Abstracts

V-Band GaAs MMIC Low-Noise and Power Amplifiers

H.-L.A. Hung, G.M. Hegazi, T.T. Lee, F.R. Phelleps, J.L. Singer and H.C. Huang. "V-Band GaAs MMIC Low-Noise and Power Amplifiers." 1988 Transactions on Microwave Theory and Techniques 36.12 (Dec. 1988 [T-MTT] (1988 Symposium Issue)): 1966-1975.

GaAs monolithic amplifiers based on MESFET technology have been developed at V-band for low-noise and power applications. These MMIC's, which have on-chip dc-blocking and bias networks, were fabricated from both VPE and MBE materials and then evaluated. The low-noise designs resulted in a single-stage MMIC LNA achieving a 6.5 dB noise figure and a 4.1 dB gain at 59 GHz, as well as a cascaded six-stage amplifier exhibiting an 8 dB minimum noise figure and a 30 dB gain from 56.2 to 60 GHz. The single-stage power amplifier provided over 4.5 dB of gain from 57 to 60.5 GHz, with a maximum output power of 95 mW and a corresponding power-added efficiency of 11 percent at 58 GHz. Maximum power-added efficiency of 15.3 percent at 73 mW was also obtained. A cascaded four-stage amplifier demonstrated stable operation, achieving 17 dB of gain and 85 mW of output power. In addition, a two-stage balanced amplifier provided 136 mW of output power and 7.5 dB of linear gain from 56.5 to 61.5 GHz. These results demonstrate that excellent low-noise performance and power/gain performance are achievable with MESFET MMIC's, in the 60 GHz band.

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