# BCM9Fractal Antenna Specification

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| ***Subject*** | Broadcom BCM9Fractal 2.4 GHz PCB Antenna for Withings |
| ***Type*** | Specification |
| ***Written by*** | Victor Ting |
| ***Diffusion*** | Withings, Manufacturing Subcontractor, Certification Lab |

# I Revision History

V05 - 20240625
- Added manufacturer address to table on page 2.
- Added construction information on page 2.
- Corrected page headers.

V04
- Added more dimensions on Figure 1, antenna feed line length and width on page 3.

V03
- Removed "Confidential" note on page footer.
- Added "MAY BE MADE PUBLIC FOR THE PURPOSES OF CERTIFICATION" on page 3.

v02
- Added "Manufacturer" column on page 2 and added "Withings"

v01

- Initial version

# II Purpose

This document describes the design and gain characteristics of the BCM9Fractal 2.4 GHz PCB antenna provided to Withings by Broadcom.

# III Confidentiality

**The gain information contained in this document may be made public for purposes of certification.**

# IV Features

- Compact design
- 2.4 to 2.5 GHz operation
- 802.11b/g/n and Bluetooth applications
- VSWR better than 2:1
- Efficiency > 72%

# V General Description

This compact high efficiency PCB antenna has been optimized for use on small form factor boards and modules using Broadcom 802.11b/g/n WLAN chipsets. It offers a good radiation pattern in all 3 planes, together with high efficiency. This design is provided to Withings under NDA and can be easily incorporated into the layouts of various types of PCB design.

# VI Antenna Gain Details

| Type | Brand | Manufacturer | Address | Model | Max Antenna Gain (dBi) | Connector |
|---|---|---|---|---|---|---|
| PCB | Broadcom | Withings | 2 rue Maurice Hartmann<br>92130 Issy-les-Moulineaux<br>FRANCE | BCM9Fractal | 2.8 | N/A |

# VII Construction

The construction of the PCB antenna is based on the following parameters:

**Dielectric constant:** 3.99
**Impedance:** 50 ohm
**Thickness:** 35 um

The following figure shows the design of the antenna to be implemented on the PCB.

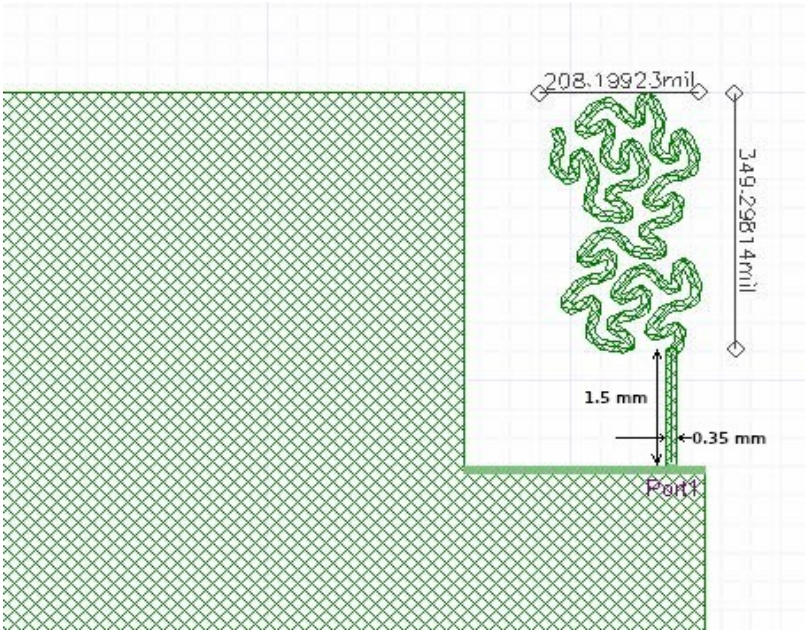


*Figure 1: PCB layout design*

# THE FOLLOWING INFORMATION IS UNDER NDA AND MAY BE MADE PUBLIC FOR THE PURPOSES OF CERTIFICATION

# VIII Measurements

The following diagram shows the orientation of the probes corresponding to the measurements made on the antenna.

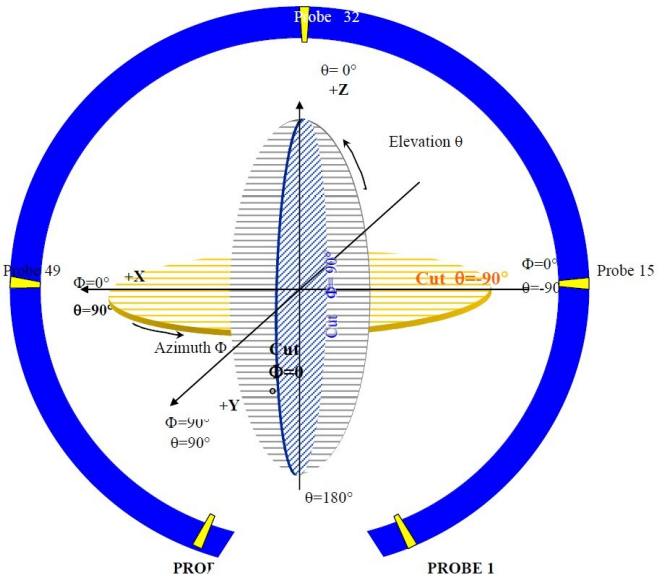


*Figure 2: Measurement probe orientation*

The subsequent graphs show the measurement results of the two cut planes:

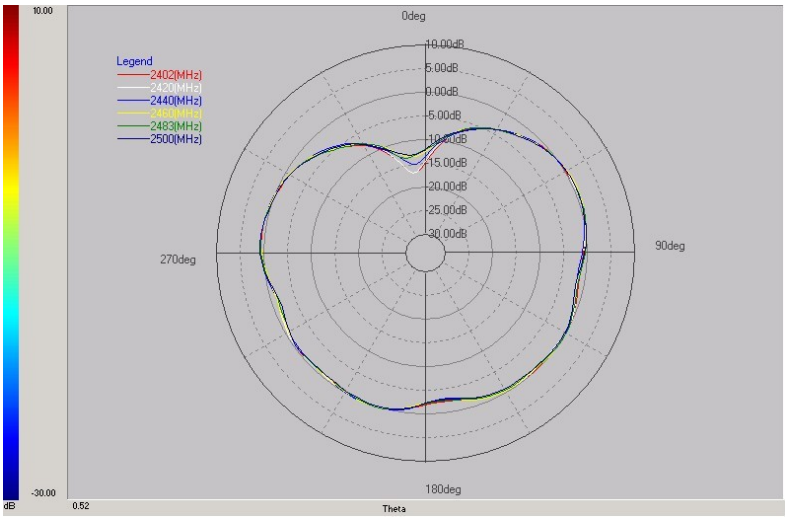


*Figure 3: Plane A: Phi 0*

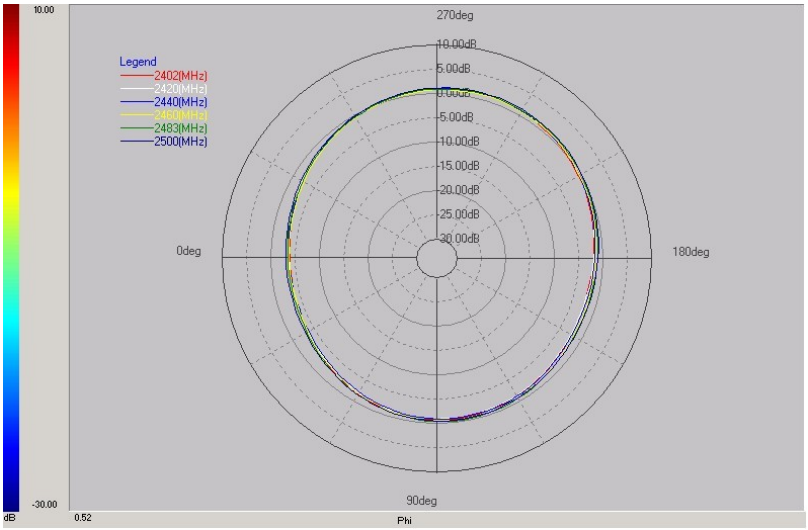


*Figure 4: Plane A: Phi 90*

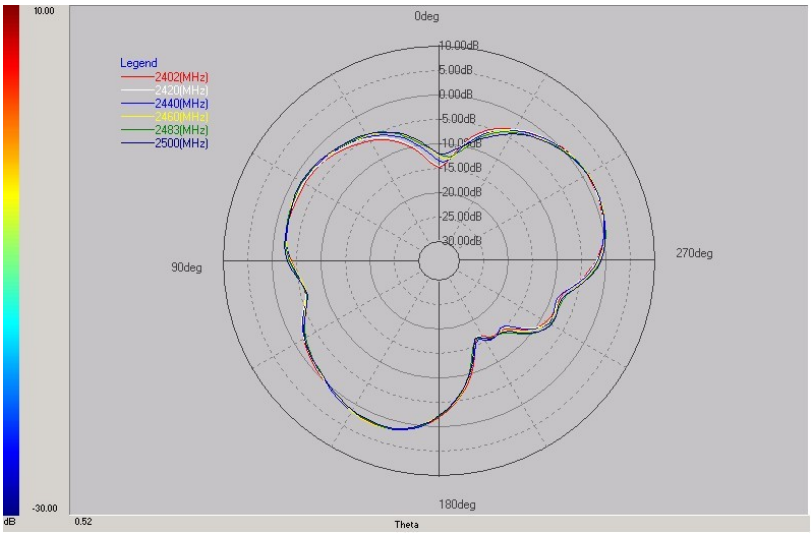


*Figure 5: Plane A: Theta 90*

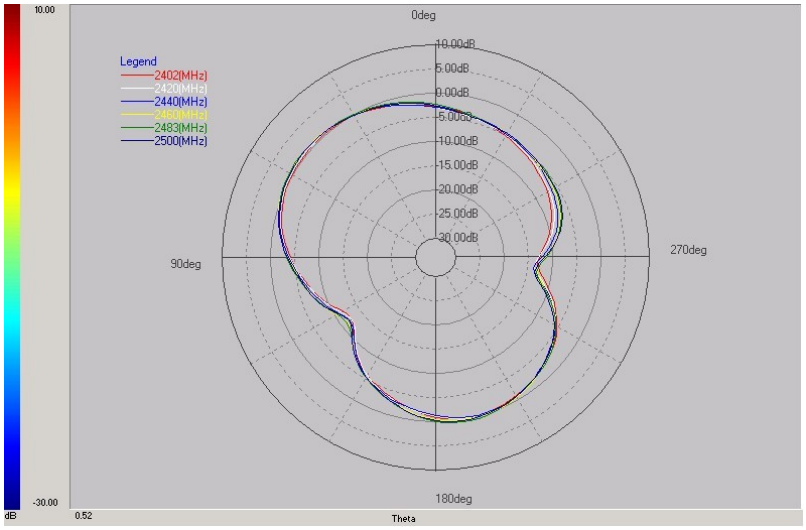


*Figure 6: Plane B: Phi 0*

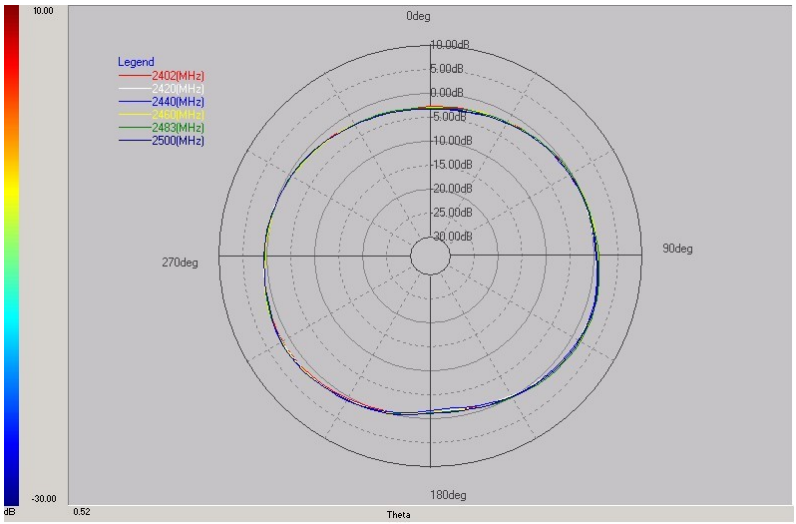


*Figure 7: Plane B: Phi 90*

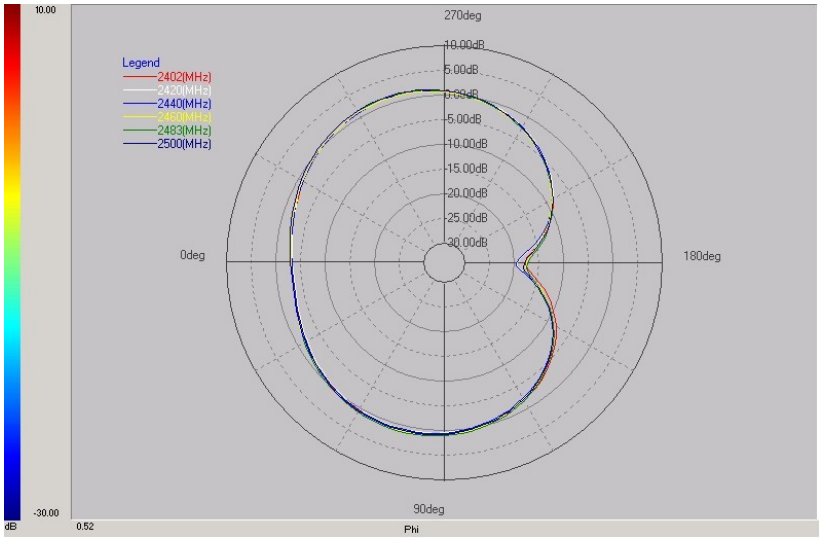


*Figure 8: Plane B: Theta 90*