Xidian University & Heriot-Watt University

**Diodes and BJT applications**

(Lab 3)

Semiconductor Electronics

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**Task 1: Simulation of Diode Circuit**

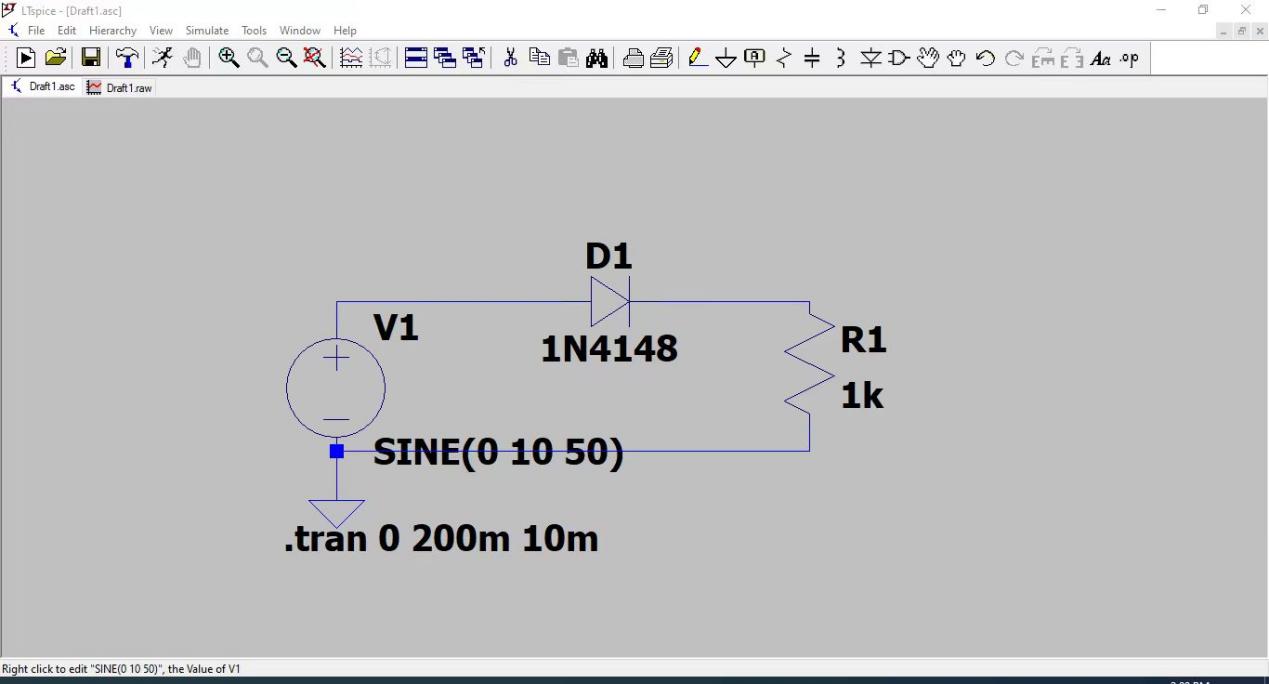


Figure1.1 the schematic of the circuit

**Short Introduction on the circuit purpose and operation.**

The purpose of the circuit is constructing a half-wave rectifier which eliminate the negative value of the input signal and only keep the positive one.

When in positive circle, the diode is in positive bias, the source and load are short connected(ideal diode). When is negative circle, the diode is in reverse bias, the source and load are disconnected(ideal diode).

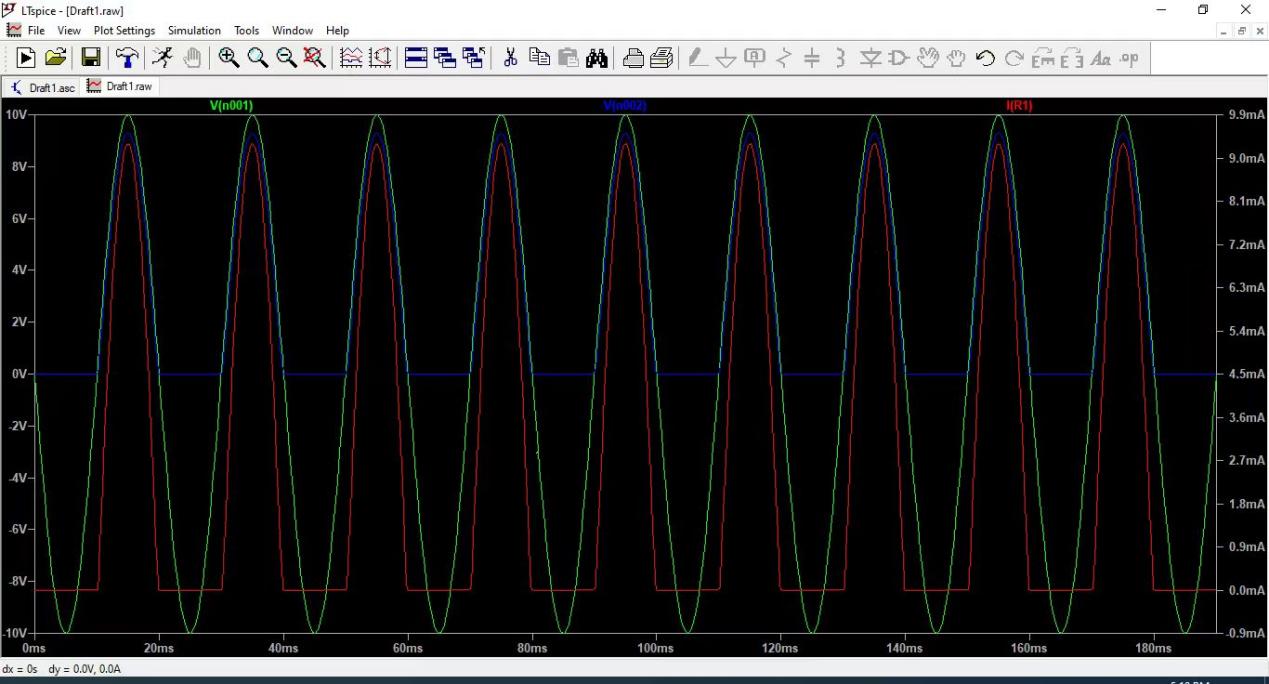


Figure1.2 input and output waveforms (1)

**Findings from the initial simulation with input and output waveforms.**

it can be observed from the simulation result that:(green:input voltage; blue: output voltage; red: output current), only the positive circle of the input waveform is kept.

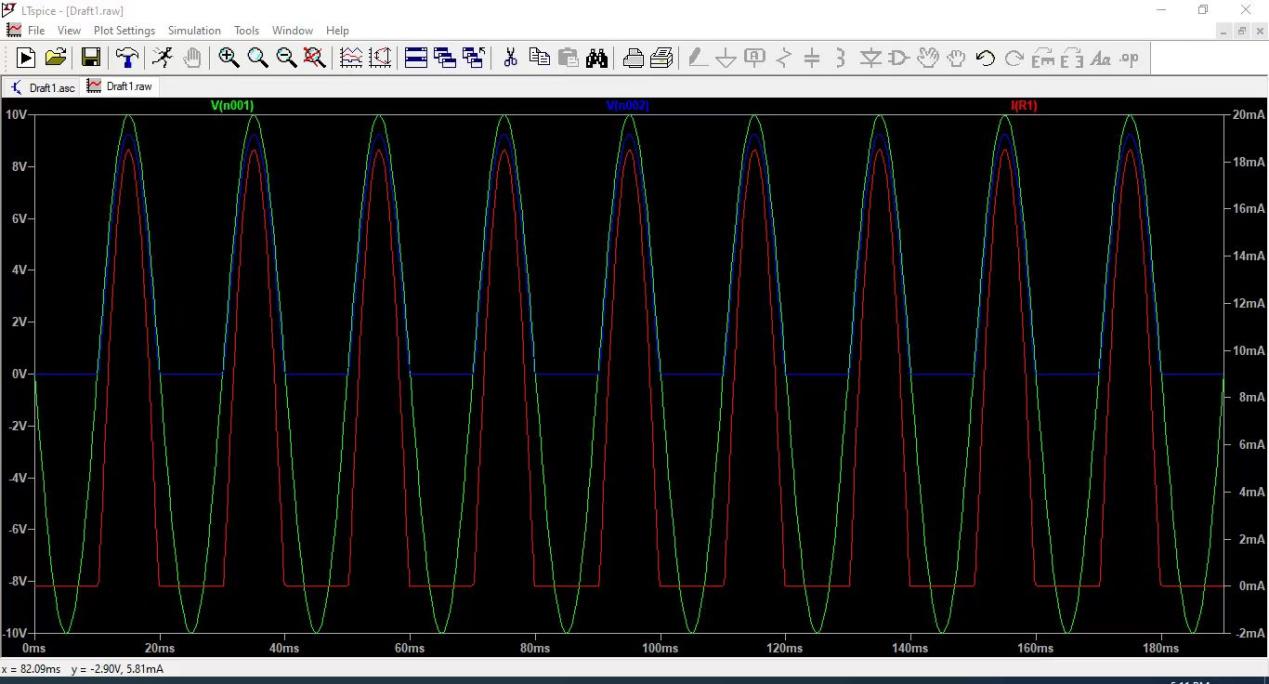


Figure1.3 input and output waveforms (2)

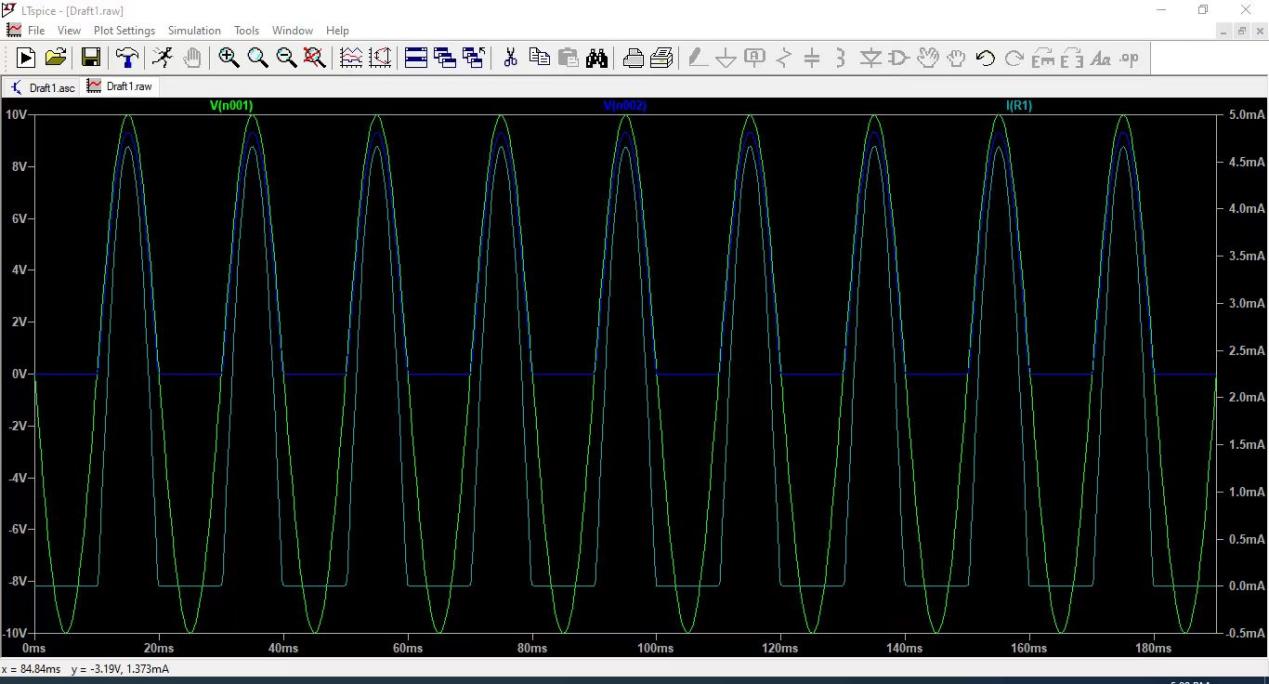
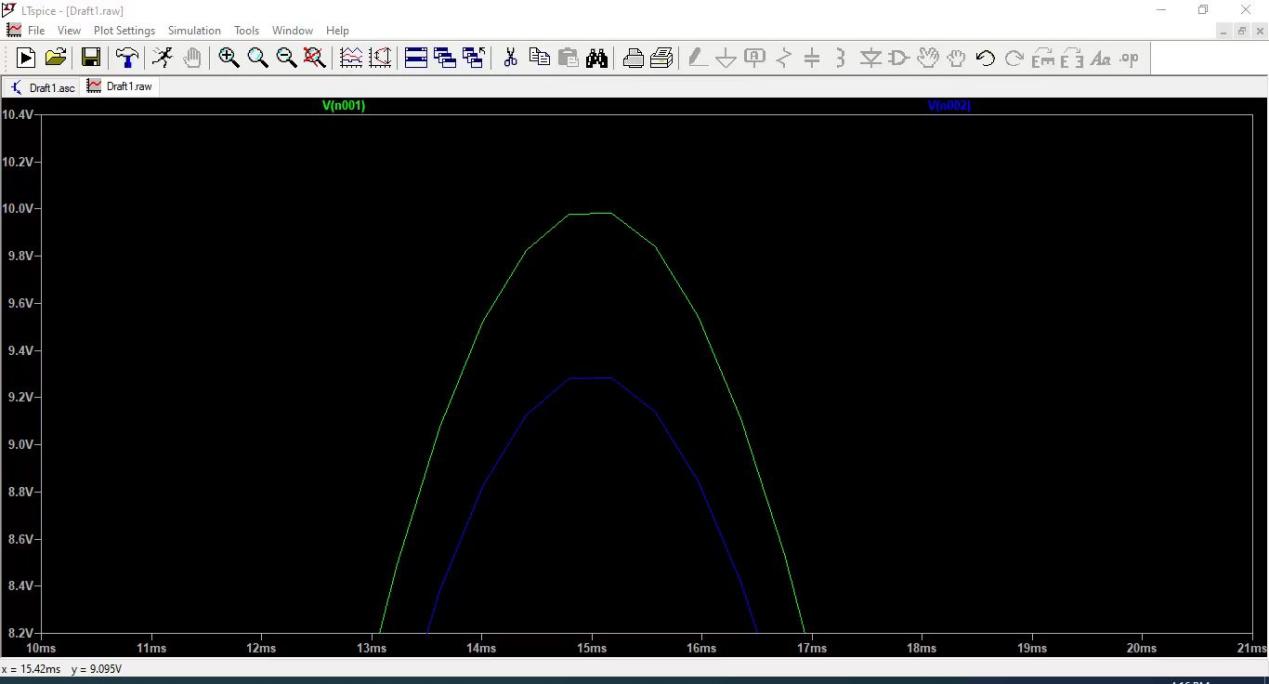


Figure1.3 input and output waveforms (3)

**The effect of change in load resistance value, using 3 different values for (RL) of your selection.**

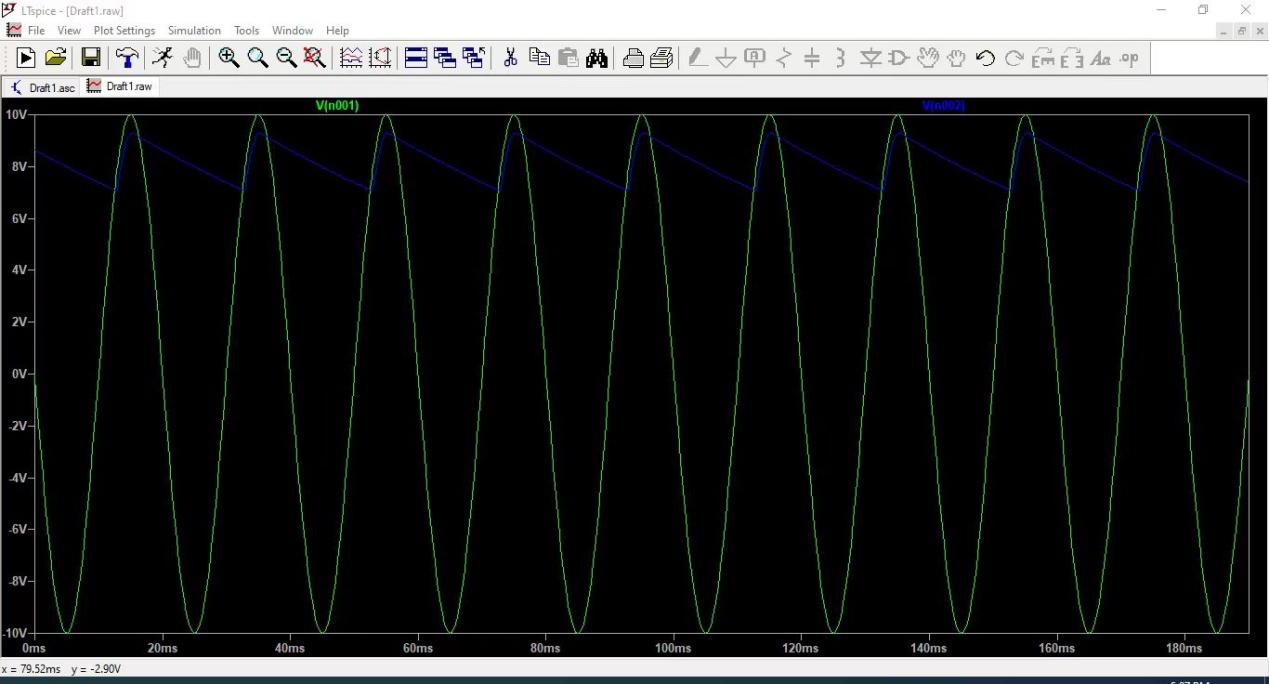
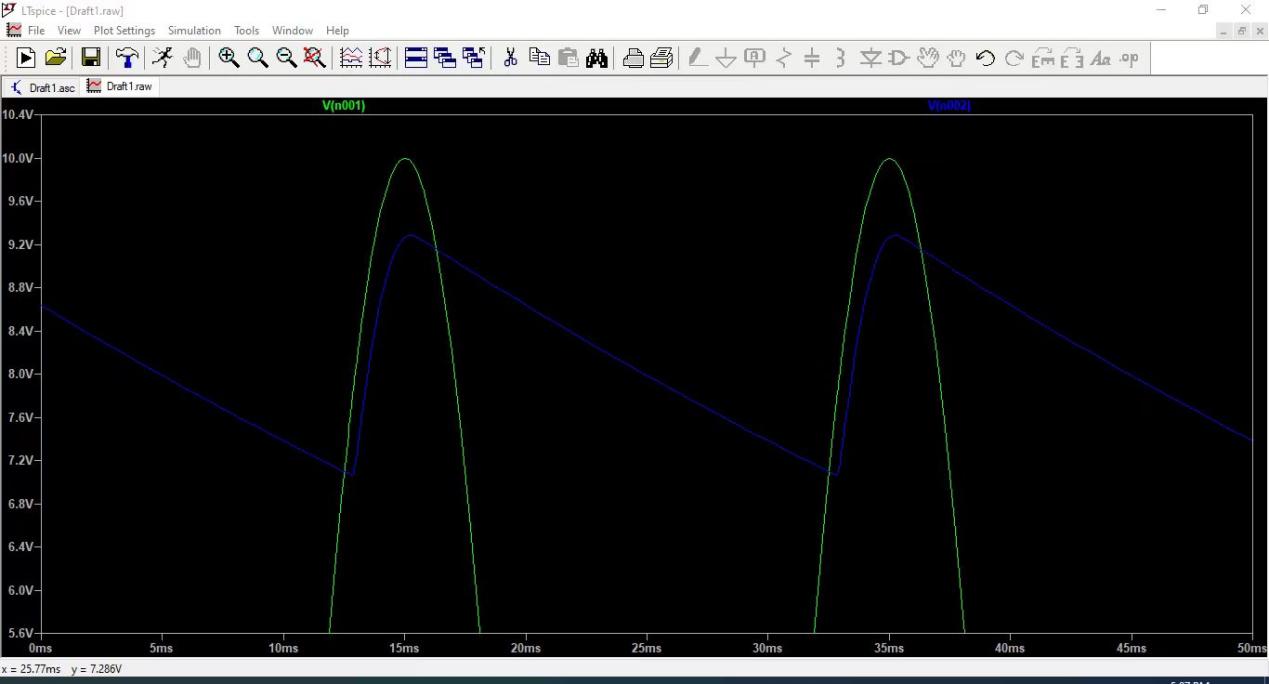
After trying the other two load resistance value, it can be found that the input voltage doesn’t change a lot. Only the current passing the load will vary according to the ohm’s law.



**Looking at the output, is 1N4148 a silicone or Germanium diode? and why?**

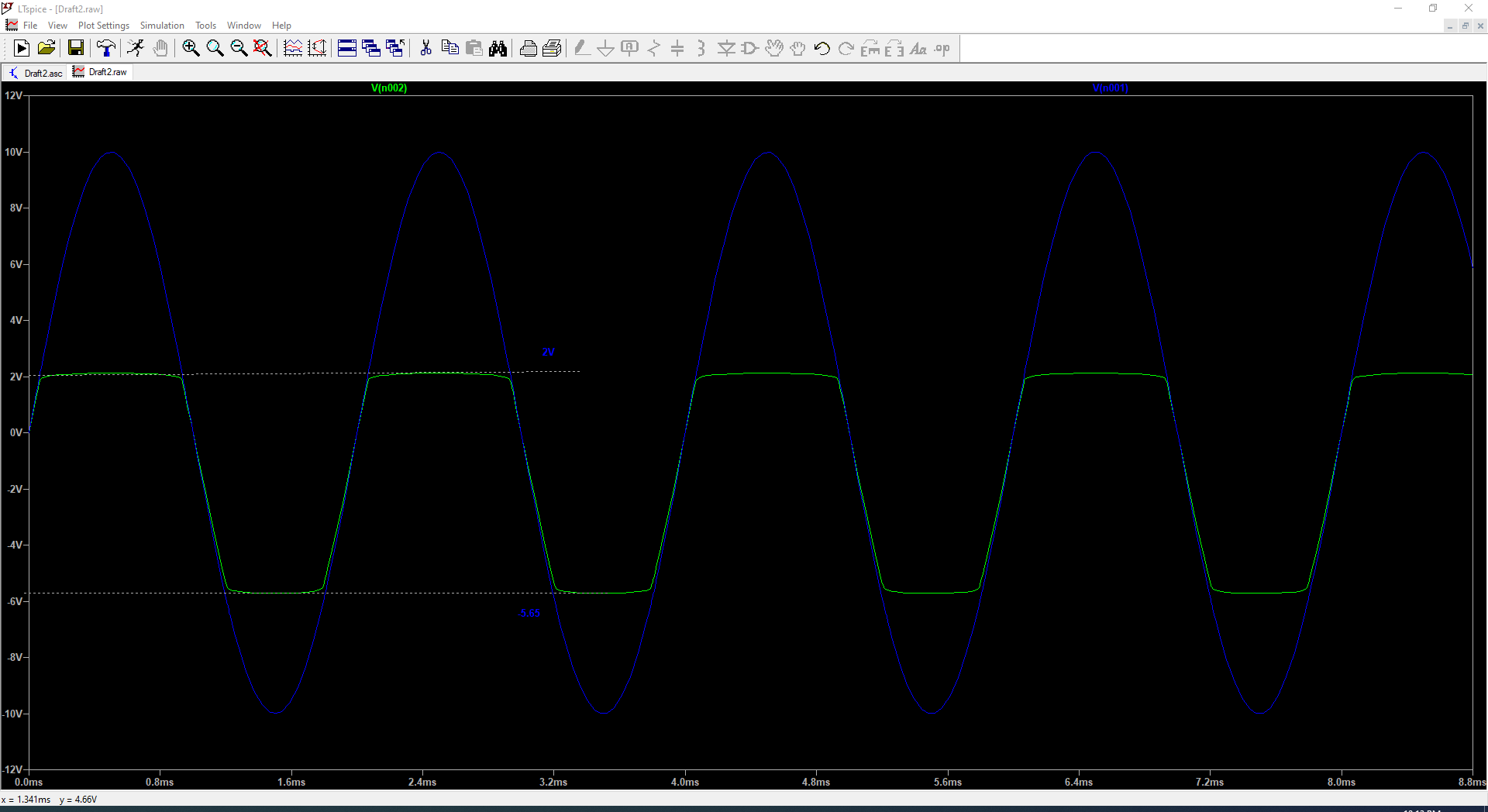
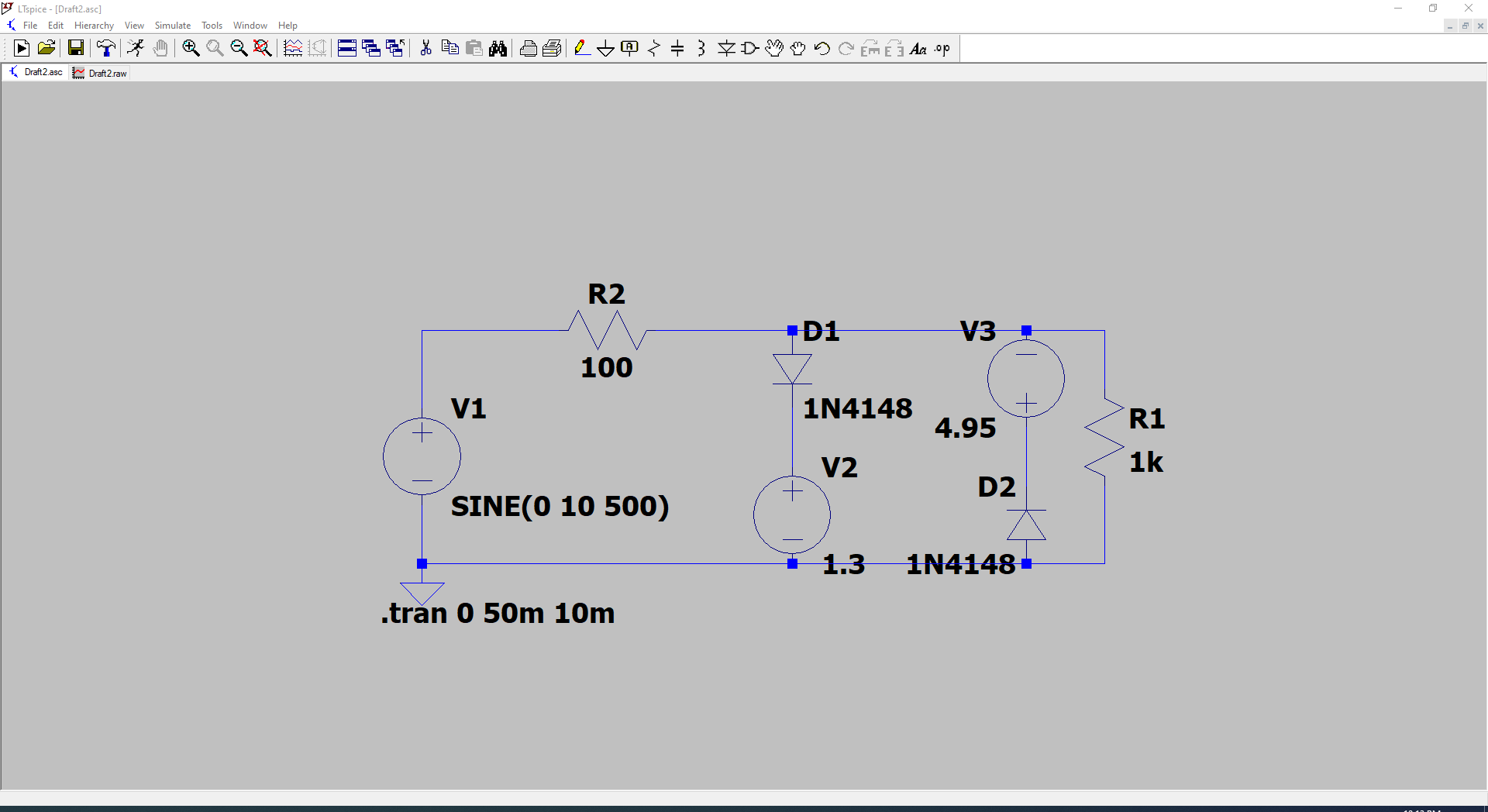
voltage drop 0.7V -> Silicon diode

**Discuss the effect on the output if the diode was replaced with an ideal diode.**

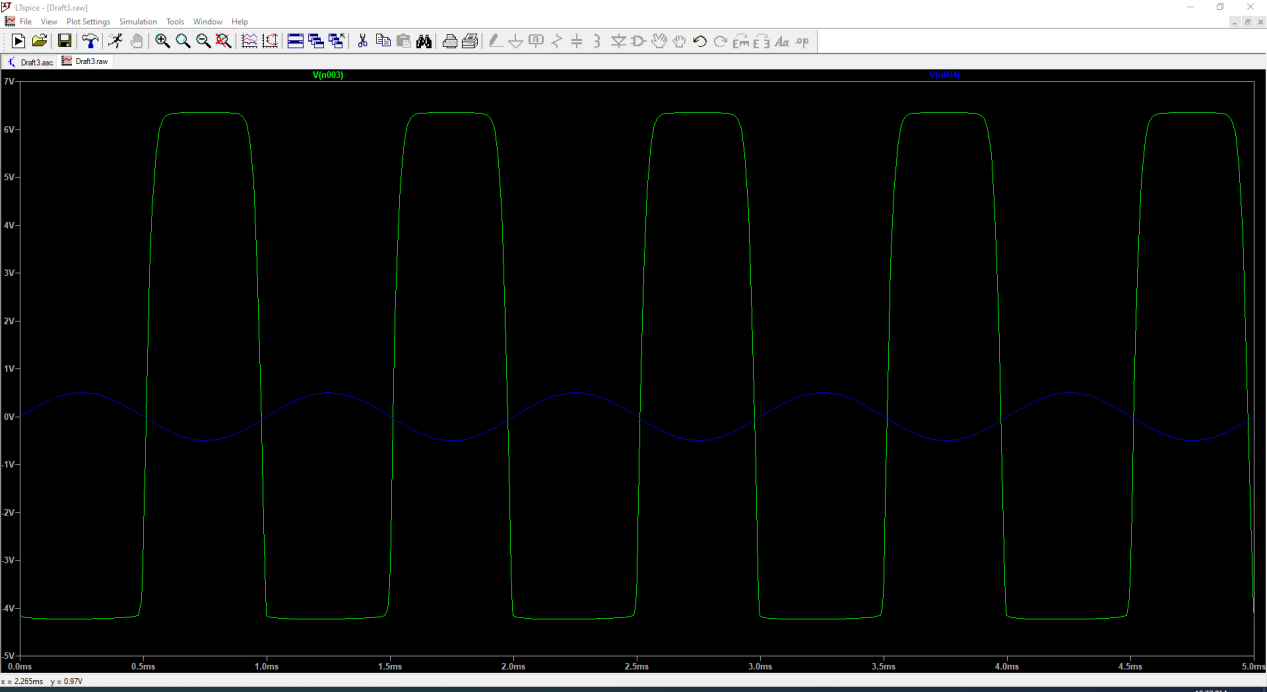
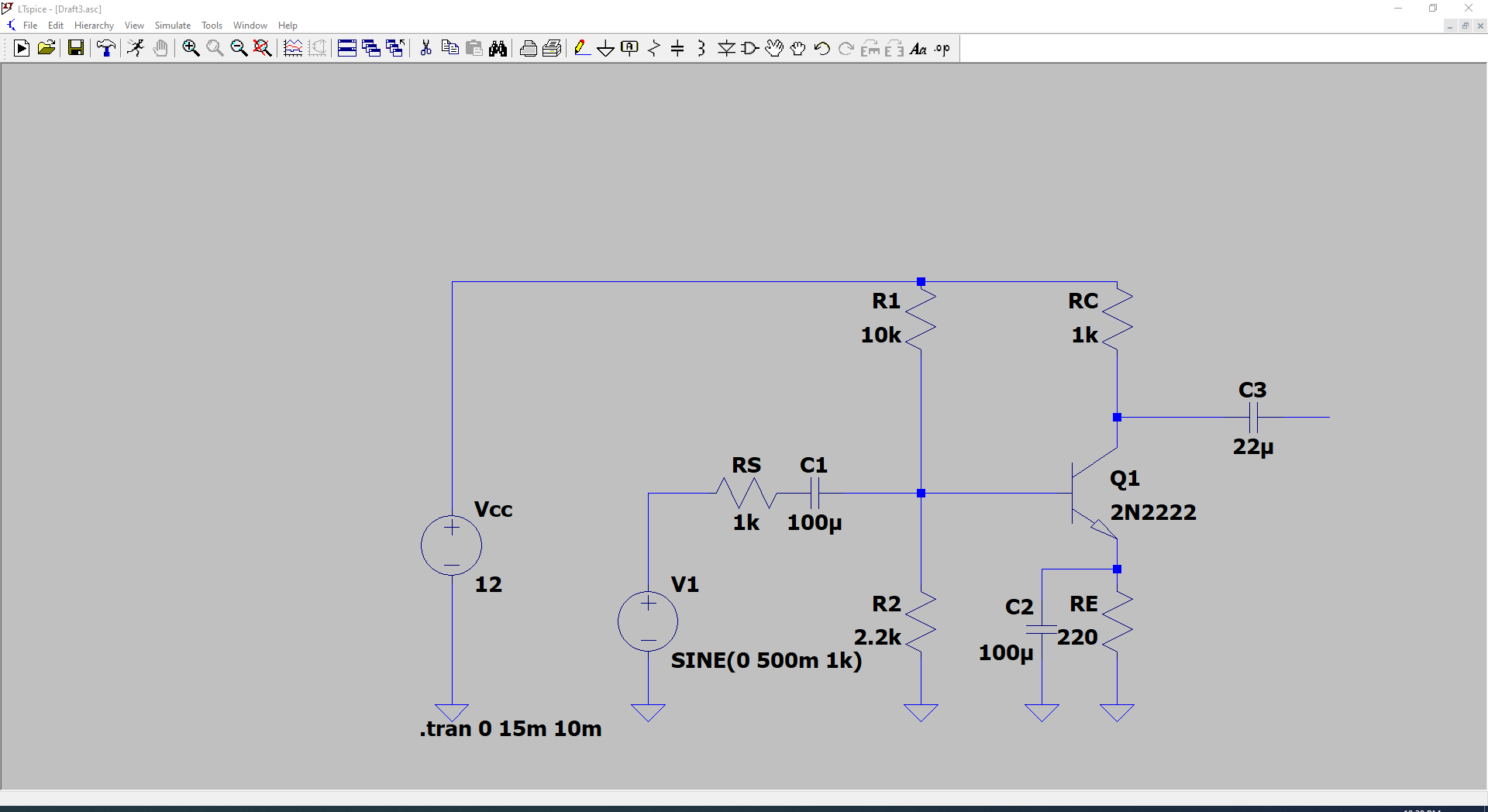


improve the output and elevate the average value

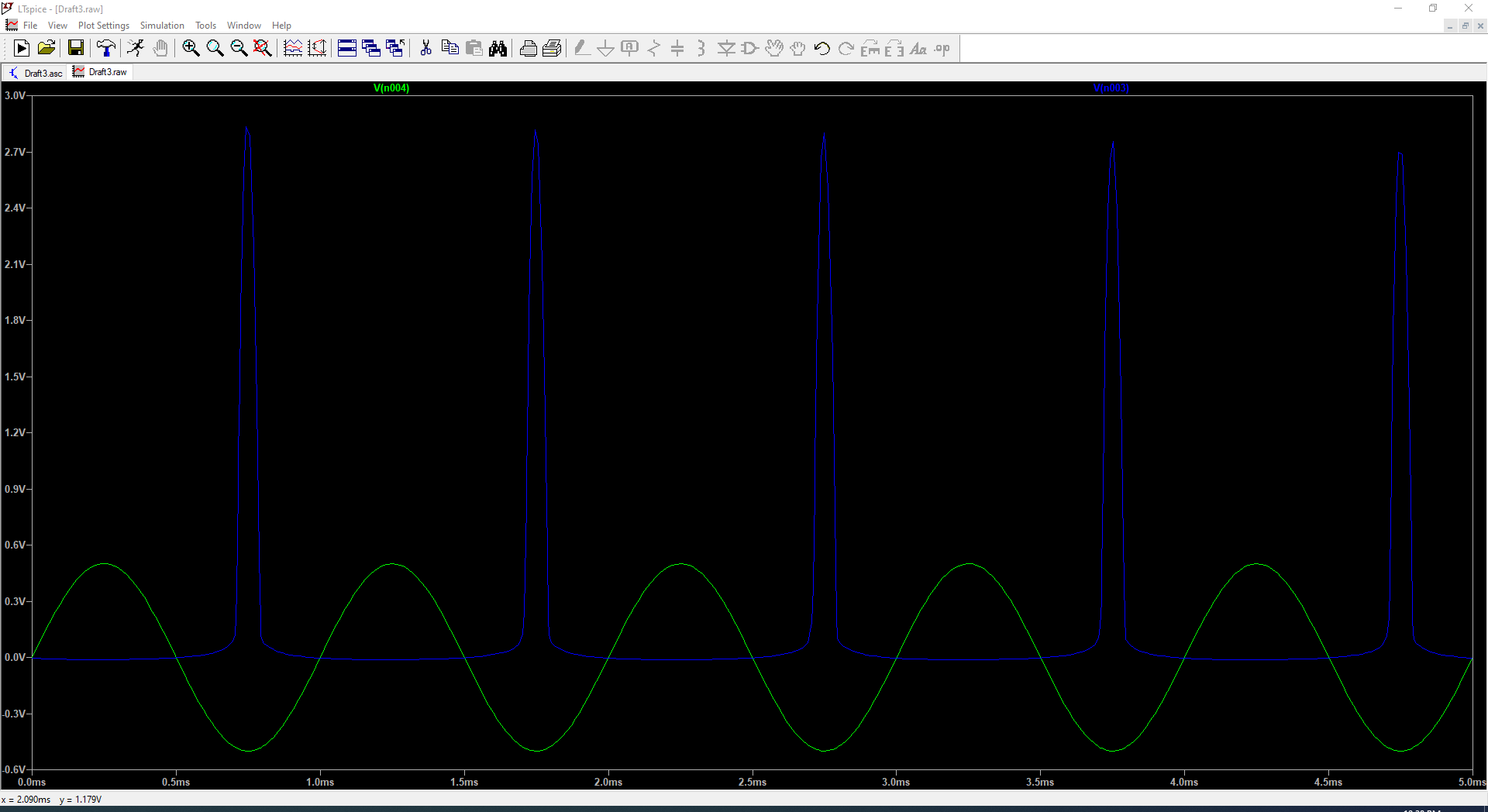
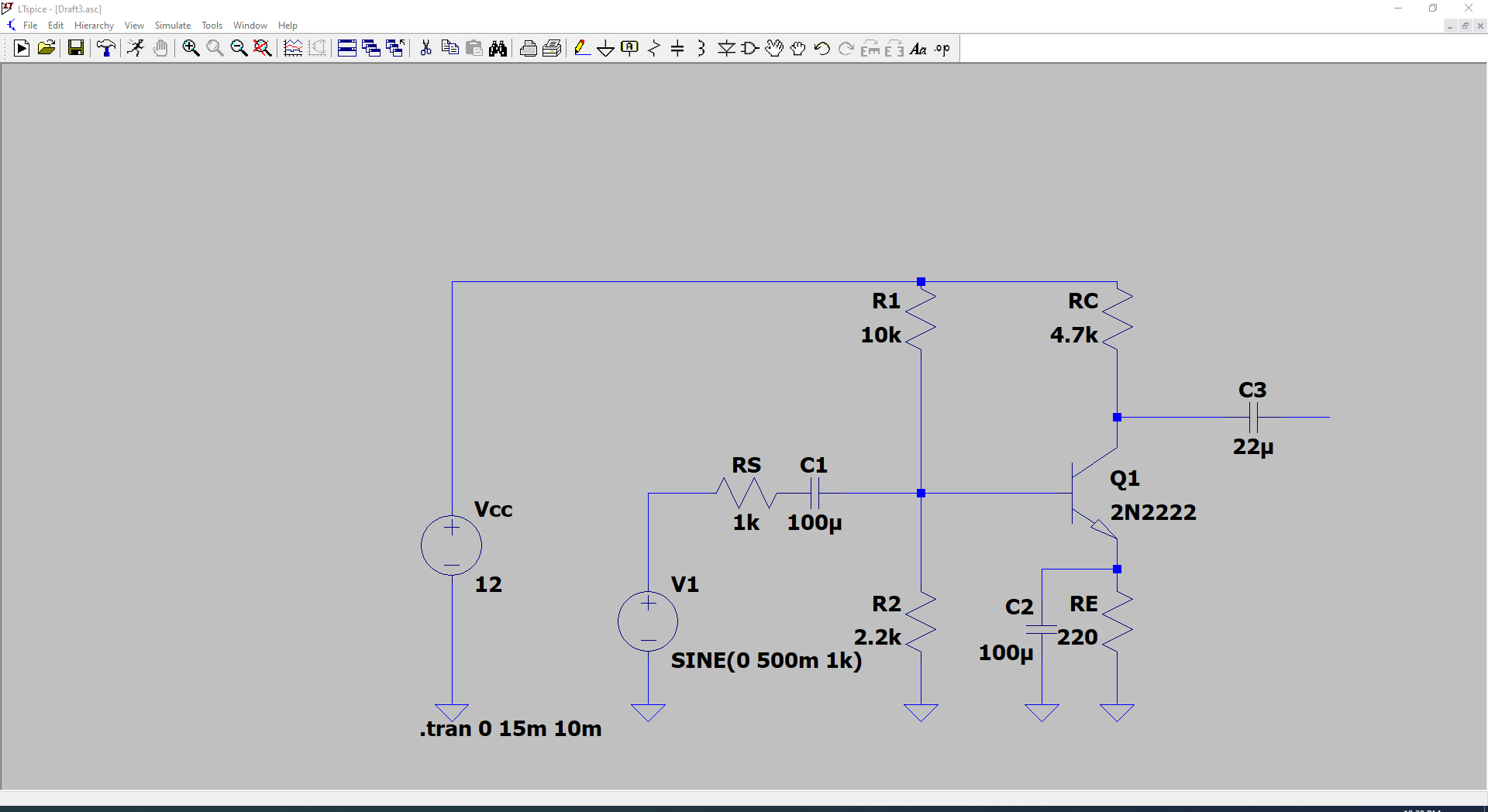
**Task 2: Design and Simulation**



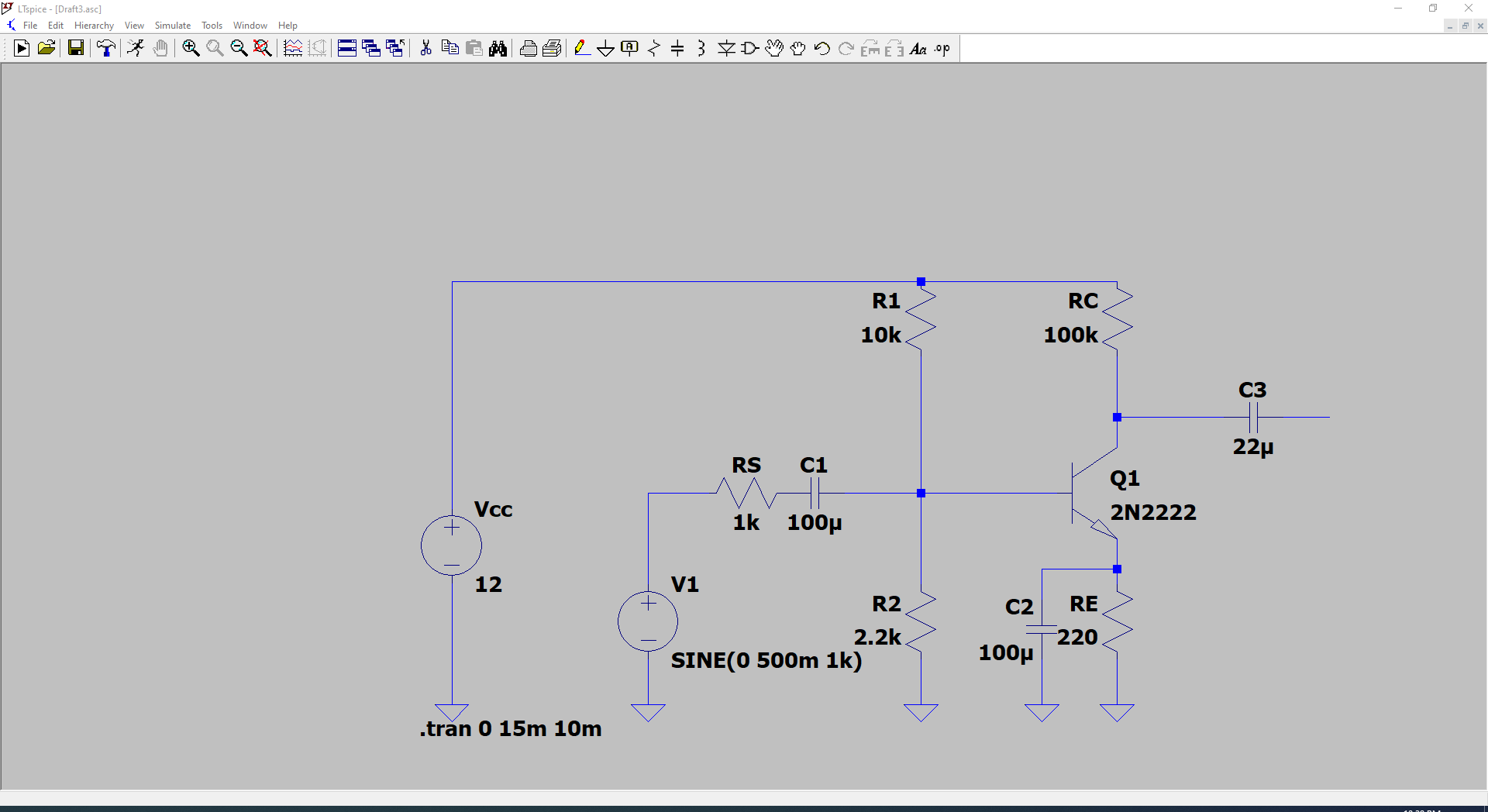
**Task 3: Simulation of BJT Circuit**

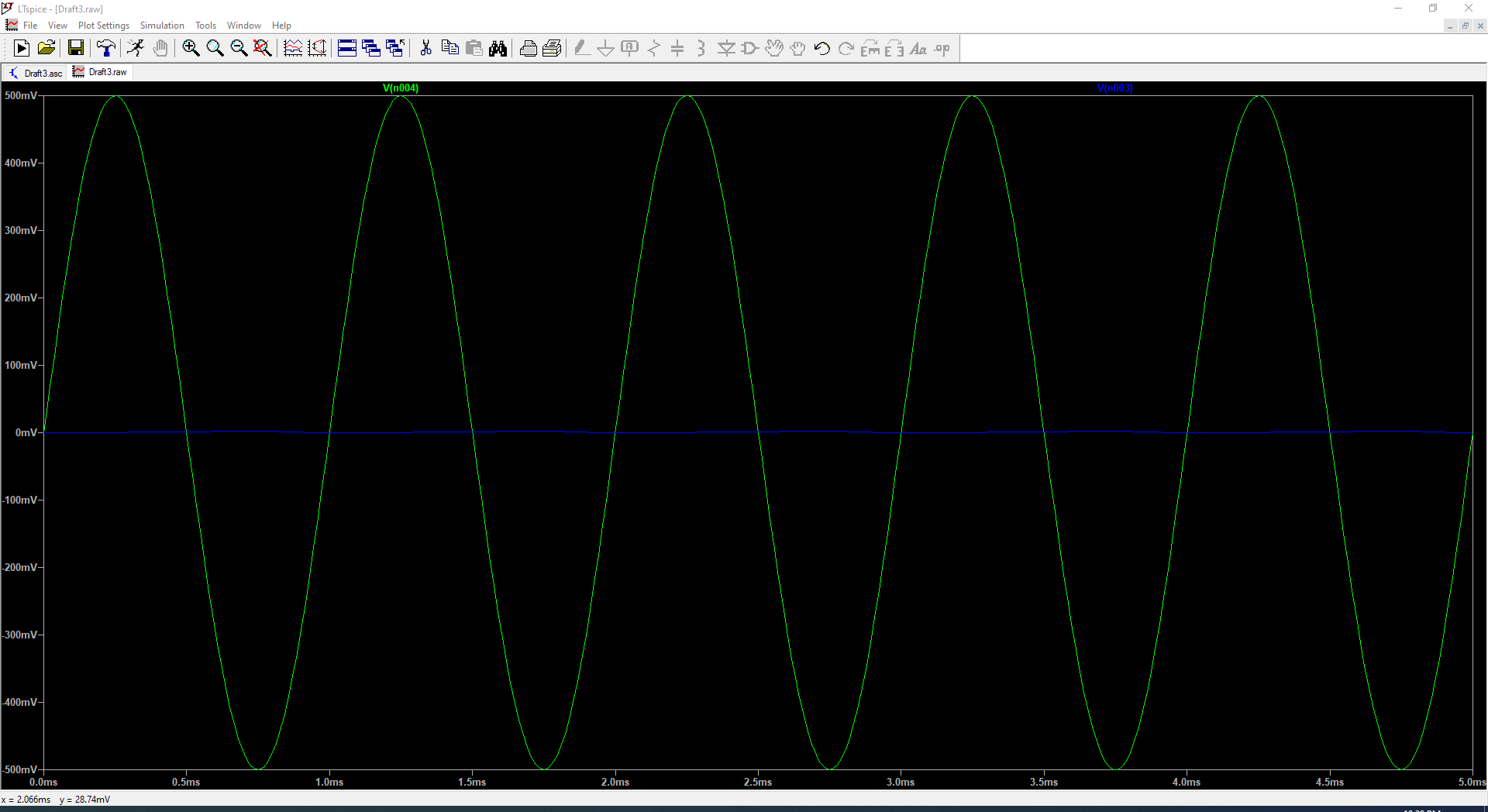


RC 4.7k



RC 100k





Frequency 5Mhz

