Interference Experiment

Sunday, February 19, 2023 1:27 PM

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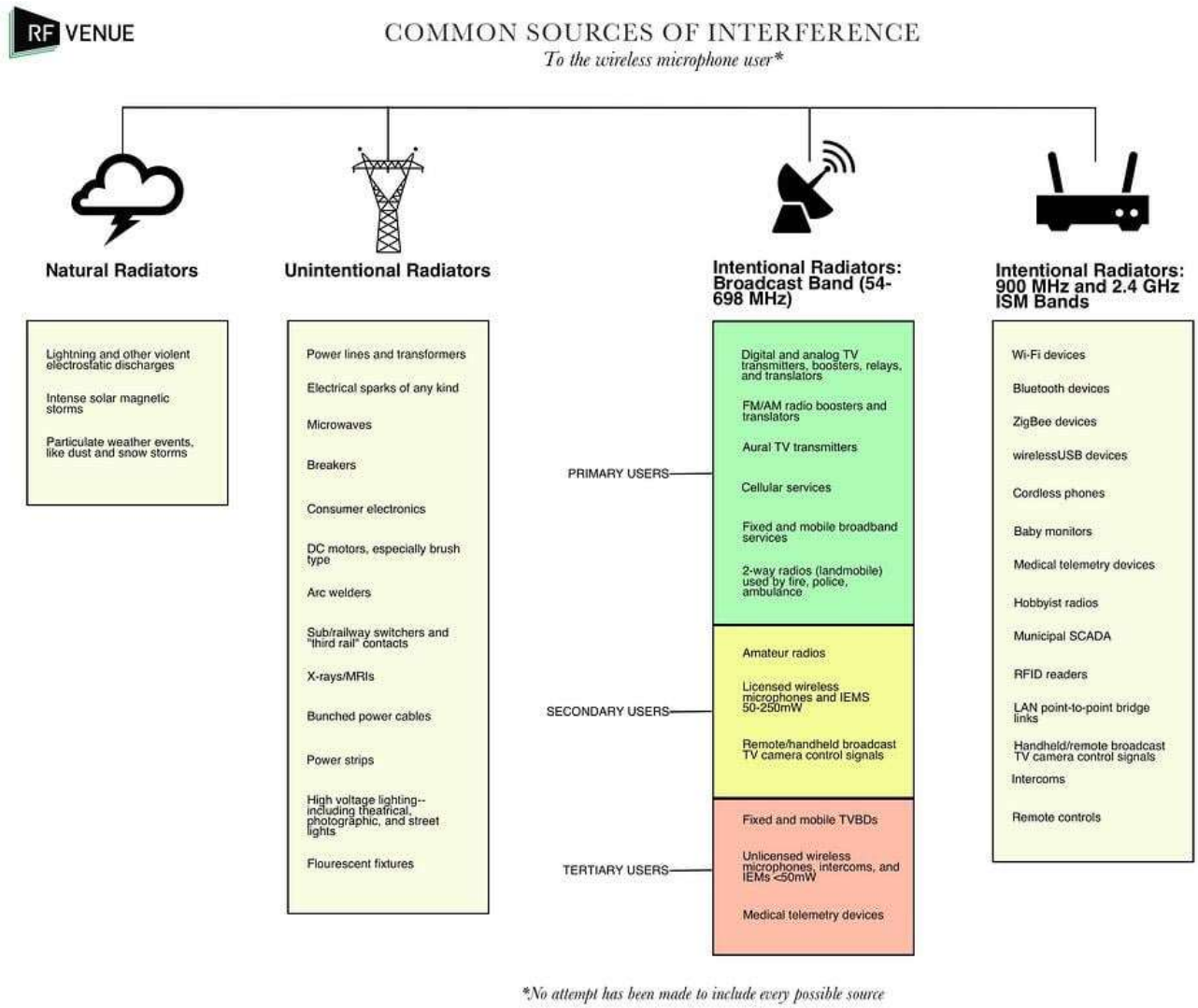
Objective:
In this lab, you will investigate the different types of interference that you might encounter including: 60 Hz, radio frequencies, signals from charging devices, and emissions from nearby instruments or laptops (charging vs not). You will explore the magnitude and frequency associated with these types of interferences. Try wrapping a lead around different equipment. What do you pick up? Do you conduct noise? How much? What happens if you reach toward power cables or towards the lights?

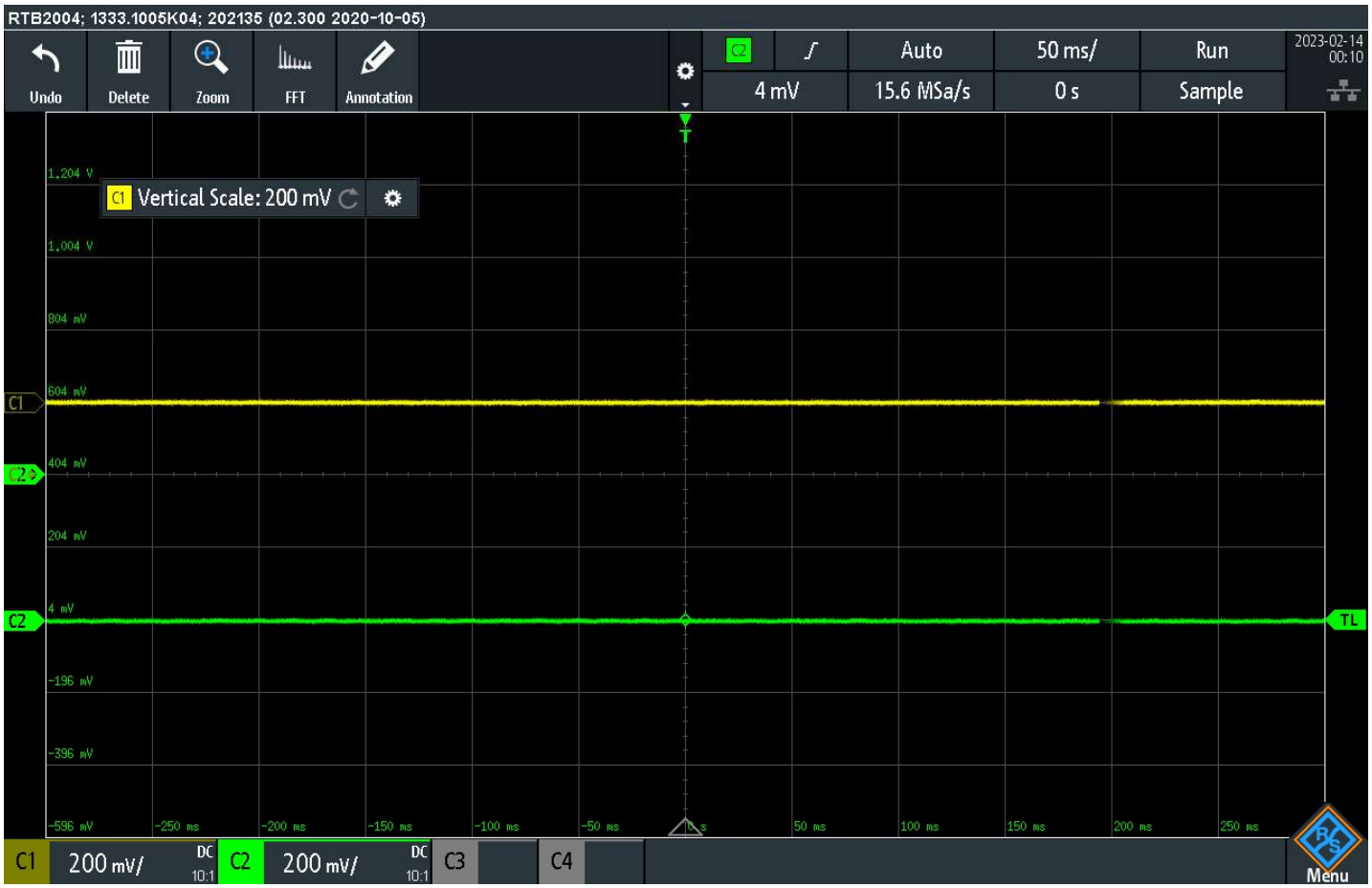
Deliverables:
Complete this lab using the oscilloscope (6+ figures). In each figure caption, include a description on how you acquired the signal and the estimated frequency / amplitude of each source of interference.

Key Terms:
Coupling: the transfer of energy from one medium to another
Interference: something that modifies our signal of interest in a disruptive manner.



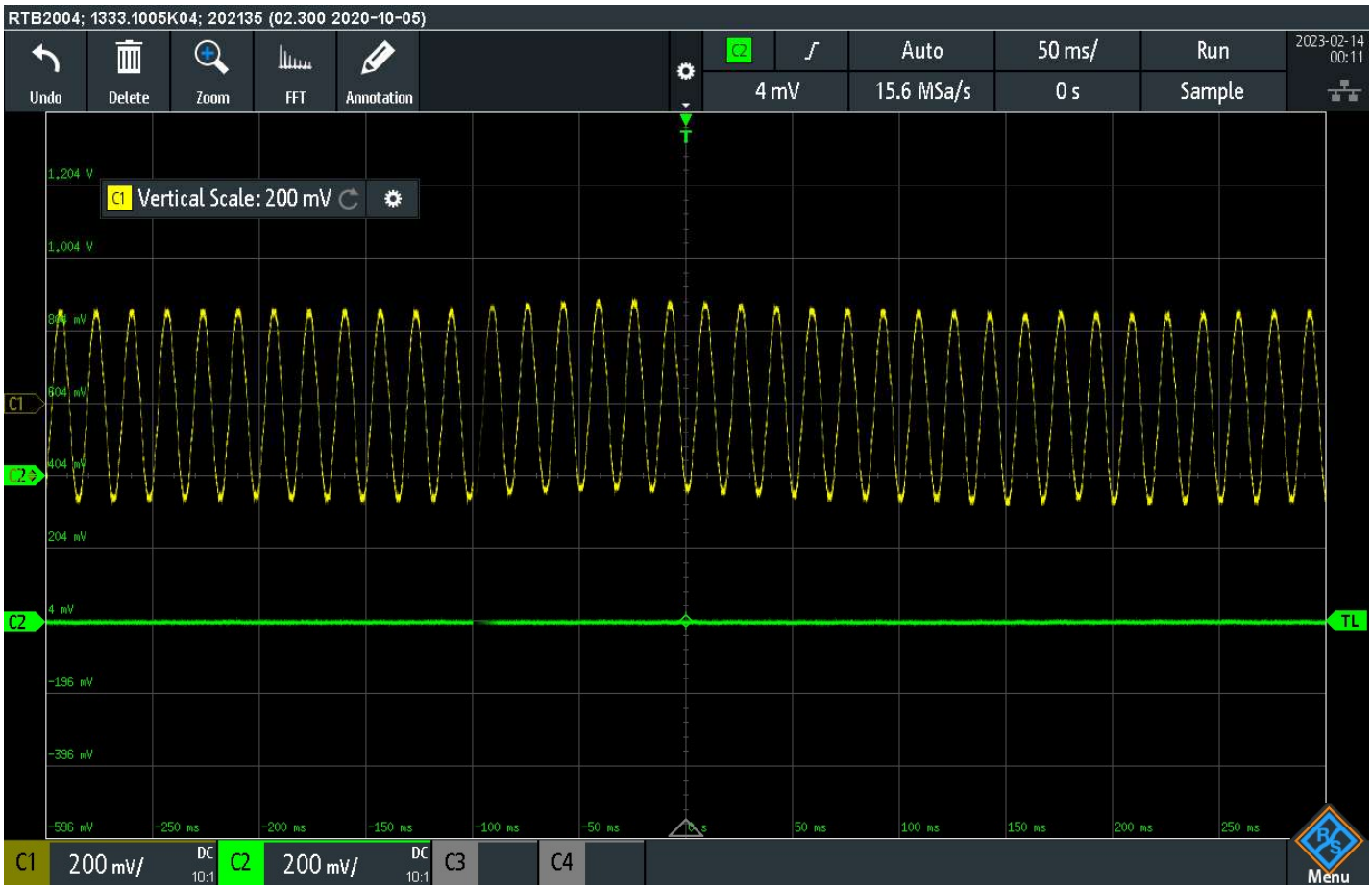
(Figure 1: Common Sources of Interference from https://www.rfvenue.com/blog/2014/12/14/common-sources-of-interference)

1. Away from Interference



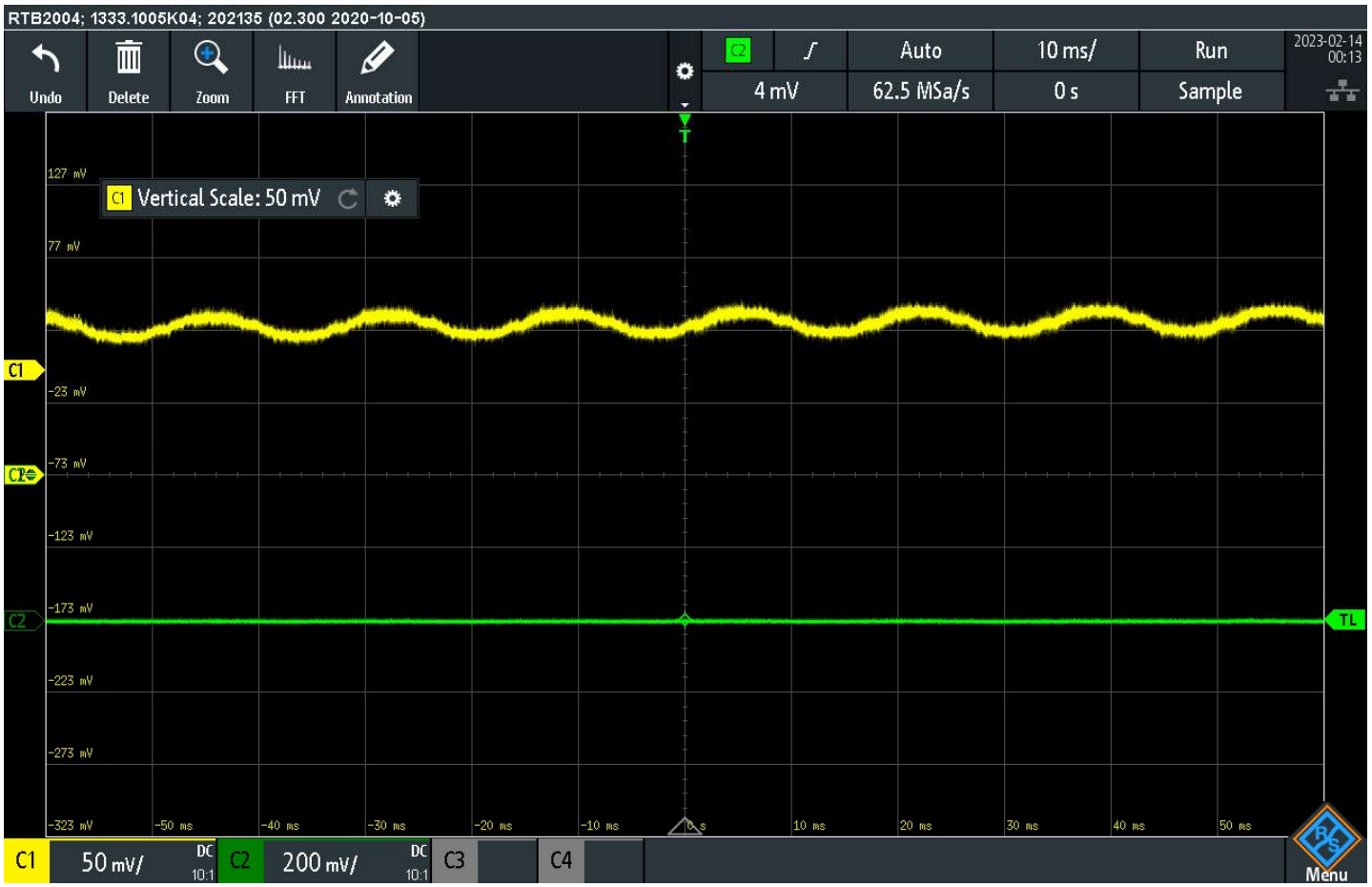
(Figure 2: No Oscilliscope Connection)
This figure shows CH1 (yellow) and CH2 (green) measuring at 4 mV with no frequency or oscillation. These measurements are holding the probes as far away as possible from any interference (note: both functions read the same value, CH2 has an offset of 600 mV)

2. Fingers



(Figure 3: Fingers Holding Oscilloscope Probes, Only Touching Metal)

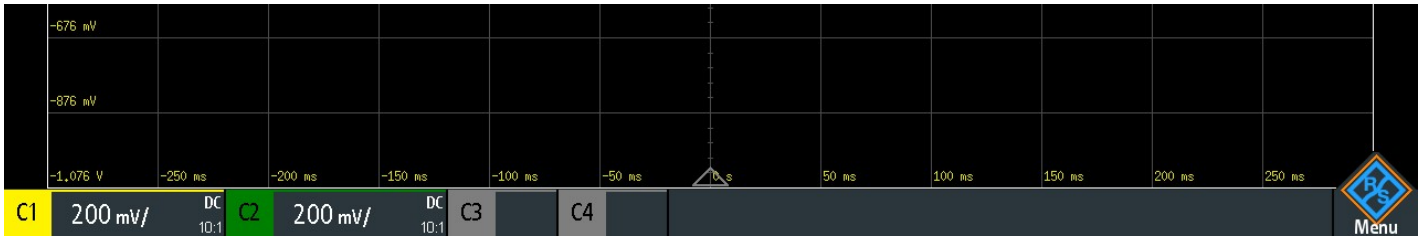
This figure shows CH1 (yellow) measuring at 555 mVpp and CH2 (green) measuring at 4 mV. CH1 has a frequency of 6.67 MHz and Ch2 has no frequency or oscillation. CH1 is holding the positive probe between my pointer and index finger and only holding the metal with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.



(Figure 4: Fingers Holding Oscilloscope Probes, Touching Metal and Plastic)

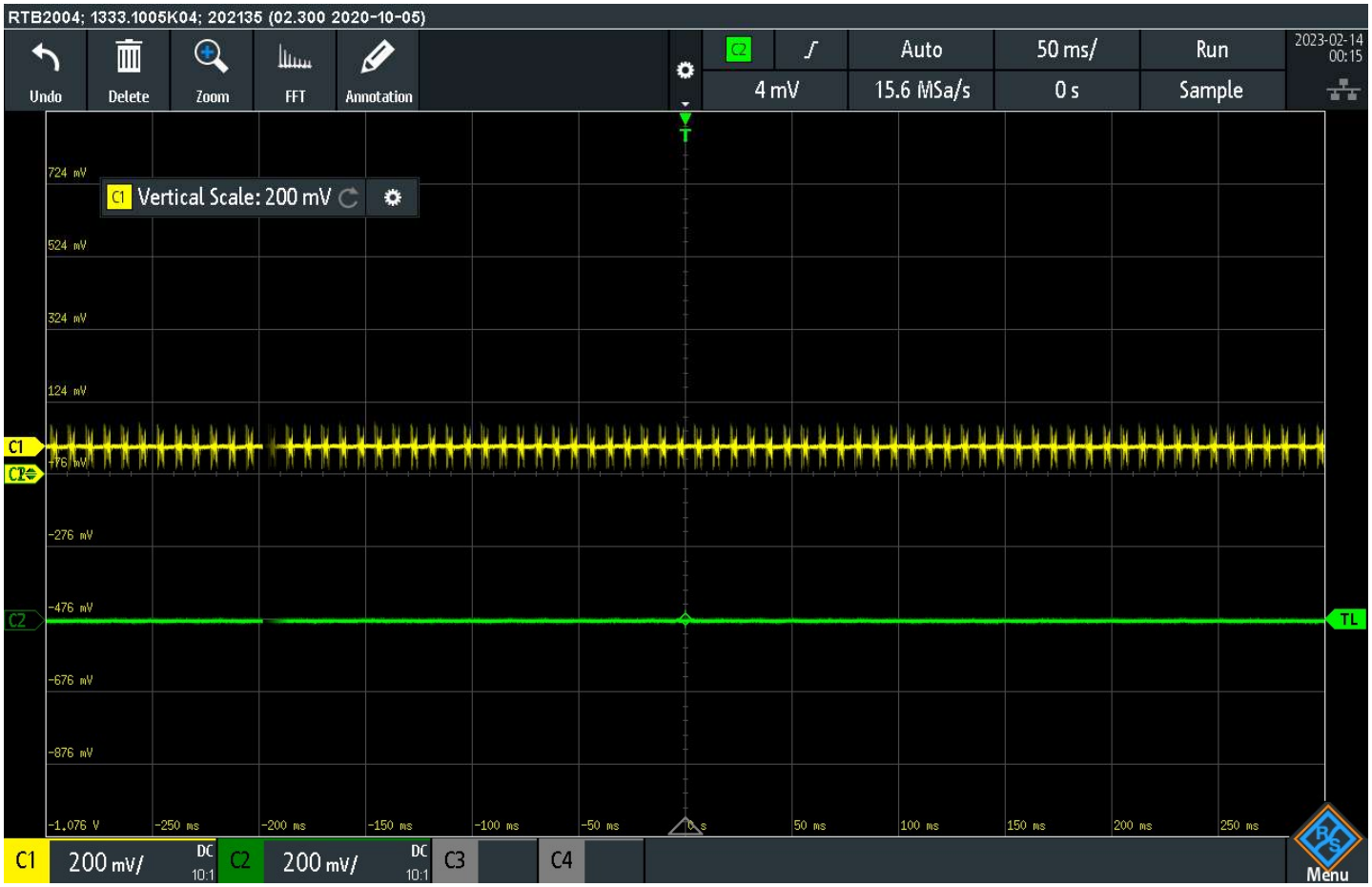
This figure shows CH1 (yellow) measuring at 40 nVpp as a sine function and CH2 (green) measuring at 4 mV. CH1 has a frequency of 20 MHz and Ch2 has no frequency or oscillation. CH1 is touching the positive probe between my pointer and index finger and half holding the metal, half holding the plastic on the probe with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.

3. Phone



(Figure 5: Oscilloscope Probe Touching Turned Off Phone Screen)

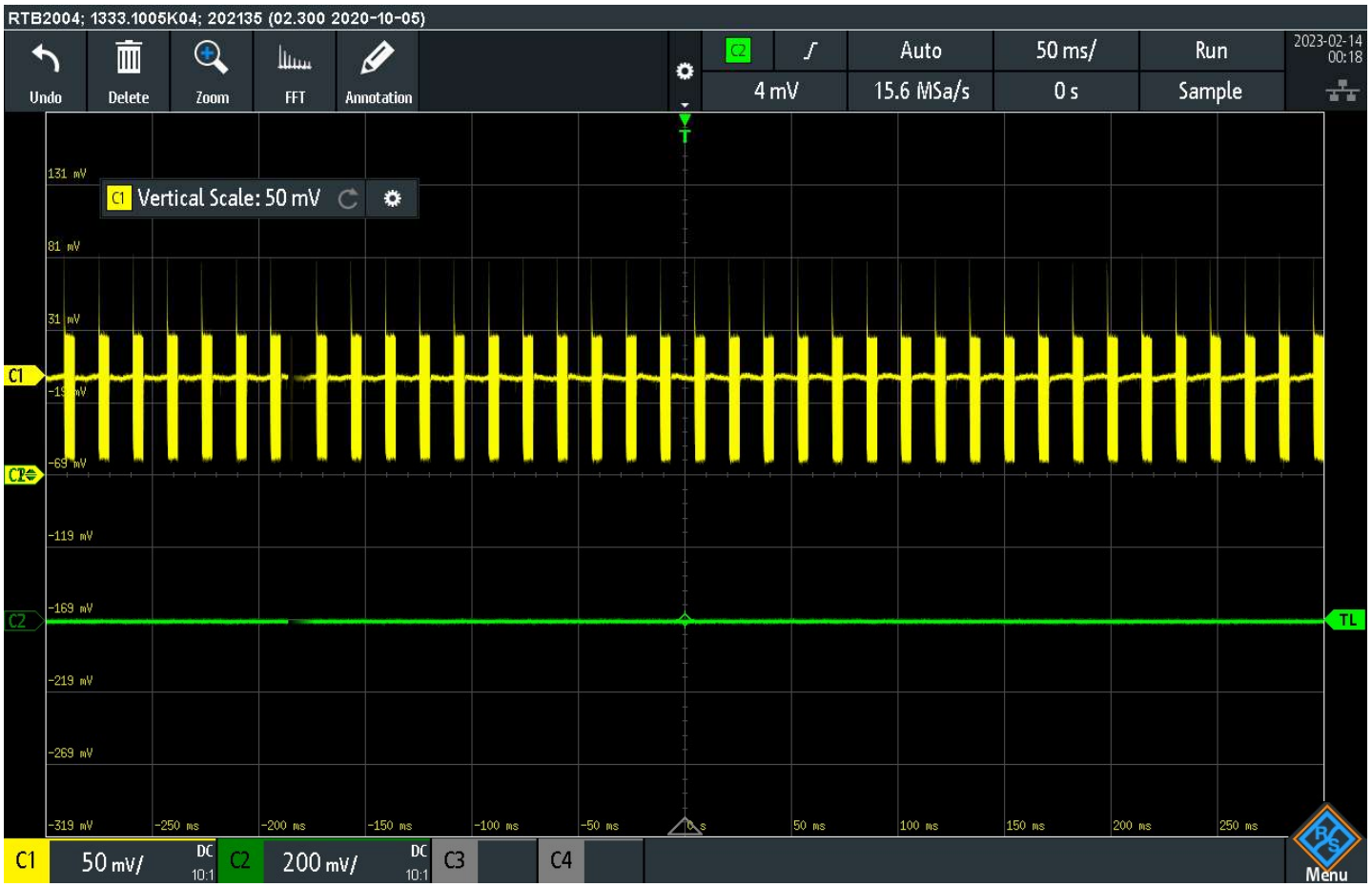
This figure shows CH1 (yellow) measuring at 50 nVpp and CH2 (green) measuring at 4 mV. The function of CH1 appears to be a tangent function. CH1 has a frequency of 20 MHz and Ch2 has no frequency or oscillation. CH1 is touching the positive probe on my turned off phone screen with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.



(Figure 6: Oscilloscope Probe Touching Turned On Phone Screen)

This figure shows CH1 (yellow) measuring at 70 nVpp and CH2 (green) measuring at 4 mV. The function of CH1 appears to be a tangent function. CH1 has a frequency of 3.3 MHz and Ch2 has no frequency or oscillation. CH1 is touching the positive probe on my turned on phone screen with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.

4. Insulin Pump



(Figure 7: Oscilloscope Probe Touching Turned On Insulin Pump)

This figure shows CH1 (yellow) with a concentrated signal on top of a weaker signal. The concentrated signal in CH1 measures at 88 mVpp while the weaker signal of CH1 measures 138 mVpp, and CH2 (green) measuring at 4 mV. The function of CH1 appears to be an overlapping of many different functions. CH1 has a frequency of 6.7 MHz and Ch2 has no frequency or oscillation. CH1 is touching the positive probe on my turned on insulin pump with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.

(Figure 8: Oscilloscope Probe 1 Inch Away from Insulin Pump)

This figure shows CH1 (yellow) with a concentrated signal on top of a weaker signal. The concentrated signal in CH1 measures at 24 mVpp while the weaker signal of CH1 measures 32 mVpp, and CH2 (green) measuring at 4 mV. The function of CH1 appears to be an overlapping of many different functions. CH1 has a frequency of 6.7 MHz and Ch2 has no frequency or oscillation. CH1 is hovering the positive probe over my turned on insulin pump with the ground probe hanging in the air. CH2 measurement is holding the probe as far away as possible from any interference.