

EMBC3

Antenna Specification



1. GENERAL

The EMBC3 is a 2.44 GHz RF electronic beacon with a PCB circular IFA. This document specifies the performance and design of this antenna. The antenna impedance is 50ohms single ended and is connected to the EM9305 50ohm single ended output using a RF pi filter. The antenna is a quarter wavelength antenna. A quarter wavelength antenna was chosen due to its high 3-dB beamwidth, its near 50ohm impedance, and its high directivity. Simulations are done with CST, and the final design is checked with S11 and radiation measurements.

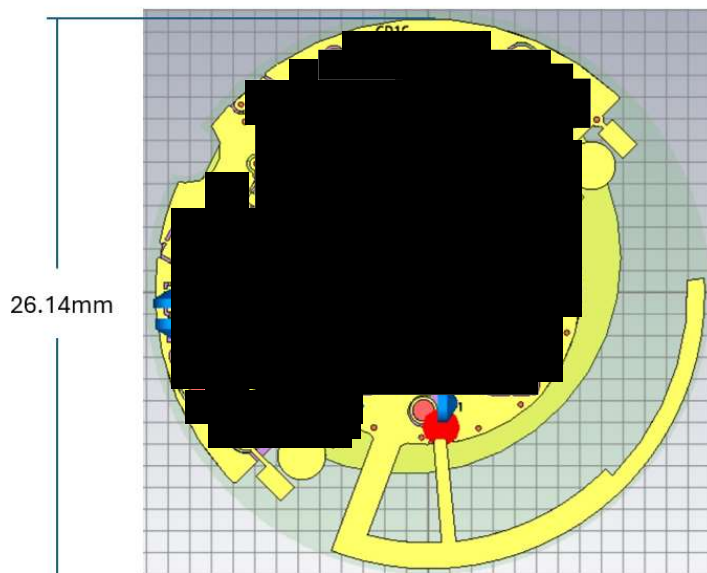


Figure 1 Full PCB dimensions

2. DESIGN

Initial design and verification are done with a full 3D EM simulation tool (CST). The design goals are to center the minimum S11 (and VSWR) at 2440 MHz and provide the largest BW possible bandwidth. BW is maximized by increasing the space of the IFA to the ground plane. When doing simulations, PCB material thickness and dielectric constant are important parameters. Also, the battery location and the plastic housing will impact the feed-point impedance so this must be included in the simulations.

Below is the Smith Chart of S11 from 1GHz to 8GHz.

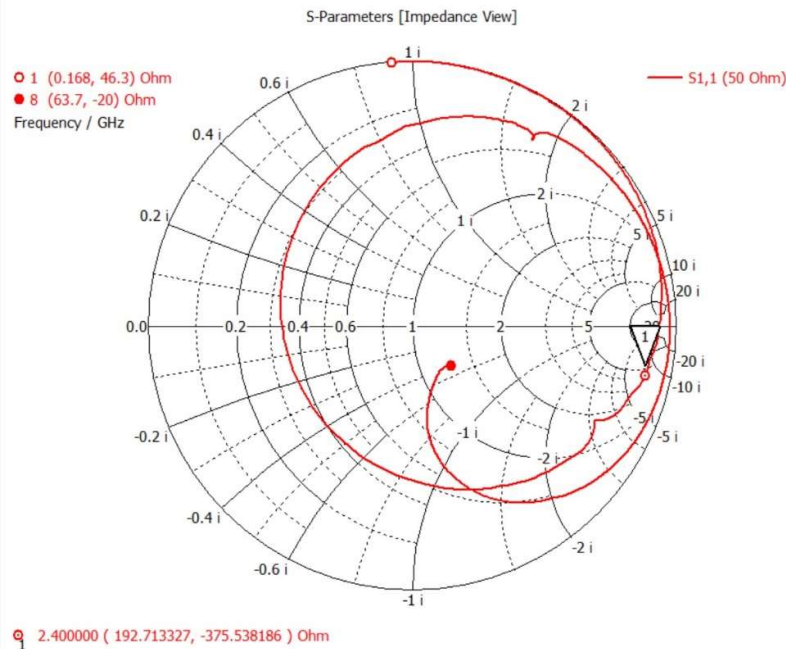


Figure 2 Smith Chart of S11

Below are the radiation patterns in $\Phi = 0$ and $\Phi = 90$. From the plot on the left, you can see the antenna is almost omnidirectional. From the plot on the right, you can see the antenna has two major lobes and radiates in a snowman pattern

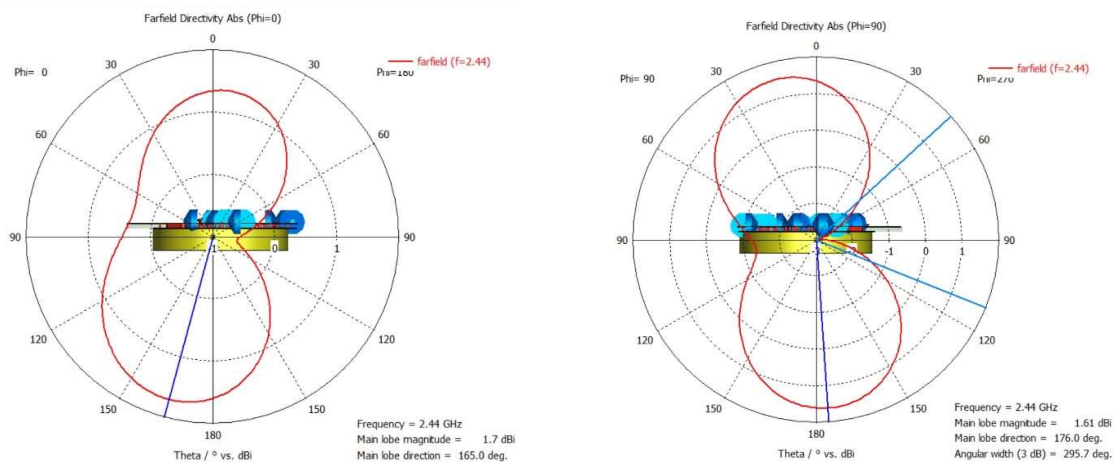


Figure 3 Radiation patterns in $\Phi = 0$ and $\Phi = 90$ planes

3. SUMMARY

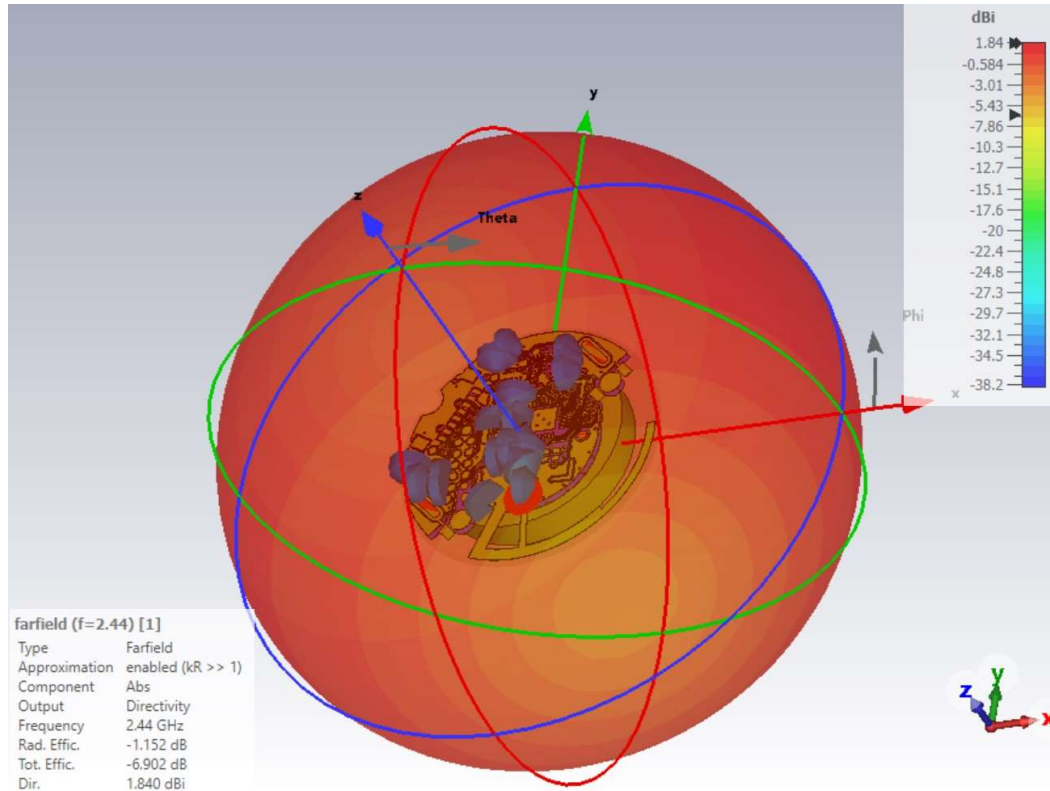


Figure 4 3D radiation pattern of antenna

| | |
|---------------------------------|------------------|
| ANTENNA TYPE | Circular IFA |
| MINIMUM S11 | -7db at 2.42GHz |
| BANDWIDTH (VSWR=2 points) | 90MHz |
| IMPEDANCE AT 2400MHz | 192.7 – j375.5 |
| RADIATION PATTERN | Nearly isotropic |
| ABSOLUTE ANTENNA GAIN phi=0deg | 1.5 dBi |
| ABSOLUTE ANTENNA GAIN phi=90deg | 1.5 dBi |