A STUDY OF MULTILAYER SPIRAL INDUCTOR USING METAMATERIAL SUBSTRATE FOR 5.8GHZ WIMAX APPLICATION

SITI AMINAH BINTI KADRI

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the most beneficial and the most merciful, it is with deepest serve gratitude of the Al-Mighty that gives strength and ability to complete this project.

I would like to take this opportunity to express my greatest thankful to my project supervisor, Pn. Zuhani binti Ismail Khan for her guidance, advices, supervision, encouragement and faith to me in accomplishing this project. I would also like to express my special thanks to En Asaari bin Sulaiman, Pn Hashimah Baba, En Huzaimy Jusoh and Hanisah Muhamed Nadzar for helping me in understand the concept of this project.

Finally, I would love to say thanks to my beloved family for their support and unending prayers and also to my friends for their understanding directly or indirectly in successful completion of my project.

ABSTRACT

New discovery material which contradicted in physic law known as metamaterial has been designed. It is the combination of the normal material (GaAs) with the unique structure. Computer Simulation Technology (CST) software has been used to design and simulate three-dimensinal structure. The results was then exported to Microsoft excel and Matlab to extract the dielectric value. Negative permittivity of material with split ring structure embedded in it has been used as a substrate for an inductor design. In a typical amplifier MMIC, up to 80% of chip area is occupied by inductors. Eagerness and inspired toward miniaturization, compact spiral inductors has been developed. These miniaturized inductors are constructed using a combination of three metal and three polyimide layers on a metamaterial substrate alternately. The area of multilayer inductor is almost four times smaller than planar design while maintaining same performance. The increasing number of layer, the performance of the inductor also improved. High performance of quality factor is the paramount desired with the consideration of losses.

TABLE OF CONTENTS