CHAPTER 5

CONCLUSION

5.1 Summary

The first part of this project is to design a core of a low noise amplifier using in the wireless communication, specifically for a digital enhanced cordless telecommunication (DECT). Following the specification for DECT, the design should be compensate with either in stability, impedance matching and voltage gain. Some theoretical calculation been made as a guidance. Here, many assumption been made to ensure the process go on after calculation process is on a right track. (All the assumption been listed in Chapter 4)

Using Mentor-Graphic software, a simulation process has been made. Some modification is done to the circuit and tuned-up until it achieves the stable signal desired. Tune-up circuit has been made because some of the exact value can't be determine and the idea here are, by manipulating either two value unknown by making assumption for one value. Problem starts occur here, as the some component varies when certain component value change. The consequence of this problem is it effects the current flow through the circuit. So, the sensitivity of the device become lesser. Refer back to theory of transconductance, g_m, a small change in V_{GS} results in a large change in I_D as shown in (5.1).

$$g_m = \frac{\partial I_D}{\partial V_{GS}} \quad |_{VDS,Const} \tag{5.1}$$

The match of the amplifier with BPF1(Band Selection Filter) and Image rejection Filter (BPF2) can be achieved by compensating the impedance of each part. This can be done by setting the impedance at the input of low noise amplifier to be equal value with the impedance that carry out from it.

Layout of the design produced at the end of the design process is using the 0.35 tsmc (Taiwan Semiconductor Manufacturing Company) technology. The resulting layout fabricate after it meet all of the specification.

5.1.1 Summary of the result.

Table 5.1: Value achieve after experiment done

Component	Value(measure)
Vin	0.75V
$\left(\frac{W}{L}\right)_1$	$\left(\frac{130um}{0.35um}\right)$
$\left(\frac{W}{L}\right)_2$	$\left(\frac{25.98um}{0.35um}\right)$
$\left(\frac{W}{L}\right)_3$	$\left(\frac{0.875um}{0.35um}\right)$
$\left(\frac{W}{L}\right)_4$	$\left(\frac{65.25um}{0.35um}\right)$
$\left(\frac{W}{L}\right)_5$	$\left(\frac{21.87um}{0.35um}\right)$
I_{D1}	2.38mA
I_{D2}	0.88mA
I_{D3}	0.25mA
I_{D4}	1.48mA
I_{D5}	0.25mA
V_{out}	3.143V

5.2 Recommendation.

Since the output buffer of the project did not work, the process matching impedance with another part of the receiver (BPF2) can't be done if this happen. The suggestion to improve output buffer part are by putting V_{bias2} to replace the grounding at the both of transistor gates M6 and M7. By controlling V_{bias2}, the size of transistor M_{buf1} and M_{buf2} can be controlled so the size will not as like as being use in the design. V_{bias2} controls the current flow so that the output resistance of M_{buf1} and M_{buf2} will achieved smaller size such it can achieve impedance match with BPF2.

Another suggestion for this circuit is to design external circuit that can generate an ac signal. Because of limitation of this low- noise amplifier circuit since it being supply with dc signal, the characteristic of noise cannot be shown. By supplying with ac signal, the minimum noise that be generated by this amplifier can be shown clearly and the frequency of it can be determine. The external circuit need also built together with a filter circuit design to avoid bias current from low- noise amplifier circuit swap back flow to ac signal circuit.

The design of a wideband low noise amplifier for wireless communication using 0.18-um CMOS technology are operating in 3.3V.In couple of year in future, most of the analogue integrated circuit design is reducing in size and scale. Hence, technology are tense to reduce its power consumption. A new design can be created with smaller voltage source, yet still can amplify the output desired. Additionally, the circuit could also operates in normal condition and avoids high power dissipation.