ABSTRACT

With technological advances in radar and signal processing, it is almost impossible to modify the shape of a target to reduce the radar cross section and avoid radar detection. Therefore, a new way to avoid radar detection is needed. The way that can be done is to use an electromagnetic wave absorber or absorber on the radar target so that it does not reflect electromagnetic waves emitted by the radar. Absorber has a thin shape and can absorb electromagnetic waves perfectly, so it has the potential to be used as an anti-radar detection coating material. In order to be optimally applied as an anti-radar coating, the absorber must consider the shape of the target surface to be protected and have small dimensions so as not to damage the design and interfere with the working system of a target, so the absorber must be designed with a thin and flexible thickness. However, the thinner the absorber dimensions, the lower the absorption rate and the narrower the bandwidth. In addition, in free space electromagnetic waves will be widely reflected and come from various angles so rigid materials will not be able to protect the surface of a curved plane well, and an absorber that is not affected by the polarization of the incident angular wave is also required.

In this research, an absorber will be designed that has a thickness that uses a thin and flexible material. The absorber is designed with lossy polyimide dielectric material, which has a thickness of 0.3-0.6 mm and is flexible. To overcome the limited absorption bandwidth of the thin absorber, the designed absorber will use the double resonance method, where the absorber consists of four sectors, each sector of which is a combination of two different absorber sizes. These two absorbers have adjacent resonant frequencies, so when arranged in one absorber cell, the two resonant frequencies seem to merge and create a wider bandwidth. One form of absorber that is not affected by wave polarization is in the form of a split ring resonator (SRR).

By using simulation, an absorber with a bandwidth over 100Mhz in X Band frequency has been designed. The absorber is designed using a checkerboard pattern which in simulation can produce a dual resonant frequency absorber with wider absorption bandwidth. However, checkerboard pattern will result in less polarization insensitive absorber, but it is found that polarization insensitiveness will improve over

a thicker substrate. The designed absorber is polarization insensitive with a material thickness of 0.5 - 0.6 mm.

Keywords: Absorber, Metamaterial