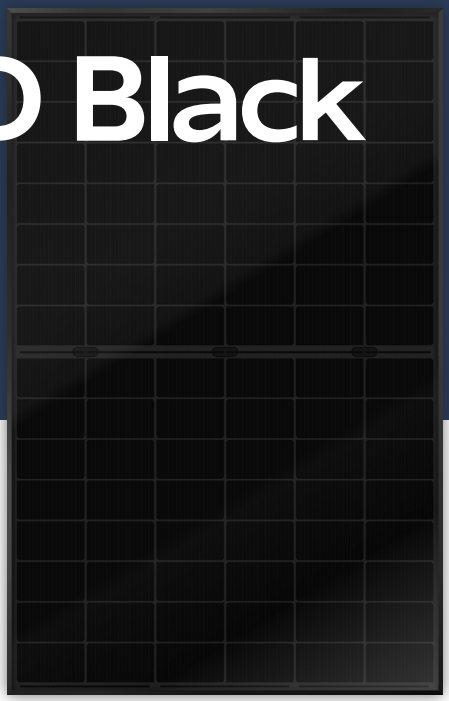
THORNOVA solar

Tangra™ S Pro HD Black

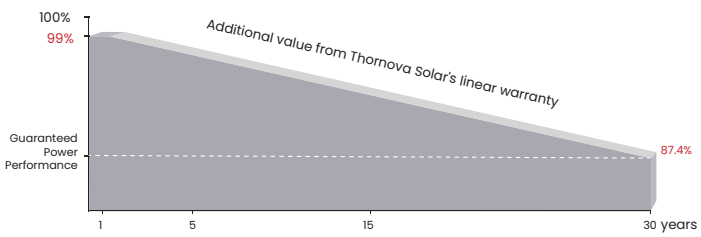
N-Type High efficiency Bifacial Dual Glass Module

TS-BGT48(435-450)-G11



- Bifacial technology allows for the harvesting of up to an additional 30% energy from the rear side of the module.
- 30 years lifespan brings 10-30% additional power generation comparing with conventional P-type module.
- N-type solar cell has no LID naturally which can increase power generation.
- Excellent low irradiance performance.
- Enhanced light trapping and optimized current collection contribute to the improvement of both module power output and reliability.
- Industry leading lowest thermal coefficient of power.
- Design optimized for lower operating current, resulting in minimized hot spot loss and improved temperature coefficient.
- Certified to withstand: wind load (2400 Pa) and snow load (5400 Pa).
- 100% triple EL test enables remarkable reduction of module hidden crack rate.

LINEAR PERFORMANCE WARRANTY



up to **25** years
Product quality & process guarantee

30 years
Linear power guarantee

0.40 %
Annual degradation Over 30 years

COMPREHENSIVE CERTIFICATES

Intertek

ISO 9001: Quality Management System
ISO 14001: Environmental Management System Standard
ISO 45001: International Occupational Health and Safety Assessment System Standard

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

RE INSURANCE

Warranty partner

Munich RE

Ariel Re

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

ELECTRICAL CHARACTERISTICS

2×48 cells

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
Peak 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
MPP voltage - V_{mp} (V)	29.54	27.51	29.72	27.68	29.90	27.88	30.08	27.96
MPP current - I_{mp} (A)	14.73	11.89	14.81	11.96	14.89	12.02	14.97	12.09
Module efficiency - η_m (%)	21.8		22.0		22.3		22.5	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25 ℃ , Spectra at AM1.5
NMOT (Nominal Module Operating Temperature): Irradiance 800W/m², Ambient Temperature 20℃ , Spectra at AM1.5, Wind at 1m/s

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

Peak power - P_{mp} (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
Irradiance ratio (rear/front)	13.5 %			

STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	69.37 x 44.65 x 1.38 inch (1762 x 1134 x 35 mm)
Weight	53.35 lbs (24.2 kg)
Number of cells	96 cells
Cell	N-type monocrystalline (7.17X8.27 inch (182X210 mm))
Glass	(F)2.0mm, Anti-Reflection Coating (B)2.0mm, Heat Strengthened Glass
Frame	Black anodized aluminum alloy
Junction box	IP68, 3 bypass diodes
Output wire	4.0 mm²
Wire length (Including Connector)	(+): 400 mm, (-): 200 mm or Customized Length
Connector	MC4 Compatible
Packing specification	31 pcs/Pallet; 744 pcs/40'HQ

OPERATING PARAMETERS

Power tolerance (W)	(0,+5)
Maximum system voltage (V)	1500
Maximum rated fuse current (A)	30
Current operating temperature (℃)	-40~+185 ℉ (-40~+85 ℃)
Bifaciality	80±10 %

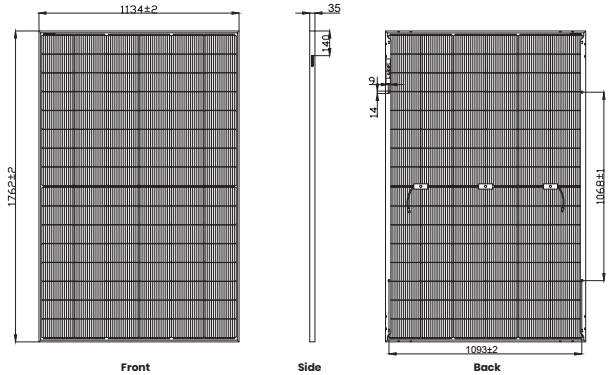
MECHANICAL LOADING

Front side maximum static loading (Pa)	5400
Rear side maximum static loading (Pa)	2400
Hailstone test (mm)	35

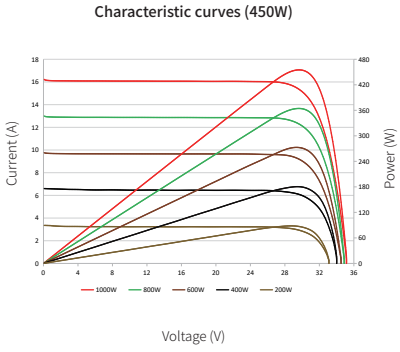
TEMPERATURE RATINGS

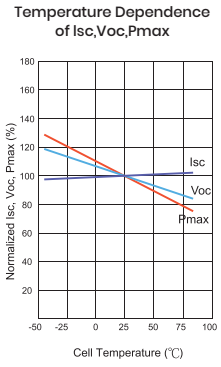
Temperature coefficient (P_{max})	-0.29 %/K
Temperature coefficient (V_{oc})	-0.28 %/K
Temperature coefficient (I_{sc})	+0.04 %/K
Nominal Module Operating Temperature	109.4±35.6 ℉ (43±2 ℃)

MODULE DIMENSIONS (MM)



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





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