Abstracts

W-band HEMT-oscillator MMICs using subharmonic injection locking

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The efficient stabilization of high electron mobility transistor (HEMT) oscillator monolithic microwave integrated circuits (MMICs) for W-band applications, using a new approach of high-order subharmonic injection locking, is presented. Transmission- and reflection-type injection locking techniques are applied to stabilize 94-GHz oscillators based on GaAs pseudomorphic-HEMT technology. A voltage-controlled oscillator MMIC was developed, consisting of the oscillator circuit and an integrated harmonic generator that can be stabilized by injection power levels of -45 dBm at 94 GHz using reflection-type injection locking, allowing reference frequencies as low as the fifteenth to twenty-first subharmonic as the input for the harmonic generator. Additionally, an injection-locked phase-locked loop (PLL) was developed, which enhances the locking range from 30 MHz to 1 GHz, using the twenty-first subharmonic as a reference signal. The combination of simple synchronization to a low-frequency reference signal and the control of the synchronization in the injection-locked PLL allows the generation of stable and low-noise millimeter-wave signals with a fully integrated MMIC source.

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