



High Power Output  
Low LCOE



Maximum Power  
465W+



# TWMNH

N-type Half-cell  
Bifacial Black Frame Module (48)

## 48HD440-465W

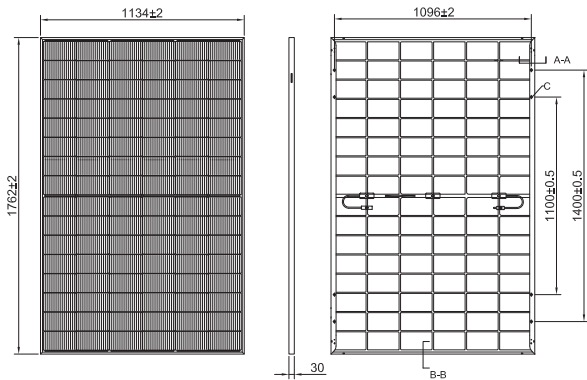


Tongwei Co.,Ltd.  
<https://en.tongwei.cn/>



Learn More

**Drawings (Unit: mm)**



**Electrical characteristics (STC)**

Modul type:	TWMNH-48 HD440	TWMNH-48 HD445	TWMNH-48 HD450	TWMNH-48 HD455	TWMNH-48 HD460	TWMNH-48 HD465
Maximum Power: Pmax [W]	440	445	450	455	460	465
Open Circuit Voltage: Voc [V]	35.35	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: Isc [A]	15.89	15.92	15.95	15.98	16.05	16.12
Voltage at Maximum Power: Vmp [V]	29.67	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: Imp [A]	14.83	14.87	14.91	14.95	14.99	15.03
Module Efficiency: η [%]	22.0	22.3	22.5	22.8	23.0	23.3

\* STC: Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, AM=1.5, Power measurement tolerance: ±3%

**Electrical characteristics (BNPI)**

Maximum Power: Pmax [W]	485.7	491.5	496.9	502.3	507.9	513.3
Open Circuit Voltage: Voc [V]	35.35	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: Isc [A]	17.54	17.57	17.61	17.64	17.72	17.80
Voltage at Maximum Power: Vmp [V]	29.67	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: Imp [A]	16.37	16.42	16.46	16.50	16.55	16.59

\* BNPI: Front side irradiance 1000W/m<sup>2</sup>, Rear side irradiance 135W/m<sup>2</sup>, 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	488
	Module Efficiency: η [%]	23.1	23.4	23.6	23.9	24.2	24.4
15%	Maximum Power: Pmax[W]	506	511	517	523	529	534
	Module Efficiency: η [%]	25.3	25.6	25.9	26.2	26.5	26.7
25%	Maximum Power: Pmax[W]	550	556	562	568	575	581
	Module Efficiency: η [%]	27.5	27.8	28.1	28.4	28.8	29.1

**Temperature rating**

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

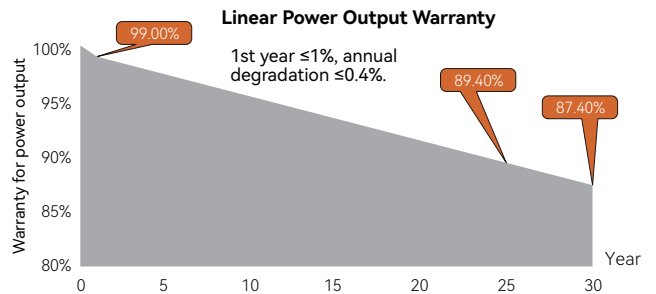
**Operating parameters**

Operating Temperature	-40°C~+70°C
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

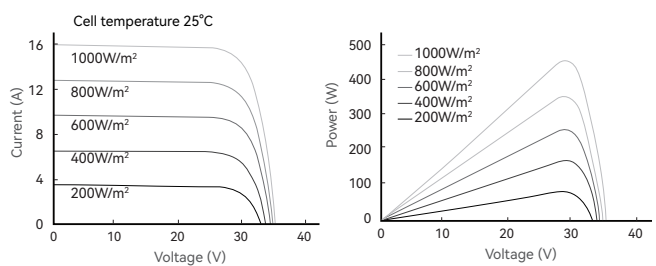
**Mechanical parameters**

Cell Type	TNC (N Type Monocrystalline Cell)
Cell Orientation	96[6×16]
Dimensions	1762±2×1134±2×30mm
Weight	23.7kg
Front Glass	2.0mm AR coating semi tempered glass
Rear Glass	2.0mm semi tempered glass
Frame	Anodized aluminum alloy black frame
Junction Box	IP68, 3diodes
Cable	4.0mm <sup>2</sup>
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(Zhonghuan)
Wind/Snow load	2400Pa/5400Pa
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)



Email: sales@tongwei.com Website: https://en.tongwei.cn/ Add: No.588, Middle Section Tianfu Avenue, High-Tech Zone, Chengdu, China (Sichuan) Pilot Free Trade Zone Tel: +86-028-60707985

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-20250325) Made in China