

# 400-415 W

High Efficiency Bifacial Dual Glass PERC Module

**TS-BG54** X Version



Bifacial technology allows for the harvesting of up to an additional 25% energy from the rear side of the module.



Excellent low irradiance performance.



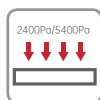
Enhanced light trapping and optimized current collection contribute to the improvement of both module power output and reliability.



Industry leading lowest thermal coefficient of power.



Design optimized for lower operating current, resulting in minimized hot spot loss and improved temperature coefficient.

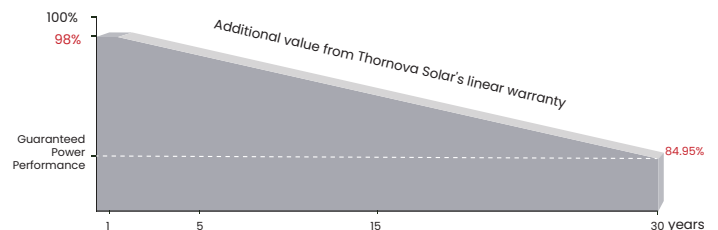


Certified to withstand: wind load (2400 Pa) and snow load (5400 Pa).



100% triple EL test enables remarkable reduction of module hidden crack rate.

## LINEAR PERFORMANCE WARRANTY



**25** years

Product quality & process guarantee

**30** years

Linear power guarantee

**0.45**%

Annual Degradation Over 30 years

## COMPREHENSIVE CERTIFICATES



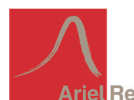
ISO 9001: Quality Management System

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



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

## ELECTRICAL CHARACTERISTICS

Model of modules	TS-BG54(400)-X		TS-BG54(405)-X		TS-BG54(410)-X		TS-BG54(415)-X	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Peak power - $P_{mp}$ (W)	400	298	405	302	410	305	415	309
Open circuit voltage - $V_{oc}$ (V)	37.18	34.95	37.33	35.09	37.68	35.42	37.79	35.59
Short circuit current - $I_{sc}$ (A)	13.39	10.85	13.44	10.89	13.59	11.01	13.72	11.12
MPP voltage - $V_{mp}$ (V)	31.42	29.22	31.55	29.35	31.84	29.61	31.94	29.72
MPP current - $I_{mp}$ (A)	12.74	10.21	12.84	10.29	12.88	10.31	13.01	10.42
Module efficiency - $\eta_m$ (%)	20.5 %		20.7 %		21.0 %		21.3 %	

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

**NOCT** (Nominal Operating Cell 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 - $P_{mp}$ (W)	438	443	449	445
Open circuit voltage - $V_{oc}$ (V)	37.18	37.33	37.68	37.79
Short circuit current - $I_{sc}$ (A)	14.66	14.71	14.87	15.02
MPP voltage - $V_{mp}$ (V)	31.42	31.55	31.84	31.94
MPP current - $I_{mp}$ (A)	13.94	14.05	14.10	14.24
Irradiance ratio (rear/front)	13.5 %			

## STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	1722 x 1134 x 30 or 35 mm (67.80 x 44.65 x 1.38 or 1.18 inch)
Weight	24.2kg (53.35 lbs) or 24.5 kg (54.01 lbs)
Number of cells	108 cells
Cell	PERC Monocrystalline 182x91 mm (7.17 x 3.58 inch)
Glass	(F)2.0mm, Anti-Reflection Coating (B)2.0mm, Heat Strengthened Glass
Frame	Anodized aluminum alloy
Junction box	IP68, 3 diodes
Output wire	4.0 mm <sup>2</sup>
Wire length	300 mm/customized
Connector	MC4 / 1500 V
Packing Specification	36 pcs/Pallet; 828 or 936 pcs/40'HQ or 31 pcs/Pallet; 713 or 806 pcs/40'HQ

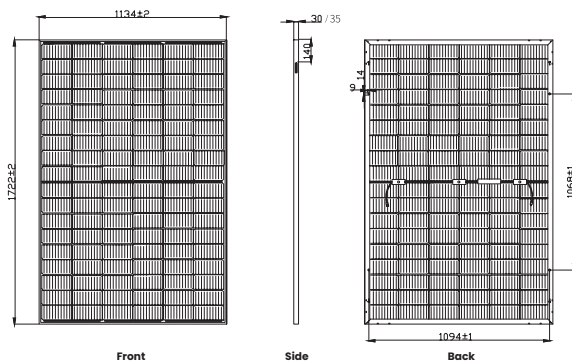
## OPERATING PARAMETERS

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
Bifaciality	70±5 %

## TEMPERATURE PERFORMANCE RATINGS

Temperature coefficient ( $P_{max}$ )	-0.350 %/°C
Temperature coefficient ( $V_{oc}$ )	-0.260 %/°C
Temperature coefficient ( $I_{sc}$ )	+0.046 %/°C
Nominal operating cell temperature	42±2 °C

## MODULE DIMENSIONS (MM)



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



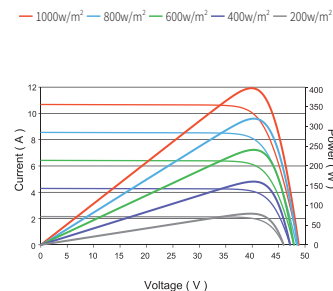
Scan the QR code to  
get more information

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.

Current-Voltage & Power-Voltage Curves (400 W)



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

