Research Migration Project

https://esim.fossee.in/research-migration-project

The Research Migration Project is an initiative of FOSSEE, IIT Bombay that promotes the use of eSim for reproducing published research circuits originally implemented using proprietary simulation tools. The objective is to migrate these validated designs to eSim to build an open-source resource database.

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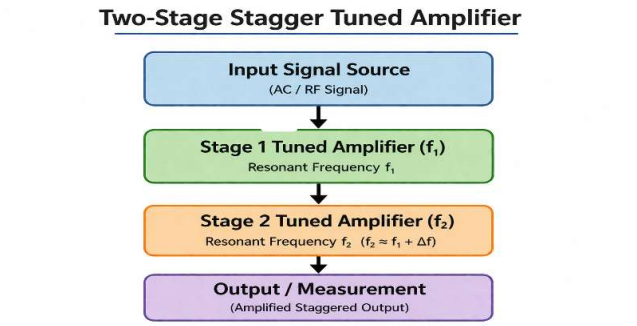
Title of the circuit: Two Stage Stagger Tuned Amplifier

Theory/Description: A Two-Stage Stagger tuned amplifier consists of two cascaded tuned amplifier stages with slightly different resonant frequencies. Each stage uses an LC tuned circuit and produces a peak response as its own frequency. By staggering these frequencies, the combined response becomes wider and flatter compared to a single tuned amplifier. The circuit uses components like transistors, inductors, capacitors, and coupling elements for amplification and tuning. It is mainly used in RF and communication systems where both gain and bandwidth are required.

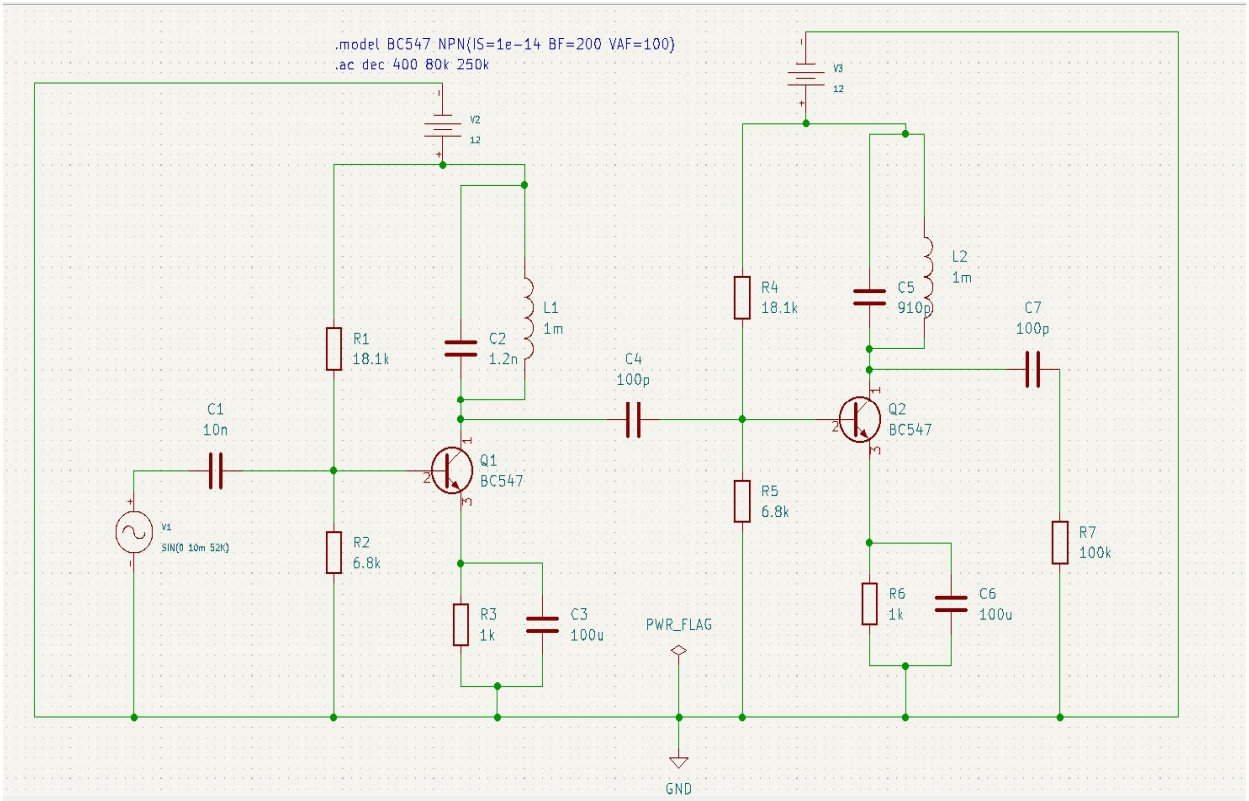
Reason to reproduce with eSim: This circuit is suitable for reproduction in eSim as it allows easy simulation of frequency response and tuning effects. Being open-source, eSim enables cost-effective implementation without proprietary software. It helps in visualizing stage-wise and overall outputs, making analysis clear and accurate. The circuit also provides strong educational value and scope for optimizing component values.

Expected Outcome/outputs: The circuit is expected to produce amplified output with a wider and flatter frequency response compared to a single tuned amplifier. Each stage will show individual peak responses at slightly different frequencies. The combined output will demonstrate a staggered effect with improved bandwidth and reduced sharpness. Performance can be validated by observing input-output waveforms and frequency response plots in simulation.

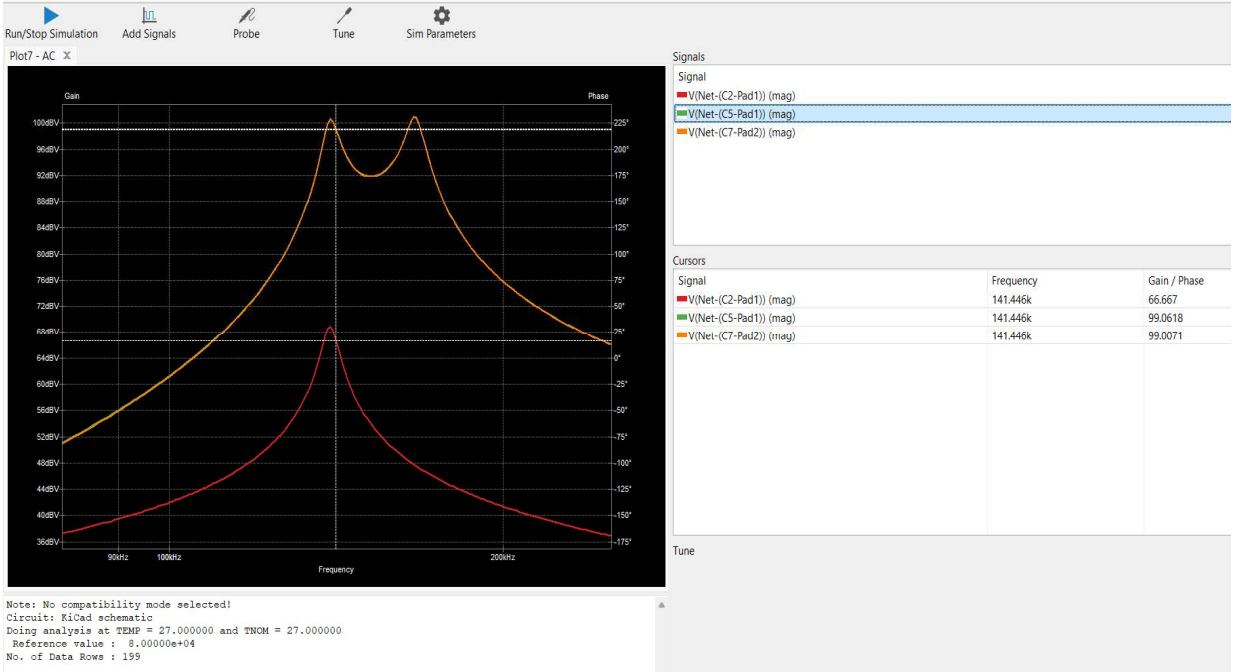
Block Diagram:



Circuit Diagram(s): *(Provide a detailed schematic of the circuit showing all components, connections, values, and labels. A circuit diagram is required to understand and evaluate the proposed work.)



Expected Results (Input, Output waveforms and/or Multimeter readings) :



Research Paper/Journal/etc.:

M. H. Taghavi et al., “A Stagger-Tuned Transimpedance Amplifier,” *IEEE Transactions on VLSI Systems*, 2016.

A. S. H. Ahmed et al., “D-band Power Amplifier with Stagger-Tuned Networks,” *IEEE Conference*, 2020.

Source/Reference(s): Millman, J., and Halkias, C. C., *Electronic Devices and Circuits*, McGraw-Hill.
