

J-V Measurement Troubleshooting Guide

We have been seeing some strange behavior with the solar cells during J-V measurements. If your data looks like any of the examples below, follow the steps in this guide to resolve the issue.

1 Pixel 2: Startup Transient

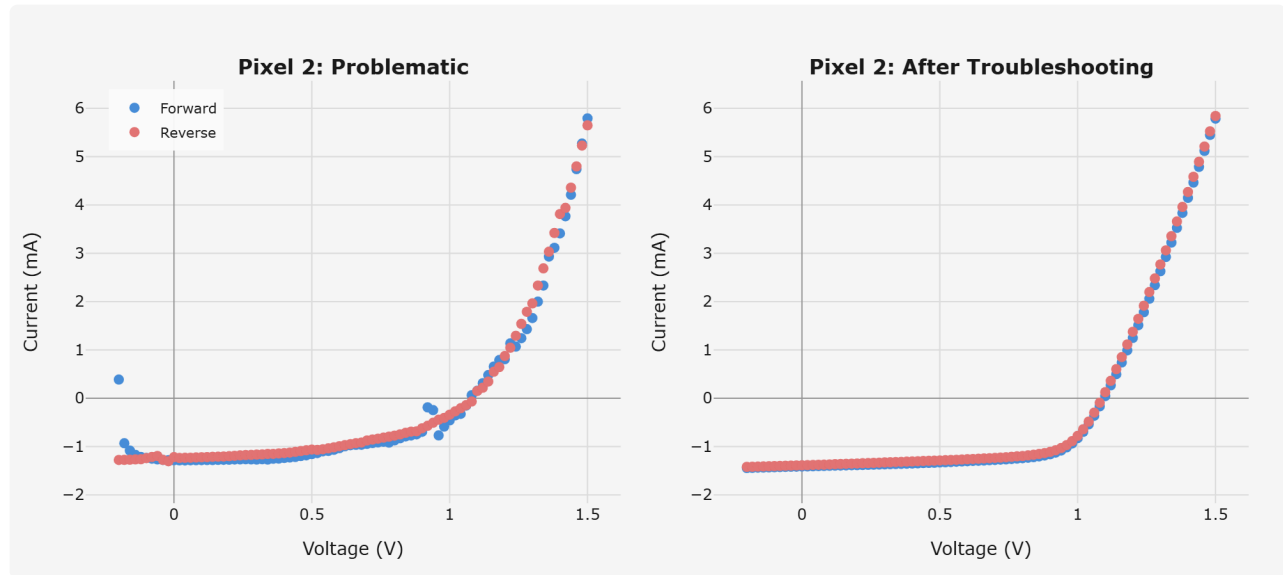


Figure 1: Pixel 2: Startup transient (left) vs. after troubleshooting (right)

Symptoms:

- Forward sweep (blue) starts with an unexpected positive spike at -0.2 V
- Data settles down after a few points but shows instability around 0.9-1.0 V

2 Pixel 5: Reverse Sweep Spikes

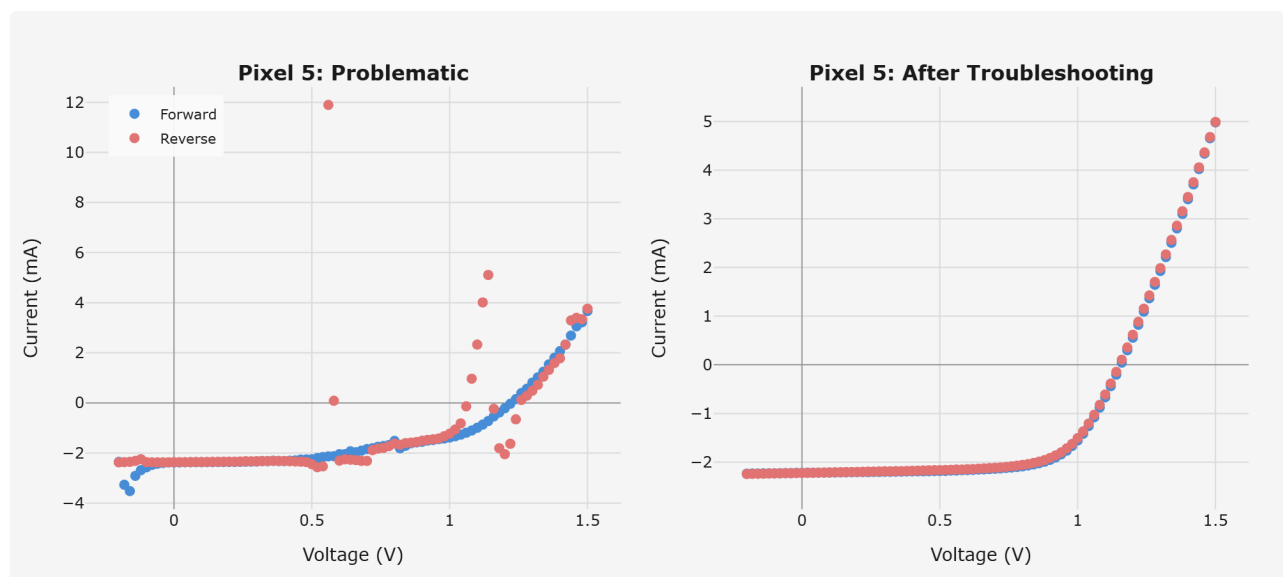


Figure 2: Pixel 5: Reverse sweep spikes (left) vs. after troubleshooting (right)

Symptoms:

- Forward sweep (blue) has some instability at the start but is mostly okay
- Reverse sweep (red) has a massive spike around 0.56 V
- Reverse sweep shows wild jumps at higher voltages (1.0-1.2 V range)

3 Pixel 6: Scattered Noise Throughout

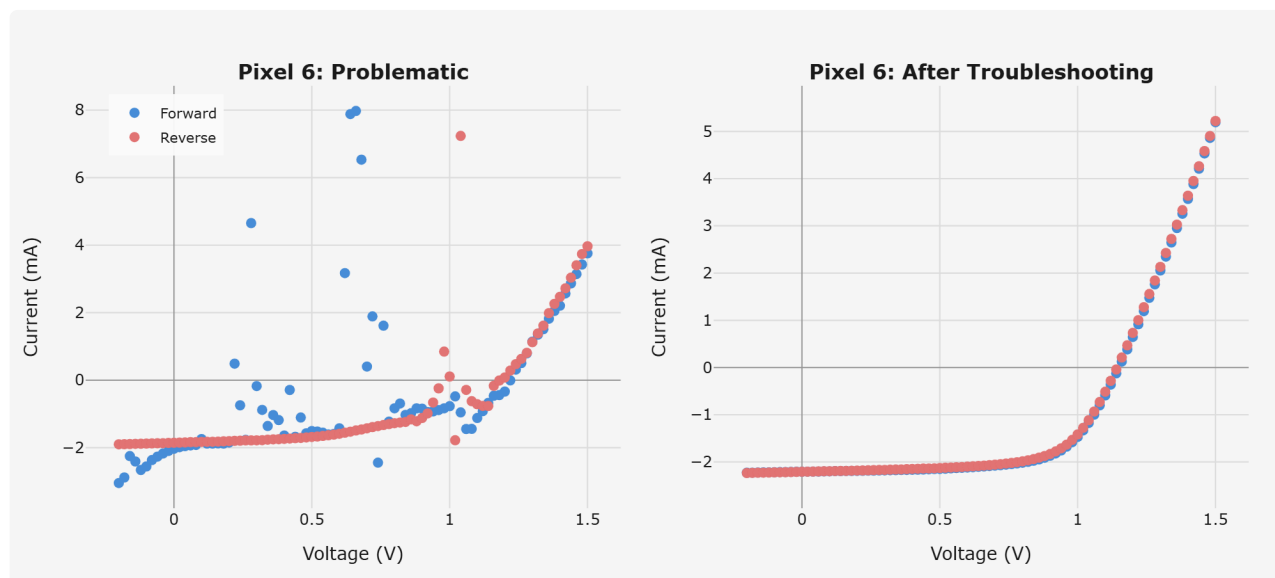


Figure 3: Pixel 6: Scattered noise (left) vs. after troubleshooting (right)

Symptoms:

- Forward sweep (blue) shows erratic jumps throughout the entire voltage range
- Current values jump from expected (-2 mA) to wildly positive (+8 mA) and back
- The curve shape is completely distorted

4 What Good Data Looks Like

Notice how the “After Troubleshooting” plots on the right of each example show:

- Smooth, continuous curves with no random jumps
- Forward (blue) and reverse (red) sweeps that follow similar paths
- Expected solar cell behavior: negative current at low voltage, crossing zero around V_{oc} (~ 1.1 V), then increasing positive current

5 How to Fix These Issues

1. **Stop the measurement** — Don’t waste time collecting more bad data.
2. **Check banana cable connections** — Confirm all banana cables are plugged in completely. Unplug and replug each one to ensure good contact.
3. **Reseat the 25-pin connector** — Completely unplug and replug the 25-pin connector cable to the solar cell. Make sure it is firmly seated on the solar cell.

4. **Try the measurement again** – Re-run on a single pixel first to verify everything is working before measuring all pixels.
5. **If problems persist: restart the system**
 - Close the PHYS 2150 Measurement Suite app
 - Power cycle the Keithley 2450 (turn off, wait a few seconds, turn back on)
 - Relaunch the app and try again

Tip

If you see erratic data, consider stopping the measurement and troubleshooting the issue before continuing. This can save time and help identify the underlying problem.

6 Prevention Tips

- Always ensure the connector is seated firmly into place before starting
- Don't bump or move cables during measurement
- If one pixel shows noise, stop and reseat before continuing to other pixels
- Check that the sample is properly seated in the holder

7 When to Ask for Help

Contact the TA if:

- Reseating the connector doesn't fix the problem
- Multiple pixels consistently show noise even after reseating the connector and restarting the app and Keithley 2450