Very Wide Tuning Range Micro-Electromechanical Capacitors in the MUMPs Process for RF Applications

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ABSTRACT

A structure that extends the tuning range of MEMS capacitors by at least a factor of eight, compared to recently reported devices fabricated in the same polysilicon surface micromachining MUMPs process [1]-[2], is proposed. A 0.2 pF capacitor has a 325% tuning range, and a Q-factor of 90 at 2.4 GHz. A variation of the same structure has a 0.6 pF capacitance and a 433% tuning range, compared to 238% and 253% for state-of-the-art MEMS [3] and CMOS [4] devices, respectively. The self-resonance frequencies of both devices are beyond 4 GHz.