INTERNATIONAL CONFERENCE ON ADVANCED RESEARCH TECHNIQUES IN ENGINEERING, SCIENCE, HUMANITIES AND BUSINESS MANAGEMENT (ICARTESHBM – 2020)
15TH MARCH, VIJAYAWADA, ANDHRA PRADESH, INDIA

CERTIFICATE NO : ICARTESHBM /2020/ C0320101

A STUDY OF ULTRA HIGH BANDWIDTH STABILITY WITH LOW NOISE AMPLIFIER

MOHAMAD HANEEF
Research Scholar, Ph.D. in Electronics and Communication Engineering, Dr. A.P.J. Abdul Kalam University,
Indore, M.P.

ABSTRACT

The Low Noise Amplifier (LNA) is a core block of an Ultra Wide Band (UWB) receiver since it amplifies a very weak signal received at the antenna to acceptable levels while introducing less self-generated noise and distortions. The LNA design poses a unique challenge as it requires simultaneous optimization of various performance parameters like power gain, input matching, noise figure, power consumption and linearity over the entire UWB band. Approach: In this study, a three stage LNA is proposed with a resistive current reuse network as a first stage, a cascode amplifier with shunt-series peaking and a local active feedback as a second stage and a voltage buffer as a third stage. A resistive current reuse network is used to achieve better linearity, low noise figure, better input matching with lesser power consumption. A cascode stage with shunt-series peaking and a local active feedback is used to enhance the bandwidth and reverse isolation. A voltage buffer is used as an output stage to achieve better output matching. Results: The proposed LNA is designed using 0.18 µm CMOS technology and is simulated to verify its performance. It achieves a power gain of greater than 17.3 dB, a noise figure less than 2.45 dB with an input matching less than -11.2 dB over a 3-dB bandwidth of 2- 12 GHz. The achieved output matching is below -12 dB, the reverse isolation is below -68 dB with a Rollet's stability factor is greater than 1000 to ensure better stability. This LNA also ensures better linearity with an IIP 3 of 3 dBm at 7.5 GHz with low power consumption of 10.7 mW. Conclusion/Recommendations: From the simulation results it is evident that the presented LNA claims the advantages of very high gain, better input matching with low noise figure and less power consumption.

Keywords: The Low Noise Amplifier (LNA), Ultra Wide Band (UWB)