

# **WCH731R**

## **Passive Data**

2025/09/25

# Test Condition

## 1. Test Condition

\* WCH731R PCB Antenna

- Test Chamber: Samsung OTA Chamber

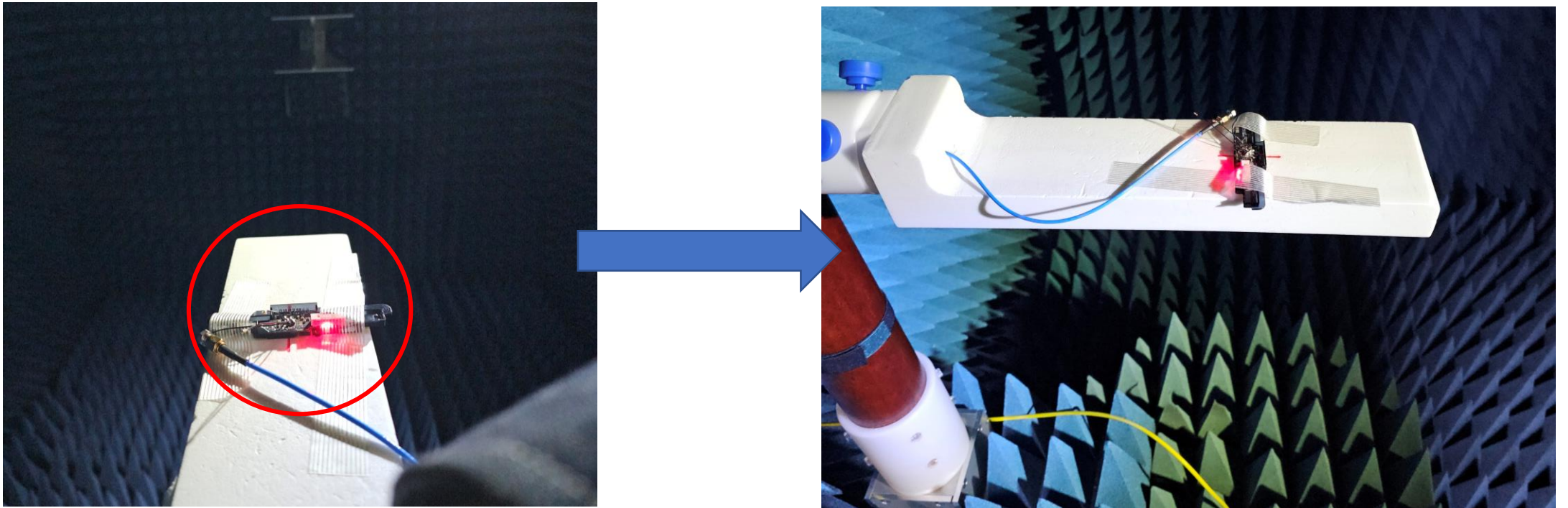
(Address: Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 16677, Korea)

- Network Analyzer : Return Loss

- 3D Passive Chamber : Gain and Efficiency

- Measured by Jeonghwan Kim 2025/09/25

## 2. Test Environment



# Antenna Gain Measurement Procedure and Software

The O5Tester Software is used to test antenna gain in the far field 3D OTA chamber.

The overview of the far field 3D OTA chamber is shown in Fig.1 and the antenna turntable rotation sampling is shown in Fig.2.

The antenna gain can be measured by the following steps

Place the AUT (Antenna Under Test) on the biaxial 3D turntable.

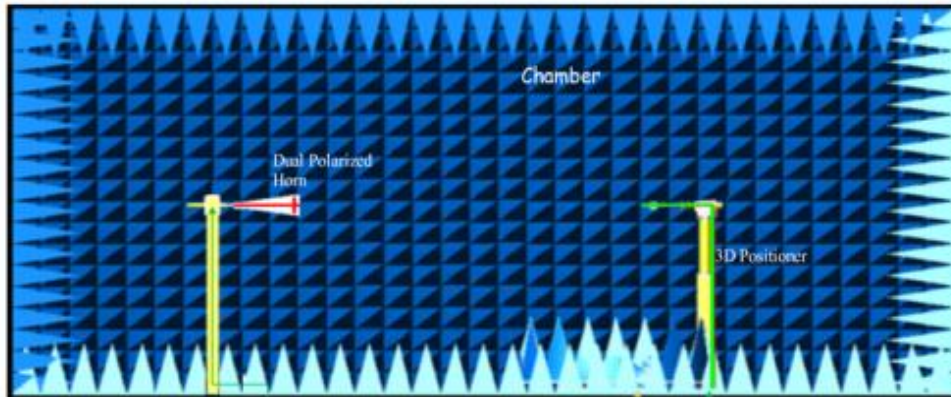
The test horn antenna maintains horizontal polarization, and the turntable rotation is controlled by the O5Tester test system and the value of each angular horizontal polarization of the AUT is read.

The test horn antenna maintains vertical polarization, and the turntable rotation is controlled by the O5Tester test system and the value of each angular vertical polarization of the AUT is read.

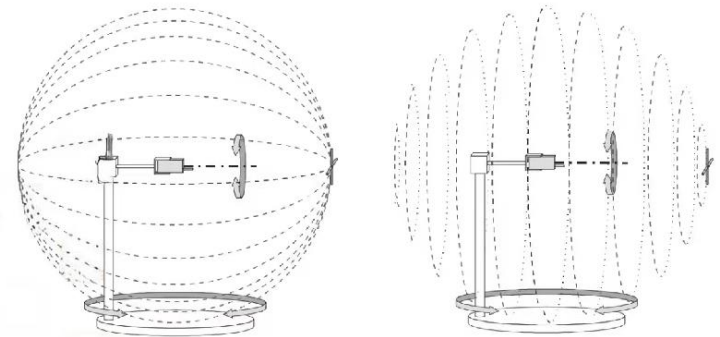
The O5Tester test system compares the obtained test values with the standard antenna to obtain the final gain values.

Compact Chamber size : 3.0m \* 2.5m x 2.5m

Operating frequency : 0.7 ~ 18 GHz



**Fig.1 Overview of 3D chamber**



**Fig.2 Antenna turntable rotation sampling**

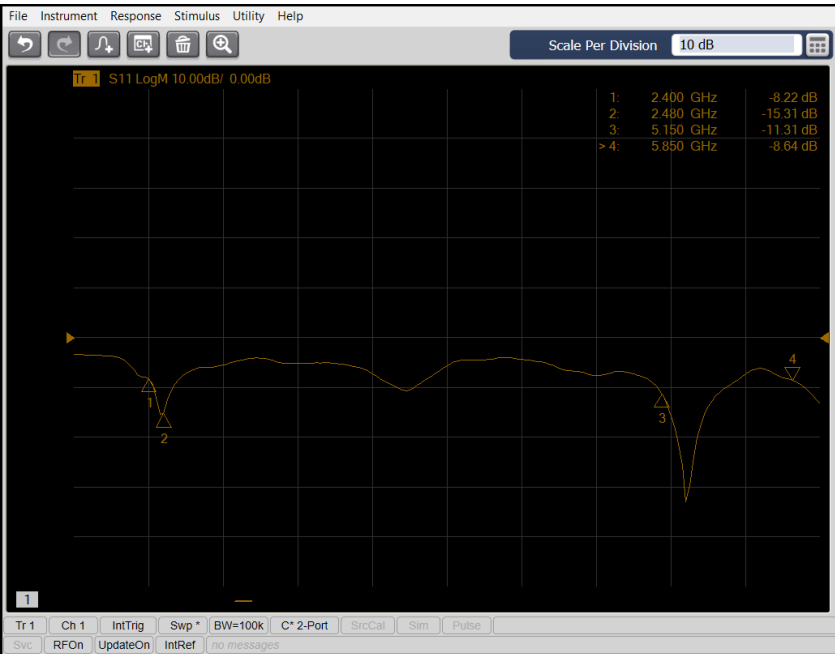
# Measuring Instruments

| Item | Measuring Instruments              | Latest Calibration Schedule |
|------|------------------------------------|-----------------------------|
| 1    | OTA Chamber                        | 2025/7/7                    |
| 2    | Network Analyzer<br>Keysight 5071c | 2025/8/4                    |

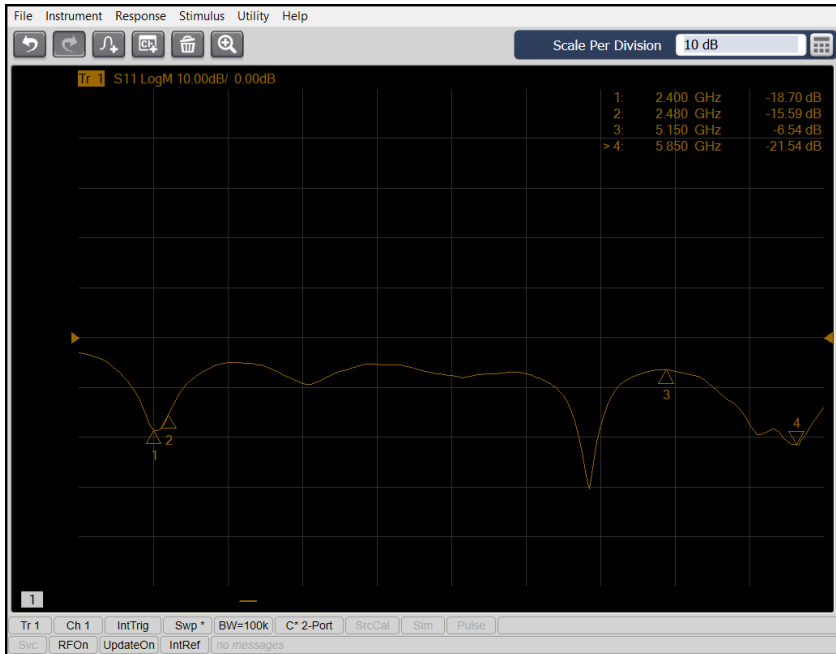
# Electrical Characteristics

| Item               | WIFI1 Specification |         | WIFI0 Specification |         | BT Specification |
|--------------------|---------------------|---------|---------------------|---------|------------------|
| Antenna Type       | PCB Antenna         |         | PCB Antenna         |         | PCB Antenna      |
| Central Frequency  | 2440MHz             | 5500MHz | 2440MHz             | 5500MHz | 2440MHz          |
| Band Width         | 80MHz               | 700MHz  | 80MHz               | 700MHz  | 80MHz            |
| Peak Gain          | 1.7dBi              | 1.1dBi  | 1.2dBi              | 1.9dBi  | 1.2dBi           |
| Return Loss        | <-8dB               | <-8dB   | <-15dB              | <-6dB   | <-14dB           |
| Polarization       | Linear              |         | Linear              |         | Linear           |
| Azimuth Beam width | Omni-directional    |         | Omni-directional    |         | Omni-directional |
| Impedance          | 50Ω                 |         | 50Ω                 |         | 50Ω              |
| Dimension          | 13 * 5.5 mm         |         | 9 * 5.5 mm          |         | 10 * 3 mm        |

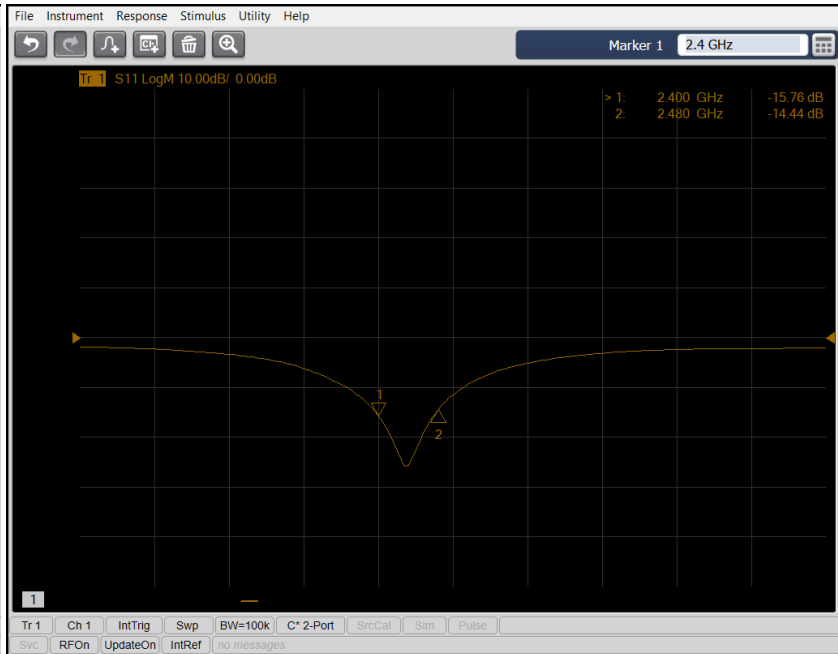
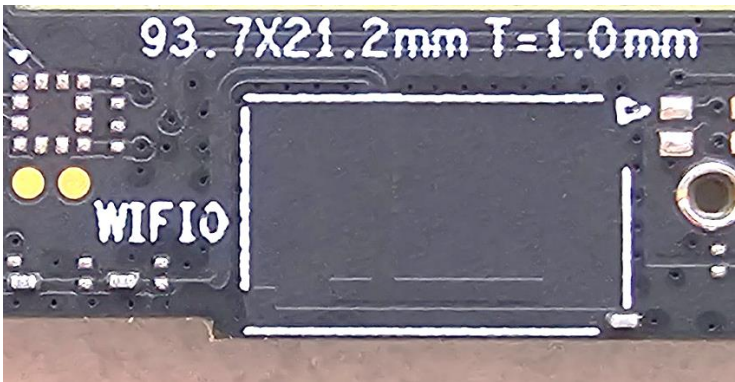
# Passive Test – Return Loss



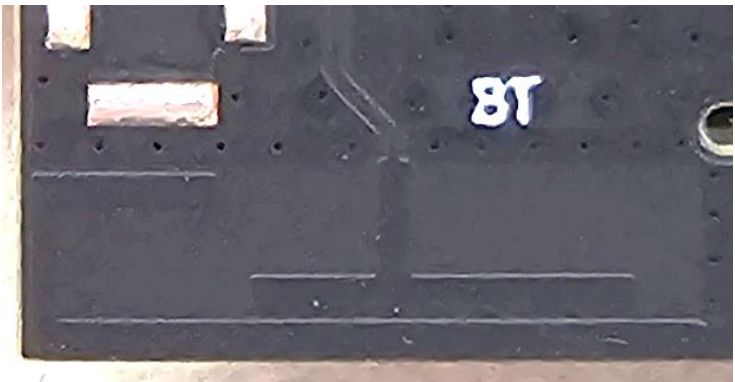
WIFI1



WIFI0



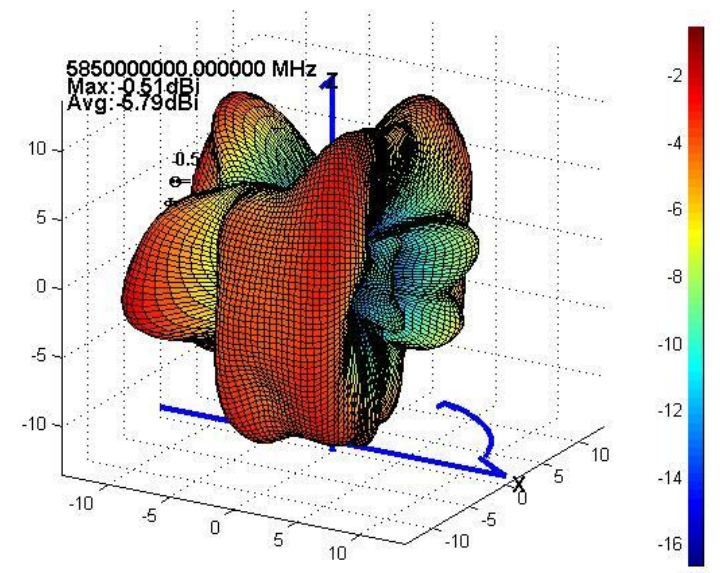
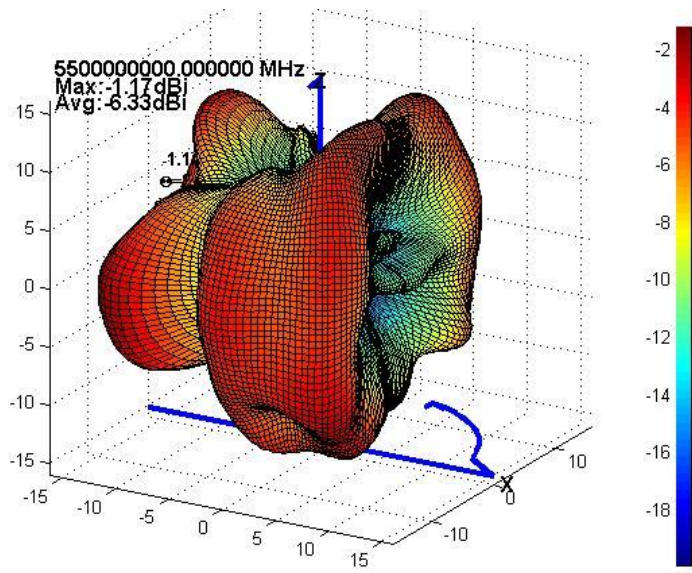
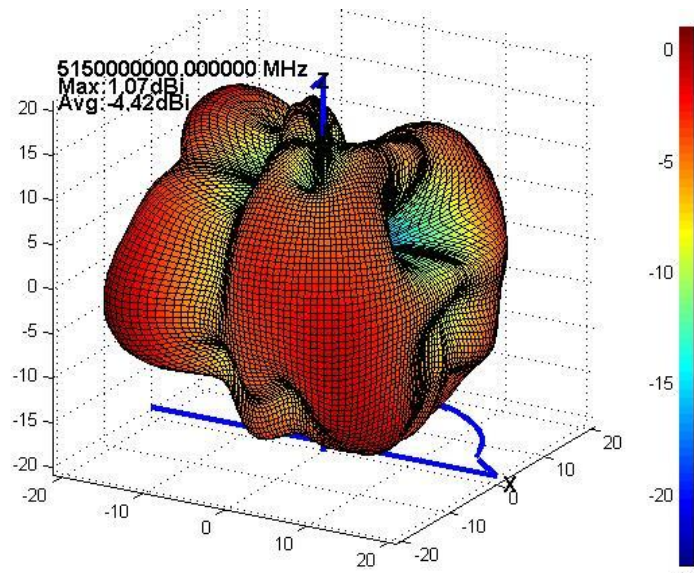
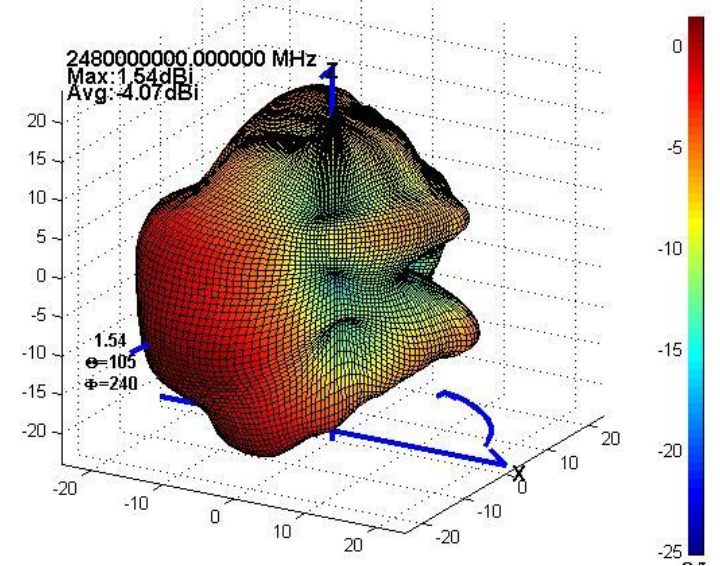
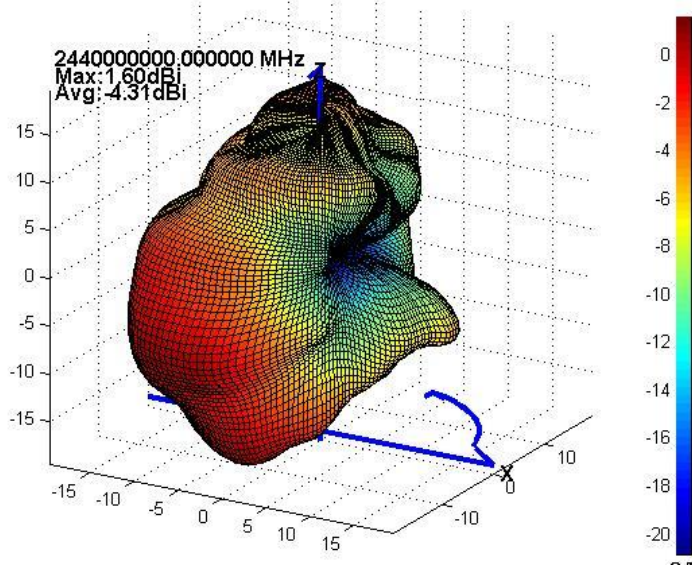
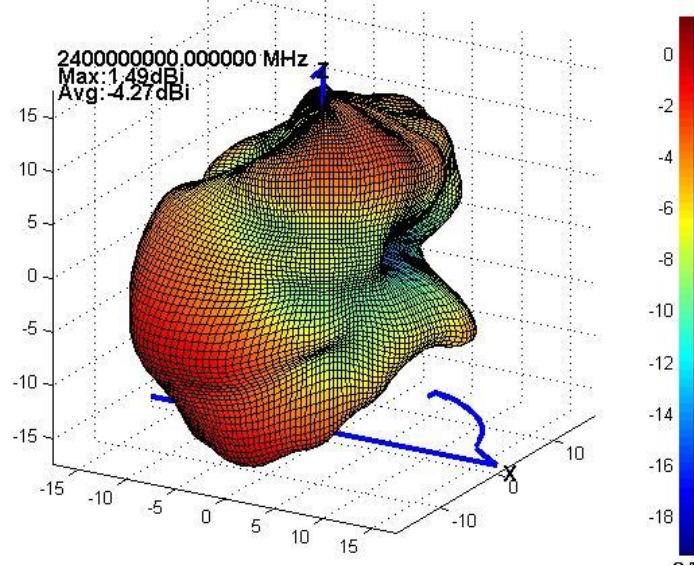
BT



# WIFI1 Passive Test – Antenna 3D Gain

| Frequency | Efficiency | Average Gain |          |          | Max Gain |          |          |
|-----------|------------|--------------|----------|----------|----------|----------|----------|
|           |            | Ver          | Hor      | Total    | Ver      | Hor      | Total    |
| 2,400 MHz | 37.4 %     | -6.2 dBi     | -8.7 dBi | -4.3 dBi | 0.3 dBi  | -0.4 dBi | 1.5 dBi  |
| 2,410 MHz | 36.9 %     | -6.1 dBi     | -9.0 dBi | -4.3 dBi | 0.4 dBi  | -0.4 dBi | 1.5 dBi  |
| 2,420 MHz | 36.3 %     | -6.1 dBi     | -9.2 dBi | -4.4 dBi | 0.5 dBi  | -0.6 dBi | 1.5 dBi  |
| 2,430 MHz | 36.1 %     | -6.1 dBi     | -9.4 dBi | -4.4 dBi | 0.6 dBi  | -0.5 dBi | 1.5 dBi  |
| 2,440 MHz | 37.0 %     | -6.0 dBi     | -9.2 dBi | -4.3 dBi | 0.7 dBi  | -0.3 dBi | 1.6 dBi  |
| 2,450 MHz | 38.5 %     | -5.9 dBi     | -8.9 dBi | -4.1 dBi | 0.8 dBi  | -0.1 dBi | 1.7 dBi  |
| 2,460 MHz | 38.7 %     | -6.0 dBi     | -8.7 dBi | -4.1 dBi | 0.8 dBi  | -0.1 dBi | 1.6 dBi  |
| 2,470 MHz | 39.2 %     | -6.1 dBi     | -8.3 dBi | -4.1 dBi | 0.7 dBi  | 0.0 dBi  | 1.6 dBi  |
| 2,480 MHz | 39.1 %     | -6.3 dBi     | -8.0 dBi | -4.1 dBi | 0.5 dBi  | -0.1 dBi | 1.5 dBi  |
| 2,490 MHz | 39.1 %     | -6.4 dBi     | -7.8 dBi | -4.1 dBi | 0.4 dBi  | -0.2 dBi | 1.4 dBi  |
| 2,500 MHz | 38.7 %     | -6.6 dBi     | -7.8 dBi | -4.1 dBi | 0.3 dBi  | -0.2 dBi | 1.1 dBi  |
| 5,150 MHz | 36.1 %     | -7.1 dBi     | -7.8 dBi | -4.4 dBi | -0.4 dBi | -2.6 dBi | 1.1 dBi  |
| 5,200 MHz | 31.9 %     | -7.7 dBi     | -8.3 dBi | -5.0 dBi | -0.6 dBi | -3.4 dBi | 0.8 dBi  |
| 5,250 MHz | 28.6 %     | -8.2 dBi     | -8.8 dBi | -5.4 dBi | -1.0 dBi | -4.0 dBi | 0.3 dBi  |
| 5,300 MHz | 27.1 %     | -8.4 dBi     | -8.9 dBi | -5.7 dBi | -1.2 dBi | -4.5 dBi | 0.1 dBi  |
| 5,350 MHz | 23.4 %     | -9.2 dBi     | -9.5 dBi | -6.3 dBi | -2.2 dBi | -5.1 dBi | -0.7 dBi |
| 5,400 MHz | 22.3 %     | -9.4 dBi     | -9.6 dBi | -6.5 dBi | -3.0 dBi | -5.3 dBi | -1.3 dBi |
| 5,450 MHz | 25.3 %     | -8.9 dBi     | -9.0 dBi | -6.0 dBi | -2.6 dBi | -4.7 dBi | -0.9 dBi |
| 5,500 MHz | 23.2 %     | -9.4 dBi     | -9.3 dBi | -6.3 dBi | -3.1 dBi | -4.7 dBi | -1.2 dBi |
| 5,550 MHz | 21.0 %     | -9.8 dBi     | -9.8 dBi | -6.8 dBi | -3.5 dBi | -4.6 dBi | -1.4 dBi |
| 5,600 MHz | 20.7 %     | -9.9 dBi     | -9.8 dBi | -6.8 dBi | -3.8 dBi | -4.3 dBi | -1.4 dBi |
| 5,650 MHz | 21.8 %     | -9.7 dBi     | -9.5 dBi | -6.6 dBi | -3.6 dBi | -3.4 dBi | -1.2 dBi |
| 5,700 MHz | 20.6 %     | -9.9 dBi     | -9.8 dBi | -6.9 dBi | -3.7 dBi | -3.3 dBi | -1.1 dBi |
| 5,750 MHz | 23.5 %     | -9.2 dBi     | -9.4 dBi | -6.3 dBi | -2.8 dBi | -2.5 dBi | -0.4 dBi |
| 5,800 MHz | 27.0 %     | -8.5 dBi     | -8.9 dBi | -5.7 dBi | -2.0 dBi | -2.1 dBi | -0.1 dBi |
| 5,850 MHz | 26.3 %     | -8.5 dBi     | -9.1 dBi | -5.8 dBi | -1.7 dBi | -2.9 dBi | -0.5 dBi |

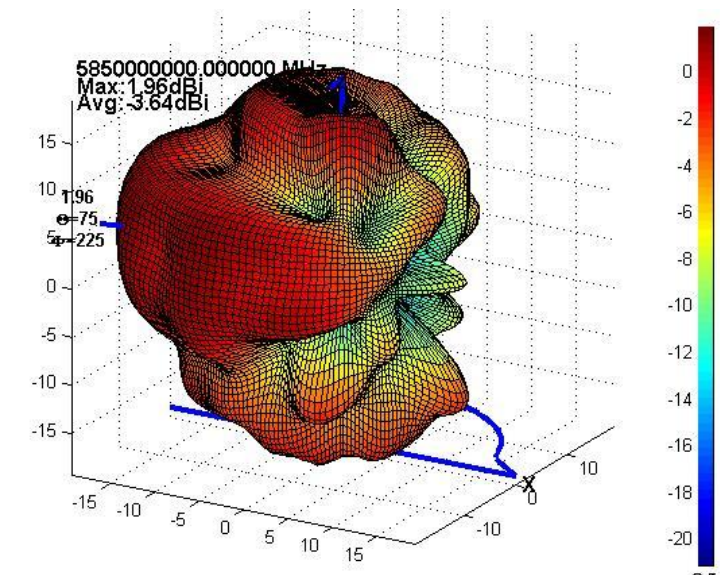
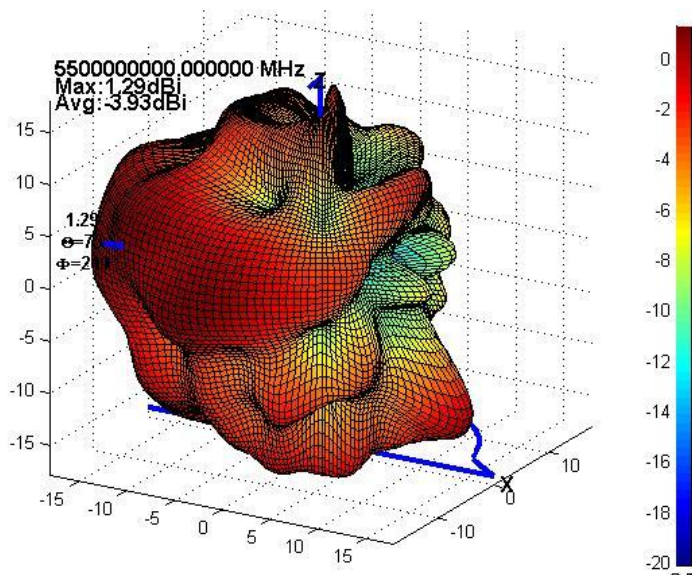
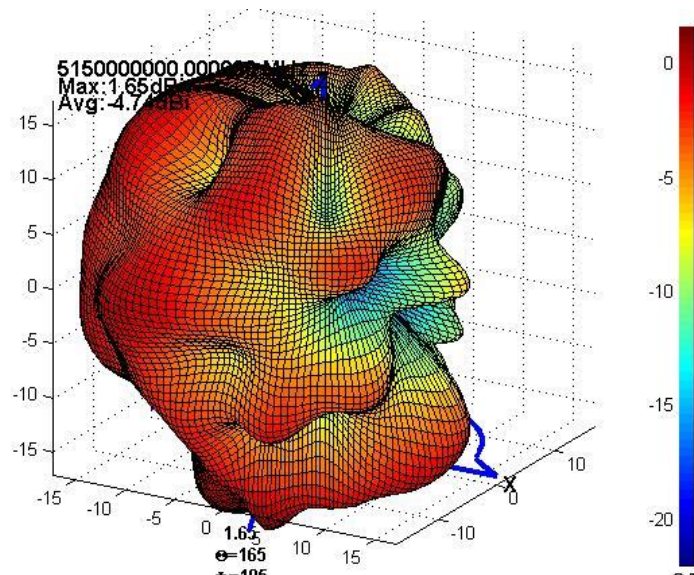
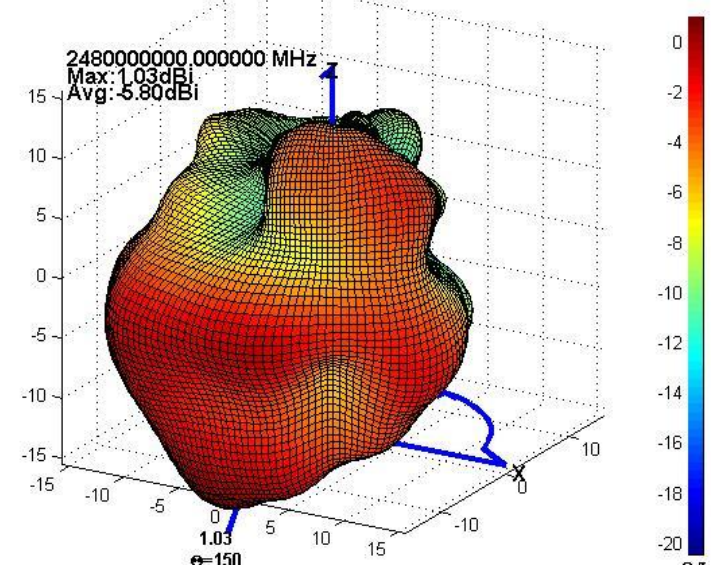
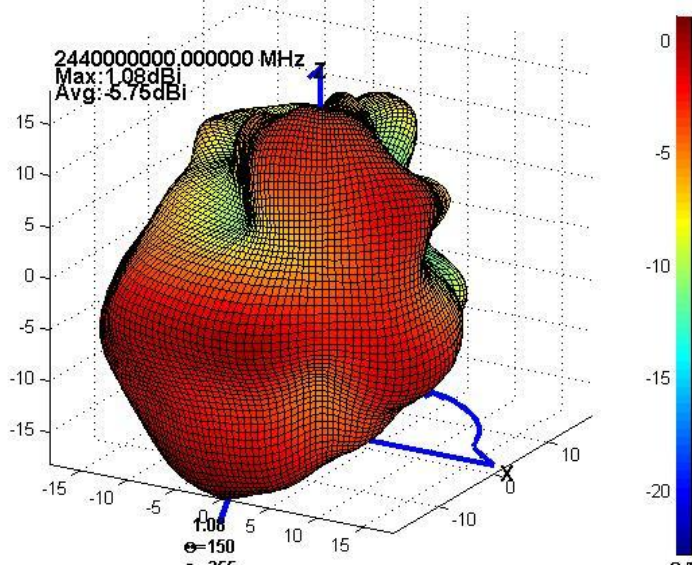
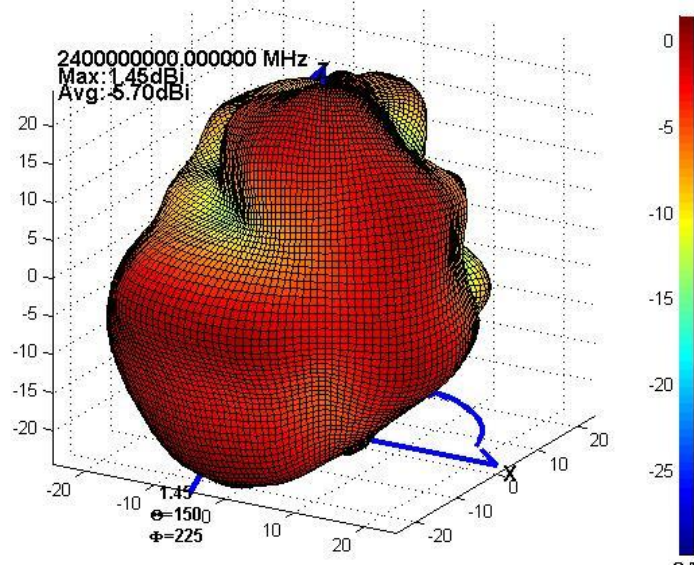
# WIFI1 Passive Test – Antenna 3D Radiation Pattern



# WIFI0 Passive Test – Antenna 3D Gain

| Frequency | Efficiency | Average Gain |          |          | Max Gain |          |          |
|-----------|------------|--------------|----------|----------|----------|----------|----------|
|           |            | Ver          | Hor      | Total    | Ver      | Hor      | Total    |
| 2,400 MHz | 40.0 %     | -8.3 dBi     | -6.0 dBi | -4.0 dBi | -2.0 dBi | -0.2 dBi | 0.7 dBi  |
| 2,410 MHz | 40.5 %     | -8.2 dBi     | -6.0 dBi | -3.9 dBi | -1.9 dBi | -0.3 dBi | 0.7 dBi  |
| 2,420 MHz | 40.3 %     | -8.1 dBi     | -6.1 dBi | -3.9 dBi | -1.7 dBi | -0.4 dBi | 0.6 dBi  |
| 2,430 MHz | 39.9 %     | -8.1 dBi     | -6.1 dBi | -4.0 dBi | -1.5 dBi | -0.6 dBi | 0.6 dBi  |
| 2,440 MHz | 40.3 %     | -8.0 dBi     | -6.1 dBi | -3.9 dBi | -1.3 dBi | -0.6 dBi | 0.7 dBi  |
| 2,450 MHz | 43.6 %     | -7.7 dBi     | -5.8 dBi | -3.6 dBi | -0.9 dBi | -0.4 dBi | 1.1 dBi  |
| 2,460 MHz | 44.5 %     | -7.6 dBi     | -5.7 dBi | -3.5 dBi | -0.7 dBi | -0.3 dBi | 1.2 dBi  |
| 2,470 MHz | 44.3 %     | -7.6 dBi     | -5.7 dBi | -3.5 dBi | -0.7 dBi | -0.4 dBi | 1.2 dBi  |
| 2,480 MHz | 44.0 %     | -7.7 dBi     | -5.7 dBi | -3.6 dBi | -0.5 dBi | -0.5 dBi | 1.1 dBi  |
| 2,490 MHz | 44.2 %     | -7.6 dBi     | -5.7 dBi | -3.5 dBi | -0.4 dBi | -0.4 dBi | 1.1 dBi  |
| 2,500 MHz | 44.8 %     | -7.6 dBi     | -5.6 dBi | -3.5 dBi | -0.3 dBi | -0.4 dBi | 1.2 dBi  |
| 5,150 MHz | 45.4 %     | -7.0 dBi     | -5.9 dBi | -3.4 dBi | 0.9 dBi  | 0.3 dBi  | 1.5 dBi  |
| 5,200 MHz | 45.3 %     | -7.0 dBi     | -6.0 dBi | -3.4 dBi | 1.2 dBi  | 0.3 dBi  | 1.9 dBi  |
| 5,250 MHz | 41.5 %     | -7.1 dBi     | -6.5 dBi | -3.8 dBi | 0.9 dBi  | 0.3 dBi  | 1.6 dBi  |
| 5,300 MHz | 33.4 %     | -7.5 dBi     | -8.0 dBi | -4.8 dBi | 0.4 dBi  | -0.4 dBi | 1.3 dBi  |
| 5,350 MHz | 30.1 %     | -7.4 dBi     | -9.2 dBi | -5.2 dBi | 0.0 dBi  | -0.9 dBi | 0.9 dBi  |
| 5,400 MHz | 30.3 %     | -7.1 dBi     | -9.7 dBi | -5.2 dBi | -0.4 dBi | -1.4 dBi | 0.5 dBi  |
| 5,450 MHz | 32.1 %     | -6.8 dBi     | -9.6 dBi | -4.9 dBi | -0.4 dBi | -1.4 dBi | 0.5 dBi  |
| 5,500 MHz | 30.6 %     | -7.0 dBi     | -9.7 dBi | -5.1 dBi | -0.6 dBi | -1.3 dBi | 0.4 dBi  |
| 5,550 MHz | 28.6 %     | -7.4 dBi     | -9.9 dBi | -5.4 dBi | -0.7 dBi | -1.5 dBi | 0.2 dBi  |
| 5,600 MHz | 28.1 %     | -7.5 dBi     | -9.8 dBi | -5.5 dBi | -0.8 dBi | -1.8 dBi | 0.0 dBi  |
| 5,650 MHz | 27.2 %     | -7.7 dBi     | -9.9 dBi | -5.7 dBi | -1.0 dBi | -2.2 dBi | -0.2 dBi |
| 5,700 MHz | 28.1 %     | -7.6 dBi     | -9.7 dBi | -5.5 dBi | -1.1 dBi | -2.5 dBi | -0.4 dBi |
| 5,750 MHz | 29.4 %     | -7.5 dBi     | -9.4 dBi | -5.3 dBi | -1.3 dBi | -2.3 dBi | -0.7 dBi |
| 5,800 MHz | 31.0 %     | -7.3 dBi     | -9.0 dBi | -5.1 dBi | -1.6 dBi | -1.6 dBi | -0.4 dBi |
| 5,850 MHz | 32.4 %     | -7.1 dBi     | -8.9 dBi | -4.9 dBi | -1.4 dBi | -1.5 dBi | -0.3 dBi |

# WIFI0 Passive Test – Antenna 3D Radiation Pattern



# BT Passive Test – Antenna 3D Gain

| Frequency | Efficiency | Average Gain |          |          | Max Gain |          |          |
|-----------|------------|--------------|----------|----------|----------|----------|----------|
|           |            | Ver          | Hor      | Total    | Ver      | Hor      | Total    |
| 2,400 MHz | 30.0 %     | -8.2 dBi     | -8.3 dBi | -5.2 dBi | -3.3 dBi | -1.5 dBi | -1.0 dBi |
| 2,410 MHz | 31.2 %     | -8.0 dBi     | -8.2 dBi | -5.1 dBi | -3.1 dBi | -1.3 dBi | -0.7 dBi |
| 2,420 MHz | 32.0 %     | -7.8 dBi     | -8.1 dBi | -5.0 dBi | -3.1 dBi | -1.2 dBi | -0.6 dBi |
| 2,430 MHz | 31.4 %     | -7.9 dBi     | -8.2 dBi | -5.0 dBi | -2.9 dBi | -1.4 dBi | -0.5 dBi |
| 2,440 MHz | 30.6 %     | -8.0 dBi     | -8.3 dBi | -5.1 dBi | -2.6 dBi | -1.5 dBi | -0.6 dBi |
| 2,450 MHz | 32.6 %     | -7.7 dBi     | -8.0 dBi | -4.9 dBi | -2.0 dBi | -1.1 dBi | -0.3 dBi |
| 2,460 MHz | 34.6 %     | -7.5 dBi     | -7.8 dBi | -4.6 dBi | -1.6 dBi | -0.7 dBi | 0.1 dBi  |
| 2,470 MHz | 34.7 %     | -7.5 dBi     | -7.7 dBi | -4.6 dBi | -1.5 dBi | -0.6 dBi | 0.4 dBi  |
| 2,480 MHz | 35.4 %     | -7.5 dBi     | -7.6 dBi | -4.5 dBi | -1.4 dBi | -0.4 dBi | 0.7 dBi  |
| 2,490 MHz | 36.9 %     | -7.4 dBi     | -7.3 dBi | -4.3 dBi | -1.3 dBi | -0.1 dBi | 1.0 dBi  |
| 2,500 MHz | 39.0 %     | -7.3 dBi     | -6.9 dBi | -4.1 dBi | -1.1 dBi | 0.1 dBi  | 1.2 dBi  |

# BT Passive Test – Antenna 3D Radiation Pattern

