

A 1.8 GHz to 43 GHz Low Noise Amplifier with 4 dB Noise Figure in 0.1 μm Gallium Arsenide Technology

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Abstract : This paper presents an analysis and design of a ultrawideband 1.8GHz to 43GHz Low Noise Amplifier (LNA) in 0.1 μm Gallium Arsenide (GaAs) pseudomorphic High Electron Mobility Transistor (pHEMT) technology. The feedback based bandwidth extension techniques is analyzed and based on the outcome, a two stage LNA is designed. The impedance fine tuning is implemented by using Transmission Line (TL) structures. The measured performance shows a good agreement with simulation results and an outstanding wideband noise matching. The measured small signal gain was 12 dB, whereas a 3 dB gain flatness in range from 1.8 - 43 GHz was reached. The noise figure was below 4 dB almost all over the entire frequency band of 1.8GHz to 43GHz, the output power at 1 dB compression point was 6 dBm and the DC power consumption was 95 mW. To the best knowledge of the authors the designed LNA outperforms the State of the Art (SotA) reported LNA designs in terms of combined parameters of noise figure within the addressed ultra-wide 3 dB bandwidth, linearity and DC power consumption.

Keywords : feedback amplifiers, GaAs pHEMT, monolithic microwave integrated circuit, LNA, noise matching

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