

A Design of 1-D Tightly Coupled Dipole Array

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TCDA is one of the ultra-wideband array antenna which was proposed by Munk (B. A. Munk, *Finite Antenna Arrays and FSS*. New York, NY, USA: Wiley, 2003). It can be a low-profile array antenna operating in ultra-wideband since the coupling capacitance between the neighboring antenna elements cancels the inductive reactance of ground plane due to the dominant transverse electromagnetic (TEM) wave propagating down the unit cell. Various types of low-profile TCDA's using this concept have been devised by Prof. Volakis (For example, M. Novak and J. L. Volakis, "Ultra-wideband antennas for multiband satellite communications at UHF-Ku frequencies," *IEEE Trans. Antennas Propag.*, vol. 63, no. 4, pp. 1334–1341, Apr. 2015). However, all the TCDA's up to now have been 2D arrays with pencil beam pattern.

In this paper, we propose the dual-polarized 1-D TCDA antenna. To provide the PEC and PMC boundary to horizontal and vertical polarization dipoles, respectively, which are the required boundary conditions of the conventional TCDA's in 2-D array, we place the additional structures which consist of conducting wall with vertical slits and ferrite sheet beside the one dimensionally arranged TCDA as shown in Fig.1. The simulation shows that the bandwidth of the proposed array antenna is 2.83:1 for both polarizations with $1/5 \lambda_{low}$ height when it radiates broadside as shown in Fig.2. The details of the design procedure and other characteristics such as radiation pattern, scanning properties, and gain will be presented at the site.

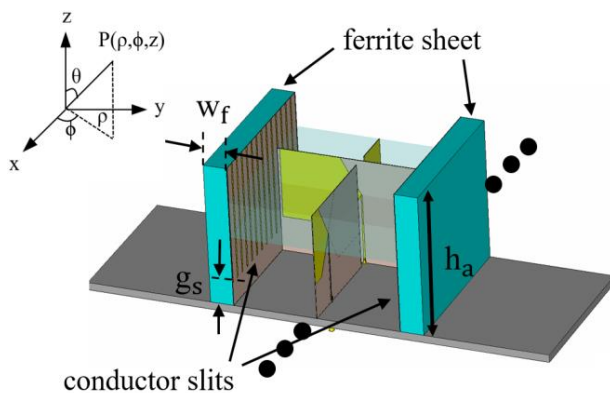


Figure 1. Simulated unit cell of antenna model

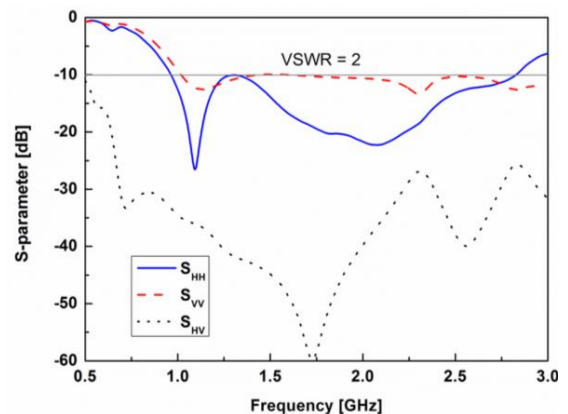


Figure 2. Simulated S-parameter of proposed 1-D TCDA antenna