Prüfbericht-Nr.: *Test Report No.*:	**CN21T0JG 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*:	11/03/2021 – 20/05/2021
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*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
24/05/2021	Ivan Zhang/ Project Engineer	Ivan Zhang

kontrolliert von / *reviewed by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
24/05/2021	Angela Yao / Reviewer	

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/Pmh+ 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*

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/Pmh+ (xxx = 510-550, in steps of 5)** **STPXXXS-C66/Pmh+ (xxx = 470-500, in steps of 5)** **STPXXXS-C54/Pmh+ (xxx = 385-410, 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.

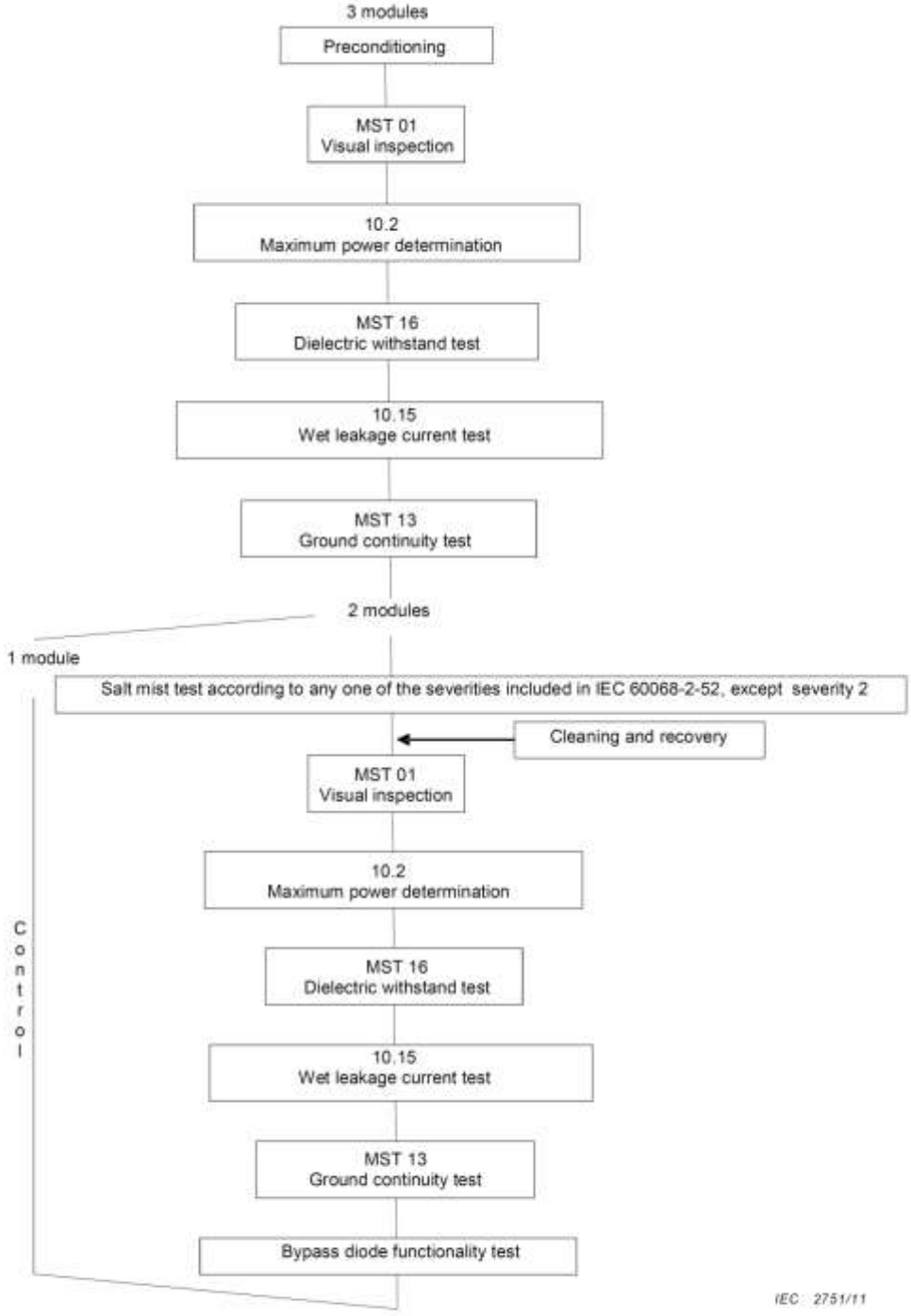
The test of the requirements of IEC 61701:2011, EN 61701:2012 were performed on module type STP540S-C72/Pmh+ as representative module and the test results are all fulfilled according to its regulations of the pass criteria.

- This report should be read in conjunction with bill of materials in appendix CN21T0JG 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/Pmh+

Sample No.	Sample S/N	Remarks / constructional characteristics	
1	STP099830028070020321	Front cover: 2.0mm AR coated tempered glass from Wuxi Suntech Power Co.,Ltd Rear cover: 2.0mm High Reflective Ceramic Coated Glass from Wuxi Suntech Power 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) / TF4(Gram weight≥410g/m2) from Hangzhou First PV Material Co.,Ltd Frame: 35mm 6005T6 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	STP099830028070030321		
3	STP099830028070160321		

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]			03/03/2021				—
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	538.2	41.89	12.847	49.45	13.700	79.45	—
2	538.3	41.62	12.935	49.49	13.712	79.33	—
3	539.7	42.02	12.843	49.57	13.729	79.29	—
* 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]			04/03/2021			—
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	
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]		04/03/2021		—
Insulation resistance measured at [V_{DC}]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured [MΩ]	Area [m²]	Result* [MΩ × m²]	—
1	5000.0	2.59	12950.0	P
2	5000.0	2.59	12950.0	P
3	5000.0	2.59	12950.0	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]		04/03/2021		—
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]	
1	Reference sample	53.7 56.9 55.8	0.859 0.910 0.893	P
2	Salt mist corrosion test	56.5 60.1 58.9	0.904 0.962 0.942	P
3	Salt mist corrosion test	49.5 53.1 56.4	0.792 0.850 0.902	P
Supplementary information: N/A				

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

7	**Salt mist corrosion test**	
Test Date [DD/MM/YYYY] start / end	24/03/2021 to 18/05/2021	—
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]	18/05/2021	
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]			18/05/2021					—
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	537.2	41.56	12.925	49.66	13.646	79.3	-0.2	P
3	536.8	41.56	12.918	49.69	13.644	79.2	-0.5	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]				18/05/2021		—
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	2.41	2.59	6.22	-	No	P
3	3.02	2.59	7.79	-	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*

9.2 b)	**Wet leakage current test after salt mist corrosion test**			
Test Date [DD/MM/YYYY]		18/05/2021		—
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]	—
2	2287.0	2.59	5900.1	P
3	1918.0	2.59	4948.4	P

9.2 d)	**Ground continuity test after salt mist corrosion test**			
Test Date [DD/MM/YYYY]		18/05/2021		—
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	92.1 72.2 70.6	1.474 1.155 1.129	P
3	Salt mist corrosion test	86.2 92.3 56.8	1.379 1.477 0.909	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]		19/05/2021		—
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				