



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

Part Number: MT-4B-AC-BLW09

Features:

- 1*GNSS, 1*LTE, 1*WiFi Antenna Combination
- Support GPS / GLONASS / BEIDOU / GALILEO / QZSS / SBAS L1 Bands
- Support 5G NR/ 4G LTE Full Frequency Bands, 698-960MHz, 1710-2690MHz, 3300-3800MHz
- Support WiFi Dual Bands, 2400-2500MHz, 5150-5850MHz
- Excellent Out of Band Rejection, Up to 55 dB
- 27dB Active Peak Gain
- Customizable Cables and Connectors
- RoHS & REACH Compliant

Applications:

- Fleet Management & Telematics
- Vehicle Navigation

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

MODEL: MT-4B-AC-BLW09

Rev.A

I. Specifications:

Items	GNSS Specifications		
GNSS Electrical Characteristics			
Application Bands	BeiDou	GPS	GLONASS
Frequencies (MHz)	1561.00	1575.42	1602.00
Efficiency (%)	49.89	42.76	58.61
Average Gain (dBi)	-3.02	-3.69	-2.32
Peak Gain (dBi)	1.21	1.21	1.44
V.S.W.R	< 3		
Return loss (dB)	< -6		
Impedance (Ω)	50		
Polarization	R.H.C.P. (Right-Handed Circular Polarization)		
Active Antenna Performance			
Application Bands	BeiDou	GPS	GLONASS
Frequencies (MHz)	1561 \pm 2.046	1575.42 \pm 1.023	1602 \pm 5
Gain (dB)	27	27	27
Noise Figure (dB)	0.98	0.98	0.92
Operation Voltage (V)	3.3 ~ 5.0		
Current Consumption (mA) (typical)	9.0		
Output Impedance (Ω)	50		

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Out Of Band Rejection			
Frequencies (MHz)	600 ~ 1300	1300 ~ 1530	1650 ~ 3000
Out Of Band Rejection (dB)	55	30	30
ESD Protection	±8 KV (direct discharge) ±15 KV (air discharge)		
Cable / Length	RG174 / 3M		
Connector	SMA (Male)		

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Items		LTE Specifications							
Application Bands		LTE 700	GSM 850/900	DCS	PCS	UMTS1	LTE2600	5G NR Band	
Frequencies (MHz)		698 ~ 824	824 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170	2300 ~ 2690	3300 ~ 3800	
Efficiency (%)	Free Space	30cm	50.32	52.44	51.30	54.41	56.06	66.22	49.97
		1m	44.24	46.10	42.28	44.36	45.16	52.00	37.39
		2m	36.79	38.34	32.07	33.14	33.16	36.81	24.70
		3m	30.60	31.89	24.33	24.76	24.35	26.06	16.32
		5m	21.17	22.06	14.00	13.81	13.12	13.06	7.12
	With 30*30 cm Ground Plane	30cm	51.39	43.46	34.41	45.74	45.09	62.33	42.36
		1m	45.17	38.20	28.36	37.30	36.32	50.45	30.46
		2m	37.57	31.77	21.51	27.86	26.67	34.71	20.94
		3m	31.25	26.43	16.32	20.81	19.58	24.60	13.84
		5m	21.62	18.28	9.39	11.61	10.56	12.35	6.04
Average Gain (dBi)	Free Space	30cm	-2.98	-2.80	-2.90	-2.64	-2.51	-1.79	-3.01
		1m	-3.54	-3.36	-3.74	-3.53	-3.45	-2.84	-4.27
		2m	-4.34	-4.16	-4.94	-4.80	-4.79	-4.34	-6.07
		3m	-5.14	-4.96	-6.14	-6.06	-6.14	-5.84	-7.87
		5m	-6.74	-6.56	-8.54	-8.60	-8.82	-8.84	-11.47

Average Gain (dBi)	With 30*30 cm Ground Plane	30cm	-2.89	-3.62	-4.63	-3.40	-3.46	-2.05	-3.73
		1m	-3.45	-4.18	-5.47	-4.28	-4.40	-2.97	-5.16
		2m	-4.25	-4.98	-6.67	-5.55	-5.74	-4.60	-6.79
		3m	-5.05	-5.78	-7.87	-6.82	-7.08	-6.09	-8.59
		5m	-6.65	-7.38	-10.27	-9.35	-9.77	-9.08	-12.19
Peak Gain (dBi)	Free Space	30cm	2.76	4.64	4.19	4.96	4.96	4.64	4.07
		1m	2.20	4.08	3.35	4.05	4.05	3.59	2.81
		2m	1.40	3.28	2.15	2.75	2.75	2.09	1.01
		3m	0.60	2.48	0.95	1.45	1.45	0.59	-0.79
		5m	-1.00	0.88	-1.45	-1.15	-1.15	-2.41	-4.39
	With 30*30 cm Ground Plane	30cm	5.02	5.33	4.51	4.51	4.42	6.05	6.10
		1m	4.46	4.77	3.67	3.67	3.51	5.00	4.10
		2m	3.66	3.97	2.47	2.47	2.21	3.50	3.04
		3m	2.86	3.17	1.27	1.27	0.91	2.00	1.24
		5m	1.26	1.57	-1.13	-1.13	-1.69	-1.00	-2.36
V.S.W.R			< 3						
Return Loss (dB)			< -6						
Impedance (Ω)			50						
Polarization			Linear						
Cable / Length			RG174 / 3 metres						
Connector			SMA (Male)						

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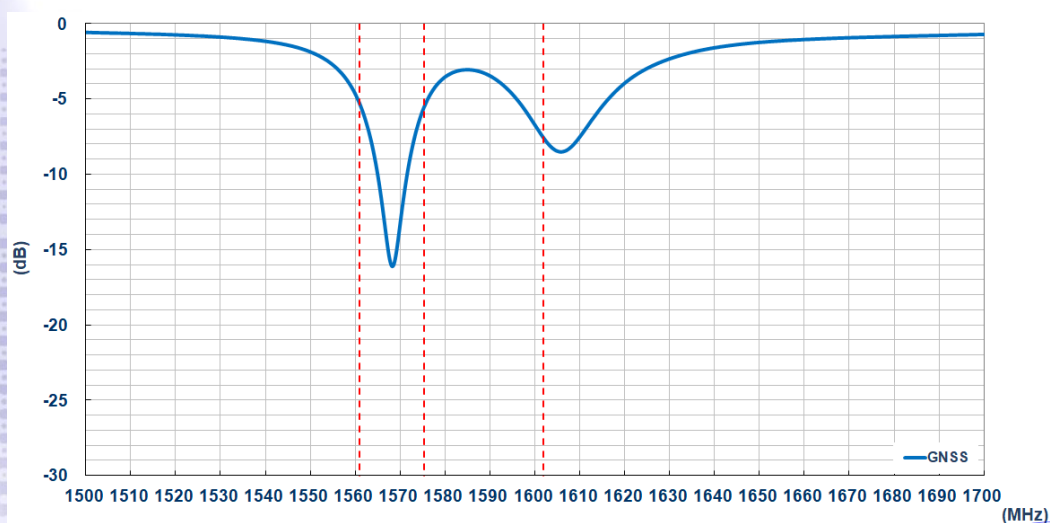
Items			WiFi Specifications						
Frequencies (MHz)			2400	2450	2500	5150	5350	5725	5850
Efficiency (%)	Free Space	30cm	71.78	73.28	77.80	83.37	69.34	63.97	60.39
		1m	56.36	57.02	61.09	51.17	50.47	45.60	37.07
		2m	39.90	40.74	43.25	33.88	28.18	25.00	23.60
		3m	28.25	28.84	30.62	19.95	16.60	14.39	13.58
		5m	14.16	14.45	15.35	6.92	5.75	4.76	4.50
	With 30*30 cm Ground Plane	30cm	63.97	60.67	69.50	68.71	67.45	60.39	52.72
		1m	50.23	47.64	54.58	47.42	46.56	41.02	35.81
		2m	35.56	33.73	38.64	27.93	27.42	23.60	20.61
		3m	25.18	23.88	27.35	16.44	16.14	13.58	11.86
		5m	12.62	11.97	13.71	5.70	5.60	4.50	3.93
Average Gain (dBi)	Free Space	30cm	-1.44	-1.35	-1.09	-0.79	-1.59	-1.94	-2.19
		1m	-2.49	-2.44	-2.14	-2.91	-2.97	-3.41	-4.31
		2m	-3.99	-3.90	-3.64	-4.70	-5.50	-6.02	-6.27
		3m	-5.49	-5.40	-5.14	-7.00	-7.80	-8.42	-8.67
		5m	-8.49	-8.40	-8.14	-11.60	-12.40	-13.22	-13.47
	With 30*30 cm Ground Plane	30cm	-1.94	-2.17	-1.58	-1.63	-1.71	-2.19	-2.78
		1m	-2.99	-3.22	-2.63	-3.24	-3.32	-3.87	-4.46
		2m	-4.49	-4.72	-4.13	-5.54	-5.62	-6.27	-6.86
		3m	-5.99	-6.22	-5.63	-7.84	-7.92	-8.67	-9.26
		5m	-8.99	-9.22	-8.63	-12.44	-12.52	-13.47	-14.06
Peak Gain (dBi)	Free Space	30cm	4.34	5.14	4.94	5.37	5.01	5.03	4.21
		1m	3.29	4.07	3.89	3.22	3.07	3.53	2.31
		2m	1.79	2.59	2.39	1.46	1.10	0.95	0.13
		3m	0.29	1.09	0.89	-0.84	-1.20	-1.45	-2.27
		5m	-2.71	-1.91	-2.11	-5.44	-5.80	-6.25	-7.07
	With 30*30 cm Ground Plane	30cm	4.53	5.08	5.88	6.43	6.37	5.02	5.29
		1m	3.48	4.03	4.83	4.82	4.76	3.34	3.61
		2m	1.98	2.53	3.33	2.52	2.46	0.94	1.21
		3m	0.48	1.03	1.83	0.22	0.16	-1.46	-1.19
		5m	-2.52	-1.97	-1.17	-4.38	-4.44	-6.26	-5.99

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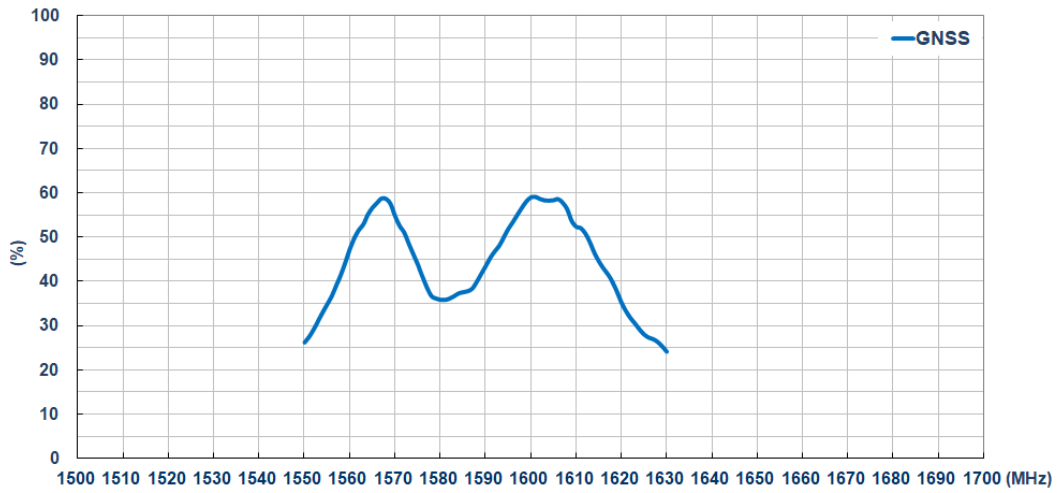
V.S.W.R	< 2
Return Loss (dB)	< -10
Impedance (Ω)	50
Polarization	Linear
Cable / Length	RG174 / 3 metres
Connector	SMA (Male)
Mechanical	
Dimension (mm)	Φ 65.00(Dia.) x 20.35(H)
Casing	PC + TPE
Weigh (g) (including cable)	91
Waterproof	IP67 / IP69K
Maximum Assembly Torque	40 N-m
Environmental Conditions	
Operation Temperature ($^{\circ}$C)	-40 ~ +85
Storage Temperature ($^{\circ}$C)	-40 ~ +85
Humidity	Non-condensing 65 $^{\circ}$ C 95% RH

II. Antenna Technical Parameters:

S11 (dB) – GNSS

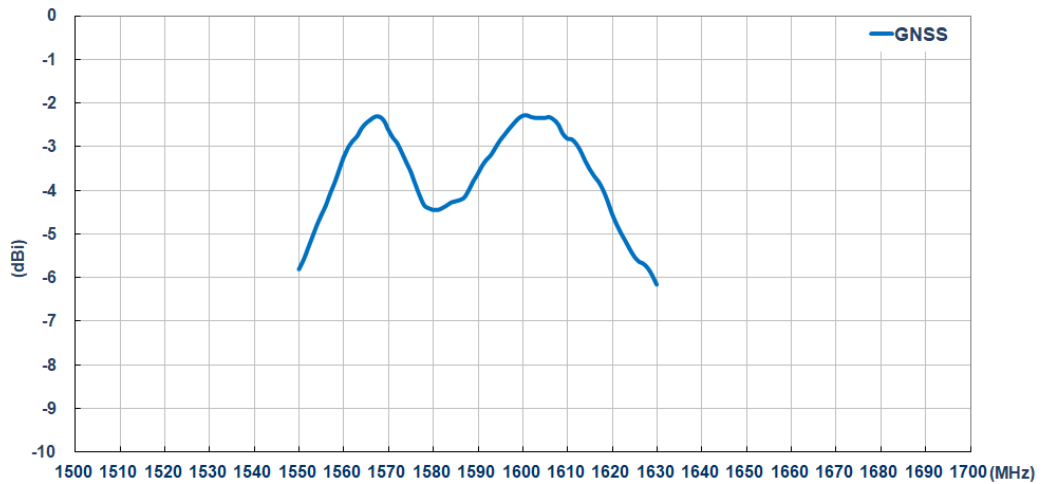


Efficiency (%) - GNSS

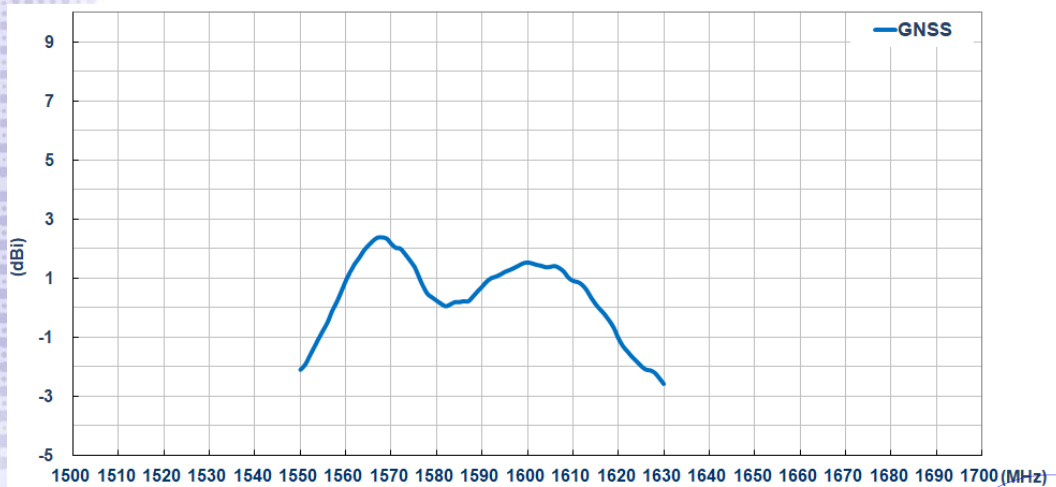


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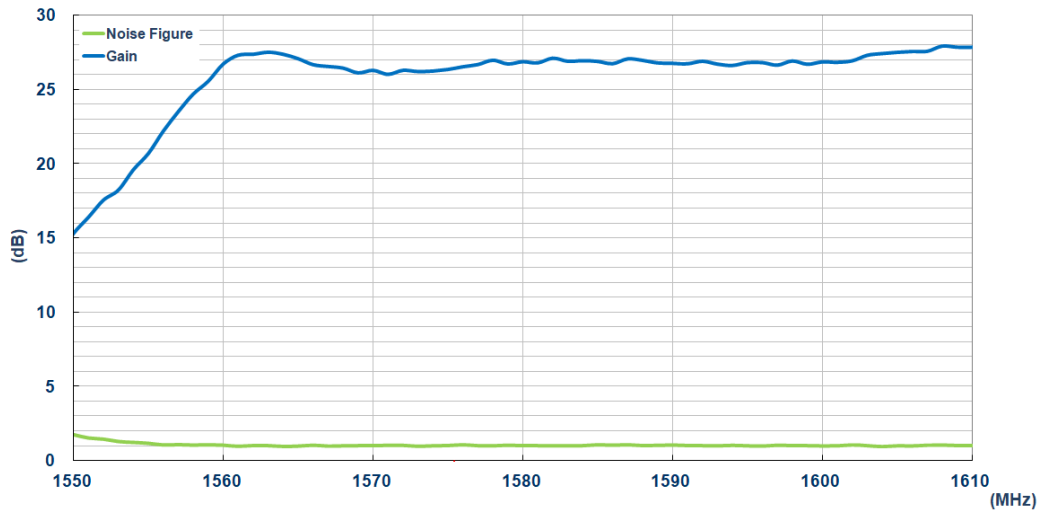
Average Gain (dBi) - GNSS



Peak Gain (dBi) - GNSS

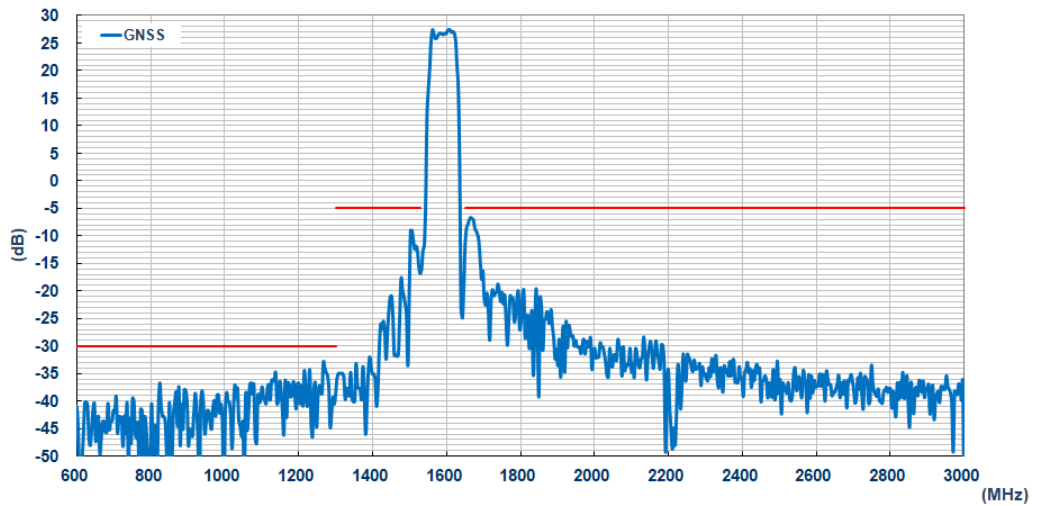


Noise Figure & Gain (dB) - GNSS



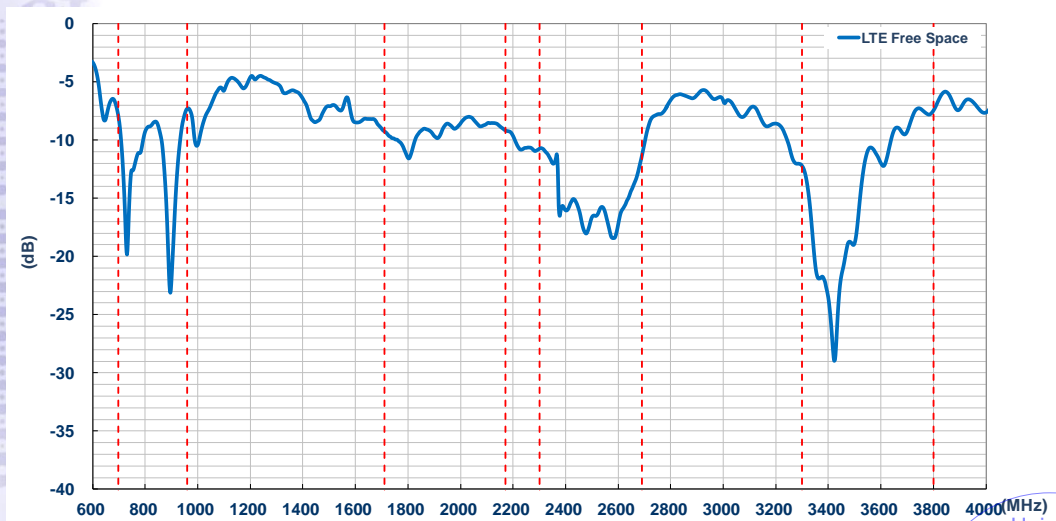
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Out of Band Rejection (dB) - GNSS

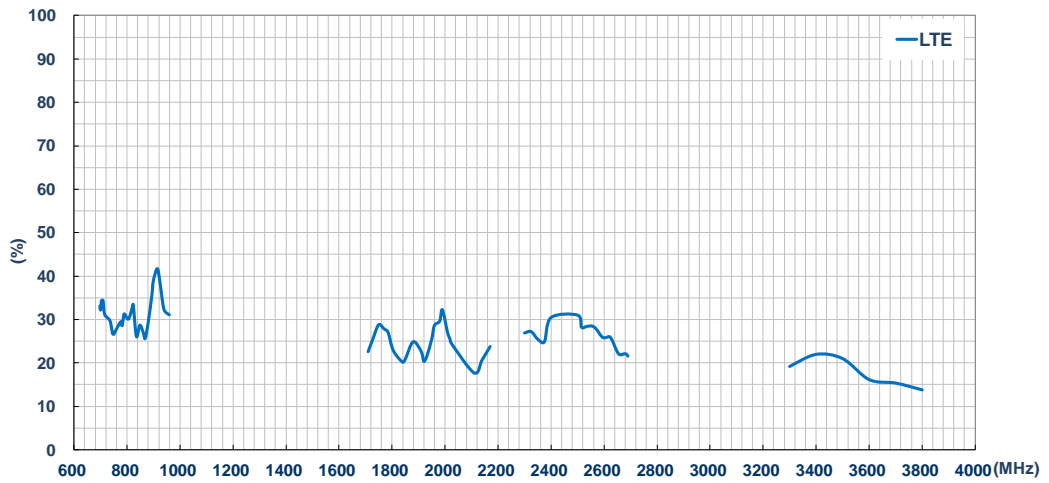


Free Space - LTE

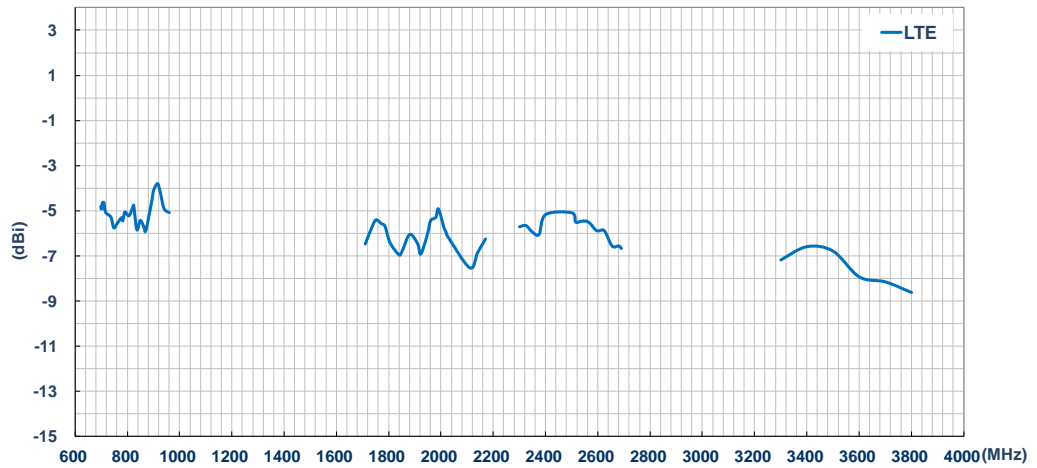
S11 (dB)



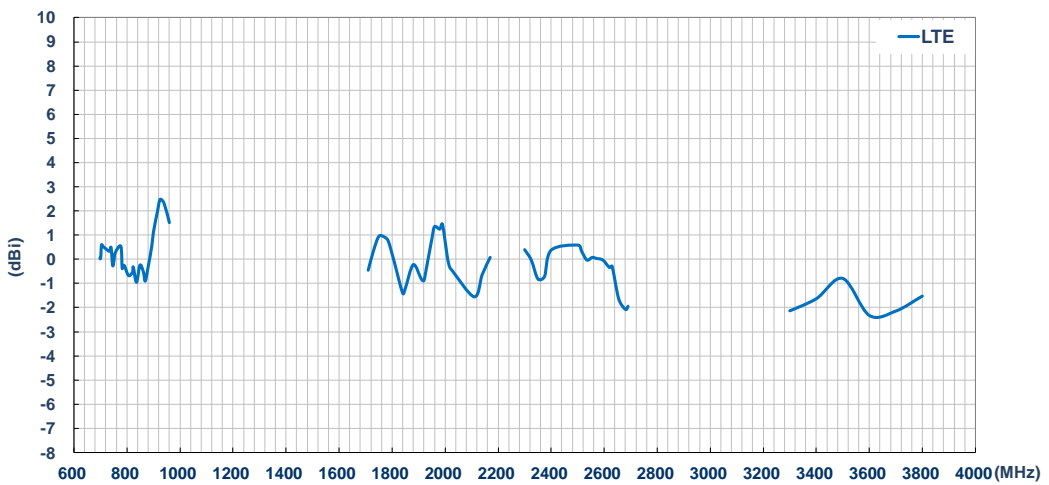
Efficiency (%)



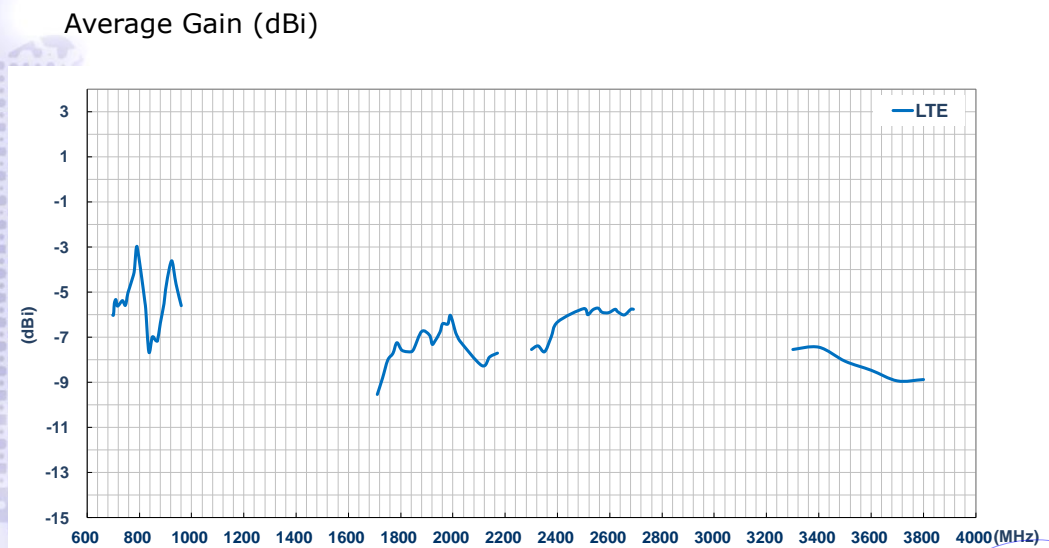
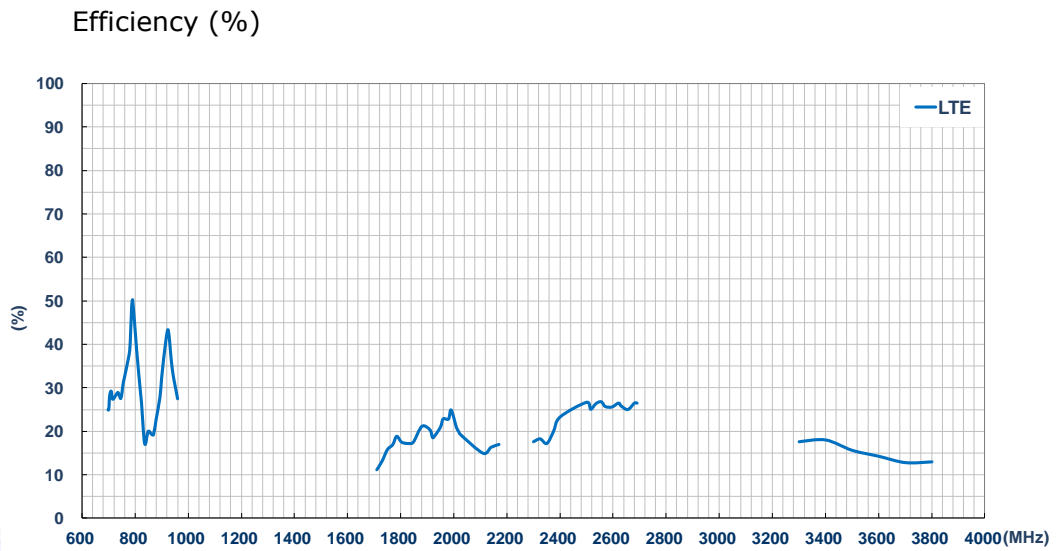
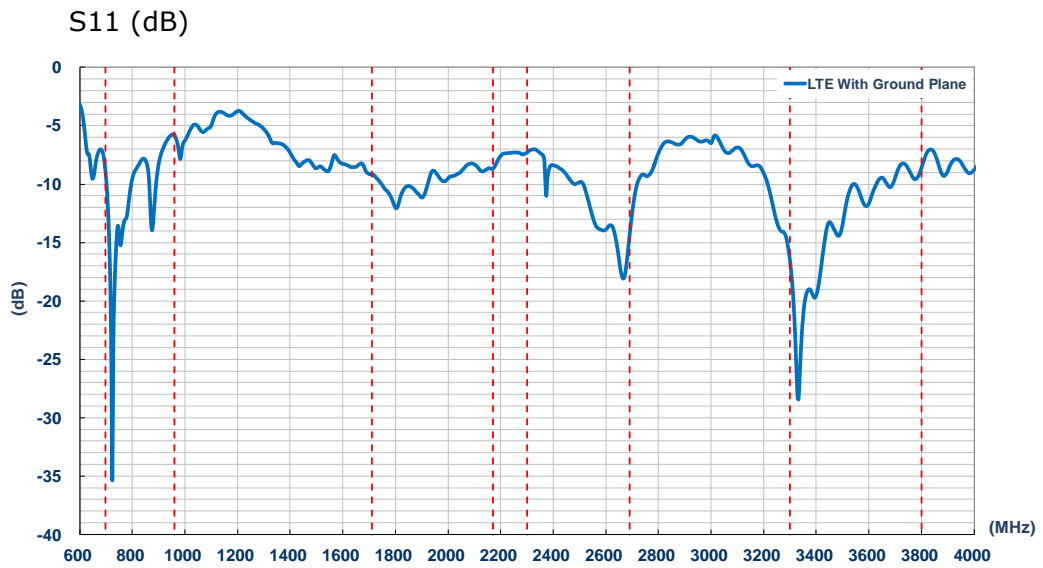
Average Gain (dBi)



Peak Gain (dBi)

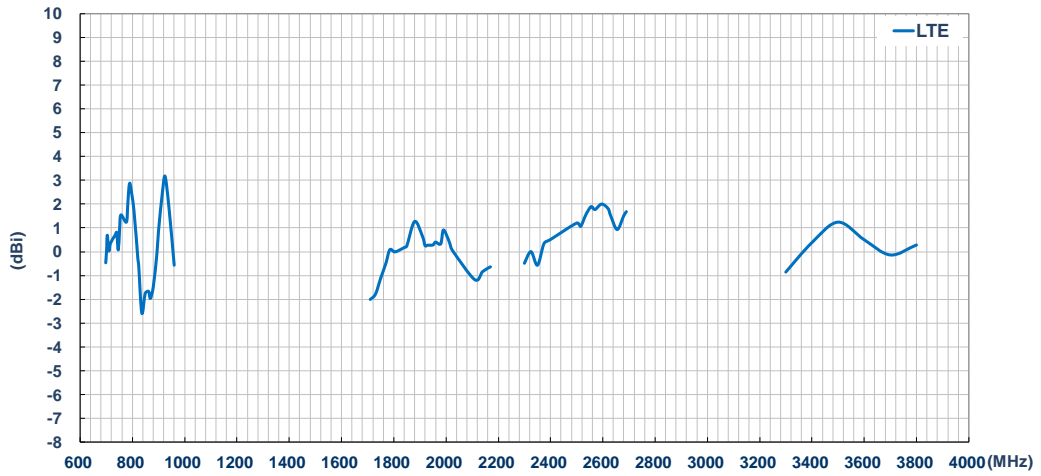


With 30*30cm Ground Plane - LTE



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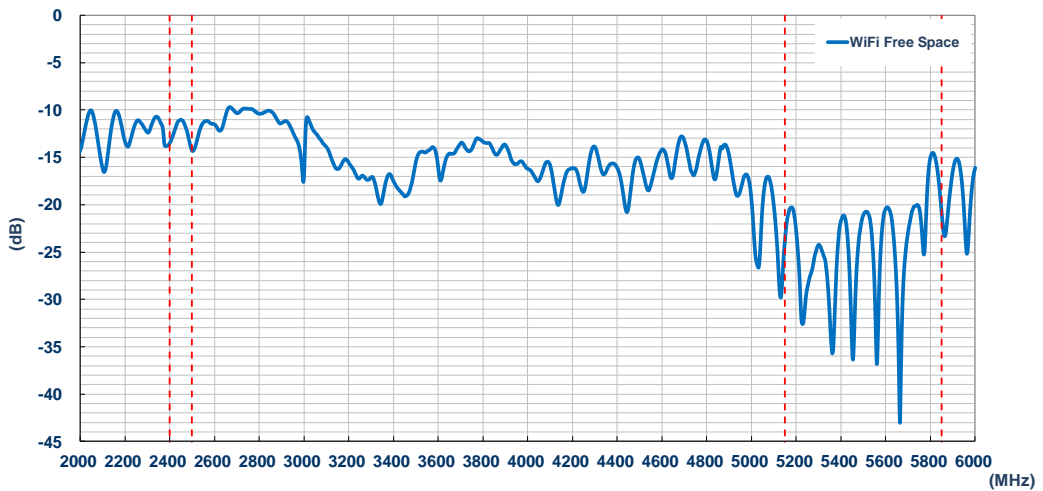
Peak Gain (dBi)



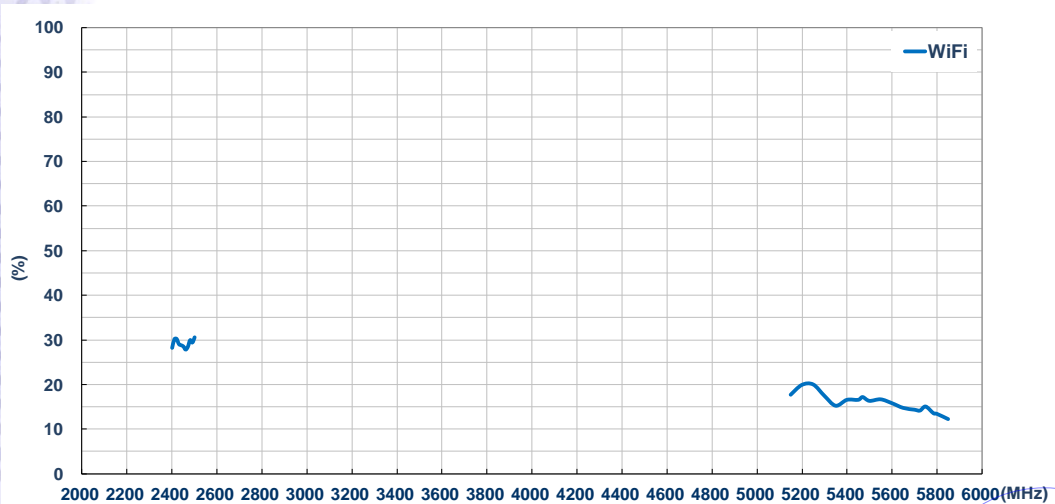
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Free Space – WiFi

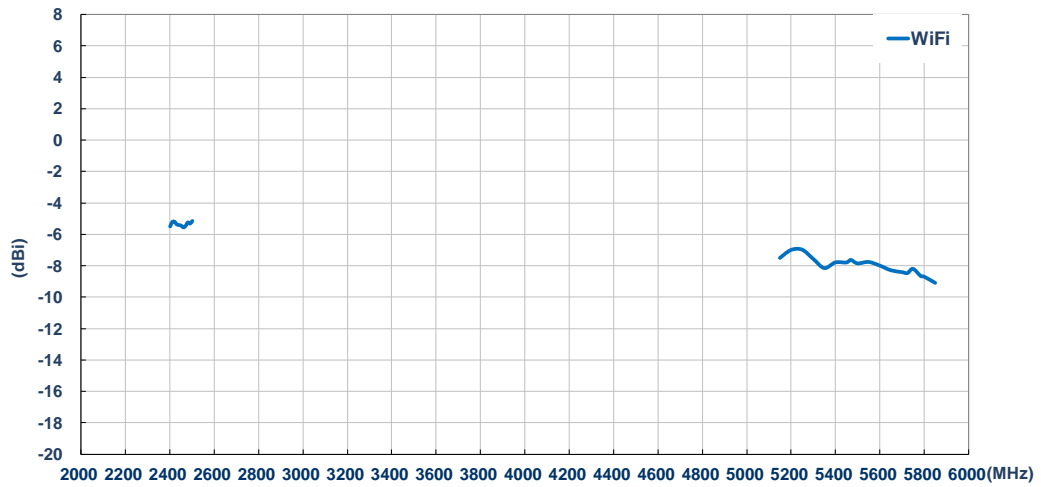
S11 (dB)



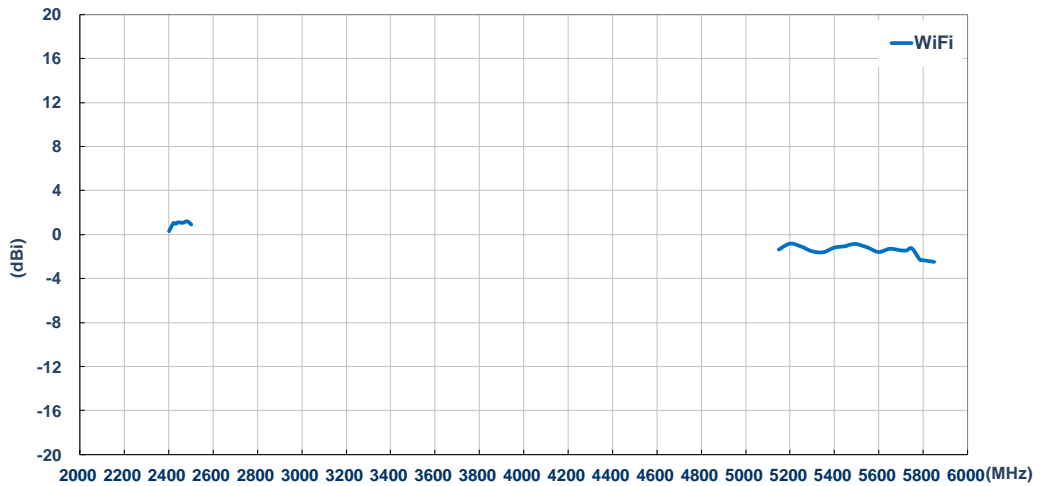
Efficiency (%)



Average Gain (dBi)

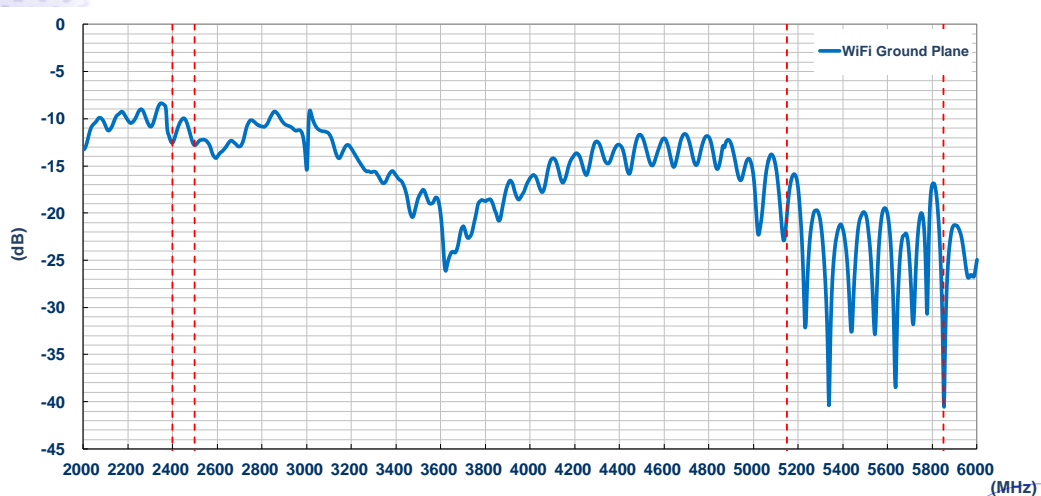


Peak Gain (dBi)

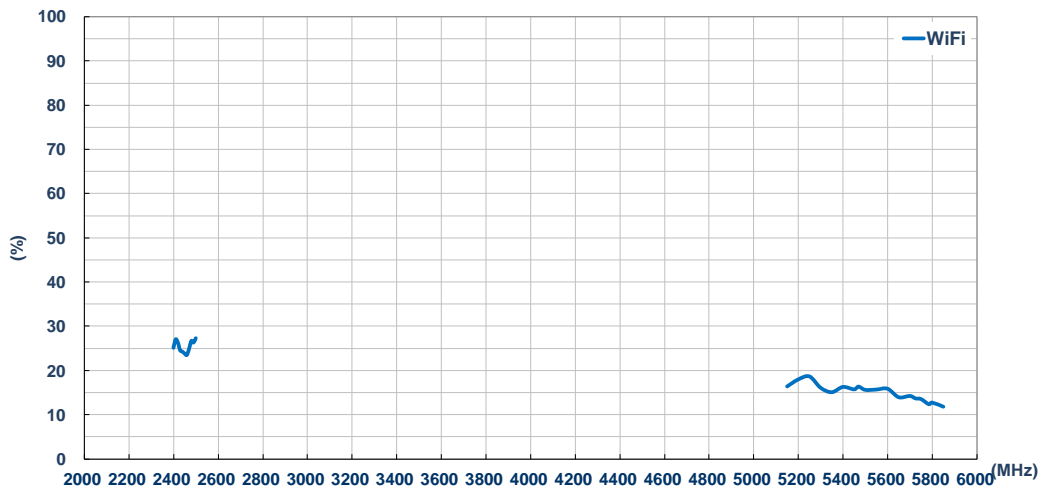


With 30*30cm Ground Plane -WiFi

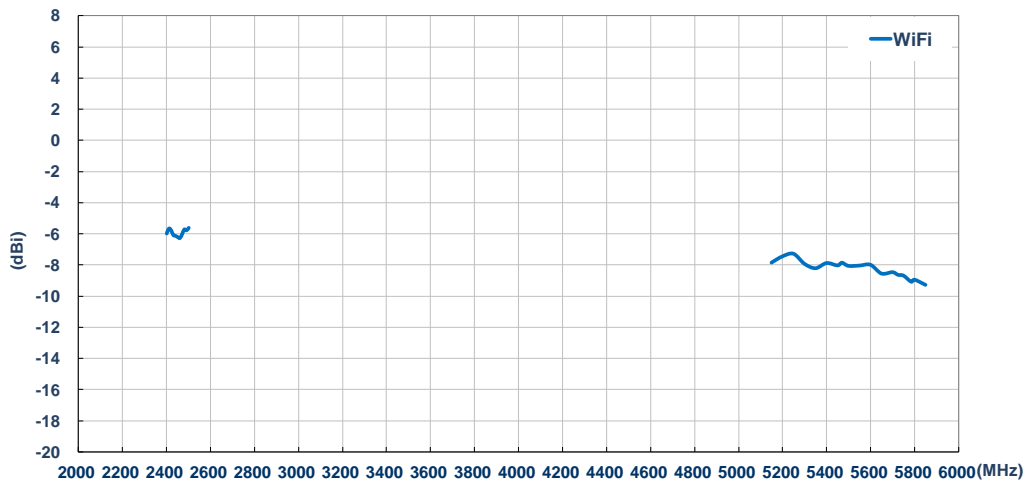
S11 (dB)



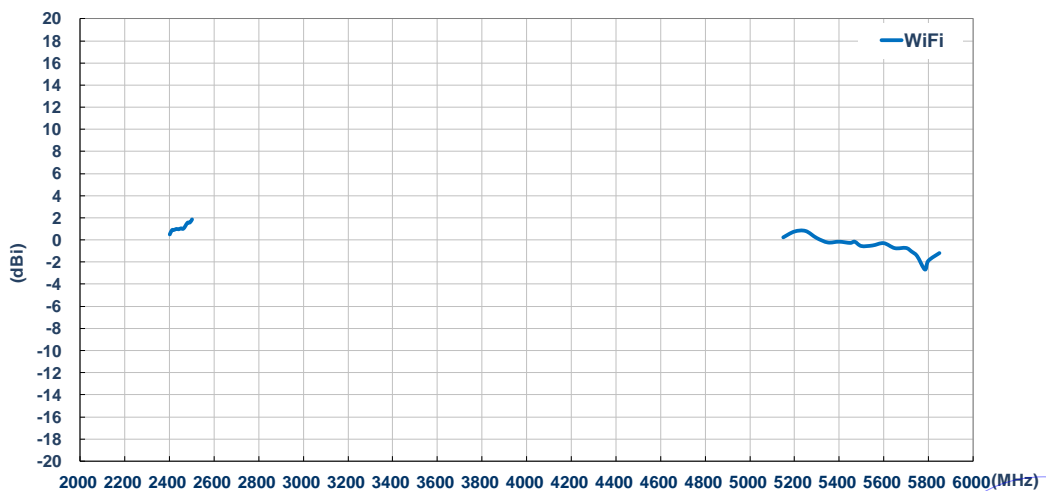
Efficiency (%)



Average Gain (dBi)

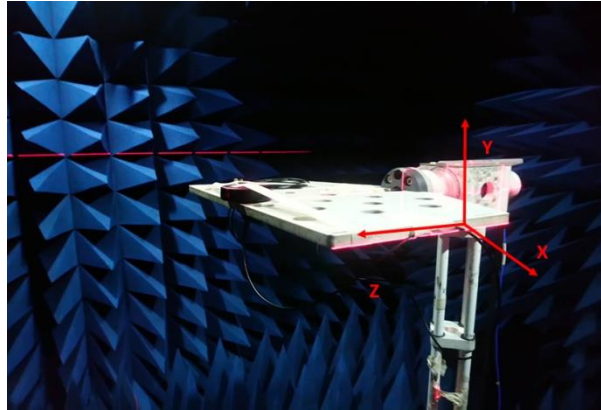


Peak Gain (dBi)

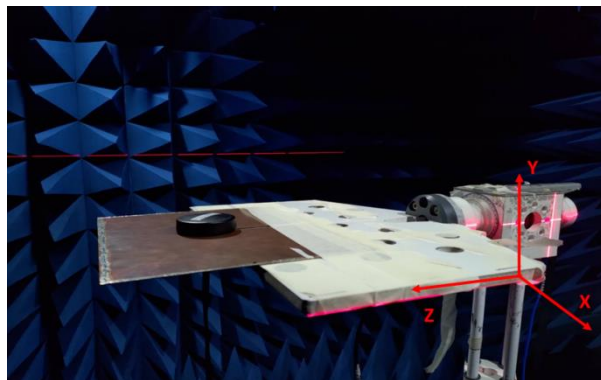


III. Antenna Radiation Pattern Measurement:

The antenna radiation patterns are measured in 3D Anechoic Chamber.
The measurement setup is as show below,
Free Space



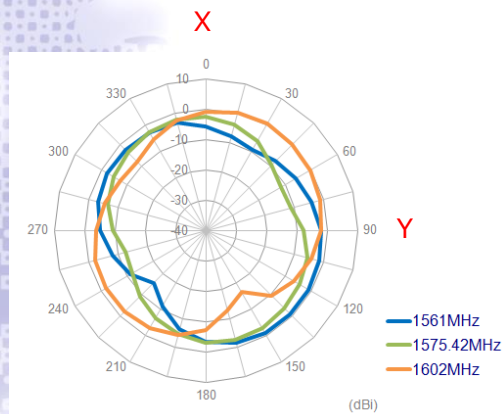
With 30*30cm Ground Plane



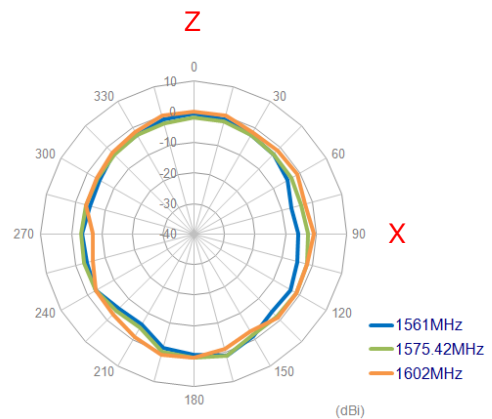
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IV. 2D Radiation Pattern:

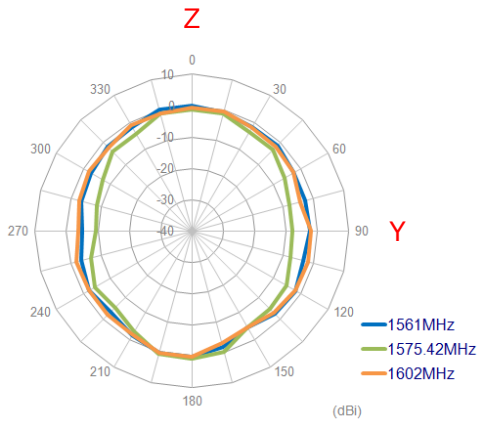
GNSS X-Y Plane



GNSS X-Z Plane

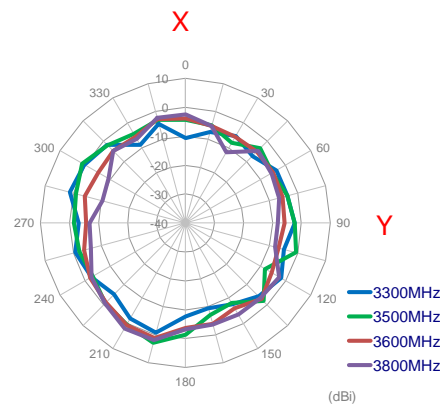
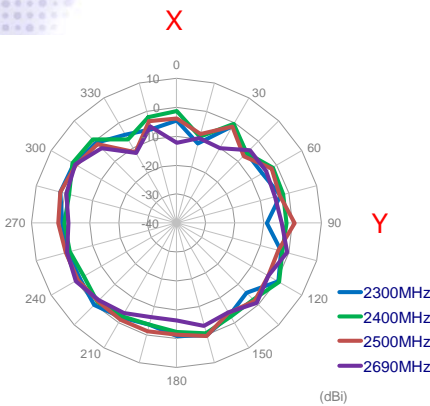
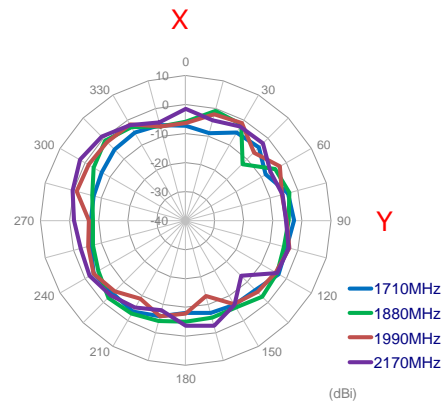
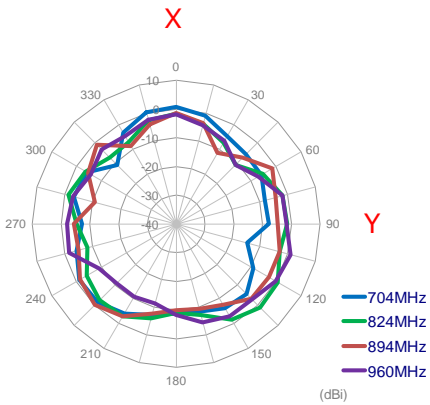


GNSS Y-Z Plane

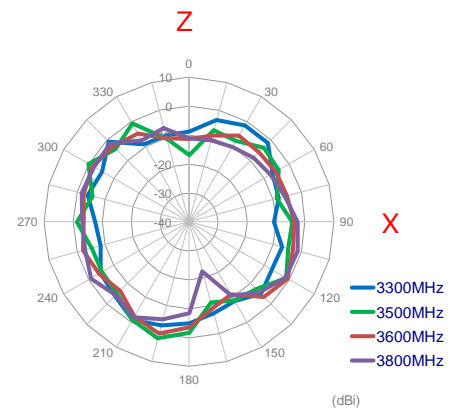
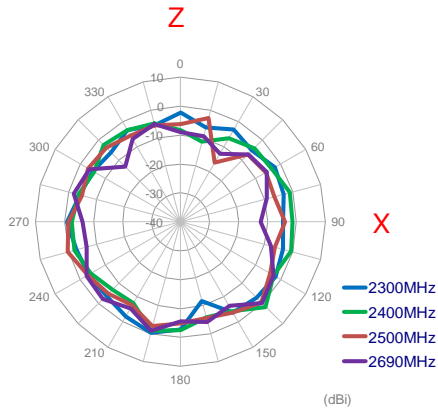
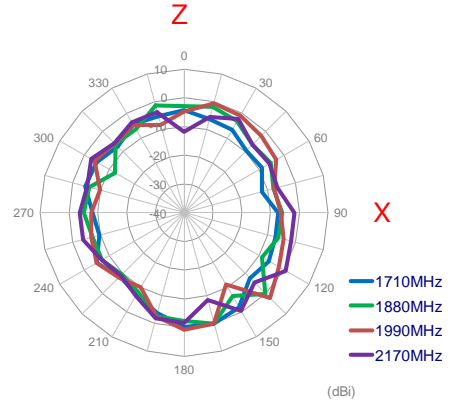
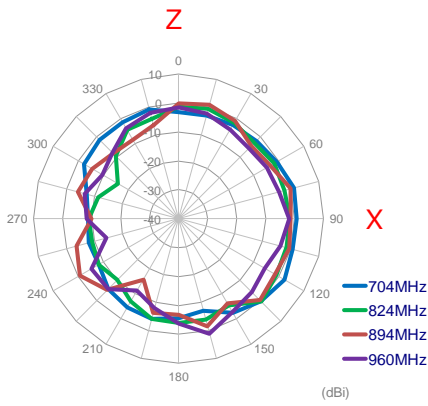


Free Space - LTE

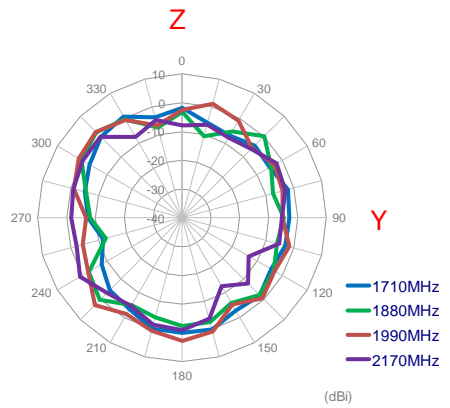
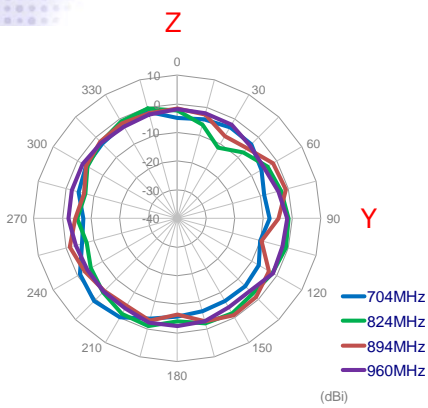
X-Y Plane



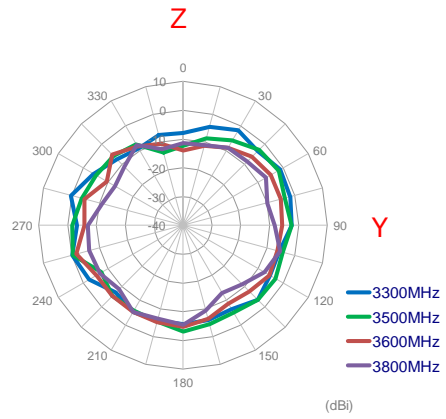
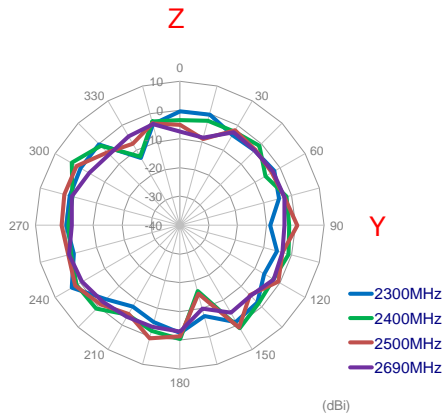
X-Z Plane



Y-Z Plane

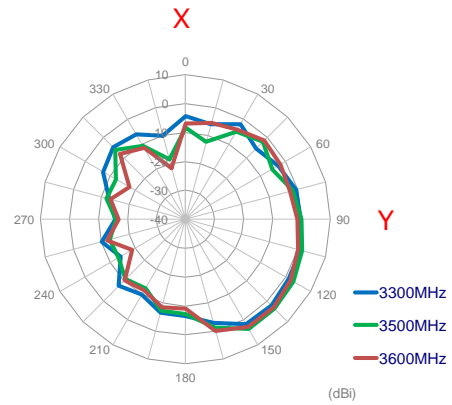
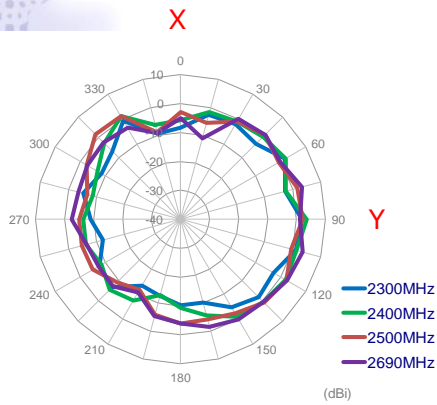
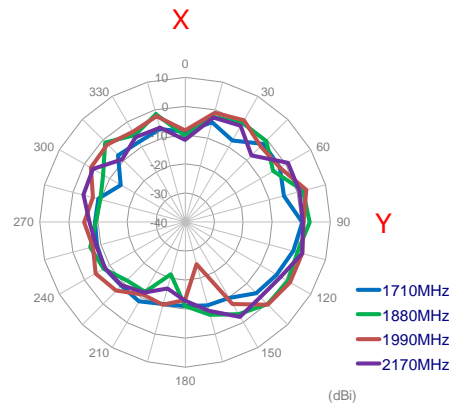
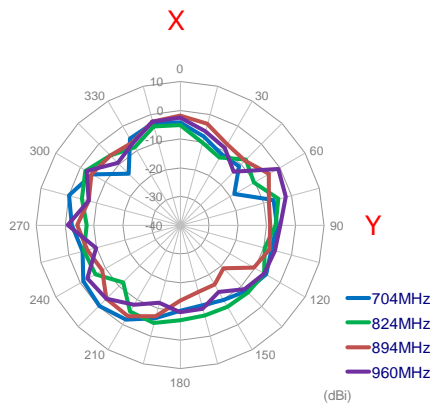


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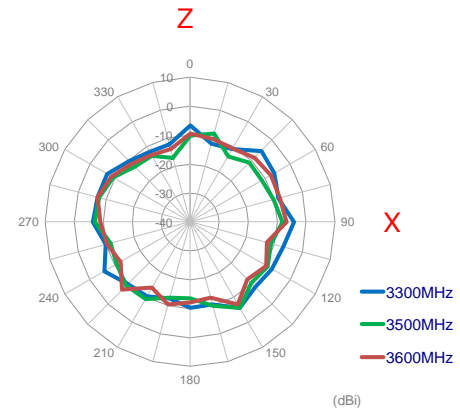
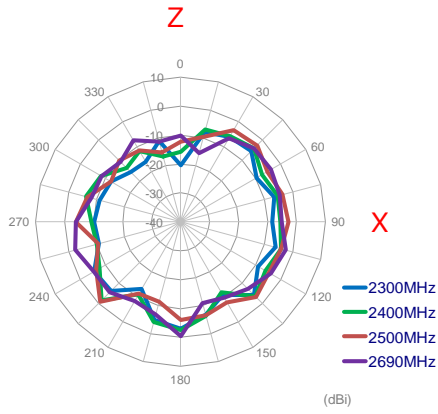
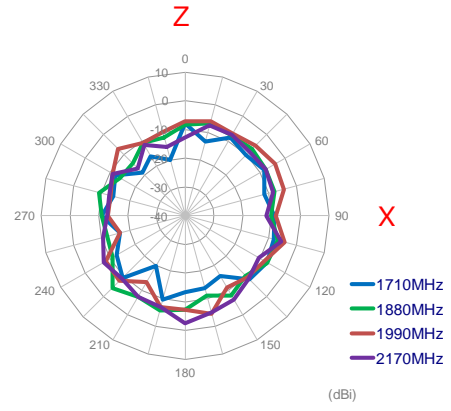
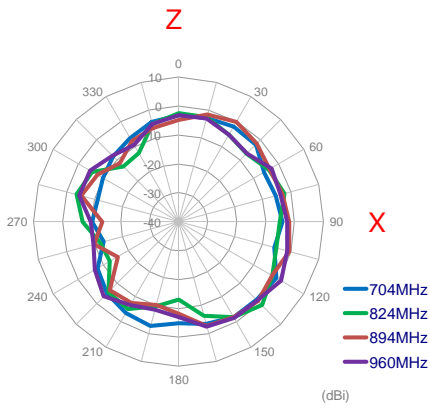


With 30*30cm Ground Plane – LTE

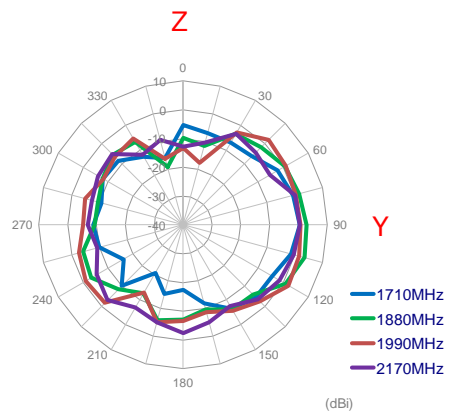
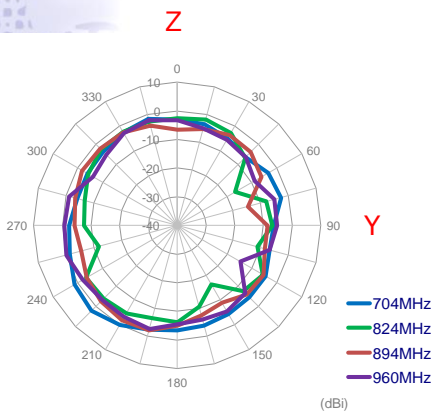
X-Y Plane



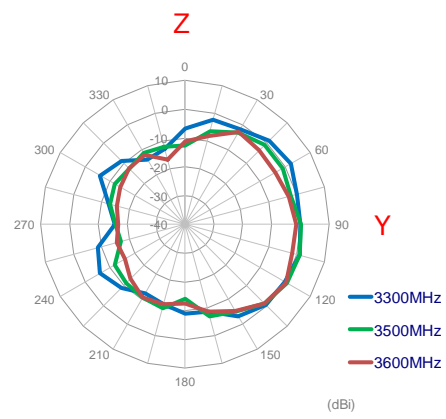
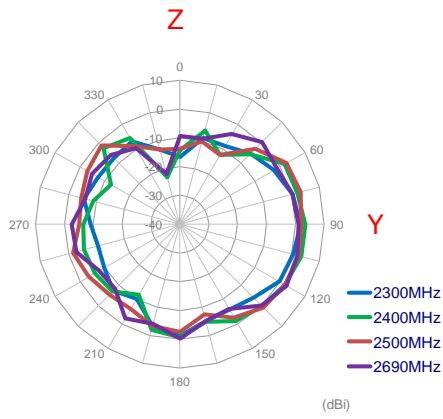
X-Z Plane



Y-Z Plane

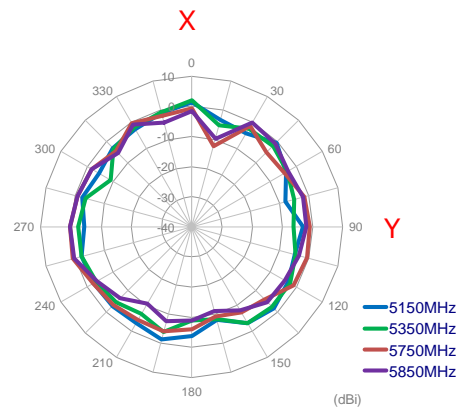
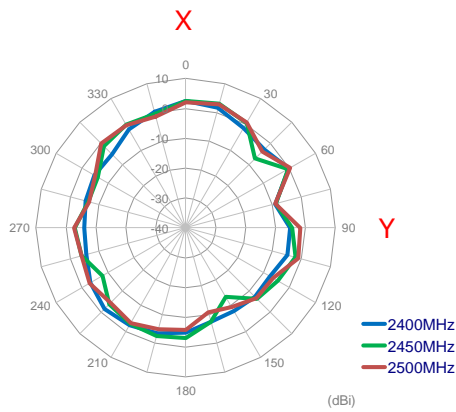


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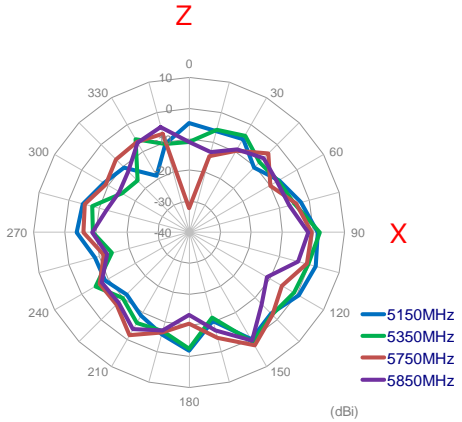
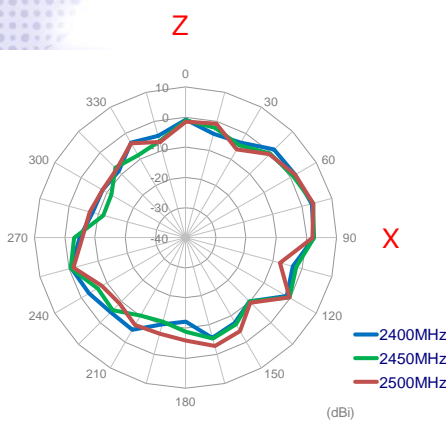


Free Space - WiFi

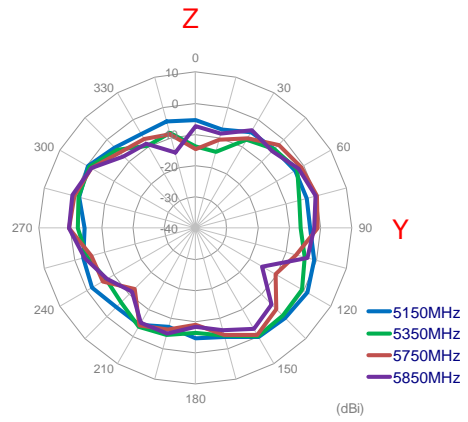
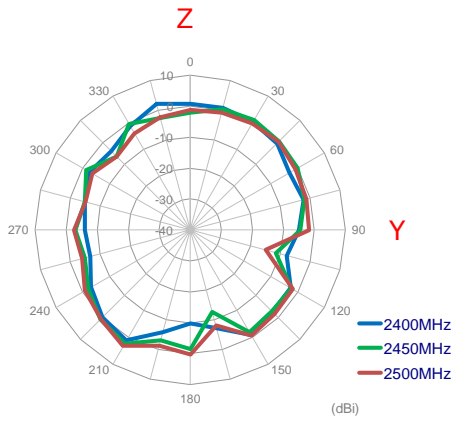
X-Y Plane



X-Z Plane

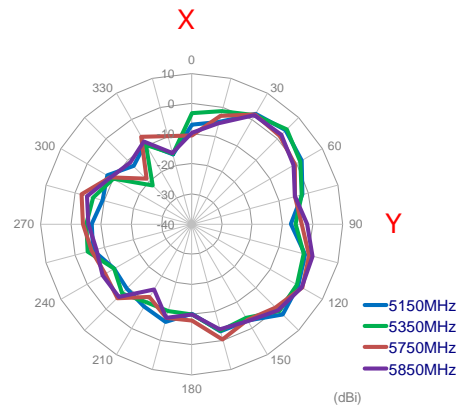
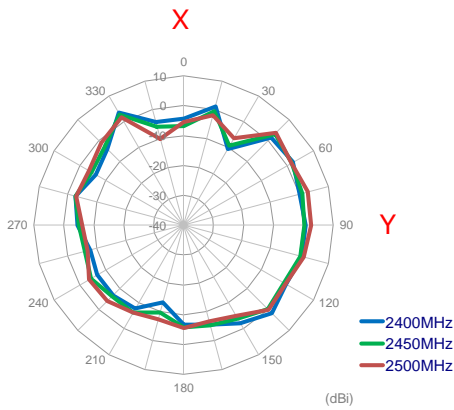


Y-Z Plane

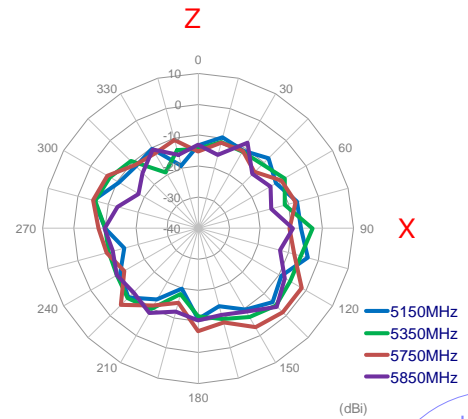
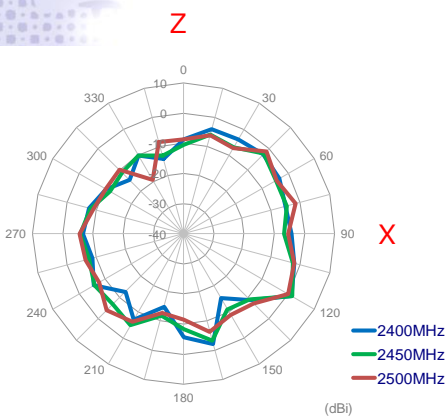


With 30*30cm Ground Plane – WiFi

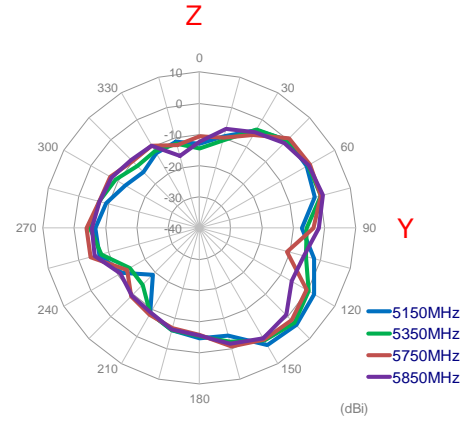
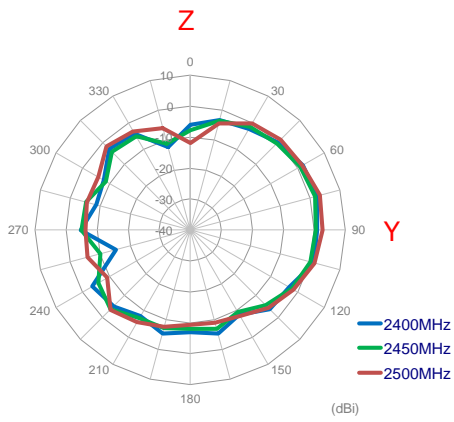
X-Y Plane



X-Z Plane



Y-Z Plane

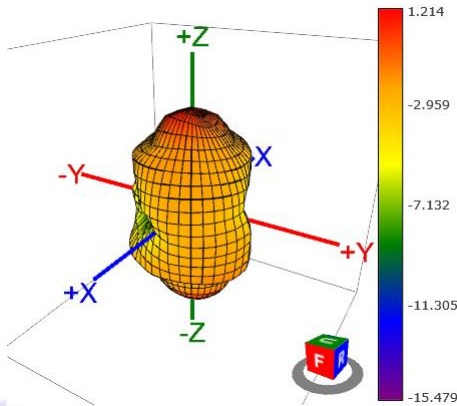


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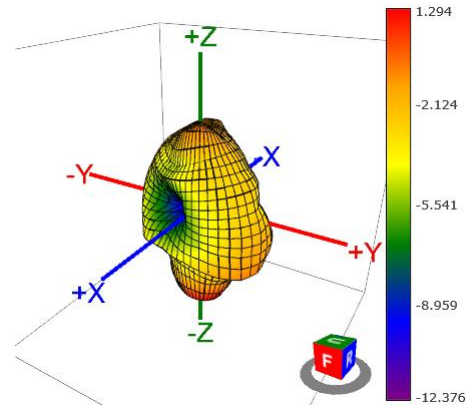
V. 3D Radiation Pattern:

GNSS

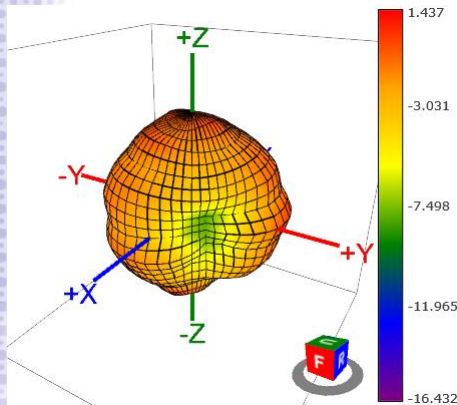
1561MHz



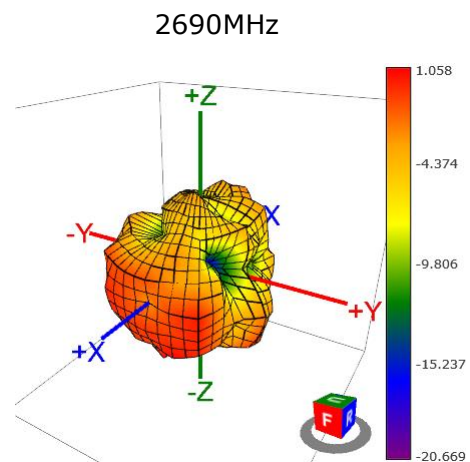
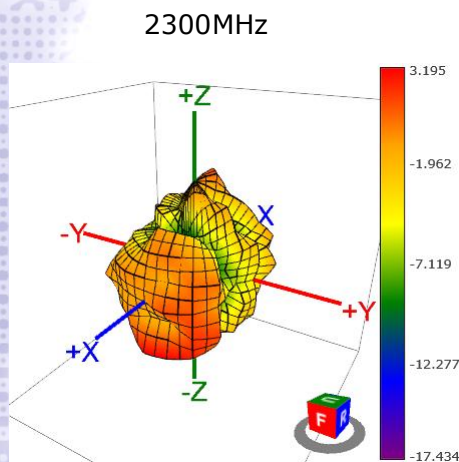
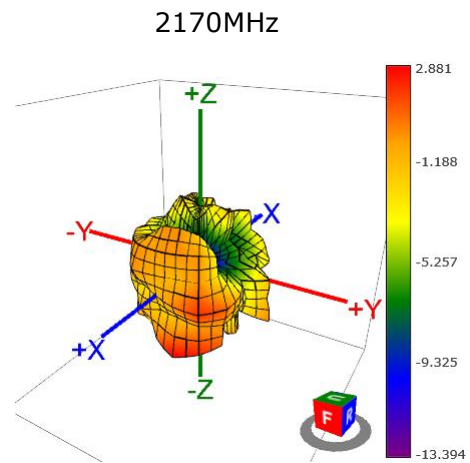
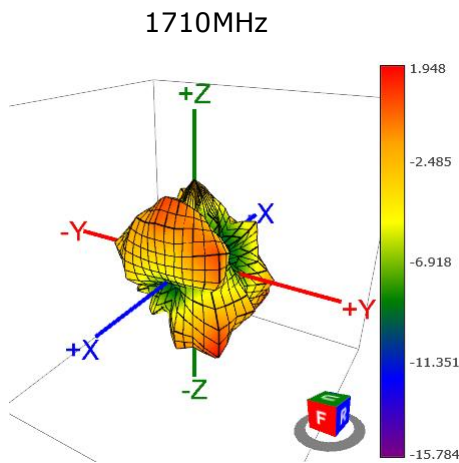
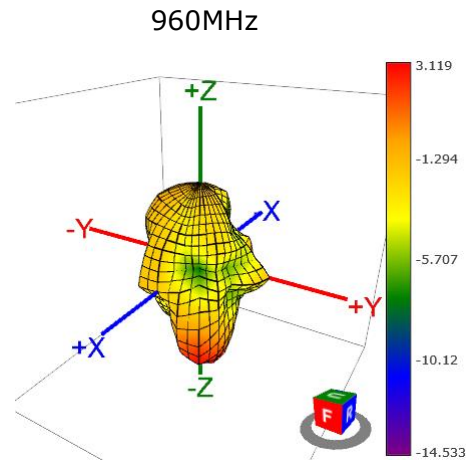
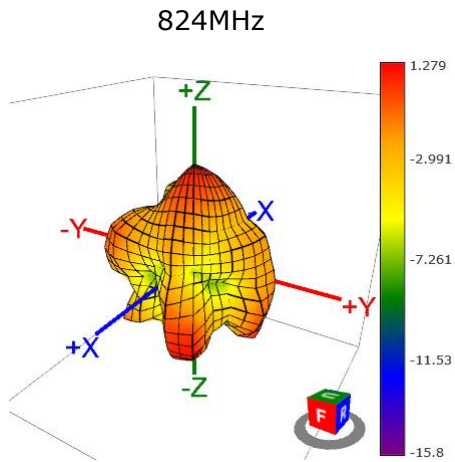
1575.42MHz



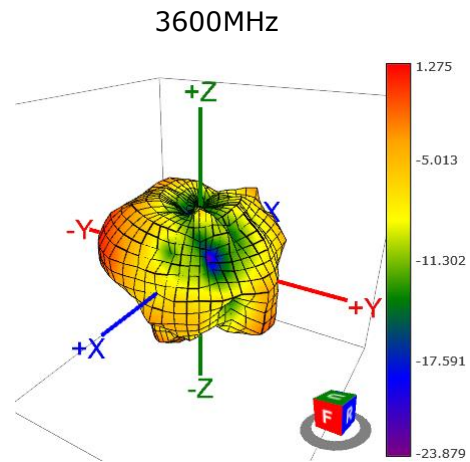
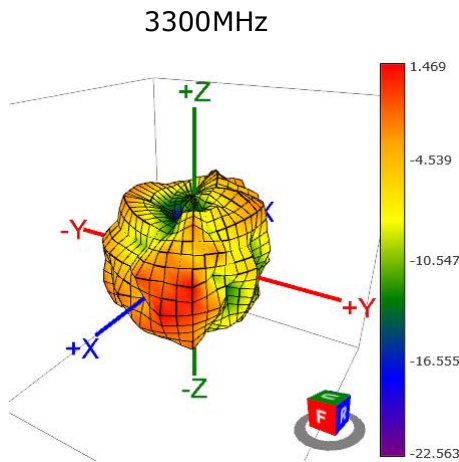
1602MHz



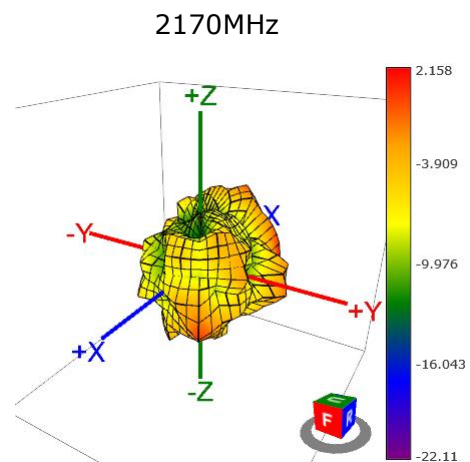
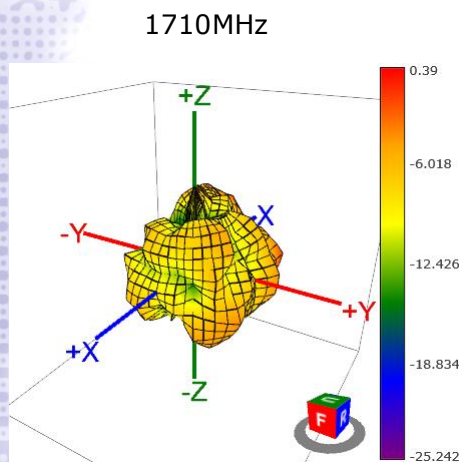
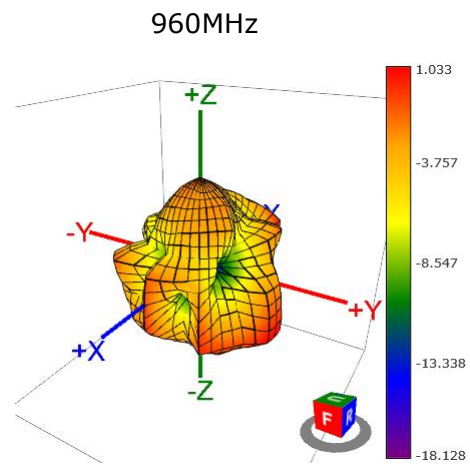
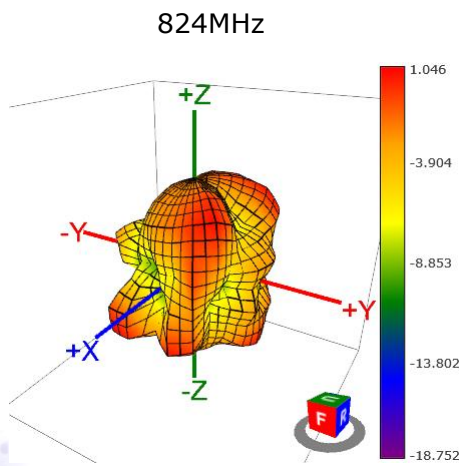
Free Space – LTE

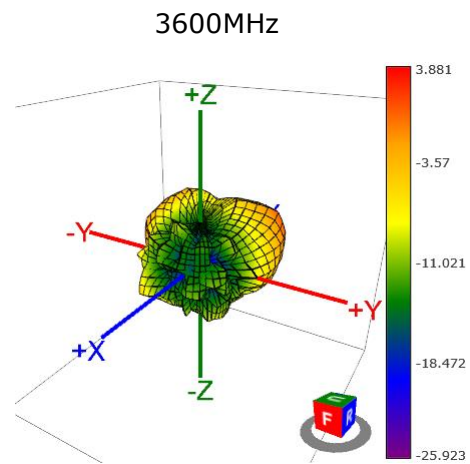
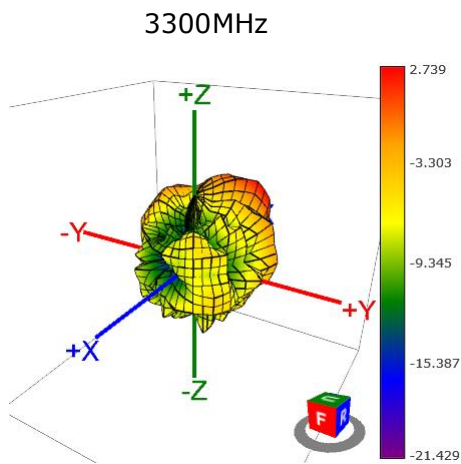
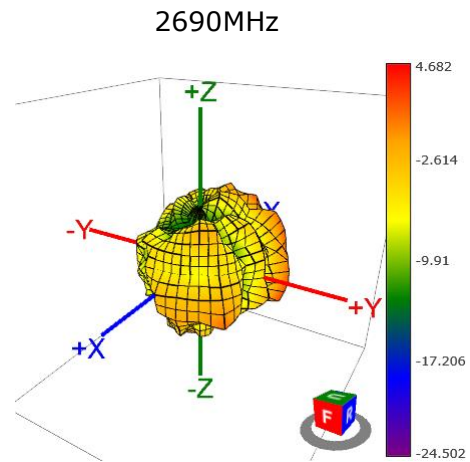
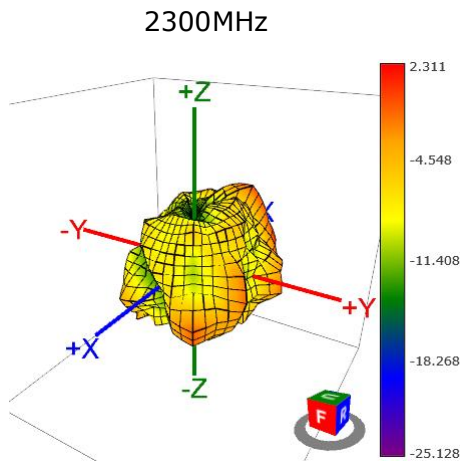


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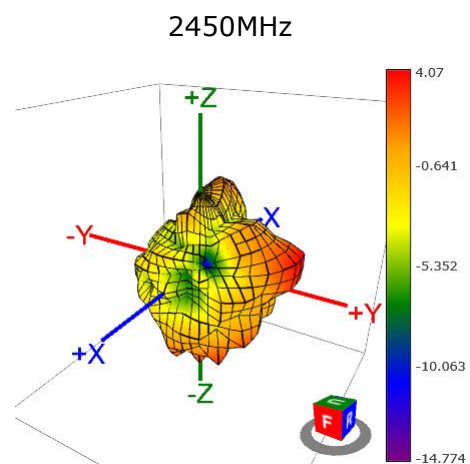
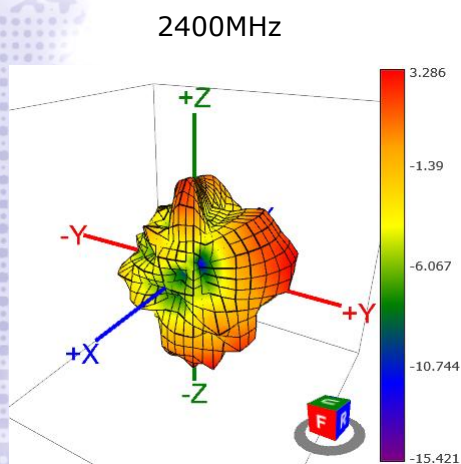


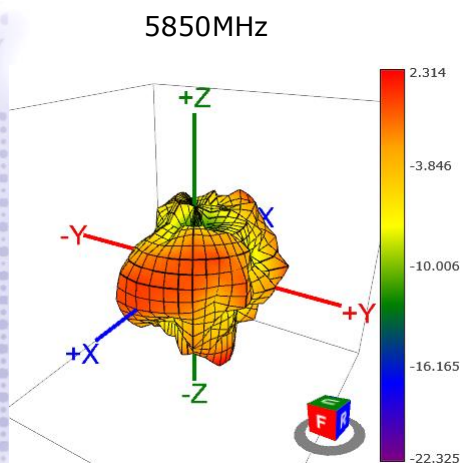
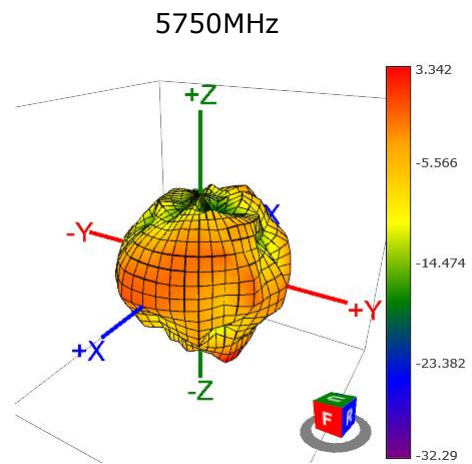
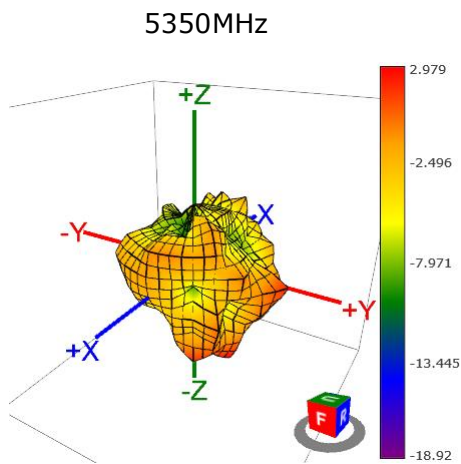
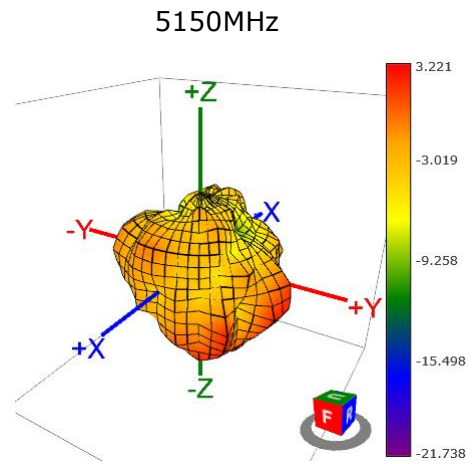
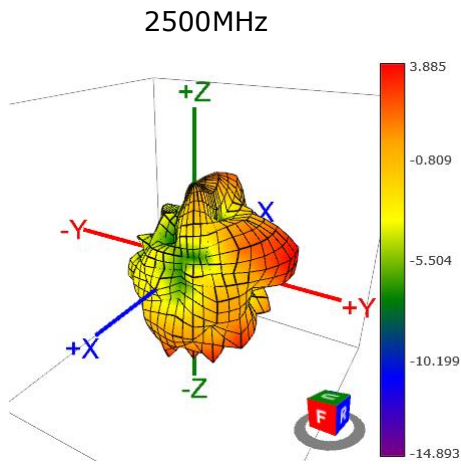
With 30*30cm Ground Plane – LTE





Free Space - WiFi

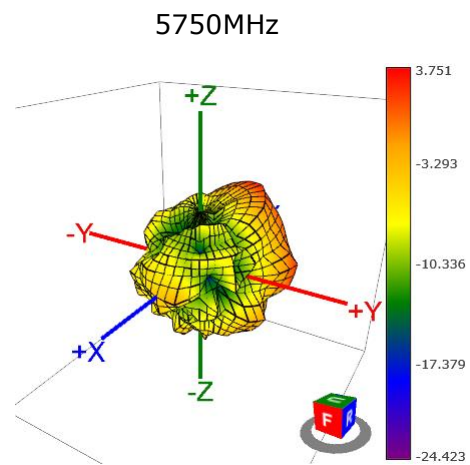
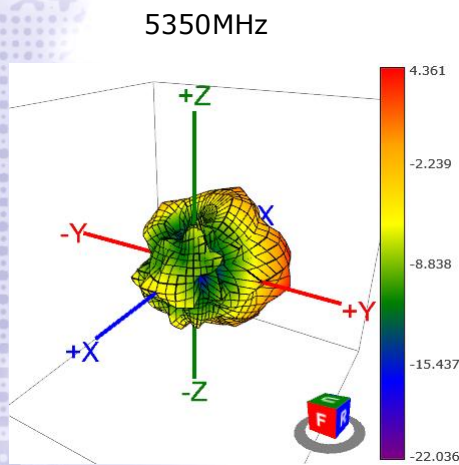
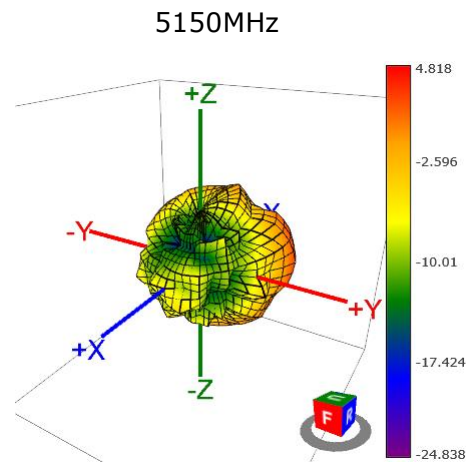
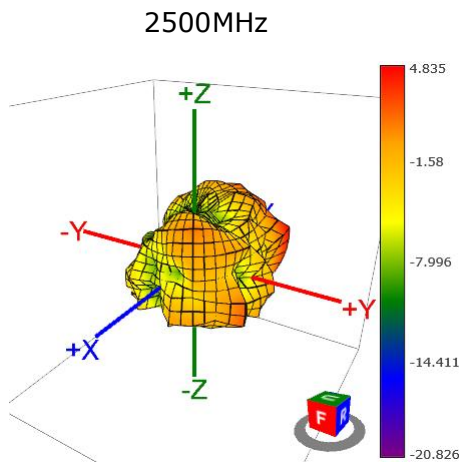
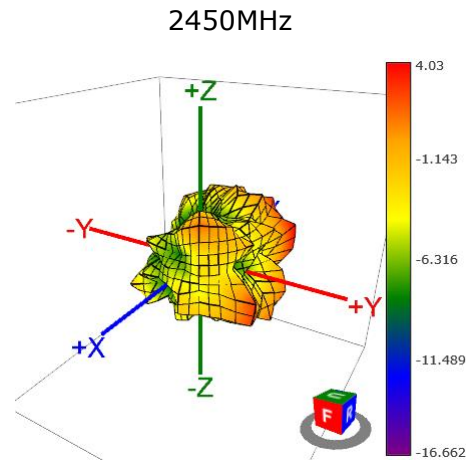
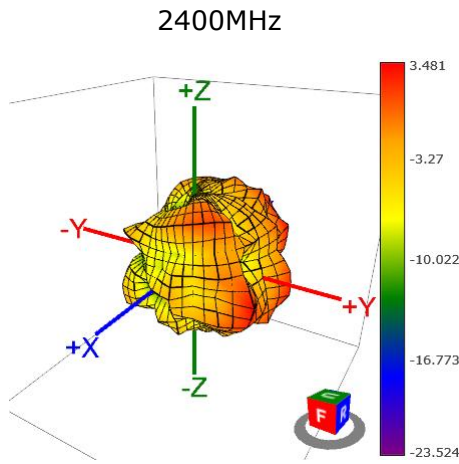


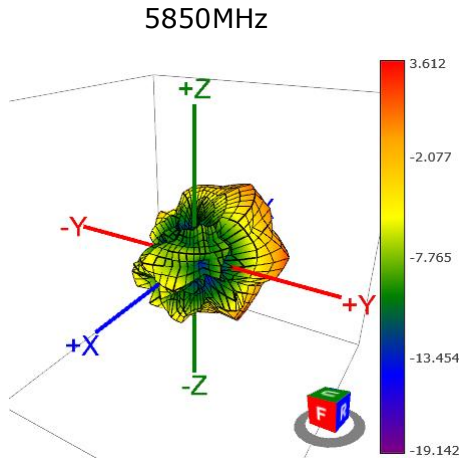


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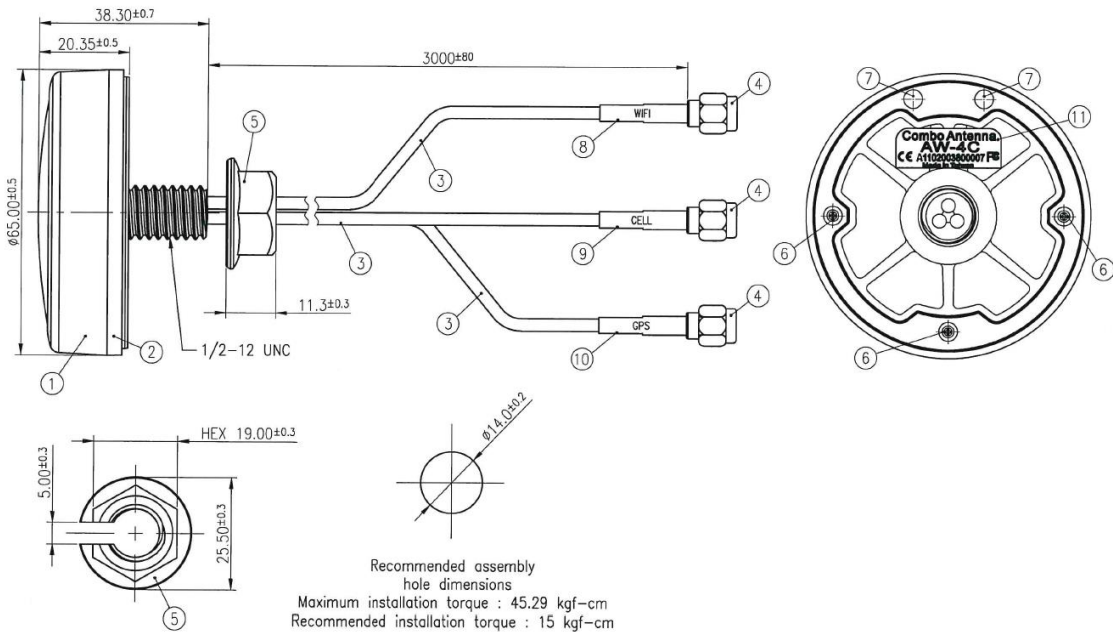
With 30*30cm Ground Plane – WiFi

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VI. Mechanical Drawing (Unit:mm):



1. All material must be RoHS compliant.
2. IP Code : IP67 / IP69K.

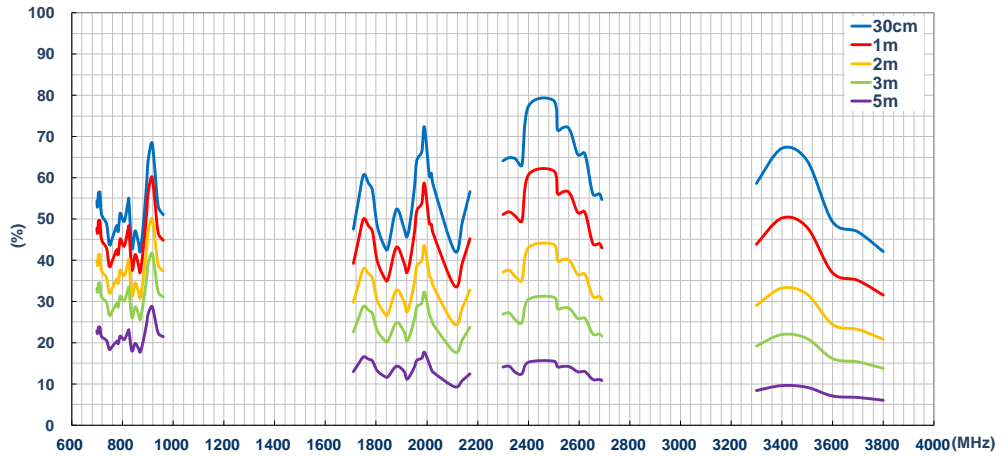
11	Label	PET	Silver	1
10	GPS Heat Shrink Tube	CTMS	Blue	1
9	CELL Heat Shrink Tube	CTMS	White	1
8	WIFI Heat Shrink Tube	CTMS	Yellow	1
7	Waterproof stopper	TPE	Black	2
6	Screw TP2.6x7	Steel	Ni Plated	3
5	Nut	Steel	Cr3+Zinc Black	1
4	SMA Straight Plug Crimp	Brass	Au Plated	3
3	Cable RG174	PVC	Black	3
2	Bottom Housing	PC+TPE	Black	1
1	Top Housing	PC	Black	1
No	NAME	MATERIAL	FINISH	Q'TY

VII. Applications Note:

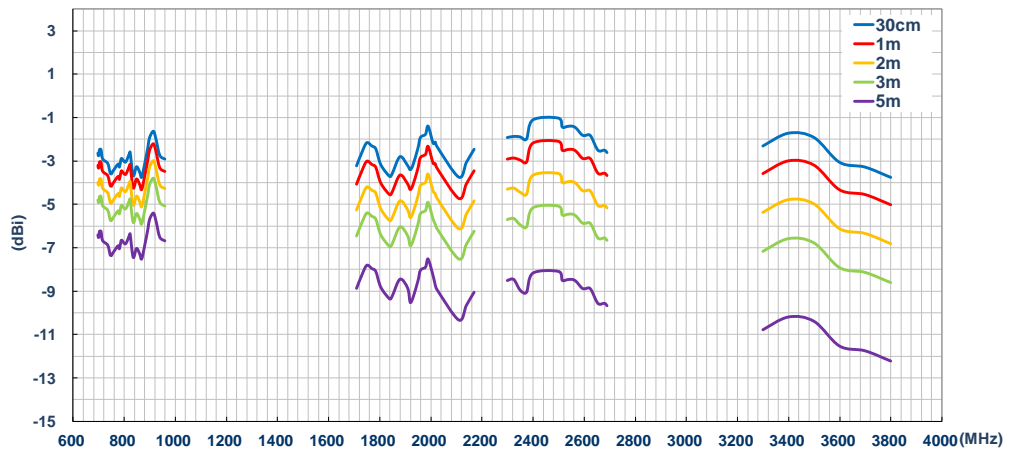
The antenna performance with different cable lengths is shown below.

Free Space – LTE

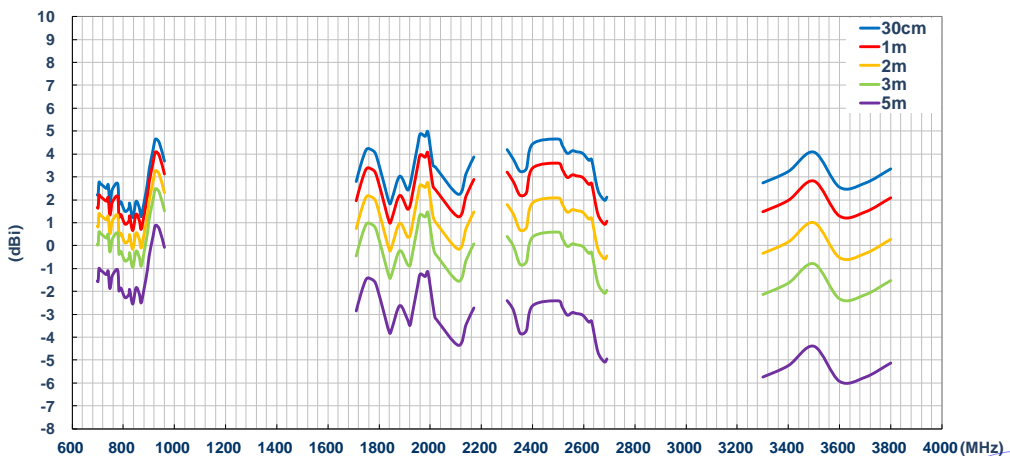
Efficiency (%)



Average Gain (dBi)



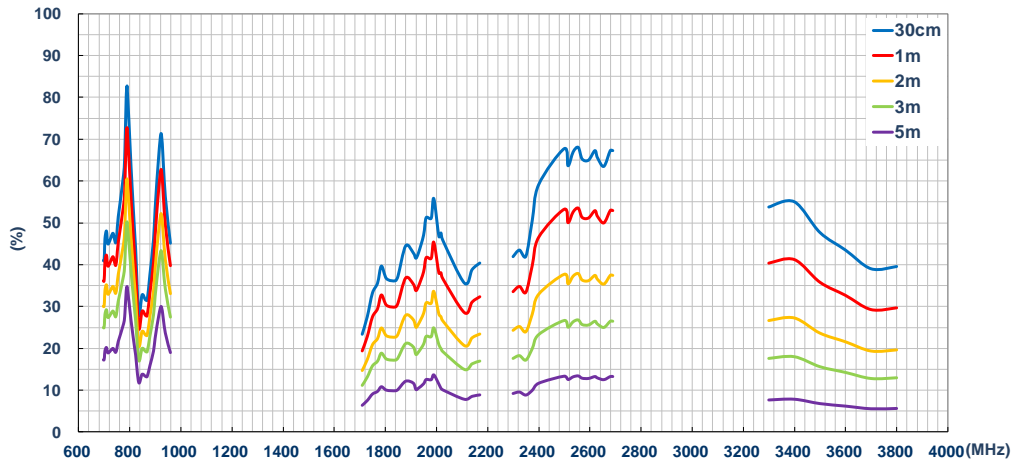
Peak Gain (dBi)



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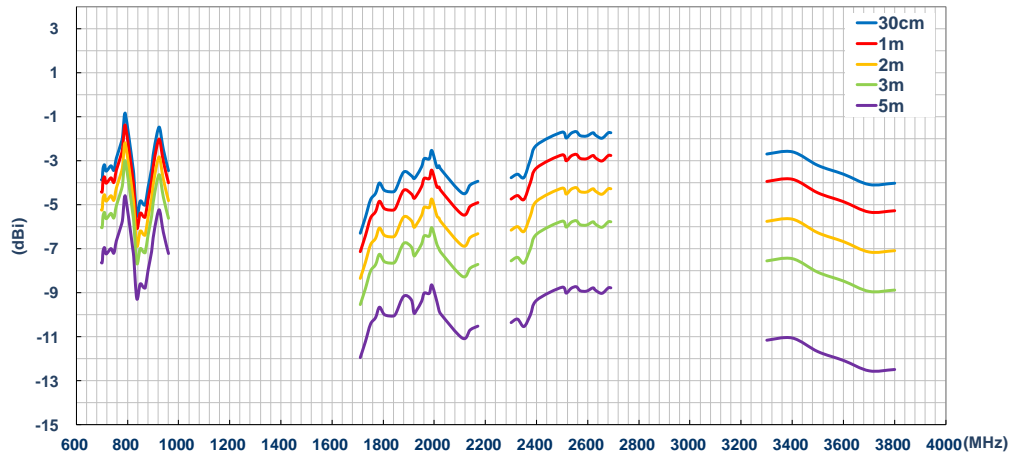
With 30*30cm Ground Plane – LTE

Efficiency (%)

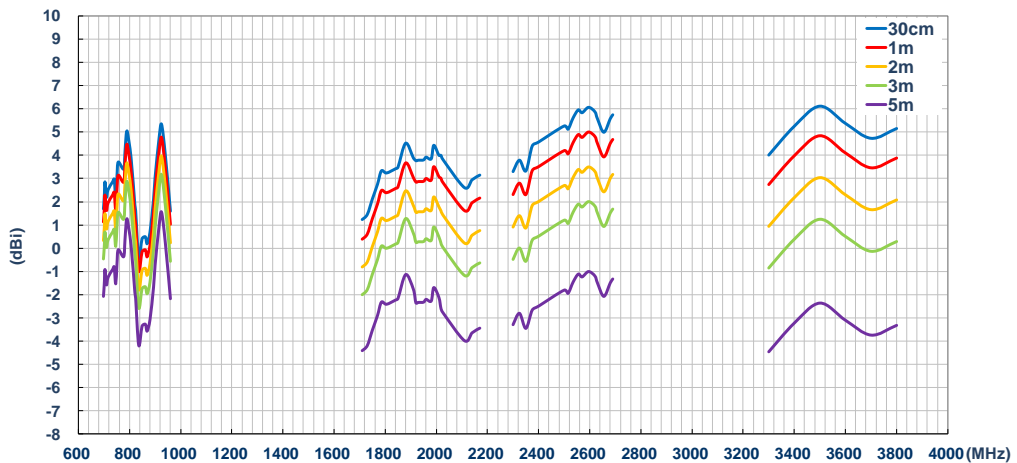


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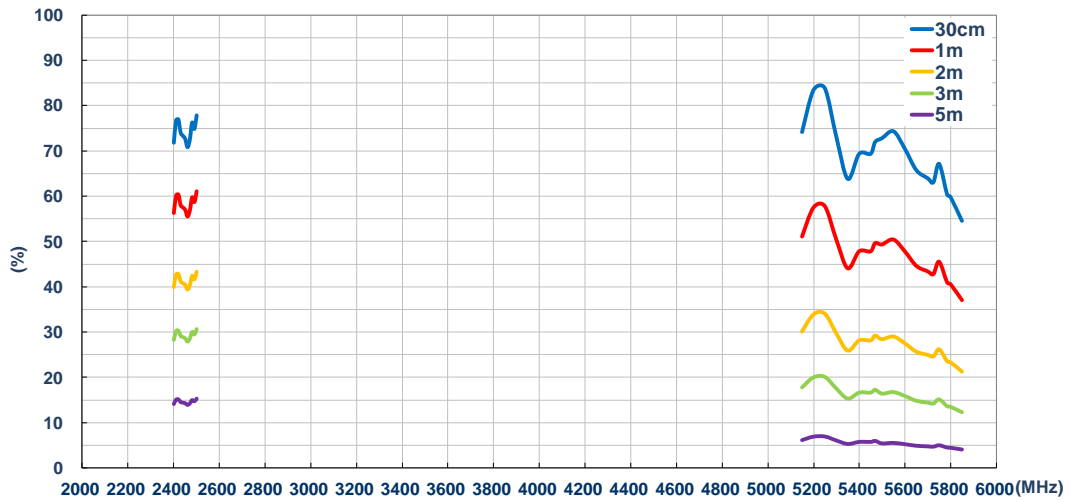
Average Gain (dBi)



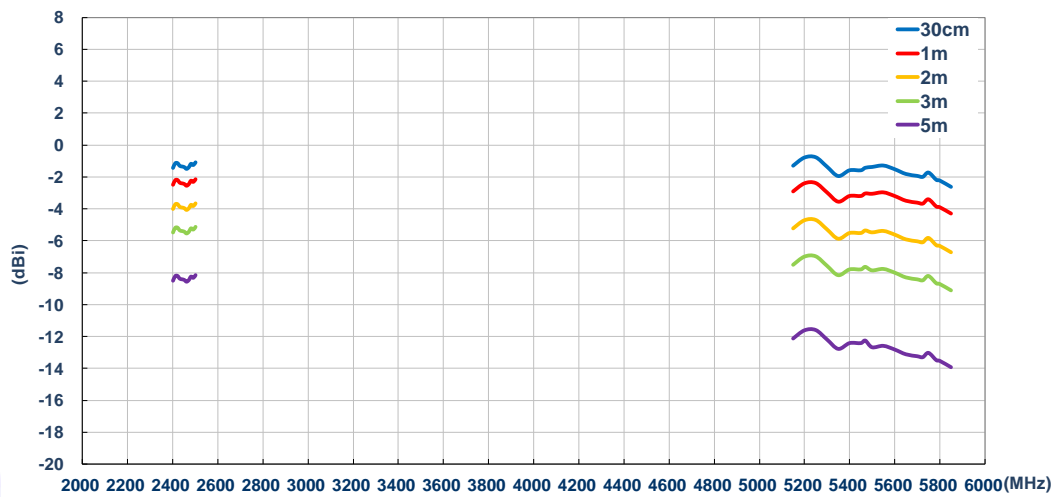
Peak Gain (dBi)



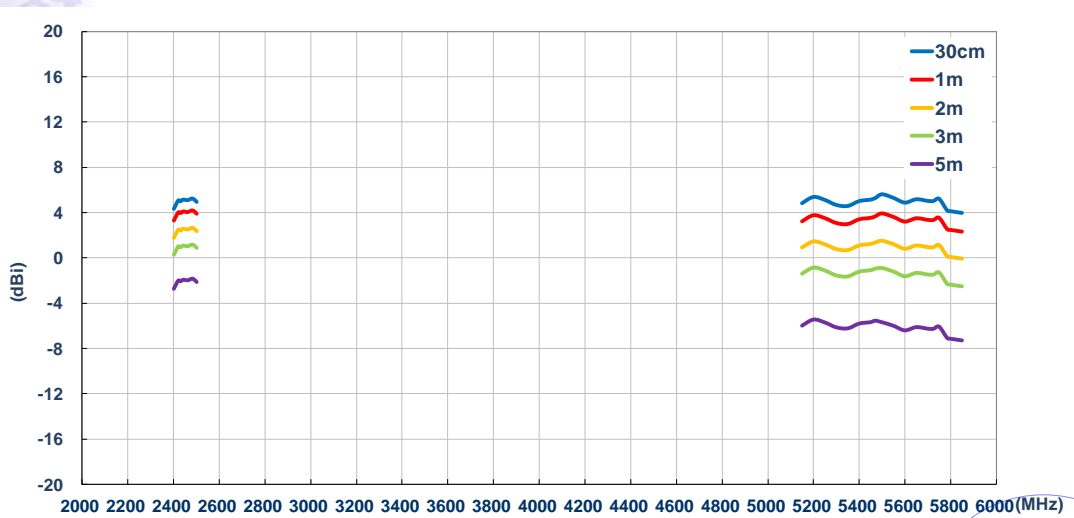
Free Space – WiFi
Efficiency (%)



Average Gain (dBi)



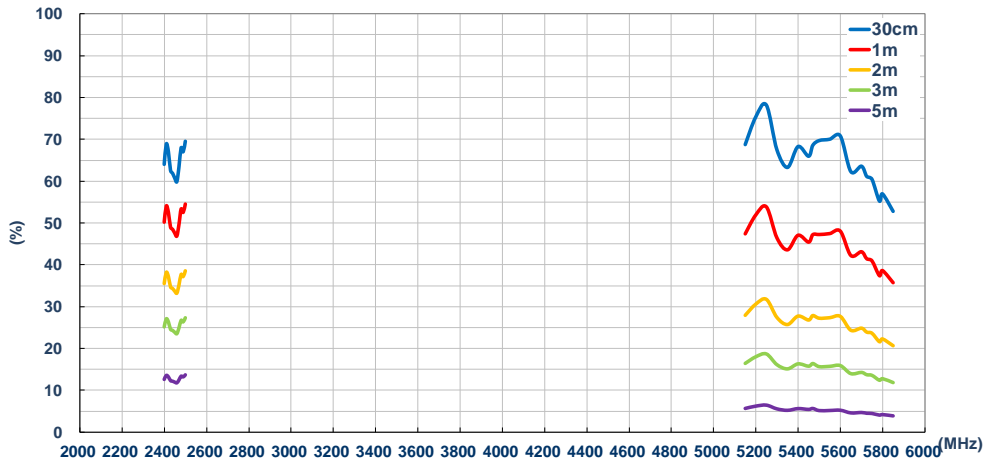
Peak Gain (dBi)



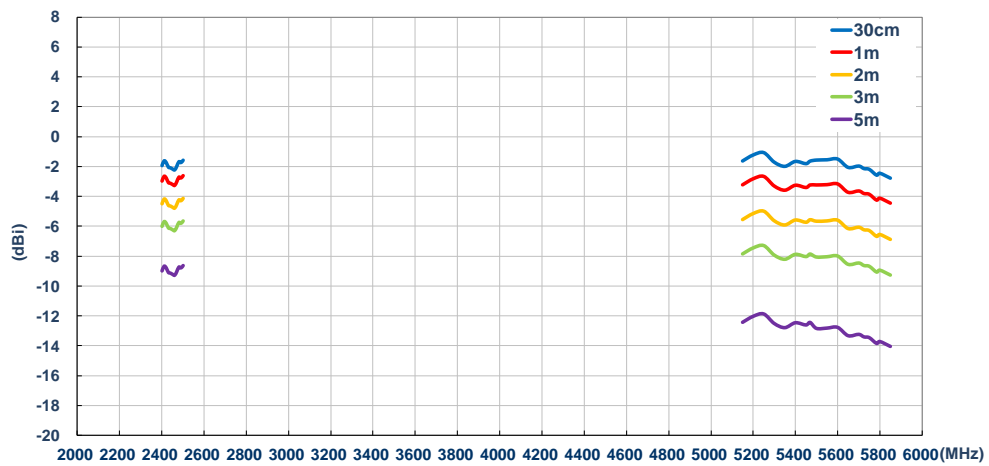
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With 30*30cm Ground Plane – WiFi

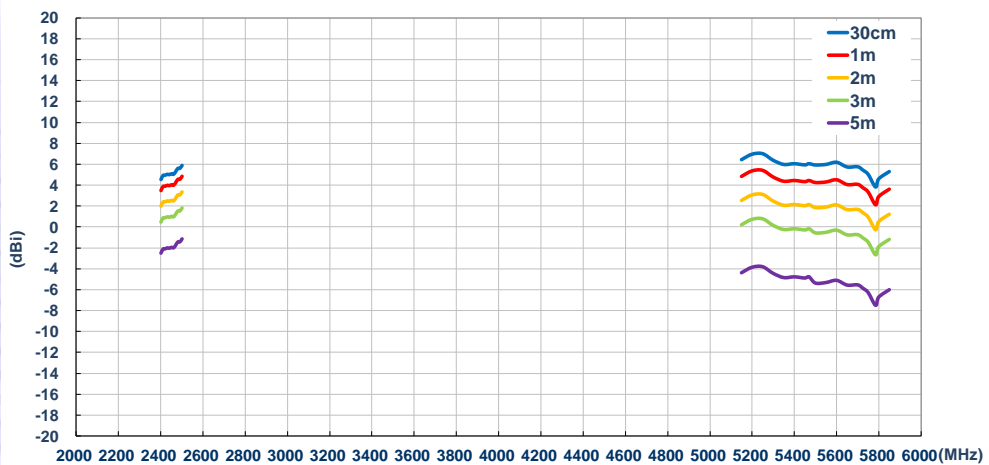
Efficiency (%)



Average Gain (dBi)



Peak Gain (dBi)



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