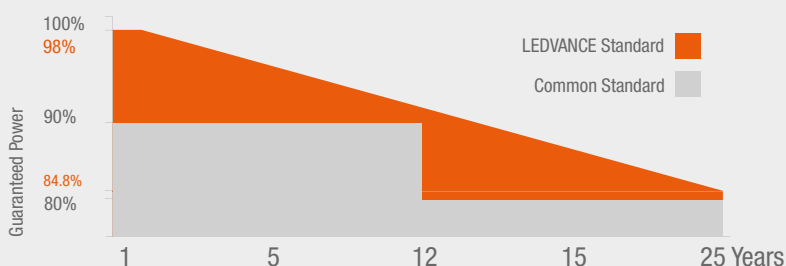


M440~460P60LM-BF F3

120CELLS HALF-CUT
Monocrystalline PERC PV Module
Black Frame



12 YEARS Product guarantee

25 YEARS Output guarantee

440-460Wp Power range

21,24% Maximum efficiency

0,55% Yearly degradation

10BB Excellent Cell Efficiency
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

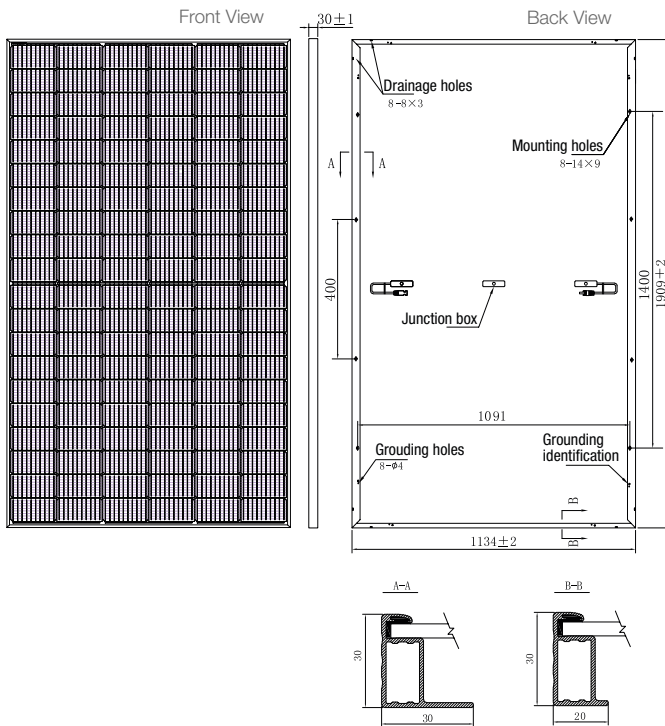
Adapted to harsh outdoor environments
Resistant to harsh environments such as salt, ammonia, sand, high temperatures and high humidity environments

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

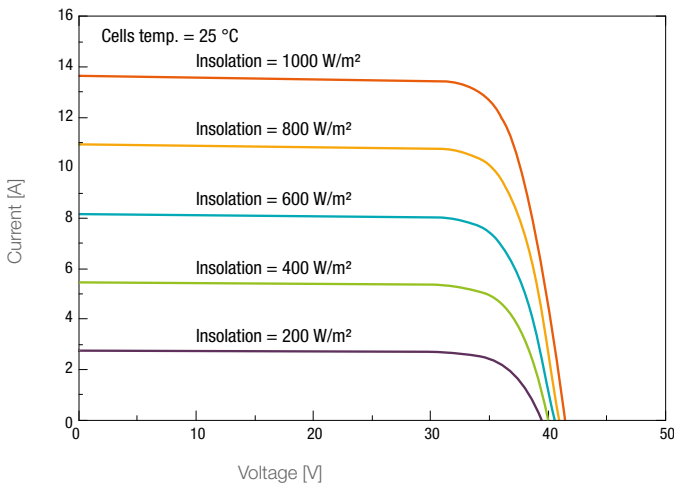


IEC 61215: Design suitability and type approval
IEC 61730: Safety qualification
IEC 61701: Salt mist corrosion testing
IEC 62716: Ammonia corrosion testing
IEC 60068: Environmental testing: Dust and sand

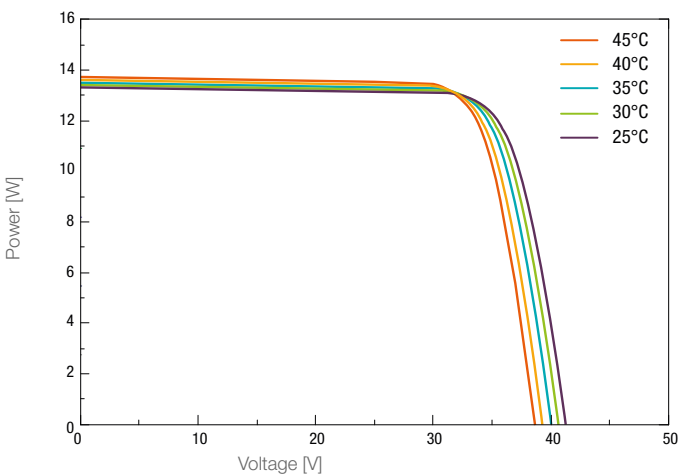
Dimensions of PV module (mm)



Current-voltage curve of the module



Power-voltage curve of the PV module



ELECTRICAL CHARACTERISTICS | STC ¹⁾

Model type	M440P60 LM BF F3	M445P60 LM BF F3	M450P60 LM BF F3	M455P60 LM BF F3	M460P60 LM BF F3
Nominal power Watt P_{max} (Wp)	440	445	450	455	460
Maximum power voltage V_{mpp} (V)	34.71	34.93	35.16	35.39	35.61
Maximum power current I_{mpp} (A)	12.68	12.74	12.80	12.86	12.92
Open circuit voltage V_{oc} (V)	41.51	41.73	41.96	42.19	42.41
Short circuit current I_{sc} (A)	13.43	13.49	13.55	13.61	13.67
Module efficiency η (%)	20.32	20.55	20.78	21.01	21.24

Measuring tolerance: ±3%

ELECTRICAL CHARACTERISTICS | NMOT ²⁾

Model type	M440P60 LM BF F3	M445P60 LM BF F3	M450P60 LM BF F3	M455P60 LM BF F3	M460P60 LM BF F3
Maximum power P_{max} (Wp)	333	337	341	344	348
Maximum power voltage V_{mpp} (V)	32.43	32.63	32.85	33.06	33.27
Maximum power current I_{mpp} (A)	10.27	10.33	10.38	10.41	10.46
Open circuit voltage V_{oc} (V)	38.78	38.98	39.20	39.41	39.62
Short circuit current I_{sc} (A)	10.90	10.95	11.00	11.05	11.10

Measuring tolerance: ±3%

WORKING CONDITIONS

Maximum system voltage	1500 V DC
Operating temperature	-40°C~+85°C
Operating humidity	5~85%
Maximum series fuse	25 A
Front/Rear side load	5400 pa / 2400 pa

MECHANICAL DATA

Solar cells	Mono PERC
Cells orientation	120 (6x20)
Size of cells	182 x 91 mm
Module dimension	1909 x 1134 x 30 mm
Frame color	BF – Black
Weight	22.3±1 kg
Glass	3.2 mm tempered glass, anti-reflective coating
Type of frame	Anodized aluminum alloy
Junction box	IP68, 3 diodes
Cables	4 mm², 300 mm or 1200 mm
Connectors	MC4 compatible

TEMPERATURE RATINGS

NMOT	44±2 °C
Temperature coefficient of P_{max}	-0.35% / °C
Temperature coefficient of V_{oc}	-0.275% / °C
Temperature coefficient of I_{sc}	0.05% / °C

TEMPERATURE RATINGS

Piece / Box	36
Piece / Container	864

FOOTNOTES:

- STC (Standard Test Conditions): 1000W/m² solar irradiance, cell temperature ±25°, AM 1.5G
- 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.