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Wideband Planar Antenna Based on Composite Right/Left-Handed Transmission-Line (CRLH-TL) for Operation across UHF/L/S-Bands

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Abstract : The paper presents a miniature wideband antenna using composite right/left-handed transmission-line (CRLH-TL) metamaterial. The proposed planar antenna has a fractional bandwidth of 100% and is designed to operate in several frequency bands from 800MHz to 2.40GHz. The antenna is constructed using just two CRLH-TL unit cells comprising of two T-shaped slots that are inverted. The slots contribute towards generating the series left-handed (LH) capacitance CL. The rectangular patch on which the slots are created is grounded with spiral shaped high impedance stubs that contribute towards LH inductance LL. The antenna has a size of 14×6×1.6mm3 (0.037λ0×0.016λ0× 0.004λ0, where λ0 is free space wavelength at 800MHz). The peak gain and efficiency of the antenna are 1.5 dBi and ~75%, respectively, at 1.6GHz. Proposed antenna is suitable for use in wireless systems working at UHF/L/S-bands, in particular, AMPS, GSM, WCDMA, UMTS, PCS, cellular, DCS, IMT-2000, JCDMA, KPCS, GPS, lower band of WiMAX.

Keywords : miniature antenna, composite right/left-handed transmission line (CRLH-TL), wideband antenna, communication transceiver, metamaterials
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