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Mutual Coupling Reduction between Elements of UWB MIMO Antenna Using Small Size Uniplanar EBG exhibiting Multiple Stop Bands

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Abstract: -In this paper, mutual coupling reduction between elements of UWB MIMO antenna using small size uniplanar EBG is presented. Proposed UWB antenna geometry consists of two circular shaped monopole radiators with a slot in ground plane for proper impedance matching. A UC-EBG (Uniplanar Electromagnetic Band Gap) cell of size 6.8mm×6.8mm is inserted between the antenna elements in 4×1 array configuration to improve the isolation. Bandgap of the UC-EBG is determined using dispersion diagram and suspended stripline method. The proposed antenna is fabricated on 1.6mm thick, low cost FR4 substrate, possessing an overall size of 27.2mm×46mm. The antenna has been fabricated and experimentally verified. The antenna shows simulated and measured -10 dB impedance bandwidths of 14.6GHz (3GHz-17.6GHz) and 14.8 GHz (3.6 GHz-17.9 GHz) respectively. UC-EBG structure exhibits multiple stop bands and suppresses E-plane coupling over these bands. Isolation better than -18 dB is achieved over the complete impedance bandwidth. Radiation efficiency and peak gain of the antenna varies from 78%-96.7% and 1.4dB to 4dB respectively. MIMO parameters, i.e. error correlation coefficient (ECC) better than 0.018 and Total active reflection coefficient (TARC) better than -26dB is achieved over the impedance bandwidth.

KEYWORDS: MIMO antenna, UC-EBG, UWB (Ultra Wideband), ECC, TARC

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