

A Small-Sized Meander-Line Type Patch Antenna Fed by Coplanar Waveguide with Finite Ground Plane

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Research and development of wide band and small sized antennas have been promoted by many institutes, companies, and laboratories for novel wireless applications such as UWB systems, terrestrial digital TV broadcasting services, and so forth. Actually, several types of small-sized and broadband antennas have been developed by using unique configurations. Another candidate as a small sized antenna is the meander-line configuration, which features wideband and low-profile printed structure.

With this in mind, we fabricated a printed meander-line antenna, which was etched on a dielectric substrate and was fed by a coaxial cable as shown in Fig.1. To match at desired frequency bands, a coplanar waveguide with a finite ground plane was etched on the same dielectric substrate. The width of the meander-line was set at 0.5 mm and the line was spaced by a gap length of 0.5 mm. The 61 crank turns were made, and thus the dimensions of the meander-line area were 60 mm x 60 mm. Figure 2 shows the measured return loss versus frequency, where the lengths of the ground plane, L1 and L2, were set at 60 mm and 10 mm, respectively. The return loss was measured to be larger than 5 dB in the UHF bandwidth from 400 MHz to 700 MHz.

Toward public and commercial digital broadcasting business, two channels at UHF band are experimentally distributed at specific areas in Japan. The carrier to noise ratio (C/N) was evaluated by using the meander line antenna, which was hanged on a wall in house. Figure 3 shows the measured C/N versus the channel numbers. From these results, C/N was measured to be larger than 45 dB in these channels. As is well known, it is necessary to C/N of larger than 22 dB to obtain a good quality of a recovered TV signal, and thus a thin and small type of antenna for digital terrestrial broadcasting was successfully realized.

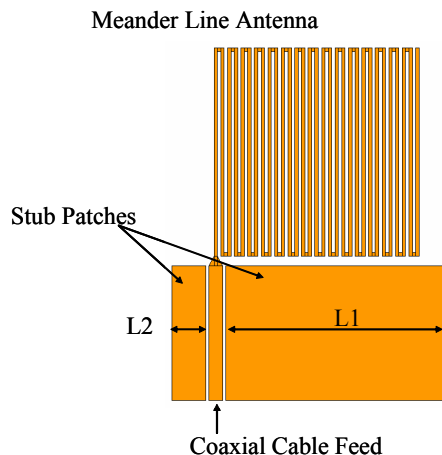


Fig. 1. Plane view of meander line antenna with stub patches.

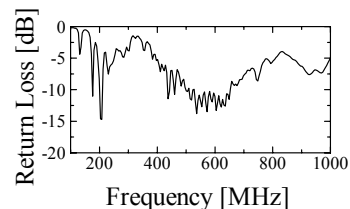


Fig. 2 Measured return loss of meander line antenna with stub patches.

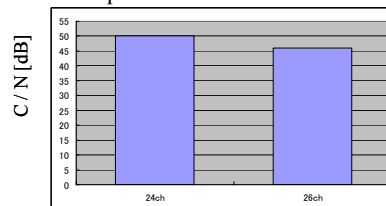


Fig. 3 Received C/N ratio of terrestrial broadcasting waves at UHF band.