Abstract

This paper presents a low power, low noise and high quality factor tunable single ended active inductor suitable for designing multiband RF front end circuits. The active inductor circuit uses differential configuration as positive transconductor and PMOS cascode structure as negative transconductor of a gyrator to reduce the noise voltage. It uses MOS transistor as a feedback resistor to provide possible negative resistance to reduce the inductor loss to enhance the quality factor. Also this structure provides wide inductive bandwidth and high resonance frequency. The tuning of center frequency and quality factor for multiband operation is achieved through the controllable current source. The center frequency tuning range of the active inductor varies from 3.9 GHz to 12.3 GHz. The designed active inductor and LNA are simulated in 180nm CMOS process using HSPICE simulation tool. Simulation results of the active inductor shows an inductive bandwidth varies from 6.45 MHz to 6.3 GHz with the center frequency 6.3 GHz. The inductance value ranges from 5nH to 550nH respectively. It has the less noise voltage of 12nV/\sqrt{\text{Hz}} to 5.6nV/\sqrt{\text{Hz}} for the designed tuning range and consumes less power of 0.65mW. The Low noise amplifier achieves the gain of 19dB, low noise figure of 2.1dB and consumes low power of 4.2mW.
Low Power Low Noise Tunable Active Inductor for Narrow Band LNA Design

References


Index Terms

Computer Science
Signal Processing
Keywords

Active Inductor  Quality Factor  Centre Frequency Tuning  Pmos Cascode Pair
Tuning Range

Mos Resistor

Multiband Rf Front End