

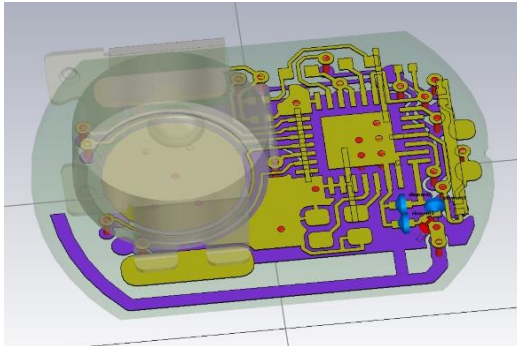


EMBT0 Antenna Specification



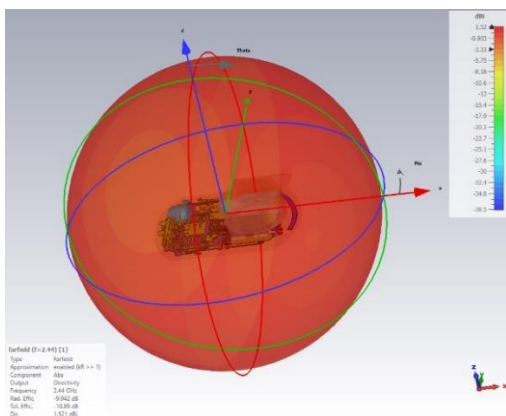
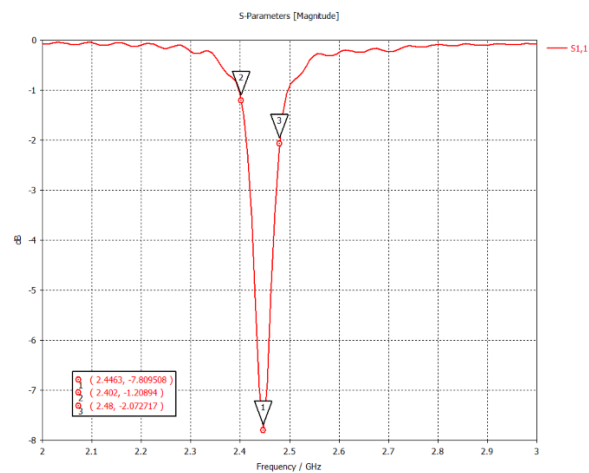
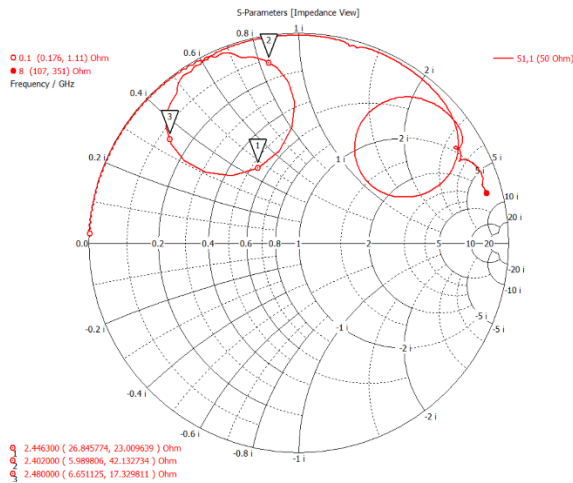
1. GENERAL

The EMBT0 is a 2.44 GHz RF electronic beacon with an electrically small PCB MIFA. This document specifies the performance and design of this antenna. The antenna impedance is $27 + j23$ ohm single ended and is connected to the EM9304 single ended output using an RF pi filter. Simulations are done with CST Studio Suite 2022.



2. DESIGN

Initial design and verification is 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 RF shield will impact the feed-point impedance so this must be included in the simulations.



Antenna Impedance @ 2.44GHz = $27 + j23$
Radiation Efficiency @ 2.44GHz = -9.9dB
Directivity @ 2.44GHz = 1.5 dBi

Conclusion: As expected, the electrically small antenna has relatively poor efficiency and a unidirectional output.

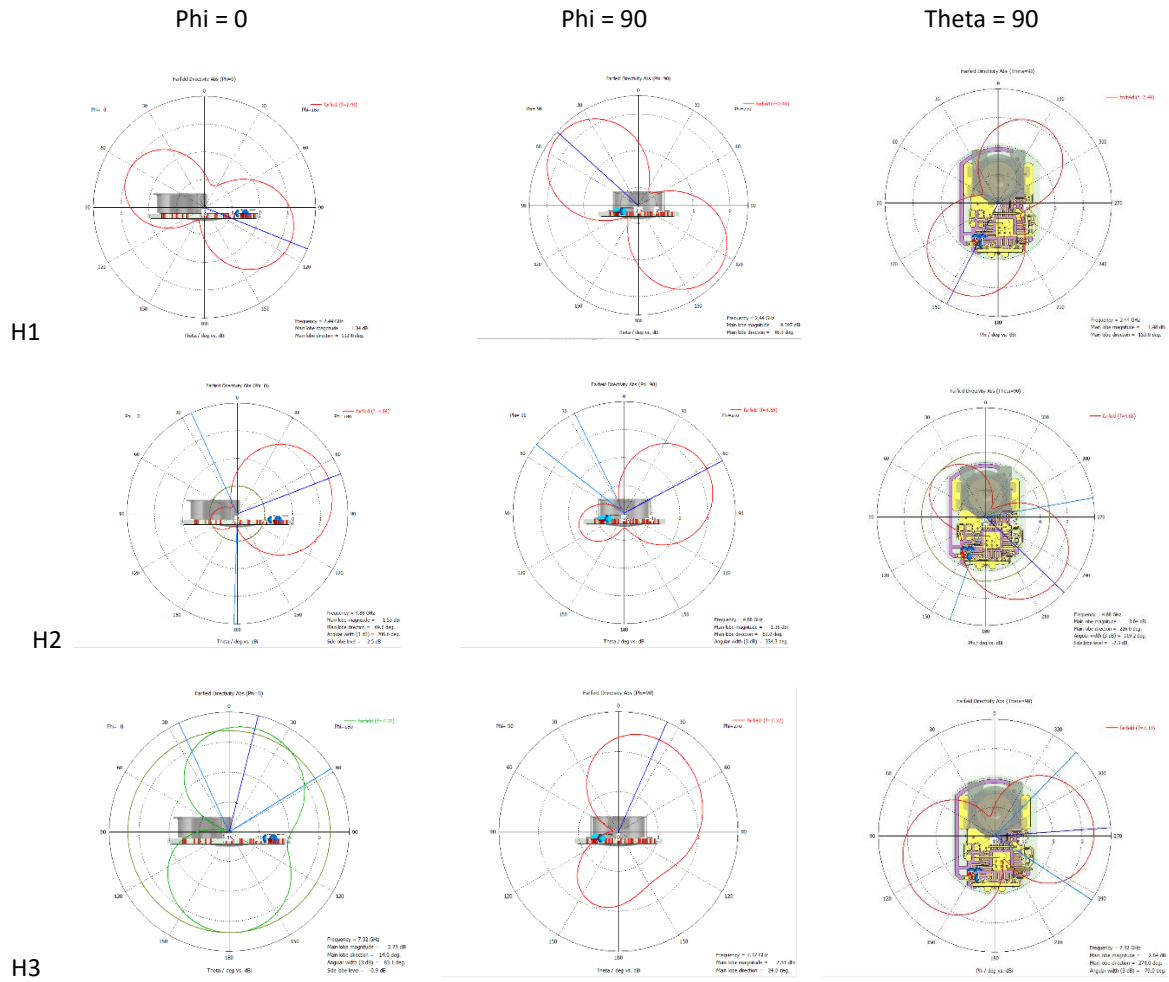


Table 1: Simulation Summary

ANTENNA TYPE	Electrically Small IFA
IMPEDANCE AT 2440MHz (SIMULATED)	27 + j23
ANTENNA RADIATED EFFICIENCY (SIMULATED)	10% (-9.9dB)
RADIATION PATTERN (SIMULATED)	Toroidal
ABSOLUTE ANTENNA GAIN (SIMULATED)	-8.4dBi

3. SUMMARY

PCB dielectric constant and thickness variation can account for differences between measurements and simulations. The maximum absolute antenna gain based on simulations is -8.4dBi @ 2.44GHz with a radiation efficiency of ~10%.