

EEC133 Lab 3 Report

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Pre-lab

Questions

- (1) $W = 20\text{mm}$. $L = 30\text{mm}$.
- (2) Bandwidth is 0.098GHz and is 4.0% of the resonant frequency. The input impedance is $46.40 - j28.53$ according to Figure 2
- (3) $L_{in} = 10.6\text{mm}$. Gap = 1mm . $L_{feed} = 33.1397\text{mm}$. Line width = 2.99231mm
- (4) (a) Return Loss from 2 to 3 GHz

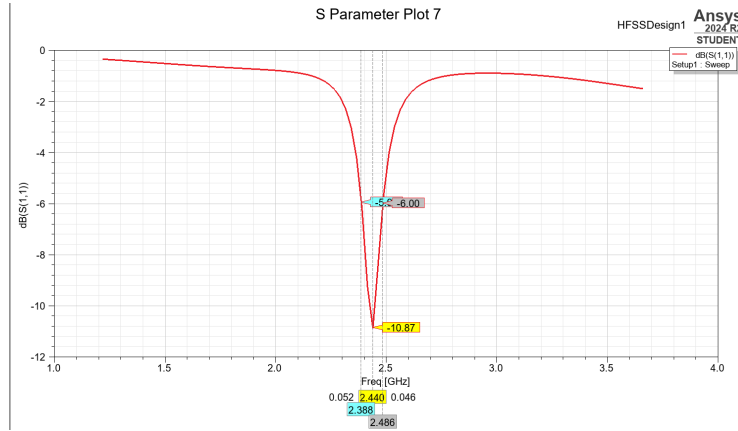


Figure 1: $S_{1,1}$ of Patch Antenna in dB

The plot shows how much of the incoming wave is reflected from the antenna. A smaller S_{11} is desirable because it implies little input wave is reflected.

- (b) The bandwidth is in the range of 2.388 to 2.486 GHz. The antenna will work as a bluetooth antenna because the bandwidth is greater than the bluetooth bandwidth, 2.402-2.48 GHz.
- (c) Input impedance from 2 to 3 GHz

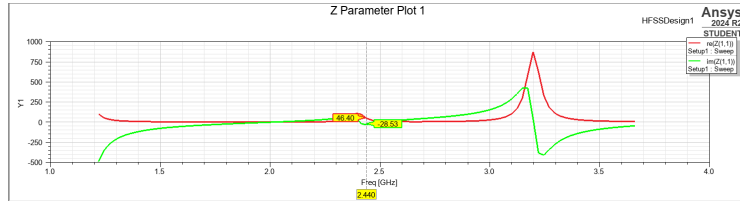


Figure 2: $\text{re}(Z(1, 1))$ and $\text{im}(Z(1,1))$

(d) 2D Directivity Pattern at 2.44 GHz and $\phi = 0$

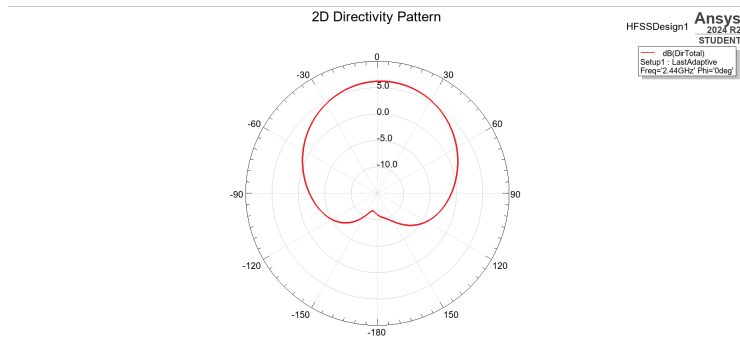


Figure 3: 2D Directivity Pattern in dB

(e) 3D directivity pattern at 2.44 GHz

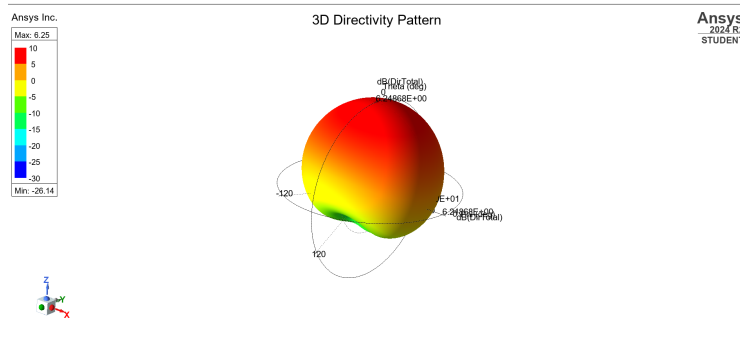


Figure 4: 3D Directivity Pattern in dB

(f) Gain of the antenna at 2.44 GHz

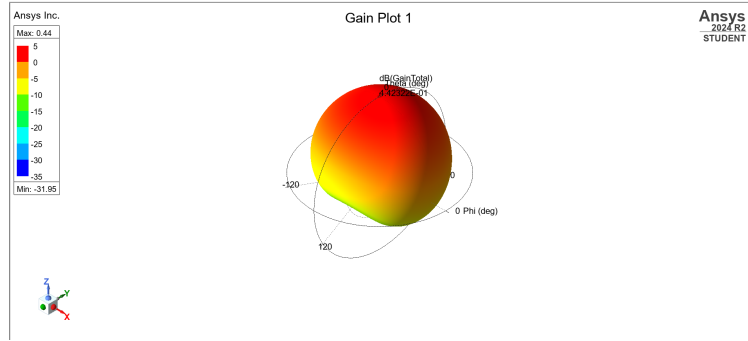


Figure 5: Antenna Gain in dB

Since the gain is 0.44dB and the directivity is 6.25dB, the antenna's radiation efficiency is $\frac{G_0}{D_0} = \frac{0.44}{6.25} = \boxed{7\%}$.