Study of Phase Noise in VCXO with Inversion-Mode Varactors

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Abstract

Voltage controlled crystal oscillators (VCXO) using CMOS varactors are investigated. The varactor is operated in the so-called inversion mode (I-Mode) with source and drain bounded together. Its capacitance is evaluated by the HSPICS-Fourier methodology. The performances of capacitance under small-signal and large-signal operations are classified. Then the frequency tuning and the related phase noise are explored. It is found that the larger the tuning coefficient has, the worse the phase noise has in I-mode varactor. The chip is fabricated by the TSMC 0.35um CMOS process. The total area including pad is 1.358×1.350 mm2 and the current consumption in the core circuit is 300uA.

Keyword：VCXO, Crystal Oscillator, Varactor, and Frequency Control, Inversion-mode