

CHAPTER 7

SUMMARY OF RESULTS AND SUGGESTIONS FOR FUTURE WORK

7.0 Summary of Results

In this work, a collection of present-day amplifier classifications and their definitions has been presented. Also, an overview of the main methods used in the design of RF power amplifiers (Load-pull, and large-signal S-parameters techniques) has been reported.

Design accuracy of the class-A high power amplifier using the small-signal S-parameters is investigated, where compression in the power gain was used as an indicator for the design accuracy. The effect of drain voltage variation on the power gain compression has been studied.

Two L-band class-E amplifiers were presented in section 5.3. One of them is a lumped-element based circuit and the other is a transmission-line based circuit. Both circuits show good performance over wide bandwidth (1.0 Ghz). In section 5.4, lumped-

element and transmission-line based X-band class-E amplifiers are proposed. Both circuits show good performance over wide bandwidth (4.8 GHz).

A new technique to improve the drain efficiency of class-E amplifier has been proposed. This technique uses two passive networks. One of them is in a series with the shunt capacitor C_S and the other is in a series with the transistor's source terminal. This technique shows improvement in the drain efficiency, which jumps from 62% to 82%.

A comparison between class-E and class-F amplifiers was presented in section 5.6. This comparison shows the advantages of each one of these classes over the others for different applications.

In chapter 6, a 900 MHz CMOS RF PA with one-watt output power and a high power added efficiency (68%) was presented. This PA can be used in the European standard for mobile communications (GSM) handset transmitter. Moreover, it presents simulation results, and layout issues of the designed PA.

7.1 Suggestions for Future Work

All of the work presented in this dissertation is based on very sophisticated software (Advance Design System). Experimental verification for this work is ignored because of the limited capability of our laboratory.

Although the new technique proposed in section 5.5 shows improvement in the drain efficiency, it does not show improvement in the PAD efficiency. The reason for this is that the input power consumption increased. One of the suggested solutions is to design a proper input stage to compensate for the loss of input power.

The comparison presented in section 5.6 between class-E and class-F amplifiers shows the advantages of each over the other based on the applications. More investigation can be done to study the relation between the amplifier's class type and the transistor's type.

The output stage proposed in chapter 6 has a good linearity, and high efficiency. Research can be conducted to study the possibility of using this configuration in the variable envelope modulation systems. Moreover, the reported CMOS amplifier need to be fabricated to study the visibility of this circuit.

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Vita

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