

PV magazine Indoor Test Report

Supplier	JA Solar
Product	JAM72D42-625/LB
Date	1 November 2024
Version	1.0



Overview of the Indoor Test

Description

The Indoor Test is a series of inspection and tests designed to characterize the performance of the PV module products before they are installed in the outdoor field.

The tests are conducted at CEA's parent company's Intertek state of the art laboratory in Zhejiang, China.

The results of the inspections are used to derive a grade number for each test and an average grade for all tests, except UVID, which is optional.

The detailed methodology can be found in the Appendix of this report.

Tests

Visual inspection	Modules are inspected for visual defects according to widely accepted industry criteria.
EL inspection	Modules are inspected for EL defects (electroluminescence) according to widely accepted industry criteria.
Low irradiance Performance	The performance loss of a module in low irradiance conditions is measured.
Pmax Temperature Coefficient	The Pmax temperature coefficient is measured, which determines the performance loss at high temperatures.
PID (Potential Induced Degradation)	The sensitivity of a module to degradation due to voltage stress is measured in a special chamber.
UVID (optional) (Ultraviolet Induced Degradation)	The sensitivity of a module to degradation due to UV light is measured in a special chamber.
Bifaciality Ratio	The bifaciality ratio of all samples is measured to compare against nameplate.

Product and Sample Details

Test sample information

Sample #	Serial number
1	2460108815075836
2	2460108815075840
3	2460108815082569
4	2460108815091538
5	2460108815109622
6	2460108815109351

Other information

Sample selection method	Sample provided by supplier, without random selection
Intertek lab report	Attached

Front side



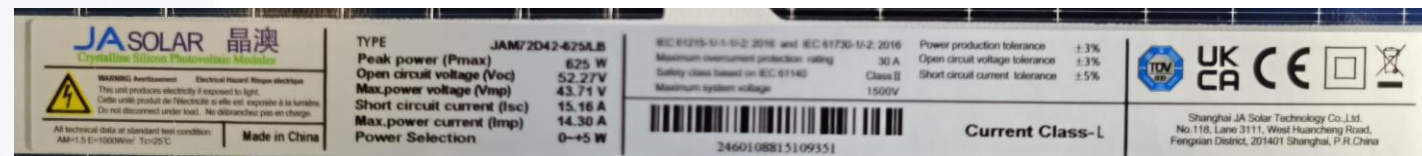
Rear side



Product information

Model	JAM72D42-625/LB
Cell technology	TOPCon
Cell number	144
Cell format	199x182 mm
Number of busbars	16
Junction box	IP68, 3 bypass diodes
Laminate construction	Glass
Bifaciality ratio	80±10%

Nameplate Label



Product Datasheet

Harvest the Sunshine

640W

JA SOLAR

JAM72D42 LB n-type Double Glass Bifacial Modules

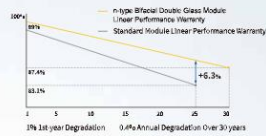
Premium Cells

n-
Bycium+
16BB
MBB Half-Cell
Technology

26%
Up To
Cell Conversion
Efficiency

Premium Modules

Higher power generation better LCOE
Better Temperature Coefficient
n-type with very Lower LID
Better low irradiance response



12-year product warranty
30-year linear power output warranty

Comprehensive Certificates

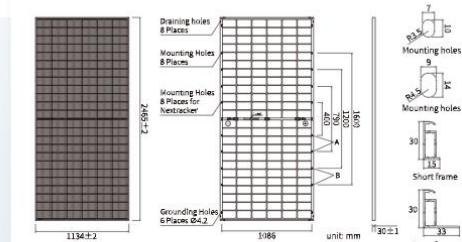
- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing



DEEP BLUE 4.0 Pro

JAM72D42 LB n-type Double Glass Bifacial Modules

DEEP BLUE 4.0 Pro



MECHANICAL PARAMETERS

Cell	Mono
Weight	34.6kg
Dimensions	2465±2mm X 1134±2mm X 30±1mm
Cable Cross Section Size	4mm ² (IEC), 12 AWG(UL)
No. of cells	144(6×24)
Junction Box	IP68, 3 diodes
Connector	QC 4.10 351/ MCA-EVO2A
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-) Landscape: 1500mm(+)/1500mm(-)
Front Glass/Back Glass	2.0mm/2.0mm
Packaging Configuration	36pcs/Pallet, 576pcs/40HQ Container

Remark: customized frame color and cable length available upon request

ELECTRICAL PARAMETERS AT STC

TYPE	JAM72D42 615/LB	JAM72D42 620/LB	JAM72D42 625/LB	JAM72D42 630/LB	JAM72D42 635/LB	JAM72D42 640/LB
Rated Maximum Power(P _{max}) [W]	615	620	625	630	635	640
Open Circuit Voltage (V _{oc}) [V]	51.87	52.07	52.27	52.47	52.67	52.87
Maximum Power Voltage(V _{mp}) [V]	43.31	43.51	43.71	43.90	44.10	44.29
Short Circuit Current(I _{sc}) [A]	15.06	15.11	15.16	15.21	15.26	15.31
Maximum Power Current(I _{mp}) [A]	14.20	14.25	14.30	14.35	14.40	14.45
Module Efficiency [%]	22.0	22.2	22.4	22.5	22.7	22.9
Power Tolerance	0~+3%					
Temperature Coefficient of I _{sc} (α _{Isc})	+0.045%/°C					
Temperature Coefficient of V _{oc} (β _{Voc})	-0.250%/°C					
Temperature Coefficient of P _{max} (γ _{Pmp})	-0.280%/°C					
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM1.5G					

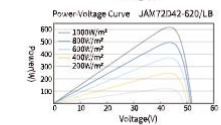
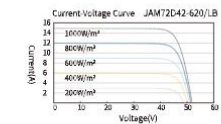
Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM72D42 615/LB	JAM72D42 620/LB	JAM72D42 625/LB	JAM72D42 630/LB	JAM72D42 635/LB	JAM72D42 640/LB
Rated Max Power(P _{max}) [W]	664	670	675	680	685	691
Open Circuit Voltage(V _{oc}) [V]	51.87	52.07	52.27	52.47	52.67	52.87
Max Power Voltage(V _{mp}) [V]	43.31	43.51	43.71	43.90	44.10	44.29
Short Circuit Current(I _{sc}) [A]	16.26	16.32	16.37	16.43	16.48	16.53
Max Power Current(I _{mp}) [A]	15.34	15.39	15.44	15.50	15.55	15.61
Irradiation Ratio (rear/front)	10%					

* For Neotracker Installations, maximum static load please take compatibility approve letter between JA Solar and Neotracker for reference.
** Bifaciality: P_{max, rear}/P_{max, front}

CHARACTERISTICS



OPERATING CONDITIONS

Maximum System Voltage	1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	30A
Maximum Static Load, Front*	5400Pa(112 lb/ft ²)
Maximum Static Load, Back*	2400Pa(50 lb/ft ²)
NOCT	45±2°C
Bifaciality**	80%±10%
Safety Class	Class II
Fire Performance	UL Type 29/Class C

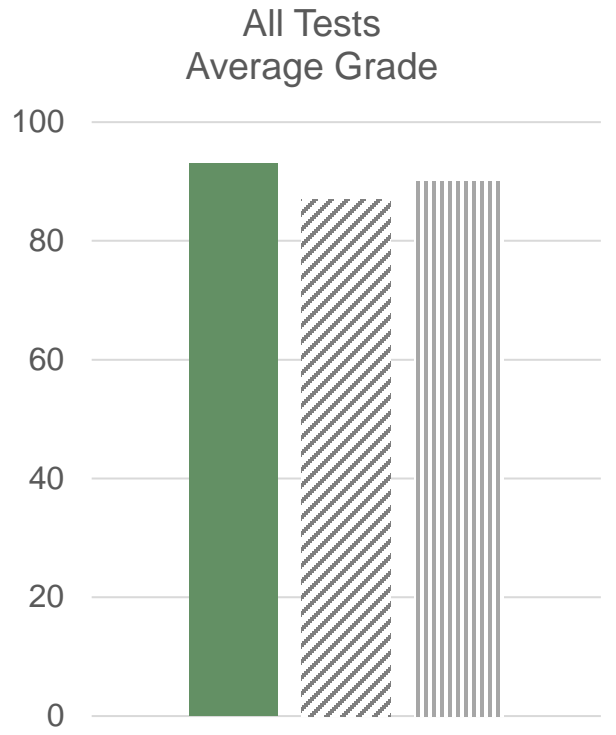
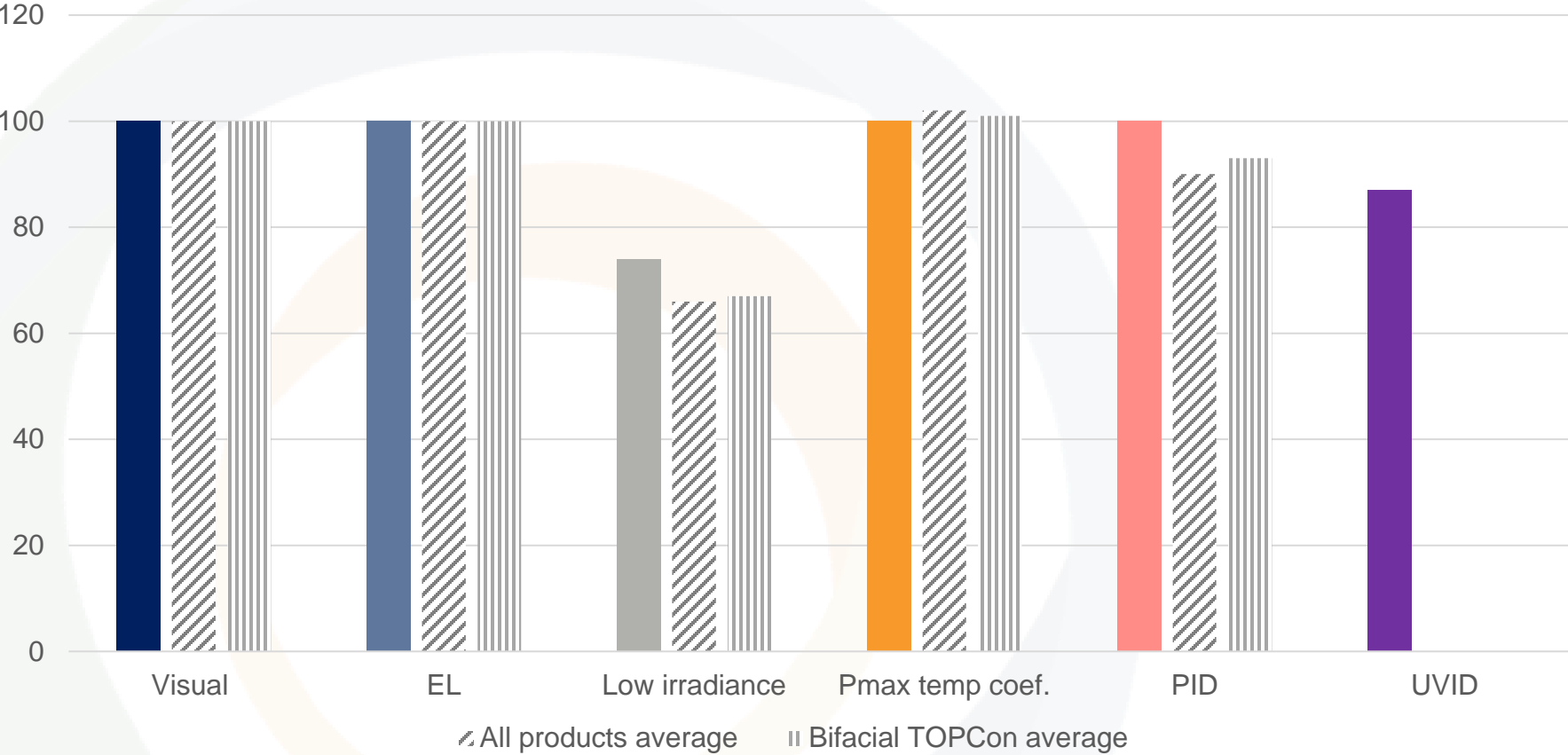
Specifications subject to technical changes and tests. JA Solar reserves the right of final interpretation.

Version No.: Global-EN-20240423A

JA SOLAR

Headquarters No. 8 Building, Nuode Center, No.1 Courtyard, East Auto Museum Road, Fengtai District, Beijing
Tel: +86 10 6361 1888 Fax: +86 10 6361 1999
E-mail: sales@jasolar.com marketing@jasolar.com www.jasolar.com

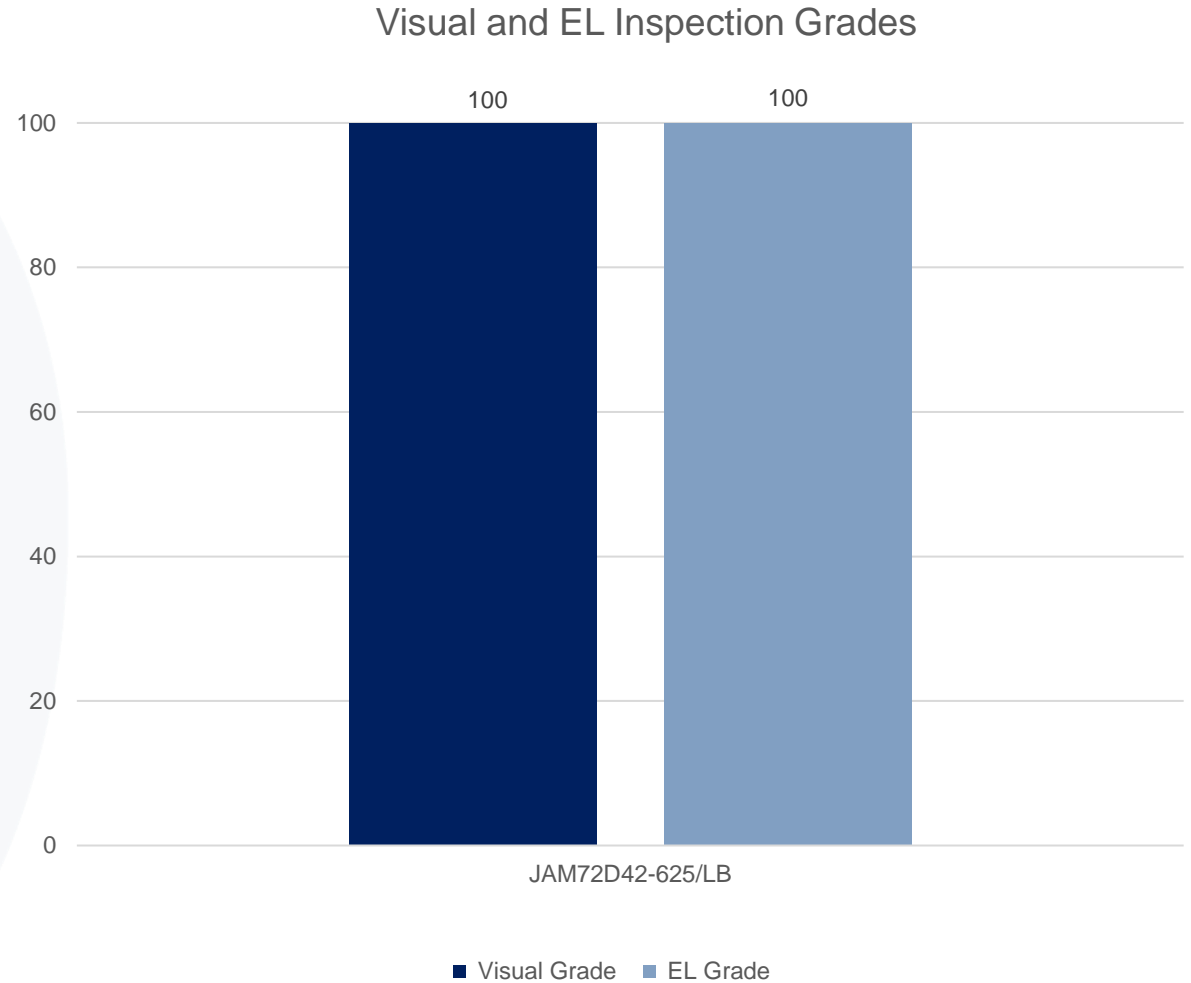
Test Grading Overview



Individual test grades are compared to the average grades for products installed since 2022.
 All products average: the average grade of all products.
 Bifacial TOPCon average: the average grade of all Bifacial TOPCon products.
 The All Tests Average Grade does **not** include the UVID test, as it is optional and not performed for all products.

Visual inspection and EL inspection

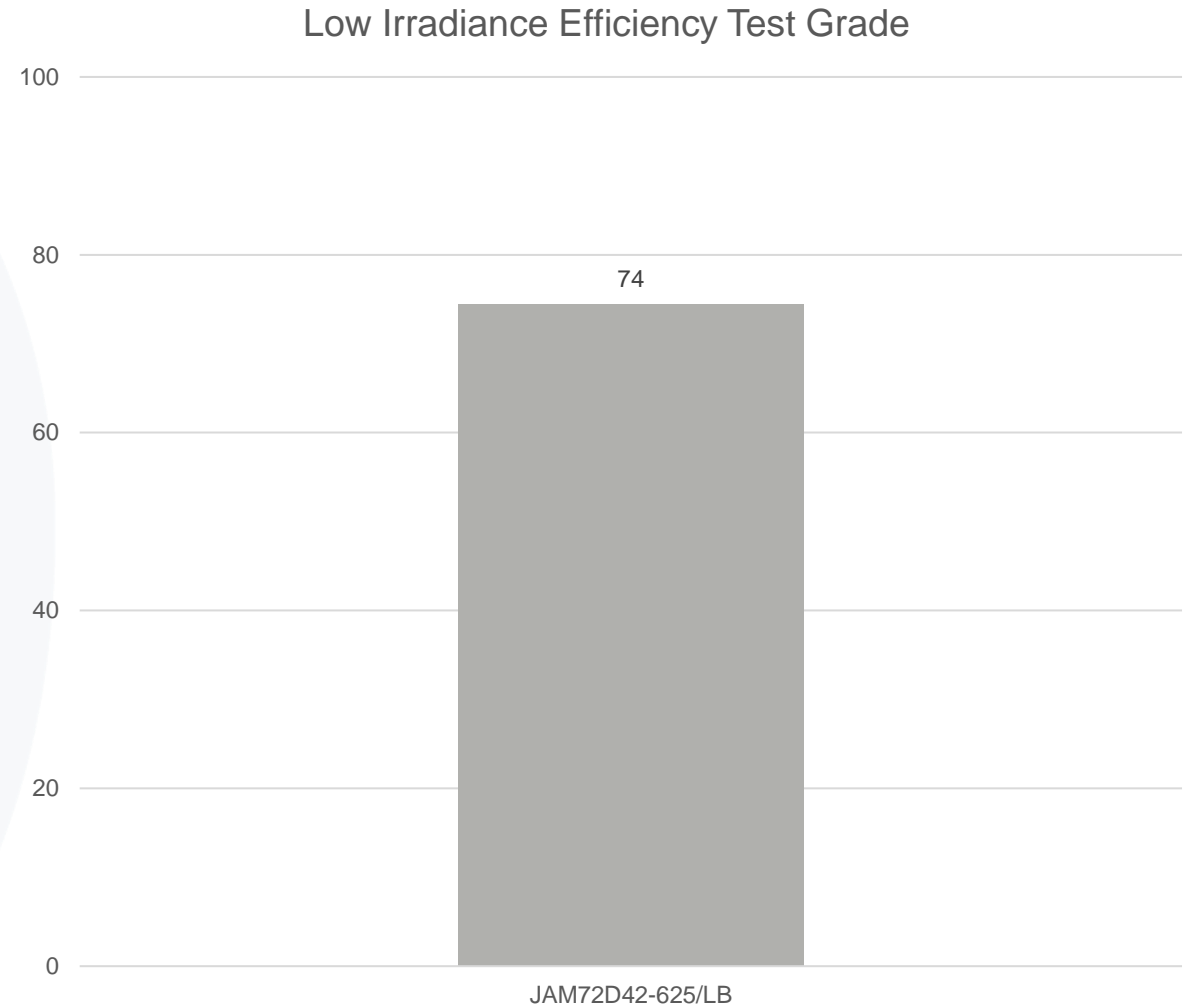
JAM72D42-625/LB	Visual inspection	EL inspection
Sample 1	None	None
Sample 2	None	None
Sample 3	None	None
Sample 4	None	None
Sample 5	None	None
Sample 6	None	None
Score	0	0
Grade	100	100



All 6 modules of each product sample lot have undergone visual inspection, according to CEA's quality criteria for visual inspection.

Low irradiance efficiency loss test

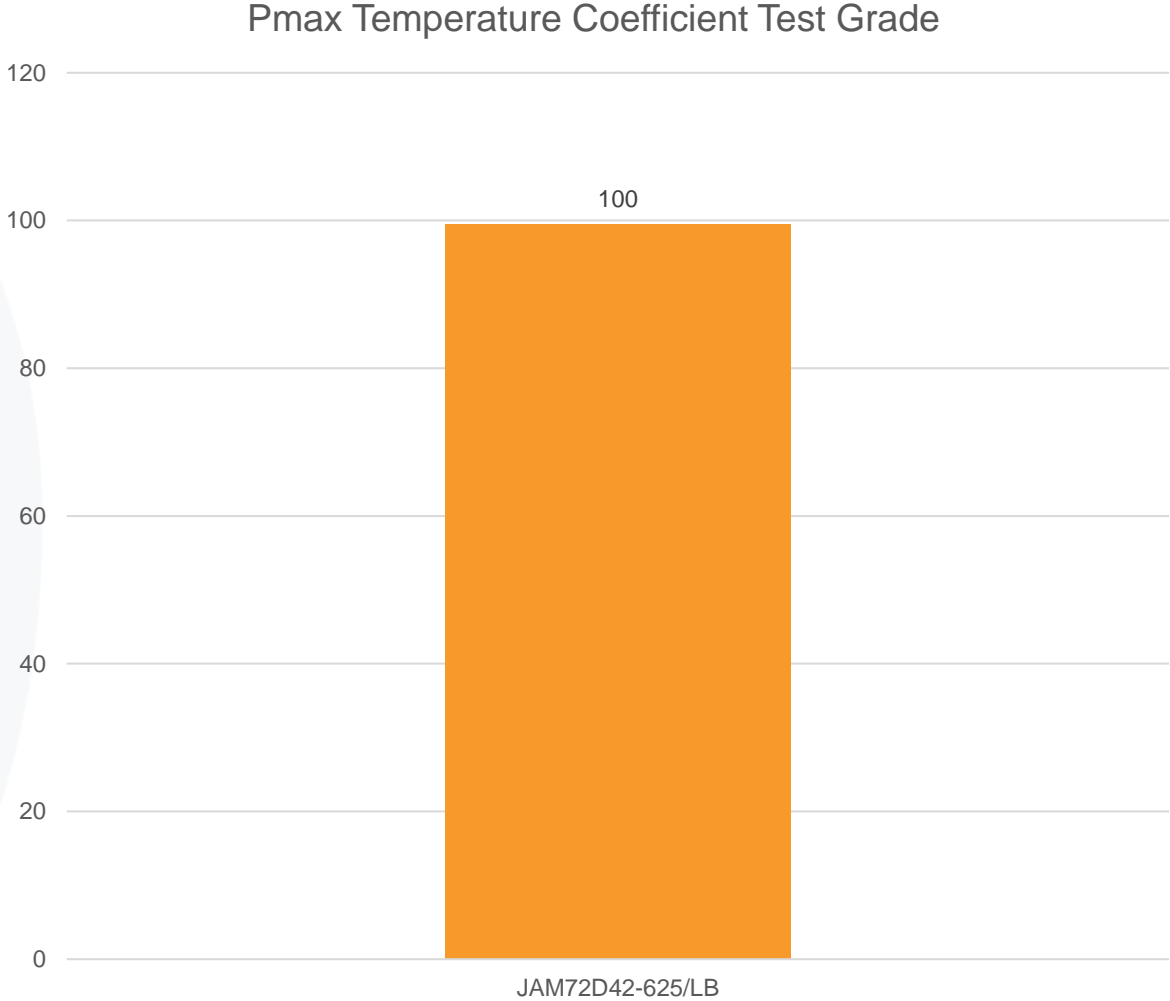
JAM72D42-625/LB	Front side low irradiance efficiency loss (%)
Sample 1	
Sample 2	
Sample 3	
Sample 4	2.70
Sample 5	
Sample 6	
Grade	74



The efficiency loss is calculated by the following formula:
$$\text{Efficiency loss} = 1 - \left[\left(\frac{P_{\text{max at low irradiance conditions}}}{P_{\text{max at STC}}} \right) * \left(\frac{1,000}{200} \right) \right]$$

Pmax temperature coefficient test

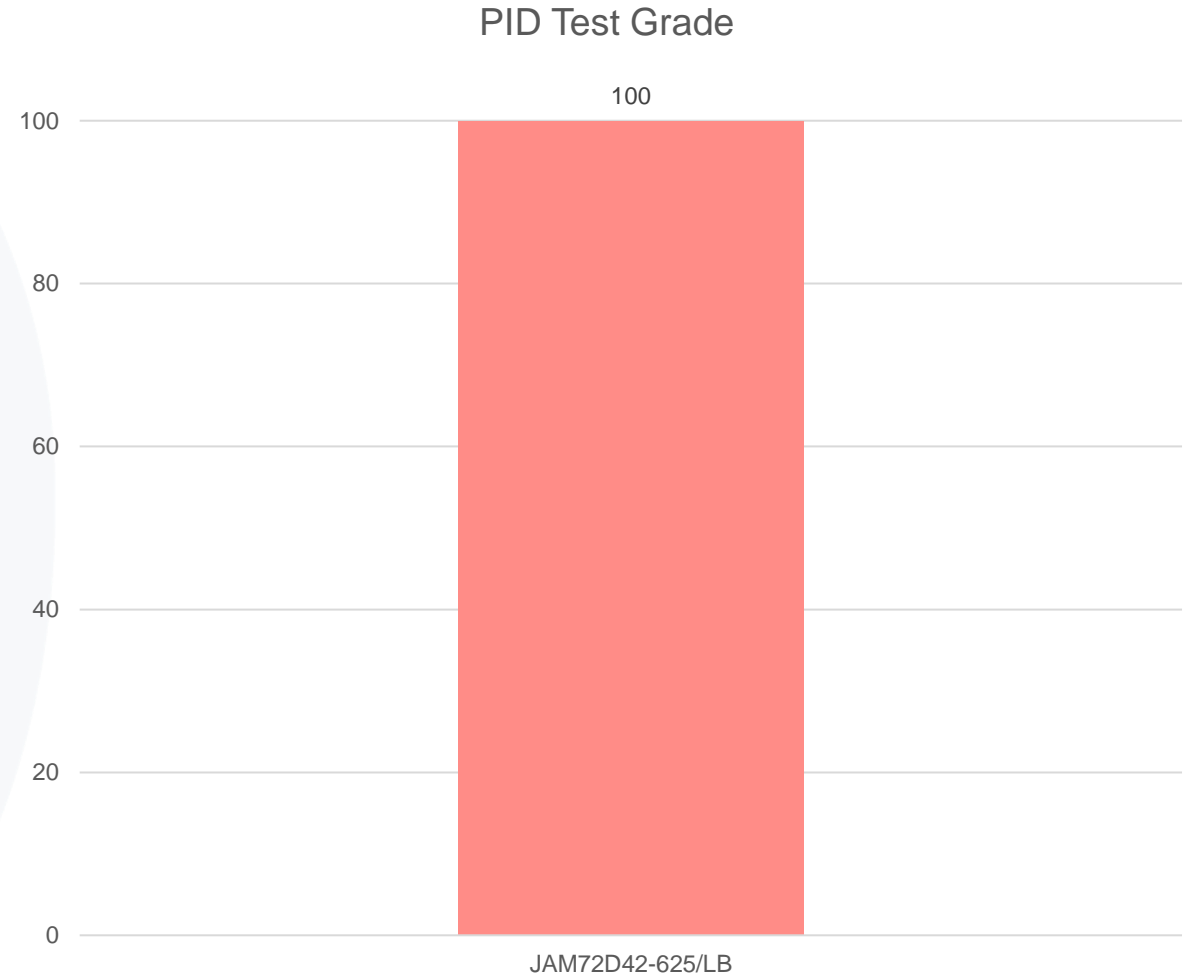
JAM72D42-625/LB	Pmax Temperature coefficient (%/°C)
Sample1	
Sample2	
Sample3	
Sample4	-0.302
Sample5	
Sample6	
Grade	100



The Pmax Temperature Coefficient is measured according to IEC standards.

PID Test

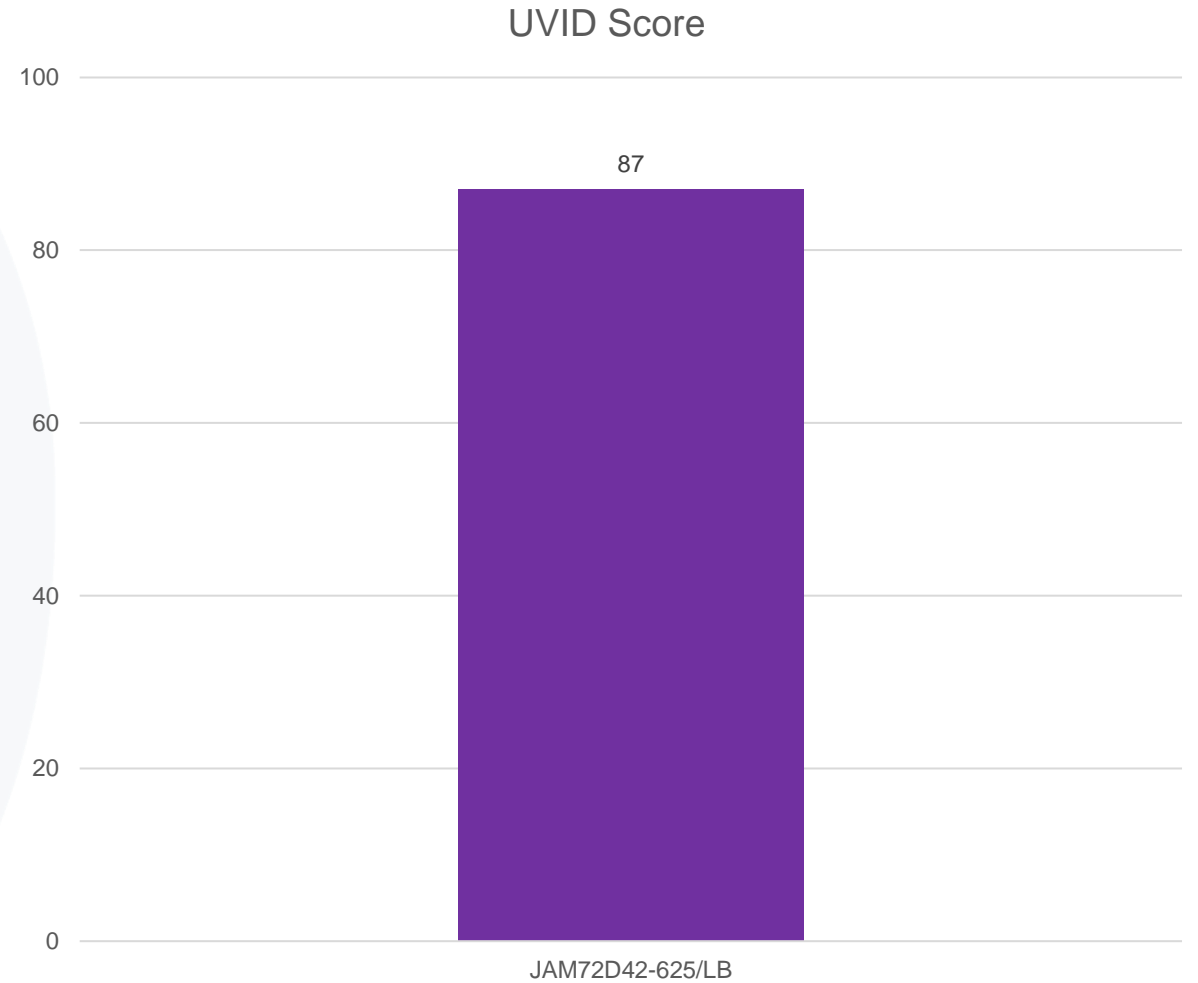
JAM72D42-625/LB	Front side PID loss (%)
Sample 1	
Sample 2	
Sample 3	
Sample 4	
Sample 5	0.09
Sample 6	
Grade	100



The PID loss is the front side power degradation after testing at 1500 V for 96 hours. After PID stressing, the sample is light soaked for one day outdoors to recover any PID-p (polarization) effect. The remaining degradation is due to other causes, such as sodium ion migration.

UVID Test

JAM72D42-625/LB	UVID loss(%/°C)
Sample1	0.75
Sample2	
Sample3	
Sample4	
Sample5	
Sample6	
Grade	87



The UVID loss is the front side power degradation after exposing the sample to 120 kWh/m² of UV irradiance.

Bifaciality Ratio

JAM72D42-625/LB	Bifaciality ratio (%)
Sample 1	76.09
Sample 2	76.05
Sample 3	76.25
Sample 4	76.02
Sample 5	76.33
Sample 6	76.62
Nameplate	80±10%
Average	76.21

The bifaciality ratio test result is not graded. The results are listed for informational purposes.

The bifaciality ratio is calculated from the following formula:

$$\text{Bifaciality ratio} = (\text{Pmax rear surface} / \text{Pmax front surface}) \times 100\%$$

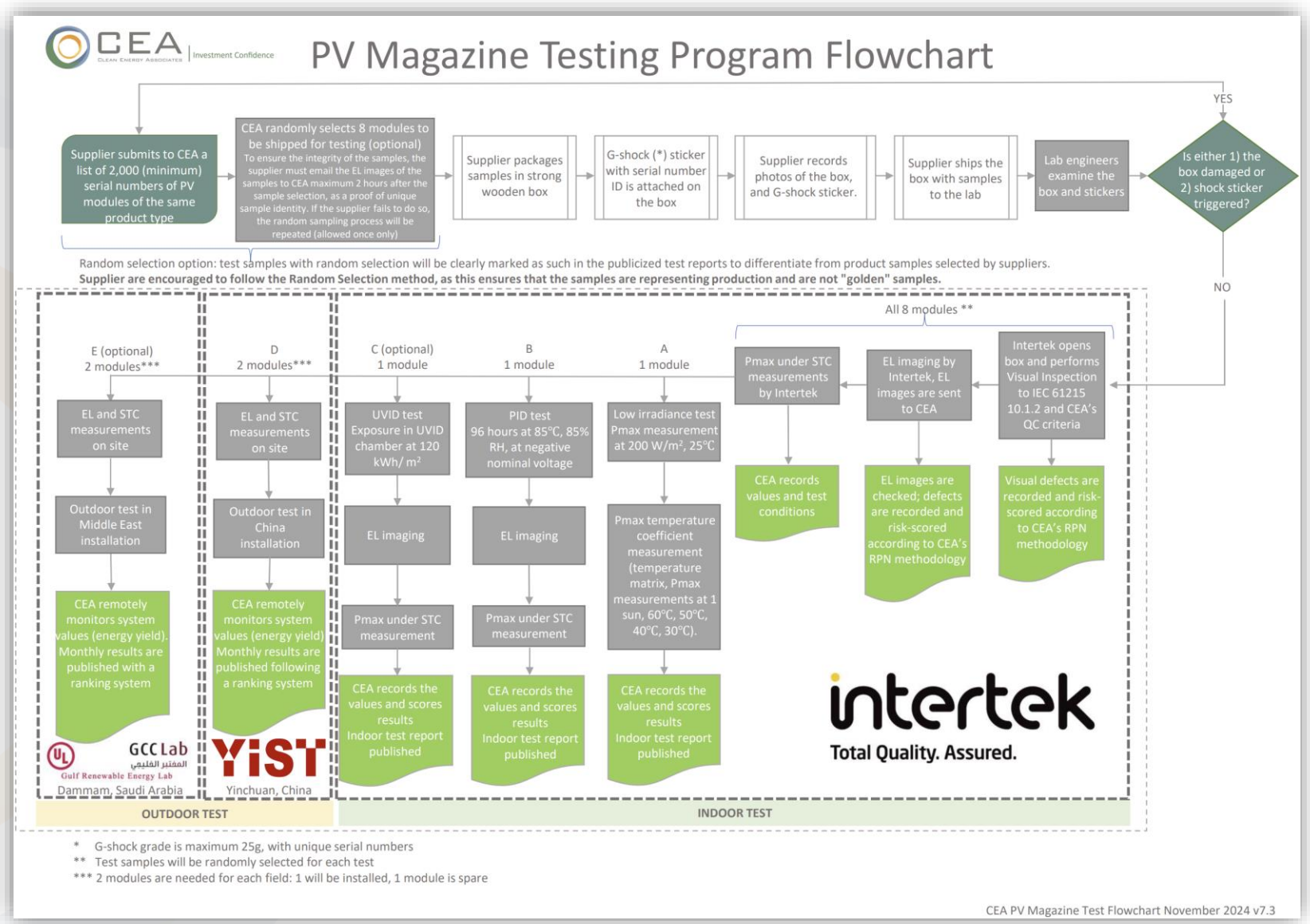
Appendix

Methodology and Scoring System

Test Flowchart and Protocol

The flowchart is a high-level description of the testing procedure, describing the steps, and tests to be applied.

Detailed checklists and instructions created by CEA are delivered to all the testing partners.



Grading Methodology - 1

Test/inspection grading system overview

For every product, all samples are shipped to the Intertek laboratory and then 2 samples are shipped from the lab to each outdoor test field to conduct the tests and inspections according to the above flowchart.

The table describes the inspections and tests applied on all products.

	Test/inspection	# of samples	Method	Values	Average grade weight	Grades
1	Visual inspection	5-8	Inspection	RPN Scores	10%	1-100
2	EL image inspection	5-8	Inspection	RPN Scores	10%	1-100
3	Low irradiance efficiency loss	1	Test	%	25%	1-100
4	Pmax Temperature coefficient	1	Test	%/°C	25%	1-120
5	PID loss	1	Test	%	30%	1-100
6	UVID120 (optional)	1	Test	%	NA	1-100
7	Outdoor installation and yield measurement	2-4	Energy Yield Monitoring	Monthly kWh/kWp	NA	NA

The RPN (risk priority number) scoring method has been developed by CEA and is used to evaluate and create risk scores of Visual and EL defects.

The weights are used to calculate the average grade for tests 1-5.

Grading Methodology - 2

A number within the 1-100/120 range will be used to grade the results, so that the overall ranking of the products will reflect general industry practices and requirements:

Grading System

	Grade range:	120	100	90	80	70	60	50	40	30	20	10	0
1	Visual inspection (RPN scores)	NA	0	0.74	2.20	4.39	7.30	10.94	15.30	20.39	26.20	32.74	≥ 40
2	EL image (RPN scores)	NA	0.00	2.03	4.62	7.75	11.43	15.65	20.43	25.75	31.62	38.03	≥ 45.00
3	Low irradiance loss	NA	≤ -2.00%	-0.02%	1.78%	3.41%	4.87%	6.16%	7.27%	8.21%	8.98%	9.58%	≥ 10.00%
4	Pmax Temp. coefficient	≥ -0.200%	-0.300%	-0.343%	-0.382%	-0.417%	-0.448%	-0.475%	-0.498%	-0.517%	-0.532%	-0.543%	≤ -0.550%
5	PID loss	NA	≤ 0.0%	0.7%	1.6%	2.7%	4.0%	5.5%	7.2%	9.1%	11.2%	13.5%	≥ 16.0%
6	UVID120 (optional)	NA	≤ 0.00%	0.60%	1.20%	1.80%	2.40%	3.00%	3.60%	4.20%	4.80%	5.40%	≥ 6.00%

The Visual and EL Inspection RPN scores are divided by the number of samples, to normalize the score, as the total number of samples may vary.

The correspondence of the scores/test results to the grades follows a binomial or linear relationship, anchored to certain key values that are generally accepted in the PV industry. For example, a PID loss of 5%, which is the pass/fail threshold of the related IEC standard, will give a grade close to 50. Grades below 50 indicate a product performance that is below a generally acceptable threshold.

Selection Methodology

We follow three testing sample selection methods:

1

Sample randomly selected by CEA from a large production lot

2

Sample purchased from the market by CEA

3

Sample provided by supplier, without random selection



Thank You

Company: Clean Energy Associates

Website: www.cea3.com

Email: info@cea3.com

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Test Report

Applicant 1 : Clean Energy Associates (China) Limited
Room 1206, 300 Yan'an West Road, Jing'an District, Shanghai, China

Applicant 2 : Pv magazine group GmbH & Co. KG
Kurfürstendamm 64 | 10707 Berlin, Germany

Product : Crystalline Silicon Terrestrial Photovoltaic Module

Manufacturer : JA Solar

Model No. of Manufacturer : JAM72D42-625/LB

No. of Sample : See the attached sheets

Date of receipt of test item : 08/22/2024,09/29/2024

Date (s) of performance of test : 08/22/2024~10/27/2024

Date of issue : 11/01/2024

Testing Laboratory : Intertek Testing Services Zhejiang Ltd.

Location : Building 2, Juanhu Science and Technology Innovation Park, No. 500
Shuiyueting East Road, Haining, Zhejiang, China

Service Requested : Testing

Method : See **General remarks** in next page

Result : See the attached sheets

Conclusion : The testing of submitted sample is **complied with** the above standards/requirements. See general remarks in page 2 for details.

***** End of page *****

Prepared and checked by:
Intertek Testing Services
Zhejiang



Andrew He
Engineer
PV Division

Reviewed by
Intertek Testing Services
Zhejiang



Ken Gu
Reviewer
PV Division

- The results reported in this test report shall refer only to the sample actually checked and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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Test Report

GENERAL INFORMATION	
Test item particulars:	
Accessories and detachable parts included in the evaluation	-
Options included	-
Possible test case verdicts:	-
Abbreviations used in the report:	
Imp – Maximum power current	Voc – Open circuit voltage
Isc - Short circuit current	FF – Fill Factor
Pmp – Maximum power	α – Current temperature coefficient
Vmp – Maximum power voltage	β – Voltage temperature coefficient
STC – Standard Test Conditions	δ – power temperature coefficient
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:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a point is used as the decimal separator.</p> <p>Test method: IEC 61215-2:2021 Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures</p> <ul style="list-style-type: none"> • Power determination at STC • Wet Leakage Test • Insulation Test • Electroluminescence (EL) Test • Low Irradiance measurement at 200 W/m² • Module Temperature Coefficient Test • UV preconditioning test <p>IEC TS 62804-1 Photovoltaic (PV) modules – Test methods for the detection of potential-induced degradation</p> <ul style="list-style-type: none"> • Potential induced degradation test (PID) 	

Test Report

General Product information:			
Sample assignment:			
Sample No.	SN	Model No.	Remarks
A240822-64-001	2460108815075840	JAM72D42-625/LB	Flash+EL
A240822-64-002	2460108815075836	JAM72D42-625/LB	Flash+EL
A240822-64-003	2460108815080569	JAM72D42-625/LB	Flash+EL
A240822-64-004	2460108815109351	JAM72D42-625/LB	Control
A240822-64-005	2460108815091538	JAM72D42-625/LB	LOW, Temperature Coefficient
A240822-64-006	2460108815109622	JAM72D42-625/LB	PID
A240929-84-001	2490108611086435	JAM72D42-625/LB	UV

Test Report

TABLE Potential induced degradation test (PID)							P
IEC 61215-2 MQT01 - Visual inspection (Initial)							P
Test Date [YYYY-MM-DD]:	2024-08-22						—
Sample#	Nature and position of initial findings – comments or attach photos						—
A240822-64-006	No major visual defect.						P
Supplementary information: N/A							
IEC 61215-2 MQT 02 – Maximum power determination (initial)							—
Test Date [YYYY-MM-DD]:	2024-08-22						—
Module temperature [°C]:	Corrected to 25						—
Irradiance [W/m²] :	1000						—
Sample#	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]	
A240822-64-004front	52.924	14.790	625.023	44.680	13.989	79.85	
A240822-64-004rear	52.567	12.920	478.899	45.268	10.579	70.51	
A240822-64-006front	53.168	14.752	627.910	45.048	13.939	80.06	
A240822-64-006rear	52.557	12.657	479.302	45.375	10.563	72.05	
Supplementary information: N/A							
IEC 61215-2 MQT 03 – Insulation test (initial)							P
Test Date [YYYY-MM-DD]..... :	2024-08-22						—
Test Voltage applied [V]	8000/1500						—
Sample #	Measured	Required	Dielectric breakdown			Result	
	MΩ	MΩ	Yes (description)		No		
A240822-64-006	>1000	14.3	-		No	P	
Supplementary information: Size of module[m²]: 2.79							
IEC 61215-2 MQT 15 – Wet leakage current test (initial)							P
Test Date [YYYY-MM-DD]..... :	2024-08-22						—
Maximum system voltage (V)	1500						—
Test voltage applied Vtest (V d.c.)	1500						—
Solution resistivity (Ω-cm)	< 3500 Ω cm at 22 ± 2°C						P
Solution temperature (°C)	22 ± 2°C						P
Sample##	Measured[MΩ]	Required[MΩ]					—
A240822-64-006	>1000	14.3					P
Supplementary information: Size of module [m²]: 2.79							
IEC 61730-2 MST 13 – Ground continuity test (initial)							P
Test Date [YYYY-MM-DD]..... :	2024-08-22						—
Maximum over-current protection rating (A)	30						—

Test Report

Current applied (A)	75	—					
Location of designated grounding point.....	Frame	—					
Location of second contacting point.....	Frame	—					
Sample# #	Resistance (mΩ)	—					
A240822-64-006	21	P					
EL Test (Initial)		—					
Test Date [YYYY-MM-DD].....	2024-08-22	—					
Please check attached photos for details.							
Supplementary information: N/A							
PID test		—					
Test Date [MM/DD/YYYY] / start - end ... :	2024-08-23~2024-08-27	—					
Total time	96 hours	—					
Voltage applied between current carry parts and grounding	-1500	—					
Temperature	85°C±2°C	—					
Humidity	85%±3%	—					
Supplementary information: N/A							
IEC 61215-2 MQT01 - Visual inspection (after PID test)		P					
Test Date [YYYY-MM-DD]:	2024-08-27	—					
Sample#	Nature and position of initial findings – comments or attach photos	—					
A240822-64-006	No major visual defect.	P					
Supplementary information: N/A							
IEC 61215-2 MQT 02 – Maximum power determination (after PID test)		—					
Test Date [YYYY-MM-DD]:	2024-08-27	—					
Module temperature [°C]:	Nature and position of initial findings – comments or attach photos	—					
Irradiance [W/m²]:	1000	—					
Sample#	Pmp change rate after this test [%]	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]
A240822-64-004front	-	52.915	14.790	624.323	44.684	13.972	79.77
A240822-64-004rear	-	52.543	12.917	478.869	45.266	10.579	70.56
A240822-64-006front	-0.03	52.922	14.769	627.743	44.833	14.002	80.31
A240822-64-006rear	-0.79	52.784	12.216	475.496	45.431	10.466	73.74
Supplementary information: N/A							
IEC 61215-2 MQT 03 – Insulation test (after PID test)							P
Test Date [YYYY-MM-DD]..... :	2024-08-27						—
Test Voltage applied [V]	8000/1500						—

Test Report

Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
A240822-64-006	>1000	14.3	-	No	P
Supplementary information: Size of module[m²]: 2.79					
IEC 61215-2 MQT 15 – Wet leakage current test (after PID test)					P
Test Date [YYYY-MM-DD]..... :			2024-08-27		—
Maximum system voltage (V)			1500		—
Test voltage applied Vtest (V d.c.)			1500		—
Solution resistivity (Ω·cm)			< 3500 Ω cm at 22 ± 2°C		P
Solution temperature (°C)			22 ± 2°C		P
Sample##			Measured[MΩ]	Required[MΩ]	—
A240822-64-006			>1000	14.3	P
Supplementary information: Size of module [m²]: 2.79					
EL Test (after PID test)					—
Test Date [YYYY-MM-DD].....			2024-08-27		—
Please check attached photos for details.					
Supplementary information: N/A					

TABLE Performance at STC							P
IEC 61215-1 - Visual inspection							P
Test Date [YYYY-MM-DD]:			2024-09-11				—
Sample#			Nature and position of initial findings – comments or attach photos				—
A240822-64-001			No major visual defect.				P
A240822-64-002			No major visual defect.				P
A240822-64-003			No major visual defect.				P
Supplementary information: N/A							
IEC 61215-2 MQT 06 – Performance at STC							—
Test Date [YYYY-MM-DD]:			2024-09-11				—
Module temperature [°C]:			Corrected to 25				—
Irradiance [W/m²] :			1000				—
Sample#	Voc[V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]	
A240822-64-001front	52.988	14.763	627.732	44.886	13.985	80.24	
A240822-64-001rear	52.616	12.877	477.394	45.273	10.545	70.46	
A240822-64-002front	52.960	14.768	626.823	44.862	13.972	80.14	
A240822-64-002rear	52.551	12.806	476.934	45.305	10.527	70.87	
A240822-64-003front	52.907	14.779	624.716	44.755	13.959	79.90	
A240822-64-003rear	52.482	12.770	476.355	45.293	10.517	71.08	

Test Report

Supplementary information: NA

IEC 61215-2 MQT 03 – Insulation test (initial)					P
Test Date [YYYY-MM-DD]			2024-09-11		—
Test Voltage applied [V]			8000/1500		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
A240822-64-001	>1000	14.3	-	No	P
A240822-64-002	>1000	14.3	-	No	P
A240822-64-003	>1000	14.3	-	No	P

Supplementary information: Size of module[m²]: 2.79

IEC 61215-2 MQT 15 – Wet leakage current test (initial)				P
Test Date [YYYY-MM-DD]		2024-09-11		—
Maximum system voltage (V)		1500		—
Test voltage applied V _{test} (V d.c.)		1500		—
Solution resistivity (Ω·cm)		< 3500Ω cm at 22 ± 2°C		P
Solution temperature (°C)		22 ± 2°C		P
Sample#	Measured[MΩ]	Required[MΩ]		—
A240822-64-001	>1000	14.3		P
A240822-64-002	>1000	14.3		P
A240822-64-003	>1000	14.3		P

Supplementary information: Size of module [m²]: 2.79

TABLE UV preconditioning test							P
IEC 61215-2 MQT01 - Visual inspection (Initial)							P
Test Date [YYYY-MM-DD]:		2024-09-29					—
Sample#		Nature and position of initial findings – comments or attach photos					—
A240929-84-001		No major visual defect.					P
Supplementary information: N/A							
IEC 61215-2 MQT 02 – Maximum power determination (initial)							—
Test Date [YYYY-MM-DD]:		2024-09-29					—
Module temperature [°C]:		Corrected to 25					—
Irradiance [W/m ²] :		1000					—
Sample#	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]	
A240822-64-004front	53.189	14.777	628.713	44.883	14.008	79.99	
A240822-64-004rear	52.569	12.927	478.181	45.308	10.554	70.37	
A240929-84-001front	53.314	14.578	621.853	45.077	13.795	80.01	

Test Report

A240929-84-001rear		52.819	12.454	492.663	45.904	10.732	74.90
Supplementary information: N/A							
IEC 61215-2 MQT 03 – Insulation test (initial)							P
Test Date [YYYY-MM-DD].....:		2024-09-29					—
Test Voltage applied [V]		8000/1500					—
Sample #	Measured	Required	Dielectric breakdown		Result		
	MΩ	MΩ	Yes (description)	No			
A240929-84-001	>1000	14.3	-	No	P		
Supplementary information: Size of module[m ²]: 2.79							
IEC 61215-2 MQT 15 – Wet leakage current test (initial)							P
Test Date [YYYY-MM-DD].....:		2024-09-29					—
Maximum system voltage (V)		1500					—
Test voltage applied Vtest (V d.c.)		1500					—
Solution resistivity (Ω·cm)		< 3500 Ω cm at 22 ± 2°C					P
Solution temperature (°C)		22 ± 2°C					P
Sample##			Measured[MΩ]	Required[MΩ]	—		
A240929-84-001			>1000	14.3	P		
Supplementary information: Size of module [m ²]: 2.79							
IEC 61215-2 MQT 10 UV preconditioning test							P
Sample#		A240929-84-001					
Test Date (YYYY-MM-DD) start/end		2024-09-29~2024-10-14					—
Module temperature [°C]		60±5					—
UV irradiance (280-400nm) [W/m ²]		220					—
UV dose (280-400nm) [kWh/ m ²]		60					—
Module operation condition		<input checked="" type="checkbox"/> Short circuited <input type="checkbox"/> Pmax					—
Supplementary information:							
IEC 61215-2 MQT01 - Visual inspection (after UV 60KWh/m²)							P
Test Date [YYYY-MM-DD]:		2024-10-14					—
Sample#		Nature and position of initial findings – comments or attach photos					—
A240929-84-001		No major visual defect.					P
Supplementary information: N/A							
IEC 61215-2 MQT 02 – Maximum power determination (after UV 60KWh/m²)							—
Test Date [YYYY-MM-DD]:		2024-10-14					—
Module temperature [°C]:		Corrected to 25					—
Irradiance [W/m ²):		1000					—

Test Report

Sample#	Pmp change rate [%]	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]
A240822-64-004front	-	53.180	14.777	628.474	44.848	14.013	79.98
A240822-64-004rear	-	52.558	12.923	477.079	45.298	10.532	70.24
A240929-84-001front	-0.69	53.164	14.557	617.545	44.820	13.778	79.79
A240929-84-001rear	-0.52	52.740	12.319	490.104	46.018	10.650	75.43

Supplementary information: N/A

IEC 61215-2 MQT 15 – Wet leakage current test (after UV 60KWh/m2)			P
Test Date [YYYY-MM-DD]	2024-10-14		—
Maximum system voltage (V)	1500		—
Test voltage applied Vtest (V d.c.)	1500		—
Solution resistivity (Ω·cm)	< 3500 Ω cm at 22 ± 2°C		P
Solution temperature (°C)	22 ± 2°C		P
Sample##	Measured[MΩ]	Required[MΩ]	—
A240929-84-001	>1000	14.3	P

Supplementary information: Size of module [m²]: 2.79

EL Test (after UV 60KWh/m2)			—
Test Date [YYYY-MM-DD] :	2024-10-14		—
Please check attached photos for details.			
Supplementary information: N/A			

IEC 61215-2 MQT 10 UV preconditioning test			P
Sample#	A240929-84-001		
Test Date (YYYY-MM-DD) start/end	2024-10-14~2024-10-27		—
Module temperature [°C]	60±5		—
UV irradiance (280-400nm) [W/m²]	220		—
UV dose (280-400nm) [kWh/ m²]	60		—
Module operation condition	<input checked="" type="checkbox"/> Short circuited <input type="checkbox"/> Pmax		—

Supplementary information:

IEC 61215-2 MQT01 - Visual inspection (after UV 120KWh/m²)			P
Test Date [YYYY-MM-DD]:	2024-10-27		—
Sample#	Nature and position of initial findings – comments or attach photos		—
A240929-84-001	No major visual defect.		P

Supplementary information: N/A

Test Report

IEC 61215-2 MQT 02 – Maximum power determination (after UV 120KWh/m2)								—	
Test Date [YYYY-MM-DD]:			2024-10-27					—	
Module temperature [°C]:			Corrected to 25					—	
Irradiance [W/m ²]:			1000					—	
Sample#	Pmp change rate [%]	Total Pmp change rate [%]	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]	
A240822-64-004front	-	-	53.169	14.779	627.880	44.882	13.990	79.91	
A240822-64-004rear	-	-	52.565	12.909	477.473	45.301	10.540	70.37	
A240929-84-001front	-0.06	-0.75	53.092	14.547	617.159	44.697	13.808	79.91	
A240929-84-001rear	-0.02	-0.54	52.966	12.435	489.991	45.856	10.685	74.40	
Supplementary information: N/A									

IEC 61215-2 MQT 15 – Wet leakage current test (after UV 120KWh/m2)				P
Test Date [YYYY-MM-DD]		2024-10-27		—
Maximum system voltage (V)		1500		—
Test voltage applied Vtest (V d.c.)		1500		—
Solution resistivity (Ω·cm)		< 3500 Ω cm at 22 ± 2°C		P
Solution temperature (°C)		22 ± 2°C		P
Sample##		Measured[MΩ]	Required[MΩ]	—
A240929-84-001		>1000	14.3	P
Supplementary information: Size of module [m ²]: 2.79				
EL Test (after UV 120KWh/m2)				—
Test Date [YYYY-MM-DD] :		2024-10-27		—
Please check attached photos for details.				
Supplementary information: N/A				

TABLE Performance at various irradiance								—
Test Date [YYYY-MM-DD]			2024-08-23					—
Test method			<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight					—
Sample #	Irradiance [W/m ²]	Loss of relative efficiency with respect to STC [%]	Voc [V]	Isc [A]	Pmp [W]	Vmp [V]	Imp [A]	FF [%]
A240822-64-005	1000(front)	-	53.033	14.789	629.046	44.907	14.008	80.21
	1000(rear)	-	52.730	12.612	478.171	45.352	10.543	71.90
	200(front)	-2.70	50.439	2.950	122.411	43.646	2.804	82.26

Test Report

	200(rear)	-3.41	50.072	2.330	92.372	44.100	2.095	79.16
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TABLE Temperature Coefficient		—
Test Date [YYYY-MM-DD]	2024-08-23	
Test method	<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight	
Sample #	Temperature coefficient[%]	
A240822-64-005	-0.3022	

Test Report

Annex 1: List of measurement equipment

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Calibration due date
IEC 61215-2 MQT01	Visual inspection	Lamp	-	NA
		Digital Luxmeter EZ6330	-	2025-08-11
		Digital caliper, measuring tape EZ6286	-	2025-07-12
		Camera	-	NA
IEC 61215-2 MQT02	Maximum power determination	Solar Simulator EZ4446	-	2025-08-02
		Reference cell EZ4751	-	2025-01-28
IEC 61215-2 MQT04	Temperature Coefficient	Solar Simulator EZ4446	-	2025-08-02
		Temperature control chamber EZ4446-4	-	2024-10-17
		Reference cell EZ4751	-	2025-01-28
IEC 61215-2 MQT03	Insulation test	Comprehensive safety test instrument EZ1096	-	2025-07-08
IEC 61215-2 MQT15	Wet leakage current test	Comprehensive safety test instrument EZ1096	-	2025-07-08
		Conductivity meter EZ5723	-	2025-06-24
IEC TS 62804-1	PID	PID test system EZ6205	-	2025-01-10
		Climate chamber EZ6217	-	2024-12-10
IEC 61215-2 MQT 19	UV test	UV Chamber EZ6520	-	2025-07-19
IEC 61730-2 MST13	Ground continuity test	Comprehensive safety test instrument EZ1096	-	2025-07-08

Test Report

Annex 2: Statement of the estimated uncertainty of the test results

Statement of the estimated uncertainty of the I/V test, K=2.

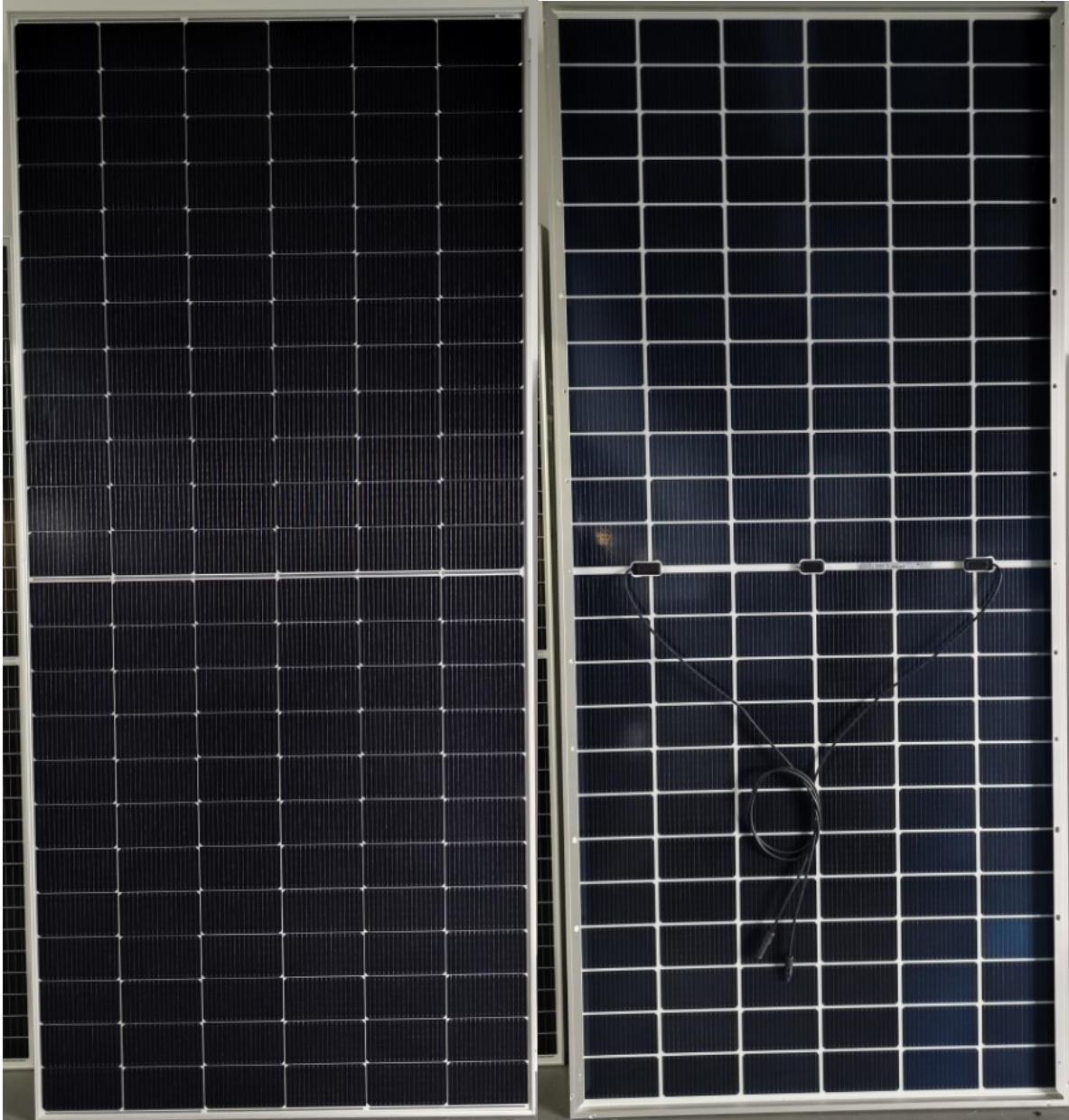
U(Isc)=2.2%

U(Voc)=1.04%

U(Pmax)=2.4%

Test Report

Annex 3: Photos of module

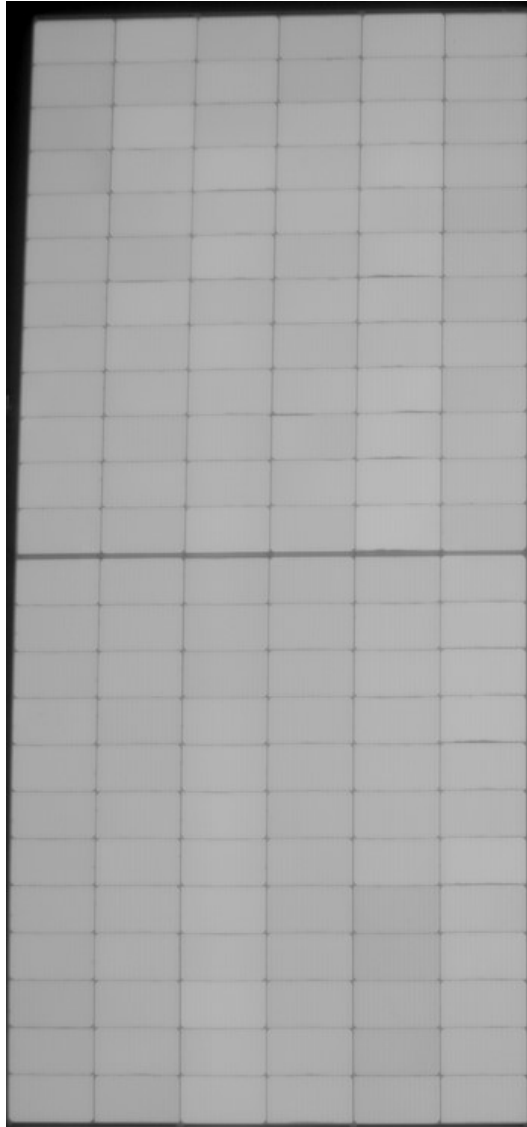


Test Report

Annex 4: Photo of EL test

Sample# A240822-64-001

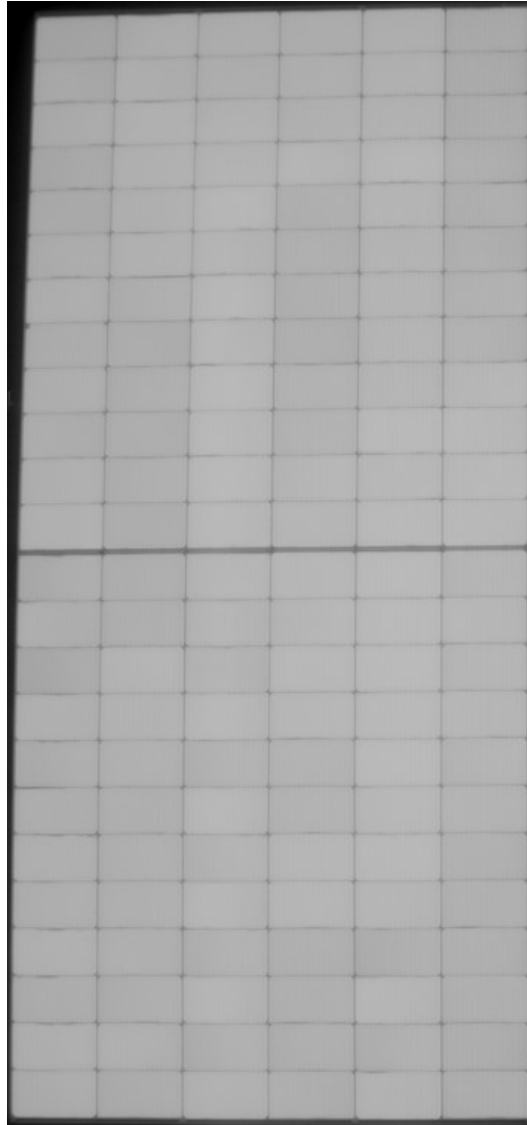
As received



Test Report

Sample# A240822-64-002

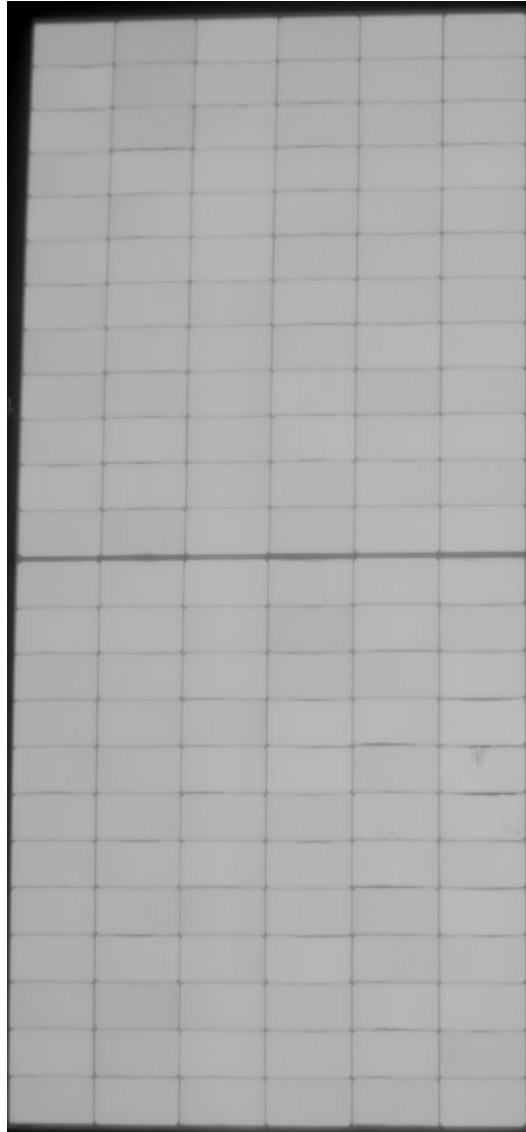
As received



Test Report

Sample# A240822-64-003

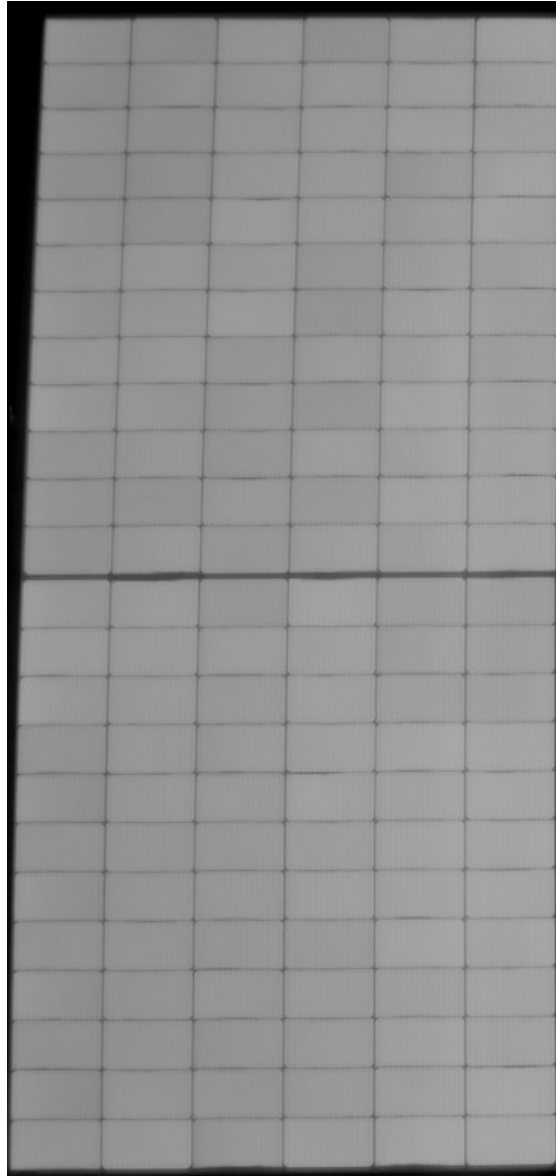
As received



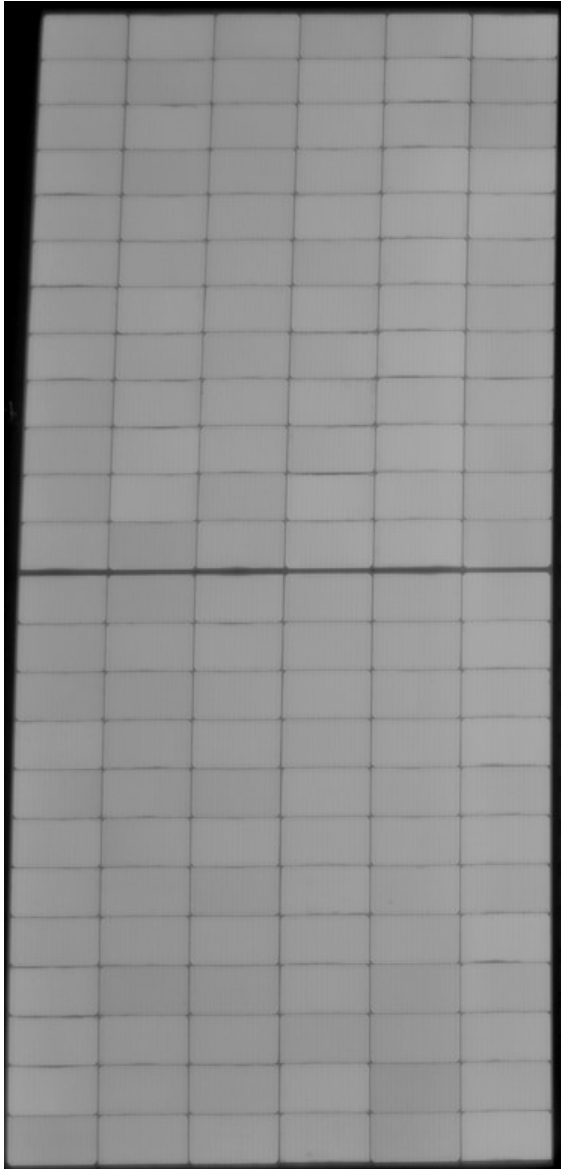
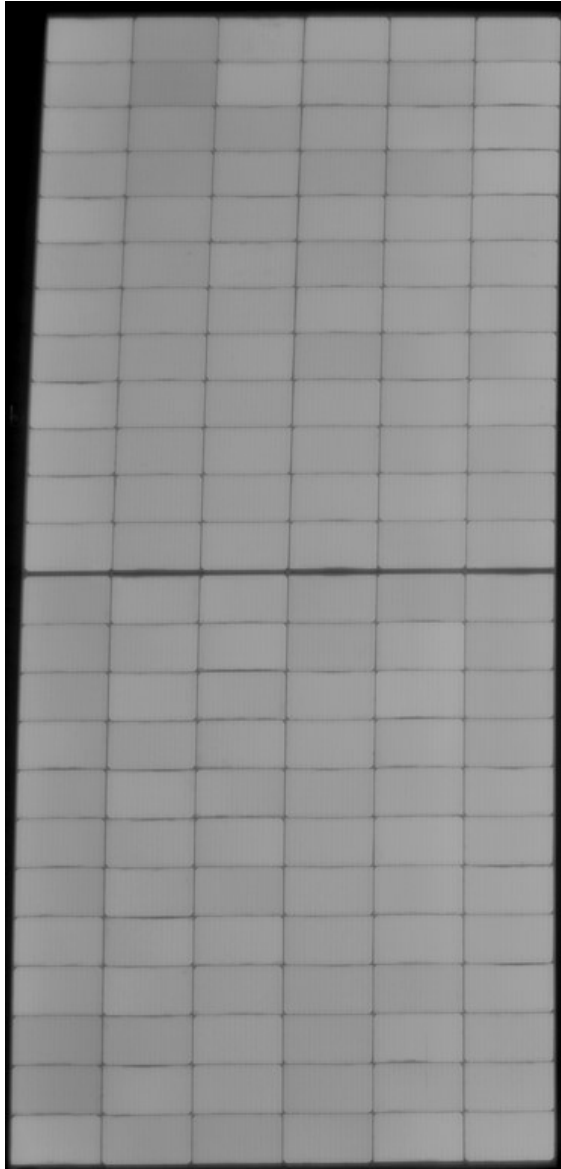
Test Report

Sample# A240822-64-005

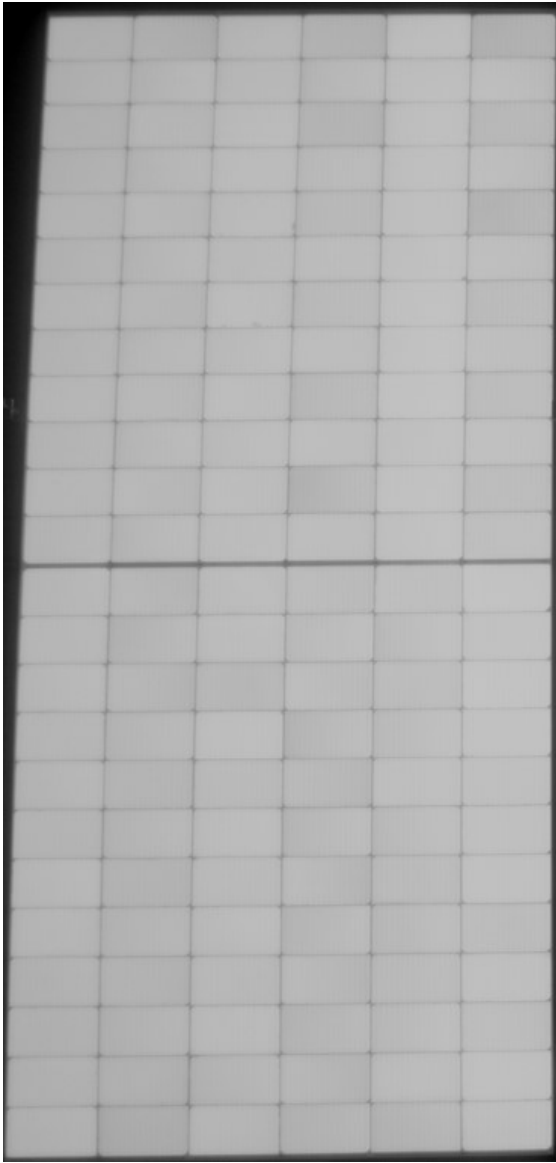
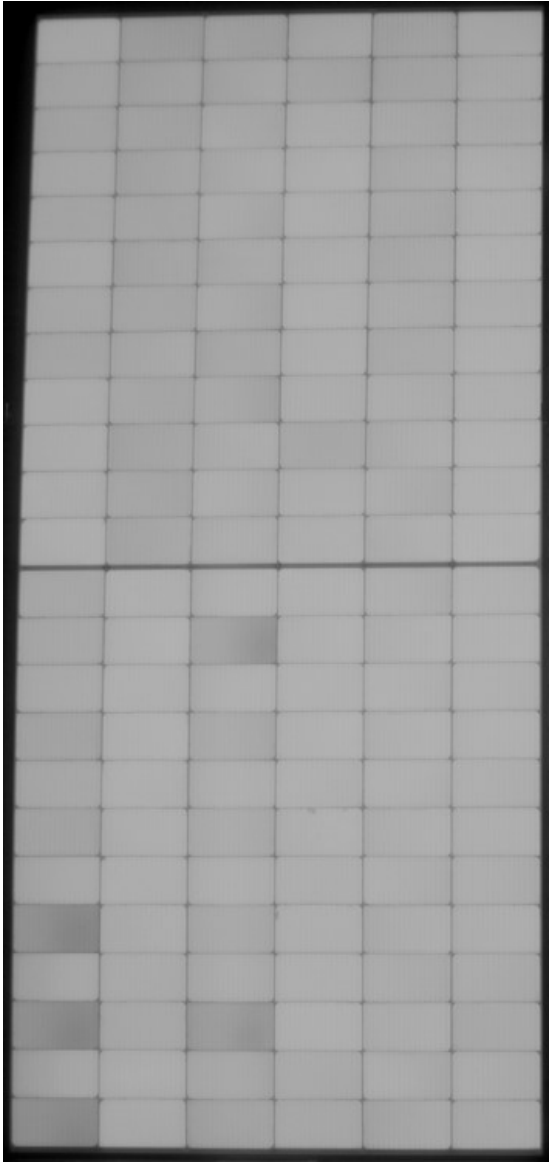
As received



Test Report

Sample# A240822-64-006	
Before PID	After PID
	

Test Report

Sample# A240929-84-001	
Before UV	After UV
	

-- END OF REPORT --