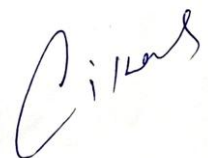





TEST REPORT


ULR No.	TC645124200000007F		Page 1 of 18	
Test Report No.:	TR120240105003		Issue Date:	05/01/2024
Discipline:	Electrical Testing		Group:	Miscellaneous
Customer/Manufacture Name:	MAYURESHWAR SOLAR ENERGY PRIVATE LIMITED PLOT NO.T-3/4, MIDC NARDANA PHASE 2, BHABALDE, NARDANA, DHULE, MAHARASHTRA, India, 424309			
Name of Manufacturer:	MAYURESHWAR SOLAR ENERGY PRIVATE LIMITED PLOT NO.T-3/4, MIDC NARDANA PHASE 2, BHABALDE, NARDANA, DHULE, MAHARASHTRA, India, 424309			
Sample Description:	Said to be, "Solar PV Module, Model: SLM-M10-144-555, 555Watt, Brand/Trademark:  ".			
Sample Condition:	Fit for Testing			
Identification:	Model Tested:	SLM-M10-144-555	Serial No.:	Refer page no. 9
			Sample Code:	Nil
Sample Deposited/Collected by:	Customer			
Customer Reference no.	Nil		Date:	19/09/2023
Job Order No.:	BTH-R1/EL/230919/8		Date of receipt:	19/09/2023
Date(s) of performance of tests	19/09/2023 to 28/12/2023			
Test Location:	At Lab			
Laboratory Name and Address:	BHARAT TEST HOUSE PVT. LTD. 1474, HSIIDC, Indl. Estate, Rai, Distt. Sonapat-131029 Haryana.		 Scan this QR Code to verify the Report	
Test specification(s):	IEC TS 62804 -1: 2015			
General Environmental Conditions:	Temperature: 25°C ± 4°C, Relative Humidity: 50%RH ± 15%RH			
Result:	The results reported are as per relevant specifications / standards.			
Supplementary Information:	- Deviation from the test methods as prescribed in relevant Specification/Work Instructions: Nil - The information supplied by the customer may affect the validity of results reported as per standard requirement. - Statement of Conformity is not required by the customer. - Authorised signatory is responsible for the results reported by the lab for the requested activity by the customer except for the information provided by the customer.			
Abbreviations:	N/A			
Remarks:	1. The report has been generated and verified digitally. This report is related to the sample submitted.			

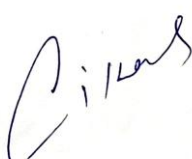

Tested by:	Reviewed by:	Authorized by:
		
Vikas	T. Gautam	T. Gautam
Testing Engineer	Authorized Signatory	Authorized Signatory
Date: 05/01/2024	Date: 05/01/2024	Date: 05/01/2024



ULR No. : TC645124200000007F
 Test Report No. : TR120240105003

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TEST REPORT	
IEC TS 62804 -1: 2015	
Photovoltaic (PV) modules – Test methods for the detection of potential – induced degradation – Part 1: crystalline silicon	
Report Reference No.....:	TR120240105003
Date of issue.....:	05/01/2024
Total number of pages.....:	18
Testing Laboratory.....:	BHARAT TEST HOUSE PVT. LTD.
Address.....:	1474, HSIIDC Indl. Estate, Rai, Distt. Sonapat-131029 Haryana.
Applicant's name.....:	MAYURESHWAR SOLAR ENERGY PRIVATE LIMITED
Address.....:	PLOT NO.T-3/4, MIDC NARDANA PHASE 2, BHABALDE, NARDANA, DHULE, MAHARASHTRA, India, 424309
Test specification.....:	
Standard.....:	IEC TS 62804 -1: 2015
Test item description.....:	Solar PV Module
Trade Mark/Brand.....:	
Manufacturer.....:	Mayureshwar solar energy private limited
Factory.....:	PLOT NOT -3/4,MIDC NARDANA PHASE 2,BHABALDE, NARDANA, DHULE, MAHARASHTRA,424309
Model/Type reference.....:	Model Tested: SLM-M10-144-555 Series models: (144 Half Cut Cells Family and Max. system voltage 1500V) SLM-M10-144-550, SLM-M10-144-545, SLM-M10-144-540, SLM-M10-144-535, SLM-M10-144-530, SLM-M10-144-525, SLM-M10-144-520, SLM-M10-144-515, SLM-M10-144-510, SLM-M10-144-505, SLM-M10-144-500,
Ratings.....:	Maximum System Voltage: 1500V, Maximum over-current protection rating: 25A See copy of Marking label and General product information.

Tested by:	Reviewed by:
	
Vikas	T. Gautam
Testing Engineer	Authorized Signatory
Date: 05/01/2024	Date: 05/01/2024

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1474, HSIIDC Industrial Estate, Rai, Distt. Sonapat, Haryana-131029
 Tel.: 0130-2367673 | Mob.: 9310314585, 8930260106 | email: bthrai@bharattesthouse.com

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Summary of testing:	
Tests performed (name of test and test clause):	Testing location:
Preconditioning	BHARAT TEST HOUSE PVT. LTD. 1474, HSIIDC, Indl. Estate, Rai, Distt. Sonapat-131029 Haryana.
10.1 Visual Inspection (Initial)	
10.2 Maximum Power Determination (Initial)	
10.15 Wet leakage current test (Initial)	
MST Ground Continuity Test	
PID stress test method (a) 3 cycles (1 cycle = 96h)	
10.2 Maximum Power Determination (Final)	
10.15 Wet leakage current test (Final)	
10.1 Visual Inspection (Final)	

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ULR No. : TC645124200000007F
Test Report No. : TR120240105003

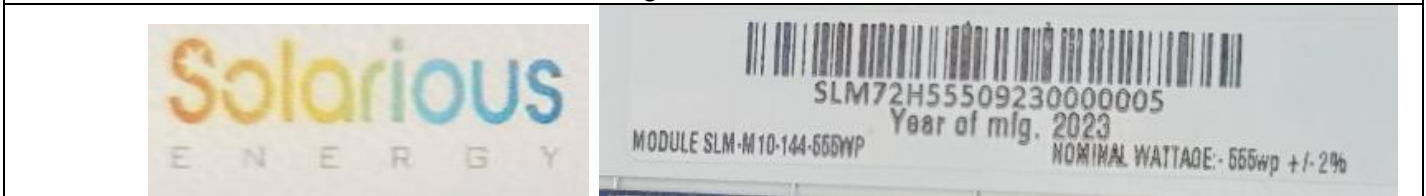
Page : 4 of 18
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Copy of Marking Plate

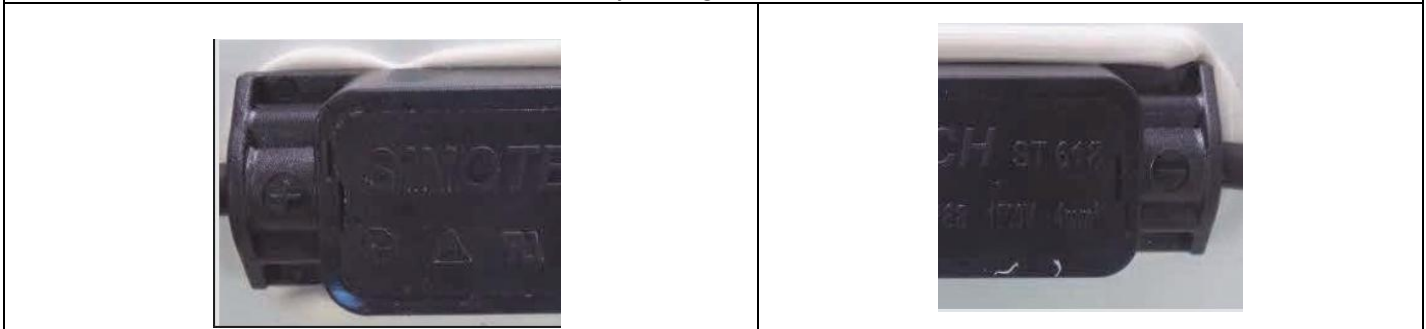
(Model No. Tested: SLM-M10-144-555)

	Manufacture:- MAYURESHWAR SOLAR ENERGY PRIVATE LIMITED Plot no T 3/4, MIDC, Nardana Phase 2 Bhabalde, Nardana, Dhule, Maharashtra-424309 info@solariousenergy.com	Rated maximum power (Pmax) 555Wp Power Tolerance ±3% Voltage at Pmax (Vmp) 43.78V Current at Pmax (Imax) 12.68A Open-circuit voltage (Voc) 49.90V Short-circuit Current (Isc) 13.43A	MODEL SLM-M10-144-555	Voc & Isc Tolerance ± 5% Maximum Fuse rating 25A Maximum System Voltage 1500VDC Operating Temperature -40° C + 85° C Protection Class II Application Class A	WARNING Only qualified person should installed or perform maintenance work on this module WARNING ELECTRICAL HAZARD This module produce electricity when exposed to light follow all the applicable electrical safety precautions

Marking inside the laminate



Polarity marking on Junction Box



Polarity marking on Connectors



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ULR No. : TC645124200000007F
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GENERAL INFORMATION	
Test item particulars:	
Accessories and detachable parts included in the evaluation.....:	N/A
Options included.....:	N/A
<u>Abbreviations used in the report:</u>	
Vmp—Maximum power voltage	Imp—Maximum power current
Voc—Open circuit voltage	Isc—Short circuit current
FF—Fill Factor	Pmp —Maximum power
STC —Standard Test Conditions	
<u>Possible test case verdicts:</u>	
-test case does not apply to the test object.....:	N/A (Not Applicable)
-test object does meet the requirement.....:	Pass (P)
-test object does not meet the requirement.....:	Fail (F)

General remarks:

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.
 Throughout this report a point is used as the decimal separator.



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ULR No. : TC645124200000007F
Test Report No. : TR120240105003

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General Product Information:

144 half cut cells family models with Maximum System Voltage: 1500V are included in this test report.

Model tested and series models are same except the differences as declared by the manufacturer for the family formation according to MNRE guidelines.

Differences (Refer annexure and Description of module construction):

1. Electrical rating

PV module type reference.....: SLM-M10-144-555

Product Electrical Ratings at STC

Nominal maximum power (P_{max}).....: 555W

Nominal open circuit voltage at (V_{oc}).....: 49.90V

Nominal short circuit current at (I_{sc}).....: 13.43A

Nominal maximum power voltage (V_{pm}).....: 43.78V

Nominal maximum power current (I_{pm}).....: 12.68A

Product Safety Ratings

Maximum system voltage.....: 1500V

Maximum over-current protection rating.....: 25A

Safety application class.....: Class A

Safety class in accordance with IS 61140.....: Class II

Fire safety class.....: Class C

Recommended maximum series/parallel module configurations.....: Maximum number of modules in series depends on the system design, type of inverter used on and environment condition.

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ULR No. : TC645124200000007F
 Test Report No. : TR120240105003

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Description of module construction: (Manufactures and part numbers, unless otherwise specified)	
Sample.....:	Random sampling
Module	Model Tested: SLM-M10-144-555 Series models: (144 Half Cut Cells Family and Max. system voltage 1500V) SLM-M10-144-550, SLM-M10-144-545, SLM-M10-144-540, SLM-M10-144-535, SLM-M10-144-530, SLM-M10-144-525, SLM-M10-144-520, SLM-M10-144-515, SLM-M10-144-510, SLM-M10-144-505, SLM-M10-144-500,
Front cover	Tempered glass with external AR coating, Thickness: 3.2mm, Manufactured by: WUJIANG CSG GLASS CO.,LTD.
Rear cover	KNACK BS PVDF W15(a), THICKNESS:0.360MM Manufactured by Knack Energy Pvt Ltd Partial discharge File No. E527726 By UL Solutions
Encapsulation material	Type: KNACK 360 PFC Thickness=0.45 to 0.75mm Manufactured by Knack Energy Pvt Ltd File No. E527726 By UL Solutions
Frame	TYPE:6005-T6 Aluminum frame, 35 frame, Manufactured by SUNSHINE TECHNOLOGY COMPANY LIMITED
Dimensions (l x w x h) mm	(144 half cut cells family)2284mm*1134mm*35mm
Module area [m ²]	2.59
Minimum distance between current carrying parts and module edge [mm]	13.75 mm±1
Cell	-
Cell (include type)	MC 182-10BB-144F Bifacial PERC Cell, half cut cell, Manufactured by Aikosolar
Cells (lxw) [mm]	182mmx182mm ±0.5mm
Cell thickness [μm]	185±18.5μm
Cell area [cm ²]	331.24
Number of cells	144 (half cell),
Components and other	-
Cells per bypass diode	48 for 144 (half cell),
Type of bypass diode	Type:40PV045, VRRM: 45V, I _(FSM) : 400A, I _{F(AV)} : 40A, Tj: 200°C max., RθJ-C: 0.8 °C/W, Manufactured by Sinotech
No. of bypass diode	3
Cell connector	Sn 60% Pb40 %, Diameter: Ø0.24mm, Manufactured by TaiCang JuRen PV Material Co.,Ltd
String connector	Sn 60% Pb40 %, Diameter:0.45mm x 5.0mm, Manufactured by TaiCang JuRen PV Material Co.,Ltd
Junction box	ST618, Rated Voltage 1500VDC, rated current:30A, IP68, Ambient temperature: -40 °C to +85 °C, Manufactured by Cixi Sinwo Solar Technology Co.Ltd., Certificate No. B 092685 0003 Rev. 04 tested by TUV SUD
Cable	62930 IEC 131 1 x 4mm ² HALOGEN ,Manufactured by Cixi Sinwo Solar Technology co.Ltd. Certificate no. B 0926850005 Rev.01 by Tuv SUD
Connectors	ST6, Max. Voltage: DC 1500V, Max. Current: 30A, IP68,manufactured by Cixi Sinwo Solar Technology Co.Ltd., Certificate No. B 092685 0004 Rev. 03 tested by TUV SUD
Adhesive for frame	1527,Color: White, Manufactured by TONSON
Adhesives (junction box)	
Potting material (junction box)	1521,Color: White, Manufactured by TONSON

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Others	Fixing tape: FF-3665 ,Manufactured by CYBRID Fluxing agent: 952-S,Manufactured by Kester <u>Light redirecting film: NA</u>
--------	--

MODULE DESIGN - MINIMUM DISTANCES	
Between cells.....:	Top and Bottom: 1.5mm
Between cell and edge of laminate.....:	23 ±1mm
Between any current carrying part and edge of laminate.....:	13.75 ±1mm

MODULE DESIGN - ELECTRICAL CONFIGURATION	
Total number of cells.....:	144 half cut cells,
Serial-parallel connection of cells.....:	3 sting in series and 2 string in parallel
Cells per bypass diode.....:	(144 Half cut Cells Family): 48,
No. of bypass diodes.....:	3



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Module group assignment:		
Sample #	Sample Group ID	Sample No. & Serial number
SLM-M10-144-555	1	1 & SLM72H55509230000006 (Control)
	2	2 & SLM72H55509230000005
	3	3 & SLM72H55509230000008
	4	4 & SLM72H55509230000002



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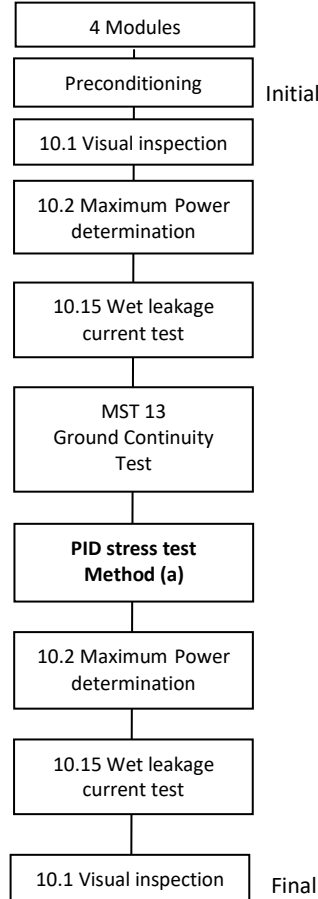


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10	TEST PROCEDURES
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TEST PROCEDURES



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Clause	Requirement + Test	Result-Remark	Verdict
4	MARKING		P
	Name, monogram or symbol of manufacturer.....:	Mayureshwar solar energy private limited 	P
	Type or model number.....:	SLM-M10-144-555	P
	Serial number.....:	Marked	P
	Polarity of terminals or leads.....:	Marked	P
	Maximum system voltage.....:	1500V	P
	The date and place of manufacture.....:	Date of manufacture traceable from the serial no.	P
	Initial examination	All Modules	-
10	Preconditioning.....:	5.0 kWh/m ²	P
10.1	Visual inspection.....:	See table 10.1 Initial	P
10.2	Maximum power determination.....:	See table 10.2 Initial	P
10.15	Wet leakage current test.....:	See table 10.15 Initial	P
MST 13	Ground continuity test.....:	See table MST 13 Initial	P
4.3.2	PID stress test method (a).....:	See table PID stress test method (a)	P
10.2	Maximum power determination.....:	See table 10.2 Final	P
10.15	Wet leakage current test.....:	See table 10.15 Final	P
10.1	Visual inspection.....:	See table 10.1 Final	P

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ULR No. : TC645124200000007F
Test Report No. : TR120240105003

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Clause	Requirement + Test	Result-Remark	Verdict
10.1 Initial	TABLE: Visual inspection (Initial)		P
Test Date [MM/DD/YYYY].....:	12/11/2023		-
Sample #	Nature and position of initial findings – comments or attach photos		-
1	No visual defect		P
2	No visual defect		P
3	No visual defect		P
4	No visual defect		P
Supplementary information: Nil			

10.2 Initial	TABLE: Maximum power determination (Initial)					P
Test Date [MM/DD/YYYY].....:			12/12/2023		-	
Module temperature [°C].....:			25		-	
Irradiance [W/m ²].....:			1000		-	
Sample#	Voc[V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF[%]
1	49.68	42.90	13.671	12.885	552.80	81.39
2	49.77	42.99	13.659	12.874	553.47	81.41
3	49.89	43.08	13.642	12.858	553.95	81.39
4	49.62	42.87	13.669	12.883	552.33	81.43
Supplementary information: Nil						

10.15 Initial	TABLE: Wet leakage current test (Initial)		P
Test Date [MM/DD/YYYY].....:	12/13/2023		-
Test Voltage applied [V].....:	1500		-
Solution resistivity [Ω cm].....:	<3500 at 22 ± 3°C	2512	-
Surface tension [Nm ⁻¹].....:	<0.03 at 22 ± 3°C	0.02	-
Solution temperature [°C].....:	24.2		-
Sample#	Measured[GΩ]	Limit[MΩ]	Result
1	3.89	15.44	P
2	4.07	15.44	P
3	3.82	15.44	P
4	3.74	15.44	P
Supplementary information: Area of module 2.59 [m ²].			

10.4 Initial	TABLE: Ground Continuity Test - MST 13 (Initial)		P
Test Date [MM/DD/YYYY].....:	12/14/2023		-
Maximum system voltage [V _{DC}].....:	1500V		-
Current applied [A].....:	62.5		-
Location of designated grounding point.....:	Ground holes on the sides of the frame		-
Location of second contacting point.....:	Greatest physical displacement from the grounding point.		-
Sample No.	Voltage [V _{DC}]	Resistance [mΩ]	
1	0.311	4.98	P
2	0.323	5.17	P
3	0.290	4.64	P
4	0.276	4.42	P
Supplementary information: Nil			

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Clause	Requirement + Test	Result-Remark	Verdict
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6.9.2	TABLE: Potential Induced Degradation Test		P
Test Date [MM/DD/YYYY].....:	12/15/2023 to 12/28/2023		-
Test Condition.....:	Method A		-
Duration.....:	3 cycles = 288h (one cycle = 96h)		-
Sample#	-		Result
1	1500		P
2	1500		P
3	1500		P
4	1500		P
Supplementary information: Area of module 2.59 [m²].			

10.2 Final	TABLE: Maximum power determination After PID Test							P
Test Date [MM/DD/YYYY].....:	12/28/2023							-
Module temperature [°C].....:	25							-
Irradiance [W/m ²].....:	1000							-
Sample#	Voc[V]	Vmp[V]	Isc[A]	Imp[A]	FF[%]	Pmp [W]	Degradation [%]	Limit[%]
1	49.35	42.58	13.505	12.729	81.32	542.02	-1.95	-5
2	49.45	42.67	13.510	12.733	81.32	543.34	-1.83	-5
3	49.37	42.49	13.558	12.779	81.12	542.99	-1.98	-5
4	49.24	42.44	13.544	12.765	81.23	541.78	-1.91	-5
Supplementary information: Nil								

10.15 Final		TABLE: Wet leakage current test After PID Test				P
Test Date [MM/DD/YYYY].....:		12/28/2023				-
Test Voltage applied [V].....:		1500				-
Solution resistivity [Ω cm].....:		<3500 at 22 ± 3°C		2494		-
Surface tension [Nm ⁻¹].....:		<0.03 at 22 ± 3°C		0.02		-
Solution temperature [°C].....:		24.3				-
Sample#	Measured[GΩ]		Limit[MΩ]			Result
1	2.67		15.44			P
2	2.84		15.44			P
3	2.51		15.44			P
4	2.58		15.44			P
Supplementary information: Area of module 2.59 [m ²].						

10.1 Final	TABLE: Visual inspection After PID Test		P
Test Date [MM/DD/YYYY].....:		12/28/2023	-
Sample #	Nature and position of initial findings – comments or attach photos		-
1	No visual defect		P
2	No visual defect		P
3	No visual defect		P
4	No visual defect		P
Supplementary information: Nil			

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List of Annexes

- Annex 1: List of measurement equipment
Annex 2: Statement of the estimated uncertainty of the test results
Annex 3: Photographs of EUT



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Annex 1: List of measurement equipment

Description	Identification #	Application
Visual inspection test setup	BTH-R1/EL/581	Visual inspection test
Irradiance meter	BTH-R/EL/411	Preconditioning test
Flasher – Solar simulator with IV tracer	BTH-R/EL/457	Maximum power determination
Steady-state solar simulator with IV tracer	BTH-R/EL/410	Maximum power determination
DC HV source with Insulation Resistance tester	BTH-R1/EL/506	Wet leakage current test
Environmental chamber with data logger	BTH-R1/EL/566	PID test
Multi-channel DC power supply	BTH-R1/EL/595	PID test
DC power supply with logger	BTH-R/EL/578	PID test
Temperature logger	BTH-R/EL/276	PID Test
Continuity tester with logger	BTH-R/EL/254	To check the continuity of PV module
Wet leakage test setup	BTH-R/EL/449	Wet leakage current test



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

For Pmp – Measurement uncertainty is $\pm 2.4\%$
For Isc – Measurement uncertainty is $\pm 2.3\%$
For Voc – Measurement uncertainty is $\pm 2.0\%$



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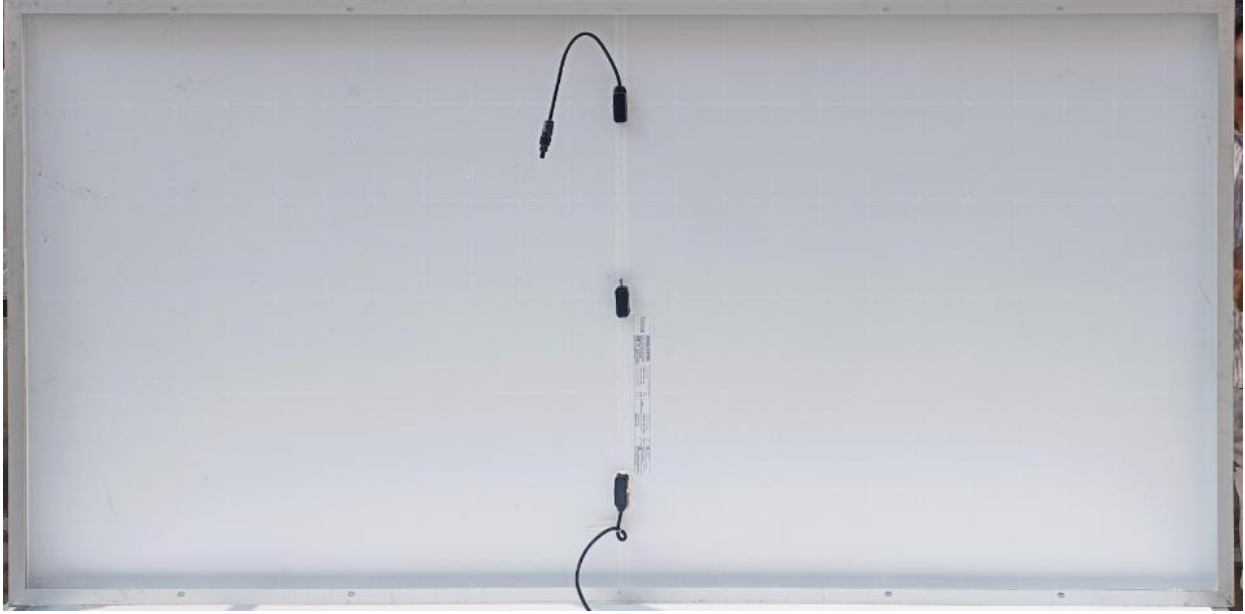
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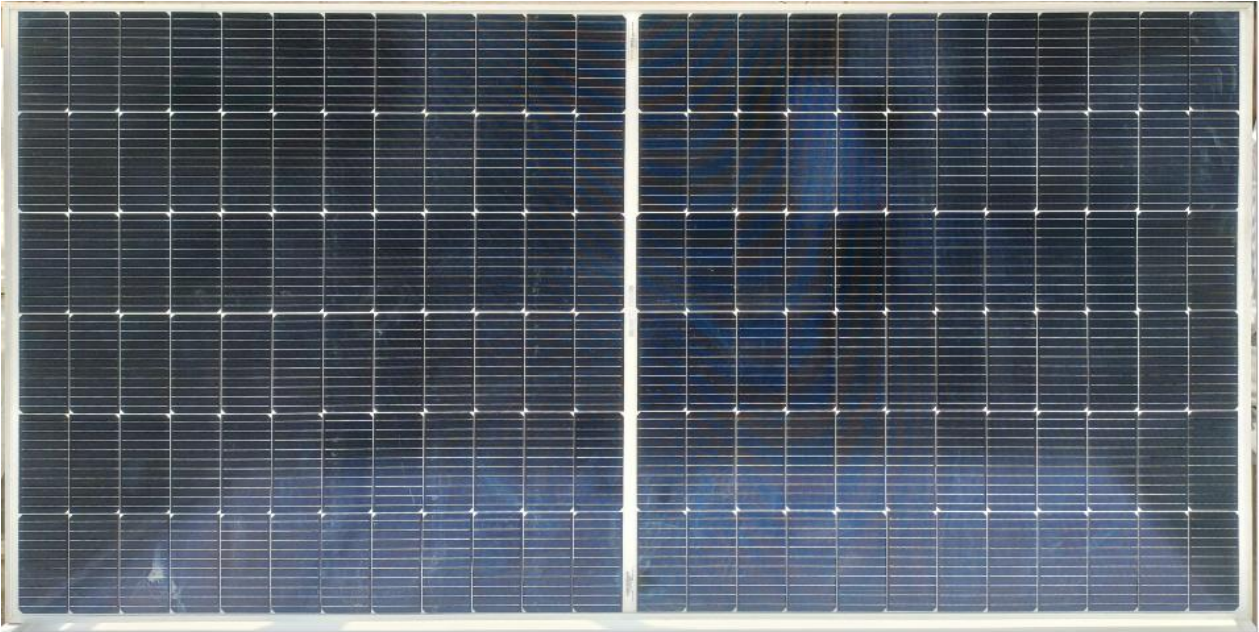
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Annex 3: Photographs of EUT



Rear view



Front view

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Junction Box closed view



Junction Box opened view



Negative Connector



Positive Connector

.....End of the document.....



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