ABSTRACT

Radar (Radio Detection and Ranging) is a system to detect, measure distances, speed, and map a moving or silent object. The X-Band Radar works on the 8 GHz - 12 GHz spectrum so it is sensitive in detecting small particles. One of the radar support sub-systems is the antenna so that a long-range of the radar is required to achieve a high gain antenna. Therefore the selected method is an array to meet the antenna gain (gain ≥ 8,0 dBi), thereby producing a unidirectional radiation pattern with a narrow beamwidth to detect the echo signal of the object. The antenna arrays are arranged linear 1x8 using the Rogers R04003C substrate, as well as adding the mitered-bends method to prove a decrease in return loss (RL ≥ -20 dB). The final design of the antenna has a dimension of 142,40 mm x 42,8 0 mm, where the simulated results have S_{11} -22,33 dB, VSWR 1,16, 480 MHz bandwidth (9,23 GHz – 9,71 GHz), and a 15,71 dBi gain. The simulation indicates that the antenna array method can increase the gain, whereas the mitered-bends method can widen the antenna bandwidth. From the measurement results of the known antenna prototype f_c = 9,496 GHz, S_{11} -32,64 dB, VSWR 1,05, bandwidth 41,9 MHz (9,5159 GHz – 9,4740 GHz), gain 8,8 dBi, as well as a linear polarized antenna with unidirectional radiation pattern direction.

***Keywords**: Radar X-band, array antenna, gain, unidirectional.*