

# EXPERIMENT NO: 5

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## Aim:

Analysis of frequency response of the BJT amplifier using eSim.

## Theory:

Frequency Response of BJT allows us to see exactly how the output gain (known as the magnitude response) and the phase (known as the phase response) changes at a particular single frequency, or over a whole range of different frequencies. The range of frequencies can be from 0Hz, (d.c.) to many thousands of mega-hertz, (MHz) depending upon the design characteristics of the circuit. The frequency response analysis of BJT is shown by plotting its gain, using logarithmic frequency scale along the x-axis.

## Procedure:

1. Create the schematic of the BJT Amplifier as shown in Figure-1.
2. Annotate the schematic.
3. Test Electric rules.
4. Generate the netlist.
5. Insert analysis for AC analysis from start frequency 10Hz to stop frequency 100MHz with 100 points in Decade mode.
6. Insert Source Details.
7. Add NPN.lib model in Device Modeling for BJT.
8. Convert KiCad netlist to Ngspice netlist.
9. Simulate the Ngspice netlist using Ngspice simulator.

## Source Parameters:

For DC Voltage Source (V1):

1. Enter Value for V1 - 10

For AC Voltage Source (V2):

1. Enter Amplitude Value - 0.5
2. Enter Phase Value - 0

## Schematic Diagram:

The circuit schematic of the BJT amplifier for frequency response in eSim is as shown below:

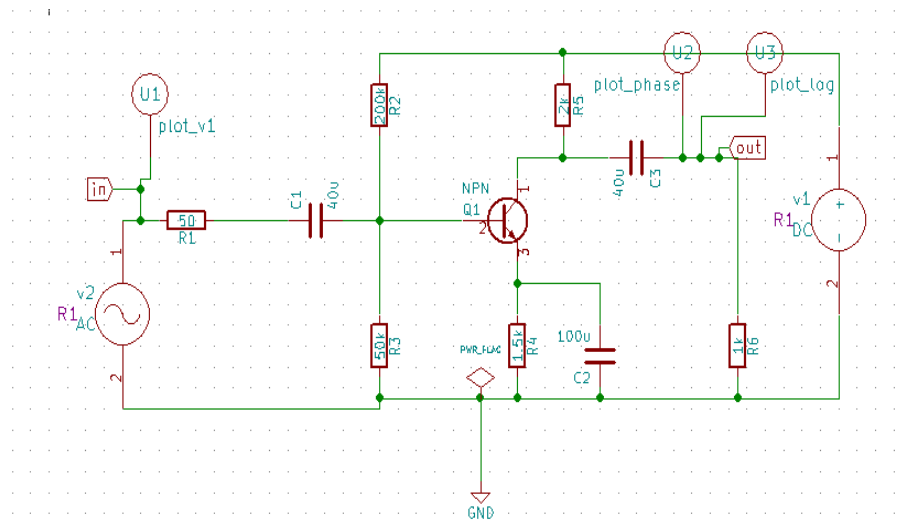


Figure 1: Frequency response of BJT

## Simulation Results:

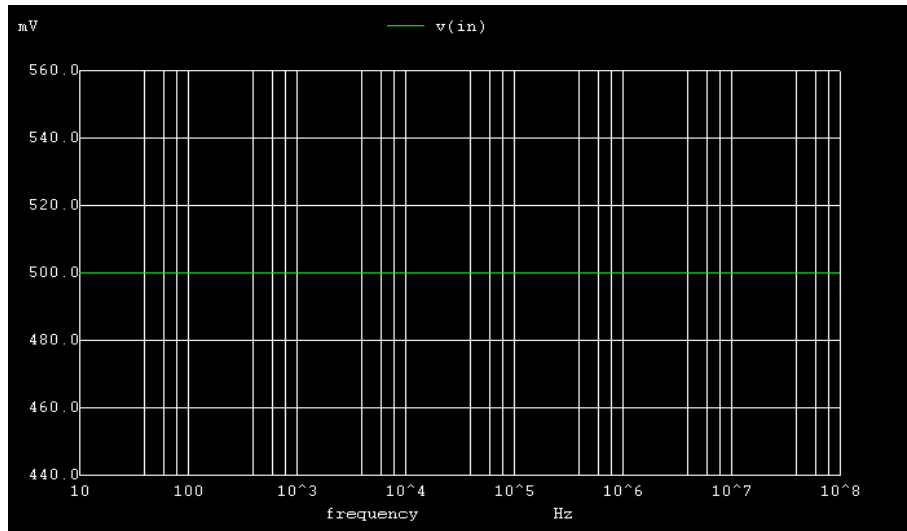


Figure 2: Ngspice Input Plot

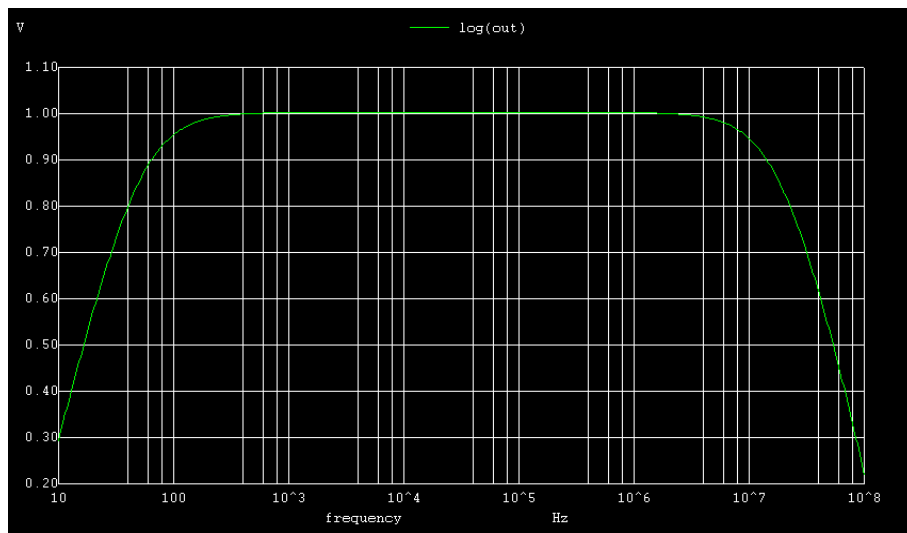


Figure 3: Ngspice Output Frequency Plot

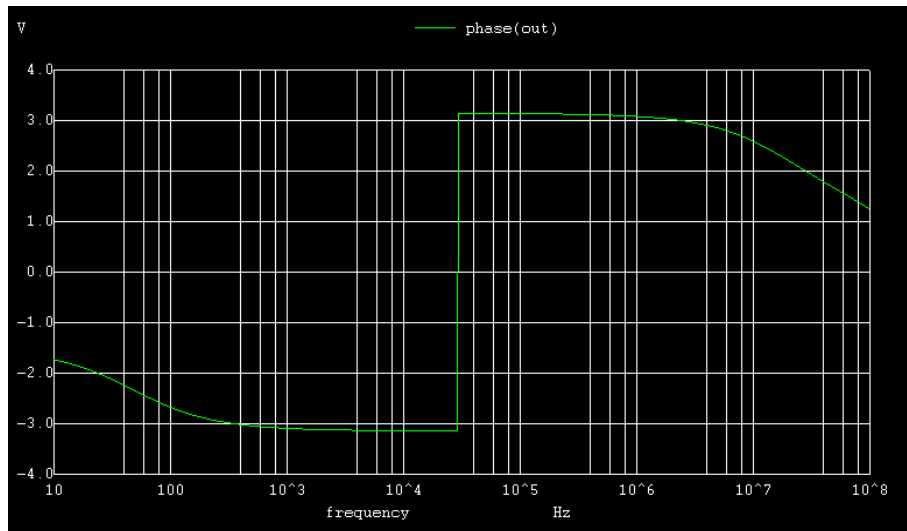


Figure 4: Ngspice Output Phase Plot

## Conclusion:

Thus, we have studied the frequency response of the BJT amplifier using eSim and we get the appropriate waveforms.

## References:

<http://www.electronics-tutorials.ws/amplifier/frequency-response.html>