

A 2 GHz low power, highly tunable and low phase noise monolithic LC VCO in 0.35 μm CMOS technology

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Abstract:

In this paper, a fully integrated 2 GHz low phase noise LC-tank VCO, designed in 0.35 μm CMOS technology is presented and analyzed. The phase noise of the VCO has been greatly reduced by means of integrated source degeneration inductors. The phase noise achieved is -108, -125 dBc/Hz and -139 dBc/Hz at 100 kHz, 600 kHz and 3 MHz offsets respectively from the carrier frequency of 2 GHz, with 2.5 V power supply voltage and giving a power consumption of 10.35 mW. A 20.3% wide tuning range is achieved by means of PMOS varactors and a degeneration resistor. The tunability of the designed oscillator covers 380 MHz, from 1.68 GHz up to 2.06 GHz with a VCO gain of 280 MHz/V. The proposed VCO is fully operational under variable conditions including temperature and supply voltage variations from -40°C to 85°C and 2.5 V $\pm 10\%$, respectively.

Keywords : inductors, low phase noise, 0.35 μm CMOS technology