

# TCL SOLAR

## Solar Panel

Product: HSM-ND48-GR

Power Range: 435–460 W



Ideal for residential applications



Framed glass-glass



Bifacial energy generation

### High energy yield

- Consistent energy production across all weather conditions
- Bifacial energy generation

### Elegant design

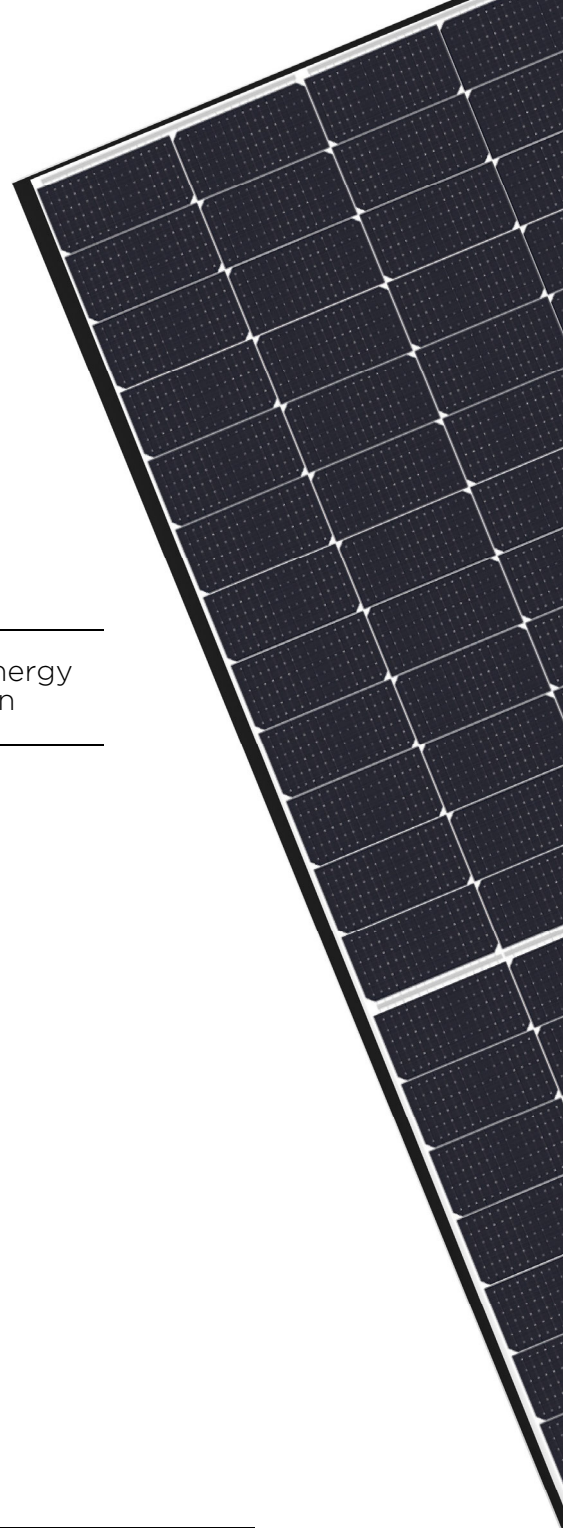
- Sleek panel aesthetic
- High-durability frame and heat-strengthened glass

### Reliable operation

- Rigorous supply chain qualification procedures
- Easy to install
- Backed by a bankable company

### Comprehensive warranty coverage

Product and power coverage	15/30 Years
Year 1 minimum warranted output	99.0%
Maximum annual degradation	0.40%



Electrical Data, Front STC Characteristics <sup>1</sup>						
	HSM-ND48-GR460	HSM-ND48-GR455	HSM-ND48-GR450	HSM-ND48-GR445	HSM-ND48-GR440	HSM-ND48-GR435
Nominal Power (P <sub>nom</sub> ) <sup>2</sup>	460 W	455 W	450 W	445 W	440 W	435 W
Power Binning	3/0%	3/0%	3/0%	3/0%	3/0%	3/0%
Panel Efficiency	23.0%	22.8%	22.5%	22.3%	22.0%	21.8%
Rated Voltage (V <sub>mpp</sub> )	30.52 V	30.32 V	30.13 V	29.93 V	29.74 V	29.54 V
Rated Current (I <sub>mpp</sub> )	15.08 A	15.01 A	14.94 A	14.87 A	14.80 A	14.73 A
Open-Circuit Voltage (V <sub>oc</sub> ) <sup>2</sup>	35.96 V	35.76 V	35.56 V	35.36 V	35.16 V	34.96 V
Short-Circuit Current (I <sub>sc</sub> ) <sup>2</sup>	16.20 A	16.13 A	16.06 A	15.99 A	15.92 A	15.85 A

BNPI Data <sup>3</sup>						
Nominal Power (P <sub>max</sub> ) <sup>2</sup>	506 W	501 W	495 W	490 W	484 W	479 W
Open-Circuit Voltage (V <sub>oc</sub> ) <sup>2</sup>	36.05 V	35.86 V	35.64 V	35.46 V	35.23 V	35.05 V
Short-Circuit Current (I <sub>sc</sub> ) <sup>2</sup>	17.77 A	17.71 A	17.63 A	17.56 A	17.48 A	17.41 A

Bifacial Gain <sup>4</sup>						
P <sub>max</sub> with 5% Bifacial Gain	483 W	478 W	473 W	467 W	462 W	457 W
I <sub>sc</sub> with 5% Bifacial Gain	17.01 A	16.94 A	16.86 A	16.79 A	16.72 A	16.64 A
P <sub>max</sub> with 10% Bifacial Gain	506 W	501 W	495 W	490 W	484 W	479 W
I <sub>sc</sub> with 10% Bifacial Gain	17.82 A	17.74 A	17.67 A	17.59 A	17.51 A	17.44 A

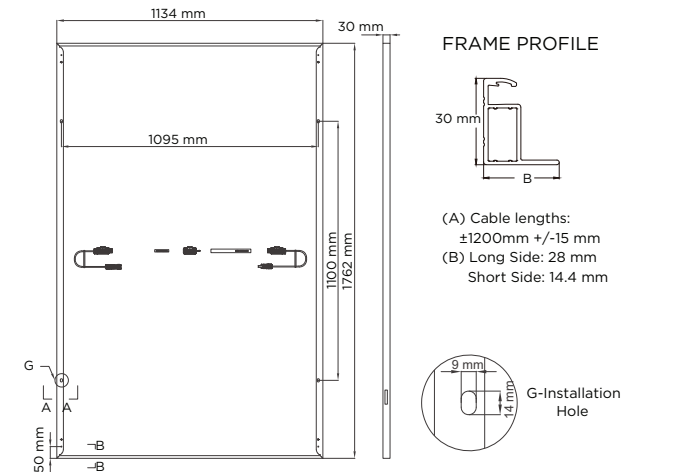
Electrical Data	
Bifaciality (ϕP <sub>max</sub> )	80% +/-5%
Maximum System Voltage	1500 V IEC
Testing Temperature	-40°C to +85°C
Maximum Series Fuse	30 A
Power Temp. Coef.	-0.29% / °C
Voltage Temp. Coef.	-0.25% / °C
Current Temp. Coef.	0.045% / °C

Packaging Configuration	
Number of modules per pallet	36
Number of pallets per 40ft HQ container	26
Number of modules per container	936

Tests And Certifications (Pending)	
Standard Tests	IEC 61215, IEC 61730
Fire Rating	Class A (IEC 61730-2 / UL 790)
Protection Class	Class II (IEC 61140)
Quality Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	ISO 45001:2018, Recycling Scheme



Mechanical Data	
Solar Cells	N-Type TOPCon
Glass	2.0 mm + 2.0 mm, high transmission heat strengthened glass, AR coating on front glass
Junction Box	IP-68, 3 bypass diodes
Connector	Stäubli MC4-EVO2
Weight	24.5 kg
Max. Load <sup>5</sup>	Wind: 2400 Pa, 245 kg/m <sup>2</sup> front & back Snow: 5400 Pa, 550 kg/m <sup>2</sup> front
Impact Resistance	25 mm diameter hail at 27 m/s
Frame	Black Anodized Aluminum Alloy



1 Standard Test Conditions (1000 W/m<sup>2</sup> irradiance, AM 1.5, 25° C). NREL calibration Standard: SOMS current, LACCS FF and Voltage.  
2 Measurements tolerance +/-3%.  
3 BNPI Test Condition (front 1000 W/m<sup>2</sup>, rear 135W/m2 irradiance, AM 1.5, 25° C).  
4 The additional gain from the back side of the panel compared to the power of the front side of the panel at the standard test conditions. It depends on mounting (structure, height, tilt angle etc.) and albedo of the underlying surface.  
5 Test load as per IEC 61215-2 is equal to design load with safety factor = 1.5. See "Safety and Installation Instructions" for details.