Abstracts

Quasi-Optical Array VCO's

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Quasi-optical array voltage controlled oscillators (VCO) are presented. A quasioptical VCO consists of an array of oscillators, a variable capacitance array and a mirror. In the oscillator array, a large number of MESFETs feed a two-dimensional periodic metal structure on a dielectric substrate. The mirror provides feedback for locked power-combining of the oscillators. The electrical frequency tuning is achieved with another array loaded with varactor diodes. When the varactor bias voltage is changed, the capacitance of the diodes changes, which in turn modulates the frequency of the output power-combined wave. Two types of arrays are presented, one consisting of short dipoles, and the other of bow-tie elements. As expected, the bow-tie VCO has better performance than the dipole VCO, due to its broadband impedance. The best obtained result from a bow-tie VCO is a 10% tuning bandwidth with less than 2 dB power change. Modulating the gate bias is shown to be inferior to varactor array tuning. The VCO is the first demonstration of a quasi-optical system consisting of several periodic arrays loaded with solid-state devices.

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