

**Test Report**  
**No. 492010421.001**

**Photovoltaic Module Qualification**  
**according to IEC/EN 61215,**  
**IEC/EN 61730-1, IEC/EN 61730-2**

Applicant: **Perlight Solar Co., Ltd.**  
Oufeng Road, Muyu Administration Area, Zeguo Town, Wenling City  
Zhejiang Province, 317521, P.R. China

File No.: SHV04017/13-04

Designed: 17 June 2013 by: Roger Ligo

Reviewed: 17.06.2013 by: Shumei Wei

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# Test Report



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Test Report No.: 492010421.001

Applicant..... :	<b>Perlight Solar Co., Ltd.</b> Oufeng Road, Muyu Administration Area, Zeguo Town Wenling City, Zhejiang Province, 317521, P.R. China
Manufacturer ..... :	<b>Perlight Solar Co., Ltd.</b> Oufeng Road, Muyu Administration Area, Zeguo Town Wenling City, Zhejiang Province, 317521, P.R. China
Order No. .... :	QT-SHV04017/13, QT-SHV05024/13
Date of Application ..... :	04/23/2013
Product ..... :	Crystalline Silicon Photovoltaic Modules
Module type(s)..... :	<p><b>PV Modules with 6" Mono-crystalline Silicon Solar Cells:</b>                      72 cells: PLM-***M-72 (***) = 245-320, in increment of 5)                      72 cells: PLM-***MB-72 (***) = 245-320, in increment of 5)                      60 cells: PLM-***M-60 (***) = 220-270, in increment of 5)                      60 cells: PLM-***MB-60 (***) = 220-270, in increment of 5)                      54 cells: PLM-***M-54 (***) = 185-240, in increment of 5)                      54 cells: PLM-***MB-54 (***) = 185-240, in increment of 5)</p> <p><b>PV Modules with 5" Mono-crystalline Silicon Solar Cells:</b>                      96 cells: PLM-***M-96 (***)= 230-280, in increment of 5)                      96 cells: PLM-***MB-96 (***)= 230-280, in increment of 5)                      72 cells: PLM-***M-72 (***)= 160-210, in increment of 5)                      72 cells: PLM-***MB-72 (***)= 160-210, in increment of 5)                      36 cells: PLM-***M-36 (***) = 80-105, in increment of 5)                      36 cells: PLM-***MB-36 (***) = 80-105, in increment of 5)</p> <p><b>PV Modules with 6" Poly-crystalline Silicon Solar Cells:</b>                      72 cells: PLM-***P-72 (***) = 235-320, in increment of 5)                      60 cells: PLM-***P-60 (***) = 195-265, in increment of 5)                      60 cells: PLM-P*** (***)=200-240, in increment of 10)                      54 cells: PLM-***P-54 (***) = 180-240, in increment of 5)                      "B" means with black backsheet.</p>
General Information	
<ul style="list-style-type: none"> <li>• Maximum System Voltage.... :</li> <li>• Application Class..... :</li> <li>• Electrical Protection Class.... :</li> </ul>	DC 1000V Class A Class II
Type of examination .....	Conformity testing with TÜV mark
Testing Period .....	05/20/2013 - 06/05/2013
Testing Laboratory..... :	<b>CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.</b> Electronic Testing Building, Shahe Road, Xili Town, Nanshan District Shenzhen City, Guangdong Province, 518055, P.R. China

Test results listed in this test report refer exclusively to the mentioned test sample.

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The submitted test samples as described in the reports hereunder are in compliance with the requirements: IEC / EN 61215: 2005 "Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval"

# Test Report



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IEC 61730-1:2004 / EN 61730-1:2007 "Photovoltaic (PV) module safety qualification. Part 1: Requirements for construction"

IEC 61730-2:2004 / EN 61730-2:2007 "Photovoltaic (PV) module safety qualification. Part 2: Requirements for testing"

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<b>History of certification</b>	
File no. .... :	N/A
Certificate no. ... :	PV 60026425, PV 60027335
Date of issue.... :	05/24/2013
Report no. .... :	15032567.001~010
Module type(s) :	<p><b>PV Modules with 6" Mono-crystalline Silicon Solar Cells:</b>                      72 cells: PLM-***M-72 (** = 245-320, in increment of 5)                      72 cells: PLM-***MB-72 (** = 245-320, in increment of 5)                      60 cells: PLM-***M-60 (** = 220-270, in increment of 5)                      60 cells: PLM-***MB-60 (** = 220-270, in increment of 5)                      54 cells: PLM-***M-54 (** = 185-240, in increment of 5)                      54 cells: PLM-***MB-54 (** = 185-240, in increment of 5)</p> <p><b>PV Modules with 5" Mono-crystalline Silicon Solar Cells:</b>                      96 cells: PLM-***M-96 (** = 230-280, in increment of 5)                      96 cells: PLM-***MB-96 (** = 230-280, in increment of 5)                      72 cells: PLM-***M-72 (** = 160-210, in increment of 5)                      72 cells: PLM-***MB-72 (** = 160-210, in increment of 5)                      36 cells: PLM-***M-36 (** = 80-105, in increment of 5)                      36 cells: PLM-***MB-36 (** = 80-105, in increment of 5)</p> <p><b>PV Modules with 6" Poly-crystalline Silicon Solar Cells:</b>                      72 cells: PLM-***P-72 (** = 235-320, in increment of 5)                      60 cells: PLM-***P-60 (** = 195-265, in increment of 5)                      60 cells: PLM-P*** (** = 200-240, in increment of 10)                      54 cells: PLM-***P-54 (** = 180-240, in increment of 5)</p> <p>"B" means with black backsheet.</p>
Description:..... :	Basic certification by TÜV Rheinland.
Supplementary information: N/A	

## Summary of testing

According to the enquiry of the applicant, based on certificates and test reports issued by TÜV Rheinland, add fire test. Meanwhile, extend to 40mm for 72Pcs PV module and four sets of junction box.

Module type PLM-290M-72 and PLM-290MB-72 were submitted as representative samples and conducted fire test. The fire test Class C was only performed on the following materials combination:

For module type PLM-290M-72, combination of raw materials as declared by the manufacturer is:

Glass: CSG (4.0mm) + EVA: First PV (F806) + Backsheet: Coveme (dyMat@PYE, white color) + Frame Adhesive: TONSAN (1527-65, white color).

For module type PLM-290MB-72, combination of raw materials as declared by the manufacturer is:

Glass: CSG (4.0mm) + EVA: First PV(F806) + Backsheet: Coveme (dyMat@BK PYE, black color) + Frame Adhesive: TONSAN (1527-65, black color).

Module type PLM-280M-72 with 40mm frame thickness was submitted as representative samples and conducted mechanical load test.

Detailed information of four sets of junction boxes are listed as combination C, combination D, combination M and combination N in the CDF in Annex 1.

All tests were successfully completed. Therefore, from the result of testing and factory inspection, it is recommended that certification should be granted.

As required by applicant, the address was changed. Please refer to declaration in Annex 4 for details.

**Detailed product information are to be found in the CDF (constructional data form) in Annex 1 of this report.**

# Test Report



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## General remarks

<b>Test item particulars:</b>	
Accessories and detachable parts included in the evaluation .....	N/A
Options included.....	N/A
<b>Abbreviations used in the report:</b>	
HF - Humidity Freeze	TC - Temperature Cycling
DH - Damp Heat	Vmpp - Maximum power voltage
Impp - Maximum power current	Voc - Open circuit voltage
Isc - Short circuit current	FF - Fill factor
Pmpp - Maximum power	$\alpha$ - Current temperature coefficient
NOCT - Nominal Operating Cell Temperature	$\beta$ - Voltage temperature coefficient
STC - Standard Test Conditions	$\gamma$ - power temperature coefficient
CTI - Comparative Tracking Index	PD - Partial Discharge
<b>Possible test case verdicts:</b>	
Test case does not apply to the test object.....	Not Applicable (N/A)
Test object does meet the requirement.....	Pass (P)
Test object does not meet the requirement.....	Fail (F)
<b>Other remarks:</b>	
<p>The test verdicts presented in this report relate only to the object tested.                      This report shall not be reproduced, except in full, with the written approval of the issuing testing laboratory.</p> <p>“(see Annex #)” refers to additional information appended to the report.                      “(see Table #)” refers to a table appended to the report.</p> <p>Throughout this report a point is used as the decimal separator</p>	



# Test Report



File No.: SHV04017/13-04

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## General product information

### Module type: PLM-290M-72

<b>Product Electrical Ratings at STC:</b>	
Nominal maximum power (Pmax) [W].....:	290
Nominal open circuit voltage at (Voc) [V].....:	45.33
Nominal maximum power voltage (Vmpp) [V].....:	35.99
Nominal short circuit current at (Isc) [A].....:	8.67
Nominal maximum power current (Impp) [A].....:	8.06
<b>Product Safety Ratings:</b>	
Maximum system voltage [V].....:	1000
Fuse rating [A].....:	15
Application Class.....:	Class A
Safety class in accordance with IEC 61140.....:	Class II
Fire safety Class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

### Module type: PLM-290MB-72

<b>Product Electrical Ratings at STC:</b>	
Nominal maximum power (Pmax) [W].....:	290
Nominal open circuit voltage at (Voc) [V].....:	45.33
Nominal maximum power voltage (Vmpp) [V].....:	35.99
Nominal short circuit current at (Isc) [A].....:	8.67
Nominal maximum power current (Impp) [A].....:	8.06
<b>Product Safety Ratings:</b>	
Maximum system voltage [V].....:	1000
Fuse rating [A].....:	15
Application Class.....:	Class A
Safety class in accordance with IEC 61140.....:	Class II
Fire safety Class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

# Test Report



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## **Module type: PLM-280M-72**

<b>Product Electrical Ratings at STC:</b>	
Nominal maximum power (Pmax) [W].....:	280
Nominal open circuit voltage at (Voc) [V].....:	45.20
Nominal maximum power voltage (Vmpp) [V].....:	35.05
Nominal short circuit current at (Isc) [A].....:	8.55
Nominal maximum power current (Impp) [A].....:	7.99
<b>Product Safety Ratings:</b>	
Maximum system voltage [V].....:	1000
Fuse rating [A].....:	15
Application Class.....:	Class A
Safety class in accordance with IEC 61140.....:	Class II
Fire safety Class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

## Testing procedure

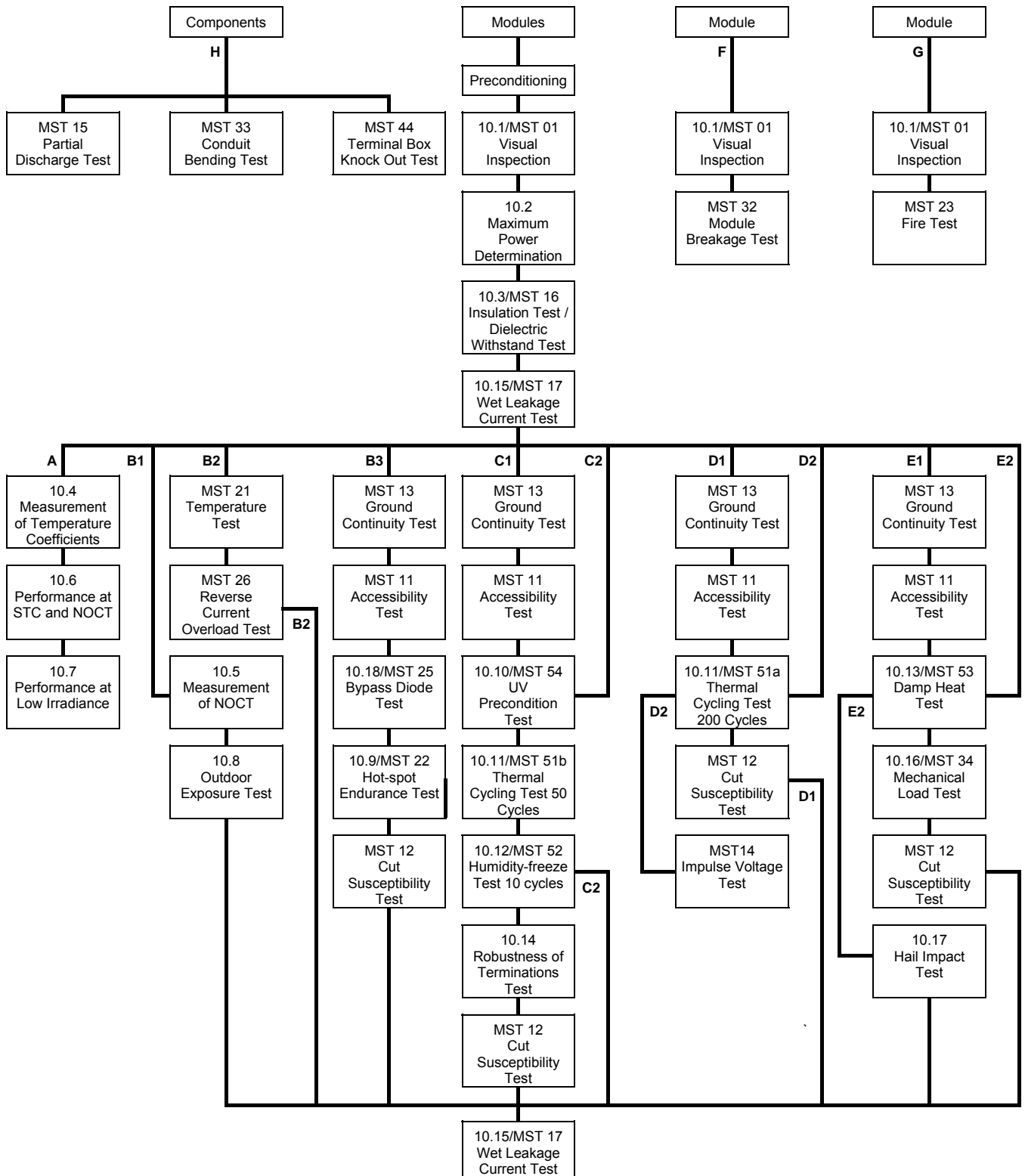
### **Module type: PLM-290M-72 & PLM-290MB-72**

<input type="checkbox"/>	Random sampling from production
<input checked="" type="checkbox"/>	Prototype submitted by client
<input type="checkbox"/>	New module type
<input checked="" type="checkbox"/>	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
<input type="checkbox"/>	Change in cell technology
<input type="checkbox"/>	Modification to encapsulation system
<input type="checkbox"/>	Modification to superstrate
<input type="checkbox"/>	Increase in module size
<input type="checkbox"/>	Modification to backsheet/ substrate
<input type="checkbox"/>	Modification to frame and/ or mounting structure
<input type="checkbox"/>	Modification to junction box/ electrical termination
<input type="checkbox"/>	Change in cell interconnect materials or technique
<input type="checkbox"/>	Change in electrical circuit of an identical package
<input type="checkbox"/>	Higher or lower power output (by 10%) in the identical package including size and using the identical cell process
<input type="checkbox"/>	Qualification of a frameless module after the design has received certification as a framed module
<input type="checkbox"/>	Change in bypass diode or number of diodes
<input checked="" type="checkbox"/>	Others
Description of similarity (differences) between the applied model and the previously tested model:	
- Add fire test	

**Module type: PLM-280M-72**

<input type="checkbox"/>	Random sampling from production
<input checked="" type="checkbox"/>	Prototype submitted by client
<input type="checkbox"/>	New module type
<input checked="" type="checkbox"/>	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
<input type="checkbox"/>	Change in cell technology
<input type="checkbox"/>	Modification to encapsulation system
<input type="checkbox"/>	Modification to superstrate
<input type="checkbox"/>	Increase in module size
<input type="checkbox"/>	Modification to backsheet/ substrate
<input checked="" type="checkbox"/>	Modification to frame and/ or mounting structure
<input checked="" type="checkbox"/>	Modification to junction box/ electrical termination
<input type="checkbox"/>	Change in cell interconnect materials or technique
<input type="checkbox"/>	Change in electrical circuit of an identical package
<input type="checkbox"/>	Higher or lower power output (by 10%) in the identical package including size and using the identical cell process
<input type="checkbox"/>	Qualification of a frameless module after the design has received certification as a framed module
<input type="checkbox"/>	Change in bypass diode or number of diodes
<input type="checkbox"/>	Others
<p>Description of similarity (differences) between the applied model and the previously tested model:</p> <ul style="list-style-type: none"> <li>- Extend to 40mm frame thickness, manufacturer: Changzhou Runli Aluminum Alloy Section Co., Ltd</li> <li>- Extend to four sets of junction box.</li> </ul>	

## TEST SEQUENCE



# Test Report



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## Module group assignment

### Module type: PLM-290M-72

Sample #	Group ID	Sample SN	Dimension (l x w x h) [mm]	Remark
1	A	8076771309800001	1966 x 992 x 50	REF
2	G	8076771309800003	1966 x 992 x 50	Spread of fire
3	G	8076771309800004	1966 x 992 x 50	Spread of fire
4	G	8076771309800002	1966 x 992 x 50	Burning brand

### Module type: PLM-290MB-72

Sample #	Group ID	Sample SN	Dimension (l x w x h) [mm]	Remark
5	A	8076771309800005	1966 x 992 x 50	REF
6	G	8076771309800007	1966 x 992 x 50	Spread of fire
7	G	8076771309800006	1966 x 992 x 50	Spread of fire
8	G	8076771309800008	1966 x 992 x 50	Burning brand

### Module type: PLM-280M-72

Sample #	Group ID	Sample SN	Dimension (l x w x h) [mm]	Remark
9	A	8076771313500004	1966 x 992 x 40	REF
10	E1	8076771313500005	1966 x 992 x 40	ML

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Clause	Requirement + Test	Result - Remark	Verdict
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## Test result overview

<b>4</b>	<b>Marking</b>	-	<b>P</b>
-	Name, monogram or symbol of manufacturer ...	Printed on nameplate	P
-	Type or model number .....	Printed on nameplate	P
-	Serial number .....	Attached separately beside the string connectors	P
-	Polarity of terminals or leads .....	Marked with color	P
-	Maximum system voltage .....	1000VDC	P
-	The date and place of manufacture.....	Traceable from serial number	P

-	<b>Initial examination</b>	<b>All modules</b>	<b>P</b>
10	Preconditioning.....	Performed by manufacturer	N/A
10.1 / MST 01	Visual inspection .....	See table 10.1	P
10.2	Maximum power determination .....	See table 10.2	P
10.3 / MST 16	Insulation test / Dielectric withstand test .....	See table 10.3	P
10.15 / MST 17	Wet leakage current test .....	See table 10.15	P

## Module type: PLM-290M-72

<b>Group A</b>	<b>1 Module</b>	<b>See Group ID A</b>	<b>P</b>
10.4	Measurement of temperature coefficients.....	N/A	-
10.6	Performance at STC and NOCT .....	N/A	-
10.7	Performance at low irradiance .....	N/A	-

<b>Group G</b>	<b>3 Modules</b>	<b>Sample Group ID G</b>	<b>P</b>
MST 23	Fire test.....	See table MST23	P

## Module type: PLM-290MB-72

<b>Group A</b>	<b>1 Module</b>	<b>See Group ID A</b>	<b>P</b>
10.4	Measurement of temperature coefficients.....	N/A	-
10.6	Performance at STC and NOCT .....	N/A	-
10.7	Performance at low irradiance .....	N/A	-

<b>Group G</b>	<b>3 Modules</b>	<b>Sample Group ID G</b>	<b>P</b>
MST 23	Fire test.....	See table MST23	P

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Clause	Requirement + Test	Result - Remark	Verdict
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**Module type: PLM-280M-72**

<b>Group A</b>	<b>1 Module</b>	<b>See Group ID A</b>	<b>P</b>
10.4	Measurement of temperature coefficients..... :	N/A	-
10.6	Performance at STC and NOCT ..... :	N/A	-
10.7	Performance at low irradiance ..... :	N/A	-

<b>Group E1</b>	<b>1 Module</b>	<b>Sample Group ID E1</b>	<b>P</b>
MST 13	Ground continuity test ..... :	N/A	N/A
MST 11	Accessibility test ..... :	N/A	N/A
10.13 / MST 53	Damp heat test ..... :	N/A	N/A
10.16	Mechanical load test (2400Pa)..... :	See table 10.16E	P
MST 12	Cut susceptibility test..... :	N/A	N/A

-	<b>Final measurements</b>	<b>All modules</b>	<b>P</b>
10.15 / MST 17	Wet leakage current test ..... :	See table 10.15F	P



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IEC / EN 61215			
Clause	Requirement + Test	Result - Remark	Verdict

**Test results of IEC / EN 61215**

**Module type: PLM-290M-72**

10.1 Visual inspection (initial)			-
Test date [MM/DD/YYYY].....:		05/21/2013	-
Sample #	Nature and position of initial findings – comments or attach photos		-
1	No visual defects		P
2	No visual defects		P
3	No visual defects		P
4	No visual defects		P
Supplementary information: N/A			-

**Module type: PLM-290MB-72**

10.1 Visual inspection (initial)			-
Test date [MM/DD/YYYY].....:		05/21/2013	-
Sample #	Nature and position of initial findings – comments or attach photos		-
5	No visual defects		P
6	No visual defects		P
7	No visual defects		P
8	No visual defects		P
Supplementary information: N/A			-

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Test Report No.: 492010421.001

IEC / EN 61215			
Clause	Requirement + Test	Result - Remark	Verdict

**Module type: PLM-280M-72**

10.1 Visual inspection (initial)			-
Test date [MM/DD/YYYY].....:		06/04/2013	-
Sample #	Nature and position of initial findings – comments or attach photos		-
9	No visual defects		P
10	No visual defects		P
Supplementary information: N/A			-

10.2 Maximum power determination (initial)							-
Test date [MM/DD/YYYY].....:		06/04/2013					-
Module temperature [°C] .....		Corrected to 25					-
Irradiance [W/m <sup>2</sup> ].....:		Corrected to 1000					-
Sample #	Voc [V]	Vmpp [V]	Isc [A]	Impp [A]	Pmpp [W]	FF [%]	-
9	44.80	35.63	8.79	8.16	290.6	73.83	-
10	44.83	35.71	8.70	8.17	291.6	74.77	-
Supplementary information: N/A							-

10.3 Insulation test (initial)				-
Test date [MM/DD/YYYY].....:		06/04/2013		-
Test voltage applied [V].....:		2 minutes of 1000 and 1 minute of 6000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
9	20.5	7815	No	P
10	20.5	6025	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m <sup>2</sup> . Area of the module is 1.95m <sup>2</sup> .				-

10.15 Wet leakage current test (Initial)			-	
Test date [MM/DD/YYYY].....:		06/04/2013		-
Test voltage applied [V].....:		2 minutes of 1000		-
Solution resistivity [Ω·cm] / <3500 .....		1020		P
Solution temperature [°C] / 22±3 .....		24		P
Sample #	Required [MΩ]	Measured [MΩ]		-
9	20.5	333		P
10	20.5	323		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m <sup>2</sup> . Area of the module is 1.95m <sup>2</sup> .				-

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IEC / EN 61215			
Clause	Requirement + Test	Result - Remark	Verdict

**Module type: PLM-280M-72**

10.16E Mechanical load test							-
Test date [MM/DD/YYYY] .....		06/05/2013					-
Sample # .....		10					-
Mounting method .....		8 M8 checked					-
Load applied to .....		Front side		Back side			-
Mechanical load at 1 <sup>st</sup> cycle [Pa] .....		2400		2400			-
Open circuit? .....		No		No			P
Mechanical load at 2 <sup>nd</sup> cycle [Pa] .....		2400		2400			-
Open circuit? .....		No		No			P
Mechanical load at 3 <sup>rd</sup> cycle [Pa] .....		2400		2400			-
Open circuit? .....		No		No			P
Supplementary information: N/A							-
10.1 Visual inspection after mechanical load test							-
Test date [MM/DD/YYYY] .....		06/05/2013					-
Sample #	Nature and position of initial findings – comments or attach photos						-
10	No visual defects						P
Supplementary information: N/A							-
10.2 Maximum power determination after mechanical load test							-
Test date [MM/DD/YYYY] .....		06/05/2013					-
Module temperature [°C] .....		Corrected to 25					-
Irradiance [W/m <sup>2</sup> ] .....		Corrected to 1000					-
Sample #	Voc [V]	Vmpp [V]	Isc [A]	Impp [A]	Pmpp [W]	FF [%]	-
10	44.81	35.51	8.74	8.18	290.5	74.21	-
Pmpp degradation after test [%] / ≤5..:		-0.38					P
Supplementary information: N/A							-
10.3 Insulation test after mechanical load test							-
Test date [MM/DD/YYYY] .....		06/05/2013					-
Test voltage applied [V] .....		2 minutes of 1000 and 1 minute of 6000					-
Sample #	Required [MΩ]	Measured [MΩ]		Dielectric breakdown?			-
10	20.5	5559		No			P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m <sup>2</sup> . Area of the module is 1.95m <sup>2</sup> .							-

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

IEC / EN 61215				
Clause	Requirement + Test	Result - Remark		Verdict
<b>10.2F Maximum power determination (final)</b>				-
Sample #	Pmpp initial [W]	Pmpp final [W]	Pmpp degradation after test sequence [%] / ≤8	
10	291.6	290.5	-0.38	P
Supplementary information: N/A				-

<b>10.15F Wet leakage current test (final)</b>				-
Test voltage applied [V] .....		2 minutes of 1000		-
Sample #	Required [MΩ]	Measured [MΩ]		
10	20.5	429		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m <sup>2</sup> . Area of the module is 1.95m <sup>2</sup> .				-

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

IEC / EN 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict

### Test results of IEC / EN 61730-1

<b>3 Application Class</b>			<b>P</b>
-	The module(s) has/have been evaluated for the following application class (Class A, B, C)	Class A	P
Supplementary information: Since there're no construction changes of the products in this project, this part is considered as passed. Please refer to test report no. 15032567.002, 15032567.004, 15032567.006, 15032567.008 issued by TÜV Rheinland for details.			-

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

## Test results of IEC / EN 61730-2

### Module type: PLM-290M-72

<b>MST23 Fire test</b>			-
Module fire resistance class .....		Class C	-
Number of modules provided to create the test assembly.....		3	-
Sample #	Spread of flame test		-
2, 3	<input checked="" type="checkbox"/> The module complies with the requirements for the fire resistance class C		P
Sample #	Burning brand test		-
4	<input checked="" type="checkbox"/> The module complies with the requirements for the fire resistance class C		P
Supplementary information: Please refer to Annex 5 for detailed pictures of the samples after test.			-

### Module type: PLM-290MB-72

<b>MST23 Fire test</b>			-
Module fire resistance class .....		Class C	-
Number of modules provided to create the test assembly.....		3	-
Sample #	Spread of flame test		-
6, 7	<input checked="" type="checkbox"/> The module complies with the requirements for the fire resistance class C		P
Sample #	Burning brand test		-
8	<input checked="" type="checkbox"/> The module complies with the requirements for the fire resistance class C		P
Supplementary information: Please refer to Annex 5 for detailed pictures of the samples after test.			-

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

## Annex 1: Constructional Data Form (CDF)



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

### CDF (Constructional Data Form) for Electrical Products

Applicant.....	<b>Perlight Solar Co., Ltd.</b> Oufeng Road, Muyu Administration Area, Zeguo Town Wenling City, Zhejiang Province, 317521, P.R. China
Manufacturer.....	<b>Perlight Solar Co., Ltd.</b> Oufeng Road, Muyu Administration Area, Zeguo Town Wenling City, Zhejiang Province, 317521, P.R. China
Product.....	Crystalline Silicon Photovoltaic Modules
Module type(s).....	<b>PV Modules with 6" Mono-crystalline Silicon Solar Cells:</b> 72 cells: PLM-***M-72 (*** = 245-320, in increment of 5) 72 cells: PLM-***MB-72 (*** = 245-320, in increment of 5) 60 cells: PLM-***M-60 (*** = 220-270, in increment of 5) 60 cells: PLM-***MB-60 (*** = 220-270, in increment of 5) 54 cells: PLM-***M-54 (*** = 185-240, in increment of 5) 54 cells: PLM-***MB-54 (*** = 185-240, in increment of 5) <b>PV Modules with 5" Mono-crystalline Silicon Solar Cells:</b> 96 cells: PLM-***M-96 (*** = 230-280, in increment of 5) 96 cells: PLM-***MB-96 (*** = 230-280, in increment of 5) 72 cells: PLM-***M-72 (*** = 160-210, in increment of 5) 72 cells: PLM-***MB-72 (*** = 160-210, in increment of 5) 36 cells: PLM-***M-36 (*** = 80-105, in increment of 5) 36 cells: PLM-***MB-36 (*** = 80-105, in increment of 5) <b>PV Modules with 6" Poly-crystalline Silicon Solar Cells:</b> 72 cells: PLM-***P-72 (*** = 235-320, in increment of 5) 60 cells: PLM-***P-60 (*** = 195-265, in increment of 5) 60 cells: PLM-P*** (***=200-240, in increment of 10) 54 cells: PLM-***P-54 (*** = 180-240, in increment of 5) "B" means with black backsheet.

#### Electrical ratings:

Module type.....	72 cells: PLM-***M-72 (*** = 245-320, in increment of 5) 72 cells: PLM-***MB-72 (*** = 245-320, in increment of 5)		
Rated Pmpp [W].....	245,250,255,260,265,270,275,280,285,290,295,300,305,310,315,320		
Rated Voc [V].....	44,70, 44,79, 44,86, 44,91, 44,99, 45,04, 45,14, 45,20, 45,29, 45,33, 45,50, 45,60, 45,70, 45,81, 45,91, 46,01		
Rated Isc [A].....	8,13, 8,19, 8,24, 8,30, 8,39, 8,47, 8,52, 8,55, 8,62, 8,67, 8,70, 8,78, 8,82, 8,87, 8,94,8,97		
Tolerance [%].....	±5	Dimensions [mm] / l x w x h.....	1966 x 992 x 40 1966 x 992 x 46 1966 x 992 x 50
Maximum system voltage [V].....	1000	Fuse rating [A].....	15
Application class.....	Class A	Safety class acc. to IEC 61140...	Class II
Min-creepage distance [mm].....	17.5	Rated mechanical load [Pa].....	2400

Confirmation of the applicant  
Wenling 2013.6.17 (Place and date)

Confirmation of TÜV NORD CERT  
Shanghai, 17 June 2013 (Place and date)

(Applicant's legally authorized signature and stamp)

(Signature of authorized TÜV NORD CERT engineer)



# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Module type .....	60 cells: PLM-***M-60 (** = 220-270, in increment of 5) 60 cells: PLM-***MB-60 (** = 220-270, in increment of 5)		
Rated Pmpp [W] .....	220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270		
Rated Voc [V] .....	37.47, 37.53, 37.64, 37.70, 37.77, 37.86, 38.00, 38.10, 38.20, 38.31, 38.42		
Rated Isc [A] .....	8.37, 8.47, 8.52, 8.59, 8.64, 8.70, 8.78, 8.84, 8.92, 8.96, 8.99		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1650 x 992 x 40 1650 x 992 x 46 1640 x 992 x 40 1640 x 992 x 46 1650 x 992 x 50
Maximum system voltage [V] .....	1000	Fuse rating [A] .....	15
Application class .....	Class A	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	17.5	Rated mechanical load [Pa] .....	2400

Module type .....	54 cells: PLM-***M-54 (** = 185-240, in increment of 5) 54 cells: PLM-***MB-54 (** = 185-240, in increment of 5)		
Rated Pmpp [W] .....	185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240		
Rated Voc [V] .....	33.55, 33.63, 33.68, 33.74, 33.82, 33.89, 33.99, 34.05, 34.20, 34.30, 34.40, 34.51		
Rated Isc [A] .....	8.15, 8.22, 8.30, 8.38, 8.47, 8.56, 8.62, 8.68, 8.77, 8.85, 8.93, 8.97		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1494 x 992 x 40 1494 x 992 x 46 1494 x 992 x 50
Maximum system voltage [V] .....	1000	Fuse rating [A] .....	15
Application class .....	Class A	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	17.5	Rated mechanical load [Pa] .....	2400

Module type .....	96 cells: PLM-***M-96 (** = 230-280, in increment of 5) 96 cells: PLM-***MB-96 (** = 230-280, in increment of 5)		
Rated Pmpp [W] .....	230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280		
Rated Voc [V] .....	59.14, 59.34, 59.52, 59.68, 59.78, 60.19, 60.35, 60.58, 60.75, 60.87, 61.06		
Rated Isc [A] .....	5.37, 5.43, 5.47, 5.50, 5.53, 5.56, 5.62, 5.66, 5.68, 5.76, 5.81		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1580 x 1061 x 40 1580 x 1061 x 46 1580 x 1061 x 50
Maximum system voltage [V] .....	1000	Fuse rating [A] .....	15
Application class .....	Class A	Safety class acc. to IEC 61140 .....	Class II

Confirmation of the applicant,  
Wang (Place and date) 2013.6.17

Confirmation of TÜV NORD CERT  
Shanghai (Place and date) 17 June 2013

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# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Min-creepage distance [mm].....:	17.5	Rated mechanical load [Pa].....:	2400
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Module type .....	72 cells: PLM-***M-72 (***= 160-210, in increment of 5) 72 cells: PLM-***MB-72 (***= 160-210, in increment of 5)		
Rated Pmpp [W] .....	160,165,170, 175, 180, 185, 190, 195, 200, 205, 210		
Rated Voc [V] .....	43.87, 44.06, 44.21, 44.49, 44.64, 44.89, 45.02, 45.26, 45.48, 45.65, 45.90		
Rated Isc [A] .....	5.08, 5.22, 5.31, 5.42, 5.47, 5.54, 5.56, 5.62, 5.66, 5.73, 5.81		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1580 x 808 x 40 1580 x 808 x 46 1580 x 808 x 50
Maximum system voltage [V].....:	1000	Fuse rating [A].....:	15
Application class .....	Class A	Safety class acc. to IEC 61140..:	Class II
Min-creepage distance [mm].....:	17.5	Rated mechanical load [Pa].....:	2400

Module type .....	36 cells: PLM-***M-36 (*** = 80-105, in increment of 5) 36 cells: PLM-***MB-36 (*** = 80-105, in increment of 5)		
Rated Pmpp [W] .....	80, 85, 90, 95, 100, 105		
Rated Voc [V] .....	21.94, 22.11, 22.32, 22.51, 22.74, 22.90		
Rated Isc [A] .....	5.08, 5.31, 5.47, 5.56, 5.66, 5.81		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1195 x 541 x 40 1195 x 541 x 46 1195 x 541 x 50
Maximum system voltage [V].....:	1000	Fuse rating [A].....:	15
Application class .....	Class A	Safety class acc. to IEC 61140..:	Class II
Min-creepage distance [mm].....:	17.5	Rated mechanical load [Pa].....:	2400

Module type .....	72 cells: PLM-***P-72 (*** = 235-320, in increment of 5)		
Rated Pmpp [W] .....	235,240,245,250,255,260,265,270,275,280,285,290,295,300,305,310,315,320		
Rated Voc [V] .....	43.07, 43.16, 43.30, 43.52,43.71, 43.85, 44.02, 44.14, 44.37, 44.57, 44.65, 44.84, 44.92, 45.10, 45.30, 45.47, 45.54, 45.65		
Rated Isc [A] .....	7.82, 7.89, 7.98, 8.06, 8.12, 8.21, 8.26, 8.29, 8.30, 8.33, 8.36, 8.38, 8.47, 8.49, 8.52, 8.60, 8.70, 8.82		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1966 x 992 x 40 1966 x 992 x 46 1966 x 992 x 50
Maximum system voltage [V].....:	1000	Fuse rating [A].....:	15

Confirmation of the applicant  
Wenling 2013.6.17 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai 17 June 2013 (Place and date)

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 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Application class .....	Class A	Safety class acc. to IEC 61140...	Class II
Min-creepage distance [mm].....	17.5	Rated mechanical load [Pa].....	2400

Module type .....	60 cells: PLM-***P-60 (** = 195-265, in increment of 5)		
Rated Pmpp [W] .....	195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265		
Rated Voc [V] .....	35.87, 35.97, 36.11, 36.29, 36.49, 36.62, 36.78, 37.00, 37.18, 37.35, 37.42, 37.58, 37.73, 37.92, 38.08		
Rated Isc [A] .....	7.81, 7.89, 7.99, 8.09, 8.13, 8.22, 8.29, 8.30, 8.34, 8.38, 8.45, 8.49, 8.52, 8.64, 8.76		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1650 x 992 x 40 1650 x 992 x 46 1650 x 992 x 50 1640 x 992 x 40 1640 x 992 x 46
Maximum system voltage [V].....	1000	Fuse rating [A].....	15
Application class .....	Class A	Safety class acc. to IEC 61140..	Class II
Min-creepage distance [mm].....	17.5	Rated mechanical load [Pa].....	2400

Module type .....	60 cells: PLM-P*** (**=200-240, in increment of 10)		
Rated Pmpp [W] .....	200, 210, 220, 230, 240		
Rated Voc [V] .....	36.0, 36.4, 36.8, 37.0, 37.5		
Rated Isc [A] .....	7.75, 7.86, 8.00, 8.18, 8.38		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1650 x 992 x 40 1650 x 992 x 46 1650 x 992 x 50
Maximum system voltage [V].....	1000	Fuse rating [A].....	15
Application class .....	Class A	Safety class acc. to IEC 61140..	Class II
Min-creepage distance [mm].....	17.5	Rated mechanical load [Pa].....	2400

Module type .....	54 cells: PLM-***P-54 (** = 180-240, in increment of 5)		
Rated Pmpp [W] .....	180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240		
Rated Voc [V] .....	32.50, 32.72, 32.89, 33.07, 33.26, 33.41, 33.59, 33.62, 33.81, 34.05, 34.13, 34.24		
Rated Isc [A] .....	8.00, 8.11, 8.21, 8.28, 8.30, 8.33, 8.38, 8.45, 8.48, 8.54, 8.67, 8.82		
Tolerance [%] .....	±5	Dimensions [mm] / l x w x h .....	1494 x 992 x 40 1494 x 992 x 46 1494 x 992 x 50
Maximum system voltage [V].....	1000	Fuse rating [A].....	15

Confirmation of the applicant  
Wang 2013.6.17 (Place and date)

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 Shanghai 1 June 2013 (Place and date)

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# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Application class .....	Class A	Safety class acc. to IEC 61140...	Class II
Min-creepage distance [mm] .....	17.5	Rated mechanical load [Pa] .....	2400

**Copy of marking plate:**



## PERLIGHT

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Solar Photovoltaic Module  
Model: **XXXXX**

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**Electrical Rating**  
at STC(1000W/m<sup>2</sup>, AM1.5 spectrum, Cell Temperature 25°C)

Maximum Power (Pmax)	XXX Wp ± 5%
Maximum Power Voltage (Vmp)	XXX V
Maximum Power Current (Imp)	XXX A
Open Circuit Voltage (Voc)	XXX V
Short Circuit Current (Isc)	XXX A
Nominal Operating Cell Temperature(NOCT)	45 ± 2°C
Maximum System Voltage	1000VDC
Weight	XXX Kg
Dimensions	XXXXX mm
Over-current protection	15A
Module application	Class A





Perlight Solar Co., Ltd.  
Chili Village, Zeguo Twon Wenling City,  
Zhejiang Province 317521  
Tel: +86-576-86472818  
Fax: +86-576-86479190  
www.perlightsolar.com.cn

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Shanghai 17 June 2013 (Place and date)

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# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

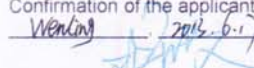


File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

**List of critical materials and components:**

Object	Manufacturer	Type	Technical Data	Remark
<b>Solar Cells</b>				
5" mono cell	Perlight Solar Co., Ltd.	S125	Dimension (w x l)= 125mm x 125mm Thickness = 200±50µm Cell area = 154.82cm <sup>2</sup> 2 busbars	Tested with PV modules
6" mono cell	Perlight Solar Co., Ltd.	S156	Diameter (w x l)= 156mm x 156mm Thickness = 200±50µm Cell area = 238.96cm <sup>2</sup> 3 busbars	Tested with PV modules
6" poly cell	Perlight Solar Co., Ltd.	P156	Diameter (w x l)= 156mm x 156mm Thickness = 200±20µm Cell area = 243.36cm <sup>2</sup> 3 busbars	Tested with PV modules
<b>Materials</b>				
Front cover	CSG	Tempered glass	Thickness = 3.2mm	Tested with PV modules
	CSG	ARC glass	Thickness = 3.2mm	Tested with PV modules
Rear cover	Coveme S.P.A	dyMat®PYE (only combine with F806)	Thickness = 0.295mm Color: White	Tested with PV modules
		dyMat®BK PYE (only combine with F806)	Thickness = 0.295mm Color: black	Tested with PV modules
	ISOVOLTAIC	2442-W	Thickness = 0.35mm Color: white	Tested with PV modules
Encapsulation material	Hangzhou First Hot-melt Materials Co., Ltd.	F806	Thickness = 0.5mm	Tested with PV modules
	Bridgestone	S25	Thickness = 0.6mm	Tested with PV modules
Frame parts	Changzhou Runli Aluminum Alloy Section Co., Ltd.	6063-T5	thickness=45 Connected by: screws Color: silver & black	Tested with PV modules
	Changzhou Runli Aluminum Alloy Section Co., Ltd.	6063-T5	thickness=50 & 40 Connected by: buckle slot Color: silver & black	Tested with PV modules
	Jiangyin East-China Aluminum Technology Co., Ltd.	GT042	Connected by: buckle slot Color: silver & black	Tested with PV modules
Adhesive (frame)	Beijing TOSAN	1527	Color: white & black	Tested with PV modules
Internal wiring (for interconnection cell-to-cell bus bar)	Kunming Sunlight Science & Technology Co., Ltd.	Copper belt with tin plated, Alloy: Sn60Pb40	1.8*0.2mm	Tested with PV modules

Confirmation of the applicant  
 (Place and date)

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 Shanghai, 17 June 2013 (Place and date)

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# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Object	Manufacturer	Type	Technical Data	Remark
	Suzhou Youbest New Type Materials Co., Ltd.	Copper belt with tin plated, Alloy: Sn60Pb40	1.6*0.2mm( only combine with S125 & 156)	Tested with PV modules
Internal wiring (for inter-string connection)	Kunming Sunlight Science & Technology Co., Ltd.	Copper belt with tin plated, Alloy: Sn60Pb40	7.0*0.25mm( only combine with 5" mono and 6" poly except for 60pcs with 1640x992x46)	Tested with PV modules
			5.0*0.35mm(* only combine with 6" mono & 6-pcs poly module with 1640x992x46)	
	Suzhou Youbest New Type Materials Co., Ltd.	Copper belt with tin plated, Alloy: Sn60Pb40	6.0*0.2mm	Tested with PV modules
Soldering material	N/A	N/A	N/A	N/A
Fluxing agent	Asahi Solder Technology Co., Ltd	ANX-3012	N/A	Tested with PV modules
Fixing tape	3M	3M-CEMP-2	N/A	Tested with PV modules

Components				
Combination A (for all modules except 5" mono 96Pcs modules, )				
Junction box	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM801	Rated voltage = 1000VDC Rated current = 15A Number of diodes 3	Tested with PV modules TUV Rheinland/ R50175690
Adhesive (junction box)	Beijing TonsanAdhesiveCo.,Ltd	1527	Color: white	Tested with PV modules
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc.	10SQ050	$I_f=10A$ , $T_j \text{ max}=200^\circ\text{C}$	Tested with PV modules
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4 0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV modules+ TUV Rheinland / R50129983
Connectors	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM801	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module +TUV Rheinland / R 50175587
Combination B (only for 5" mono 96Pcs module)				
Junction box	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM802-2	Rated voltage = 1000VDC Rated current = 7.5A Number of diodes 3	Tested with PV modules+ TUV Rheinland/ R50175690
Adhesive (junction box)	Beijing TonsanAdhesiveCo.,Ltd	1527	Color: white	Tested with PV modules
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc.	10SQ050	$I_f=10A$ , $T_j \text{ max}=200^\circ\text{C}$	Tested with PV modules

Confirmation of the applicant  
Wenling (Place and date) 2013-6-1

Confirmation of TÜV NORD CERT  
 Shanghai, 17 June 2013 (Place and date)

(Applicant's legally authorized signature and stamp)

(Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module+ TUV Rheinland / R50129983
Connectors	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM601	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module +TUV Rheinland / R 50175587
<b>Combination C</b>				
Junction box	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM828	Rated voltage = 1000VDC Rated current = 13A Number of diodes 3	Declared by manufacturer + TUV Rheinland / R50175585
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Declared by manufacturer
Potting material	Beijing Tonsan	1521	N/A	Declared by manufacturer
Bypass diodes	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	THY2550	I <sub>v</sub> =25A, T <sub>j</sub> max =200°C	Declared by manufacturer
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Declared by manufacturer + TUV Rheinland / R50129983
Connectors	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM601	Rated voltage = 1000VDC Rated current = 16A	Declared by manufacturer +TUV Rheinland / R 50175587
<b>Combination D</b>				
Junction box	Cixi Zhonghuan Electronic Co., Ltd	PV-ZH011-1	Rated voltage = 1000VDC Rated current = 12A Number of diodes 3	Declared by manufacturer + TUV SUD / B120176905002
Adhesive (junction box)	Shanghai Huitian New Chemical Material Co., Ltd	HT906Z	Color: white	Declared by manufacturer
Potting material	Shanghai Huitian New Chemical Material Co., Ltd	HT-5299W	N/A	Declared by manufacturer
	Dow Corning	PV-7010	N/A	Declared by manufacturer
Bypass diodes	Sunter	20SQ045	I <sub>v</sub> =20A, T <sub>j</sub> max =200°C	Declared by manufacturer
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Declared by manufacturer + TUV Rheinland / R50129983
Connectors	Ningbo Free Trade Zhonghuan Electronic Technology Co., Ltd	PV-ZH202	Rated voltage = 1000VDC Rated current = 30A	Declared by manufacturer +TUV Rheinland / R 50117542
<b>Combination E</b>				

Confirmation of the applicant  
Wending (Place and date) 2016.6.17

Confirmation of TUV NORD CERT  
 Shanghai, 17 June 2016 (Place and date)

(Applicant's legally authorized signature and stamp) (Signature of authorized TUV NORD CERT engineer)



# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Junction box	Cixi Boneng New Energy Technology Co., Ltd	PV-BN089	Rated voltage = 1000VDC Rated current = 8A Number of diodes 3	Tested with PV module + TUV Rheinland / R50252888
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV module
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc	10SQ050	$I_p=10A$ , $T_j \text{ max}=200^\circ\text{C}$	Tested with PV module
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4 0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983
Connectors	Cixi Boneng Photovoltaic Electronic Technology Co., Ltd	PV-BN101	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module + TUV Rheinland / R50141884
<b>Combination F</b>				
Junction box	Cixi Boneng New Energy Technology Co., Ltd	PV-BN088	Rated voltage = 1000VDC Rated current = 16A Number of diodes 6, 2 in parallel	Tested with PV module + TUV Rheinland / R50252888
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV module
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc	12SQ050	$I_p=12A$ , $T_j \text{ max}=200^\circ\text{C}$	Tested with PV module
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4 0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983
Connectors	Cixi Boneng Photovoltaic Electronic Technology Co., Ltd	PV-BN101	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module + TUV Rheinland / R50141884
<b>Combination G</b>				
Junction box	Cixi Boneng New Energy Technology Co., Ltd	PV-BN089A	Rated voltage = 1000VDC Rated current = 12A Number of diodes 3	Tested with PV module + TUV Rheinland / R50252888
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV module
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc	MBR1545S	$I_p=15A$ , $T_j \text{ max}=200^\circ\text{C}$	Tested with PV module
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4 0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983

Confirmation of the applicant

Wenling 2013.6.17 (Place and date)

Confirmation of TÜV NORD CERT

Shanghai, 17 June 2013 (Place and date)

(Applicant's legally authorized signature and stamp)

(Signature of authorized TÜV NORD CERT engineer)

PV-F-011 CDF

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# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Connectors	Cixi Boneng Photovoltaic Electronic Technology Co., Ltd	PV-BN101	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module +TUV Rheinland / R 50141884
<b>Combination H</b>				
Junction box	Ningbo Chuangyuan Photovoltaic Technology Co., Ltd	PV-CY802	Rated voltage = 1000VDC Rated current = 12A Number of diodes: 6, 2 in parallel	Tested with PV module + TUV Rheinland / R50133917
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV module
	Dow Corning	7091	Color: white	Tested with PV module
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	Jinan Jinheng Electronic Co., Ltd	12SQ045	$I_p=12A$ , $T_j$ max =200°C	Tested with PV module
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983
Connectors	Ningbo Chuangyuan Photovoltaic Technology Co., Ltd	PV-CY01	Rated voltage = 1000VDC Rated current = 30A	Tested with PV module +TUV Rheinland / R 50133919
<b>Combination I</b>				
Junction box	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM803-1	Rated voltage = 1000VDC Rated current = 15A Number of diodes 6, 2 in parallel	Tested with PV modules+ TUV Rheinland/ R50175690
Adhesive (junction box)	Beijing TonsanAdhesiveCo.,Ltd	1527	Color: white	Tested with PV modules
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit Inc.	MBR1545S	$I_p=15A$ , $T_j$ max =200°C	Tested with PV modules
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module+ TUV Rheinland / R50129983
Connectors	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd	PV-JM601	Rated voltage = 1000VDC Rated current = 16A	Tested with PV module +TUV Rheinland / R 50175587
<b>Combination J</b>				
Junction box	Ningbo Free Trade Zhonghuan Electronic Technology Co., Ltd	PV-ZH008 PV-ZH009	Rated voltage = 1000VDC Rated current = 8A for PV-ZH008 Rated current = 12A for PV-ZH009 Number of diodes 3 for PV-ZH008 Number of diodes 6 for PV-ZH009	Tested with PV modules+ TUV Rheinland/ R50152316

Confirmation of the applicant

Wangling (Place and date) 2013.6.17

Confirmation of TÜV NORD CERT

Shanghai, 17 June 2013 (Place and date)

(Applicant's legally authorized signature and stamp)

(Signature of authorized TÜV NORD CERT engineer)



# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001



File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV modules
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	PanJit	10SQ050	$I_p=10A, T_j \text{ max}=200^\circ\text{C}$	Tested with PV modules
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983
Connectors	Ningbo Free Trade Zhonghuan Electronic Technology Co., Ltd.	PV-ZH202	Rated voltage = 1000VDC Rated current = 30A	Tested with PV module + TUV Rheinland / R 50117542
<b>Combination K (for all modules except 5' mono 96Pcs modules, only combine with backsheet 2442.)</b>				
Junction box	Tyco Electronics AMP GmbH	1740971-1	Rated voltage = 1000VDC Rated current = 13A Number of diodes: 3	Tested with PV modules TUV Rheinland/ R60019018
Adhesive (junction box)	Dow Corning	7091	Color: white	Tested with PV modules
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	Tyco Electronics	SL1515	$I_p=15A, T_j \text{ max}=200^\circ\text{C}$	Tested with PV modules
Cable	Tyco Electronics AMP GmbH	ZHSCG-35 1x4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV modules TUV Rheinland/ R60021060
Connectors	Tyco Electronics AMP GmbH	6-1394461-2 6-1394462-4	Rated voltage = 1000VDC Rated current = 16A	Tested with PV modules + TUV Rheinland/ R60025797
<b>Combination L (only combine with Icosolar 2442 and adhesive 7091 and 1527)</b>				
Junction box	Ningbo Chuangyuan Photovoltaic Technology Co., Ltd.	PV-CY801	Rated voltage = 1000VDC Rated current = 8A Number of diodes 3	Tested with PV module + TUV Rheinland / R50133917
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd	1527	Color: white	Tested with PV module
	Dow Corning	7091	Color: white	Tested with PV module
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	Jinan Jinheng Electronic Co., Ltd.	12SQ045	$I_p=12A, T_j \text{ max}=200^\circ\text{C}$	Tested with PV module
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Tested with PV module + TUV Rheinland / R50129983

Confirmation of the applicant  
Wenling, 2013.6.11 (Place and date)

Confirmation of TUV NORD CERT  
 Shanghai, 17 June 2013 (Place and date)

(Applicant's legally authorized signature and stamp) (Signature of authorized TUV NORD CERT engineer)

PV-F-011 CDF

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Version 1.2

# Test Report



File No.: SHV04017/13-04

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File No.: SHV04017/13-04

Attached to Test Report No.: 492010421.001

Connectors	Ningbo Chuangyuan Photovoltaic Technology Co., Ltd.	PV-CY01	Rated voltage = 1000VDC Rated current = 30A	Tested with PV module +TUV Rheinland / R 50133919
<b>Combination M</b>				
Junction box	Ningbo Free Trade Zhonghuan Electronic Technology Co., Ltd.	PV-ZH009-3	Rated voltage = 1000VDC Rated current = 12A Number of diodes 3	Declared by manufacturer + TUV Rheinland/ R50152316
Adhesive (junction box)	Shanghai Huitian New Chemical Material Co., Ltd.	HT906Z	Color: white	Declared by manufacturer
Potting material	N/A	N/A	N/A	N/A
Bypass diodes	Sunter	20SQ045	$I_p=20A$ , $T_j$ max =200°C	Declared by manufacturer
Cable	Ningbo Zhonghuan Sunter PV Technology Co., Ltd.	PV 1-F 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Declared by manufacturer + TUV Rheinland / R50203086
Connectors	Ningbo Free Trade Zhonghuan Electronic Technology Co., Ltd.	PV-ZH202	Rated voltage = 1000VDC Rated current = 30A	Tested with PV module +TUV Rheinland / R 50117542
<b>Combination N</b>				
Junction box	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd.	PV-JM825	Rated voltage = 1000VDC Rated current = 13A Number of diodes: 3	Declared by manufacturer + TUV Rheinland / R50175585
Adhesive (junction box)	Beijing Tonsan Adhesive Co., Ltd.	1527	Color: white	Declared by manufacturer
Potting material	Beijing Tonsan	1521	N/A	Declared by manufacturer
Bypass diodes	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd.	THY2550	$I_p=25A$ , $T_j$ max =200°C	Declared by manufacturer
Cable	Wuxi Xinhongye Wire & Cable	PV 1-F, 1X4.0mm <sup>2</sup>	Rated voltage = 1800VDC Diameter = 4.0mm <sup>2</sup>	Declared by manufacturer + TUV Rheinland / R50129983
Connectors	Zhejiang JiamingTianheyuan Photovoltaic Technology Co., Ltd.	PV-JM601	Rated voltage = 1000VDC Rated current = 16A	Declared by manufacturer +TUV Rheinland / R 50175587

**Remark:**

The Fire Test Class C has only been performed on the following materials combination:

1. Glass: CSG (4.0mm) + EVA: First PV (F806) + Backsheet: Coveme (dyMat@PYE, white color) + Frame Adhesive: TONSAN (1527-65, white color)
2. Glass: CSG (4.0mm) + EVA: First PV (F806) + Backsheet: Coveme (dyMat@BK PYE, black color) + Frame Adhesive: TONSAN (1527-65, black color).

----- End of CDF -----

Confirmation of the applicant

Wangli (2013.6.17) (Place and date)

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT

Shanghai, 17 June 2013 (Place and date)

(Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

## Annex 2: List of measurement equipment

Test clause	Equipment	Identification	Next calibration date
10.2	Pulsed solar simulator	PSS8	09/20/2013
10.3/MST16	Withstanding voltage / Insulation resistance tester	7700	12/18/2013
10.15/MST17	Withstanding voltage / insulation resistance tester	7700	12/28/2013
10.16/MST34	Power supply	WYK-15020K	09/09/2013
MST23	Fire tester	A0912651	11/03/2013

# Test Report



File No.: SHV04017/13-04

Test Report No.: 492010421.001

### **Annex 3: Statement of the estimated uncertainty of the test results**

The total measuring uncertainty of P<sub>mpp</sub> is  $\leq 3.2\%$

The total measuring uncertainty of I<sub>sc</sub> is  $\leq 2.6\%$

The total measuring uncertainty of V<sub>oc</sub> is  $\leq 2.1\%$

**Annex 4: Declaration of address change**

## 关于公司地址更新的声明

**Statement of the Address Update**

我司营业执照地址称呼发生了改变，原“浙江省温岭市泽国镇池里村”更改为“浙江省温岭市泽国镇牧屿欧风路”，实际是同一个地址，只是政府更新了街道地址名称，期间我司并没有发生搬迁。

As the government has renewed the names of streets, the address of our company on the business license has changed correspondingly. The former address “Chili Village, Zeguo Town, Wenling City, Zhejiang Province” is now “Oufeng Road, Muyu Administration, Zeguo Town, Wenling City, Zhejiang Province.” Actually, these two addresses are the same one and our company is not relocated.

补充：我司英文地址是 OUFENG ROAD, MUYU ADMINISTRATION AREA, ZEGUO TOWN, WENLING CITY, ZHEJIANG PROVINCE, CHINA.

Supplement: Our English address is OUFENG ROAD, MUYU ADMINISTRATION AREA, ZEGUO TOWN, WENLING CITY, ZHEJIANG PROVINCE, CHINA

特此声明！

Hereby certified!

浙江宝利特新能源股份有限公司

Perlight Solar Co., Ltd

经办人/Agent: 

日期 / Date: 2013.05.22

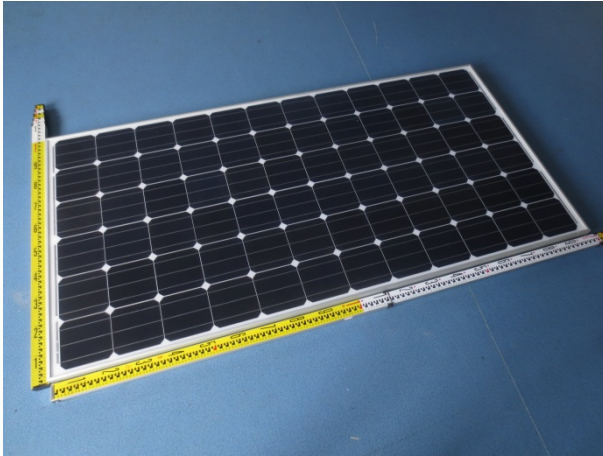


File No.: SHV04017/13-04

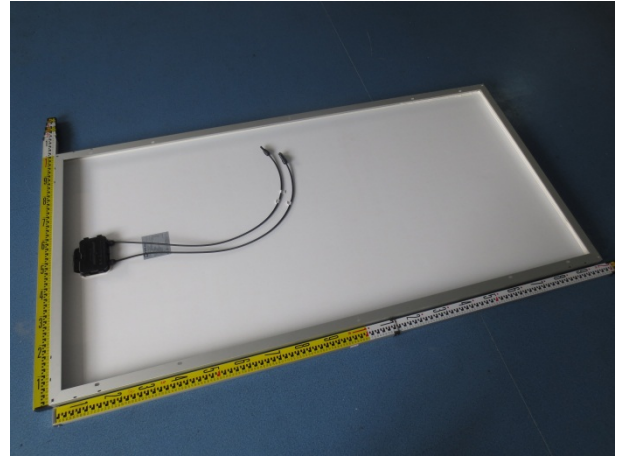
Test Report No.: 492010421.001

**Annex 5: Photos**

**Module type: PLM-290M-72**



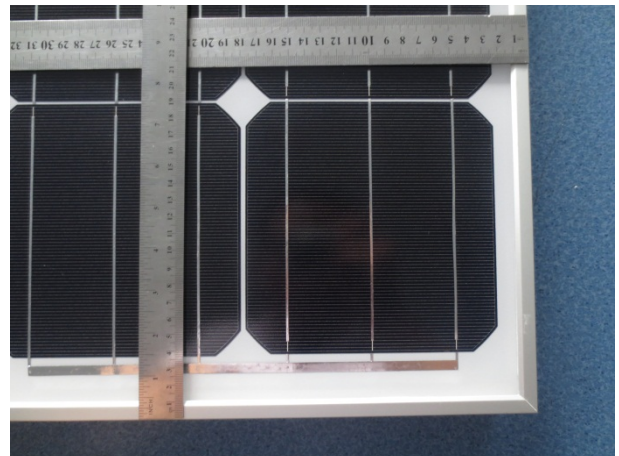
*Front overview*



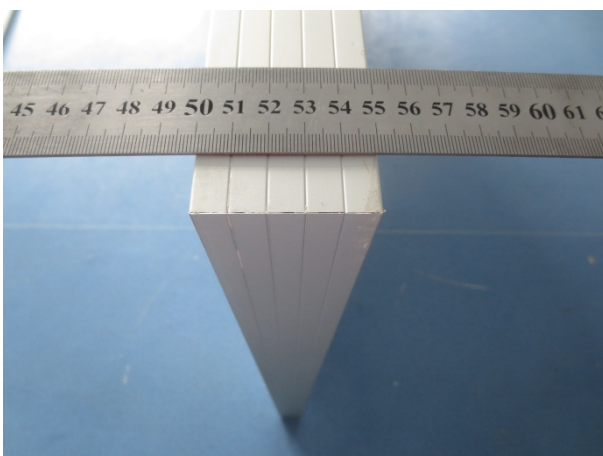
*Back overview*



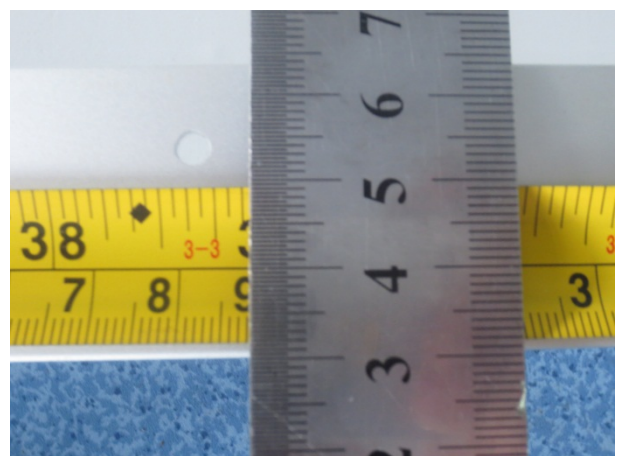
*Label*



*Solar cell*



*Frame*



*Grounding hole*



Junction box(PV-JM801)



Junction box (opened)



Bypass diode(10SQ050)



Cable(PV1-F 1 x 4.0mm<sup>2</sup>)



Mark (Do not disconnect under load)



Connectors(PV-JM601)





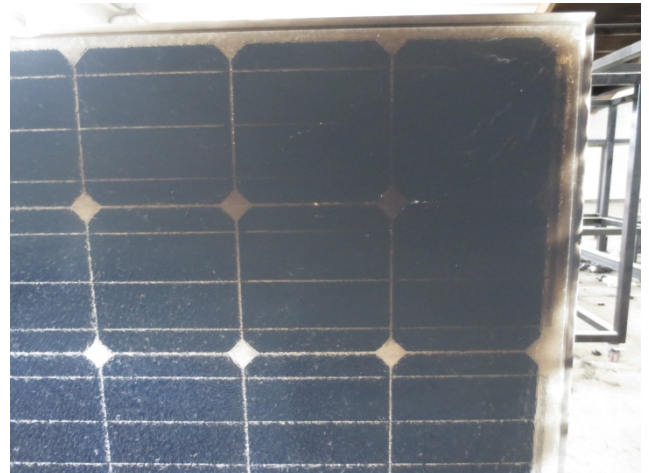
*Sample 2#: After spread of flame test*



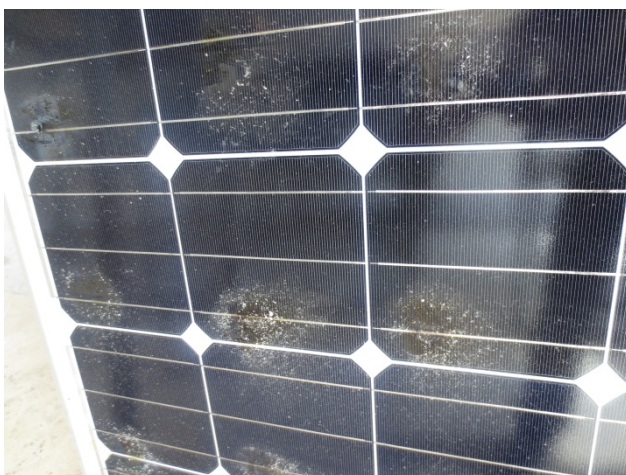
*Sample 2#: After spread of flame test*



*Sample 2#: After spread of flame test*



*Sample 2#: After spread of flame test*



*Sample 4#: After burning brand test*



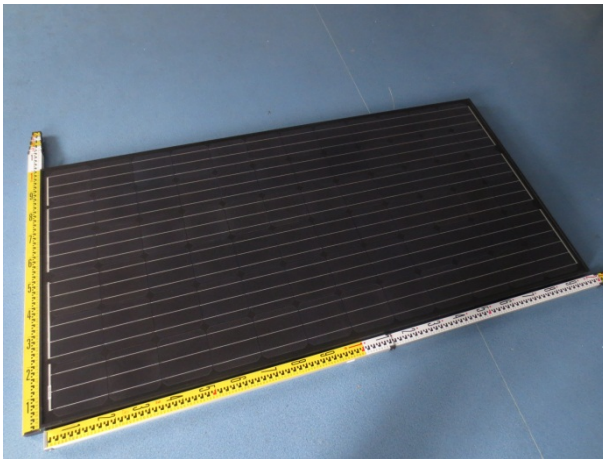
*Sample 4#: After burning brand test*



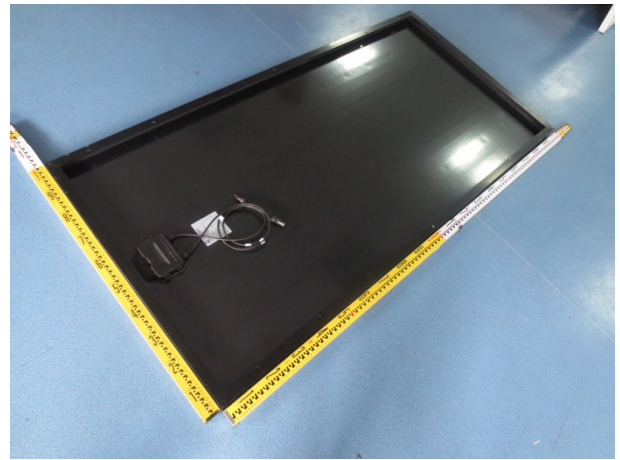
File No.: SHV04017/13-04

Test Report No.: 492010421.001

**Module type: PLM-290MB-72**



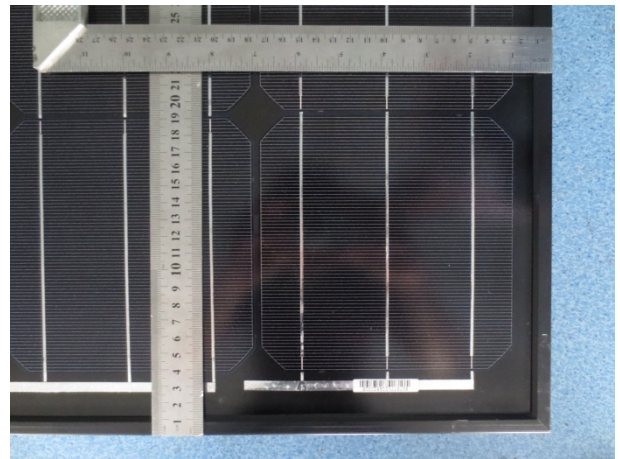
Front overview



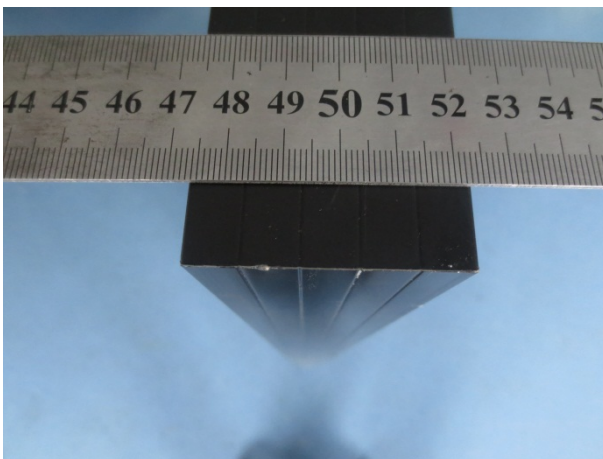
Back overview



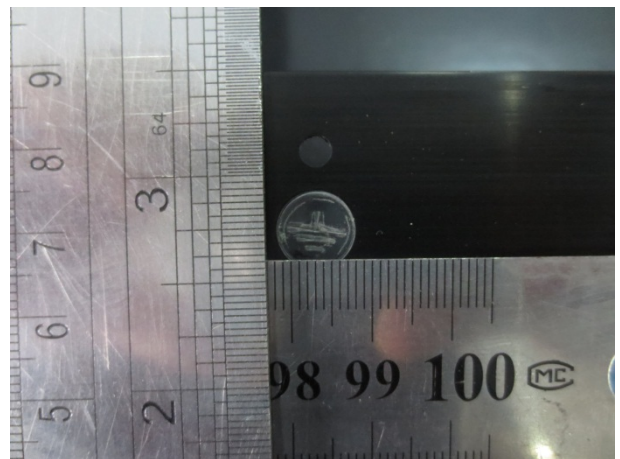
Label



Solar cell



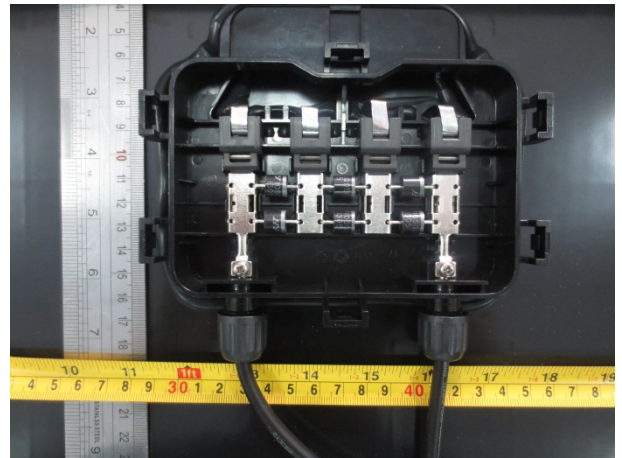
Frame



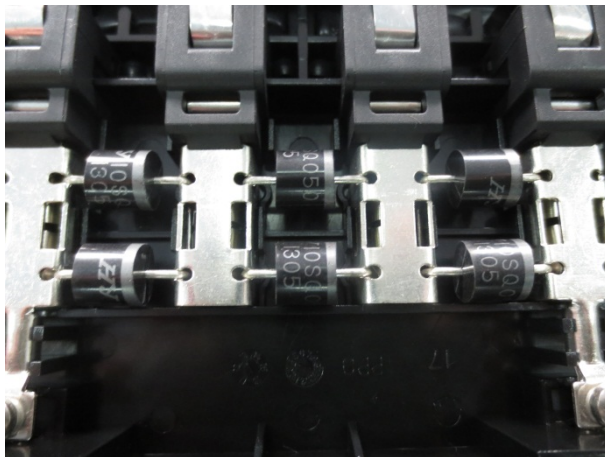
Grounding hole



Junction box(PV-JM801)



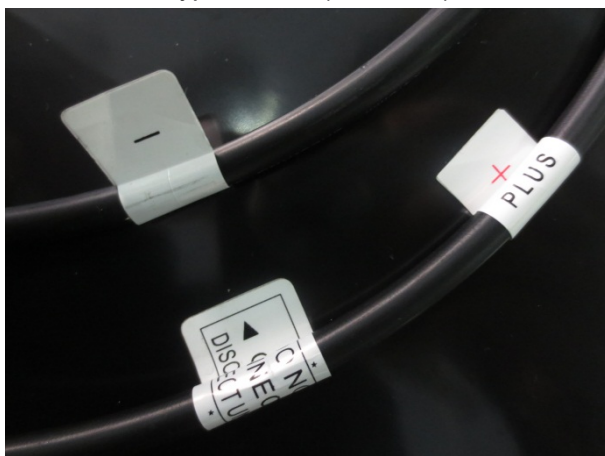
Junction box (opened)



Bypass diode(10SQ050)



Cable(PV-F, 1 x 4.0mm<sup>2</sup>)



Mark (Do not disconnect under load)



Connectors(PV-JM601)





*Sample 6#: After spread of flame test*



*Sample 6#: After spread of flame test*



*Sample 6#: After spread of flame test*



*Sample 6#: After spread of flame test*



*Sample 8#: After burning brand test*

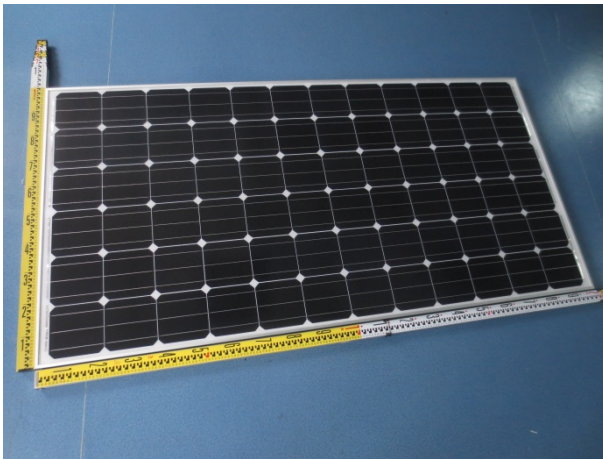


*Sample 8#: After burning brand test*

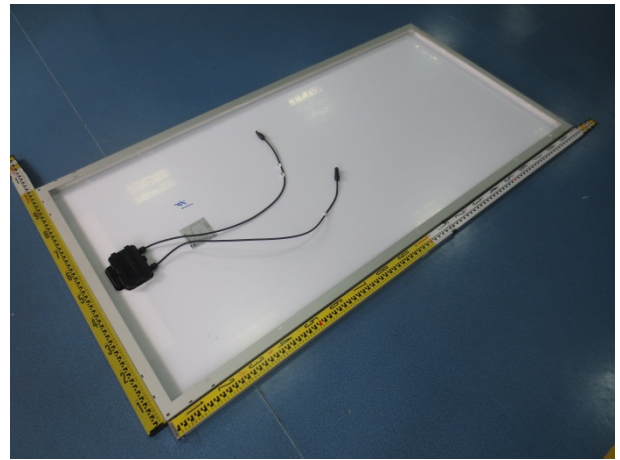
File No.: SHV04017/13-04

Test Report No.: 492010421.001

**Module type: PLM-280M-72**



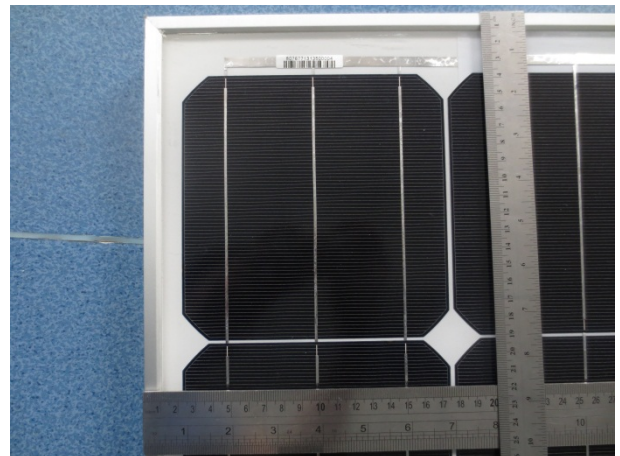
Front overview



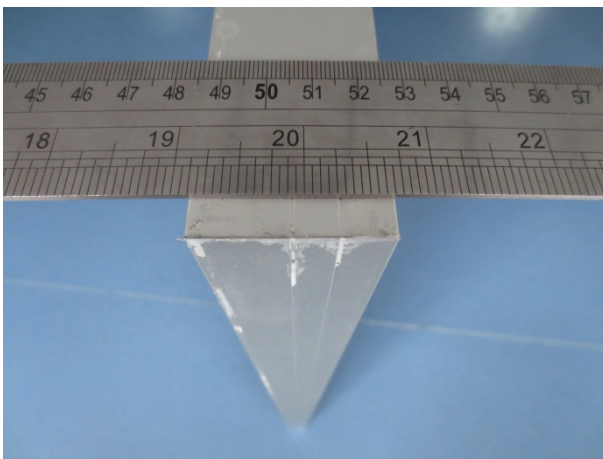
Back overview



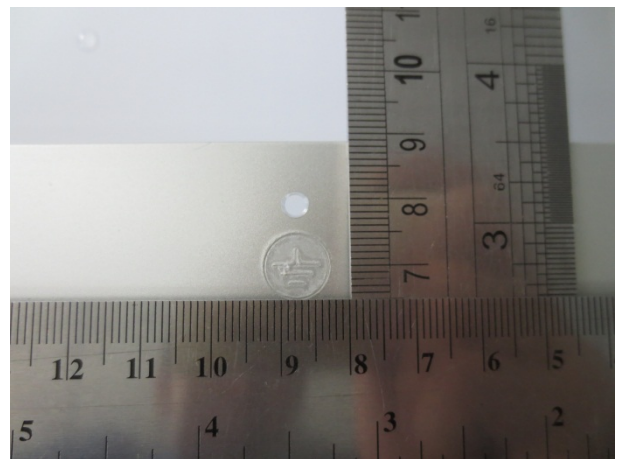
Label



Solar cell



Frame

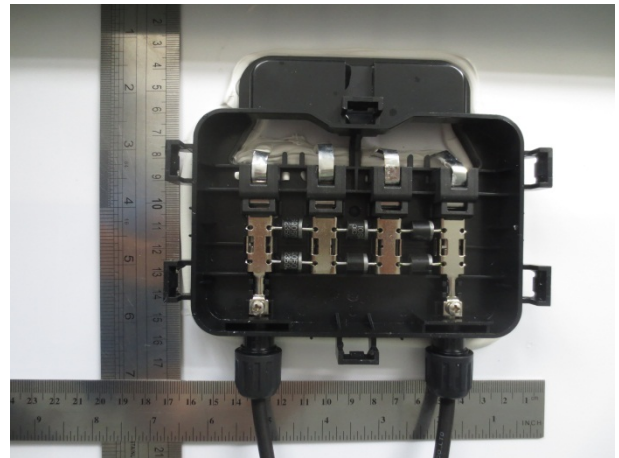


Grounding hole

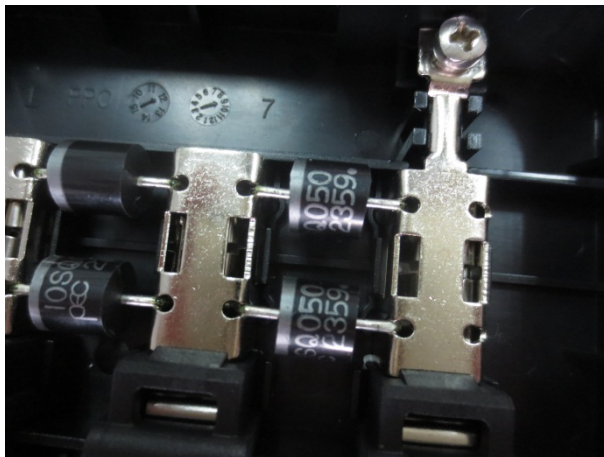




Junction box(PV-JM801)



Junction box (opened)



Bypass diode(10SQ050)



Cable(PV-F, 1 x 4.0mm<sup>2</sup>)



Mark (Do not disconnect under load)



Connectors(PV-JM601)

----- End of test report -----