

## Positive Grounding Guidance

### 1.0 Introduction

This guideline provides positive grounding instructions for Jiawei photovoltaic (PV) modules manufactured with monocrystalline back-contact solar cells.

### 2.0 Surface Polarisation

These back-contact solar cells for the high efficiency solar modules have unique structure and technology, different from conventional cells; they yield average conversion efficiencies up to 22%.

Users are benefited by using the high efficiency modules because the modules are smaller in size and produce more power when compare to modules made with conventional cells.

Due to the module's unique back-contact high efficiency design, it is required to install according to the manufacturers recommendations (i.e. positive grounding) to maintain the efficiency of the solar module to the specified rating.

If the modules are installed according to conventional methods without grounding or with negative grounding, the modules will exhibit a reversible decrease in performance because of surface polarization effect. This is caused by a small amount of leakage current from the module building upon the front of cells. All modules experience some amount of

leakage current, however the surface polarisation effect seems to be unique to thin-film and back-contact solar cells.

### 3.0 Positive Grounding Guidance

**Caution:**

If an AC inverter is used and the system is grounded on the positive, it must be an isolated type. Most standards forbid using a non-isolated (trafoless) inverter in a system grounded on the DC-side and it can be dangerous. There must be a real electrical separation between DC and AC.

As mentioned in section 2.0, the surface polarization effect is completely reversible and avoidable when the modules are installed properly. This means, that a system that has been installed according to common methods (with grounding or with negative grounding) and is suffering from decreased performance can be restored to full operational performance by wiring it as a positive grounded system. The remedial guidance would be straight forward as follows:

The required remedial actions can be achieved by grounding the positive DC link of the system. In every case, ground has to be connected to the frame of the modules. If real grounding is not possible, at least the frame has to be connected to the most positive in the system. Basically ground has to be connected only at one single point to the most voltage of the system.

A schematic diagram is shown below for reference:

