ECEN 325 - 512

Operational Amplifiers - Part 2

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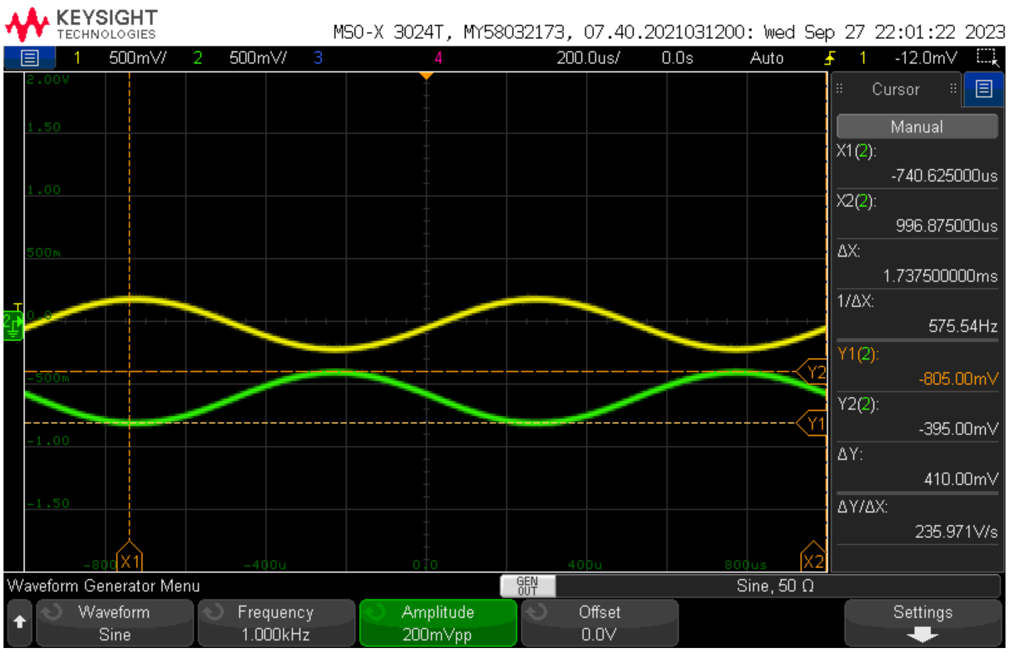
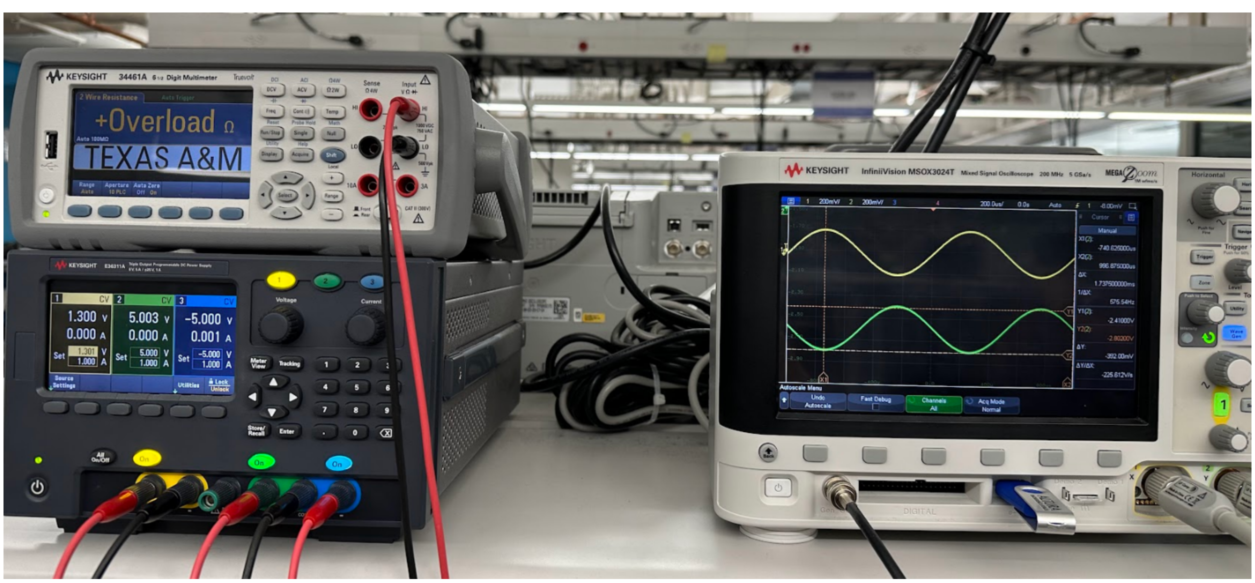
Measurements

Summing Amplifier

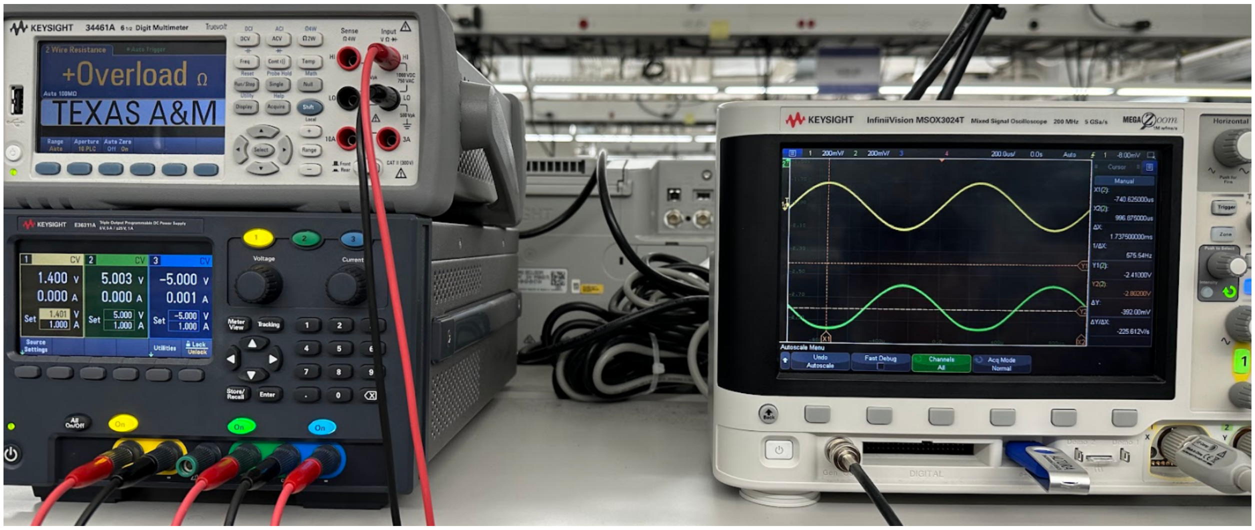
1) Time-Domain Waveform



2a) Before clipping

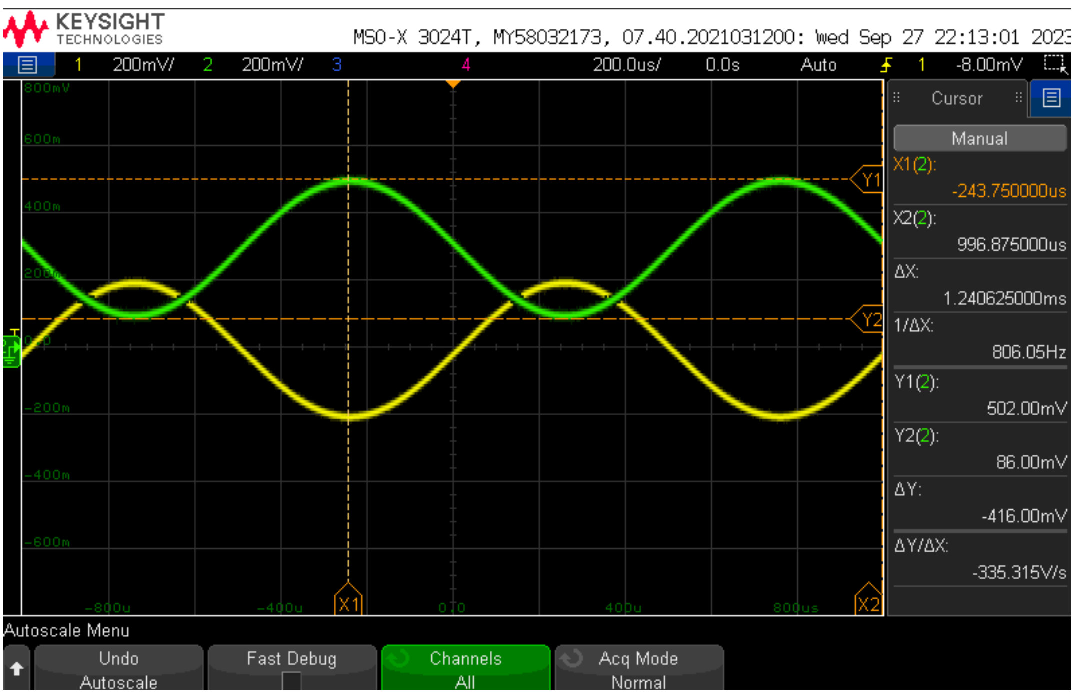


2b) After Clipping

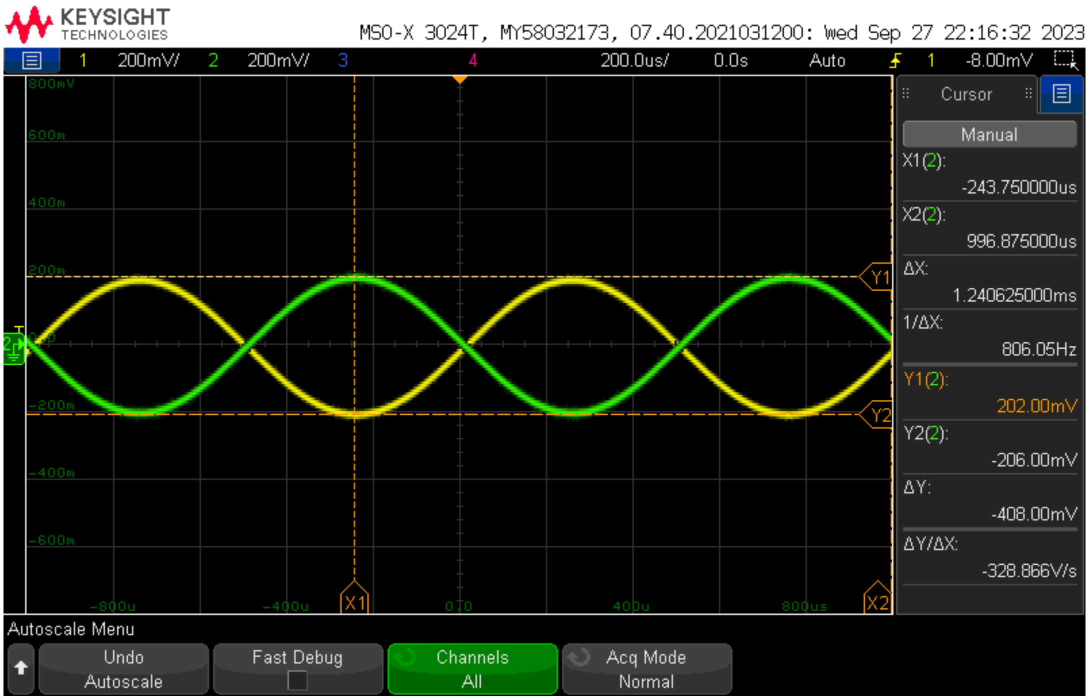


Differential Amplifier

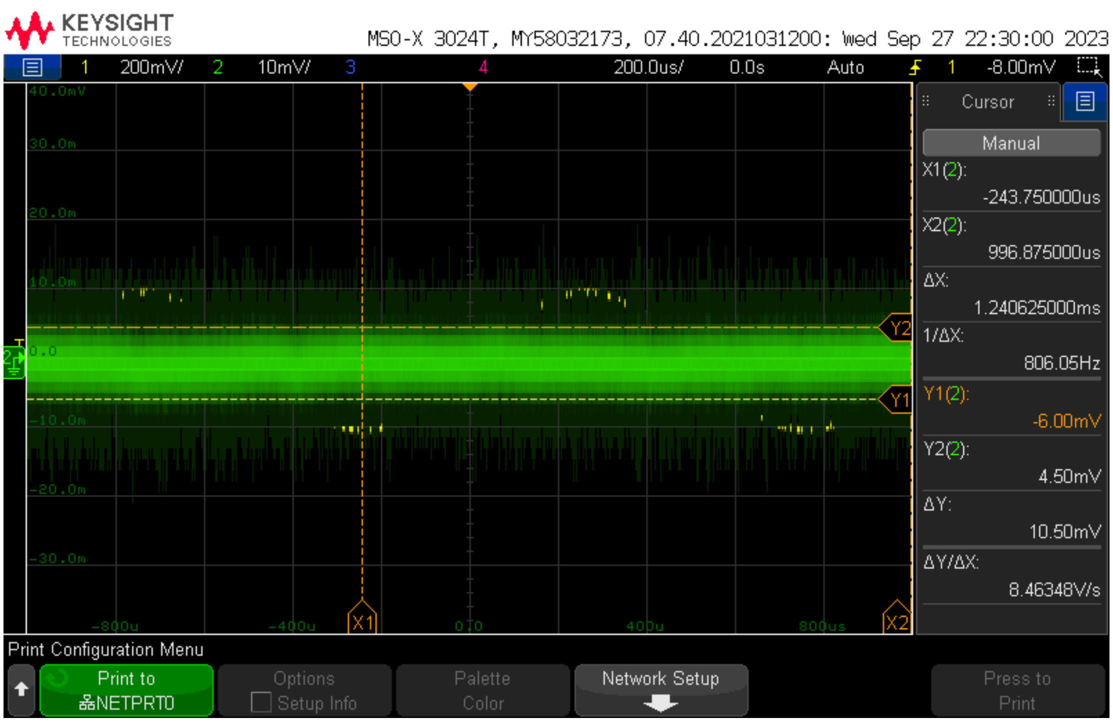
1) Time-domain Waveform



2) Vi1 = 0.2 sin(2π1000t) and Vi2 is ground.



3)



Calculating Measure $A_{DM} = V_0/V_i$.

$V_{out} = 202mV$

$$V_{in} = 206mV$$

$$\frac{V_{out}}{V_{in}} = 0.98$$

Calculating Measure $A_{CM} = V_0/V_i$.

$$V_{out} = 10.50mV$$

$$V_{in} = 400mV$$

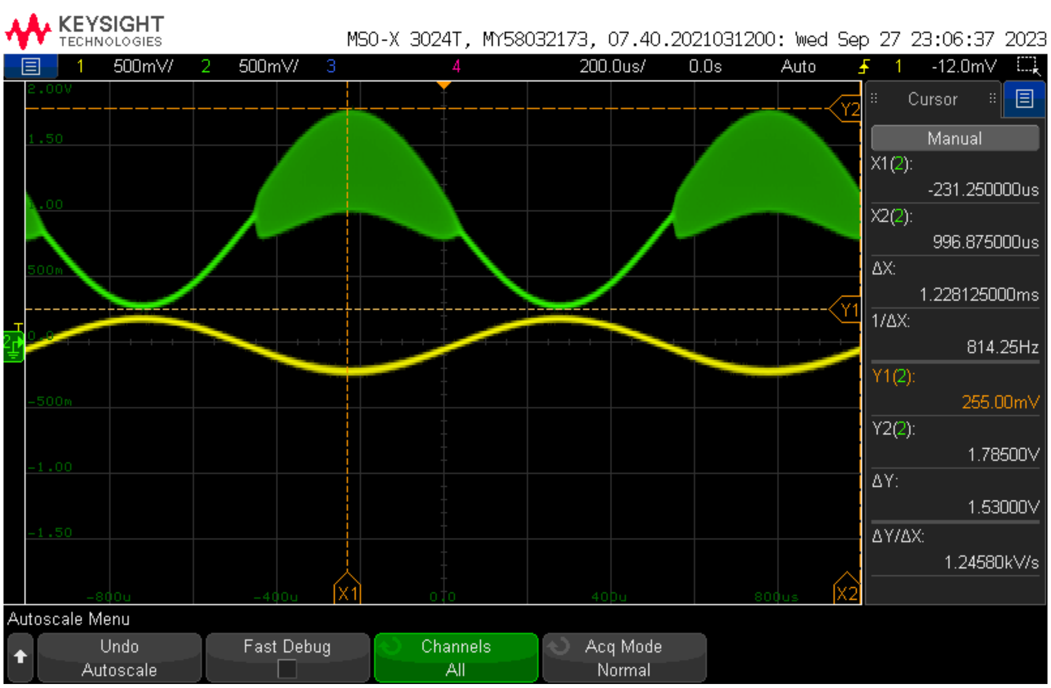
$$\frac{V_{out}}{V_{in}} = \frac{10.50}{400} = 0.026$$

Calculating Measure $CMRR = Adm/Acm$.

$$\frac{Adm}{Acm} = \frac{0.98}{0.026} = 37.69$$

Instrumentation Amplifier

1) Time-domain waveform



Data Table:

The provided data table is a good way to organize and present our range of simulated and measured values. It is divided into three distinct sections: Summing Amp, Differential Amp, and Instrumentatiom Amp, which correspond to different stages and aspects of the experiment or analysis. This format simplifies the detection of inconsistencies, allows for easy comparison of results across different methods or frequency domains, and ensures transparency and data integrity. By structuring data in this manner, we can efficiently manage and reference our findings, enhancing the clarity and reliability of our work.

	Simulated	Measured
Summing Amp Output Voltage Amplitude	400 mV	410 mV
Summing Amp Clipping Voltage	N/A	1.3 V
Differential Amplifer Output Voltage Amplitude	400 mV	408 mV
Differential Amplifer Adm	N/A	0.98
Differential Amplifer Acm	N/A	0.026
Differential Amplifer CMRR	N/A	37. 69
Instrumentation Amplifier Output Voltage	1.2 V	1.53 V

Results:

In summary, this lab experiment demonstrated a strong correlation between our theoretical predictions and real-world measurements, affirming our understanding of circuit concepts. However, a noteworthy observation was the unexpected noise in the output of the instrumentation amplifier during the final transient analysis. While the exact cause remains unclear, this noise serves as a reminder of the complexities in practical circuits, influenced by factors like environmental interference and component variations. Future experiments should explore noise mitigation strategies. This experience emphasizes the importance of bridging theory and practice in electrical engineering education.