

# Design and Characteristics Analysis of Multi-Band Antenna for Mobile Handset

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## ABSTRACT

This thesis is aimed at designing an embedded planar inverted-F antenna (PIFA) and monopole antenna that can be applied to mobile phones. Three embedded antennas applicable to multiple-band mobile phones were designed and fabricated. The planar inverted-F antenna and monopole antenna adopt the resonant condition of a quarter-wavelength line. The design of PIFA makes use of existing copper foil, aluminum foil, and base plate FR4. The advantages of this antenna are low cost, small size, light, easy to manufacture, and of low profile. The monopole antenna has a simple structure, wide impedance bandwidth and good properties of omni-directional radiation pattern at the horizontal plane. In this paper, three antennas were designed in accordance with the specified requirements of multi-band and multimode. Two different concepts were employed in the design of two planar inverted-F antennas. First, a parasitic resonance conductor was placed near the antenna to invoke parasitic resonance so as to increase the impedance bandwidth. Second, a folded antenna has been applied to reduce the antenna size and at the same time utilized the parasitic capacitance and inductance of the folded structure to lower the resonant frequency. The design of monopole antenna produced multi-band resonance via different branch of the monopole antenna. In order to design low frequency, one branch of the monopole antenna was meandered without increasing the volume. Finally, the distance between the antenna and ground was changed to control the impedance bandwidth at high frequency. The simulated and measured results of the embedded planar inverted-F antenna and the monopole antenna are analyzed and compared.

Keywords : Planar Inverted-F Antenna ; Folded antenna ; Branch of monopole antenna

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