A Proposed Flexible Elliptical Ring Monopole Antenna for DSC and UWB with Notch Suppression for 5.8GHz Applications

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Until recently, the UWB antenna has been used in many applications within different areas such in medical applications, multimedia connectivity, and personal communications, to mention a few, due to the design simplicity, low power, and high data rate transmission. The monopole antenna is a good candidate to be used in such applications due to the compact size, simplicity of fabrication, and cost effectiveness. Furthermore, the wearable devices technology requires a small size, high efficiency, and low profile antennas. An elliptical ring monopole antenna of 46 mm major axis and 23 mm minor axis printed on a Kapton substrate with a length of 66 mm, width of 36 mm, and a thickness of 50.8-µm is a good candidate to operate for the DSC (1.61 – 2) GHz and UWB (3.1 - 10.6) GHz bands. Two square slots of 2mm × 2mm have been removed from the two edge of the ground plane to enhance the impedance matching over the frequency range of (8-11) GHz. This antenna is fed by a tapered coplanar waved guide (CPW) transmission line of 12.8 mm length with a gap of 0.4mm to provide an enhanced impedance matching of 50 ohm over the aforementioned bands(H. Khaleel, H. Al-Rizzo, D. Rucker, S. Mohan, Antennas and Wireless Propagation Letters, IEEE, vol.11, no., pp.564-567, 2012). In addition, a modified rectangular slot line has been inserted to the monopole antenna to provide a notch at the frequency of 5.8 GHz to reject the signal comes from WLAN applications which operating at the given frequency. This slot line is able to be adjusted to any specified frequency that would be rejected. These types of antennas are very useful these days for the application that required a rejection of the unwanted frequencies especially for UWB applications. The antenna has been simulated using the High Frequency Structure Simulator (HFSS) ver. 15 and fabricated using an Inkjet printer. A parametric study has been carried out to obtain the final antenna dimensions which are mentioned on the attached figure. The simulated and practical S-Parameters are in a good agreement and shown in the figure below. The antenna has a good gain and radiation characteristic over the specified bandwidths. The proposed antenna is a good candidate for the applications required antennas operates on a DSC and UWB bands with a tunable band rejection.