**ShanghaiTech University**
**School of Information Science and Technology**

**EE112 Lab Experiments**

# Experiment 3: Single Stage Common-Emitter(CE) &Common-Source(CS) Amplifier

## Contents



## 1 Lab

Please remember to bring USB storage to save oscilloscope captures. Make sure you have desired measurement results displayed on the picture you saved.

## 1.1 Attenuation Network

Measured Attenuation Ratio:_____

## 1.2 Single Stage CE BJT Amplifier

Table 1: Component Values

| Component Values | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| $R_{b1}$ | | |
| $R_{b2}$ | | |
| $R_c$ | | |
| $R_e$ | | |

Table 2: Device Operating Points

| Operating Points | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| $V_{be}$ | | |
| $V_{ce}$ | | |
| $I_b$ | | |
| $I_c$ | | |

Table 3: Performance

| Performance | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| Middle Band Gain($A_{mid}$) | | |
| Low Cutoff Frequency($f_L$) | | |
| High Cutoff Frequency($f_H$) | | |
| Output Swing($SW$) | | |
| Total Power Consumption($P_{total}$) | | |

Attach the Bode plot of voltage gain (in dB) with frequency from 100Hz to 100kHz (in log scale). Mark $A_{mid}$, $f_L$ and $f_H$ on the curve.

Attach output waveform with $V_{source}$=1V at middle band frequency. Record the magnitude (pk-pk) and frequency of the function generator aside.

Attach output waveform when output is swing limited. Record the magnitude (pk-pk) and frequency of the function generator aside.

## 1.3 Single Stage CS MOS Amplifier

Table 4: Component Values

| Component Values | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| $R_{g1}$ | | |
| $R_{g2}$ | | |
| $R_d$ | | |
| $R_s$ | | |

Table 5: Device Operating Points

| Operating Points | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| $V_{gs}$ | | |
| $V_{ds}$ | | |
| $I_d$ | | |

Table 6: Performance

| Performance | Measurement | Simulation(Refer to Prelab) |
|---|---|---|
| Middle Band Gain($A_{mid}$) | | |
| Low Cutoff Frequency($f_L$) | | |
| High Cutoff Frequency($f_H$) | | |
| Output Swing($SW$) | | |
| Total Power Consumption($P_{total}$) | | |

Attach the Bode plot of voltage gain (in dB) with frequency from 100Hz to 100kHz (in log scale). Mark $A_{mid}$, $f_L$ and $f_H$ on the curve.

Attach output waveform with $V_{source}$=1V at middle band frequency. Record the magnitude (pk-pk) and frequency of the function generator aside.

Attach output waveform when output is swing limited. Record the magnitude (pk-pk) and frequency of the function generator aside.

## Reference

[1] UNIVERSITY OF CALIFORNIA AT BERKELEY, College of Engineering Department of Electrical Engineering and Computer Sciences, EE105 Lab Experiments