

Isolation Between Multiband Antennas

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Mobile terminals have expanded to support different mobile communication standard, such as GSM (GSM850, GSM900, GSM1800, GSM1900), WLAN (2400-2484), UMTS(1920-2170) and so on. Multi-band antennas, which support the multiple communication system capacity inside mobile terminal, have drawn a lot of interest in the wireless communication community. For the multi-band antenna, the choice between the single feed and multiple feeds is usually relies on the system requirement. The multi-band antenna with multiple feeds can reduce the design complexity as the design of individual radiating elements with separate feeds is relatively easier, but controlling the interaction between the two antennas is difficult within a confined area (because of a market need for the small form factor of mobile terminal, the radiating elements for multi-band antenna with multiple feeds are usually to be placed closely together inside mobile terminal).

For the multi-band antennas with multi-feeds, each individual radiating element supports its corresponding frequency bands. (i.e., one radiating element for GSM bands and the other radiating element UMTS or Bluetooth). Since the antennas have to be put inside a small form-factor mobile terminal, the performance of individual radiating element decreases as a function of total antenna volume. Further degradation is due to the mutual coupling among radiating elements and between the radiating elements and parts inside the mobile terminal. The problem become more significant when the supported frequency bands are very close. Hence, multi-band antennas with multi-feeds design inside a compact mobile terminal is challenging, especially the strong coupling between the various radiating elements due to close proximity from the small size of the mobile terminal compared to the wavelengths involved.

In this paper, the isolation between multi-band antennas with multiple feeds for the mobile terminal was studied and analyzed. The Ansoft HFSS simulation software is used to have an initial idea of the design. To optimize the whole design, the antenna geometry, number of ground pins and slot size are specially designed to improve isolation. The multi-band antennas with multiple feeds were prototyped and tested. The antenna characteristic such as antenna efficiency, return loss, radiation pattern, were measured for verification.