

Ultrabroadband 1x8 Vivaldi Array for Beam Steering Applications

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Abstract—In this paper, we present a novel 1x8 array Vivaldi antenna for broadband beam steering applications. The Vivaldi antenna element offers a very wide bandwidth in a single feeding configuration with a lower frequency of 4GHz and an upper frequency of 35GHz. Each element of the antenna offers a lower gain and therefore can produce wide angle beam steering.

I. INTRODUCTION

Beam steering array antennas play a key role in revolutionizing future space and terrestrial communications [1-8]. In this paper, a novel 1x8 Vivaldi antenna is presented for beam steering applications.

II. ANTENNA CONFIGURATION AND RESULTS

Fig. 1 shows the top and bottom view of the Vivaldi antenna along with its dimensions. Fig 2. Shows the simulated reflection coefficients. It can be observed that the -10 dB limit covers a very wide range of frequencies from 4 GHz to 35 GHz. Fig. 3 shows the 3D radiation pattern of the single Vivaldi antenna at 12.5 GHz. The directivity of the single antenna element is 9.42 dBi at this frequency. Fig 4. shows the 3D radiation pattern of the single Vivaldi antenna at 21.7 GHz and it offers a directivity of 12.5 dBi.

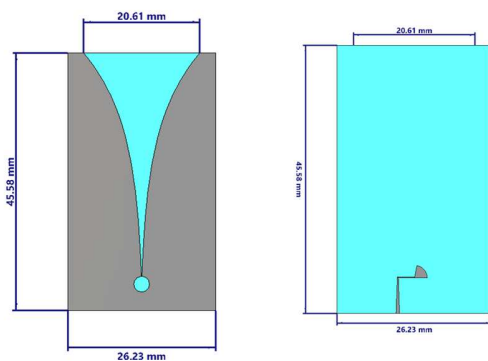


Figure 1. Single Vivaldi Antenna Dimensions

III. 1X8 VIVALDI ARRAY ANTENNA

Fig 5. shows the 1x8 Vivaldi array antenna dimensions whose height is 45mm and the width is 209mm. Fig. 6 illustrates the reflection coefficient of the given configuration. The band

width starts from a lower frequency of 6 GHz all the way to 35 GHz. Fig. 7 and Fig. 8 depict the 3D radiation pattern of the 1x8 configuration at 12.5 GHz and 21 GHz with a directivity of 18.1 dBi and 20.6 dBi respectively.

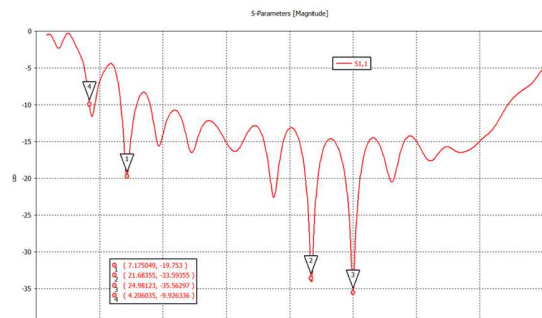


Figure 2. S-parameters of the single Vivaldi antenna

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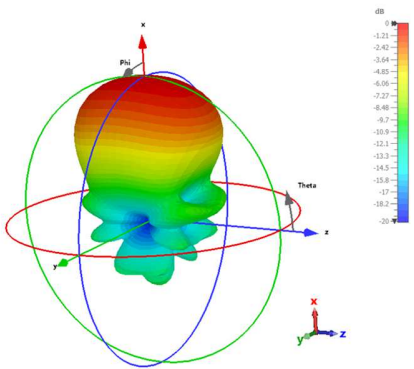


Figure 3. 3D Farfield plot at 12.5 GHz

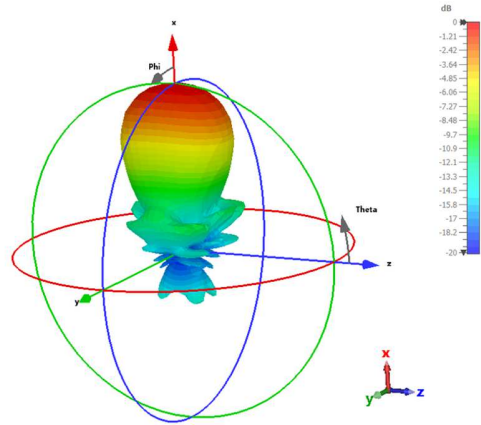


Figure 4. 3D Farfield plot at 21.7 GHz

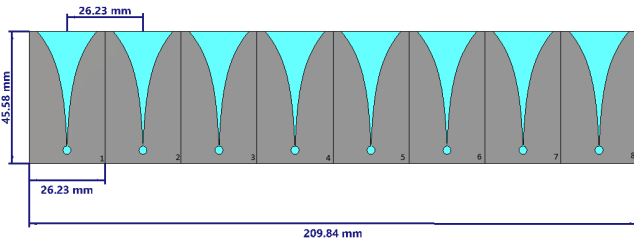


Figure 5. 1x8 Vivaldi Antenna Array

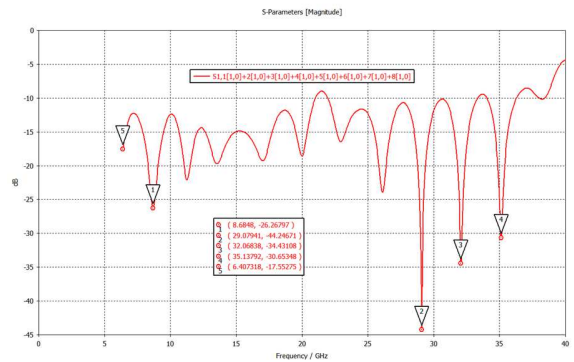


Figure 6. S-parameters of the 1x8 Vivaldi array

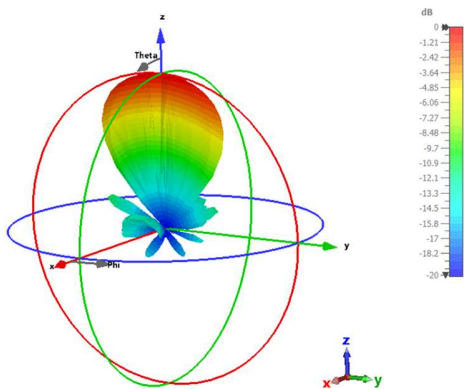


Figure 2. Array Farfield plot at 12.5 GHz

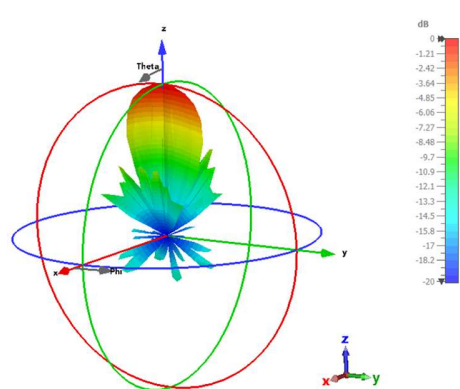


Figure 1. Array Farfield plot at 21 GHz