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# Zosma<sup>™</sup> 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.



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



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

#### **RE INSURANCE**

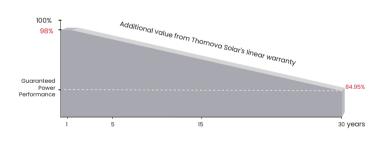
Warranty partner

Munich RE



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

#### LINEAR PERFORMANCE WARRANTY



**15** 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.

#### **ELECTRIC CHARACTERISTICS**



Model of modules	TS-BG60(445)		TS-BG60(450)		TS-BG60(455)		TS-BG60(460)		TS-BG60(465)	
	STC	NOCT								
Peak power - $P_{mp}(W)$	445	332	450	336	455	339	460	343	465	346
Open circuit voltage - V <sub>oc</sub> (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 - $\eta_m$ (%)	20.6		20	).9	21	1.1	21	3	21	1.6

STC (Standard Testing Conditions): Irradiance 1000W/m², 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 <sub>mp</sub> (W)	487	493	498	504	509
Open circuit voltage - V <sub>oc</sub> (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 DIMENSIONS (MM)

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 mm <sup>2</sup>
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 (°C )	-40~+185 °F (-40~+85 °C )
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 <sub>max</sub> )	-0.33 %/K
Temperature coefficient (V <sub>oc</sub> )	-0.26 %/K
Temperature coefficient ( $I_{sc}$ )	+0.06 %/K
Nominal operating cell temperature	113±35.6 °F (45±2 °C )

#### Current-Voltage & Power-Voltage **Temperature Dependence** 140 Curves (465 W) of lsc,Voc,Pmax 18 - 1000w/m<sup>2</sup> - 800w/m<sup>2</sup> - 600w/m<sup>2</sup> - 400w/m<sup>2</sup> - 200w/m<sup>2</sup> 16 (%) ) XBMA 490 10 200/ 12 420 ç 350 2 280 g 210 € 140 70 20 25 30 10 15 35 Front Back 40 \* The unmarked tolerance is ±1 mm Voltage (V) Cell Temperature (°C) Length shown in mm

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