


Test Report No. TRPVP07117/23P/02

Commission Testing
according to IEC 61730-2 / EN IEC 61730-2


Applicant: **Jolywood (Taizhou) Solar Technology Co., Ltd.**
Kaiyang Rd. Jiangyan Economic Development Zone
Taizhou City, Jiangsu Province, 225500, P.R. China

File No.: PVP07117/23P-02

Designed:
(Project Engineer)

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| | |
|---|---|
| Applicant..... : | Jolywood (Taizhou) Solar Technology Co., Ltd. Kaiyang Rd. Jiangyan Economic Development Zone Taizhou City, Jiangsu Province, 225500, P.R. China |
| Manufacturer : | Jolywood (Taizhou) Solar Technology Co., Ltd. Kaiyang Rd. Jiangyan Economic Development Zone Taizhou City, Jiangsu Province, 225500, P.R. China |
| Order No. : | QT-PVP07117/23P |
| Date of Application : | 07/19/2023 |
| Product : | Crystalline Silicon Terrestrial Photovoltaic (PV) Modules |
| Module type(s)..... : | Double Glass PV Modules with 182mm Half-cut Mono n-type Bifacial Solar Cells: 156 cells: JW-HD156N-xxx (xxx=580-635, in steps of 5) 144 cells: JW-HD144N-xxx (xxx=525-590, in steps of 5) 120 cells: JW-HD120N-xxx (xxx=435-490, in steps of 5) 132 cells: JW-HD132N-xxx (xxx=485-540, in steps of 5) 108 cells: JW-HD108N-xxx (xxx=395-440, in steps of 5) |
| General Information • Maximum System Voltage.... : | DC 1500V |
| • Electrical Protection Class.... : | N/A |
| • Fire Safety Class : | Class A |
| Type of examination : | Commission testing only |
| Testing Period : | 01/16/2024 - 01/18/2024 |
| Testing Laboratory..... : | China Photovoltaic Product Test Center (CPTC) No.1 Guanzhuang Dongli, Chaoyang District, Beijing, 100024, P.R. China Visual inspection Address: No.1, South Side of Yanmi Road, Economic Development Zone, Miyun District, Beijing, China Fire test Address: 618 West Ring Road, Yutian County, Tangshan City, Hebei Province, 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 is based on the following the requirements:
IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018 "Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing"

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 Module type: JW-HD144N-58011

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 Module type: JW-HD144N-58013

Summary of testing

According to the enquiry of the applicant, a commission test was performed according to IEC 61730-2:2016. Testing items are listed in page 6 in this report.

List of related module types:

Double Glass PV Modules with 182mm Half-cut Mono n-type Bifacial Solar Cells:

144 cells: JW-HD144N-xxx (xxx=525-590, in steps of 5)

120 cells: JW-HD120N-xxx (xxx=435-490, in steps of 5)

132 cells: JW-HD132N-xxx (xxx=485-540, in steps of 5)

108 cells: JW-HD108N-xxx (xxx=395-440, in steps of 5)

156 cells: JW-HD156N-xxx (xxx=580-635, in steps of 5)

Since module type JW-HD144N-580 is with the same design of above series, and with the same BOM except the number of solar cell. Therefore, JW-HD144N-580 is selected as representative samples of above module types and conducted with test MST 23 Class A.

All tests were successfully completed.

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General remarks

| | |
|---|--|
| Test item particulars: | |
| Accessories and detachable parts included in the evaluation | N/A |
| Options included | N/A |
| Abbreviations used in the report: | |
| HF - Humidity Freeze | TC - Temperature Cycling |
| DH - Damp Heat | Vmp - Maximum power voltage |
| Imp - Maximum power current | Voc - Open circuit voltage |
| Isc - Short circuit current | FF - Fill Factor |
| Pmax - Maximum power | α - Current temperature coefficient |
| NMOT - Nominal Module Operating Temperature | β - Voltage temperature coefficient |
| STC - Standard Test Conditions | γ - Power temperature coefficient |
| BNPI - Bifacial Nameplate Irradiance | BSI - Bifacial Stress Irradiance |
| CTI - Comparative Tracking Index | PTI - Proof Tracking Index |
| RTI - Relative Temperature Index | RTE - Relative Thermal Endurance index |
| TI - Temperature Index | DTI - Distance through insulation |
| CI - Clearances | Cr - Creepage distances |
| PD - Pollution Degree | MG - Material Groups |
| Possible test case verdicts: | |
| 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) |
| Other remarks: | |
| <p>The test verdicts presented in this report relate only to the object tested. This report shall not be reproduced except in full, without the written approval of the issuing testing laboratory.</p> <p>Sample #-front: Exposure under 1000W/m² on the front side with rear side covered by black cover. Sample #-rear: Exposure under 1000W/m² on the rear side with front side covered by black cover. Sample #-BNPI: Exposure under BNPI on the front side with rear side covered by black cover. Sample #-BSI: Exposure under BSI on the front side with rear side covered by black cover. Bifaciality coefficient $\phi = \min(I_{Sc_{rear}} / I_{Sc_{front}}, P_{max_{rear}} / P_{max_{front}}) \times 100\%$. Equivalent irradiance: $G_{BNPI} = 1000W/m^2 + \phi \times 135W/m^2$; $G_{BSI} = 1000W/m^2 + \phi \times 300W/m^2$.</p> <p>“(see Annex #)” refers to additional information appended to the report. “(see Table #)” refers to a table appended to the report.</p> <p>Power degradation data expressed in negative value indicates a reduction of maximum power output. Power degradation data expressed in positive value indicates an increment of maximum power output. Throughout this report, a point is used as the decimal separator.</p> | |

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Module group assignment

Module type: JW-HD144N-580

| Sample # | Serial number | Dimension (l x w x h) [mm] | Remark |
|----------|----------------------|----------------------------|--------------------|
| 1 | JW998820230100101588 | 2278 x 1134 x 30 | Fire test, Class A |
| 2 | JW998820230100101587 | 2278 x 1134 x 30 | Fire test, Class A |
| 3 | JW998820230100101586 | 2278 x 1134 x 30 | Fire test, Class A |

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| Clause | Requirement + Test | Result - Remark | Verdict |
|--------|--------------------|-----------------|---------|
|--------|--------------------|-----------------|---------|

Test result overview

Module type: JW-HD144N-580

| Initial examinations | | | - |
|----------------------|-------------------------|-----------------|---|
| MST01 | Visual inspection | See table 10.2 | P |
| Sample 1#, 2#, 3# | | | - |
| MST23 | Fire test | See table 10.17 | P |

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

Test results of IEC 61730-2 / EN IEC 61730-2

Module type: JW-HD144N-580

| | | | |
|---|---|--|---|
| 10.2 Visual inspection (initial) - MST01 | | | - |
| Test date [MM/DD/YYYY].....: | 01/16/2024 | | - |
| 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 |
| Supplementary information: N/A | | | |

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| IEC 61730-2 / EN IEC 61730-2 | | | |
|---|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 10.17 Fire test - MST23 | | | - |
| Test date [MM/DD/YYYY].....: | 01/18/2024 | | - |
| Standard applied | UL 1703, Class A | | - |
| No. of modules provided to create the test assembly | 2 for spread of flame test 1 for burning brand test | | - |
| Test environmental conditions [°C].....: | 24.7 | | - |
| Wind speed [m/s] | 5.2 (76mm from right) | | - |
| | 5.2 (middle) | | - |
| | 5.2 (76mm from left) | | - |
| | 5.2 (Average) | | - |
| Spread of flame test temperature [°C]..: | 742 - 755 | | - |
| Spread of flame test duration time [s] ..: | 600 | | - |
| Ignition brands temperature [°C] | 888 ± 28 | | - |
| Time of Ignition brands [s] | 300 | | - |
| Sample # | Requirements | | - |
| 1 | <input checked="" type="checkbox"/> Modules comply with the requirements for the fire test according to above noticed standard | | P |
| 2 | | | |
| 3 | | | |
| Supplementary information: Please refer to Annex 3 for detailed pictures of the samples after test. | | | |

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Annex 1: List of measurement equipment

| Measurement / testing | Measuring equipment | Equipment ID | Calibration due date |
|-----------------------|-------------------------------|-------------------|----------------------|
| Visual inspection | Visual inspection platform | GF-24 WGCS-1 | 10/23/2024 |
| | Irradiance illuminometer | GF-28 1010A | 12/20/2024 |
| Fire test | module combustion test system | GF-112 SCF | 05/23/2024 |
| | Electronic balance | GF-190 LBA-5200 | 03/05/2024 |
| | Mechanical stopwatch | GF-120 803 | 09/17/2024 |
| | Hygrothermograph | GF-270-3 TH20R | 11/05/2024 |
| | Flammability tester | GF-117 KRX-V2-P10 | 10/23/2024 |
| | Handheld anemometer | GF-112 TES-1340 | 05/23/2024 |

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Annex 2: Photos

Module type: JW-HD144N-580

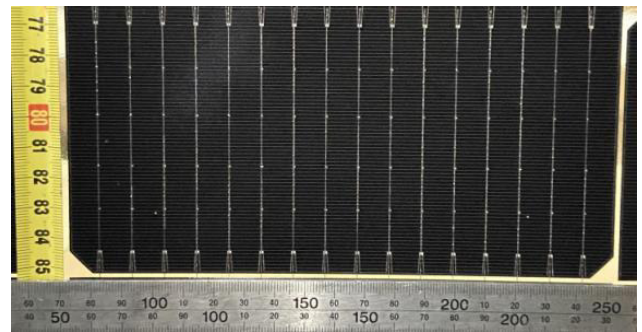


Front overview



Back overview

N/A

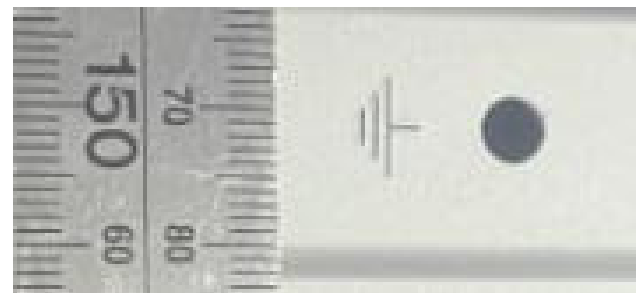


Label (Not stuck on PV modules)

Solar cell



Frame



Grounding Mark



Junction box (JWPV-01a)



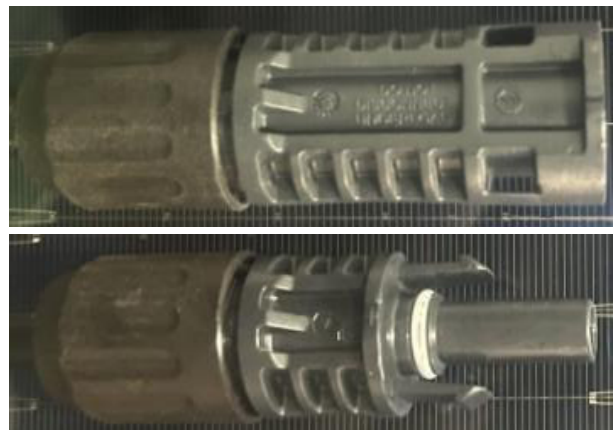
Junction box (opened)

N/A



Bypass diode (Junction box is potted)

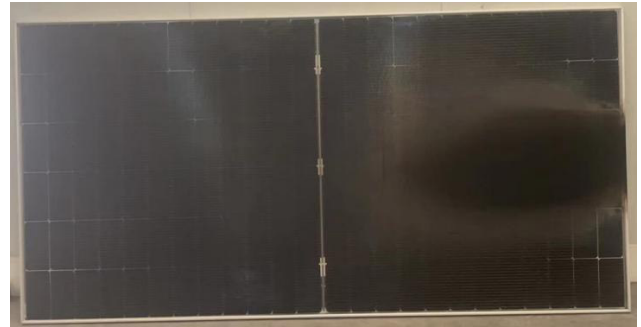
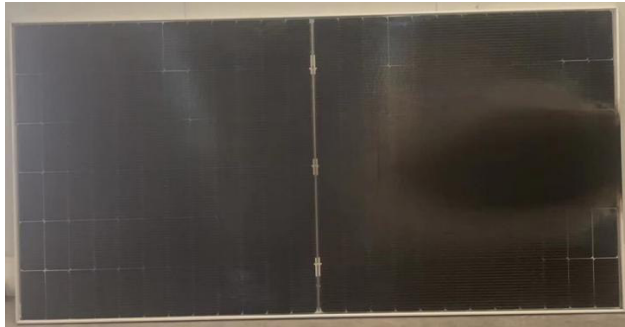
Cable (62930 IEC 131 1x4.0mm²)



Mark (Do not disconnect under load)

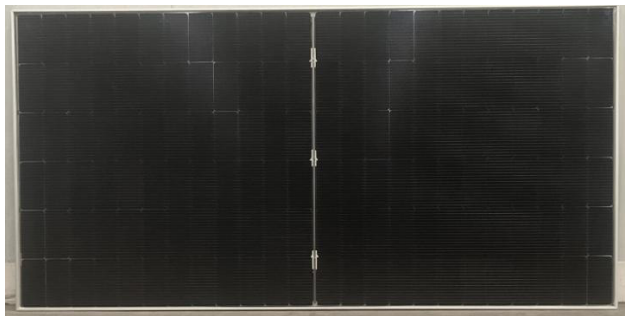
Connectors (Not specified)

Annex 3: Photos of fire test
Module type: JW-HD144N-580



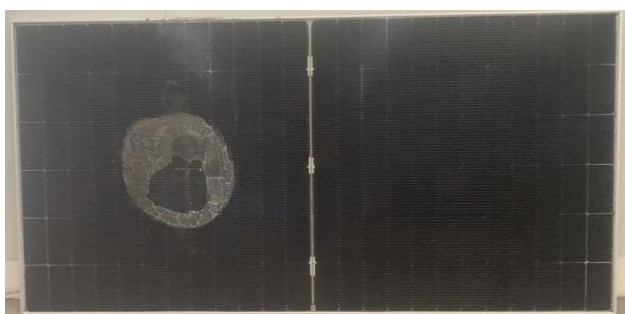
Sample 1#: Spread of flame test (front)

Sample 1#: Spread of flame test (back)



Sample 2#: Spread of flame test (front)

Sample 2#: Spread of flame test (back)



Sample 3#: Burning brand test (front)

Sample 3#: Burning brand test (back)

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