Abstracts

An X-band self-mixing oscillator antenna for transceiver and spatial power-combining applications

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The general theory for oscillator and mixer design is applied to develop an X-band self-mixing oscillator antenna. The antenna uses a Gunn diode as the active device that provides the oscillations and self-mixing operations. The circuit uses a slotline ring resonator for frequency stabilization and can be modified to include a varactor diode for wide-band frequency tuning. The circuit performance is compared with theoretical results derived from simple transmission-line models. The radiation patterns of the self-mixing oscillator antenna are also compared with those measured from a similarly configured passive antenna. Since the radiated power also serves as the local oscillator (LO) frequency for the self-mixing operation, the circuit is useful as a half-duplex transceiver. When the self-mixing operation is not required, a single oscillator antenna can be used as a transmitter and several units can be assembled in a planar array for spatial powercombining applications.

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