TECHNICAL NOTE

Dark Current Measurements Using an Oriel PVIV-10A Amplifier

Newport
Experience | Solutions

Introduction

It has been discovered that the 10A system will not produce accurate dark current measurements when certain recipes are used. More specifically, this issue occurs when the PVIV-10A-I-AMP and Dark Current boxes are both checked. The source of this predicament has been identified as an electrical circuit anomaly related to the shutter control. The shutter is unable to be disabled to perform a measurement which would properly yield a dark current measurement. This perplexity is specific to the PVIV-10A model.

The purpose of this technical note is to describe a procedure for taking dark current measurement successfully using the PVIV-10A system.

Recommended Solution

The following procedure to collect dark current measurements was found to be successful in use with the 10A amplifier.

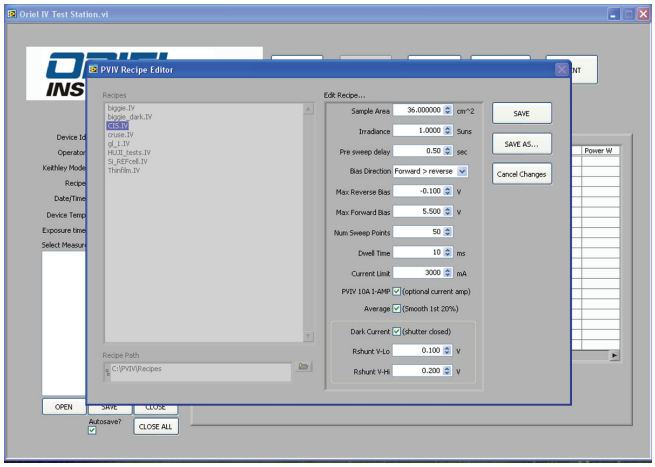

Figure 1: Example Recipe

- De-select the Dark Current box, essentially enabling the system to take a normal light IV curve with the shutter open.

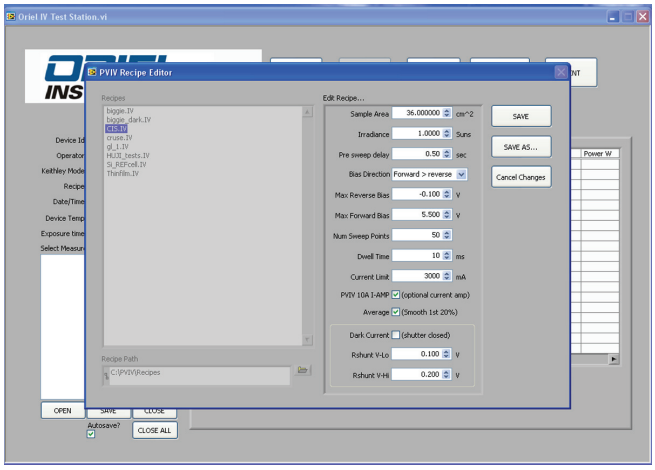

Figure 2: Dark Current Box De-Selected

- Disconnect the BNC cable connected to the shutter.
  - This can be achieved by either disconnecting the Shutter Out on the rear panel of the 10A amplifier to by disconnecting the BNC from the back of the solar simulator unit.

Figure 3: Shutter Out BNC Connector on Rear Panel

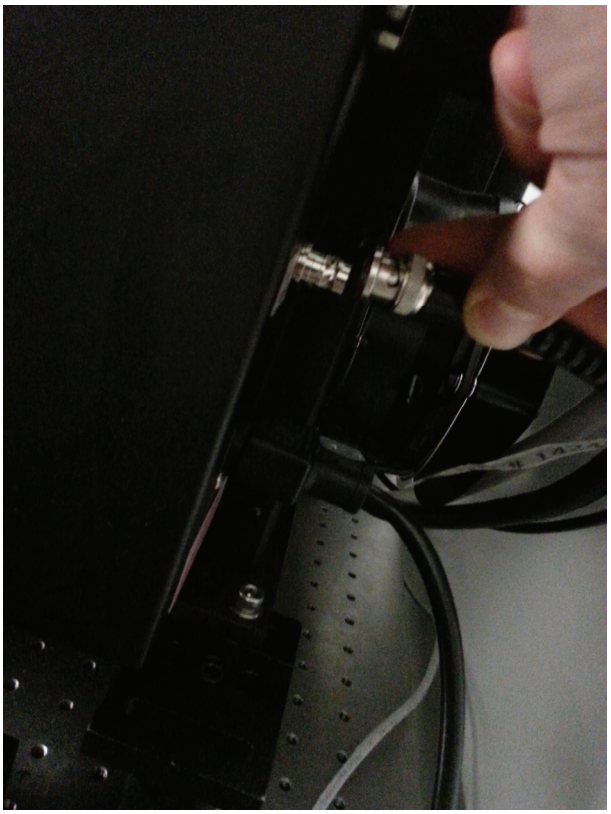

Figure 4: Shutter BNC Connector on the Solar Simulator

- With the shutter manually disabled, take the measurement as usual.
- Export the text file result into a spreadsheet based software, such as Microsoft Excel.

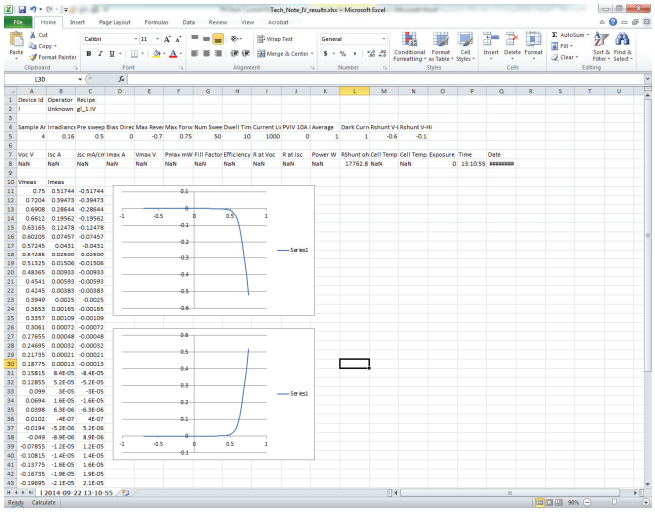

Figure 5: Example Text File Imported to Excel

- Invert the measured current data by multiplying each value by -1.
  - In Figure 5, beginning on row 11, the raw IV data is listed.
    - When plotted as is, the top graph is produced.
    - This curve represents a typical IV response from a cell when light is incident on it.
    - Namely, the exponentially decaying feature at its right end.
  - However, when we invert the current measured data, by multiplying Column B by -1, the bottom plot is produced.
    - This curve represents the dark current response from the call. This is the true response from the cell under test.
- The procedure is now complete. Reconnect the BNC connector for the shutter control, and continue measurements per normal procedure.

Conclusions and Recommendations

This procedure demonstrates an accurate method to collect dark current measurements using the PVIV-10A system. The resulting data from this procedure can be trusted and used for calculations and measurement parameters.

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