Abstracts

A novel base feed design for high power, high frequency heterojunction bipolar transistors

M. Salib, Hyo-Kun Hahn, J. Kositz, J. Zingaro, A. Ezis and A. Gupta. "A novel base feed design for high power, high frequency heterojunction bipolar transistors." 2001 MTT-S International Microwave Symposium Digest 01.2 (2001 Vol. II [MWSYM]): 1075-1078 vol.2.

HBTs for power amplifiers are typically designed to provide high power per unit cell to minimize chip area and losses in the on-chip combiner circuitry. A high power unit cell is obtained by combining the power of several emitter fingers ("subcells"). A problem arises when the magnitude and phase of signals driving each sub-cell differ significantly from one to the other. The imbalance results in reduced total power and efficiency and the problem gets worse with increasing frequency. Our experience is that at X-band the performance of the unit cell is compromised when more than four to six subcells (40 /spl mu/m/sup 2/ each) are combined in one device using the conventional "fishbone" method. This paper describes a new method of feeding signal to the sub-cells for overcoming this problem. An example is provided where the powers of the sixteen 40 /spl mu/m/sup 2/ subcells are combined such that the output scales as expected and there is minimal loss in the efficiency. The unit cell produced 29.6 dBm power with a 10 dB gain and PAE of 58% at 10.5 GHz. A two-stage X-Band power MMIC using this cell yielded 5 W with a gain of 13 dB and 43% PAE.

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