

A unique Bluetooth PCB antenna design exclusively for RF-ST-FL-001.

It describes a 2.4 GHz PCB antenna in the form of an exclusively for RF-ST-FL-001

I-Synapse CO., Ltd.

Manufacturing company:
I-Synapse CO., Ltd.



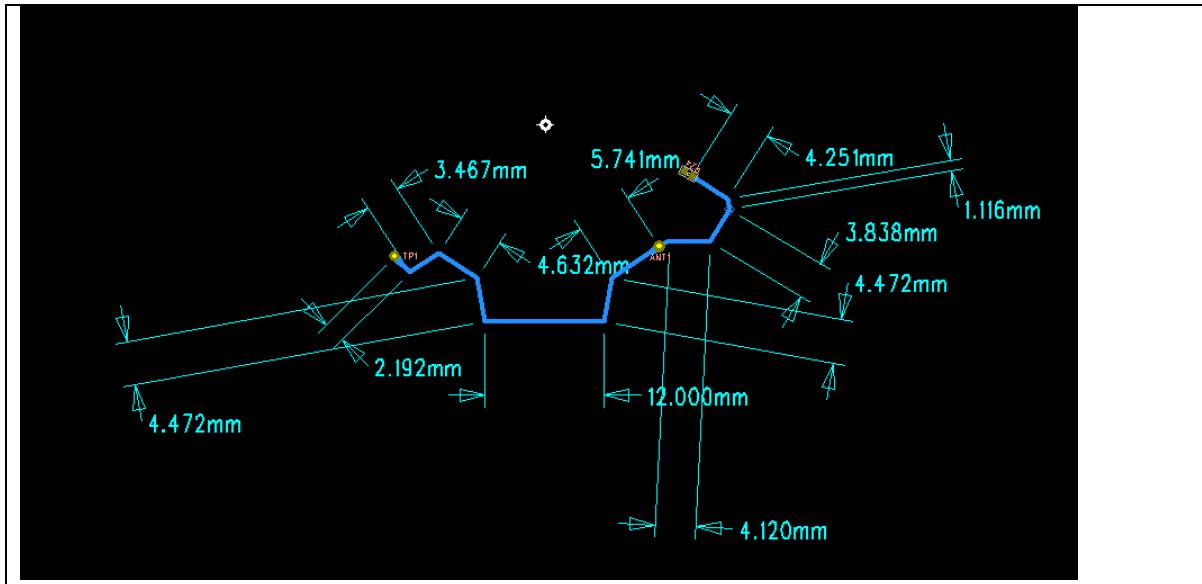
Add.: 1005-ho, 26, Seongsuil-ro 10-gil, Seongdong-gu, Seoul, 04793, Republic of Korea

Measurement laboratory:
EMTI



Add.: 3, Mokdongjungang-ro 13na-gil, Yangcheon-gu, Seoul, Republic of Korea

1. Antenna Layout



2. Antenna Placement

Length (mm)

A. 2.192	G. 5.741
B. 3.467	H. 4.120
C. 4.632	I. 3.838
D. 4.472	J. 1.116
E. 12.000	K. 4.251
F. 4.472	

Width (mm)

0.5

Thickness

1 Oz (0.0348)

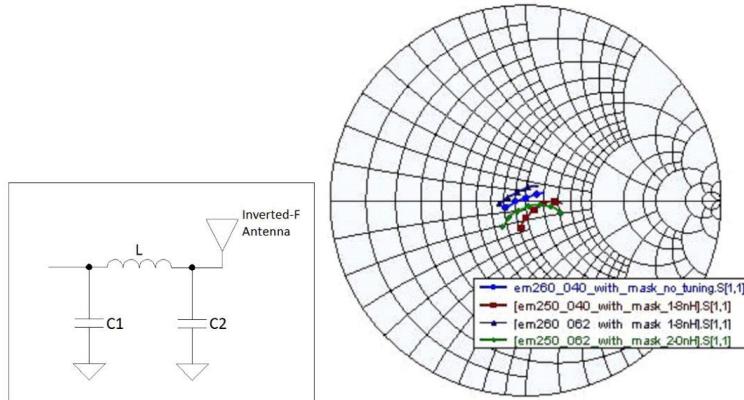
3. Antenna Gain

		min	max	avg
SN01-EUT flat	vertical Polarization Gain(dBi)	-33.4	-6.5	-13.2
	Horizontal Polarization Gain(dBi)	-37.5	-0.2	-9.6
SN01-EUT side	vertical Polarization Gain(dBi)	-35.4	-4.1	-10.8
	Horizontal Polarization Gain(dBi)	-38.7	-2.8	-11.2
SN01-EUT vertical	vertical Polarization Gain(dBi)	-12.3	+0.5	-4.2
	Horizontal Polarization Gain(dBi)	-28.5	-4.9	-14.6
SN02-EUT flat	vertical Polarization Gain(dBi)	-34.6	-1.8	-9.7
	Horizontal Polarization Gain(dBi)	-32.4	-2.6	-9.4
SN02-EUT side	vertical Polarization Gain(dBi)	-23.4	-5.2	-10.2

	Horizontal Polarization Gain(dBi)	-28.2	-2.8	10.4
SN02-EUT vertical	vertical Polarization Gain(dBi)	-12.0	+2.0	-4.3
	Horizontal Polarization Gain(dBi)	-28.0	-5.8	-12.2

4. Tuning

The printed antenna was designed to provide a 50-ohm output.



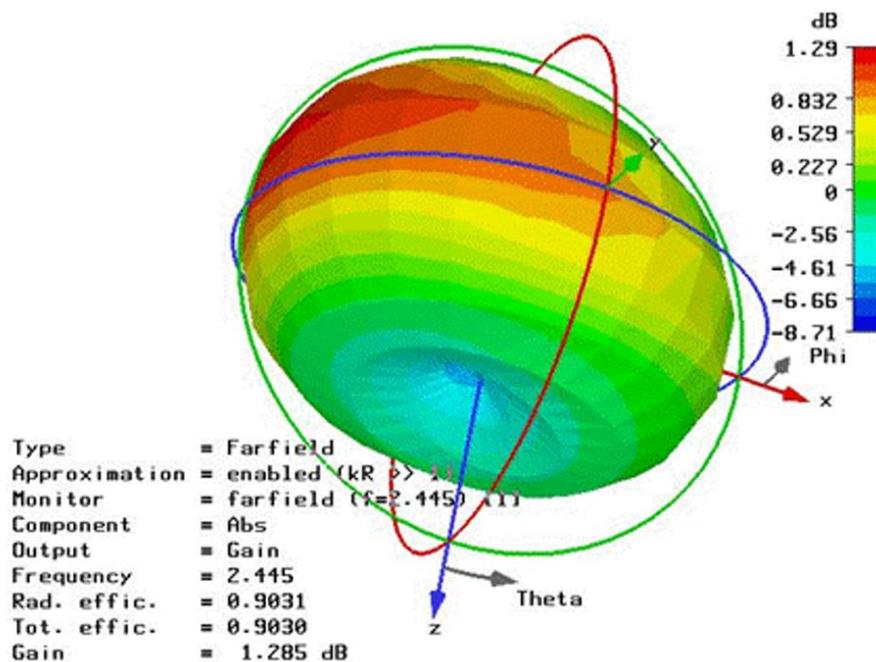
Antenna Matcing Components

5. Antenna Performance

5.1 Simulation of the antenna gain pattern

The antenna was designed using OrCAD.

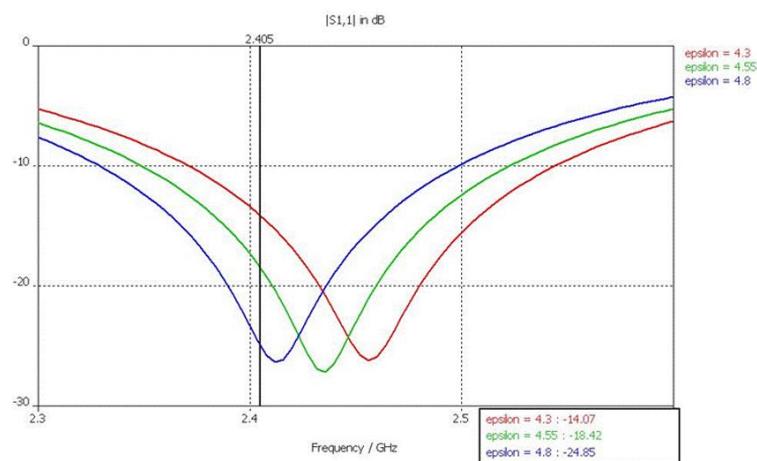
The antenna gain pattern was simulated, and the displayed gain is the absolute sum of both polarizations.

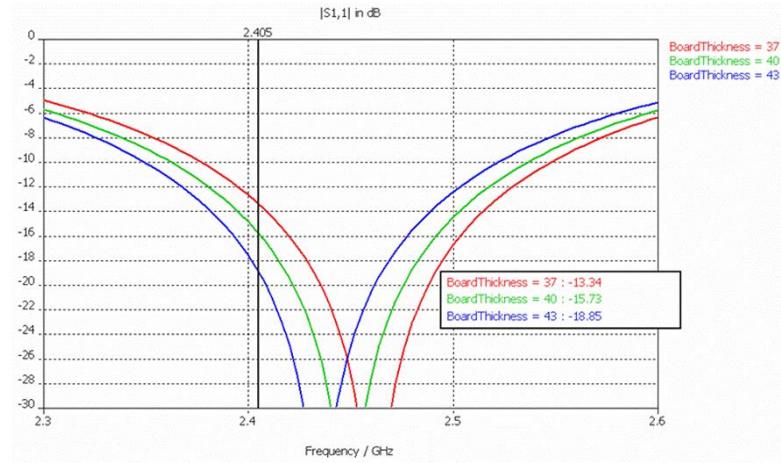


5.2 Effects of Manufacturing Variations

The two antennas were designed to have sufficient bandwidth margin to maintain performance despite manufacturing tolerances.

The following figure shows that good matching is still achieved even when the dielectric constant varies between 4.3 and 4.8, and when the board thickness varies by ± 3 mil.

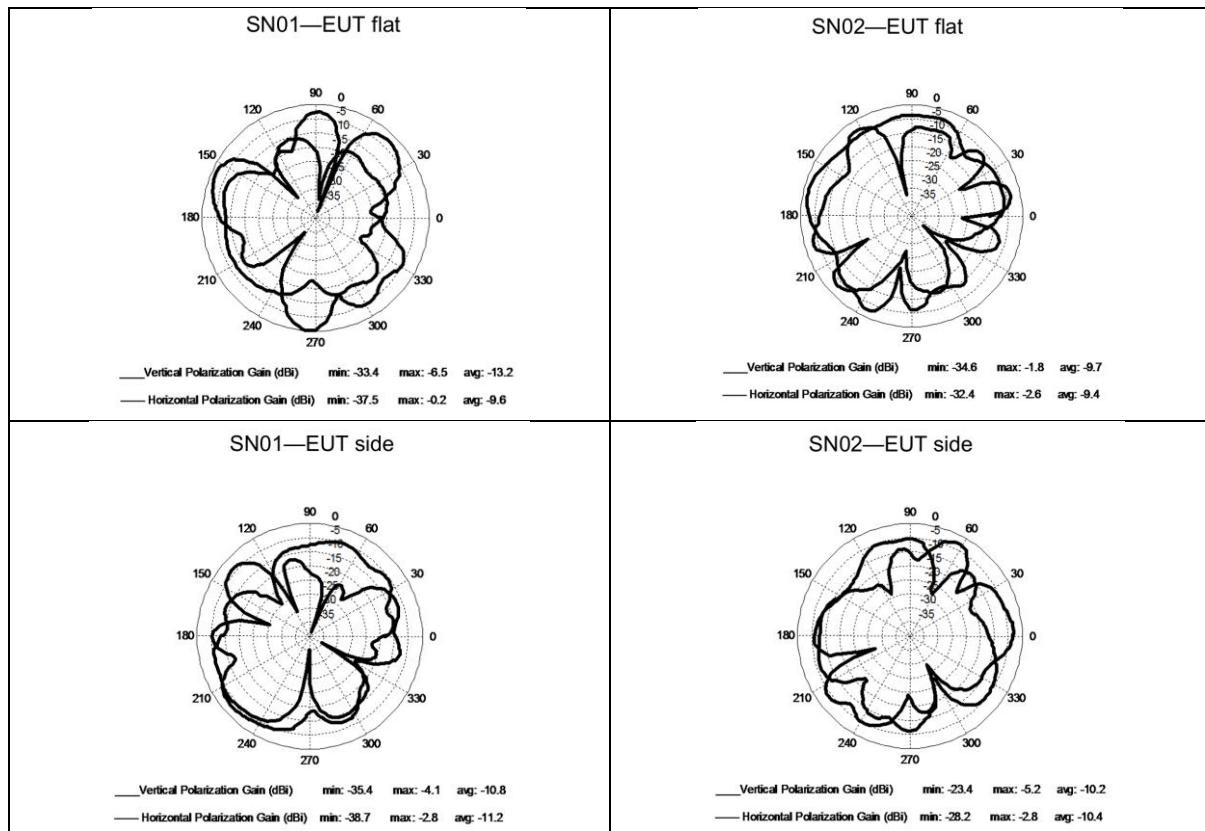




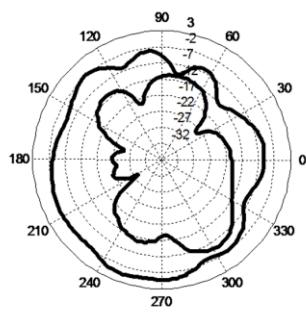
Effects of Manufacturing Tolerances

5.3 Measured Antenna Patterns

The antenna patterns were measured on prototype boards in a 5-meter anechoic chamber. Patterns were measured in three orthogonal planes for both polarizations.

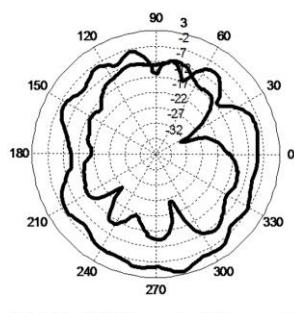


SN01—EUT vertical



— Vertical Polarization Gain (dBi) min: -12.3 max: +0.5 avg: -4.2
— Horizontal Polarization Gain (dBi) min: -28.5 max: -4.9 avg: -14.6

SN02—EUT vertical



— Vertical Polarization Gain (dBi) min: -12.0 max: +2.0 avg: -4.3
— Horizontal Polarization Gain (dBi) min: -28.0 max: -5.8 avg: -12.2