

Abstract

In order to realize a robust and effective digital RF receiver, a robust and efficient downconversion circuit is necessary. This circuit typically consists of a mixer and a local oscillator to act as a frequency reference, and both must be optimized. The mixer must achieve good gain, linearity, and noise performance, while the oscillator must provide a stable frequency free of phase noise, while staying within a constrained power budget.

In this work, cross-coupled MOSFET pairs are added to existing Gilbert-cell active mixers and FBAR-differential-Colpitts oscillators. The resulting circuits show improved metrics when analyzed in simulation; the positive contribution of the cross-coupled pairs is explained as a combination of both linear effects (negative impedance) and non-linearities which counteract existing undesired non-linearities in the system.