ABSTRACT

Fifth generation (5G) technology provides high-speed communications systems and requires multiple-input multiple-output (MIMO) antenna systems to increase subscriber capacity. In this research, we propose a microstrip antenna design for fifth generatin (5G) communication systems operating at the 3.5 GHz frequency.

The antenna is designed on an epoxy substrate type FR4 with dielectric constant (εr) = 4.3, thickness (h) = 1.6 mm, and tangent loss (tan α) = 0.0265. To achieve optimal parameter values, the antenna is equipped with a U-Slot. The addition of slots is intended to increase the bandwidth of the microstrip antenna. The addition of DGS is intended to suppress surface waves by removing (etch) part of the beam field or grounding to widen the bandwidth.

The simulation results carried out using the CST Studio program produced a return loss value (S11) of -14.12 dB, (S22) of -14.11 and VSWR 1.48, VSWR 2 of 1.49 at a frequency of 3.5 GHz, on port 1 the bandwidth was 238 MHz and on port 2 bandwidth 235 MHz. The gain on port 1 obtained from simulation is 4.65 dBi and port 2 is 4.63 dBi with directivity on port 1 of 6.36 dBi and directivity on port 1 of 6.34 dBi. The isolation coefficient value (S12) is -24.48 and (S21) is -24.52 dB. The radiation patterns obtained when simulating unidirectional and elliptical polarization. The use of MIMO antennas with U-Slot and DGS technology has proven successful in expanding bandwidth. Meanwhile, the fabrication results showed that return loss at port 1 was -11.36 dB and port 2 was

13.84 dB, VSWR on port 1 is 1.7 and port 2 is 1.5 with a bandwidth on port 1 of 550 MHz and port 2 of 580 MHz. Bidirectional radiation pattern, elliptical polarization and 3.3 dBi gain.

Keywords: *Microstrip Antenna, MIMO, U-Slot, DGS, 5G (Fifth Generation)*