



High Power Output  
Low LCOE



Maximum Power  
470W



# TWMNH

N-type Half-cell Dual Glass  
Monofacial Full-black Module(48)

## 48HE440-470W



Residential  
Rooftop



15  
YEAR  
Materials  
Warranty



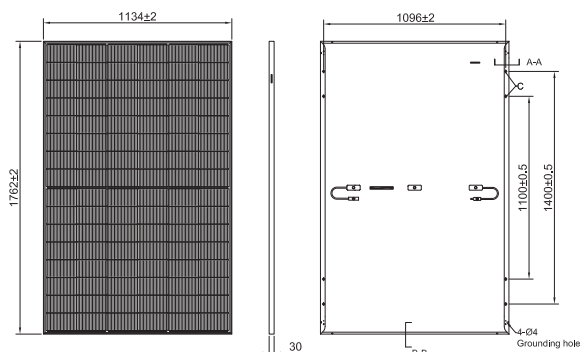
30  
YEAR  
Power  
Warranty

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



Learn More

## Drawing (Unit: mm)



## Electrical Characteristics (STC)

| Module type:                      | TWMNH-48<br>HE440 | TWMNH-48<br>HE445 | TWMNH-48<br>HE450 | TWMNH-48<br>HE455 | TWMNH-48<br>HE460 |
|-----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Maximum Power: Pmax [W]           | 440               | 445               | 450               | 455               | 460               |
| Open Circuit Voltage: Voc [V]     | 35.65             | 35.80             | 35.95             | 36.10             | 36.25             |
| Short Circuit Current: Isc [A]    | 15.72             | 15.76             | 15.81             | 15.85             | 15.89             |
| Voltage at Maximum Power: Vmp [V] | 29.30             | 29.56             | 29.81             | 30.06             | 30.31             |
| Current at Maximum Power: Imp [A] | 15.02             | 15.06             | 15.10             | 15.14             | 15.18             |
| Module Efficiency: η [%]          | 22.0              | 22.3              | 22.5              | 22.8              | 23.0              |

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

## Temperature Rating

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

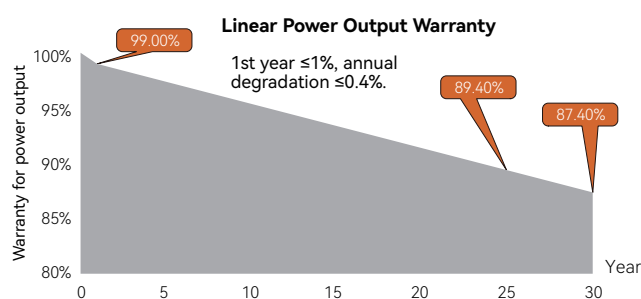
## Operating Parameters

|                            |             |
|----------------------------|-------------|
| 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%       |
| Fire Class Rating          | Class C     |

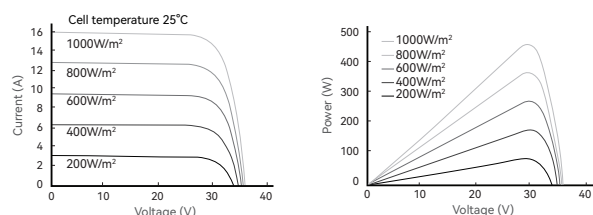
## Mechanical Parameters

|                      |                                                                                                                                                                      |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cell Type            | TNC (N Type Monocrystalline Cell)                                                                                                                                    |
| Cell Orientation     | 96[6×16]                                                                                                                                                             |
| Dimensions           | 1762±2×1134±2×30mm                                                                                                                                                   |
| Weight               | 22.8kg                                                                                                                                                               |
| 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)<br>PV-KST4-EVO2/xy_UR, PV-KBT4-EVO2/xy_UR(Staubli)<br>PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy(Staubli)<br>PV-ZH202B(Zhejiang Zhonghuan Sunter) |
| Max static test load | Front side 5400Pa,Rear side 2400Pa                                                                                                                                   |
| Per pallet           | 36pcs                                                                                                                                                                |
| Packaging            | 936pcs per 40'HC                                                                                                                                                     |

## Linear Warranty



## I-V Curve



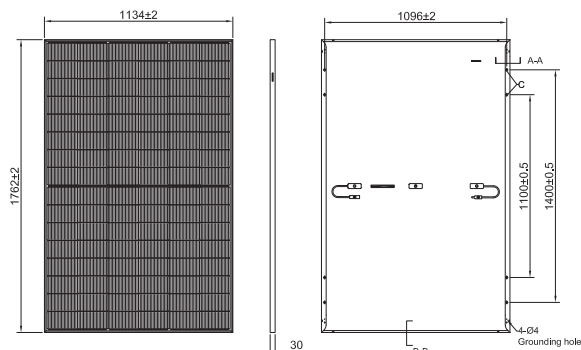
## Certifications

### 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)



## Drawing (Unit: mm)



## Electrical Characteristics (STC)

| Module type:                                  | TWMNH-48<br>HE465 | TWMNH-48<br>HE470 |
|-----------------------------------------------|-------------------|-------------------|
| Maximum Power: P <sub>max</sub> [W]           | 465               | 470               |
| Open Circuit Voltage: V <sub>oc</sub> [V]     | 36.40             | 36.55             |
| Short Circuit Current: I <sub>sc</sub> [A]    | 15.92             | 15.95             |
| Voltage at Maximum Power: V <sub>mp</sub> [V] | 30.56             | 30.80             |
| Current at Maximum Power: I <sub>mp</sub> [A] | 15.22             | 15.26             |
| Module Efficiency: η [%]                      | 23.3              | 23.5              |

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

## 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 |

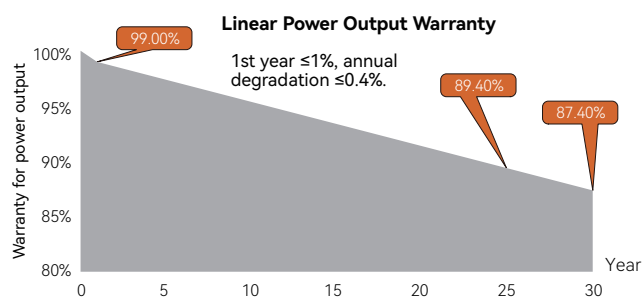
## Operating Parameters

|                               |             |
|-------------------------------|-------------|
| Operating Temperature         | -40°C~+70°C |
| Module [T <sub>98</sub> ] max | 70°C        |
| Maximum System Voltage        | 1500V DC    |
| Maximum Series Fuse Rating    | 30A         |
| Power Selection Tolerance     | 0~+3%       |
| Fire Class Rating             | Class C     |

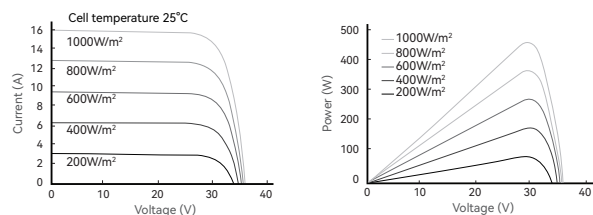
## Mechanical Parameters

|                      |                                                                                                                                                                      |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cell Type            | TNC (N Type Monocrystalline Cell)                                                                                                                                    |
| Cell Orientation     | 96[6×16]                                                                                                                                                             |
| Dimensions           | 1762±2×1134±2×30mm                                                                                                                                                   |
| Weight               | 22.8kg                                                                                                                                                               |
| 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)<br>PV-KST4-EVO2/xy_UR, PV-KBT4-EVO2/xy_UR(Staubli)<br>PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy(Staubli)<br>PV-ZH202B(Zhejiang Zhonghuan Sunter) |
| Max static test load | Front side 5400Pa, Rear side 2400Pa                                                                                                                                  |
| Per pallet           | 36pcs                                                                                                                                                                |
| Packaging            | 936pcs per 40'HC                                                                                                                                                     |

## Linear 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)

