






TEST REPORT IEC TS 62804-1: 2015 Photovoltaic (PV) modules- Test methods for the detection of potential-induced degradation	
ULR-TC510023000000209F Discipline: Electronics Testing Group: Miscellaneous Products	
Report Number.....: Date of Issue: Total no. of pages.....:	HPLI/Test/2211050701 03/03/2023 21
Manufacturer's Name.....: Address.....:	SWELECT HHV SOLAR PHOTOVOLTAICS PRIVATE LIMITED. SF. NO. 166,169, SEMBAGOUNDEN PUDUR, NO 51, KUPPAEPALAYAM VILLAGE, SARCARSAMAKULAM, COIMBATORE DIST, TAMIL NADU, India-641107
Name of test laboratory.....: Address of laboratory.....:	HI PHYSIX LABORATORY INDIA PVT. LTD. B-32/1/2, MIDC, RANJANGAON, PUNE, MAHARASHTRA- 412220.
Test Specification Standard.....: Test Procedure: Non- Standard Test Method.....:	IEC TS 62804 - 1:2015 Compliance Report N/A
Test Report Form No.....: Test Report Form(s) Originator.....: Test Report Form	IEC TS 62804-1: 2015/HPLI_PV Hi Physix Laboratory India Pvt. Ltd., Pune Dated 02-2019
Test item Description: Trade Mark.....:	Crystalline silicon terrestrial photovoltaic (PV) modules. 
Model / Type reference	SWM11BN6540 (Representative Model). SWM11BN6535, SWM11BN6530, SWM11BN6525, SWM11BN6520, SWM11BN6515, SWM11BN6510, SWM11BN6505, SWM11BN6500 SWM11BN4495, SWM11BN4490, SWM11BN4485, SWM11BN4480, SWM11BN4475, SWM11BN4470,

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

Ashutosh Pathak
(Chief Technical Manager)



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	<p>SWM11BN4465, SWM11BN4460, SWM11BN4455 SWM11BN2450, SWM11BN2445, SWM11BN2440, SWM11BN2435, SWM11BN2430, SWM11BN2425, SWM11BN2420, SWM11BN2415, SWM11BN2410 SWM11BN0405, SWM11BN0400, SWM11BN0395, SWM11BN0390, SWM11BN0385, SWM11BN0380, SWM11BN0375, SWM11BN0370, SWM11BN0365</p>
<p>Ratings.....:</p>	<p>See copy of marking plate on page no. 5</p>
<p>Remark:</p>	<p>The Test performed on Model No. SWM11BN6540 (Representative Model). All series models mentioned in this test report as per customer request only.</p>

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

Ashutosh Pathak
Ashutosh Pathak
(Chief Technical Manager)



HI PHYSIX
testing & calibration laboratory

HI PHYSIX LABORATORY INDIA PVT. LTD.

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Testing procedure and testing location:

<input checked="" type="checkbox"/> Testing Laboratory:		
Testing location/ address	Hi Physix Laboratory India Private Limited B-32/1/2 M.I.D.C, Ranjangaon Pune Maharashtra -412220.	
Tested by (name + signature).....:	Heeralal Mahto (Testing Engineer)	
Approved by (name + signature) ..:	Ashutosh Pathak (Chief Technical Manager)	 FOR HI PHYSIX LABORATORY INDIA PVT. LTD. Ashutosh Pathak (Chief Technical Manager)
Issued by (name, function, Signature).....:	K. K. Jayaswal (Chief Quality Manager)	



Summary of testing:	
Tests performed (name of test and test clause): IEC TS 62804-1: 2015 (Single Polarity-Negative, Three Cycles)	Testing location: Hi Physix Laboratory India Private Limited. B-32/1/2 M.I.D.C, Ranjangaon Pune Maharashtra - 412220.
Preconditioning	
10.1 Visual Inspection (Initial and Final)	
10.2 Maximum power determination (Initial and Final)	
10.15 Wet leakage current test (Initial and Final)	
MST 13 Ground continuity test (Initial)	
PID stress test according to IEC TS 62804-1:2015 with following severities - Climatic conditions: 85°C and 85% RH - Duration: 288 hours – 3 Cycles of 96 hours each	

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Copy of marking plate on the backside of the Module:

swelect
Swelect HHH Solar photovoltaics Private Ltd,
Sl.No.166 & 169, Sembagounden Padar, No.51, Kappalalayam village,
Chinnai District, Tamil Nadu, Tamil Nadu-640001, Tamil Nadu, INDIA
www.swelectes.com

Certified for ISO 9001, ISO 14001, ISO 45001 latest version

MODEL NO : SWM11BN6540

Electrical Ratings at STC (1000 W/m², AM 1.5, Cell temp. 25°C)

Pmax (W)	Voc (V)	Isc (A)	Vmp (V)	Imp (A)	Maximum System Voltage (V) : 1500
540	49.82	13.68	41.84	12.92	Maximum Series Fuse (A) : 25

Output Tolerance: -0/+4.99W
Protection against Electrical Shock : Class II
Fire rating class : C
Panel Size & Weight : 2285 x 1138 x 35mm 27.5kg.

CE, RoHS, and other certification logos.

WARNING ELECTRICAL HAZARD !!

- BE AWARE of dangerous high DC voltage when connecting modules
- Don't drop any solid object on the module
- Don't handle or install modules when they are wet
- Don't short circuit the electrical terminals when exposed to light
- Don't damage or scratch the rear surface of the module
- Don't stack modules horizontally
- Don't pull the cable to lift the module
- Don't expose the electrical terminals to rain / water
- Don't walk/step over/sit on the module
- Don't Disconnect under load

For more details: Refer installation manual

Copy of marking laminated inside the glass:

SWM11BN6540-Nominal Wattage:540W±2%

SW13622A00117 **2022**

(All serial No. mentioned on page No: 6)

Polarity of terminals or leads:





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HI PHYSIX
testing & calibration laboratory



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Test item particulars:	Crystalline silicon terrestrial photovoltaic (PV) modules.	
Accessories and detachable parts included in the evaluation.:	N/A	
Options included	N/A	
Abbreviations used in the report:		
DH – Damp Heat	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	
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)	
- Date(s) of performance of tests.....	01/02/2023 to 20/02/2023	
- Receipt Number.....	22110507	
- Date of Deposit.....	15/11/2022	
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. The Management System is maintained in accordance with IS/ISO/IEC 17025:2017 and testing Standards/Instruments are traceable to National / International Standards. “(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.</p>	
Optional tests of performance at low irradiance and Electroluminescence at Isc and 0.1.Isc has not been conducted.		
Module group assignment:		
Sample #	Sample Group ID	Sample No. & S/N
SWM11BN 6540	1 (Control)	1 & SW13622A00117
	2	2 & SW13622A00142
	3	3 & SW13622A00144
Remark: All tests has been carried out on model: SWM11BN6540 of 144 half cut cells package.Family Models are mentioned on this test report on the bases of customer declaration only. Laboratory is not answerable for any pass or fails in the series family models. Bill of material is same for all family models as per declaration provided by the manufacturer		

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

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Registered office : B-9/51, Sector 18, Rohini, Delhi- 110089



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S.No.	Tests with clause reference	Specified Requirements	Covered under our NABL Scope (Yes/No)	RESULTS	Verdict
1	Cl. No. 4 of IEC TS 62804-1: 2015 (Test procedures)	The procedures given in the following subclauses shall be performed in the order given. Any intended or unintended changes and deviations shall be recorded and reported in details as indicated in clause 5.1(Marking)	Yes	See clause. No 4 and PID test flow chart	P
2.	Cl. No. 4.2 of IEC TS 62804-1: 2015 (Pres –stress tests)& (Initial Measurements)	a) All modules shall be exposed to sunlight (either real or simulated)to a target irradiation level according to the procedure for stabilization for crystalline Si modules within IEC 61215:2005 Clause 5 (Preconditioning)	Yes	Complies	P
		b) Perform IEC 61215:2005 10.1 Visual inspection		See table 10.1	P
		c) Perform IEC 61215:2005 10.2 Maximum power determination, including on the control module		See table 10.2	P
		d) Perform IEC 61215:2005 10.7 (Performance at low irradiance, including on the control module) Optional test		---	---
		e) Perform IEC 61215:2005 10.15 (Wet leakage Test)		See table 10.15	P
		f) Perform electroluminescence imaging at 1 and 0.1 short circuit current (Isc) Optional test		---	---
		g) Perform IEC 61730-2 MST 13 (Ground continuity Test)		See table MST 13	P

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S.No.	Tests with clause reference	Specified Requirements	Covered under our NABL Scope (Yes/No)	RESULTS	Verdict
3	Cl. No. 4.3 of IEC TS 62804-1: 2015 (Damp heat test applied with voltage stress)	Test according to IEC TS 62804-1:2015 (Severity A and Severity B)	Yes	See tablePID stress test (1 st Cycle) (2 nd Cycle) (3 rd Cycle)	P
4	Cl. No. 4.2 of IEC TS 62804-1: 2015 (Post –stress tests)& (Final Measurements))	b) Perform IEC 61215:2005 10.1 Visual inspection	Yes	See tablePID stress test (1 st Cycle)(2 nd Cycle) (3 rd Cycle) after (Visual inspection)	P
		c) Perform IEC 61215:2005 10.2 Maximum power determination, including on the control module		See tablePID stress test (1 st Cycle)(2 nd Cycle) (3 rd Cycle) after (Maximum power determination)	P
		d) Perform IEC 61215:2005 10.7 (Performance at low irradiance, including on the control module) Optional test		--	--
		e) Perform IEC 61215:2005 10.15 (Wet leakage Test)		See tablePID stress test (1 st Cycle)(2 nd Cycle) (3 rd Cycle) after (Wet leakage Test)	P
		f) Perform electroluminescence imaging at 1 and 0.1 short circuit current (Isc) Optional test		--	--

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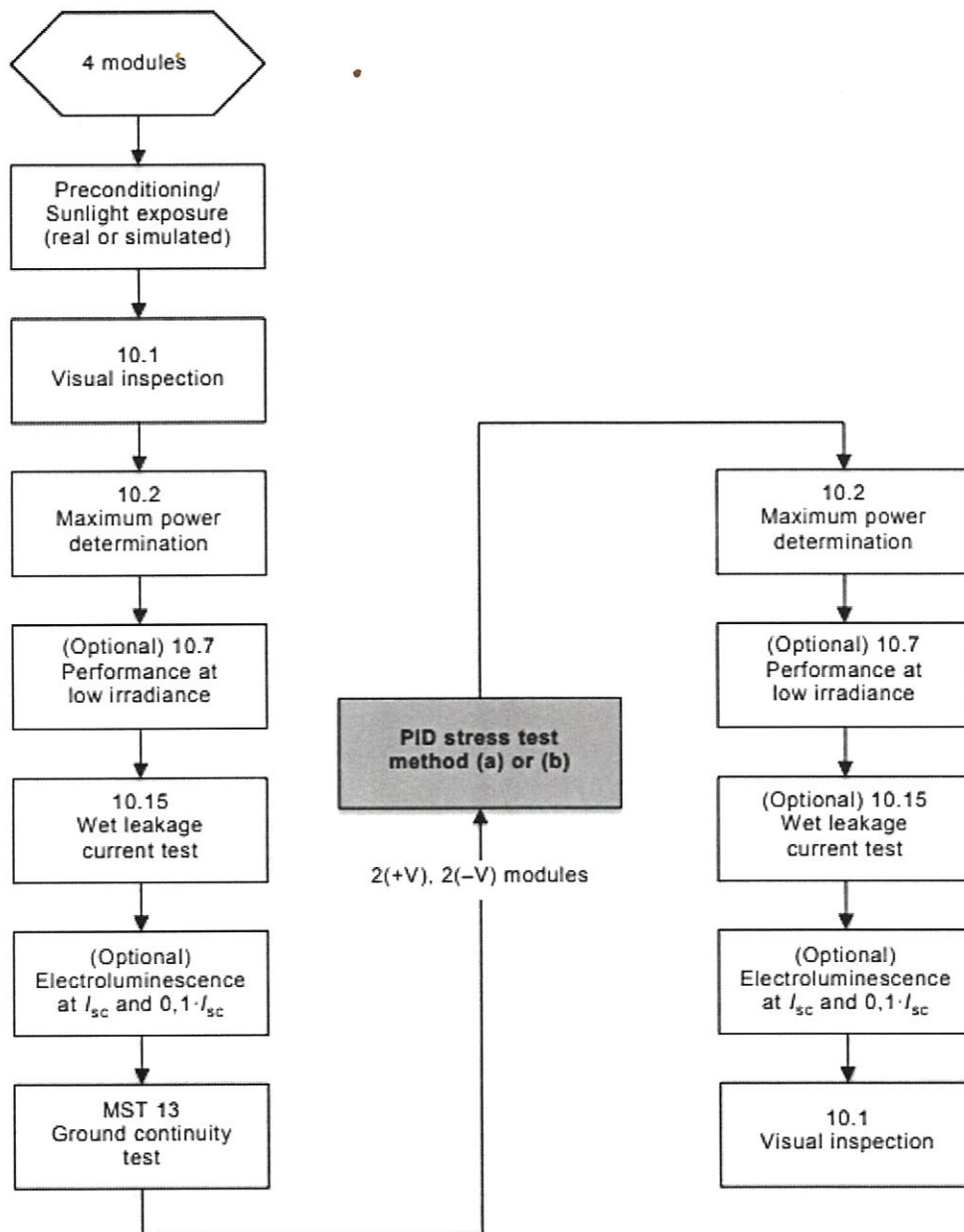



Figure 1 – PID test flow

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4	MARKING		P
	Name, monogram or symbol of manufacturer	SWELECT HHV SOLAR PHOTOVOLTAICS PRIVATE LIMITED.  (See also on page No: 5)	P
	Type or model number	SWM11BN6540 (See also on page No. 05)	P
	Serial number	Marked. (See copy of marking laminated inside glass on page No. 04)	P
	Polarity of terminals or leads.....	Positive and negative marked (See copy of markings of Polarity of terminals or leads page No. 05)	P
	Maximum system voltage	DC1500V marked	P
	The date and place of manufacture	Mark as Date of Manufactured: 17/12/2022 (DD.MM.YYYY) and Address marked as: SF. NO. 166,169, SEMBAGOUNDEN PUDUR, NO 51, KUPPAEPALAYAM VILLAGE, SARCARSAMAKULAM, COIMBATORE DIST, TAMIL NADU, India-641107.(See copy of marking plate on the backside of the Module on page No: 05)	P

	Initial examination	All modules	P
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	P

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.


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(Chief Technical Manager)



TABLES

Visual Inspection (Initial) (10.1)

TABLE: Visual inspection (Initial)		P
Test Date [DD/MM/YYYY].....:	01/02/2023	—
Sample #	Nature and position of initial findings – comments or attach photos	—
1	No visual defects observed	P
2	No visual defects observed	P
3	No visual defects observed	P
Supplementary information: Nil		

Maximum power determination (Initial) (10.2)

TABLE: Maximum power determination (Initial)							P
Test Date [DD/MM/YYYY].....:	01/02/2023						—
Module temperature [°C].....:	25						—
Irradiance [W/m ²].....:	1000						—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
1	50.101	40.979	14.026	13.246	542.85	77.24	
2	50.107	40.961	14.056	13.283	544.12	77.25	
3	50.103	40.973	14.029	13.250	542.91	77.23	
Supplementary information: Temperature corrected to 25°C and Irradiance corrected to 1000 W/m ²							

Wet leakage current test (Initial) (10.15)

TABLE: Wet leakage current test (Initial)				P
Test Date [DD/MM/YYYY].....:	02/02/2023			—
Test Voltage applied [V].....:	1500V			—
Solution resistivity [Ω cm].....:	< 3,500 Ω cm at 22 ± 3°C	2570		—
Surface tension [Nm ⁻¹].....:	< 0.03 Nm ⁻¹ at 22 ± 3°C	0.024		—
Solution temperature [°C].....:	24°C			—
Sample #	Measured [MΩ]	Limit [MΩ]		Result
1	>2000	15.38		P
2	>2000	15.38		P
3	>2000	15.38		P
Supplementary information: Size of module 2.60 [m ²], Minimum requirement according to the standard is 40MΩ-m ² .				

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

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(Chief Technical Manager)



Ground continuity test (Initial) (MST 13)

TABLE: Ground Continuity Test – MST 13 (Initial)			P
Test Date [DD/MM/YYYY]		03/02/2023	—
Maximum system voltage [V _{DC}]		1500V	—
Current applied [A]		62.5A	—
Location of designated grounding point		Two grounding holes on sides of frames	—
Location of second contacting point		Greatest physical displacement from the grounding point.	—
Sample No.	Voltage [V _{DC}]	Resistance [Ω]	—
1	0.20	0.003	P
2	0.15	0.002	P
3	0.20	0.003	P
Supplementary information: Nil			

Performance of PID Test- 1st Cycle

TABLE: PID stress test			P
Test Date [DD/MM/YYYY]		03/02/2023 to 08/02/2023	—
Test Method		Chamber	—
Module Temperature		85°C	—
Relative Humidity		85%Rh	—
Grounding Polarity		+ve	—
Duration[Hours]		96	—
Sample No.	Applied Voltage [V]		—
2	-1500		P
3	-1500		P
Supplementary information: Nil			

Visual inspection after 1st PID Cycle Test (10.1)

TABLE: Visual inspection			P
Test Date [DD/MM/YYYY]		08/02/2023	—
Sample #	Nature and position of initial findings – comments or attach photos		—
2	No visual defects observed		P
3	No visual defects observed		P
Supplementary information: Nil			

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

(Signature)
Ashutosh Pachak
(Chief Technical Manager)