ZARUL AIEZZAT B.ENG (HONS) ELECTRICAL & ELECTRONIC ENG JAN 2018

**UNIVERSITI TEKNOLOGI MARA**
**CAWANGAN PULAU PINANG**

# CHARACTERISTIC PERFORMANCES 3D PRINTED MICROWAVE ABSORBER

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**BACHELOR OF ENGINEERING (HONS) ELECTRICAL AND ELECTRONIC ENGINEERING**

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# AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results if my own, unless otherwise indicated or acknowledge as a reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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# ABSTRACT

Electronic Toll Collection (ETC) system in Intelligent Transport System (ITSs) had spread in this past few years because of the improvement is communication technology advances. There are many components in the communication technology which is information, procedures, components, software, hardware, data and people. The sender and receiver interact to gain the information of the data through electromagnetic wave. This wireless technology is fast but had it weakness which is reflection or diffraction of other signal that can harmful to the user. From the point of view, the absorber is needed to solve this problem. Moreover, there are many types of absorber had been introduced in industry but vary with current time. So, this project is about the investigation of new materials and techniques for electromagnetic waves absorption. The purpose of this project is to design a 3D printed hollow pyramidal absorber by using thermoplastic filament. It is designed to function at frequency 8 GHz to 12 GHz. The absorber is designed by using SolidWorks for the hardware and simulated by using Computer Simulation Technology (CST) software to predict their performances. Every thermoplastic filament has their different abilities and specifications. The pyramidal absorber shape is designed as the mostly used shape in market and the basic type of the absorber. The dimension of pyramidal absorber at size 38 mm length x 38 mm width x 83 mm height. This absorber is designed using PLA type of thermoplastic filament. The performance of the absorber is measured by using free space arch reflectivity as measurement method. The absorption performance from existing commercial absorber is as reference for the developed absorber. The result 3D printed hollow pyramidal microwave absorber shows a good absorption performance which is -19.9572 dB for the minimum while the maximum absorption is -59.0001 dB.

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