Abstracts

Micromachined electro-mechanically tunable capacitors and their applications to RFIC's

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Micromachined electro-mechanically tunable capacitors with two and three parallel plates are presented. Experimental devices have been fabricated using a standard polysilicon surface micromachining process. The two-plate tunable capacitor has a measured nominal capacitance of 2.05 pF, a Q-factor of 20 at 1 GHz, and achieves a tuning range of 1.5:1, The three-plate version has a nominal capacitance of 4.0 pF, a Q-factor of 15.4 at 1 GHz, and a tuning range of 1.87:1. The tuning ranges achieved here are near theoretical limits. Effects due to various physical phenomena such as temperature, gravity, and shock are examined in detail. An RF voltage-controlled oscillator with an integrated inductor and a micromachined tunable capacitor is also demonstrated. The active circuit and the inductor have been fabricated in a 0.5 /spl mu/m CMOS process. The voltage-controlled oscillator has been assembled by bonding together the CMOS and the micromachined parts. The 1.35 GHz voltage-controlled oscillator has a phase noise of -98.5 dBc/Hz at a 100 kHz offset from the carrier.

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