

**DESIGN OF LTCC MICROSTRIP PATCH  
ANTENNA AT 28 GHz**

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## ABSTRACT

This paper presents a microstrip patch antenna design that is suitable for satellite uplink communication. It consists of multilayer substrate that will make the coverage more efficient while operates at 28 GHz which is for Ka-Band. The specification for the proposed patch antenna is it has a frequency of 28 GHz, Ferro A6-S LTCC substrate with permittivity 5.9, a substrate thickness of 0.096 mm and copper thickness of 0.01 mm. The designed parameters for the proposed antenna were calculated using transmission line model equation. The simulation process was done using the circuit Computer Simulation Technology (CST) Microwave Studio software. The characters of antenna such as return loss, bandwidth, gain, directivity and voltage standing wave ratio (VSWR) have been investigated in the simulation. The antenna has eight layers of substrate where the simulation computed at 28 GHz frequency, antenna return loss of -46.99 dB, VSWR value of 1.009 and 3.13% bandwidth. The patch antenna is added with EBG and parasitic patch to investigate the changes in the results. It is proven that the antenna with the combination of EBG and parasitic patch have wider bandwidth.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND OF STUDY

Wireless systems are considered as a very important in this emerging world and it is part of modern society since people in this age is demanding to the access of more information, where they can get it more immediately in many location. Nowadays, the developments of technology are opening up new markets besides making new applications possible. It also promising a significant economic benefits. In wireless systems, antennas play a very important role in ensuring that the transmitted signal reached to the desired destination. Therefore, the performance of an antenna should be improved as well as minimizing the loss as small as possible.

Microstrip is an electrical transmission line which can be fabricated using printed circuit board (PCB) technology right after design it using certain software, and it is used to deliver microwave frequency signals. It also consists of a conducting strip separated from a ground plane by a dielectric layer called as the substrate while an antenna is one of the basic components in any wireless communication system and it is a device that allows the signal to be propagates through waves in space. The growing of the wireless communications systems make the demand increases time by time. Therefore, to satisfy those needs, an integrated compact low-cost antenna which is Low Temperature Co-fired Ceramic (LTCC) technology has been conducted.