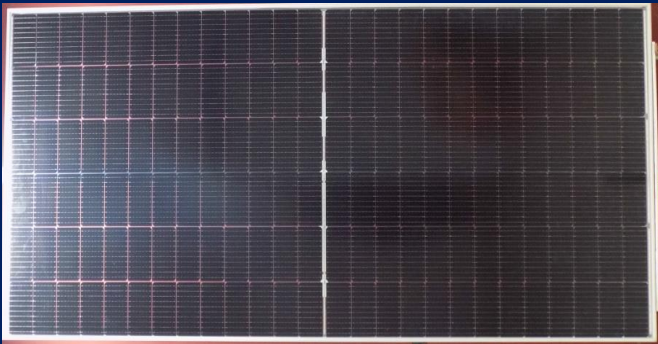




Prüfbericht-Nr.: Test report no.:	IN24P0NY 002 ULR:TC568823400000642F	Auftrags-Nr.: Order no.:	146795584	Seite 1 von 31 Page 1 of 31
Kunden-Referenz-Nr.: Client reference no.:	1433811	Auftragsdatum: Order date:	29-05-2023	
Auftraggeber: Client:	Swelect Energy Systems Limited. "SWELECT HOUSE" No.5 Sir P.S Sivasamy Salai, Mylapore, Chennai -600 004. India			
Prüfgegenstand: Test item:	Photovoltaic (PV) modules			
Bezeichnung / Typ-Nr.: Identification / Type no.:	SWM11BT8595			
Auftrags-Inhalt: Order content:	Testing against PID resistivity			
Prüfgrundlage: Test specification:	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			
Wareneingangsdatum: Date of sample receipt:	08-09-2023			
Prüfmuster-Nr.: Test sample no.:	Refer list of test samples			
Prüfzeitraum: Testing period:	15/09/2023 – 16/10/2023			
Ort der Prüfung: Place of testing:	Bangalore, India			
Prüflaboratorium: Testing laboratory:	TUV Rheinland(India) Pvt. Ltd.,Bangalore,India			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by: Kumaragowda G		genehmigt von: authorized by: K. Ganesh Kamath		
Datum: Date: 03-01-2024		Ausstellungsdatum: Issue date: 03-01-2024		
Stellung / Position:	Sr.Engineer-Products(S&C)	Stellung / Position:	Sr.Manager-Products(S&C)	
Sonstiges / Other:	None			
Zustand des Prüfgegenstandes bei Anlieferung: 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
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.				

V05

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 2 von 31
Page 2 of 31

Anmerkungen
Remarks

1	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. <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>
2	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. <i>As contractually agreed, this document has been signed digitally only. TUV 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, TUV 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>
3	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. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	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. <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>

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 3 von 31
Page 3 of 31

Produktbeschreibung
Product description

1	Produktdetails <i>Product details</i> SWM11BT8595
2	Verwendete Materialien <i>Used materials</i> Refer constructional characteristics in the "List of test samples"
3	Adresse(n) der Fertigungsstätte(n) <i>Address(es) of the manufacturing site(s)</i> Swelect HHV Solar Photovoltaics Private Limited.No. 169, 166, Sembagoundan Pudur, Kuppeplayam Village, Coimbatore North Taluk, Coimbatore District Tamil Nadu-641107
4	Zusammenfassung der Prüfergebnisse <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 – - Negative potential of the specified maximum system voltage between the shorted output terminals and the frame(ground), - 1500V DC - Climatic conditions: 85°C and 85% RH - Duration: 288 hours (3 cycles of 96 hours each) 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 IS EN IEC 61215 two modules will be tested and one additional module will be used as a reference sample. Pass Criteria: A module design shall be judged to have passed the PID test , if each test sample meets all the following criteria: • The degradation of maximum output power does not exceed 5%. • No evidence of a major visual defect (as defined in IS EN IEC 61215) All presented results are only valid for the exact tested module type and design (cell type, encapsulation material, glass type)

Prüfbericht-Nr.: IN24P0NY 002			
Test report no.: ULR:TC568823400000642F			
Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result

—	Test specification		
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	—

—	Marking		
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

-	List of test samples		
Sample No.	Sample S/N	Type/Model	Remarks/constructional characteristics (e.g. cell, back sheet, frame type)
A003546092-026	SW12723A33822	SWM11BT8595	Cell: 10bb Mono Bifacial cell by Aiko solar Back sheet: PRESERV 1 300 TF by RenewSys India Private Limited. EVA: CONSERV P UVT - 14 FC (Front), CONSERV E2P 360(Back) by RenewSys India Private Limited. Front cover: ARC coated tempered glass, manufactured by Gujarat Borosil Junction box: PV-ZH011C-5 by Zhejiang Zhonghuan Sunter PV Technology Co., Ltd
A003546092-048	SW12723A33768	SWM11BT8595	
A003546092-054	SW12723A33852	SWM11BT8595	

Prüfbericht-Nr.: IN24P0NY 002 <i>Test report no.: ULR:TC568823400000642F</i>		Seite 5 von 31 Page 5 of 31	
Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Messergebnisse – Bemerkungen/ <i>Measuring results - Remarks</i>	Ergebnis <i>Result</i>

10.1	Visual inspection (Initial)		
Test date (DD/MM/YYYY)		15-09-2023	
Sample No.		Nature and position of initial findings	—
A003546092-026		No Major visual defects found	P
A003546092-048		No Major visual defects found	P
A003546092-054		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/m²]			1000				
Sample No.	P _{max} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]	FF [%]	
A003546092-026	593.72	45.67	13.00	54.33	13.57	80.53	P
A003546092-048	589.94	45.62	12.93	54.33	13.48	80.54	P
A003546092-054	595.34	45.64	13.05	54.36	13.60	80.51	P
Supplementary information: - None							
Modules are preconditioned and stabilized according to IEC 61215:2021							

10.3	Insulation test (Initial)					
Test date (DD/MM/YYYY)				25-09-2023		—
Maximum system voltage [V _{DC}]				1500V		
High voltage applied [V _{DC}]				8000V		
Insulation resistance measured at [V _{DC}]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
A003546092-026	38.9	2.81	109.31	--	No	P
A003546092-048	39.6	2.81	111.28	--	No	P
A003546092-054	42.2	2.81	118.58	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m²						
Supplementary information: - None						

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 6 von 31
Page 6 of 31

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
------------------	---	--	--------------------

10.15	Wet leakage current test (Initial)		
Test date (DD/MM/YYYY)	25-09-2023		—
Insulation resistance measured at [V _{DC}]	1500V		
Solution resistivity [Ω cm]	< 3,500		P
Solution temperature [°C]	22 ± 3		P
Sample No.	Measured	Area	Result*
	[M Ω]	[m ²]	[M Ω × m ²]
A003546092-026	2100.00	2.81	5901.00
A003546092-048	2700.00	2.81	7587.00
A003546092-054	2700.00	2.81	7587.00
* Minimum requirement acc. to the standard is 40 M Ω × m ²			
Supplementary information: - None			

10.4	Ground continuity test (Initial)			
Test date (DD/MM/YYYY)		25-09-2023		—
Maximum over-current protection rating [A]		30		
Current applied [A]		75		
Location of designated grounding point		Right side Longer frame		
Location of second contacting point		Opposite frame		
Sample No.		Voltage [mV]	Resistance [mΩ]	
A003546092-026		259.2	3.46	P
A003546092-048		315.5	4.21	P
A003546092-054		225.3	3.00	P
Supplementary information: - None				

Prüfbericht-Nr.: IN24P0NY 002 <i>Test report no.: ULR:TC568823400000642F</i>		Seite 7 von 31 Page 7 of 31	
Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Messergebnisse – Bemerkungen/ <i>Measuring results - Remarks</i>	Ergebnis <i>Result</i>

	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]	
30/09/2023 – 05/10/2023	A003546092-048	-1500	96	P
	A003546092-054	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after 1 st PID Cycle		
Test date (DD/MM/YYYY)		05/10/2023	
Sample No.		Nature and position of initial findings	—
A003546092-048		No Major visual defects found	P
A003546092-054		No Major visual defects found	P
Supplementary information: - None			

10.2	Maximum power determination after 1 st PID Cycle							
Test date (DD/MM/YYYY)		05/10/2023						—
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 [%]	
A003546092-048	591.75	45.56	12.99	54.41	13.56	80.22	0.31	P
A003546092-054	592.20	45.58	12.99	54.42	13.56	80.24	-0.52	P
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

Prüfbericht-Nr.: IN24P0NY 002 <i>Test report no.: ULR:TC568823400000642F</i>		Seite 8 von 31 Page 8 of 31	
Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Messergebnisse – Bemerkungen/ <i>Measuring results - Remarks</i>	Ergebnis <i>Result</i>

10.3	Insulation test after 1 st PID Cycle					
Test date (DD/MM/YYYY)				05/10/2023		—
Maximum system voltage [V _{DC}]				1500V		
High voltage applied [V _{DC}]				8000V		
Insulation resistance measured at [V _{DC}]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
A003546092-048	31.30	2.81	87.95	--	No	P
A003546092-054	39.10	2.81	109.87	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m²						
Supplementary information: - None						

10.15	Wet leakage current test after 1 st PID Cycle			
Test date (DD/MM/YYYY)		05/10/2023		—
Insulation resistance measured at [V _{DC}]		1500V		
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 3		P
Sample No.	Measured	Area	Result*	—
	[M Ω]	[m ²]	[M Ω × m ²]	
A003546092-048	2300.00	2.81	6463.00	P
A003546092-054	5300.00	2.81	14893.00	P
* Minimum requirement acc. to the standard is 40 M Ω × m ²				
Supplementary information: - None				

Prüfbericht-Nr.: IN24P0NY 002 <i>Test report no.: ULR:TC568823400000642F</i>		Seite 9 von 31 Page 9 of 31	
Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Messergebnisse – Bemerkungen/ <i>Measuring results - Remarks</i>	Ergebnis <i>Result</i>

	Performance of PID Test – II nd 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	A003546092-048	-1500	96	P
	A003546092-054	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after II nd PID Cycle		
Test date (DD/MM/YYYY)		10/10/2023	
Sample No.		Nature and position of initial findings	—
A003546092-048		No Major visual defects found	P
A003546092-054		No Major visual defects found	P
Supplementary information: - None			

10.2	Maximum power determination after II nd PID Cycle							
Test date (DD/MM/YYYY)		10/10/2023						—
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 [%]	
A003546092-048	592.11	45.60	12.98	54.46	13.55	80.26	0.36	P
A003546092-054	592.74	45.63	12.99	54.52	13.58	80.09	-0.44	P
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
------------------	---	--	--------------------

10.3	Insulation test after II nd PID Cycle					
Test date (DD/MM/YYYY)				10/10/2023		—
Maximum system voltage [V _{DC}]				1500V		
High voltage applied [V _{DC}]				8000V		
Insulation resistance measured at [V _{DC}]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
A003546092-048	28.7	2.81	80.65	--	No	P
A003546092-054	33.5	2.81	94.14	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m²						
Supplementary information: - None						

10.15	Wet leakage current test after II nd PID Cycle			
Test date (DD/MM/YYYY)		10/10/2023		—
Insulation resistance measured at [V _{DC}]		1500V		
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 3		P
Sample No.	Measured	Area	Result*	—
	[M Ω]	[m ²]	[M Ω × m ²]	
A003546092-048	1900.00	2.81	5339.00	P
A003546092-054	2200.00	2.81	6182.00	P
* Minimum requirement acc. to the standard is 40 M Ω × m ²				
Supplementary information: - None				

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
------------------	---	--	--------------------

	Performance of PID Test – III rd 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	A003546092-048	-1500	96	P
	A003546092-054	-1500	96	P
Supplementary information: - None				

10.1	Visual inspection after III rd PID Cycle		
Test date (DD/MM/YYYY)		15/10/2023	
Sample No.		Nature and position of initial findings	—
A003546092-048		No Major visual defects found	P
A003546092-054		No Major visual defects found	P
Supplementary information: - None			

10.2	Maximum power determination after III rd PID Cycle							
Test date (DD/MM/YYYY)		15/10/2023						—
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 [%]	
A003546092-048	588.37	45.43	12.95	54.36	13.52	80.05	-0.26	P
A003546092-054	587.10	45.48	12.91	54.38	13.48	80.07	-1.38	P
Supplementary information: - None								
Initial measurements were referred for calculating degradation								

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 12 von 31
Page 12 of 31

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
------------------	---	--	--------------------

10.3	Insulation test after III rd PID Cycle					
Test date (DD/MM/YYYY)				15/10/2023		—
Maximum system voltage [V _{DC}]				1500V		
High voltage applied [V _{DC}]				8000V		
Insulation resistance measured at [V _{DC}]				1500V		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
A003546092-048	21.20	2.81	59.57	--	No	P
A003546092-054	19.60	2.81	55.08	--	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m²						
Supplementary information: - None						

10.15	Wet leakage current test after III rd PID Cycle			
Test date (DD/MM/YYYY)		15/10/2023		—
Insulation resistance measured at [V _{DC}]		1500V		
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 3		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
A003546092-048	1300.00	2.81	3653.00	P
A003546092-054	1100.00	2.81	3091.00	P
* Minimum requirement acc. to the standard is 40 MΩ × m²				
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.

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 13 von 31
Page 13 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

Annexure 1: Abbreviations used in the report

STC	Standard Test Conditions
P_{max}	Maximum power
I_{mp}	Maximum power point current
V_{mp}	Maximum power point voltage
I_{sc}	Short circuit current
V_{oc}	Open circuit voltage
FF	Fill factor
PID	Potentially induced degradation

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 14 von 31
Page 14 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

Annexure 2: Constructional Data Form for Photovoltaic Modules:

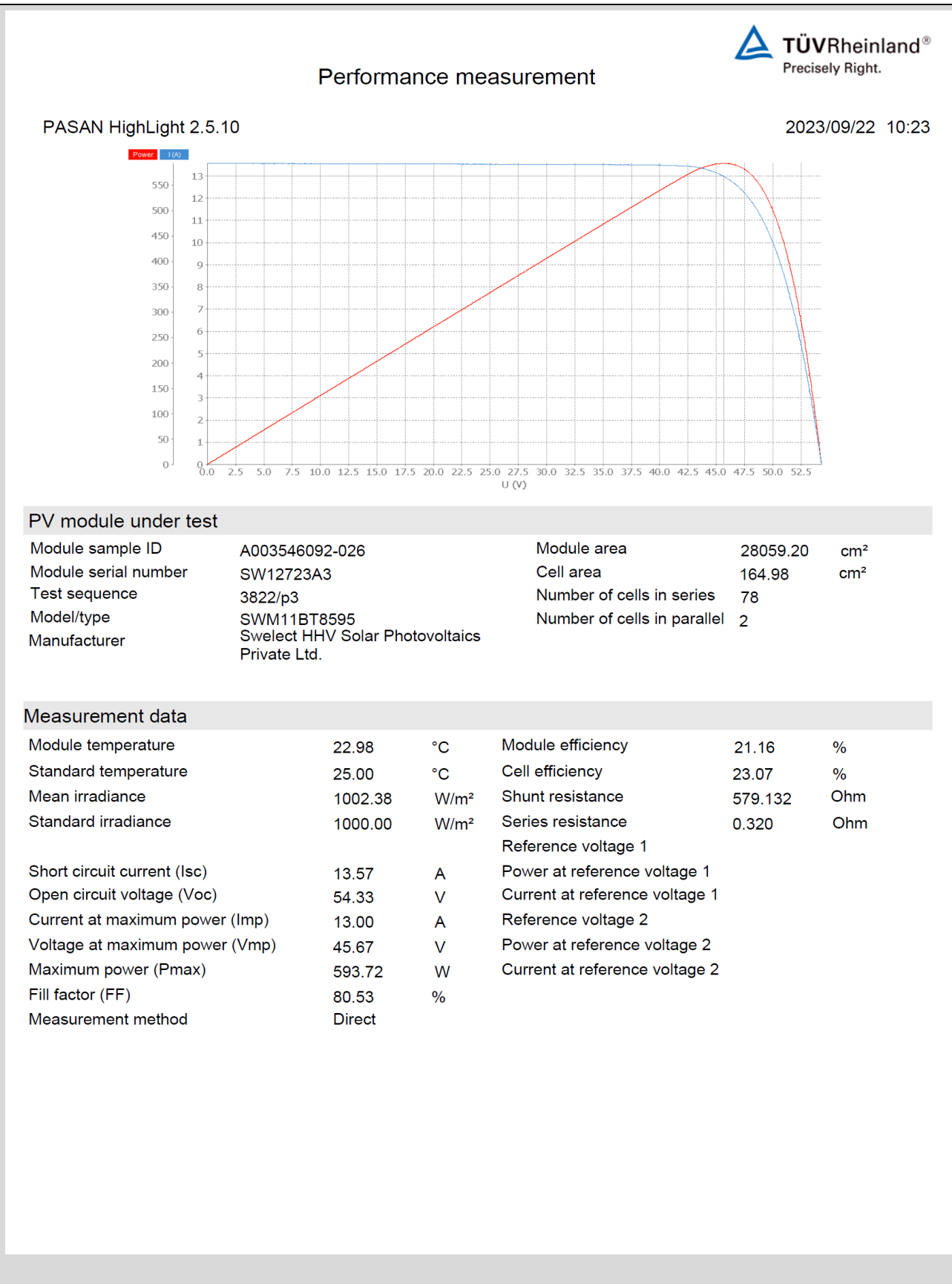
Module type:			
Object	Manufacturer /trademark	Type / model	Technical data / ratings
Front cover	Gujarat Borosil Limited	AR Coated Tempered solar glass	3.2mm
Rear cover	RenewSys India Pvt., Ltd	PRESERV 1 300 TF	Total thickness: 0.360mm
EVA	RenewSys India Pvt., Ltd	Front: CONSERV P UVT - 14 FC, Back: CONSERV E2P 360	Thickness [mm]: 0.60(-5%/10%) 0.55(-5%/10%)
Solar Cell	Aiko solar	MC182-247-10BB-160F- BBD17.3(7M9E1018A-L1)	Mono Bifacial Perc cel-10BB 182 x 91 170 ±17
Junction box	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	PV-ZH011C-5	Max. voltage [V]: 1500 Max. current [A]: 30
Bypass diode	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	40SQ045	Tj [°C]: 200
Cable	Zhejiang Zhonghuan Sunter PV Technology Co., Ltd	62930 IEC 131 1x4mm²,	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

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 15 von 31
Page 15 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Annexure 3: Measurement reports: Initial



Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

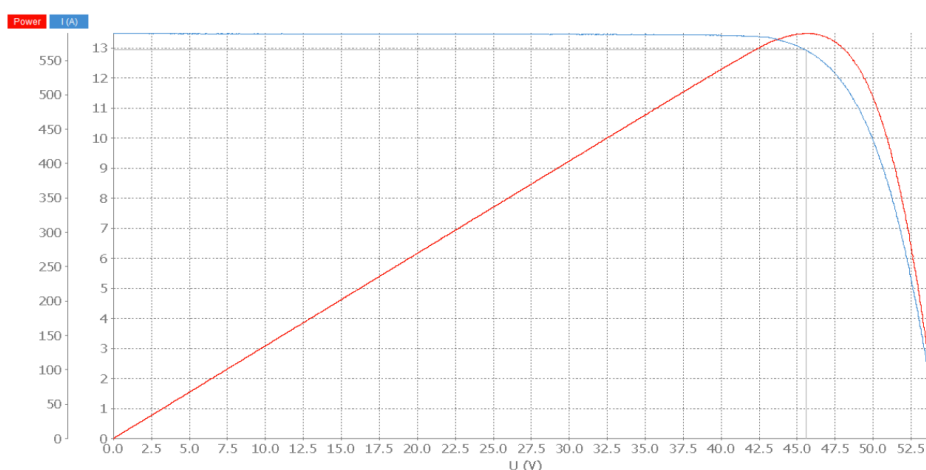
Seite 16 von 31
Page 16 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Performance measurement

PASAN HighLight 2.5.10

2023/09/22 10:47



PV module under test

Module sample ID	A003546092-048	Module area	28059.20	cm ²
Module serial number	SW12723A33768	Cell area	164.98	cm ²
Test sequence	p3	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	22.08	°C	Module efficiency	21.02	%
Standard temperature	25.00	°C	Cell efficiency	22.92	%
Mean irradiance	1002.91	W/m ²	Shunt resistance	858.552	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.325	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.48	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.33	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.93	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.62	V	Power at reference voltage 2		
Maximum power (Pmax)	589.94	W	Current at reference voltage 2		
Fill factor (FF)	80.54	%			
Measurement method	Direct				

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

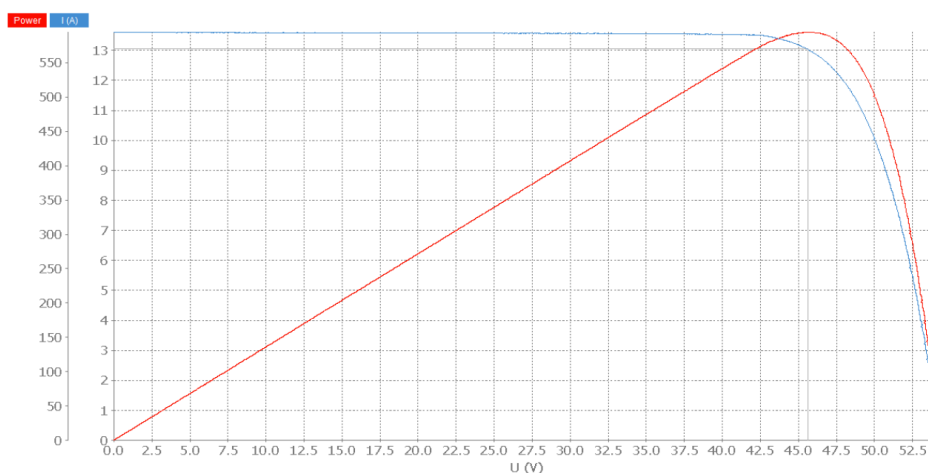
Seite 17 von 31
Page 17 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Performance measurement

PASAN HighLight 2.5.10

2023/09/22 11:28



PV module under test

Module sample ID	A003546092-054	Module area	28059.20	cm ²
Module serial number	SW12723a33852	Cell area	164.98	cm ²
Test sequence	P3	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

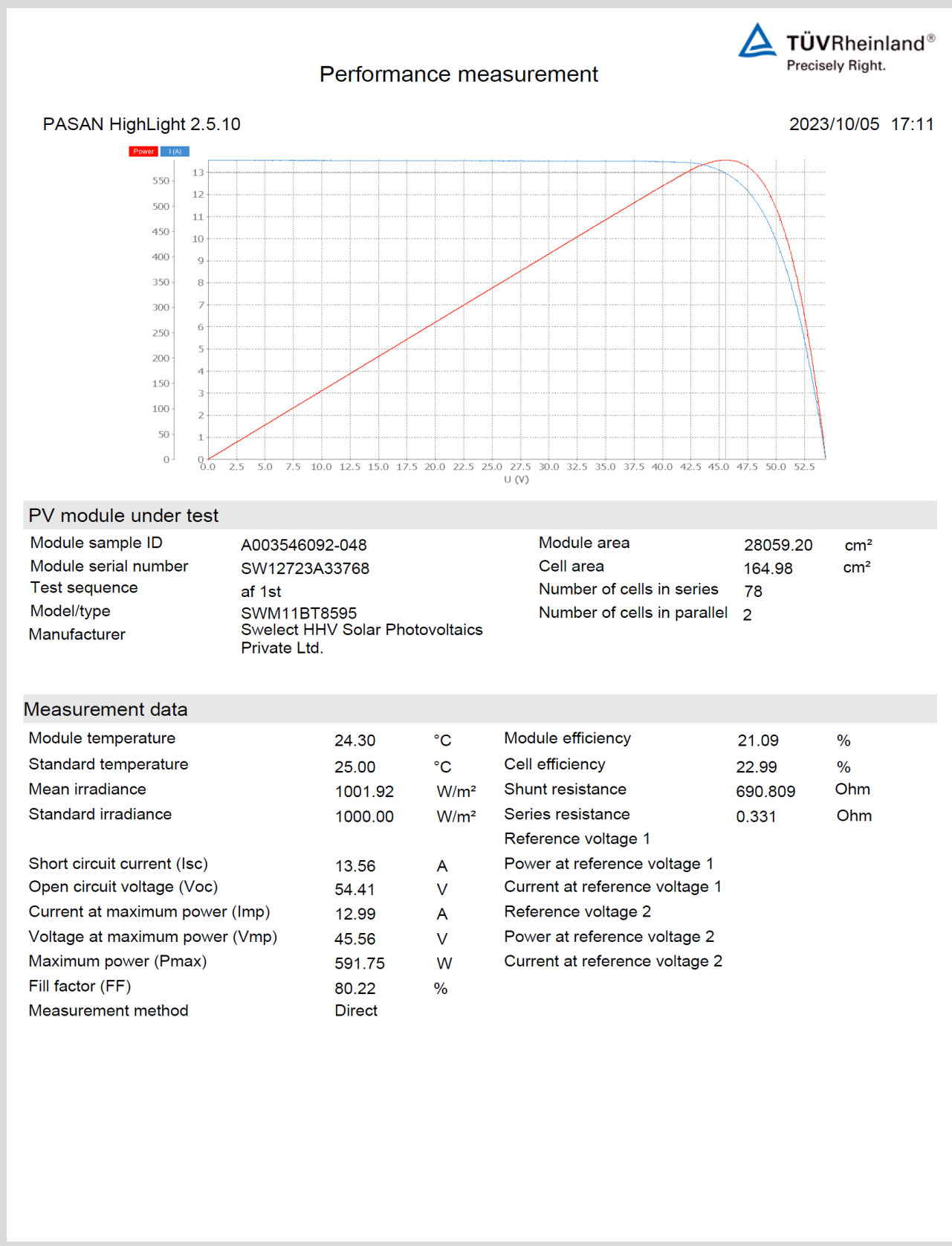
Module temperature	22.52	°C	Module efficiency	21.22	%
Standard temperature	25.00	°C	Cell efficiency	23.13	%
Mean irradiance	1003.09	W/m ²	Shunt resistance	815.554	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.323	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.60	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.36	V	Current at reference voltage 1		
Current at maximum power (Imp)	13.04	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.64	V	Power at reference voltage 2		
Maximum power (Pmax)	595.34	W	Current at reference voltage 2		
Fill factor (FF)	80.51	%			
Measurement method	Direct				

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 18 von 31
Page 18 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Measurement Reports after PID 1ST Cycle:



Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 19 von 31
Page 19 of 31

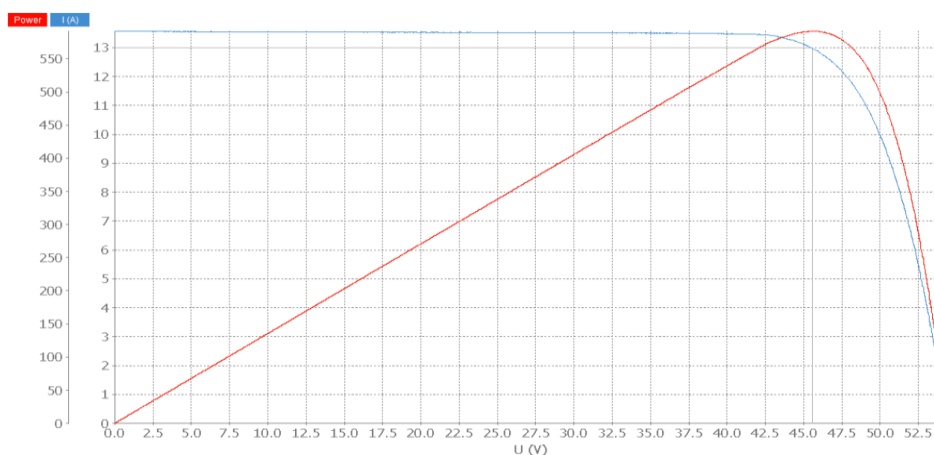
ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION



Performance measurement

PASAN HighLight 2.5.10

2023/10/05 17:25



PV module under test

Module sample ID	A003546092-054	Module area	28059.20	cm ²
Module serial number	SW12723A33852	Cell area	164.98	cm ²
Test sequence	af 1st	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

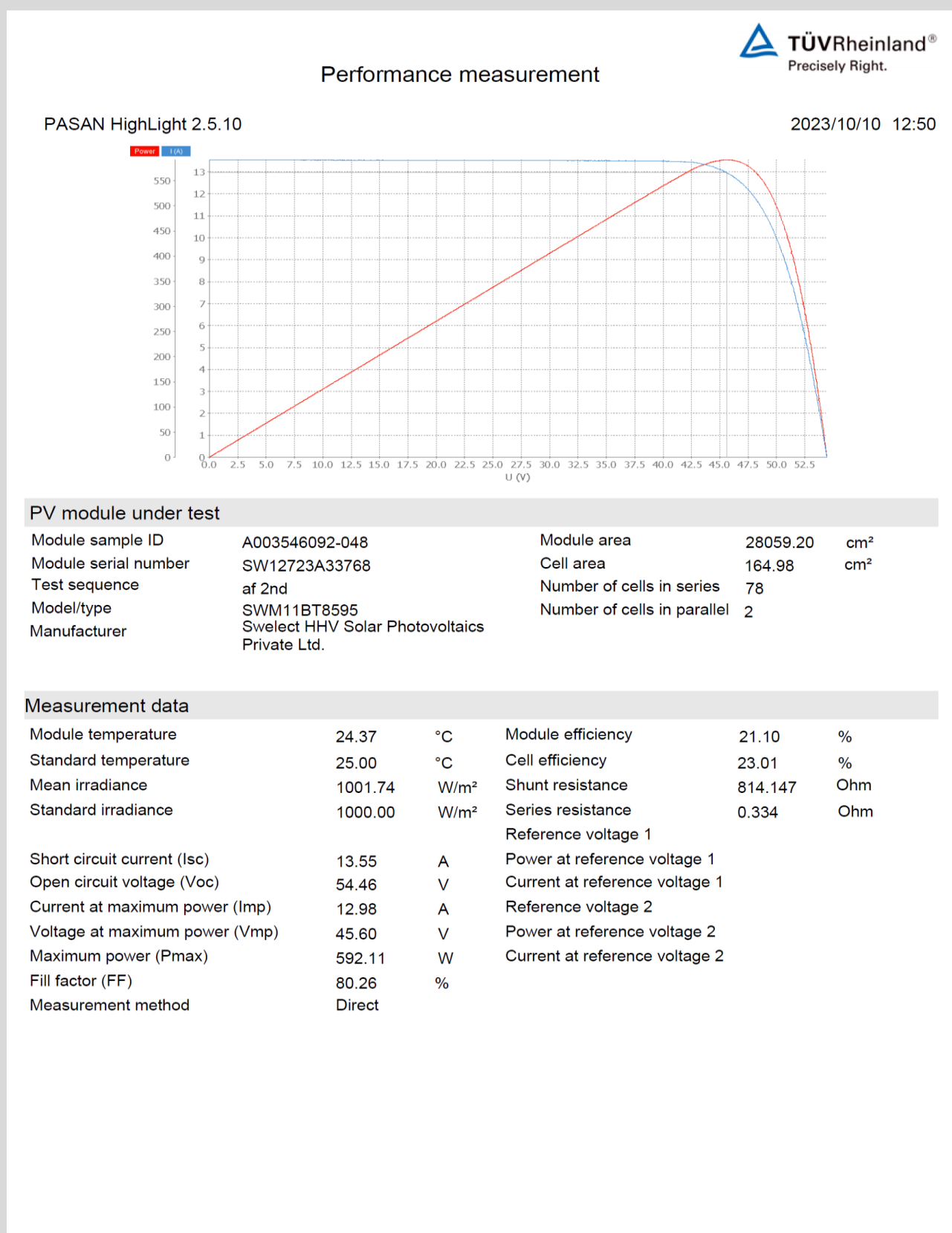
Module temperature	24.64	°C	Module efficiency	21.11	%
Standard temperature	25.00	°C	Cell efficiency	23.01	%
Mean irradiance	1001.76	W/m ²	Shunt resistance	530.244	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.330	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.56	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.42	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.99	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.58	V	Power at reference voltage 2		
Maximum power (Pmax)	592.20	W	Current at reference voltage 2		
Fill factor (FF)	80.24	%			
Measurement method	Direct				

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 20 von 31
Page 20 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Measurement Reports after PID 2ND Cycle:



Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 21 von 31
Page 21 of 31

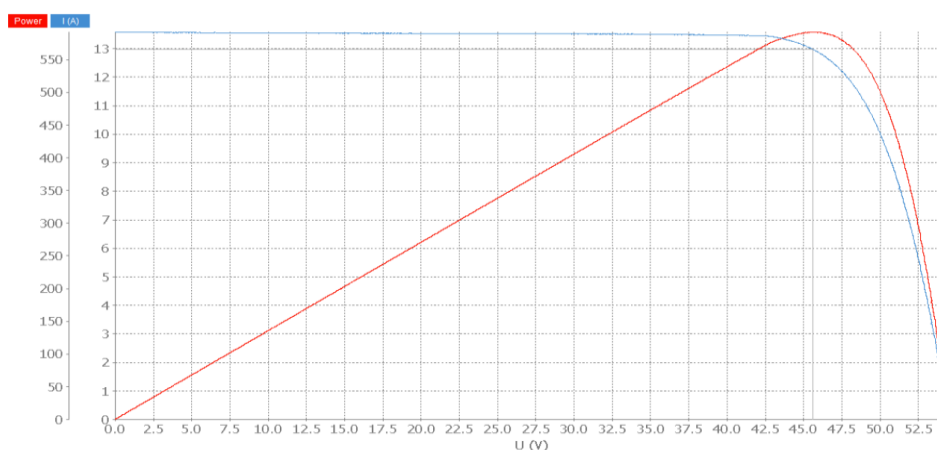
ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION



Performance measurement

PASAN HighLight 2.5.10

2023/10/10 12:45



PV module under test

Module sample ID	A003546092-054	Module area	28059.20	cm ²
Module serial number	SW12723A33852	Cell area	164.98	cm ²
Test sequence	af 2nd	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	25.78	°C	Module efficiency	21.12	%
Standard temperature	25.00	°C	Cell efficiency	23.03	%
Mean irradiance	1001.41	W/m ²	Shunt resistance	460.202	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.336	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.58	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.52	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.99	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.62	V	Power at reference voltage 2		
Maximum power (Pmax)	592.74	W	Current at reference voltage 2		
Fill factor (FF)	80.09	%			
Measurement method	Direct				

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 22 von 31
Page 22 of 31

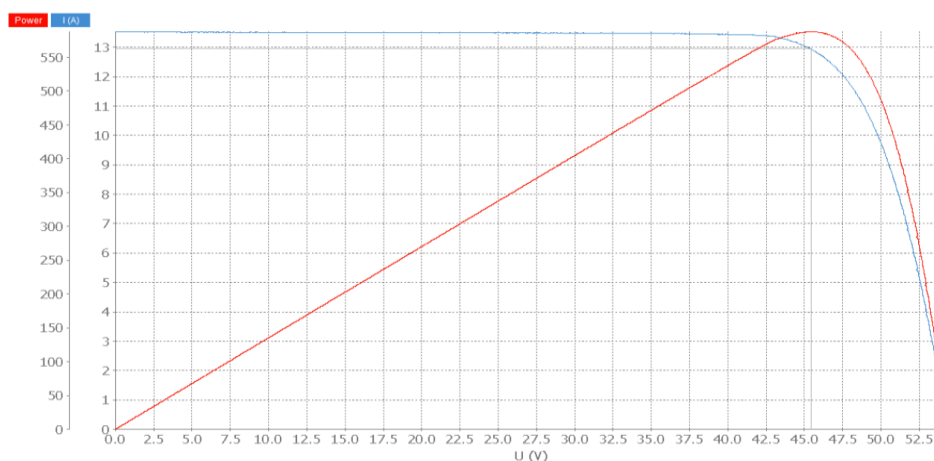
ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Measurement Reports after PID 3RD Cycle:

Performance measurement

PASAN HighLight 2.5.10

2023/10/16 17:35



PV module under test

Module sample ID	A003546092-048	Module area	28059.20	cm ²
Module serial number	SW12723A33768	Cell area	164.98	cm ²
Test sequence	af	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	22.70	°C	Module efficiency	20.97	%
Standard temperature	25.00	°C	Cell efficiency	22.86	%
Mean irradiance	1003.19	W/m ²	Shunt resistance	771.281	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.344	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.52	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.36	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.95	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.43	V	Power at reference voltage 2		
Maximum power (Pmax)	588.37	W	Current at reference voltage 2		
Fill factor (FF)	80.05	%			
Measurement method	Direct				

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

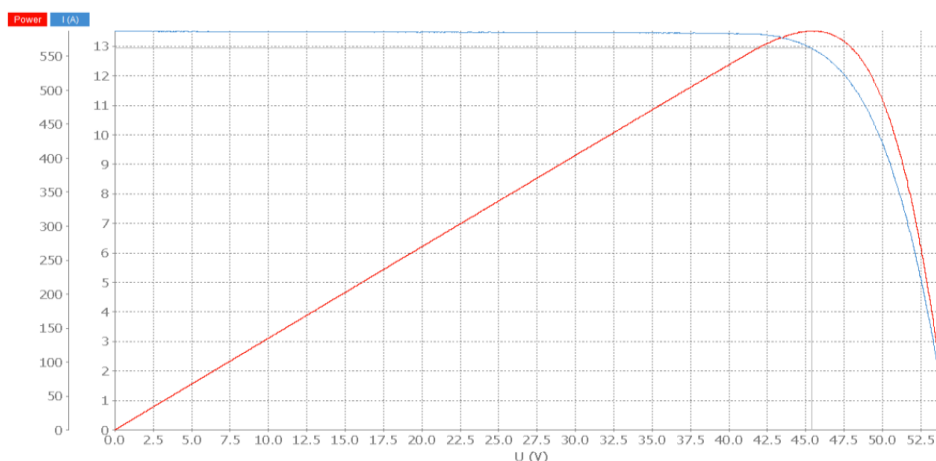
Seite 23 von 31
Page 23 of 31

ZUSATZ-DOKUMENTATION ADDITIONAL DOCUMENTATION

Performance measurement

PASAN HighLight 2.5.10

2023/10/16 17:50



PV module under test

Module sample ID	A003546092-054	Module area	28059.20	cm ²
Module serial number	SW12723A33852	Cell area	164.98	cm ²
Test sequence	af	Number of cells in series	78	
Model/type	SWM11BT8595	Number of cells in parallel	2	
Manufacturer	Swelect HHV Solar Photovoltaics Private Ltd.			

Measurement data

Module temperature	22.57	°C	Module efficiency	20.94	%
Standard temperature	25.00	°C	Cell efficiency	22.83	%
Mean irradiance	1003.34	W/m ²	Shunt resistance	601.095	Ohm
Standard irradiance	1000.00	W/m ²	Series resistance	0.339	Ohm
			Reference voltage 1		
Short circuit current (Isc)	13.51	A	Power at reference voltage 1		
Open circuit voltage (Voc)	54.33	V	Current at reference voltage 1		
Current at maximum power (Imp)	12.94	A	Reference voltage 2		
Voltage at maximum power (Vmp)	45.42	V	Power at reference voltage 2		
Maximum power (Pmax)	587.69	W	Current at reference voltage 2		
Fill factor (FF)	80.08	%			
Measurement method	Direct				

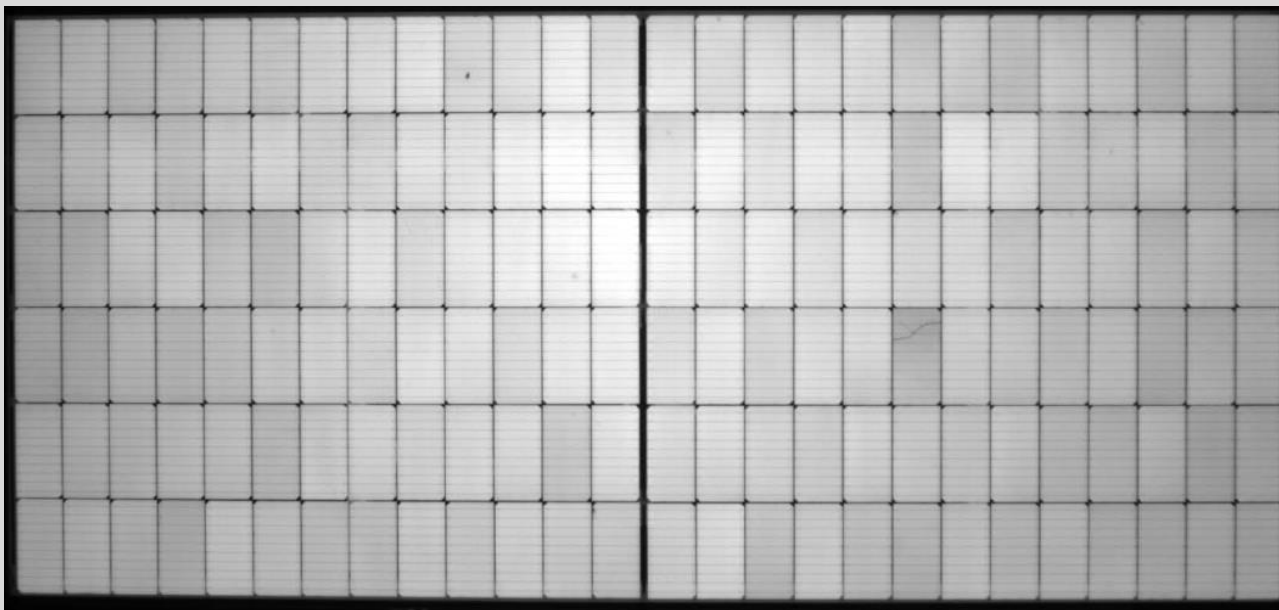
Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 24 von 31
Page 24 of 31

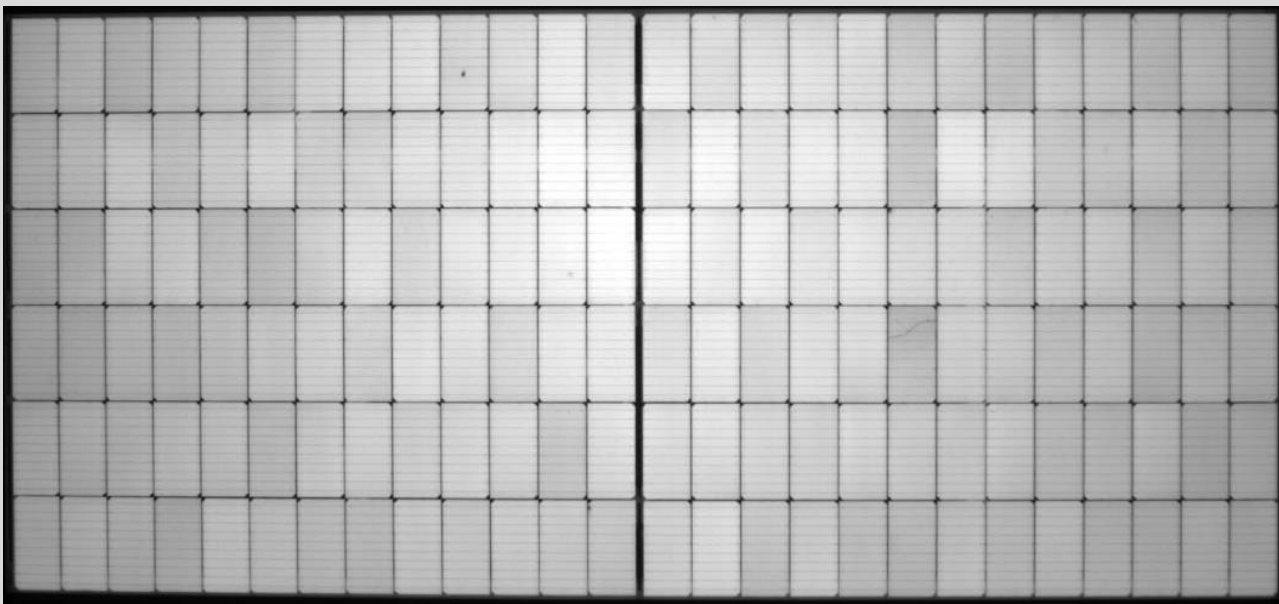
ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

Annexure 5: EL Images of Test samples:

A003546092-048 (Initial)



A003546092-048(After- PID 1st Cycle)

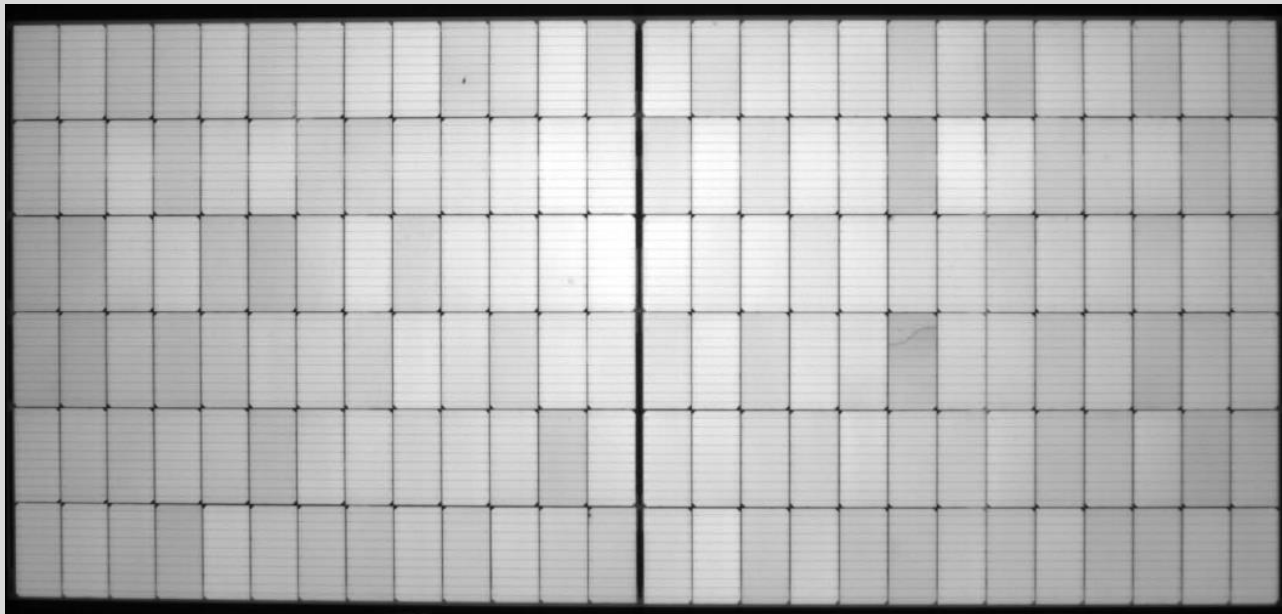


Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

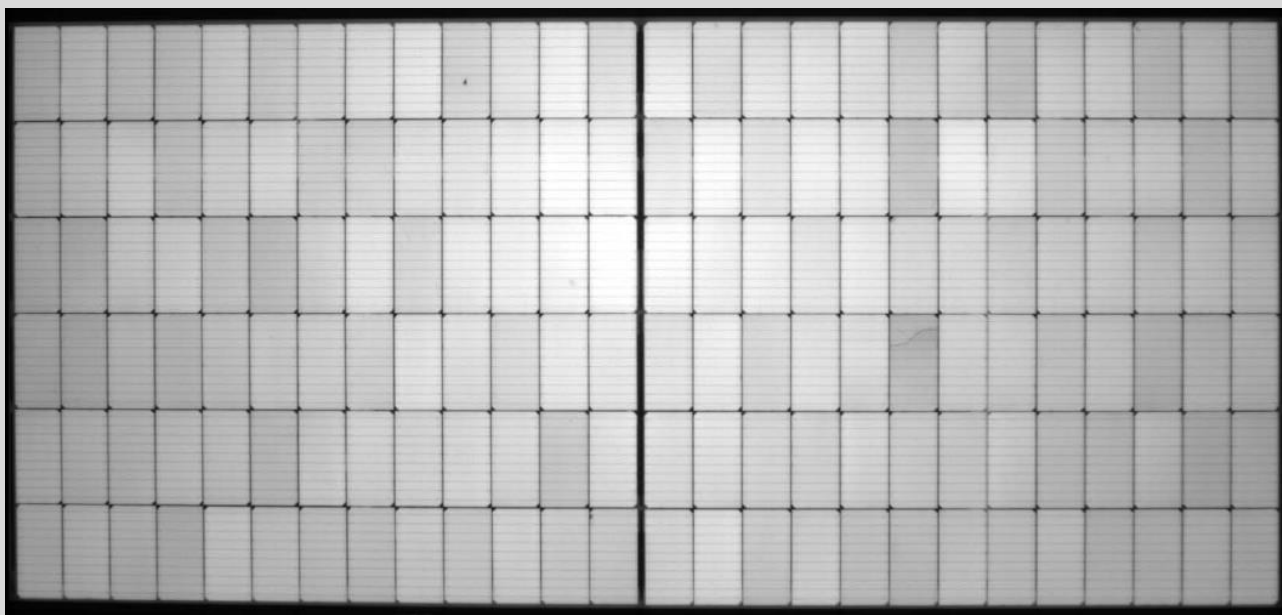
Seite 25 von 31
Page 25 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

A003546092-048(After- PID 2nd Cycle)



A003546092-048(After- PID 3rd Cycle)

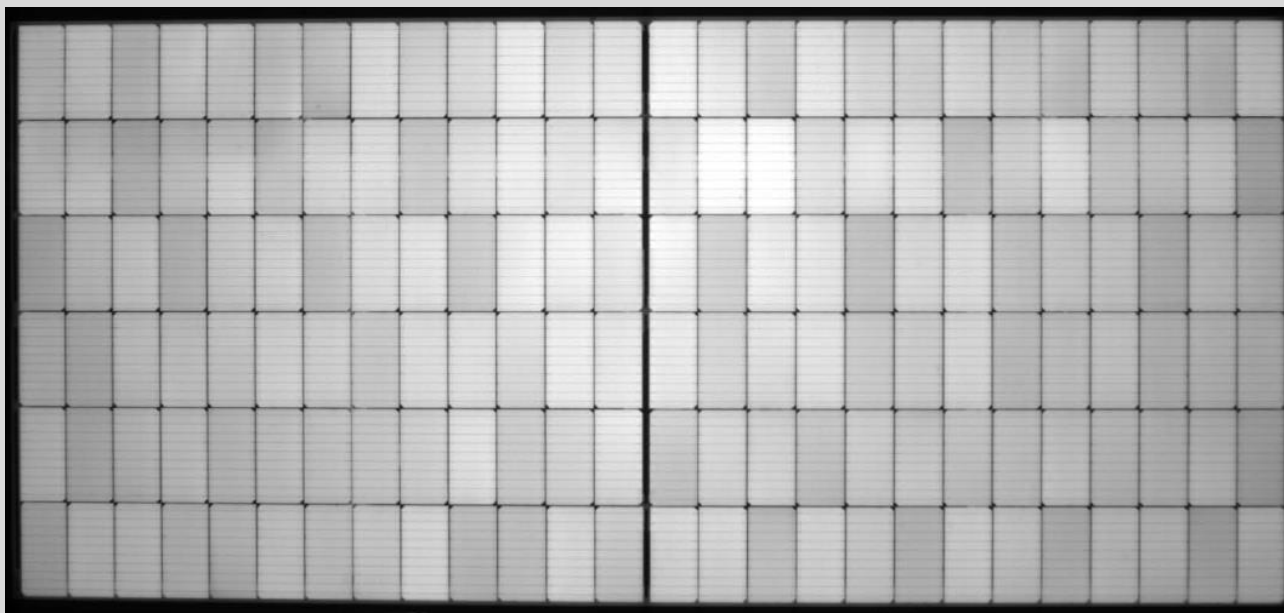


Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

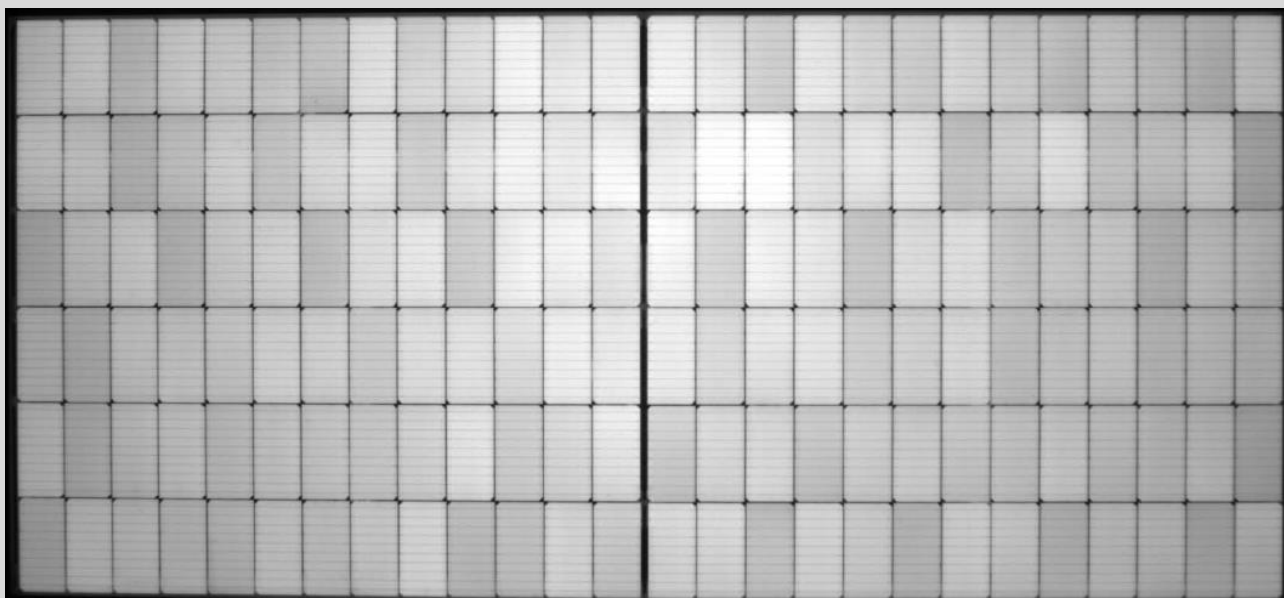
Seite 26 von 31
Page 26 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

A003546092-054(Initial)



A003546092-054(After- PID 1st Cycle)

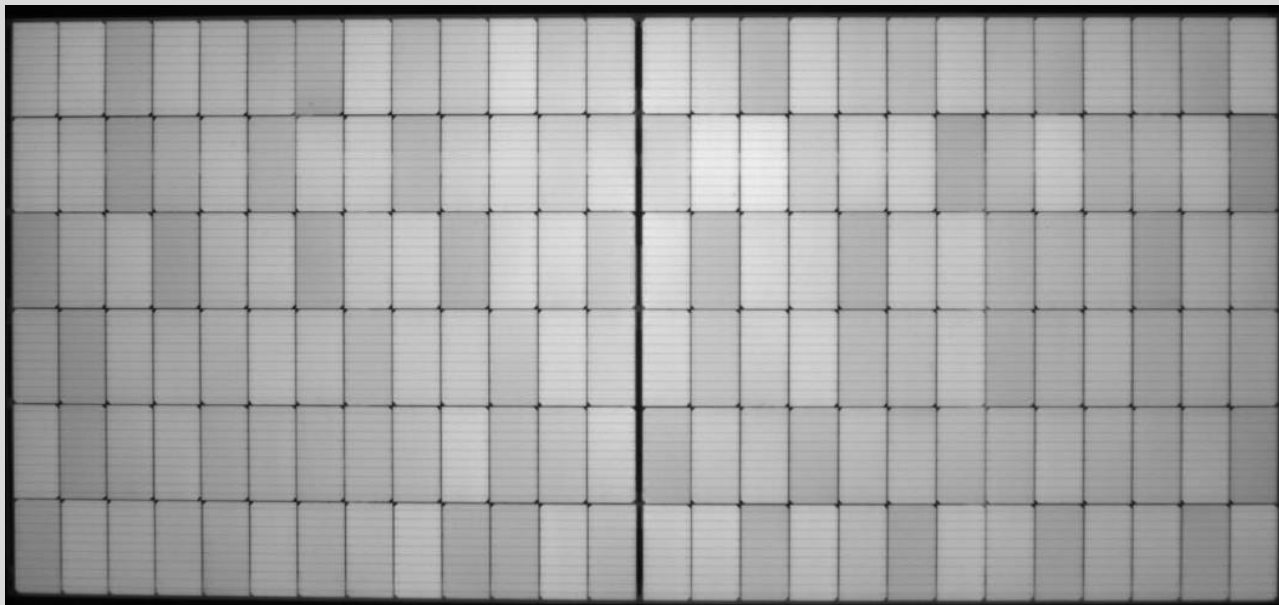


Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

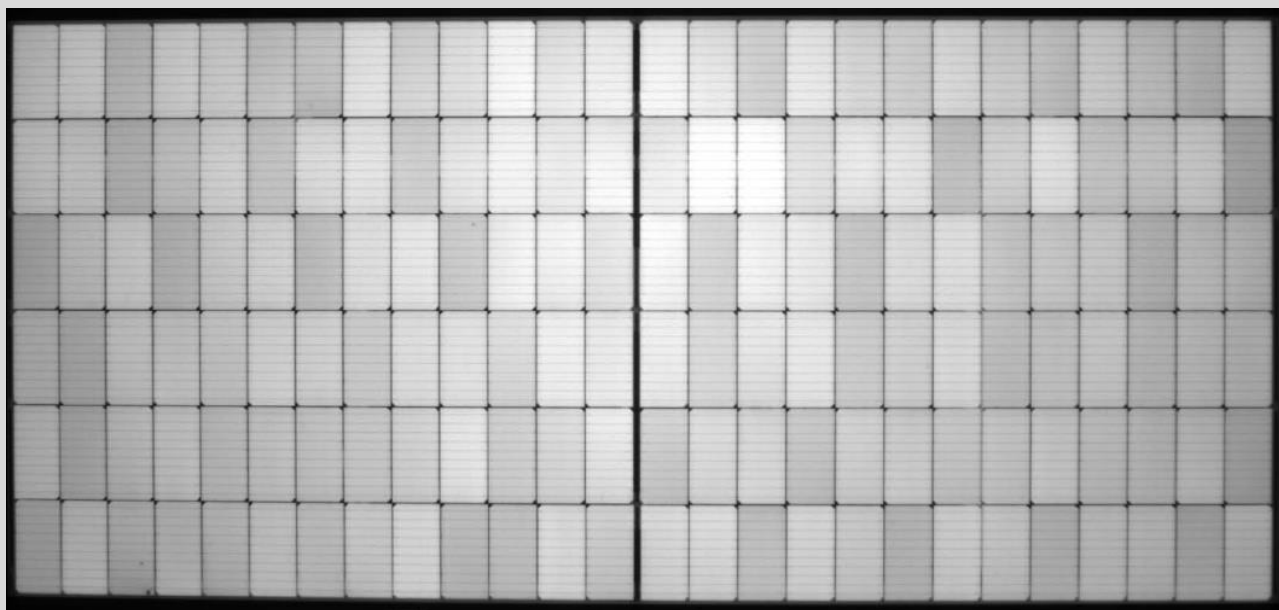
Seite 27 von 31
Page 27 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

A003546092-054(After- PID 2nd Cycle)



A003546092-054(After- PID 3rd Cycle)

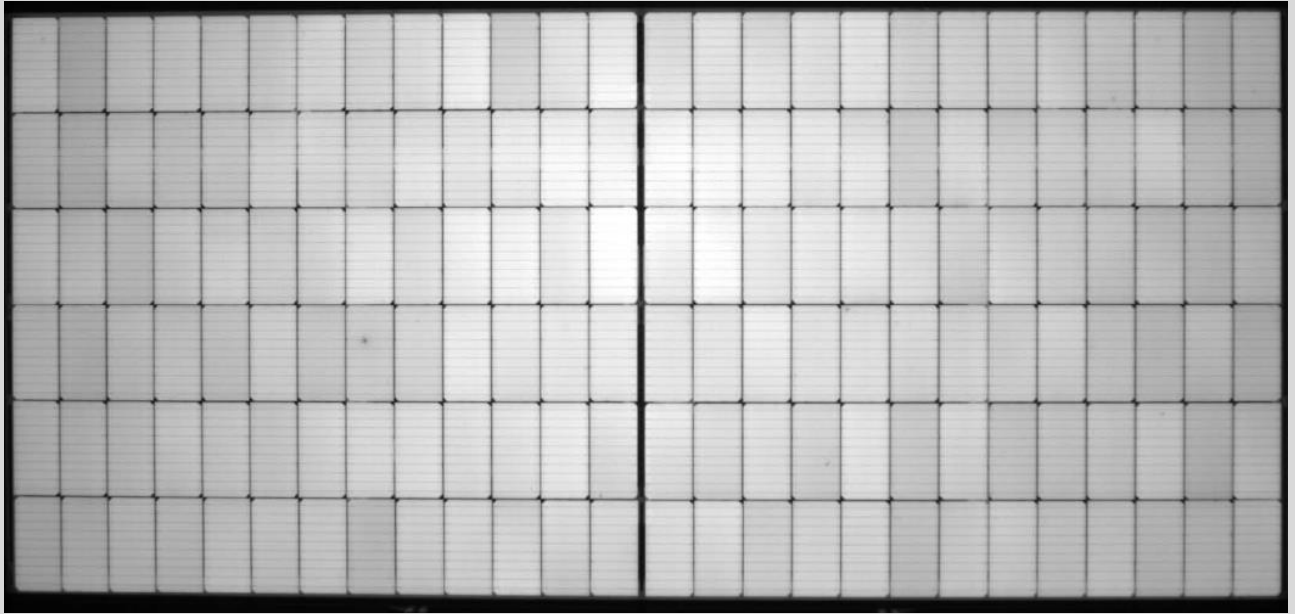


Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 28 von 31
Page 28 of 31

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

A003546092-026 (Control module)



Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 29 von 31
Page 29 of 31

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Annexure 6: Pictures of Test sample

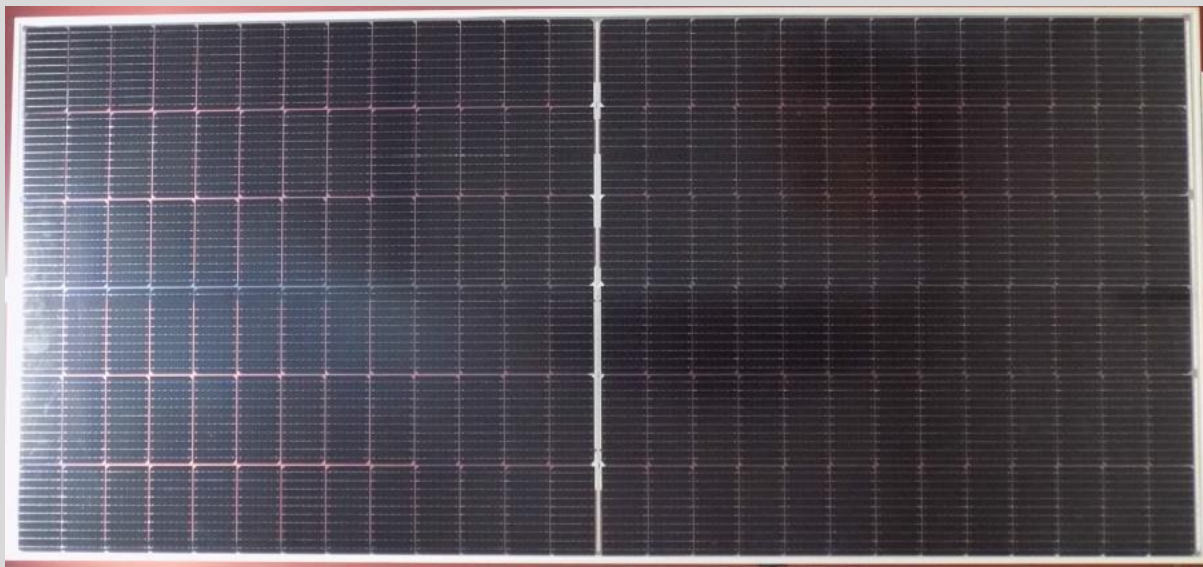


Fig.1: Front view of the module



Fig.2: Rear view of the module

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 30 von 31
Page 30 of 31

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION



Fig.3:Detail view of the Solar cell



Fig.4: Detail view of Junction Box

Prüfbericht-Nr.: IN24P0NY 002
Test report no.: ULR:TC568823400000642F

Seite 31 von 31
Page 31 of 31

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

 Swelect IBV Solar Photovoltaics Private Ltd. No. 109, 160 Sembagandan Pudur, Kuppapalayam Village, Coimbatore, Coimbatore North Taluk, Coimbatore District, Tamil Nadu 641107. Made in India www.swelects.com	P _{max} (WP)	V _{oc} (V)	I _{sc} (A)	V _{mp} (V)	I _{mp} (A)	Max System Voltage (A)	Binning (Wp)	Weight (Kg)
	895	85.02	13.67	46.15	12.91	1500	0-4.99	29.5
	Output Tolerance		Series Fuse: 30A		Fire Hazard Rating C			
	0 to +3%		±5%		Protection against Electric shock: Class II			
	For field connections use AWG 12 insulated cable min. of rating at least 90°C							

MODEL NO : SWM11BT8595		
Electrical Ratings at STC (1000 W/m ² , AM 1.5, Cell temp. 25°C)		
		
WARNING ELECTRICAL HAZARD !!		

BE AWARE of dangerous high DC voltage when connecting modules	Don't expose the electrical terminals to rain / water	Don't short circuit the electrical terminals when exposed to light
Don't handle or install modules when they are wet	For more details: Refer installation manual	Don't stack modules horizontally
Don't damage or scratch the rear surface of the module	Don't pull the cable to lift the module	Don't Disconnect under load
	Don't walk/step over/sit on the module	Don't drop any solid object on the module

Mfg. Date: 08-Jul-2023

Fig.5: Detail view of the Type label



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