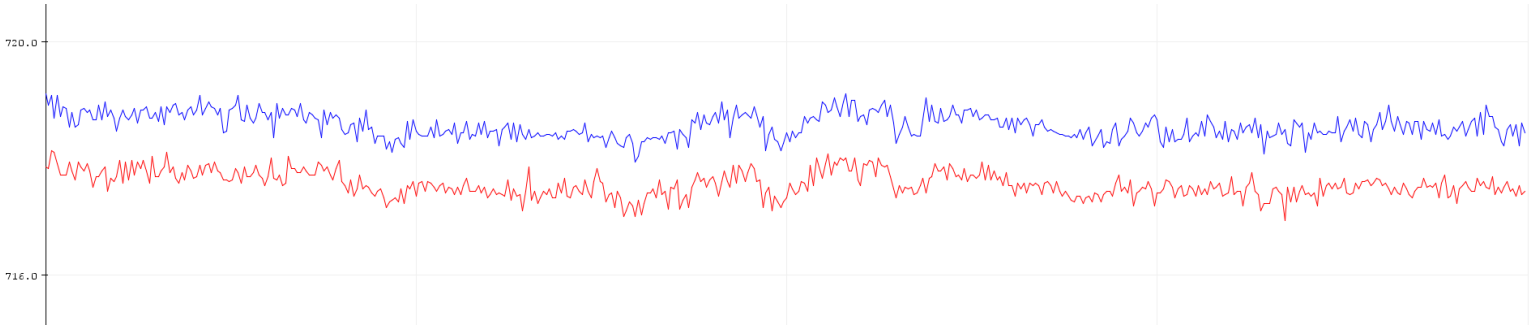
This lab is about comparison between single-end method and differential method. Also the effect of Pull up resistor.

1. With no current in the ground connection between the TMP36 and ADS1115, what was the temperature read by the TMP36?



The temperature read by TMP36 with differential method is 719, read by single-ended method is 718.

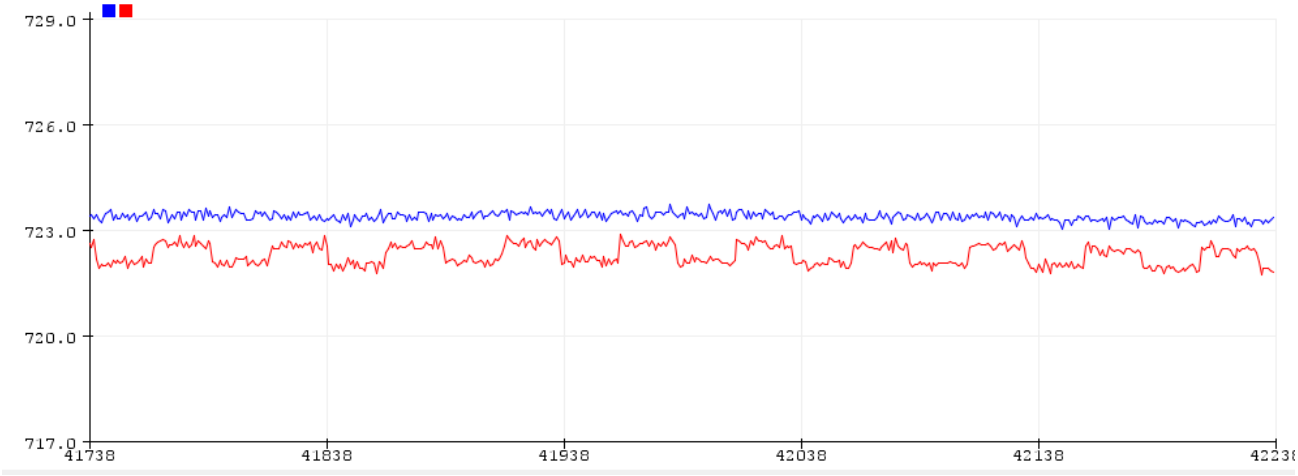
2. With no current in the ground return path, what was the voltage difference between the differential measurement and the single-ended measurement of the TMP36?

   The voltage difference for differential method and single-ended method is about 0.001V

3. What was the current from the function generator in your ground return between the TMP36 and ADS1115 in your set up?

   The peak-to-peak current flow through ground is about 40mA peak to peak square wave.

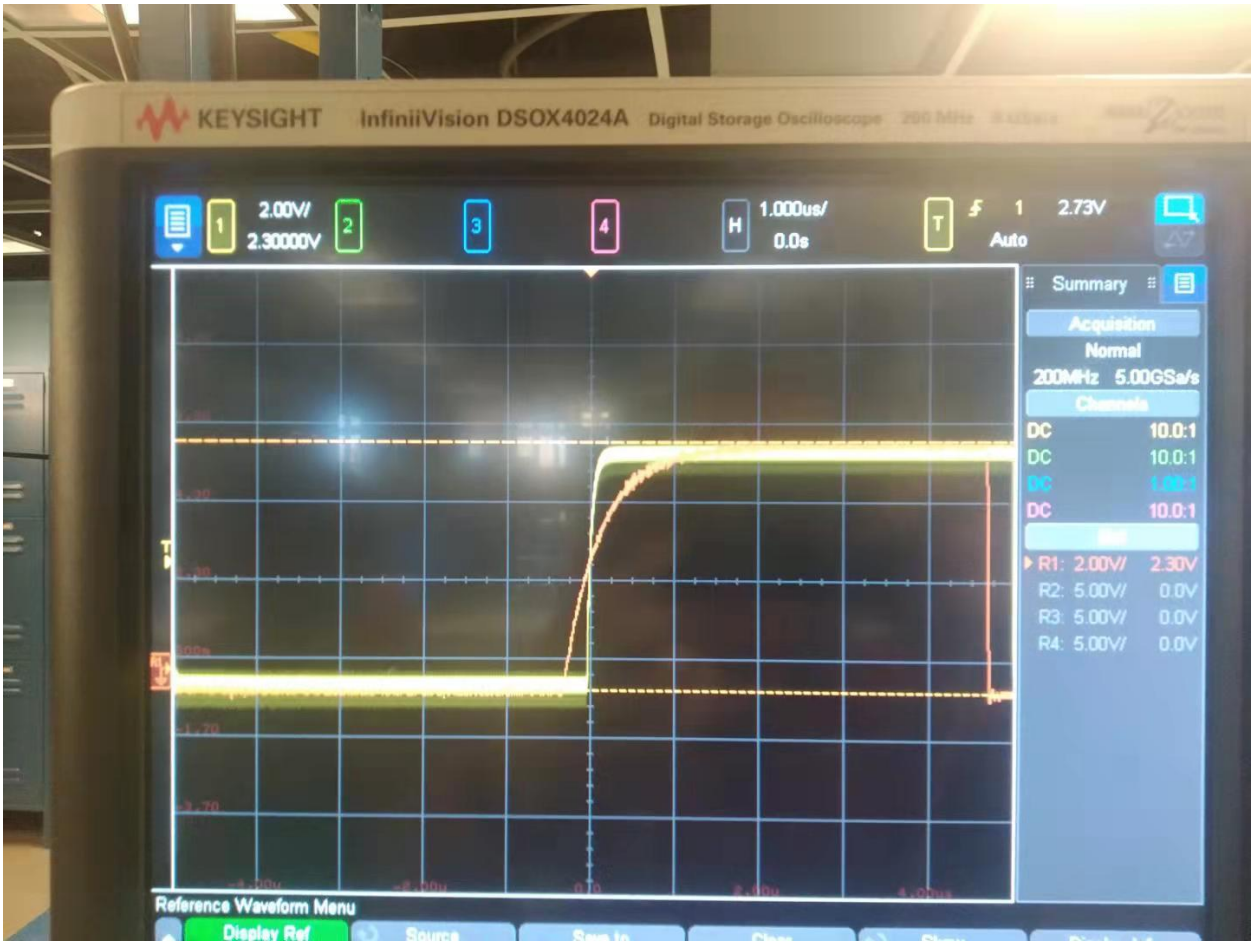
4. What is the voltage difference you measured between the single-ended and differential measurements when there was this current flowing through the ground path?



The voltage is about 0.0005V or 0.0015V depending on the whether the single-ended signal.

5. How would you recommend routing the differential pair from the sensor to the ADS1115 for the lowest noise pick up

I recommend use differential method to reduce the ground noise when routing. As seen from the lab, differential method is unaffected by ground noise.



The SCK signal probed without using pull up resistor, the reference signal.
The SCK signal probed using using pull up resistor, the measured signal.
As seen from the scope, using pull up resistor helps form more complete square waveform, greatly reducing the rise time.