UNIVERSITI TEKNOLOGI MARA

A Miniature Stub-Loaded Antenna Optimized at VHF Band for FSR Sensor Application

HASRUL HISYAM BIN HARUN

Dissertation submitted in partial fulfillment of the requirements
for the degree of
Master of Science in Telecommunication and Information Engineering

Faculty of Electrical Engineering

January 2014

ABSTRACT

The concept of forward scattering radar briefly introduce in this paper which is the suggested application for monopole antenna design proposed. The concept of antenna monopole design, miniature technique and optimization method proposed with problem statement, objectives and research methodology are explained in earlier chapter of this article. This supported with a reviewed of previous experimental result from several researches as references. This article demonstrated a miniature monopole antenna optimization at VHF band (30-300MHz) for FSR sensor application. Stub-loaded technique is applied in this design by placing the stub at strategic position along the antenna. 200MHz is targeted as operating frequency and antenna characteristic such as return loss, radiation patter, VSWR etc are targeted to be comparable to Commercial Off-The-Shelf (COTS) product. Antenna design in this paper simulated using Computer Simulation Technique (CST) and introduced Parameter Sweep and Genetic Algorithm (GA) technique to determine the optimal lengths of antenna and stubs. This paper reveal that stubs attached to one sided of monopole antenna is more suitable for single frequency at VHF band and proved that 26.7 % of antenna size reduction can be achieve compare to conventional quarter-wave monopole antenna.

ACKNOWLEDGEMENT

First of all, praise to Allah the most gracious and merciful that I have been able to finish this research in the very limited time. The completion of this research will not be possible without the technical support and aided from others. Thus I would like to take this short opportunity to express my deepest gratitude and gratefulness to my supervisor Dr. Nur Emileen Abdul Rashid for her knowledgeable advice and guidance throughout the completion of this research. Not forgotten to all lecturers and colleagues in this master program who have provided guidance and advice in carrying out data collection and data analysis throughout this research and also to able for me to complete other courses.

I also would like to thanks to my lovely wife Norhayati Binti Kamis, my sons Hafiy Naufal Bin Hasrul Hisyam and Hadif Nizar Bin Hasrul Hisyam for their patience during my difficult time, a morale support, encouragement and love had given me the strength to finish up this course as well as this research. The same thanks also go to my beloved mother Hasma Binti Hashim Baba, father Harun Bin Amin, mother in law Maimunah Binti Anas and siblings for their continuous support. Life would not have a meaning without my family.

Last but not least, I would like to dedicate my appreciation to all my colleagues in RF department at Freescale Semiconductor Malaysia who has supported and gave a lot of encouragement.

CONTENT

TABLE OF CONTENTS