ABSTRACT

Synthetic Aperture Radar (SAR) is one of the radar technology that was developed to overcome the limitations of optical cameras, which had previously been used for earth surface observation or remote sensing application, which utilizes the working principle of electromagnetic waves for data collection. This SAR work at frequency range 1.265-1.275 GHz (L-Band), with a center frequency of 1.27 GHz. Signal transmitted by SAR on the earth's surface and reflected back, then received and processed by SAR receiver. Because of the received signal power level is very low when it is received by the receiving antenna, then after being amplified by the receiver antenna, the signal needs to be re-amplified by the low noise amplifier (LNA) in order to have high enough power level with low noise level that can be processed by the next stage.

In this Final Project, LNA is designed and realized that can work at frequency range 1.265-1.275 GHz. The LNA specification is assigned as follow: gain of ≥ 20 dB and noise figure of ≤ 5 dB. The Agilent's Advanced Design System 2011.10 (ADS 2011.10) is used for the LNA design and simulation. The Hetero Junction Field Effect Transistor (HJ-FET) NE3508M04 is used as the active component which has 21.757 dB of maximum gain at 1.27 GHz, so it is used the single stage amplifier method with bilateral design in the LNA design and realization.

Performance test of the LNA has been done by comparing the measurement result and the design specification. From the measurement result it is known that the LNA at frequency 1.27 GHz has gain of 17.53 dB and noise figure of 10.7 dB. Input VSWR of 16.336 and output VSWR of 1.595, with input impedance of (6.842 - j55.03) Ω and output impedance of (56.3 – j24.15) Ω.

Keywords: Low Noise Amplifier (LNA), Gain, Noise Figure, Synthetic Aperture Radar (SAR), Agilent's Advanced Design System 2011.10 (ADS 2011.10)