



## Declaration on Standard Anti-Reflective Coating of Tongwei PV Modules

To: Whom It May Concern

Date: 22 September 2025

Dear Sir/Madam,

We wish to clarify the following regarding the Tongwei solar PV modules:

The following Tongwei solar PV module models:

TWMNH-48HD

TWMNH-48HW

TWMNH-48HE

TWMNH-54HD

TWMNH-66HD

TWMNF-66HD

are manufactured with anti-reflective coating (AR Coating) as an integral feature on the front glass surface.

Technical References:

For detailed specifications, please refer to the Tongwei PV Module Datasheet, specifically under the section 'Mechanical Parameters'.

This notification is meant to dispel any uncertainty or misconceptions regarding the features of these modules.

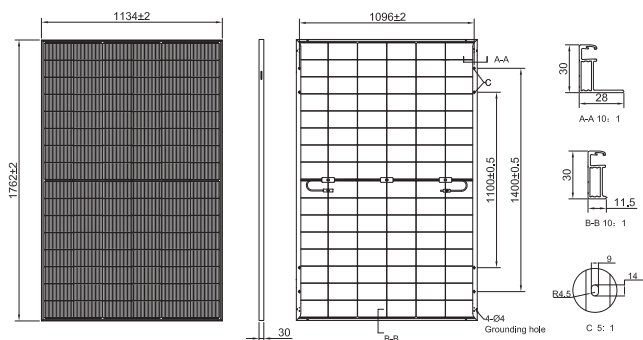
Thank you for your attention.

Sincerely,

A handwritten signature in black ink that reads 'Chann Zhou'.

Overseas Technical Service Manager  
TONGWEI Co., Ltd

### Drawings (Unit: mm)



### Electrical Characteristics (STC)

Module type: TWMNH-48HDXXX					
Maximum Power: Pmax [W]	445	450	455	460	465
Open Circuit Voltage: Voc [V]	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: Isc [A]	15.92	15.95	15.98	16.05	16.12
Voltage at Maximum Power: Vmp [V]	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: Imp [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: Pmax [W]	491.5	496.9	502.3	507.9	513.3
Open Circuit Voltage: Voc [V]	35.55	35.75	35.95	36.15	36.35
Short Circuit Current: Isc [A]	17.57	17.61	17.64	17.72	17.80
Voltage at Maximum Power: Vmp [V]	29.93	30.19	30.44	30.69	30.94
Current at Maximum Power: Imp [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: Pmax[W]	467	472	477	483	488
	Module Efficiency: η [%]	23.4	23.6	23.9	24.2	24.4
15%	Maximum Power: Pmax[W]	511	517	523	529	534
	Module Efficiency: η [%]	25.6	25.9	26.2	26.5	26.7
25%	Maximum Power: Pmax[W]	556	562	568	575	581
	Module Efficiency: η [%]	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

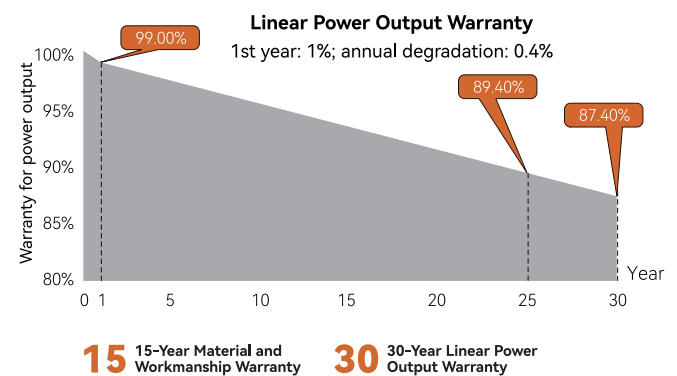
### Operating Parameters

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

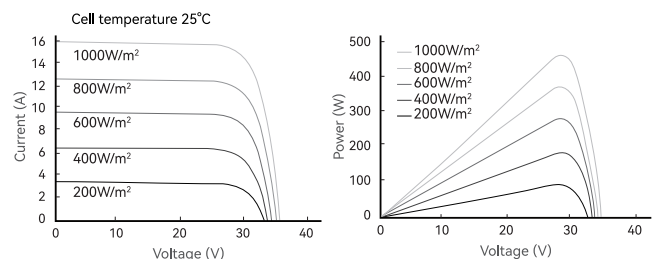
### Mechanical Parameters

Cell Type	TNC
Cell Orientation	96[6×16]
Dimension	1762±2×1134±2×30mm
Weight	23.7kg
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

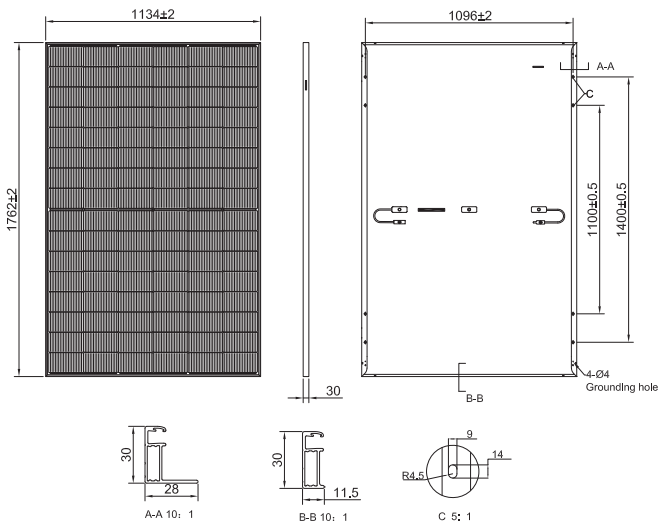
#### Quality Management System and Product Certification

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



Scan the code for more information

**Drawing (Unit: mm)**



**Mechanical Parameters**

Cell Type	TNC
Cell Orientation	96[6×16]
Dimension	1762±2×1134±2×30mm
Weight	23.7 kg
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	4.0 mm <sup>2</sup>
Cable Length	+1200mm,-1200mm,length can be customized
Maximum Static Test Load	6,000 Pa (front) / 4,000 Pa (rear)
Packaging (Per pallet)	36 pcs
Packaging	936 pcs per 40'HC

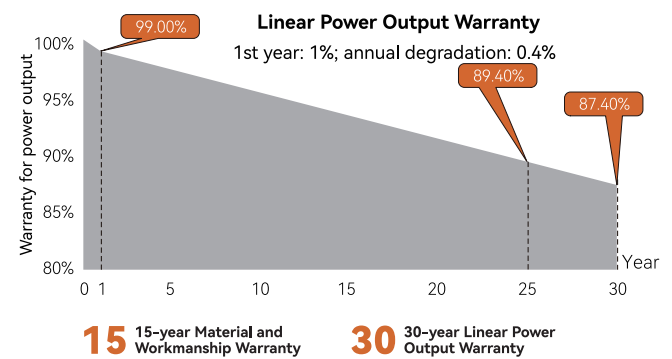
**Electrical Characteristics (STC)**

Module type: TWMNH-48HWXXX

Maximum Power: Pmax [W]	455	460	465	470	475
Open Circuit Voltage: Voc [V]	36.10	36.25	36.40	36.55	36.70
Short Circuit Current: Isc [A]	15.85	15.89	15.92	15.95	15.97
Voltage at Maximum Power: Vmp [V]	30.06	30.31	30.56	30.80	31.05
Current at Maximum Power: Imp [A]	15.14	15.18	15.22	15.26	15.30
Module Efficiency: η [%]	22.8	23.0	23.3	23.5	23.8

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

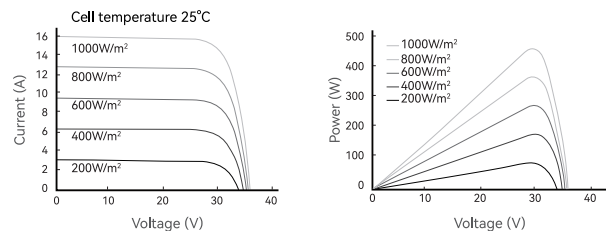
**Warranty**



**Temperature Rating**

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

**Curve**



**Operating Parameters**

Operating Temperature	-40°C~+70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+3%

**Certifications**

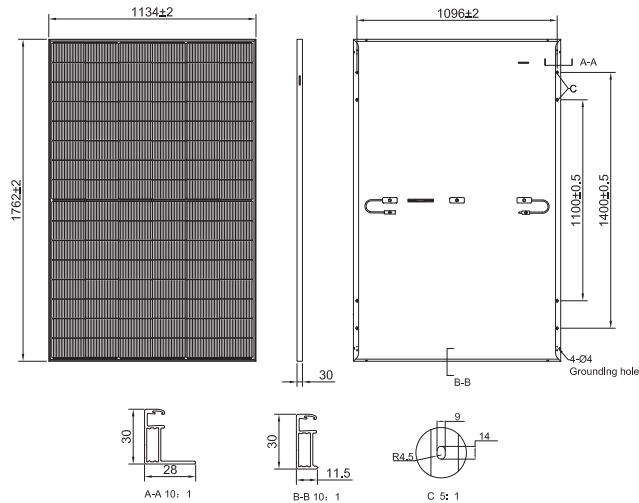
**Quality Management System and Product Certification**

- 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



Scan the code for more information

**Drawing (Unit: mm)**



**Mechanical Parameters**

Cell Type	TNC
Cell Orientation	96[6×16]
Dimension	1762±2×1134±2×30mm
Weight	23.7 kg
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	4.0 mm <sup>2</sup>
Cable Length	+1200mm,-1200mm,length can be customized
Maximum Static Test Load	6,000 Pa (front) / 4,000 Pa (rear)
Packaging (Per pallet)	36 pcs
Packaging	936 pcs per 40'HC

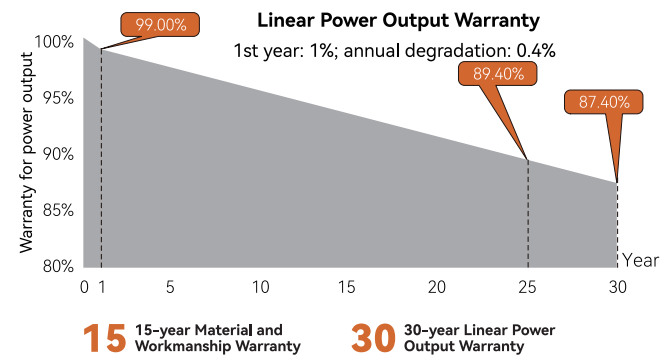
**Electrical Characteristics (STC)**

Module type: TWMNH-48HEXXX

Maximum Power: Pmax [W]	450	455	460	465	470
Open Circuit Voltage: Voc [V]	35.95	36.10	36.25	36.40	36.55
Short Circuit Current: Isc [A]	15.81	15.85	15.89	15.92	15.95
Voltage at Maximum Power: Vmp [V]	29.81	30.06	30.31	30.56	30.80
Current at Maximum Power: Imp [A]	15.10	15.14	15.18	15.22	15.26
Module Efficiency: η [%]	22.5	22.8	23.0	23.3	23.5

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

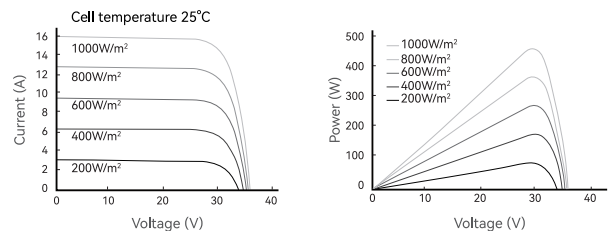
**Warranty**



**Temperature Rating**

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

**Curve**



**Operating Parameters**

Operating Temperature	-40°C~+70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+3%

**Certifications**

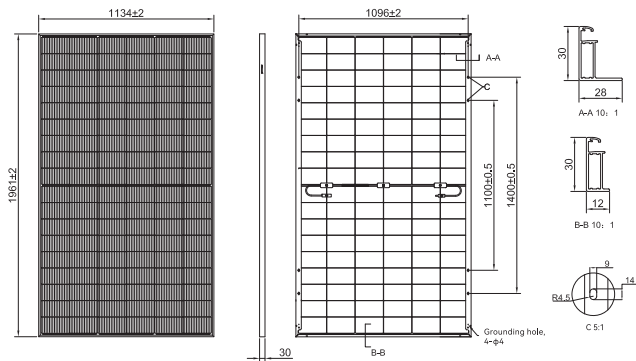
**Quality Management System and Product Certification**

- 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



Scan the code for more information

### Drawings (Unit: mm)



### Electrical Characteristics (STC)

Module type: TWMNH-54HDXXX					
Maximum Power: Pmax [W]	495	500	505	510	515
Open Circuit Voltage: Voc [V]	39.88	40.06	40.24	40.42	40.60
Short Circuit Current: Isc [A]	15.86	15.89	15.92	15.95	15.98
Voltage at Maximum Power: Vmp [V]	33.45	33.70	33.94	34.19	34.43
Current at Maximum Power: Imp [A]	14.80	14.84	14.88	14.92	14.96
Module Efficiency: η [%]	22.3	22.5	22.7	22.9	23.2

\* 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]	546.6	552.0	557.6	563.1	568.8
Open Circuit Voltage: Voc [V]	39.88	40.06	40.24	40.42	40.60
Short Circuit Current: Isc [A]	17.51	17.54	17.57	17.61	17.64
Voltage at Maximum Power: Vmp [V]	33.45	33.70	33.94	34.19	34.43
Current at Maximum Power: Imp [A]	16.34	16.38	16.43	16.47	16.52

\* 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]	519	525	530	535	540
	Module Efficiency: η [%]	23.3	23.6	23.8	24.1	24.3
15%	Maximum Power: Pmax[W]	569	575	580	586	592
	Module Efficiency: η [%]	25.6	25.9	26.1	26.4	26.6
25%	Maximum Power: Pmax[W]	618	625	631	637	643
	Module Efficiency: η [%]	27.8	28.1	28.4	28.6	28.9

### Temperature Rating

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

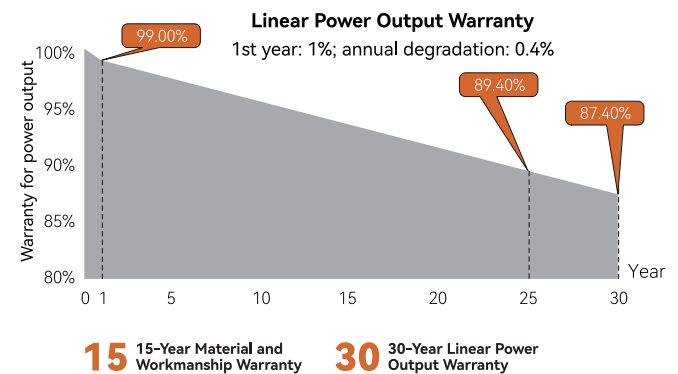
### Operating Parameters

Operating Temperature	-40°C~+70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+3%
Bifaciality coefficient of Pmax	80±5%
Bifaciality coefficient of Voc	98±5%
Bifaciality coefficient of Isc	80±5%

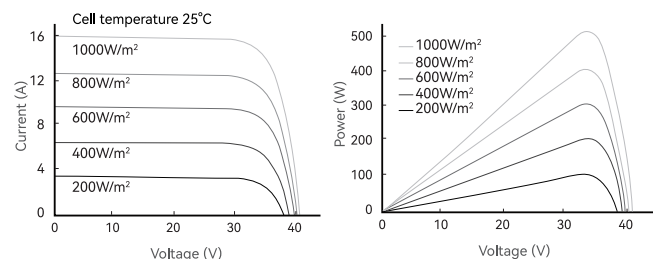
### Mechanical Parameters

Cell Type	TNC
Cell Orientation	108[6×18]
Dimension	1961±2×1134±2×30mm
Weight	26.5kg
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, 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	864 pcs per 40'HC

### Warranty



### Curve



### Certifications

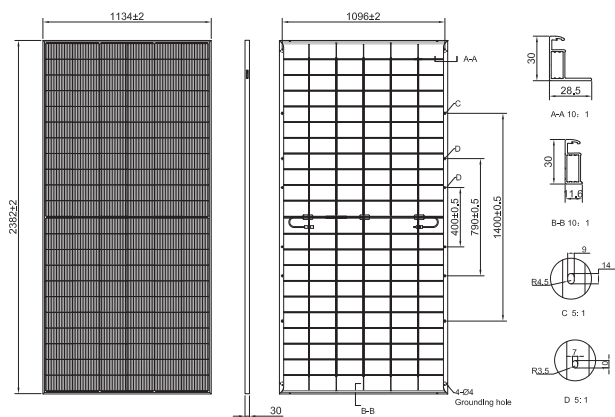
#### Quality Management System and Product Certification

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



Scan the code for more information

**Drawings (Unit: mm)**



**Mechanical Parameters**

Cell Type	TNC
Cell Orientation	132 [6×22]
Dimension	2382±2×1134±2×30mm
Weight	32.5kg
Front Glass	2.0 mm AR coating semi tempered glass
Rear Glass	2.0 mm semi tempered glass
Frame	Anodized aluminum alloy frame
Junction Box	IP68, 3 diodes
Cable	4.0mm <sup>2</sup>
Cable Length	+400 mm, -200 mm or ±1,400 mm; length can be customized
Maximum Static Test Load	5,400 Pa (front) / 2,400 Pa (rear)
Packaging (Per pallet)	36 pcs
Packaging	720 pcs per 40'HC

**Electrical Characteristics (STC)**

Module type: TWMNH-66HDXXX

Maximum Power: Pmax [W]	610	615	620	625	630
Open Circuit Voltage: Voc [V]	48.70	48.90	49.10	49.30	49.50
Short Circuit Current: Isc [A]	15.94	16.00	16.06	16.12	16.18
Voltage at Maximum Power: Vmp [V]	40.48	40.65	40.82	40.96	41.10
Current at Maximum Power: Imp [A]	15.07	15.13	15.19	15.26	15.33
Module Efficiency: η [%]	22.6	22.8	23.0	23.1	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]	673.6	678.9	684.6	690.2	695.4
Open Circuit Voltage: Voc [V]	48.70	48.90	49.10	49.30	49.50
Short Circuit Current: Isc [A]	17.60	17.66	17.73	17.80	17.86
Voltage at Maximum Power: Vmp [V]	40.48	40.65	40.82	40.96	41.10
Current at Maximum Power: Imp [A]	16.64	16.70	16.77	16.85	16.92

\* 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]	640	645	651	656	661
	Module Efficiency: η [%]	23.7	23.9	24.1	24.3	24.5
15%	Maximum Power: Pmax[W]	701	707	713	718	724
	Module Efficiency: η [%]	26.0	26.2	26.4	26.6	26.8
25%	Maximum Power: Pmax[W]	762	768	775	781	787
	Module Efficiency: η [%]	28.2	28.4	28.7	28.9	29.1

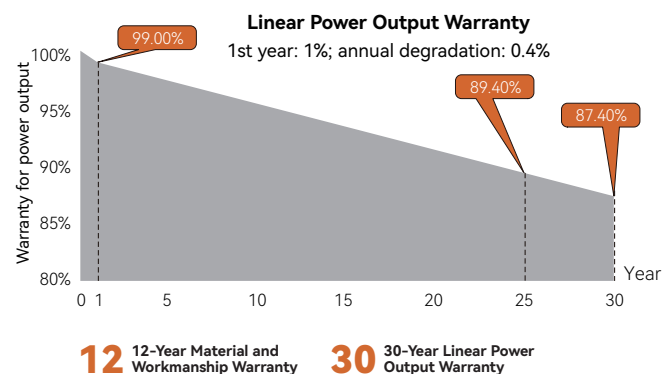
**Temperature Rating**

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

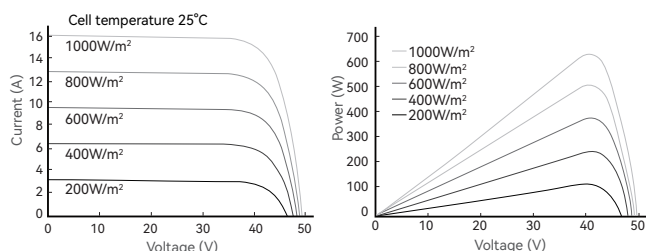
**Operating Parameters**

Operating Temperature	-40°C~+70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+3%
Bifaciality coefficient of Pmax	80±5%
Bifaciality coefficient of Voc	98±5%
Bifaciality coefficient of Isc	80±5%

**Warranty**



**Curve**



**Certifications**

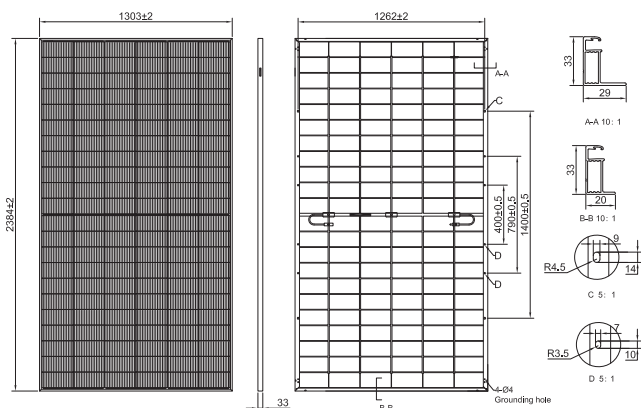
**Quality Management System and Product Certification**

- ISO9001:2015/Quality Management System
- ISO14001:2015/Environmental Management System
- ISO45001:2018/Occupational Health and Safety Management System
- ISO50001:2018 / Energy Management System
- EC62941:2019 / Quality System for PV Module Manufacturing
- IEC 61215 (2021) / IEC 61730 (2023), IEC TS 62804, IEC 61701, IEC 62716, IEC 60068-2-68



Scan the code for more information

**Drawings (Unit: mm)**



**Electrical Characteristics (STC)**

Module type: TWMNF-66HDXXX					
Maximum Power: Pmax [W]	705	710	715	720	725
Open Circuit Voltage: Voc [V]	48.77	48.94	49.11	49.28	49.45
Short Circuit Current: Isc [A]	18.40	18.45	18.50	18.55	18.60
Voltage at Maximum Power: Vmp [V]	40.52	40.69	40.86	41.03	41.20
Current at Maximum Power: Imp [A]	17.40	17.45	17.50	17.55	17.60
Module Efficiency: η [%]	22.7	22.9	23.0	23.2	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]	778.4	783.7	789.4	794.8	800.5
Open Circuit Voltage: Voc [V]	48.77	48.94	49.11	49.28	49.45
Short Circuit Current: Isc [A]	20.31	20.37	20.42	20.48	20.53
Voltage at Maximum Power: Vmp [V]	40.52	40.69	40.86	41.03	41.20
Current at Maximum Power: Imp [A]	19.21	19.26	19.32	19.37	19.43

\* 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]	740	745	750	756	761
	Module Efficiency: η [%]	23.8	24.0	24.1	24.3	24.5
15%	Maximum Power: Pmax[W]	810	816	822	828	833
	Module Efficiency: η [%]	26.1	26.3	26.5	26.7	26.8
25%	Maximum Power: Pmax[W]	881	887	893	900	906
	Module Efficiency: η [%]	28.4	28.6	28.7	29.0	29.2

**Temperature Rating**

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

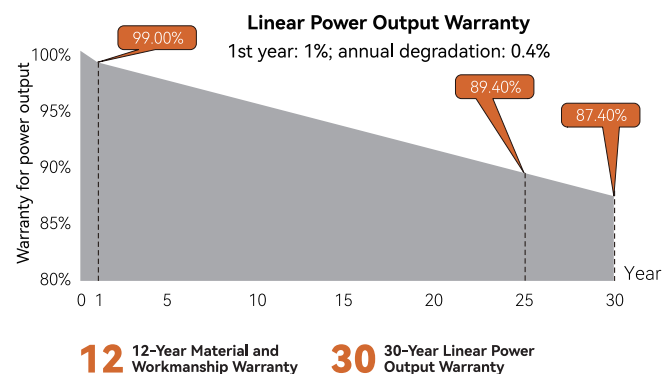
**Operating Parameters**

Operating Temperature	-40°C~+70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	35A
Power Output Tolerance	0~+3%
Bifaciality coefficient of Pmax	80±5%
Bifaciality coefficient of Voc	98±5%
Bifaciality coefficient of Isc	80±5%

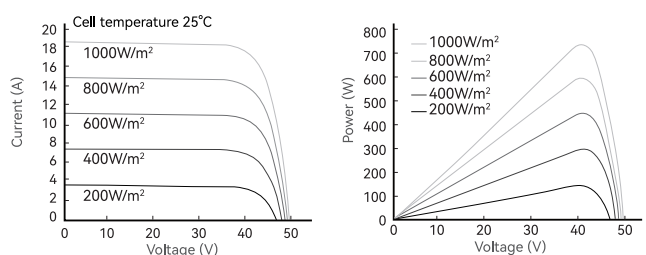
**Mechanical Parameters**

Cell Type	TNC
Cell Orientation	132 [6×22]
Dimension	2384±2×1303±2×33mm
Weight	37.9kg
Front Glass	2.0 mm AR coating semi tempered glass
Rear Glass	2.0 mm semi tempered glass
Frame	Anodized aluminum alloy frame
Junction Box	IP68, 3 diodes
Cable	4.0 mm <sup>2</sup>
Cable Length	+400 mm, -200 mm or ±1,400 mm; length can be customized
Maximum Static Test Load	5,400 Pa (front) / 2,400 Pa (rear)
Packaging (Per pallet)	33 pcs
Packaging	594 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



Scan the code for more information