S-PARAMETER OPTIMIZATION IN LOW NOISE AMPLIFIER

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ABSTRACT

The cascode LNA was designed for W-CDMA application. The LNA main function is to amplify extremely low signals without adding noise, thus preserving required signal to noise ratio of the system at extremely low power levels. The operating frequency for the design was at 2.14GHz with a supply voltage of 1.8V and implement on Silterra's 0.18-μm. The objective the this project is define as to design an LNA with good noise and gain performances following the specifications set by the W-CDMA standard. It also to study a suitable topology for the LNA designs in a W-CDMA standard such as the inductively-degenerated cascode The transistor of LNA was design at 290μm using the power constrained optimization method. The type of simulation will be performed, which is distributed resistor and capacitors by the simulation using cadence design tools. The input resistor was 50Ω matched using the transistor as well as the capacitor (mimcap) was also used to isolate VDD and ground. An inductor at the gate is acting as a 2.26nH as well as at drain and source is 7.66nH and 1.65nH. The plots of s-parameter, available gain and minimum noise figure simulation are describe detail in this paper. These paper are also analyzed extensively and justification for the error.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

LNA function in today's communication system provides level of amplification of the signal received at the system's antenna. The smallest possible signal that can be received by the receiver defines the receiver's sensitivity. The largest signal that can be received by the receiver establishes an upper power level limit that can handle by the system while preserving voice or data quality. Its main function is to amplify extremely low signals without adding noise, thus preserving required signal to noise ratio of the system at extremely low power levels.

LNA in the backbone of RF communication receivers as it is the first gain stage in the receive path. Its main function is to increase the input signal level, while at the same time minimizing the increment of the SNR of the whole receiver system. The main reason being the noise impedance matching and the input matching are not always obtained for the same source impedance [1].