

Title of the experiment:

Single Tuned Amplifier

An amplifier circuit with a single tuner section being at the collector of the amplifier circuit is called as Single tuner amplifier circuit. A simple transistor amplifier circuit consisting of a parallel tuned circuit in its collector load makes a single tuned amplifier circuit. The values of capacitance and inductance of the tuned circuit are selected such that its resonant frequency is equal to the frequency to be amplified.

The high frequency signal that has to be amplified is applied at the input of the amplifier. The resonant frequency of the parallel tuned circuit is made equal to the frequency of the signal applied by altering the capacitance value of the capacitor C, in the tuned circuit.

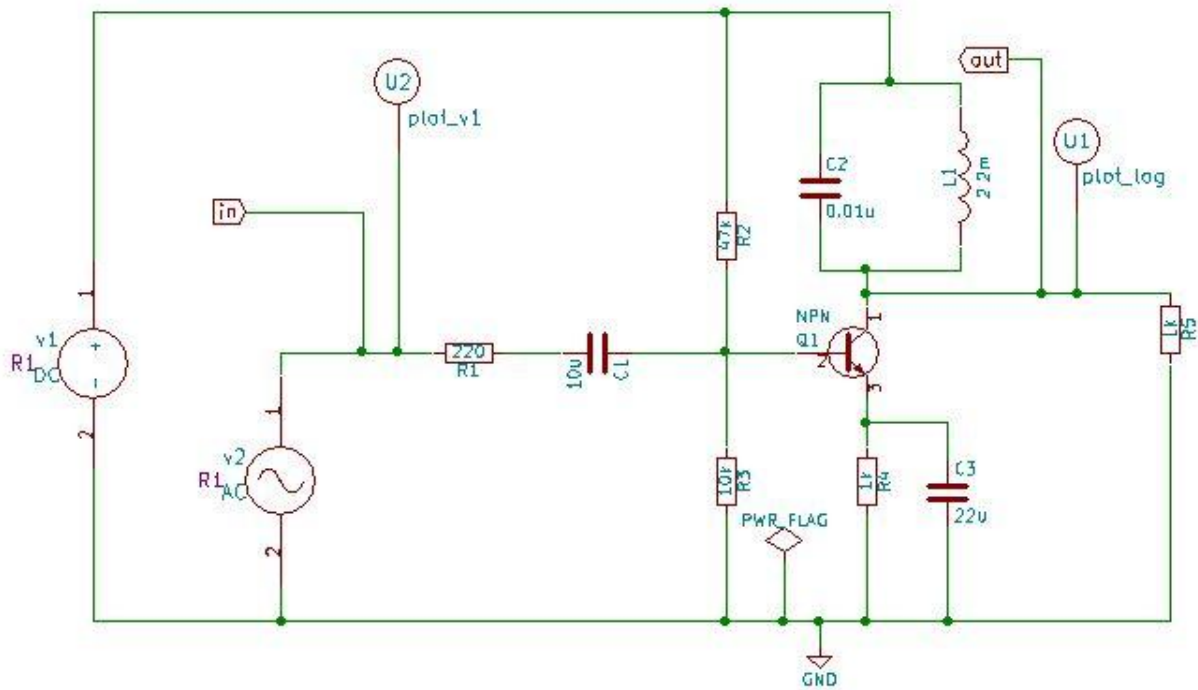
At this stage, the tuned circuit offers high impedance to the signal frequency, which helps to offer high output across the tuned circuit. As high impedance is offered only for the tuned frequency, all the other frequencies which get lower impedance are rejected by the tuned circuit. Hence the tuned amplifier selects and amplifies the desired frequency signal.

The parallel resonance occurs at resonant frequency f_r when the circuit has a high Q. the resonant frequency f_r is given by

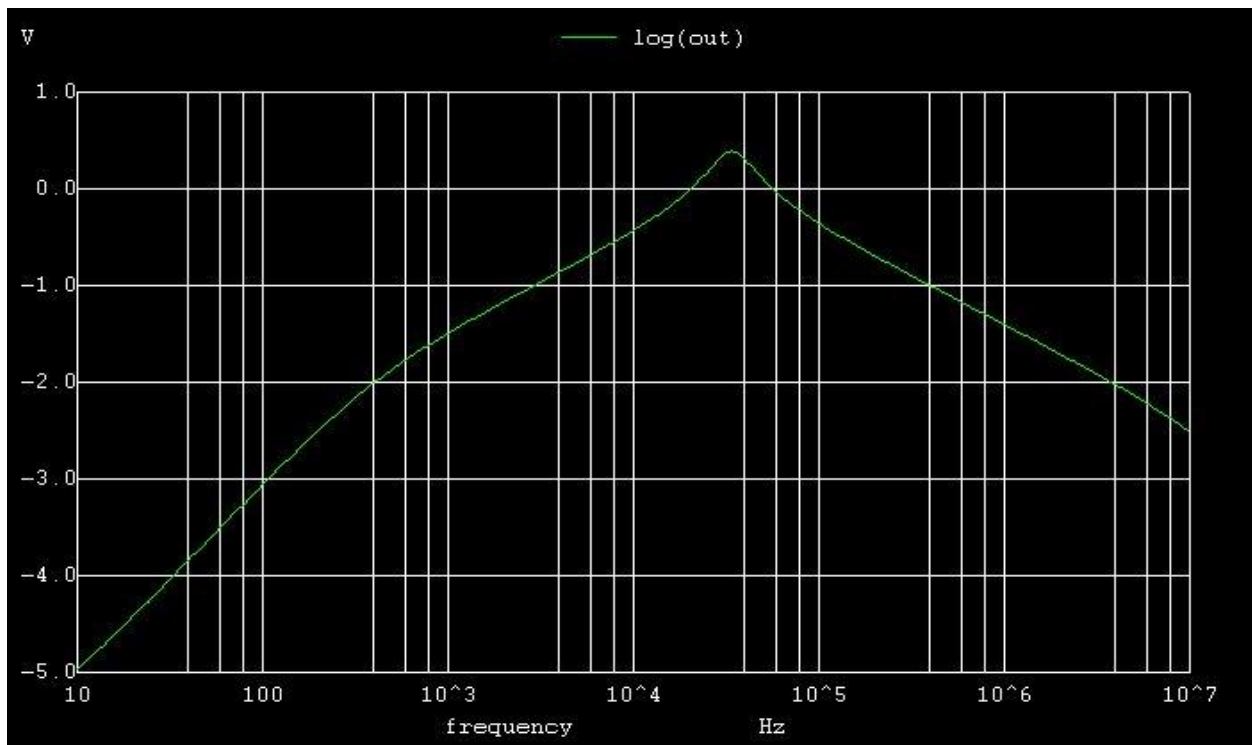
$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

At resonant frequency f_r the impedance of parallel tuned circuit is very high and is purely resistive. The voltage across R_L is therefore maximum, when the circuit is tuned to resonant frequency. Hence the voltage gain is maximum at resonant frequency and drops off above and below it. The higher the Q, the narrower will the curve be.

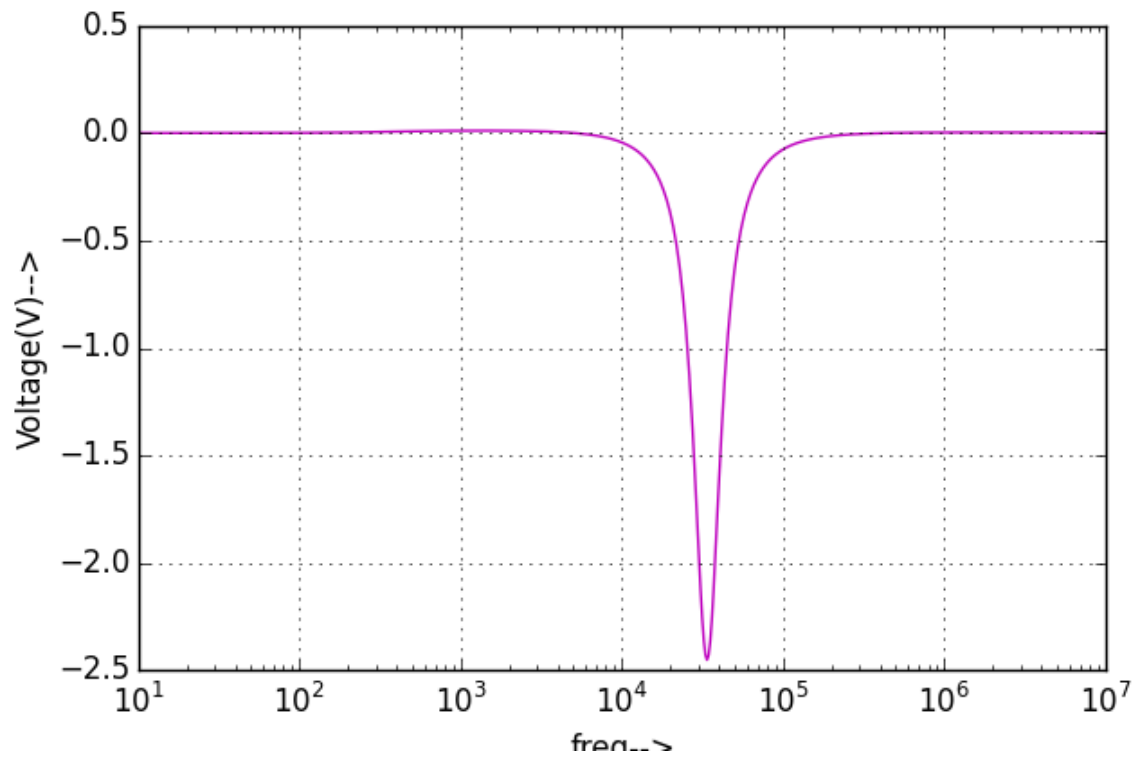
Schematic diagram:



Simulation results(NgSpice):



Simulation result(Python):



Reference:

https://www.tutorialspoint.com/amplifiers/types_of_tuned_amplifiers.htm

<http://www.mycircuits9.com/2012/05/tuned-amplifiers-using-bjt.html>