



High Power Output
Low LCOE



Maximum Power
460W



TWMNH

N-type Half-cell
Bifacial Full-black Module (48)

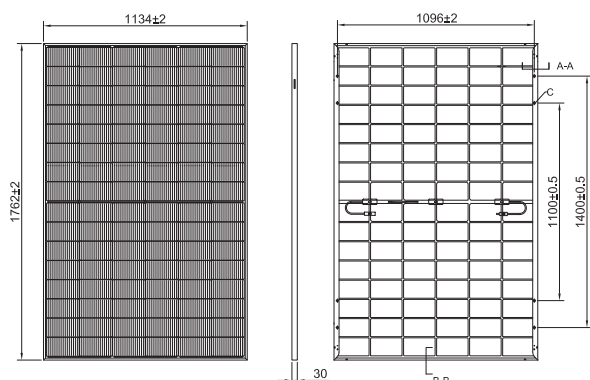
48HC440-460W

Tongwei Co.,Ltd.
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Drawings (Unit: mm)



Electrical characteristics (STC)

Module type:	TWMNH-48 HC440	TWMNH-48 HC445	TWMNH-48 HC450	TWMNH-48 HC455	TWMNH-48 HC460
Maximum Power: P _{max} [W]	440	445	450	455	460
Open Circuit Voltage: V _{oc} [V]	35.35	35.55	35.75	35.95	36.15
Short Circuit Current: I _{sc} [A]	15.89	15.92	15.95	15.98	16.05
Voltage at Maximum Power: V _{mp} [V]	29.67	29.93	30.19	30.44	30.69
Current at Maximum Power: I _{mp} [A]	14.83	14.87	14.91	14.95	14.99
Module Efficiency: η [%]	22.0	22.3	22.5	22.8	23.0

* STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5, Power measurement tolerance: ±3%

Electrical characteristics (BNPI)

Maximum Power: P _{max} [W]	485.7	491.5	496.9	502.3	507.9
Open Circuit Voltage: V _{oc} [V]	35.35	35.55	35.75	35.95	36.15
Short Circuit Current: I _{sc} [A]	17.54	17.57	17.61	17.64	17.72
Voltage at Maximum Power: V _{mp} [V]	29.67	29.93	30.19	30.44	30.69
Current at Maximum Power: I _{mp} [A]	16.37	16.42	16.46	16.50	16.55

* BNPI: Front side irradiance 1000W/m², Rear side irradiance 135W/m², Cell Temperature=25°C, AM=1.5, Power measurement tolerance: ±3%

Electrical characteristics with different rear side power gain

5%	Maximum Power: P _{max} [W]	462	467	472	477	483
	Module Efficiency: η [%]	23.1	23.4	23.6	23.9	24.2
15%	Maximum Power: P _{max} [W]	506	511	517	523	529
	Module Efficiency: η [%]	25.3	25.6	25.9	26.2	26.5
25%	Maximum Power: P _{max} [W]	550	556	562	568	575
	Module Efficiency: η [%]	27.5	27.8	28.1	28.4	28.8

Temperature rating

Temperature Coefficient of P _{max}	-0.28%/°C
Temperature Coefficient of V _{oc}	-0.24%/°C
Temperature Coefficient of I _{sc}	+0.046%/°C

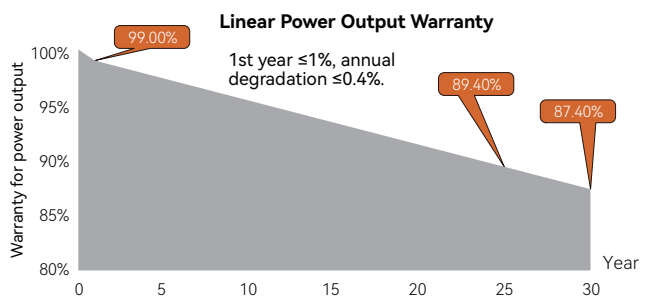
Operating parameters

Operating Temperature	-40°C~+70°C
Module [T ₉₈] max	70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Selection Tolerance	0~+3%
Bifaciality coefficient of P _{max}	80±10%
Bifaciality coefficient of V _{oc}	98±5%
Bifaciality coefficient of I _{sc}	80±10%
Fire Class Rating	Class C

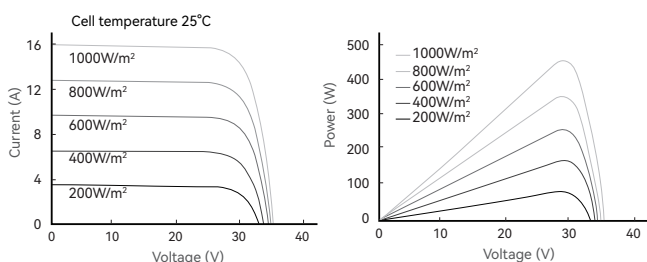
Mechanical parameters

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 ²
Cable length	+1200mm, -1200mm, length can be customized
Connector	TW-PVCON-01(Tongwei Solar) PV-KST4-EVO2/xy_UR, PV-KBT4-EVO2/xy_UR(Staubli) PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy(Staubli) PV-ZH202B(Zhejiang Zhonghuan Sunter)
Max static test load	Front side 5400Pa,Rear side 2400Pa
Per pallet	36pcs
Packaging	936pcs per 40'HC

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)



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