



AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Electronics and Communications Engineering Department

**Design of Low Power / Low Sensitivity to Process
Variations Integrated RF Receivers in Deep Sub-micron
CMOS Technology**

A Thesis

Submitted in partial fulfillment of the requirements of the degree of
Master of Science in Electrical Engineering

Submitted by

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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Electrical Engineering (Electronics and Communications Engineering).

The work included in this thesis was carried out by the author at the Electronics and Communications Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

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ABSTRACT

Sameh Ahmed Assem Mostafa Ibrahim, Design of Low Power / Low Sensitivity to Process Variations Integrated RF Receivers in Deep Sub-micron CMOS Technology, Master of Science dissertation, Ain Shams University, 2005.

This dissertation demonstrates the design of a fully integrated 2.4 GHz CMOS receiver in accordance with the Bluetooth standard. The receiver integrates a low noise amplifier, a passive polyphase quadrature generator, four Gilbert cell mixers, an active polyphase intermediate frequency filter and a zero-crossing demodulator.

The dissertation also includes detailed system engineering of the proposed receiver. Three main constraints were regarded through the whole work; full integration in CMOS, low sensitivity to process variations and low power. These constraints have been considered in three aspects; system level, circuit level and layout (mask) level.

AMS 0.35 μm CMOS technology was used. Simulation results show that the front-end has a 23 dB voltage conversion gain, an 11 dB noise figure and a -9 dBm IIP3. It consume 6.79 mA from a 3.3 V supply. A minimum image rejection ratio of 37 dB was achieved.

Key words: low-if receiver, Bluetooth, polyphase, image rejection ratio, CMOS, zero-crossing detector, low noise amplifier, double quadrature.

ACKNOWLEDGEMENT

الحمد لله رب العالمين

I would like to thank my supervisors Prof. Dr. Hani F. Ragai and Dr. Mohamed S. Tawfik for their continuous guidance, encouragement and help. They helped me throughout my entire design flow. I learned so many valuable things from them, but above all, they taught me how to be devoted to research and how to help others. I would like also to thank them for their patience.

I would like to thank Prof. Dr. Khaled W. Sharaf for his support and encouragement. He helped me solve many of the problems I faced during my work. He welcomed my persisting questions with great patience and never let me down.

Many Thanks go to my colleagues and friends for their support and help during my thesis. And special thanks for Mohammed Abd-El-Sattar, Amr Misbah and Amr Amin.

Last but not least, I would like to thank my parents. Their patience, care, and love are what made me. I pray to God that I will always be a good faithful son to them. I wish also to thank my wife in being patient with me in the critical time I passed through.

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