ANTENNA PASSIVE TEST REPORT

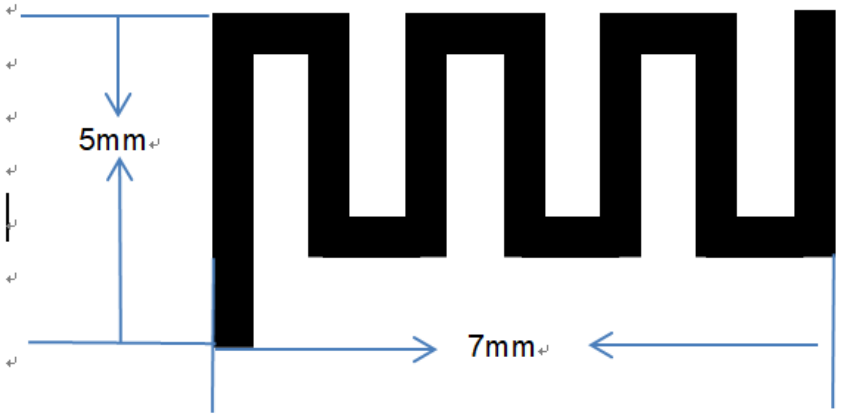
Standards	ANSI/IEEE Std 149-2021
Date Initial Sample(s) Received	Jun 25, 2024
Testing Start Date	Jun 25, 2024
Testing Finish Date	Jun 25, 2024
Report Issue Date	Jul 1,2024
*	**In the configuration tested, the EUT detailed in this report complied with the standards specified above.**

Revision History

Revision	Issue Date	Description
01	Jul 1,2024	Initial creation of report

TABLE OF CONTENTS

1 Antenna Photo&Length



1.4 General Description of EUT

Device Description:	N/A
Device Manufacturer:	N/A
Device Model:	N/A
Hardware Version:	N/A
Software Version:	N/A
Air Interface Supported	2.4GHz BLE
Dimension:	N/A

1.5 Test Procedure

Testing is performed according to the **ANSI/IEEE Std 149-2021**.

1.6 Test Specification

Identity	Document Title
ANSI/IEEE Std 149-2008	IEEE Standard Test Procedures for Antennas

1.7 Laboratory Environment

Temperature	Min. =19℃, Max. = 25℃	
Relative humidity	Min. =40%, Max. =72%	
Shield effect	0.7-6GHz	> 100dB
Ground resistance	<0.5Ω	

2 OTA Measurements System Configuration

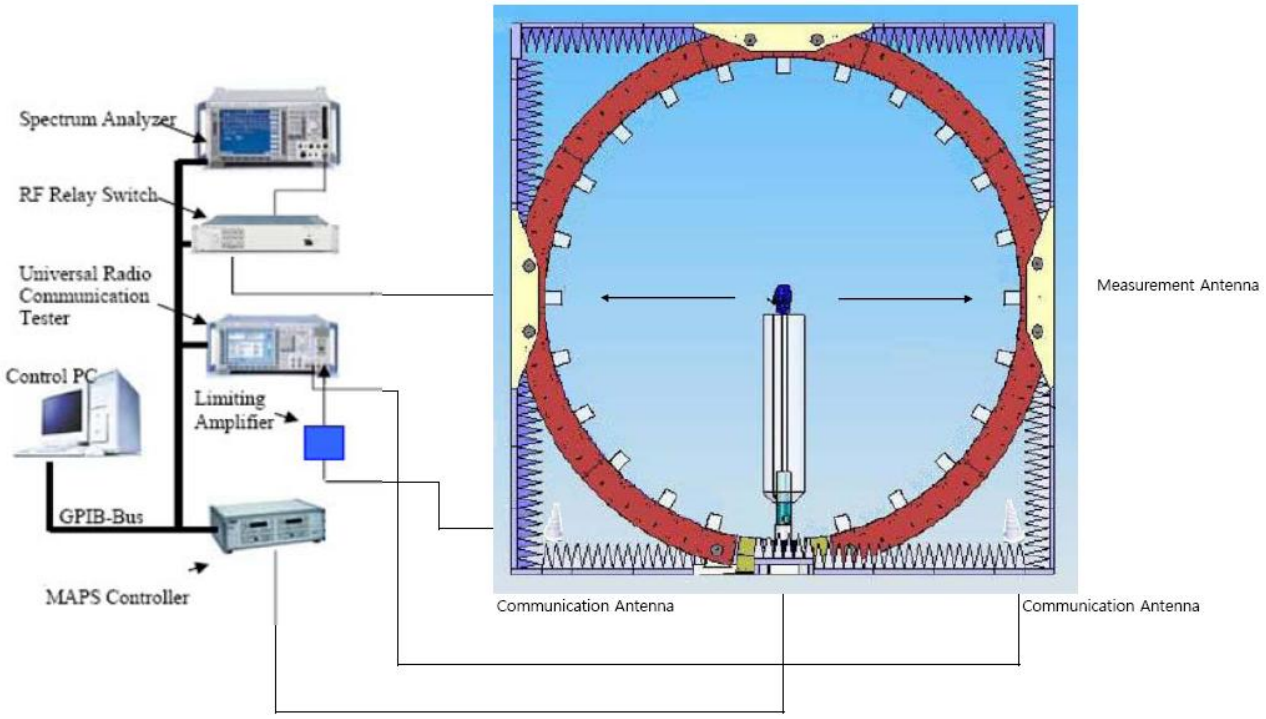
2.1 Test Configuration

Testing Condition:

- Temperature: 22±3˚C
- Humidity: <80%

Measurement Facility:

Great-Circle-Cut method is used to measure the antenna 3D GAIN of EUT in OTA qualified anechoic chamber. Equipment Under Test (EUT) geometry centre vertical projection at the centre of platform, the distance from EUT to measurement antenna is 5m



F-1. OTA Measurement System Configuration

3 Test Equipment List

Type of Equipment	Model Number	Manufacture	Calibration Date	Valid Period
Network Analyzer	E5071C	Keysight		
Quad-Ridge Horn Antenna 700 MHz-10 GHz	EMCO 3164-08	ETS-Lindgren L.P.	N/A	N/A
MAPS Controller	EMCENTER	ETS-Lindgren L.P.	N/A	N/A
SAM V4.5BS Head Phantom	Head Phantom	SPEAG	NCR	NCR

Definition of Acronyms:
NCR: No Calibration Requirement.

4 Measurement Uncertainty

Item	2400-2500 MHz (dB)
Gain	0.88
Efficiency	0.88
Measurement Uncertainty (95% CONFIDENCE INTERVAL) K=2	

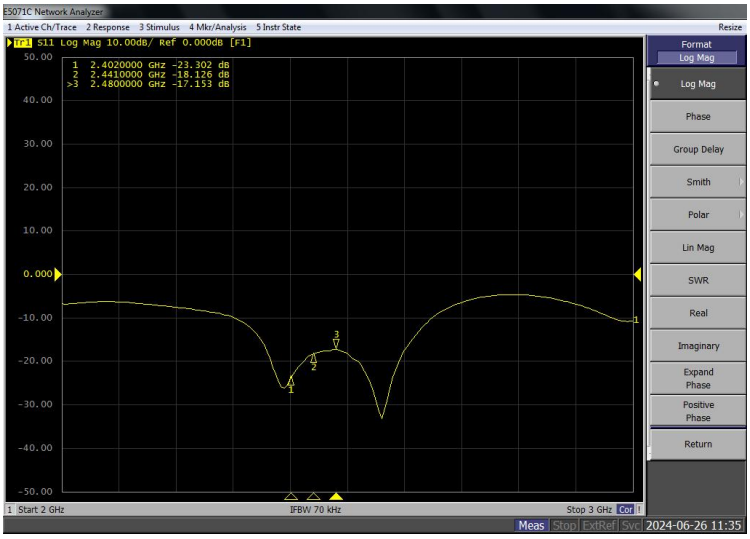
5 Test Results

Free Space			
Frequency (MHz)	**Efficiency (dB)**	**Efficiency (%)**	**Gain (dBi)**
2350	-3.46	45.13	0.98
2355	-3.63	43.38	1.09
2360	-3.46	45.08	1.21
2365	-3.65	43.18	1.09
2370	-3.71	42.52	1.03
2375	-3.89	40.84	0.83
2380	-3.89	40.80	0.81
2385	-3.82	41.47	0.87
2390	-3.86	41.11	1.01
2395	-3.74	42.22	1.18
2400	-4.01	39.67	0.79
2402	-4.09	38.98	0.82
2405	-4.14	38.51	0.83
2410	-4.19	38.08	0.69
2415	-4.21	37.93	0.71
2420	-4.04	39.42	0.96
2425	-4.16	38.36	0.79
2430	-4.27	37.42	0.77
2435	-4.42	36.11	0.65
2440	-4.42	36.11	0.59
2441	-4.37	36.56	0.68
2445	-4.26	37.50	0.72
2450	-4.18	38.20	0.90

2455	-4.04	39.43	1.09
2460	-4.21	37.97	0.92
2465	-4.27	37.38	0.91
2470	-4.55	35.11	0.57
2475	-4.60	34.64	0.44
2480	-4.69	33.95	0.26
2485	-4.66	34.23	0.43
2490	-4.61	34.57	0.50
2495	-4.44	35.96	0.79
2500	-4.39	36.39	0.78
2505	-4.28	37.35	0.92
2510	-4.29	37.23	0.93
2515	-4.49	35.55	0.78
2520	-4.72	33.71	0.58
2525	-4.96	31.90	0.47
2530	-5.06	31.20	0.44
2535	-5.12	30.73	0.31
2540	-5.07	31.11	0.35
2545	-4.96	31.90	0.50
2550	-4.96	31.95	0.52
2555	-4.98	31.75	0.54
2560	-5.11	30.86	0.31
2565	-5.14	30.59	0.33
2570	-5.17	30.39	0.21
2575	-5.14	30.62	0.19
2580	-5.08	31.02	0.39

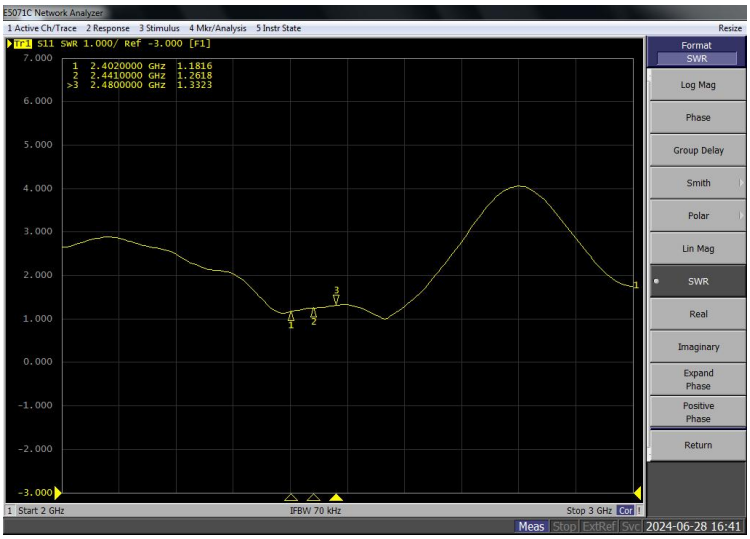
6 Pattern Plots

6.1 Return Loss



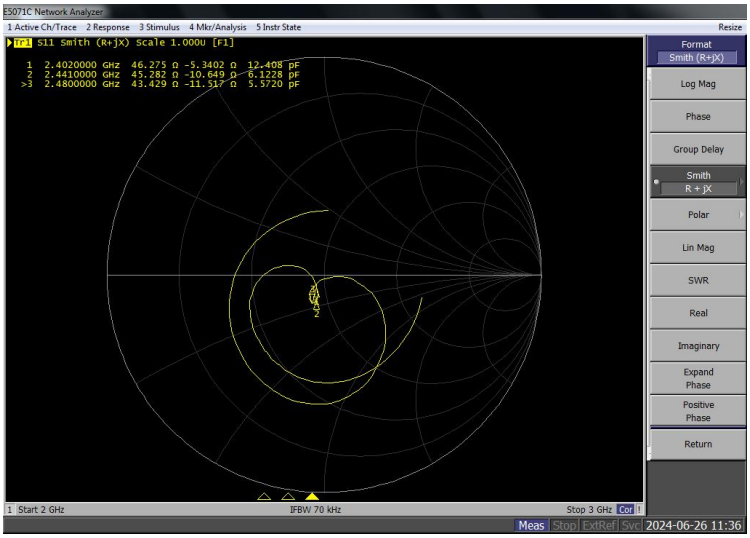
Free Space

6.2 VSWR



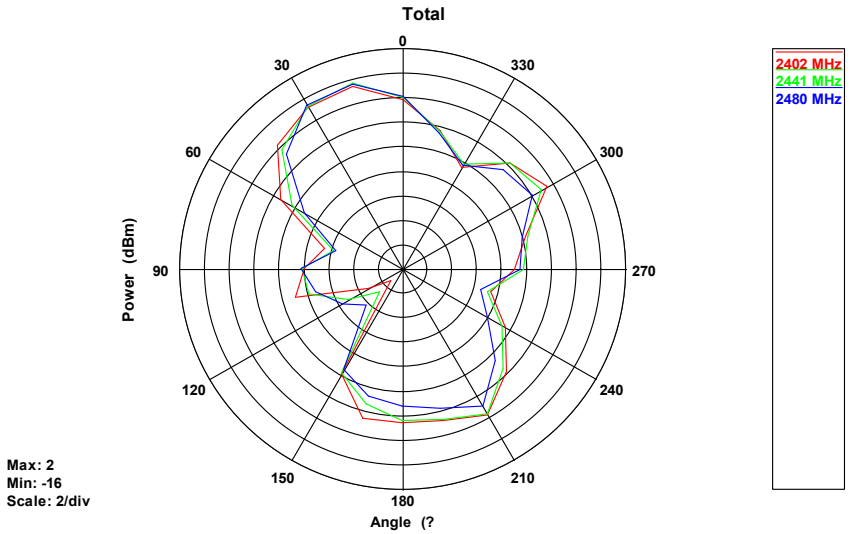
Free Space

6.3 Stimulus


E5071C Network Analyzer
1 Active Ch/Trace 2 Response 3 Stimulus 4 Mkr/Analysis 5 Instr State
Resize
Tr1 S11 Smith (R+jX) Scale 1.000U [F1]
1 2.4020000 GHz 46.275 Ω -5.3402 Ω 12.408 pF
2 2.4410000 GHz 45.282 Ω -10.649 Ω 6.1228 pF
>3 2.4800000 GHz 43.429 Ω -11.517 Ω 5.5720 pF
Format
Smith (R+jX)
Log Mag
Phase
Group Delay
Smith
R + jX
Polar
Lin Mag
SWR
Real
Imaginary
Expand Phase
Positive Phase
Return
1 Start 2 GHz
IFBW 70 kHz
Stop 3 GHz
Meas
Stop
ExtRef
Svc
2024-06-26 11:36

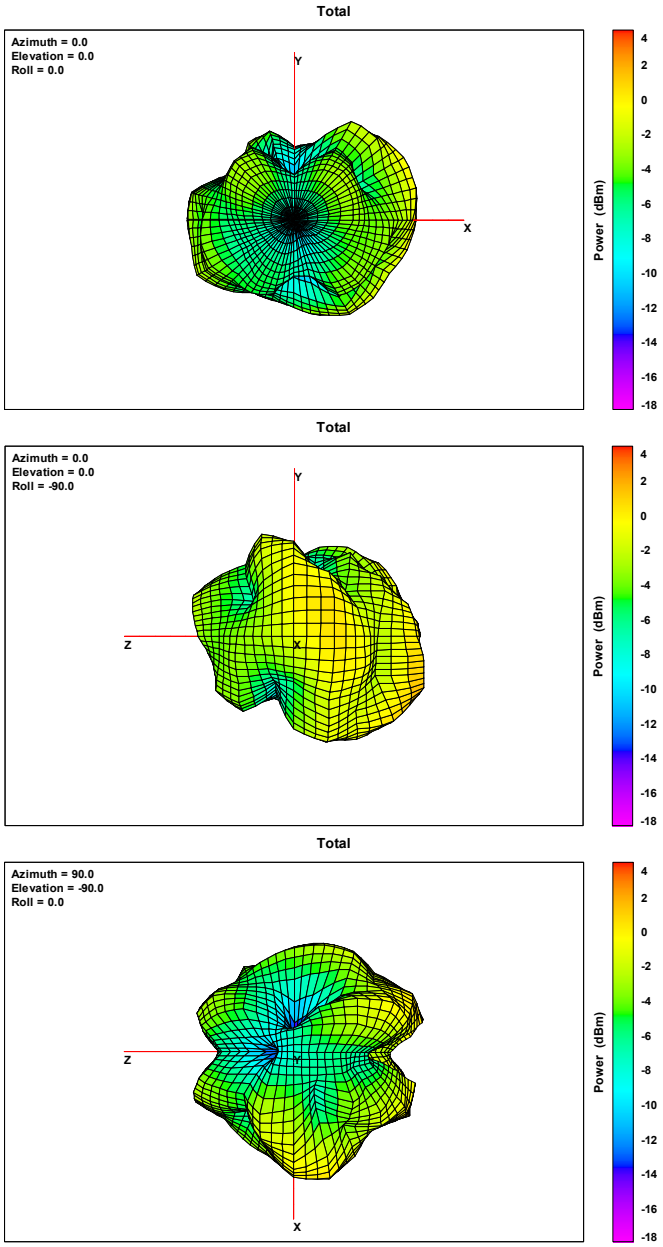
Free Space

7 2-D Antenna Pattern(Theta=90°)



Free Space #1

8 3-D Antenna Pattern



Free Space #1

9 The EUT and Test Configuration

N/A
---END---