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Title:A 0.38 THz Fully Integrated Transceiver Utilizing a Quadrature Push-Push Harmonic Circuitry in SiGe BiCMOS
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Abstract:A fully integrated transceiver operating at 0.38 terahertz (THz) has been demonstrated in 0.13 μm SiGe BiCMOS with f_T = 230 GHz. We present a quadrature push-push harmonic circuitry consisting of the clamping pairs driven by balanced quadrature LO signals coupled through the transformers and the Coplanar Stripline (CPS). Harmonic generation of the clamping circuit is analyzed with a clamped sinusoidal model. Several terahertz circuits such as a quadrupler, a THz subharmonic mixer, and an IQ quadrature generator are implemented with the quadrature push-push circuitry to realize a homodyne FMCW radar. Radar functionality is demonstrated with ranging and detection of a target at 10 cm. The measured Equivalent Isotropically Radiated Power (EIRP) of the transmitter is -11 dBm at 0.38 THz and the receiver noise figure (NF) is between 35-38 dB while dissipating a power of 380 mW.
Number of references:32
Inspec controlled terms:BiCMOS integrated circuits - coplanar waveguides - Ge-Si alloys - strip lines - UHF mixers
Uncontrolled terms:fully integrated transceiver - quadrature push-push harmonic circuitry - SiGe BiCMOS - clamping pair - balanced quadrature LO signal - transformer - coplanar stripline - CPS - harmonic generation - clamping circuit - clamped sinusoidal model - terahertz circuit - quadrupler - THz subharmonic mixer - IQ quadrature generator - homodyne FMCW radar - equivalent isotropically radiated power - EIRP - receiver noise figure - frequency 0.38 THz - size 0.13 micron - frequency 230 GHz - power 380 mW - SiGe
Inspec classification codes:B2570K Mixed technology integrated circuits - B1310 Waveguides and striplines - B1350 Microwave circuits and devices
Numerical data indexing:frequency 3.8E+11 Hz;size 1.3E-07 m;frequency 2.3E+11 Hz;power 3.8E-01 W
Chemical indexing:SiGe Ge Si SiGe Ge Si

Treatment:Practical (PRA); Theoretical or Mathematical (THR)
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