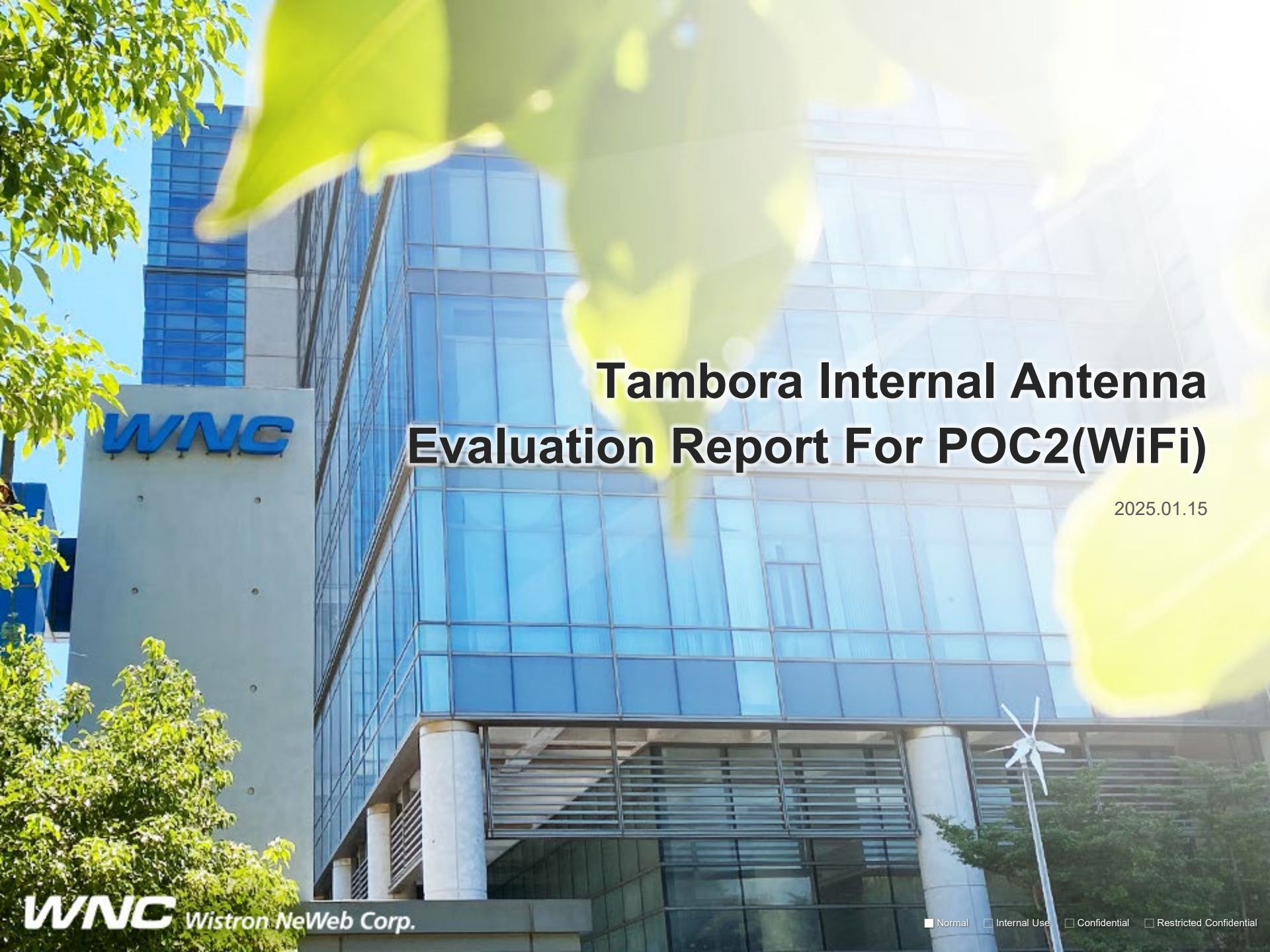




Tambora Internal Antenna Evaluation Report For POC2(WiFi)

2025.01.15



Agenda

- ◆ General Information
- ◆ Test Setup
 - Diagram
 - Equipment
 - Procedure
- ◆ Antenna Placement
- ◆ Antenna Matching
- ◆ Antenna Performance
 - Antenna Efficiency & Peak Gain
 - Antenna VSWR
- ◆ Conclusion

- **General Information**
- **Test Setup**
 - **Diagram**
 - **Equipment**
 - **Procedure**
- **Test Result**
 - **Summary**
 - **Performance**

■ Antenna Information:

- Brand: WNC

20 Park Ave. II, Hsinchu Science Park, Hsinchu 308, Taiwan

■ Antenna Type:

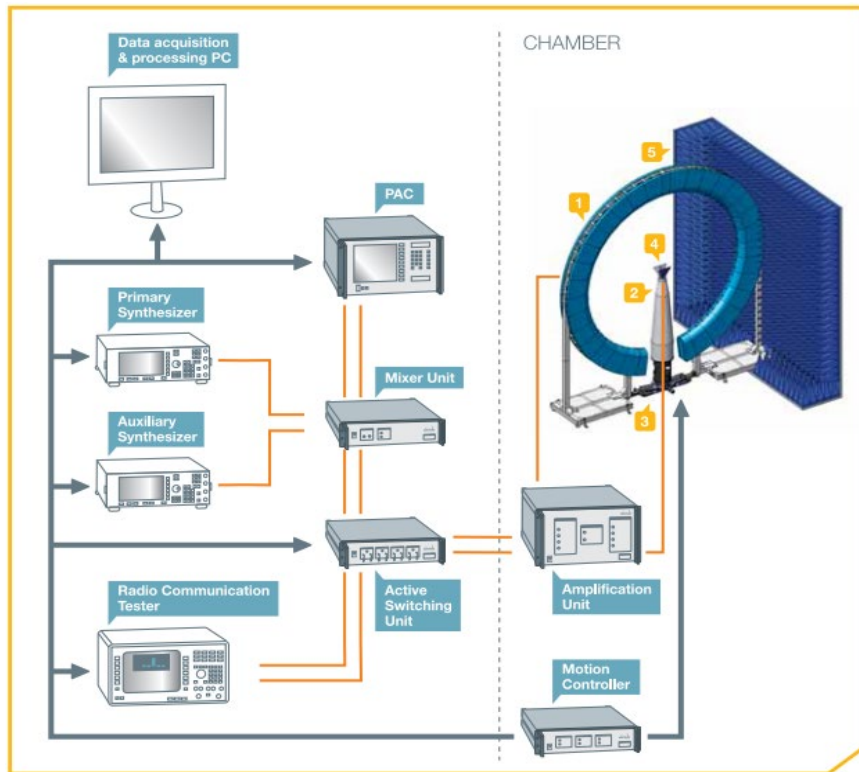
- Wi-Fi DB_1 : PIFA (57XPAG15.001)
- Wi-Fi DB_2 : PIFA (57XPAG15.002)
- WiFi 6G_1/6G_2 : PIFA (3S.007DN.111)

■ Test Date and Member

Date : 2024/ 10/18

Member : Rita

Test Setup and Diagram



SG 64 uses analog RF signal generators to emit EM waves from the probe array to the antenna under test (AUT) or vice versa.

It uses the NPAC as an RF receiver for antenna measurements. The NPAC also drives the electronic scanning of the probe array.

The NPAC includes the fastest and most accurate sources and receivers on the market.

Device	Type/Model	Serial#	Manufacturer	Calibrated Date	Calibrated Until
SG64 Chamber	Standard	SG64	MVG	2020/03/30	2024/03/30
Turn Table	Customization	-	Machinery Dept.	2020/03/30	2024/03/30
New Probe Array Controller	N/A	1102341-4535	MVG	2020/03/30	2024/03/30
Power Supply Unit	N/A	1103211-13204	MVG	2020/03/30	2024/03/30
Active Switching Unit	N/A	1102347-7214	MVG	2020/03/30	2024/03/30
TX Amplification Unit	N/A	1102527-5909	MVG	2020/03/30	2024/03/30
RX Amplification Unit	N/A	1102536-3823	MVG	2020/03/30	2024/03/30
Transfer Swtitching Unit	N/A	1102183-3351	MVG	2020/03/30	2024/03/30
Mixer Unit	N/A	1102545-7208	MVG	2020/03/30	2024/03/30
Power And Control Unit	N/A	1102706-7209	MVG	2020/03/30	2024/03/30
Antenna Probe	DP 400-6000	-	MVG	2020/03/30	2024/03/30
Cable 13.7m - 400MHz to 18GHz	SS402	00100A1F5A1XXS	Woken	2020/03/30	2024/03/30
Temperature & Humidity Meter	HTC-01	-	Metravi	2020/03/30	2024/03/30

Note:

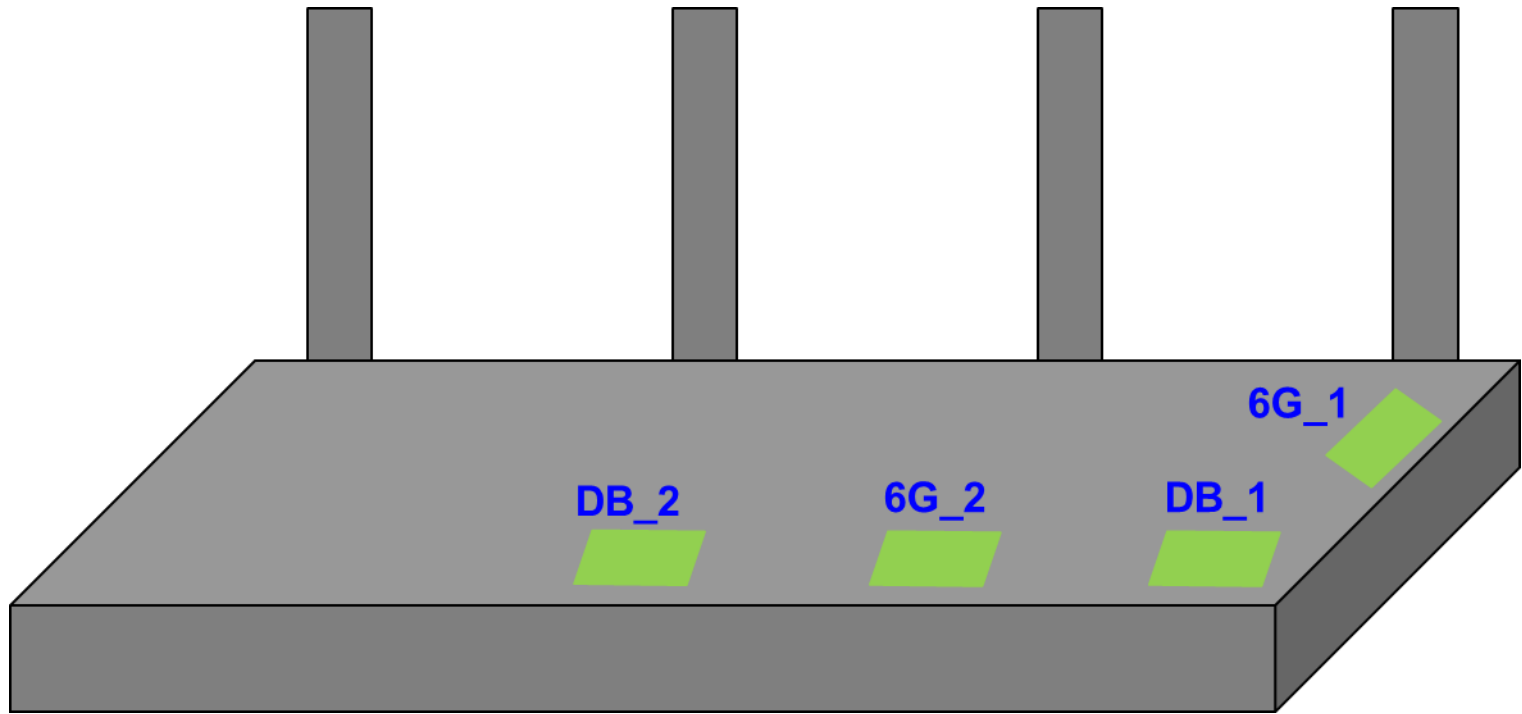
1. There are 63 set ANT probes in WNC's SG64 Chamber.

Test Setup and Procedure



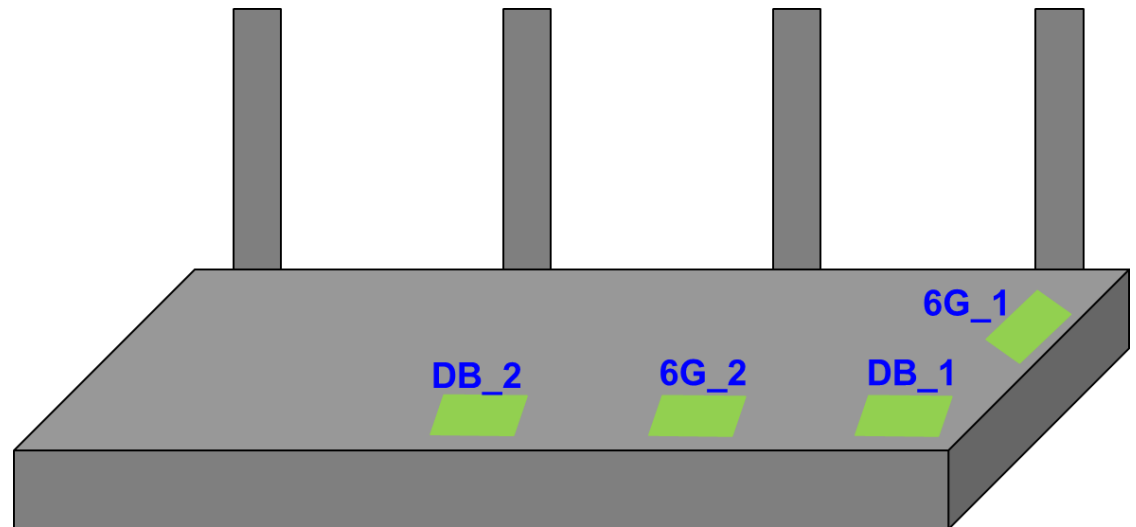
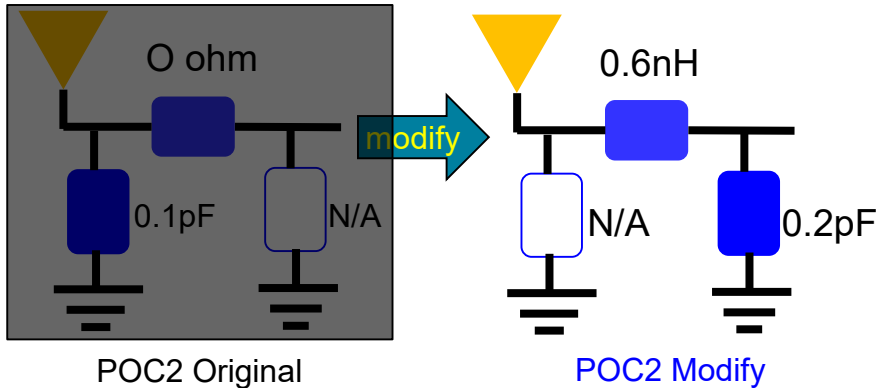
- Place the device at the center of the chamber.
- Connect the antenna cable to RF cable of the chamber
- Run Satimo test SW (**NPAC Spherical Measurement, v1.5.4 (GIT-E6965664)**)
- Get 3D data in 2.8125 degree step from phi 0° ~ 360° and theta -90° ~ $+90^{\circ}$, including efficiency, peak gain, 2D & 3D radiation pattern.
- This is far field test for **SEQO-D1** antenna verification.
- This is passive measurement, which means the device is off and not in any operating mode.

Antenna Placement

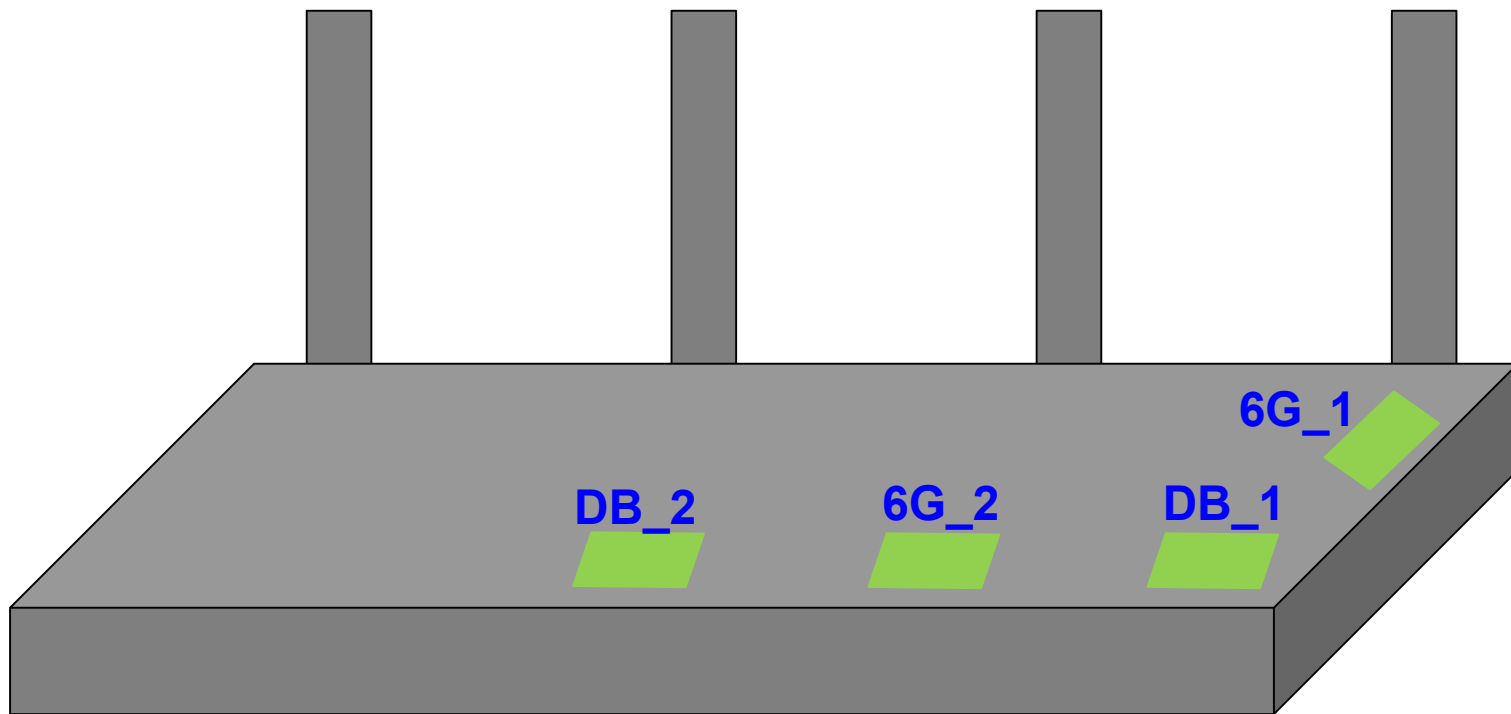


Antenna Matching (POC2 Modify)

6G_2



- The antenna matching for this POC2 needs to be adjusted.



Antenna Performance – Efficiency(%) & Peak Gain(dBi)

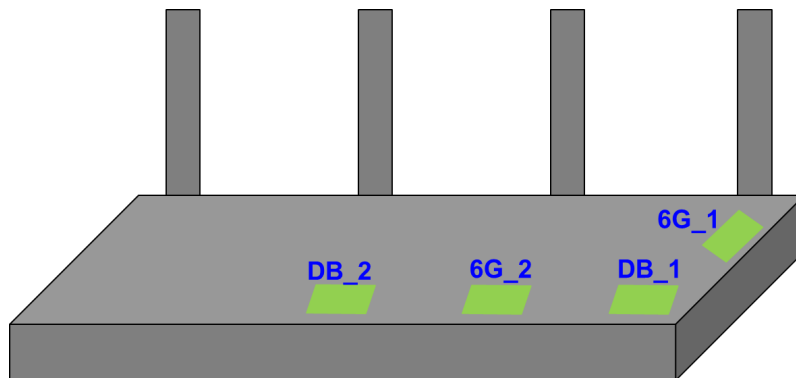
➤ WiFi Antenna

DB_1			
Freq.(MHz)	Effi.(%)	Effi . dB	Peak Gain(dBi)
2380	59.9	-2.2	3.4
2400	58.0	-2.4	3.4
2412	57.1	-2.4	3.5
2442	55.4	-2.6	3.4
2484	55.8	-2.5	2.6
2500	54.1	-2.7	2.9
2520	53.1	-2.8	3.4
5050	63.3	-2.0	6.3
5150	64.7	-1.9	5.9
5250	64.0	-1.9	5.8
5350	61.3	-2.1	6.0
5470	60.3	-2.2	7.1
5600	58.6	-2.3	6.3
5725	60.6	-2.2	5.2
5750	62.6	-2.0	5.5
5785	61.7	-2.1	5.2
5800	63.3	-2.0	5.2
5850	65.9	-1.8	5.3
5875	66.3	-1.8	5.1
5900	64.6	-1.9	5.0
5925	64.3	-1.9	5.2

DB_2			
Freq.(MHz)	Effi.(%)	Effi . dB	Peak Gain(dBi)
2380	62.2	-2.1	5.9
2400	61.5	-2.1	5.6
2412	59.7	-2.2	5.5
2442	60.8	-2.2	5.3
2484	58.6	-2.3	5.1
2500	57.0	-2.4	5.0
2520	55.6	-2.6	4.7
5050	64.3	-1.9	6.9
5150	60.1	-2.2	6.4
5250	61.9	-2.1	7.4
5350	64.4	-1.9	6.8
5470	63.8	-1.9	6.8
5600	64.0	-1.9	6.8
5725	65.5	-1.8	7.0
5750	66.9	-1.7	6.5
5785	64.3	-1.9	6.4
5800	64.0	-1.9	6.4
5850	65.9	-1.8	6.2
5875	63.0	-2.0	6.2
5900	62.2	-2.1	6.0
5925	61.4	-2.1	5.7

6G_1			
Freq.(MHz)	Effi.(%)	Effi . dB	Peak Gain(dBi)
5050	30.3	-5.2	2.5
5150	36.0	-4.4	3.4
5250	40.0	-4.0	3.3
5350	36.6	-4.4	2.7
5470	34.1	-4.7	2.1
5600	36.8	-4.3	2.3
5725	45.7	-3.4	4.4
5750	47.7	-3.2	4.7
5785	49.7	-3.0	4.7
5800	50.2	-3.0	4.8
5850	55.5	-2.6	5.3
5875	55.4	-2.6	5.4
5900	55.3	-2.6	5.6
5925	57.0	-2.4	5.6
6100	55.2	-2.6	5.9
6125	55.3	-2.6	5.9
6225	53.8	-2.7	5.5
6325	56.6	-2.5	5.6
6425	56.6	-2.5	5.5
6525	55.1	-2.6	5.4
6625	55.8	-2.5	5.0
6725	58.0	-2.4	5.2
6875	58.2	-2.3	6.6
6925	56.3	-2.5	6.5
7100	54.9	-2.6	5.2
7125	54.6	-2.6	5.1

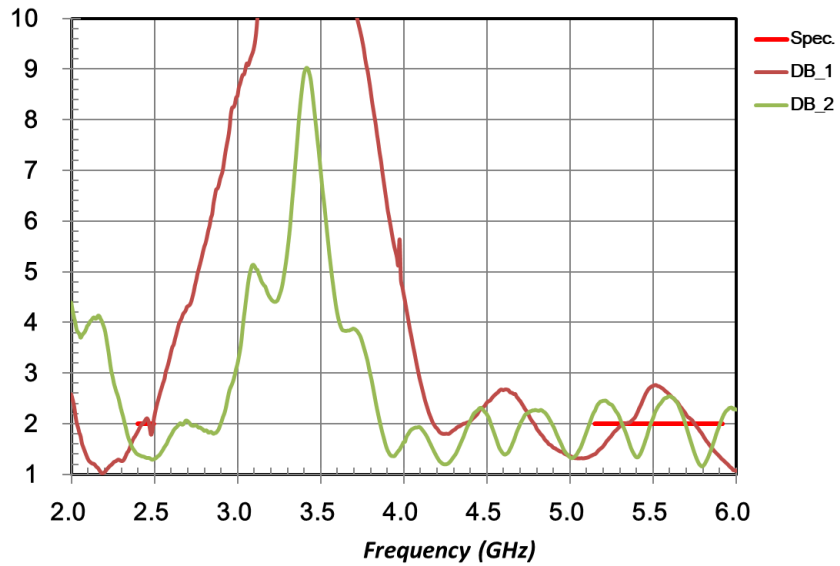
6G_2			
Freq.(MHz)	Effi.(%)	Effi . dB	Peak Gain(dBi)
5050	27.2	-5.6	2.2
5150	31.8	-5.0	2.6
5250	40.1	-4.0	3.8
5350	48.3	-3.2	4.8
5470	50.3	-3.0	5.4
5600	48.5	-3.1	5.0
5725	51.8	-2.9	5.4
5750	53.1	-2.7	5.6
5785	53.7	-2.7	5.7
5800	53.5	-2.7	5.6
5850	58.4	-2.3	5.9
5875	58.1	-2.4	5.7
5900	57.4	-2.4	6.0
5925	58.8	-2.3	6.1
6100	54.4	-2.6	6.7
6125	54.6	-2.6	6.4
6225	57.6	-2.4	7.1
6325	59.2	-2.3	8.3
6425	56.2	-2.5	8.1
6525	55.2	-2.6	7.8
6625	54.4	-2.6	7.6
6725	57.2	-2.4	8.2
6875	58.1	-2.4	7.7
6925	56.5	-2.5	7.5
7100	54.5	-2.6	6.1
7125	53.2	-2.7	5.8



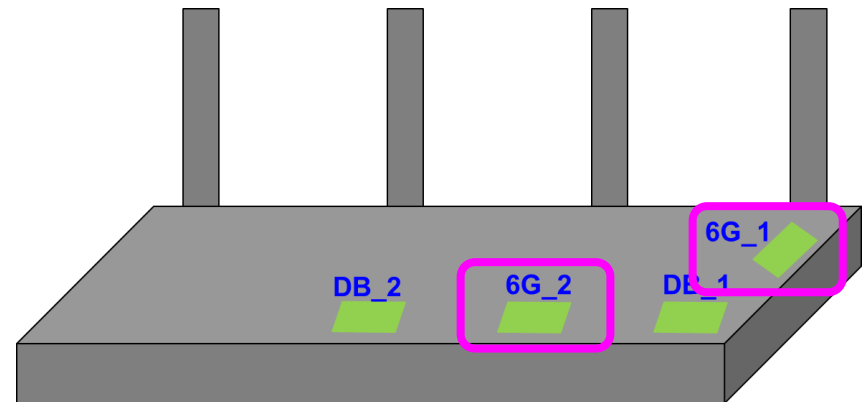
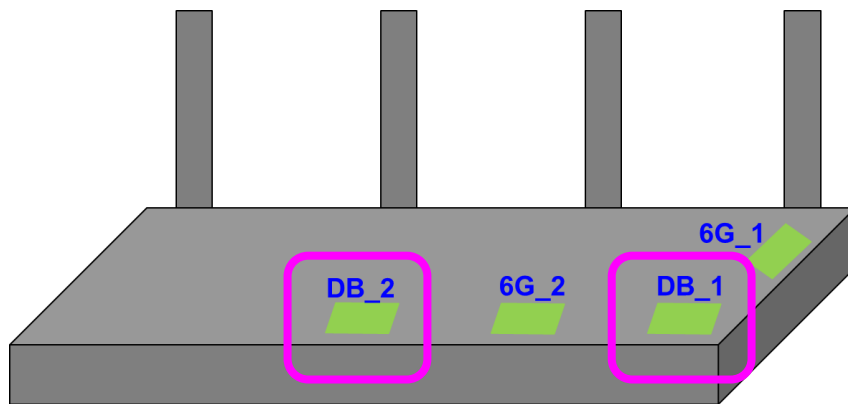
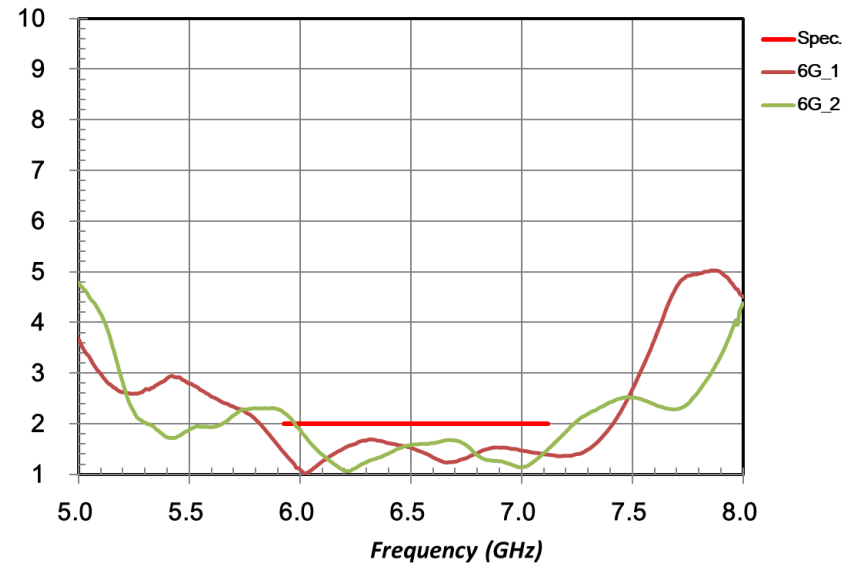
➤ Test data includes iPex cable and RF trace loss of layout.

Antenna Performance – VSWR

WIFI Dual Band



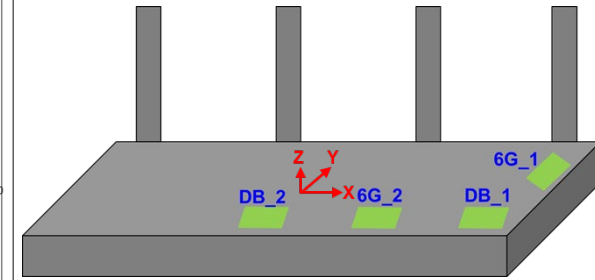
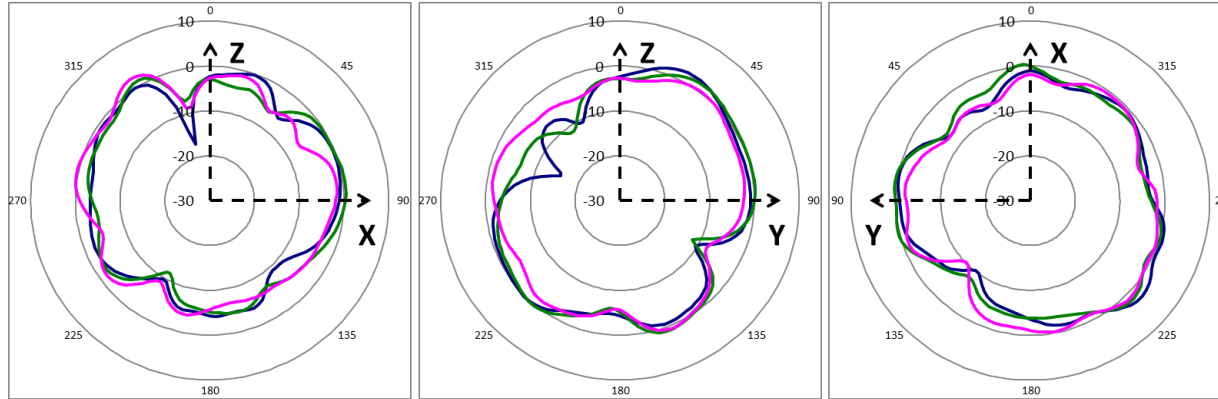
WIFI 6E Only



Antenna Performance – Radiation Pattern(WiFi Antenna)

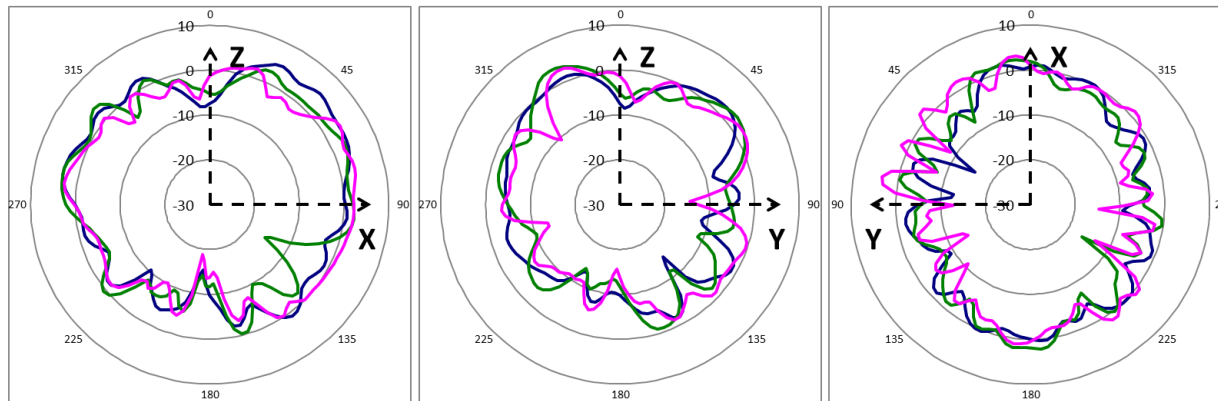
DB_1
Radiation Pattern

— 2400MHz
— 2442MHz
— 2500MHz



DB_1
Radiation Pattern

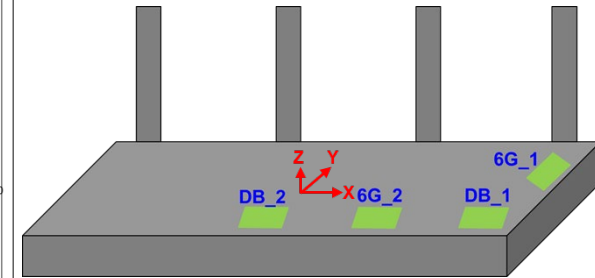
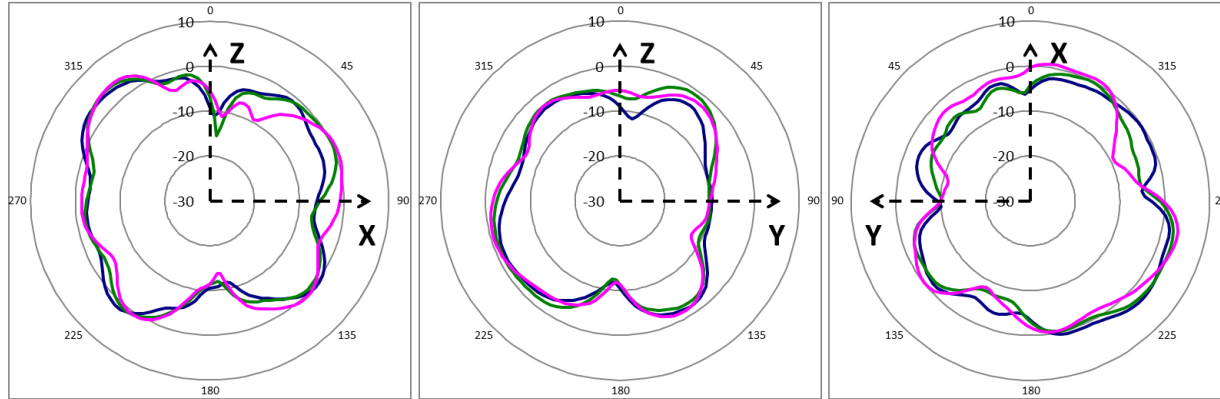
— 5150MHz
— 5470MHz
— 5850MHz



Antenna Performance – Radiation Pattern(WiFi Antenna)

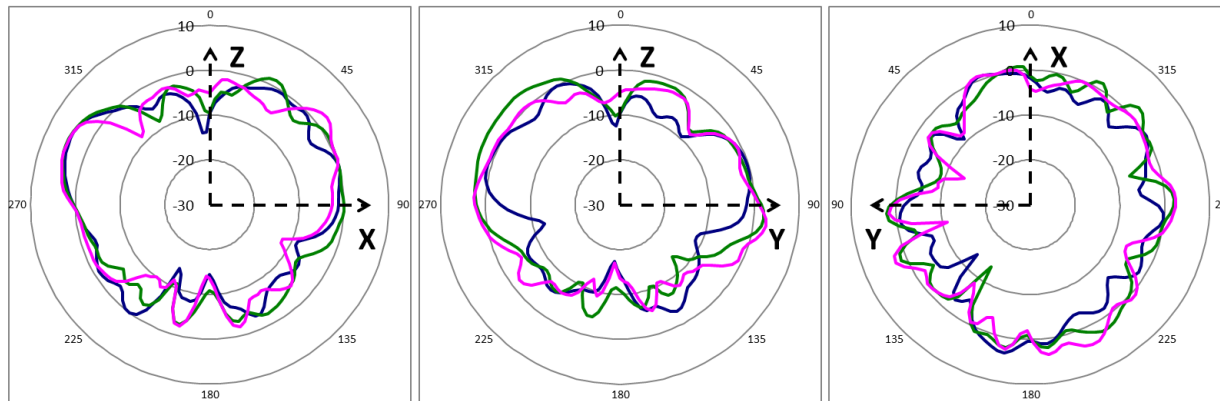
DB_2
Radiation Pattern

— 2400MHz
— 2442MHz
— 2500MHz



DB_2
Radiation Pattern

— 5150MHz
— 5470MHz
— 5850MHz

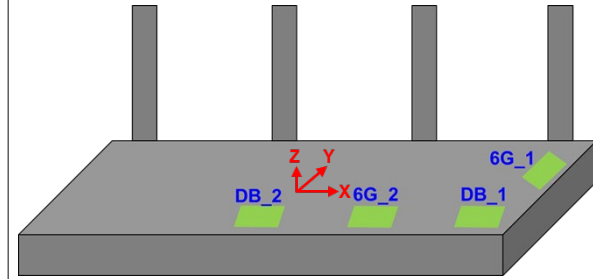
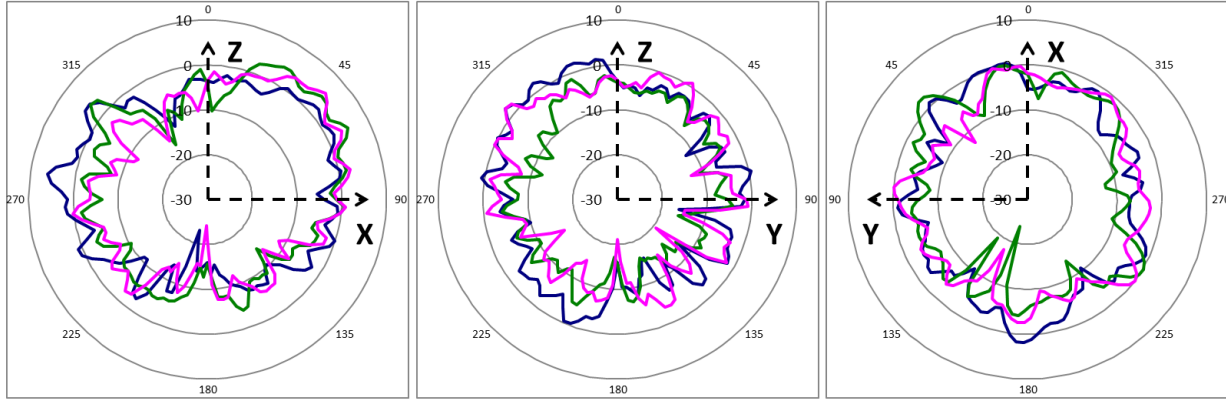


Antenna Performance – Radiation Pattern(WiFi Antenna)

6G_1

Radiation Pattern

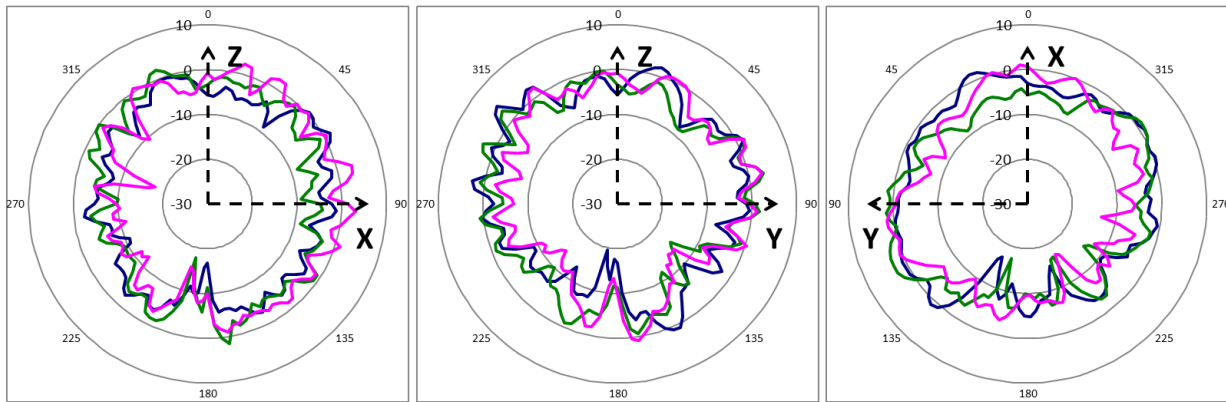
— 5925MHz
— 6525MHz
— 7125MHz



6G_2

Radiation Pattern

— 5925MHz
— 6525MHz
— 7125MHz



Conclusion

- Evaluation condition, full assembly with battery 、 heatsink & external antenna
- WIFI Dual Band(2.4GHz & 5GHz) –
 - DB_1 : 54.1%-58.0% at 2.4GHz & 58.6%-66.3% at 5GHz
 - DB_2 : 57.0%-61.5% at 2.4GHz & 60.1%-66.9% at 5GHz
- WIFI 6GHz(5925-7125MHz) –
 - 6G_1 : 53.8%-58.2% at 6GHz
 - 6G_2 : 53.2%-59.2% at 6GHz
- All test data include the iPex connector, cable, and RF trace loss of the layout.