

PRACTICE TASK 3 REPORT
« Operational amplifiers. Wien bridge oscillator»
Principles of Circuits

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1. Work purpose: to study parameters of Wien bridge oscillator

Goals:

- 1) Calculate parameters of Wien bridge oscillator
- 2) Compare calculated and simulated signal frequencies

2. Starting data

- Source voltage frequency, [Hz], $f_{test} = 8000$
- Load resistance, [Ω]: $R_{Load} = 1000000$
- Resistance R_1 [Ω] [V]: $R_1 = 15000$
- Voltage source power supply [V]: $V_{cc\pm} = \pm 9$
 $V_{ref} = 1$

3. Calculations3.1. Calculate R_2

$$R_1 = R_2 = 15000 \quad [\Omega]$$

3.2. Define (choose) R_3

$$R_3 = 260000 \quad [\Omega]$$

3.3. Define (choose) R_4

$$R_4 = \frac{R_3}{2} = 130000 \quad [\Omega]$$

3.4. Calculate C1 and C2 value in your model

$$C_1 = C_2 = \frac{1}{2\pi R_1 f_{test}} = 1326p \quad [F]$$

3.5. Define f_0 in Hz calculated from C1, C2, R1, R2 real values

$$f_{0_calculated} = \frac{1}{2\pi R_1 C_{1_real}} = 8000 \quad [\text{Hz}]$$

3.6. Define f_0 in from simulation results of Wien bridge with ideal operational amplifier

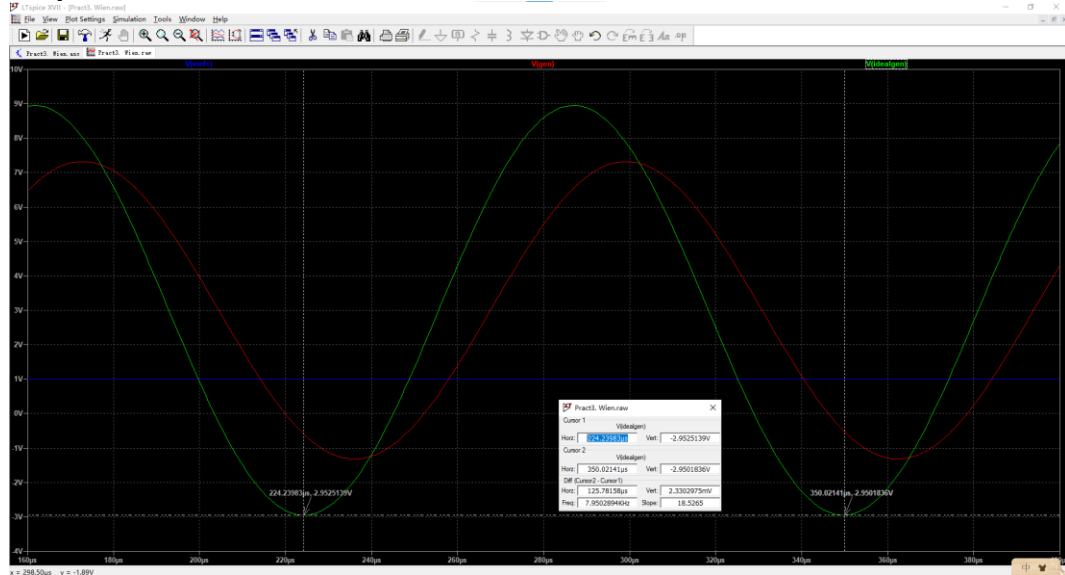


Figure 1. Results with ideal operational amplifier simulation

$$f_{0_ideal} = 7950.29 \quad [\text{Hz}]$$

3.7. Define f_0 in from simulation results of Wien bridge with real operational amplifier

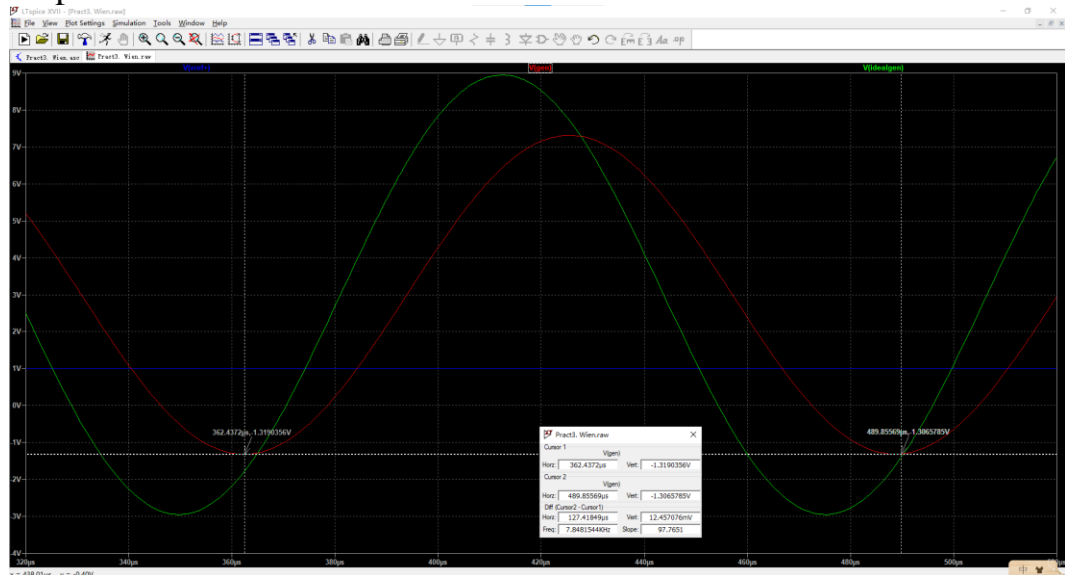


Figure 2. Results with real operational amplifier simulation

$$f_{0_real} = 7848.15 \quad [\text{Hz}]$$

4. Conclusions

Conclusions should contain:

- 1) Values of f_{0_real} , f_{0_ideal} , $f_{0_calculated}$

$$f_{0_calculated} = \frac{1}{2\pi R_1 C_{1_real}} = 8000 \text{ [Hz]}$$

$$f_{0_ideal} = 7950.29 \text{ [Hz]}$$

$$f_{0_real} = 7848.15 \text{ [Hz]}$$

- 2) [Optional] Which resistor and capacitors correspond to the required parameters?
Try to find a set of capacitor and resistors which could provide required frequency.