In this paper a three stage Active Inductor (AI) based Low Noise Amplifier (LNA) for Ultra Wide Band (UWB) receiver is presented. A fully differential topology has been adopted in order to improve the circuit robustness against unwanted common mode signals. T-coil peaking is used to enhance the bandwidth over the entire Ultra Wide Band frequency range. Active inductor is employed because of its low area, tunable inductance and high quality factor. Simultaneous Noise and Impedance Matching (SNIM) is employed to reduce the noise figure of the design. Resistive source degeneration has been implemented to improve the linearity of the circuit. The proposed LNA is designed using 90nm CMOS technology. The proposed LNA achieves power gain (S21) greater than 12dB throughout the UWB spectrum providing a bandwidth of 4 – 11 GHz. The input matching (S11) and output matching (S22) are kept well below -10 dB and – 8dB respectively, while the reverse isolation (S12) is less than -43 dB providing a linearity of -6. 9 dBm. Upon adoption of SNIM the Noise Figure falls in the range 4. 4 - 8. 2 dB.
Active Inductor based Low Noise Amplifier for Ultra Wide Band Receiver

References

- F. Yuan, 2007, "CMOS Active Inductor and Transformer Principle, Implementation and Application", Springer
- X. Guan, C. Huynh and C. Nguyen, 2011 &quot;Design of 0.18µm CMOS Resistive Shunt feedback Low Noise Amplifier for 3.1-10.6GHz UWB Receivers&quot;, 36th International Conference of Infrared, Millimeter and Terahertz Waves (IRMW-THz), pp. 1-2

- Jongsik Kim, Tae Wook Kim, Minsu Jeong; Boeun Kim and Hyunchol Shin, 2006, &quot;A 2.4 GHz CMOS Driver Amplifier Based on Multiple Gated Transistor and Resistive Source Degeneration for Mobile Wi-Max&quot;, IEEE Conference on Solid State Circuits, pp. 255-258
- Yongwang Ding and Ramesh Harjani, 2005, "High Linearity CMOS RF Front End Circuits"&quot;, Springer

**Index Terms**

- Computer Science
- Integrated Circuits

**Keywords**

- Power Gain
- Simultaneous Noise And Impedance Matching
- Noise Figure
- Resistive Source Degeneration
- Third Order Input Intercept Point