



JUNIPER AP66 ANTENNA REPORT

Brand: Juniper

Model: AP66, AP66E

By Juniper Networks, 1133 Innovation Way, Sunnyvale, CA 94089, USA



Summary

- **S11:** All of return loss can reach -10 dB.
- **Efficiency:** All the efficiencies are greater than 50%. It's frequency draft to higher in 5G and could be tuned back to resonant frequency.
- **Isolation:** The worst intra-isolation between 5G and 6G can reach 35 dB in 5.8 GHz-6 GHz band.
- **Gain ripple (V+H-pol):**
 - The gain ripple of 2G WIFI antenna are under 9 dB at theta 60 degree plane. The composited gain under 5 dB.
 - The gain ripple of 5G WIFI antenna are under 10 dB at theta 60 degree plane. The composited gain under 6 dB.
 - The gain ripple of 6G WIFI antenna are under 10 dB at theta 60 degree plane. The composited gain under 6 dB.
 - The gain ripple of Zigbee & BLE antenna is under 10 dB at theta 60 degree plane.
 - The gain ripple of GPS antenna is under 8 dB at theta 90 degree plane.

Summary

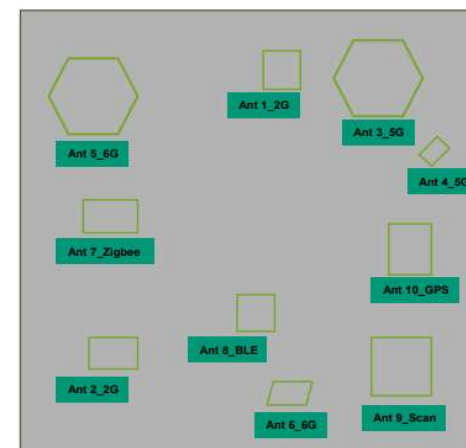
Function		WIFI						Zigbee	BLE	Scan
Band		2G		5G		6G		2G	2G	2G/5G/6G
Antenna		1	2	3	4	5	6	7	8	9
S11	MAX 2G	-16.8	-12.2	N.A		N.A		-13.7	-18.3	-14.5
	MAX 5G	N.A		-16.1	-10.0	N.A		N.A		-11.2
	MAX 6G	N.A		N.A		-8.9	-12.1	N.A		-11.3
Efficiency	MIN 2G	87	78	N.A		N.A		78	88	84
	MIN 5G	N.A		69	72	N.A		N.A		73
	MIN 6G	N.A		N.A		51	75	N.A		70
Peak Gain	MAX 2G	4.8	5.1	N.A		N.A		5.8	6.3	5.0
	MAX 5G	N.A		4.7	6.7	N.A		N.A		5.4
	MAX 6G	N.A		N.A		4.1	6.5	N.A		6.2
Gain Ripple	MAX 2G	6.5	9.8	N.A		N.A		5.0	9.4	9.7
	MAX 5G	N.A		6.1	8.6	N.A		N.A		9.4
	MAX 6G	N.A		N.A		6.2	7.9	N.A		9.0
Composite gain	2G	5.3		N.A		N.A		N.A		
	5G	N.A		6.3		N.A		N.A		
	6G	N.A		N.A		5.5		N.A		

Function		GPS
Band		L1/L5
Antenna		10
S11	MAX L1	-10.0
	MAX L5	-10.0
Efficiency	MIN L1	82
	MIN L5	77
Peak Gain	MAX L1	3.2
	MAX L5	3.9
Gain Ripple	MAX L1	4.0
	MAX L5	7.2

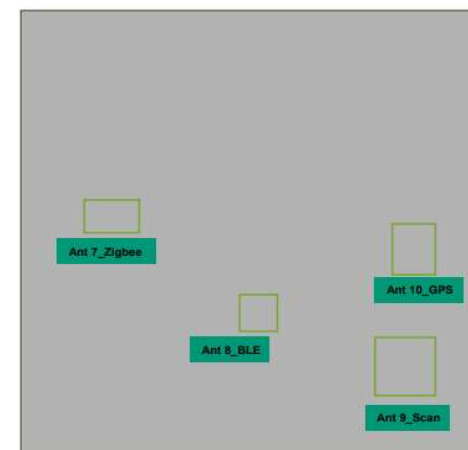
Antenna Placement and Type

Antenna No.	Function	Band	Type	AP66	AP66E
1	Wi-Fi	2G	PIFA	V	N/A (*)
2	Wi-Fi	2G	PIFA	V	N/A (*)
3	Wi-Fi	5G	Dipole	V	N/A (*)
4	Wi-Fi	5G	PIFA	V	N/A (*)
5	Wi-Fi	6G	Dipole	V	N/A (*)
6	Wi-Fi	6G	PIFA	V	N/A (*)
7	Zigbee	2G	PIFA	V	V
8	BLE	2G	PIFA	V	V
9	Scan	2G/5G/6G	PIFA	V	V
10	GPS	L1/L5	PIFA	V	V

Note (*): AP66E does not include internal Wi-Fi antennas; it relies on external antenna via N type RF connectors.

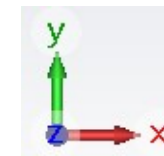
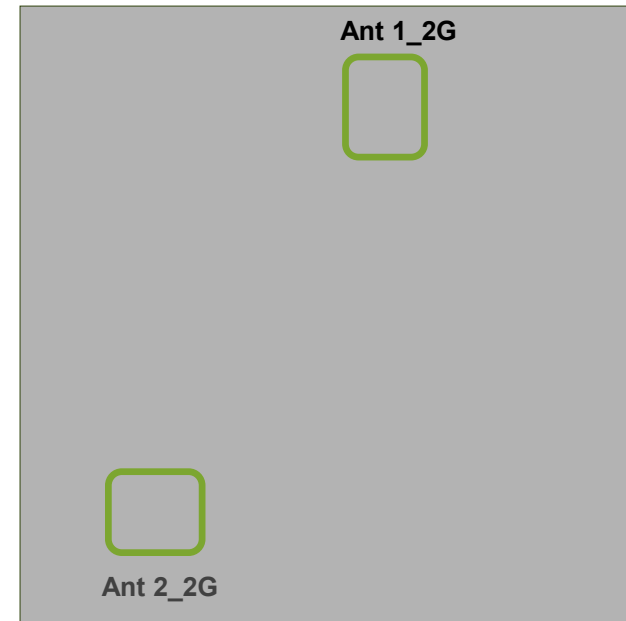
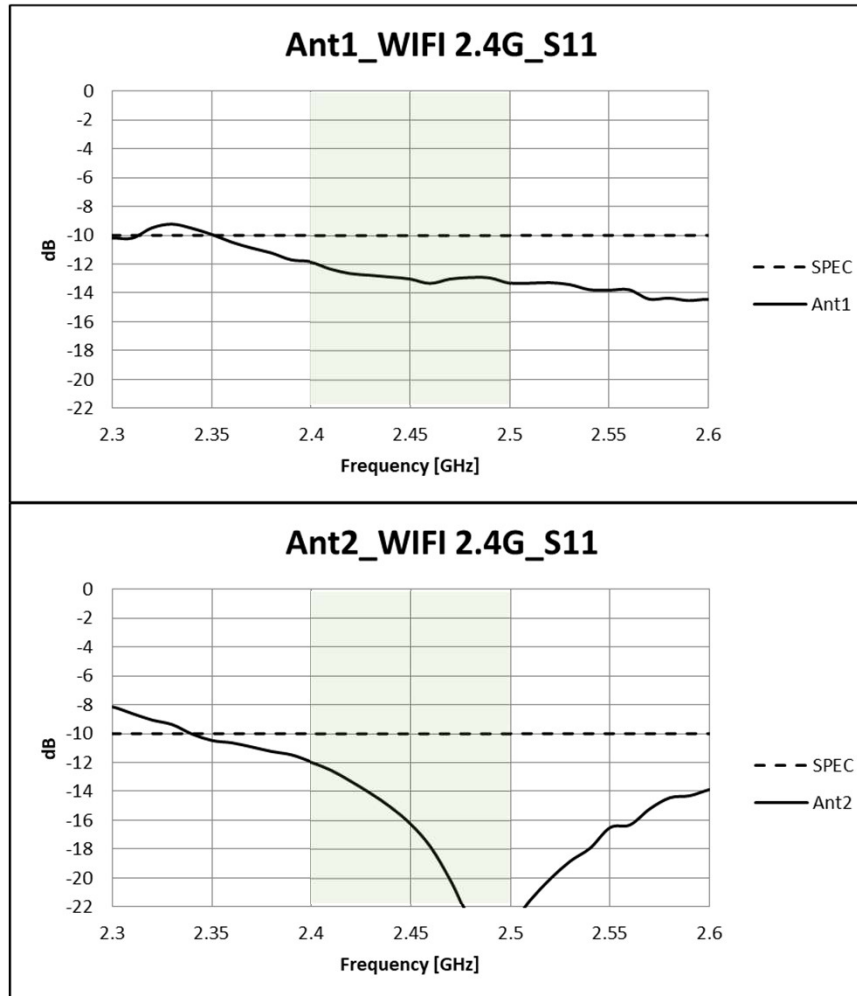


AP66

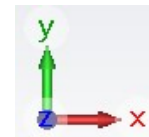
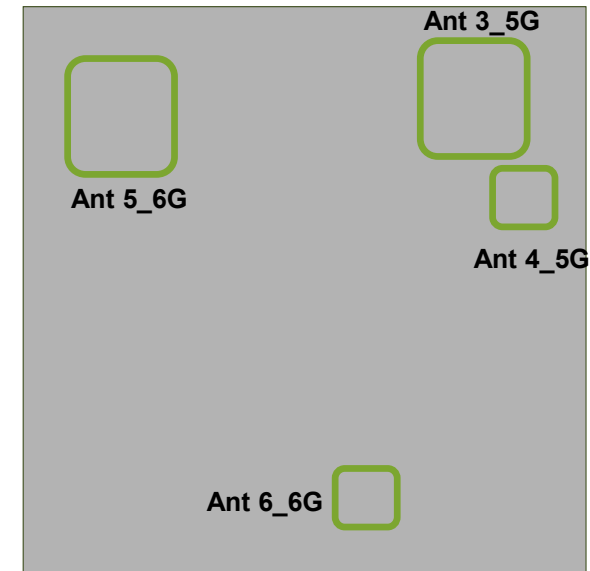
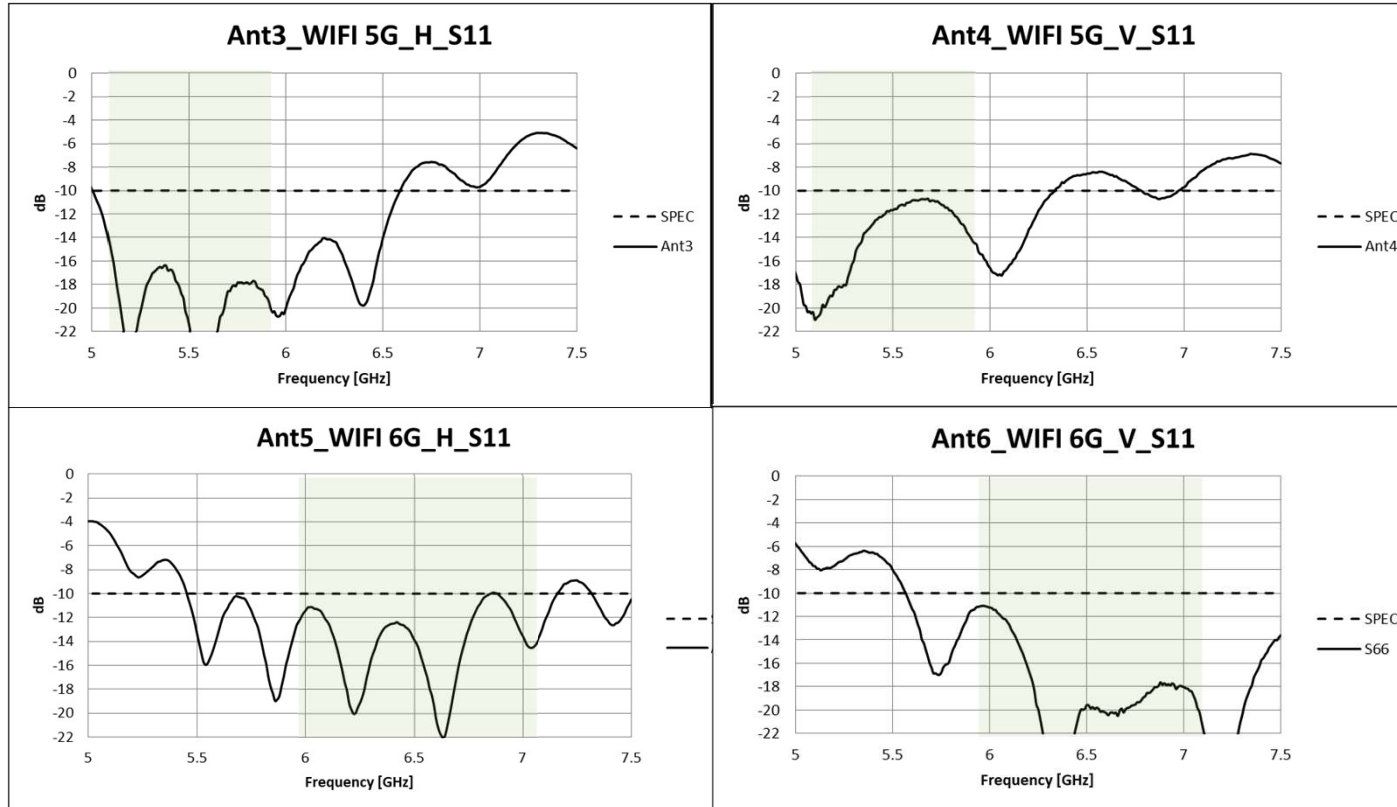


AP66E

S-Parameter – Ant1&2

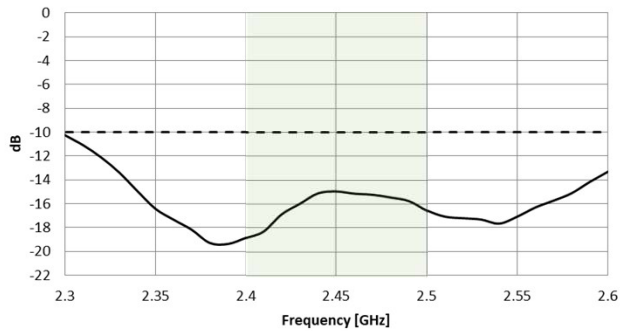


S-Parameter – Ant3-6

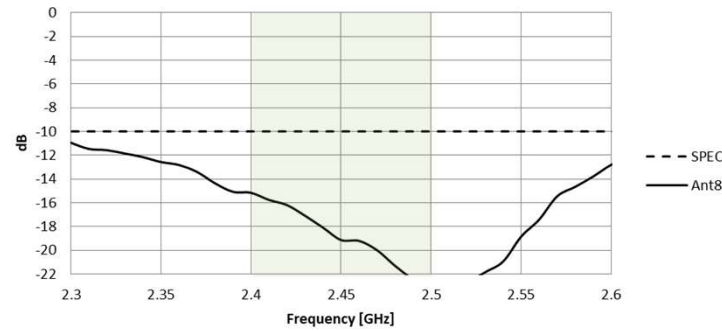


S-Parameter – Ant7-10

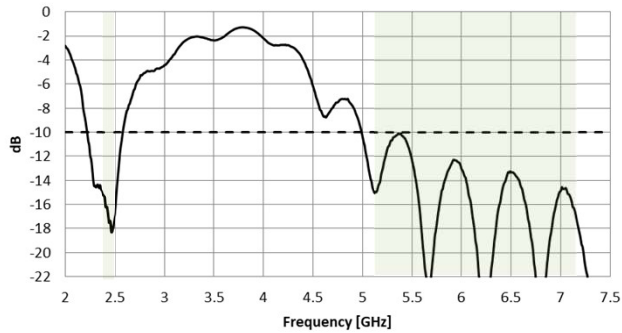
Ant7_Zigbee_S11



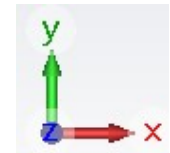
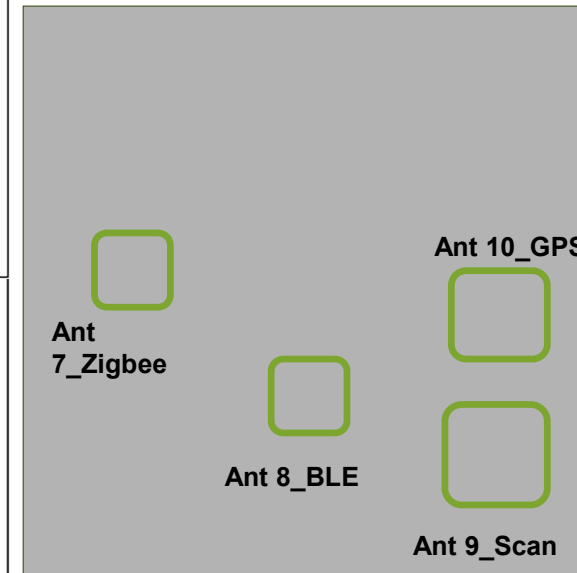
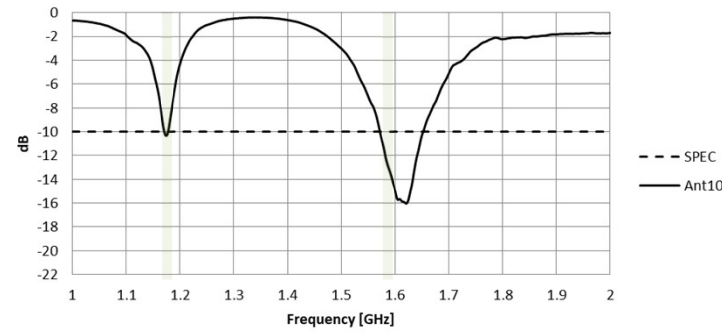
Ant8_BLE_S11



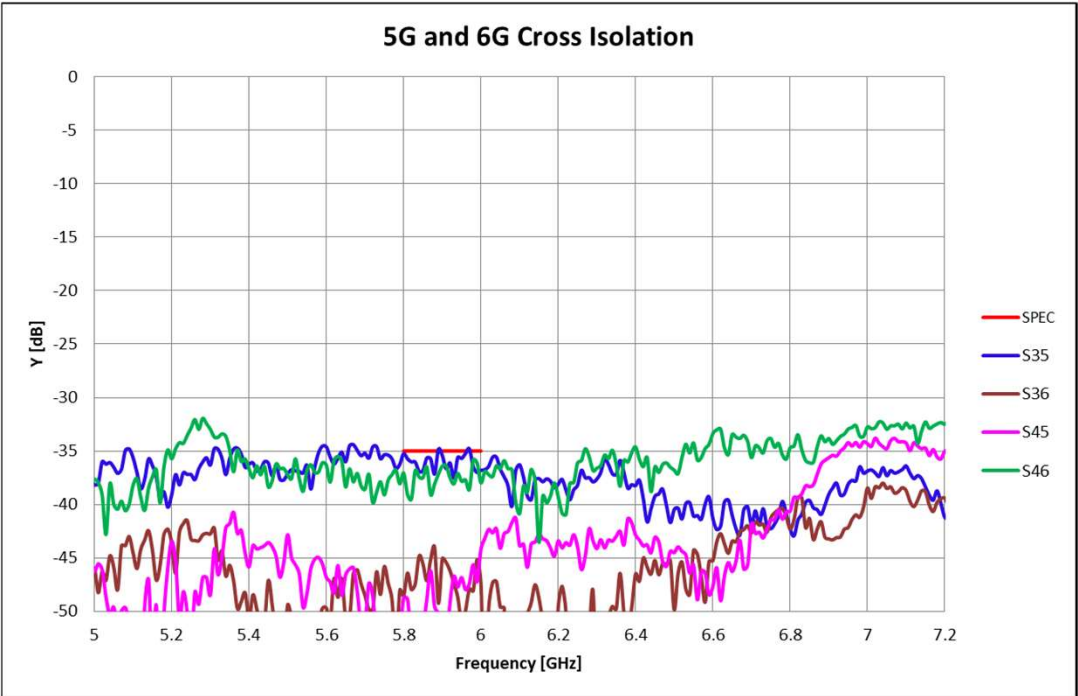
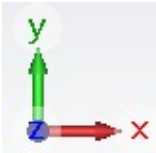
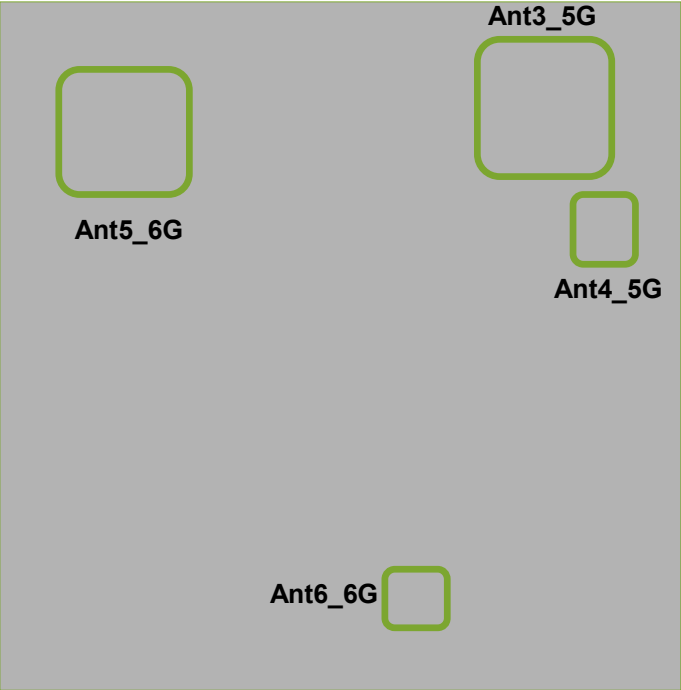
Ant9_Scan_S11



Ant10_GPS_S11



WIFI cross isolation

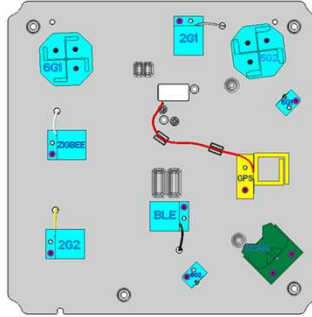


WIFI omnidirectional antenna isolation	
	test(dB)
5G VS 5G	32.1
5G VS 6G	35.0
6G VS 6G	32.3

Antenna efficiency (%)

Fre(Ghz)	Ant1_ 2G1	Ant2_ 2G2	Ant3_ 5G2	Ant4_ 5G1	Ant5_ 6G1	Ant6_ 6G2	Ant7_ Zigbee	Ant8_ BLE	Ant9_ SCAN	Ant10_ GPS
1176										75
1575										84
2400	86	82					82	88	89	
2450	82	82					78	85	85	
2500	87	84					84	86	86	
5150			72	85					74	
5300			71	82					73	
5500			72	78					72	
5850			67	72					73	
5925					65	72			71	
6500					61	77			70	
6700					55	76			69	
7125					50	77			69	

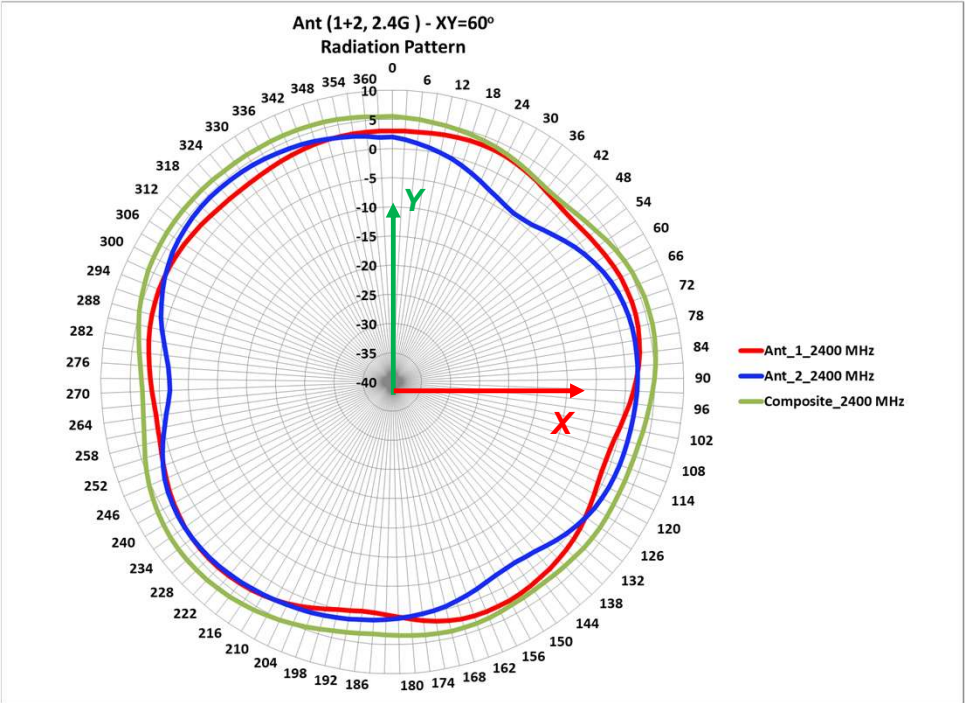
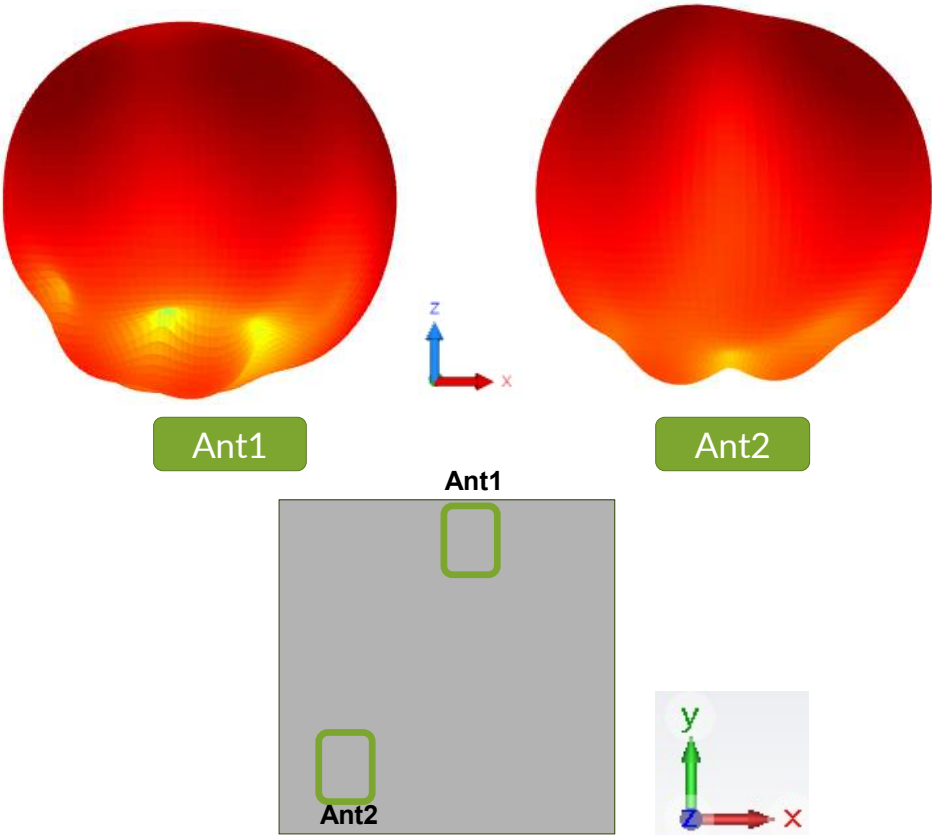
Antenna peak gain (dB)



Fre(Ghz)	Ant1_2G1	Ant2_2G2	Ant3_5G2	Ant4_5G1	Ant5_6G1	Ant6_6G2	Ant7_Zigbee	Ant8_BLE	Ant9_SCAN	Ant10_GPS
1176										3.2
1575										3.9
2400	4.3	5.1					5.1	6.3	4.7	
2450	4.6	4.6					4.9	5.8	4.8	
2500	4.8	4.6					5.8	5.9	5.0	
5150			4.7	6.7					5.4	
5300			4.5	6.6					5.3	
5500			4.2	6.5					5.1	
5850			4.7	6.3					5.0	
5925					3.8	6.2			5.1	
6500					4.2	5.7			6.2	
6700					4.1	6.1			5.9	
7125					4.0	6.5			5.7	

Radiation pattern of Ant 1&2

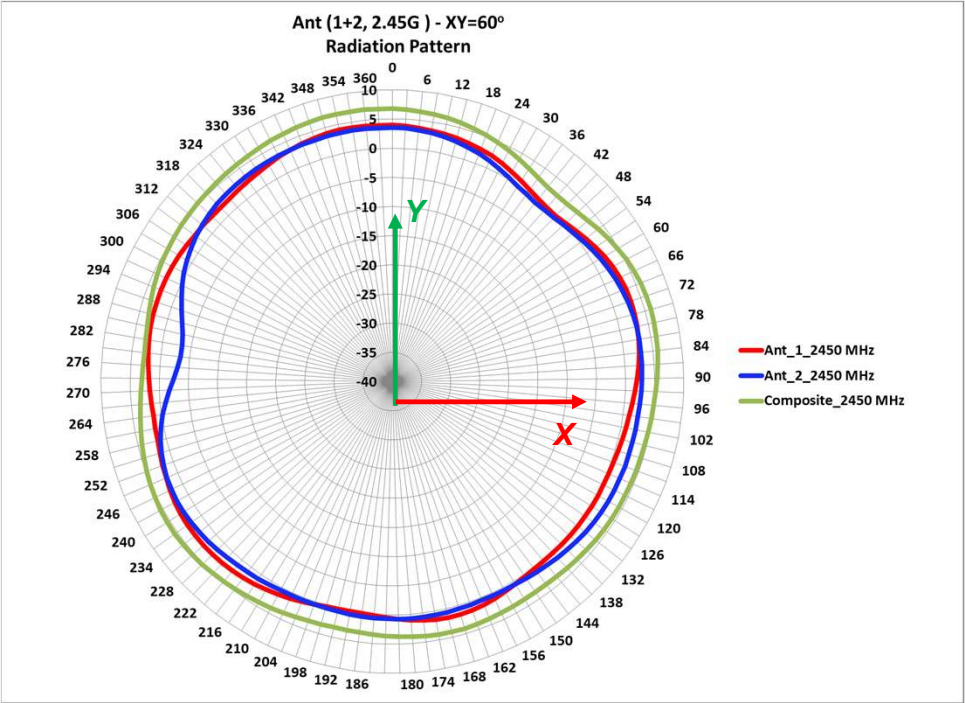
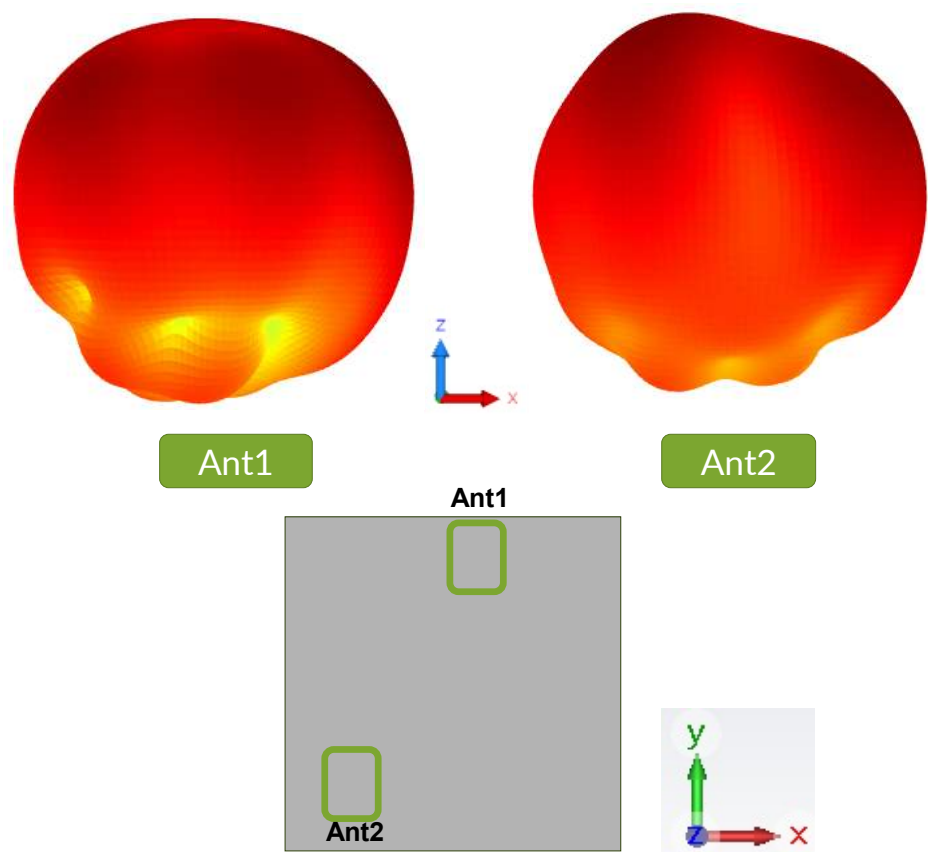
WIFI_2400



	ANT1	ANT2	Composite
Gain Max	3.7	4.5	N.A
Gain Min	-1.0	-4.3	
Flatness	4.6	8.8	4.2
Gain average	2.3	1.6	4.9

Radiation pattern of Ant 1&2

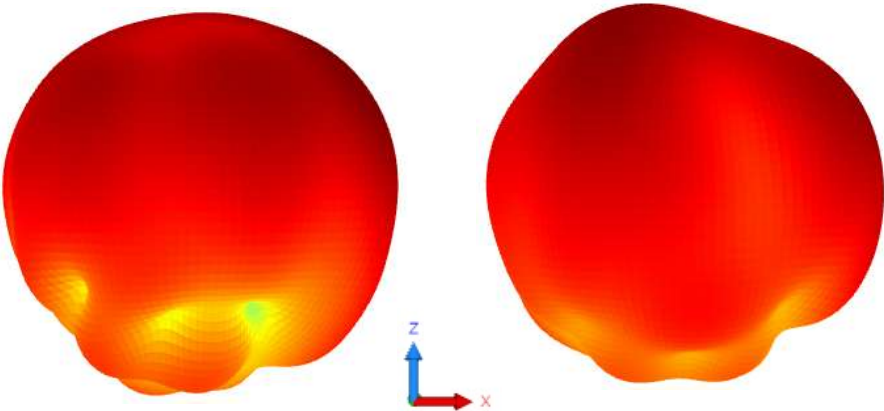
WIFI_2450



	ANT1	ANT2	Composite
Gain Max	4.1	3.6	N.A
Gain Min	-0.1	-3.4	
Flatness	4.2	7.0	4.3
Gain average	2.0	1.7	4.8

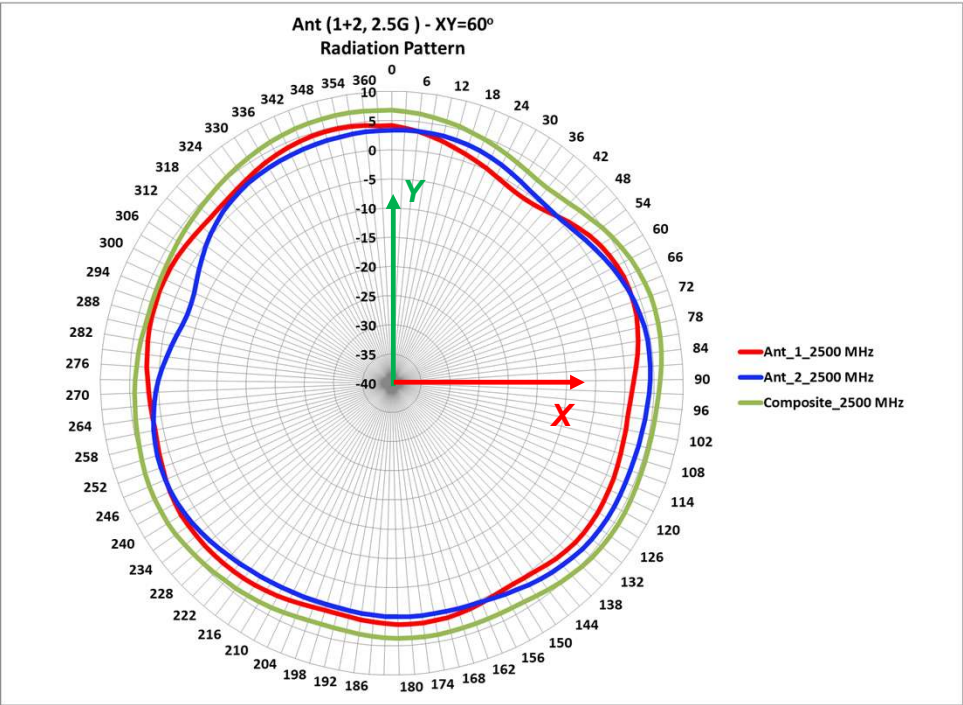
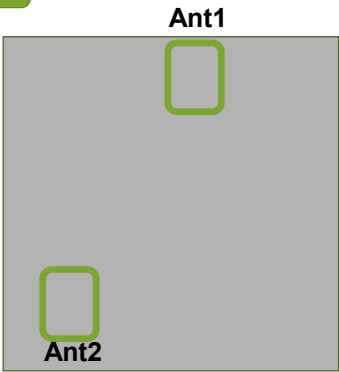
Radiation pattern of Ant 1&2

WIFI_2500



Ant1

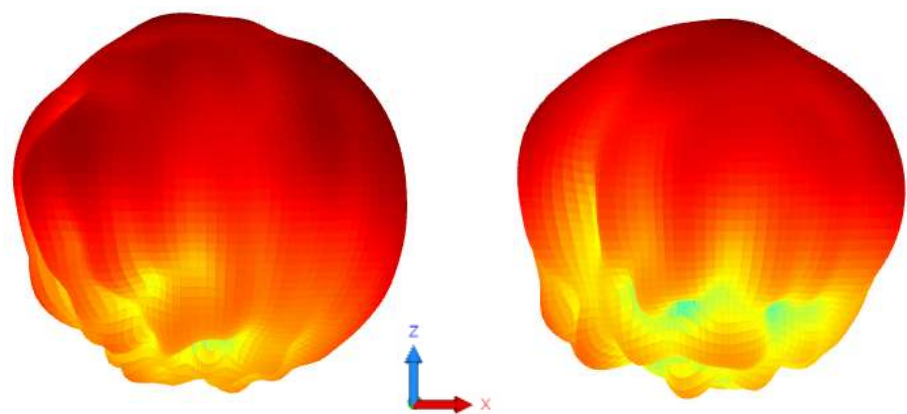
Ant2



	ANT1	ANT2	Composite
Gain Max	4.6	4.5	N.A
Gain Min	-1.1	-3.0	
Flatness	5.7	7.5	4.1
Gain average	2.2	2.0	5.0

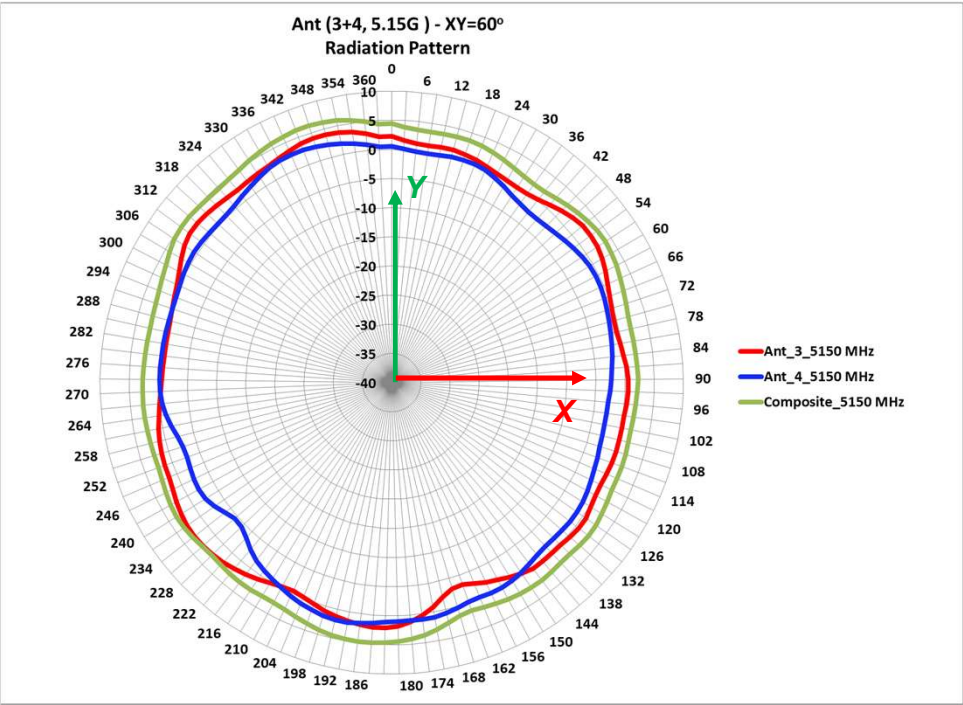
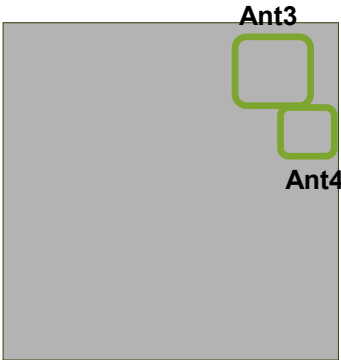
Radiation pattern of Ant 3&4

WIFI_5150



Ant3

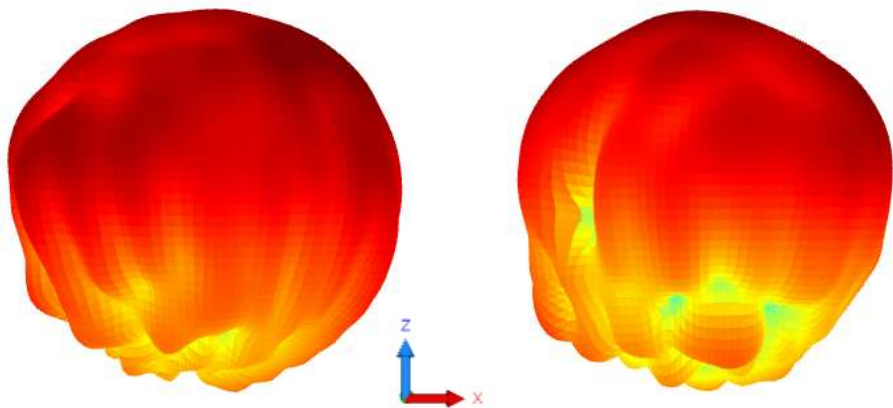
Ant4



	ANT3	ANT4	Composite
Gain Max	4.1	2.7	N.A
Gain Min	-3.3	-4.4	
Flatness	7.3	7.1	4.8
Gain average	1.2	-0.3	3.4

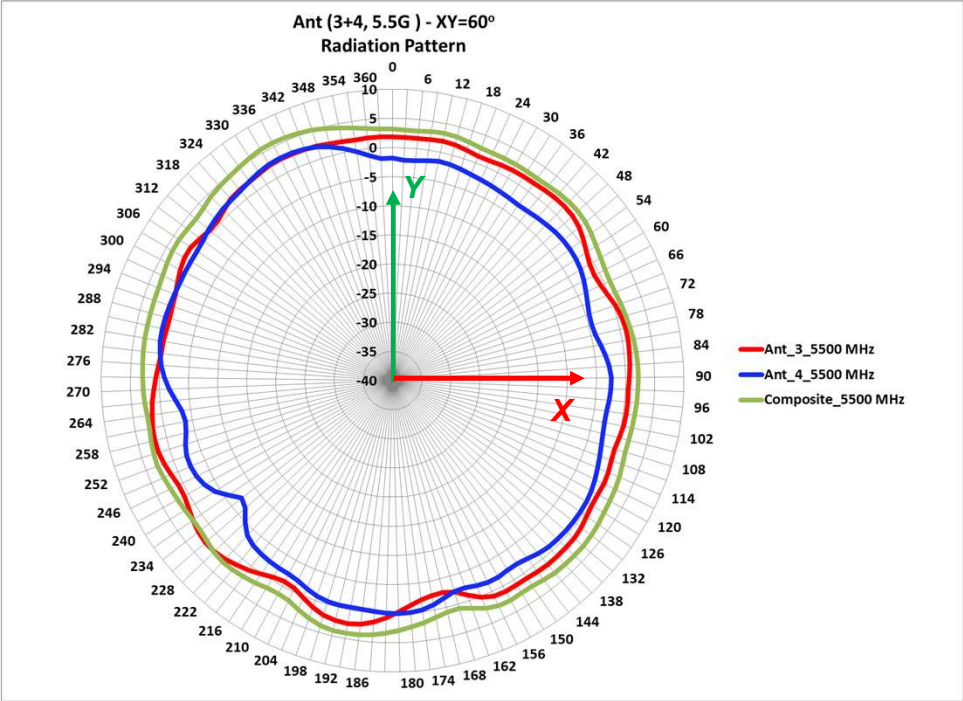
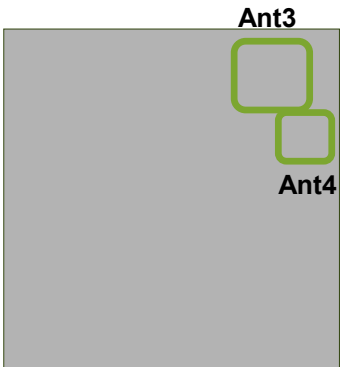
Radiation pattern of Ant 3&4

WIFI_5500



Ant3

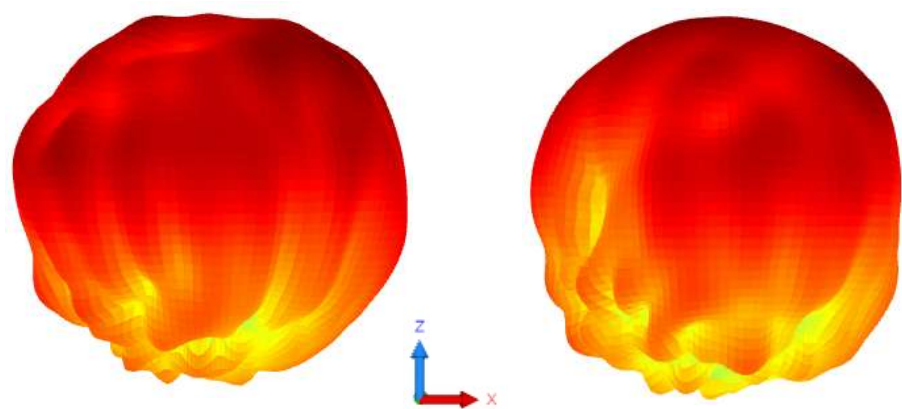
Ant4



	ANT3	ANT4	Composite
Gain Max	2.6	2.8	N.A
Gain Min	-2.7	-7.2	
Flatness	5.2	10.0	4.9
Gain average	1.1	-1.1	3.7

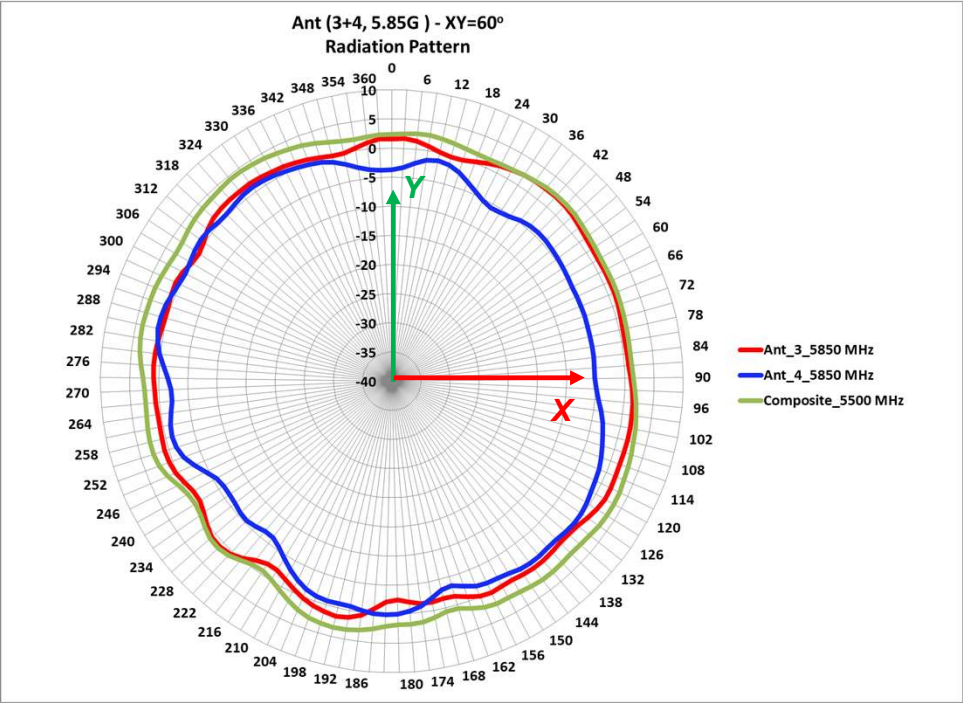
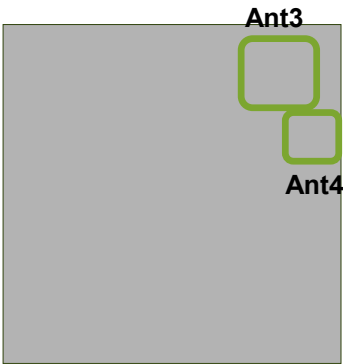
Radiation pattern of Ant 3&4

WIFI_5850



Ant3

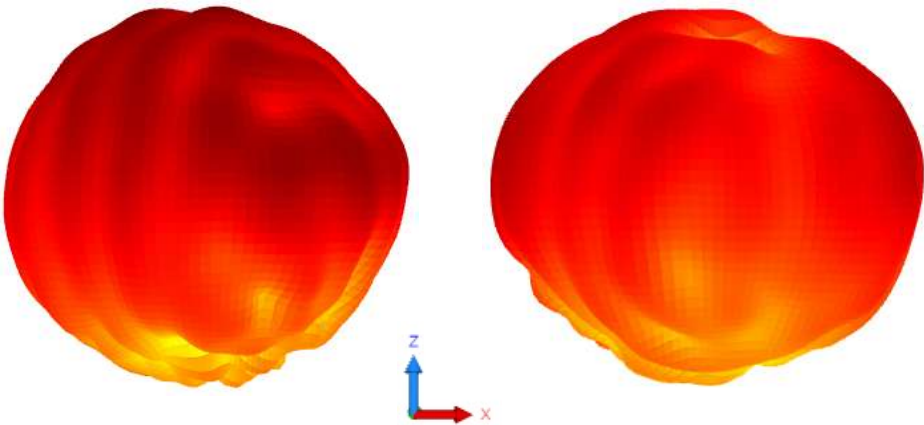
Ant4



	ANT3	ANT4	Composite
Gain Max	2.3	1.2	N.A
Gain Min	-2.5	-6.3	
Flatness	4.8	7.5	5.0
Gain average	0.7	-1.8	2.5

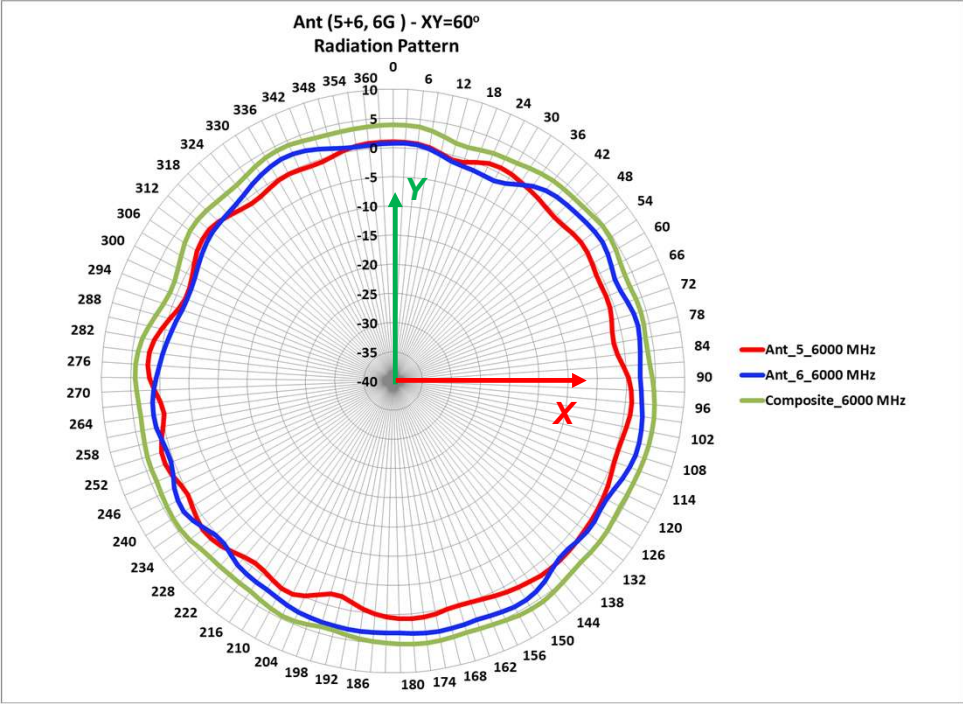
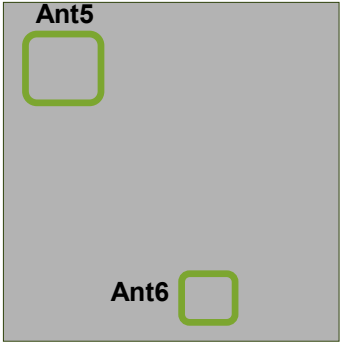
Radiation pattern of Ant 5&6

WIFI_6000



Ant5

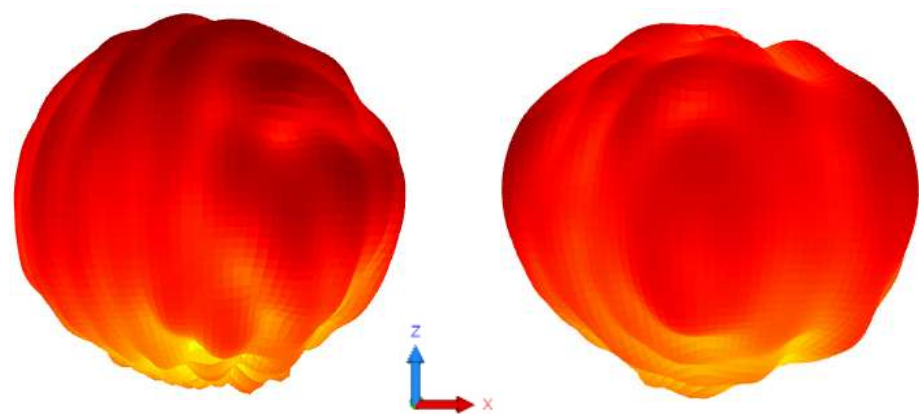
Ant6



	ANT5	ANT6	Composite
Gain Max	2.2	4.0	N.A
Gain Min	-2.1	-2.0	
Flatness	4.2	6.0	4.6
Gain average	0.4	1.9	4.1

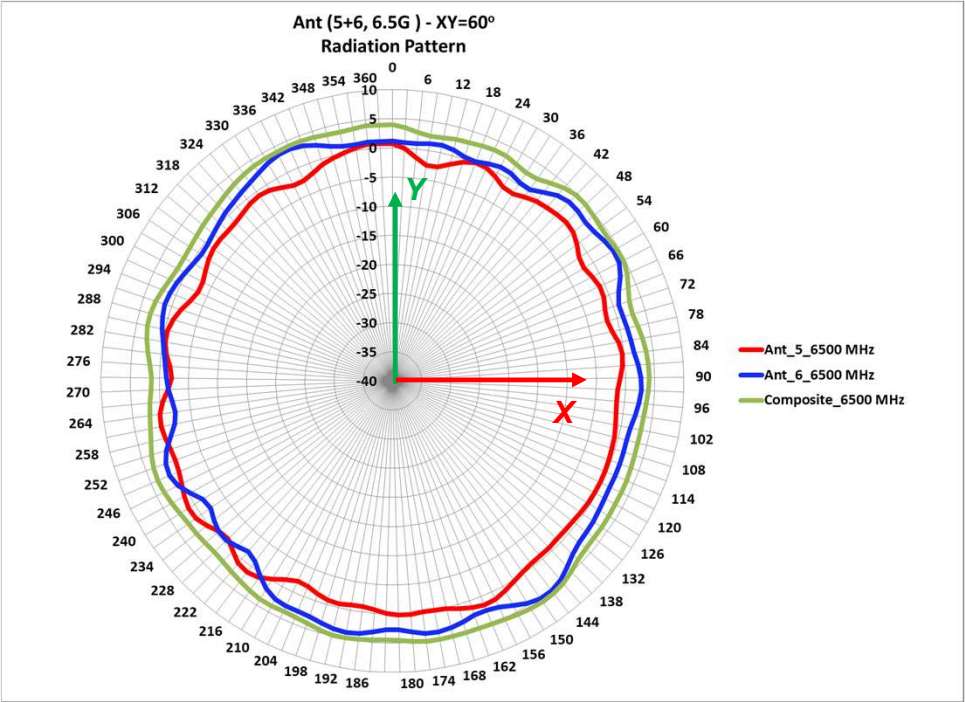
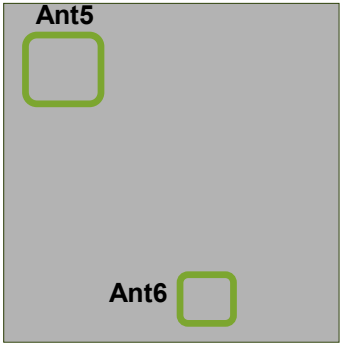
Radiation pattern of Ant 5&6

WIFI_6500



Ant5

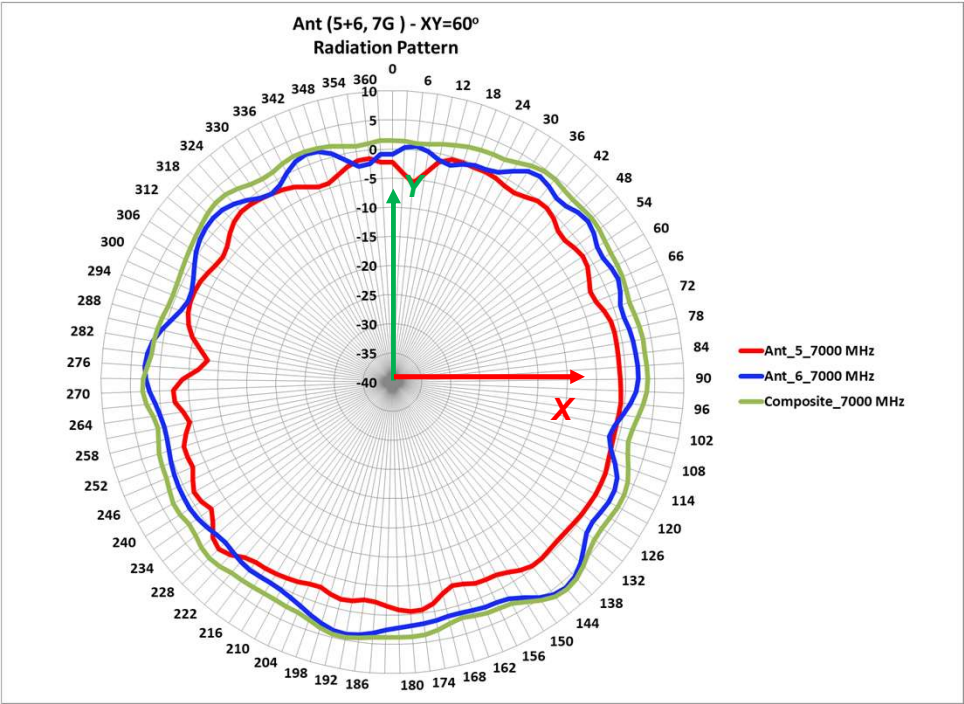
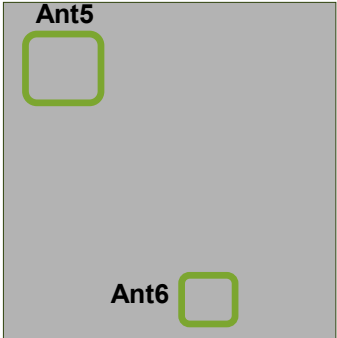
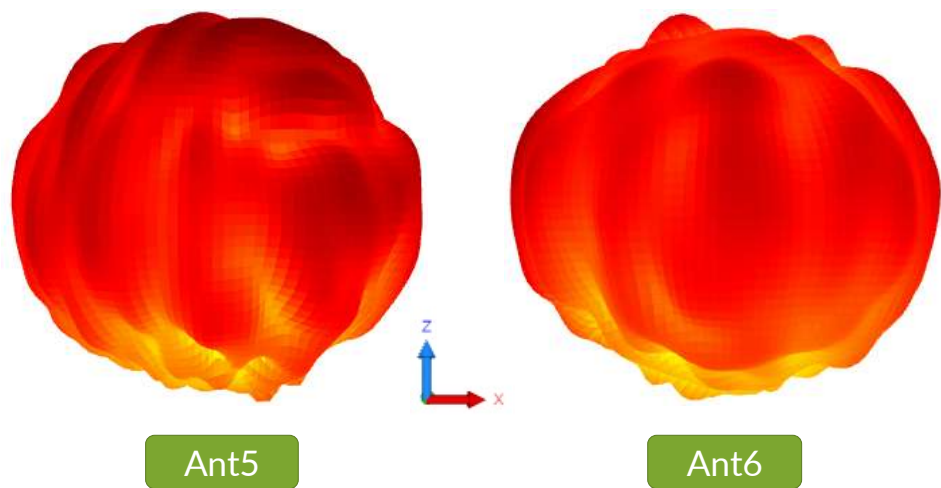
Ant6



	ANT5	ANT6	Composite
Gain Max	1.5	5.2	N.A
Gain Min	-3.3	-2.4	
Flatness	4.8	7.7	4.5
Gain average	-0.5	1.9	3.7

Radiation pattern of Ant 5&6

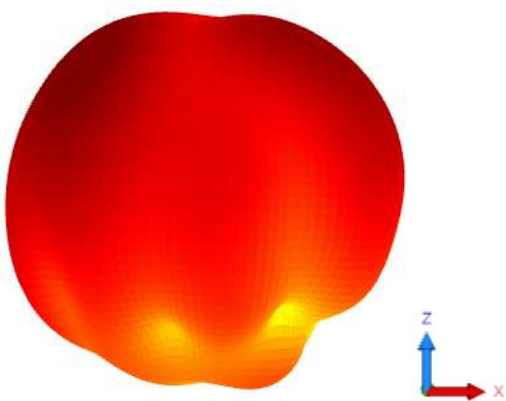
WIFI_7000



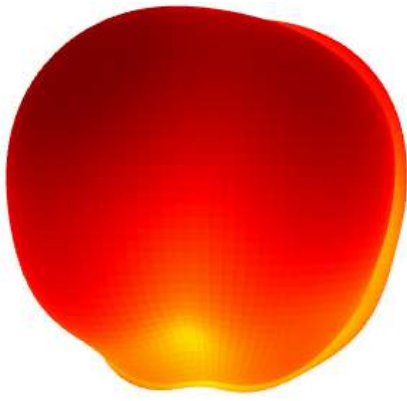
	ANT5	ANT6	Composite
Gain Max	1.4	6.1	N.A
Gain Min	-8.1	-2.6	
Flatness	9.5	8.7	5.9
Gain average	-1.6	1.6	3.1

Radiation pattern of Ant 7&8

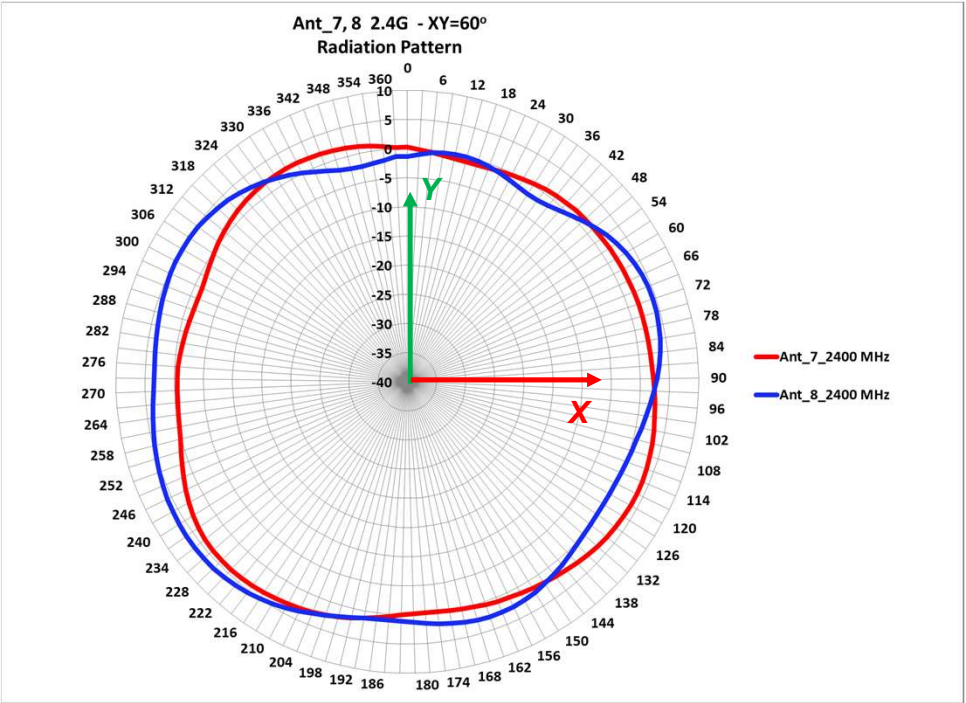
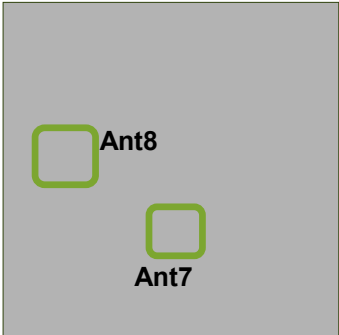
ZIGbee&BLE_24



Ant7_Zigbee



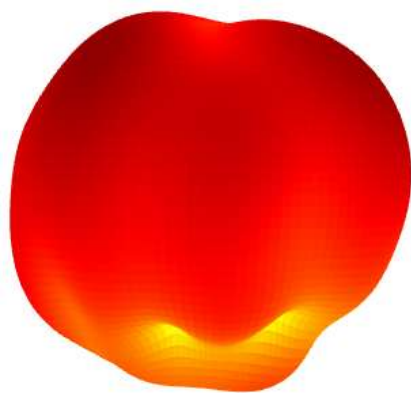
Ant8_BLE



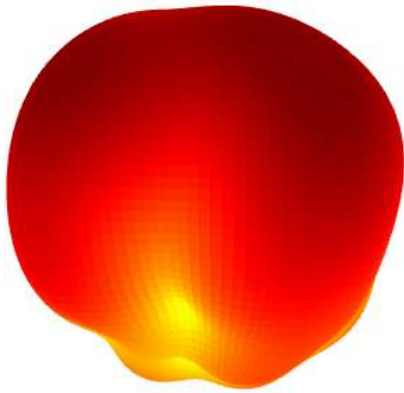
	ANT7	ANT8
Gain Max	4.2	6.8
Gain Min	-1.4	-2.3
Flatness	5.6	8.6
Gain average	1.7	2.8

Radiation pattern of Ant 7&8

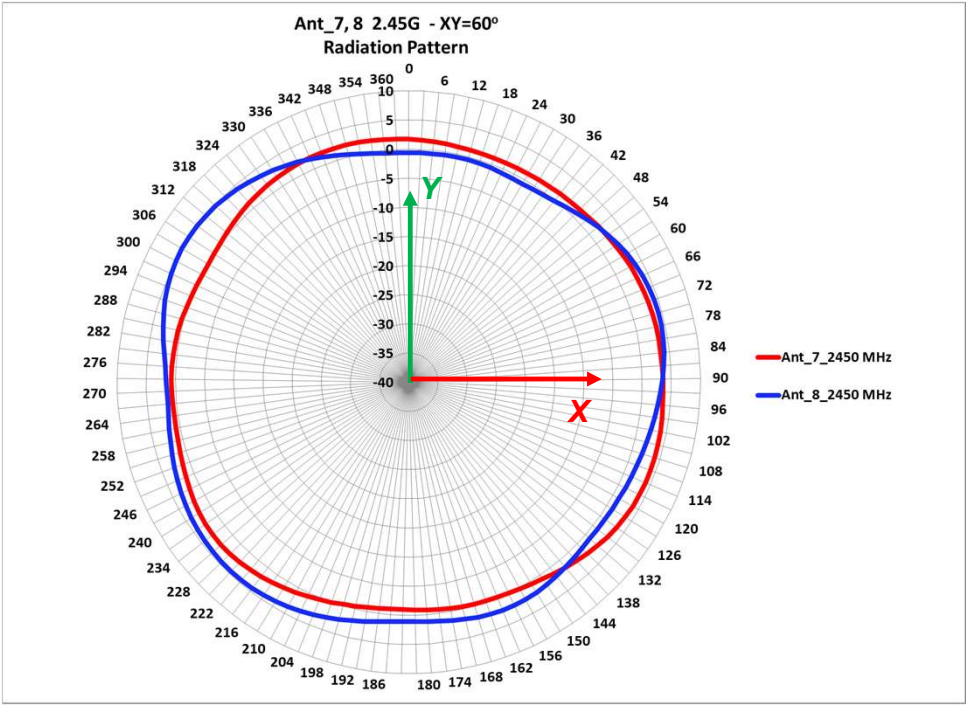
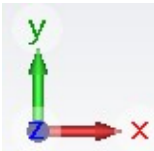
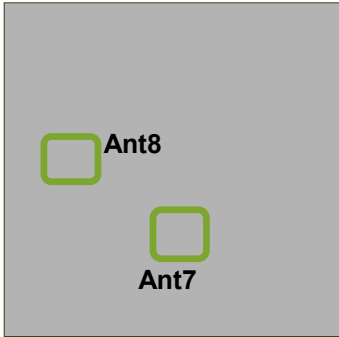
ZIGbee&BLE_24



Ant7_Zigbee



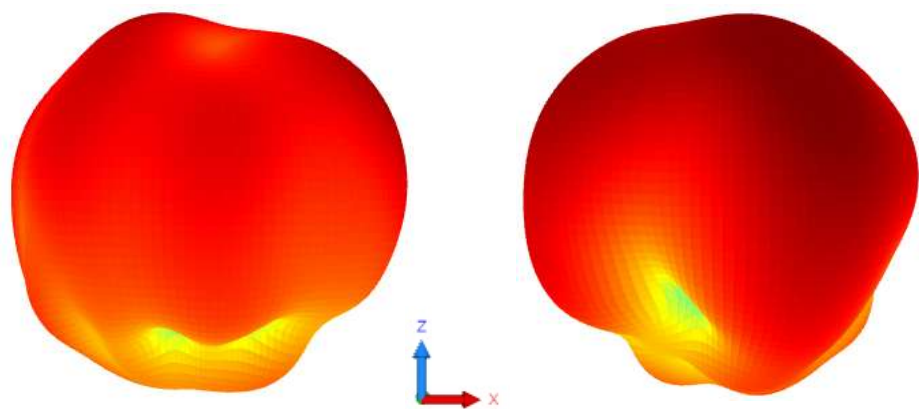
Ant8_BLE



	ANT7	ANT8
Gain Max	4.1	5.2
Gain Min	-1.0	-0.8
Flatness	5.1	6.0
Gain average	1.8	2.6

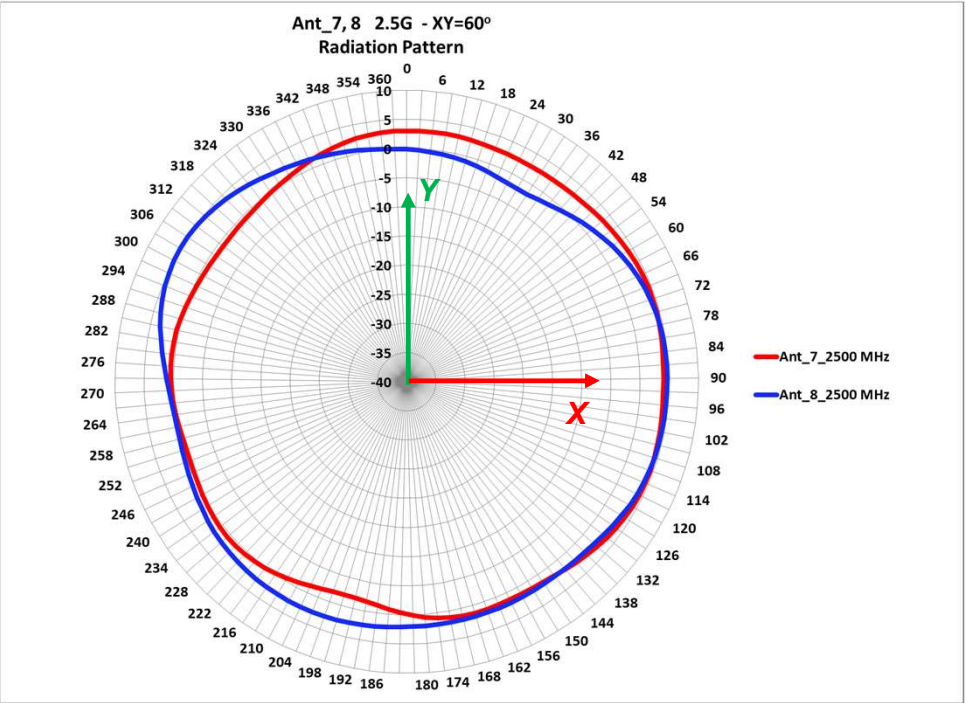
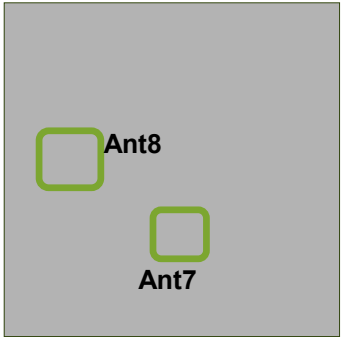
Radiation pattern of Ant 7&8

ZIGbee&BLE_25



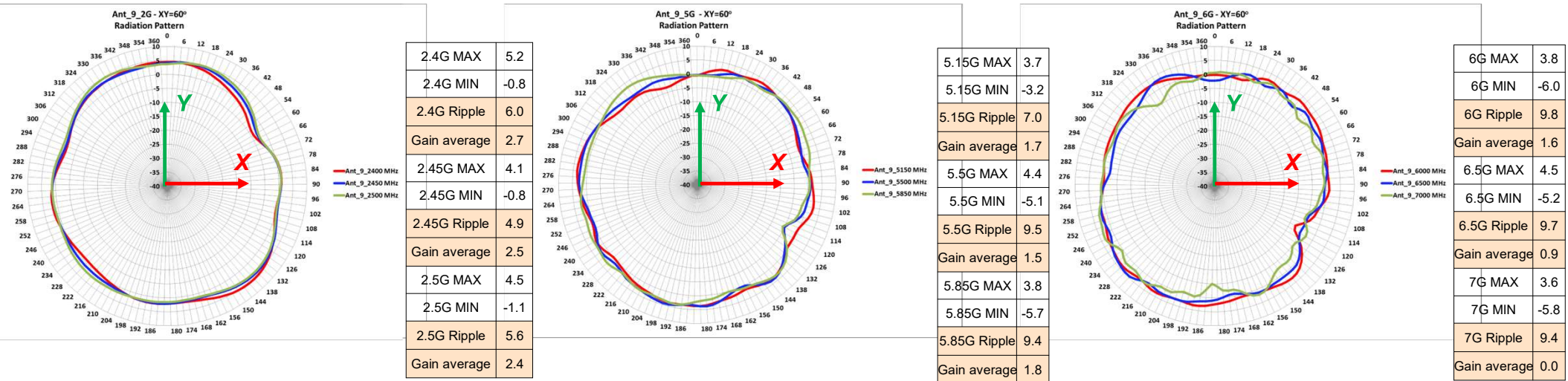
Ant7_Zigbee

Ant8_BLE



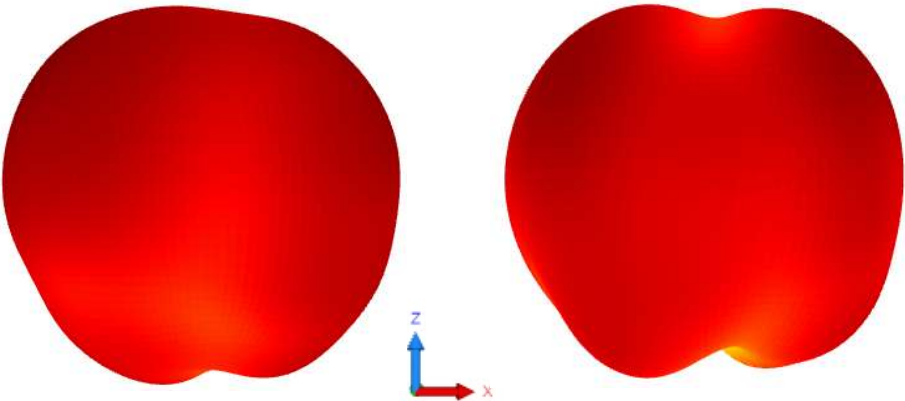
	ANT7	ANT8
Gain Max	4.5	5.0
Gain Min	-1.9	-1.9
Flatness	6.4	6.9
Gain average	2.0	2.5

Radiation pattern of Ant_9_Scan



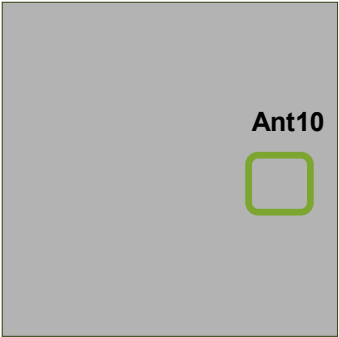
Radiation pattern of Ant_10_GPS

GPS_L1&L5

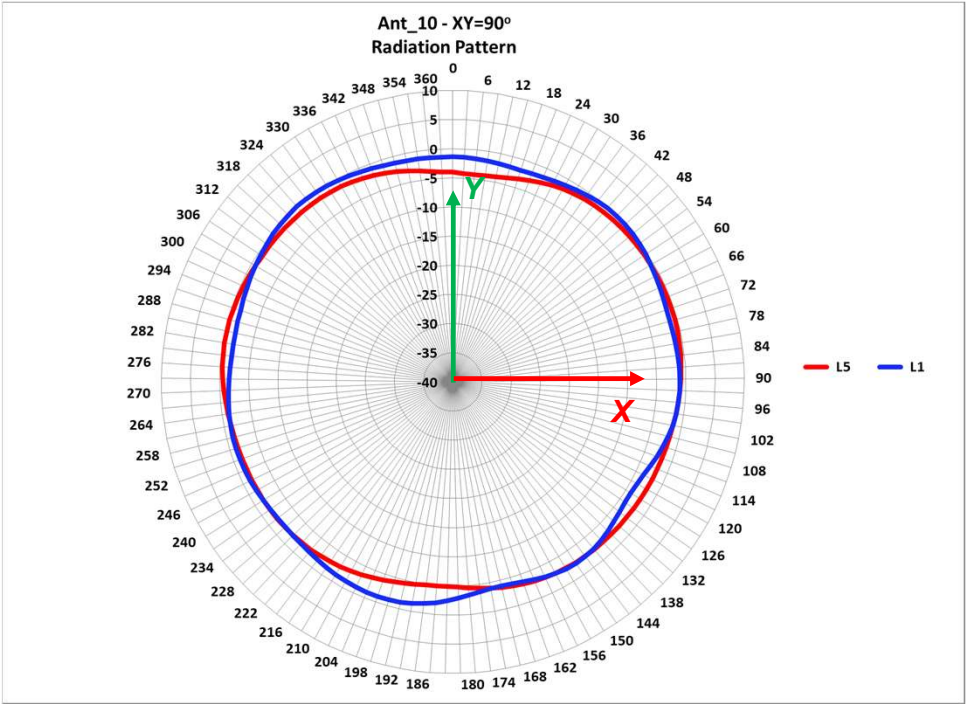


Ant10_L5

Ant10_L1



Ant10



	L5	L1
Gain Max	-0.2	0.2
Gain Min	-4.9	-4.0
Flatness	4.7	4.3
Gain average	-1.8	-1.4