



TEST REPORT

SGS-CSTC
Standards Technical Services
(Shanghai) Co., Ltd.

No.588 West Jindu Road,
Songjiang District,
Shanghai, China

Report reference no.: SHES240400798971
Date of issue.....: Aug.15, 2024
Total number of pages: 17
Testing laboratory: SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Address: 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Applicant's name.....: PROMOD ENERJİ A.Ş.
Address: Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERİ, Türkiye
Test specification: IEC 62716:2013 Ammonia corrosion test
Test item description: Photovoltaic (PV) module(s)
Trade mark: 
Manufacturer.....: PROMOD ENERJİ A.Ş.
Address: Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERİ, Türkiye
Factory.....: PROMOD ENERJİ A.Ş.
Address: Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERİ, Türkiye
Model/Type reference: PRD670-132MT
Ratings: Refer to nameplate



Signature

Drafted by: Ricardo Xu



Signature

Approved by: Van Hua

Summary of testing

PRD670-132MT is tested according to IEC 62716:2013 in this test report.

The submitted samples have been tested and found to comply with the above-mentioned standards' requirements.

Tests performed (name of test and test clause):

IEC 62716:2013

Testing location:

Guoce Testing Technology (Suzhou) Co., Ltd.

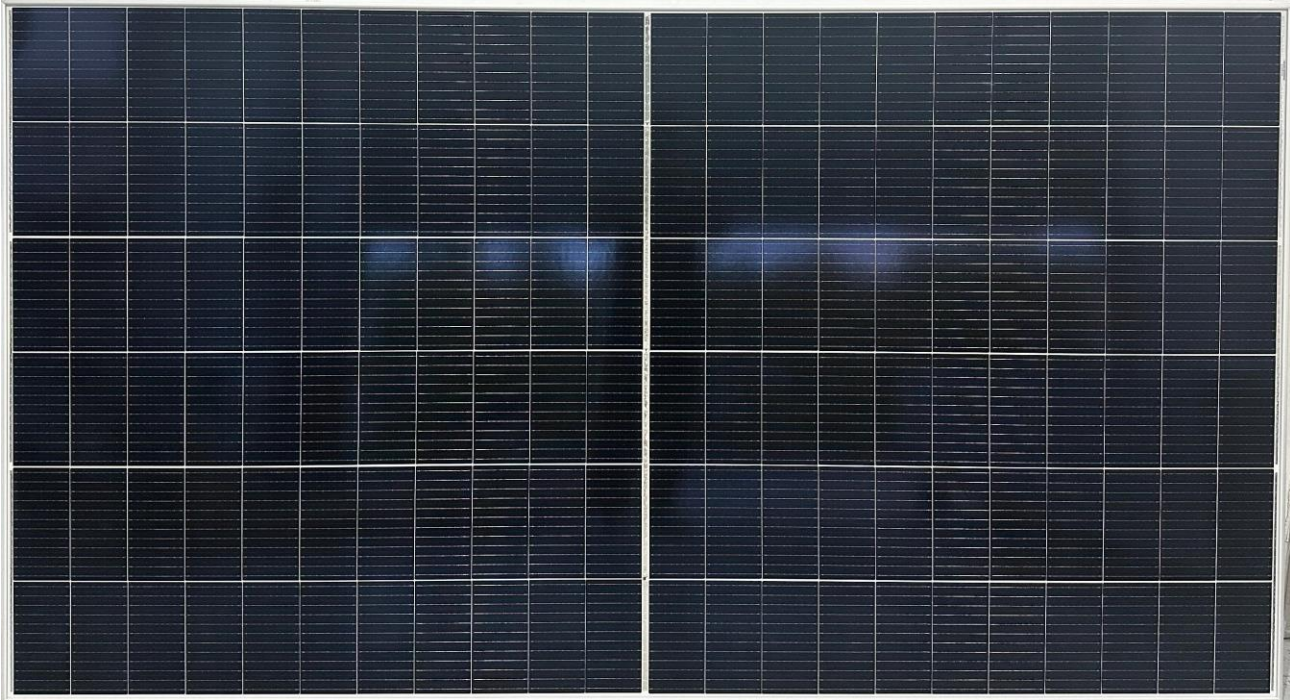
Building 11, No. 18, Yaofeng East Road, Mudu Town,
Wuzhong District, Suzhou, Jiangsu, 215151, China

Copy of marking plate / device under test

Module Type: PRD670-132MT

PROMOD ENERJİ		Rated Max. Power (Pmax)	670W	Dimensions	2384*1303*35
		Voltage at Pmax	38.48V	Weight	34KG
		Current at Pmax	17.42A	Safety class	Class II
		Open-Circuit Voltage(Voc)	46.15V	Standards	IEC
Module type: PM66HC210BF STC: E=1000 W/m2, AM 1.5 Tc: 25°C. Power Sorting: 0~±4W		Short-Circuit Current(Isc)	18.43A		WARNING: This module produces electricity when exposed to light. Follow all applicable electrical safety precautions
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	30A		
		PROMODENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					   

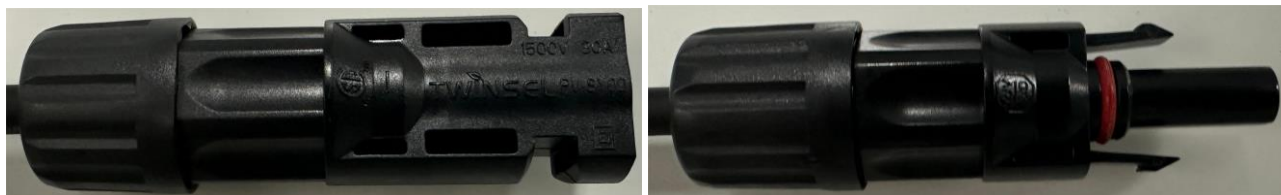
Marking plate of sample



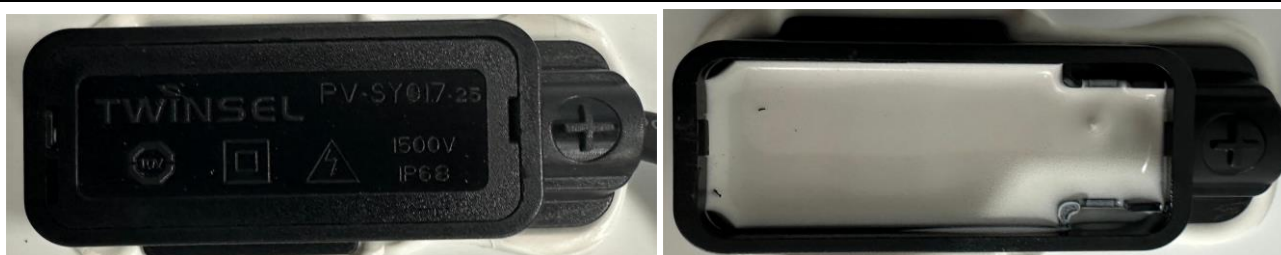
Front view of sample



Rear view of sample



View of connector



View of junction box



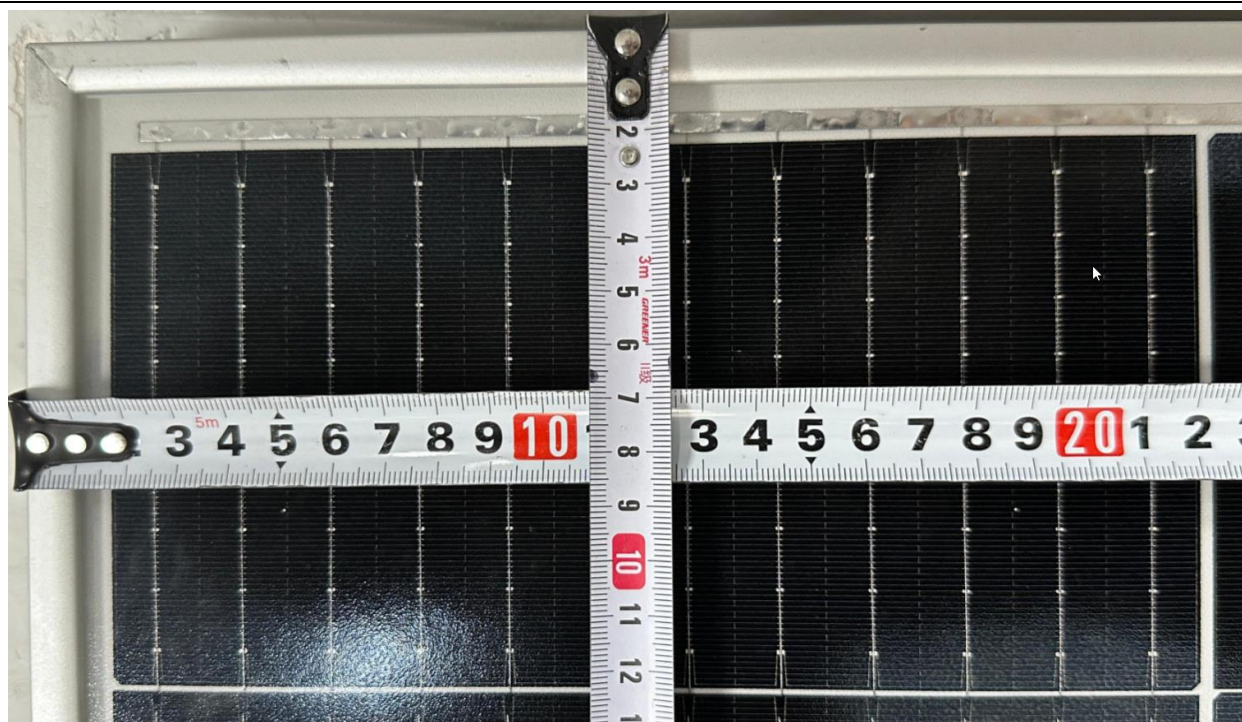
View of mounting holes



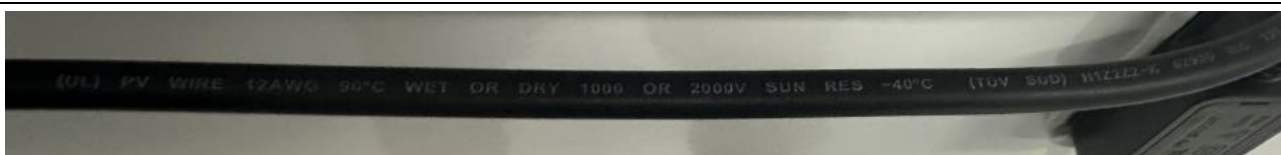
View of ground



View of frame



View of cell



View of cable

Possible test case verdicts:	
- Test case does not apply to the test object	N/A
- Test object does meet the requirement	Pass (P)
- Test object does not meet the requirement	Fail (F)
General remarks:	
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General product information	
The product is photovoltaic (PV) module.	

1. Test samples

Sample #	Model	Sample S/N	Remark
01	PRD670-132MT	481202I2603133	Control module
02	PRD670-132MT	481202I2602974	Ammonia Corrosion
03	PRD670-132MT	481202I2603347	Ammonia Corrosion

2. Test specification and test result

Initial Measurements		
TABLE 2.1	MQT 01 Visual inspection (Initial)	P
Test Date [YYYY-MM-DD]..... : 2024-05-24		—
Sample #	Nature and position of initial findings – comments or attach photos	
01	No major visual defects	P
02	No major visual defects	P
03	No major visual defects	P

TABLE 2.2	MQT 06.1 Performance at STC (Initial)						—
Test Date [YYYY-MM-DD]..... : 2024-05-24							—
Module temperature [°C]..... : Corrected to 25.0							—
Irradiance [W/m²]..... : Corrected to 1000							—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	
01	18.47	45.92	17.11	39.71	679.6	80.13	
02	18.47	45.98	17.09	39.75	679.1	79.96	
03	18.43	45.97	17.03	39.73	676.5	79.86	
Supplementary information: /							

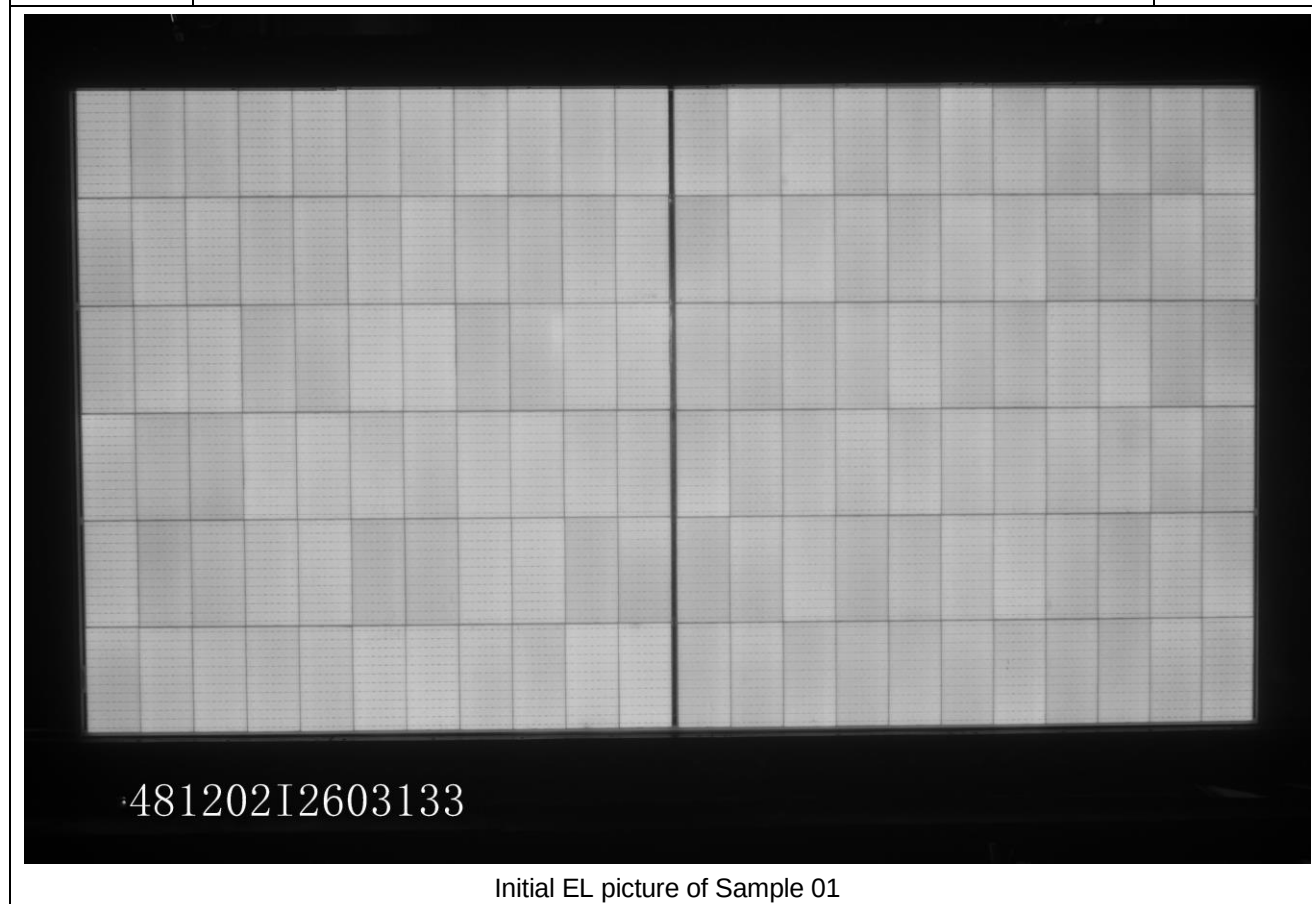
TABLE 2.3	MQT 03 Insulation test (Initial)				P
Test Date [YYYY-MM-DD]..... : 2024-05-24					—
Test Voltage applied [V]..... : 8000/1500					—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
01	32710	≥12.86	—	No	P
02	38290	≥12.86	—	No	P
03	23790	≥12.86	—	No	P
Supplementary information: Size of module [m²] 3.11					

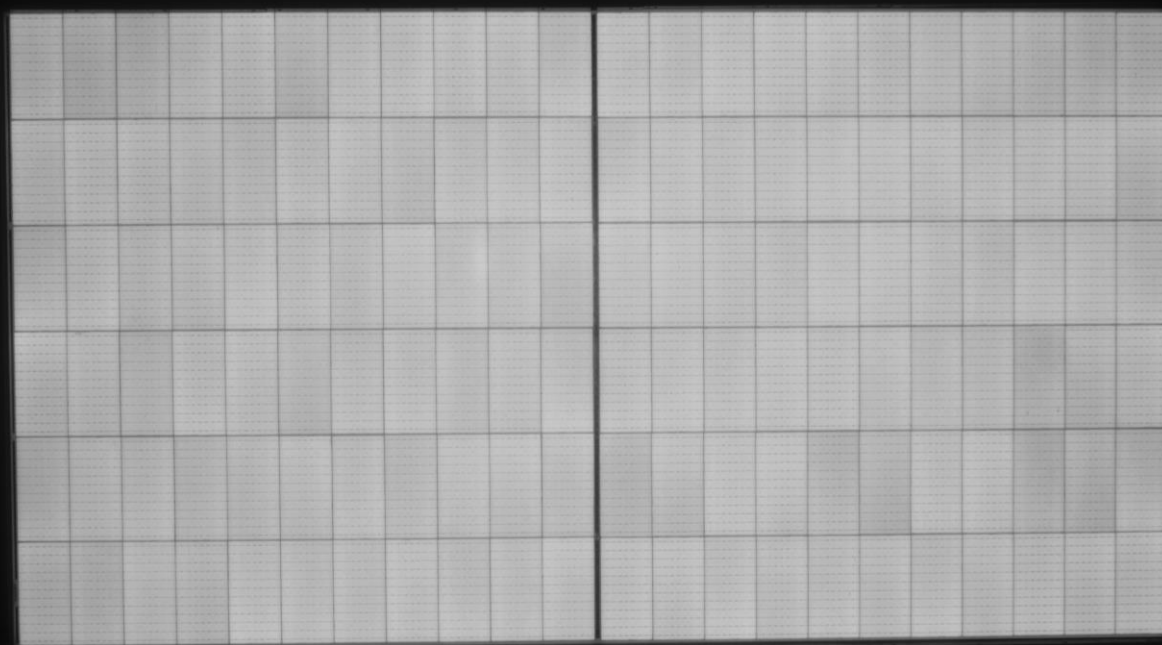
TABLE 2.4 MQT 15 Wet leakage current test (Initial)			P
Test Date [YYYY-MM-DD]		2024-05-24	—
Test Voltage applied [V]		1500	—
Solution resistivity [Ω cm]		2071	P
Solution temperature [$^{\circ}$ C]		22.5	P
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]	Result
01	5029	≥ 12.86	P
02	7128	≥ 12.86	P
03	6567	≥ 12.86	P
Supplementary information: Size of module [m^2] 3.11			

TABLE 2.5 MST 13 Ground continuity test (Initial)			P
Test Date [YYYY-MM-DD]		2024-05-24	—
Maximum over-current protection rating [A] :		30	—
Current applied [A]		75	—
Location of designated grounding point....:		The ground hole of one longer side	—
Another location of contacting point....:		A:The ground hole of one longer side B:Adjacent shorter side with greatest distar grounding point C:Another Adjacent shorter side with greatest from the grounding point	
Sample #	Voltage (V)	Resistance (Ω)	Verdict
01-A	0.0555	0.0006	P
01-B	0.0382	0.0004	P
01-C	0.0349	0.0004	P
02-A	0.0563	0.0006	P
02-B	0.0371	0.0004	P
02-C	0.0365	0.0004	P
03-A	0.0568	0.0006	P
03-B	0.0359	0.0004	P
03-C	0.0341	0.0004	P
Supplementary information: Size of module [m^2] 3.11			

TABLE 2.6 Electroluminescence test (Initial)			—
Test Date [MM/DD/YYYY]		2024-05-24	—
Applied current [A]		18	—
Exposure time [s]		6	—

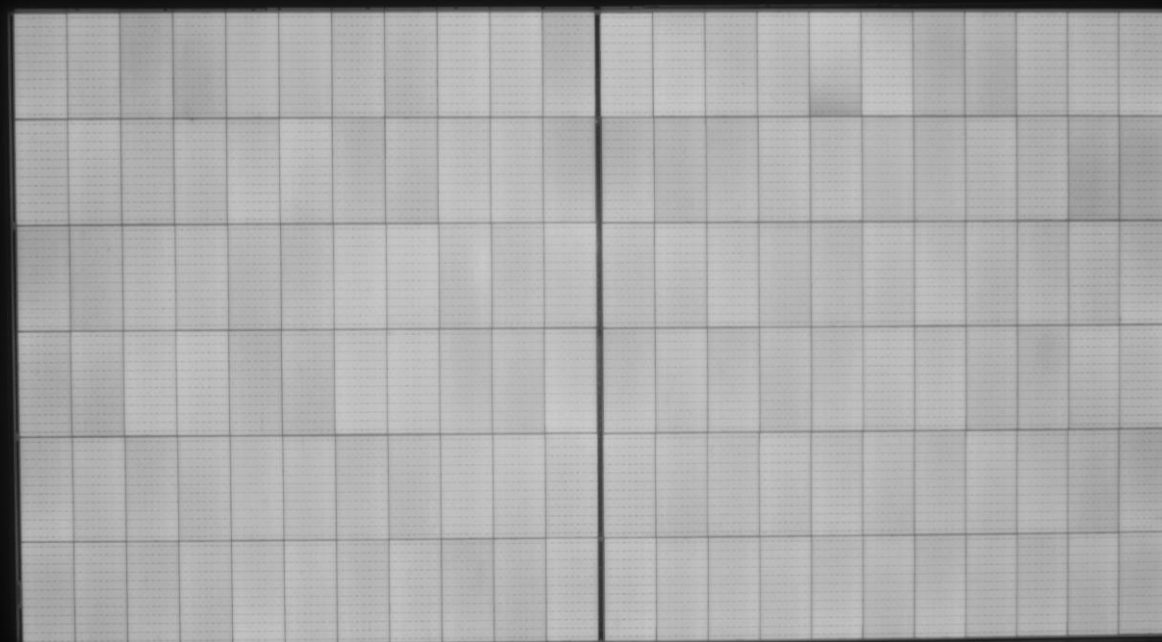
Sample No.	Nature and position of initial findings – comments or attach photos	Result
01	No major visual defects	—
02	No major visual defects	—
03	No major visual defects	—





481202I2602974

Initial EL picture of Sample 02



481202I2603347

Initial EL picture of Sample 03

Supplementary information: N/A

TABLE 2.7: Ammonia corrosion test		—
Test Date [MM/DD/YYYY] start/end	2024-05-24/2024-06-14	—
Sample #.....	02 & 03	—
Ammonia test chamber temperature [°C]:	59.9~60.5	—
Ammonia concentration[PPM].....:	6667	—
Humidity of NH3 spray period [%]	99.1 ~ 99.6	—
Temperature of standard atmosphere storage period [°:	23.5 ~ 25.0	—
Humidity of standard atmosphere storage period [%]:	55.3 ~ 56.2	—
Time of duration [days].....:	20	—
Supplementary information: /		

Final Measurements						
TABLE 2.8	MQT 01 Visual inspection after Ammonia test					P
Test Date [MM/DD/YYYY]			2024-06-14			—
Sample #	Nature and position of initial findings – comments or attach photos					—
02	No visual defects					P
03	No visual defects					P
Supplementary information: /						
TABLE 2.9	TABLE: Maximum power determination after Ammonia test					P
Test Date [MM/DD/YYYY]			2024-06-14			—
Module temperature [°C]			25			—
Irradiance [W/m²]			1000			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
01	18.43	45.87	17.12	39.69	679.5	80.38
02	18.41	45.82	16.98	39.75	675.0	80.01
03	18.40	45.83	16.91	39.77	672.5	79.75
Pmp degradation after this test [%] ≤5% :			Sample 01 (As control): -0.01% Sample 02: -0.61% Sample 03: -0.59%			P
Supplementary information: /						
TABLE 2.10	MST 16 Insulation test after Ammonia test					P
Test Date [MM/DD/YYYY]			2024-06-14			—
Test Voltage applied [V]			8000 1min/1500 2min			—
Sample #	Measured	Required	Dielectric breakdown			Result
	MΩ	MΩ	Yes (description)		No	

02	30610	≥12.86	—	No	P
03	23290	≥12.86	—	No	P
Supplementary information: Size of module [m²] 3.11.					
TABLE 2.11	MST 17 Wet leakage current test after Ammonia test				P
Test Date [MM/DD/YYYY]		2024-06-14			—
Test Voltage applied [V]		1500 2min			—
Solution resistivity [Ω cm]		2106			P
Solution temperature [°C]		22.5			P
Sample #	Measured [MΩ]	Limit [MΩ]			Result
02	4833	≥ 12.86			P
03	6275	≥ 12.86			P
Supplementary information: Size of module [m²] 3.11.					

TABLE 2.12		MST 13 Ground continuity test after Ammonia test		P
Test Date [YYYY-MM-DD]		2024-06-14		—
Maximum over-current protection rating [A] :		30		—
Current applied [A]		75		—
Location of designated grounding point....:		The ground hole of one longer side		—
Another location of contacting point....:		A:The ground hole of one longer side B:Adjacent shorter side with greatest distar grounding point C:Another Adjacent shorter side with greatest from the grounding point		
Sample #	Voltage (V)		Resistance (Ω)	Verdict
02-A	0.0318		0.0004	P
02-B	0.0276		0.0004	P
02-C	0.0235		0.0003	P
03-A	0.0325		0.0004	P
03-B	0.0275		0.0004	P
03-C	0.0228		0.0003	P
Supplementary information: Size of module [m²] 3.11				

TABLE 2.13		Electroluminescence test after Ammonia test		—
Test Date [MM/DD/YYYY].....:		2024-06-14		—
Applied current [A]		18		—
Exposure time [s]		6		—
Sample No.	Nature and position of initial findings – comments or attach photos			Result

02	No major visual defects	P
03	No major visual defects	P



EL picture of Sample 02 after Ammonia test

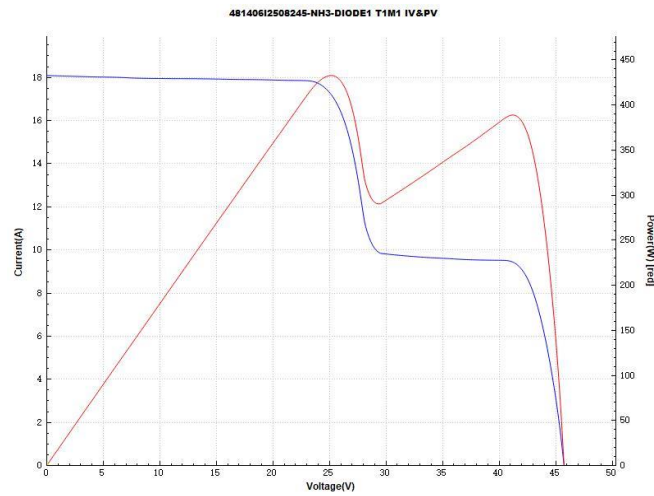


EL picture of Sample 03 after Ammonia test

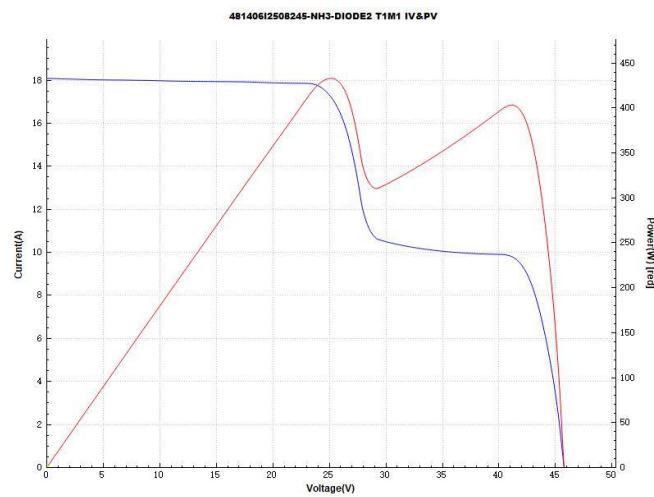
Supplementary information: N/A

TABLE 2.14: Bypass diode functionality test				P
Test Date [YYYY-MM-DD]..... :		2024-06-15		—
Sample #	Bypass diodes are working? (Yes or No)			Result
	Diode 1	Diode 2	Diode 3	
02	Yes	Yes	Yes	P
03	Yes	Yes	Yes	P

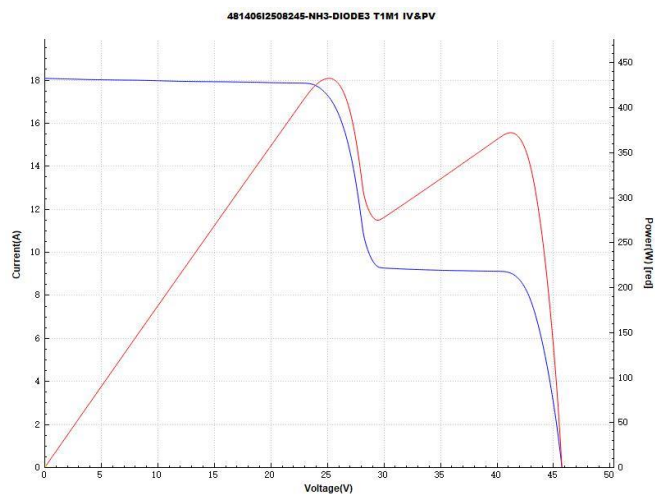
IV curve after shading



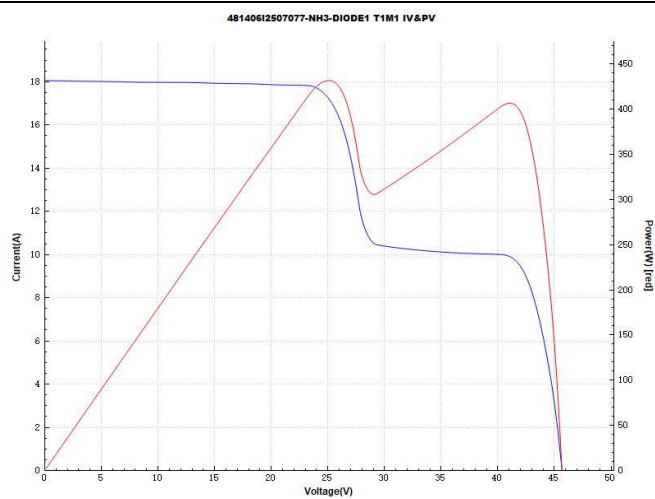
Sample 02(Diode 1)



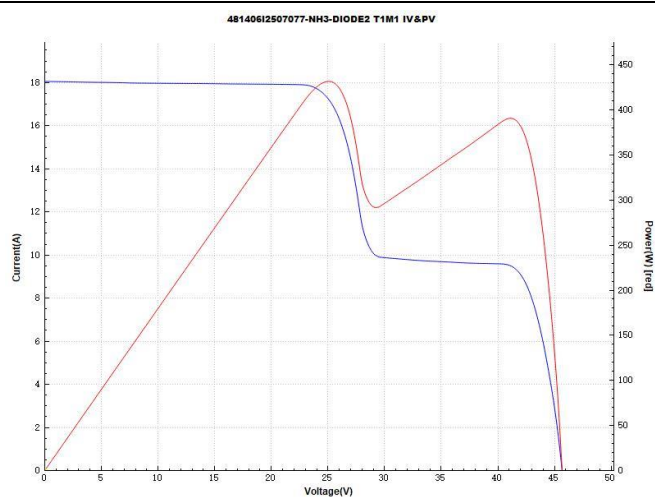
Sample 02(Diode 2)



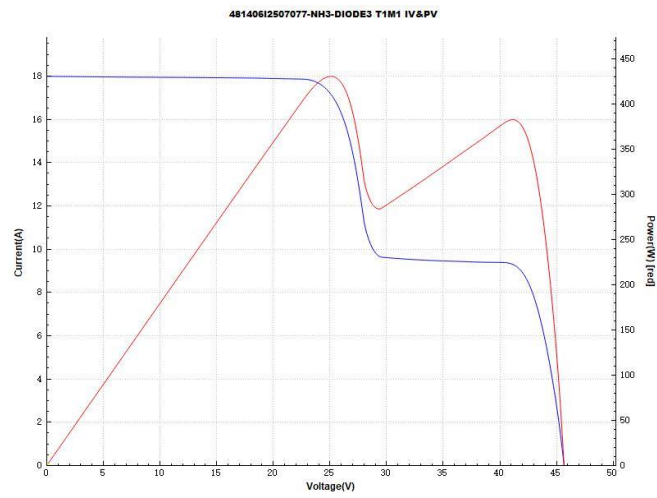
Sample 02 (Diode 3)



Sample 03 (Diode 1)



Sample 03 (Diode 2)



Sample 03(Diode 3)

3. List of measurement equipment

No.	Test Item	Equipment	Code	Calibration Expire Date
1	Visual inspection	Luminometer	GCYQ-AG-15	2025-01-31
		tape measure	GCYQ-AG-43/44	2024-08-23
2	Maximum power determination	Pulsed Solar Simulator	GCYQ-HJ-22	2024-08-22
		Standard components	GCTC-BZJ-004	2024-09-17
		Temperature and humidity meter	GCYQ-AG-32-1	2024-08-20
3	Insulation test	Withstanding voltage/	GCYQ-AG-18	2024-08-17
		Temperature and humidity meter	GCYQ-AG-32-4	2024-08-20
4	Wet leakage current test	Withstanding voltage/	GCYQ-AG-18	2024-08-17
		Conductive meter	GCYQ-AG-07	2024-10-31
5	Electroluminescence test	EL test system	GCYQ-HJ-23	2024-08-01
6	Ammonia test	Ammonia test chamber	GCYQ-HJ-18	2024-08-20
7	Ground continuity test	DC power supply	GCYQ-AG-23	2024-08-22

4. Statement of the estimated uncertainty of the test results

The estimated uncertainty fulfils the requirements from the IEC GUIDE 115.
Uncertainty: I_{sc} :1.0%; V_{oc}: 2.4%; P_{max}: 2.6% (K=2)

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