TAOGLAS

Datasheet

2-in-1 Ultima

Part No:
MA111.C.LB.001

Description:

MA111 Ultima Series – 2-in-1 Super Low-Profile Combination GPS/GLONASS/BeiDou/Galileo and Cellular Permanent Mount Antenna

Features:

Height: 19.6mm (0.77”)
Diameter: 55mm (2.17”)
Heavy duty Permanent Mount
UV and vandal resistant ABS housing and thread
IP67 Rated Waterproof
Cable: 3m RG-174 GNSS, 3m CFD-200 Cellular
Connector: SMA(M)ST
RoHS & Reach Compliant

1. Introduction

The MA111 Ultima Series 2-in-1 GPS/GLONASS/BeiDou/Galileo & Cellular Combination Antenna is an extremely low-profile combination high performance GPS/GLONASS/BeiDou/Galileo and cellular antenna solution for professional telematics applications. At only 22 mm height it is one the lowest profile antennas in the market, with a diameter of 55 mm. It is designed to be mounted and couple to the metal structures it attaches to radiate. Durable UV ABS housing, thread and nut is resistant to vandalism and direct attack.

Typical Applications Include:

- Asset Tracking
- Digital Signage
- Smart Metering

The IP67 waterproof robust plastic body makes it extremely light, economical for shipping and minimum weight impact on vehicles. This also makes it ideal for use in humid environments such as water pits or marine applications as there are no external metal parts to corrode. The closed cell foam with double-sided adhesive provides a permanent waterproof seal and can adjust to different curvatures, stopping water from leaking under the antenna into the mounting hole.

For applications that require mounting on non-metal structures we recommend the Hercules MA105. The cables and connectors are fully customizable, contact your regional Taoglas Customer support teams for more information.

2. Specifications

GNSS Frequency Bands Covered							
GPS/QZSS	L1 1575.42MHz	L2 1227.6MHz	L5 1176.45MHz	L6 1278.75MHz			
	■	□	□	□			
GLONASS	L5R 1176.45MHz	L3PT 1201.5MHz	L2PT 1246MHz	L1CR 1575.42MHz	L1PT 1602MHz		
	□	□	□	■	■		
Galileo	E5a 1176.45MHz	E5b 1201.5MHz	E4 1215MHz	E3 1256MHz	E6 1278.75MHz	E2 1561MHz	L1 1575.42MHz
	□	□	□	□	□	■	■
BeiDou	B1 1561MHz	B2 1207.14MHz	B3 1268.52MHz				
	■	□	□				
Compass	E5B(B2)/ E6(B3) 1268.56MHz	E2(B1) 1561MHz					
	□	■					
SBAS	Omnistar 1542.5MHz	WAAS/EGN OS 1575.42MHz					
	□	■					

GNSS Electrical			
Frequency (MHz)	**1561**	**1575.42**	**1602**
Efficiency (%)			
Free space	48.3	56.2	42.6
30x30cm Ground plane	44.7	55.7	61.5
Average Gain (dB)			
Free space	-3.16	-2.50	-3.71
30x30cm Ground plane	-3.49	-2.54	-2.11
Peak Gain (dBi)			
Free space	1.08	1.88	1.05
30x30cm Ground plane	1.32	2.56	4.13
Polarization	RHCP		
Impedance	50Ω		
Return Loss	<-10dB		

LNA and Filter Electrical Properties			
Frequency (MHz)	**1561**	**1575.42**	**1602**
Gain@1.8V (Typ.)	22.23dB	21.65dB	18.85dB
Gain@3.0V (Typ.)	30.11dB	32.39dB	28.37dB
Gain@5.5V (Typ.)	34.87dB	39.07dB	33.09dB
Noise@1.8V (Typ.)	1.83dB	1.85dB	1.99dB
Noise@3.0V (Typ.)	1.5dB	1.49dB	1.5dB
Noise@5.5V (Typ.)	1.66dB	1.61dB	1.62dB
Current@1.8V(mA)	4.88mA		
Current@3.0V(mA)	10.84mA		
Current@5.5V(mA)	22.83mA		

Cellular Antenna											
Frequency (MHz)		**5G NR Band 71**	**LTE700**	**GSM 850/900**	**5G NR Band**	**DCS**	**PCS**	**UMTS1**	**LTE2600**	**5G NR Band 77, 78, 79**	**LTE5200/ Wi-Fi 5800**
		617 ~698	**698 ~806**	**824 ~960**	**1427 ~1518**	**1710 ~1880**	**1850 ~1990**	**1920 ~2170**	**2490 ~2690**	**3300 ~3500**	**5150 ~5925**
Efficiency (%)											
Free Space	3m	9.6	10.9	21.2	13.0	49.9	47.9	40.7	14.8	28.6	26.9
30x30cm Ground Plane	3m	2.0	29.3	51.0	10.1	36.6	37.4	29.2	11.7	25.5	20.4
Average Gain (dB)											
Free Space	3m	-10.18	-9.63	-6.73	-8.87	-3.02	-3.20	-3.90	-8.29	-5.44	-5.70
30x30cm Ground Plane	3m	-16.91	-5.33	-2.92	-9.95	-4.36	-4.27	-5.35	-9.34	-5.94	-6.91
Peak Gain (dBi)											
Free Space	3m	-5.83	-5.41	-1.66	-3.70	2.20	2.40	1.56	-3.06	1.10	-0.44
30x30cm Ground Plane	3m	-10.81	-0.09	2.93	-1.42	2.73	4.01	3.33	-2.18	0.60	0.11
Impedance		50Ω									
Polarization		Linear									
Radiation Pattern		Omni-Directional									

Mechanical	
Dimensions	Diameter: 55mm, Height: 30mm
Cable type	Cellular: CFD-200 GPS/GLONASS/BeiDou/Galileo: RG-174
Cable length	3000mm
Casing	ABS
Connector	SMA Male
Thread Diameter	M24
Weight	0.21Kg
Environmental	
Temperature Range	-40°C to 85°C
Waterproof	IP67
Thermal Shock	100 cycles -40°C to +80°C
Shock (drop test)	1m drop on concrete 6 axes
Humidity	Non-condensing 65°C 95% RH

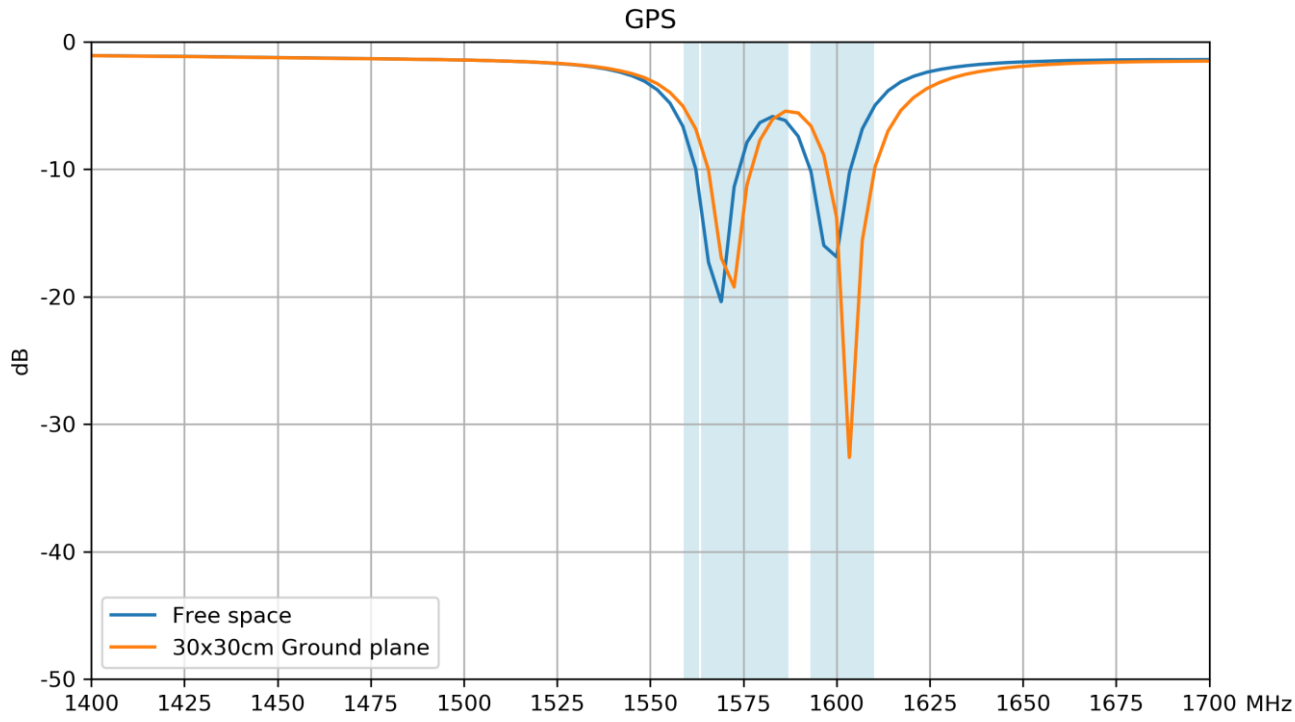
5G/4G Bands			
Band Number	5GNR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	**Downlink**	**Covered**
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 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		✓

*Tested on 30*30cm Ground Plane

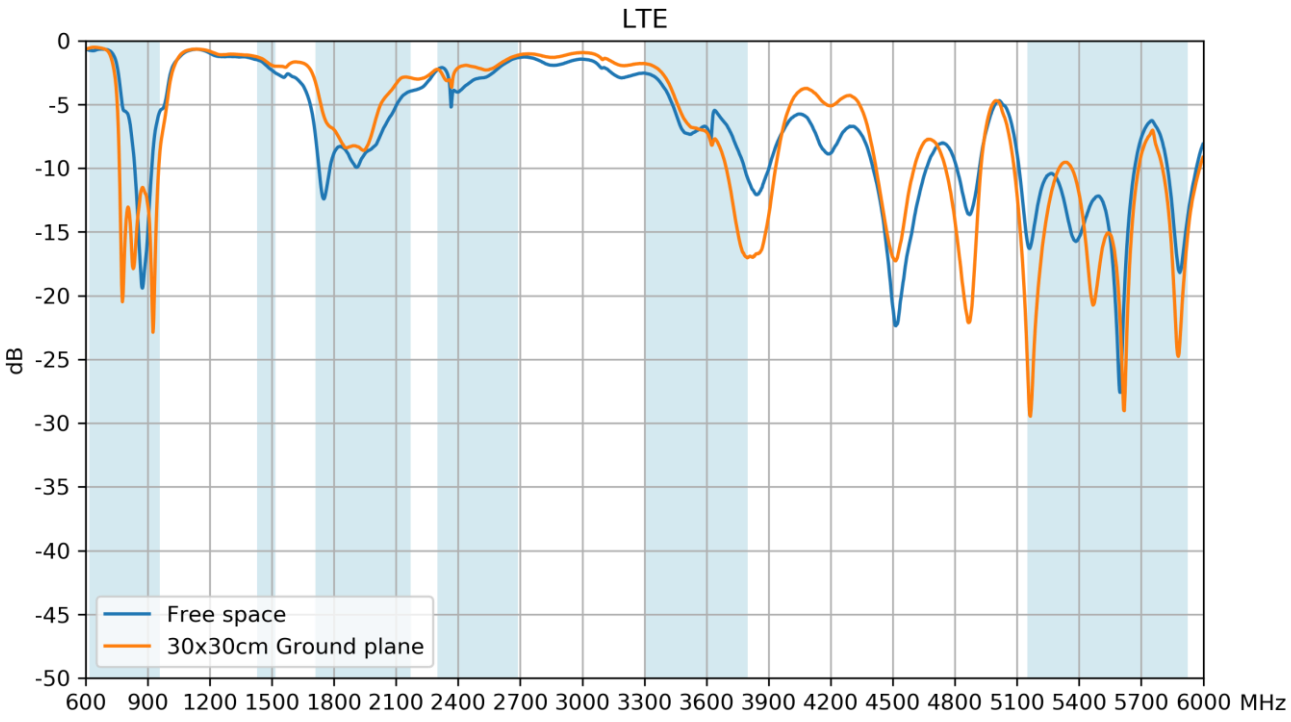
**Covered bands represent greater than 20% Efficiency

3. Antenna Characteristics

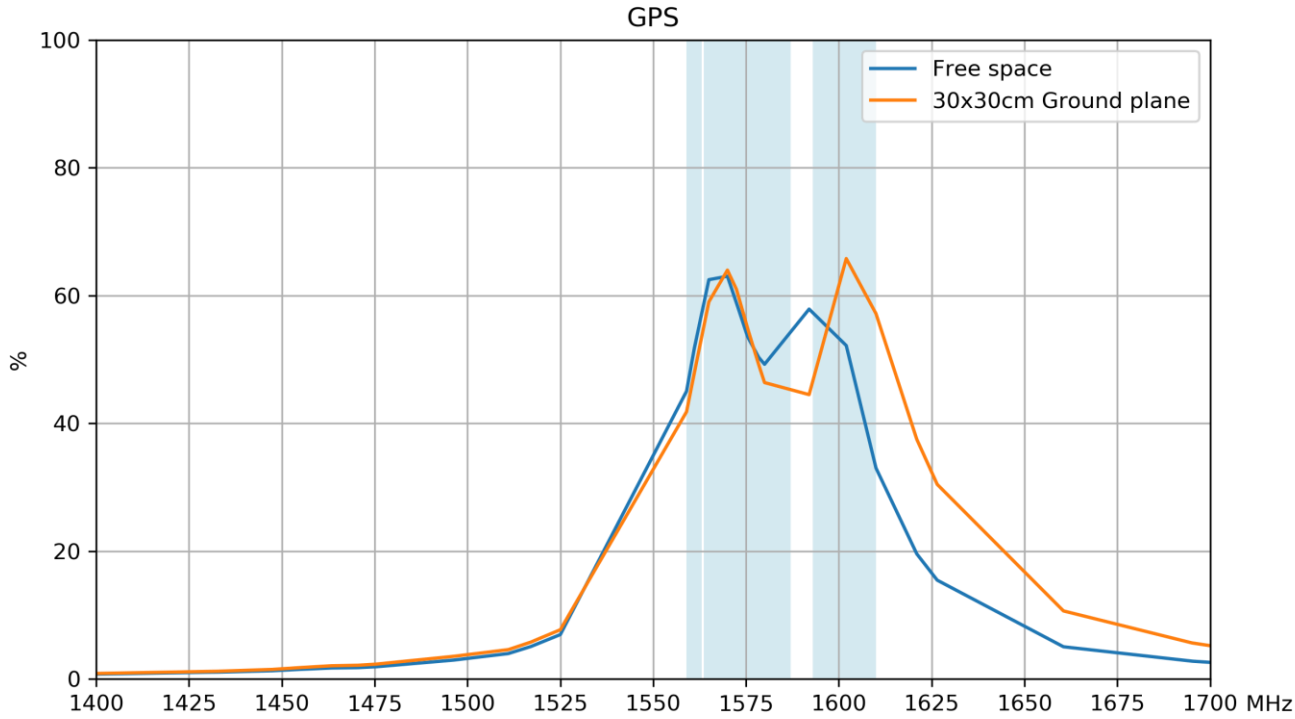
3.1 Return Loss – GNSS



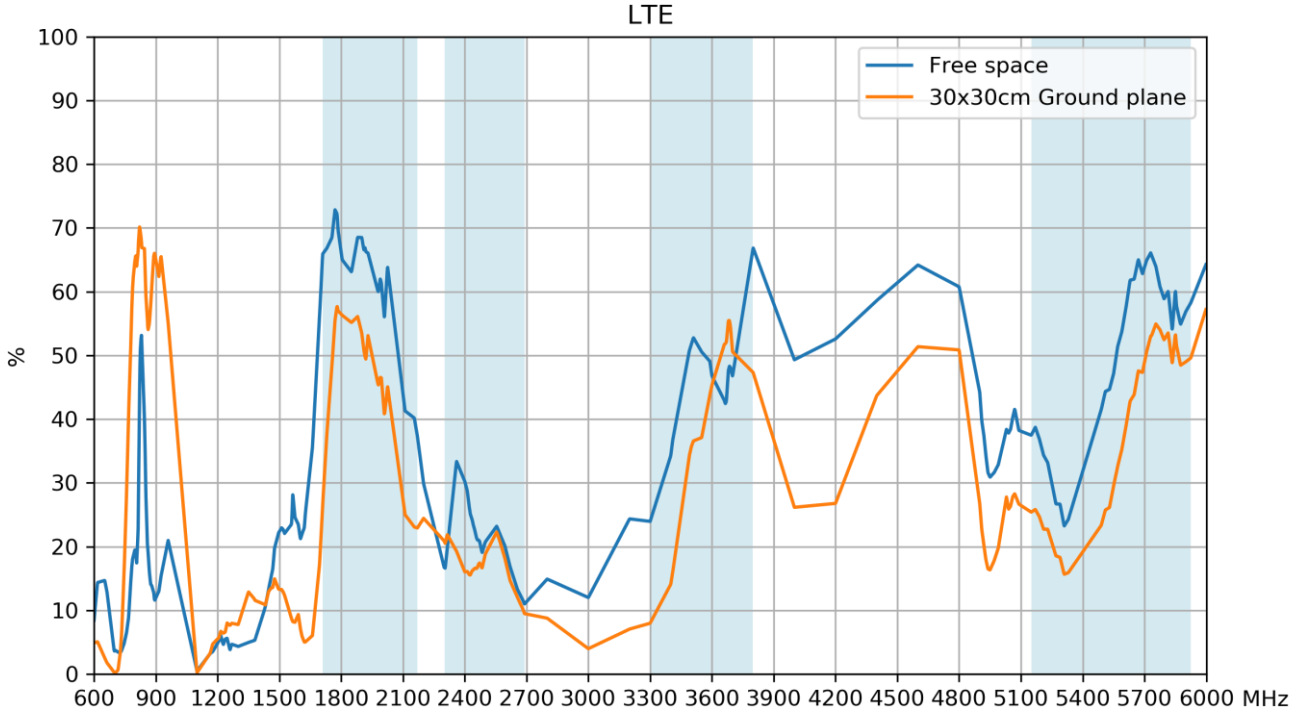
3.2 Return Loss – Cellular



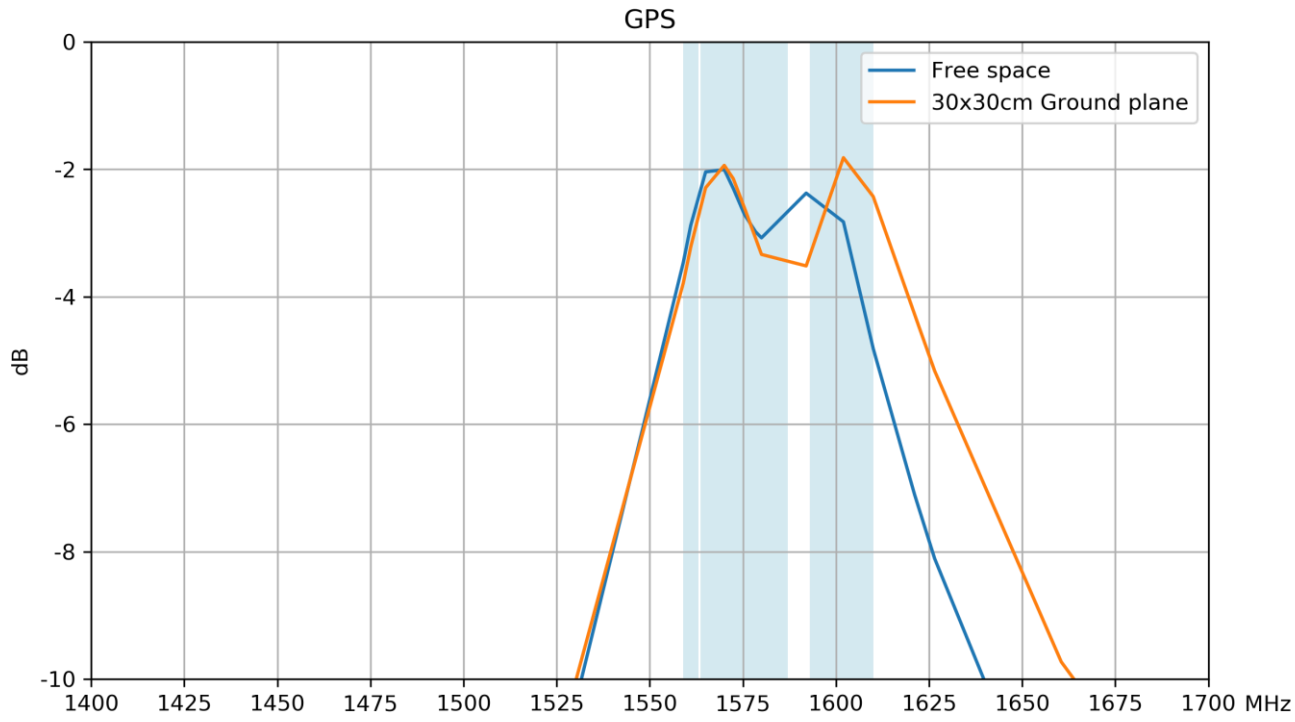
3.3 Efficiency – GNSS



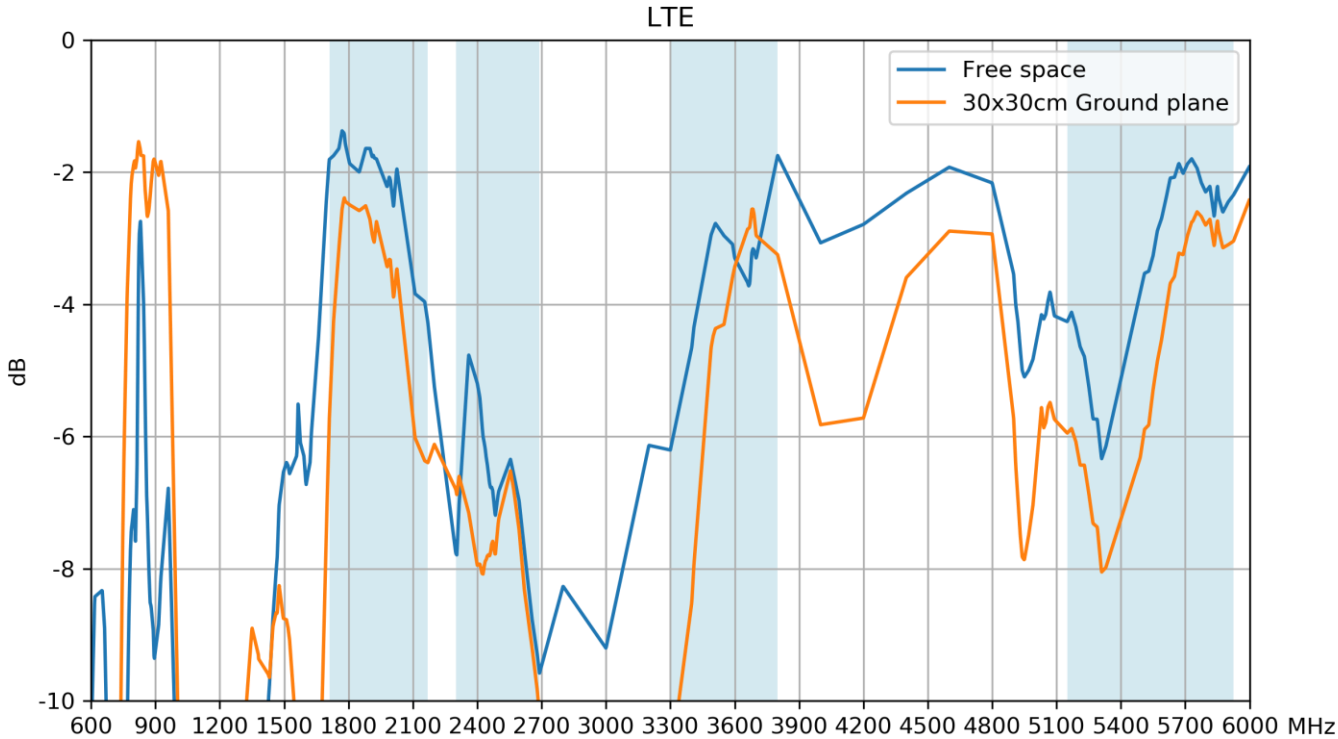
3.4 Efficiency – Cellular



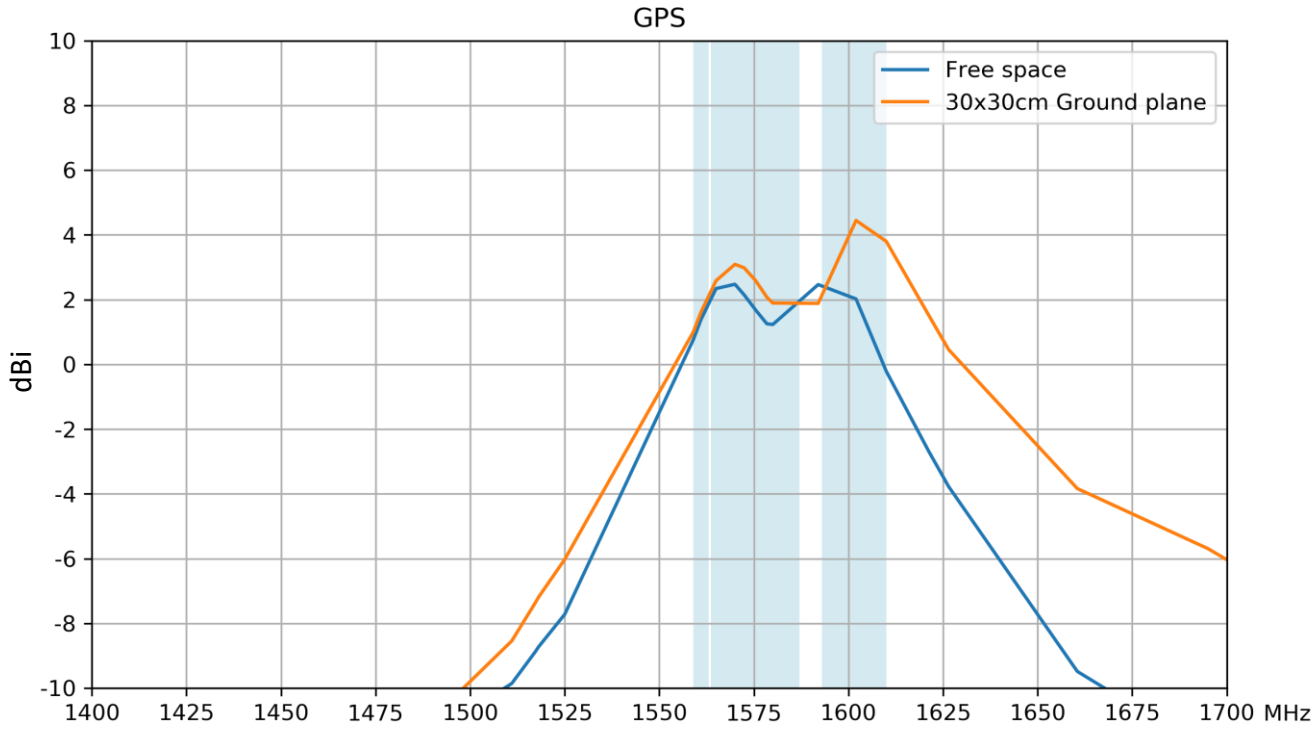
3.5 Average Gain – GNSS



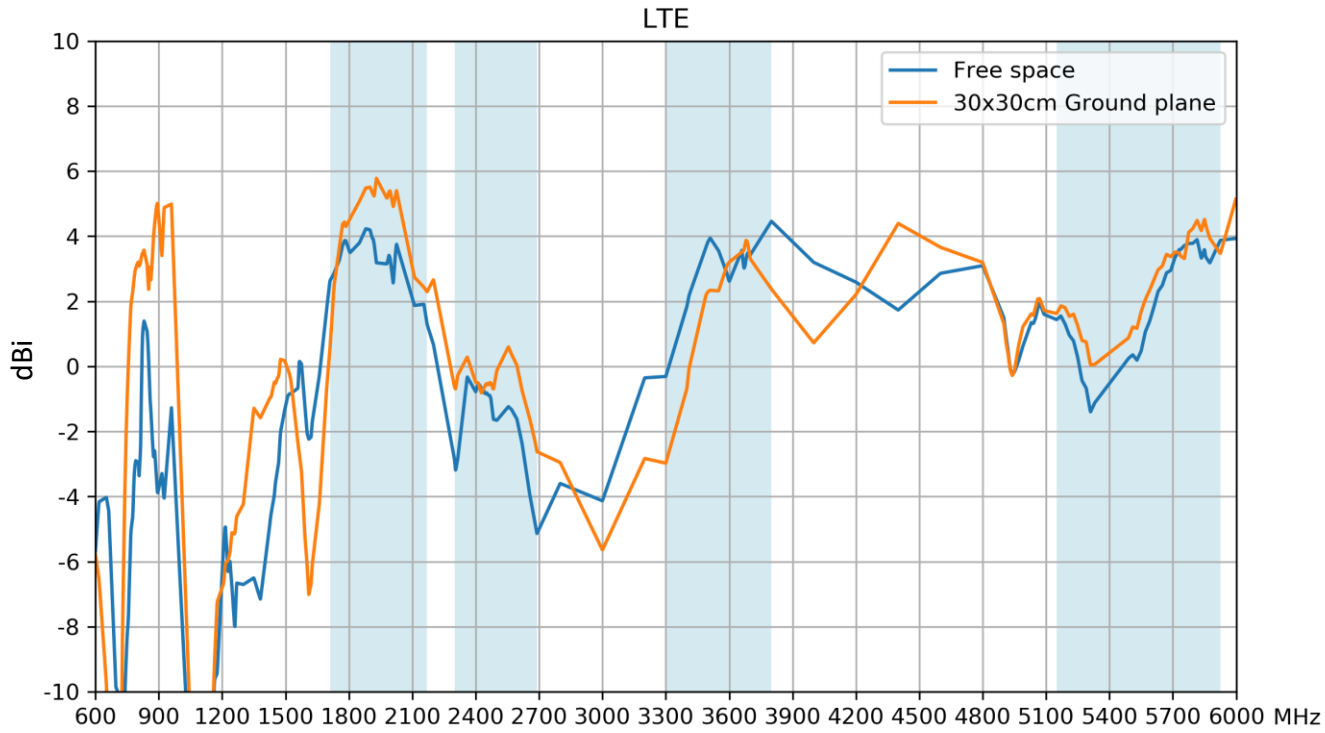
3.6 Average Gain – Cellular



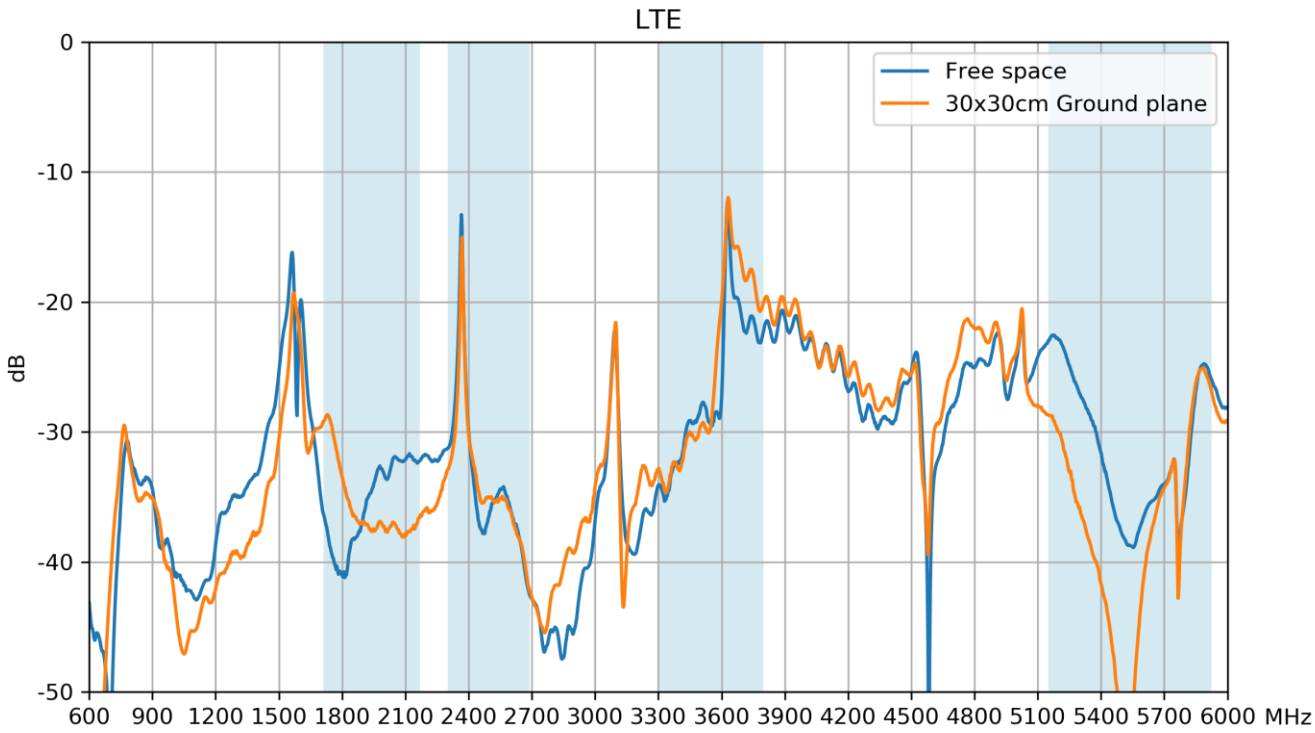
3.7 Peak Gain – GNSS



3.8 Peak Gain – Cellular

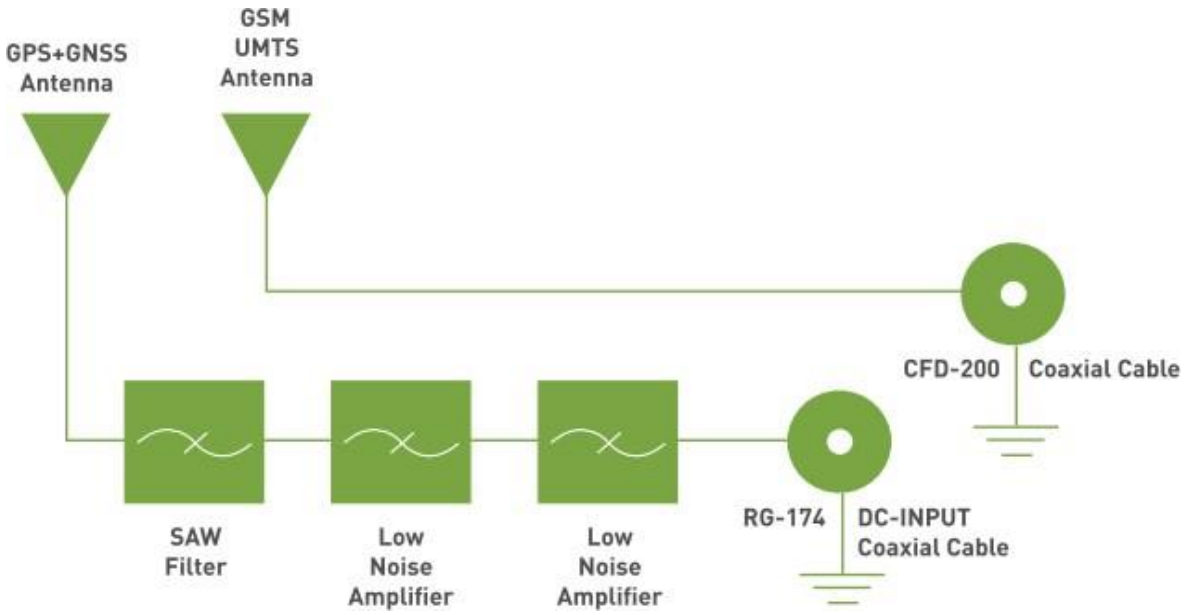


3.9 Isolation

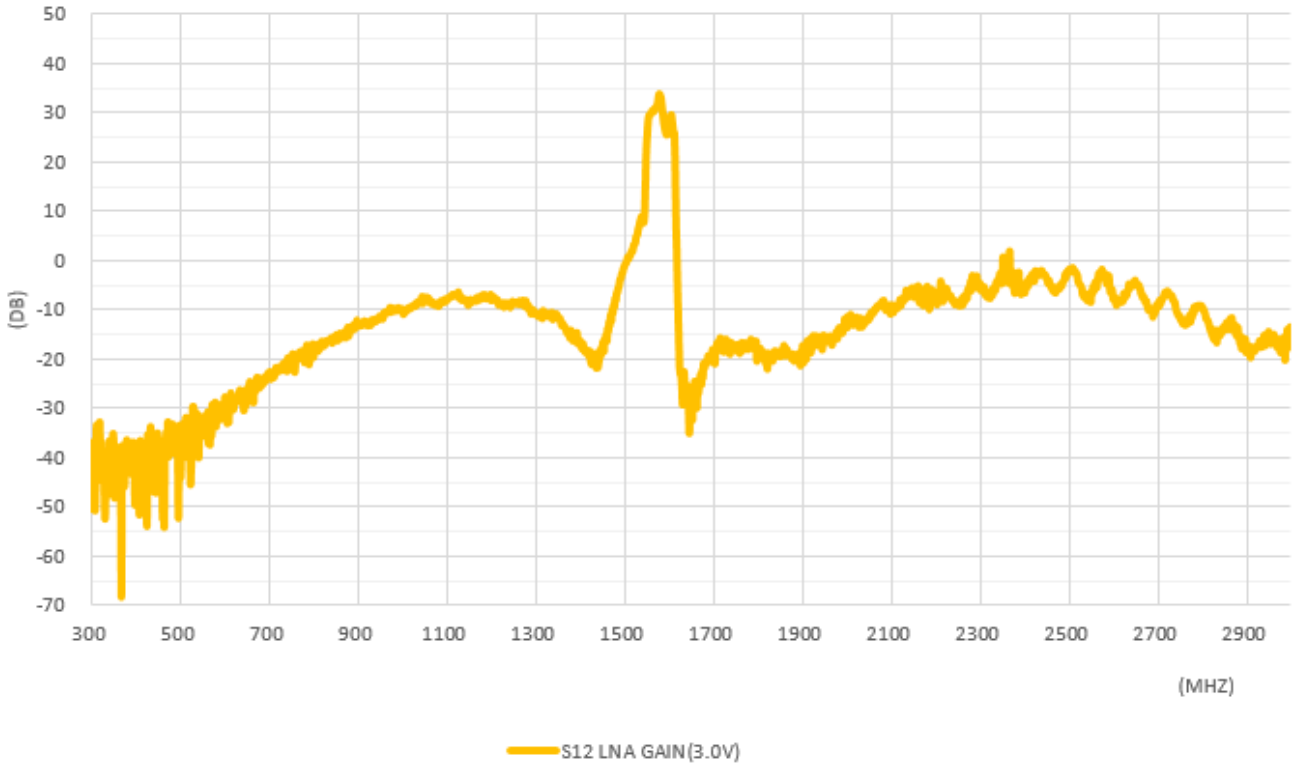


4. Active Antenna Characteristics

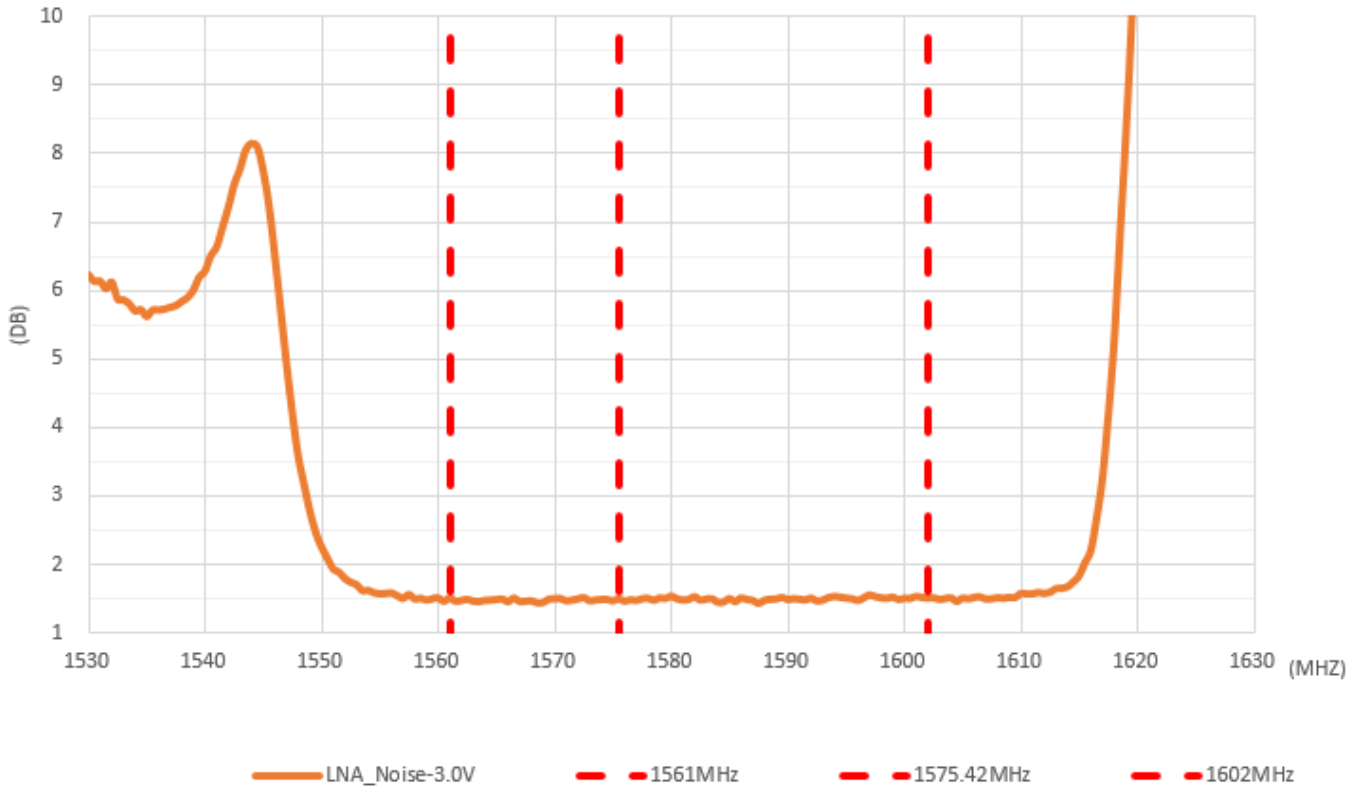
4.1 Block Diagram



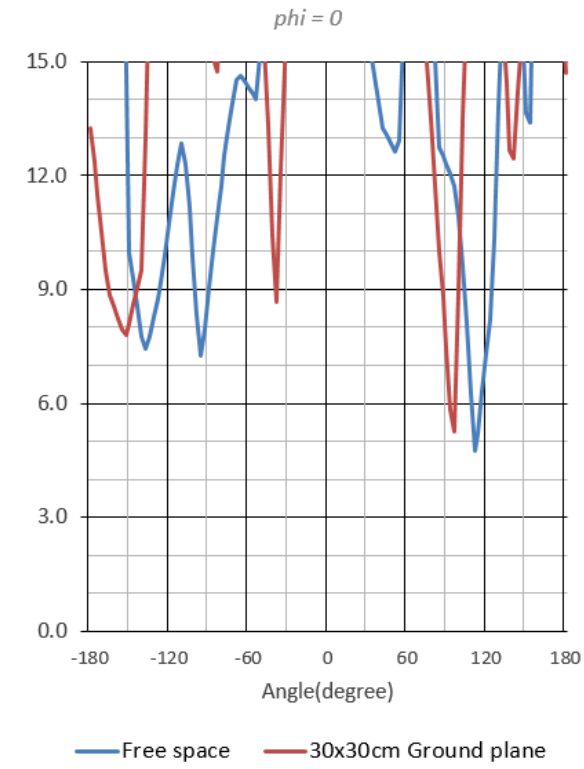
4.2 Block Diagram

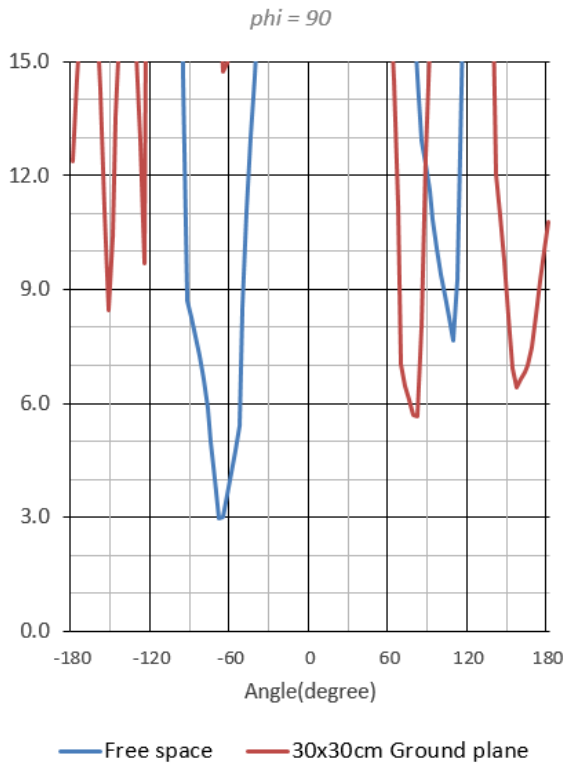


4.3 LNA Gain and Noise Figure @ 3.0V

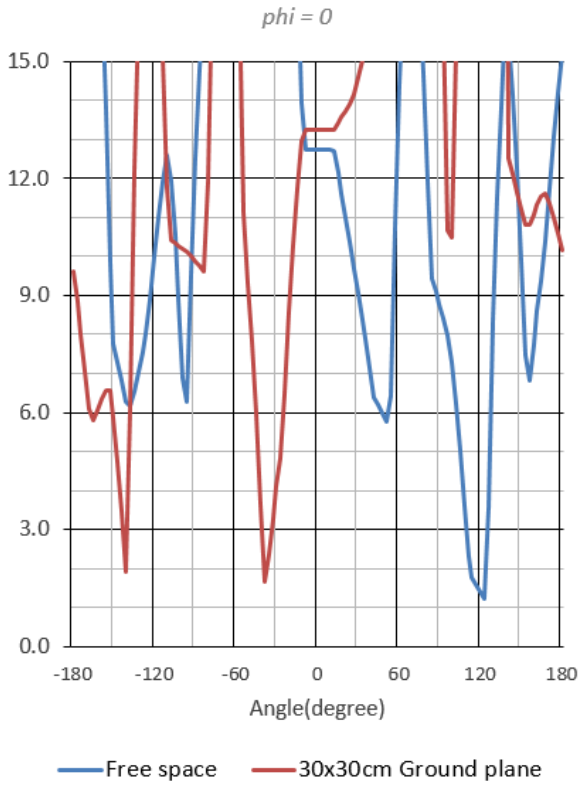


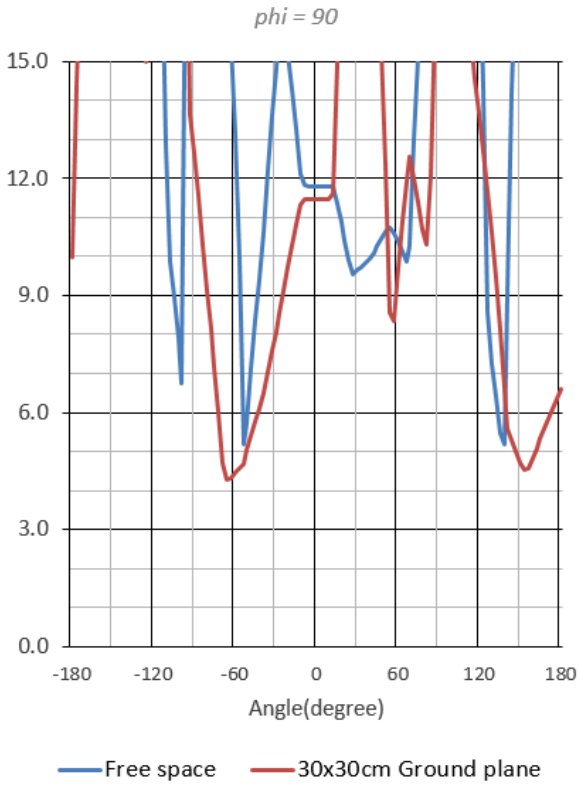
4.4 Axial Ratio – BeiDou



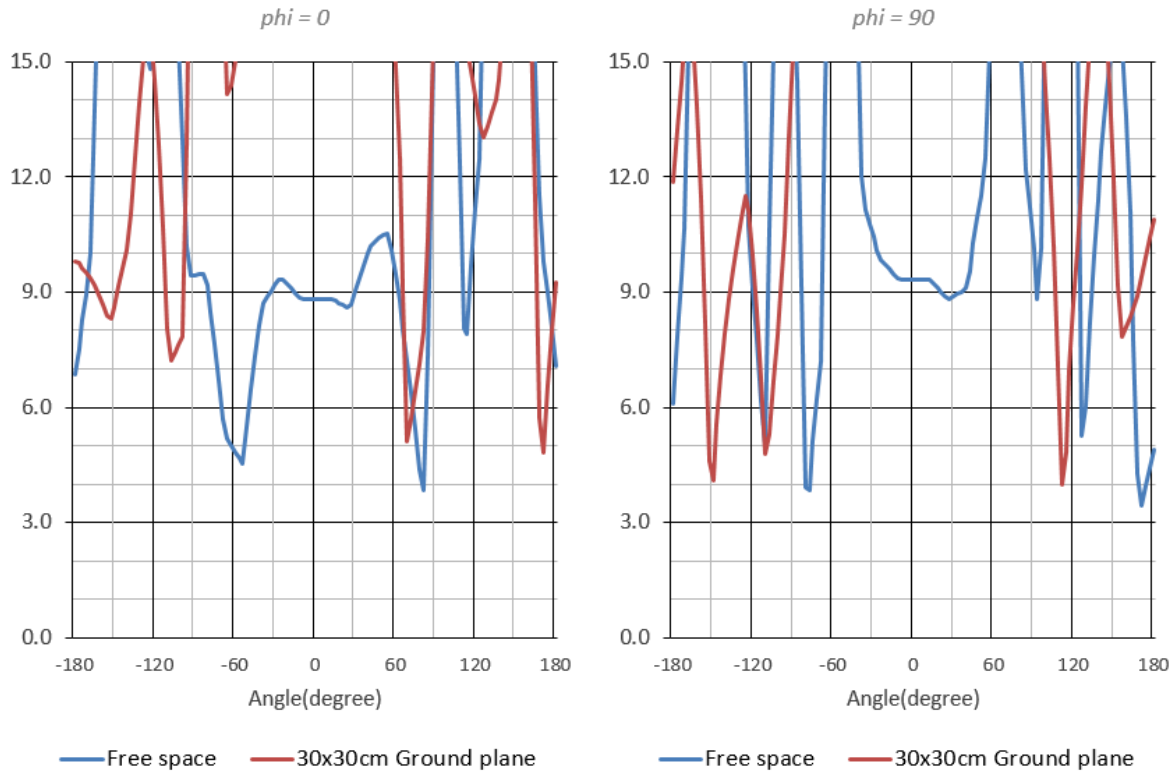


4.5 Axial Ratio – GPS/Galileo





4.6 Axial Ratio – GLONASS

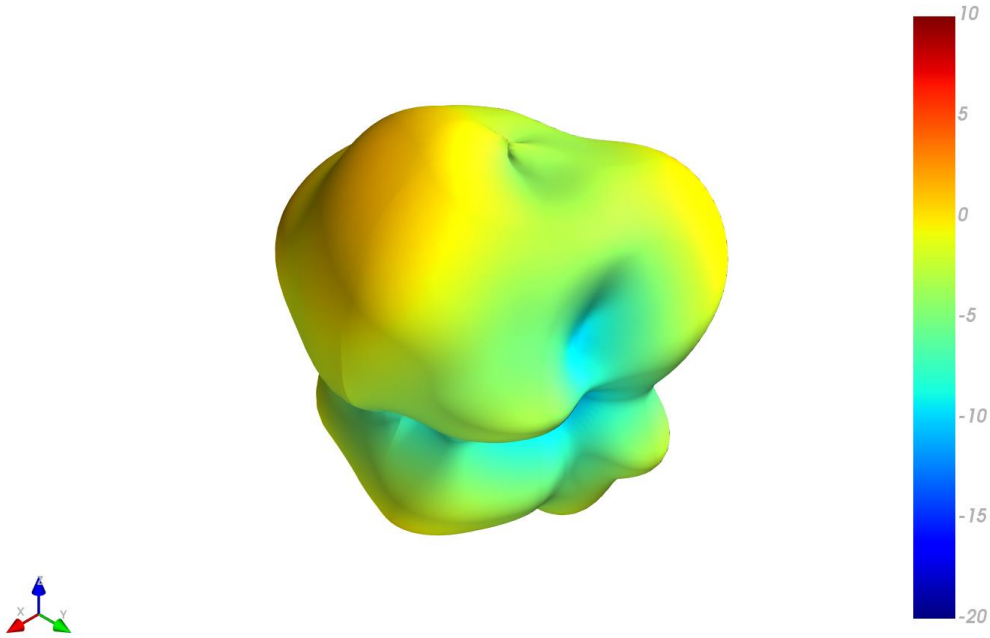


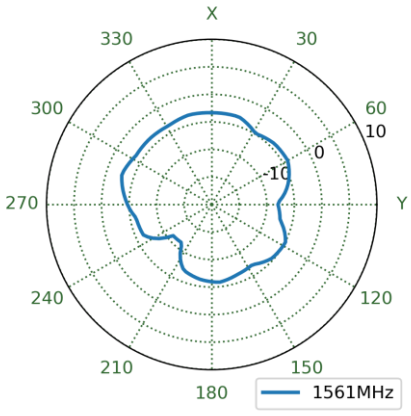
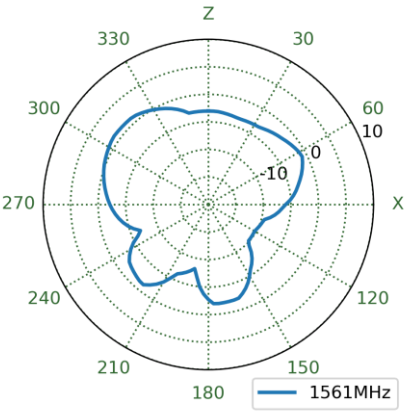
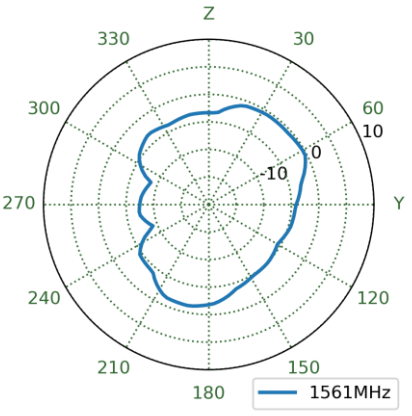
5. Radiation Patterns

5.1 Test Setup – 30*30cm Ground Plane

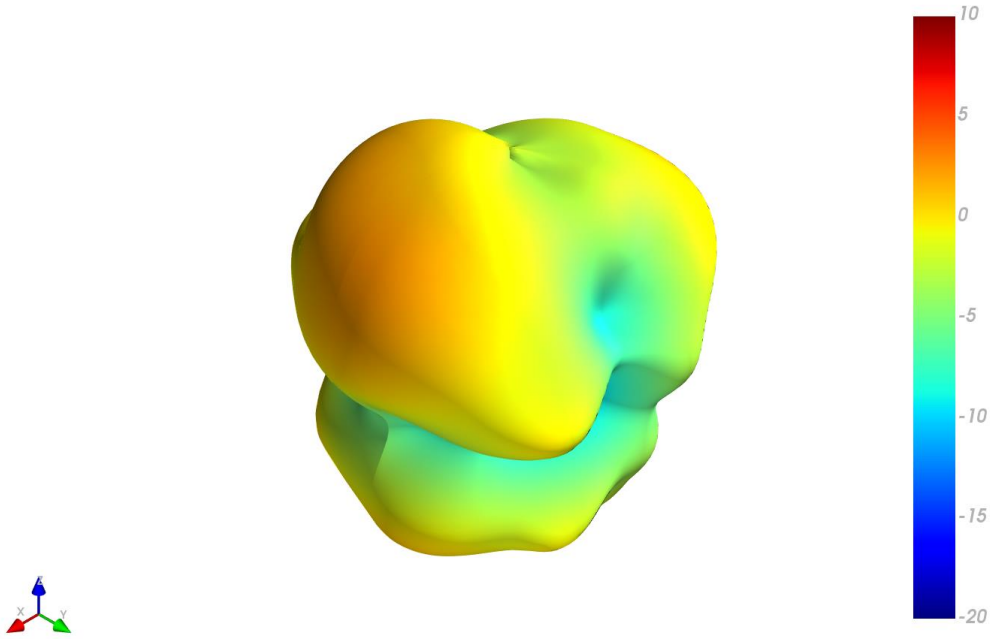
5.2 GNSS 3D and 2D Radiation Patterns – 30*30cm Ground Plane

1561MHz

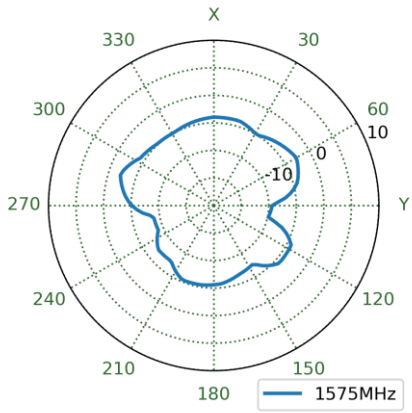


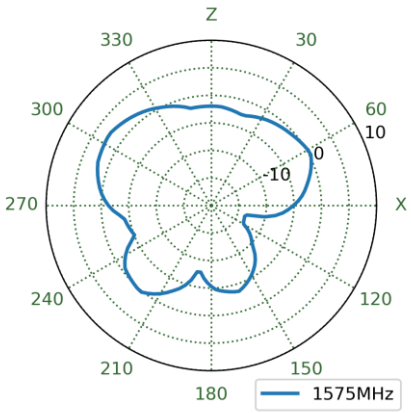
XY Plane	XZ Plane	YZ Plane
		

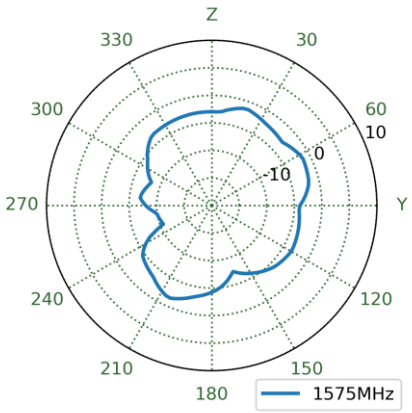
1575.42MHz



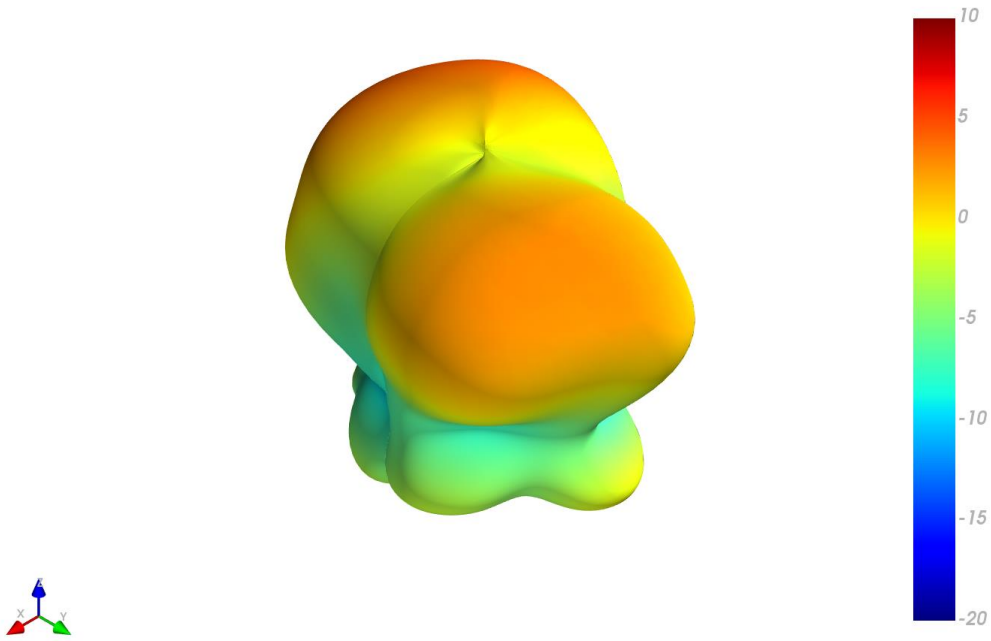
XY Plane	XZ Plane	YZ Plane

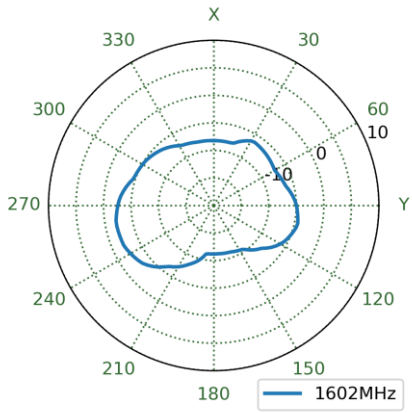
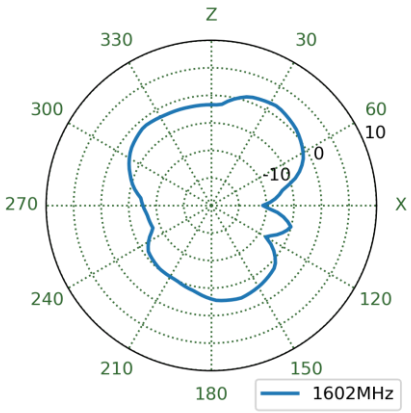
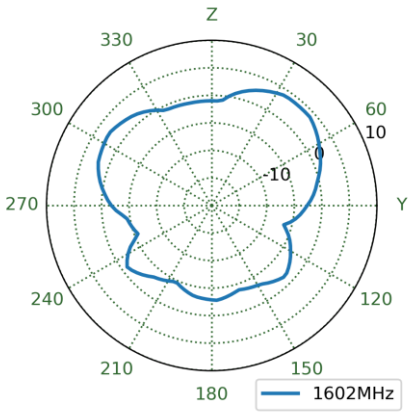






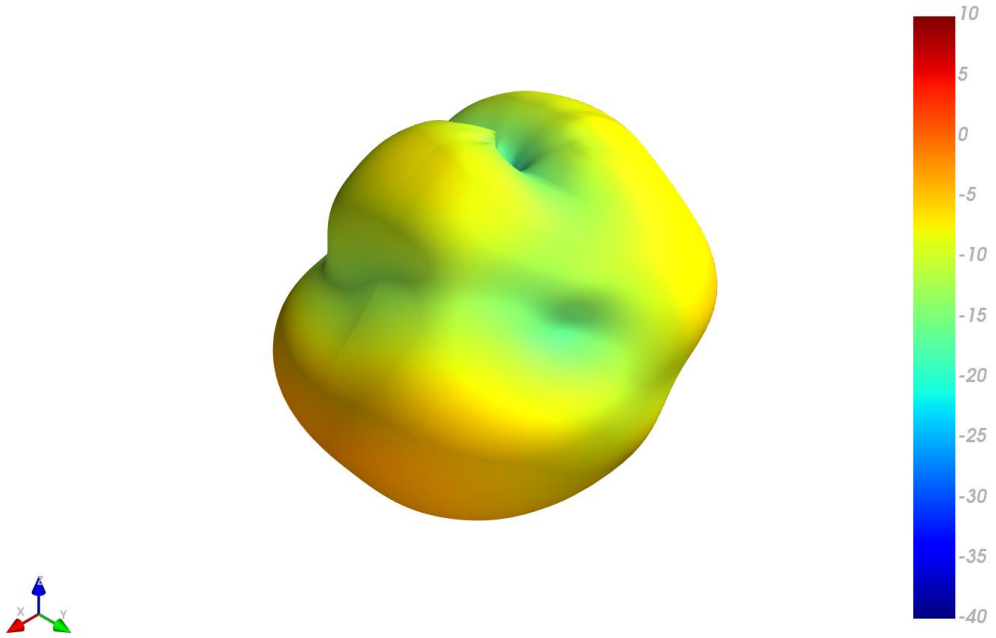
1602MHz

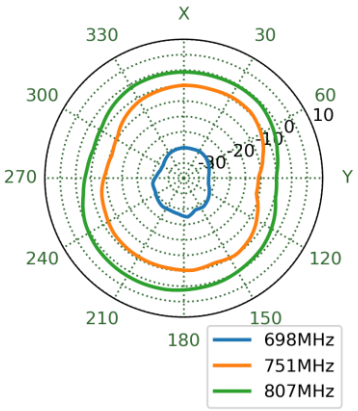
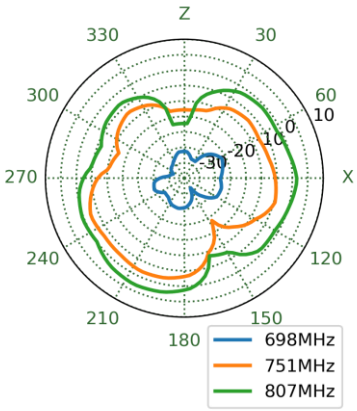
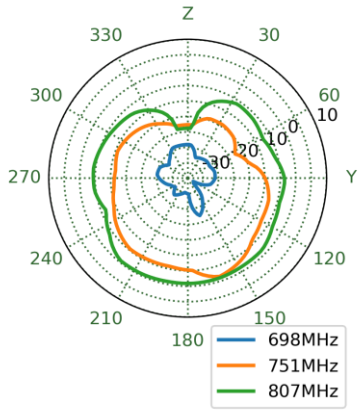


XY Plane	XZ Plane	YZ Plane
		

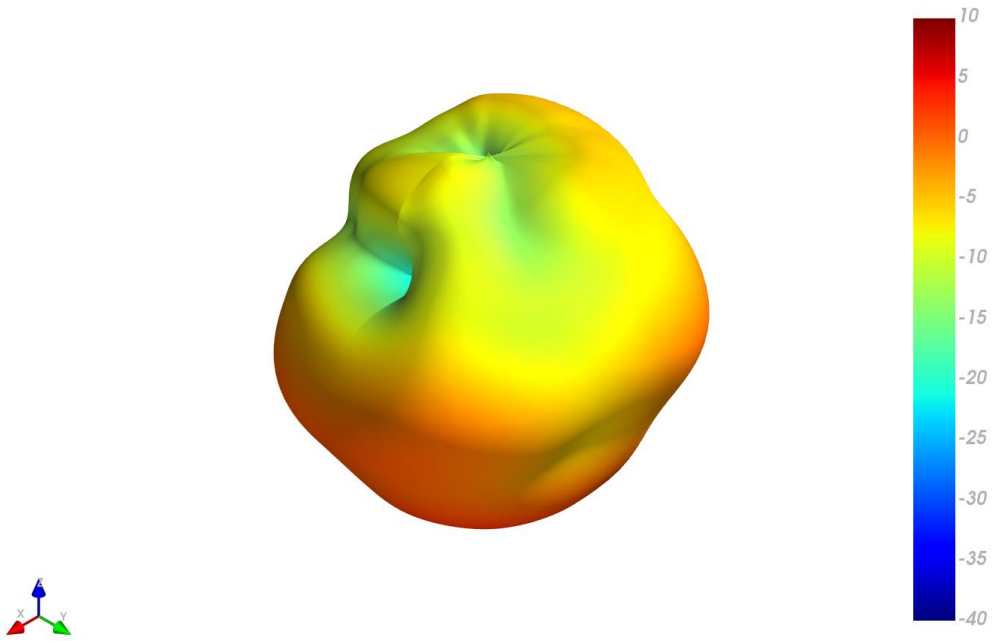
5.3 Cellular 3D and 2D Radiation Patterns – 30*30cm Ground Plane

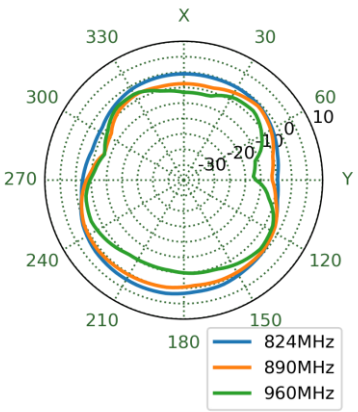
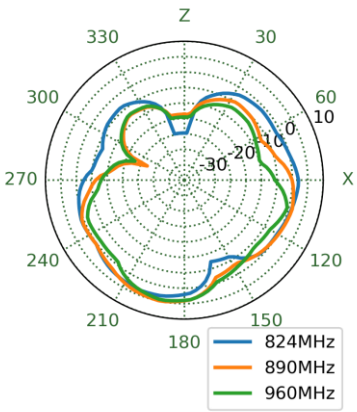
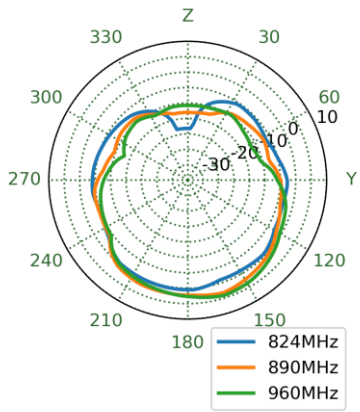
751MHz



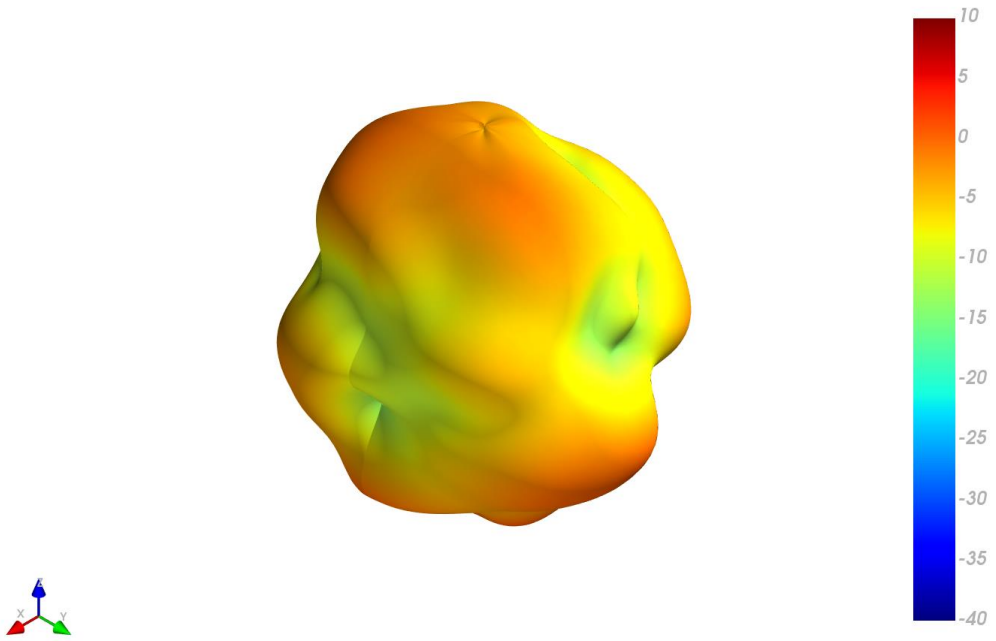
XY Plane	XZ Plane	YZ Plane
		

890MHz

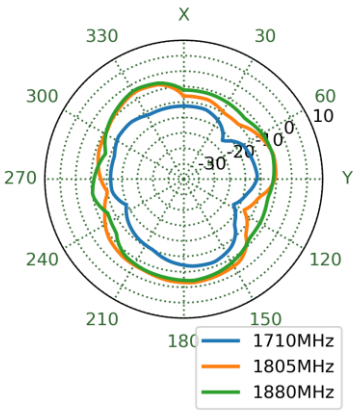


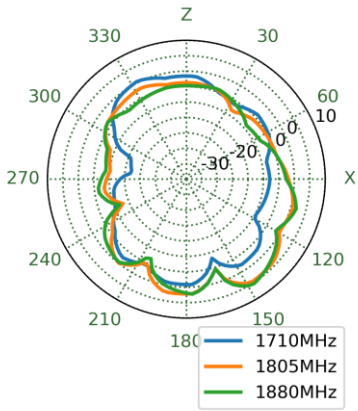
XY Plane	XZ Plane	YZ Plane
		

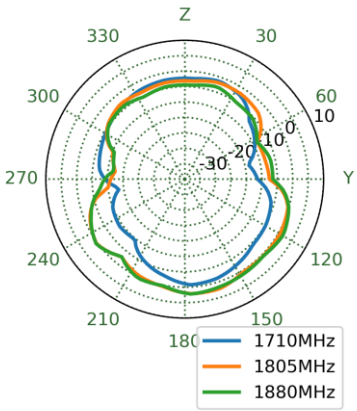
1805MHz



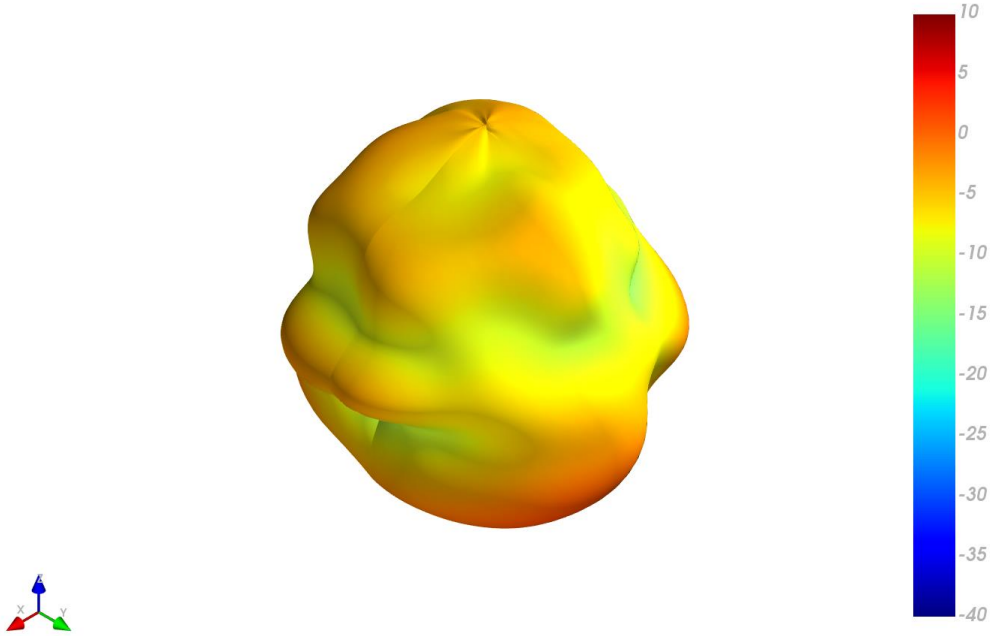
XY Plane	XZ Plane	YZ Plane



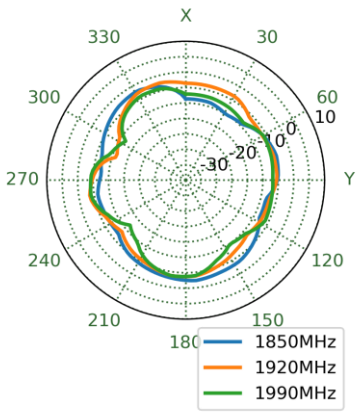


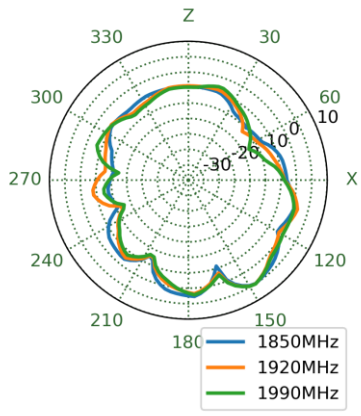


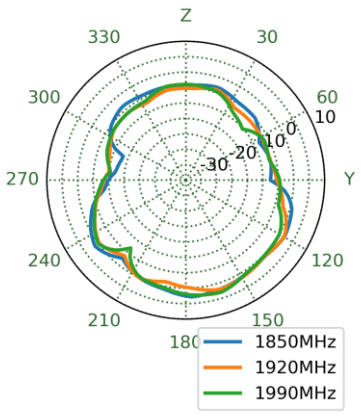
1920MHz



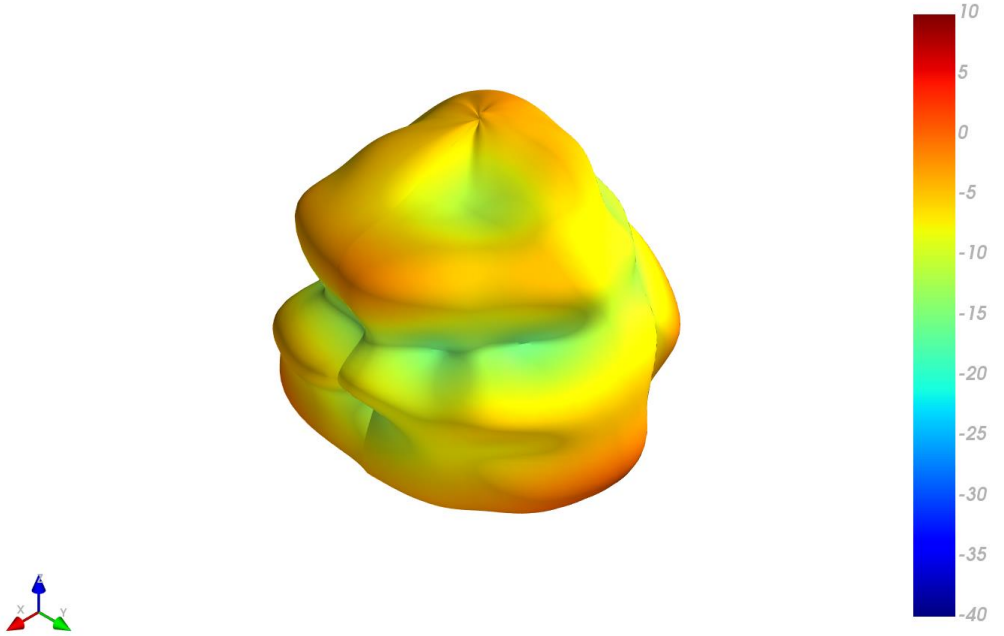
XY Plane	XZ Plane	YZ Plane



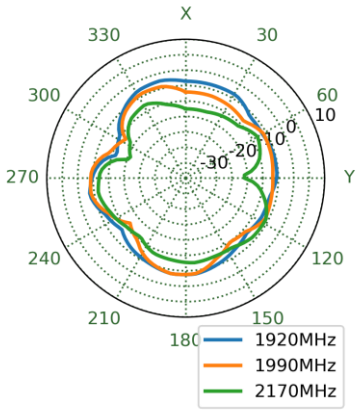


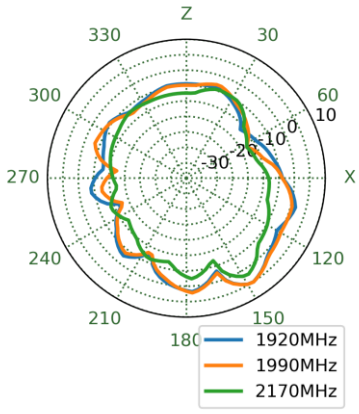


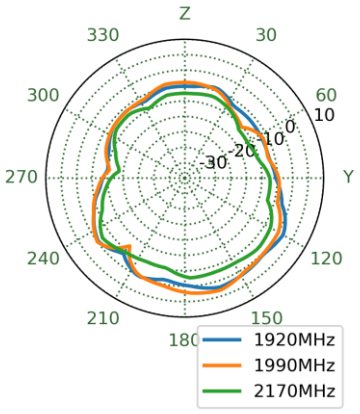
1990MHz



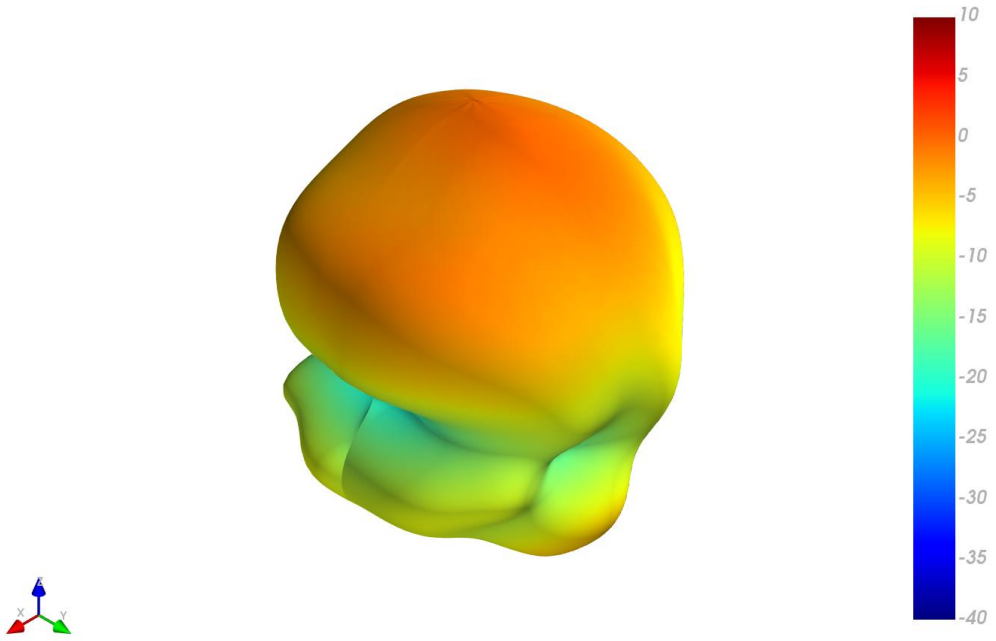
XY Plane	XZ Plane	YZ Plane



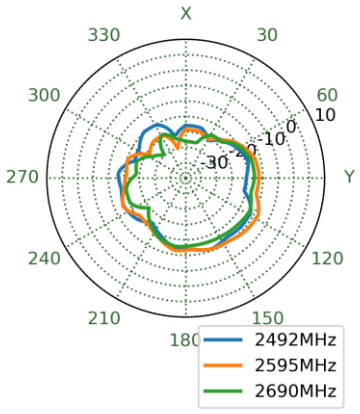


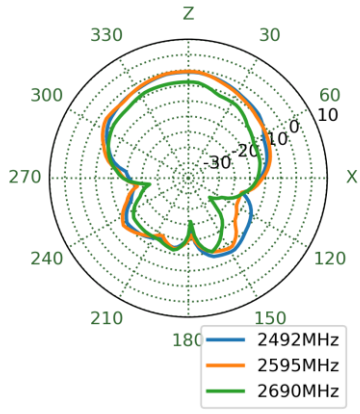


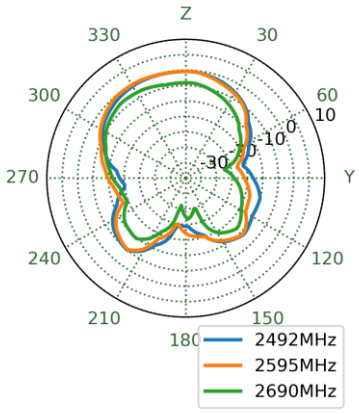
2595MHz



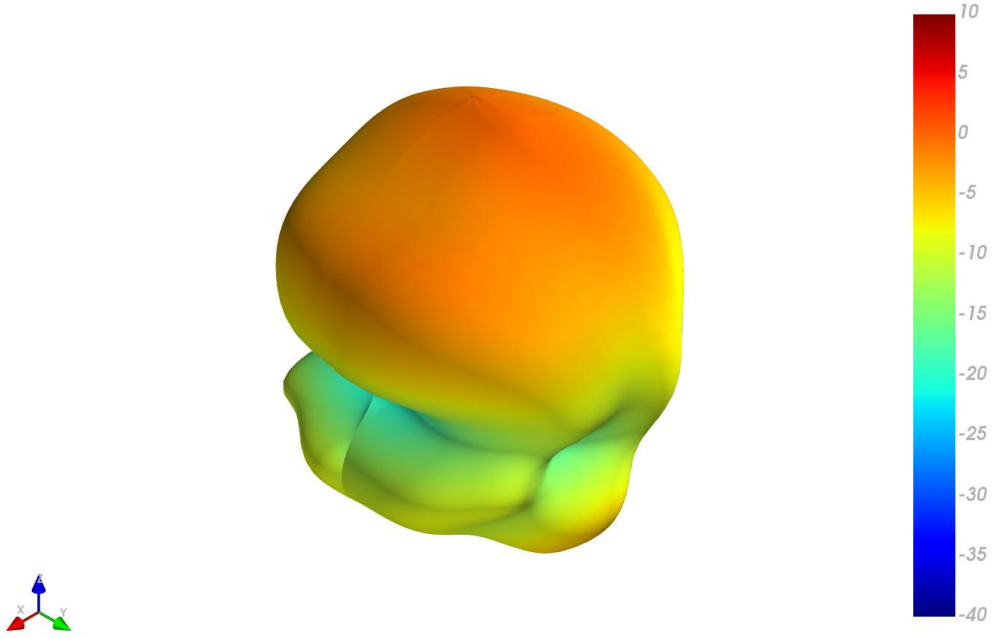
XY Plane	XZ Plane	YZ Plane

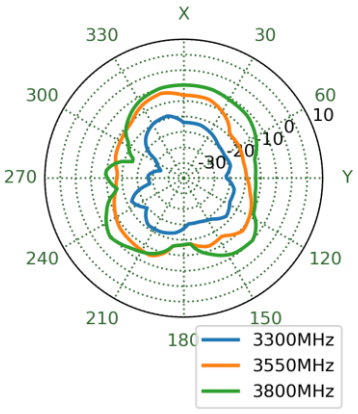
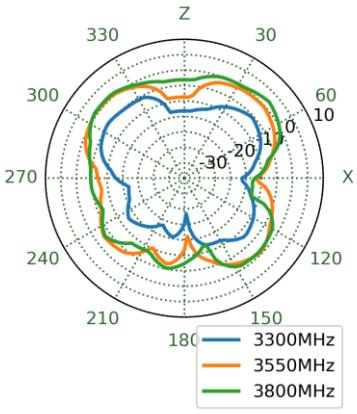
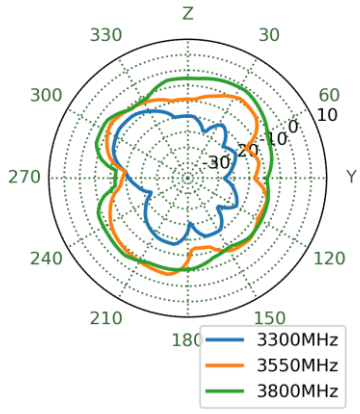




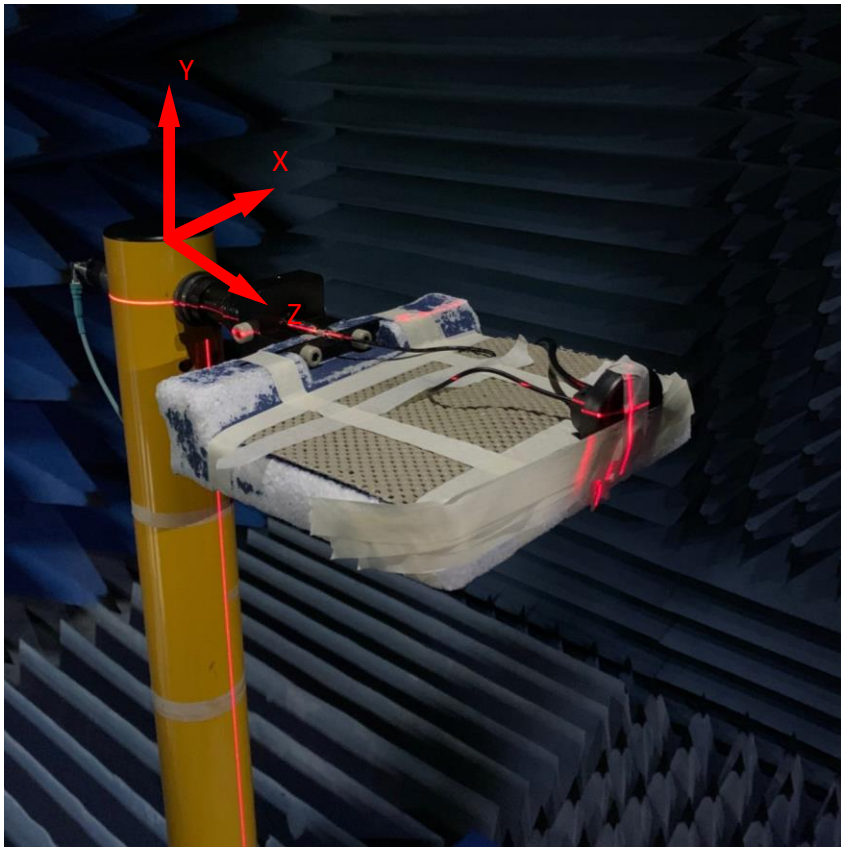


3550MHz



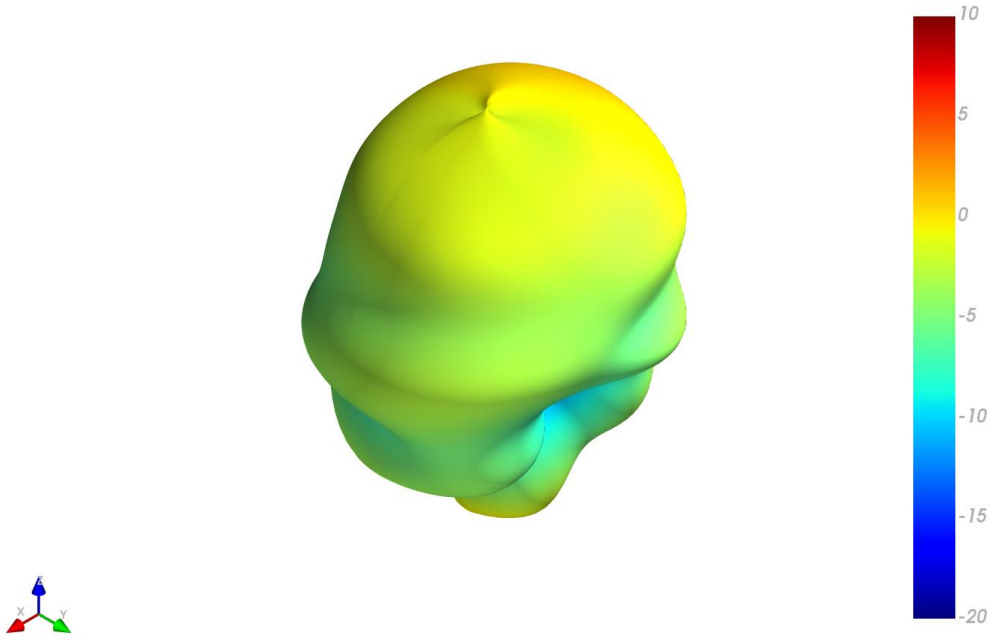
XY Plane	XZ Plane	YZ Plane
		

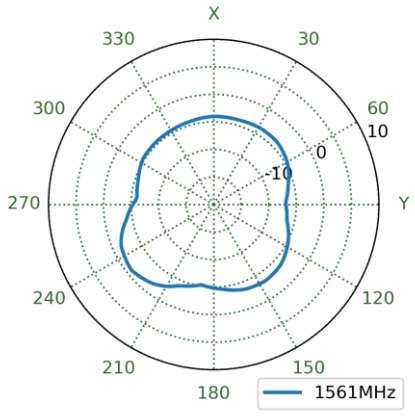
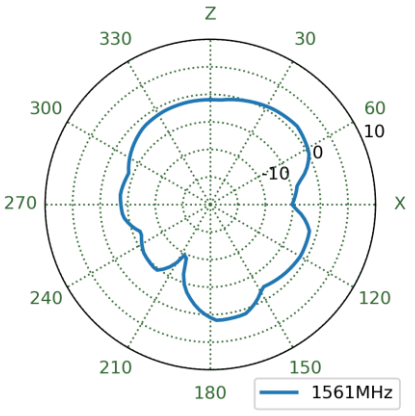
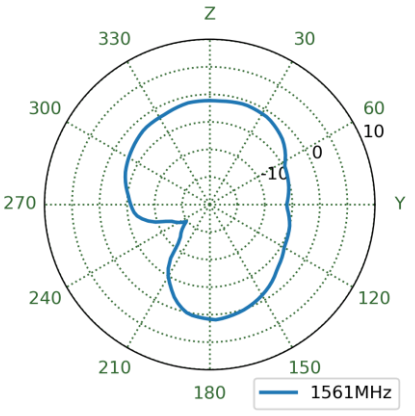
5.4 Test Setup – Free Space



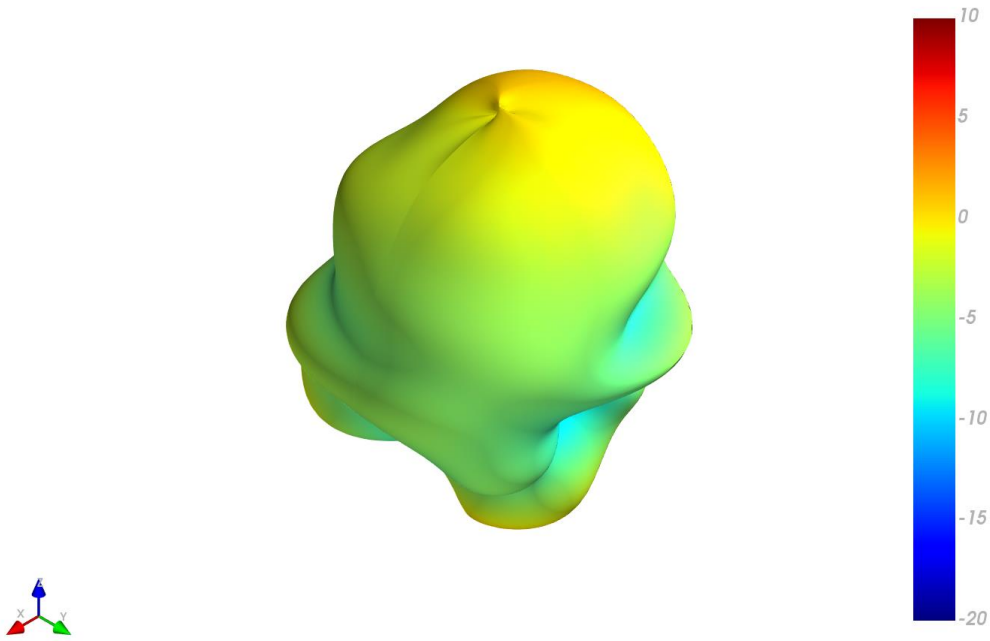
5.5 GNSS 3D and 2D Radiation Patterns – Free Space

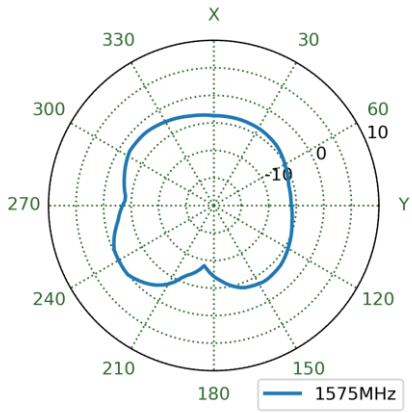
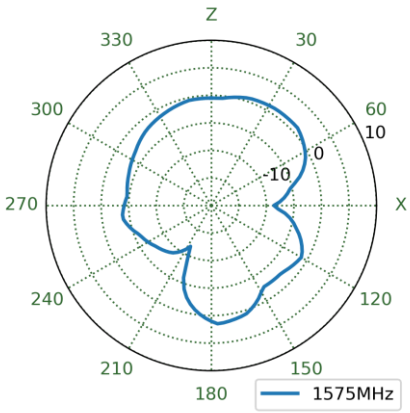
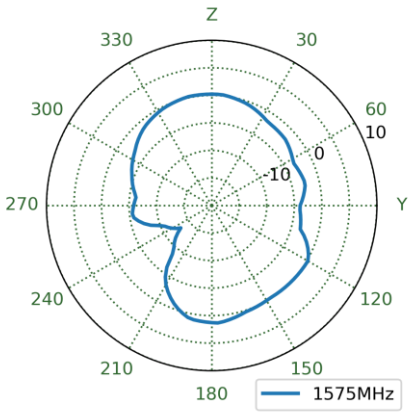
1561MHz



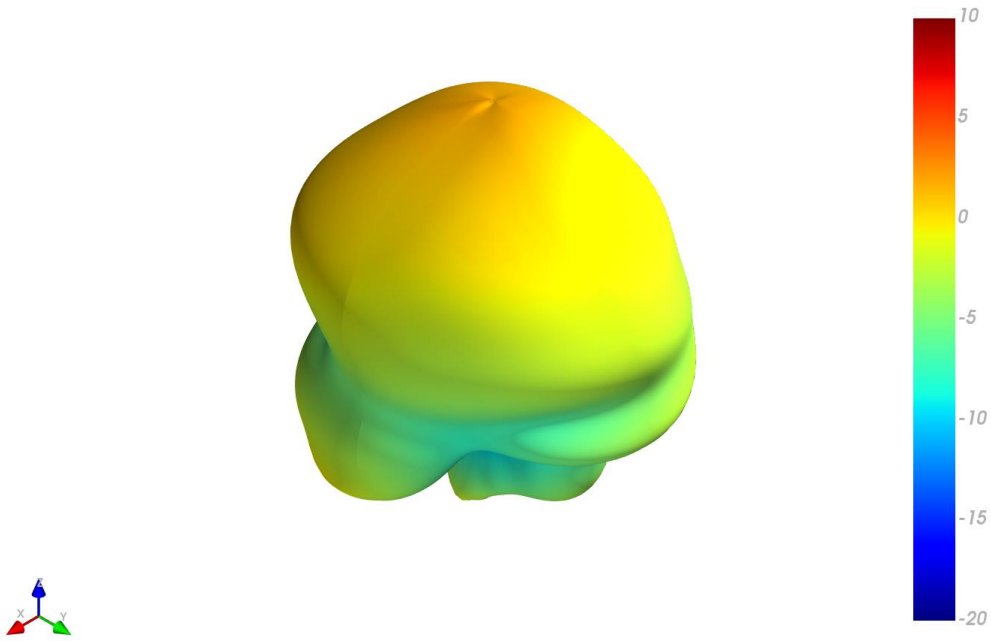
XY Plane	XZ Plane	YZ Plane
		

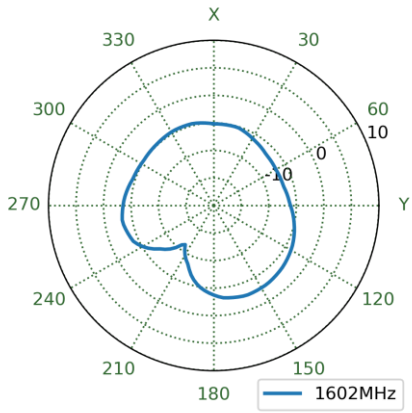
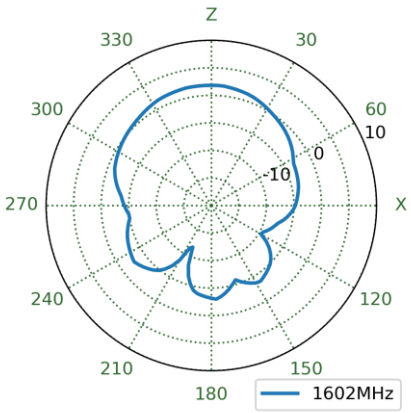
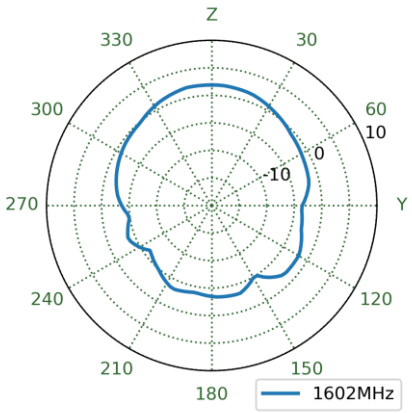
1575.42MHz



XY Plane	XZ Plane	YZ Plane
		

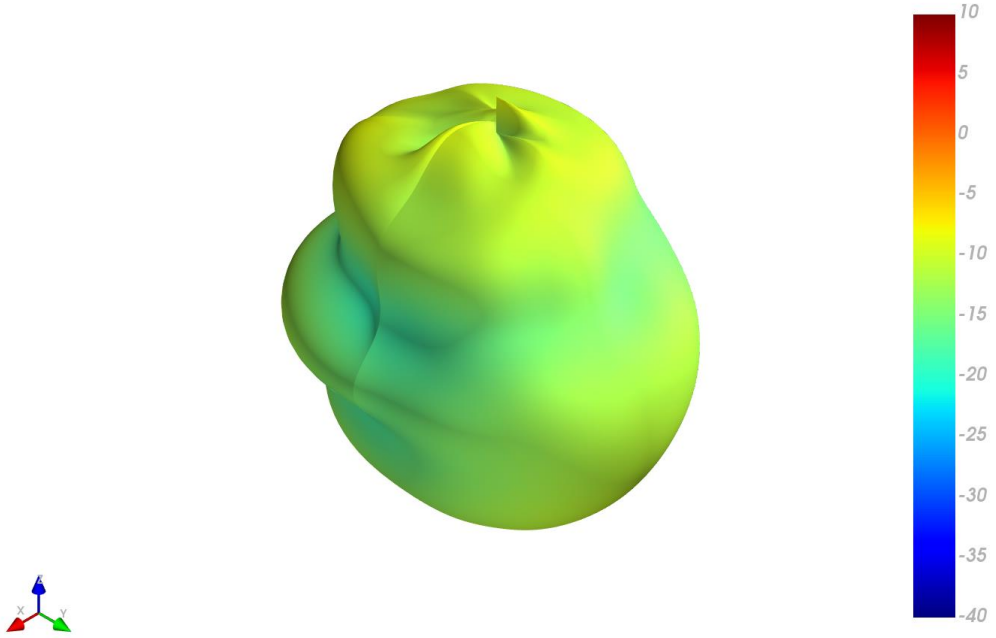
1602MHz

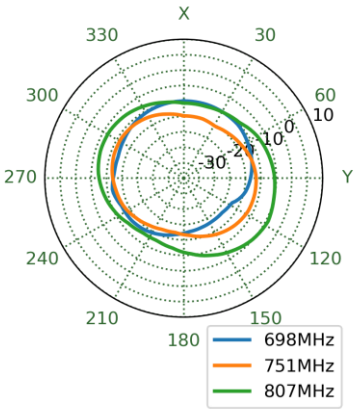
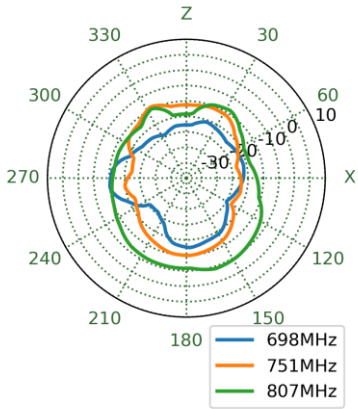
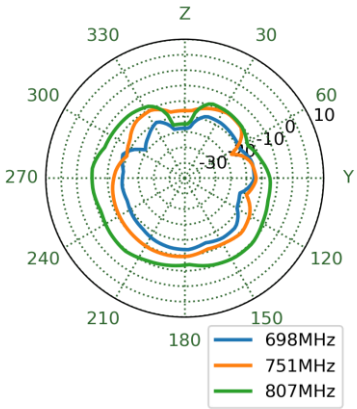


XY Plane	XZ Plane	YZ Plane
		

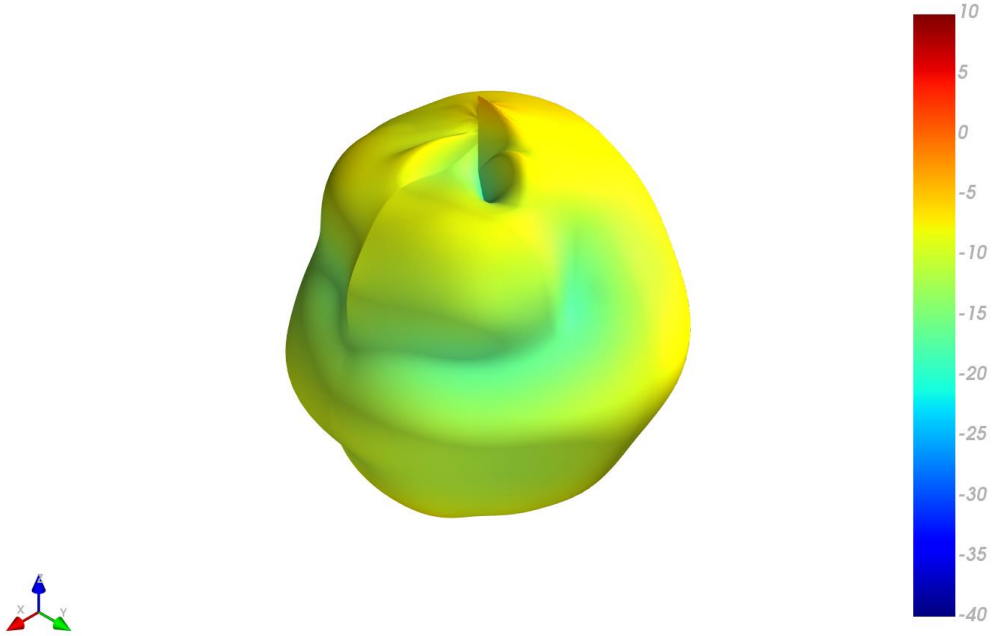
5.6 Cellular 3D and 2D Radiation Patterns – Free Space

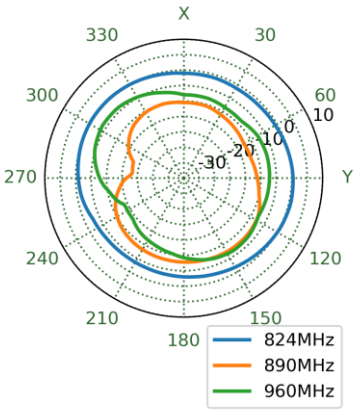
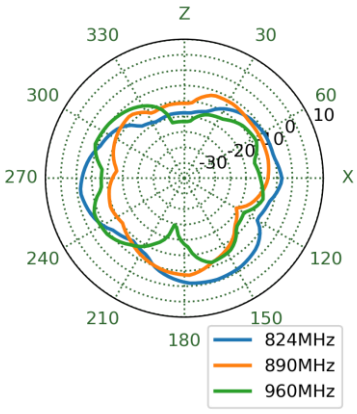
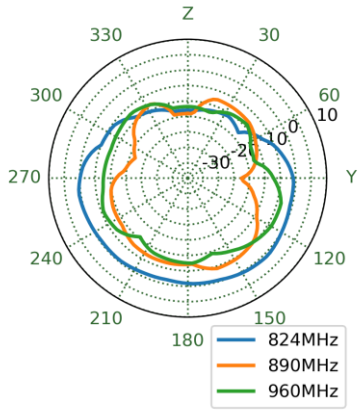
751MHz



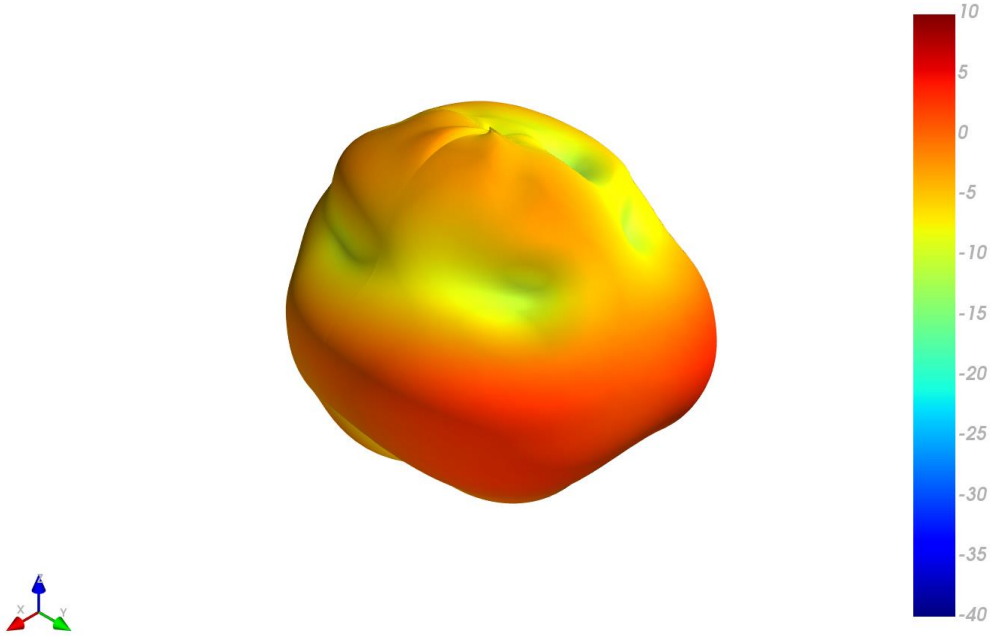
XY Plane	XZ Plane	YZ Plane
		

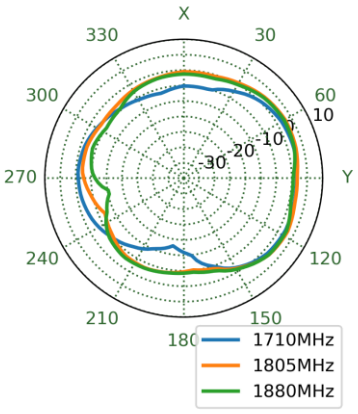
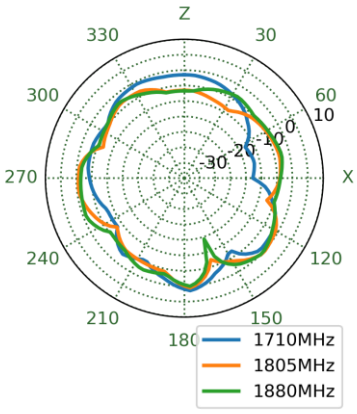
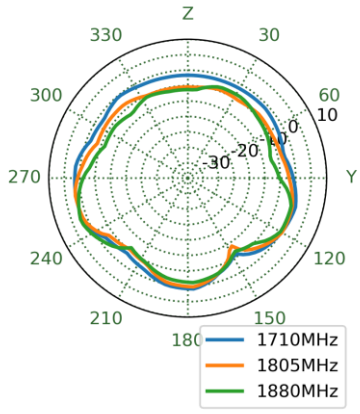
890MHz



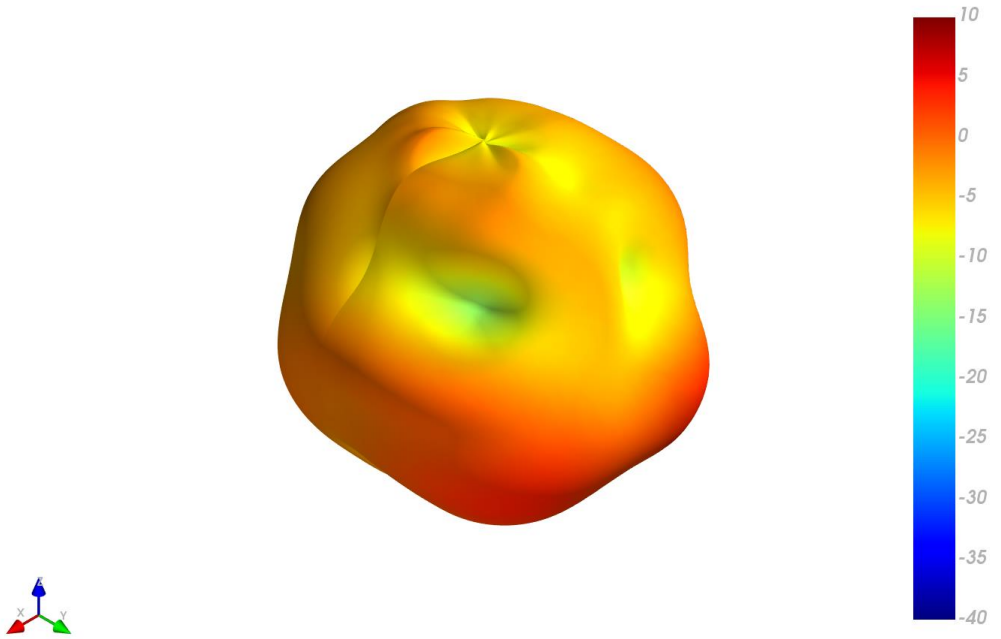
XY Plane	XZ Plane	YZ Plane
		

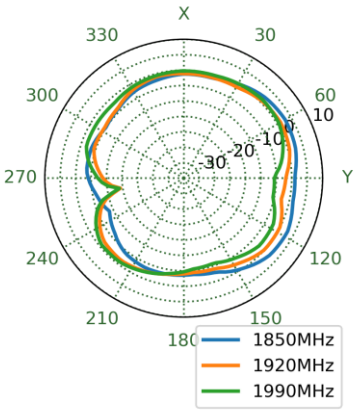
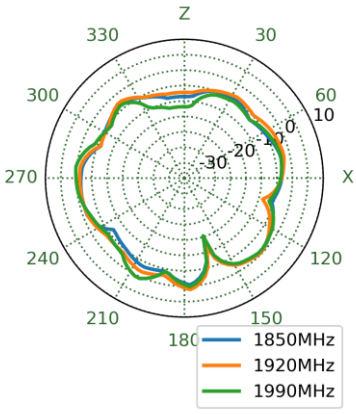
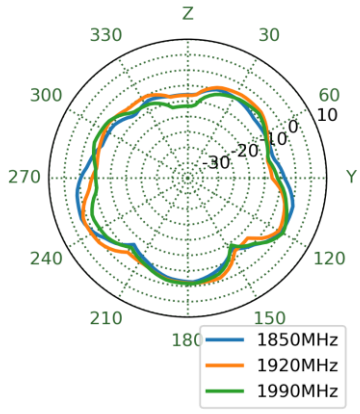
1805MHz



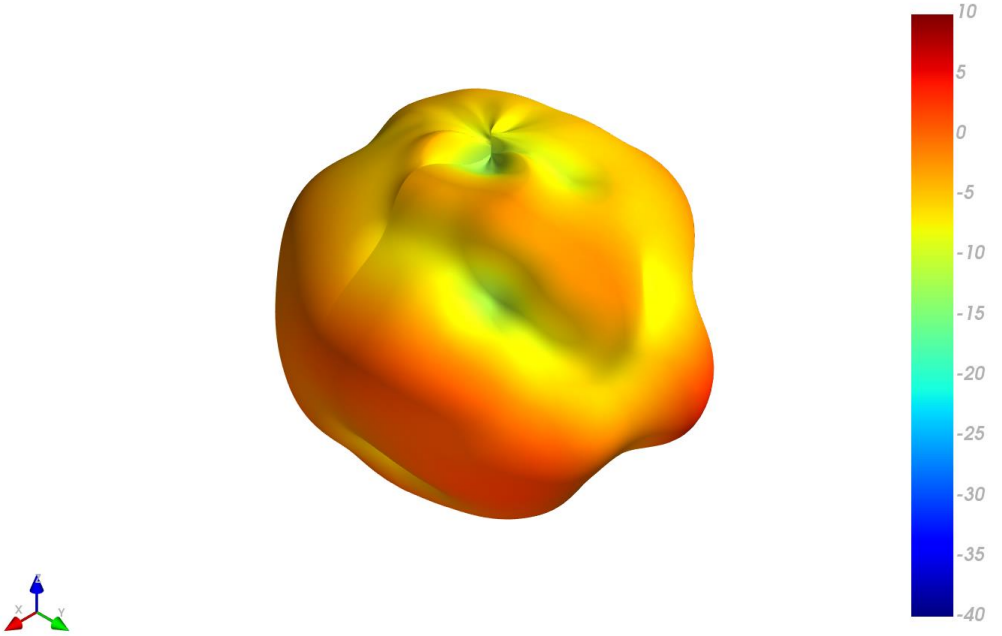
XY Plane	XZ Plane	YZ Plane
		

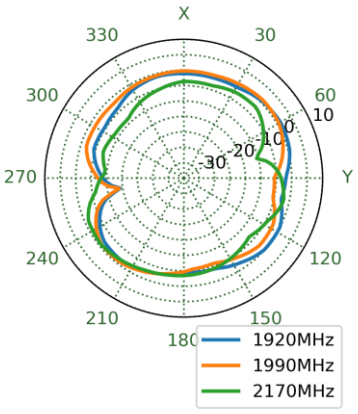
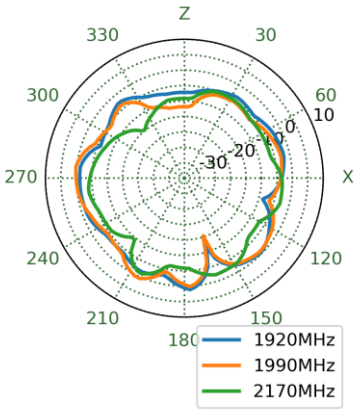
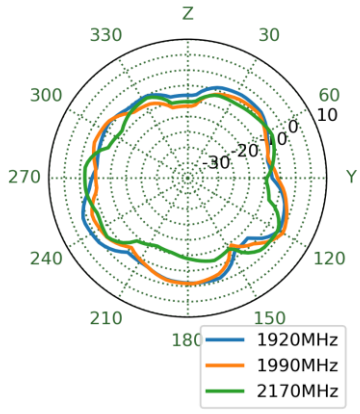
1920MHz



XY Plane	XZ Plane	YZ Plane
		

1990MHz



XY Plane	XZ Plane	YZ Plane
		

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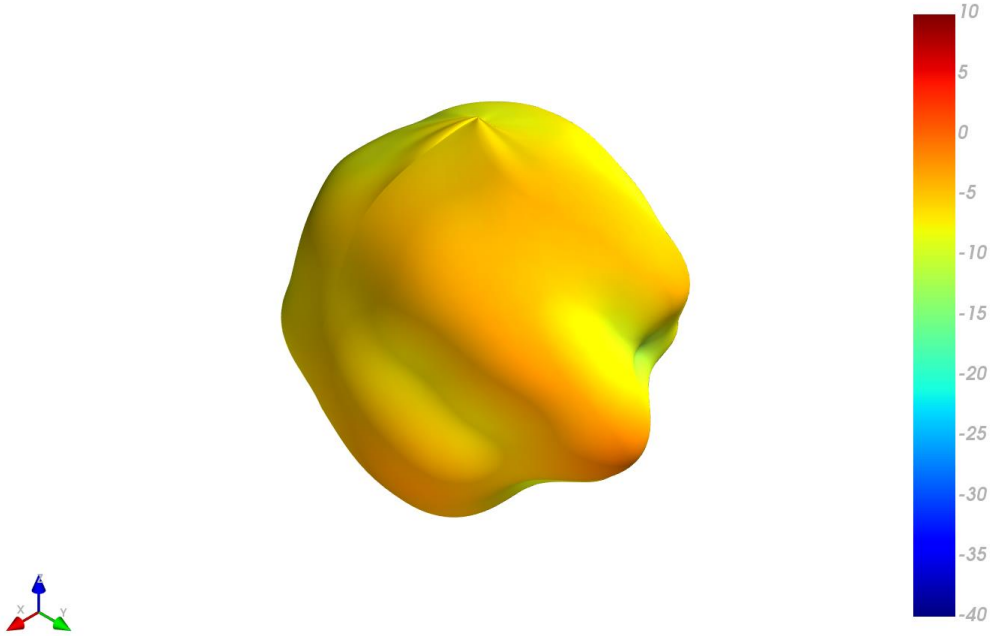
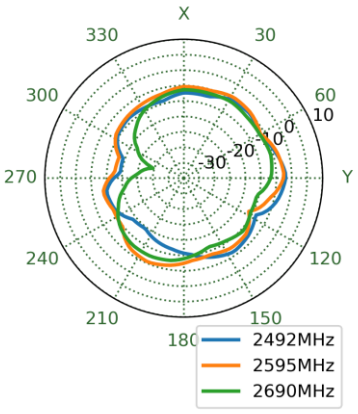
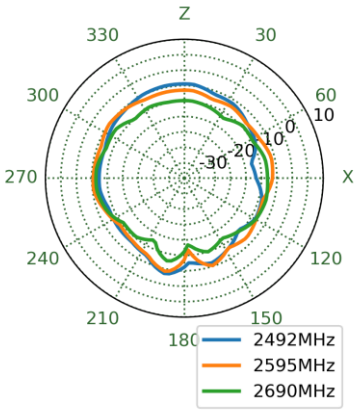
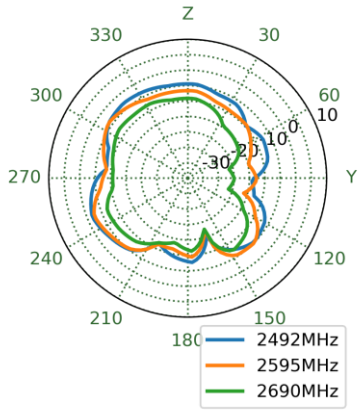
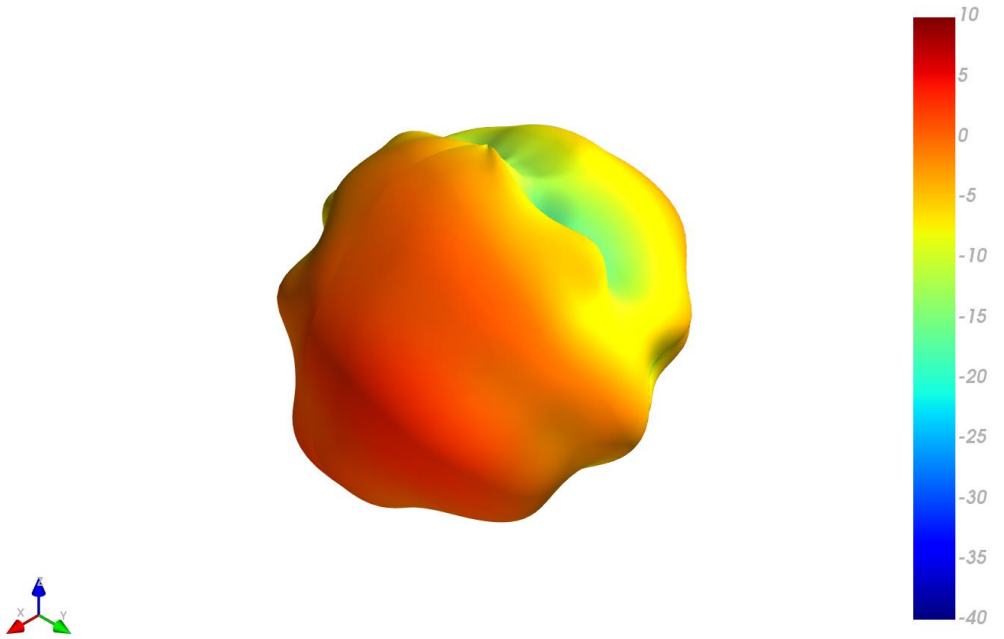
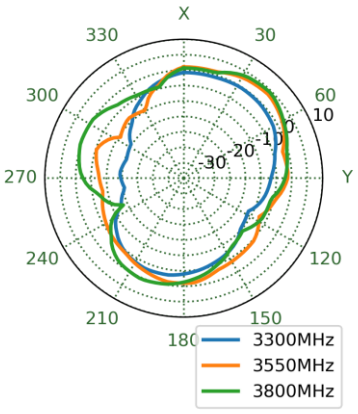
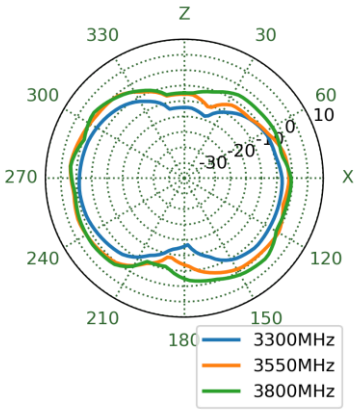
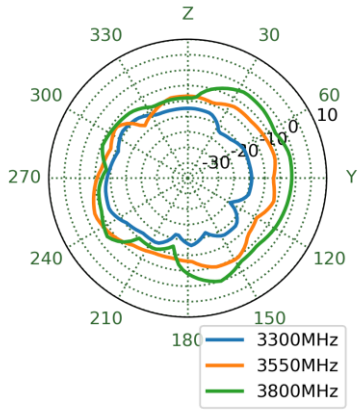


XY Plane	XZ Plane	YZ Plane
		

3550MHz



XY Plane	XZ Plane	YZ Plane
		

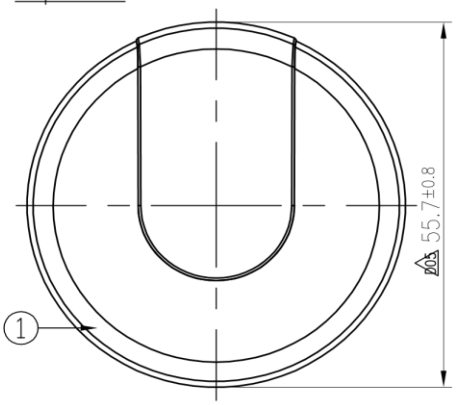
6. Mechanical Drawing (Units: mm)

ISO NO: EDW-13-8-xxxx

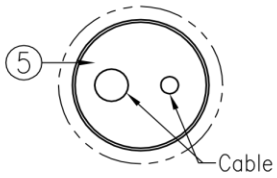
<Release>

REV	ZONE	DESCRIPTION	ENG	APPROVED	ISSUED DATE
001	ALL	Initial Design	Gabriel	Joanna	2013/01/16
002	F2.F3	Revised the part number.	Gabriel	Joanna	2013/01/23
003	ALL	Changed the sharp of label	Gabriel	Wayne	2013/12/12
004	ALL	Amend Nut And Material	Joason	Wayne	2014/04/02
005	ALL	Change Label to Print Heat Shrink Tube. Modify Tolerances and BOM. (ECR-18-8-009)	Rachel	Paul	2018/08/08

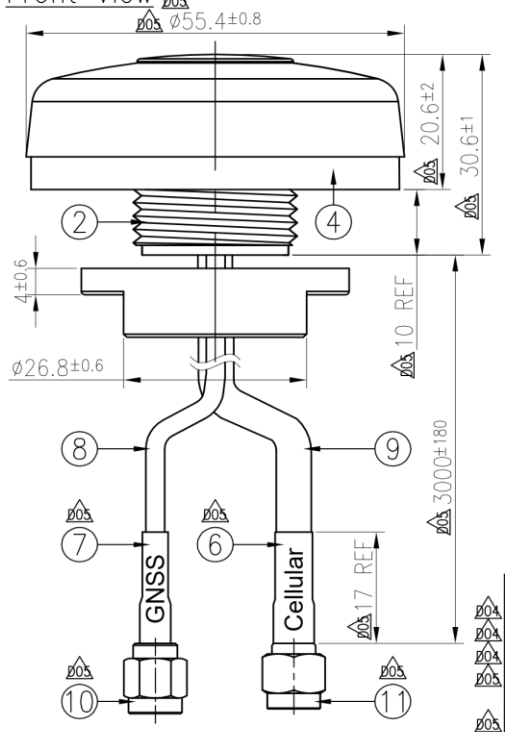
Top View



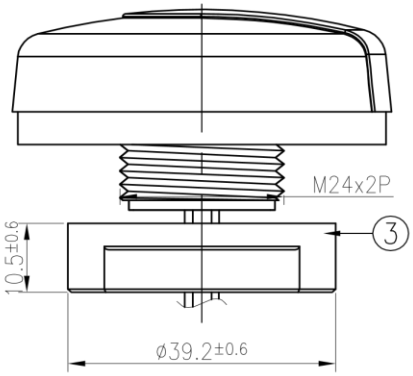
Bottom Thread View



Front View 005



Side View 005



NOTES: 003
1.Part Number:MA.111.C.L301111.B305111

		Name	P/N	Material	Finish	QTY
004	1	Housing_Top	000113F000020A	PC	Black	1
004	2	Housing_Bottom	000113F010020A	PC	Black	1
004	3	M24 Nut	000112A020020A	ABS	Black	1
005	4	Double-Sided Adhesive With Foam(Black Foam)	001013A000020A	CR4305+3M9448	White Liner	1
	5	Silicone Rubber	000712A000020A	Silicone Rubber	Black	1
005	6	Heat Shrink Tube (Cellular)	001316L100000A	PE	Blue Tube/White Text	1
005	7	Heat Shrink Tube (GNSS)	001316C000000A	PE	Blue Tube/White Text	1
005	8	RG174 Coaxial Cable	301315C000000A	PVC	Black	1
005	9	CFD200 Coaxial Cable	301415C010000A	PE	Black	1
005	10	SMA(M) ST	200212I000012A	Brass	Au Plated	1
005	11	SMA(M) ST	200216D02009BA	Brass	Au Plated	1

UNLESS OTHERWISE SPECFIED TOLERANCES ON:
.X± 0.2
XX.± 0.5 .XX± 0.1
X.± 0.3 .XXX± 0.05

DATE: 2018/08/08 | MAT'L:
UNIT: mm | FINISH:
THIRD ANGLE PROJECTION | SCALE: 1/1

APPROVED BY: Joanna | CHECKED BY: Wayne | DRAWN BY: Gabriel | CUSTOMERS SIGNATURE / DATE

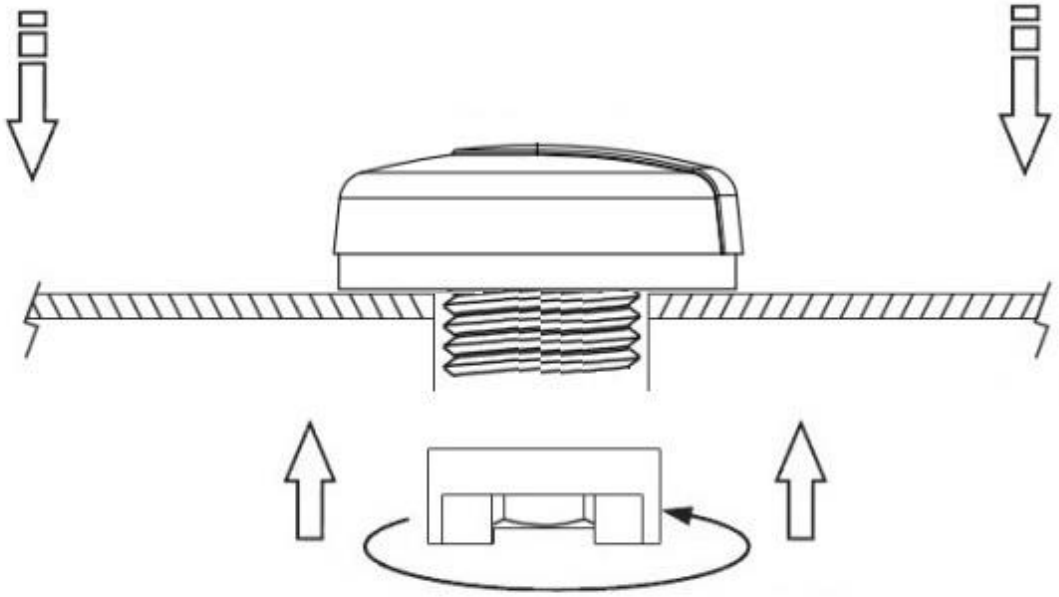
taoglas antenna solutions TW Design Centre

REV D05

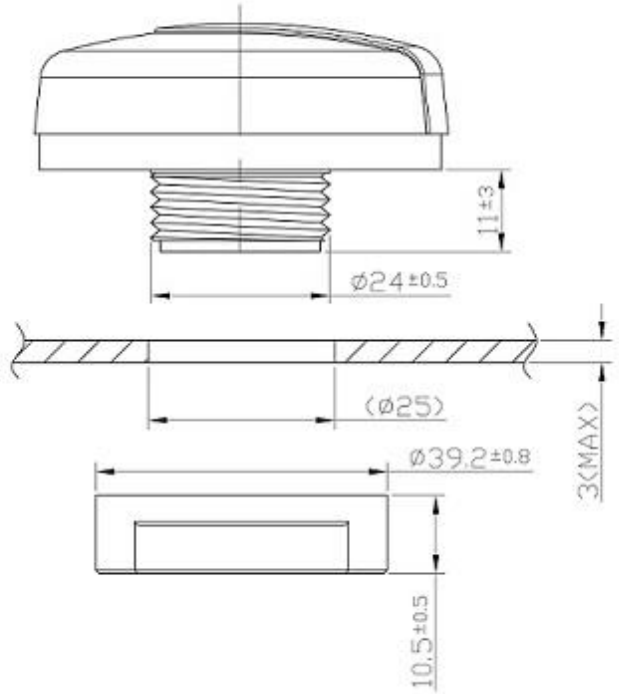
TITLE. : Ultima Screwmount
GPS/GLONASS-3M RG-174 SMA(M)
005 Cellular-3M CFD-200 SMA(M)

PART NO. : MA111.C.LB.001 003

7. Installation

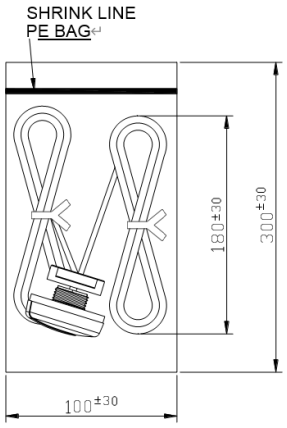


Recommended torque for Mounting is 3.92N·m
Maximum torque for Mounting is 4.9N·m

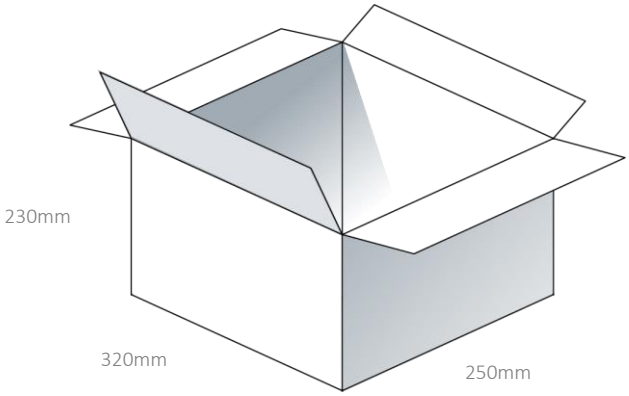


8. Packaging

1pcs MA111.C.LB.001 per PE Bag
Dimensions - Ø330*28.4
Weight – 0.21Kg

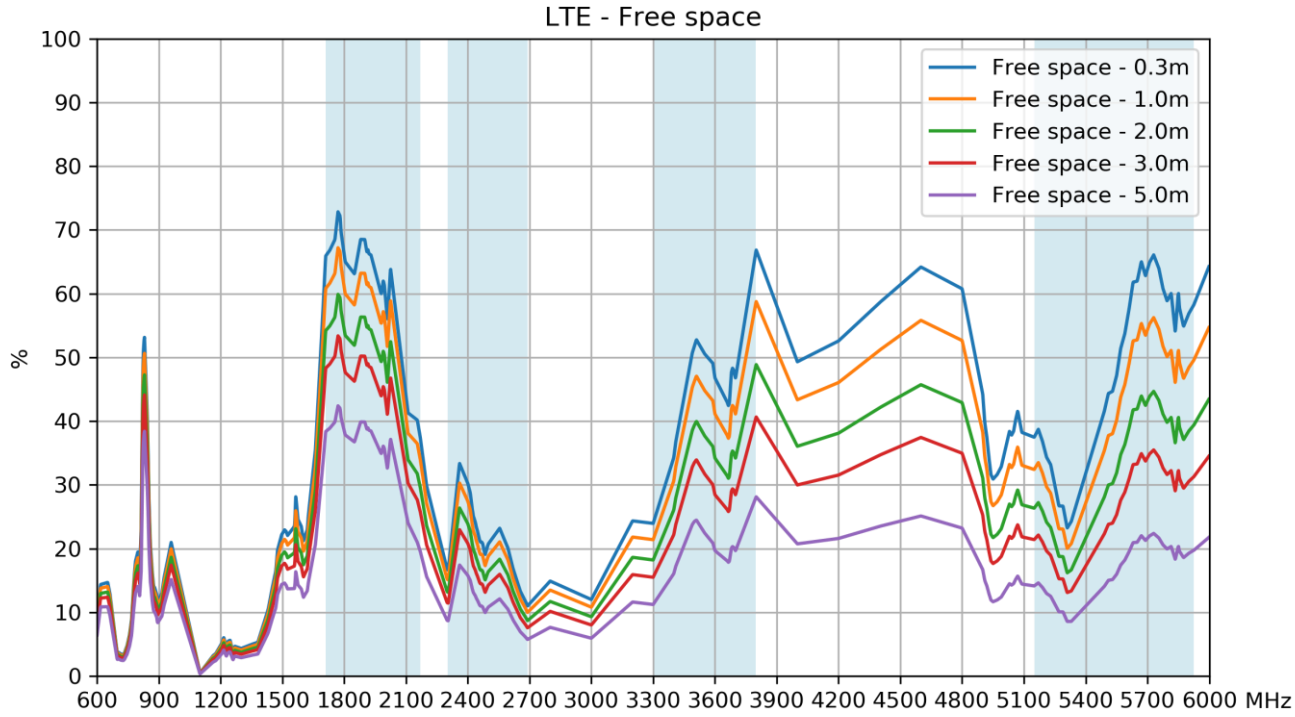


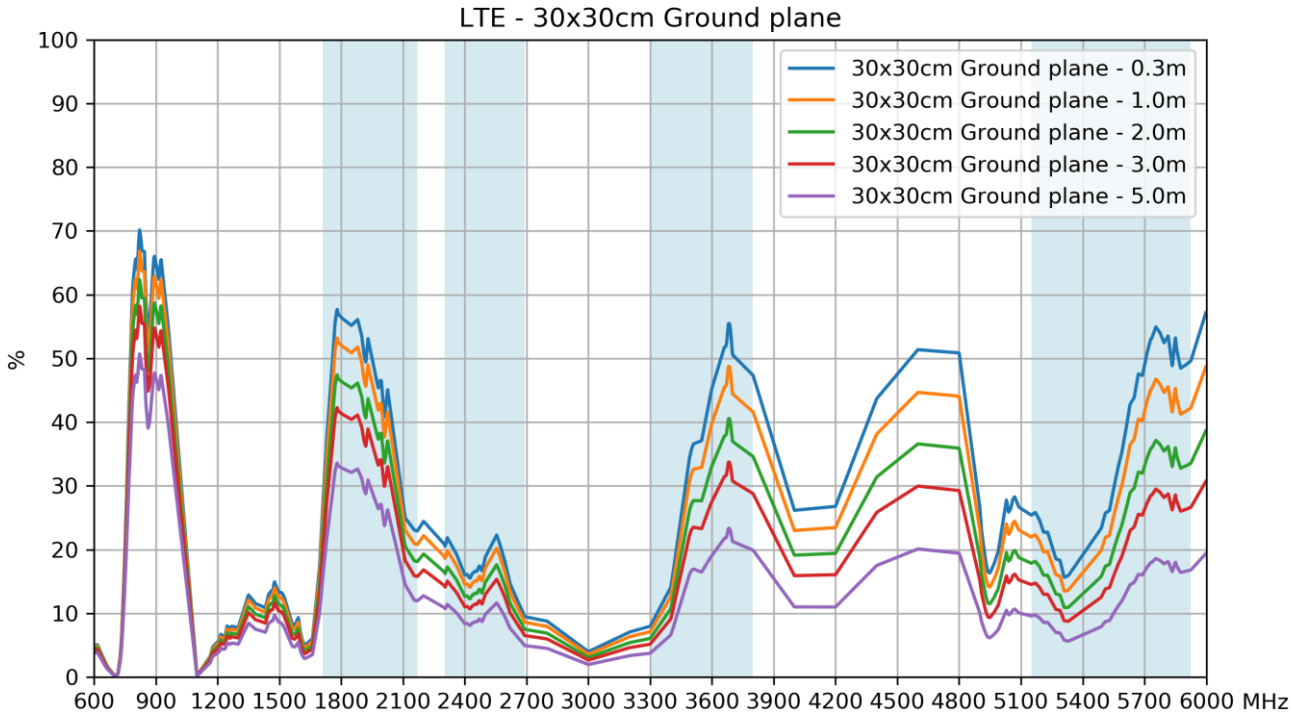
40pcs MA111.C.LB.001 per carton
Dimensions - 320*250*230mm
Weight – 8.7Kg



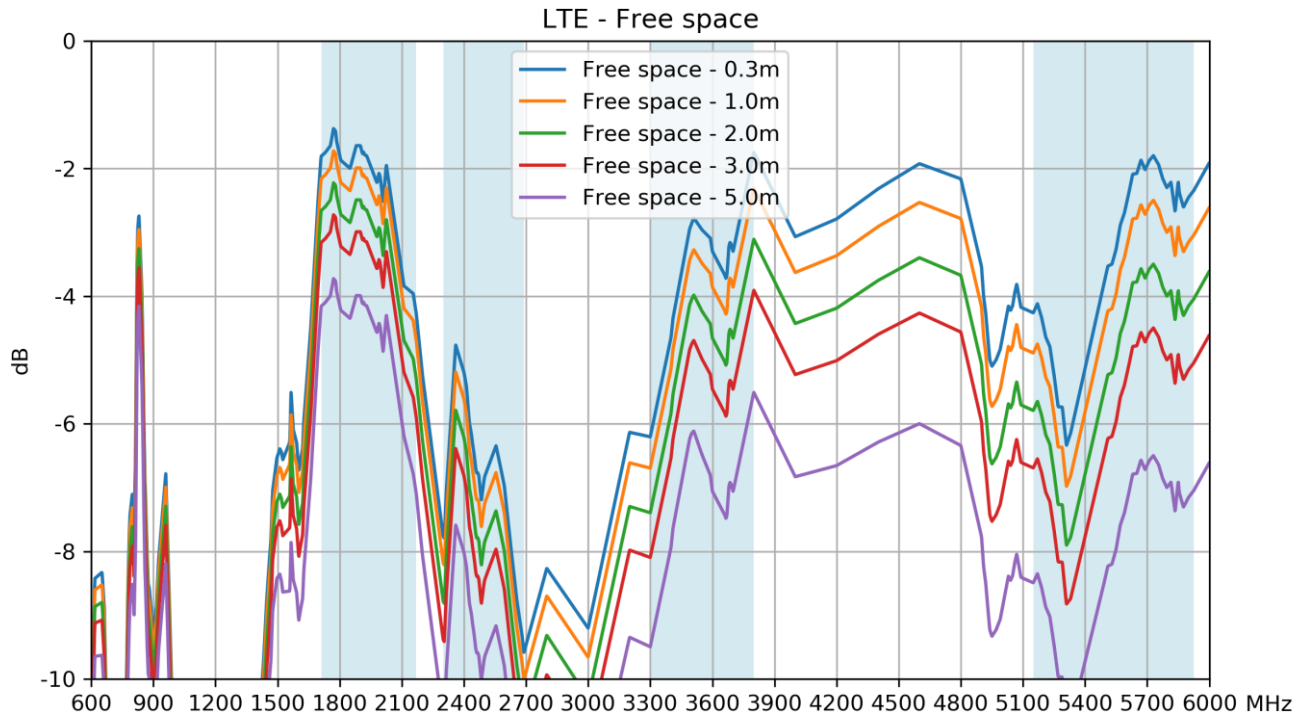
9. Application Note

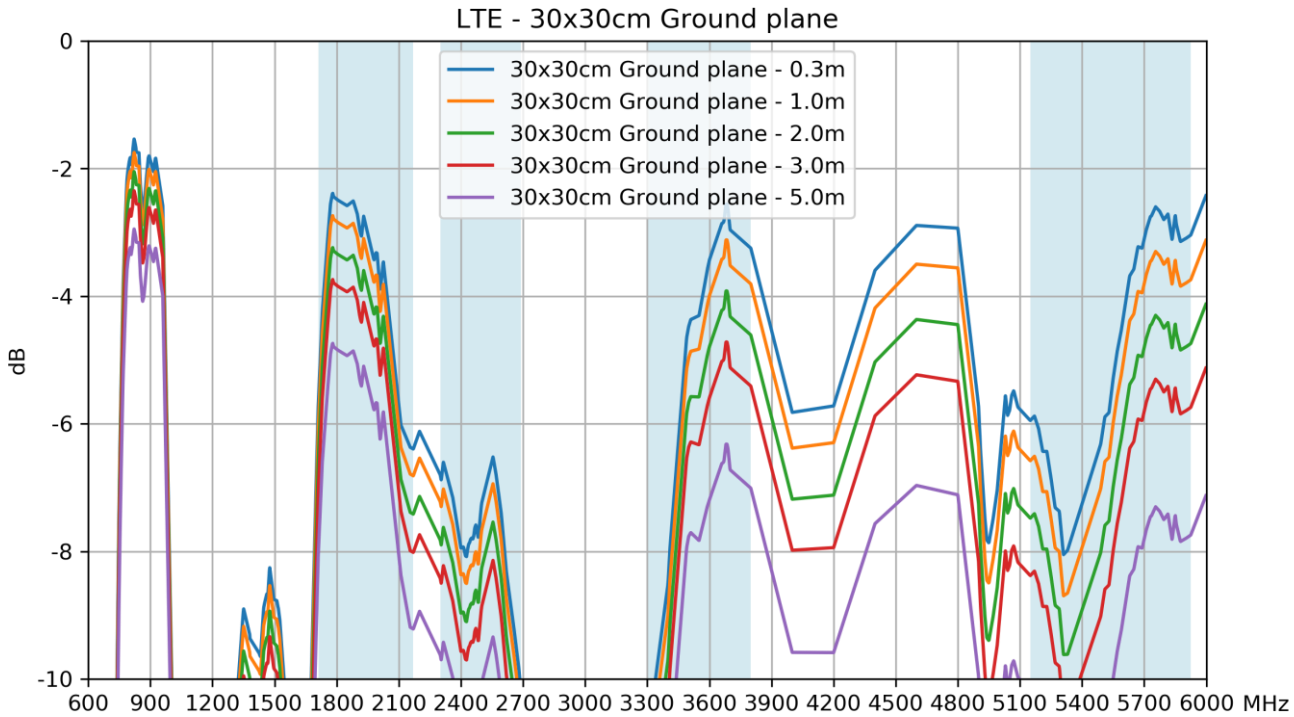
9.1 Efficiency – Cellular



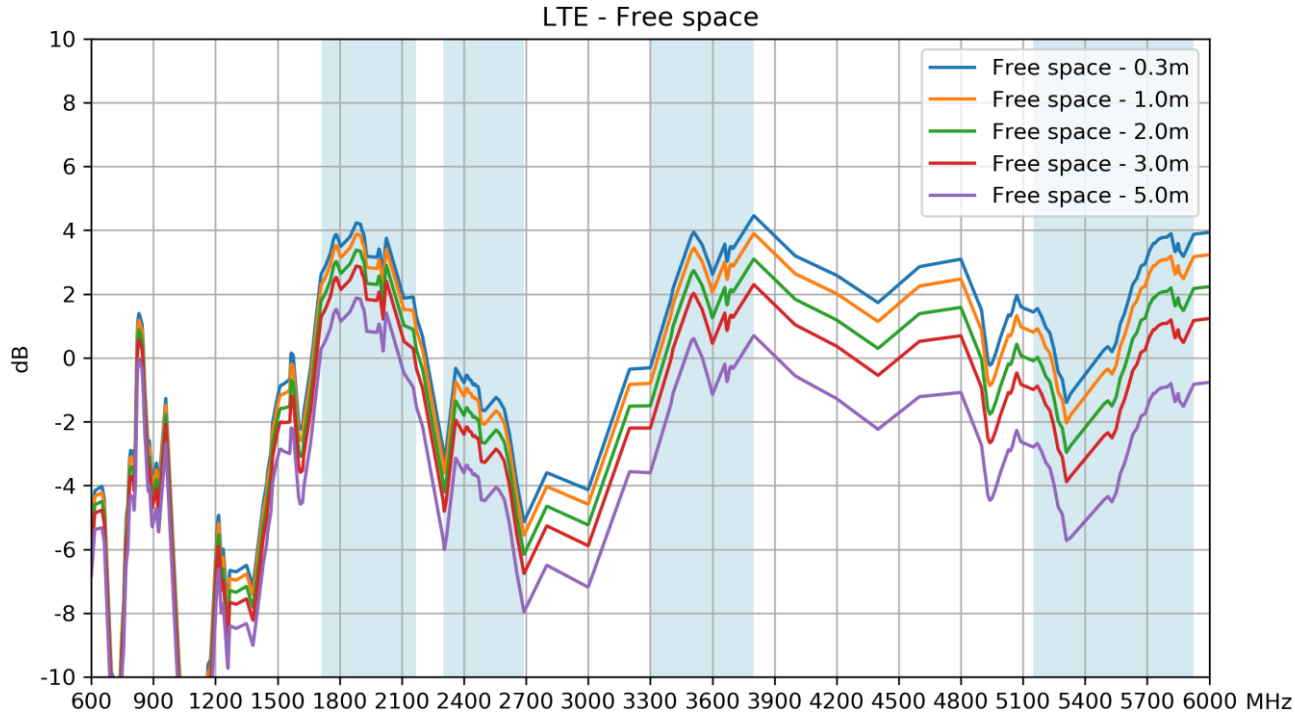


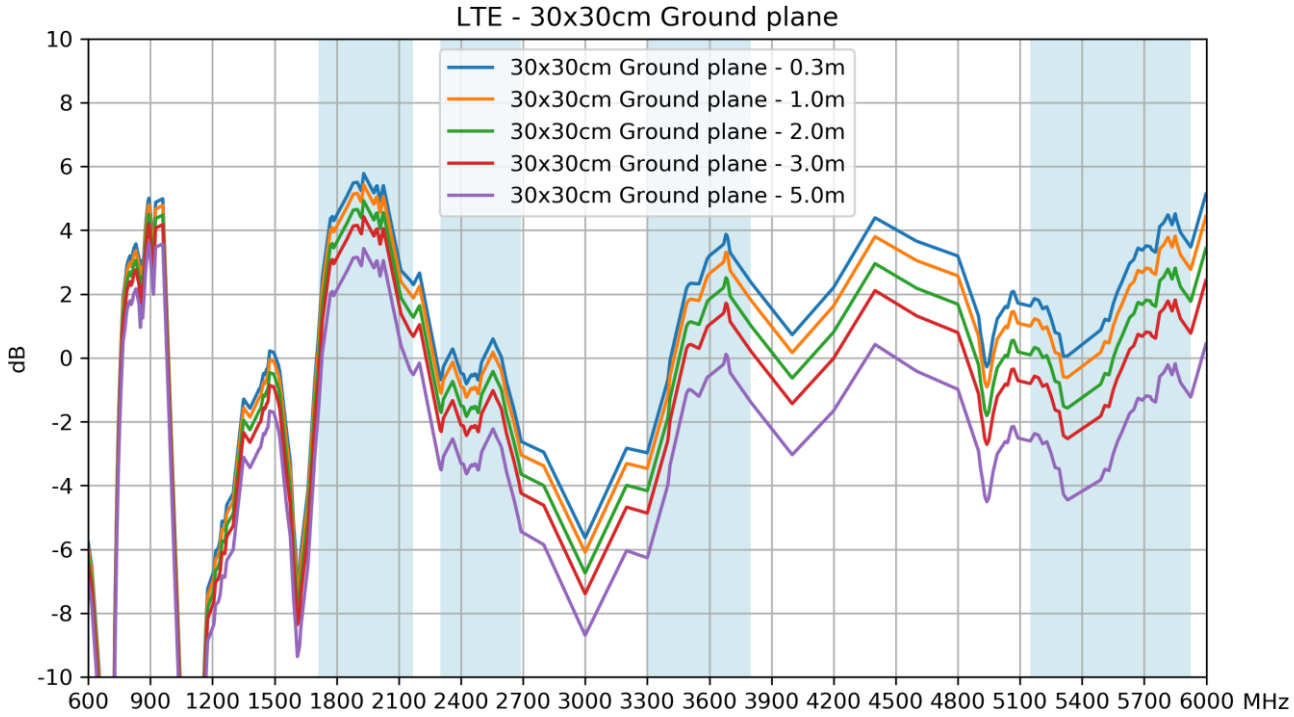
9.2 Average Gain – Cellular





9.3 Peak Gain – Cellular





Changelog for the datasheet

SPE-13-8-040 – MA111.C.LB.001

Revision: C (Current Version)	
Date:	2020-02-25
Changes:	Updated to show ground plane data
Changes Made by:	Jack Conroy

Previous Revisions

Revision: B	
Date:	2019-01-22
Changes:	New Table Added
Changes Made by:	Jack Conroy

Revision: A (Original First Release)	
Date:	2013-05-17
Notes:	
Author:	Aine Doyle

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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
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