Abstracts

A 100-Element HBT Grid Amplifier (Oct. 1993 [T-MTT])

M. Kim, E.A. Sovero, J.B. Hacker, M.P. De Lisio, J.-C. Chiao, S.-J. Li, D.R. Gagnon, J.J. Rosenberg and D.B. Rutledge. "A 100-Element HBT Grid Amplifier (Oct. 1993 [T-MTT])." 1993 Transactions on Microwave Theory and Techniques 41.9 (Oct. 1993 [T-MTT] (Special Issue on Quasi-Optical Techniques)): 1762-1771.

A 100-element 10-GHz grid amplifier has been developed. The active devices in the grid are chips with heterojunction-bipolar-transistor (HBT) differential-pairs. The metal grid pattern was empirically designed to provide effective coupling between the HBT's and free space. Two independent measurements, one with focusing lenses, the other without, were used to characterize the grid. In each case, the peak gain was 10 dB at 10 GHz with a 3-dB bandwidth of 1 GHz. The input and output return loss were better than 15 dB at 10 GHz. The maximum output power was 450 mW, and the minimum noise figure was 7 dB. By varying the bias, a signal could be amplitude modulated with a modulation index as large as 0.65. Tests show that the grid was quite tolerant of failures--the output power dropped by only 1 dB when 10% of the inputs were detuned. The grid amplifier is a multi-mode device that amplifies beams of different shapes and angles. Beams with incidence angles up to 30° were amplified with less than a 3-dB drop in gain.

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