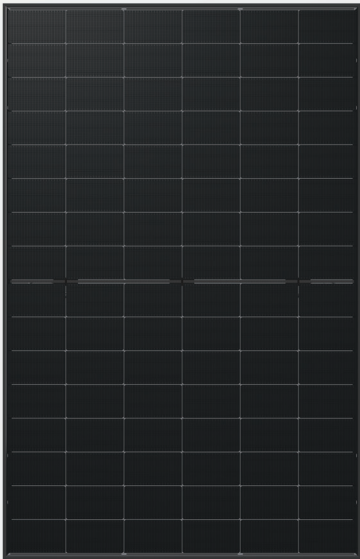


# TNOC 2.0

## N-type Half-cell Bifacial Dual glass Black Frame and Transparent Module (48) TWMNH-48HD



High light transmittance, suitable for carports and balcony scenarios



Compact size and lightweight, hassle-free operation and low maintenance

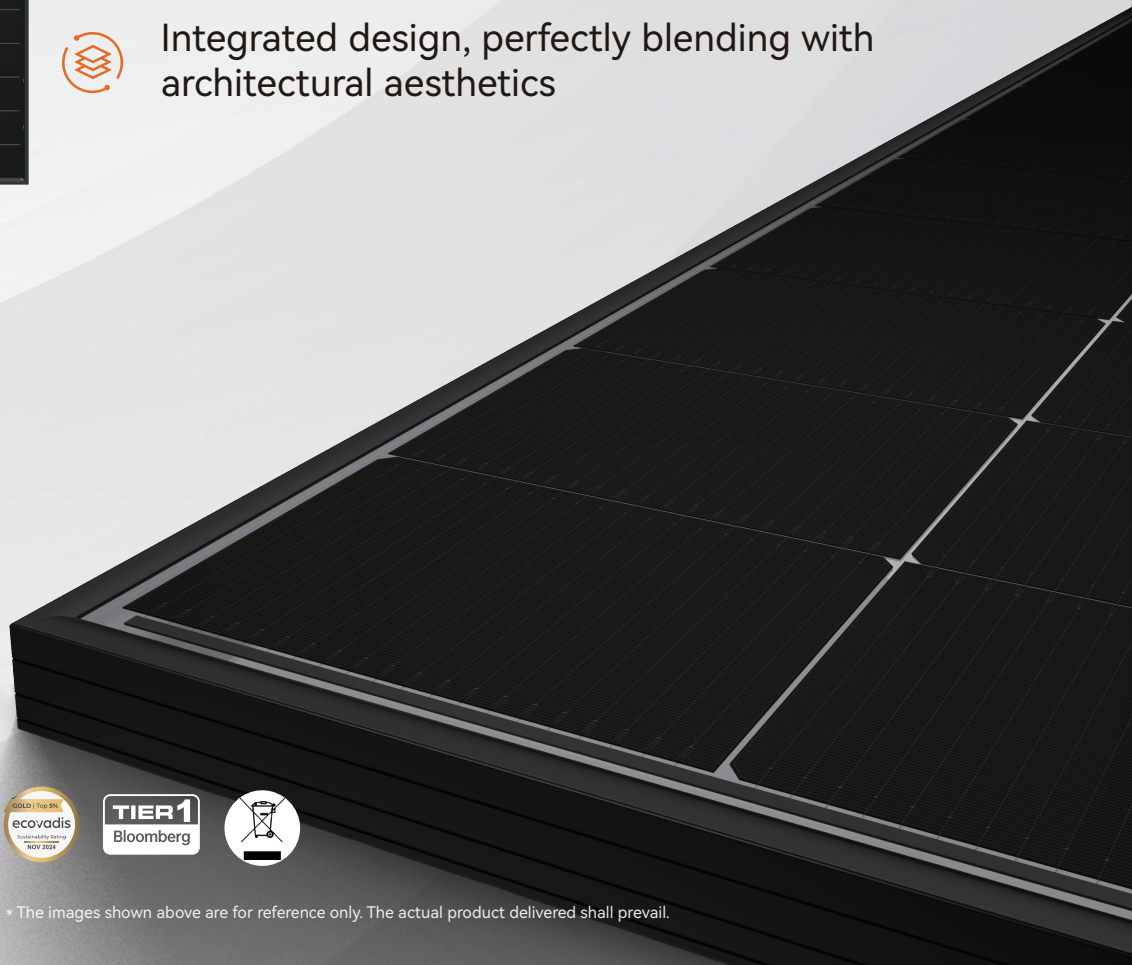


Increased power, lower transportation cost

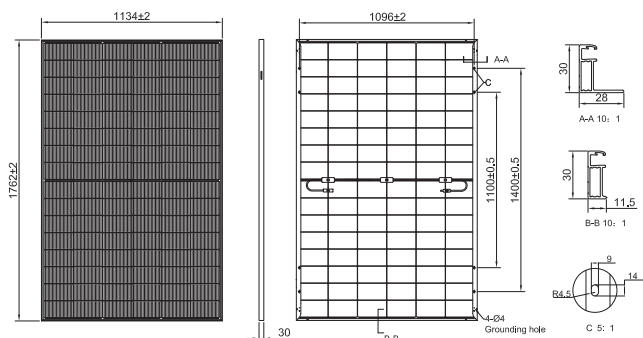


Integrated design, perfectly blending with architectural aesthetics

### 445-465W



## Drawings (Unit: mm)



## Electrical Characteristics (STC)

Module type: TWMNH-48HDXXX

Maximum Power: P <sub>max</sub> [W]	445	450	455	460	465
Open Circuit Voltage: V <sub>oc</sub> [V]	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: I <sub>sc</sub> [A]	15.92	15.95	15.98	16.05	16.12
Voltage at Maximum Power: V <sub>mp</sub> [V]	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: I <sub>mp</sub> [A]	14.87	14.91	14.95	14.99	15.03
Module Efficiency: η [%]	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: P <sub>max</sub> [W]	491.5	496.9	502.3	507.9	513.3
Open Circuit Voltage: V <sub>oc</sub> [V]	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: I <sub>sc</sub> [A]	17.57	17.61	17.64	17.72	17.80
Voltage at Maximum Power: V <sub>mp</sub> [V]	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: I <sub>mp</sub> [A]	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: P <sub>max</sub> [W]	467	472	477	483	488
	Module Efficiency: η [%]	23.4	23.6	23.9	24.2	24.4
15%	Maximum Power: P <sub>max</sub> [W]	511	517	523	529	534
	Module Efficiency: η [%]	25.6	25.9	26.2	26.5	26.7
25%	Maximum Power: P <sub>max</sub> [W]	556	562	568	575	581
	Module Efficiency: η [%]	27.8	28.1	28.4	28.8	29.1

## Temperature Rating

Temperature Coefficient of P <sub>max</sub>	-0.28%/°C
Temperature Coefficient of V <sub>oc</sub>	-0.24%/°C
Temperature Coefficient of I <sub>sc</sub>	+0.046%/°C

## Operating Parameters

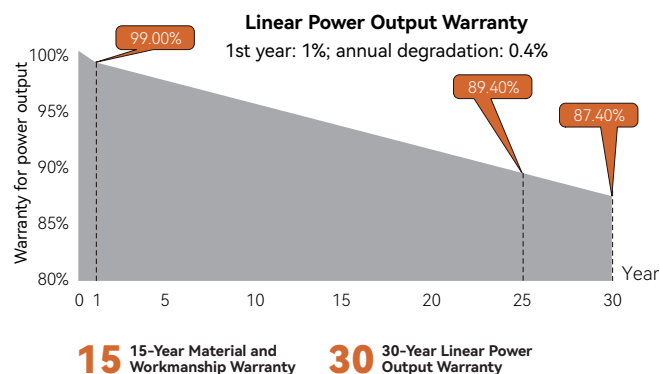
Operating Temperature*	[T <sub>98</sub> ] <sub>≤70°C</sub>
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+3%
Bifaciality coefficient of P <sub>max</sub>	80±10%
Bifaciality coefficient of V <sub>oc</sub>	98±5%
Bifaciality coefficient of I <sub>sc</sub>	80±10%

\*The module operating temperature can reach up to 85°C for short term.

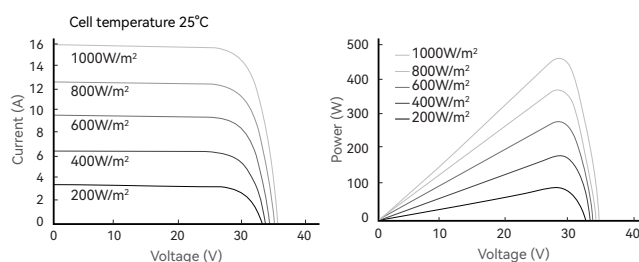
## Mechanical Parameters

Cell Type	TNC
Cell Orientation	96[6×16]
Dimension	1762±2×1134±2×30mm
Weight	24.3kg
Front Glass	2.0 mm AR coating semi tempered glass
Rear Glass	2.0 mm semi tempered glass
Frame	Anodized aluminum alloy black frame
Junction Box	IP68, 3 diodes
Cable	4.0mm <sup>2</sup>
Cable Length	±1,200 mm, length can be customized
Maximum Static Test Load	5,400 Pa (front) / 2,400 Pa (rear)
Packaging (Per pallet)	36 pcs
Packaging	936 pcs per 40'HC

## Warranty



## Curve



## Certifications

### Quality Management System and Product Certification

ISO 9001: 2015 / Quality Management System  
 ISO 14001: 2015 / Environmental Management System  
 ISO 45001: 2018 / Occupational Health and Safety Management System  
 ISO 50001: 2018 / Energy Management System  
 IEC 62941: 2019 / Quality System for PV Module Manufacturing  
 IEC 61215 (2021) / IEC 61730 (2023), IEC TS 62804,  
 IEC 61701, IEC 62716, IEC 60068-2-68



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