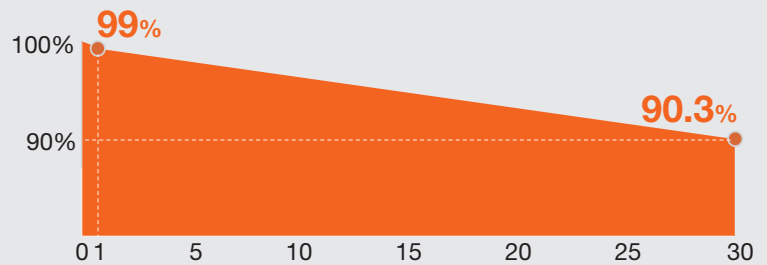


M440-460H48RB-BF

96 CELLS HALF-CUT
Bifacial N-HJT PV Module
Black Frame



- * First year power degradation $\leq 1\%$
- * Annual power degradation (2-30 year) $\leq 0.3\%$
- * Power output until the 30th year $\geq 90.3\%$

25 YEARS Product guarantee

30 YEARS Output guarantee

440-460Wp Power range

23.02% Maximum efficiency

0,30% Yearly degradation

SMBB Excellent Cell Efficiency
Super multi Bus Bar technology increases the efficiency of the modules

Resistance to power degradation
Resistance to power degradation caused by Potential-Induced Degradation PID effect, thanks to strict quality control in the module production process and other subassemblies

Better Weak Illumination Response
More power output in weak light conditions, such as haze, clouds and early morning

Adapted to harsh outdoor environments
Resistant to harsh environments such as salt, ammonia, sand, high temperatures and high humidity environments

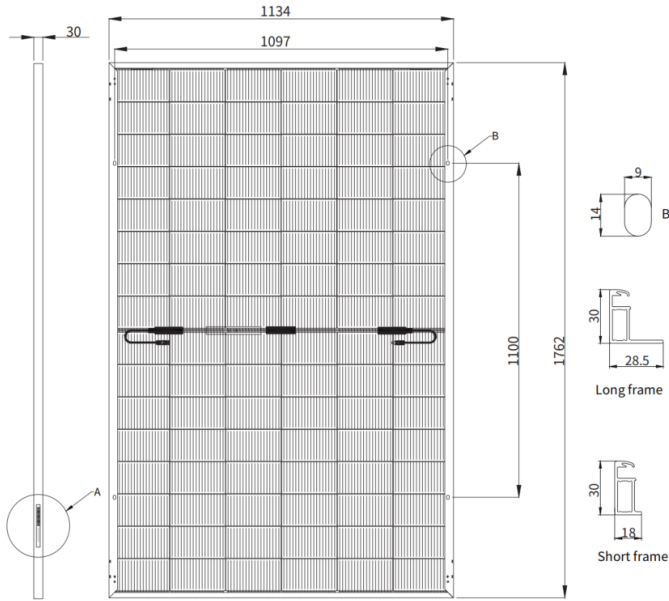
Highest production standards
Guarantees of operational reliability and quality module implementations go far beyond requirements specified in certificates



IEC 61215: Design suitability and type approval
IEC 61730: Safety qualification
IEC 61701: Salt mist corrosion testing
IEC 62716: Ammonia corrosion testing
IEC 60068: Environmental testing: Dust and sand

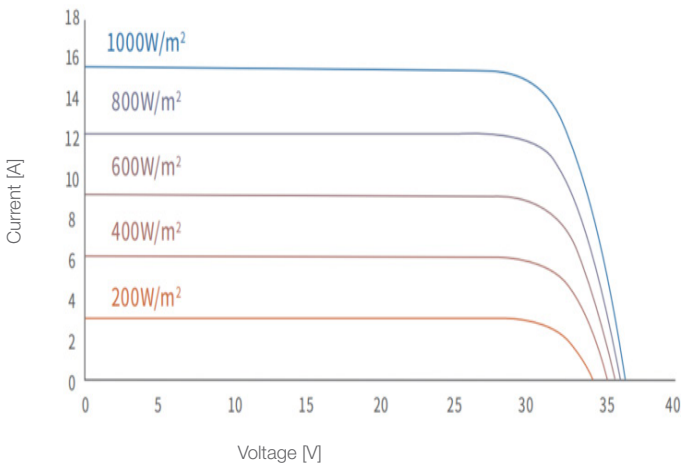
With subsidiaries in more than 50 countries and business activities in over 150 countries, LEDVANCE is committed to supplying reliable and durable PV products to customers to create together a greener planet.

Dimensions of PV module (mm)

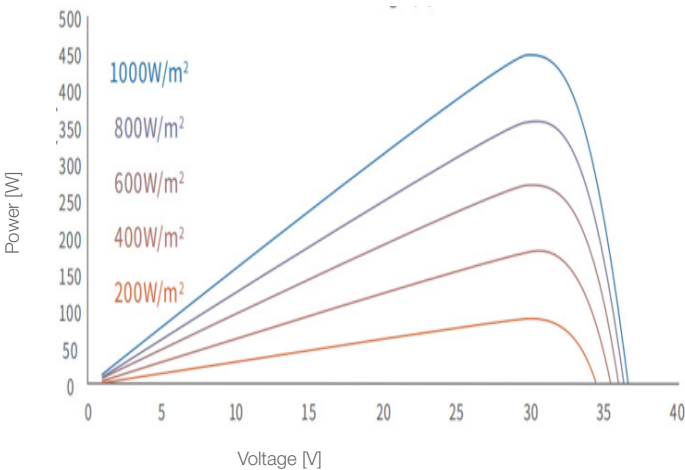


NOTE:
Frame color and cable length can be customized.

Current-voltage curve of the module by different insolation



Power-voltage curve of the PV module by different insolation



ELECTRICAL CHARACTERISTIC | STC ¹⁾

Power Level	440	445	450	455	460
Nominal power Watt P_{max} (Wp)	440	445	450	455	460
Maximum power voltage V_{mpp} (V)	30.37	30.52	30.66	30.81	30.96
Maximum power current I_{mpp} (A)	14.49	14.59	14.68	14.77	14.86
Open circuit voltage V_{oc} (V)	36.18	36.34	36.50	36.66	36.82
Short circuit current I_{sc} (A)	15.19	15.29	15.38	15.47	15.57
Module efficiency η (%)	22.02	22.27	22.52	22.77	23.02

Measuring tolerance: $\pm 3\%$

Bifacial Output-Backside Power Gain

Maximum power (Wp)	490	496	501	507	512
Maximum power voltage V_{mpp} (V)	30.47	30.62	30.77	30.92	31.07
Maximum power current I_{mpp} (A)	16.10	16.20	16.30	16.41	16.50
Open circuit voltage V_{oc} (V)	36.31	36.47	36.63	36.79	36.95
Short circuit current I_{sc} (A)	16.94	17.04	17.15	17.25	17.35

ELECTRICAL CHARACTERISTIC | NMOT ²⁾

Power Level	440	445	450	455	460
Maximum power P_{max} (Wp)	334	338	342	346	349
Maximum power voltage V_{mpp} (V)	28.89	29.03	29.17	29.32	29.46
Maximum power current I_{mpp} (A)	11.58	11.66	11.73	11.80	11.88
Open circuit voltage V_{oc} (V)	34.53	34.68	34.84	34.99	35.14
Short circuit current I_{sc} (A)	12.14	12.22	12.29	12.37	12.44

Measuring tolerance: $\pm 3\%$

WORKING CONDITIONS

Maximum system voltage	1500 V DC
Operating temperature	-40°C ~ +85°C
Operating humidity	5~85%
Maximum series fuse	30 A
Front load / rear load	5400 Pa / 2400 Pa

MECHANICAL DATA

Solar cells	Mono N-type HJT
Number of cells	96 (6x16) pcs
Size of cells	182 x 105 mm
Module dimension	1762 x 1134 x 30 mm
Frame color	BF - black
Weight	23 \pm 1 kg
Glass	1.6 mm tempered glass, anti-reflective coating, double glass
Type of frame	Anodized aluminum alloy
Junction box	IP68, 3 diodes
Cables	4 mm ² , 1200 mm
Connectors	MC4-Evo 2

TEMPERATURE RATINGS

NMOT	44 \pm 2 °C
Temperature coefficient of P_{max}	-0.24% / °C
Temperature coefficient of V_{oc}	-0.24% / °C
Temperature coefficient of I_{sc}	0.04% / °C

PACKAGING CONFIGURATION

Piece / Box	36
Size of packing	1784 x 1140 x 1255 mm
Weight of packing	785 kg
Piece / Container (40'HC)	936

FOOTNOTES:

- 1) STC (Standard Test Conditions): 1000W/m² solar irradiance, cell temperature 25°C, AM 1.5G
- 2) NMOT (nominal cell operating temperature): insolation 800W/m², ambient temperature 20°C, AM 1.5G, wind speed 1m/s

CAUTION:

- Do not connect two or more strings of modules to one fuse.
- The electrical data in this product sheet does not refer to a single module and is not part of the offer, it is used to compare different types of modules only.
- Due to continuous technical innovation, development and product improvement, technical data contained in this product sheet is subject to change at any time without notice and may not be the basis for any damage claims.