

TÜV Rheinland (Shanghai) Co., Ltd.

ZNshine Solar Module TCLP Report

Commissioned Test

Client: ZNSHINE PV-TECH Co., Ltd.

Report No.: CN227VOX 001

September 2022

TÜV Rheinland (Shanghai) Co., Ltd.

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Rev No.	Rev. Date	Content/Changes	Prepared/revised	Checked/released
1	30 September 2022	Formal Report	Allen Qian	Shangshang Ju

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Inspector

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Reviewer

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Client:	ZNSHINE PV-TECH Co., Ltd.
Quotation No.:	245782345
Order No.:	244446750
Order Date:	31.08.2022

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List of Abbreviations

ND: Not detected

µg/L: Microgram per liter

mg/L: Milligrams per liter

TCLP: Toxicity Characteristic Leaching Procedure

TUV: TÜV Rheinland (Shanghai) Co., Ltd.

J-Box: Junction-Box

1. Executive Summary

General Information	
Client	ZNSHINE PV-TECH Co., Ltd.
Project Name	ZNshine Solar Module TCLP
Product Specification	ZNshine Solar Photovoltaic Module: ZXM7-SHLDD144-XXX/M, ZXM6-NHLDD144-XXX/M
Detail of sample	<ol style="list-style-type: none"> 1. A section of the laminate, including the glass superstrate and substrate (top and bottom), the encapsulant, the cell and the interconnect wires (aka ribbons) 2. A section of the aluminum frame with the adhesive used to adhere the frame to the laminate 3. A complete junction box assembly, including the adhesive used to adhere the assembly to the substrate, the junction box, diodes, cables, connectors and potting compound.
Test Details	
Scope of work	TCLP
Test Period	22.09.2022 - 28.09.2022
Laboratory	TÜV Building III, No.177, Lane 777, West Guangzhong Road Jingan District, Shanghai, China
Reference Standards	For Arsenic, Mercury, Selenium: HJ/T 300-2007; HJ694-2014
	For Barium, Cadmium, Chromium, Lead, Silver: HJ/T 300-2007; HJ776-2015
Result	<ol style="list-style-type: none"> 1. Arsenic was found in Laminate, Frame, J-box. 2. Barium was found in frame. 3. Mercury was found in J-box. 4. Other elements were not found. <p>Note: Refer to table 1 for data Detail in next page.</p>

2. Results

Table 1:

Metal	Results			Threshold	Unit
	Laminate	Frame	J-box		
Arsenic	1.0	1.4	1.0	0.3	µg/L
Barium	ND	0.03	ND	0.01	mg/L
Cadmium	ND	ND	ND	0.05	mg/L
Chromium	ND	ND	ND	0.03	mg/L
Lead	ND	ND	ND	0.1	mg/L
Mercury	ND	ND	0.08	0.04	µg/L
Selenium	ND	ND	ND	0.4	µg/L
Silver	ND	ND	ND	0.03	mg/L

Remark: ND: Not detected.

Reference Standards: For Arsenic, Mercury, Selenium: HJ/T 300-2007; HJ694-2014

Reference Standards: For Barium, Cadmium, Chromium, Lead, Silver: HJ/T 300-2007; HJ776-2015

3. Equipment List

Table 2:

Equipment name	Equipment Type	Equipment number
Atomic fluorescence photometer	AFS8510	F-004-01
Inductively coupled plasma emission spectrometer	Icap6000	Icap6000

End of the report

ZXM7-SHLDD144 Series ZNSHINESOLAR

Znshinesolar 10BB HALF-CELL Bifacial Light-Weight Double Glass Monocrystalline PERC PV Module

525W | 530W | 535W | 540W | 545W | 550W



Excellent cells efficiency

MBB technology decreases the distance between busbar and finger grid line which is benefit to power increase.



Better Weak Illumination Response

More power output in weak light condition, such as haze, cloudy, and early morning.



Anti PID

Ensured PID resistance through the quality control of cell manufacturing process and raw materials.



Adapt To Harsh Outdoor Environment

Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity environment.



TIER 1

Global, Tier 1 bankable brand, with independently certified state-of-the-art automated manufacturing.



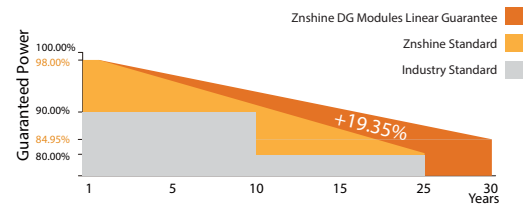
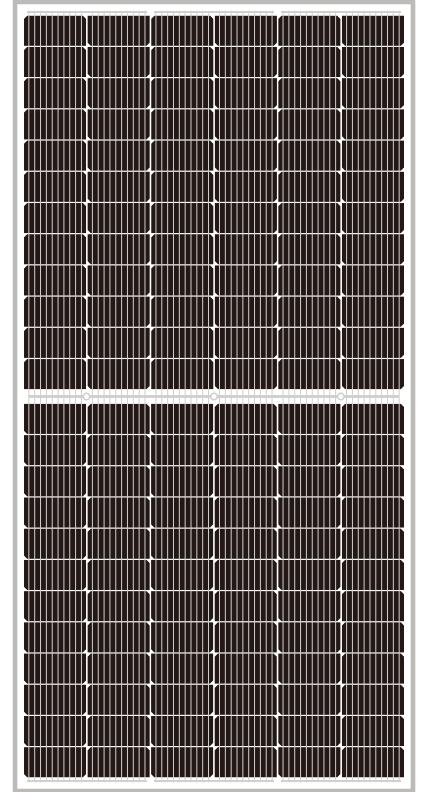
Excellent Quality Management System

Warranted reliability and stringent quality assurances well beyond certified requirements.



Bifacial Technology

Up to 25% additional power gain from back side depending on albedo.



12 years product guarantee
30 years output guarantee



0.45% annual degradation
over 30 years



IEC61215/IEC61730/IEC61701/IEC62716/UL61730

ISO 9001: Quality Management System

ISO 14001: Environmental Management System

ISO45001: Occupational Health and Safety Management System

Founded in 1988, ZNShine solar is a world's leading high-tech PV module manufacturer. With the state-of-the-art production lines, the company boasts module capacity of 6GW. Bloomberg has listed ZNShine as a global Tier 1 PV module maker. Today Znshine has distributed its sales to more than 60 countries around the globe.

www.znshinesolar.com

ELECTRICAL CHARACTERISTICS | STC*

Nominal Power Watt Pmax(W)*	525	530	535	540	545	550
Power Output Tolerance Pmax(%)	0~+3	0~+3	0~+3	0~+3	0~+3	0~+3
Maximum Power Voltage Vmp(V)	40.90	41.10	41.30	41.50	41.70	41.90
Maximum Power Current Imp(A)	12.85	12.91	12.96	13.02	13.07	13.13
Open Circuit Voltage Voc(V)	49.20	49.40	49.60	49.80	50.00	50.20
Short Circuit Current Isc(A)	13.59	13.65	13.71	13.77	13.83	13.89
Module Efficiency (%)	20.32	20.52	20.71	20.90	21.10	21.29

*STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25°C, AM 1.5
*Measuring tolerance: ±3%

ELECTRICAL CHARACTERISTICS | NMOT*

Maximum Power Pmax(Wp)	392.70	396.40	399.90	403.60	406.80	410.80
Maximum Power Voltage Vmp(V)	38.00	38.20	38.40	38.50	38.80	38.90
Maximum Power Current Imp(A)	10.33	10.38	10.42	10.47	10.49	10.56
Open Circuit Voltage Voc(V)	46.00	46.20	46.30	46.50	46.70	46.90
Short Circuit Current Isc(A)	10.98	11.02	11.07	11.12	11.17	11.22

*NMOT(Nominal module operating temperature):Irradiance 800W/m², Ambient Temperature 20°C,AM 1.5,Wind Speed 1m/s

ELECTRICAL CHARACTERISTICS WITH 25% REAR SIDE POWER GAIN

Front power Pmax/W	525	530	535	540	545	550
Total power Pmax/W	656	663	669	675	681	688
Vmp/V(Total)	41.00	41.20	41.40	41.60	41.80	42.00
Imp/A(Total)	16.01	16.08	16.15	16.23	16.30	16.37
Voc/V(Total)	49.30	49.50	49.70	49.90	50.10	50.30
Isc/A(Total)	16.95	17.02	17.10	17.17	17.25	17.32

MECHANICAL DATA

Solar cells	Mono PERC
Cells orientation	144 (6×24)
Module dimension	2278×1134×30 mm(With Frame)
Weight	33.5 kg
Glass	2.0 mm+2.0mm, High Transmission, AR Coated Heat Strengthened Glass
Junction box	IP 68, 3 diodes
Cables	4 mm ² ,350 mm
Connectors	MC4-compatible

TEMPERATURE RATINGS

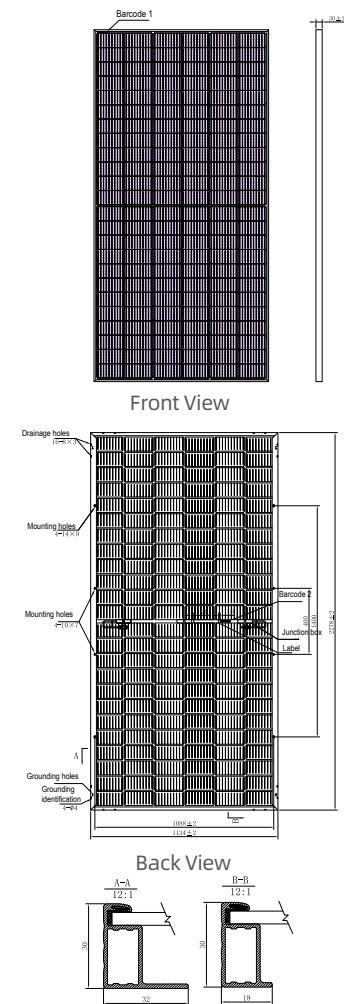
NMOT	44°C ±2°C	Maximum system voltage	1500 V DC
Temperature coefficient of Pmax	-0.35%/°C	Operating temperature	-40°C~+85°C
Temperature coefficient of Voc	-0.29%/°C	Maximum series fuse	30 A
Temperature coefficient of Isc	0.05%/°C	Maximum load(snow/wind)	5400 Pa / 2400 Pa
Refer.Bifacial Factor	70±5%		

*Do not connect Fuse in Combiner Box with two or more strings in parallel connection
*Remark:Electrical data in this catalog do not refer to a single module and they are not part of the offer.They only serve for comparison among different module types.

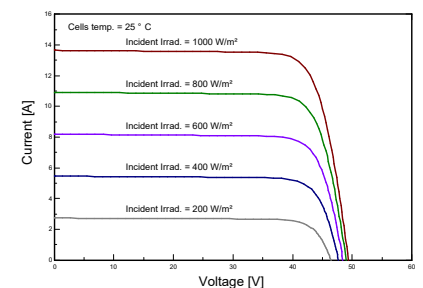
PACKAGING CONFIGURATION

Piece/Box	36	
Piece/Container(40'HQ)	720	*Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.
Piece/Container(with additional small package)	/	

DIMENSIONS(MM)



I-V CURVES OF PV MODULE(530W)



P-V CURVES OF PV MODULE(530W)

