

Design and Implementation of Dual-Band MIMO Antenna with Low Mutual Coupling Using Electromagnetic Band Gap Structures for Portable Equipments

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Abstract

A dual-band Multiple Input Multiple Output (MIMO) antenna system with enhanced isolation for LTE and WLAN applications is proposed. Using a double-rectangular Defected Ground Structure (DGS), the MIMO antenna gets two resonant frequencies of 2.6 GHz and 5.7 GHz with bandwidth of 5.7% and 4.3% respectively. To reduce much more mutual coupling between dual-band MIMO antenna ports, a novel double-side Electromagnetic Band Gap (EBG) structure with equivalent circuit model is proposed. Size of the antenna is getting better, especially at the low band. The EBG unit cell is $8.6 \times 8.6 \text{ mm}^2$ that is built on FR4 substrate with height of 1.6 mm, so it is achieved more compact size than conventional EBG structures. With 1×7 EBG structures, the mutual coupling gets -40 dB in the low frequency band and -30 dB in the high one with narrow distance of 0.11 from feeding point to feeding point. Furthermore, radiation efficiency as well as gain of the antenna is getting better, especially at the low band.

Keywords: MIMO antenna, DGS, double-side EBG, mutual coupling

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