

Specification

PATENT PENDING

- Part No. : **MA950.A.LBICG.005**
- Product Name : MA950 Guardian 5in1 Adhesive Mount Antenna
LTE*2+Wi-Fi*2+GNSS
- Features : Low-profile Housing – Mounts flush to Surface
2* LTE MIMO 698-960MHz/1710-2170MHz/
2490-2690MHz/ 3300-3600MHz
2* Wi-Fi MIMO 2.4GHz/5.8GHz
1* Active GPS-GLONASS-GALILEO-BeiDou Antenna
Worldwide 4G Bands including 3G and 2G
IP67 Waterproof Enclosure
Dims: 146*134*20mm
1M Low Loss KSR200-P and RG174 with
SMA(M)/RP-SMA(M) connectors
Cables and Connectors Customizable
RoHS & REACH Compliant
Also available in white



1.Introduction

The MA950 Guardian is a next generation combination antenna. The first panel antenna worldwide designed for IoT Gateway and Router devices. It is a low profile 5in1 wall and adhesive mount antenna. This heavy-duty, fully IP67 waterproof external M2M antenna can be used by RF professionals in IoT Gateway and Routers, HD Video Streaming, Transportation and Remote Monitoring Applications

This antenna delivers powerful MIMO antenna technology for worldwide 4G LTE bands at 698-960MHz/1710-2170MHz/2490-2690MHz/3300-3600MHz bands, dual-band 2.4/5.8GHz Wi-Fi, plus GPS-GLONASS-GALILEO-BeiDou for location accuracy. It enables designers to cover a wide range of technologies by installing a single antenna.

4G wireless applications demand high speed data uplink and downlink. High efficiency and high gain MIMO antennas are necessary to achieve the required signal to noise ratio and throughput required to solve these challenges. Taoglas also takes care to have high isolation among these antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths.

The GPS-GLONASS-GALILEO-BeiDou active antenna has been carefully designed for excellent performance across all GNSS bands, leading to higher location accuracy and stability of tracking in urban environments.

The housing is IP67 waterproof and comes with 3M foam adhesive. The antenna can be mounted internally or externally on a vehicle. The MA950 comes with 3 meter, low loss KSR-200P coaxial cables for the LTE and Wi-Fi antennas, and RG174 coaxial cable for the GNSS antenna as standard. Customized cables and connector versions are also available.

2. Specification

GPS-GLONASS-GALILEO-BeiDou				
Center Frequency	GPS/GALILEO: 1575.42±1.023MHz BeiDou: 1561.098±2.046MHz GLONASS: 1602±5MHz			
Passive Antenna Efficiency (without cable loss)	GPS/GALILEO: 48% GLONASS: 57% BeiDou: 63%			
Passive Antenna Average Gain (without cable loss)	GPS/GALILEO: -3.13dBi GLONASS: -2.39dBi BeiDou: -1.97dBi			
Passive Antenna Peak Gain (without cable loss)	GPS/GALILEO: 1.98dBi GLONASS: 3.01dBi BeiDou: 3dBi			
VSWR	3:1 Max			
Impedance	50Ω			
Axial Ratio	GPS/GALILEO: <14.02 GLONASS: <5.9 BeiDou: <9.7			
Polarization	RHCP			
Cable	3 meter RG174 standard, fully customizable			
Connector	SMA(M) standard, fully customizable			
LNA and Filter Electrical Properties				
Center Frequency	GPS/GALILEO: 1575.42±1.023MHz GLONASS: 1602±5MHz BeiDou: 1561.098±2.046MHz			
Output Impedance	50Ω			
VSWR	< 2:1			
Return Loss	10dB Min.			
LNA Gain, Current Draw, and Noise Figure@GPS	Voltage	LNA Gain(Typ)	Current Draw(mA) Typ	Noise Figure(Typ)
	Min 1.8V	28dB	7.9mA	1.13dB
	Typ 3.0V	30dB	9.0mA	1.13dB
	Max 5.5V	33dB	9.9mA	1.14dB
Total Specification (Through Antenna, SAW Filter, and LNA)				
Frequency	1561.098±2.046MHz	1575.42±1.023MHz	1602±5MHz	
Gain@3V	1561MHz: 28±3dBi	1575.42MHz: 28±3dBi	1602MHz: 28±3dBi	
Output Impedance	50Ω			

4G/3G/2G LTE Antenna									
Frequency (MHz)		LTE700	GSM850	GSM900	DCS	PCS	UMTS1	LTE2600	LTE3500
		698~803	824~894	880~960	1710 ~1880	1850 ~1990	1920 ~2170	2490 ~2690	3300 ~3600
Efficiency (%)									
MIMO_1	Free	50.82	55.85	41.29	66.47	70.19	71.51	49.20	50.92
	ABS	68.31	69.61	61.27	66.31	70.86	70.00	50.61	51.88
	Glass	67.99	67.37	62.94	66.89	71.80	69.58	51.00	52.83
	Metal	42.12	51.55	58.33	39.49	47.20	47.71	44.36	44.85
	Wall	67.97	70.42	66.80	63.91	64.94	63.35	50.37	51.49
MIMO_2	Free	54.13	58.97	48.65	61.54	68.31	68.39	54.62	52.55
	ABS	71.74	66.05	58.58	63.18	69.29	69.23	53.95	54.95
	Glass	64.53	55.70	45.22	64.94	67.87	65.86	50.05	51.77
	Metal	55.62	63.13	56.59	32.14	40.89	43.97	54.22	52.90
	Wall	61.91	48.38	52.88	58.00	56.47	56.36	54.68	48.72
Average Gain (dBi)									
MIMO_1	Free	-2.96	-2.62	-3.85	-1.78	-1.54	-1.46	-3.12	-2.96
	ABS	-1.68	-1.59	-2.13	-1.79	-1.50	-1.55	-3.00	-2.87
	Glass	-1.73	-1.73	-2.02	-1.75	-1.44	-1.58	-2.96	-2.79
	Metal	-3.94	-2.88	-2.37	-4.07	-3.27	-3.23	-3.57	-3.51
	Wall	-1.70	-1.53	-1.76	-1.95	-1.88	-1.99	-3.00	-2.89
MIMO_2	Free	-2.72	-2.32	-3.17	-2.11	-1.66	-1.66	-2.65	-2.83
	ABS	-1.47	-1.81	-2.33	-2.00	-1.59	-1.60	-2.71	-2.63
	Glass	-1.93	-2.56	-3.46	-1.88	-1.68	-1.82	-3.04	-2.87
	Metal	-2.61	-2.00	-2.50	-4.95	-3.90	-3.59	-2.67	-2.77
	Wall	-2.09	-3.15	-2.79	-2.37	-2.48	-2.50	-2.63	-3.15
Peak Gain (dBi)									
MIMO_1	Free	3.18	3.60	2.14	3.98	4.37	4.37	3.70	4.49
	ABS	4.65	4.00	3.45	5.24	6.05	6.05	4.69	3.18
	Glass	3.71	3.92	4.35	5.28	6.16	7.67	5.34	3.87
	Metal	5.09	3.10	4.73	4.50	4.96	5.69	6.02	4.96
	Wall	4.74	4.97	3.67	5.44	4.84	4.84	5.08	3.75
MIMO_2	Free	5.83	3.66	2.57	3.78	4.01	4.01	3.87	3.97
	ABS	4.33	4.52	4.41	4.34	4.73	5.69	5.64	5.42
	Glass	3.02	3.14	1.36	4.99	5.89	6.02	6.18	4.42
	Metal	3.54	3.11	3.33	3.12	4.36	5.02	7.16	4.95
	Wall	3.21	1.77	2.15	5.49	5.49	7.20	6.10	4.74
Impedance				50Ω					
Polarization				Linear					
VSWR				< 3					
Cable				3 meter TGC-200 standard, fully customizable					
Connector				SMA(M) standard, fully customizable					

2.4GHz/5.8GHz Wi-Fi Antenna			
Frequency (MHz)		2400~2500	4900~5850
Efficiency (%)			
MIMO_1	Free space	57.73	48.06
	ABS	53.59	49.42
	Glass	53.98	47.16
	Metal	51.80	46.70
	Wall	61.02	46.29
MIMO_2	Free space	44.09	47.04
	ABS	46.34	46.79
	Glass	40.79	46.88
	Metal	45.58	45.59
	Wall	50.62	43.60
Average Gain (dBi)			
MIMO_1	Free space	-2.39	-3.25
	ABS	-2.71	-3.13
	Glass	-2.68	-3.36
	Metal	-2.86	-3.44
	Wall	-2.15	-3.42
MIMO_2	Free space	-3.57	-3.33
	ABS	-3.37	-3.36
	Glass	-3.91	-3.35
	Metal	-3.45	-3.52
	Wall	-2.96	-3.67
Peak Gain (dBi)			
MIMO_1	Free space	4.35	4.84
	ABS	5.34	5.18
	Glass	2.99	5.03
	Metal	5.22	5.98
	Wall	5.47	5.77
MIMO_2	Free space	2.94	5.70
	ABS	2.18	5.43
	Glass	3.75	7.07
	Metal	6.02	6.76
	Wall	3.23	5.97
Impedance	50Ω		
Polarization	Linear		
VSWR	< 3		
Cable	3 meter TGC-200 standard, fully customizable		
Connector	RP-SMA(M) standard, fully customizable		

*All measurements with 1m Cable, see application note section 6 for other cable lengths

MECHANICAL	
Antenna Dimensions	146*134*20mm
Casing	ASA
Weight (including cable)	900g
Ingress Protection Rating	IP67
ENVIRONMENTAL	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Humidity	Non-condensing 65°C 95% RH

2.1. LTE Bands Covered while on metal Ground Plane

LTE BANDS				
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA			
	Uplink	Downlink	MIMO 1	MIMO 2
1	UL: 1920 to 1980	DL: 2110 to 2170	✓	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓	✓
5	UL: 824 to 849	DL: 869 to 894	✓	✓
7	UL: 2500 to 2570	DL: 2620 to 2690	✓	✓
8	UL: 880 to 915	DL: 925 to 960	✓	✓
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗	✗
12	UL: 699 to 716	DL: 729 to 746	✓	✓
13	UL: 777 to 787	DL: 746 to 756	✓	✓
14	UL: 788 to 798	DL: 758 to 768	✓	✓
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✓	✓
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✓	✓
19	UL: 830 to 845	DL: 875 to 890	✓	✓
20	UL: 832 to 862	DL: 791 to 821	✓	✓
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✓	✓
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✓	✗
25	UL: 1850 to 1915	DL: 1930 to 1995	✓	✓
26	UL: 814 to 849	DL: 859 to 894	✓	✓
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✓	✓
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✓	✓
29	UL: -	DL: 717 to 728 (LTE only)	✓	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗	✗
32	UL: -	DL: 1452 - 1496	✗	✗
35		1850 to 1910	✓	✓
38		2570 to 2620	✓	✓
39		1880 to 1920	✓	✓
40		2300 to 2400	✓	✓
41		2496 to 2690	✓	✓
42		3400 to 3600	✓	✓
43		3600 to 3800	✓	✓

*Covered bands represent an efficiency greater than 20%

2.2. LTE Bands Covered in Free Space

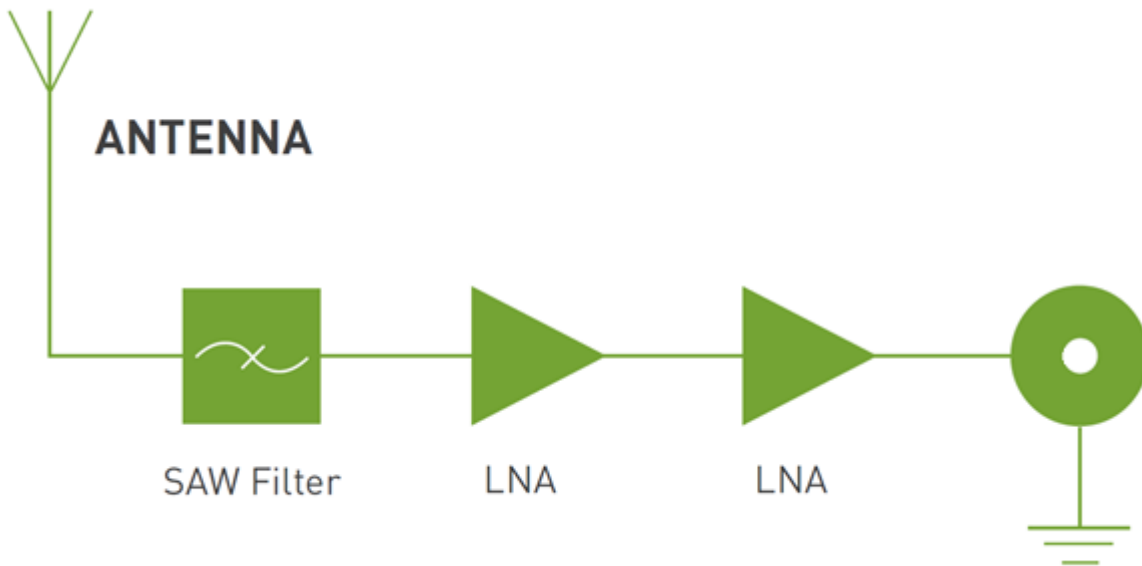
LTE BANDS				
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA			
	Uplink	Downlink	MIMO 1	MIMO 2
1	UL: 1920 to 1980	DL: 2110 to 2170	✓	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓	✓
5	UL: 824 to 849	DL: 869 to 894	✓	✓
7	UL: 2500 to 2570	DL: 2620 to 2690	✓	✓
8	UL: 880 to 915	DL: 925 to 960	✓	✓
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗	✗
12	UL: 699 to 716	DL: 729 to 746	✓	✓
13	UL: 777 to 787	DL: 746 to 756	✓	✓
14	UL: 788 to 798	DL: 758 to 768	✓	✓
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✓	✓
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✓	✓
19	UL: 830 to 845	DL: 875 to 890	✓	✓
20	UL: 832 to 862	DL: 791 to 821	✓	✓
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✓	✓
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✓	✓
25	UL: 1850 to 1915	DL: 1930 to 1995	✓	✓
26	UL: 814 to 849	DL: 859 to 894	✓	✓
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✓	✓
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✓	✓
29	UL: -	DL: 717 to 728 (LTE only)	✓	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗	✗
32	UL: -	DL: 1452 - 1496	✓	✓
35		1850 to 1910	✓	✓
38		2570 to 2620	✓	✓
39		1880 to 1920	✓	✓
40		2300 to 2400	✓	✓
41		2496 to 2690	✓	✓
42		3400 to 3600	✓	✓
43		3600 to 3800	✓	✓

*Covered bands represent an efficiency greater than 20%

3. Antenna Characteristics

3.1. GPS-GLONASS-GALILEO-BeiDou

3.1.1. Block Diagram (Active antenna)



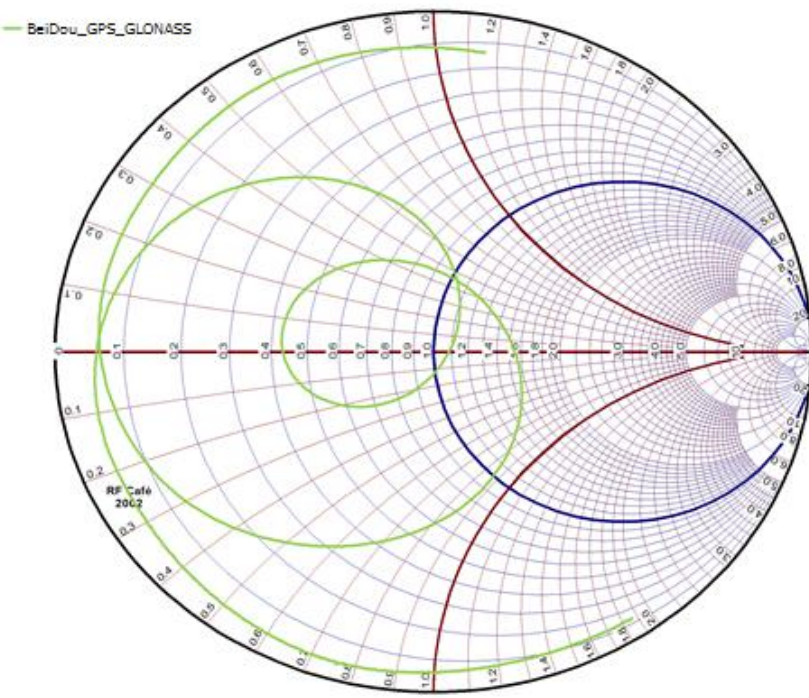
3.1.2. Test Setup



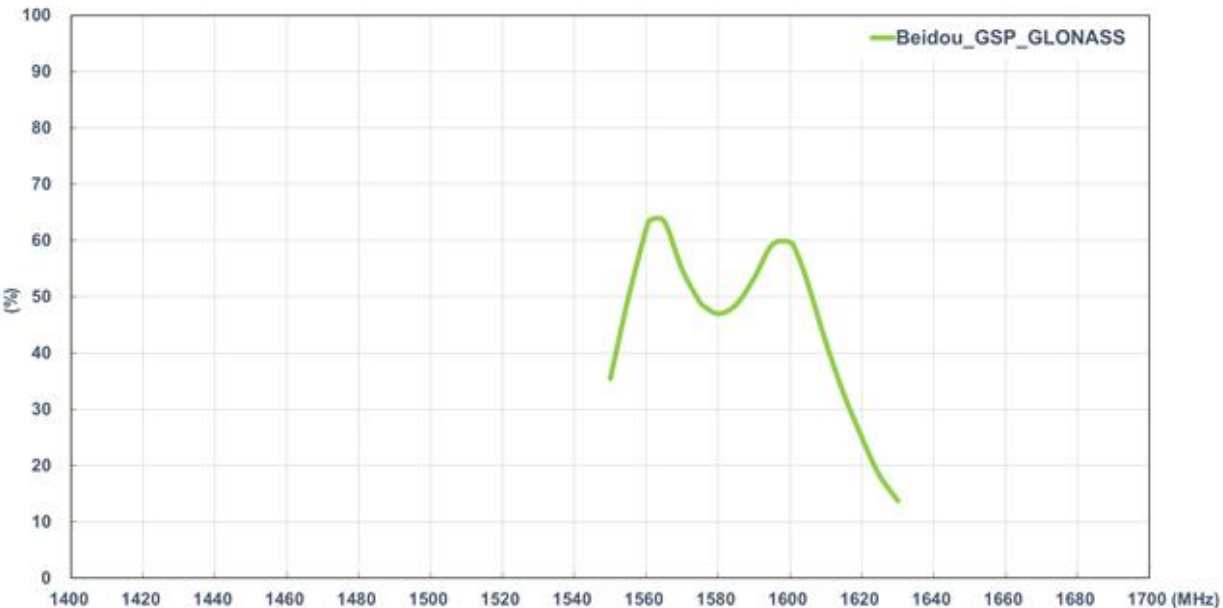
3.1.3. GPS-GLONASS-GALILEO-BeiDou Return Loss (Passive antenna)



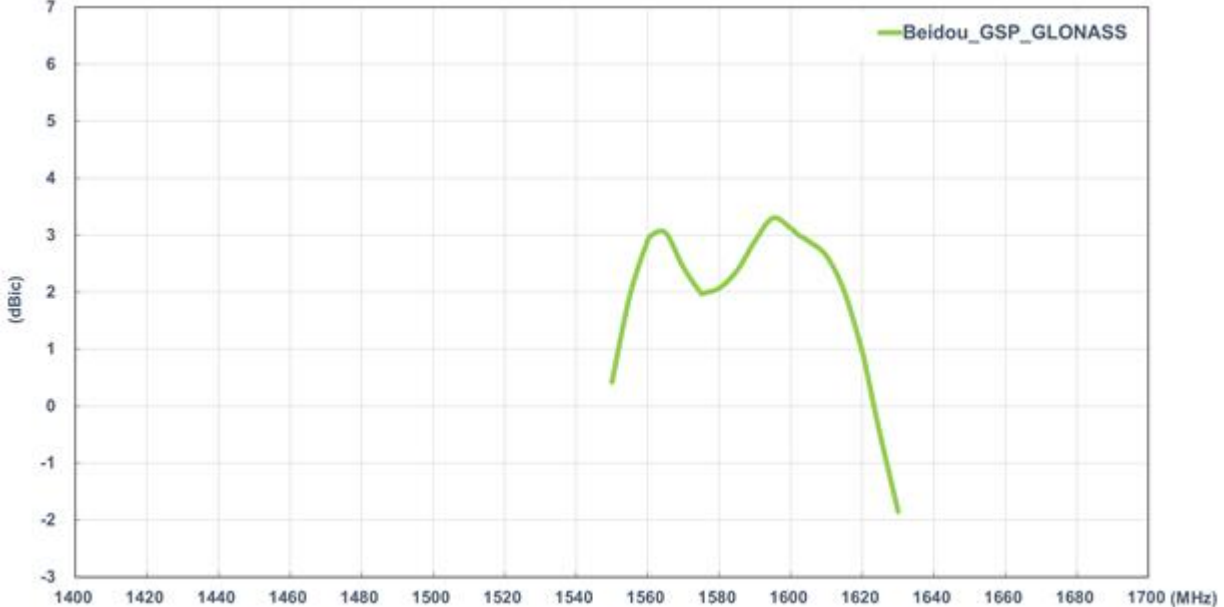
3.1.4. GPS-GLONASS-GALILEO-BeiDou Smith Chart (Passive antenna)



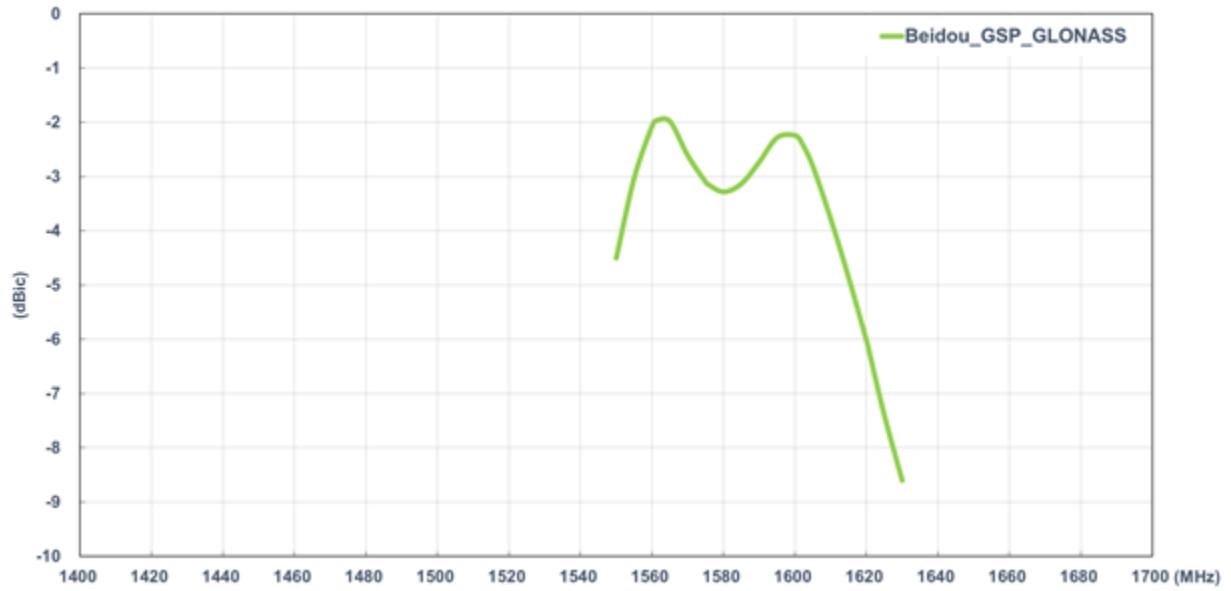
3.1.5. GPS-GLONASS-GALILEO-BeiDou Efficiency (Passive antenna)



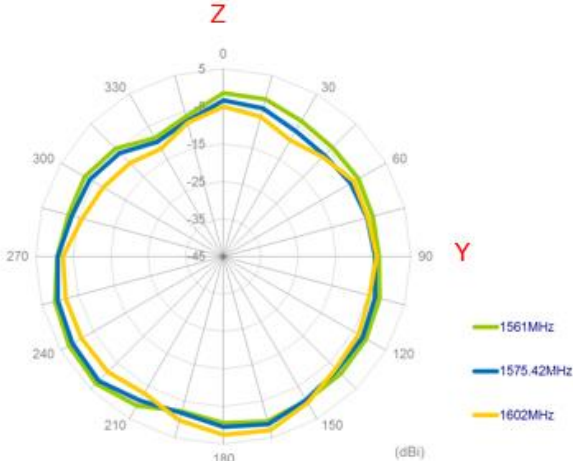
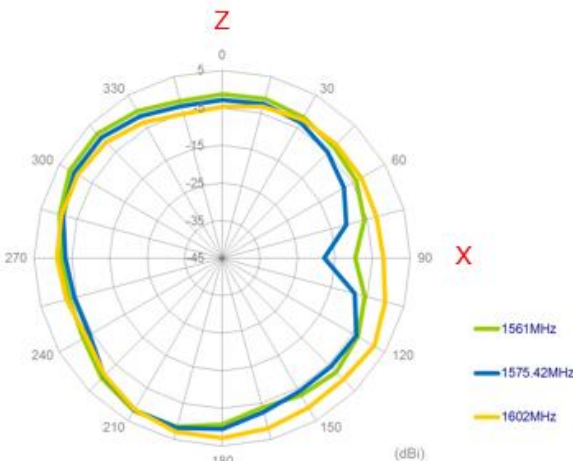
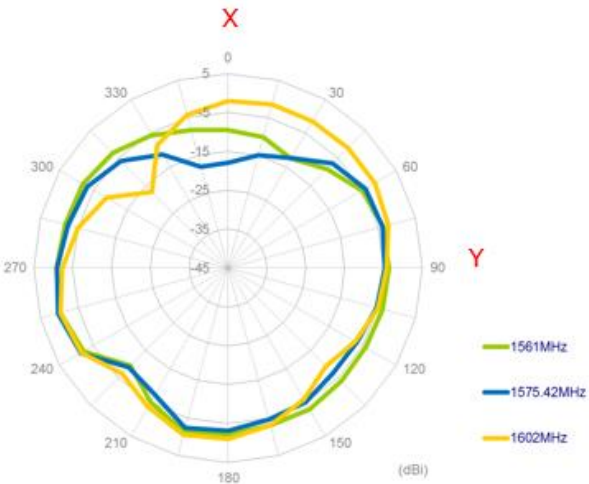
3.1.6. GPS-GLONASS-GALILEO-BeiDou Peak Gain (Passive antenna)



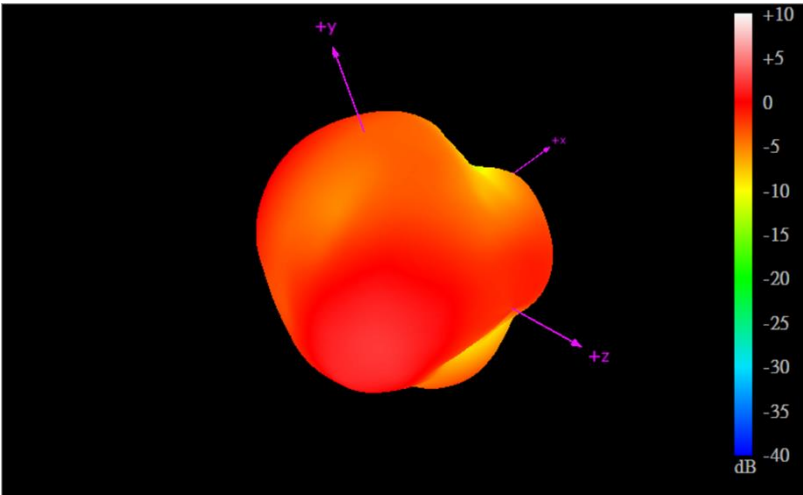
3.1.7. GPS-GLONASS-GAILEO-BeiDou Average Gain (Passive antenna)



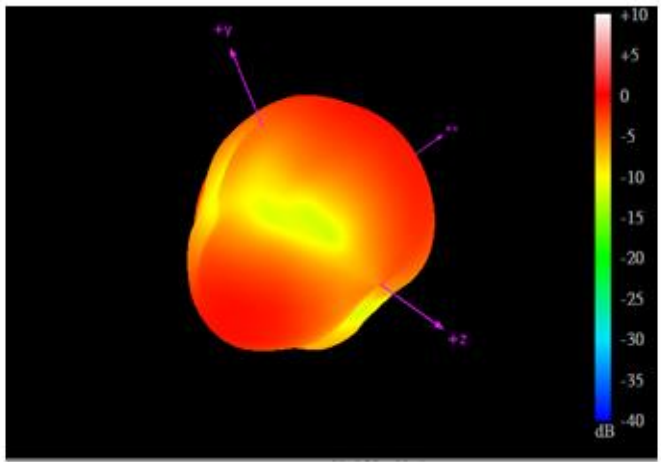
3.1.8. GPS-GLONASS-GALILEO-BeiDou Radiation Pattern (Passive antenna)
 2D Radiation Pattern



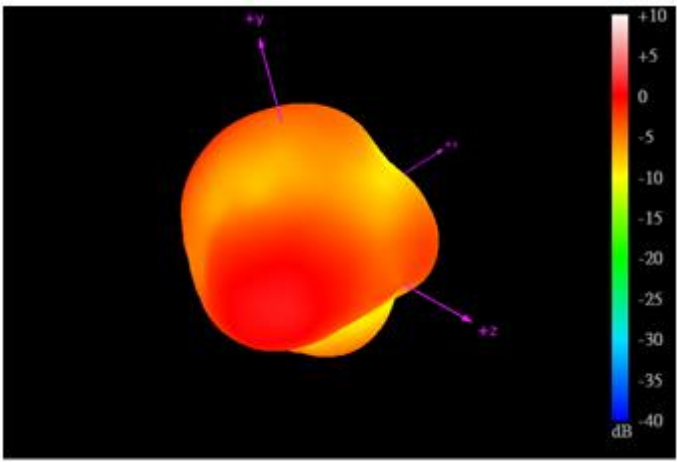
3.1.9. 3D Radiation Pattern (Passive antenna)



1561MHz

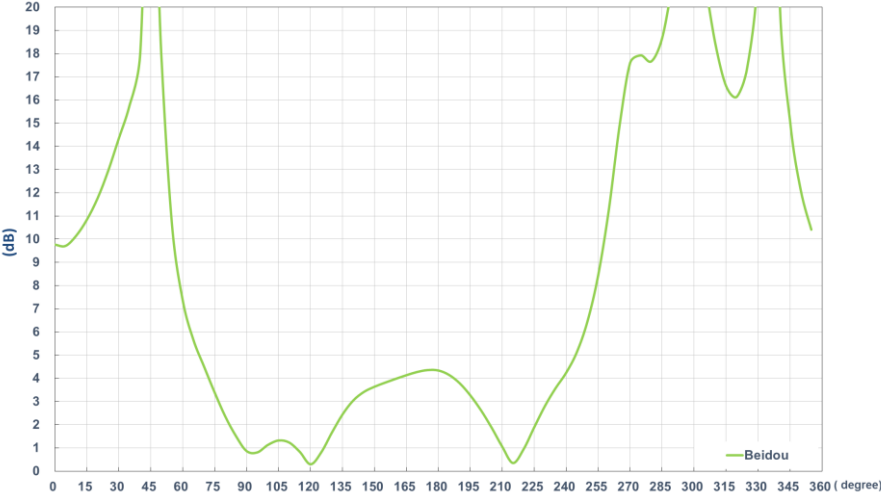


1575.42MHz

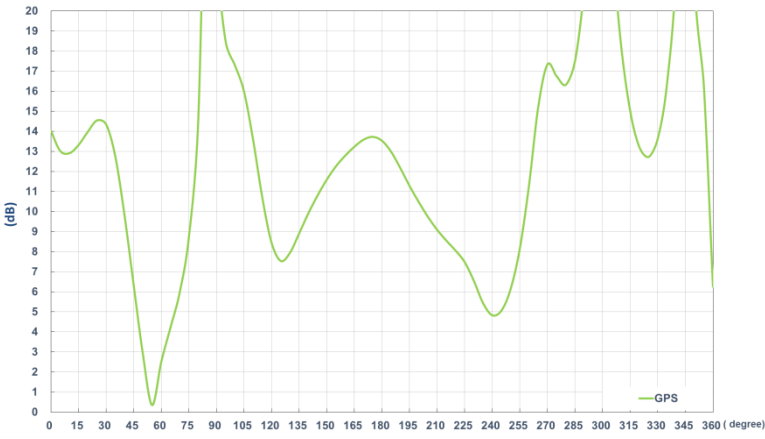


1602MHz

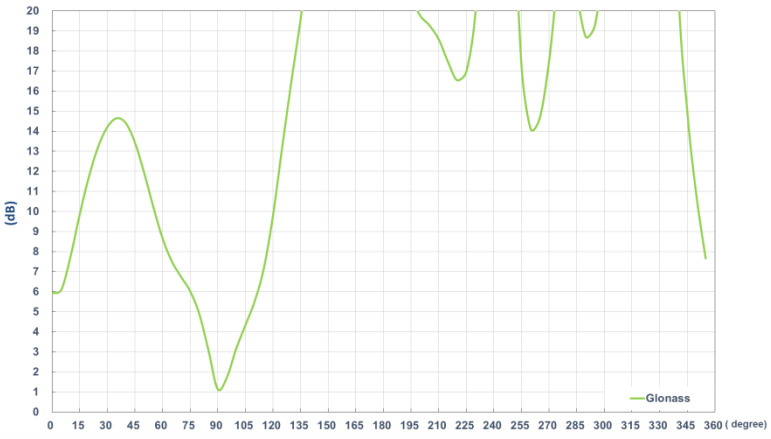
3.1.10. Axial Ratio (Passive antenna)



1561MHz

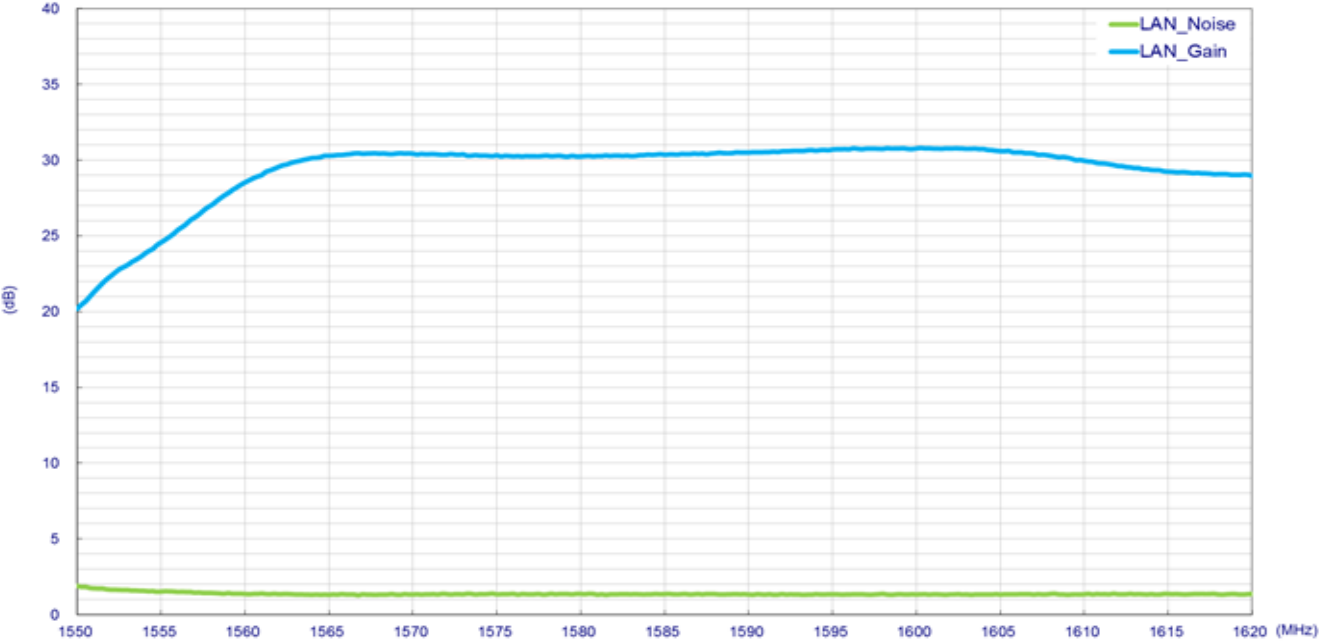
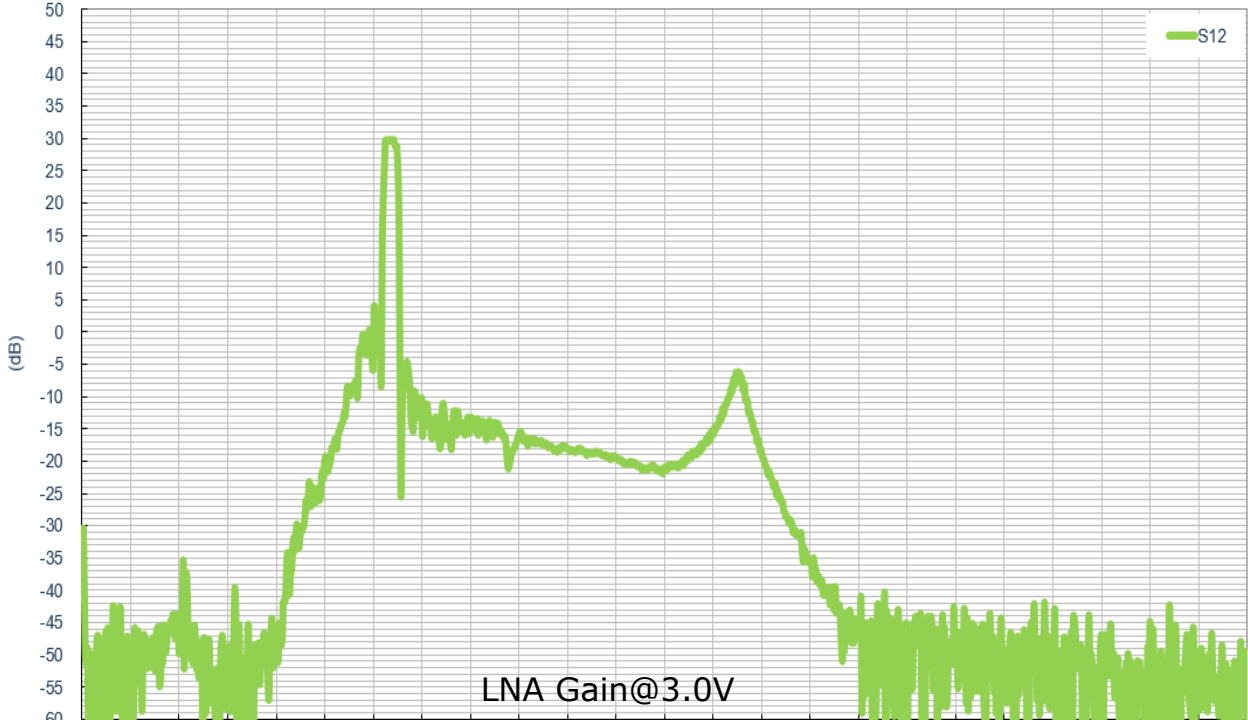


1575.42MHz



1602MHz

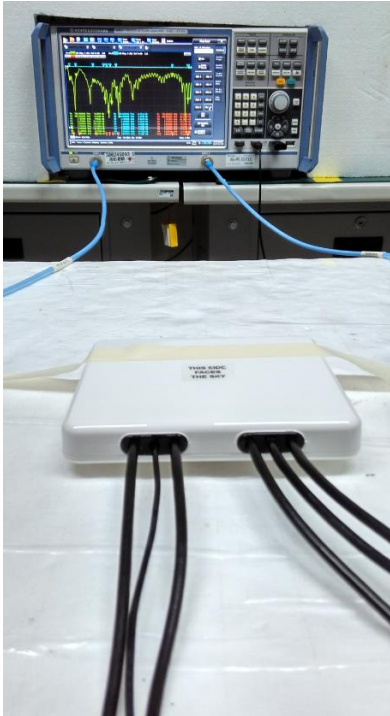
3.1.11. GPS-GLONASS-GALILEO-BeiDou LNA Gain and Noise Figure (Active antenna)



LNA Noise Figure @3.0V

3.2. LTE_MIMO/Wi-Fi_MIMO Antenna

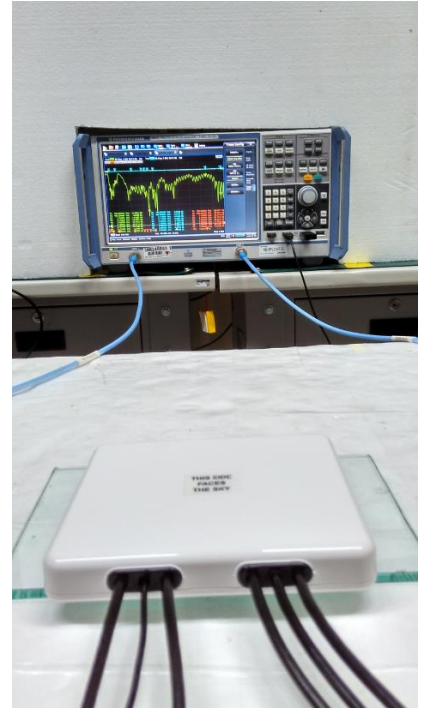
3.2.1. Test Setup



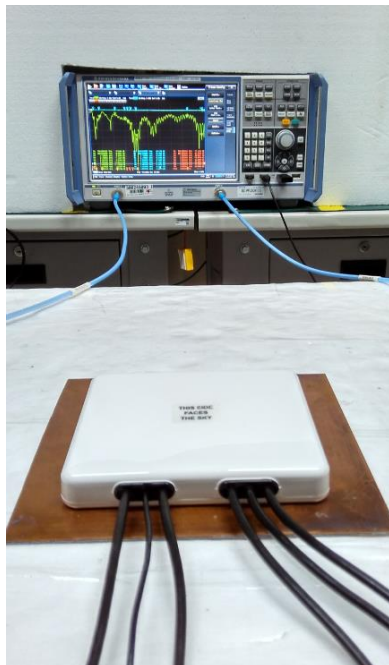
Free space



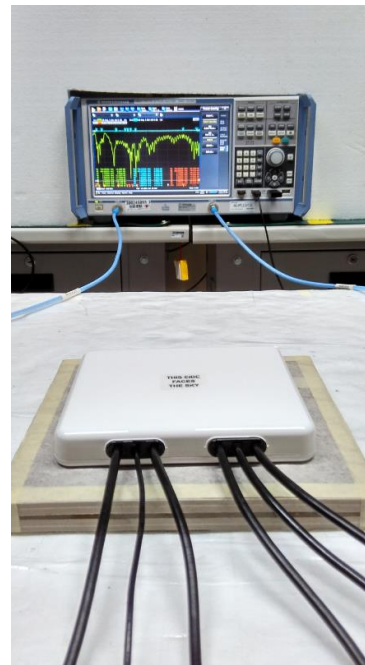
ABS



Glass



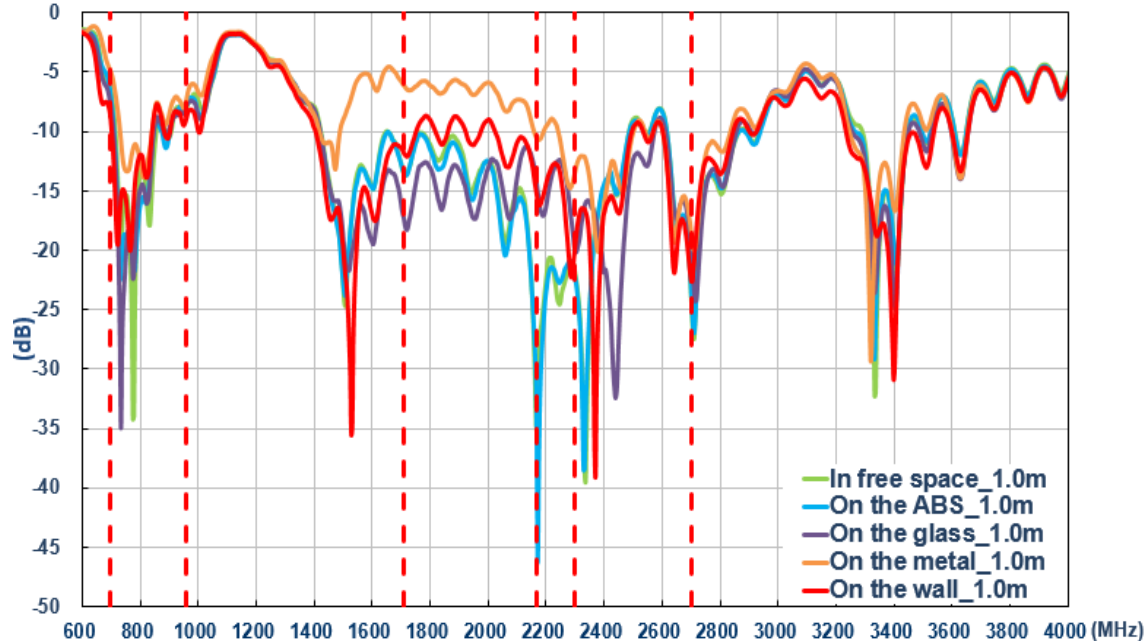
Metal



Wall

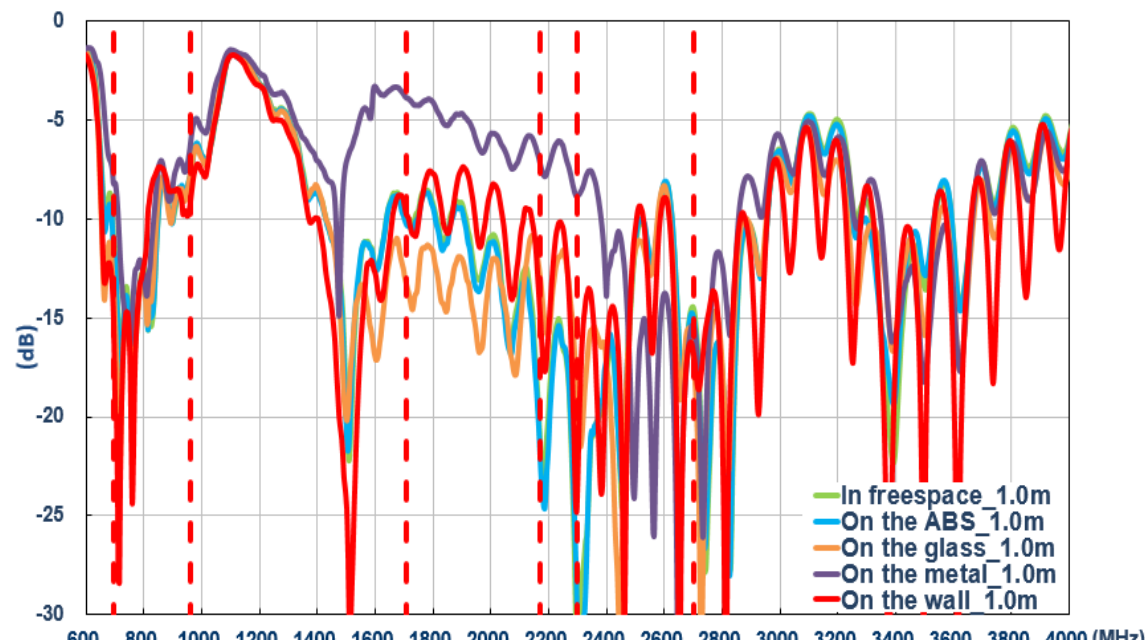
3.2.2. LTE_1 Antenna Return Loss

Performance in different environments with 1 meter cable length



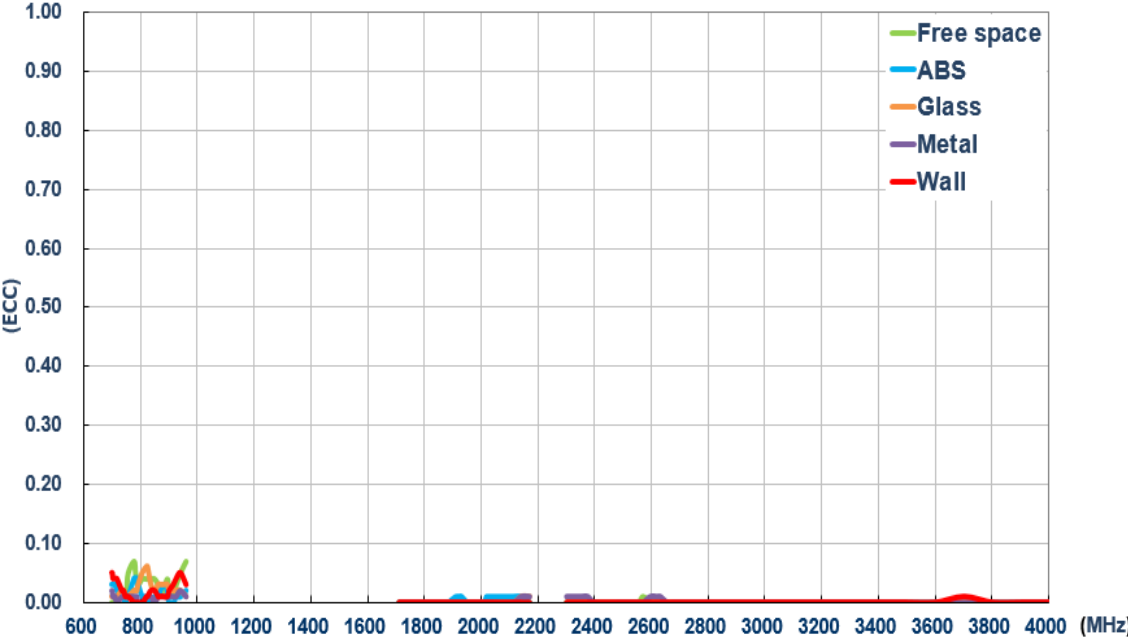
3.2.3. LTE_2 Antenna Return Loss

Performance in different environments with 1 meter cable length



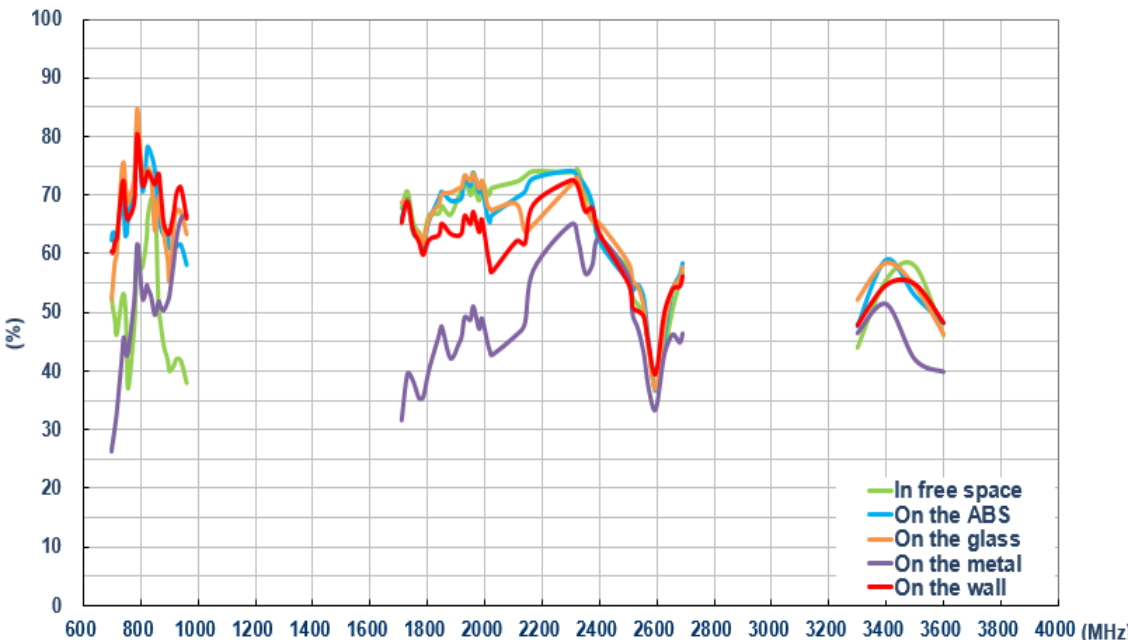
3.2.4. LTE Envelope Correlation Coefficient

Performance in different environments with 1 meter cable length



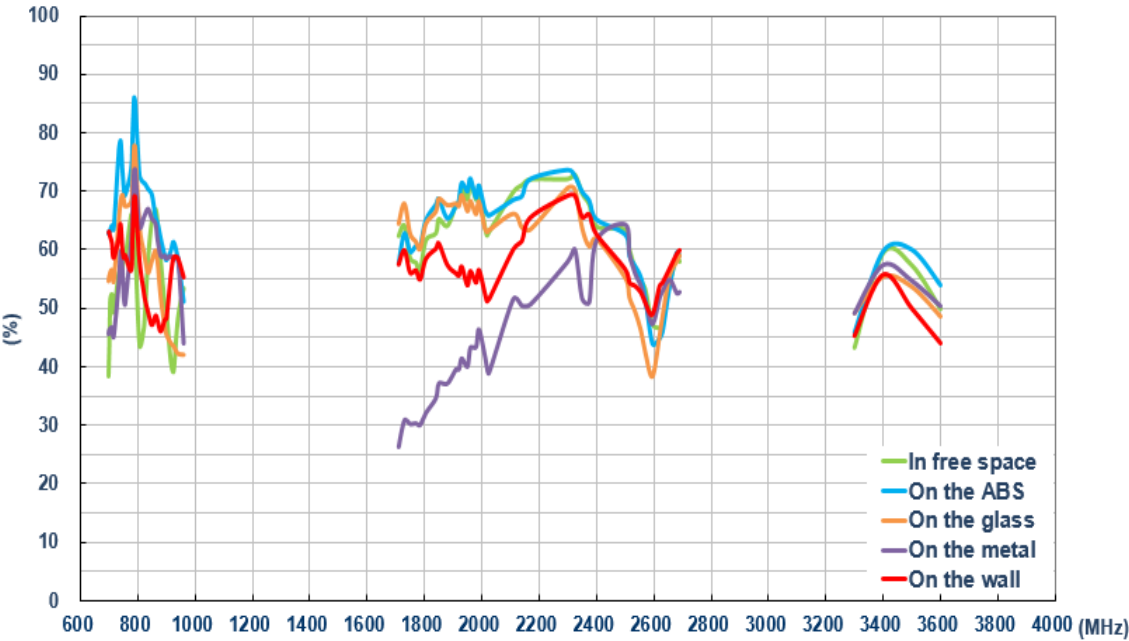
3.2.5. LTE_1 Antenna Efficiency

Performance in different environments with 1 meter cable length



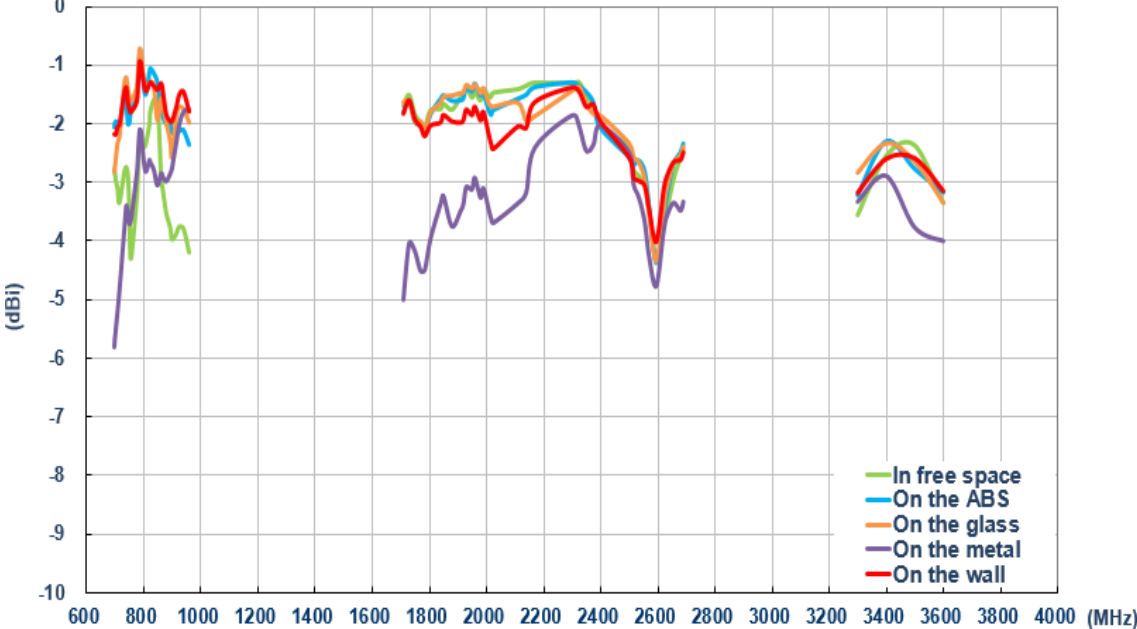
3.2.6. LTE_2 Antenna Efficiency

Performance in different environments with 1 meter cable length



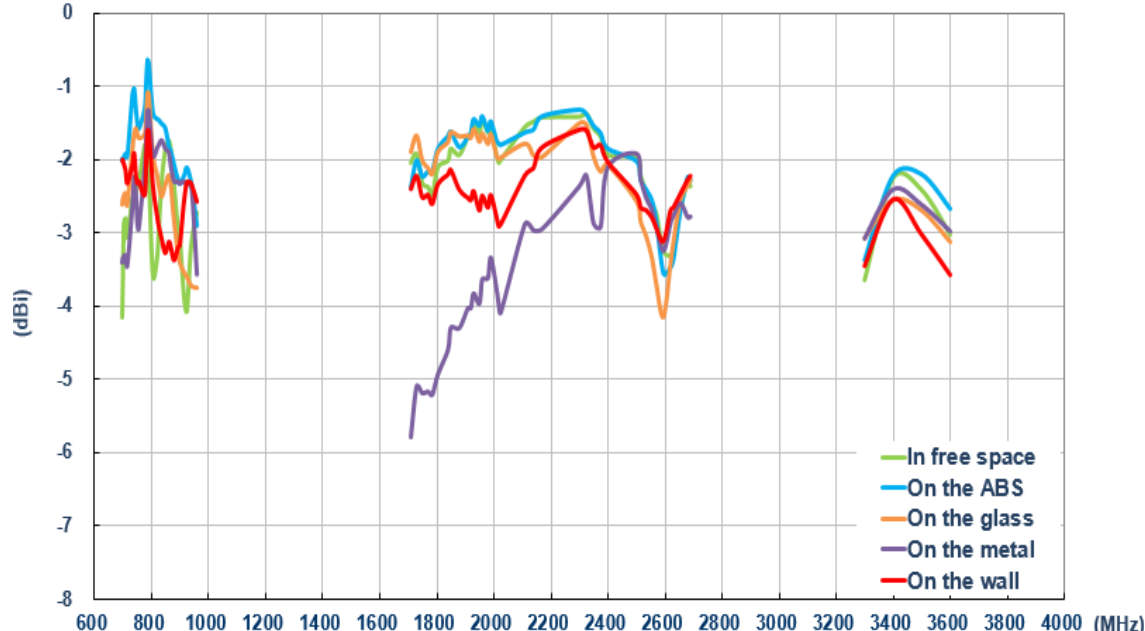
3.2.7. LTE_1 Antenna Average Gain

Performance in different environments with 1 meter cable length



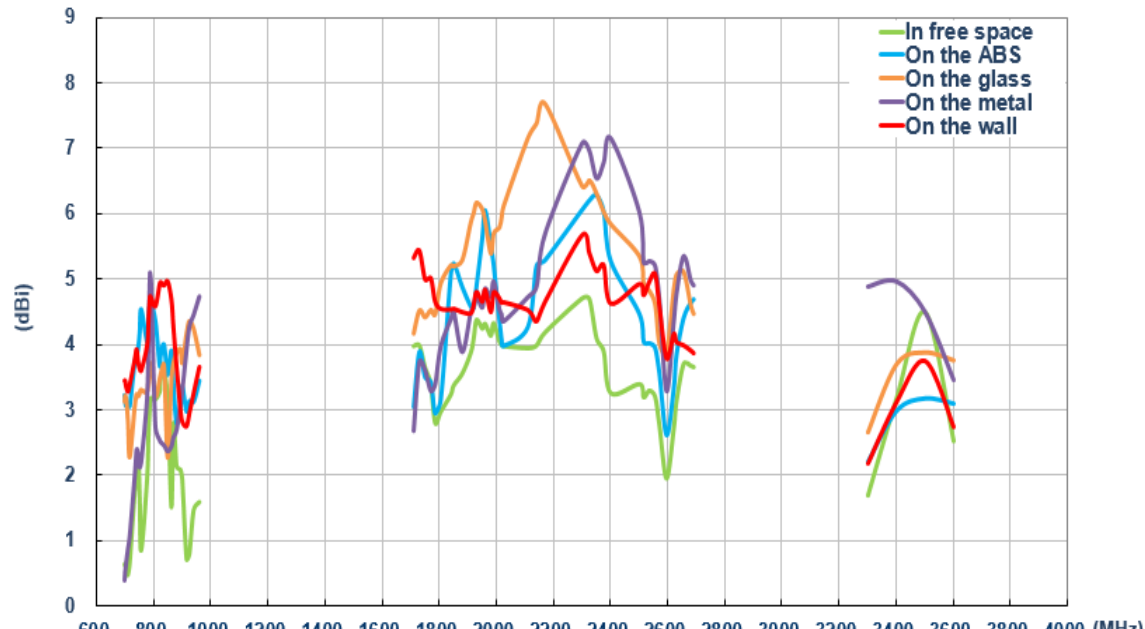
3.2.8. LTE_2 Antenna Average Gain

Performance in different environments with 1 meter cable length



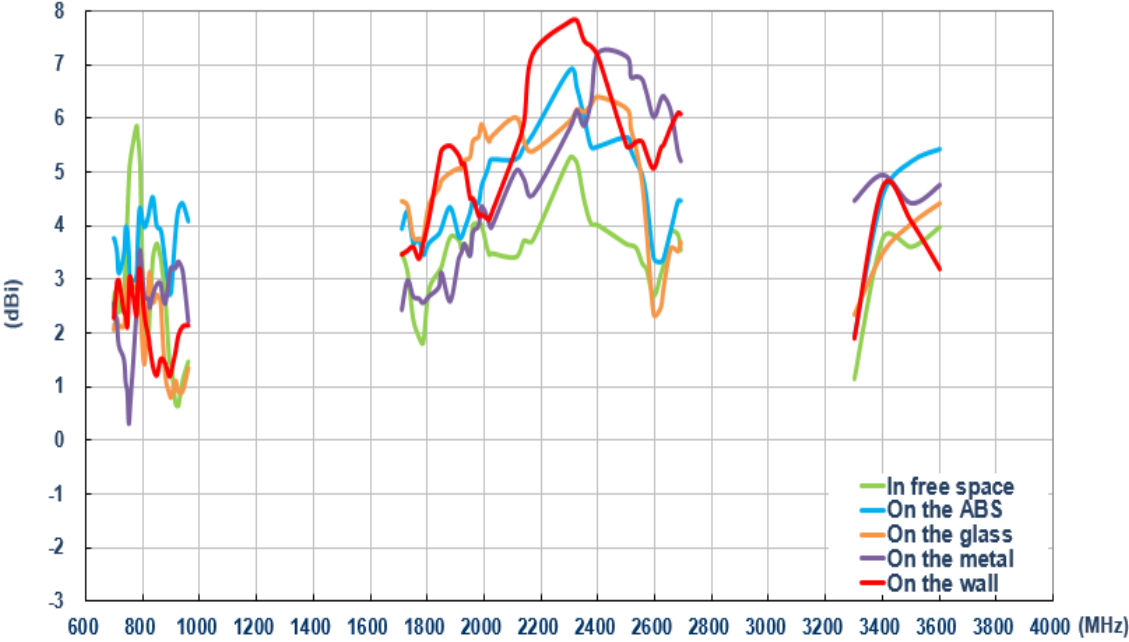
3.2.9. LTE_1 Antenna Peak Gain

Performance in different environments with 1 meter cable length



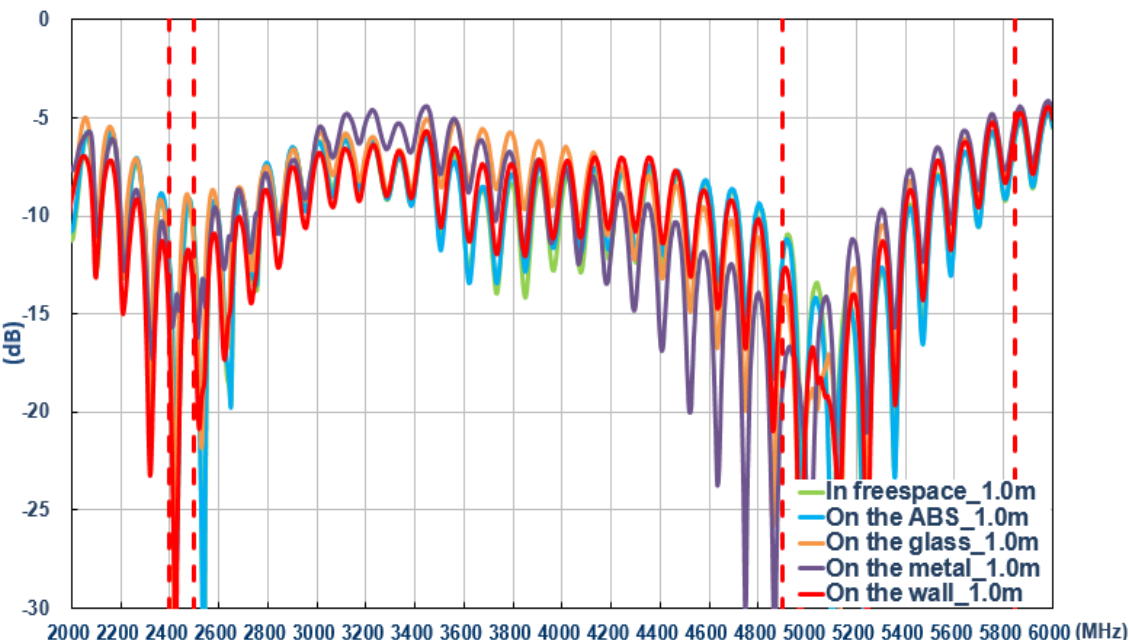
3.2.10. LTE_2 Antenna Peak Gain

Performance in different environments with 1 meter cable length



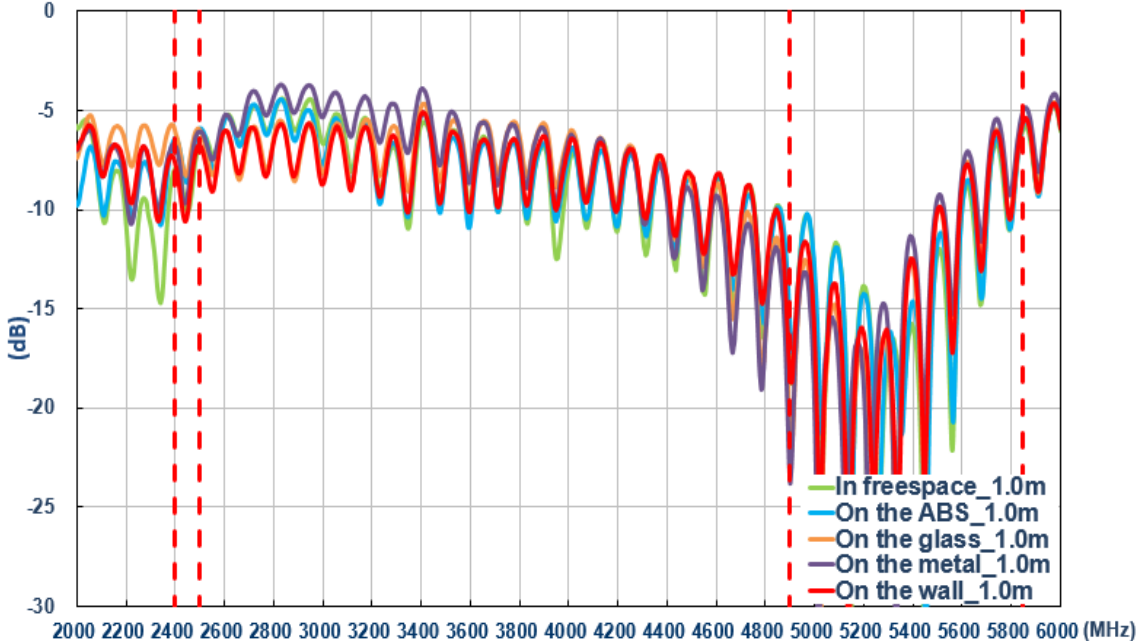
3.2.11. Wi-Fi_1 Antenna Return Loss

Performance in different environments with 1 meter cable length



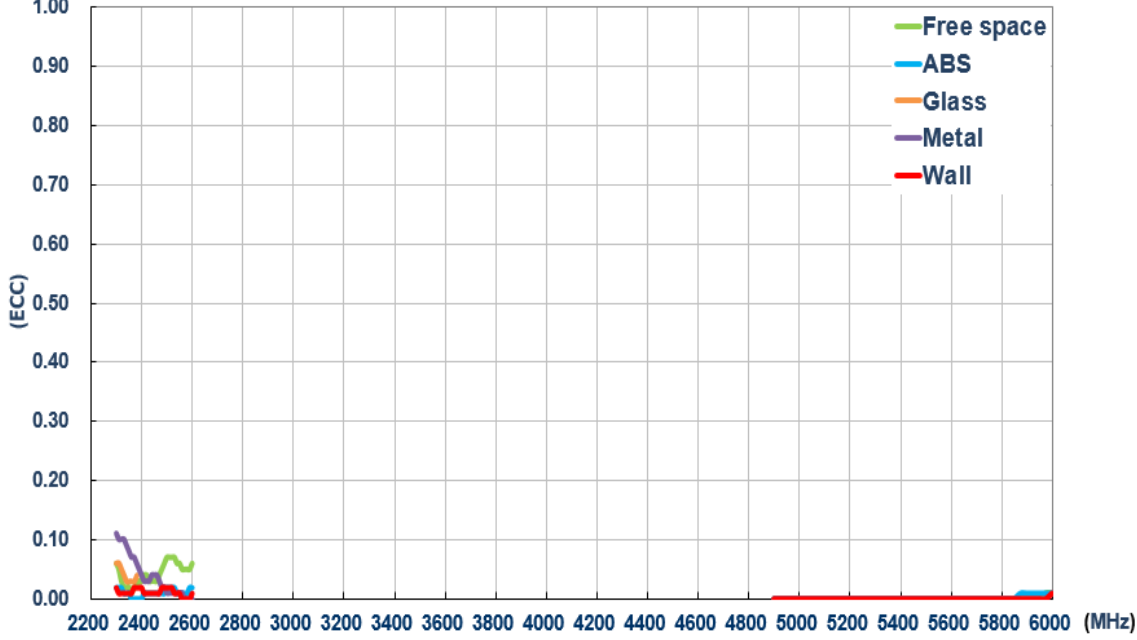
3.2.12. Wi-Fi_2 Antenna Return Loss

Performance in different environments with 1 meter cable length



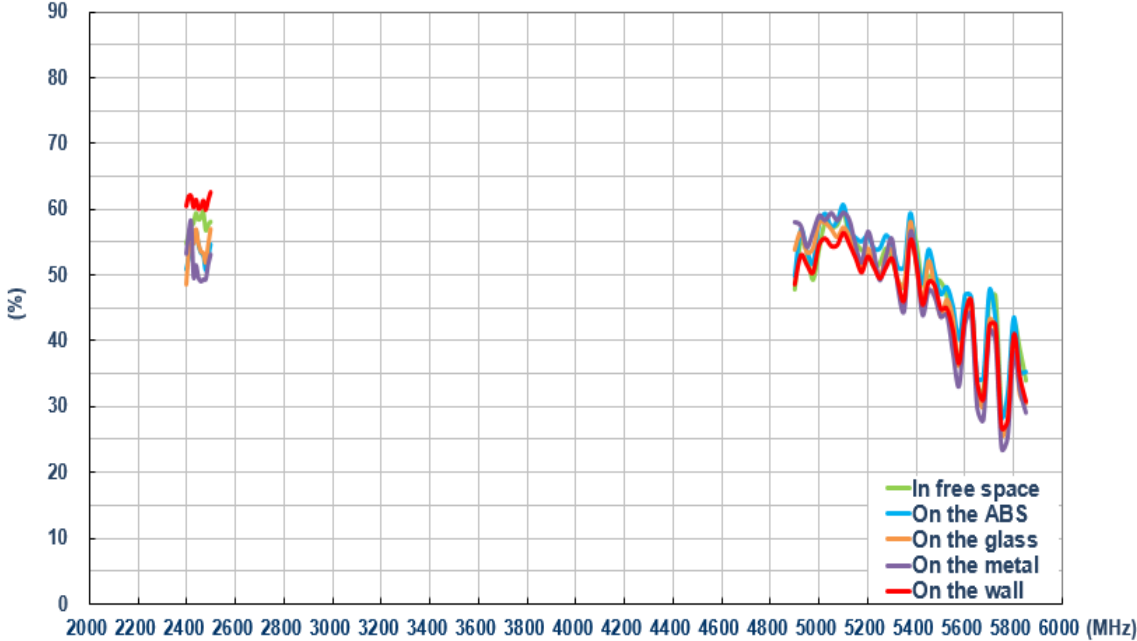
3.2.13. Wi-Fi Envelope Correlation Coefficient

Performance in different environments with 1 meter cable length



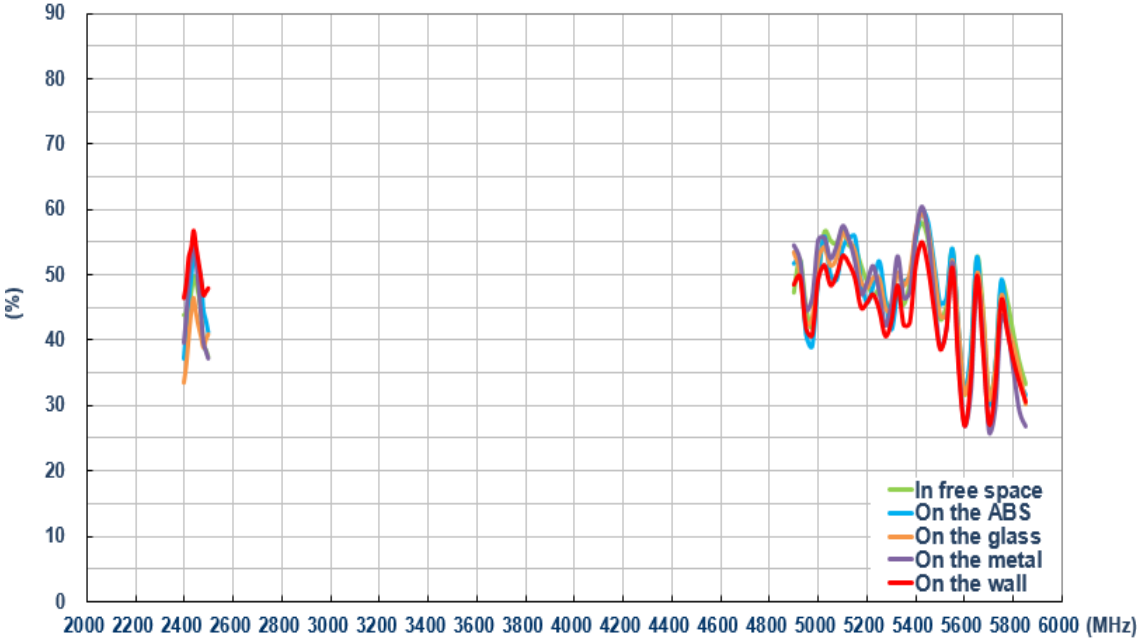
3.2.14. Wi-Fi_1 Antenna Efficiency

Performance in different environments with 1 meter cable length



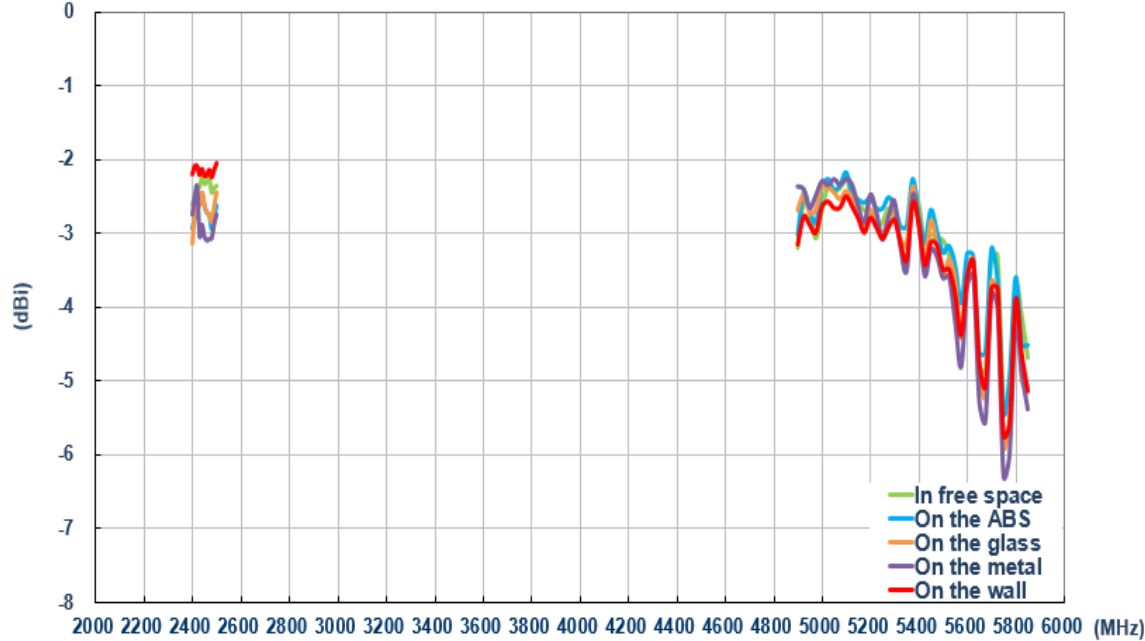
3.2.15. Wi-Fi_2 Antenna Efficiency

Performance in different environments with 1 meter cable length



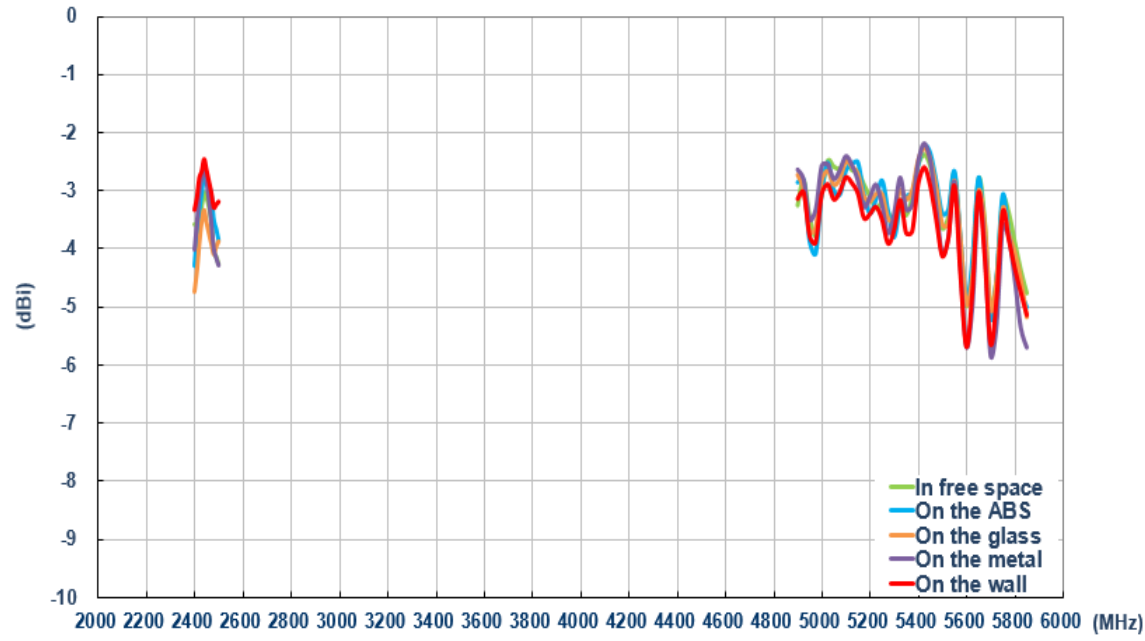
3.2.16. Wi-Fi_1 Antenna Average Gain

Performance in different environments with 1 meter cable length



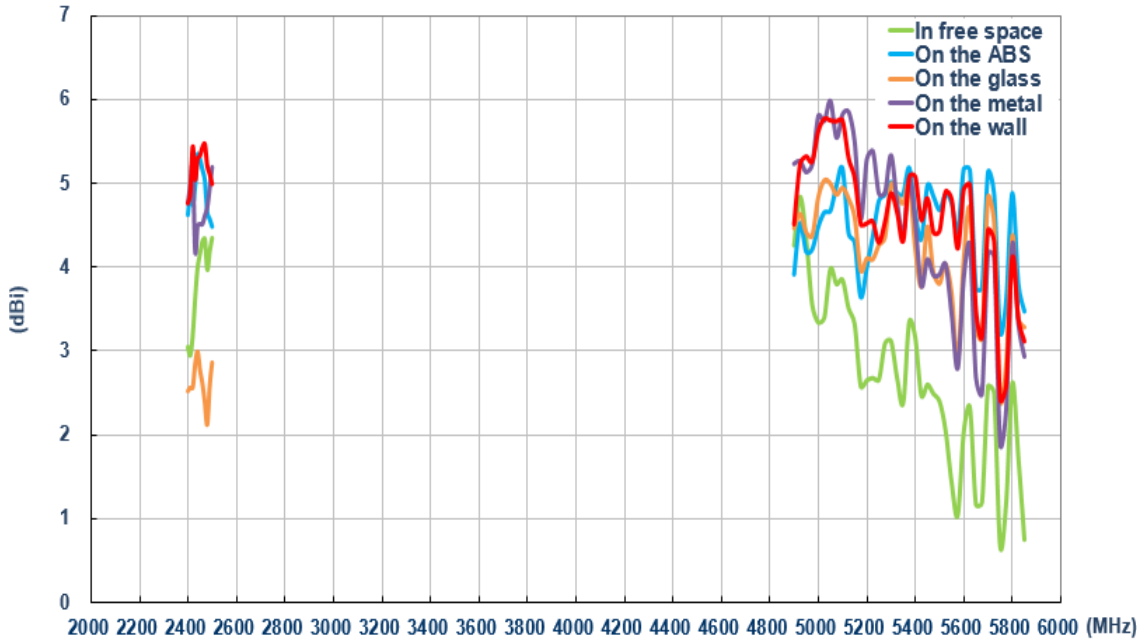
3.2.17. Wi-Fi_2 Antenna Average Gain

Performance in different environments with 1 meter cable length



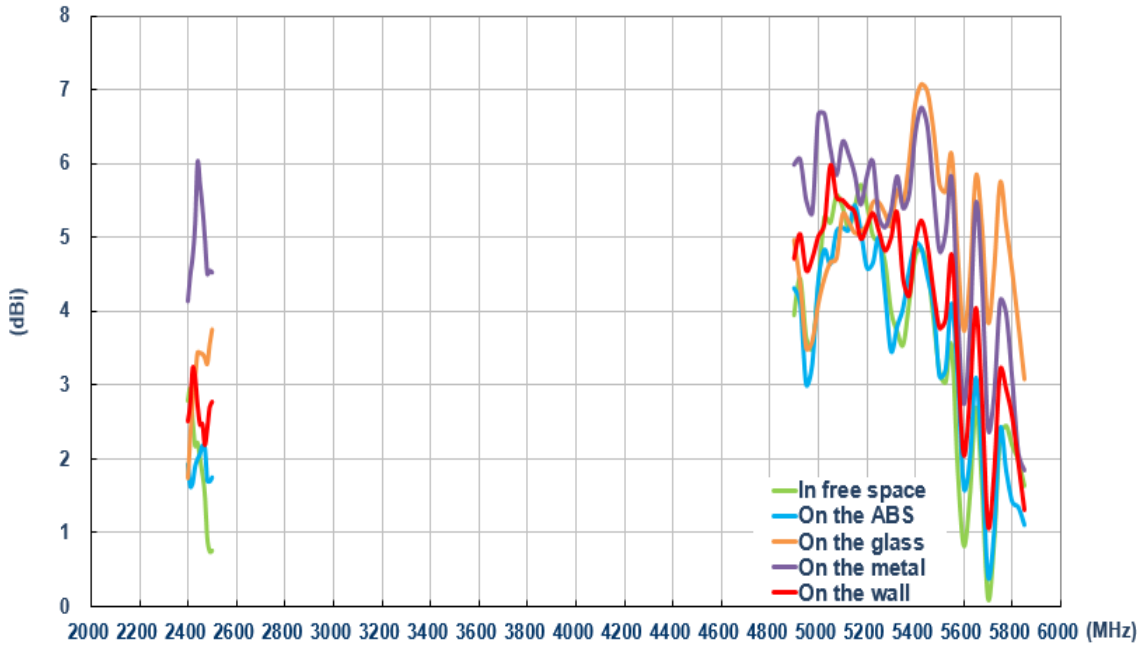
3.2.18. Wi-Fi_1 Antenna Peak Gain

Performance in different environments with 1 meter cable length

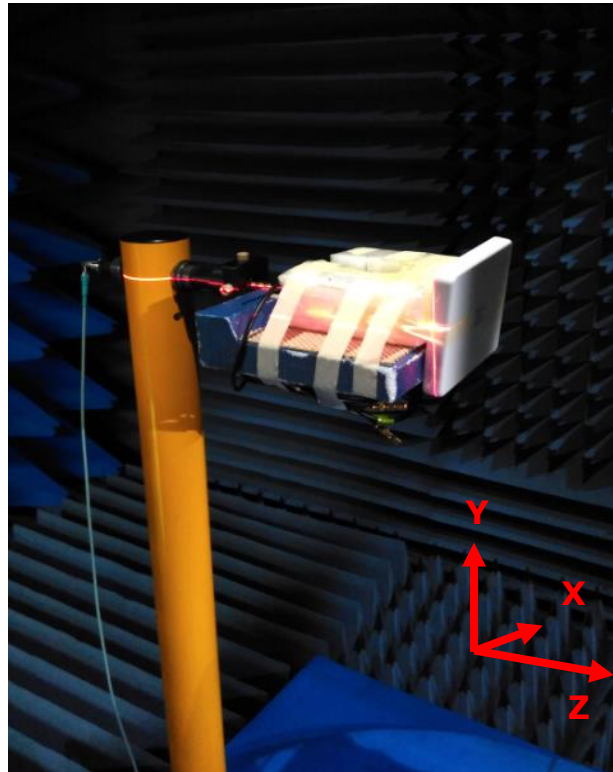


3.2.19. Wi-Fi_2 Antenna Peak Gain

Performance in different environments with 1 meter cable length



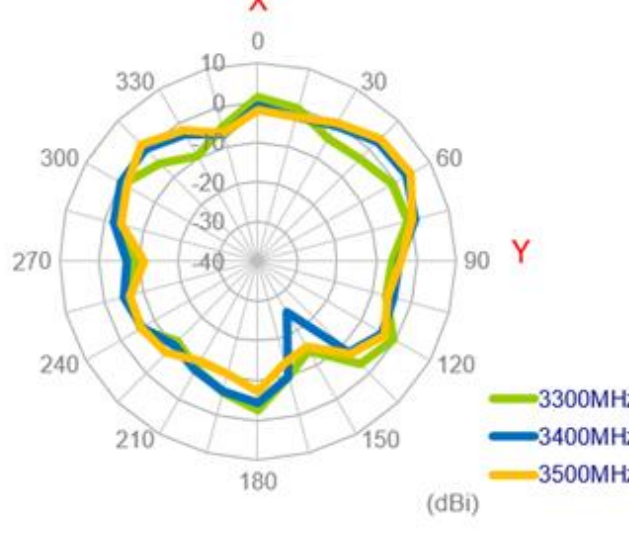
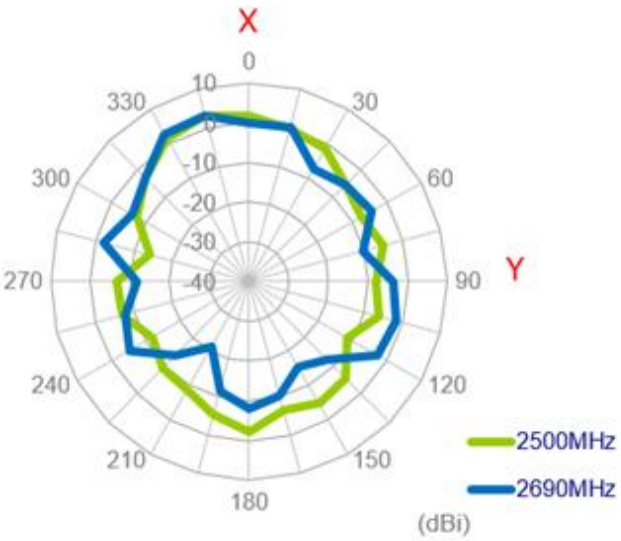
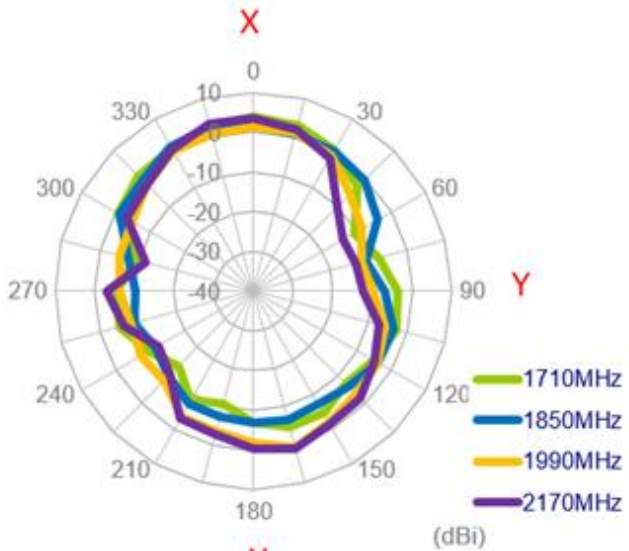
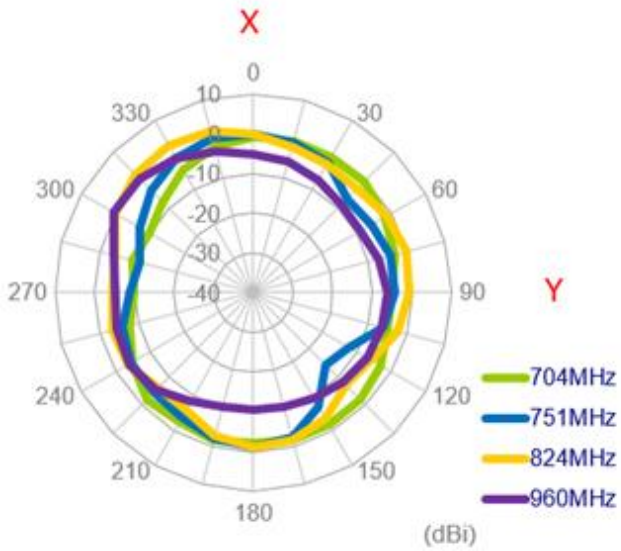
3.2.20. Test Setup for Antenna Radiation Pattern



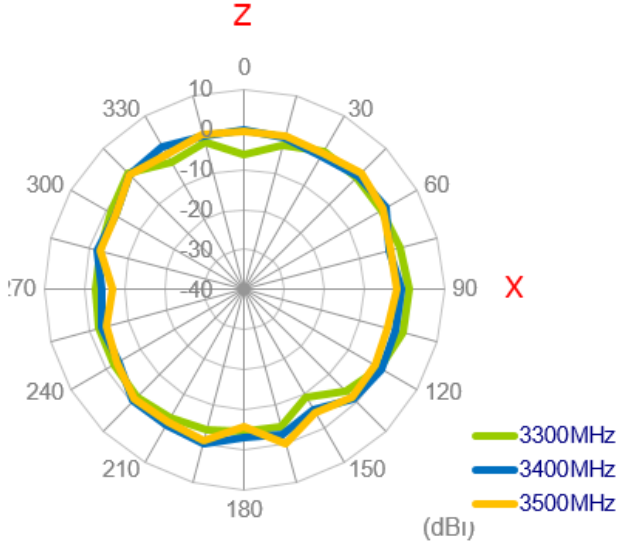
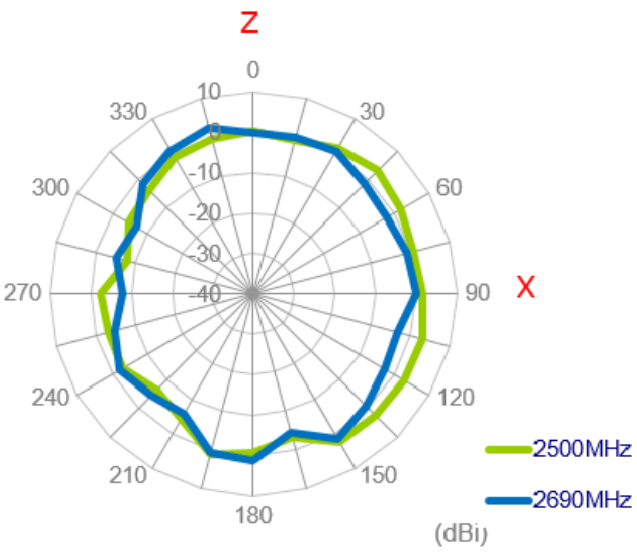
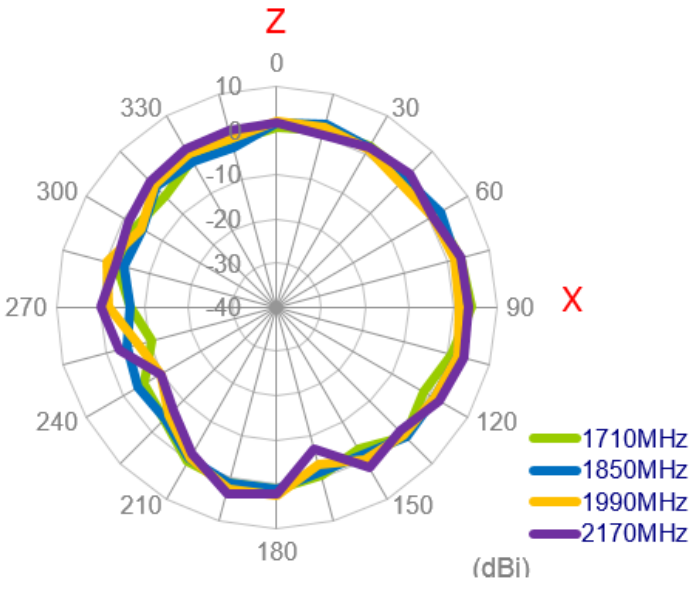
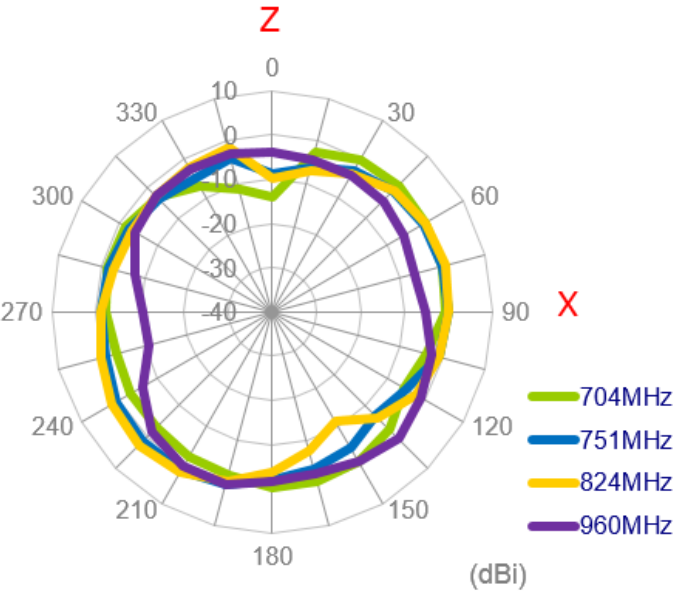
In free space

3.2.20 2D Radiation Pattern (LTE_MIMO1 with 1M cable length in free space)

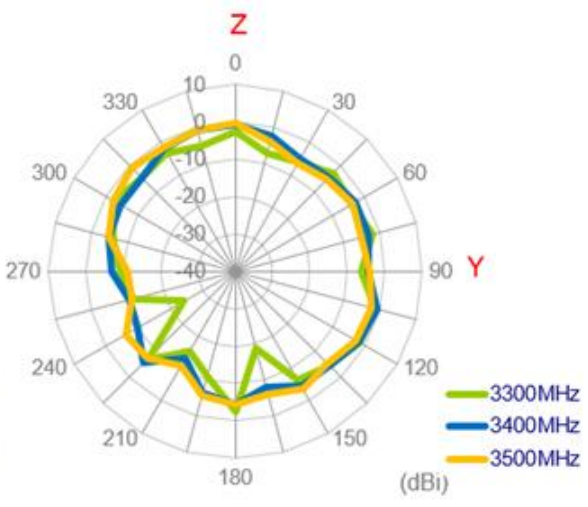
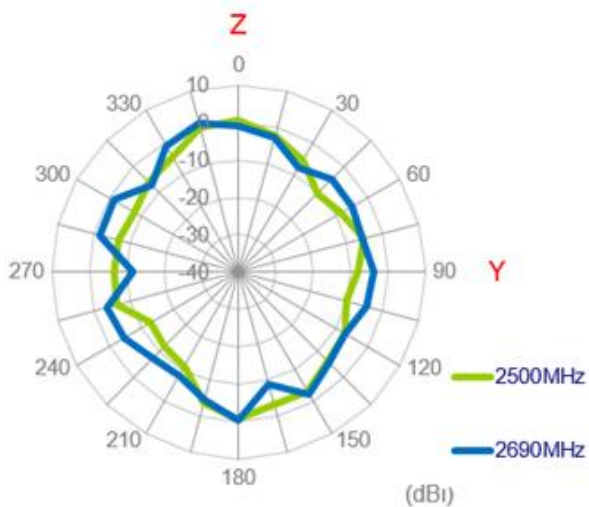
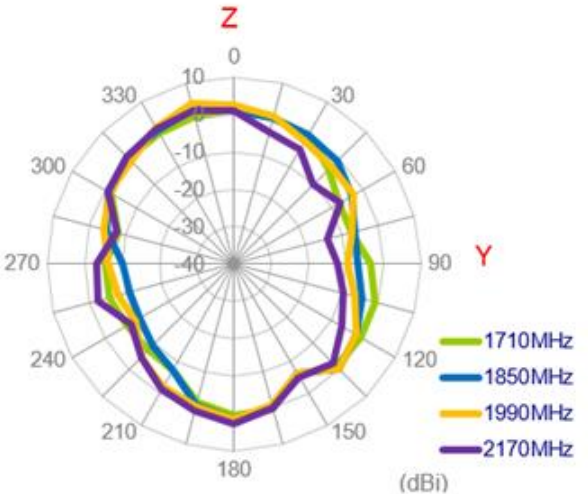
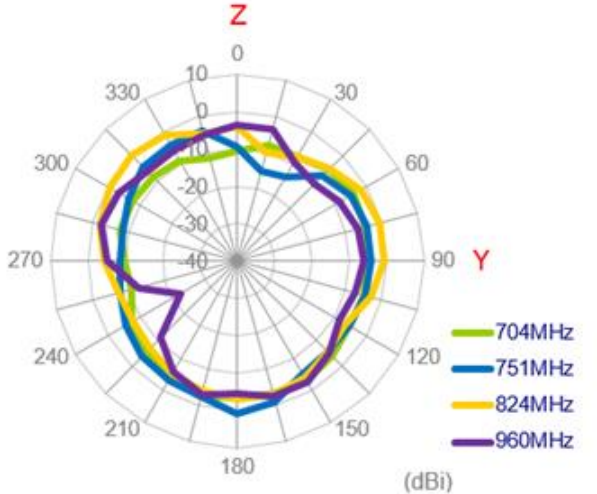
XY Plane



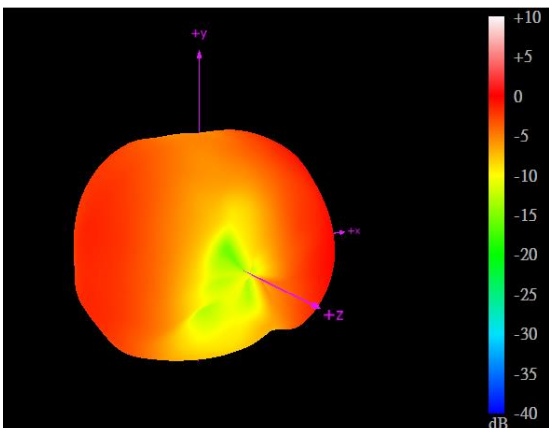
XZ Plane



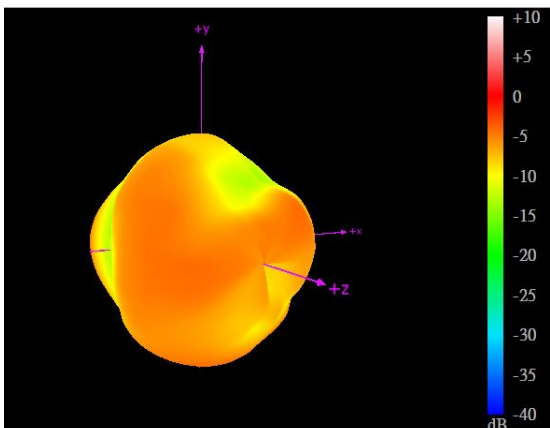
YZ Plane



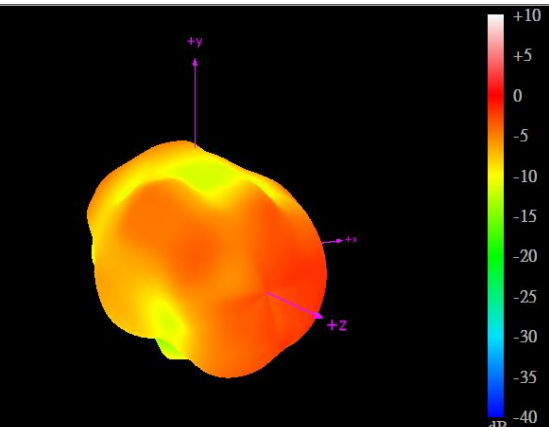
3.2.21. 3D Radiation Pattern (LTE_MIMO1 with 1M cable length in free space)



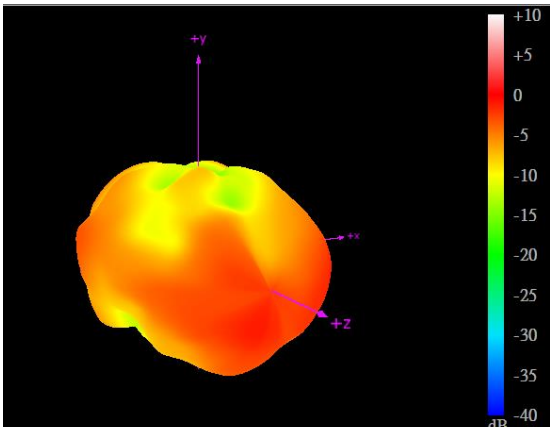
704MHz



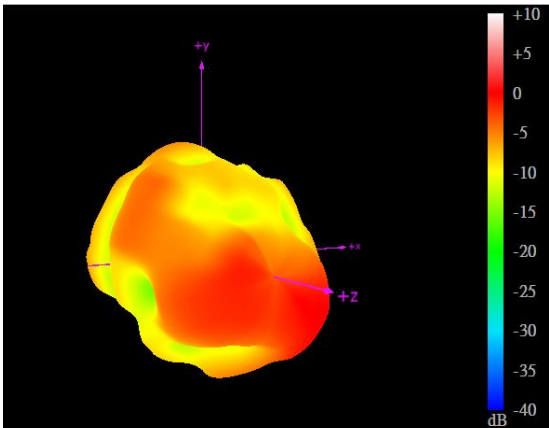
960MHz



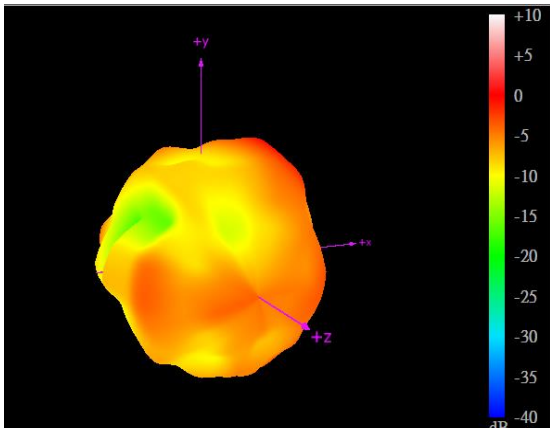
1710MHz



2170MHz



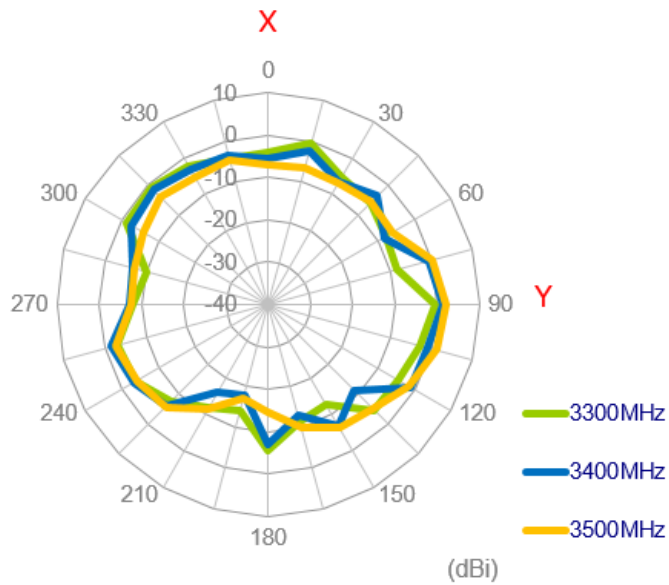
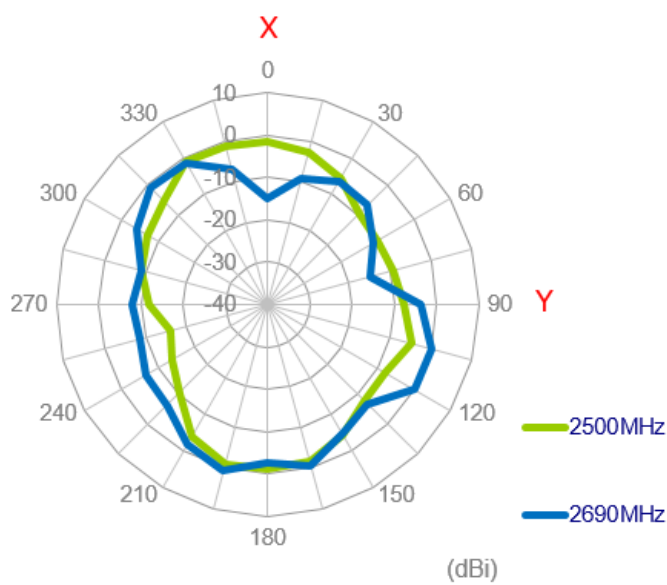
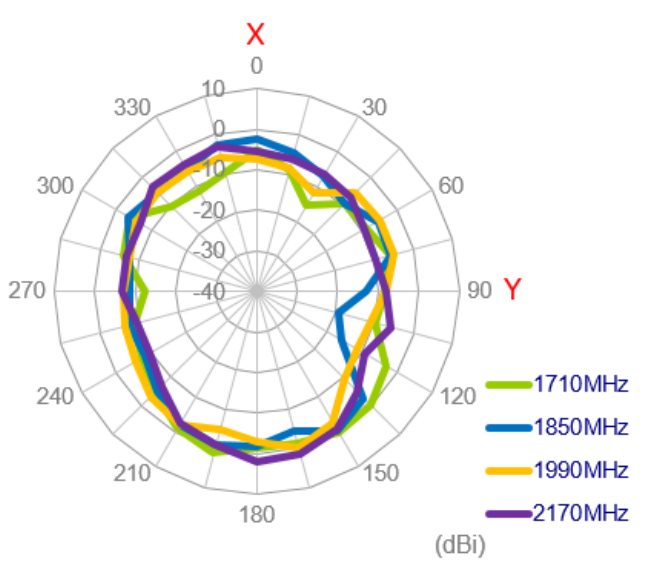
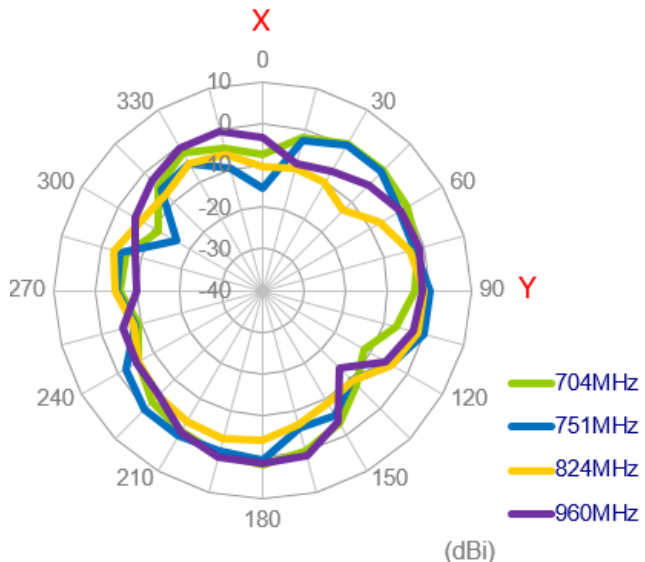
2690MHz



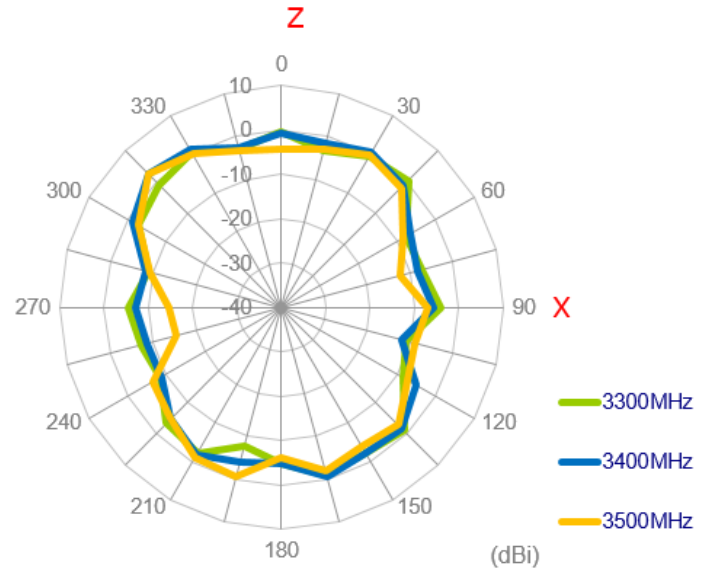
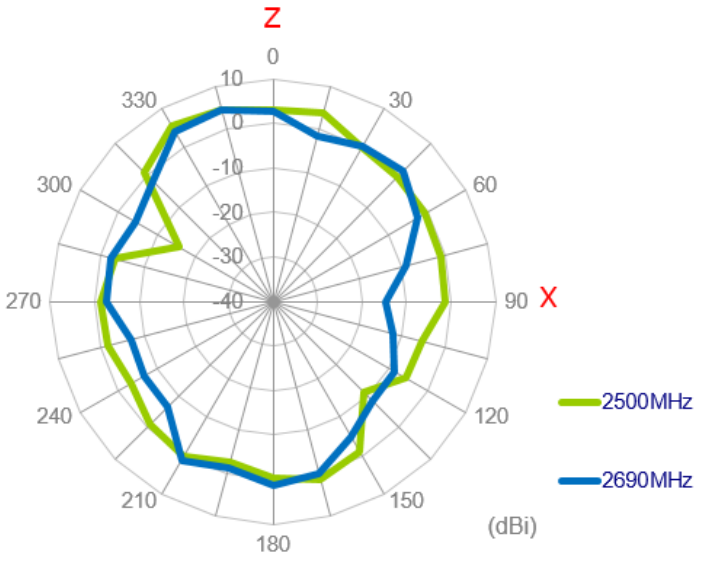
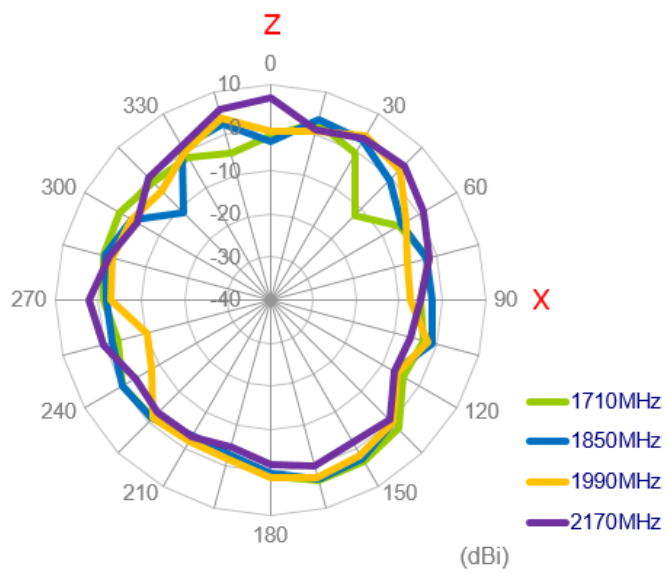
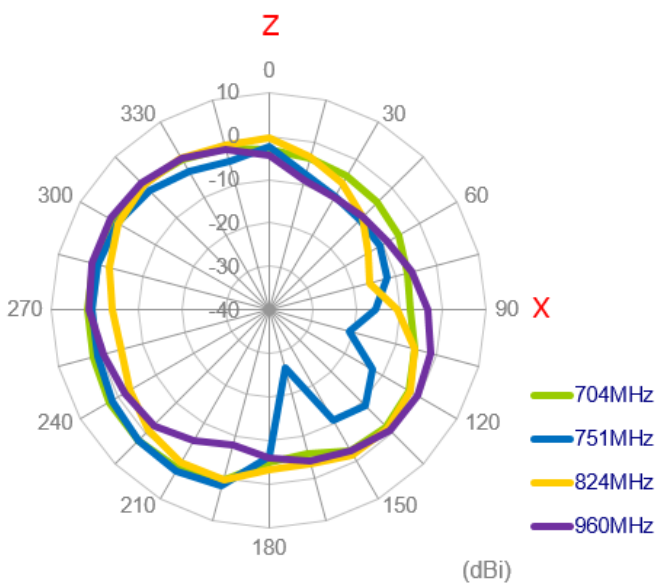
3500MHz

3.2.22. 2D Radiation Pattern (LTE_MIMO2 with 1M cable length in free space)

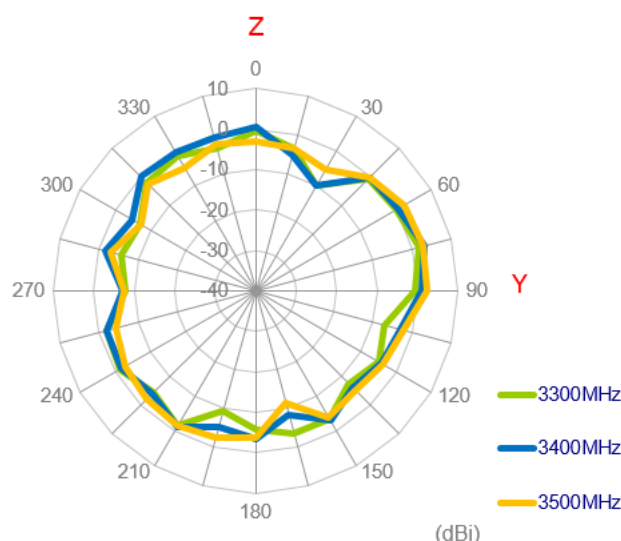
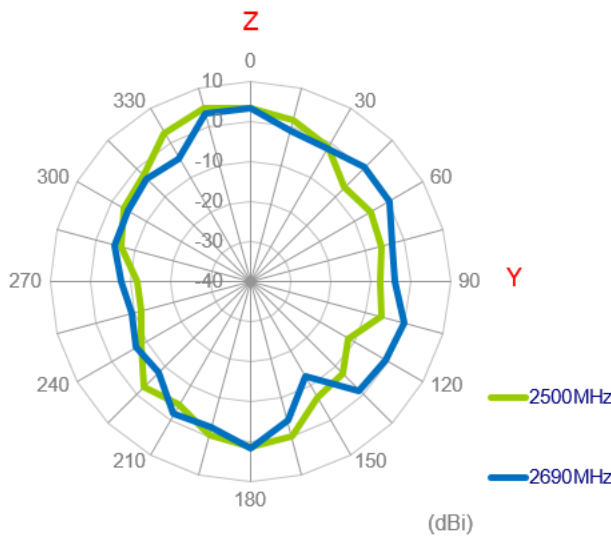
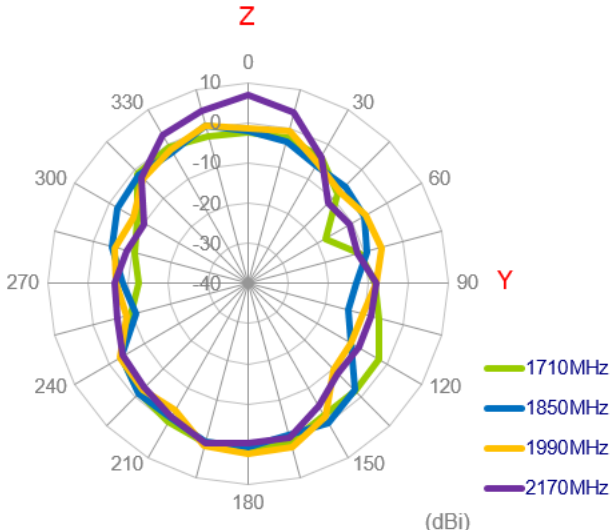
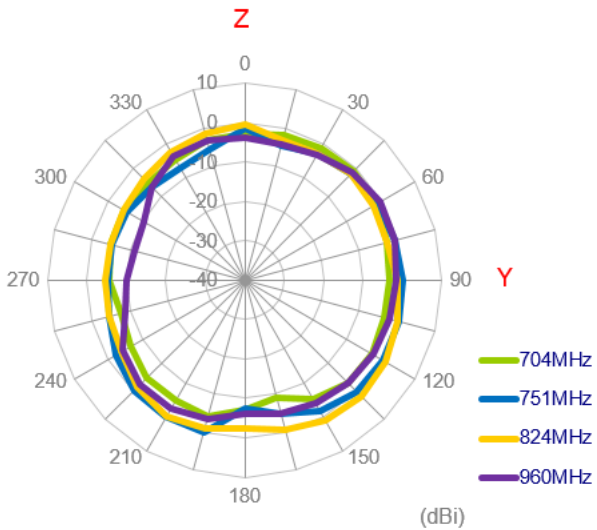
XY Plane



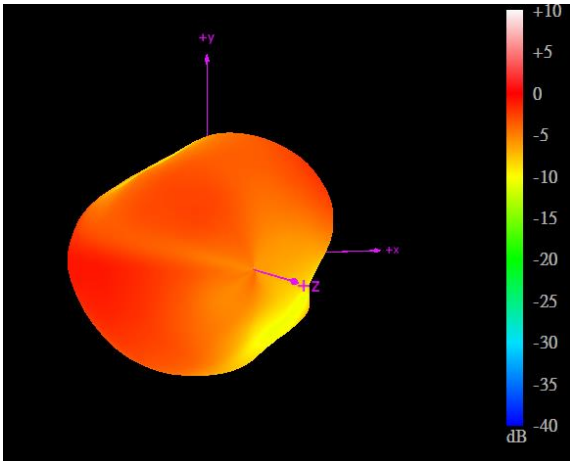
XZ Plane



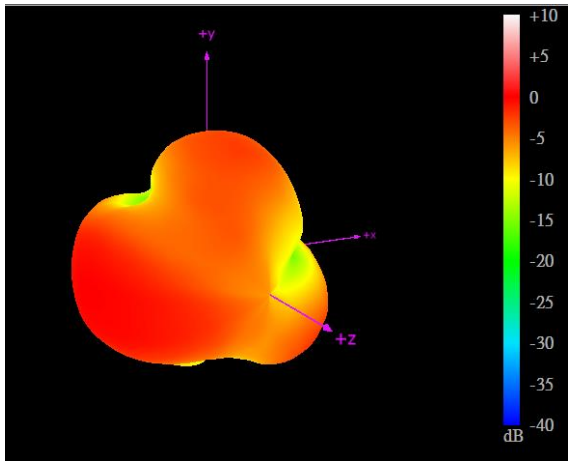
YZ Plane



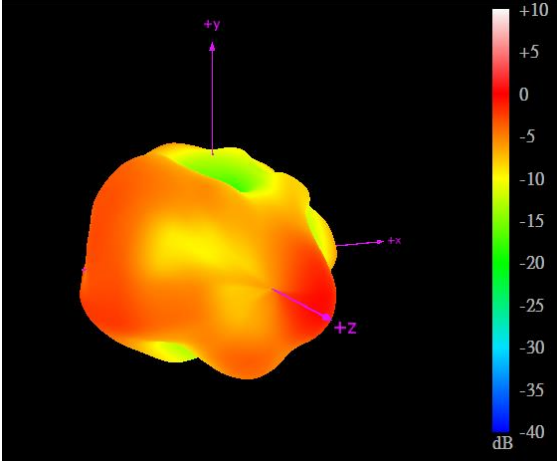
3.2.23. 3D Radiation Pattern (LTE_MIMO2 with 1M cable length in free space)



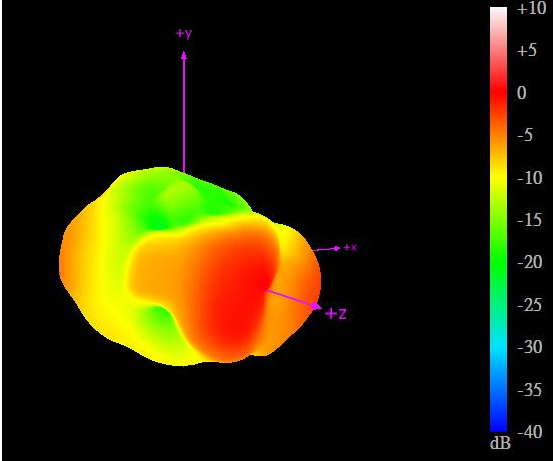
704MHz



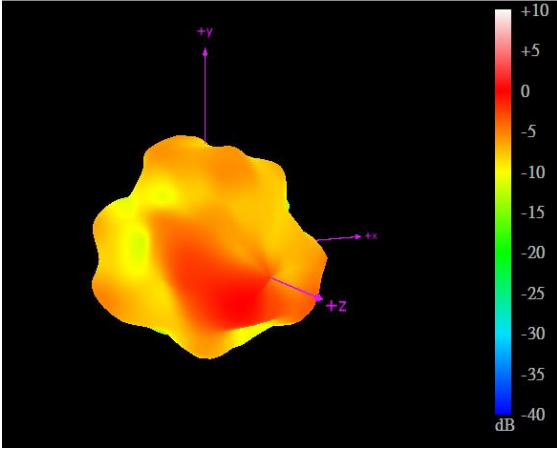
960MHz



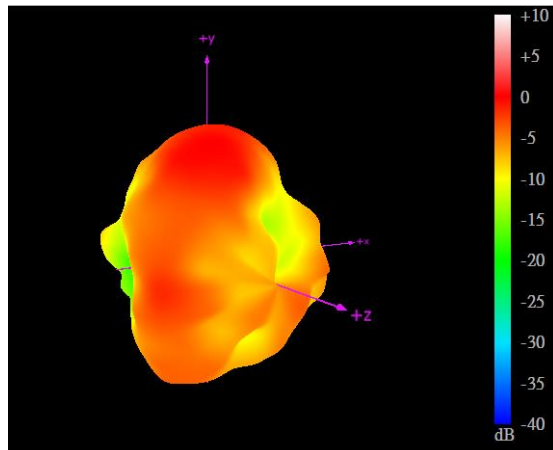
1710MHz



2170MHz



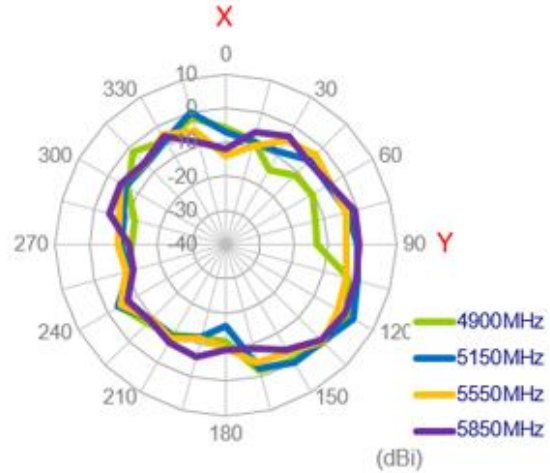
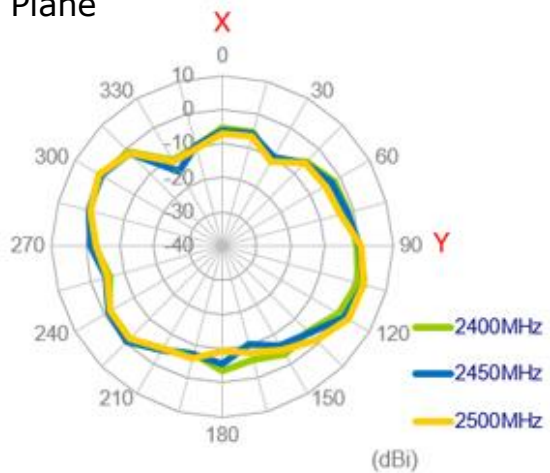
2690MHz



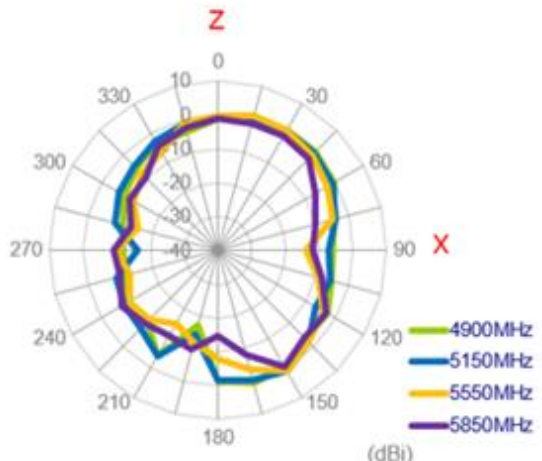
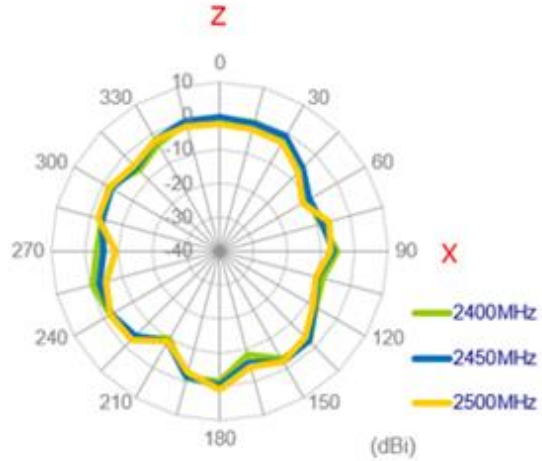
3500MHz

3.2.24. 2D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length in free space)

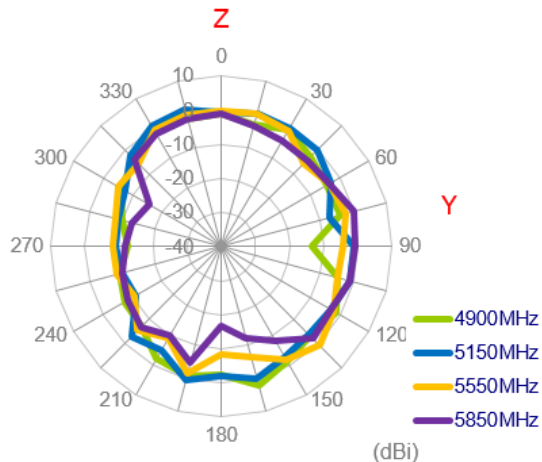
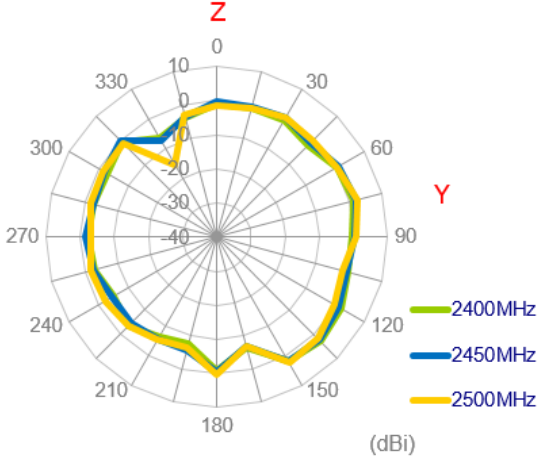
XY Plane



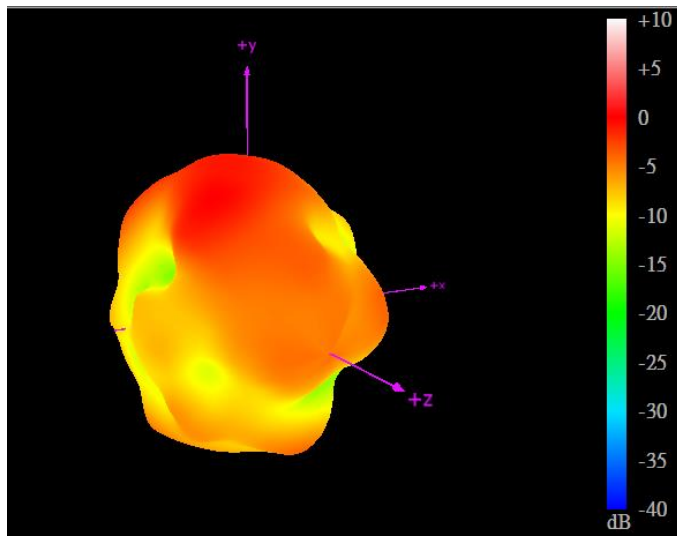
XZ Plane



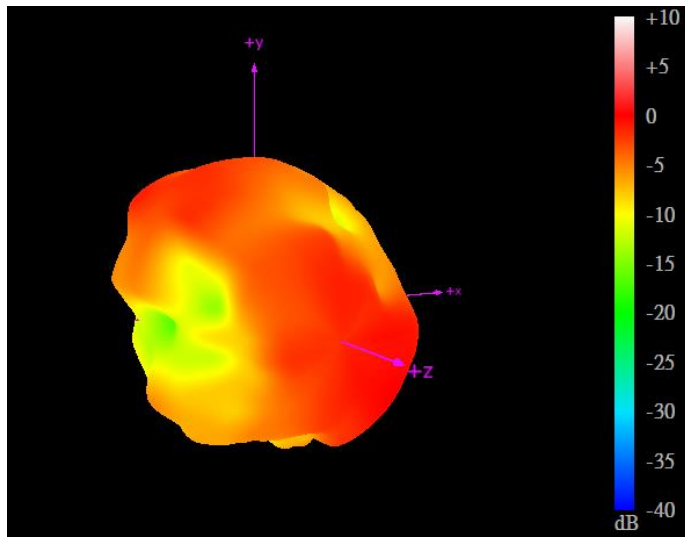
YZ Plane



3.2.25. 3D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length in free space)



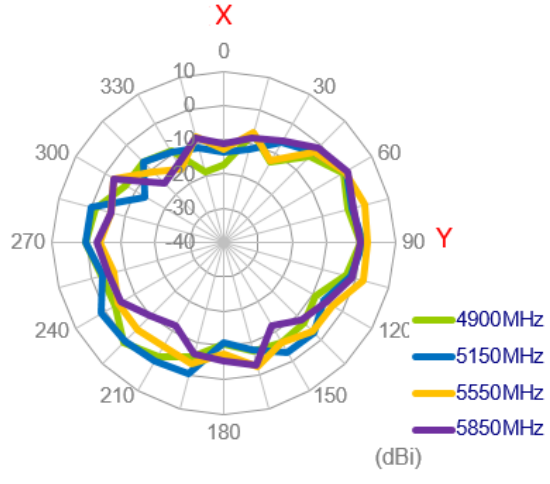
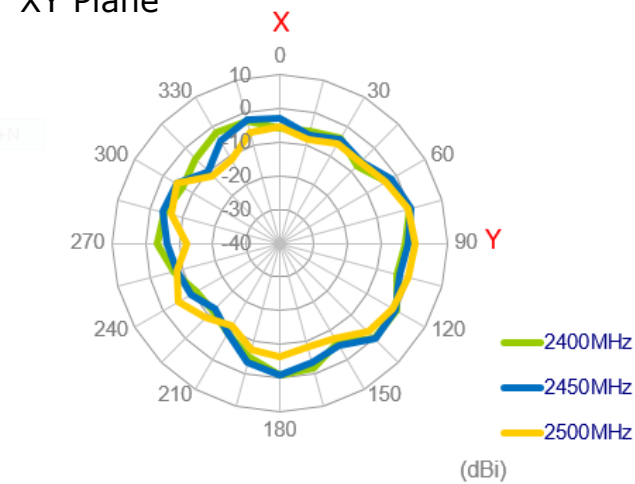
2450MHz



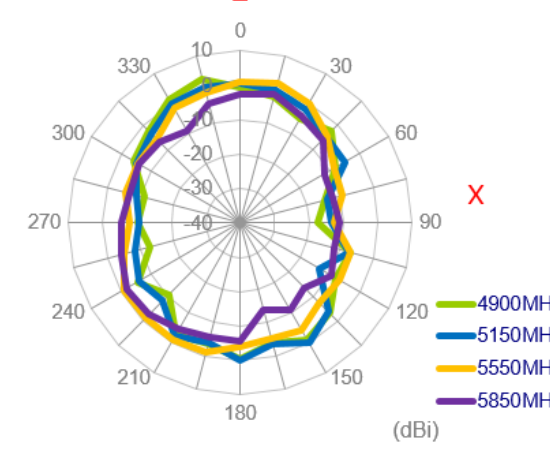
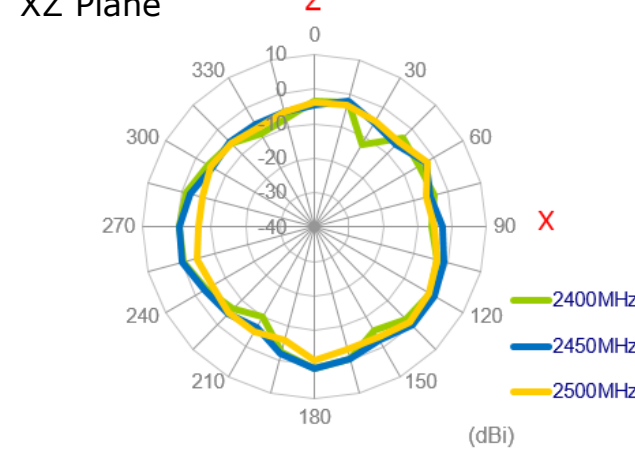
5550MHz

3.2.26. 2D Radiation Pattern (Wi-Fi_MIMO2 with 3M cable length in free space)

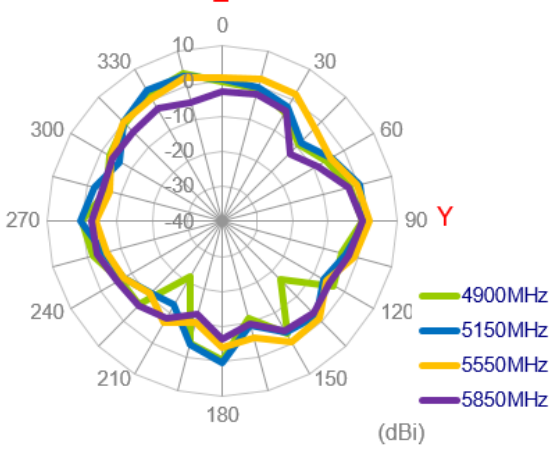
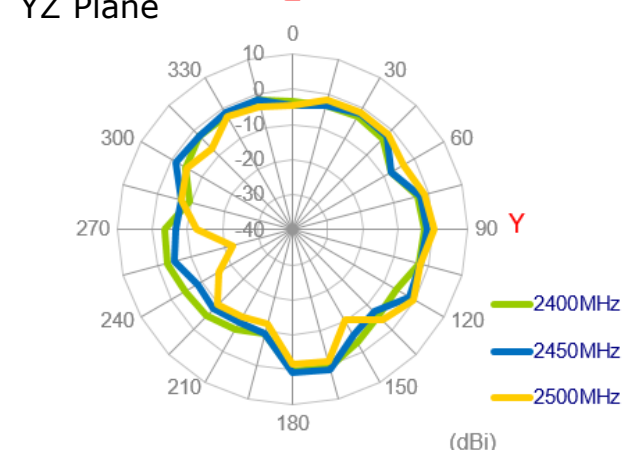
XY Plane



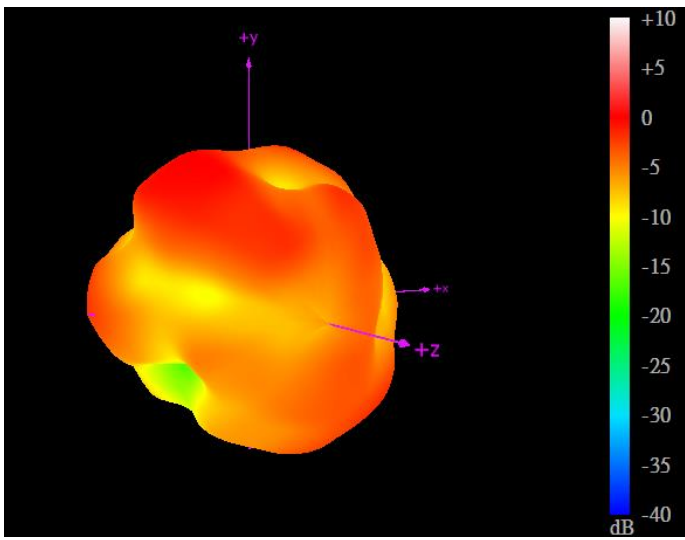
XZ Plane



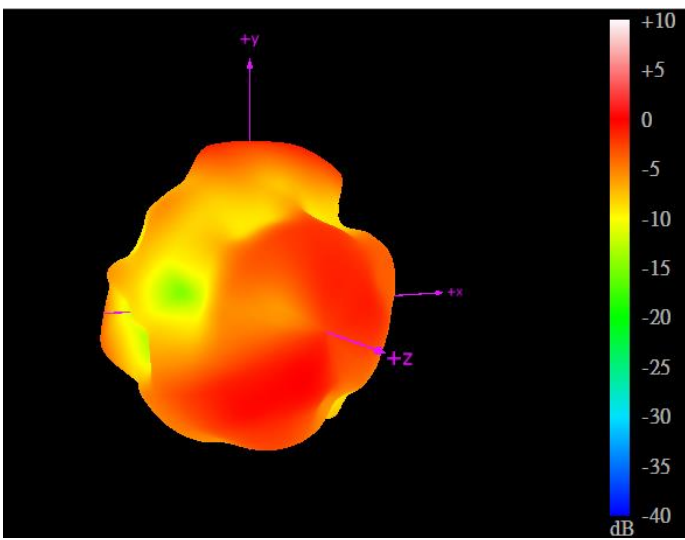
YZ Plane



3.2.27. 3D Radiation Pattern (Wi-Fi_MIMO2 with 1M cable length in free space)



2450MHz



5550MHz

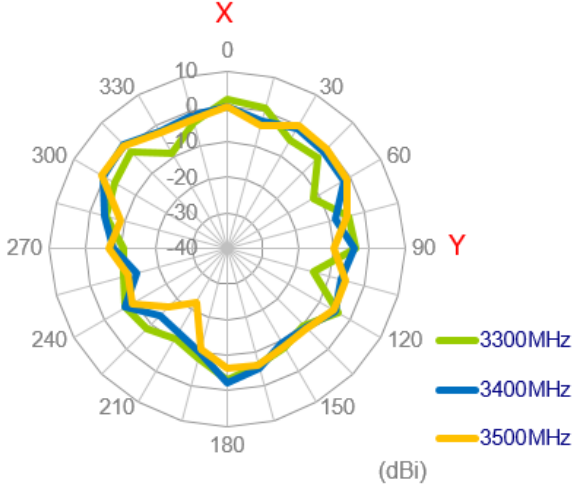
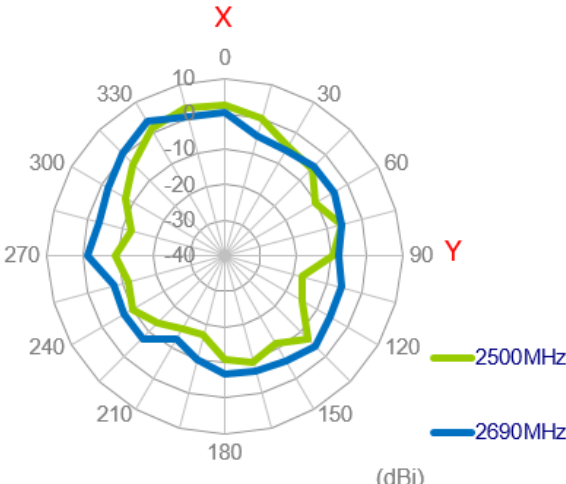
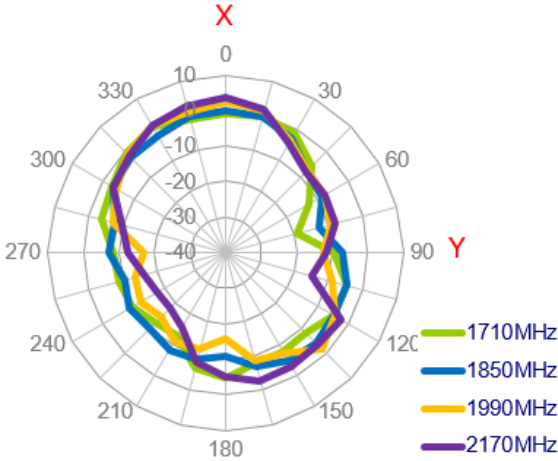
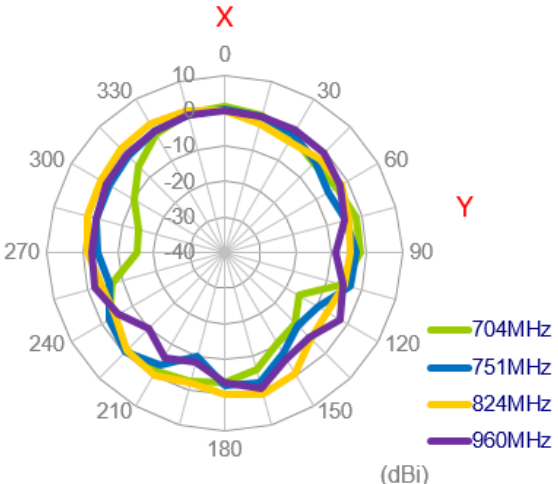
3.2.28. Test Setup for Antenna Radiation Pattern



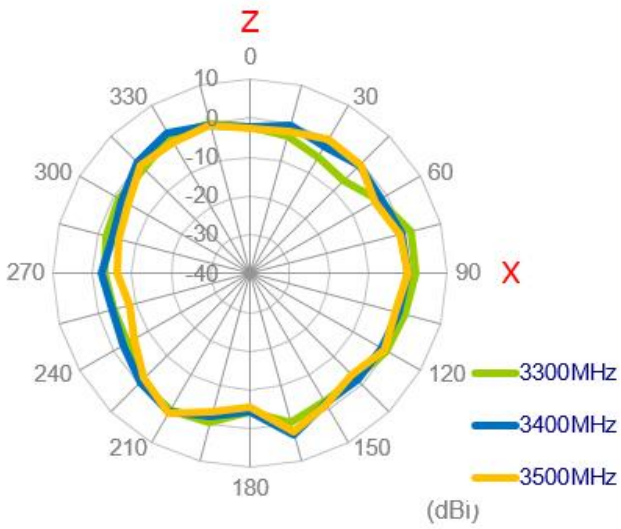
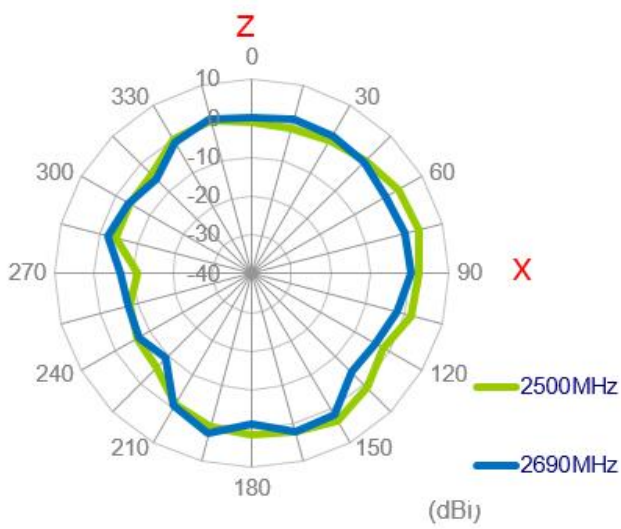
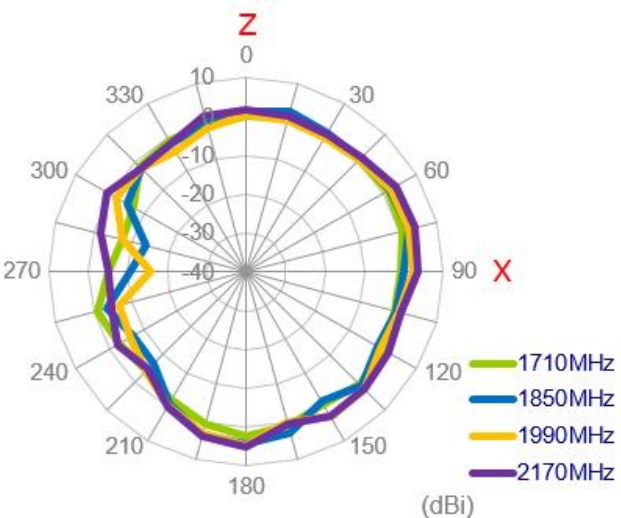
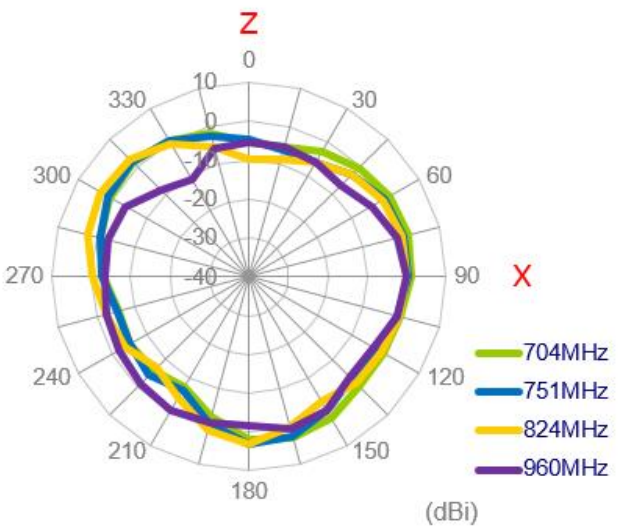
On the ABS

3.2.29. 2D Radiation Pattern (LTE_MIMO1 with 1M cable length on ABS)

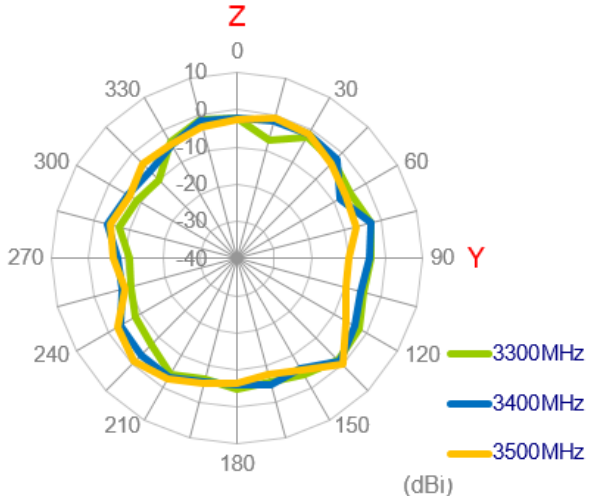
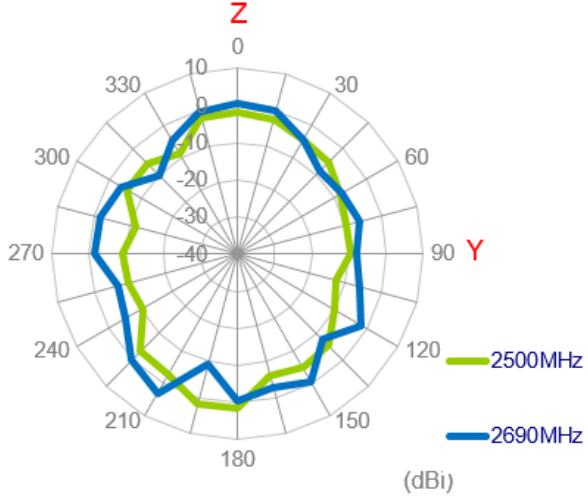
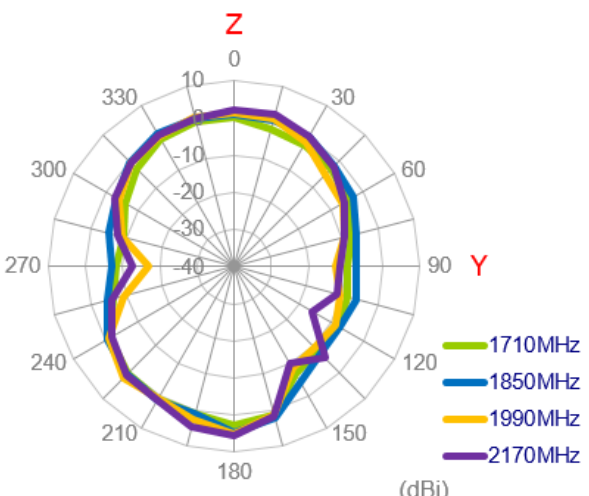
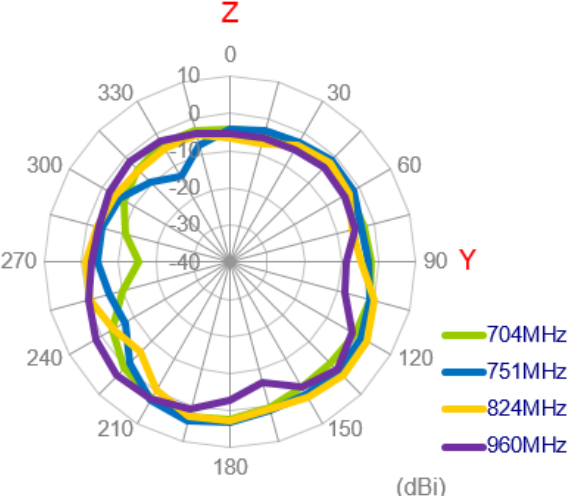
XY Plane



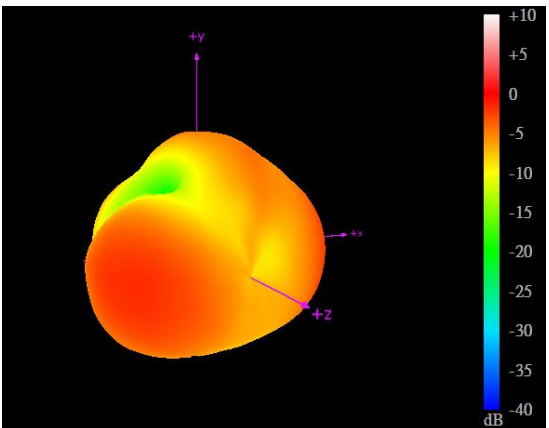
XZ Plane



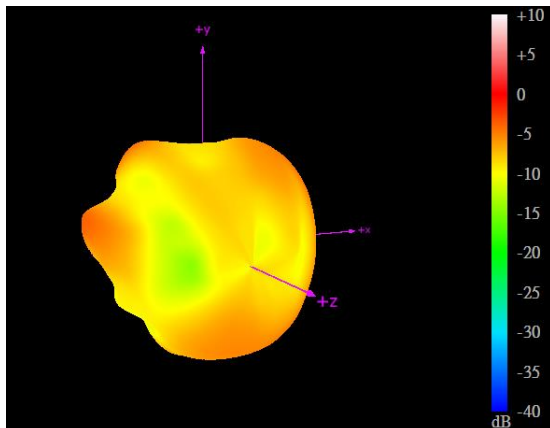
YZ Plane



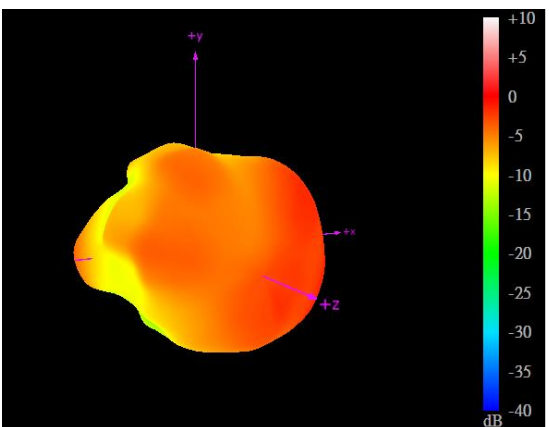
3.2.30. 3D Radiation Pattern (LTE_MIMO1 with 1M cable length on ABS)



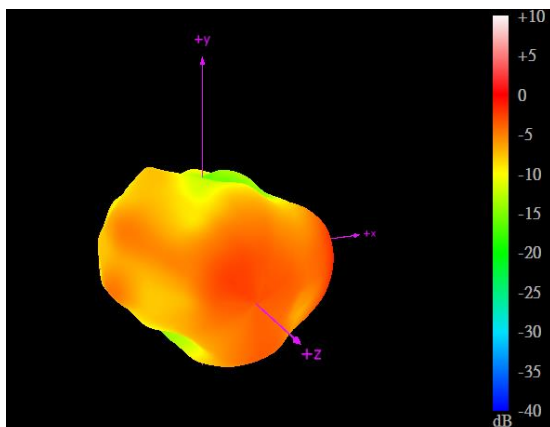
704MHz



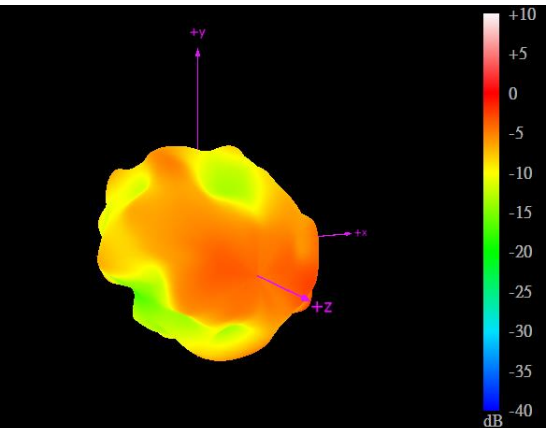
960MHz



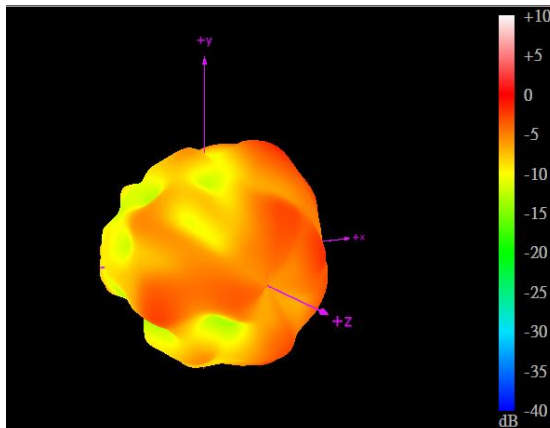
1710MHz



2170MHz



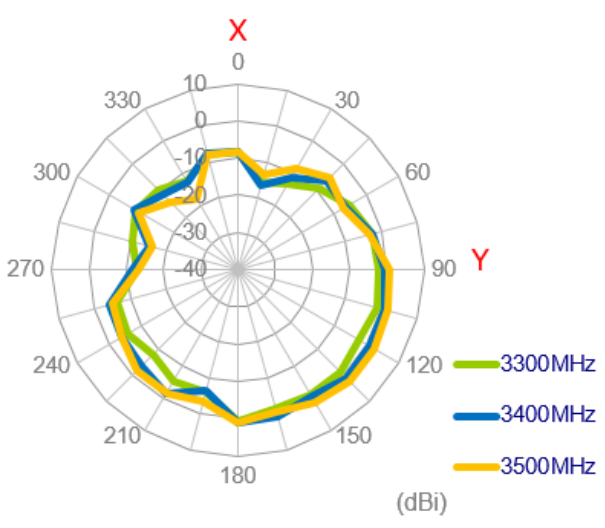
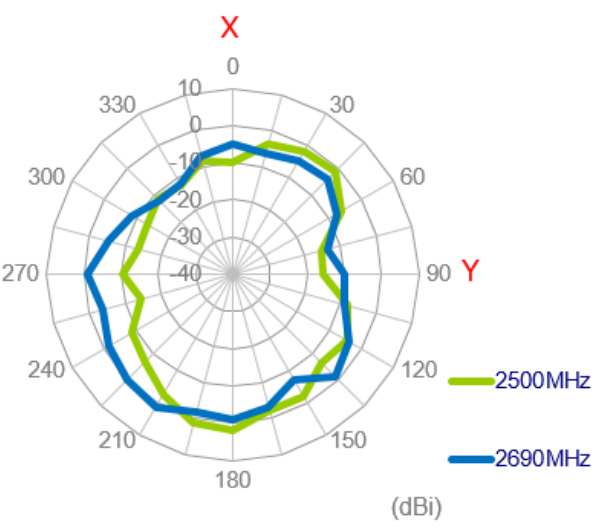
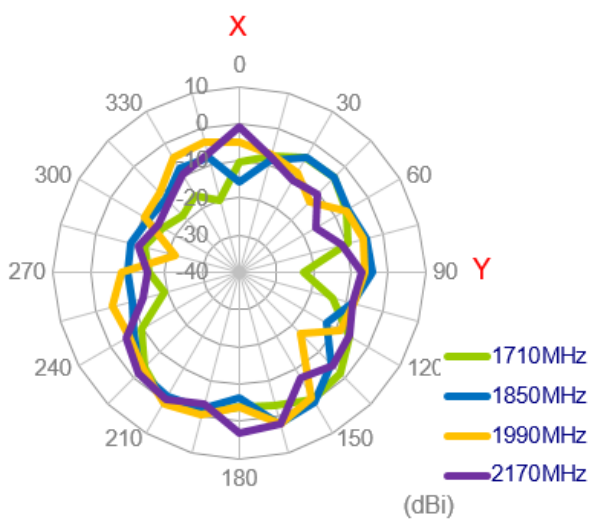
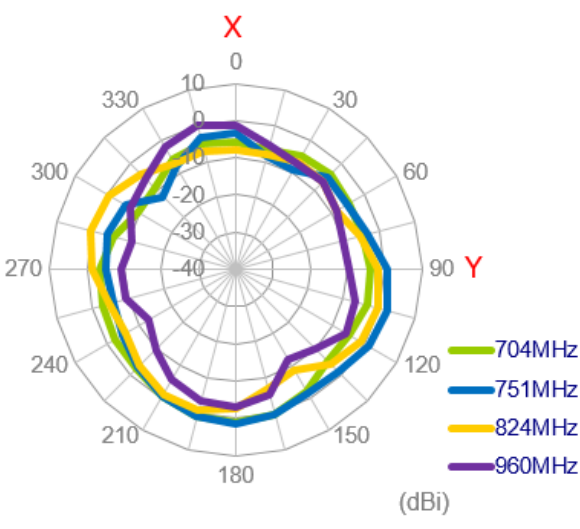
2690MHz



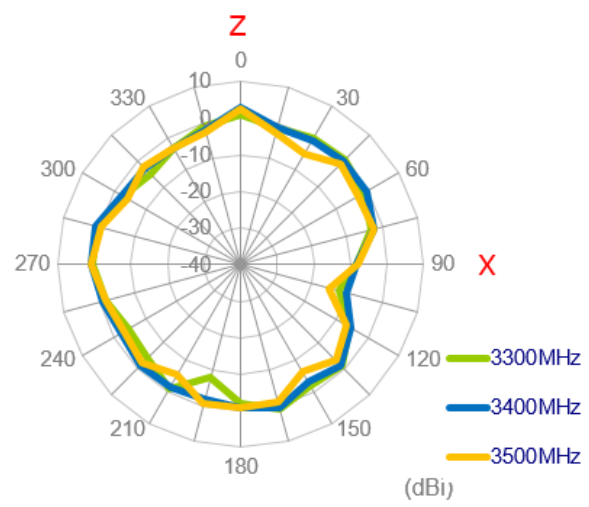
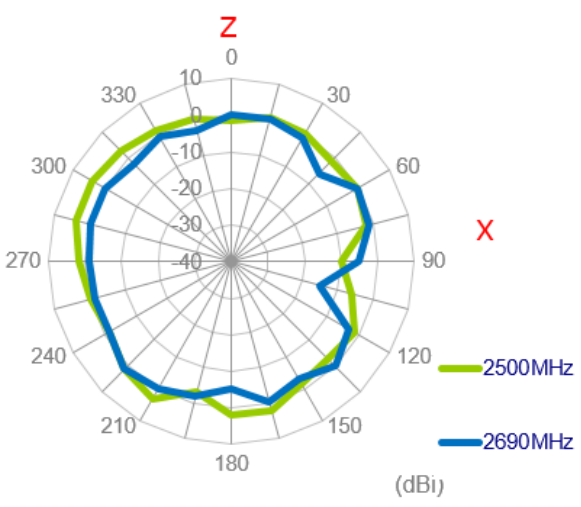
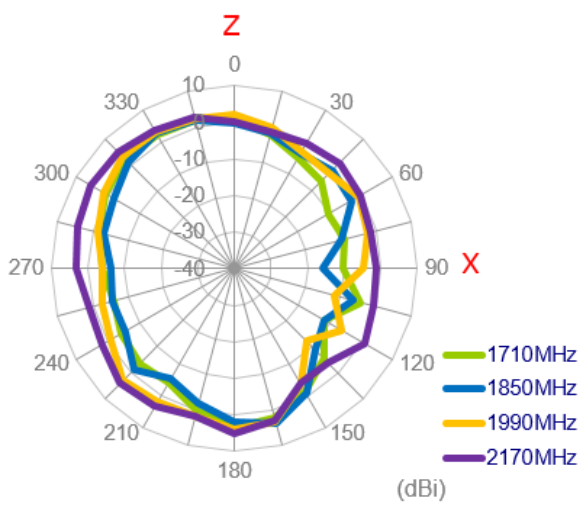
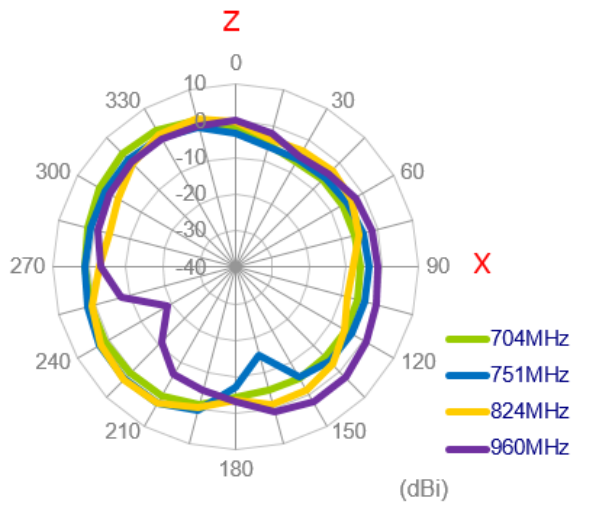
3500MHz

3.2.31. 2D Radiation Pattern (LTE_MIMO2 with 1M cable length on ABS)

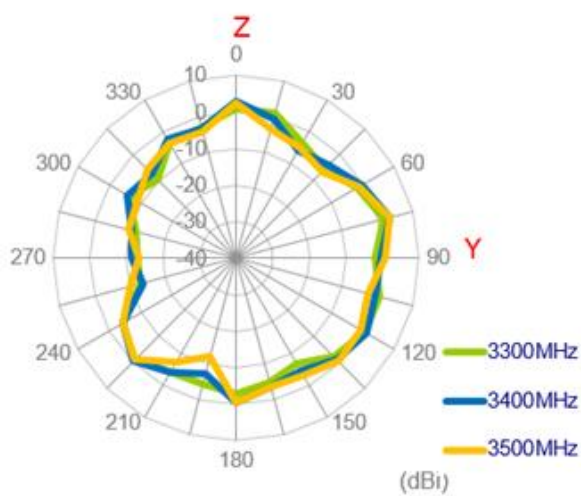
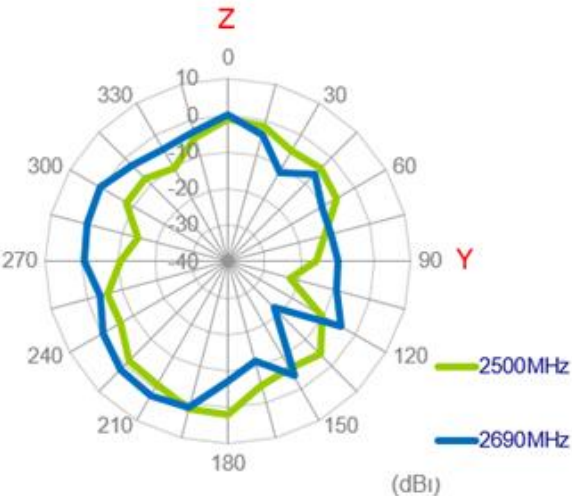
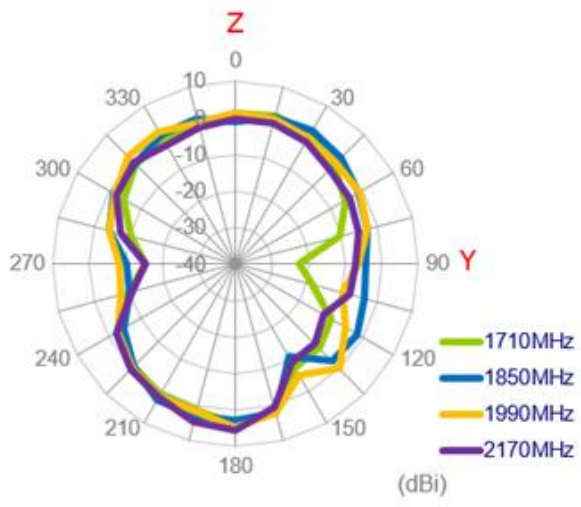
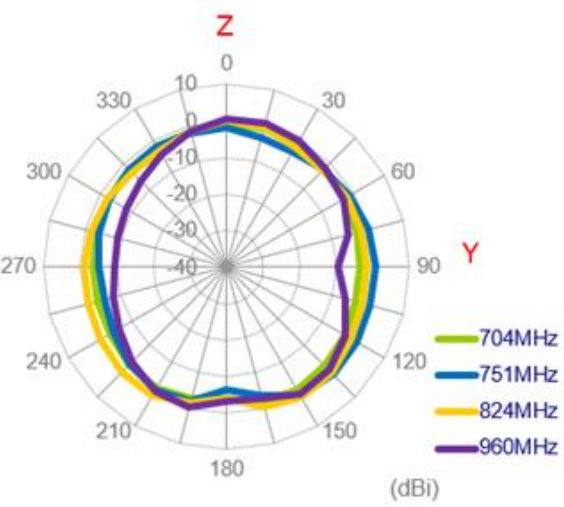
XY Plane



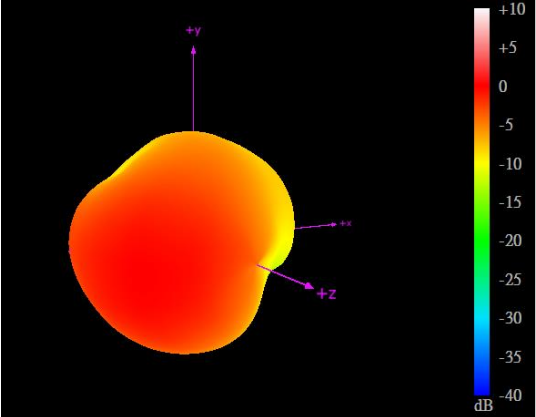
XZ Plane



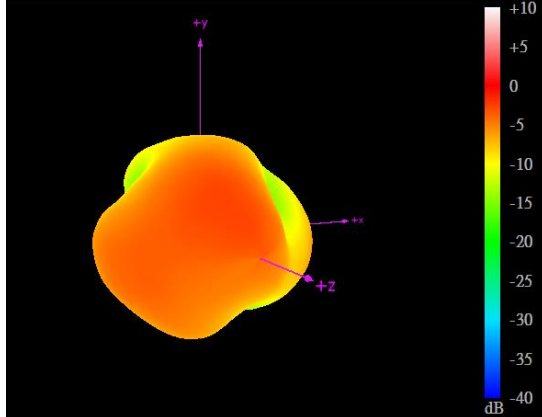
YZ Plane



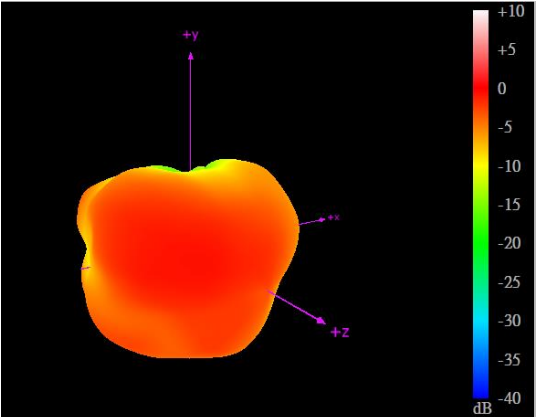
3.2.32. 3D Radiation Pattern (LTE_MIMO2 with 1M cable length on ABS)



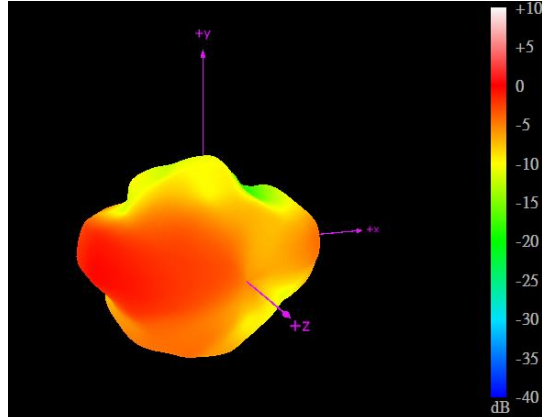
704MHz



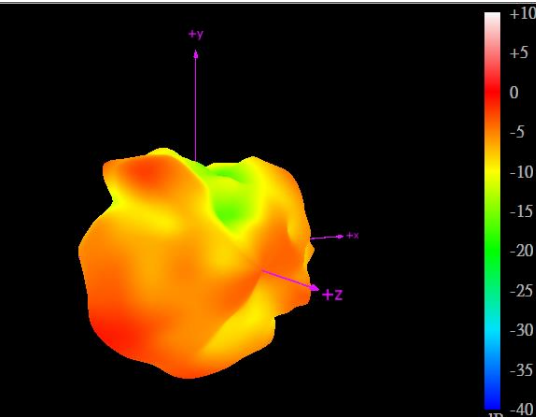
960MHz



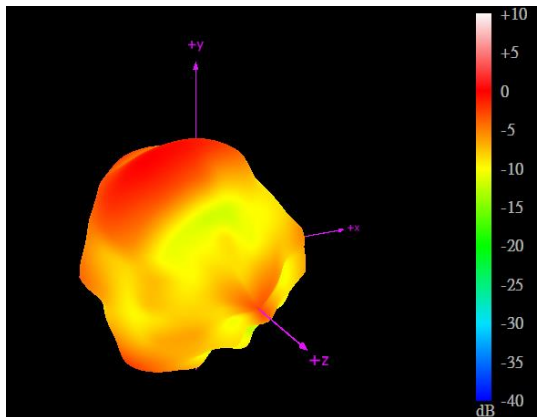
1710MHz



2170MHz



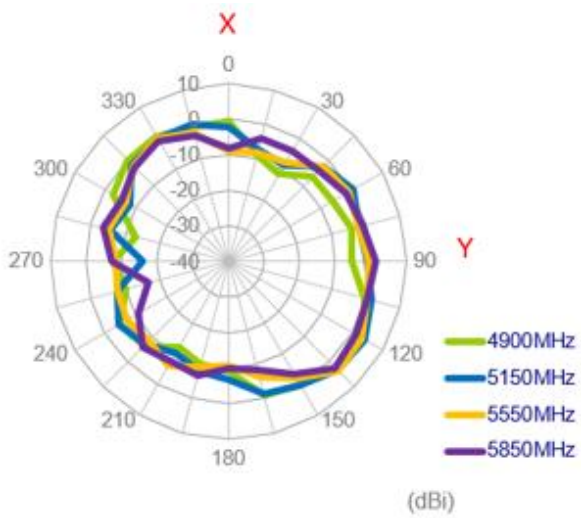
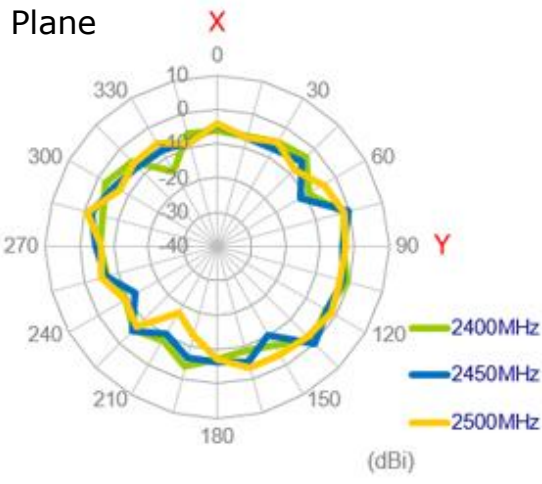
2690MHz



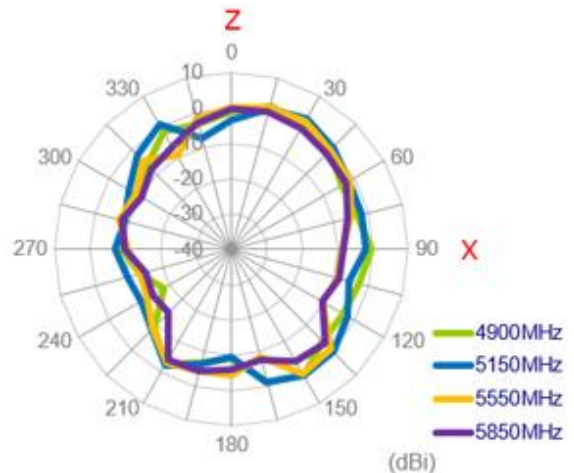
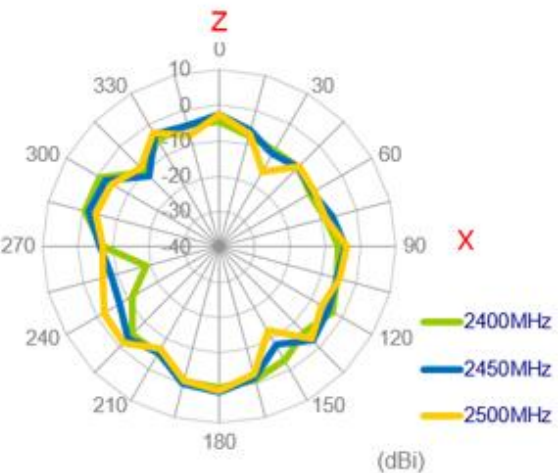
3500MHz

3.2.33. 2D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on ABS)

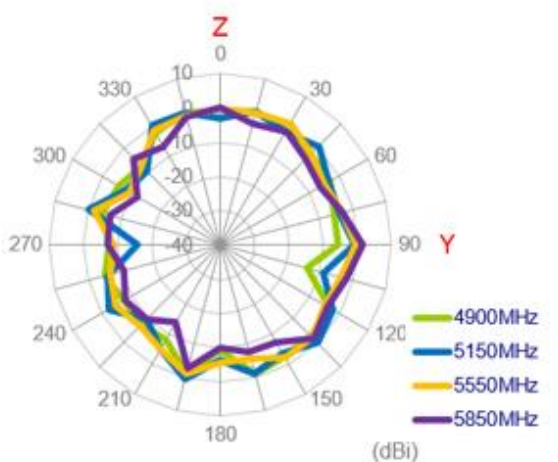
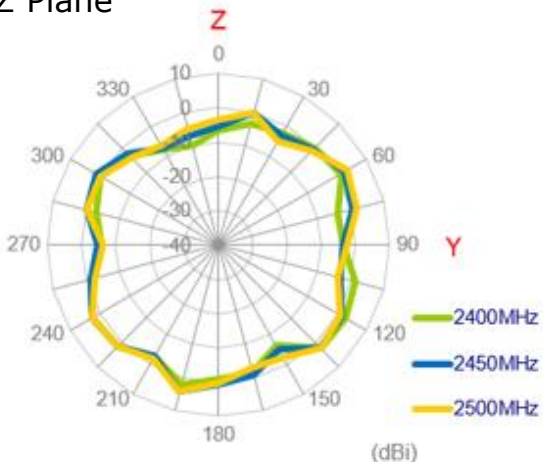
XY Plane



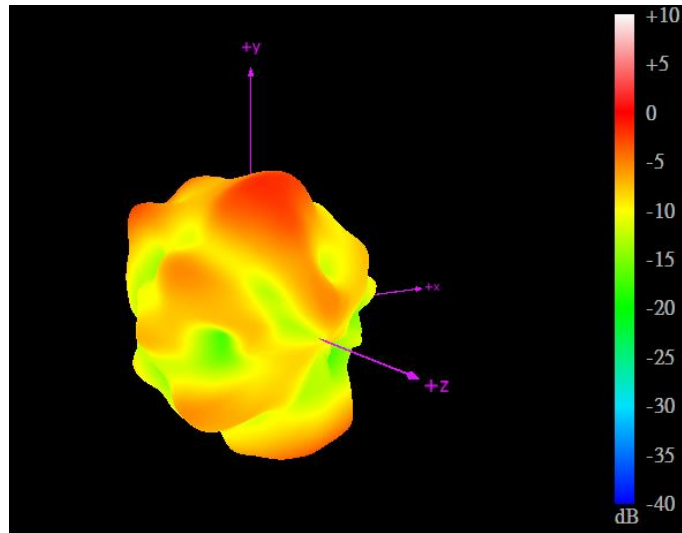
XZ Plane



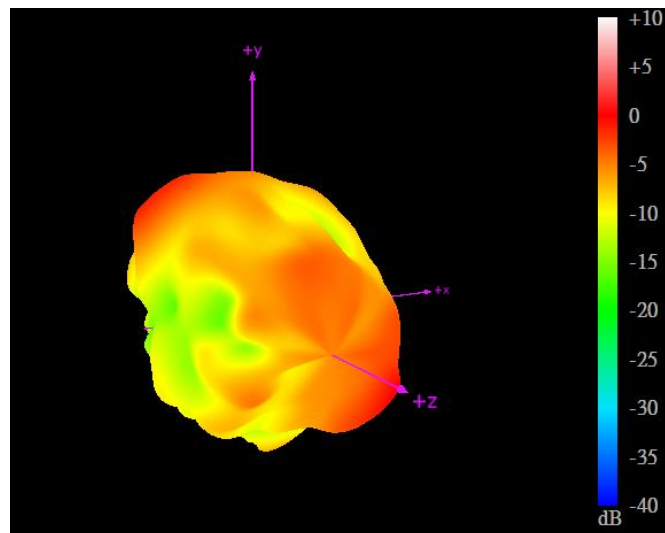
YZ Plane



3.2.34. 3D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on ABS)



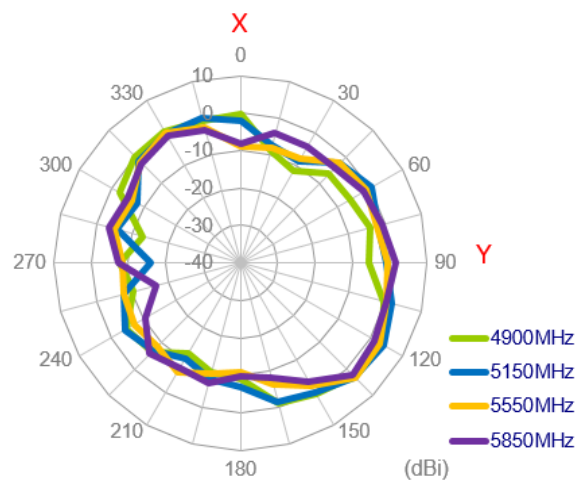
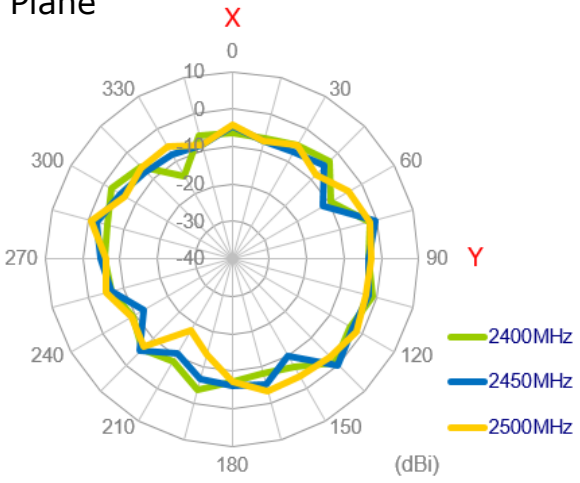
2450MHz



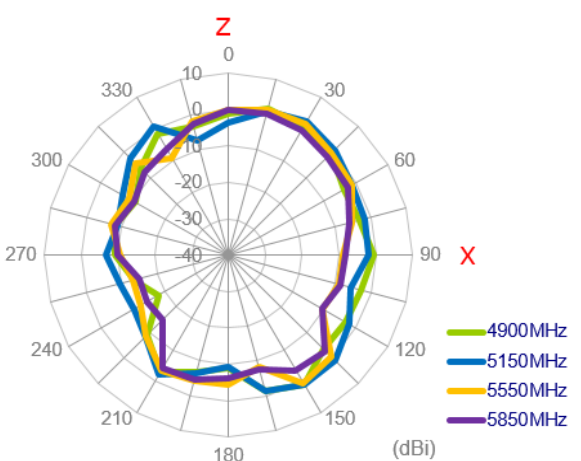
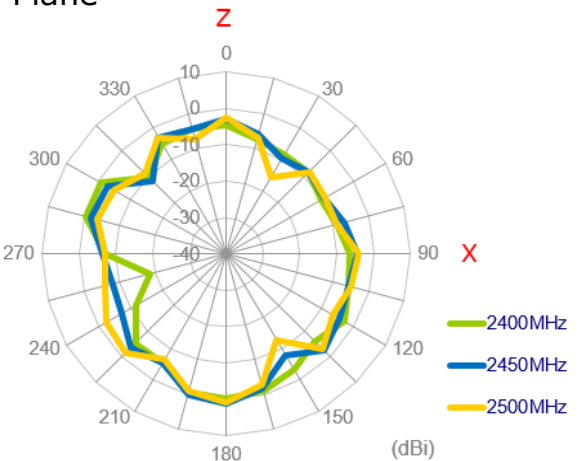
5550MHz

3.2.35. 2D Radiation Pattern (Wi-Fi_MIMO2 with 3M cable length on ABS)

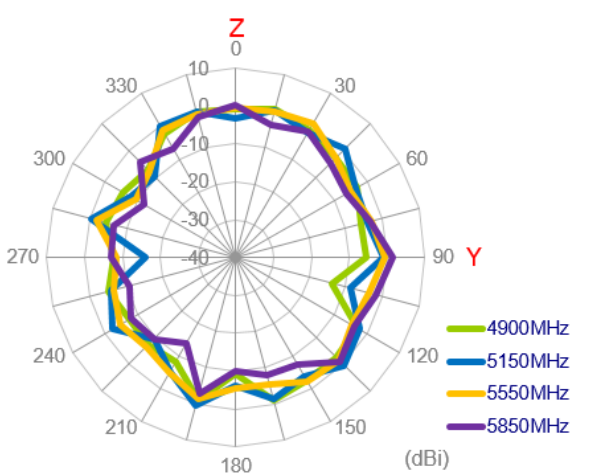
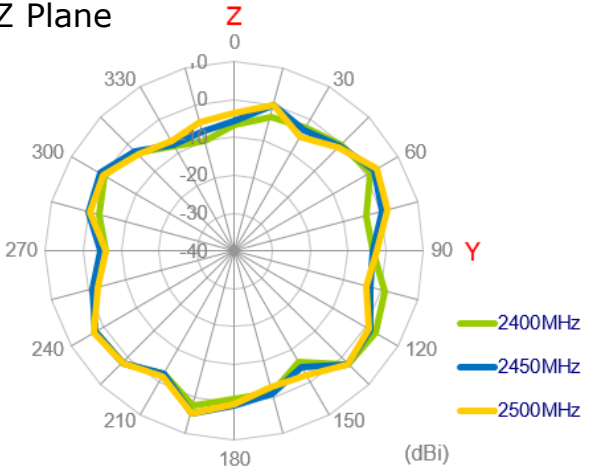
XY Plane



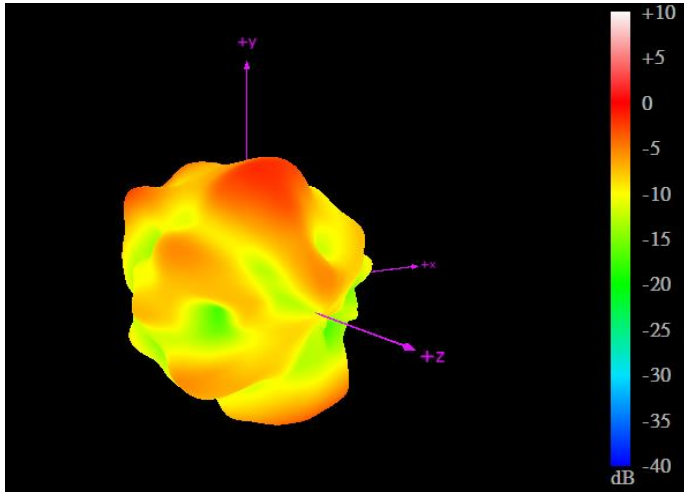
XZ Plane



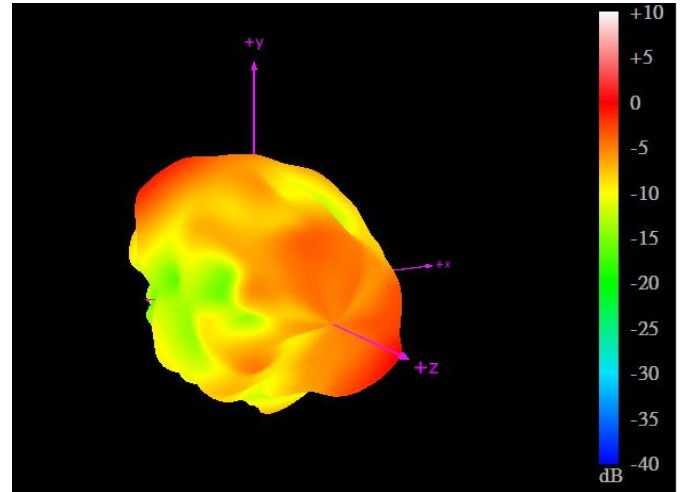
YZ Plane



3.2.36. 3D Radiation Pattern (Wi-Fi_MIMO2 with 1M cable length on ABS)

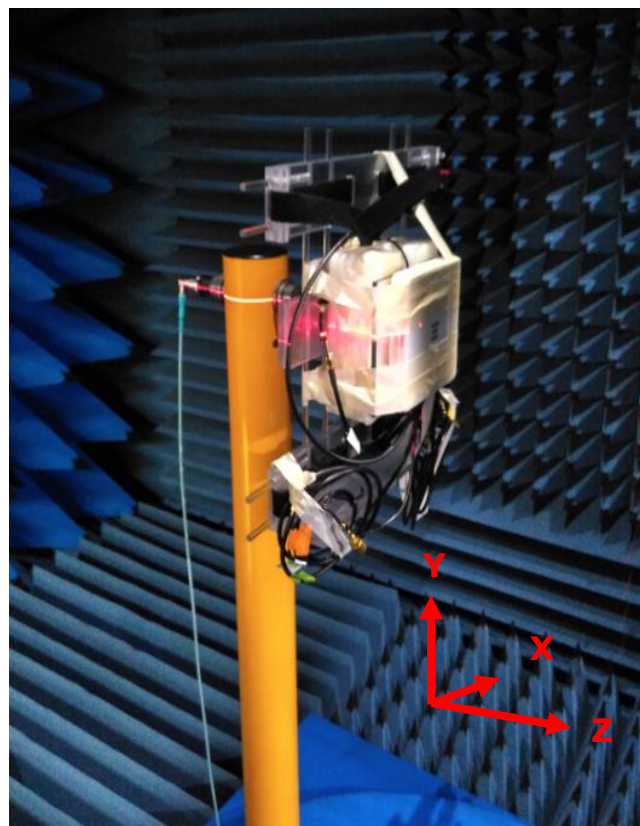


2450MHz



5550MHz

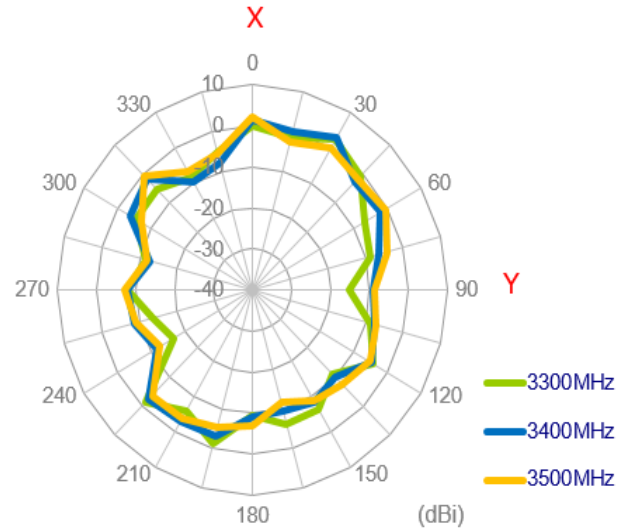
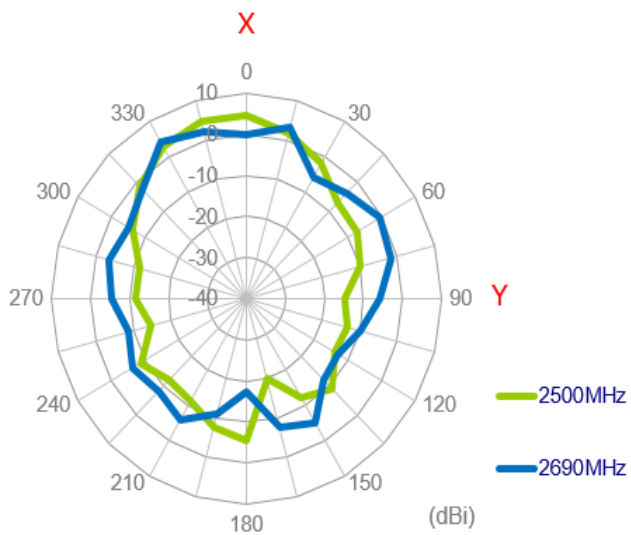
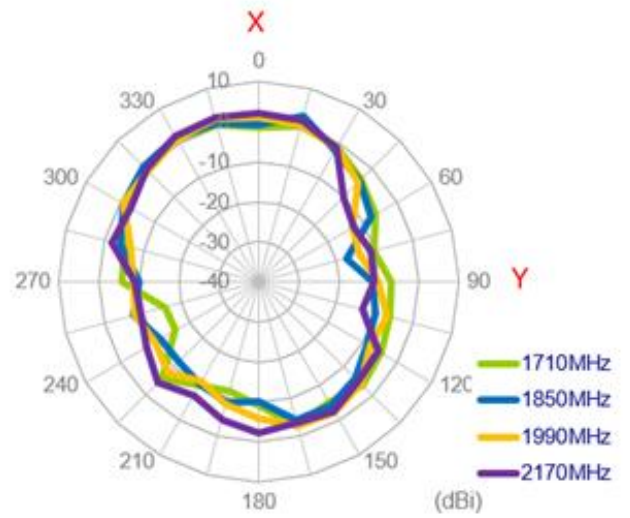
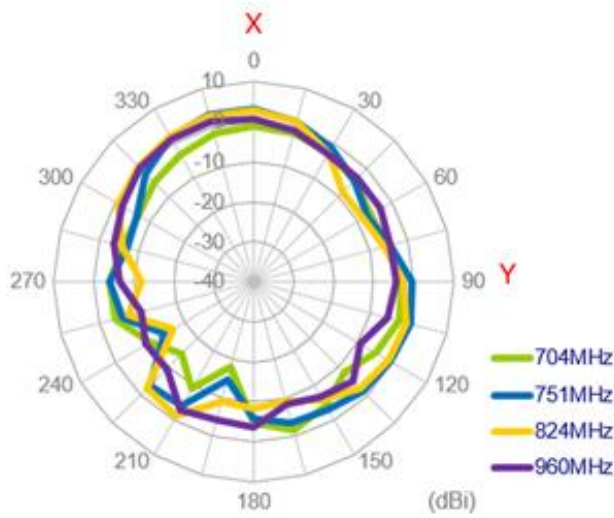
3.2.37. Test Setup for Antenna Radiation Pattern



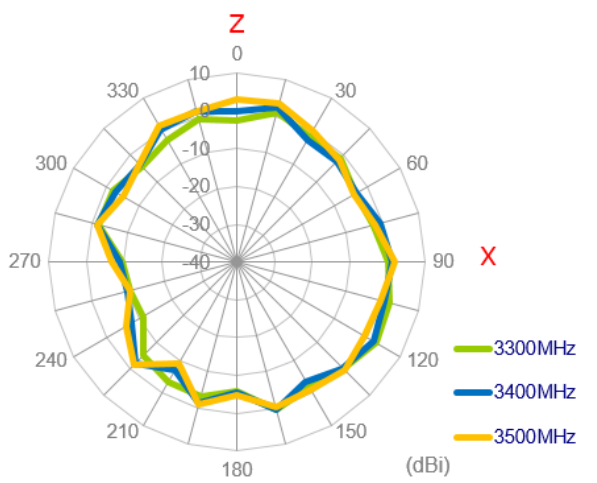
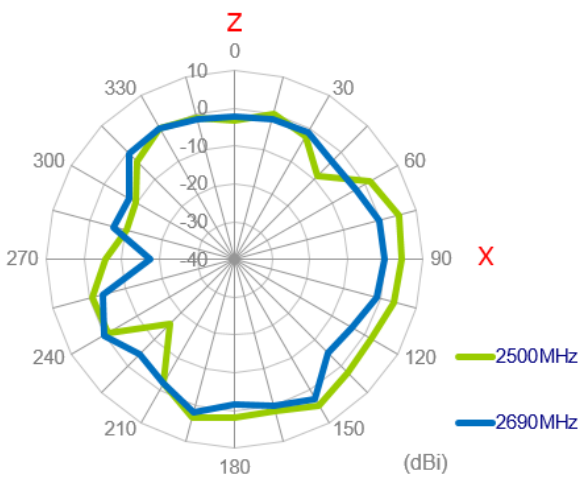
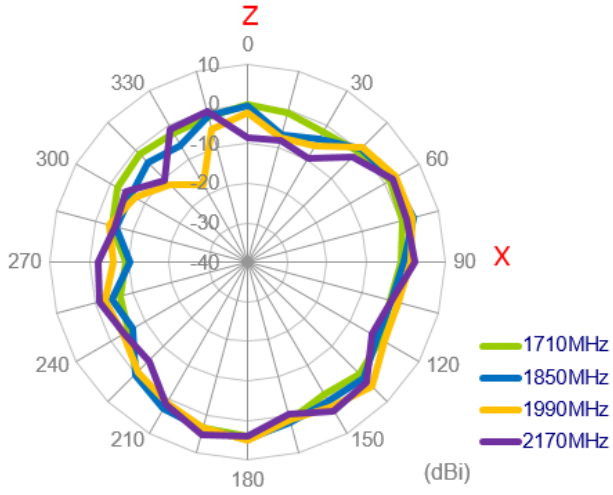
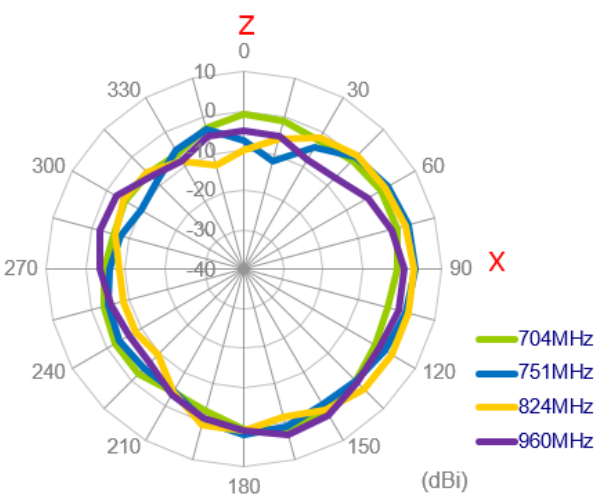
On glass

3.2.38. 2D Radiation Pattern (LTE_MIMO1 with 1M cable length on glass)

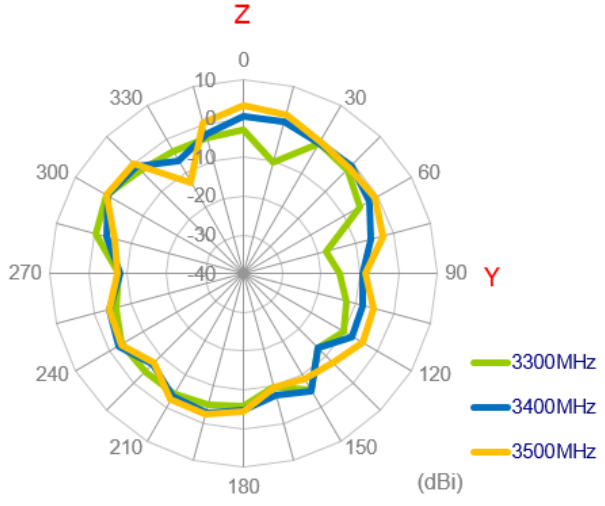
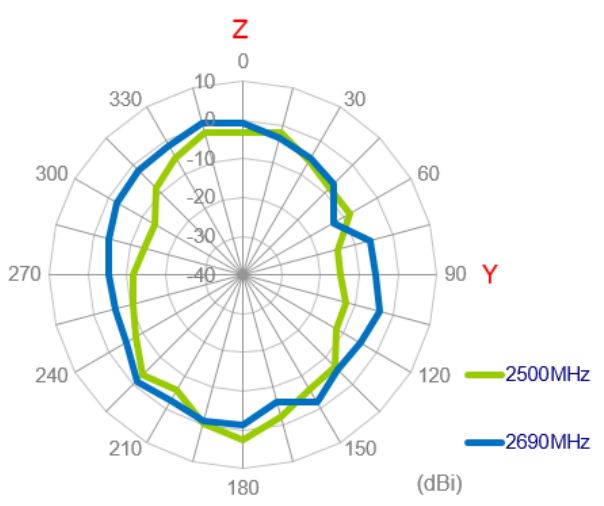
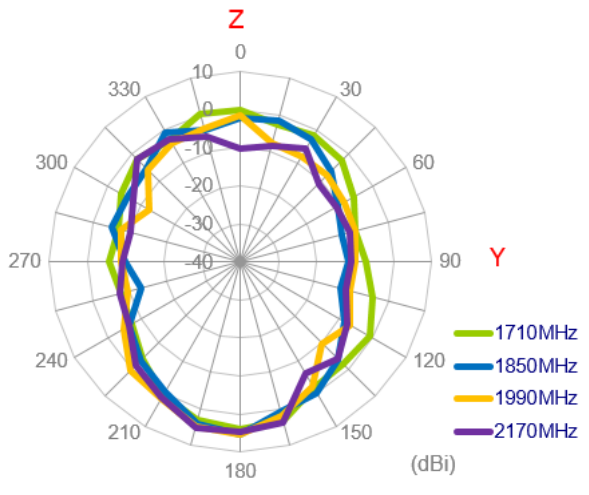
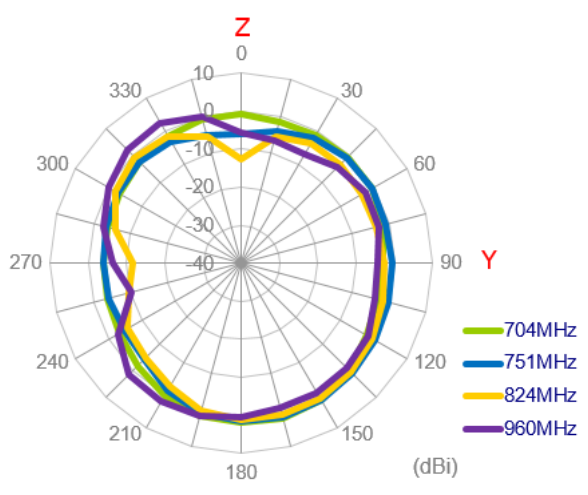
XY Plane



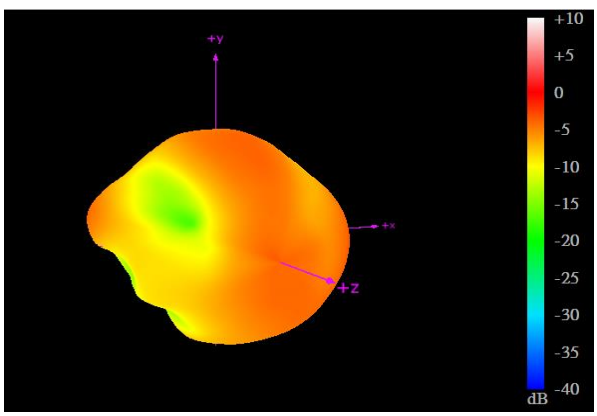
XZ Plane



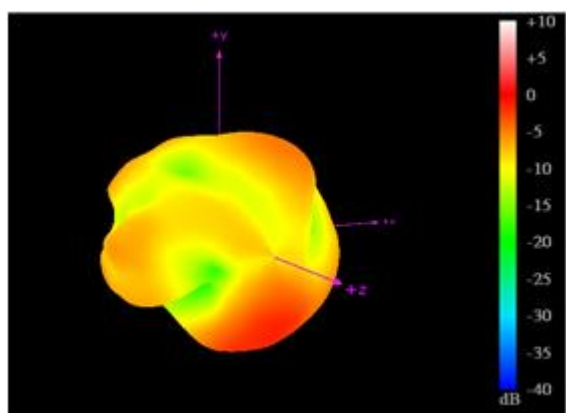
YZ Plane



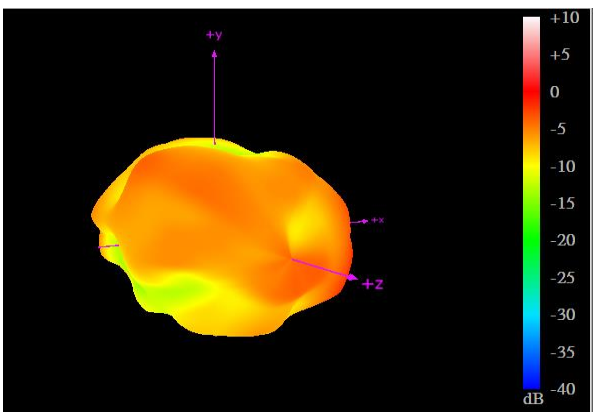
3.2.39. 3D Radiation Pattern (LTE_MIMO1 with 1M cable length o glass)



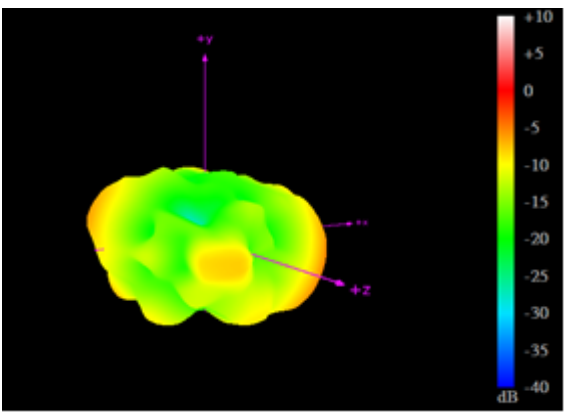
704MHz



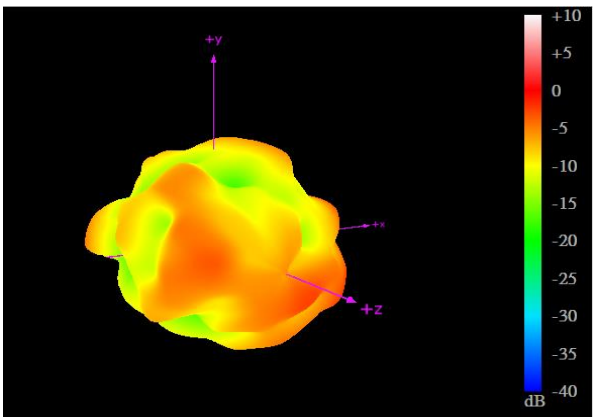
960MHz



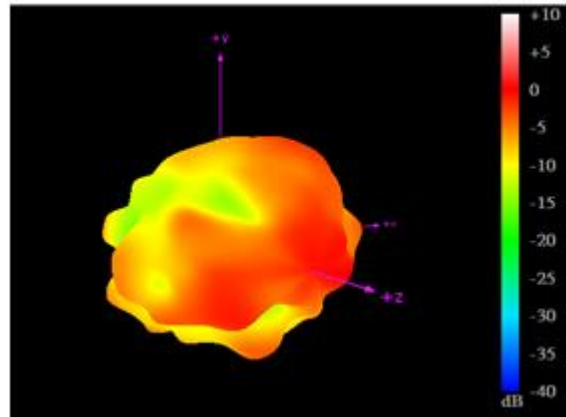
1710MHz



2170MHz



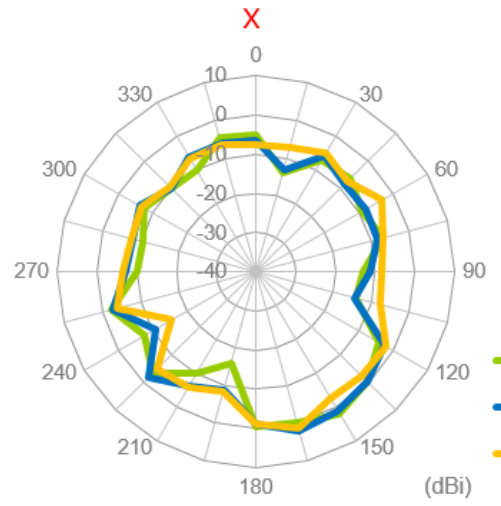
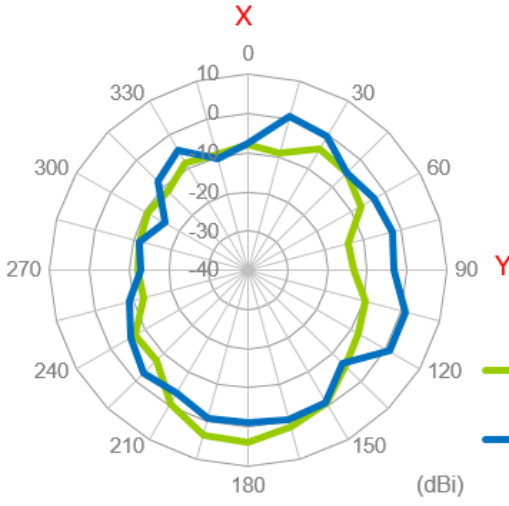
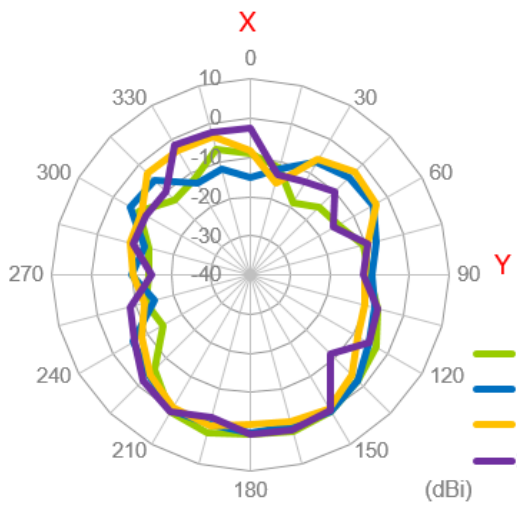
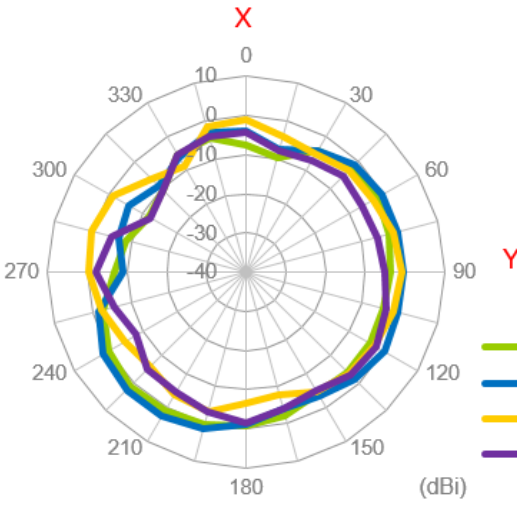
2690MHz



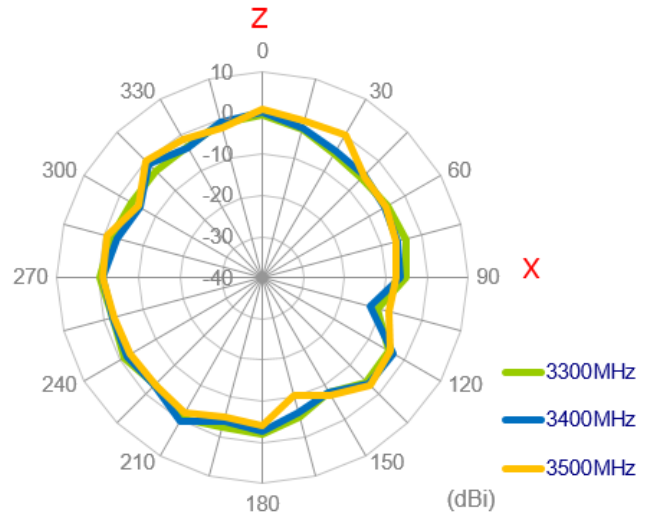
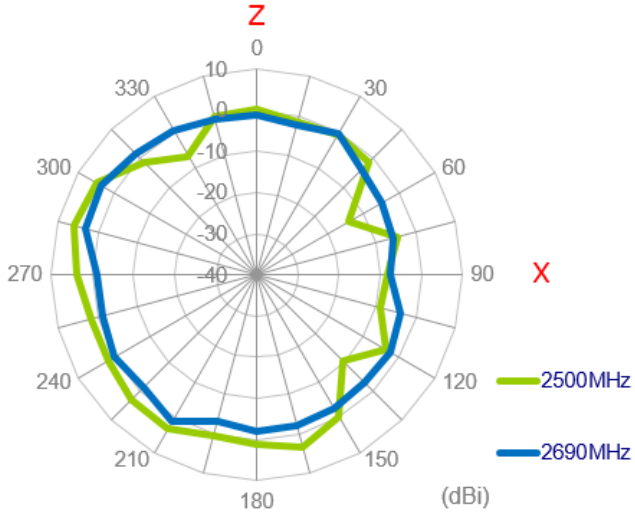
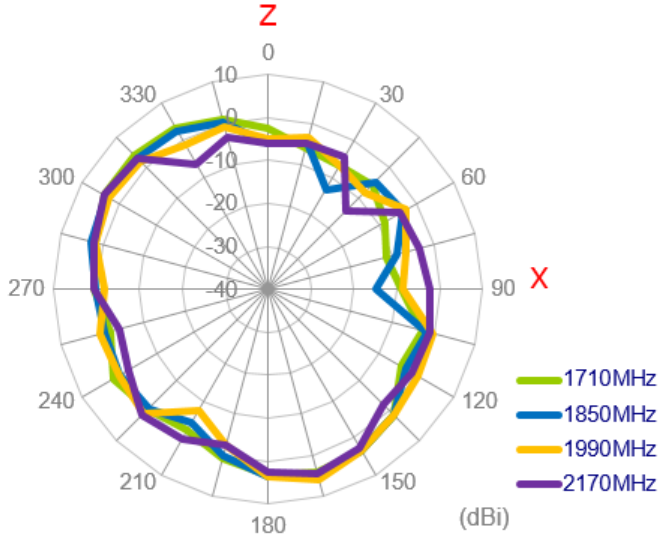
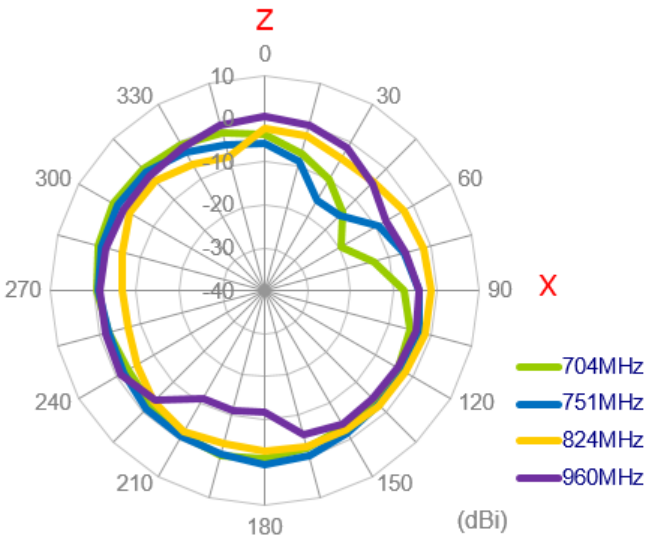
3500MHz

3.2.40. 2D Radiation Pattern (LTE_MIMO2 with 1M cable length on glass)

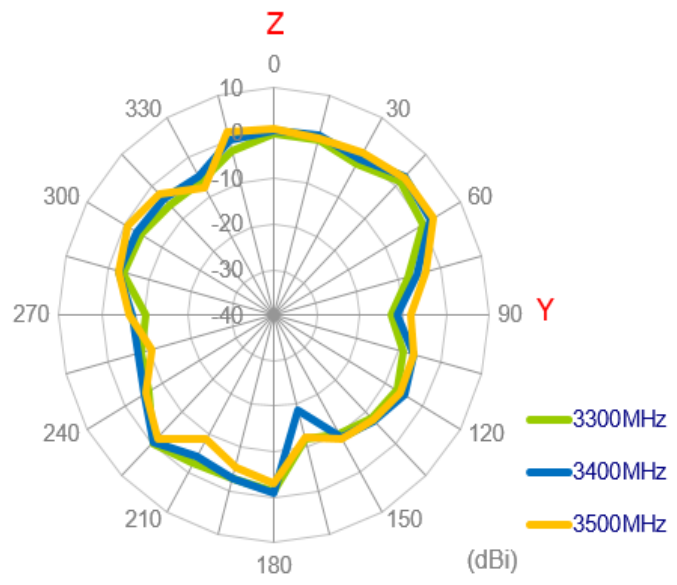
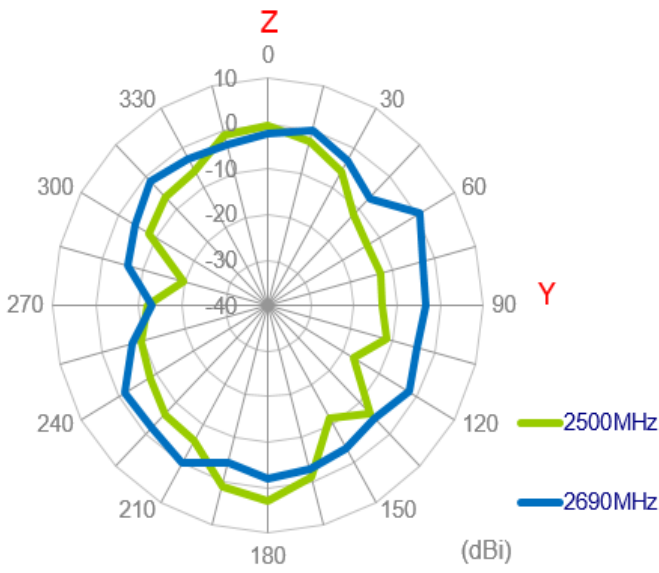
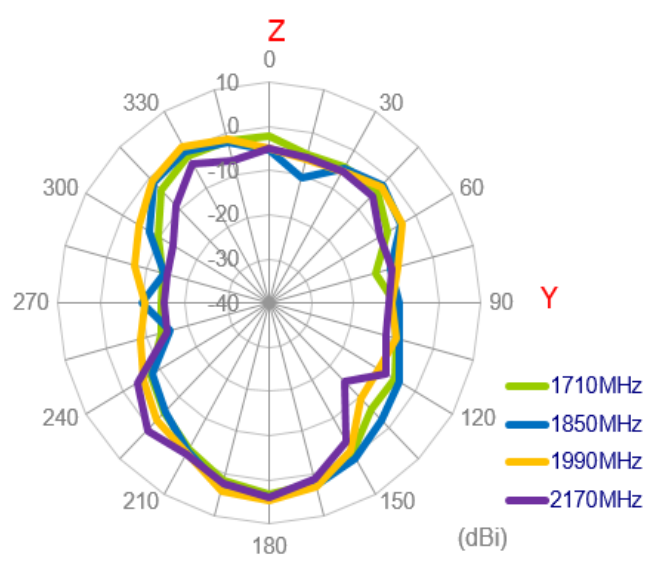
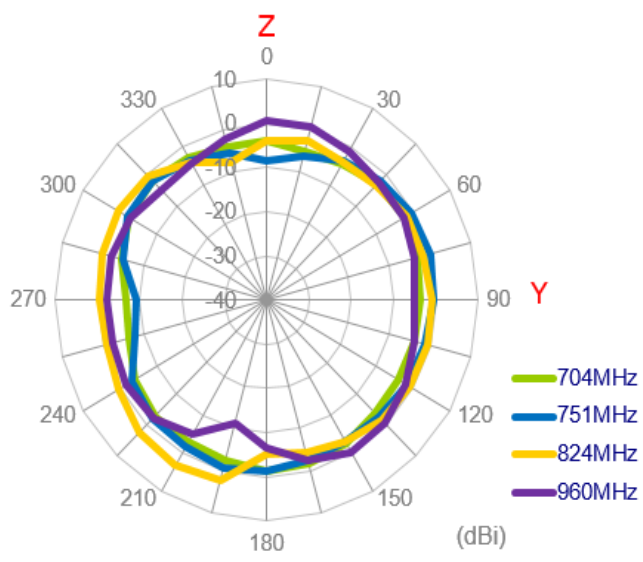
XY Plane



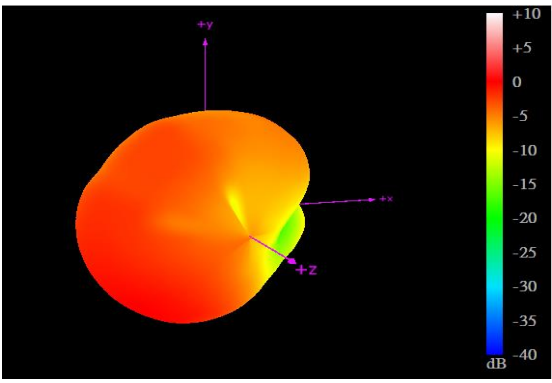
XZ Plane



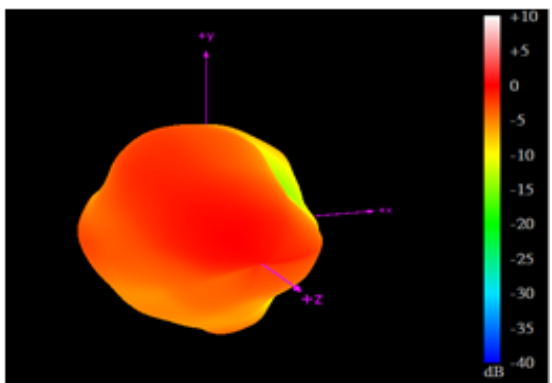
YZ Plane



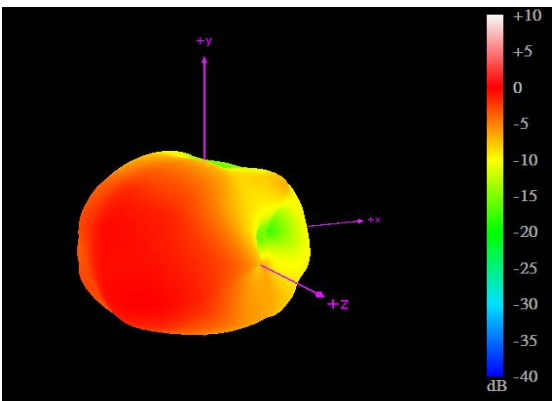
3.2.41. 3D Radiation Pattern (LTE_MIMO2 with 1M cable length on glass)



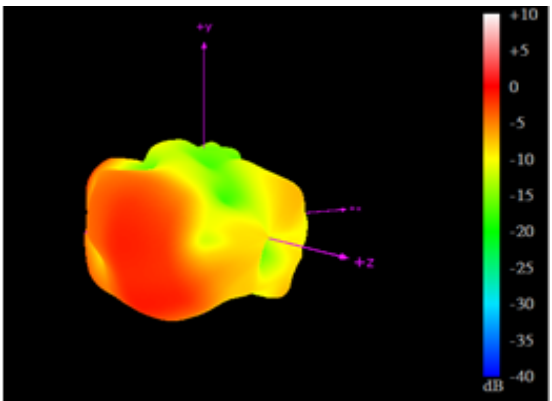
704MHz



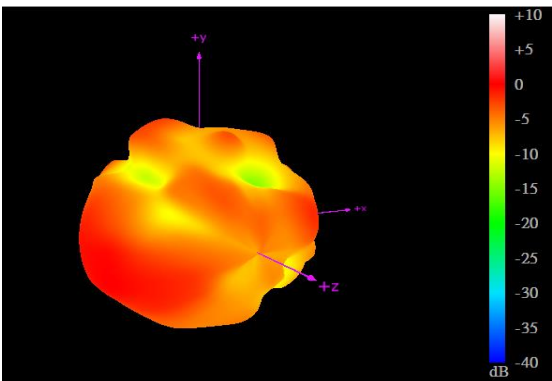
960MHz



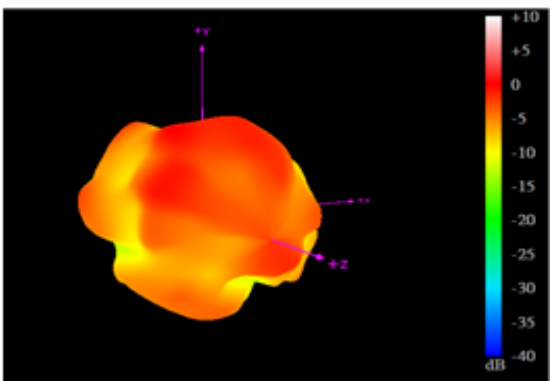
1710MHz



2170MHz



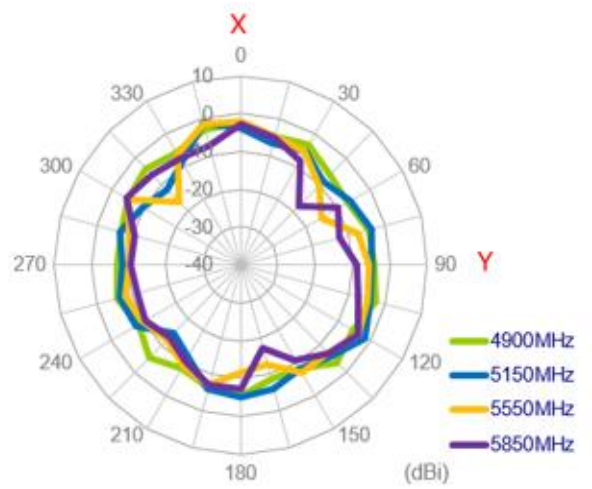
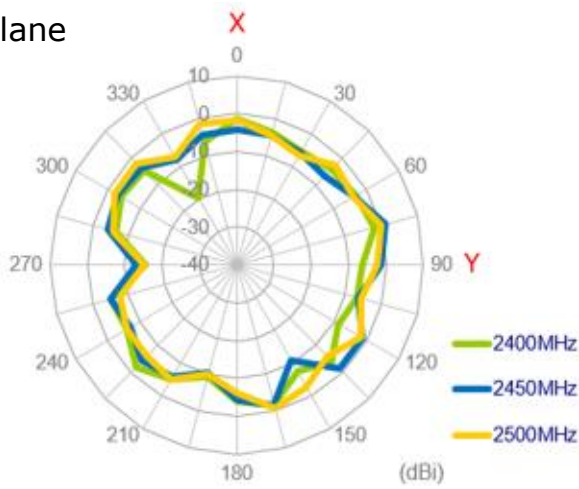
2690MHz



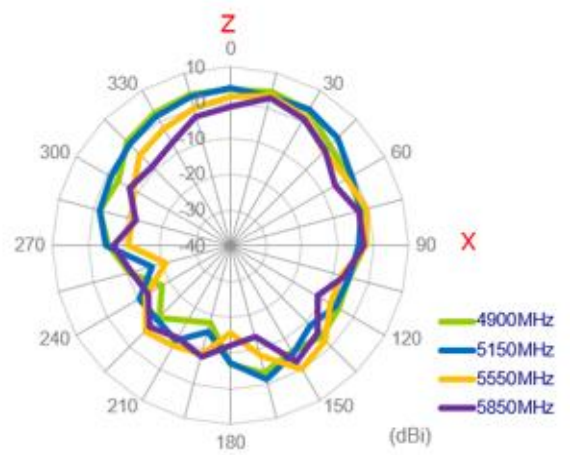
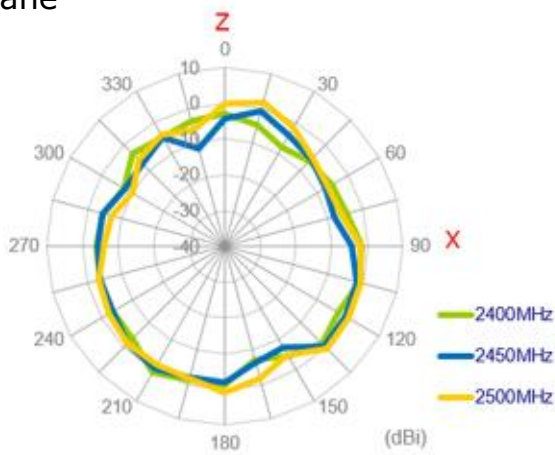
3500MHz

3.2.42. 2D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on glass)

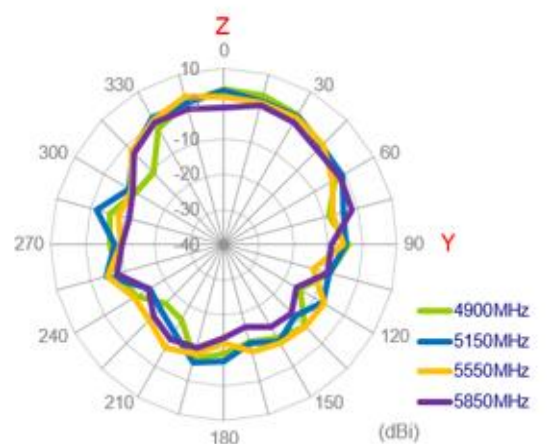
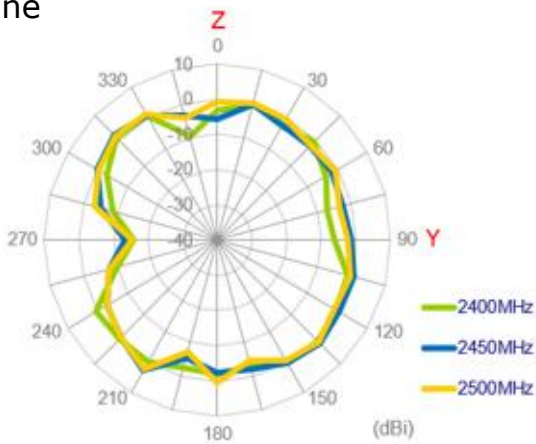
XY Plane



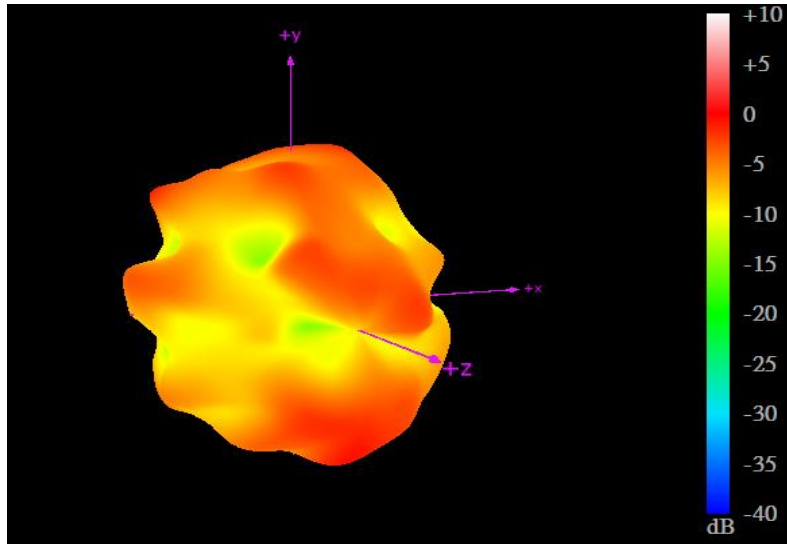
XZ Plane



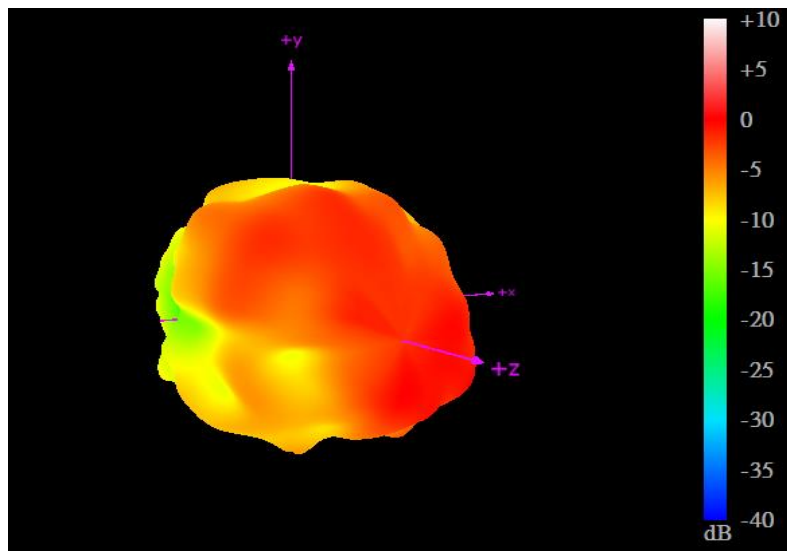
YZ Plane



3.2.43. 3D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on glass)



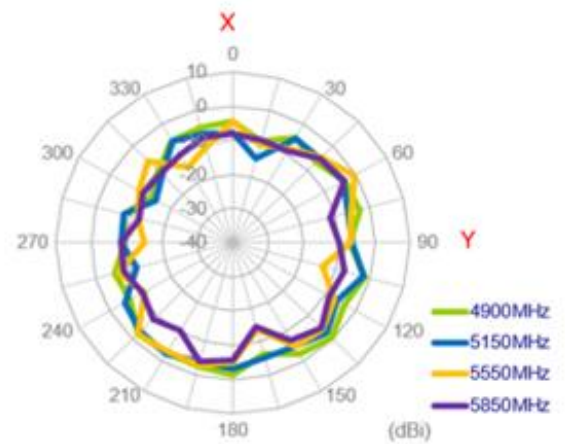
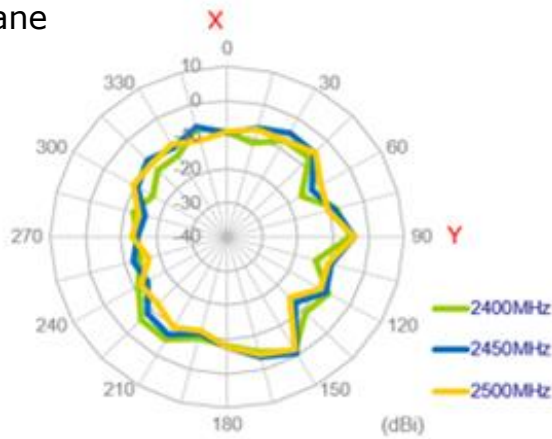
2450MHz



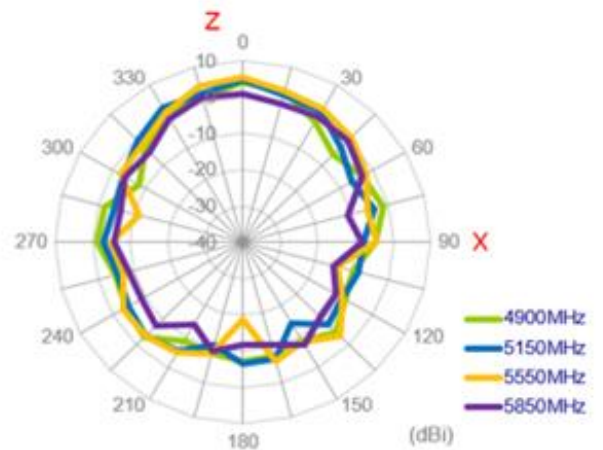
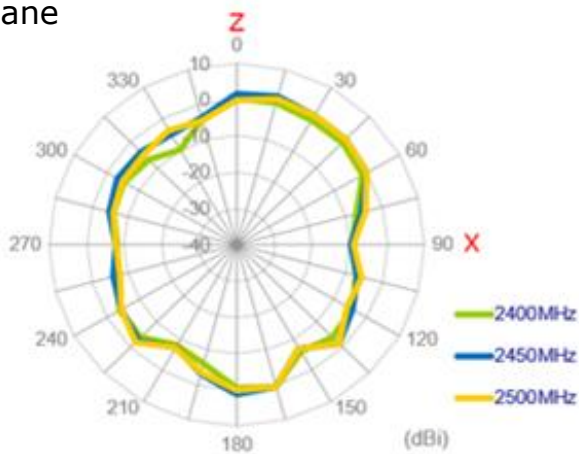
5550MHz

3.2.44. 2D Radiation Pattern (Wi-Fi_MIMO2 with 3M cable length on glass)

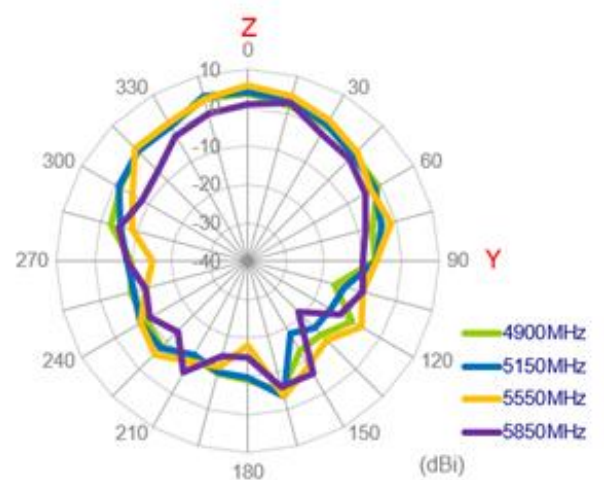
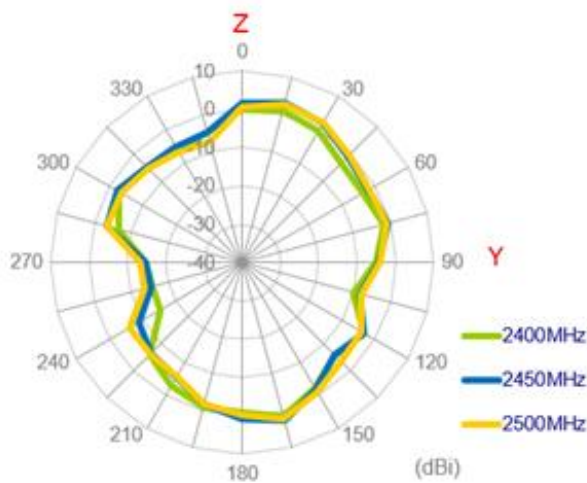
XY Plane



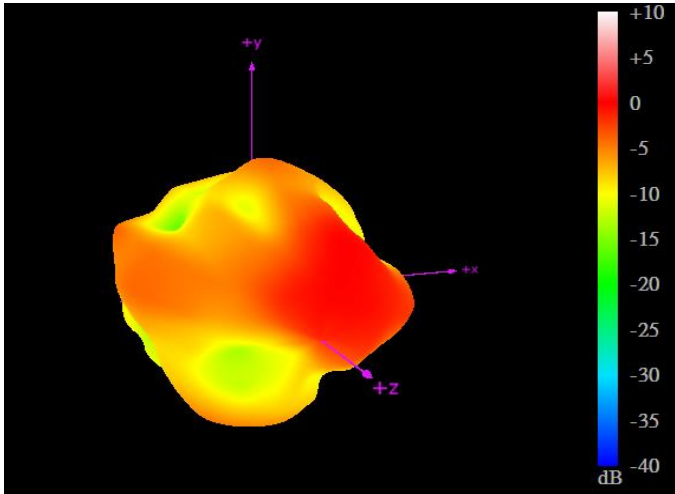
XZ Plane



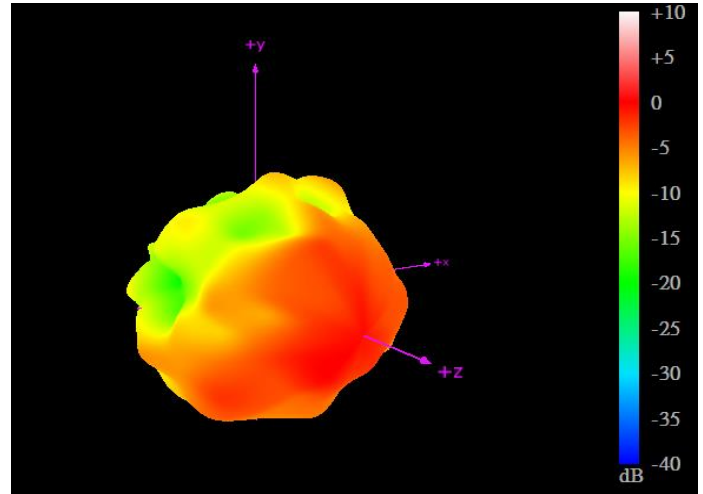
YZ Plane



3.2.45. 3D Radiation Pattern (Wi-Fi_MIMO2 with 1M cable length on glass)

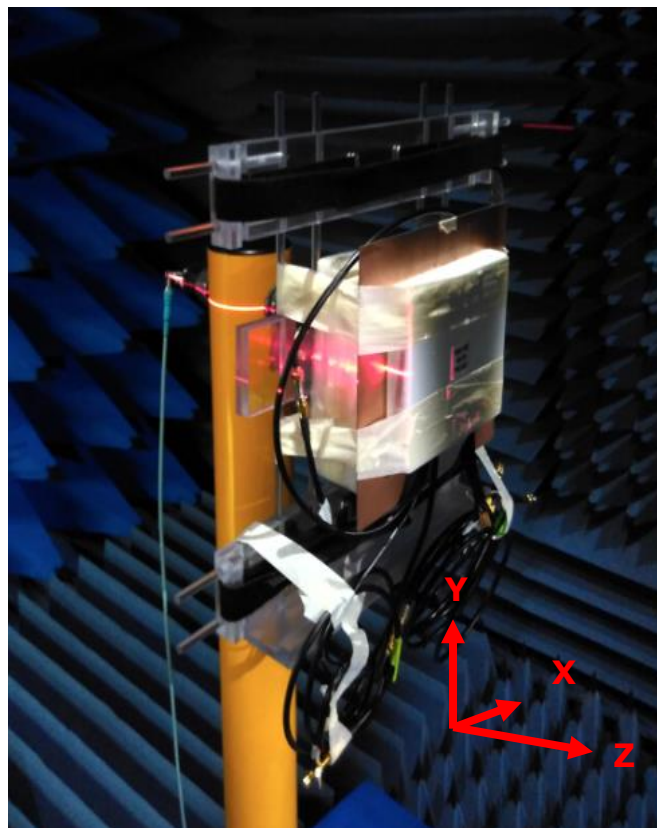


2450MHz



5550MHz

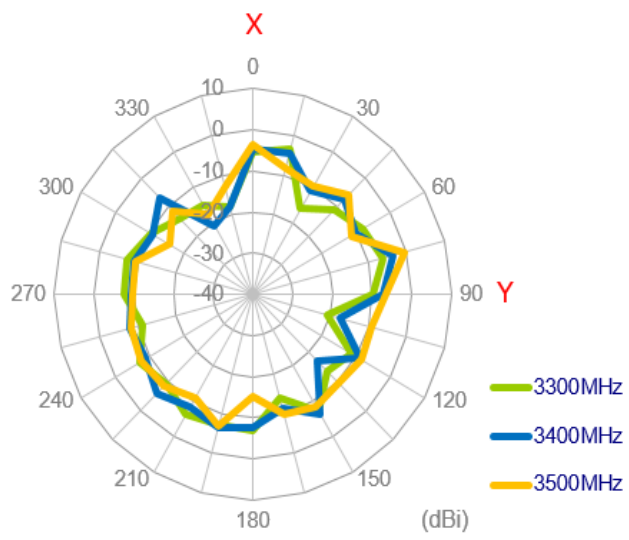
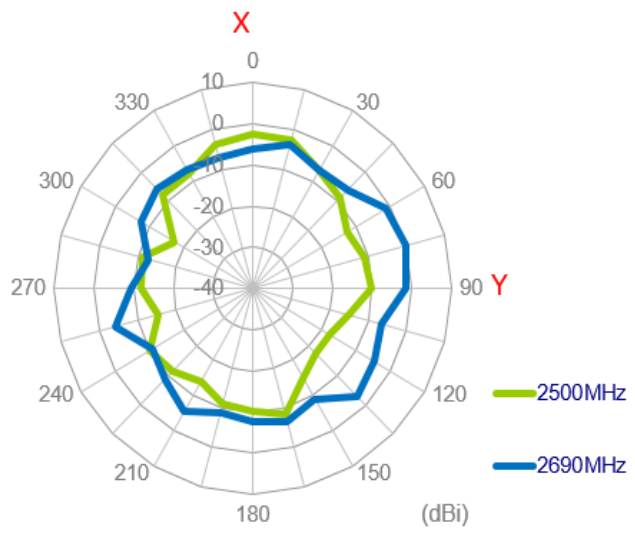
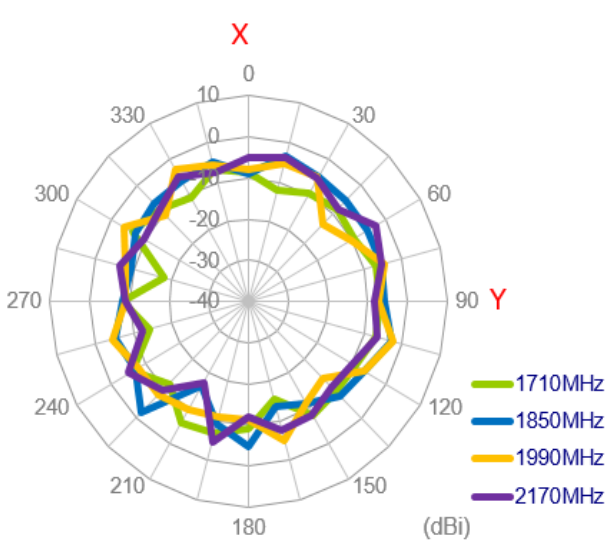
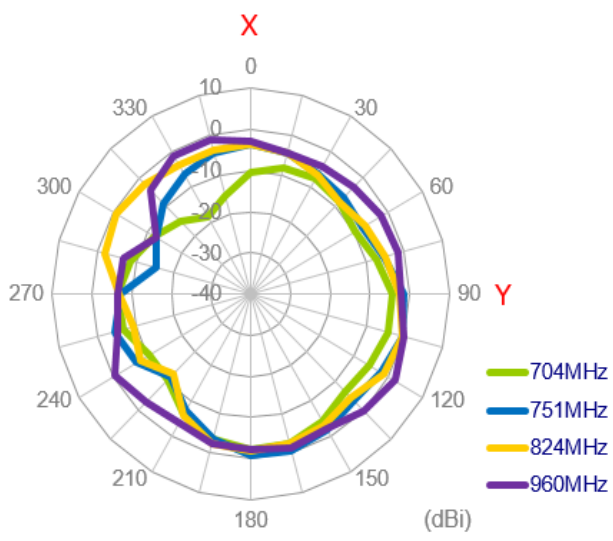
3.2.46. Test Setup for Antenna Radiation Pattern



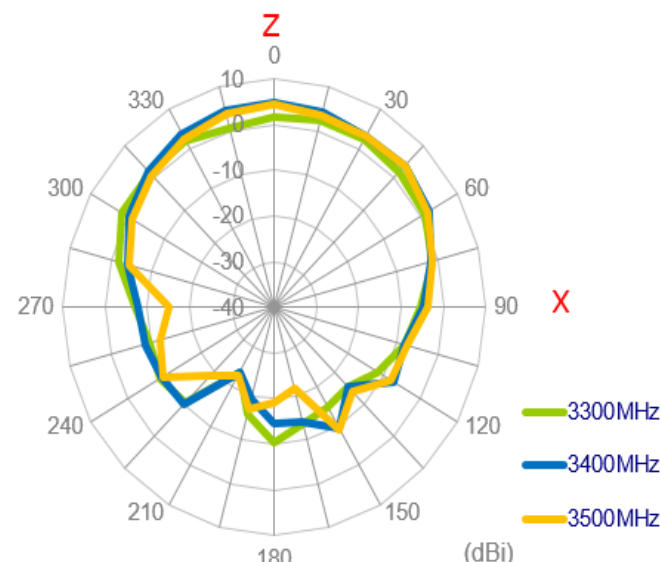
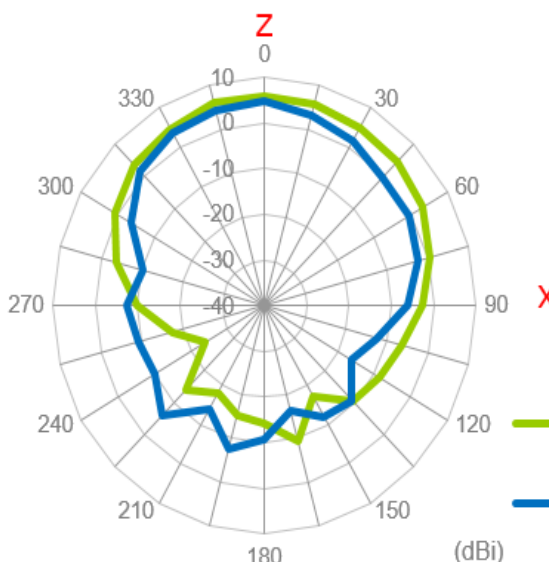
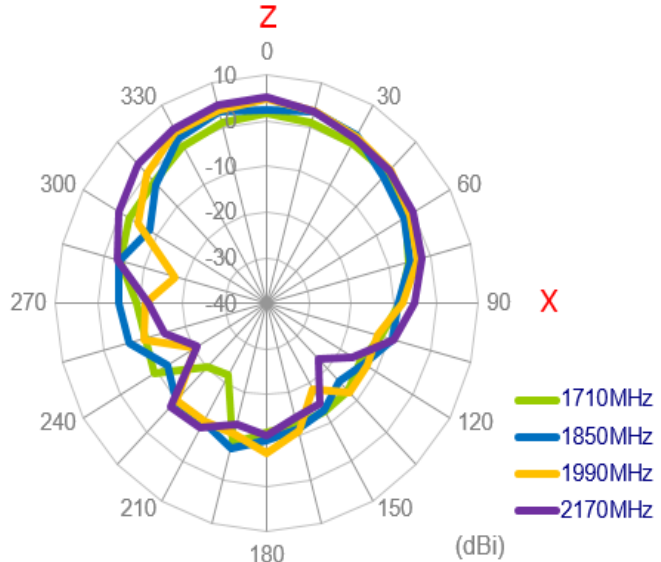
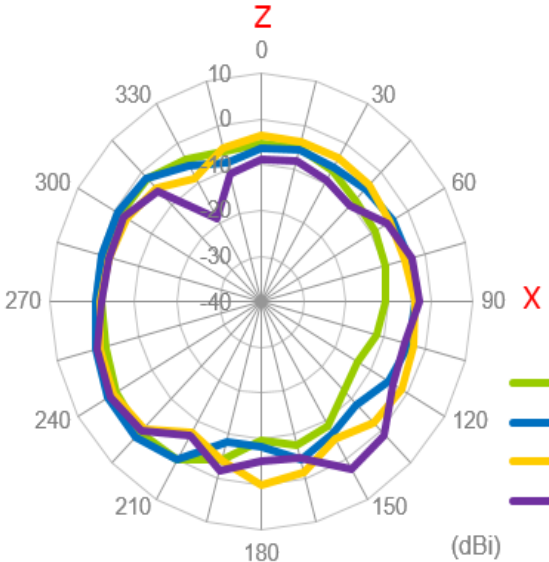
On metal

3.2.47. 2D Radiation Pattern (LTE_MIMO1 with 1M cable length on metal)

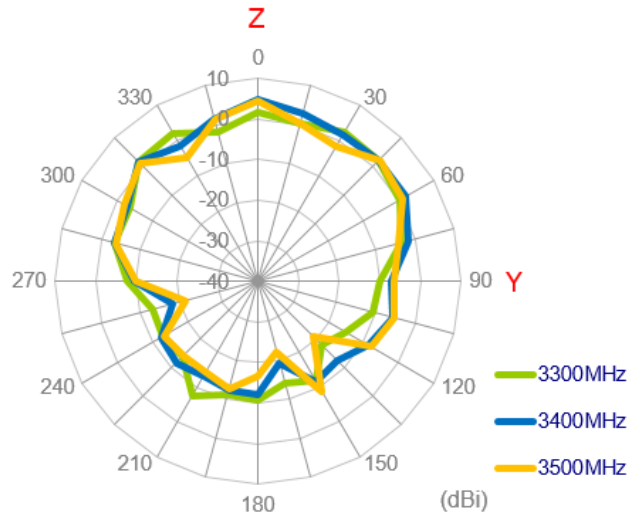
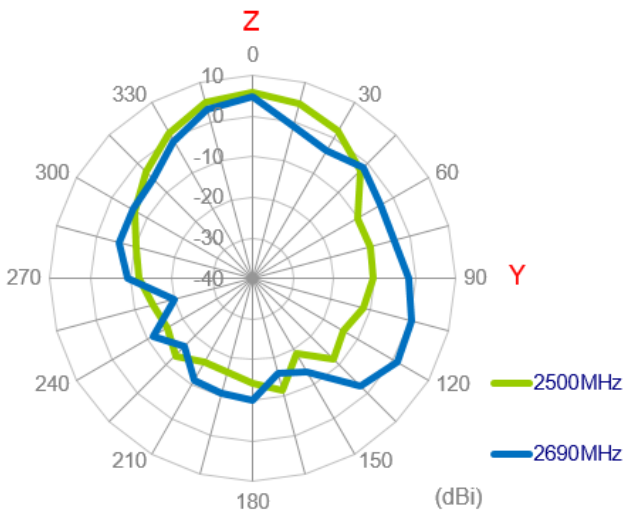
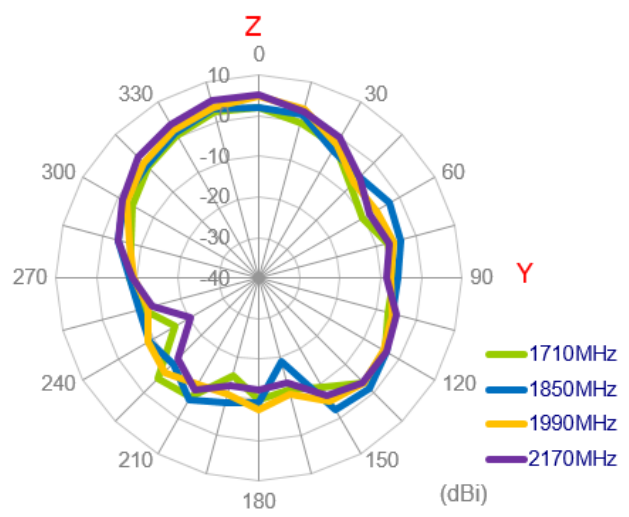
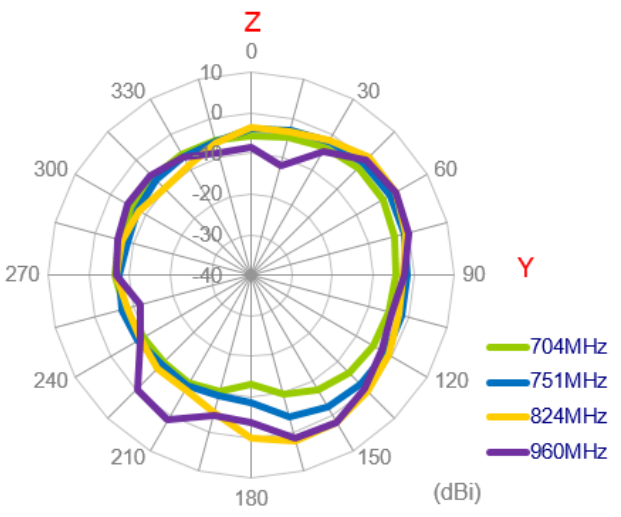
XY Plane



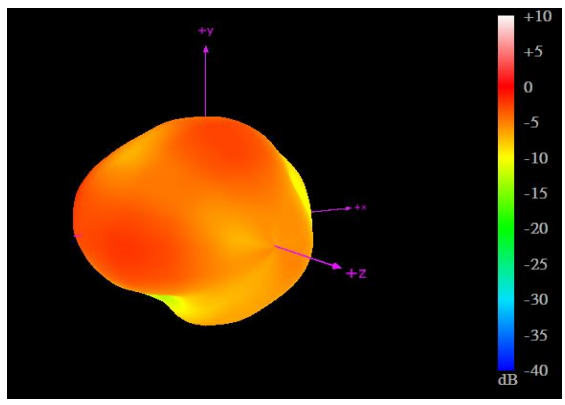
XZ Plane



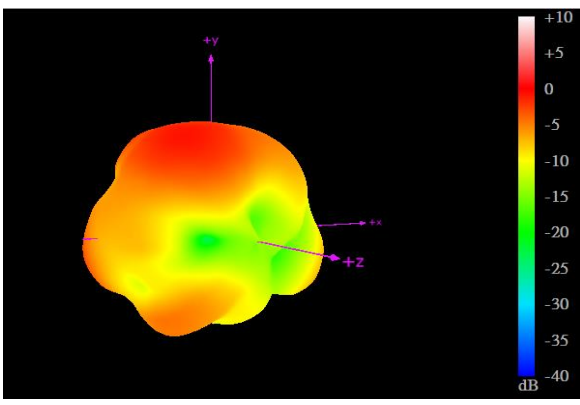
YZ Plane



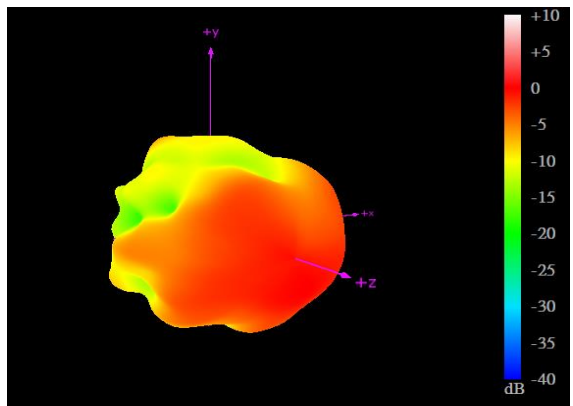
3.2.48. 3D Radiation Pattern (LTE_MIMO1 with 1M cable length on metal)



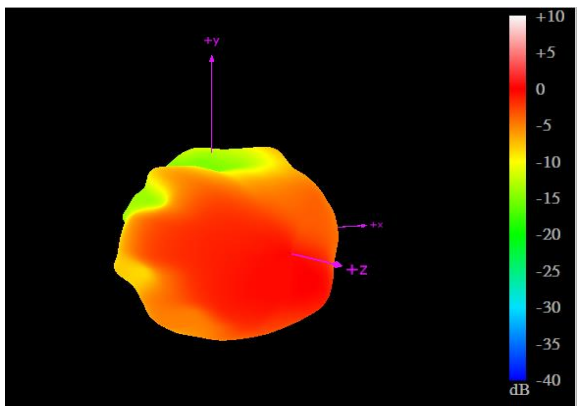
704MHz



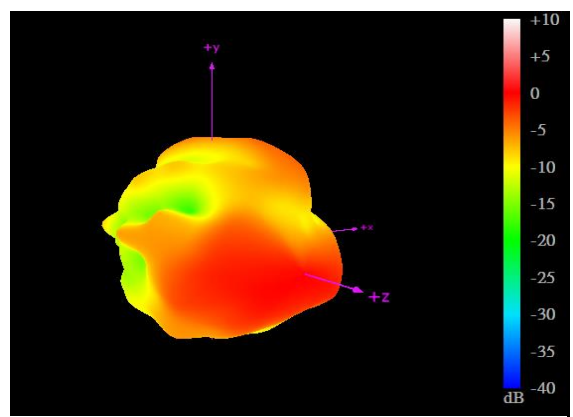
960MHz



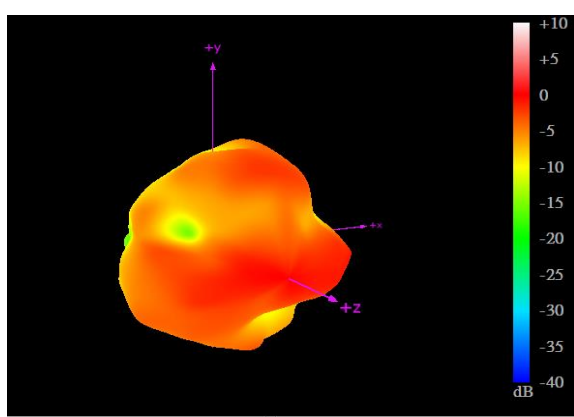
1710MHz



2170MHz

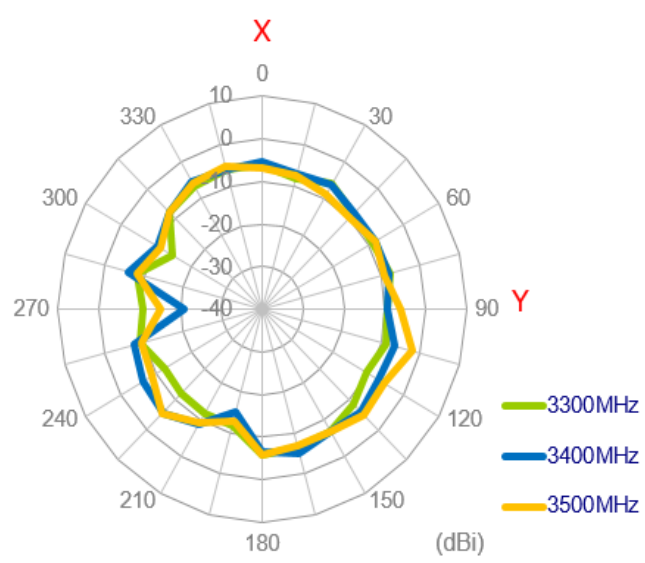
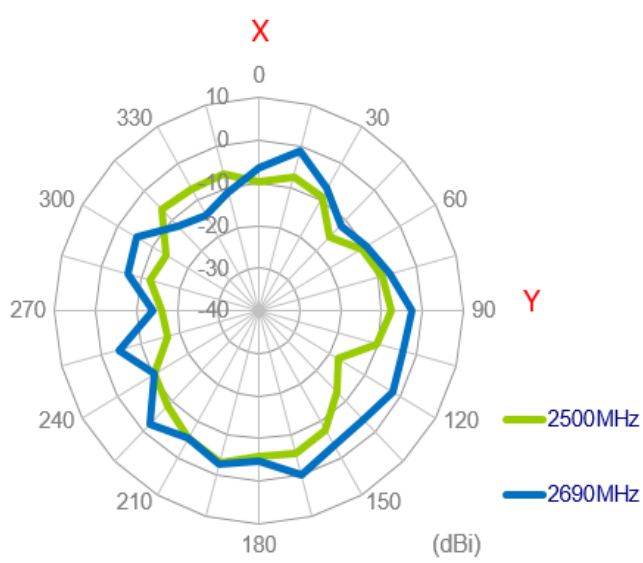
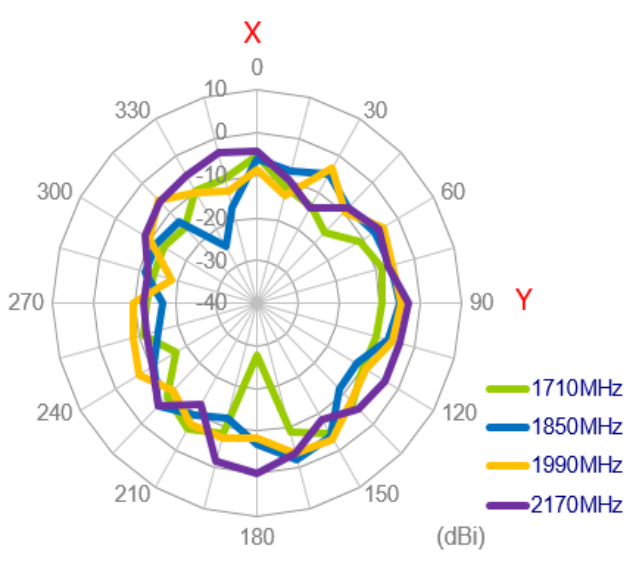
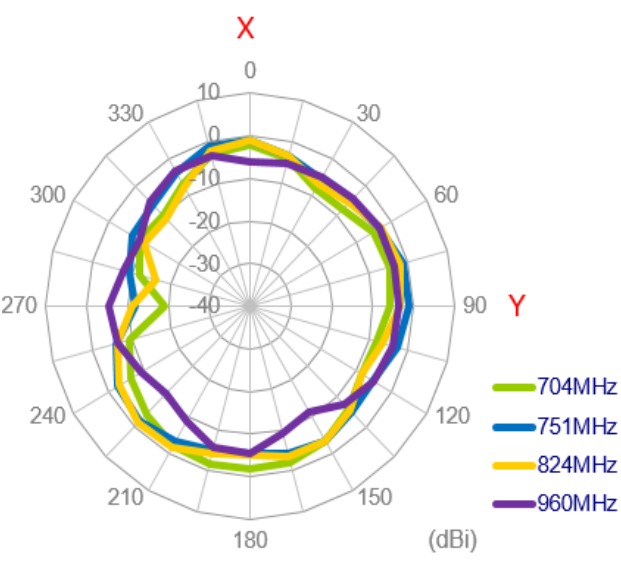


2690MHz

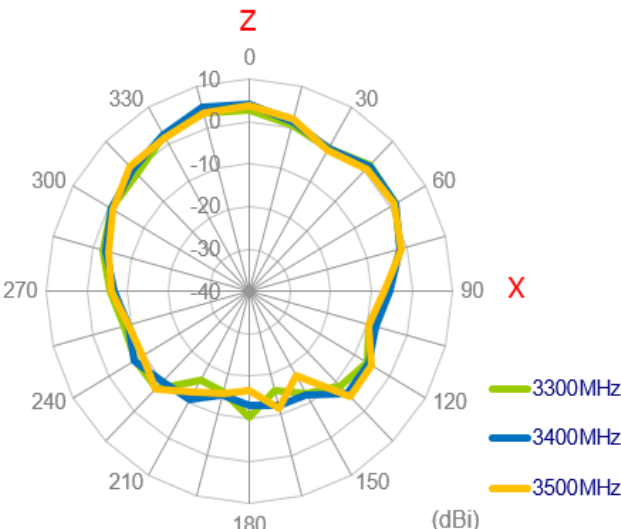
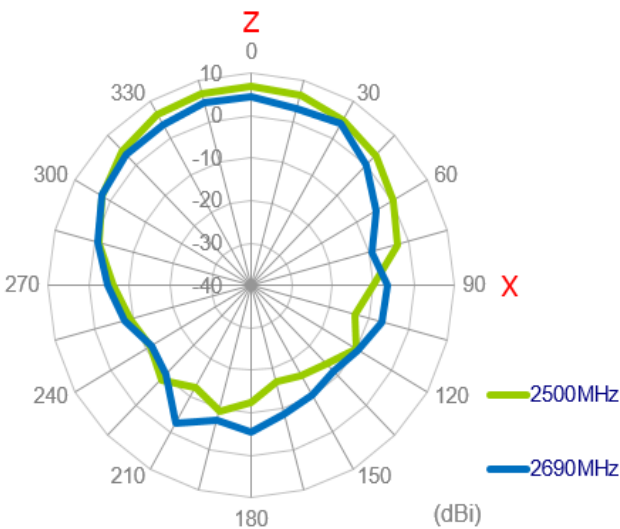
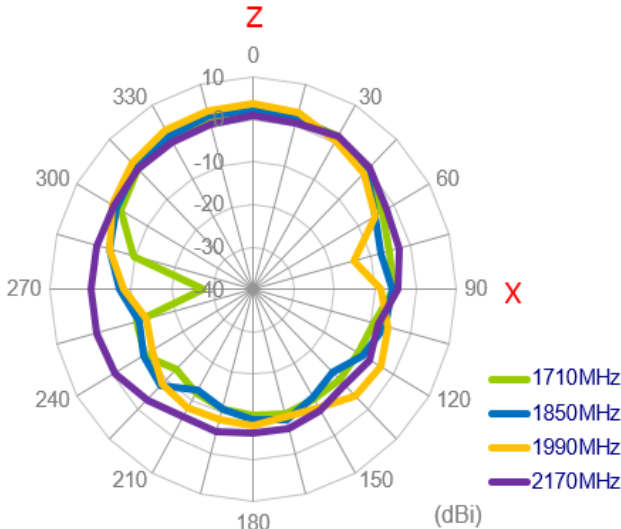
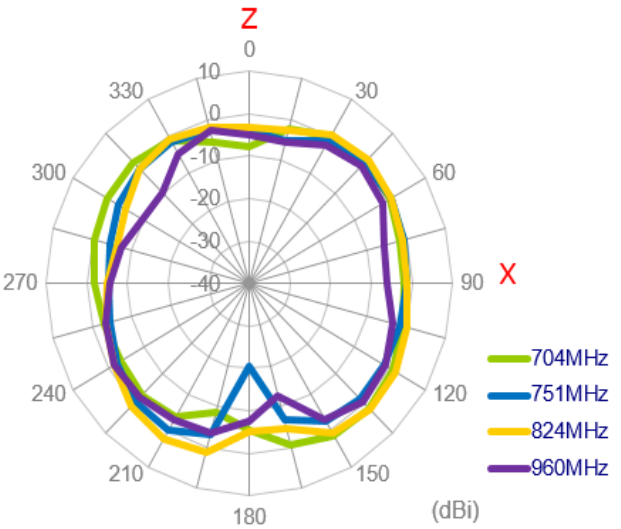


3500MHz

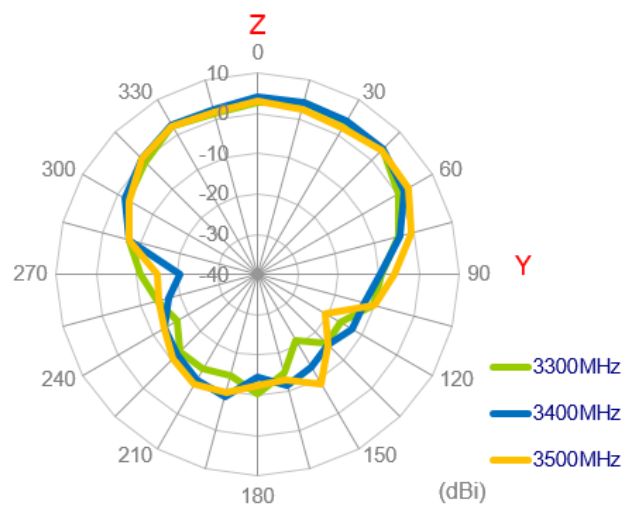
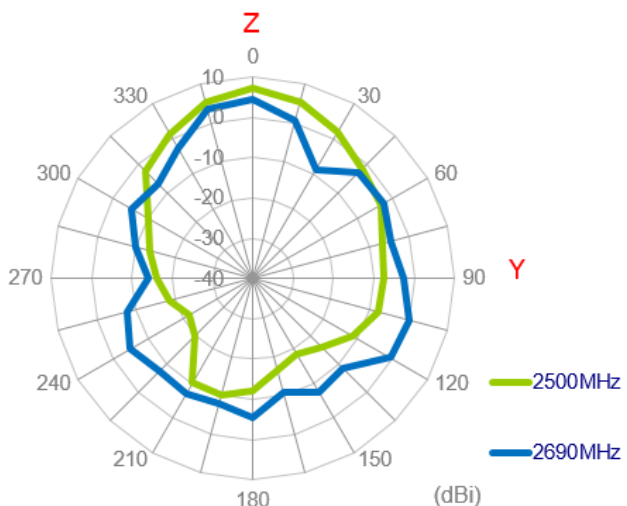
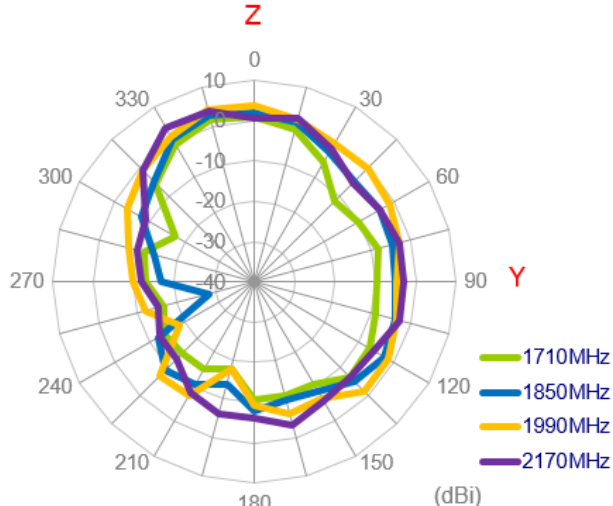
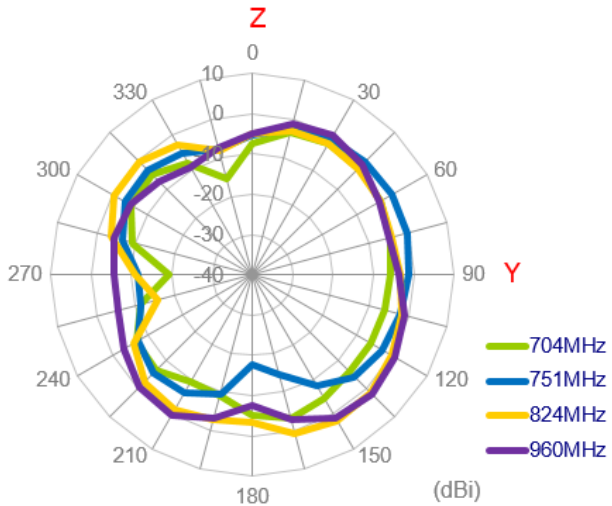
3.2.49. 2D Radiation Pattern (LTE_MIMO2 with 1M cable length on metal)
 XY Plane



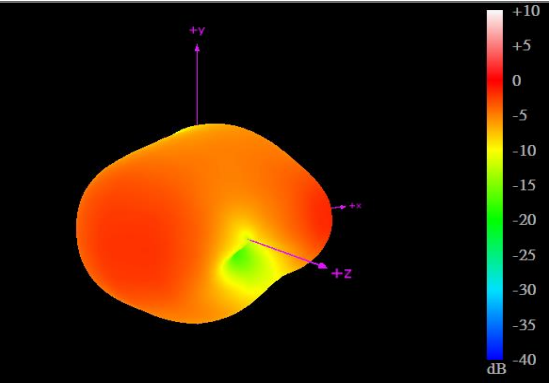
XZ Plane



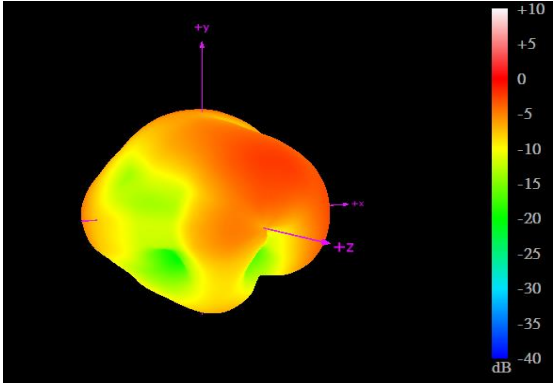
YZ Plane



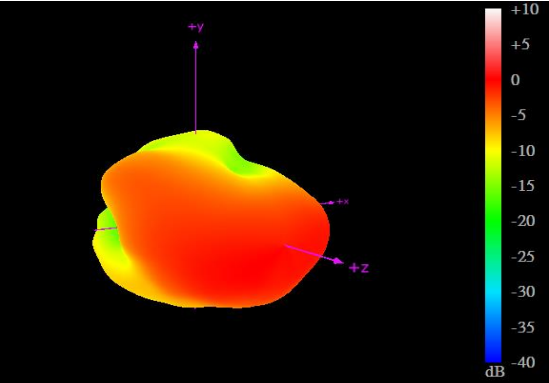
3.2.50. 3D Radiation Pattern (LTE_MIMO2 with 1M cable length on metal)



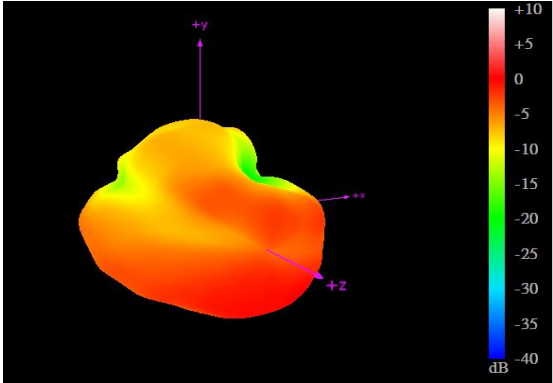
704MHz



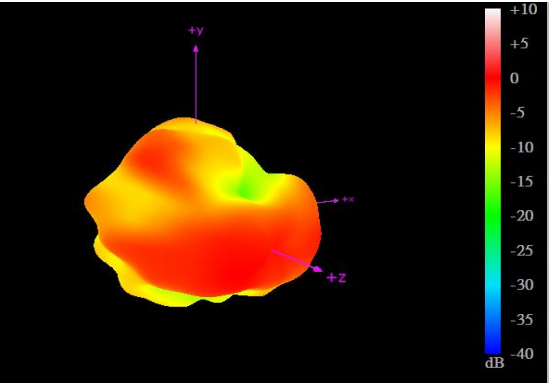
960MHz



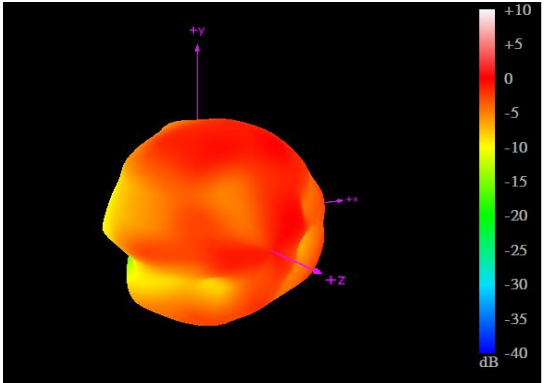
1710MHz



2170MHz



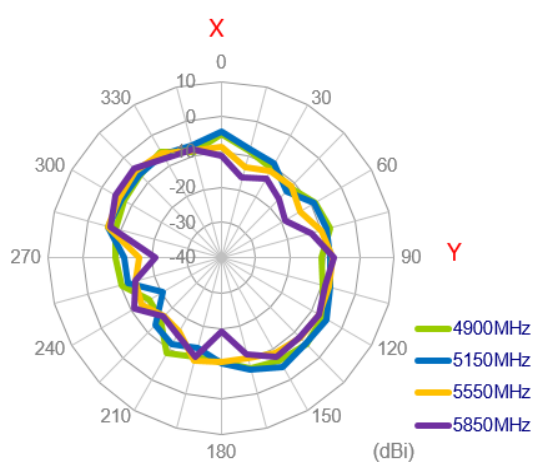
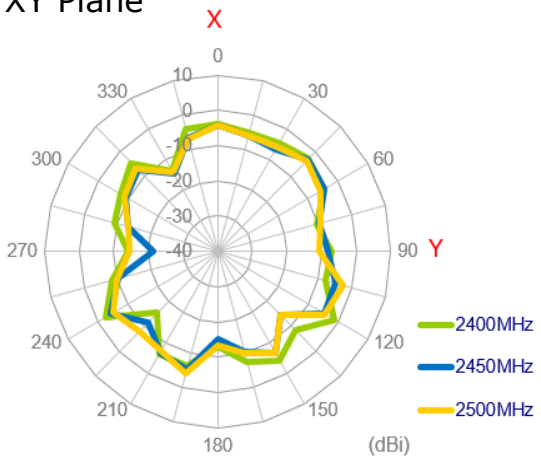
2690MHz



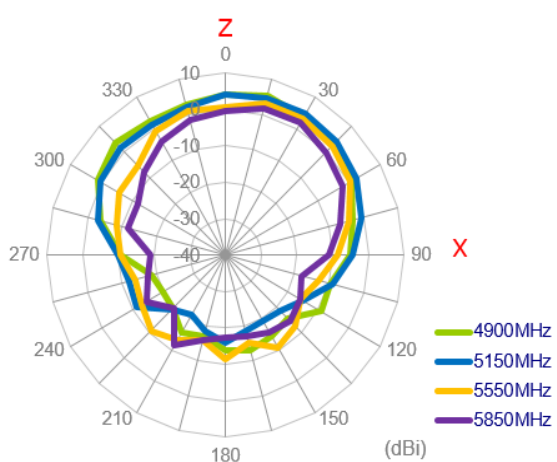
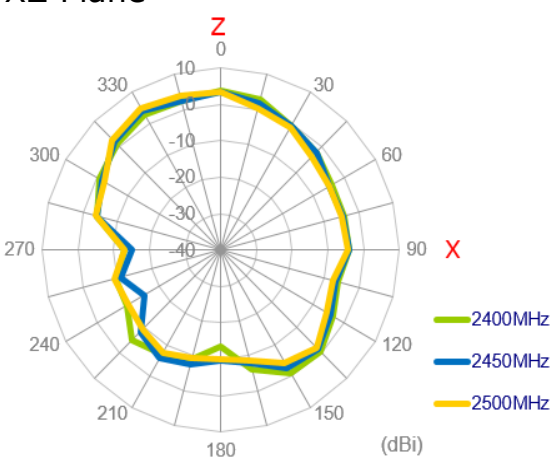
3500MHz

3.2.51. 2D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on metal)

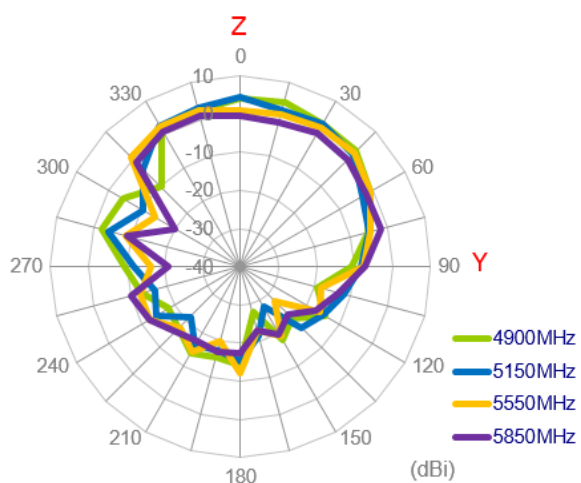
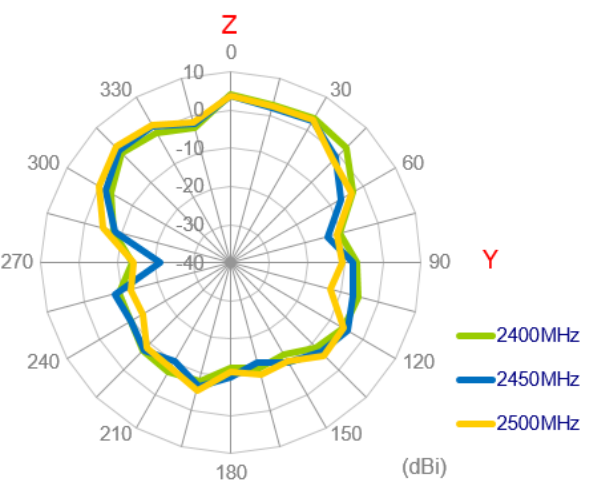
XY Plane



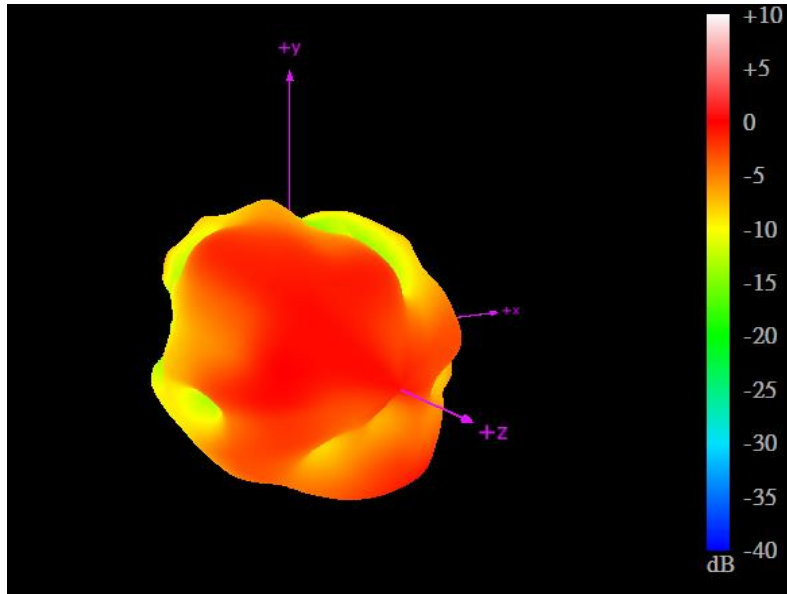
XZ Plane



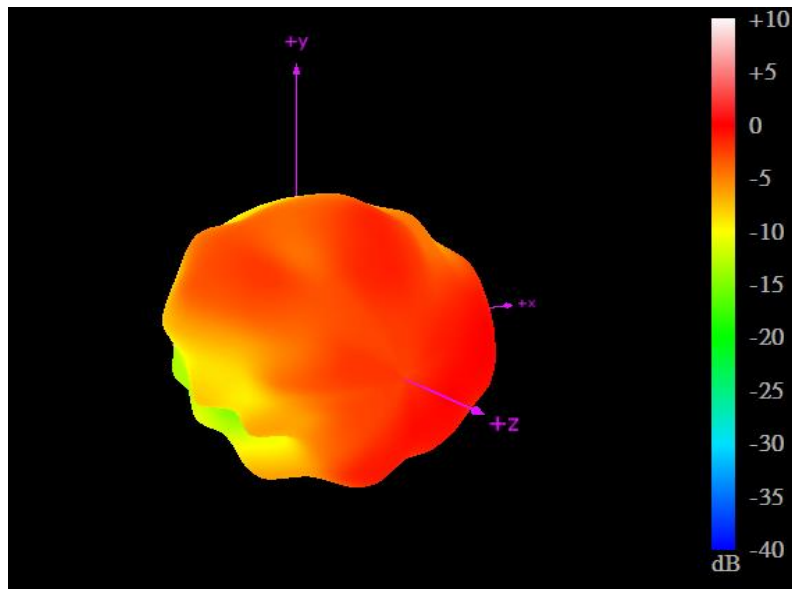
YZ Plane



3.2.52. 3D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length on metal)



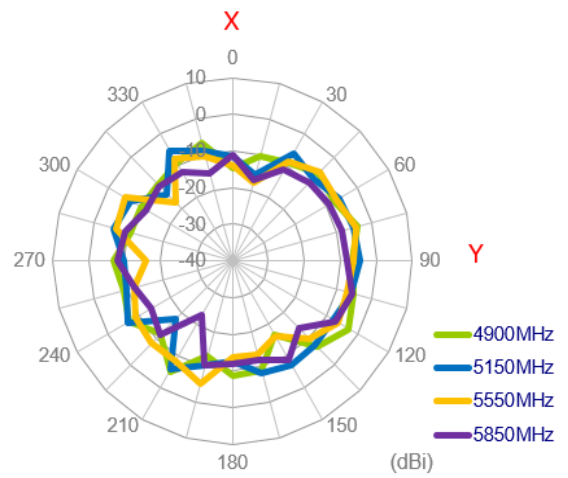
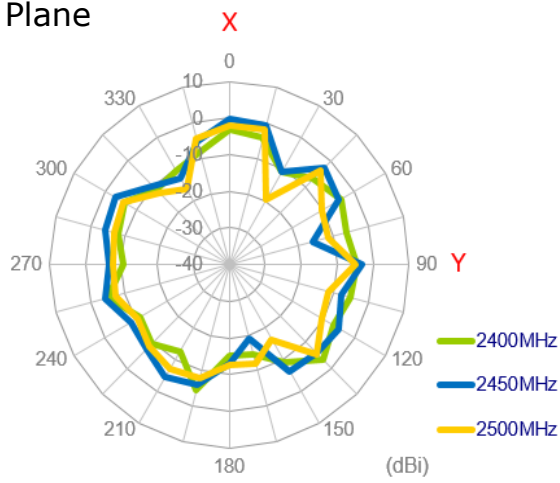
2450MHz



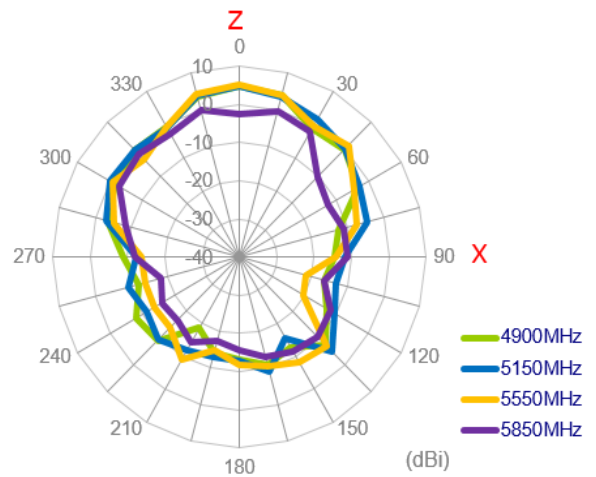
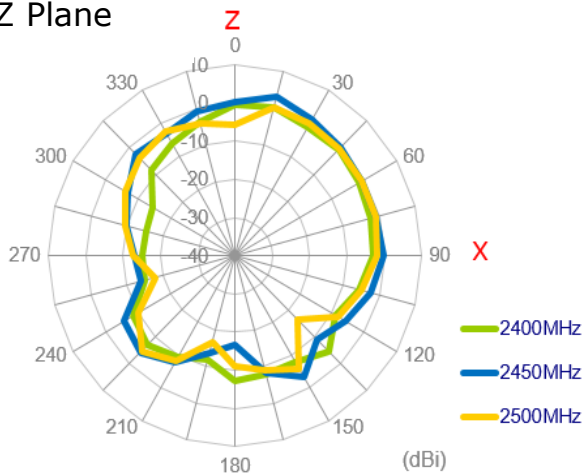
5550MHz

3.2.53. 2D Radiation Pattern (Wi-Fi_MIMO2 with 3M cable length on metal)

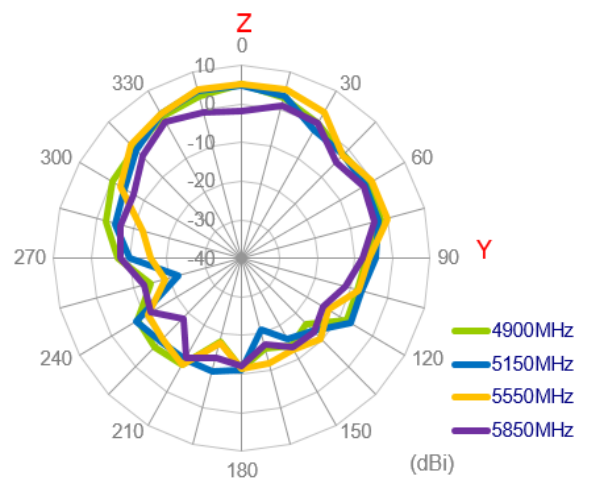
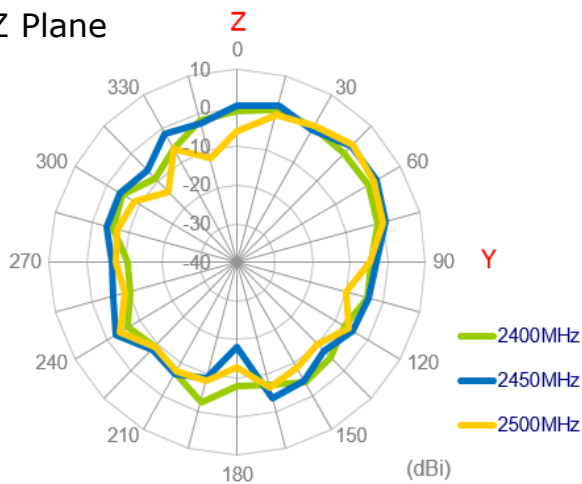
XY Plane



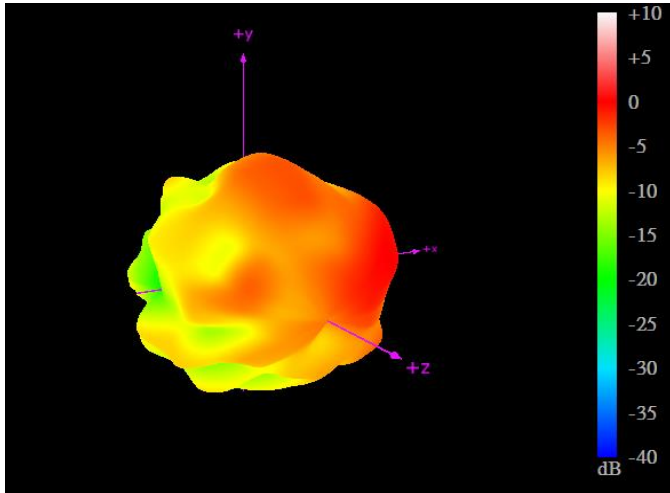
XZ Plane



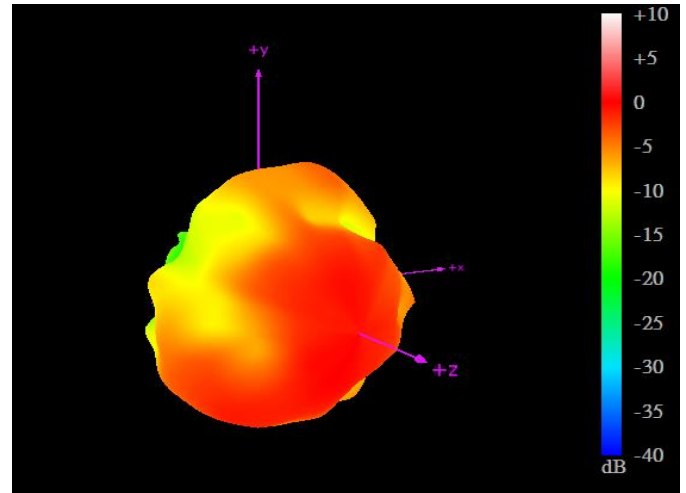
YZ Plane



3.2.54. 3D Radiation Pattern (Wi-Fi_MIMO2 with 1M cable length on metal)

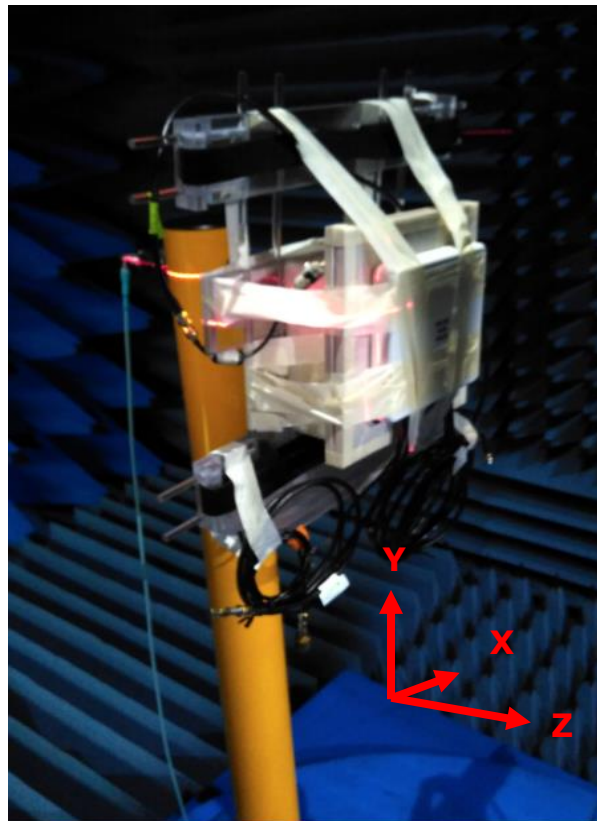


2450MHz



5550MHz

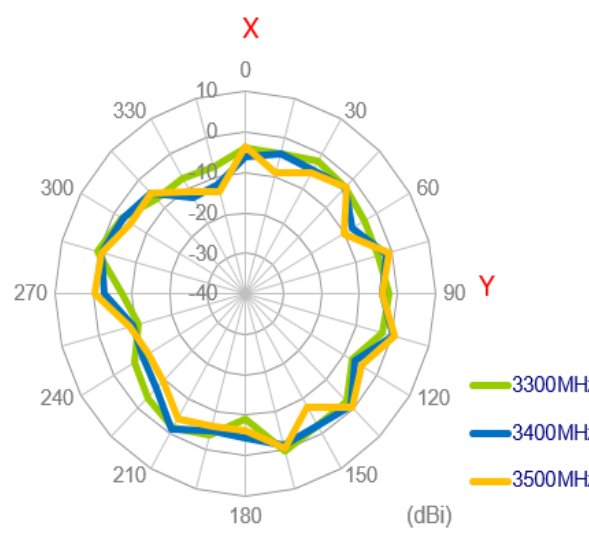
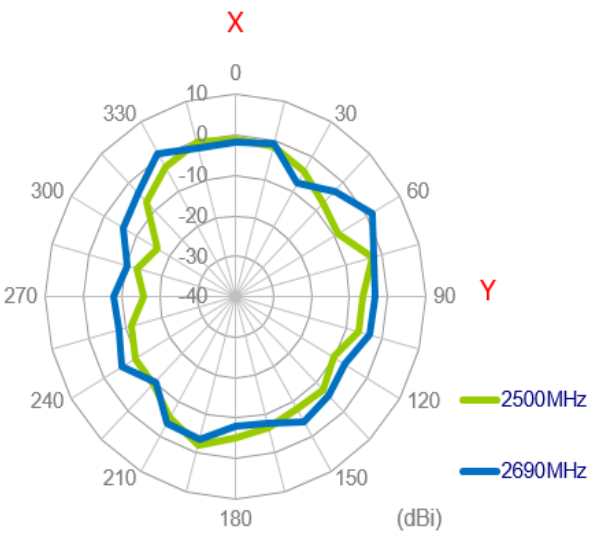
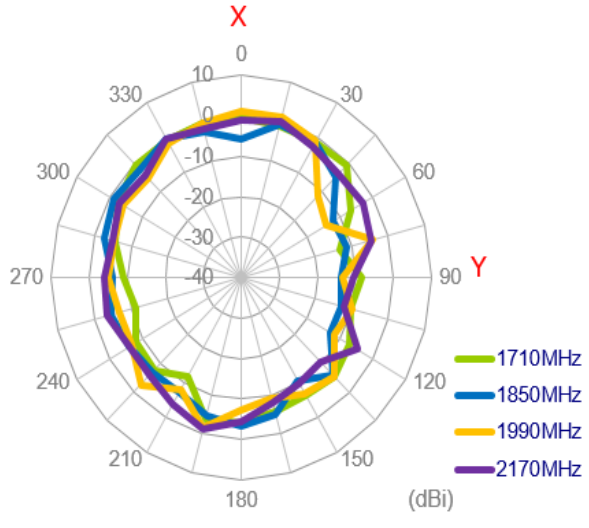
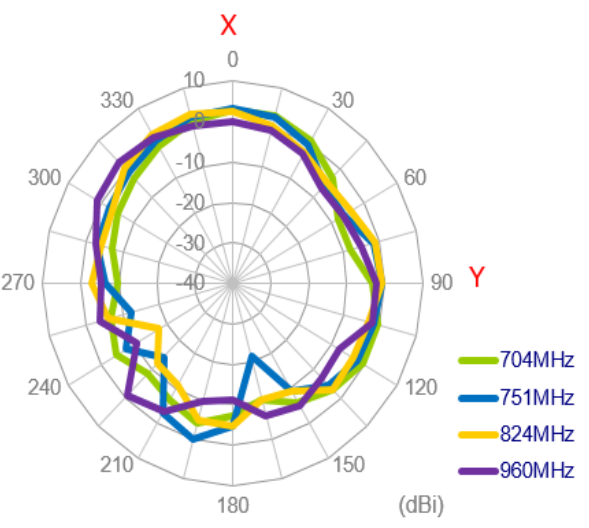
3.2.55. Test Setup for Antenna Radiation Pattern



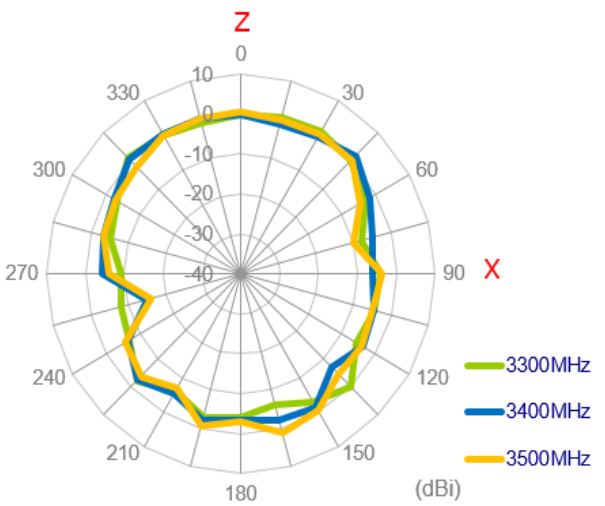
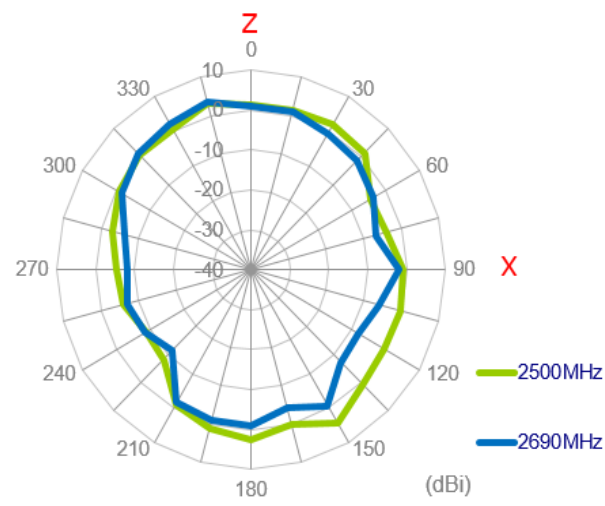
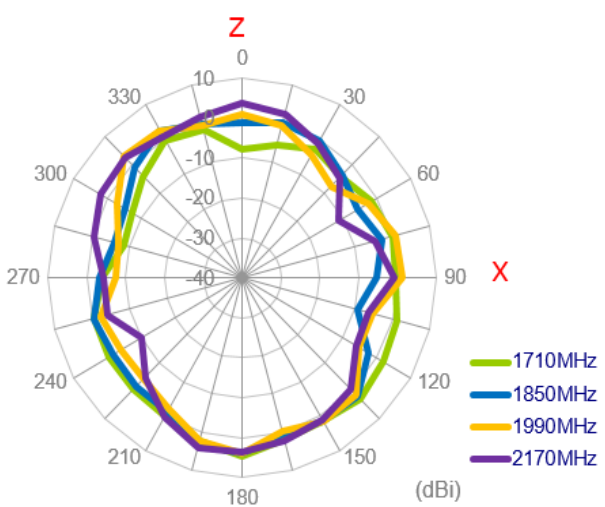
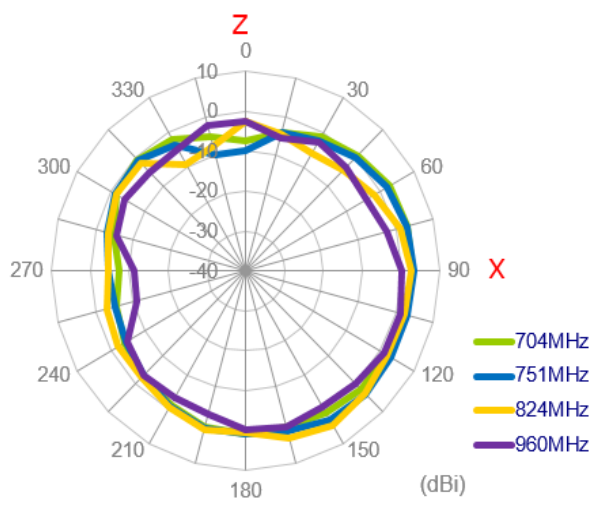
On the Wall

3.2.56. 2D Radiation Pattern (LTE_MIMO1 with 1M cable length on the wall)

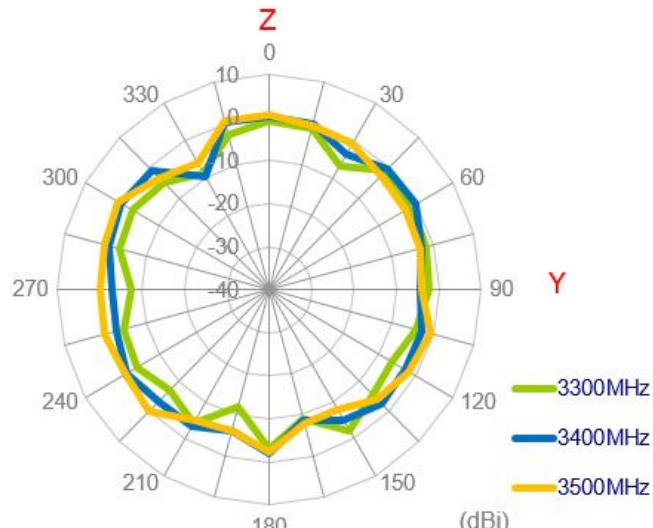
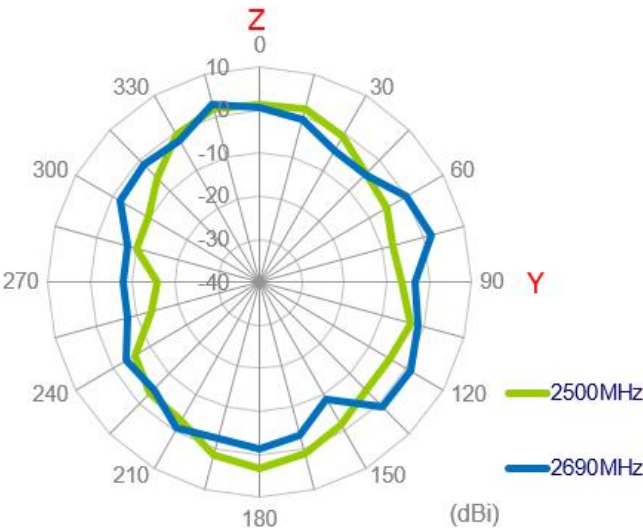
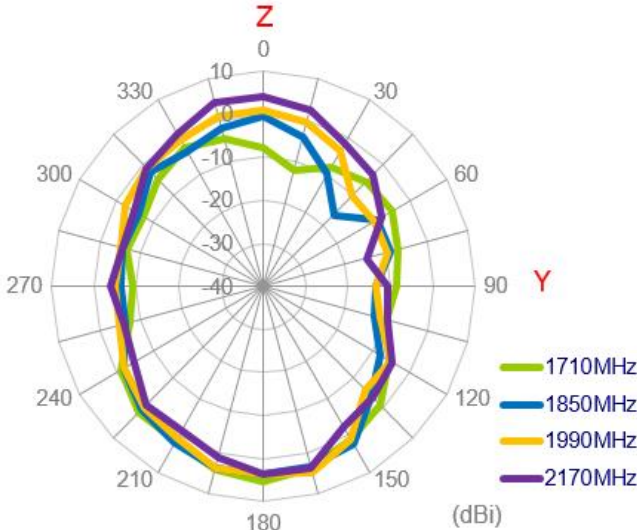
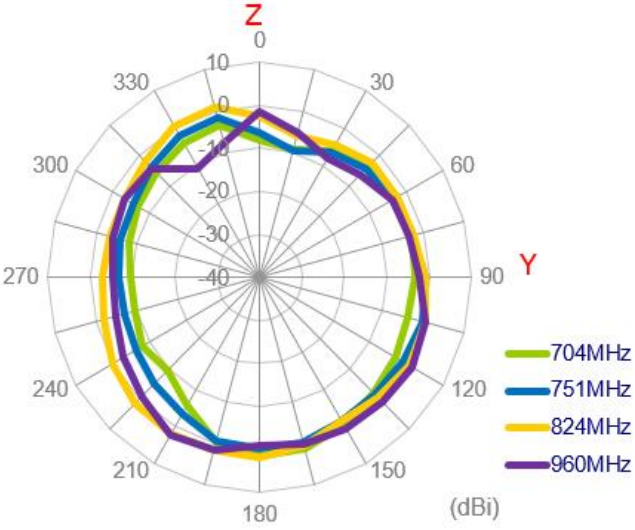
XY Plane



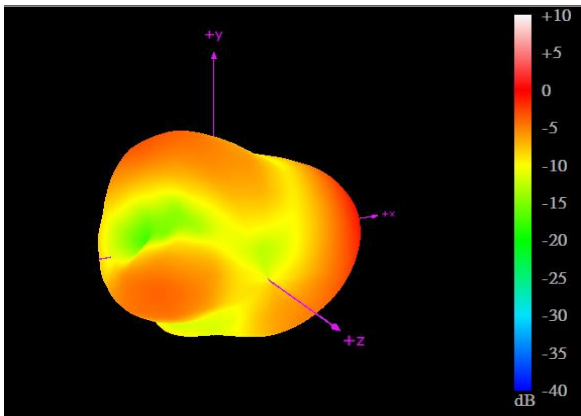
XZ Plane



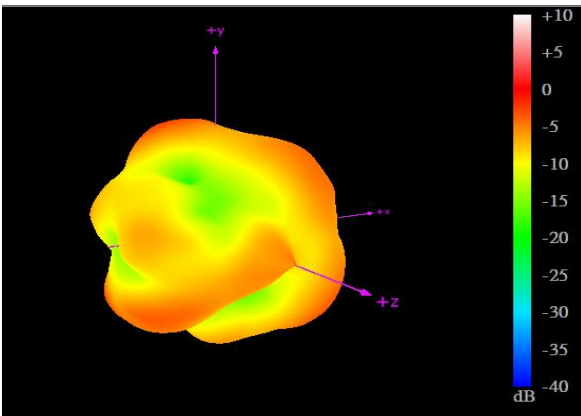
YZ Plane



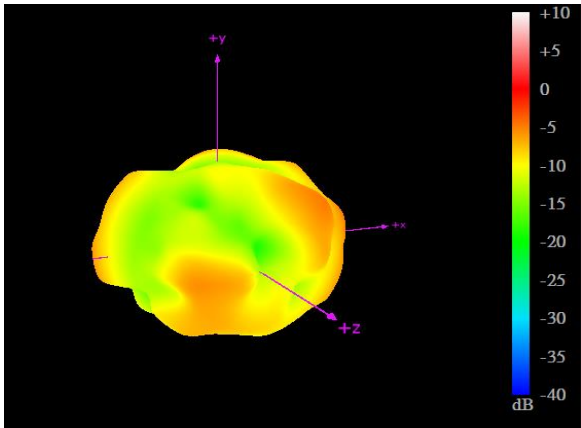
3.2.57. 3D Radiation Pattern (LTE_MIMO1 with 1M cable length on the wall)



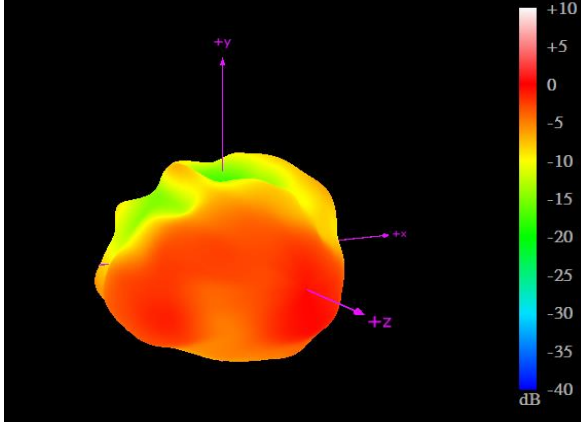
704MHz



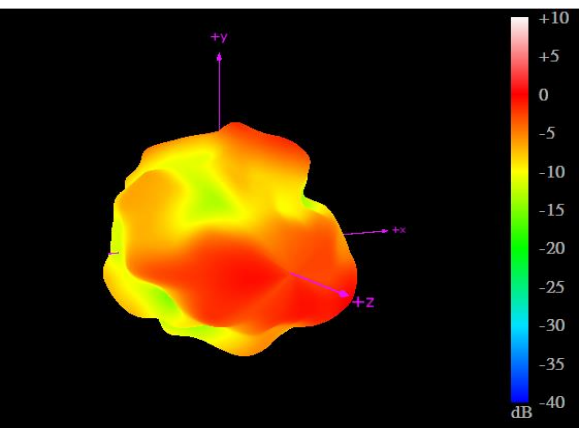
960MHz



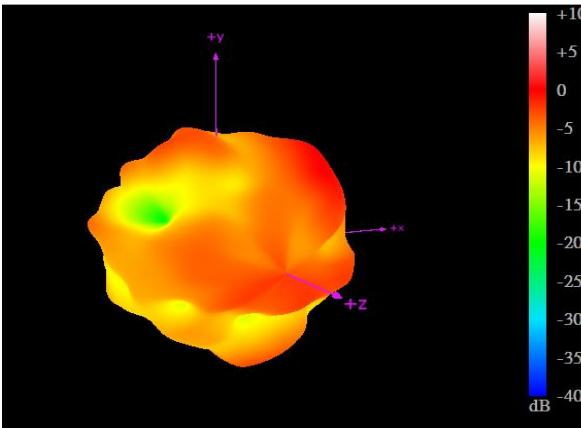
1710MHz



2170MHz



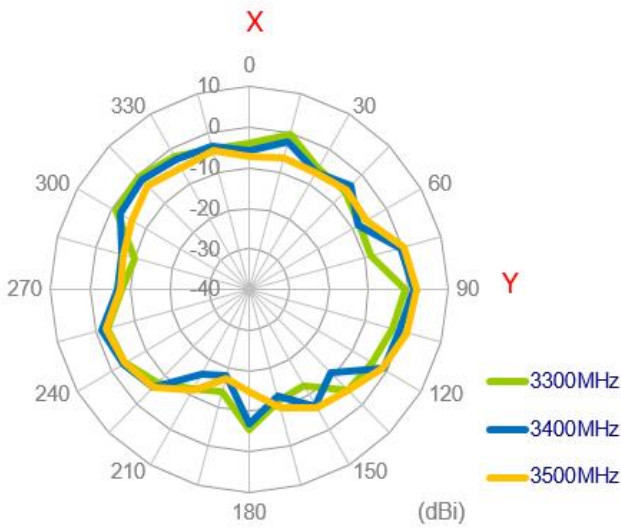
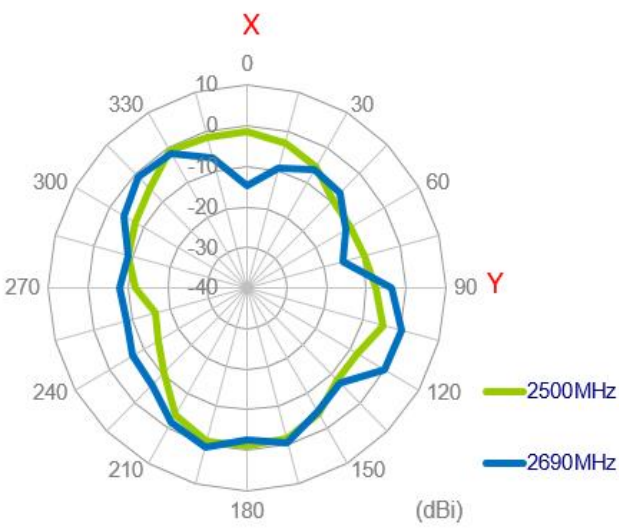
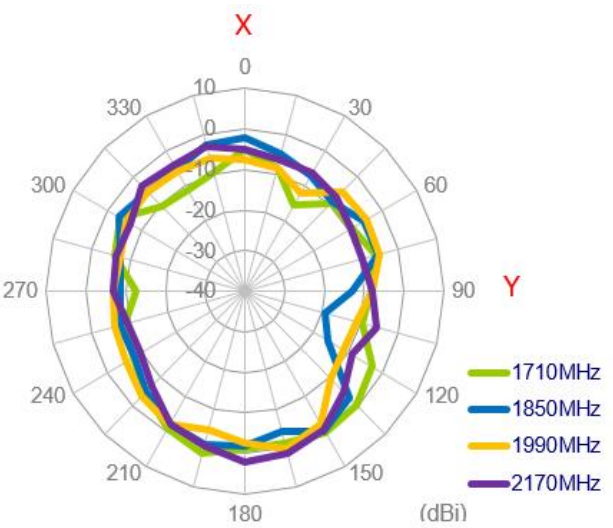
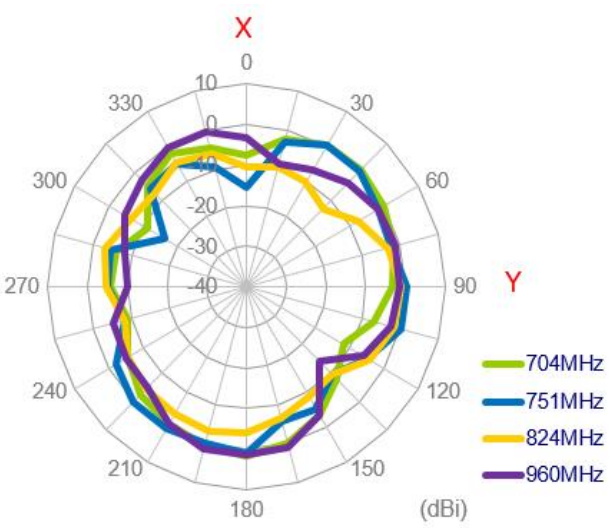
2690MHz



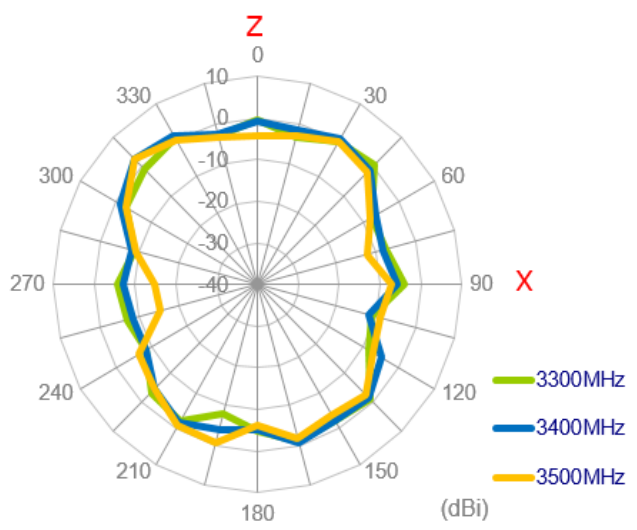
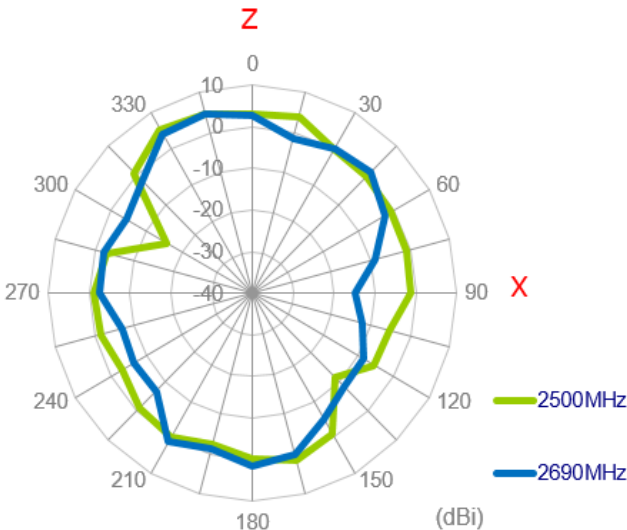
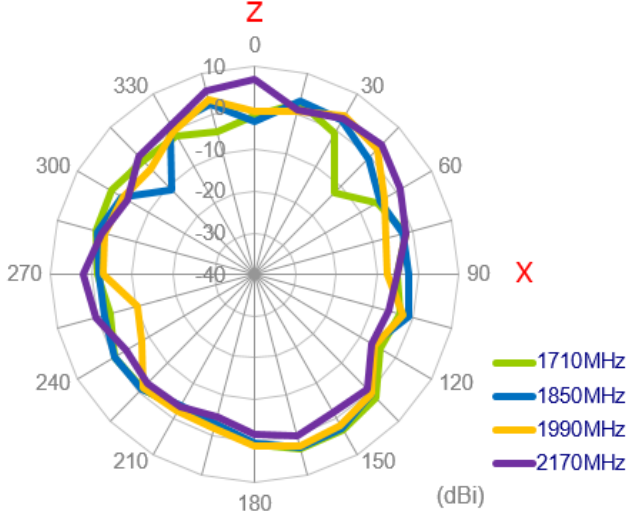
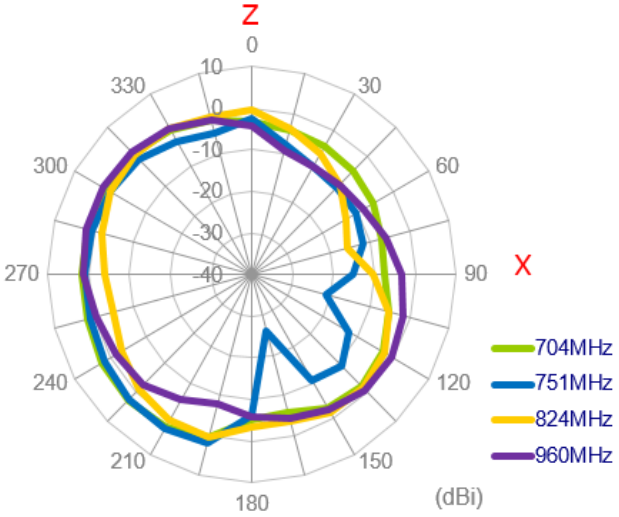
3500MHz

3.2.58. 2D Radiation Pattern (LTE_MIMO2 with 1M cable length on the wall)

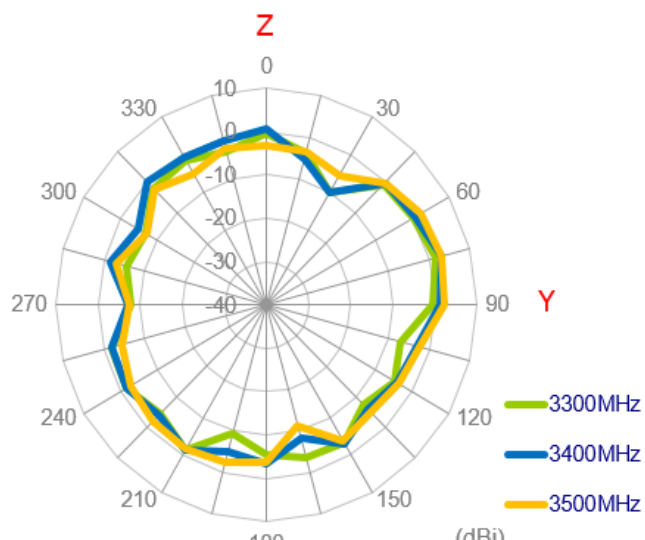
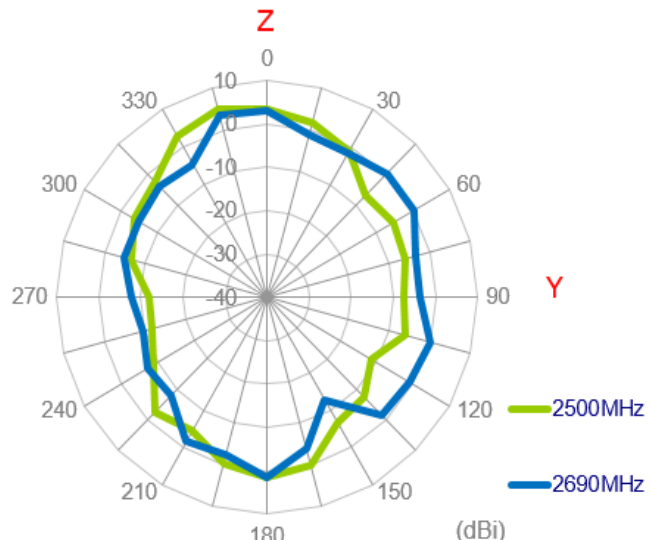
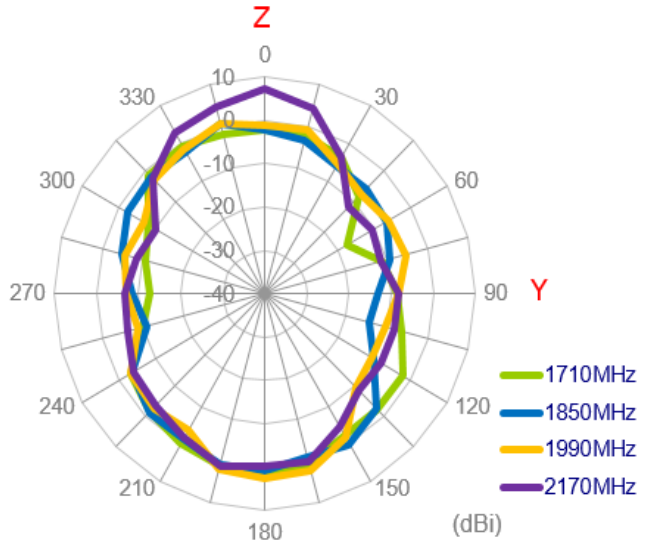
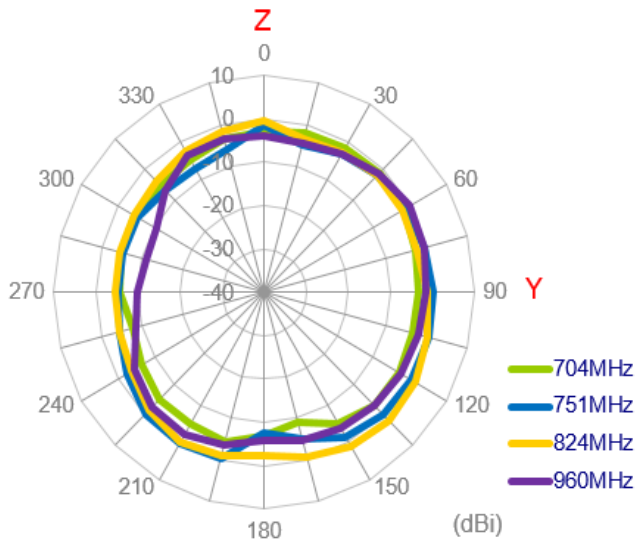
XY Plane



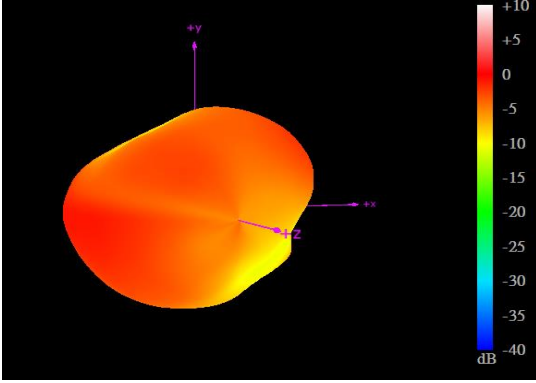
XZ Plane



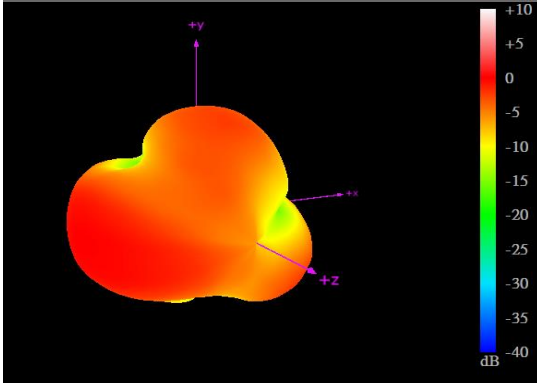
YZ Plane



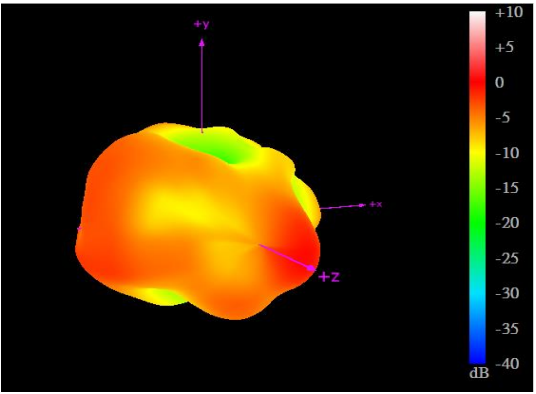
3.2.59. 3D Radiation Pattern (LTE_MIMO2 with 1M cable length on the wall)



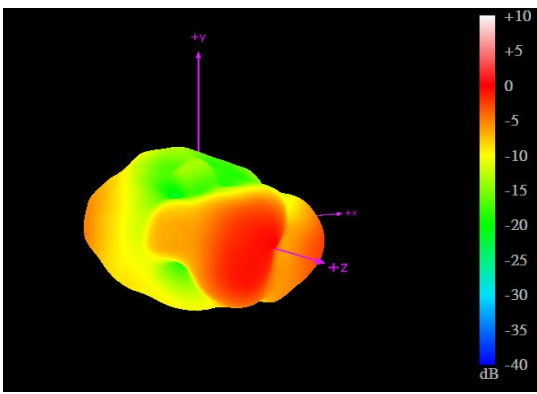
704MHz



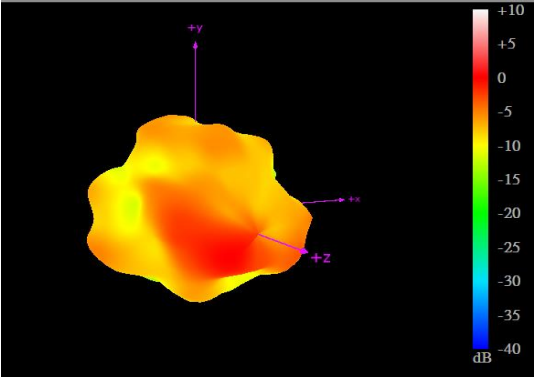
960MHz



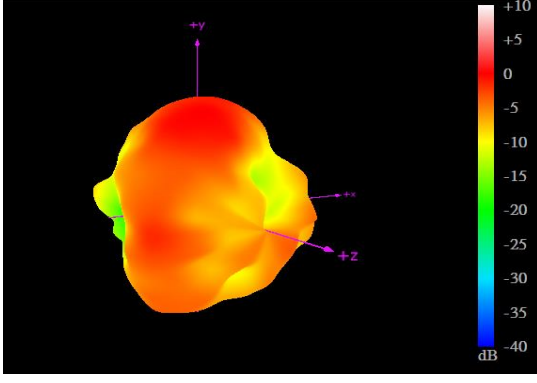
1710MHz



2170MHz



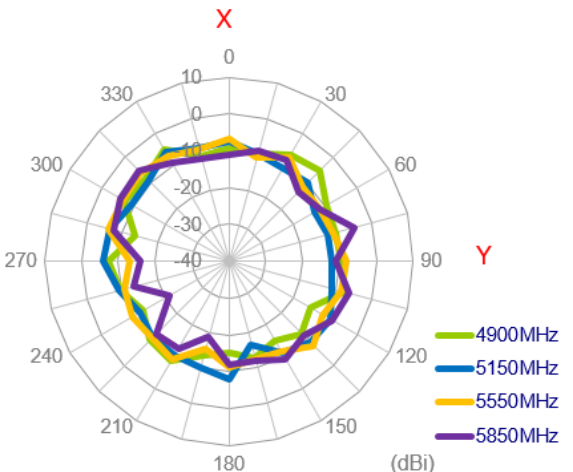
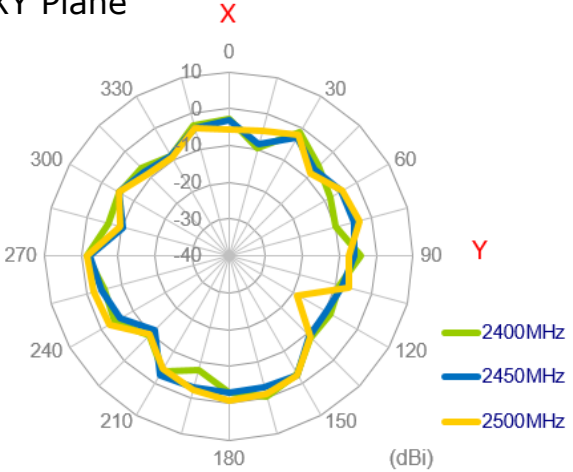
2690MHz



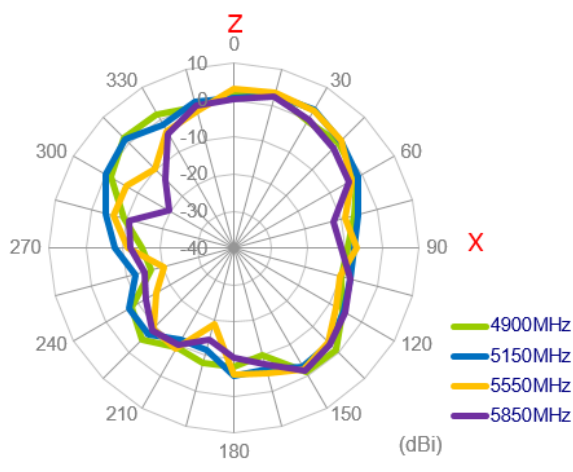
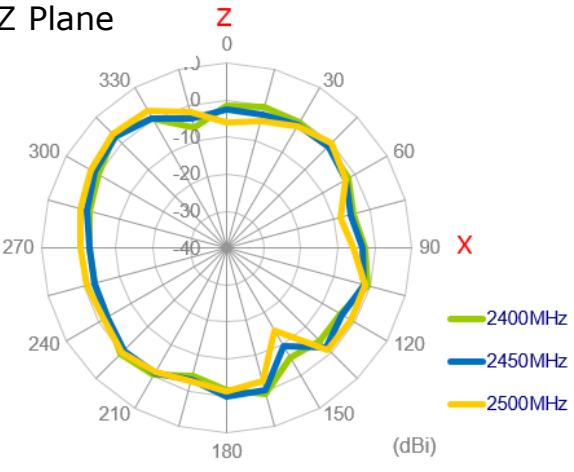
3500MHz

3.2.60. 2D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length in free space)

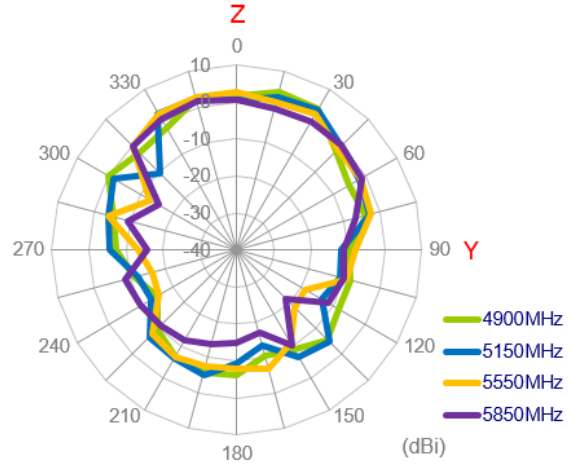
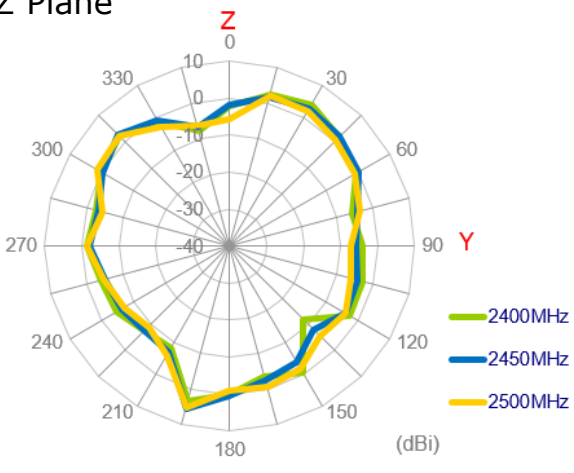
XY Plane



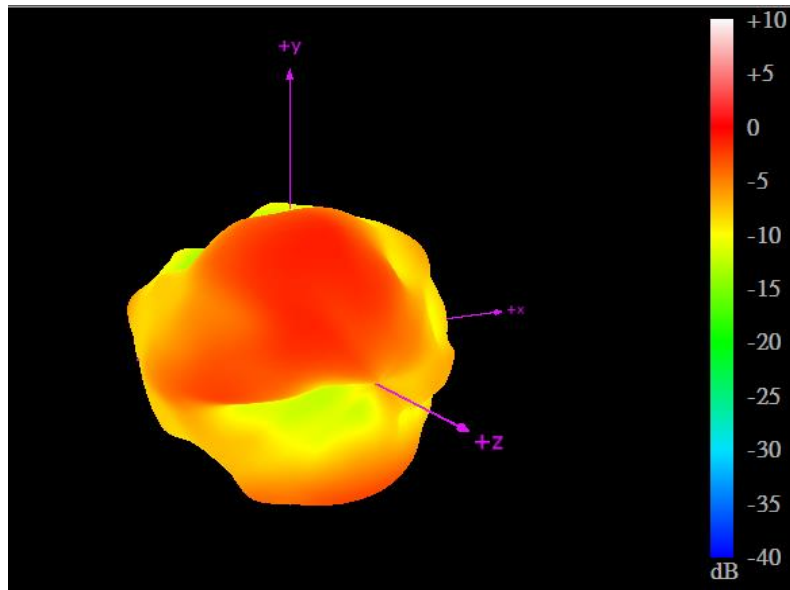
XZ Plane



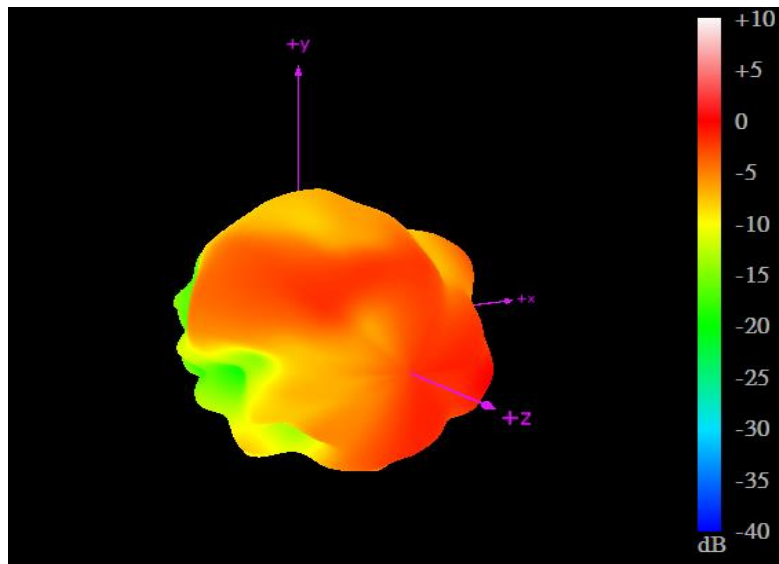
YZ Plane



3.2.61 3D Radiation Pattern (Wi-Fi_MIMO1 with 1M cable length in free space)



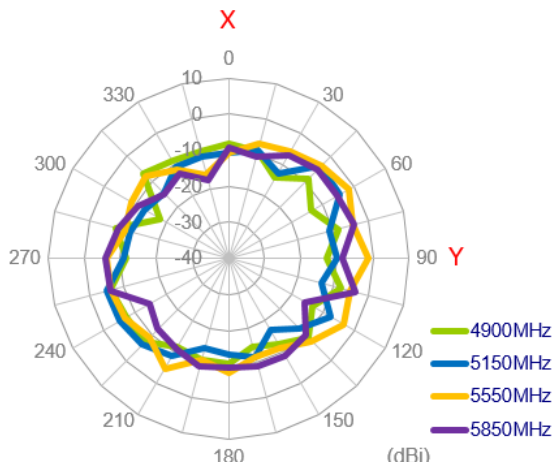
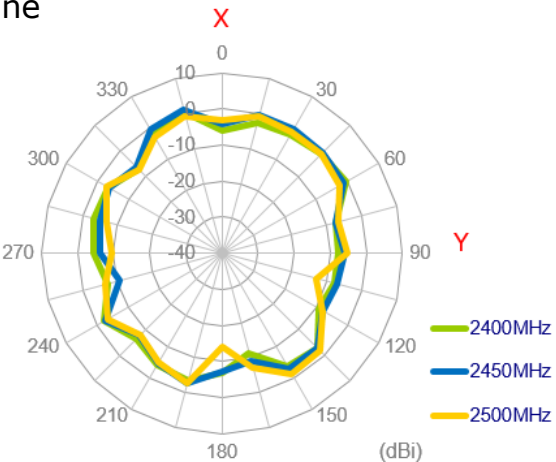
2450MHz



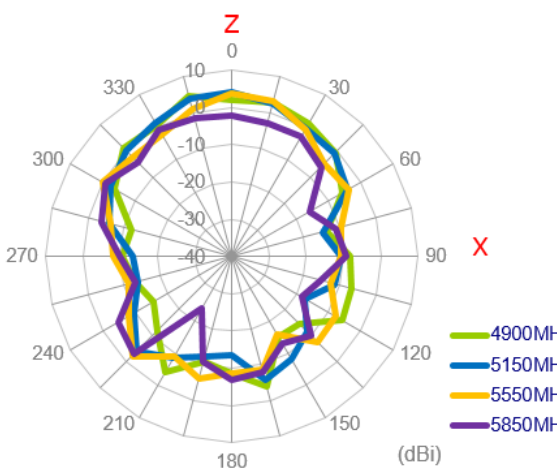
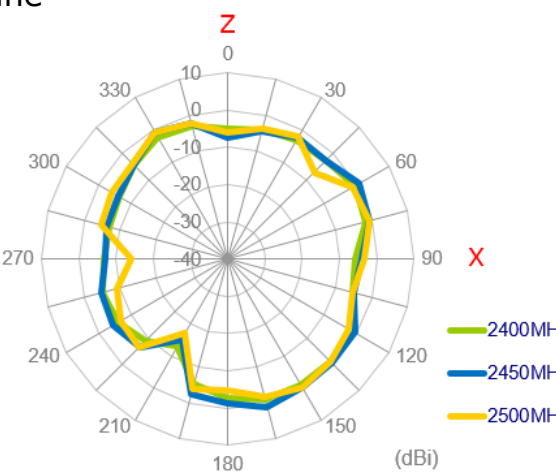
5550MHz

3.2.61. 2D Radiation Pattern (Wi-Fi_MIMO2 with 3M cable length in free space)

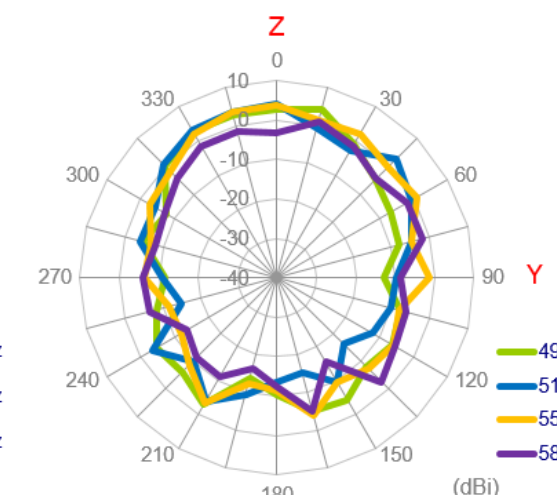
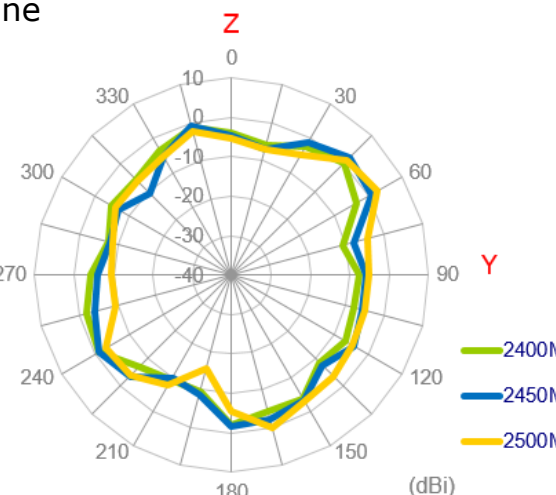
XY Plane



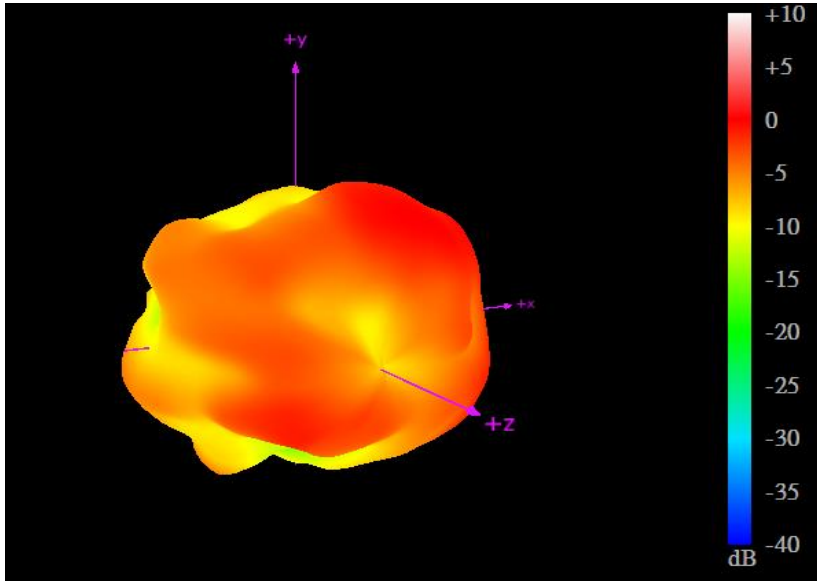
XZ Plane



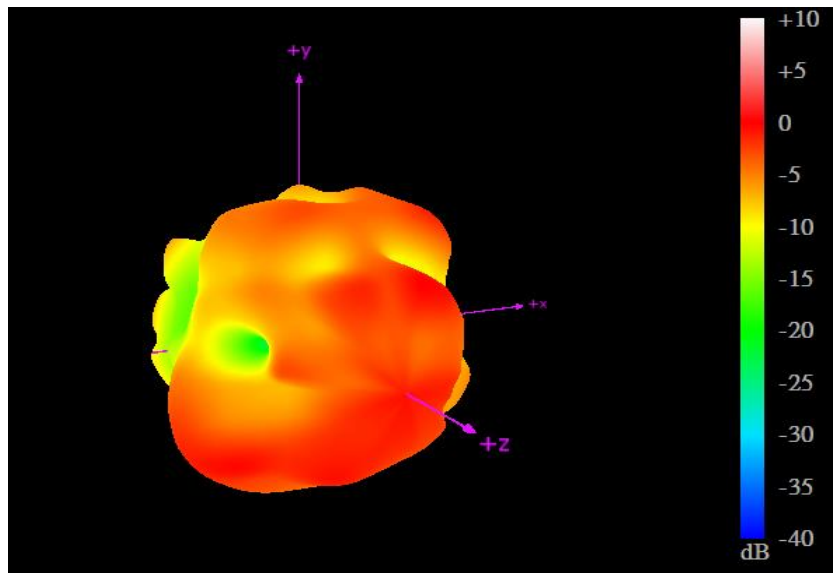
YZ Plane



3.2.62. 3D Radiation Pattern (Wi-Fi_MIMO2 with 1M cable length in free space)



2450MHz



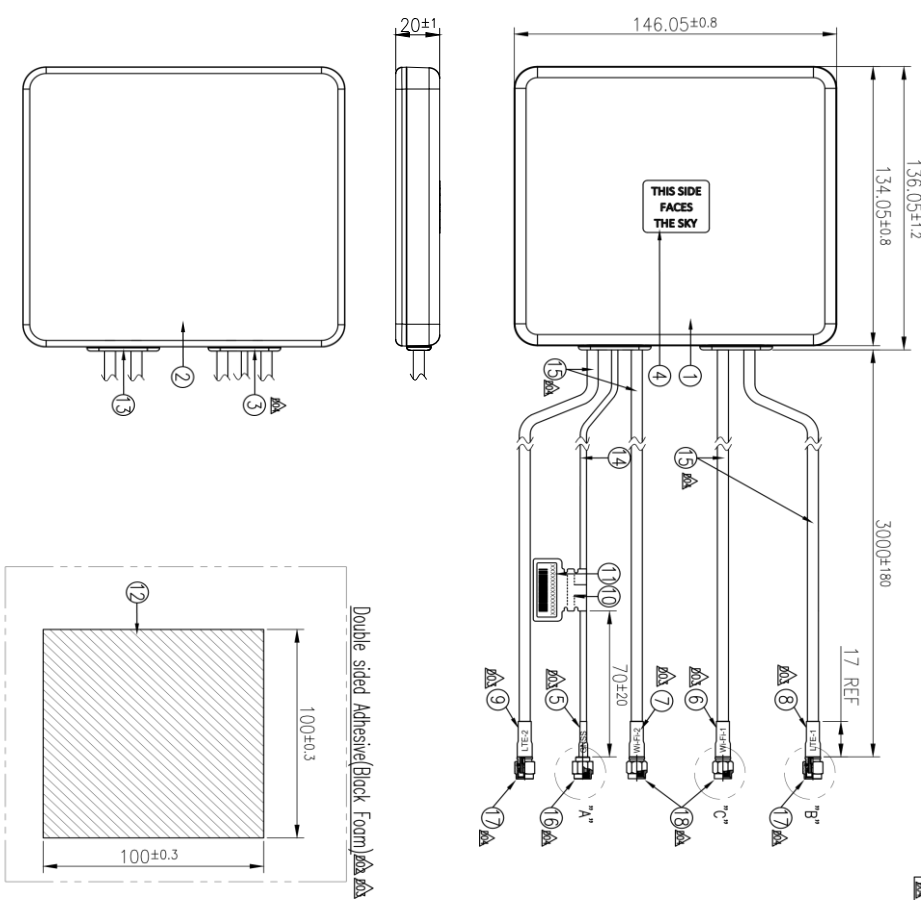
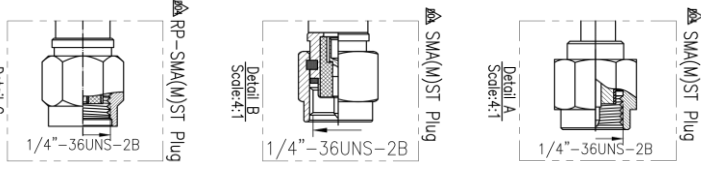
5550MHz



4. Mechanical Drawing (Unit: mm)

ISO NO.: EWM-18-B-0234
 STATE: Release
 NOTES: 1. All material must be kept compliant.
 2. The connector orientation has a fixed position to the universe as per drawing.
 3. Double Sided Adhesive Area: []

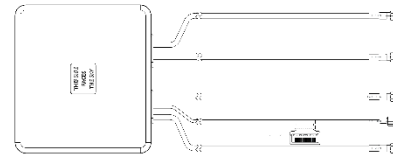
Item No.	Part Name	Material	Finish	Qty
1	Top Housing	PC	Black	1
2	Bottom Housing	PC	Black	1
3	Release 3 Tab	PC	Black	1
4	Release 4 Tab	PC	Black	1
5	Release 5 Tab	PC	Black	1
6	Release 6 Tab	PC	Black	1
7	Hand Strap (Length=10)	PC	Black, Silver, Red	1
8	Hand Strap (Length=15)	PC	Black, Silver, Red	1
9	Hand Strap (Length=20)	PC	Black, Silver, Red	1
10	Hand Strap (Length=25)	PC	Black, Silver, Red	1
11	Hand Strap (Length=30)	PC	Black, Silver, Red	1
12	Hand Strap (Length=35)	PC	Black, Silver, Red	1
13	Hand Strap (Length=40)	PC	Black, Silver, Red	1
14	Hand Strap (Length=45)	PC	Black, Silver, Red	1
15	Hand Strap (Length=50)	PC	Black, Silver, Red	1
16	Hand Strap (Length=55)	PC	Black, Silver, Red	1
17	Hand Strap (Length=60)	PC	Black, Silver, Red	1
18	Hand Strap (Length=65)	PC	Black, Silver, Red	1
19	Hand Strap (Length=70)	PC	Black, Silver, Red	1
20	Hand Strap (Length=75)	PC	Black, Silver, Red	1
21	Hand Strap (Length=80)	PC	Black, Silver, Red	1
22	Hand Strap (Length=85)	PC	Black, Silver, Red	1
23	Hand Strap (Length=90)	PC	Black, Silver, Red	1
24	Hand Strap (Length=95)	PC	Black, Silver, Red	1
25	Hand Strap (Length=100)	PC	Black, Silver, Red	1
26	Hand Strap (Length=105)	PC	Black, Silver, Red	1
27	Hand Strap (Length=110)	PC	Black, Silver, Red	1
28	Hand Strap (Length=115)	PC	Black, Silver, Red	1
29	Hand Strap (Length=120)	PC	Black, Silver, Red	1
30	Hand Strap (Length=125)	PC	Black, Silver, Red	1
31	Hand Strap (Length=130)	PC	Black, Silver, Red	1
32	Hand Strap (Length=135)	PC	Black, Silver, Red	1
33	Hand Strap (Length=140)	PC	Black, Silver, Red	1
34	Hand Strap (Length=145)	PC	Black, Silver, Red	1
35	Hand Strap (Length=150)	PC	Black, Silver, Red	1
36	Hand Strap (Length=155)	PC	Black, Silver, Red	1
37	Hand Strap (Length=160)	PC	Black, Silver, Red	1
38	Hand Strap (Length=165)	PC	Black, Silver, Red	1
39	Hand Strap (Length=170)	PC	Black, Silver, Red	1
40	Hand Strap (Length=175)	PC	Black, Silver, Red	1
41	Hand Strap (Length=180)	PC	Black, Silver, Red	1
42	Hand Strap (Length=185)	PC	Black, Silver, Red	1
43	Hand Strap (Length=190)	PC	Black, Silver, Red	1
44	Hand Strap (Length=195)	PC	Black, Silver, Red	1
45	Hand Strap (Length=200)	PC	Black, Silver, Red	1
46	Hand Strap (Length=205)	PC	Black, Silver, Red	1
47	Hand Strap (Length=210)	PC	Black, Silver, Red	1
48	Hand Strap (Length=215)	PC	Black, Silver, Red	1
49	Hand Strap (Length=220)	PC	Black, Silver, Red	1
50	Hand Strap (Length=225)	PC	Black, Silver, Red	1
51	Hand Strap (Length=230)	PC	Black, Silver, Red	1
52	Hand Strap (Length=235)	PC	Black, Silver, Red	1
53	Hand Strap (Length=240)	PC	Black, Silver, Red	1
54	Hand Strap (Length=245)	PC	Black, Silver, Red	1
55	Hand Strap (Length=250)	PC	Black, Silver, Red	1
56	Hand Strap (Length=255)	PC	Black, Silver, Red	1
57	Hand Strap (Length=260)	PC	Black, Silver, Red	1
58	Hand Strap (Length=265)	PC	Black, Silver, Red	1
59	Hand Strap (Length=270)	PC	Black, Silver, Red	1
60	Hand Strap (Length=275)	PC	Black, Silver, Red	1
61	Hand Strap (Length=280)	PC	Black, Silver, Red	1
62	Hand Strap (Length=285)	PC	Black, Silver, Red	1
63	Hand Strap (Length=290)	PC	Black, Silver, Red	1
64	Hand Strap (Length=295)	PC	Black, Silver, Red	1
65	Hand Strap (Length=300)	PC	Black, Silver, Red	1
66	Hand Strap (Length=305)	PC	Black, Silver, Red	1
67	Hand Strap (Length=310)	PC	Black, Silver, Red	1
68	Hand Strap (Length=315)	PC	Black, Silver, Red	1
69	Hand Strap (Length=320)	PC	Black, Silver, Red	1
70	Hand Strap (Length=325)	PC	Black, Silver, Red	1
71	Hand Strap (Length=330)	PC	Black, Silver, Red	1
72	Hand Strap (Length=335)	PC	Black, Silver, Red	1
73	Hand Strap (Length=340)	PC	Black, Silver, Red	1
74	Hand Strap (Length=345)	PC	Black, Silver, Red	1
75	Hand Strap (Length=350)	PC	Black, Silver, Red	1
76	Hand Strap (Length=355)	PC	Black, Silver, Red	1
77	Hand Strap (Length=360)	PC	Black, Silver, Red	1
78	Hand Strap (Length=365)	PC	Black, Silver, Red	1
79	Hand Strap (Length=370)	PC	Black, Silver, Red	1
80	Hand Strap (Length=375)	PC	Black, Silver, Red	1
81	Hand Strap (Length=380)	PC	Black, Silver, Red	1
82	Hand Strap (Length=385)	PC	Black, Silver, Red	1
83	Hand Strap (Length=390)	PC	Black, Silver, Red	1
84	Hand Strap (Length=395)	PC	Black, Silver, Red	1
85	Hand Strap (Length=400)	PC	Black, Silver, Red	1
86	Hand Strap (Length=405)	PC	Black, Silver, Red	1
87	Hand Strap (Length=410)	PC	Black, Silver, Red	1
88	Hand Strap (Length=415)	PC	Black, Silver, Red	1
89	Hand Strap (Length=420)	PC	Black, Silver, Red	1
90	Hand Strap (Length=425)	PC	Black, Silver, Red	1
91	Hand Strap (Length=430)	PC	Black, Silver, Red	1
92	Hand Strap (Length=435)	PC	Black, Silver, Red	1
93	Hand Strap (Length=440)	PC	Black, Silver, Red	1
94	Hand Strap (Length=445)	PC	Black, Silver, Red	1
95	Hand Strap (Length=450)	PC	Black, Silver, Red	1
96	Hand Strap (Length=455)	PC	Black, Silver, Red	1
97	Hand Strap (Length=460)	PC	Black, Silver, Red	1
98	Hand Strap (Length=465)	PC	Black, Silver, Red	1
99	Hand Strap (Length=470)	PC	Black, Silver, Red	1
100	Hand Strap (Length=475)	PC	Black, Silver, Red	1
101	Hand Strap (Length=480)	PC	Black, Silver, Red	1
102	Hand Strap (Length=485)	PC	Black, Silver, Red	1
103	Hand Strap (Length=490)	PC	Black, Silver, Red	1
104	Hand Strap (Length=495)	PC	Black, Silver, Red	1
105	Hand Strap (Length=500)	PC	Black, Silver, Red	1
106	Hand Strap (Length=505)	PC	Black, Silver, Red	1
107	Hand Strap (Length=510)	PC	Black, Silver, Red	1
108	Hand Strap (Length=515)	PC	Black, Silver, Red	1
109	Hand Strap (Length=520)	PC	Black, Silver, Red	1
110	Hand Strap (Length=525)	PC	Black, Silver, Red	1
111	Hand Strap (Length=530)	PC	Black, Silver, Red	1
112	Hand Strap (Length=535)	PC	Black, Silver, Red	1
113	Hand Strap (Length=540)	PC	Black, Silver, Red	1
114	Hand Strap (Length=545)	PC	Black, Silver, Red	1
115	Hand Strap (Length=550)	PC	Black, Silver, Red	1
116	Hand Strap (Length=555)	PC	Black, Silver, Red	1
117	Hand Strap (Length=560)	PC	Black, Silver, Red	1
118	Hand Strap (Length=565)	PC	Black, Silver, Red	1
119	Hand Strap (Length=570)	PC	Black, Silver, Red	1
120	Hand Strap (Length=575)	PC	Black, Silver, Red	1
121	Hand Strap (Length=580)	PC	Black, Silver, Red	1
122	Hand Strap (Length=585)	PC	Black, Silver, Red	1
123	Hand Strap (Length=590)	PC	Black, Silver, Red	1
124	Hand Strap (Length=595)	PC	Black, Silver, Red	1
125	Hand Strap (Length=600)	PC	Black, Silver, Red	1
126	Hand Strap (Length=605)	PC	Black, Silver, Red	1
127	Hand Strap (Length=610)	PC	Black, Silver, Red	1
128	Hand Strap (Length=615)	PC	Black, Silver, Red	1
129	Hand Strap (Length=620)	PC	Black, Silver, Red	1
130	Hand Strap (Length=625)	PC	Black, Silver, Red	1
131	Hand Strap (Length=630)	PC	Black, Silver, Red	1
132	Hand Strap (Length=635)	PC	Black, Silver, Red	1
133	Hand Strap (Length=640)	PC	Black, Silver, Red	1
134	Hand Strap (Length=645)	PC	Black, Silver, Red	1
135	Hand Strap (Length=650)	PC	Black, Silver, Red	1
136	Hand Strap (Length=655)	PC	Black, Silver, Red	1
137	Hand Strap (Length=660)	PC	Black, Silver, Red	1
138	Hand Strap (Length=665)	PC	Black, Silver, Red	1
139	Hand Strap (Length=670)	PC	Black, Silver, Red	1
140	Hand Strap (Length=675)	PC	Black, Silver, Red	1
141	Hand Strap (Length=680)	PC	Black, Silver, Red	1
142	Hand Strap (Length=685)	PC	Black, Silver, Red	1
143	Hand Strap (Length=690)	PC	Black, Silver, Red	1
144	Hand Strap (Length=695)	PC	Black, Silver, Red	1
145	Hand Strap (Length=700)	PC	Black, Silver, Red	1
146	Hand Strap (Length=705)	PC	Black, Silver, Red	1
147	Hand Strap (Length=710)	PC	Black, Silver, Red	1
148	Hand Strap (Length=715)	PC	Black, Silver, Red	1
149	Hand Strap (Length=720)	PC	Black, Silver, Red	1
150	Hand Strap (Length=725)	PC	Black, Silver, Red	1
151	Hand Strap (Length=730)	PC	Black, Silver, Red	1
152	Hand Strap (Length=735)	PC	Black, Silver, Red	1
153	Hand Strap (Length=740)	PC	Black, Silver, Red	1
154	Hand Strap (Length=745)	PC	Black, Silver, Red	1
155	Hand Strap (Length=750)	PC	Black, Silver, Red	1
156	Hand Strap (Length=755)	PC	Black, Silver, Red	1
157	Hand Strap (Length=760)	PC	Black, Silver, Red	1
158	Hand Strap (Length=765)	PC	Black, Silver, Red	1
159	Hand Strap (Length=770)	PC	Black, Silver, Red	1
160	Hand Strap (Length=775)	PC	Black, Silver, Red	1
161	Hand Strap (Length=780)	PC	Black, Silver, Red	1
162	Hand Strap (Length=785)	PC	Black, Silver, Red	1
163	Hand Strap (Length=790)	PC	Black, Silver, Red	1
164	Hand Strap (Length=795)	PC	Black, Silver, Red	1
165	Hand Strap (Length=800)	PC	Black, Silver, Red	1
166	Hand Strap (Length=805)	PC	Black, Silver, Red	1
167	Hand Strap (Length=810)	PC	Black, Silver, Red	1
168	Hand Strap (Length=815)	PC	Black, Silver, Red	1
169	Hand Strap (Length=820)	PC	Black, Silver, Red	1
170	Hand Strap (Length=825)	PC	Black, Silver, Red	1
171	Hand Strap (Length=830)	PC	Black, Silver, Red	1
172	Hand Strap (Length=835)	PC	Black, Silver, Red	1
173	Hand Strap (Length=840)	PC	Black, Silver, Red	1
174	Hand Strap (Length=845)	PC	Black, Silver, Red	1
175	Hand Strap (Length=850)	PC	Black, Silver, Red	1
176	Hand Strap (Length=855)	PC	Black, Silver, Red	1
177	Hand Strap (Length=860)	PC	Black, Silver, Red	1
178	Hand Strap (Length=865)	PC	Black, Silver, Red	1
179	Hand Strap (Length=870)	PC	Black, Silver, Red	1
180	Hand Strap (Length=875)	PC	Black, Silver, Red	1
181	Hand Strap (Length=880)	PC	Black, Silver, Red	1
182	Hand Strap (Length=885)	PC	Black, Silver, Red	1
183	Hand Strap (Length=890)	PC	Black, Silver, Red	1
184	Hand Strap (Length=895)	PC	Black, Silver, Red	1
185	Hand Strap (Length=900)	PC	Black, Silver, Red	1
186	Hand Strap (Length=905)	PC	Black, Silver, Red	1
187	Hand Strap (Length=910)	PC	Black, Silver, Red	1
188	Hand Strap (Length=915)	PC	Black, Silver, Red	1
189	Hand Strap (Length=920)	PC	Black, Silver, Red	1
190	Hand Strap (Length=925)	PC	Black, Silver, Red	1
191	Hand Strap (Length=930)	PC	Black, Silver, Red	1
192	Hand Strap (Length=935)	PC	Black, Silver, Red	1
193	Hand Strap (Length=940)	PC	Black, Silver, Red	1
194	Hand Strap (Length=945)	PC	Black, Silver, Red	1
195	Hand Strap (Length=950)	PC	Black, Silver, Red	1
196	Hand Strap (Length=955)	PC	Black, Silver, Red	1
197	Hand Strap (Length=960)	PC	Black, Silver, Red	1
198	Hand Strap (Length=965)	PC	Black, Silver, Red	1
199	Hand Strap (Length=970)	PC	Black, Silver, Red	1
200	Hand Strap (Length=975)	PC	Black, Silver, Red	1
201	Hand Strap (Length=980)	PC	Black, Silver, Red	1
202	Hand Strap (Length=985)	PC	Black, Silver, Red	1
203	Hand Strap (Length=990)	PC	Black, Silver, Red	1
204	Hand Strap (Length=995)	PC	Black, Silver, Red	1
205	Hand Strap (Length=1000)	PC	Black, Silver, Red	1



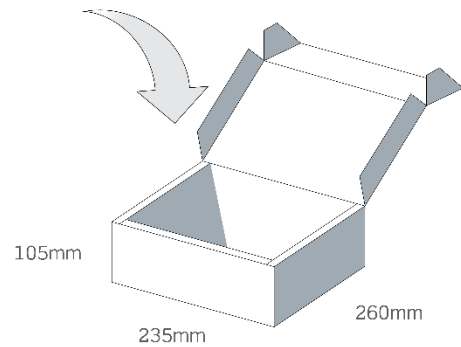
APPROVED BY: Wayne	DATE: 2016/07/05	TITLE: 5m1 Adhesive SMA(M)-RG174 SMA(M)-LT(142)
CHECK BY: Jack/Jason	DATE: 2016/07/05	PART NO.: MA950A1BICG.007
DRAWN BY: Antjie	DATE: 2016/07/05	SCALE: 1:2
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS (MM)	DATE: 2016/07/05	PAGES: 1/1
TAOGLAS	DATE: 2016/07/05	REV: D04

REV./AREA	DESCRIPTION	ENG.	APPROVED	DATE
1	Initial Design	Antjie	Wayne	2016/07/05
2	Final Design and Release	Bonnie	Paul	2017/09/25
3	Final Design and Release	Ruby	Aaron	2020/01/31
4	Final Design and Release	Ruby	Aaron	2021/09/16

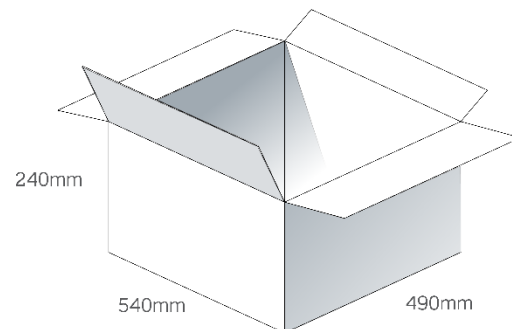
5. Packaging



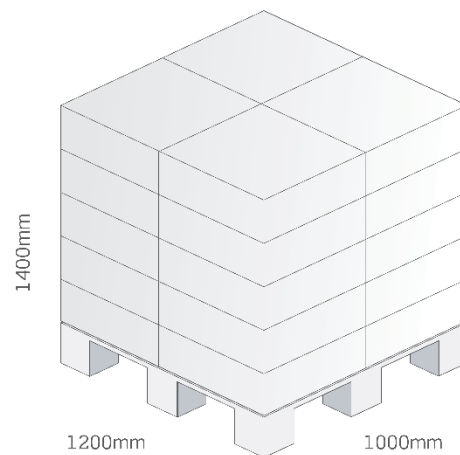
1 MA950.A.LBICG.007 per small box
 Box Dimensions - 260 x 235 x 105mm
 Weight - 900g



1 Outer Carton
 Carton Dimensions - 540 x 490 x 240mm
 8 pcs MA950.A.LBICG.007 per carton
 Weight - 8Kg



Pallet Dimensions 1200*1000*1400mm
 20 Cartons per Pallet
 4 Cartons per layer
 5 Layers

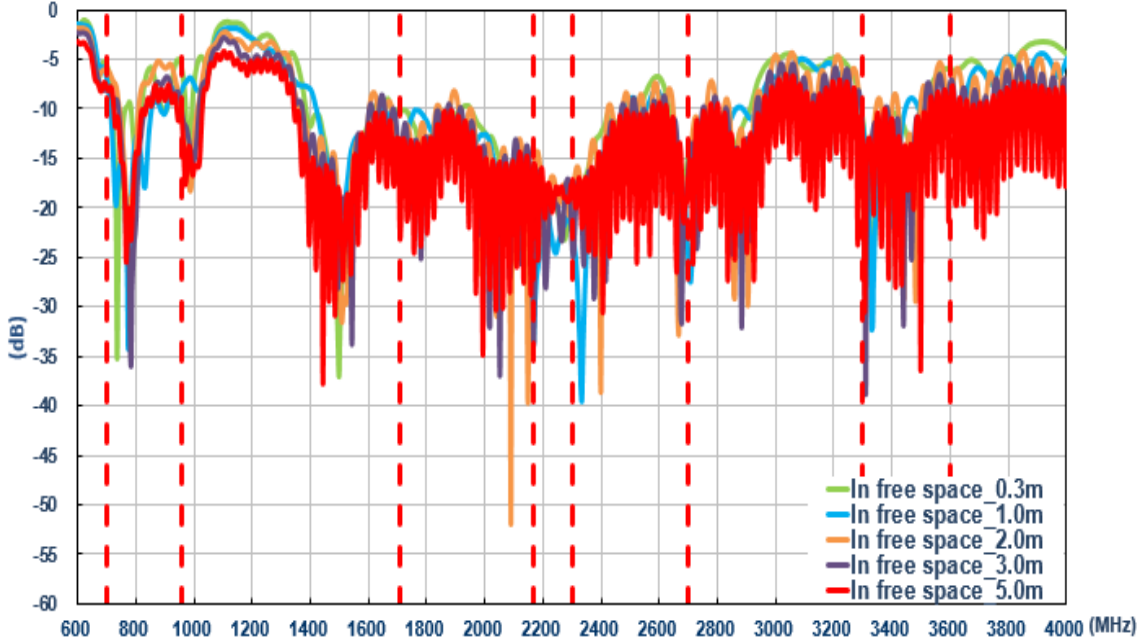


6. Application Note

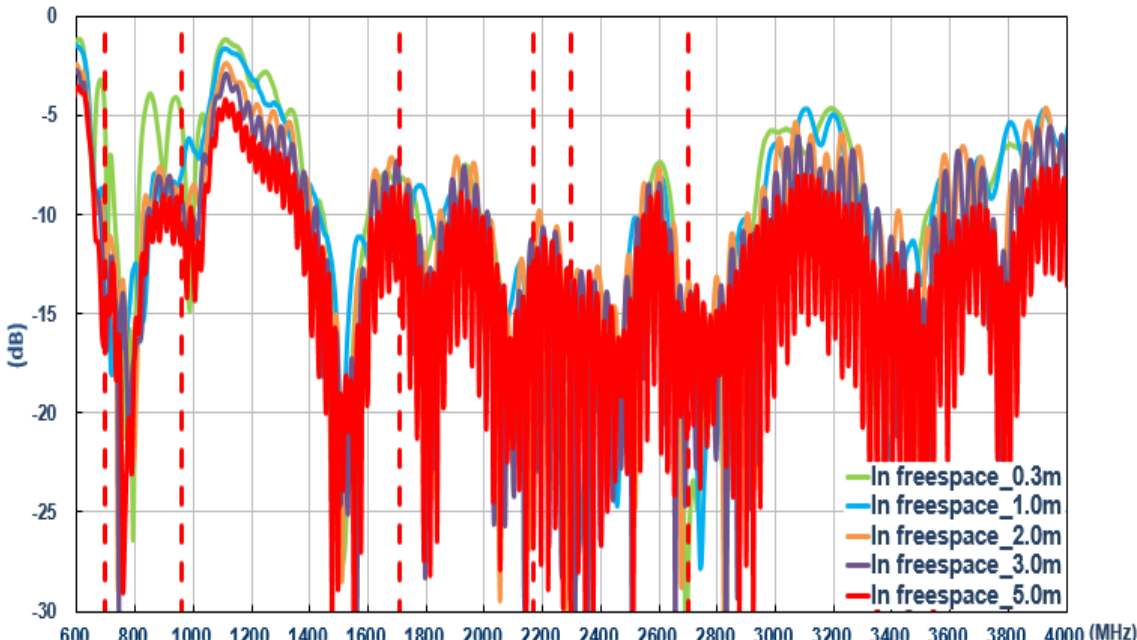
The MA950 antenna performance with different cable lengths is shown below.

6.1. In free space (LTE)

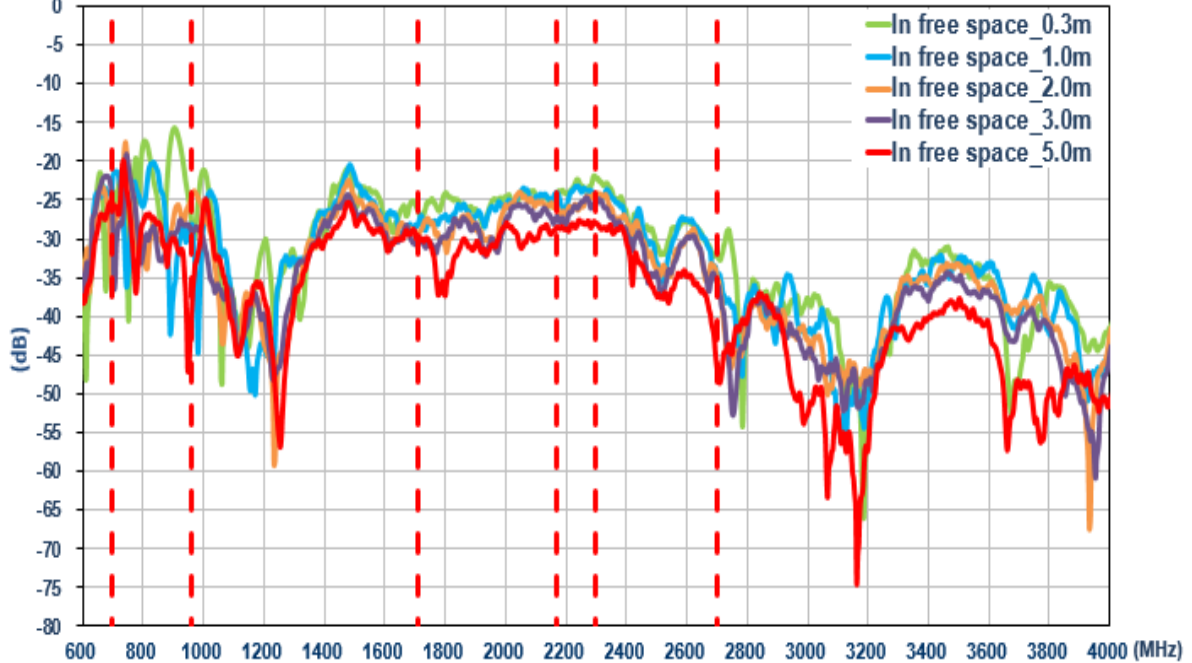
6.1.1. Return Loss (LTE_MIMO_1)



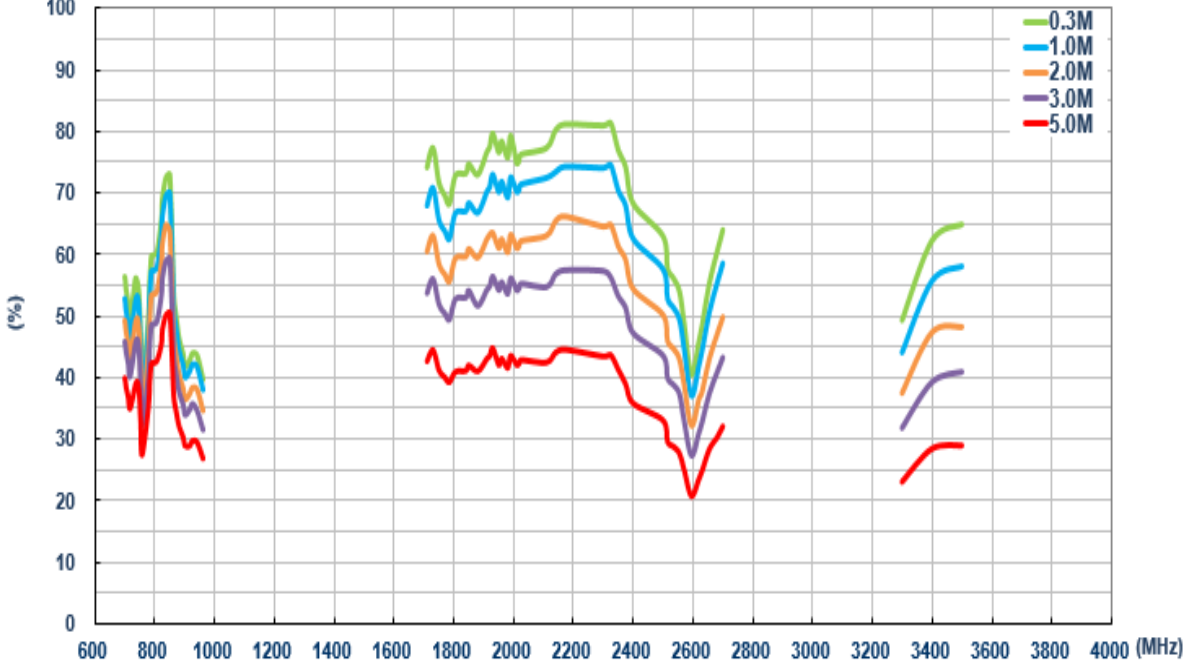
6.1.2. Return Loss (LTE_MIMO_2)



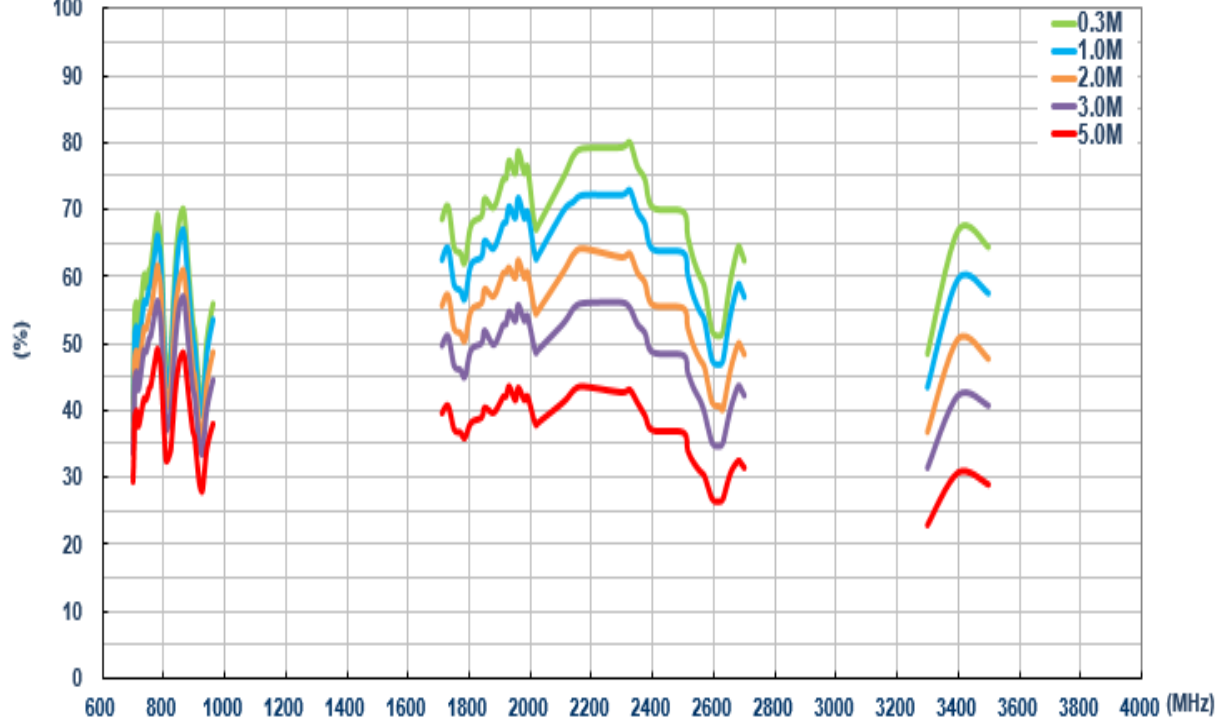
6.1.3. Isolation (LTE antenna)



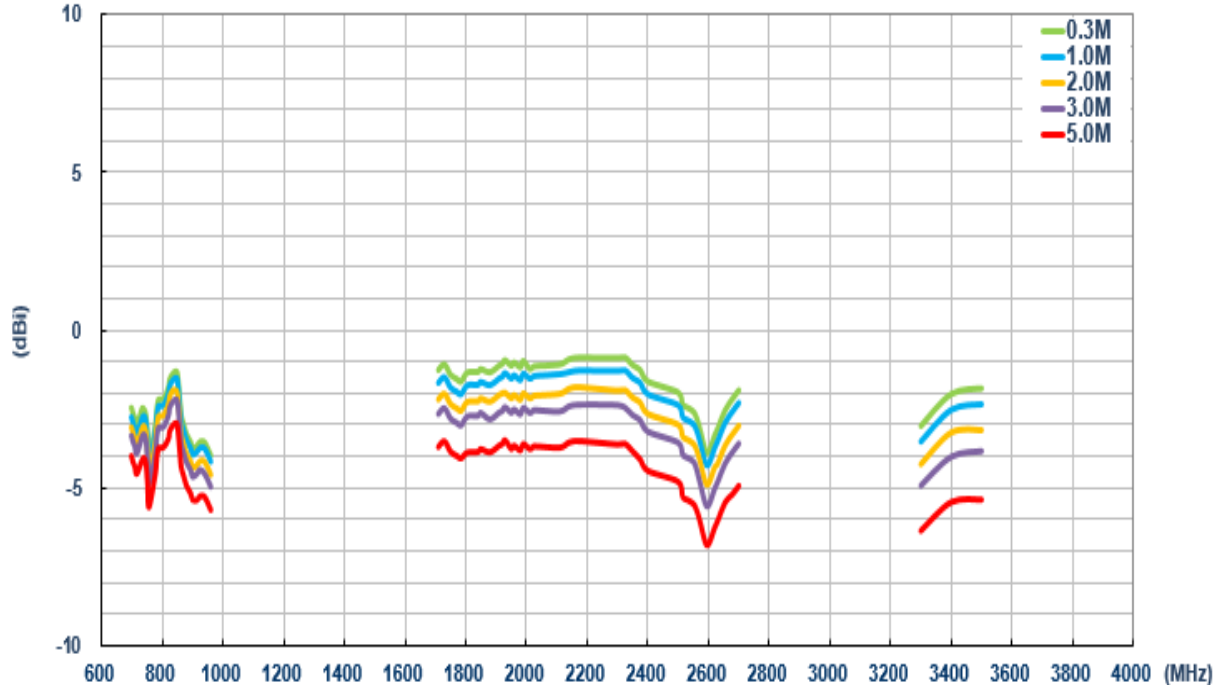
6.1.4. Efficiency (LTE MIMO_1)



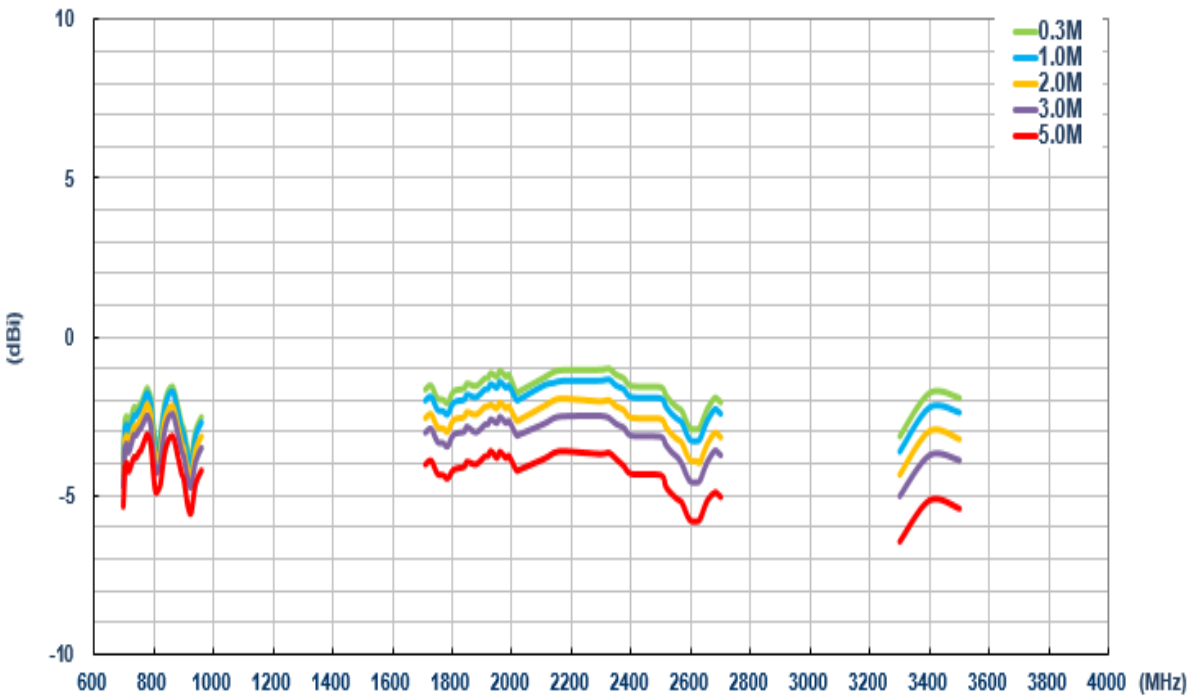
6.1.5. Efficiency (LTE MIMO_2)



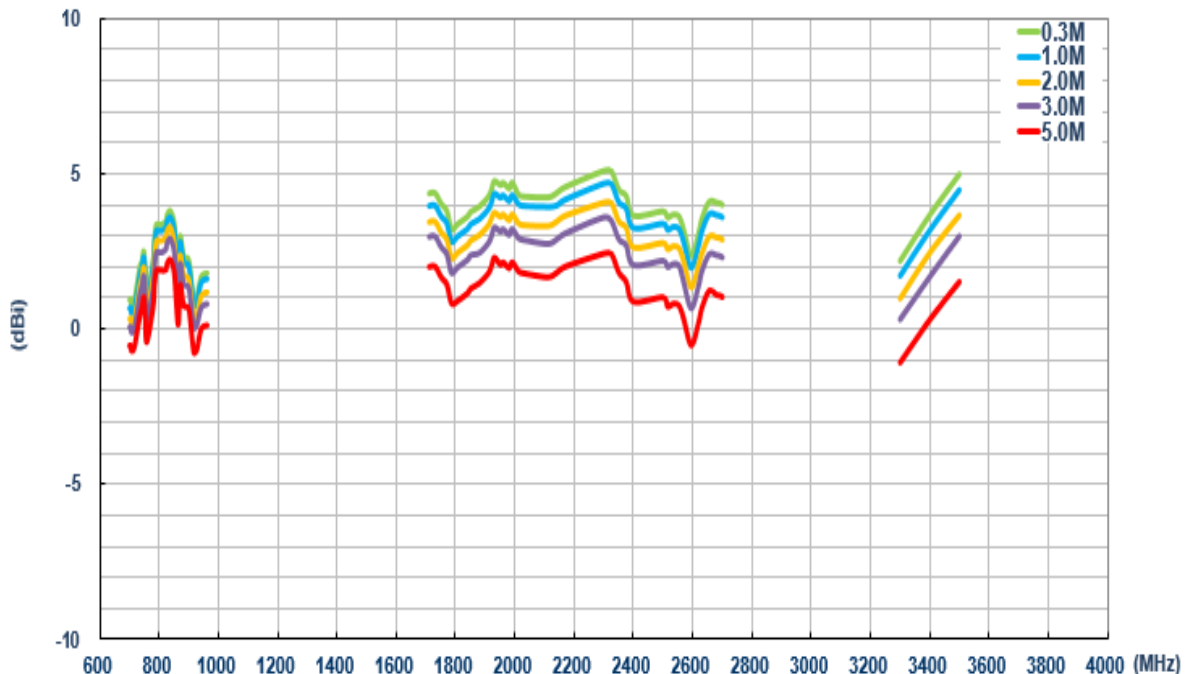
6.1.6. Average Gain (LTE MIMO_1)



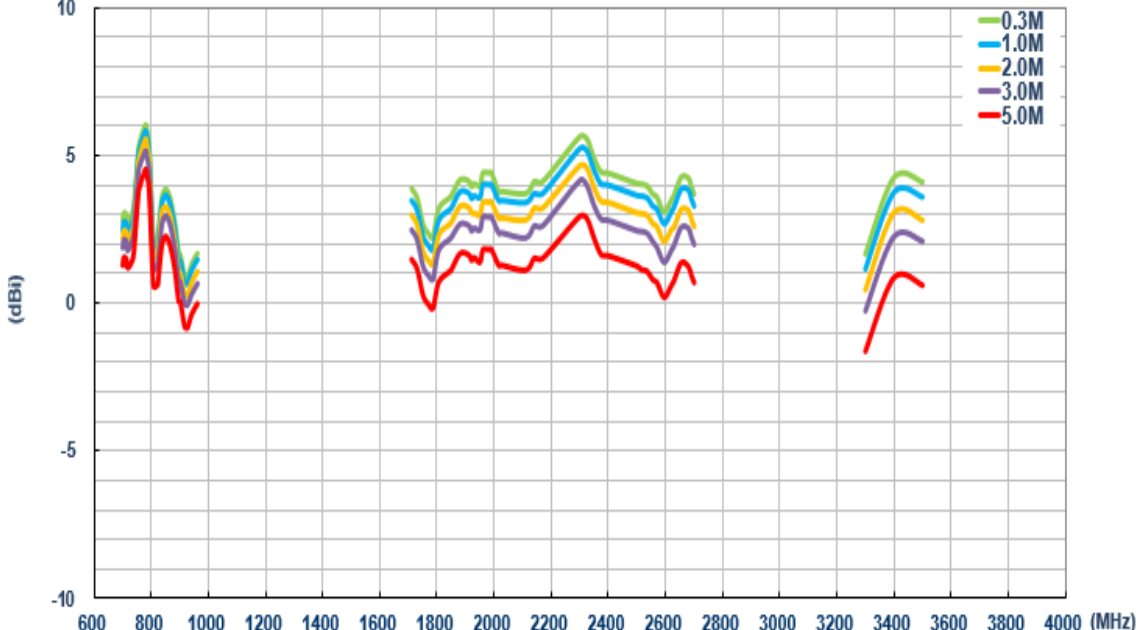
6.1.7. Average Gain (LTE MIMO_2)



6.1.8. Peak Gain (LTE MIMO_1)

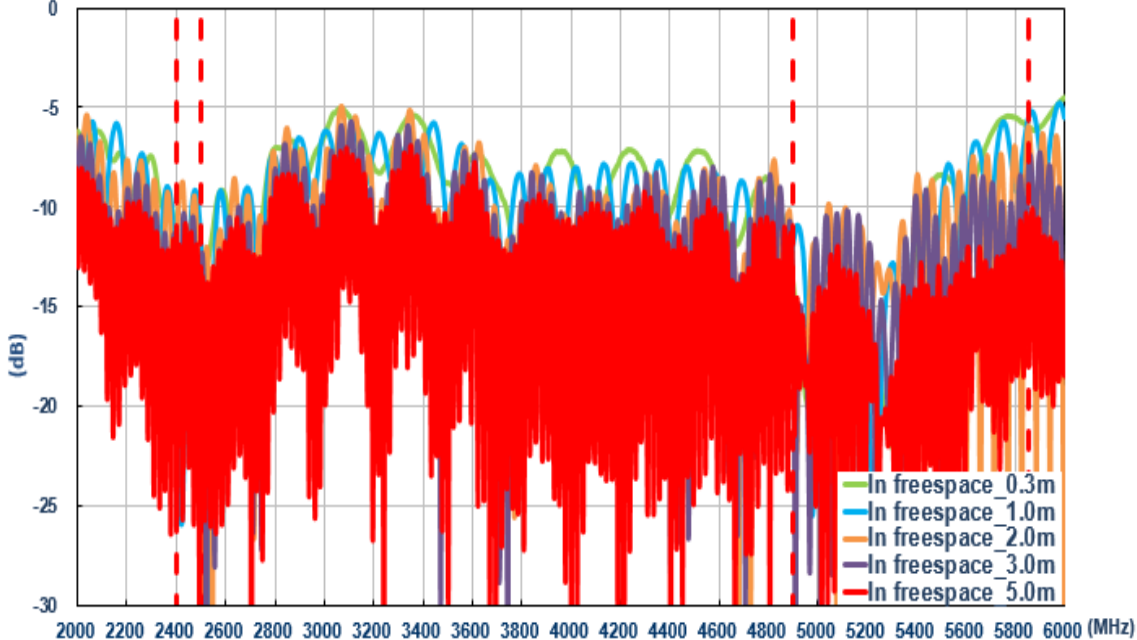


6.1.9. Peak Gain (LTE MIMO_2)

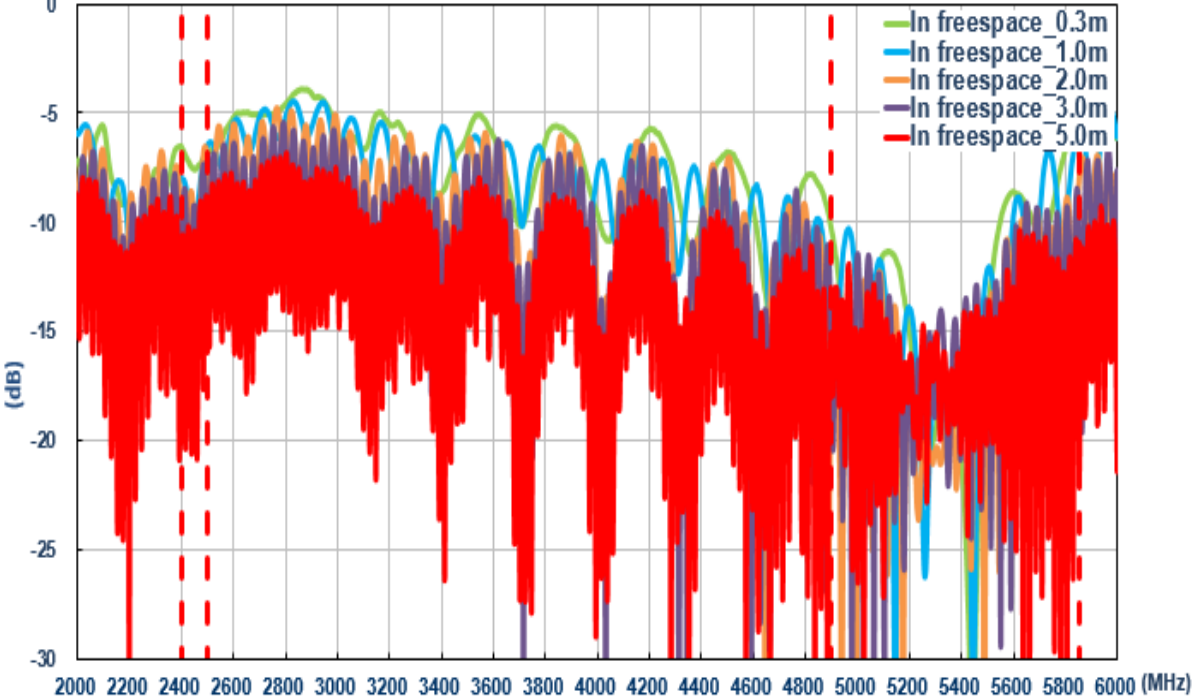


6.2. In free space (Wi-Fi)

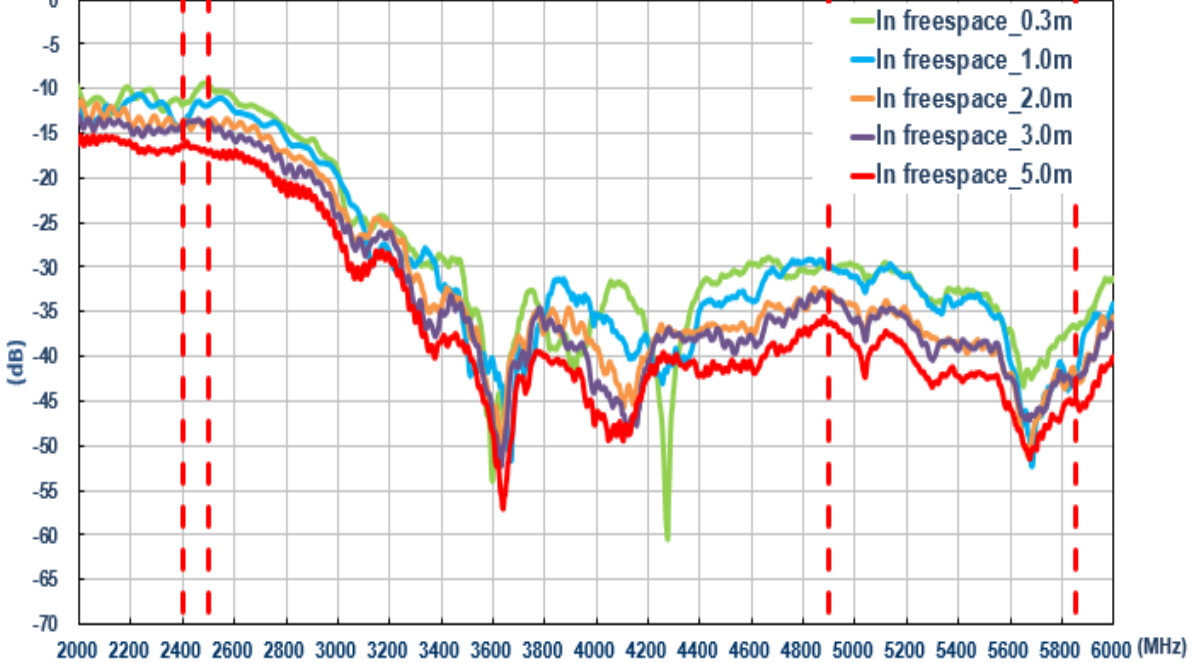
6.2.1. Return Loss (Wi-Fi_MIMO_1)



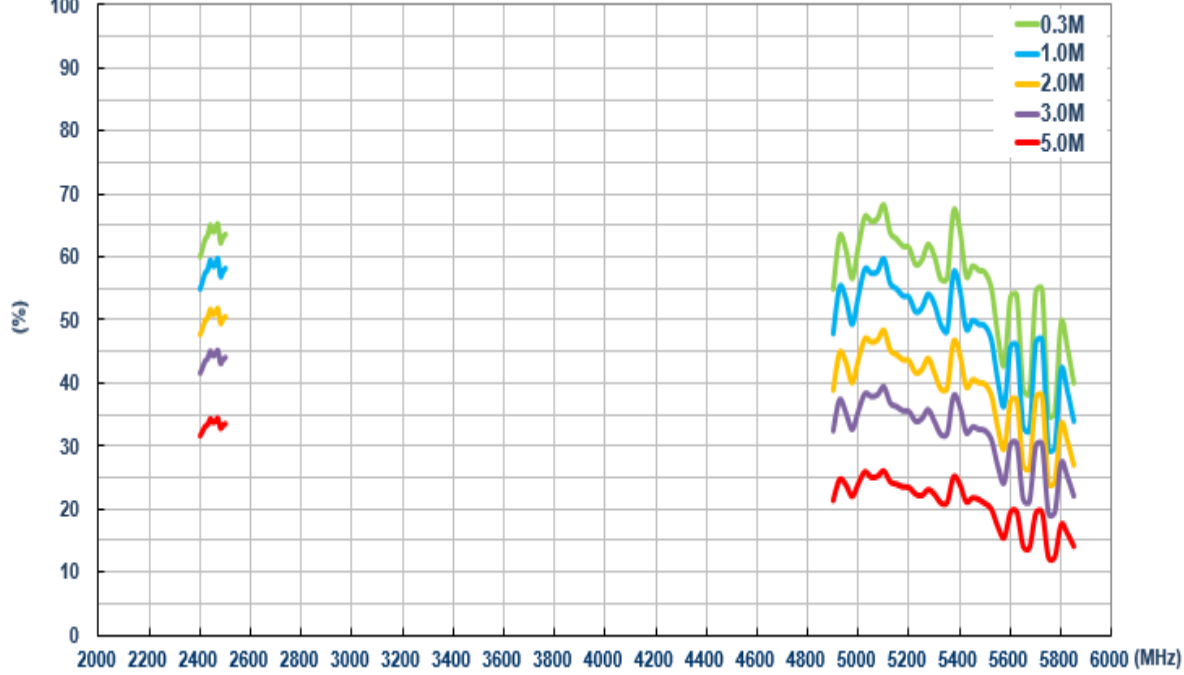
6.2.2. Return Loss (Wi-Fi_MIMO_2)



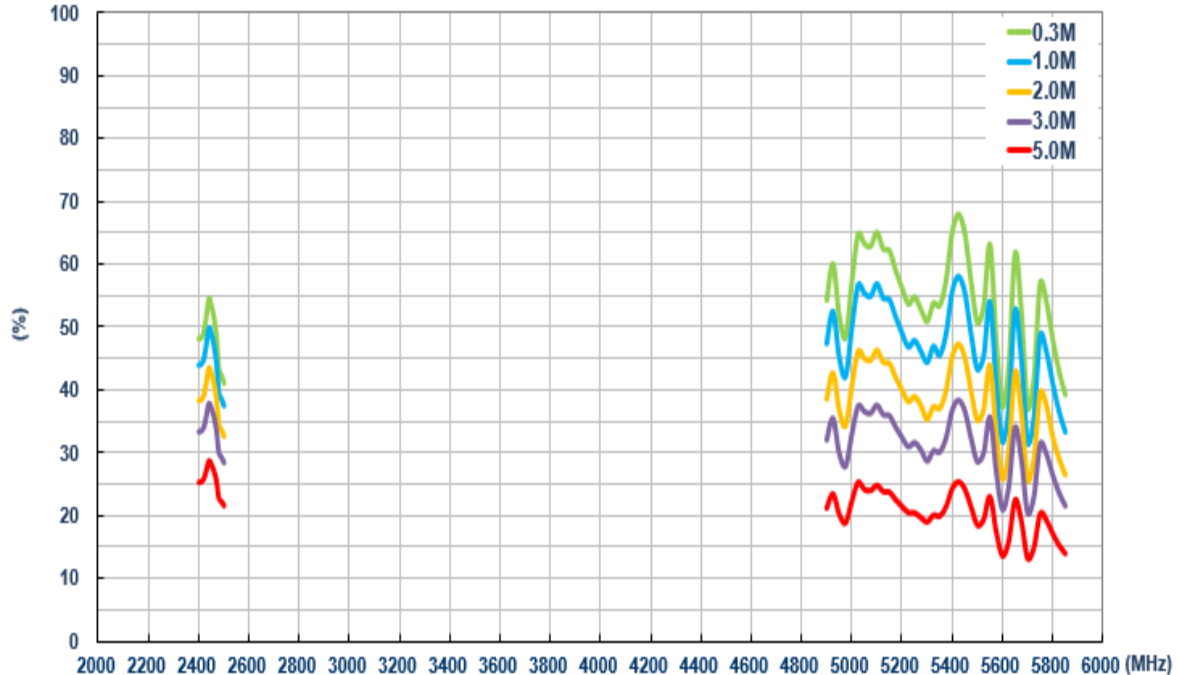
6.2.3. Isolation (Wi-Fi)



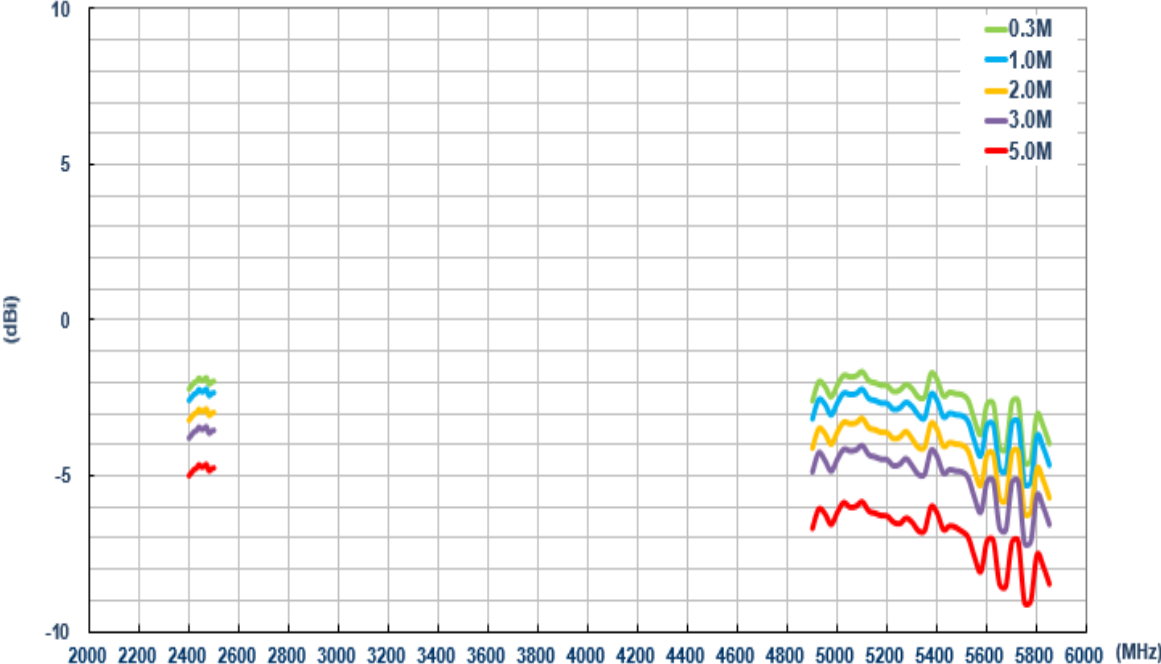
6.2.4. Efficiency (Wi-Fi MIMO_1)



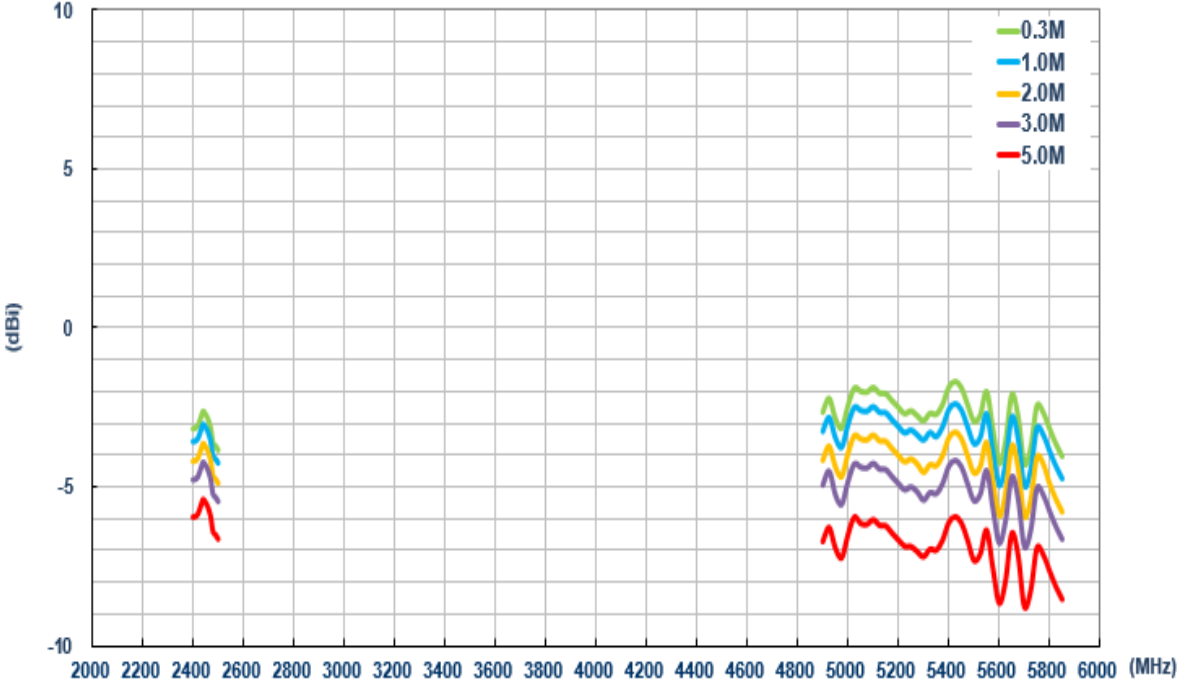
6.2.5. Efficiency (Wi-Fi MIMO_2)



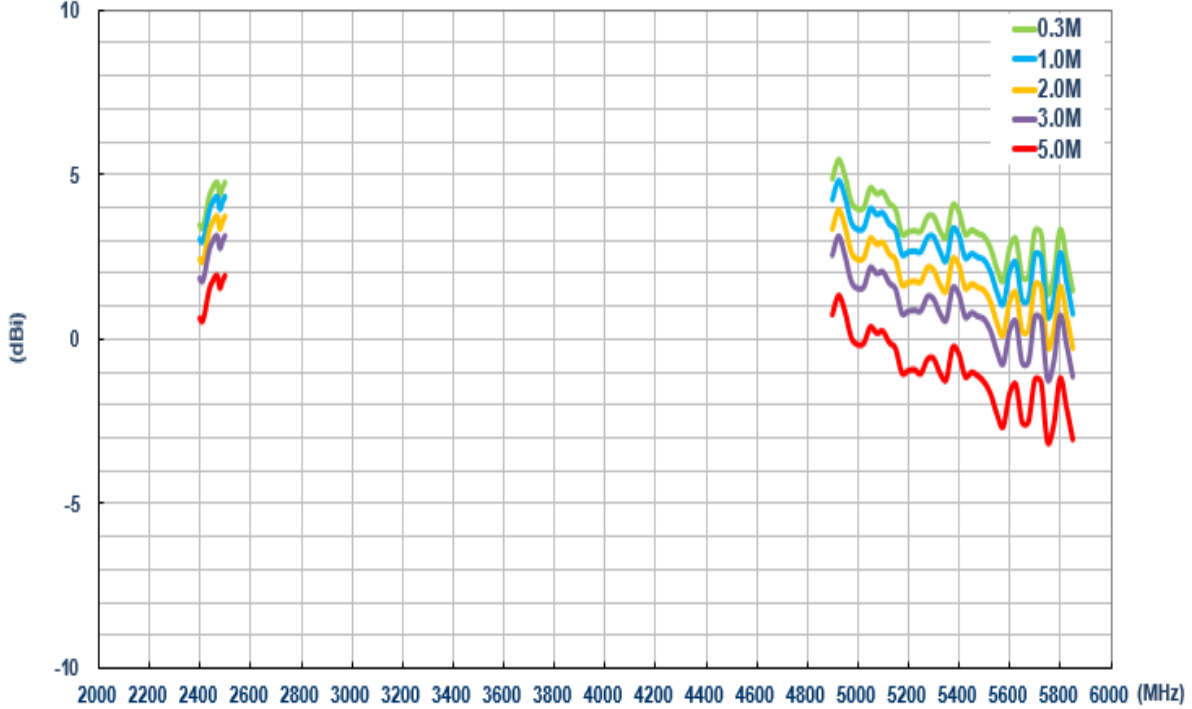
6.2.6. Average Gain (Wi-Fi MIMO_1)



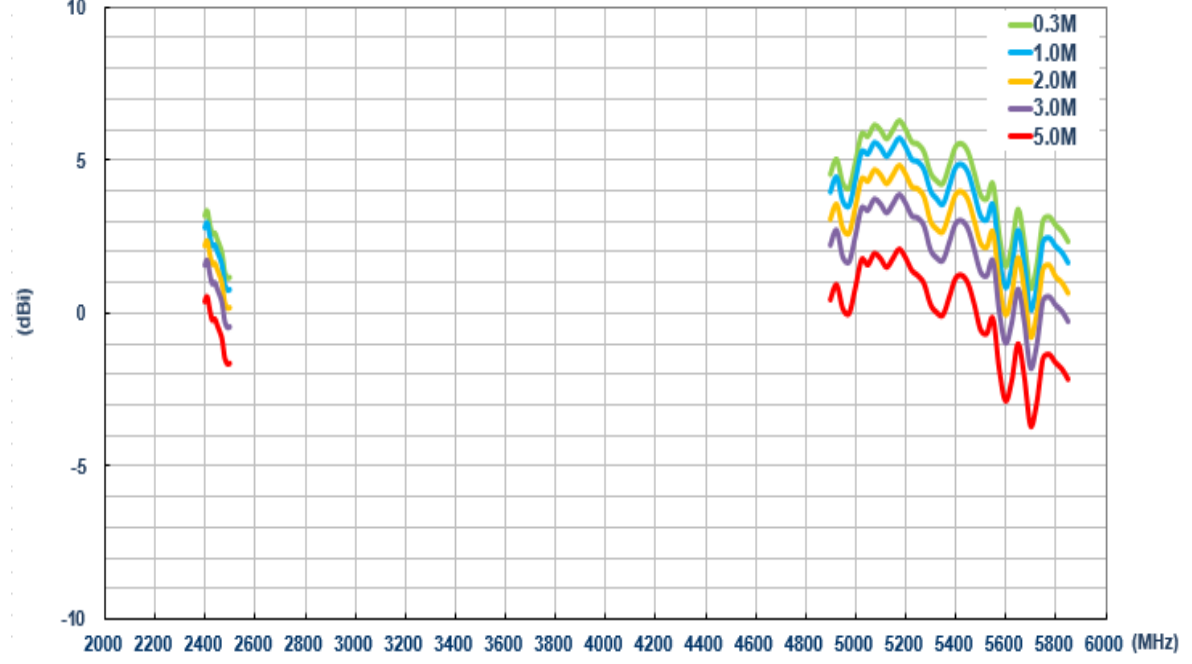
6.2.7. Average Gain (Wi-Fi MIMO_2)



6.2.8. Peak Gain (Wi-Fi MIMO_1)

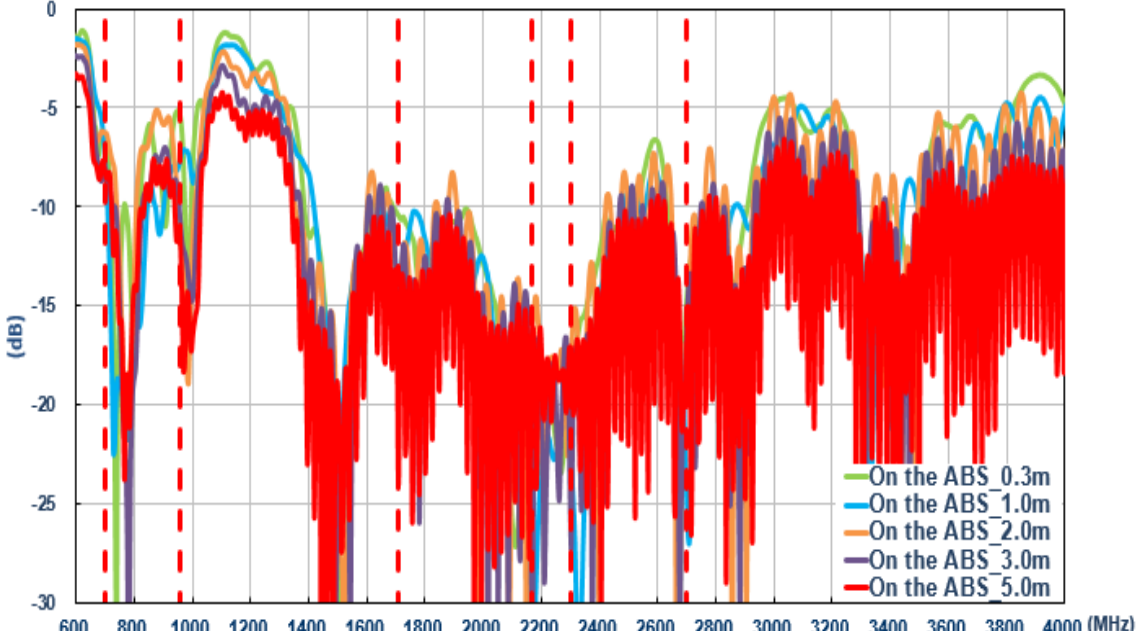


6.2.9. Peak Gain (Wi-Fi MIMO_2)

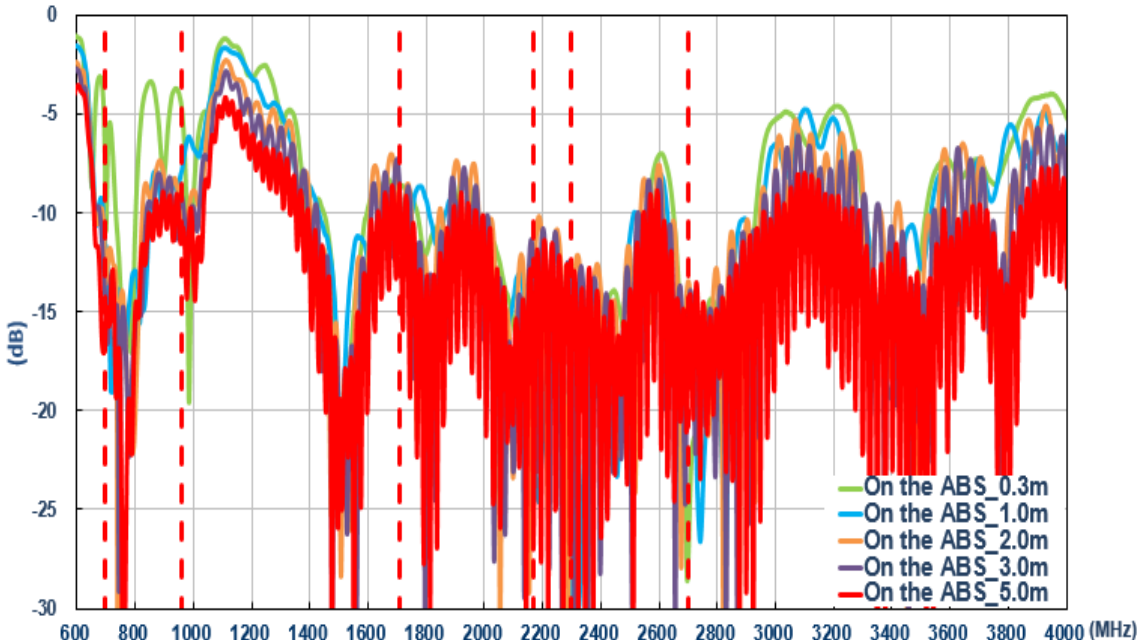


6.3. On the ABS (LTE)

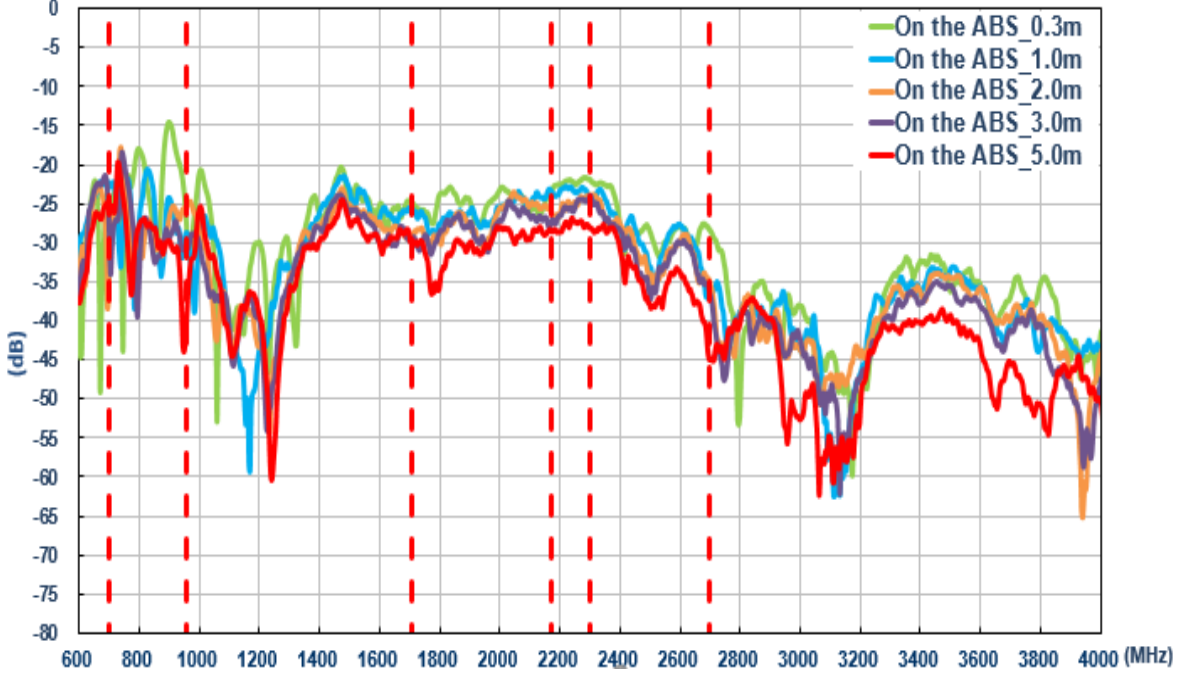
6.3.1. Return Loss (LTE_MIMO_1)



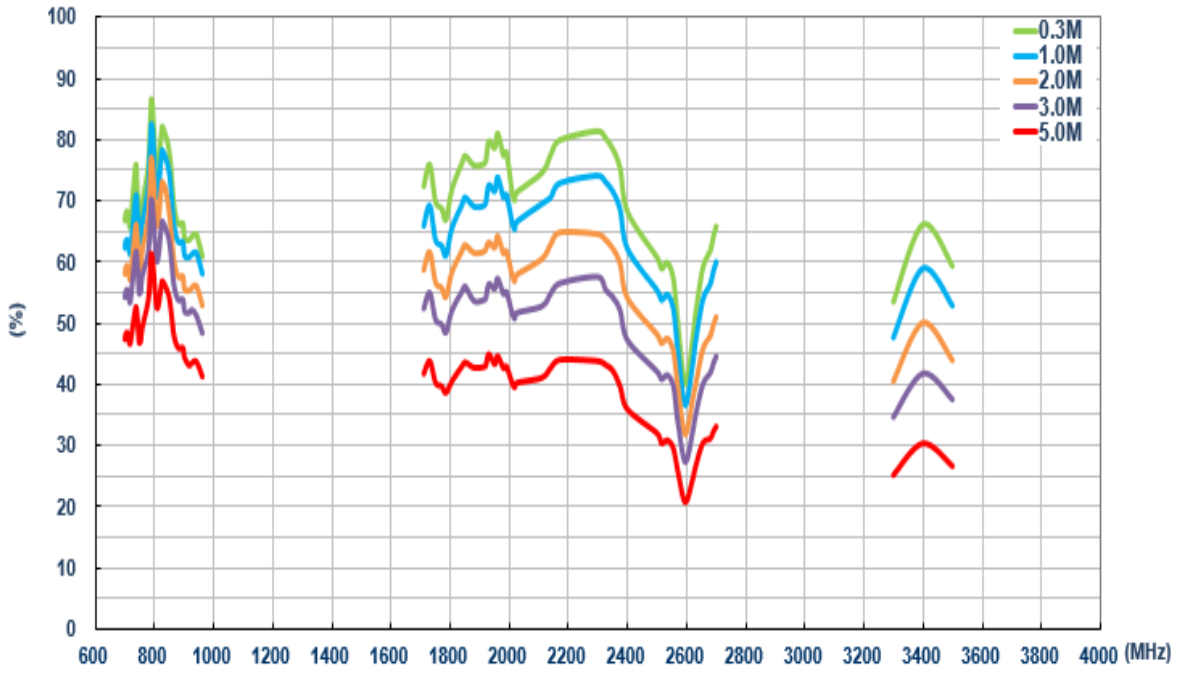
6.3.2. Return Loss (LTE_MIMO_2)



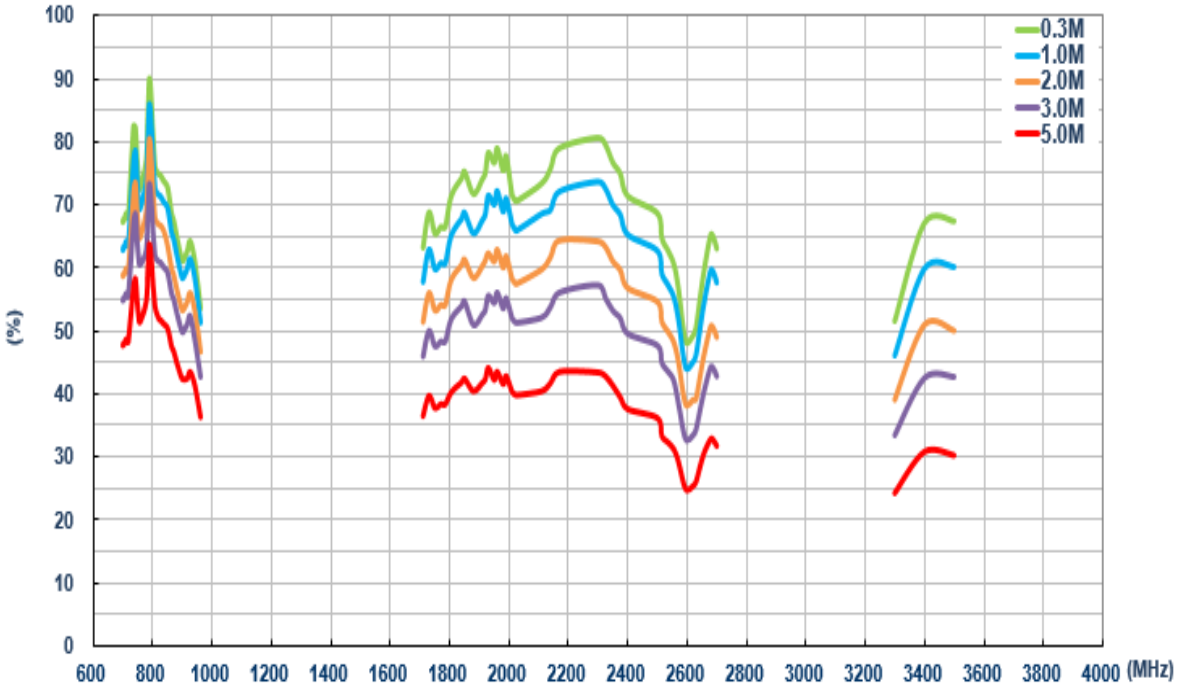
6.3.3. Isolation (LTE antenna)



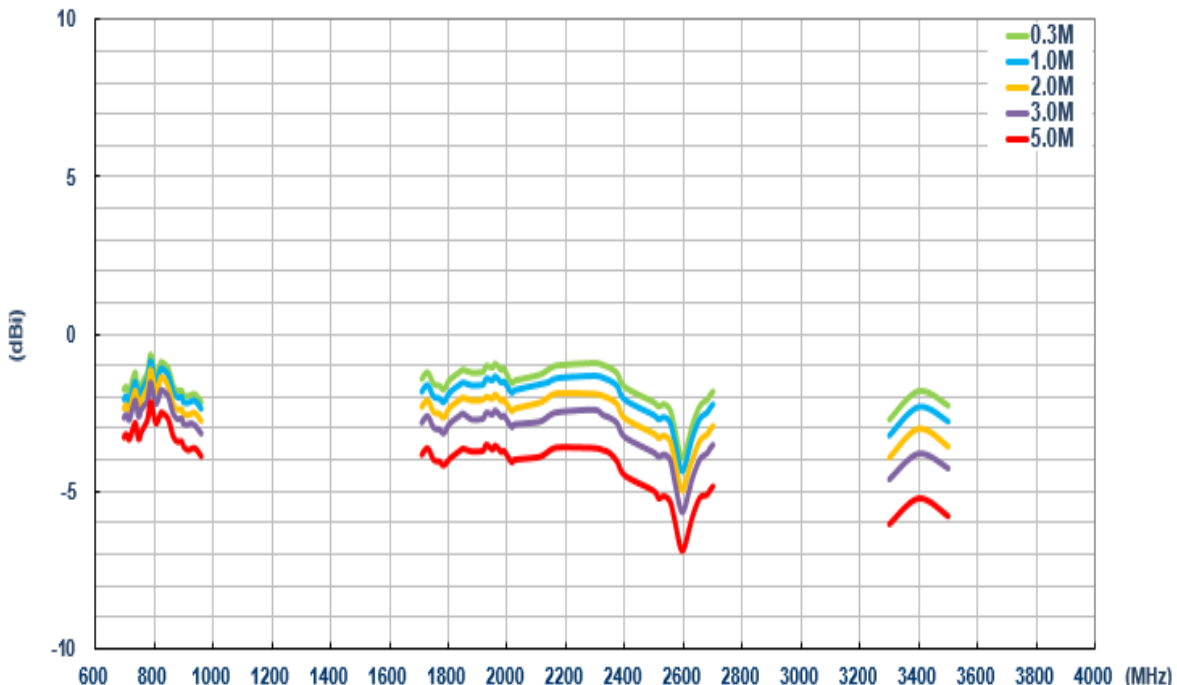
6.3.4. Efficiency (LTE MIMO_1)



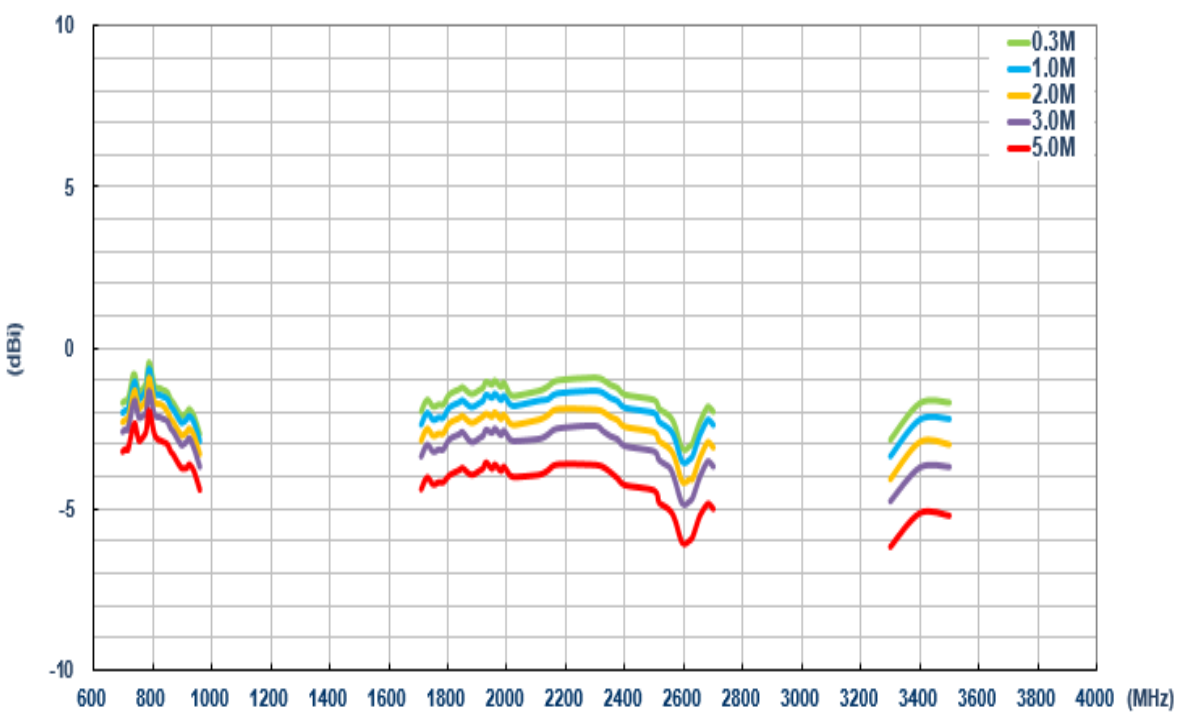
6.3.5. Efficiency (LTE MIMO_2)



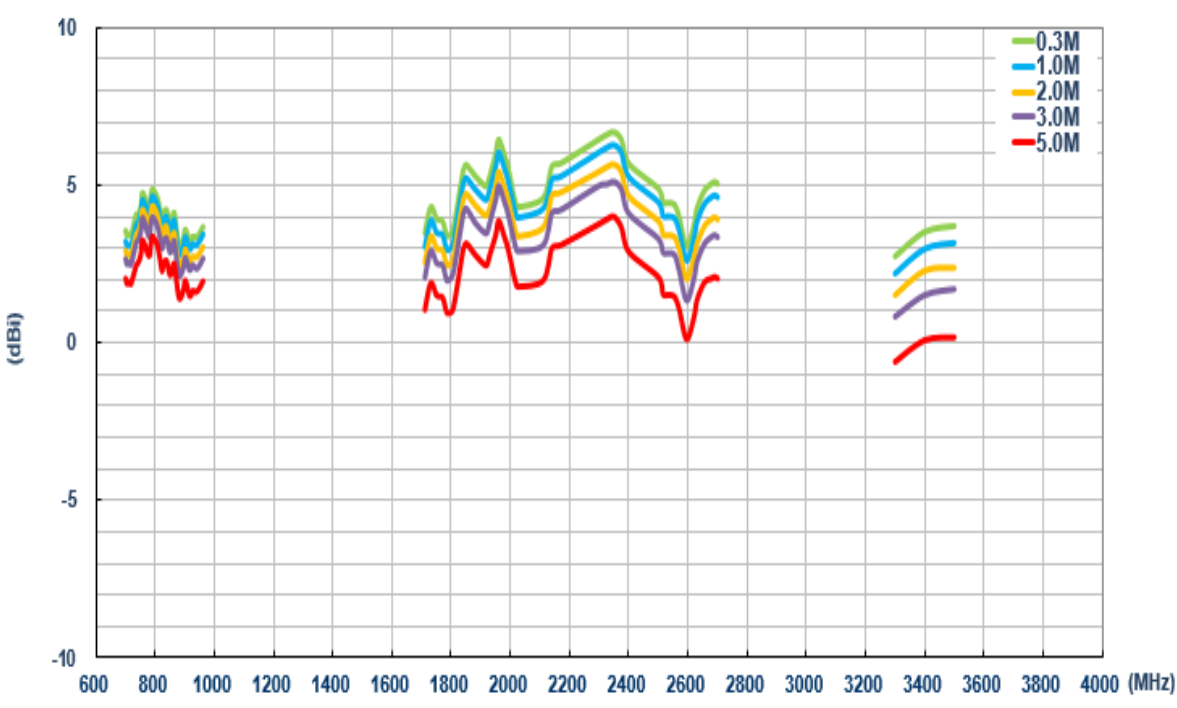
6.3.6. Average Gain (LTE MIMO_1)



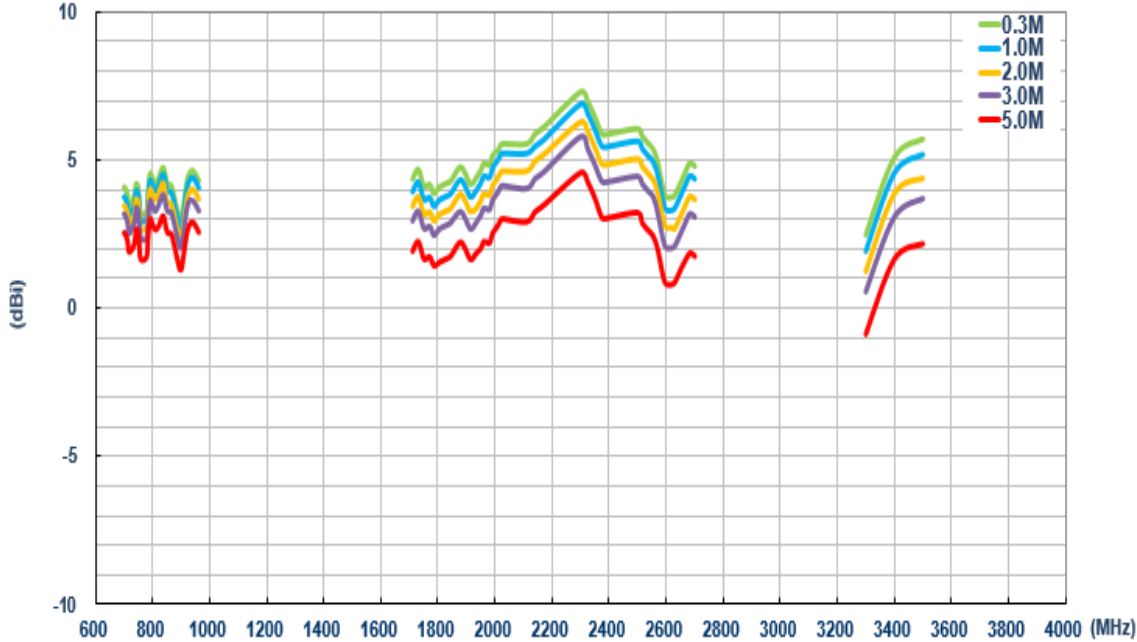
6.3.7. Average Gain (LTE MIMO_2)



6.3.8. Peak Gain (LTE MIMO_1)

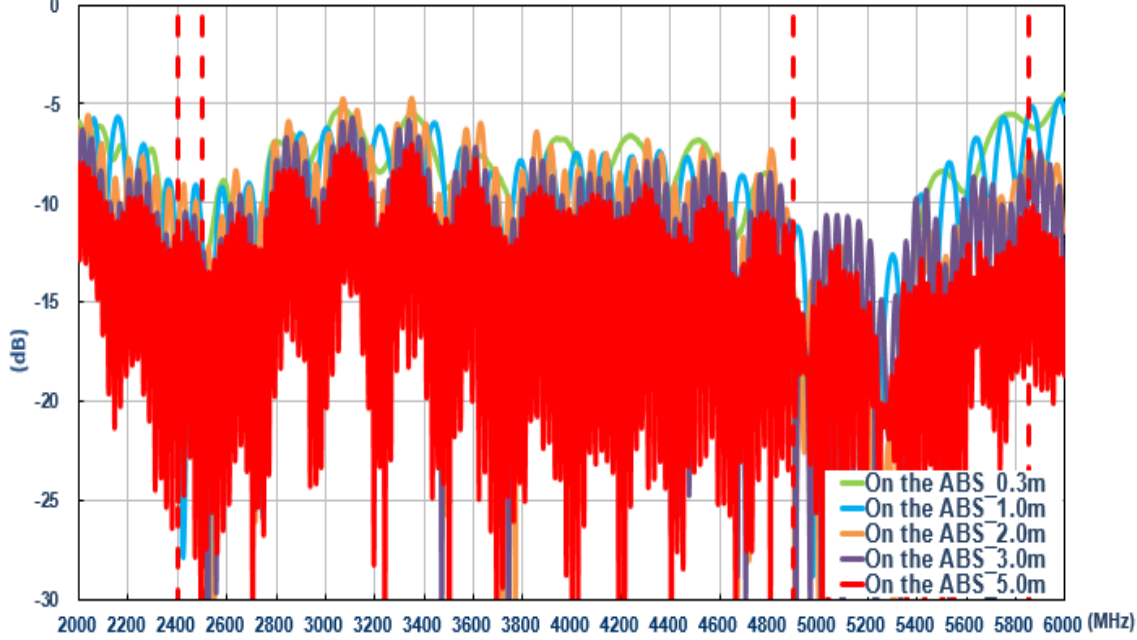


6.3.9. Peak Gain (LTE MIMO_2)

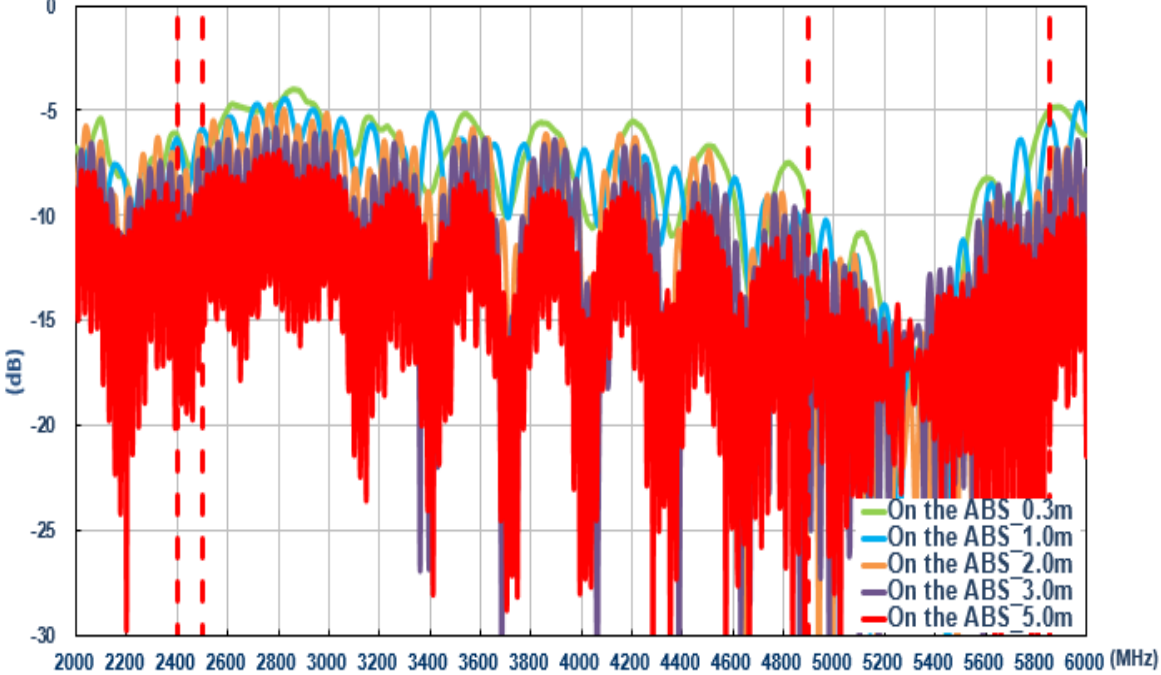


6.4. On ABS (Wi-Fi)

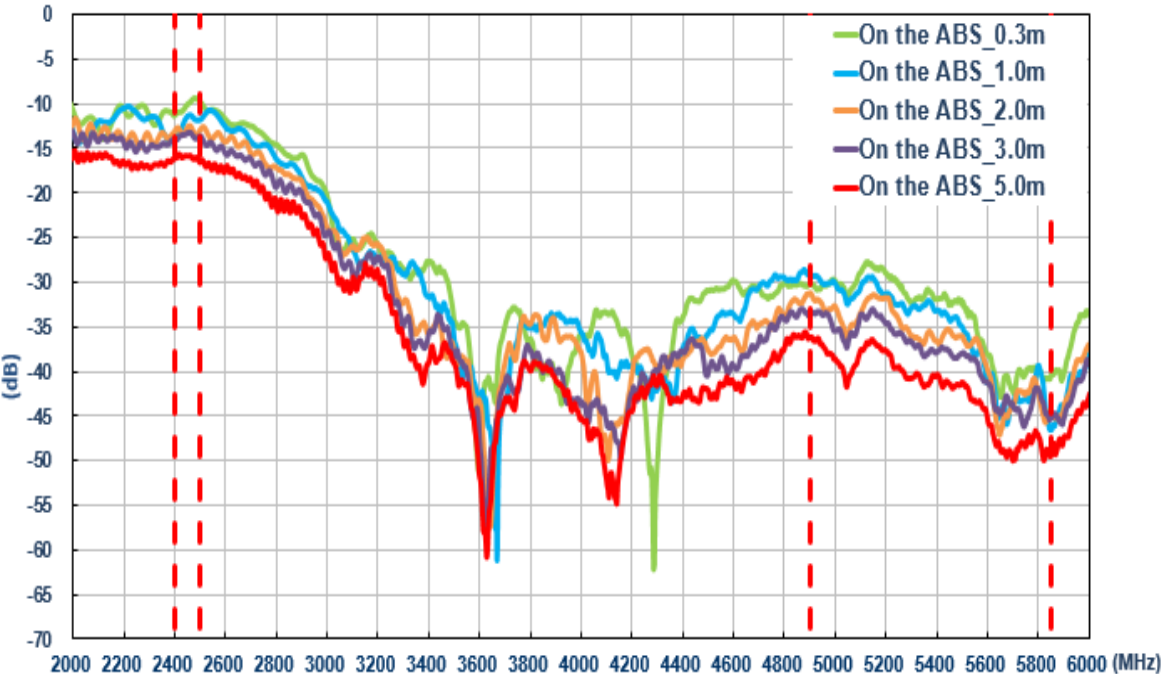
6.4.1. Return Loss (Wi-Fi_MIMO_1)



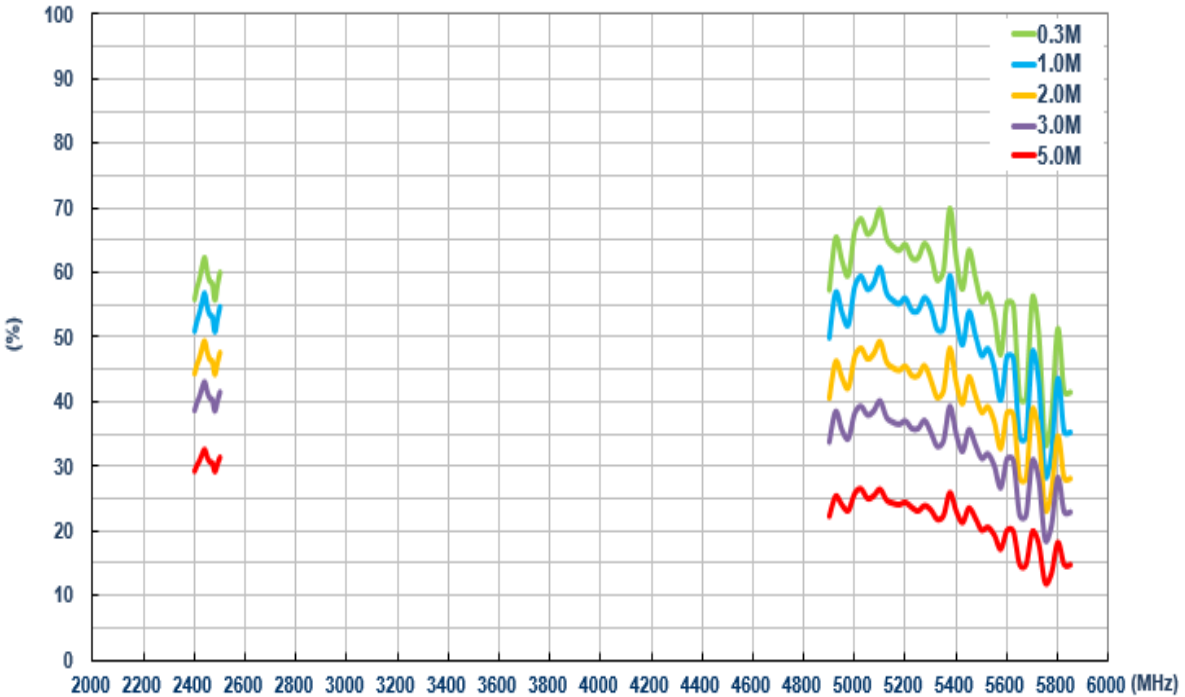
6.4.2. Return Loss (Wi-Fi_MIMO_2)



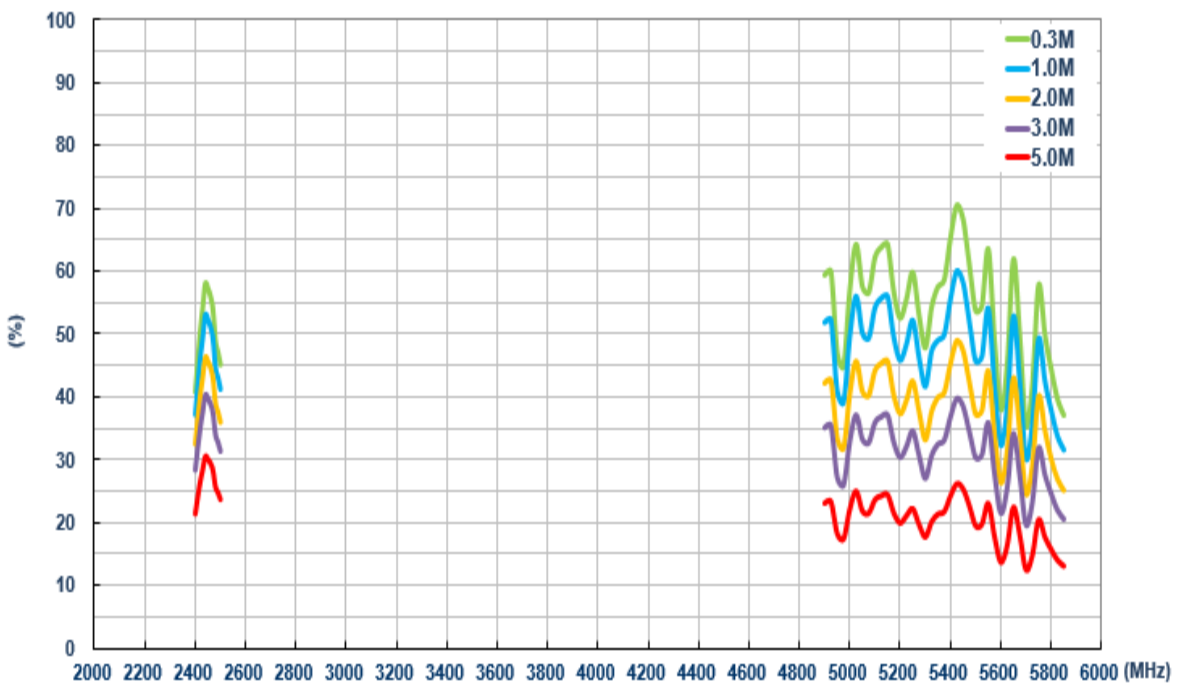
6.4.3. Isolation (Wi-Fi)



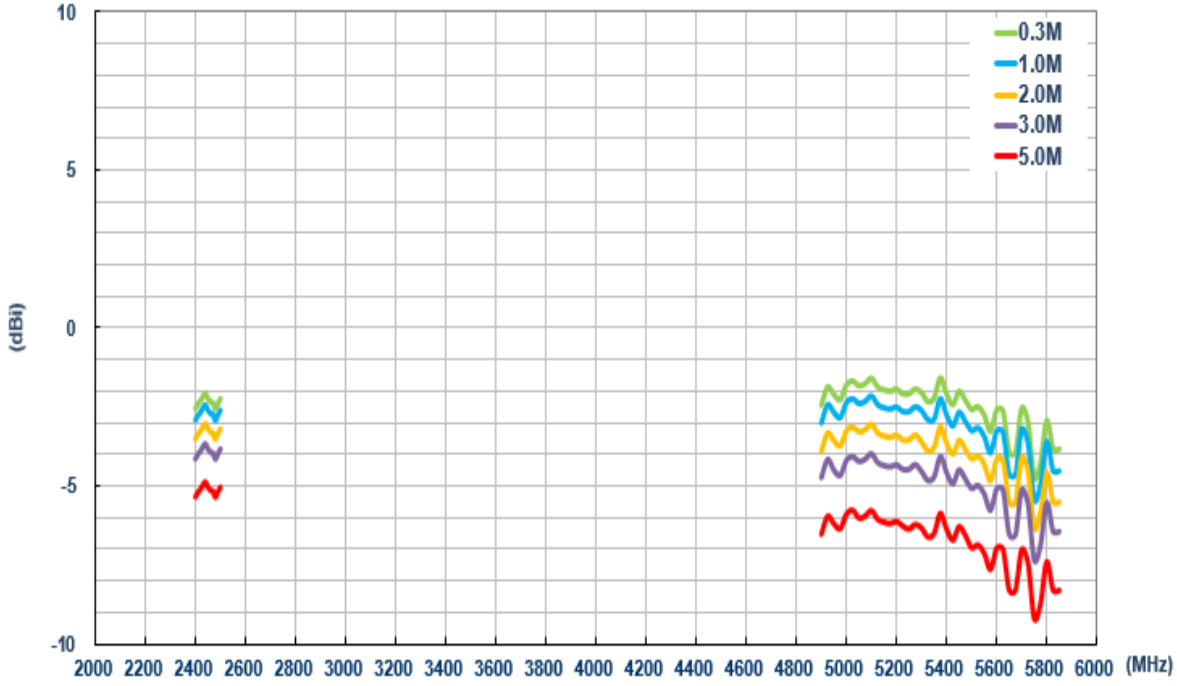
6.4.4. Efficiency (Wi-Fi MIMO_1)



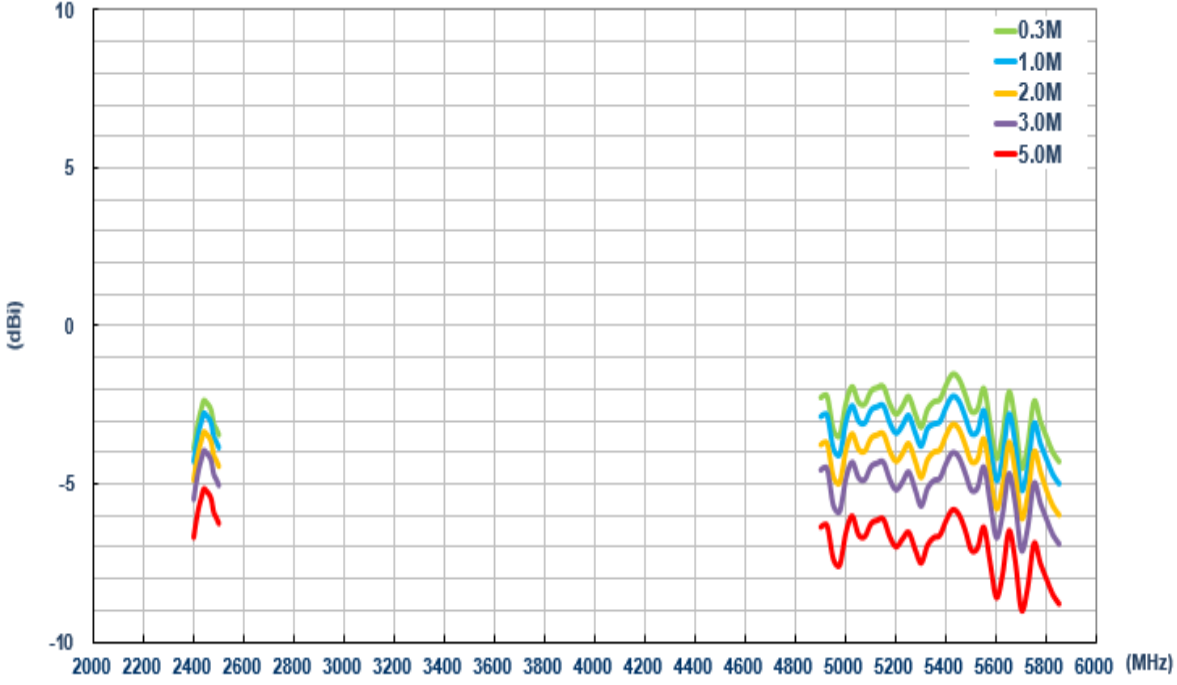
6.4.5. Efficiency (Wi-Fi MIMO_2)



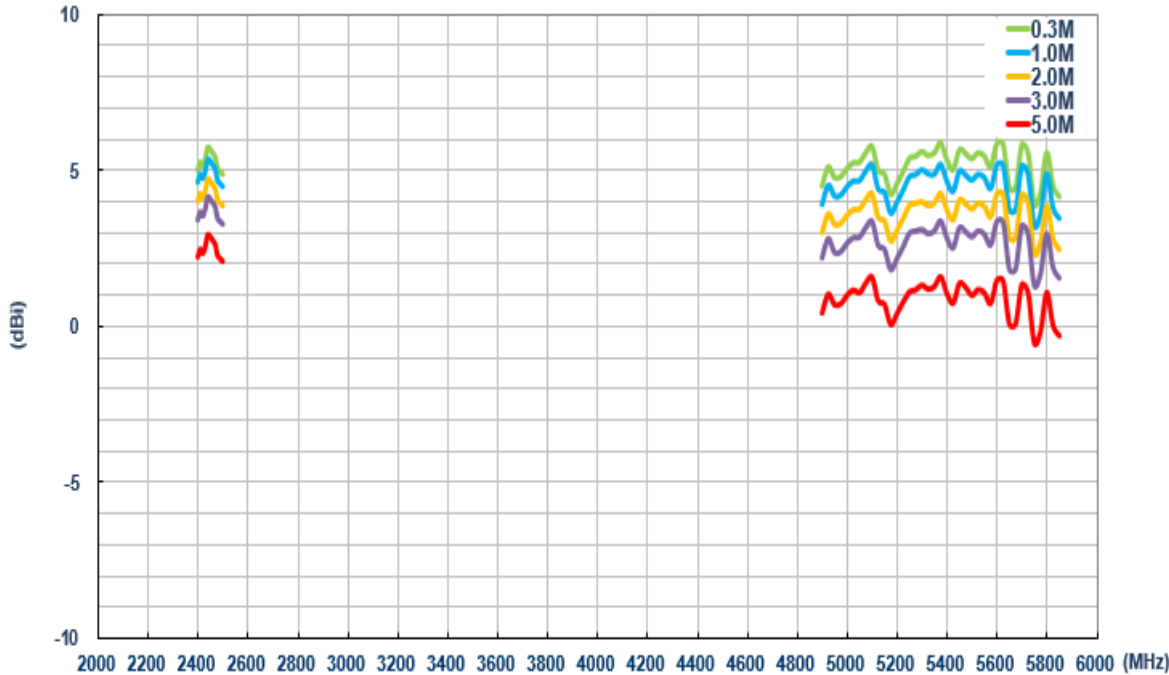
6.4.6. Average Gain (Wi-Fi MIMO_1)



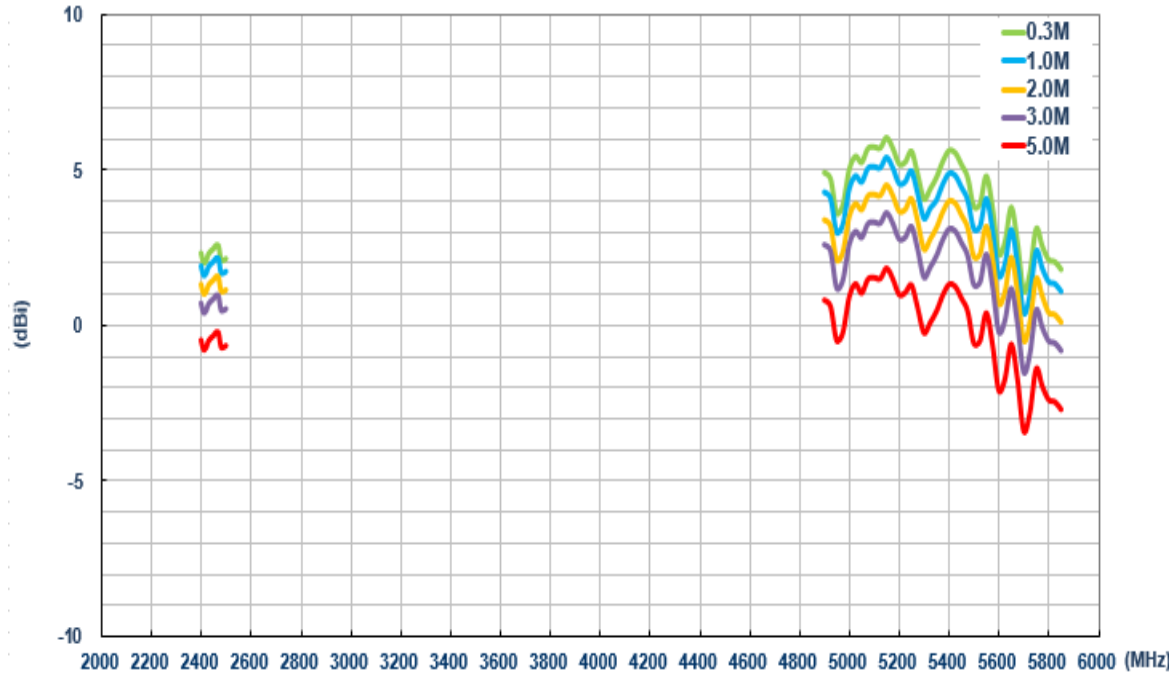
6.4.7. Average Gain (Wi-Fi MIMO_2)



6.4.8. Peak Gain (Wi-Fi MIMO_1)

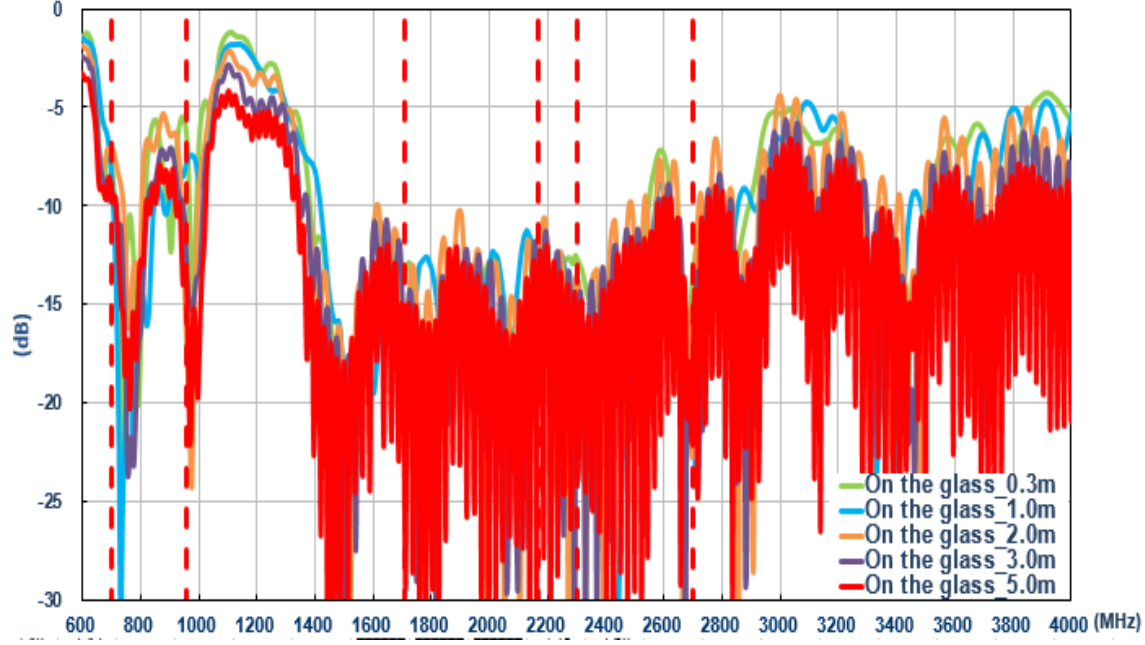


6.4.9. Peak Gain (Wi-Fi MIMO_2)

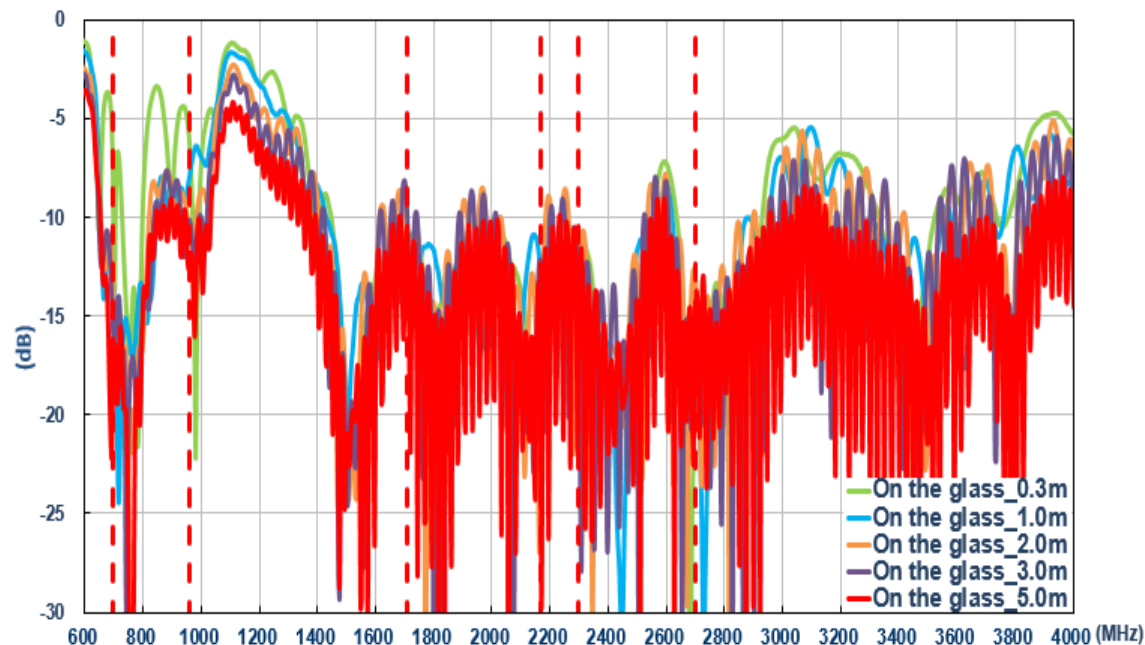


6.5. On glass (LTE)

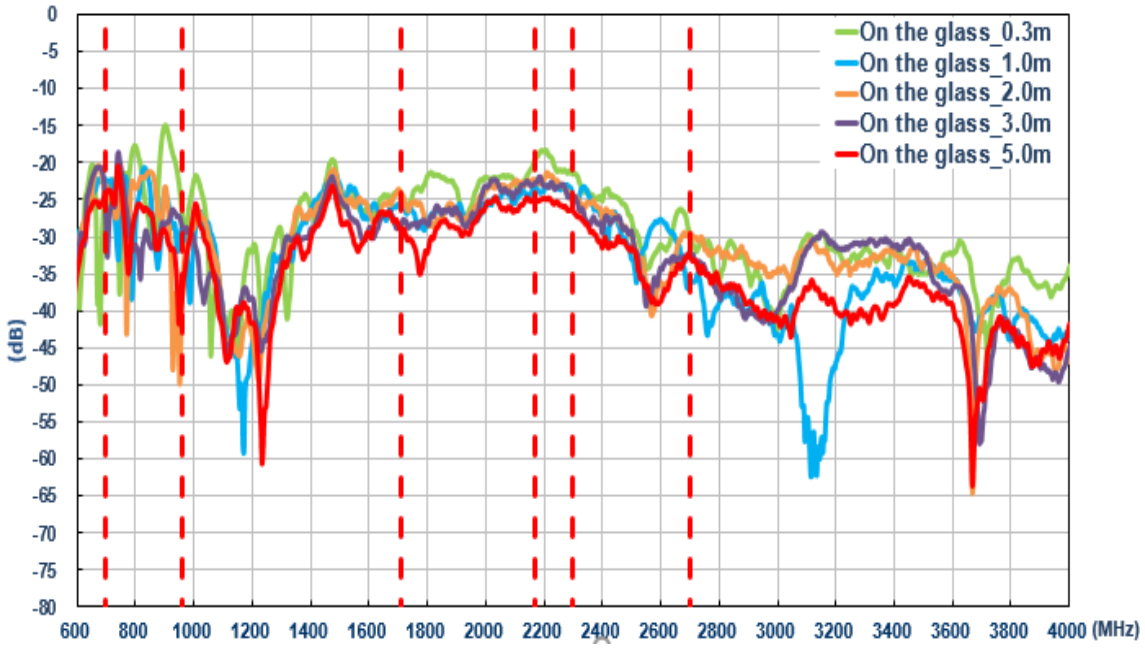
6.5.1. Return Loss (LTE_MIMO_1)



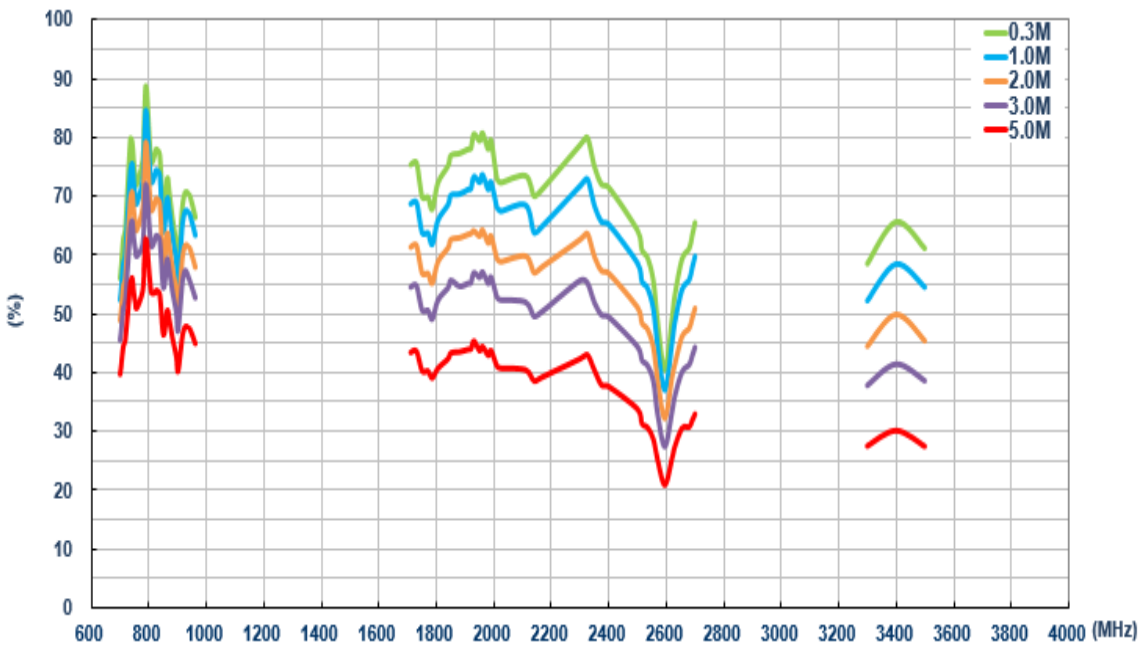
6.5.2. Return Loss (LTE_MIMO_2)



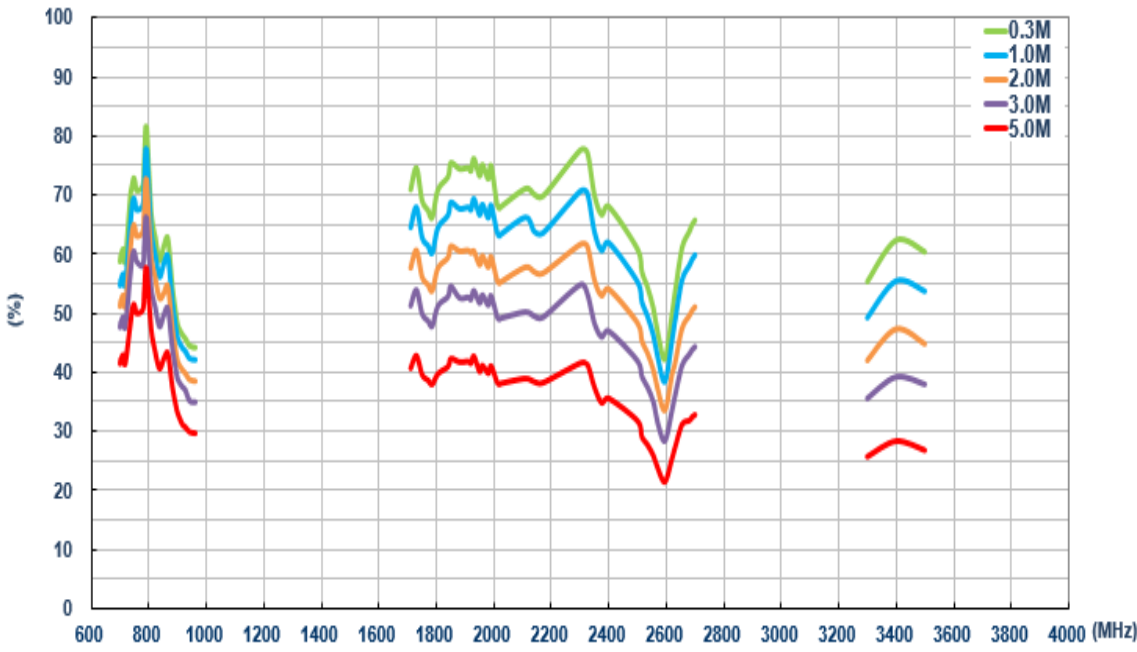
6.5.3. Isolation (LTE antenna)



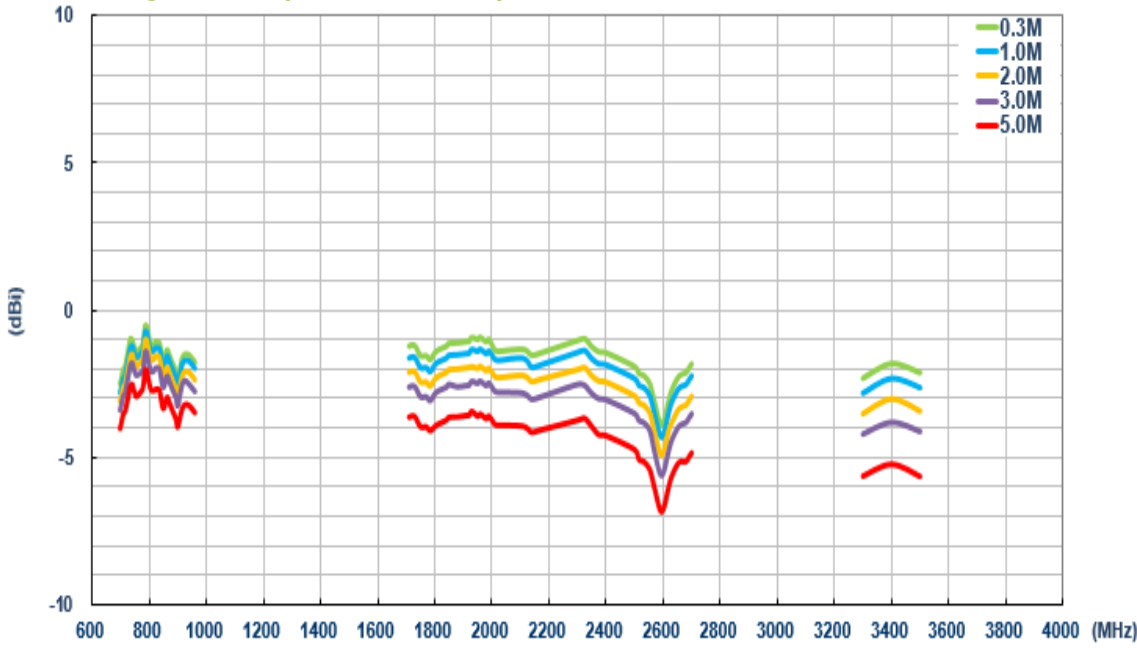
6.5.4. Efficiency (LTE MIMO_1)



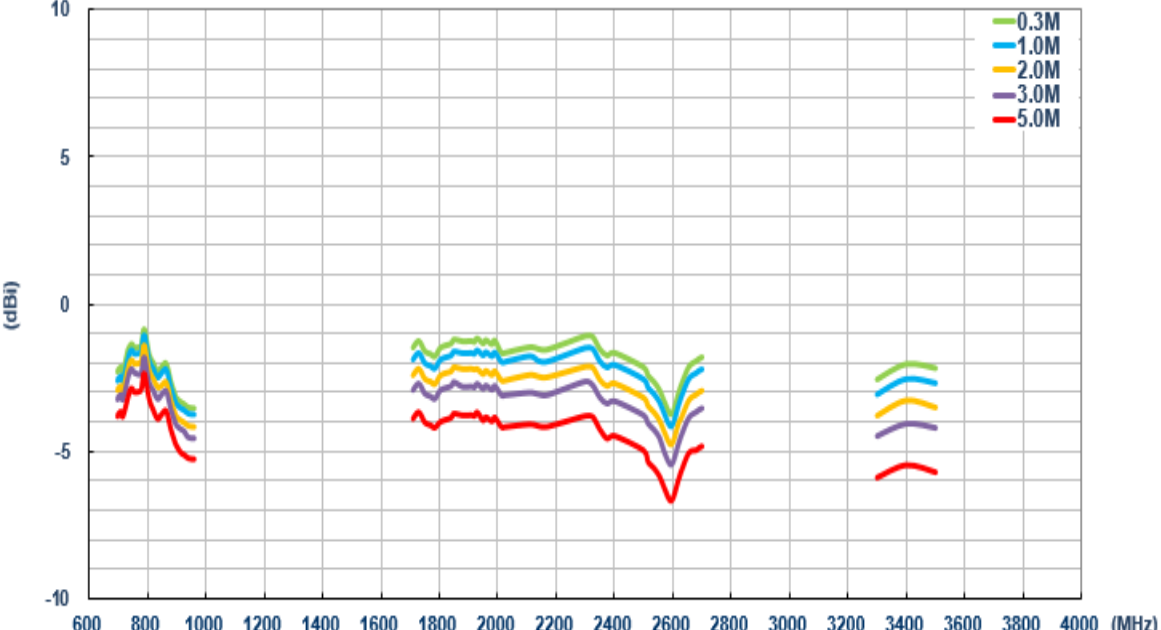
6.5.5. Efficiency (LTE MIMO_2)



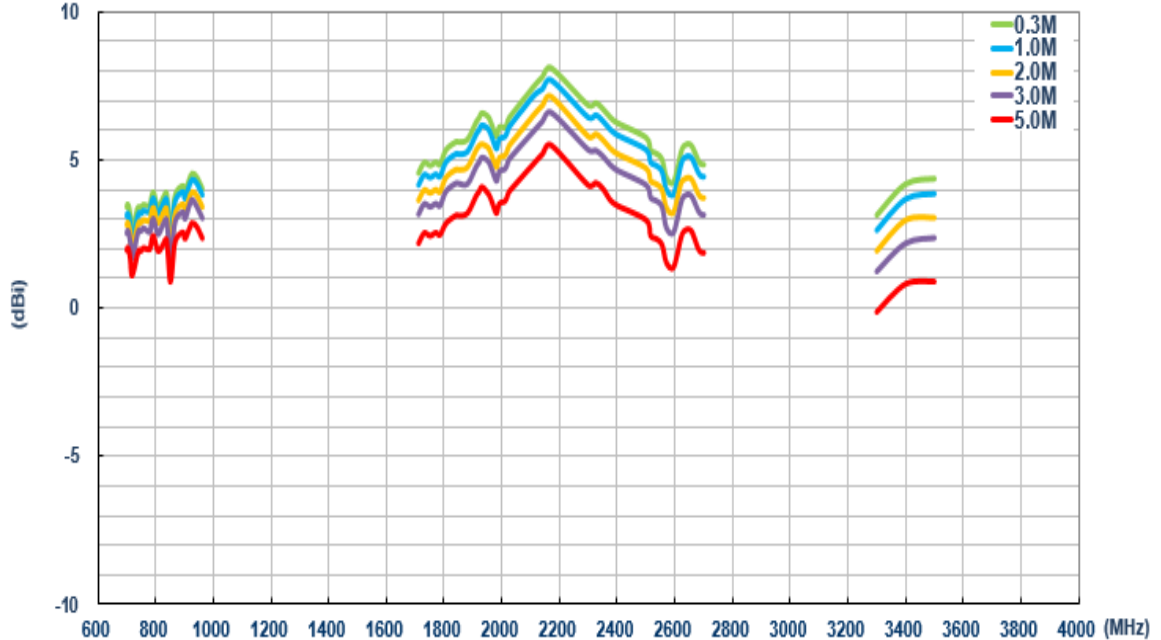
6.5.6. Average Gain (LTE MIMO_1)



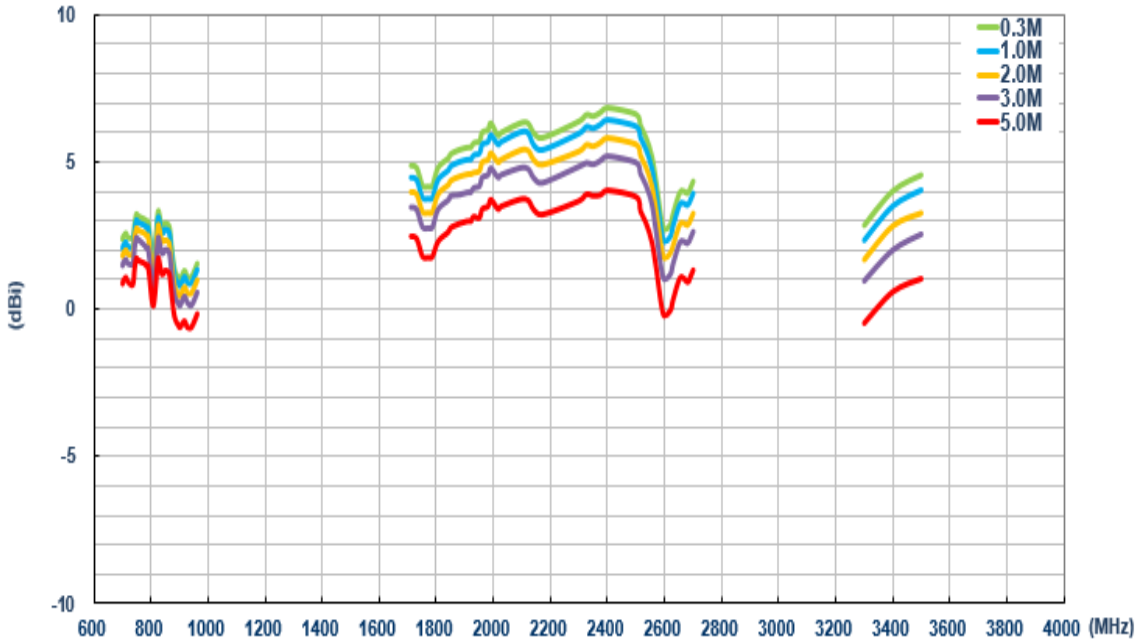
6.5.7. Average Gain (LTE MIMO_2)



6.5.8. Peak Gain (LTE MIMO_1)

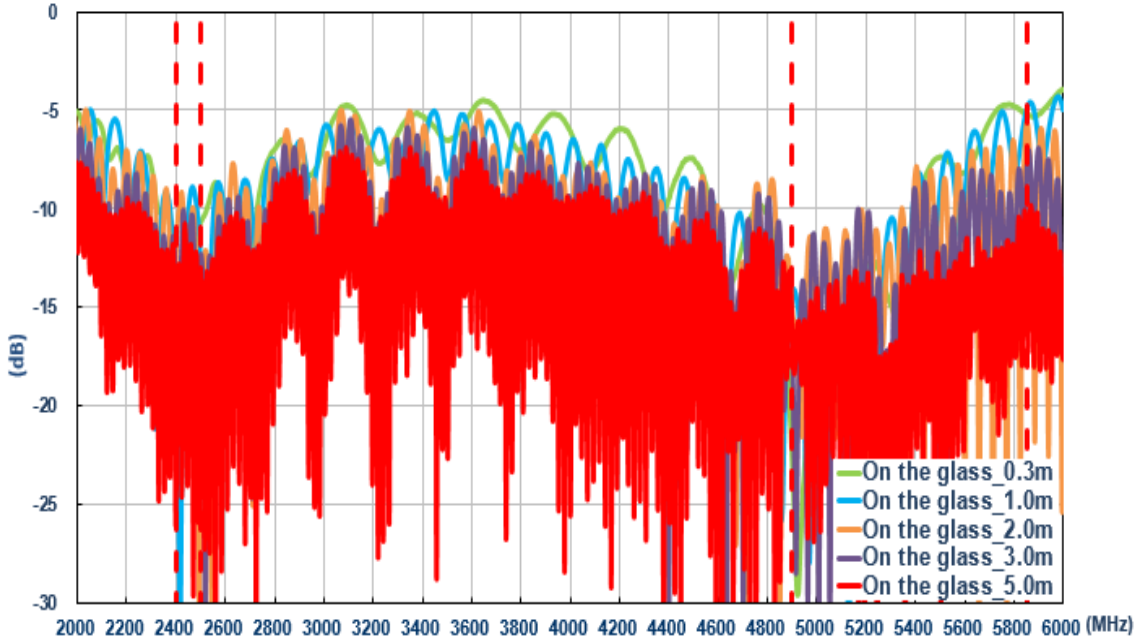


6.5.9. Peak Gain (LTE MIMO_2)

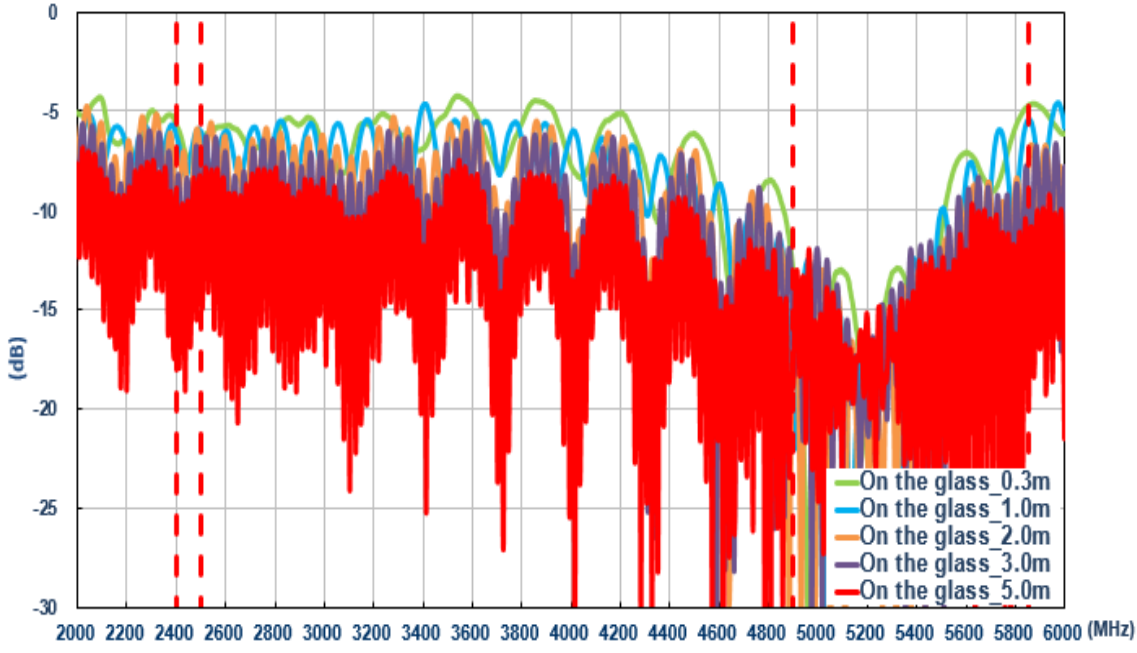


6.6. On glass (Wi-Fi)

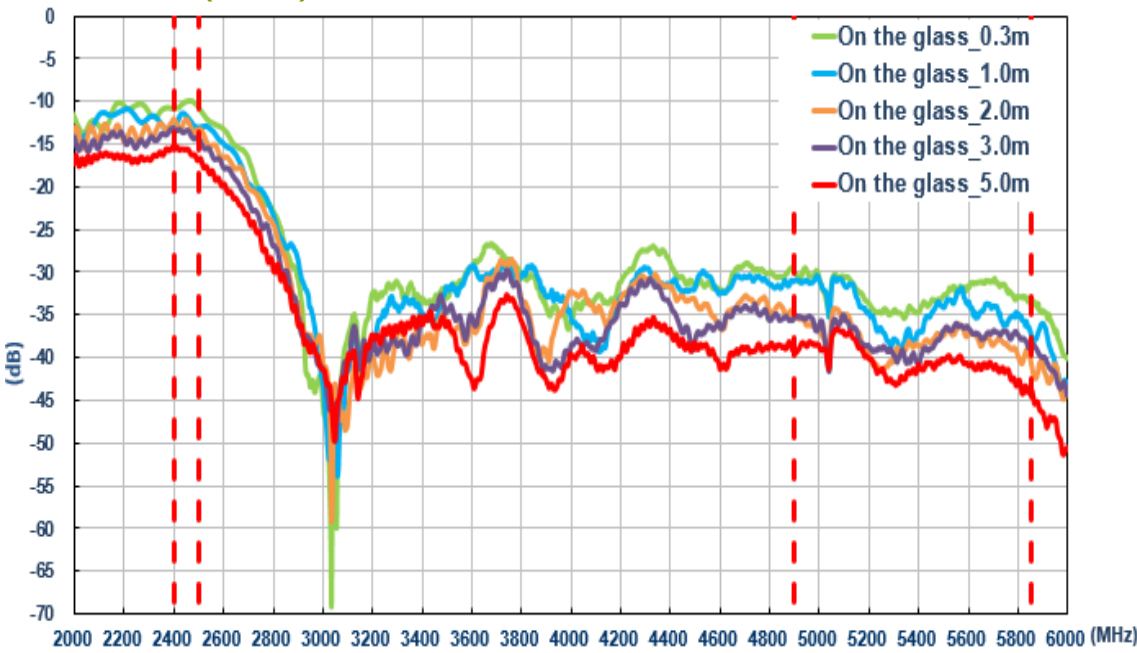
6.6.1. Return Loss (Wi-Fi _MIMO_1)



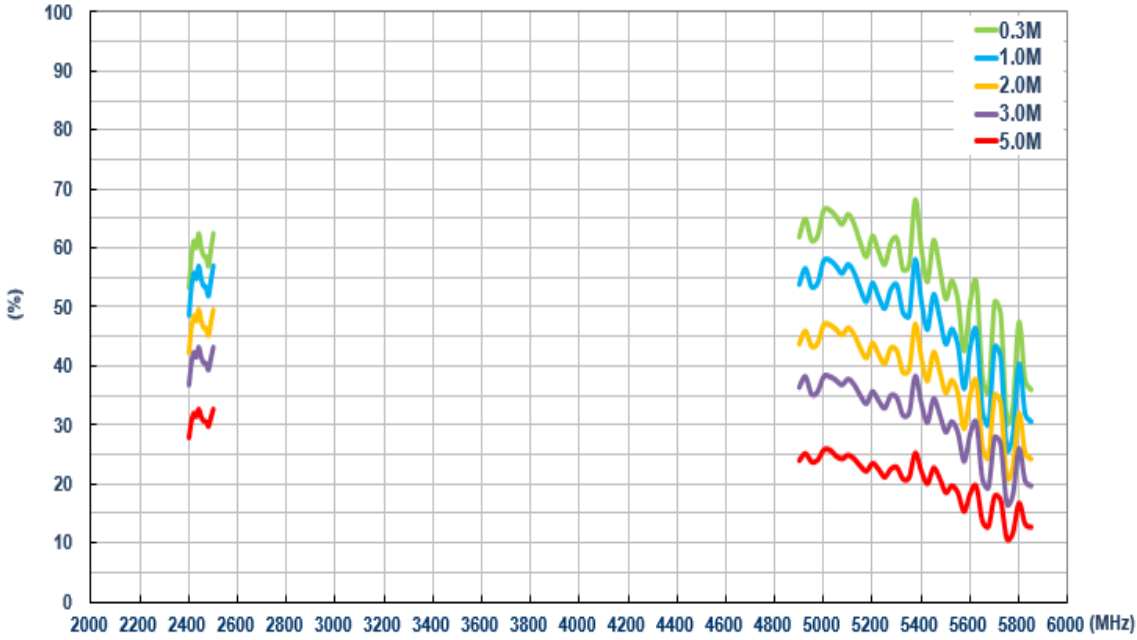
6.6.2. Return Loss (Wi-Fi _MIMO_2)



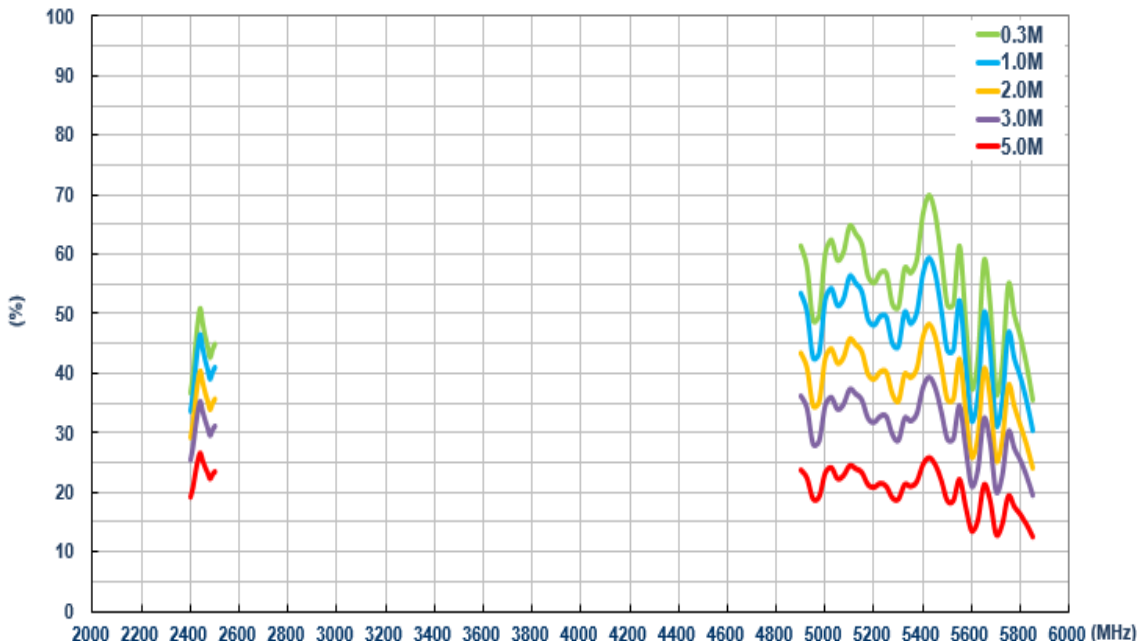
6.6.3. Isolation (Wi-Fi)



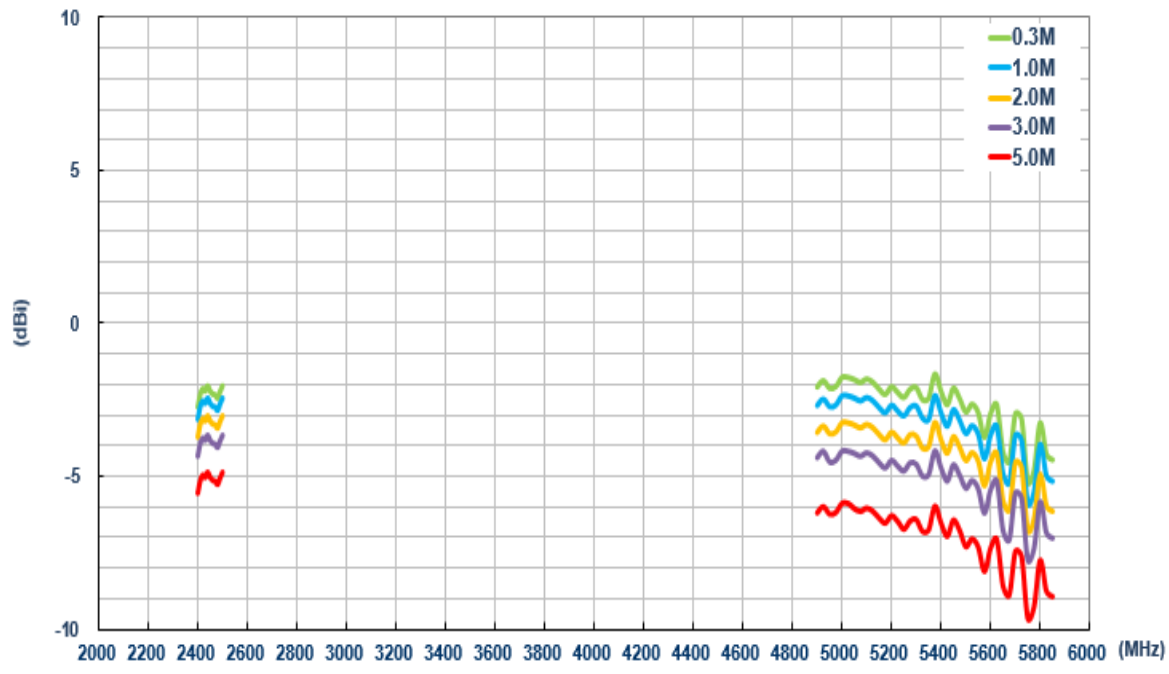
6.6.4. Efficiency (Wi-Fi_MIMO_1)



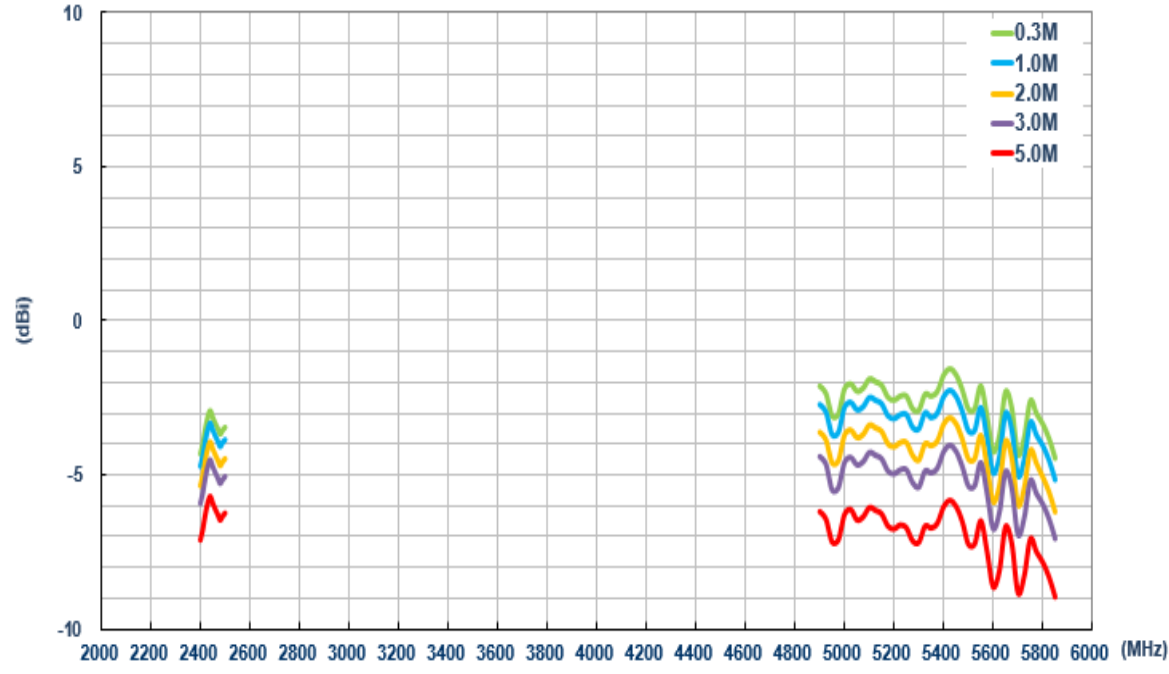
6.6.5. Efficiency (Wi-Fi_MIMO_2)



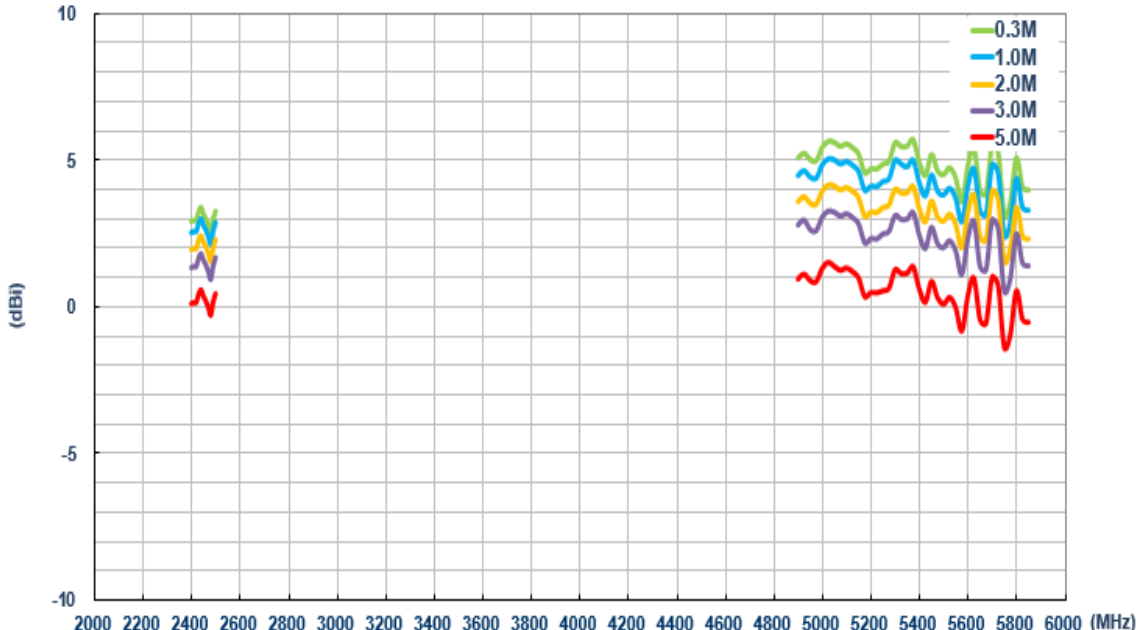
6.6.6. Average Gain (Wi-Fi_MIMO_1)



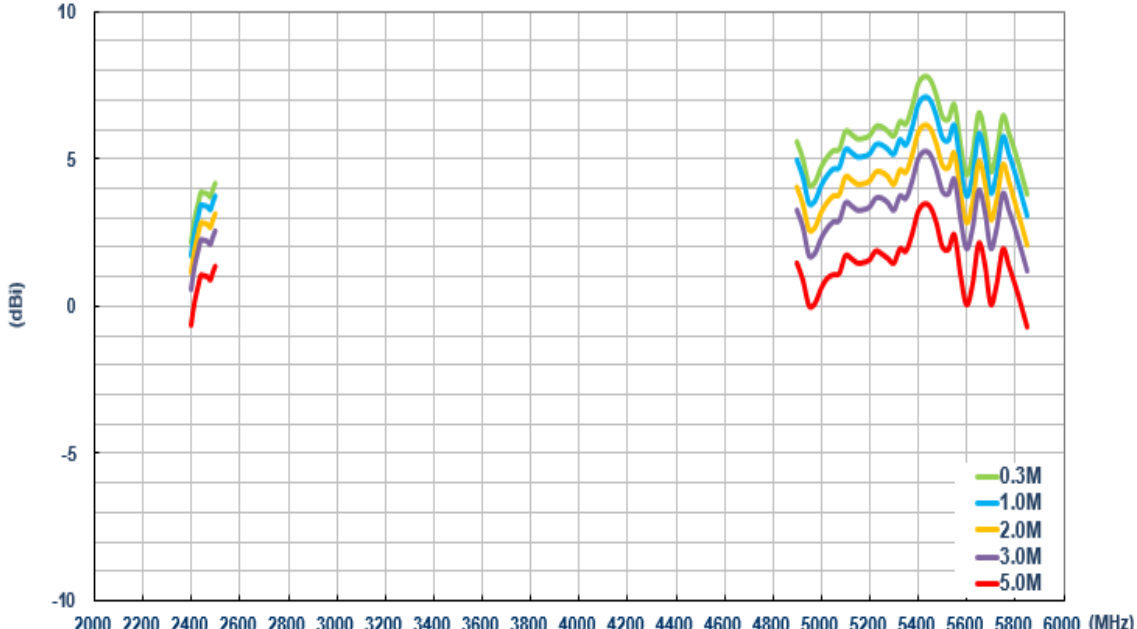
6.6.7. Average Gain (Wi-Fi_MIMO_2)



6.6.8. Peak Gain (Wi-Fi _MIMO_1)

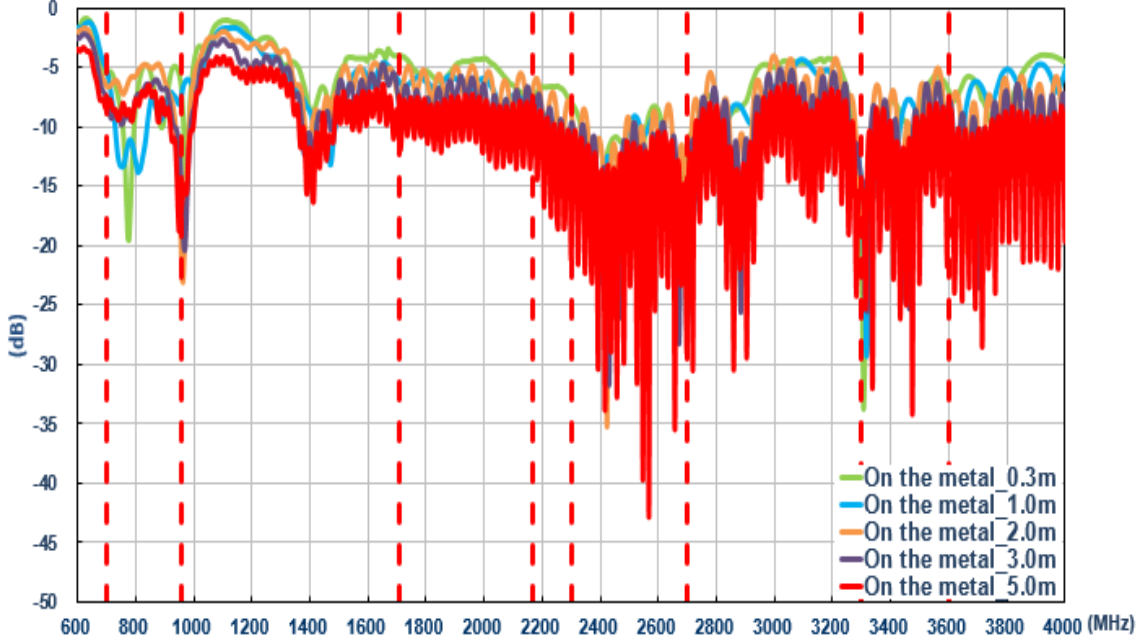


6.6.9. Peak Gain (Wi-Fi _MIMO_2)

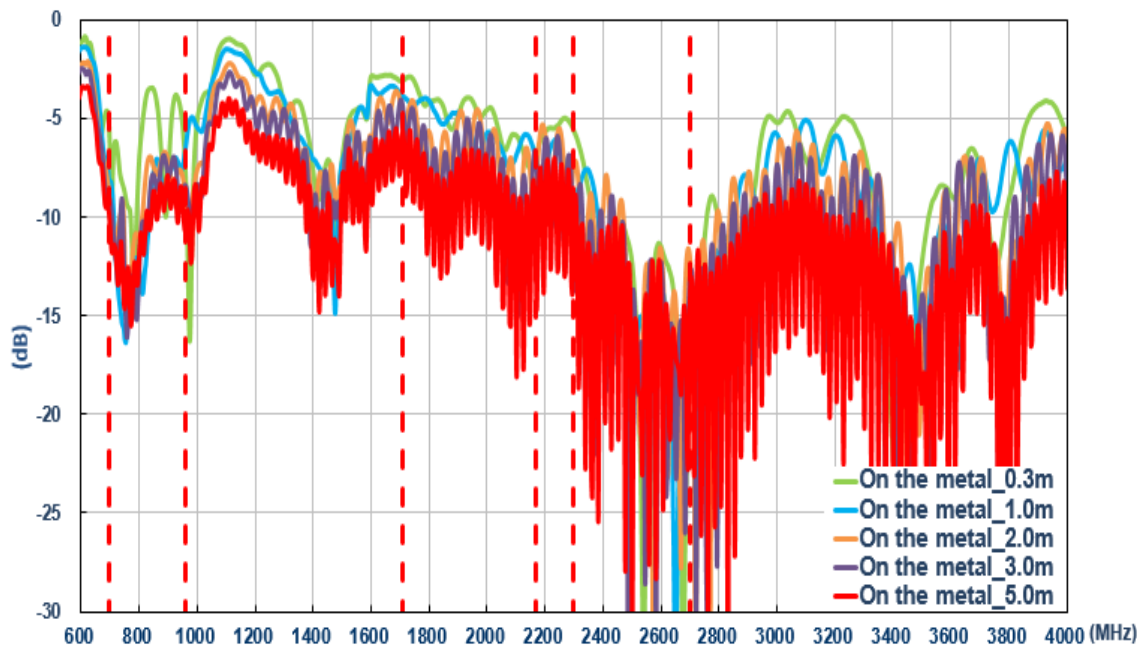


6.7. On metal (LTE)

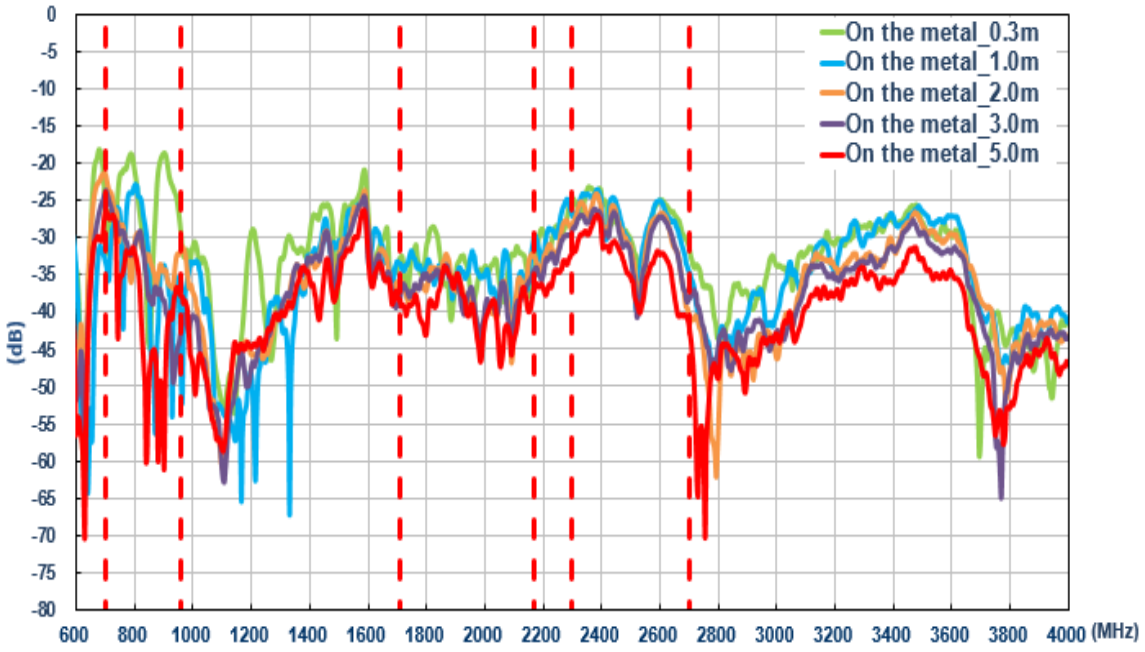
6.7.1. Return Loss (LTE_MIMO_1)



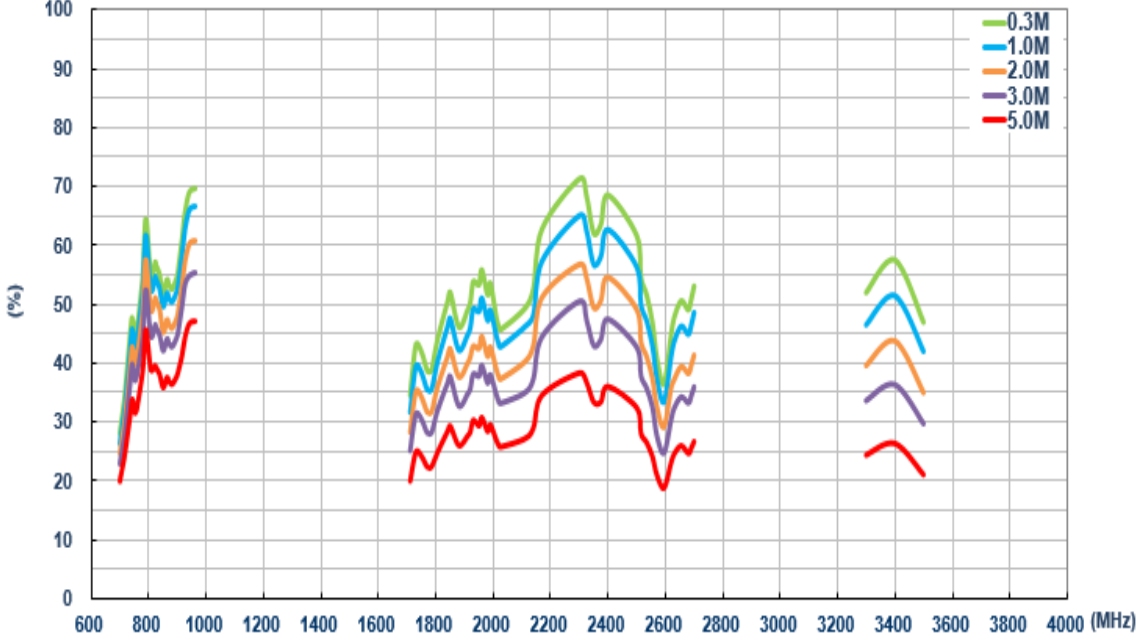
6.7.2. Return Loss (LTE_MIMO_2)



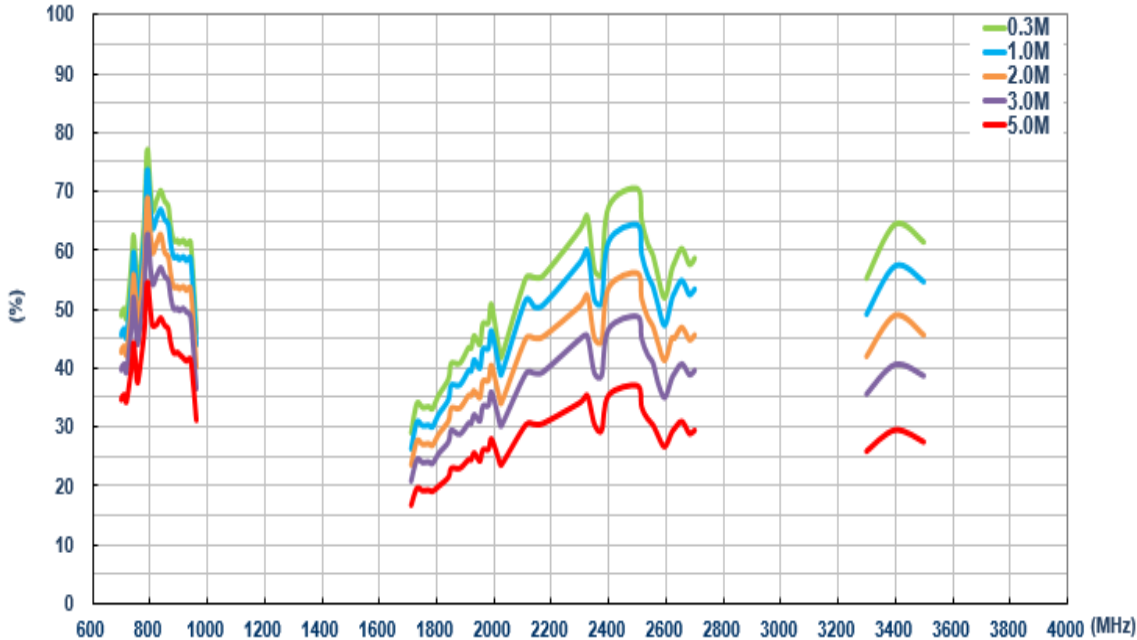
6.7.3. Isolation (LTE antenna)



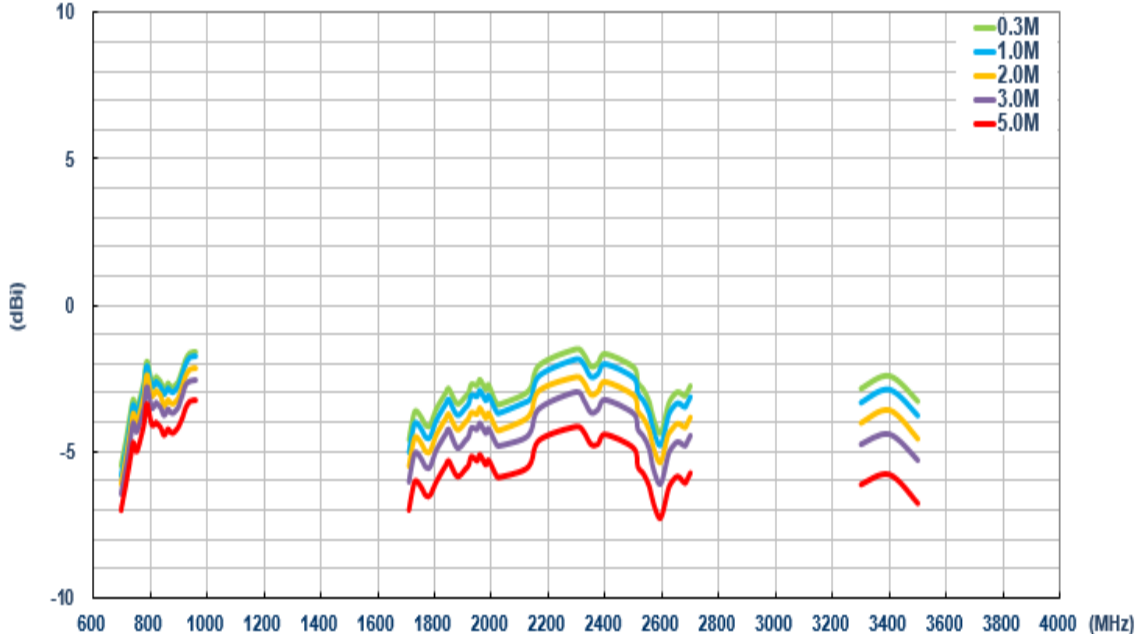
6.7.4. Efficiency (LTE_MIMO_1)



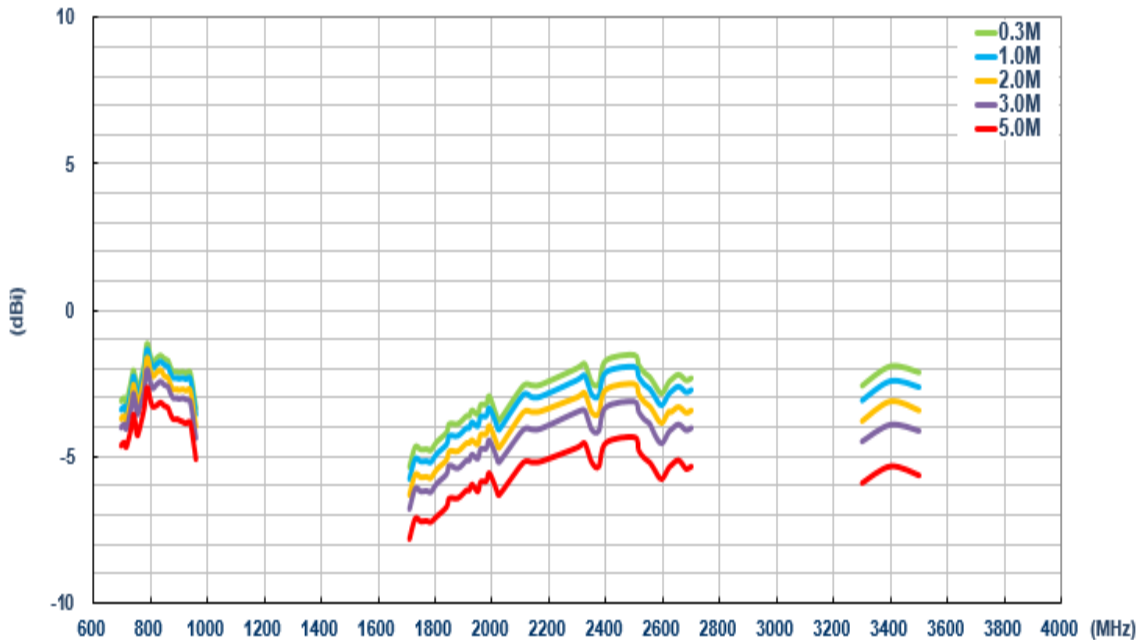
6.7.5. Efficiency (LTE_MIMO_2)



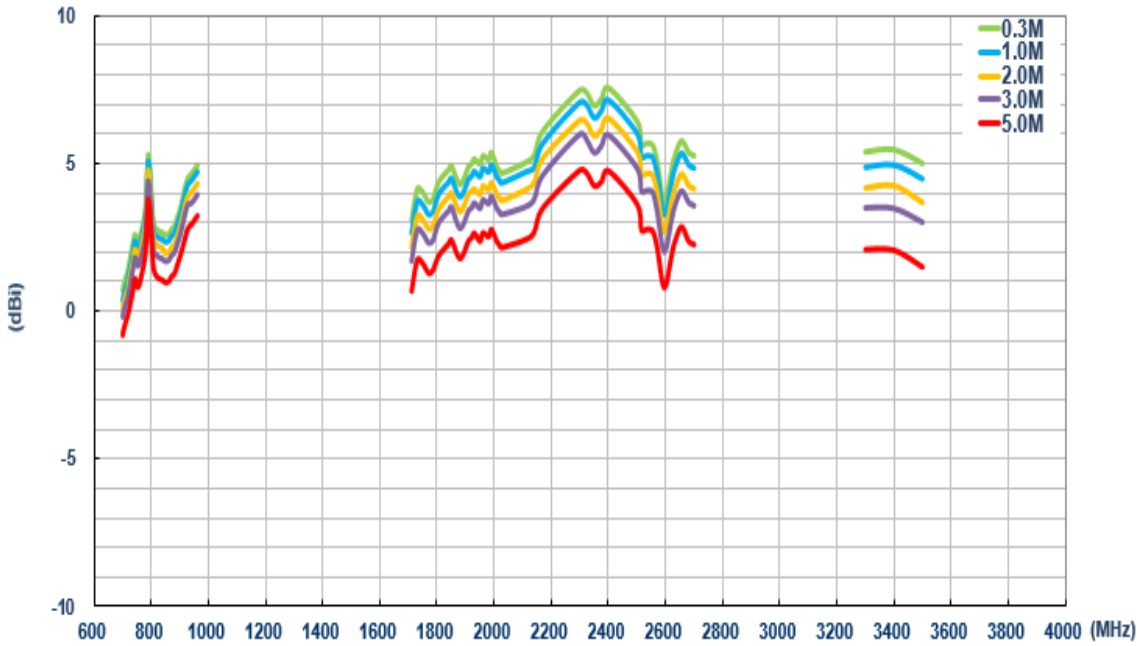
6.7.6. Average Gain (LTE_MIMO_1)



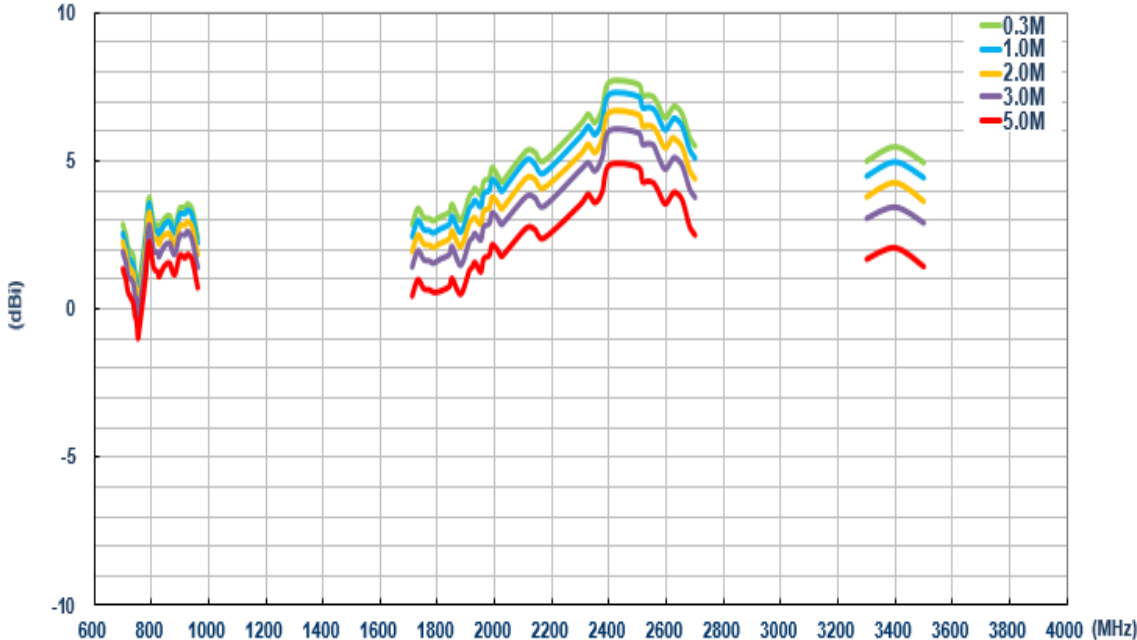
6.7.7. Average Gain (LTE_MIMO_2)



6.7.8. Peak Gain (LTE_MIMO_1)

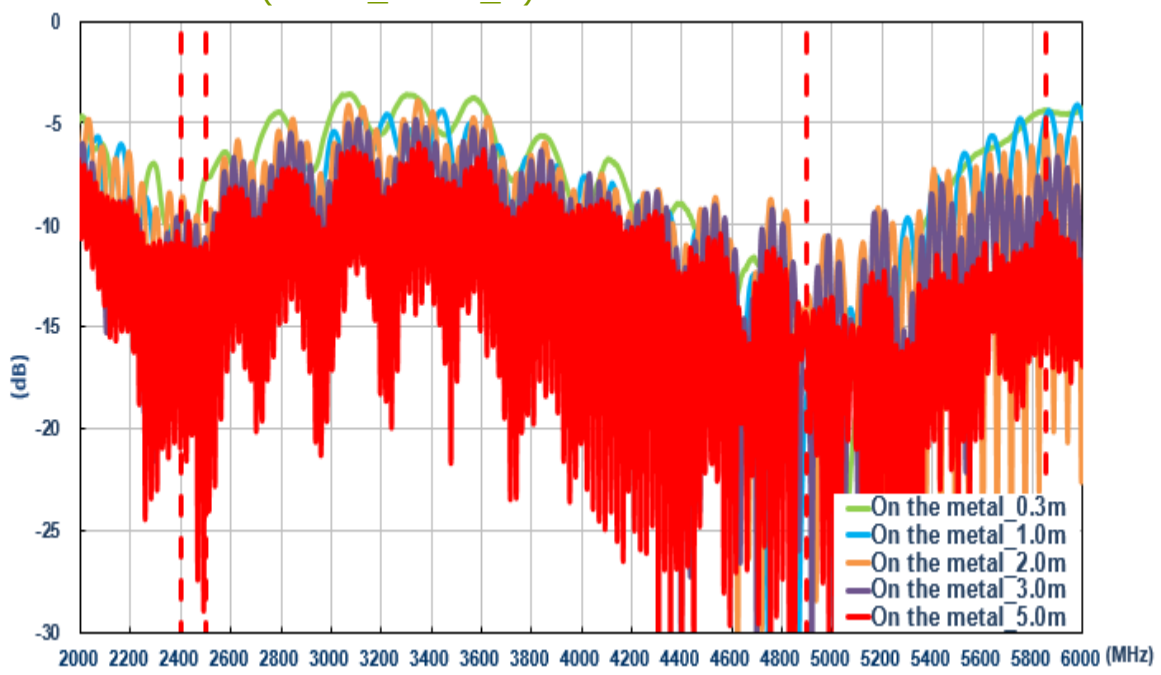


6.7.9. Peak Gain (LTE_MIMO_2)

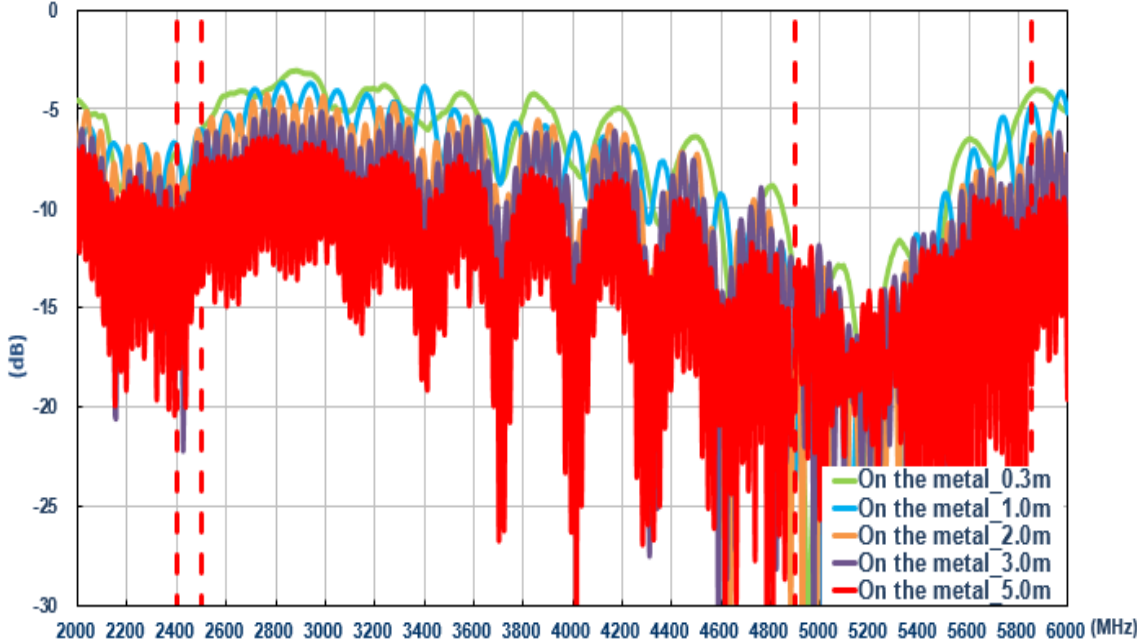


6.8. On metal (Wi-Fi)

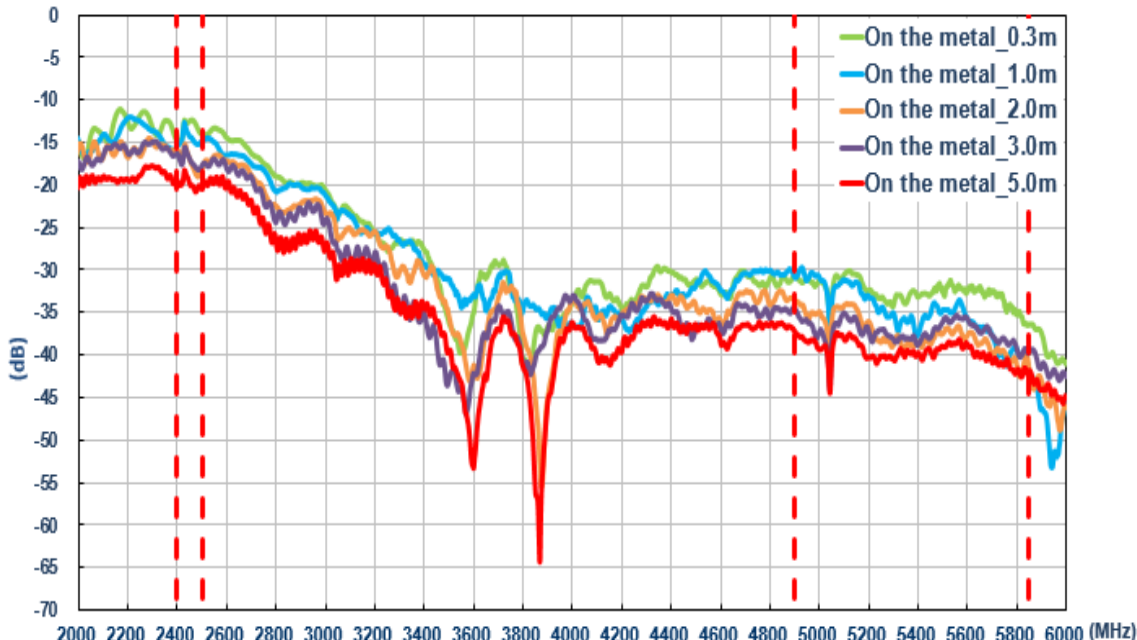
6.8.1. Return Loss (Wi-Fi_MIMO_1)



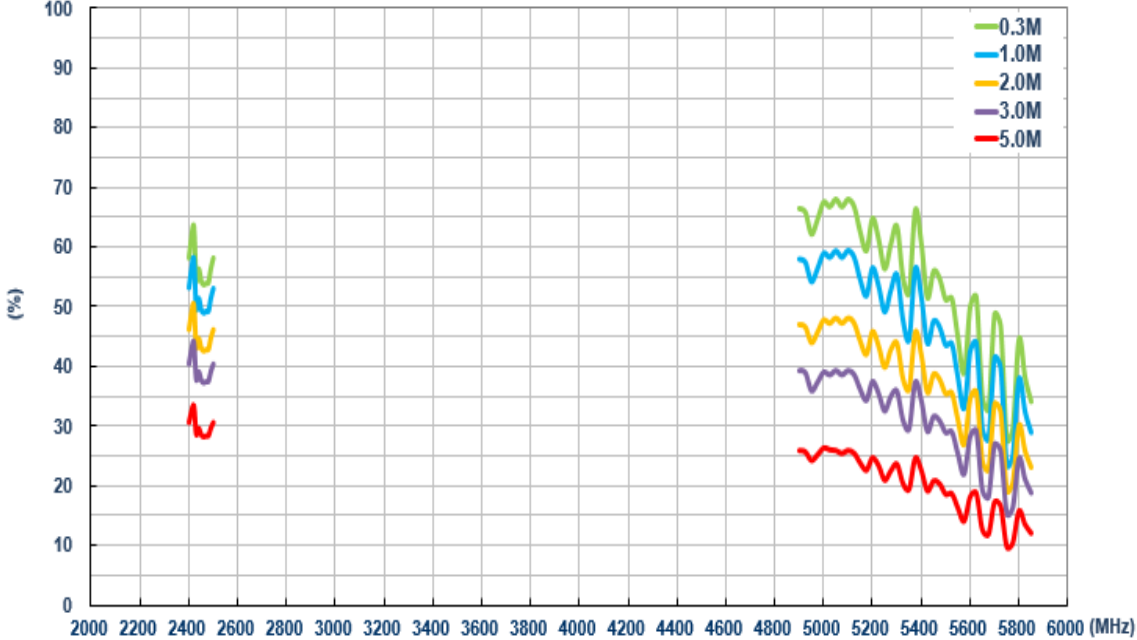
6.8.2. Return Loss (Wi-Fi_MIMO_2)



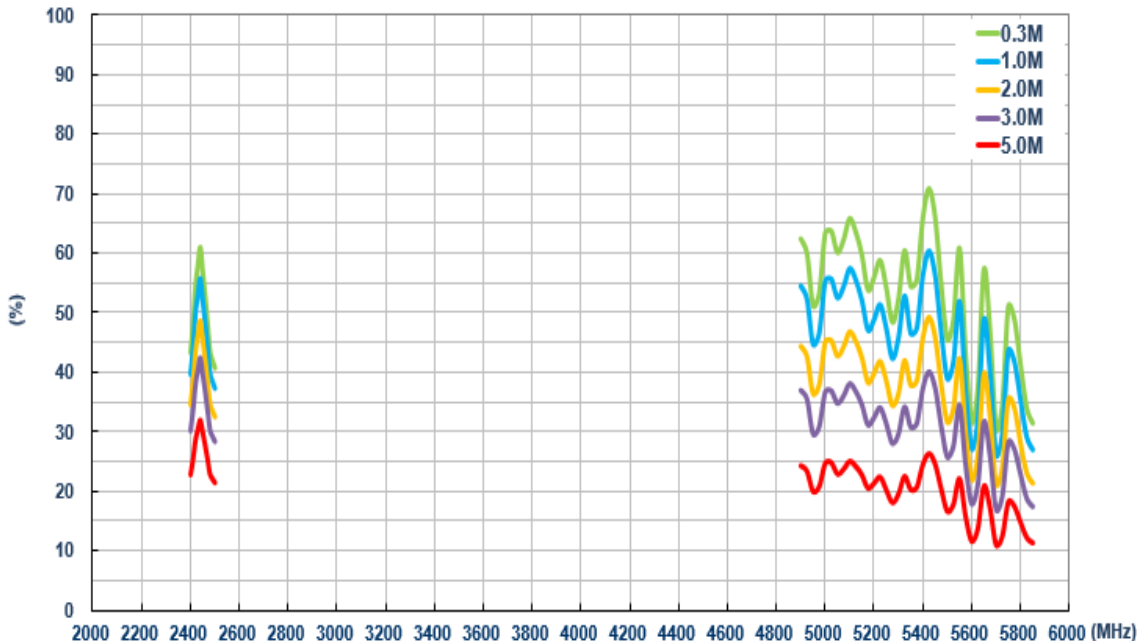
6.8.3. Isolation (Wi-Fi)



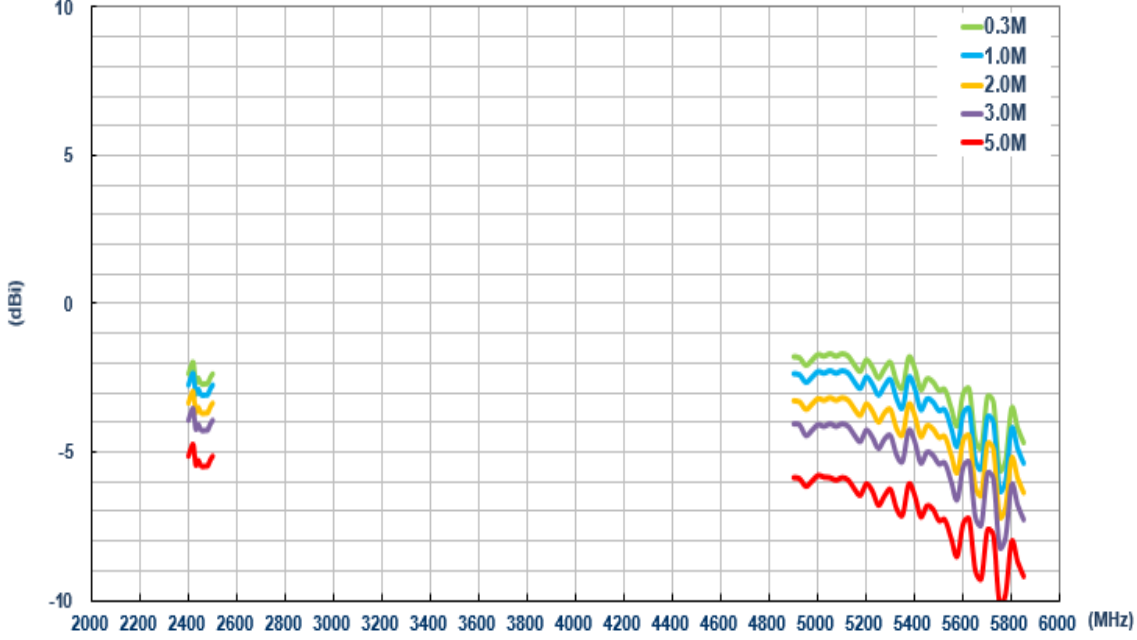
6.8.4. Efficiency (Wi-Fi_MIMO_1)



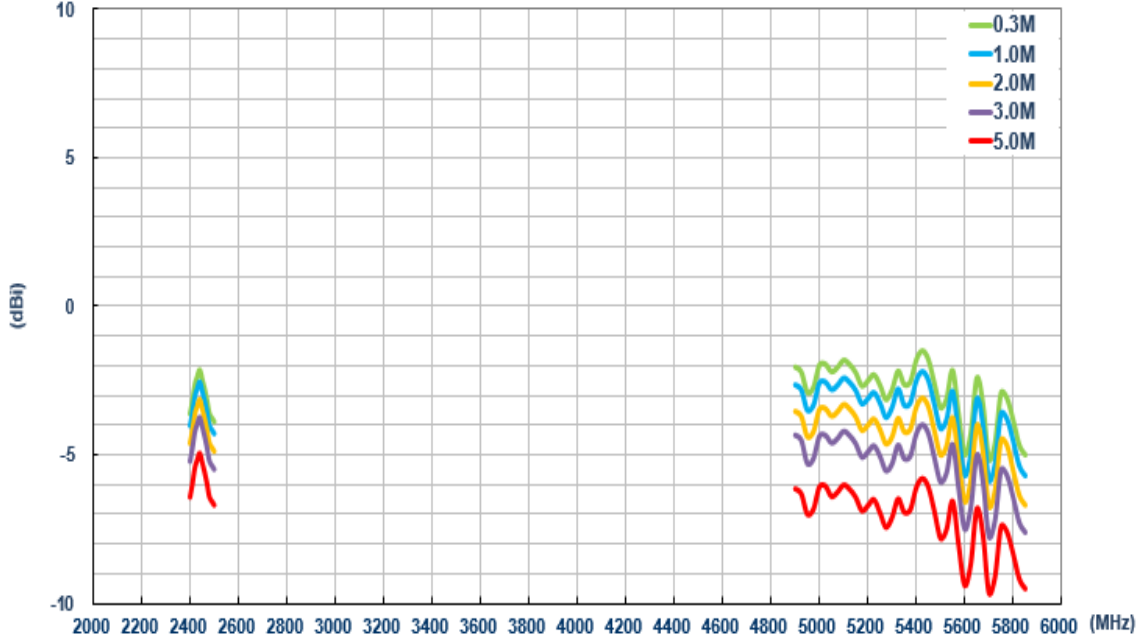
6.8.5. Efficiency (Wi-Fi_MIMO_2)



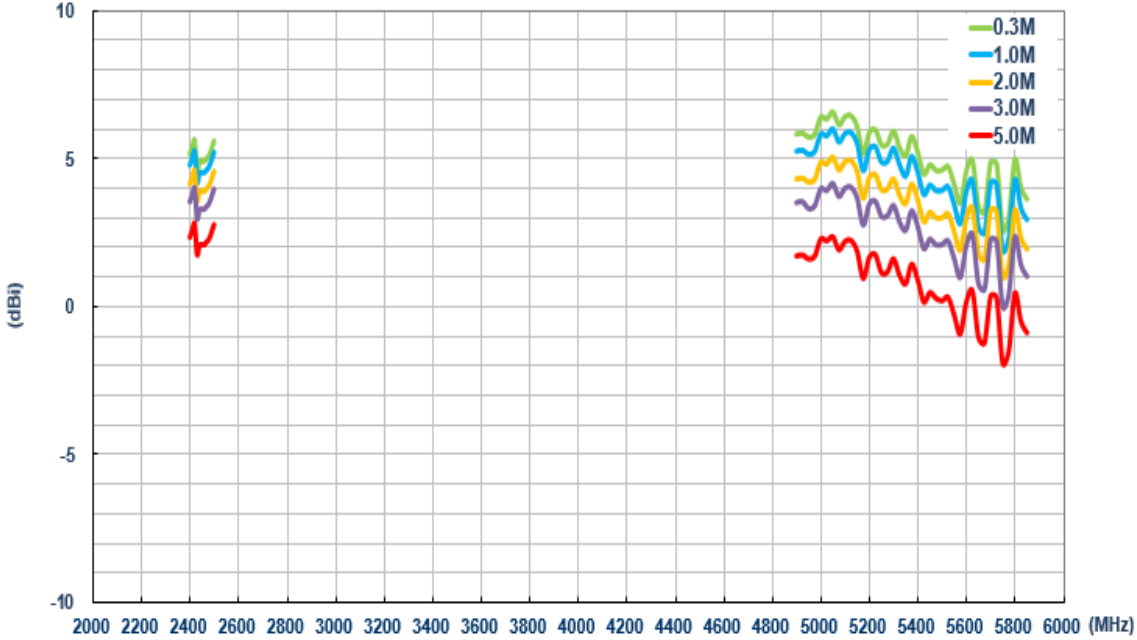
6.8.6. Average Gain (Wi-Fi_MIMO_1)



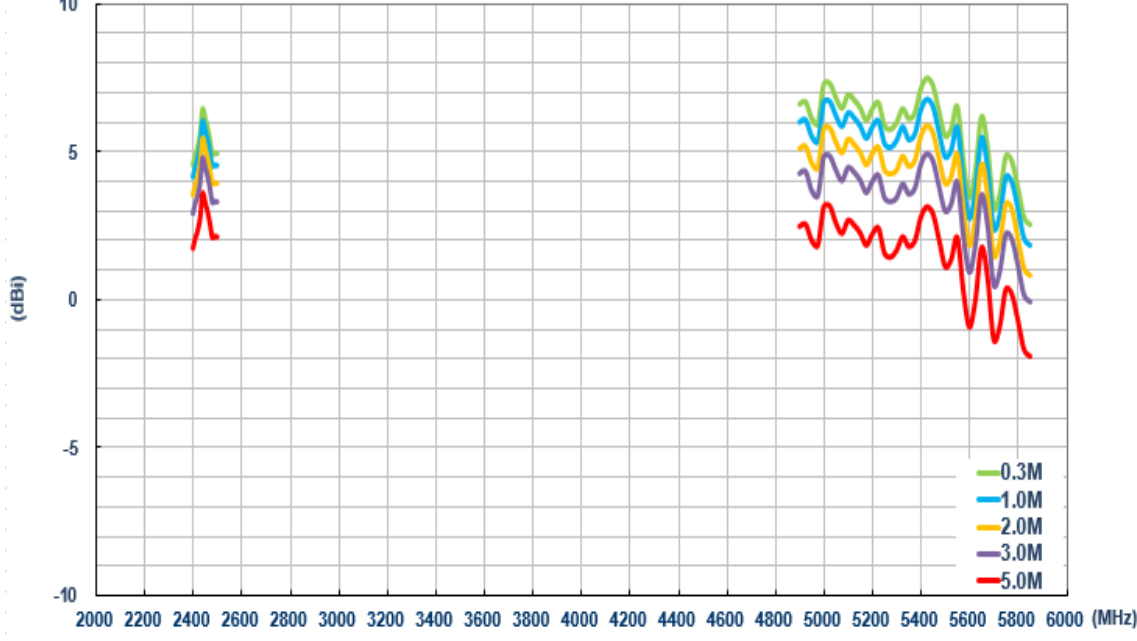
6.8.7. Average Gain (Wi-Fi_MIMO_2)



6.8.8. Peak Gain (Wi-Fi_MIMO_1)

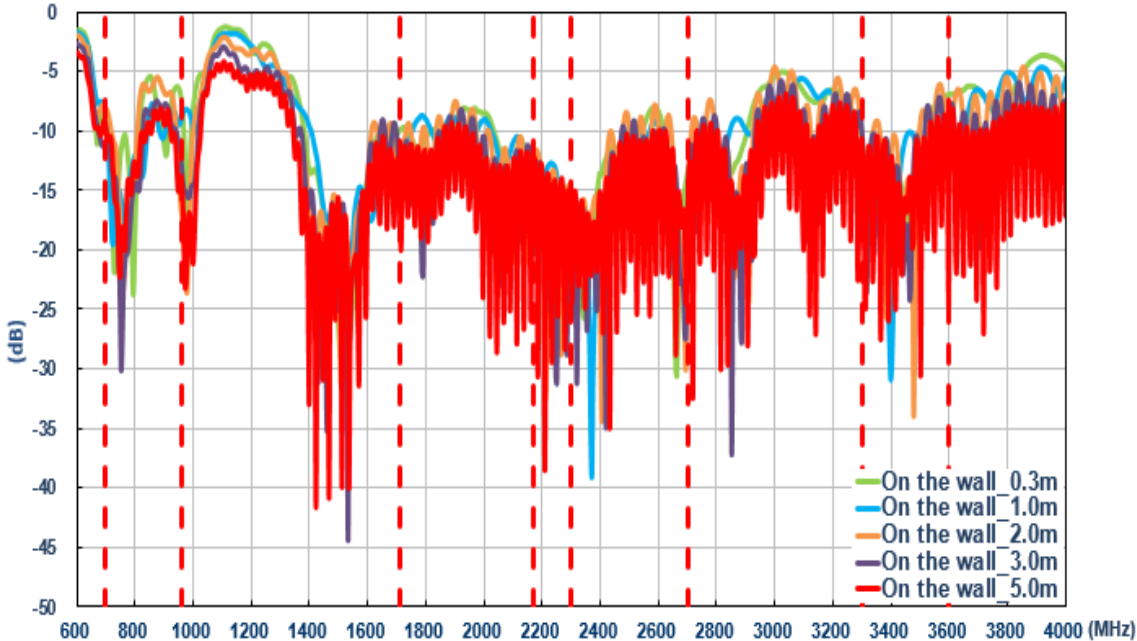


6.8.9. Peak Gain (Wi-Fi_MIMO_2)

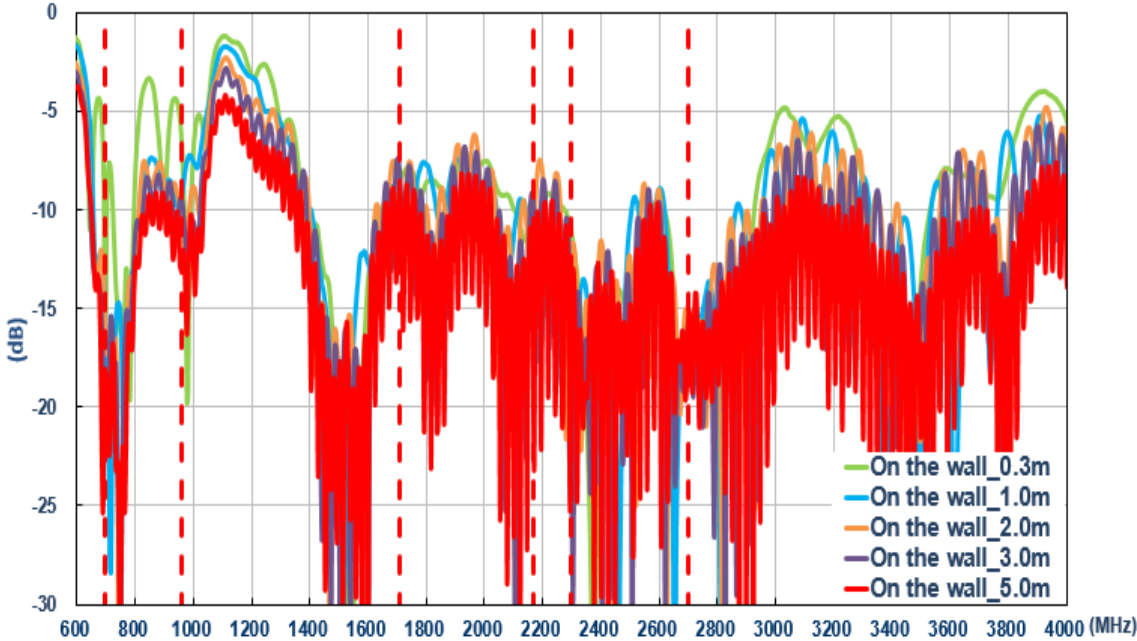


6.9. On the wall (LTE)

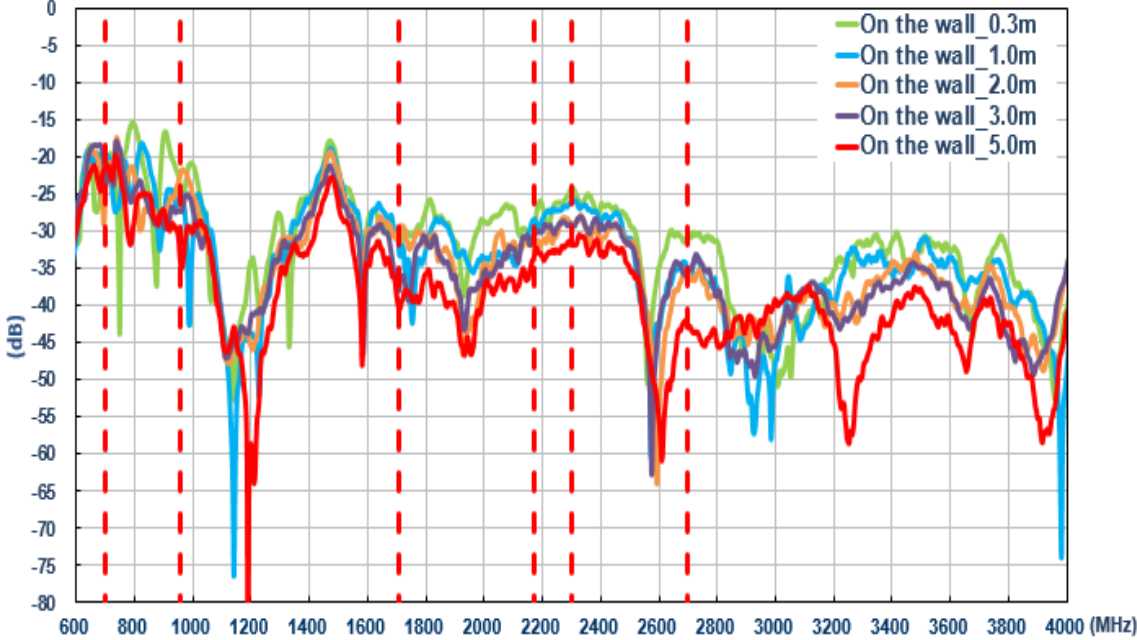
6.9.1. Return Loss (LTE_MIMO_1)



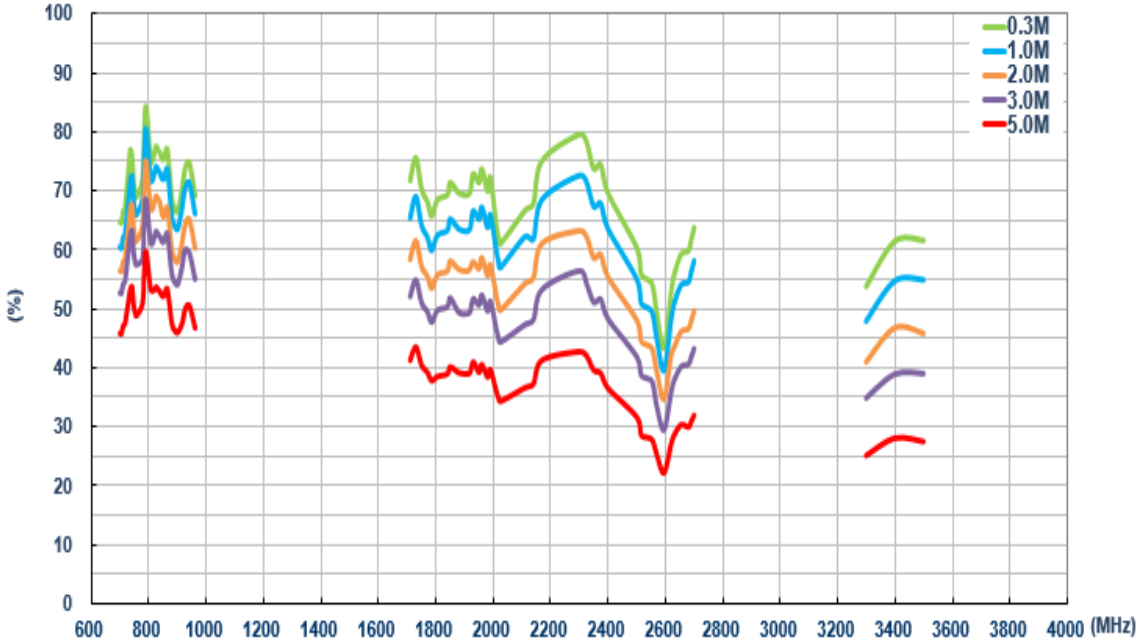
6.9.2. Return Loss (LTE_MIMO_2)



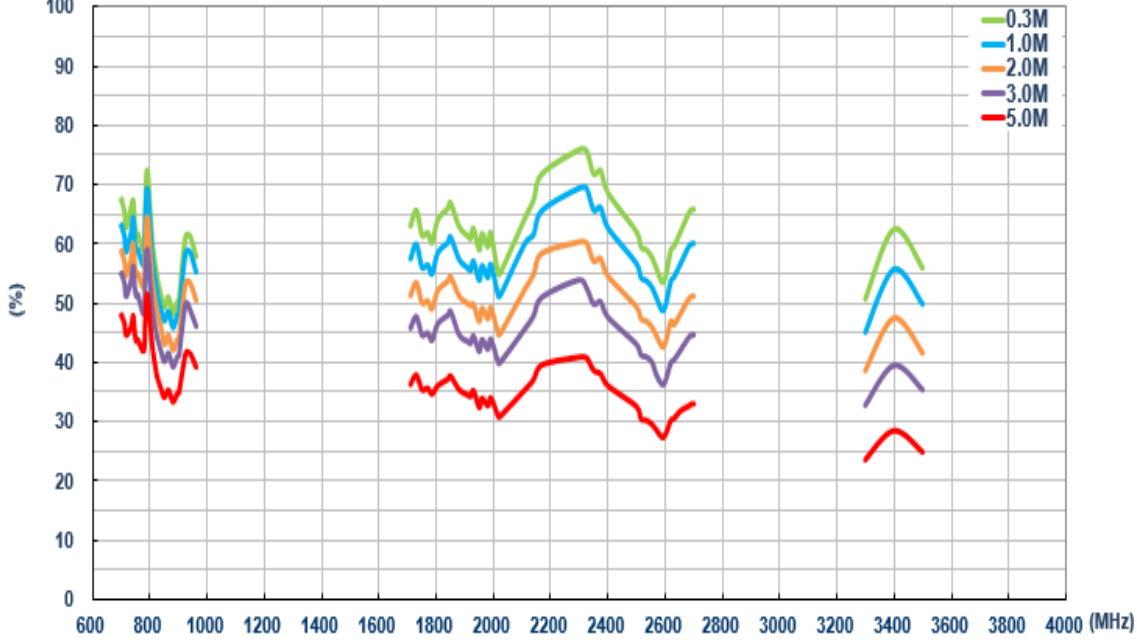
6.9.3. Isolation (LTE antenna)



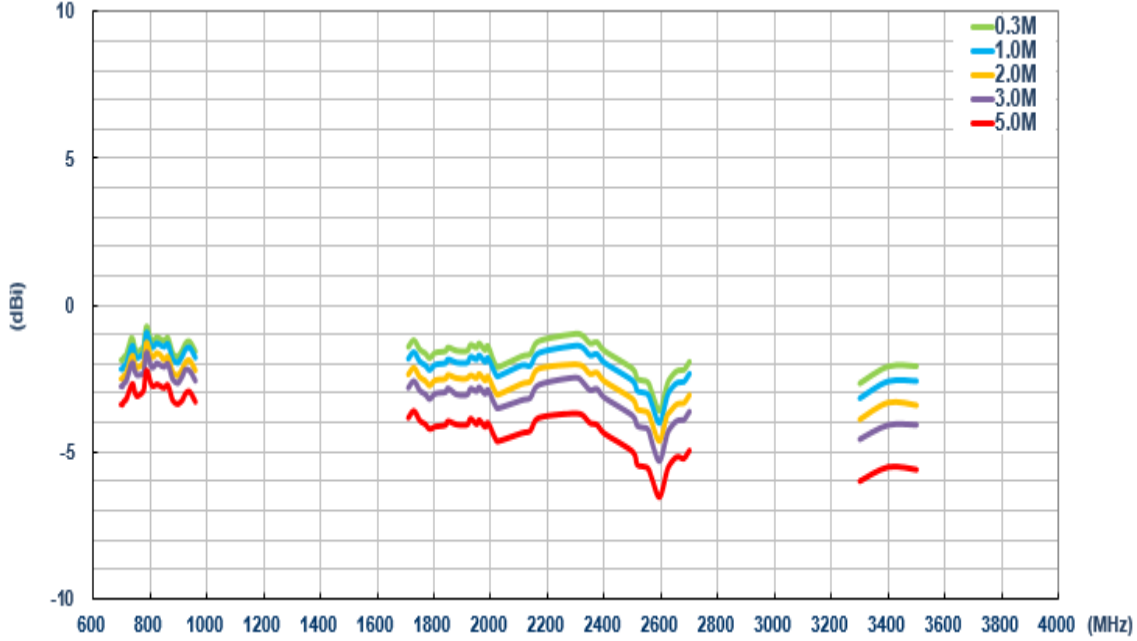
6.9.4. Efficiency (LTE_MIMO_1)



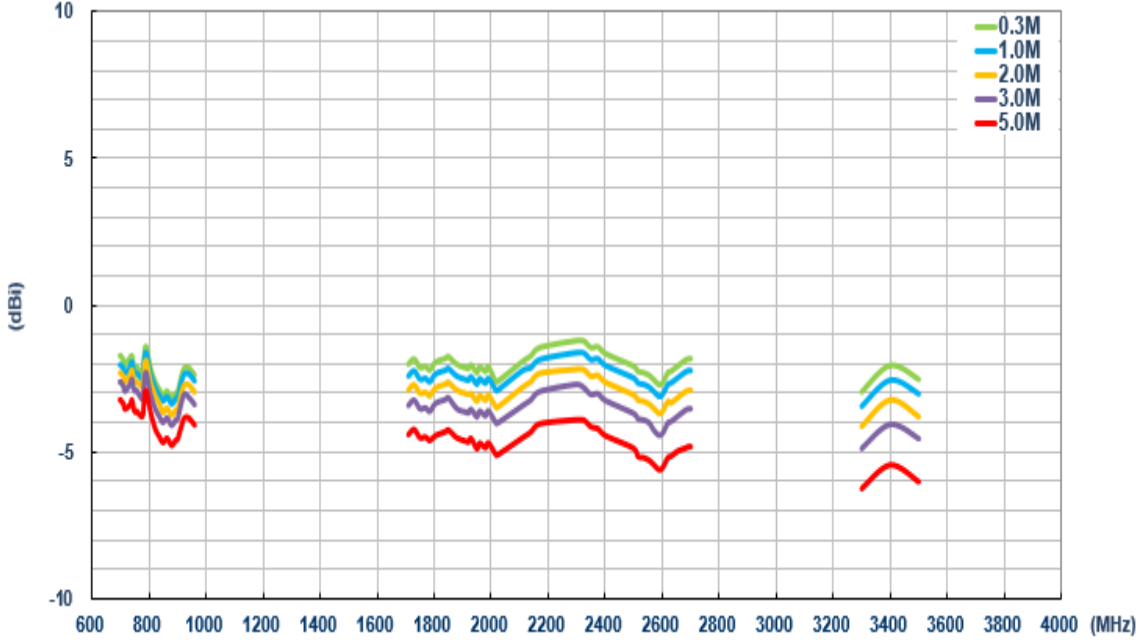
6.9.5. Efficiency (LTE_MIMO_2)



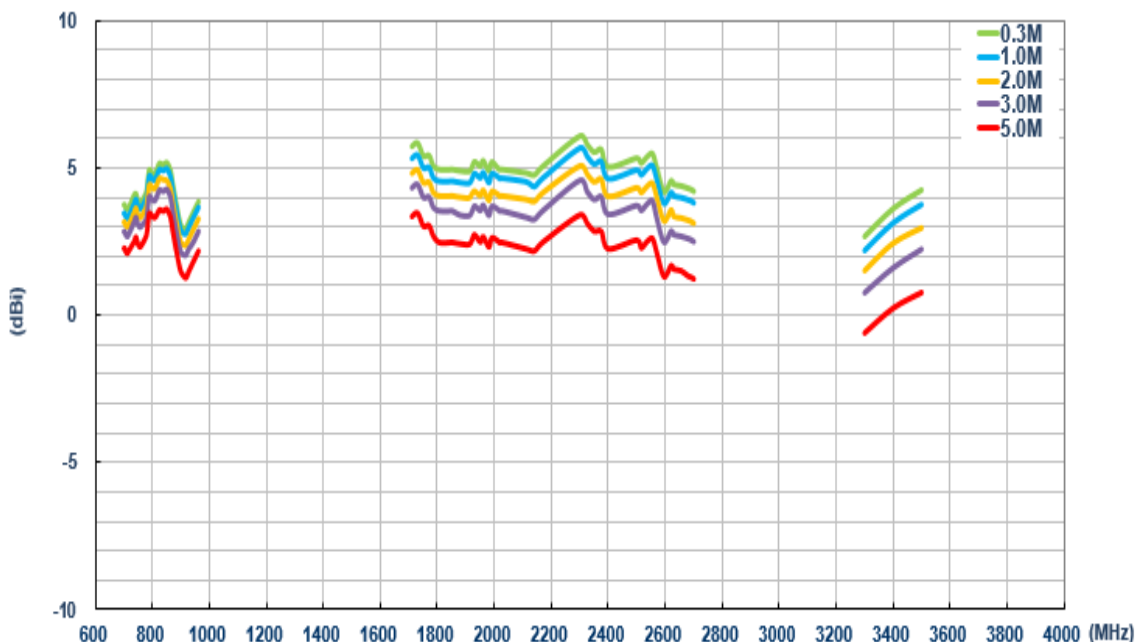
6.9.6. Average Gain (LTE_MIMO_1)



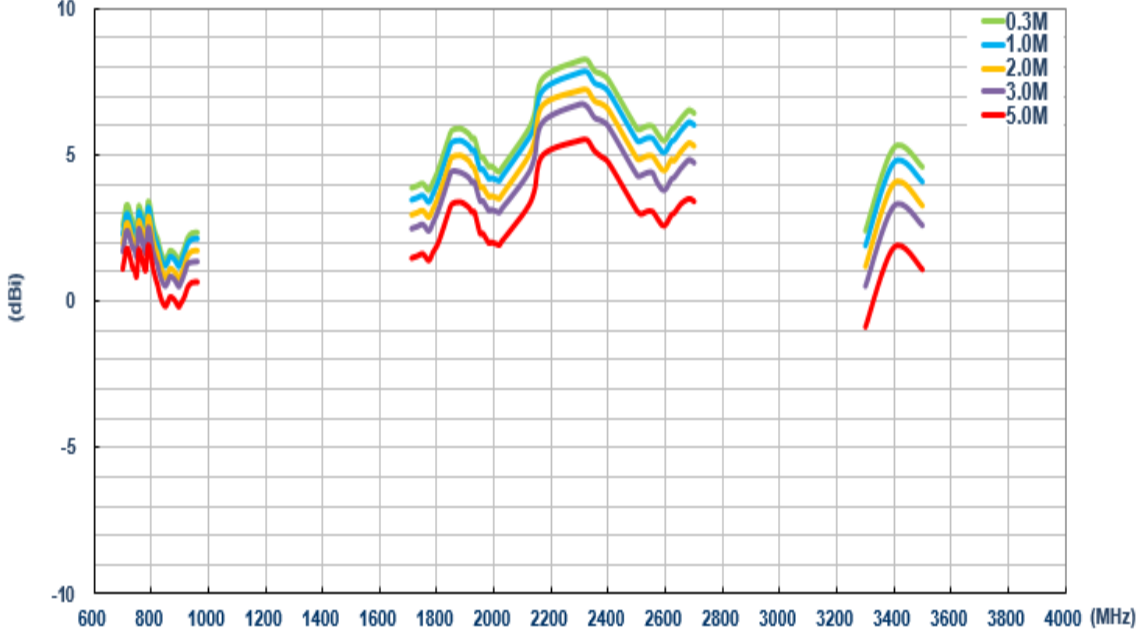
6.9.7. Average Gain (LTE_MIMO_2)



6.9.8. Peak Gain (LTE_MIMO_1)

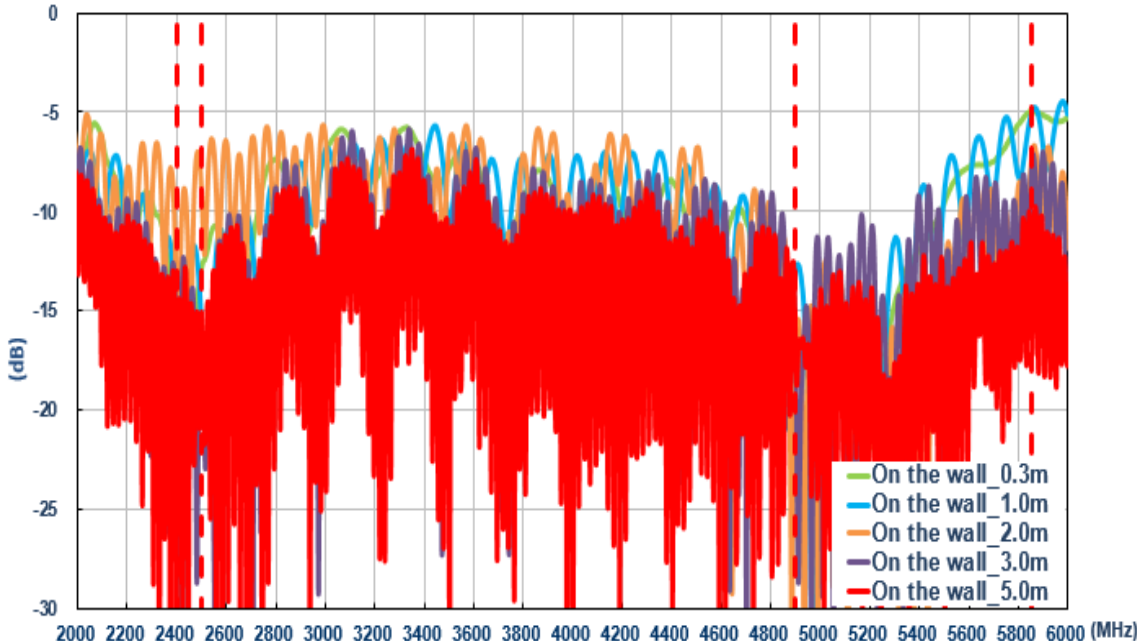


6.9.9. Peak Gain (LTE_MIMO_2)

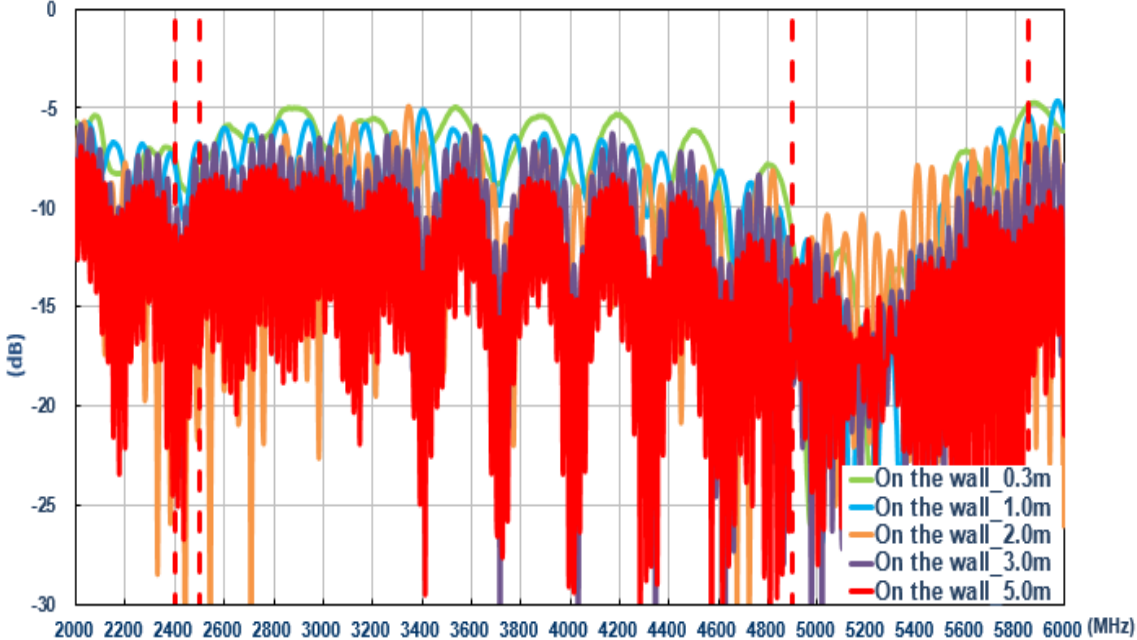


6.10. On the wall (Wi-Fi)

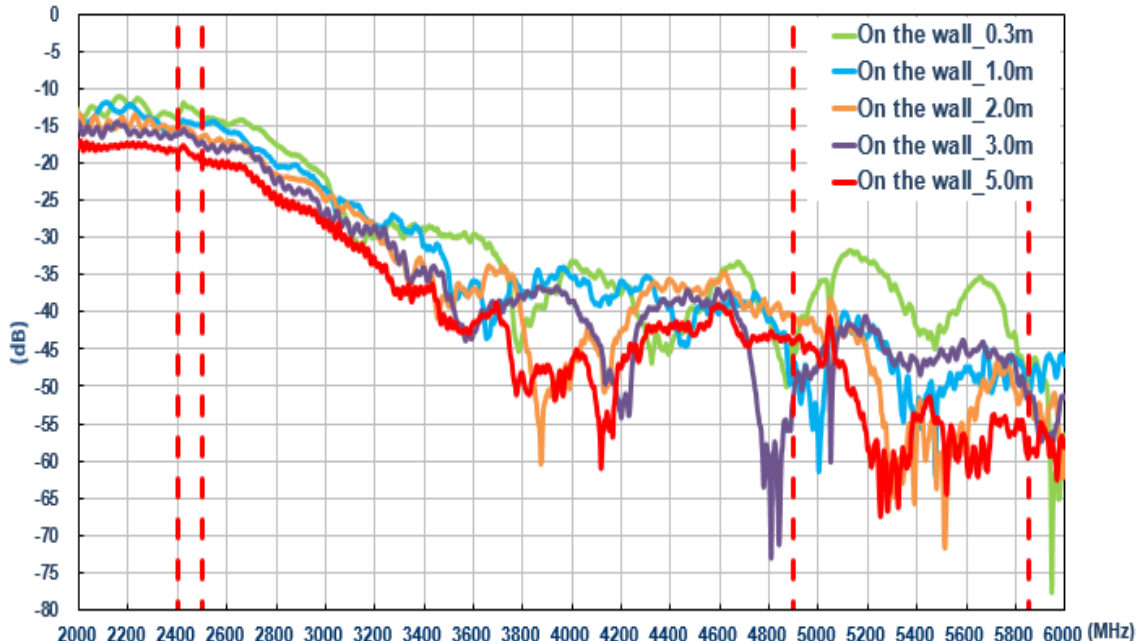
6.10.1. Return Loss (Wi-Fi_MIMO_1)



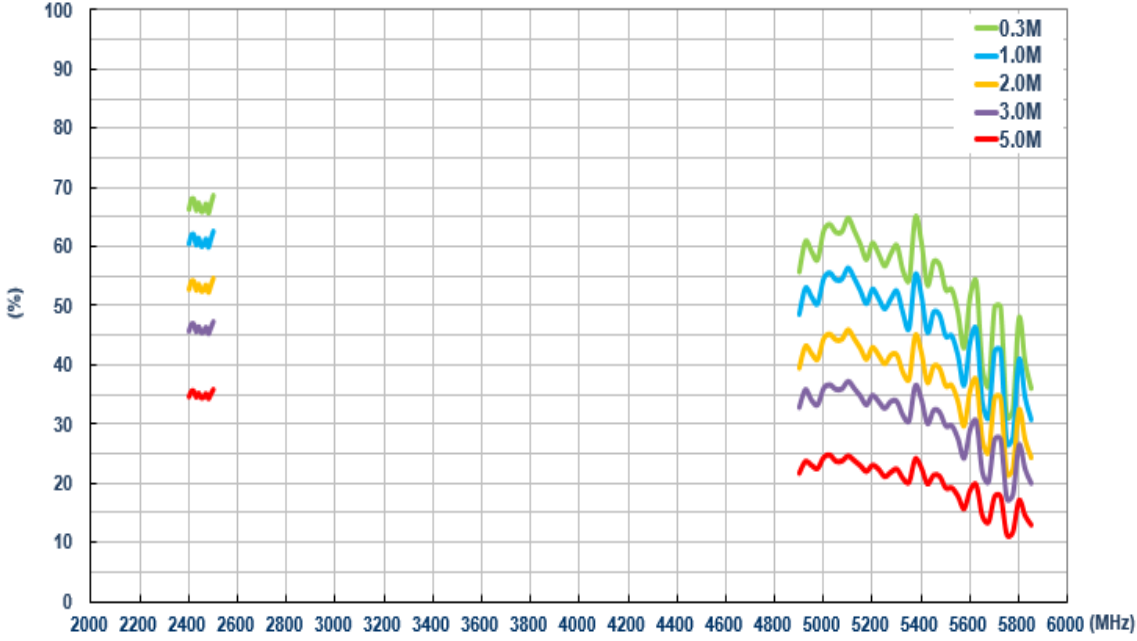
6.10.2. Return Loss (Wi-Fi_MIMO_2)



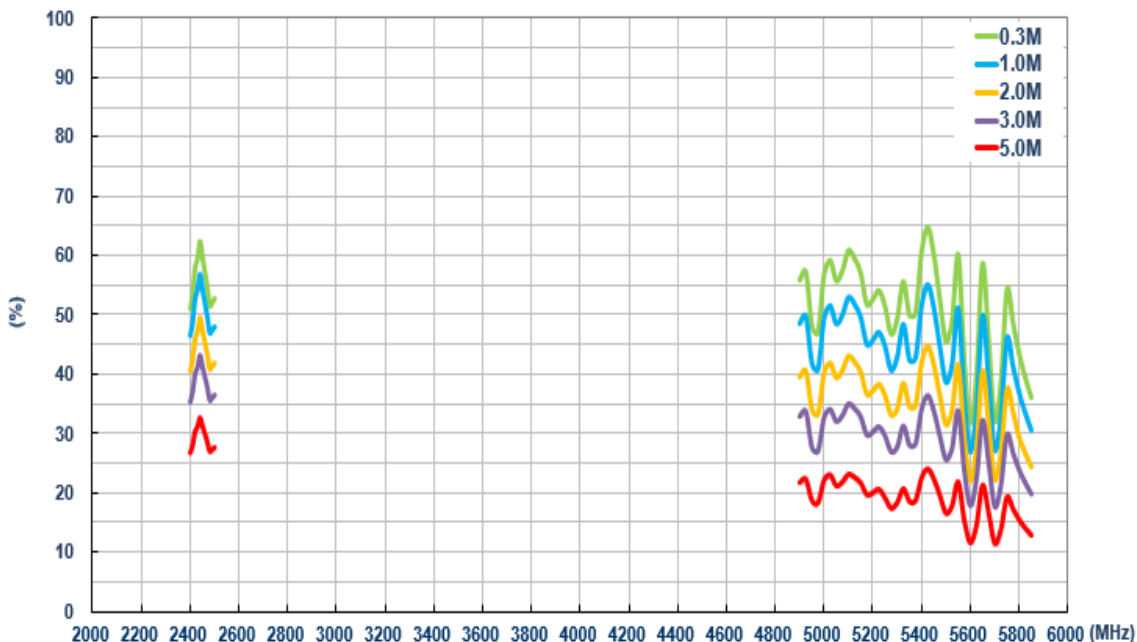
6.10.3. Isolation (Wi-Fi)



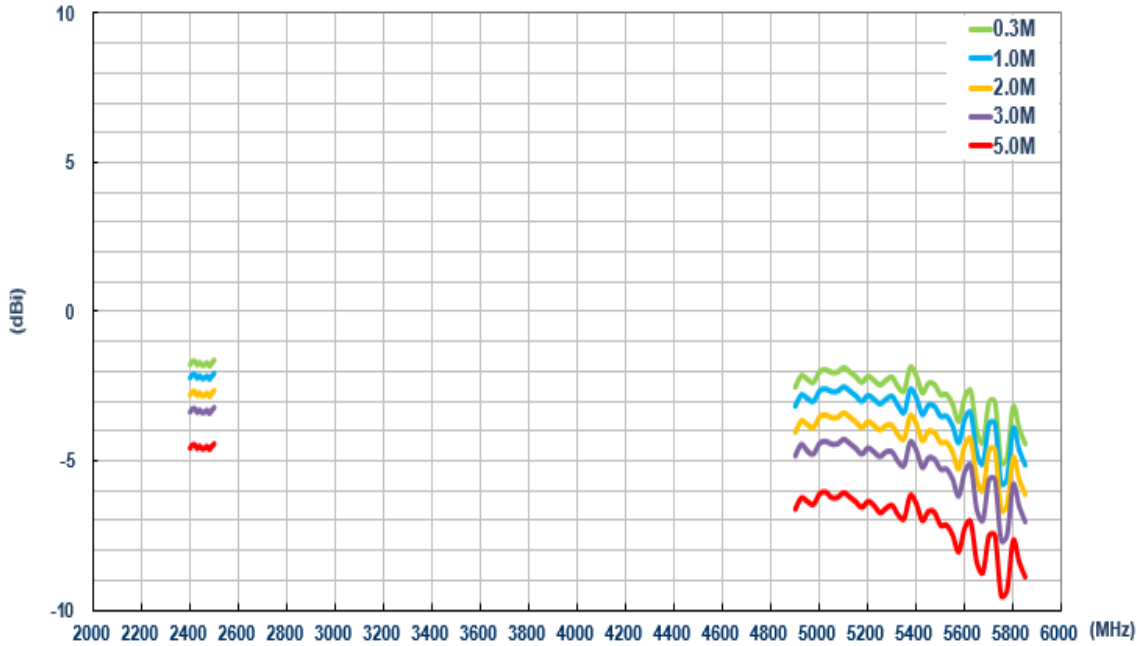
6.10.4. Efficiency (Wi-Fi_MIMO_1)



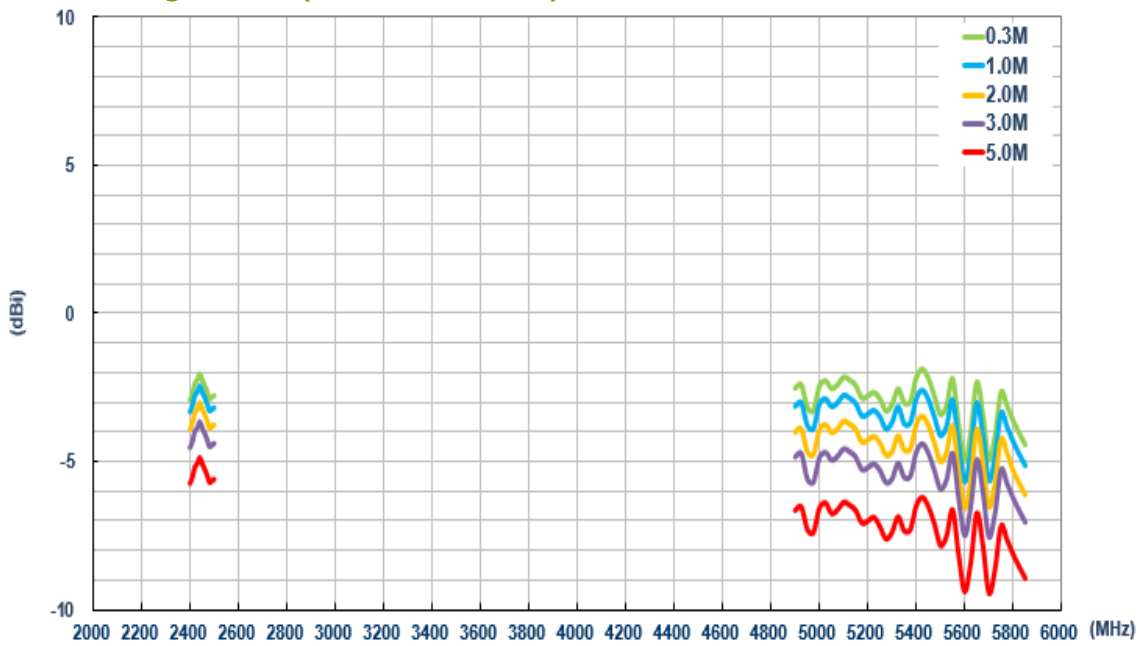
6.10.5. Efficiency (Wi-Fi_MIMO_2)



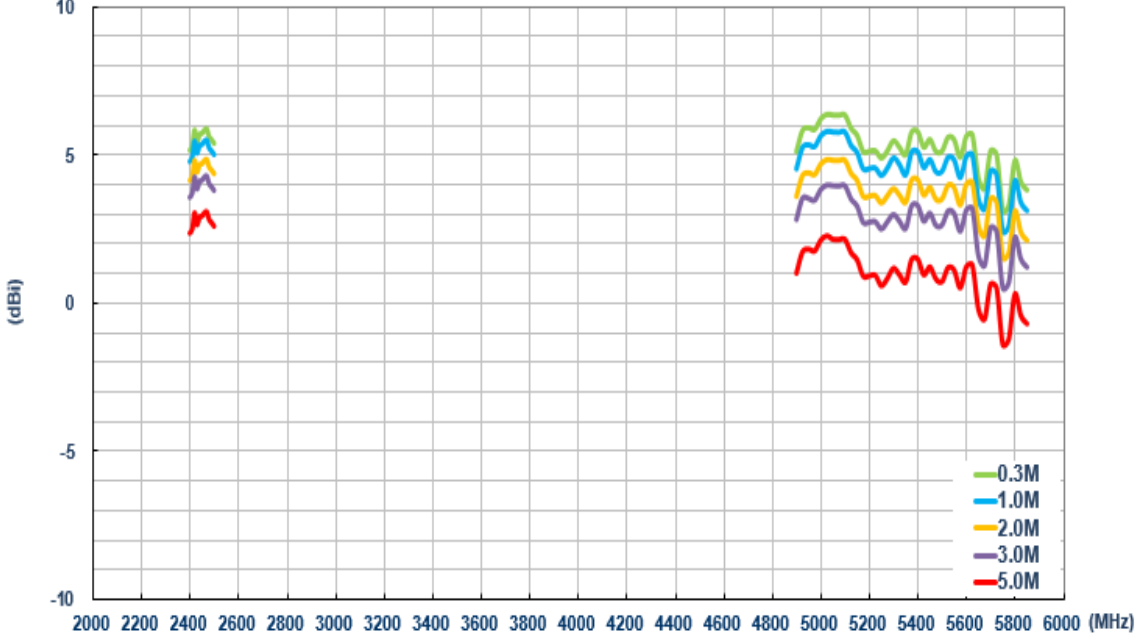
6.10.6. Average Gain (Wi-Fi_MIMO_1)



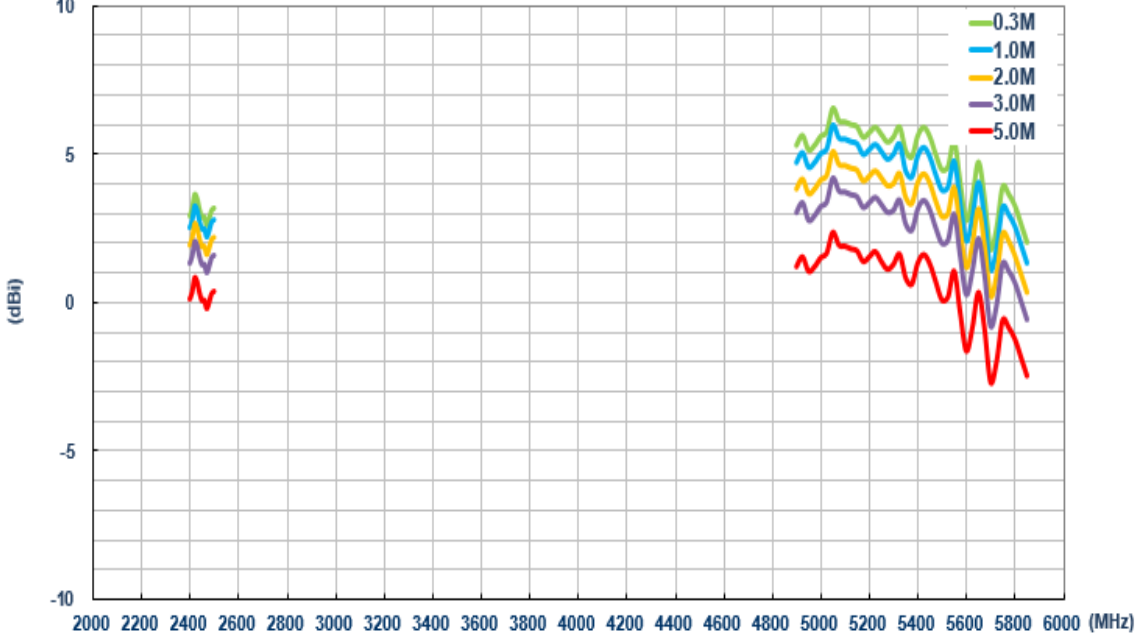
6.10.7. Average Gain (Wi-Fi_MIMO_2)



6.10.8. Peak Gain (Wi-Fi_MIMO_1)



6.10.9. Peak Gain (Wi-Fi_MIMO_2)



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