TEST REPORT

SGS-CSTC
Standards Technical Services
(Shanghai) Co., Ltd.
No.588 West Jindu Road,
Songjiang District,
Shanghai, China

Report reference no. .....:	SHES250200209671
Date of issue.....:	January. 14, 2025
Total number of pages .....:	16
Testing laboratory .....:	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Address .....:	588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Applicant's name.....:	Anhui Red Star Solar Co., Ltd
Address .....:	Building 7, Electronic Information Industrial Park Phase I,Bengbu Tongling Modern Industrial Park, Xinmaqiao Town, Guzhen County, Bengbu City, Anhui Province
Test specification .....:	Clause MQT 01, MQT 06.1, MQT 03, MQT 08, MQT 15, MQT 16 of IEC 61215-2:2016 Clause MST 26 of IEC 61730-2-2016.
Test item description .....:	Photovoltaic (PV) module(s)
Trade mark .....:	N/A
Manufacturer .....:	Anhui Red Star Solar Co., Ltd Building 7, Electronic Information Industrial Park Phase I,Bengbu Tongling Modern Industrial Park, Xinmaqiao Town, Guzhen County, Bengbu City, Anhui Province
Factory.....:	Exiom Solution,S.A. Delin Industrial Park,399 Ganxi Road,Ehu Town,Xishan District,Wuxi City ,Jiangsu, P.R.C
Model/Type reference .....:	SPTM-DT-590
Ratings .....:	Refer to marking plate of sample

Signature	Signature
Drafted by: Yuting Gu	Approved by: Haro Xia

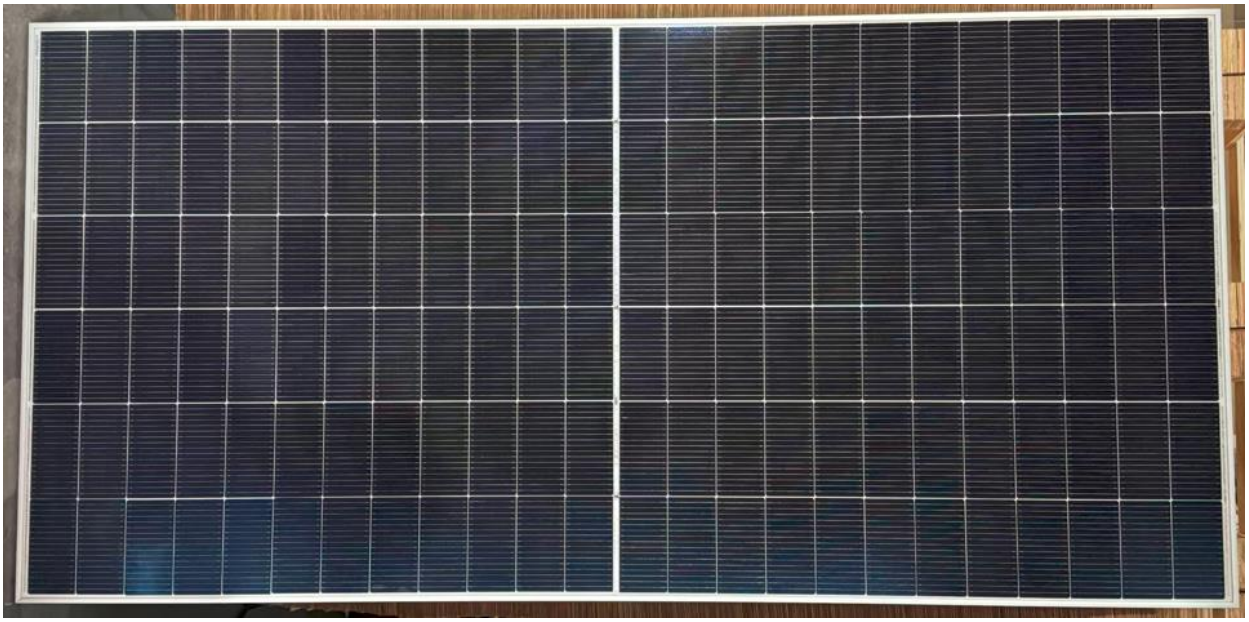
Summary of testing	
Submitted samples are tested according to MQT 01, MQT 06.1, MQT 03, MQT 08, MQT 15, MQT 16 of IEC 61215-2:2016 and MST 26 of IEC 61730-2-2016. The test results are present within this test report.	
Tests performed (name of test and test clause): IEC 61215-2-2016: Visual inspection (MQT 01) Performance at STC (MQT 06.1) Insulation test (MQT 03) Outdoor exposure test (MQT 08) Wet leakage current test (MQT 15) Static mechanical load test (MQT 16) IEC 61730-2-2016: Reverse current overload test MST 26	**Testing location:** SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Copy of marking plate / device under test:

Module Type: SPTM-DT-590

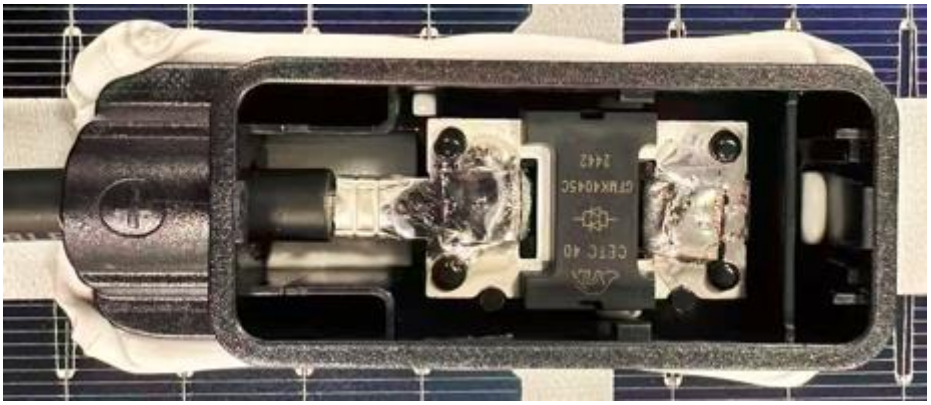
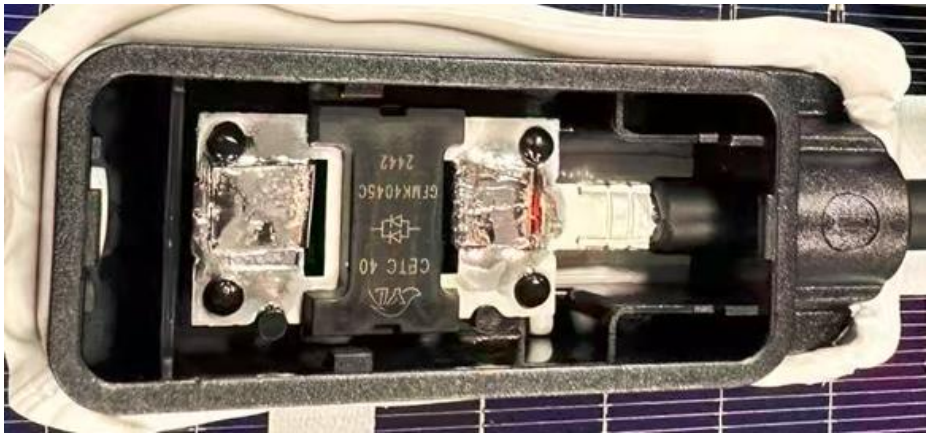
Marking plate of Sample

Serial Number of Sample



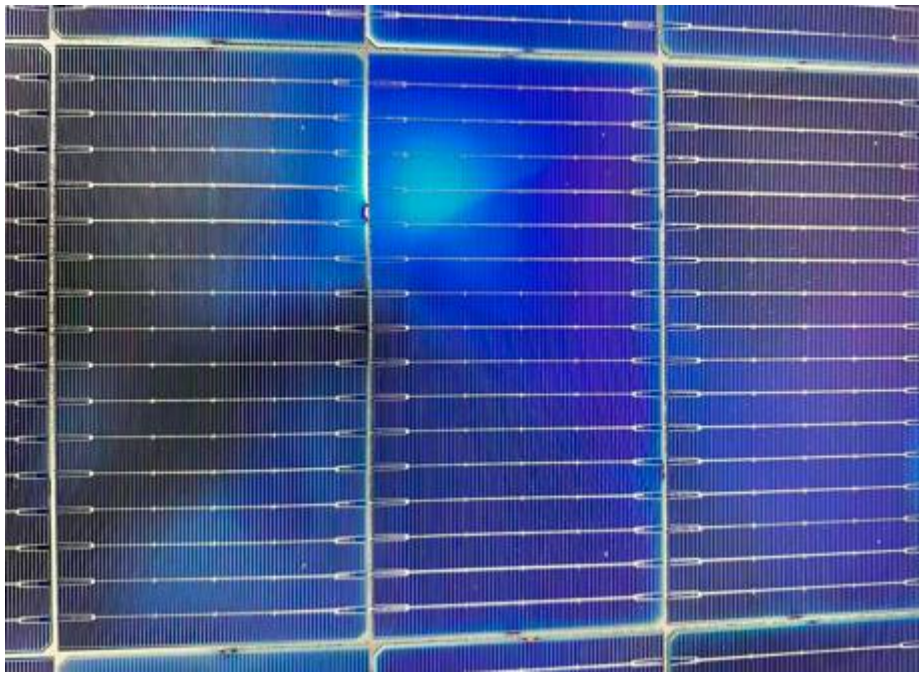
Front view of sample

Rear view of sample


Junction Box

Connector



Cells

Possible test case verdicts	
- Test case does not apply to the test object .....:	N/A
- Test object does meet the requirement .....:	ass (P)
- Test object does not meet the requirement .....:	Fail (F)

General remarks

The test results presented in this report relate only to the object tested.

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"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Contents:

1) The main report
2) Appendix 1: List of measurement equipment
3) Appendix 2: Statement of the estimated uncertainty of the test results
4) Appendix 3: Constructional Data Form (CDF) for Photovoltaic (PV) Modules (CDF No. SHES250200209671.01, 5 pages)

General product information

The product is photovoltaic (PV) module.

1.Sampling procedure

☐ Random sampling from production (e.g. during factory audit (FA) or inline inspection) ☐ Random sampling from the warehouse, container or transportation boxes
☒ Modules have been submitted by the manufacturer/ client without random sampling by SGS

2. Test sample

Sample #	Model Type	Serial Number
01	SPTM-DT-590	SPTM7259025021800003

3. Test specification and test result

MQT 01 Visual inspection		
Test Date [YYYY-MM-DD] :	2024-11-08	—
Sample #	Nature and position of initial findings	Verdict
01	No Major visual defects	P
Supplementary information: N/A		

MQT 06.1 Performance at STC						
Test Date [YYYY-MM-DD]..... :	2024-11-08					—
Test method	☒ indoor		☐ outdoor			—
Module temperature [°C] ..... :	Corrected to 25.0					—
Irradiance [W/m^2] ..... :	Corrected to 1000					—
Sample #	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF [%]
01	52.32	13.97	44.48	13.28	590.51	80.79
Supplementary information: Refer to Appendix 2: Statement of the estimated uncertainty of the test verdicts.						

MQT 03 Insulation test				
Test Date [YYYY-MM-DD] ..... :	2024-11-10			—
Test Voltage applied [V] ..... :	3000/1000			—
Size of module [m²] ..... :	Sample 01: 2.62			—
Required Resistance [MΩ].....:	Sample 01: ≥15.27			—
Sample #	Measured	Dielectric breakdown		Result
01	MΩ	Yes (description)	No	
	>9999	—	No	P
Supplementary information: /				

MQT 15 Wet leakage current test			
Test Date [YYYY-MM-DD] .....:	2024-11-10		—
Test Voltage applied [V].....:	1000		—
Solution temperature [°C].....:	23.1		—
Size of module [m²] ..... :	Sample 01: 2.62		—
Sample #	Required Resistance [MΩ]	Measured [MΩ]	Result
01	>9999	≥15.27	P
Supplementary information: /			

MQT 08 Outdoor exposure test		
Test Date [YYYY-MM-DD] start/end..... :	2024-11-10 to 2024-11-14	—
Sample #	01	—
Total irradiation dosage [kWh/m²] ..... :	60.0	—
Angle of tilt the test module..... :	Vertical	—
Electrical load [Ω]:	5	—
Supplementary information: /		

Visual inspection after outdoor exposure test		
Test Date [YYYY-MM-DD] ..... :	2024-11-14	—
Sample #	Nature and position of initial findings – comments or attach photos	Result
01	No Major visual defects	P
Supplementary information: /		

MQT 15: Wet leakage current test after outdoor exposure test		
Test Date [YYYY-MM-DD] .....:	2024-11-16	—
Test Voltage applied [V] .....:	1000	—
Solution temperature [°C] .....:	23.6	—
Size of module [m²] .....:	Sample 01: 2.62	—

Required Resistance [MΩ]..... :	Sample 01: ≥15.27		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
01	>9999	≥15.27	P
Supplementary information: /			

MQT 02 - Maximum power determination after outdoor exposure test - Optional						—
Test Date [YYYY-MM-DD] ..... :	2024-11-16					—
Module temperature [°C]..... :	Corrected to 25.0					—
Irradiance [W/m²)..... :	Corrected to 1000					—
Sample #	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF [%]
01	52.32	13.97	44.48	13.28	590.51	80.79
Supplementary information: /						

MQT 03 - Insulation test after outdoor exposure test - Optional					P
Test Date [YYYY-MM-DD] ..... :	2024-11-17				—
Test Voltage applied [V] ..... :	1000				—
Size of module [m²] ..... :	Sample 01: 2.62				—
Required Resistance [MΩ]..... :	Sample 01: ≥15.27				—
Sample #	Measured	Required (MΩ)	Dielectric breakdown		P
	(MΩ)	(MΩ)	Yes (description)	No	
01	>9999	≥15.27	—	No	P
Supplementary information: /					

MQT 16 Static mechanical load test			P
Sample #:	01		—
Design load (front side/ back side) ..... :	1600/1600		—
Safety factors ..... :	1.5		—
Test Date [YYYY-MM-DD]	2024-11-18		—
Mounting method ..... :	Clamps mounting (4 points)		—
Load applied to ..... :	front side	back side	—
Mechanical load [Pa]..... :	2400	2400	—
First cycle time (start/end)..... :	1h	1h	—
Intermittent open-circuit (yes/no) ..... :	No	No	P
Second cycle time (start/end) ..... :	1h	1h	—
Intermittent open-circuit (yes/no) ..... :	No	No	P
Third cycle time (start/end) ..... :	1h	1h	—

Intermittent open-circuit (yes/no) .....:	No	No	P
Supplementary information: /			
MQT 01 - Visual inspection after static mechanical load test			P
Test Date [YYYY-MM-DD] ..... :	2024-11-18		—
Sample #	Nature and position of initial findings – comments or attach photos		—
01	No Major visual defects		P
Supplementary information: /			
MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD] ..... :	2024-11-18		—
Test Voltage applied [V]..... :	1000		—
Solution temperature [°C]..... :	23.7		—
Size of module [m²] ..... :	Sample 01: 2.62		—
Required Resistance [MΩ]..... :	Sample 01: ≥15.27		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
01	>9999	≥15.27	P
Supplementary information: /			

MST 26 Reverse current overload test		
Sample #.....:	01	—
Test Date (YYYY-MM-DD)....:	2024-11-20	—
Test current (A)..... :	16	—
Range of applied voltage (V) ..... :	23.5~28.3	—
Test duration..... :	1 hours	—
Observations		Result
Sample 01		
■ No flaming of the module		P
■ No flaming or charring of the cheesecloth		
■ No flaming of the tissue paper		
■ MST 17 requirements fulfilled (see appended Table MST17)		
Supplementary information:/		
MST 17: Wet leakage current test after Reverse current overload test		—
Test Date (YYYY-MM-DD) ……:	2024-11-20	—
Test Voltage applied (V, dc) ……:	1000	—
Solution resistivity (Ω cm) ……:	1294	—

Solution temperature (°C) ……..:	22.6		—
Sample#	Measured (MΩ)	Required (MΩ)	Result
01	>9999	≥15.27	P
Supplementary information: Sample 01: 2.62 [m²]			

Appendix 1: List of measurement equipments

Clause	Measurement / testing	Testing / measuring equipment / material used	Equipment ID	Calibration due date
4.1 10.2	Visual inspection	Luminometer	OI20-02	2025.04.01
4.3 10.13	Insulation test	Withstanding voltage/Insulation resistance tester	EV21-56	2025.09.01
4.6	Performance at STC	Pulsed Solar Simulator	EV20-51	2025.03.19
4.15 10.14	Wet leakage current test	Withstanding voltage/ Insulation resistance tester	EV21-57	2025.09.01
		Conductive meter	CC20-01	2025.04.02
		Contact Thermometer	TT20-12	2025.03.28
4.16	Static mechanical load test	Mechanical load tester	FP21-07	2025.08.02
10.19	Reverse current overload test	DC Power Supply	ES20-501	2025.07.21
		Luminometer	OI20-02	2025.04.01
		Hybrid Recorder	TT21-04	2025.06.26
	Others	Temperature -hydrometer	TT21-44 TT21-45 TT21-47	2025.04.29
		Steel Tape	LS21-05	2025.07.25
		Vernier caliper	LS20-04	2025.07.25

Appendix 2: Statement of the estimated uncertainty of the test results

The estimated uncertainty fulfils the requirements from the CTL decision sheet DSH 251B / 2009.

Appendix 3: Constructional Data Form (CDF) for Photovoltaic (PV) Modules

----- End of Test Report -----