So far, using a logic basic multiplexer for switching the pixel ground connection into the measurement circuit does not work. We have observed a ‘leakage’ of the voltage of other pixels into the measurement circuit. Numerous solutions have been implemented:

1. Dual channel analog switches seemed to leak between channels when switching grounds, replace with single channel analog switches
2. Remove ground shorted pixels to prevent seeing them in the measurement
3. Attempted isolated measurements
4. Attempted reverse biasing the cells

There are more that were not documented or remembered. These all failed. This problem of the common positive connection of the perovskites has no immediate Google answer, the most common result being references to the common positive of old European vehicles that would positively bias the frame of the car. On 28 April 2023, I was able to find [this link](https://forum.arduino.cc/t/multiplexing-ground-references/12788/4) (from 2009!), which is discussing a similar problem but measuring multiple integrated battery cells separately. If you had a multi-cell battery, then how would you measure the individual cell voltages? While no proper circuit analysis was performed, the assertion of… Taking a step back.

The single analog switch attenuates in off state by 57 dB, attenuation is expressed as , where the ratio of source to destination is converted to a log scale. Rearranging for destination voltage yields , which can be used to estimate the reduction of the voltage. If the perovskite voltage is 1.2, then the attenuated voltage is 3 mV. But, the solar cell produces current at around 300 mW, so 250 mA, which attenuated is 620 uA.

A picture containing screenshot, black, design

Description automatically generated

Looking at a MOSFET, which can be modeled as an ideal switch, there are two options for the connection between the source and drain. The conduction channel is a low resistance path when the MOSFET is on, but when the MOSFET is off, the conduction path because very high resistance. This means that the source and drain and never disconnected. Because the perovskites are current producers, this essentially places the cells in open circuit, meaning they produce maximum voltage, which exactly explains the behavior seen.

Because the analog switches do not actually break the connection, they merely place a high impedance between the points in the circuit, it is essentially a very large resistance. While this works for controlling most circuits ever conceived, this does not work for disconnecting solar cells.

[opto isolator - How can I multiplex fully isolated differential signals? - Electrical Engineering Stack Exchange](https://electronics.stackexchange.com/questions/363517/how-can-i-multiplex-fully-isolated-differential-signals)