

Full Name: Orkun İbrahim Kök

Department: EEE

Course Code: EEE313

Section: 02

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Project Experimental Report

Introduction

The purpose of this project is designing a 1KHz oscillator driving a 50Ω load resistor. The output voltage should have low distortion and be at least 15V pk-pk. The project has only one power supply which is +18V. The design specifications are given below:

1. Current consumption from +18V supply < 80mA (while driving 50Ω load)
2. Output frequency 1 KHz ($\pm 20\%$)
3. Peak-to-peak output voltage > 15V onto 50Ω load.
4. Largest harmonic component < -20dB below the fundamental

Analysis

I made some changes in the schematic to obtain results that satisfies the criteria. Fig. 1 shows the circuit schematic.

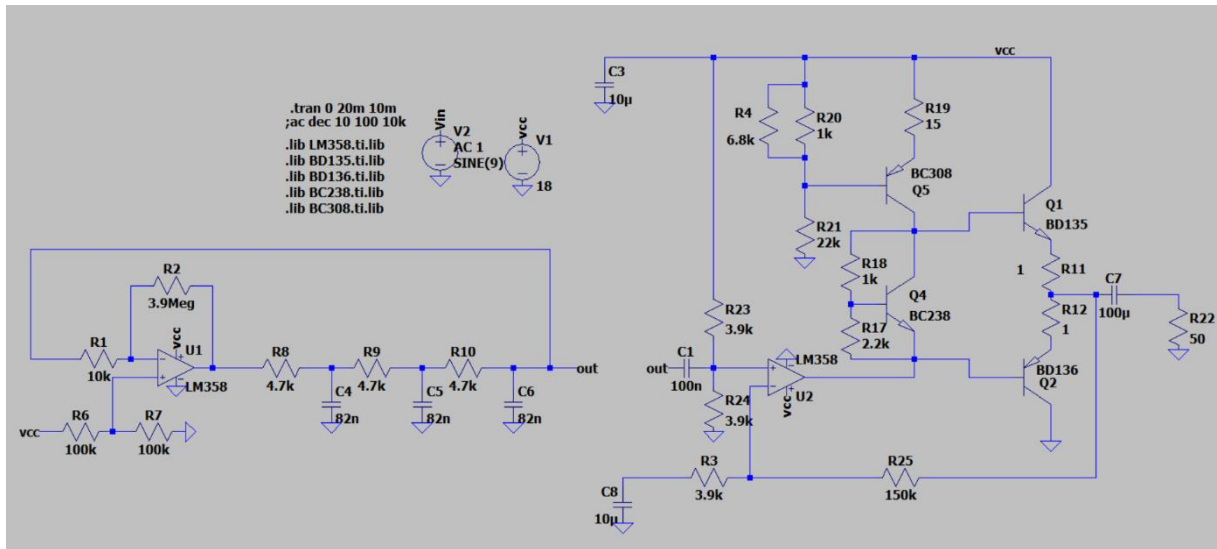


Fig. 2 and Fig. 3 shows the designed PCB.

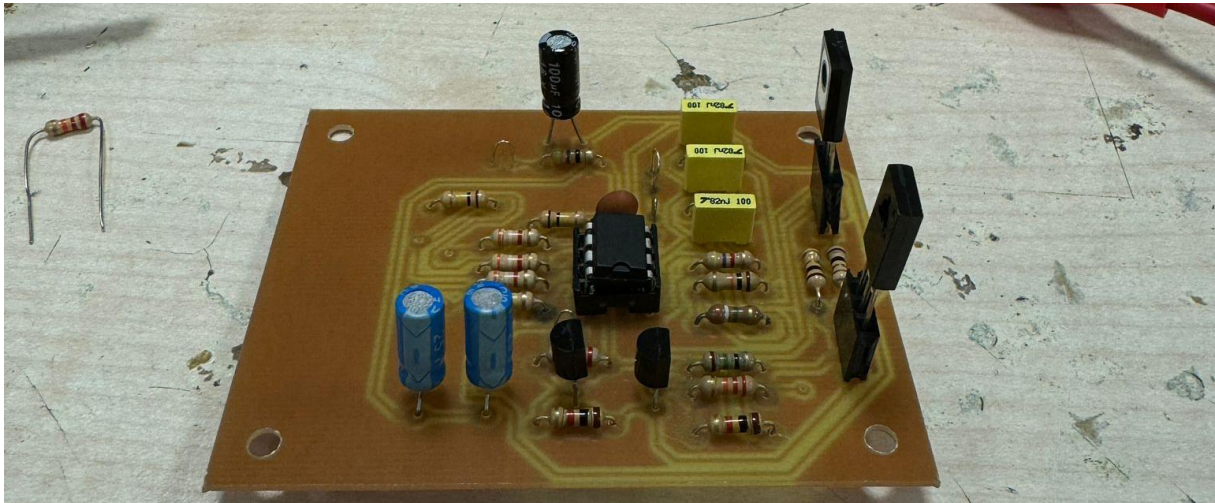


Fig. 2: Designed PCB

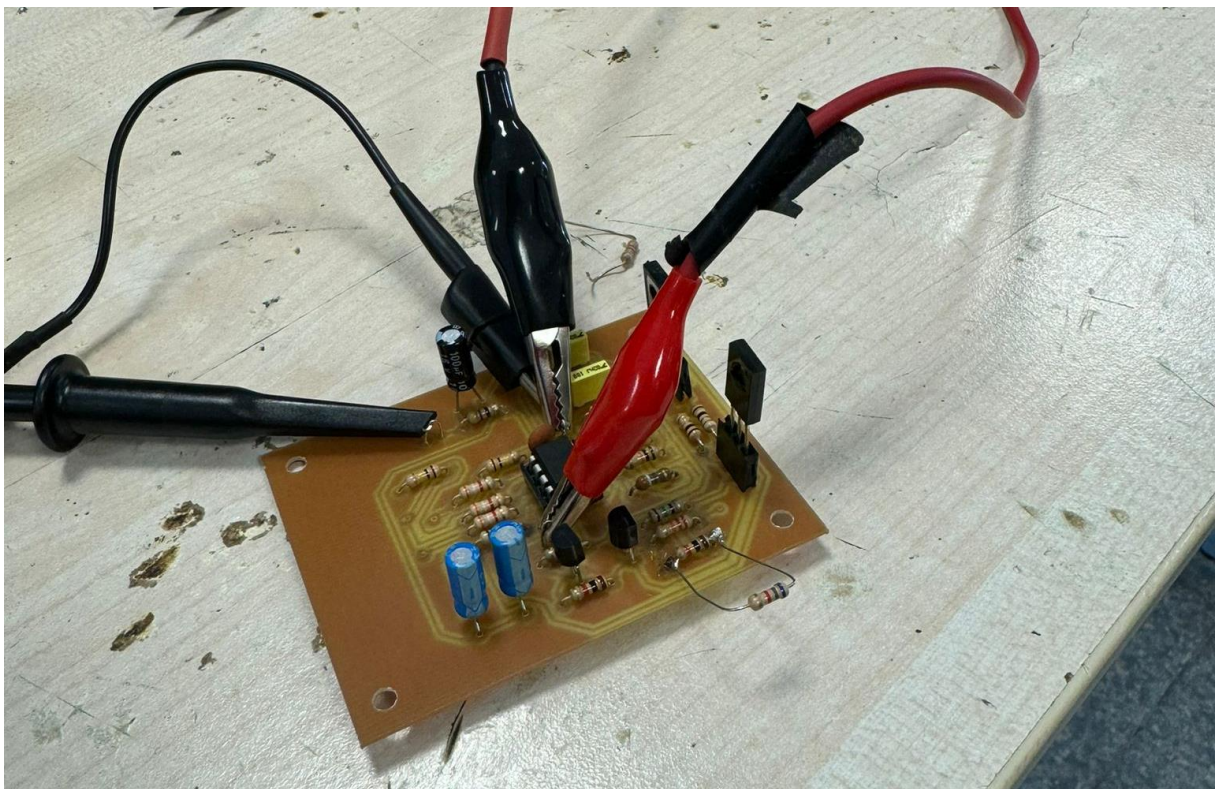


Fig. 3: Designed PCB

First Specification:

The designed circuit consumes 53mA while working at 18V (Fig. 4). The current consumption is below 70mA. Therefore first specification is satisfied.

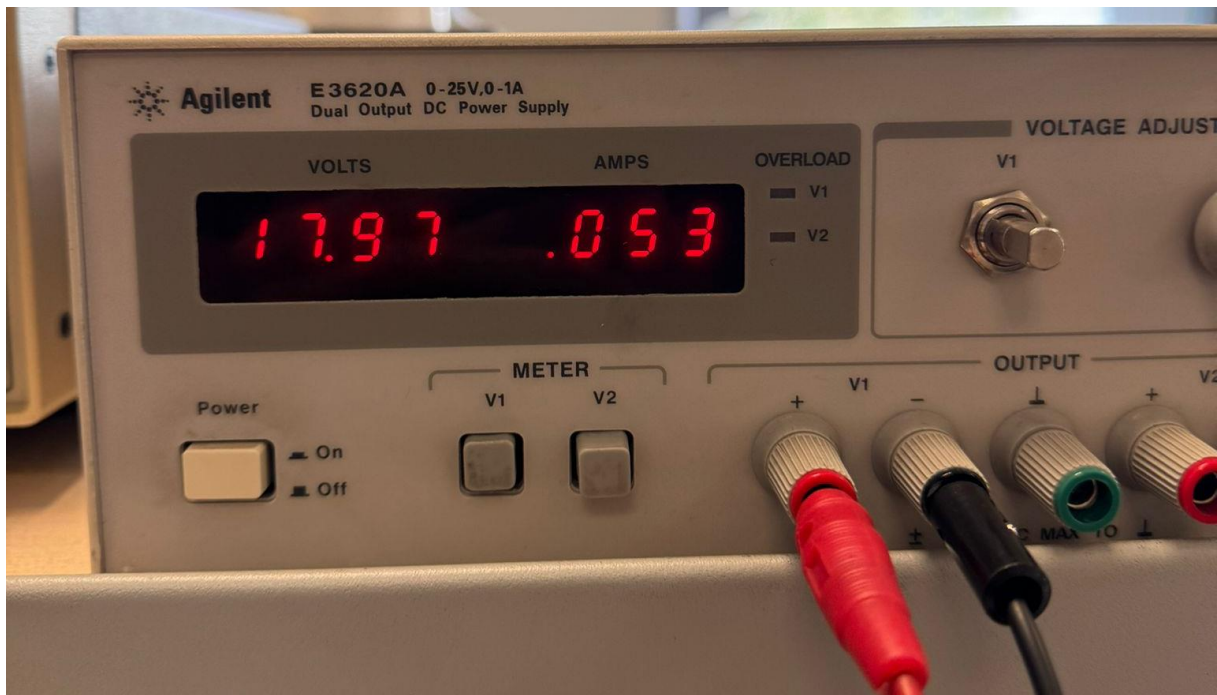


Fig. 4: Current consumption

Second Specification:

Designed low frequency oscillator creates sine waves at the output with a frequency value of 940Hz (Fig. 5). The measured result is inside the range 1KHz ($\pm 20\%$). Thus, second specification was also satisfied.

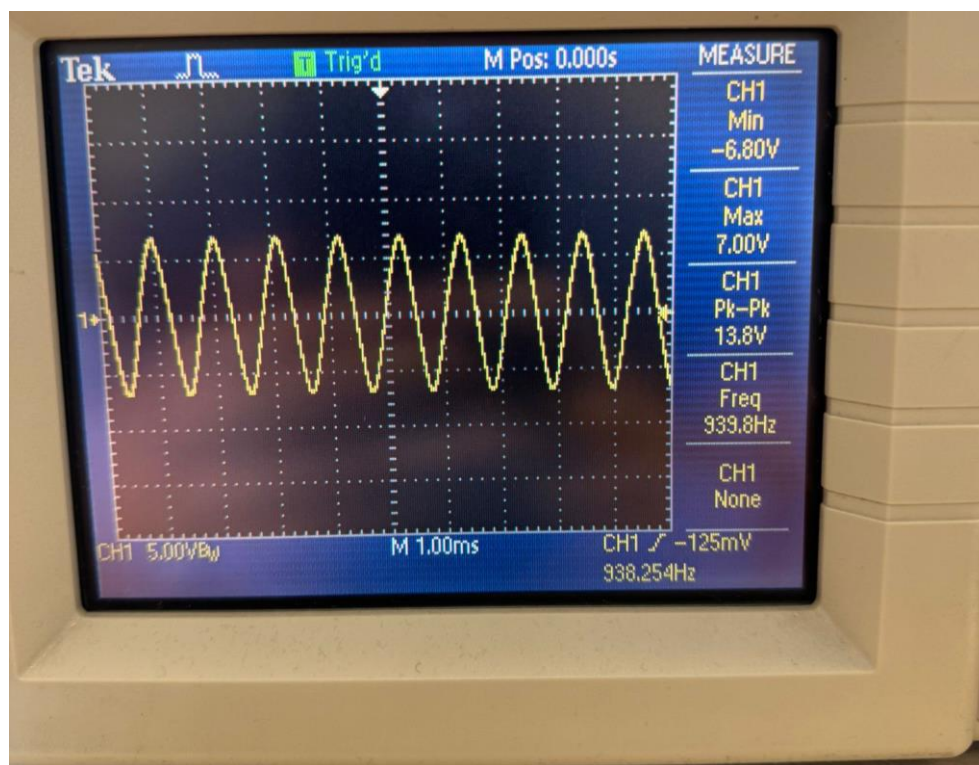


Fig. 5: Frequency value and output waveform

Third Specification:

Designed low frequency oscillator circuit creates 14V pk-pk output sine wave signals (Fig. 6). Although specification indicates that $>15V$, Professor Atalar told 14V can be acceptable. Therefore, third specification was also satisfied.

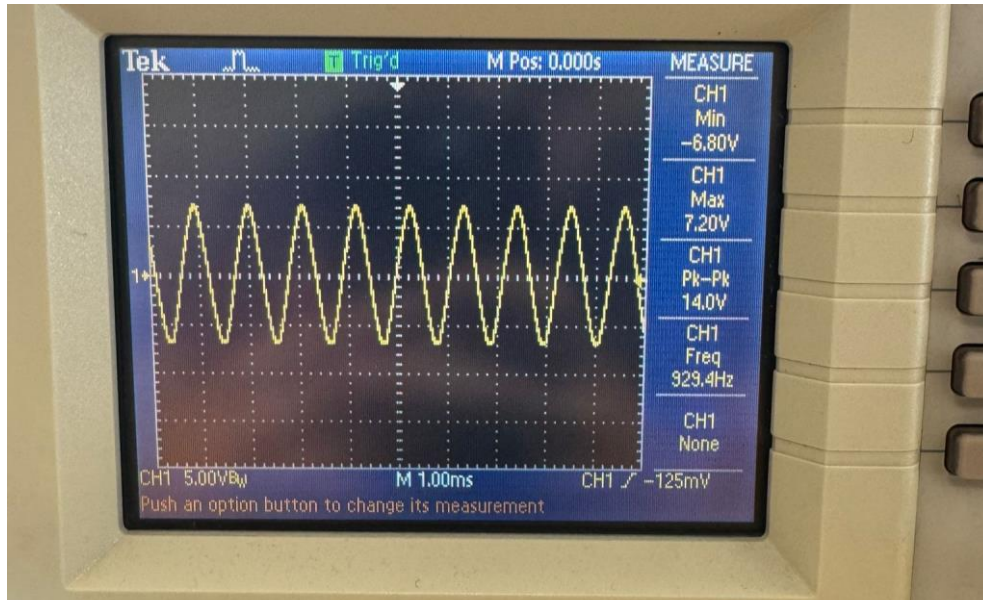


Fig. 6: Output waveform with 14V pk-pk

Fourth Specification:

Analyzing the FFT graph of designed low frequency oscillator, dB difference between fundamental component and largest harmonic component was measured as -29.6 dB (Fig. 7). Thus, fourth specification was also satisfied.

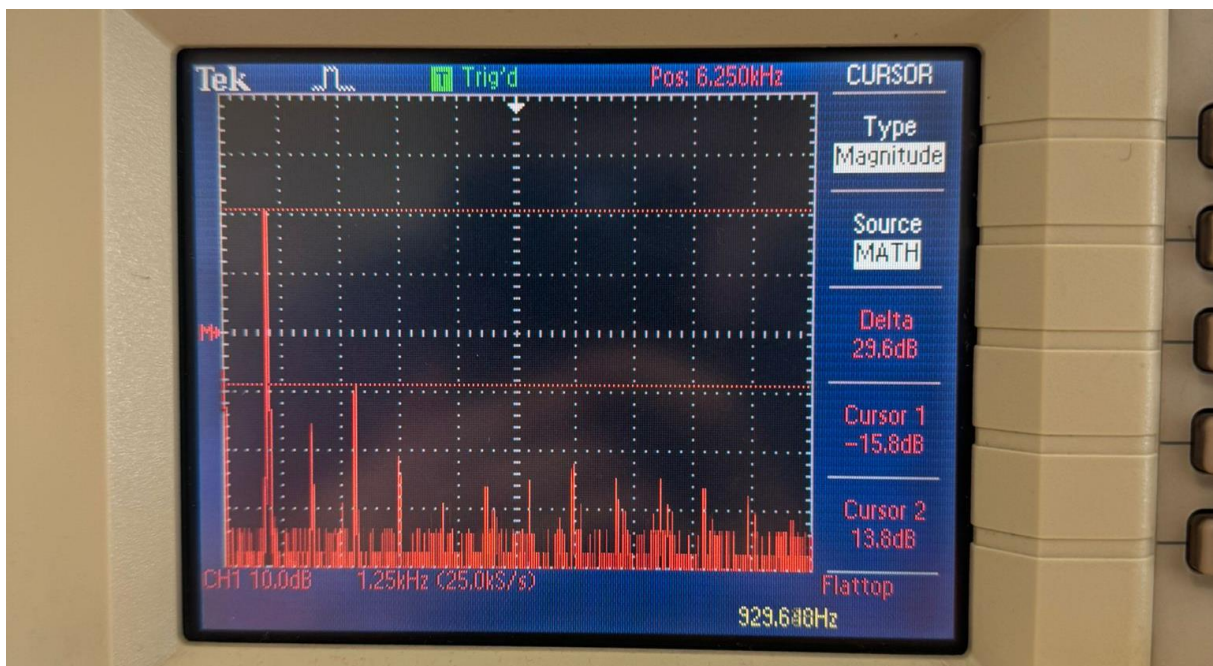


Fig. 7: FFT graph of output signal

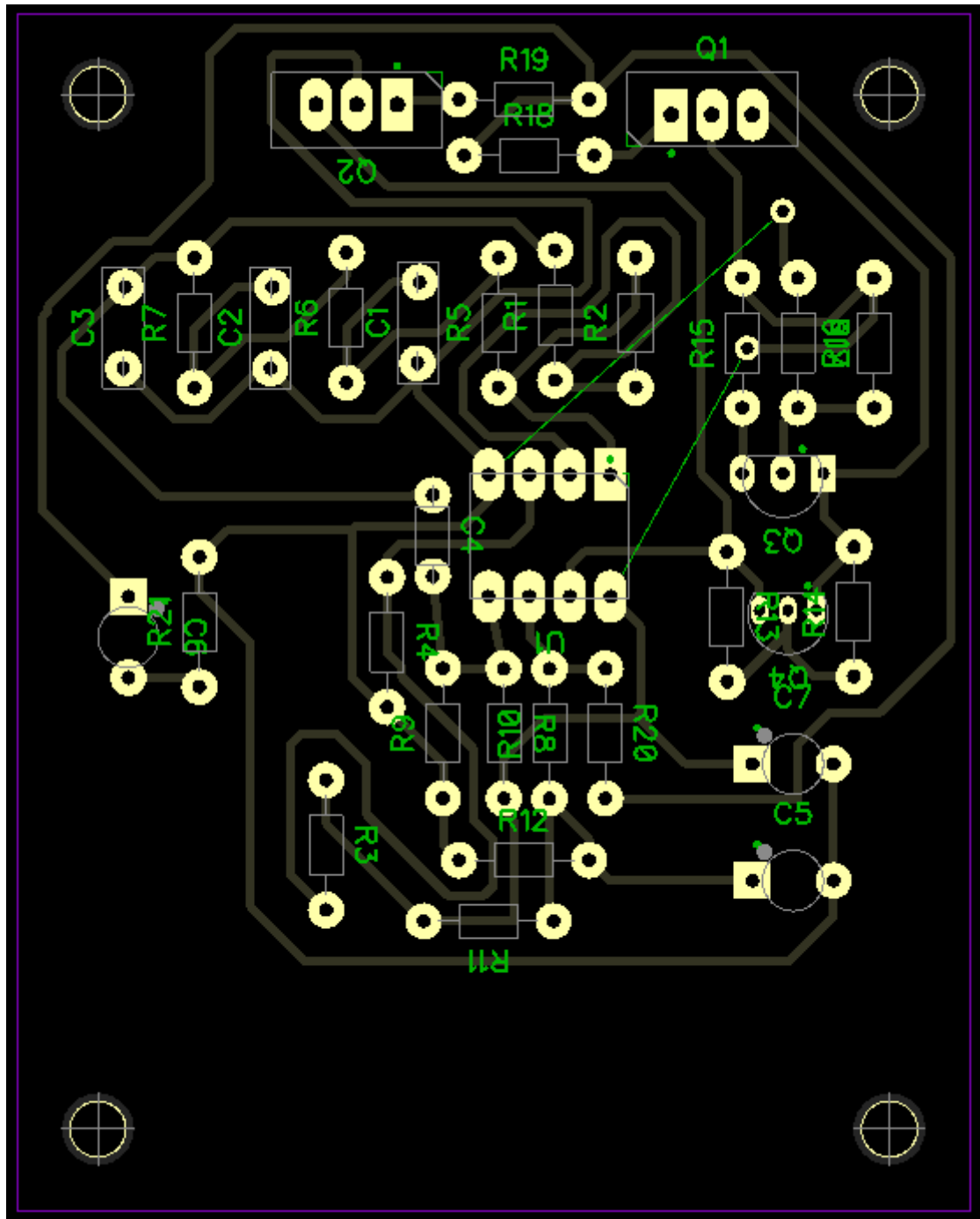


Fig. 8: Designed PCB

Youtube video link: <https://youtu.be/wn8rQe2P32o>