

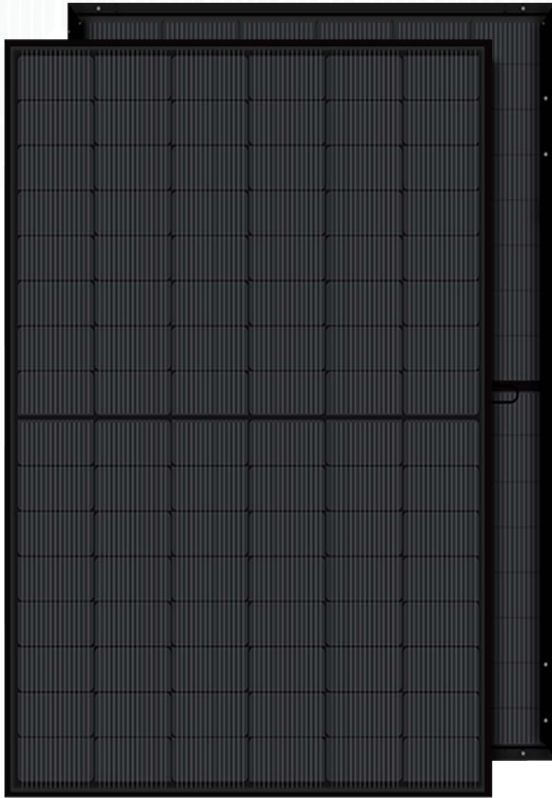


GreensunSolar

N-Type

GSM-MN12R/96HBD 440-460W

**N-Type
All Black
Bifacial Dual Glass
Mono Silicon PV Module**



460W

Maximum Power
Output

23.0%

Maximum Module
Efficiency

0~+5W

Power Output
Guarantee



N-type Topcon technology for lower LCOE

The lower temperature coefficient and better low irradiance performance of Topcon technology can effectively reduce LCOE.



Double-sided power generation, higher yield

The dual-glass module has a double-sided ratio of up to 80% and a power generation gain of 7%-25% on the back side.



Ultra-low Degradation, longer warranty, higher output

- First-year degradation 1% and annual degradation at 0.4%
- Up to 25 years product warranty and 30 years power warranty



Universal solution for residential and C&I application

- Easy for integration, designed for compatibility with existing mainstream inverters and diverse mounting systems
- Perfect size and low weight for handling and installation
- Most valuable solution on low load capacity rooftops (weight similar to backsheet version)
- Mechanical performance up to 5400 Pa positive load and 4000 Pa negative load



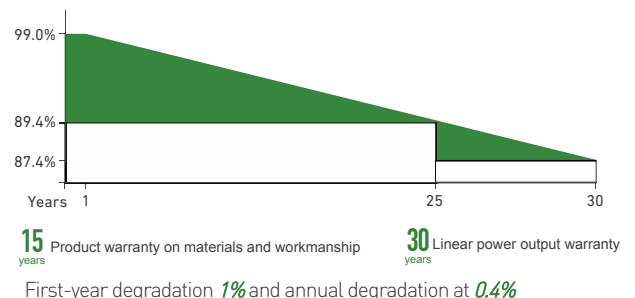
PID Resistance

Excellent Anti-PID performance guarantee via optimized mass-production process and materials control.

Delivers Reliable Performance Over Time

- manufacturer of crystalline silicon photovoltaic modules
- Fully automatic facility and world-class technology
- Rigorous quality control to meet the highest standard: ISO9001:2015, ISO14001: 2015 and OHSAS: 18001 2007
- Tested for harsh environments (salt mist, ammonia corrosion and sand blowing test: IEC 61701, IEC 62716, DIN EN 60068-2- 68)
- Long term reliability tests
- 2×100% EL inspection ensuring defect-free modules

Linear Performance Warranty



Greensun Solar Energy Tech Co., Limited
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Electrical Specification (STC*)

Maximum Power	P _{max} (W)	440	445	450	455	460
Maximum Power Voltage	V _{mp} (V)	29.72	29.90	30.08	30.26	30.44
Maximum Power Current	I _{mp} (A)	14.81	14.89	14.97	15.05	15.13
Open Circuit Voltage	V _{oc} (V)	34.67	34.85	35.03	35.21	35.39
Short Circuit Current	I _{sc} (A)	15.95	16.00	16.05	16.10	16.15
Module Efficiency	(%)	22.00	22.30	22.50	22.80	23.00
Power Output Tolerance	(W)	0~+5				

* Irradiance 1000W/m², Module Temperature 25°C, Air Mass 1.5

Electrical Specification (NOCT*)

Maximum Power	P _{max} (W)	331	335	338	342	346
Maximum Power Voltage	V _{mp} (V)	27.68	27.88	27.96	28.15	28.31
Maximum Power Current	I _{mp} (A)	11.96	12.02	12.09	12.15	12.22
Open Circuit Voltage	V _{oc} (V)	32.94	33.11	33.28	33.45	33.62
Short Circuit Current	I _{sc} (A)	12.88	12.92	12.96	13.00	13.04

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

Mechanical Data

Number of Cells	96Cells (6x16)
Dimensions of Module L*W*H (mm)	1762x1134x30mm
Weight (kg)	20.9 kg
Front Side Glass	1.6mm high transmittance, AR tempered glass
Back Side Glass	1.6mm semi-tempered glass
Frame	Anodized aluminum alloy frame
J-Box	IP68, 3 diodes
Cable	4.0mm ²
Cable Length	300mm, length can be customized
Wind/ Snow Load	2400Pa/5400Pa*
Connector	MC Compatible

* For more details please check the installation manual

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of I _{sc}	+0.040%/°C
Temperature Coefficient of V _{oc}	-0.240%/°C
Temperature Coefficient of P _{MAX}	-0.280%/°C

Maximum Ratings

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

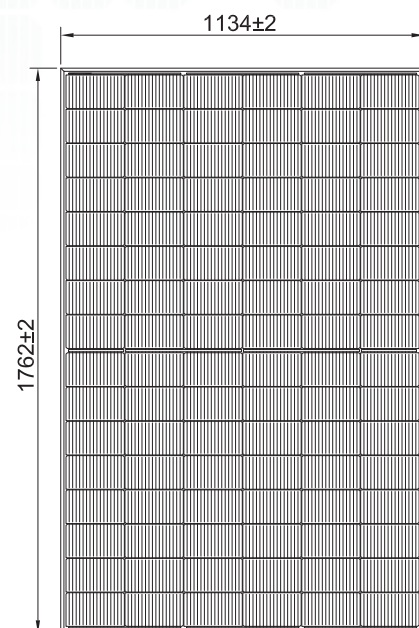
Packaging Configuration

Module per box	36 pieces
Module per 40' container	936 pieces

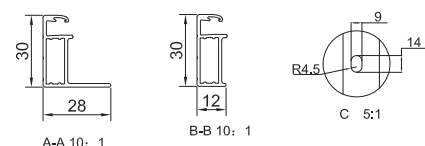
Optional

Connector	MC Original
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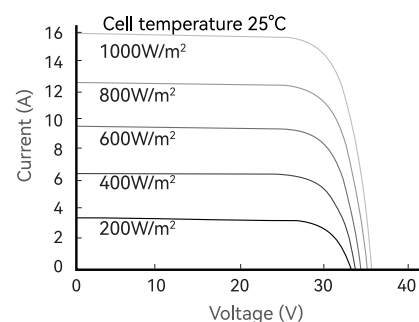
Module Dimension



Back View



I-V Curve at Different Temperature (450W)



I-V/P-V Curve at Different Irradiation (450W)

