



TUNGHSU

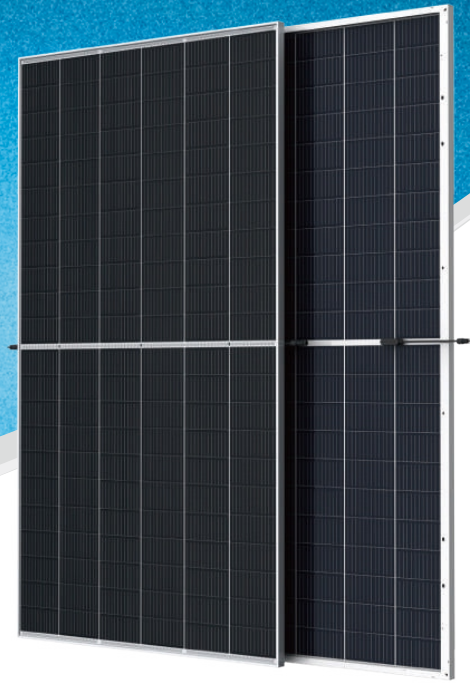
Spiration series

G12(210mm)

645W/650W/655W/660W/665W

132 CELLS HALF-CELL BIFACIAL MBB MONO PV

MODULE BIFACIAL DOUBLE GLASS



645-665W

Tungshu components with high efficiency and high reliability

- * Advanced production equipment, highly automated process control, world-class production technology
- * The company has a product research and development laboratory that meets the new ISO/IEC international standards
- * Excellent weak light performance, resistant to salt spray and ammonia corrosion.
- Passing the certification test of the PV standards.
- * Certified by international quality management and environmental management system
- * Application grade: A, Safe grade: II, Fireproofing grade: C

Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO 45001: Occupation Health and Safety Management System
 GB/T 23001-2017: Management system with Integration of Information Technology and Industrialization



Non-destructive cutting



Higher customer value



Higher power generation performance



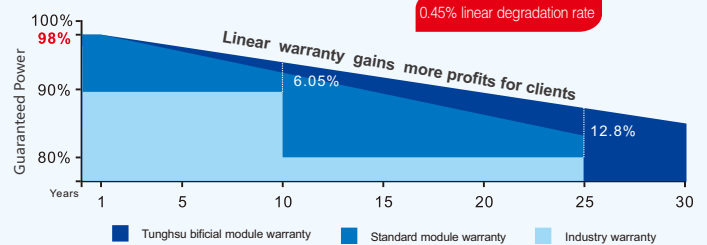
Higher power output



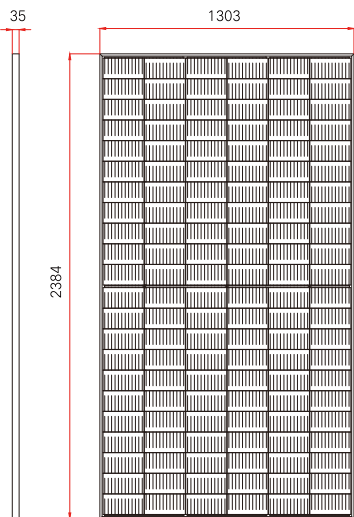
Certified to withstand the most challenging environmental conditions

Industry-leading linear warranty

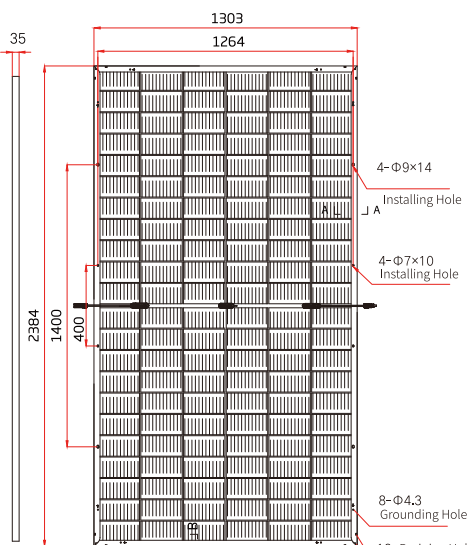
+15 Year Product Warranty +30 Year Linear Power Warranty



DIMENSIONS OF PV MODULE(mm)

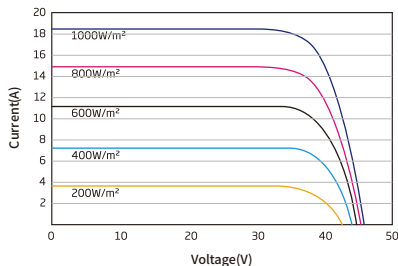


Front View

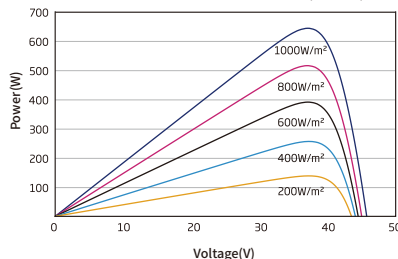


Back View

I-V CURVES OF PV MODULE(650W)



P-V CURVES OF PV MODULE(650W)



ELECTRICAL DATA (STC)

Peak Power Watts- P_{MAX} (Wp)	645	650	655	660	665
Power Output Tolerance- P_{MAX} (W)	0~ +5				
Maximum Power Voltage- V_{MPP} (V)	37.55	37.73	37.91	38.09	38.27
Maximum Power Current- I_{MPP} (A)	17.18	17.23	17.28	17.33	17.38
Open Circuit Voltage- V_{OC} (V)	45.31	45.51	45.71	45.91	46.11
Short Circuit Current- I_{SC} (A)	18.20	18.25	18.30	18.35	18.40
Module Efficiency η_m (%)	20.8	20.9	21.1	21.2	21.4

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.

ELECTRICAL DATA (NOCT)

Maximum Power- P_{MAX} (Wp)	488	492	496	500	504
Maximum Power Voltage- V_{MPP} (V)	34.95	35.13	35.31	35.49	35.67
Maximum Power Current- I_{MPP} (A)	13.97	14.01	14.05	14.09	14.13
Open Circuit Voltage- V_{OC} (V)	42.30	42.48	42.66	42.84	43.02
Short Circuit Current- I_{SC} (A)	14.81	14.86	14.91	14.96	15.01

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

MECHANICAL DATA

Solar Cells	Monocrystalline
Cell Orientation	132cell
Module Dimensions	2384x1303x35mm(93.86x51.30x 1.38 inches)
Weight	38.7kg(85.32lb)
Front Glass	2.0mm(0.08inches) , High Transmission, Strengthened Coated Glass
Encapsulant Material	POE/EVA
Rear glass	2.0mm semi-tempered glass (white grid)
Frame	35 mm (1.38 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	4.0mm ² , 350mm photovoltaic special cable, or customized
Connector	MC4 EV02 / TS4*

TEMPERATURE RATING

NOCT(Nominal Operating Cell Temperature)	43°C (± 2°C)
Temperature Coefficient of P_{MAX}	- 0.340%/°C
Temperature Coefficient of V_{OC}	- 0.25%/°C
Temperature Coefficient of I_{SC}	0.04%/°C

LIMIT PARAMETERS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	35A

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

15 year Product Workmanship Warranty
30 year Linear Power Warranty

PACKAGING CONFIGURATION

Modules per box: 31 pieces
Modules per 40' container:558 pieces