 1134 x 30 mm
Weight	24.3 kg
Cell	96 cells, N-type monocrystalline
Front glass	2.0mm, anti-reflection coating
Back glass	2.0mm, heat strengthened glass
Frame	Black anodized aluminum alloy
Junction box	IP68, 3 diodes
Output wire	4.0 mm <sup>2</sup>
Wire length	300mm/1200mm/customized
Connector	MC4 Compatible
Packing Specification	36pcs/pallet; 936 pcs/40'HQ

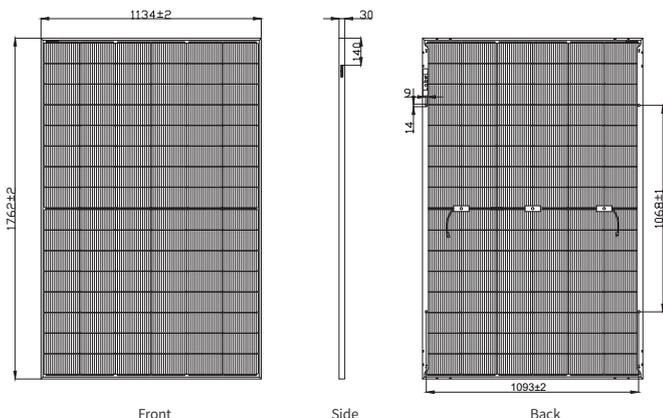
**OPERATING PARAMETERS**

Power tolerance (W)	(0,+5)
Maximum system voltage (V)	1500
Maximum rated fuse current (A)	30
Current operating temperature (°C)	-40~+85 °C
Mechanical load	5400 Pa* / 2400 Pa☺

**TEMPERATURE PERFORMANCE RATINGS**

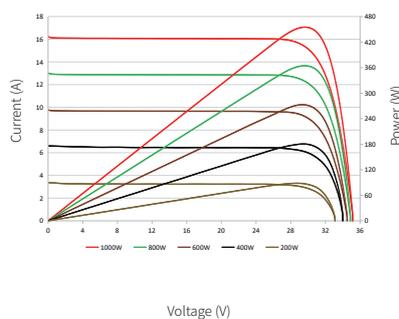
Temperature coefficient ( $P_{max}$ )	-0.30 %/°C
Temperature coefficient ( $V_{oc}$ )	-0.28 %/°C
Temperature coefficient ( $I_{sc}$ )	+0.04 %/°C
Nominal Module Operating Temperature	43±2 °C

**MODULE DIMENSIONS (MM)**

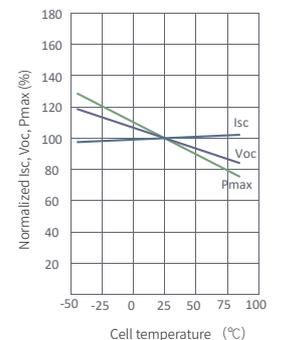


\* The unmarked tolerance is ±1 mm  
Length shown in mm

Characteristic curves (445W)



Temperature Dependence of  $I_{sc}, V_{oc}, P_{max}$



Scan the QR code to get more information

Web: [www.thornovasolar.com](http://www.thornovasolar.com)

E-mail: [info@thornovasolar.com](mailto:info@thornovasolar.com)

\* The parameters delineated within this datasheet, both technical and monetary, may exhibit variations contingent upon the region. Thornova Solar provides no warranty as to their absolute accuracy. Owing to our unceasing commitment to innovation, research, development, and product enhancement, Thornova Solar retains the discretion to amend any information encapsulated in this datasheet without any preceding notification. Clients are urged to procure the most recent iteration of this datasheet and incorporate it as an intrinsic component of the legally binding agreement ratified by both parties. The English rendition of this datasheet serves purely as a point of reference. Should discrepancies arise between the English text and versions rendered in other languages, the stipulations of the English version shall take precedence.