

ABSTRACT

GPR is a very useful system for the process of detecting objects that are or buried in the ground to a certain depth without having to dig the ground. An important component in GPR Applications is the antenna, consisting of a transmitting and receiving antenna.

The design of this antenna uses FR-4 Epoxy substrate media which has a dielectric constant (ϵ_r) of 4.4, a substrate thickness (h) of 3.2 mm and a dielectric loss tangent (\tan) of 0.025. This design and realization is formed in the dimensions of the substrate $20 \times 20 \text{ cm}^2$ with a sub-substrate structure and additional slots on the ground plane. For the feeding technique using a feedline microstrip with an impedance of 50 Ω . The GPR model 51600s application uses the 1.6 GHz frequency as the standard frequency for GPR usage.

From the results obtained in the simulation at a frequency of 1.6 GHz, the return loss is -16.29 dB with a frequency range of 1.523-1.636 GHz, then the overall bandwidth achieved is 113.9 MHz as measured at VSWR 1.36. In the measurement results, the return loss is -12.123 dB with a frequency range of 1.5-1.58 GHz, then the overall bandwidth achieved is 80 MHz which is measured at a VSWR of 1.658 dB. The results of simulations and measurements have been obtained and it is observed that the changes that occur during measurements are due to the limitations of cables, tools and antenna realizations.

Keywords: *Bowtie Planar Antenna, GPR, Bandwidth.*