ABSTRACT

High-frequency communication is widely used in telecommunication system, from radar, navigation and eventually the development of communication system, 5G. One of these frequency that will be used by 5G is 15 GHz [1]. Because the system will works at high frequency and the wavelength become tinier, the signal become more suspectible to reflection and diffraction because objects. Because of that, it needs MIMO (Multiple Input, Multiple Output) system as solution for these problems.

Then antenna that will be designed for these system is MIMO antena with 4 element which each of these elements are a microstrip antenna with rectangular patch and U-slot. The slot give a wider bandwidth to the antenna, as a solution for microstrip antenna weakness. For greater bandwidth, the feeding technique is inset feed which is also very easy to match the impedance. Because it will be arranged into antenna array, the feeder than will be divided using T-junction.

From the simulation the return loss at 14,9 GHz reach -19,0296 dB and the bandwidth is 1,2 GHz. Gain of the antenna is 9,9085 dB with unidirectional radiation pattern and linear polarization. There are 3 fabrication condition, which one of them is using Duroid 6002 as substrate material, with the measurement antenna works at 13,1-13,5 GHz with unidirectional pattern and circular polarization. The other condition are using Duroid 5880 with deformed groundplane, which is fixed by stacked with Duroid 6002 with copper under it and also added copper layer. When these 2 fabricated antenna measured, antenna 1 and 4 has average return loss above -10 dB so it doesn't meet requirements. This is happened because antenna 1 and 4 touch the deformed groundplane. However, antenna 2 and 3 have return loss under -15 dB in 14,4 – 15,4 GHz so it meets the specifications. Polarization of these antenna is elliptic with unidirectional radiation pattern.

Keyword: *Antenna, MIMO, 15 GHz, Microstrip, U-Slot*