

**Technical Report No.: <704062000685>**

**Rev. <00>**

**Dated 2020-07-17**

Client: YUHUAN SUNPRO POWER CO.,LTD.  
Qinggang Technological Ind.Zon,317606,Yuhuan, Zhejiang  
Province,People's Republic of China.  
Mr. Wang hui jun

Manufacturing place: YUHUAN SUNPRO POWER CO.,LTD.  
Qinggang Technological Ind.Zon,317606,Yuhuan, Zhejiang  
Province,People's Republic of China.  
Mr. Wang hui jun

Test subject: Product: Photovoltaic modules

Test specification: IEC 61215-2:2016, visual inspection (MQT 01)  
IEC 61215-2:2016, performance at STC (MQT 06)  
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)  
IEC 61215:2005, Mechanical load test (10.16)  
Electroluminescence at Isc  
According to client requirements.

Purpose of examination: Test according to the test specification

Test result: Positive:The present test results show in clause 3.

*Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details please see testing and certification regulation, chapter A-3.4*

## 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 1500V DC

Manufacturer's specification for predictive use:

N/A

### 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

See clause 3

## 2 Order

### 2.1 Date of Purchase Order, Customer's Reference

The order dated 2020-07-01

### 2.2 Receipt of Test Sample, Location

Yangzhou Opto-Electrical Products Testing Institute.

No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

### 2.3 Date of Testing

2020-07-09 to 2020-07-15

### 2.4 Location of Testing

Yangzhou Opto-Electrical Products Testing Institute.

No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

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

N/A

3 Test Results

Sample #	Sample S/N	Remark/Constructional characteristics	Remark
GDP200386-1	STP3999X0000011971520	Mono cell,1665*1002*35mm	Hail impact test
GDP200386-2	STP3999X0000044151520	Mono cell,1665*1002*35mm	Mechanical load test

3.1	TABLE: Visual inspection (Initial)		P
Test Date [YYYY/MM/DD].....:	2020-07-09		—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
GDP200386-1	No major visual defects		P
GDP200386-2	No major visual defects		P
Supplementary information:N/A			

3.2	TABLE: EL-images (Initial)		—
Test Date [YYYY/MM/DD].....:	2020-07-09		—
Current applied	Isc±5%		
Sample No.	Remark		Verdict
GDP200386-1	Refer to Appendix 1: EL-images		—
GDP200386-2	Refer to Appendix 1: EL-images		—
Supplementary information: Refer to Appendix 1: EL-images			

3.3	TABLE: Performacne at STC (Initial)					
Test Date [YYYY/MM/DD]:	2020-07-09					
Irradiance (W/m²)	1000					
Module temperature [°C]	25					
Sample No	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]

GDP200386-1	40.675	33.586	9.932	9.439	317.024	78.48
GDP200386-2	40.793	33.615	9.935	9.437	317.232	78.28
Supplementary information:N/A						

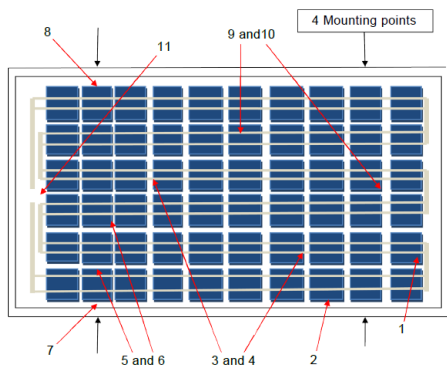
<b>3.4</b>	<b>Initial Insulation test</b>				P
Test Date [YYYY-MM-DD].....:		2020-07-10			—
Test Voltage applied [V] .....		8000/1500			—
Size of module [m²].....:		1.64			—
Required Resistance [MΩ] .....		24.39			—
Sample #	Measured	Dielectric breakdown			Result
	MΩ	Yes (description)	No		
GDP200386-1	>5000	No Dielectrical breakdown	x		P
GDP200386-2	>5000	No Dielectrical breakdown	x		P
Supplementary information:The maximum resistance measurement range is 5000MΩ.					

<b>3.5</b>	<b>Initial Wet leakage current test</b>				P
Test Date [YYYY-MM-DD].....:		2020-07-10			—
Test Voltage applied [V] .....		1500			—
Solution resistivity [Ωcm] .....		< 3,500 Ω cm at 22 ± 2°C	3270		—
Solution temperature [°C] .....		22.6			—
Size of module [m²].....:		1.64			—
Sample #	Required Resistance [MΩ]	Measured [MΩ]		Result	
GDP200386-1	24.39	493.4		P	
GDP200386-2	24.39	383.1		P	
Supplementary information:N/A					

<b>3.6</b>	<b>Hail impact test</b>						P	
Test Date [YYYY-MM-DD].....:		2020-07-15					—	
Sample #		GDP200386-1					—	
Ice ball size [mm] .....		1	2	3	4	5	6	P
		25.0	24.9	24.8	25.1	25.0	25.1	
		7	8	9	10	11	/	

	24.9	24.9	25.0	25.1	24.9	/	
Ice ball weight [g]..... :	1	2	3	4	5	6	P
	7.49	7.53	7.50	7.48	7.52	7.52	
	7	8	9	10	11	/	
Ice ball velocity [m/s]..... :	7.48	7.49	7.51	7.51	7.46	/	P
	1	2	3	4	5	6	
	22.9	23.1	23.2	22.8	23.1	22.9	
	7	8	9	10	11	/	
	22.8	23.2	23.2	23.1	22.8	/	
Number of impact locations ..... :	11						—

Supplementary information: 1) Ice ball diameter: 25mm ± 5 %. 2) impact location descriptions as below:



<b>3.7</b>	<b>Mechanical load test</b>		P
Sample # .....	GDP200386-2		—
Test Date [YYYY-MM-DD] .....	2020-07-15		—
Mounting method .....	According to user manual	According to user manual	—
Load applied to .....	front side	back side	—
Mechanical load [Pa] .....	8000	2400	—
First cycle time (start/end).....	09:20/10:20	10:27/11:27	—
Intermittent open-circuit (yes/no) .....	no	no	P
Second cycle time (start/end) .....	11:32/12:32	12:46/13:46	—
Intermittent open-circuit (yes/no) .....	no	no	P
Third cycle time (start/end) .....	13:43/14:43	14:48/15:48	—
Intermittent open-circuit (yes/no) .....	no	no	P
Supplementary information: Use eight mounting holes on the long side. The third cycle 8000pa were provided on front side. Test method refer to IEC61215:2005, 10.16.			



<b>3.8</b>	<b>TABLE: Visual inspection(Final)</b>		P
Test Date [YYYY/MM/DD].....:	2020-07-15		—
Sample No.	Nature and position of initial findings – comments or attach photos	Verdict	
GDP200386-1	No major visual defects		P
GDP200386-2	No major visual defects		P
Supplementary information:N/A			

<b>3.9</b>	<b>TABLE: EL-images(Final)</b>		—
Test Date [YYYY/MM/DD].....:	2020-07-15		—
Current applied	Isc±5%		—
Sample No.	Remark	Verdict	
GDP200386-1	Refer to Appendix 1: EL-images	—	
GDP200386-2	Refer to Appendix 1: EL-images	—	
Supplementary information: Refer to Appendix 1: EL-images			

<b>3.10</b>	<b>TABLE: Performacne at STC (Final)</b>							P
Test Date [MM/DD/YYYY].....:	2020-07-15							—
Module temperature [°C].....:	25							—
Irradiance [W/m²].....:	1000							—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	Degradation [%]	Limit [%]
GDP200386-1	40.770	33.352	9.744	9.490	316.514	79.67	-0.16	-5
GDP200386-2	40.653	33.497	9.815	9.458	316.816	79.40	-0.13	-5
Supplementary information: N/A								

<b>3.11</b>	<b>Insulation test (Final)</b>		P
Test Date [YYYY-MM-DD].....:	2020-07-15		—
Test Voltage applied [V] .....	8000/1500		—
Size of module [m²].....:	1.64		—
Required Resistance [MΩ]..... :	24.39		—

Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
GDP200386-1	>5000	No Dielectrical breakdown	x	P
GDP200386-2	>5000	No Dielectrical breakdown	x	P

Supplementary information: The maximum resistance measurement range is 5000MΩ.

<b>3.12</b>	<b>Wet leakage current test(Final)</b>		P
Test Date [YYYY-MM-DD].....	2020-07-15		—
Test Voltage applied [V] .....	1500		—
Solution resistivity [Ωcm) .....	< 3,500 Ω cm at 22 ± 2°C	2456	—
Solution temperature [°C] .....	22.6		—
Size of module [m²].....	1.64		—
Sample #	Required Resistance [MΩ]	Measured [MΩ]	Result
GDP200386-1	24.39	457.9	P
GDP200386-2	24.39	373.8	P

Supplementary information:N/A

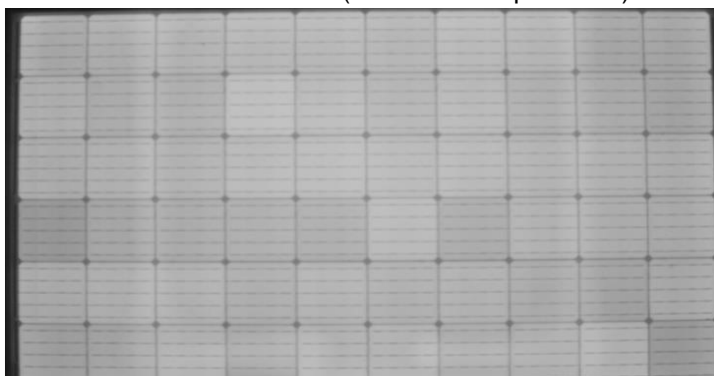
**4 Remark**

N/A

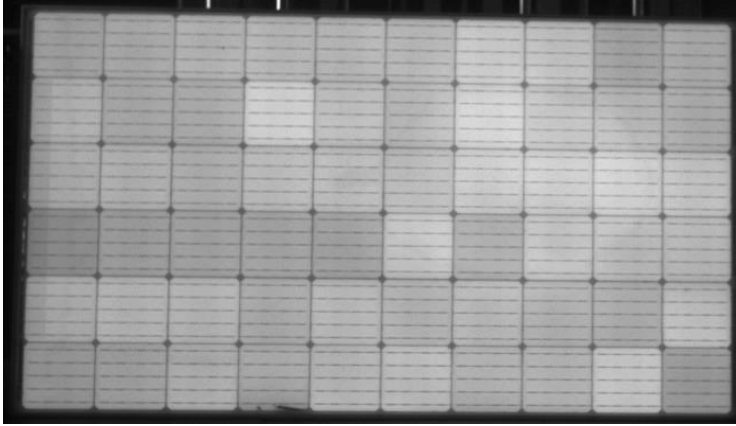
**5 Appendix**

Appendix 1: EL-images

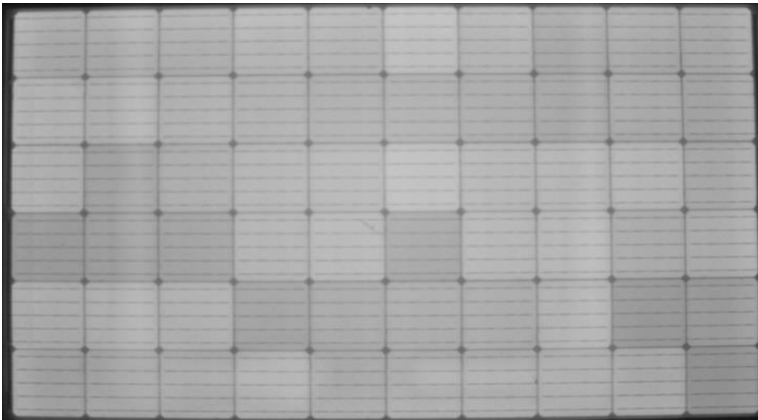
Serial No.: GDP200386-1 (Before hail impact test )



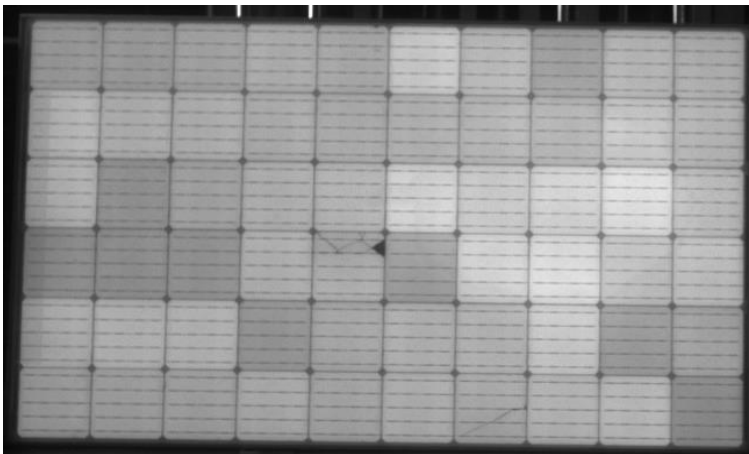
Serial No.: GDP200386-1 (After hail impact test)



Serial No.: GDP200386-2 (Before mechanical load test)



Serial No.: GDP200386-2 (After mechanical load test)





Appendix 2: List of measurement equipment

Equipment No	Description	Date of calibration	Calibration Cycle
SB08001	Solar simulator	April -08-2020	1 Year
SB08125	Illumination Meter	April -26-2020	1 Year
SB08108	Ruler	December -12-2019	1 Year
SB10018	Program control dielectric withstand voltage tester	December -12-2019	1 Year
SB08054	Conductivity meter	December -12-2019	1 Year
SB08076	Hail testing machine	May -20-2020	1 Year
SB11005	Meachanical oad tester	December -12-2019	1 Year
SB10010	DC Power supply	December -12-2019	1 Year

Appendix 3: Statement of the estimated uncertainty of the test results

The power measurement uncertainty is 2.28% (K=2).

6 Summary

The test specification is met

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

Tested by: *Song Siethang*

Approved by: *Huang Liang*