Design and Analysis of Integrated Mobile-Phone PIFA Antenna with FSS Module

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ABSTRACT

The purpose of studies in this thesis aims at designing embedded planar Inverted-F Antenna that can be applied to mobile phones. The antenna is to make use of existing aluminum foil and substrate FR4 with a commercial low price to design a kind of PIFA. The advantage of this antenna includes low cost, small size, light, easy for manufacture, and low profile, and so on. The antenna adopts one quarter of wavelength, and utilizes the feeding way of microstrip to design 50 ohms of matching impedance, using the Finite Integration Technique method to calculate the distribution of surface electric current, radiation efficiency, radiation field and gains. Furthermore, two concepts are introduced in the design to improve characteristics of the antenna. First, partial radiators are lengthened to increase the radiation efficiency and impedance bandwidth of the antenna. Second, a parasitic element is placed near the antenna to generate parasitic resonance so as to increase matching impedance bandwidth. Last, for the sake of increasing the radiation efficiency of cellular tphones by controlling the nearby electromagnetic field around a human model, the periodic elements are employed to create a FSS (Frequency selective surface) array with the bandgap characteristic to suppress the propagation of the electromagnetic wave. The design of integrated mobile-phone PIFA antenna with FSS module, which can let the back-oriented radiation to be reduced, is contributive to increase the radiation efficiency and gains. It also has the effectiveness of mobile phones in reducing specific absorption rate (SAR) induced around a human head model, and maintains the antenna performance of mobile communications.

Keywords : Planar Inverted-F Antenna, shield, Frequency selective surface

Table of Contents

目錄 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. . . . . xvii 第一章　緒論. . . . . 1 1.1 前言. . . . . 1 1.2 研究動機及方法. . . . . 2 1.3 論文架構. . . . . 3 第二章　平面倒F型天線的演進與基本理論. . . . . 4 2.1平面倒F型天線. . . . . 4 2.1.1 原理. . . . . 4 2.1.2倒L型天線. . . . . 4 2.1.3倒F型天線. . . . . 5 2.1.4 平面倒F型天線. . . . . 6 2.2平面倒F型天線等效電路模型. . . . . 10 2.3沖壓天線與銅箔天線之比較. . . . . 12 2.3.1 沖壓天線. . . . . 12 2.3.2 銅箔天線. . . . . 13 2.4饋入方式. . . . . 14 2.4.1 同軸饋入. . . . . 14 2.4.2 微帶線饋入. . . . . 15 2.4.3 固定式天線與端子介面. . . . . 15 第三章 平面倒F型天線設計. . . . . 18 3.1平面倒F型天線設計. . . . . 18 3.1.1 適用頻段. . . . . 18 3.1.2天線設計. . . . . 18 3.1.3模擬分析與實測結果. . . . . 20 3.2部份天線輻射體增長之平面倒F型天線設計. . . . . 29 3.2.1適用頻段. . . . . 29 3.2.2天線設計. . . . . 29 3.2.3模擬分析與實測結果. . . . . 35 3.3部份天線輻射體增長與寄生之平面倒F型天線設計. . 40 3.3.1適用頻段. . . . . 40 3.3.2天線設計. . . . . 40 3.3.3 模擬分析與實測結果. . . . . 42 3.4 平面倒F型天線設計之探討. . . . . 51 第四章 頻率選擇平面在平面倒F型天線上的模擬與應用. 55 4.1概述. . . . . 55 4.2 利用時域有限差分方法分析頻率選擇平面特性. . . 57 4.3 頻率選擇平面在平面倒F型天線上的應用. . . . . 61 4.3.1偶極形式頻率選擇平面. . . . . 61 4.3.2 槽孔形式頻率選擇平面. . . . . 74 第五章 利用Wheeler Cap方法量測天線效率. . . . . 91 5.1簡介. . . . . 91 5.2電磁理論與電路模型分析. . . . . 94 5.2.1 電磁理論分析. . . . . 94 5.2.2 傳輸線模型. . . . . 96 5.3量測配置與方法. . . . . 98 5.4平面倒F型天線之量測. . . . . 102 第六章 手機加裝FSS對SAR量測結果之影響. . . . . 106 6.1 人體電磁波

能量吸收率（SAR）簡介. . . . . 106 6.2 SAR量測系統簡介. . . . . 109 6.3 SAR量測要求. . . . . 110 6.4量測結果. . . . . 113 第七章 結論. . . . . 119 7.1總結. . . . . 119 7.2未來研究方向. . . . . 119 參考文獻. 120

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