Antenna Datasheet

Product OC: YEMN016AA
Version: 1.8
Date: 2025-10-15
Status: Released

Product Name: 5G & GNSS 5in1 Screw Mount Combo External Antenna
Key Features:
4 × 4 5G / 4G MIMO + GPS L1 & L5
Screw Mount
204.4 mm × 86.7mm × 32 mm
SMA Male Connector
IP Rating: IP67 & IP69K
PC Housing
Compatible with ECE-R118 cables under demand

Overview

YEMN016AA is a 5G & GNSS 5-in-1 combo antenna measuring 204.4 mm × 86.7 mm × 32 mm. This ultra-wide-band 5G & GNSS antenna provides broad coverage from 600–6,000 MHz whilst offering backward-compatibility to support 3G and 2G networks as well as LTE Cat-M and narrowband IoT (NB-IoT). The antenna is available with connection via 5 cable lengths from 300–5,000 mm (Compatible with ECE-R118 cables), terminated with SMA Male connectors. Ideal for applications where the antenna is required to be discrete, this low profile, screw mount omni-directional antenna is easy to install with maximum durability assured thanks to its IP67 & IP69K rated enclosure. It is compatible with Quectel's RM520x Series modules.

YEMN016AA has 2 × 5G LMH antennas, 2 × 5G MH/Wi-Fi antennas and 1 × GNSS L1 & L5 antenna. It allows high efficiency, stable signal transmission and reception for active GNSS from 1164–1189 MHz & 1565–1606 MHz, and 5G/4G bands from 600–960 MHz and 1400–6000 MHz. In the meantime, this product also offers high isolation between antennas to avoid self-interference. All in all, this unique product is designed to provide stable and high-speed data connection to 5G & GNSS applications. YEMN016AA can be used in harsh environments thanks to its robust UV resistant (UL 746c f1) and flame resistant (UL 94 V-0) enclosure.

Typical Applications Include:

- HD Video Streaming over LTE
- Vehicle Tracking and Telematic System
- IoT and Routers Applications

Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs. We have regional R & D centers to offer quick response to meet your requirements. Please contact our sales & FAEs if you have any requests.

Below are the variants based on YEMN016AA.

- Combo variants overview

Combo variants overview							
OC	**5G LMH**	**5G MH/Wi-Fi**	**GNSS L1 & L5 (28 dB)**	**GNSS L1 & L5 (17 dB)**	**Total**	**Mounting Type**	**Screw Nut**
YEMN016AA	2	2	1	-	5in1	Screw	M20
YEMN016BA	2	2	-	1	5in1	Screw	M20
YEMN401J1AH	2	2	-	-	4in1	Screw	M20
YEMN306J1AH	2	-	1	-	3in1	Screw t	M20
YEMN304J1BH	2	-	-	1	3in1	Screw	M20
YEMN307J1CH	1	1	1	-	3in1	Screw	M20
YEMN305J1DH	1	1	-	1	3in1	Screw	M20
YEMN206J1AH	1	1	-	-	2in1	Screw	M20
YEMN204J1BH	2	-	-	-	2in1	Screw	M20
YEMN207J1CH	1	-	1	-	2in1	Screw	M20
YEMN205J1DH	1	-	-	1	2in1	Screw	M20
YEMN101J1AH	1	-	-	-	1	Screw	M20

Contents

Overview **1**
Contents **3**

1 Specification **4**
1.1. Electrical 4
1.1.1. LMHs 5
1.1.2. MHs 6
1.1.3. GNSS 7
1.2. Mechanical & Environmental 8
1.3. Supported Bands 9
1.4. Block Diagram (Active Antenna) 13

2 Drawing **14**

3 Detailed Performance **15**
3.1. S-Parameter Test 15
3.1.1. VSWR 15
3.1.2. Return Loss 18
3.1.3. Isolation 21
3.1.3.1. Test Status: In Free Space 21
3.1.3.2. Test Status: On 500 mm × 500 mm Metal Plane 23
3.1.4. GNSS LNA Gain 25
3.1.5. GNSS Noise Figure 26
3.2. Radiation Performance Test 27
3.2.1. Efficiency 27
3.2.2. Average Gain 30
3.2.3. Peak Gain 33
3.2.4. 3D & 2D Radiation Pattern 37
3.2.4.1. Test Status: In Free Space 37
3.2.4.2. Test Status: On 500 mm × 500 mm Metal Plane 53
3.3. GNSS Test Data (Open Sky) 68

4 Packaging **70**

5 Installation **72**

6 Appendix Reference **73**

Contact Us **75**
Legal Notices **76**
Revision History **78**

1 Specification

1.1. Electrical

Electrical Specifications		
Frequency Range	**LMHs**	600–960 MHz, 1400–6000 MHz
	MHs	1164–1189 MHz, 1400–6000 MHz
	GNSS	1164–1189 MHz, 1565–1606 MHz
Radiation Pattern	**LMHs & MHs**	Omni-directional
	GNSS	Directional
Polarization	**LMHs & MHs**	Linear
	GNSS	RHCP
Impedance		50 Ω
Isolation		≤ -10 dB

1.1.1. LMHs

Band / SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	n74 /n75 /n76	GNSS L1	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /n77	n79	Wi-Fi 5G
	Freq. (MHz)	600– 700	700– 810	820– 960	1420– 1520	1559– 1609	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150 – 5850
Max VSWR	FS	6.5	4.7	3.0	4.0	3.8	3.3	1.7	1.7	2.4	1.9	1.8	2.3
	MP	9.5	5.1	3.5	3.6	3.3	3.1	1.6	1.7	2.5	2.1	1.9	2.6
Max Return Loss (dB)	FS	-2.7	-3.8	-6.0	-4.4	-4.9	-5.5	-12.0	-12.2	-7.7	-10.5	-11.2	-8.0
	MP	-1.8	-3.4	-5.1	-5.0	-5.5	-5.9	-12.6	-12.1	-7.3	-9.1	-9.9	-7.1
AVG Eff. (%)	FS	26.1	38.6	43.2	31.4	35.7	48.4	64.9	63.7	63.8	61.1	52.9	34.1
	MP	17.5	39.8	39.1	25.1	30.4	47.5	67.4	63.7	59.2	59.3	46.7	28.4
AVG AVG Gain (dB)	FS	-5.8	-4.1	-3.6	-5.0	-4.5	-3.2	-1.9	-2.0	-2.0	-2.1	-2.8	-4.7
	MP	-7.6	-4.0	-4.1	-6.0	-5.2	-3.2	-1.7	-2.0	-2.3	-2.3	-3.3	-5.5
Max Peak Gain (dBi)	FS	-2.8	-0.9	0.1	-0.4	0.1	5.2	5.9	5.4	5.0	4.5	5.1	2.2
	MP	-1.4	0.7	1.4	2.4	1.9	4.8	5.7	5.9	5.9	4.8	5.0	2.8
VSWR	FS	≤ 6.5											
	MP	≤ 9.5											
Return Loss	FS	≤ -2.7 dB											
	MP	≤ -1.8 dB											
Peak Gain	FS	≤ 5.9 dBi											
	MP	≤ 5.9 dBi											

- LMHs: 5G LMH1, 5G LMH2
- MHs: 5G MH1, 5G MH2
- FS: In Free Space
- MP: On 500 mm × 500 mm Metal Plane

1.1.2. MHs

Band / SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	GNSS L5	n74 /n75 /n76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /n77	n79	Wi-Fi 5G
	Freq. (MHz)	600–700	700–810	820–960	1166-1187	1420–1520	1700–2170	2300–2400	2400–2500	2500–2690	3300–4200	4400–5000	5150–5850
Max VSWR	FS	-	-	-	7.6	4.9	2.7	2.8	2.7	2.8	3.1	2.2	2.6
	MP	-	-	-	7.5	4.9	2.6	2.6	2.5	2.7	2.9	2.4	2.6
Max Return Loss (dB)	FS	-	-	-	-2.8	-3.6	-6.7	-6.4	-6.8	-6.5	-5.9	-8.5	-7.1
	MP	-	-	-	-2.8	-3.6	-7.0	-6.9	-7.3	-6.8	-6.3	-7.8	-6.9
AVG Eff. (%)	FS	-	-	-	13.6	26.7	47.4	48.0	48.0	50.2	49.0	48.6	42.9
	MP	-	-	-	10.5	26.0	44.4	48.8	48.8	47.9	41.0	41.1	38.0
AVG AVG Gain (dB)	FS	-	-	-	-9.0	-5.7	-3.2	-3.2	-3.2	-3.0	-3.1	-3.1	-3.7
	MP	-	-	-	-10.3	-5.8	-3.5	-3.1	-3.1	-3.2	-3.9	-3.9	-4.2
Max Peak Gain (dBi)	FS	-	-	-	-1.7	-0.7	2.2	1.9	2.6	2.6	4.7	3.6	3.5
	MP	-	-	-	0.8	1.8	4.9	5.2	4.8	4.1	7.3	6.4	4.0
VSWR	FS	≤7.6											
	MP	≤7.5											
Return Loss	FS	≤ -2.8 dB											
	MP	≤ -2.8 dB											
Peak Gain	FS	≤ 4.7 dBi											
	MP	≤ 7.3 dBi											

- LMHs: 5G LMH1, 5G LMH2
- MHs: 5G MH1, 5G MH2
- FS: In Free Space
- MP: On 500 mm × 500 mm Metal Plane

1.1.3. GNSS

Band / Frequency (MHz)	GPS L5 GALILEO E5a BDS B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BDS B2b	GPS L2 QZSS L2C	GLONASS G2	BDS B3	BDS B1I	GPS L1 GALILEO E1 BDS B1C QZSS L1	GLONASS G1
	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	1.27						1.64	1.36
Return Loss (dB)	-18.1						-12.3	-16.2
Efficiency (%)	78						51	52
Peak Gain (dBi)	4.26						2	2.65

LNA Electrical	
LNA Gain	28 ±3 dB @ 3-5V 26 ±3 dB @ 1.8V
Noise Figure	≤ 2.5 dB
Output VSWR	< 2.0
Filter Out-of-Band Attenuation	65 dB f0 ±100 MHz f0 (1176 MHz, 1588 MHz)
Working Voltage	DC 1.8–5 V
Working Current	< 20 mA
Impedance	50 Ω

1.2. Mechanical & Environmental

Mechanical		
Antenna Size		204.4 mm × 86.7 mm × 32 mm
Casing Material & Color		PC, UL94 V0 & Black
Cable Type & Length	**LMHs & MHs**	ALS302 Black & 300 mm
	GNSS	RG174 Black & 300 mm
Connector Type		SMA (The current state of the SMA connector is not waterproof. If a waterproof connector is required, it can be customized.)
Weight		Typ. 423 ±5 g
Mounting Type		Screw (M20 Nut)
Environmental		
Operation Temperature		-40 °C to +85 °C
Storage Temperature		-40 °C to +85 °C
Ingress Protection (IP) Rating		IP67 IP69K
RoHS & REACH Compliant		Yes
Housing Flame Rating		UL 94 V-0
Housing UV Resistant		UL 746c f1e

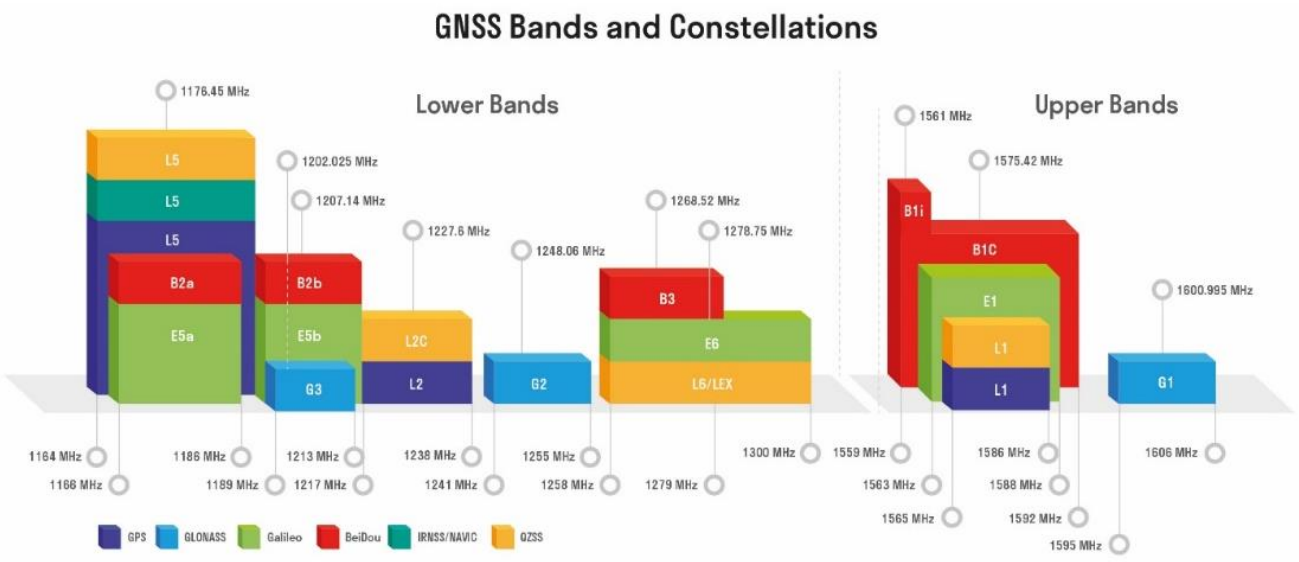
- LMHs: 5G LMH1, 5G LMH2
- MHs: 5G MH1, 5G MH2
- FS: In Free Space
- MP: On 500 mm × 500 mm Metal Plane

1.3. Supported Bands

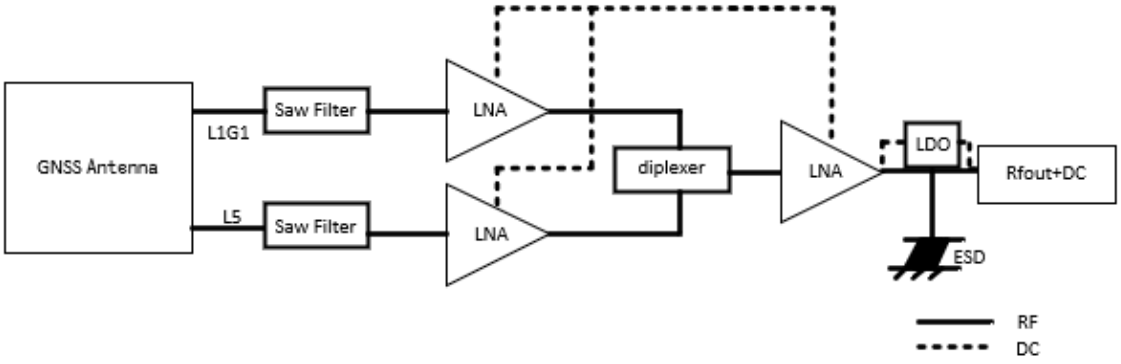
5G NR / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / GPRS / GSM / NB-IoT					
Band	**Frequency (MHz)**	**Uplink (MHz)**	**Downlink (MHz)**	**LMHs**	**MHs**
1	2100	1920–1980	2110–2170	√	√
2	1900	1850–1910	1930–1990	√	√
3	1800	1710–1785	1805–1880	√	√
4	1700	1710–1755	2110–2155	√	√
5	850	824–849	869–894	√	-
7	2600	2500–2570	2620–2690	√	√
8	900	880–915	925–960	√	-
9	1800	1749.9–1784.9	1844.9–1879.9	√	√
11	1500	1427.9–1447.9	1475.9–1495.9	√	√
12	700	699–716	729–746	√	-
13	700	777–787	746–756	√	-
14	700	788–798	758–768	√	-
17	700	704–716	734–746	√	-
18	850	815–830	860–875	√	-
19	850	830–845	875–890	√	-
20	800	832–862	791–821	√	-
21	1500	1447.9–1462.9	1495.9–1510.9	√	√
22	3500	3410–3490	3510–3590	√	√
23	2100	2000–2020	2180–2200	√	√
24	1600	1626.5–1660.5	1525–1559	√	√
25	1900	1850–1915	1930–1995	√	√
26	850	814–849	859–894	√	-

5G NR / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / GPRS / GSM / NB-IoT					
Band	**Frequency (MHz)**	**Uplink (MHz)**	**Downlink (MHz)**	**LMHs**	**MHs**
28	700	703–748	758–803	√	-
31	450	452.5–457.5	462.5–467.5	-	-
34	2100	2010–2025		√	√
38	2600	2570–2620		√	√
39	1900	1880–1920		√	√
40	2300	2300–2400		√	√
41	2500	2496–2690		√	√
42	3500	3400–3600		√	√
48	3500	3550–3700		√	√
66	1700	1710–1780	2110–2200	√	√
71	600	663–698	617–652	√	-
74	1500	1427–1470	1475–1518	√	√
77	3500	3300–4200		√	√
78	3500	3300–3800		√	√
79	4500	4400–5000		√	√

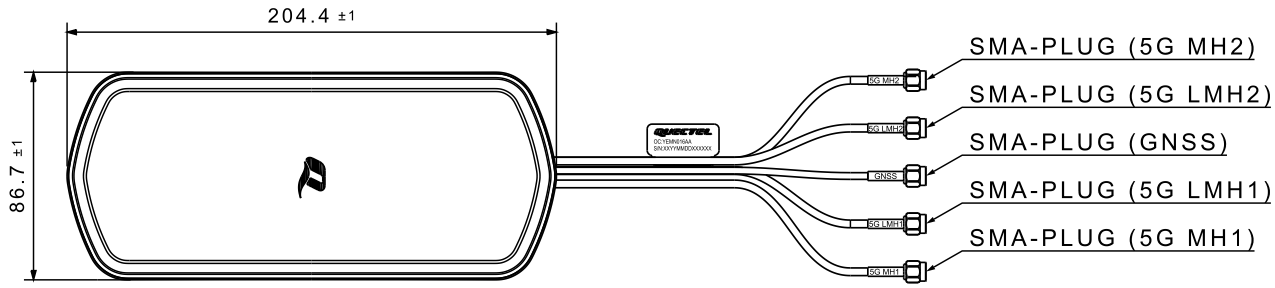
GNSS Frequency Bands (MHz)					
GPS	**L1** Centre 1575.42 (1565–1586)	**L2** Centre 1227.6 (1217–1238)	**L5** Centre 1176.45 (1164–1189)		
	√	-	√		
GLONASS	**G1-L1OC-L1OF** Centre 1601 (1595–1606)	**G2-L2OC-L2OF** Centre 1248.06 (1241–1255)	**G3-L3OC** Centre 1202.025 (1189–1213)		
	√	-	-		
GALILEO	**E1** Centre 1575.42 (1563–1588)	**E5a** Centre 1176.45 (1166–1187)	**E5b** Centre 1207.14 (1197–1218)	**E6** Centre 1278.75 (1258–1300)	
	√	√	-	-	
BDS	**B1I** Centre 1561.098 (1559–1564)	**B1C (BDS-3)** Centre 1575.42 (1559–1592)	**B2a-B2I** Centre 1176.45 (1166–1187)	**B2b** Centre 1207.14 (1197–1217)	**B3** Centre 1268.52 (1258–1279)
		√	√	-	-
QZSS	**L1** Centre 1575.42 (1573–1578)	**L2C** Centre 1227.6 (1226–1229)	**L5** Centre 1176.45 (1166–1187)	**L6** Centre 1278.75 (1257–1300)	
	√	-	√	-	
IRNSS	**L5** Centre 1176.45 (1164–1189)				
	√				

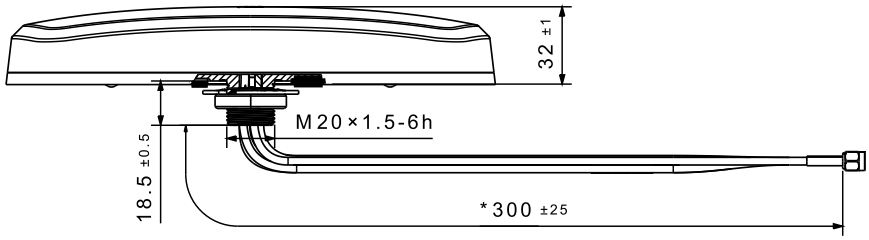

GNSS Bands and Constellations
Lower Bands
Upper Bands
1176.45 MHz
L5
L5
L5
B2a
E5a
1202.025 MHz
1207.14 MHz
B2b
E5b
G3
1227.6 MHz
L2C
L2
1248.06 MHz
G2
1268.52 MHz
1278.75 MHz
B3
E6
L6/LEX
1561 MHz
1575.42 MHz
B1i
B1C
E1
L1
L1
1600.995 MHz
G1
1164 MHz
1166 MHz
1186 MHz
1189 MHz
1213 MHz
1217 MHz
1238 MHz
1241 MHz
1255 MHz
1258 MHz
1279 MHz
1300 MHz
1559 MHz
1563 MHz
1565 MHz
1586 MHz
1588 MHz
1592 MHz
1595 MHz
1606 MHz
GPS
GLONASS
Galileo
BeiDou
IRNSS/NAVIC
QZSS

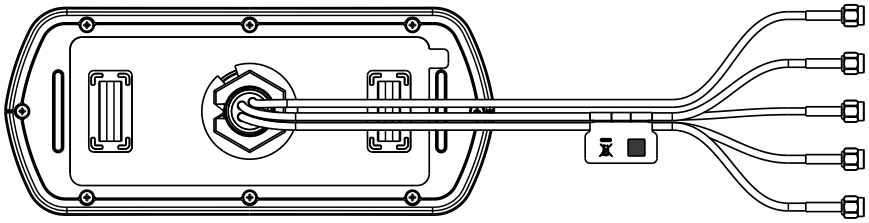
1.4. Block Diagram (Active Antenna)

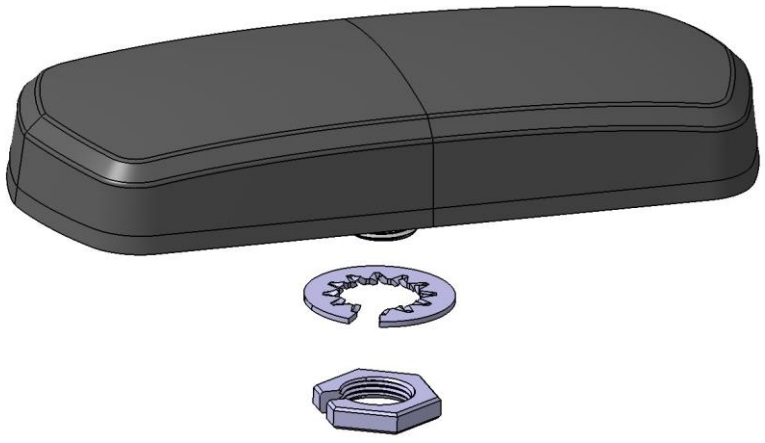


2 Drawing


204.4 ±1
86.7 ±1
SMA-PLUG (5G MH2)
SMA-PLUG (5G LMH2)
SMA-PLUG (GNSS)
SMA-PLUG (5G LMH1)
SMA-PLUG (5G MH1)
5G MH2
5G LMH2
GNSS
5G LMH1
5G MH1


32 ±1
M20×1.5-6h
18.5 ±0.5
*300 ±25

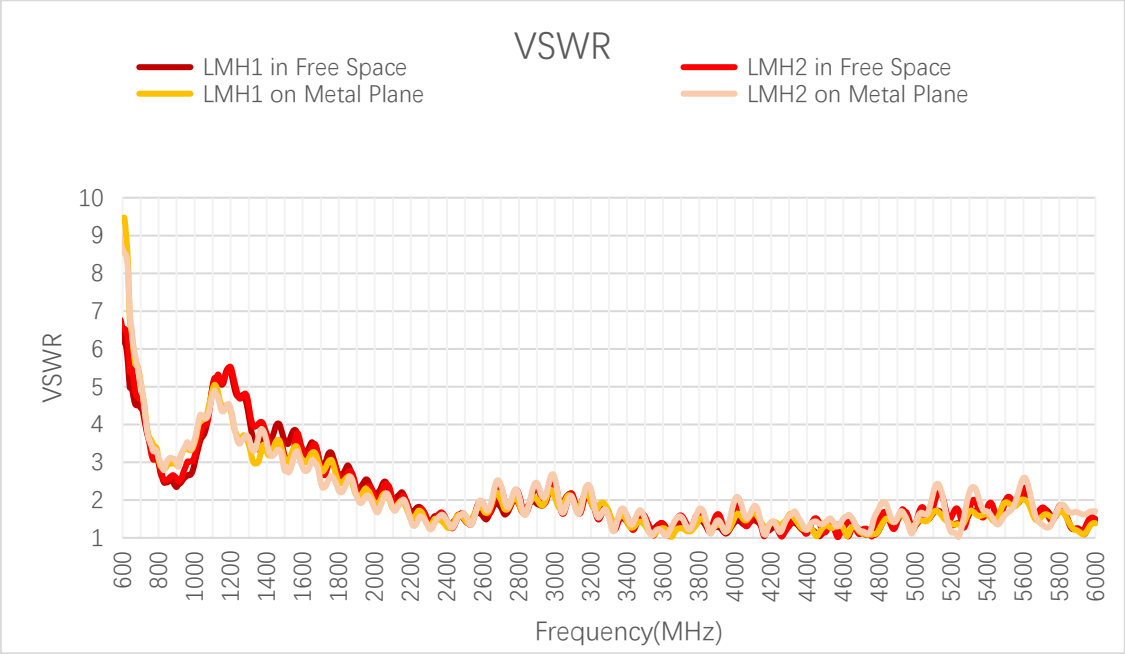


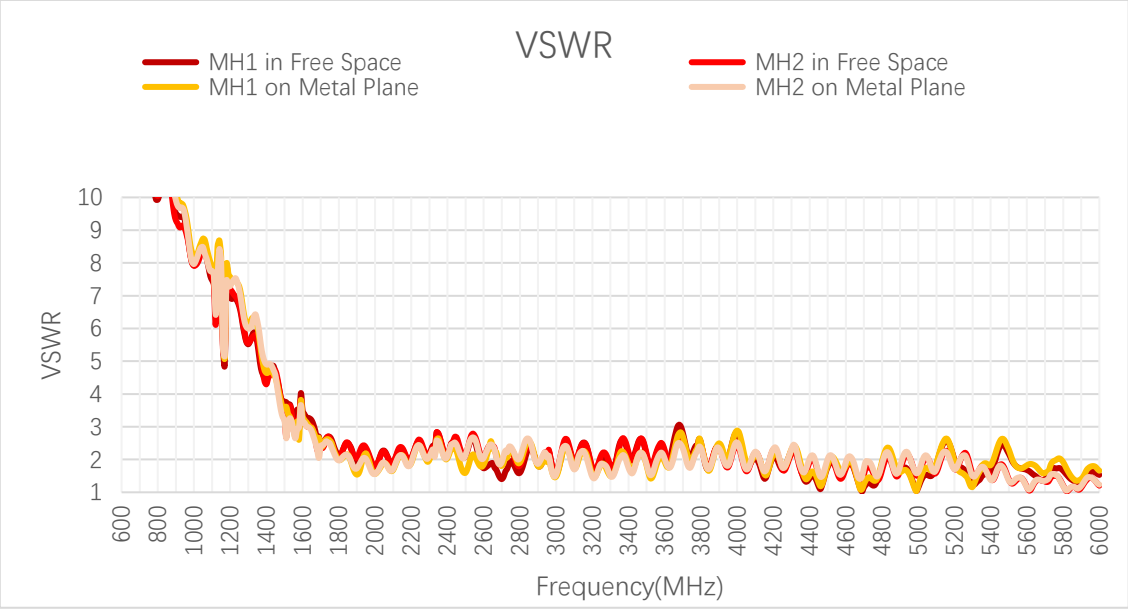


3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR



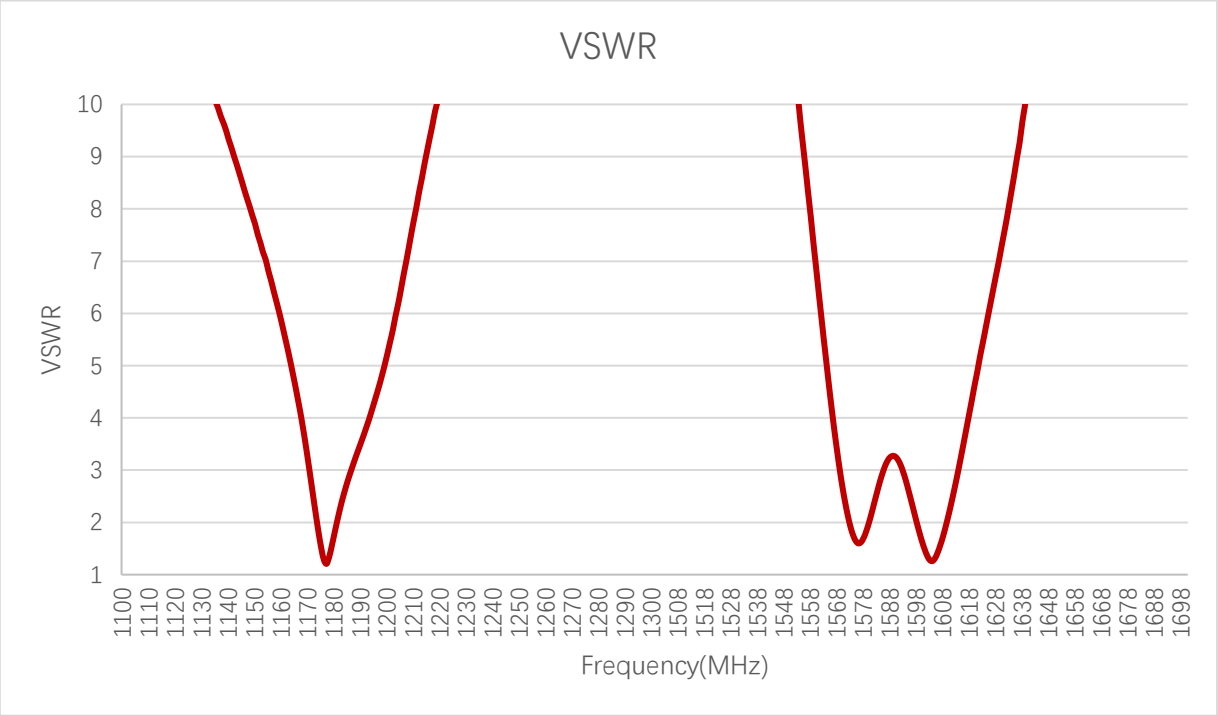


VSWR – LMH

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	6.3	5.6	4.4	2.5	2.3	2.7	3.8	2.9	3.2	2.6
	MP	9.4	8.3	4.8	2.9	2.9	3.4	3.4	2.8	3.0	2.4
LMH2	FS	6.5	6.2	4.6	2.5	2.6	3.0	3.4	2.7	2.9	2.6
	MP	8.6	8.1	4.9	2.8	3.0	3.5	3.2	2.3	2.5	2.5
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
LMH1	FS	2.5	2.2	1.6	1.5	1.6	1.4	1.2	1.3	2.0	1.5
	MP	2.3	2.0	1.5	1.5	1.8	1.3	1.1	1.4	1.9	1.4
LMH2	FS	2.3	2.0	1.6	1.4	1.9	1.4	1.1	1.3	2.0	1.5
	MP	2.1	1.9	1.5	1.4	1.9	1.1	1.2	1.3	1.6	1.7

VSWR – MH

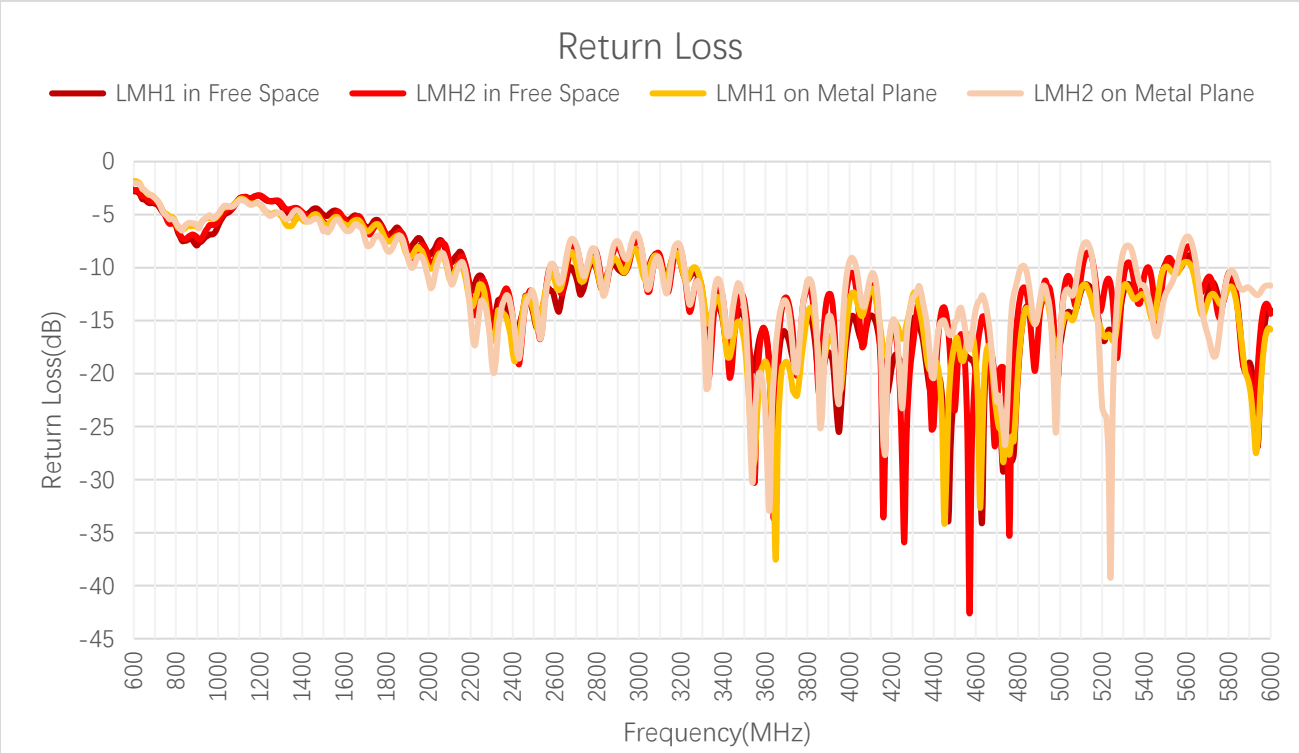
Frequency (MHz)		600	630	710	830	900	1176	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	4.9	2.4	2.7	2.1
	MP	-	-	-	-	-	-	4.6	2.4	2.6	1.7
MH2	FS	-	-	-	-	-	7.6	4.7	2.3	2.7	2.1
	MP	-	-	-	-	-	7.5	4.7	2.4	2.5	1.8
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
MH1	FS	2.3	2.3	2.8	2.6	1.7	2.1	1.1	1.1	2.2	1.5
	MP	2.2	2.1	2.6	2.3	1.8	1.9	1.2	1.2	2.3	1.7
MH2	FS	2.4	2.4	2.8	2.7	2.0	2.3	1.5	1.5	1.4	1.2
	MP	2.0	2.1	2.6	2.5	2.1	2.0	1.7	1.6	1.4	1.2

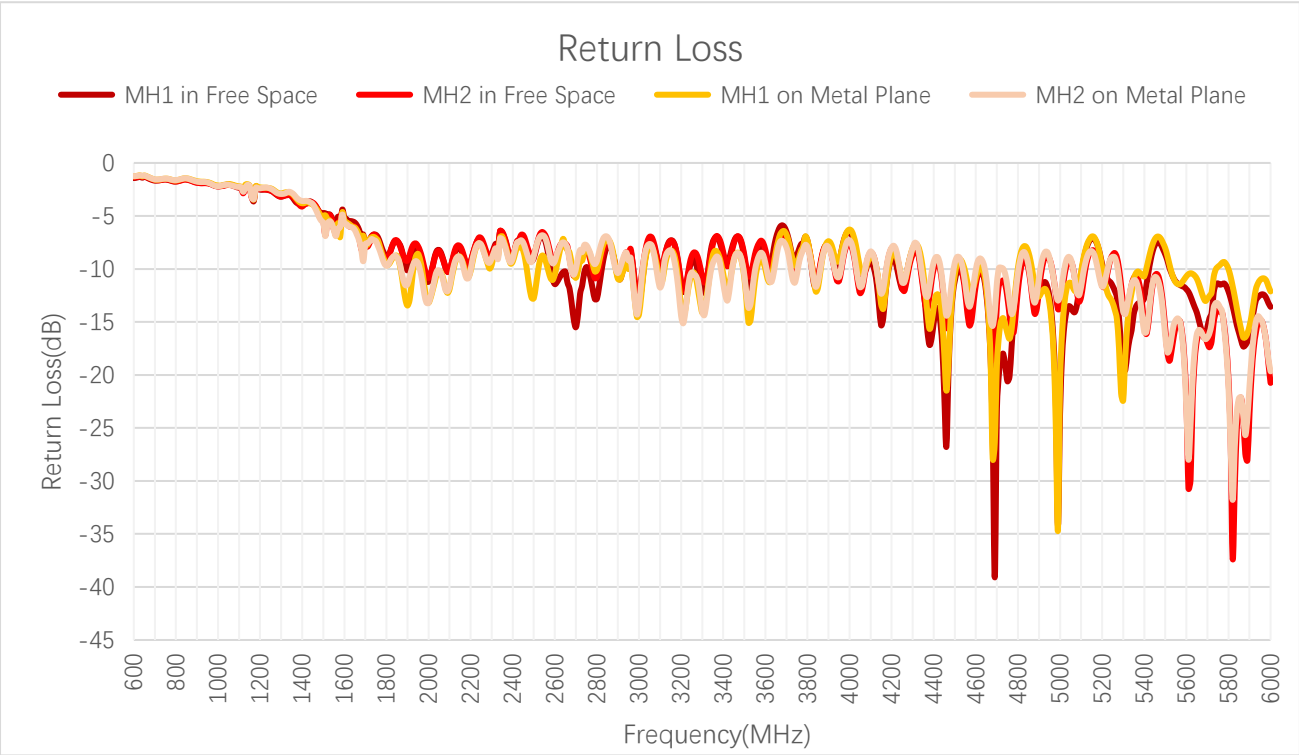


VSWR – GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	1.27	-	-	-	-	-	1.64	1.36

3.1.2. Return Loss



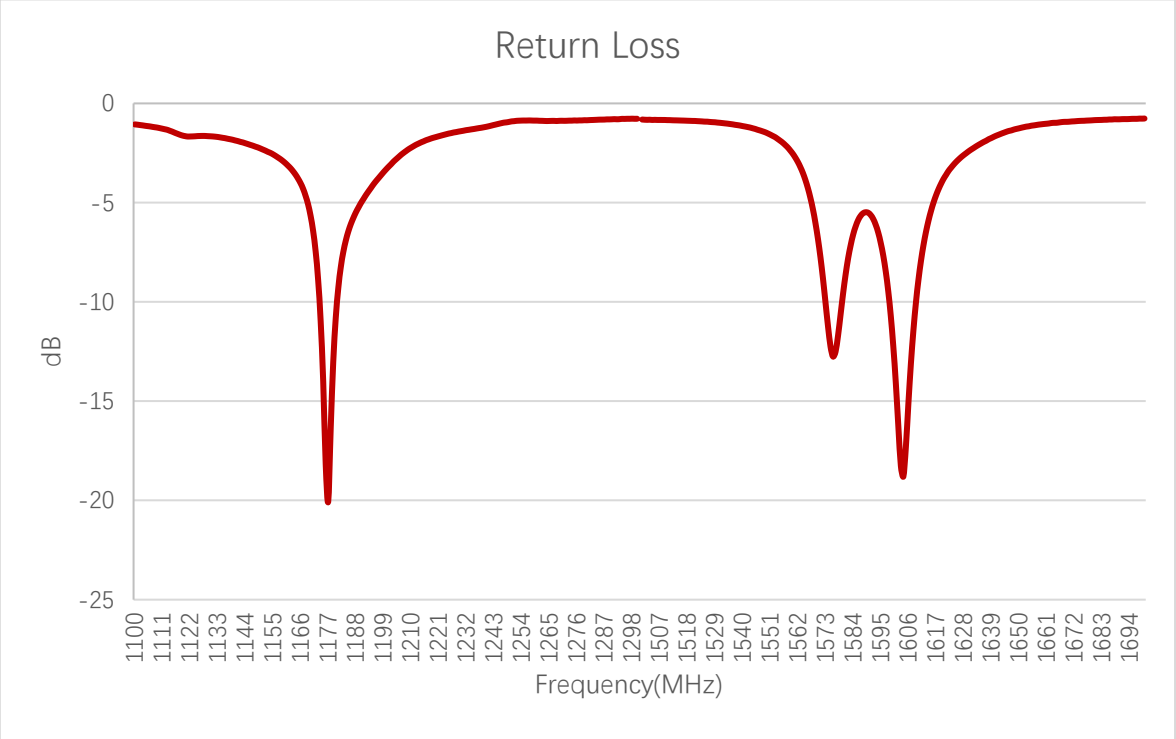


Return Loss (dB) – LMH

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	-2.8	-3.1	-4.0	-7.5	-7.9	-6.9	-4.7	-6.3	-5.6	-7.1
	MP	-1.9	-2.1	-3.7	-6.3	-6.2	-5.2	-5.3	-6.6	-6.0	-7.8
LMH2	FS	-2.7	-2.8	-3.8	-7.2	-7.1	-6.0	-5.2	-6.7	-6.3	-6.9
	MP	-2.0	-2.2	-3.6	-6.5	-6.0	-5.1	-5.6	-8.0	-7.3	-7.5
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
LMH1	FS	-7.2	-8.7	-12.8	-13.9	-13.0	-16.1	-22.6	-17.3	-9.7	-14.0
	MP	-8.0	-9.8	-14.3	-13.9	-11.2	-18.8	-23.9	-16.4	-9.9	-15.8
LMH2	FS	-8.3	-9.7	-12.8	-15.3	-10.1	-16.0	-23.8	-17.2	-9.8	-14.4
	MP	-9.0	-10.1	-13.5	-15.1	-10.0	-23.5	-22.7	-16.6	-12.6	-11.7

Return Loss (dB) – MH

Frequency (MHz)		600	630	710	830	900	1176	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	-3.6	-7.6	-6.8	-8.8
	MP	-	-	-	-	-	-	-3.8	-7.7	-7.0	-11.6
MH2	FS	-	-	-	-	-	-2.8	-3.7	-7.9	-6.7	-8.8
	MP	-	-	-	-	-	-2.8	-3.7	-7.6	-7.3	-11.0
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
MH1	FS	-8.2	-8.1	-6.6	-7.2	-11.4	-8.8	-23.2	-23.7	-8.6	-13.6
	MP	-8.6	-8.9	-6.9	-8.3	-10.5	-10.0	-19.1	-20.7	-8.1	-12.1
MH2	FS	-7.9	-7.8	-6.5	-6.8	-9.3	-8.2	-13.4	-13.7	-15.7	-20.8
	MP	-9.4	-8.8	-7.2	-7.5	-9.3	-9.5	-11.3	-12.6	-16.4	-19.7



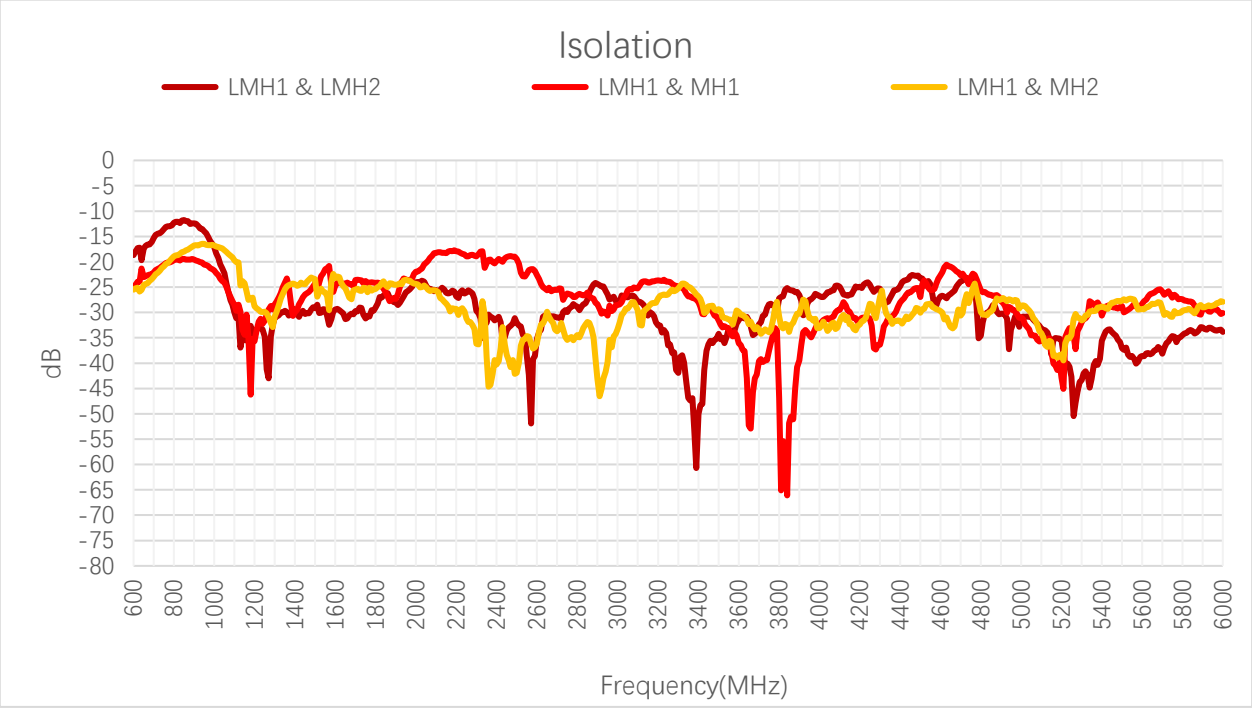
Return Loss (dB) – GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-18.1	-	-	-	-	-	-12.3	-16.2

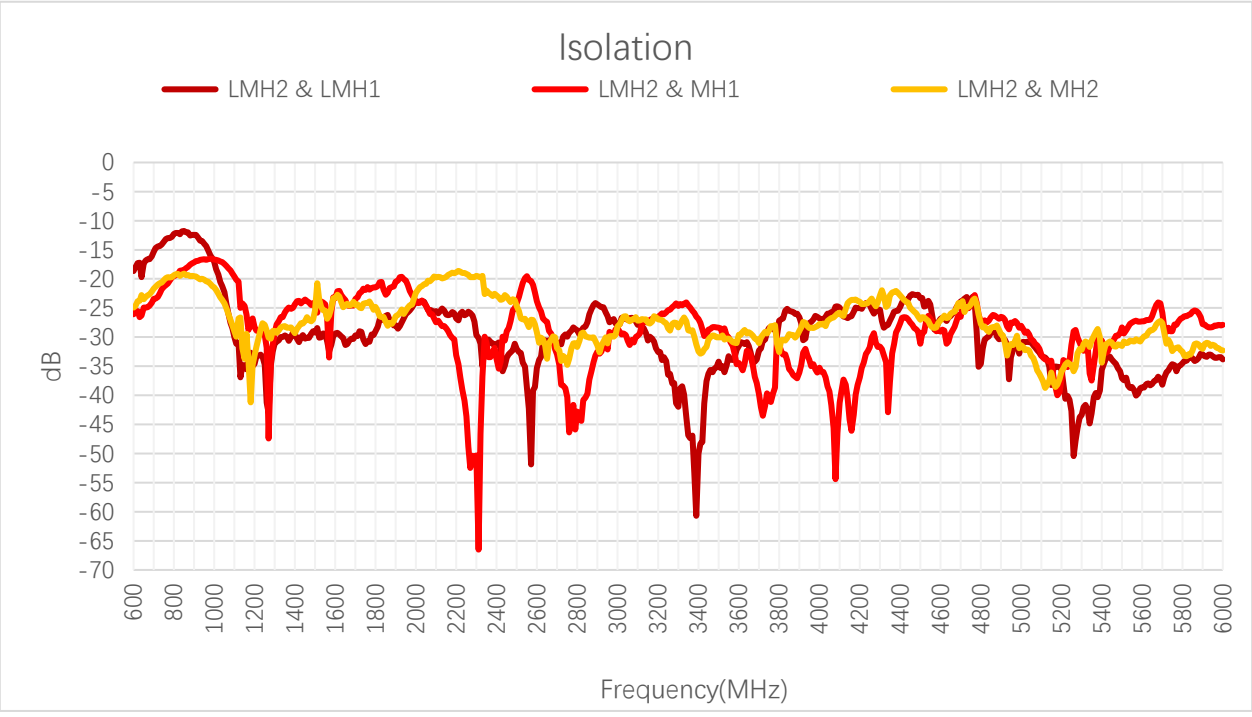
3.1.3. Isolation

3.1.3.1. Test Status: In Free Space

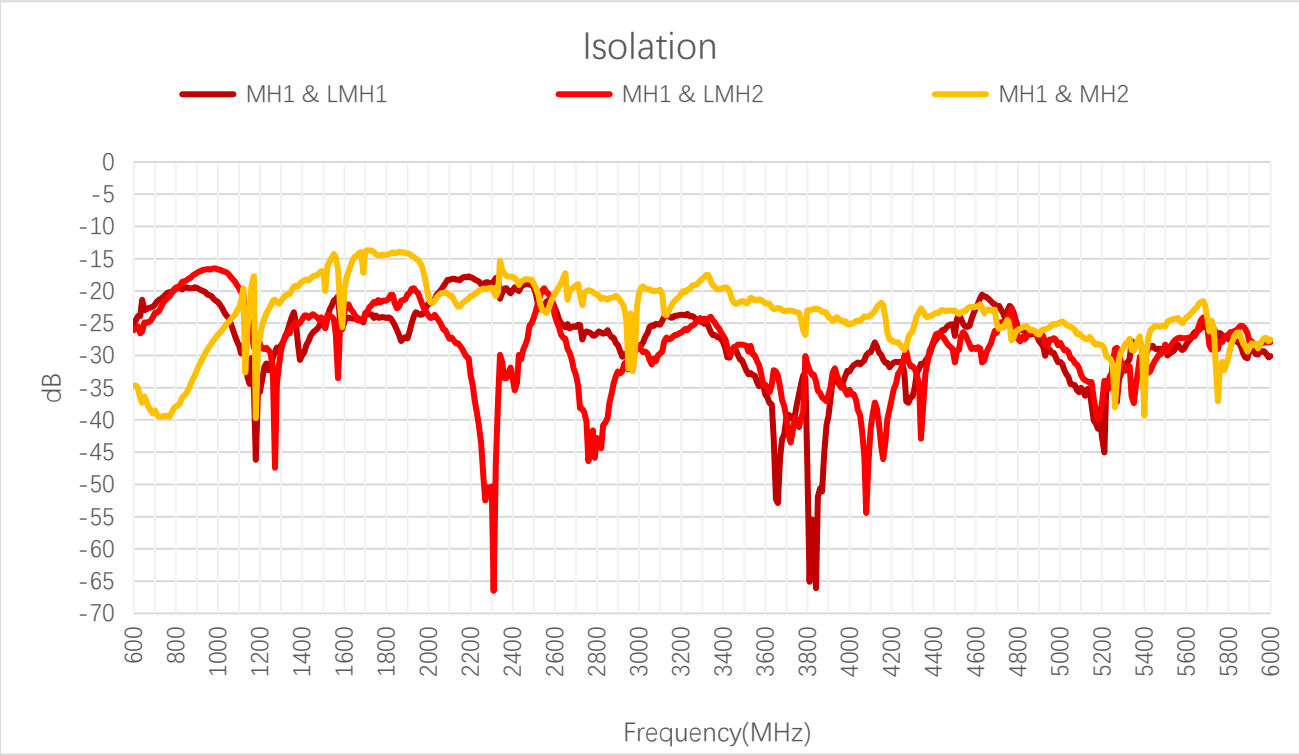
3.1.3.1.1. LMH1



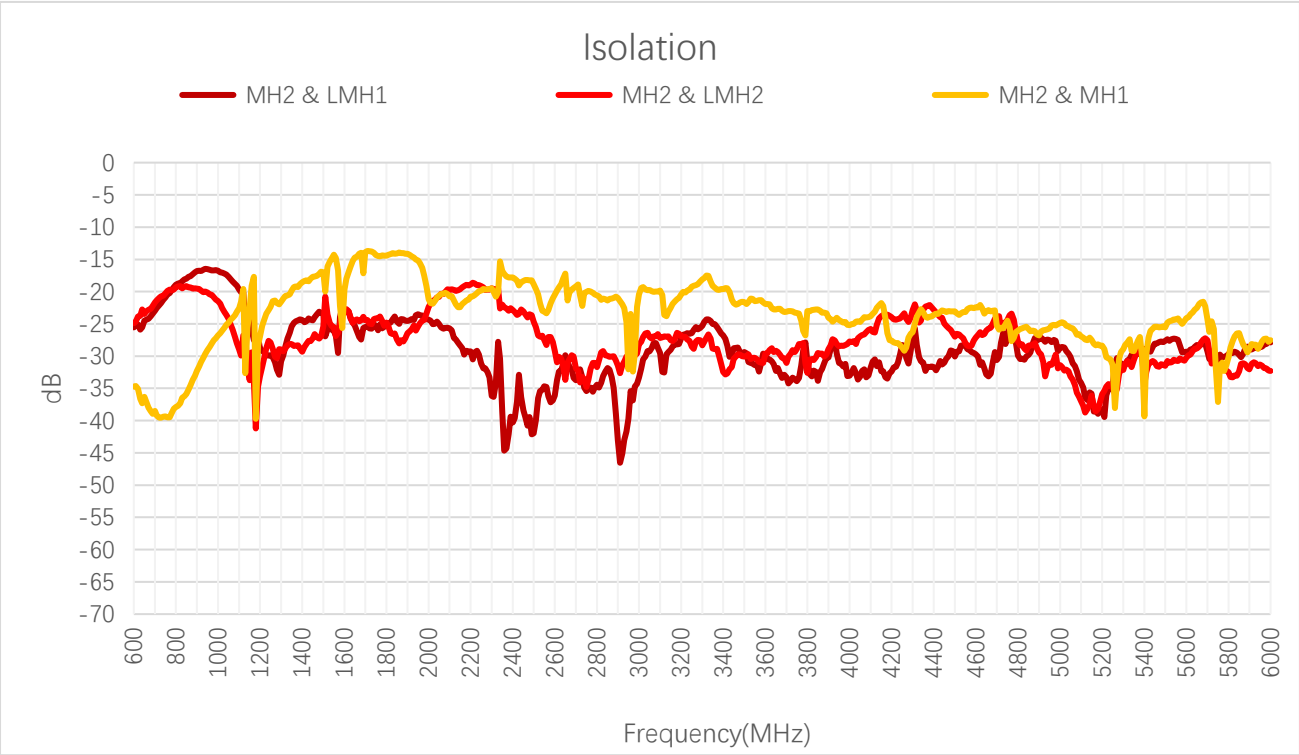
3.1.3.1.2. LMH2



3.1.3.1.3. MH1

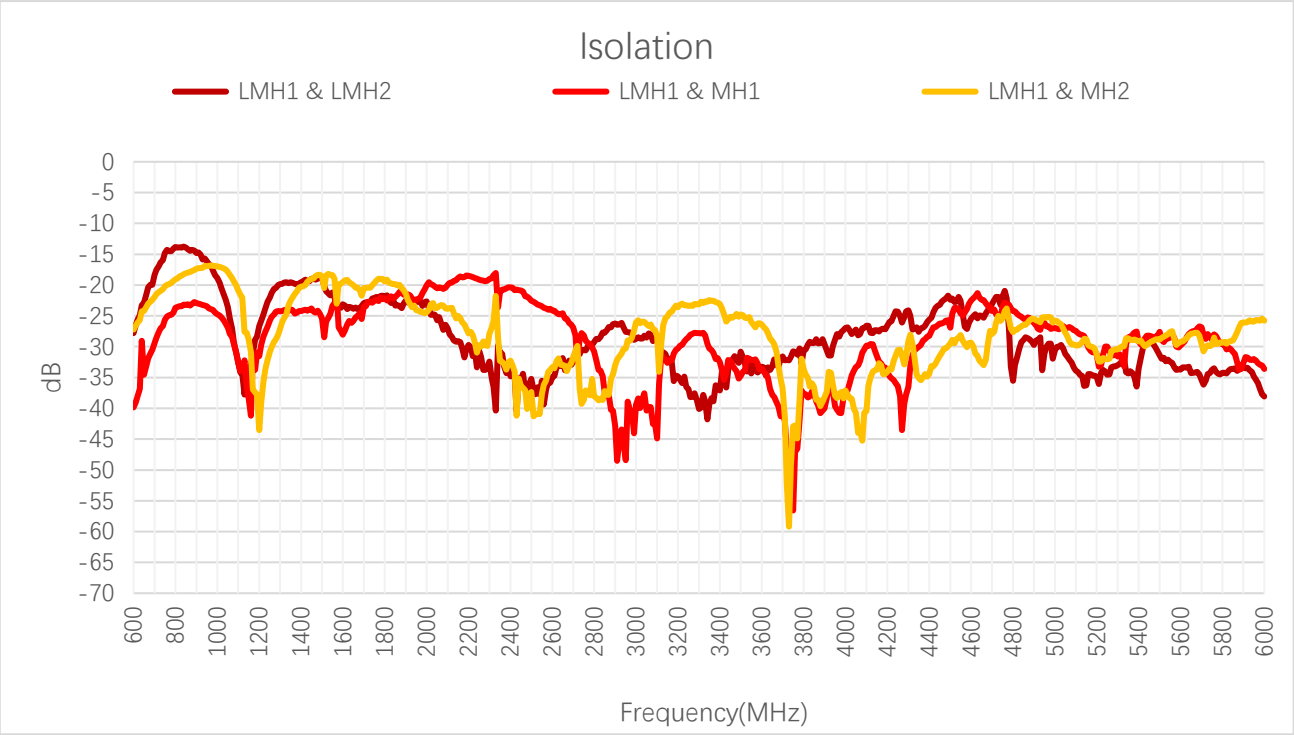


3.1.3.1.4. MH2

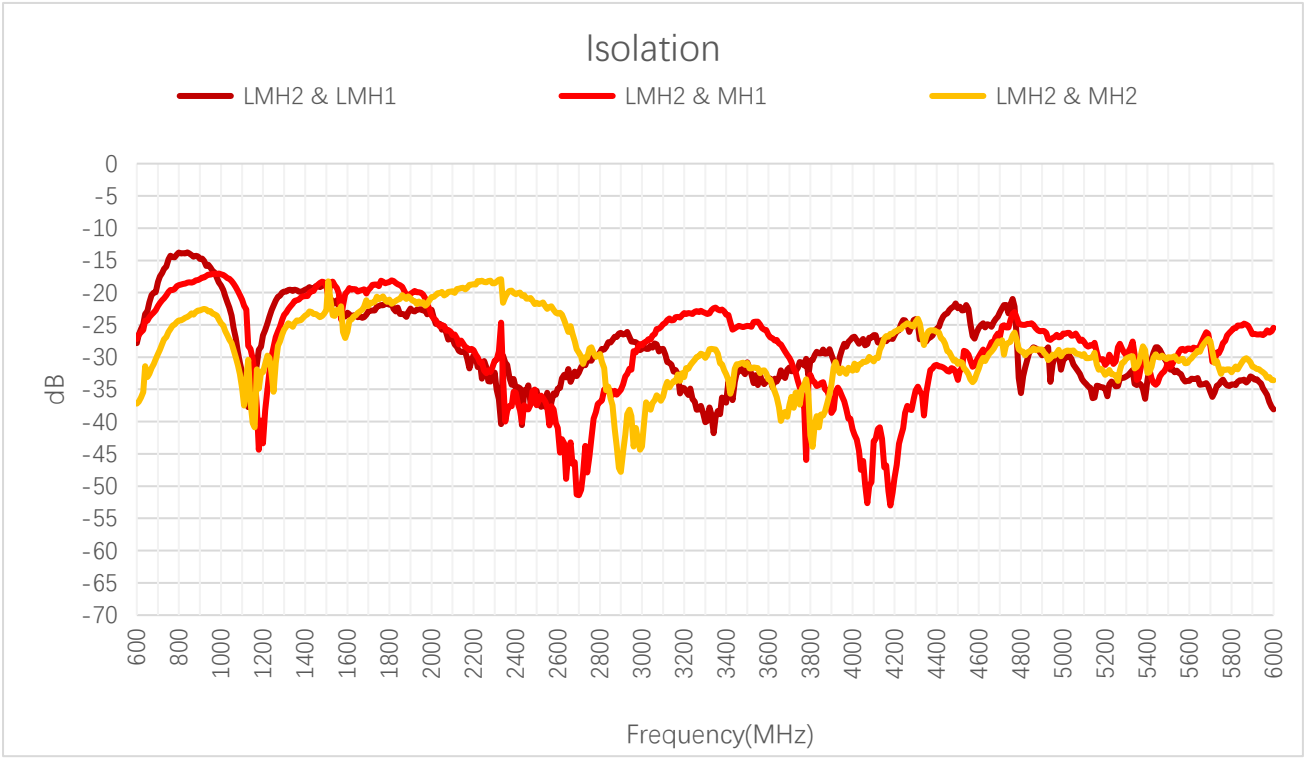


3.1.3.2. Test Status: On 500 mm × 500 mm Metal Plane

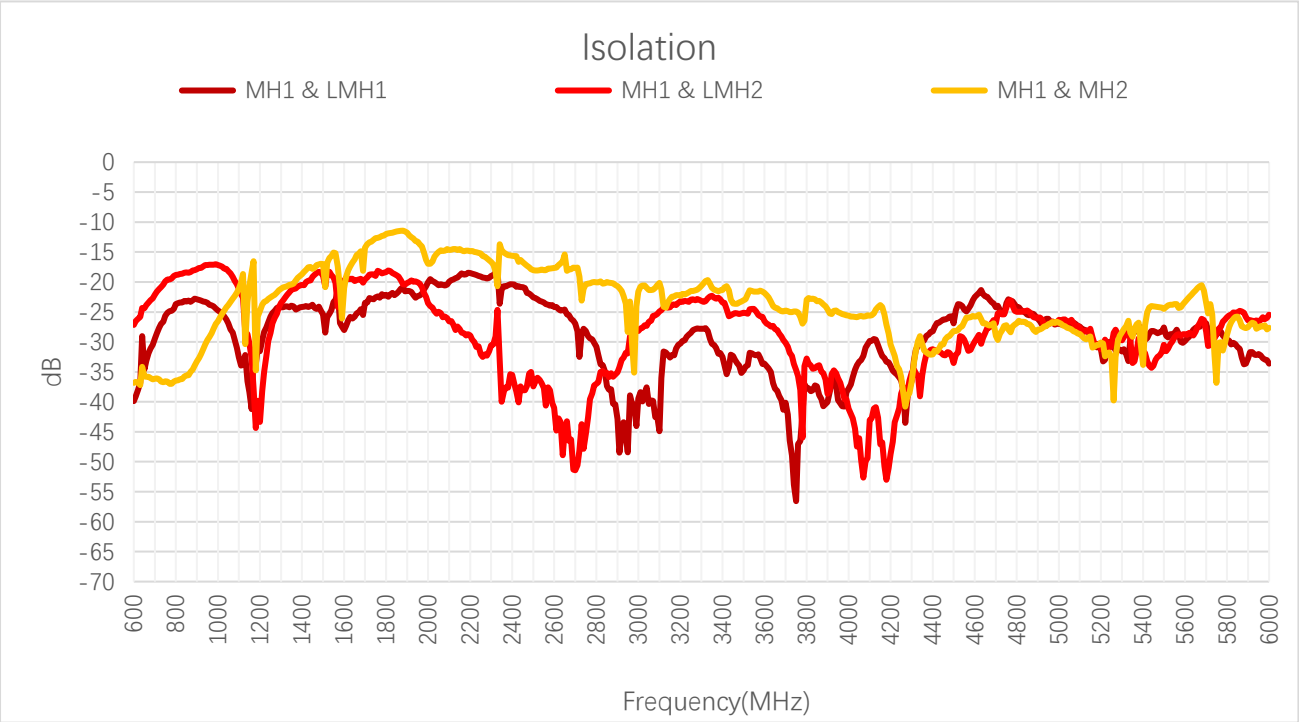
3.1.3.2.1. LMH1



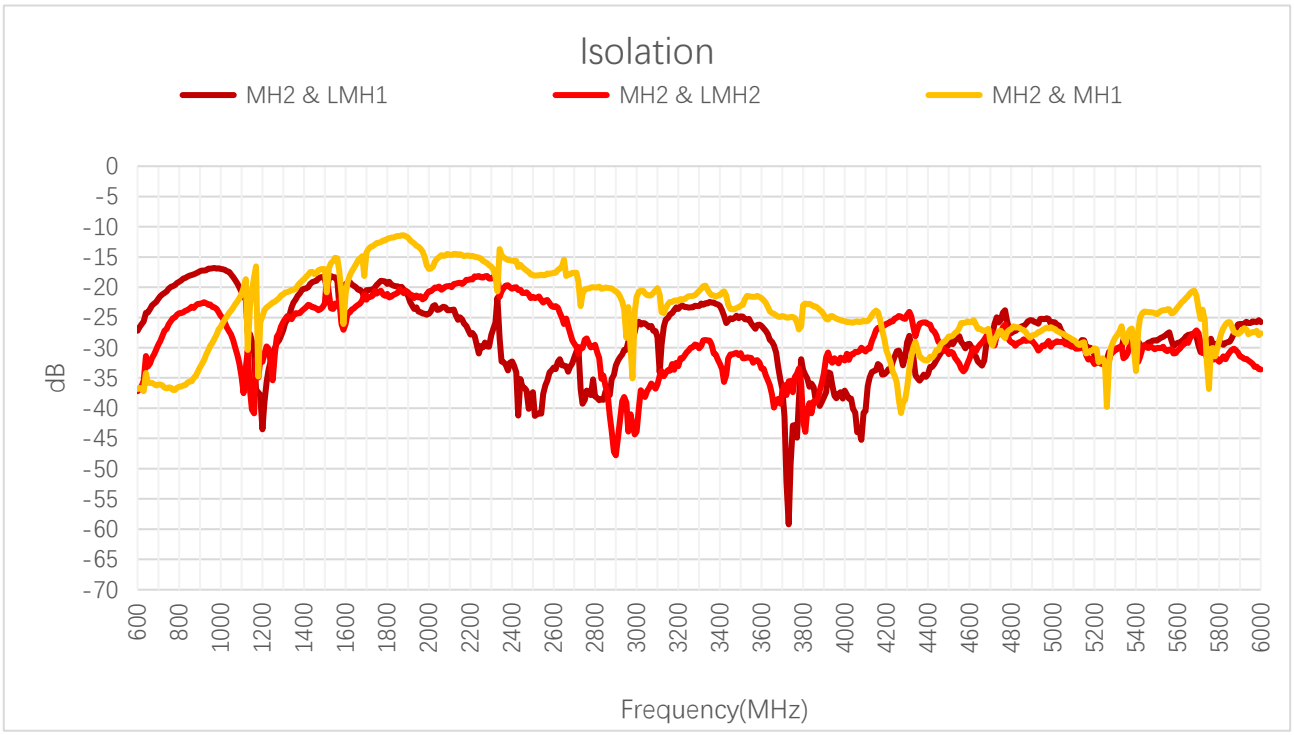
3.1.3.2.2. LMH2



3.1.3.2.3. MH1

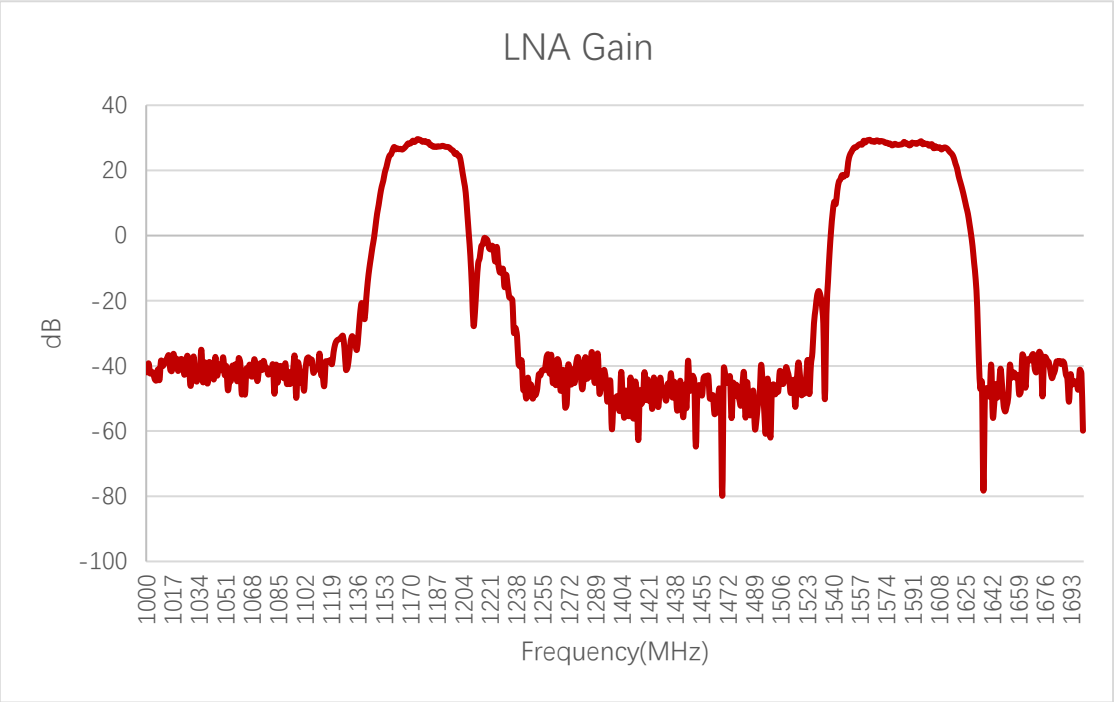


3.1.3.2.4. MH2



- FS: In Free Space
- MP: On 500 mm × 500 mm Metal Plane

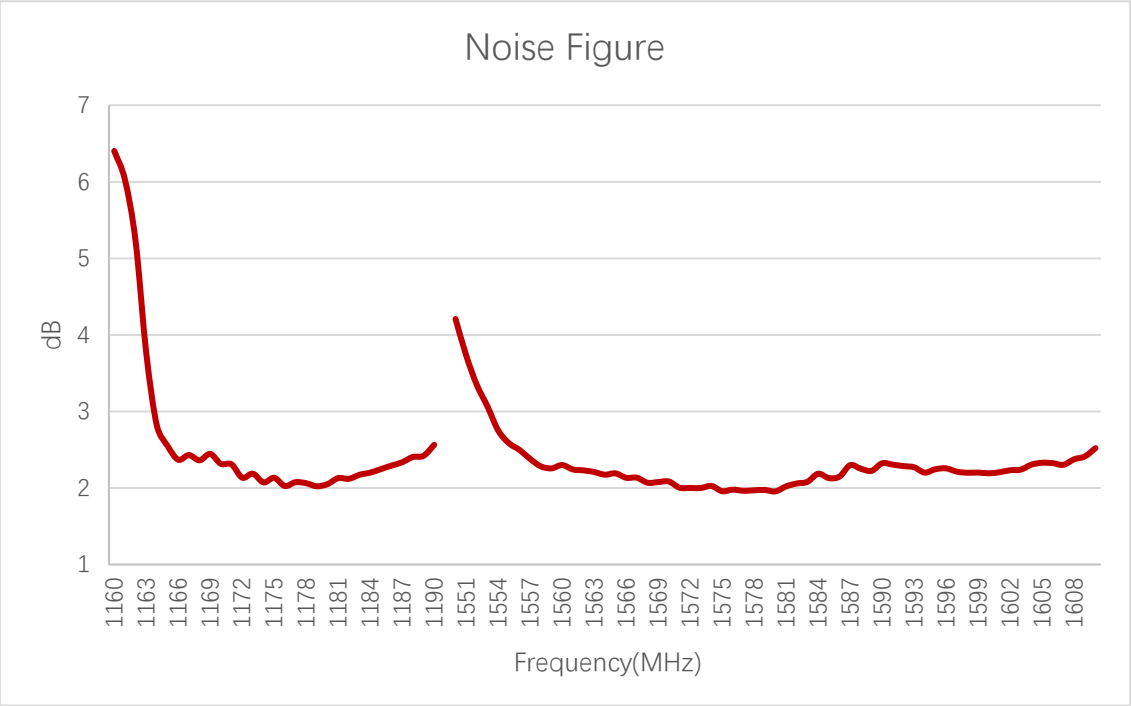
3.1.4. GNSS LNA Gain



LNA Gain (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
LNA Gain (dB)	29.3	-	-	-	-	-	28.1	27.9

3.1.5. GNSS Noise Figure

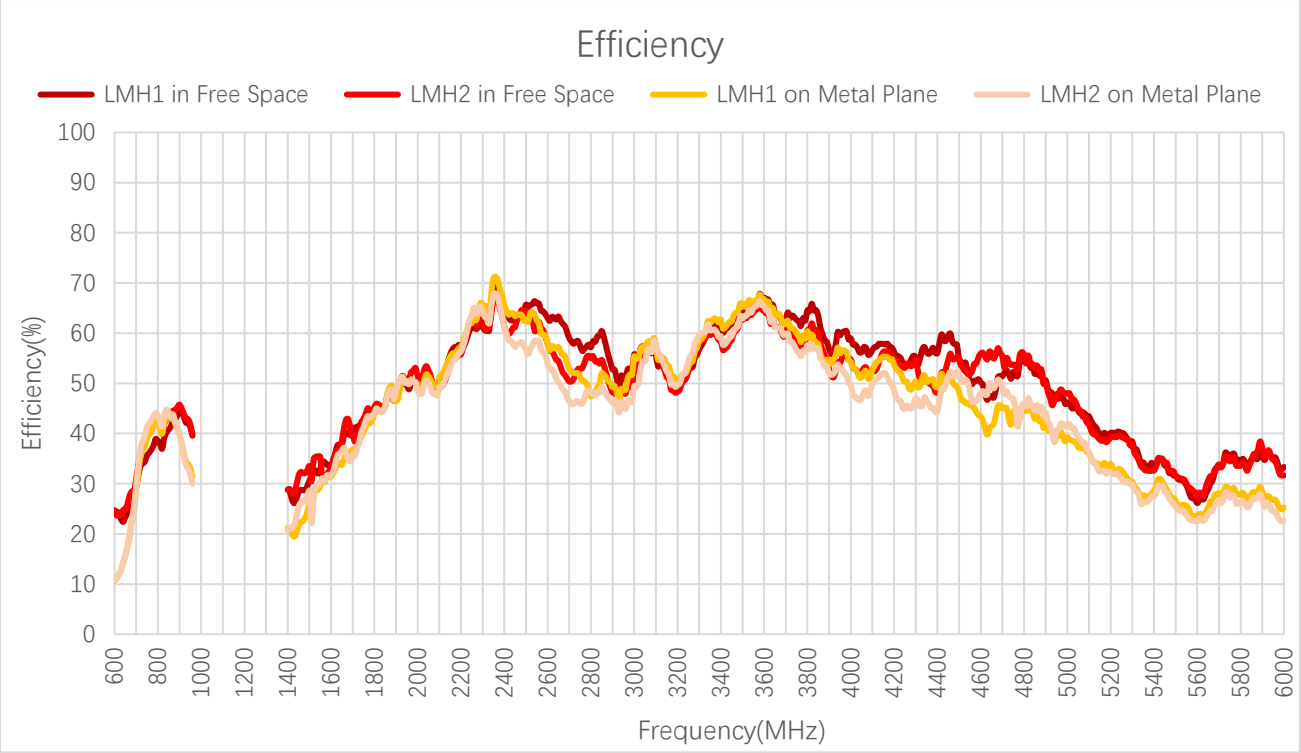


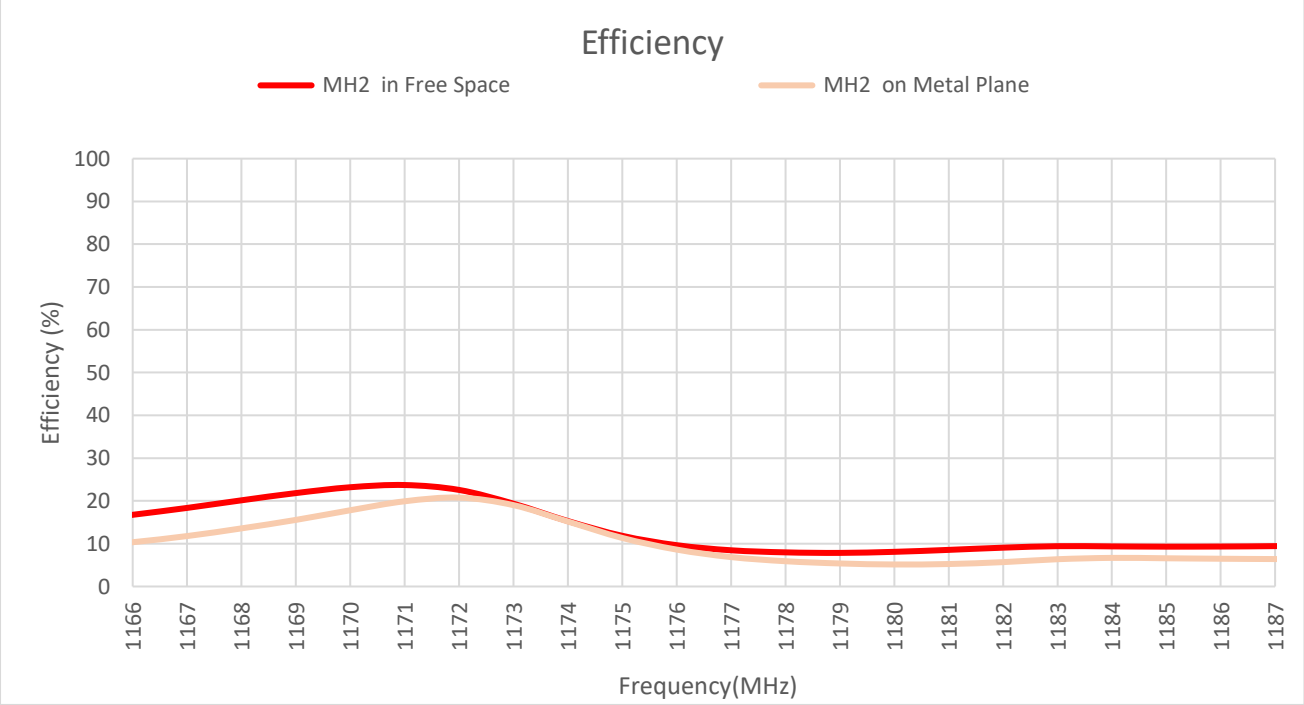
Noise Figure (dB)

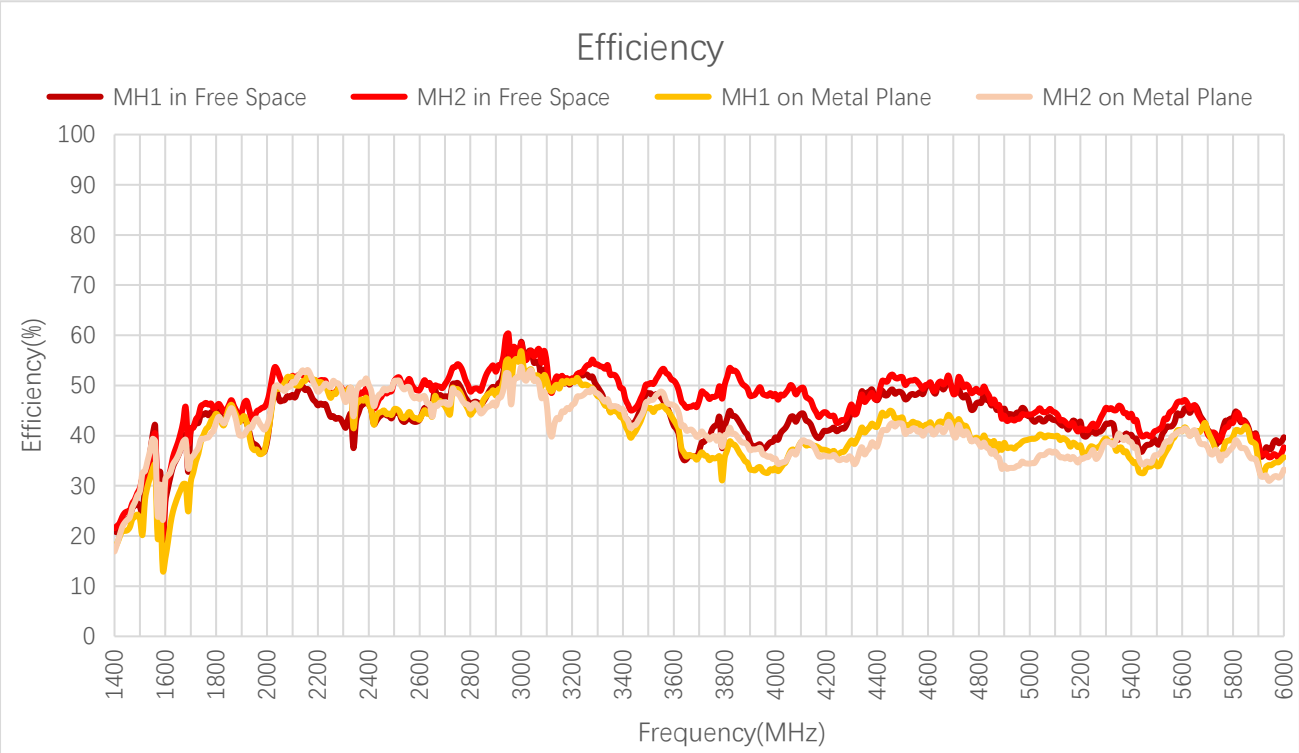
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Noise Figure (dB)	2.02	-	-	-	-	-	1.95	2.23

3.2. Radiation Performance Test

3.2.1. Efficiency





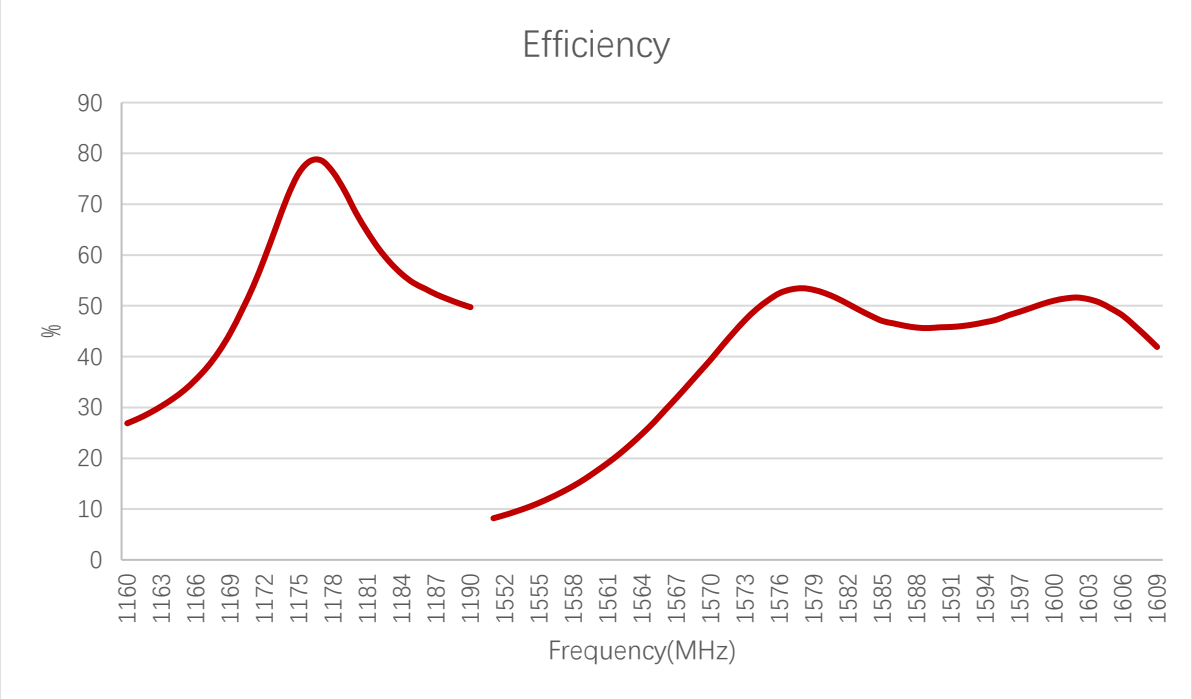


Efficiency (%) – LMH

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	24.7	23.0	31.6	39.1	44.5	39.6	27.0	40.3	42.3	48.6
	MP	10.6	12.8	32.2	42.1	39.8	31.5	20.2	36.1	39.5	49.5
LMH2	FS	24.4	23.7	33.6	41.9	45.8	39.9	29.7	38.4	41.8	48.7
	MP	10.8	12.9	33.5	43.6	39.9	30.0	23.4	35.5	40.3	48.7
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
LMH1	FS	49.6	54.3	68.3	62.3	63.0	67.1	51.4	46.1	31.6	33.3
	MP	50.4	54.3	71.0	63.4	57.6	66.8	45.0	39.2	26.7	25.2
LMH2	FS	50.9	52.3	66.5	61.2	57.9	64.4	55.4	48.0	31.6	31.7
	MP	50.4	52.1	67.6	57.3	53.9	65.4	49.1	41.5	25.4	22.6

Efficiency (%) – MH

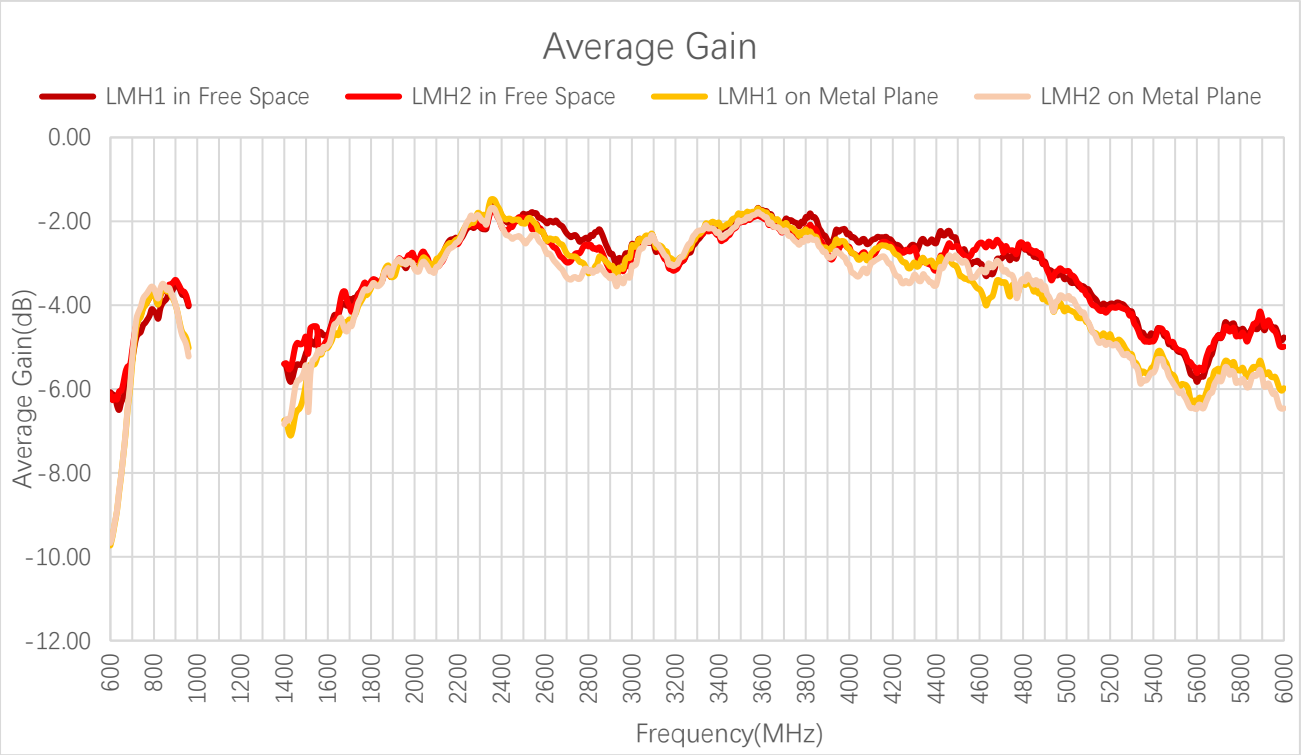
Frequency (MHz)		600	630	710	830	900	1176	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	22.8	41.6	44.2	44.8
	MP	-	-	-	-	-	-	21.0	32.7	38.9	44.0
MH2	FS	-	-	-	-	-	9.7	24.6	41.6	45.9	44.7
	MP	-	-	-	-	-	8.6	22.6	36.0	39.3	42.7
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
MH1	FS	38.3	49.8	43.0	44.1	43.2	42.0	49.2	43.9	38.5	39.7
	MP	37.1	50.9	46.1	44.7	43.2	43.1	42.5	39.3	34.0	35.7
MH2	FS	43.7	52.2	47.2	47.8	49.1	51.0	48.3	44.2	41.0	37.7
	MP	42.9	53.0	48.6	48.5	47.3	46.0	40.1	34.4	36.1	33.2

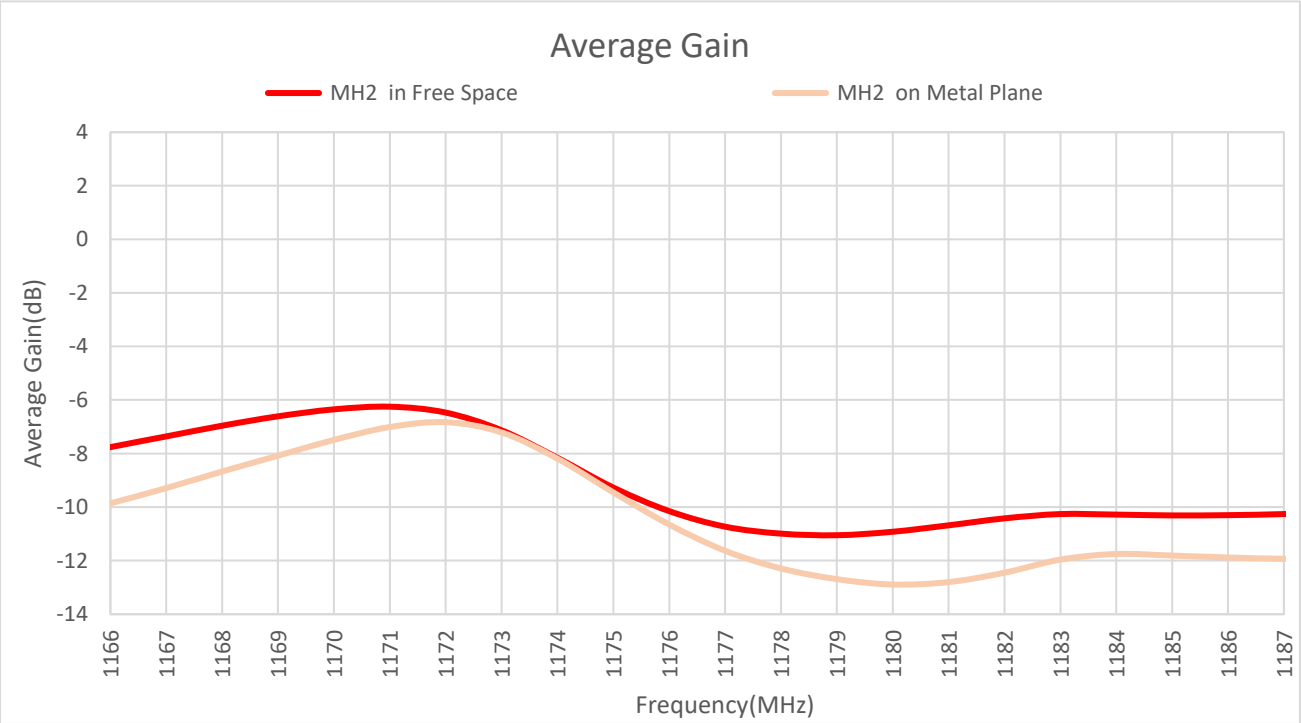


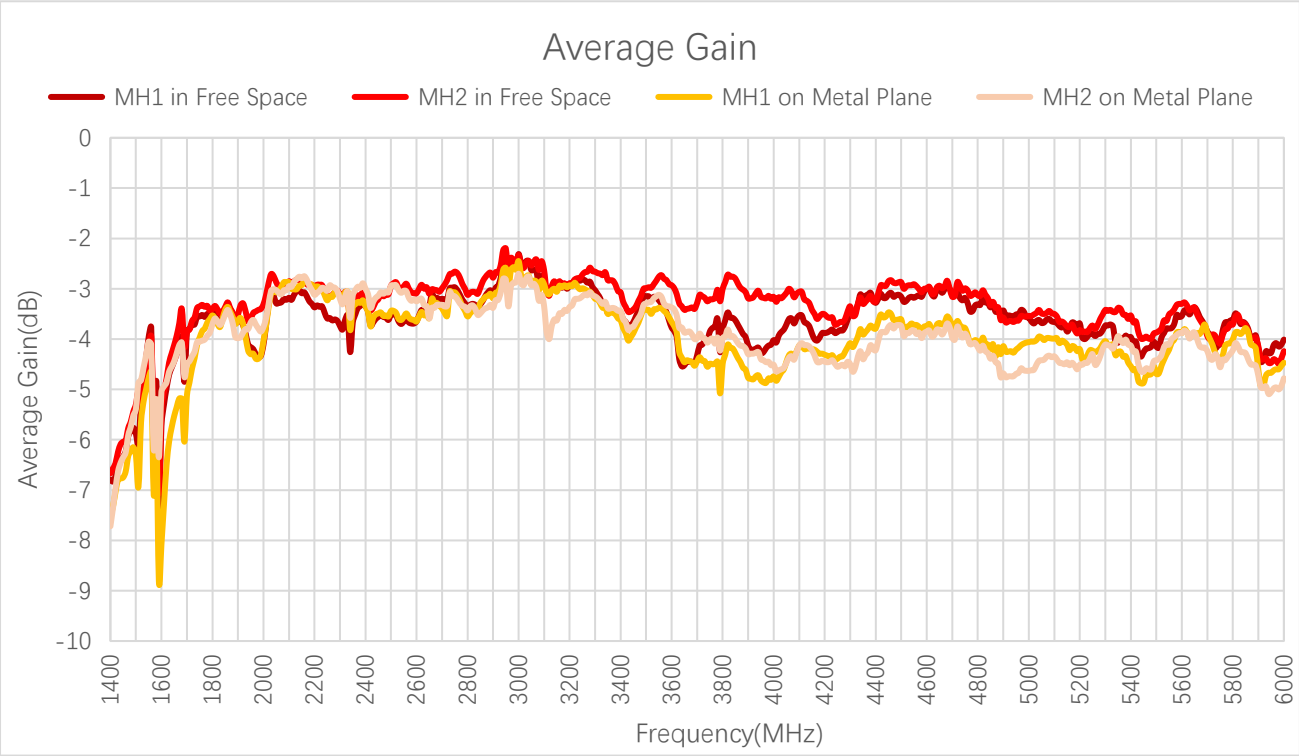
Efficiency (%) – GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	78	-	-	-	-	-	51	52

3.2.2. Average Gain







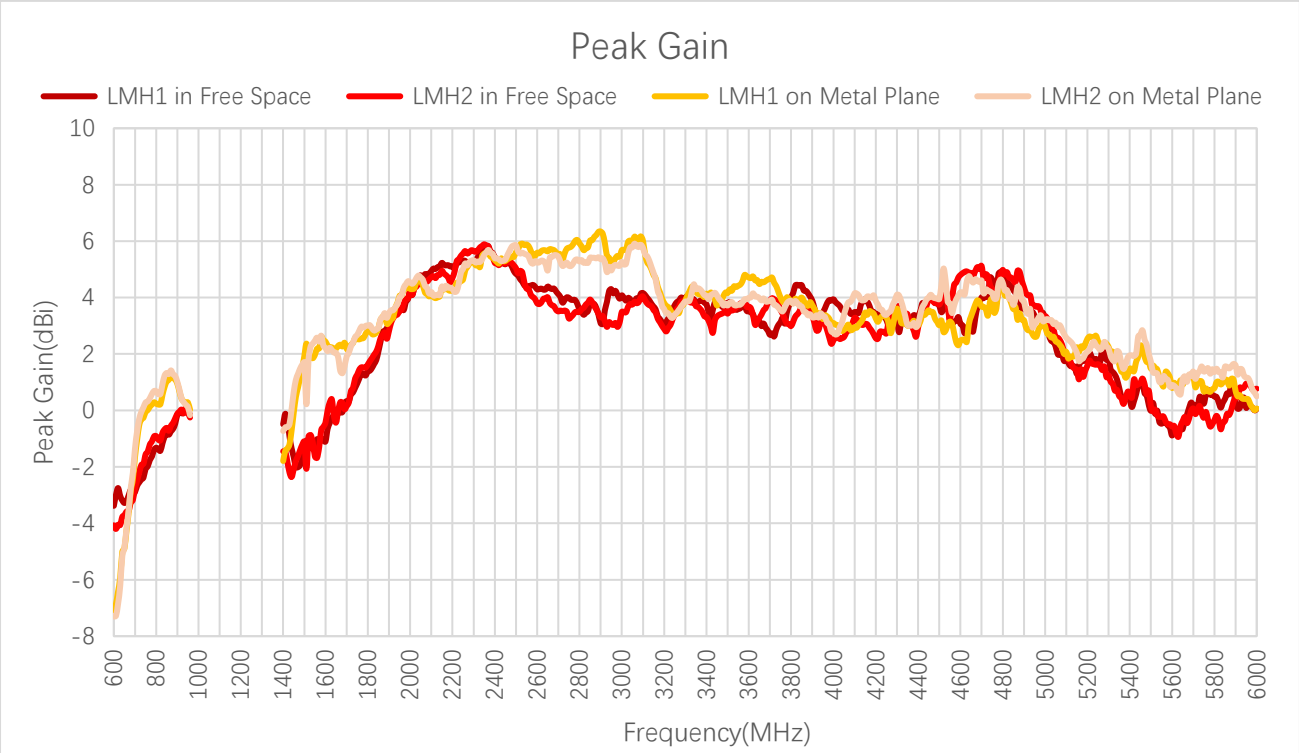
Average Gain (dB) – LMH

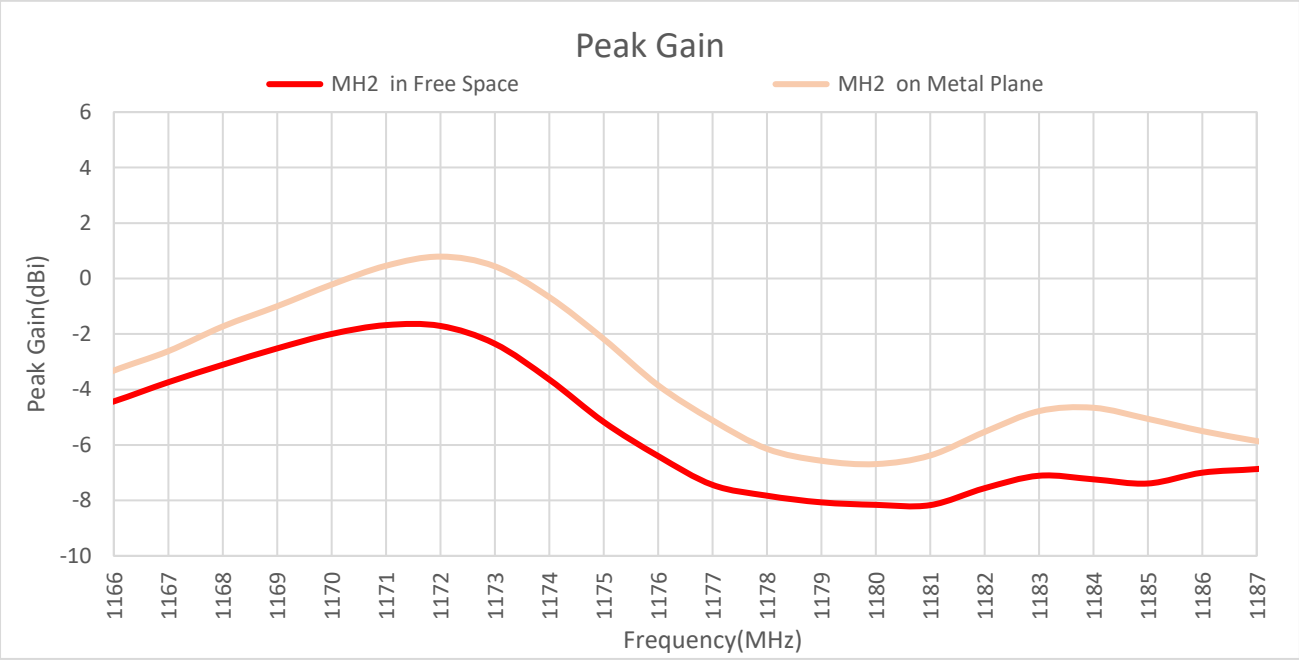
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	-6.1	-6.4	-5.0	-4.1	-3.5	-4.0	-5.7	-4.0	-3.7	-3.1
	MP	-9.7	-8.9	-4.9	-3.8	-4.0	-5.0	-6.9	-4.4	-4.0	-3.1
LMH2	FS	-6.1	-6.3	-4.7	-3.8	-3.4	-4.0	-5.3	-4.2	-3.8	-3.1
	MP	-9.7	-8.9	-4.8	-3.6	-4.0	-5.2	-6.3	-4.5	-4.0	-3.1
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
LMH1	FS	-3.0	-2.7	-1.7	-2.1	-2.0	-1.7	-2.9	-3.4	-5.0	-4.8
	MP	-3.0	-2.7	-1.5	-2.0	-2.4	-1.8	-3.5	-4.1	-5.7	-6.0
LMH2	FS	-2.9	-2.8	-1.8	-2.1	-2.4	-1.9	-2.6	-3.2	-5.0	-5.0
	MP	-3.0	-2.8	-1.7	-2.4	-2.7	-1.9	-3.1	-3.8	-5.9	-6.5

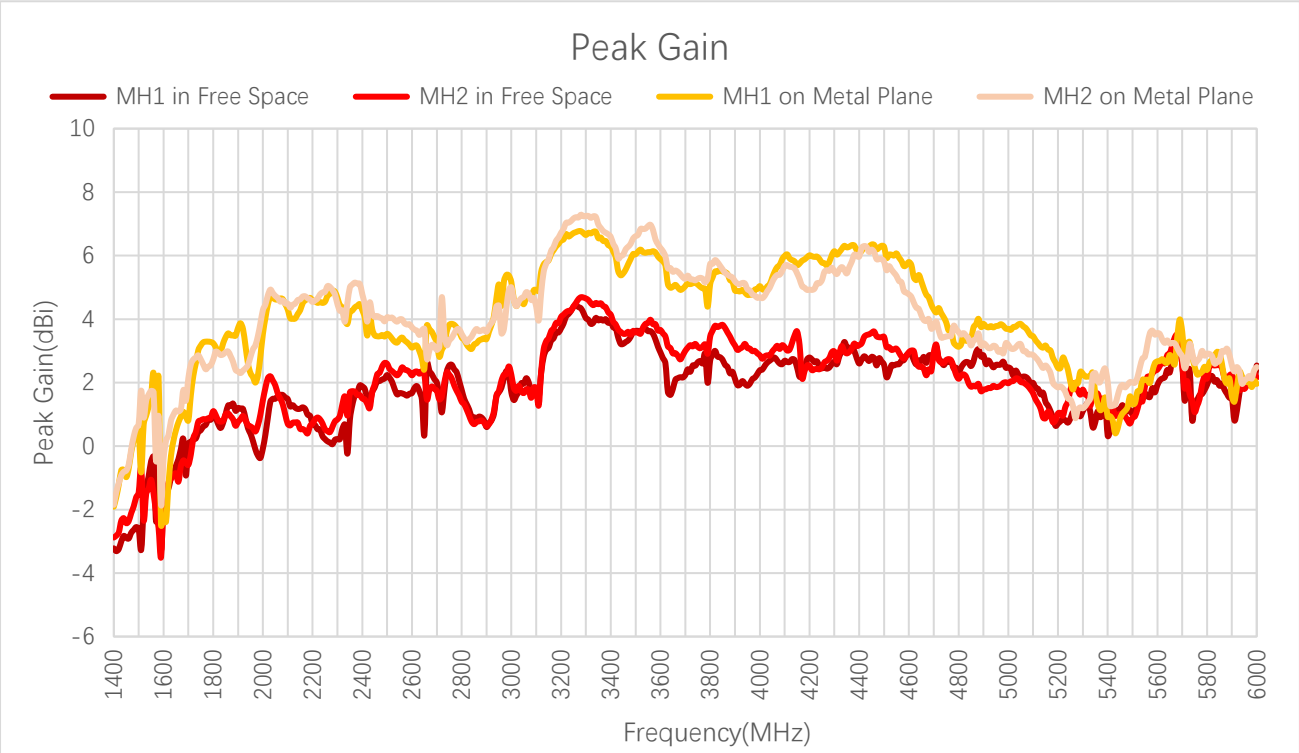
Average Gain (dB) – MH

Frequency (MHz)		600	630	710	830	900	1176	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	-6.4	-3.8	-3.6	-3.5
	MP	-	-	-	-	-	-	-6.8	-4.9	-4.1	-3.6
MH2	FS	-	-	-	-	-	-10.2	-6.1	-3.8	-3.4	-3.5
	MP	-	-	-	-	-	-10.7	-6.5	-4.4	-4.1	-3.7
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
MH1	FS	-4.2	-3.0	-3.7	-3.6	-3.7	-3.8	-3.1	-3.6	-4.2	-4.0
	MP	-4.3	-2.9	-3.4	-3.5	-3.7	-3.7	-3.7	-4.1	-4.7	-4.5
MH2	FS	-3.6	-2.8	-3.3	-3.2	-3.1	-2.9	-3.2	-3.5	-3.9	-4.2
	MP	-3.7	-2.8	-3.1	-3.1	-3.3	-3.4	-4.0	-4.6	-4.4	-4.8

3.2.3. Peak Gain







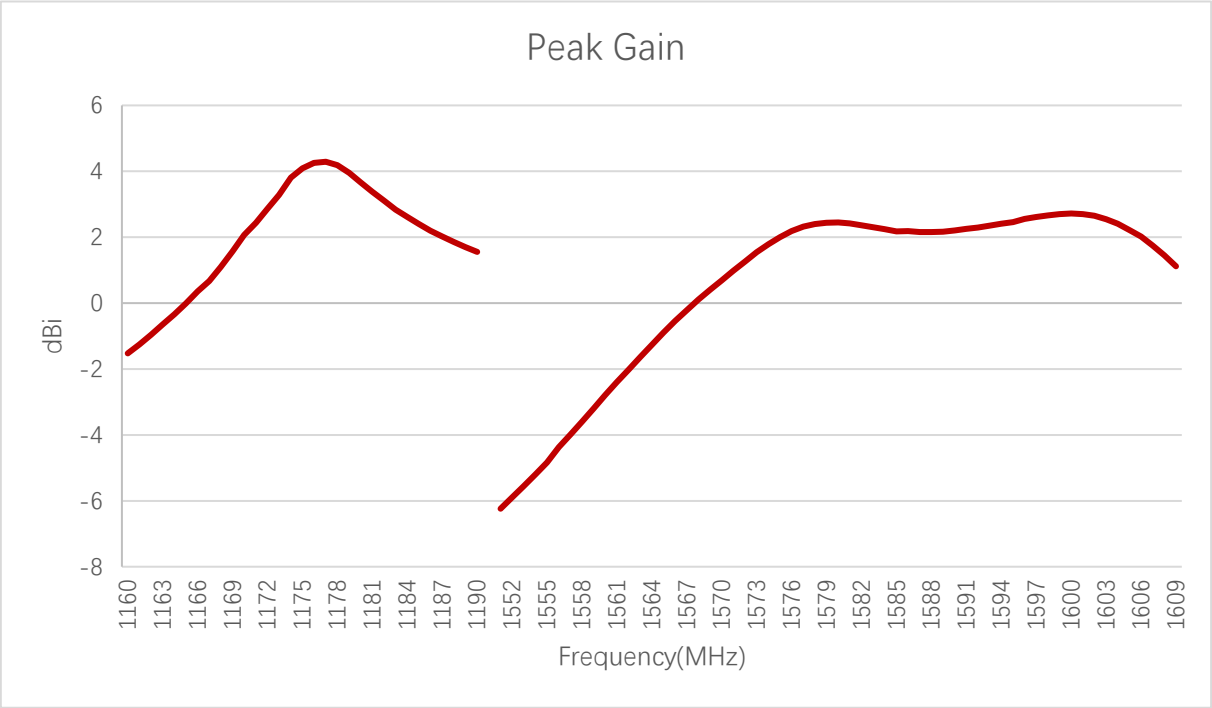
Peak Gain (dBi) – LMH

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	-3.4	-3.0	-2.7	-1.2	-0.2	-0.2	-1.4	0.3	0.8	2.8
	MP	-7.1	-5.9	-1.0	0.6	1.0	0.0	-0.7	2.1	2.6	3.4
LMH2	FS	-4.1	-4.1	-2.5	-0.8	-0.1	-0.3	-2.4	0.3	1.1	2.8
	MP	-7.3	-6.2	-0.7	0.9	1.0	-0.2	0.1	2.0	2.6	3.5
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
LMH1	FS	3.5	5.1	5.9	5.2	4.3	3.5	4.0	3.2	0.0	0.1
	MP	4.1	4.1	5.6	5.3	5.6	4.7	3.7	3.0	1.5	0.1
LMH2	FS	3.5	4.8	5.9	5.2	3.8	3.7	5.1	3.3	0.1	0.8
	MP	4.0	4.1	5.5	5.4	5.2	4.0	4.6	3.2	1.7	0.5

Peak Gain (dBi) – MH

Frequency (MHz)		600	630	710	830	900	1176	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	-2.8	0.1	0.4	1.3
	MP	-	-	-	-	-	-	-0.8	1.6	3.0	3.5
MH2	FS	-	-	-	-	-	-6.4	-2.3	-0.3	0.8	0.8
	MP	-	-	-	-	-	-3.9	-0.8	2.6	2.9	2.7

Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
MH1	FS	0.4	1.2	0.8	1.9	1.7	3.0	2.8	2.5	1.0	2.5
	MP	2.3	4.2	4.2	3.5	3.1	5.9	4.3	3.7	1.3	2.0
MH2	FS	0.6	0.7	1.7	2.0	2.2	3.7	3.0	2.0	0.9	2.2
	MP	2.8	4.6	5.0	4.1	3.7	6.2	3.8	3.2	2.0	2.5



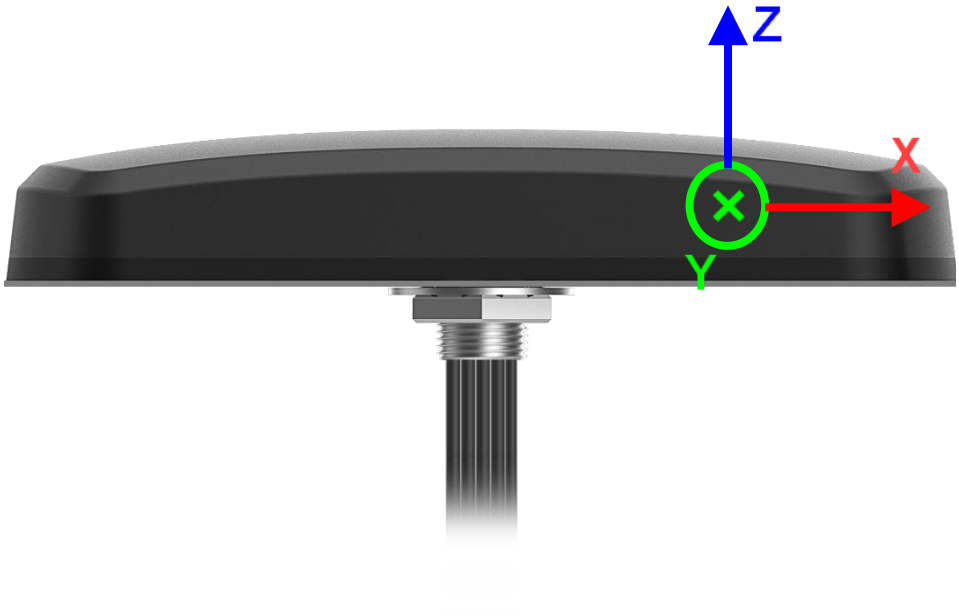
Peak Gain (dBi)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	4.26	-	-	-	-	-	2	2.65

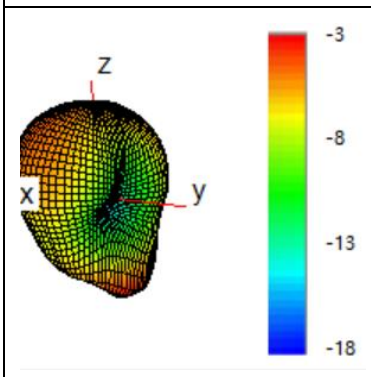
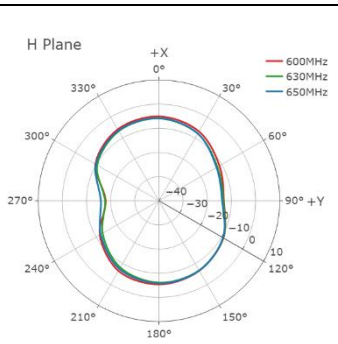
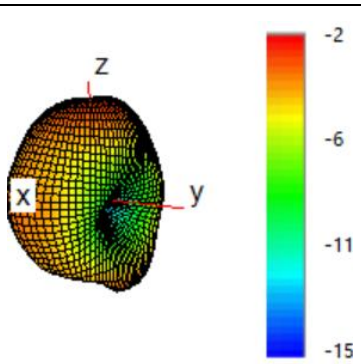
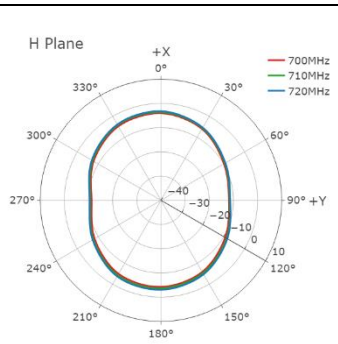
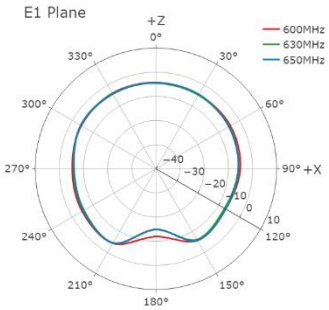
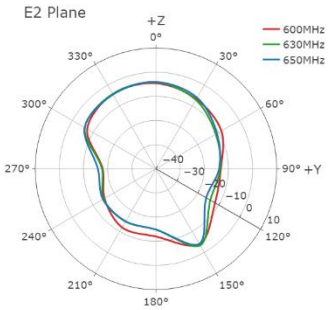
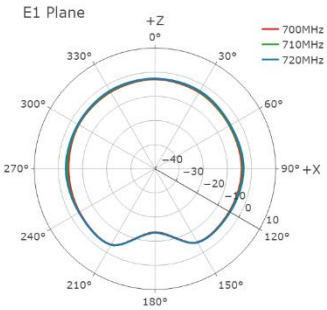
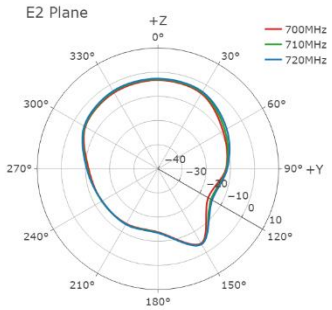
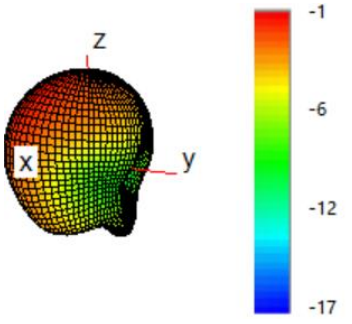
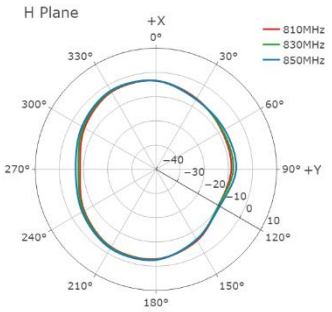
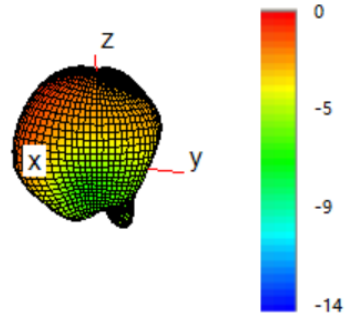
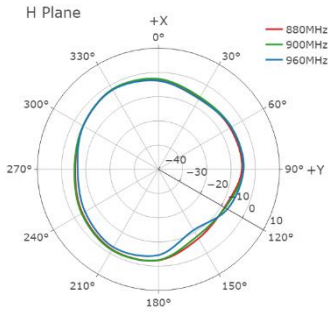
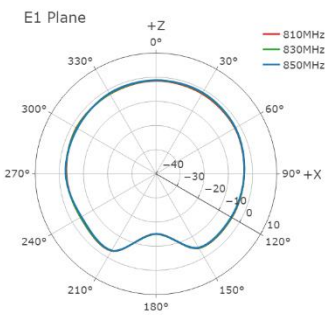
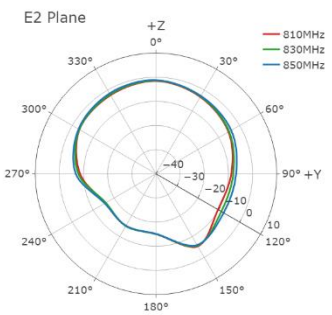
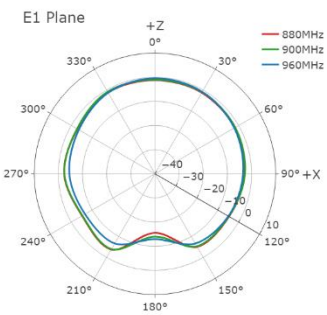
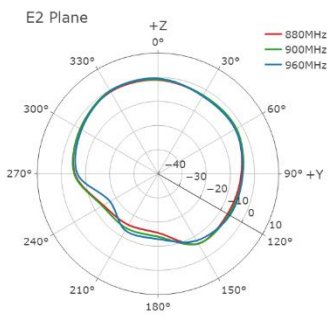
3.2.4. 3D & 2D Radiation Pattern

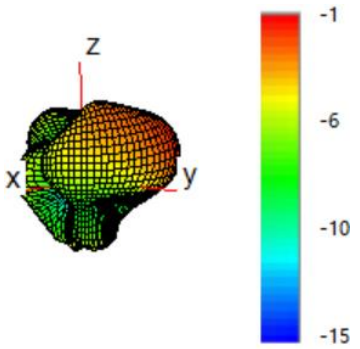
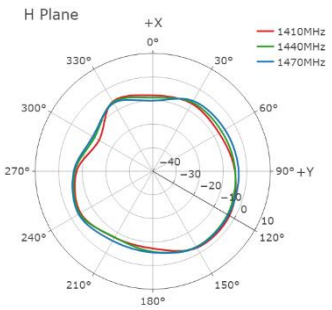
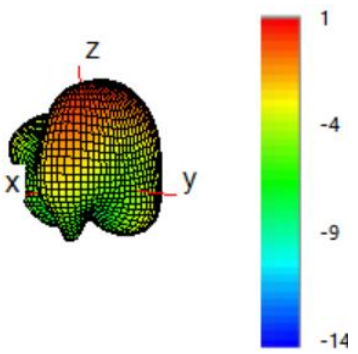
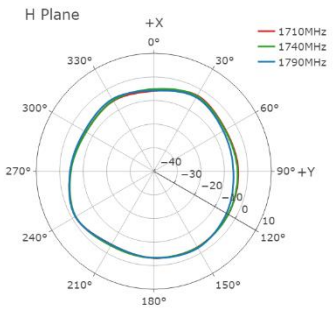
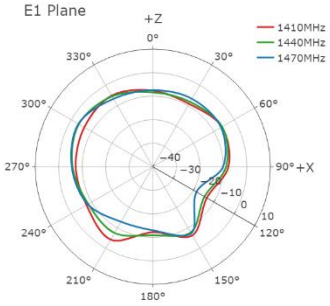
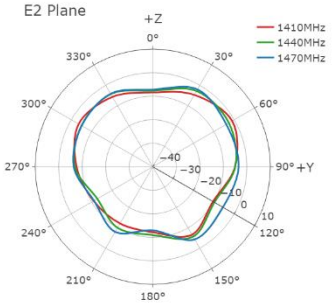
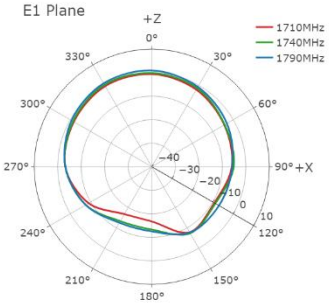
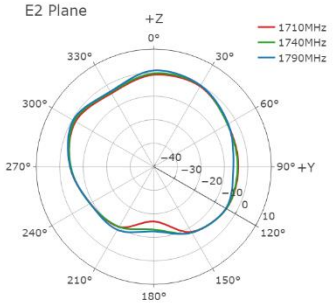
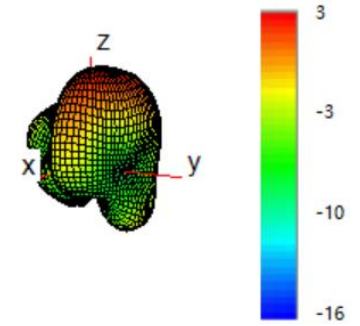
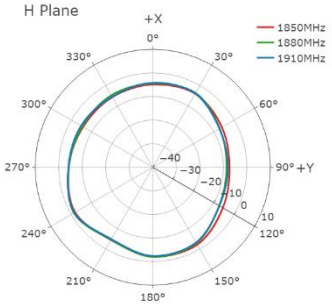
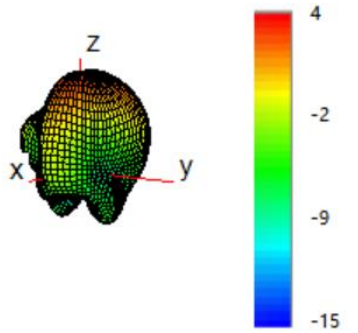
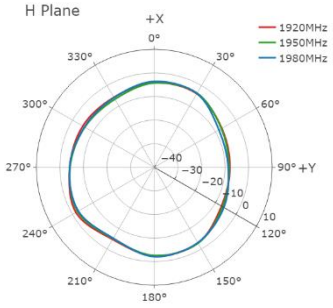
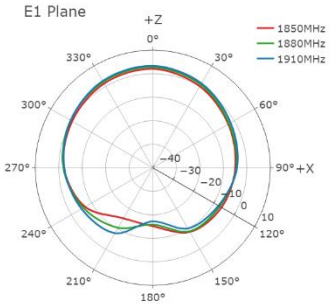
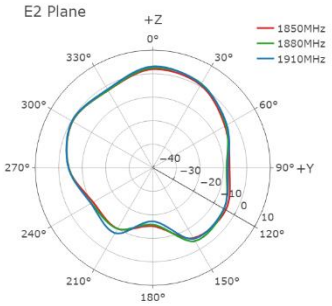
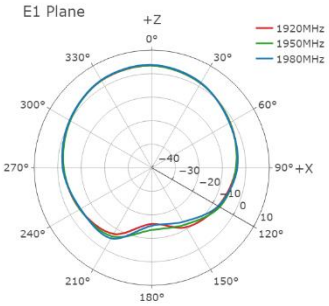
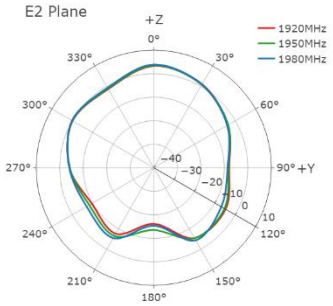
3.2.4.1. Test Status: In Free Space

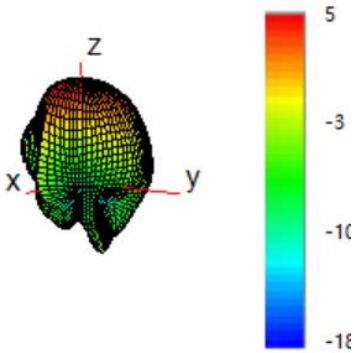
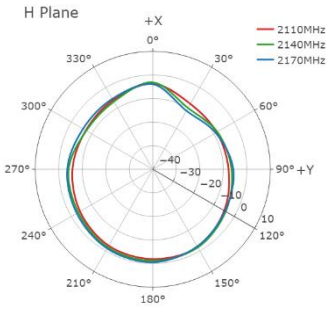
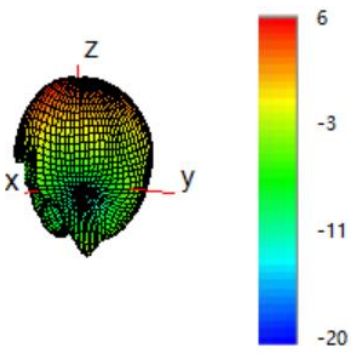
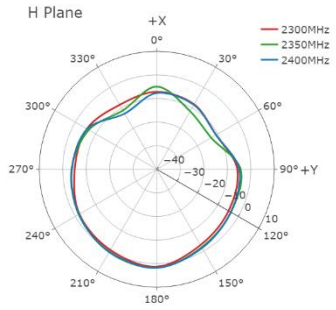
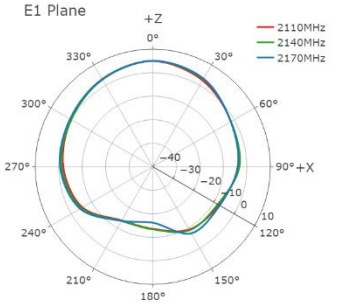
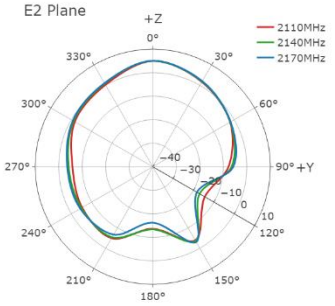
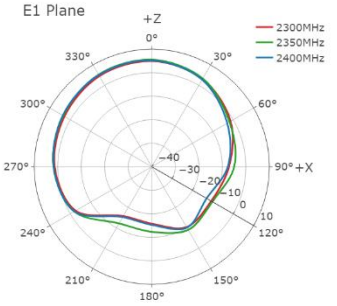
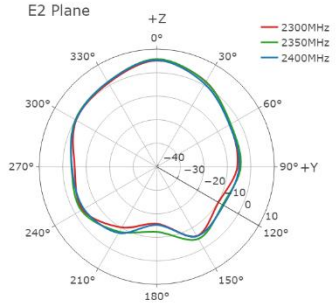
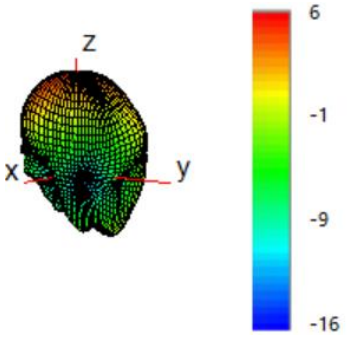
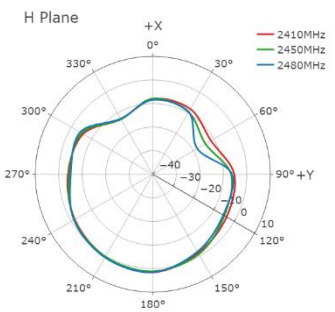
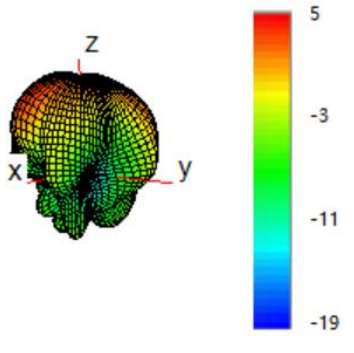
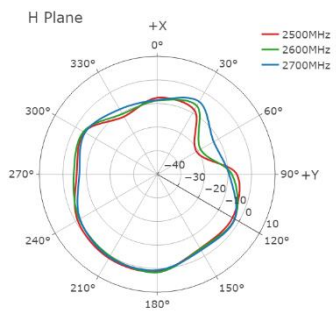
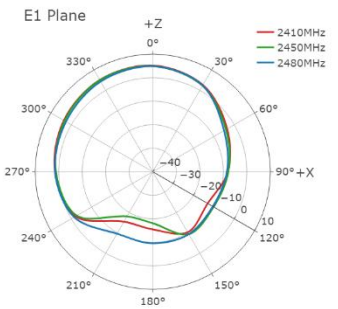
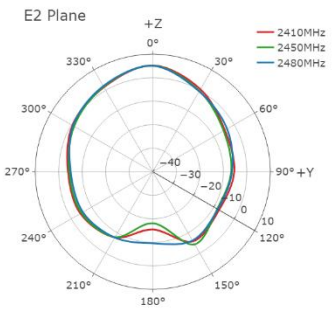
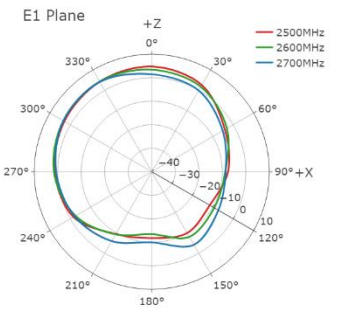
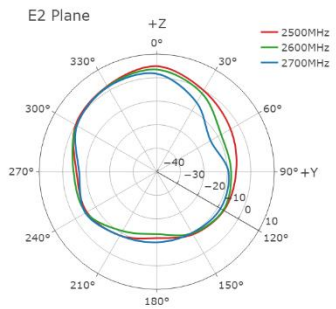
- Test Chamber: HF-G-1 (LMH & MH); FS-G-1 (GNSS)

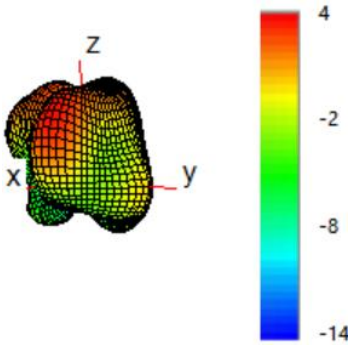
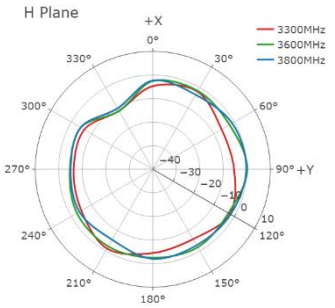
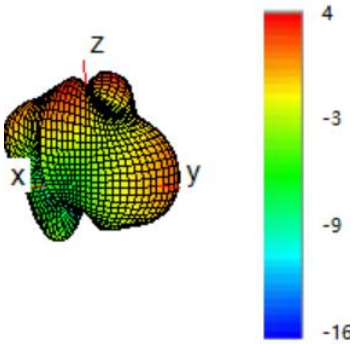
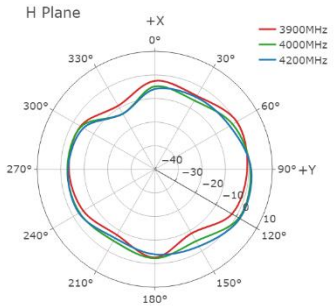
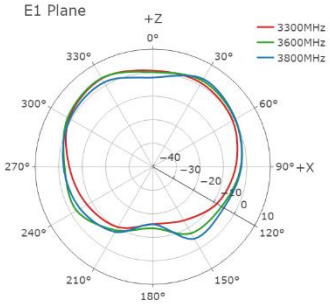
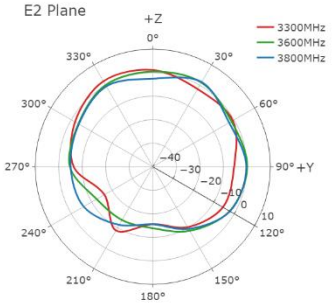
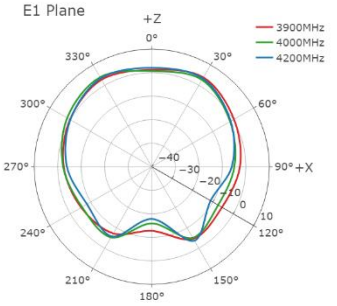
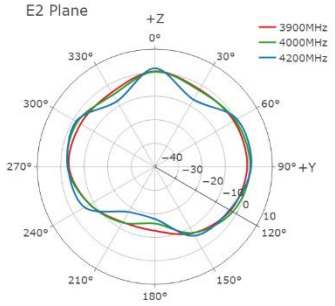
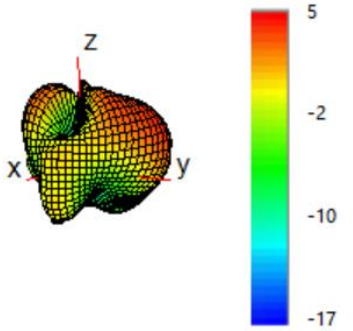
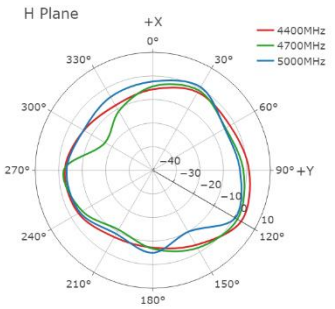
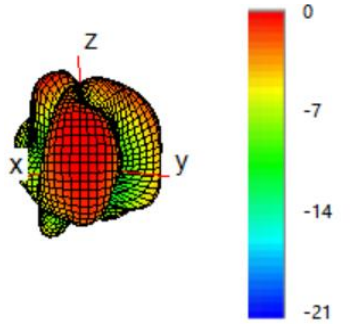
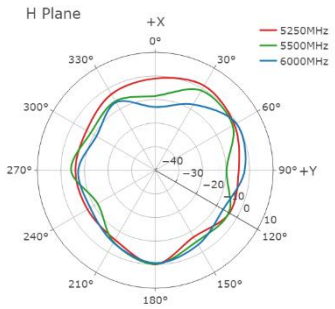
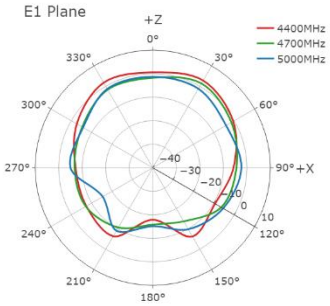
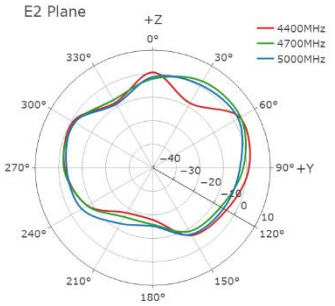
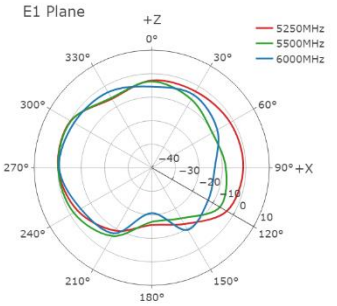
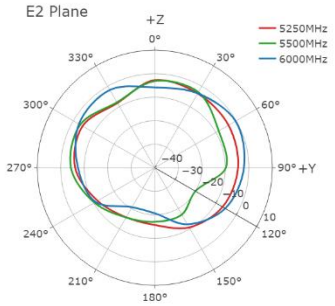


LMH1

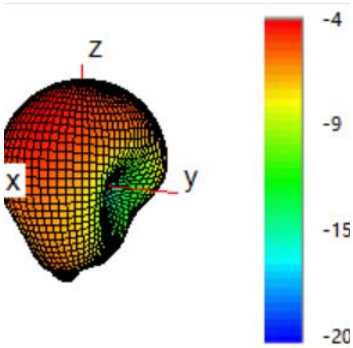
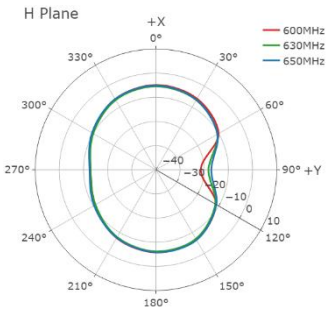
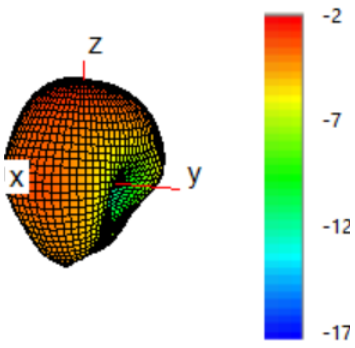
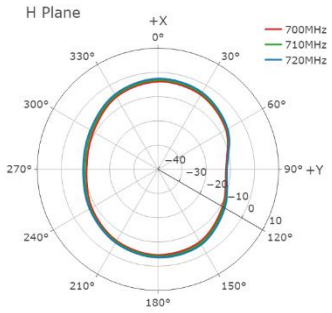
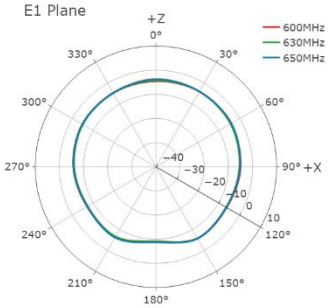
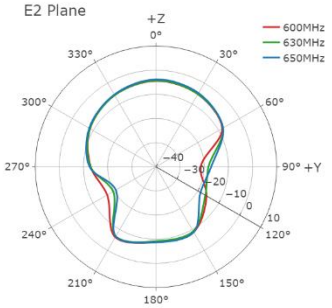
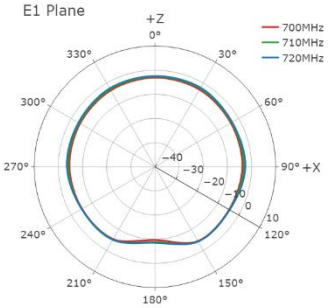
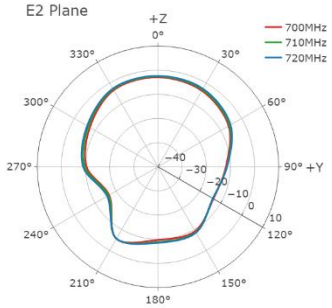
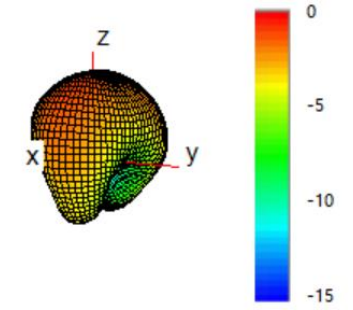
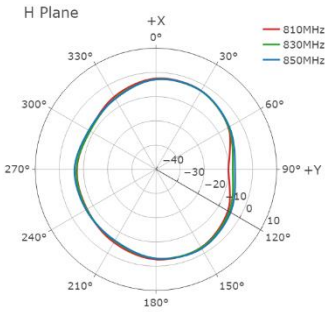
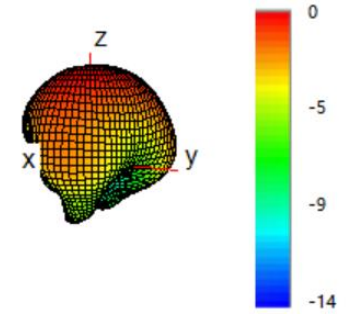
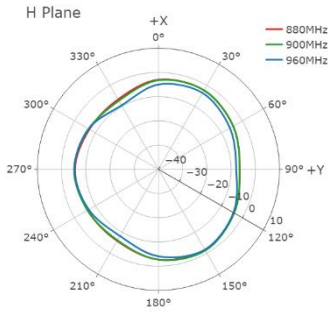
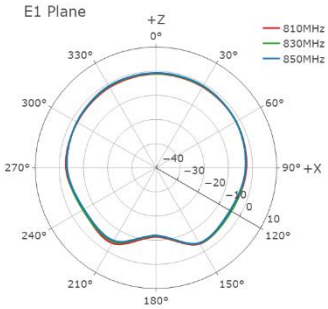
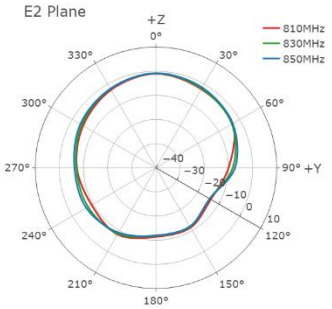
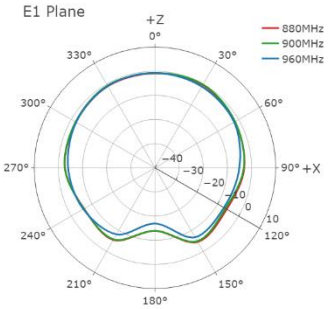
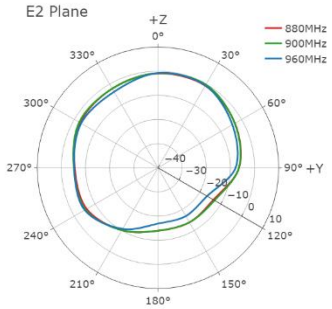
630 MHz		710 MHz	
			
			
830 MHz		900 MHz	
			
			

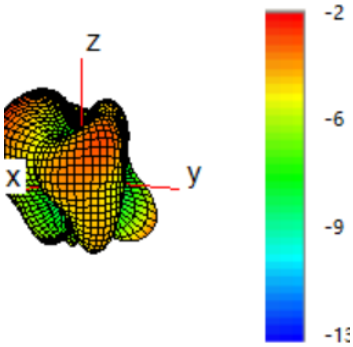
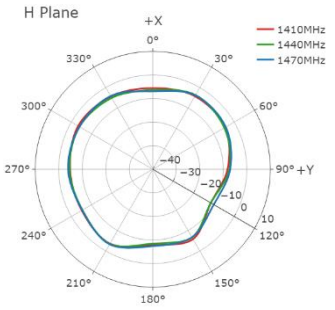
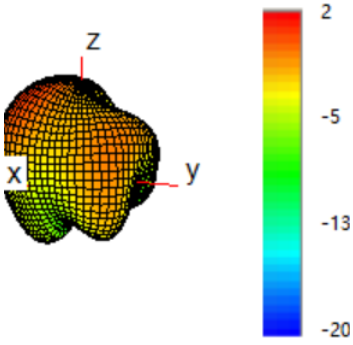
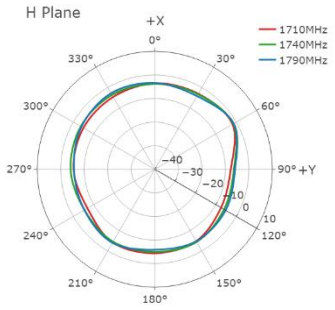
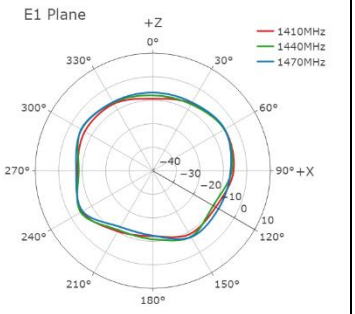
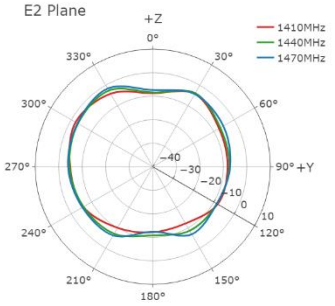
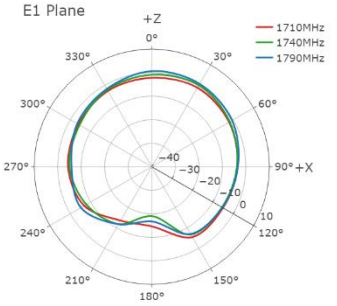
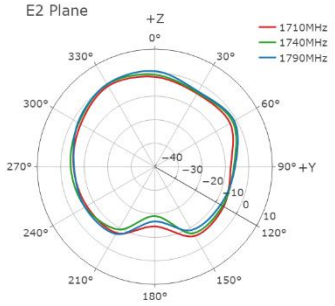
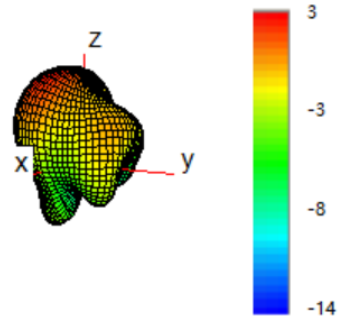
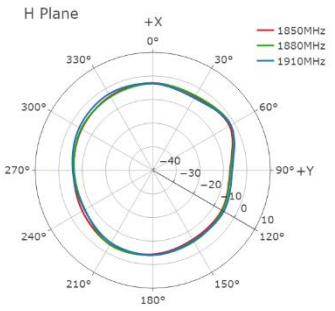
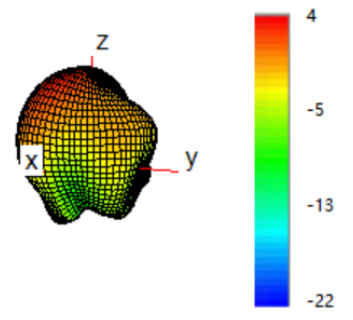
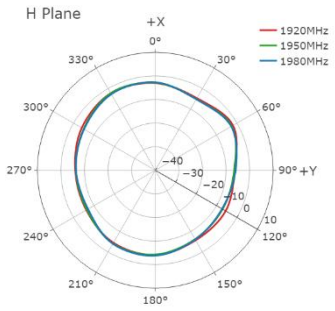
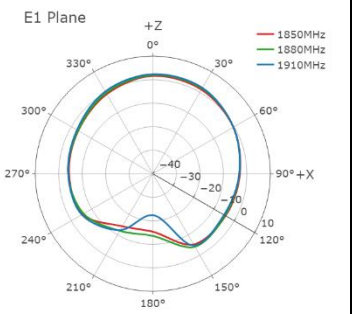
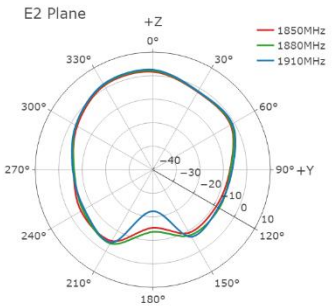
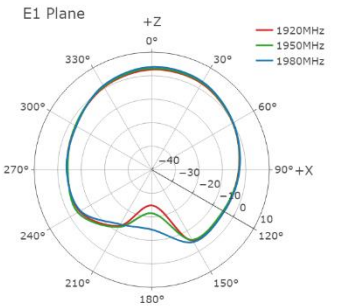
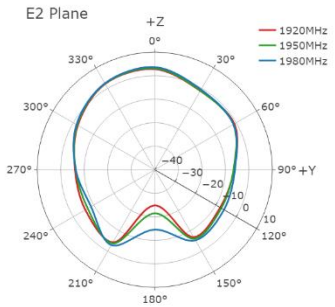
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

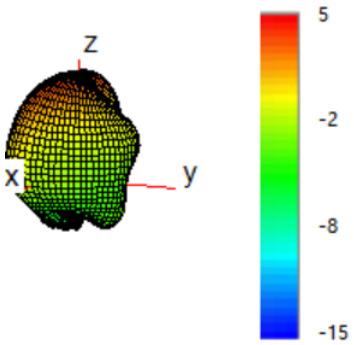
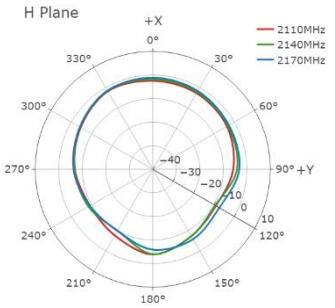
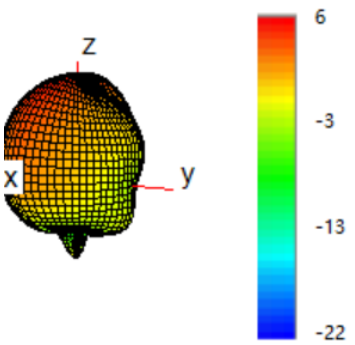
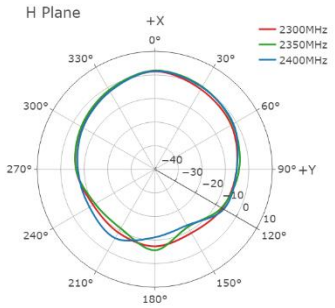
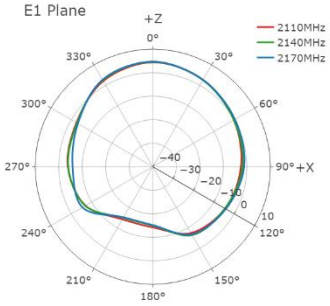
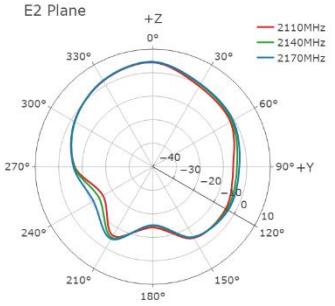
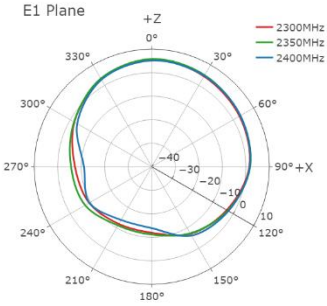
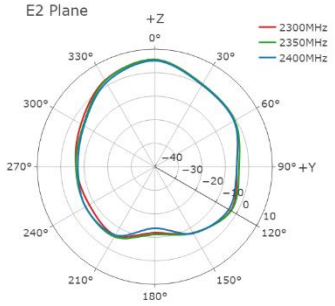
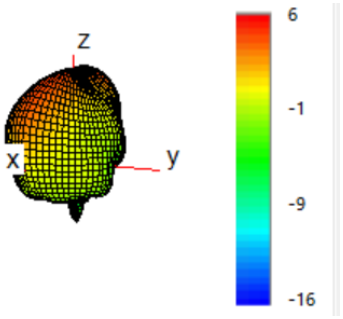
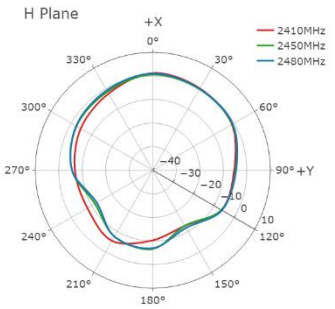
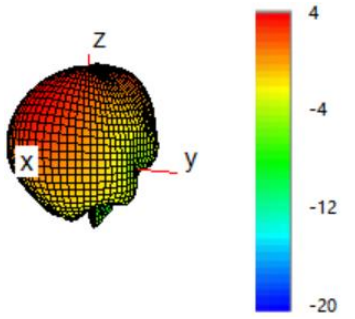
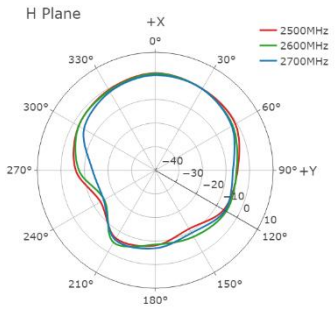
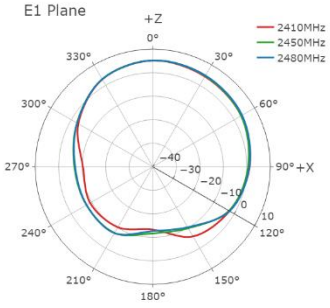
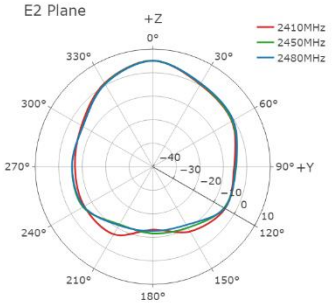
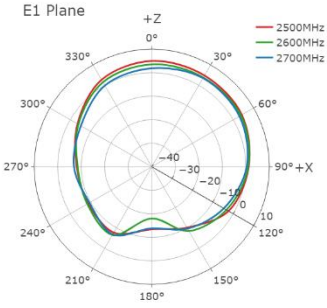
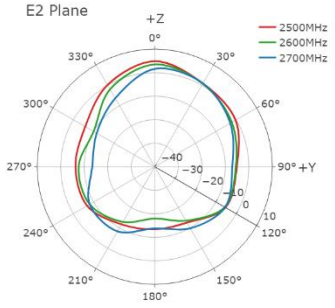
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

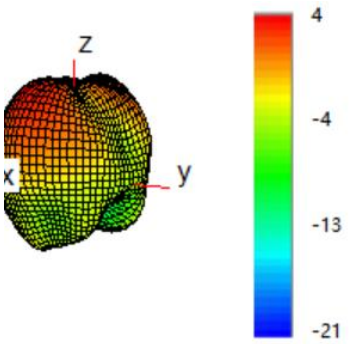
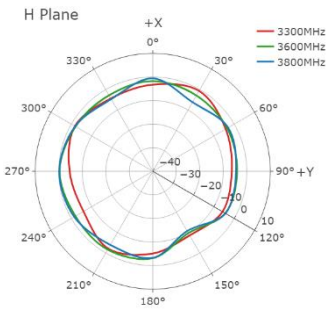
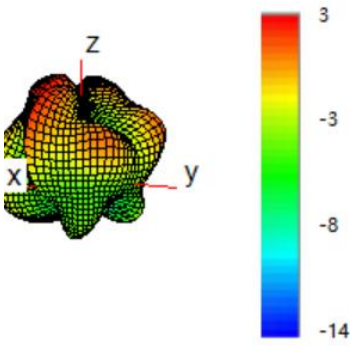
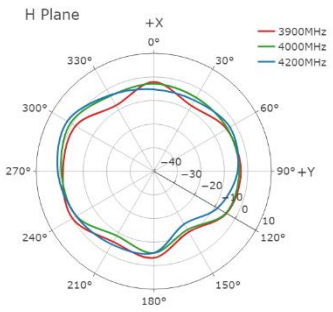
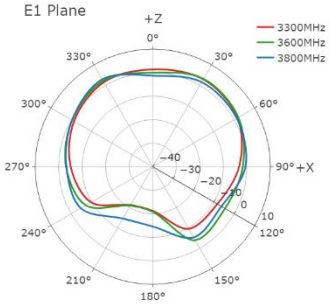
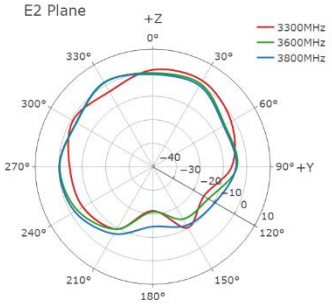
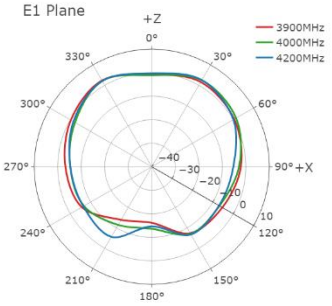
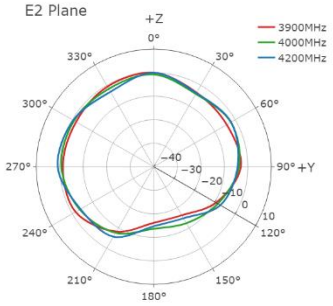
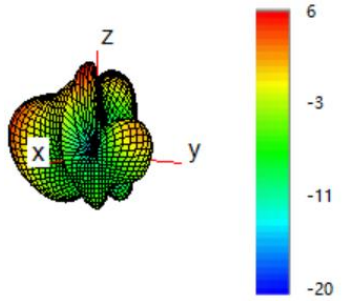
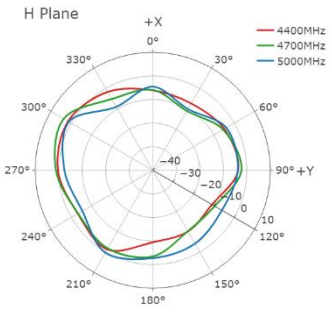
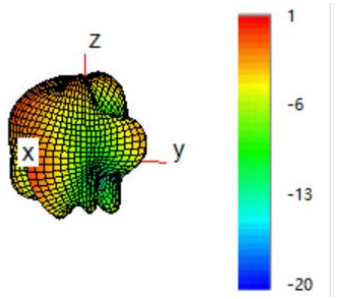
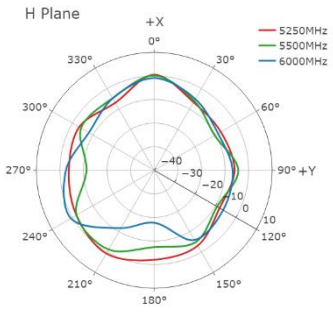
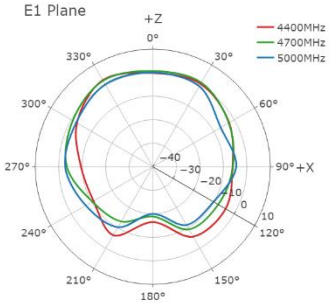
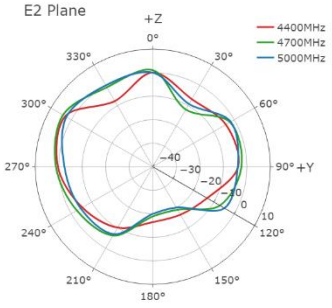
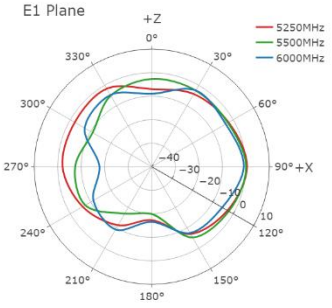
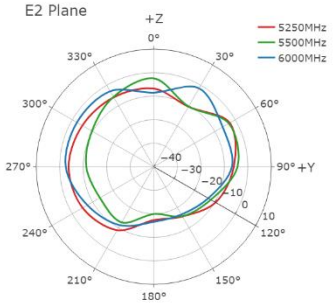
3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

LMH2

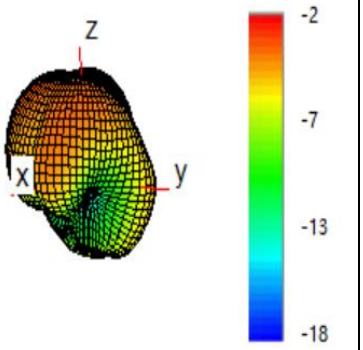
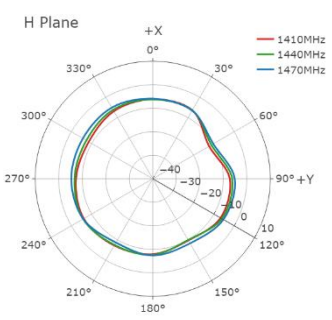
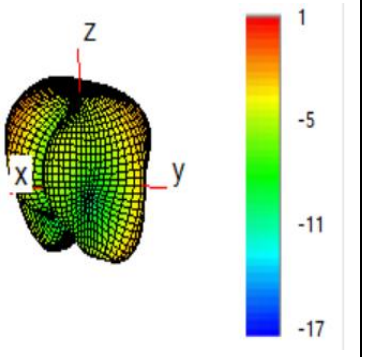
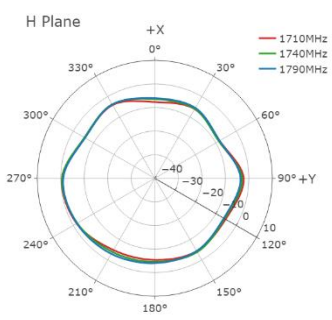
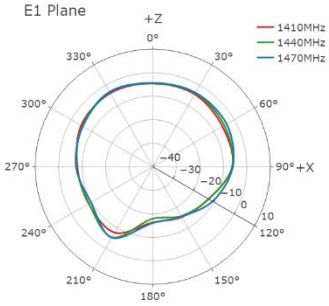
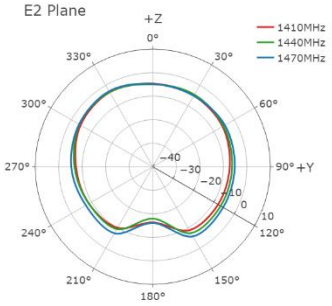
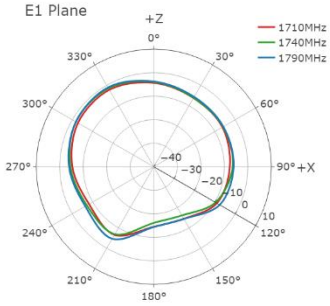
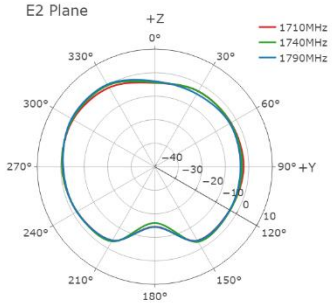
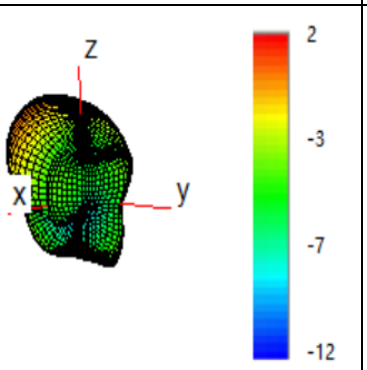
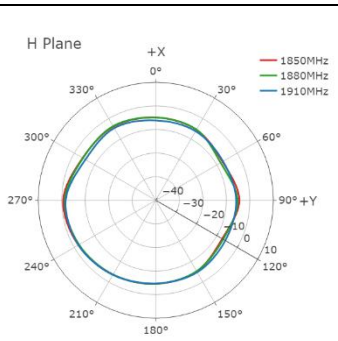
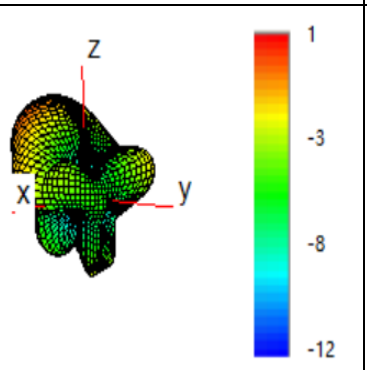
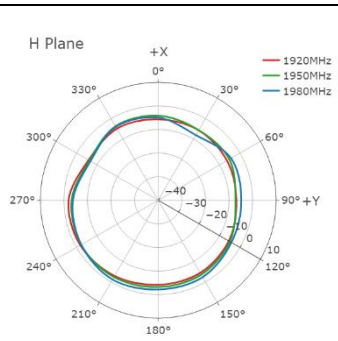
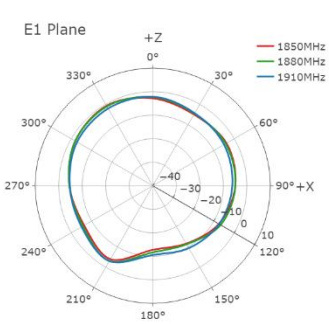
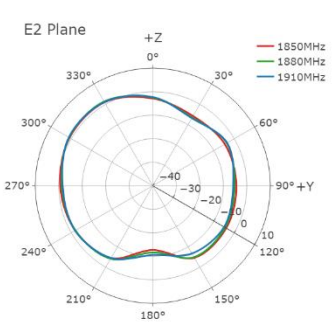
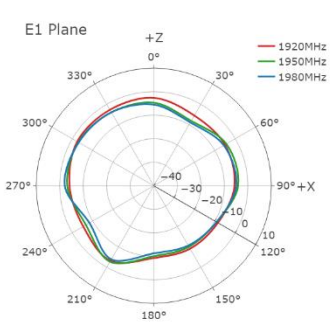
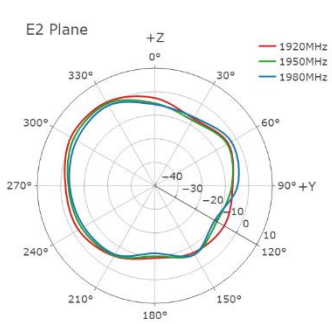
630 MHz		710 MHz	
			
			
830 MHz		900 MHz	
			
			

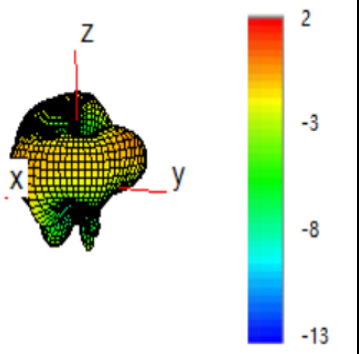
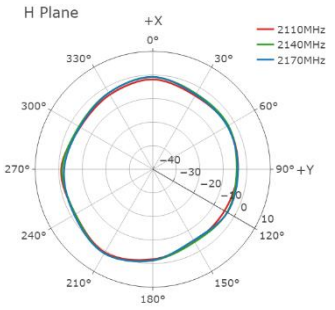
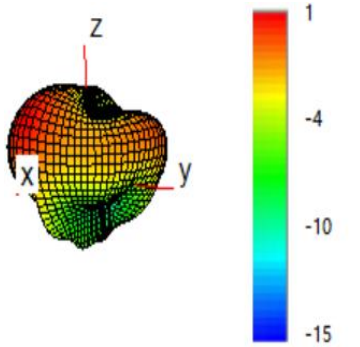
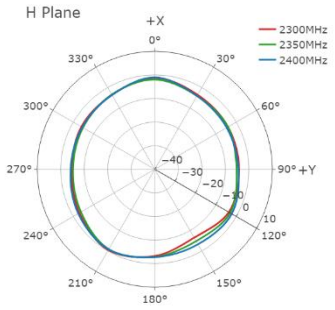
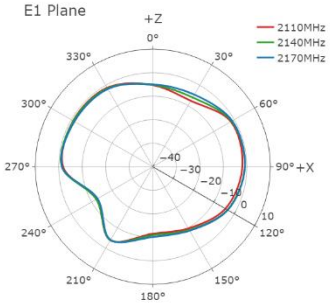
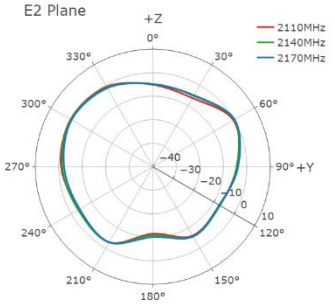
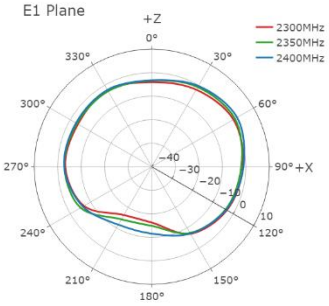
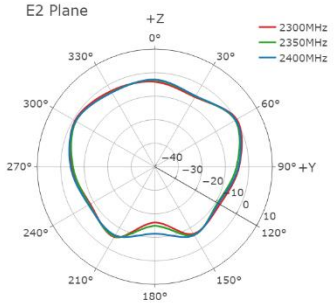
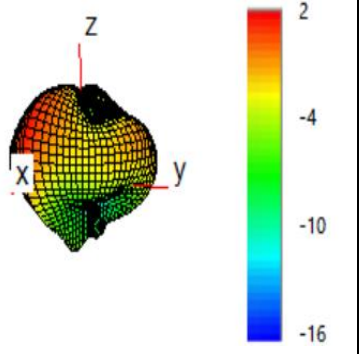
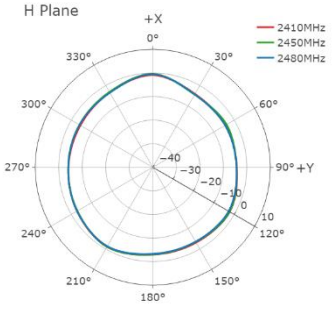
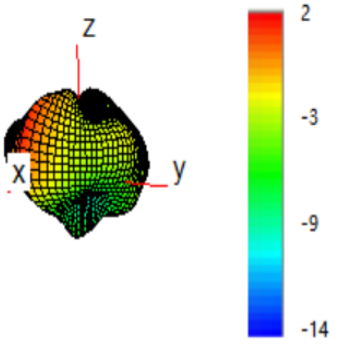
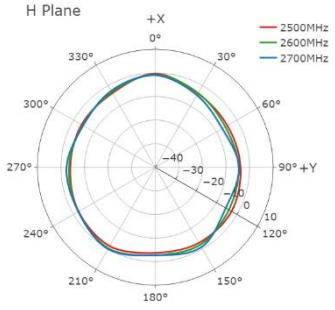
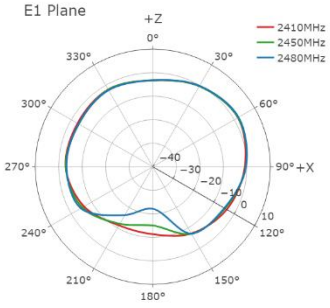
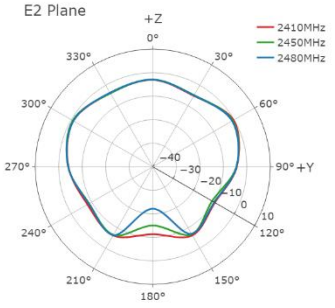
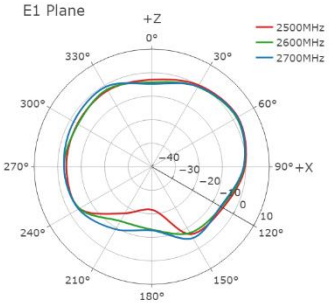
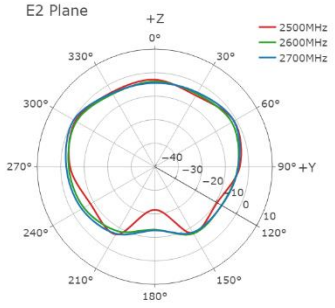
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

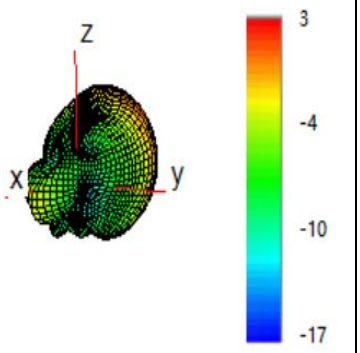
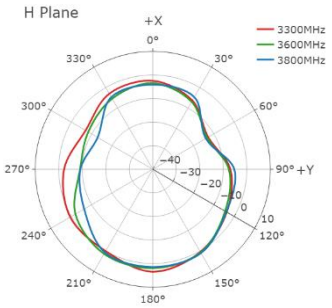
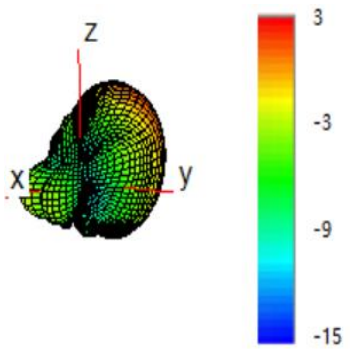
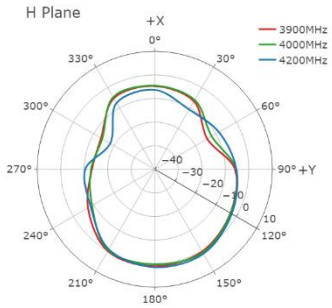
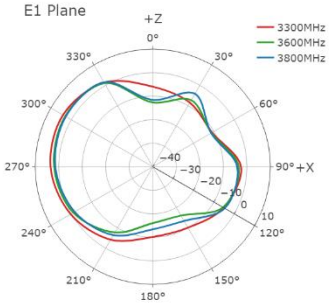
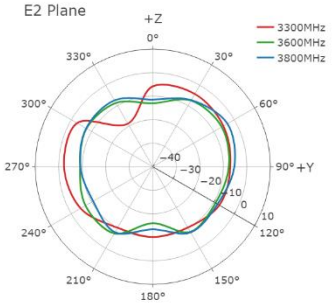
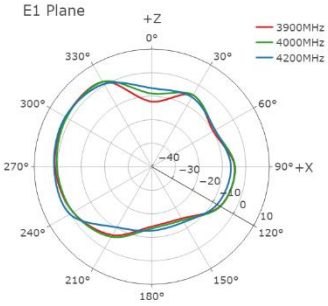
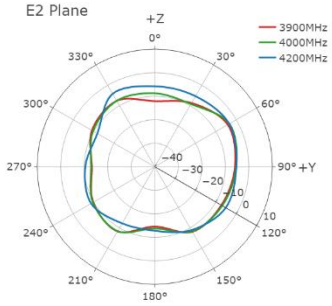
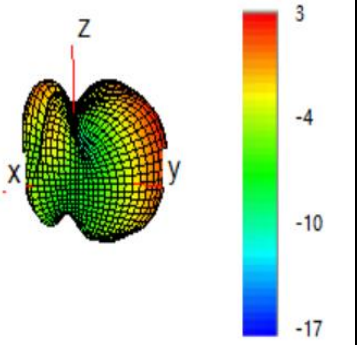
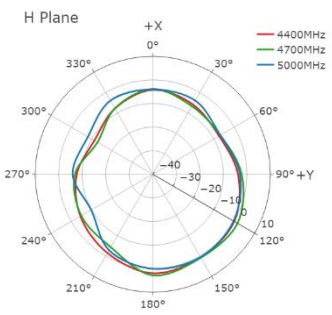
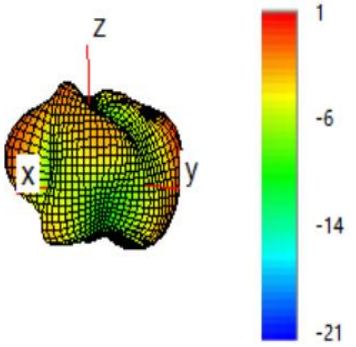
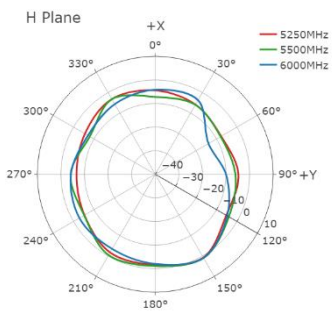
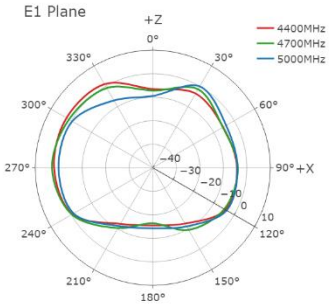
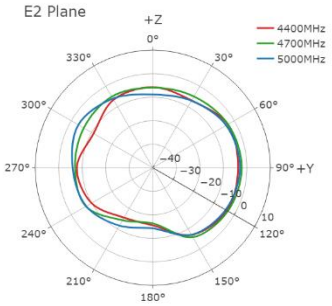
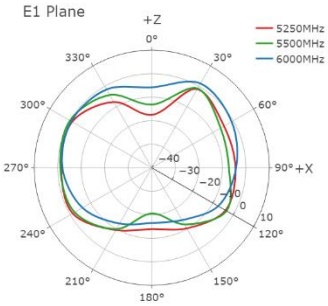
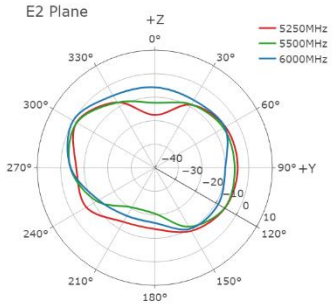
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

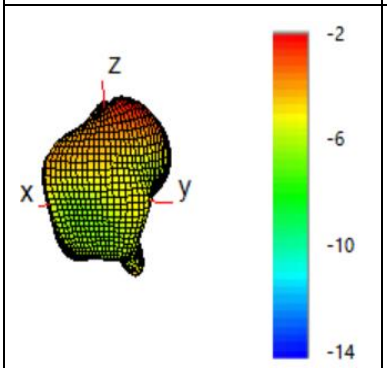
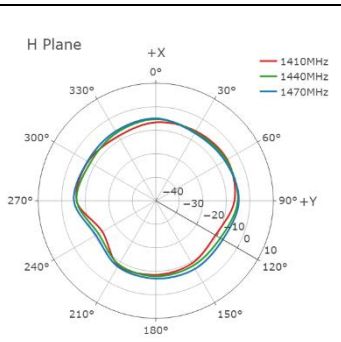
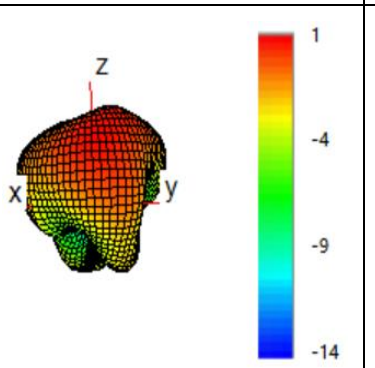
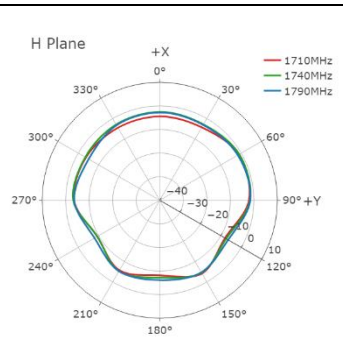
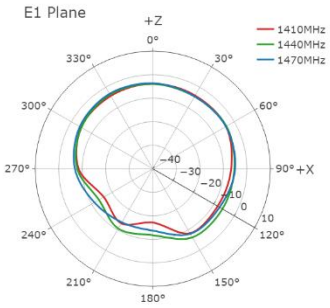
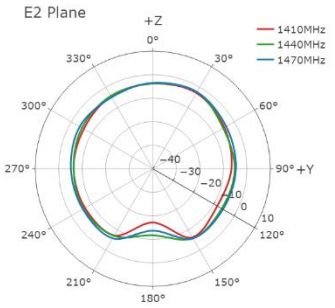
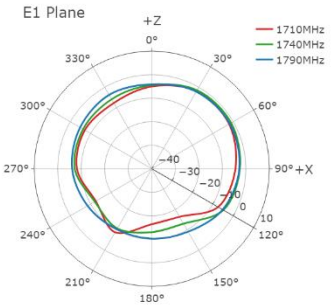
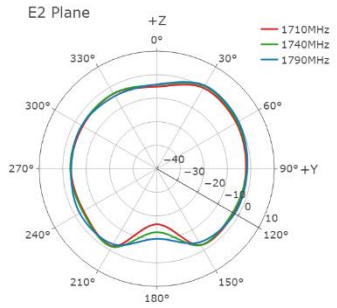
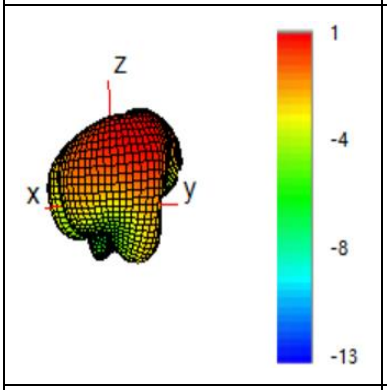
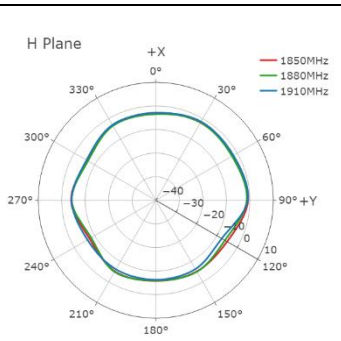
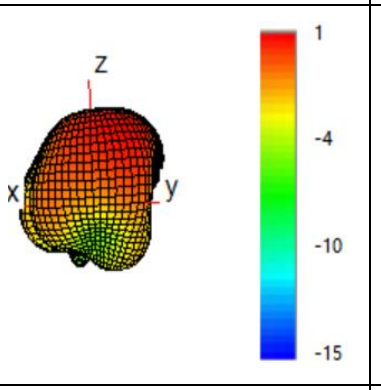
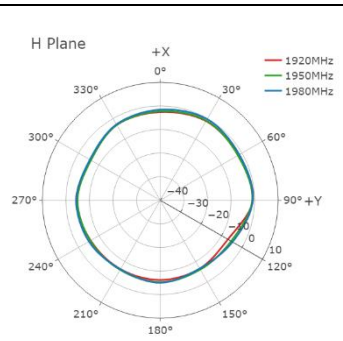
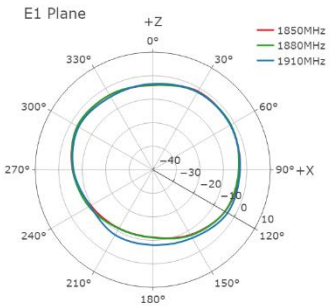
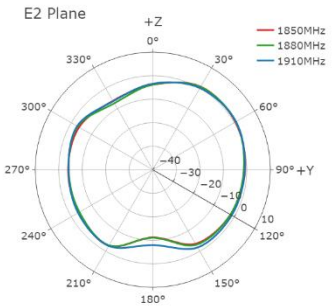
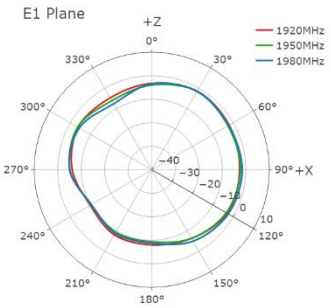
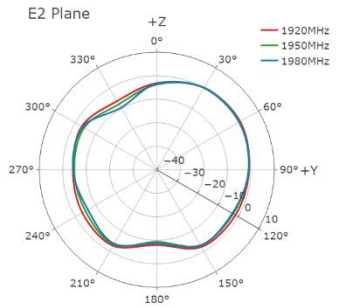
MH1

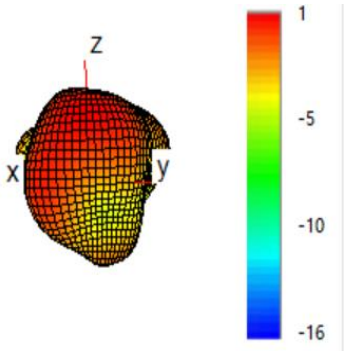
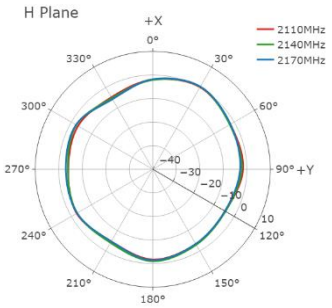
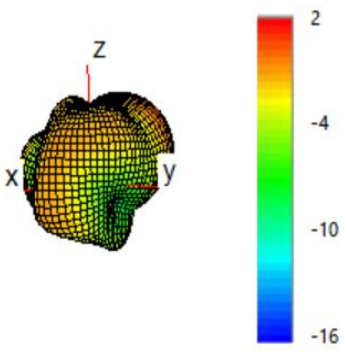
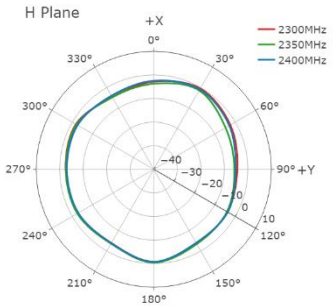
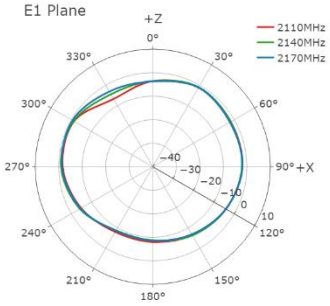
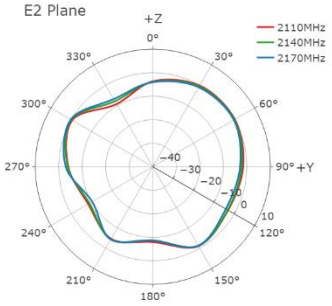
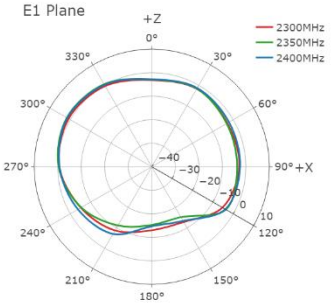
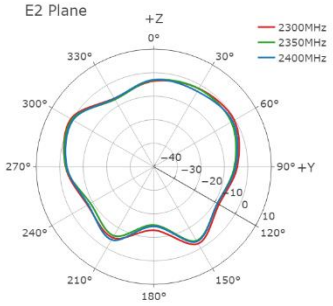
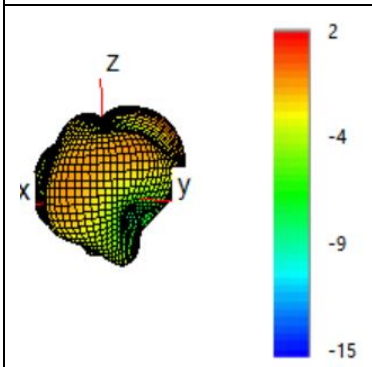
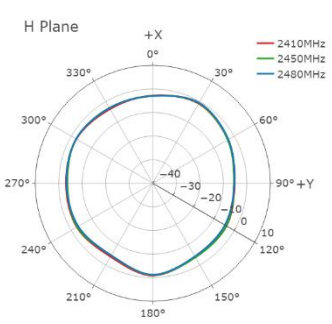
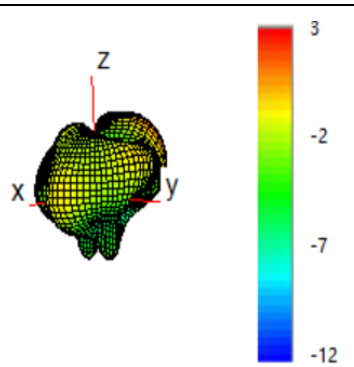
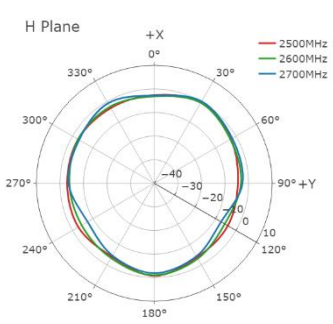
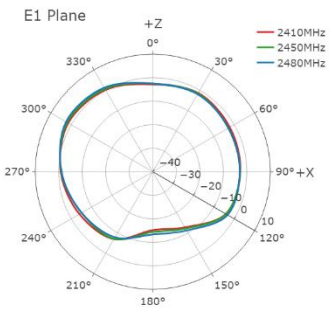
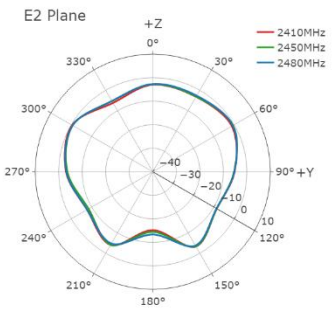
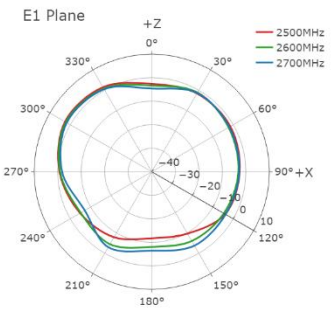
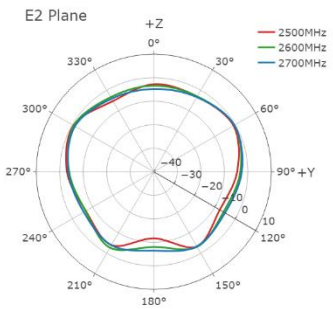
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

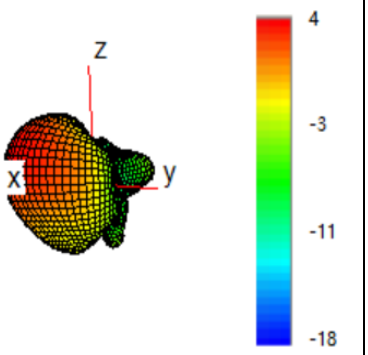
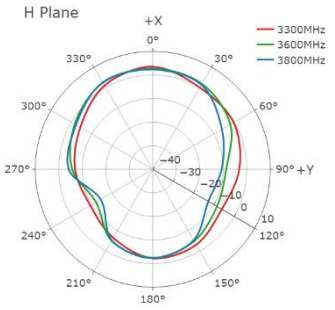
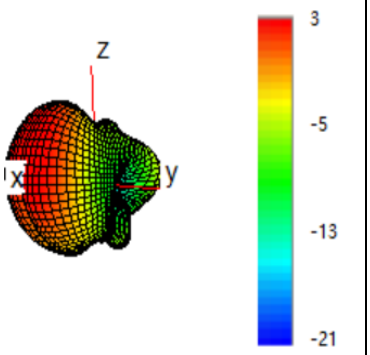
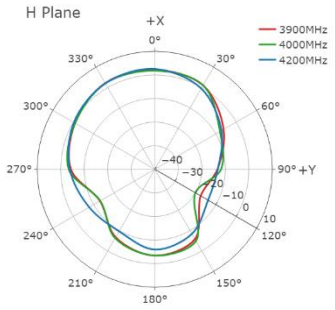
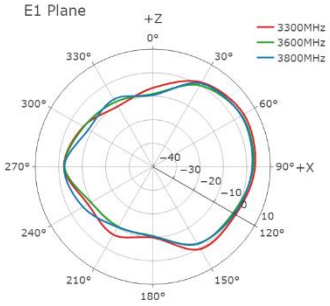
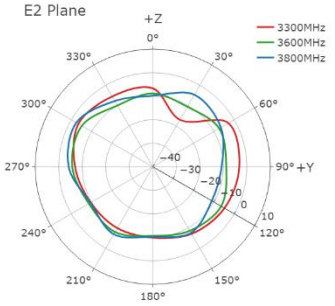
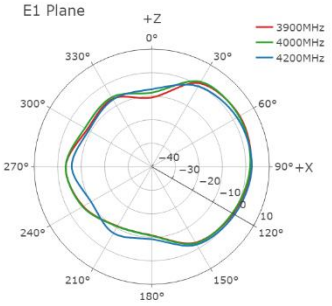
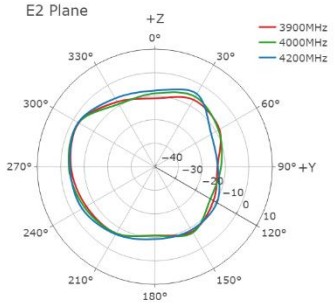
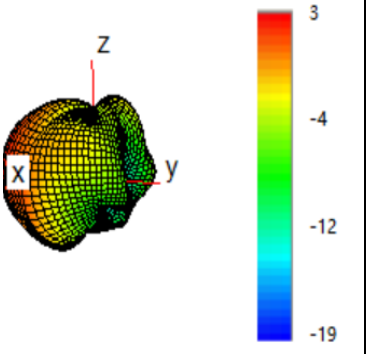
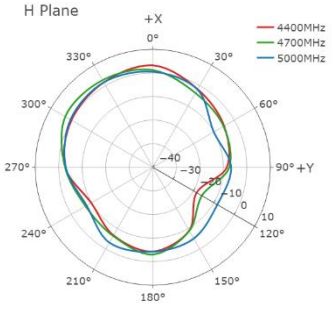
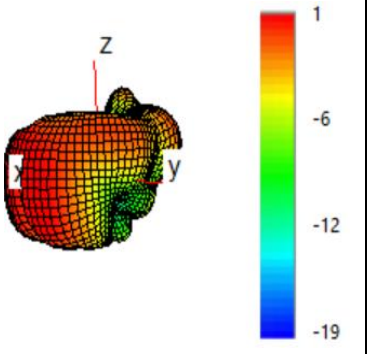
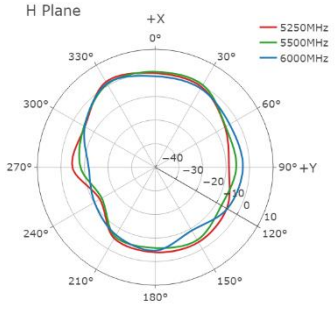
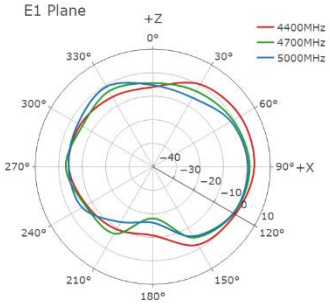
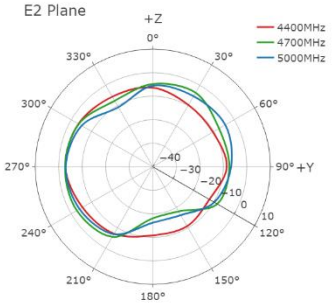
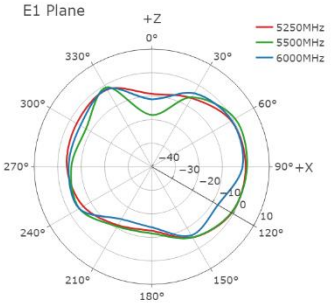
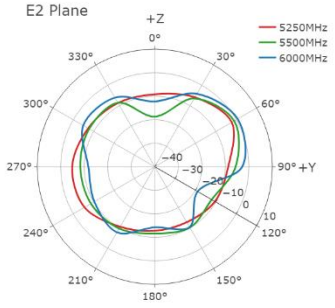
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

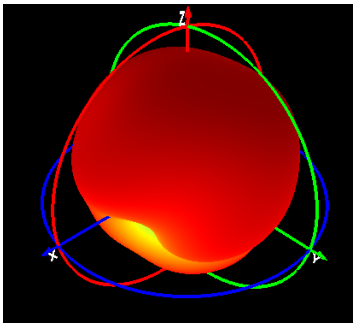
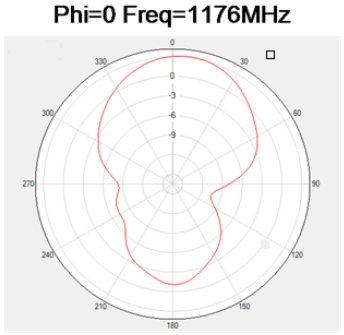
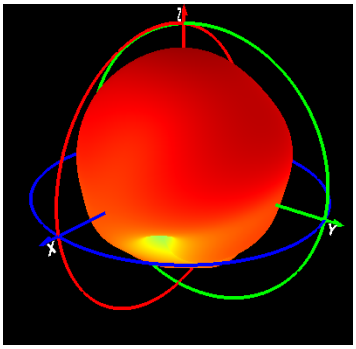
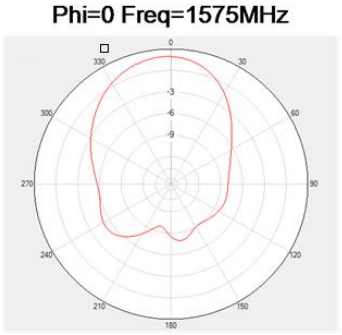
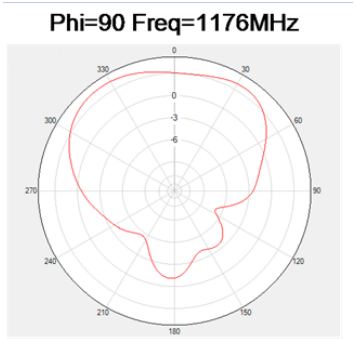
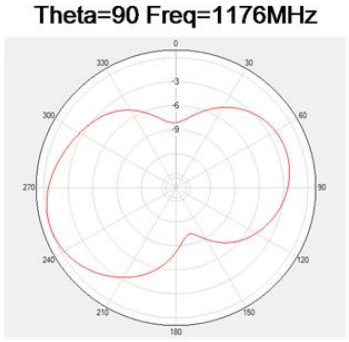
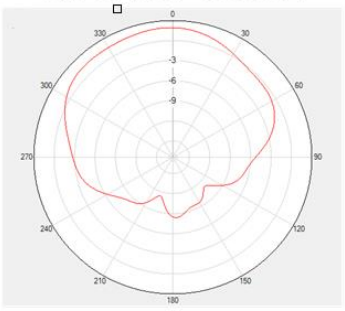
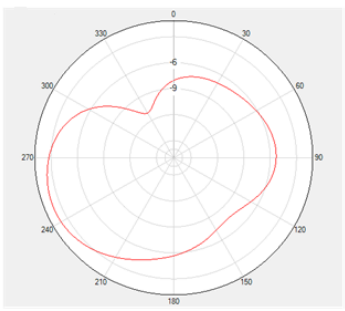
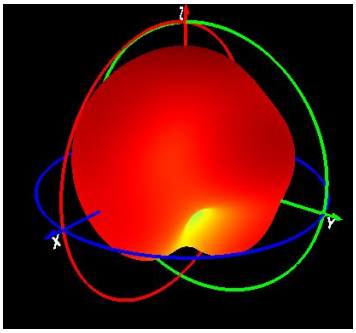
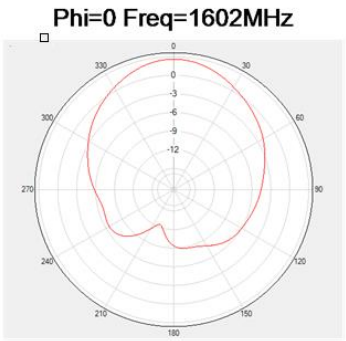
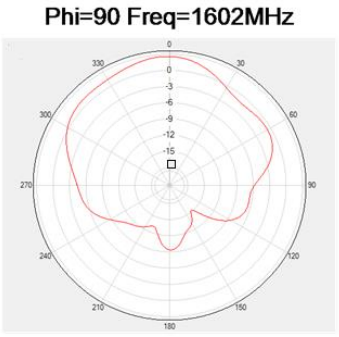
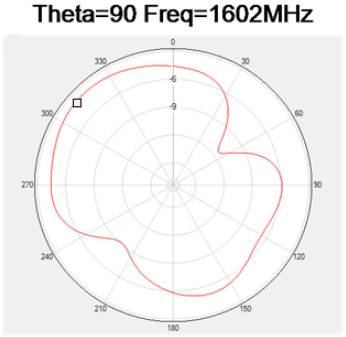
MH2

1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

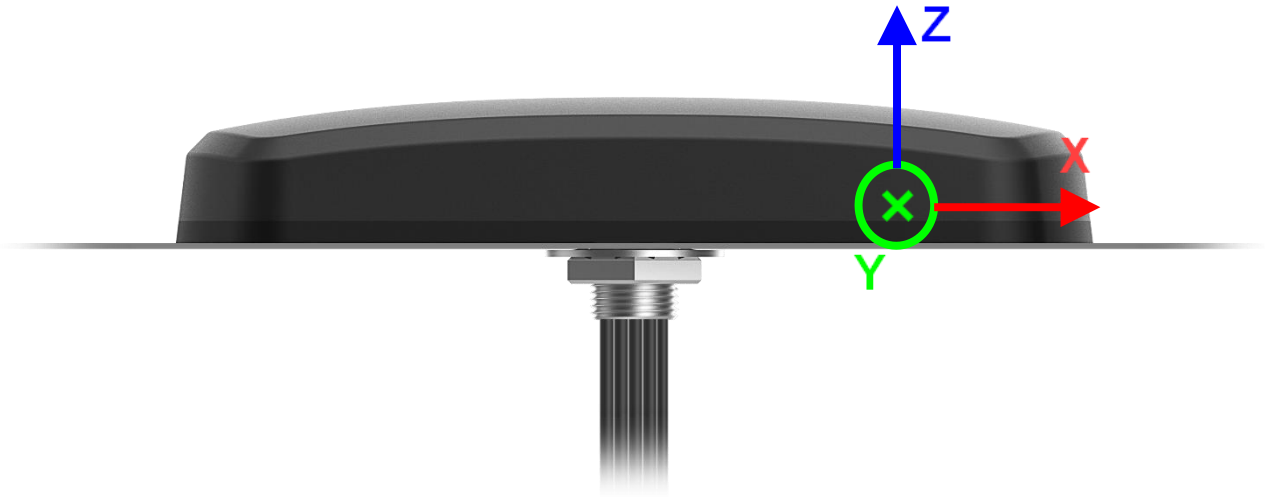
3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

GNSS

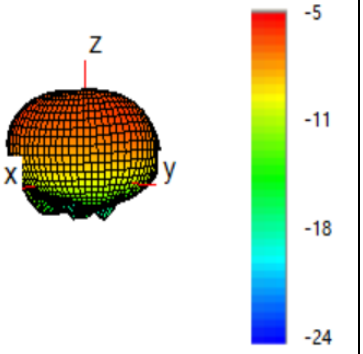
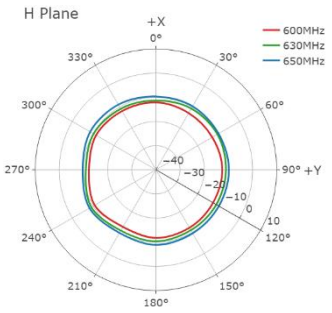
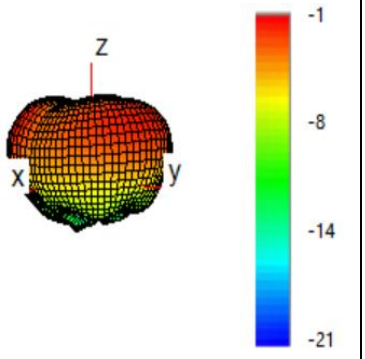
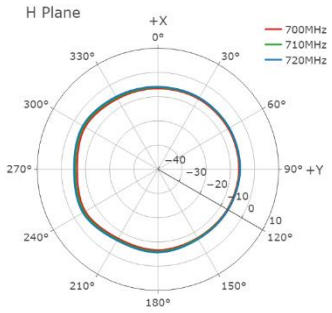
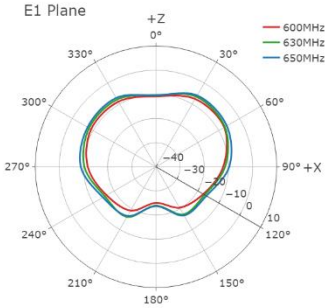
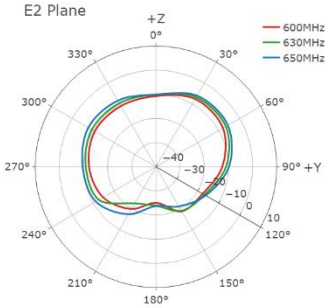
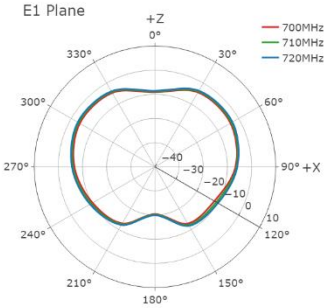
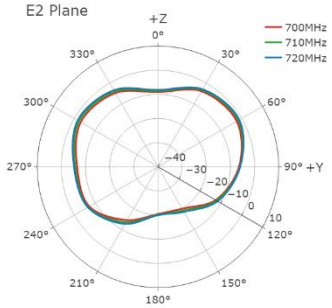
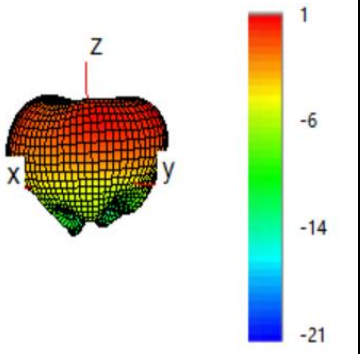
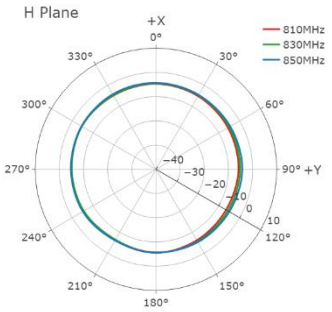
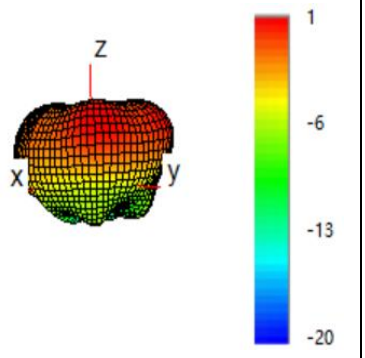
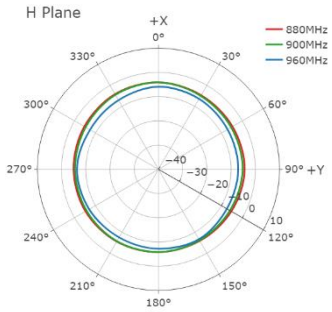
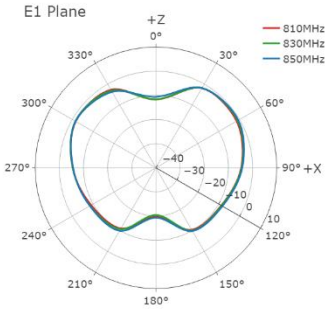
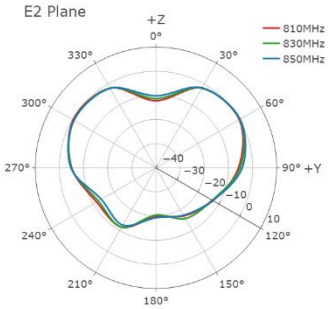
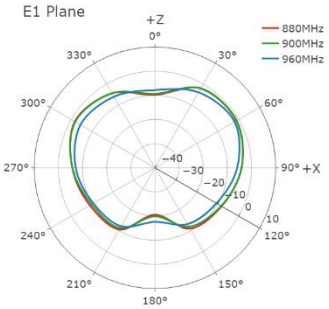
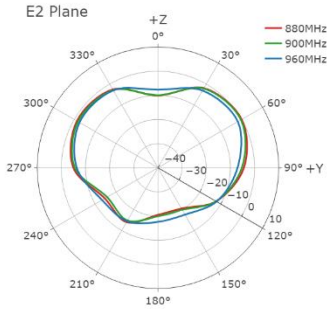
1176 MHz		1575 MHz	
			
			
1602 MHz			
			
			

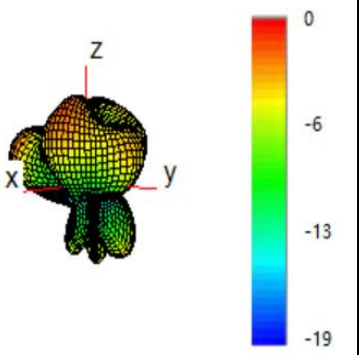
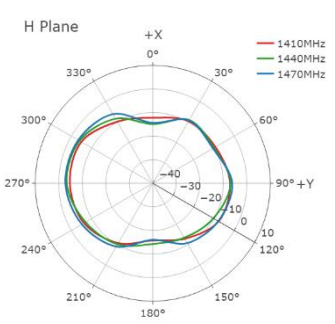
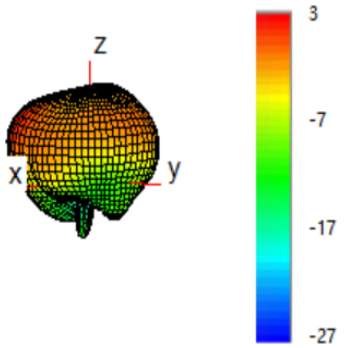
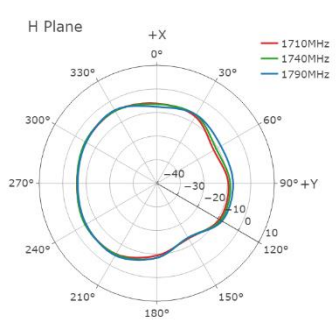
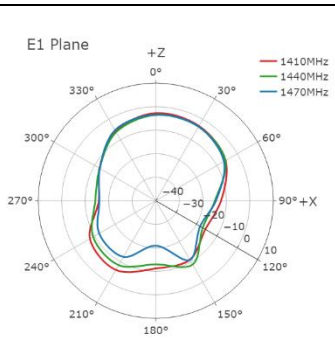
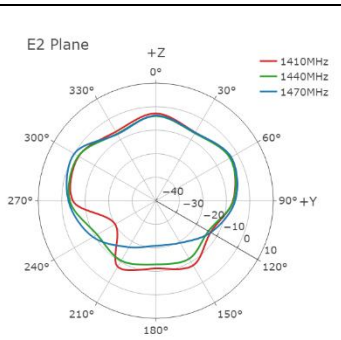
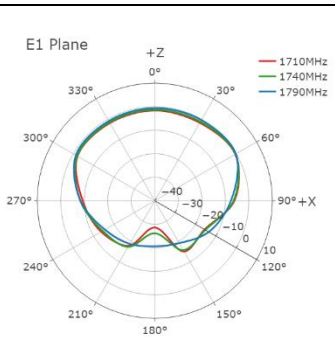
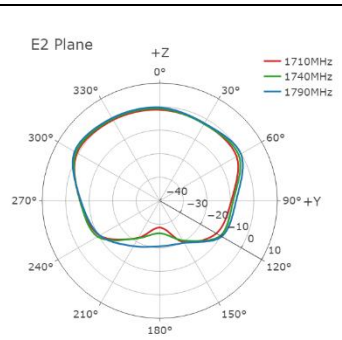
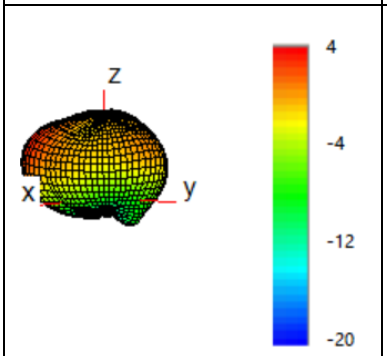
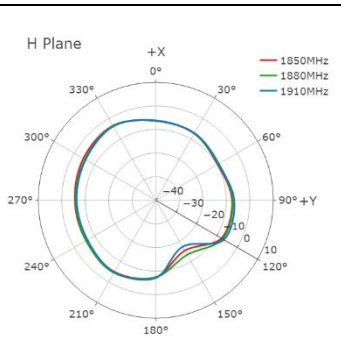
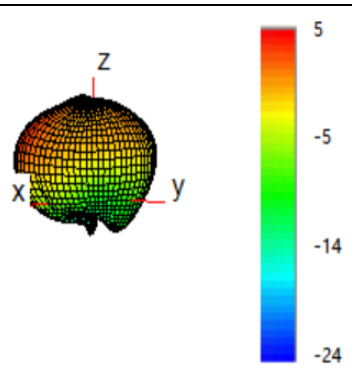
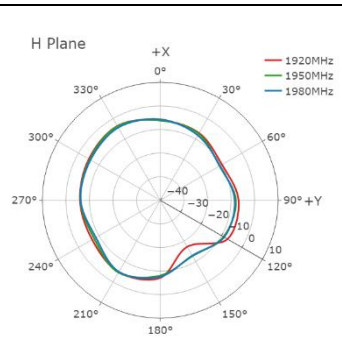
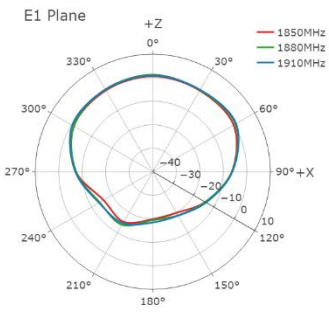
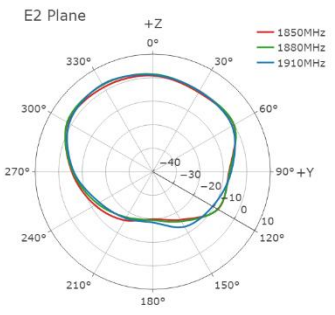
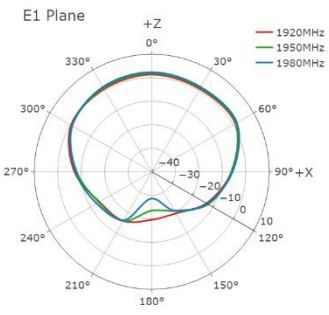
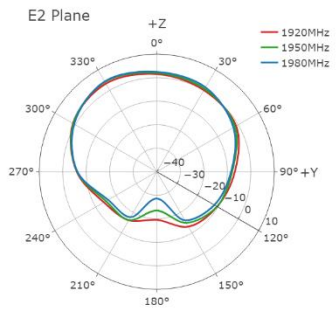
3.2.4.2. Test Status: On 500 mm × 500 mm Metal Plane

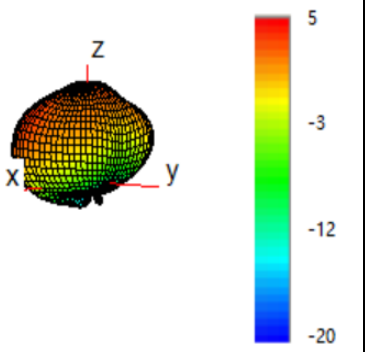
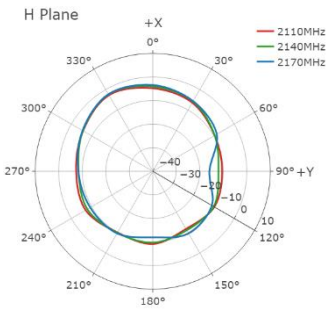
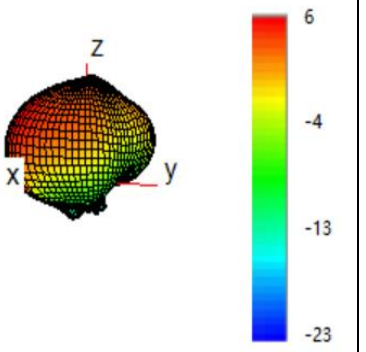
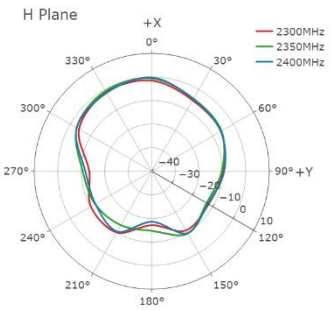
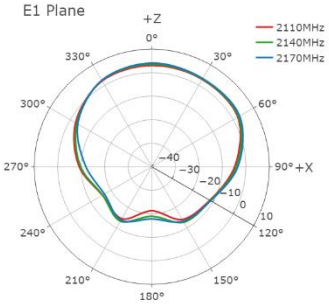
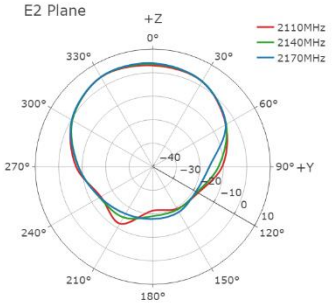
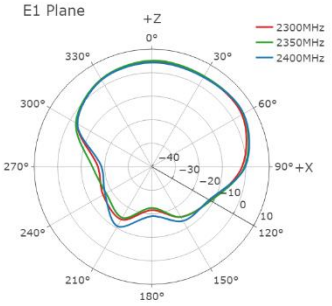
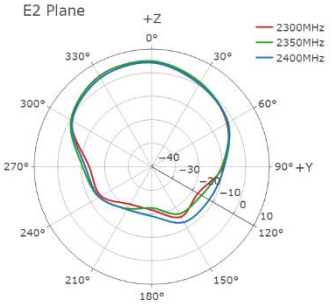
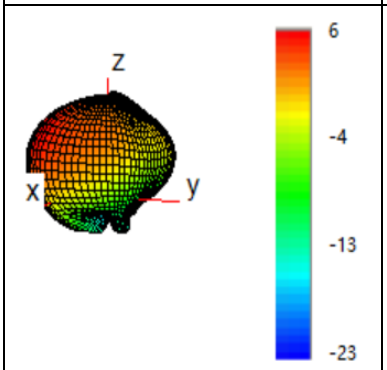
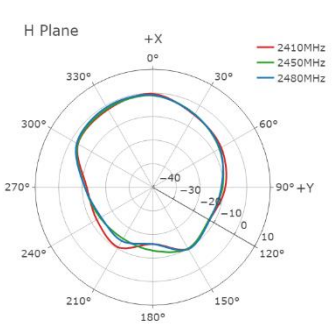
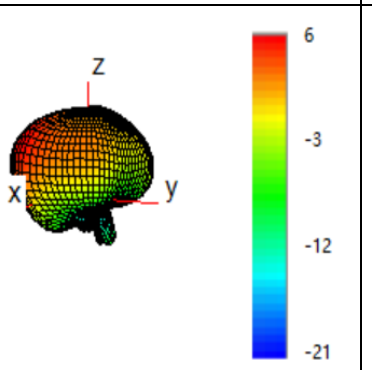
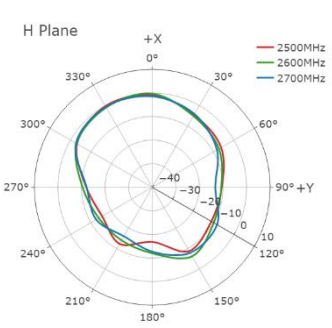
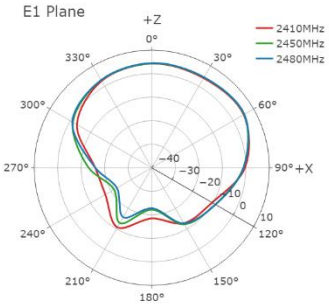
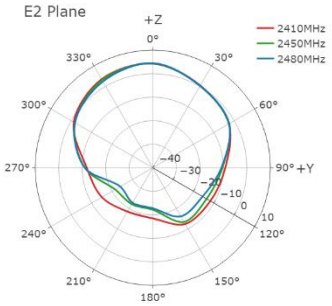
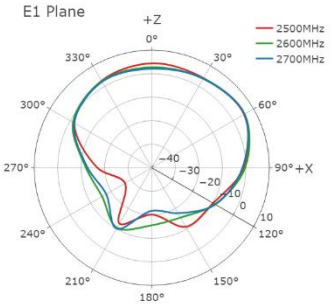
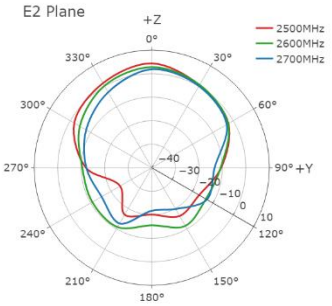
- Test Chamber: HF-G-1(LMH & MH), FS-G-1(GNSS)

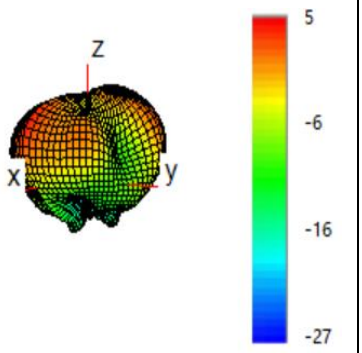
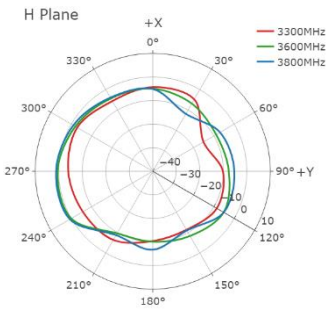
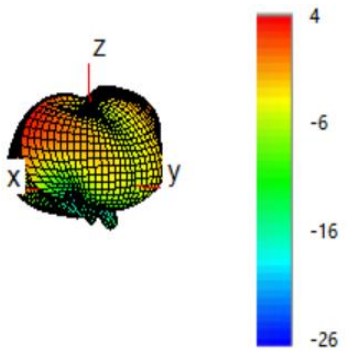
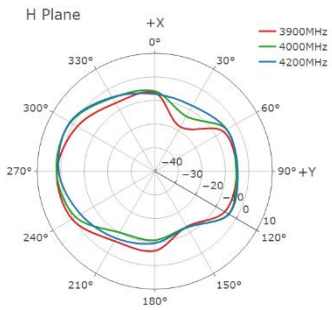
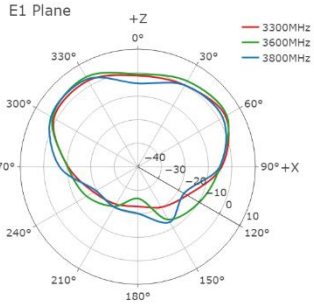
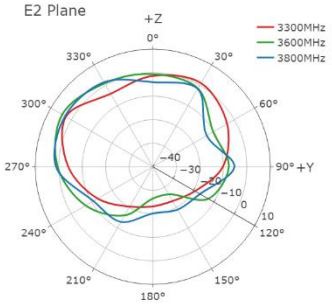
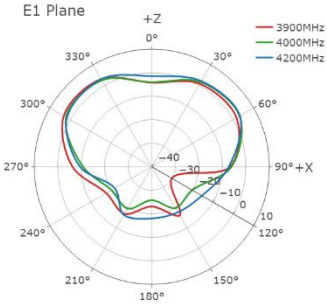
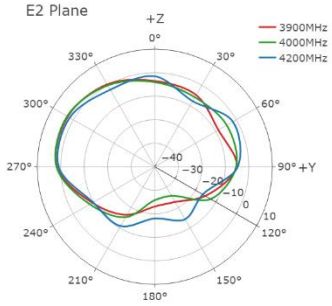
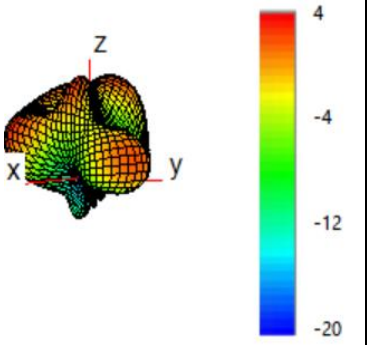
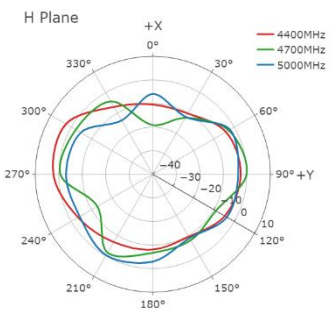
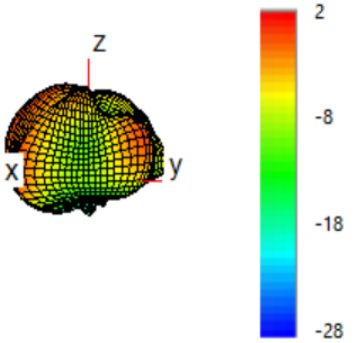
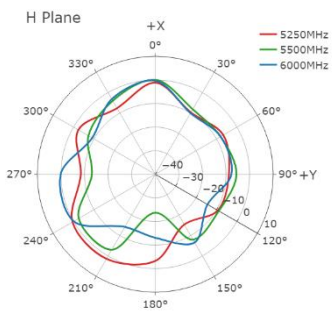
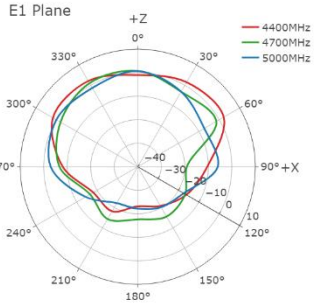
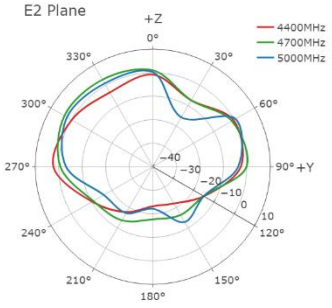
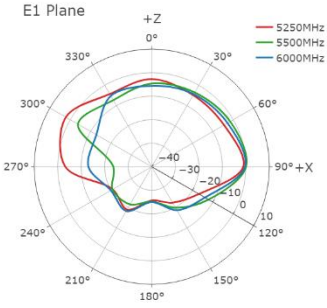
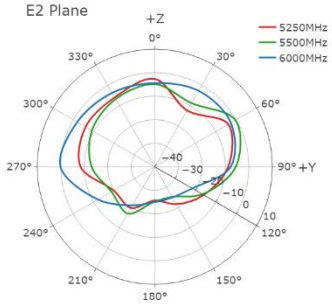


- **LMH1**

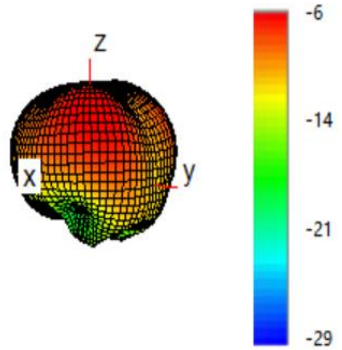
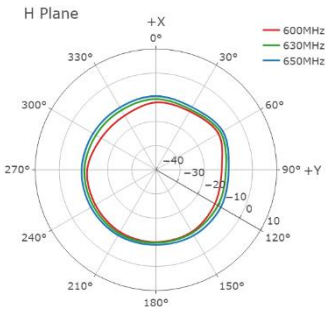
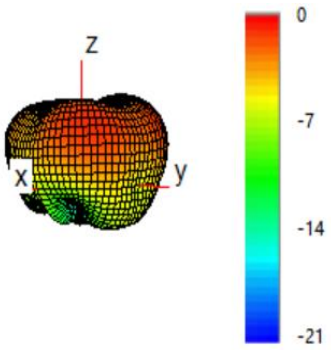
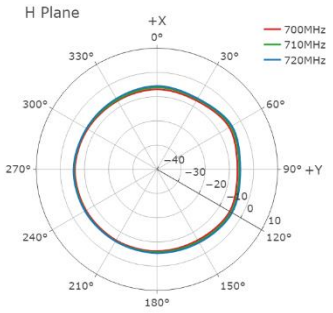
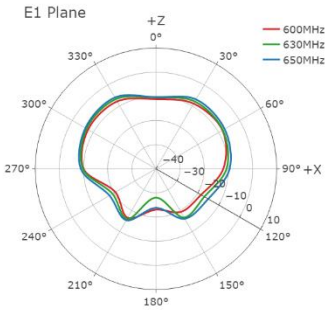
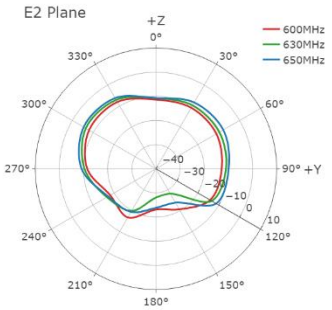
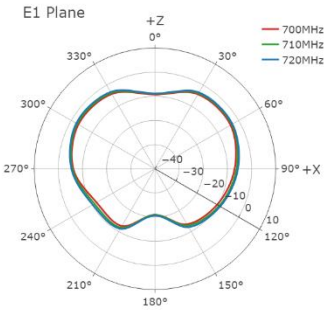
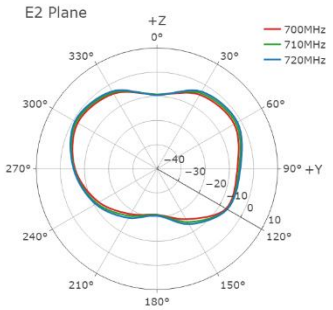
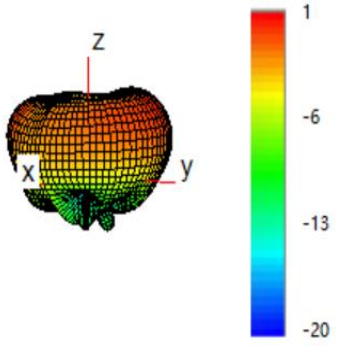
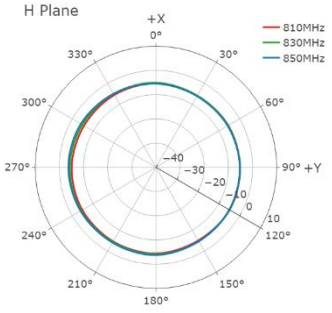
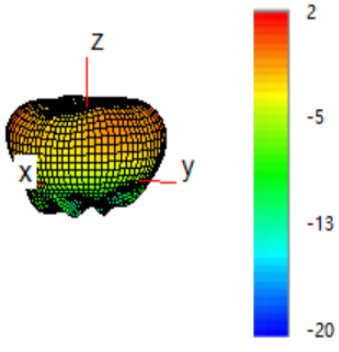
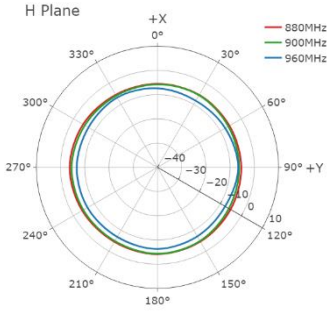
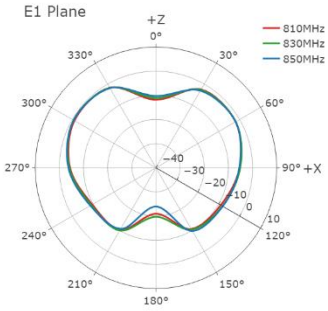
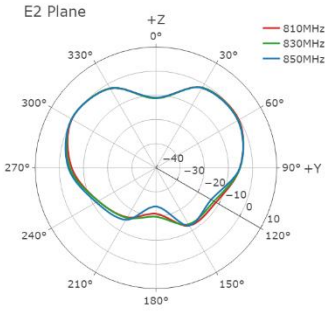
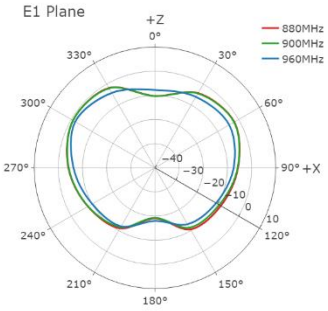
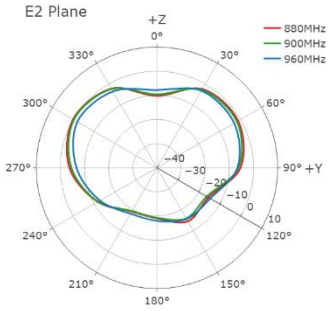
630 MHz		710 MHz	
			
			
830 MHz		900 MHz	
			
			

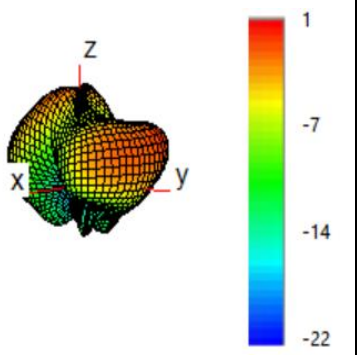
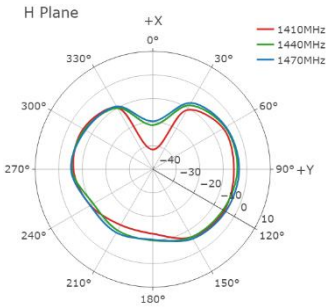
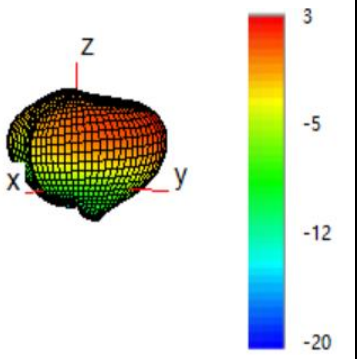
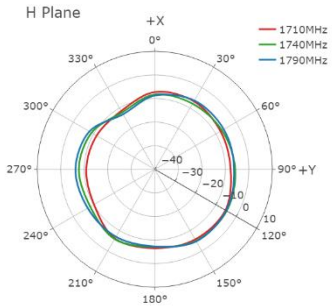
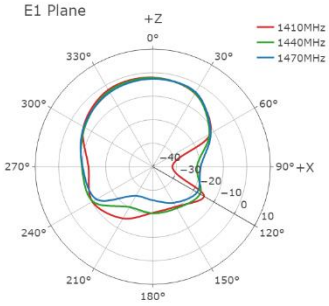
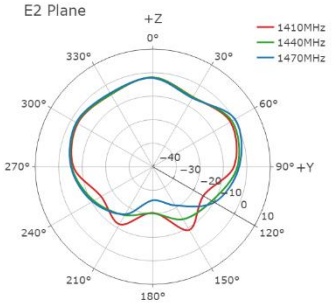
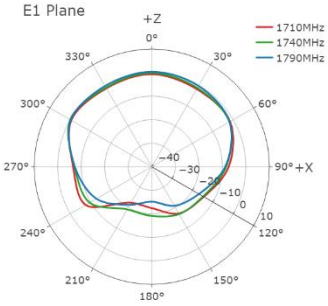
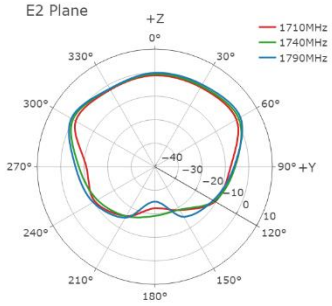
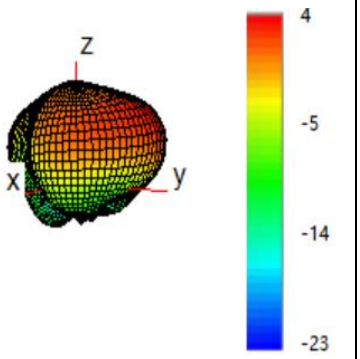
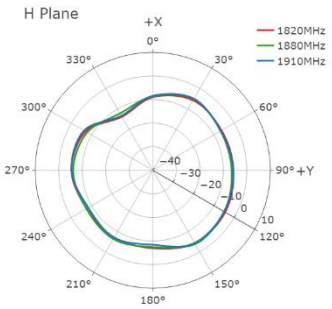
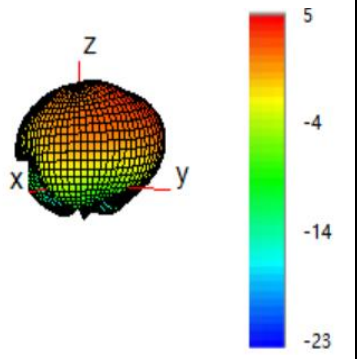
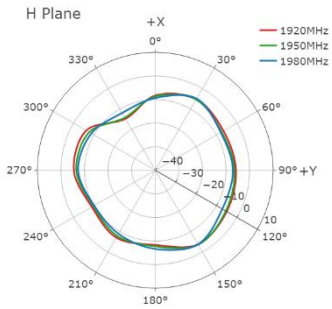
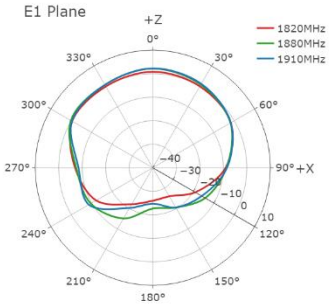
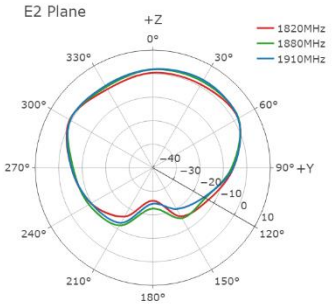
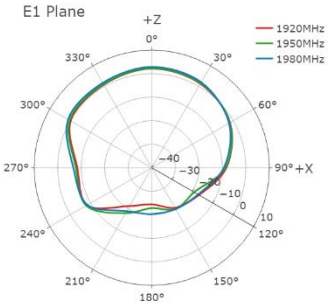
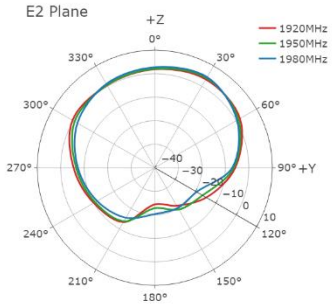
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

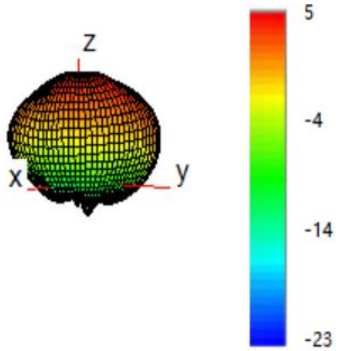
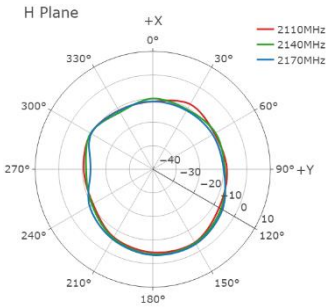
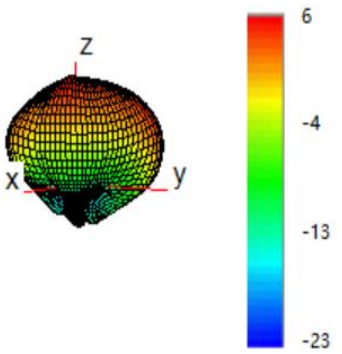
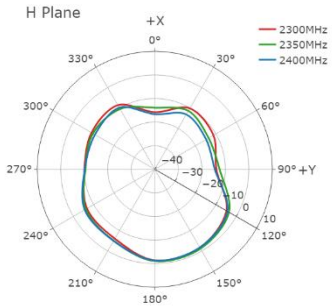
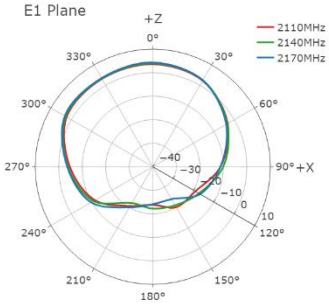
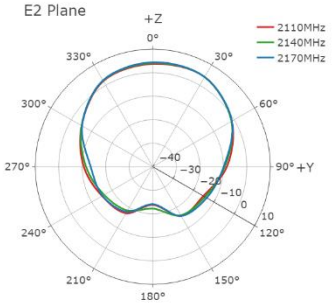
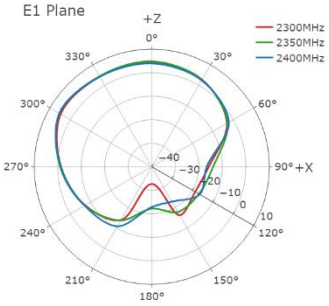
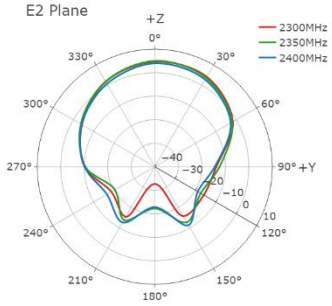
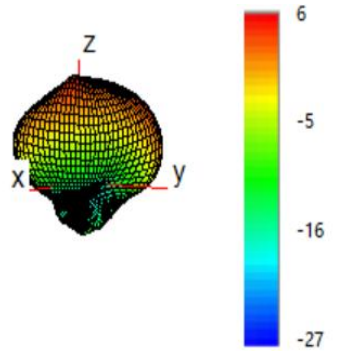
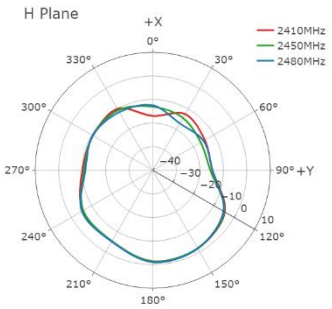
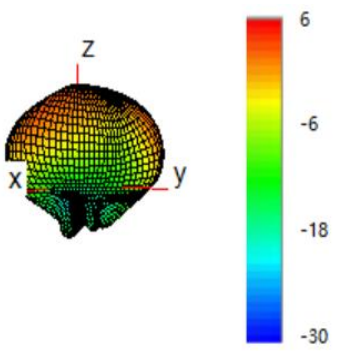
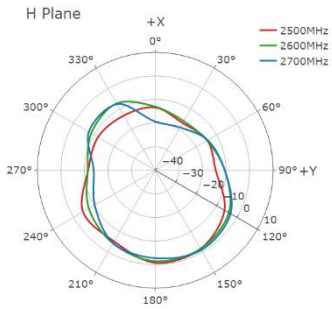
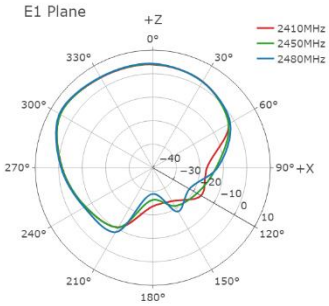
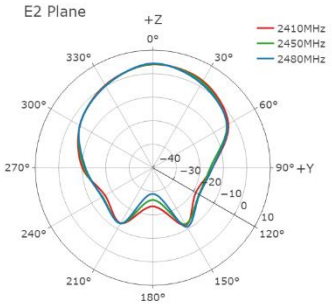
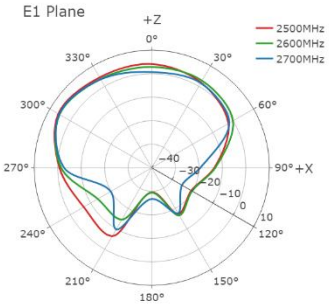
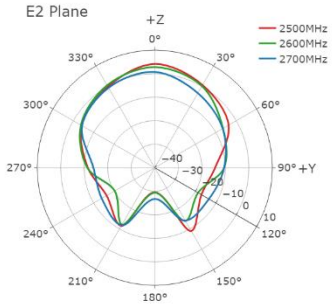
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

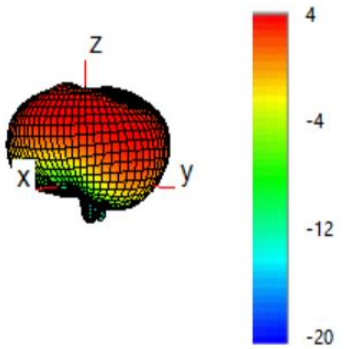
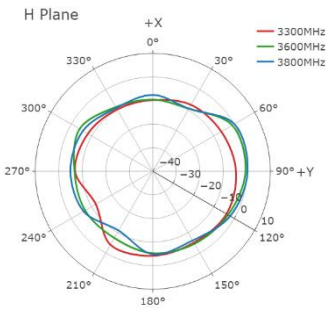
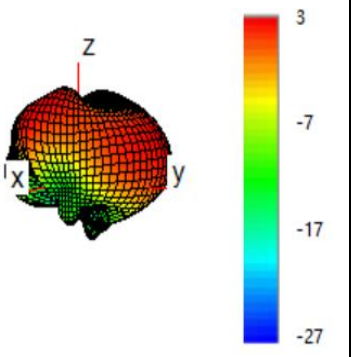
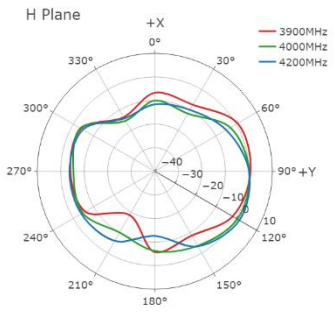
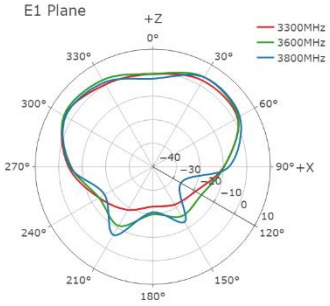
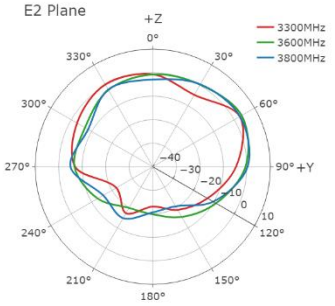
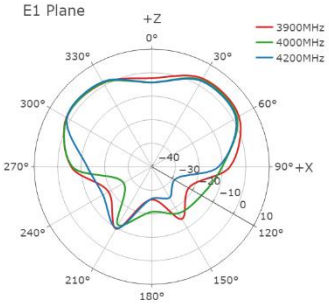
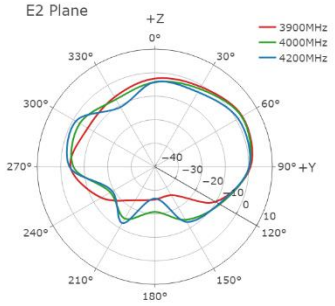
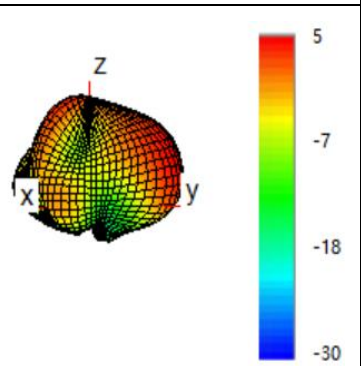
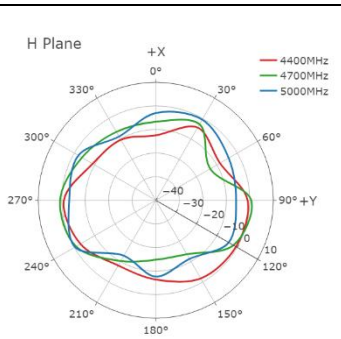
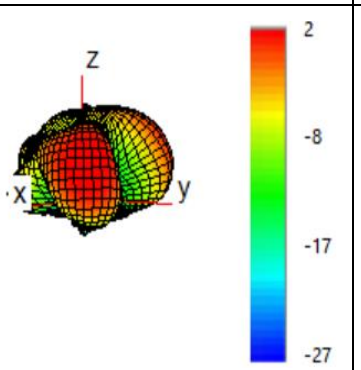
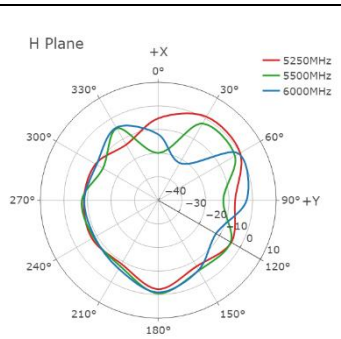
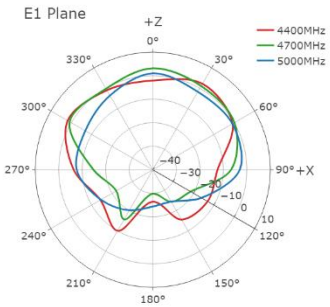
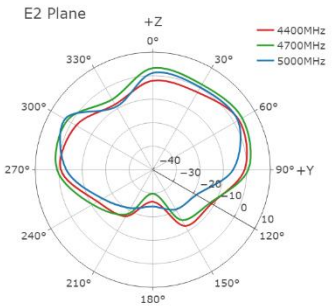
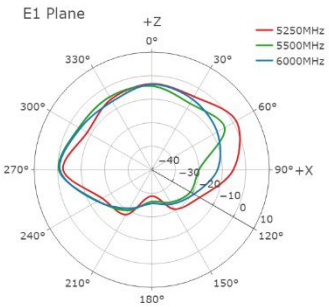
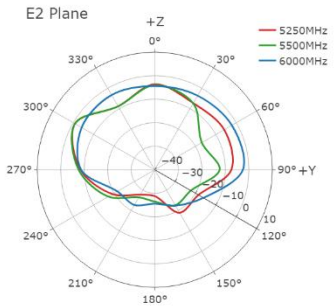
3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

- **LMH2**

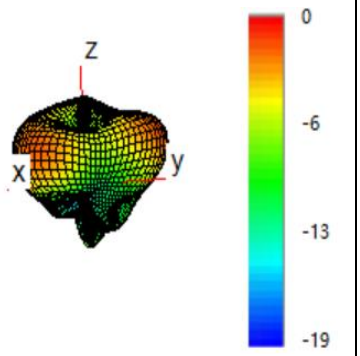
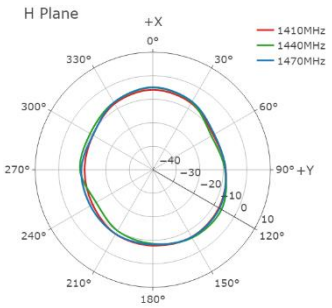
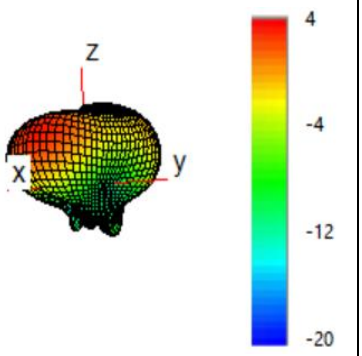
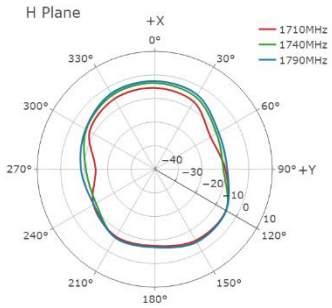
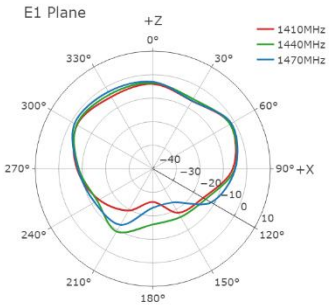
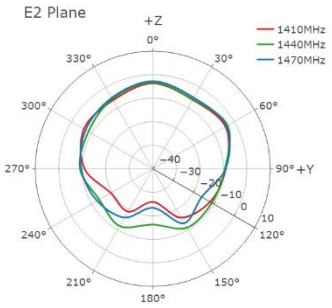
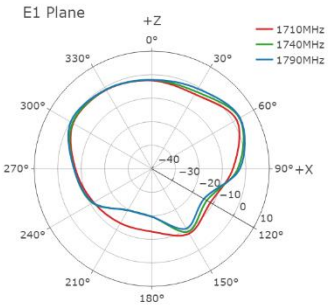
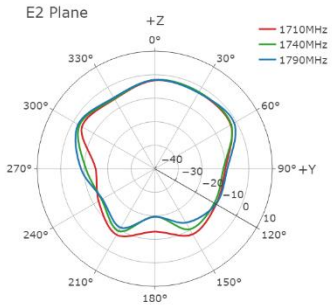
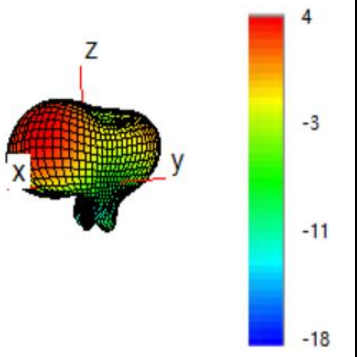
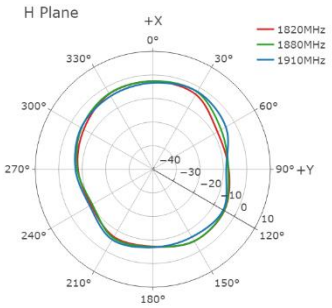
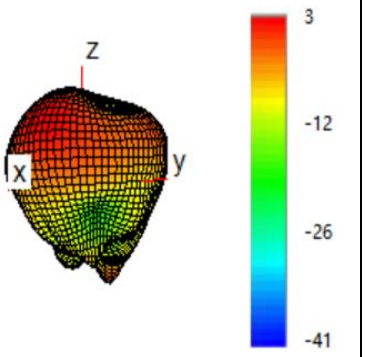
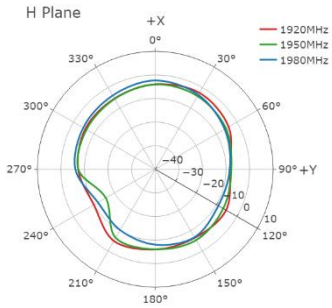
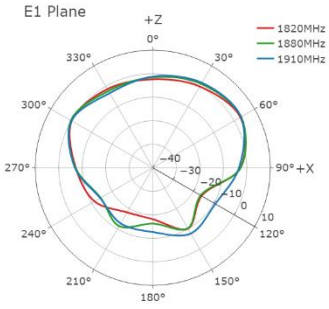
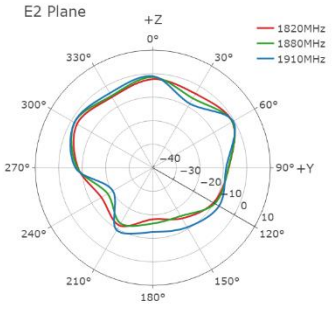
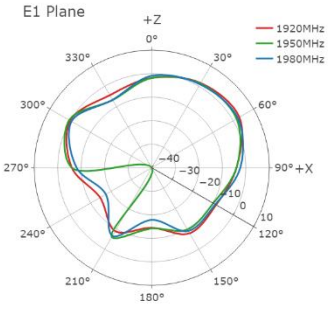
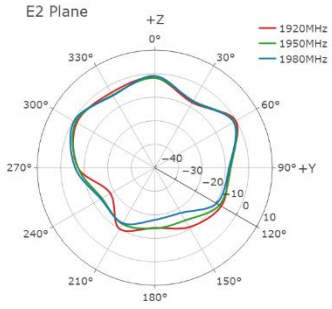
630 MHz		710 MHz	
			
			
830 MHz		900 MHz	
			
			

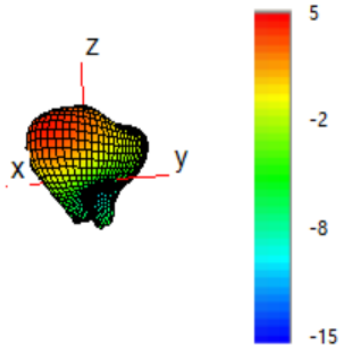
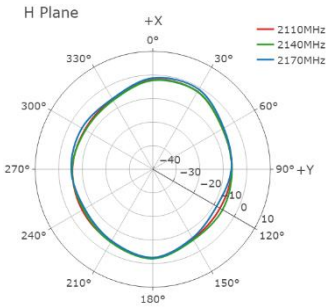
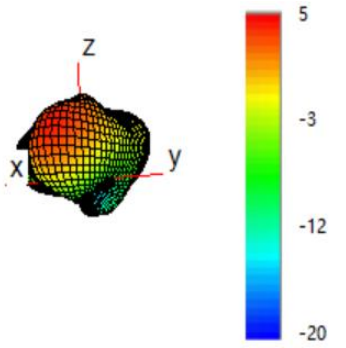
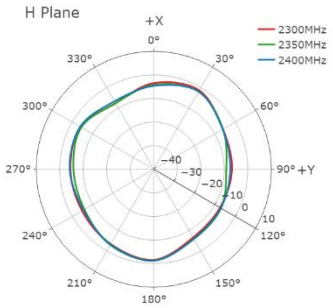
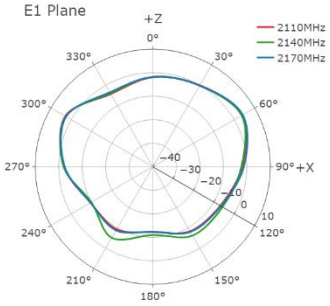
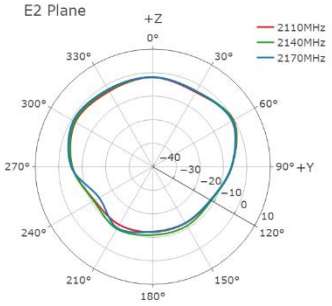
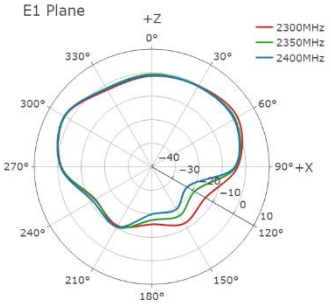
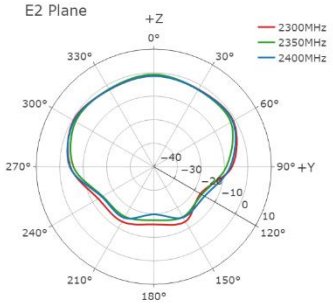
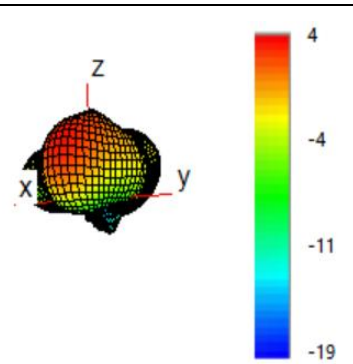
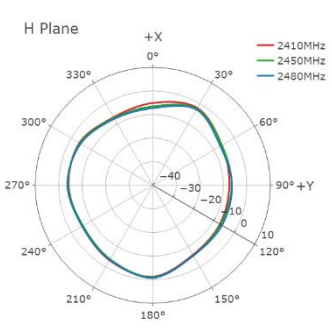
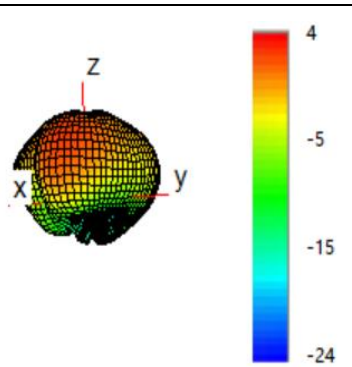
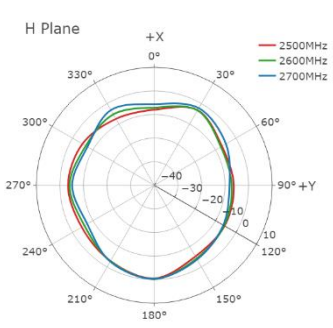
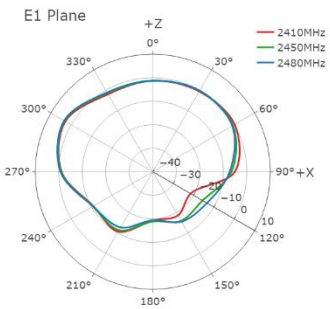
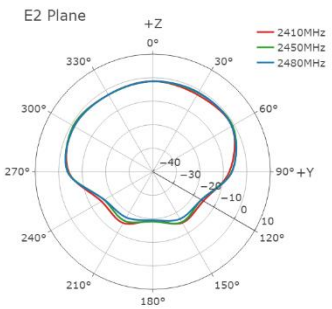
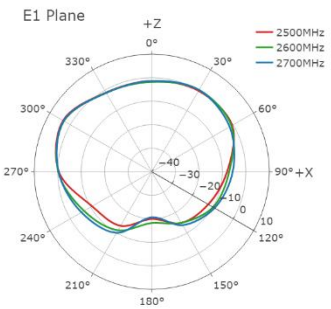
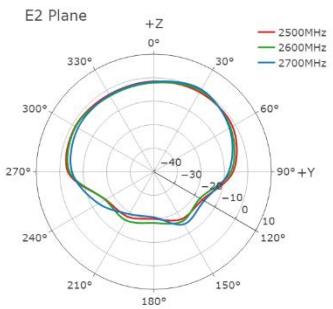
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

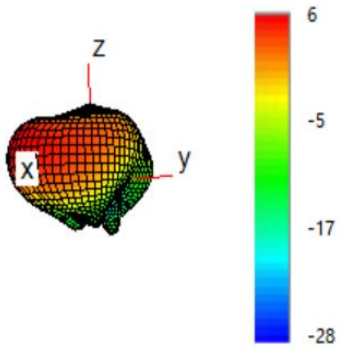
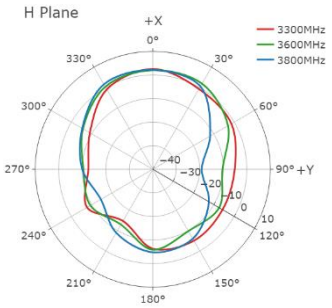
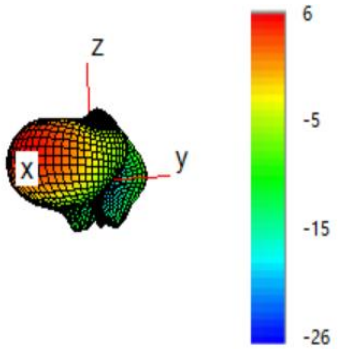
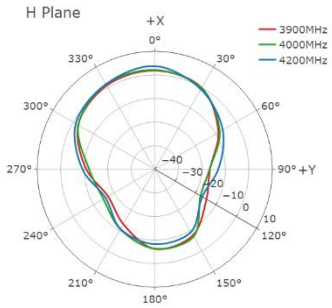
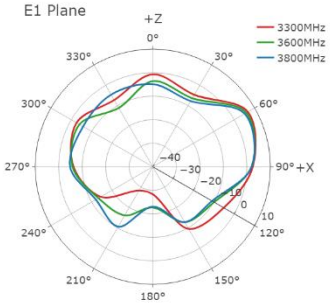
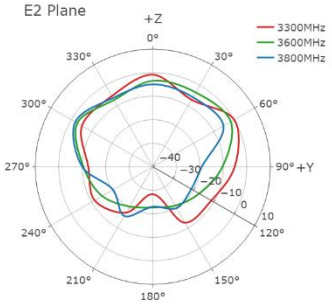
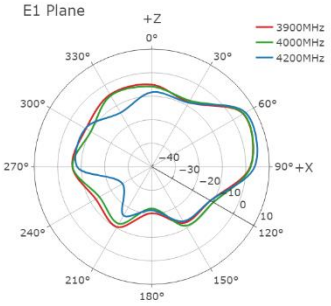
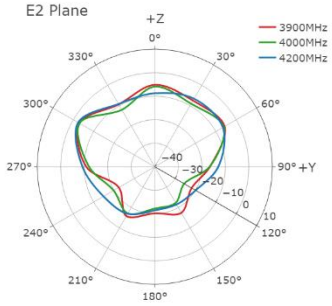
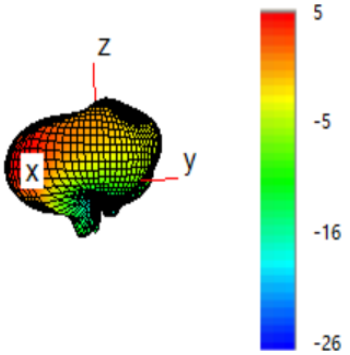
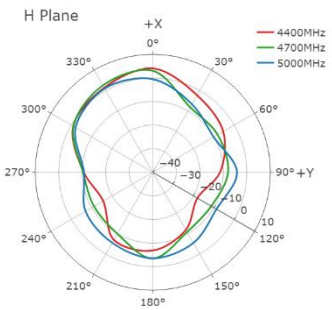
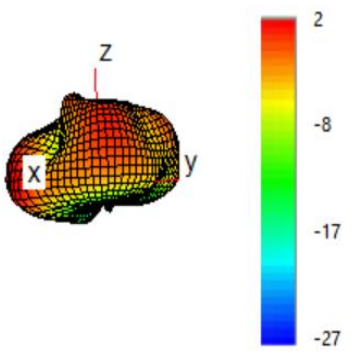
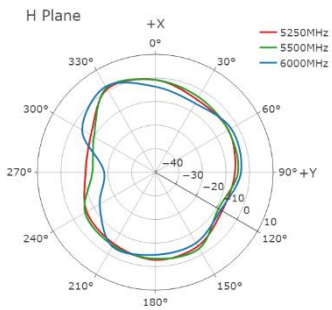
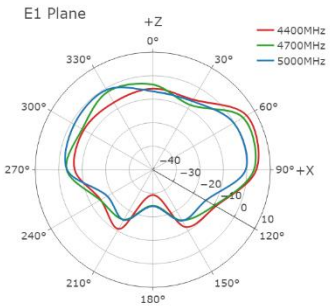
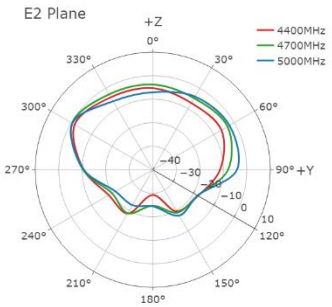
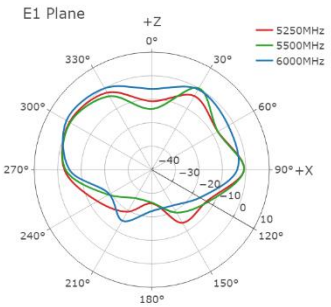
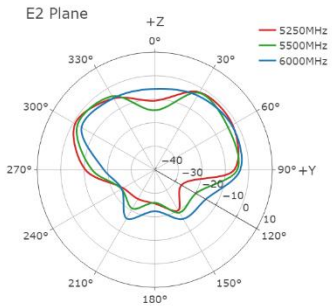
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

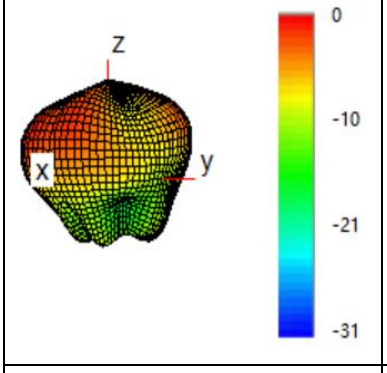
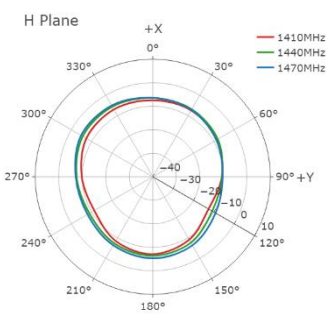
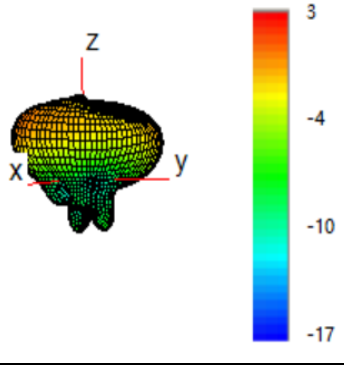
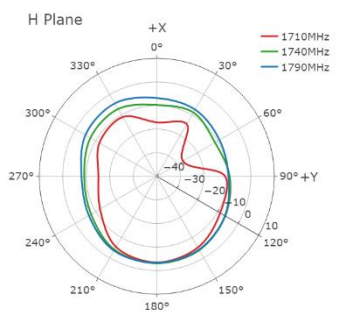
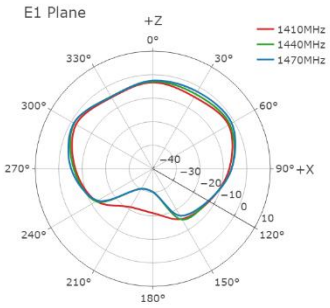
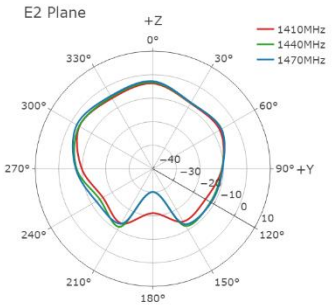
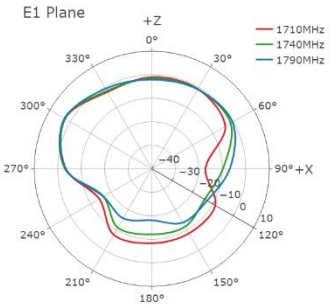
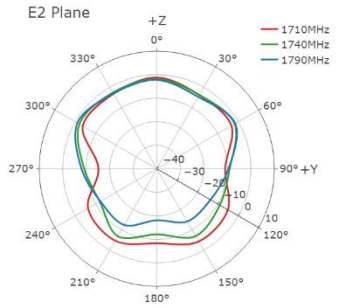
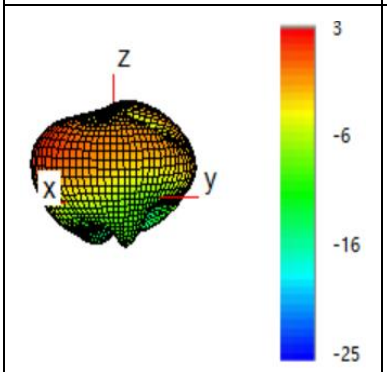
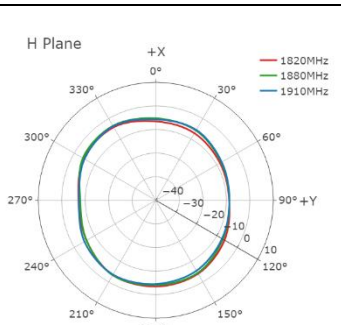
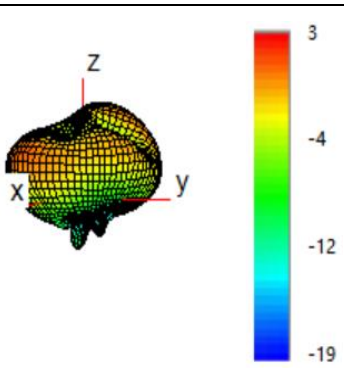
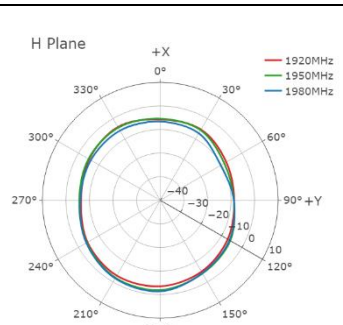
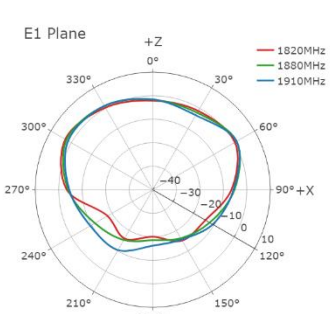
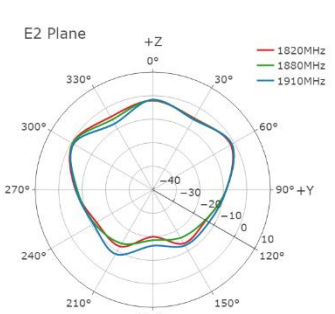
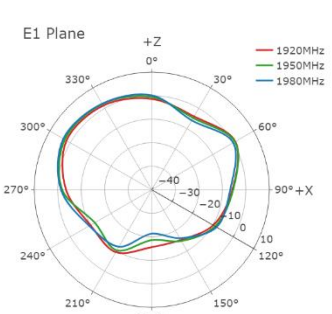
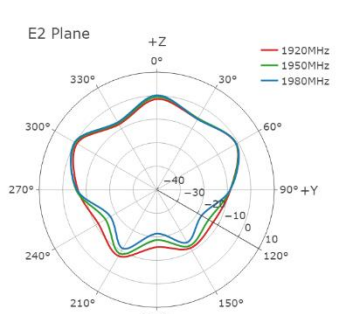
MH1

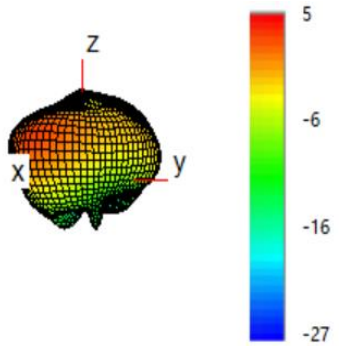
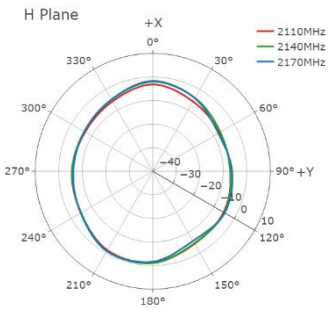
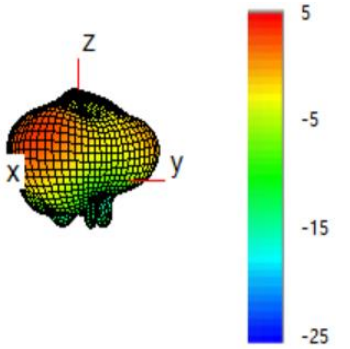
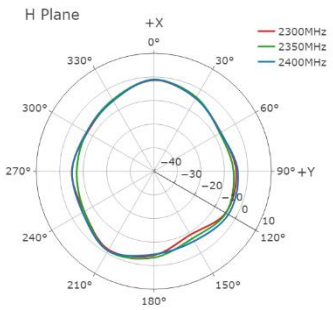
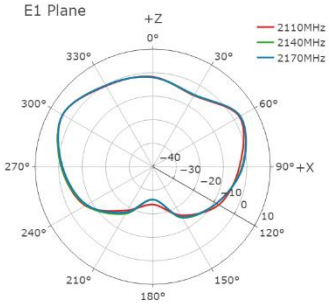
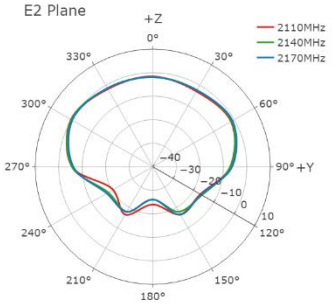
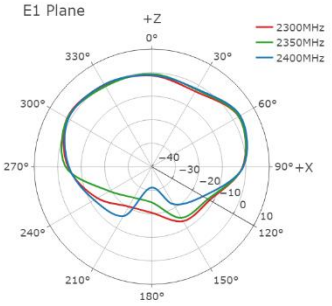
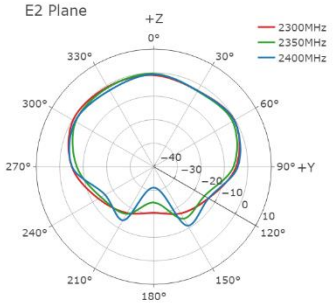
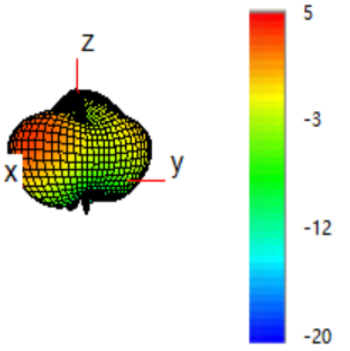
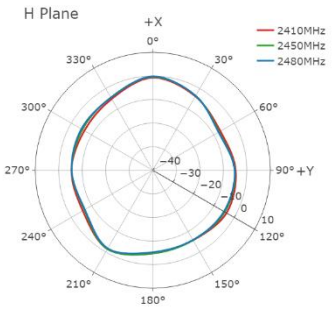
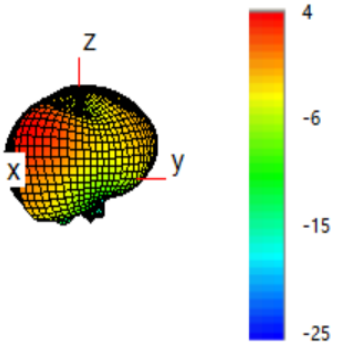
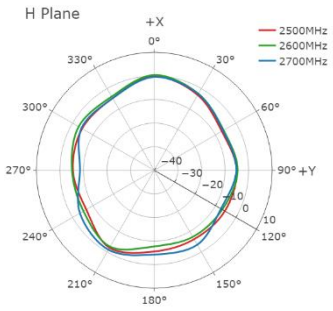
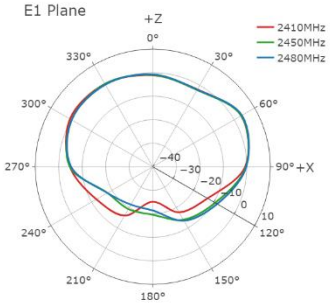
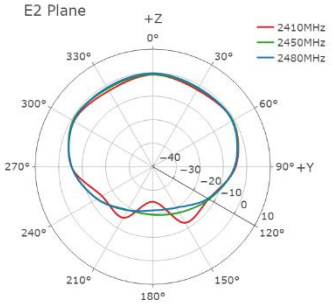
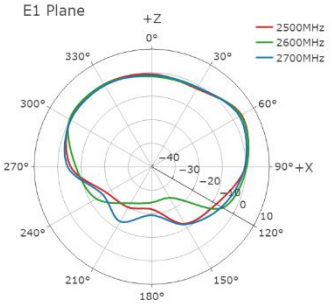
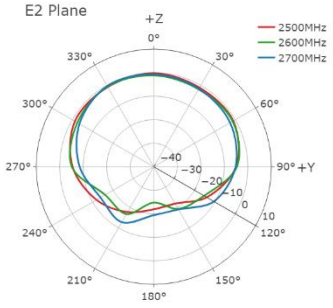
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

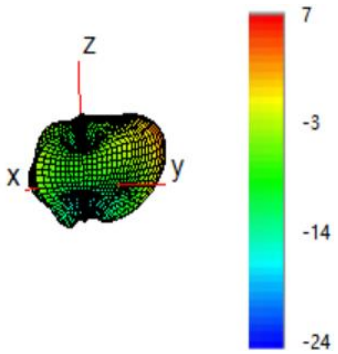
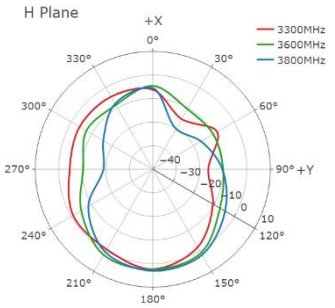
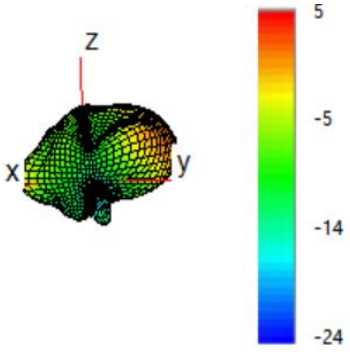
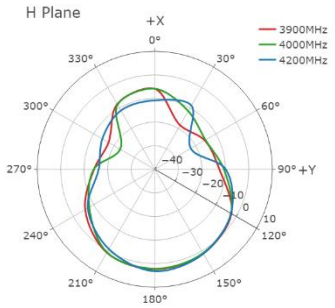
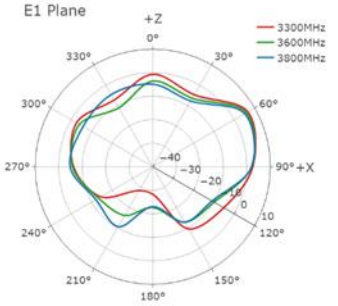
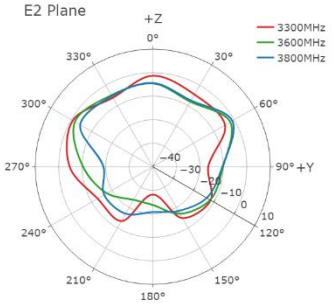
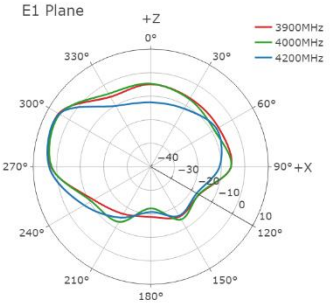
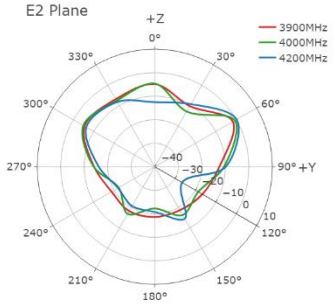
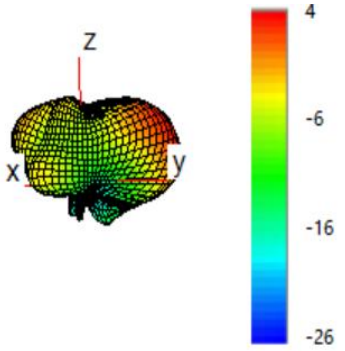
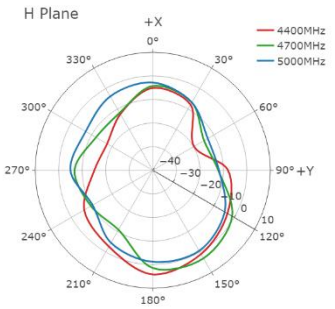
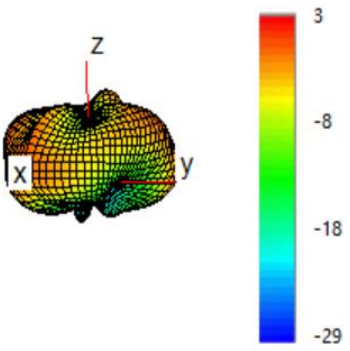
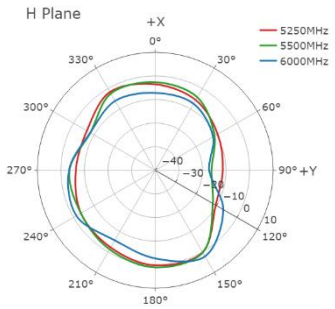
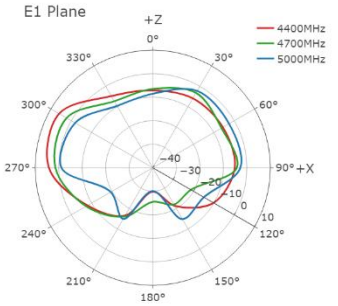
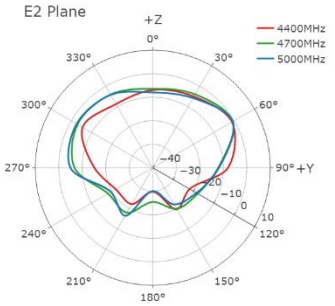
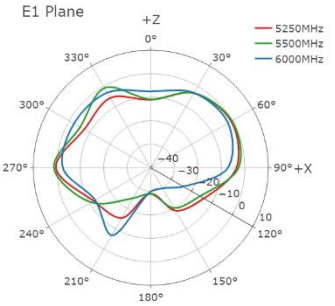
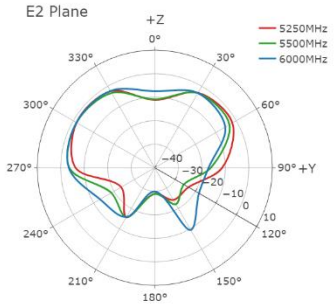
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

MH2

1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

3.3. GNSS Test Data (Open Sky)

Table 1: Static drifting test at normal temperature

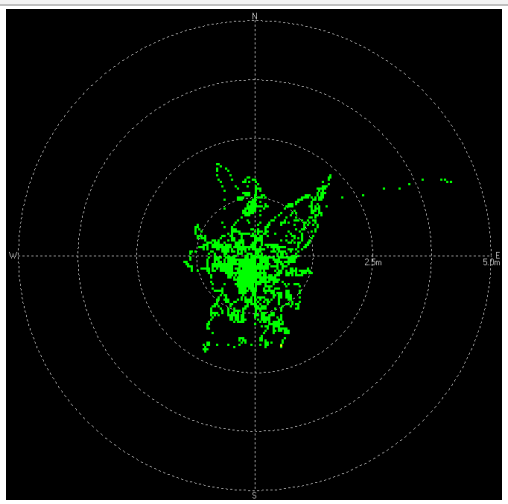
Test Module	CEP50 (m)	Maximum (m)	Static Drifting Figure
RM520NGL	0.7672	4.4519	

Table 2: GPS navigating performance

Test Module	GPS SV		GL SV		GA SV		BE SV	
	L1	L5	L1	L5	L1	L5	L1	L5
RM520NGL	10	3	9	/	8	8	21	8

Table 3: L1 Average CN0

Test Module	GPS Cno		GL Cno		GA Cno		BE Cno	
	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)
RM520NGL	37.375		38.532		32.177		44.684	

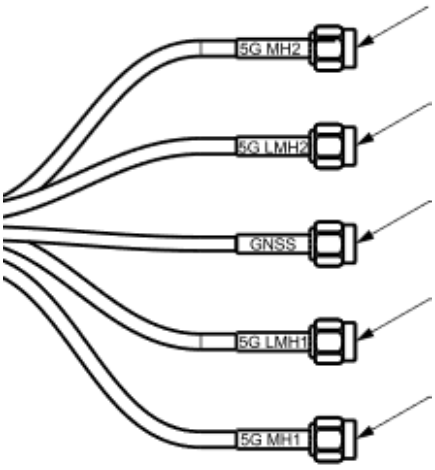
Table 4: L5 Average CN0

Test Module	GPS Cno		GL Cno		GA Cno		BE Cno	
	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)	Top4 (dBHz)	Median (dBHz)
RM520NGL	36.025		/		33.875		40.150	

Table 5: TTFF Test

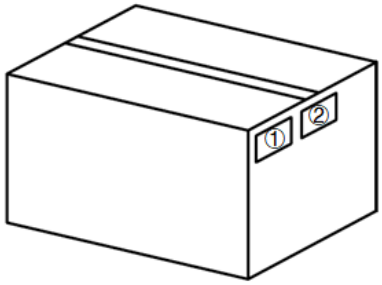
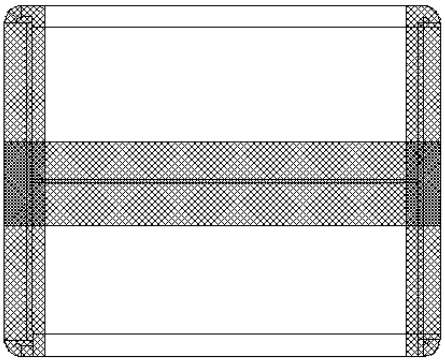
Test Module	Test Mode	Times	Time(s)
RM520NGL	Hot start	100	0.81
	Warm start	100	25.21
	Cold start	100	33.41

Table 6: The correspondence between the module PORT and the antenna port is as follows

Module Port (RG520)	Antenna (YEMN016AA)
	
	
0 (LMH1/4G Main)	5G LMH1
1 (MH2/Mimo2)	5G MH2
2 (MH1/Mimo1)	5G MH1
3 (LMH2/4G Div)	5G LMH2

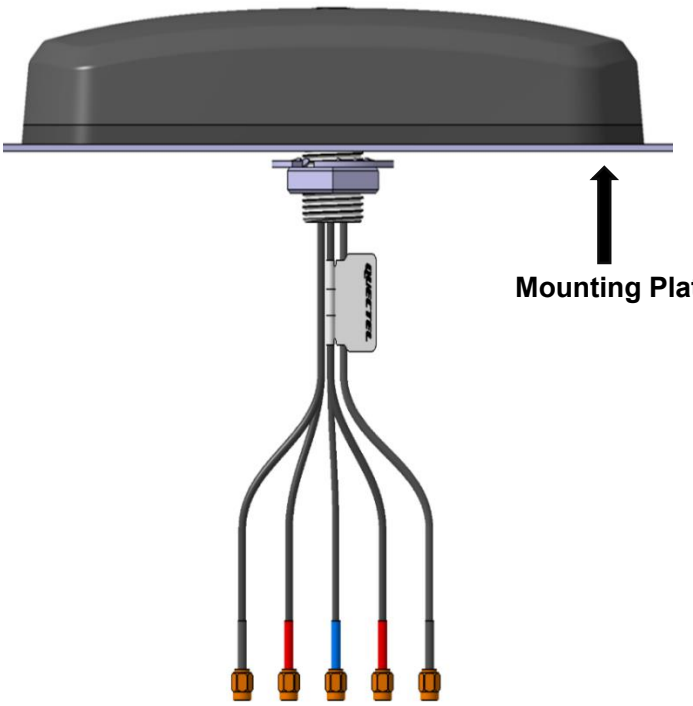
4 Packaging

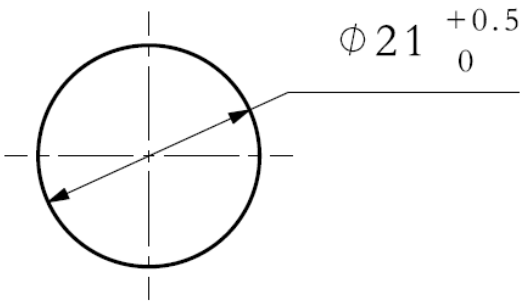
Step	Packaging Picture / 2D Picture	Description
1		Put the product in a PE bag inside the inner box.
2		Top the product with the pearl cotton.
3		Inner box diagram Inner Box Size: L × W × H = 240 × 130 × 100 mm
4		Place inner boxes into the outer box: 6 boxes per layer, stacked 3 layers high (18 boxes total per outer box). (18 Antennas / Carton Box) Carton Size: L × W × H = 500 × 420 × 330 mm

5		**Position for Attaching Labels** ① Carton Label ② Quality Label
6		**Sealing Cartons** H-shaped sealing cartons

5 Installation

- Recommended hole dimensions as below.
- Recommended mounting plate thickness: 1–4 mm.





Recommended Hole

Installation Instructions					
Tube Mark	Tube Color	Cable	Connector	Frequency (MHz)	Technology
5G LMH1	Red	ALS302	SMA Male	600–960 MHz, 1400–6000 MHz	5G/4G/3G/2G
5G LMH2	Red	ALS302	SMA Male	600–960 MHz, 1400–6000 MHz	5G/4G/3G/2G
5G MH1	Black	ALS302	SMA Male	1164–1189 MHz, 1400–6000 MHz	5G MIMO/Wi-Fi/BT
5G MH2	Black	ALS302	SMA Male	1164–1189 MHz, 1400–6000 MHz	5G MIMO/Wi-Fi/BT
GNSS	Blue	RG174	SMA Male	1164–1189 MHz, 1565–1606 MHz	GPS/GLONASS/GALILEO /BDS/QZSS/IRNSS

6 Appendix Reference

Abbreviation	Description
5G	5th-Generation Mobile Communication Technology
4G	4th-Generation Mobile Communication Technology
3G	3rd-Generation Mobile Communication Technology
2G	2nd-Generation Mobile Communication Technology
GNSS	Global Navigation Satellite System
GLONASS	Global Navigation Satellite System (Russia)
GPS	Global Positioning System
QZSS	Quasi-Zenith Satellite System
IRNSS	Indian Regional Navigation Satellite System
LTE	Long Term Evolution
LTE-A	LTE-Advanced
NB-IoT	Narrow Band Internet of Things
LPWA	Low Power Wide Area
WCDMA	Wideband Code Division Multiple Access
GSM	Global System for Mobile Communications
Wi-Fi	Wireless Fidelity
GND	Ground
LMH	Low-Middle-High Bands
LMHs	5G LMH1,5G LMH2
MH	Middle-High Envelope Bands
MHs	5G MH1, 5G MH2

FS	In Free Space
MP	On Metal Plane
VSWR	Voltage Standing Wave Ratio
S-Parameter	Scatter Parameter
LNA	Low Noise Amplifier
GPRS	General Packet Radio Service
WLAN	Wireless Local Area Network
HSPA	High-Speed Packet Access
RHCP	Right Hand Circularly Polarized
RoHS	Restriction of Hazardous Substances
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
IP	Ingress Protection
IK	Impact Protection
ECE R118	UN Regulation No. 118 (ECE R118-approved cables are flame-resistant cables)

Contact Us

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

Or our local offices. For more information, please visit:
http: www.quectel.com-support-sales.htm

For technical support, or to report documentation errors, please visit:
http: www.quectel.com-support-technical.htm
Or email us at: support@quectel.com

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and-or documentation owned by one or more third parties (“third-party materials”). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

Disclaimer

a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

Revision History

Version	Date	Author	Note
-	2023-07-17	Jim Luo/ Mastin Zeng/ Will Gu/ David Liu/ Aria Chu	Creation of the document
1.0	2023-07-17	Jim Luo/ Mastin Zeng/ Will Gu/ David Liu/ Aria Chu	First official release
1.1	2023-09-06	Will Gu	Deleted impact protection (IK) rating (Chapter 1.3).
1.2	2023-10-16	Will Gu/ Junsen Li	1. Updated the drawing (Chapter 2). 2. Updated the GNSS data.
1.3	2024-01-23	Will Gu/ Aria Chu	1. Updated the drawing (Chapter 2). 2. Updated the data (Chapter 5).
1.4	2024-06-24	Jim Luo/ Junsen Li/ Will Gu/ David Liu/ Vinnie Liu	1. Updated the product name. 2. Updated the overview. 3. Added Chapters 5 and 6.
1.5	2024-11-25	Will Gu/ Rainey Liao	1. Updated the product picture. 2. Updated typical applications in the overview.
1.6	2025-04-09	Aria Chu	1. Updated the antenna image on cover. 2. Deleted the note about efficiency (Chapter 1.3).
1.7	2025-07-18	Morrie Du/ Will Gu/ Strong Qiang/ Aria Chu	1. Added data for MH's 1176 MHz. 2. Added housing flame rating and housing UV resistant (Chapter 1.2). 3. Added GNSS test data (Chapter 3.3). 4. Updated the package (Chapter 4).
1.8	2025-10-15	Junsen Li	Added LNA gains according to different supply voltages (Chapter 1.1.3).

www.quectel.com