AP541
Antenna Test Report

Version:V1
2025-12-1

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1. Test Information

Equipment	EMT Chamber
Applicant	Han-Networks
Manufacturer	Dongguan Tailin Electronic Communication Co., Ltd

2. Testing Location

Testing Location	
Tailin Electronic	No. 152, Qiaodong Road (Dongjiang Sec.), Qiaotou Town, Dongguan, Guangdong, China

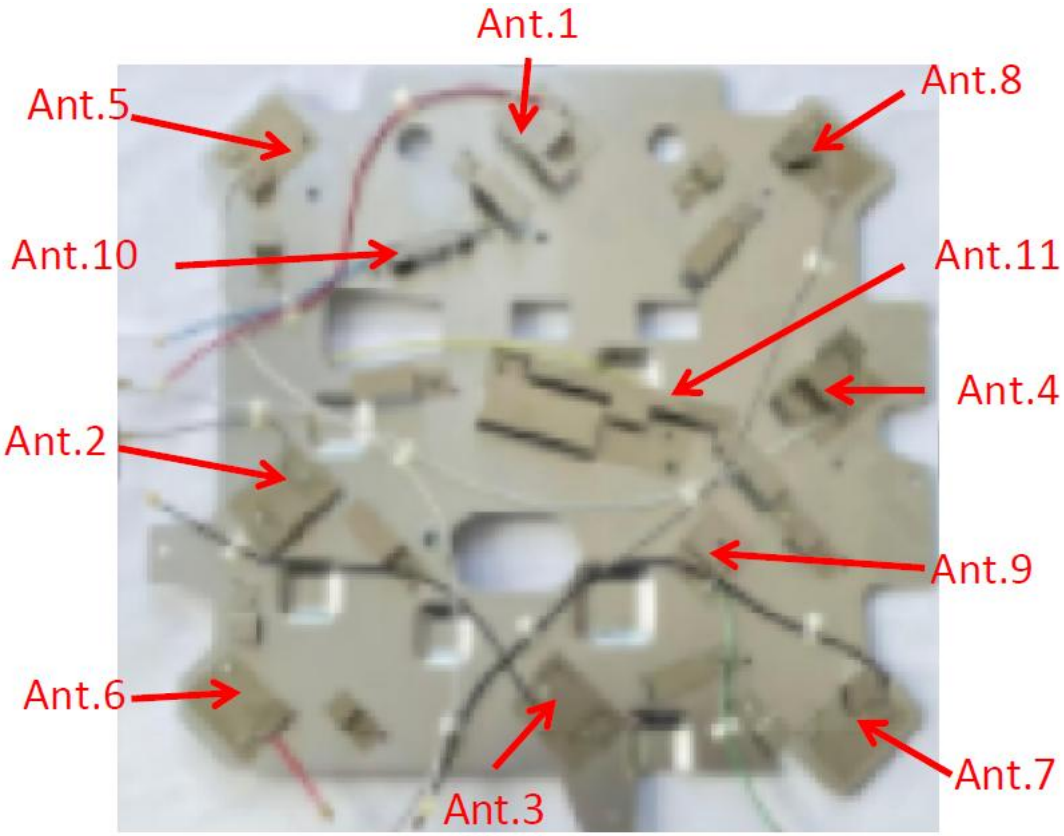
Test Condition	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	Zhihua	20-24 / 45-60	2025-08.20

3. Test Frequency

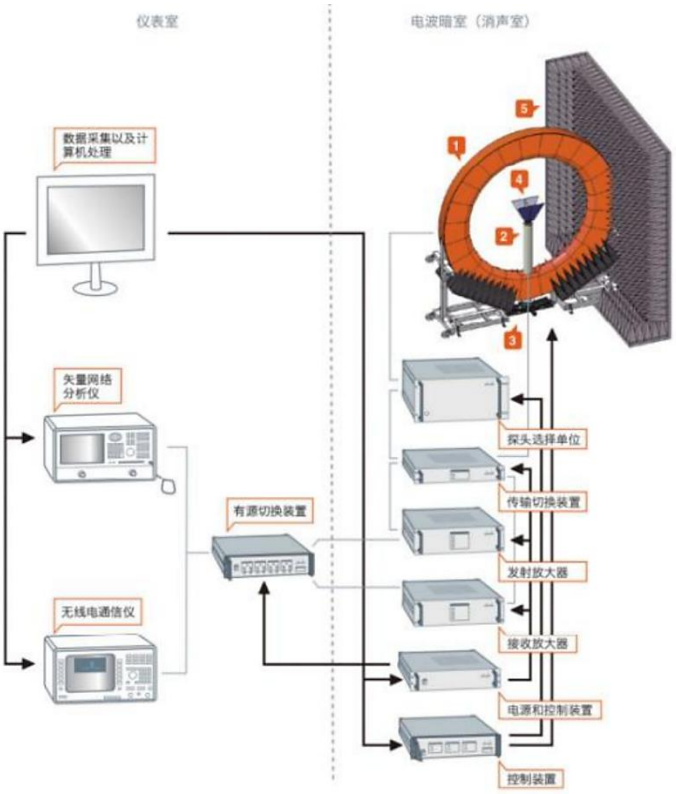
Band (MHz)	Test Frequency (MHz)
2400-2500	2450
5150-5850	5150/5550/5850
5925-7125	5925/6550/7125

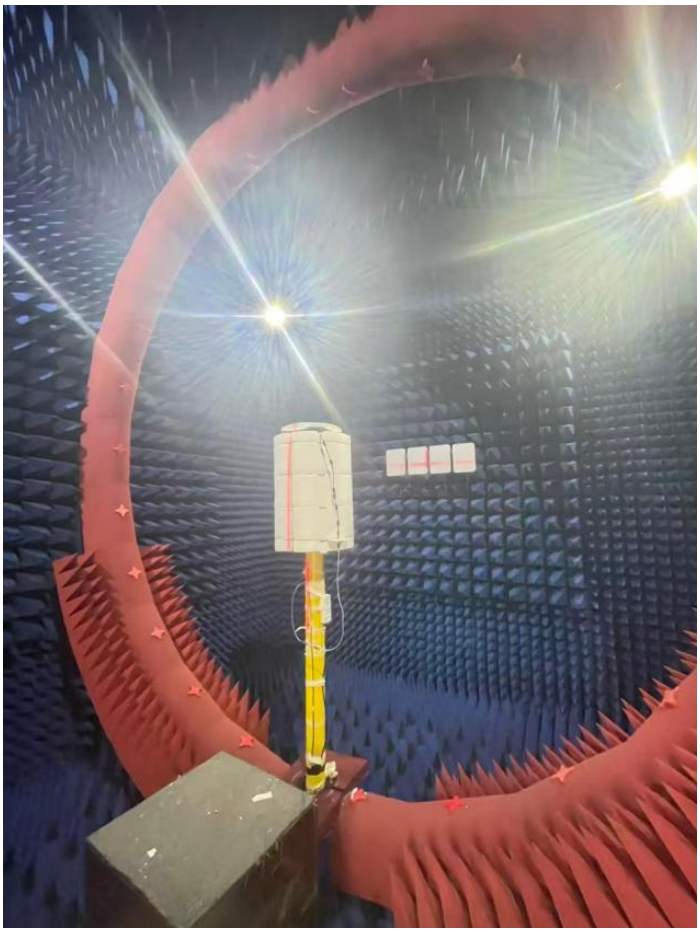
4. Antenna Information

Ant No.	Function	Operating Band	Type	Dimension	Polarization
Ant 1, 2, 3, 4	WiFi 2G/5G	2400-2500 MHz/5150-5850 MHz	PIFA	31*22*10mm	Vertical
Ant 5, 6, 7 , 8	WiFi 5G/6G	5150-5850 MHz/5925-7125 MHz	PIFA	28*20.5*6.8mm	Vertical
Ant 9	Scan	2400-2500 MHz/5150-5850 MHz /5925-7125 MHz	PIFA	21.5*21.9*8.2mm	Vertical
Ant 10	BLE	2400-2500 MHz	PIFA	43.3*7.1*9.6mm	Vertical
Ant 11	GPS	1164-1218 MHz/1558-1610 MHz	PIFA	79.1*24.4*8.8mm	Vertical

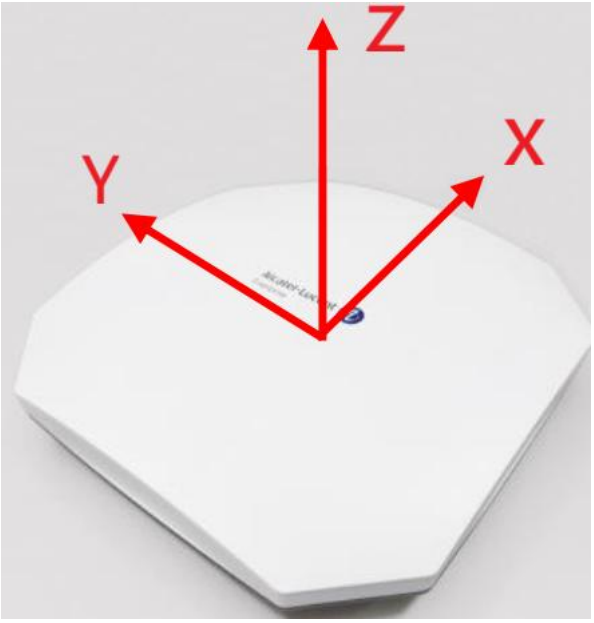


5. Test Configuration

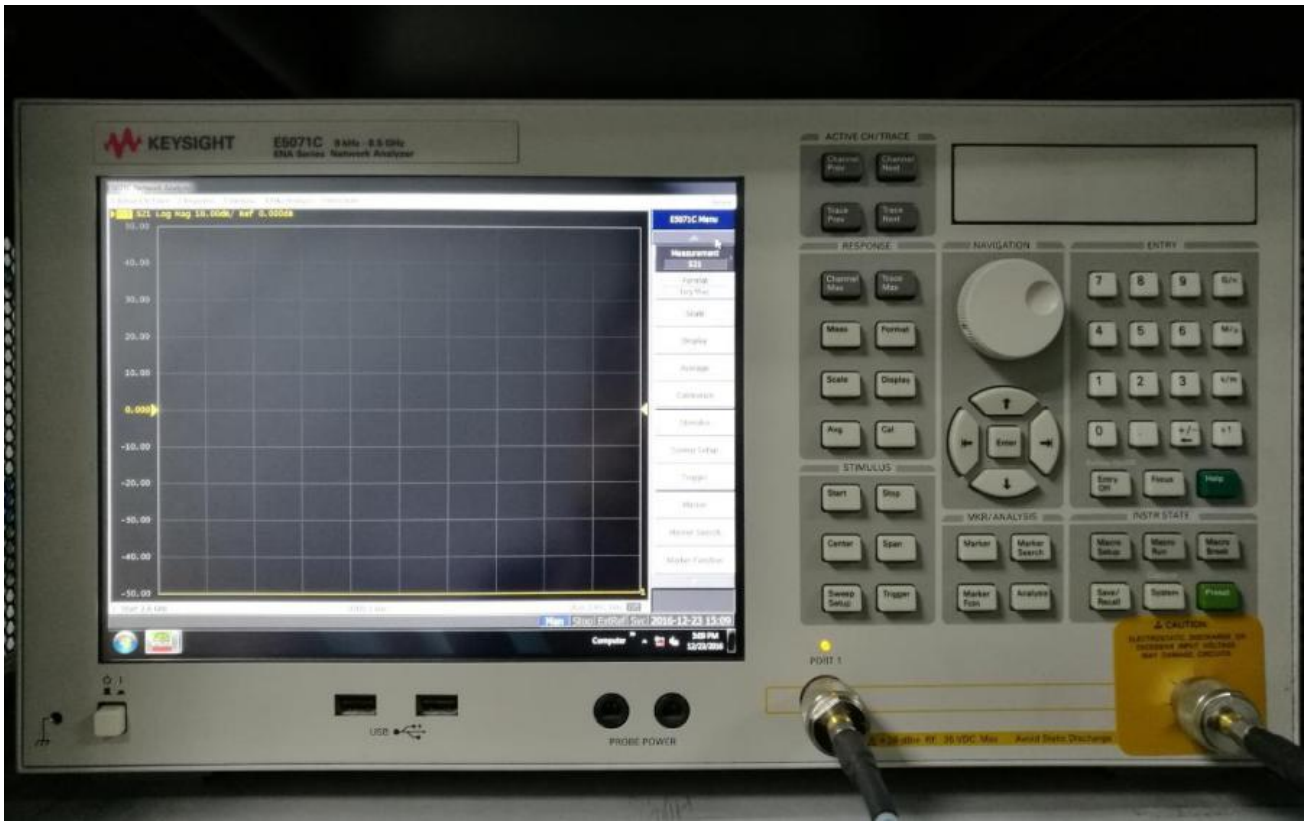




Microwave anechoic chamber



6. Reference Test



Measurement Instrument

7. Test Method

The “great circle” cut method, whereby the Measurement Antenna remains fixed and the EUT is rotated about two axes in sequential order. The radiated RF performance of the Equipment Under Test (EUT) is measured by sampling the radiated transmit power of the mobile at various locations surrounding the device. A three-dimensional characterization of the 'transmit' performance of the EUT is pieced together by analyzing the data from the spatially distributed measurements.

Data points taken every 2 degrees in the theta and in the phi axes are deemed sufficient to fully characterize the EUT's Far-Field radiation pattern and total radiated power All of the measured power values will be integrated.

8. Measured Values and Calculation of Correlated / Uncorrelated Gains

Summary of Antenna Peak Gain

Antenna Peak Gain Table (Ant. Position：2.4G Ant.1~4)

Band (MHz)	2400-2500
Ant.1 Max Gain (dBi)	4.63
Ant.2 Max Gain (dBi)	5.42
Ant.3 Max Gain (dBi)	5.08
Ant.4 Max Gain (dBi)	5.95

Antenna Peak Gain Table (Ant. Position：5GL/5G Ant.1~4)

Band (MHz)	5150 ~ 5250	5250 ~ 5350	5470 ~ 5725	5725 ~ 5850
Ant.1 Max Gain (dBi)	3.91	4.50	3.73	4.17
Ant.2 Max Gain (dBi)	4.39	4.39	3.67	4.75
Ant.3 Max Gain (dBi)	3.58	3.72	3.70	3.46
Ant.4 Max Gain (dBi)	4.08	3.69	3.78	5.54

Antenna Peak Gain Table (Ant. Position：5GH/6G Ant.5~8)

Band (MHz)	5470 ~ 5725	5725 ~ 5850	5925 ~ 6425	6425 ~ 6525	6525 ~ 6875	6875 ~ 7125
Ant.5 Max Gain (dBi)	4.06	3.21	3.09	3.23	3.23	2.90
Ant.6 Max Gain (dBi)	4.80	3.76	3.39	3.23	4.09	3.77
Ant.7 Max Gain (dBi)	3.98	4.58	3.99	4.18	4.18	2.57
Ant.8 Max Gain (dBi)	3.32	3.60	4.12	3.41	3.41	2.19

Antenna Peak Gain Table (Ant. Position：Scanning Ant.9)

Band (MHz)	2400-2500			
Ant.9 Max Gain (dBi)	6.75			
Band (MHz)	5150 ~ 5250	5250 ~ 5350	5470 ~ 5725	5725 ~ 5850
Ant.9 Max Gain (dBi)	5.79	5.79	6.22	5.74
Band (MHz)	5925 ~ 6425	6425 ~ 6525	6525 ~ 6875	6875 ~ 7125
Ant.9 Max Gain (dBi)	5.80	6.44	6.44	5.99

Antenna Peak Gain Table (Ant. Position：BLE/Zigbee Ant.10)

Band (MHz)	2400-2500
Ant.10 Max Gain (dBi)	4.59

Antenna Peak Gain Table (Ant. Position：GNSS Ant.11)

Band (MHz)	1164~1215	1559~1610
Ant.11 Max Gain (dBi)	1.12	3.15

Result for Uncorrelated Gain and Correlated Gain

Maximum Correlated Gain Calculation

Because the antennas are fixed in location within the device the directional antenna gain for MIMO is calculated over a sphere using the raw spatial data taken at 10 degree steps of theta and 10 degree of theta phi for each antenna using the equations from KDB 662911 D01. The raw antenna data is located in the appendix of this report.

The correlated antenna gain was calculated using KDB 662911 D01 F(2)(d)(i).

$$\text{Directional gain} = 10\log[(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N_{ANT}]\ \text{dBi}$$

The uncorrelated antenna gain was calculated using KDB 662911 D01 F(2)(d)(ii)

$$\text{Directional gain} = 10\log[(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10})/N_{ANT}]\ \text{dBi}$$

The correlated gains were calculated for each point in the spatial data and the highest values reported.

Correlated Directional Gain for 2.4GHz (Ant. Position：2.4G Ant.1~4)

Frequency (MHz)	2450
Directional Gain	7.23

Ant.1~4 @2450MHz

Please see Page 1~6 of "Antenna Test Data_P1" file.

Uncorrelated Directional Gain for 2.4GHz (Ant. Position：2.4G Ant.1~4)

Frequency (MHz)	2450
Directional Gain	1.97

Ant.1~4 @2450MHz

Please see Page 7~12 of "Antenna Test Data_P1" file.

Correlated Directional Gain for 5GHz (Ant. Position：5GHz Ant.1~4)

Frequency (MHz)	5150	5550	5850
Directional Gain	7.93	7.75	7.73

Ant.1~4 @5150MHz

Please see Page 13~18 of "Antenna Test Data_P1" file.

Ant.1~4 @5550MHz

Please see Page 25~30 of "Antenna Test Data_P1" file.

Ant.1~4 @5850MHz

Please see Page 7~12 of "Antenna Test Data_P2" file.

Uncorrelated Directional Gain for 5GHz (Ant. Position：5GHz Ant.1~4)

Frequency (MHz)	5150	5550	5850
Directional Gain	1.94	1.88	1.75

Ant.1~4 @5150MHz

Please see Page 19~24 of "Antenna Test Data_P1" file.

Ant.1~4 @5550MHz

Please see Page 1~6 of "Antenna Test Data_P2" file.

Ant.1~4 @5850MHz

Please see Page 13~18 of "Antenna Test Data_P2" file.

Correlated Directional Gain for 5G High/6GHz (Ant. Position：5G High/6G Ant.5~8)

Frequency (MHz)	5550	5850	5925	6550	7125
Directional Gain	7.73	7.30	7.33	7.83	7.37

Ant.5~8 @5550MHz

Please see Page 19~24 of "Antenna Test Data_P2" file.

Ant.5~8 @5850MHz

Please see Page 1~6 of "Antenna Test Data_P3" file.

Ant.5~8 @5925MHz

Please see Page 13~18 of "Antenna Test Data_P3" file.

Ant.5~8 @6550MHz

Please see Page 25~30 of "Antenna Test Data_P3" file.

Ant.5~8 @7125MHz

Please see Page 7~12 of "Antenna Test Data_P4" file.

Uncorrelated Directional Gain for 5G High/6GHz (Ant. Position：5G High/6G Ant.5~8)

Frequency (MHz)	5550	5850	5925	6550	7125
Directional Gain	1.73	1.38	1.36	1.93	1.44

Ant.5~8 @5550MHz

Please see Page 25~30 of "Antenna Test Data_P2" file.

Ant.5~8 @5850MHz

Please see Page 7~12 of "Antenna Test Data_P3" file.

Ant.5~8 @5925MHz

Please see Page 19~24 of "Antenna Test Data_P3" file.

Ant.5~8 @6550MHz

Please see Page 1~6 of "Antenna Test Data_P4" file.

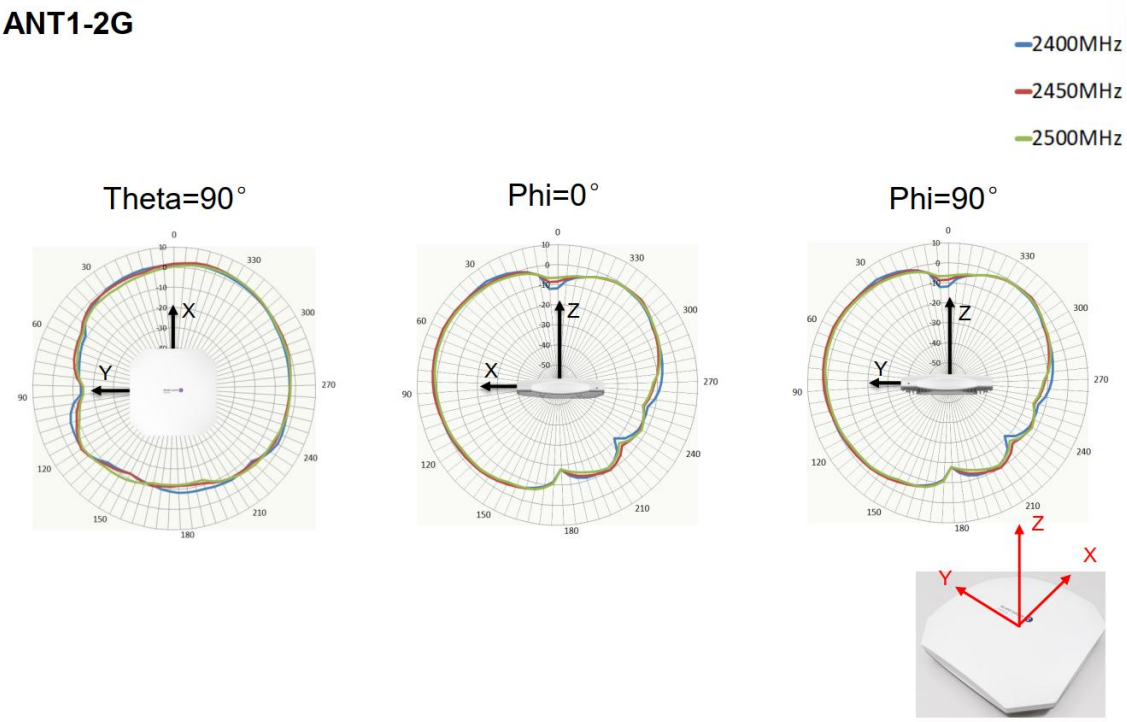
Ant.5~8 @7125MHz

Please see Page 13~18 of "Antenna Test Data_P4" file.

9. Radiation Pattern

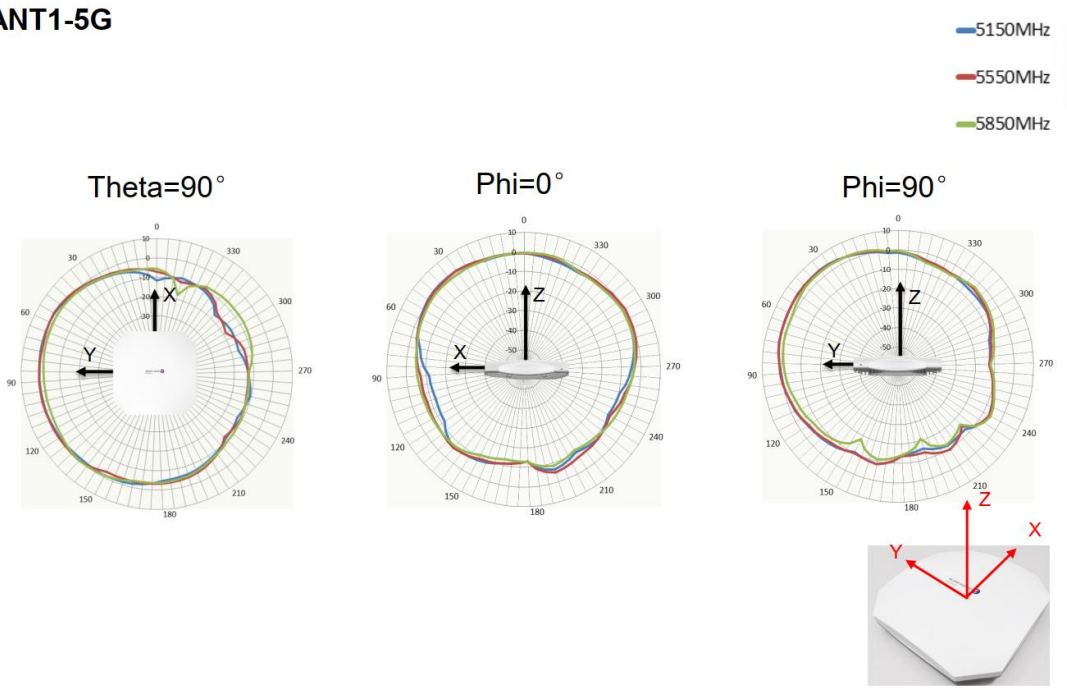
Ant. Position：2.4G Ant.1

ANT1-2G



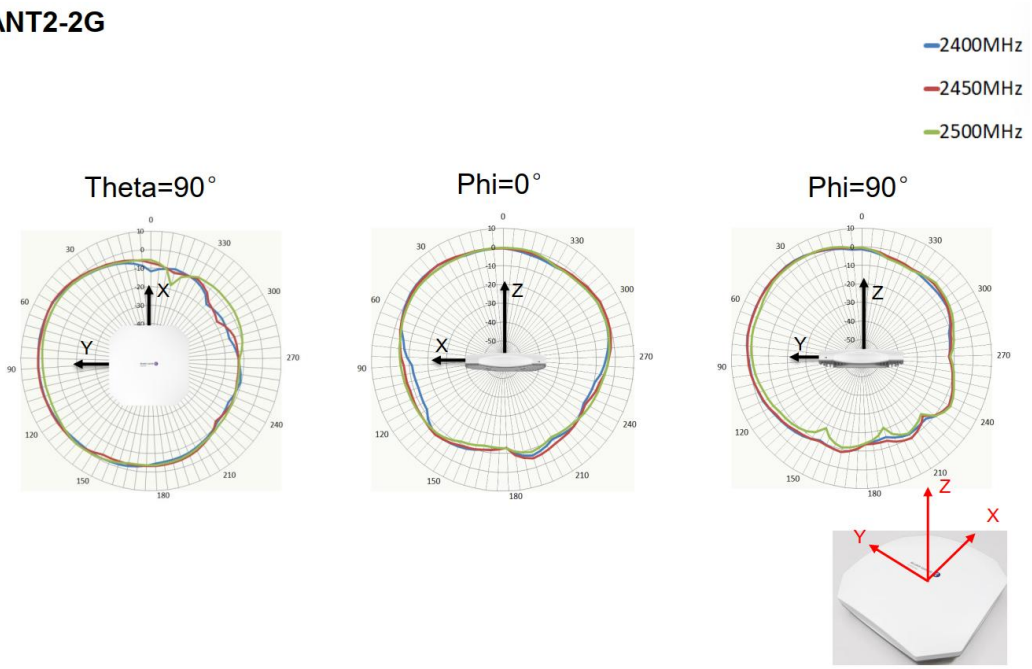
Ant. Position：5G Ant.1

ANT1-5G



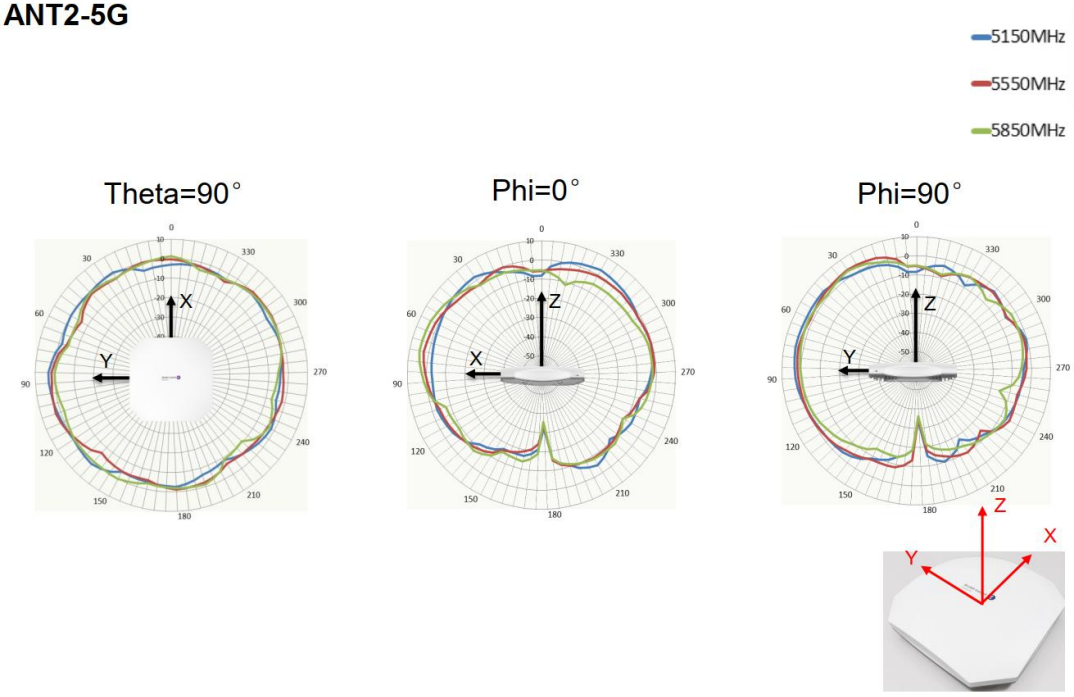
Ant. Position：2G Ant.2

ANT2-2G



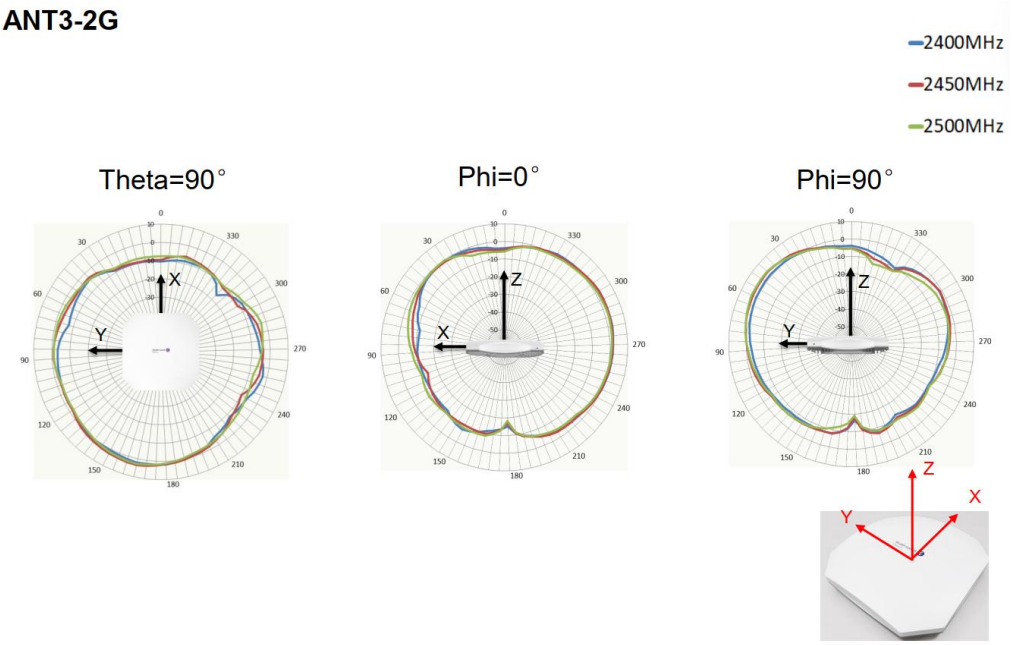
Ant. Position：5G Ant.2

ANT2-5G



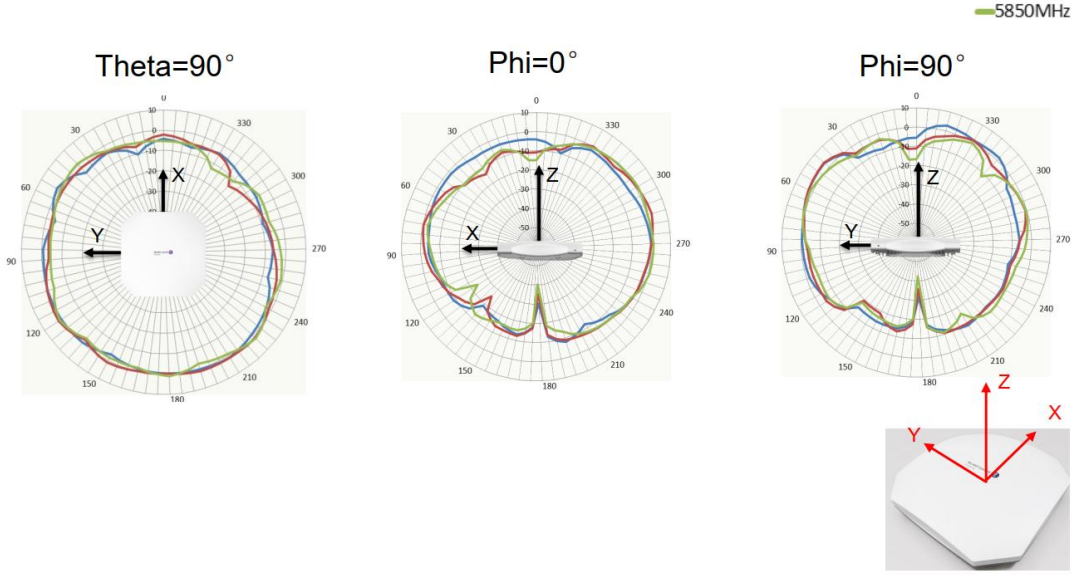
Ant. Position：2G Ant.3

ANT3-2G



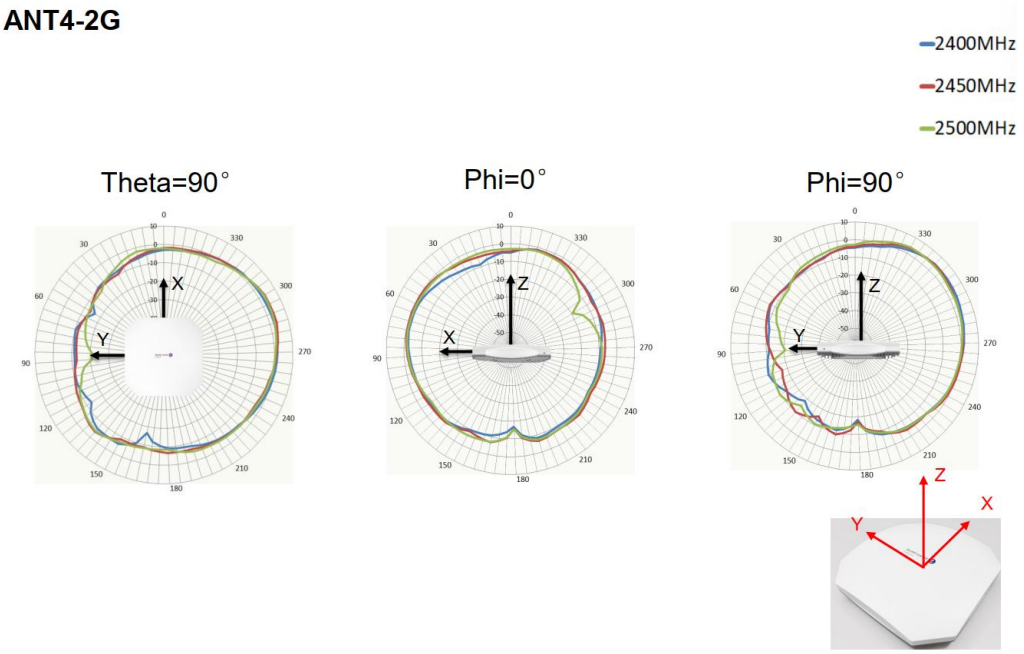
Ant. Position：5G Ant.3

ANT3-5G



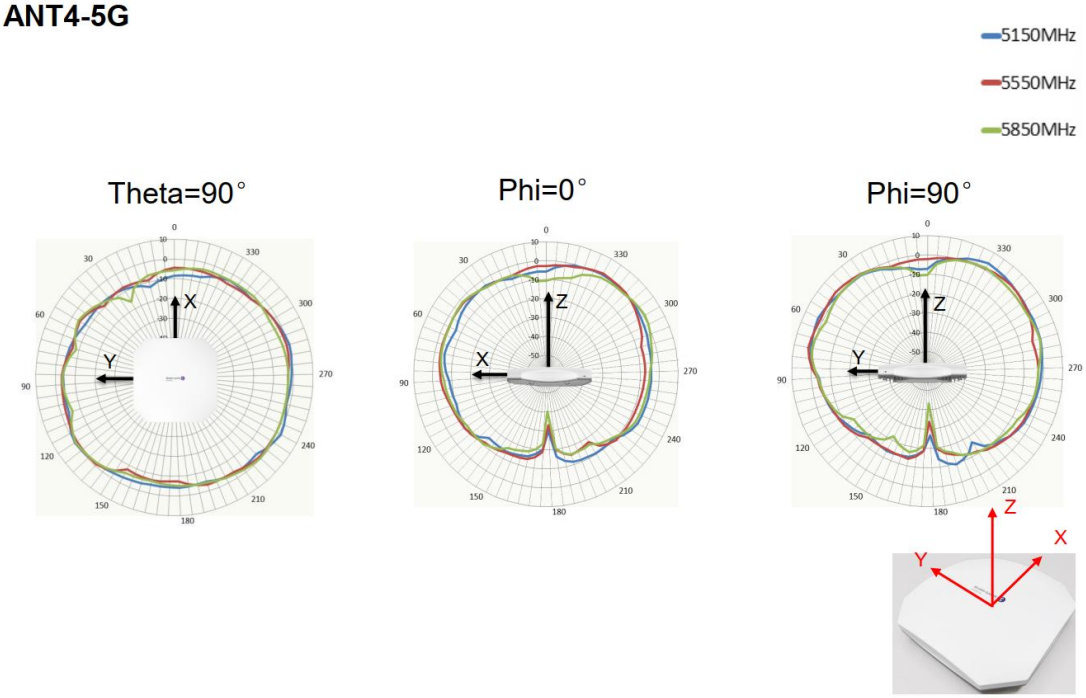
Ant. Position：2G Ant.4

ANT4-2G



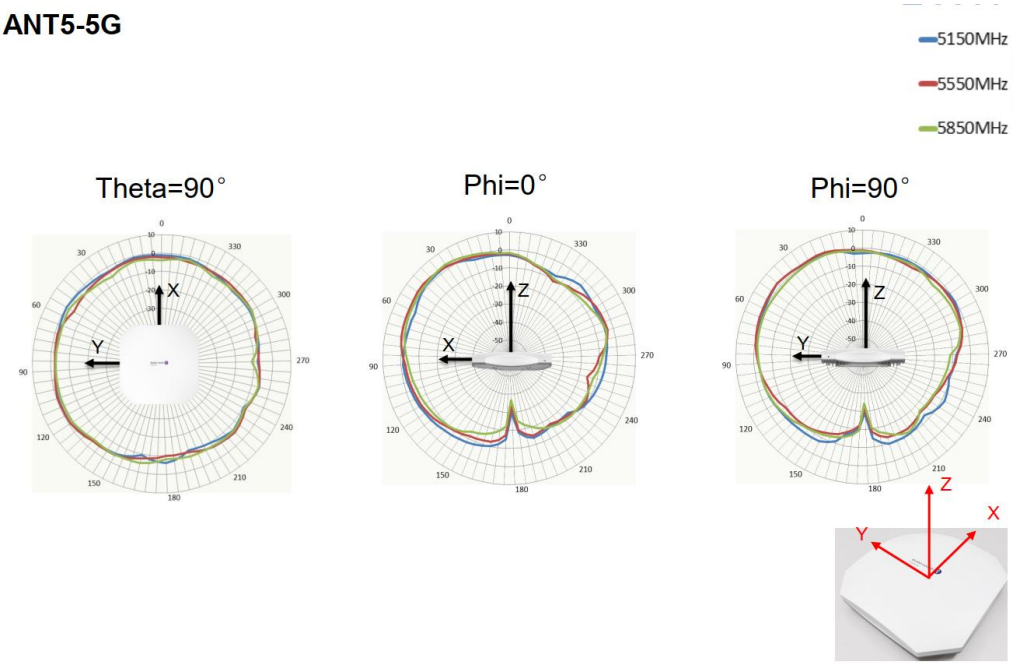
Ant. Position：5G Ant.4

ANT4-5G



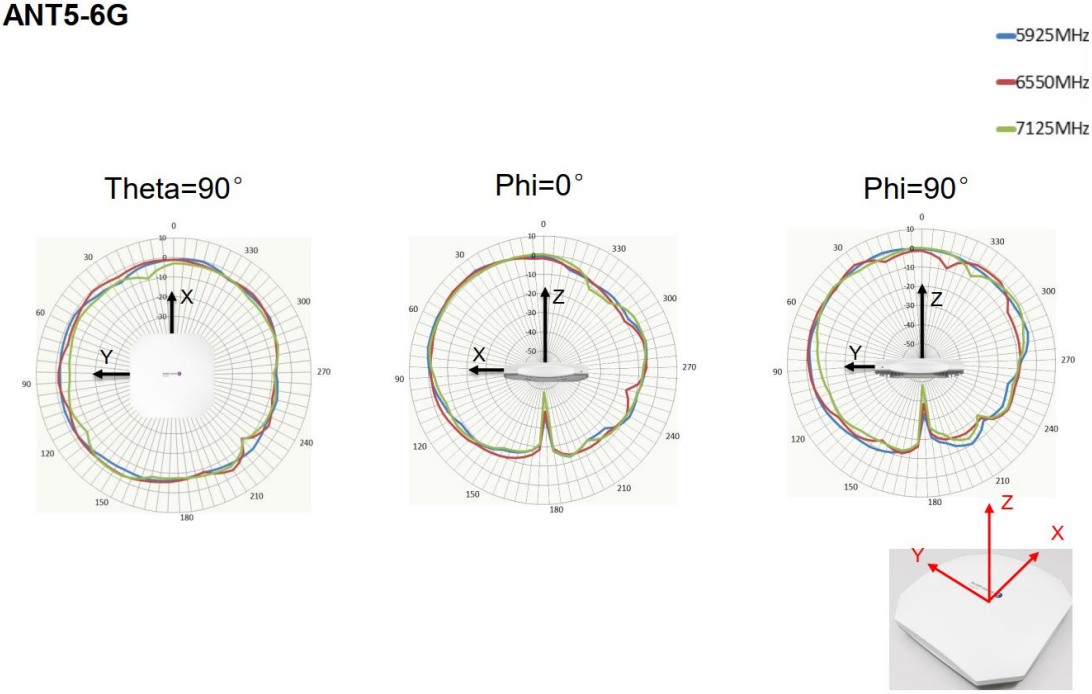
Ant. Position：5G BLE Ant.5

ANT5-5G



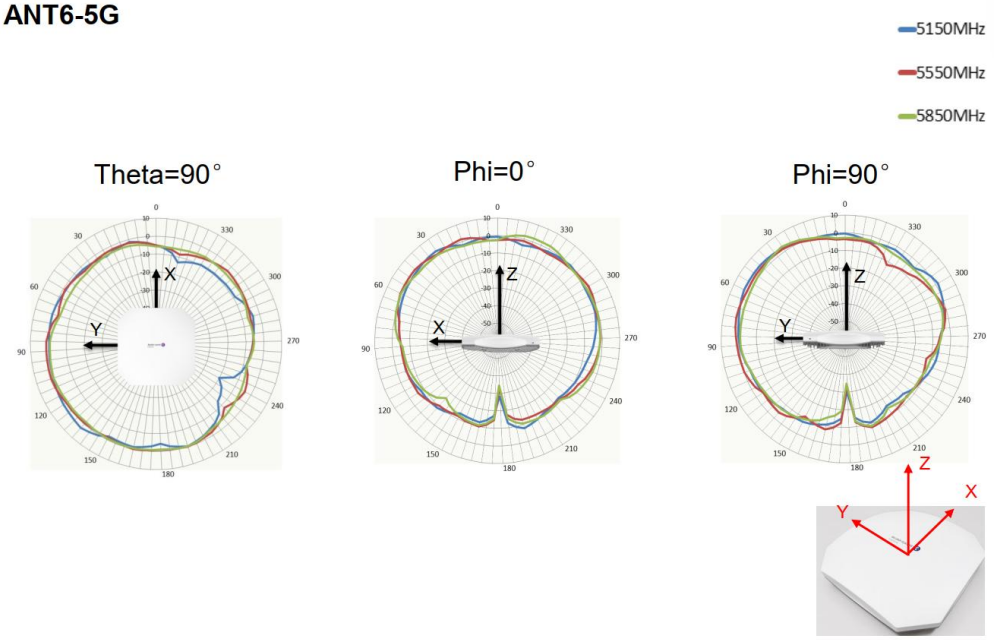
Ant. Position：6G Ant.5

ANT5-6G



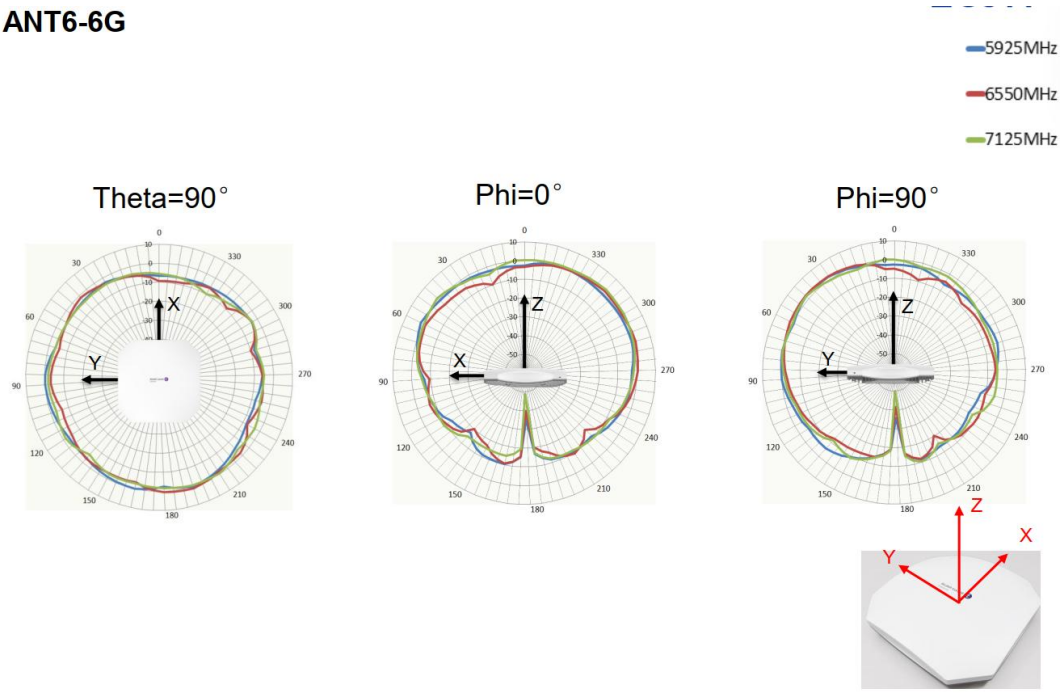
Ant. Position：5G Ant.6

ANT6-5G



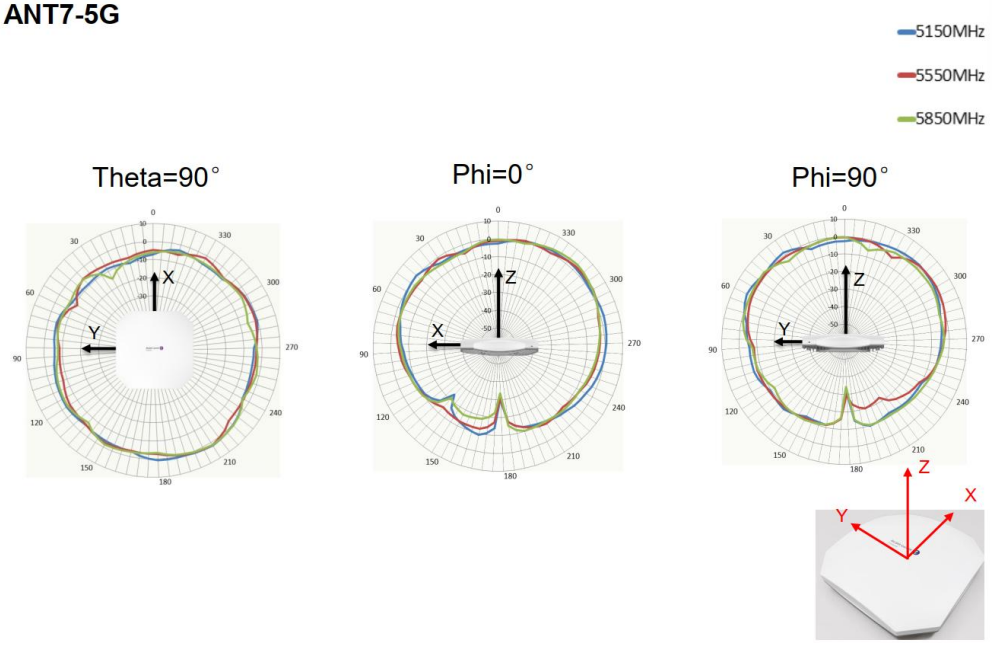
Ant. Position：6G Ant.6

ANT6-6G



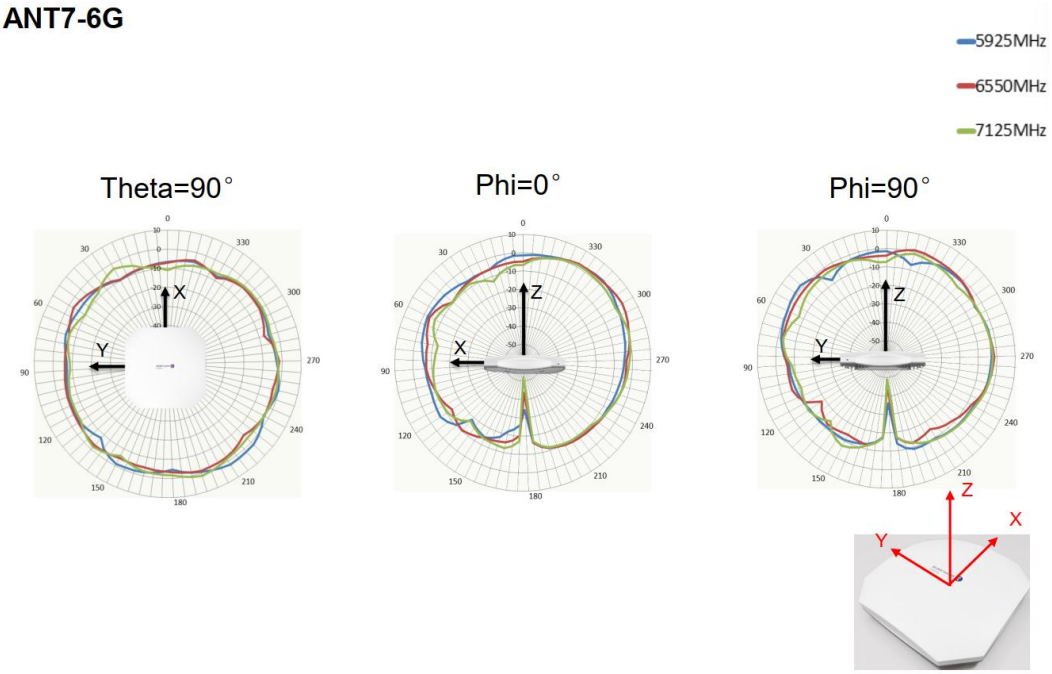
Ant. Position：5G Ant.7

ANT7-5G



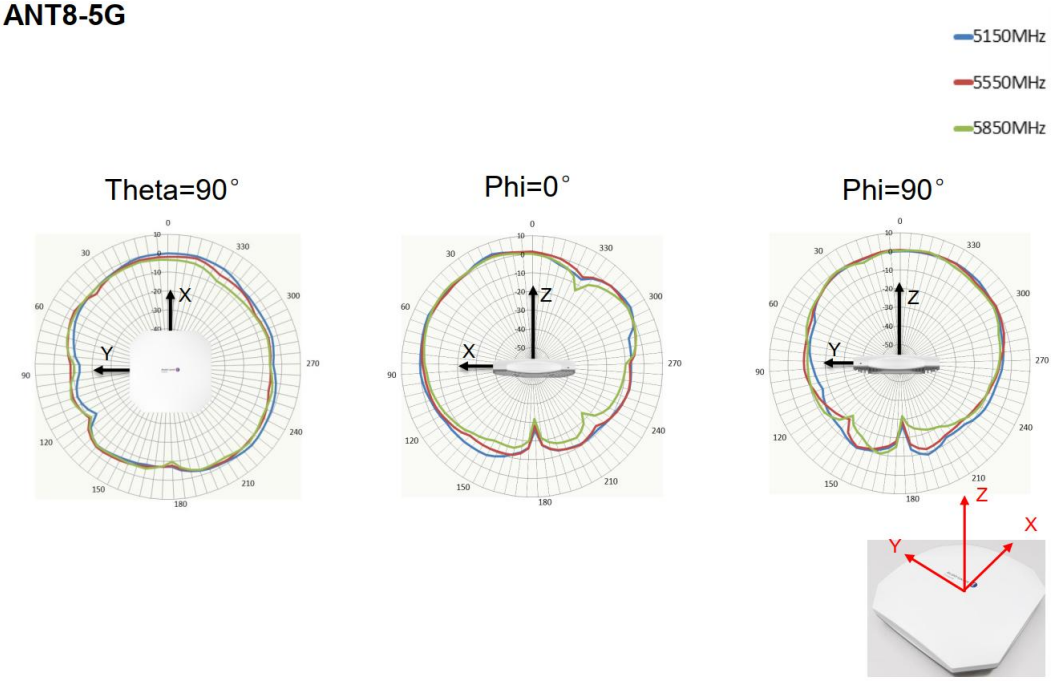
Ant. Position：6G Ant.7

ANT7-6G



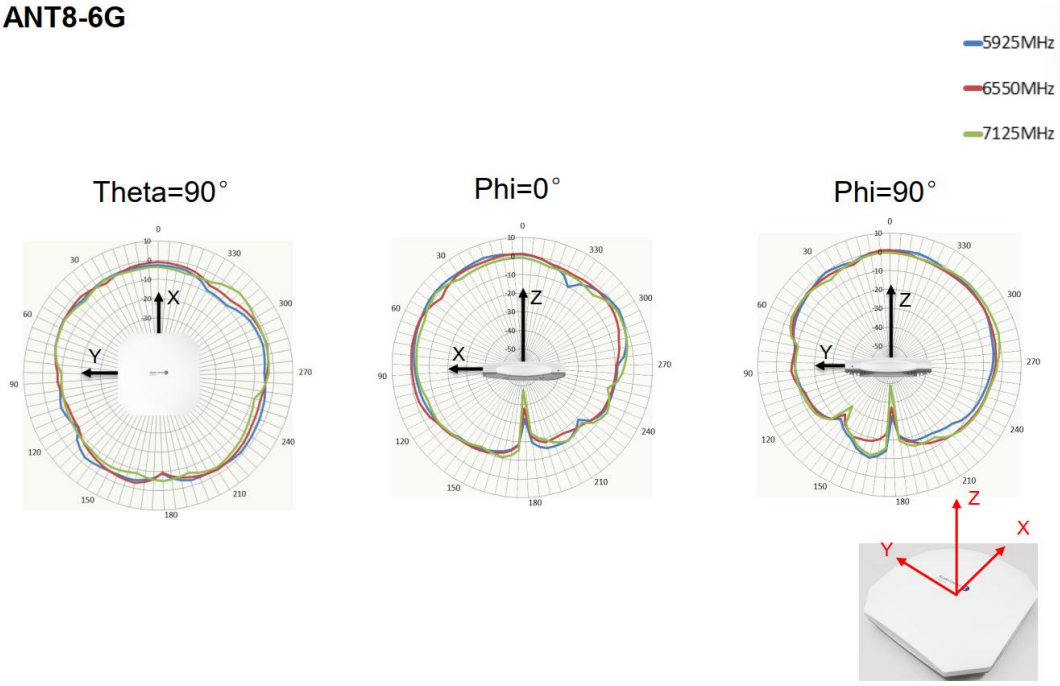
Ant. Position：5G Ant.8

ANT8-5G



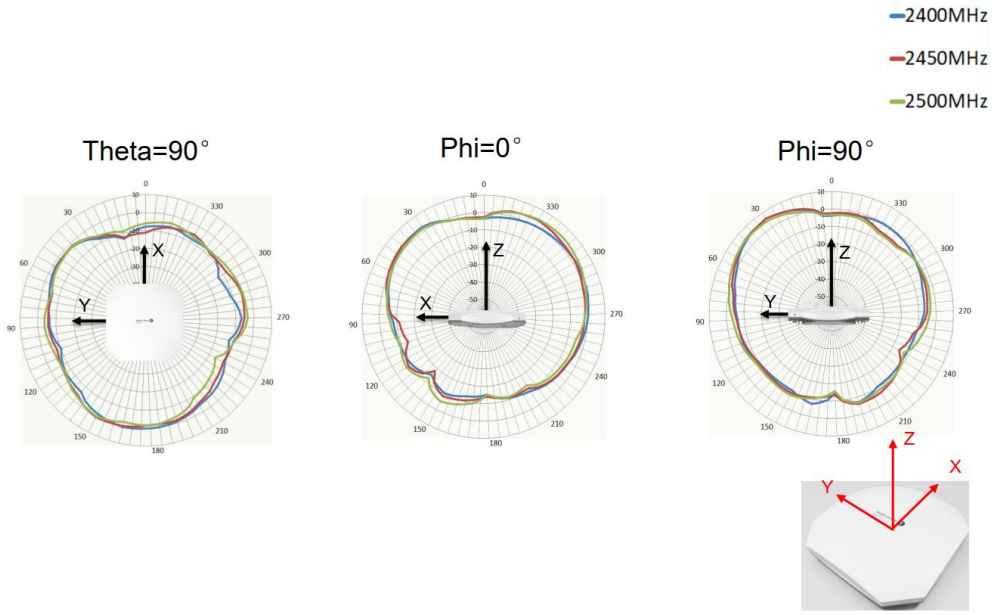
Ant. Position：6G Ant.8

ANT8-6G



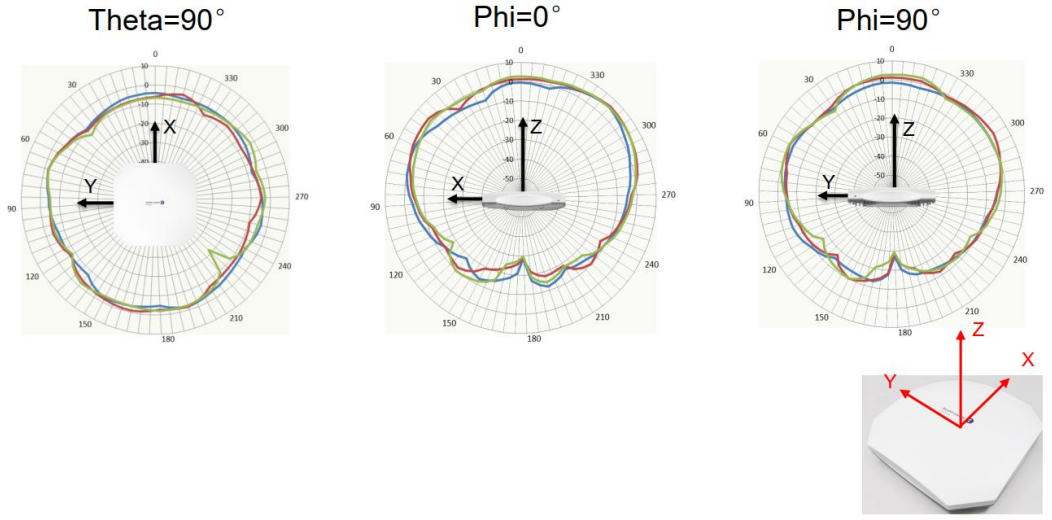
Ant. Position：2G Ant.9

ANT9-2G



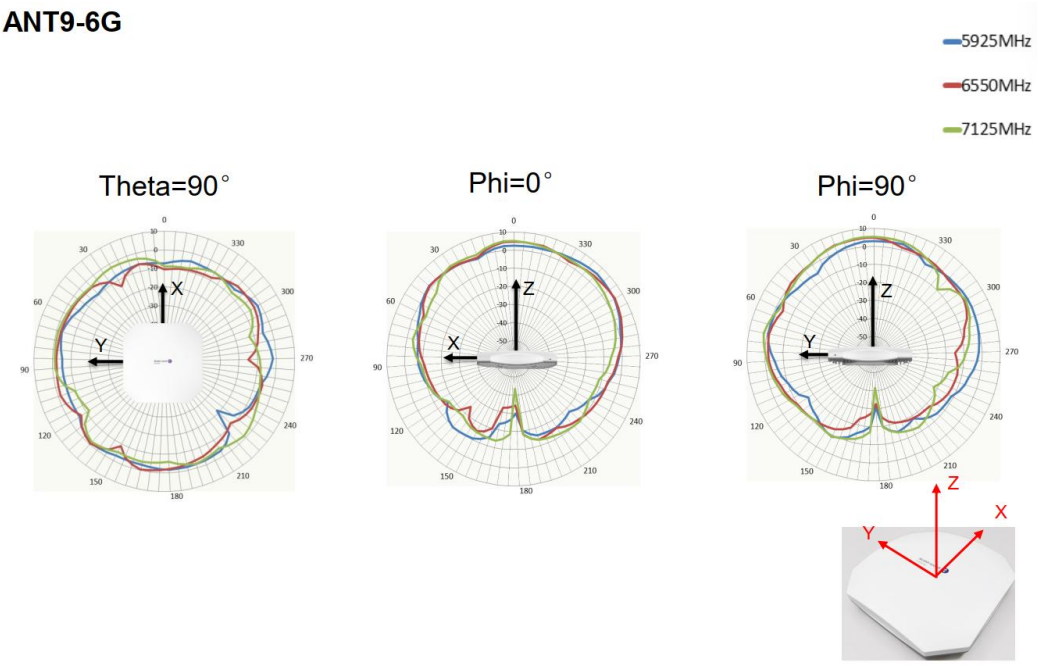
Ant. Position：5G Ant.9

ANT9-5G



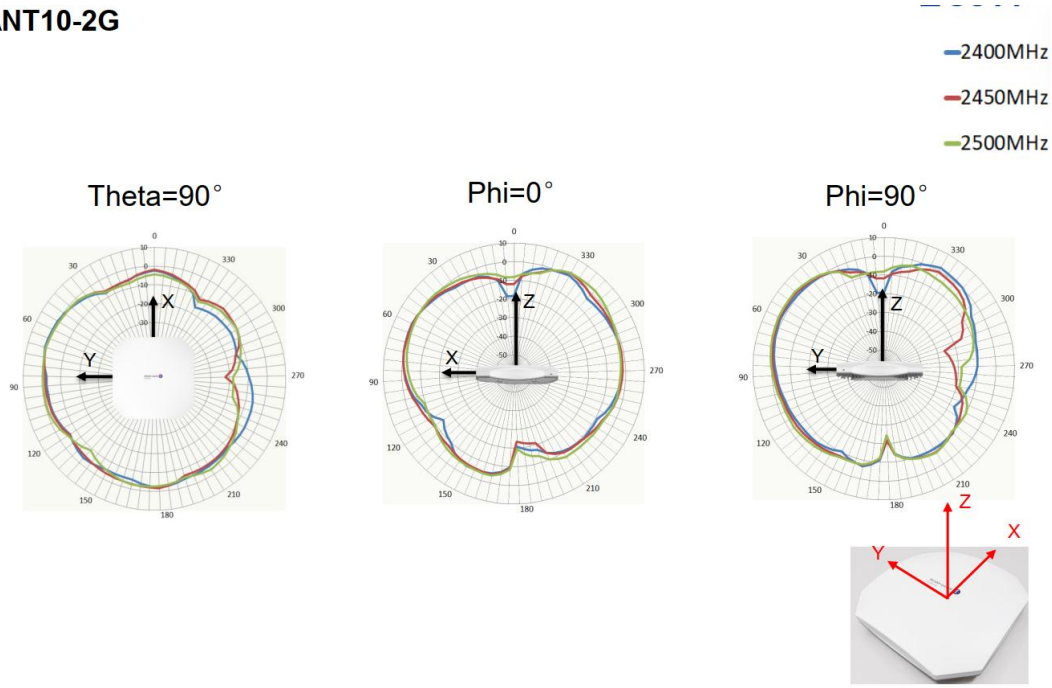
Ant. Position：6G Ant.9

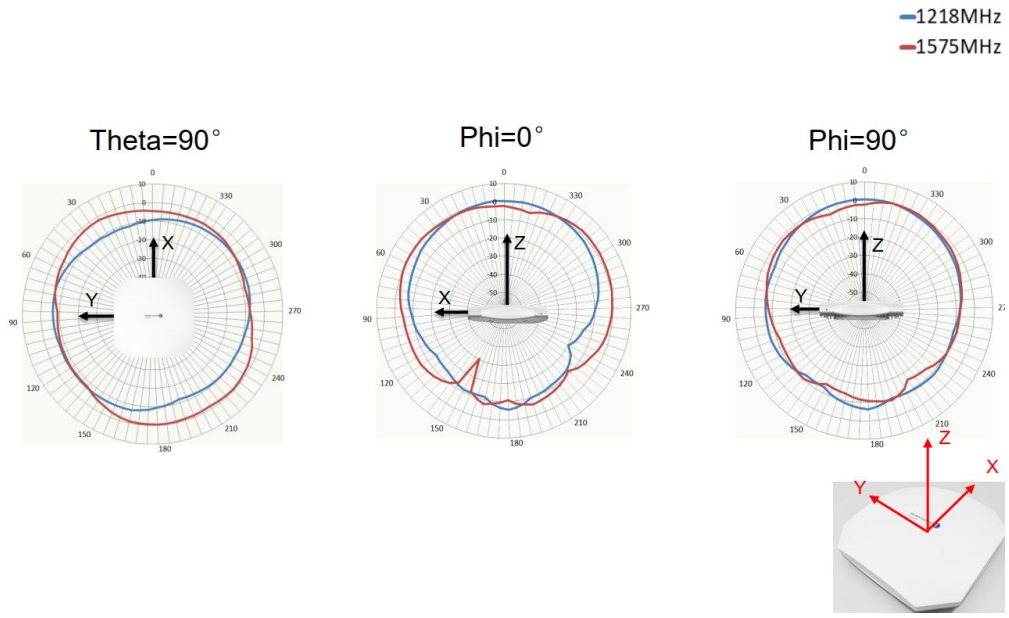
ANT9-6G



Ant. Position：2G Ant.10

ANT10-2G



Ant. Position：GNSS Ant.11

ANT11-1.218/1.575GHz