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

Doby Prayadinata, author

Abstrak

Pada penelitian ini dirancang concurrent quad band LNA mengunakan 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 menunjukan kinerja LNA pada frekuensi 0,95 GHz untuk GSM diantaranya memiliki nilai return loss S11 = -25,4 dB, gain S21 = 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 S11 = -26,7 dB, gain S21 = 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 S11 = -24,6 dB, gain S21 = 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 S11 = -16,1 dB, gain S21 = 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 S11 = - 16,4 dB, gain S21 = 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 S11 = -14,5 dB, gain S21 = 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 S11 = -13,2 dB, gain S21 = 18,7 dB, dan group delay sebesar 2 ns. Kinerja LNA pada frekuensi 2,75 GHz untuk LTE diantaranya memiliki nilai return loss S11 = -14,3 dB, gain S21 = 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 S11 = -25.4 dB, S21 = 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 S11 = -26.7 dB, S21 = 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 S11 = -24.6 dB, S21 = 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 S11 = -16.1 dB, S21 = 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 S11 = -16.4 dB, S21 = 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 S11 = -14.5 dB, S21 = 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 S11 = -13.2 dB, S21 = 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 S11 = -14.3 dB, S21 = 15.3 dB gain and group delay of 2 ns.