

410-430 W

High Efficiency Bifacial Single Glass TOPCon Module

TS-BBT54 All Black



Bifacial technology enables additional energy harvesting from the rear side (up to 25%).



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.



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



Industry leading lowest thermal coefficient of power.



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

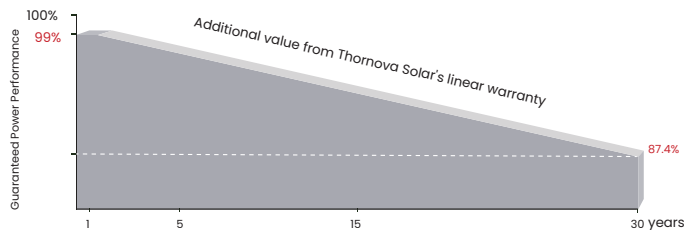


Certified to withstand: wind load (2400 Pa) and snow load (5400 Pa).



100% triple EL test enabling remarkable reduction of hidden crack rate of modules.

LINEAR PERFORMANCE WARRANTY



15 years

Product quality & process guarantee

30 years

Linear power guarantee

0.40%

Annual Degradation

COMPREHENSIVE CERTIFICATES



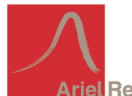
ISO 9001: Quality Management System

ISO 14001: Environmental Management System Standard

ISO 45001: International Occupational Health and Safety Assessment System Standard

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

RE INSURANCE



ELECTRIC CHARACTERISTICS

Model of modules	TS-BBT54(410)		TS-BBT54(415)		TS-BBT54(420)		TS-BBT54(425)		TS-BBT54(430)	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum power - P_{mp} (W)	410	305	415	309	420	313	425	317	430	320
Open-circuit voltage - V_{oc} (V)	37.31	35.22	37.42	35.32	37.58	35.48	37.75	35.63	38.07	35.94
Short-circuit current - I_{sc} (A)	13.80	11.15	13.87	11.20	13.93	11.25	13.99	11.30	14.00	11.31
Maximum power voltage - V_{mp} (V)	31.38	29.38	31.59	29.57	31.91	29.87	32.22	30.16	32.49	30.41
Maximum power current - I_{mp} (A)	13.07	10.40	13.14	10.45	13.16	10.48	13.19	10.50	13.24	10.53
Module efficiency - η_m (%)	21.0 %		21.3 %		21.5 %		21.8 %		22.0 %	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25 °C, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/s

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

Maximum power - P_{mp} (W)	454	460	465	471	476
Open-circuit voltage - V_{oc} (V)	37.31	37.42	37.58	37.75	38.07
Short-circuit current - I_{sc} (A)	15.29	15.36	15.43	15.50	15.52
Maximum power voltage - V_{mp} (V)	31.38	31.59	31.91	32.22	32.49
Maximum power current - I_{mp} (A)	14.48	14.56	14.59	14.61	14.67
Irradiance ratio (rear/front)	13.5 %				

STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	1722 x 1134 x 30 mm (67.80 x 44.65 x 1.18 inch)
Weight	21.5 kg (47.40 lbs)
Number of cells	108 cells
Cell	N-type Monocrystalline 182x91 mm(7.17 x 3.58inch)
Glass	(F)Tempered, 3.2 mm AR, High transmittance, Low iron (B)Black mesh backsheets
Frame	Anodized aluminum alloy
Junction box	IP68, 3 bypass diodes
Output wire	4.0 mm ²
Wire length	300mm/customized
Connector	MC4 Compatible
Packing Specification	36 pcs/Pallet; 828 pcs/40'HQ

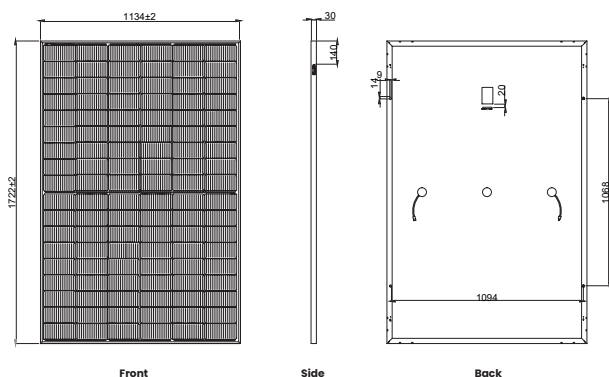
OPERATING PARAMETERS

Power tolerance (W)	(0,+5)
Maximum system voltage (V)	1500
Maximum rated fuse current (A)	25
Current operating temperature (°C)	-40~+85 °C
Mechanical load	5400 Pa / 2400 Pa

TEMPERATURE RATINGS

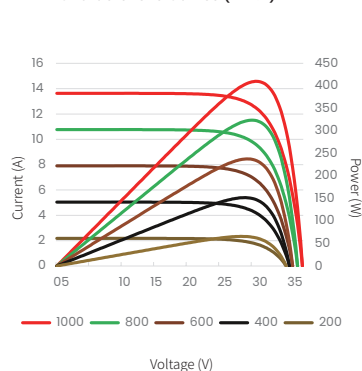
Temperature coefficient (P_{max})	-0.30 %/°C
Temperature coefficient (V_{oc})	-0.26 %/°C
Temperature coefficient (I_{sc})	+0.046 %/°C
Nominal operating cell temperature	43±2 °C

MODULE DIMENSIONS (MM)



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

Characteristic Curves (410W)



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

