

Lab 6: Differential Amplifier Lab Worksheet

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 Design Parameters

Component Values	Experiment	Simulation
R_1		
R_2		
R_3		
R_4		

Table 1: Design Parameters

1.2 Current Mirror Characterization

Operating Points	Experiment	Simulation
I_{ref}		
I_{bias}		
R_{out}		

Table 2: Operation Condition of Current Mirror

1.3 Differential Input Stage Characterization

Operating Points	Experiment	Simulation
V_{c1}		
V_{C2}		
V_{ce1}		
V_{ce2}		
V_{E1}/V_{E2}		

Table 3: Operation Condition of Current Mirror

Attach the waveform of the differential output ($V_{o1} - V_{o2}$) and the differential input ($V_{b1} - V_{b2}$) showing the differential signal gain at a frequency below the cutoff frequency. Record the frequency you use aside.

Performance	Experiment	Simulation
Differential Mode Gain(A_{dm})		
Differential Output Swing(SW)		
Differential Mode Gain High Cutoff Frequency(f_{Hdm})		
Load Resistor Mismatch($\Delta R/R$)		0.1%
Common Mode Gain(A_{cm})		
Common Mode Rejection Ratio(CMRR)		

Table 4: Performance

Attach the waveform of the differential output ($V_{o1} - V_{o2}$) showing the output swing. Record the input magnitude (pk-pk) and frequency you use aside.

Attach the waveform of the differential output ($V_{o1} - V_{o2}$) and the common input ($V_{b1/b2}$) showing the common mode gain at a frequency below the cutoff frequency. Record the frequency you use aside.

Attach the Bode plot of differential voltage gain (in dB) with frequency from 10Hz to 100 kHz (in log scale). Mark low frequency gain and cutoff frequency on the curve.

Attach the Bode plot of common voltage gain (in dB) with frequency from 10Hz to 100 kHz (in log scale). Mark low frequency gain on the curve. (Explain the why the common mode gain has different high cutoff frequency than the differential mode if there is any.

Reference

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