



TEST REPORT

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

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

Report reference no.: SHES240400799171

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

Total number of pages: 13

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 61215-2:2021 LID 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: PRD415-120MT / PRD450-108MT / PRD550-110MT / PRD650-120MT / PRD670-132MT (Test sample)

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 reads "Van Hua".

Signature

Approved by: Van Hua

Summary of testing

PRD415-120MT / PRD450-108MT / PRD550-110MT / PRD650-120MT / PRD670-132MT are selected as test sample and tested according to Clause MQT 08 of IEC 61215-2:2021. and electroluminescence test.

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 61215-2:2021

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: PRD415-120MT

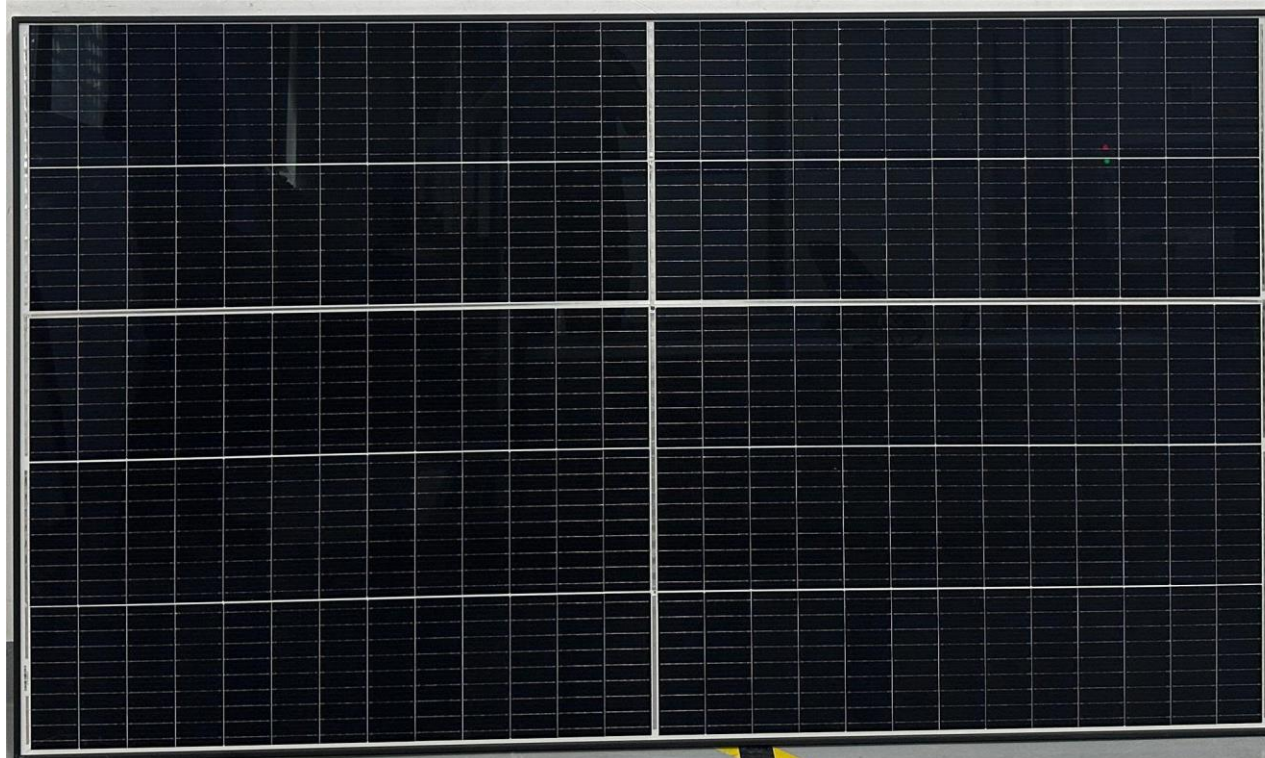
PROMOD ENERJİ		Rated Max. Power (Pmax)	415W	Dimensions	1754*1096*30
		Voltage at Pmax	35.14V	Weight	21KG
		Current at Pmax	11.82A	Safety class	Class II
		Open-Circuit Voltage(Voc)	42.20V	Standards	IEC
Module type: PM40HC210BF STC: E=1000 W/m2, AM 1.5 Tc 25°C Power Sorting: 0 ~±4W 		Short-Circuit Current(Isc)	12.53A	 WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions	
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	20A		
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

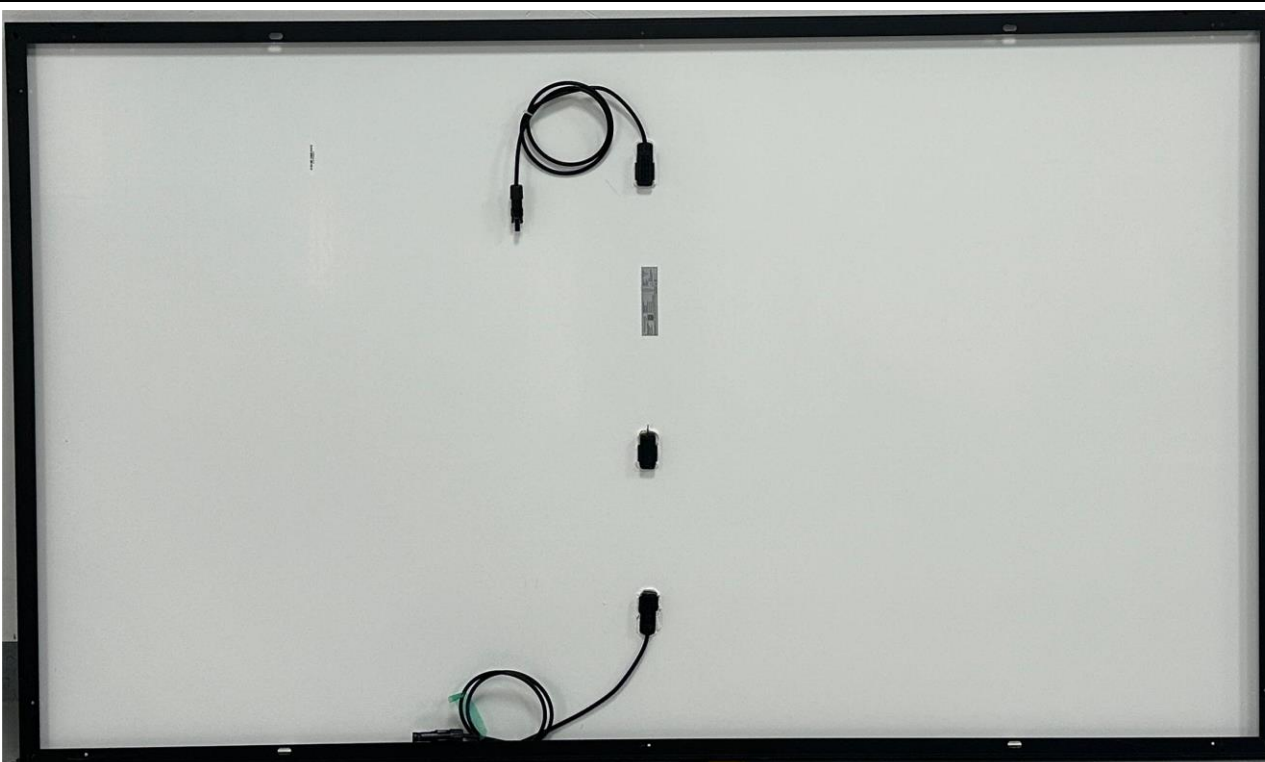
Module Type: PRD450-108MT

PROMOD ENERJİ		Rated Max. Power (Pmax)		450W	Dimensions		1894*1096*30
		Voltage at Pmax		37.74V	Weight		22.5KG
		Current at Pmax		11.93A	Safety class		Class II
		Open-Circuit Voltage(Voc)		45.33V	Standards		IEC
		Short-Circuit Current(Isc)		12.65A	WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions		
		Maximum System Voltage		1500V			
		Maximum Overcurrent Protection Rating		20A			
Module type: PM43HC210BF STC: E=1000 W/m2, AM 1.5 Tc: 25°C Power Sorting: 0 ~±4W							
PROMOD ENERJİ 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



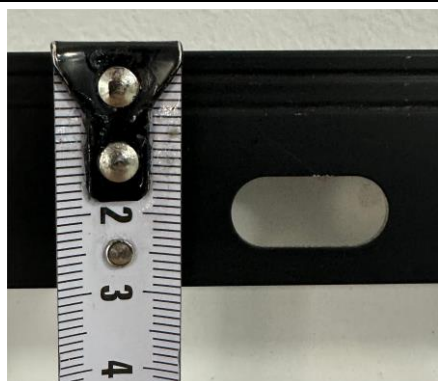
Rear view of sample



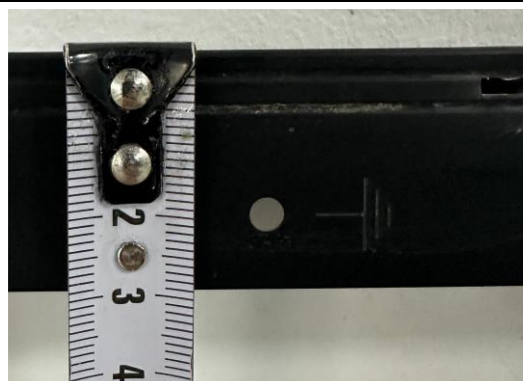
View of connector



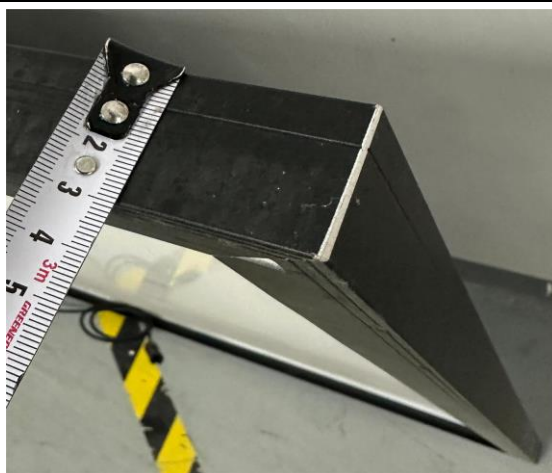
View of junction box



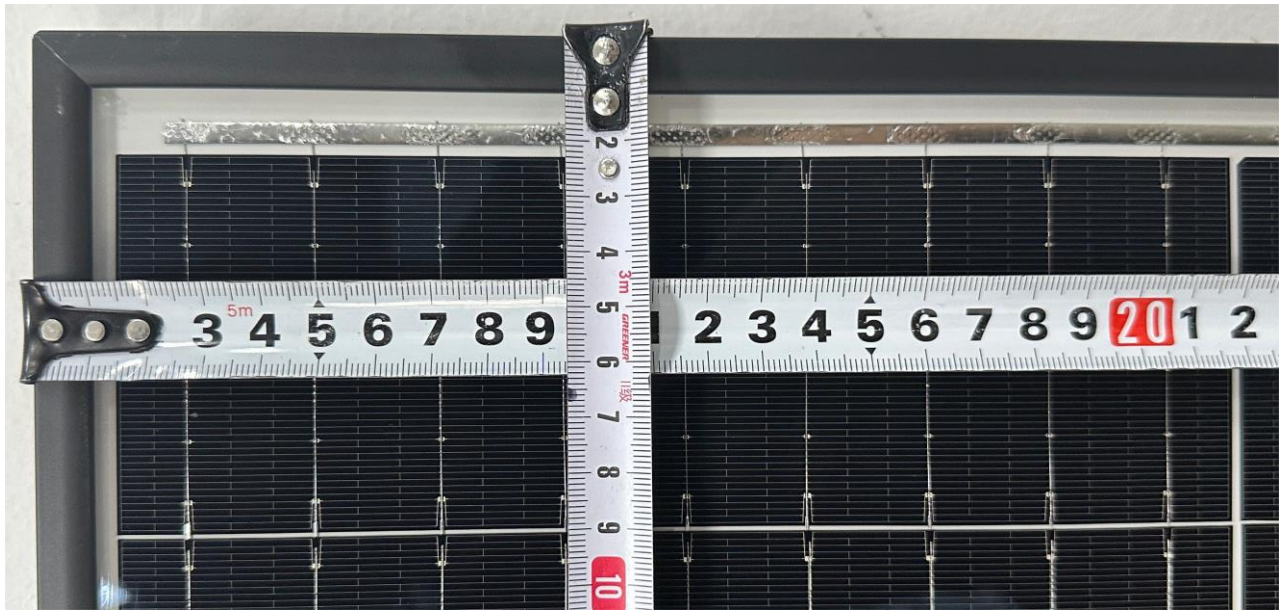
View of mounting holes



View of ground



View of frame



View of cell

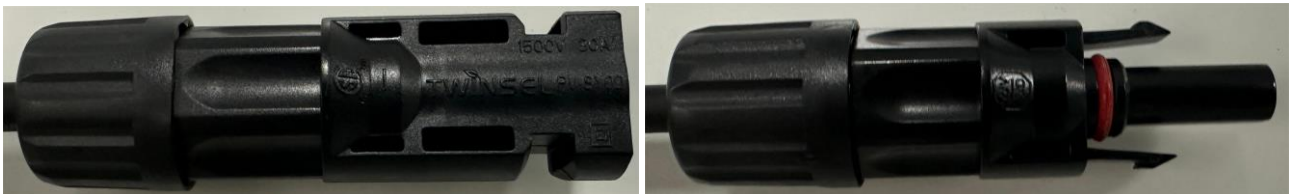


View of cable

Module Type: PRD550-110MT

PROMOD ENERJİ Module type: PM55HC210BF STC: E=1000 W/m², AM 1.5 Tc: 25°C. Power Sorting: 0 ~±4W 		Rated Max. Power (P _{max})	550W	Dimensions	2384*1096*35
		Voltage at P _{max}	31.86V	Weight	31KG
		Current at P _{max}	17.27A	Safety class	Class II
		Open - Circuit Voltage(V _{oc})	38.24V	Standards	IEC
		Short-Circuit Current(I _{sc})	18.28A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions
Maximum System Voltage	1500V				
Maximum Overcurrent Protection Rating	30A				
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MADE IN TURKEY					

Marking plate of sample



View of connector



View of junction box



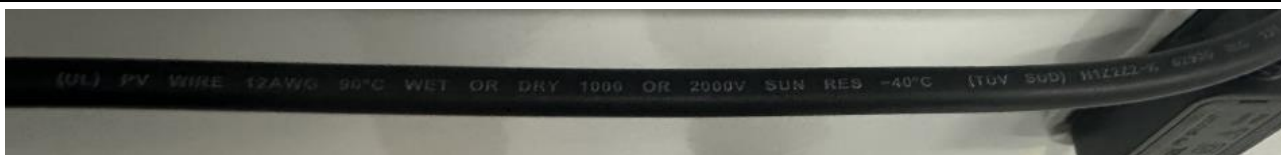
View of mounting holes



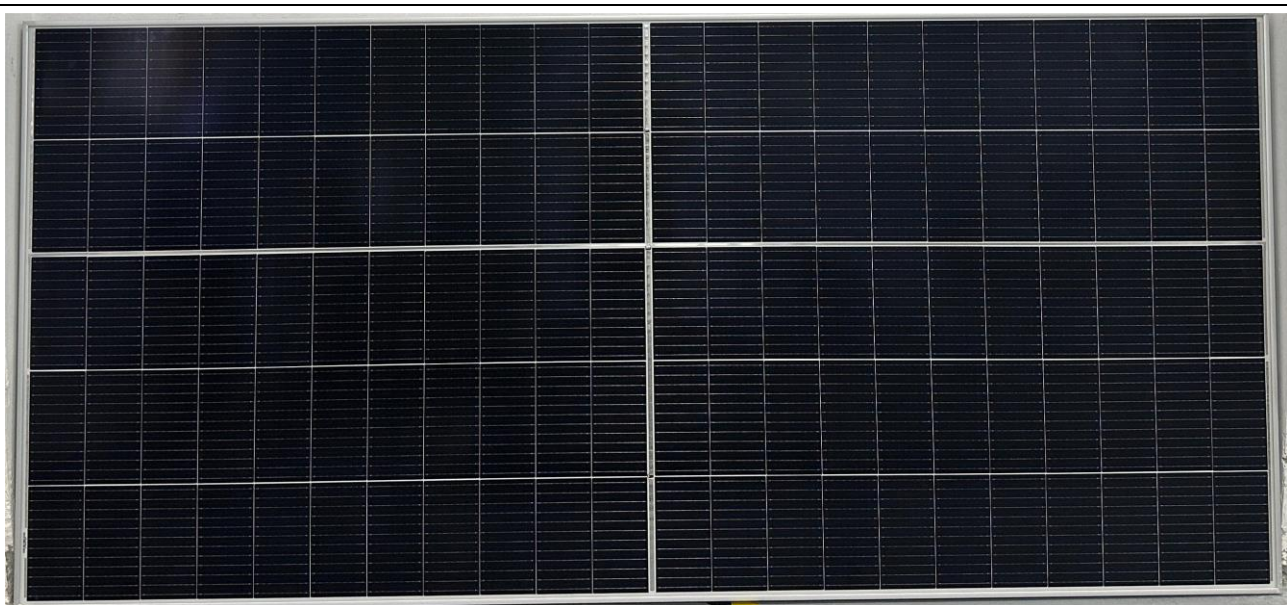
View of ground



View of frame



View of cable



Front view of module



Rear view of module

Module Type: PRD650-120MT

PROMOD ENERJİ		Rated Max. Power (Pmax)	650W	Dimensions	2384*1303*35
		Voltage at Pmax	37.76V	Weight	34KG
		Current at Pmax	17.22A	Safety class	Class II
		Open-Circuit Voltage(Voc)	45.35V	Standards	IEC
		Short-Circuit Current(Isc)	18.23A	 WARNING: This module produces electricity when exposed to light. Follow all applicable electrical safety precautions	
Maximum System Voltage	1500V				
Maximum Overcurrent Protection Rating	30A				
Module type: PM66HC210BF			PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com		
STC: E=1000 W/m ² , AM 1.5 Tc: 25°C			MADE IN TURKEY		
Power Sorting: 0 ~±4W			   		

Marking plate of sample



View of connector



View of junction box



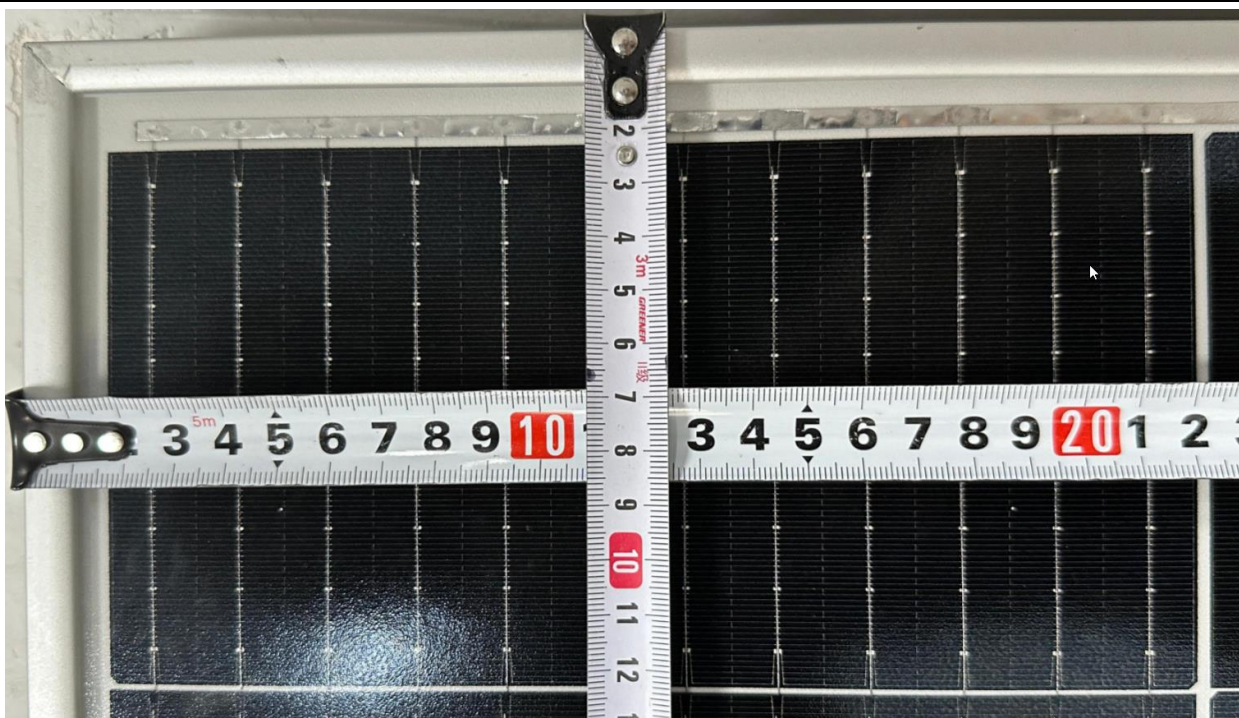
View of mounting holes



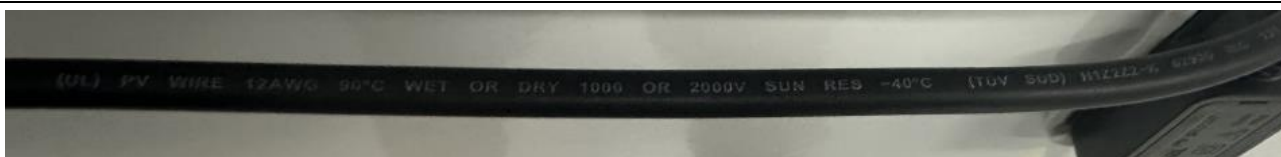
View of ground



View of frame



View of cell

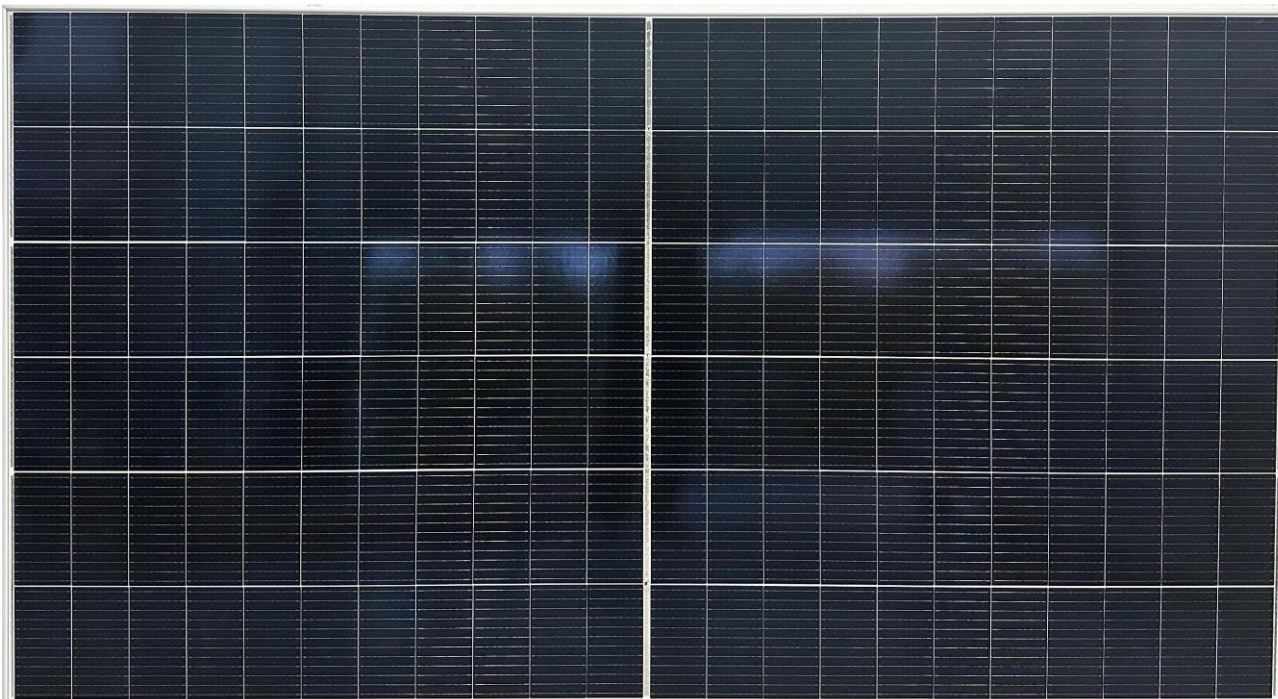


View of cable

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 the light. Follow all applicable electrical safety precautions		
		Maximum System Voltage	1500V				
		Maximum Overcurrent Protection Rating	30A				
PROMODENERJİ URETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com							
MADE IN TURKEY							

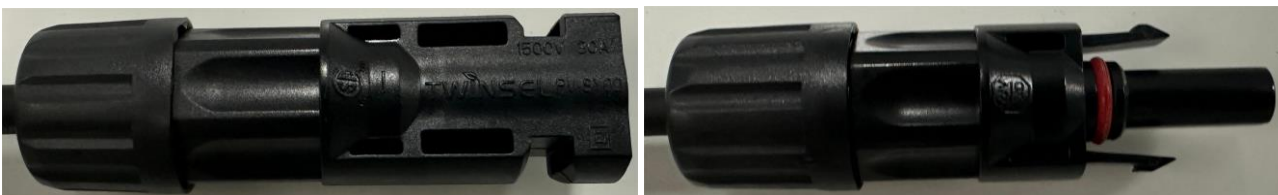
Marking plate of sample



Front view of sample



Rear view of sample



View of connector



View of junction box



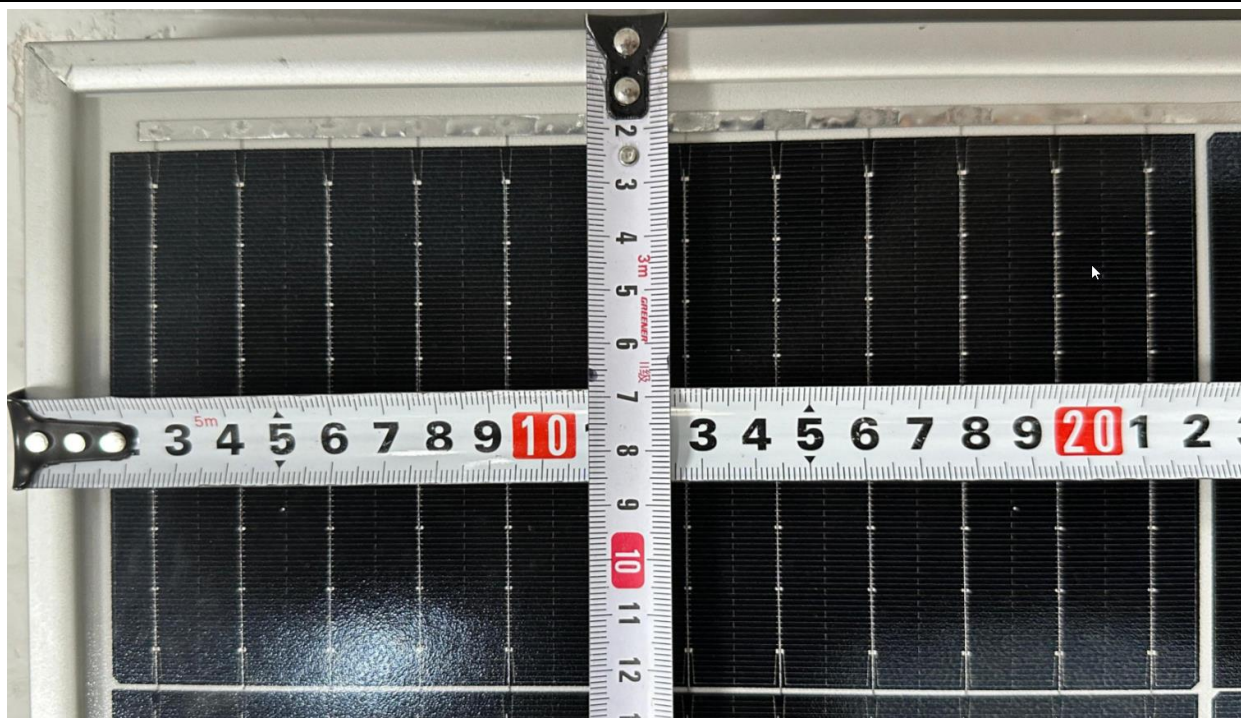
View of mounting holes



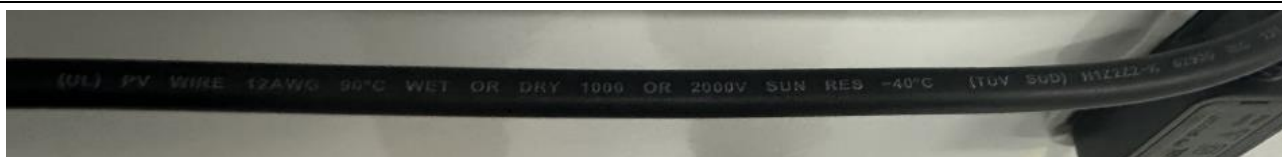
View of ground



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	PRD415-120MT	481403I3331328	LID 60
02	PRD450-108MT	471811I3522288	LID 60
03	PRD550-110MT	471905I4313927	LID 60
04	PRD650-120MT	482029I2602945	LID 60
05	PRD670-132MT	481202I2603564	LID 60

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
04	No major visual defects	P
05	No major visual defects	P

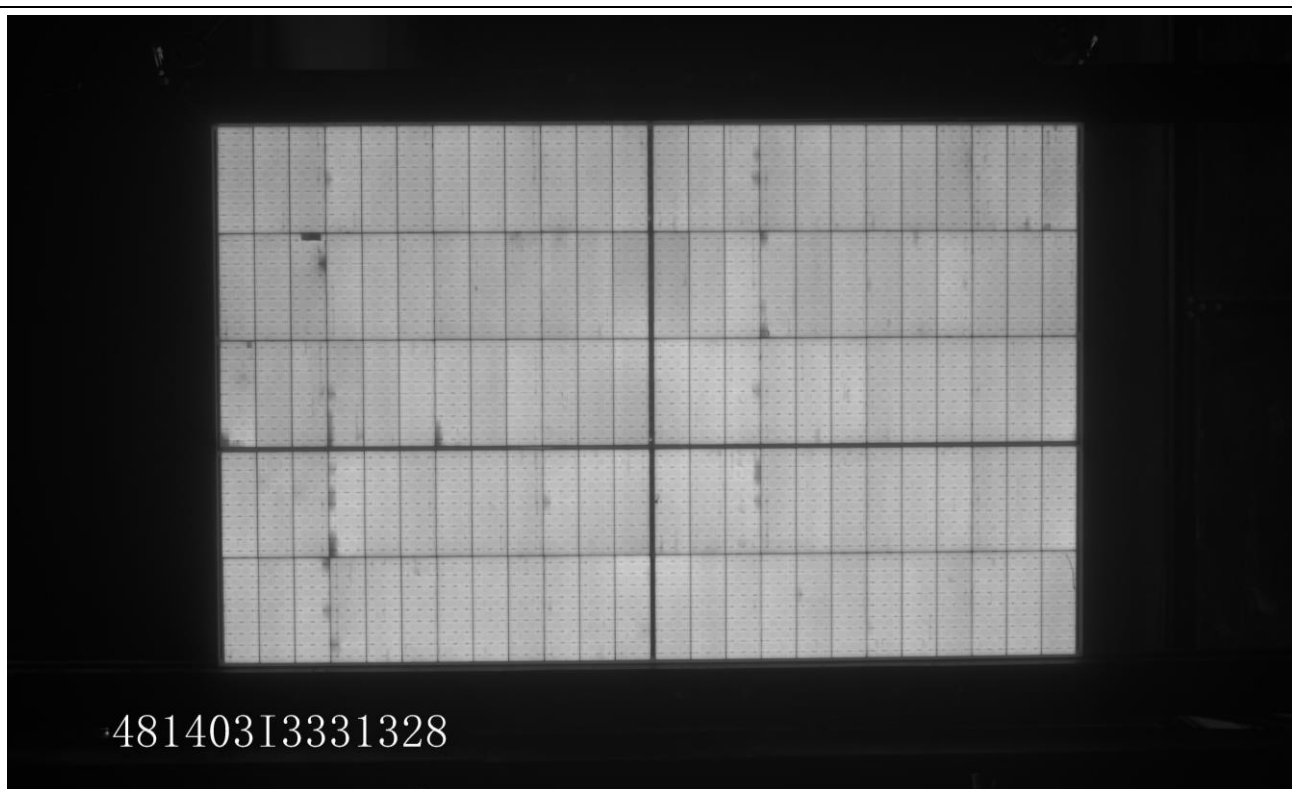
TABLE: 2.2	MQT 06.1 Performance at STC (Initial)						—
Test Date [YYYY-MM-DD]..... :	2024-05-24						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m ²]	Corrected to 1000						—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	
01	12.27	41.35	11.13	35.88	399.4	78.69	
02	12.32	44.70	11.23	38.64	434.1	78.84	
03	18.31	37.91	16.55	33.02	546.5	78.75	
04	18.27	45.78	16.67	39.51	658.6	78.75	
05	18.41	46.01	17.06	39.74	678.1	80.05	
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	23690	≥20.8	—	No	P
02	25410	≥19.3	—	No	P
03	27740	≥15.3	—	No	P
04	23640	≥12.9	—	No	P
05	29870	≥12.9	—	No	P
Supplementary information: Size of module [m ²] 1.92/2.08/2.61/3.11/3.11					

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 [°C].....		22.5		P
Sample #	Measured [MΩ]	Limit [MΩ]	Result	
01	7491	≥20.8	P	
02	6388	≥19.3	P	
03	8745	≥15.3	P	
04	6678	≥12.9	P	
05	6121	≥12.9	P	
Supplementary information: Size of module [m²] 1.92/2.08/2.61/3.11/3.11				

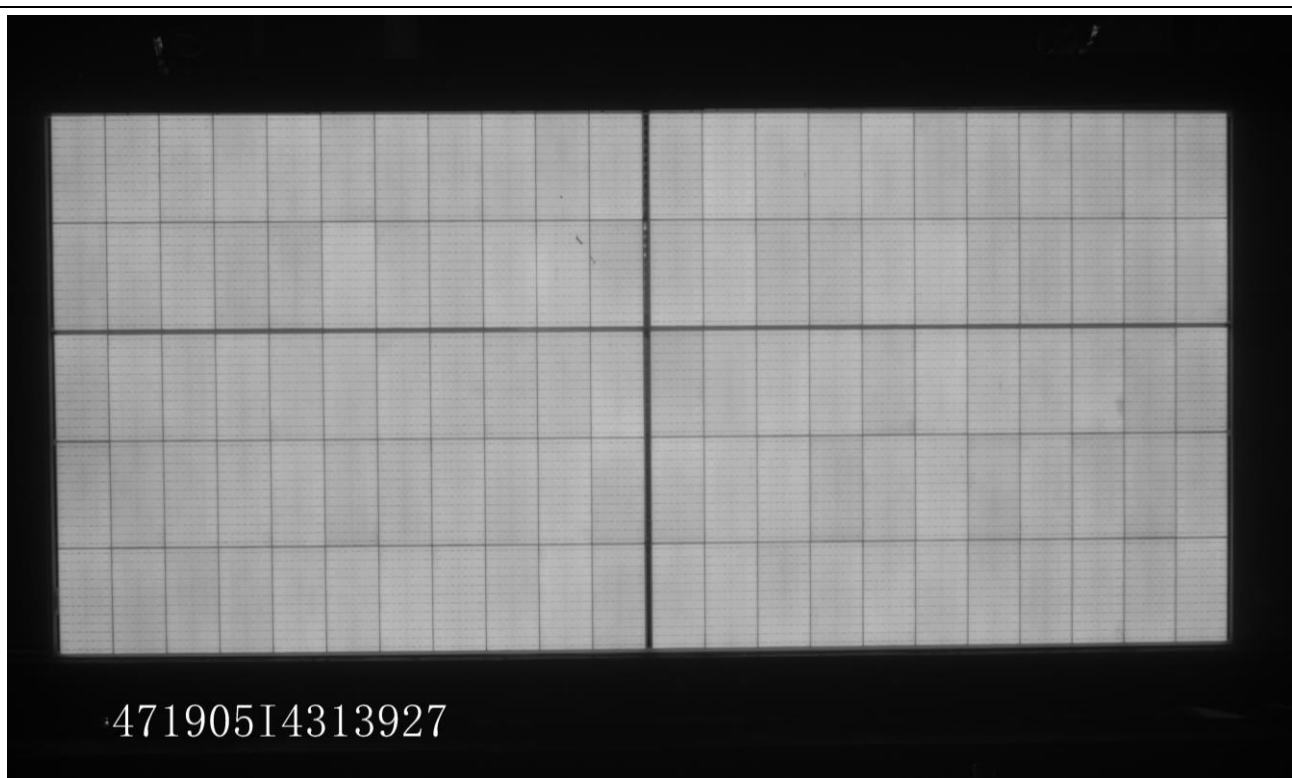
TABLE 2.5		Electroluminescence test (Initial)		—
Test Date [MM/DD/YYYY] :		2024-05-24		—
Applied current [A].....		18		—
Exposure time [s]		6		—
Sample No.	Nature and position of initial findings – comments or attach photos			Result
01	No major visual defects			—
02	No major visual defects			—
03	No major visual defects			—
04	No major visual defects			—
05	No major visual defects			—



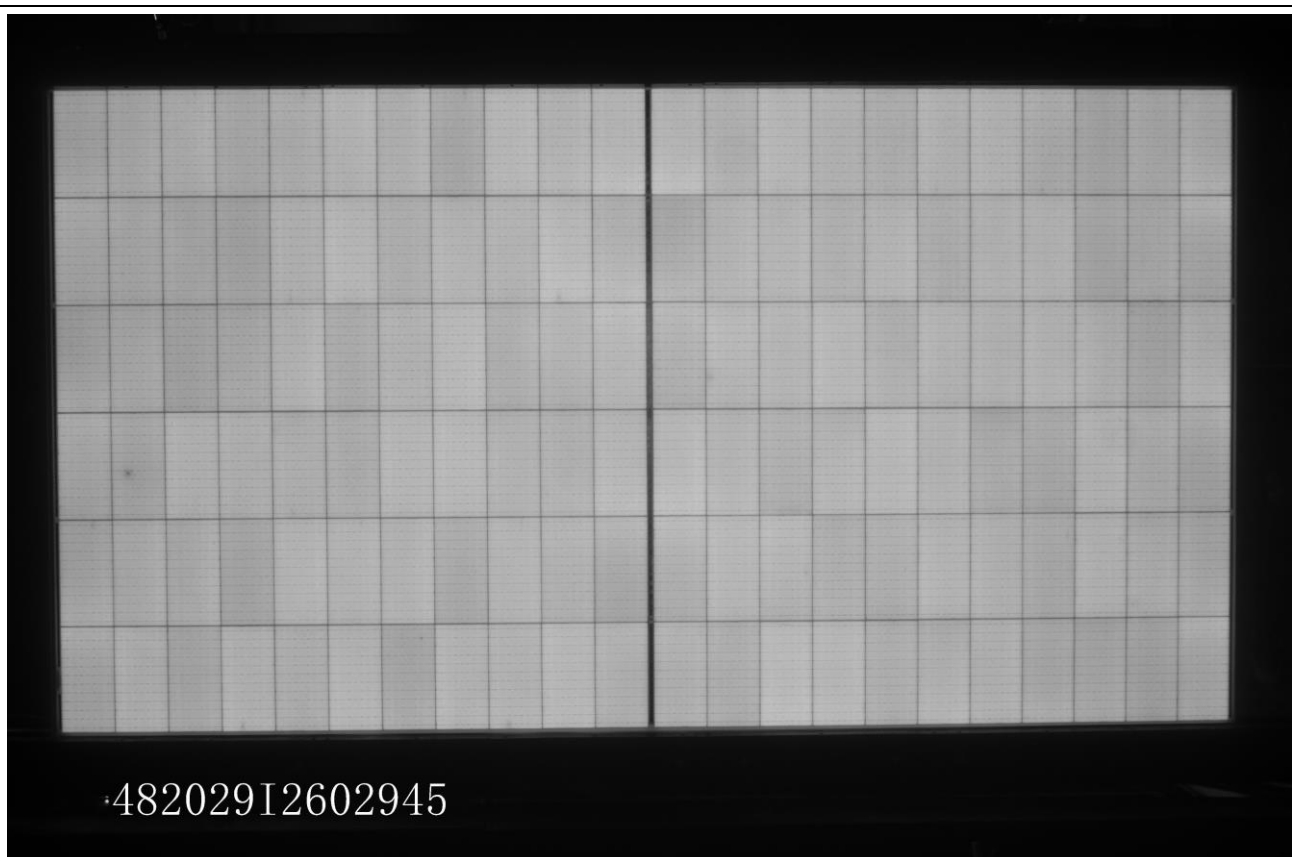
Initial EL picture of Sample 01



Initial EL picture of Sample 02



Initial EL picture of Sample 03



Initial EL picture of Sample 04

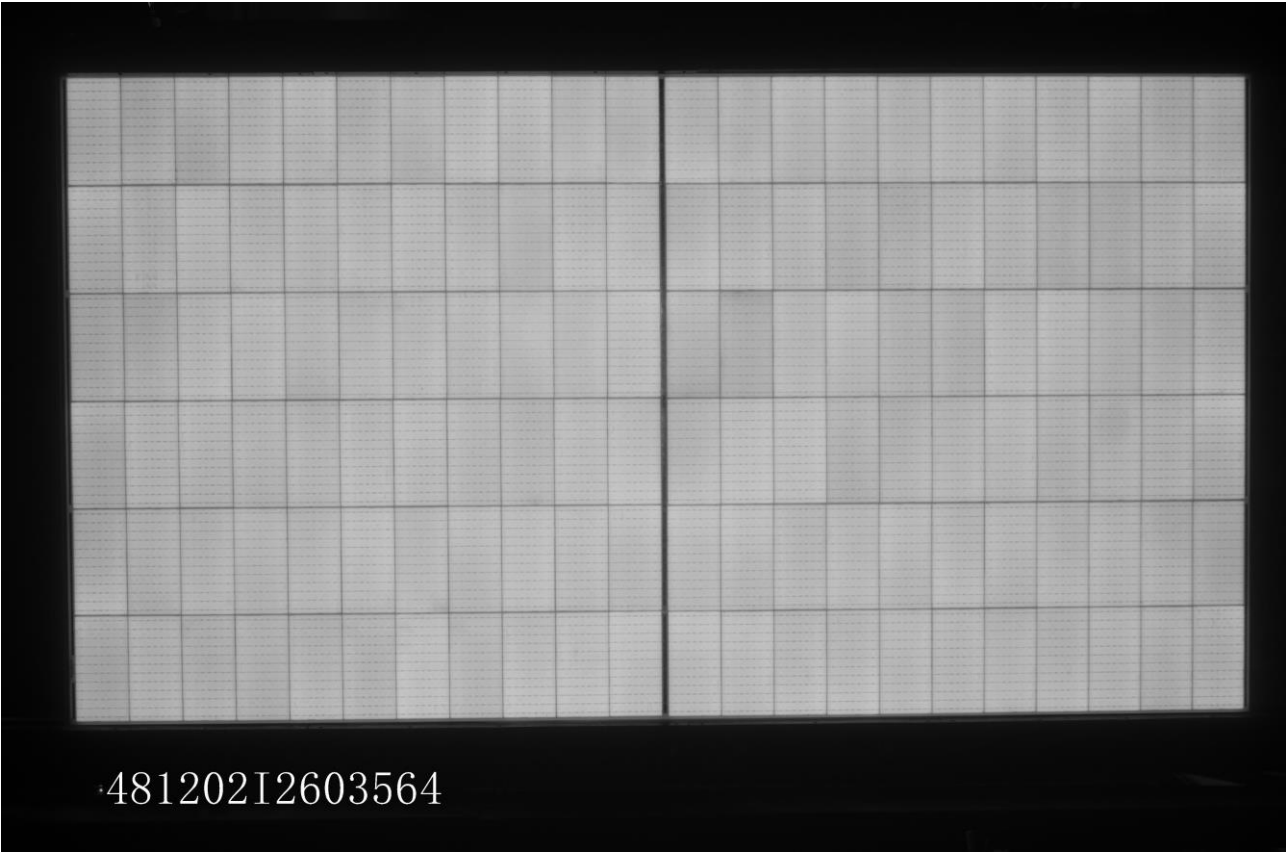
	
Initial EL picture of Sample 05	
Supplementary information: N/A	

TABLE 2.6: Light Induced Degradation test (LID)		—
Test Date [MM/DD/YYYY] start/end	2024-05-26/2024-05-29	—
Module temperature [° C].....	50.3	—
Irradiance [KWh/m ²]	190.4	—
Total Irradiance dose [kWh/ m ²].....	60	—
Module operation condition.....	☒ Short circuited ☐ Open circuited	—
Supplementary information: /		

Final Measurements						
TABLE 2.7	MQT 01 Visual inspection after LID test					P
Test Date [MM/DD/YYYY].....:			2024-06-01			—
Sample #	Nature and position of initial findings – comments or attach photos					—
01	No visual defects					P
02	No visual defects					P
03	No visual defects					P
04	No visual defects					P
05	No visual defects					P
Supplementary information: /						
TABLE 2.8	MQT 06.1 Performance at STC after LID test					P
Test Date [MM/DD/YYYY].....:			2024-06-01			—
Module temperature [°C]			25			—
Irradiance [W/m ²]			1000			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
01	12.24	41.41	11.20	35.47	397.3	78.38
02	12.25	44.75	11.23	38.51	432.5	78.89
03	18.29	37.85	16.50	32.96	543.8	78.56
04	18.19	45.67	16.56	39.63	656.3	79.00
05	18.33	45.91	16.96	39.80	675.0	80.21
Pmp degradation after this test [%] ≤5% :			Sample 01: -0.52%, Sample 02: -0.38% Sample 03: -0.49%, Sample 03: -0.36% Sample 05: -0.46%			P
Supplementary information: /						
TABLE 2.9	MQT 03 Insulation test after LID test					P
Test Date [MM/DD/YYYY].....:			2024-06-01			—
Test Voltage applied [V]			8000 1min/1500 2min			—
Sample #	Measured	Required	Dielectric breakdown		Result	
	MΩ	MΩ	Yes (description)	No		
01	21560	≥20.8	—	No	P	
02	23370	≥19.3	—	No	P	
03	21640	≥15.3	—	No	P	
04	24450	≥12.9	—	No	P	
05	22540	≥12.9	—	No	P	
Supplementary information: Size of module [m ²] 1.92/2.08/2.61/3.11/3.11						
TABLE 2.10	TABLE: Wet leakage current test after LID test					P
Test Date [MM/DD/YYYY].....:			2024-06-01			—

Test Voltage applied [V]		1500 2min	—
Solution resistivity [Ω cm] :		1985	P
Solution temperature [°C] :		22.3	P
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]	Result
01	4998	≥ 20.8	P
02	5124	≥ 19.3	P
03	4766	≥ 15.3	P
04	6721	≥ 12.9	P
05	5243	≥ 12.9	P
Supplementary information: Size of module [m^2] 1.92/2.08/2.61/3.11/3.11			

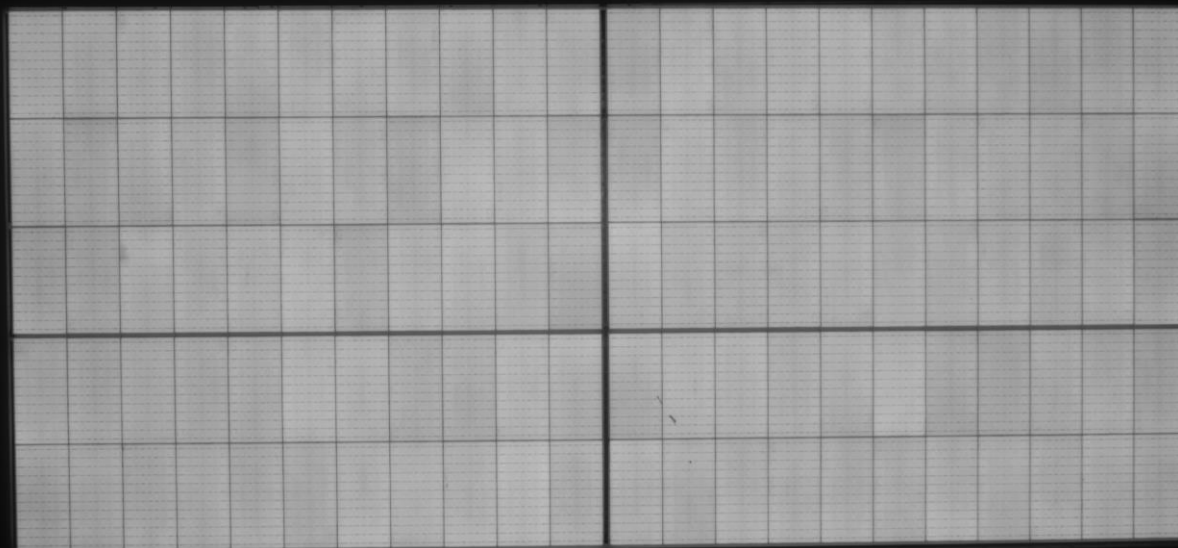
TABLE 2.11 Electroluminescence test after LID test		—
Test Date [MM/DD/YYYY].....:		2024-06-01
Applied current [A]		18
Exposure time [s]		6
Sample No.	Nature and position of initial findings – comments or attach photos	Result
01	No major visual defects	P
02	No major visual defects	P
03	No major visual defects	P
04	No major visual defects	P
05	No major visual defects	P

481403I3331328-LID60

EL picture of Sample 01

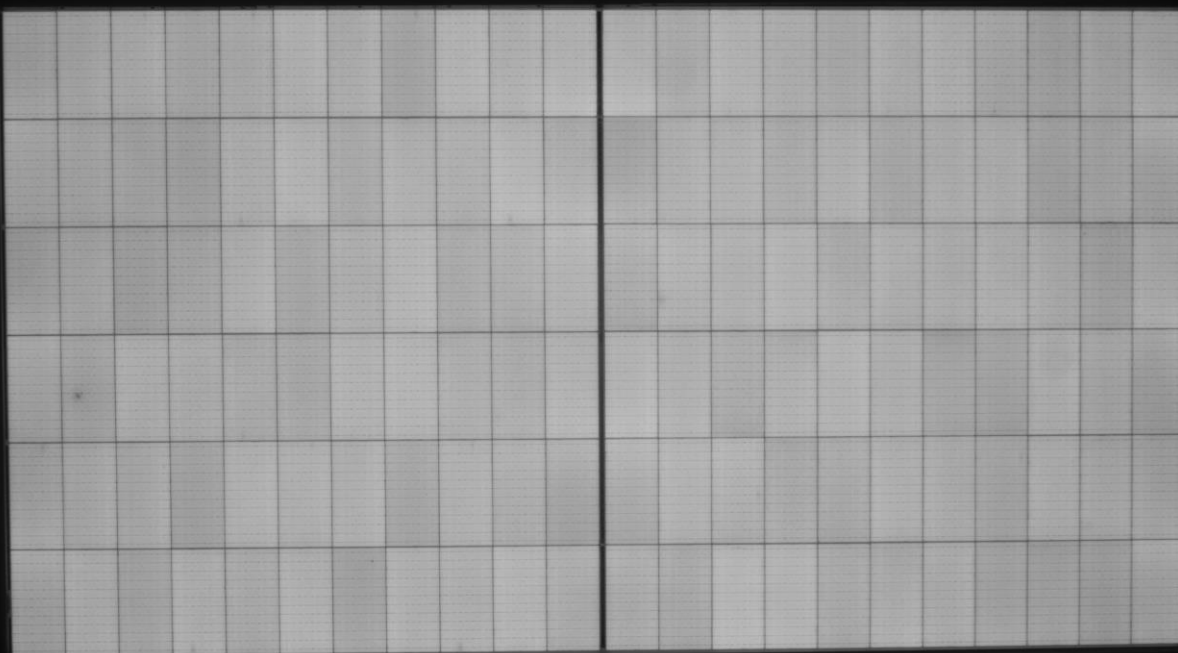
471811I3522288-LID60

EL picture of Sample 02



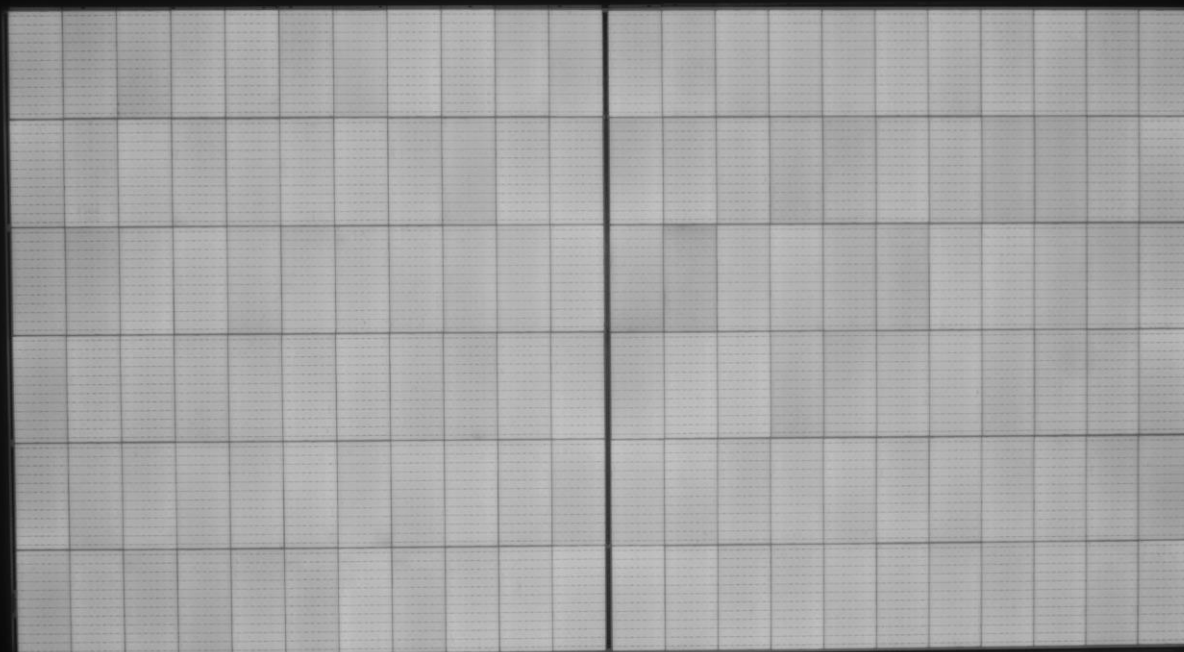
471905I4313927-LID60

EL picture of sample 03



482029I2602945-LID60

EL picture of sample 04



481202I2603564-LID60

EL picture of sample 05

Supplementary information: N/A

3. List of measurement equipment

No.	Test Item	Equipment	Code	Calibration Expire Date
1	Visual inspection	Luminometer	PM6612L	2025-01-31
		Steel tape	Deli 5m	2024-08-23
2	Maximum power determination	Pulsed Solar Simulator	GIV-20A2616	2024-08-22
3	Insulation test	Withstanding voltage/ Insulation resistance tester	AN16313HG	2024-08-17
4	Wet leakage current test	Withstanding voltage/ Insulation resistance tester	AN16313HG	2024-08-17
		Conductive meter	DDS-307	2024-10-31
5	LID test	Steady state sunlight test chamber	GCYQ-HJ-25	2024-10-23
6	Electroluminescence EL test	EL test system	GCYQ-HJ-23	2024-08-01

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 -----