



Product Name: 3-in-1 5G NR/ 4G LTE/ WiFi Combination Antenna

Part Number: MT-4B-AC-2LW

Features:

- 2*LTE, 1*WiFi Antenna Combination
- 5G NR/ 4G LTE Full Frequency Bands, 698-960MHz, 1710-2690MHz, 3300-3800MHz Supporting
- WiFi Dual Bands, 2400-2500MHz, 5150-5850MHz Supporting
- Customizable Cables and Connectors
- RoHS & REACH Compliant

Applications:

- Fleet Management & Telematics
- Vehicle Navigation

3-in-1 5G NR/ 4G LTE/ WiFi Combination Antenna

MODEL: MT-4B-AC-2LW

Rev.A

I. Specifications:

Category		LTE 1						
Application Band		LTE 700	GSM 850/900	DCS	PCS	UMTS1	LTE2600	5G NR Band
Frequency (MHz)		698 ~ 824	824 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170	2300 ~ 2690	3300 ~ 3800
Efficiency (%)								
Free Space	30cm	57.63	59.04	62.02	68.06	64.75	66.47	49.34
	1m	50.66	51.90	51.12	55.49	52.16	52.25	38.74
	2m	42.14	43.17	38.78	41.45	38.30	37.05	27.43
	3m	35.05	35.91	29.41	30.97	28.12	26.27	19.42
	5m	24.25	24.84	16.93	17.28	15.16	13.20	9.73
With Ground Plane	30cm	40.55	41.33	35.49	42.69	38.14	27.58	41.21
	1m	35.65	36.33	29.25	34.81	30.73	10.32	31.66
	2m	29.65	30.22	22.19	26.00	22.56	15.39	22.91
	3m	24.66	25.13	16.83	19.42	16.56	10.92	16.22
	5m	17.06	17.39	9.69	10.84	8.93	5.50	8.13
Average Gain (dBi)								
Free Space	30cm	-2.39	-2.29	-2.07	-1.67	-1.89	-1.77	-3.07
	1m	-2.95	-2.85	-2.91	-2.56	-2.83	-2.82	-4.12
	2m	-3.75	-3.65	-4.11	-3.82	-4.17	-4.31	-5.62
	3m	-4.55	-4.45	-5.31	-5.09	-5.51	-5.81	-7.12
	5m	-6.15	-6.05	-7.71	-7.62	-8.19	-8.79	-10.12

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With Ground Plane	30cm	-3.92	-3.84	-4.50	-3.70	-4.19	-5.59	-3.85
	1m	-4.48	-4.40	-5.34	-4.58	-5.13	-9.86	-5.00
	2m	-5.28	-5.20	-6.54	-5.85	-6.47	-8.13	-6.40
	3m	-6.08	-6.00	-7.74	-7.12	-7.81	-9.62	-7.90
	5m	-7.68	-7.60	-10.14	-9.65	-10.49	-12.60	-10.90
Peak Gain (dBi)								
Free Space	30cm	4.31	3.65	5.76	6.00	6.00	5.89	3.10
	1m	3.75	3.09	4.92	5.09	5.09	4.84	1.84
	2m	2.95	2.29	3.72	3.79	3.79	3.34	1.64
	3m	2.15	1.49	2.52	2.52	2.49	1.84	1.64
	5m	0.55	-0.11	0.12	0.12	-0.11	-1.16	1.64
With Ground Plane	30cm	2.33	2.03	4.47	4.47	4.32	5.86	5.37
	1m	1.77	1.47	3.63	3.63	3.41	4.81	3.81
	2m	0.97	0.67	2.43	2.43	2.11	3.31	2.95
	3m	0.17	-0.13	1.23	1.23	0.81	1.81	2.95
	5m	-1.43	-1.73	-1.17	-1.17	-1.79	-1.19	2.95
V.S.W.R								
Free Space		< 3						
With Ground Plane		< 4.42						
Return Loss (dB)								
Free Space		< -6						
With Ground Plane		< -4						
Impedance (Ω)		50						
Polarization		Linear						
Cable / Length		H-100, 30cm						
Connector		SMA (SP)						

Category		LTE 2						
Application Band		LTE 700	GSM 850/900	DCS	PCS	UMTS1	LTE2600	5G NR Band
Frequency (MHz)		698 ~ 824	824 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170	2300 ~ 2690	3300 ~ 3800
Efficiency (%)								
Free Space	30cm	56.50	63.86	51.02	64.10	62.47	64.73	49.93
	1m	49.67	56.14	42.05	52.27	50.32	50.89	40.78
	2m	41.31	46.69	31.90	39.04	36.95	36.08	28.87
	3m	34.36	38.84	24.20	29.17	27.13	25.58	20.44
	5m	23.77	26.87	13.92	16.28	14.62	12.86	10.24
With Ground Plane	30cm	41.33	47.84	29.84	36.04	36.00	58.29	43.02
	1m	36.33	42.05	24.59	29.38	29.00	45.82	33.78
	2m	30.21	34.97	18.65	21.95	21.29	32.49	23.91
	3m	25.13	29.09	14.15	16.40	15.63	23.03	16.93
	5m	17.39	20.13	8.14	9.15	8.43	11.58	8.49
Average Gain (dBi)								
Free Space	30cm	-2.48	-1.95	-2.92	-1.93	-2.04	-1.89	-3.02
	1m	-3.04	-2.51	-3.76	-2.82	-2.98	-2.93	-3.90
	2m	-3.84	-3.31	-4.96	-4.08	-4.32	-4.43	-5.40
	3m	-4.64	-4.11	-6.16	-5.35	-5.67	-5.92	-6.90
	5m	-6.24	-5.71	-8.56	-7.88	-8.35	-8.91	-9.90
With Ground Plane	30cm	-3.84	-3.20	-5.25	-4.43	-4.44	-2.34	-3.66
	1m	-4.40	-3.76	-6.09	-5.32	-5.38	-3.39	-4.71
	2m	-5.20	-4.56	-7.29	-6.59	-6.72	-4.88	-6.21
	3m	-6.00	-5.36	-8.49	-7.85	-8.06	-6.38	-7.71
	5m	-7.60	-6.96	-10.89	-10.39	-10.74	-9.36	-10.71

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Peak Gain (dBi)								
Free Space	30cm	4.91	5.55	3.89	4.84	4.84	4.92	4.43
	1m	4.35	4.99	3.05	3.93	3.93	3.87	3.17
	2m	3.55	4.19	1.85	2.63	2.63	2.37	2.04
	3m	2.75	3.39	0.65	1.33	1.33	0.87	2.04
	5m	1.15	1.79	-1.75	-1.27	-1.27	-2.13	2.04
With Ground Plane	30cm	2.47	4.23	3.38	3.76	3.76	6.37	6.09
	1m	1.91	3.67	2.54	2.85	2.85	5.32	4.83
	2m	1.11	2.87	1.34	1.55	1.55	3.82	4.31
	3m	0.31	2.07	0.14	0.25	0.25	2.32	4.31
	5m	-1.29	0.47	-2.26	-2.26	-2.35	-0.68	4.31
V.S.W.R								
Free Space		< 3						
With Ground Plane		< 4.42						
Return Loss (dB)								
Free Space		< -6						
With Ground Plane		< -4						
Impedance (Ω)		50						
Polarization		Linear						
Cable / Length		H-100, 30cm						
Connector		SMA (SP)						

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Category		WiFi						
Frequency (MHz)		2400	2450	2500	5150	5350	5725	5850
Efficiency (%)								
Free Space	30cm	72.11	69.98	70.96	80.35	79.25	81.47	71.12
	1m	56.62	54.95	55.72	55.46	54.70	55.34	48.31
	2m	40.09	38.90	39.45	32.66	32.21	31.84	27.80
	3m	28.38	27.54	27.93	19.23	18.97	18.32	16.00
	5m	14.22	13.80	14.00	6.67	6.58	6.07	5.30
With Ground Plane	30cm	41.78	38.82	38.55	80.17	74.13	78.52	69.18
	1m	32.81	28.91	30.27	55.34	52.60	53.33	46.99
	2m	23.23	21.58	21.43	32.58	30.13	30.69	27.04
	3m	16.44	15.28	15.17	19.19	17.74	17.66	15.56
	5m	8.24	7.66	7.60	6.65	6.15	5.85	5.15
Average Gain (dBi)								
Free Space	30cm	-1.42	-1.55	-1.49	-0.95	-1.01	-0.89	-1.48
	1m	-2.47	-2.60	-2.54	-2.56	-2.62	-2.57	-3.16
	2m	-3.97	-4.10	-4.04	-4.86	-4.92	-4.97	-5.56
	3m	-5.47	-5.60	-5.54	-7.16	-7.22	-7.37	-7.96
	5m	-8.47	-8.60	-8.54	-11.76	-11.82	-12.17	-12.76
With Ground Plane	30cm	-3.79	-4.11	-4.14	-0.96	-1.30	-1.05	-1.60
	1m	-4.84	-5.39	-5.19	-2.57	-2.79	-2.73	-3.28
	2m	-6.34	-6.66	-6.69	-4.87	-5.21	-5.13	-5.68
	3m	-7.84	-8.16	-8.19	-7.17	-7.51	-7.53	-8.08
	5m	-10.84	-11.16	-11.19	-11.77	-12.11	-12.33	-12.88
Peak Gain (dBi)								
Free Space	30cm	3.59	3.85	3.53	5.33	4.89	5.38	4.36
	1m	2.54	2.80	2.48	3.72	3.28	3.70	2.68
	2m	1.04	1.30	0.98	1.42	0.98	1.30	0.28
	3m	-0.46	-0.20	-0.52	-0.88	-1.32	-1.10	-2.12
	5m	-3.46	-3.20	-3.52	-5.48	-5.92	-5.90	-6.92

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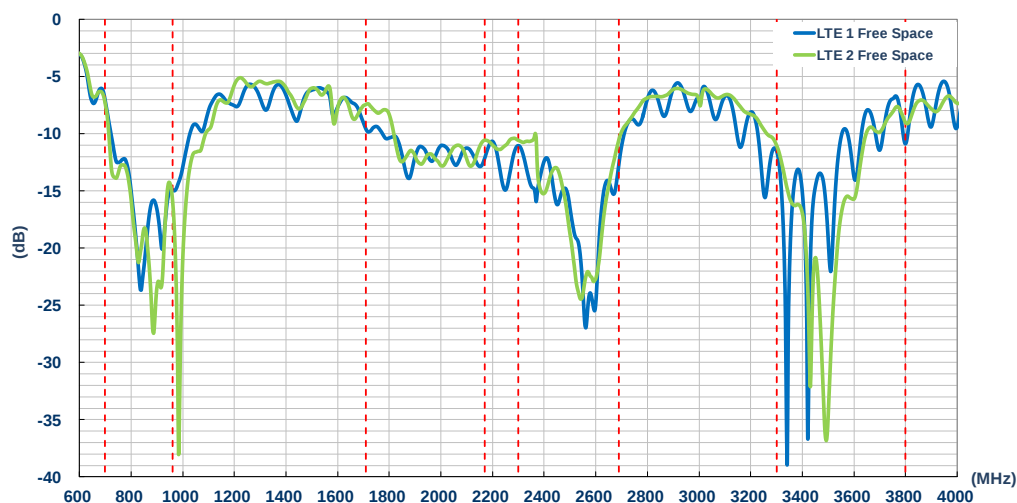
With Ground Plane	30cm	4.09	3.06	2.66	7.02	5.24	5.47	5.30
	1m	3.04	1.49	1.61	5.41	4.13	3.79	3.62
	2m	1.54	0.51	0.11	3.11	1.33	1.39	1.22
	3m	0.04	-0.99	-1.39	0.81	-0.97	-1.01	-1.18
	5m	-2.96	-3.99	-4.39	-3.79	-5.57	-5.81	-5.98
V.S.W.R								
V.S.W.R		< 2						
Return Loss (dB)		< -10						
Impedance (Ω)		50						
Polarization		Linear						
Cable / Length		H-100, 30cm						
Connector		RSMA (SP)						
Mechanical								
Dimension (mm)		Φ65.00(Dia.) x 20.35(H)						
Casing		PC + TPE						
Weigh (g) (including cable)		91						
Waterproof Resistant		IP67						
Maximum Assembly Torque		40 N-m						
Environmental Conditions								
Operation Temperature (°C)		-40 ~ +85						
Storage Temperature (°C)		-40 ~ +85						
Humidity		Non-condensing 65 °C 95% RH						

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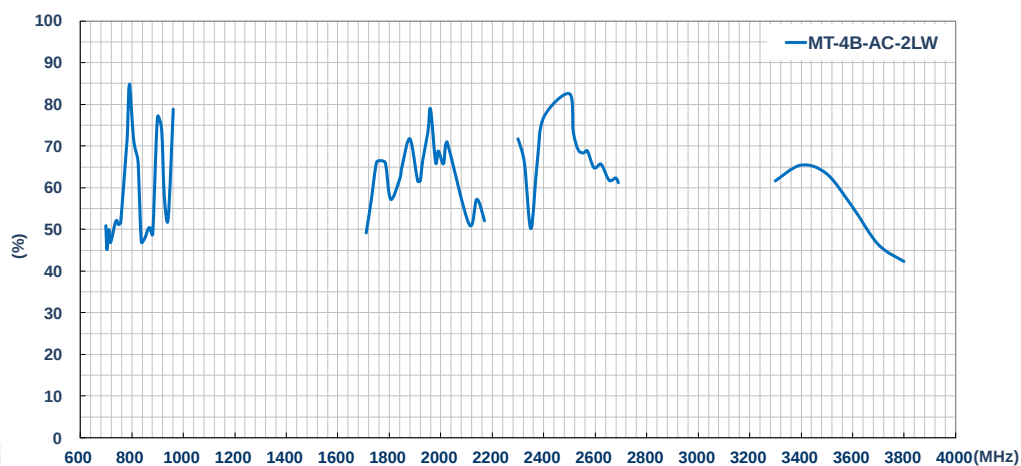
II. Antenna Technical Parameters:

Free Space

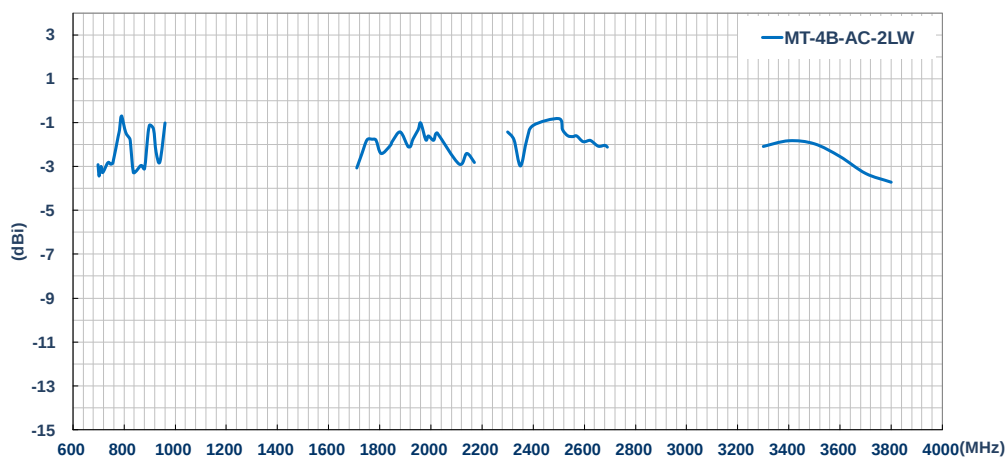
S11 (dB) - LTE 1 & LTE 2



Efficiency (%) - LTE 1

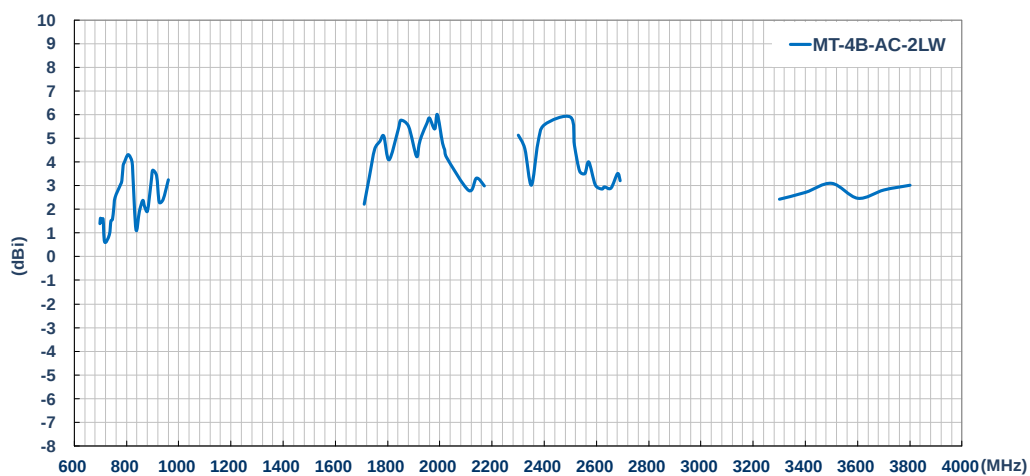


Average Gain (dBi) - LTE 1



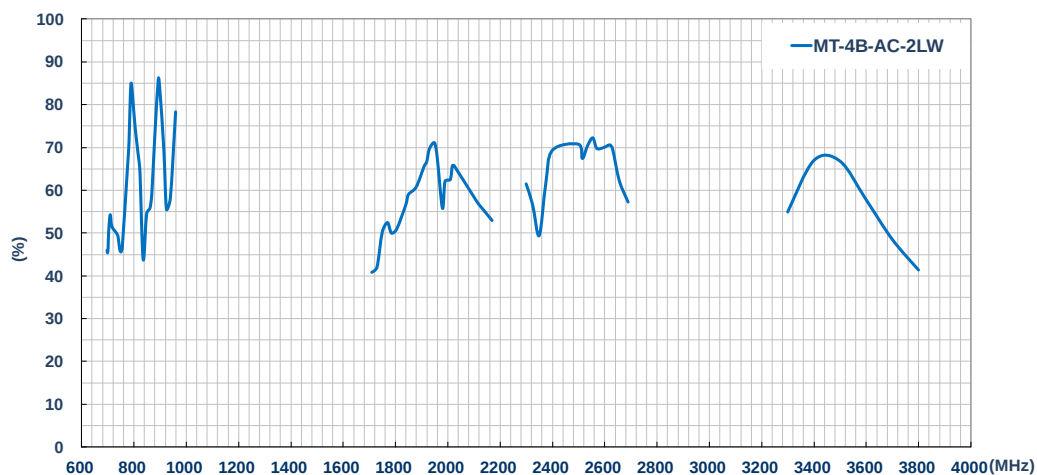
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Peak Gain (dBi) – LTE 1

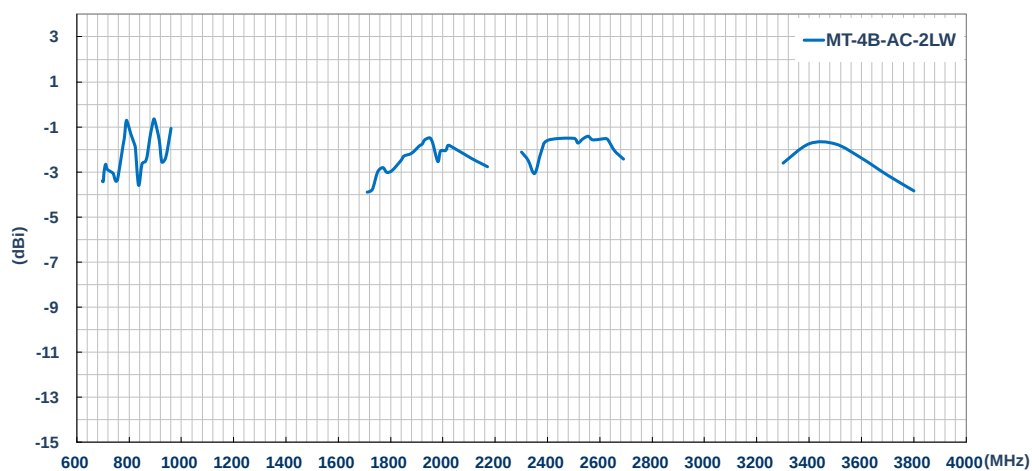


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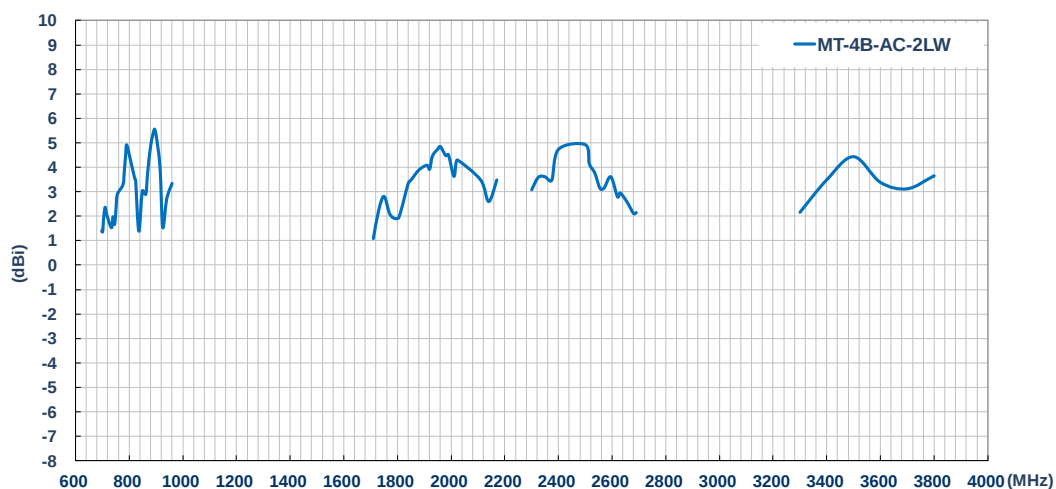
Efficiency (%) – LTE 2



Average Gain (dBi) – LTE 2



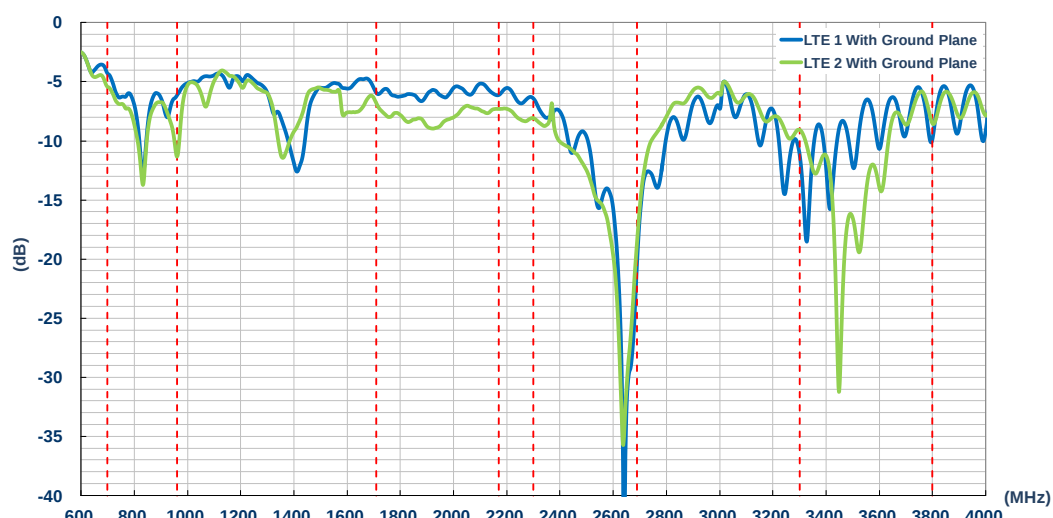
Peak Gain (dBi) – LTE 2



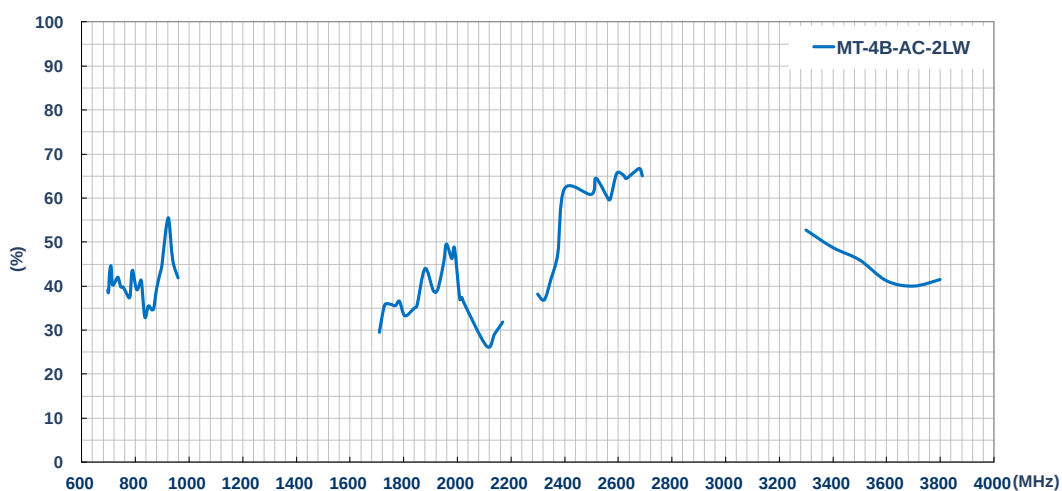
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With Ground Plane

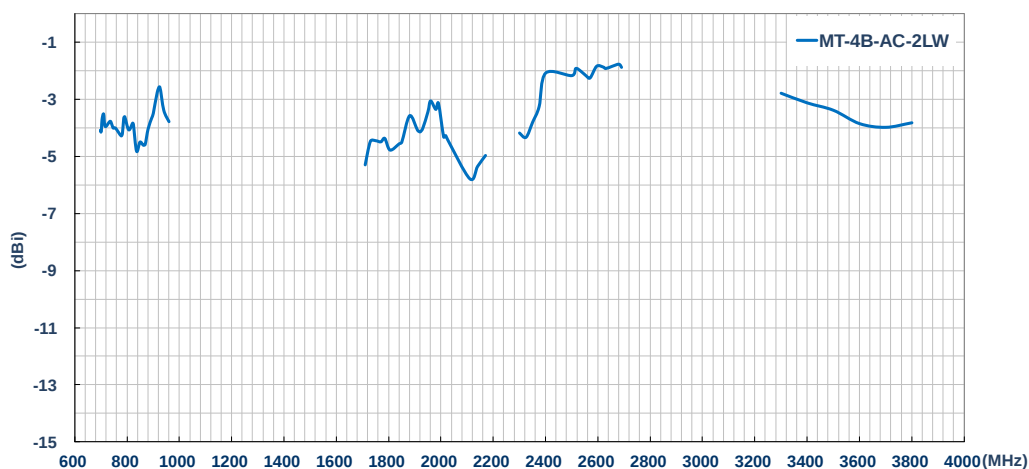
S11 (dB) – LTE 1 & LTE 2



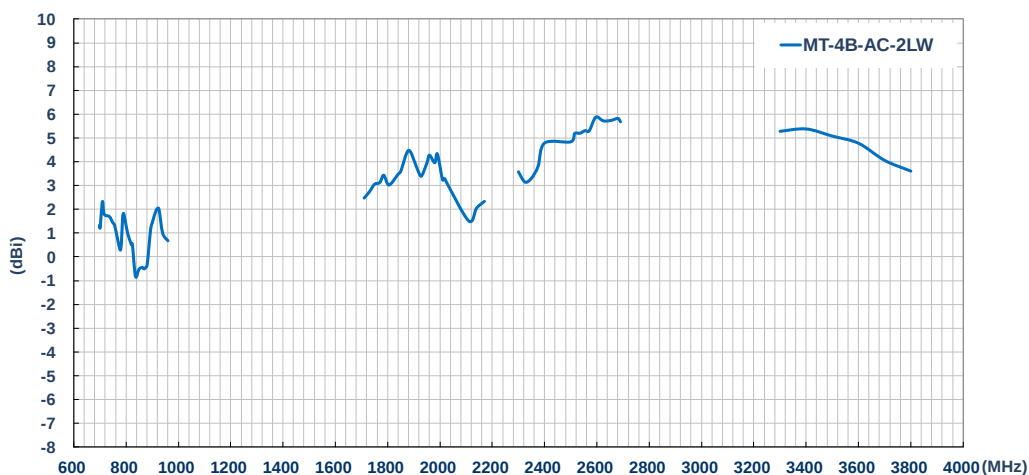
Efficiency (%) – LTE 1



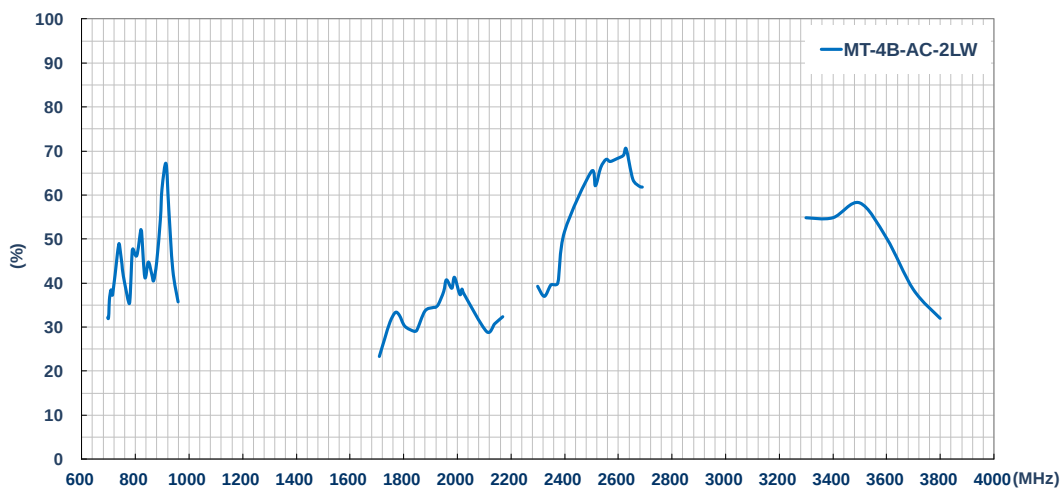
Average Gain (dBi) – LTE 1



Peak Gain (dBi) – LTE 1

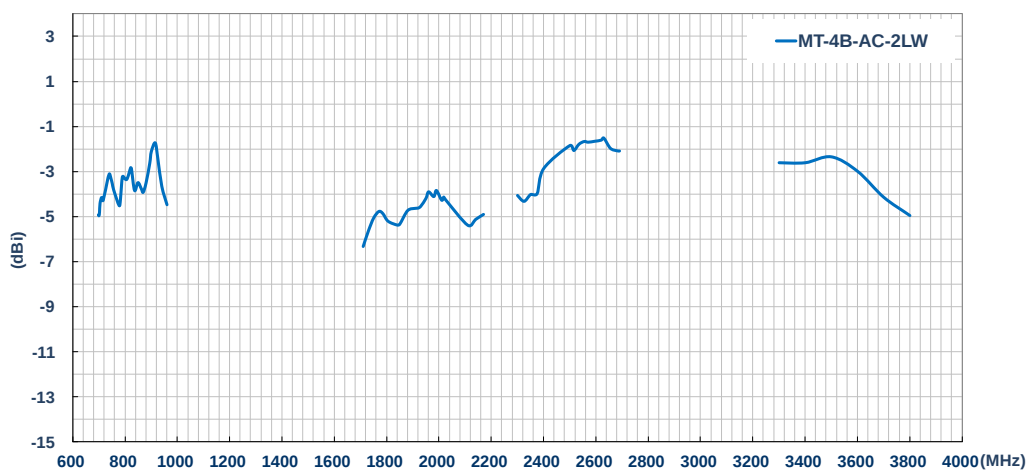


Efficiency (%) – LTE 2

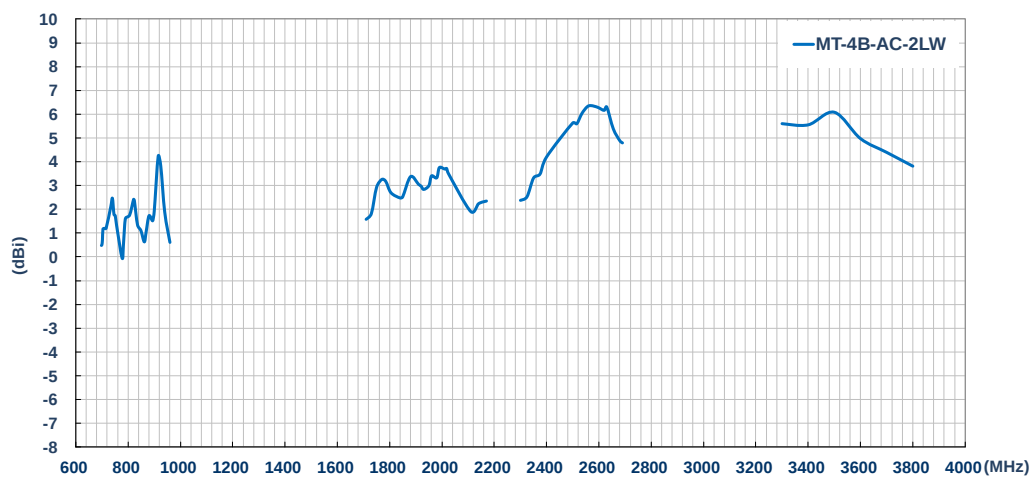


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Average Gain (dBi) – LTE 2

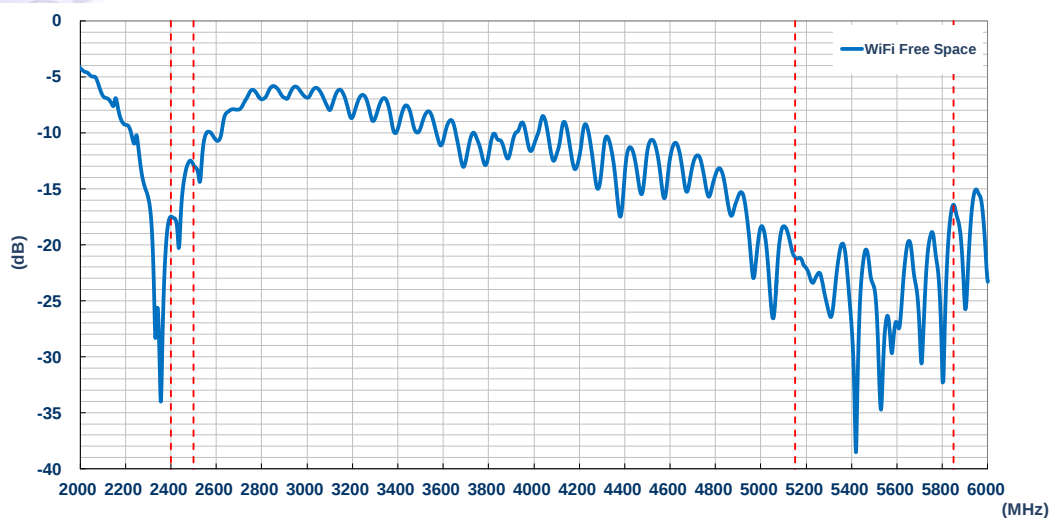


Peak Gain (dBi) – LTE 2



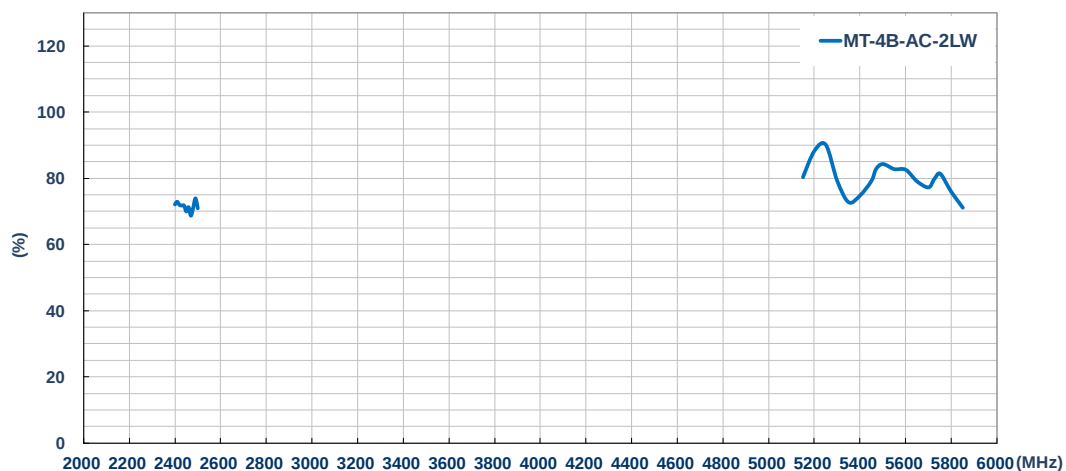
Free Space

S11 (dB) – WiFi

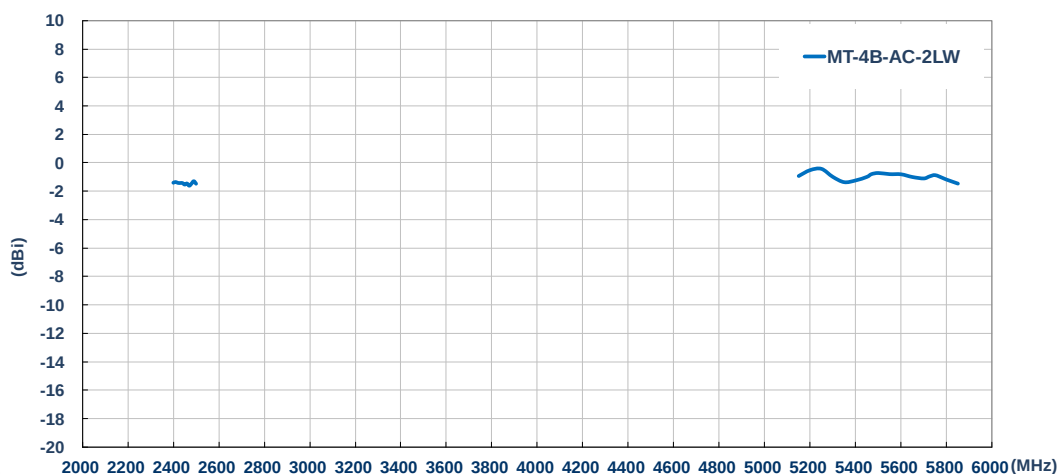


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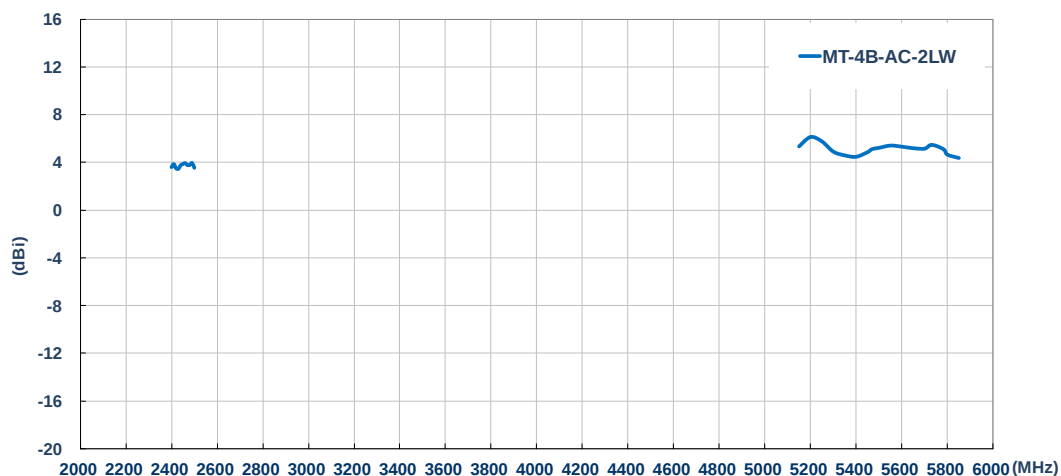
Efficiency (%) – WiFi



Average Gain (dBi) – WiFi



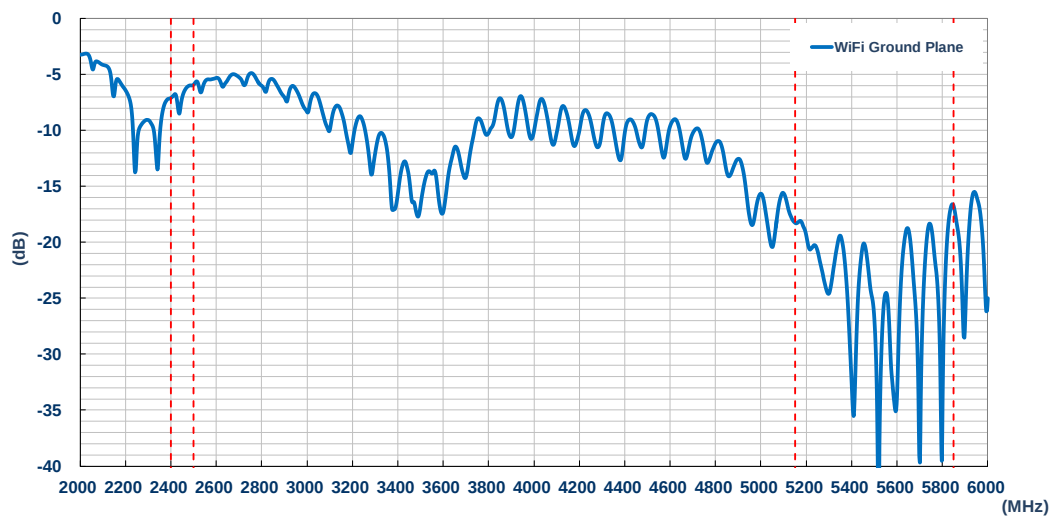
Peak Gain (dBi) – WiFi



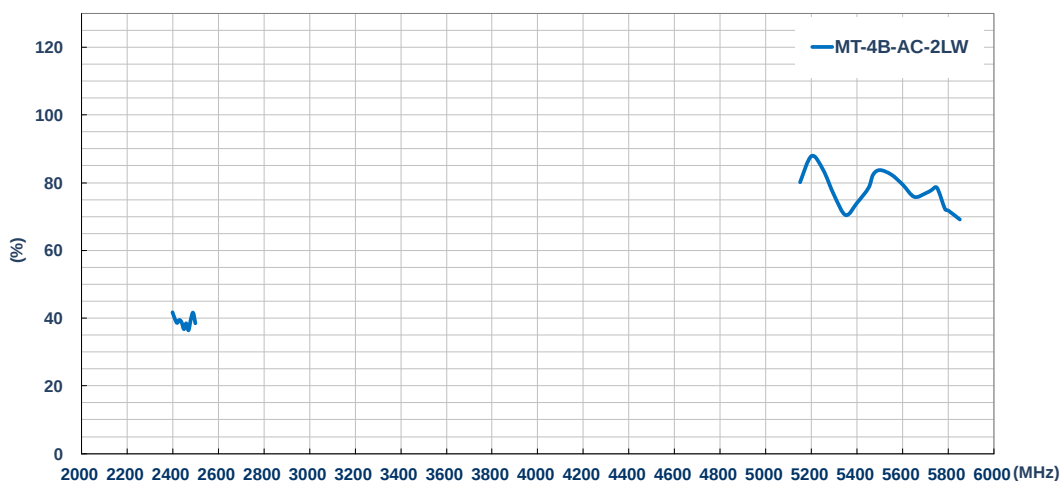
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With Ground Plane

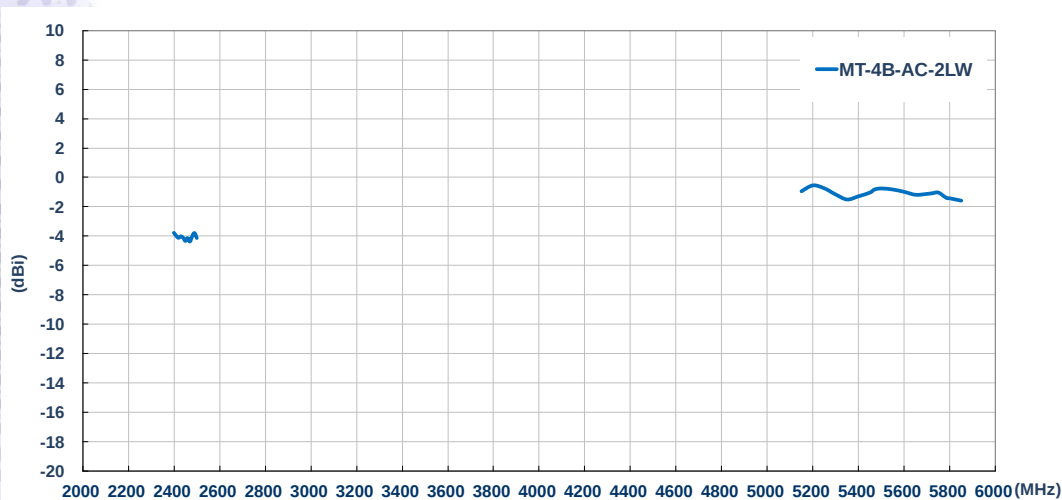
S11 (dB) – WiFi



Efficiency (%) – WiFi

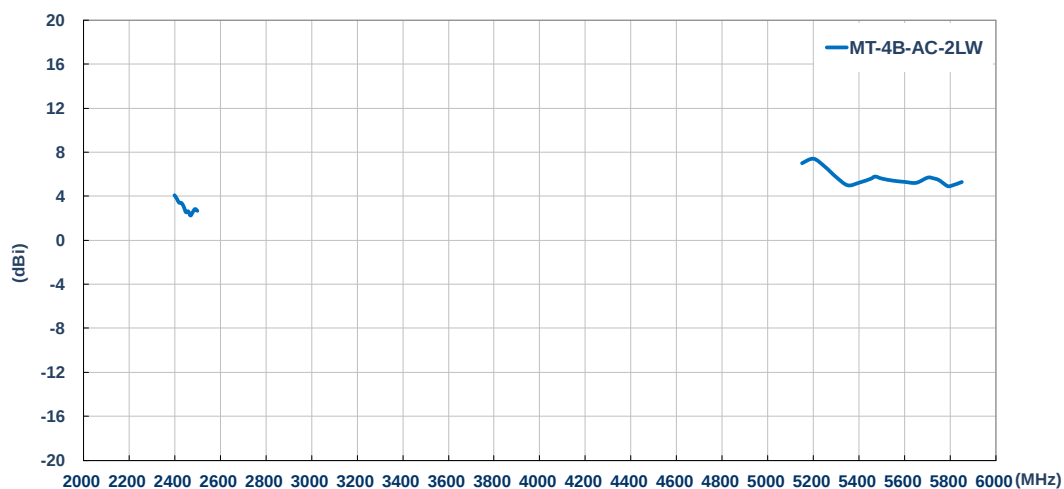


Average Gain (dBi) – WiFi



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Peak Gain (dBi) – WiFi



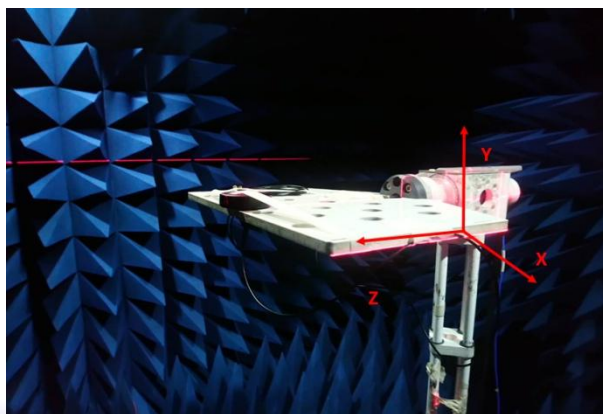
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III. Antenna Radiation Pattern Measurement:

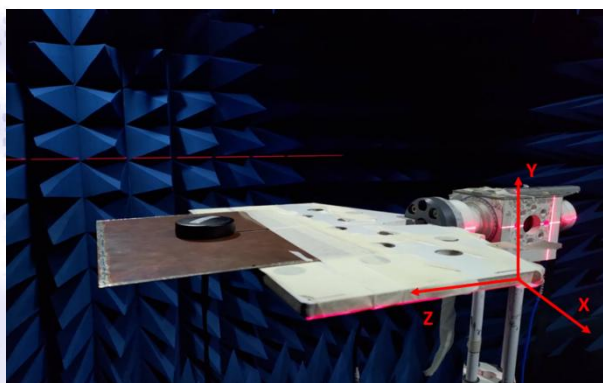
The antenna radiation patterns were measured in Anechoic Chamber.

The measurement setup as below,

Free Space



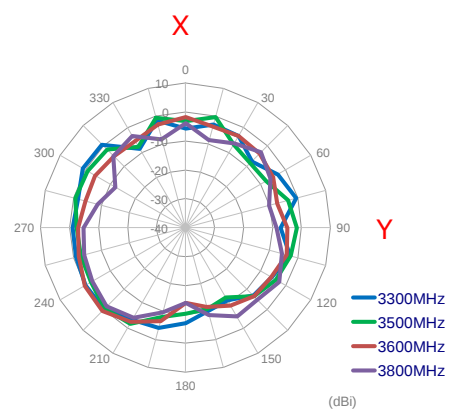
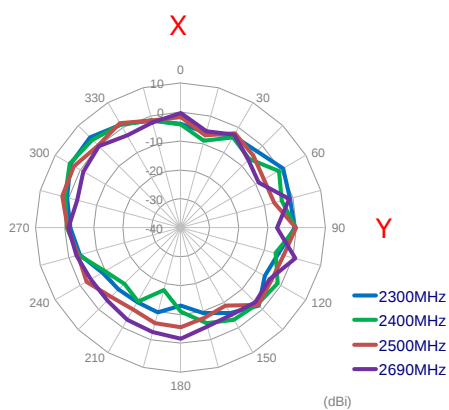
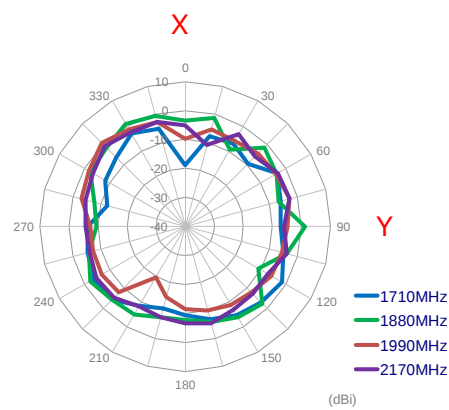
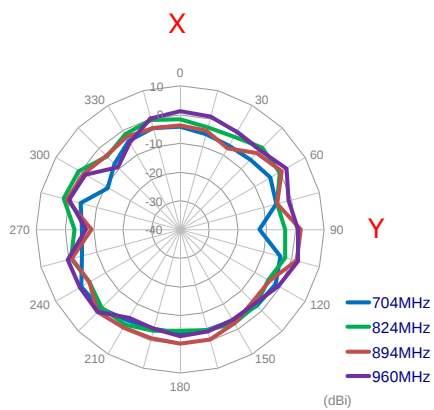
With Ground Plane



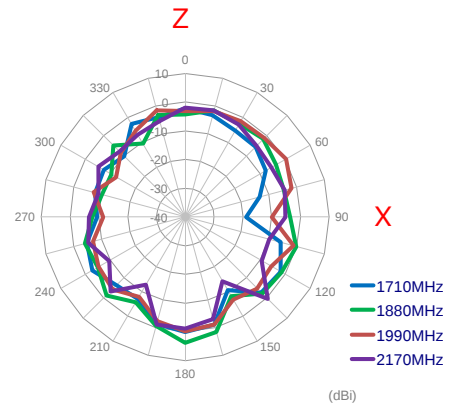
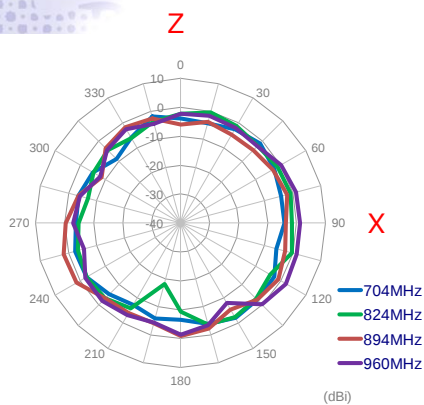
IV. 2D Radiation Pattern:

Free Space – LTE 1

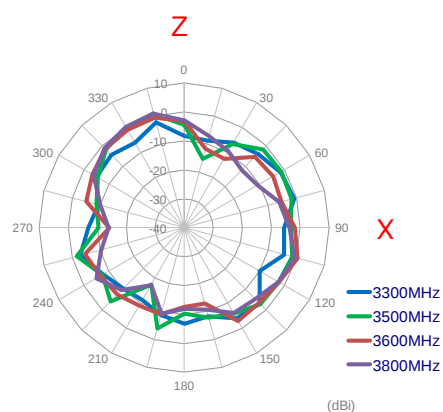
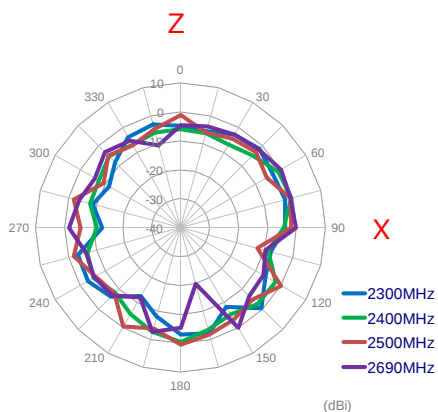
X-Y Plane



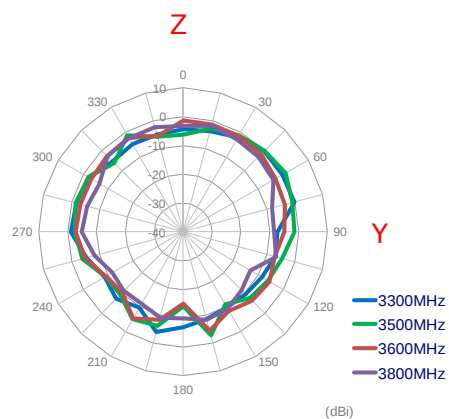
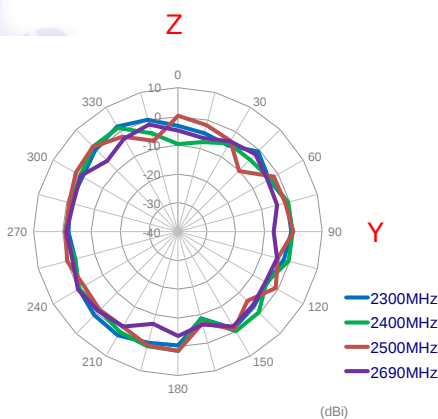
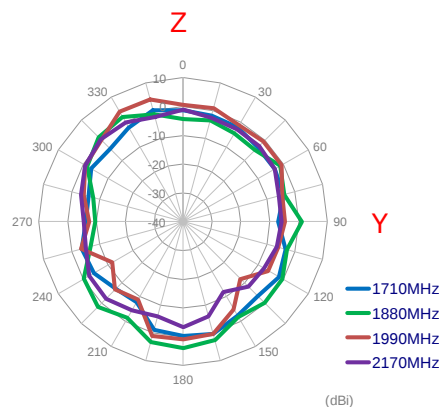
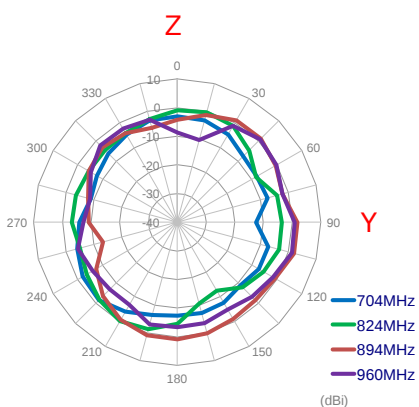
X-Z Plane



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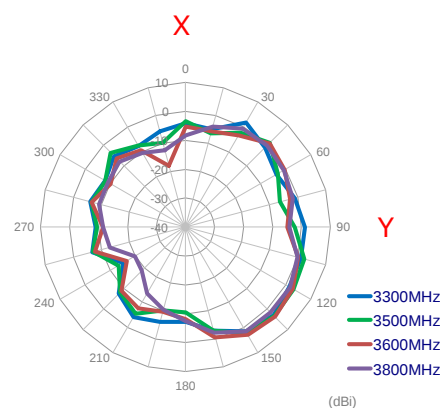
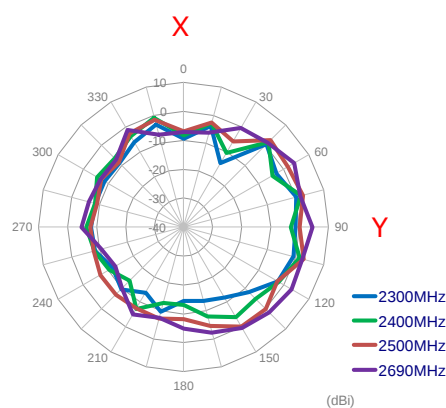
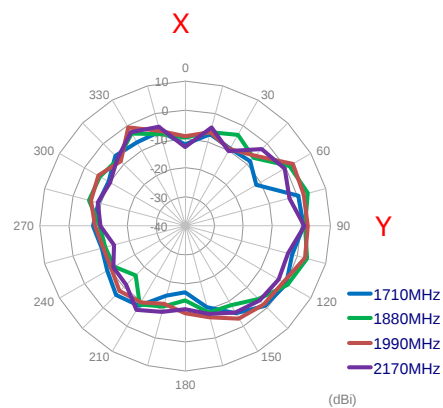
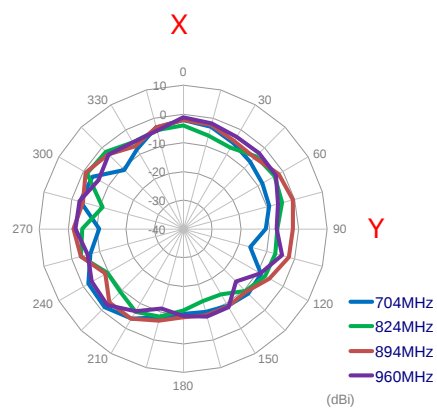


Y-Z Plane

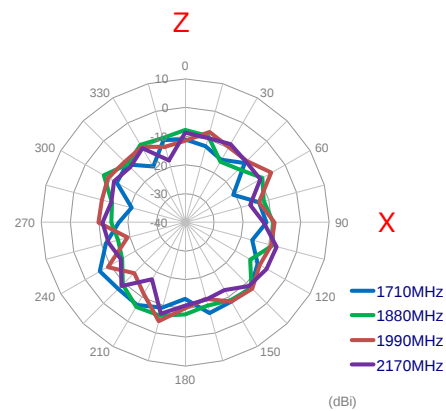
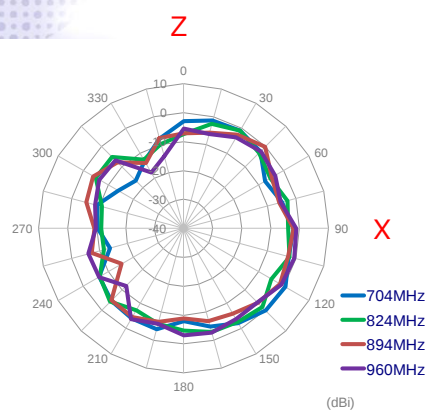


With Ground Plane – LTE 1

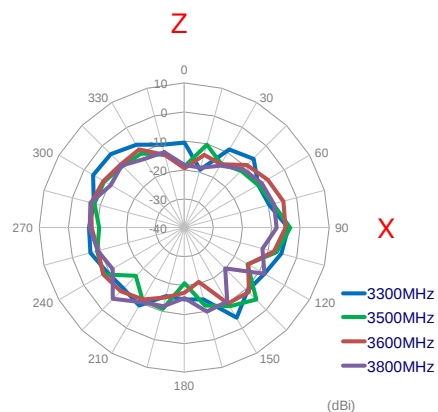
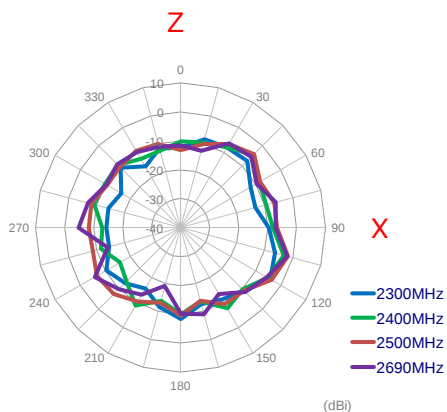
X-Y Plane



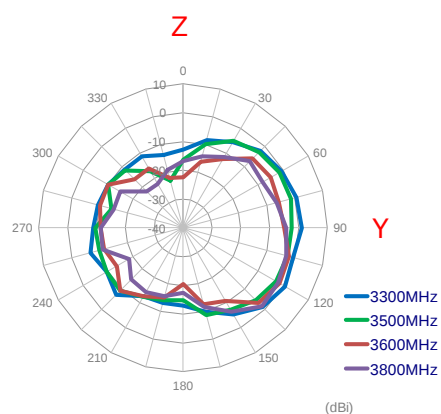
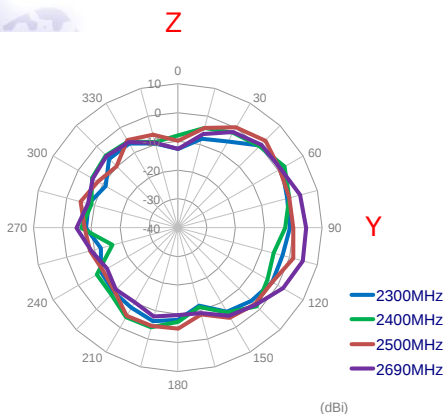
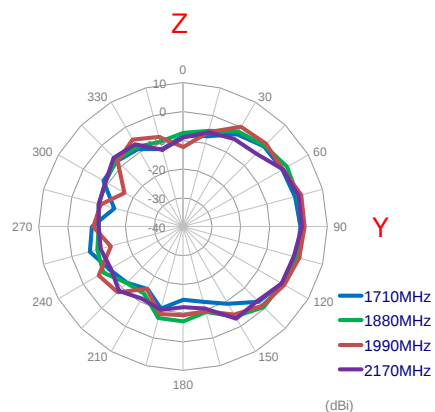
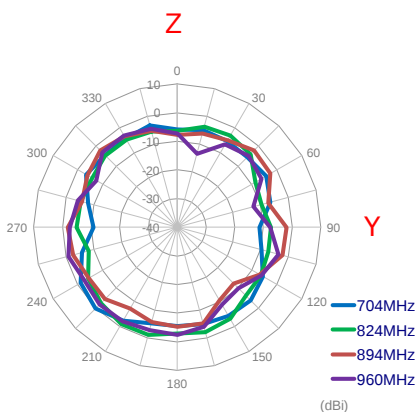
X-Z Plane



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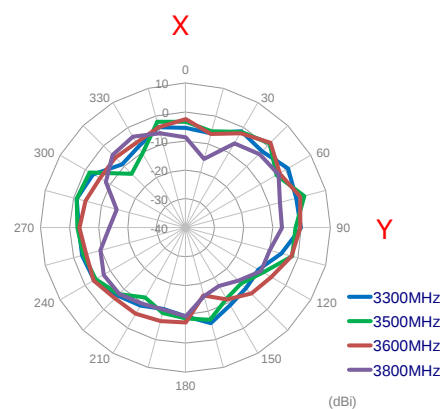
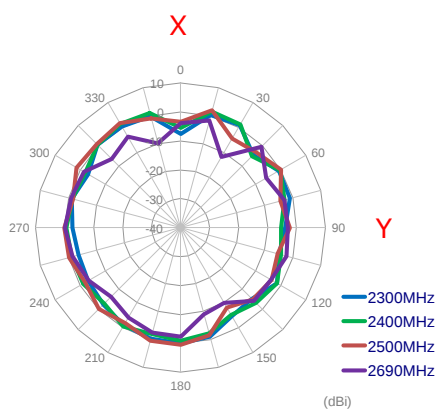
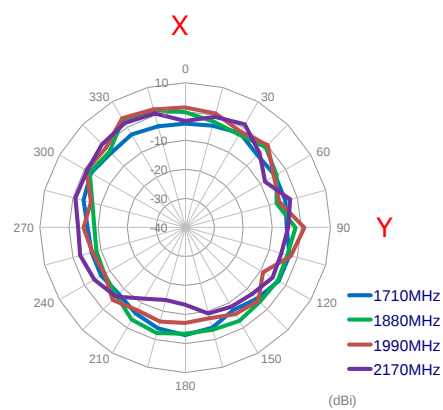
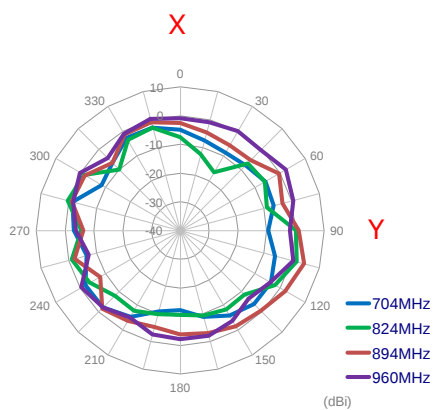


Y-Z Plane

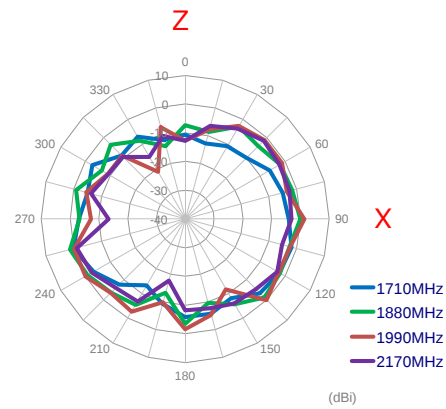
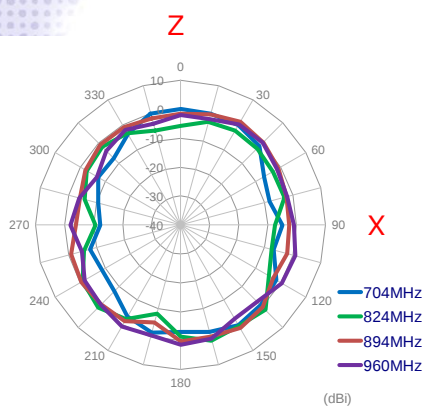


Free Space – LTE 2

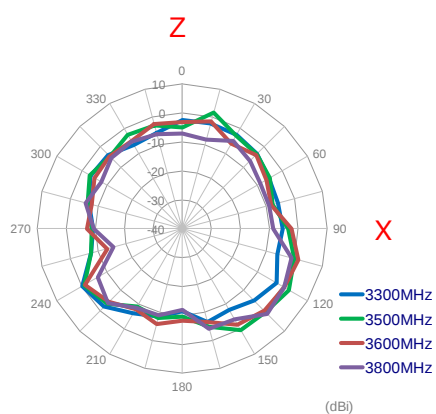
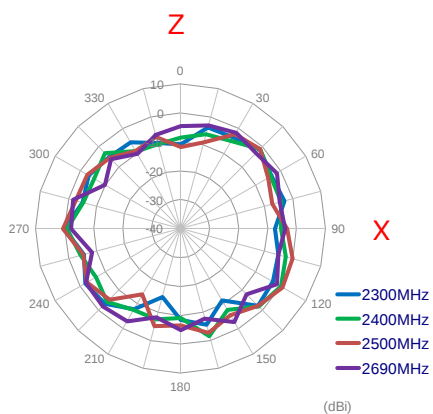
X-Y Plane



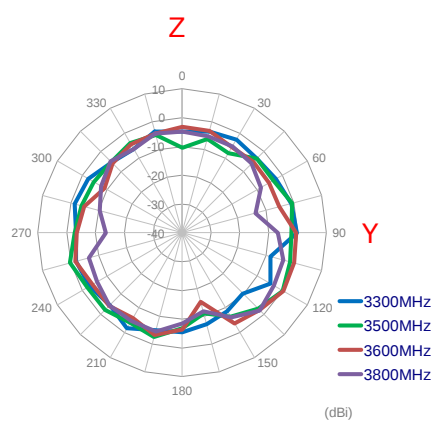
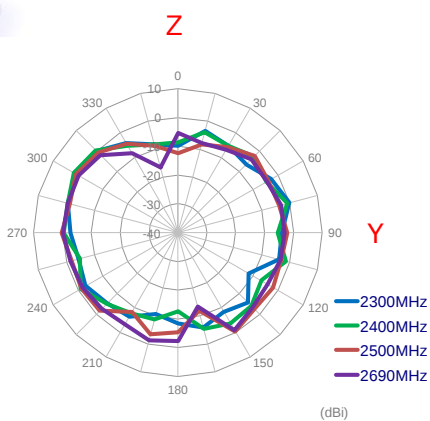
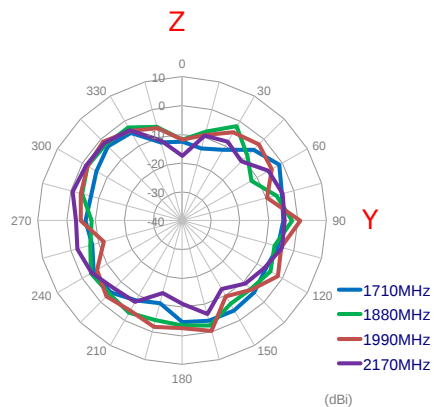
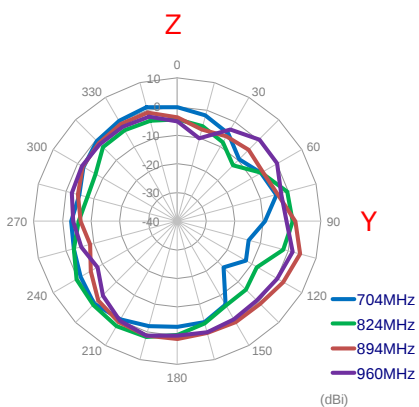
X-Z Plane



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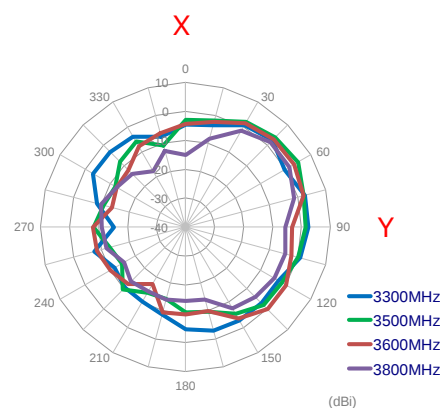
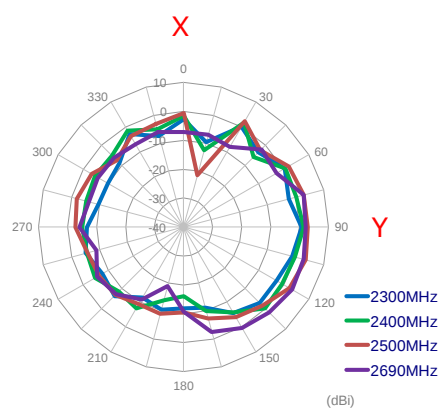
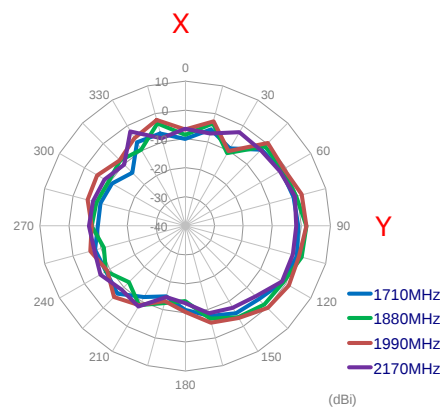
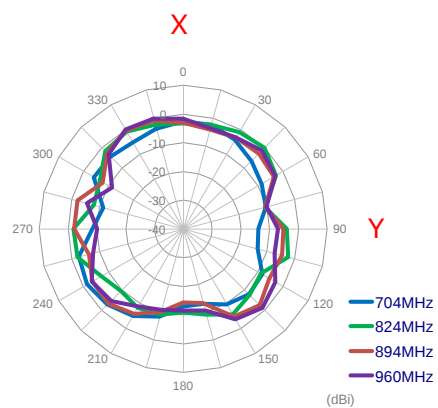


Y-Z Plane

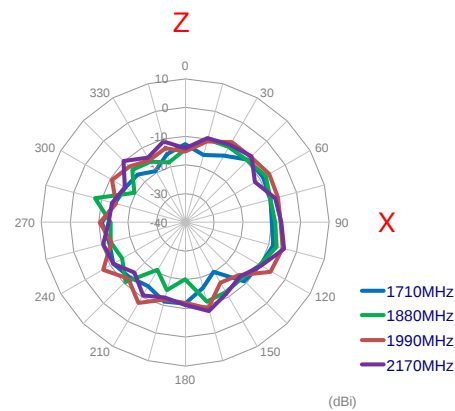
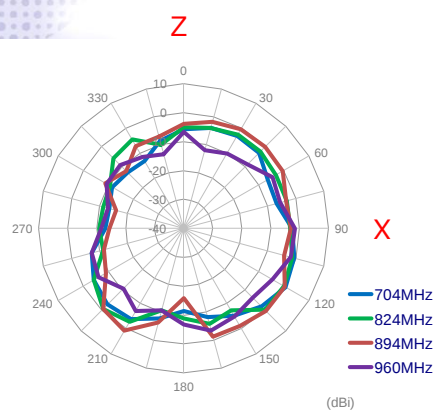


With Ground Plane – LTE 2

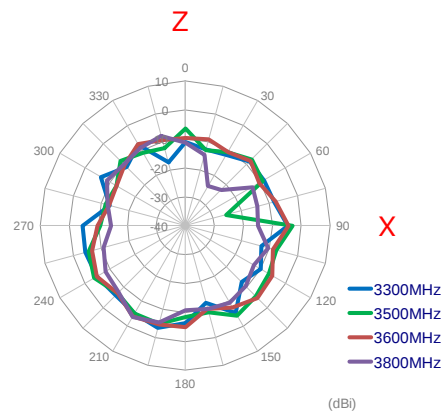
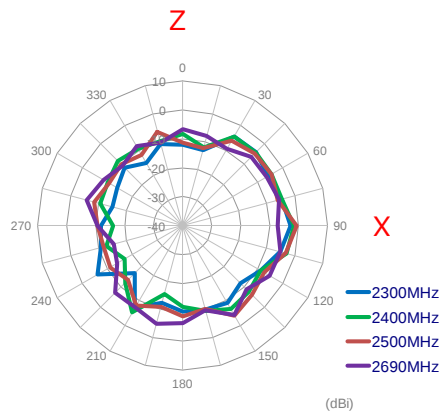
X-Y Plane



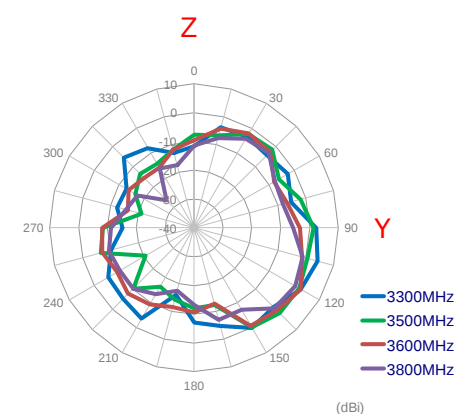
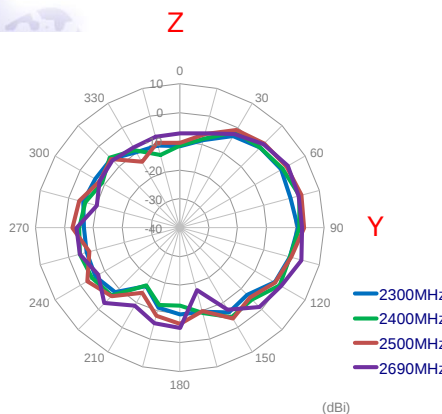
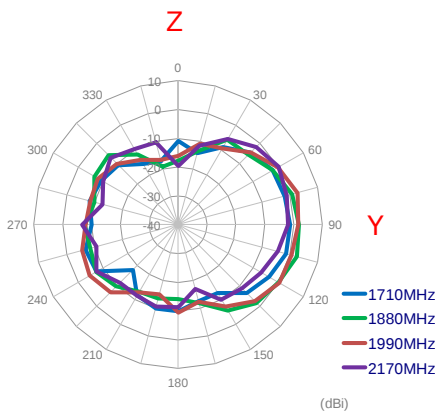
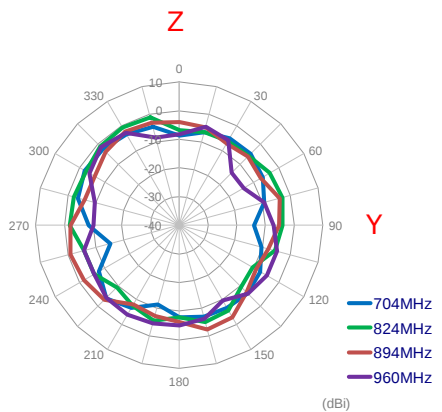
X-Z Plane



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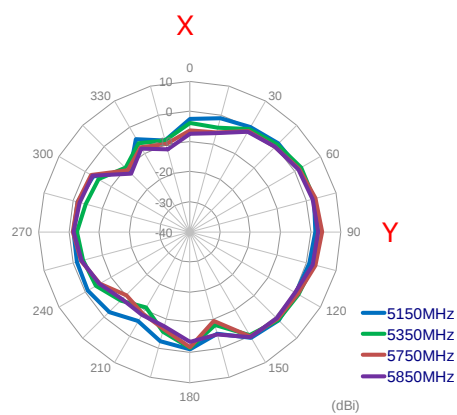
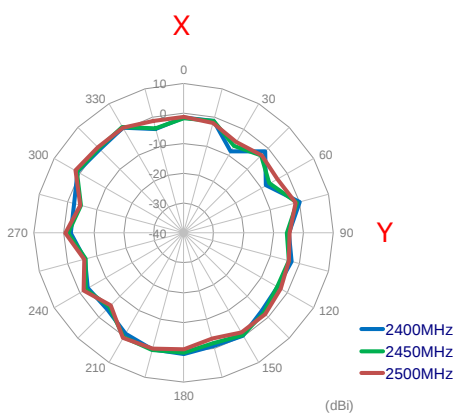


Y-Z Plane

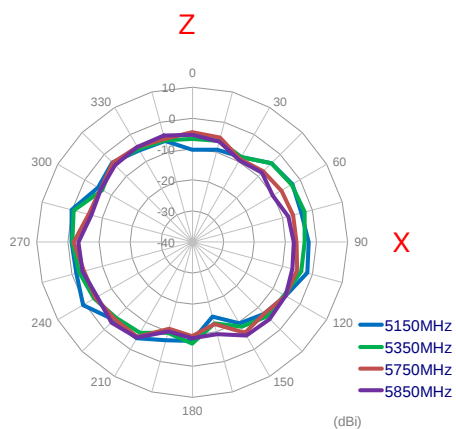
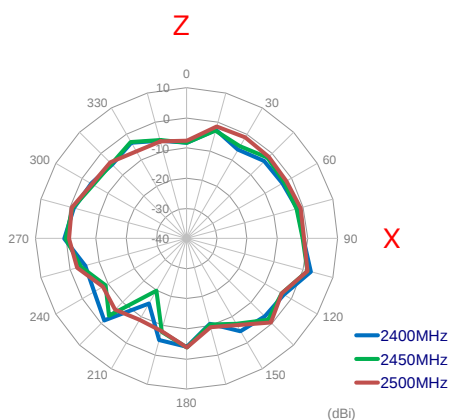


Free Space - WiFi

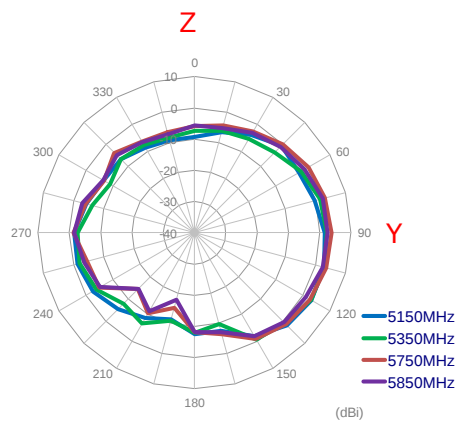
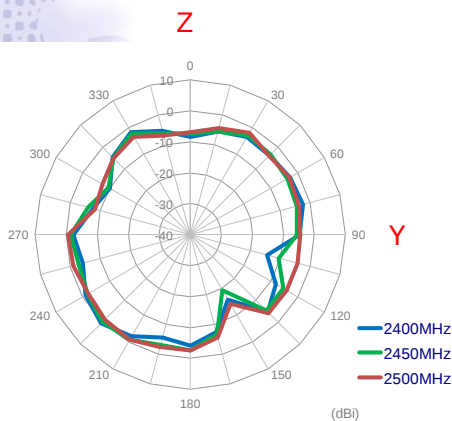
X-Y Plane



X-Z Plane

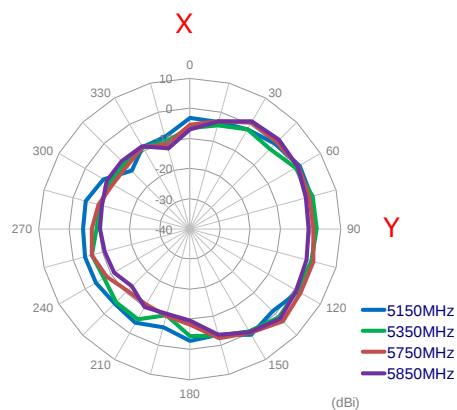
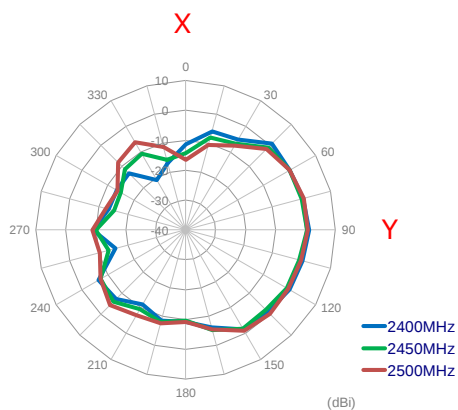


Y-Z Plane

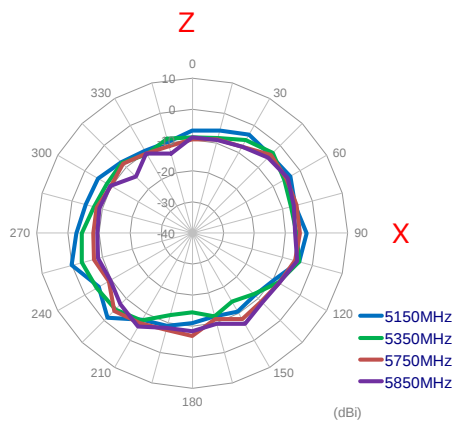
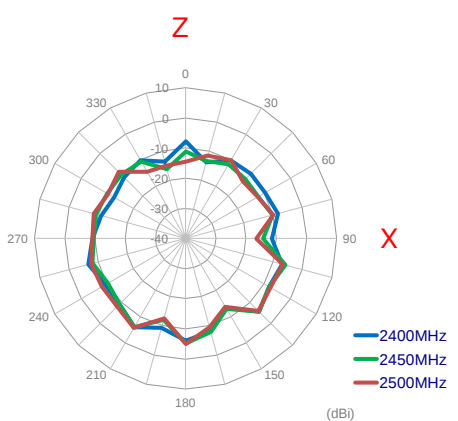


With Ground Plane – WiFi

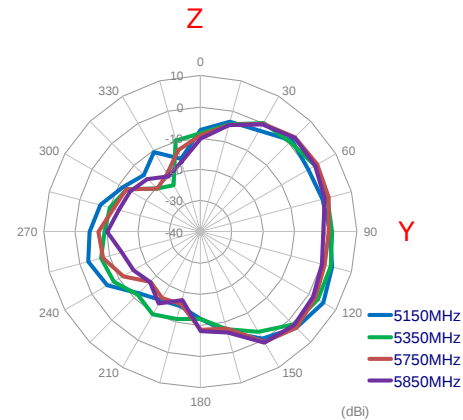
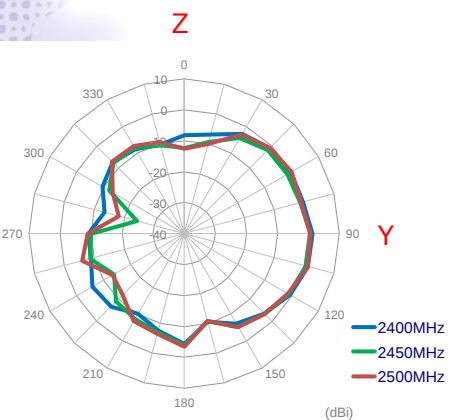
X-Y Plane



X-Z Plane



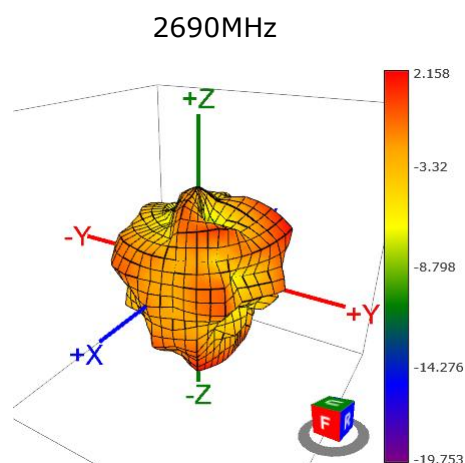
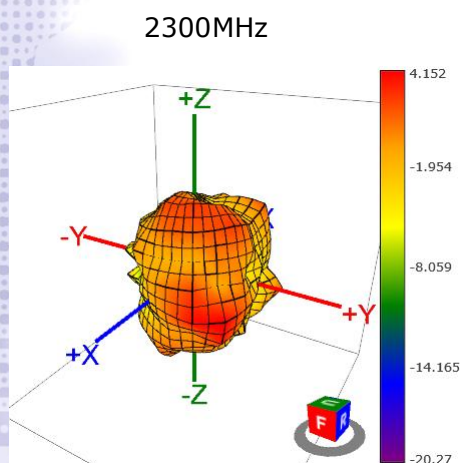
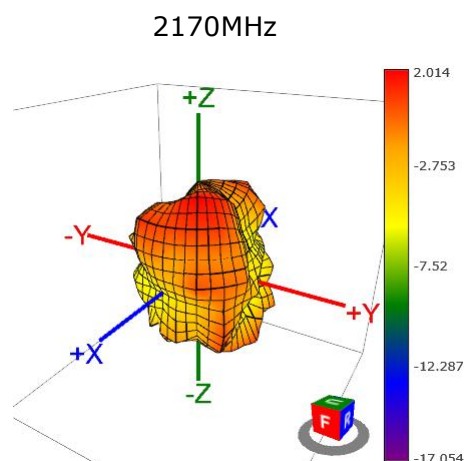
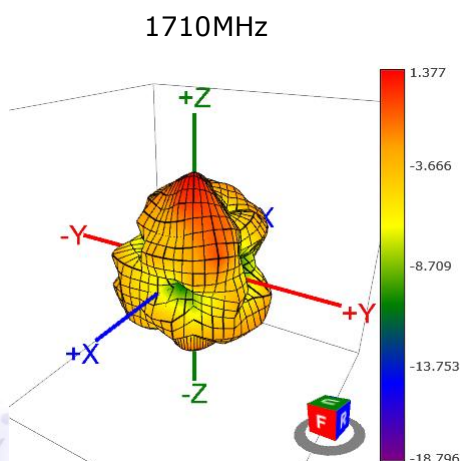
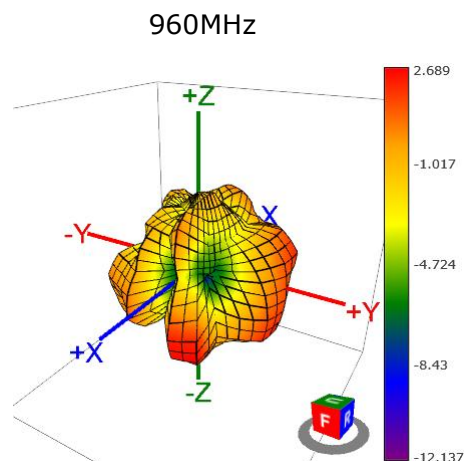
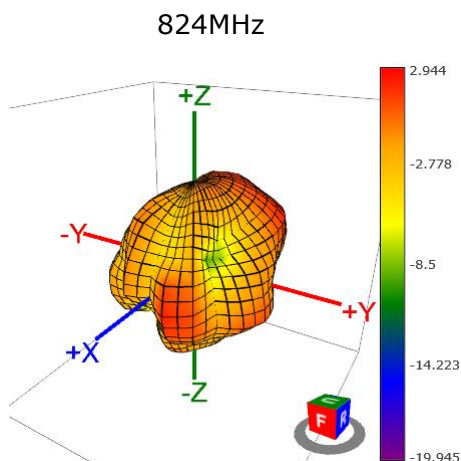
Y-Z Plane



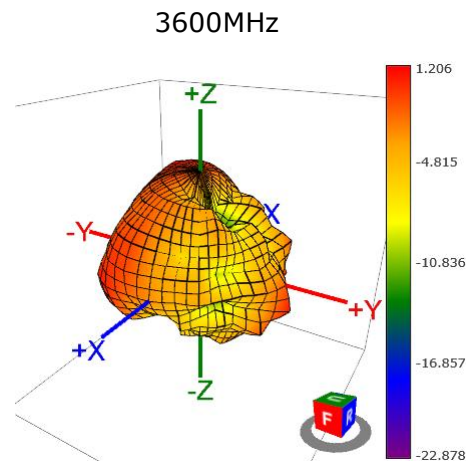
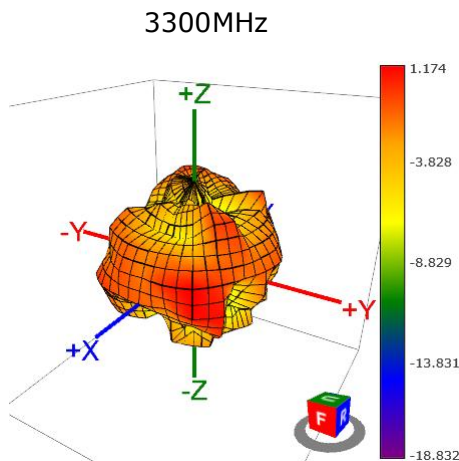
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V. 3D Radiation Pattern:

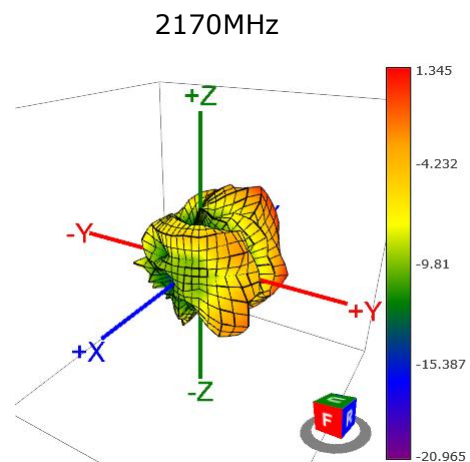
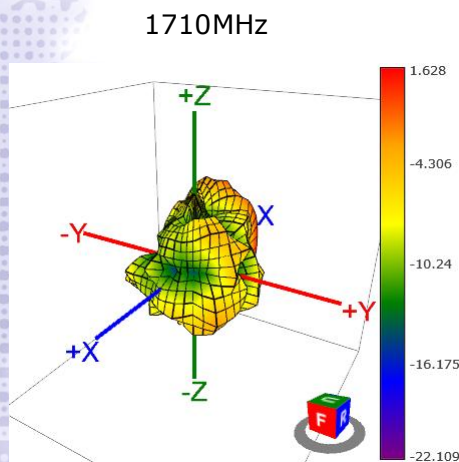
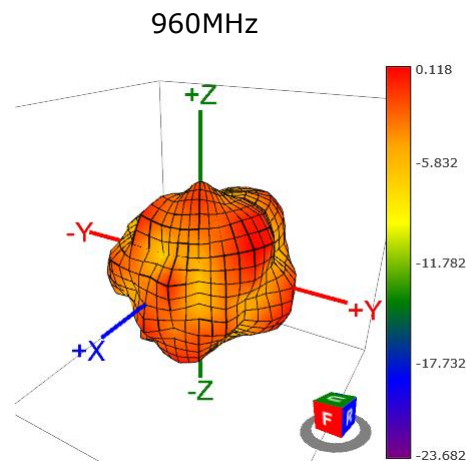
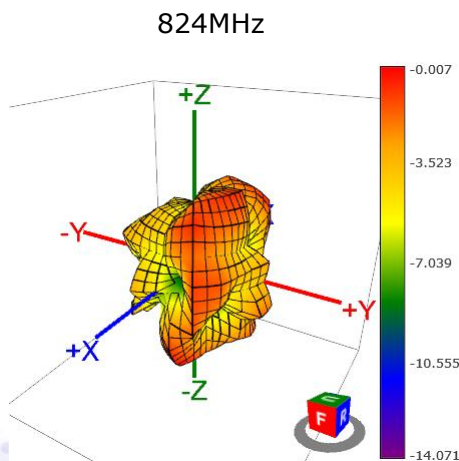
Free Space – LTE 1



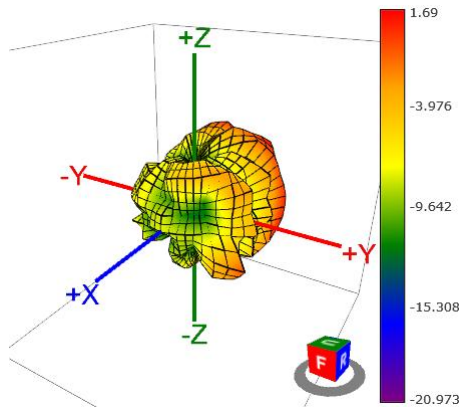
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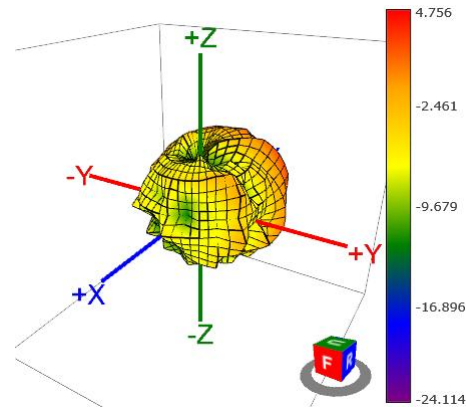
With Ground Plane – LTE 1



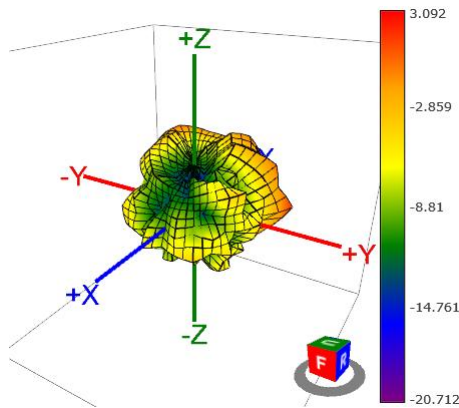
2300MHz



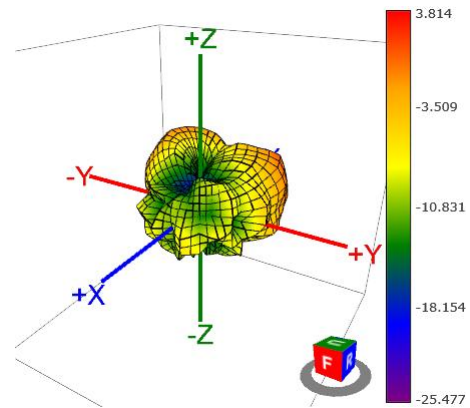
2690MHz



3300MHz

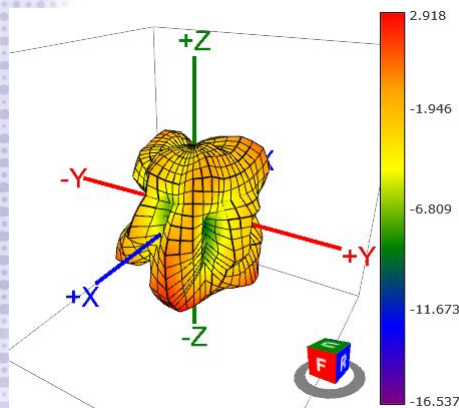


3600MHz

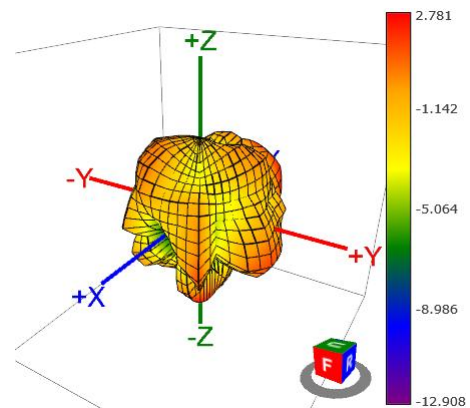


Free Space - LTE 2

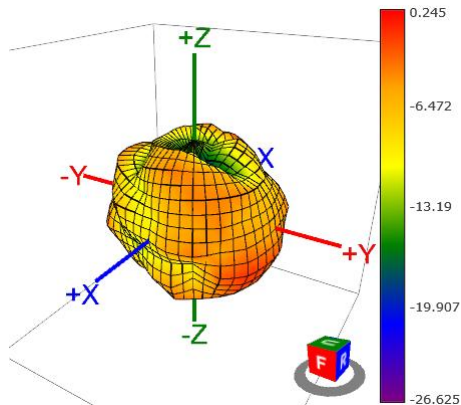
824MHz



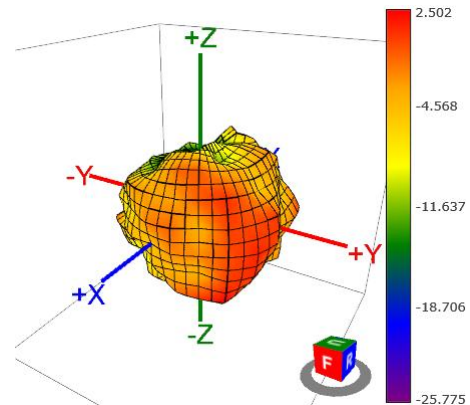
960MHz



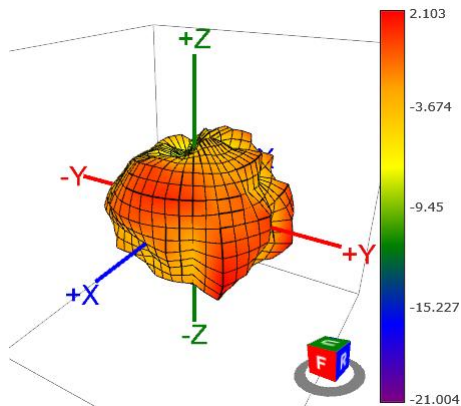
1710MHz



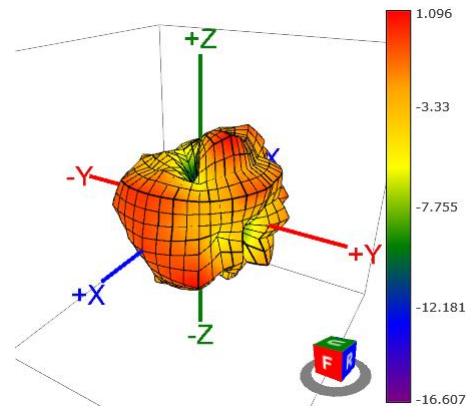
2170MHz



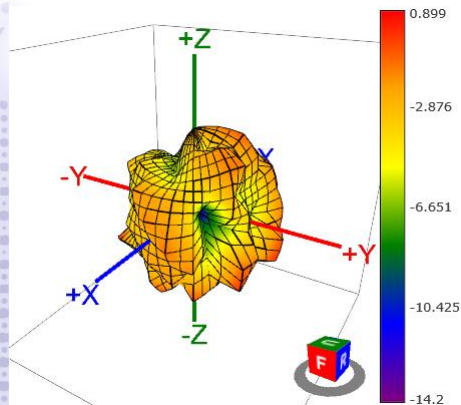
2300MHz



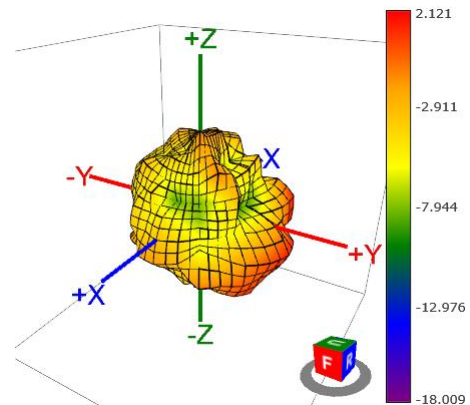
2690MHz



3300MHz

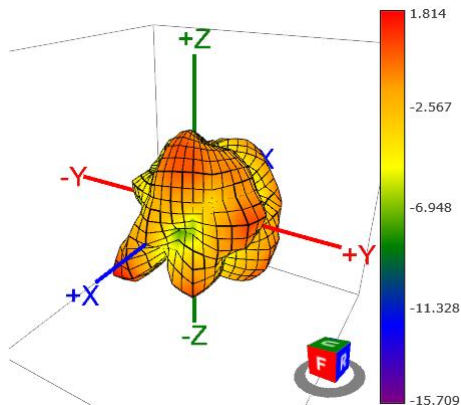


3600MHz

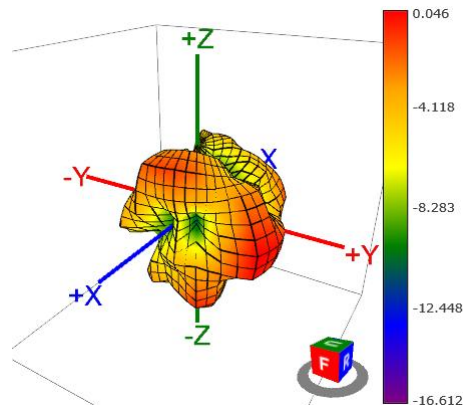


With Ground Plane – LTE 2

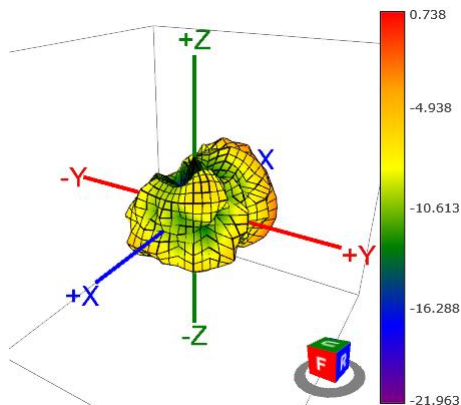
824MHz



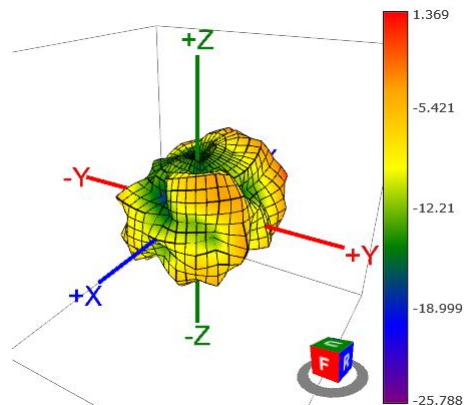
960MHz



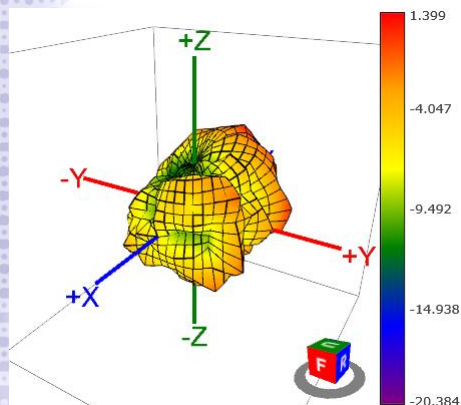
1710MHz



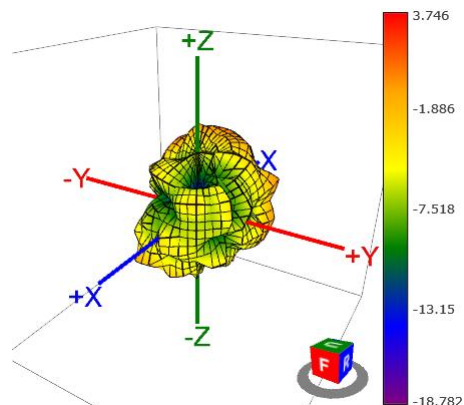
2170MHz



2300MHz

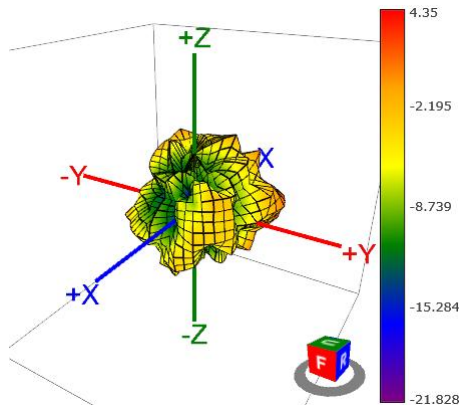


2690MHz

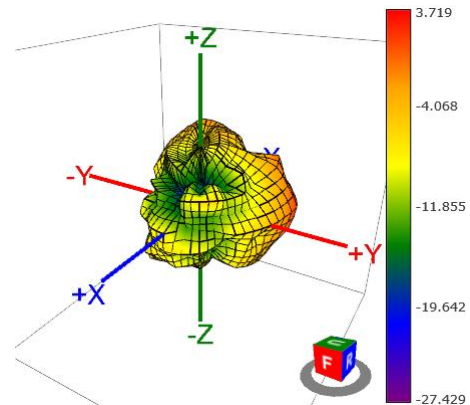


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3300MHz

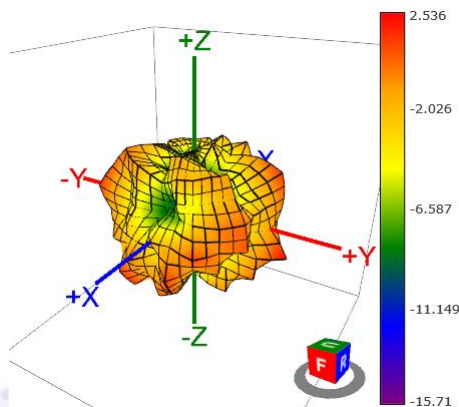


3600MHz

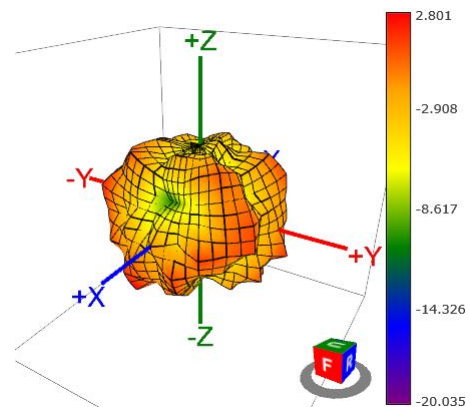


Free Space - WiFi

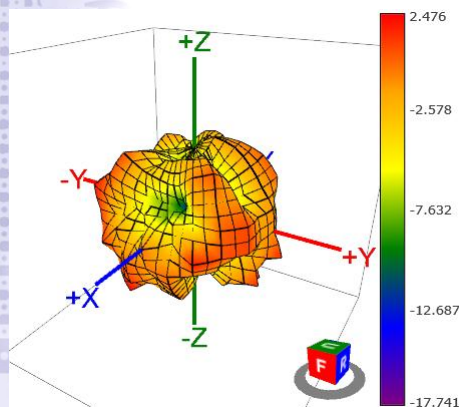
2400MHz



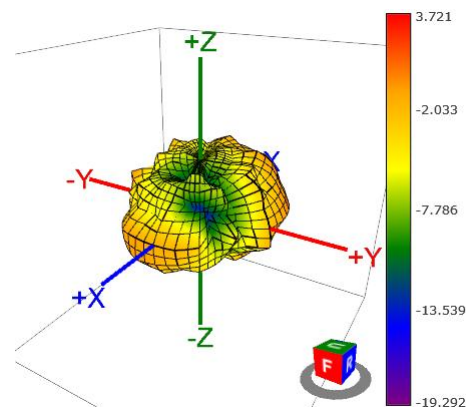
2450MHz



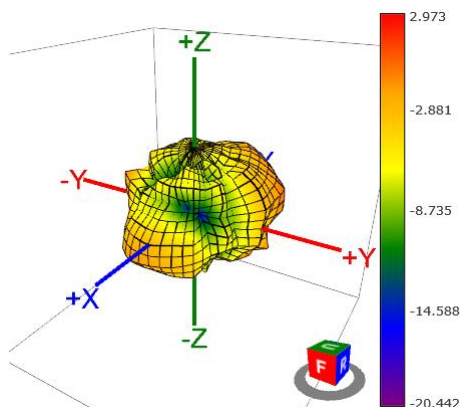
2500MHz



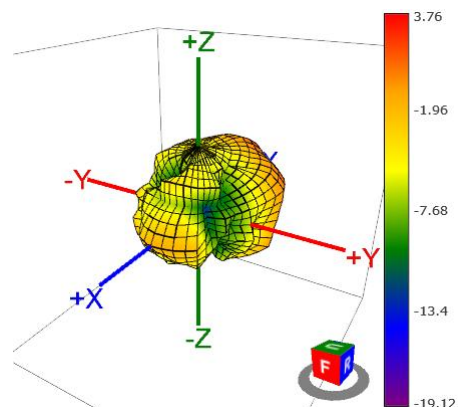
5150MHz



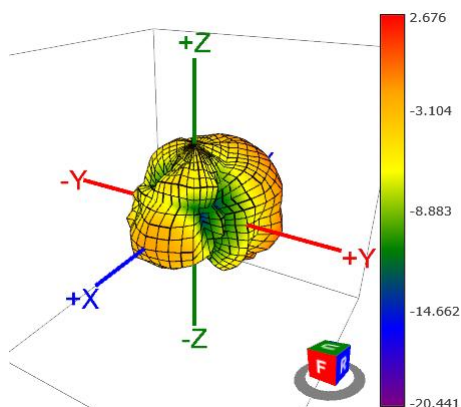
5350MHz



5750MHz

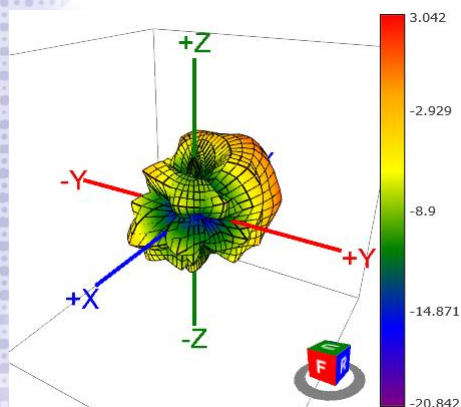


5850MHz

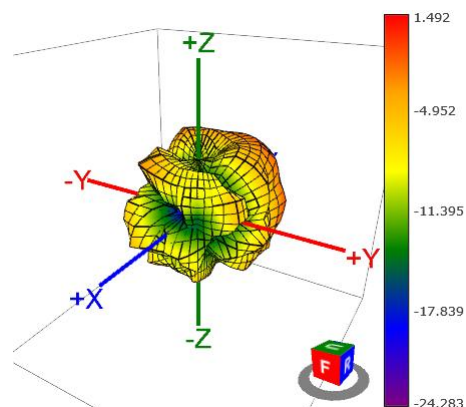


With Ground Plane –WiFi

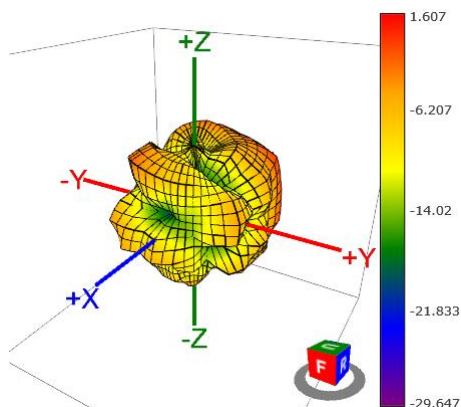
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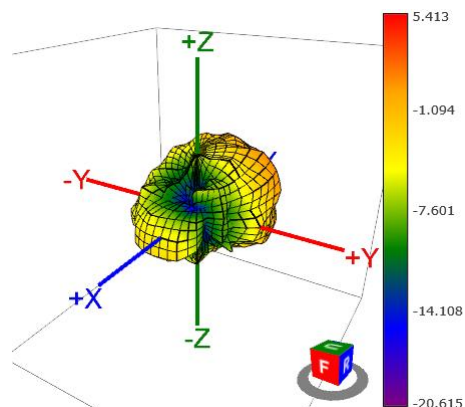
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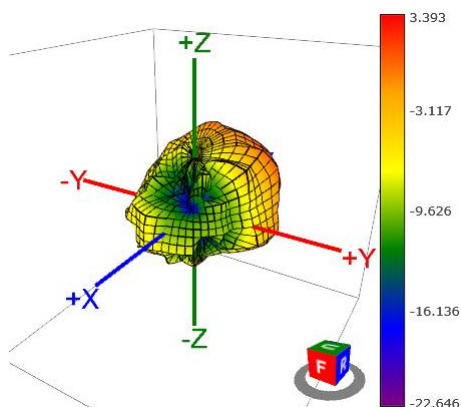
2500MHz



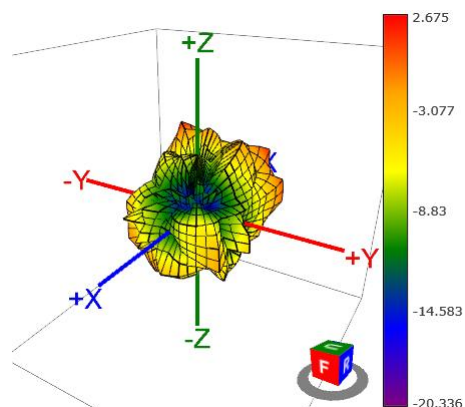
5150MHz



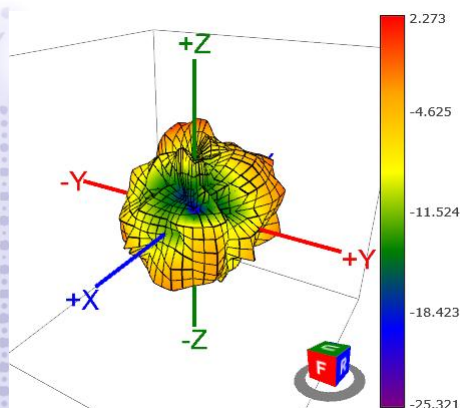
5350MHz



5750MHz

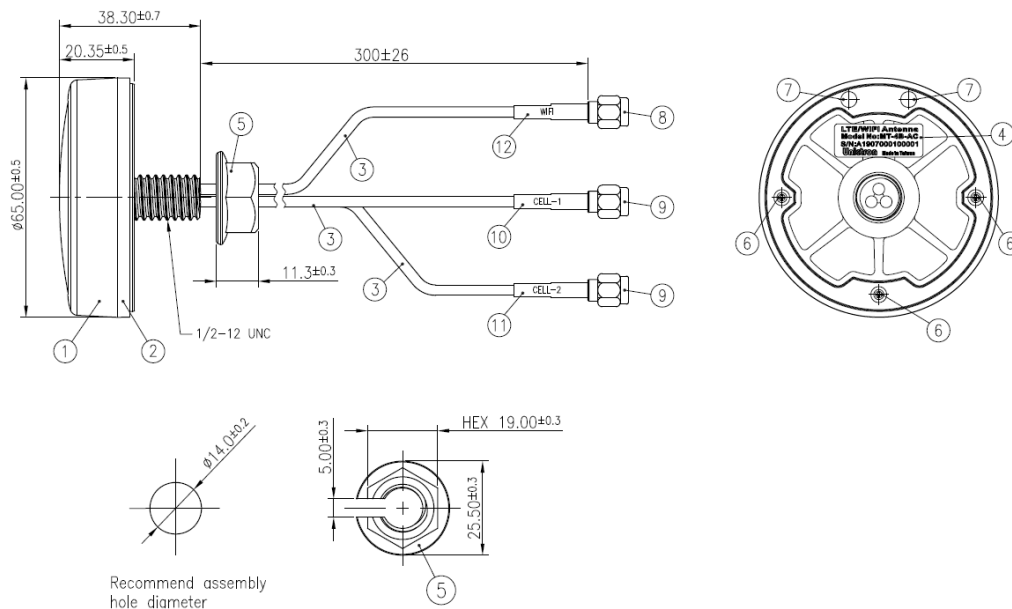


5850MHz



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VI. Mechanical Drawing (Unit:mm):



Recommend assembly hole diameter

12	WiFi Heat Shrink Tube	CTMS	Yellow	1
11	CELL-2 Heat Shrink Tube	CTMS	White	1
10	CELL-1 Heat Shrink Tube	CTMS	White	1
9	SMA(SP) Connector	Brass	Au plating	2
8	RSMA(SP) Connector	Brass	Au plating	1
7	Waterproof stopper	TPE	Black	2
6	Screw TP2.6x7	Steel	Ni Plated	3
5	Nut	Steel	Cr3+Zinc Black	1
4	Label	PET	Silver	1
3	Cable H-100	PVC	Black	3
2	Bottom Housing	PC+TPE	Black	1
1	Top Housing	PC	Black	1
No	NAME	MATERIAL	FINISH	QTY

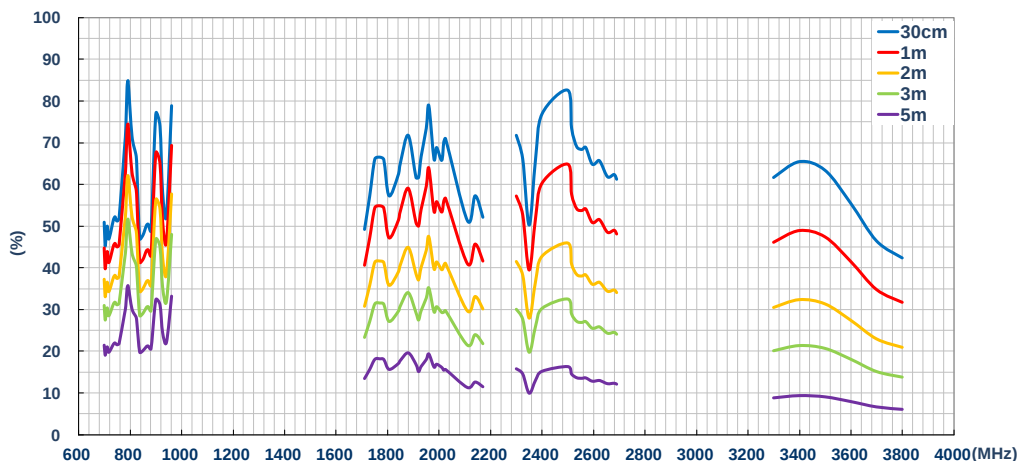
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VII. Applications Note:

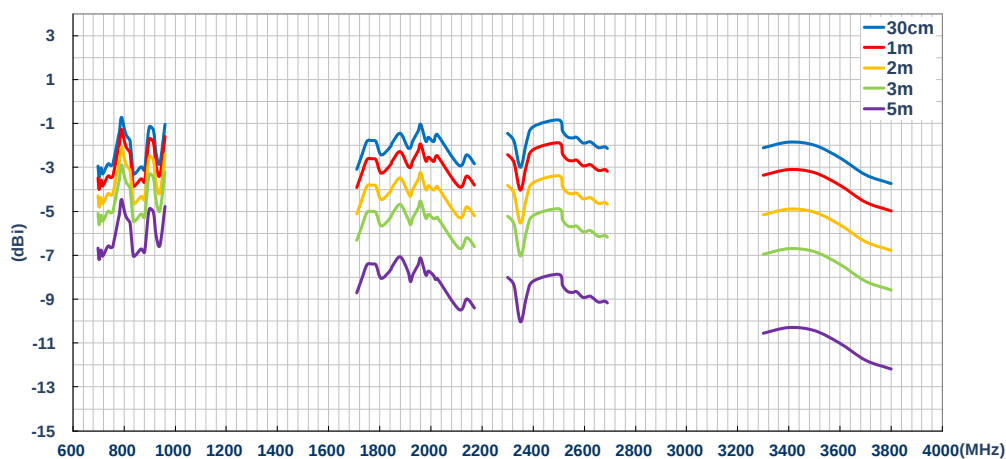
The antenna performance with different cable lengths is shown below.

Free Space – LTE 1

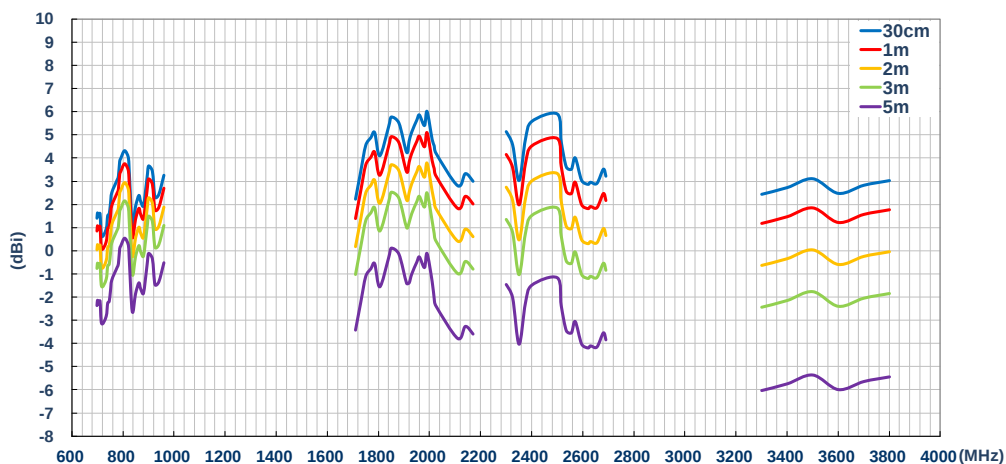
Efficiency (%)



Average Gain (dBi)



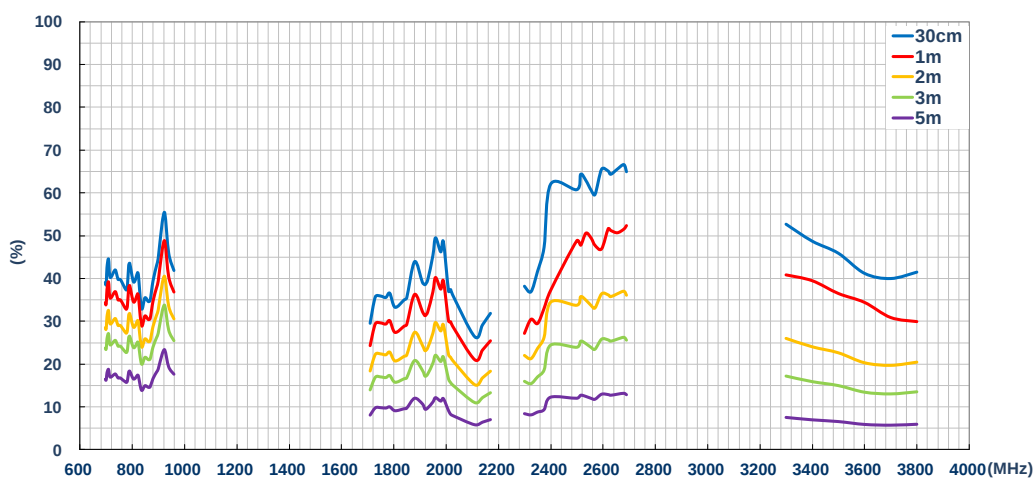
Peak Gain (dBi)



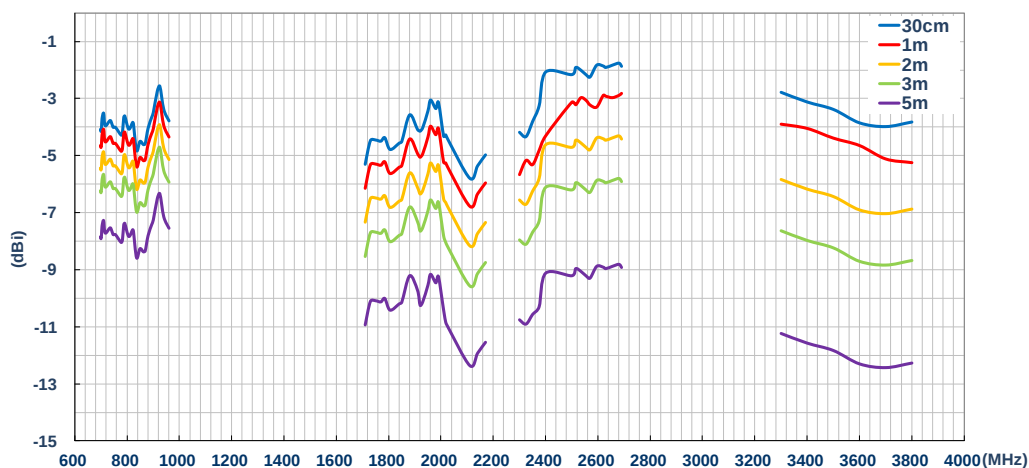
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With Ground Plane – LTE 1

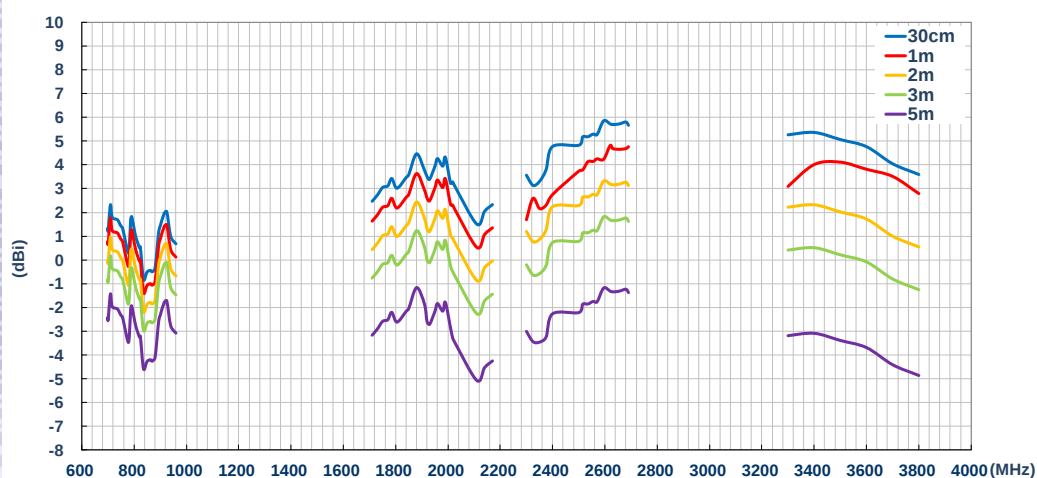
Efficiency (%)



Average Gain (dBi)



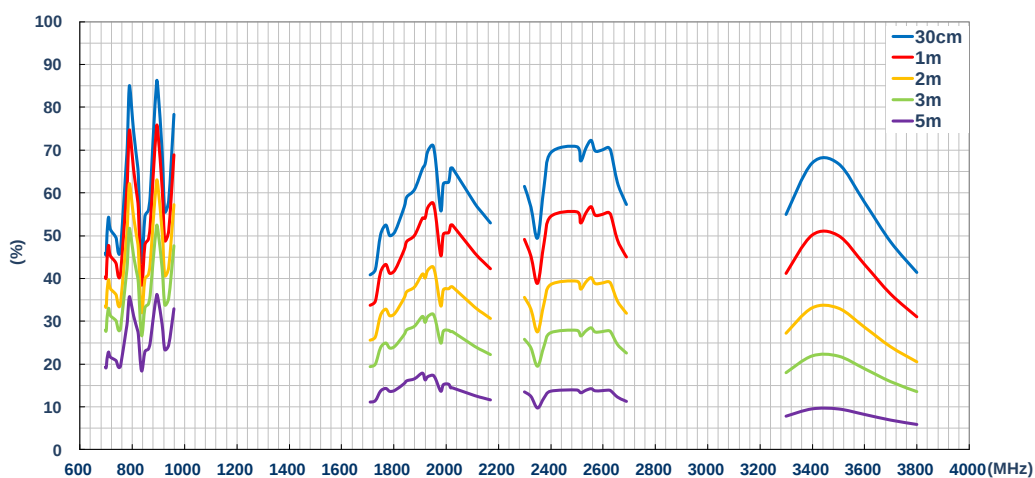
Peak Gain (dBi)



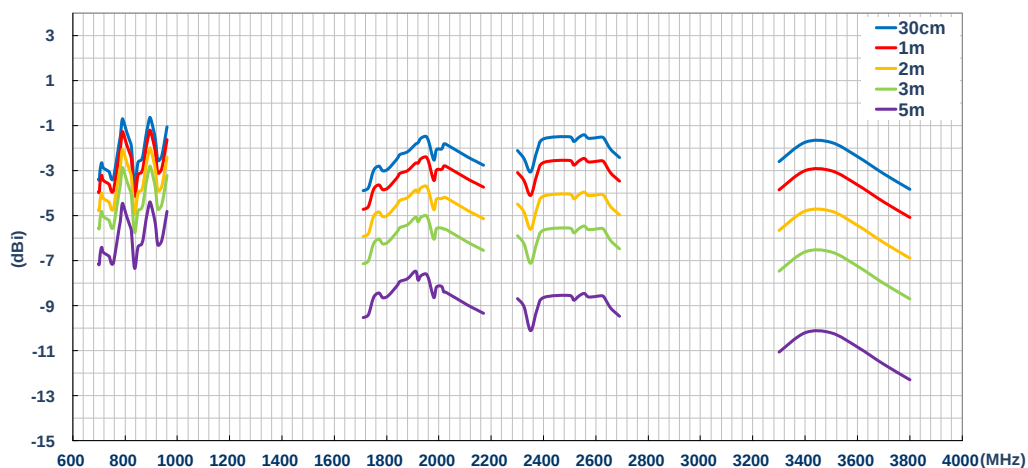
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Free Space – LTE 2

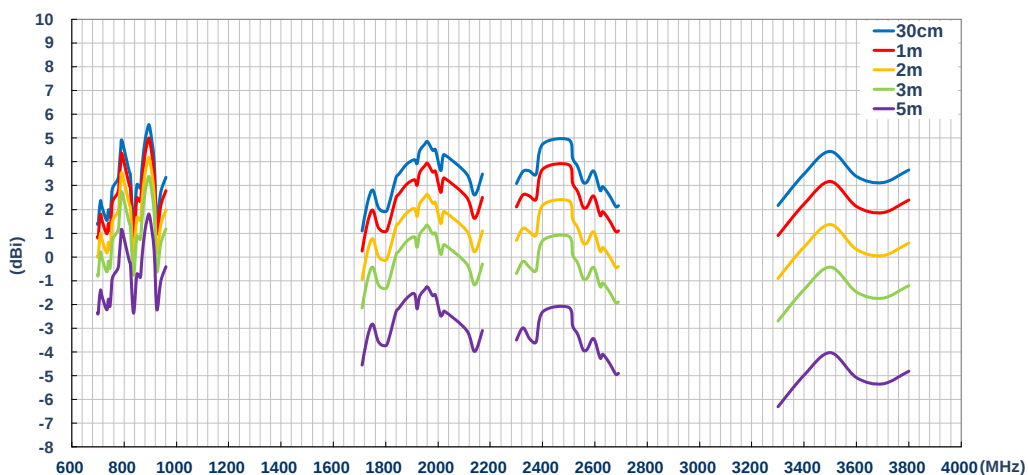
Efficiency (%)



Average Gain (dBi)



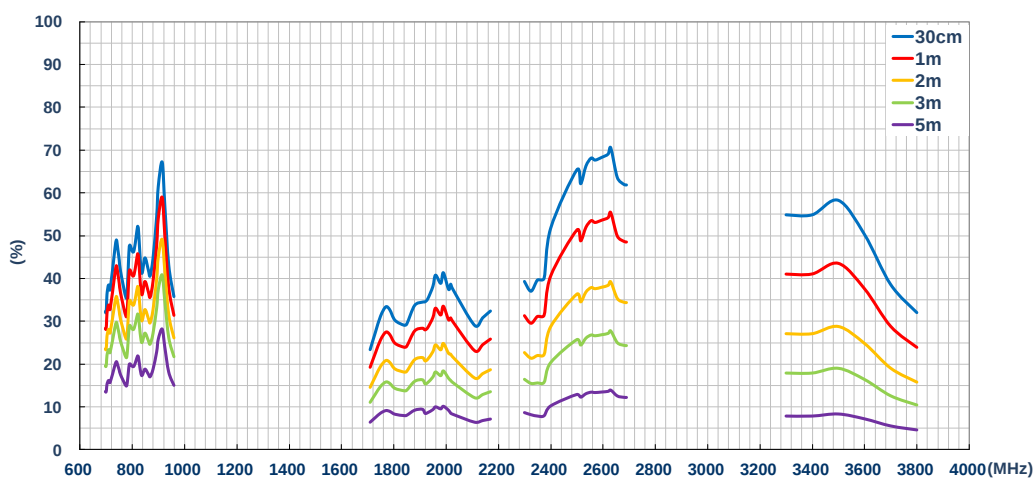
Peak Gain (dBi)



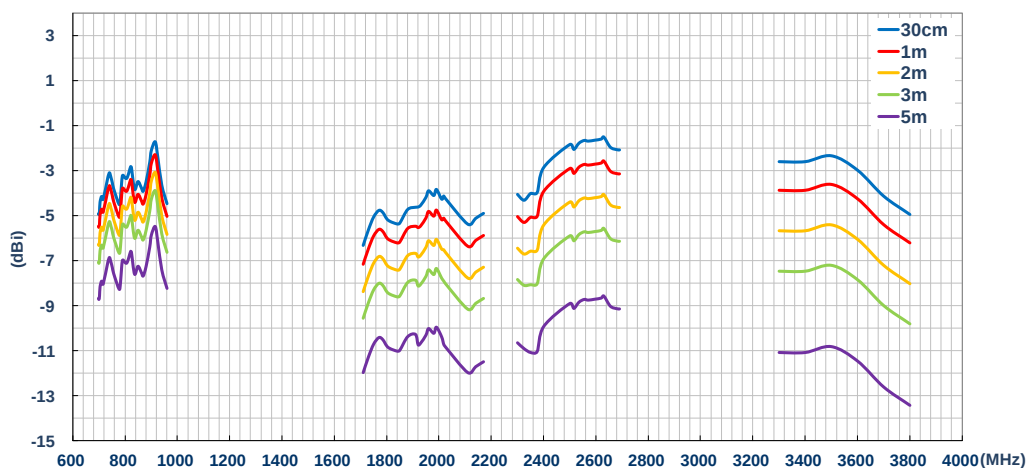
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With Ground Plane – LTE 2

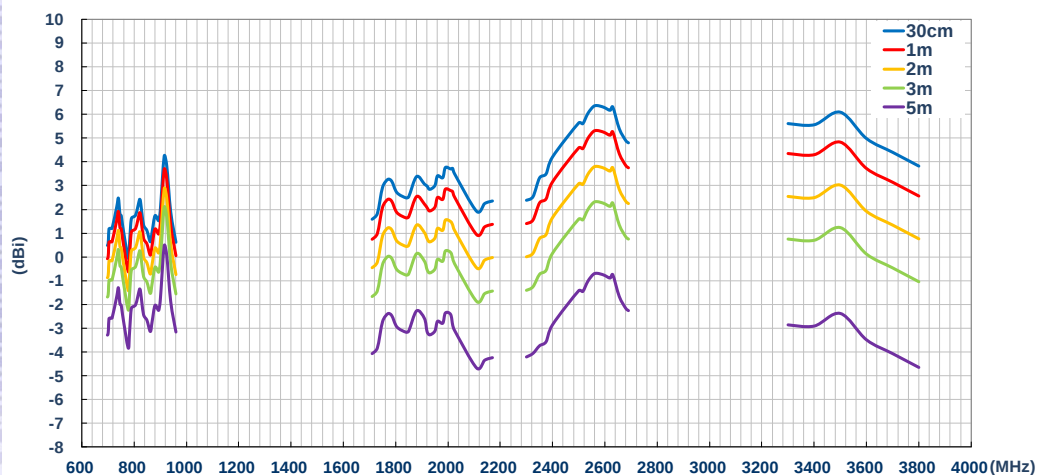
Efficiency (%)



Average Gain (dBi)



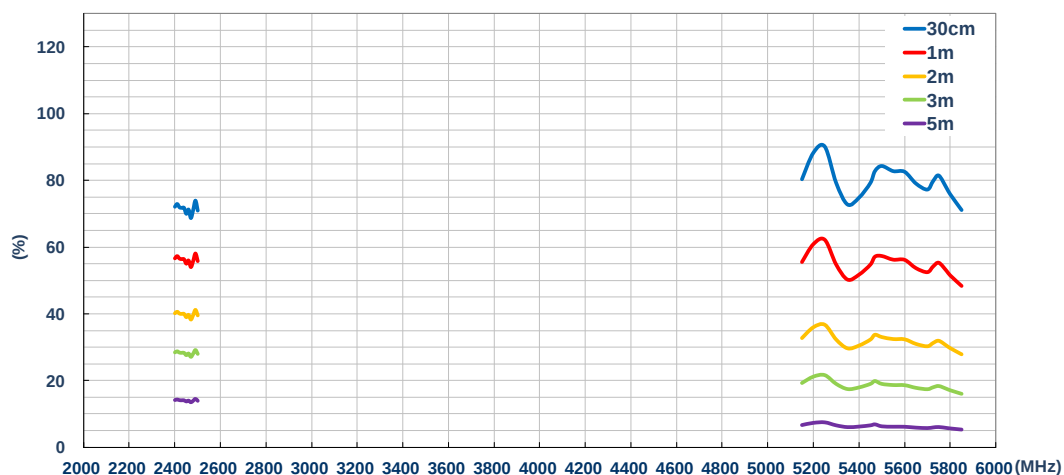
Peak Gain (dBi)



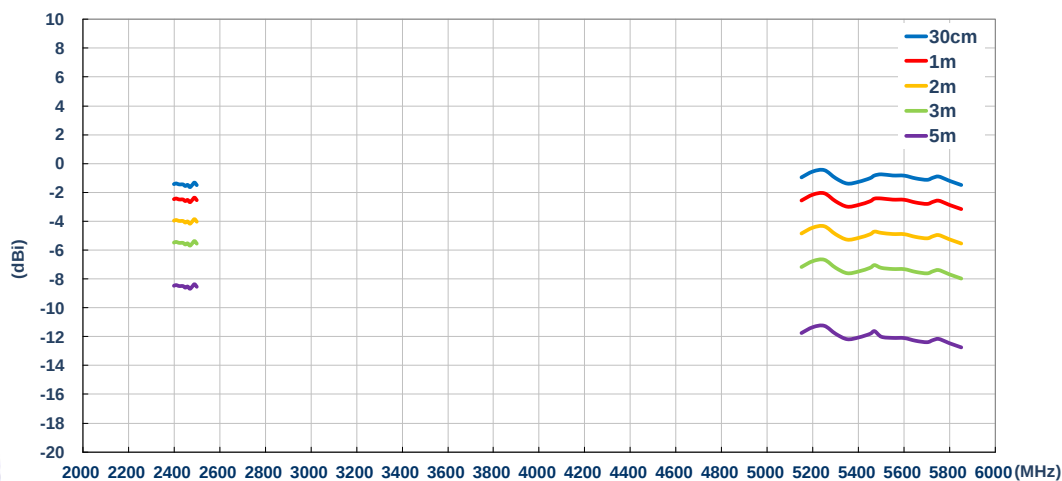
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Free Space – WIFI

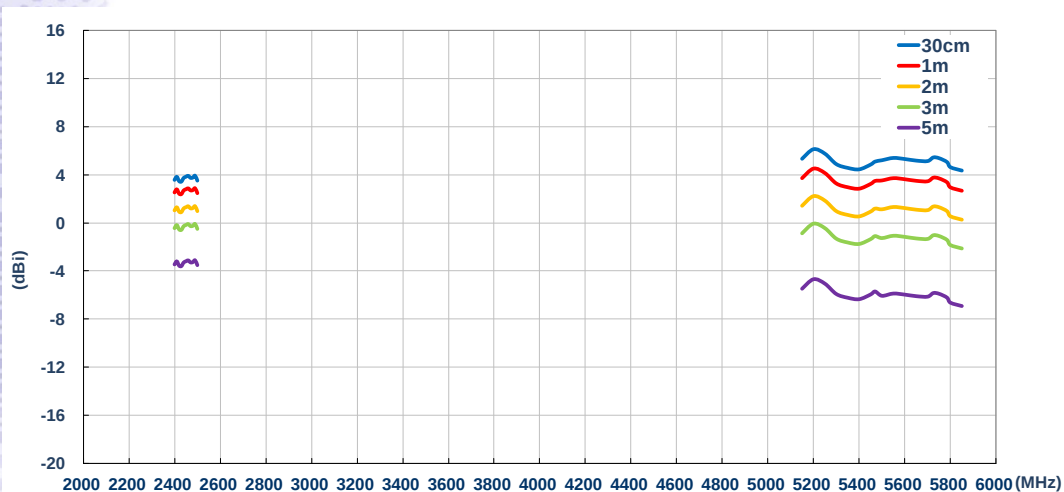
Efficiency (%)



Average Gain (dBi)



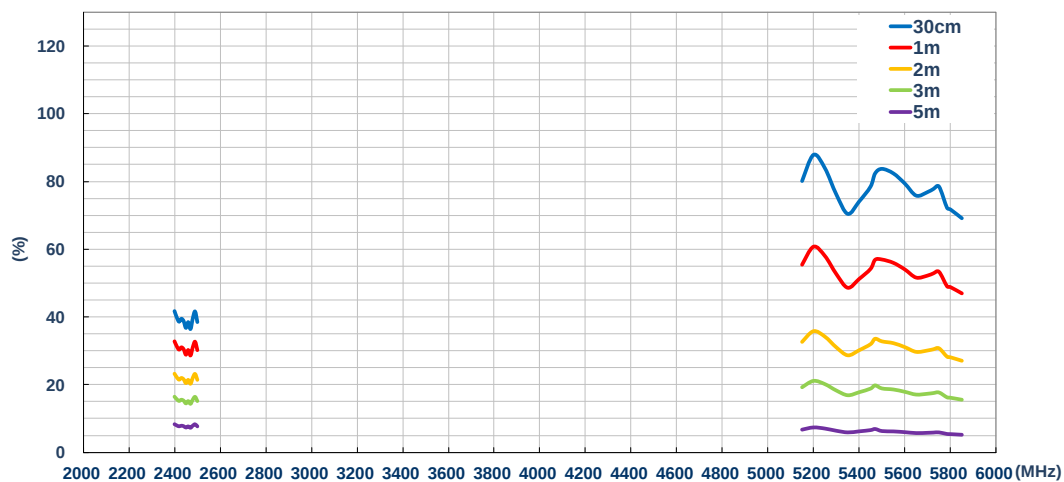
Peak Gain (dBi)



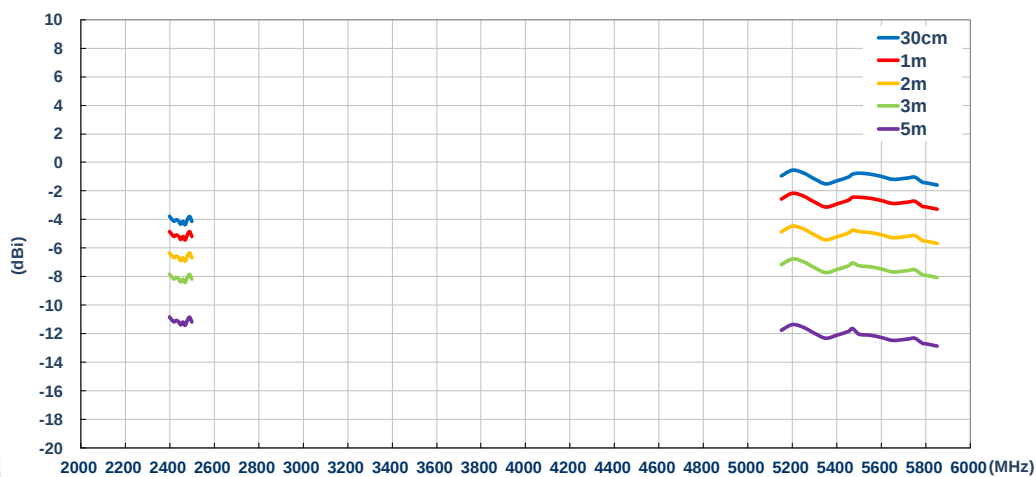
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With Ground Plane – WIFI

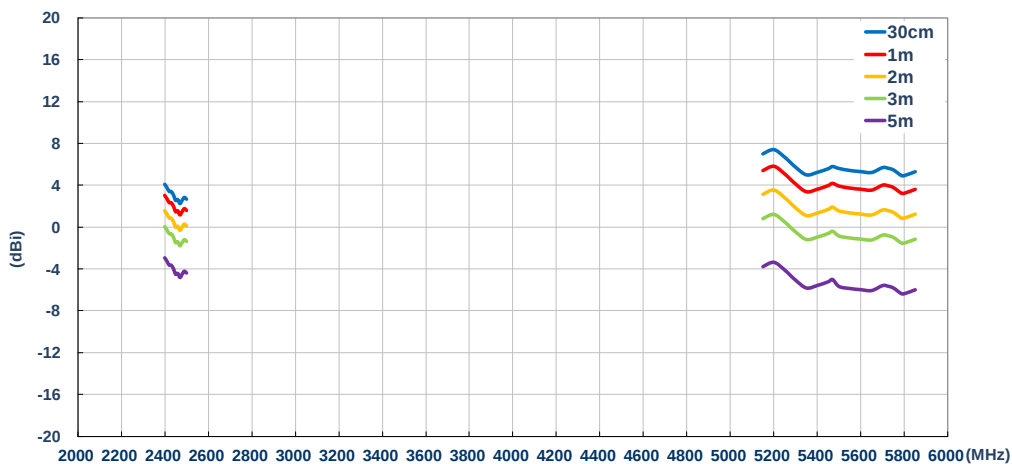
Efficiency (%)



Average Gain (dBi)



Peak Gain (dBi)



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