

2CJ4 LAB Report

Set 1

February 6th
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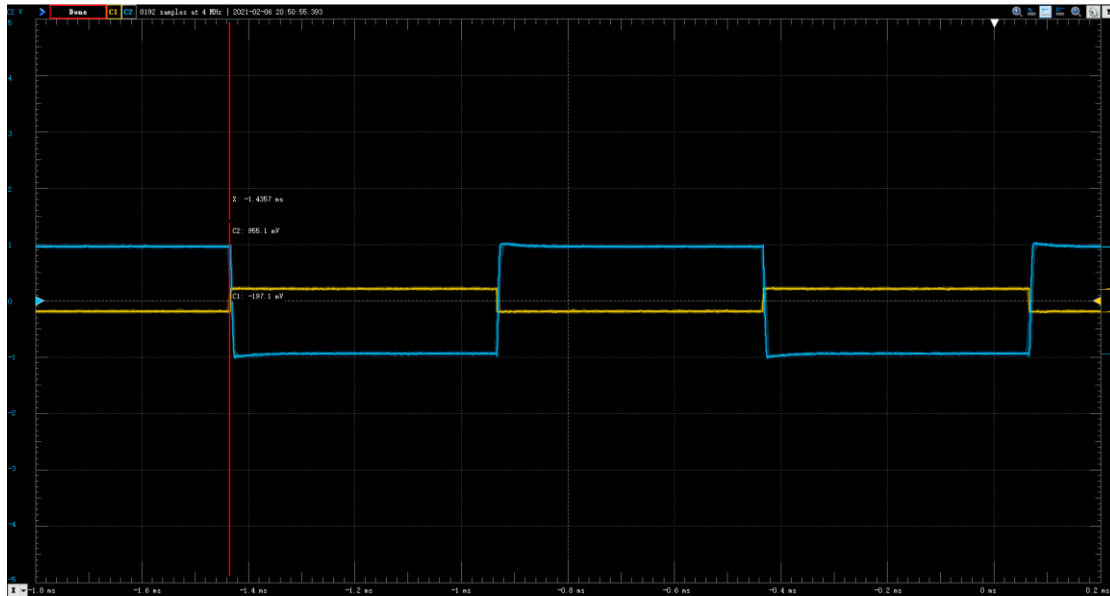
Cooperate with:
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Jishen Wang (400228352)

As a future member of the engineering profession, the student is responsible for performing the required work in an honest manner, without plagiarism and cheating. Submitting this work with my name and student number is a statement and understanding that this work is our own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario.

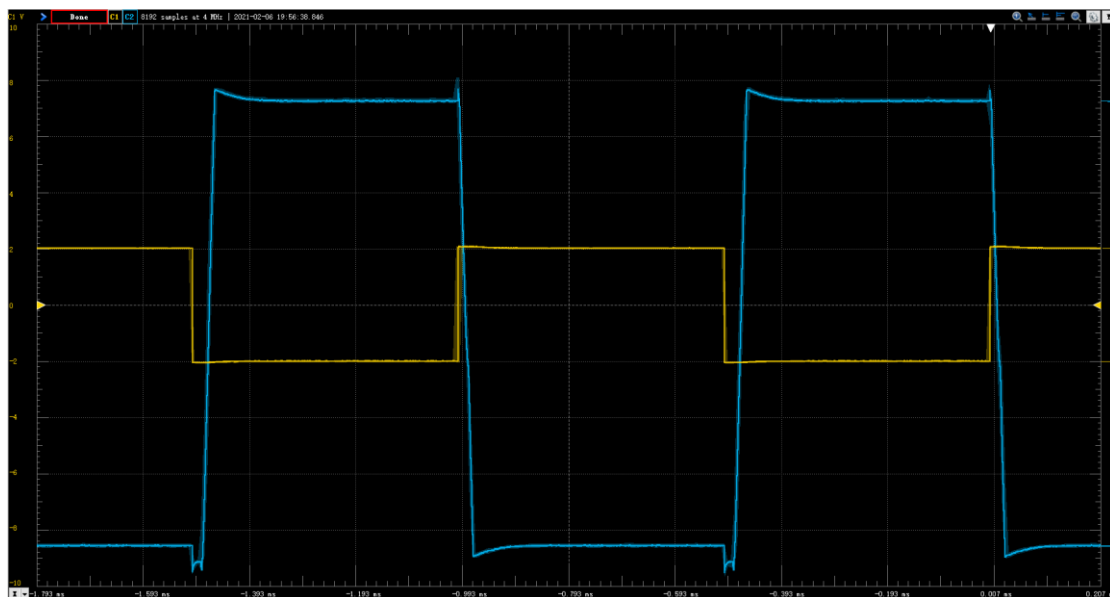
Part One:

The VCC and VEE are equal to 5 voltage.

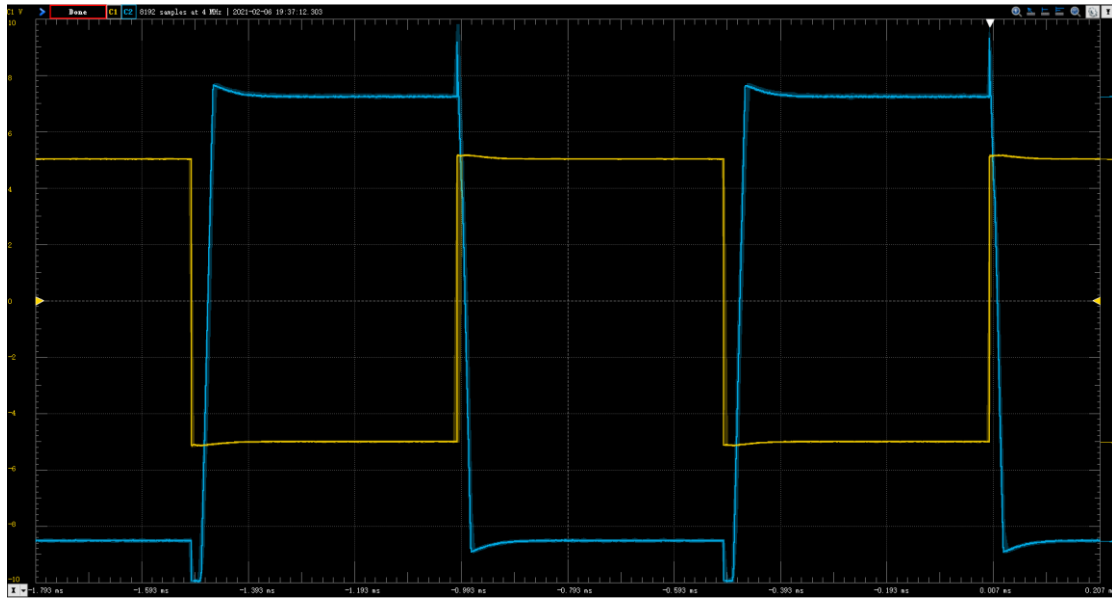
1. The $V_i = 200 \text{ mV}$



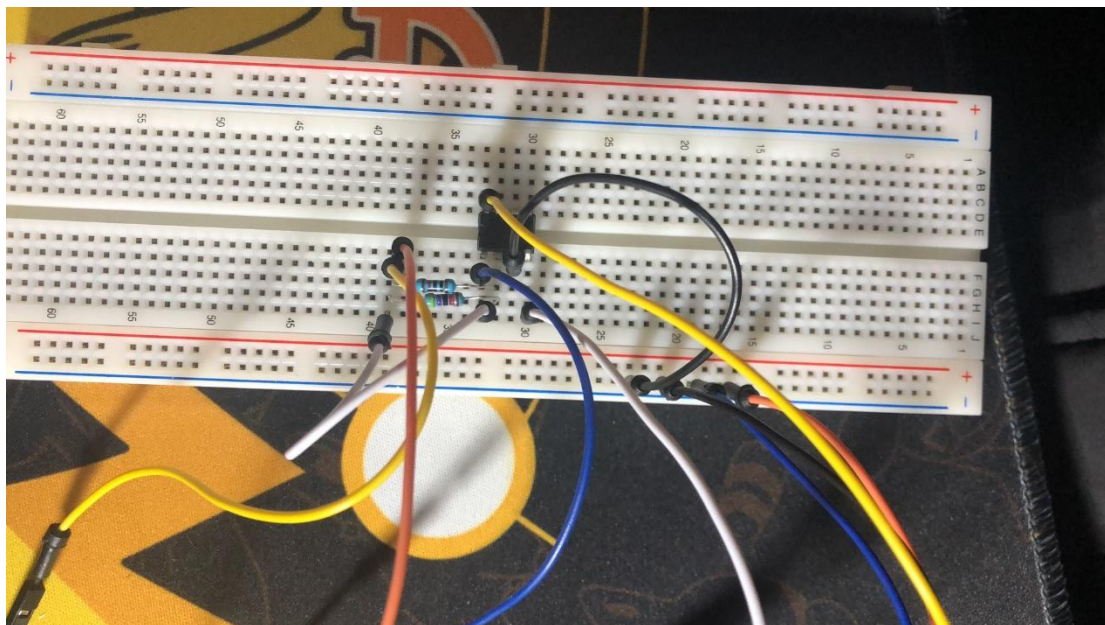
2. The $V_i = 2 \text{ V}$



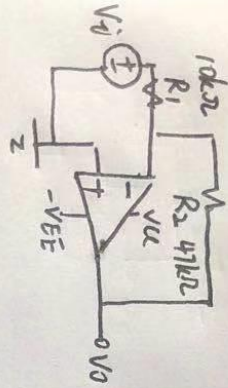
3. The $V_i = 5 \text{ V}$



The circuit:



Part Two:



$$V_- = V_+ = 0V$$

$$\frac{0 - V_i}{R_1} + \frac{0 - V_o}{R_2} = 0$$

$$\frac{V_i}{10k} + \frac{V_o}{47k} = 0$$

$$V_o = -\frac{47}{10} V_i$$

$$V_o = -4.7 V_i$$

$$A: V_{u} = V_{FE} = 5V$$

$$-5 \leq V_o \leq 5$$

$$-5 \leq -4.7 V_i \leq 5$$

$$-1.06 \leq V_i \leq 1.06$$

$$V_o = \begin{cases} 5V & V_i \leq -1.06V \\ -4.7V_i & -1.06V \leq V_i \leq 1.06V \\ -5V & V_i \geq 1.06V \end{cases}$$

$$a) V_i = 0.2V$$

$$A = \frac{V_o}{V_{in}} = -4.7$$

$$b) V_i = 2V > 1.06$$

$$A = \frac{V_o}{V_{in}} = -\frac{5}{2} = -2.5$$

$$c) V_i = 5V > 1.06$$

$$A = \frac{V_o}{V_{in}} = -\frac{5}{5} = -1$$

$$B: V_{u} = V_{FE} = 2.5V$$

$$-2.5 \leq V_o \leq 2.5$$

$$-2.5 \leq -4.7 V_i \leq 2.5$$

$$-0.53 \leq V_i \leq 0.53$$

$$V_o = \begin{cases} 2.5V & V_i \leq -0.53V \\ -4.7V_i & -0.53V \leq V_i \leq 0.53V \\ -2.5V & V_i \geq 0.53V \end{cases}$$

$$a) V_i = 0.2V < 0.53V$$

$$A = \frac{V_o}{V_{in}} = -4.7$$

$$b) V_i = 2V > 0.53V$$

$$A = \frac{V_o}{V_{in}} = -\frac{2.5}{2} = -1.25$$

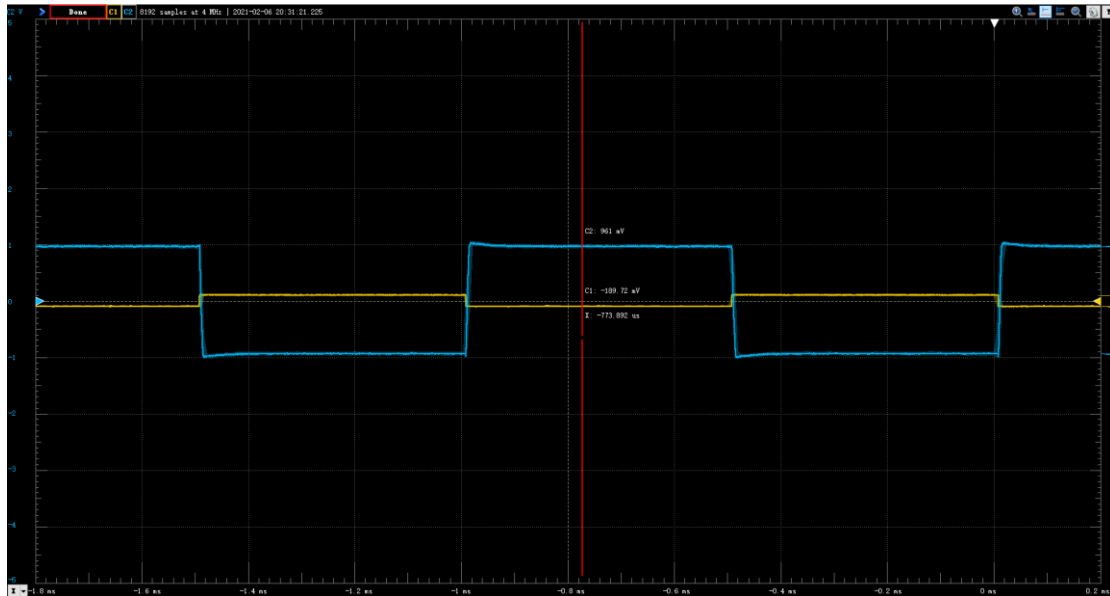
$$c) V_i = 5V > 0.53V$$

$$A = \frac{V_o}{V_{in}} = -\frac{2.5}{5} = -0.5$$

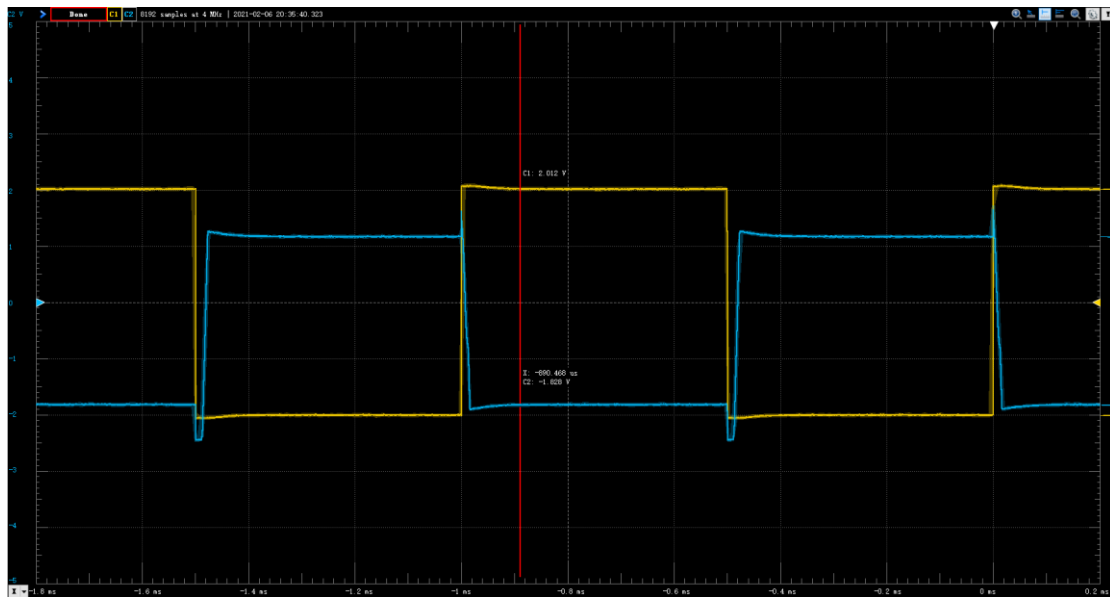
Part Three:

The VCC and VEE are equal to 2.5 voltage.

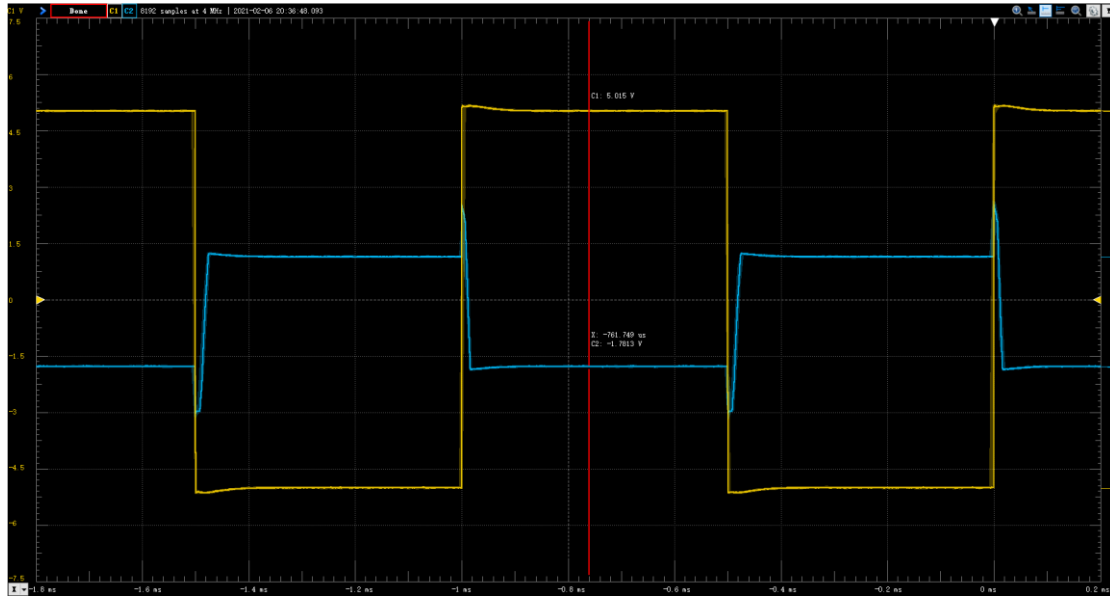
1. The $V_i = 200 \text{ mV}$



2. The $V_i = 2 \text{ V}$



3. The $V_i = 5\text{ V}$



(The relevant calculation is covered in the part two)

Conclusion: after the calculation, the experiment result is generally compare to our expectation.