



TEST REPORT

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

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

Report reference no.: SHES240400798671

Date of issue.....: Aug.15, 2024

Total number of pages: 18

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 61701:2020 Salt mist corrosion test, Test Method 5

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

A handwritten signature in blue ink that reads "Ricardo Xu".

Signature

Drafted by: Ricardo Xu

A handwritten signature in blue ink that appears to read "Van Hua".

Signature

Approved by: Van Hua

Summary of testing

PRD670-132MT is tested according to IEC 61701:2020 Test Method 5 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 61701:2020 Test Method 5

Testing location:

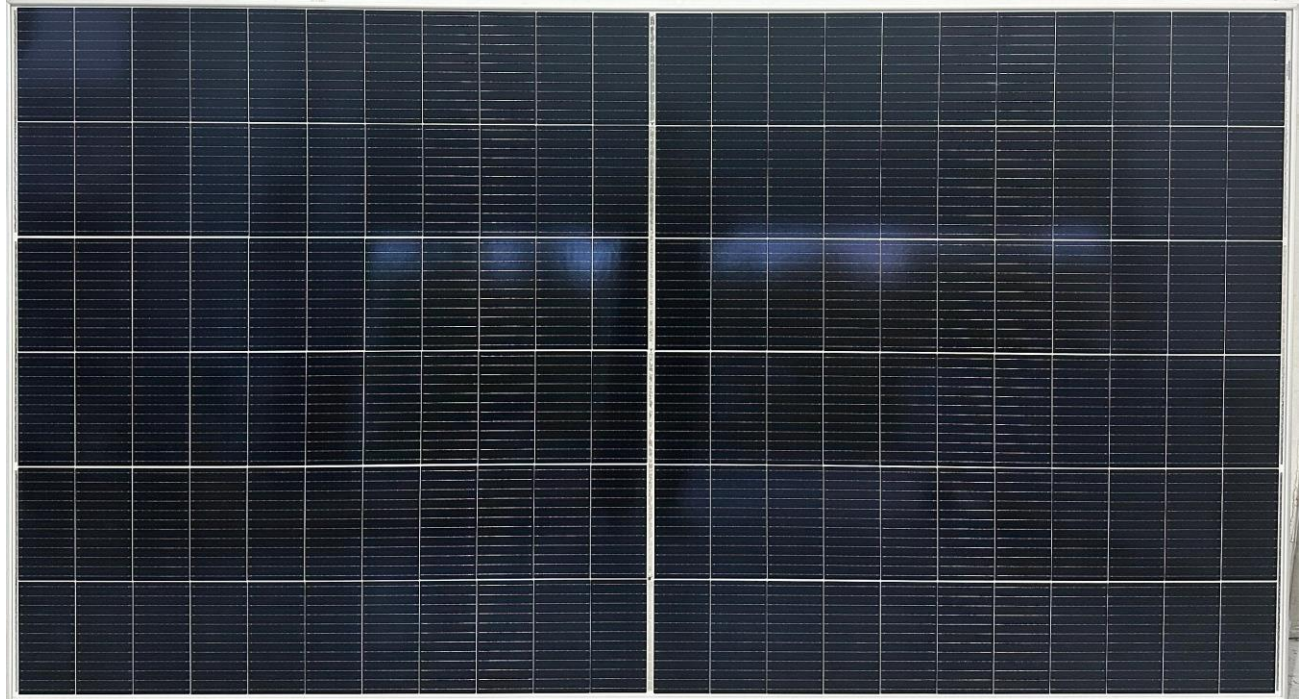
Guoce Testing Technology (Suzhou) Co., Ltd.

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
Module type: PM66HC210BF STC: E=1000 W/m², AM 1.5 Tc: 25°C. Power Sorting: 0 ~±4W 		Current at Pmax	17.42A	Safety class	Class II
		Open-Circuit Voltage(Voc)	46.15V	Standards	IEC
		Short-Circuit Current(Isc)	18.43A	 WARNING: This module produces electricity when exposed the 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					

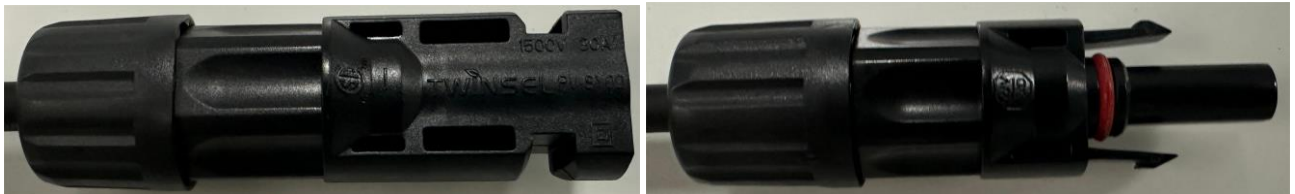
Marking plate of sample



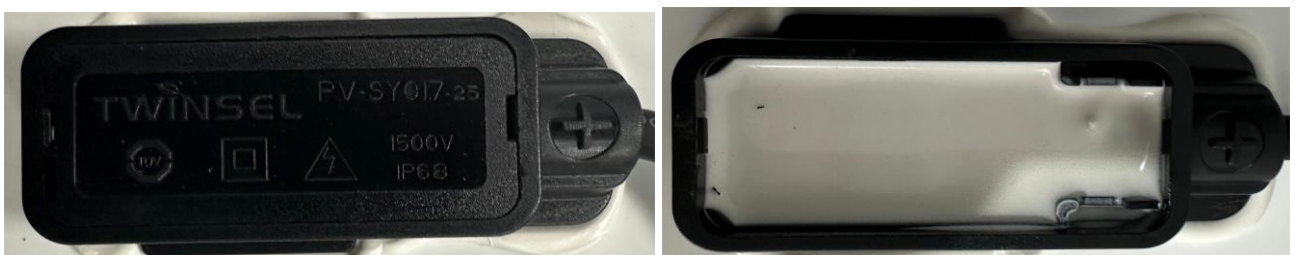
Front view of sample



Rear view of sample



View of connector



View of junction box



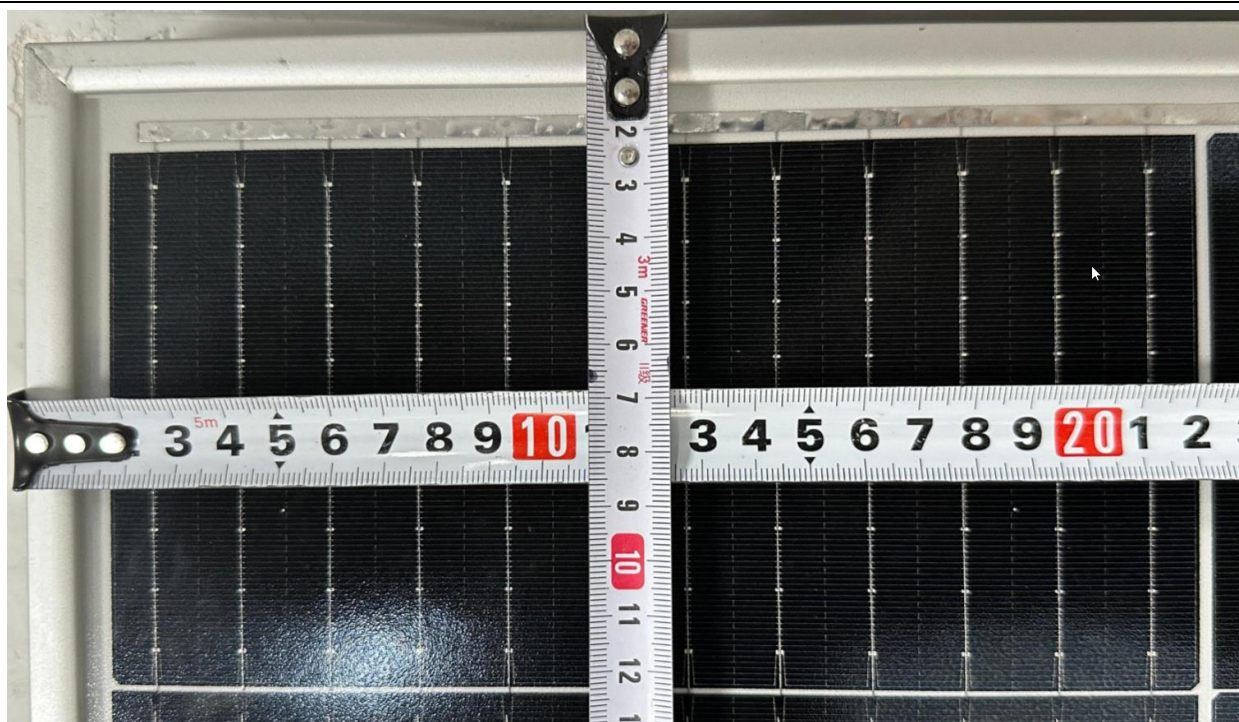
View of mounting holes



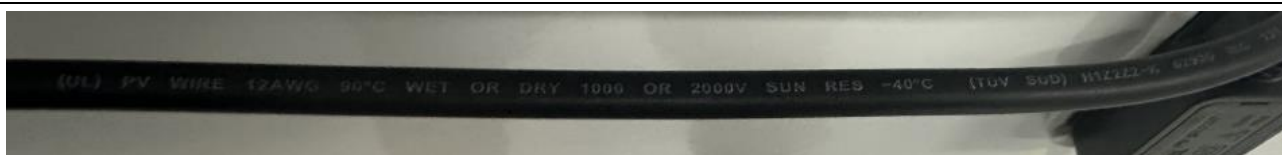
View of ground



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
01	PRD670-132MT	481202I2602881
02		481202I2602915
03		481202I2603796

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 before initial stabilization						—
Test Date [YYYY-MM-DD]	2024-05-24						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m ²]	Corrected to 1000						—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	
01	18.35	45.90	17.01	39.72	675.4	80.10	
02	18.39	46.03	17.04	39.82	678.5	80.18	
03	18.39	45.89	16.99	39.69	674.2	79.91	
Supplementary information:							
1) Sample 01 as control.							
2) Samples 02, 03 subjected to salt spray test.							

TABLE 2.3: MQT 19.1 Initial Stabilization procedure							P
Light exposure method				☒ Simulator ☐ Natural sunlight			
Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight							
Stabilization criterion x per IEC 61215-1-x				X=0.01			
Sample #	01	Test Date (YYYY-MM-DD) start/end			2024-05-24 / 2024-05-27		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load(Ω)	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	675.4	—	—
1	5.1	>500	—	2.2Ω	673.7	—	—

2	5.3	>500	—	2.2Ω	672.9	0.37	Yes
Sample #	02	Test Date (YYYY-MM-DD) start/end.....:			2024-05-24 / 2024-05-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load(Ω)	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	668.5	—	—
1	5.1	>500	—	2.2Ω	678.5	—	—
2	5.3	>500	—	2.2Ω	677.5	0.21	Yes
Sample #	03	Test Date (YYYY-MM-DD) start/end.....:			2024-05-24 / 2024-05-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load(Ω)	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	672.3	—	—
1	5.1	>500	—	2.2Ω	674.2	—	—
2	5.3	>500	—	2.2Ω	672.5	0.32	Yes

TABLE 2.4	MQT 06.1 Performance at STC after initial stabilization						—
Test Date [YYYY-MM-DD] :			2024-05-27				—
Module temperature [°C]..... :			Corrected to 25.0				—
Irradiance [W/m ²]..... :			Corrected to 1000				—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	
01	18.33	45.88	16.95	39.70	672.9	80.02	
02	18.37	45.98	17.00	39.83	677.1	80.16	
03	18.36	45.81	16.93	39.70	672.1	79.91	
Supplementary information: /							

TABLE 2.5		MQT 03 Insulation test (Initial)				P
Test Date [YYYY-MM-DD] :			2024-05-27			—
Test Voltage applied [V] :			8000/1500			—
Sample #	Measured	Required	Dielectric breakdown		Result	
	MΩ	MΩ	Yes (description)	No		
01	35760	≥12.86	—	No	P	
02	22290	≥12.86	—	No	P	
03	28090	≥12.86	—	No	P	
Supplementary information: Size of module [m²] 3.11						

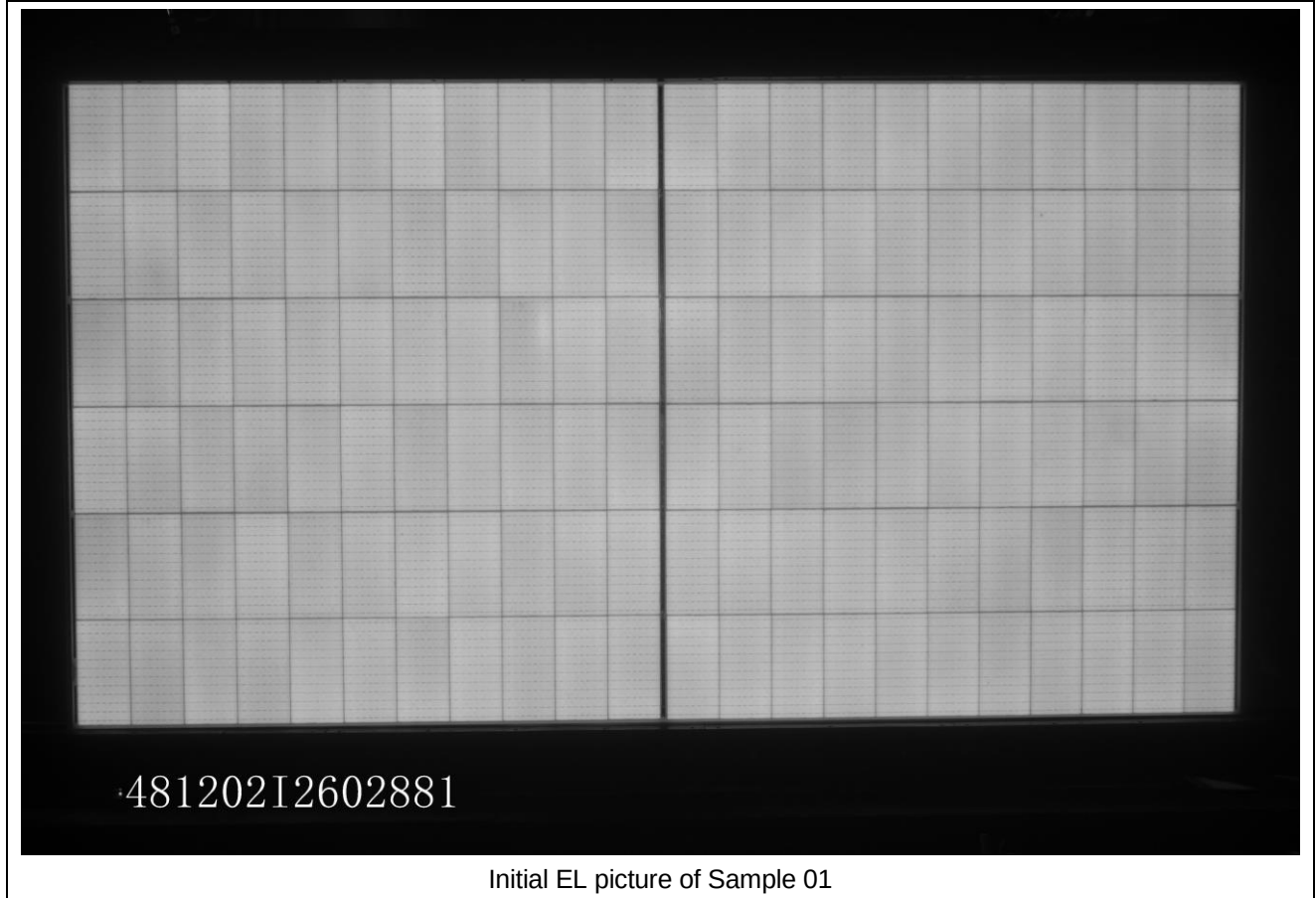
TABLE 2.6	MQT 15 Wet leakage current test (Initial)					P
Test Date [YYYY-MM-DD]				2024-05-27		—

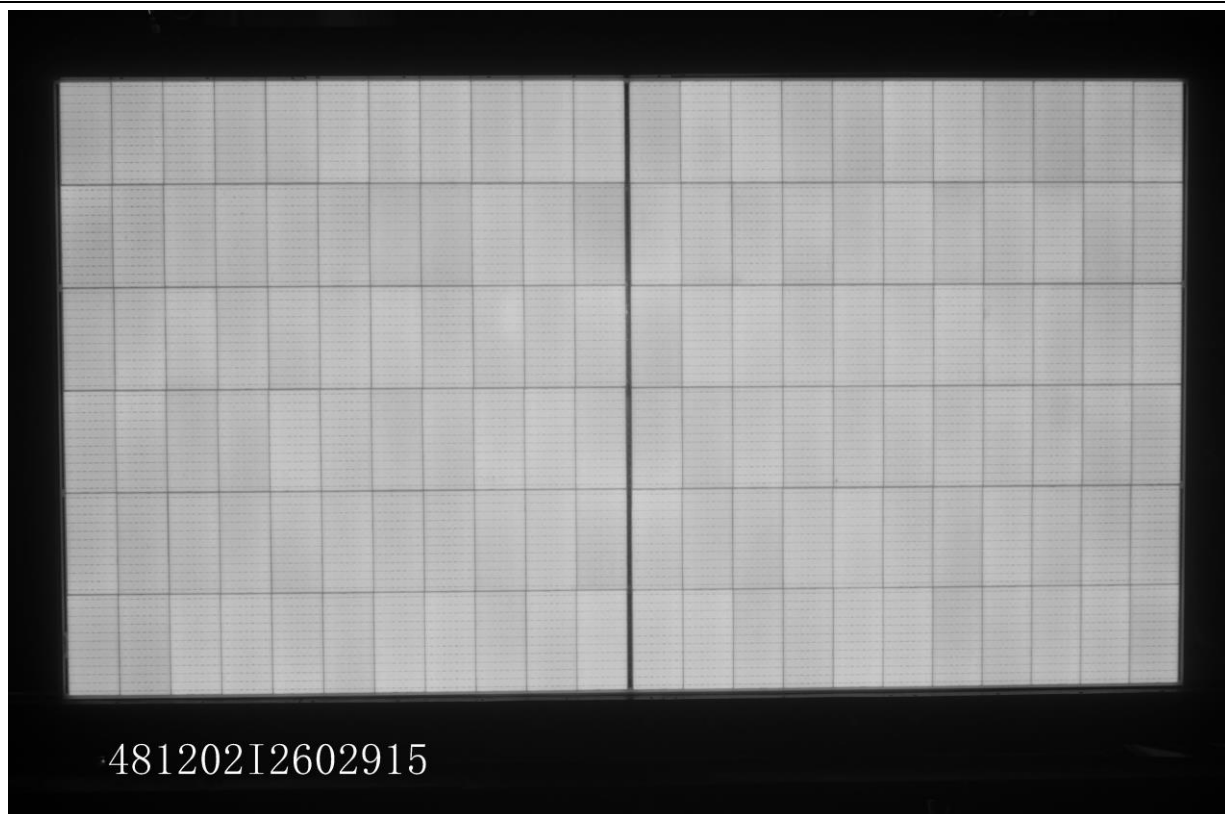
Test Voltage applied [V].....		1500	—
Solution resistivity [Ω cm].....		2071	P
Solution temperature [°C]		22.5	P
Sample #	Measured [MΩ]	Limit [MΩ]	Result
01	4746	≥12.86	P
02	5296	≥12.86	P
03	4378	≥12.86	P
Supplementary information: Size of module [m²] 3.11			

TABLE 2.7		MST 13 Ground continuity test (Initial)	P
Test Date [YYYY-MM-DD]	2024-05-27	—	—
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	0.0286	0.0005	P
01-B	0.0221	0.0004	P
01-C	0.0205	0.0003	P
02-A	0.0276	0.0004	P
02-B	0.0236	0.0004	P
02-C	0.0209	0.0003	P
03-A	0.0293	0.0005	P
03-B	0.0224	0.0004	P
03-C	0.0206	0.0003	P
Supplementary information: Size of module [m^2] 3.11			

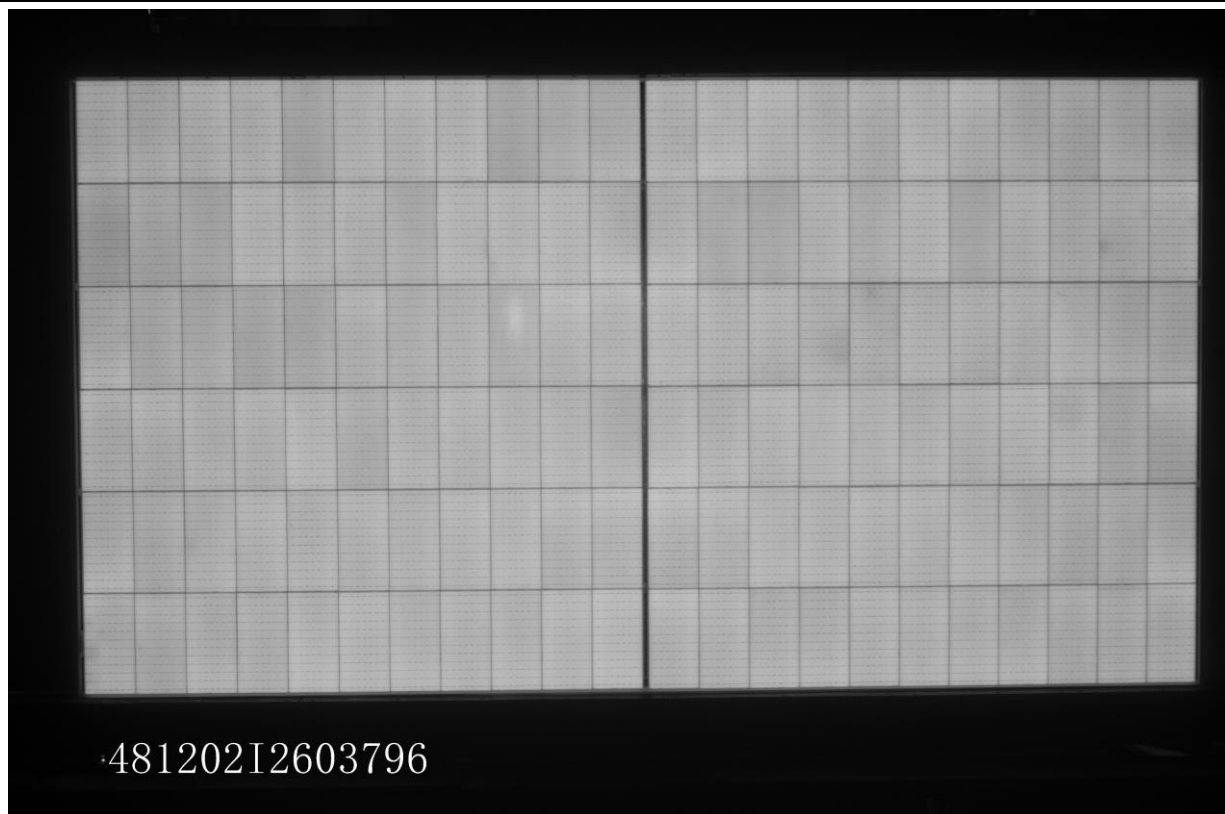
TABLE 2.8		Electroluminescence test (Initial)	—
Test Date [MM/DD/YYYY]	2024-05-27	—	—
Applied current [A].....	18	—	—
Exposure time [s]	6	—	—
Sample No.	Nature and position of initial findings – comments or attach photos	Result	
01	No major visual defects	—	

02	No major visual defects	—
03	No major visual defects	—





Initial EL picture of Sample 02



Initial EL picture of Sample 03

Supplementary information: N/A

TABLE 2.9: Salt mist corrosion test		—
Test Date [YYYY-MM-DD] start/end	22024-05-27 / 2024-06-24	—
Test Method (Severity level)	5	—
Temperature in Salt mist chamber :	35.8~36.3	P
Salt solution concentration [weight %] :	5	P
pH value :	6.8~7.2	P
Temperature in Humidity chamber :	40.1	P
Humidity in Humidity chamber :	94	P
Total test time [day]	28	—
Sample #	01,02	—
Supplementary information: /		

Final Measurements						
TABLE 2.10	MQT 01 Visual inspection after salt mist corrosion test					P
Test Date [YYYY-MM-DD]		2024-06-24			—	
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
Supplementary information: N/A						
TABLE 2.11	MQT 06.1 Performance at STC after salt mist corrosion test					P
Test Date [YYYY-MM-DD]		2023-11-17			—	
Module temperature [°C]		Corrected to 25.0			—	
Irradiance [W/m ²]		Corrected to 1000			—	
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
01	18.31	45.82	17.00	39.73	675.41	80.51
02	18.26	45.86	16.90	39.78	672.3	80.28
03	18.23	45.79	16.82	39.71	668.0	80.02
Pmp degradation after this test [%] ≤5% :			Sample 01 as control module: 0%, Sample 02: - 0.71%, Sample 03: -0.62%			P
Supplementary information: /						
TABLE 2.12	MQT 03 Insulation test after salt mist corrosion test					P
Test Date [YYYY-MM-DD]		2024-06-24			—	
Test Voltage applied [V]		4000/1500			—	
Sample #	Measured	Required	Dielectric breakdown			Result
	MΩ	MΩ	Yes (description)		No	

01	30610	≥ 12.86	—	No	P
02	29710	≥ 12.86	—	No	P
03	21450	≥ 12.86	—	No	P

Supplementary information: Size of module [m²] 3.11

TABLE 2.13	MQT 15 Wet leakage current test after salt mist corrosion test			P
Test Date [YYYY-MM-DD]	2024-06-24			—
Test Voltage applied [V]	1500			—
Solution resistivity [Ω cm]	2059			P
Solution temperature [°C]	22.1			P
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]		Result
1	5939	≥ 12.86		P
2	4281	≥ 12.86		P
3	5766	≥ 12.86		P

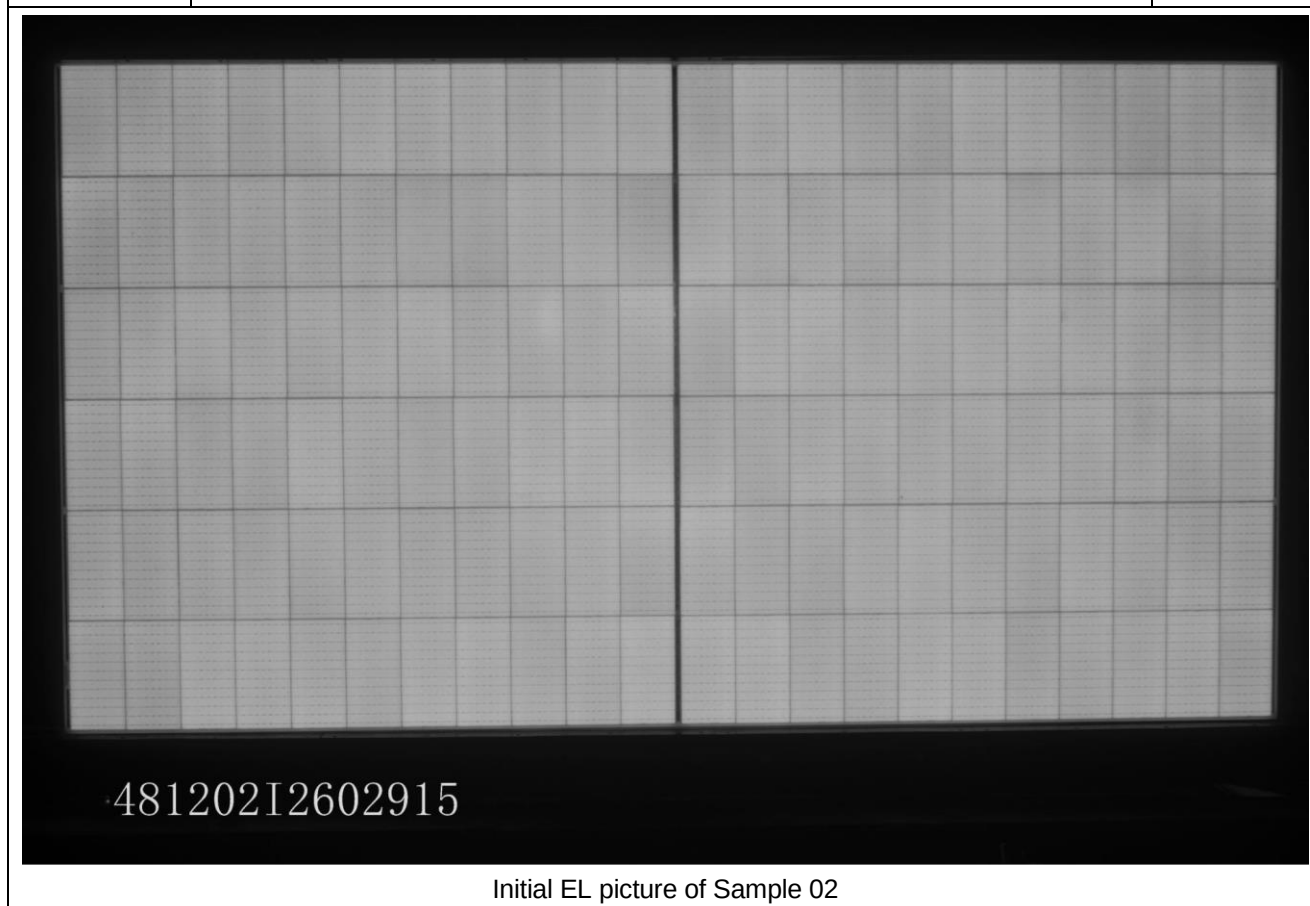
Supplementary information: Size of module [m²] 3.11

TABLE 2.14	MST 13 Ground continuity test after salt mist corrosion test			P
Test Date [YYYY-MM-DD]	2024-06-24			—
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	0.0285	0.0004	P	
01-B	0.0248	0.0003	P	
01-C	0.0355	0.0005	P	
02-A	0.0302	0.0004	P	
02-B	0.0246	0.0003	P	
02-C	0.0329	0.0004	P	
03-A	0.0286	0.0005	P	
03-B	0.0218	0.0004	P	
03-C	0.0202	0.0003	P	

Supplementary information: Size of module [m²] 3.11

TABLE 2.15	Electroluminescence test after salt mist corrosion test			P
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Test Date [MM/DD/YYYY]	2024-06-24	—
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	—
03	No major visual defects	—



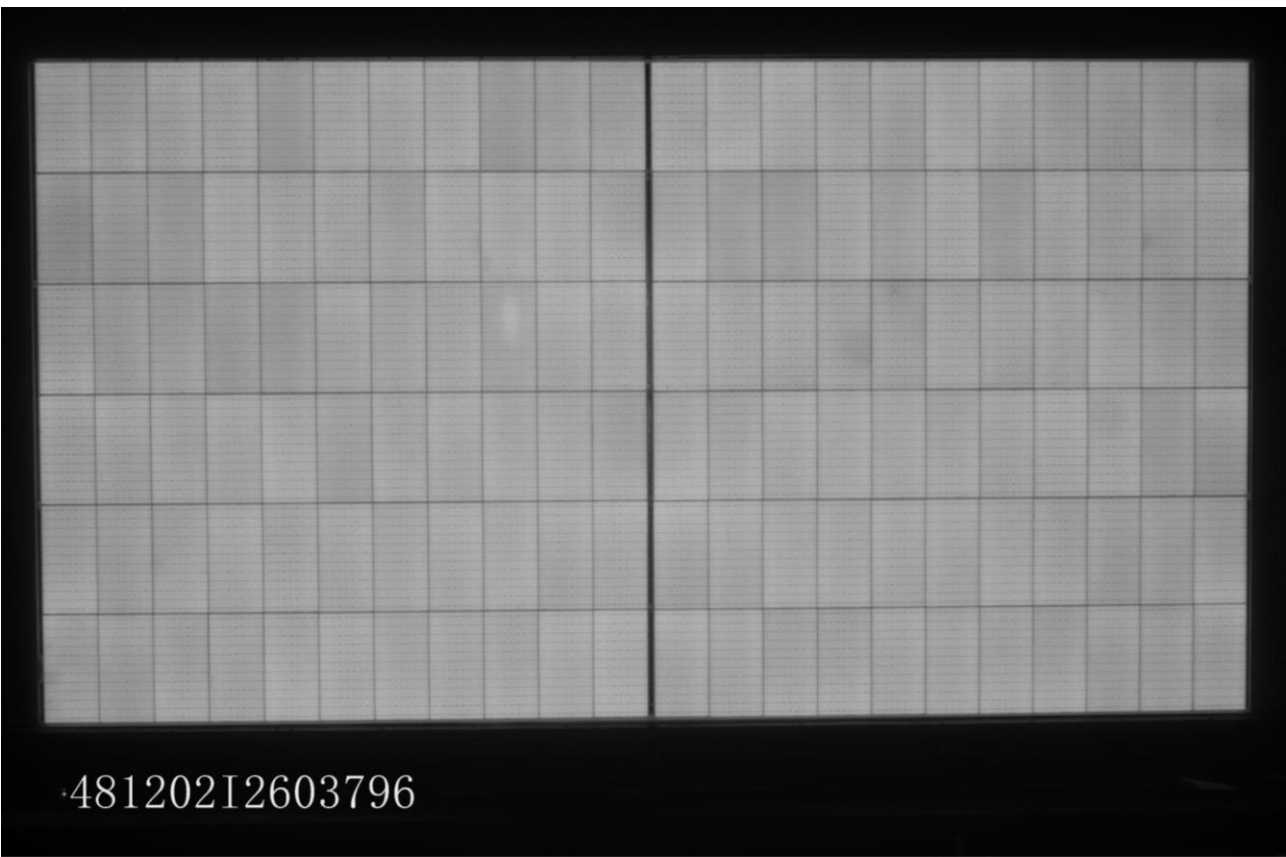
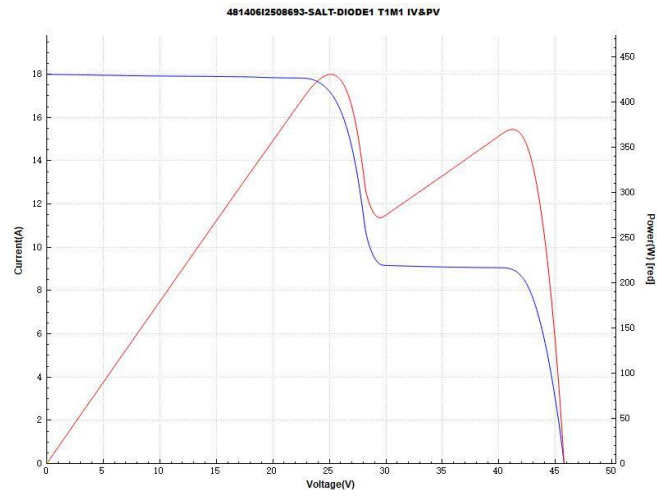
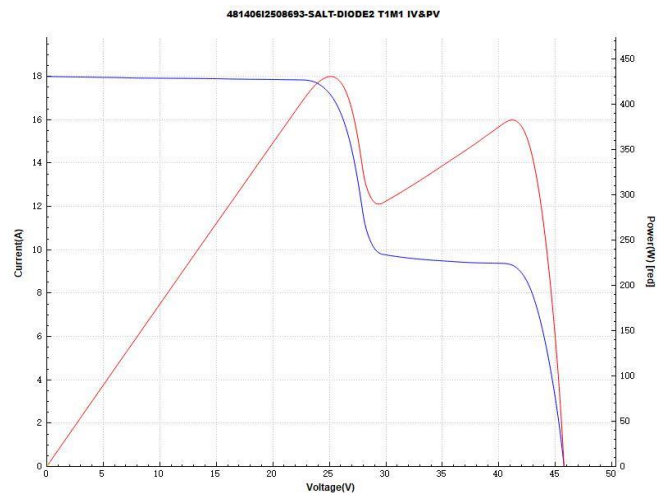
	
Initial EL picture of Sample 03	
Supplementary information: N/A	

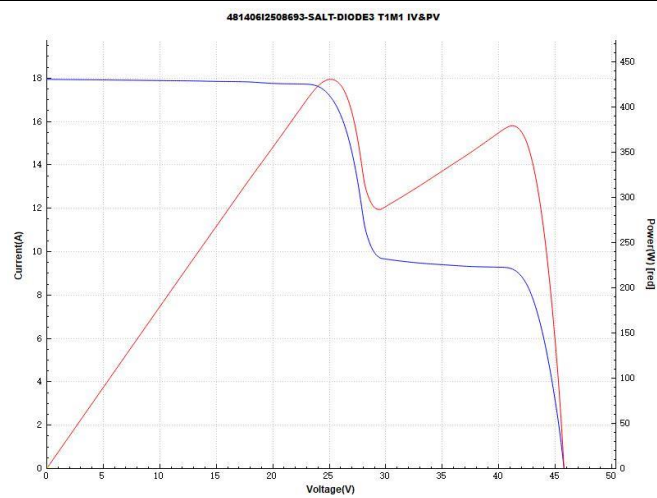
TABLE 2.16: MST 07 Bypass diode functionality test				P
Test Date [YYYY-MM-DD]..... :		2023-11-17		—
Sample #	Bypass diodes are working? (Yes or No)			Result
	Diode 1	Diode 2	Diode 3	
02	Yes	Yes	Yes	P
03	Yes	Yes	Yes	P
IV curve after shading				



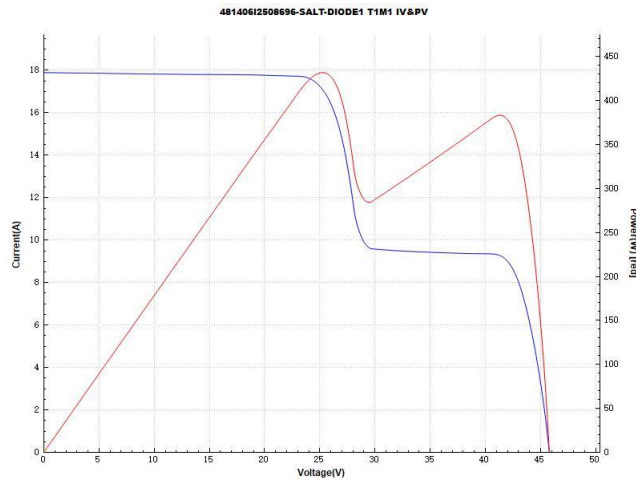
Sample 02 (Diode 1)



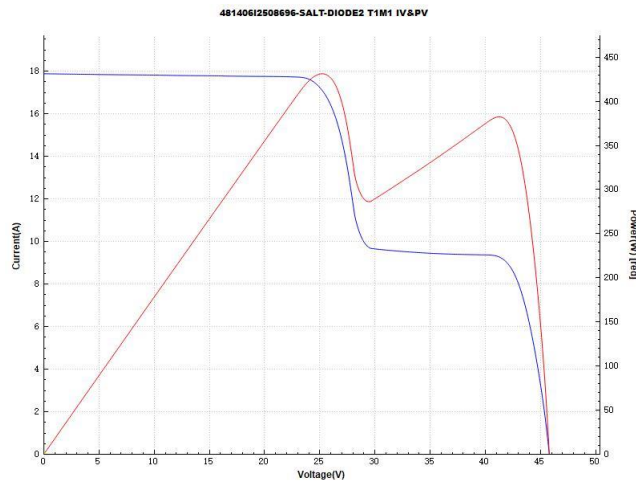
Sample 02 (Diode 2)



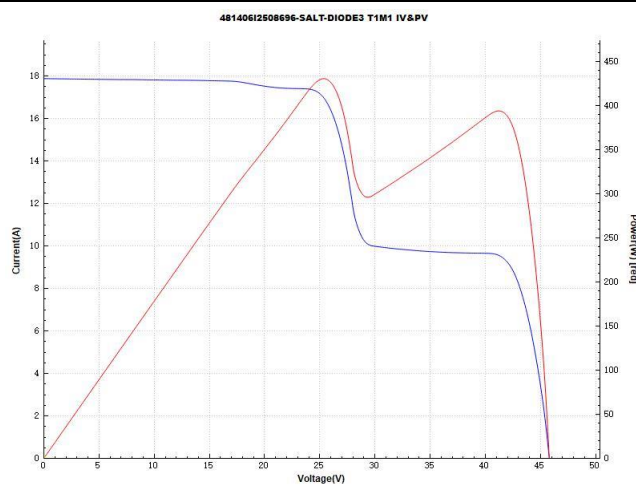
Sample 02 (Diode 3)



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	Initial Stabilization procedure	Steady state sunlight simulation test chamber	GCYQ-HJ-25	2024-11-28
3	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
4	Insulation test	Withstanding voltage	GCYQ-AG-18	2024-08-17
		Temperature and humidity meter	GCYQ-AG-32-4	2024-08-20
5	Wet leakage current test	Withstanding voltage	GCYQ-AG-18	2024-08-17
		Conductive meter	GCYQ-AG-07	2024-10-31
6	Electroluminescence EL test	EL test system	GCYQ-HJ-23	2024-08-01
7	Salt spray test	Salt spray test chamber	GCYQ-HJ-17	2024-08-31
8	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%; Voc: 2.4%; P_{max}: 2.6% (K=2)

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