TAOGLAS®



Datasheet

17-in-1 GuardianX

Part No:
MA9917.A.001.wm

Description:

Guardian X 17-in-1 Combination Wall Mount Antenna

1*Active GNSS, 8*5G/4G MIMO 8*Dual-Band Wi-Fi MIMO

Features:

Low-profile IP67 Rated Housing

8*5G/4G MIMO 600-6000MHz

8*Wi-Fi MIMO 2.4/5.8GHz

1*GNSS - GPS-GLONASS

Cables: GNSS 3m of RG-174, 5G/4G and Wi-Fi 3m of TGC-200

Connectors: GNSS and 5G/4G – SMA(M), Wi-Fi – RP-SMA(M)

Dimensions (without bracket): 360x160x20.5mm

CE Certified

RoHS & Reach Compliant

CE

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1. Introduction



The Taoglas MA9917.A Guardian X has been designed to combine a high number of antenna combinations in one enclosure. The MA9917.A is a 17-in-1 combination antenna that combines all 17 antenna elements in one low-profile heavy-duty, IP67 rated waterproof, wall mount external enclosure. The MA9917.A comes with 1* Active GPS/GLONASS/Galileo, 8* 5G/4G Cellular MIMO (600-6000MHz), 8* Wi-Fi 6 MIMO (2.4/5.1-7.125GHz) as standard. The MA9917.A has been designed as a low profile solution for IoT and Automotive applications where space is at a premium.

This is an ideal external combination antenna solution that is used where drilling a hole through the roof of a vehicle or a metal panel for an external antenna is not feasible.
The MA9917 also operates at Band 71, the newly established 5G band at 600MHz.

Typical applications include:
- Passenger Bus / Rail / Air Applications.
- Automotive and Heavy Equipment Vehicle Tracking and Telematics
- HD Video over 5G/4G
- First Responder and Emergency Services
- M2M Applications/IoT

5G/4G 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 ensure high isolation between the MIMO antennas to prevent self-interference. Low loss cables are used to keep efficiency high over longer cable lengths. In contrast, smaller MIMO antennas with poorer quality thin cables will have reduced efficiency and isolation, which would lead to a large drop in system throughput, increased incidences of signal drops, and may indeed not make a system connection at all.

Cable type and length, and connector types are fully customizable and the GuardianX can also be customized for any variation of antennas below 17-in-1. Contact your regional Taoglas customer support team for more information.

2. Specifications

GNSS Frequency Bands Covered							
GPS	L1	L2	L5				
	■	□	□				
GLONASS	G1	G2	G3				
	■	□	□				
Galileo	E1	E5a	E5b	E6			
	■	□	□	□			
BeiDou	B1	B2a	B2b	B3			
	□	□	□	□			
QZSS (Regional)	L1	L2C	L5	L6			
	■	□	□	□			
IRNSS (Regional)	L5						
	□						
SBAS	L1/E1/B1	L5/B2a/E5a	G1	G2	G3		
	■	□	■	□	□		

*SBAS systems: WASS(L1/L5), EGNOSS(E1/E5a), SDCM(G1/G2/G3), SNAS(B1,B2a), GAGAN(L1/L5), QZSS(L1/L5), KAZZ(L1/L5).

GNSS Electrical		
Frequency (MHz)	**1575.42**	**1602**
VSWR (max.)	2.0:1	2.0:1
Efficiency (%)	67	71
Peak Gain	3	3.2
Axial Ratio (dB)	6	14
Polarization	RHCP	
Impedance	50Ω	

LNA and Filter Electrical Properties		
Frequency (MHz)	**1575.42**	**1602**
VSWR (max.)	2.0:1	2.0:1
Gain@1.8V (Typ.)	25	25
Gain@3.0V (Typ.)	31	31
Gain@5.5V (Typ.)	34	34
Noise@1.8V (Typ.)	3	3
Noise@3.0V (Typ.)	3	3
Noise@5.5V (Typ.)	3.3	3.3
Power consumption@1.8V (Typ.)	5	
Power consumption@3.0V (Typ.)	10	
Power consumption@5.5V (Typ.)	23	
Total Specification (Through Antenna, SAW Filter and LNA)		
Frequency (MHz)	**1575.42**	**1602**
Gain@3V (dBi)	31 ± 3	30 ± 3
Output Impedance	50 Ω	

5G/4G MIMO Antennas											
Frequency (MHz)		5G NR Band 71	LTE700	GSM 850/900	5G NR Band 74, 75, 76	DCS	PCS	UMTS1	LTE2600	5G NR Band 77, 78, 79	LTE5200/ Wi-Fi 5800
		617 ~698	698 ~824	824 ~960	1427~ 1518	1710 ~1880	1850 ~1990	1920 ~2170	2300 ~2690	3300 ~3800	5150 ~5925
Efficiency (%)											
MIMO 1	3m	41.1	46.1	39.2	46.2	42.0	38.5	30.3	29.8	34.9	24.9
MIMO 2	3m	25.9	29.8	30.6	14.8	32.3	28.6	26.2	26.7	17.4	14.1
MIMO 3	3m	27.8	30.0	30.3	33.0	32.2	32.9	29.2	29.5	25.7	14.6
MIMO 4	3m	15.4	29.7	30.5	36.6	32.0	31.5	25.7	26.2	18.3	14.7
MIMO 5	3m	15.4	29.7	30.5	36.6	32.0	31.5	25.7	26.2	18.3	14.7
MIMO 6	3m	27.8	30.0	30.3	33.0	32.2	32.9	29.2	29.5	25.7	14.6
MIMO 7	3m	25.9	29.8	30.6	14.8	32.3	28.6	26.2	26.7	17.4	14.1
MIMO 8	3m	41.1	46.1	39.2	46.2	42.0	38.5	30.3	29.8	34.9	24.9
Average Gain (dB)											
MIMO 1	3m	-3.87	-3.36	-4.07	-3.36	-3.77	-4.14	-5.18	-5.25	-4.57	-6.04
MIMO 2	3m	-5.87	-5.26	-5.14	-8.31	-4.91	-5.43	-5.82	-5.74	-7.59	-8.51
MIMO 3	3m	-5.56	-5.23	-5.18	-4.82	-4.92	-4.82	-5.34	-5.30	-5.90	-8.36
MIMO 4	3m	-8.12	-5.27	-5.15	-4.36	-4.94	-5.02	-5.90	-5.82	-7.38	-8.34
MIMO 5	3m	-8.12	-5.27	-5.15	-4.36	-4.94	-5.02	-5.90	-5.82	-7.38	-8.34
MIMO 6	3m	-5.56	-5.23	-5.18	-4.82	-4.92	-4.82	-5.34	-5.30	-5.90	-8.36
MIMO 7	3m	-5.87	-5.26	-5.14	-8.31	-4.91	-5.43	-5.82	-5.74	-7.59	-8.51
MIMO 8	3m	-3.87	-3.36	-4.07	-3.36	-3.77	-4.14	-5.18	-5.25	-4.57	-6.04
Peak Gain (dBi)											
MIMO 1	3m	2.82	2.84	0.49	3.98	3.71	3.09	2.08	2.07	2.32	1.78
MIMO 2	3m	0.69	0.77	2.06	-1.82	1.56	1.18	1.37	1.37	0.03	-1.31
MIMO 3	3m	2.24	2.25	2.01	1.25	2.89	3.16	2.26	2.26	0.64	-0.19
MIMO 4	3m	-0.92	0.67	0.62	2.49	2.46	3.06	2.46	2.46	0.01	-0.86
MIMO 5	3m	-0.92	0.67	0.62	2.49	2.46	3.06	2.46	2.46	0.01	-0.86
MIMO 6	3m	2.24	2.25	2.01	1.25	2.89	3.16	2.26	2.26	0.64	-0.19
MIMO 7	3m	0.69	0.77	2.06	-1.82	1.56	1.18	1.37	1.37	0.03	-1.31
MIMO 8	3m	2.82	2.84	0.49	3.98	3.71	3.09	2.08	2.07	2.32	1.78
Impedance		50 Ω									
Polarization		Linear									
Radiation Pattern		Omni									
Max. input power		20W									

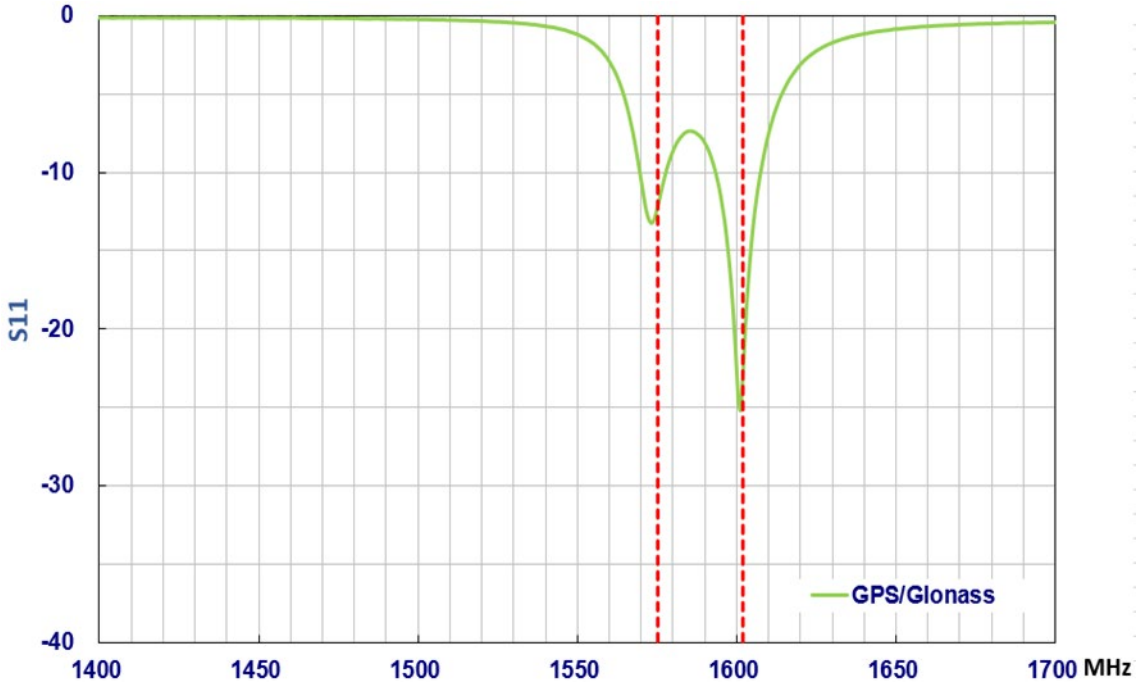
Wi-Fi MIMO				
Frequency (MHz)		**2400~2500**	**5150~5850**	**5925~7125**
Efficiency (%)				
MIMO 1	3m	32.9	30.9	25.7
MIMO 2	3m	31.4	31.0	25.5
MIMO 3	3m	28.7	36.9	27.3
MIMO 4	3m	37.6	37.7	25.7
MIMO 5	3m	37.6	37.7	25.7
MIMO 6	3m	28.7	36.9	27.3
MIMO 7	3m	31.4	31.0	25.5
MIMO 8	3m	32.9	30.9	25.7
Average Gain (dB)				
MIMO 1	3m	-4.82	-5.10	-5.9
MIMO 2	3m	-5.03	-5.09	-6
MIMO 3	3m	-5.42	-4.33	-5.6
MIMO 4	3m	-4.25	-4.23	-5.9
MIMO 5	3m	-4.25	-4.23	-5.9
MIMO 6	3m	-5.42	-4.33	-5.6
MIMO 7	3m	-5.03	-5.09	-6
MIMO 8	3m	-4.82	-5.10	-5.9
Peak Gain (dBi)				
MIMO 1	3m	0.92	1.91	0.3
MIMO 2	3m	1.41	1.29	0.5
MIMO 3	3m	1.57	4.09	1.4
MIMO 4	3m	3.92	4.25	0.8
MIMO 5	3m	3.92	4.25	0.8
MIMO 6	3m	1.57	4.09	1.4
MIMO 7	3m	1.41	1.29	0.5
MIMO 8	3m	0.92	1.91	0.3
Impedance		50 Ω		
Polarization		Linear		
Radiation Pattern		Omni		
Max. input power		20W		

Mechanical	
Height without Bracket	20.5mm
Planner Dimension	360x160mm
Bracket Dimensions	Ø77x6.3mm
Housing Material	PC
Bracket Material	ASA
Cable	3m TGC200 for 5G/4G – Fully Customizable 3m TGC200 for Wi-Fi – Fully Customizable 3m RG174 for GNSS – Fully Customizable
Connector	5G/4G/SMA-Plug – Fully Customizable Wi-Fi: RP-SMA-Plug – Fully Customizable GNSS: SMA-Plug – Fully Customizable
Weight	1300 g (Not Included Package)
Protection	IP67
Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

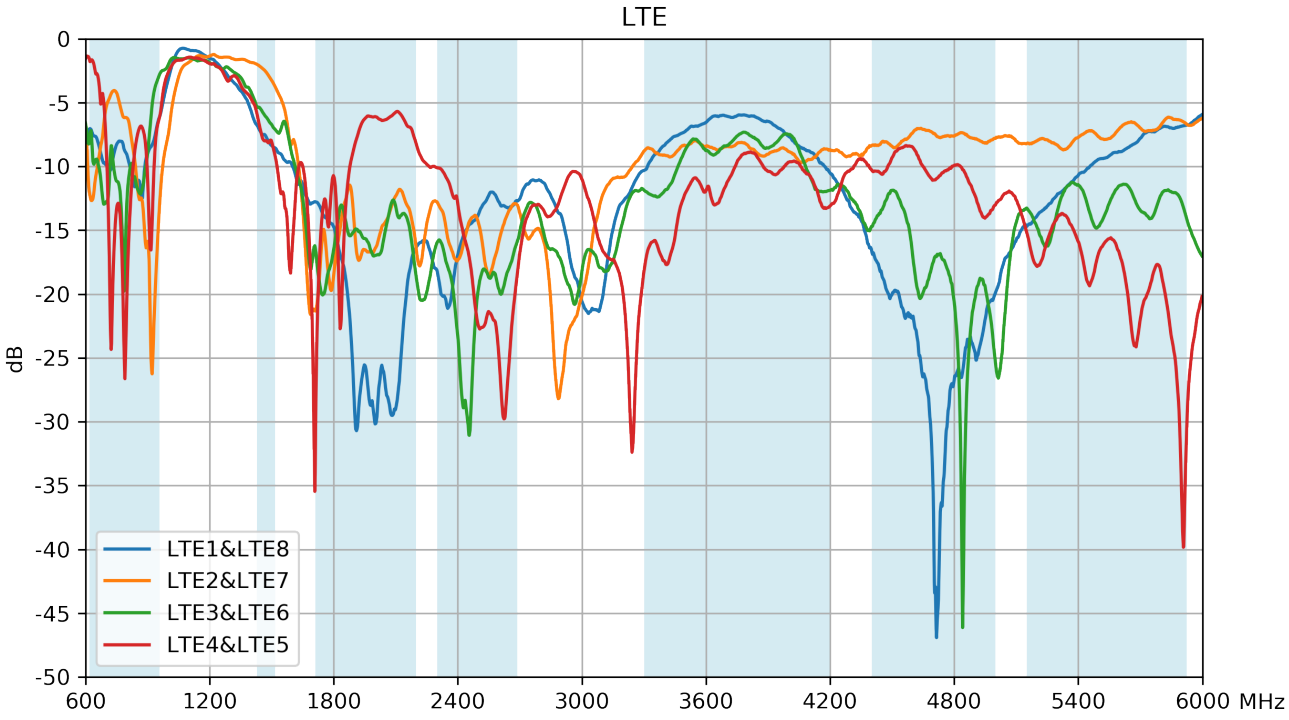
5G/4G Bands			
Band Number	5GNR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 894	✓
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	✓
18	UL: 815 to 830	DL: 860 to 875	✓
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	✓
24	UL:1625.5 to 1660.5	DL: 1525 to 1559	✓
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	✓
28	UL: 703 to 748	DL: 758 to 803	✓
29	UL: -	DL: 717 to 728	✓
30	UL: 2305 to 2315	DL: 2350 to 2360	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5	✗
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		✓
48	3550 to 3700		✓
66	UL: 1710-1780	DL: 2110-2200	✓
71	617 to 698		✓
74/75/76	1427 to 1518		✓
78	3300 to 3800		✓
79	4400 to 5000		✓

3. Antenna Characteristics

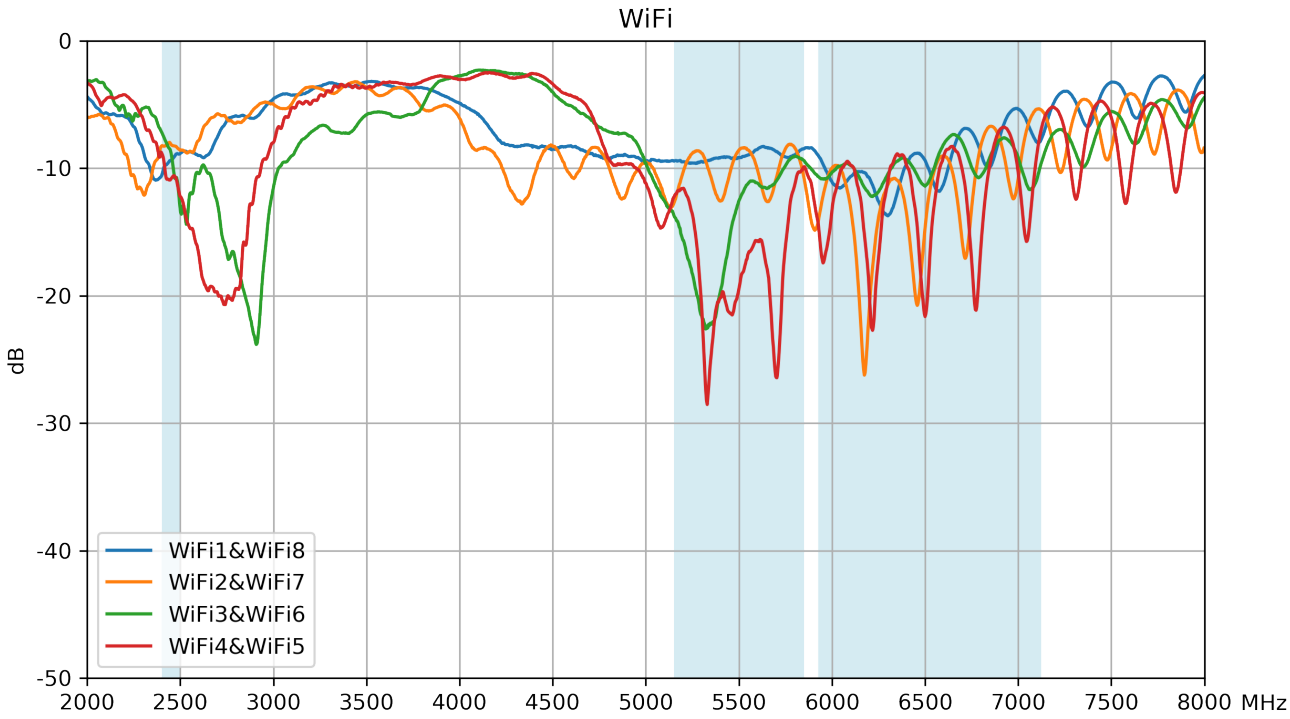
3.1 Return Loss - GNSS



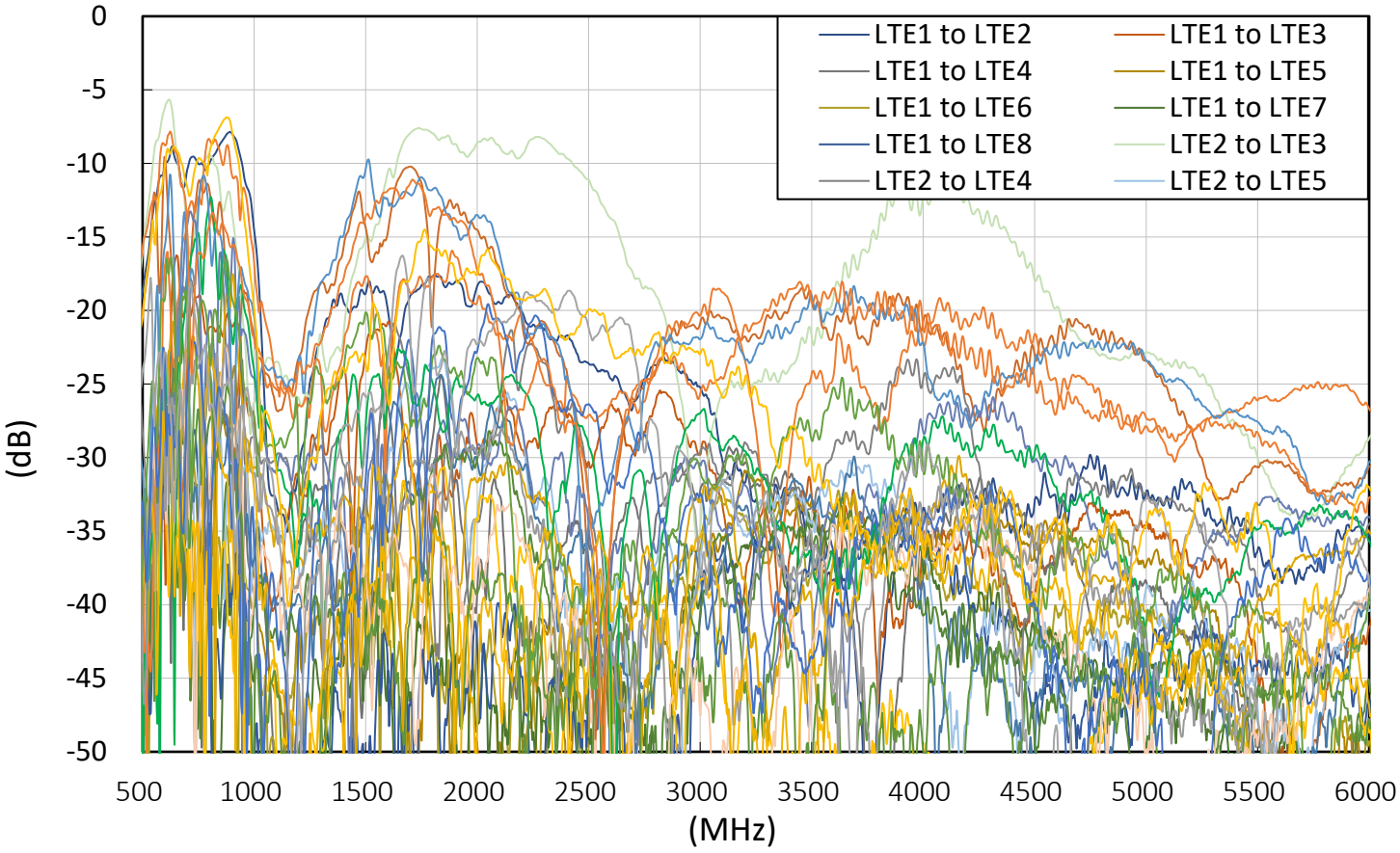
3.2 Return Loss – 5G/4G (MIMO 1-8)



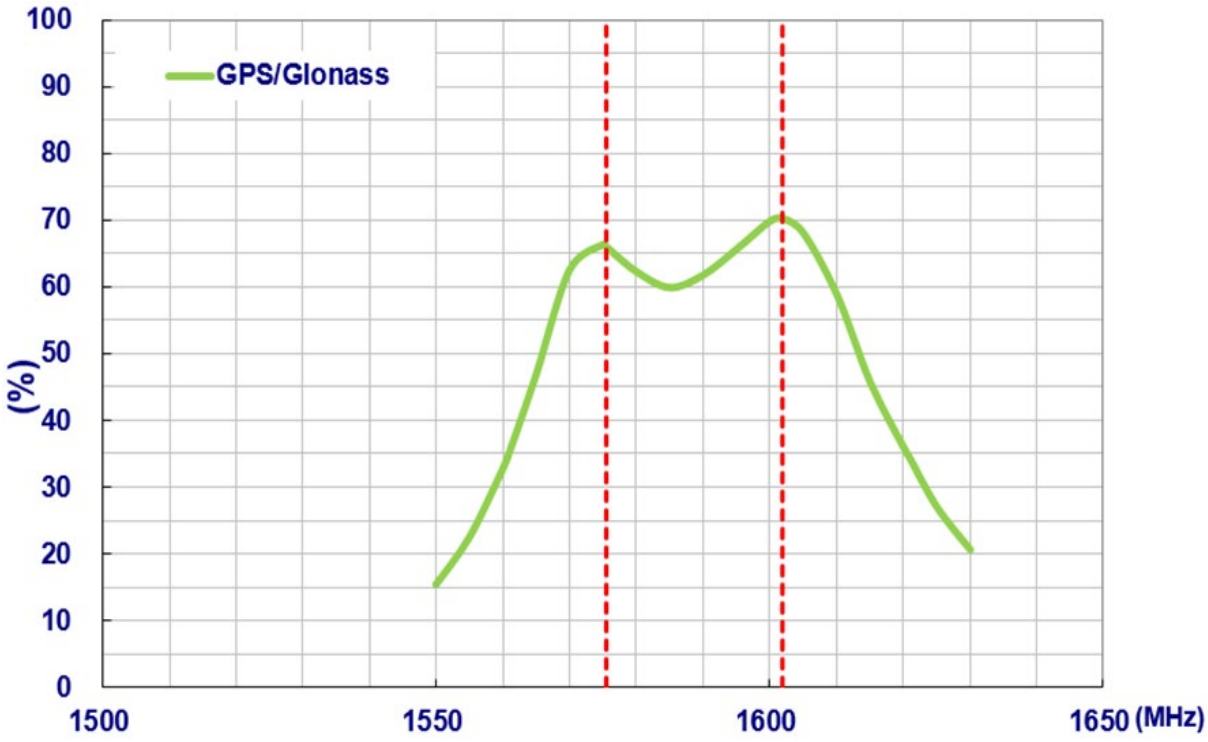
3.3 Return Loss – Wi-Fi (MIMO 1-8)



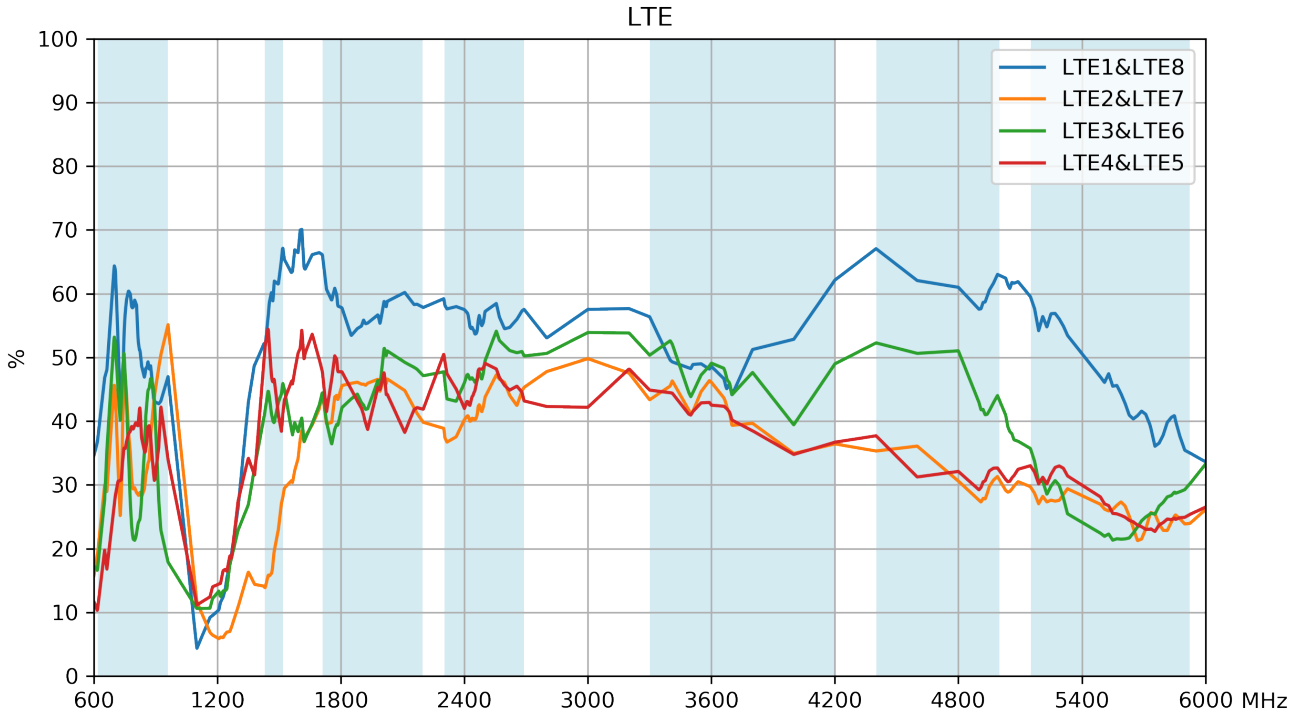
3.4 Isolation



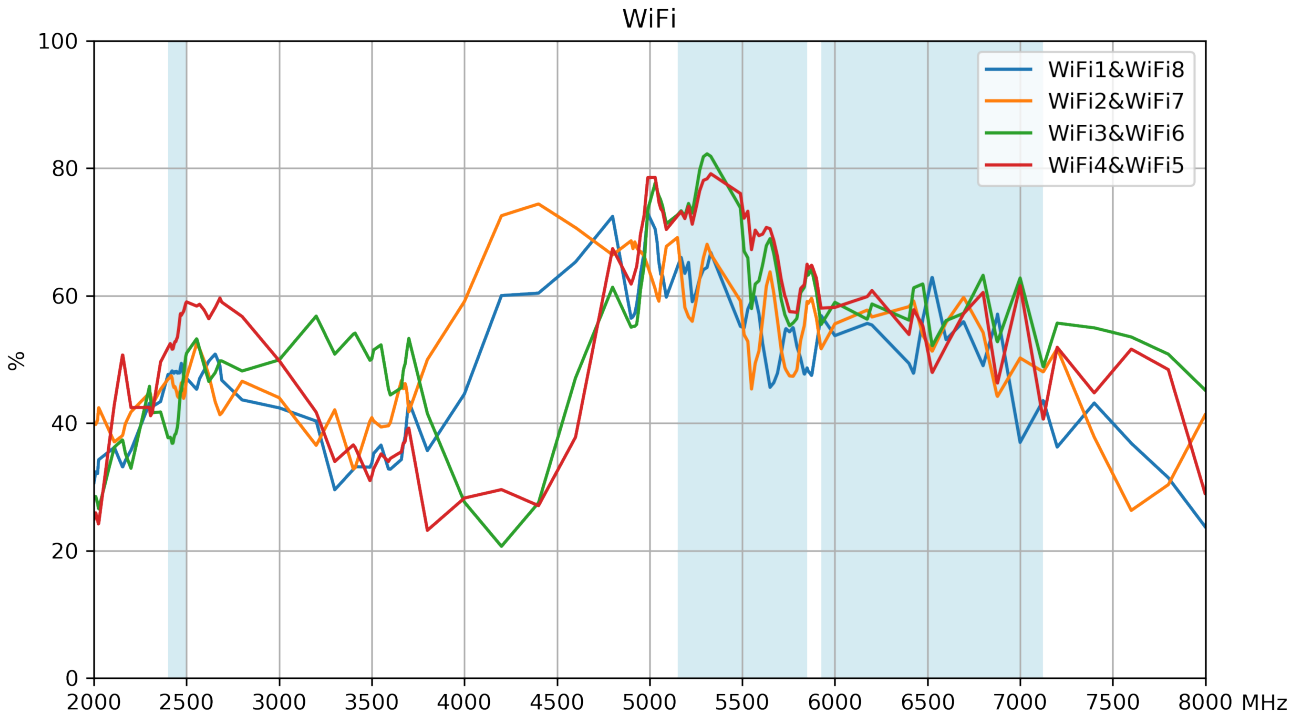
3.5 Efficiency - GNSS



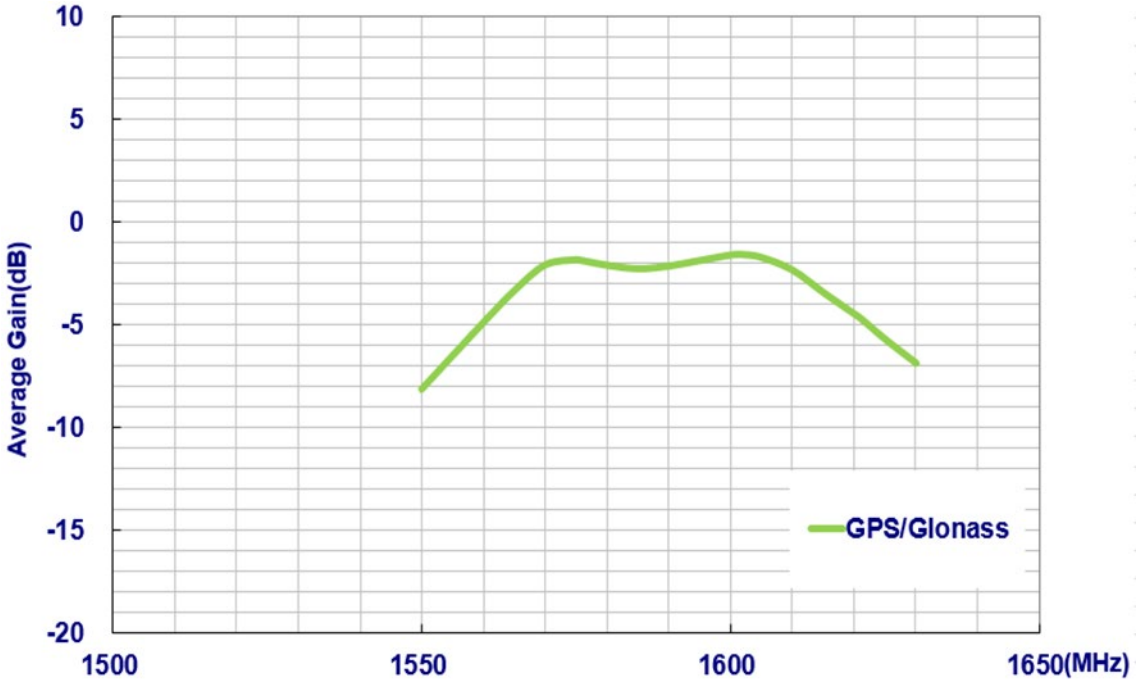
3.6 Efficiency – 5G/4G (MIMO 1-8)



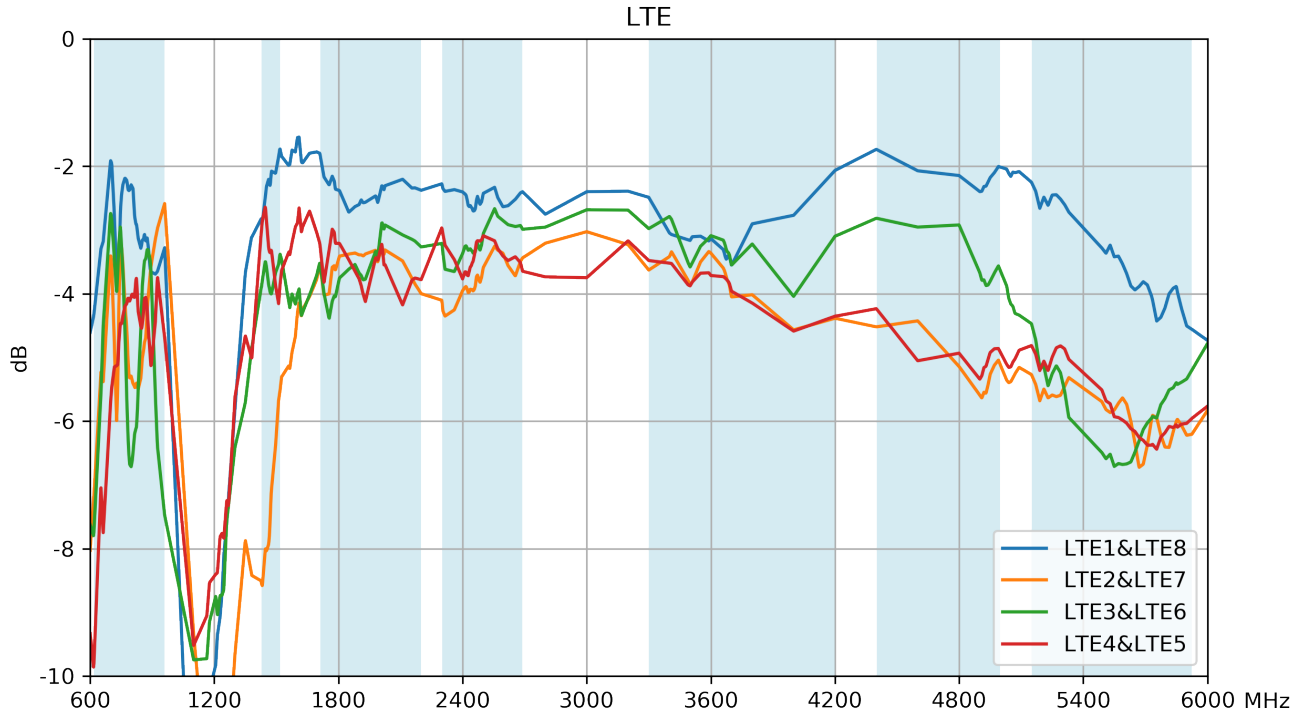
3.7 Efficiency – Wi-Fi (MIMO 1-8)



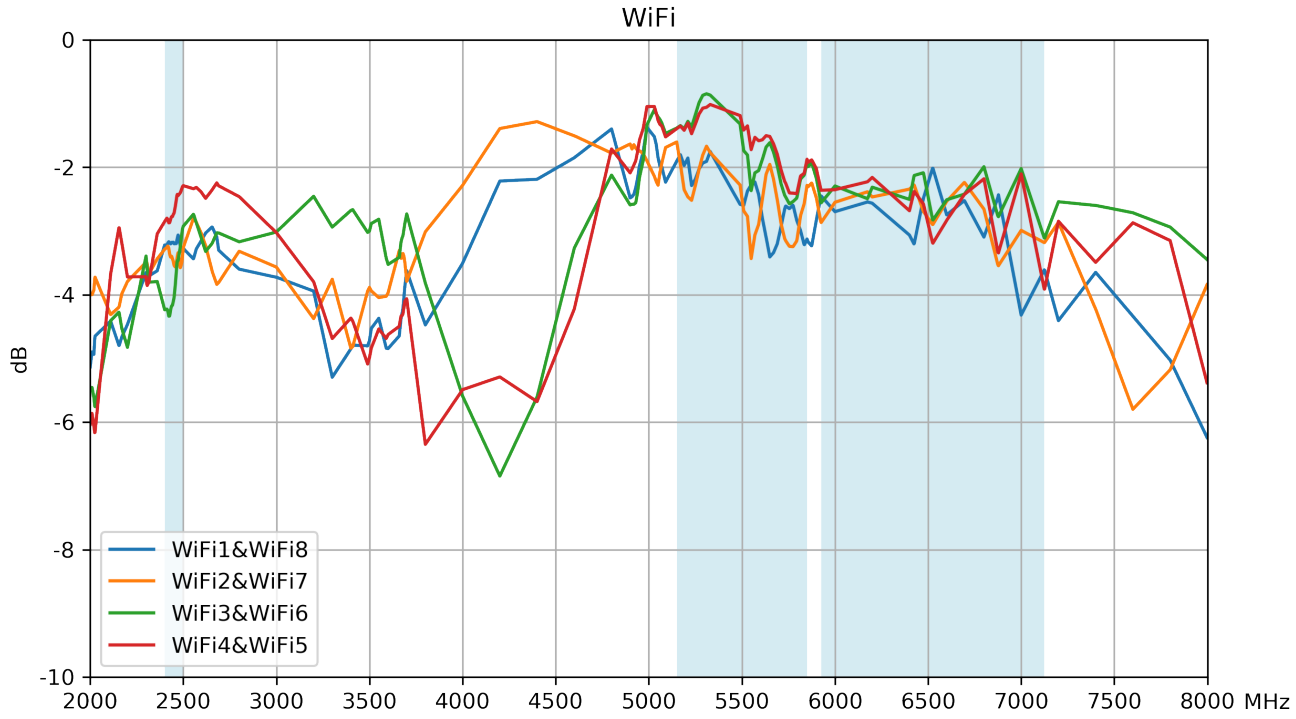
3.8 Average Gain - GNSS



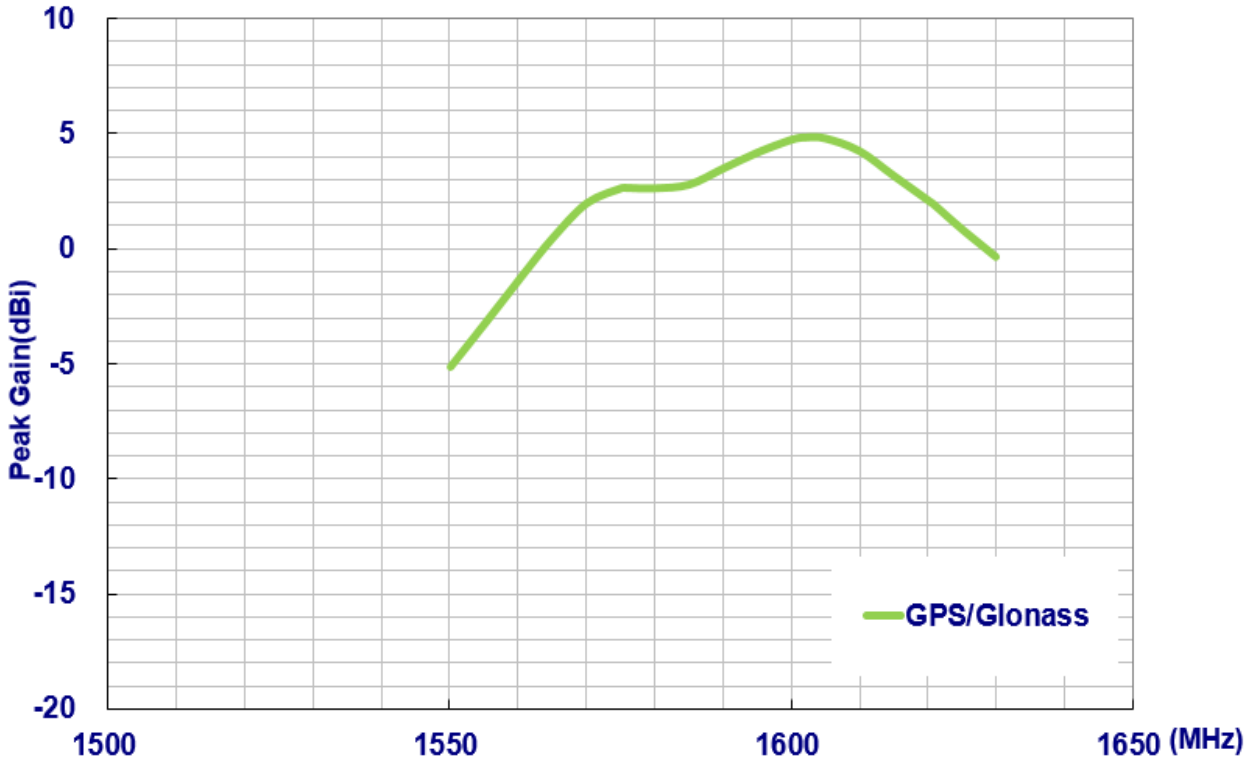
3.9 Average Gain – 5G/4G (MIMO 1-8)



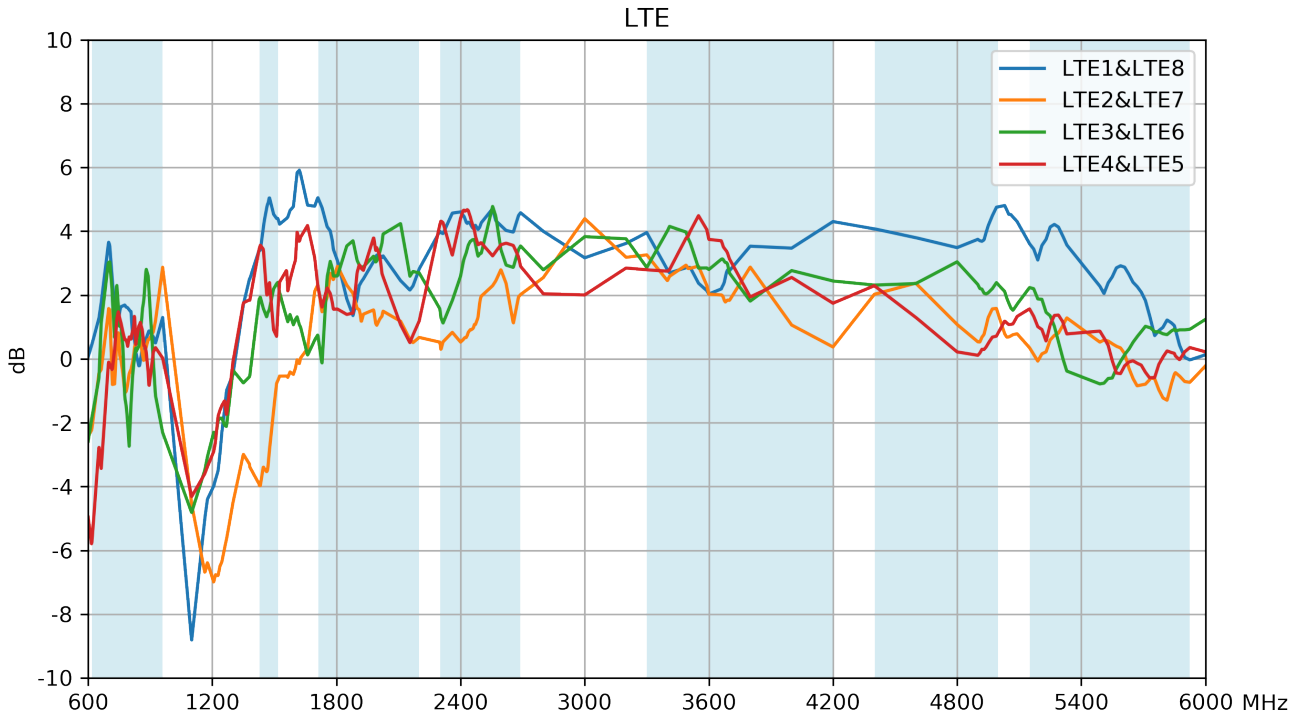
3.10 Average Gain – Wi-Fi (MIMO 1-8)



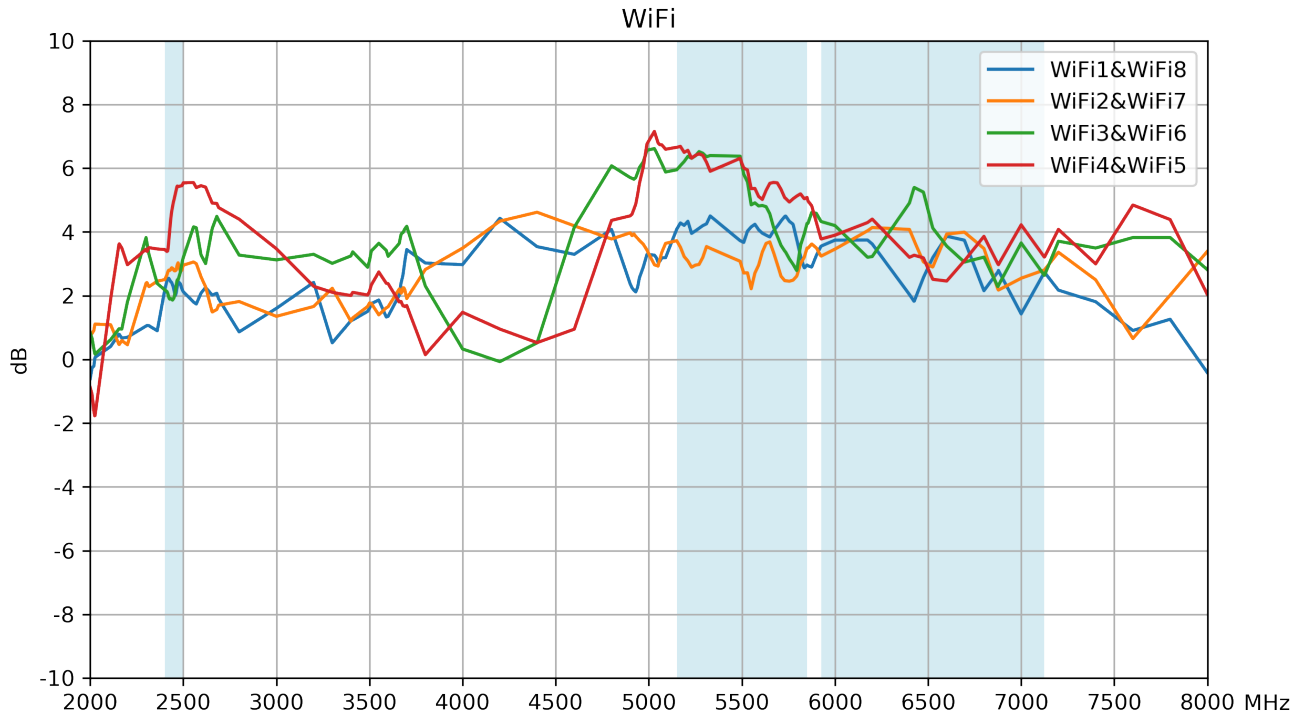
3.11 Peak Gain - GNSS



3.12 Peak Gain – 5G/4G (MIMO 1-8)

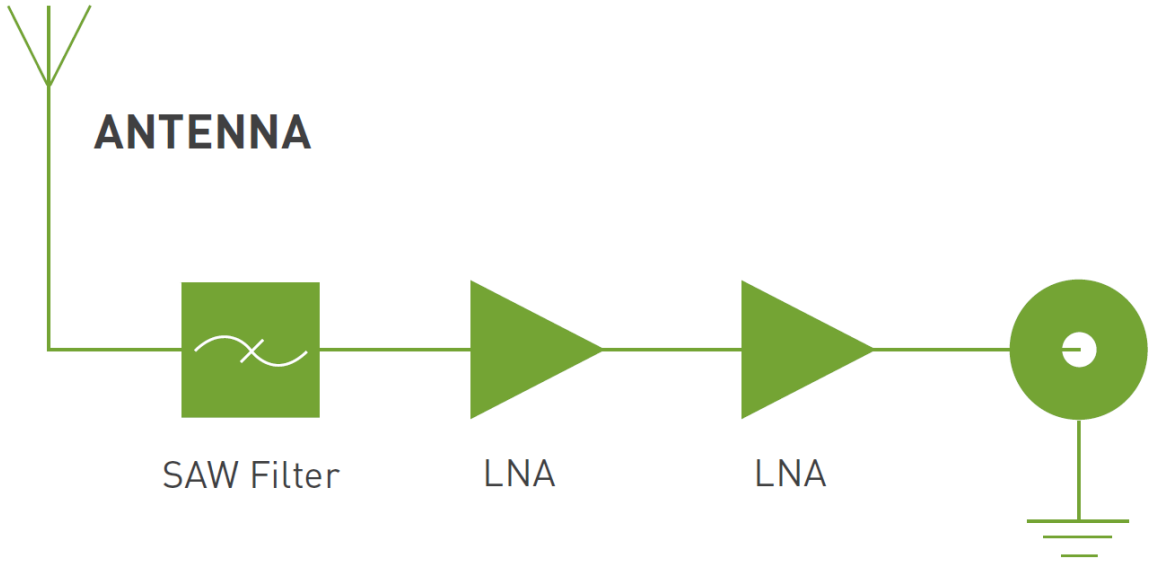


3.13 Peak Gain – Wi-Fi (MIMO 1-8)

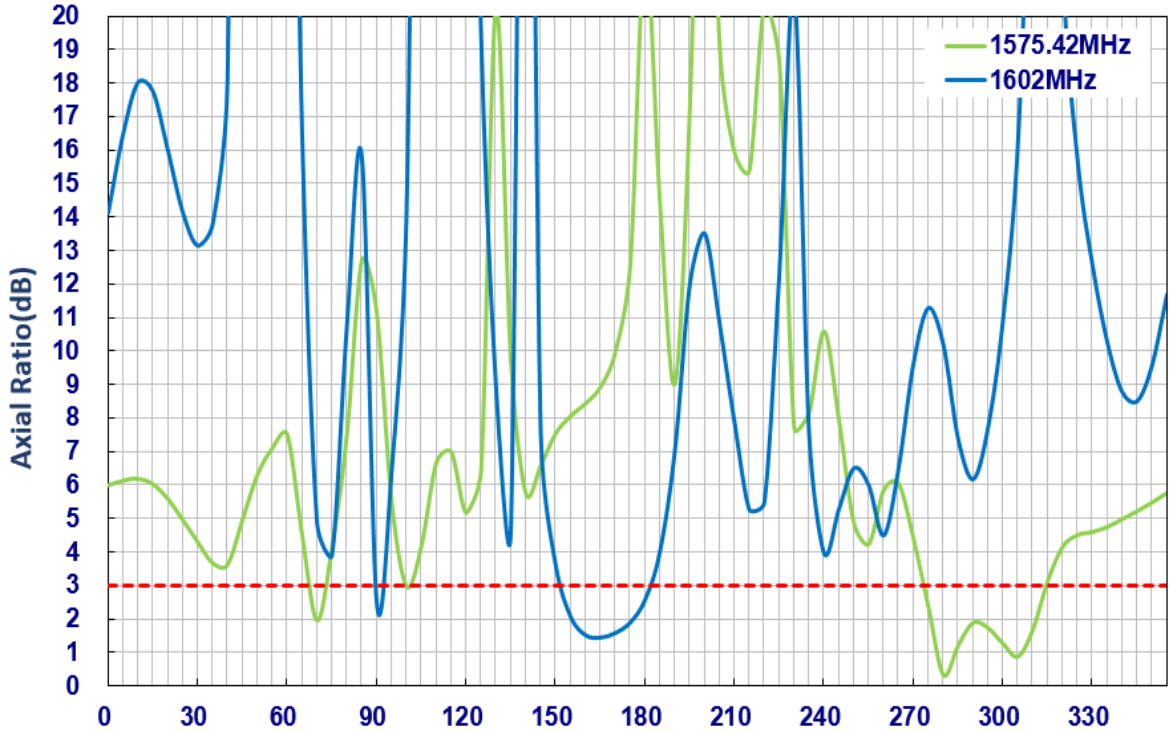


4. Active Antenna Characteristics

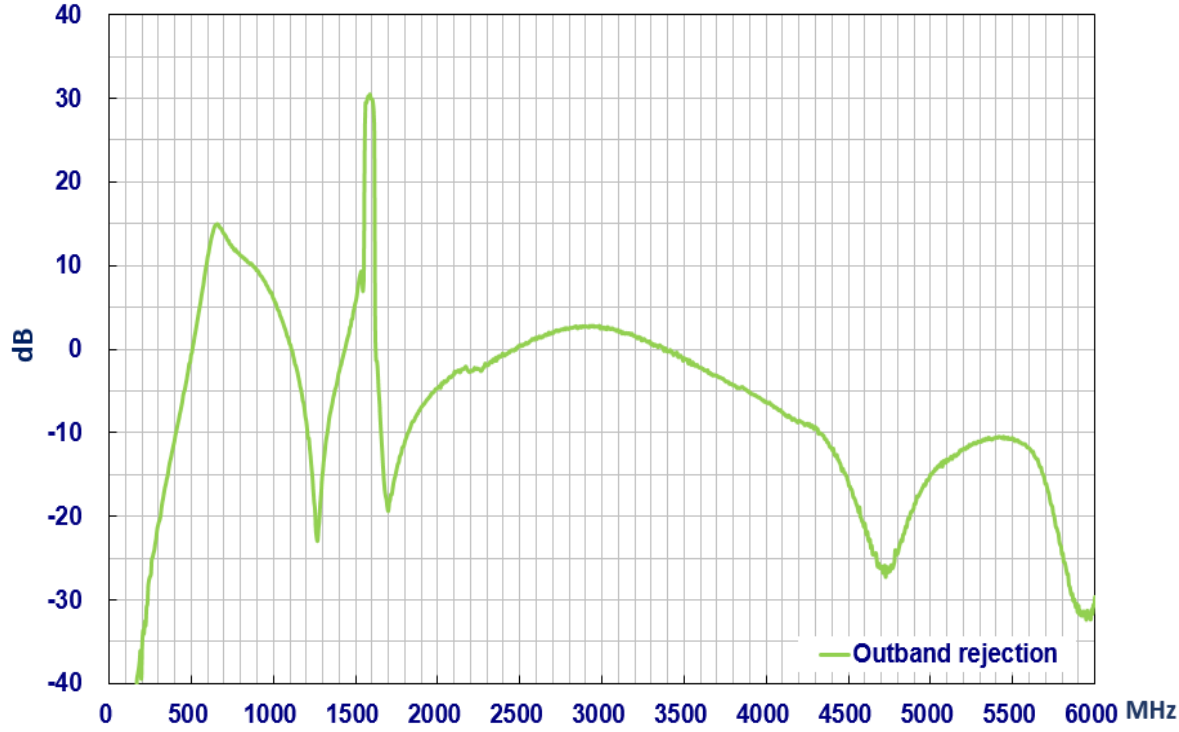
4.1 Block Diagram



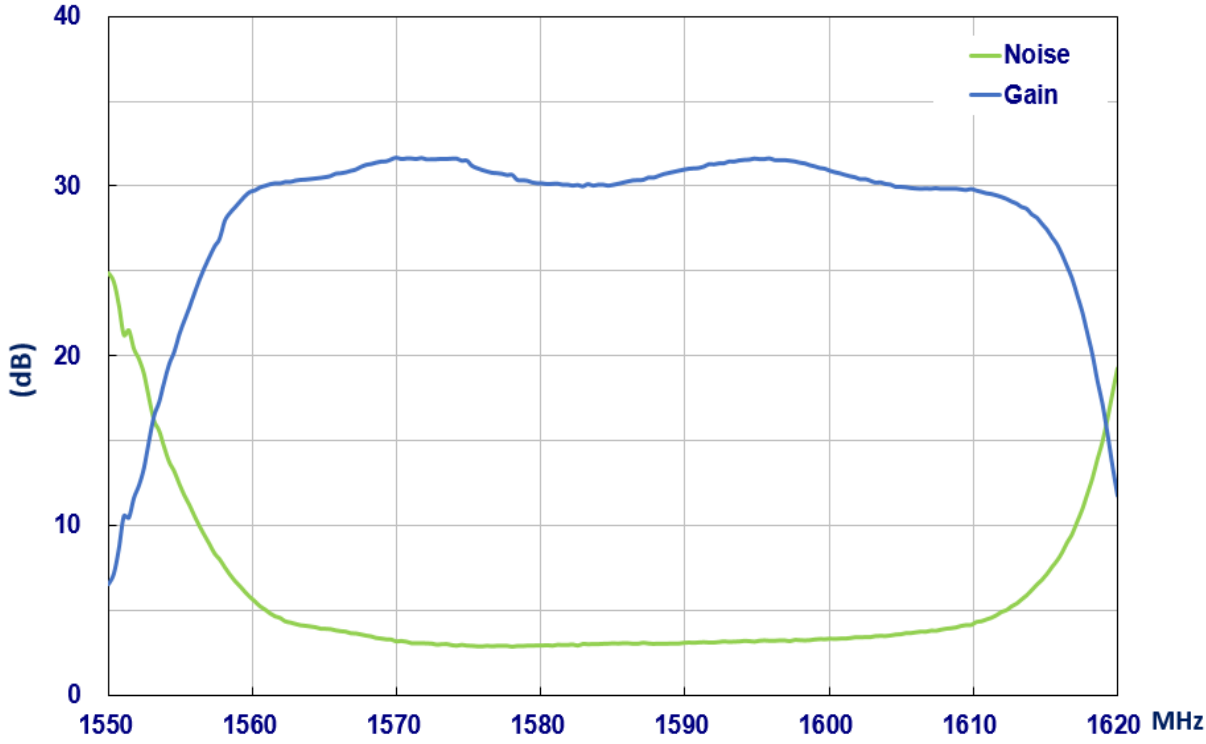
4.2 Axial Ratio



4.3 LNA Gain @3.0V



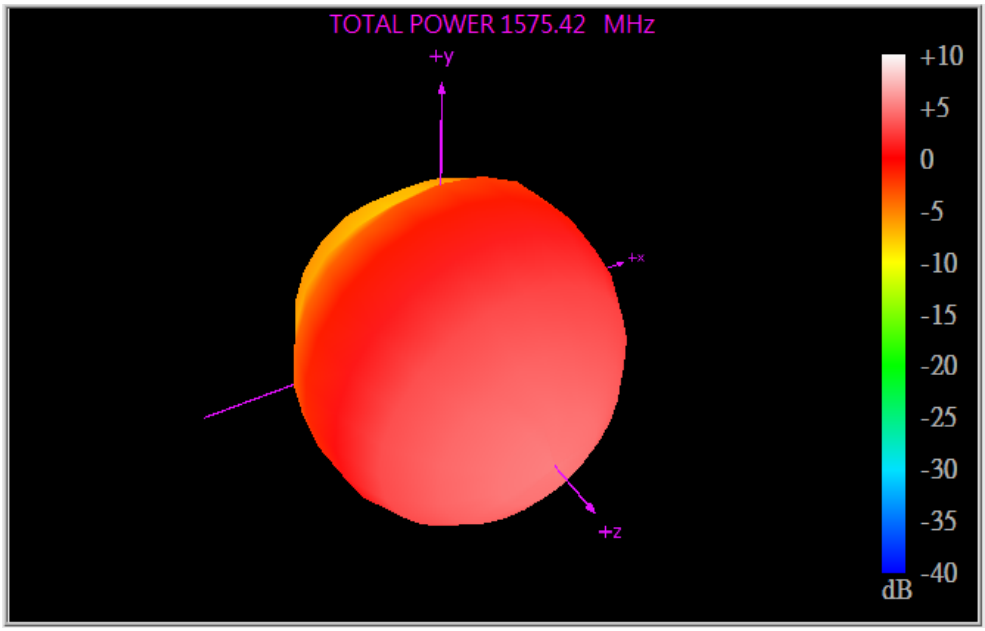
4.4 Noise Figure @3.0V



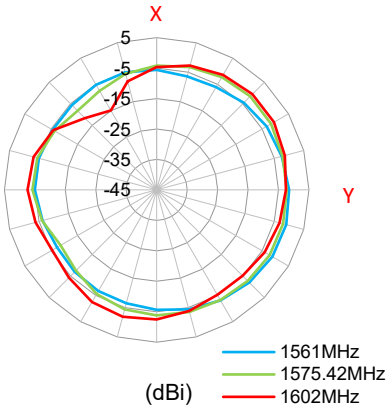
5. Radiation Patterns

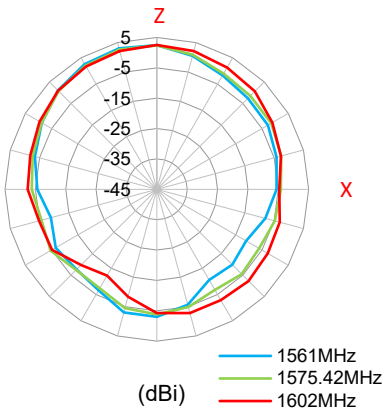
5.1 GNSS 3D and 2D Radiation Patterns

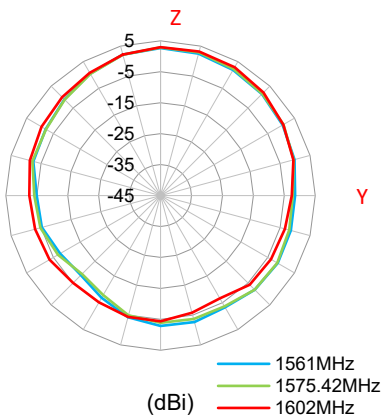
1575.42MHz



XY Plane	XZ Plane	YZ Plane

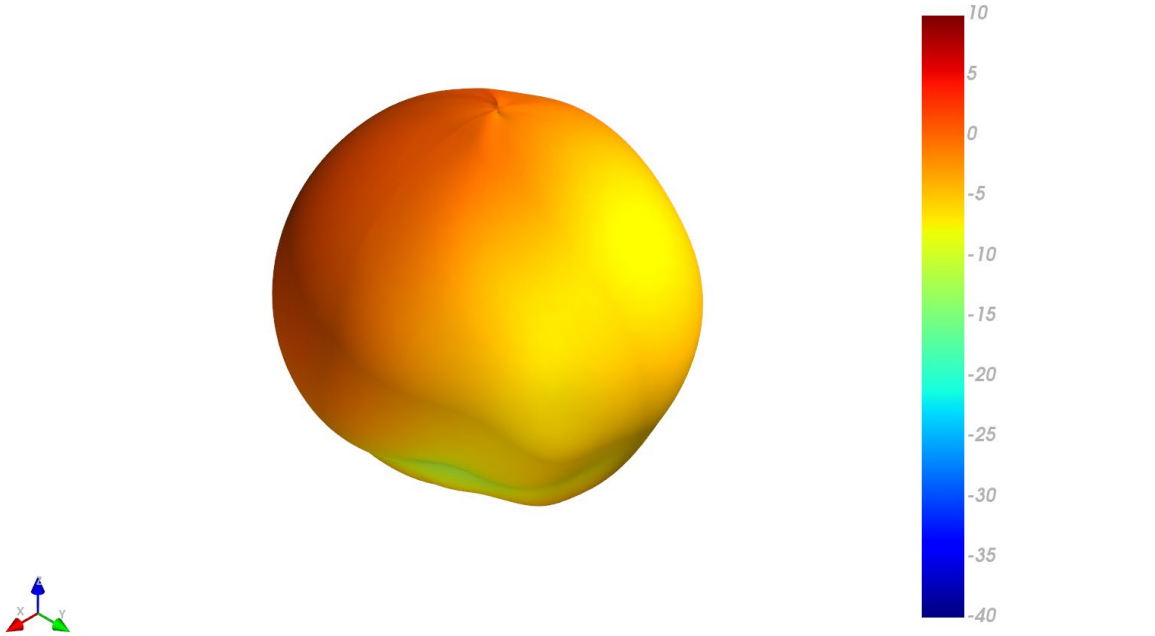


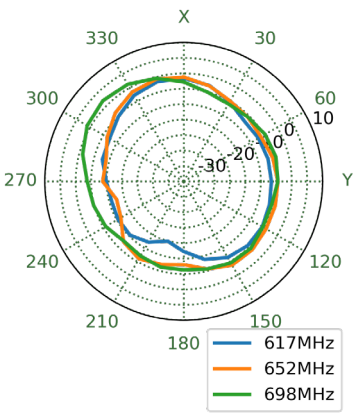
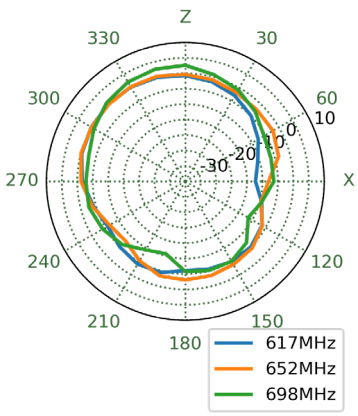
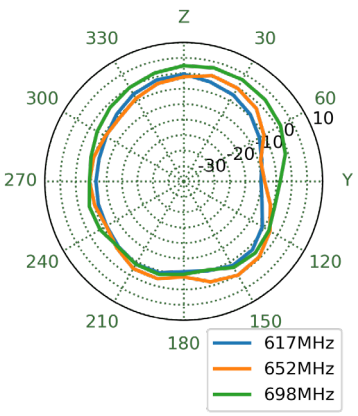




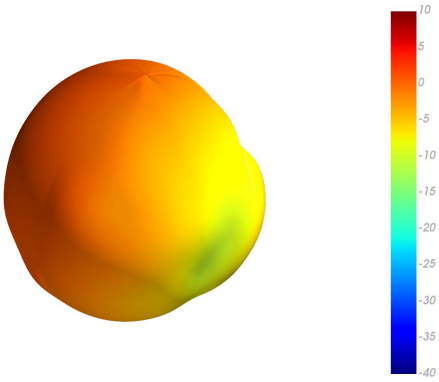
5.2 5G/4G MIMO 1 & 8 3D and 2D Radiation Patterns

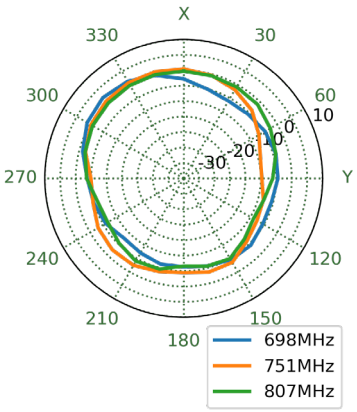
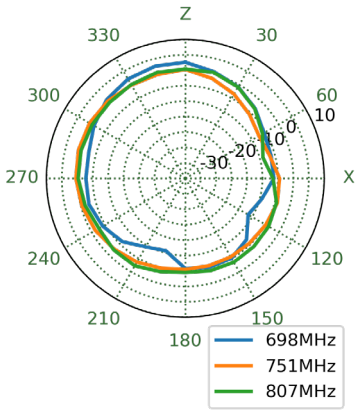
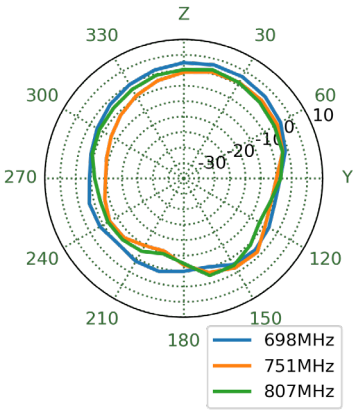
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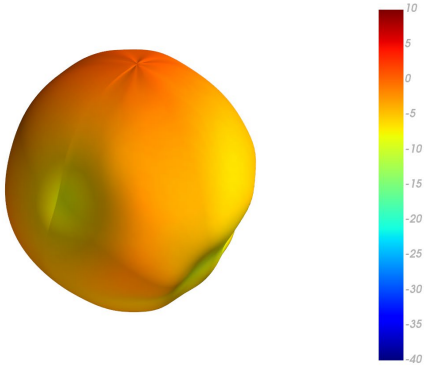
XY Plane	XZ Plane	YZ Plane
		

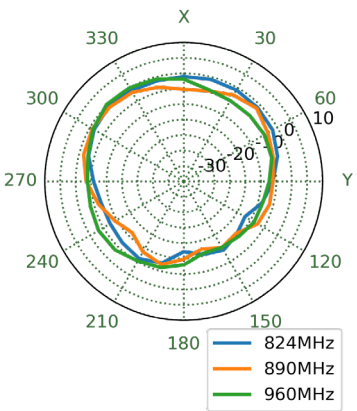
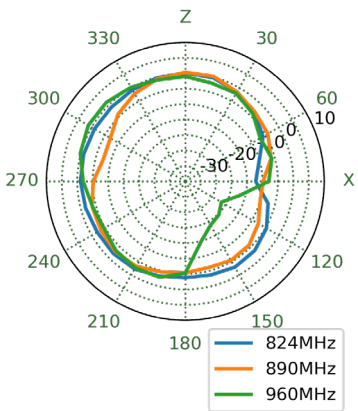
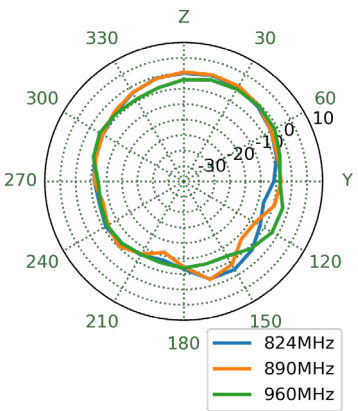
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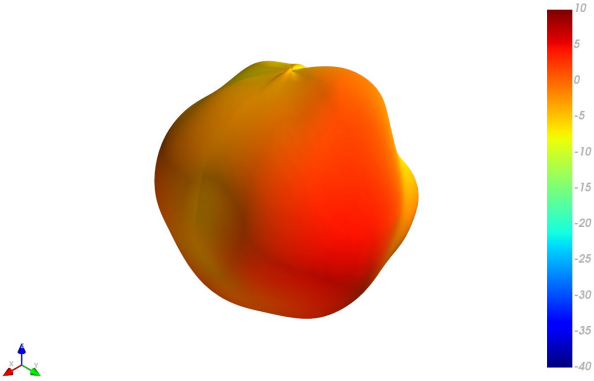
XY Plane	XZ Plane	YZ Plane
		

890MHz

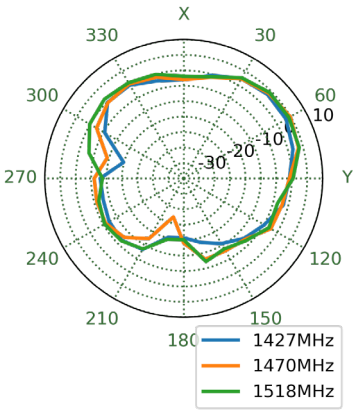


XY Plane	XZ Plane	YZ Plane
		

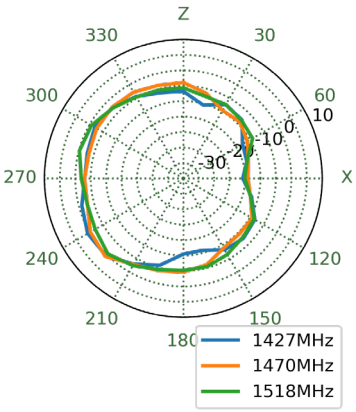
1470MHz



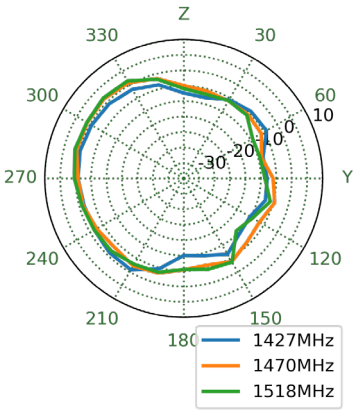
XY Plane



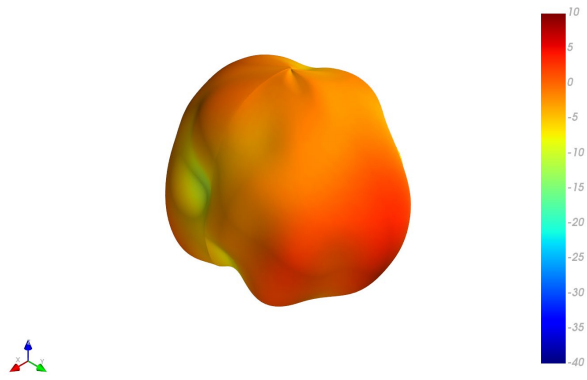
XZ Plane



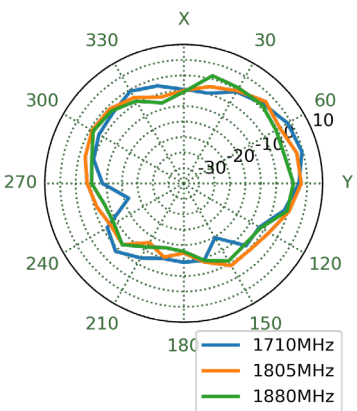
YZ Plane



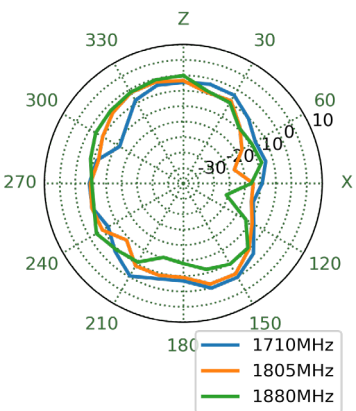
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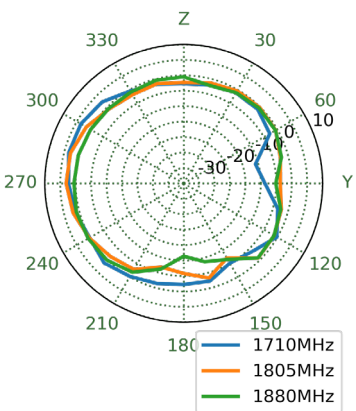
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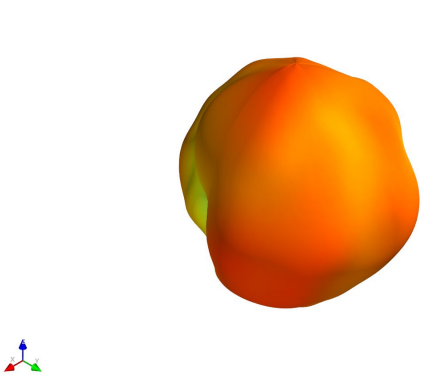
XZ Plane



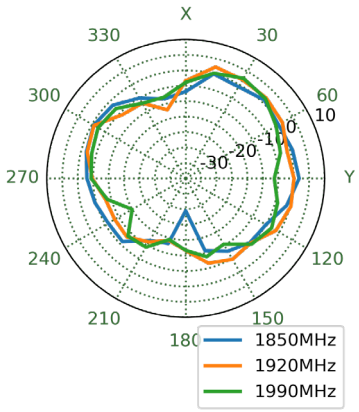
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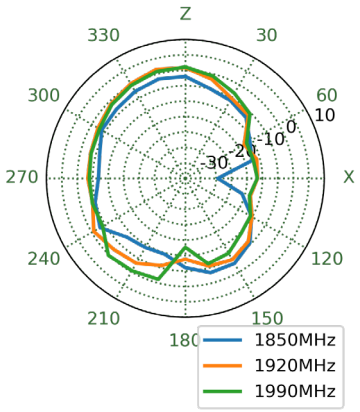
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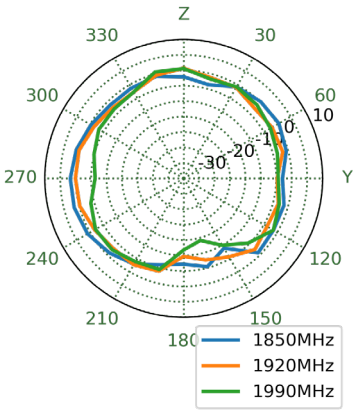
XY Plane



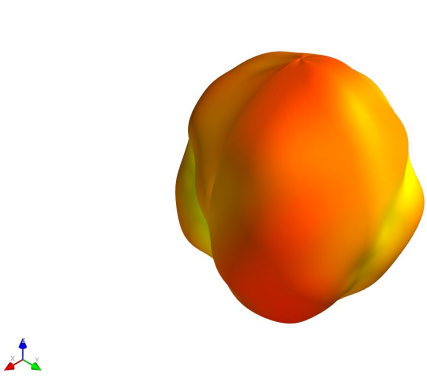
XZ Plane



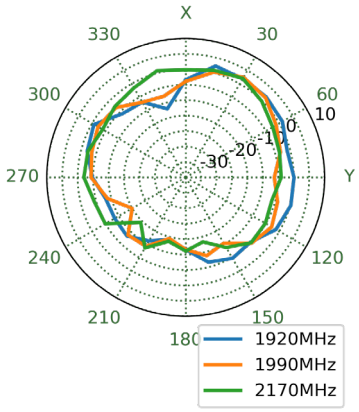
YZ Plane



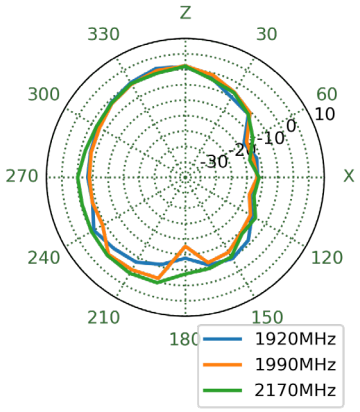
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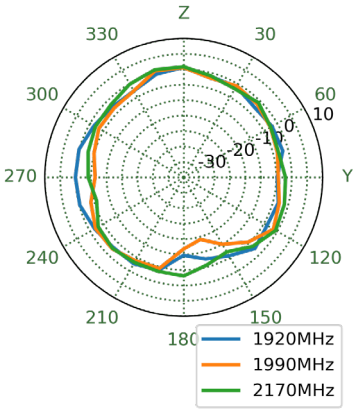
XY Plane



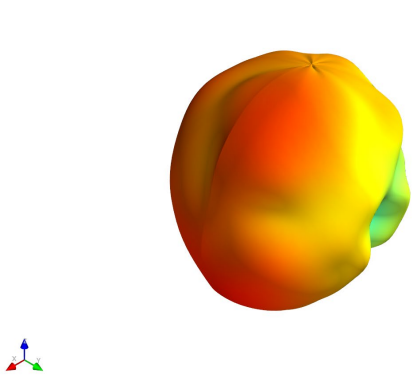
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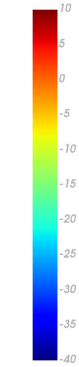


YZ Plane

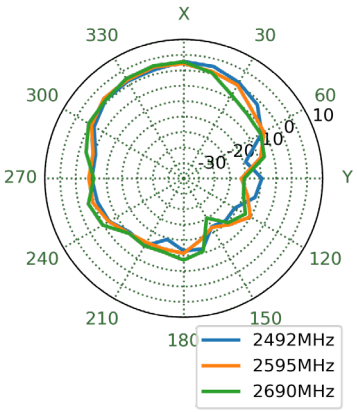


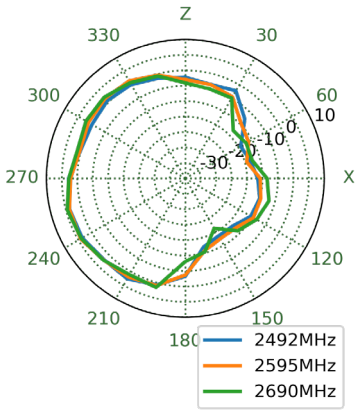
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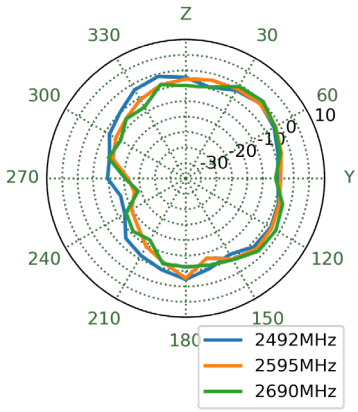




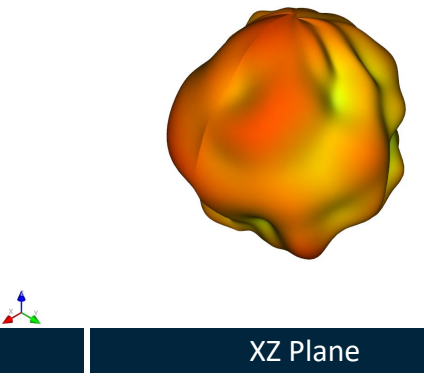
XY Plane	XZ Plane	YZ Plane

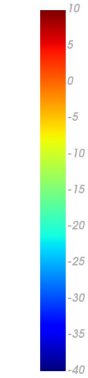






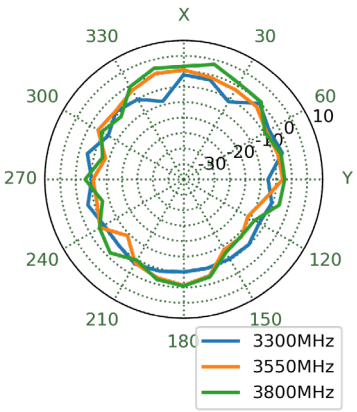
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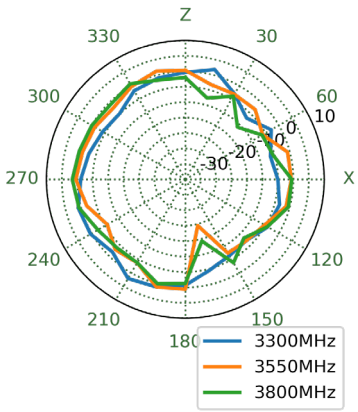


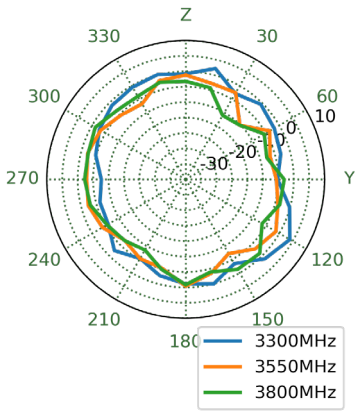




XY Plane	XZ Plane	YZ Plane

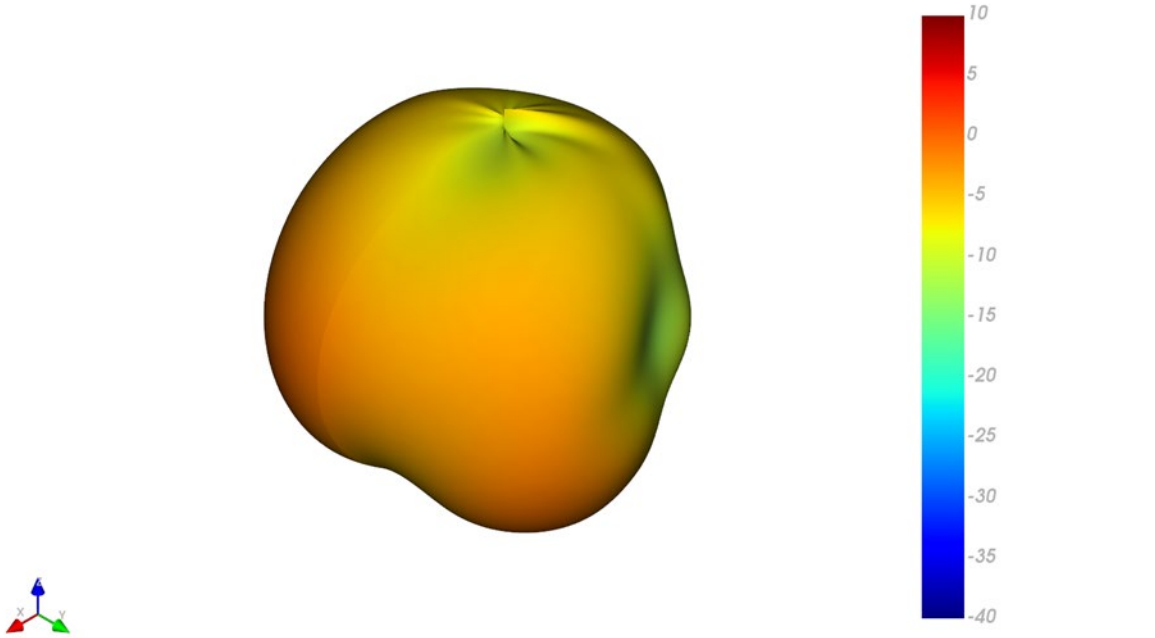


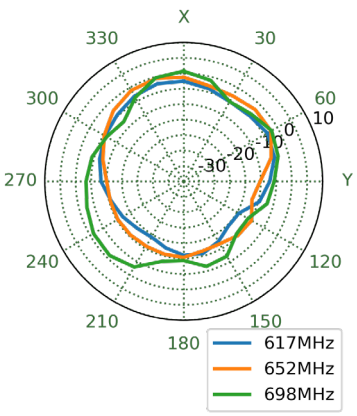
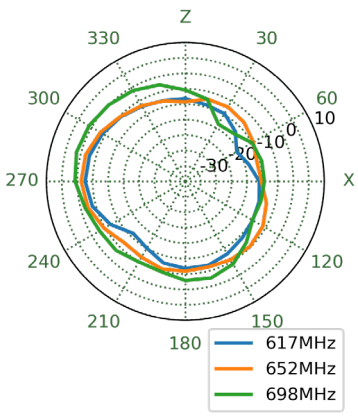
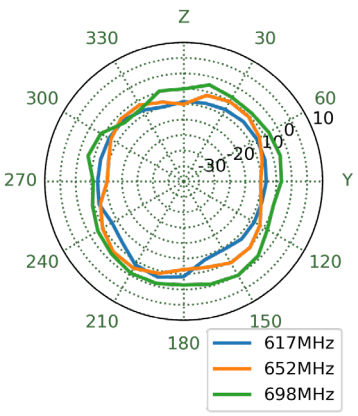




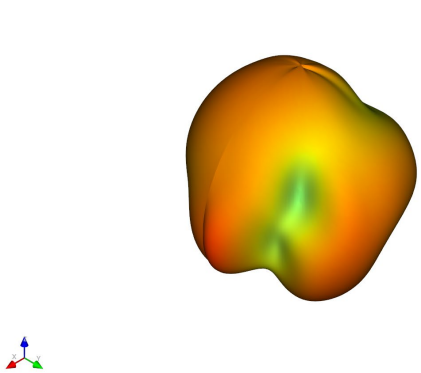
5.3 5G/4G MIMO 2 & 7 3D and 2D Radiation Patterns

652MHz



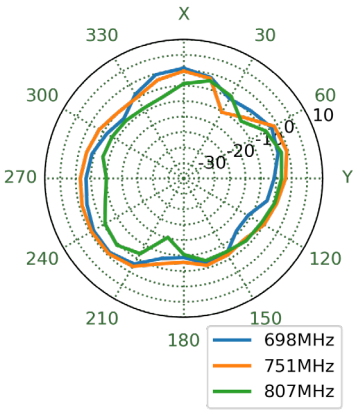
XY Plane	XZ Plane	YZ Plane
		

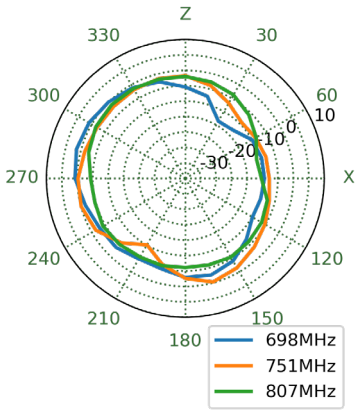
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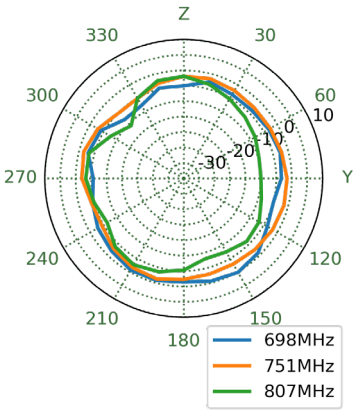




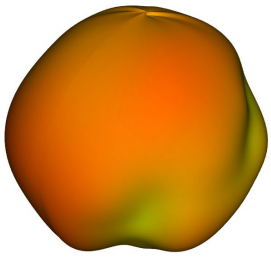
XY Plane	XZ Plane	YZ Plane

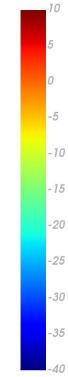






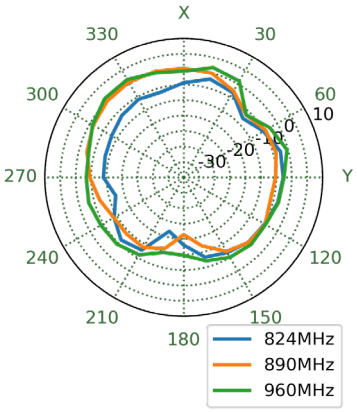
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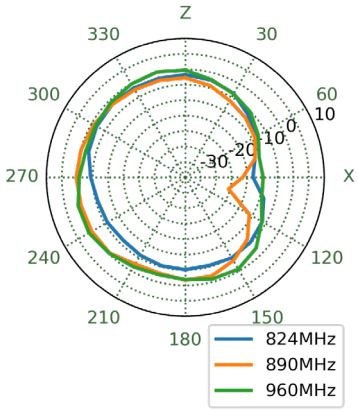


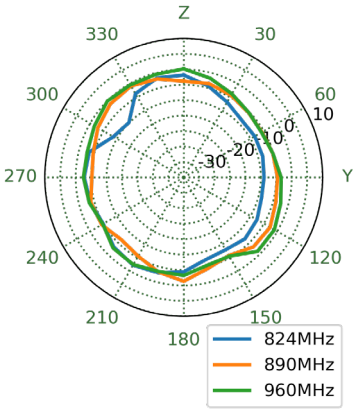




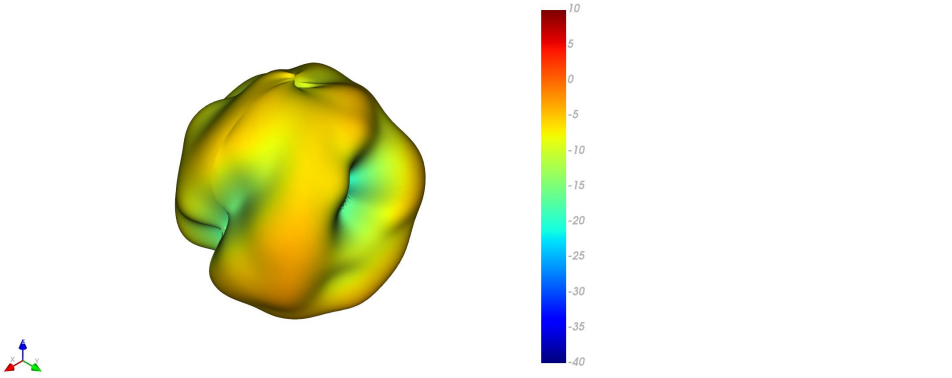
XY Plane	XZ Plane	YZ Plane



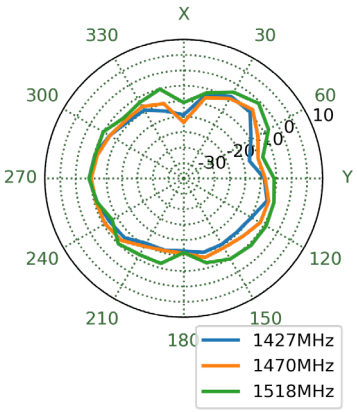




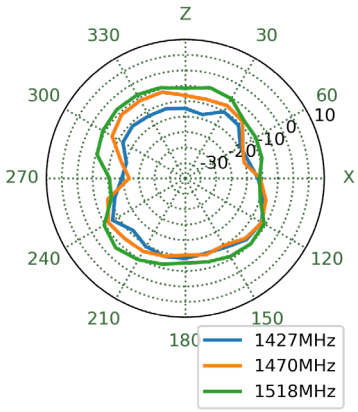
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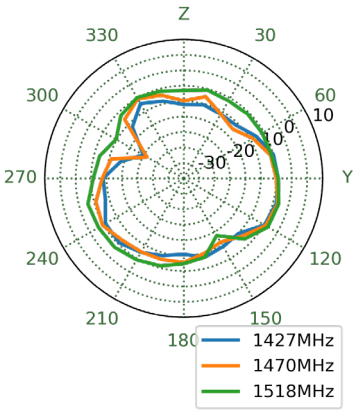
XY Plane



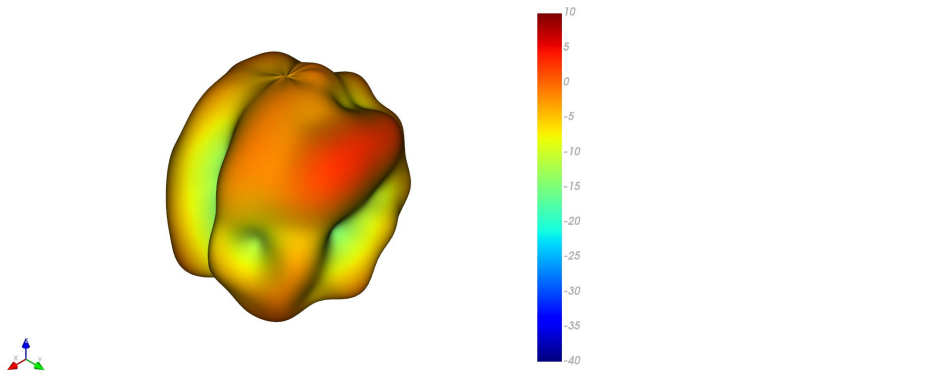
XZ Plane



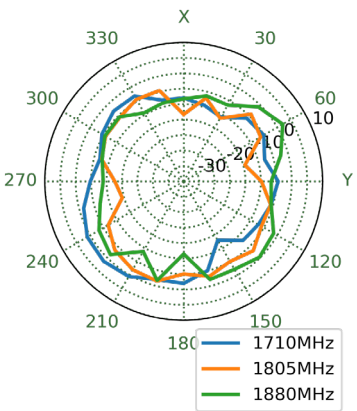
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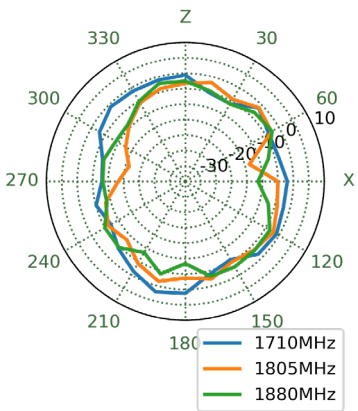
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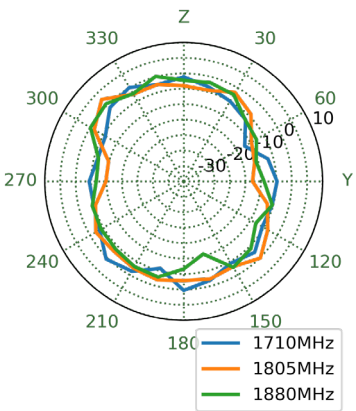
XY Plane



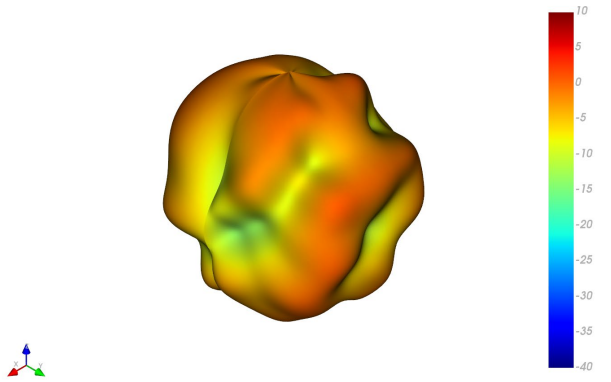
XZ Plane

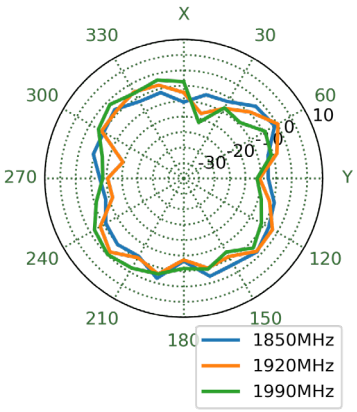
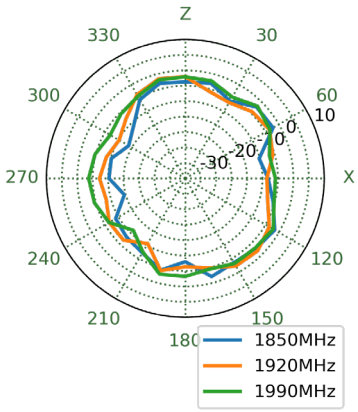
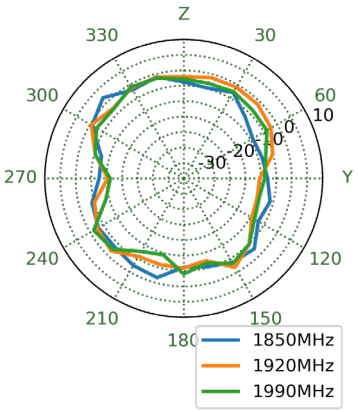


YZ Plane

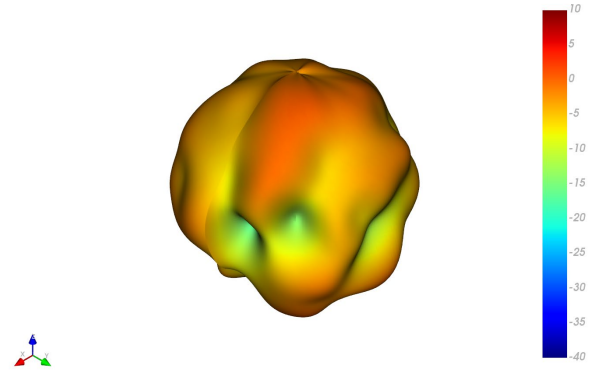


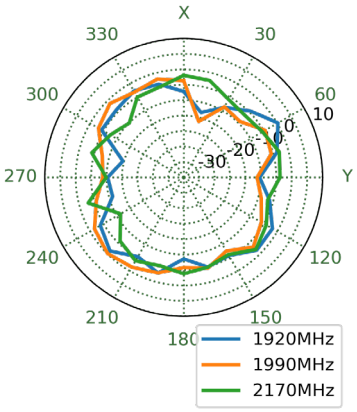
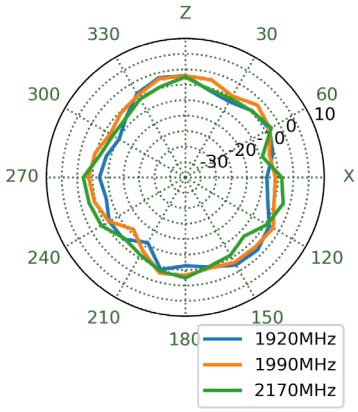
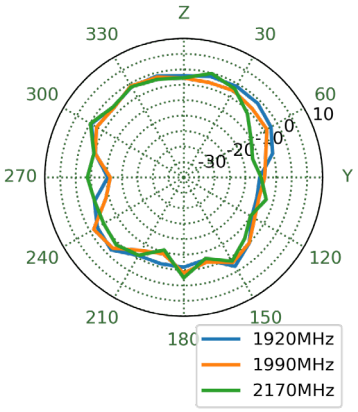
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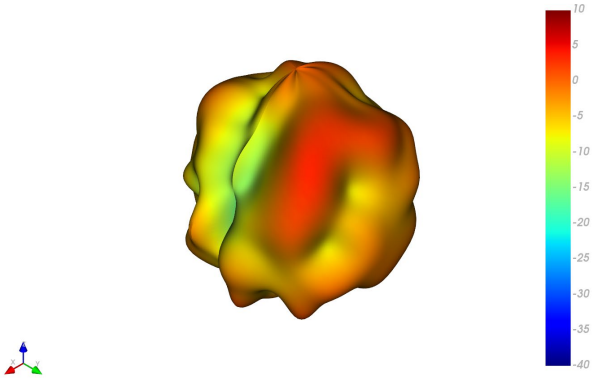
XY Plane	XZ Plane	YZ Plane
		

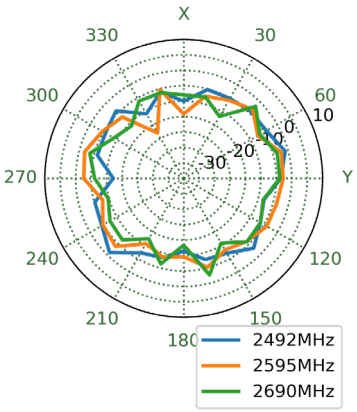
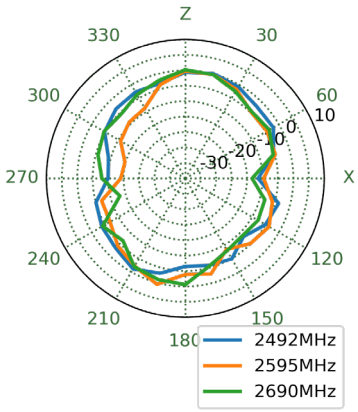
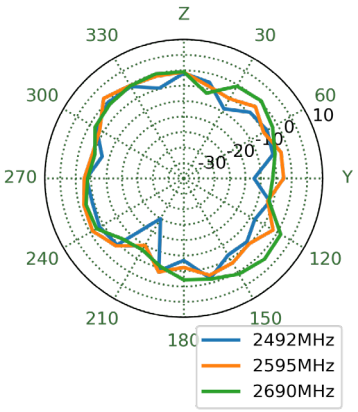
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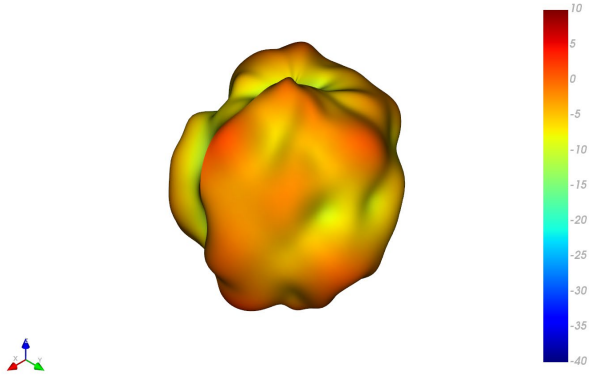
XY Plane	XZ Plane	YZ Plane
		

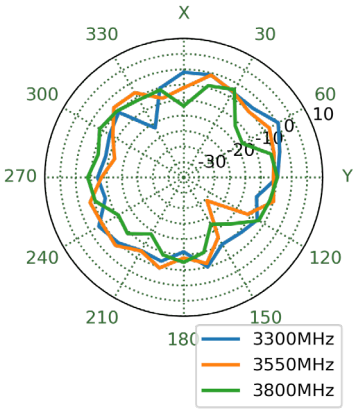
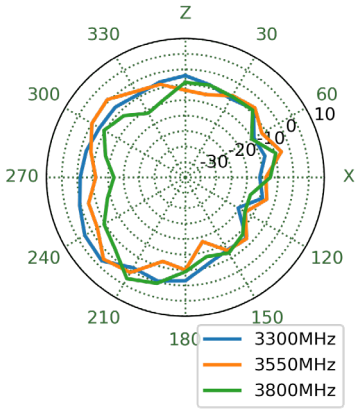
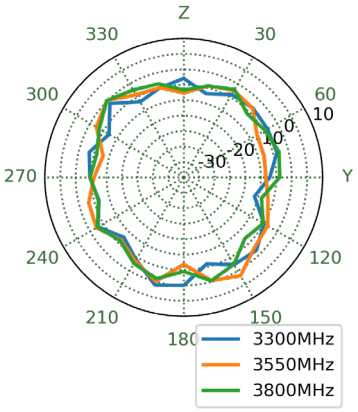
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XY Plane	XZ Plane	YZ Plane
		

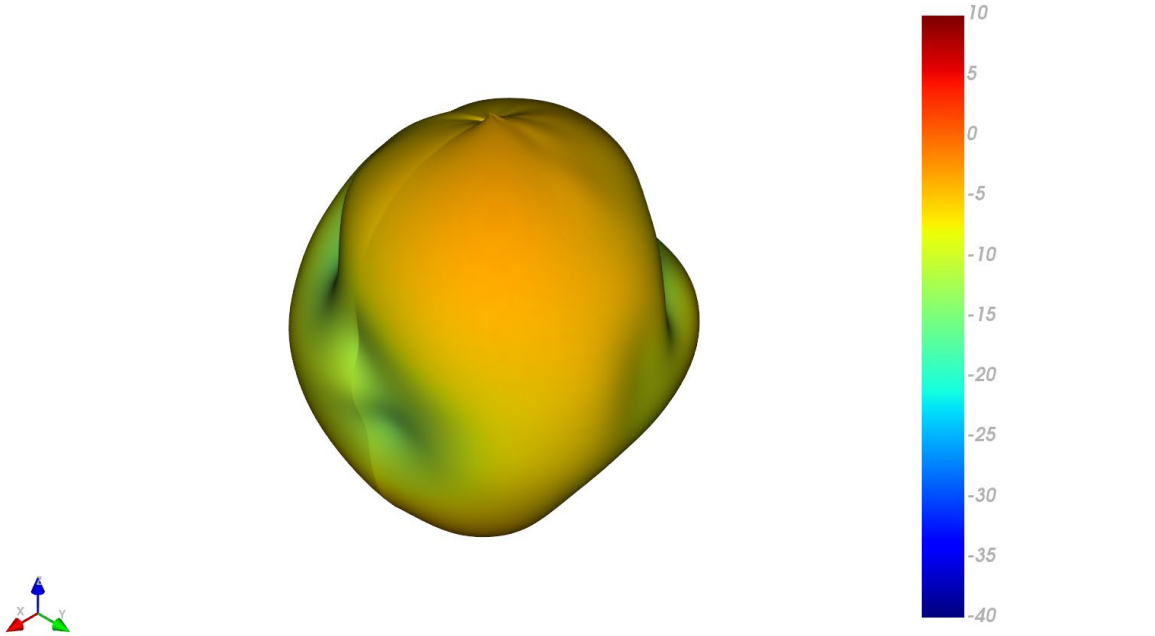
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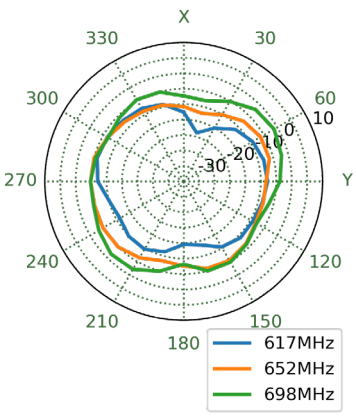
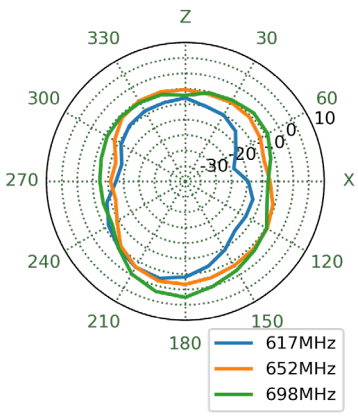
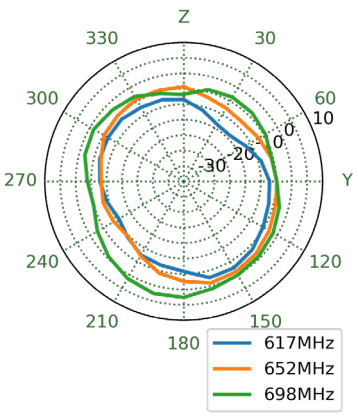


XY Plane	XZ Plane	YZ Plane
		

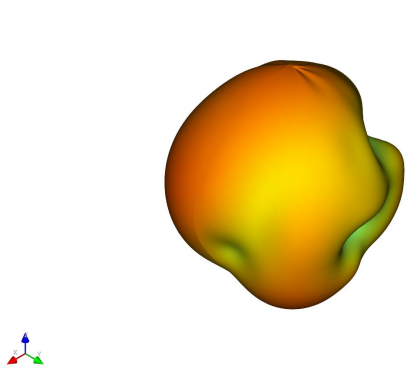
5.4 5G/4G MIMO 3 & 6 3D and 2D Radiation Patterns

652MHz



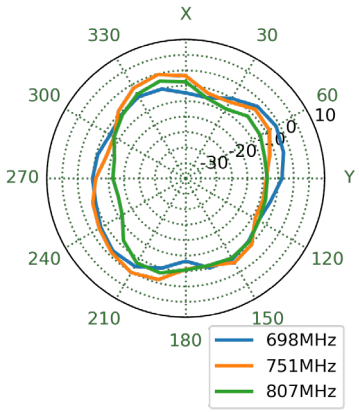
XY Plane	XZ Plane	YZ Plane
		

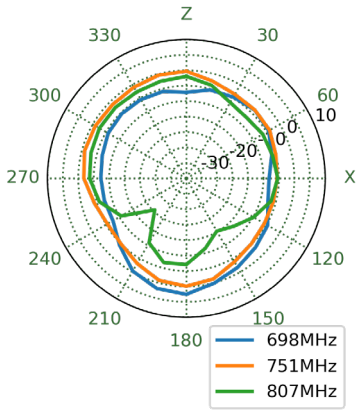
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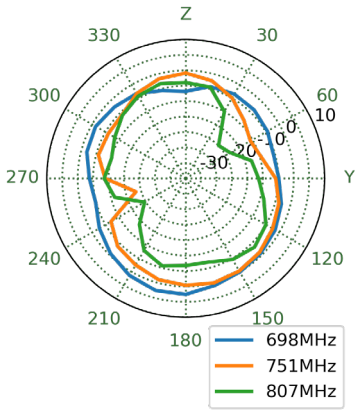




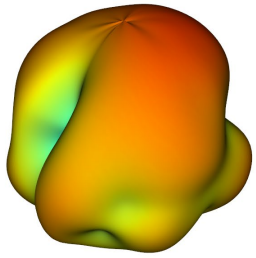
XY Plane	XZ Plane	YZ Plane







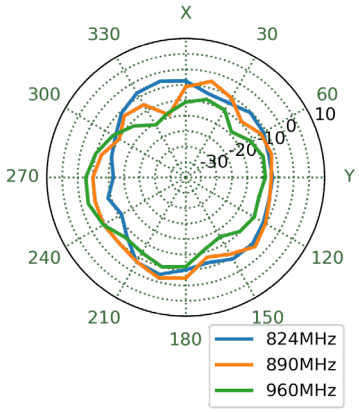
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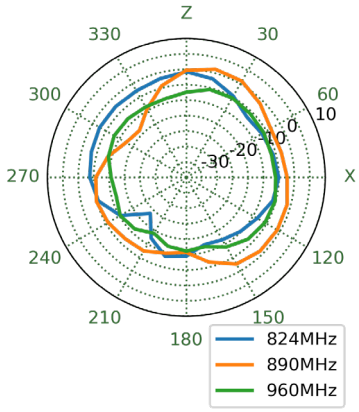


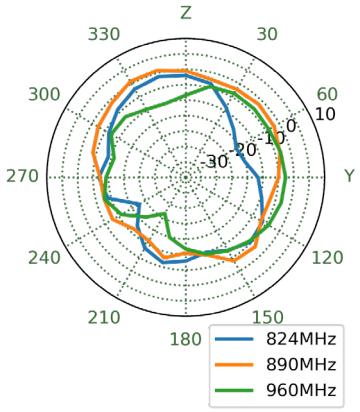




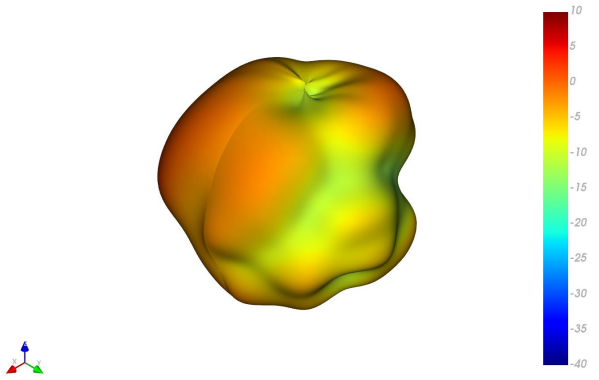
XY Plane	XZ Plane	YZ Plane



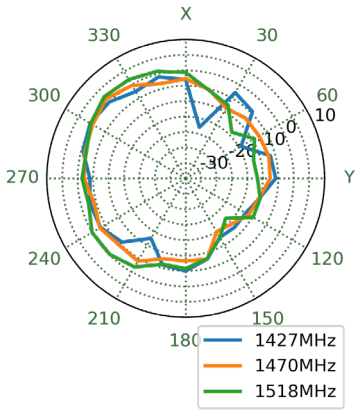




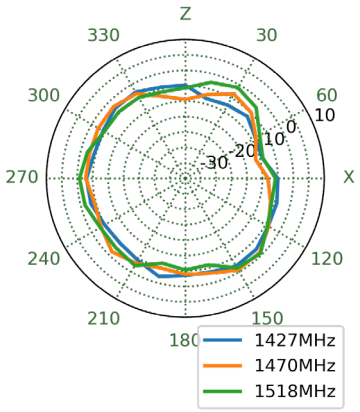
1470MHz



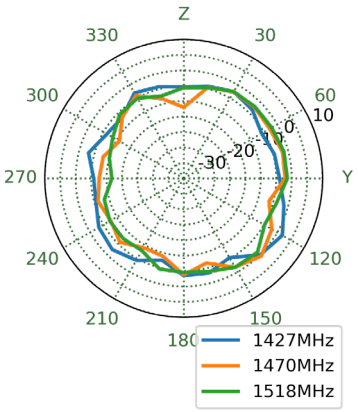
XY Plane



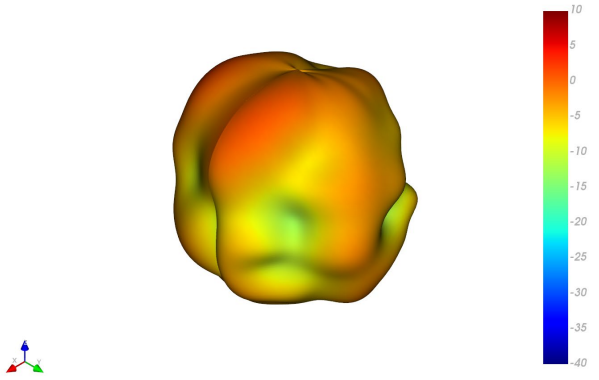
XZ Plane



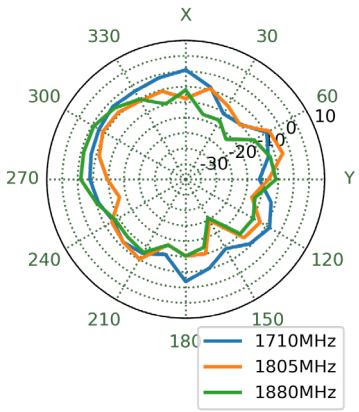
YZ Plane



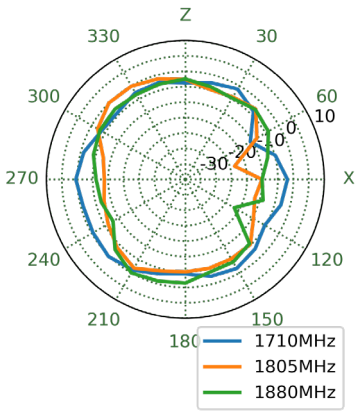
1805MHz



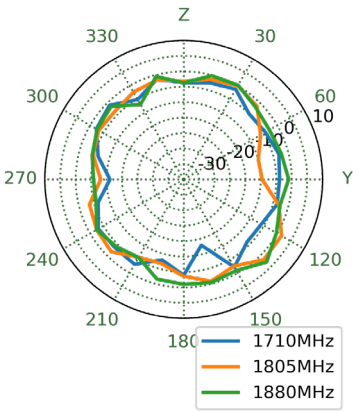
XY Plane



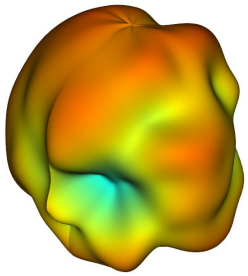
XZ Plane



YZ Plane



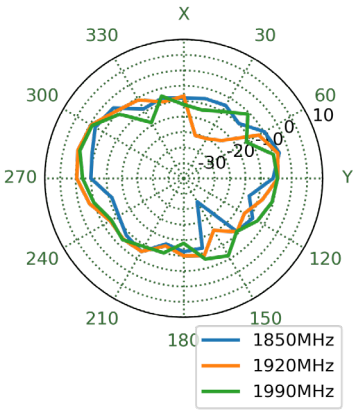
1920MHz

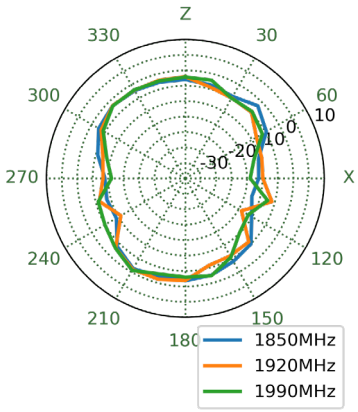


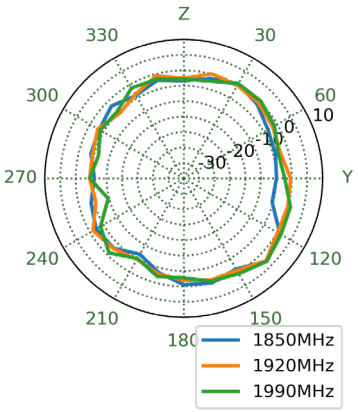




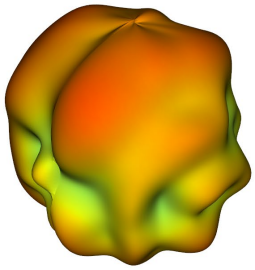
XY Plane	XZ Plane	YZ Plane







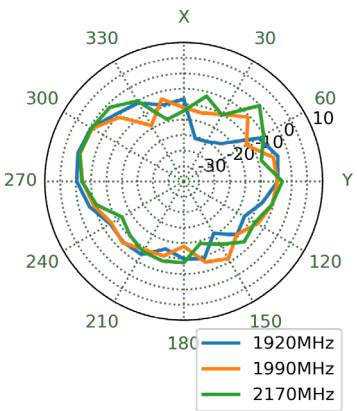
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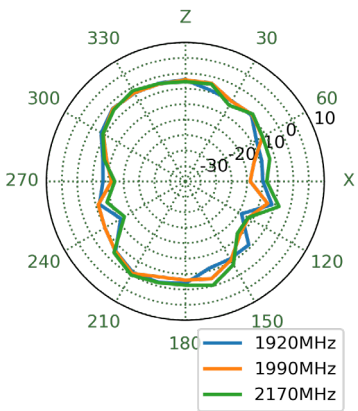


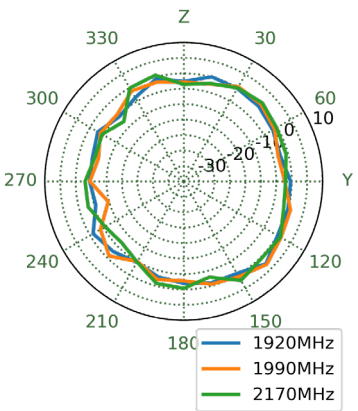




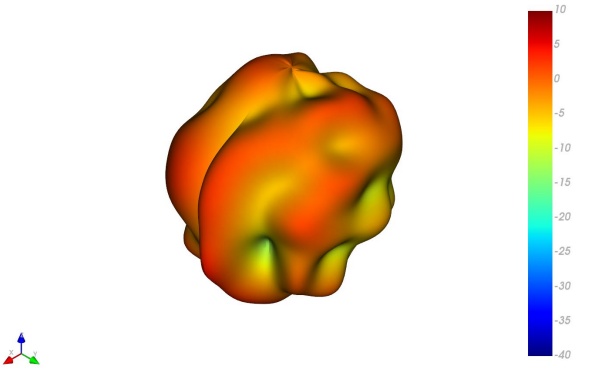
XY Plane	XZ Plane	YZ Plane

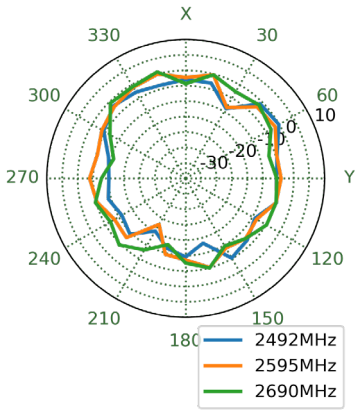
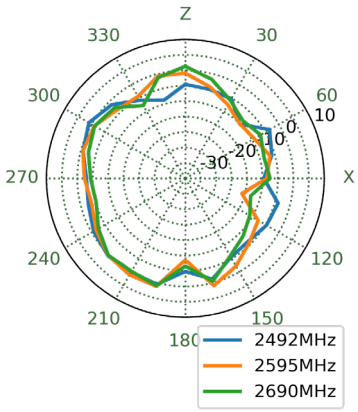
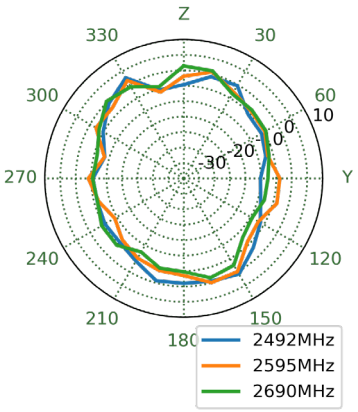




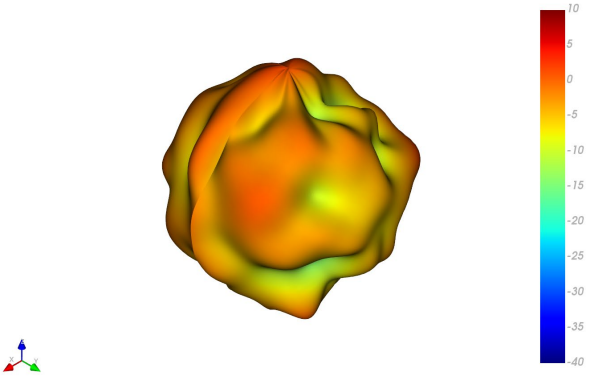


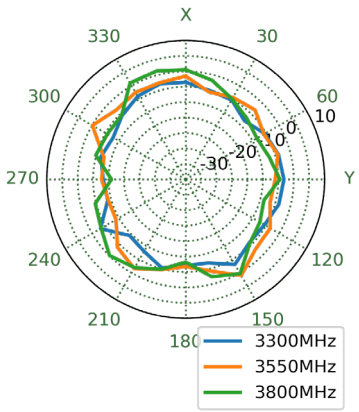
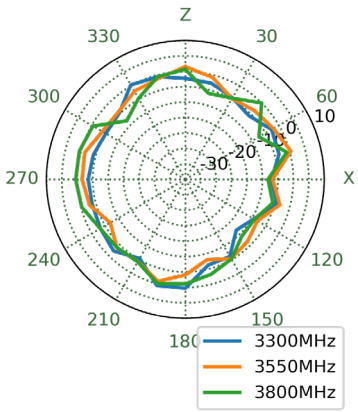
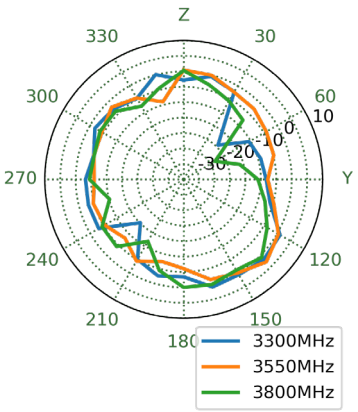
2595MHz



XY Plane	XZ Plane	YZ Plane
		

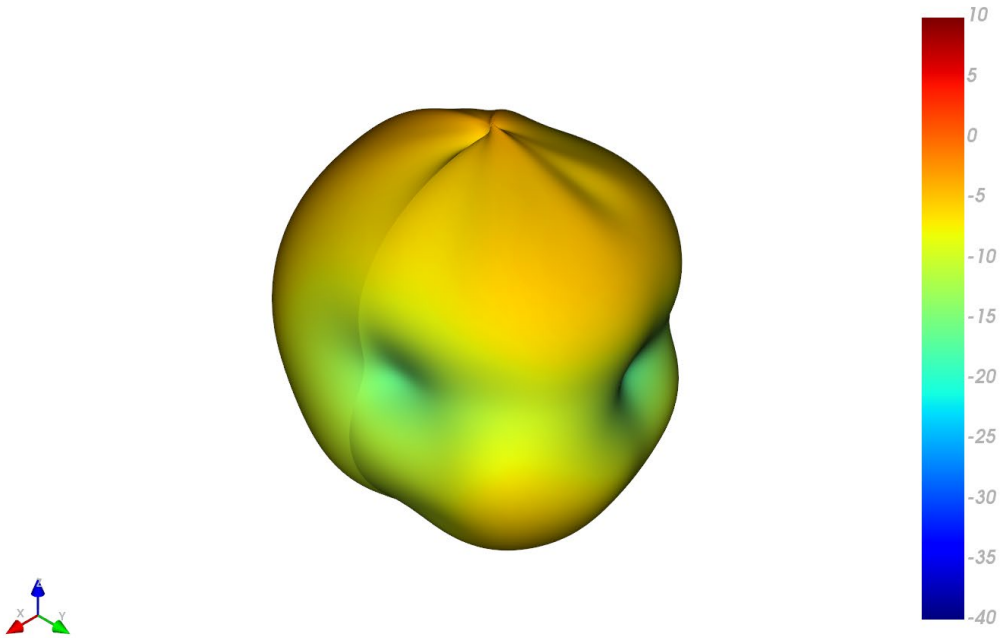
3550MHz

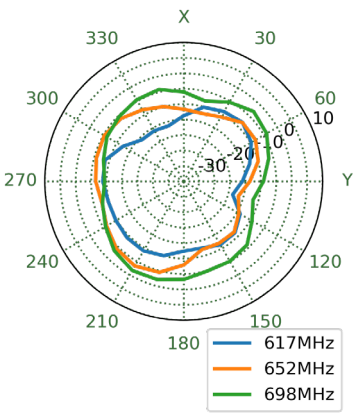
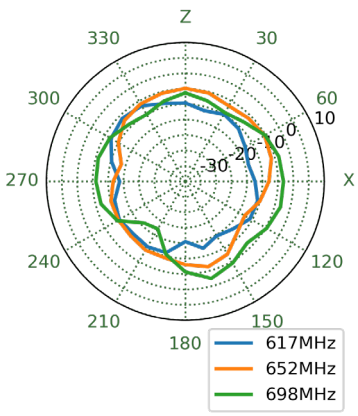
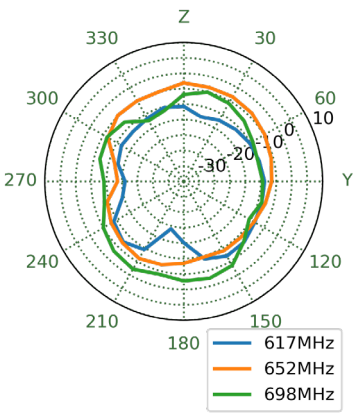


XY Plane	XZ Plane	YZ Plane
		

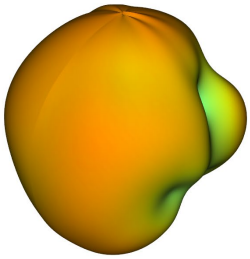
5.5 5G/4G MIMO 4 & 5 3D and 2D Radiation Patterns

652MHz



XY Plane	XZ Plane	YZ Plane
		

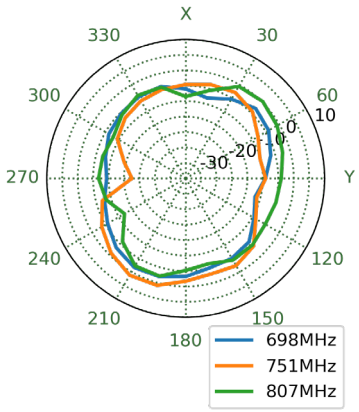
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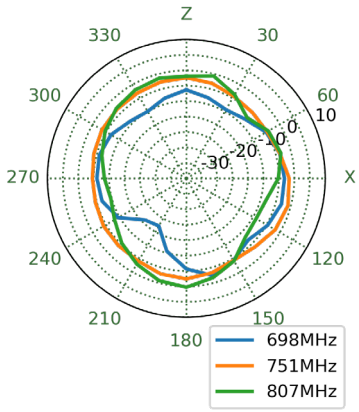


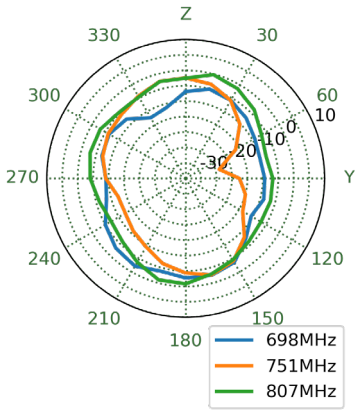




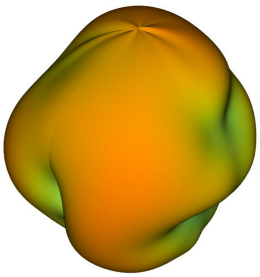
XY Plane	XZ Plane	YZ Plane







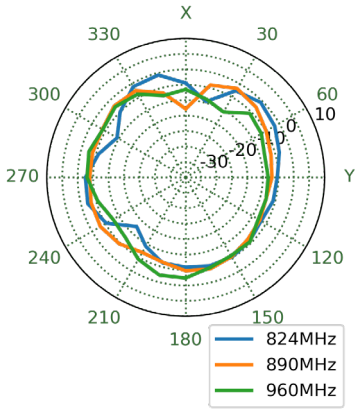
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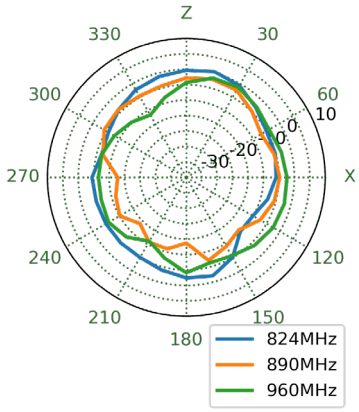


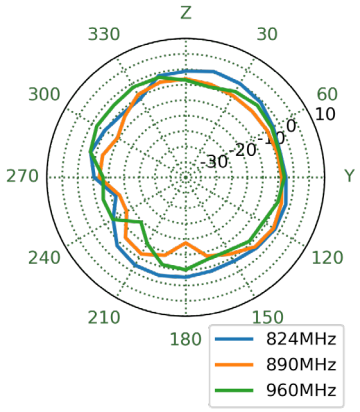




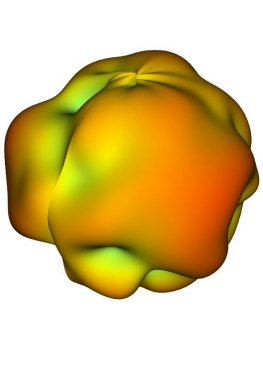
XY Plane	XZ Plane	YZ Plane







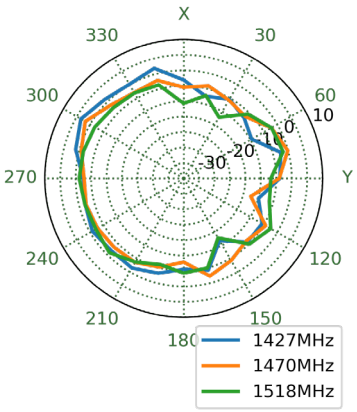
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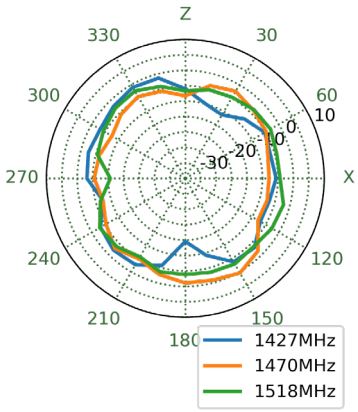


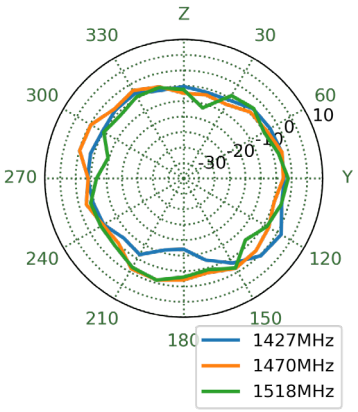




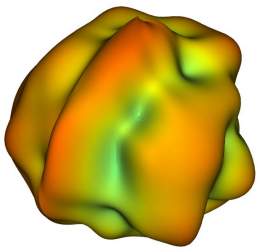
XY Plane	XZ Plane	YZ Plane







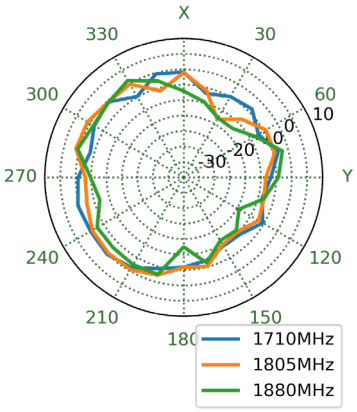
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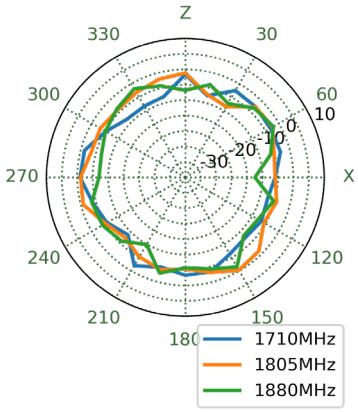


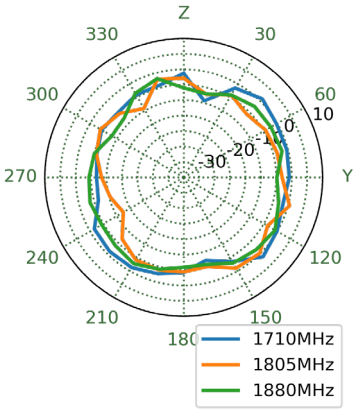




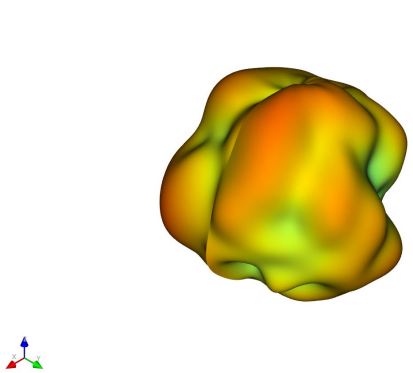
XY Plane	XZ Plane	YZ Plane

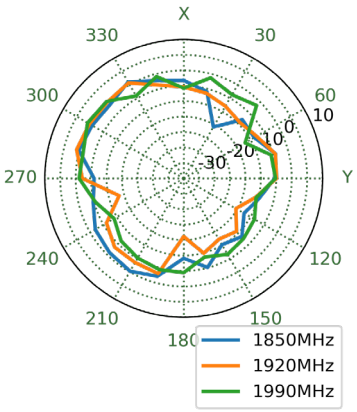
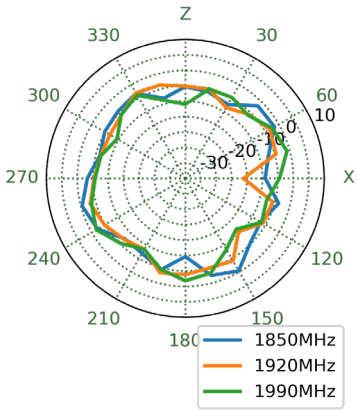
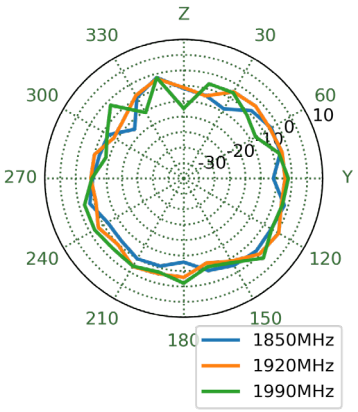




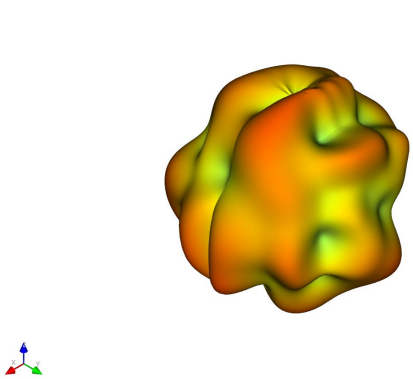


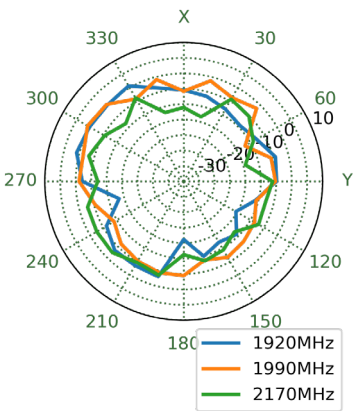
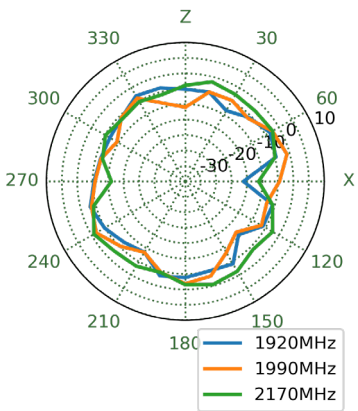
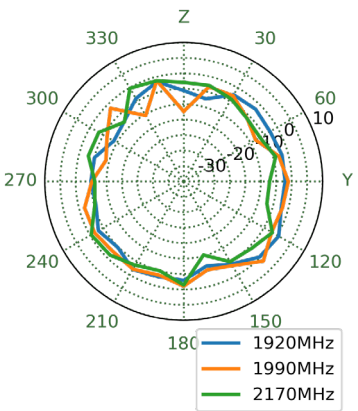
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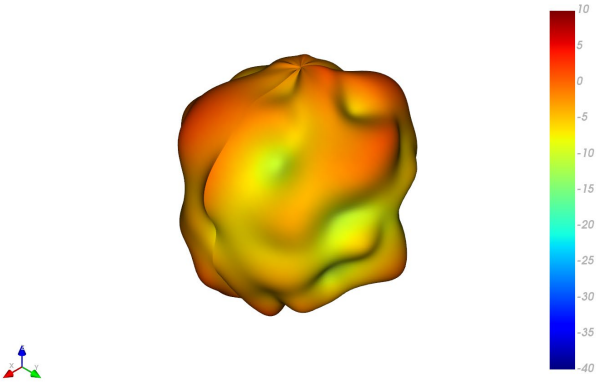
XY Plane	XZ Plane	YZ Plane
		

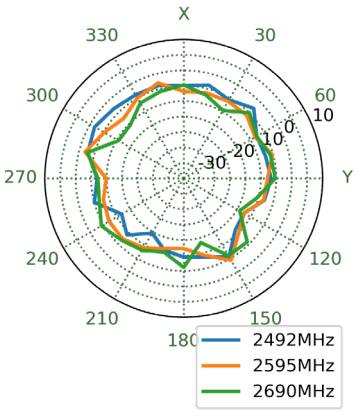
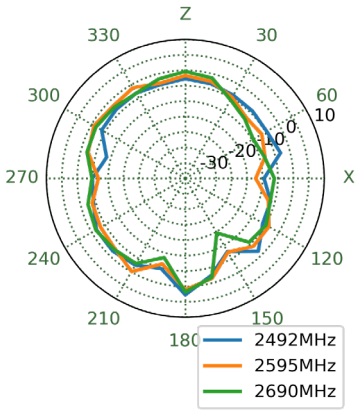
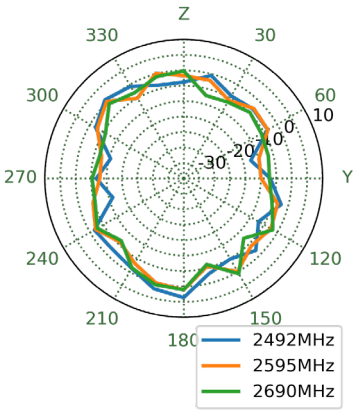
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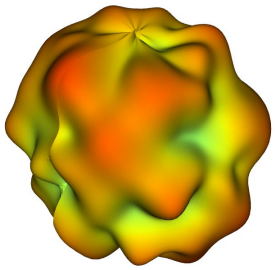
XY Plane	XZ Plane	YZ Plane
		

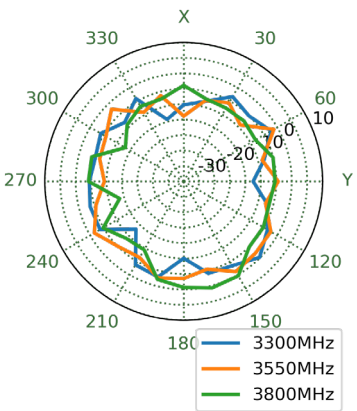
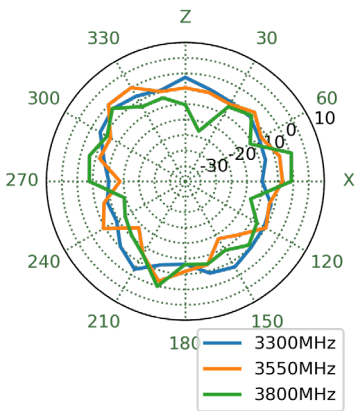
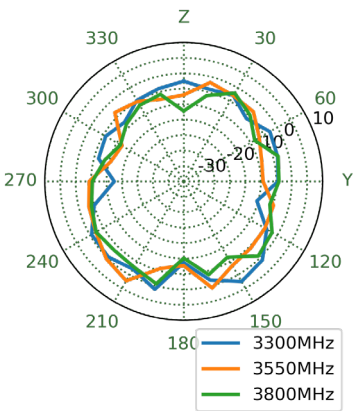
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XY Plane	XZ Plane	YZ Plane
		

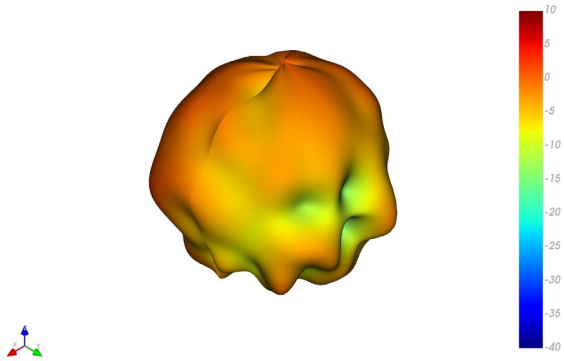
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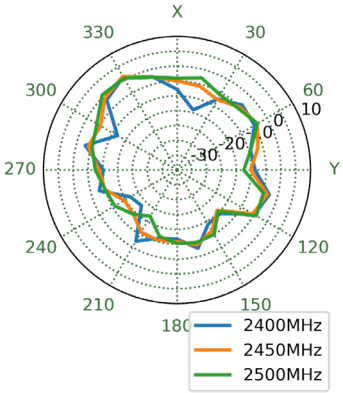
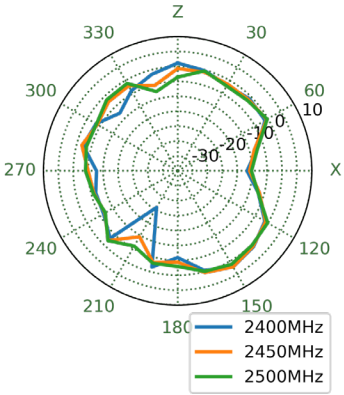
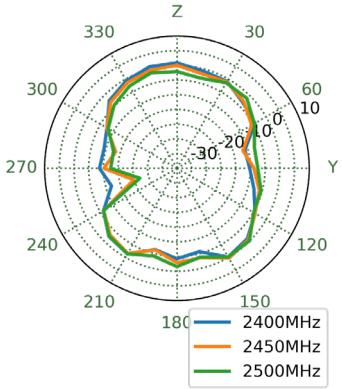


XY Plane	XZ Plane	YZ Plane
		

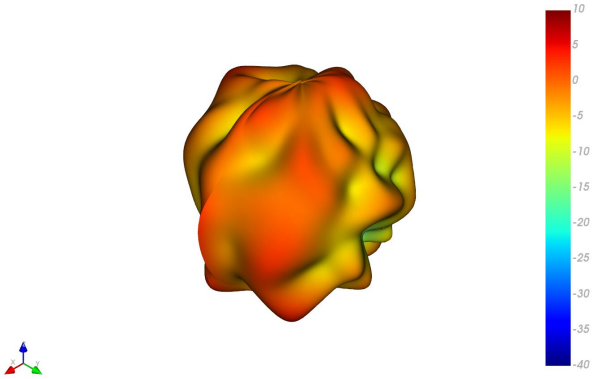
5.6 Wi-Fi MIMO 1 & 8 3D and 2D Radiation Patterns

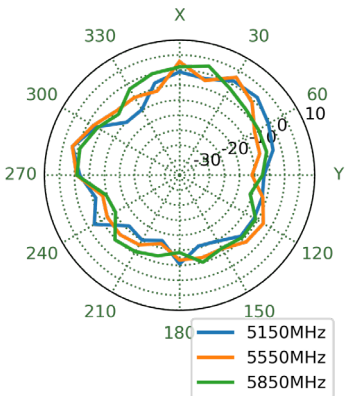
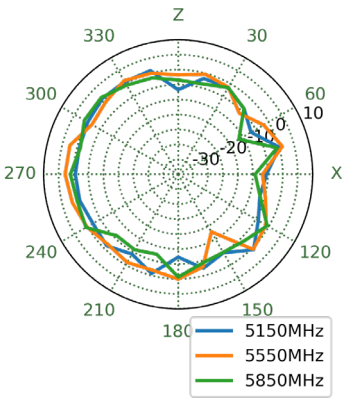
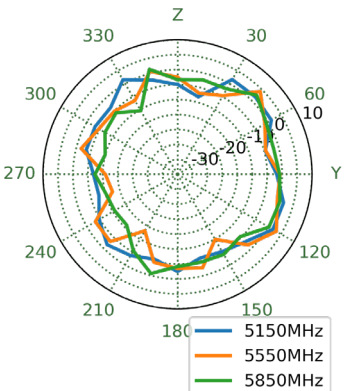
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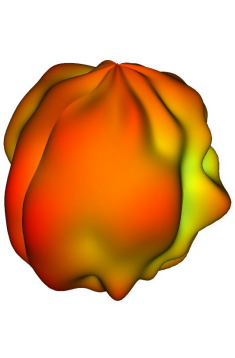
XY Plane	XZ Plane	YZ Plane
		

5550MHz



XY Plane	XZ Plane	YZ Plane
		

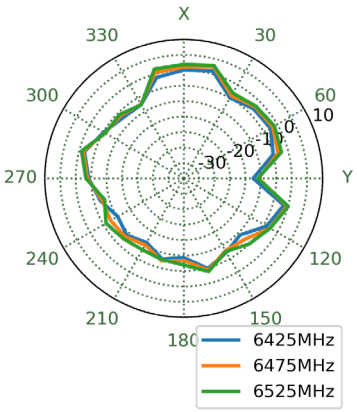
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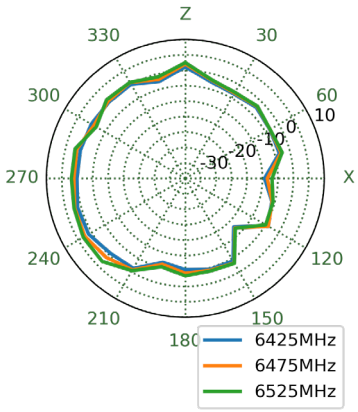




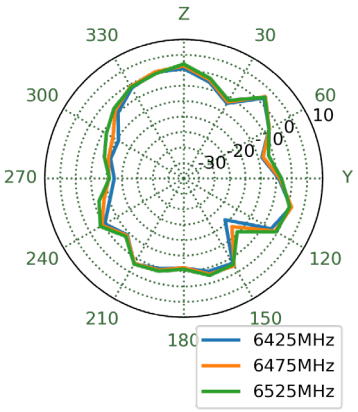
XY Plane



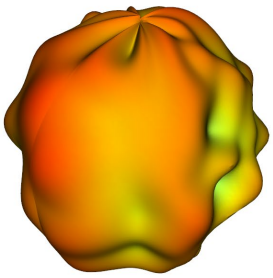
XZ Plane



YZ Plane



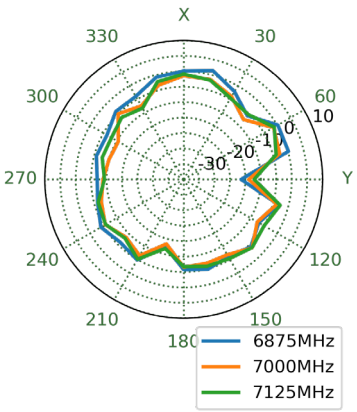
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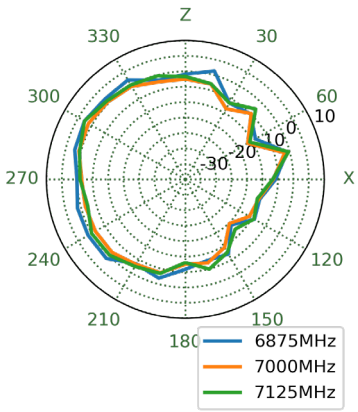




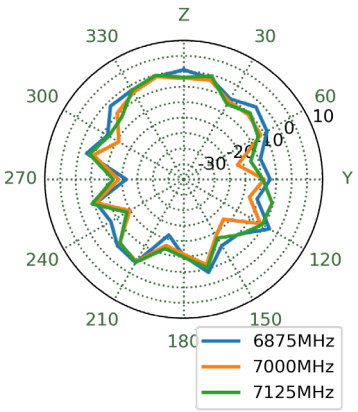
XY Plane



XZ Plane

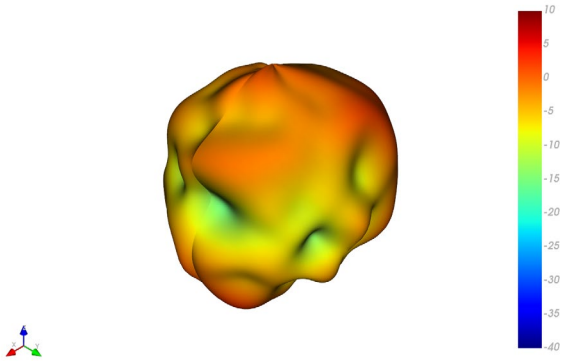


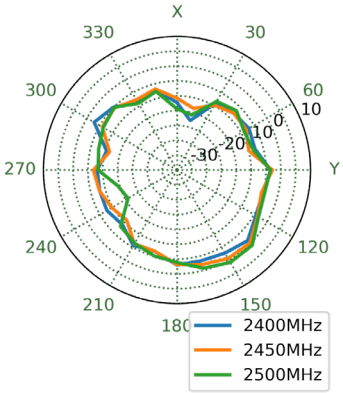
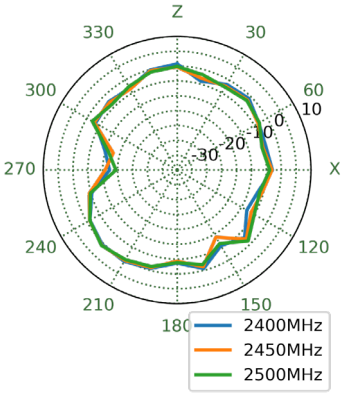
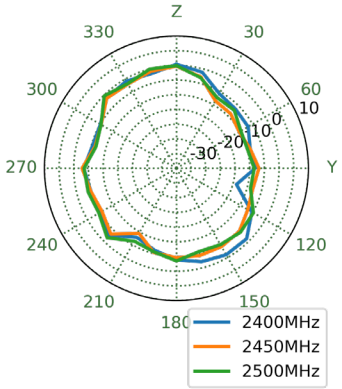
YZ Plane



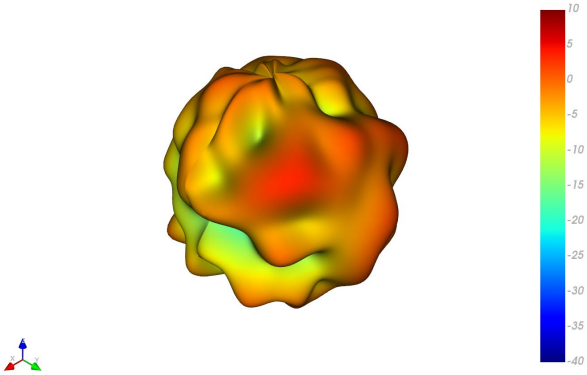
5.7 Wi-Fi MIMO 2 & 7 3D and 2D Radiation Patterns

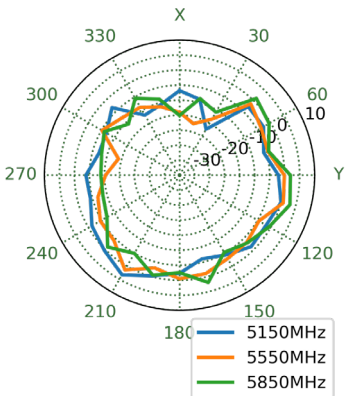
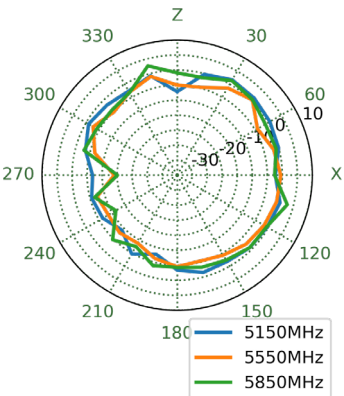
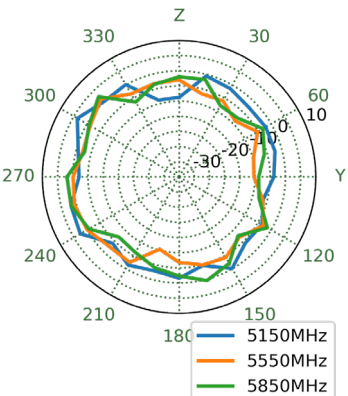
2450MHz



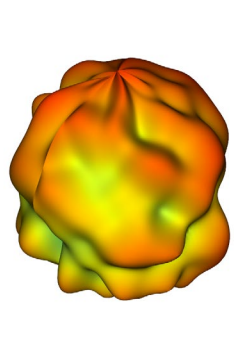
XY Plane	XZ Plane	YZ Plane
		

5550MHz

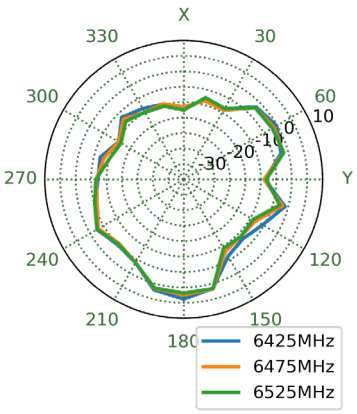
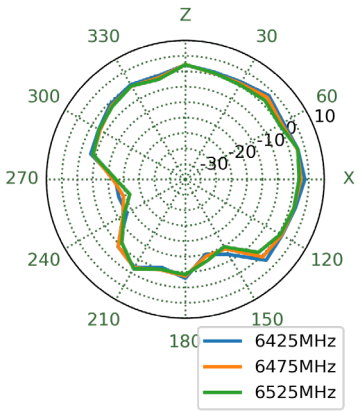
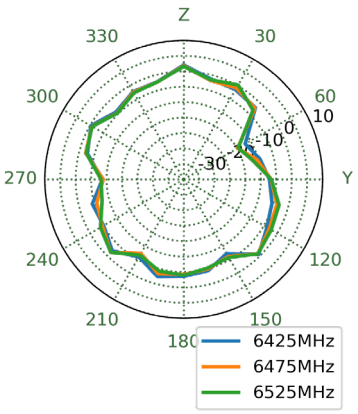


XY Plane	XZ Plane	YZ Plane
		

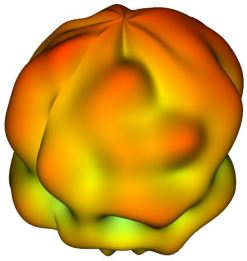
6475MHz



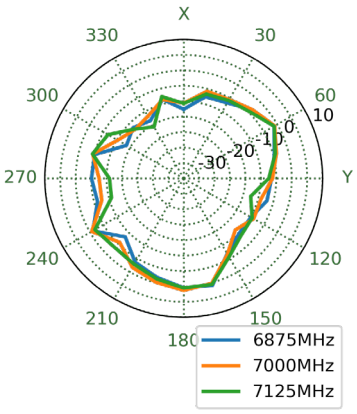
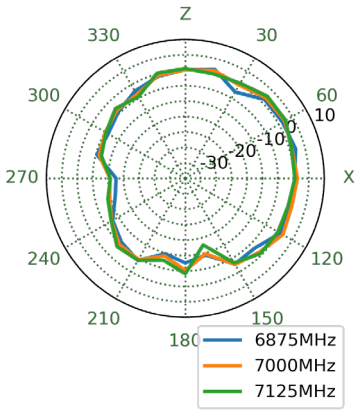
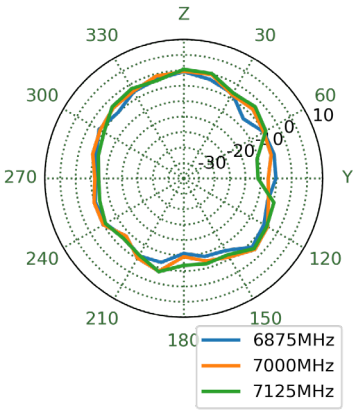


XY Plane	XZ Plane	YZ Plane
		

7000MHz

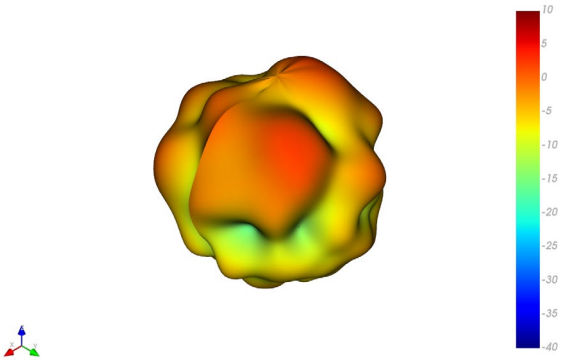


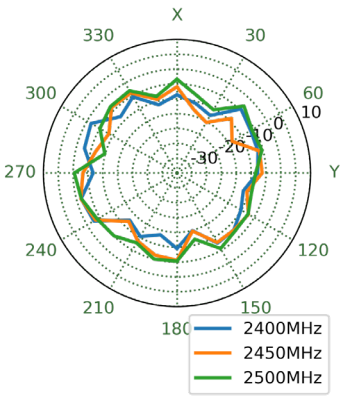
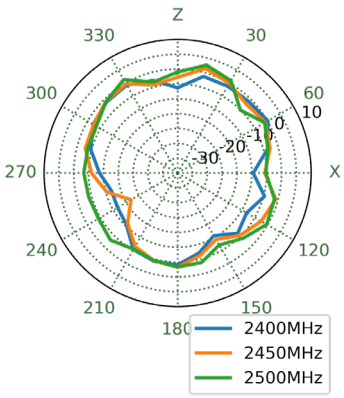
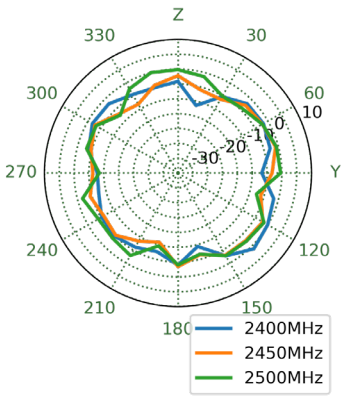


XY Plane	XZ Plane	YZ Plane
		

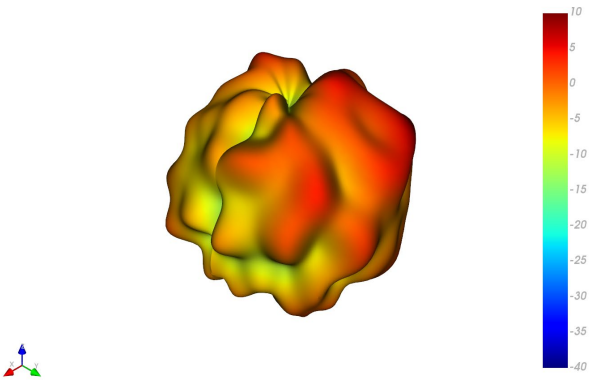
5.8 Wi-Fi MIMO 3 & 6 3D and 2D Radiation Patterns

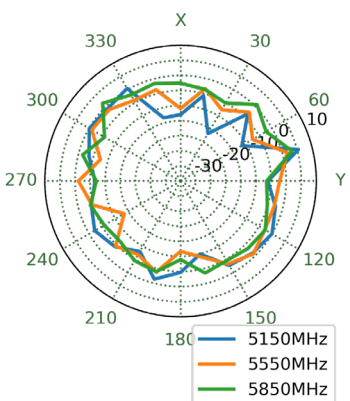
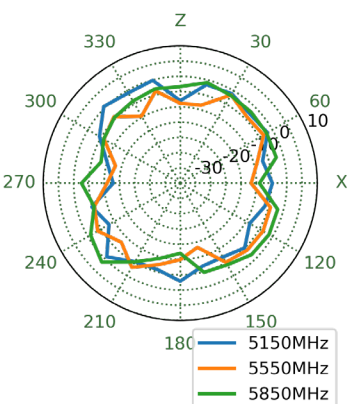
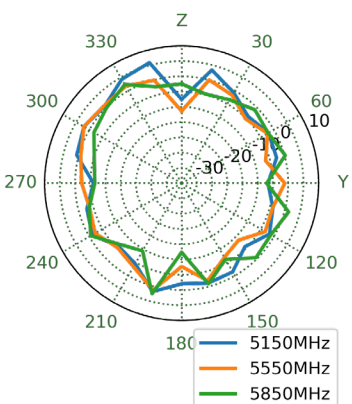
2450MHz



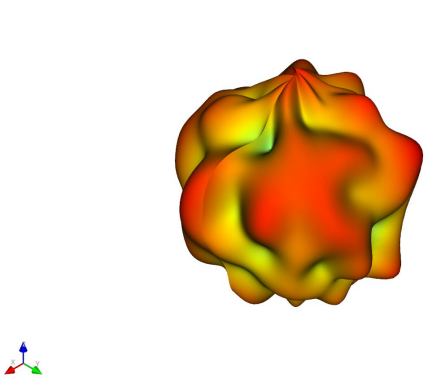
XY Plane	XZ Plane	YZ Plane
		

5550MHz



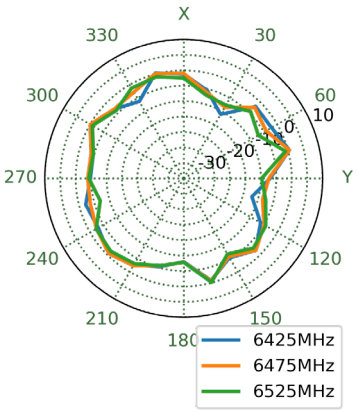
XY Plane	XZ Plane	YZ Plane
		

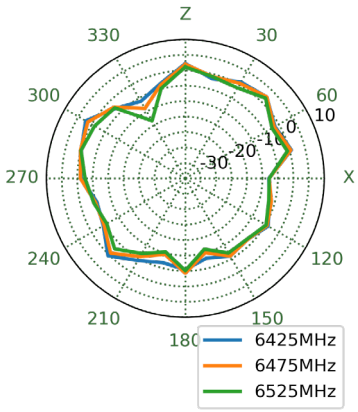
6475MHz

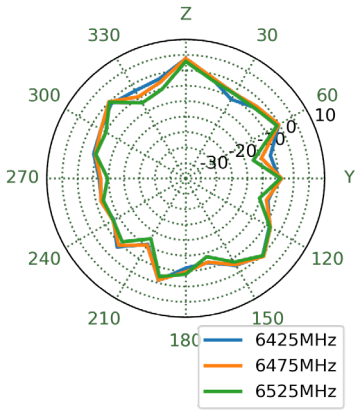




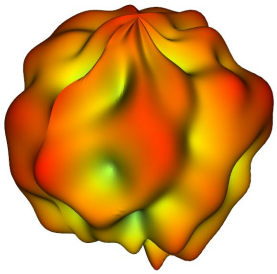
XY Plane	XZ Plane	YZ Plane







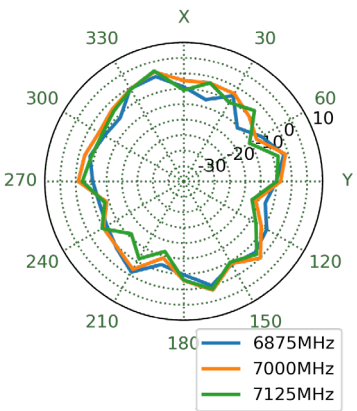
7000MHz

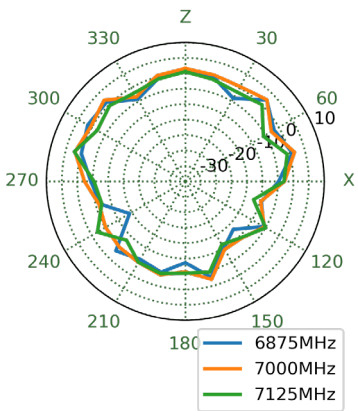


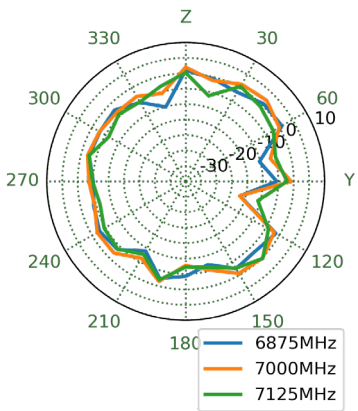




XY Plane	XZ Plane	YZ Plane

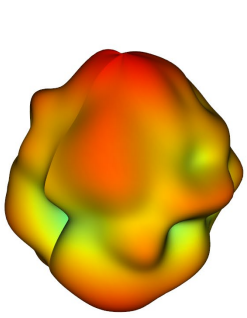






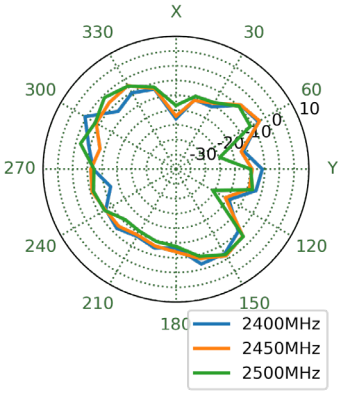
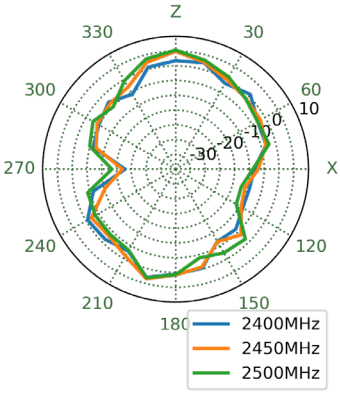
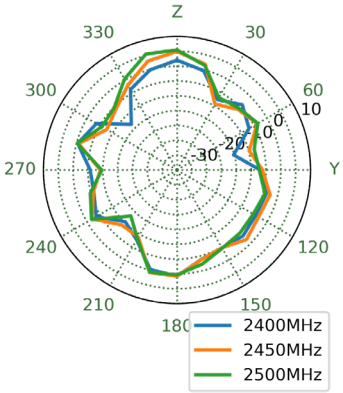
5.9 Wi-Fi MIMO 4 & 5 3D and 2D Radiation Patterns

2450MHz

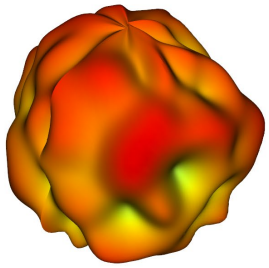






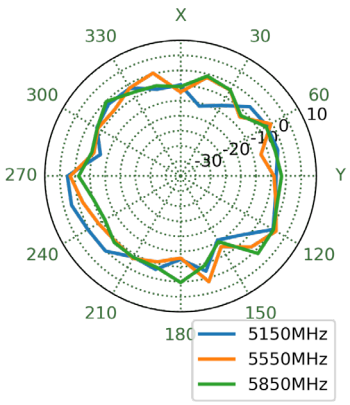
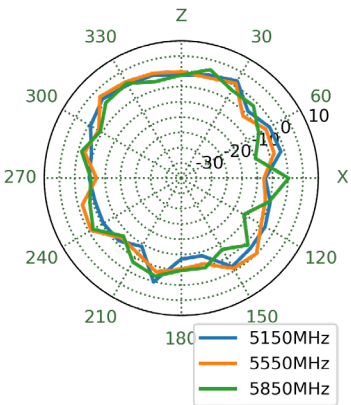
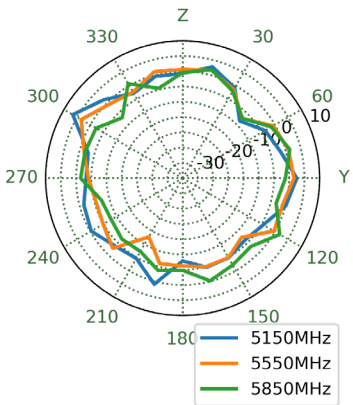
XY Plane	XZ Plane	YZ Plane
		

5550MHz

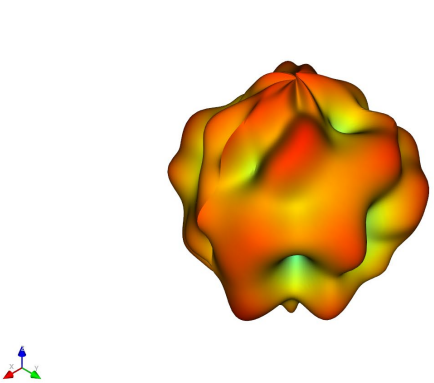


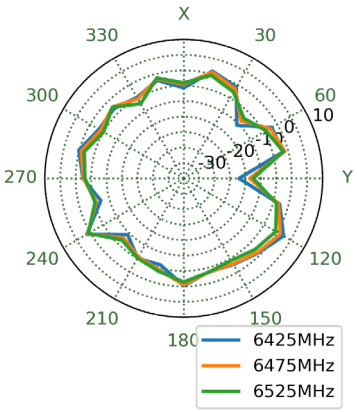
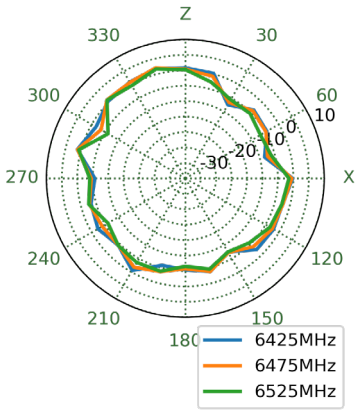
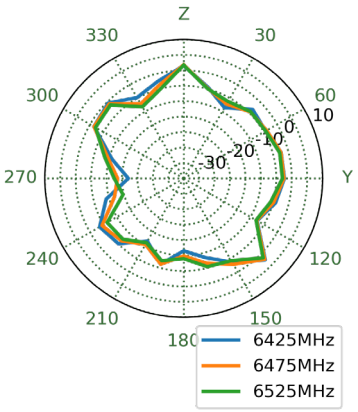




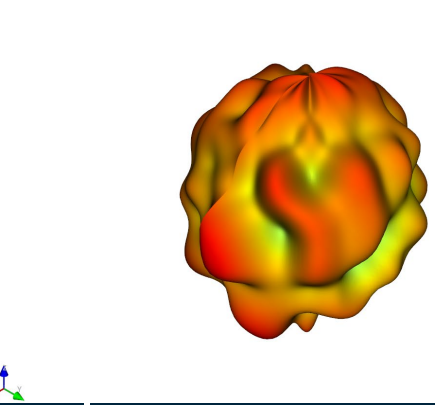
XY Plane	XZ Plane	YZ Plane
		

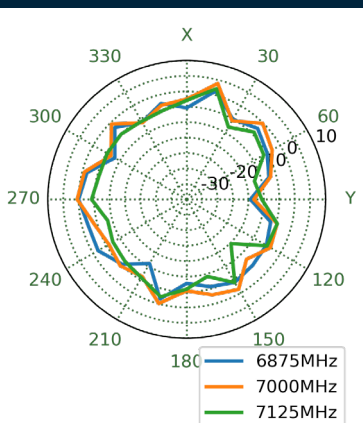
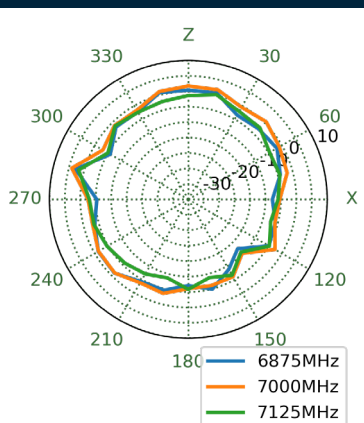
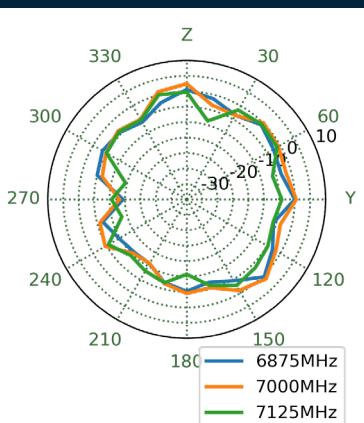
6475MHz



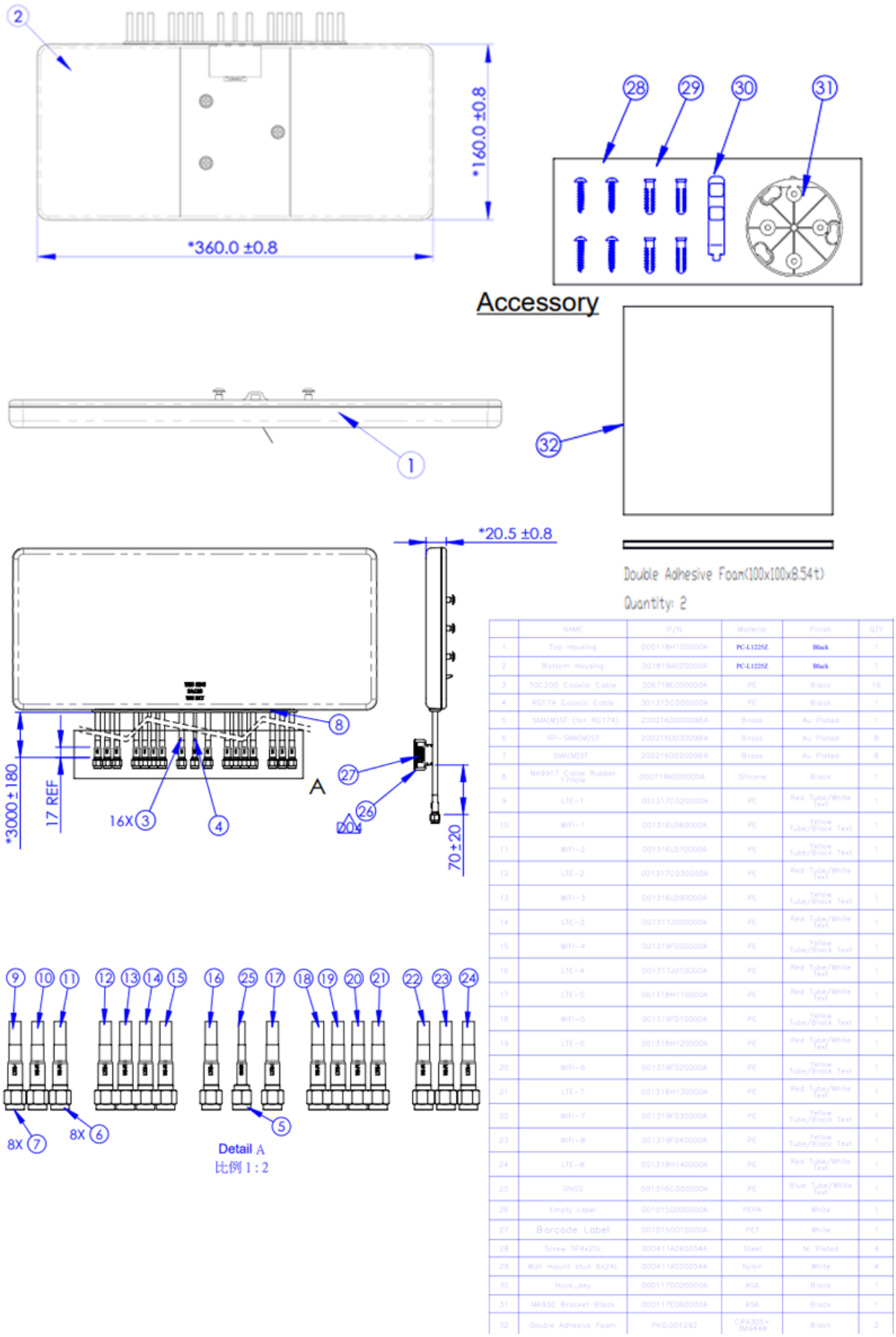
XY Plane	XZ Plane	YZ Plane
		

7000MHz



XY Plane	XZ Plane	YZ Plane
		

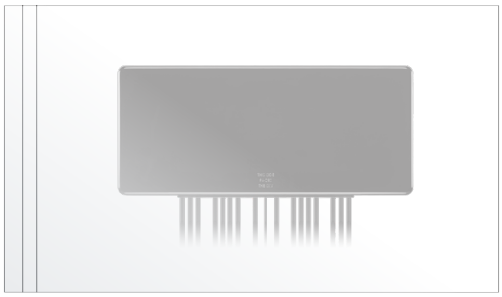
6. Mechanical Drawing (Units: mm)



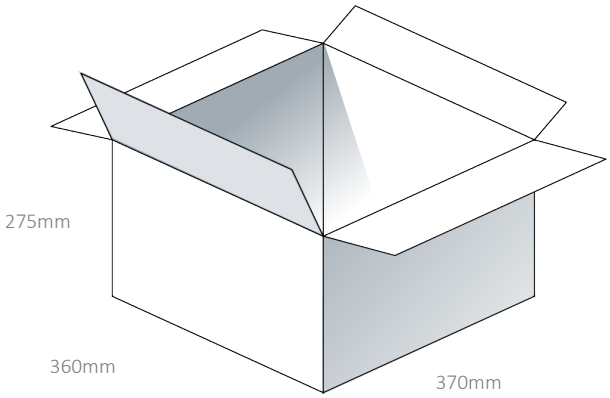
	NAME	P/N	Material	Finish	QTY
1	Top Housing	000118H100000A	PC-L1225Z	Black	1
2	Bottom Housing	001819A020000A	PC-L1225Z	Black	1
3	TGC200 Coaxial Cable	306718E000000A	PE	Black	16
4	RG174 Coaxial Cable	301315C000000A	PE	Black	1
5	SMA(M)ST (for RG174)	200216D000098A	Brass	Au Plated	1
6	RP-SMA(M)ST	200216D03009BA	Brass	Au Plated	8
7	SMA(M)ST	200216D020098A	Brass	Au Plated	8
8	MA9917 Cable Rubber 1.7Hole	000719A000000A	Silicone	Black	1
9	LTE-1	001317C020000A	PE	Red Tube/White Text	1
10	WiFi-1	001316L060000A	PE	Yellow Tube/Black Text	1
11	WiFi-2	001316L070000A	PE	Yellow Tube/Black Text	1
12	LTE-2	001317C030000A	PE	Red Tube/White Text	
13	WiFi-3	001316L090000A	PE	Yellow Tube/Black Text	1
14	LTE-3	001317J000000A	PE	Red Tube/White Text	1
15	WiFi-4	001319F000000A	PE	Yellow Tube/Black Text	1
16	LTE-4	001317J010000A	PE	Red Tube/White Text	1
17	LTE-5	001318H110000A	PE	Red Tube/White Text	1
18	WiFi-5	001319F010000A	PE	Yellow Tube/Black Text	1
19	LTE-6	001318H120000A	PE	Red Tube/White Text	1
20	WiFi-6	001319F020000A	PE	Yellow Tube/Black Text	1
21	LTE-7	001318H130000A	PE	Red Tube/White Text	1
22	WiFi-7	001319F030000A	PE	Yellow Tube/Black Text	1
23	WiFi-8	001319F040000A	PE	Yellow Tube/Black Text	1
24	LTE-8	001318H140000A	PE	Red Tube/White Text	1
25	GNSS	001316C000000A	PE	Blue Tube/White Text	1
26	Empty Label	001015G000000A	PEPA	White	1
27	Barcode Label	001015G010000A	PET	White	1
28	Screw TP4x25L	000411A040054A	Steel	Ni Plated	4
29	Wall mount stud 6x24L	000411A050054A	Nylon	White	4
30	Hook_key	000117D020000A	ASA	Black	1
31	MA930 Bracket Black	000117E060000A	ASA	Black	1
32	Double Adhesive Foam	PKG.001292	CR4300+JM9448	Black	2

7. Packaging

1pcs MA9917.A.001.wm per PE Bag
Weight - 1.6Kg



4pcs MA9917.A.001.wm per carton
Dimensions - 360*370*275mm
Weight - 7Kg

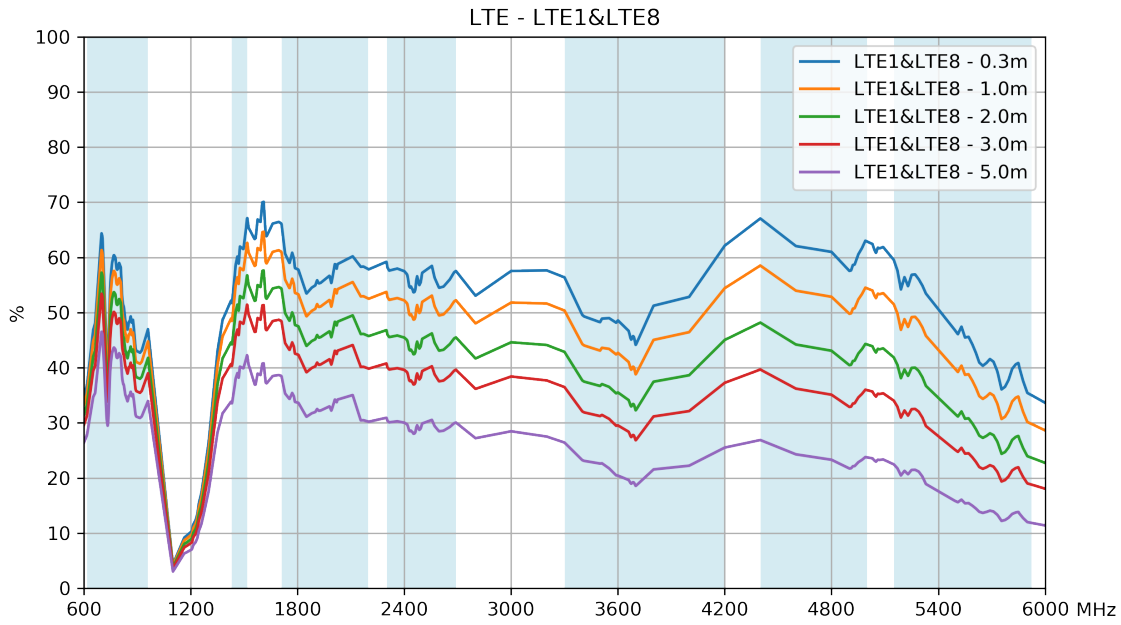


8. Application Note

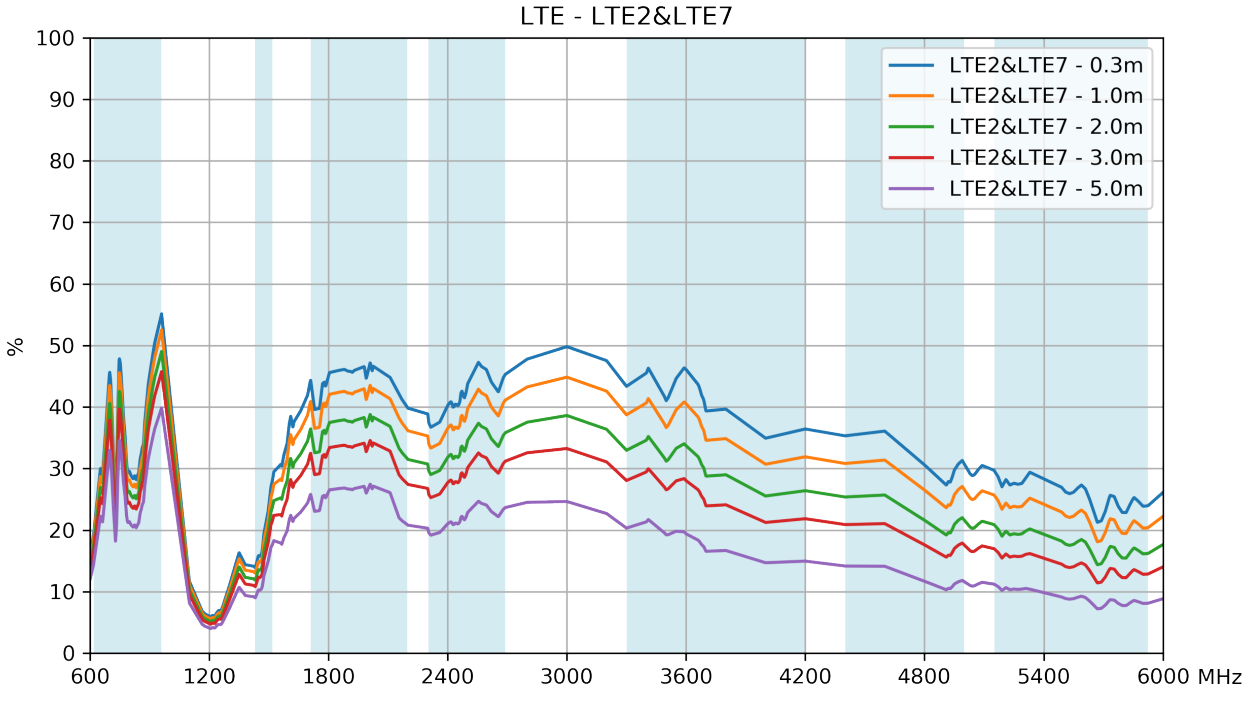
The MA9917.A.001.wm's performance is affected by different cable lengths, in this section the performance is shown with different cable lengths.

8.1 Efficiency – 5G/4G MIMO

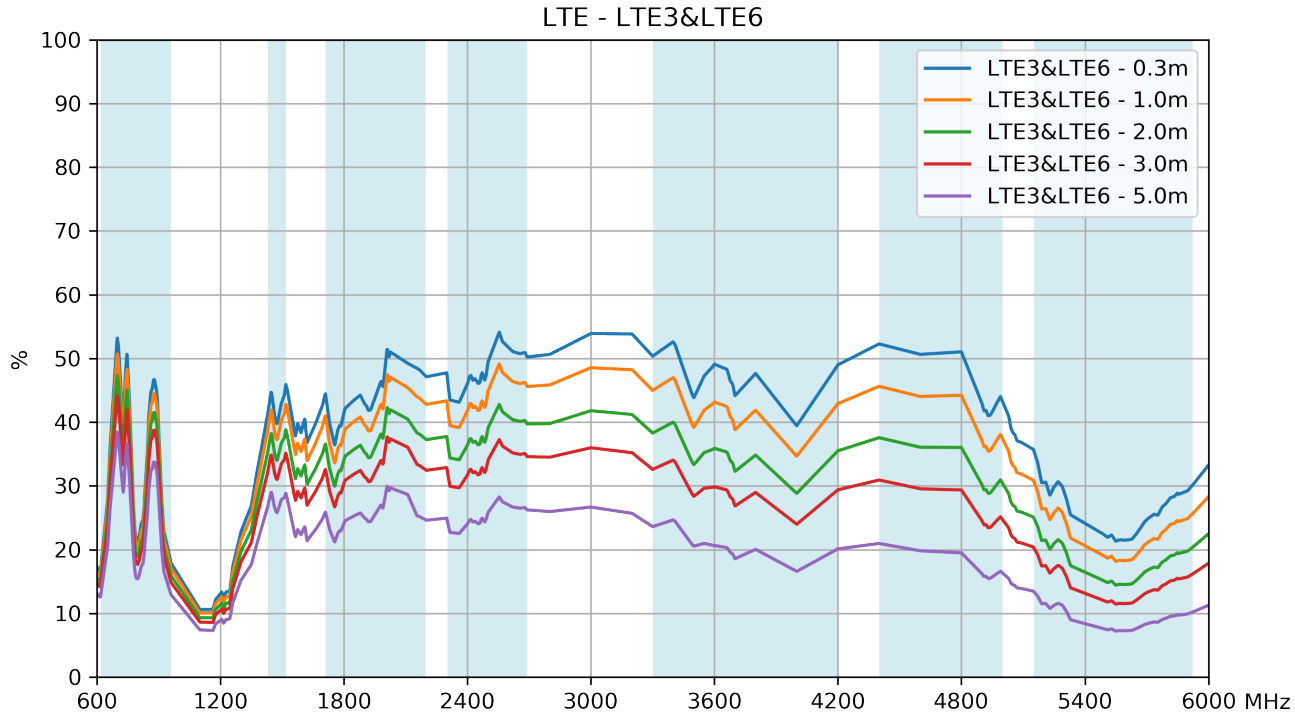
5G/4G MIMO 1 & 8



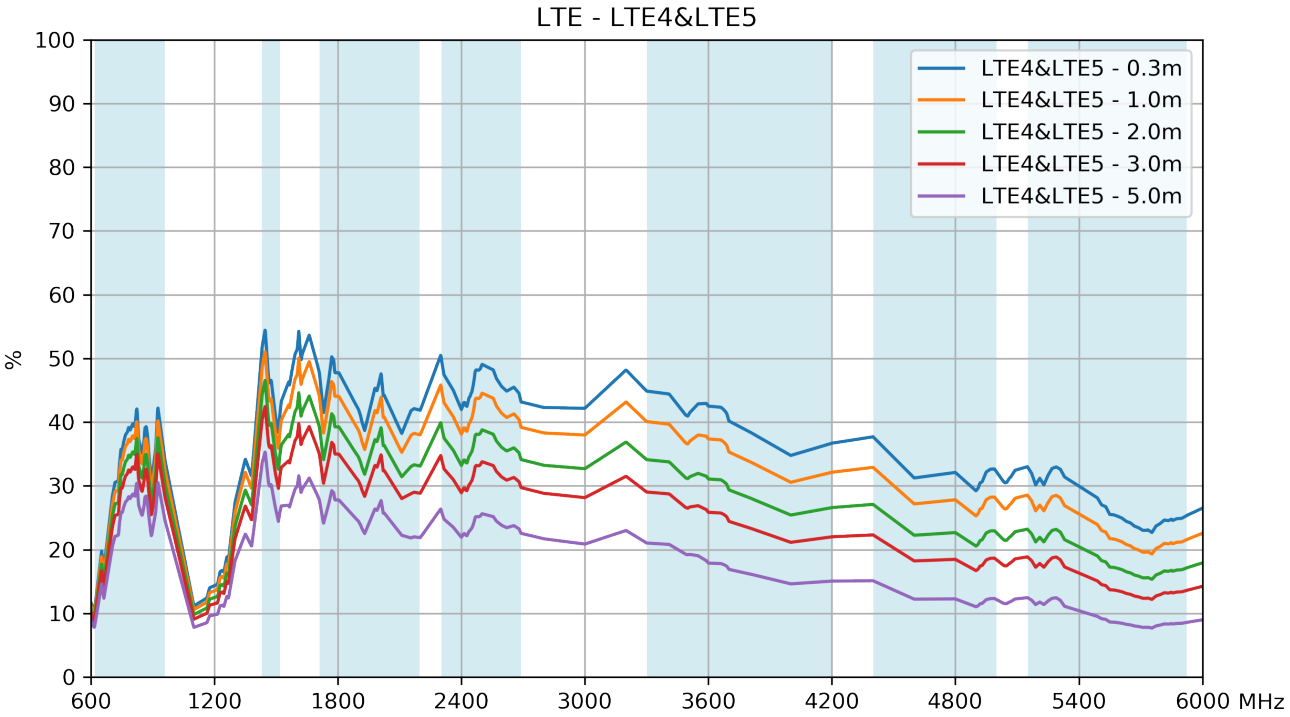
5G/4G MIMO 2 & 7



5G/4G MIMO 3 & 6

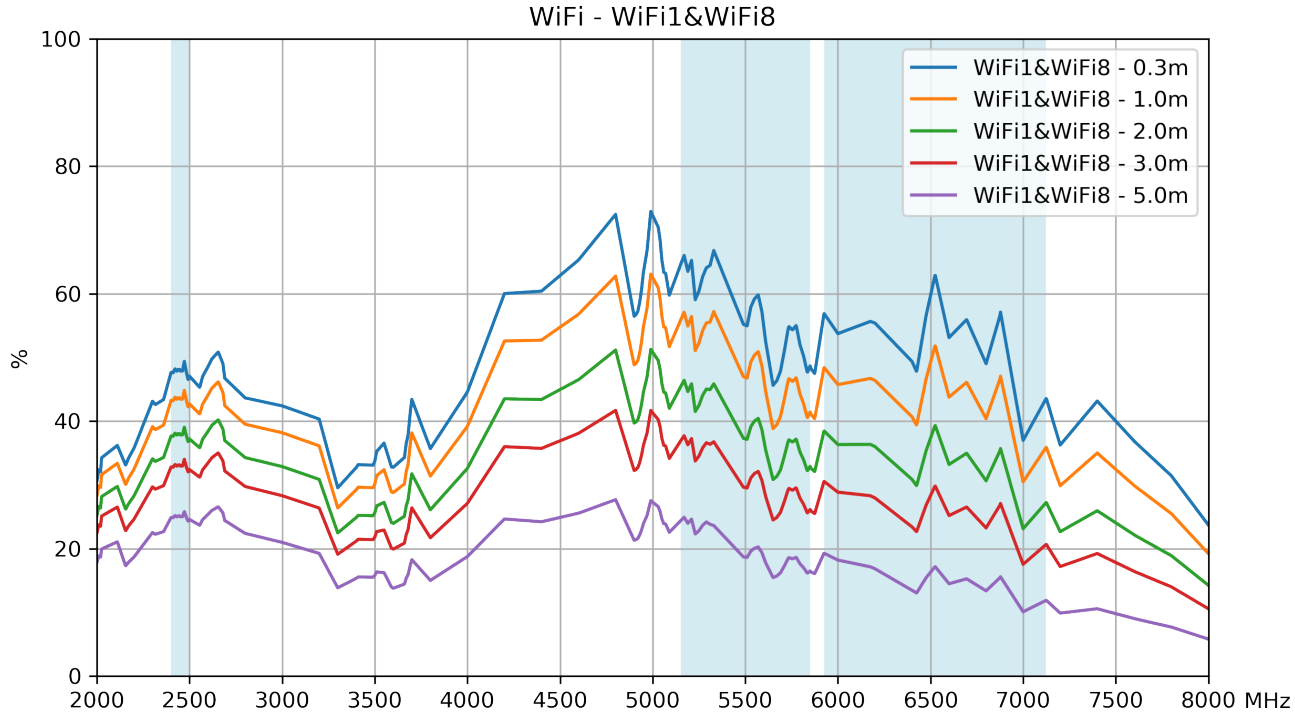


5G/4G MIMO 4 & 5

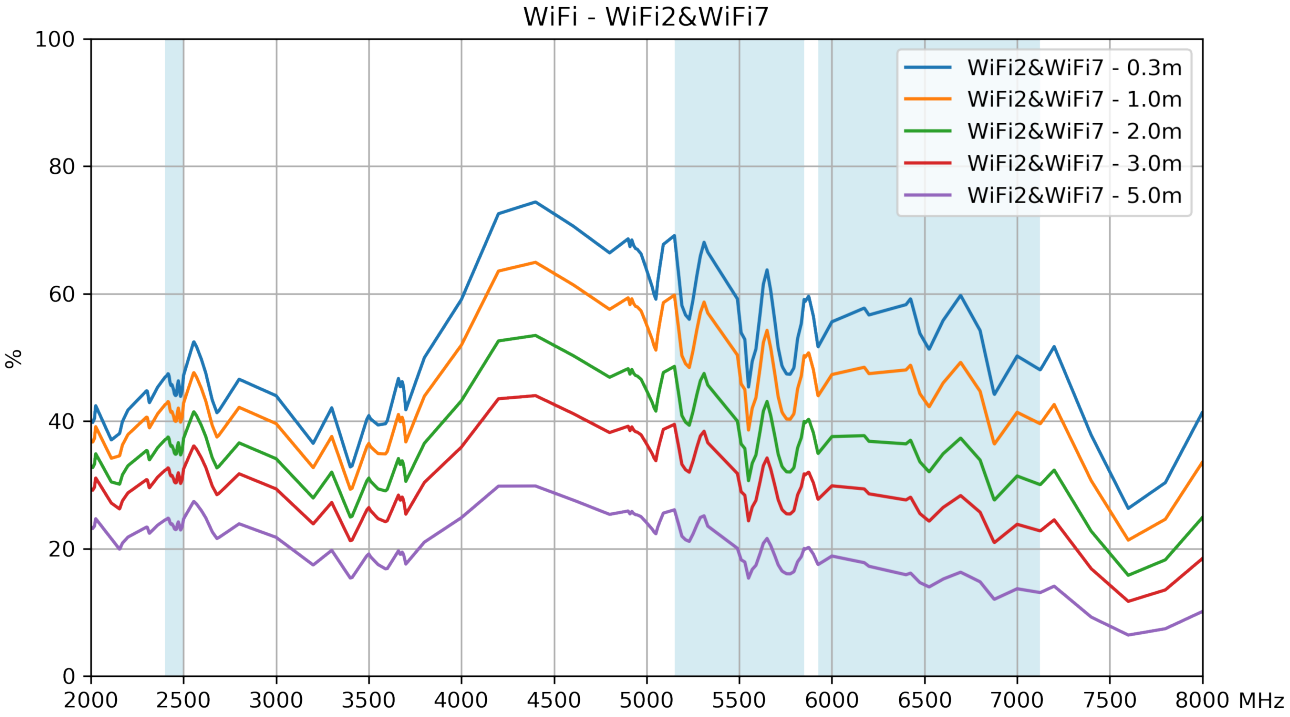


8.2 Efficiency – Wi-Fi MIMO

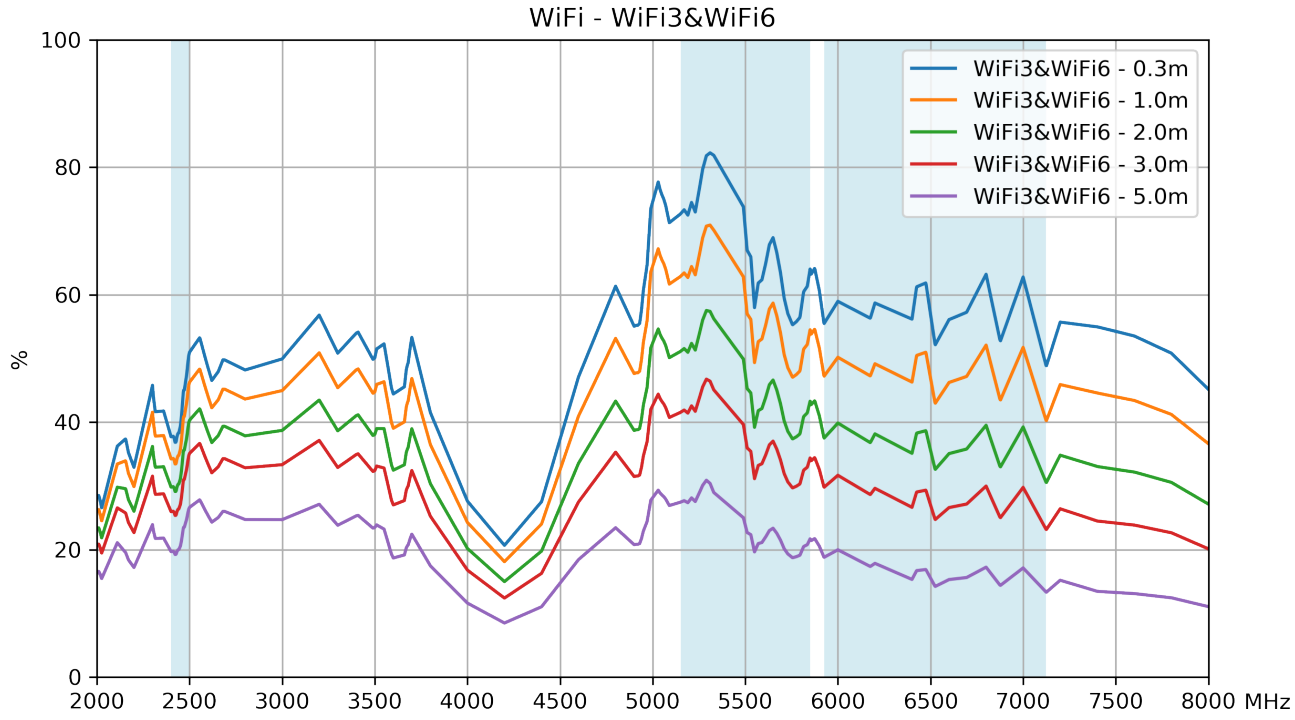
Wi-Fi MIMO 1 & 8



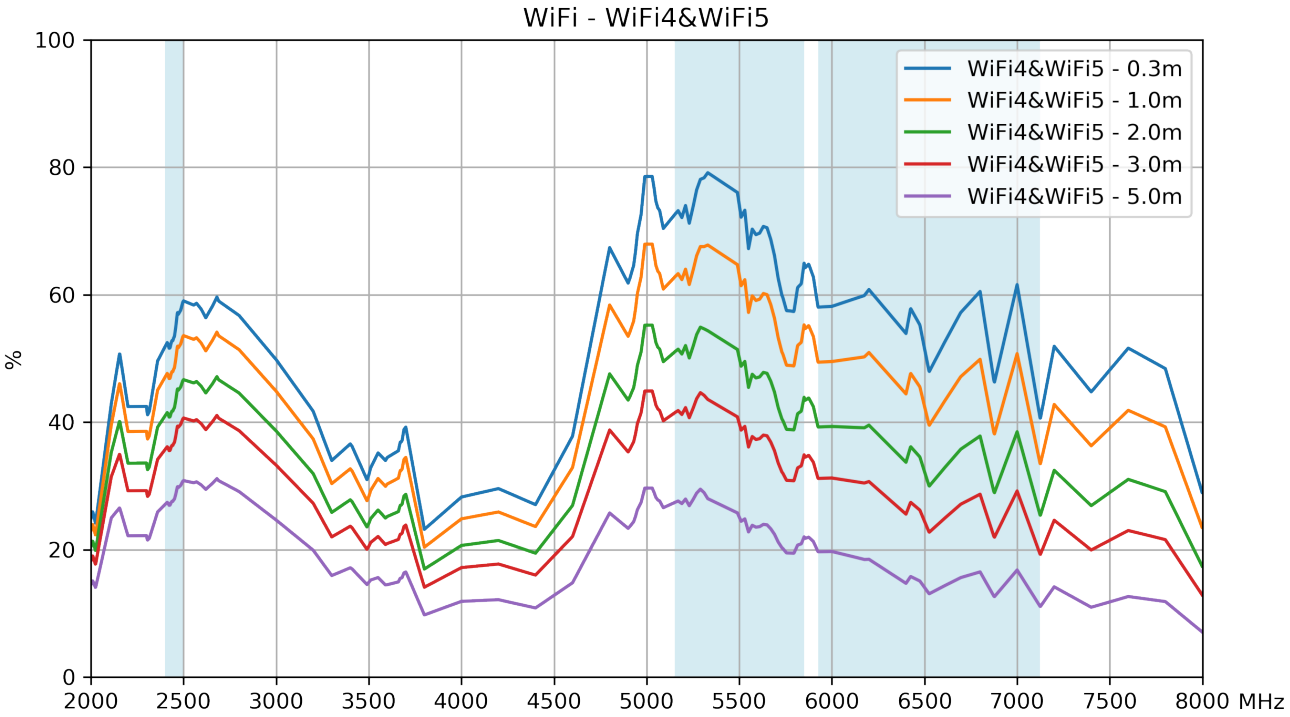
Wi-Fi MIMO 2 & 7



Wi-Fi MIMO 3 & 6

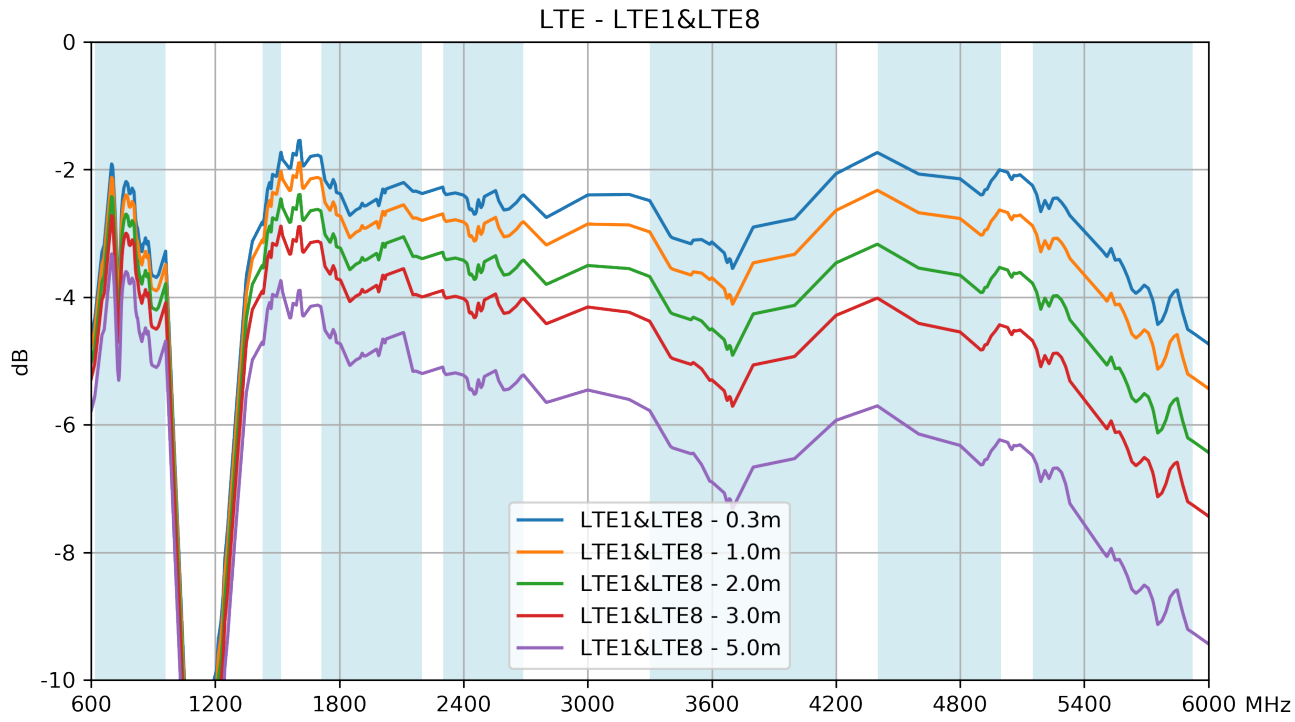


Wi-Fi MIMO 4 & 5

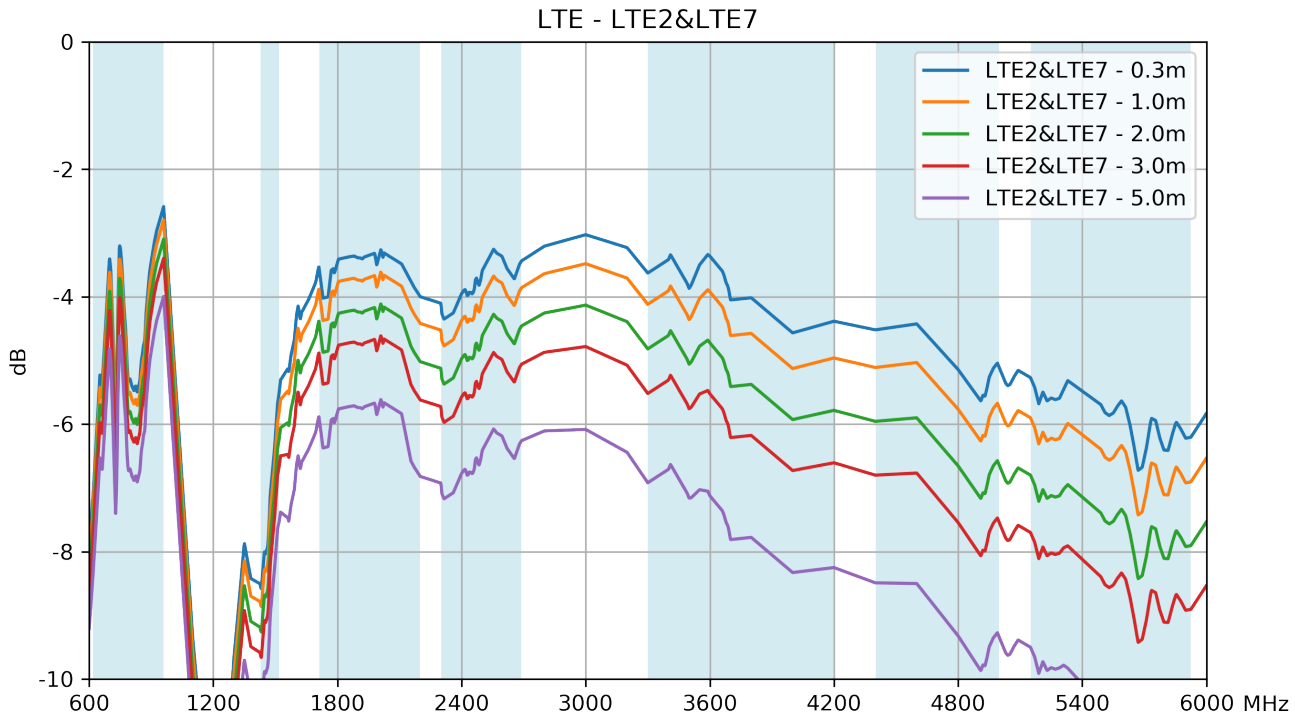


8.3 Average Gain – 5G/4G MIMO

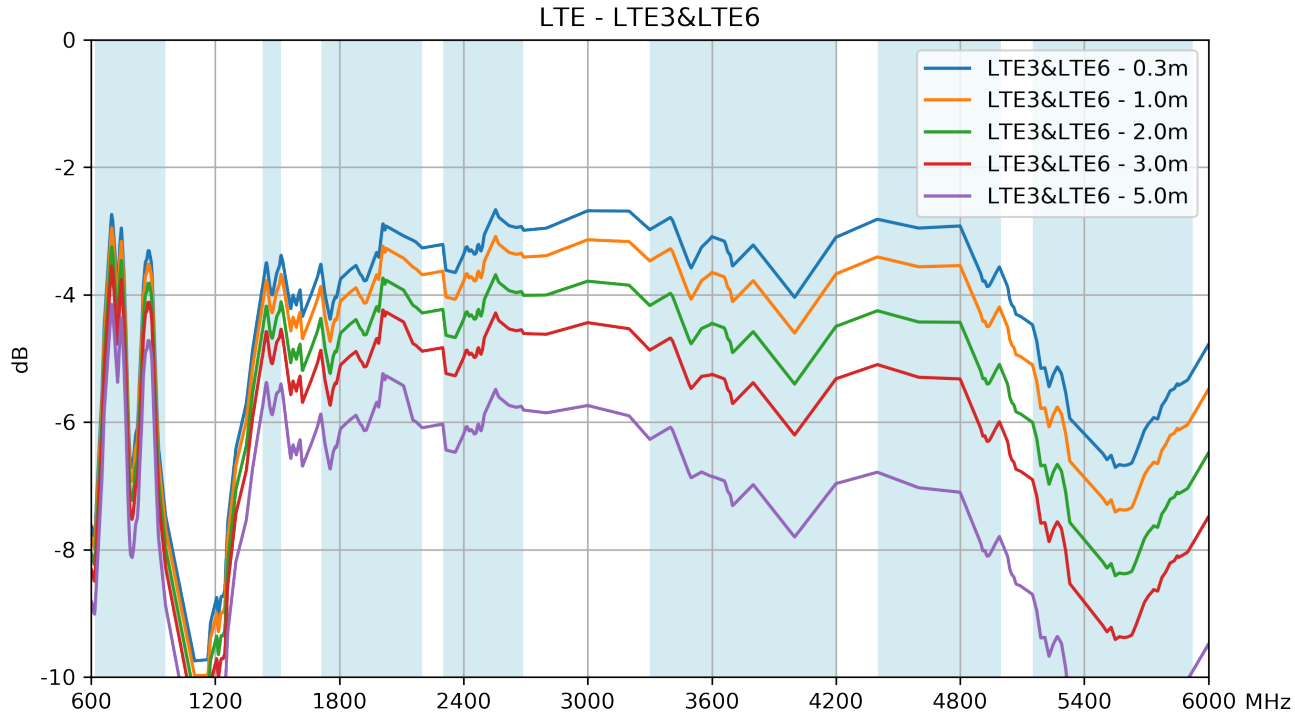
5G/4G MIMO 1 & 8



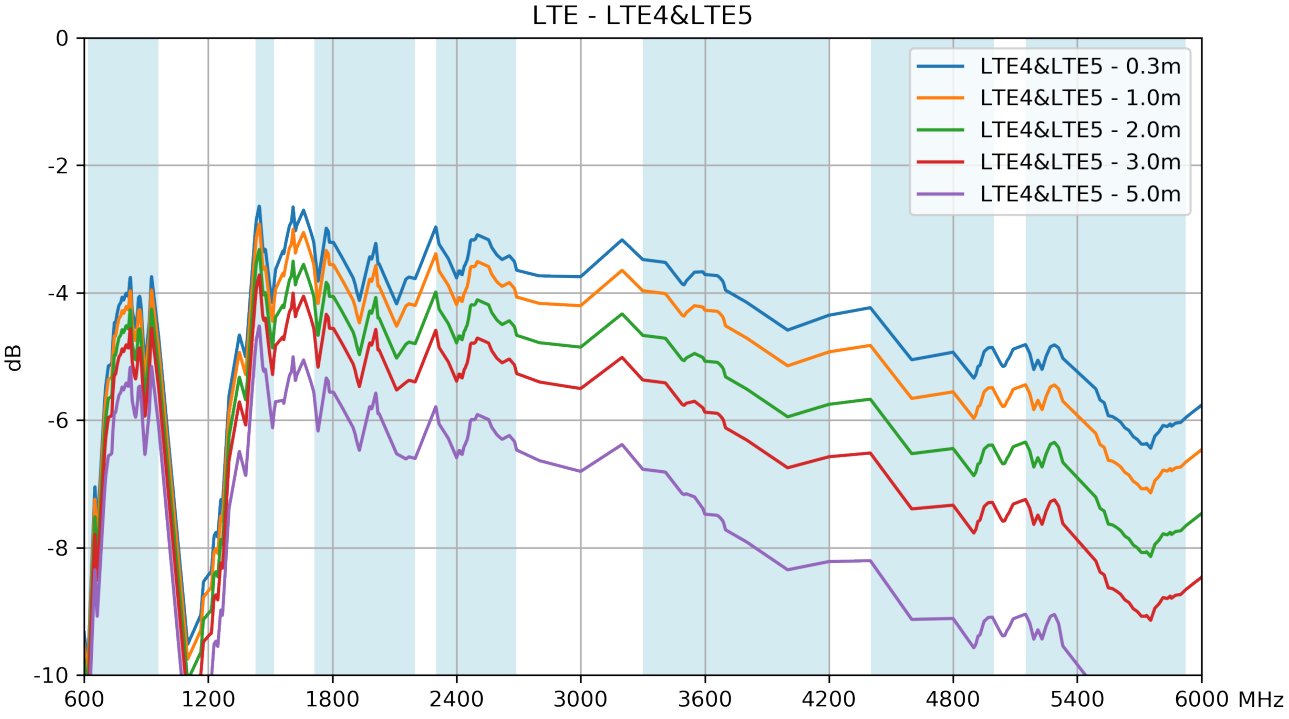
5G/4G MIMO 2 & 7



5G/4G MIMO 3 & 6

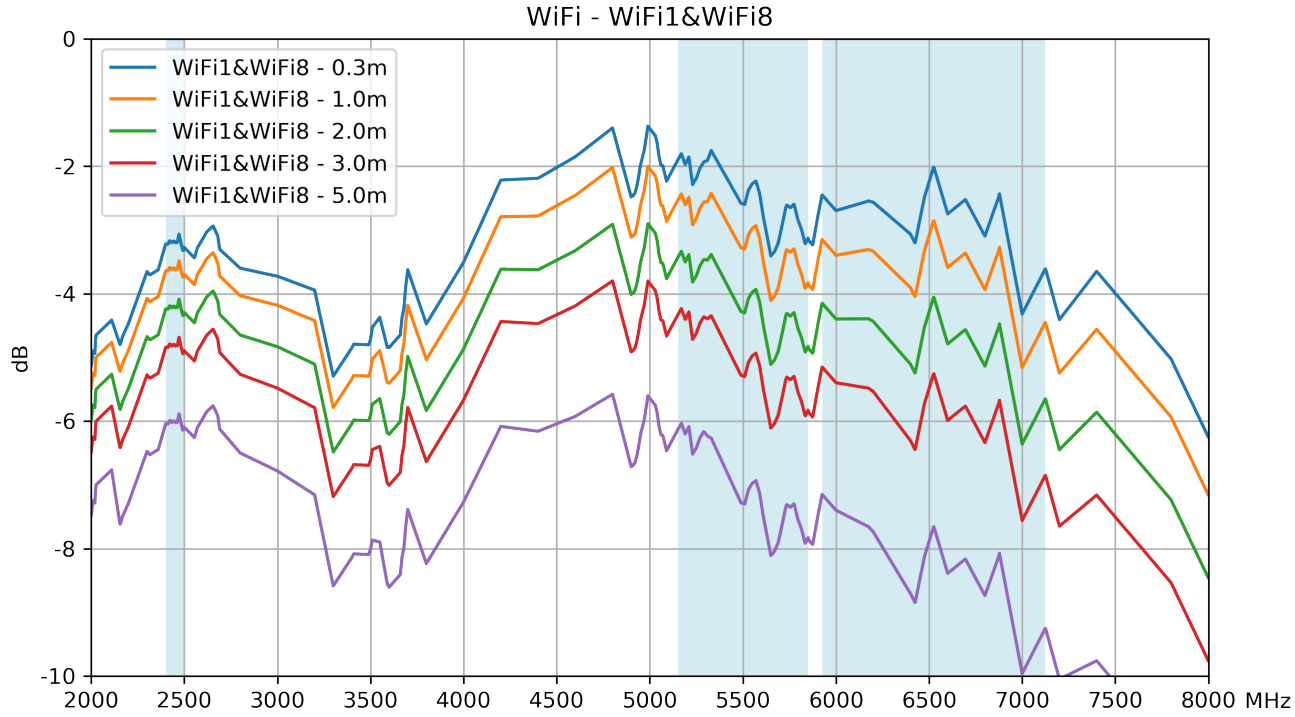


5G/4G MIMO 4 & 5

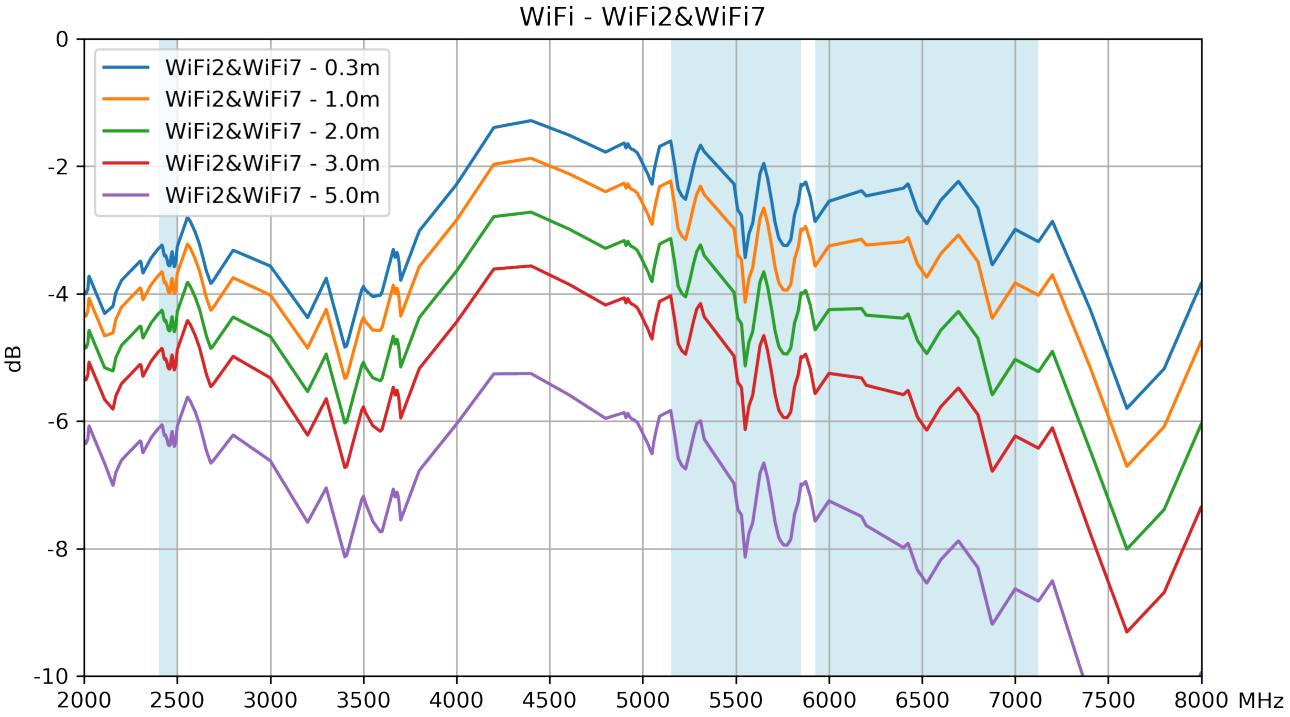


8.4 Average Gain – Wi-Fi MIMO

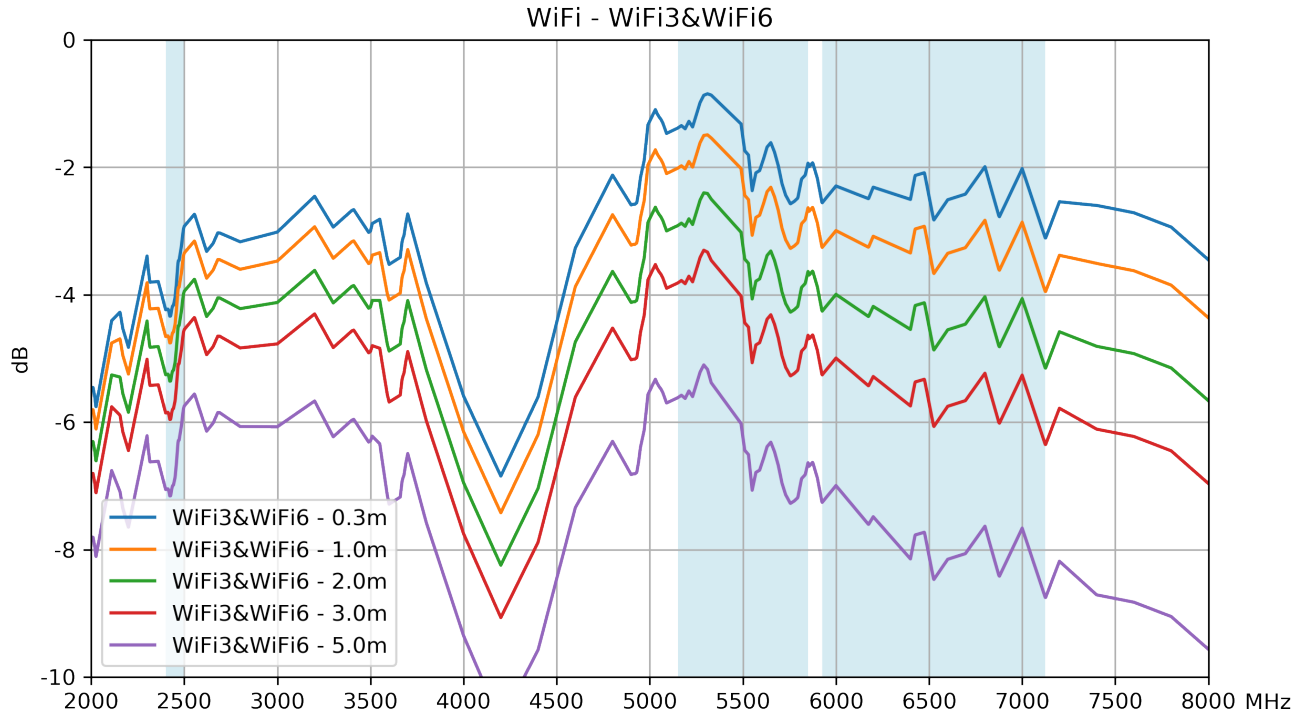
Wi-Fi MIMO 1 & 8



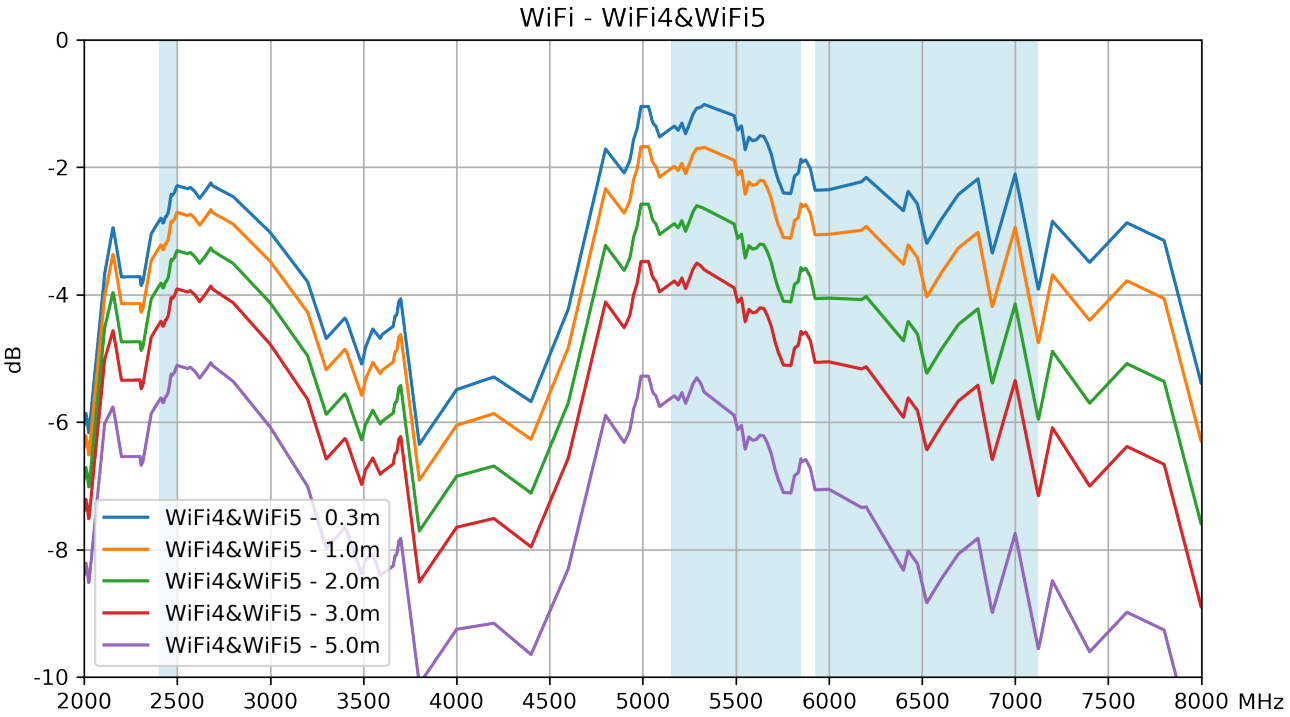
Wi-Fi MIMO 2 & 7



Wi-Fi MIMO 3 & 6

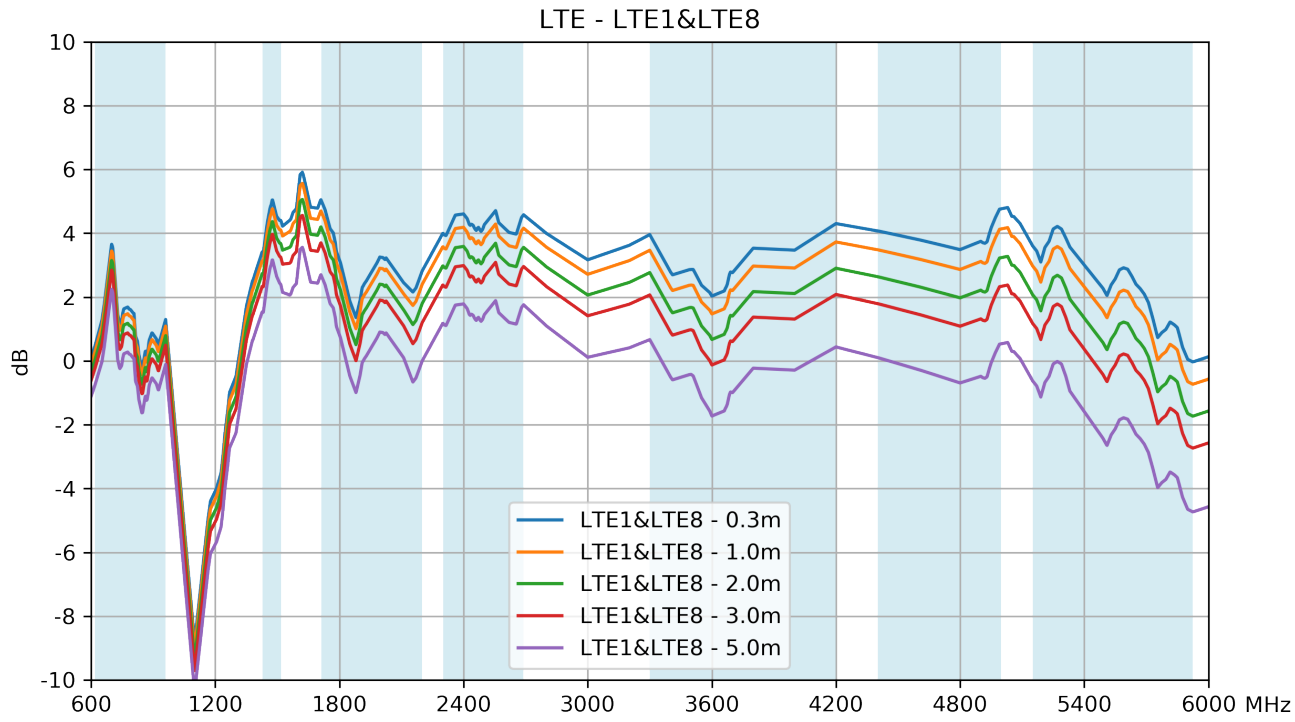


Wi-Fi MIMO 4 & 5

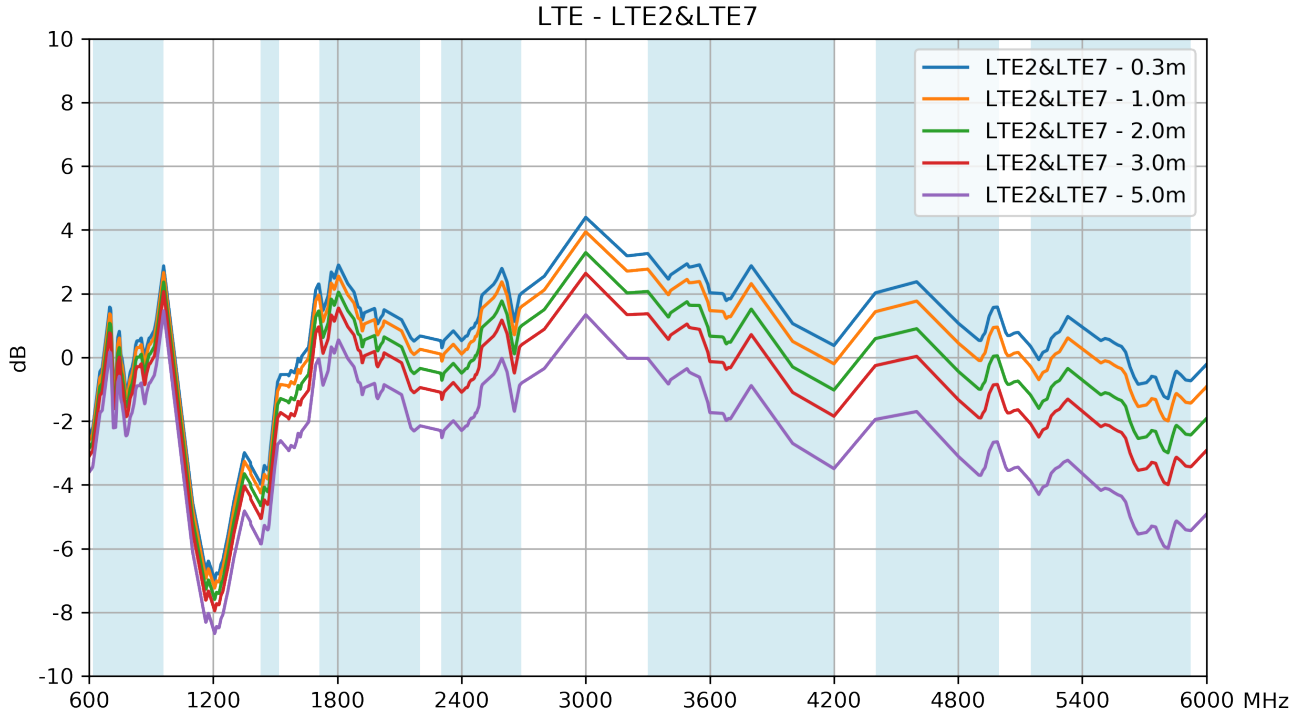


8.5 Peak Gain – 5G/4G MIMO

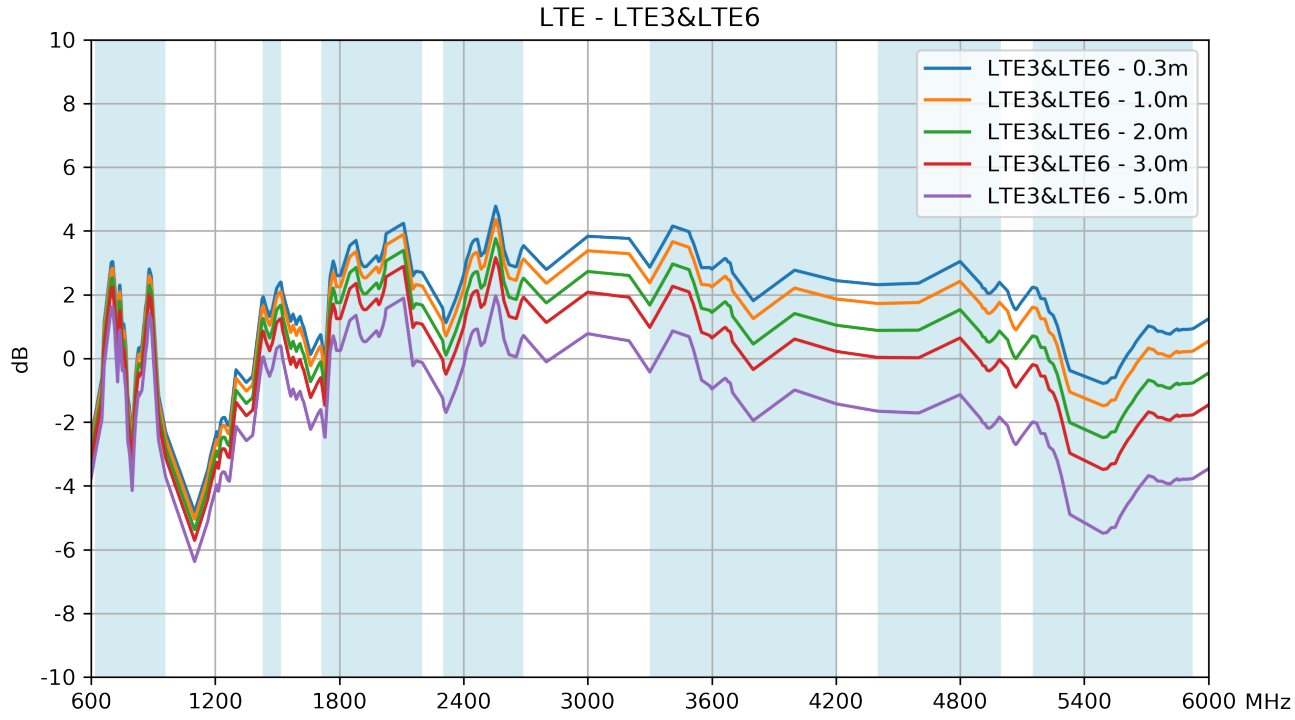
5G/4G MIMO 1 & 8



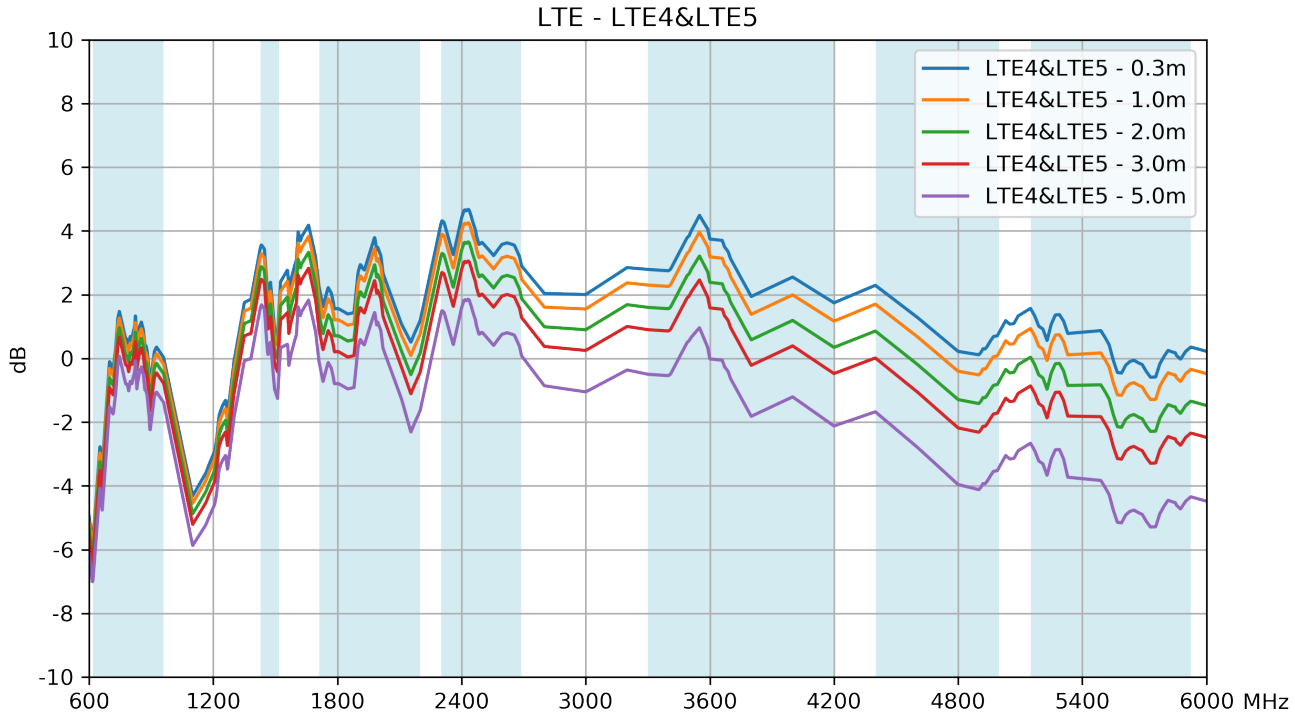
5G/4G MIMO 2 & 7



5G/4G MIMO 3 & 6

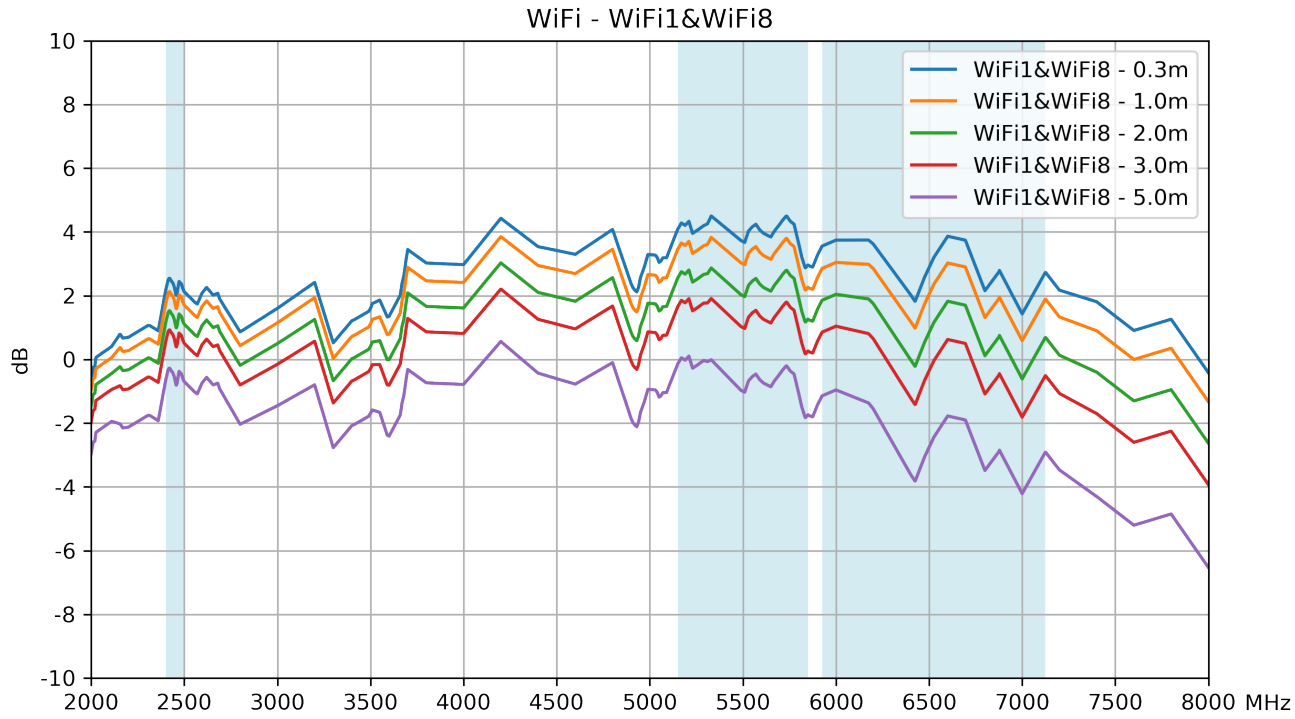


5G/4G MIMO 4 & 5

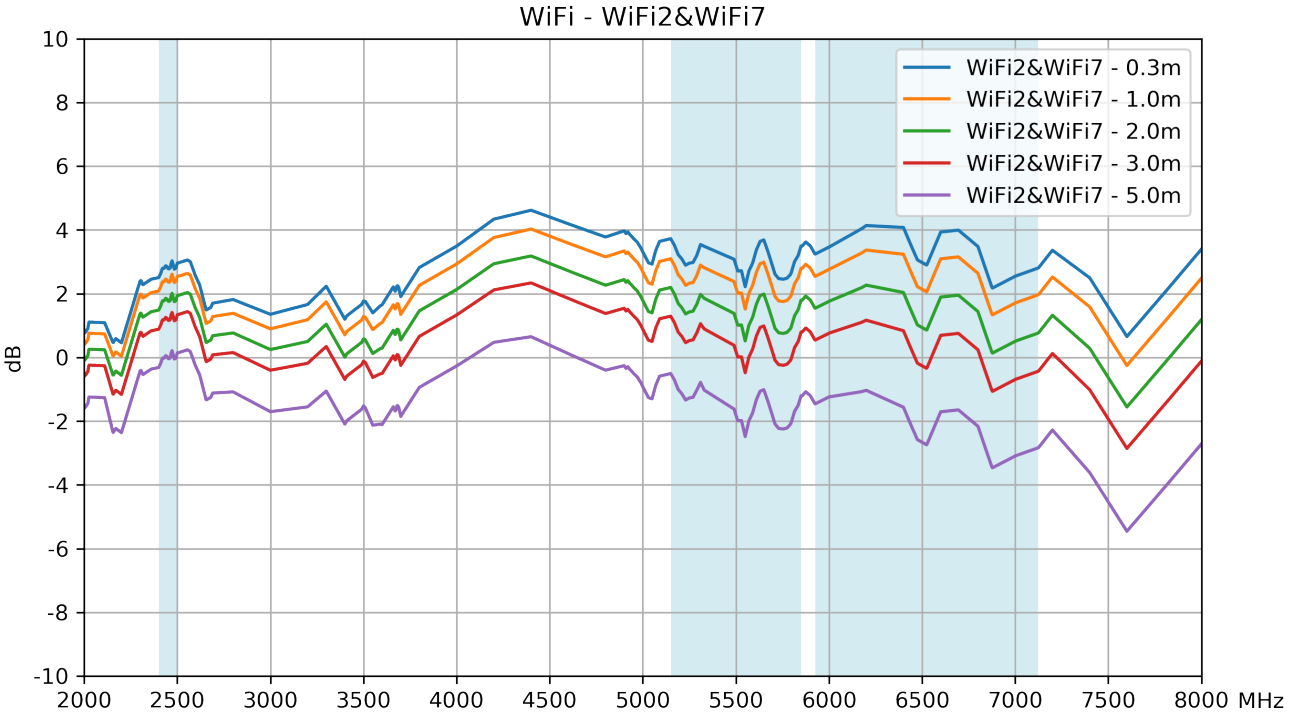


8.6 Peak Gain – Wi-Fi MIMO

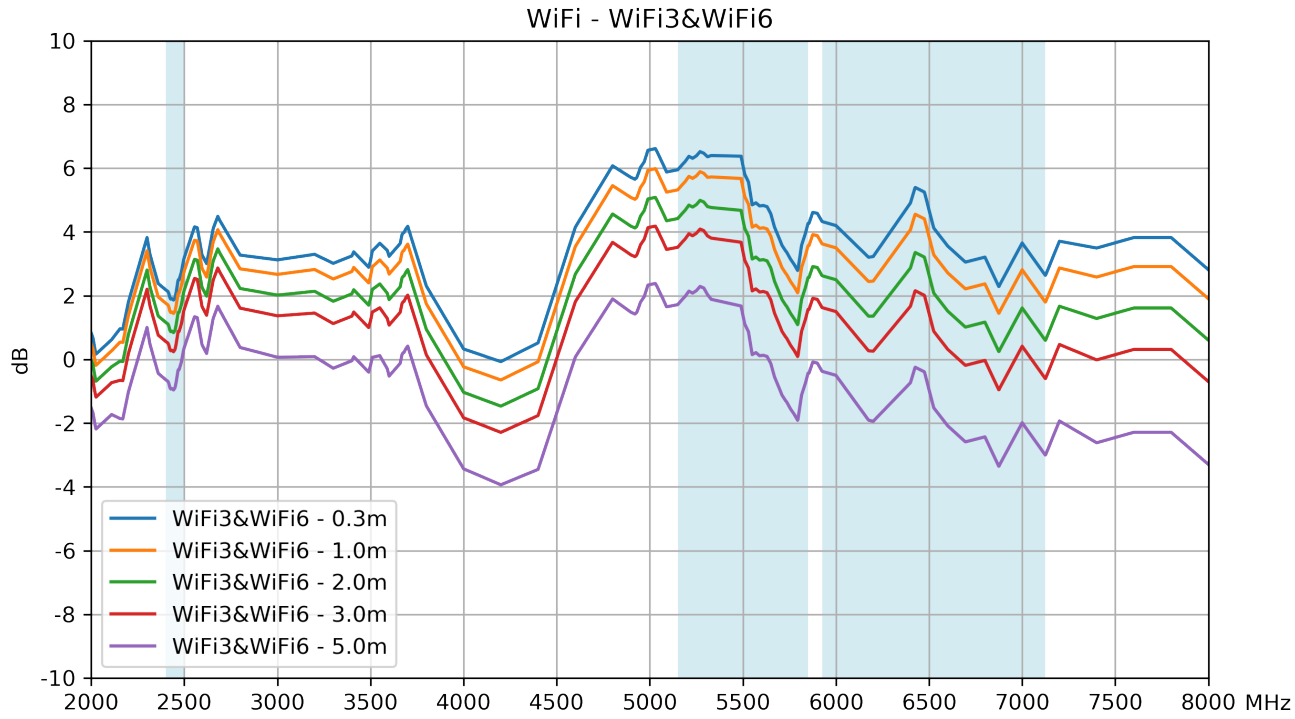
Wi-Fi MIMO 1 & 8



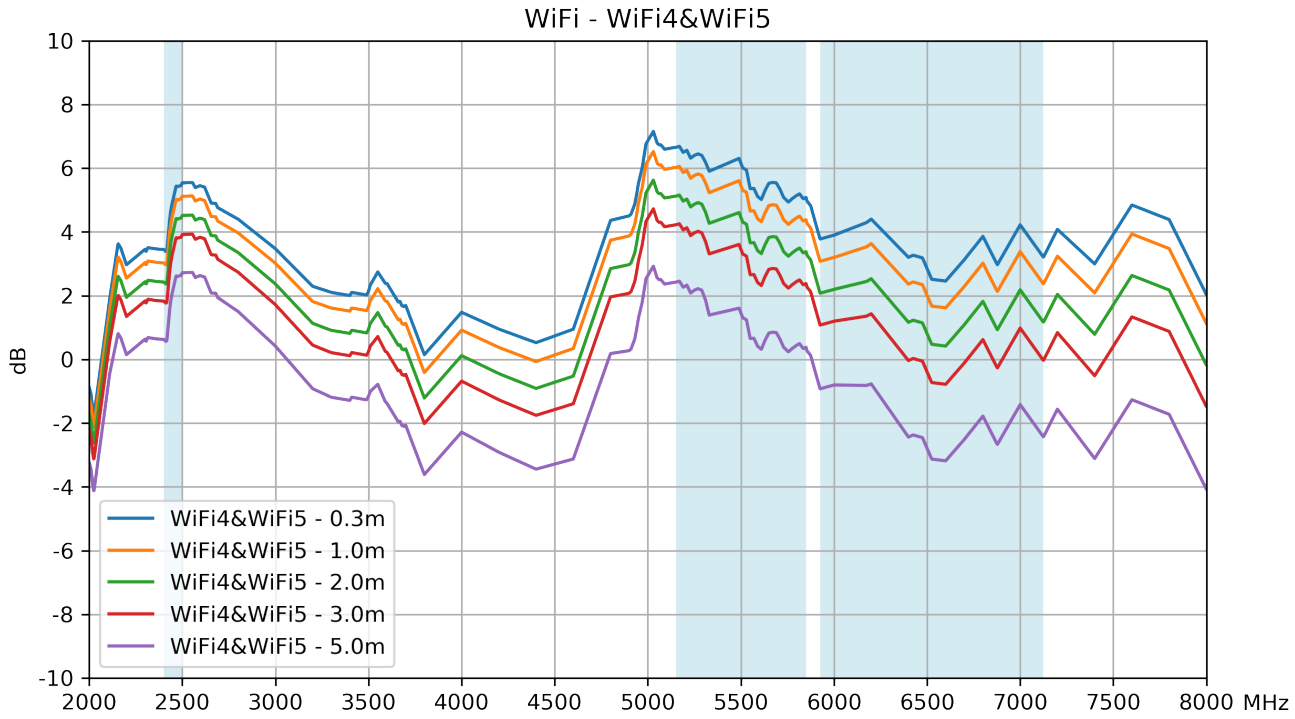
Wi-Fi MIMO 2 & 7



Wi-Fi MIMO 3 & 6



Wi-Fi MIMO 4 & 5



8.7 Comparison Tables

5G/4G Antennas											
Frequency (MHz)		5G Band 71	LTE700	GSM800 900	5G NR 74	5GNR N66	LTE2600	5GNR N77	5GNR N78	5GNR N79	LTE5200
		617-698	698-824	824-960	1427-1518	1710-2200	2300-2690	3300-4200	3300-3800	4400-5000	5150-5925
Efficiency (%)											
LTE1& LTE8	0.3m	48.9	55.5	47.2	59.4	57.7	56.0	48.8	47.9	60.7	45.4
	1.0m	46.8	52.9	45.0	55.6	53.2	50.8	43.2	42.3	52.6	38.8
	2.0m	43.8	49.4	42.0	50.7	47.2	44.3	36.2	35.5	42.8	31.1
	3.0m	41.1	46.1	39.2	46.2	42.0	38.5	30.3	29.8	34.9	24.9
	5.0m	36.0	40.1	34.1	38.3	33.2	29.2	21.3	21.0	23.2	16.0
LTE2& LTE7	0.3m	30.9	35.9	36.9	19.0	44.4	41.6	42.2	42.9	30.3	25.7
	1.0m	29.5	34.2	35.1	17.8	40.9	37.8	37.3	37.9	26.2	22.0
	2.0m	27.7	31.9	32.8	16.2	36.3	32.9	31.2	31.8	21.4	17.6
	3.0m	25.9	29.8	30.6	14.8	32.3	28.6	26.2	26.7	17.4	14.1
	5.0m	22.7	25.9	26.7	12.2	25.5	21.7	18.4	18.8	11.6	9.0
LTE3& LTE6	0.3m	33.2	36.1	36.6	42.5	44.3	47.8	47.1	47.4	44.6	26.6
	1.0m	31.7	34.4	34.8	39.8	40.8	43.4	41.6	41.9	38.7	22.8
	2.0m	29.7	32.1	32.5	36.2	36.3	37.8	34.9	35.2	31.5	18.2
	3.0m	27.8	30.0	30.3	33.0	32.2	32.9	29.2	29.5	25.7	14.6
	5.0m	24.4	26.1	26.4	27.4	25.5	25.0	20.5	20.8	17.1	9.3
LTE4&LT E5	0.3m	18.4	35.8	36.8	47.1	44.0	45.7	41.4	42.1	31.8	26.8
	1.0m	17.6	34.1	35.1	44.1	40.5	41.5	36.6	37.2	27.6	22.9
	2.0m	16.5	31.9	32.7	40.2	36.0	36.2	30.7	31.2	22.5	18.3
	3.0m	15.4	29.7	30.5	36.6	32.0	31.5	25.7	26.2	18.3	14.7
	5.0m	13.5	25.9	26.6	30.4	25.3	23.9	18.1	18.4	12.1	9.4
Average Gain (dB)											
LTE1& LTE8	0.3m	-3.10	-2.55	-3.26	-2.26	-2.39	-2.52	-3.11	-3.20	-2.17	-3.43
	1.0m	-3.30	-2.76	-3.47	-2.55	-2.74	-2.94	-3.65	-3.73	-2.79	-4.11
	2.0m	-3.58	-3.06	-3.77	-2.95	-3.26	-3.54	-4.42	-4.49	-3.68	-5.07
	3.0m	-3.87	-3.36	-4.07	-3.36	-3.77	-4.14	-5.18	-5.25	-4.57	-6.04
	5.0m	-4.43	-3.96	-4.67	-4.17	-4.79	-5.34	-6.72	-6.78	-6.35	-7.97
LTE2& LTE7	0.3m	-5.10	-4.45	-4.33	-7.21	-3.53	-3.81	-3.75	-3.68	-5.19	-5.90
	1.0m	-5.30	-4.66	-4.54	-7.50	-3.88	-4.23	-4.29	-4.21	-5.81	-6.58
	2.0m	-5.58	-4.96	-4.84	-7.90	-4.40	-4.83	-5.05	-4.97	-6.70	-7.55
	3.0m	-5.87	-5.26	-5.14	-8.31	-4.91	-5.43	-5.82	-5.74	-7.59	-8.51
	5.0m	-6.43	-5.86	-5.74	-9.13	-5.93	-6.63	-7.35	-7.26	-9.37	-10.45
LTE3& LTE6	0.3m	-4.79	-4.42	-4.37	-3.72	-3.53	-3.20	-3.27	-3.24	-3.50	-5.75
	1.0m	-4.99	-4.63	-4.58	-4.00	-3.89	-3.62	-3.81	-3.78	-4.12	-6.43
	2.0m	-5.27	-4.93	-4.88	-4.41	-4.40	-4.22	-4.58	-4.54	-5.01	-7.39
	3.0m	-5.56	-5.23	-5.18	-4.82	-4.92	-4.82	-5.34	-5.30	-5.90	-8.36
	5.0m	-6.13	-5.83	-5.78	-5.63	-5.94	-6.02	-6.88	-6.83	-7.68	-10.30
LTE4& LTE5	0.3m	-7.35	-4.46	-4.34	-3.27	-3.56	-3.40	-3.83	-3.76	-4.97	-5.72
	1.0m	-7.55	-4.67	-4.55	-3.55	-3.92	-3.82	-4.36	-4.29	-5.60	-6.40
	2.0m	-7.84	-4.97	-4.85	-3.96	-4.43	-4.42	-5.13	-5.06	-6.49	-7.37
	3.0m	-8.12	-5.27	-5.15	-4.36	-4.94	-5.02	-5.90	-5.82	-7.38	-8.34
	5.0m	-8.69	-5.87	-5.75	-5.17	-5.97	-6.22	-7.43	-7.34	-9.16	-10.27
Peak Gain (dBi)											
LTE1&LT E8	0.3m	3.63	3.65	1.30	5.06	5.06	4.71	4.30	3.96	4.75	4.21
	1.0m	3.42	3.44	1.09	4.78	4.71	4.29	3.73	3.47	4.12	3.58
	2.0m	3.12	3.14	0.79	4.38	4.21	3.69	2.90	2.77	3.22	2.68
	3.0m	2.82	2.84	0.49	3.98	3.71	3.09	2.08	2.07	2.32	1.78
	5.0m	2.22	2.24	-0.11	3.18	2.71	1.89	0.67	0.67	0.52	-0.02
LTE2&LT E7	0.3m	1.50	1.58	2.87	-0.66	2.91	2.80	3.26	3.26	2.37	1.29
	1.0m	1.29	1.37	2.66	-0.96	2.56	2.38	2.77	2.77	1.77	0.61
	2.0m	0.99	1.07	2.36	-1.39	2.06	1.78	2.07	2.07	0.90	-0.35
	3.0m	0.69	0.77	2.06	-1.82	1.56	1.18	1.37	1.37	0.03	-1.31
	5.0m	0.09	0.17	1.46	-2.68	0.56	-0.02	-0.03	-0.03	-1.70	-3.23
LTE3&LT E6	0.3m	3.05	3.06	2.82	2.40	4.24	4.78	4.15	4.15	3.04	2.24
	1.0m	2.84	2.85	2.61	2.10	3.89	4.36	3.66	3.66	2.42	1.61
	2.0m	2.54	2.55	2.31	1.67	3.39	3.76	2.96	2.96	1.53	0.71
	3.0m	2.24	2.25	2.01	1.25	2.89	3.16	2.26	2.26	0.64	-0.19
	5.0m	1.64	1.65	1.41	0.39	1.89	1.96	0.86	0.86	-1.14	-1.99
LTE4&LT E5	0.3m	-0.11	1.48	1.43	3.57	3.81	4.68	4.49	4.49	2.29	1.57
	1.0m	-0.32	1.27	1.22	3.29	3.46	4.26	3.96	3.96	1.70	0.94
	2.0m	-0.62	0.97	0.92	2.89	2.96	3.66	3.21	3.21	0.86	0.04
	3.0m	-0.92	0.67	0.62	2.49	2.46	3.06	2.46	2.46	0.01	-0.86
	5.0m	-1.52	0.07	0.02	1.69	1.46	1.86	0.96	0.96	-1.68	-2.66

Wi-Fi Antennas							
Frequency (MHz)		2.4GHz	5GHz	6.175GHz	6.475GHz	6.7GHz	7GHz
		2400-2500	5150-5850	5925-6425	6425-6525	6525-6875	6875-7125
Efficiency (%)							
WiFi1&WiFi8	0.3m	47.8	56.3	53.1	55.7	55.5	48.6
	1.0m	43.4	48.2	44.6	45.9	45.8	40.0
	2.0m	37.8	38.6	34.7	34.8	34.7	30.4
	3.0m	32.9	30.9	27.0	26.4	26.3	23.0
	5.0m	25.0	19.8	16.3	15.2	15.2	13.3
WiFi2&WiFi7	0.3m	45.6	56.5	56.5	54.7	53.1	46.7
	1.0m	41.4	48.4	47.3	45.1	43.7	38.5
	2.0m	36.1	38.7	36.7	34.2	33.2	29.2
	3.0m	31.4	31.0	28.5	26.0	25.2	22.1
	5.0m	23.8	19.9	17.2	14.9	14.5	12.7
WiFi3&WiFi6	0.3m	41.7	67.2	57.8	58.4	56.3	54.3
	1.0m	37.8	57.5	48.4	48.1	46.4	44.7
	2.0m	32.9	46.0	37.6	36.5	35.2	33.9
	3.0m	28.7	36.9	29.2	27.7	26.7	25.7
	5.0m	21.8	23.7	17.7	15.9	15.4	14.8
WiFi4&WiFi5	0.3m	54.6	68.8	58.1	53.7	52.8	48.7
	1.0m	49.5	58.9	48.7	44.2	43.5	40.1
	2.0m	43.1	47.2	37.8	33.5	33.0	30.4
	3.0m	37.6	37.7	29.4	25.4	25.0	23.1
	5.0m	28.5	24.2	17.8	14.6	14.4	13.3
Average Gain (dB)							
WiFi1&WiFi8	0.3m	-3.20	-2.49	-2.75	-2.54	-2.56	-3.14
	1.0m	-3.62	-3.17	-3.51	-3.38	-3.40	-3.98
	2.0m	-4.22	-4.13	-4.60	-4.58	-4.60	-5.18
	3.0m	-4.82	-5.10	-5.69	-5.78	-5.80	-6.38
	5.0m	-6.02	-7.02	-7.87	-8.18	-8.20	-8.78
WiFi2&WiFi7	0.3m	-3.41	-2.48	-2.48	-2.62	-2.75	-3.31
	1.0m	-3.83	-3.16	-3.25	-3.46	-3.59	-4.15
	2.0m	-4.43	-4.12	-4.35	-4.66	-4.79	-5.35
	3.0m	-5.03	-5.09	-5.45	-5.86	-5.99	-6.55
	5.0m	-6.23	-7.02	-7.64	-8.26	-8.39	-8.95
WiFi3&WiFi6	0.3m	-3.80	-1.73	-2.38	-2.34	-2.50	-2.65
	1.0m	-4.22	-2.40	-3.15	-3.18	-3.34	-3.49
	2.0m	-4.82	-3.37	-4.25	-4.38	-4.54	-4.69
	3.0m	-5.42	-4.33	-5.34	-5.58	-5.74	-5.89
	5.0m	-6.62	-6.26	-7.53	-7.98	-8.14	-8.29
WiFi4&WiFi5	0.3m	-2.63	-1.62	-2.36	-2.70	-2.77	-3.13
	1.0m	-3.05	-2.30	-3.13	-3.54	-3.61	-3.97
	2.0m	-3.65	-3.27	-4.22	-4.74	-4.81	-5.17
	3.0m	-4.25	-4.23	-5.31	-5.94	-6.01	-6.37
	5.0m	-5.45	-6.16	-7.50	-8.34	-8.41	-8.77
Peak Gain (dBi)							
WiFi1&WiFi8	0.3m	2.54	4.50	3.75	3.19	3.86	2.79
	1.0m	2.12	3.83	3.04	2.35	3.02	1.95
	2.0m	1.52	2.87	2.04	1.15	1.82	0.75
	3.0m	0.92	1.91	1.04	-0.05	0.62	-0.45
	5.0m	-0.28	0.10	-0.96	-2.45	-1.78	-2.85
WiFi2&WiFi7	0.3m	3.03	3.72	4.14	3.73	3.99	2.81
	1.0m	2.61	3.09	3.37	2.89	3.15	1.97
	2.0m	2.01	2.19	2.27	1.69	1.95	0.77
	3.0m	1.41	1.29	1.17	0.49	0.75	-0.43
	5.0m	0.21	-0.51	-1.03	-1.91	-1.65	-2.83
WiFi3&WiFi6	0.3m	3.19	6.52	5.40	5.40	4.12	3.65
	1.0m	2.77	5.89	4.56	4.56	3.28	2.81
	2.0m	2.17	4.99	3.36	3.36	2.08	1.61
	3.0m	1.57	4.09	2.16	2.16	0.88	0.41
	5.0m	0.37	2.29	-0.24	-0.24	-1.52	-1.99
WiFi4&WiFi5	0.3m	5.54	6.68	4.40	3.27	3.86	4.22
	1.0m	5.12	6.05	3.63	2.43	3.02	3.38
	2.0m	4.52	5.15	2.53	1.23	1.82	2.18
	3.0m	3.92	4.25	1.43	0.03	0.62	0.98
	5.0m	2.72	2.45	-0.77	-2.37	-1.78	-1.42

Changelog for the datasheet

SPE-19-8-150 – MA9917.A.001.wm

Revision: C (Current Version)	
Date:	2024-07-24
Notes:	Updated drawing
Author:	Conor McGrath

Previous Revisions

Revision: B	
Date:	2021-03-05
Notes:	Added Isolation Graph
Author:	Gary West

Revision: A (Original First Release)	
Date:	2020-05-15
Notes:	
Author:	Jack Conroy

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