DESIGN OF TWO ELEMENT ULTRA WIDE BAND MICRO STRIP ANTENNA

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ABSTRACT- *There is a single-layer, compressed size array of dual MSA feeders suggested for connection. The resonance frequency was achieved by using a simple rectangle. We achieve antenna set with UWB (ultra-wideband) and low VSWR (constant wave voltage ratio). The properties of the proposed MSA array are designed using an electromagnetic analyzer based on MoM, IE3D. A comprehensive analysis of return loss, radiation pattern, absolute gain (dBi) and VSWR for the proposed array antenna is presented in this project. In the era of modern communication, the micro-bar antenna is suitable for simple configuration, low lighting and easy manufacturing in nature. There are a lot of antennas that are used to design the structure of the array.*

KEYWORDS- Compact, Feed, Absolute gain, Layer, UWB, VSWR

I. INTRODUCTION

To talk about a new era of communication, the microstrip design of the small antenna evokes much interest among young engineers and especially microwave engineers [1]. For microwave transitions, we need a small, lightweight antenna. On this basis, the Microstrip Antenna is the most suitable device. For microwave communication as well as for wireless communication, more than one operating frequency is required per day for many reasons. Operating frequencies are required mainly because most microwave and wireless engineers use different communication bands and engineers use different frequency bands. Therefore, engineers recently designed antennas with multiple properties. Another standard required for antenna design is to reduce the size. Reducing size is the new method. In this way, the size of the antenna is the same as for the conventional antenna. To reduce size, the most useful technique is to cut different structures in the correct position on a traditional microstrip antenna [2-5]. Reducing the size of the antenna means a very low resonance frequency for the cleaved antenna compared to the traditional antenna [6-8]. Unlike slotted antennas, there are other antennas such as DRA (aerial resonance buffer), fractional antenna, etc. to reduce antenna size [15-20]. Hard to design fractal antennas and DRA need to high substrates are not readily available. Today, microstrip micro size of the microstrip is very small and can be reduced to increase demand for applications in various communications, especially microwave and mobile communications [9-10].

An antenna should be of low-profile type with low manufacturing cost, compatible for both non-planar and planar type surfaces, mechanically robust when mounted on rigid surfaces, simple, easy to fabricate [20]. Suitable shape of patch shape and effective mode selection makes it very versatile in terms of impedance, radiation patter and resonant frequency. In this chapter the design of micro strip antenna with micro strip line which is used for feeding is offered. The micro strip antenna is designed on a dielectric substrate of type FR4 with dielectric constant of 4.4 and thickness of 0.8 mm. More importantly, as per the precise simulation study using electromagnetic three dimensional simulators, the micro strip patch antenna performs in relation to bandwidth and radiation gain.

There is a single-layer, compressed size array of dual MSA feeders suggested for connection. The resonance frequency was achieved by using a simple rectangle rectangle. It is designed to increase loss of antenna bandwidth and gain performance. To reduce the size of the antenna substrates, a higher value is determined from the dielectric constant [11-14]. Our goal is to design the antenna with multi-band operation and increase frequency ratio as well as increase operational bandwidth. The simulation was performed by IE3D [21] using the MOM method and verification of measurements. Due to its small size, low cost and light weight, this antenna is a good candidate for the application of satellite communication systems and microwave relay systems.

II. ANTENNA STRUCTURE

The proposed antenna configurations designed in Figure 1 are displayed with FR4. Two equal slots of the rectangle (T1, T2) are cut in the left and right side of the correction shown in Figure 1. The dimensions and position of the radius = 0.8 mm are indicated in the shapes. The insulation material specified for this design is the FR4 epoxy substrate with an electrostatic insulation constant = 4.4 mm. Antenna height = 1.6 mm. The center joint feeding feeder is used for 0.8 mm diameter with a simple earth-level arrangement at point (-3, 0) and (3.0) where the correction center is at point 0,0. Figure 1 shows the proposed antenna configuration.

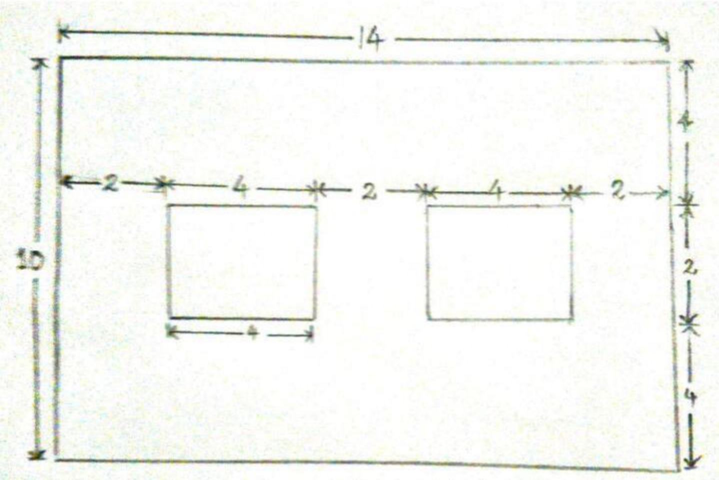

Figure 1: Designed Antenna

The proposed antenna configuration is designed with a similar FR4 substrate. The proposed antenna is a square area of 14 mm x 10 mm.

III. SIMULATED RESULTS AND ANALYSIS

Different parameter analysis of the proposed antenna is performed and displayed. Several antenna parameters have been investigated to improve bandwidth and antenna loss and loss. Figure 2 shows the simulated return loss of the proposed antenna when one port is active. Figure 3 shows the proposed return loss of the proposed antenna when all ports are active.

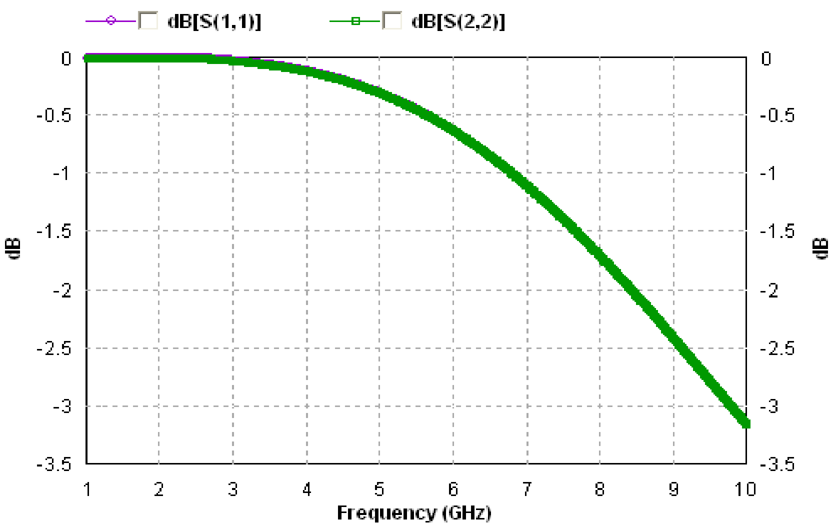

Fig 2: Return Loss Pattern when one port active

When both ports are active:

In the proposed antenna when both the ports are active, the resonant frequencies obtained for the total frequencies range from 1 GHz to 10 GHz and we achieve a UWB bandwidth of about 10 GHz which is very difficult for any microstrip antenna because MSA does not give wide bandwidth. While there is one active port and another that acts as a parasite, the antenna does not apply to any applications because we do not have any operating frequency.

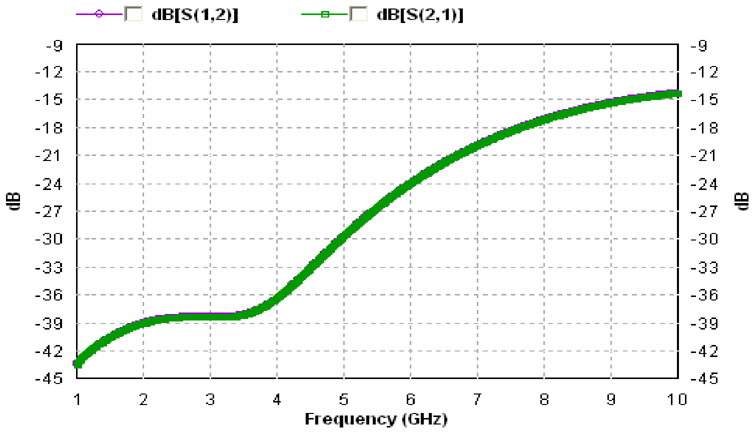

Fig 3: Return Loss Pattern when all ports active

III.I. Simulated Radiation Pattern

TABLE I : FREQUENCY WITH GAIN

ANTENNA STRUCTURE	*RESONANT FREQUENCY (GHZ)*	*FREQUENCY RATIO*	*3 dB BEAM WIDTH (IN DEGREES)*	*ABSOLUTE GAIN (dBI)*
1	f_1=1	1	170.43^0	- 46.3
2	f_2=1.65	1.65	170.37^0	- 37.9
3	f_3=2.5	2.5	170.30^0	- 31.2
4	f_4=5	5	170.05^0	- 20.94
5	f_5=7.5	7.5	167.4^0	- 16.9

TABLE II : FREQUENCY WITH RETURN LOSS (when one port is active)

ACTIVE PORT	OPERATING FREQUENCY (GHZ)	RETURN LOSS(dB)	BAND WIDTH(GHZ)
1	-	-	-
2	-	-	-
Maximum Return Loss = -3.15 dB			

TABLE III : FREQUENCY WITH RETURN LOSS (when all ports are active)

ACTIVE PORT	OPERATING FREQUENCY (GHZ)	RETURN LOSS(dB)	BAND WIDTH (GHz)
S_{11} & S_{21}	1	- 43.43	>10
S_{11} & S_{21}	10	- 14.37	
S_{11} & S_{21}	5	- 29.75	
S_{11} & S_{21}	2.5	- 38.44	
S_{11} & S_{21}	7.5	- 18.43	
S_{11} & S_{21}	1.65	- 40.03	
S_{11} & S_{21}	8.9	- 15.52	

IV. CONCLUSION

Double layer, single antenna feed printed micro patch that conducted simulation probes using the IE3D electromagnetic solver. When two equal slots of the rectangle (T1, T2) are split on the left and right sides of the correction, the maximum improvement shows a maximum return loss of about 43.43 dB plus the VSWR value within the 2: 1 range. The 3D package of the radiation scheme of about 170.43^0 is a package wide enough for the intended applications.

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