

Small, Broadband Meanderline Loaded Inverted-L Antenna

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Abstract

This paper describes a very small, efficient, inverted-L antenna that operates over a decade bandwidth in two modes: 1) a resonant, tuned mode for low band and 2) an instantaneous broadband mode for the high band. The antenna consists of a vertical plate structure fed by a probe through the ground plane and a horizontal top plate structure that is capacitively connected to the top end of the vertical plate. A set of length-adjustable meandering transmission lines are connected in series with the top plate and the vertical plate. At the high end of the frequency band, the meanderlines behave as a choke thereby sending all current through the vertical and horizontal plates. Wideband operation is attained since the antenna appears large in terms of wavelength at the high end of the operational band. The pattern and impedance behavior is representative of a top loaded monopole antenna. Because the horizontal plate is offset and carries significant current, there is also a horizontally polarized component contributing to the antenna pattern.

At low frequencies the meanderlines behave as a frequency dependent lumped inductance which tunes out the capacitive reactance of the plates. The current flowing through the resonant structure becomes larger than that through the feed itself. As a result, the feed point appears to shift to the gap between the top and vertical plates. In this mode, the antenna behaves as a vertical dipole, thereby reducing coupling to the ground plane. For this reason, the antenna exhibits a higher efficiency than the tuned short monopole or loop antennas.