Abstracts

Piezoelectric-transducer-controlled tunable microwave circuits

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This paper introduces a new method to tune microwave circuits of phase shifters, filters, resonators, and oscillators, controlled by a piezoelectric transducer (PET) with computational and experimental results. An optimized PET-controlled phase shifter is demonstrated to operate up to 40 GHz with a maximum total loss of 4 dB and phase shift of 480/spl deg/. PET-controlled tunable bandpass filter, ring resonator, and one-dimensional photonic-bandgap resonator show a very wide tuning bandwidth of 17.5%-28.5% near 10 GHz with little performance degradation. A new PET-controlled or voltage-controlled dielectric-resonator oscillator (DRO) is demonstrated with a tuning bandwidth of 3.7% at the center frequency of 11.78 GHz. The tuning bandwidth is slightly less than that of a mechanical tuning using a micrometer-head-controlled tunable DRO with a tuning bandwidth of 4.7%. The new tuning method should have many applications in monolithic and hybrid microwave integrated circuits.

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