

ABSTRACT

Microstrip antenna is an antenna that is often used for various purposes because it has several advantages including small, simple, and inexpensive. Behind that advantage, there are some disadvantages, namely having a small bandwidth and small gain. Basically, using a substrate with a low permittivity value will produce large bandwidth but with larger dimensions and smaller gain. Conversely, using a substrate with a high permittivity value will produce a large gain and smaller dimensions but with a small bandwidth.

The antenna design is done by using the circular shape and substrate of Roger RT5880 with a relative permittivity value of 2.2 and also 1.588 mm. The design is done by making a circular micro-strip antenna Single Layer Patch. Being arranged substrate is not homogeneous in some parts with a range of relative permittivity values (ϵ_r) $\pm 25\%$ and $\pm 18\%$.

The result of the design antenna is a circular patch single layer microstrip antenna with a non-homogeneous substrate. Non-homogeneous substrates are designed around the patch shape. With substrate modifications 3 scenarios are 5 segments, 9 segments, and 13 segments. The highest increase in bandwidth value and gain occurs when the 13 segment non-homogeneous substrate conditions with a range of relative permittivity values decrease by 25% and the segment width is 0.5 mm. The best antenna performance is a bandwidth increase of 128.15 MHz (29.558%), a gain of 0.8076 dBi (11.855%), and the center frequency of the antenna shifts to the right (increment) of 1.0075 GHz (9.842%) rather than performance with homogeneous substrate.

Keywords: *Microstrip Antenna, Circular Single Layer Patch, Non-Homogeneous Relative Permittivity, X-Band, Microstrip Line Feed, Roger RT5880*