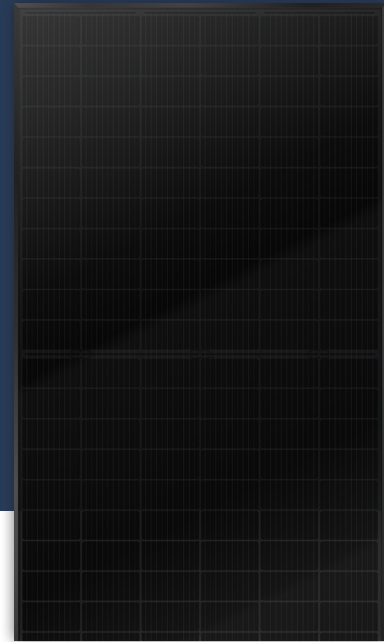


445-460 W

High Efficiency Bifacial Single Glass PERC Module
TS-BB60



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.

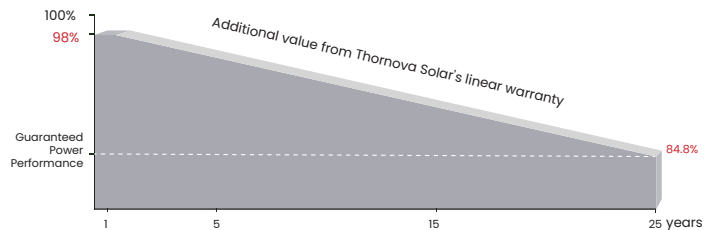


Certified to withstand: wind load (2400 Pa) and snow load (5400 Pa).



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

LINEAR PERFORMANCE WARRANTY



15 years

Product quality & process guarantee

25 years

Linear power guarantee

0.55 %

Annual Degradation Over 25 years

COMPREHENSIVE CERTIFICATES



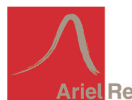
ISO 9001: Quality Management System

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-BB60(445)		TS-BB60(450)		TS-BB60(455)		TS-BB60(460)	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Peak power - P_{mp} (W)	445	332	450	335	455	339	460	343
Open circuit voltage - V_{oc} (V)	41.27	38.79	41.46	38.97	41.65	39.15	41.78	39.29
Short circuit current - I_{sc} (A)	13.42	10.88	13.47	10.91	13.54	10.97	13.63	11.04
MPP voltage - V_{mp} (V)	34.46	32.05	34.62	32.19	34.78	32.35	34.89	32.46
MPP current - I_{mp} (A)	12.92	10.36	13.01	10.41	13.09	10.48	13.19	10.57
Module efficiency - η_m (%)	20.6 %		20.9 %		21.1 %		21.3 %	

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)

Model of modules	TS-BB60(445)	TS-BB60(450)	TS-BB60(455)	TS-BB60(460)
Peak power - P_{mp} (W)	487	493	498	504
Open circuit voltage - V_{oc} (V)	41.27	41.46	41.65	41.78
Short circuit current - I_{sc} (A)	14.69	14.74	14.82	14.92
MPP voltage - V_{mp} (V)	34.46	34.62	34.78	34.89
MPP current - I_{mp} (A)	14.14	14.24	14.33	14.44
Irradiance ratio (rear/front)	13.5 %			

STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	1903 x 1134 x 30 mm (74.92 x 44.65 x 1.18 inch)
Weight	24 kg (52.91 lbs)
Number of cells	120 cells
Cell	PERC monocrystalline 182x91 mm (7.17 x 3.58 inch)
Glass	(F) Tempered, 3.2 mm AR, High transmittance, Low iron (B) Backsheet
Frame	Anodized aluminum alloy
Junction box	IP68
Output wire	4.0 mm ²
Wire length	300 mm or customized length
Connector	MC4 / 1500 V
Packing Specification	36 pcs/Pallet; 720 or 864 pcs/40'HQ

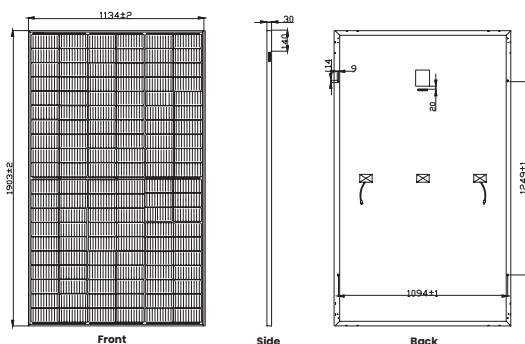
OPERATING PARAMETERS

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
Bifaciality	70±5 %

TEMPERATURE PERFORMANCE RATINGS

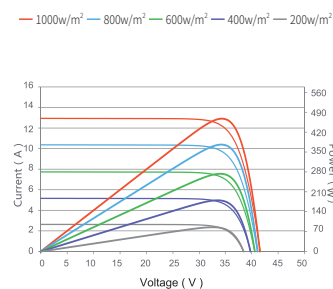
Temperature coefficient (P_{max})	-0.35 %/°C
Temperature coefficient (V_{oc})	-0.28 %/°C
Temperature coefficient (I_{sc})	+0.045 %/°C
Nominal operating cell temperature	45±2 °C

MODULE DIMENSIONS (MM)

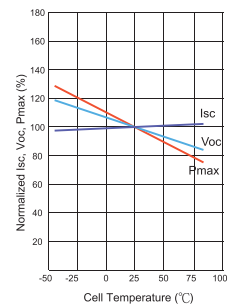


* The unmarked tolerance is ±1 mm
Length shown in mm

Current-Voltage & Power-Voltage Curves (460 W)



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



Scan the QR code to get more information

Web: www.thornovasolar.com

E-mail: info@thornovasolar.com

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