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## Technical Report No. 704061357605

Rev.00

Dated: 2013-11-22

Client: Hangzhou Zhejiang University Sunny Energy Science and Technology Co.,Ltd.  
Room 320-321 West Area Building, Zhejiang University Science Park  
No.525, xixi Road, 310013, Hangzhou, Zhejiang, People's Republic of China  
Mr Lei xiao wei

Manufacturing place: Hangzhou Zhejiang University Sunny Energy Science and Technology Co.,Ltd, FUYANG FILIALE  
NO.288 North Gonghe road, Xindeng Town, 311404, Fuyang City, Zhejiang, People's Republic of China  
Mr Lei xiao wei

Test subject: Product: Photovoltaic modules  
Type: ZDNY-250P60, ZDNY-260C60

Test specification: IEC 61215: 2005-04, Second Edition, partial, see below for details;  
IEC 61730-2: 2004-10, First Edition , partial, see below for details;  
Test method, refer to IEC 62804 Edition1.0 Draft; Test condition, see below for details;

Purpose of examination: Test according to the test specifications.

Test result: The test results show that the presented product is in compliance with the specified requirements.

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### 1.1 Function

Manufacturer's specification for intended use:

The PV modules for electricity generation systems with max. voltage of 1000 V DC.

### 1.2 Consideration of the foreseeable misuse

- Not applicable
- Covered through the applied standard
- Covered by the following comment
- Covered by attached risk analysis

### 1.3 Technical Data

Type or model number	ZDNY-260C60
Voc (Vdc)	38.82
Vmp (Vdc)	31.20
Imp (Adc)	8.34
Isc (Adc)	8.71
Pmp (W)	260
Deviation of Pmp at STC	± 3 %
Maximum system voltage (V)	1000
Maximum over-current protection rating (A)	15
Application Class	A

<b>Description of module construction: for module type ZDNY-260C60 (Manufactories and part numbers, unless otherwise specified)</b>	
Sample .....	Random sampling from production <input type="checkbox"/> Prototype submitted by client <input checked="" type="checkbox"/>
<b>Module</b>	
Front Cover .....	Nanjing Solglass Science & Technology Co., Ltd tempered glass , Thickness: 3.2 mm

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Rear Cover .....	Zhejiang Ventura Photovoltaic Materials Co.,Ltd. Material : TPT Thickness: 20 / 250 / 10 μm
Encapsulation material .....	HangZhou SuoKangBo Solar Composites Energy Technology Co.,Ltd Materials EVA .
Frame .....	Tonglu jade hin machinery manufacturing Co., Ltd. Aluminum frame 6063-T5 Thickness: 40 mm
Dimensions (l x w x h) [mm] .....	1650 × 992 × 40
Module area [m <sup>2</sup> ] .....	1.64
Adhesives (frame) .....	Shanghai Huitian Nanyang Chemical new material Co., Ltd Silicone, Type: HT906Z
Minimum distance between current-carrying parts and module edge [mm]	19
<b>Cell</b>	
Cell (include type) .....	Zhejiang Jinbest Energy science and technology Co.,Ltd
Cells (l x w) [mm] .....	156 x 156
Cell thickness [μm] .....	180±15
Cell area [cm <sup>2</sup> ] .....	238.95
Number of cells .....	60
<b>Components</b>	
Cells per bypass diode .....	20
Type of bypass diode .....	Schottky, THY2550, Panjit Internation Inc
No. of bypass diodes .....	6
Cell- and string connectors .....	Jiangyin Yixin New Material Technology Co., Ltd Cell interconnector : Cross section: 1.8x 0.18 mm Material: Base Cu. Coating Sn60Pb40,  string connectors: Cross section: 0.35 x 5.0 mm Material: Base Cu. Coating Sn60Pb40,
Junction box .....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd. Type:PV-JM825

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Cable .....	Wu xi Xinhongye Wire &Cable Co., Ltd . Type PV1-F 1x4.0 mm2
Connectors .....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd. PV-JM0601-1
Adhesives ( junction box) .....	Shanghai Huitian Nanyang Chemical new material Co., Ltd Silicone adhesive, type HT906Z
Potting material (junction box).....	N/A
<b>Other</b>	
Others.....	Fixing tape : TERAOKA SEISAKUSHO CO., LTD. Soldering material: ANX3133, Wuxi ASAHI

Type or model number	ZDNY-250P60
Voc (Vdc)	37.75
Vmp (Vdc)	30.76
Imp (Adc)	8.13
Isc (Adc)	8.55
Pmp (W)	250
Deviation of Pmp at STC	± 3 %
Maximum system voltage (V)	1000
Maximum over-current protection rating (A)	15
Application Class	A

<b>Description of module construction: for module type ZDNY-250P60 (Manufactories and part numbers, unless otherwise specified)</b>	
Sample .....	Random sampling from production <input type="checkbox"/> Prototype submitted by client <input checked="" type="checkbox"/>
<b>Module</b>	
Front Cover .....	Nanjing Solglass Science & Technology Co., Ltd tempered glass , Thickness: 3.2 mm

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Rear Cover .....	Zhejiang Ventura Photovoltaic Materials Co.,Ltd.Type : TPT300 Material : TPT Thickness: 20 / 250 / 10 μm
Encapsulation material .....	HangZhou SuoKangBo Solar Composites Energy Technology Co.,Ltd Type: SKB-825 , Materials EVA .
Frame .....	Tonglu jade hin machinery manufacturing Co., Ltd. Aluminum frame 6063-T5 Thickness: 40 mm
Dimensions (l x w x h) [mm] .....	1650 × 992 × 40
Module area [m <sup>2</sup> ] .....	1.64
Adhesives (frame) .....	Shanghai Huitian Nanyang Chemical new material Co., Ltd Silicone, Type: HT906Z
Minimum distance between current-carrying parts and module edge [mm]	19
<b>Cell</b>	
Cell (include type) .....	Zhejiang Jinbest Energy science and technology Co.,Ltd,156M
Cells (l x w) [mm] .....	156 x 156
Cell thickness [μm] .....	180±15
Cell area [cm <sup>2</sup> ] .....	243.36
Number of cells .....	60
<b>Components</b>	
Cells per bypass diode .....	20
Type of bypass diode .....	Schottky, THY2550, Panjit Internation Inc
No. of bypass diodes .....	6
Cell- and string connectors .....	Jiangyin Yixin New Material Technology Co., Ltd Cell interconnector : Cross section: 1.8x 0.18 mm Material: Base Cu. Coating Sn60Pb40,  string connectors: Cross section: 0.35 x 5.0 mm Material: Base Cu. Coating Sn60Pb40,
Junction box .....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd. Type:PV-JM825

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Cable .....	Wu xi Xinhongye Wire &Cable Co., Ltd . Type PV1-F 1x4.0 mm2
Connectors .....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd. PV-JM0601-1
Adhesives ( junction box) .....	Shanghai Huitian Nanyang Chemical new material Co., Ltd Silicone adhesive, type HT906Z
Potting material (junction box).....	N/A
<b>Other</b>	
Others.....	Fixing tape : TERAOKA SEISAKUSHO CO., LTD. Soldering material: ANX3133, Wuxi ASAHI

## 2 Order

### 2.1 Date of Purchase Order, Customer's Reference

The order dated 2013-11-06.

### 2.2 Receipt of Test Sample, Location

Yangzhou Opto-Electrical Products Testing Institute,  
No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

### 2.3 Date of Testing

2013-11-12~2013-11-17.

### 2.4 Location of Testing

Yangzhou Opto-Electrical Products Testing Institute,  
No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

### 2.5 Points of Non-compliance or Exceptions of the Test Procedure

NA



### 3 Test Results

#### 3.1 Positive Test Results

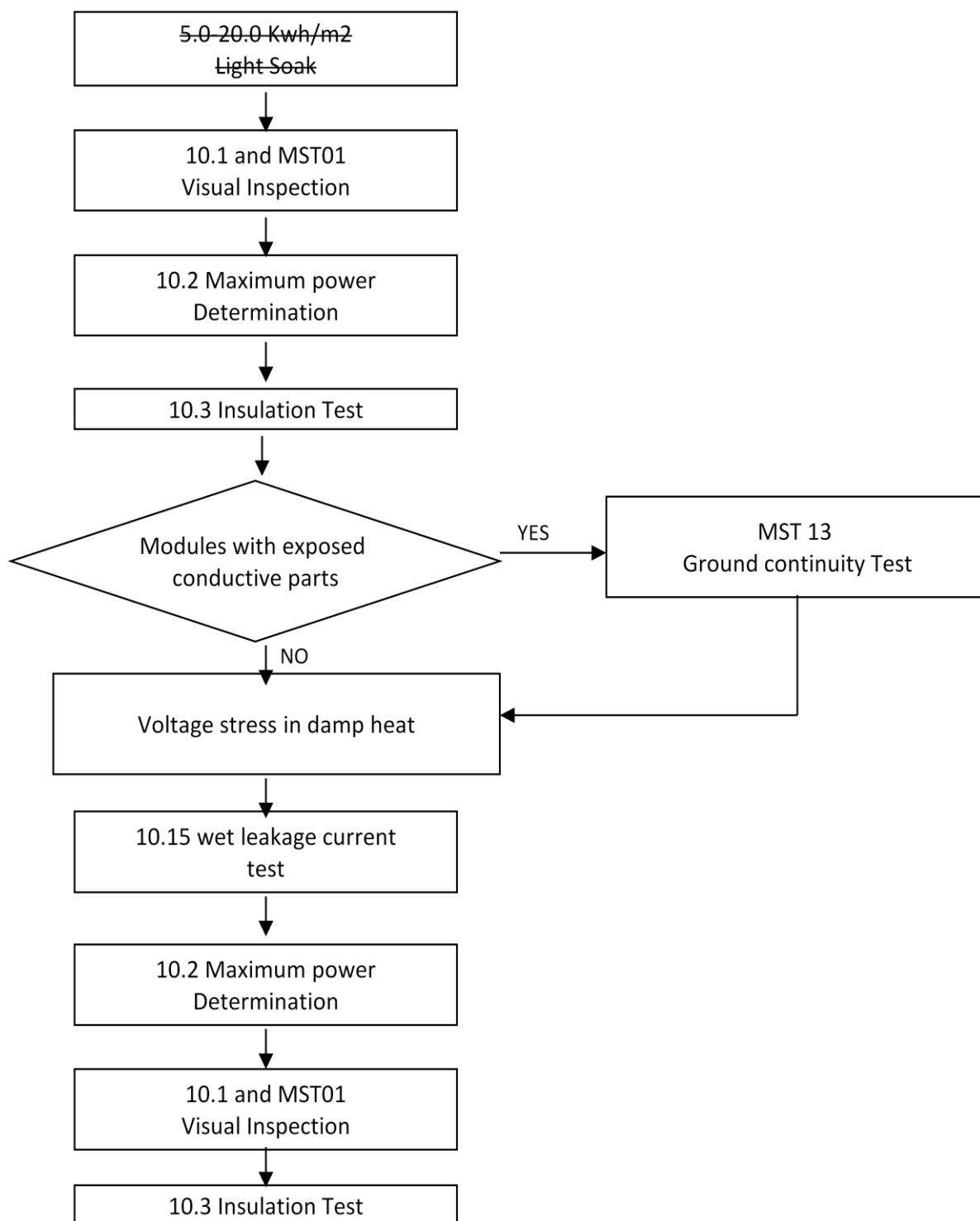
Performance requirements according to IEC 61215: 2005-04, Second Edition and EN 61215: 2005, partial;

Safety requirements according to IEC 61730-1/-2: 2004-10, First Edition and EN 61730-1/-2: 2007, partial;

IEC 62804 Edition1.0 Draft;

#### 3.2 Test Data

Module group assignment:		
Sample #	Sample Type	Sample S/N
GDP13430 1/3	ZDNY-260C60	131037901260030002
GDP13430 2/3	ZDNY-260C60	131037901260030003
GDP13430 3/3	ZDNY-260C60	131037901260030005
GDP13429 1/3	ZDNY-250P60	131037902250030002
GDP13429 2/3	ZDNY-250P60	131037902250030004
GDP13429 3/3	ZDNY-250P60	131037902250030005



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<b>10.1</b>	<b>TABLE: Visual inspection (Initial)</b>		P
Test Date [MM/DD/YYYY].....:		11/12/2013	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
GDP13430 1/3	No major visual defects		P
GDP13430 2/3	No major visual defects		P
GDP13430 3/3	No major visual defects		P
GDP13429 1/3	No major visual defects		P
GDP13429 2/3	No major visual defects		P
GDP13429 3/3	No major visual defects		P
Supplementary information: N/A			

<b>10.2</b>	<b>TABLE: I-V characteristic (Initial)</b>						P
Test Date [MM/DD/YYYY].....:		11/12/2013				—	
Radiant Source.....:		<input checked="" type="checkbox"/> Solar simulator		<input type="checkbox"/> Natural Sunlight			
Module temperature [°C]		25				—	
Irradiance [W/m <sup>2</sup> ]		1000				—	
Sample No.	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF[%]	
GDP13430 1/3	37.826	30.336	8.679	8.226	249.544	76.02	
GDP13430 2/3	37.865	30.391	8.721	8.235	250.256	75.79	
GDP13430 3/3	37.831	30.364	8.697	8.216	249.483	75.83	
GDP13429 1/3	37.823	30.087	8.604	8.134	244.737	75.20	
GDP13429 2/3	37.859	30.817	8.604	8.023	247.232	75.90	
GDP13429 3/3	37.839	30.214	8.593	8.164	246.677	75.87	
Supplementary information: N/A							

<b>10.3</b>	<b>TABLE: Insulation test (initial)</b>				P
Test Date [YYYY-MM-DD] .....		11/12/2013			—
Test Voltage applied [V] .....		3000/1000			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	

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GDP13430 1/3	>5000	24.39	No dielectric breakdown	x	P
GDP13430 2/3	>5000	24.39	No dielectric breakdown	x	P
GDP13430 3/3	>5000	24.39	No dielectric breakdown	x	P
GDP13429 1/3	>5000	24.39	No dielectric breakdown	x	P
GDP13429 2/3	>5000	24.39	No dielectric breakdown	x	P
GDP13429 3/3	>5000	24.39	No dielectric breakdown	x	P
Supplementary information: Size of module [m <sup>2</sup> ]: 1.64, The maximum resistance measurement range is 5000 MΩ.					

<b>TABLE: MST 13 – ground continuity test (Initial)</b>				P
Maximum over-current protection rating (A) .....		15		—
Current applied (A) .....		37.5		—
Location of designated grounding point .....		On the middle of the longest frame		—
Location of second contacting point .....		On the other middle of the longest frame		—
Sample No.	Position in test sequence:	Voltage (V)	Resistance (Ω)	Result
GDP13430 2/3	Initial examination	0.1875/0.3/0.2625	0.005/0.008/0.007	P
GDP13430 3/3	Initial examination	0.1875/0.225/0.225	0.005/0.006/0.006	P
GDP13429 2/3	Initial examination	0.375/0.375/0.3375	0.01/0.01/0.009	P
GDP13429 3/3	Initial examination	0.2625/0.3/0.2625	0.007/0.008/0.007	P
Supplementary information: N/A				

<b>TABLE: Damp heat test applied with voltage stress</b>		P
Test Date [MM/DD/YYYY] start/end .....	11/13/2013 to 11/17/2013	—
Chamber air temperature ( °C) .....	85	—
Chamber relative humidity ( % RH) .....	85	—
Test duration hours (h) .....	96	—
Sample #	Applied voltage stress (V) and polarities	—

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GDP13430 2/3	-1000	P
GDP13430 3/3	-1000	P
GDP13429 2/3	-1000	P
GDP13429 3/3	-1000	P
Supplementary information: N/A		

10.15	<b>TABLE: Wet leakage current test (final)</b>		P
Test Date [MM/DD/YYYY].....:	11/17/2013		—
Test voltage applied [V] .....	1000		—
Module maximum system voltage rating (V, DC) :	1000		—
Solution resistivity [ $\Omega$ cm], < 3,500 $\Omega$ cm at 22 $\pm$ 3 $^{\circ}$ C .....	2700 at 20 $^{\circ}$ C		—
Sample No.	Measured [ $M\Omega$ ]	Limit [ $M\Omega$ ]	Verdict
GDP13430 2/3	1150	24.39	P
GDP13430 3/3	2519	24.39	P
GDP13429 2/3	1302	24.39	P
GDP13429 3/3	1921	24.39	P
Supplementary information: Size of module [ $m^2$ ]: 1.64			

10.2	<b>TABLE: Maximum power determination (final)</b>							P
Test Date [MM/DD/YYYY] start-end.....:	11/17/2013							—
Module temperature [ $^{\circ}$ C] low-high.....:	25							—
Irradiance [ $W/m^2$ ] low-high .....	1000							—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	FF [%]	Pmp [W]	Degradation [%]	Limit [%]
GDP13430 1/3	37.813	30.175	8.690	8.197	75.27	247.335	-0.89	$\pm$ 1
GDP13430 2/3	37.924	30.491	8.737	8.218	75.62	250.576	0.13	-5
GDP13430 3/3	37.921	30.348	8.706	8.238	75.72	249.991	0.20	-5
GDP13430 1/3	37.798	30.261	8.618	8.161	75.82	246.977	0.92	$\pm$ 1
GDP13429 2/3	37.873	30.300	8.650	8.160	75.47	247.245	0.005	-5
GDP13429 3/3	37.847	30.048	8.635	8.176	75.17	245.659	-0.41	-5
Supplementary information: Crystalline silicon module: Pmp degradation after this test $\leq$ 5%								

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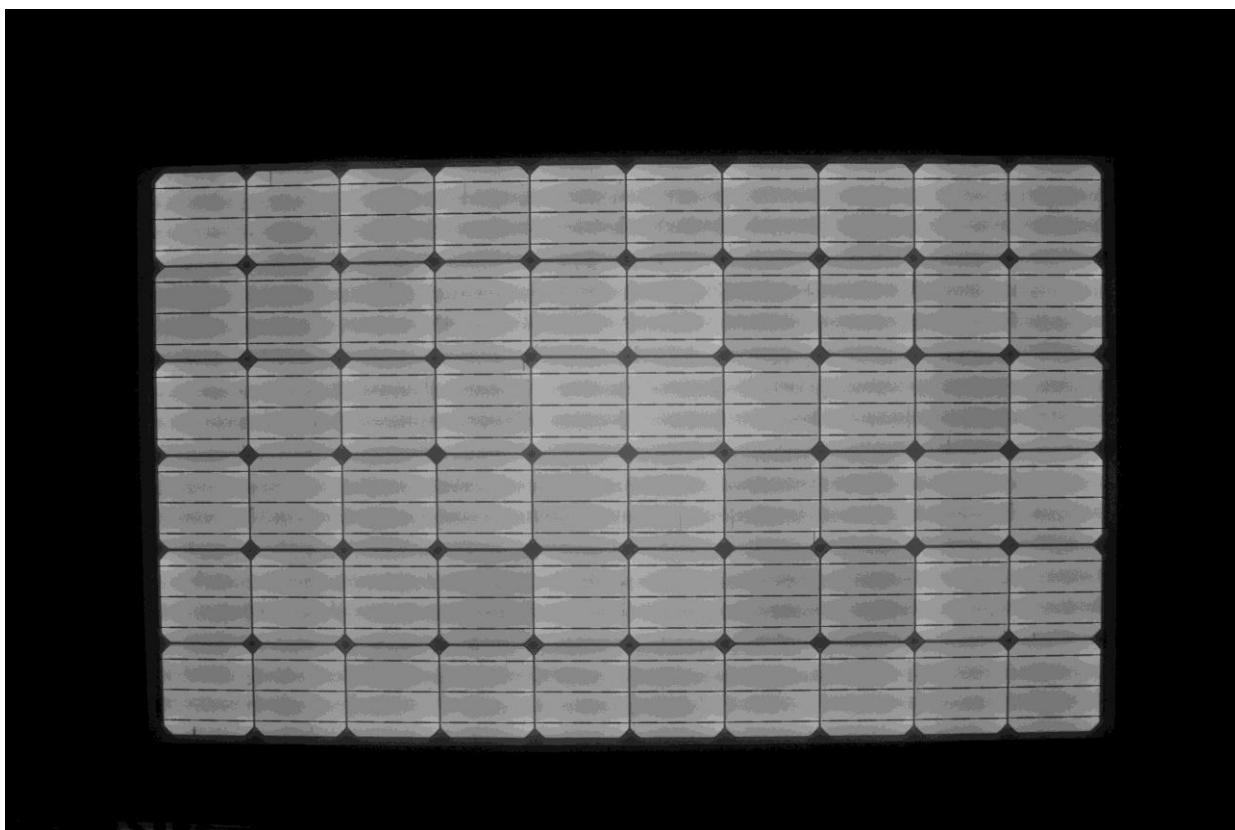
10.1	<b>TABLE: Visual inspection (final)</b>		P
Test Date [MM/DD/YYYY].....:		11/17/2013	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
GDP13430 1/3	No major visual defects		P
GDP13430 2/3	No major visual defects		P
GDP13430 3/3	No major visual defects		P
GDP13430 1/3	No major visual defects		P
GDP13429 2/3	No major visual defects		P
GDP13429 3/3	No major visual defects		P
Supplementary information:N/A			

10.3	<b>Table: Insulation test (final)</b>				P
Test Date [YYYY-MM-DD] .....		11/17/2013		—	
Test Voltage applied [V] .....		3000/1000		—	
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
GDP13430 1/3	>5000	24.39	No dielectric breakdown	x	P
GDP13430 2/3	>5000	24.39	No dielectric breakdown	x	P
GDP13430 3/3	>5000	24.39	No dielectric breakdown	x	P
GDP13430 1/3	>5000	24.39	No dielectric breakdown	x	P
GDP13429 2/3	>5000	24.39	No dielectric breakdown	x	P
GDP13429 3/3	>5000	24.39	No dielectric breakdown	x	P
Supplementary information: Size of module [m <sup>2</sup> ]: 1.64, The maximum resistance measurement range is 5000 MΩ.					

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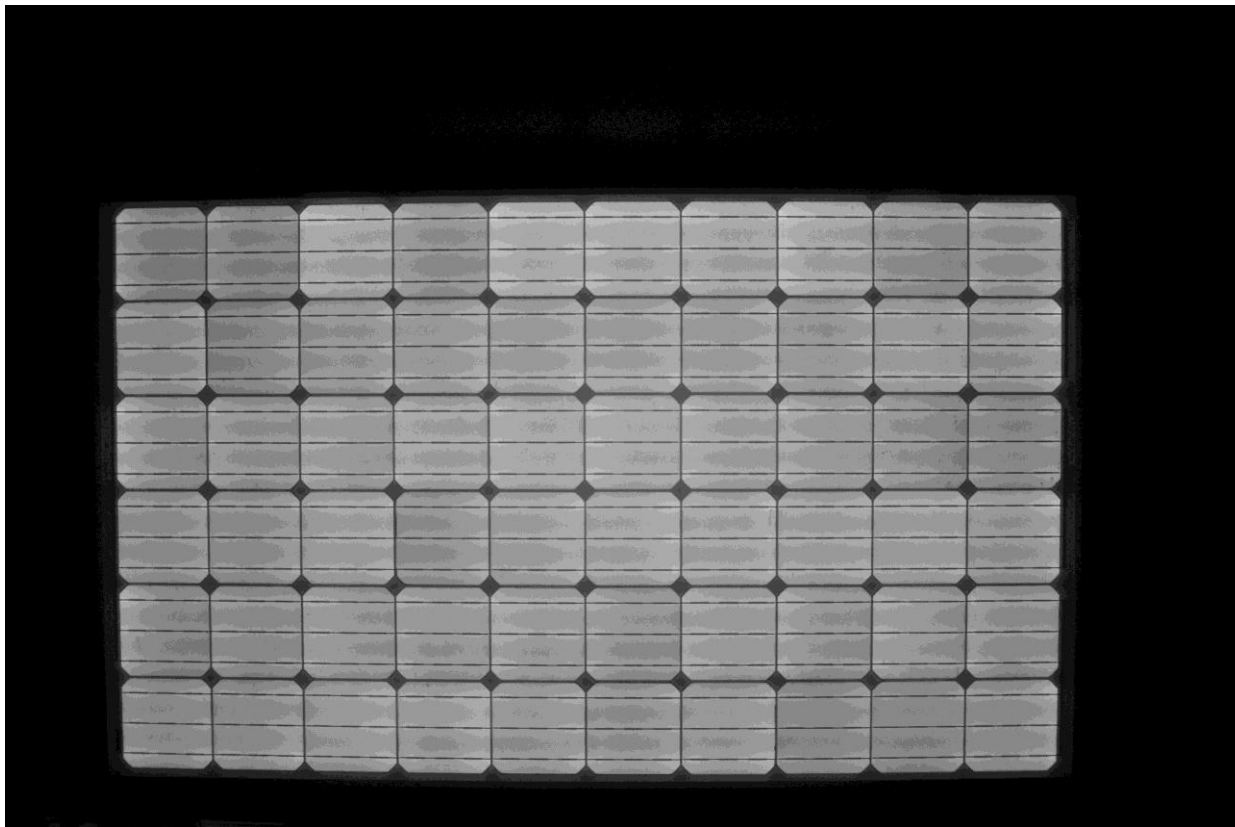
**Photos of samples:**EL test photos after Damp heat test applied with voltage stress.

GDP13430 2/3





GDP13430 3/3



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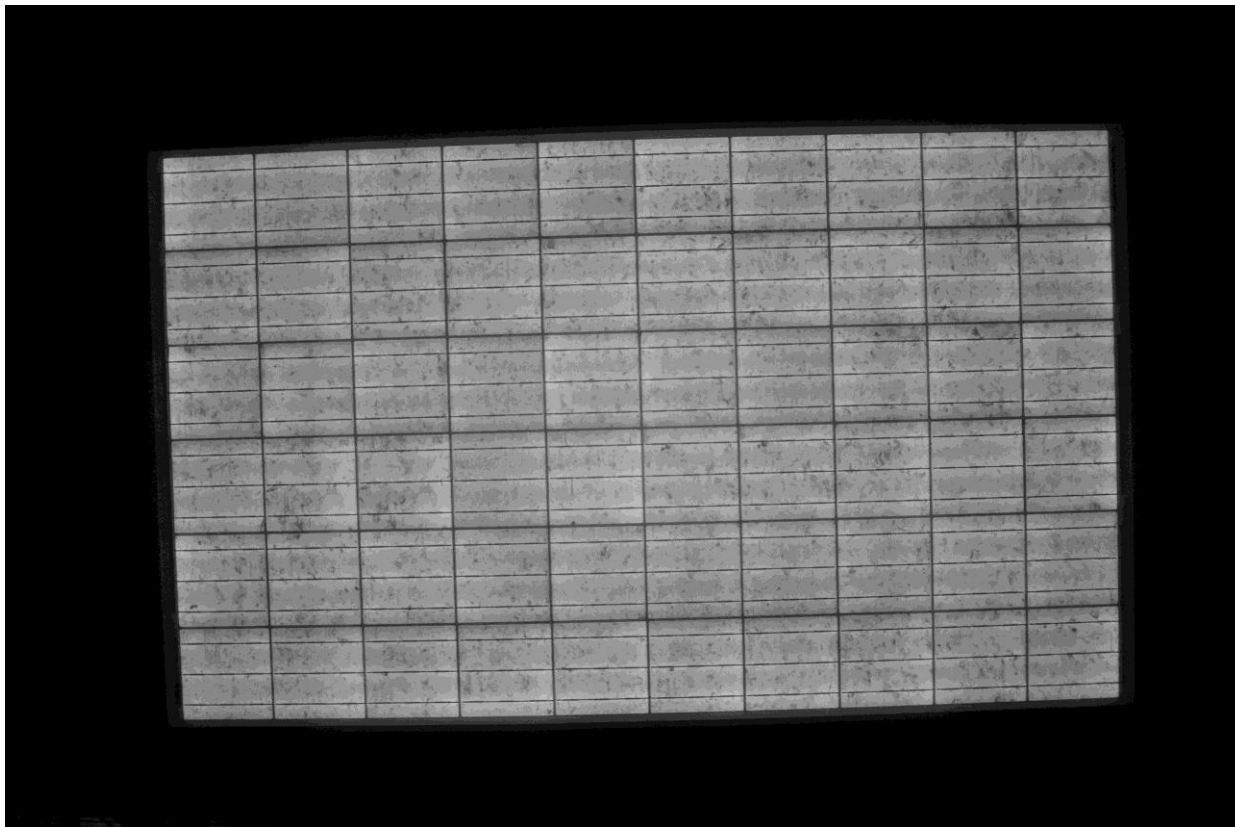
<http://www.tuv-sud.cn>

Jiangsu TÜV Product Service Ltd.  
Shanghai branch  
TÜV SÜD Group

No. 88 Heng Tong Road  
Shanghai 200070  
P. R. China



GDP13429 2/3



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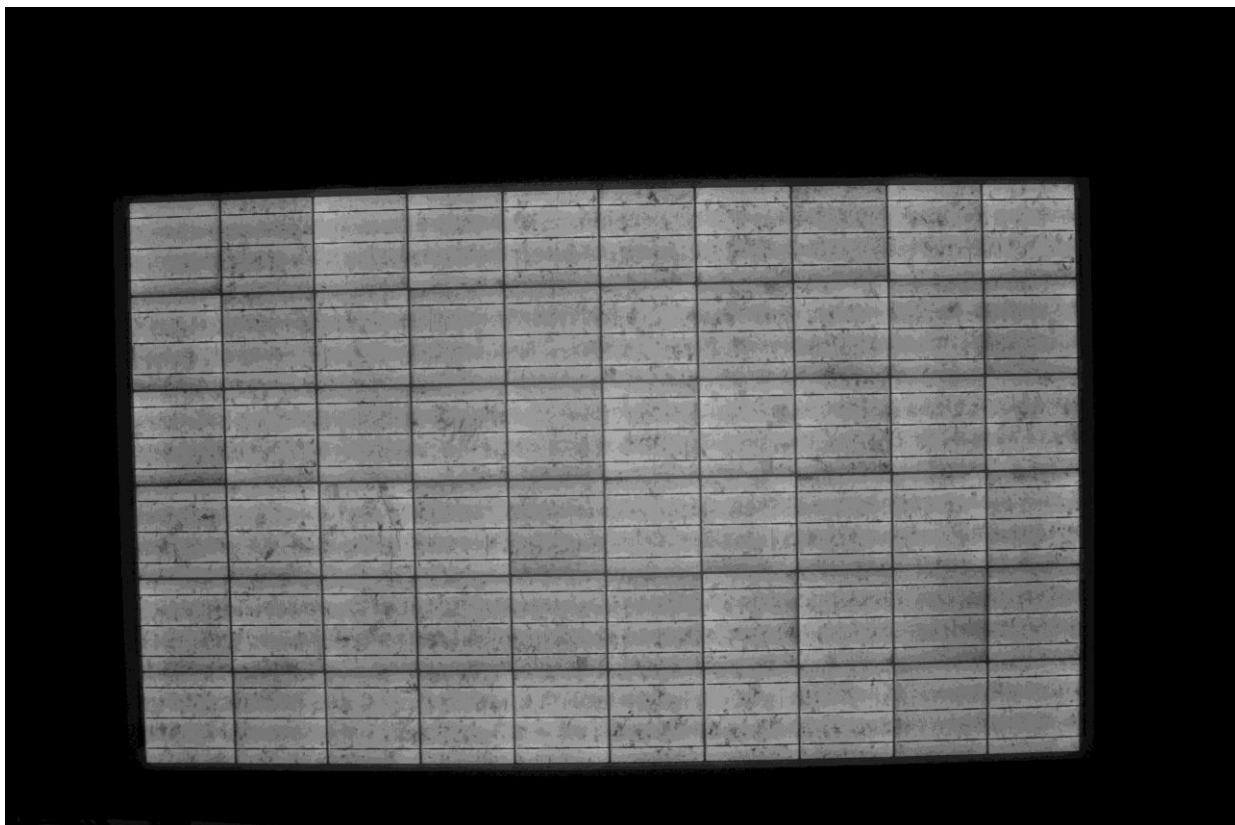
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Shanghai 200070  
P. R. China





#### 4 Remark

##### 4.1 Remarks to Factory

The assembly of the product has to comply with the documentation (Part 1.3 BOM list). Before the implementation of safety relevant modifications to the product into the ongoing production the product must be retested for acceptance. The results must be implemented to the documentation.

#### 5 Documentation

N/A





## 6 Summary

The test specifications are met.

Jiangsu TÜV Product Service Ltd. Shanghai Branch  
TÜV SÜD Group

Engineer:

Huang Gang  
Gang Huang  
Project Handler

Technical Report checked:

Xiangxi Bo  
Xiangxi Bo  
Designated Reviewer