

Cascode current mirror for a variable gain stage in a 1.8 GHz low noise amplifier (LNA)

ABSTRACT

A high frequency CMOS variable gain low noise amplifier (VGLNA) constructed based on an inductive source degenerated LNA and a cascode current mirror is proposed. The 'variable' concept is to prevent the unwanted saturation phenomenon due to large input signal. A cascode current mirror cell which consumes minimal voltage headroom without sacrificing the accuracy of the circuit is proposed in the circuit. With a 0.18 μm CMOS technology, this technique is applied on a VGLNA operating at 1.8 GHz for GSM band application. The simulation results reveal that the maximum gain is 17.29 dB with gain tuning range of 9.56 dB. The noise figure (NF) is less than 0.92 dB with the power consumption of 9.34 mW at power supply of 1.8 V. Comparison with several same operating frequency LNA circuits published show that this work demonstrated among the lowest NF and highest IIP3 with compromise on the gain.

Keyword: Cascode current mirror; Low noise amplifier; Noise figure; Variable gain