




Photovoltaic Module Performance Report

Report Reference No.	151101964SHA-002
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Testing Laboratory	Intertek Testing Services Shanghai
Address.....	Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Testing location/procedure.....	Intertek Testing Service Shanghai PV laboratory
Address.....	1-2F, No. 2, Alley 1218, Wan Rong Road, Shanghai, China, 200436
Applicant's name	Boviet Solar Technology Co., Ltd.
Address.....	B5-B6, Song Khe-Noi Hoang Industrial Zone, 21000 Bac Giang Province, Vietnam.
Test specification	Humidity-freeze test (40 cycles)
Standard.....	IEC 61215:2005 2 nd Edition Sections, Clause 10.1, Clause 10.2, Clause 10.3, Clause 10.12
Standard deviation	Refer to Summary of testing
Test Item description	Photovoltaic(PV) Module(s)
Model/Type reference.....	BVM6612P-305
Manufacturer.....	Boviet Solar Technology Co., Ltd.
Brand name.....	
Address.....	B5-B6, Song Khe-Noi Hoang Industrial Zone, 21000 Bac Giang Province, Vietnam.
Rating.....	See Page2
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General Product information:

Description of module construction:

Model	Module dimension(mm)	Cell technology	No. of cells
BVM6612P-305	1956x992x40	Poly-crystalline	72

Product Electrical Rating:

Model No.	Voc (V)	Isc (Amps)	Pmp (W)	Vmp (V)	Imp (Amps)
BVM6612P-305	45.6	9.05	305	37.4	8.16

Summary of testing:

At the request of the applicant, the purpose of this report is to perform the 4 times Humidity-freeze test which is specified in IEC 61215: 2005 2nd Edition.

Tests performed (name of test and test clause)

Tests	Clause
Visual inspection	IEC 61215: 2005 2 nd Edition: Cl. 10.1
Maximum power determination	IEC 61215: 2005 2 nd Edition: Cl. 10.2
Insulation test	IEC 61215: 2005 2 nd Edition: Cl. 10.3
Humidity-freeze test	IEC 61215: 2005 2 nd Edition: Cl. 10.12

List of test samples

Sample No.	Type / model	Remark
P39000B060300019	BVM6612P-305	Control
P39000B060300025	BVM6612P-305	Humidity-freeze test
P39000B060300027	BVM6612P-305	Humidity-freeze test

Supplementary information: Preconditioning of test samples was performed within IEC 61215 performance testing.

IEC 61215 – Design qualification and type approval

Clause	Requirement + Test	Result - Remark	Verdict
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10.1 Initial	TABLE: Visual inspection (Initial)		—
Test Date [MM/DD/YYYY]..... :	07/29/2015		—
Sample #	Nature and position of initial findings – comments or attach photos		—
P39000B060300019	No Visual Defects		P
P39000B060300025	No Visual Defects		P
P39000B060300027	No Visual Defects		P
Supplementary information: N/A			

10.2 Initial	TABLE: Maximum power determination (initial)					—
Test Date [MM/DD/YYYY]..... :	07/29/2015					—
Module temperature [°C]	25					—
Irradiance [W/m ²]	1000					—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
P39000B060300019	45.24	36.53	8.79	8.28	302.55	76.07
P39000B060300025	45.40	36.72	8.85	8.37	307.39	76.48
P39000B060300027	45.38	36.72	8.90	8.34	306.31	75.81
Supplementary information: N/A						

10.3 Initial	Table: Insulation test (initial)				—
Test Date [MM/DD/YYYY]..... :	07/29/2015				—
Test Voltage applied [V]	1000/3000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	-
P39000B060300019	>500	20.6		No	P
P39000B060300025	>500	20.6		No	P
P39000B060300027	>500	20.6		No	P
Supplementary information: Size of the module: 1.94[m ²]					

IEC 61215 – Design qualification and type approval

Clause	Requirement + Test	Result - Remark	Verdict			
10.12 A	TABLE: Humidity freeze 10 test (1st 10 cycles)		—			
Test Date [MM/DD/YYYY] start/end..... :		09/18/2015 to 09/29/2015	—			
Total cycles (10)		10	—			
Sample #	Open circuits (yes/no)		—			
P39000B060300025	No		P			
P39000B060300027	No		P			
Supplementary information: N/A						
(10.1 Visual inspection after humidity freeze 10 test)			—			
Test Date [MM/DD/YYYY]		09/29/2015	—			
Sample #	Nature and position of initial findings – comments or attach photos		—			
P39000B060300025	No major visible defect		P			
P39000B060300027	No major visible defect		P			
Supplementary information: N/A						
(10.2 Maximum power determination after humidity freeze 10 test)			—			
Test Date [MM/DD/YYYY]		09/29/2015	—			
Module temperature [°C]		25	—			
Irradiance [W/m2)		1000	—			
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
P39000B060300025	45.32	36.62	8.89	8.32	304.70	75.63
P39000B060300027	45.35	36.62	8.93	8.31	304.16	75.10
Pmp degradation after this test [%] ≤ 5%				0.88 / 0.70		P
Supplementary information: N/A						
(10.3 Insulation test after humidity freeze 10 test)			—			
Test Date [MM/DD/YYYY]		09/29/2015		—		
Test Voltage applied [V]		1000/3000		—		
Sample #	Measured	Required	Dielectric breakdown		Result	
	MΩ	MΩ	Yes (description)	No		
P39000B060300025	>500	20.6		No	P	

IEC 61215 – Design qualification and type approval			
Clause	Requirement + Test	Result - Remark	Verdict

P39000B060300027	>500	20.6		No	P
Supplementary information: Size of the module: 1.94[m ²]					

10.12 B	TABLE: Humidity freeze 10 test (2nd 10 cycles)					—
Test Date [MM/DD/YYYY] start/end..... :		09/30/2015 to 10/11/2015			—	
Total cycles (10)		10			—	
Sample #	Open circuits (yes/no)				—	
P39000B060300025	No				—	
P39000B060300027	No				—	
Supplementary information: N/A						
(10.1 Visual inspection after humidity freeze 10 test)						
Test Date [MM/DD/YYYY]		10/11/2015			—	
Sample #	Nature and position of initial findings – comments or attach photos				—	
P39000B060300025	No major visible defect				—	
P39000B060300027	No major visible defect				—	
Supplementary information: N/A						
(10.2 Maximum power determination after humidity freeze 10 test)						
Test Date [MM/DD/YYYY]		10/11/2015			—	
Module temperature [°C]		25			—	
Irradiance [W/m ²]		1000			—	
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
P39000B060300025	45.29	36.33	8.86	8.31	301.73	75.24
P39000B060300027	45.52	35.89	8.88	8.41	301.76	74.64
Pmp degradation after 2nd 10 cycles [%]			0.97 / 0.79		—	
Pmp degradation after total 20 cycles [%]			1.84 / 1.49		—	
Supplementary information: N/A						
(10.3 Insulation test after humidity freeze 10 test)						
Test Date [MM/DD/YYYY]		10/11/2015			—	
Test Voltage applied [V]		1000/3000			—	

IEC 61215 – Design qualification and type approval			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
P39000B060300025	>500	20.6		No	—
P39000B060300027	>500	20.6		No	—

Supplementary information: Size of the module: 1.94[m²]

10.12 C	TABLE: Humidity freeze 10 test (3rd 10 cycles)				—
Test Date [MM/DD/YYYY] start/end..... :		10/12/2015 to 10/22/2015			—
Total cycles (10)		10			—
Sample #	Open circuits (yes/no)				—
P39000B060300025	No				—
P39000B060300027	No				—

Supplementary information: N/A

(10.1 Visual inspection after humidity freeze 10 test)

Test Date [MM/DD/YYYY]		10/22/2015			—
Sample #	Nature and position of initial findings – comments or attach photos				—
P39000B060300025	No major visible defect				—
P39000B060300027	No major visible defect				—

Supplementary information: N/A

(10.2 Maximum power determination after humidity freeze 10 test)

Test Date [MM/DD/YYYY]		10/22/2015			—	
Module temperature [°C]		25			—	
Irradiance [W/m ²]		1000			—	
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
P39000B060300025	45.36	36.33	8.83	8.23	299.07	74.69
P39000B060300027	45.37	35.94	8.89	8.33	299.54	74.26

Pmp degradation after 3rd 10 cycles [%] : 0.88 / 0.74

Pmp degradation after total 30 cycles [%] : 2.71 / 2.21

Supplementary information: N/A

IEC 61215 – Design qualification and type approval

Clause	Requirement + Test	Result - Remark	Verdict
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(10.3 Insulation test after humidity freeze 10 test)					
Test Date [MM/DD/YYYY]		10/22/2015		—	
Test Voltage applied [V]		1000/3000		—	
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
P39000B060300025	>500	20.6		No	—
P39000B060300027	>500	20.6		No	—
Supplementary information: Size of the module: 1.94[m ²]					

10.12 D	TABLE: Humidity freeze 10 test (4th 10 cycles)				—
Test Date [MM/DD/YYYY] start/end..... :		10/23/2015 to 11/05/2015		—	
Total cycles (10)		10		—	
Sample #	Open circuits (yes/no)				—
P39000B060300025	No				—
P39000B060300027	No				—

Supplementary information: N/A

(10.1 Visual inspection after humidity freeze 10 test)					—
Test Date [MM/DD/YYYY]		11/05/2015		—	
Sample #	Nature and position of initial findings – comments or attach photos				—
P39000B060300025	No major visible defect				—
P39000B060300027	No major visible defect				—

Supplementary information: N/A

(10.2 Maximum power determination after humidity freeze 10 test)							—
Test Date [MM/DD/YYYY]		11/05/2015		—			
Module temperature [°C]		25		—			
Irradiance [W/m ²]		1000		—			
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
P39000B060300025	45.51	36.04	8.81	8.29	298.77	74.49	
P39000B060300027	45.50	35.94	8.86	8.20	294.80	73.14	



IEC 61215 – Design qualification and type approval					
Clause	Requirement + Test		Result - Remark	Verdict	
Pmp degradation after 4th 10 cycles [%]			0.10 / 1.58	—	
Pmp degradation after total 40 cycles [%]			2.80 / 3.76	—	
Supplementary information: N/A					
(10.3 Insulation test after humidity freeze 10 test)					
Test Date [MM/DD/YYYY]		11/05/2015		—	
Test Voltage applied [V]		1000/3000		—	
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
P39000B060300025	>500	20.6		No	—
P39000B060300027	>500	20.6		No	—
Supplementary information: Size of the module: 1.94[m ²]					

ANNEX 1: PRODUCT DESCRIPTION SHEET (MANUFACTURERS AND TYPE REFERENCES)

A1.1	MODULES TYPE/S
	BVM6612P-305

A1.2	SOLAR CELL	
	Cell type reference.....:	156P
	Cell dimensions L x W (mm).....:	156 x 156
	Cell thickness (µm).....:	200±20
	Cell area (cm ²).....:	243.36

A1.3	IDENTIFICATION OF MATERIALS	
	Front cover.....:	CSG glass CO.,LTD. Tempered low iron patterned solar glass Nominal thickness 4.0mm
	Rear cover.....:	Toyo Aluminium K.K Type: FPL-FAW-T250-W50-4, layer: PVDF/PET/LE overall thickness: 0.35mm.
	Encapsulate.....:	Changzhou Sveck Photovoltaic New Material Co., Ltd. 15297 Nominal Thickness 0.5mm
	Frame.....:	TTERGY New Materials Co., LTD Aluminium alloy, 6063-T5
	Adhesive for frame.....:	Shanghai Huitian New Material Co., Ltd. HT906Z, white
	Adhesive for junction box.....:	Shanghai Huitian New Material Co., Ltd. HT906Z, white
	Potting material.....:	Shanghai Huitian New Material Co., Ltd. 5299W-S

	Internal wiring.....:	Cell connector Wuxi Sveck Technology Co., Ltd. 1.6*0.25mm, Sn 60%/Pb 40% Nominal Thickness/Width: 0.25/1.6mm String connector Wuxi Sveck Technology Co., Ltd. 5*0.35mm, Sn 60%/Pb 40% Nominal Thickness/Width: 0.35/5mm
	Soldering material	Shenzhen Wise Technology Co.,Ltd WS-868B-13C
	Other	N/A

A1.4	IDENTIFICATION OF COMPONENTS	
	Junction box	ZHEJIANG JIAMING TIANHEYUAN PHOTOVOLTAIC TECHNOLOGY CO., LTD. JM805A, 15A/1000VDC
	Cable	ZHEJIANG JIAMING TIANHEYUAN PHOTOVOLTAIC TECHNOLOGY CO., LTD. PV wire, rated 1000 V, Sunlight resistant, 90°C wet or dry, 12 AWG conductor size,
	Connector	ZHEJIANG JIAMING TIANHEYUAN PHOTOVOLTAIC TECHNOLOGY CO., LTD. PV-JM601, rated 1000 V dc, 25 A max, with 12AWG PV cable.
	Bypass diode	ZHEJIANG JIAMING TIANHEYUAN PHOTOVOLTAIC TECHNOLOGY CO., LTD. THY2550

A1.5	MODULE DESIGN –DIMENSIONS	
	Module dimensions L x W x H (mm)	1956x992x40

ANNEX 2: Photos of sample BVM6612P-305

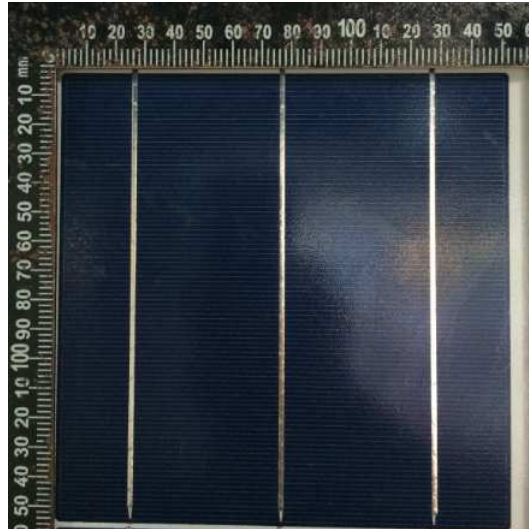


Front view



Rear view

ANNEX 2: Photos of sample BVM6612P-305



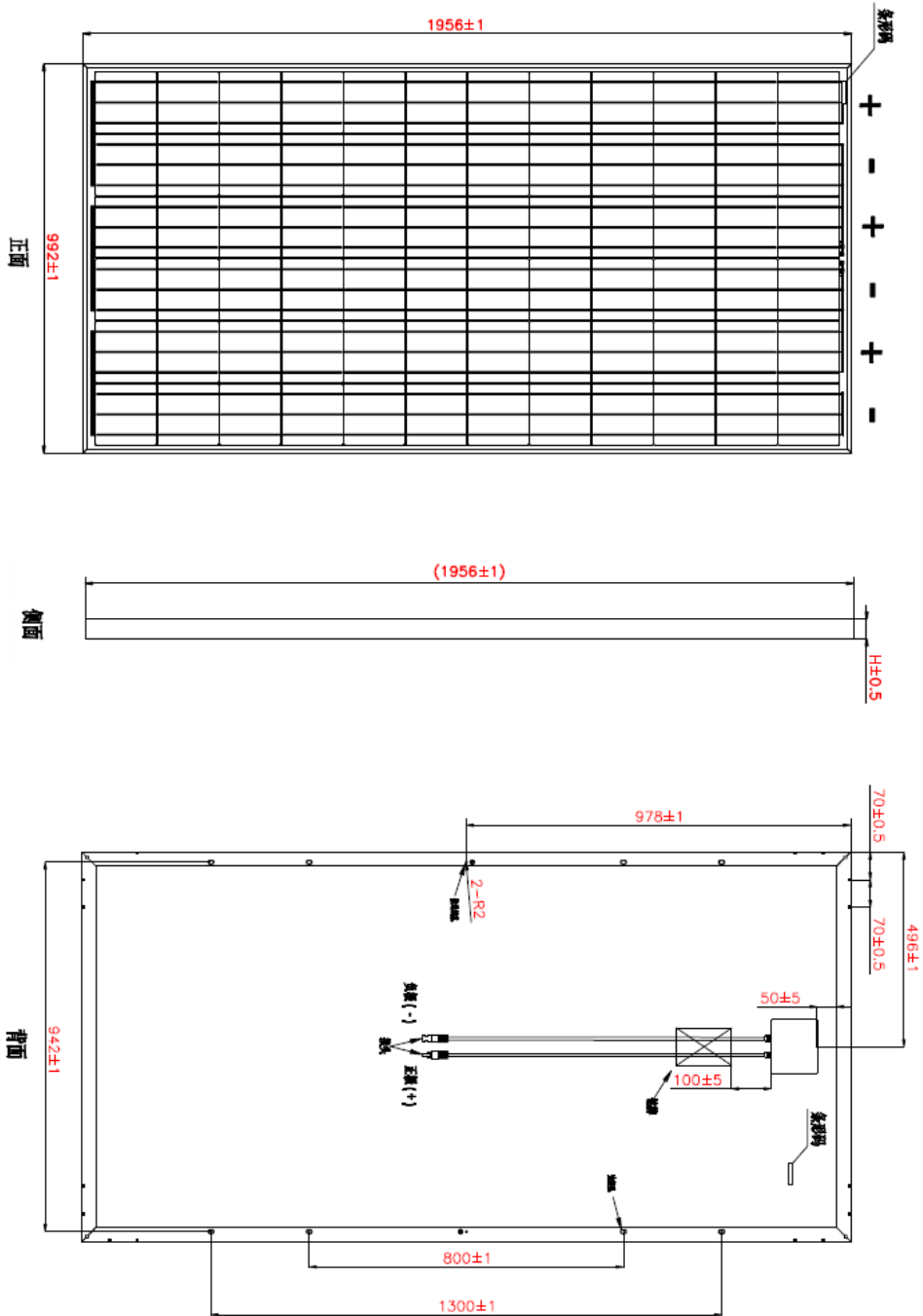
Cell



Junction box & connector

ANNEX 3: CONSTRUCTION DETAILS (UNIT: mm)

SCHMATIC of BVM6612P-305



H=40

