TC-6168

Test Report

Solex Energy Ltd

REPORT NUMBER: 4790618738.12.1-NABL-S1

PROJECT NUMBER: 4790618738.12.1

ULR NUMBER: TC616823100000044F

Select the applicable test locations:

☒**LOCATION 1:**

UL India Private Limited,
Laboratory building, Kalyani Platina Campus, Sy.no.129/4,
EPIP Zone, Phase II, Whitefield,
Bangalore – 560 066
P:91-80-41384400

☐**LOCATION 2:**

UL India Private Limited,
Oak building, Kalyani Platina Campus, Sy.No.129/4,
EPIP Zone, Phase II, Whitefield,
Bangalore, Karnataka – 560 066

☐**LOCATION 3:**

UL India Private Limited, 30/A, I Stage, Vishveshwarya Industrial Estate, Doddanekkundi Industrial Area, Bangalore - 560048

TEST DISCIPLINE: ELECTRONICS
PRODUCT GROUP: SOLAR PANEL

General details

Customer / Applicant	SOLEX ENERGY LTD. RS #938 KIM - MANDVI ROAD, NEAR GENERAL POLYTEX TADKESHWAR, GUJARAT, 394170, INDIA		
Manufacturer	SOLEX ENERGY LTD PLOT NO 1 A BLOCK 938, TADKESHWAR, KIM MANDVI ROAD, MANDVI, SURAT, GUJARAT, GUJARAT, 394110		
Program	**NABL**		
Item Under Test	Crystalline Silicon Solar PV Module		
Model	SMF72HM10-545		
Number of Samples	01(One)		
UL. Sample Identification	5622388	**Refer Summary of Test results for multiple samples**	
Manufacturer Serial Number (if any)	SA22110012035		
Condition of IUT on receipt	Good		
Date of Receipt	13 December 2022		
Applicable Standard	IEC 61215-2:2016, CL 4.2 Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures (Maximum power determination (MQT 02)) / IEC 60904-1:2020 Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage characteristics.		
Date of Testing (Start date)	20 January 2023	**End Date**	25 January 2023
UL. general^ ambient condition	**Temperature in °C**		23 ±5°C
	Relative humidity in %		<70 %
Date of Issue	31 January 2023		
Test In-charge	Naveen kumar N		

Fill in the rows with information or add hyphen (-)

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CIN: U74200KA1997PTC023189

Kantha Raju Digitally signed by Kantha Raju Date: 2023.01.31 19:33:30 +05'30'	Srimathy N Digitally signed by Srimathy N Date: 2023.01.31 19:52:22 +05'30'
Kantha raju H S	N Srimathy
Senior Project Engineer	Project Engineer
Reviewed by	**Authorized signatory**

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General Remarks (If any)

Description of Item under Test (IUT)

Photovoltaic PV Modules – SMF72HM10-545 (5622388)

Summary of Test Results

Test No.	Test Parameter	Standard & Clause Number	UL. Sample Identification	Result
1	Visual inspection	IEC 61215-2:2016, CL 4.1	5622388	Refer Observation
2	Stabilization	IEC 61215-2:2016, CL 4.19		Refer Observation
3	Maximum power determination	IEC 61215-2:2016, CL 4.2		Refer Observation

P: Meets the requirements F: Does not meet the requirement NA: Not applicable

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Master Equipment and Calibration details

Test Name	Id Number	Description	Expiration Date
Visual Inspection	201099	Measuring Tool, Tape Measure	2023-06-10
Visual Inspection	160912	Fixture, For Testing, Table	NA
Visual Inspection	68610	Datalogger, RH & Temperature	2023-12-30
Visual Inspection	211906	Meter and/or Sensor, Light	2023-10-09
Visual Inspection	76645	Magnifying Lens, Without Ruler	NA
Maximum power determination	199796	Apparatus, Solar Simulator	NA
Maximum power determination	64832	Datalogger, RH & Temperature	2023-09-07
Maximum power determination	199638	Thermometer, Infrared	2023-04-05
Maximum power determination	226647	Reference Standard, Voltage or Current	2023-11-08
Stablization 1	54584	Apparatus, Pyranometer, Solar Diffuse Radiance	2025-08-26
Stablization 1	199233	Datalogger	2023-06-07
Stablization 1	175795	Fixture, For Testing, Metal Plate	NA
Stablization 1	175615	Load, Resistive, Variable	NA
Stablization 2	54584	Apparatus, Pyranometer, Solar Diffuse Radiance	2025-08-26
Stablization 2	199233	Datalogger	2023-06-07
Stablization 2	175795	Fixture, For Testing, Metal Plate	NA
Stablization 2	175615	Load, Resistive, Variable	NA

Test methodology adopted: **As per test Procedure** Clause 4.2.3 of IEC 61215-2:2016.

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Test Observation (If any)

Test Table: Visual inspection

10.2 Initial	TABLE: Visual inspection	P
Test Date [YYYY-MM-DD] ..... :	2023-01-20	—
Sample #	Nature and position of initial findings – comments or attach photos	Result
5622388	No visual defects found	P
Supplementary information: N/A		

Test Table: Stabilization

MQT 19.1: Initial stabilization

MQT 06.1: Performance at STC before initial stabilization							P
Test Date [YYYY-MM-DD].....:	2023-01-20						—
Test method……..:	■Simulator ☐ Natural sunlight						—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Result
5622388	13.49	49.85	12.85	42.14	541.64	81.00	P

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TABLE 02.2: 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 : IEC 61215-1-1			(0.01)/ 1%				
Sample #	5622388	Test Date (YYYY-MM-DD) start/end		2023-01-21/ 2023-01-25			
Test cycle	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	(Pmax – Pmin) / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—	541.64	—	—
1	5.02	844.7	51.7	4	540.21	—	—
2	5.03	702.2	50.0	4	539.71	0.4	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—

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Test Table: Maximum power determination

10.4	**TABLE: Maximum power determination**						P
Test Date [YYYY-MM-DD].....:	2023-01-25						—
Irradiance (W/m2)	1000						—
Module temperature (°C)	25						—
Test method……:	☒ Simulator ☐Natural sunlight						—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	—
5622388	49.87	41.89	13.46	12.88	539.71	80.00	—
5622388	49.89	42.00	13.46	12.84	539.31	80.00	—
5622388	49.91	41.82	13.46	12.90	539.50	80.00	—
Average	**49.89**	**41.90**	**13.46**	**12.87**	**539.50**	**80.00**	—
Supplementary information: NA							

Statement of the estimated uncertainty of the test results

1) The Uncertainty of Voc is ±1.30%

2) The Uncertainty of Isc is ±1.60%

3) The Uncertainty of Pmp is ±1.70%

The expanded measurement uncertainty resulting from the standard measurement uncertainty multiplied with a factor k=2 is specified, denoting the deviations of the measurement value within a probability of 95%.

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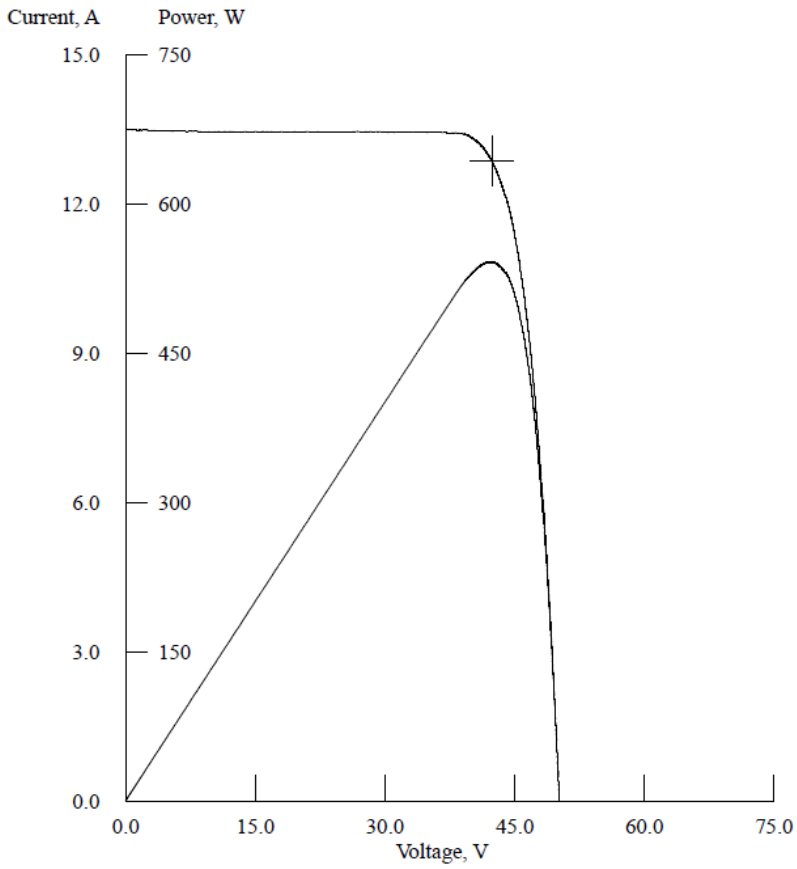
Appendix

PIV Graphs: SMF72HM10-545 (5622388)



5600

Title: SOLEX ENERGY_4790618738
Comment: INITIAL PIV
Operator: Admin
ID: 5622388 (SA22110012035)
Module Type: ModuleType1
17:30:01 20-01-2023
Measured Temperature = 24.9°C
Corrected Temperature = 25.0°C
Irr Meas = 100.0mW/cm²
Irr Corr = 100.0mW/cm²
Voc = 49.85V
Isc = 13.49A
Pmax = 541.64W
Vpm = 42.14V
Ipm = 12.85A
FF = 0.81
Eff,m = 20.96%
Eff,c = 22.99%
Rs = 0.26 Ohm
Rsh = 153.16 Ohm

Load Voltage: 5.300 V
IV Points: 3894

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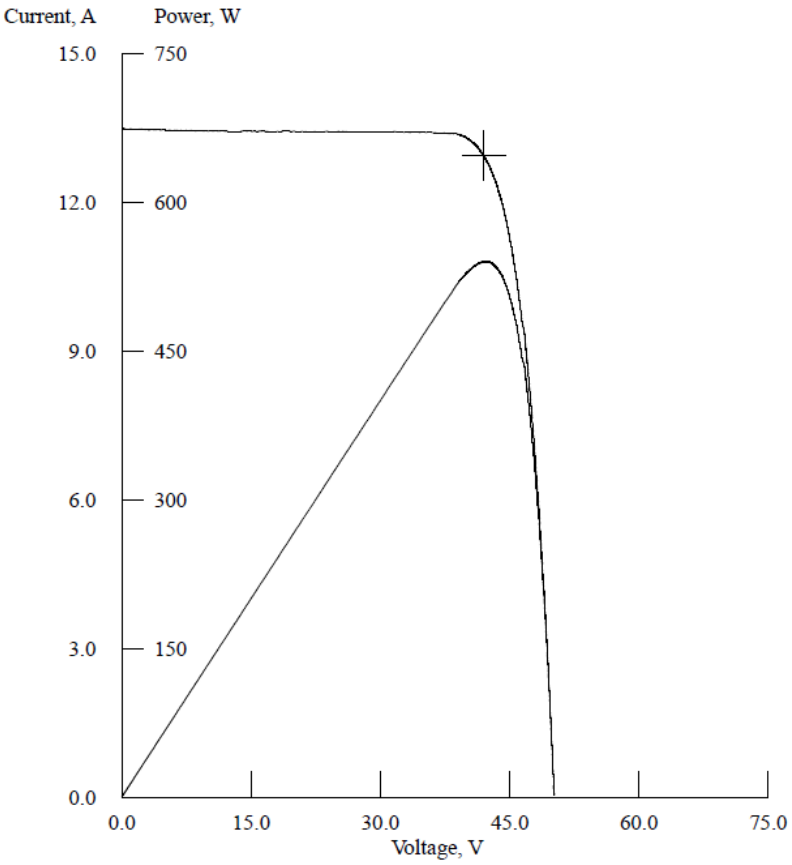

5600

Title: SOLEX ENERGY_4790618738
Comment: STABILAZATION-1
Operator: Admin
ID: 5622388
Module Type: ModuleType1
09:48:35 24-01-2023
Measured Temperature = 24.5°C
Corrected Temperature = 25.0°C
Irr Meas = 99.9mW/cm²
Irr Corr = 100.0mW/cm²
Voc = 49.86V
Isc = 13.48A
Pmax = 540.21W
Vpm = 41.77V
Ipm = 12.93A
FF = 0.80
Eff,m = 20.90%
Eff,c = 22.93%
Rs = 0.25 Ohm
Rsh = 115.84 Ohm

Load Voltage: 5.300 V
IV Points: 3871

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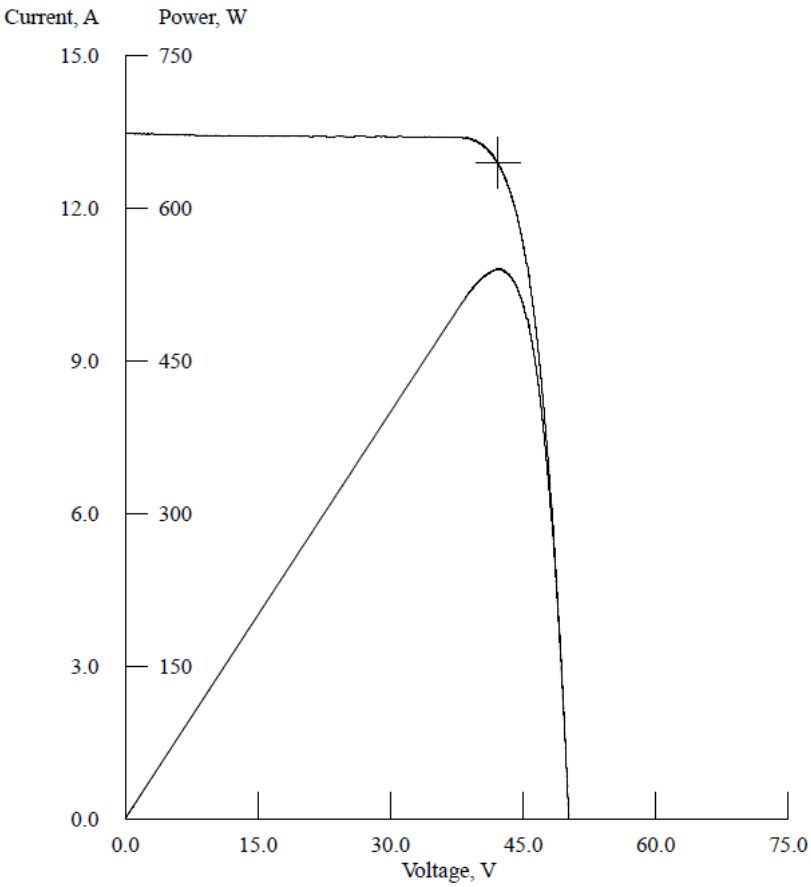

5600

Title: SOLEX ENERGY_4790618738
Comment: STABILAZATION-2
Operator: Admin
ID: 5622388
Module Type: ModuleType1
16:18:07 25-01-2023
Measured Temperature = 24.6°C
Corrected Temperature = 25.0°C
Irr Meas = 100.0mW/cm²
Irr Corr = 100.0mW/cm²
Voc = 49.87V
Isc = 13.46A
Pmax = 539.71W
Vpm = 41.89V
Ipm = 12.88A
FF = 0.80
Eff,m = 20.88%
Eff,c = 22.91%
Rs = 0.25 Ohm
Rsh = 151.71 Ohm

Load Voltage: 5.400 V
IV Points: 3549

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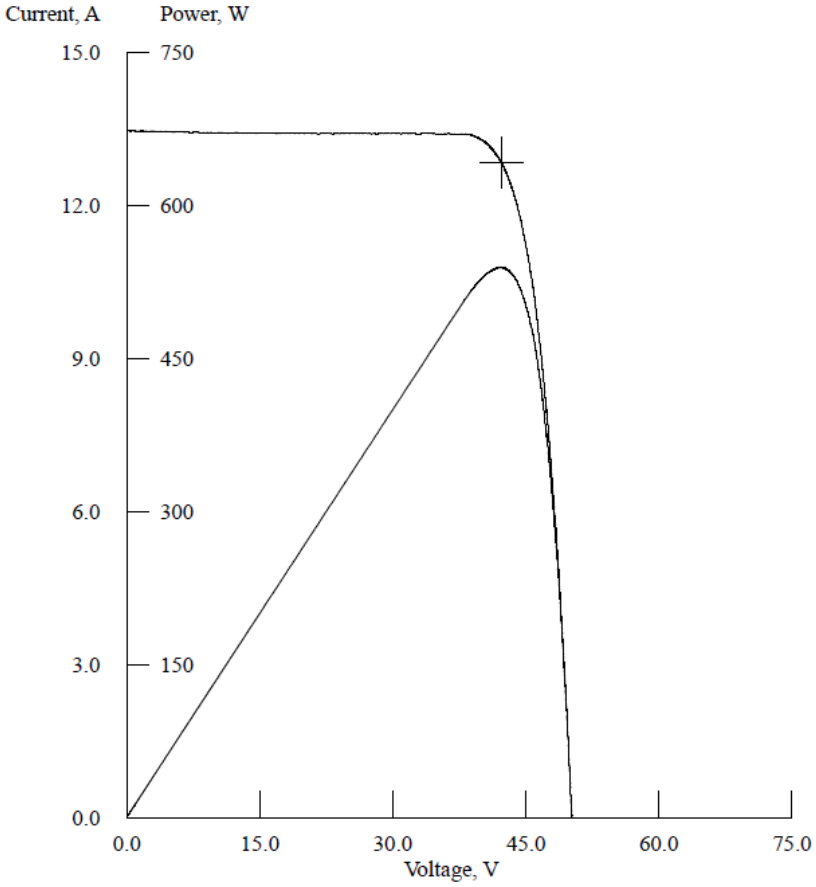

5600

Title: SOLEX ENERGY_4790618738
Comment: STABILAZATION-2
Operator: Admin
ID: 562238
Module Type: ModuleType1
16:21:25 25-01-2023
Measured Temperature = 24.9°C
Corrected Temperature = 25.0°C
Irr Meas = 100.0mW/cm²
Irr Corr = 100.0mW/cm²
Voc = 49.89V
Isc = 13.46A
Pmax = 539.31W
Vpm = 42.00V
Ipm = 12.84A
FF = 0.80
Eff,m = 20.87%
Eff,c = 22.89%
Rs = 0.25 Ohm
Rsh = 141.05 Ohm

Load Voltage: 5.400 V
IV Points: 3552

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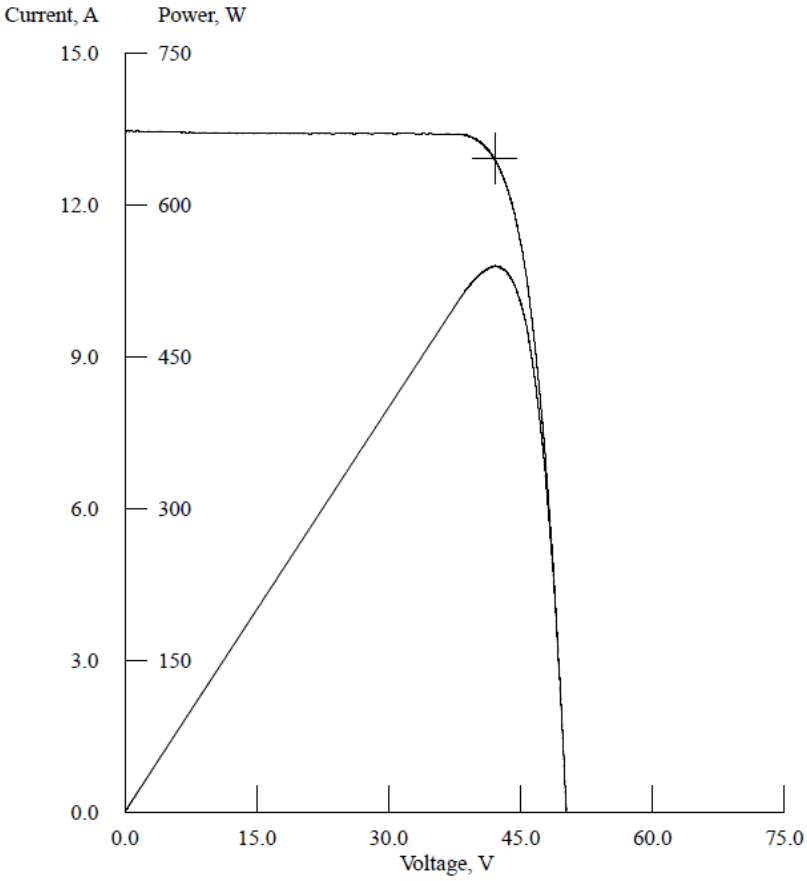

5600

Title: SOLEX ENERGY_4790618738
Comment: STABILAZATION-2
Operator: Admin
ID: 562238
Module Type: ModuleType1
16:23:52 25-01-2023
Measured Temperature = 25.1°C
Corrected Temperature = 25.0°C
Irr Meas = 100.0mW/cm²
Irr Corr = 100.0mW/cm²
Voc = 49.91V
Isc = 13.46A
Pmax = 539.50W
Vpm = 41.82V
Ipm = 12.90A
FF = 0.80
Eff,m = 20.88%
Eff,c = 22.90%
Rs = 0.25 Ohm
Rsh = 118.97 Ohm

Load Voltage: 5.400 V
IV Points: 3556

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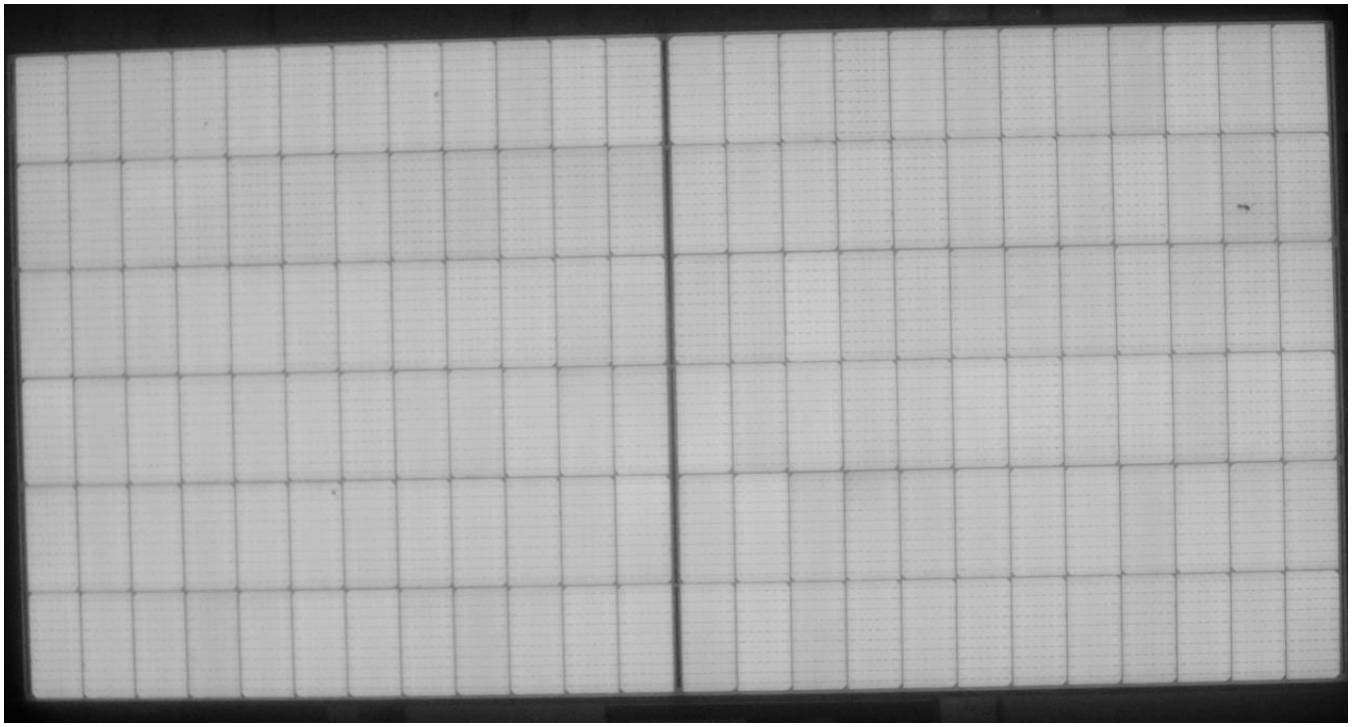
EL Image: SMF72HM10-545 (5622388)



*EL image is for Only for customer reference. EL image is not covered under NABL scope

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Photographs: SMF72HM10-545 (5622388)

Front view

Rear view

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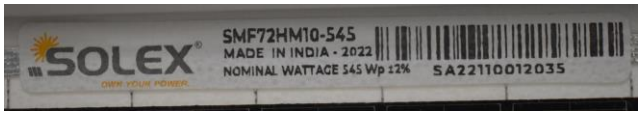
Rating Label

Junction box



Serial number and Logo Inside Laminate

Connectors

******End of Report******