Experimental Measurements and Personal Instrumentation

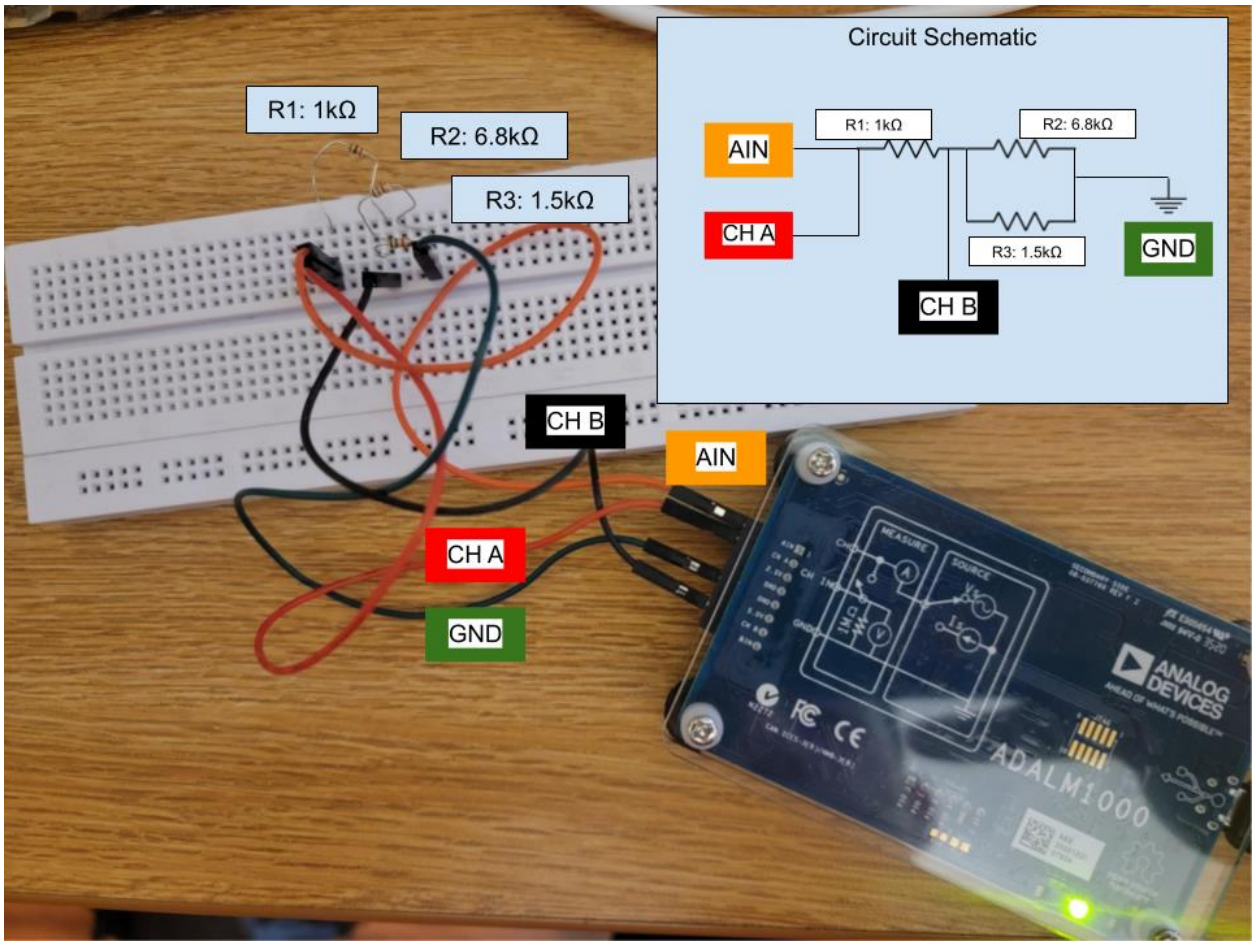
Prove your skill set using ONE of the following: M1K board, Analog Discovery Board, or M2K board.

Q2.4 Measuring voltage across a resistor using a sinusoidal input source

I can build a resistive circuit and measure voltage across ONE resistor using a sinusoidal input source (Must be two or more resistors, hint: try to make a sinusoidal source with amplitude 0 to 5V centered at 2.5 V and another from -5 to +5V centered at 0 then document whether your board can accomplish both or only one of these).

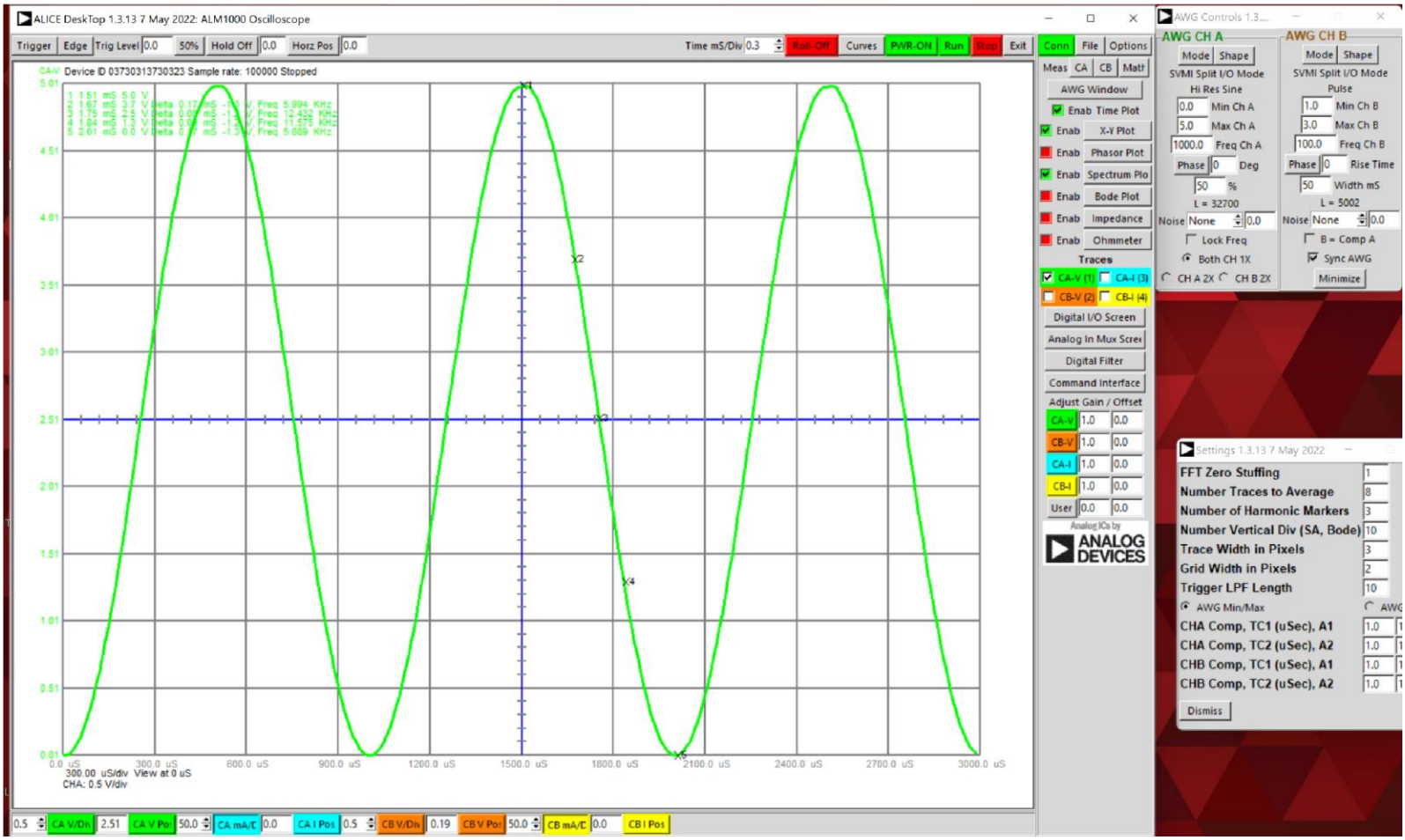
I was able to use the board with a 1kΩ resistor set in series with two parallel resistors, 6.8kΩ and 1.5kΩ. Then, I connected the pins from the ADALM1000 to the breadboard in the same way as mentioned in Q2.2 which has been copied below for convenience. This is so that I can measure the voltage across one resistor which will be the 1kΩ resistor. I then opened the ALICE desktop where I was able to set the minimum voltage to 0.0 volts and the maximum voltage to 5.0 volts where the axis goes through 2.5 volts. However, when trying to set the minimum voltage to -5.0 volts, I was not able to because the program did not recognize negative values. Therefore, my board was not able to accomplish both of these tasks.

Part of Q2.2: Once I finished this, I connected the AIN lead and A channel to the first pin on the 1kΩ resistor. Then, I connected the ground pin to the joint where all of the resistors connect to. Finally, I connected the Channel B pin to the end of the circuit, as labeled below.


Circuit Schematic
AIN
R1: 1kΩ
R2: 6.8kΩ
CH A
R3: 1.5kΩ
GND
CH B
R1: 1kΩ
R2: 6.8kΩ
R3: 1.5kΩ
CH B
AIN
CH A
GND
ANALOG DEVICES
ADALM1000

(x-axis and y-axis stretched to allow for easier reading, and line thickness increased to 3 pixels on the graph presented below)

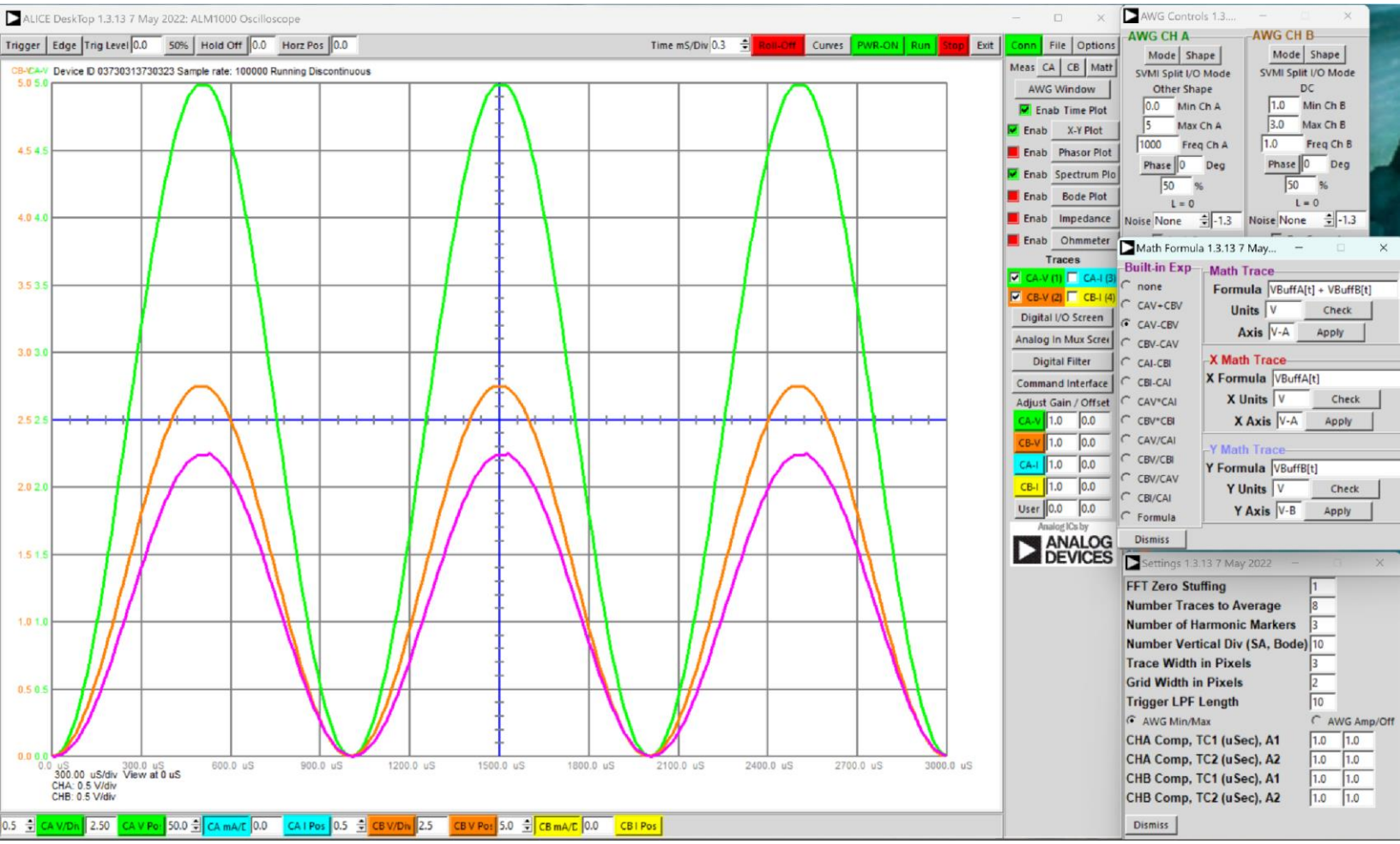
Source voltage:



Green = source voltage ranges from 0 to 5 volts

Orange = voltage after r1 or 1kΩ resistor which ranges from about 0 to 2.75 volts

Purple = source voltage minus voltage after the resistor, or the voltage consumed by R1(1kΩ) resistor; this ranges from 0 to 2.25 volts



Grading Rubric for Q2.4 from F22 Intro to ECSE

2.4	Measuring voltage across a resistor using a sinusoidal input source	7 / 7 pts
	+ 0 pts incomplete	
	+ 7 pts complete	
	+ 3 pts make a sinusoidal source but missing the measurement part	
	+ 1 pt build the circuit but no setting for source and no measurement for resistor.	
	+ 6 pts circuit complete but no plot for the resistor voltage	
	✔ **+ 1 pt** Proficient	
	+ 0 pts Learning (need one or more goals to be met under this objective)	
	+ 0 pts Need significant improvement	
	✔ **+ 1 pt** I can use consistent color coding of wires when I build circuits on my breadboard to aid in troubleshooting.	
	✔ **+ 1 pt** I can "zoom in" to an oscilloscope output by changing the time scale (x-axis) to show important parameters (for example, a sinusoid with 25 cycles would be easier to see if only 3-5 cycles were shown instead!) when needed	
	✔ **+ 1 pt** I can "zoom in" to an oscilloscope output by changing the voltage scale (y-axis) to show important parameters (for example, a sinusoid with 500mV amplitude would be difficult to see with 5V/div...) when needed	
	✔ **+ 1 pt** I can change the THICKNESS of my trace lines for easy viewing.	
	✔ **+ 1 pt** I can change the background color of my oscilloscope output to white and paste in an external document for easy viewing.	
	✔ **+ 1 pt** I can label the measurement output clearly with the circuit schematic component names	