

# Design and Implementation of Band Pass Filtered Inverting Attenuator Circuit

Nayana Gari Naveena

Department of Electronics and Communication Engineering

Rajiv Gandhi University Of Knowledge and Technologies

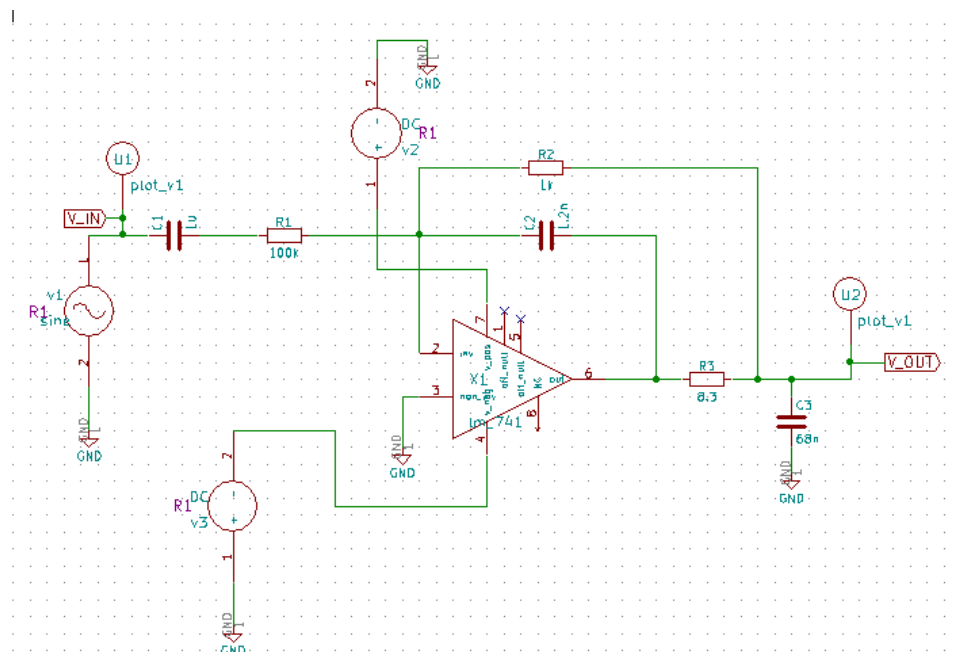
## Theory:

A **Band Pass Filtered Inverting Attenuator Circuit** combines filtering, attenuation, and signal inversion in a single stage. Its main function is to reduce the amplitude of the input signal by a fixed amount while allowing only a defined frequency range to pass, with the output inverted 180 degrees. In this design, the circuit provides a constant attenuation of about  $-20$  dB in the range of 10Hz to 100kHz. The band-pass response is achieved by cascading high-pass and low-pass filtering, with poles chosen outside the passband to maintain flat attenuation and suppress low-frequency drift and high-frequency noise.

The attenuation level is set by the feedback-to-input resistor ratio, while the RC network governs the filter limits. Applications include communication, audio, instrumentation, and biomedical systems, where it ensures frequency selection and prevents large signals from saturating later stages.

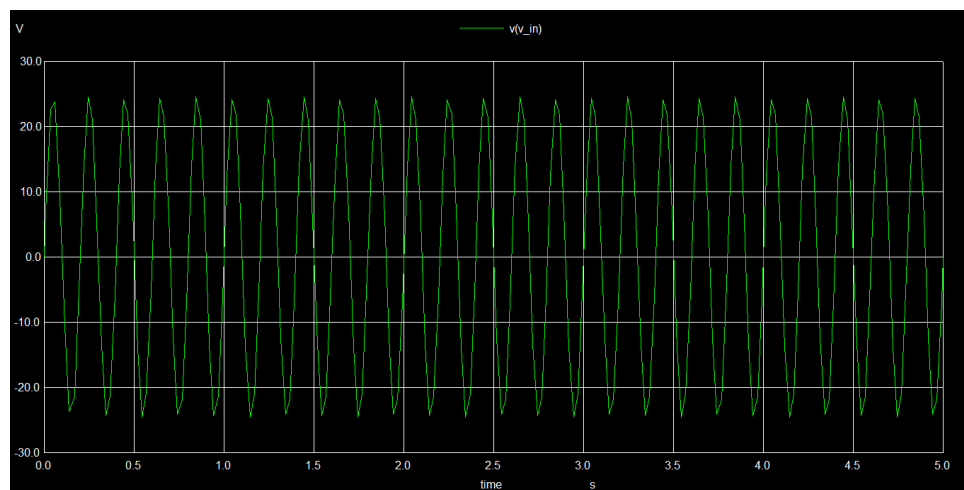
The key advantage of this circuit is its ability to combine controlled attenuation, band-pass filtering, and inversion in one efficient design, making it reliable for practical signal conditioning.

# Circuit Design for Transient Analysis

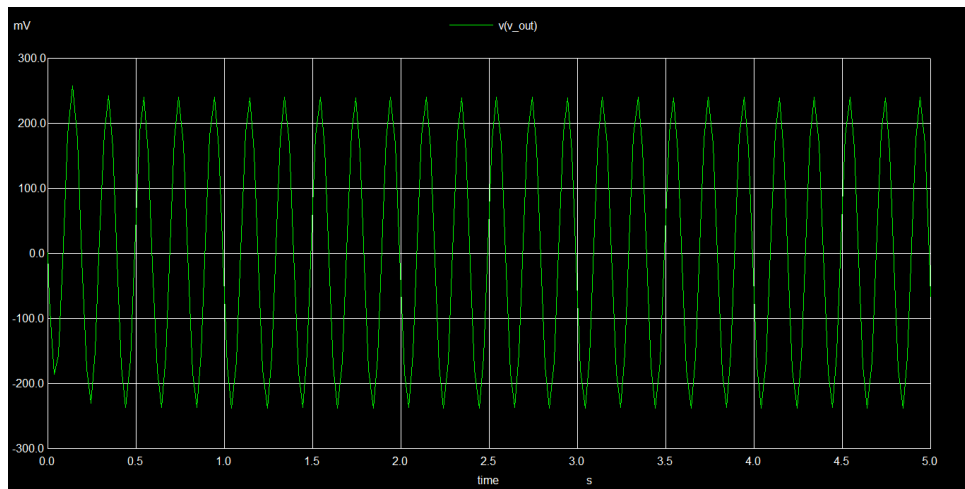


Band Pass Filtered Inverting Attenuator Circuit with Transient source

## Transient Simulations in ngspice plot

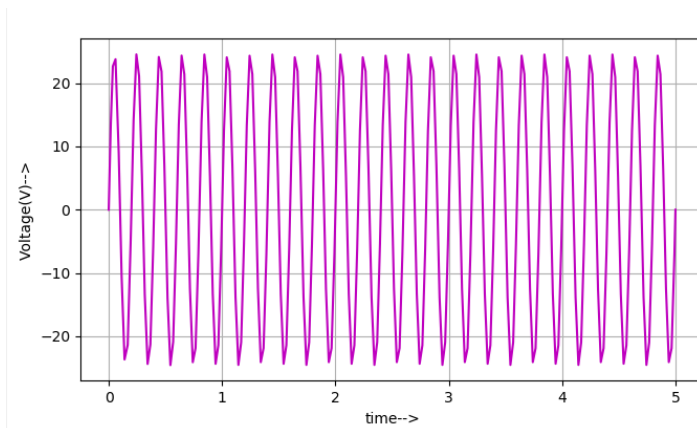


Input Waveform

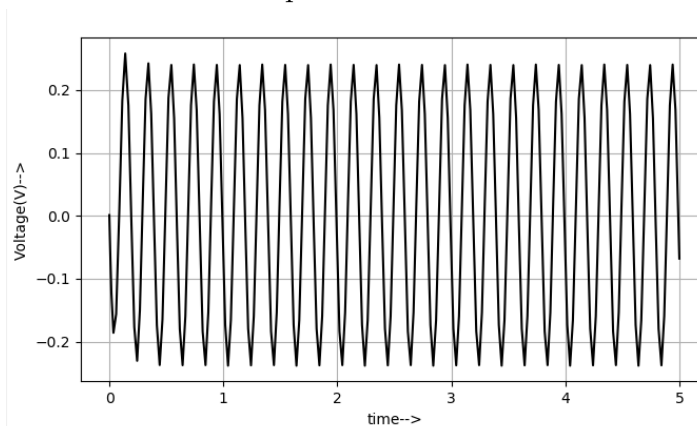


Output Waveform

## Transient Simulations in Python plot



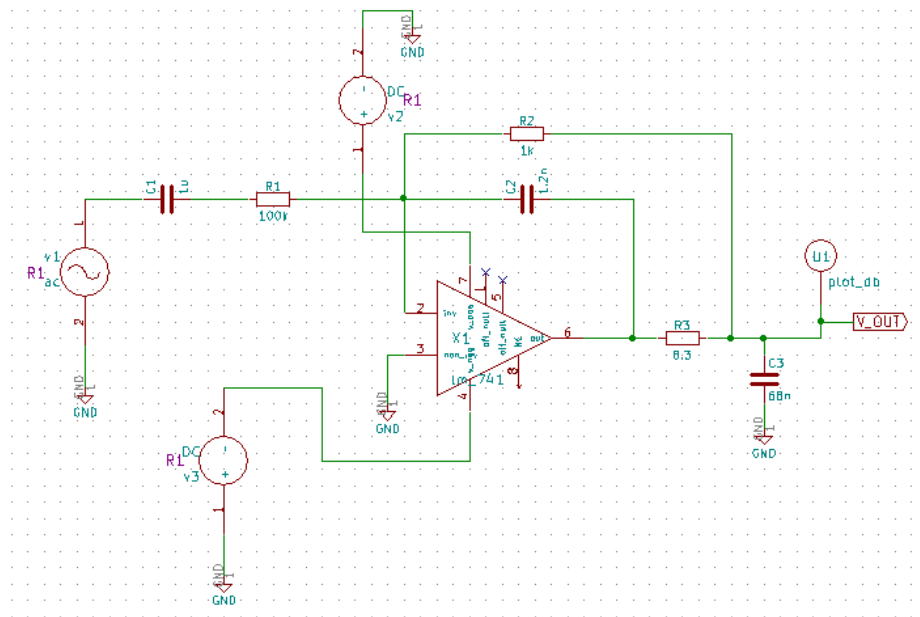
Input Waveform



Output Waveform

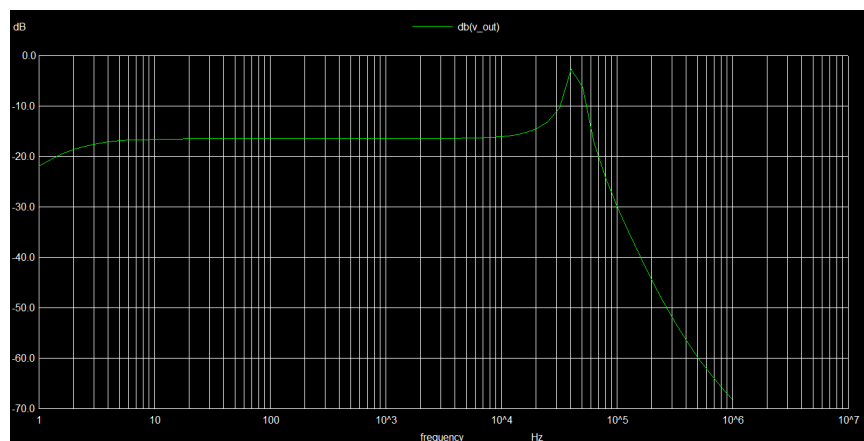
**Transient Simulation Result:** The transient simulation shows that for an input of 50V(p-p), the output is attenuated to 500mV(p-p).

# Circuit Design for Ac Analysis



Band Pass Filtered Inverting Attenuator Circuit with ac source

## Ac Simulation



AC Simulation Result

**AC Simulation Result:** The AC analysis shows a constant attenuation of approximately  $-20$  dB across the frequency range of  $10$  Hz to  $100$  kHz for an input of  $25$  V, confirming proper band-pass behavior.

## References

[Band Pass Filtered Inverting Attenuator Circuit](#)