Abstracts

AlGaAs/GaAs Heterojunction Ballistic Bipolar Transistors (BBT) for EHF Amplifiers

E.J. Zhu, W.H. Ku and C.E.C. Wood. "AlGaAs/GaAs Heterojunction Ballistic Bipolar Transistors (BBT) for EHF Amplifiers." 1983 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 83.1 (1983 [MCS]): 17-21.

This paper presents the theory and design of AlGaAs/GaAs heterojunction Ballistic Bipolar Transistors (BBTs) which utilize heterojunction injection and ballistic electron motion in GaAs. Key factors for the successful realization of this new 3-terminal EHF solid-state device are identified and discussed. We present for the first time an ideal emitter junction structure with suitable Al concentration and doping profile as well as an "inverted" heterojunction bipolar device structure. The proposed inverted BBT structure has the advantages of reducing both the base current and the important emitter-base capacitances. The performance of this new device makes it an attractive candidate for the first realizable 3-terminal solid-state device capable of amplification in the EHF frequency range (60 GHz and above) as well as GaAs gigabit logic building block. It is believed that BBT represents a new 3-terminal device of tremendous promise for both analog and digital MMIC and M³IC applications.

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