The Substrate Integrated Waveguide (SIW) With Different Distances of Via

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ABSTRACT

Substrate integrated waveguides (SIWs) was known the best waveguides to give impressive results and cannot be denied that it yielded much better than traditional waveguide or rectangular waveguide. This project was to study the number of via SIW with distances between via from center to center as the manipulated variables. It discovered that the results yielded by performance of SIW can be affected by the distances of via with fixed diameter at 1.0 mm. This proposition additionally examine whether the presupposition that the return loss increased and insertion loss diminished after the distances between via in the same row increased. During designing the SIW, cylinder shaped been chosen as the shape of via and HFSS software was used. 12 GHz was used as cut off frequency and FR4 as the substrate for those designs. From this study, four distances which were 1.1 mm, 1.2 mm, 1.3 mm, and 1.4 mm used in design process and the results were analysed based on return loss (S11) and insertion loss (S21) graph. The return loss and insertion loss of the design p = 1.3 mm give the reliable results which were -19.4964 dB and -2.2232 dB respectively.

This project can be improved by using other arrangement of via besides two straight parallel lines so that it will yield much impressive results. The future researchers can also use other different substrate besides FR4 such as RT Rogers Duroid to gain more steeper of S11 and more nearer to zero of S21. Besides that, future researcher can fabricate the design to measured and compare with results from simulator software.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF STUDY

Waveguides are one of the transmission lines that used in microwave frequencies to make a connection between transmitter and receivers with antennas. The most common waveguide used in radio frequency (RF) world was rectangular waveguide.

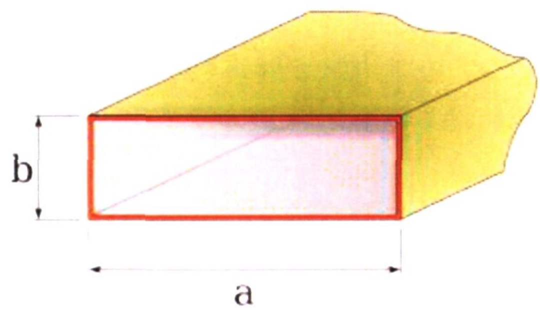

Figure 1-1-1: Rectangular waveguide

"a" and "b" represent the width and the height of the waveguide dimension respectively as shown in Figure 1-1-1. Theoretically, the height should be smaller than the width. The rectangular waveguide has a hollow space in the central waveguide that can be filled with any dielectric material. The waveguide was surrounded with metal walls in order for electromagnetic wave reflected and propagated on the inner surface of the metal in zigzag path [1]. The most frequently used propagation mode in the rectangular waveguides is transverse electric (TE) mode where propagation direction was perpendicular to electric field components as shown in Figure 1-1-2.