

G12R-48P

N-type Bifacial Double Glass Module

HSM-ND48-GR435~460

460W
Maximum Power Output

23.0%
Maximum Efficiency



High Energy Yield

- Lower temperature coefficient (Pmax): $-0.29\%/^{\circ}\text{C}$
- Up to 80% power bifaciality

Industry-leading G12 Wafer

- $<1\%$ degradation in the first year
- Smaller wafer chamfer, larger light receiving area

Superior Customer Value

- Higher installed DC capacity within limited rooftop space

Long-term Reliability

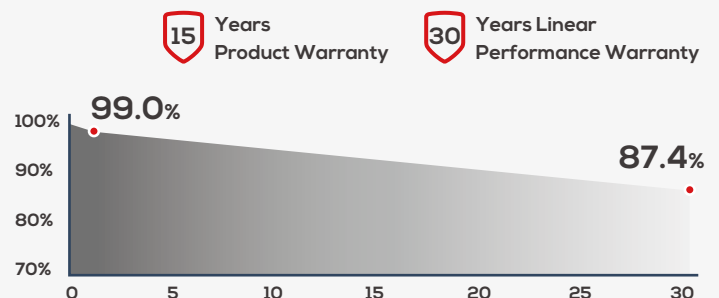
- Harsh environment resistance
- Damage-free laser cutting, lower micro-crack risk
- Mechanical load: Front 5400 Pa, Back 2400 Pa

Comprehensive Products and System Certificates



IEC 61215 / IEC 61730 ISO 9001:2015 ISO 45001:2018 ISO 14001:2015

Linear Performance Warranty



* Please refer to product warranty for details

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HSM-ND48-GR435~460

460W

Maximum Power

23.0%

Maximum Efficiency

0~+5W

Power Tolerance

Electrical Parameters (STC*)

* STC: Irradiance 1000W/m², Cell Temperature 25°C, AM1.5, Measuring Tolerance: ±2%

Maximum Power	P _{max} (W)	435	440	445	450	455	460
Open Circuit Voltage	V _{oc} (V)	34.77	34.98	35.19	35.40	35.59	35.80
Short Circuit Current	I _{sc} (A)	15.90	15.98	16.06	16.14	16.22	16.30
Maximum Power Voltage	V _{mp} (V)	29.30	29.50	29.70	29.90	30.10	30.30
Maximum Power Current	I _{mp} (A)	14.85	14.92	14.99	15.06	15.12	15.19
Module Efficiency	(%)	21.8	22.0	22.3	22.5	22.8	23.0

Electrical Characteristics with 10% Bifacial Gain*

* The additional gain from the back side depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

Maximum Power	P _{max} (W)	479	484	490	495	501	506
Open Circuit Voltage	V _{oc} (V)	34.77	34.98	35.19	35.40	35.59	35.80
Short Circuit Current	I _{sc} (A)	17.49	17.58	17.67	17.75	17.84	17.93
Maximum Power Voltage	V _{mp} (V)	29.30	29.50	29.70	29.90	30.10	30.30
Maximum Power Current	I _{mp} (A)	16.34	16.41	16.49	16.57	16.63	16.71

Mechanical Data

* Please refer to installation manual for details

No. of Cells	96pcs (6×16)
Dimension	1762×1134×30 mm
Weight	24.5kg
Front Glass	2.0mm High Transmission, Heat Strengthened, AR coating Glass
Back Glass	2.0mm High Transmission, Heat Strengthened Glass
Frame	Anodized Aluminium Alloy
J-Box	IP68
Cables	4.0mm ² , +1200mm, -1200mm/±1400mm (can be customized)
Diodes	3
Maximum Static Load	Front: 5400Pa/Back: 2400Pa*

Temperature Coefficient

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

Nominal Module Operating Temperature*	43±2°C	Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of I _{sc}	+0.045%/°C	Temperature Coefficient of P _{max}	-0.29%/°C

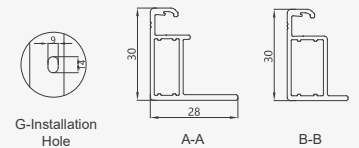
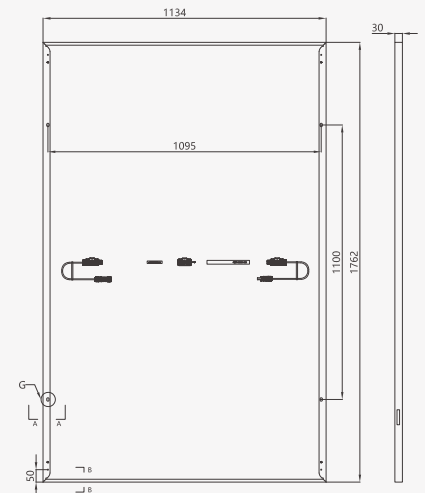
Operating Parameters

Operating Temperature	-40~+85°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Bifaciality	80±5%

Packaging Configuration

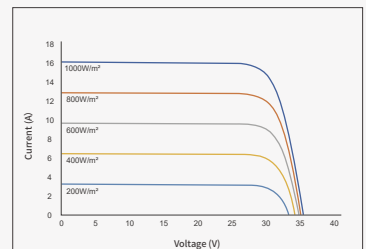
Modules per Pallet	36pcs
Modules per 40'HQ Container	936pcs
Pallets per 40'HQ Container	26plt

Engineering Drawing [Unit: mm]

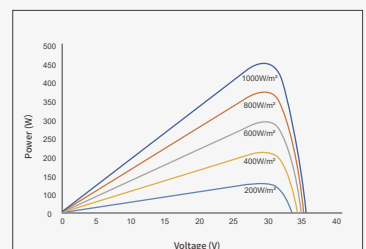


Curve Graph

I-V Curves (450W)



P-V Curves (450W)



TCL

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Datasheets