Abstracts

High-performance W-Band Monolithic Pseudomorphic InGaAs HEMT LNA's and Design/Analysis Methodology

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High-performance W-band monolithic one- and two-stage low noise amplifiers (LNA's) based on pseudo-morphic InGaAs/GaAs HEMT devices have been developed. The one-stage amplifier has a measured noise figure of 5.1 dB with an associated gain of 7 dB from 92 to 95 GHz, and the two-stage amplifier has a measured small signal gain of 13.3 dB at 94 GHz and 17 dB at 89 GHz with a noise figure of 5.5 dB from 91 to 95 GHz. An eight-stage LNA built by cascading four of these monolithic two-stage LNA chips demonstrates 49 dB gain and 6.5 dB noise figure at 94 GHz. A rigorous analysis procedure was incorporated in the design, including accurate active device modeling and full-wave EM analysis of passive structures. The first pass success of these LNA chip designs indicates the importance of a rigorous design/analysis methodology in the millimeter wave monolithic IC development.

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