

CONTENTS

AGREEMENT PAGE

ORIGINALITY STATEMENTS

ABSTRACT	iv
GRATITUDE NOTE	v
Contents	vi
List of Figures	viii
List of Tables	x
List of Appendixes	xi
1 INTRODUCTION	1
1.1 Background	1
1.2 Problem Formulation	2
1.3 Objectives	2
1.4 Scope of Works	3
1.5 Research Method	3
1.6 Schedule and Milestone	3
2 BASIC CONCEPT	5
2.1 Antenna	5
2.1.1 Rectangular Microstrip Patch Antenna	5
2.1.2 Feed Line	9
2.2 Dual-Band	10
2.3 Antenna Directivity	11
2.4 Radiation Pattern	11
2.5 Gain	11
2.6 VSWR	12
2.7 Bandwidth	13

3 PROPOSED MODEL OF ANTENNA	14
3.1 Flowchart of Antenna Design	14
3.2 The Specification of Initial Antenna Design	14
3.3 Antenna Target	15
3.4 Simulation with 3D model simulation software	15
3.4.1 Initial Antenna Design and Antenna Iteration	16
3.4.2 Antenna Iteration 1	18
3.4.3 Final Antenna Iteration	20
3.5 Antenna Realization	22
3.6 Antenna Measurement 3D Model Simulation Software	22
3.6.1 VSWR	23
3.6.2 Bandwidth	24
3.6.3 Gain	25
3.6.4 Antenna Directivity and Radiation Pattern	25
3.7 Final Results from 3D Model Simulation Software	30
4 RESULTS AND ANALYSIS	31
4.1 Antenna Measurement in Lab	31
4.1.1 VSWR Measurement	31
4.1.2 Radiation Pattern Measurement	33
4.2 Comparison of Measurement in Antenna Lab and Simulation Results	35
4.2.1 Comparison between VSWR	36
4.2.2 Comparison between S11	37
4.2.3 Comparison between Azimuth radiation pattern	37
5 CONCLUSIONS AND SUGGESTION	39
5.1 Conclusion	39
5.2 Suggestion	39
Bibliography	41
APPENDIX	
A Antenna Calculations Appendix	
B VSWR Analysis and Bandwidth Analysis Calculations Appendix	

LIST OF FIGURES

2.1	Top view of a microstrip antenna.	5
2.2	Side view of a microstrip antenna.	6
2.3	Bottom view of a microstrip antenna.	6
2.4	The Feed Line.	9
2.5	The W_f and L_f position at the feed line.	10
3.1	Antenna Design Flowchart.	14
3.2	The Initial Design of the Antenna.	16
3.3	The Initial Design of the Antenna in 3D model simulation software.	17
3.4	VSWR results of the initial antenna.	17
3.5	The changing of antenna dimension in Iteration 1.	18
3.6	VSWR result in Antenna Iteration 1.	19
3.7	The Final Design of the antenna from the Final iteration.	20
3.8	VSWR result in final antenna iteration.	21
3.9	Printed Antenna of Dual-Band Rectangular Microstrip Antenna of 5 and 6 GHz Compared with Regular Flash Disk	22
3.10	S Parameters of the Final Antenna Iteration from Subsection 3.4.3.	24
3.11	Gain of the Final Antenna Iteration from Subsection 3.4.3.	25
3.12	5 GHz radiation Pattern.	25
3.13	6 GHz radiation Pattern.	26
3.14	5 GHz Azimuth radiation pattern at Elevation 0°, 30°, 60°, and 90°.	26
3.15	5 GHz Elevation radiation pattern at Azimuth 0°, 30°, 60°, and 90°.	27
3.16	6 GHz Elevation radiation pattern at Elevation 0°, 30°, 60°, and 90°.	28
3.17	6 GHz Elevation radiation pattern at 0°, 30°, 60°, and 90°.	29
4.1	VSWR measurement method.	31
4.2	The results of the VSWR using VNA.	32
4.3	Radiation Pattern Measurement scheme from [1] that has been edited	33
4.4	Printed Antenna of Dual-Band Rectangular Microstrip Antenna of 5 and 6 GHz.	33
4.5	5 GHz Azimuth Radiation Pattern.	34
4.6	6 GHz Azimuth Radiation Pattern.	35