Abstracts

A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits

K.W. Kobayashi, W.L. Jones, K. MacGowan, R. Kono and L.-S.J. Lee. "A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 261-268.

This work benchmarks the first demonstration of a multistage monolithic HEMT IC design which incorporates a dc temperature compensated current-mirror bias scheme. This is believed to be the first demonstrated monolithic HEMT bias scheme of its kind. The active bias approach has been applied to a 2-18 GHz five-section low noise HEMT distributed amplifier which achieves a nominal gain of 12.5 dB and a noise figure <2.5 dB across a 2-18 GHz band. The regulated current-mirror scheme achieves better than 0.2% current regulation over a 0-125°C temperature range. The RF gain response was also measured over the same temperature range and showed less than 0.75 dB gain degradation. This results in a -0.006 dB/°C temperature coefficient which is strictly due to HEMT device G/sub m/ variation with temperature. The regulated current-mirror circuit can be employed as a stand-alone V/sub gs/-voltage reference circuit which can be monolithically applied to the gate bias terminal of existing HEMT IC's for providing temperature compensated performance. This monolithic bias approach provides a practical solution to dc bias regulation and temperature compensation for HEMT MMIC's which can improve the performance, reliability, and cost of integrated microwave assemblies (IMA's) used in space-flight military applications.

❑ Return to main document.