Abstracts

Dielectric Resonator Oscillators Using GaAs/(Ga,A1)As Heterojunction Bipolar Transistors

K.K. Agarwal. "Dielectric Resonator Oscillators Using GaAs/(Ga,A1)As Heterojunction Bipolar Transistors." 1986 MTT-S International Microwave Symposium Digest 86.1 (1986 [MWSYM]): 95-98.

This paper reports the first application of heterojunction bipolar transistors (HBTs) in microwave oscillators. A dielectric resonator (DR) is used to stabilize a 4-GHz shunt feedback oscillator. Using an npn grounded emitter GaAs HBT with 1.2- to 1.5-µm emitter width, microwave oscillator power in excess of 10 dBm with 30% efficiency was achieved. The oscillator frequency stability of 3 ppm/°C over -30° to + 70°C, and FM noise of -73 dBc/Hz at 1-kHz off-carrier was measured. With further design optimization, improved performance is expected. The HBT phase-noise performance is comparable to silicon-bipolar and is superior to GaAs FET. A mechanical tuning using metal screw gives a 9% tuning for 1-dB change in output power as compared to about 3% for dielectric tuning (epsilon/sub r/ = 38). The dielectric tuning as implemented provides a controlled tuning slope but is found to be susceptible to mode jumping beyond 3% range.

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