Abstracts

A Low-Noise K-Ka Band Oscillator Using AlGaAs/GaAs Heterojunction Bipolar Transistors (Short Papers)

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The design considerations, fabrication process, and performance of the first K -- Ku band oscillator implemented rising a self-aligned AIGaAs/GaAs heterojunction bipolar transistor (HBT) are described. A large-signal time-domain based design approach has been used which applies a SPICE-F simulator to optimization of the oscillator circuit parameters for maximum output power. The oscillator employs a 2 x 10 μm² emitter AIGaAs/GaAs HBT fabricated using a pattern inversion technology. The HBT has a base current 1/f noise power density lower than 1 X 10/sup -20/ A²/Hz at 1 kHz, and lower than 1 X 10/sup -22/ A²/Hz at 100 kHz, for a collector current of 1 mA. The oscillator, which is composed of only low-Q microstrip transmission lines, has a phase noise of -80 dBc/Hz at 100 kHz off carrier when operated at 26.6 GHz. These results indicate the applicability of the HBT's to low-phase-noise monolithic oscillators at microwave and millimeter-wave frequencies, where both Si bipolar transistors and GaAs FET's are absent.

❑ Return to main document.