

# Compact Dual-Band Antenna Design using Metamaterial

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**Abstract:** Here, provide a composite right/left-handed trans- mission line (CRLH - TL) technique for a small, short-ended, coplanar waveguide (CPW) fed dual-band antenna boosted with metamaterial. Metamaterial, which is used in the suggested design to achieve miniaturisation, also enables the antenna to function at double band frequency. In comparison to the conventional antenna, the size reduction of the suggested design is improved by the implementation of slots and vias in the structure. The antenna operating in dual band frequency 5.4 GHz - 5.6 GHz and 6.7 GHz to 6.9 GHz with reflection coefficient of 5.5GHz and 6.8GHz. This can be used for WLAN and wireless application of STM link. The antenna exhibits stable radiation properties over the operational bandwidths, reasonable gain, and good impedance matching.

**Keywords:** Metamaterials, Dual-Band Antenna, Antenna Miniaturization

## REFERENCES

- [1]. L. I. Babilio, L. K. Warne, W. L. Langston, W. A. Johnson, and M. B. Sinclair. Microwave-frequency, negative-index metamaterial designs based on degenerate dielectric resonators. IEEE Antennas and Wireless Propagation Letters, 11:113–116, 2012.
- [2]. Jagtar Singh Sivia and Sumeet Singh Bhatia. Design of fractal based microstrip rectangular patch antenna for multiband applications. In 2015 IEEE International Advance Computing Conference (IACC), pages 712– 715, 2015.
- [3]. Vipul Sharma, Shyam Pattnaik, Tanuj Garg, and Swapna Devi. A microstrip metamaterial split ring resonator. International Journal of the Physical Sciences, 6:660–663, 01 2011.
- [4]. Siamak Ebadi and Abbas Semnani. Mutual coupling reduction in waveguide-slot-array antennas using electromagnetic bandgap (ebg) struc- tures. IEEE Antennas and Propagation Magazine, 56(3):68–79, 2014.
- [5]. Pei-Ling Chi and Yi-Sen Shih. Compact and bandwidth-enhanced zeroth- order resonant antenna. IEEE Antennas and Wireless Propagation Letters, 14:285–288, 2014.
- [6]. Sun Mingming, Qin Weiping, Wang Haimeng, and Chen Dong. Resonator and bandpass filter using crlh transmission line based on microstrip- coplanar-waveguide structure. In 2008 International Conference on Microwave and Millimeter Wave Technology, volume 3, pages 1590–1592. IEEE, 2008.
- [7]. Binfeng Zong, Guangming Wang, Cheng Zhou, and Yawei Wang. Com- pact low-profile dual-band patch antenna using novel tl-mtm structures. IEEE Antennas and Wireless Propagation Letters, 14:567–570, 2015.
- [8]. Ruchita Sonak, Mohammad Ameen, and Raghvendra Kumar Chaudhary. Cpw-fed electrically small open-ended zeroth order resonating metama- terial antenna with dual-band features for gps/wimax/wlan applications. AEU - International Journal of Electronics and Communications, 2019.