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Abstract
The major research in this thesis is different property of amplifiers. Gain amplifier and low noise amplifier are designed and accomplished on FR4 laminate, and power amplifier is designed and accomplished on monolithic microwave integrated circuit (MMIC).
Gain amplifier and low noise amplifier are utilizing Agilent AT-415 BJT as core of the design, targeting a center frequency of 2.4 GHz ISM band apply to 802.11b and 802.11g. Gain amplifier is designed on single stage circuit, include two types radio frequency choke(RF choke). Low noise amplifier is designed on single- and two stages circuit, include two types radio frequency choke. Power amplifier is utilizing 0.15 m InGaAs PHEMT of WIN Semiconductors Corp. as core of the design, targeting a center frequency of 28 GHz apply to Local multipoint distribution system (LMDS). Power amplifier with two supply voltages of gate and drain are -0.25 V and 6 V. The design of this power amplifier exhibits a power gain of 25.02 dB with a total power of 26.88 dBm, an input return loss (S11) of -22 dB, an output return loss (S22) of -20.23 dB, and an input 1-dB compression point (P1dB) of -0.3215 dBm. Additionally, the power-added efficiency (PAE) is 23.82 %. Measure this power amplifier when voltages of gate and drain are -0.25 V and 6.5 V exhibits a power gain of 13.4 dB, an input return loss of -15 dB, an output return loss of -9.44 dB. When voltages of gate and drain are -0.25 V and 6.9 V exhibits a power gain of 11.6 dB, an input return loss of -10.5 dB, an output return loss of -10.5 dB. When voltages of gate and drain are -0.25 V and 5 V exhibits a power gain of 17.3 dB, an input return loss of -16.5 dB, an output return loss of -11.3 dB. When voltages of gate and drain are -0.25 V and 4 V exhibits a power gain of 20.6 dB, an input return loss of -14.5 dB, an output return loss of -11.8 dB. The chip size of this MMIC is 2×2 mm2, the size of power amplifier is 2×1.5 mm2.
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