Prüfbericht-Nr.: *Test Report No.*:	**CN21UGJG 001**	**Auftrags-Nr.:** *Order No.*:	244279109	Seite 1 von 12 *Page 1 of 12*
Kunden-Referenz-Nr.: *Client Reference No.*:	2014517	**Auftragsdatum:** *Order date*:	13/11/2020	

Auftraggeber: *Client*: **Wuxi Suntech Power Co., Ltd.**
No.16 Xinhua Road, Xinwu District, Wuxi, JiangSu Province, 214000 , P. R. China

Prüfgegenstand: *Test item*: Photovoltaic (PV) Module(s)

Bezeichnung / Typ-Nr.: *Identification / Type No.*: See module type designation list on page 3

Auftrags-Inhalt: *Order content*: Salt mist corrosion testing of photovoltaic (PV) modules

Prüfgrundlage: *Test specification*: IEC 61701:2011, EN 61701:2012 severity 6
Salt mist corrosion testing of photovoltaic (PV) modules

Wareneingangsdatum: *Date of receipt*:	14/12/2020
Prüfmuster-Nr.: *Test sample No.*:	See page 6
Prüfzeitraum: *Testing period*:	14/12/2020 – 05/03/2021
Ort der Prüfung: *Place of testing*:	Refer to page 4
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland (Shanghai) Co., Ltd.
Prüfergebnis*: *Test result**:	Pass

Detaillierte Fotodokumentation
siehe Anlage zu diesem Bericht

Detailed photo documentation
see appendix to this report

geprüft von / *tested by*: Ivan Zhang

31/03/2021 Ivan Zhang/ Project Engineer

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by*:

31/03/2021 Angela Yao / Technical Certifier

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:
- As requested by customer, all the tests were performed according to standards as above, and the test results were documented within this test report.
- The tests were performed on STP540S-C72/Vmh as representative module.
- Valid only for the material combinations as listed in bill of materials in appendix of this test report.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*: Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Liste der verwendeten Prüfmittel
List of used test equipment

Prüfmittel *Test equipment*	**Prüfmittel-Nr. / ID-Nr.** *Equipment No. / ID-No.*	**Nächste Kalibrierung** *Next calibration*

All equipment used for tests, including equipment for subsidiary measurements having a significant effect on the accuracy or validity of the result of the test is calibrated before being put into service.
The laboratory has an established programme and procedure for the calibration of its equipment according to EN ISO/IEC 17025 (Reg. no.: D-PL-11097-02-01).

Produktbeschreibung
Product description

1	**Produktdetails** *Product details*
	With mono c-Si cell: **Max. System voltage: 1500V** **STPXXXS-C72/Vmh (xxx = 525-550, in steps of 5)** **STPXXXS-C66/Wmh (xxx = 480-500, in steps of 5)** **STPXXXS-C54/Umh (xxx = 390-410, in steps of 5)** **STPXXXS-C54/Umhm (xxx = 390-410, in steps of 5)** **Max. System voltage: 1000V** **STPXXXS-C72/Vmhb (xxx = 525-550, in steps of 5)** **STPXXXS-C54/Umhb (xxx = 390-410, in steps of 5)**
2	**Verwendete Materialien** *Used materials* See bill of materials in appendix
3	**Adresse(n) der Fertigungsstätte(n)** **Address(es) of the manufacturing site(s)**

Name / Description:	Wuxi Suntech Power Co., Ltd.
Street:	No.16 Xinhua Road, Xinwu District
Postcode / City, Country:	214000, Wuxi, JiangSu Province, P. R. China
Type of production:	C-Si PV-module production
Inspection report No. / Date:	50139230 003/ 16/12/2020

Produktbeschreibung
Product description

4 Zusammenfassung der Prüfergebnisse
Summary of test results

According to the inquiry the resistance to salt mist of photovoltaic (PV) modules should be assessed in accordance with IEC 61701:2011, EN 61701:2012 severity 6.

For the qualification of the modules to this tests initial and final control measurements were performed before and after the salt mist corrosion testing. The measurements included relative power measurements, insulation testing and visual inspection. The maximum permissible power degradation of 5% must not be exceeded. Furthermore the minimum requirements for the insulation test and wet leakage test as defined in IEC 61215-1:2016 MQT 03 and MQT 15 have to be met. No major visual defects as defined in IEC 61215-1:2016 shall occur.

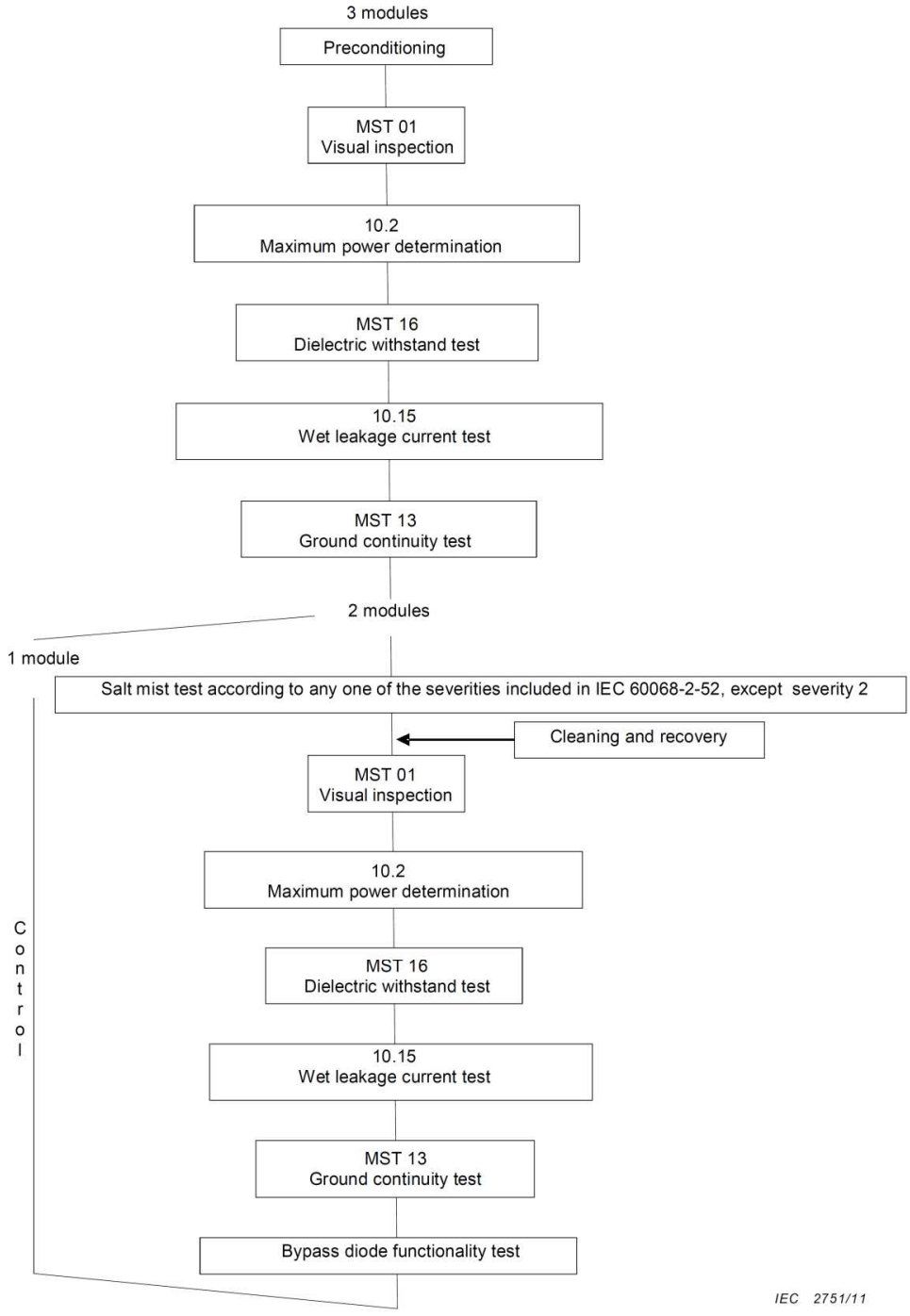
The test of the requirements of IEC 61701:2011, EN 61701:2012 were performed on module type STP540S-C72/Vmh as representative module and the test results are all fulfilled according to its regulations of the pass criteria.

- This report should be read in conjunction with bill of materials in appendix CN21UGJG 001.

The appendix of this test report includes the following annexes (6 pages):
Annex 1: Bill of materials (1 page)
Annex 2: Photos of module (2 pages)
Annex 3: Measurement reports (3 pages)

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Test Procedures:



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.

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

List of test samples
Module type: STP540S-C72/Vmh

Sample No.	Sample S/N	Remarks / constructional characteristics
1	STP099830027710124520	Front cover: 3.2mm AR-coating from Wuxi Suntech Power Co.,Ltd Rear cover: BEC-303 from SUZHOU FIRST PV MATERIAL CO., LTD Solar cell: 182*91±0.5mm, Thickness=175±17.5um,6" mono c-si, PJ310BF47B2 from Jiangsu Runergy Yueda PV Technology Co.,Ltd EVA: F406PS(Gram weight≥430g/m2) / F806W(Gram weight≥410g/m2) from Hangzhou First PV Material Co.,Ltd Frame: 35mm 6005 T6 from Wuxi Suntech Power Co.,Ltd Frame and Junction box adhesive: 1527 from Suzhou Tonsan Adhesive Co., Ltd Cell/String connector: Sn60Pb40 Ø= 0.32/4mm*0.4mm from Wuxi Suntech Power Co.,Ltd Junction box: STP-JBOX07 from Wuxi Suntech Power Co., Ltd. Potting material: 1521 from Suzhou Tonsan Adhesive Co., Ltd. Fluxing agent: AATF9800-MBB from Shenzhen Tongfang Electronic New Materials Co., Ltd. Cable: 62930 IEC 131 from Wuxi Suntech Power Co.,Ltd Connector: TL-Cable01S from Jiangsu Tonglin Electric Co.,Ltd. Bypass diode: 30SQ045 from PANJIT International Inc.
2	STP099830027710154520	
3	STP099830027710164520	

—

Supplementary information: 10.1- Visual inspection and constructional check have been performed on this sample.

6.2 c)	**Visual inspection (Initial)**	
Test Date [DD/MM/YYYY]	14/12/2020	—
Sample No.	Nature and position of initial findings	—
1	No visual defects	P
2	No visual defects	P
3	No visual defects	P
Supplementary information: N/A		

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

6.2 a)	**Maximum power determination (Initial)**						
Test Date [DD/MM/YYYY]			15/12/2020				—
Module temperature [°C]			Corrected to 25 °C				
Irradiance [W/m²]			1000*				
Sample No.	Pmax [W]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	FF [%]	
1	535.1	41.16	13.001	49.47	13.647	79.26	—
2	534.2	41.11	12.93	49.50	13.657	79.04	—
3	534.5	41.14	12.993	49.45	13.653	79.19	—
* A pulse solar simulator class AAA conforming to the requirements of IEC-60904-9 is used.							
Supplementary information: N/A							

6.2 e)	**Dielectric withstand test (Initial)**					
Test Date [DD/MM/YYYY]				15/12/2020		—
Maximum system voltage [V_{DC}]				1500		
High voltage applied [V_{DC}]				8000		
Insulation resistance measured at [V_{DC}]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1	5.00	2.59	12.95	-	No	P
2	5.00	2.59	12.95	-	No	P
3	5.00	2.59	12.95	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ*m²						
Supplementary information: the insulation tester can mesure up to 5.00 GΩ.						

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

6.2 b)	**Wet leakage current test (Initial)**			
Test Date [DD/MM/YYYY]		15/12/2020		—
Insulation resistance measured at [V_{DC}]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured [MΩ]	Area [m²]	Result* [MΩ × m²]	—
1	2809.0	2.59	7275.0	P
2	2530.0	2.59	6553.0	P
3	2978.0	2.59	7713.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m²				
Supplementary information: N/A				

6.2 d)	**Ground continuity test (Initial)**			
Test Date [DD/MM/YYYY]		15/12/2020		—
Maximum over-current protection rating [A]		25		
Current applied [A]		62.5		
Location of designated grounding point		Grounding point of the long edge		
Location of second contacting point		The greatest physical displacement of adjacent side		
Sample No.	Position in test sequence	Voltage [mV]	Resistance [mΩ]	
1	Reference sample	67.8 71.7 69.5	1.085 1.147 1.112	P
2	Salt mist corrosion test	58.9 50.6 56.4	0.942 0.810 0.902	P
3	Salt mist corrosion test	78.9 77.6 71.0	1.262 1.242 1.136	P
Supplementary information: N/A				

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

7	**Salt mist corrosion test**		
Test Date [DD/MM/YYYY] start / end		15/12/2020 to 20/02/2021	—
NaCl - concentration [%]		5	
Course of cycle (7 days)		- Spraying: 2h / 15 - 35°C / reaction of NaCl - Humidity storage: 20-22h / 40°C / RH 93% - After four periods of spraying and humidity storage, one storage period under standard atmosphere: 3 days / 23°C / RH 45%-55%	
Duration		8 cycles = 56 days	
Sample No.		—	—
2		—	—
3		—	—
Supplementary information: N/A			

9.2 c)	**Visual inspection after salt mist corrosion test**	
Test Date [DD/MM/YYYY]	05/03/2021	
Sample No.	Nature and position of findings	—
2	Nature and position of findings	—
3	Nature and position of findings	—
Supplementary information: N/A		

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

9.2 a)	**Maximum power determination after salt mist corrosion test**							
Test Date [DD/MM/YYYY]			05/03/2021					—
Module temperature [°C]			Corrected to 25					
Irradiance [W/m²]			1000					
Sample No.	P_{max} [W]	V_{mpp} [V]	I_{mpp} [A]	V_{oc} [V]	I_{sc} [A]	FF [%]	Degradation [%]	
2	531.8	41.12	12.935	49.48	13.613	78.96	-0.46	P
3	532.2	40.77	13.052	49.43	13.621	79.04	-0.44	P
Supplementary information: The maximum allowable Pmax degradation after this test is 5%.								

9.2 e)	**Dielectric withstand test after salt mist corrosion test**					
Test Date [DD/MM/YYYY]				02/03/2021		—
Maximum system voltage [V_{DC}]				1500		
High voltage applied [V_{DC}]				8000		
Insulation resistance measured at [V_{DC}]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
2	5.00	2.59	12.95	-	No	P
3	5.00	2.59	12.95	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ*m²						
Supplementary information: the insulation tester can mesure up to 5.00 GΩ.						

9.2 b)	**Wet leakage current test after salt mist corrosion test**			
Test Date [DD/MM/YYYY]		02/03/2021		—
Insulation resistance measured at [V_{DC}]		1500		
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
2	2219.0	2.59	5747.0	P
3	2415.0	2.59	6255.0	P

9.2 d)	**Ground continuity test after salt mist corrosion test**			
Test Date [DD/MM/YYYY]		02/03/2021		—
Maximum over-current protection rating [A]		25		
Current applied [A]		62.5		
Location of designated grounding point		Grounding point of the long edge		
Location of second contacting point		The greatest physical displacement of adjacent side		
Sample No.	Position in test sequence	Voltage [mV]	Resistance [mΩ]	
2	Salt mist corrosion test	83.9 88.7 77.6	1.342 1.419 1.242	P
3	Salt mist corrosion test	79.7 88.1 89.9	1.275 1.410 1.438	P
Supplementary information: N/A				

Absatz	**IEC 61701:2011, EN 61701:2012 severity 6**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

9.2 f)	**Bypass diode functional test after salt mist corrosion test**			
Test Date [DD/MM/YYYY]		05/03/2021		—
Number of diodes in junction box		3		
Diode manufacturer		PANJIT International Inc.		
Diode type designation		30SQ045		
Max. permissible junction temperature Tj_{max} [°C] (according to diode datasheet)		200		
Sample No.	Diode 1	Diode 2	Diode 3	
2	Functional	Functional	Functional	P
3	Functional	Functional	Functional	P
Supplementary information: N/A				