3 DEVELOPMENT AND RESULTS

By analyzing the chosen topology, the values to be used in the resonance circuit located at the load stage for the mixer to operate at the 2.4GHz frequency. In this way, values of 8nH and 0.5497pF were calculated and adopted for the inductors and capacitors, respectively.

In order to achieve a higher conversion gain for the mixer upconverter it is necessary to establish the polarizing current transistors that allow a higher frequency of transit (ft) and consequently a higher transconductance (gm), since the gain of the mixer is directly proportional to gm.

3.1 MOSFET Mixer

For the development of the upconverter mixer using MOSFETs, the transistors with values of W = 10u and L = 130n were dimensioned, width and length of the channel respectively. These values were chosen in order to maintain a minimum L to achieve maximum frequencies and less parasitic capacitances in the circuit. Carrying out a simulation of the transit frequency according to the Vgs voltage and a simulation of drain current Id in function of the voltage Vgs, a bias current Id = 3mA was obtained and transductance equal to 7.5mS obtained by observing the points of the MOS transistor.

Obtained the value of the bias current that produces greater transconductance, just mount the schematic of the mixer upconverter using the values of W and L previously defined and ensure that in the transconductance stage the transistors are polarized with a current Id = 3mA, therefore the mixer will achieve greater conversion gain for the technology used.

3.1.1 Performance Simulations