Abstracts

A Novel HBT Distributed Amplifier Design Topology Based on Attenuation Compensation Techniques (Dec. 1994, Part II [T-MTT])

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We report on a novel HBT distributed amplifier design which achieves the highest gain-bandwidth product (GBP) per device f/sub T/ so far reported for HBT distributed amplifiers. This paper introduces a new design topology for HBT DA's which incorporates attenuation compensation on both the input and output transmission lines. A four-section HBT DA using this novel topology achieves a gain of 15 dB and a 3-dB bandwidth of > 15 GHz. The resulting gain-bandwidth product is 84 GHz. When normalized to the device f/sub T/, this DA achieves the highest normalized gain-bandwidth-product figure of merit for HBT DA's, /spl ap/ 3.67, which is a 55% improvement over existing state-of-the-art performance. Attenuation compensation of the input transmission line is realized using HBT active impedance transformations. The resulting transistor configuration consists of a common-collector driving a common-emitter-cascode transistor pair. This configuration offers 15-20 dB more available gain for the device unit cell, and results in gain-bandwidth product improvements of 200% over a conventional common-emitter DA configuration. This paper will discuss the design theory, techniques, and measurements of this newly developed HBT distributed amplifier topology.

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