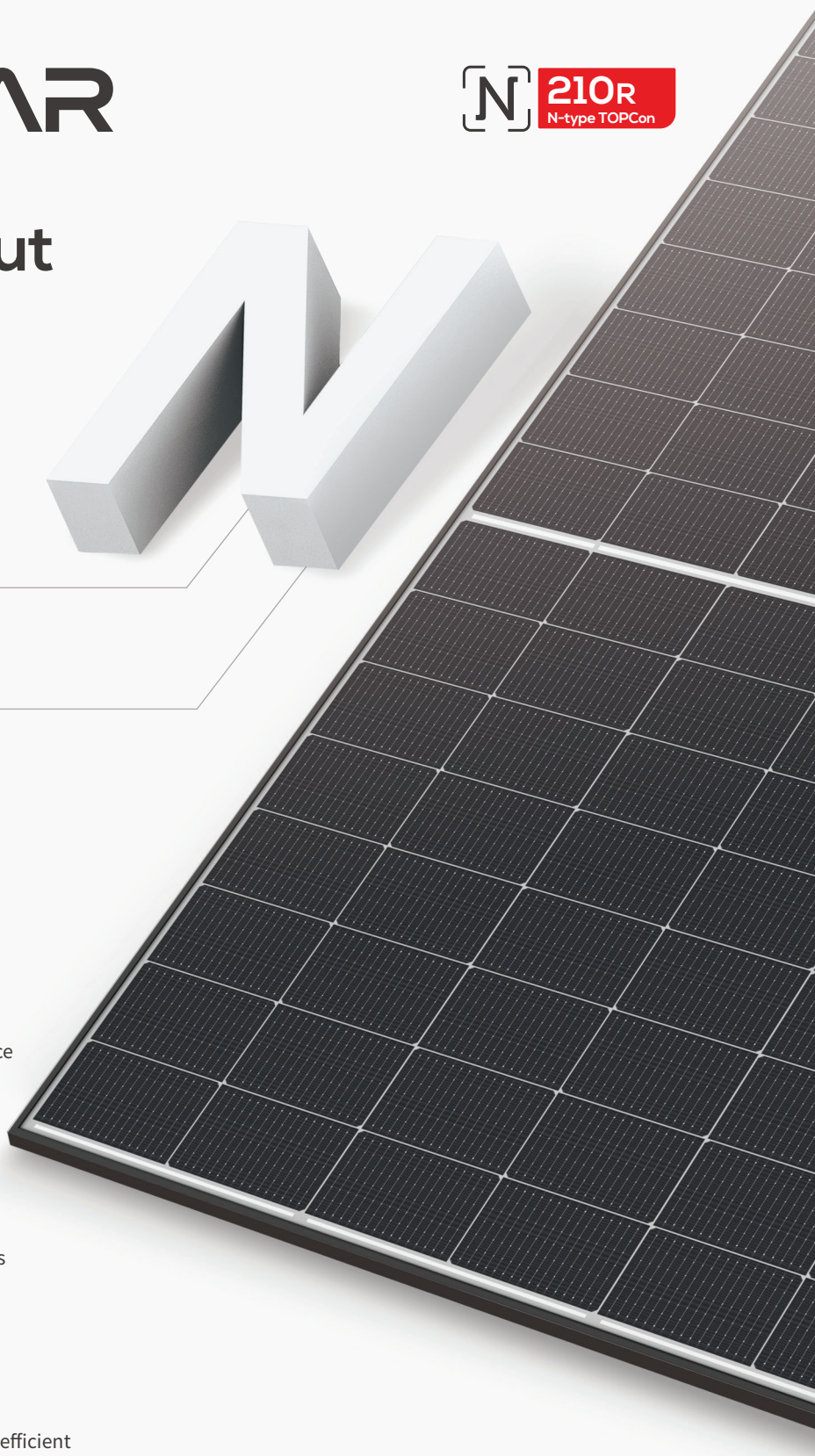
TCL SOLAR

N 210R N-type TOPCon

TCL Solar Half Cut

N-type Bifacial Double Glass Module

HSM-ND48-GR435~455
G12R-48P



455W
Maximum Power Output

22.8%
Maximum Efficiency

TIER 1 BloombergNEF

Aesthetic Experience

- For RES scenarios, delivering aesthetic experience

Reliable and convenient to install

- Rigorous material selection
- High-strength frame and heat strengthened glass
- Easier handling and installation

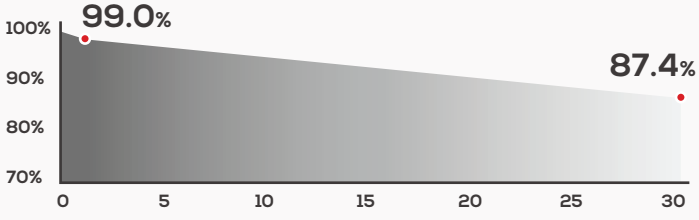
High Energy Yield

- Excellent thermal resistance and temperature coefficient
- Outstanding power generation performance

Linear Performance Warranty

25 Years Product Warranty

30 Years Linear Performance Warranty



Comprehensive Products and System Certificates

IEC 61215 / IEC 61730 ISO 9001:2015 ISO 45001:2018 ISO 14001:2015

Version No.:HC-N-HSM2025-0101-EN-AU

* Please refer to product warranty for details

HSM-ND48-GR435~455 | TOPCon

455W Maximum Power | **22.8%** Maximum Efficiency | **0~+3W** Power Sorting

Electrical Parameters (STC* & BNPI*)

Measurement Tolerance: Pmax (W) ±3%; Voc (V) ±3%; Isc (A) ±4%
* STC: Irradiance 1000W/m², Cell Temperature 25°C, AM1.5
* BNPI: Back Irradiance 135W/m², Cell temperature 25°C, Atmospheric quality AM 1.5, Wind speed 1m/s

Testing Condition		STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Maximum Power	Pmax (W)	435	479	440	484	445	490	450	495	455	501
Open Circuit Voltage	Voc (V)	34.96	35.05	35.16	35.23	35.36	35.46	35.56	35.64	35.76	35.86
Short Circuit Current	Isc (A)	15.85	17.41	15.92	17.48	15.99	17.56	16.06	17.63	16.13	17.71
Maximum Power Voltage	Vmp (V)	29.54	29.43	29.74	29.61	29.93	29.83	30.13	30.00	30.32	30.20
Maximum Power Current	Imp (A)	14.73	16.28	14.80	16.35	14.87	16.43	14.94	16.50	15.01	16.59
Module Efficiency	(%)	21.8		22.0		22.3		22.5		22.8	

Electrical Characteristics with Different Bifacial Gain*

* The additional gain from the back side depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

Bifacial Gain		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
Maximum Power	Pmax (W)	457	479	462	484	467	490	473	495	478	501
Open Circuit Voltage	Voc (V)	34.96	34.96	35.16	35.16	35.36	35.36	35.56	35.56	35.76	35.76
Short Circuit Current	Isc (A)	16.64	17.44	16.72	17.51	16.79	17.59	16.86	17.67	16.94	17.74
Maximum Power Voltage	Vmp (V)	29.54	29.54	29.74	29.74	29.93	29.93	30.13	30.13	30.32	30.32
Maximum Power Current	Imp (A)	15.47	16.20	15.54	16.28	15.61	16.36	15.69	16.43	15.76	16.51

Temperature Coefficient

Nominal Module Operating Temperature*	43±2°C
Temperature Coefficient of Isc	+0.045%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Pmax	-0.29%/°C

Operating Parameters

Operating Temperature (T98 max)	-40~70°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A

Mechanical Data

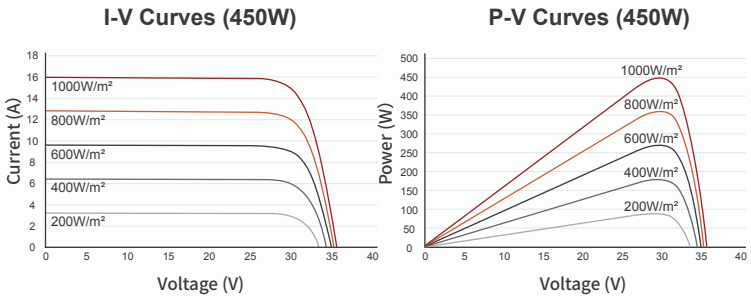
* Please refer to installation manual for details

No.of Cells	96pcs (6×16)
Dimension	1762×1134×30 mm
Weight	24.5kg±3%
Front Glass	2.0mm, Heat Strengthened, AR coating Glass
Back Glass	2.0mm, Heat Strengthened Glass
Frame	Anodized Aluminium Alloy
J-Box	IP68, three diodes
Cables	4.0mm², +1200mm, -1200mm (can be customized)
Maximum Static Load	Front: 5400Pa/Back: 2400Pa*
Fire Rating	IEC Class C
Connectors:	Staubli Electrical Connectors AG, PV-KST4-EVO 2/xy_UR; PV-KBT4-EVO 2/xy_UR
Bifaciality (φPmax/φIsc)	80%±10%
Bifaciality (φVoc)	98%±2%

Packaging Configuration

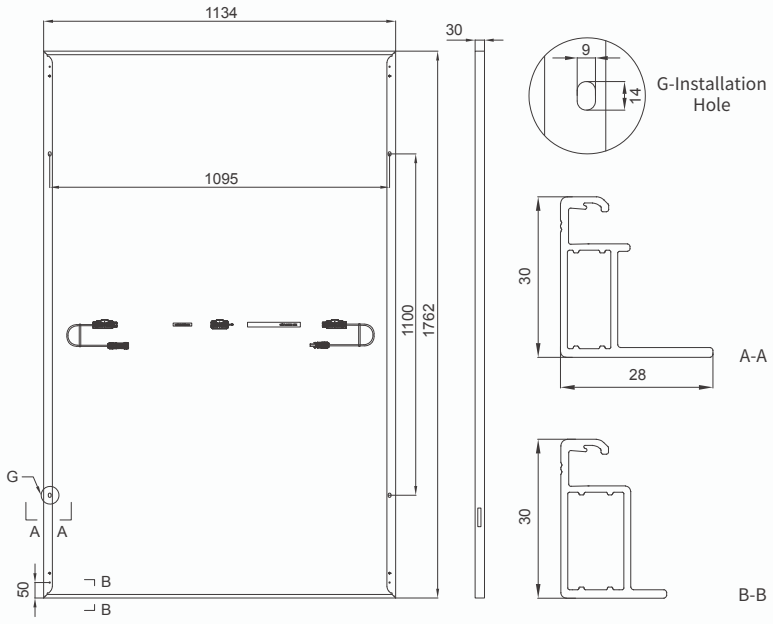
Modules per Pallet	36pcs
Modules per 40'HQ Container	936pcs
Pallets per 40'HQ Container	26pcs

Curve Graph



Engineering Drawing

[Unit: mm]



TCL SOLAR

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Datasheets