

Technical Report No. 704062204008

Rev.00

Dated 2022-05-31

Client: Risen Energy Co., Ltd.
Meilin, Ninghai, 315609 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Manufacturing place: Risen Energy Co., Ltd.
No.23 Middle Xingke Road, Ninghai, 315609, Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Risen Energy (CHANGZHOU) Co., Ltd. (101449)
No.1, Shuinan Road, zhixi industrial park, Jintan District 213251
Changzhou City PEOPLE'S REPUBLIC OF CHINA

ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO.,LTD.(083073)
No.8 Tongzhu Road,Taoyuan Street, Ninghai County, 315609 Ningbo,
Zhejiang People's Republic of China.

Risen Energy (YIWU) Co., Ltd.(106291)
No. 599 Sufu Road, Suxi Town, Yiwu City, Zhejiang Province, 322000,
PEOPLE'S REPUBLIC OF CHINA
Contact person: Mr. Yang Shubo

Risen Energ (Anhui) Co.,Ltd.(113068)
Chuzhou Avenue Economic and Technological Development Zone 239000
Chuzhou City, Anhui Province People's Republic of China.

Test subject: Product: Photovoltaic modules

Test specification: IEC 61215-2:2016, visual inspection (MQT 01)
IEC 61215-2:2016, performance at STC (MQT 06.1)
IEC 61215-2:2016, Insulation test (MQT 03)
IEC 61215-2:2016, Wet leakage current (MQT 15)
IEC 61215-2:2016, Hail test (MQT 17)
According to client requirements.

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Purpose of examination: Test according to the test specification

Test result: The test results show that the presented product is in compliance with the specified requirements.

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1 Description of the test subject

1.1 Function

Manufacturer's specification for intended use:
The PV modules for electricity generation systems with max. voltage of 1500 V DC

1.2 Consideration of the foreseeable misuse

- Not applicable
- Covered through the applied standard
- Covered by the following comment
- Covered by attached risk analysis

1.3 Technical Data

Sample S/N	Model	Constructional characteristics	Remark
461208I3390607	RSM110-8-540M	210 half cells module	Hail test
461208I3390601	RSM110-8-540M	210 half cells module	Hail test

2 Order

2.1 Date of Purchase Order, Customer's Reference

The order dated 2021-08-05

2.2 Receipt of Test Sample, Location

Risen Energy Co., Ltd.
Meilin, Ninghai, 315609 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

2.3 Date of Testing

2021-07-10

2.4 Location of Testing

Risen Energy Co., Ltd.
Meilin, Ninghai, 315609 Ningbo, Zhejiang, PEOPLE’S REPUBLIC OF CHINA

2.5 Points of Non-compliance or Exceptions of the Test Procedure

N/A

3 Test Results

3.1	TABLE: Visual inspection		P
Test Date [YYYY/MM/DD].....:	2021-07-10		—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
461208I3390607	No major visual defects		P
461208I3390601	No major visual defects		P
Supplementary information:N/A			

3.2	TABLE:Performacne at STC					P
Test Date [YYYY/MM/DD]:	2021-07-10					—
Irradiance (W/m ²)	1000					—
Module temperature [°C]	25					—
Sample No	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
461208I3390607	37.596	31.371	18.052	17.130	537.375	79.178
461208I3390601	37.641	31.331	17.937	17.100	535.754	79.350
Supplementary information:N/A						

3.3	Initial Insulation test		P
Test Date [YYYY-MM-DD]	2021-07-10		—

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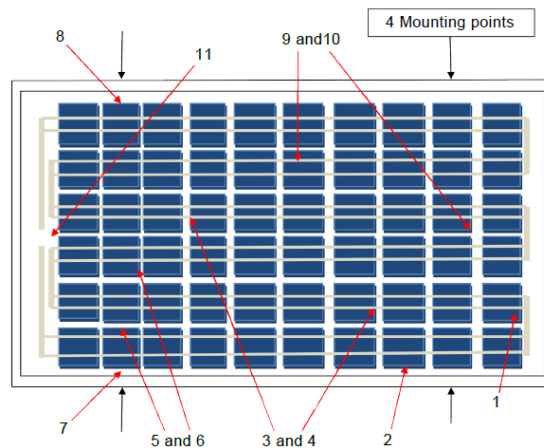
Test Voltage applied [V]	8000/1500	—		
Size of module [m ²]	2.61	—		
Required Resistance [MΩ]	15.31	—		
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
461208I3390607	35700	No Dielectrical breakdown	x	P
461208I3390601	33800	No Dielectrical breakdown	x	P
Supplementary information: N/A				

3.4	Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2021-07-10			—
Test Voltage applied [V]	1500			—
Solution resistivity [Ωcm]	< 3,500 Ω cm at 22 ± 2°C	2015.4		—
Solution temperature [°C]	21.6			—
Size of module [m ²]	2.61			—
Sample #	Required Resistance [MΩ]	Measured [MΩ]		Result
461208I3390607	15.31	17600		P
461208I3390601	15.31	18800		P
Supplementary information: N/A				

3.5: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2021-07-10						—
Sample #	461208I3390607						—
Ice ball size [mm]	1	2	3	4	5	6	—
	44.5	43.7	43.0	45.0	43.8	45.1	
	7	8	9	10	11	/	
	43.3	44.1	44.8	43.6	42.9	/	

Ice ball weight [g].....:	1	2	3	4	5	6	—
	43.0	42.4	41.9	43.6	42.6	43.8	
	7	8	9	10	11	/	
	42.3	42.9	43.1	42.6	42.0	/	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	31.3	32.1	29.7	31.1	30.3	31.9	
	7	8	9	10	11	/	
	30.7	29.5	32.2	30.6	29.8	/	
Number of impact locations	11						—

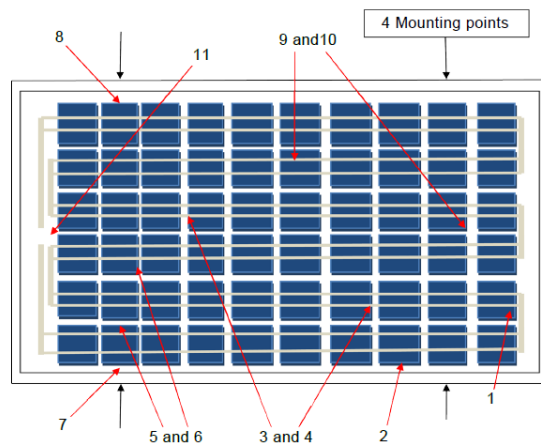
Supplementary information:



3.6: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD].....:	2021-07-10						—
Sample #	461208I3390601						—
Ice ball size [mm].....:	1	2	3	4	5	6	—
	43.9	43.7	44.8	43.2	43.7	44.1	
	7	8	9	10	11	/	
	45.0	44.4	45.0	44.1	43.8	/	
Ice ball weight [g].....:	1	2	3	4	5	6	—

	42.7	42.6	43.6	42.4	42.8	42.8	
	7	8	9	10	11	/	
	44.1	43.1	43.7	42.9	43.0	/	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	32.0	31.8	31.3	31.8	30.2	31.1	
	7	8	9	10	11	/	
	31.7	29.8	31.3	30.2	29.5	/	
Number of impact locations	11						—

Supplementary information: (impact location descriptions)



3.9	TABLE: Performacne at STC (Final)							P
Test Date [MM/DD/YYYY]	2021-07-10							—
Module temperature [°C]	25							—
Irradiance [W/m ²]	1000							—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	Degradation [%]	Limit [%]
461208I3390607	37.630	31.217	17.943	17.114	534.254	79.128	-0.58	-5
461208I3390601	37.601	31.230	17.905	17.050	532.484	79.090	-0.61	-5
Supplementary information: N/A								

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3.10	Insulation test (Final)			P
Test Date [YYYY-MM-DD]	2021-07-10			—
Test Voltage applied [V]	8000/1500			—
Size of module [m ²]	2.61			—
Required Resistance [MΩ].....	15.31			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
461208I3390607	34700	No Dielectrical breakdown	x	P
461208I3390601	34200	No Dielectrical breakdown	x	P
Supplementary information: N/A				

3.11	Wet leakage current test(Final)			P
Test Date [YYYY-MM-DD]	2021-07-10			—
Test Voltage applied [V].....	1500			—
Solution resistivity [Ωcm)	< 3,500 Ω cm at 22 ± 2°C	1824.0		—
Solution temperature [°C].....	22.4			—
Size of module [m ²]	2.61			—
Sample #	Required Resistance [MΩ]	Measured [MΩ]		Result
461208I3390607	15.31	15700		P
461208I3390601	15.31	17600		P
Supplementary information:N/A				

4 Remark

N/A

5 Documentation

Appendix 1: List of measurement equipment

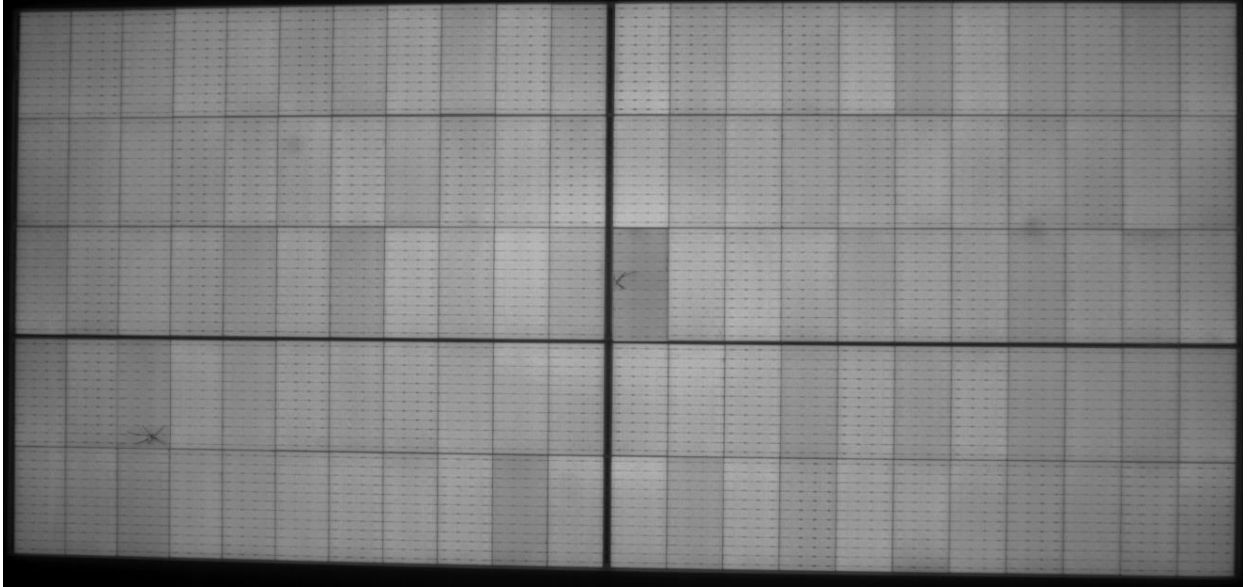
Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Last Calibration date	Calibration due date
1	Visual inspection	RS-DZ-30-LU02	2021.06.03	2022.06.02
2	Performance at STC	0201595	2021.01.05	2022.01.04
3	Insulation test	0201596	2021.05.26	2022.05.25
4	Wet leakage current test	0201596	2021.05.26	2022.05.25
		RS-DZ-30-DD01		
5	Hail test	RS-DZ-30-CS69	2021.06.02	2022.06.01

Appendix 2: Statement of the estimated uncertainty of the test results(K=2).

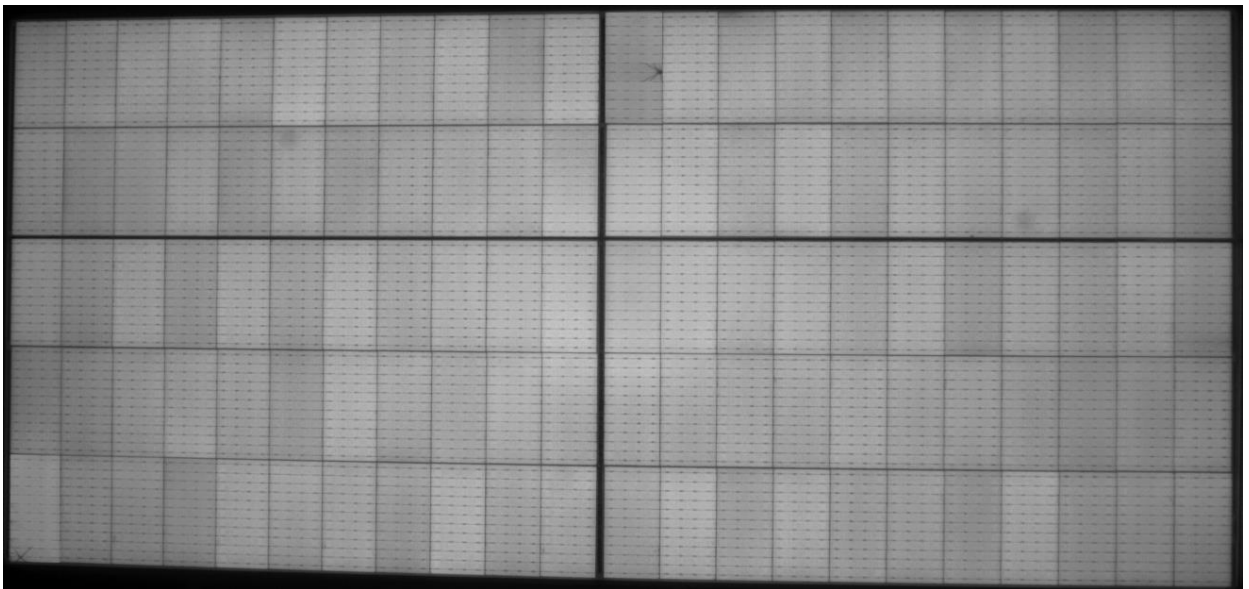
<p>P_{max} measurement uncertainty: 2.4%</p> <p>V_{oc} measurement uncertainty: 1.3%</p> <p>I_{sc} measurement uncertainty: 2.5%</p>

Appendix 3:EL photos after hail test

46120813390607



46120813390601



Appendix 4:BOM list

A1.1	MODULE TYPE/S
	RSM110-8-540M

A1.2	MODULE DESIGN	
	Module dimensions (L x W x H) [mm]	2384x1096x35
	Weights	29 kg (approx)
	Front/Rear cover bonding classification	<input checked="" type="checkbox"/> rigid/flexible <input type="checkbox"/> rigid/rigid <input type="checkbox"/> flexible/flexible

A1.3	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells	0.3 mm
	Between cell and accessible surfaces	10.4 mm
	Between any current carrying part and accessible surfaces	10.4 mm

A1.4	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	110
	Serial-parallel connection of cells	11*5*2
	Cells per bypass diode	44/22/44
	No. of bypass diodes	3


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6 Summary

The test specification is met.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Tested by: Yang Chen 

Approved by: Gang Huang 