

**UNIVERSITI TEKNOLOGI MARA**

**MINIATURIZATION OF  
RECTANGULAR PATCH ANTENNA  
THROUGH A COMBINATION OF  
FRACTAL AND DEFECTED  
GROUND STRUCTURE**

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## ABSTRACT

This thesis presents a design of rectangular patch antenna incorporates with fractal and defected ground structure (DGS) for radar application. There are two antennas; conventional and fractal patch were fabricated on RO3003 substrate. The RO3003 substrate has relative permittivity,  $\epsilon_r = 3.0$ , and height,  $h = 0.75$  mm. The patch antenna was designed to resonate at 3.5GHz. The approach of fractal patch together with DGS is focusing on reducing the size of the antenna and enhancing the bandwidth. All simulations and measurements were done using Computer Simulation Technology Microwave Studio (CST-MWS) and Vector Network Analyzer (VNA) respectively. The simulation results show that the conventional antenna has the return loss,  $S_{11}$  of -20.79 dB while for the fractal antenna has the return loss,  $S_{11}$  of -20.39 dB. However, the fractal antenna exhibits a size reduction of 50.18% compared to the conventional. The bandwidth was also improved by 93.75 %. In the measurement, the value of the return loss  $S_{11}$  for conventional is -16.71 dB and the fractal antenna is -15.75 dB.

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