

Technical Report No.: 704062302835-00

Date: 2023-07-21

Client: Anhui Huasun Energy Co.,Ltd.
No. 99, Qingliu Road, Xuancheng Economic and Technological
Development Zone, Xuanzhou District, Xuancheng City, Anhui
Province,China

Factory: Anhui Huasun Energy Co.,Ltd.
No. 99, Qingliu Road, Xuancheng Economic and Technological
Development Zone, Xuanzhou District, Xuancheng City, Anhui
Province,China

Test object: Product: Photovoltaic modules
Model: See clause 1.4

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)

Purpose of examination: Testing and evaluation (visual / partial) according to the test specification

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

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. It does not imply a general statement regarding the quality of products from regular production. For further details please see testing and certification regulation, chapter A-3.4.

1. Description of the test object

1.1 Picture(s)

N/A

1.2 Function

Manufacturer's specification for intended use:

The PV modules for electricity generation systems with max. voltage of 1500 V DC

Manufacturer's specification for predictive use:

N/A

1.3 Consideration of the foreseeable use

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

1.4 Technical Data

Sample No.	Serial number	Type	Dimension
GDP230684-1	HBB12306088004090	HS-182-B108DS435	1722x1134x30 mm

2. Order

2.1 Date of Purchase Order, Customer's Reference

2023-07-06

2.2 Test Sample(s)

- Reception date(s):
 - 2023-07-13
- Location(s) of reception:

Yangzhou Opto-Electrical Products Testing Institute.
No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

- Condition of test sample(s):
In good condition

2.3 Date(s) of Testing

2023-07-13 ~ 2023-07-20

2.4 Location(s) 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

3.1 Positive Test Results

3.1.1	TABLE: Visual inspection		P
Test Date [YYYY/MM/DD].....:		2023-07-13	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
GDP230684-1	No major visual defects		P
Supplementary information:N/A			

3.1.2	TABLE:Performacne at STC(Front)					
Test Date [YYYY-MM-DD]:			2023-07-13			
Irradiance (W/m ²)			1000			
Module temperature [°C]			25			
Sample No	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
GDP230684-1	13.434	40.343	12.520	34.718	434.686	80.21
Supplementary information:N/A						

3.1.2	TABLE:Performacne at STC(Back)					
Test Date [YYYY-MM-DD]:			2023-07-13			
Irradiance (W/m ²)			1000			
Module temperature [°C]			25			
Sample No	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
GDP230684-1	11.801	40.196	10.446	35.398	369.774	77.96
Supplementary information:N/A						

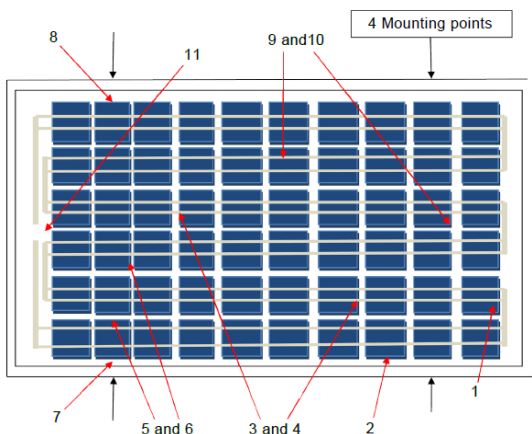
3.1.2	TABLE: Performance at equivalent irradiance					
Test Date [YYYY-MM-DD]:			2023-07-13			
Irradiance (W/m ²)			1115			
Module temperature [°C]			25			
Sample No	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
GDP230684-1	14.921	40.459	13.941	34.720	484.019	80.18

Supplementary information:N/A

3.1.3 Initial Insulation test				P
Test Date [YYYY-MM-DD]..... :		2023-07-13		—
Test Voltage applied [V]		8000/1500		—
Size of module [m ²]		1.95		—
Required Resistance [MΩ]..... :		20.51		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
GDP230684-1	> 2000	No Dielectrical breakdown	x	P
Supplementary information: The maximum resistance measurement range is 2000M Ω.				

3.1.4 Initial Wet leakage current test				P
Test Date [YYYY-MM-DD]..... :		2023-07-13		—
Test Voltage applied [V]..... :		1500		—
Solution resistivity [Ωcm)		< 3,500 Ω cm at 22 ± 2°C	2943	—
Solution temperature [°C]		22.7		—
Size of module [m ²]..... :		1.95		—
Sample #	Required Resistance [MΩ]	Measured [MΩ]		Result
GDP230684-1	20.51	668.5		P
Supplementary information:N/A				

3.1.5 Hail impact test							P
Test Date [YYYY-MM-DD]..... :			2023-07-20				—
Sample #			GDP230684-1				—
Ice ball size [mm]..... :	1	2	3	4	5	6	—
	34.7	34.6	34.9	34.6	34.7	34.8	
	7	8	9	10	11	/	
	34.6	34.9	34.7	34.8	34.7	/	
	1	2	3	4	5	6	

Ice ball weight [g]	20.7	20.7	20.4	20.6	20.4	20.6	—
	7	8	9	10	11	/	
	20.5	20.3	20.6	20.3	20.5	/	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	27.11	27.01	26.85	26.96	26.82	27.12	
	7	8	9	10	11	/	
	27.03	26.92	26.71	26.92	26.87	/	
Number of impact locations.....	11						—
Supplementary information:1) Ice ball diameter:35mm ± 5 %.2) impact location descriptions)							
							

3.1.6	TABLE: Visual inspection(Final)	P
Test Date [YYYY-MM-DD].....	2023-07-20	—
Sample No.	Nature and position of initial findings – comments or attach photos	Verdict
GDP230684-1	No major visual defects	P
Supplementary information:N/A		

3.1.7	TABLE: Performacne at STC (Final) (Front)							P
Test Date [YYYY-MM-DD].....	2023-07-20							—
Module temperature [°C].....	25							—
Irradiance [W/m²].....	1000							—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Degradation [%]	Limit [%]
GDP230684-1	13.432	40.333	12.539	34.589	433.711	80.06	-0.22	-5
Supplementary information: N/A								

3.1.7	TABLE: Performacne at STC (Final) (Back)							P
Test Date [YYYY-MM-DD].....:	2023-07-20							—
Module temperature [°C].....:	25							—
Irradiance [W/m²].....:	1000							—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Degradation [%]	Limit [%]
GDP230684-1	11.799	40.192	10.413	35.331	367.902	77.58	-0.51	-5
Supplementary information: N/A								

3.1.7	TABLE: Performance at equivalent irradiance (Final)							P
Test Date [YYYY-MM-DD].....:	2023-07-20							—
Module temperature [°C].....:	25							—
Irradiance [W/m²].....:	1115							—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Degradation [%]	Limit [%]
GDP230684-1	14.923	40.444	13.952	34.629	483.144	80.05	-0.18	-5
Supplementary information: N/A								

3.1.8	Insulation test (Final)				P
Test Date [YYYY-MM-DD].....:	2023-07-20				—
Test Voltage applied [V]	8000/1500				—
Size of module [m²]	1.95				—
Required Resistance [MΩ].....:	20.51				—
Sample #	Measured	Dielectric breakdown			Result
	MΩ	Yes (description)		No	
GDP230684-1	>2000	No Dielectrical breakdown		x	P
Supplementary information: The maximum resistance measurement range is 2000M Ω.					

3.1.9	Wet leakage current test (Final)		P
Test Date [YYYY-MM-DD].....:	2023-07-20		—
Test Voltage applied [V]	1500		—

Solution resistivity [Ωcm]	< 3,500 $\Omega\text{ cm}$ at 22 \pm 2°C	2843	—
Solution temperature [°C]	22.6		—
Size of module [m^2].....	1.95		—
Sample #	Required Resistance [$\text{M}\Omega$]	Measured [$\text{M}\Omega$]	Result
GDP230684-1	20.51	630.1	P
Supplementary information:N/A			

3.2 Points of Non-Compliance according to the test specification

- None

4. Remarks

The user manual has been examined according to the minimum requirements described in the product standard. The manufacturer is responsible for the accuracy of further particulars as well as of the composition and layout.

4.1 Factory surveillance cycle

N/A

4.2 Additional information for routine tests to be performed by the factory(ies)

N/A

5. Documentation

Appendix 1 Equipments list

Description	Equipment ID	Calibration due date
Pulsed Solar Simulator	SB20019	2023-08-29



Appendix 2 Statement of the estimated uncertainty of the test results

Pmax measurement uncertainty: 2.24% (K=2)
 Voc measurement uncertainty: 1.10% (K=2)
 Isc measurement uncertainty: 1.84% (K=2)

6. Summary

The test specification is met.

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

Tested by:	Yang Xu	
	<i>Printed name,function & signature</i>	
Approved by:	Guangxia Fu	
	<i>Printed name,function & signature</i>	