

DUAL PORT ANTENNA WITH SINGLE RADIATOR ELEMENT

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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The thesis is submitted in partial fulfillment of the requirements for the award of  
Bachelor of Electronic Engineering (Wireless Communication)

Faculty of Computer Engineering and Electronic Engineering  
Universiti Teknikal Malaysia Melaka

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**BORANG PENGESAHAN STATUS LAPORAN  
PROJEK SARJANA MUDA II**

**Tajuk Projek** : .DUAL PORT ANTENNA WITH SINGLE RADIATOR ELEMENT

**Sesi Pengajian** :

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## **DEDICATION**

This research is dedicated to my parents, for their endless love, support and encouragement.

## ACKNOWLEDGEMENT

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Lastly, the cooperation and support received from all the members who contributed to this research was vital for the success of this project. The ideas, suggestions, and perspective given greatly enhanced this research project. Once again, I am in grateful and in appreciation of all the assistance contributed for my study.

## ABSTRACT

Evolution in wireless communication technology has led to the demands for faster transmission and receiving of information within the network application. Increase in channel capacity is a method to provide reliable and high speed communication. In this regard, the dual port antenna design is being considered for better performance in term of speed and reliability. In this paper, a design of dual port monopole-slot-like microstrip antenna with single radiator element is presented and discussed. The main objective of this project is to design, simulate and fabricate the dual port antenna with single radiator element. The primary designed antenna are able to cover WLAN band at 5.15-5.35 GHz. The antenna design consists of simple rectangular radiating patch, two microstrip feed lines which are connected orthogonally to the radiating patch, and a L-shaped defected ground plane. In addition, a coupling sleeve-arm and inverted T-shaped slot are utilized on the ground plane of antenna each under one of the corresponding feed lines with aimed to provide isolation between two ports. Performance of the proposed design is verified by the simulation and measured results including s-parameters, surface current distribution and gain. The simulation and measurement result show that the designed antenna have proper radiation characteristics at the desired operation frequencies. The fabricated antenna is capable of supporting frequency band of 4.7-5.4 GHz and 4.9-5.9 GHz with gain more than 2 dB and return loss less than -10 dB.

**Keywords:** Dual port antenna, Single radiator element, WLAN.



## ABSTRAK

*Evolusi dalam teknologi komunikasi tanpa wayar telah membawa kepada permintaan untuk penghantaran dan penerimaan maklumat lebih cepat dalam aplikasi rangkaian. Peningkatan dalam kapasiti saluran adalah satu kaedah untuk menyediakan komunikasi yang boleh dipercayai dan berkelajuan tinggi. Dalam hal ini, reka bentuk antenna dwi port dipercayai mempunyai prestasi yang lebih baik dari segi kelajuan dan kebolehpercayaan. Dalam kertas ini, satu reka bentuk antenna mikrostrip dwi port alur-seperti-monopol dengan unsur radiator tunggal dibentangkan dan dibincangkan. Objektif utama projek ini adalah untuk merkabentuk, simulasi dan fabrikasi antena dwi port dengan unsur radiator tunggal. Antena utama direka dapat meliputi jalur WLAN di 5.15-5.35 GHz. Reka bentuk antena terdiri daripada tampalan radiasi segi empat tepat asas, dua jalur suapan mikrostrip yang dihubungkan berserenjang dengan tampalan yang beradiasi dan satah bawah 'defected' berbentuk L. Di samping itu, gandingan lengan-lengan dan slot berbentuk T terbalik telah digunakan pada satah bawah antena setiap satu di bawah salah satu jalur suapan dengan bertujuan untuk menyediakan pengasingan yang memuaskan antara dua port. Prestasi reka bentuk yang dicadangkan itu disahkan oleh keputusan simulasi, dan pengukuran termasuk 's-parameter', pengedaran arus permukaan dan 'gain'. Simulasi dan pengukuran menunjukkan bahawa hasil antena yang direka mempunyai ciri-ciri radiasi yang betul pada frekuensi operasi yang dikehendaki. Antena direka mampu menyokong jalur frekuensi 4.7-5.4 GHz dan 4.9-5.9 GHz dengan 'gain' lebih daripada 2 dB dan kehilangan pulangan kurang daripada -10 dB.*

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## LIST OF ABBREVIATION AND SYMBOL

ABBREVIATION	SYMBOL
$c$	Velocity of light in free space
$\epsilon_{reff}$	Effective relative permittivity
$\epsilon_r$	Relative permittivity
$f_o$	Desired resonant frequency
$Z_o$	Characteristic of impedance
CST	Computer Simulation Technology
DGS	Defected Ground Structure
SNR	Signal-to-Noise Ratio
WLAN	Wireless Local Area Network



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