

A 1-V LNA for UWB Applications in 90 nm CMOS Technology

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Abstract

Ultra Wide-band (UWB) communication has great demand for applications in short range low power and high speed modern wireless systems. At the receiver front end, LNA is the most important component as it can determine the total noise figure of the system. Many topologies currently exist, such as distributed amplifiers, resistive shunt feedback, cascade amplifier and current-reuse amplifier. To achieve good gain, noise figure, and keep good wide-band for 1-V supply voltage, this paper proposes an LNA design based on the existing current-reuse topology. A gain of 15 dB is obtained over the entire 2-6 GHz range of operation. DC power consumption is below 8mW for 1-V supply voltage. Impedance matching at input and output of LNA is set at 50-ohm over 2-6 GHz, resulting in $S(1,1)$ and $S(2,2)$ below -13dB. Noise less components like inductors and capacitors are used to keep noise factor below 3dB. Due to minimum area consideration, matching is obtained by using only a two stage LC ladder network. The design also provides a good isolation between input and output of the LNA with $S(1,2) < -40$ dB.

Keywords

UWB, LNA, current-reuse, ladder network.