

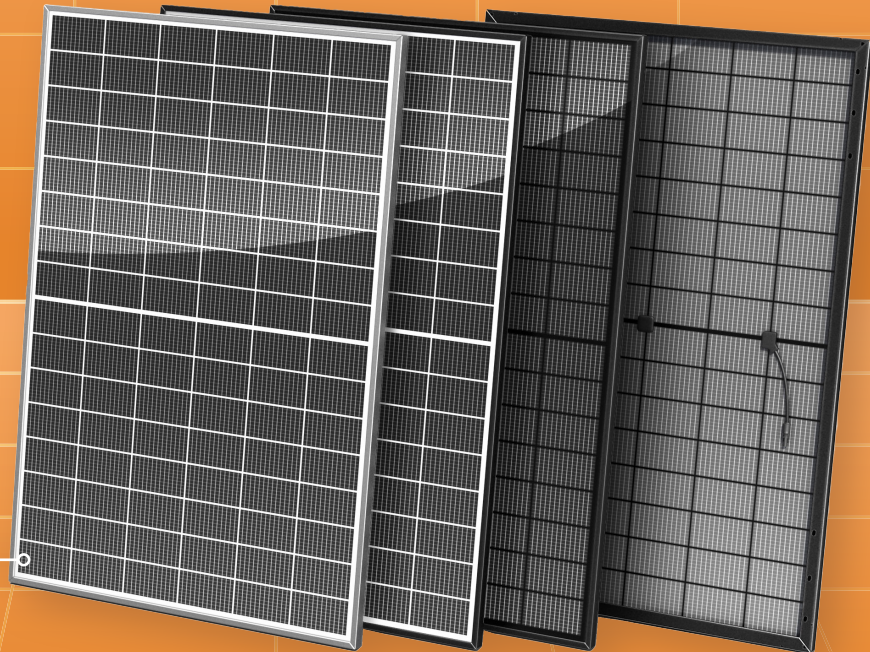
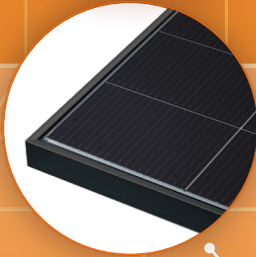
# STANDARD SOLAR PANELS

GermanSolar's standard solar panels are high efficiency, convenient, and easy to use



GermanSolar  
The Partner For Your Solar Lifetime!

OBB



## BIFACIAL APOLLO G12R 96 MONO CELL SOLAR PANELS

GSM-440W 445W 450W 455W 460W

GermanSolar is a specialist in customization, introducing colored glass, frames, and back-sheet material and shapes to aesthetically match your ideas with the prospective application. With innovative technology and design, GermanSolar offers high quality modules with enhanced aesthetic appearance for building structures and facades. By providing outstanding customization options, GermanSolar supports your required project needs with colored and shaped panels of your choice, and consults with you in choosing the right size, thickness, shape, and color to complement the design of your application and your building.

### FEATURES



HJT OBB Technology -  
Shorter current transport  
path, better low-light  
performance and higher  
power generation



Positive power of  
up to +5.00 Wp



Hail test :  
IEC 61215-2:2021  
Φ45mm, 30.7m/s



Withstands wind  
loads up to 2400Pa  
/ heavy snow loads  
up to 5400Pa



Sealing with PIB:  
Stronger moisture  
resistance, greater air  
impermeability to extent  
module lifespan.



High ammonia &  
salt mist resistant  
certified and PID-  
free



EL tested and micro  
cracks inspected



15-year limited  
product warranty



30-year linear  
performance  
warranty



ISO 9001  
ISO 14001  
ISO 45001  
ISO 26000  
ISO 19600



RoHS



IEC 61730-1  
IEC 61730-2, IEC 61215-1,  
IEC 61215-2 and IEC 61215-1-1



EN IEC 61730:  
PHOTOVOLTAIIC (PV) MODULE  
SAFETY QUALIFICATION  
2014/35/EU:  
THE LOW VOLTAGE DIRECTIVE

STANDARD SOLAR PANELS

### ELECTRICAL DATA \*

|                                              |              |       |       |       |       |
|----------------------------------------------|--------------|-------|-------|-------|-------|
| Nominal Max. Power (P <sub>max</sub> ) * (W) | 440          | 445   | 450   | 455   | 460   |
| Open Circuit Voltage (V <sub>oc</sub> ) (V)  | 36.52        | 36.62 | 36.72 | 36.82 | 36.92 |
| Short Circuit Current (I <sub>sc</sub> ) (A) | 15.31        | 15.42 | 15.53 | 15.64 | 15.75 |
| Max. Power Voltage (V <sub>mpp</sub> ) (V)   | 30.61        | 30.72 | 30.83 | 30.94 | 31.05 |
| Max. Power Current (I <sub>mpp</sub> ) (A)   | 14.38        | 14.49 | 14.60 | 14.71 | 14.82 |
| Module Efficiency (%)                        | 22.02        | 22.27 | 22.52 | 22.77 | 23.02 |
| Power Tolerance (%)                          | ± 3          |       |       |       |       |
| Power Temperature Coefficient γ              | -0.24 % / °C |       |       |       |       |
| Current Temperature Coefficient α            | +0.04 % / °C |       |       |       |       |
| Voltage Temperature Coefficient β            | -0.22 % / °C |       |       |       |       |

\*STC: Irradiance 1000 W / m<sup>2</sup>, cell temperature 25 °C, AM = 1.5, Tolerance of P<sub>max</sub> is within + / - 3 %.

### BNPC \* \*

|                                                  |        |       |       |       |       |
|--------------------------------------------------|--------|-------|-------|-------|-------|
| Nominal Max. Power (P <sub>max</sub> ) * (W)     | 493    | 499   | 505   | 510   | 515   |
| Open Circuit Voltage (V <sub>oc</sub> ) (V)      | 36.65  | 36.75 | 36.85 | 36.95 | 37.05 |
| Short Circuit Current (I <sub>sc</sub> ) (A)     | 17.17  | 17.29 | 17.42 | 17.54 | 17.66 |
| Max. Power Voltage (V <sub>mpp</sub> ) (V)       | 30.72  | 30.83 | 30.94 | 31.05 | 31.16 |
| Max. Power Current (I <sub>mpp</sub> ) (A)       | 16.07  | 16.19 | 16.31 | 16.44 | 16.56 |
| NMOT (Nominal Module Operating Temperature) (°C) | 41 ± 3 |       |       |       |       |

\*\*BSTC: Front side irradiation 1000 W / m<sup>2</sup>, back side reflection irradiation 135 W / m<sup>2</sup>, AM = 1.5, ambient temperature 25 °C.

### MECHANICAL DATA

|                  |                                                |
|------------------|------------------------------------------------|
| Dimensions (mm)  | 1762 × 1134 × 30                               |
| Weight (kg)      | 25.0 ( 2.0 mm glass ) or 23.0 ( 1.6 mm glass ) |
| Solar Cells (mm) | HJT Mono 182 × 105 0BB                         |
| Front Glass      | 2.0 mm glass or 1.6 mm glass                   |
| Back Glass       | 2.0 mm glass or 1.6 mm glass                   |
| Frame            | Anodised aluminum alloy                        |
| Junction Box     | IP68, 3 diodes                                 |
| Cables           | 300 mm in length (customizable) / UV resistant |
| Connectors       | MC4 original / MC4 compatible                  |

### PACKAGING

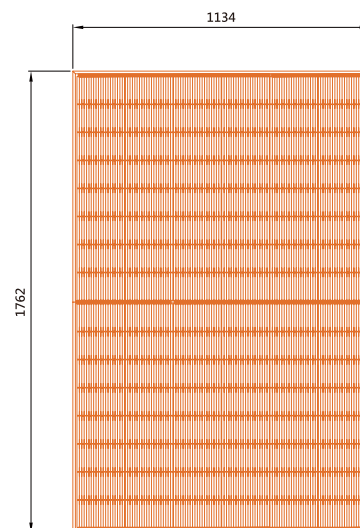
|                                         |     |
|-----------------------------------------|-----|
| Panels Per Pallet (pcs)                 | 36  |
| Pallets Per Container (pcs)             | 26  |
| Panels quantity per 40' container (pcs) | 936 |

### OPERATING CONDITIONS

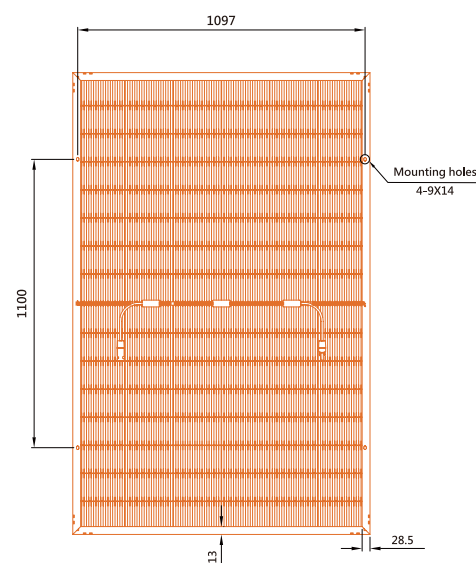
|                                                                             |               |
|-----------------------------------------------------------------------------|---------------|
| Max. System Voltage (V)                                                     | 1500          |
| Operating Temperature (°C)                                                  | -40°C ~ +85°C |
| Max. Series Fuse Rating (A)                                                 | 30            |
| Front Side Maximum Static Loading/<br>Rear Side Maximum Static Loading (Pa) | 5400 / 2400   |

### Design (mm)

Front View



Back View



### LINEAR PERFORMANCE WARRANTY

15 Years Product Warranty | 30 Years Performance Warranty

