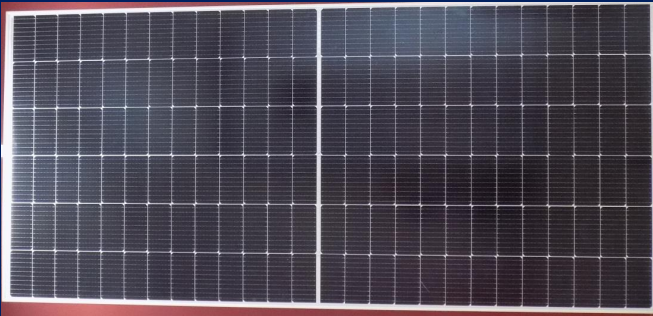




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<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	1433811	<b>Auftragsdatum:</b> <i>Order date:</i>	29/05/2023	
<b>Auftraggeber:</b> <i>Client:</i>	Swelect Energy Systems Limited. "SWELECT HOUSE" No.5 Sir P.S Sivasamy Salai, Mylapore, Chennai -600 004. India			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Photovoltaic (PV) modules			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	SWM11BN8595			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Testing against PID resistivity			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	Solar Photovoltaic Modules IEC TS 62804-1:2015, IS 17210(Part 1):2019, Test methods for the detection of potential-induced degradation – Part 1: Crystalline silicon with following severities - Climatic conditions: 85°C and 85% RH - Duration: 288 hours- 3 cycles of 96 hours each			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	08-09-2023			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	Refer list of test samples			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	15/09/2023 – 16/10/2023			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	Bangalore, India			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TUV Rheinland(India) Pvt. Ltd.,Bangalore,India			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von:</b> <i>tested by:</i> Kumaragowda G		<b>genehmigt von:</b> <i>authorized by:</i> K. Ganesh Kamath		
<b>Datum:</b> <i>Date:</i> 03-01-2024		<b>Ausstellungsdatum:</b> <i>Issue date:</i> 03-01-2024		
<b>Stellung / Position:</b>	Sr.Engineer-Products(S&C)	<b>Stellung / Position:</b>	Sr.Manager-Products(S&C)	
<b>Sonstiges /</b> <i>Other:</i>	None			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* 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 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.</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. 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. 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. 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*

<b>1</b>	<b>Produktdetails</b> <i>Product details</i>  SWM11BN8xxx( with xxx = 595-585 in step of 1 with 156 cells)
<b>2</b>	<b>Verwendete Materialien</b> <i>Used materials</i>  Refer constructional characteristics in the "List of test samples"
<b>3</b>	<b>Adresse(n) der Fertigungsstätte(n)</b> <i>Address(es) of the manufacturing site(s)</i>  1. Swelect HHV Solar Photovoltaics Private Limited.No. 169, 166, Sembagoundan Pudur, Kuppeplayam Village, Coimbatore North Taluk, Coimbatore District Tamil Nadu-641107
<b>4</b>	<b>Zusammenfassung der Prüfergebnisse</b> <i>Summary of test results</i>  "According to the enquiry of the manufacturer for a testing against PID resistivity shall be performed according to IEC TS 62804 with following severities – <ul style="list-style-type: none"><li>- Negative potential of the specified maximum system voltage between the shorted output terminals and the frame(ground), - 1500V DC</li><li>- Climatic conditions: 85°C and 85% RH</li><li>- Duration: 288 hours (3 cycles of 96 hours each)</li></ul> Before and after the PID test, Visual inspection, maximum power determination, Ground continuity and documentation by electroluminescence imaging shall be performed.  In line with the standard for PV module type approval testing EN IEC 61215 two modules will be tested and one additional module will be used as a reference sample.  <b>Pass Criteria:</b>  A module design shall be judged to have passed the PID test, if each test sample meets all the following criteria: <ul style="list-style-type: none"><li>• The degradation of maximum output power does not exceed 5%.</li><li>• No evidence of a major visual defect (as defined in EN IEC 61215)</li></ul> <b>All presented results are only valid for the exact tested module type and design (cell type, encapsulation material, glass type)</b>

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—	<b>Test specification</b>		
Photovoltaic (PV) modules – Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon	IEC TS 62804-1:2015-08, Edition 1.0 IS 17210 (Part 1):2019		—

—	<b>Marking</b>		
Name, monogram or symbol of manufacturer	On Type label and on module front		P
Type or model number	On Type label		P
Serial number	On laminate from front side		P
Polarity of terminals or leads	On JB and cable		P
Maximum system voltage	On Type label		P
Date and place of manufacture	Date traceable from serial number and Manufacturing address mentioned on type label		P

-	<b>List of test samples</b>		
Sample No.	Sample S/N	Type/Model	Remarks/constructional characteristics (e.g. cell, back sheet, frame type)
A003546092-017	SW11923A12451	SWM11BN8595	Cell: 10bb Mono Bifacial cell by Jupiter solar Back sheet: PRESERV 1 300WD by RenewSys India Private Limited.
A003546092-042	SW12723A33597	SWM11BT8595	EVA: CONSERV P UVT-14 FC(Front) CONSERV P 360-14FC(Back) by RenewSys India Private Limited.
A003546092-043	SW11823A10534	SWM11BT8595	Front cover: ARC coated tempered glass, manufactured by Gujarat Borosil Junction box: PV-ZH011C-5 by Zhejiang Zhonghuan Sunter PV Technology Co., Ltd

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10.1	Visual inspection (Initial)		
Test date (DD/MM/YYYY)	15/09/2023		
Sample No.	Nature and position of initial findings		—
A003546092-017	No Major visual defects found		P
A003546092-042	No Major visual defects found		P
A003546092-043	No Major visual defects found		P
Supplementary information: - None			

10.2	Maximum power determination (Initial)						
Test date (DD/MM/YYYY)	22/09/2023						
Module temperature [°C]	Corrected to 25						
Irradiance [W/m <sup>2</sup> ]	1000						
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 [%]	—
A003546092-017	587.42	45.78	12.83	54.43	13.41	80.49	P
A003546092-042	589.61	45.79	12.88	54.31	13.44	80.79	P
A003546092-043	588.05	45.76	12.85	54.4	13.43	80.52	P
Supplementary information: - None							

10.3	Insulation test (Initial)						
Test date (DD/MM/YYYY)	22/09/2023						
Maximum system voltage [V <sub>DC</sub> ]	1500V						
High voltage applied [V <sub>DC</sub> ]	8000V						
Insulation resistance measured at [V <sub>DC</sub> ]	1500V						
Sample No.	Measured [GΩ]	Area [m <sup>2</sup> ]	Result* [GΩ × m <sup>2</sup> ]	Dielectric breakdown			—
A003546092-017	40.2	2.81	112.96	Yes (description) --	No No	P	
A003546092-042	28.9	2.81	81.21	--	No	P	
A003546092-043	44.1	2.81	123.92	--	No	P	
* Minimum requirement acc. to the standard is 0.04 GΩ × m <sup>2</sup>							
Supplementary information: - None							

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10.15 Wet leakage current test (Initial)				
Test date (DD/MM/YYYY)	22/09/2023			—
Insulation resistance measured at [V <sub>DC</sub> ]	1500V			
Solution resistivity [ $\Omega$ cm]	< 3,500			P
Solution temperature [°C]	22 ± 3			P
Sample No.	Measured	Area	Result*	—
	[M $\Omega$ ]	[m <sup>2</sup> ]	[M $\Omega$ × m <sup>2</sup> ]	
A003546092-017	3200.0	2.81	8992.0	P
A003546092-042	5500.0	2.81	15455.00	P
A003546092-043	4100.0	2.81	11521.00	P
* Minimum requirement acc. to the standard is 40 M $\Omega$ × m <sup>2</sup>				
Supplementary information: - None				

10.4 Ground continuity test (Initial)				
Test date (DD/MM/YYYY)	22/09/2023			—
Maximum over-current protection rating [A]	25			
Current applied [A]	62.5			
Location of designated grounding point	Right side Longer frame			
Location of second contacting point	Opposite frame			
Sample No.	Voltage [mV]	Resistance [m $\Omega$ ]		
A003546092-017	289.5	4.63		P
A003546092-042	315.3	5.04		P
A003546092-043	311.2	4.98		P
Supplementary information: - None				

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Performance of PID Test -1st Cycle				
Test Method	Chamber			—
Module Temperature [°C]	85			
Relative Humidity [%]	85			
Grounding polarity	+ve			
Test date [DD/MM/YYYY]	Sample No.	Applied Voltage [V]	Duration[Hrs]	
05/10/2023 – 10/10/2023	A003546092-042	-1500	96	P
	A003546092-043	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after 1 <sup>st</sup> PID Cycle		
Test date (DD/MM/YYYY)	10/10/2023		
Sample No.	Nature and position of initial findings		—
A003546092-042	No Major visual defects found		P
A003546092-043	No Major visual defects found		P
Supplementary information: - None			

10.2	Maximum power determination after 1 <sup>st</sup> PID Cycle							
Test date (DD/MM/YYYY)	05/10/2023							—
Module temperature [°C]	Corrected to 25							
Irradiance [W/m <sup>2</sup> ]	1000							
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 [%]	Degradation [%]	
A003546092-042	580.15	45.35	12.79	54.12	13.42	79.87	-1.60	P
A003546092-043	585.95	45.6	12.85	54.41	13.46	80.02	-0.35	P
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

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10.3 Insulation test after 1 <sup>st</sup> PID Cycle						
Test date (DD/MM/YYYY)				05/10/2023		—
Maximum system voltage [V <sub>DC</sub> ]				1500V		
High voltage applied [V <sub>DC</sub> ]				8000V		
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m <sup>2</sup> ]	[GΩ × m <sup>2</sup> ]	Yes (description)	No	
A003546092-042	44.2	2.81	124.20	--	No	P
A003546092-043	41.9	2.81	117.74	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m <sup>2</sup>						
Supplementary information: - None						

10.15 Wet leakage current test after 1 <sup>st</sup> PID Cycle						
Test date (DD/MM/YYYY)				05/10/2023		—
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Solution resistivity [Ω cm]				< 3,500		P
Solution temperature [°C]				22 ± 3		P
Sample No.	Measured		Area	Result*		—
	[MΩ]	[m <sup>2</sup> ]	[m <sup>2</sup> ]	[MΩ × m <sup>2</sup> ]		
A003546092-042	3200.00	2.81	2.81	8992.00		P
A003546092-043	1900.00	2.81	2.81	5339.00		P
* Minimum requirement acc. to the standard is 40 MΩ × m <sup>2</sup>						
Supplementary information: - None						



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Performance of PID Test – II <sup>nd</sup> Cycle				
Test Method	Chamber			—
Module Temperature [°C]	85			
Relative Humidity [%]	85			
Grounding polarity	+ve			
Test date [DD/MM/YYYY]	Sample No.	Applied Voltage [V]	Duration[Hrs.]	
05/10/2023– 10/10/2023	A003546092-042	-1500	96	P
	A003546092-043	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after II <sup>nd</sup> PID Cycle			
Test date (DD/MM/YYYY)	10/10/2023			
Sample No.	Nature and position of initial findings			—
A003546092-042	No Major visual defects found			P
A003546092-043	No Major visual defects found			P
Supplementary information: - None				

10.2	Maximum power determination after II <sup>nd</sup> PID Cycle							
Test date (DD/MM/YYYY)	10/10/2023							
Module temperature [°C]	Corrected to 25							
Irradiance [W/m <sup>2</sup> ]	1000							
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 [%]	Degradation [%]	—
A003546092-042	580.39	45.31	12.81	54.04	13.43	79.95	-1.56	
A003546092-043	584.38	45.54	12.83	54.35	13.45	79.96	-0.62	
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

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10.3 Insulation test after II <sup>nd</sup> PID Cycle						
Test date (DD/MM/YYYY)				10/10/2023		—
Maximum system voltage [V <sub>DC</sub> ]				1500V		
High voltage applied [V <sub>DC</sub> ]				8000V		
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m <sup>2</sup> ]	[GΩ × m <sup>2</sup> ]	Yes (description)	No	
A003546092-042	31.60	2.81	88.80	--	No	P
A003546092-043	21.60	2.81	60.70	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m <sup>2</sup>						
Supplementary information: - None						

10.15 Wet leakage current test after II <sup>nd</sup> PID Cycle						
Test date (DD/MM/YYYY)				10/10/2023		—
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Solution resistivity [Ω cm]				< 3,500		P
Solution temperature [°C]				22 ± 3		P
Sample No.	Measured	Area	Result*	—		
	[MΩ]	[m <sup>2</sup> ]	[MΩ × m <sup>2</sup> ]			
A003546092-042	1700.00	2.81	4777.00	P		
A003546092-043	2100.00	2.81	5901.00	P		
* Minimum requirement acc. to the standard is 40 MΩ × m <sup>2</sup>						
Supplementary information: - None						

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Performance of PID Test – III <sup>rd</sup> Cycle				
Test Method	Chamber			—
Module Temperature [°C]	85			
Relative Humidity [%]	85			
Grounding polarity	+ve			
Test date [DD/MM/YYYY]	Sample No.	Applied Voltage [V]	Duration[Hrs.]	
10/10/2023 – 15/10/2023	A003546092-042	-1500	96	P
	A003546092-043	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after III <sup>rd</sup> PID Cycle			
Test date (DD/MM/YYYY)	15/10/2023			
Sample No.	Nature and position of initial findings			—
A003546092-042	No Major visual defects found			P
A003546092-043	No Major visual defects found			P
Supplementary information: - None				

10.2	Maximum power determination after III <sup>rd</sup> PID Cycle							
Test date (DD/MM/YYYY)	15/11/2023							
Module temperature [°C]	Corrected to 25							
Irradiance [W/m <sup>2</sup> ]	1000							
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 [%]	Degradation [%]	—
A003546092-042	579.00	45.39	12.76	54.00	13.39	80.06	-1.79	
A003546092-043	581.92	45.54	12.78	54.27	13.4	80.01	-1.04	
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

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10.3 Insulation test after III <sup>rd</sup> PID Cycle						
Test date (DD/MM/YYYY)				15/10/2023		—
Maximum system voltage [V <sub>DC</sub> ]				1500V		
High voltage applied [V <sub>DC</sub> ]				8000V		
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m <sup>2</sup> ]	[GΩ × m <sup>2</sup> ]	Yes (description)	No	
A003546092-042	15.60	2.81	43.84	--	No	P
A003546092-043	20.30	2.81	57.04	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m <sup>2</sup>						
Supplementary information: - None						

10.15 Wet leakage current test after III <sup>rd</sup> PID Cycle						
Test date (DD/MM/YYYY)				15/11/2023		—
Insulation resistance measured at [V <sub>DC</sub> ]				1500V		
Solution resistivity [Ω cm]				< 3,500		P
Solution temperature [°C]				22 ± 3		P
Sample No.	Measured	Area	Result*	—		
	[MΩ]	[m <sup>2</sup> ]	[MΩ × m <sup>2</sup> ]			
A003546092-042	900.00	2.81	2529.00	P		
A003546092-043	1200.00	2.81	3372.00	P		
* Minimum requirement acc. to the standard is 40 MΩ × m <sup>2</sup>						
Supplementary information: - None						

**Result:**

1. The degradation of maximum output power does not exceed 5%
2. There is no evidence of a major local degradation in electroluminescence inspection.

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**Annexure 1: Abbreviations used in the report**

<b>STC</b>	Standard Test Conditions
<b>P<sub>max</sub></b>	Maximum power
<b>I<sub>mp</sub></b>	Maximum power point current
<b>V<sub>mp</sub></b>	Maximum power point voltage
<b>I<sub>sc</sub></b>	Short circuit current
<b>V<sub>oc</sub></b>	Open circuit voltage
<b>FF</b>	Fill factor
<b>PID</b>	Potentially induced degradation

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**Annexure 2: Constructional Data Form for Photovoltaic Modules:**


<b>Module type:</b>			
Object	Manufacturer /trademark	Type / model	Technical data / ratings
Front cover	Gujarat Borosil Limited	AR Coated Tempered solar glass	3.2mm
Rear cover	RenewSys India Pvt., Ltd	PRESERV 1-300WD	Total thickness: 0.365mm
EVA	RenewSys India Pvt., Ltd	Front: CONSERV P UVT-14 FC, Back: CONSERV P 360 14 FC	Thickness [mm]: 0.6mm (-5%/10%) 0.5mm (-5%/10%)
Solar Cell	Jupiter solar	BI_182_Ø247_10BB_FBB0.1_ RBB1.4_144F	Mono Crystalline - 10BB 182 x 91 150 +20/-10
Junction box	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	PV-ZH011C-5	Max. voltage [V]: 1500 Max. current [A]: 25
Bypass diode	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	40SQ045	Tj [°C]: 200
Cable	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	62930 IEC 131	Max. voltage [V]: 1500 V RTI [°C]: 120
Connector	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	PV-ZH202B	Max. voltage [V]:1500 Max. current [A]: 30

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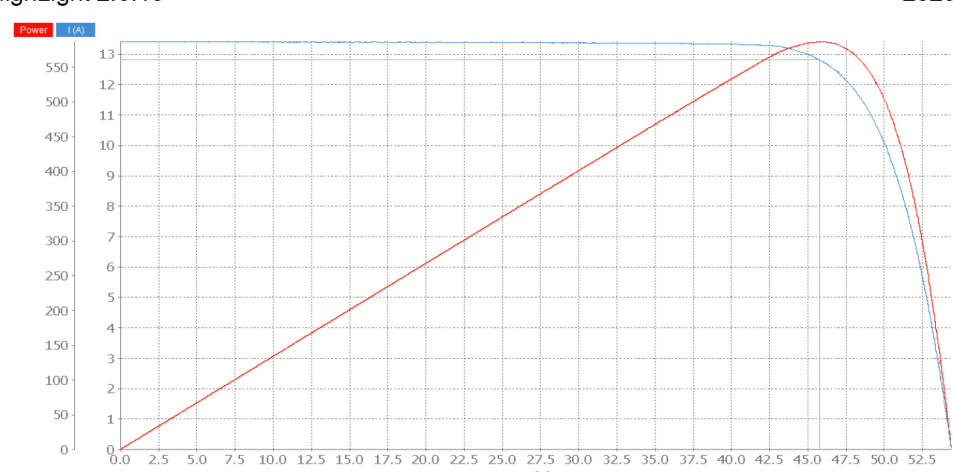
**Annexure 3: Measurement reports: Initial**



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**Performance measurement**

PASAN HighLight 2.5.10 2023/09/22 14:10



PV module under test				
Module sample ID	A003546092-017	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW11923A12451	Cell area	164.98	cm <sup>2</sup>
Test sequence	p3	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data					
Module temperature	22.39	°C	Module efficiency	20.93	%
Standard temperature	25.00	°C	Cell efficiency	22.82	%
Mean irradiance	1003.10	W/m <sup>2</sup>	Shunt resistance	1031.545	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.313	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.41	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.43	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.83	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.78	V	Power at reference voltage 2		
Maximum power (Pmax)	587.42	W	Current at reference voltage 2		
Fill factor (FF)	80.49	%			
Measurement method	Direct				

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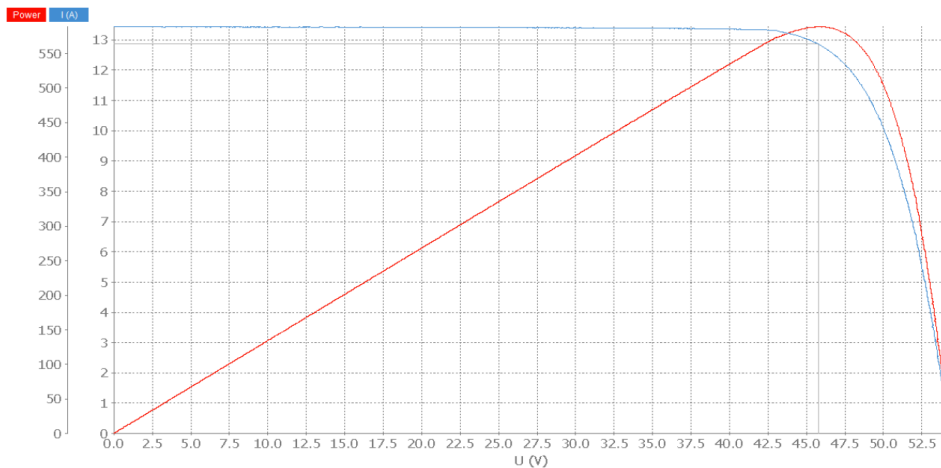
ZUSATZ-DOKUMENTATION  
ADDITIONAL DOCUMENTATION



Performance measurement

PASAN HighLight 2.5.10

2023/09/22 15:00



PV module under test

Module sample ID	a003546092-042	Module area	28059.20	cm <sup>2</sup>
Module serial number	sw12723a33597	Cell area	164.98	cm <sup>2</sup>
Test sequence	P3	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	22.41	°C	Module efficiency	21.01	%
Standard temperature	25.00	°C	Cell efficiency	22.91	%
Mean irradiance	1003.16	W/m <sup>2</sup>	Shunt resistance	829.723	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.305	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.44	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.31	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.88	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.78	V	Power at reference voltage 2		
Maximum power (Pmax)	589.60	W	Current at reference voltage 2		
Fill factor (FF)	80.79	%			
Measurement method	Direct				



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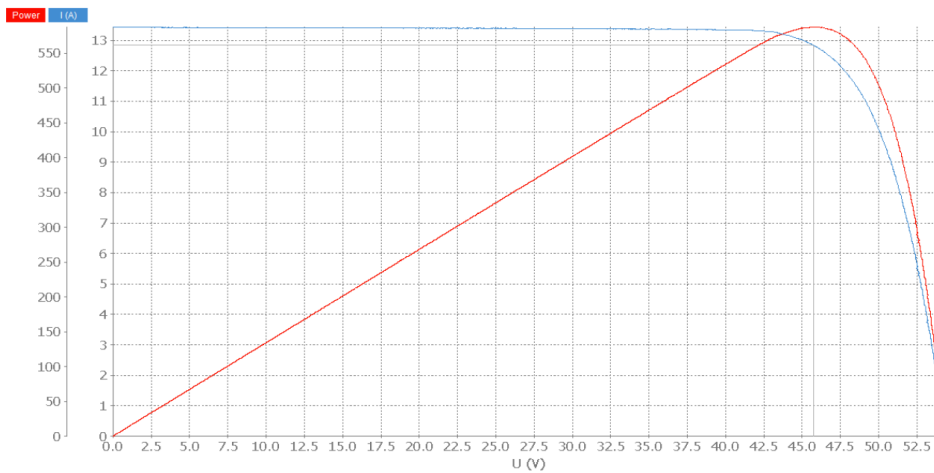
ZUSATZ-DOKUMENTATION  
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Performance measurement

PASAN HighLight 2.5.10

2023/09/22 14:29



PV module under test

Module sample ID	A003546092-043	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW11823A10534	Cell area	164.98	cm <sup>2</sup>
Test sequence	p3	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data


Module temperature	22.43	°C	Module efficiency	20.96	%
Standard temperature	25.00	°C	Cell efficiency	22.85	%
Mean irradiance	1002.80	W/m <sup>2</sup>	Shunt resistance	702.466	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.313	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.42	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.40	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.85	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.76	V	Power at reference voltage 2		
Maximum power (Pmax)	588.05	W	Current at reference voltage 2		
Fill factor (FF)	80.52	%			
Measurement method	Direct				

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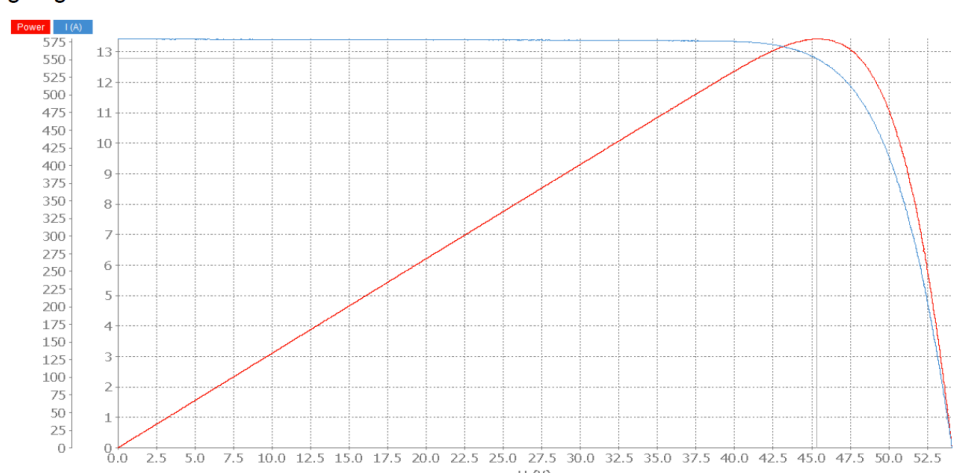
**Measurement Reports after PID 1<sup>ST</sup> Cycle:**



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**Performance measurement**

PASAN HighLight 2.5.10 2023/10/05 17:33



PV module under test				
Module sample ID	A003546092-042	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW12723A33597	Cell area	164.98	cm <sup>2</sup>
Test sequence	af 1st	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data					
Module temperature	24.45	°C	Module efficiency	20.68	%
Standard temperature	25.00	°C	Cell efficiency	22.54	%
Mean irradiance	1001.71	W/m <sup>2</sup>	Shunt resistance	764.553	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.321	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.42	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.12	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.79	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.35	V	Power at reference voltage 2		
Maximum power (Pmax)	580.15	W	Current at reference voltage 2		
Fill factor (FF)	79.87	%			
Measurement method	Direct				

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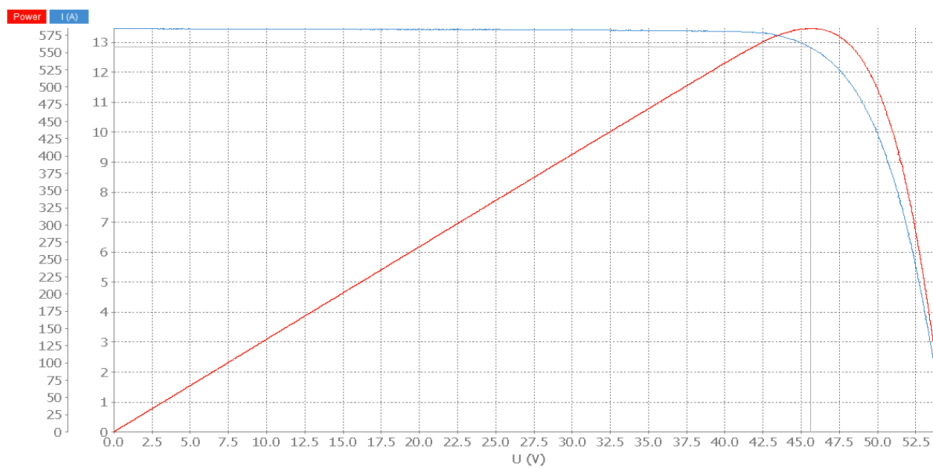
ZUSATZ-DOKUMENTATION  
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Performance measurement

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PV module under test

Module sample ID	A003546092-043	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW11823A10534	Cell area	164.98	cm <sup>2</sup>
Test sequence	af 1st	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

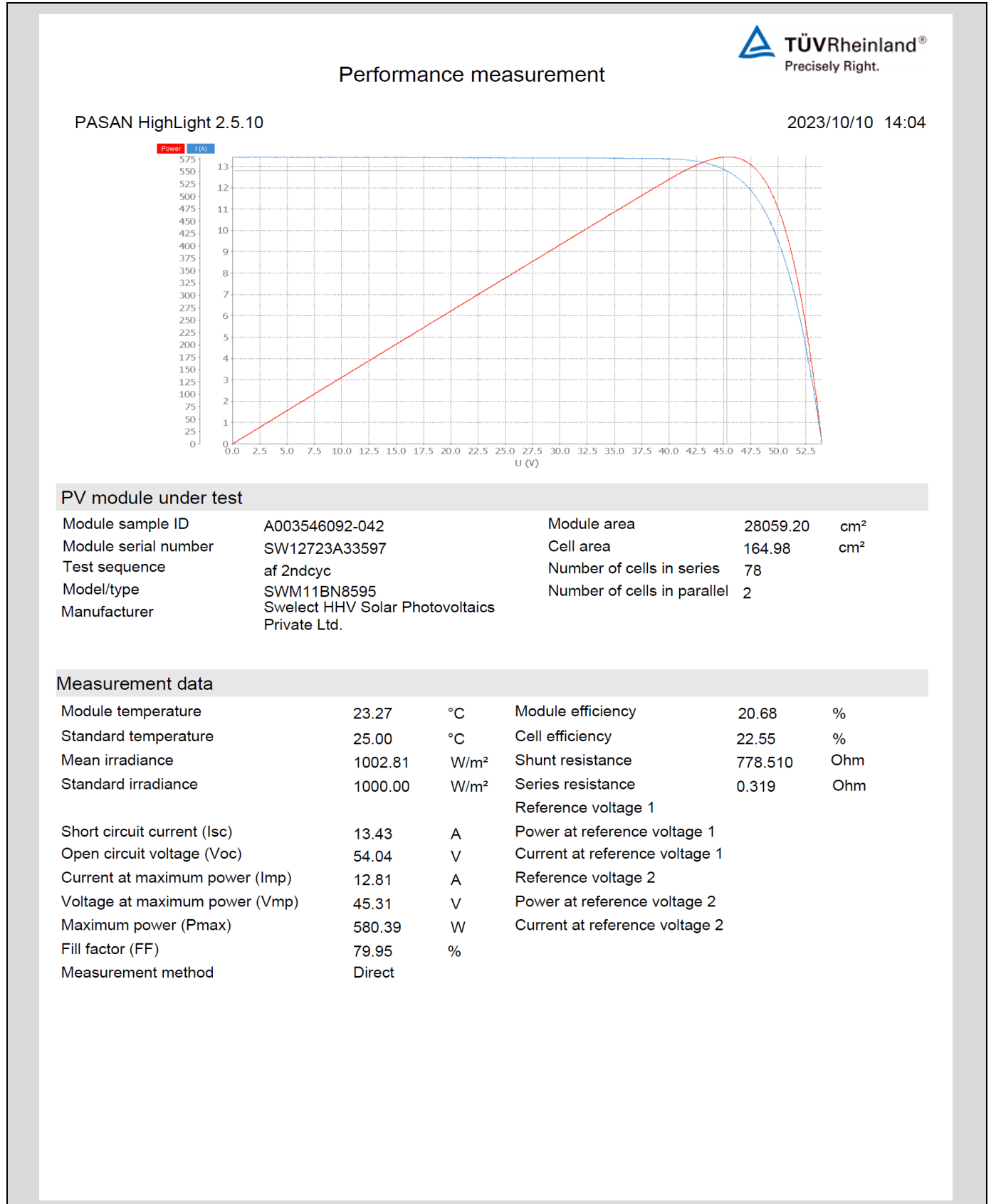
Module temperature	24.38	°C	Module efficiency	20.88	%
Standard temperature	25.00	°C	Cell efficiency	22.77	%
Mean irradiance	1001.93	W/m <sup>2</sup>	Shunt resistance	514.122	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.323	Ohm
			Reference voltage 1		
Short circuit current (I <sub>sc</sub> )	13.46	A	Power at reference voltage 1		
Open circuit voltage (V <sub>oc</sub> )	54.41	V	Current at reference voltage 1		
Current at maximum power (I <sub>mp</sub> )	12.85	A	Reference voltage 2		
Voltage at maximum power (V <sub>mp</sub> )	45.60	V	Power at reference voltage 2		
Maximum power (P <sub>max</sub> )	585.95	W	Current at reference voltage 2		
Fill factor (FF)	80.02	%			
Measurement method	Direct				

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**Measurement Reports after PID 2<sup>ND</sup> Cycle:**



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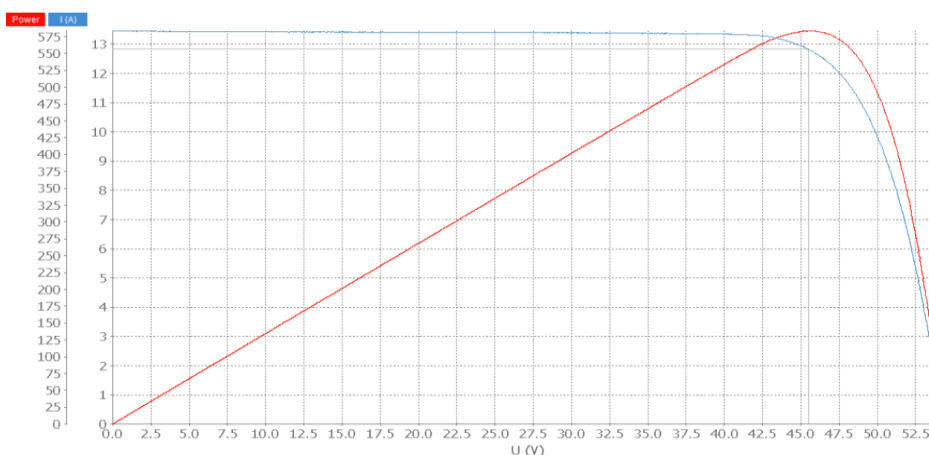
**ZUSATZ-DOKUMENTATION**  
**ADDITIONAL DOCUMENTATION**



Performance measurement

PASAN HighLight 2.5.10

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PV module under test

Module sample ID	A003546092-043	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW11823A10534	Cell area	164.98	cm <sup>2</sup>
Test sequence	af 2nd	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data


Module temperature	23.31	°C	Module efficiency	20.83	%
Standard temperature	25.00	°C	Cell efficiency	22.71	%
Mean irradiance	1002.85	W/m <sup>2</sup>	Shunt resistance	428.671	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.325	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.45	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.35	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.83	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.54	V	Power at reference voltage 2		
Maximum power (Pmax)	584.38	W	Current at reference voltage 2		
Fill factor (FF)	79.96	%			
Measurement method	Direct				

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**Measurement Reports after PID 3<sup>RD</sup> Cycle:**

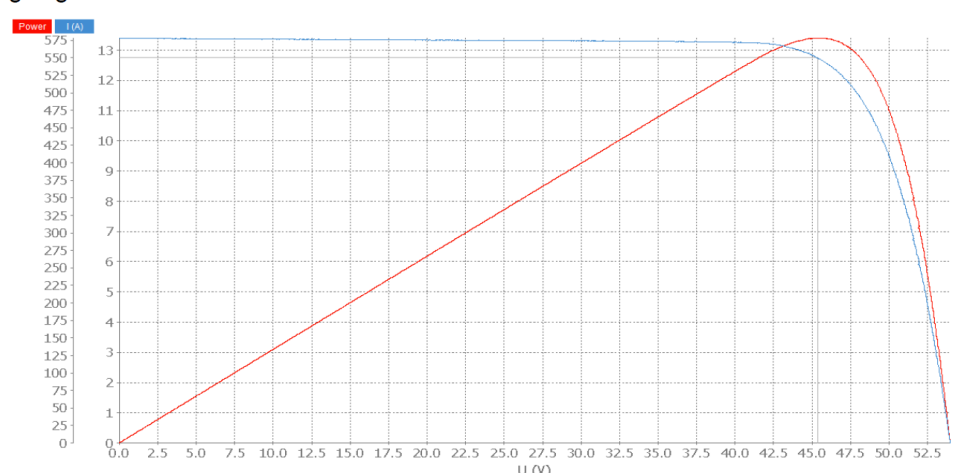


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**Performance measurement**

PASAN HighLight 2.5.10

2023/10/15 11:09



**PV module under test**

Module sample ID	A003546092-042	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW12723A33597	Cell area	164.98	cm <sup>2</sup>
Test sequence	af	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

**Measurement data**

Module temperature	22.85	°C	Module efficiency	20.64	%
Standard temperature	25.00	°C	Cell efficiency	22.50	%
Mean irradiance	1003.13	W/m <sup>2</sup>	Shunt resistance	321.890	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.314	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.39	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.00	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.76	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.38	V	Power at reference voltage 2		
Maximum power (Pmax)	579.00	W	Current at reference voltage 2		
Fill factor (FF)	80.06	%			
Measurement method	Direct				

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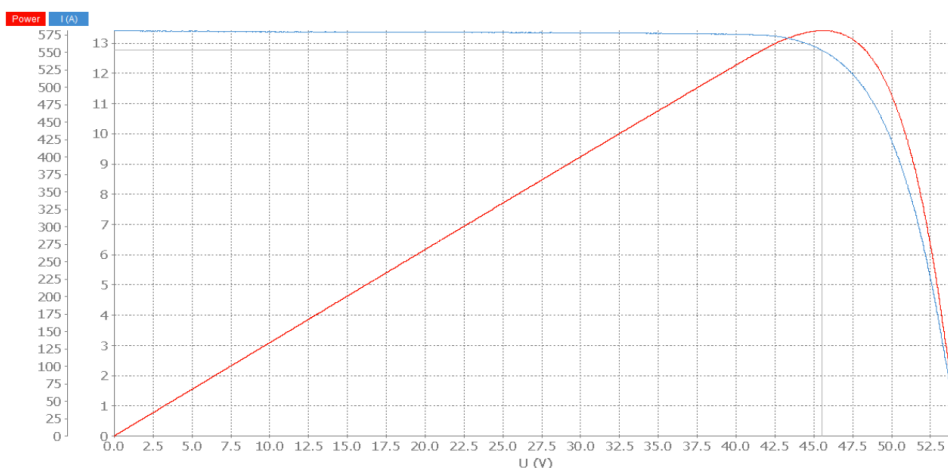
ZUSATZ-DOKUMENTATION  
ADDITIONAL DOCUMENTATION



Performance measurement

PASAN HighLight 2.5.10

2023/10/15 11:12



PV module under test

Module sample ID	A003546092-043	Module area	28059.20	cm <sup>2</sup>
Module serial number	SW11823A10534	Cell area	164.98	cm <sup>2</sup>
Test sequence	af	Number of cells in series	78	
Model/type	SWM11BN8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	22.78	°C	Module efficiency	20.74	%
Standard temperature	25.00	°C	Cell efficiency	22.61	%
Mean irradiance	1003.35	W/m <sup>2</sup>	Shunt resistance	373.732	Ohm
Standard irradiance	1000.00	W/m <sup>2</sup>	Series resistance	0.321	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.40	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.27	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.78	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.54	V	Power at reference voltage 2		
Maximum power (Pmax)	581.92	W	Current at reference voltage 2		
Fill factor (FF)	80.01	%			
Measurement method	Direct				

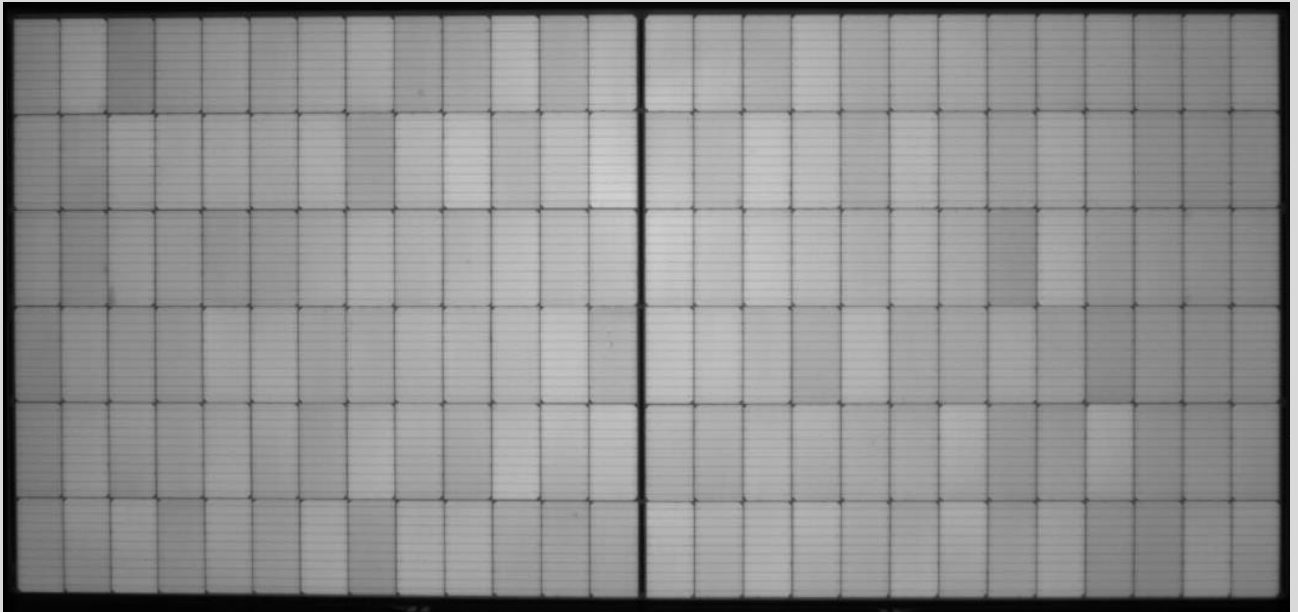
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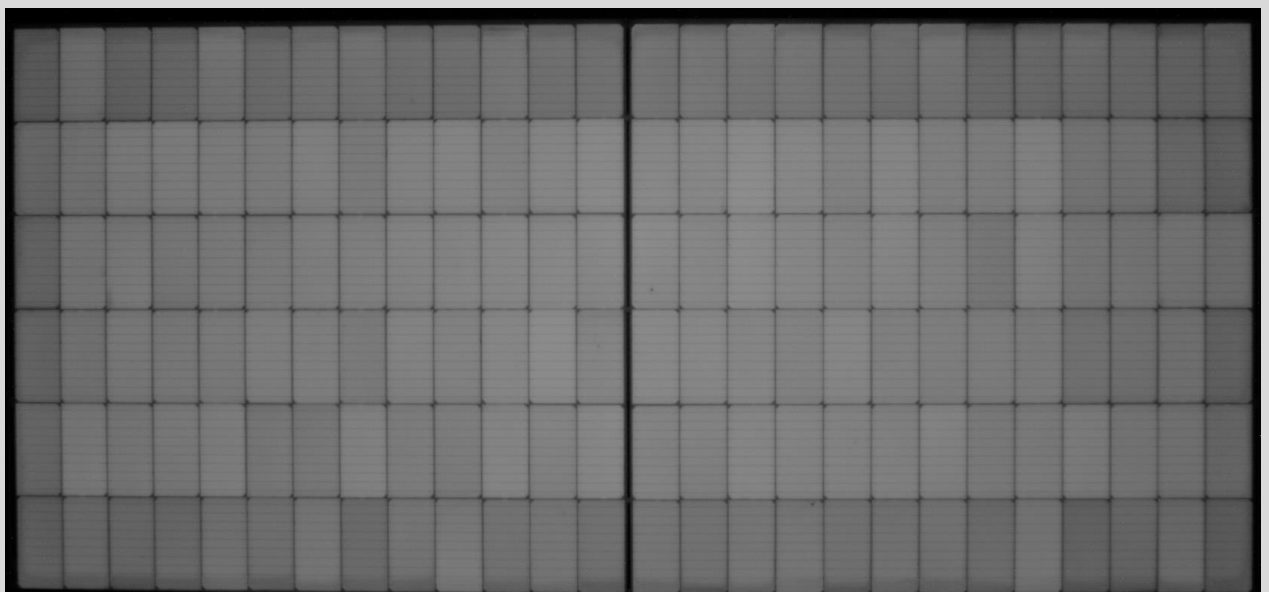
**ZUSATZ-DOKUMENTATION**  
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**Annexure 5: EL Images of Test samples:**

A003546092-042 (Initial)



A003546092-042(After- PID 1<sup>st</sup> Cycle)



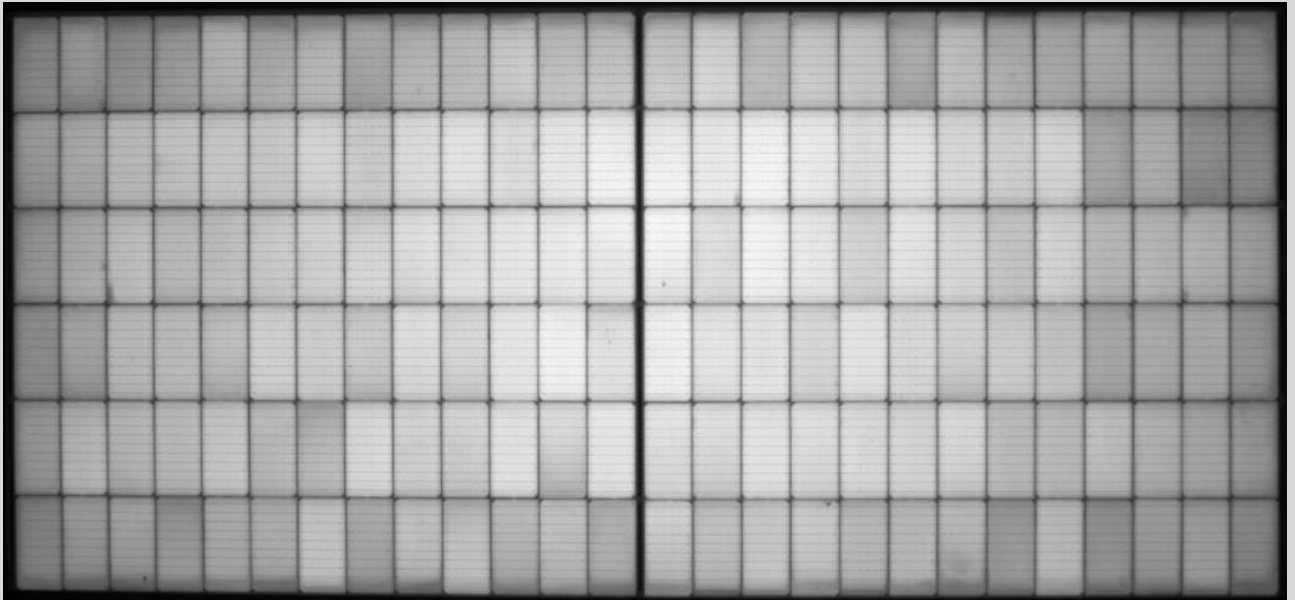


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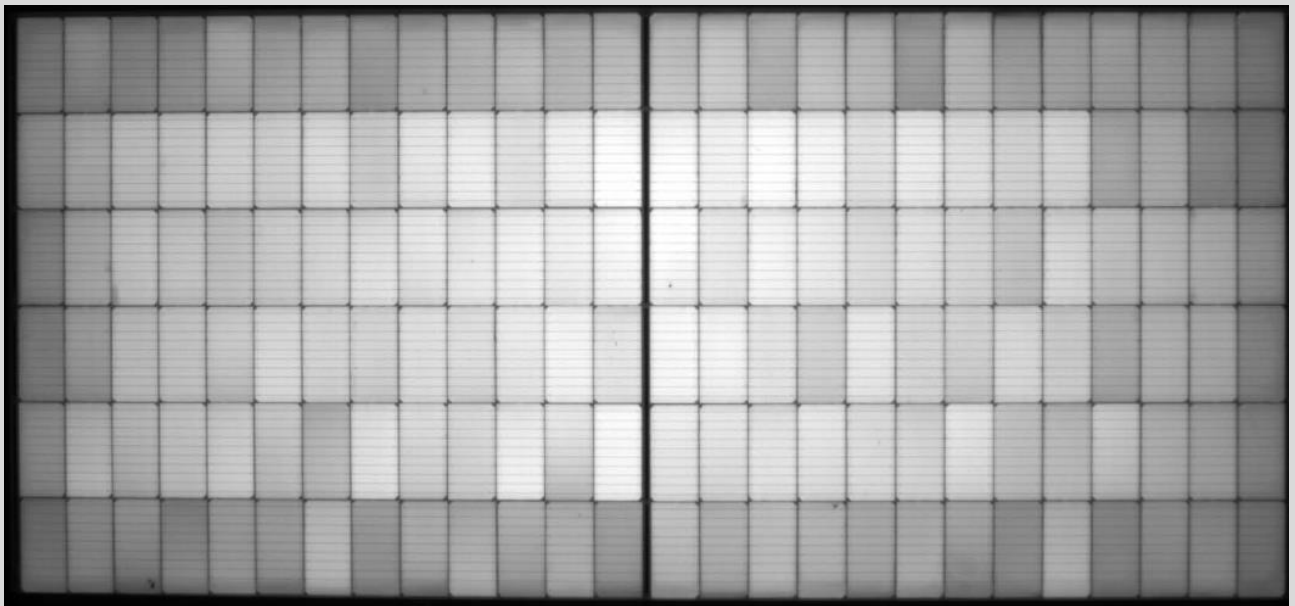
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A003546092-042(After- PID 2<sup>nd</sup> Cycle)



A003546092-042(After- PID 3<sup>rd</sup> Cycle)

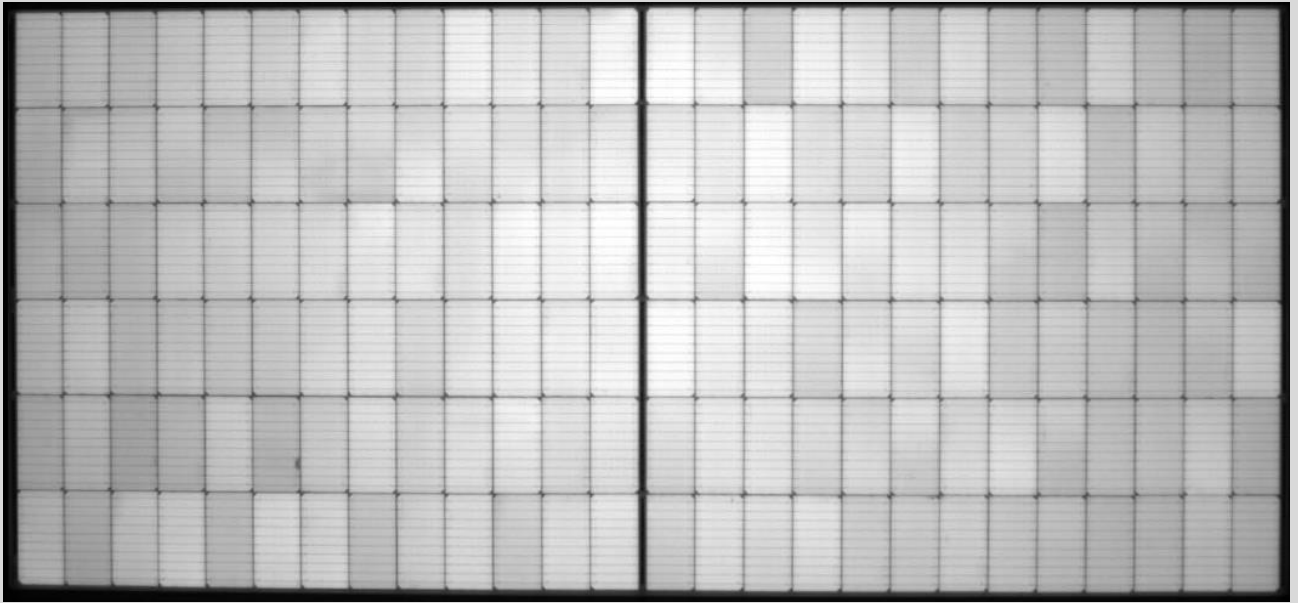


**Prüfbericht-Nr.:** IN24P0NY 003  
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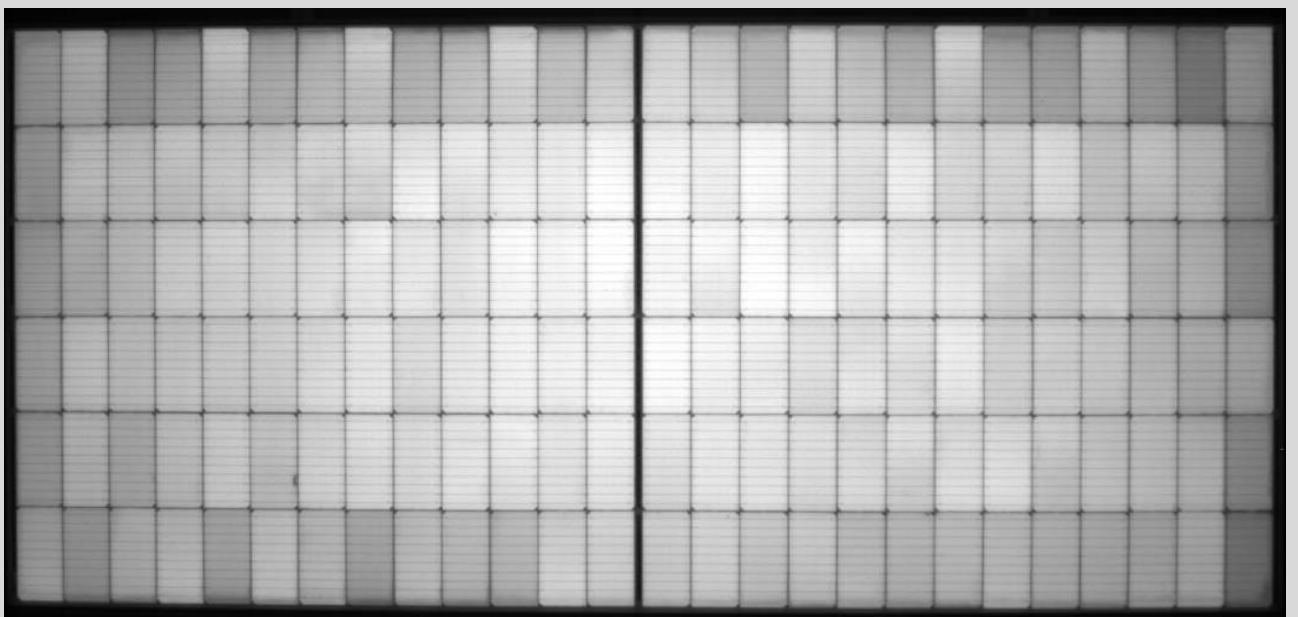
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A003546092-043(Initial)



A003546092-043 (After- PID 1<sup>st</sup> Cycle)

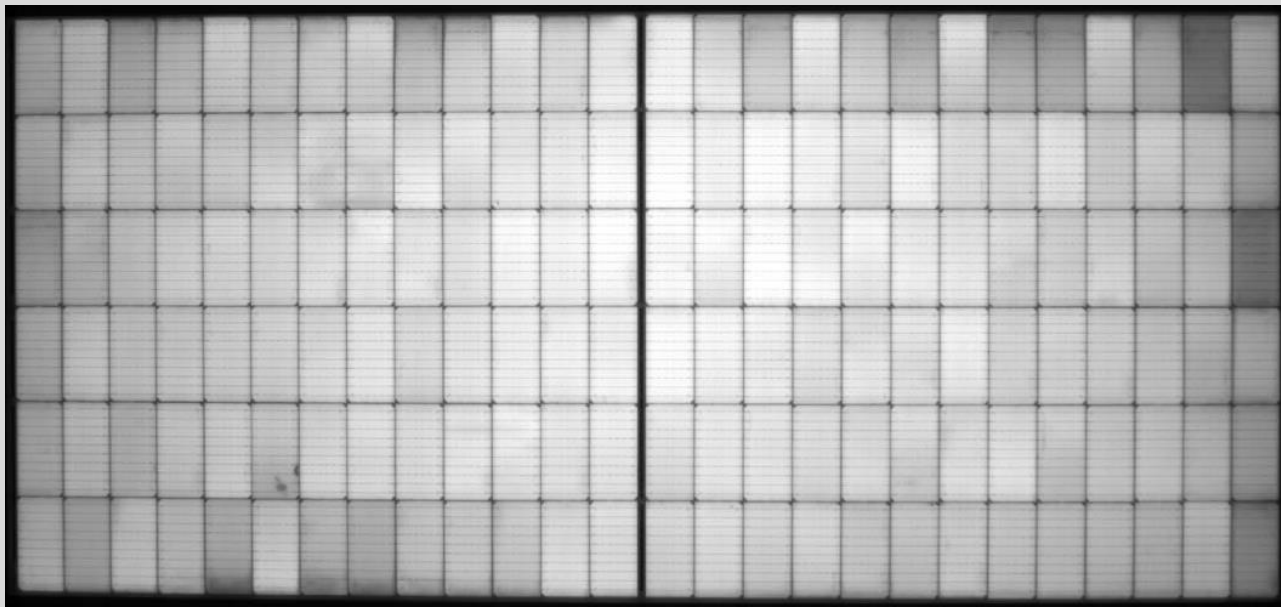


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Test report no.: ULR:TC568823400000643F

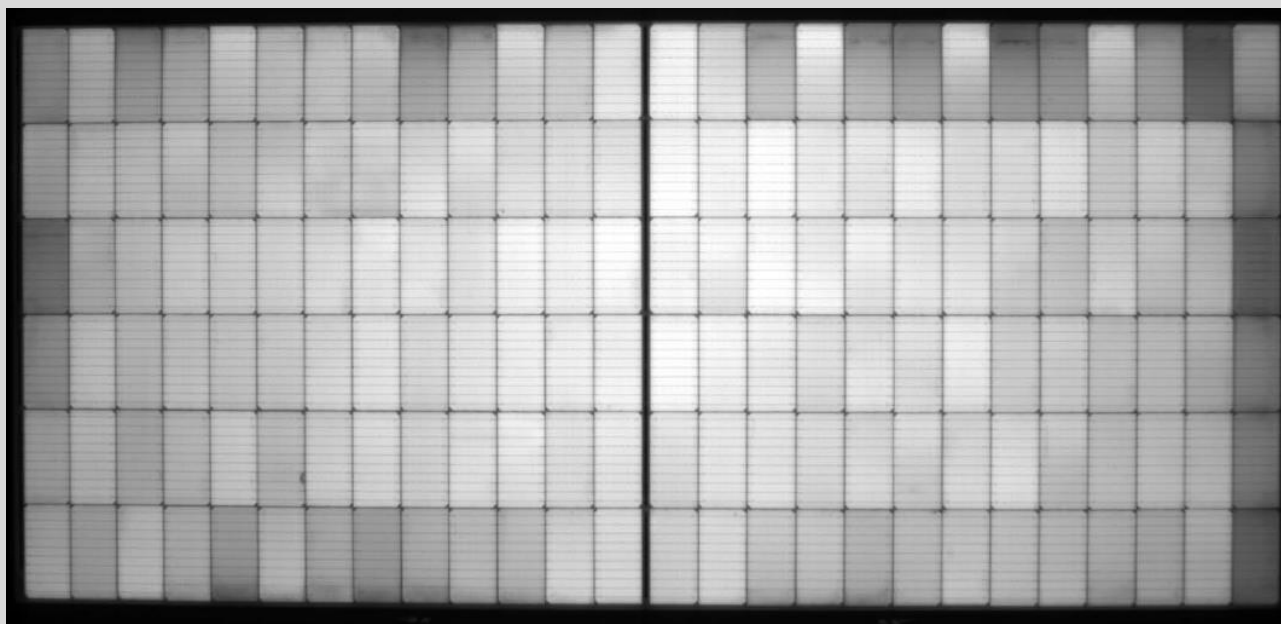
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A003546092-043 (After- PID 2<sup>nd</sup> Cycle)



A003546092-043 (After- PID 3<sup>rd</sup> Cycle)

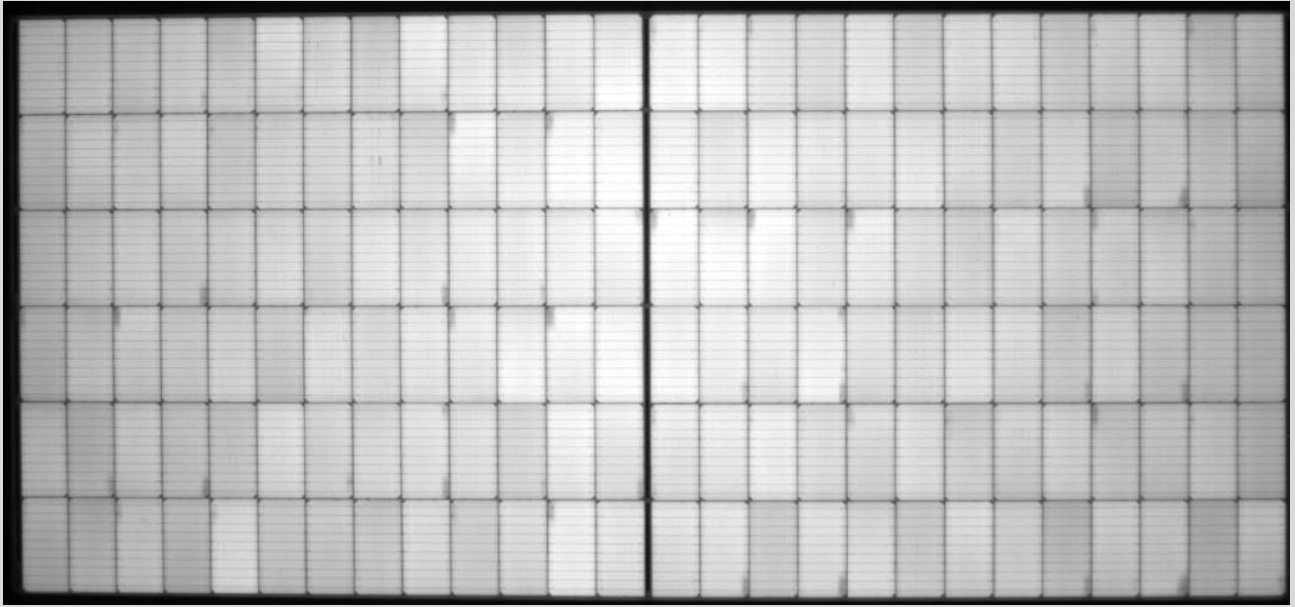


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**ZUSATZ-DOKUMENTATION**  
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A003562596-017 (Control module)



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**FOTO-DOKUMENTATION**  
**PHOTO-DOCUMENTATION**

**Annexure 6: Pictures of Test sample**

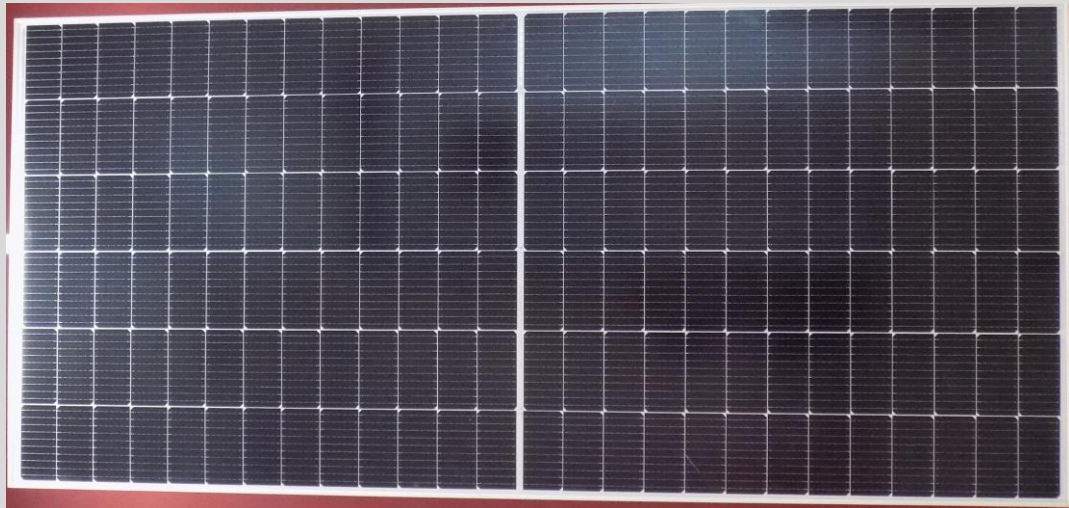


Fig.1: Front view of the module



Fig.2: Rear view of the module

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PHOTO-DOCUMENTATION

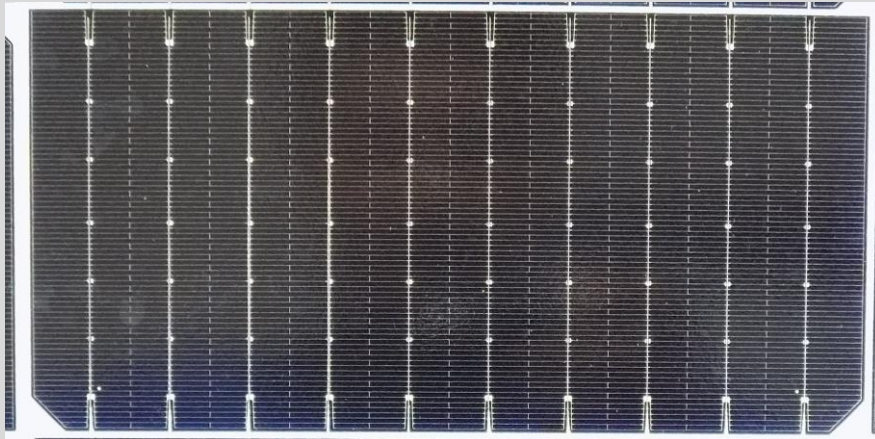


Fig.3:Detail view of the Solar cell



Fig.4: Detail view of Junction Box

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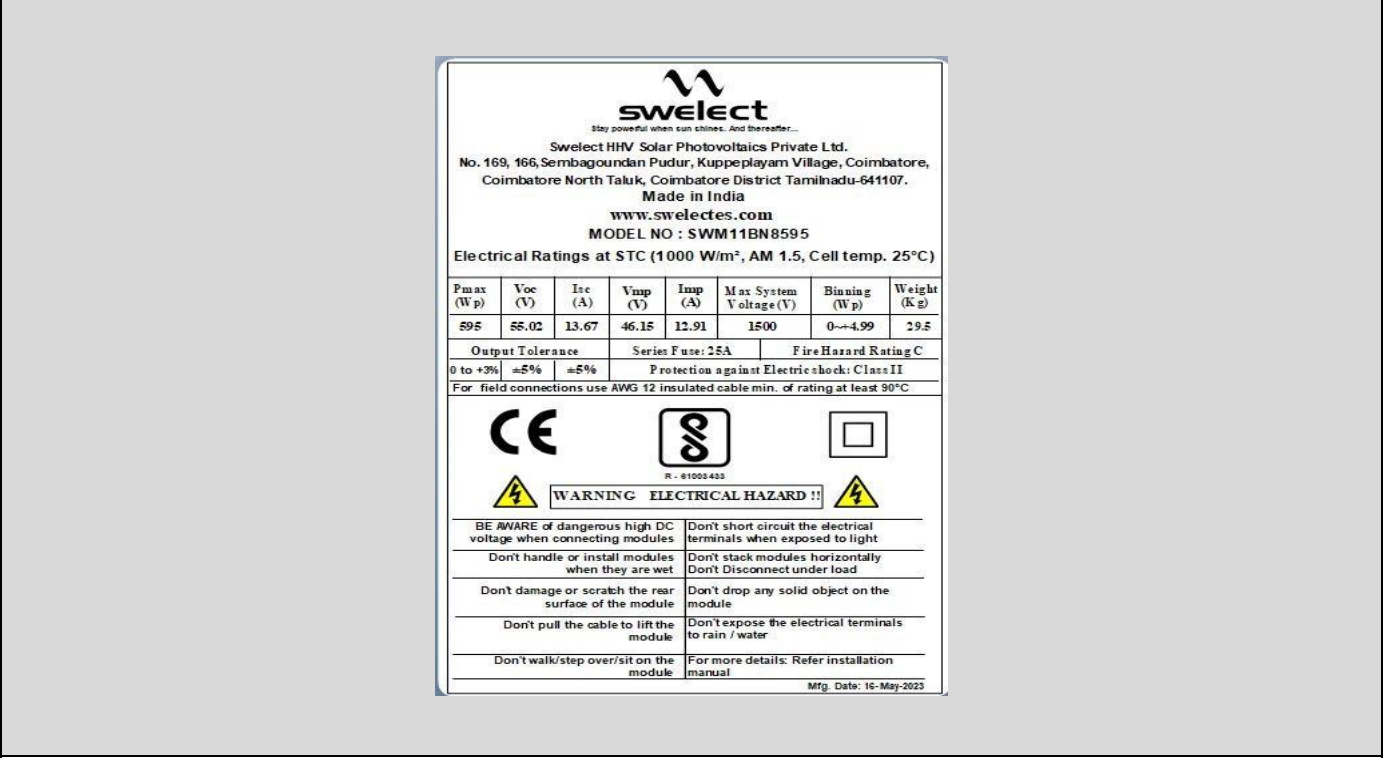


Fig.5: Detail view of the Type label



Fig.6: Detail view of the frame with ground mark