



High Power Output
Low LCOE



Maximum Power
460W



TWMNH

N-type Half-cell
Bifacial Full-black Module (48)

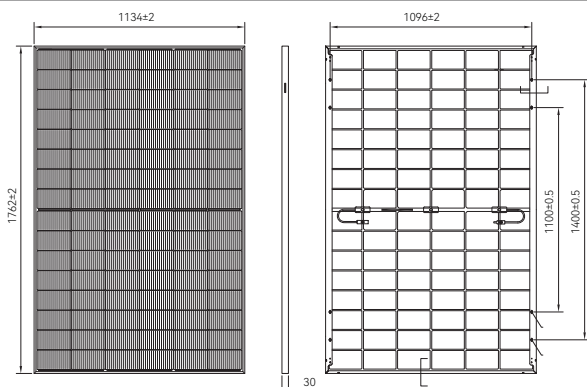
48HC440-460W

Tongwei Co.,Ltd.
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Drawings (Unit: mm)



Electrical characteristics (STC)

Module type:	TWMNH-48 HC440	TWMNH-48 HC445	TWMNH-48 HC450	TWMNH-48 HC455	TWMNH-48 HC460
Maximum Power: Pmax [W]	440	445	450	455	460
Open Circuit Voltage: Voc [V]	35.35	35.55	35.75	35.95	36.15
Short Circuit Current: Isc [A]	15.89	15.92	15.95	15.98	16.05
Voltage at Maximum Power: Vmp [V]	29.67	29.93	30.19	30.44	30.69
Current at Maximum Power: Imp [A]	14.83	14.87	14.91	14.95	14.99
Module Efficiency: η [%]	22.0	22.3	22.5	22.8	23.0

* STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5, Power measurement tolerance: ±3%

Electrical characteristics (BNPI)

	485.7	491.5	496.9	502.3	507.9
Maximum Power: Pmax [W]					
Open Circuit Voltage: Voc [V]	35.35	35.55	35.75	35.95	36.15
Short Circuit Current: Isc [A]	17.54	17.57	17.61	17.64	17.72
Voltage at Maximum Power: Vmp [V]	29.67	29.93	30.19	30.44	30.69
Current at Maximum Power: Imp [A]	16.37	16.42	16.46	16.50	16.55

* BNPI: Front side irradiance 1000W/m², Rear side irradiance 135W/m², Cell Temperature=25°C, AM=1.5, Power measurement tolerance: ±3%

Electrical characteristics with different rear side power gain

5%	Maximum Power: Pmax[W]	462	467	472	477	483
	Module Efficiency: η [%]	23.1	23.4	23.6	23.9	24.2
15%	Maximum Power: Pmax[W]	506	511	517	523	529
	Module Efficiency: η [%]	25.3	25.6	25.9	26.2	26.5
25%	Maximum Power: Pmax[W]	550	556	562	568	575
	Module Efficiency: η [%]	27.5	27.8	28.1	28.4	28.8

Temperature rating

Temperature Coefficient of Pmax	-0.28%/°C
Temperature Coefficient of Voc	-0.24%/°C
Temperature Coefficient of Isc	+0.046%/°C

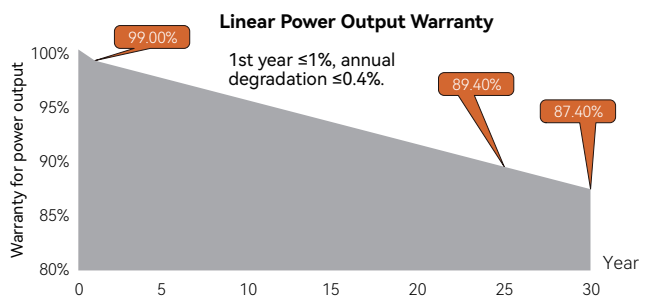
Operating parameters

Operating Temperature	-40°C~+70°C
Module [T98] max	70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Selection Tolerance	0~+3%
Bifaciality coefficient of Pmax	80±10%
Bifaciality coefficient of Voc	98±5%
Bifaciality coefficient of Isc	80±10%
Fire Class Rating	Class C

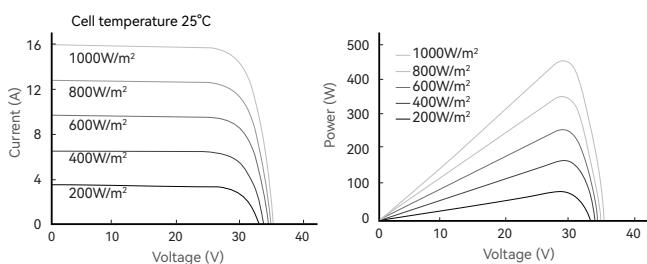
Mechanical parameters

Cell Type	TNC (N Type Monocrystalline Cell)
Cell Orientation	96[6×16]
Dimensions	1762±2×1134±2×30mm
Weight	21.9kg
Front Glass	1.6mm AR coating semi tempered glass
Rear Glass	1.6mm semi tempered glass
Frame	Anodized aluminum alloy black frame
Junction Box	IP68, 3diodes
Cable	4.0mm ²
Cable length	+1200mm, -1200mm, length can be customized
Connector	TW-PVCON-01(Tongwei Solar) PV-KST4-EVO2/xy_UR, PV-KBT4-EVO2/xy_UR(Staubli) PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy(Staubli) PV-ZH202B(Zhejiang Zhonghuan Sunter)
Max static test load	Front side 5400Pa,Rear side 2400Pa
Per pallet	36pcs
Packaging	936pcs per 40'HC

Warranty



I-V Curve



Certifications

Quality Management System and Product Certification

ISO 9001: 2015 / Quality management systems
ISO 14001: 2015 / Environmental management systems
ISO 45001: 2018 / Occupational health and safety management systems
ISO 50001: 2018 / Energy management systems
IEC 62941: 2019 / Quality system for PV module manufacturing
IEC 61215(2021) / IEC 61730(2023)



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Statement: With technological process and product update, there maybe deviation between the technical parameters of Tongwei's module products and the technical parameters contained in the specification, and Tongwei Solar has the right to adjust the technical parameters at any time without notifying the customer, the final interpretation of the technical specification is vested in Tongwei Solar. (AU-20250523) Made in China