

A Dual Band Helical-Monopole Antenna For Mobile and Cellular Applications

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ABSTRACT

Mobile communications have been rapidly growing in the last decade. Cellular phones capable of operation in two different bands of frequencies have been developed. A typical combination could be GSM-900 band and DCS-1800 band system. Two simple solutions for the dual band design are: (1) to use either a single antenna or (2) a combination of two antennas where each antenna is designed to operate at the appropriate single band of frequency.

When a single antenna is used, a complex matching network is required to provide impedance match between the antenna and the transmitter/receiver circuitry of the handset for both of the frequency bands because impedance values for both the antenna and the transmitter/receiver circuitry change with frequencies. The required complex matching network increases the cost of a cellular phone. On the other hand, when two antennas are used, two feeding points and additional switches in the RF circuitry are required. The additional feeding point and switches increase the complexity, size, and cost of a cellular phone.

The proposed combination of helical-monopole antenna utilizes single feed solution, which eliminates the inefficiency of space usage. Also, the antenna internally matches with the 50Ω standard systems with the criteria of $VSWR \leq 2$ for both frequency bands, which eliminates the need for external matching network. Furthermore, due to its simplicity, small size compared to operating wavelength, and omnidirectional radiation pattern, the proposed antenna makes a good candidate for cellular and mobile applications.