CHAPTER I
INTRODUCTION

1.1 Background

Advances in communication technology show very rapid development, especially in wireless communication. Wireless communication is believed to be more effective and efficient because it does not require cables and has constant transfer power. In wireless communication requires an antenna to send and receive information signals. An antenna is a transducer that can convert control electromagnetic energy in the transmission line to electromagnetic energy emission in free space. There are various types of antennas used in wireless communication, depending on the application [1]. UWB is one of the most widely developed antennas today. UWB antennas have many advantages, namely: wide bandwidth, high data rate, simpler and cheaper transceiver components, low transmit power, and also low interference. According to the Federal Communications Commission (FCC), Ultra-Wideband (UWB) is defined as wireless transmission. which has a fractional bandwidth of at least 25% of the center frequency or a minimum of 500 MHz (at a minimum center frequency of 6 GHz). ultra-wideband works at a frequency of 3.1-10.6 GHz [2]. UWB transmits many radio frequencies simultaneously which causes the antenna to transfer data quickly. wide bandwidth also affects the amount of signal emitted by the antenna.UWB antennas have accuracy High detection on target, immune to noise, jamming, and interference. In the design of the UWB antenna, a planar antenna with a circular patch and FR-4 substrate is used. The planar antenna is an antenna that can work at high frequencies. It consists of a ground plane, substrate, and patch. Planar antennas were chosen because of their low profile, compact, low weight, and small dimensions so they are often used in wireless communication [3]. In addition, planar antennas can be modified by giving slots in the antenna structure layer and antenna parameter values that can increase the gain and directivity of the antenna [4] [5]. The selection of circular patches also makes it easier to modify the antenna. Then the results of the UWB antenna design are given the substrate integrated waveguide method. SIW is a structure that can be used in complex microwave systems as interconnects, filters and SIW is a transmission line that passes high-frequency signals with small losses and can integrate components. The combination of a waveguide and planar transmission lines

produces a new channel that maintains the advantages of its constituent channel. A transmission line with a cylinder diameter d and pitch distance p is made with a transition mode-specific [6]. The SIW design is slightly different when connected to a microstrip, coplanar, and coaxial cable transmission line. So in this design, a suitable transition mode is also made for minimum power loss and a large frequency range [7].

1.2 Problem Identification

UWB is an antenna that can transmit data with high power low, wide bandwidth but has a small gain. Antenna gain serves as a parameter to measure the ability of an antenna to transmit and receive a signal. This thesis will examine the increase in the gain of the UWB antenna with a frequency range of 3.1 Ghz to 10.6 Ghz using the SIW method.

1.3 Objective and Contribution

This thesis provides an example of a method of increasing the gain of an ultra-wideband antenna. The design of the antenna uses a planar antenna with the circular patch. The research was carried out using the substrate integrated waveguide method to increase the gain of the antenna. Modification of the SIW structure was carried out to suit a planar microstrip antenna.

1.4 Scope of This Thesis

This thesis focuses on increasing the gain of the planar antenna using the substrate integrated waveguide method. The antenna is designed using CST studio and only focuses on the gain and VSWR values. The antenna is simulated from a frequency of 3.1 GHz to 10.6 GHz.

1.5 Research Method

This thesis divided into six work packages are as follows:

1. Study Literature

   This steps determine the reference from journal, paper, books related with this topic.

2. Data Collecting

   In this stage the collecting the information and data related to this filter design.

3. Study Development In this stage is planning process included design and completed specification device selection and final confirmation. This stage aims to implement the design at the stage previous and design at have been made.

4. Trials

   In this stage testing the filter has been made with perform measurement based on parameter analysis as a quantitative picture of the filter performance that has been designed.

5. Performance Analysis

   In this stage aim to perform design performance test an analyzing result of that have been done and adapted with design specifications that have been determined.

6. Reporting

   The final stage of this research is the preparation of the final report .

1.6 Writing Systems

The rest of this undergraduate thesis is written as follows:

1. Chapter I INTRODUCTION

   This chapter contains a background, problem identification, objectives and contribution, scope of this thesis,research method, and writing systems.

2. Chapter II BASIC CONCEPTS

   This chapter contains an explanation of basic theory about antenna planar,UWB,and SIW.

3. Chapter III SYSTEM MODEL AND PROPOSED MODEL

   This chapter contains flowchart and the final antenna system model with the integreted waveguide method.

4. Chapter IV RESULT AND ANALYSIS

   This chapter contains analysis result simulation and measuremnt of antenna parameters observed.

5. Chapter V CONCLUSION AND SUGGESTION

   This chapter contains the conclusion and suggestion of this final assignment.