Design of SIW-Based Antenna-Filter for 6.2 GHz Applications

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ABSTRACT

In this paper a design of integrated antenna and filter was proposed. The design is based on Substrate Integrated Waveguide (SIW) on a Rogers 3003 substrate fabricated by printed circuit board technique. The dielectric constant of the substrate for both filter and antenna is $\varepsilon r = 3$. The filter and antenna is designed and fabricated with 0.75 mm and 0.5 mm substrate height respectively. At first, the circular SIW filter on the TM_{010} was designed separately before integrating with a circular microstrip antenna operating on TM_{110}. At 6.2 GHz resonance frequency, a good simulation results are obtained with 6.6 dB gain and return loss less than -10 dB. Then, the simulated design is fabricated and measured. The result of the simulation is then compared with the measurement. The design is capable to reduce the size of receiving system and lowering the overall fabrication cost since it does not required a matching circuit.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

This chapter give highlights and describe in brief the background of the antenna and filter integration using Substrate Integrated Waveguide. It also mentions the problems under investigation done by the author and the objectives of the project. Overall, the general idea of the project extent is notified in this chapter.

1.2 BACKGROUND OF STUDY

There is a growing interest in the integration of microwave filters and antennas in communication systems at the RF front end [1]–[6]. Each integrated solution brings its own unique advantages but all offer common size reduction. Design cycles are shorter with integrated solutions because they can efficiently handle the interactions between discrete components and have fewer RF components to put together. Furthermore, designing such subsystems in a multi-layer technology could further reduce the overall size [7], [8].

The SIW-based antenna-filter design is an integration of antenna and filter by implementing the SIW concept that operates in C-band frequency spectrum. The SIW