Abstracts

A Novel Heterojunction Bipolar Transistor VCO Using an Active Tunable Inductance

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This paper reports on the results of a novel HBT Voltage Controlled Oscillator (VCO) that incorporates a bias-tunable active inductor. This development benchmarks the first demonstration of a tunable active inductance controlled HBT VCO of this type. The active inductor topology can obtain inductances of up to 10 nH at frequencies up to 10 GHz and can be bias-tuned over a similar range. VCO's were designed at 4 and 10 GHz by implementing different active inductance values. A 29% frequency tuning range from 3.54 to 4.73 GHz was obtained for the 4-GHz design. The output power varied from -1.2 to -0.2 dBm, respectively-less than 1 dB variation over the tuning range. The phase noise is -70 dBc/Hz at 100 kHz offset from the carrier. The new VCO topology can be implemented without the use of backside vias or microstrip-matching components and can be realized in a compact 1.0 x 0.7 mm^2 area. The variable active inductance VCO topology provides a compact, high performance alternative to the analog multi-vibrator oscillator circuit that generally has a smaller tuning capability and worse phase noise performance at microwave frequencies.

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