Abstracts

Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers

K.W. Kobayashi, L.T. Tran, J.C. Cowles, T.R. Block, A.K. Oki and D.C. Streit. "Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 739-748.

An InAlAs/InGaAs-InP HBT CPW distributed amplifier (DA) with a 2-30 GHz 1-dB bandwidth has been demonstrated which benchmarks the widest bandwidth reported for an HBT DA. The DA combines a 100 GHz fmax and 60 GHz fT HBT technology with a cascode coplanar waveguide DA topology to achieve this record bandwidth. The cascode gain cell offers 5-7 dB more available gain (MAG) than a common-emitter, and is used to extend the amplifier's upper frequency performance. A coplanar waveguide design environment is used to simplify the modeling and fabrication, as well as to reduce the size of the amplifier. Novel active load terminations for extending the DA's lower frequency response were separately demonstrated. The active loads are capable of extending the lower bandwidth performance by two decades resulting in performance below 45 MHz. This work explores both design techniques and technology capability which can be applied to other distributively matched HBT circuits such as active baluns for mixers, active combiners/dividers, and low dc power-broadband amplifiers.

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