



WAP2301M

Antenna Test Report

Senao Networks Inc.

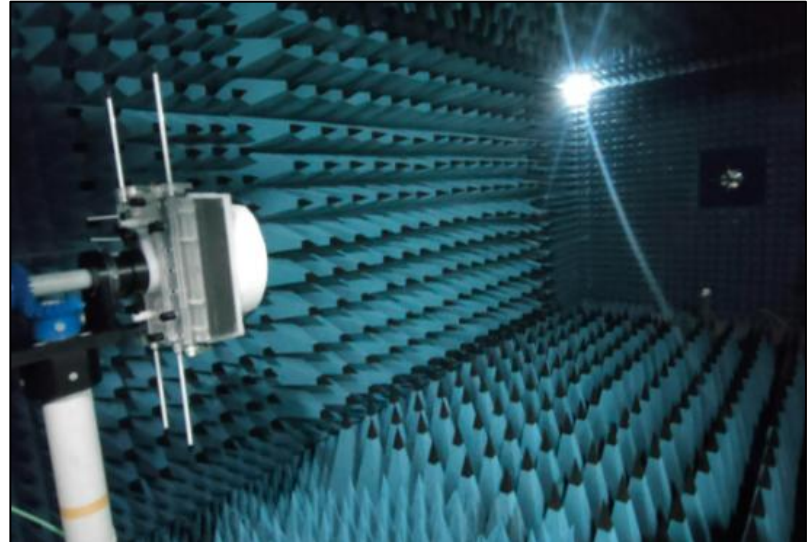
Customer	Generic
Project	WAP2301M
Project Description	2/5G Dual band*3
Date	2025/11/05
Prepared by	Kenny
Report Version	V05

Version	Date	Description
V01	2025/05/29	EVT sample testing _ printing and PCB antenna comparison
V02	2025/06/13	EVT sample testing _ verify antenna performance of increasing height 10mm top cover
V03	2025/06/20	EVT sample testing _ evaluate antenna performance of increasing height 5mm top cover
V04	2025/07/24	EVT sample testing _ test with 5mm height mockup sample
V05	2025/11/05	DVT sample testing

- Antenna Test Information
- Antenna Test Setup
- Placement and Specification
- S-Parameter & Isolation
- Radiation Pattern
- Combine Pattern
- Efficiency and Gain

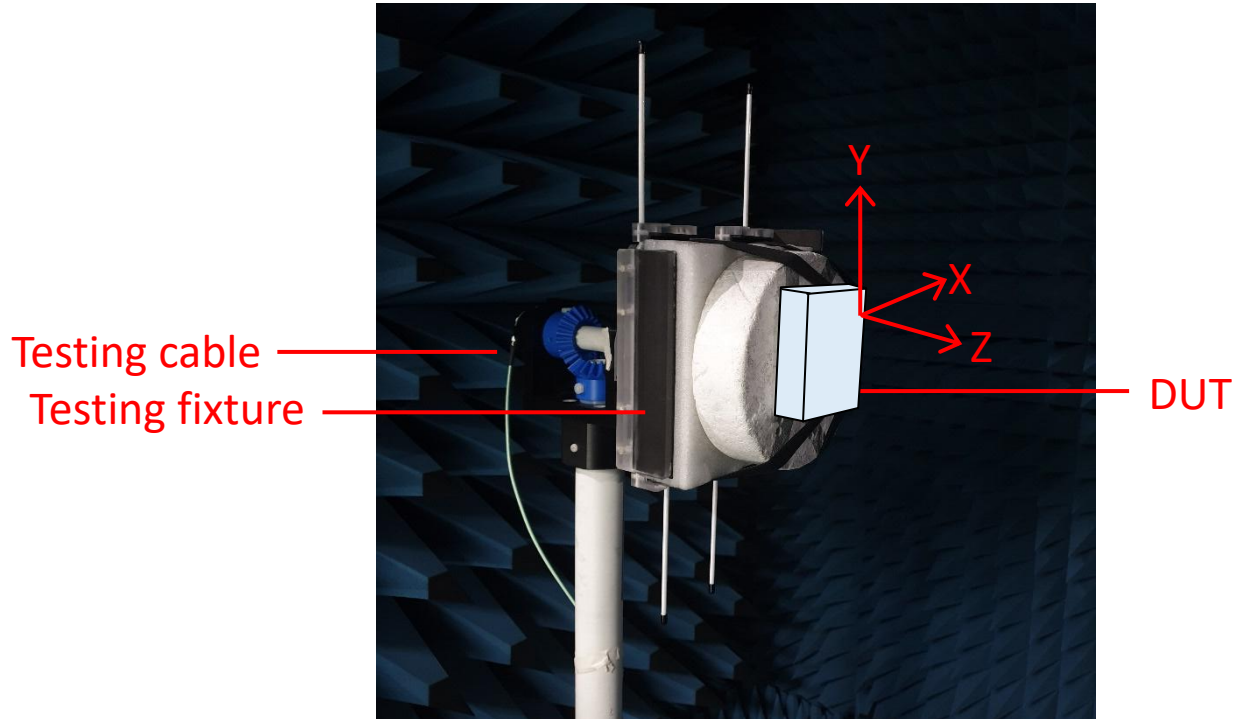
3D Anechoic Chamber - BWANT

- Size: 7.32M(L)x3.66M(W)x3.66M(H)
- Testing range from 600MHz to 8.5GHz
- Chamber Isolation : 10KHz to 10GHz >100dB (NSA 94-106)
- Calibration antenna : BWANT SD650 /SD740 /SD900 /SD1150 /SD1575 /SD1800 /SD2140 /SD2450 /SD3200 /SD3600 /SD4550 /SD5400 /HA-0508
- Test software : BWANT 3D Passive



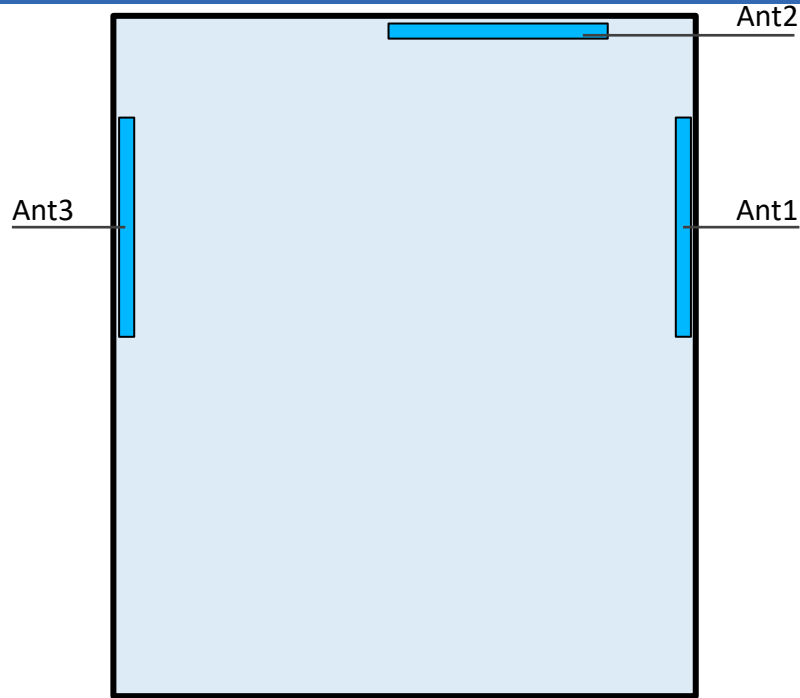
Antenna Test Setup

- The DUT is set up on the test fixture and the antenna is connected to the test cable to measure the antenna performance.



Placement and Specification

Ant1 – Scan 2.4G/WiFi 5G
 Ant2 – WiFi 2.4/5G
 Ant3 – WiFi 2.4G/Scan 5G



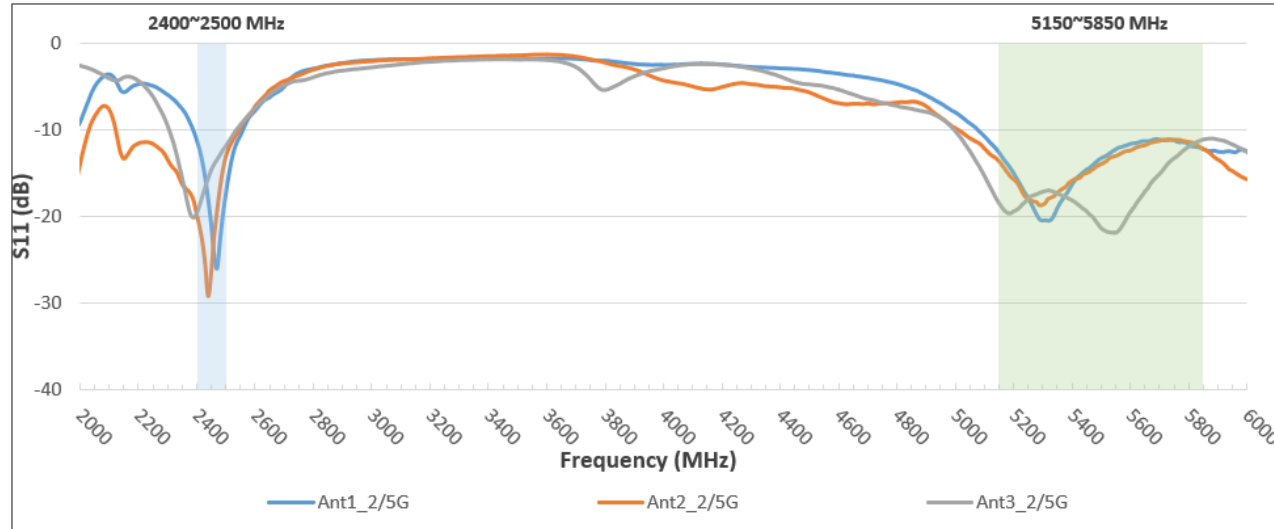
Radio No.	Operating Band	Peak Gain (dBi)	Efficiency (%)	Ant Type	Feeding
Radio1	2400MHz ~ 2500 MHz	4.06	58.1	Dipole	Cable
Radio2	5150MHz ~ 5850 MHz	4.36	59.1	Dipole	Cable
Scan	2400MHz ~ 2500 MHz	4.52@2G	53.6@2G	Dipole	Cable
	5150MHz ~ 5850 MHz	3.60@5G	53.1@5G		

Antenna Return Loss (S11)

Ant1 – Scan 2.4G/WiFi 5G

Ant2 – WiFi 2.4/5G

Ant3 – WiFi 2.4G/Scan 5G



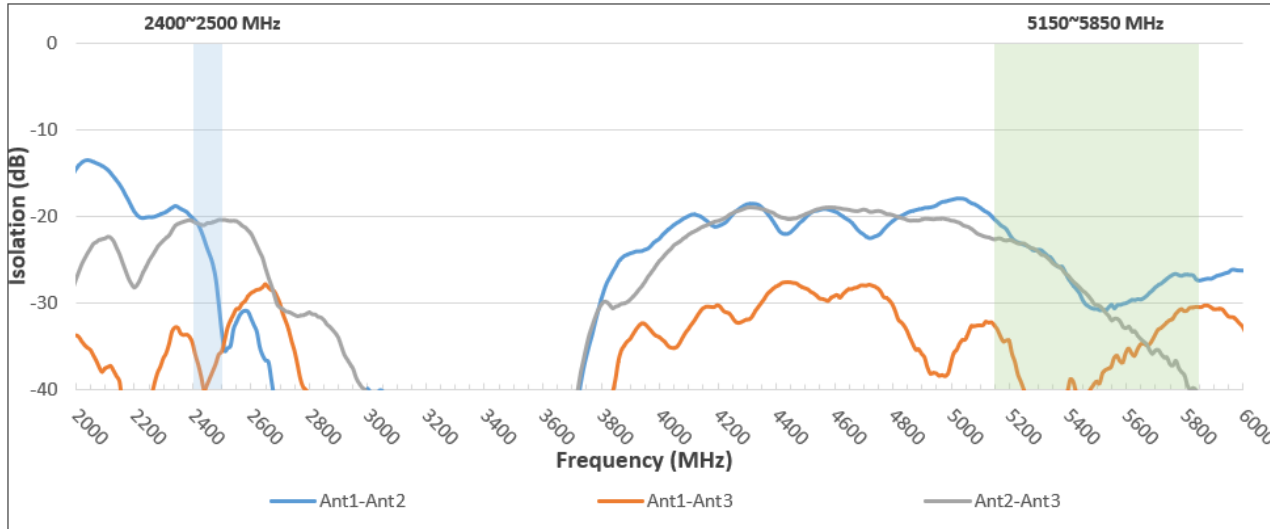
Return Loss (S11)			
Freq. (MHz)	Ant1 2/5G	Ant2 2/5G	Ant3 2/5G
2400	-11.11	-19.53	-19.65
2450	-20.88	-26.65	-14.63
2500	-17.36	-13.10	-11.88
5150	-12.57	-13.54	-18.41
5550	-12.23	-13.01	-21.83
5850	-12.19	-12.19	-11.11

Antenna Isolation (S21)

Ant1 – Scan 2.4G/WiFi 5G

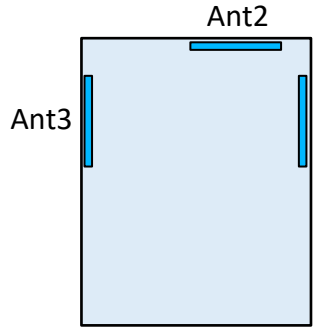
Ant2 – WiFi 2.4/5G

Ant3 – WiFi 2.4G/Scan 5G

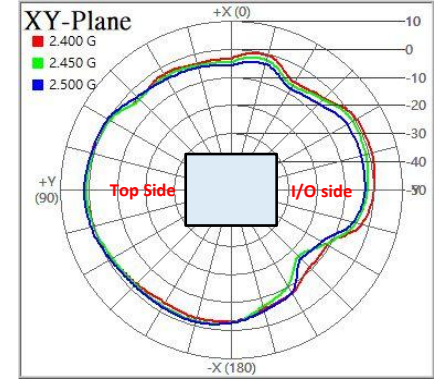
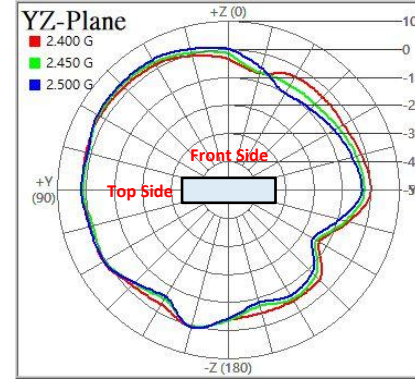
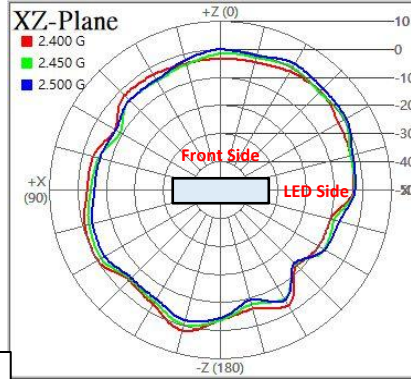


Isolation (S21)			
Freq. (MHz)	Ant1-Ant2	Ant1-Ant3	Ant2-Ant3
2400	-20.12	-34.62	-20.56
2450	-23.65	-39.45	-20.79
2500	-33.29	-35.63	-20.43
5150	-20.33	-32.63	-22.67
5550	-30.18	-37.39	-32.00
5850	-27.35	-30.49	-41.15

2D Radiation Pattern – Radio 1_2G



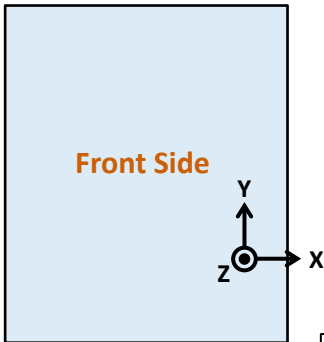
Ant2



Top Side

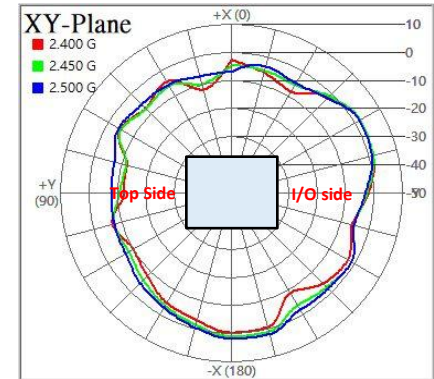
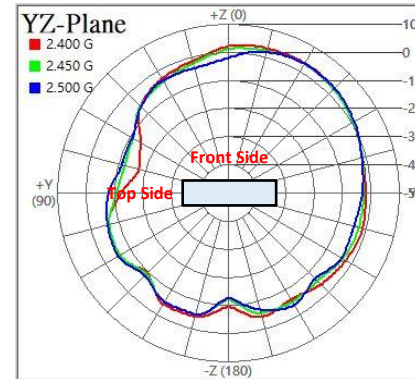
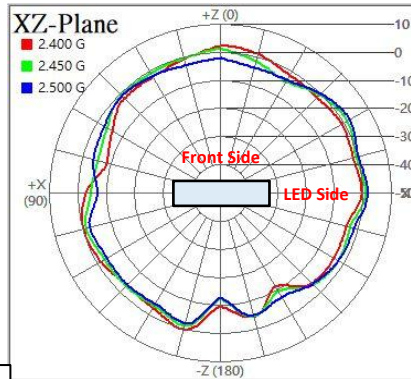
LED side

Front Side

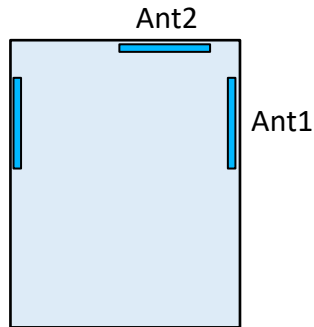


I/O Side

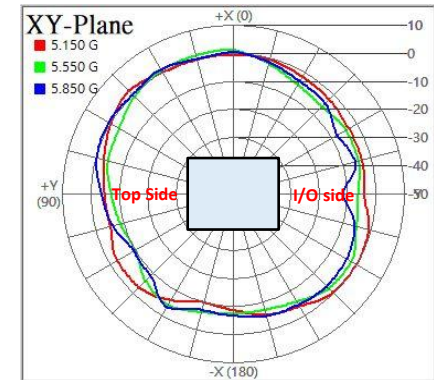
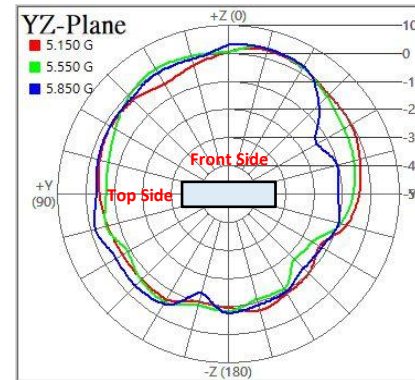
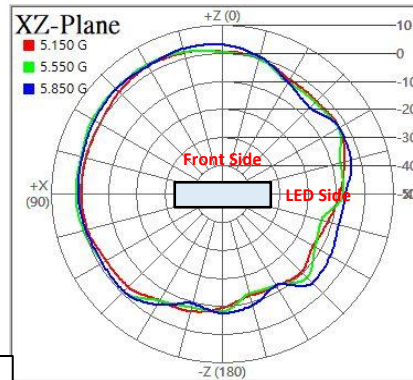
Ant3



2D Radiation Pattern – Radio 2_5G



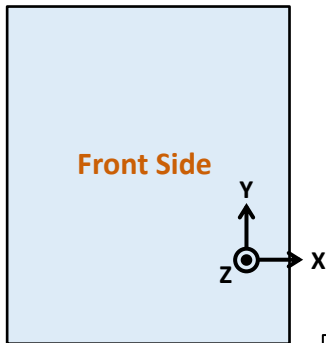
Ant1



Top Side

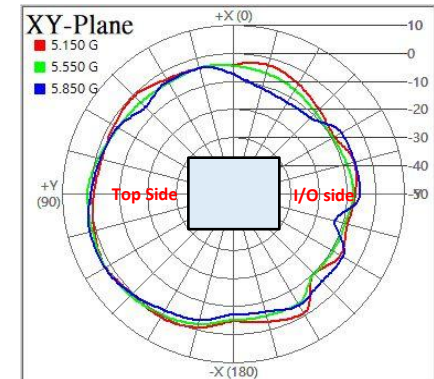
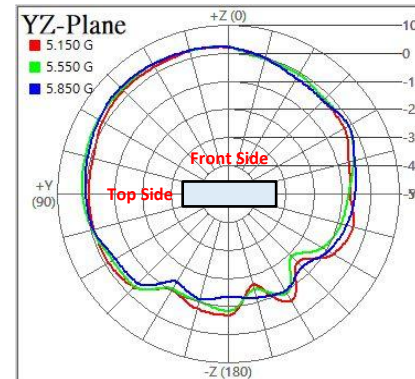
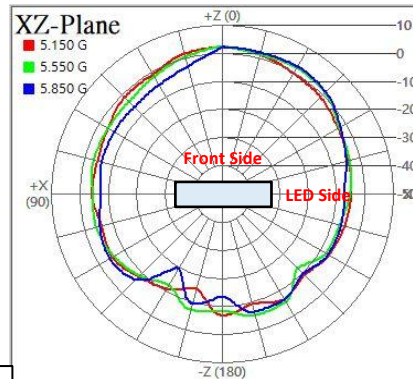
LED side

Front Side

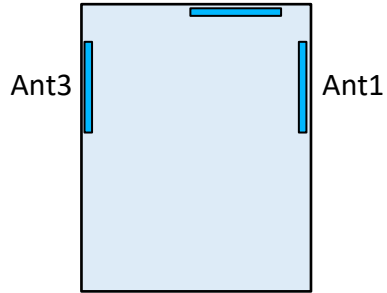


I/O Side

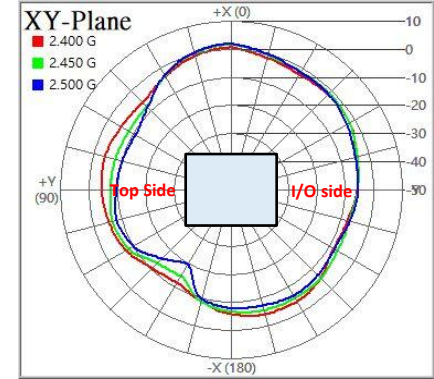
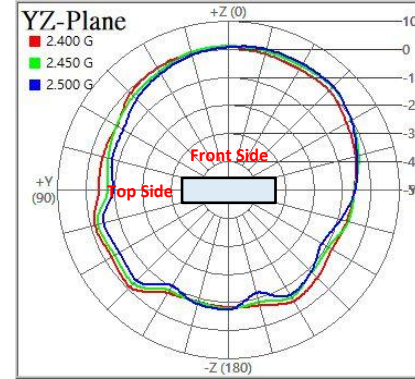
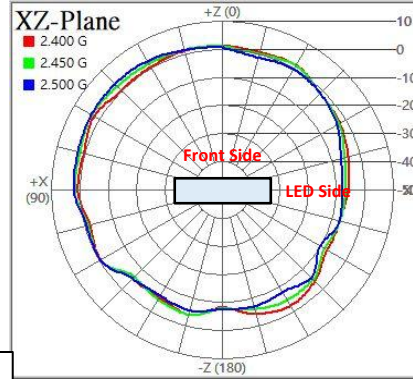
Ant2



2D Radiation Pattern – Scan Radio_ 2/5G



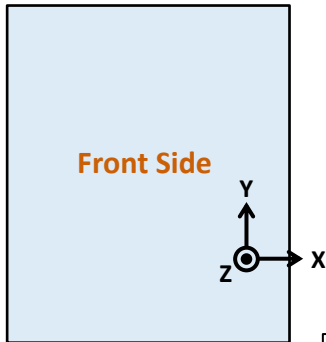
Ant1



Top Side

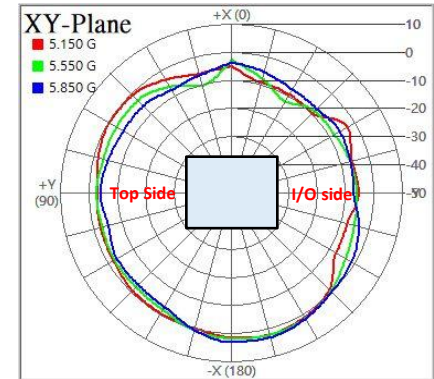
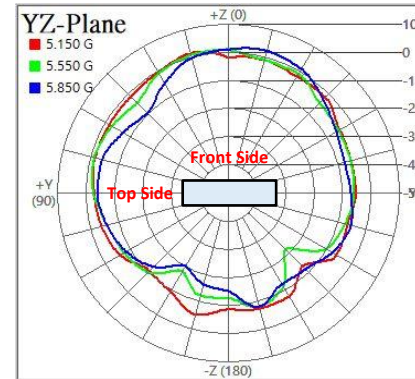
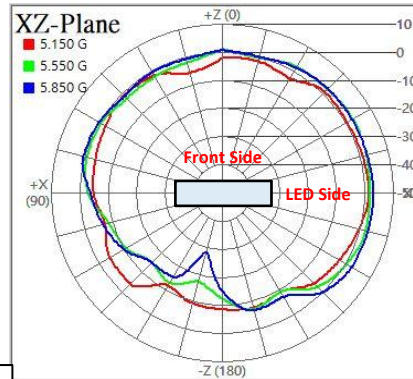
LED side

Front Side

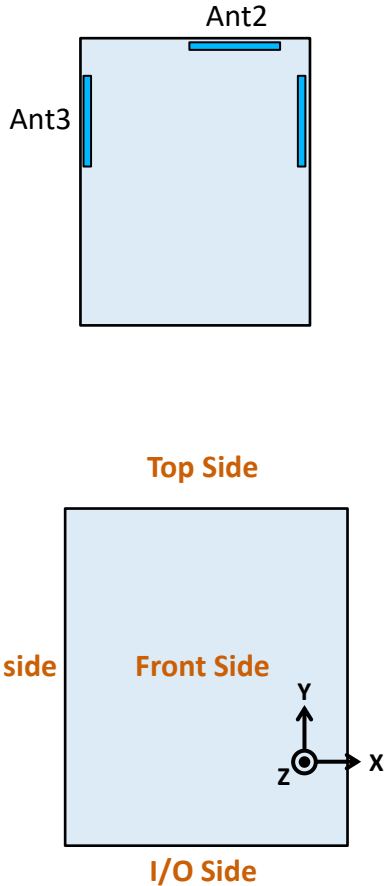


I/O Side

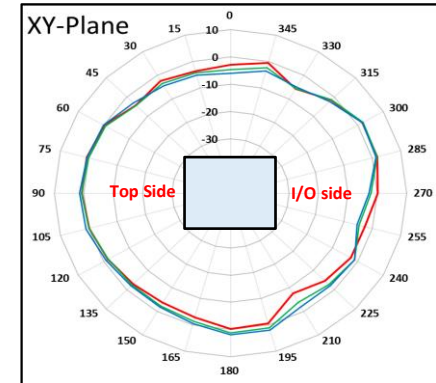
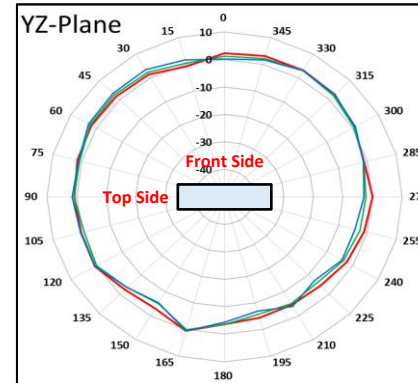
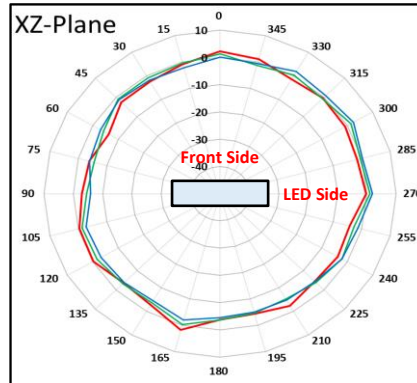
Ant3



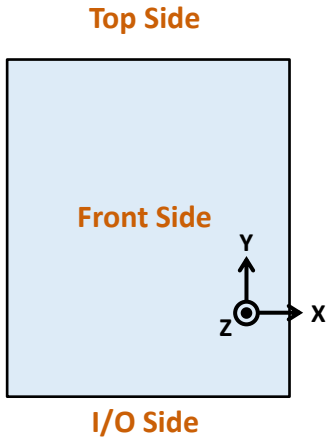
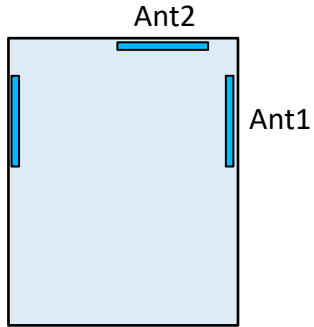
Combine Pattern – Radio 1_2G



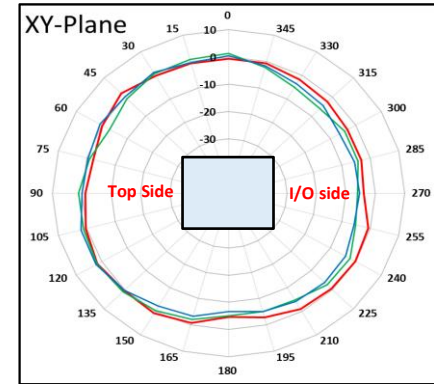
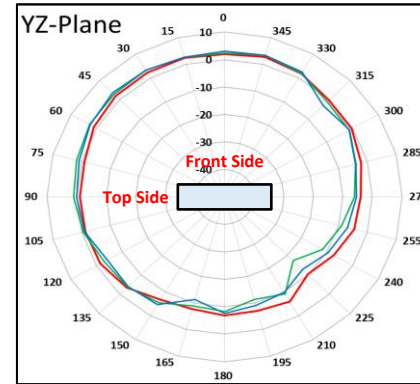
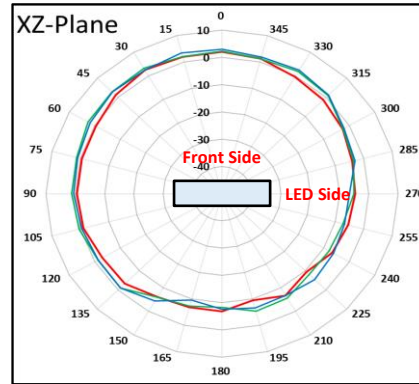
— 2400 MHz — 2450 MHz — 2500 MHz



Combine Pattern – Radio 2_5G



— 5150 MHz — 5550 MHz — 5850 MHz



Antenna Efficiency and Gain

Freq. (MHz)	ANT1_2/5G		ANT2_2/5G		ANT3_2/5G	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
2400	51.0	2.16	58.1	3.15	50.2	3.33
2450	53.6	3.84	54.8	4.04	54.3	3.06
2500	51.9	4.52	54.7	4.06	54.6	3.08
5150	57.6	3.12	59.1	3.62	53.1	2.39
5550	56.1	3.42	58.4	3.68	51.8	3.35
5850	57.0	3.96	56.1	4.36	52.9	3.60

- All antennas are PCB dipoles paste to side the top cover and fed by cables.
- WiFi antennas efficiency are around 50~59%, gain are around 3.0~4.0 at Radio1, 3.1~4.3 at Radio2.
- Scan antennas efficiency are around 51~53%, gain are around 2.1~4.5 at 2.4G, 2.3~3.6 at 5G.
- The radiation energy of the antennas cover different directions respectively, and good system coverage can be obtained after combination.