A DESIGN OF UHF RFID READER ANTENNA WITH AIR GAP

Thesis is presented as partial fulfilment for the award of the

Bachelor of Electronics Engineering (Hons) (communication)

UNIVERSITI TEKNOLOGI MARA

NORAZLIN BINTI MOHAMAD RAZALI
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA

ACKNOWLEDGEMENT

In the name of Allah s.w.t and He the most merciful with salawat and salaam to Prophet Muhammad s.a.w. Alhamdulillah thanks to Him with the help and His permission giving us the idea and health, also the opportunity to successfully completing this project of designing a UHF RFID reader antenna with air gap. I would like to express my gratitude to those who have been very supportive and helpful with their constructive advises especially my project's supervisor, Prof. Madya. Dr. Mohd Tarmizi Ali for his guidance, time, attention and advises throughout the process in completing this project.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Ultra high frequency (UHF) radio frequency identification (RFID) is a rapidly growing technology for automated identification of objects wirelessly. Globally, each country has its own frequency allocation for UHF RFID applications and generally the UHF RFID frequency ranges from 840.5 to 955 MHz [1]. The UHF banded RFID tag can be read longer and faster than the low frequency (LF) and high frequency (HF) banded tags. The reason is because the intensity of magnetic field in HF can be well defined for a specific read zone but it quickly downs as the function of distances from the antenna [2]. Hence, the networked RFID and other RFID technologies had been focused on the UHF band.

It is a well-known that communication at far-field is widely used due to its long read range while near-field reading can be useful for objects made up of metals or having liquids in their vicinity [3] because usual far-field tag's performance is affected by the presence of these objects [4]–[7].

There are several details need to be taken into consideration for optimized RFID antenna design. Some of them are for longer reading range, better accuracy, reduced fabrication cost, and simple system configuration and implementation.

The RFID reader antenna is one of the important components in RFID systems and its capability will determine the performance of whole RFID system. In order to obtain well-read performance, the reader antenna need to be designed for circular polarization (CP), because circularly polarized antennas can increase orientation diversity and reduce the loss caused by the multi-path between the reader and the tag antenna. General speaking, circular polarization commonly needs two orthogonal modes of equal amplitude which are excited with a 90° phase difference [8].

This project of designing a UHF RFID reader antenna with air gap is fed sequentially by four perfect electrical conductor (PEC) probes which connected directly to microstrip feed line. The PEC probes arranged at adequate distance between them allow sequential rotation of current to the main patch of the antenna which also help in contribution to circular polarization. The introduction of air gap and parasitic patch in the designed antenna has also improve its gain and the overall performance.