

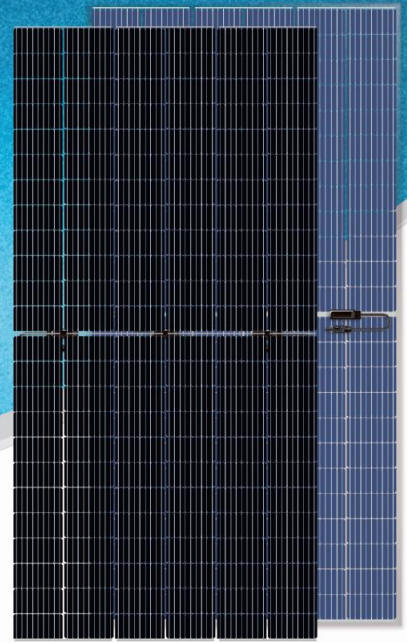


# TUNGHSU

## STAR SERIES

### Mono solar modules

### 144 cells double-glass multi-busbar half-cut modules



# 430-450W

#### Tunghsu 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



#### High power output

Double-sided power generation, higher power generation of the module  
 Up to 450w front power and 20.7% module efficiency with half-cut and MBB  
 Reduce BOS cost with higher power bin and 1500V system voltage



#### Higher power generation

Lower temperature coefficient (-0.35%) and lower working temperature bring more power generation  
 Half-cell technology brings stronger anti-shadow occlusion ability



#### Highly reliability due to stringent quality control

In-house testing goes well beyond certification requirements  
 (UV, TC, HF, PID resistant and many more)

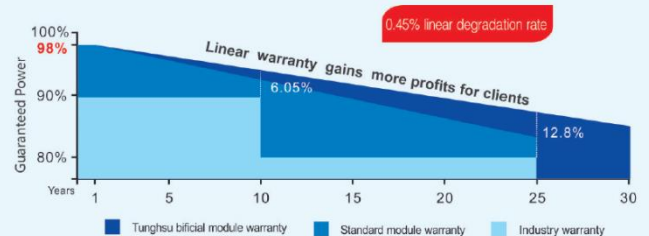


#### High-efficiency PERC+ cell technology

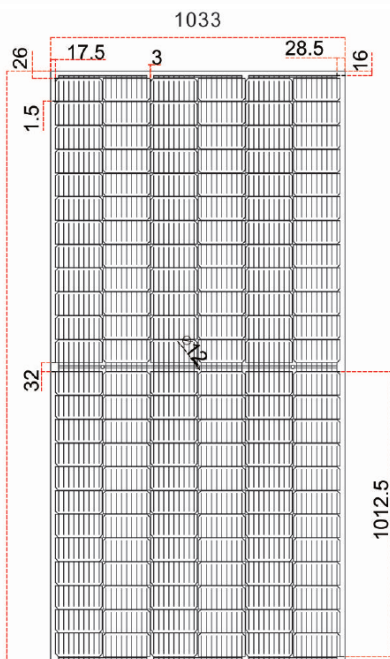
Double-sided PERC cell, half-cut technology and transparent grid backsheet  
 Higher module power and efficiency, lower power attenuation

#### Industry-leading linear warranty

+15 Year Product Warranty +30 Year Linear Power Warranty

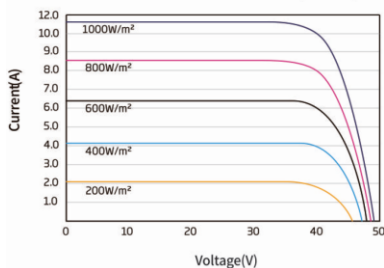


### DIMENSIONS OF PV MODULE(mm)

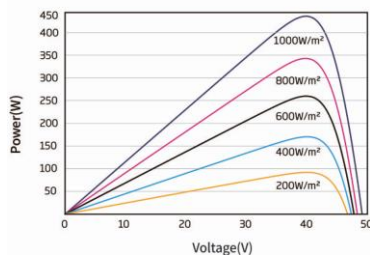


Front View

### I-V CURVES OF PV MODULE(440W)



### P-V CURVES OF PV MODULE(440W)



### ELECTRICAL DATA (STC)

Peak Power Watts- $P_{MAX}$ (Wp)	430	435	440	445	450
Power Output Tolerance- $P_{MAX}$ (W)	0~ +5				
Maximum Power Voltage- $V_{MPP}$ (V)	40.5	40.8	41.1	41.4	41.7
Maximum Power Current- $I_{MPP}$ (A)	10.62	10.67	10.71	10.75	10.80
Open Circuit Voltage- $V_{OC}$ (V)	48.7	48.9	49.1	49.3	49.5
Short Circuit Current- $I_{SC}$ (A)	11.20	11.24	11.28	11.32	11.36
Module Efficiency $\eta_m$ (%)	19.93	20.16	20.39	20.62	20.85

STC: Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Air Mass AM1.5.

### ELECTRICAL PARAMETERS AND DIFFERENT POWER GAIN BACK (Take 10% irradiation ratio as an example)

Maximum Power- $P_{MAX}$ (Wp)	457	479	500	522	544
Maximum Power Voltage- $V_{MPP}$ (V)	40.8	40.8	40.8	40.8	40.8
Maximum Power Current- $I_{MPP}$ (A)	11.20	11.74	12.27	12.80	13.34
Open Circuit Voltage- $V_{OC}$ (V)	49.0	49.1	49.2	49.3	49.4
Short Circuit Current- $I_{SC}$ (A)	11.80	12.36	12.93	13.49	14.05

Back gain: Under standard test conditions, the additional gain from the back and the front power depends on the installation and ground albedo parameters.

### ELECTRICAL DATA (NOCT)

Maximum Power- $P_{MAX}$ (Wp)	325	329	333	337	341
Maximum Power Voltage- $V_{MPP}$ (V)	38.2	38.5	38.8	39.0	39.1
Maximum Power Current- $I_{MPP}$ (A)	8.51	8.55	8.58	8.63	8.71
Open Circuit Voltage- $V_{OC}$ (V)	46.0	46.2	46.4	46.6	46.7
Short Circuit Current- $I_{SC}$ (A)	9.02	9.05	9.08	9.12	9.15

NOCT: Irradiance at 800W/m<sup>2</sup>, Ambient Temperature 20°C, Wind Speed 1m/s.

### MECHANICAL DATA

Solar Cells	Monocrystalline
Cell Orientation	144cell(6x24)
Module Dimensions	2089*1033*8mm
Weight	37kg(81.57lb)
Front Glass	3.2mm (0.13inches), High Transmission, Tempered Coated Glass
Encapsulant Material	POE/POE
Rear Glass	3.2mm(0.13inches) semi-tempered glass
J-Box	IP 68 rated
Cables	4.0mm <sup>2</sup> , 350mm photovoltaic special cable, or customized
Connector	MC4、QC4

### TEMPERATURE RATING

NOCT(Nominal Operating Cell Temperature)	41°C (± 3°C)
Temperature Coefficient of $P_{MAX}$	- 0.35%/°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	20A

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

### WARRANTY

15 year Product Workmanship Warranty
30 year Linear Power Warranty

### PACKAGING CONFIGURATION

Modules per box: 35 pieces
Modules per 40' container: 700 pieces

Nota: Lea las instrucciones de seguridad e instalación antes de utilizar el producto  
Tungshu Kangtu con el progreso tecnológico y las actualizaciones del producto, se reserva el derecho de ajustar los parámetros técnicos necesarios del producto en cualquier momento sin notificar al cliente. El derecho de interpretación final de estas especificaciones técnicas pertenece a Anhui Tungshu Kangtu Solar Technology Co. Ltd.

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