

TRINA

TSM-DE21 650-675W

PRODUCT: TSM-DE21
POWER RANGE: 650-675W

675W

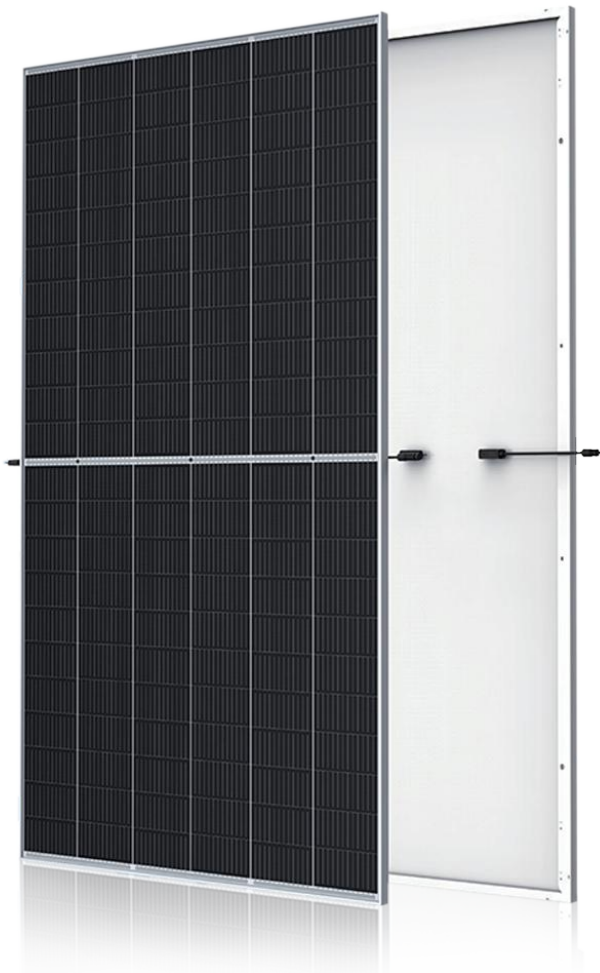
MAXIMUM POWER OUTPUT

0~+5W

POSITIVE POWER TOLERANCE

21.7%

MAXIMUM EFFICIENCY



High customer value

- Lower LCOE (Levelized Cost Of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lower first year and annual degradation
- Designed for compatibility with existing mainstream system components



High power up to 675W

- Up to 21.7% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



High reliability

- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt/ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load



High energy yield

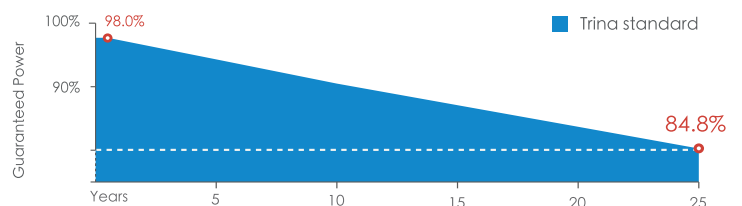
- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.34%) and operating temperature

Comprehensive Products and System Certificates

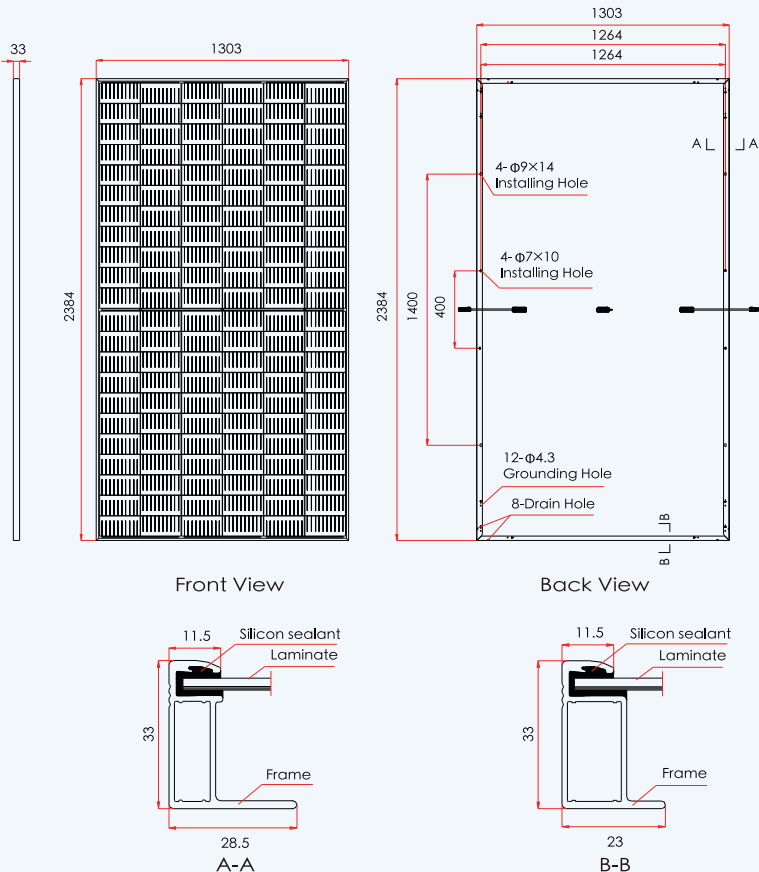


IEC61215/IEC61730/IEC61701/IEC62716/UL61730
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse Gases Emissions Verification
ISO45001: Occupational Health and Safety Management System

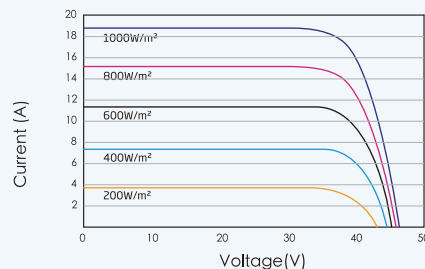
Backsheet Performance Warranty



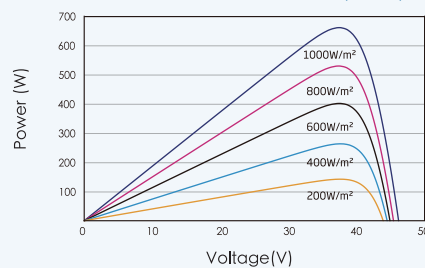
DIMENSIONS OF PV MODULE(mm)



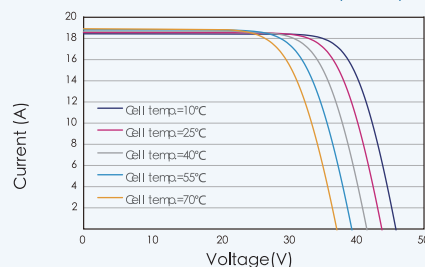
I-V CURVES OF PV MODULE(665 W)



P-V CURVES OF PV MODULE(665W)



I-V CURVES OF PV MODULE(665 W)



ELECTRICAL DATA (STC)

Peak Power Watts- P_{MAX} (Wp)*	650	655	660	665	670	675
Power Tolerance- R_{MAX} (W)	0 ~ +5					
Maximum Power Voltage- V_{MP} (V)	37.4	37.6	37.8	38.0	38.2	38.4
Maximum Power Current- I_{MP} (A)	17.39	17.43	17.47	17.51	17.55	17.58
Open Circuit Voltage- V_{OC} (V)	45.3	45.5	45.7	45.9	46.1	46.3
Short Circuit Current- I_{SC} (A)	18.44	18.48	18.53	18.57	18.62	18.66
Module Efficiency η_m (%)	20.9	21.1	21.2	21.4	21.6	21.7

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.3 Measuring tolerance: $\pm 3\%$.

ELECTRICAL DATA (NOCT)

Maximum Power- R_{MAX} (Wp)	492	496	500	504	508	511
Maximum Power Voltage- V_{MP} (V)	34.9	35.1	35.3	35.4	35.6	35.8
Maximum Power Current- I_{MP} (A)	14.09	14.13	14.17	14.22	14.26	14.29
Open Circuit Voltage- V_{OC} (V)	42.7	42.9	43.0	43.2	43.4	43.6
Short Circuit Current- I_{SC} (A)	14.86	14.89	14.93	14.96	15.01	15.04

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	132 cells
Module Dimensions	2384x1303x33 mm (93.86x51.30x1.30 inches)
Weight	33.3 kg (73.4 lb)
Glass	3.2 mm (0.13 inches) High Transmission, Tempered Glass
Encapsulant material	EVA
Backsheet	White
Frame	33mm(1.30 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²), Portrait: 350/280 mm(13.78/11.02 inches) Length can be customized
Connector	MC4 EVO2 / TS4 Plus/ TS4*

*Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NOCT(Nominal Operating Cell Temperature)	43° C ($\pm 2^\circ$ C)
Temperature Coefficient of P_{MAX}	-0.34%/° C
Temperature Coefficient of V_{OC}	-0.25%/° C
Temperature Coefficient of I_{SC}	0.04%/° C

MAXIMUM RATINGS

Operational Temperature	-40~+85 °C
Maximum System Voltage	1500V DC (IEC) 1500V DC (UL)
Max Series Fuse Rating	30A

WARRANTY

12 year Product Workmanship Warranty
25 year Power Warranty
2% first year degradation
0.55% Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 33 pieces
Modules per 40' container: 594 pieces

JINKO

54HL4R-(V) 430-450W

N-type



N-type Technology

N-type modules with Tunnel Oxide Passivating Contacts (TOPCon) technology offer lower LID/LeTID degradation and better low light performance.



HOT 2.0 Technology

N-type modules with JinkoSolar's HOT 2.0 technology offer better reliability and efficiency.



Durability Against Extreme Environment

High salt mist and ammonia resistance.



Mechanical Load Enhanced

Certified to withstand:
5400 Pa front side max static test load
2400 Pa rear side max static test load



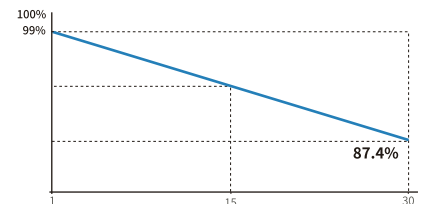
SMBB Technology

Better light trapping and current collection to improve module power output and reliability.



Anti-PID Guarantee

Minimizes the chance of degradation caused by PID phenomena through optimization of cell production technology and material control.



15 Year Product Warranty | **30 Year** Linear Power Warranty | **1%** First-year Degradation | **0.4%** Annual Degradation Over 30 Years

JKM430-450N-54HL4R-(V)-F5-EN



- IEC61215 (2016) / IEC61730 (2016)
- IEC61701 / IEC62716 / IEC60068 / IEC62804
- ISO9001:2015: Quality Management System
- ISO14001:2015: Environment Management System
- ISO45001:2018: Occupational health and safety management systems

54HL4R-(V) 430-450 Watt

Mechanical Characteristics

Cell Type	N -type Mono-crystalline
No. of cells	108 (54×2)
Dimensions	1762×1134×30 mm
Weight	21.0 kg
Front Glass	3.2 mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Protection Class	Class II
IEC Fire Type	Class C
Output Cables	4.0 mm ² (+): 400 mm , (-): 200 mm or Customized Length

Packaging Configuration

Pallet Dimensions	1792×1120×1249 mm
Packing detail (Two pallets = One stack)	36 pcs/pallets, 72 pcs/stack, 936 pcs/ 40'HQ Container

Specifications (STC)

Maximum Power - Pmax [Wp]	430	435	440	445	450
Maximum Power Voltage - Vmp [V]	32.38	32.59	32.81	33.02	33.21
Maximum Power Current - Imp [A]	13.28	13.35	13.41	13.48	13.55
Open-circuit Voltage - Voc [V]	38.95	39.16	39.38	39.59	39.78
Short-circuit Current - Isc [A]	13.73	13.80	13.86	13.93	14.00
Module Efficiency STC [%]	21.52	21.77	22.02	22.27	22.52
Power tolerance	0 ~ + 3 %				
Temperature coefficients of Pmax	-0.29 %/°C				
Temperature coefficients of Voc	-0.25 %/°C				
Temperature coefficients of Isc	0.045 %/°C				

STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5

Specifications (NOCT)

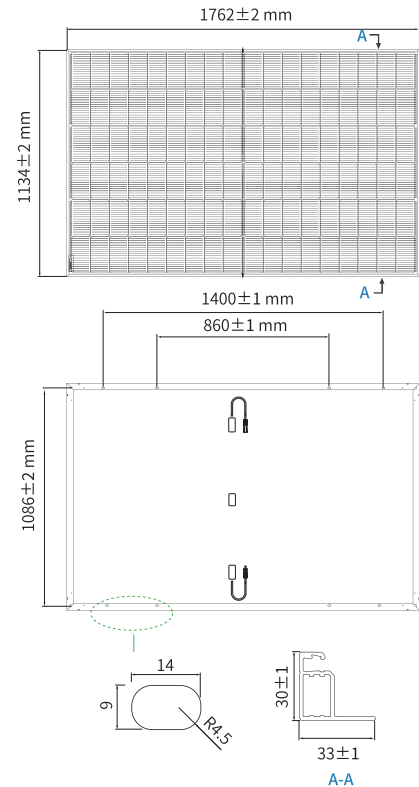
Maximum Power - Pmax [Wp]	323	327	331	335	338
Maximum Power Voltage - Vmp [V]	30.10	30.33	30.56	30.76	30.90
Maximum Power Current - Imp [A]	10.73	10.78	10.83	10.89	10.94
Open-circuit Voltage - Voc [V]	37.00	37.20	37.41	37.61	37.79
Short-circuit Current - Isc [A]	11.09	11.14	11.19	11.25	11.30

NOCT: Irradiance 800W/m², Ambient Temperature 20°C, AM=1.5, Wind Speed 1m/s

Application Conditions

Operating Temperature	-40 °C ~ +85 °C
Maximum system voltage	1000/1500 VDC (IEC)
Maximum series fuse rating	25 A
Nominal operating cell temperature - NOCT	45 ± 2 °C

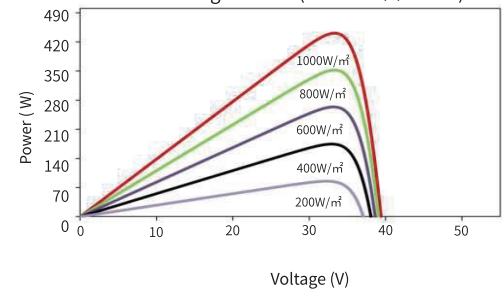
Engineering Drawings



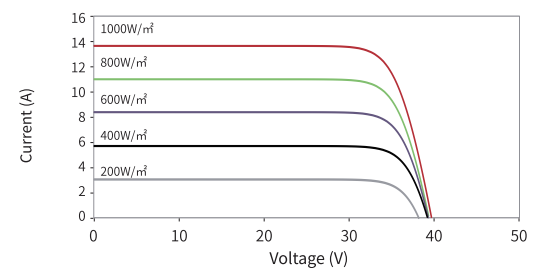
Note: For specific dimensions and tolerance ranges, please refer to the corresponding detailed module drawings.

Electrical Performance

Power-Voltage Curves (54HL4R-(V) 440W)



Current-Voltage Curves (54HL4R-(V) 440W)



LONGI LR5-54HTB 415-435M

- Suitable for Distribution Market
- Simple design embodies modern style
- Better energy generation performance
- High-quality module guarantees long-term reliability



15-year Warranty for
Materials and Processing



25-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

IEC62941: Guideline for module design qualification and type approval



LR5-54HTH 415~435M

22.3%
MAX MODULE
EFFICIENCY

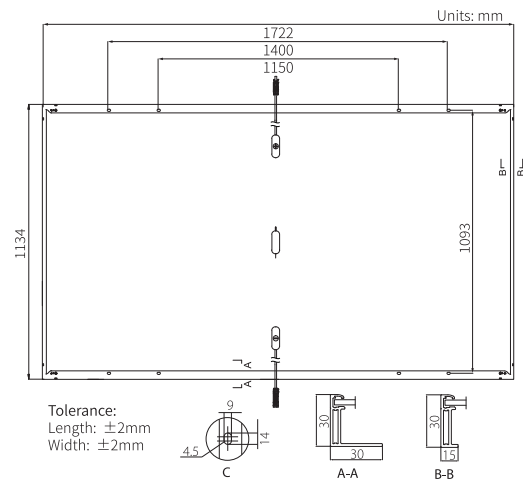
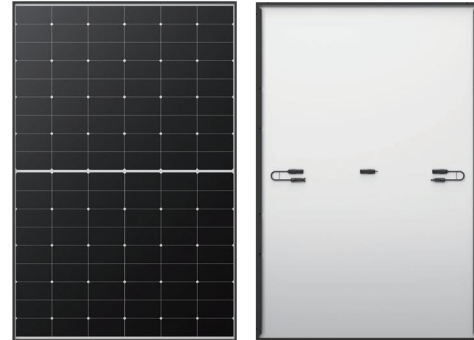
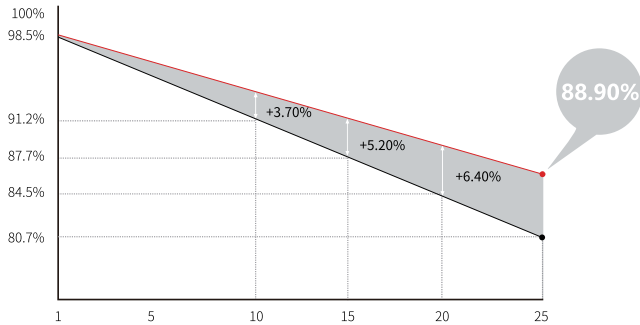
0~3%
POWER
TOLERANCE

<1.5%
FIRST YEAR
POWER DEGRADATION

0.40%
YEAR 2-25
POWER DEGRADATION

Additional Value

25-Year Power Warranty



Mechanical Parameters

Cell Orientation	108 (6×18)
Junction Box	IP68, three diodes
Output Cable	4mm ² , ± 1200 mm length can be customized
Glass	Single glass, 3.2mm coated tempered glass
Frame	Anodized aluminum alloy frame
Weight	20.8kg
Dimension	1722×1134×30mm
Packaging	36pcs per pallet / 216pcs per 20' GP / 936pcs per 40' HC

Electrical Characteristics

STC : AM1.5 1000W/m² 25°C

NOCT : AM1.5 800W/m² 20°C 1m/s

Test uncertainty for Pmax: $\pm 3\%$

Module Type	LR5-54HTH-415M		LR5-54HTH-420M		LR5-54HTH-425M		LR5-54HTH-430M		LR5-54HTH-435M	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	415	310	420	314	425	318	430	321	435	325
Open Circuit Voltage (Voc/V)	38.53	36.18	38.73	36.36	38.93	36.55	39.13	36.74	39.33	36.93
Short Circuit Current (Isc/A)	13.92	11.24	14.00	11.31	14.07	11.36	14.15	11.43	14.22	11.49
Voltage at Maximum Power (Vmp/V)	32.24	29.42	32.44	29.60	32.64	29.78	32.84	29.97	33.04	30.15
Current at Maximum Power (Imp/A)	12.88	10.54	12.95	10.60	13.03	10.67	13.10	10.72	13.17	10.78
Module Efficiency(%)	21.3		21.5		21.8		22.0		22.3	

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	$\pm 3\%$
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	25A
Nominal Operating Cell Temperature	45 ± 2 °C
Protection Class	Class II
Fire Rating	UL type 1 or 2 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.230%/°C
Temperature Coefficient of Pmax	-0.290%/°C

ZXM7-EHLD156 Series

Znshinesolar 11BB HALF-CELL N-Type TOPCon
Double Glass Monocrystalline PV Module

585-630W

POWER RANGE

22.54%

MAXIMUM EFFICIENCY

0.40%

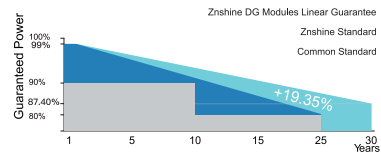
YEARLY DEGRADATION



12 YEARS PRODUCT WARRANTY



30 YEARS OUTPUT GUARANTEE



*Please check the valid version of Limited Product Warranty which is officially released by ZNSHINE PV-TECH Co.,Ltd.



Excellent Cells Efficiency

SMBB technology reduce the distance between busbars and finger grid line which is benefit to power



Anti PID

Ensured PID resistance through the quality control of cell manufacturing process and raw materials.



TIER 1

Global, Tier 1 bankable brand, with independently certified advanced automated manufacturing.



Better Weak Illumination Response

More power output in weak light condition, such as haze, cloudy, and early morning.



Adapt To Harsh Outdoor Environment

Resistant to harsh environments such as salt, ammonia,



Excellent Quality Management System

Warranted reliability and stringent quality assurances well beyond certified requirements.



IEC 61215/IEC 61730

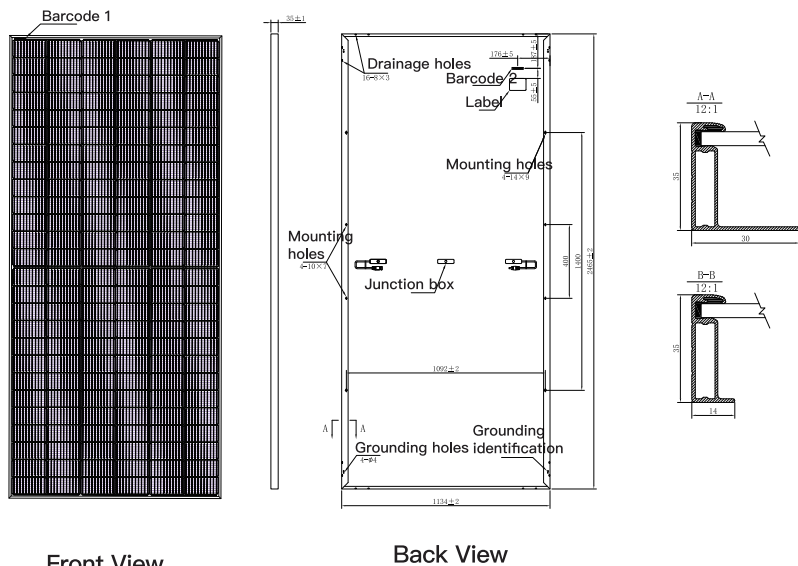
ISO 14001: Environmental Management System

ISO 9001: Quality Management System

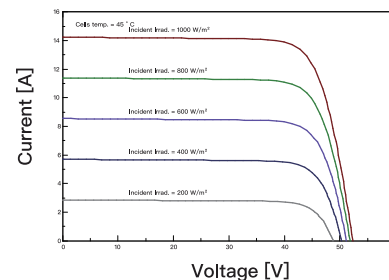
ISO 45001: Occupational Health and Safety Management System

*As there are different certification requirements in different markets, please contact your local znshine sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

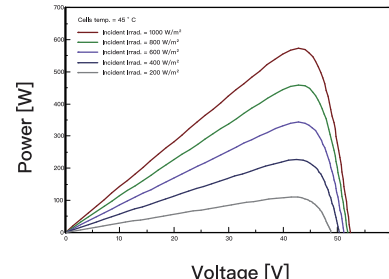
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(610W)



P-V CURVES OF PV MODULE(610W)



*Remark: customized frame color and cable length available upon request

ELECTRICAL CHARACTERISTICS | STC*

Nominal Power Watt Pmax(W)*	585	590	595	600	605	610	615	620	625	630
Maximum Power Voltage Vmp(V)	44.70	44.90	45.10	45.30	45.50	45.70	45.90	46.10	46.30	46.50
Maximum Power Current Imp(A)	13.09	13.15	13.20	13.25	13.30	13.35	13.40	13.45	13.50	13.55
Open Circuit Voltage Voc(V)	54.10	54.30	54.50	54.70	54.90	55.10	55.30	55.50	55.70	55.90
Short Circuit Current Isc(A)	13.81	13.87	13.93	13.99	14.05	14.11	14.17	14.23	14.29	14.35
Module Efficiency (%)	20.93	21.11	21.29	21.46	21.64	21.82	22.00	22.18	22.36	22.54

*The data above is for reference only and the actual data is in accordance with the practical testing
 *STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25±2°C, AM 1.5
 *Measuring uncertainty: ±3%, all the electrical characteristics such as Power, Im, Vm and FF are within ±3% tolerance.

MECHANICAL DATA

Solar cells	N-type Monocrystalline
Cells orientation	156 (6×26)
Module dimension	2465×1134×35 mm (With Frame)
Weight	34.5±1.0 kg
Glass	2.0 mm+2.0mm, High Transmission, AR Coated Heat Strengthened Glass
Junction box	IP 68, 3 diodes
Cables	4 mm ² , 350 mm (With Connectors)
Connectors*	MC4-compatible

*Please refer to regional datasheet for specified connector

ELECTRICAL CHARACTERISTICS | NMOT

Maximum Power Pmax(Wp)	441.80	445.80	449.40	453.10	456.80	460.50	464.20	467.90	471.70	475.50
Maximum Power Voltage Vmpp(V)	42.20	42.30	42.50	42.70	42.80	43.00	43.20	43.30	43.50	43.60
Maximum Power Current Impp(A)	10.48	10.53	10.57	10.62	10.66	10.71	10.76	10.80	10.85	10.89
Open Circuit Voltage Voc(V)	51.10	51.20	51.40	51.60	51.80	52.00	52.20	52.40	52.50	52.70
Short Circuit Current Isc(A)	11.15	11.19	11.24	11.29	11.34	11.39	11.44	11.48	11.53	11.58

*NMOT: Irradiance 800W/m², Ambient Temperature 20°C, AM 1.5, Wind Speed 1m/s

TEMPERATURE RATINGS

NMOT	44°C ±2°C	Maximum system voltage	1500 V DC
Temperature coefficient of Pmax	(-0.30±0.03)%/°C	Operating temperature	-40°C~+85°C
Temperature coefficient of Voc	-0.25%/°C	Maximum series fuse	25 A
Temperature coefficient of Isc	0.046%/°C	Front Side Maximum Static Loading	Up to 5400 Pa
		Rear Side Maximum Static Loading	Up to 2400 Pa

*Remark: Do not connect Fuse in Combiner Box with two or more strings in parallel connection
 They only serve for comparison among different module types.
 *Caution: Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

PACKAGING CONFIGURATION*

Piece/Box	31
Piece/Container(40'HQ)	496

*Customized packaging is available upon request.



ZXM8-TPLDD120 Series

12BB HALF-CELL Bifacial Double Glass Monocrystalline

PERC PV Module

585-610W

POWER RANGE

21.55%

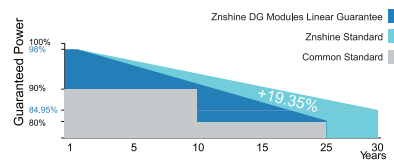
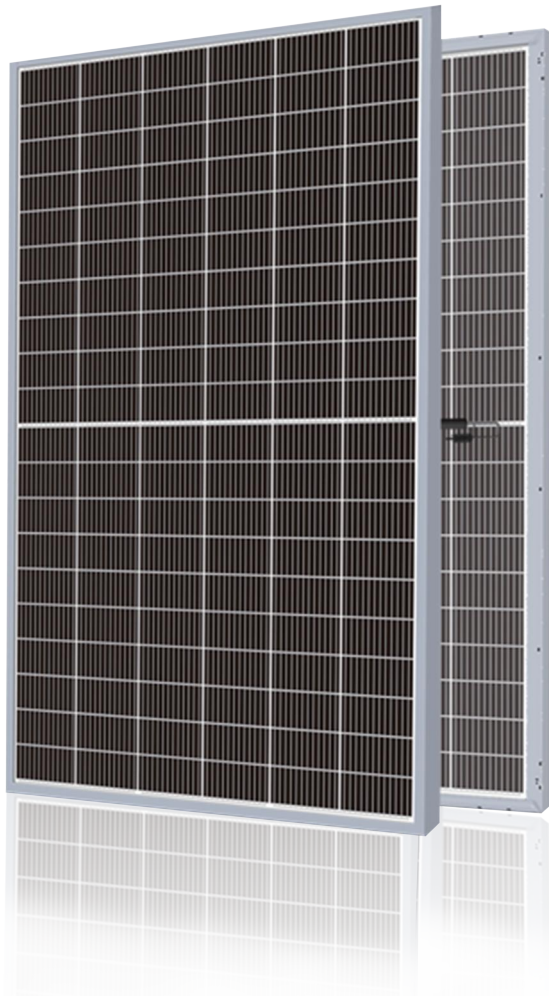
MAXIMUM EFFICIENCY

0.45%

YEARLY DEGRADATION

 12 YEARS PRODUCT WARRANTY

 30 YEARS OUTPUT GUARANTEE



*Please check the valid version of Limited Product Warranty which is officially released by ZNSHINE PV-TECH Co.,Ltd.



Excellent Cells Efficiency

MBB technology reduce the distance between busbars and finger grid line which is benefit to power increase.



Anti PID

Ensured PID resistance through the quality control of cell manufacturing process and raw materials.



TIER 1

Global, Tier 1 bankable brand, with independently certified advanced automated manufacturing.



Bifacial Technology

Up to 25% additional power gain from back side depending on albedo.



Better Weak Illumination Response

More power output in weak light condition, such as haze, cloudy, and early morning.



Adapt To Harsh Outdoor Environment

Resistant to harsh environments such as salt, ammonia,



Excellent Quality Management System

Warranted reliability and stringent quality assurances well beyond certified requirements.



IEC 61215/IEC 61730/IEC 61701/IEC 62716

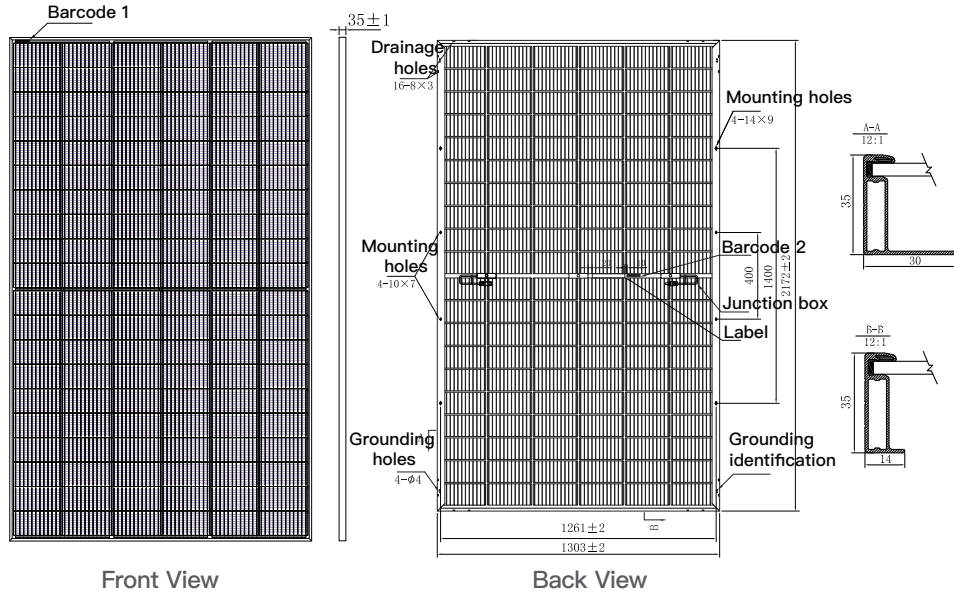
ISO 14001: Environmental Management System

ISO 9001: Quality Management System

ISO45001: Occupational Health and Safety Management System

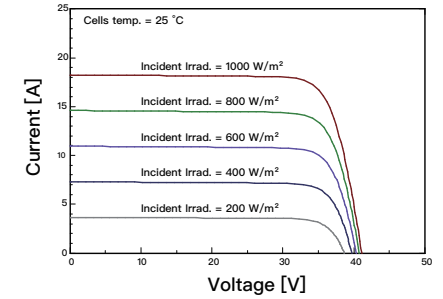
*As there are different certification requirements in different markets, please contact your local zshine sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

DIMENSIONS OF PV MODULE(mm)

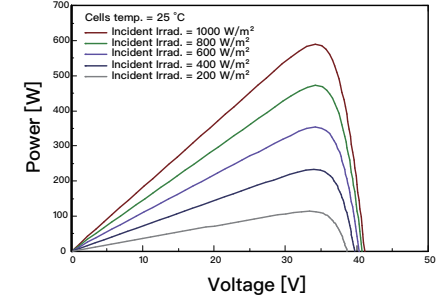


*Remark: customized frame color and cable length available upon request

I-V CURVES OF PV MODULE(590W)



P-V CURVES OF PV MODULE(590W)



ELECTRICAL CHARACTERISTICS | STC*

Nominal Power Watt Pmax(W)*	585	590	595	600	605	610
Maximum Power Voltage Vmp(V)	33.90	34.10	34.30	34.50	34.70	34.90
Maximum Power Current Imp(A)	17.26	17.31	17.35	17.40	17.44	17.48
Open Circuit Voltage Voc(V)	40.90	41.10	41.30	41.50	41.70	41.90
Short Circuit Current Isc(A)	18.21	18.25	18.29	18.33	18.37	18.41
Module Efficiency (%)	20.67	20.85	21.02	21.20	21.38	21.55

*The data above is for reference only and the actual data is in accordance with the practical testing
 *STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25±2°C, AM 1.5
 *Measuring uncertainty: ±3%, all the electrical characteristics such as Power, Im, Vm and FF are within ±3% tolerance.

MECHANICAL DATA

Solar cells	Mono PERC
Cells orientation	120 (6x20)
Module dimension	2172x1303x35 mm (With Frame)
Weight	35±1 kg
Glass	2.0 mm+2.0mm, High Transmission, AR Coated Heat Strengthened Glass
Junction box	IP 68, 3 diodes
Cables	4 mm ² , 350 mm (With Connectors)
Connectors*	MC4-compatible

*Please refer to regional datasheet for specified connector

ELECTRICAL CHARACTERISTICS | NMOT*

Maximum Power Pmax(Wp)	439.70	443.60	447.20	451.10	454.80	458.40
Maximum Power Voltage Vmpp(V)	31.80	32.00	32.20	32.40	32.50	32.70
Maximum Power Current Imp(A)	13.83	13.87	13.90	13.94	13.98	14.01
Open Circuit Voltage Voc(V)	38.40	38.60	38.80	39.00	39.20	39.30
Short Circuit Current Isc(A)	14.70	14.73	14.76	14.80	14.83	14.86

*NMOT: Irradiance 800W/m², Ambient Temperature 20°C, AM 1.5, Wind Speed 1m/s

TEMPERATURE RATINGS

NMOT	43°C ±2°C	Maximum system voltage	1500 V DC
Temperature coefficient of Pmax	-0.34%/°C	Operating temperature	-40°C~+85°C
Temperature coefficient of Voc	-0.29%/°C	Maximum series fuse	35 A
Temperature coefficient of Isc	0.05%/°C	Front Side Maximum Static Loading	Up to 5400Pa
Refer. Bifacial Factor	70±10%	Rear Side Maximum Static Loading	Up to 2400Pa

*Remark: Do not connect Fuse in Combiner Box with two or more strings in parallel connection

WORKING CONDITIONS

ELECTRICAL CHARACTERISTICS WITH 25% REAR SIDE POWER GAIN

Front power Pmax/W	585	590	595	600	605	610
Total power Pmax/W	731	738	744	750	756	763
Vmp/V(Total)	34.00	34.20	34.40	34.60	34.80	35.00
Imp/A(Total)	21.51	21.56	21.62	21.68	21.73	21.79
Voc/V(Total)	41.00	41.20	41.40	41.60	40.80	42.00
Isc/A(Total)	22.69	22.74	22.79	22.83	22.89	22.94

*Bifacial Gain: The additional gain from the back side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

PACKAGING CONFIGURATION*

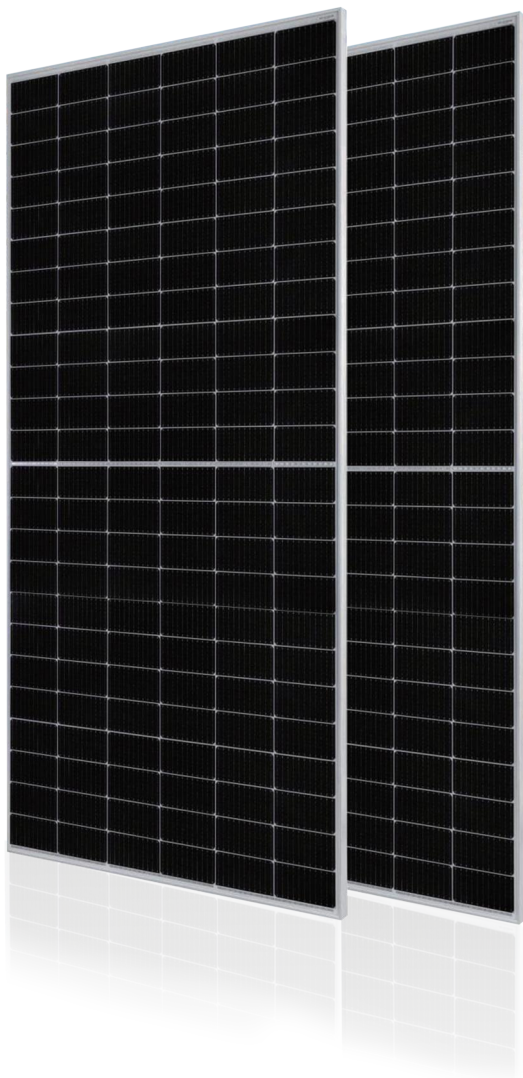
Piece/Box	31
Piece/Container(40'HQ)	558

*Customized packaging is available upon request.
 *Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.
 *Caution: Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

555W MBB Half-cell Module

JAM72S30 530-555/MR

Assembled with 11BB PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.



Higher output power



Less shading and lower resistive loss



Lower LCOE



Better mechanical loading tolerance

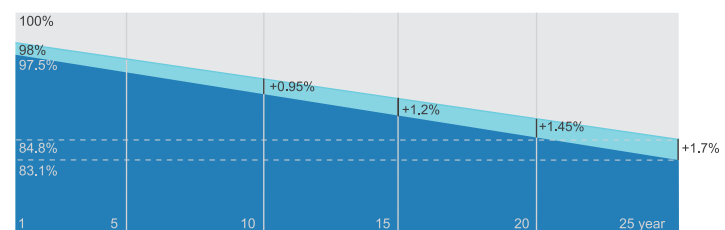
Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty

0.55% Annual Degradation Over 25 years



■ New linear power warranty ■ Standard module linear power warranty



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