





<b>Prüfbericht-Nr.:</b> Test report no.:	<b>CN23PBF2 001</b>	<b>Auftrags-Nr.:</b> Order no.:	244515531	Seite 1 von 17 Page 1 of 17
<b>Kunden-Referenz-Nr.:</b> Client reference no.:	2496578	<b>Auftragsdatum:</b> Order date:	16/05/2023	
<b>Auftraggeber:</b> Client:	<b>Sany Silicon Energy (Zhuzhou) Co., Ltd.</b> Room 518-50, Building 1, Longxin International, No.255, Tongxia Road, Tongtangwan Street, Shifeng District, 412005 Zhuzhou City, Hunan Province, P.R. China			
<b>Prüfgegenstand:</b> Test item:	Photovoltaic (PV) module			
<b>Bezeichnung / Typ-Nr.:</b> Identification / Type no.:	See module type designation on page 3			
<b>Auftrags-Inhalt:</b> Order content:	Ammonia corrosion testing of photovoltaic (PV) modules			
<b>Prüfgrundlage:</b> Test specification:	IEC 62716:2013; EN 62716:2013 Photovoltaic (PV) modules – Ammonia corrosion testing			
<b>Wareneingangsdatum:</b> Date of sample receipt:	28/04/2023			
<b>Prüfmuster-Nr.:</b> Test sample no.:	Refer to page 5			
<b>Prüfzeitraum:</b> Testing period:	13/06/2023 - 04/07/2023			
<b>Ort der Prüfung:</b> Place of testing:	Refer to page 4			
<b>Prüflaboratorium:</b> Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
<b>Prüfergebnis*:</b> Test result*:	Pass			
<b>geprüft von:</b> tested by:	<input checked="" type="checkbox"/> 	<b>genehmigt von:</b> authorized by:	<input checked="" type="checkbox"/> 	
<b>Datum:</b> Date:	23/10/2023	<b>Ausstellungsdatum:</b> Issue date:	23/10/2023	
<b>Stellung / Position:</b>	Project Engineer	<b>Stellung / Position:</b>	Authorizer	
<b>Sonstiges /</b> <b>Other:</b>	- Basic qualification for module types listed on page 3. - Valid in conjunction with TÜV Rheinland certificate PV 50587008 - Valid only for the material combinations as listed in Constructional Data Form (CDF) No. CN23PBF2 001			
				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<b>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.</b> <i>This test report only relates to the above mentioned 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.</i>				

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**Anmerkungen**  
Remarks

1	<p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>
2	<p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</p> <p><i>As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</i></p>
3	<p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>
4	<p>Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird.</p> <p><i>The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.</i></p>

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**Produktbeschreibung**  
Product description

1	<b>Produktdetails</b> Product details	<p><b>New model types:</b></p> <p><b>Max. system voltage: up to 1500 VDC (Voc at STC):</b></p> <p><b>With ½ cut of mono c-Si cells:</b></p> <p><b>SYMN144TBDxxx (xxx=555-580, in steps of 5, 144 cells)</b></p> <p><b>SYMN120TBDxxx (xxx=455-475, in steps of 5, 120 cells)</b></p> <p><b>SYMN108TBDxxx (xxx=415-435, in steps of 5, 108 cells)</b></p> <p><b>xxx represents output power in Wp</b></p>											
2	<b>Verwendete Materialien</b> Used materials	see Constructional Data Form (CDF) no. CN23PBF2 001											
3	<b>Adresse(n) der Fertigungsstätte(n)</b> Address(es) of the manufacturing site(s)	<table border="1"> <tr> <td data-bbox="558 896 885 974">Name / Description:</td> <td data-bbox="885 896 1532 974">Sany Silicon Energy (Zhuzhou) Co., Ltd.</td> </tr> <tr> <td data-bbox="558 974 885 1075">Street:</td> <td data-bbox="885 974 1532 1075">Sany Energy Equipment Industrial Park, No.320 Qingshui Road, Shifeng District</td> </tr> <tr> <td data-bbox="558 1075 885 1176">Postcode / City, Country:</td> <td data-bbox="885 1075 1532 1176">412005 / Zhuzhou City, Hunan Province, P.R. China</td> </tr> <tr> <td data-bbox="558 1176 885 1254">Type of production:</td> <td data-bbox="885 1176 1532 1254">Crystalline PV-module</td> </tr> <tr> <td data-bbox="558 1254 885 1332">Inspection report No. and date</td> <td data-bbox="885 1254 1532 1332">CN23RWL8 001 / 11/05/2023</td> </tr> </table>		Name / Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.	Street:	Sany Energy Equipment Industrial Park, No.320 Qingshui Road, Shifeng District	Postcode / City, Country:	412005 / Zhuzhou City, Hunan Province, P.R. China	Type of production:	Crystalline PV-module	Inspection report No. and date	CN23RWL8 001 / 11/05/2023
Name / Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.												
Street:	Sany Energy Equipment Industrial Park, No.320 Qingshui Road, Shifeng District												
Postcode / City, Country:	412005 / Zhuzhou City, Hunan Province, P.R. China												
Type of production:	Crystalline PV-module												
Inspection report No. and date	CN23RWL8 001 / 11/05/2023												
4	<b>Sonstiges</b> Other	Test sample(s), as well sample information, description, product details and intended usage was provided by customer. Throughout this report a point is used as the decimal separator.											
5	<b>Prüfmusterbereitstellung</b> Test sample obtaining	<input checked="" type="checkbox"/> Sending by customer <input type="checkbox"/> Sampling by TÜV Rheinland Group  <input type="checkbox"/> others:											

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**Produktbeschreibung**  
*Product description*

**6 Zusammenfassung der Prüfergebnisse**  
*Summary of test results*

According to the inquiry the resistance to ammonia corrosion of photovoltaic (PV) modules should be assessed in accordance with IEC 62716:2013 and EN 62716:2013.

The required tests of IEC 62716:2013 and EN 62716:2013 were passed according to its regulations of the pass criteria. The above listed module types have passed all tests of the IEC 61215/EN 61215 and IEC 61730/EN 61730 standards before ammonia corrosion resistance test was applied (see history of certification).

- Basic qualification for model types listed in section 1. The relevant tests were performed on SYMN144TBDxxx with bill of materials as listed on page 5 as representative. The test results are documented within this test report.

- The differences of module types are as below:

1. SYMN144TBDxxx are for modules with 144 pcs half-cut 182mm Topcon solar cells;
2. SYMN120TBDxxx are for modules with 120 pcs half-cut 182mm Topcon solar cells;
3. SYMN108TBDxxx are for modules with 108 pcs half-cut 182mm Topcon solar cells

- The materials and combinations in below table have been approved on module in main license with certificate PV 50587008. No additional testing is considered necessary.

Object	Manufacturer	Type / model	Technical data / ratings
Cell connectors	Changzhou Sheng Yue metal new material Co., Ltd.	Sn60Pb40	$\varnothing = 0.26 \pm 0.01 \text{ mm}$
String connectors	Changzhou Sheng Yue metal new material Co., Ltd.	Sn60Pb40	T(mm) x L(mm): 0.3mm x 6.0mm 0.3mm x 4.0mm
Fluxing agent	Zhuhai Changxian New Materials Technology Co., Ltd	CX700	—
Fixing tape	Guangdong Sunrui New Material Co., Ltd.	HZ UV-100	Thickness= $100 \mu\text{m} \pm 40 \mu\text{m}$

The test report is valid only for the materials as listed in Constructional Data Form (CDF) No. CN23PBF2 001.

This test report includes a history of reporting and certification, measurement reports and photo in the appendix.

*Summary of test location:*

All tests were performed at China Testing & Certification International Group Co., Ltd., China Photovoltaic Product Test Center, with the address No.1, South side of Yanmi Road, economic development zone, Miyun District, Beijing, P.R. China

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Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen / Measuring results - Remarks	Ergebnis Result
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7.1	List of test samples Module type: SYMN144TBD565		
Sample no.	Sample SN	Remarks / constructional characteristics (e.g. cell, backsheet, frame type)	
1	230401D230201	<p>Front cover: 2.0mm External AR Coating Tempered Glass from Hunan Kibing Solar Technology Co., Ltd.</p> <p>Encapsulation material: EP304 (between glass and cell) / F406PS (between cell and back glass) from HANGZHOU FIRST APPLIED MATERIAL CO., LTD.</p> <p>Rear cover: 2.0mm Semi-Tempered back glass from Hunan Kibing Solar Technology Co., Ltd.</p> <p>Solar Cell: SYCN182T16 from Sany Silicon Energy (Zhuzhou) Co., Ltd.</p>	
2	230401D230203	<p>Frame: 30mm, 6005-T6 from CHANGSHU DONGNENG SOLAR TECHNOLOGY CO., LTD</p> <p>Adhesive of frame sealing: HT906Z from Shanghai Huitian New Material Co., Ltd.</p> <p>Cell connector: Ø0.26mm Sn60/Pb40 from Suzhou YourBest New-type Materials Co., Ltd.</p> <p>String connector: 6.0mm x 0.3mm, 4.0mm x 0.3mm Sn60/Pb40 from Suzhou YourBest New-type Materials Co., Ltd.</p>	—
3	230401D230202	<p>Fluxing agent: SF180 from ASAHI SOLDER TECHNOLOGY(WUXI) CO., LTD</p> <p>Fixing Tape: D60F6-2 from SuZhou Rongzhi Electronic Technology Co., Ltd</p> <p>Junction box: 3Qxy from QC Solar (Suzhou) Corporation</p> <p>Cable: 62930 IEC 131 1 x 4.0mm<sup>2</sup> from QC Solar (Suzhou) Corporation</p> <p>Connector: QC4.10-cds from QC Solar (Suzhou) Corporation</p> <p>Bypass diode: QCM4045 from QC Solar (Suzhou) Corporation</p> <p>Adhesive of J-Box sealing: HT906Z from Shanghai Huitian New Material Co., Ltd.</p> <p>Potting Material in junction box: 5299W-S from Shanghai Huitian New Material Co., Ltd.</p>	
Remark: Sample # 1 was tested as reference module.			

<b>Absatz</b> <i>Clause</i>	<b>Anforderungen - Prüfungen /</b> <i>Requirements - Tests</i>	<b>Messergebnisse –</b> <b>Bemerkungen /</b> <i>Measuring results - Remarks</i>	<b>Ergebnis</b> <i>Result</i>
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7.2	Visual inspection (initial)		
Test date (dd/mm/yyyy)		13/06/2023	
Sample no.	Requirement	Nature and position of initial findings	—
1	No major visual defects	No major visual defects	P
2		No major visual defects	P
3		No major visual defects	P
Supplementary information: -			

7.3	Maximum power determination at STC (initial)						
Test date (dd/mm/yyyy)			13/06/2023				—
Test method			<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight				
Ambient temperature [°C]			25 ± 2				
Irradiance [W/m²]			1000 ± 10				
Module temperature [°C]			25 ± 2				
Sample no.	P <sub>max</sub> [W]	V <sub>mpp</sub> [V]	I <sub>mpp</sub> [A]	V <sub>oc</sub> [V]	I <sub>sc</sub> [A]	FF [%]	
1	556.6	43.30	12.856	51.55	13.501	80.0	N/A
2	554.7	43.32	12.807	51.39	13.482	80.2	N/A
3	555.9	43.24	12.857	51.41	13.515	80.0	N/A
Supplementary information: -							

7.4	Insulation test (initial)					
Test date (dd/mm/yyyy)				13/06/2023		—
Maximum system voltage [V <sub>DC</sub> ]				1500		
High voltage applied [V <sub>DC</sub> ]				8000		
Insulation resistance measured at [V <sub>DC</sub> ]				1500		
Sample no.	R <sub>iso</sub> [GΩ]	A [m²]	R <sub>iso</sub> •A [GΩ•m²]	Dielectric breakdown		
				Yes (description)	No	
1	>15.00	2.58	>38.70	-	No	P
2	>15.00	2.58	>38.70	-	No	P
3	>15.00	2.58	>38.70	-	No	P
Supplementary information: Minimum requirement is 0.04 GΩ•m² for A > 0.1 m² and 0.4 GΩ for A ≤ 0.1 m². Insulation tester can measure up to 15.00 GΩ.						

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Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen / Measuring results - Remarks	Ergebnis Result
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7.5	Wet leakage current test (initial)			
Test date (dd/mm/yyyy)		13/06/2023		—
Insulation resistance measured at [V <sub>DC</sub> ]		1500		
Solution resistivity [Ω·cm]		≤ 3500		
Solution temperature [°C]		22 ± 2		
Sample no.	R <sub>iso</sub> [MΩ]	A [m²]	R <sub>iso</sub> ·A [MΩ·m²]	
1	>15000.0	2.58	>38700.0	P
2	>15000.0	2.58	>38700.0	P
3	>15000.0	2.58	>38700.0	P
Supplementary information: Minimum requirement is 40 MΩ·m². Insulation tester can measure up to 15000.0 MΩ.				

7.6	Continuity test of equipotential bonding (initial)			
Test date (dd/mm/yyyy)		13/06/2023		—
Maximum overcurrent protection rating [A]		30		
Current applied [A]		75		
Duration of applied current [min]		2		
Location of designated point for equipotential bonding		long side of the frame		
No. of other conductive parts tested		3		
Sample no.	Max. measured voltage [mV]	Max. calculated resistance [mΩ]		
1	—	<1.0	P	
2	—	<1.0	P	
3	—	<1.0	P	
Supplementary information: N/A				



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<b>Absatz</b> <i>Clause</i>	<b>Anforderungen - Prüfungen /</b> <i>Requirements - Tests</i>	<b>Messergebnisse –</b> <b>Bemerkungen /</b> <i>Measuring results - Remarks</i>	<b>Ergebnis</b> <i>Result</i>
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8	Ammonia corrosion test		
Test date (dd/mm/yyyy)		13/06/2023 – 02/07/2023	—
Sample no. 2		230401D230203	—
Sample no. 3		230401D230202	
NH <sub>3</sub> concentration [ppm]		6661~6668	—
Temperature [°C]		59.2~61.2 / 25.7~26.9	
Relative humidity [%]		97.2~100.0 / 59.5~61.1	
Course of cycle (1 day)		- exposure of NH <sub>3</sub> for 8 hours and 60°C with nearly 100% condensation on the samples - drying for 16 hours at 18°C~28°C and max. 75%RH	
Duration		20 cycles = 480 hours (20 days)	
Comment		According to DIN EN ISO 3231/DIN EN ISO 6988 DIN 50018	
Supplementary information: N/A			

8.1	Visual inspection after Ammonia corrosion test (control)		
Test date (dd/mm/yyyy)		04/07/2023	
Sample no.	Requirement	Nature and position of initial findings	—
2	No major visual defects	No major visual defects	P
3		No major visual defects	P
Supplementary information: N/A			

8.2	Maximum power determination at STC after Ammonia corrosion test								
Test date (dd/mm/yyyy)				04/07/2023				—	
Test method				<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight					
Ambient temperature [°C]				25 ± 2					
Irradiance [W/m²]				1000 ± 10					
Module temperature [°C]				25 ± 2					
Measurement uncertainties [%] (k =2)				P <sub>max,m1</sub>	≤ 2.54	V <sub>oc,m2</sub>	≤ 0.76		I <sub>sc,m3</sub>
Sample no.	P <sub>max</sub> [W]	V <sub>mpp</sub> [V]	I <sub>mpp</sub> [A]	V <sub>oc</sub> [V]	I <sub>sc</sub> [A]	FF [%]	Degra- dation [%]		
2	552.4	43.21	12.783	51.33	13.465	79.9	-0.43	P	
3	553.9	43.19	12.823	51.39	13.494	79.9	-0.37	P	
Supplementary information: N/A									



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<b>Absatz</b> <i>Clause</i>	<b>Anforderungen - Prüfungen /</b> <i>Requirements - Tests</i>	<b>Messergebnisse –</b> <b>Bemerkungen /</b> <i>Measuring results - Remarks</i>	<b>Ergebnis</b> <i>Result</i>
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### 8.3 Insulation test after Ammonia corrosion test

Test date (dd/mm/yyyy)				04/07/2023		—
Maximum system voltage [V <sub>DC</sub> ]				1500		
High voltage applied [V <sub>DC</sub> ]				8000		
Insulation resistance measured at [V <sub>DC</sub> ]				1500		
Sample no.	R <sub>iso</sub> [GΩ]	A [m²]	R <sub>iso</sub> ·A [GΩ·m²]	Dielectric breakdown		
				Yes (description)	No	
2	>15.00	2.58	>38.70	-	No	P
3	>15.00	2.58	>38.70	-	No	P

Supplementary information: Minimum requirement is  $0.04 \text{ G}\Omega \cdot \text{m}^2$  for  $A > 0.1 \text{ m}^2$  and  $0.4 \text{ G}\Omega$  for  $A \leq 0.1 \text{ m}^2$ .  
Insulation tester can measure up to  $15.00 \text{ G}\Omega$ .

#### 8.4 Wet leakage current test after Ammonia corrosion test

Test date (dd/mm/yyyy)		04/07/2023		—
Insulation resistance measured at [V <sub>DC</sub> ]		1500		
Solution resistivity [Ω·cm]		≤ 3500		
Solution temperature [°C]		22 ± 2		
Sample no.	R <sub>iso</sub> [MΩ]	A [m²]	R <sub>iso</sub> ·A [MΩ·m²]	
2	>15000.0	2.58	>38700.0	P
3	>15000.0	2.58	>38700.0	P

Supplementary information: Minimum requirement is  $40 \text{ M}\Omega\cdot\text{m}^2$ .  
Insulation tester can measure up to  $15000.0 \text{ M}\Omega$ .

## 8.5 Continuity test of equipotential bonding after Ammonia corrosion test

Test date (dd/mm/yyyy)		04/07/2023	—
Maximum overcurrent protection rating [A]		30	
Current applied [A]		75	
Duration of applied current [min]		2	
Location of designated point for equipotential bonding		long side of the frame	
No. of other conductive parts tested		3	
Sample no.	Max. measured voltage [mV]	Max. calculated resistance [mΩ]	
2	—	<1.0	P
3	—	<1.0	P

Supplementary information: N/A

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<b>Absatz</b> <i>Clause</i>	<b>Anforderungen - Prüfungen /</b> <i>Requirements - Tests</i>	<b>Messergebnisse –</b> <b>Bemerkungen /</b> <i>Measuring results - Remarks</i>	<b>Ergebnis</b> <i>Result</i>
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8.6	Bypass diode functionality test after Ammonia corrosion test			
Test date (dd/mm/yyyy)		04/07/2023		—
Number of diodes in junction box		3		
Diode manufacturer		QC Solar (Suzhou) Corporation		
Diode type designation		QCM4045		
Applied current [A]		I <sub>sc</sub> x 1.25		
Duration of current flow [min]		60		
Sample no.	Diode 1	Diode 2	Diode 3	
2	working properly	working properly	working properly	P
3	working properly	working properly	working properly	P
Supplementary information: N/A				

--- Ende des Prüfberichts / End of Test Report ---

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

**Appendix A: Abbreviations used in the report**

NMOT	Nominal Module Operating Temperature
STC	Standard Test Conditions
$P_{\max}$	Maximum power
$I_{\text{mpp}}$	Maximum power point current
$V_{\text{mpp}}$	Maximum power point voltage
$I_{\text{sc}}$	Short circuit current
$V_{\text{oc}}$	Open circuit voltage
FF	Fill factor
A	Module area

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

**Appendix B: History of reporting and certification**

Subject	Module type	Report no.	Certificate no.	Date of issue
N/A				

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

**Appendix C: Measurement reports**

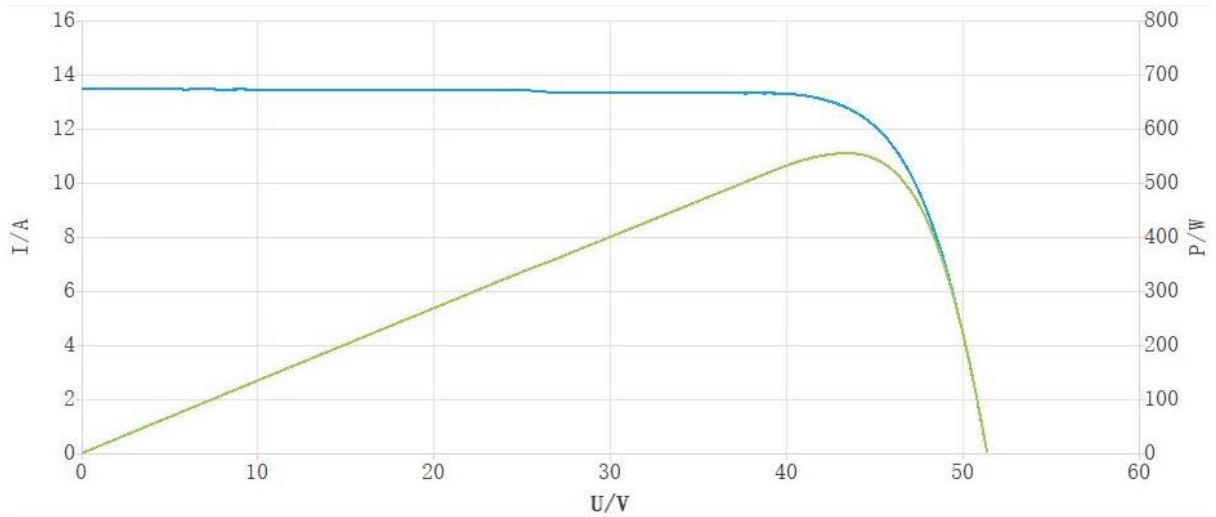


Fig. 1: IV-curves of serial no. 230401D230201 (initial)

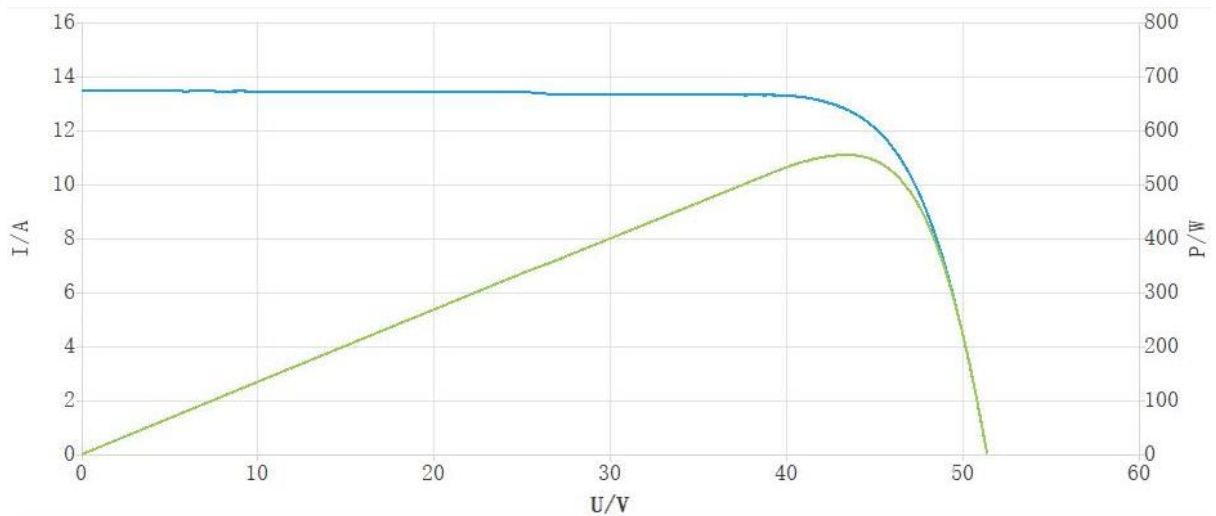


Fig. 2: IV-curves of serial no. 230401D230203 (initial)

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

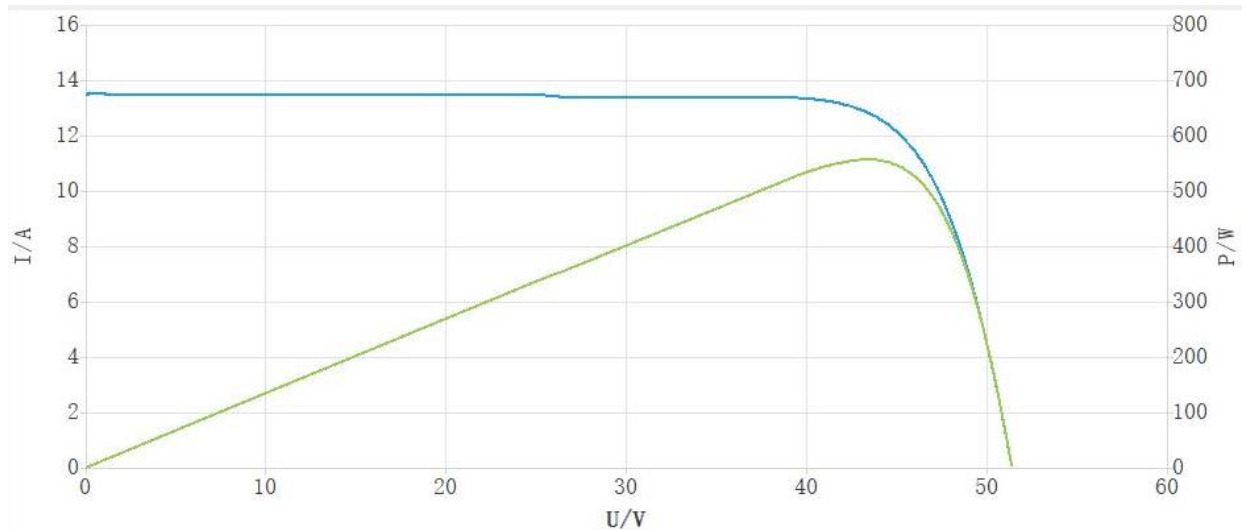


Fig. 3: IV-curves of serial no. 230401D230202 (initial)

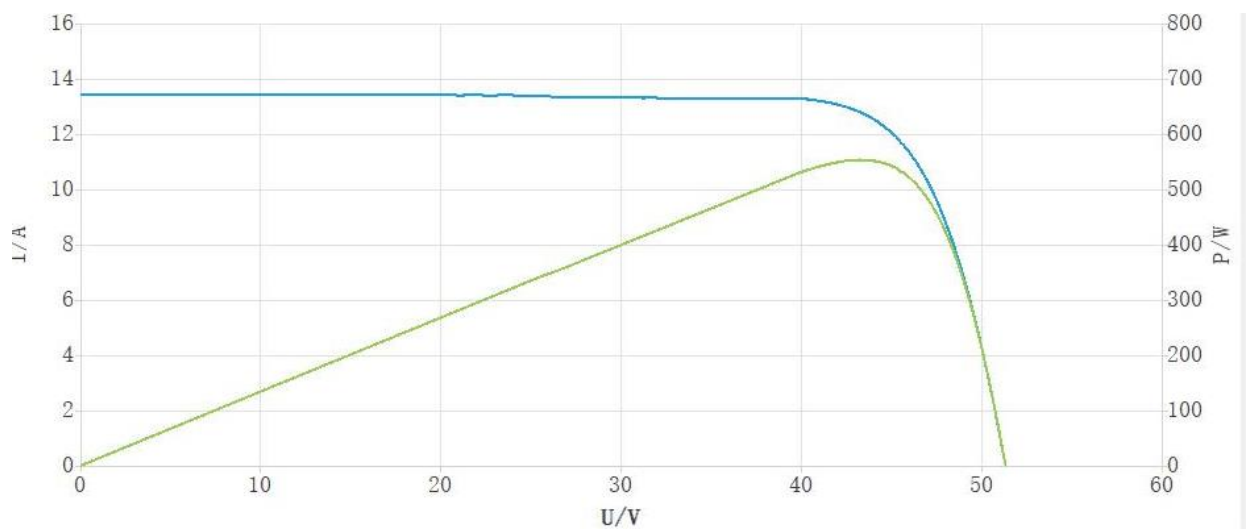


Fig. 4: IV-curves of serial no. 230401D230203 (final)

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

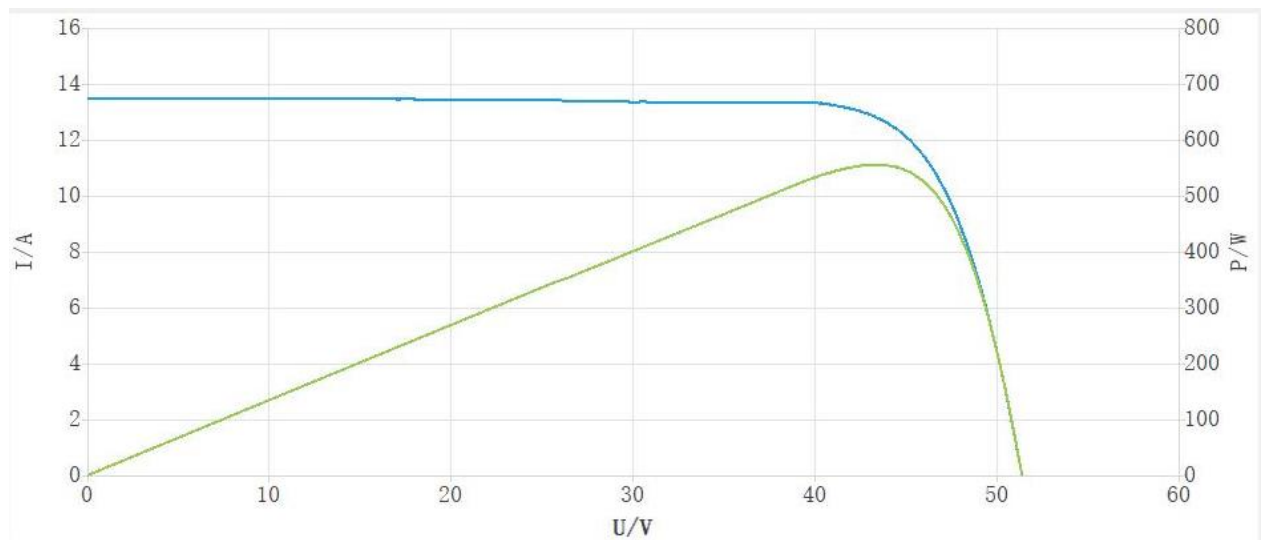


Fig. 5: IV-curves of serial no. 230401D230202 (final)



FOTO-DOKUMENTATION  
 PHOTO DOCUMENTATION

Appendix D: Photos



Fig. 6: front view of test sample



Fig. 7: rear view of test sample

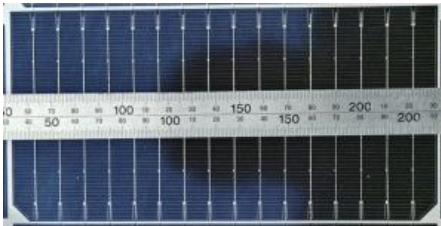


Fig. 8: detail view of solar cell



**PV MODULE**  
 Sany Silicon Energy (Zhuzhou) Co., LTD  
 Sany Energy Equipment Industrial Park,  
 No.320 Qingshui Road, Shifeng District,  
 Zhuzhou City, Hunan Province  
 412005 China  
 www.sanygroup.com/

**SYM144TBD565**  
 Max. power (P<sub>max</sub>)  
 Max. power tolerance  
 Voltage at max. power(V<sub>mpp</sub>)  
 Current at max. power(I<sub>mpp</sub>)  
 Open-circuit voltage(V<sub>oc</sub>)  
 Short-circuit current(I<sub>sc</sub>)  
 Maximum system voltage

565W  
 ± 3%  
 42.14V  
 13.41A  
 50.87V±3%  
 14.19A±3%  
 1500VDC

bifaciality  
 Series Fuse Rating  
 operating temperature range  
 protect rage  
 module vprotecteight  
 module size  
 STC

80±5%  
 30A  
 40°C ~ +85°C  
 II  
 32.0(kg)  
 2278×1134×30(mm)  
 1000W/m², AM1.5, 25°C



warning

Only the professionals can install and  
 maintain the components Be careful of the  
 dangerous high DC voltage when connecting  
 the components Never damage or scratch the  
 back of the assembly

Fig. 9: detail view of type label

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ADDITIONAL DOCUMENTATION



Fig. 10: detail view of closed junction box



Fig. 11: detail view of connector

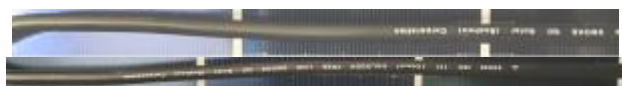


Fig. 12: detail view of cable



Fig. 13: detail view of equipotential bonding hole and symbol



Fig. 14: detail view of frame corner

N/A

N/A