1. Features

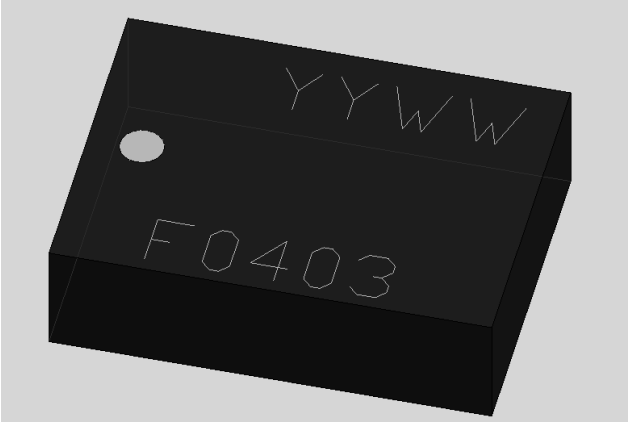
- Designed for 2.4GHz applications: BT / BLE, Wi-Fi® (802.11a/b/g/n), ZigBee®.
- Low profile design
- High efficiency
- Lightweight
- Intended for SMD mounting
- Supplied in tape and reel

2. Description

F0403 is intended for use with all 2.4 GHz applications. The antenna uses a ground plane in order to radiate efficiently, but this ground plane must not extend underneath the antenna itself. Ideal for small wearables.

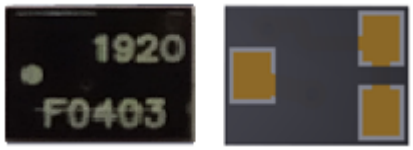
3. Applications

- Mobile phones
- PDAs
- PNDs
- Headsets
- PMPs / MP3s
- Laptops
- PC-Cards
- Medical devices
- Sensors



4. Part Number

F1-FR4 ANT : F0403



5. General Data

Product name	F1-FR4 ANT
Part Number	F0403
Frequency	2.4 – 2.5GHz
Polarization	Linear
Operating temperature	-40°C to140°C
Impedance with matching	50 Ω
Weight	<0.03g
Antenna type	SMD
Dimensions	4 x 3 x 1.1 (mm)

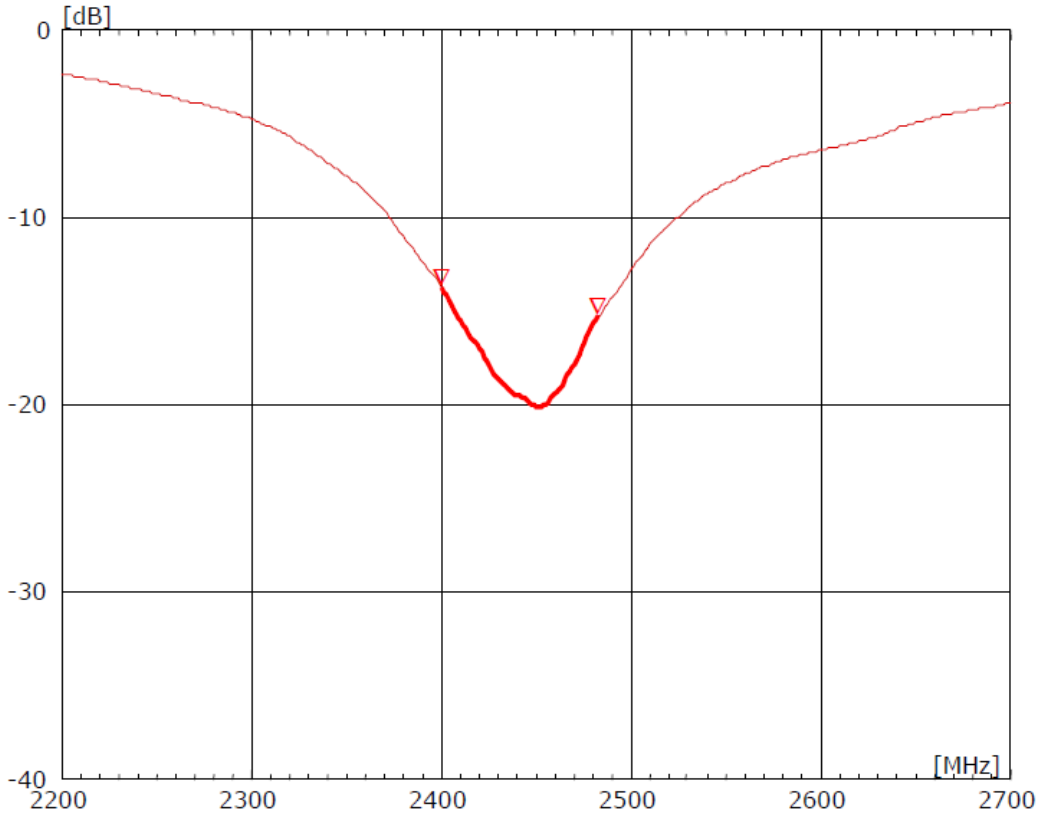
6. RF Characteristics

	2.4 – 2.5 GHz
Peak gain	0.8dBi
Average gain (Linear)	-1.9dBi
Average efficiency	65%
Maximum return loss	<-10dB
Maximum VSWR	2:1

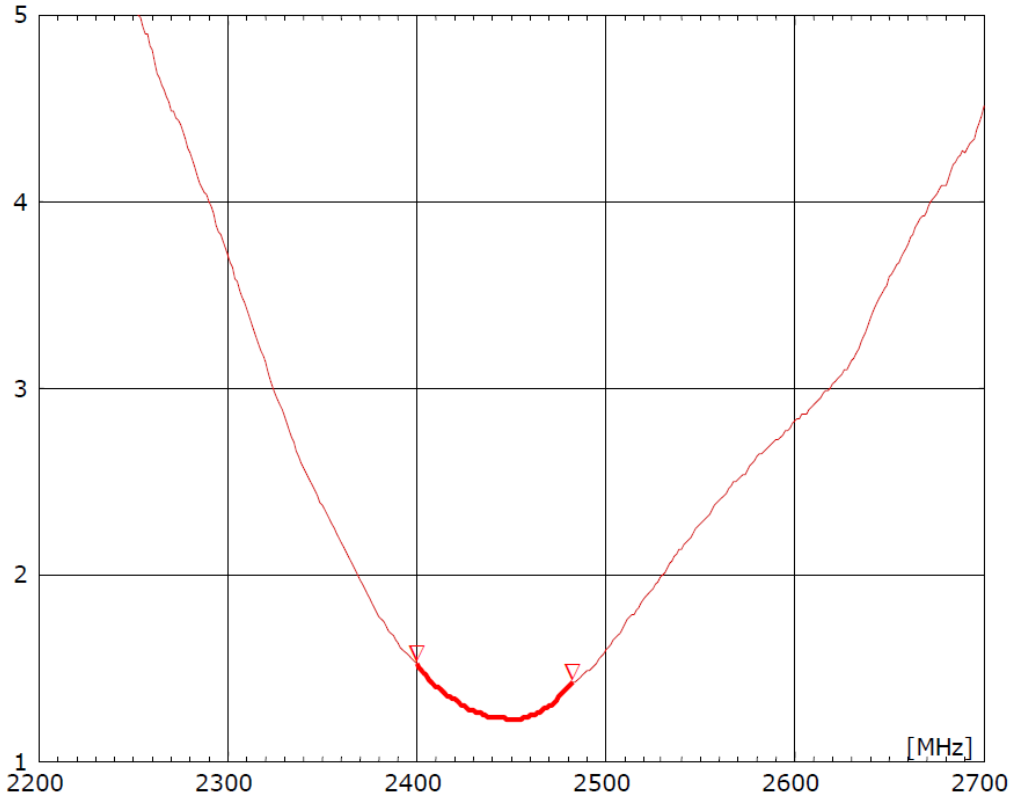
All data measured on F1media co,. Ltd evaluation PCB
Part No. F0403

7. RF Performance

7.1 Return Loss

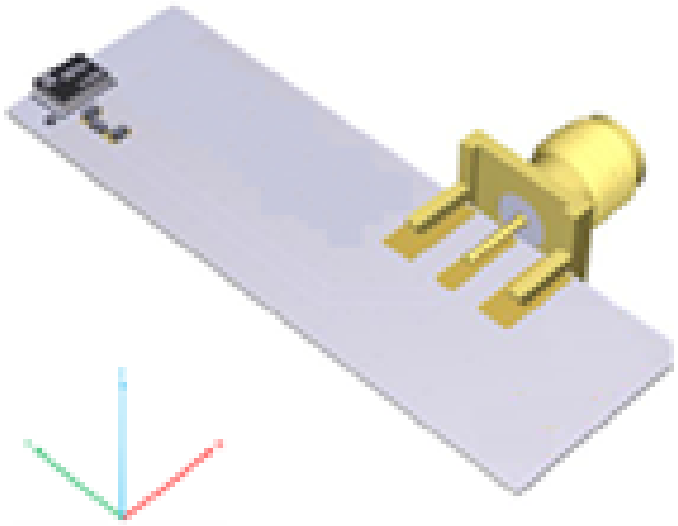


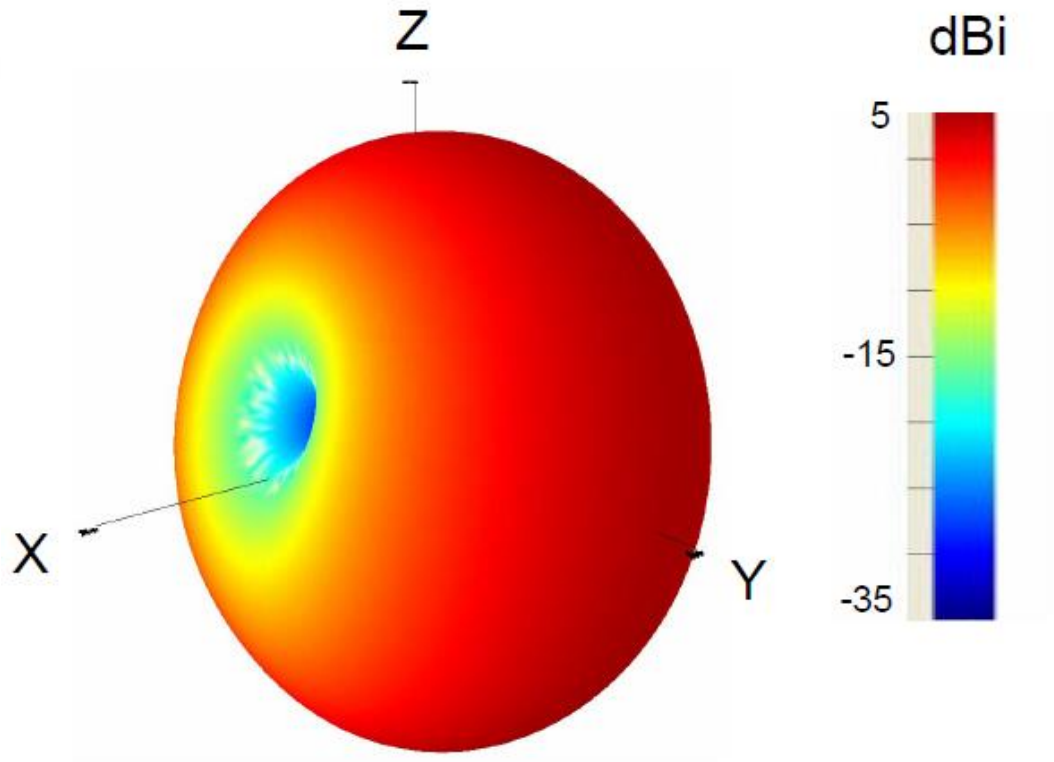
7.2 VSWR



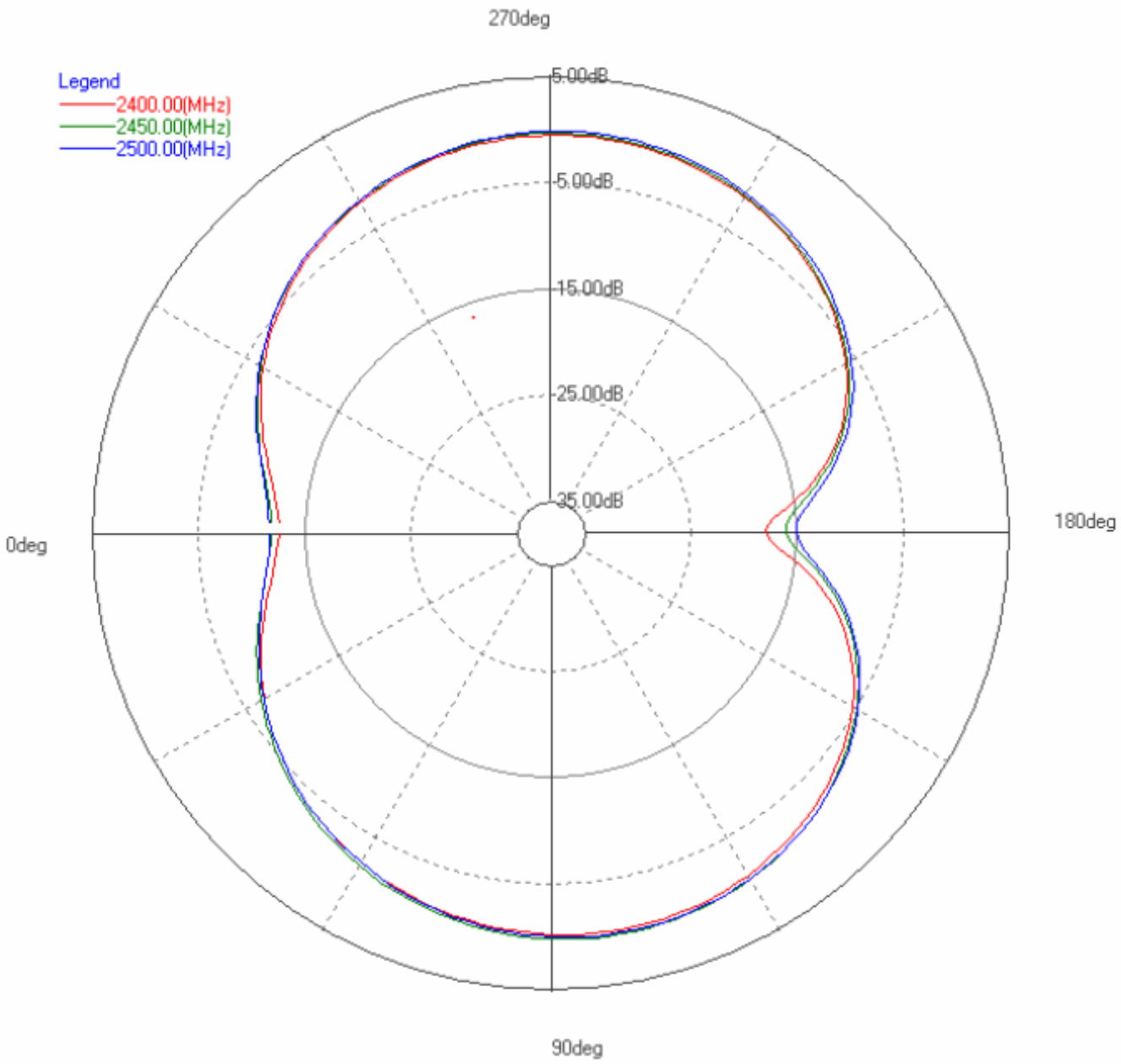
7.3 Antenna pattern

7.3.1 2400 MHz – 2500 MHz

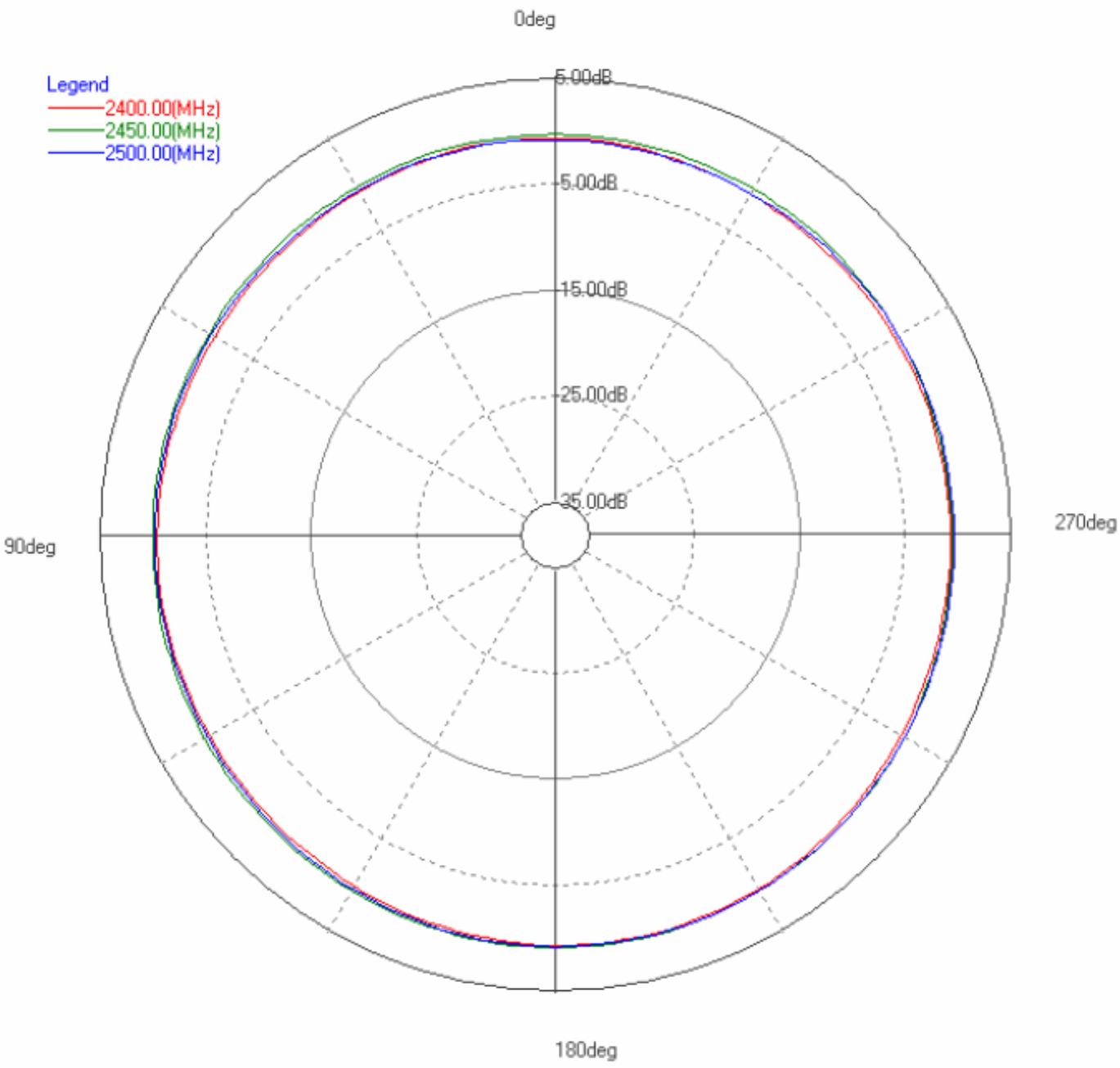




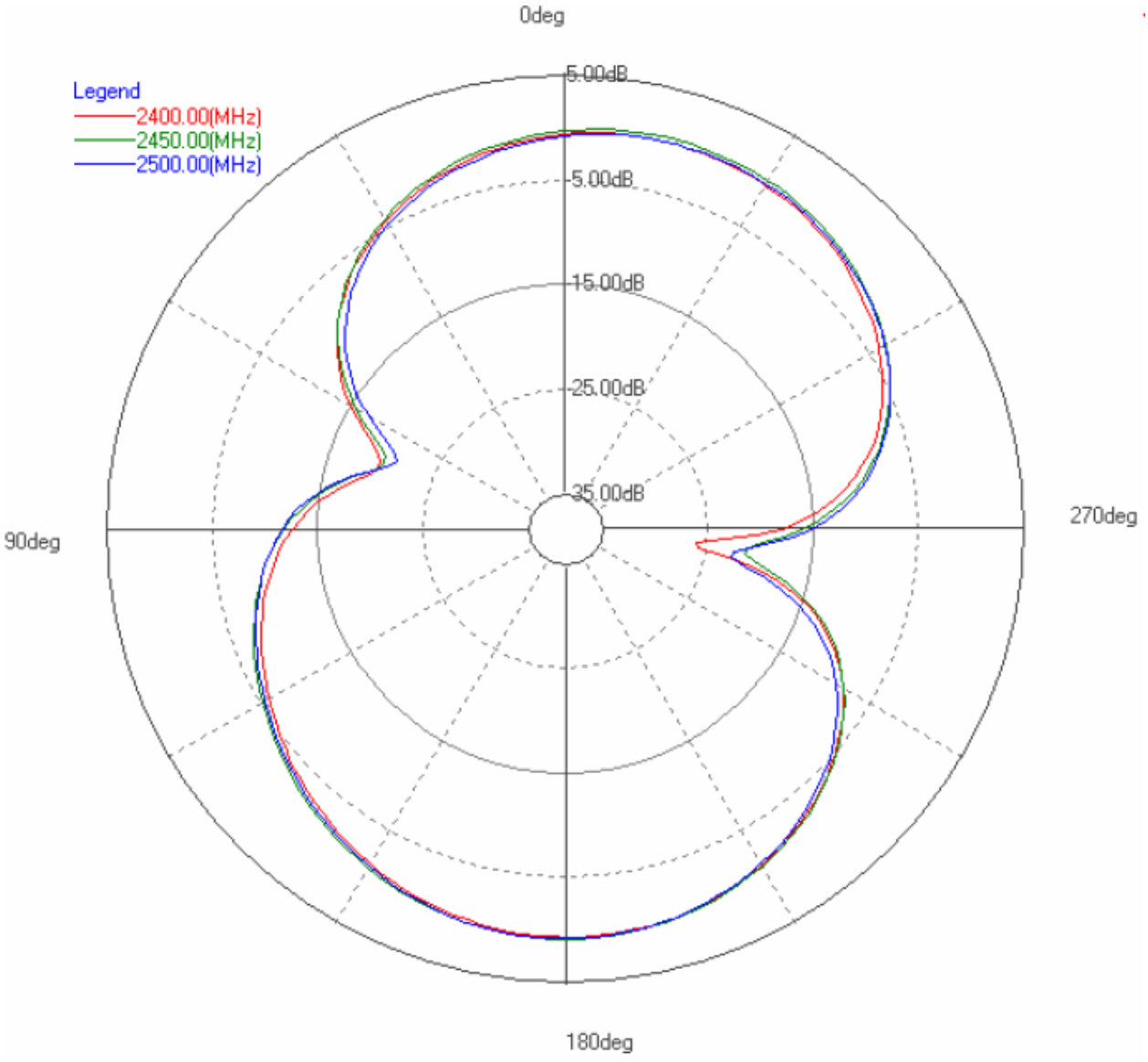
3D pattern at 2450 MHz


270deg
Legend
2400.00(MHz)
2450.00(MHz)
2500.00(MHz)
5.00dB
-5.00dB
-15.00dB
-25.00dB
-35.00dB
0deg
180deg
90deg

XY plane


0deg
Legend
2400.00(MHz)
2450.00(MHz)
2500.00(MHz)
5.00dB
5.00dB
15.00dB
25.00dB
35.00dB
90deg
270deg
180deg

ZY plane

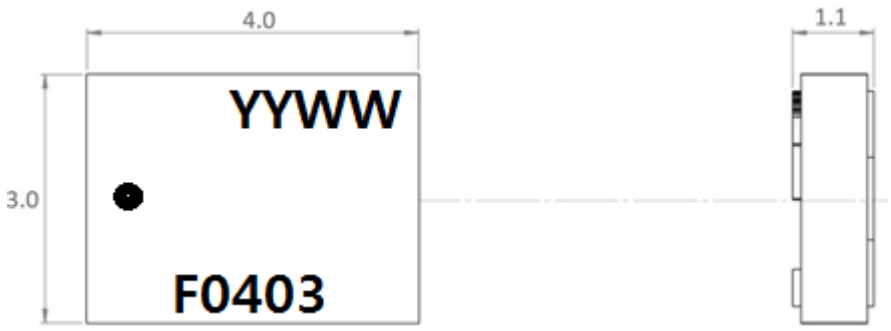

0deg
Legend
2400.00(MHz)
2450.00(MHz)
2500.00(MHz)
-5.00dB
-5.00dB
-15.00dB
-25.00dB
-35.00dB
90deg
270deg
180deg

XZ plane

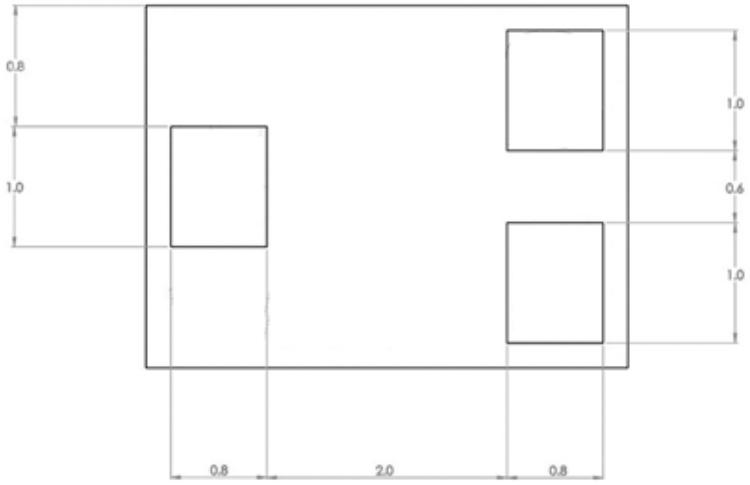
8. Antenna Dimensions

F1media:F0403

Top side



Bottom Side



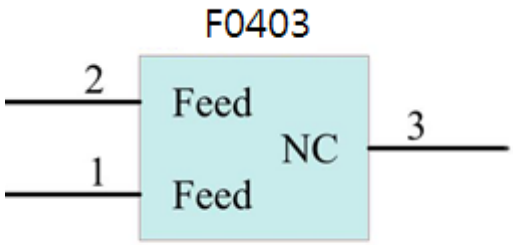
3 solder pads (1.0 x 0.8 mm)

All Dimensions in (mm)

9. Schematic symbol and Pin definition

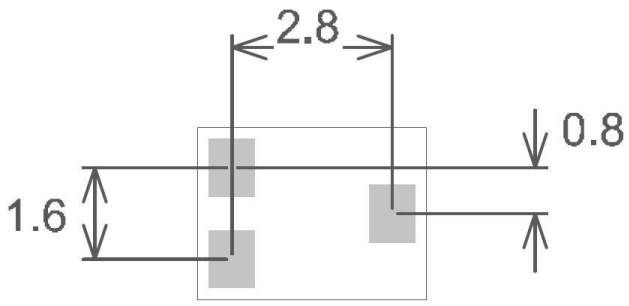
The circuit symbol for the antenna is shown below. The antenna has 5 pins with only two as functional. All other pins are for mechanical strength.

Pin	Description
1,2	Feed
3	Not used (Mechanical only)



10. Antenna footprint

The recommended host PCB footprint is below.



ALL PADS = 1.0 X 0.8 (MM)
ALL DIMENSIONS IN MM

11. Electrical Interface

11.1 Transmission Line

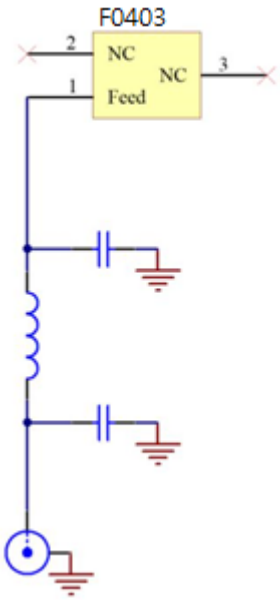
All transmission lines should be designed to have a characteristic impedance of 50Ω.

• The length of the transmission lines should be kept to a minimum
• Any other parts of the RF system like transceivers, power amplifiers, etc, should also be designed to have an impedance of 50 Ω

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the track, so the characteristic impedance of the co-planar transmission is 50 Ω.

11.2 Matching Circuit

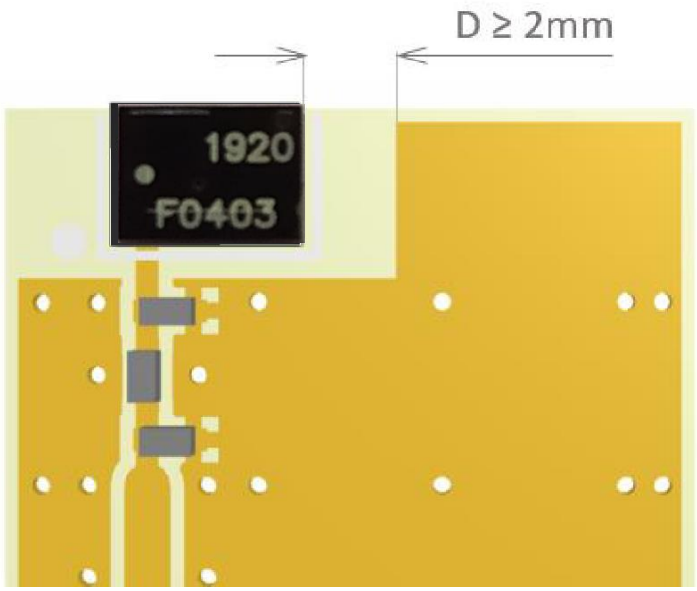
The antenna requires a matching circuit that must be optimized for each product. The matching circuit will require up to 3 components and the following circuit should be designed into the host PCB. Not all components may be required but should be included as a precaution. The matching network must be placed close to the antenna feed to ensure it is more effective in tuning the antenna.



12. Antenna Integration Guide

12.1 Antenna Placement

F1media strongly recommends placing the antenna at the edge of the board. Maximum antenna performance is achieved by placing the antenna towards one of the corners of the PCB and with the feed point of the antenna as close to same corner of the PCB as possible.

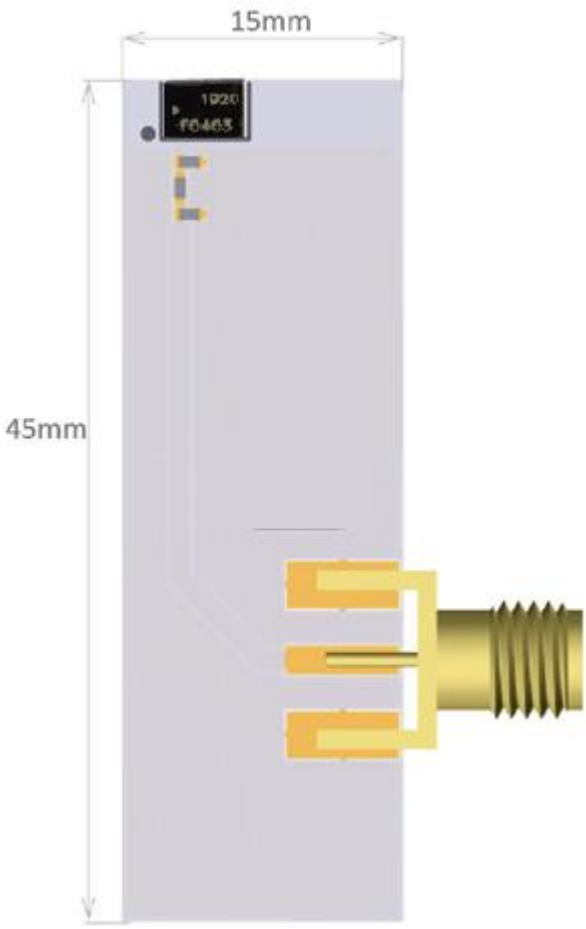


Additional ground and components near the antenna should be at a distance of at least 2 mm. Where possible the antenna should be clear of ground from both sides, although the antenna can work well with a minimum clearance of D ≥ 2 mm as shown in the drawing above.

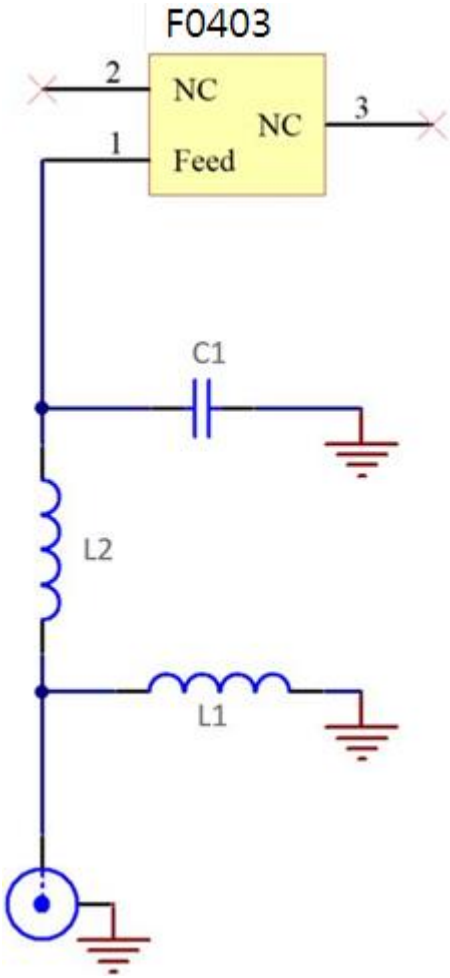
13. Reference Board

The reference board has been designed for the purpose of evaluating F0403 and includes an SMA female connector.

F0403 Evaluation Board



14. Reference Board Matching Circuit



Designator	Type	Value	Description
L1, L2	Inductor	2.2nH	Murata LQG15HN series
C1	Capacitor	Not fitted	Not fitted

15. Packaging

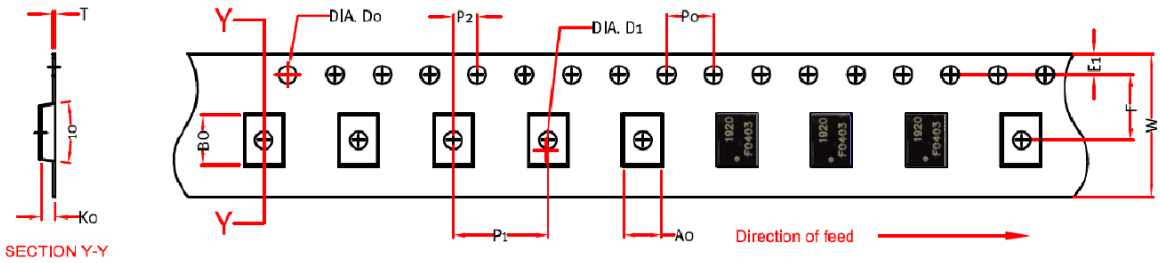
15.1 Optimal Storage Conditions

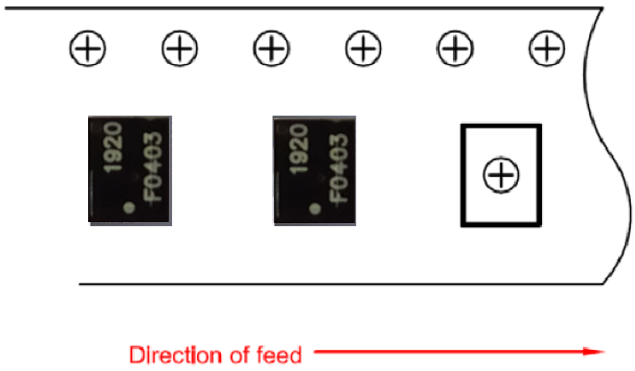
Temperature	-10ºC to 40ºC
Humidity	Less than 75% RH
Shelf life	24 Months
Storage place	Away from corrosive gas and direct sunlight
Packaging	Reels should be stored in unopened sealed manufacturer's plastic packaging.

Note: Storage of open reels of antennas is not recommended due to possible oxidization of pads on antennas. If short term storage is necessary, then it is highly recommended that the bag containing the antenna reel is re-sealed and stored in like storage conditions as in above table.

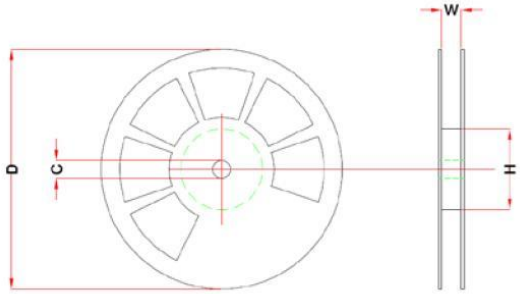
18.2 Tape Characteristics

F1media
[Part Number: F0403]





15.3 Reel Dimensions



Width	Reel Diameter	Hub Diameter	Shaft Diameter
14 mm	178 mm	60 mm	13.2 mm