

RFID Layout and RF Circuit Design

沈清祥、吳俊德

E-mail: 9806493@mail.dyu.edu.tw

ABSTRACT

When designing one RFID module including the antenna, PCB layout engineers only put the microstrip antenna into PCB Layout directly and don't adjust PCB parameters, size or shape which can have much influence on the overall performance of microstrip antenna input impedance and antenna plane. In the design of one RFID module with the antenna frequency (2.4-2.484 GHz) band, the electromagnetic simulation software in this thesis simulates the return Loss S11 part of the antenna alone of the antenna and its return loss and verify the antenna change . In system board the printing antenna on the dielectric $\epsilon_r=4.4$ FR4 PCB is simulated for the return Loss S11 part. We will compare the experiment and simulation and analysis the difference.

Keywords : microstrip、Return Loss、dielectric

Table of Contents

封面內頁	
簽名頁	
授權書.....	iii
中文摘要.....	iv
英文摘要.....	v
誌謝.....	vi
目錄.....	vii
圖目錄.....	x
表目錄.....	xiii
第一章 緒論	
第一節 RFID系統.....	1
第二節 工作原理.....	1
第三節 RFID 種類.....	3
第四節 被動式RFID.....	5
第五節 Tag通訊協定.....	5
第二章 被動式RFID佈局與射頻電路設計	
第一節 RFID讀寫器電路佈局和設計.....	7
第二節 去耦電容(decoupling)	7
第三節 Trace line lengths.....	9
第四節 天線製造(Antenna Fabrication).....	10
第三章 主動式RFID佈局與射頻電路設計	
第一節 電路設計規則(H/W Design Rule)	13
第二節 直接降頻接收機架構.....	14
第三節 RF LC Filter and Matching for BALUN.....	15
第四節 Decoupling Capacitor.....	15
第五節 Resistor internal Bias Current Reference.....	16
第六節 Crystal Circuit.....	17
第七節 RF BALUN Matching Circuit.....	18
第八節 SPI(Serial Peripheral Interface) Interface.....	18
第九節 Antenna impedance Matching Circuit.....	19
第十節 DC Bypass Capacitor.....	19
第十一節 PCB佈局注意事項.....	20

第十二節 Antenna Matching and BALUN.....	22
第十三節 天線阻抗匹配(Impedance Matching)調整.....	22
第十四節 Active RF ID Applications.....	25

第四章 RFID 天線模擬

第一節 高頻電磁軟體.....	27
第二節 天線模擬與量測.....	29
第三節 把蜿蜒型天線拉直的模擬與量測.....	39
第四節 改變S(包含S2,S3,S4)距離1 mm.....	40
第五節 天線長度加長1.7 mm.....	42
第六節 實際PCB量測.....	44

第五章 結論.....	47
參考文獻.....	48

REFERENCES

[1] <http://www.feko.info>[2] Chin-Ming Wu,多頻帶蜿蜒型天線之研究, 大葉大學/電信工程學系碩士論文[3] Stephen H.Hall GarrettW.hall Janes.McCAll, " High-Speed Digital System Design "[4] RF CIRCUIT DESIGN[5] Hung-Ruei Chen, "A Balance-fed Planar Ant fo Mobile Applications "大葉大學電信工程學系/碩士論文[6] 陳威良, 使用電磁模擬軟體:FEKO 分析大尺寸結構之高頻電磁效應, 大葉大學電信工程學系/碩士論文[7] B.Razavi,RF MICROELECTRONICS,Prentice Hall,1998[8] Kee Chena"LNA and Limiter Circuit Design for Direct Conversion Receiver"Department of Communication Engineering National Chiao Tung University 2004[9] Jehchuen Chen"Studies on Mixer and Channel Select Filter for ISM Band Direct Conversion Receiver" Department of Communication Engineering National Chiao Tung University 2004[10] Jussi Nummela, Leena Ukkonen" 13.56 MHz RFID Antenna for Cell Phone Integrated Reader" IEEE Journal of RFID2007 pages:1088-1091[11] Won-Ju Yoon, Sang-Hwa Chung, Seong-Joon Lee, and Young- Sik Moon, "Design and Implementation of an Active RFID System for Fast Tag Collection" IEEE Journal of RFID2007 pages:961-966[12] Jong C. Park, Jae Y. Park, "Design of Wideband LC Balun Embedded Into Organic Substrate Using Coupled LC Resonators, " IEEE Journal of BALUN[13] Yong-Xin Guo "A Novel LTCC Miniaturized Dualband Balun " IEEE Journal of BALUN[14] 郭仁財 譯微波工程, 高立圖書[15] 袁杰 編著高頻電路分析與設計, 全威圖書[16] <http://www.ti.com>