Antenna Specification

Frequency Range of operation

- Wi-Fi: 2.4 to 2.48 GHz and 5.15 to 5.85 GHz (Ant0)
- Bluetooth (2.4 GHz): 2.4 to 2.48 GHz (Ant1)
- LoRa (Ant1)
- 24G Radar **Antenna Types:**

- 2.4 GHz: PIFA
- 5 GHz: PIFA
- LoRa : PIFA
- 24G Radar : Patch

Test Lab Name : Passive System Alliance Walsin Technology Corporation

Peak Antenna Gain:

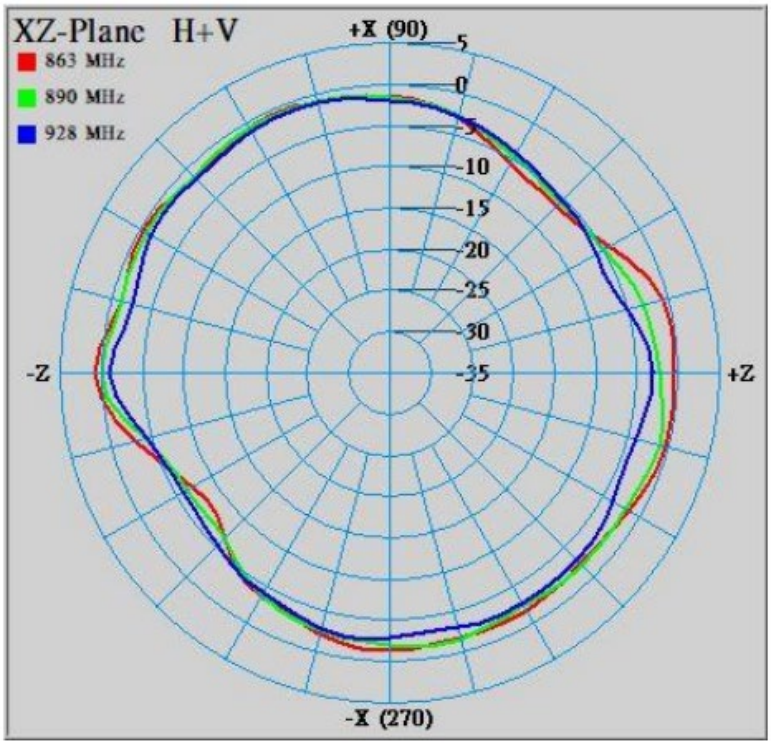
Band	Peak Gain (dbi)
BLE	4.2
Wi-Fi 2.4 GHz	3.94
Wifi 5GHz Band 1 (5150-5250 MHz)	2.11
Wifi 5GHz Band 2 (5250-5350 MHz)	2.11
Wifi 5GHz Band 3 (5470-5725 MHz)	3.78
Wifi 5GHz Band 4 (5725-5850 MHz)	3.60
CE LoRa (863-870 MHz)	0.95
FCC LoRa (902-928 MHz)	-0.3
NCC LoRa (920-925 MHz)	-0.44
AU LoRa (915-928 MHz)	-0.41
JP LoRa (920-928 MHz)	-0.47
Malaysia Lora (919-923 MHz)	-0.44
24G Radar	2

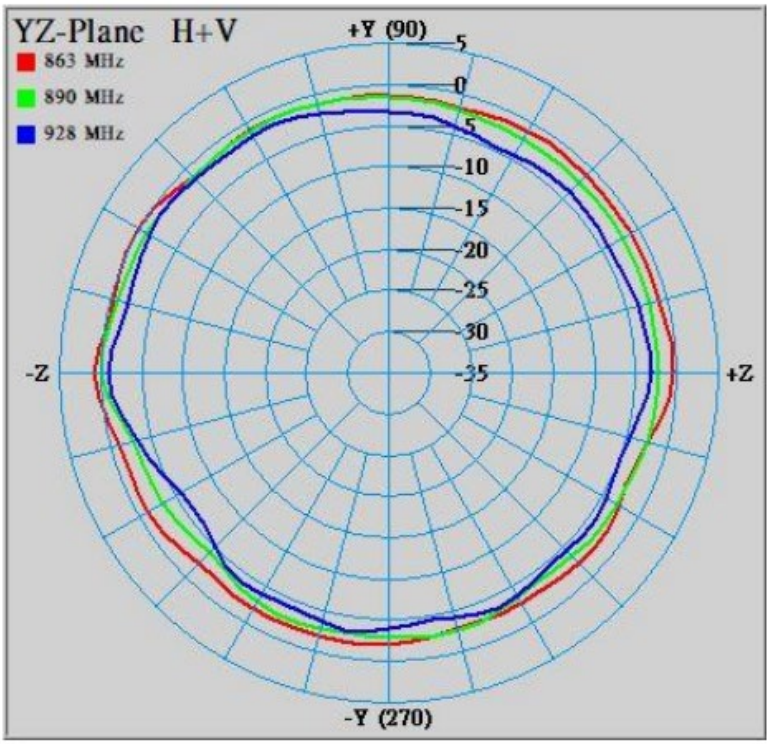
Antenna Location:

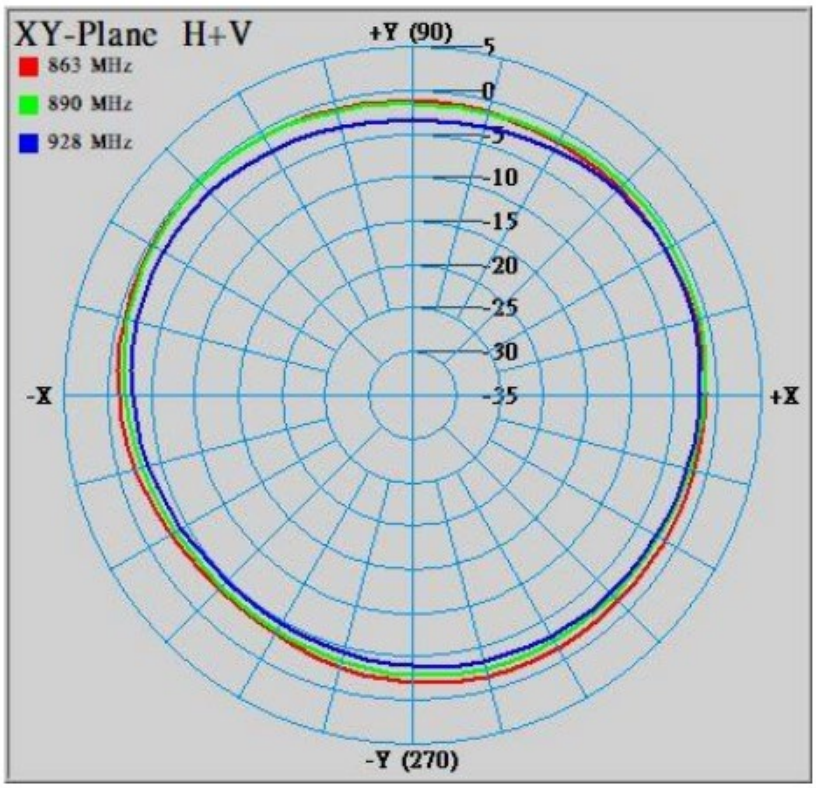
Antenna location and antenna photos can be found in Exhibit IntPho_1 and Exhibit IntPho_2

LORA

2D Radiation Patterns

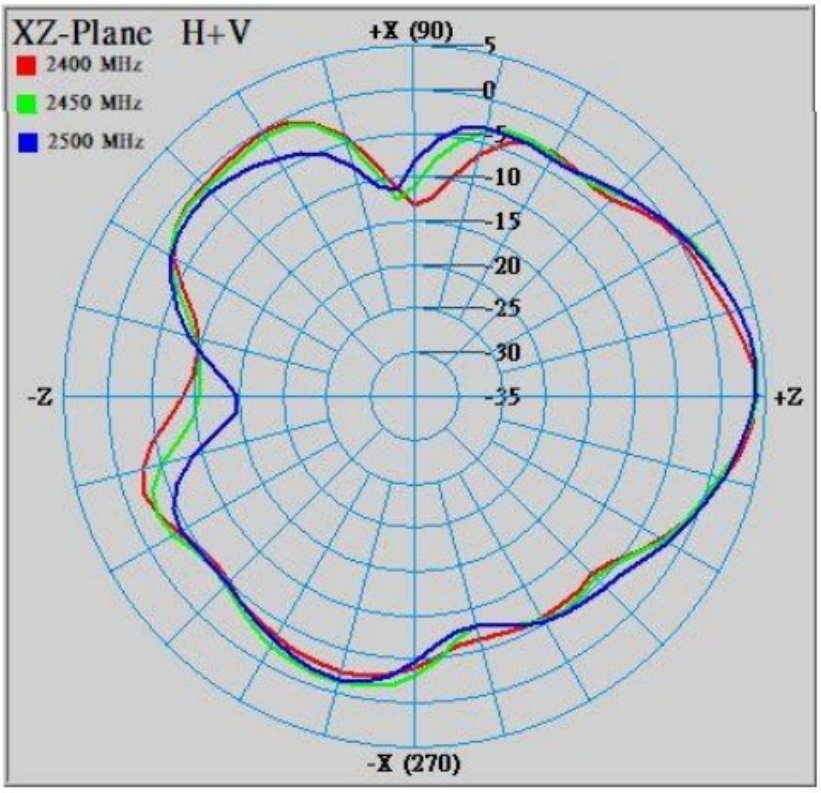


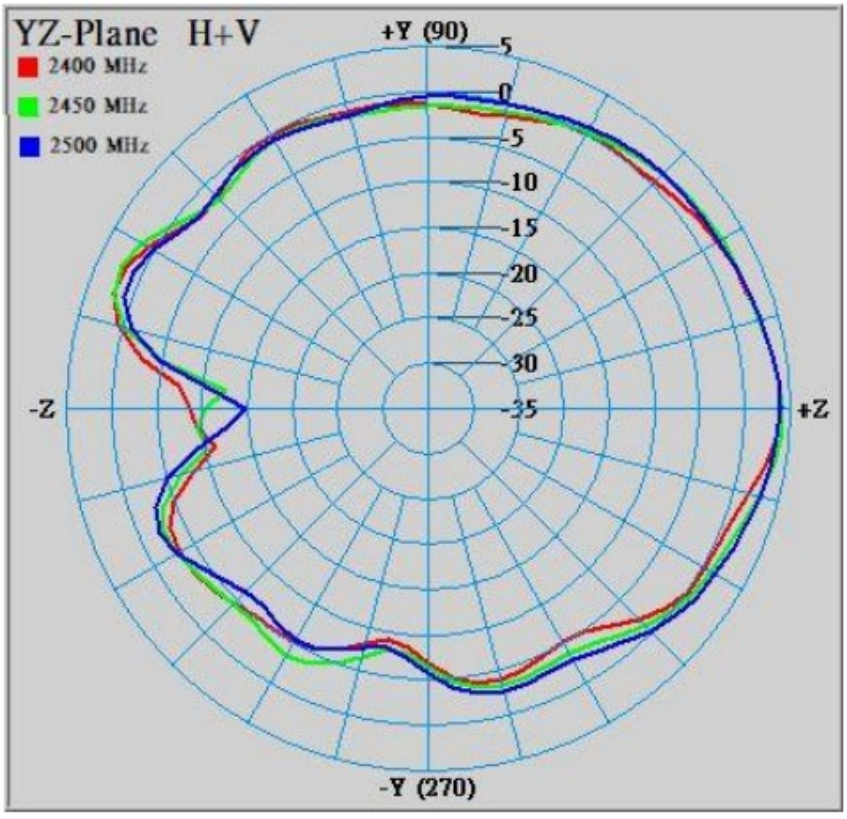

YZ-Planc H+V
863 MHz
890 MHz
928 MHz
+Y (90)
5
0
-5
-10
-15
-20
-25
-30
-35
-Z
+Z
-Y (270)

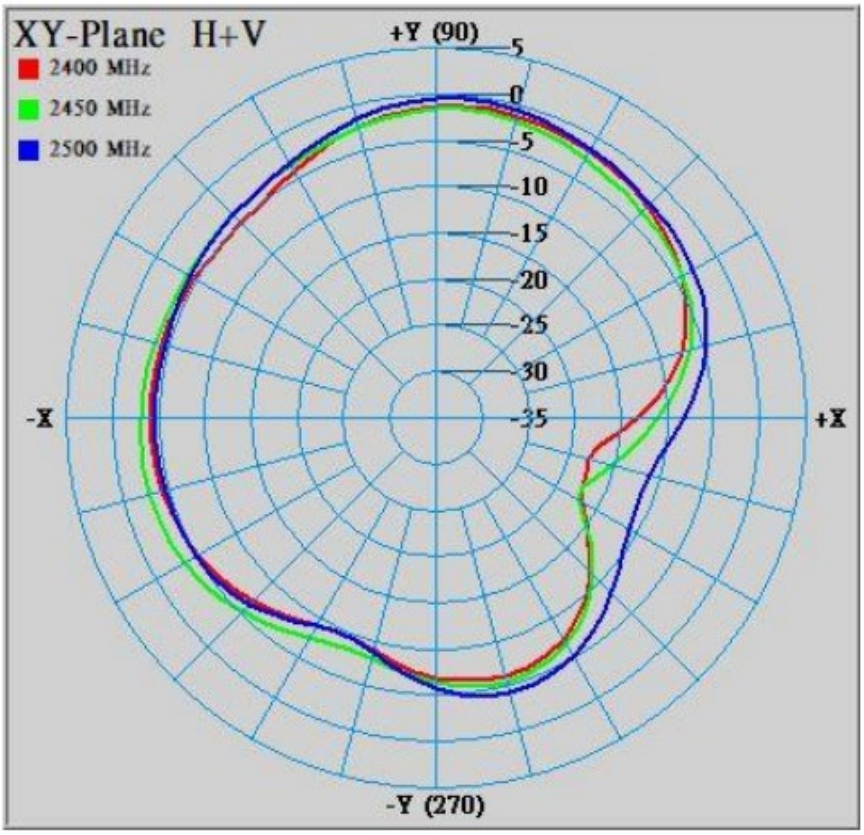

XY-Planc H+V
863 MHz
890 MHz
928 MHz
+Y (90)
5
0
-5
-10
-15
-20
-25
-30
-35
-X
+X
-Y (270)

BLE

2D Radiation Patterns

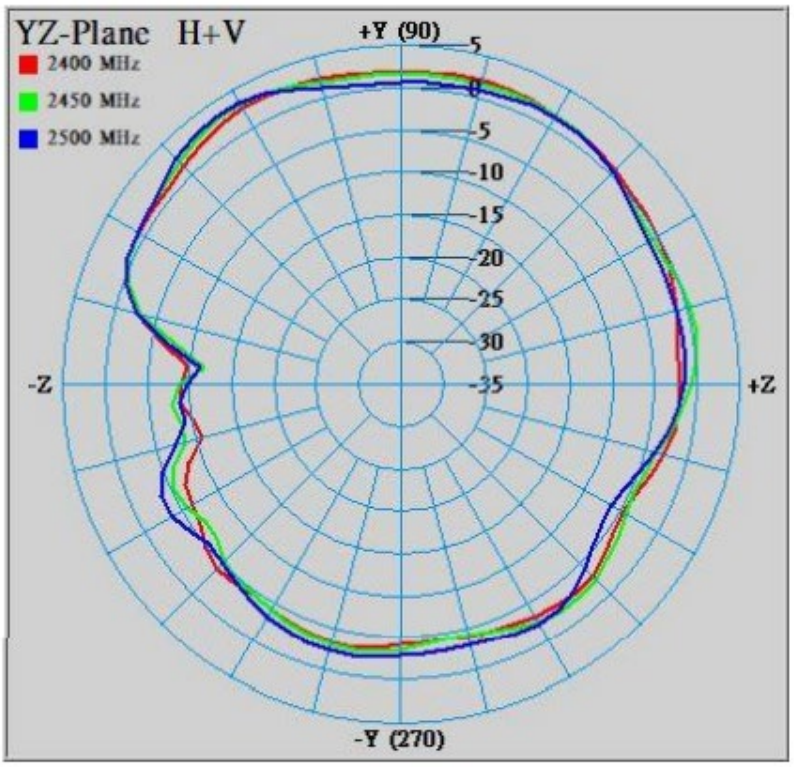


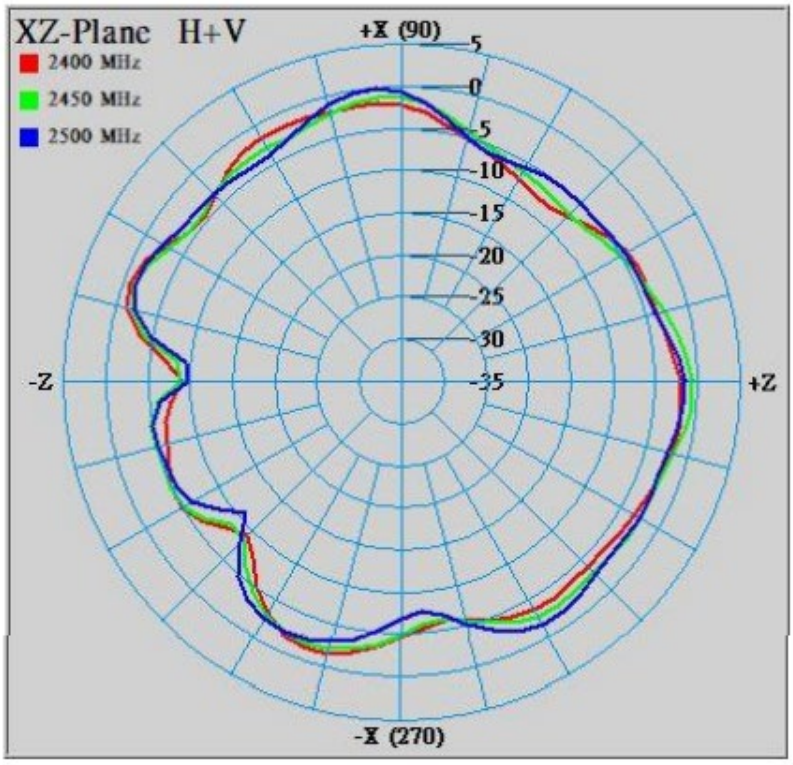


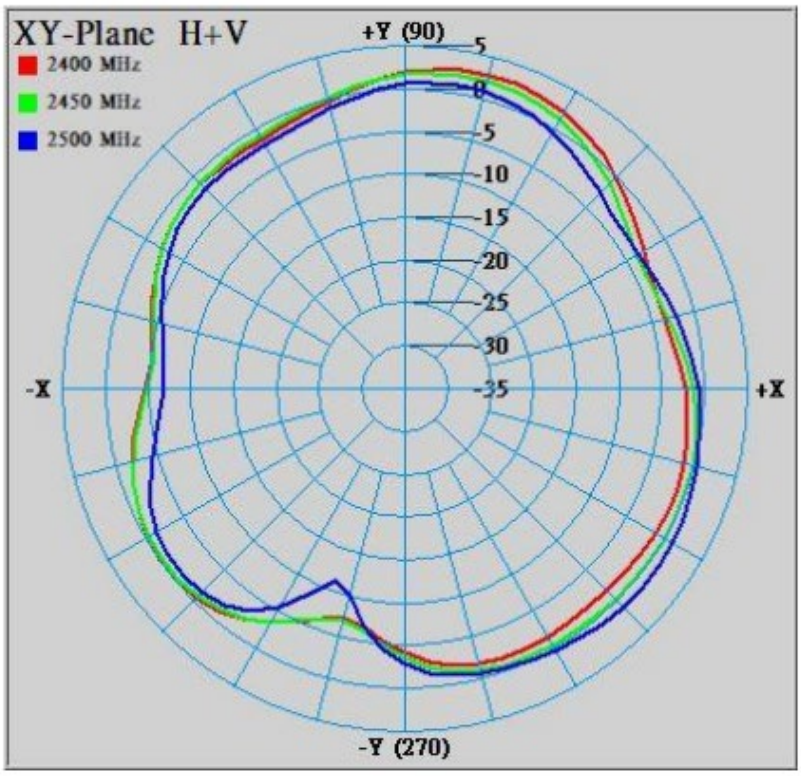

XY-Plane H+V
2400 MHz
2450 MHz
2500 MHz
+Y (90)
5
0
-5
-10
-15
-20
-25
-30
-35
-X
+X
-Y (270)

WiFi@2G

2D Radiation Patterns

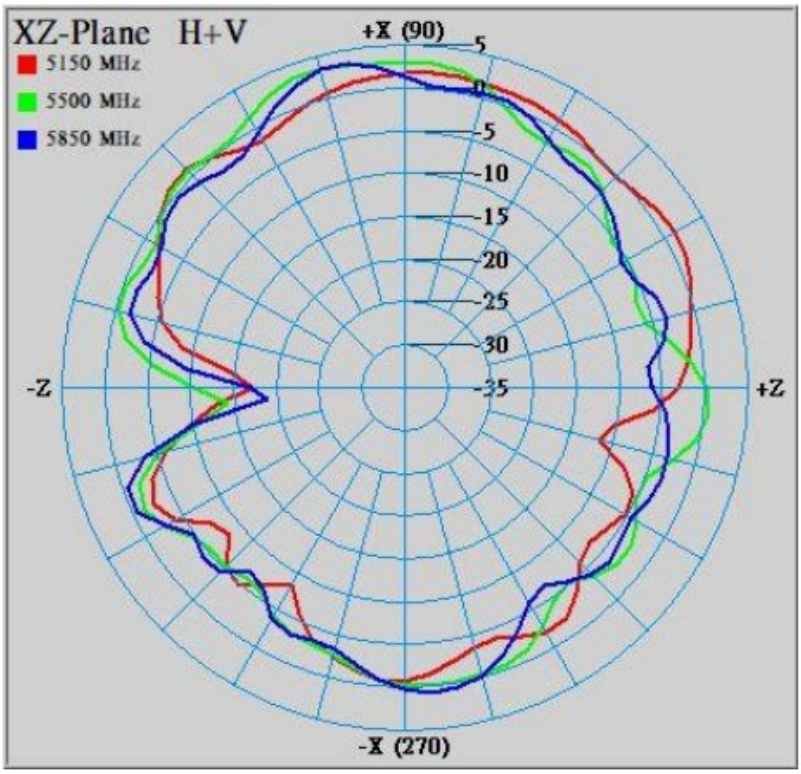


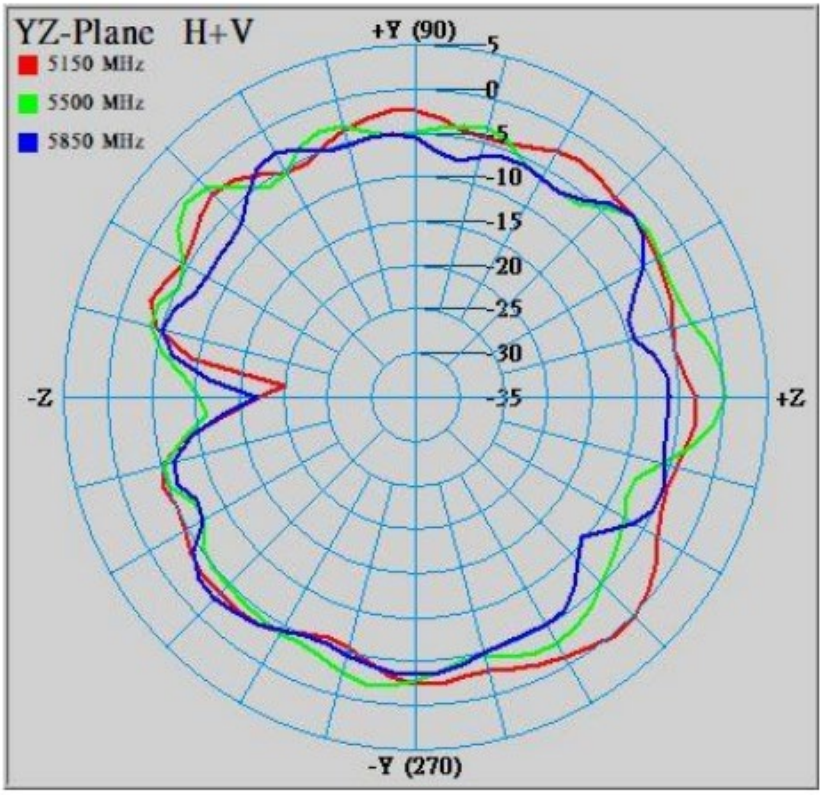


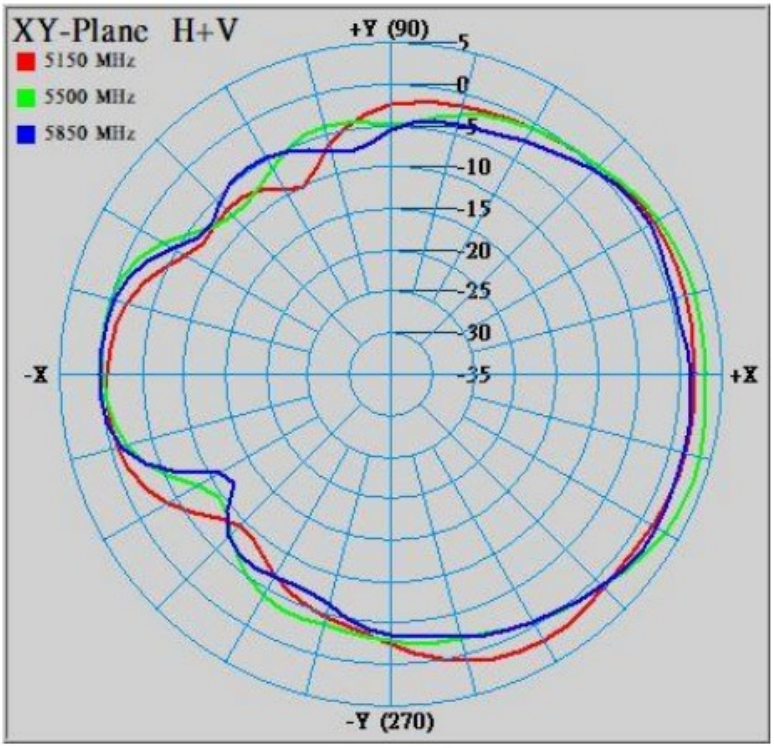

XY-Plane H+V
2400 MHz
2450 MHz
2500 MHz
+Y (90)
5
0
-5
-10
-15
-20
-25
-30
-35
-X
+X
-Y (270)

2D Radiation Patterns

WiFi@5G



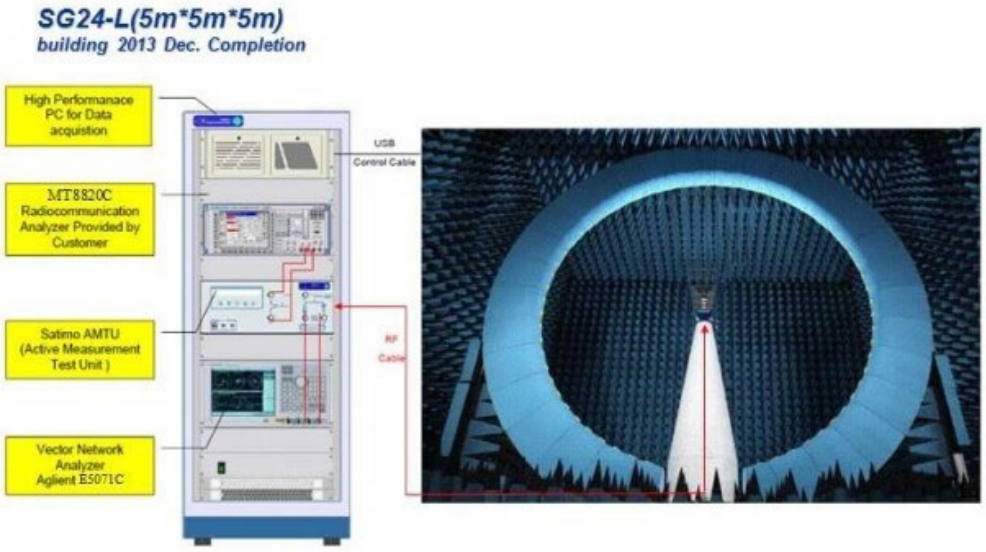



XY-Plane H+V
5150 MHz
5500 MHz
5850 MHz
+Y (90)
5
0
-5
-10
-15
-20
-25
-30
-35
-X
+X
-Y (270)

1. Measurement Information

1.1 Test Equipment

Chamber: SATIMO SG24-L



1. Measurement Information

1.1 Test Equipment

Network analyzer: E5063A ENA

Equipment	Brand and test program	Calibrated Equipment	Calibration date
Reflection Coefficient Measurement	Keysight Network Analyzer	Keysight Network 85033E	2022/4/13
Pattern Measurement	Satimo Test Program: SPM V15	Satimo SD2450 (2G) SD5150 (5G) SD5450 (5G)	2022/11/29

Tested date：2022/06/07
Test personnel：Peter Chang
Lab address：566-1, Ko-Shi Road , Yang-Mei, Tao-Yuan, 32668, Taiwan

■Operating instructions:

1.Place the DUT at the center of the turntable,
2.Connecting the test cable to the DUT, and use the SPM software for passive measurement.
3.During the measured process, SATIMO SG24 will conduct radiation testing with the DUT through 23 probes by a vertical 360- degree; then the turntable will rotate a horizontal 180- degree.
4. After, a complete measurement of spherical 3D is completed.

24G Radar

1. Radar antenna manufacturer: Socionext
2. Radar antenna type: Patch antenna

2.4. Antenna configuration

Figure 2-3 shows an antenna configuration. This product has two receiver antennas. The center-to-center distance of receiver antennas is 5.76 mm.

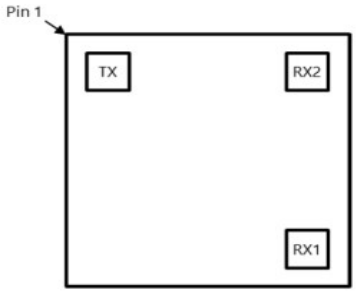


Figure 2-3 Top View Antenna configuration (Not to scale)

Table 3-11 Antenna Section

Parameter		Symbol	Conditions	Limits			Unit
				Min	Typ	Max	
E1	RX antenna Gain	Grxa	f_{RF}=24.15GHz		2		dBi
E2	TX antenna Gain	Gtxa	f_{RF}=24.15GHz		2		dBi

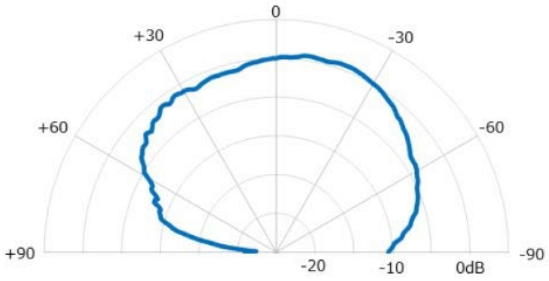
Table 3-15 Transmitter Section

Parameter		Symbol	Conditions	Limit			Unit
				Min	Typ	Max	
E21	RF transmit Frequency range	f_{TX}		24.06		24.24	GHz
E22	RF Transmit Power Note 11)	PAout	f_{TX}=24.05GHz to 24.25GHz, Tjopr=25°C	-1	2	3.7	dBm
E23	Transmit Power Variation Note 11)	PAvar	f_{TX}=24.05GHz to 24.25 GHz		0.7		dB

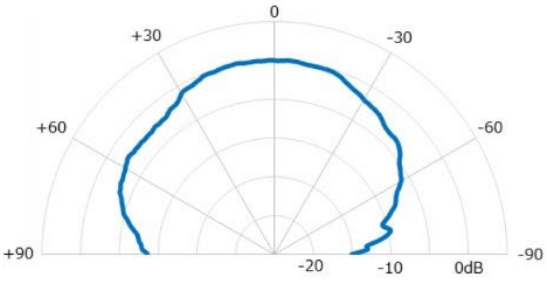
Note 11) These limit values are based on the measurement conditions defined by Socionext; a receiving antenna is placed in the zenith direction of the DUT and the distance is 3m. Socionext's conditions may differ from the conditions defined in the radio regulations of each country.

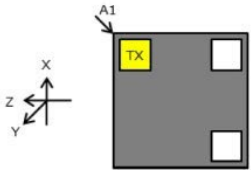
Antenna pattern (Reference)

TX/Y-Z plane

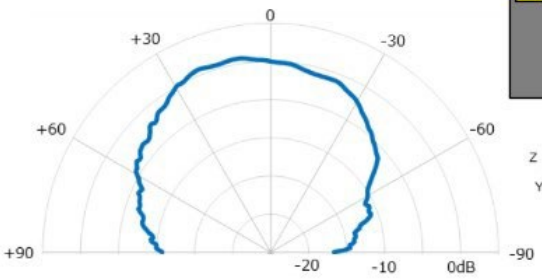


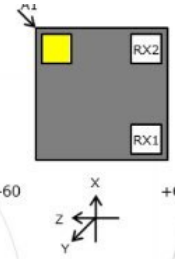
TX/X-Y plane



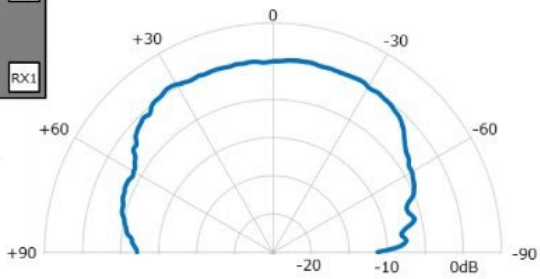


RX1/Y-Z plane

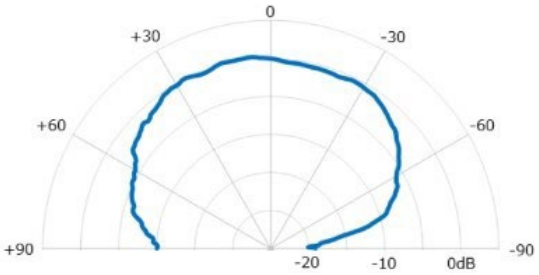




RX1/X-Y plane



RX2/Y-Z plane



RX2/X-Y plane