

JW-HD108N

N-type Bifacial Mono Module
with SMBB Technology

415-435W

J-TOPCon 2.0
Technology



435W
Maximum Power Output

22.27%
Maximum Module Efficiency

0~+5W
Power Output Tolerance

IEC61215(2016), IEC61730(2016) | ISO9001:2015: Quality Management System | ISO14001:2015: Environment Management System
ISO45001:2018: Occupational health and safety management systems | IEC62941: 2019: Quality system for PV module manufacturing



10-30% Additional Power Generation
30 years lifespan brings 10-30% additional power generation comparing with conventional P-type module



Better Weak Illumination Response
Higher power output even under low-light environments like on cloudy or foggy days



ZERO LID (Light Induced Degradation)
N-type solar cell has no LID naturally which can increase power generation



Better Temperature Coefficient
Higher power generation under working conditions, thanks to passivating contact cell technology



Higher Reliability
Adopted Jolywood latest J-TOPCon2.0 technology, No polysilicon wrap around, Full electrical isolation, Zero leakage current; Much Safer for roof

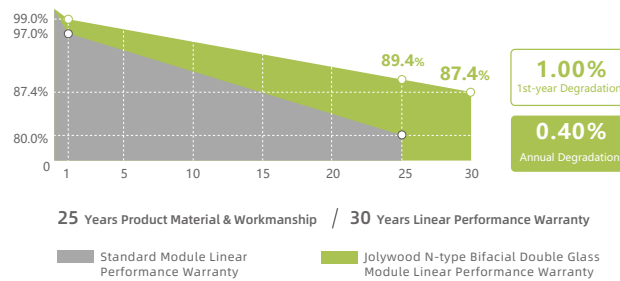


Wider Applicability
More application scenes like BIPV, vertical installation, snowfield, high-humid, windy and dusty area

Jolywood Delivers Reliable Performance Over Time

- Leader of N-type bifacial manufacturer
- Full-automatic facility and industry-leading technology
- Best-in-class durability and reliability
- BNEF Tier One

Linear Performance Warranty



*Subject to the terms and conditions contained in the applicable Jolywood Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on residential rooftops in certain regions.

Electrical Properties | STC*

Testing Condition	Front Side	Front Side	Front Side	Front Side	Front Side
Peak Power (Pmax) (W)	415	420	425	430	435
MPP Voltage (Vmp) (V)	31.7	31.9	32.1	32.3	32.5
MPP Current (Imp) (A)	13.10	13.17	13.24	13.32	13.39
Open Circuit Voltage (Voc) (V)	37.7	37.9	38.1	38.3	38.4
Short Circuit Current (Isc) (A)	13.91	13.98	14.05	14.12	14.18
Module Efficiency (%)	21.25	21.51	21.76	22.02	22.27

*STC: Irradiance 1000 W/m², Cell Temperature 25°C, AM1.5
The data above is for reference only and the actual data is in accordance with the practical testing Power Measurement Tolerance ±3%

Electrical Properties | NOCT*

Testing Condition	Front Side	Front Side	Front Side	Front Side	Front Side
Peak Power (Pmax) (W)	315	318	322	326	330
MPP Voltage (Vmp) (V)	29.8	30.0	30.2	30.3	30.5
MPP Current (Imp) (A)	10.56	10.62	10.67	10.74	10.82
Open Circuit Voltage (Voc) (V)	36.0	36.2	36.4	36.6	36.8
Short Circuit Current (Isc) (A)	11.22	11.27	11.33	11.38	11.44

*NOCT: Irradiance 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s

Operating Properties

Operating Temperature (°C)	-40°C~+85°C
Maximum System Voltage (V)	1500V DC (IEC)
Maximum Series Fuse Rating (A)	30
Power Tolerance	0~+5W
Bifaciality*	80%

*Bifaciality=Pmaxrear (STC) /Pmaxfront (STC) , Bifaciality tolerance:±5%

Temperature Coefficient

Temperature Coefficient of Pmax*	-0.300%/°C
Temperature Coefficient of Voc	-0.250%/°C
Temperature Coefficient of Isc	+0.045%/°C
Nominal Operating Cell Temperature (NOCT)	42±2°C

*Temperature Coefficient of Pmax±0.03%/°C

Mechanical Properties

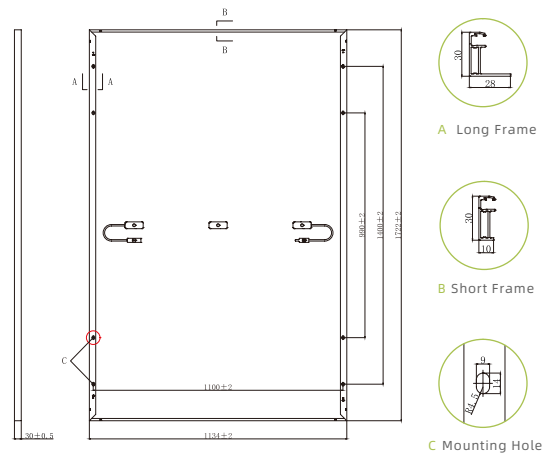
Cell Size	182.00mm*91.00mm
Number of Cells	108pcs(12*9)
Module Dimension	1722mm*1134mm*30mm
Weight	24.5kg
Front / Rear Glass*	2.0mm/2.0mm
Frame	Anodized Aluminium Alloy
Junction Box	IP68 (3 diodes)
Length of Cable	4.0mm ² , +300mm/-180mm (Cable length can be customized)

*Heat strengthened glass

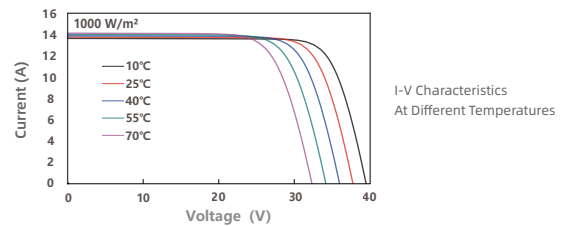
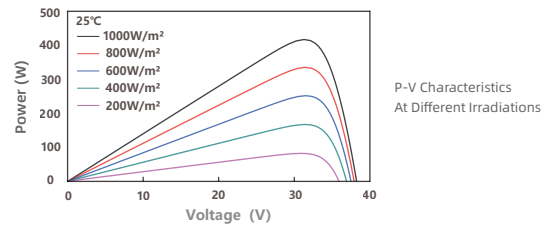
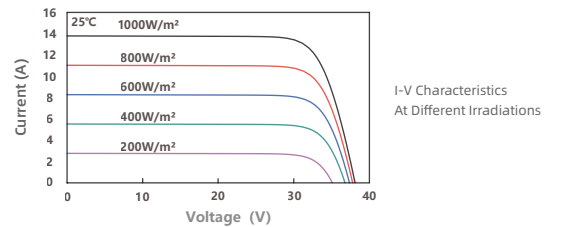
With Different Power Generation Gain (regarding 415W as an example)

Power Gain (%)	Peak Power (Pmax) (W)	MPP Voltage (Vmp) (V)	MPP Current (Imp) (A)	Open Circuit Voltage (Voc) (V)	Short Circuit Current (Isc) (A)
10	448	31.7	14.13	37.7	14.99
15	465	31.7	14.65	37.7	15.54
20	481	31.7	15.17	37.7	16.08
25	498	31.7	15.69	37.7	16.62
30	515	31.8	16.20	37.8	17.16

Engineering Drawing (unit: mm)



Characteristic Curves | HD108N-415



Packaging Configuration

Packing Type	20'GP	40'GP	40'HQ
Piece/Pallet		36	
Pallet/Container	6	13	26
Piece/Container	216	468	936

*The specification and key features described in this datasheet may deviate slightly and are not guaranteed. Due to ongoing innovation, R&D enhancement, Jolywood (Taizhou) Solar Technology Co., Ltd. reserves the right to make any adjustment to the information described herein at any time without notice. Please always obtain the most recent version of the datasheet which shall be duly incorporated into the binding contract made by the parties governing all transactions related to the purchase and sale of the products described herein.





Product Service

Attestation of Conformity

No. N8A 098081 0013 Rev. 02

Holder of Certificate: **Jolywood (Taizhou) Solar Technology Co., Ltd.**
Kaiyang Rd.Jiangyan Economic Development Zone
225500 Taizhou City,Jiangsu Province
PEOPLE'S REPUBLIC OF CHINA

Product: **Crystalline Silicon Terrestrial Photovoltaic (PV) Modules**
Mono-Crystalline Silicon Photovoltaic Module

This Attestation of Conformity is issued on a voluntary basis according to the Low Voltage Directive 2014/35/EU relating to electrical equipment designed for use within certain voltage limits. It confirms that the listed equipment complies with the principal protection requirements of the directive and is based on the technical specifications applicable at the time of issuance. It refers only to the particular sample submitted for testing and certification. For details see: www.tuvsud.com/ps-cert

Test report no.: 704061930402-07

Date, 2021-03-30

(Zhulin Zhang)

Page 1 of 2

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.



Product Service

Attestation of Conformity

No. N8A 098081 0013 Rev. 02

Model(s):

- 1) JW-D72N-xxx, xxx= 365-410, in step of 5
 - 2) JW-D60N-xxx, xxx= 305-340, in step of 5
 - 3) JW-HD144N-xxx, xxx=390-420, in steps of 5
 - 4) JW-HD120N-xxx, xxx=325-350, in steps of 5
 - 5) JW-HD144P-xxx, xxx=390-415, in steps of 5
 - 6) JW-HD120P-xxx, xxx=325-345, in steps of 5
 - 7) JW-HD156N-xxx, xxx=425-455, in steps of 5
 - 8) JW-HD156P-xxx, xxx=425-445, in steps of 5
 - 9) JW-HD144N-xxx, xxx=430-470, in steps of 5
 - 10) JW-HD120N-xxx, xxx=360-390, in steps of 5
 - 11) JW-HD144P-xxx, xxx=430-450, in steps of 5
 - 12) JW-HD120P-xxx, xxx=360-375, in steps of 5
 - 13) JW-HD144N-xxx, xxx=525-555, in steps of 5
 - 14) JW-HD120N-xxx, xxx=435-460, in steps of 5
 - 15) JW-HD144P-xxx, xxx=525-545, in steps of 5
 - 16) JW-HD120P-xxx, xxx=435-450, in steps of 5
 - 17) JW-HD132N-xxx, xxx=485-505, in steps of 5
 - 18) JW-HD108N-xxx, xxx=395-415, in steps of 5
- xxx is standing for rated output power at STC.

Parameters:

Construction:	Framed or frameless, with Junction box, Cable and Connectors.
Safety Class:	Class II
Maximum System Voltage:	1500 V DC
Fire Safety Class:	Class C according to UL 790
Test Laboratory:	Yangzhou Opto-Electrical Products Testing Institute, No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

Tested according to:

- EN IEC 61730-1:2018
- EN IEC 61730-1:2018/AC:2018-06
- EN IEC 61730-2:2018
- EN IEC 61730-2:2018/AC:2018-06

Page 2 of 2

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.



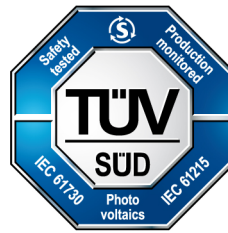
Product Service

CERTIFICATE

No. Z2 098081 0012 Rev. 14

Holder of Certificate: **Jolywood (Taizhou) Solar Technology Co., Ltd.**
Kaiyang Rd.Jiangyan Economic Development Zone
225500 Taizhou City, Jiangsu Province
PEOPLE'S REPUBLIC OF CHINA

Certification Mark:



Product: **Crystalline Silicon Terrestrial Photovoltaic (PV) Modules**
Mono-Crystalline Silicon Photovoltaic Module

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the testing and certification regulations of TÜV SÜD Group have to be complied. For details see: www.tuvsud.com/ps-cert

Test report no.: 704061930402-14

Valid until: 2026-11-24

Date, 2021-11-26

(Zhulin Zhang)

CERTIFICATE

No. Z2 098081 0012 Rev. 14

Model(s):

- 1) JW-D72N-xxx, xxx= 365-410, in step of 5
 - 2) JW-D60N-xxx, xxx= 305-340, in step of 5
 - 3) JW-HD144N-xxx, xxx=390-420, in step of 5
 - 4) JW-HD120N-xxx, xxx=325-350, in step of 5
 - 5) JW-HD144P-xxx, xxx=390-415, in step of 5
 - 6) JW-HD120P-xxx, xxx=325-345, in step of 5
 - 7) JW-HD156N-xxx, xxx=425-455, in step of 5
 - 8) JW-HD156P-xxx, xxx=425-445, in step of 5
 - 9) JW-HD144N-xxx, xxx=430-470, in step of 5
 - 10) JW-HD120N-xxx, xxx=360-390, in step of 5
 - 11) JW-HD144P-xxx, xxx=430-450, in step of 5
 - 12) JW-HD120P-xxx, xxx=360-375, in step of 5
 - 13) JW-HD144N-xxx, xxx=525-575, in step of 5
 - 14) JW-HD120N-xxx, xxx=435-480, in step of 5
 - 15) JW-HD144P-xxx, xxx=525-555, in step of 5
 - 16) JW-HD120P-xxx, xxx=435-460, in step of 5
 - 17) JW-HD132N-xxx, xxx=485-525, in step of 5
 - 18) JW-HD108N-xxx, xxx=395-430, in step of 5
 - 19) JW-HD132P-xxx, xxx=485-505, in step of 5
 - 20) JW-HD108P-xxx, xxx=395-415, in step of 5
 - 21) JW-HD120P-xxx, xxx=580-610, in step of 5
 - 22) JW-HD120N-xxx, xxx=580-620, in step of 5
 - 23) JW-HD156N-xxx, xxx=580-620, in step of 5
- xxx is standing for rated output power at STC.

Parameters:

Construction:	Framed or frameless, with Junction box, Cable and Connectors.
Safety Class:	Class II
Maximum System Voltage:	1500 V DC
Fire Safety Class:	Class A or Class C according to UL 790
Test Laboratory:	Yangzhou Opto-Electrical Products Testing Institute, No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China.

Tested according to:

IEC 61215-1:2016
IEC 61215-1-1:2016
IEC 61215-2:2016
IEC 61730-1:2016
IEC 61730-2:2016
EN 61215-1:2016
EN 61215-1-1:2016
EN 61215-2:2017
EN IEC 61730-1:2018
EN IEC 61730-1:2018/AC:2018-06
EN IEC 61730-2:2018
EN IEC 61730-2:2018/AC:2018-06

LIMITED WARRANTY

Applied to : Roof Top Project

Applied Regions: Australia, Europe, Korea and Japan

Limited Warranty

Effective Date: 2nd Nov, 2022

Doc No.: JW-Roof Top Project-2022-V3

Thanks for choosing the photovoltaic solar module products made by Jolywood (Taizhou) Solar Technology Co., Ltd. (hereinafter referred to as "JOLYWOOD") who will provide a **25-year Limited Product Warranty** from WARRANTY START DATE (hereinafter referred to as "Limited Product Warranty Period") and a **30-year Limited Power Warranty** (hereinafter referred to as "Limited Power Warranty Period") from WARRANTY START DATE (collectively, hereinafter referred to as "Warranty Period"), for Niwa Modules (HD120N-M6, **HD108N-M10**, HT108N-M10) installed on Roof Top Project located in the territory of Australia , Europe, Korea and Japan (hereinafter referred to as "CUSTOMER") in accordance with this <Limited Warranty>.

1. WARRANTY START DATE

JOLYWOOD provides the Limited Warranty set forth herein commencing upon (1) one hundred and twenty(120) days following the delivery date from factory, or (2) installation date, whichever comes earlier ("WARRANTY START DATE").

2. LIMITED PRODUCT WARRANTY

Subject to the limitations & exclusions contained herein, JOLYWOOD warrants its MODULES, including factory-assembled DC connectors and cables, if any, to be free from defect in materials and workmanship, as per the mechanical and electrical characteristics of MODULES ' datasheet, under proper installation, normal use specifies in JOLYWOOD's standard documentations such as installation manual etc. If MODULES fail to comply with this Limited Product Warranty during Limited Product Warranty Period, JOLYWOOD will, at its option, either repair or replace the product, or refund market residual value at the time of warranty claim resolution of comparable JOLYWOOD MODULES.

The remedy solutions under this clause shall be the sole and exclusive remedy provided under the "Limited Product Warranty" and shall not be extended beyond the period set forth herein.

3. LIMITED POWER WARRANTY

JOLYWOOD warrants that Limited Power Warranty Period, the degradation rate of MODULES shall not exceed the amount as set forth below under Standard Test Condition (STC).

For N type Mono-crystalline MODULES, (i) **1.0%** in the first year; (ii) **0.4%** each year thereafter until that date which is thirty (**30**) years following the WARRANTY START DATE, at which time the actual power output shall be not less than 87.4% of the nominal power output. See Table 1 below.

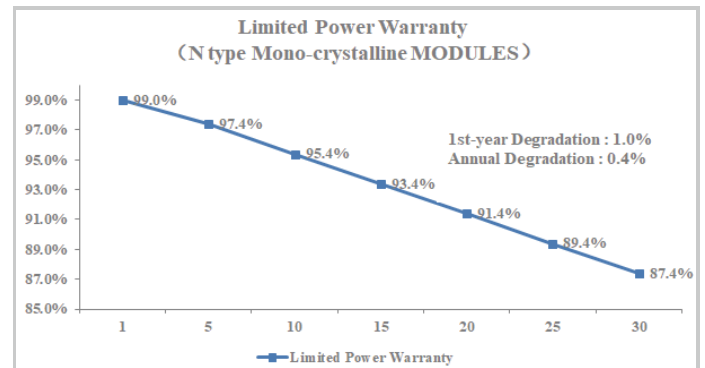


Table 1 : Limited Power warranty for N type Mono-crystalline MODULES

For P type Mono-crystalline MODULES, (i) 2.0% in the first year; (ii) 0.45% each year thereafter until that date which is thirty (30) years following the WARRANTY START DATE, at which time the actual power output shall be not less than 84.95% of the nominal power output. See Table 2 below.

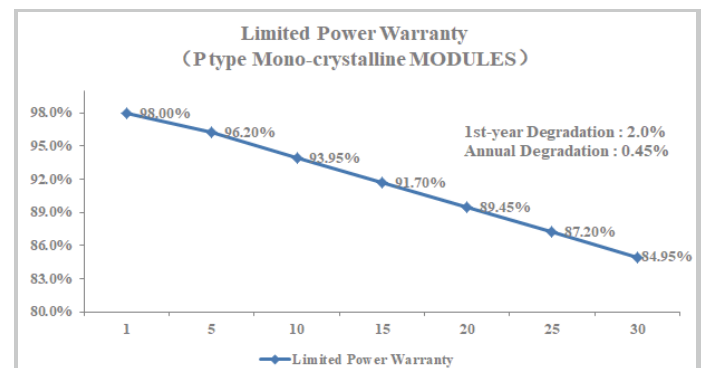


Table 2 : Limited Power warranty for P type Mono-crystalline MODULE

Power Definition:

(i) Standard Test Condition (STC): (i) light spectrum of AM 1.5, (ii) an irradiation of 1000 W per m² and (iii) a cell temperature of 25 degrees centigrade at right angle irradiation. The measurements are carried out in accordance with IEC 61215 as tested at the connectors or junction box terminals – as applicable – per calibration and testing standards of JOLYWOOD valid at the date of manufacture of the MODULES.

(ii) Nominal Power Output: means the original manufactured nameplate specification of the MODULES, expressed in Watts, as certified by JOLYWOOD and indicated on the MODULE, excluding any specified positive tolerance.

(iii) Actual Power output: means the power output of the MODULES expressed in Watts at watt peak that a MODULE generated or, for a Bifacial MODULE that the front-side of a Bifacial MODULE generates, at a given point in time in a year after the Warranty Start Date under Standard Test Condition (STC).

(iv) Degradation Rate: shall be any positive amount calculated in accordance with the following formula, expressed as a percent:

Degradation Rate = 1- (actual power output/ nominal power output)

JOLYWOOD warrants each MODULE against defects in materials and workmanship that result in the failure of the MODULES to produce the warranted percentage specified above of the nominal power output for the MODULE set forth in JOLYWOOD product datasheet. If JOLYWOOD determines in its discretion that any MODULE is not providing the warranted percentage of the nominal power output because of defects in materials and workmanship, JOLYWOOD will at its option either (i) provide extra MODULES for power loss, or (ii) refund to the CUSTOMER current market value of power loss, or (iii) repair or replace the defective MODULES at its own cost.

The remedy solutions under this clause shall be the sole and exclusive remedy provided under the “Limited Power

Warranty” and shall not be extended beyond the period set forth herein.

4. NON-INDEPENDENT WARRANTY

The CUSTOMER shall be entitled to claim for the Limited Warranty above-mentioned. If a case simultaneously was in breach of both Limited Product Warranty and Limited Power Warranty, and when JOLYWOOD has already provided solution to one of them, it can be considered that JOLYWOOD has solved all applicable warranty claims. Under this circumstance, the CUSTOMER shall no longer claim for Limited Warranty during the Warranty Period.

5. THRESHOLD CONDITIONS OF WARRANTY

(i) In any case, all warranty claims should be submitted to JOLYWOOD by written form with relevant written evidence within Warranty Period.

(ii) The warranties shall not apply to any MODULE for which full and final payment has not been received by JOLYWOOD.

(iii) The warranties shall not apply to any MODULES failed to comply with Limited Warranty due to following events or circumstances:

√ Improper installation, misuse, improper operation and maintenance, which have not follow the installation manual of JOLYWOOD.

√ Altered, repaired or modified without prior written consent of JOLYWOOD or otherwise inconsistent with JOLYWOOD'S written instructions.

√ Removed and re-installed at any location other than the physical location in which it was originally installed following purchase by CUSTOMER or receipt from JOLYWOOD as a replacement MODULE.

√ Installed on movable place, marine environment, extremely hot weather, acid rain, salt mist, chemicals, corrosion, oxidation etc., or other abnormal, severe environment.

√ Force Majeure, such as electrical surges, lightning, flood, fire, vandalism, tampering, accidental breakage, or other events beyond JOLYWOOD'S control.

√ Negligence, willful misconduct or accident in the course of storage, transportation, handling, installation, application, normal use or maintenance.

√ Subject to direct contact with salt water, corrosive materials, pest damage, or malfunctioning PV system components.

√ Type or serial number of the MODULES have been altered, removed or made illegible.

√ Damage caused by external facilities.

(iv) For repair or replacement of modules under both Limited Product Warranty and Limited Power Warranty, JOLYWOOD shall only bear shipping cost to the delivery point under Incoterms same with defected modules.

(v) JOLYWOOD shall not bear any costs for returning of defected modules.

(vi) Installation and operation of MODULES shall be conducted by qualified professional skills. All claims shall be documented. JOLYWOOD shall not undertake any responsibility or cost without prior written consent.

6. LIMITATION OF LIABILITY

THE LIMITED WARRANTY REPLACES AND EXCLUDES ALL OTHER EXPLICIT OR IMPLICIT WARRANTY TERMS, INCLUDING BUT NOT LIMITED TO MERCHANTABILITY WARRANTY. IT'S A WARRANTY FOR SPECIFIC PURPOSE, USE OF APPLICATION WHICH DOES NOT INFRINGE UPON THE RIGHT OF A THIRD PARTY, INCLUDING BUT NOT LIMITED TO INTELLECTUAL PROPERTY AND ALL OTHER RESPONSIBILITIES OR OBLIGATIONS THAT BELONG TO JOLYWOOD, UNLESS CONFIRMED BY THE CEO WITH SIGNATURE. IF IT IS NOT PROHIBITED BY LOCAL LAW

OR REGULATIONS, TO ANY REASON CAUSED BY PRODUCTS OR RELATED TO THEM, INCLUDING BUT NOT LIMITED TO MODULES OR DEFECTS CAUSED BY USE OR APPLICATION. JOLYWOOD WILL NOT UNDERTAKE ANY RESPONSIBILITIES OR OBLIGATIONS FOR DAMAGE TO ANY NATURAL PERSON OR TANGIBLE PROPERTY OR DAMAGE IN OTHER ASPECTS. FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT OR SPECIAL DAMAGES, REGARDLESS OF THE GENERATION, OR EVEN JOLYWOOD HAS BEEN INFORMED IN ADVANCE OF SUCH DAMAGE, JOLYWOOD IS IRRESPONSIBLE UNDER ANY CIRCUMSTANCES. THEREFORE, THE USE LOSS, PROFIT LOSS, PRODUCTION LOSS, INCOMING LOSS AND OTHER SPECIFIC LOSSES ARE NOT INCLUDED IN THE WARRANTY SCOPE. IF JOLYWOOD UNDERTAKES THE DAMAGE OR OTHER RESPONSIBILITIES, THE ACCUMULATED COMPENSATION AMOUNT WILL NOT EXCEED THE INVOICING VALUE OF A SINGLE MODULE PAID BY THE CUSTOMER.

7. WARRANTY TRANSFER

This "Limited Warranty" is transferable to subsequent owners of the MODULES provided that:

(1) The MODULES remain located in their original installation location, and

(2) The CUSTOMER notifies JOLYWOOD in writing specifying the transferee's identity and contact information, before such transfer.

8. NOTICE

Any notice required or permitted under this Limited Warranty shall be in writing to JOLYWOOD's customer service team or sales (mail, fax, or other written form).

9. CLAIMS

CUSTOMER shall bear the burden of establishing a breach of the Warranties hereunder. If CUSTOMER believes there has been a breach of the Limited Product Warranty or Limited

Power Warranty (collectively, "Warranties"), then CUSTOMER shall promptly, and no later than thirty (30) days from the day becomes or should have become aware of such breach, provide notice to JOLYWOOD setting forth the following information related to the claim including but not limited to (i) party making claim (ii) detailed description about defect (iii) serial number (iv) evidence, including photographs and measurement data (v) the copy of commercial invoice and the purchase date.

The return of any MODULES will not be accepted unless prior written approval has been given by JOLYWOOD. If proved by inspection that no breach of this Limited Warranty occurred, JOLYWOOD shall not take any responsibility for repair, replacement or compensation of returning MODULES. Any incurred cost including but not limited to custom clearance cost, shipping cost should be borne by CUSTOMER. The replacement MODULES delivered to CUSTOMER in advance should be compensated to JOLYWOOD.

10. Disputes

In case of any dispute occurred during the warranty claim, a first-class international test-institute designated or accepted by JOLYWOOD shall be involved to settle the claim finally. All fees and expenses shall be borne by the losing party. And the final explanation right shall be borne by JOLYWOOD.

11. Others

The repair or replacement of the MODULES or the supply of extra MODULES will not, neither lead to the beginning of new warranty period, nor extend the original warranty period. Any MODULES been replaced shall become the property of JOLYWOOD.

JOLYWOOD has right to deliver another type (different in size, color, shape and/or power) in case JOLYWOOD has discontinued producing the replaced MODULES at the time of warranty claim resolution.

12. Force Majeure

JOLYWOOD shall not be responsible or liable in any way to the CUSTOMER or any third-party arising from any non-performance or delay in performance of any terms and conditions of sale, including this "Limited Warranty", due to a force majeure event, including, without limitation, acts of God, war, riots, strikes, warlike conditions, perils of the seas, plague or other epidemics, fire, flood, or any other similar cause or circumstance beyond the reasonable control of JOLYWOOD. In such cases, performance by JOLYWOOD of this Limited Warranty shall be suspended without liability for the period of delay reasonably attributable to such causes.

NOTES:

If you have purchased this product in Australia, you should be aware that this warranty is provided in addition to other rights and remedies held by a consumer at law. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the good repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

In case of questions regarding the products, quality and performance, please feel free to contact the regional office below or mail to service@jolywood.cn for help.

Jolywood Solar Technology Australia Pty. Ltd.
Address: U604/7 Jenkins Road, CARLINGFORD NSW 2118
Tel: +61 411698941
Email: ivan.zhang@jolywood.cn