

TÜV Rheinland (Shanghai) Co., Ltd.
Solar/ Fuelcell Technology

Test Report

Photovoltaic module performance measurement at
Standard Test Conditions (STC)

TÜV Report No. 15080817.001

Shanghai, April 2015



Deutsche
Akkreditierungsstelle
D-PL-11097-02-01

Test report No.: 15080817.001

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Prüfbericht - Nr.:

Client
(Customer No. + address): Jiangsu Green Power PV Co., Ltd.
 No.1 Longmen Road, New District, Wujin
Auftraggeber
(Kunden-Nr. + Adresse): ChangZhou ,Jiangsu 213161
 P. R. China

Test Item: Photovoltaic (PV) Module(s) **Date of receipt:** 01/04/2015
Gegenstand der Prüfung: **Eingangsdatum:**

Identification: Not provided
Bezeichnung:



Order No.: 154084507 **Quotation No.:** 52111351
Auftragsnummer: **Angebotsnummer:**

Testing location: TÜV Rheinland (Shanghai) Co., Ltd.
Prüfart: B1-13F No. 177, Lane 777, West Guangzhong Road, Zhabei District
 Shanghai 200072, P. R. China

Test specification: IEC60904-1:2006
Prüfgrundlage: IEC60904-3:2008
 IEC61215:2005, clause 10.6 Performance at STC

Test Result: N/A
Prüfergebnis:

tested by / geprüft:**reviewed by / kontrolliert:**

17/04/2015	Project Engineer / Allen Zhou		17/04/2015	Technical Certifier/ James Ha	
Date	Title/Name	Signature	Date	Title/Name	Signature
<i>Datum</i>	<i>Titel/Name</i>	<i>Unterschrift</i>	<i>Datum</i>	<i>Titel/Name</i>	<i>Unterschrift</i>

Other Aspects / Sonstiges:

N/A

Abkürzungen: P(ass) = entspricht Prüfgrundlage
 F(ail) = entspricht nicht Prüfgrundlage
 N/A = nicht anwendbar
 N/T = nicht getestet

Abbreviations: P(ass) = passed
 F(ail) = failed
 N/A = not applicable
 N/T = not tested

This test report relates to the listed test samples. Without permission of the test centre this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

Dieser Prüfbericht bezieht sich nur auf die gelisteten Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

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Sampling procedure

<input type="checkbox"/>	Random sampling from production (e.g. during factory audit (FA) or inline inspection)
<input type="checkbox"/>	Random sampling from the warehouse, container or transportation boxes
<input checked="" type="checkbox"/>	Modules have been submitted by the manufacturer/ client without random sampling by TÜV Rheinland

Module group assignment:

Serial no.	Module type	Remarks / constructional characteristics	Type of extra connectors used*	Test item
01215015100007	Not provided	6" poly c-Si module, 72 pcs	A	STC, EL
01215015100009				
Supplementary information: (*) A: Customer provided; B: TÜV Rheinland provided.				

Tables

Visual inspection (accord. to IEC61215:2005, Clause 10.1)

Test Date [DD-MM-YYYY]	12/04/2015	—
Serial no.	Nature and position of initial findings	Verdict
01215015100007	No visual defect	P
01215015100009	No visual defect	P
Supplementary information: Refer to Appendix 4: Photos of the modules.		

Performance at STC (accord. to IEC61215:2005, Clause 10.6; IEC60904-1: 2006; IEC60904-3:2008)

Test Date [DD-MM-YYYY]	12/04/2015					—
Test method.....	<input checked="" type="checkbox"/> indoor	<input type="checkbox"/> outdoor				—
Irradiance [W/m ²]	1000					—
Module temperature [°C]	25					—
Serial no.	Pmpp [W]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	FF [%]
01215015100007	304.3	36.96	8.232	45.63	8.822	75.6
01215015100009	306.6	36.62	8.371	45.70	8.864	75.7
Supplementary information: Refer to Appendix 2: Statement of the estimated uncertainty of the test verdicts.						

EL-images

Test Date [DD-MM-YYYY]	12/04/2015	—
Current applied	Isc ± 5%	—
Serial no.	Remarks	—
01215015100007	N/A	P
01215015100009	N/A	P
Supplementary information: Refer to Appendix 5: EL-images.		

Appendix 1: Measuring equipment and used software

Measuring equipment

Device	Index no	Measured variable	Application
Reference solar cell PTB 076_2010	PV-193	Global irradiance coplanar with specimen	Pulsed solar simulator measurements
Pulsed solar load	PV-219	Current, voltage	Pulsed solar simulator measurements
	PV-222		
	PV-223		
IR-sensor	PV-201	Specimen temperature	Pulsed solar simulator measurements
	PV-202		
	PV-203		
	PV-204		

Measurement related software

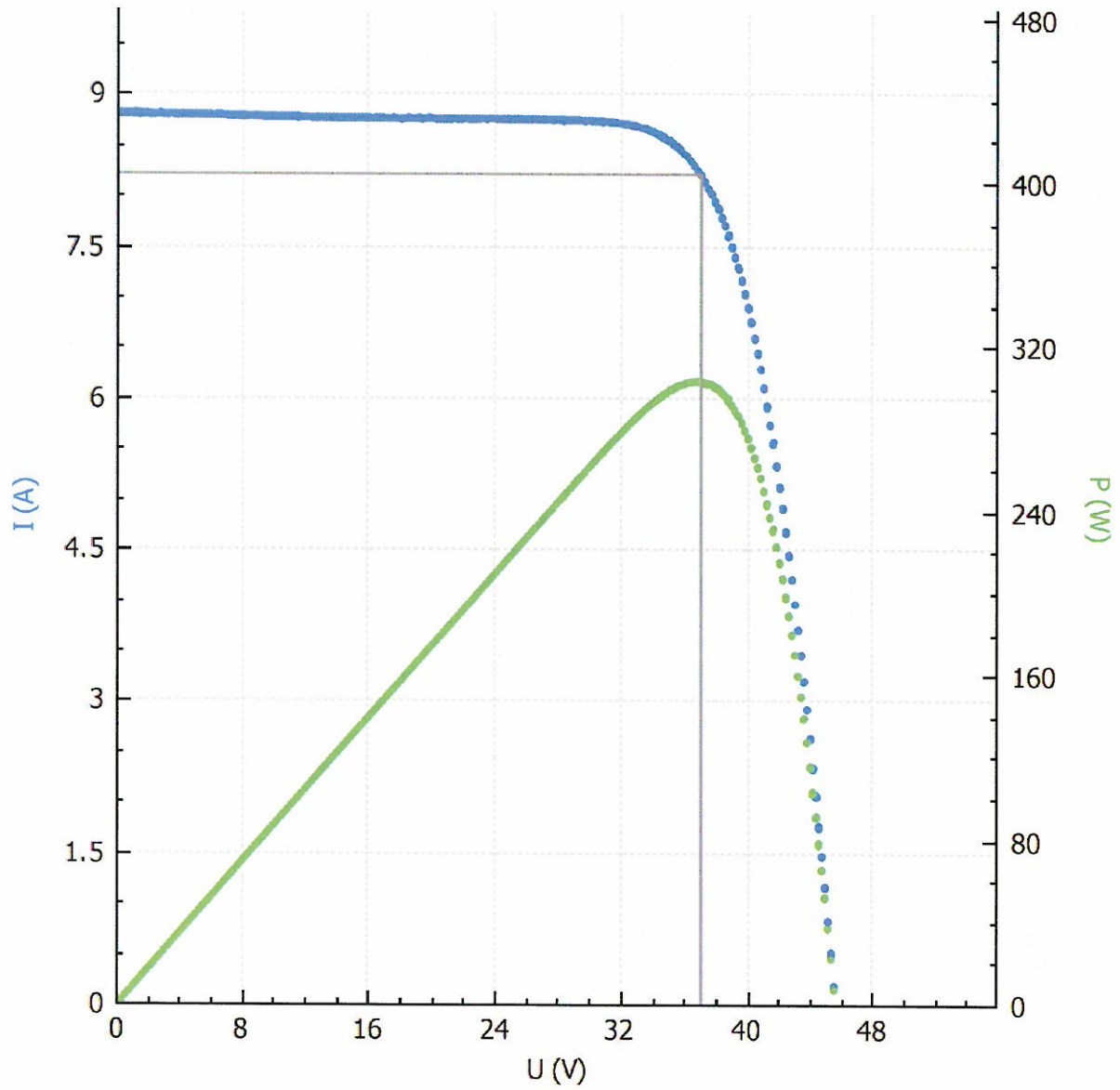
Program name	Version no.	Date	Application
Pulsed Solar Simulator Software	STC v2.4.4	12.07.2011	Operating software pulsed solar simulator

Appendix 2: Statement of the estimated uncertainty of the test verdicts

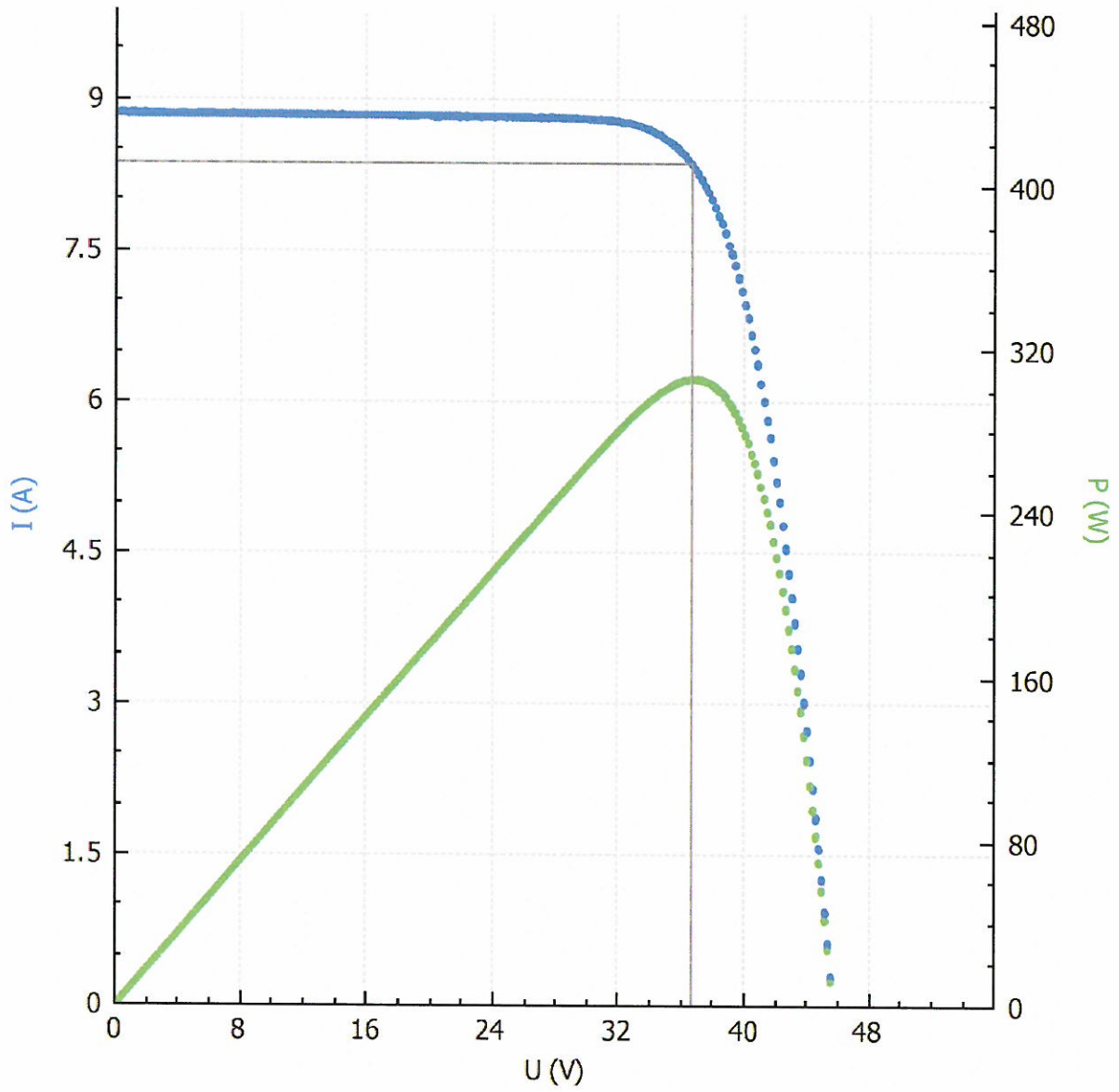
- The verdicts of performance rating are only related to the test samples that were subjected to the tests. They cannot be generalised to the modules from the series production.
- The STC measurement was performed with a pulsed solar simulator of Class AAA according to IEC60904-9:2007. The extended measurement uncertainty is:
 - o $2\sigma P_{mpp} \leq \pm 3.0 \%$
 - o $2\sigma I_{sc} \leq \pm 2.8 \%$
 - o $2\sigma V_{oc} \leq \pm 0.9 \%$

Appendix 3: Measurement report (I/V curves)

Serial number: 01215015100007



Serial number: 01215015100009



Appendix 4: Photos of the modules



Fig. 1: front view of test sample

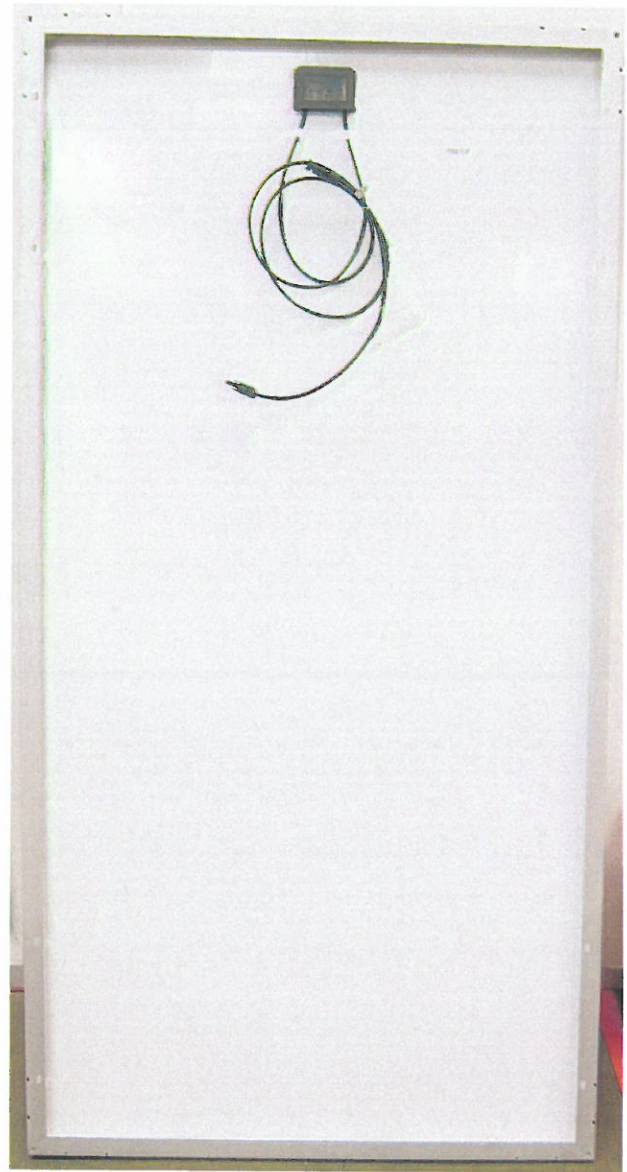


Fig. 2: rear view of test sample



Fig. 3: series number of test sample

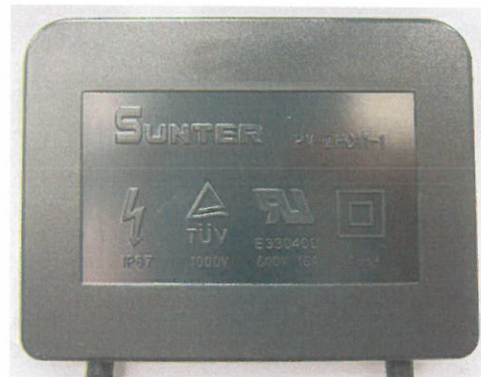


Fig. 4: junction box of test sample

Appendix 5: EL-images

Fig. 5: EL-image of sample with serial no. 01215015100007



Fig. 6: EL-image of sample with serial no. 01215015100009

End of Test Report