

# Antenna review

2.4GHz inverted F antenna on a 1.2mm FR4 PCB

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# General

Original source of the antenna:

[https://github.com/sad-electronics/wch-kicad-lbr/blob/main/footprints/wch-antenna.pretty/ANT-F-1-2.4G-1.2MM-FR4-WCH.kicad\\_mod](https://github.com/sad-electronics/wch-kicad-lbr/blob/main/footprints/wch-antenna.pretty/ANT-F-1-2.4G-1.2MM-FR4-WCH.kicad_mod)

Modified by Xdevelop: No

Simulation software: Dassault Systems CST Studio Suite® 2023

Number of tetrahedrons: 52,733

Matched: No

If you have any questions, contact

*Bernhard Wörndl-Aichriedler*

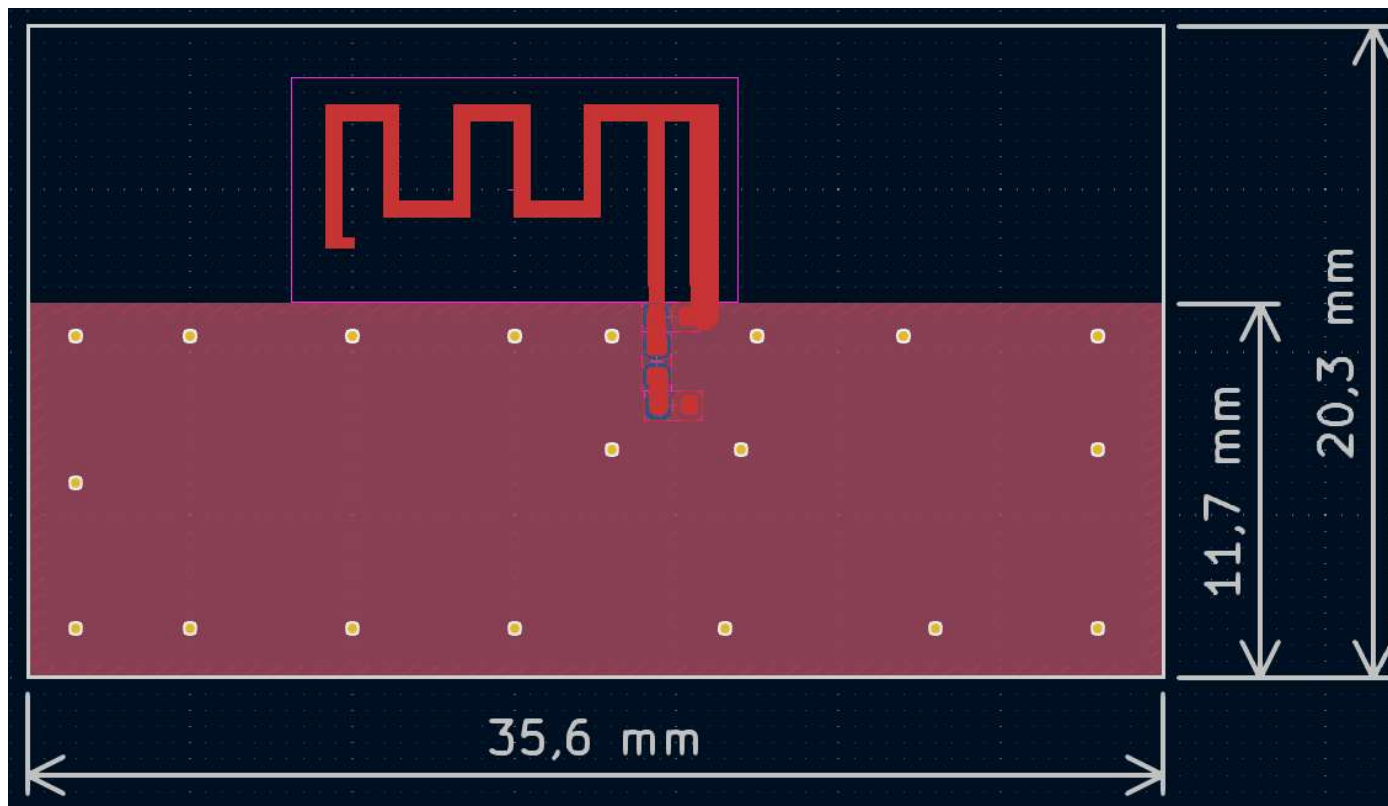
[bwa@xdevelop.at](mailto:bwa@xdevelop.at)

# PCB data

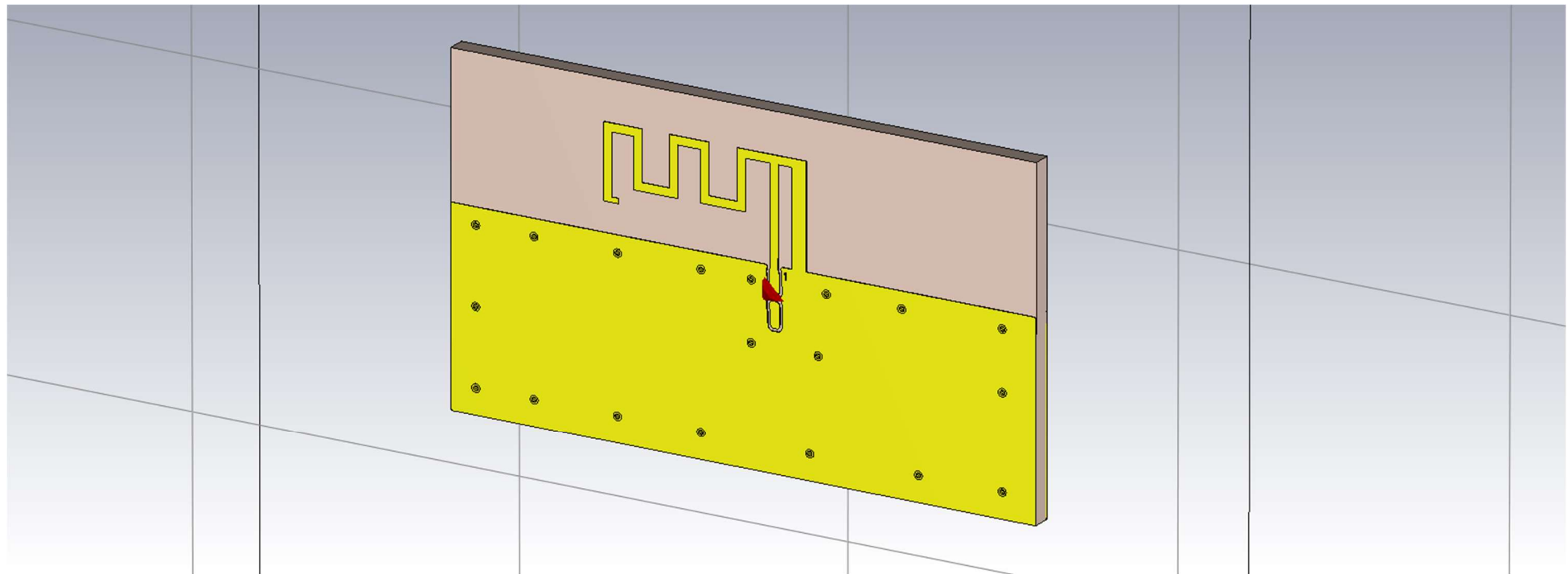
## Stackup:

Layer	Thickness	Material	Dielectric constant $\epsilon_r$
Top	35 $\mu$ m	Copper	Not relevant
Core	1.13mm	FR4 (epoxy resin + fiberglass)	4.3
Bottom	35 $\mu$ m	Copper	Not relevant

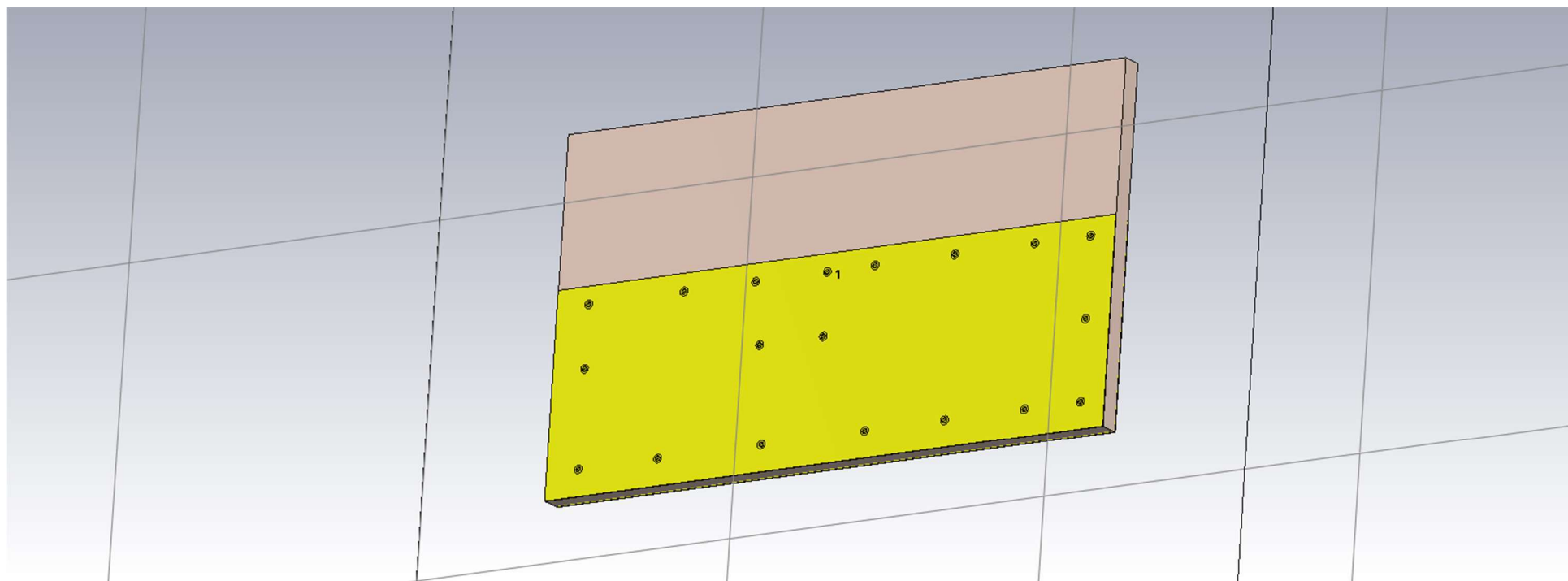
# PCB dimensions & layout



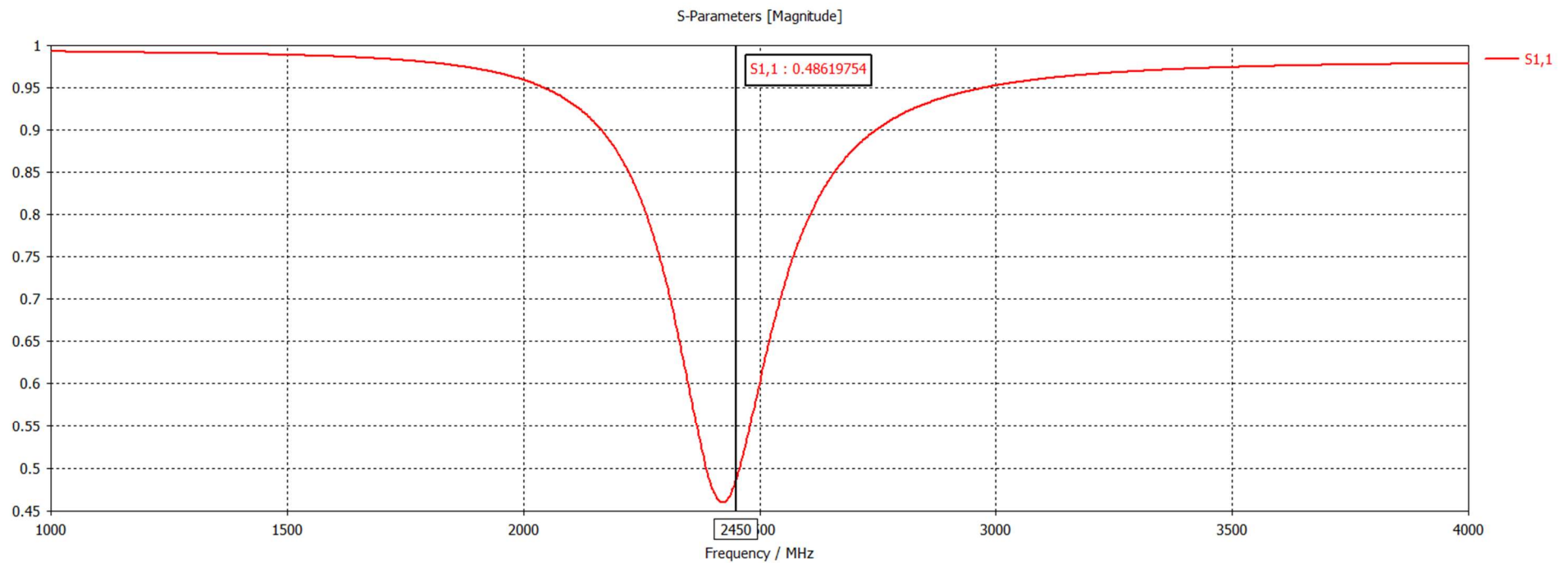
# 3D model of the PCB from the front



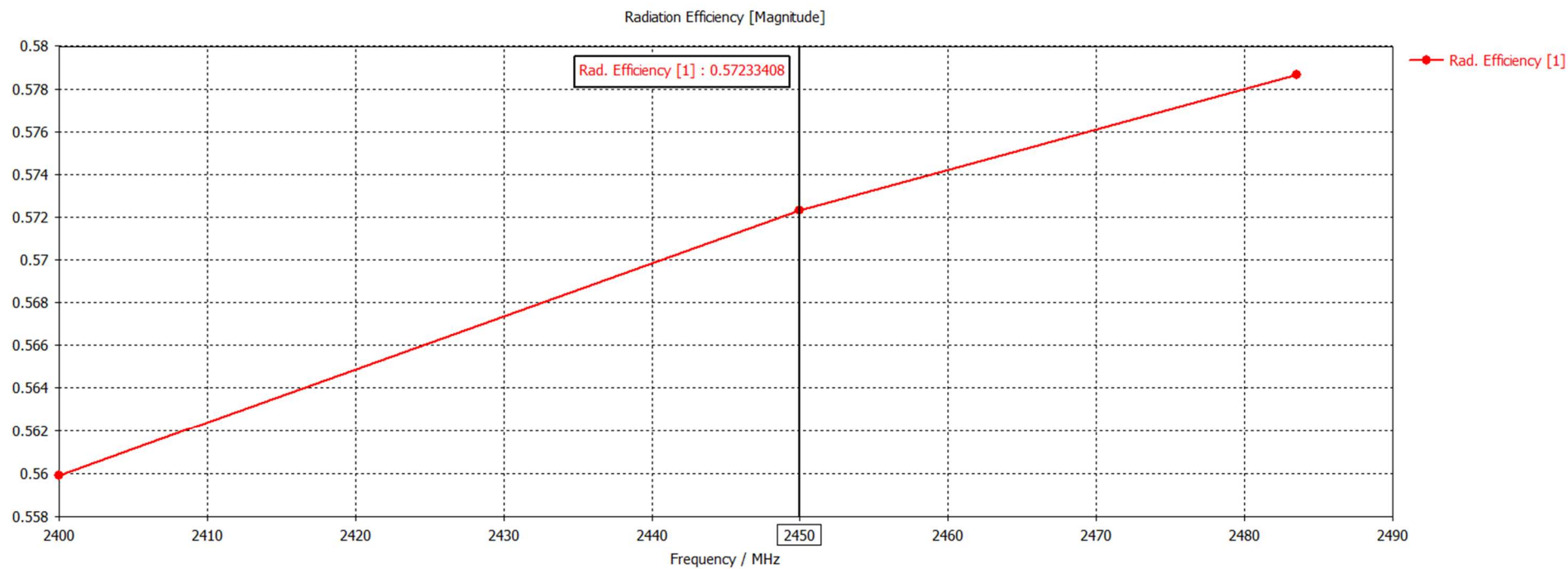
## 3D model of the PCB from the back



# S-parameter

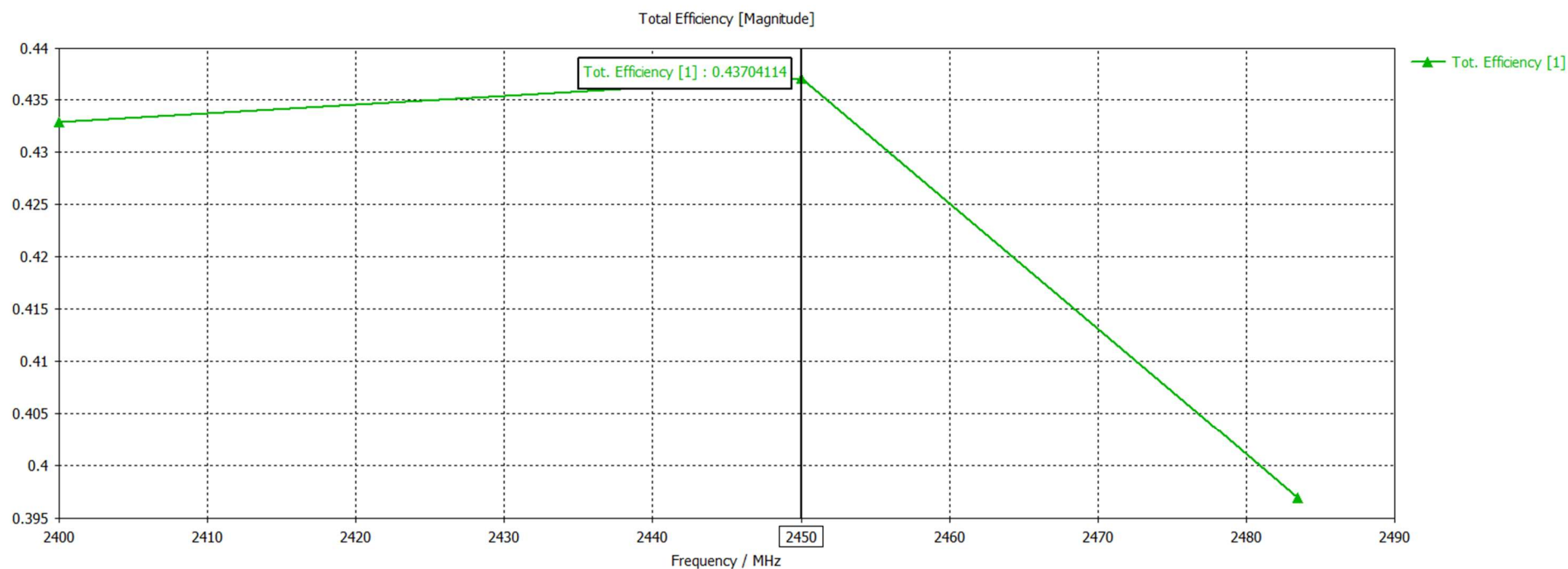


# Radiation efficiency

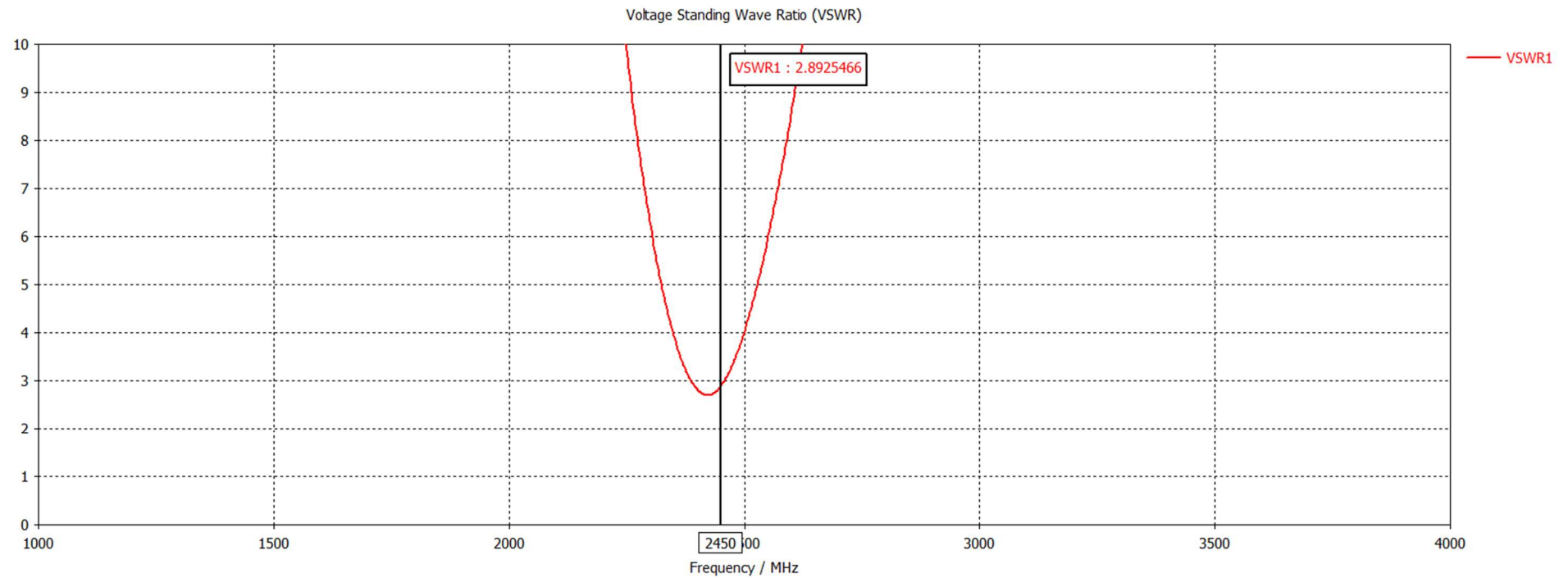




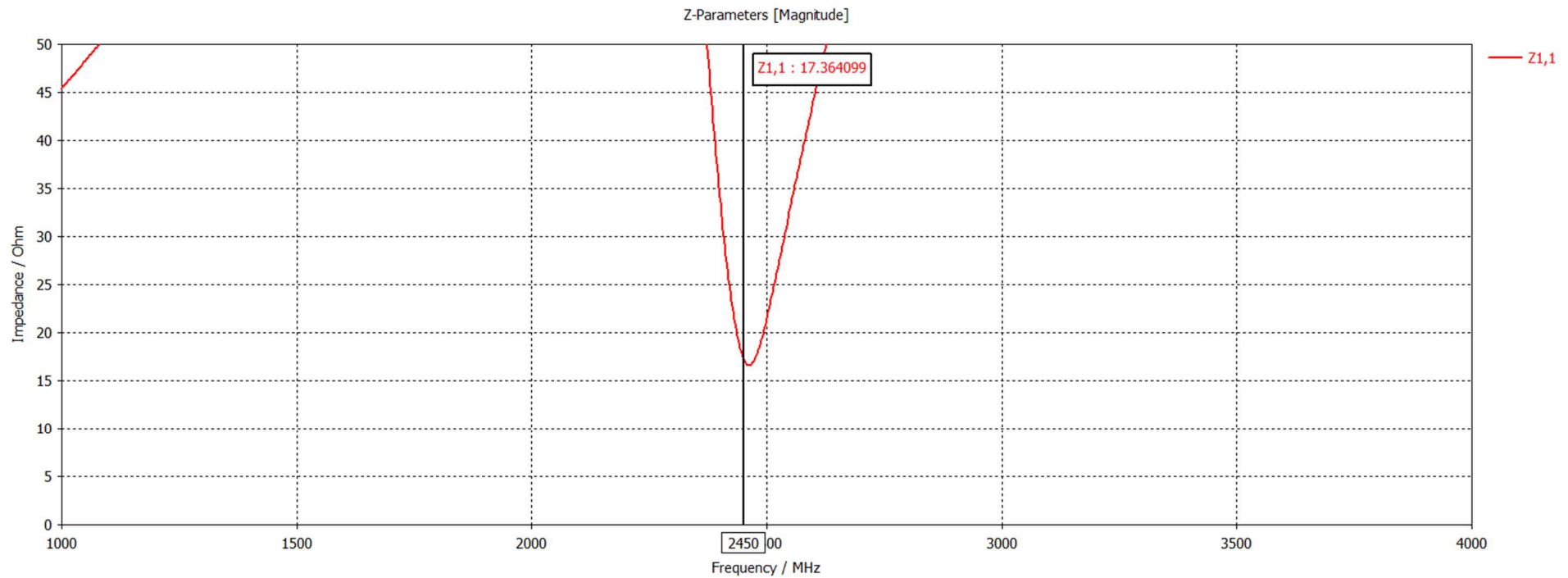
# Total efficiency



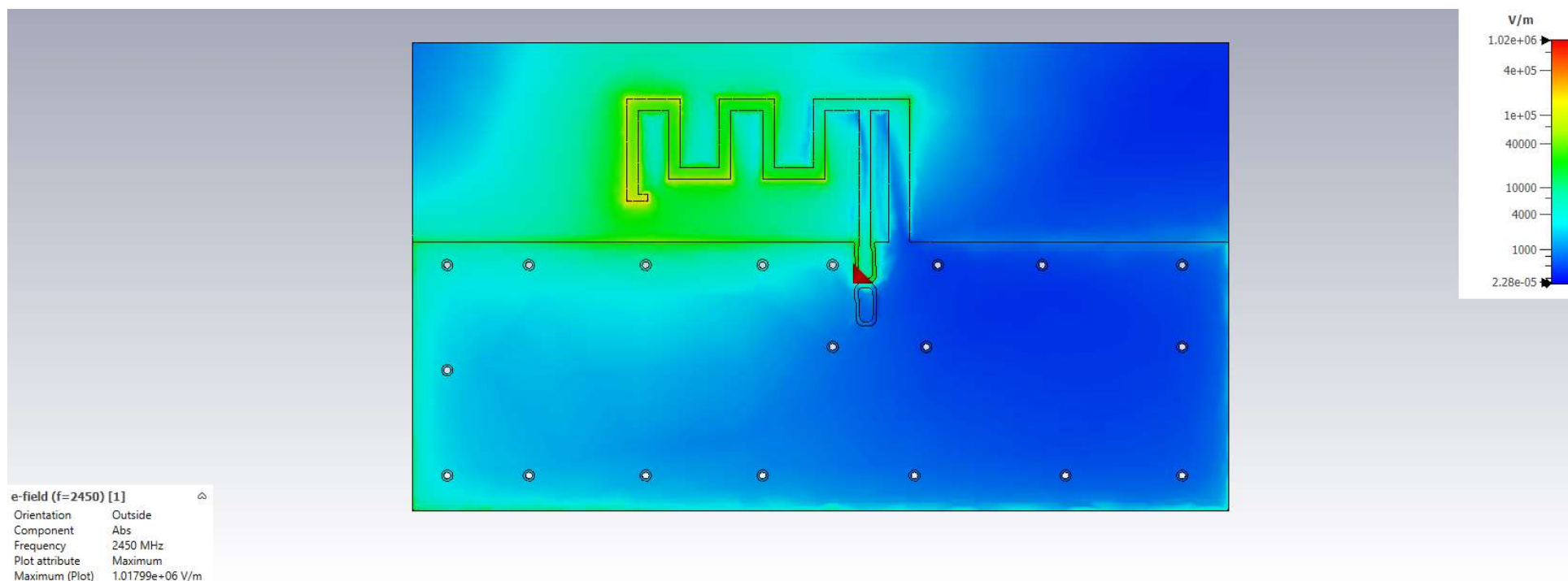
# VSWR



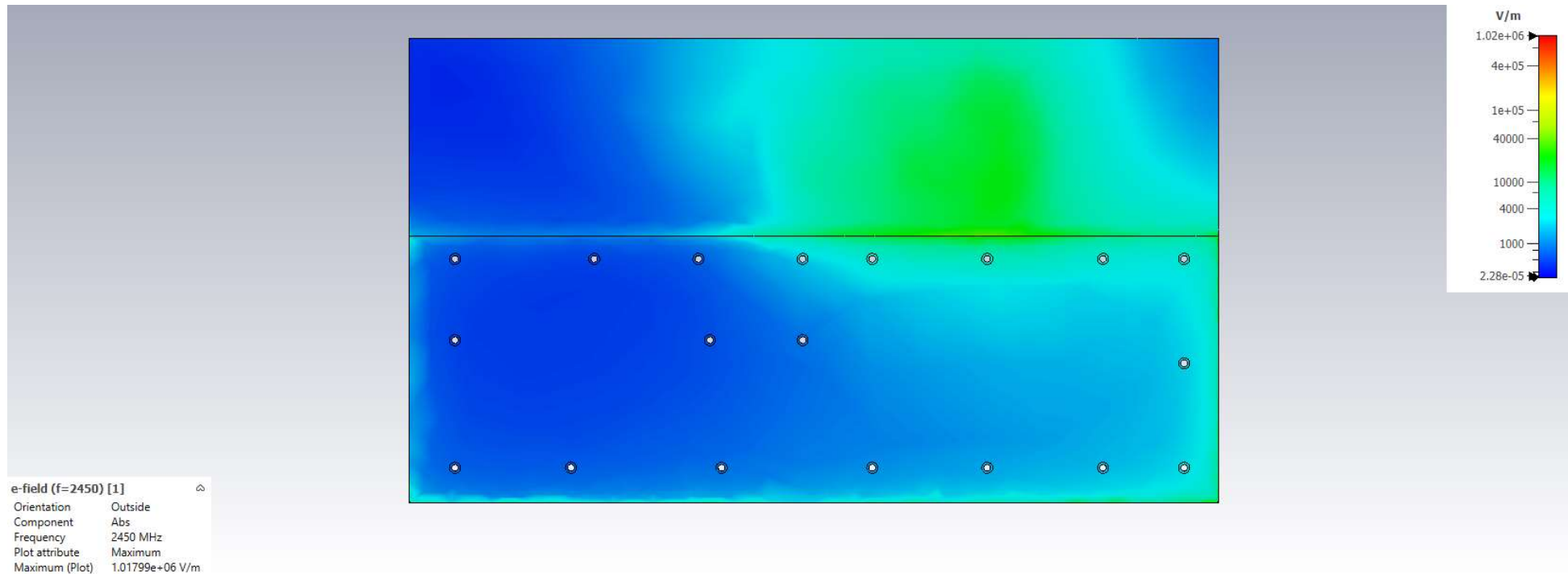
# Impedance Z



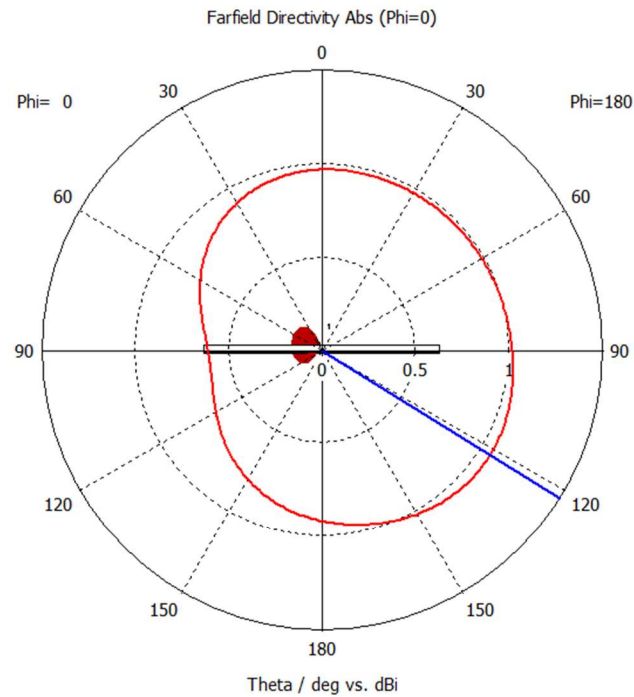
# Maximum E-field (front)



# Maximum E-field (back)

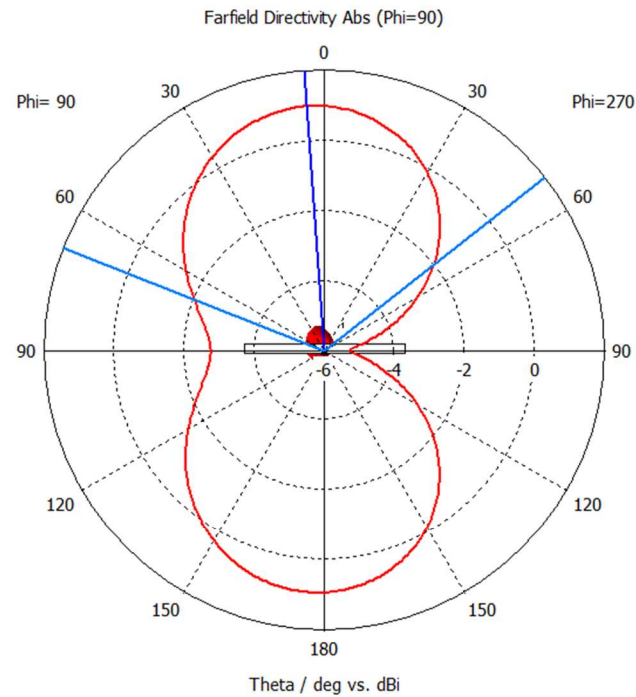


# Farfield viewed from the upper edge (-y) of the PCB



Frequency = 2450 MHz  
Main lobe magnitude = 1.06 dBi  
Main lobe direction = 122.0 deg.

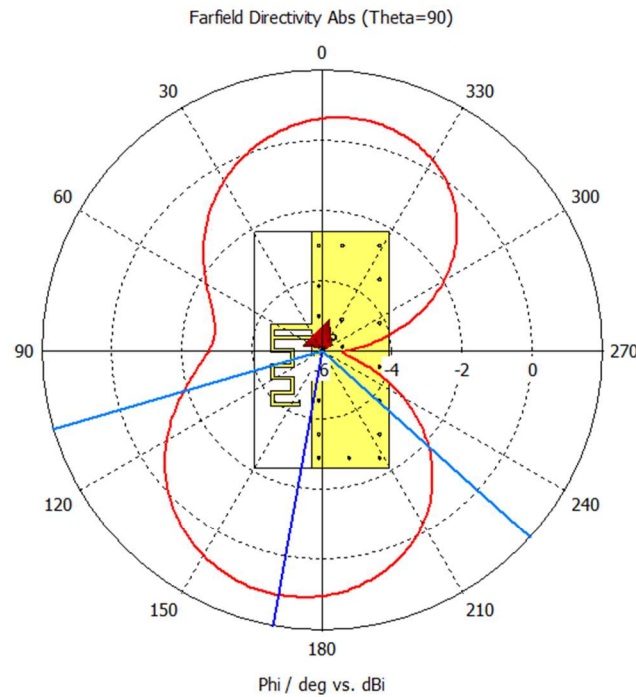
# Farfield viewed from the right edge (-x) of the PCB



— farfield (f=2450)

Frequency = 2450 MHz  
Main lobe magnitude = 0.98 dBi  
Main lobe direction = 4.0 deg.  
Angular width (3 dB) = 120.4 deg.

# Farfield viewed from the top (-z) of the PCB

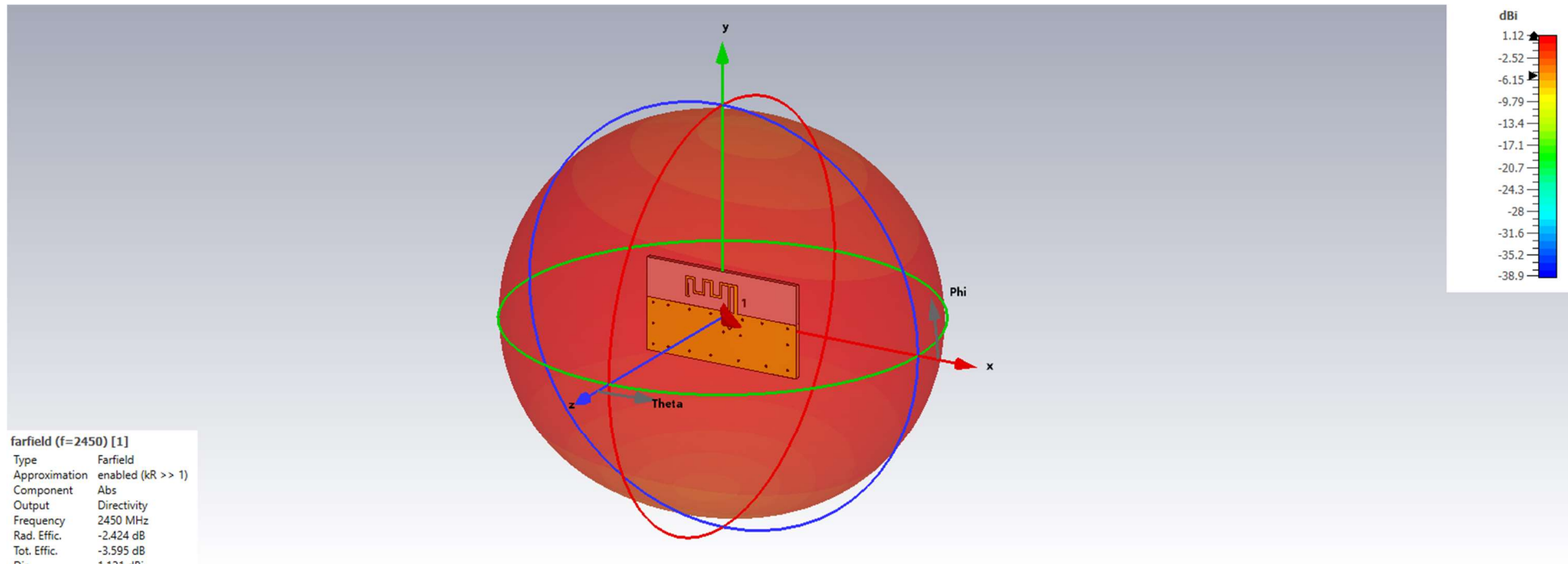


— farfield (f=2450)

Frequency = 2450 MHz  
Main lobe magnitude = 1.1 dBi  
Main lobe direction = 170.0 deg.  
Angular width (3 dB) = 121.6 deg.



# 3D-Farfield (perspective)



farfield (f=2450) [1]  
 Type Farfield  
 Approximation enabled (kR >> 1)  
 Component Abs  
 Output Directivity  
 Frequency 2450 MHz  
 Rad. Effic. -2.424 dB  
 Tot. Effic. -3.595 dB  
 Dir. 1.121 dBi

# 3D-Farfield (perspective)

