

## **Low-profile Top Loaded Monopole Antenna for VHF Applications**

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A low-profile top loaded folded monopole antenna with wide band omnidirectional radiation patterns is presented in this letter. The antenna is designed using a short vertical monopole element placed on a metallic reflector plane (MRP). The antenna impedance bandwidth is enlarged by adding vertical shorting pins at appropriate locations between the loading circuit and the MRP. The proposed antenna was studied numerically in the VHF frequency range. To meet with our measurement facilities, the antenna prototype was realized and fully characterized around 2.1 GHz. The experimental results are in good agreement with the numerical simulations. The antenna radiation patterns are omnidirectional with high radiation efficiency ( $> 90\%$ ) in a relatively large frequency band (11.5% bandwidth).

The quality of a wireless links is a function of the signal scattering between the receiver and the emitter. For short wavelengths operations, fading effects and signal attenuation may lead to low quality communication systems especially when they are implemented in complex environment. To overcome this issue, we tend to operate in lower frequencies such in the U/VHF band. Quarter wavelength monopole antennas are the most common type used in this frequency band. They are highly desirable for air, space and ground communication links. Besides, recent wireless device packages require the integration of compact antennas having high radiation performances. Yet, The intended gain, impedance bandwidth and radiation efficiency decrease rapidly with the antennas dimensions. For this reason, the miniaturization of antennas without degrading its performances is a real challenge. Furthermore, the miniaturization of monopole antennas have been widely explored. In particular, top-loading techniques have been used to achieve a significant reduction of the vertical height of monopole antennas.

In this letter, a novel low-profile monopole-type antenna is proposed for the VHF frequency band. The antenna performances have been optimized and simulated from 100MHz to 200MHz. However, as experimental facilities in VHF are not available in our laboratory, a prototype of the low-profile antenna is elaborated with a 1/15 scale factor from the VHF band and fully characterized. The realized antenna have a vertical polarization and an omnidirectional radiation pattern with a relative bandwidth of 11.5% around 2.05GHz. Furthermore, a maximum gain of 3.7dBi and a radiation efficiency over 90% where obtained at this frequency.