

Abstract

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Novel Compact CPW Filtenna Structures

In this paper, two compact coplanar monopole filter_antenna structures have been proposed and presented. A detailed parametric study has been carried out using a commercial software package (CST_MW Studio) to investigate the effects of reconfigurable both patch and ground structure (RP & RGS) on the filtration and radiation characteristics of the proposed filtennas. The proposed reconfigurable patch (RP) resonators are H_Slot patch shape and Edge_Slot patch shape, where the overall patch dimensions are assumed constant. The proposed reconfigurable ground structure (RGS) includes Extended Open Circuit ground "EOC", Extended Short Circuit ground "ESC", Symmetric Truncated Open Circuit ground "STOC", and Asymmetric Truncated Open Circuit ground "ATOC". The first proposed CPW filtenna is referred to as coplanar H_Slot Patch Filtenna with a reconfigurable ground structure "CPW_HSPF_RGS", while the second filtenna is referred to as coplanar Edge_Slot Patch Filtenna with a reconfigurable ground structure "CPW_ESPF_RGS". These filtennas are simulated and fabricated using a lossy and compact FR-4 substrate. Simulation results indicate that the filtration and radiation characteristics of the proposed filtennas are highly dependent on the ed RGS pattern as well as the patch resonator shape. In other word, unlike the conventional CPW monopole (UWB antenna), they resonate at multi-frequencies having different isolated operating bands. Also, these filtennas cover many wireless applications including the 3G and 4G bands. Therefore, filtration and radiation characteristics of the proposed filtennas can be adjusted using the proposed RGS pattern and the patch resonator shape. The presented filtenna structures are very compact in size and they are easy to fabricate. Good agreement has been obtained between simulated and measured CPW Filtenna characteristics over a wide frequency band (up to 15.0 GHz).