

Rancang bangun concurrent quadband LNA dengan LC resonator untuk aplikasi mobile broadband wireless acces

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20307136&lokasi=lokal>

Abstrak

Pada penelitian ini dirancang concurrent quad band LNA menggunakan LC resonator yang bekerja pada frekuensi 0,95 GHz, 1,85 GHz, 2,35 GHz, dan 2,65 GHz. Perancangan dilakukan menggunakan Advance Design System (ADS) kemudian dipabrikasi menggunakan substrat FR4. Kinerja hasil perancangan menunjukkan kinerja LNA pada frekuensi 0,95 GHz untuk GSM diantaranya memiliki nilai return loss $S_{11} = -25,4$ dB, gain $S_{21} = 38,42$ dB, stability $K = 18,6$, $NF = 1,3$ dB, $VSWR = 1,1$, dan FoM sebesar 1,91.

Sementara itu, kinerja LNA pada frekuensi 1,85 GHz untuk WCDMA diantaranya memiliki nilai return loss $S_{11} = -26,7$ dB, gain $S_{21} = 33,24$ dB, stability $K = 11,3$, $NF = 1,31$ dB, $VSWR = 1,09$, dan FoM sebesar 1,59. Sementara itu, kinerja LNA pada frekuensi 2,35 GHz untuk WiMAX diantaranya memiliki nilai return loss $S_{11} = -24,6$ dB, gain $S_{21} = 31,24$ dB, stability $K = 8,5$, $NF = 1,3$ dB, $VSWR = 1,24$, dan FoM sebesar 1,55. Kinerja LNA pada frekuensi 2,65 GHz untuk LTE diantaranya memiliki nilai return loss $S_{11} = -16,1$ dB, gain $S_{21} = 30,13$ dB, stability $K = 7,3$, $NF = 1,33$ dB, $VSWR = 1,13$, dan FoM sebesar 1,36.

Hasil pengukuran pada frekuensi 1,205 GHz memiliki nilai return loss $S_{11} = -16,4$ dB, gain $S_{21} = 12,1$ dB, stability $K = 18,6$, $NF = 1,3$ dB, $VSWR = 1,1$, dan group delay sebesar 4 ns. Sementara itu, kinerja LNA pada frekuensi 2,05 GHz untuk WCDMA diantaranya memiliki nilai return loss $S_{11} = -14,5$ dB, gain $S_{21} = 11,2$ dB, dan group delay sebesar 1 ns. Sementara itu, kinerja LNA pada frekuensi 2,45 GHz untuk WiMAX diantaranya memiliki nilai return loss $S_{11} = -13,2$ dB, gain $S_{21} = 18,7$ dB, dan group delay sebesar 2 ns. Kinerja LNA pada frekuensi 2,75 GHz untuk LTE diantaranya memiliki nilai return loss $S_{11} = -14,3$ dB, gain $S_{21} = 15,3$ dB, dan group delay sebesar 2 ns.

.....In the present study was designed quad-band concurrent LNA using LC resonator works at a frequency of 0.95 GHz, 1.85 GHz, 2.35 GHz and 2.65 GHz. The design is done using Advance Design System (ADS) is then fabricated using FR4 substrate. Performance results show the performance of LNA design at a frequency of 0.95 GHz to GSM which have the return loss $S_{11} = -25.4$ dB, $S_{21} = 38.42$ dB gain, stability $K = 18.6$, $NF = 1.3$ dB, $VSWR = 1.1$, and the FOM of 1.91. Meanwhile, the performance of the LNA at a frequency of 1.85 GHz for WCDMA which have the value of return loss $S_{11} = -26.7$ dB, $S_{21} = 33.24$ dB gain, stability $K = 11.3$, $NF = 1.31$ dB, $VSWR = 1.09$, and the FOM of 1.59. Meanwhile, the performance of the LNA at a frequency of 2.35 GHz for WiMAX which have the value of return loss $S_{11} = -24.6$ dB, $S_{21} = 31.24$ dB gain, stability $K = 8.5$, $NF = 1.3$ dB, $VSWR = 1.24$, and the FOM of 1.55. LNA performance at a frequency of 2.65 GHz for the LTE value of which has a return loss $S_{11} = -16.1$ dB, $S_{21} = 30.13$ dB gain, stability $K = 7.3$, $NF = 1.33$ dB, $VSWR = 1.13$, and the FOM of 1.36.

The results of measurements at a frequency of 1,205 GHz has a value of return loss $S_{11} = -16.4$ dB, $S_{21} = 12.1$ dB gain, stability $K = 18.6$, $NF = 1.3$ dB, $VSWR = 1.1$, and group delay of 4 ns. Meanwhile, the performance of the LNA at a frequency of 2.05 GHz for WCDMA which have the value of return loss $S_{11} = -14.5$ dB, $S_{21} = 11.2$ dB gain and group delay of 1 ns. Meanwhile, the performance of the LNA at a frequency of 2.45 GHz for WiMAX which have the value of return loss $S_{11} = -13.2$ dB, $S_{21} = 18.7$ dB gain

and group delay of 2 ns. LNA performance at a frequency of 2.75 GHz for the LTE value of which has a return loss $S_{11} = -14.3$ dB, $S_{21} = 15.3$ dB gain and group delay of 2 ns.