Abstracts

Frequency-selective MEMS for miniaturized low-power communication devices

C.T.-C. Nguyen. "Frequency-selective MEMS for miniaturized low-power communication devices." 1999 Transactions on Microwave Theory and Techniques 47.8 (Aug. 1999 [T-MTT] (Mini-Special Issue on Low-Power/Low-Noise Technologies for Mobile Wireless Communications)): 1486-1503.

With Q's in the tens to hundreds of thousands, micromachined vibrating resonators are proposed as integrated circuit-compatible tanks for use in the low phase-noise oscillators and highly selective filters of communications subsystems. To date, LF oscillators have been fully integrated using merged CMOS/microstructure technologies, and bandpass filters consisting of spring-coupled micromechanical resonators have been demonstrated in a frequency range from HF to VHF. In particular, two-resonator micromechanical bandpass filters have been demonstrated with frequencies up to 35 MHz, percent bandwidths on the order of 0.2%, and insertion losses less than 2 dB. Higher order three-resonator filters with frequencies near 455 kHz have also been achieved, with equally impressive insertion losses for 0.09% bandwidths, and with more than 64 dB of passband rejection. Additionally, free-beam single-pole resonators have recently been realized with frequencies up to 92 MHz and Q's around 8000. Evidence suggests that the ultimate frequency range of this high-Q tank technology depends upon material limitations, as well as design constraints, in particular, to the degree of electromechanical coupling achievable in microscale resonators.

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