

Isolation Enhancement of Compact Dual-Band Printed Multiple Input Multiple Output Antenna for WLAN Applications

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Abstract : Recently, the demand for wireless communications systems to cover more than one frequency band (multi-band) with high data rate has been increased for both fixed and mobile services. Multiple Input Multiple Output (MIMO) technology is one of the significant solutions for attaining these requirements and to achieve the maximum channel capacity of the wireless communications systems. The main issue associated with MIMO antennas especially in portable devices is the compact space between the radiating elements which leads to limit the physical separation between them. This issue exacerbates the performance of the MIMO antennas by increasing the mutual coupling between the radiating elements. In other words, the mutual coupling will be stronger if the radiating elements of the MIMO antenna are closer. This paper presents a low-profile dual-band (2×1) MIMO antenna that works at 2.4GHz, 5.3GHz and 5.8GHz for wireless local area networks (WLAN) applications. A neutralization line (NL) technique for enhancing the isolation has been used by introducing a strip line with a length of $\lambda g/4$ at the isolation frequency (2.4GHz) between the radiating elements. The overall dimensions of the antenna are 33.5 x 36 x 1.6 mm³. The fabricated prototype shows a good agreement between the simulated and measured results. The antenna impedance bandwidths are 2.38-2.75 GHz and 4.4-6 GHz for the lower and upper band respectively; the reflection coefficient and mutual coupling are better than -25 dB in both lower and higher bands. The MIMO antenna performance characteristics are reported in terms of the scattering parameters, envelope correlation coefficient (ECC), total active reflection coefficient, capacity loss, antenna gain, and radiation patterns. Analysis of these characteristics indicates that the design is appropriate for the WLAN terminal applications.

Keywords : ECC, neutralization line, MIMO antenna, multi-band, mutual coupling, WLAN

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