



pa η da 3.0 Mini 2

465W

MAXIMUM MODULE EFFICIENCY

23.3%

POSITIVE POWER TOLERANCE

0~+5_w



N-type TOPCon Bifacial Module

**IMPROVED POWER
NEVER SETTLE FOR LESS**



Backside Yield



Wide Applications



Superior Yield



Outstanding Bifaciality



Excellent Durability



Yingli Solar Website



QUALIFICATIONS & CERTIFICATES

IEC 61215, IEC 61730, CE

ISO 9001: Quality management systems

ISO 14001: Environmental management systems

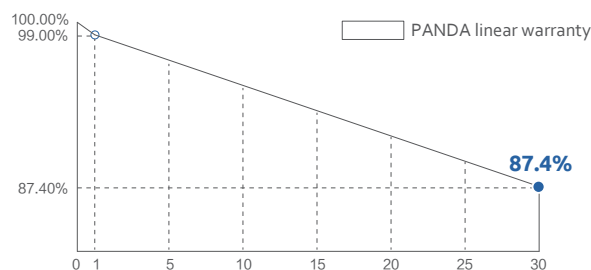
IEC 62941: Quality system for PV module manufacturing

ISO 45001: Occupational health and safety management systems



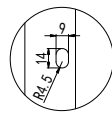
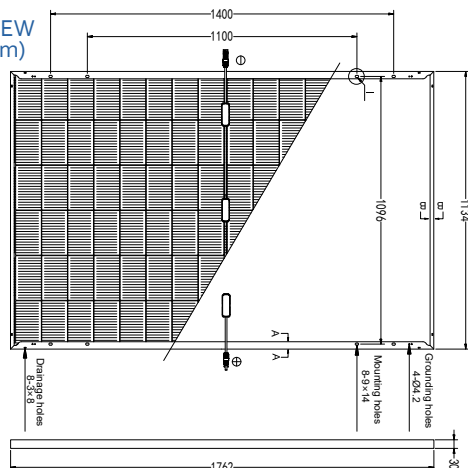
Warranty partner

Munich RE

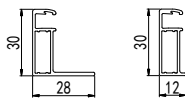


1.00% the 1st year power degradation
0.40% annual power degradation

BACK VIEW
(units:mm)



DETAIL I

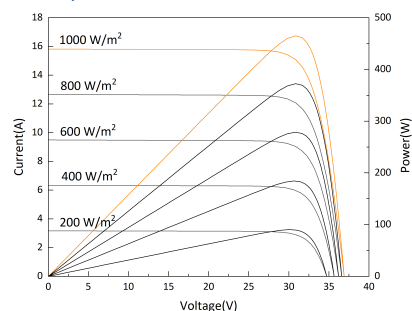


Schematic Section



Warning: Read the Installation and User Manual in its entirety before handling, installing and operating Yingli Solar modules.

I-V / P-V CURVES



Electrical Parameters at Standard Test Conditions (STC)

Module type	YLxxxCF48 i/2 (xxx=Pmax)					
Power output* P_{max} (W)	440	445	450	455	460	465
Power output tolerances ΔP_{max} (W)	0 / + 5					
Module efficiency η_m (%)	22.0	22.3	22.5	22.8	23.0	23.3
Voltage at P_{max} - V_{mpp} (V)	29.68	29.91	30.14	30.37	30.60	30.83
Current at P_{max} - I_{mpp} (A)	14.83	14.88	14.94	14.99	15.04	15.09
Open-circuit voltage V_{oc} (V)	35.84	36.05	36.26	36.47	36.68	36.89
Short-circuit current I_{sc} (A)	15.52	15.58	15.64	15.70	15.76	15.82

STC: 1000 W·m⁻² irradiance, 25°C cell temperature, AM 1.5. *Measuring tolerance: $\pm 3\%$.

Electrical Parameters at Nominal Operating Cell Temperature (NOCT)

Power output- P_{max} (W)	335	338	342	346	350	354
Voltage at P_{max} - V_{mpp} (V)	28.31	28.53	28.75	28.97	29.19	29.41
Current at P_{max} - I_{mpp} (A)	11.82	11.86	11.91	11.95	11.99	12.03
Open-circuit voltage- V_{oc} (V)	34.03	34.23	34.43	34.63	34.83	35.03
Short-circuit current- I_{sc} (A)	12.50	12.55	12.60	12.65	12.70	12.75

NOCT: open-circuit module operation temperature at 800 W·m⁻² irradiance, 20°C ambient temperature, 1 m · s⁻¹ wind speed.

Bifacial Electrical Parameters at Standard Test Conditions(BNPI)

Power output- P_{max} (W)	488	493	499	504	510	515
Voltage at P_{max} - V_{mpp} (V)	29.68	29.91	30.14	30.37	30.60	30.83
Current at P_{max} - I_{mpp} (A)	16.43	16.49	16.55	16.61	16.66	16.72
Open-circuit voltage- V_{oc} (V)	35.84	36.05	36.26	36.47	36.68	36.89
Short-circuit current- I_{sc} (A)	17.20	17.26	17.33	17.40	17.46	17.53

BNPI: 1000W·m⁻² on the front side and 135 W·m⁻² on the back side, 25°C cell temperature, AM 1.5.
Bifaciality coefficient is 80% $\pm$ 5%.

Thermal Characteristics

Nominal operating cell temperature-NOCT(°C)	42 $\pm$ 2
Temperature coefficient of P_{max} - γ (% / °C)	- 0.29
Temperature coefficient of V_{oc} - β (% / °C)	- 0.24
Temperature coefficient of I_{sc} - α (% / °C)	0.042

Packaging Specifications

Number of modules per pallet	36
Number of pallets per 40' container	26
Packaging box dimensions (L / W / H)	1780 mm / 1110 mm / 1245 mm
Box weight	782 kg

Operating Conditions

Max. system voltage	1500 V _{DC}
Max. series fuse rating*	30 A
Operating temperature range	- 40°C ~ 85°C
Max. static load, front (e.g., snow)	5400 Pa
Max. static load, back (e.g., wind)	2400 Pa
Max. hailstone impact (diameter / velocity)	25 mm / 23 m·s ⁻¹

*Do not connect fuse in combiner box with two or more strings in parallel connection.

General Characteristics

Dimensions (L / W / H)	1762 mm / 1134 mm / 30 mm
Weight	20.7 kg

Construction Materials

Cell (material / quantity)	n-type monocrystalline silicon / 6 x 16
Glass (thickness)	1.6 mm / 1.6 mm
Frame (material)	anodized aluminum alloy
Junction box (type / protection degree)	3 bypass diodes / $\geq$ IP68
Cable (length / cross-sectional area)	$\pm$ 1200 mm / 4 mm ²

• Due to continuous innovation, research and product improvement, the specifications in this product information sheet are subject to change without prior notice.
• The specifications may deviate slightly and are not guaranteed.
• The data do not refer to a single module and they are not part of the offer, they only serve for comparison to different module types.



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