

# FCC Part 15 Antenna Gain

## Test Report

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## 1. Overview

This test report presents the results of measuring the antenna gain for the Equipment Under Test (EUT) using the standard antenna method.

## **2. Test Objective**

**To measure the antenna gain of a specific EUT using the standard antenna method and evaluate its performance.**

**This test report demonstrates compliance with the antenna gain reporting requirements of FCC 2.1033(b)(4), 15.203, 15.212.**

### 3. Test Equipment

The equipment used for this test is shown below.

- **Equipment Under Test (EUT):**

  - Model: UA-1040TBLE**

  - Antenna Type: Pattern Antenna**

  - Antenna Manufacturer: A&D Company, Limited**

  - Operating frequency range: 2402-2480MHz (ISM)**

- **Antenna Measurement System:**

  - Fully anechoic chamber with Double-Ridged Horn Antenna, mechanical positioners of Phi axes.**

- **Network Analyzer:**

  - KEYSIGHT N9918A**

  - Calibration Date: 28/09/2023 (Conducted once a year)**

- **Commercial Test Software:**

  - MATEOS.NET sold by Microwave Factory Co.,Ltd.**

### 4. Test Method

The standard antenna method, which is an industry standard measurement method, is used to measure the antenna gain and directivity of the EUT.

Prepare a transmit antenna and a reference antenna, and install them in the anechoic chamber at a certain distance. Measuring the received power of reference antenna  $P_{rs}$  [dBm] in this state.

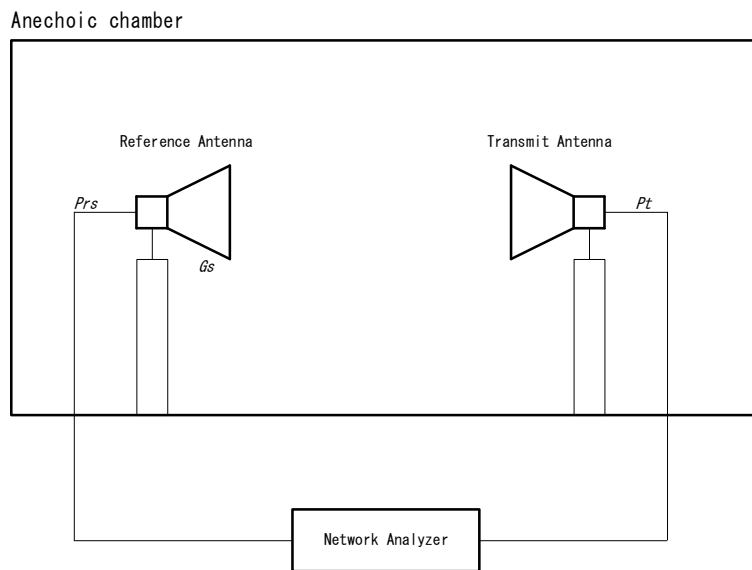


Fig.1 Measurement of Reference Antenna

Install the test antenna (EUT) in place of the reference antenna, and measuring the received power of EUT  $P_{rt}$  [dBm].

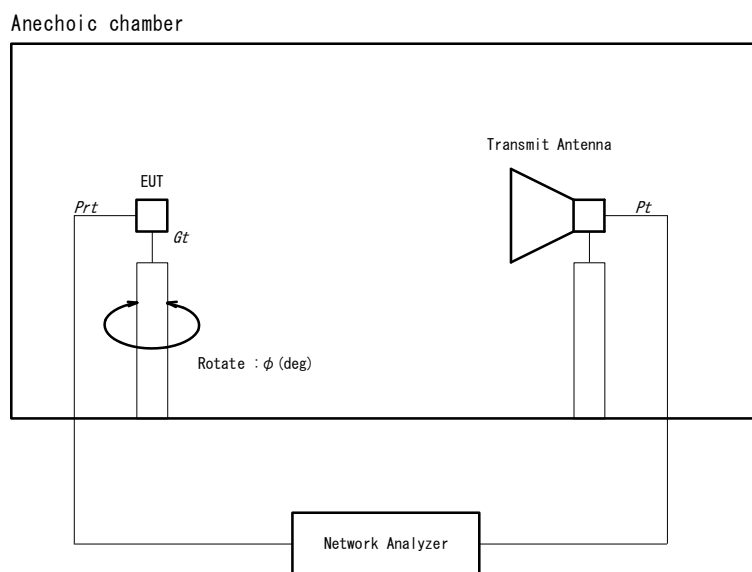


Fig.2 Measurement of EUT

EUT gain  $G_t$  [dBi] is calculated from the reference antenna gain  $G_s$  [dBi] and received power of reference antenna  $P_{rs}$  [dBm] using the following formula.

$$G_t = P_{rt} - P_{rs} + G_s$$

Also, measurement of antenna directivity by rotating the EUT in the Phi axes direction.

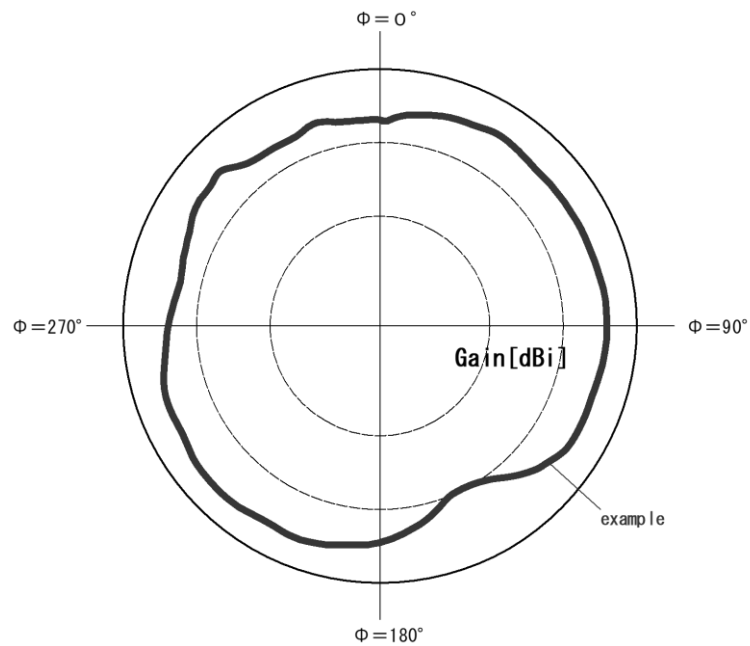


Fig.3 Antenna directivity diagram

## 5. Test Information

**Test Lab: SAKUMA ANTENNA Co.,Ltd.**

**Test Lab Address: 304 Kannai capital building, Bentendori, 2-25, Naka Ward,  
Yokohama City, Kanagawa, Japan**

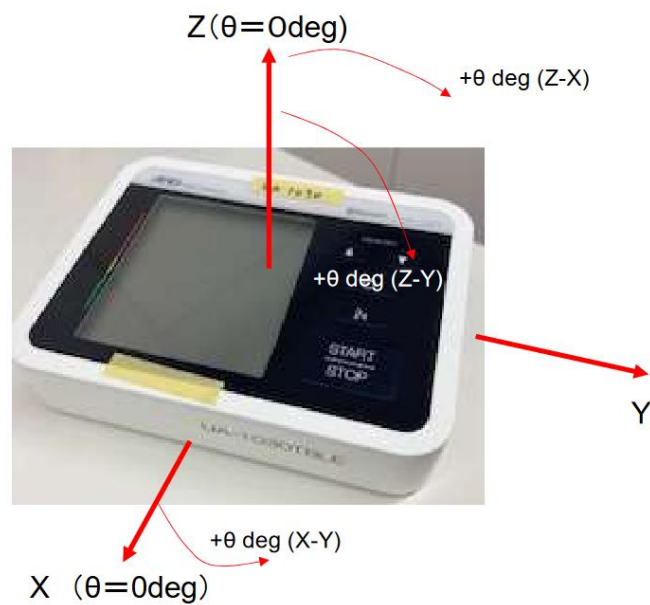
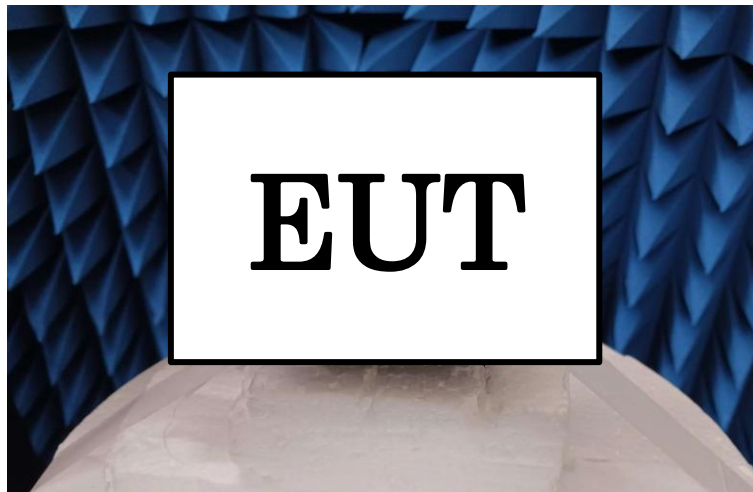
**Test Date: 5, Feb, 2024**

**Test Person: Hironori Okado**



## 6. Test Setup Photos

The device containing the integral antenna is placed on the styrofoam pylon.

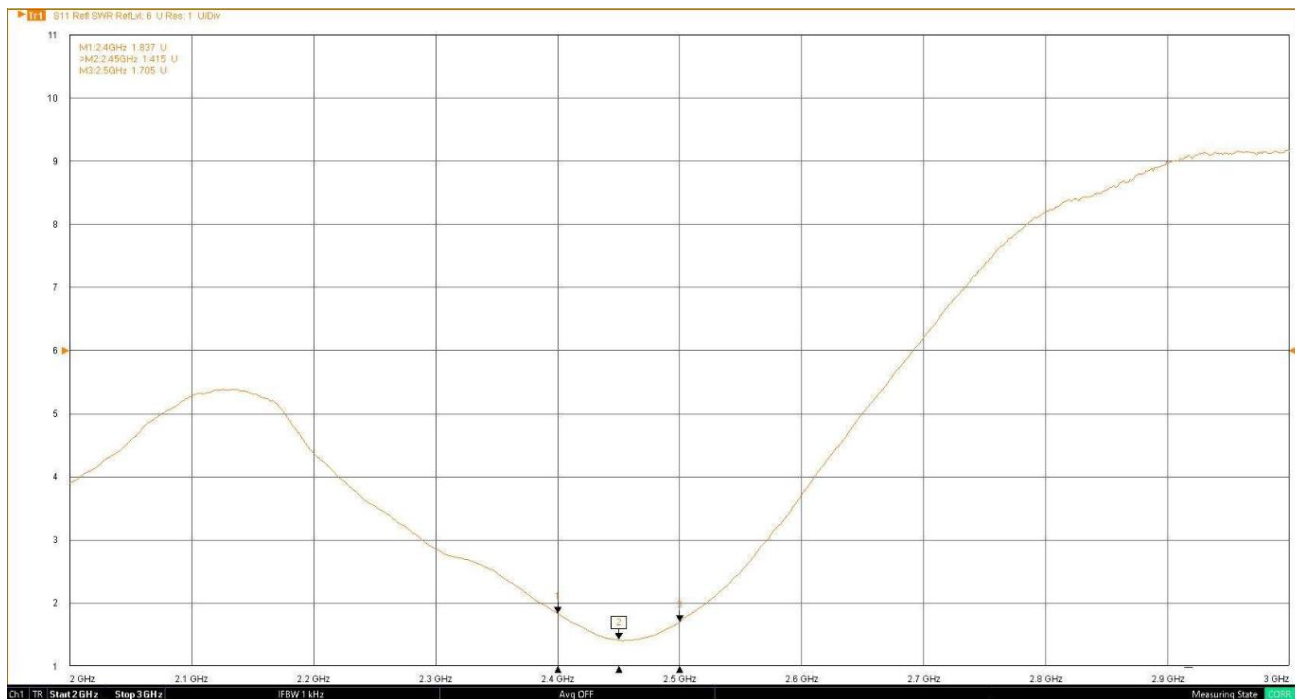


**Definition of antenna measurement axis**

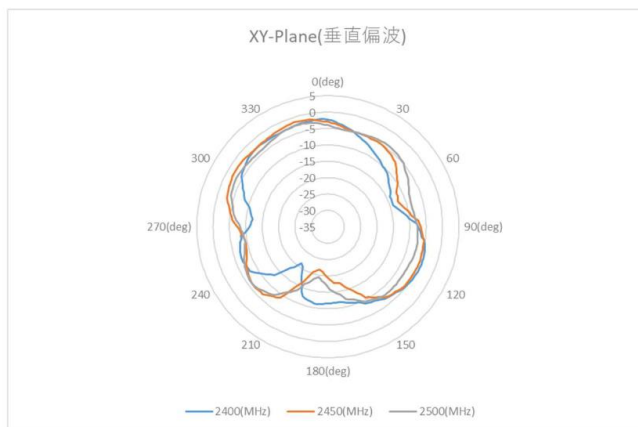
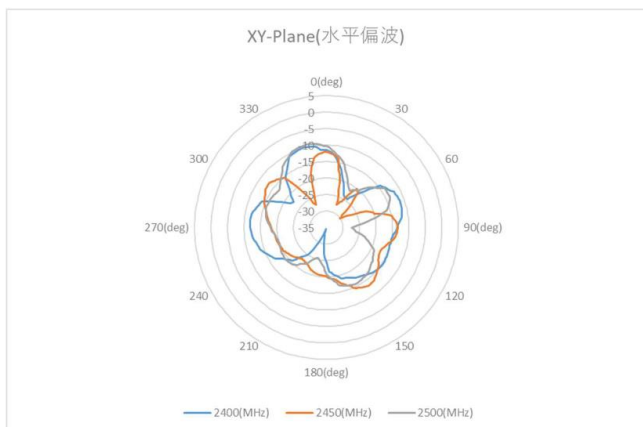
## 7. Test Result

The following is the result of the antenna test.

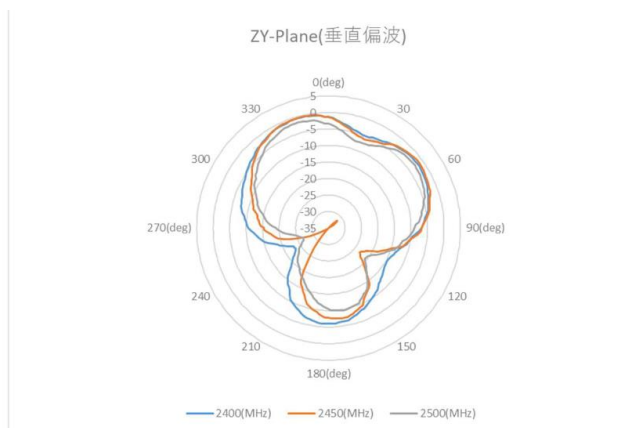
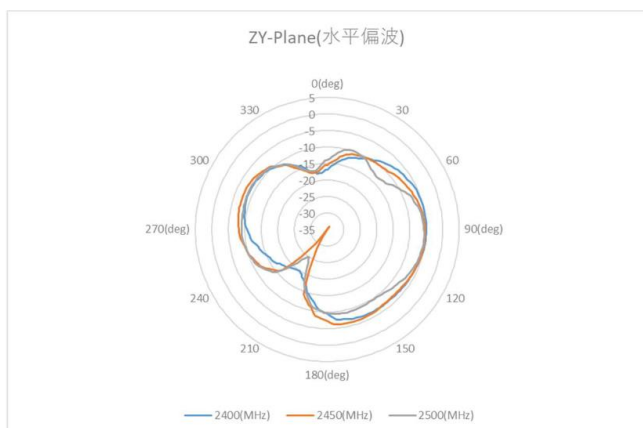
### (1) VSWR



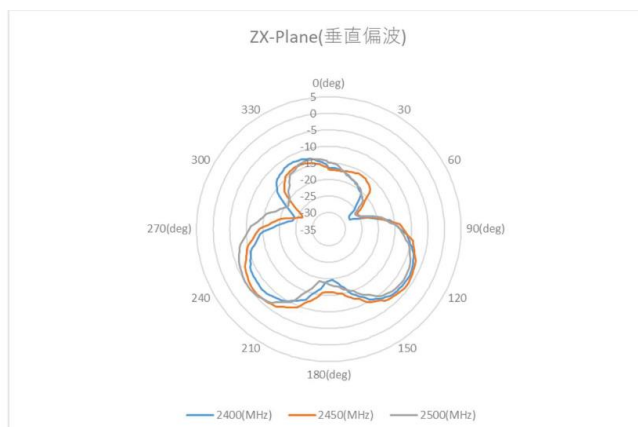
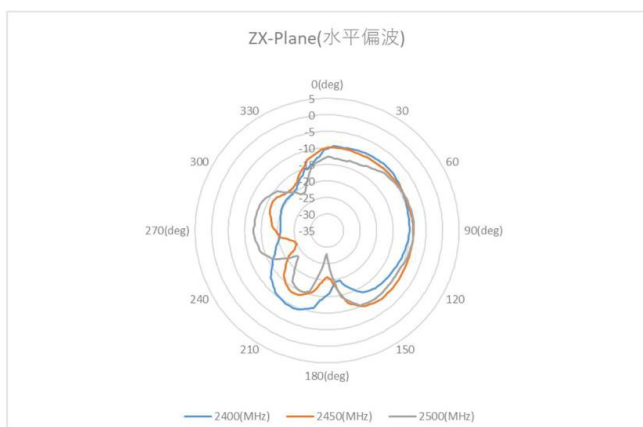
**(2) Directivity**



**XY-Plane**



**ZY-Plane**



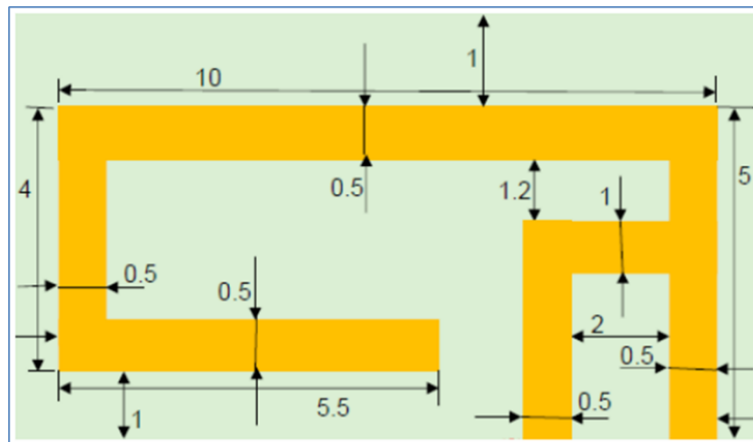
**ZX-Plane**

**(3) Antenna Efficiency & Maximum Gain**

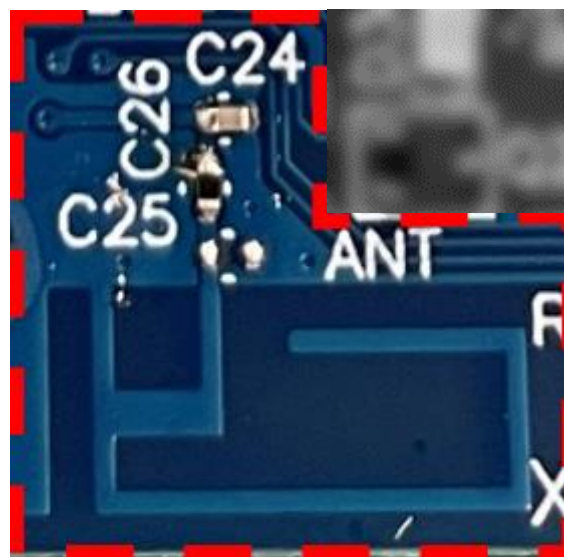
	<b>2400MHz</b>	<b>2450MHz</b>	<b>2500MHz</b>
<b>Antenna Efficiency</b>	<b>-5.7dB</b>	<b>-5.5dB</b>	<b>-6.4dB</b>

	<b>XY-Plane</b>	<b>ZY-Plane</b>	<b>XZ-Plane</b>
<b>Maximum Gain</b>	<b>-1.5dBi</b>	<b>-0.4dBi</b>	<b>-5.0dBi</b>

## 8. Antenna Photos or Drawings



Antenna Dimension



RF circuit

## 9. Revision History

Revision#	Date	Description of Change
1.00	07/05/2024	Original

**END OF DOCUMENT**



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