

S-band low noise amplifier using 1 μm InGaAs/InAlAs/InP pHEMT

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Abstract

This paper discusses the design of a wideband low noise amplifier (LNA) in which specific architecture decisions were made in consideration of system-on-chip implementation for radio-astronomy applications. The LNA design is based on a novel ultra-low noise InGaAs/InAlAs/InP pHEMT. Linear and non-linear modelling of this pHEMT has been used to design an LNA operating from 2 to 4 GHz. A common-drain in cascade with a common source inductive degeneration, broadband LNA topology is proposed for wideband applications. The proposed configuration achieved a maximum gain of 27 dB and a noise figure of 0.3 dB with a good input and output return loss ($S_{11} < -10$ dB, $S_{22} < -11$ dB). This LNA exhibits an input 1-dB compression point of -18 dBm, a third order input intercept point of 0 dBm and consumes 85 mW of power from a 1.8 V supply.

Keywords : HEMT; InGaAs; InP; SKADS; telescope; LNA.

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