ABSTRACT

In this thesis, we present a low noise amplifier and a voltage-controlled oscillator with 2.5V supply voltage for the ISM (Industrial Scientific and Medical) band heterodyne receiver. Here, the performances of the low noise amplifier and the voltage-controlled oscillator are simulated by the Advanced Design System (ADS) software with the 0.25μm CMOS process parameters. The operating frequency of the low noise amplifier is located at 2.4GHz. Because the low noise amplifier is at the first stage of a receiver, the noise figure and the gain of this amplifier circuit will dominate the performance of the noise figure of the whole receiver. Thus, the designing goals of a low noise amplifier must own high voltage gain and low noise. This low noise amplifier is principally composed of a cascode amplifier and a common-source amplifier. Design simulation results show the high gain of 21.083dB, low noise figure of 2.74dB and good impedance match. We adopted the LC tank architecture to design the voltage-controlled oscillator. With a 2.5V supply, the tuning frequency is from 2.156GHz to 2.377GHz with 9.8% tuning range. The phase noise is —120.3dBc/Hz at 1MHz frequency offset.

Keywords : Low noise amplifier ; Voltage-controlled oscillator ; Heterodyne receiver ; High voltage gain ; Low noise ; Cascode amplifier ; Common-source amplifier ; Phase noise

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