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1X1_Elliptical Patch Antenna

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ABSTRACT

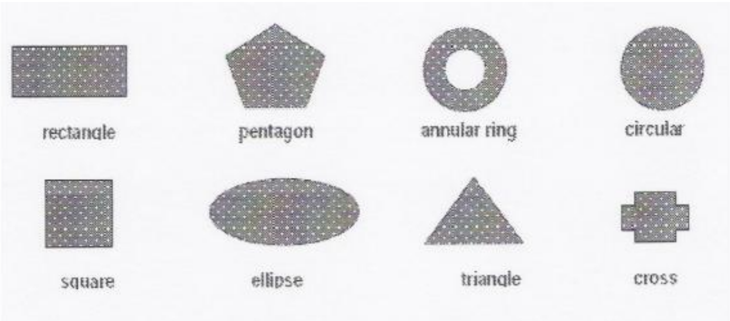
Microstrip patch antennas (MPA) is a commonly used in the last few years. Advantages of MSA are Ease of fabrication, Ease of design ,Compactness of size ,Ease of installation and size factor ,Good aerodynamic profile and Low cost. But bandwidth is one of the major drawbacks. Researchers are trying to overcome this drawback of MSA. This paper present design of 1X1 microstrip elliptical patch antenna for 5.8GHz frequency using IE3D software.

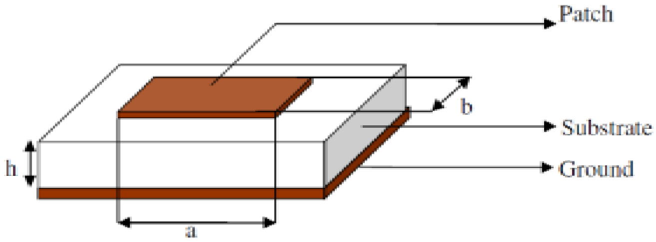
Keywords— IE3D, Microstrip Patch Antenna(MSA)

I. INTRODUCTION

Microstrip antenna is a printed type of antenna consisting of a dielectric substrate with relative permittivity and permeability where sandwiched in between a ground plane and a metallic patch. The concept of microstrip antenna was first proposed in 1953, twenty years before the practical antennas were produced .

In its simplest form, micro strip antenna is a dielectric substrate panel sandwiched in between two conductors. The lower conductor is called ground plane and the upper conductor is known as patch. Microstrip antenna is commonly used at ISM band.. The patch can be design in various shapes such as rectangular, square, circular depending on the desired characteristics.





Basic rectangular microstrip patch antenna construction.

Due to fringing field effect microstrip antenna look greater than its actual dimension.

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DESIGNING STEPS:

STEP 1: CALCULATION OF WIDTH (W):

$$W = \frac{c}{2f_o\sqrt{\frac{(\varepsilon_r + 1)}{2}}}$$

STEP 2: CALCULATION OF EFFECTIVE DIELECTRIC CONSTANT :

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-\frac{1}{2}}$$

STEP 3: CALCULATION OF THE EFFECTIVE LENGTH (L EFF):

$$L_{eff} = \frac{c}{2f_o\sqrt{\varepsilon_{reff}}}$$

Step 4: Calculation of the length extension (∆L):

$$\Delta L = 0.412h\frac{(\varepsilon_{reff} + 0.3)\left(\frac{W}{h} + 0.264\right)}{(\varepsilon_{reff} - 0.258)\left(\frac{W}{h} + 0.8\right)}$$

Step 5: Calculation of actual length of patch (L):

$$L = L_{eff} - 2\Delta L$$

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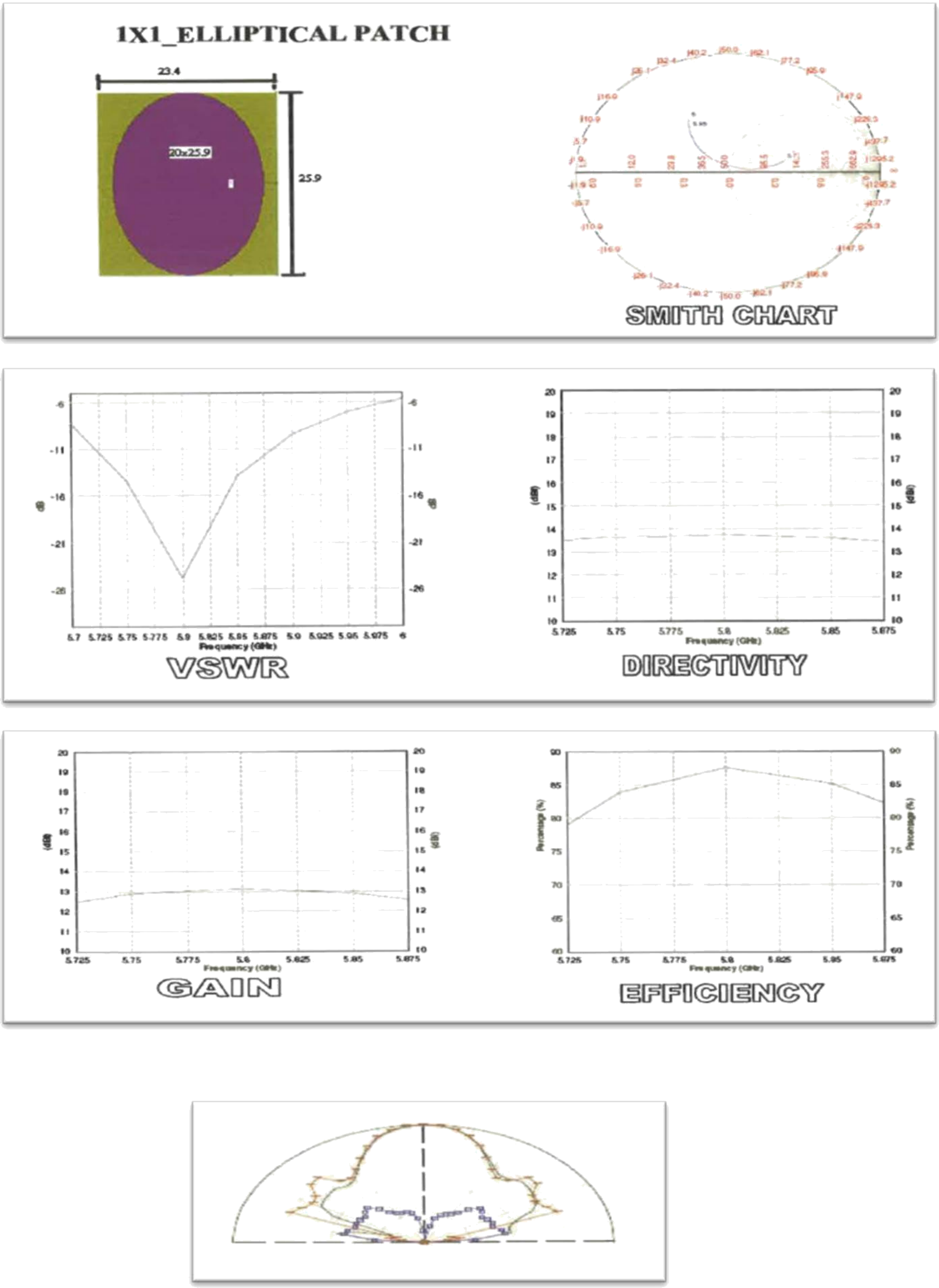

1x1 Elliptical Patch Smith chart,VSWR, Directivity, Gain and Efficiency

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RESULT

The antenna structures proposed here are successfully simulated over the frequency range 5.725 GHz – 5.875 GHz.

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