





HI PHYSIX LABORATORY INDIA PVT. LTD.

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TEST REPORT IEC 61701: 2011 Salt mist corrosion testing of photovoltaic (PV) modules	
ULR-TC510023000000262F Discipline: Electronics Testing Group: Miscellaneous Products	
Report Number:	HPLI/Test/2211050702
Date of Issue	14/03/2023
Total no. of pages:	19
Manufacturer's Name:	SWELECT HHV SOLAR PHOTOVOLTAICS PRIVATE LIMITED.
Address:	SF. NO. 166,169, SEMBAGOUNDEN PUDUR, NO 51, KUPPAEPALAYAM VILLAGE, SARCARSAMAKULAM, COIMBATORE DIST, TAMIL NADU, India-641107 Contact Person :Mr.Mirunalini Chellappan Contact number : 9900015990
Name of test laboratory:	HI PHYSIX LABORATORY INDIA PVT. LTD.
Address of laboratory:	B-32/1/2, MIDC, RANJANGAON, PUNE, MAHARASHTRA - 412220
Test Specification Standard:	IEC 61701: 2011 (Severity 6)
Test Procedure	Compliance Report
Non- Standard Test Method:	N/A
Test Report Form No:	IEC 61701: 2011/HPLI_PV
Test Report Form(s) Originator:	Hi Physix Laboratory India Pvt. Ltd., Pune
Test Report Form	Dated 11-2018
Test item Description	Crystalline silicon terrestrial photovoltaic (PV) module
Trade Mark:	

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Ashutosh Pathak
(Chief Technical Manager)



<p>Model / Type reference</p>	<p>SWM11BN6540 (Representative Model). SWM11BN6535, SWM11BN6530, SWM11BN6525, SWM11BN6520, SWM11BN6515, SWM11BN6510, SWM11BN6505, SWM11BN6500 • SWM11BN4495, SWM11BN4490, SWM11BN4485, SWM11BN4480, SWM11BN4475, SWM11BN4470, 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
(Chief Technical Manager)



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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)	Santosh Tawhare (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 61701: 2011 Severity 6	Testing location: Hi Physix Laboratory India Private Limited. B-32/1/2 M.I.D.C, Ranjangaon Pune Maharashtra - 412220.
Preconditioning	
MST 01 Visual Inspection (Initial and Final)	
10.2 Maximum power determination (Initial and Final)	
MST 16 Dielectric withstand test (Initial and Final)	
10.15 Wet leakage current test (Initial and Final)	
MST 13 Ground continuity test (Initial and Final)	
Salt mist test according to IEC 60068-2-52, Severity 6	
Bypass diode functionality test	

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Copy of marking plate on the backside of the Module:

swelect
Swelect HHS Solar photovoltaics Private Ltd.
SI.No.166 & 169 Semblegaon Road, P. Odar, No.51, Kappagalayam village,
Chintamani District, Karnataka, Coimbatore, Tamilnad-540001, Tamilnad, INDIA
www.swelects.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

R: 81003433
http://www.swelects.com

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 the following manual
Mfg. No: 17 DEC 2022

Copy of marking laminated inside the glass:

SWM11BN6540-Nominal Wattage:540W±2%

SW13622A00119 2022

(All serial No: mention on page No: 7)

Polarity of terminals or leads:



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Test item particulars:	Crystalline silicon terrestrial photovoltaic (PV) modules. (Poly-crystalline)	
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.....	07/01/2023 to 13/03/2023	
- Receipt Number.....	22110507	
- Date of Deposit.....	15/11/2022	
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. The Management System is maintained in accordance with IS/ISO/IEC 17025:2005 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.		
Module group assignment:		
Sample #	Sample Group ID	Sample No. & S/N
SWM11BN6540	1	1 & SW13622A00119
	2	2 & SW13622A00055
	3	3 & SW13622A00030

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Sr. No.	Tests with clause reference	Specified Requirements	Covered under our NABL Scope (Yes/No)	RESULTS	Verdict
1.	Cl. No. 4.2 of IEC 61701: 2011 (Bypass diode functionality test)	a) To verify that the diodes(s) of the samples remains functional following the salt fog exposure	Yes	Complies	P
2.	Cl. No. 6 of IEC 61701: 2011 (Initial Measurements)	The following initial measurements shall be performed on the selected sample depending on the PV module technology being evaluated	Yes	See below	P
		a) Maximum power determination (10.2) according to IEC 61215		See table 10.2	P
		b) Wet leakage Test 10.15) according to IEC 61215		See table 10.15	P
		c) Visual inspection (MST01) according to IEC 61730-2		See table MST01	P
		d) Ground continuity Test (MST13) according to IEC 61730-2		See table MST13	P
		e) Dielectric withstand test (MST16) according to IEC 61730-2		See table MST16	P
3.	Cl. No. 7 of IEC 61701: 2011 (Salt mist test procedure)	Apply to the test samples under study the salt mist test as described in IEC 60068-2-52.	Yes	See table Performance of salt mist corrosion test (Severity 6)	P
4	Cl. No. 9 of IEC 61701: 2011 (Final Measurements)	After the salt mist test the test samples shall be subjected to the following tests depending on the PV module technology	Yes	See below	P
		a) Maximum power determination (10.2) according to IEC 61215		See table 10.2	P
		b) Wet leakage Test 10.15) according to IEC 61215		See table 10.15	P
		c) Visual inspection (MST01) according to IEC 61730-2		See table MST01	P

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TC-5100

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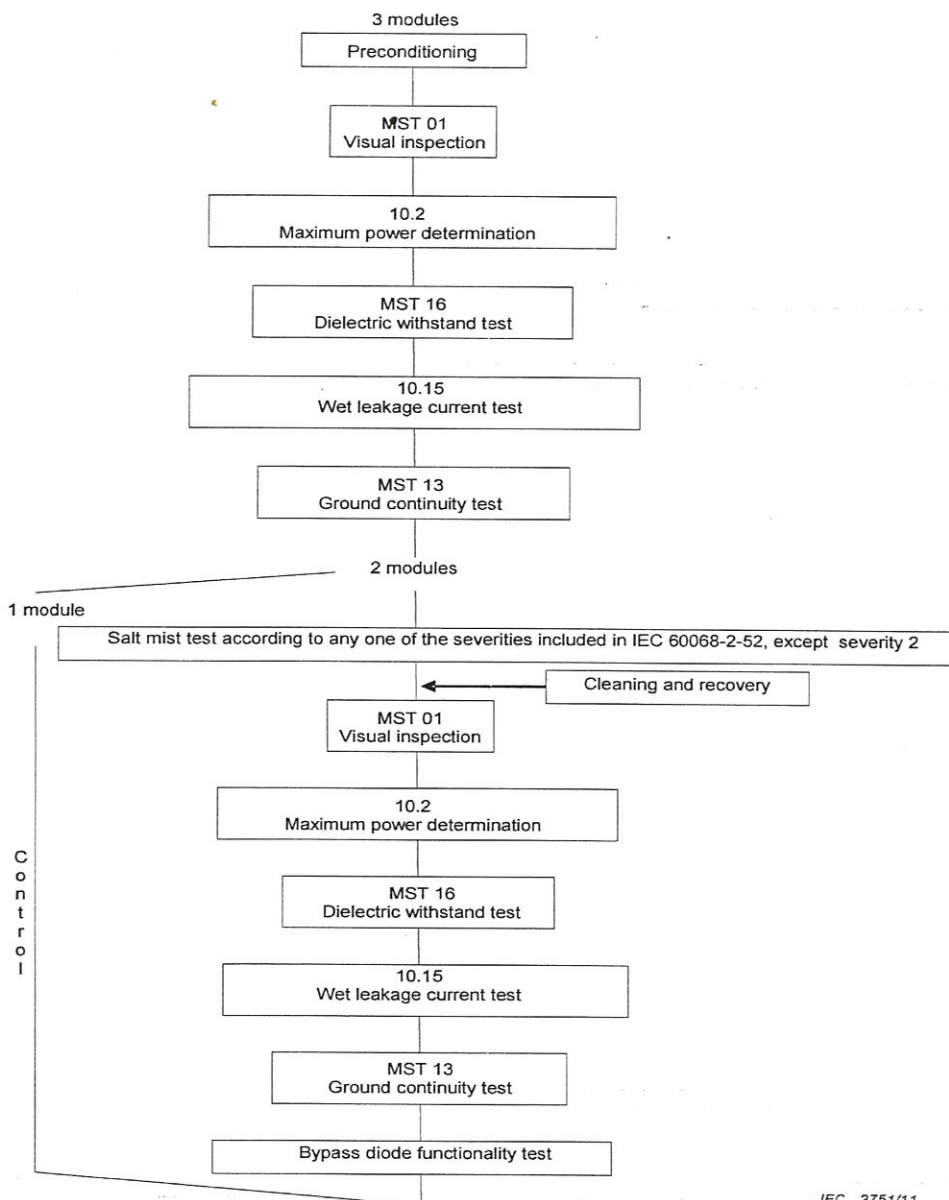
Sr. No.	Tests with clause reference	Specified Requirements	Covered under our NABL Scope (Yes/No)	RESULTS	Verdict
		d) Ground continuity Test (MST13) according to IEC 61730-2	Yes	See table MST13	P
		e) Dielectric withstand test (MST16) according to IEC 61730-2		See table MST16	P
		f) Bypass diode functionality test		See table Bypass diode functional test after salt mist corrosion test	P

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TC-5100



IEC 2751/11

NOTE 1 Preconditioning and tests 10.2 and 10.15 are taken from IEC 61215. Tests MST 01, MST 13 and MST 16 are taken from IEC 61730-2.

NOTE 2 The control module should be used as a check every time the test modules are measured to evaluate the effect of the salt mist test.

Figure 1 – Salt mist corrosion testing sequence for crystalline silicon PV modules

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TABLES**Visual Inspection (Initial) (MST01)**

TABLE: Visual inspection (Initial)		P
Test Date [MM/DD/YYYY].....:	01/07/2023	—
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 [MM/DD/YYYY].....:	01/08/2023						—
Module temperature [°C].....:	25						—
Irradiance [W/m ²].....:	1000						—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
1	49.768	41.200	14.039	13.169	542.59	77.65	
2	49.753	41.202	13.962	13.101	539.80	77.70	
3	49.756	41.169	14.008	13.151	541.45	77.68	
Supplementary information: Temperature corrected to 25°C and Irradiance corrected to 1000 W/m ²							

Dielectric withstand test (Initial) (MST 16)

TABLE: Dielectric Withstand Test - MST 16 (Initial)				P
Test Date [MM/DD/YYYY].....:	01/08/2023			—
	Maximum system voltage [V _{DC}].....:	1500V		—
	Test voltage applied V _{TEST} [V _{DC}].....:	2 minutes of 1500V and 1 minute of 8000V		—
	Module area A [m ²].....:	2.60		—
Sample No.	Dielectric breakdown	Insulation resistance at V _{TEST} [MΩ]	Insulation resistance x A [MΩ·m ²]	
1	<input checked="" type="checkbox"/>	>2000	40	P
2	<input checked="" type="checkbox"/>	>2000	40	P
3	<input checked="" type="checkbox"/>	>2000	40	P
Supplementary information: <input checked="" type="checkbox"/> Means No Dielectric breakdown, Minimum requirement according to the standard is 40 MΩ·m ² .				

FOR HI PHYSIX LABORATORY INDIA PVT. LTD.

Anurag Pathak

(Chief Technical Manager)

www.hiphysix.com

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



Wet leakage current test (Initial) (10.15)

TABLE: Wet leakage current test (Initial)			P
Test Date [MM/DD/YYYY]..... :	01/09/2023		—
Test Voltage applied [V]..... :	1500		—
Solution resistivity [Ω cm)..... :	< 3,500 Ω cm at 22 \pm 3°C	2440	—
Surface tension [Nm^{-1}]..... :	< 0.03 Nm^{-1} at 22 \pm 3°C	0.025	—
Solution temperature [°C]..... :	24°C		—
Sample #	Measured [$\text{M}\Omega$]	Limit [$\text{M}\Omega$]	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 40 $\text{M}\Omega\text{-m}^2$.			

Ground continuity test (Initial) (MST 13)

TABLE: Ground Continuity Test - MST 13 (Initial)			P
Test Date [MM/DD/YYYY]..... :	01/09/2023		—
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	0.30	0.005	P
3	0.20	0.003	P
Supplementary information: Nil			

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Performance of salt mist corrosion test (Severity 6)

Test Date [MM/DD/YYYY].....:	01/09/2023 to 03/06/2023	—
NaCl concentration.....:	5%	—
Course of cycle	Test method 6 of IEC 60068-2-52 used	—
Duration.....:	8 cycles = 56 Days (one cycle = 7days)	—
Sample No.	--	—
2	--	P
3	--	P
Supplementary information: Nil		

Visual inspection after salt mist corrosion test (MST 01)

TABLE: Visual inspection		P
Test Date [MM/DD/YYYY].....:	03/10/2023	—
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		

Maximum power determination after salt mist corrosion test (10.2)

TABLE: Maximum power determination							P
Test Date [MM/DD/YYYY].....:	03/10/2023						—
Module temperature [°C].....:	25						—
Irradiance [W/m ²].....:	1000						—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
2	49.741	41.214	13.849	12.984	535.14	77.68	
3	49.745	41.181	13.934	13.074	538.42	77.67	
Pmp degradation after this test [%]				2: - 0.86	3: - 0.56	P	
Supplementary information: Temperature corrected to 25°C and Irradiance corrected to 1000 W/m ²							

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