Building **Your Trust** in Solar

Claim Manual EU

Version: 4.0
Deparment: Technical Service EU
Contact: cs.eu@jinkosolar.com

Contents

EXECUTIVE SUMMARY

Thank you for choosing Jinko Solar as your supplier of PV modules. To ensure the PV modules are installed correctly, please carefully read and strictly follow the installation and operation instructions manual.

The purpose of this Manual is to provide the claim guideline procedure to all our customers in the event of the occurrence of defects and how to process them according to our standards.

This manual is applicable only to the PV modules that are installed, connected and operated in accordance with the installation and operation instructions, hence covered by Jinko's Product Warranty.

HOW TO MAKE A CLAIM

To submit a claim please follow these steps:

Phase A:

- Perform the site inspection to detect any possible defect/effect according to the criteria described in this document, as well as, collect all the info and evidence required.

Phase B:

- Go to https://www.jinkosolar.eu/en/customer-service/after-sales.html
- Download the mandatory docs.
- Please provide, for each PV module potentially affected by a defect/effect, the information, pictures, and documents required for each type of defect/effect in accordance with this guideline document. In addition to the above, please also include the information and documentation below when applicable on a case by case basis:
  - •In case of electrical/performance defect provide the measurement set-up and picture of the device's display, IV curves.
  - •In case of visual defects, please provide more than one picture, preferably illustrating the relevant PV module/s from different angles.
  - •All photos must be minimum 1MB size, please pay attention to the resolution of the photos, as their level of definition helps us in determining the possible root of the problem, hence the solution to the issue.
  - •Always provide the serial number of each PV module affected by the defect/effect. To the end of speeding up our action, we suggest that you name the photos of the defect/effect with the serial number of the PV module/s.
- Please send the package of information, photos, and documentation by WeTransfer link if such package is bigger than 10 MB.
- The package containing the information, photos and documentation shall be addressed to: cs.eu@jinkosolar.com

IMPORTANT SAFETY RULES

Before accessing any site where a solar power plant is installed and carrying out any visit, inspection, works, maintenance and any activities alike, please consider that PV modules generate DC electrical energy when exposed to sunlight or other light sources. Active parts of the PV modules, including but not limited to, terminals may cause burns, sparks, and result in lethal electric shock. The PV modules shall be handled exclusively by authorized personnel adequately trained and fully equipped to access a power plant involving, among others, the risk of electric shock.

Make sure that you always strictly comply with all health and safety laws and regulations applicable in the territory where the PV Modules are installed. The following are some general recommendations that we wish to share with you, provided such recommendations shall not be regarded as a substitute of the prescriptions of any applicable law or regulation, the compliance with which shall always prevail in all cases:

- Always wear protective head gear, insulating gloves and safety shoes with rubber soles.
- Due to the risk of electrical shock, do not perform any work if the terminals of the PV module are wet. Always use insulated tools and never use wet tools.
- During the operation, do not use sharp tools to wipe the back sheet and the glass. It may cause scratches and damages to the PV module and potentially hinder its operational capability and/or limit your benefit to the Warranty.
- Never disconnect the PV Module connectors under load.
- Do not cut the wires while the module is under load.
- Do not open a Fuse Switch Disconnectors if they´re not developed to mitigate the electrical arc.

Should you have any doubt, inquiry and support request, please do not hesitate to contact the Jinko Technical Team by writing directly to:

cs.eu@jinkosolar.com

STANDARD DEFINITIONS

For the purpose of this document the following definitions shall apply:

"Warranty Start Date" means the date from which the Warranties provided by Jinko Solar on its PV modules are effective, such date being the earlier between: a) the date of delivery of the PV modules to the original purchaser thereof; or b) the date occurring one hundred and eighty (180) calendar days after the PV module' s relevant manufacturing date, the latter being indicated by the serial number [digit no. 7 – 12 (YYMMDD), starting from the left side of the serial number of each PV module.

"Limited Product Warranty" means the warranty provided by Jinko Solar on its PV modules as of the Warranty Start Date and terminating on that date occurring one hundred and twenty (120) months thereafter, pursuant to which Jinko Solar warrants that the relevant PV modules and their respective DC connectors and cables, if any, shall be free from material defects in design, materials and workmanship that affect the performance of the relevant PV modules (the). For the sake of clarity, material defects shall not include normal wear and tear, and visual or cosmetic defects that do not hinder the use of the PV modules for the use they are intended to or their performance.

"Limited Power Warranty" means the warranty provided by Jinko Solar on its PV modules pursuant to which the Degradation Rate shall not exceed the percentages set out in this paragraph within the reference periods calculated as of the Warranty Start Date: (a) for monocrystalline Modules: (i) 3.0% in the first year; (ii) 0.7% each year thereafter until that date which is twenty-five (25) years following the Warranty Start Date, at which time the Actual Power Output shall be not less than 80.2% of the Nominal Power Output; and (b) for polycrystalline modules: (i) 2.5% in the first year; (ii) 0.7% each year thereafter until that date which is twenty-five (25) years following the Warranty Start Date, at which time the Actual Power Output shall be not less than 80.7% of the Nominal Power Output(the).

"Degradation Rate" means any positive amount calculated in accordance with the following formula expressed as a percentage:

$$DR = 1.00 - [(PO_t) / (PO_0)]$$

"Nominal Power Output (PO0)" means the original manufactured nameplate specification of the relevant PV module, expressed in Watts, as certified by Jinko Solar and indicated on the relevant PV module, excluding any specified positive tolerance.

"Actual Power Output (POt)" means the power output of the relevant PV module, expressed in Watts, at Watt peak that a relevant PV module generates at a given point in time in a year after the Warranty Start Date (t) in its 'Maximum Power Point' under Standard Test Conditions, corrected for any measurement error ("STC")..

"Standard Test Conditions" or "STC" means the following standard test conditions measured in accordance with IEC 61215: (a) light spectrum of AM 1.5; (b) an irradiation of 1000W per m2; and (c) a cell temperature of 25 degrees centigrade at right angle irradiation.

DEFECTS CRITERIA

Please find in the following pages the Jinko Solar criteria to detect and identify a possible defect, as well as the relevant guidelines and procedures to request the support of the Jinko Technical Team.

1.HOT SPOT

Hot-spot heating occurs in a PV module when its operating current exceeds the reduced short-circuit current of a shadowed or faulty cell or group of cells within it. We, Jinko Solar, highly recommend using thermograph analysis to detect the presence of possible hot spot defects.

1.1. Procedure

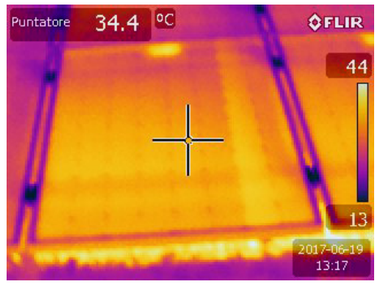
- Inspect the surface of the solar modules carefully and remove any possible shading
- Ensure the PV array is well connected and operating
- Check inverter display or String electrical output
- Position the camera as perpendicularly as possible to the object being measured
- Avoid any shading effect or dirty conditions during the measurement phase
- Record module serial number, time, date, picture number, and module location in the array

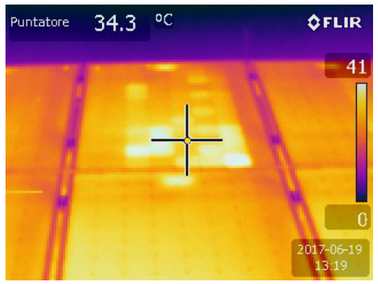
1.2. General requirements of the equipment (Infrared Image Camera)

Temperature Measurement Accuracy, within +/- 2 ℃,
Detector resolution (infrared), at least 160*120 (19200 Pixels).

1.3. Criteria

Single cell temperature exceeds 105 degree C, or temp difference greater than 20 degree between highest and lowest cell temp of the same module.





Please note that any damage to the PV modules caused by shading, system design, installation, maintenance, or force majeure shall render the warranty void in respect to such PV modules.

In the event you detect the possible presence of hot spot heating in the PV module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Thermal image with a clear information of the temperature
- Normal front picture of the PV module
- Related PV Module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

2.DISCONNECTED SUBSTRING

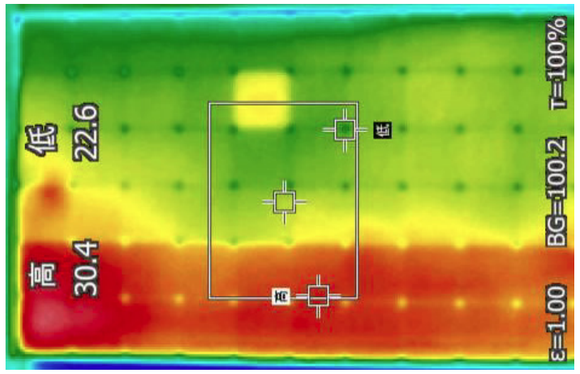
2.1. Criteria

- Measuring a module in Open circuit, the voltage should be approximately 2/3 or 1/3 of the Voc in STC Conditions, just only it´s necessary to consider the slight variations on the voltage value due to module temperature/ Irradiance level

- An IV curve should show the Voltage level to approximately 2/3 or 1/3 of the V in STC conditions, just only it´s necessary to consider the slight variations on the voltage value due to module temperature/ Irradiance Level

- An IR Picture should show one or two substrings with a slightly higher temperature level

- An IR Picture should show diodes in conducting state



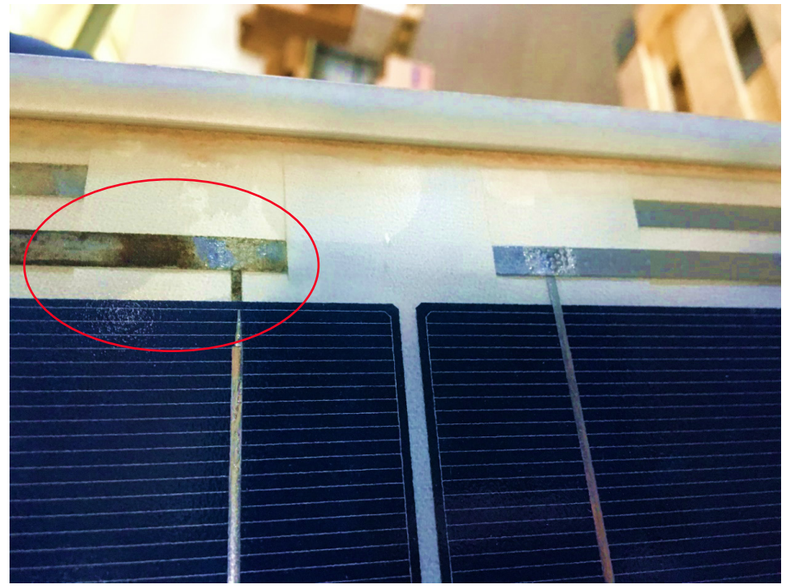
In the event you detect the possible presence of disconnected substring/s in the PV module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Thermal image of the PV module
- Normal front picture of the PV module
- Related PV module serial number

*Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

3.DELAMINATION

Delamination occurs when the bond between the plastic backsheet (on the back) and the glass (on the front) fails. Delamination forming a continuous path between any part of the electrical circuit and the edge of the module is considered as a major defect. This is a substantial problem for a PV module because it allows air and moisture to creep inside the PV module, causing corrosion and imminent failure.



WARNING: The delamination of the back sheet may enable the possibility of exposure to active electrical components, especially when the modules are wet. Please make sure you put in place all measures and actions required by the laws applicable in the territory in which the PV modules are installed to the end of avoiding electrical shock.

Delaminated solar modules should be replaced.
Due to the delamination, moisture can get to the cells which leads to cell corrosion and an ongoing performance loss. Further, the light transmission is reduced.

3.1. Criteria

- In the event you detect the possible presence of delamination on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected: Clear picture of the defect
- Photo of the whole PV module
- Related PV module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

4. GLASS BREAKAGE

In most cases, glass breakages are caused by external conditions such as poor handling during transportation, during installation or, less frequently, by hail and/or acts of third party (such as stone throwing).It is very rare for the glass to break due to manufacturing or material defects.

4.1 Criteria

Visual criteria to detect glass breakage

4.1.1Glass breakage from Hit

- clear hit point
- splintering of glass parts
- possible deformation of the frame

Panels with broken glass should be replaced.

4.1.2. Spontaneous glass breakage

- No hit point and no deformation of the frame
- Initial point with the contour of a butterfly, radial yield lines
- In the event you detect the possible presence of a glass breakage on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected: Clear picture of the defect
- Photo of the whole PV module
- One or more detail photo of the initial point of the glass breakage
- Related PV module serial number

We would like to specify that the glass breakage is considered a defect only in the cases where such glass breakage is caused by a manufacturing issue.

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

5. JUNCTION BOX ISSUES

The junction box contains the bypass diodes of the PV module. Bypass diodes are electric components that in case of need - for example, partial shading of the modules - bridge a part of the solar cells and thus cut them off.

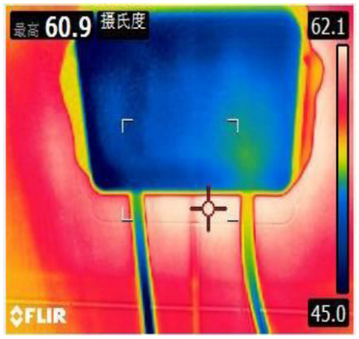
Faulty bypass diodes or connections due to a manufacturing fault can also generate overheating and lead to arcing in the junction box. Please note that Jinko Solar installs fire-resistant materials to the end of preventing or limiting the fire from spreading out.

5.1.Criteria

Junction box top temperature should be less than 90 ° C. Exceed 90° C judgment junction box temperature abnormal.

In the event you detect the possible presence of a junction box issue on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Junction box Thermal Image
- Normal digital picture of the module's back-side
- Related PV module serial number



* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

6.LOW PERFOMANCE DEFECT

6.1.Criteria

In presence of low performance defect, we recommend performing I-V curve tests on site. I-V curve tracing reveals more about the efficiency of a PV module or array than any other measurement method. It is also the fastest way to test the performance of a PV module.

The I-V curve (Figure 1) represents all possible operating points (current and voltage) of a PV module at the existing conditions of sunlight (irradiance) and temperature. The curve starts at the short circuit current and ends at the open circuit voltage. The maximum power point, located at the knee of the I-V curve, is the operating point that delivers the highest output power. It is the job of the inverter to find and operate at that point on the I-V curve, and to adapt as the curve changes with irradiance and temperature. The P-V curve (power versus voltage) reads zero at the ends and a maximum at the knee of the I-V curve. Any impairment – such as shading, soiling, or series resistance – that affects the shape of the I-V curve (Figure 2) will reduce the maximum power and diminish the value of the array as an energy source.

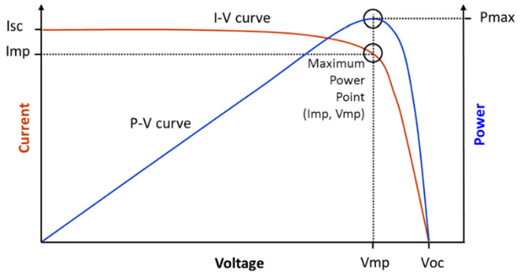


Fig. 1 I-V and P-V curves for a PV module or string.

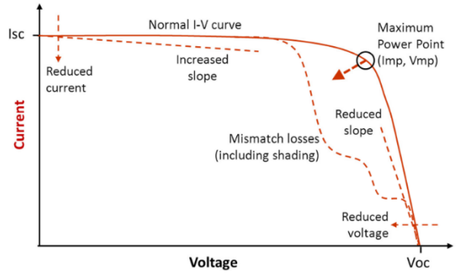


Fig. 2 The five types of deviation from normal I-V curve shape.

If the performance of the single PV module is under the minimum value guaranteed, the Jinko Solar Technical Team will investigate the root cause and provide support performing site inspection or lab test if needed.

In the event you detect the possible presence of a low performance defect on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- I-V curves report and data
- Technical plant document design (SLD, Layout, Report)
- General pictures of the plant where the PV module/s is7are installed (PV array, Inverters, Mounting system)
- Related PV module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

7.MAJOR VISUAL DEFECTS

The following are considered major visual defects:

- Broken, cracked, or torn external surfaces, including superstrates, substrates, frames and junction boxes
- Bent or misaligned external surfaces, including superstrates, substrates, frames and junction boxes to the extent that the installation and/or operation of the module would be impaired
- A crack in a cell the propagation of which could remove more than 10 % of that cell's area from the electrical circuit of the module
- Bubbles or delaminations forming a continuous path between any part of the electrical circuit and the edge of the module
- Loss of mechanical integrity, to the extent that the installation and/or operation of the module would be impaired.

7.1. Criteria for assessing visual defects

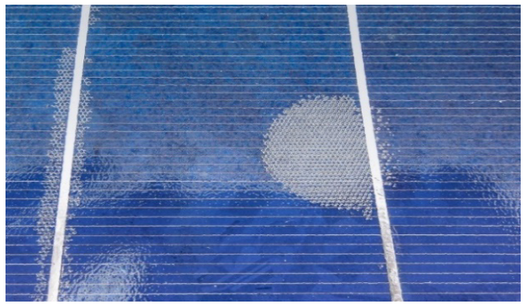
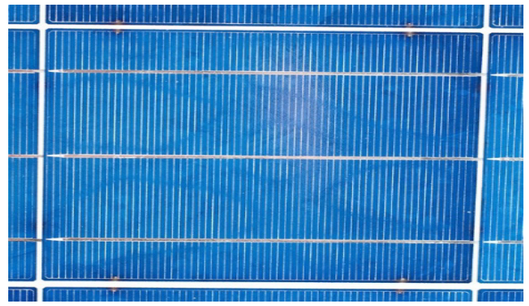
In the event you detect the possible presence of a major visual defect on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Clear picture of the defect
- Photo of the whole PV module
- Related PV module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

8.COSMETIC ISSUES

General imperfections on the front/rear surface are considered as a visual or cosmetic imperfection, which does not have any impact on the PV module reliability and on its capability of producing the power output and performance it is intended to have.

However, in the unlikely event a PV module affected by a visual or cosmetic issue produces a power output that is lower than the one guaranteed by Jinko Solar, the Jinko Solar Technical Team will investigate the possible root cause and provide support performing site inspection or lab test if needed.

In the event you detect the possible presence of a cosmetic issue on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Clear picture of the defect
- Photo of the whole PV module
- Related PV module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive prove of the defect, Jinko Solar reserves the right to ask more measurements/document/info to conduct a fully informed analysis in relation to the potentially affected PV modules.

9.SNAIL TRAILS

Jinko Solar confirms that the phenomenon so called “snail trails” is only a cosmetic visual effect, which does not have any impact on the PV module reliability and on its capability of producing the power output and performance it is intended to have

However, in the unlikely event a PV module affected by “snail trails” produces a power output that is lower than the one guaranteed by Jinko Solar, the Jinko Solar Technical team will investigate the possible root cause and provide support performing site inspection or lab test if needed.

In the event you detect the possible presence of a cosmetic issue on the PV Module/s, to the end of receiving assistance, please provide the Jinko Solar Technical Team with the following documentation and information in relation to each PV Module potentially affected:

- Clear picture of the “snail trails”
- Photo of the whole PV module
- Related PV Module serial number

* Please note that the information and documentation provided by you shall not be considered as an exhaustive proof of the defect. Jinko Solar reserves the right to ask more measurements/documents/information to conduct a fully informed analysis in relation to the potentially affected PV modules.

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The info provided in accordance with this document shall not be considered as an exhaustive proof or evidence of presence of the defect/effect on the PV module/s, Jinko Solar reserves the right to request additional measurements/document/information, as it may deem appropriate from time to time in its sole discretion, to make an informed decision in relation to the alleged presence of a defect/effect.

Contact:
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www.jinkosolar.eu