THORNOVA solar | TIER 1 BloombergNEF

Zosma™ M Pro Black

PERC High efficiency Monofacial Dual Glass Module

TS-BG60(445-465)

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.

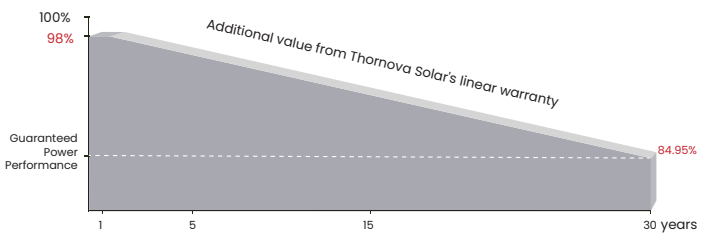
Design optimized for lower operating current, resulting in minimized hot spot loss and improved temperature coefficient.

2400Pa/5400Pa

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

30 years
Linear power guarantee

0.45 %
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.

ELECTRIC CHARACTERISTICS

2×60cells

Model of modules	TS-BG60(445)		TS-BG60(450)		TS-BG60(455)		TS-BG60(460)		TS-BG60(465)	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Peak power - P_{mp} (W)	445	332	450	336	455	339	460	343	465	346
Open circuit voltage - V_{oc} (V)	41.27	38.96	41.46	39.14	41.65	39.32	41.78	39.44	41.92	39.57
Short circuit current - I_{sc} (A)	13.42	10.84	13.47	10.88	13.54	10.94	13.63	11.01	13.73	11.09
MPP voltage - V_{mp} (V)	34.46	32.26	34.62	32.41	34.78	32.56	34.89	32.66	35.02	32.78
MPP current - I_{mp} (A)	12.92	10.28	13.01	10.35	13.09	10.42	13.19	10.50	13.28	10.57
Module efficiency - η_m (%)	20.6		20.9		21.1		21.3		21.6	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25 ℃, Spectra at AM1.5
NOCT (Nominal Operating Cell 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)	487	493	498	504	509
Open circuit voltage - V_{oc} (V)	41.27	41.46	41.65	41.78	41.94
Short circuit current - I_{sc} (A)	14.69	14.74	14.82	14.87	14.95
MPP voltage - V_{mp} (V)	34.46	34.62	34.78	34.89	35.04
MPP current - I_{mp} (A)	14.14	14.24	14.33	14.44	14.52
Irradiance ratio (rear/front)	13.5 %				

STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	75.12 x 44.65 x 1.38 inch (1908 x 1134 x 35 mm)
Weight	57.98 lbs (26.3 kg)
Number of cells	120 cells
Cell	PERC monocrystalline (M10)
Glass	(F)2.0mm, Anti-Reflection Coating (B)2.0mm, Heat Strengthened Glass
Frame	Transparent black mesh backsheet
Junction box	IP68
Output wire	4.0 mm²
Wire length (Including Connector)	(+):400 mm, (-): 200 mm or Customized Length
Connector	MC4 - EVO2
Packing specification	31 pcs/Pallet; 682 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	70±5 %

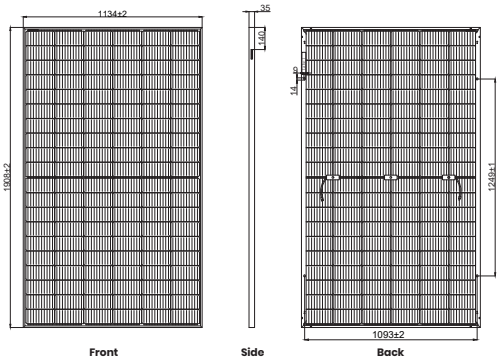
MECHANICAL LOADING

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

TEMPERATURE RATINGS

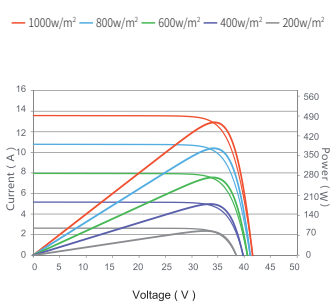
Temperature coefficient (P_{max})	-0.33 %/K
Temperature coefficient (V_{oc})	-0.26 %/K
Temperature coefficient (I_{sc})	+0.06 %/K
Nominal operating cell temperature	113±35.6 ℉ (45±2 ℃)

MODULE DIMENSIONS (MM)

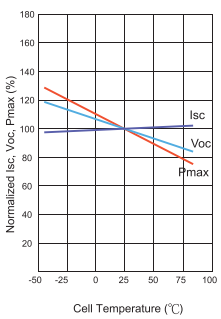


*** The unmarked tolerance is ±1 mm**
Length shown in mm

Current-Voltage & Power-Voltage Curves (465 W)



Temperature Dependence of Isc,Voc,Pmax



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