ABSTRACT

The microstrip wearable antenna is a wireless communication technology for monitoring the human body that can be integrated with clothing and maintain user safety and comfort. However, microstrip antenna have some disadvantages such as low gain and efficiency, narrow bandwidth and surface waves that can destroy the radiation pattern. In addition, the use of a wearable antenna possibly makes a mutual coupling effect between the body and the antenna which can change the resonant frequency, decrease the performance of the antenna and the effect of radiation on the body.

Based on these problems, an Electromagnetic Band Gap (EBG) structure was added with a unit cell in the shape of a Mushroom-like EBG and a via in the centre of the EBG the antenna design. The use of the EBG structure can increase efficiency, reduce the effect of mutual coupling, produce a better radiation pattern and reduce the effects of radiation on the body.

The study was carried out on antennas without EBG structure and with EBG structure in a bandwidth range of 10-100 MHz for a resonant frequency of 3.5 GHz 5G Band (n78 3500 MHz). In the 0 mm SAR distance, the SAR value with the EBG structure was reduced by 55% with the SAR value of Conventional Antenna 2.4264 W/Kg and Modified EBG Antenna and 1.082 W/Kg DGS. There is also an increase in bandwidth of 92% with the bandwidth value of Conventional Antenna is 27.30 MHz and Modified EBG Antenna is 52.50 MHz DGS with the object of testing on Hand. On the radiation parameters, the radiation pattern is unidirectional, linearly polarized and the gain is 8.89 dBi.

Keywords: Wearable antenna, mikrostrip, unit cell, mushroom-like, electromagnetic band gap.