



Antenna Datasheet

Product OC: YEMN016AA

Version: 1.5

Date: 2024-11-25

Status: Released

Product Name: 5G & GNSS 5in1 Screw Mount Combo Antenna

Key Features:

4 × 4 5G / 4G MIMO + GPS L1 & L5

Screw Mount

204.4 × 86.7 × 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 × 86.7 × 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

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1 Specification

1.1. Electrical

Electrical Specifications		
Frequency Range	LMHs	600–960 MHz, 1400–6000 MHz
	MHs	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

SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	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	1420– 1520	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	3.3	1.7	1.7	2.4	1.9	1.8	2.3
	MP		9.5	5.1	3.5	3.6	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	-5.5	-12.0	-12.2	-7.7	-10.5	-11.2	-8.0
	MP		-1.8	-3.4	-5.1	-5.0	-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	48.4	64.9	63.7	63.8	61.1	52.9	34.1

	MP	17.5	39.8	39.1	25.1	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	-3.2	-1.9	-2.0	-2.0	-2.1	-2.8	-4.7
	MP	-7.6	-4.0	-4.1	-6.0	-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	5.2	5.9	5.4	5.0	4.5	5.1	2.2
	MP	-1.4	0.7	1.4	2.4	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 × 500 mm Metal Plane

1.1.2. MHs

SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	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	1420– 1520	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150– 5850	
Max VSWR	FS	-	-	-	4.9	2.7	2.8	2.7	2.8	3.1	2.2	2.6	
	MP	-	-	-	4.9	2.6	2.6	2.5	2.7	2.9	2.4	2.6	
Max Return Loss (dB)	FS	-	-	-	-3.6	-6.7	-6.4	-6.8	-6.5	-5.9	-8.5	-7.1	
	MP	-	-	-	-3.6	-7.0	-6.9	-7.3	-6.8	-6.3	-7.8	-6.9	
AVG Eff. (%)	FS	-	-	-	26.7	47.4	48.0	48.0	50.2	49.0	48.6	42.9	
	MP	-	-	-	26.0	44.4	48.8	48.8	47.9	41.0	41.1	38.0	
AVG AVG	FS	-	-	-	-5.7	-3.2	-3.2	-3.2	-3.0	-3.1	-3.1	-3.7	

Gain (dB)	MP	-	-	-	-5.8	-3.5	-3.1	-3.1	-3.2	-3.9	-3.9	-4.2
Max Peak Gain (dBi)	FS	-	-	-	-0.7	2.2	1.9	2.6	2.6	4.7	3.6	3.5
	MP	-	-	-	1.8	4.9	5.2	4.8	4.1	7.3	6.4	4.0
VSWR	FS	≤4.9										
	MP	≤4.9										
Return Loss	FS	≤ -3.6 dB										
	MP	≤ -3.6 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 × 500 mm Metal Plane

1.1.1.3. GNSS

Frequency (MHz)	Band	GPS L5 GALILEO E5a BEIDOU B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BEIDOU B2b	GPS L2 QZSS L2C	GLONASS G2	BEIDOU B3	BEIDOU B1I	GPS L1 GALILEO E1 BEIDOU 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
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 2–5 V
Working Current	12.3 ±3 mA
Impedance	50 Ω

1.2. Mechanical & Environmental

Mechanical		
Antenna Size		204.4 × 86.7 × 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.)
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 (After Installation) IP69K (After Installation)
RoHS & REACH Compliant		Yes

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

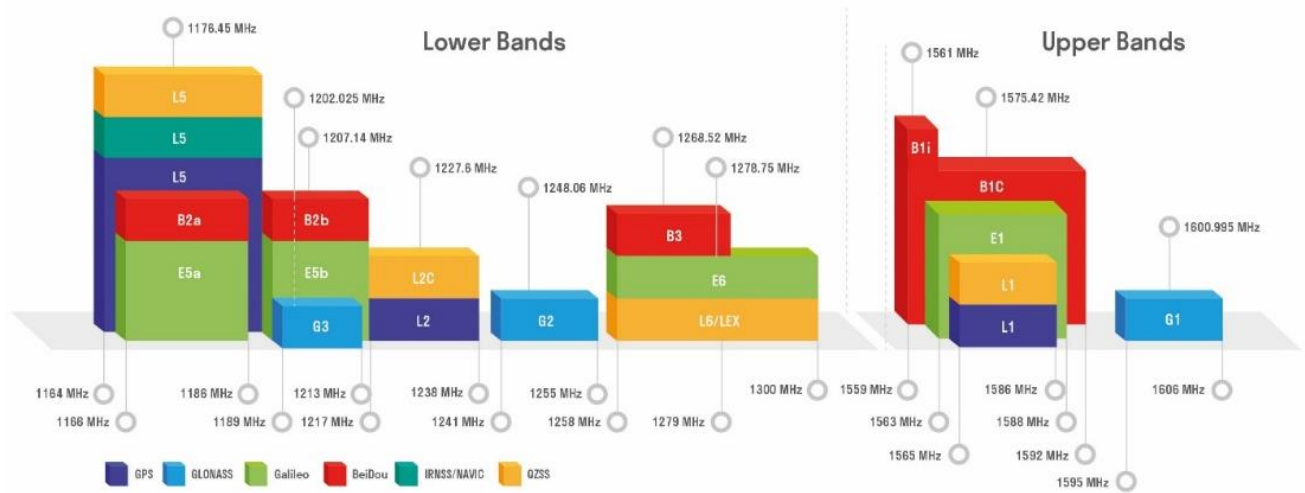
1.3. Supported Bands

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	√	-

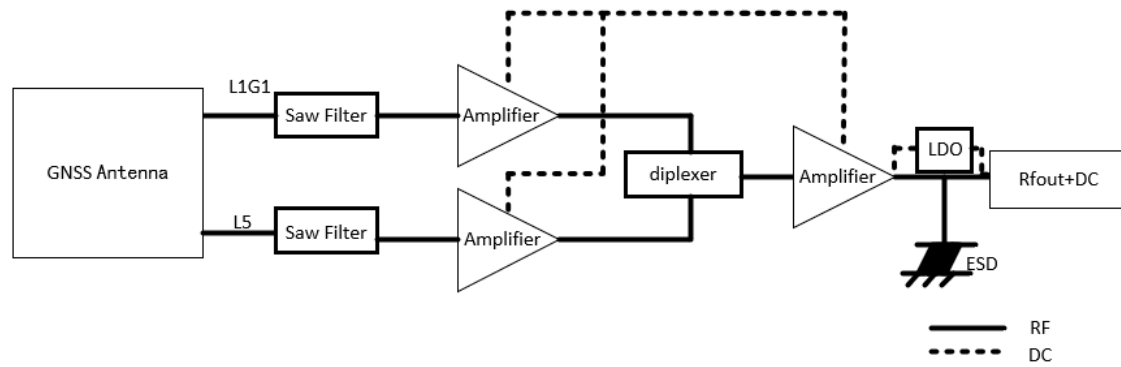
5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT					
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	LMHs	MHs
28	700	703–748	758–803	√	-
31	450	452.5–457.5	462.5–467.5	-	-
34	2100	2010–2025		√	√
38	2600	2570–2620		√	√
39	1900	1880–1920		√	√
40	2300	2300–2400		√	√
41	2500	2496–2690		√	√
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		√	√
Note: Covered √ means efficiency >20 %					

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-L10C-L10F Centre 1601 (1595–1606)	G2-L20C-L20F Centre 1248.06 (1241–1255)	G3-L30C 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)	
	√	√	-	-	
BEIDOU	B1I Centre 1561.098 (1559–1564)	B1C (BeiDou-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)				
	√				

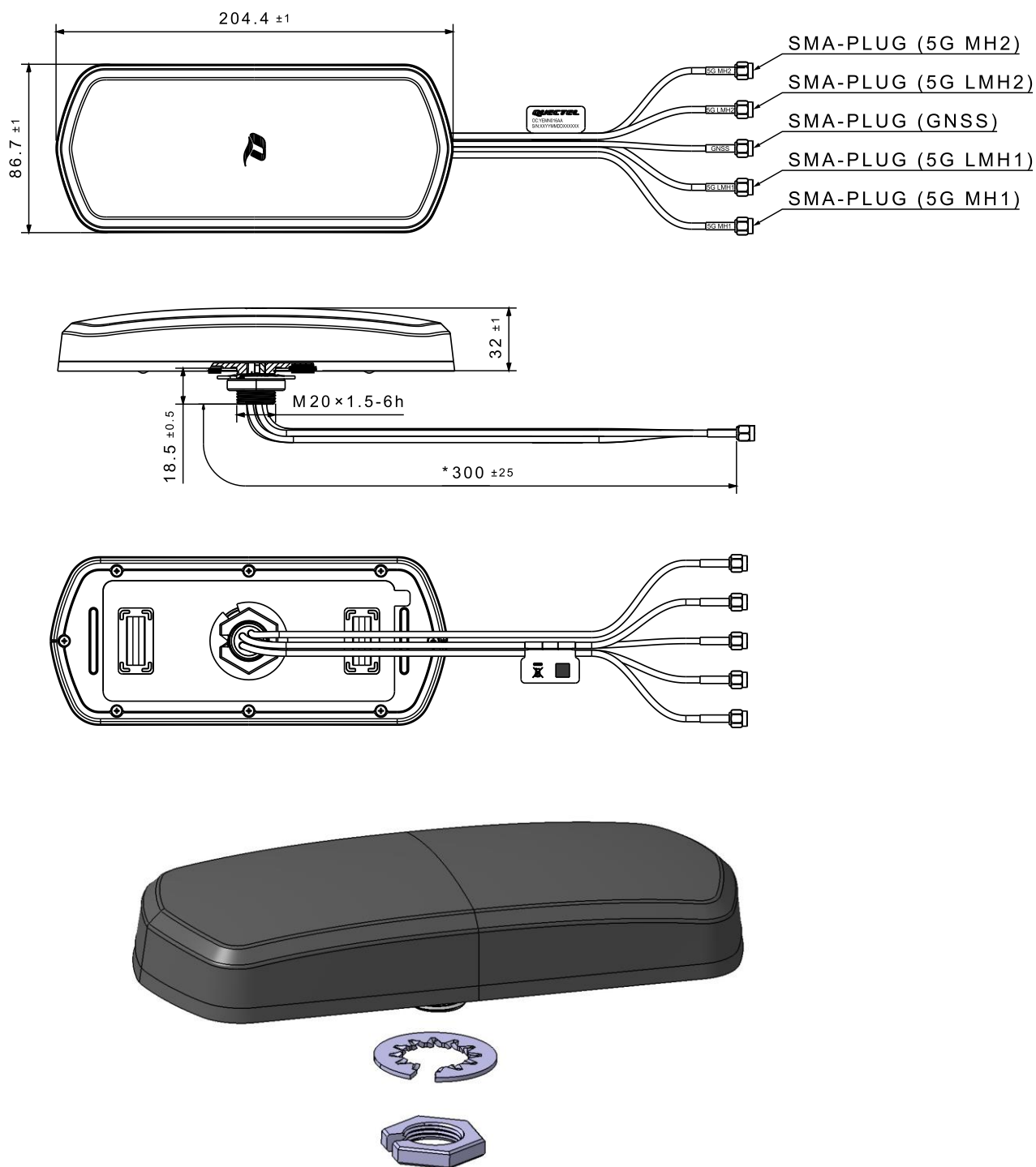
GNSS Bands and Constellations



1.4. Block Diagram (Active Antenna)



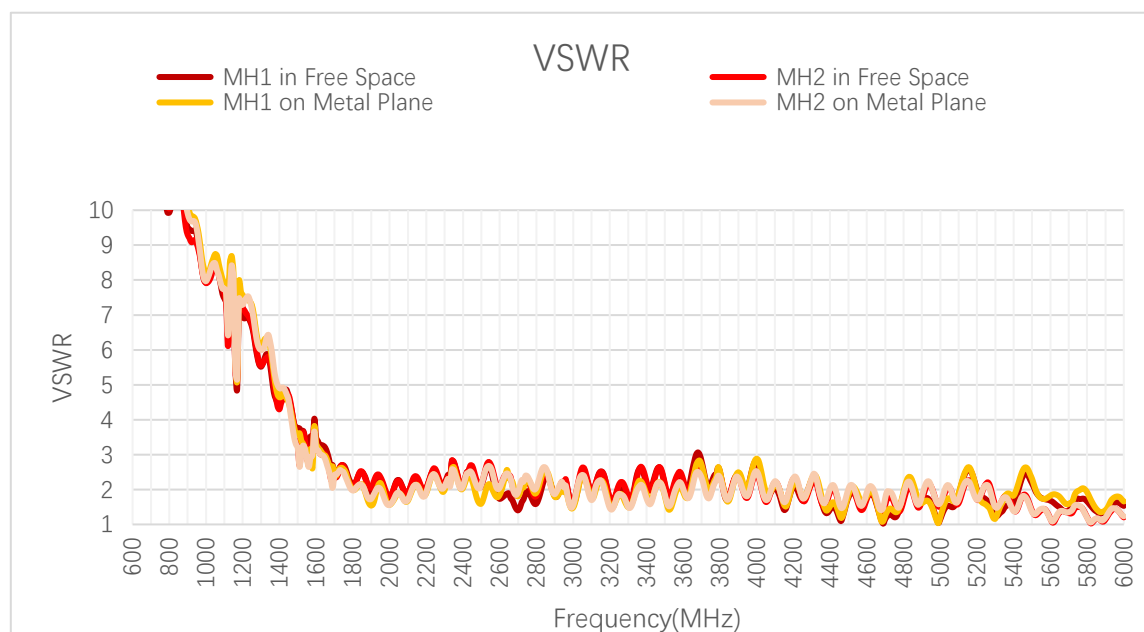
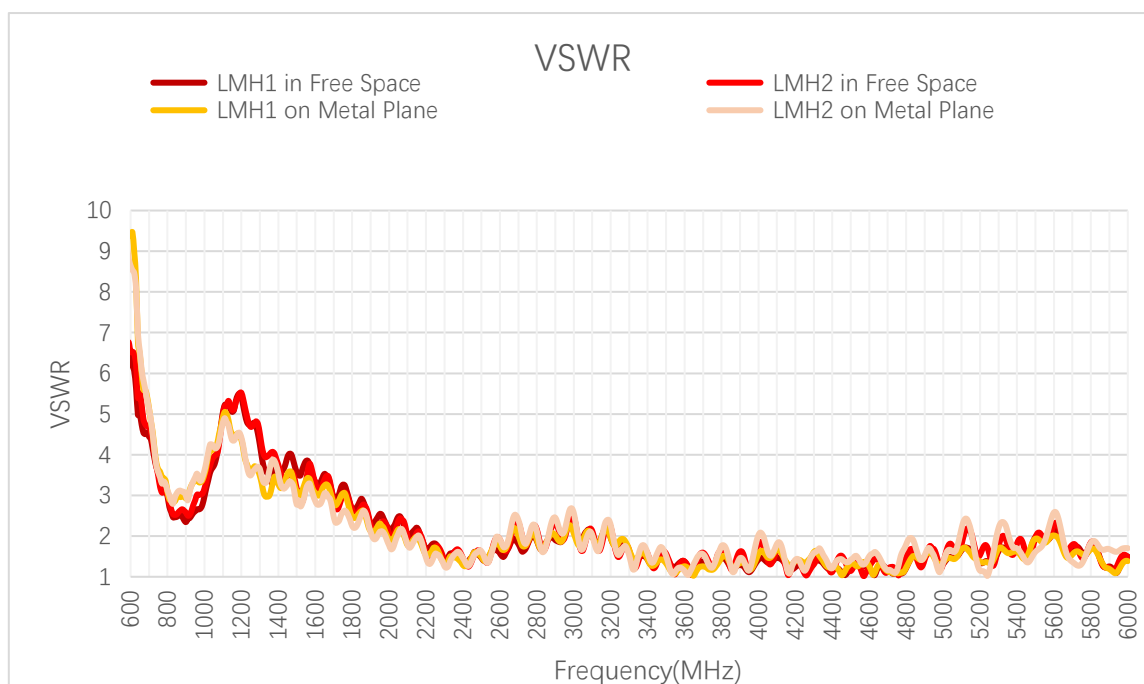
2 Drawing



3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR

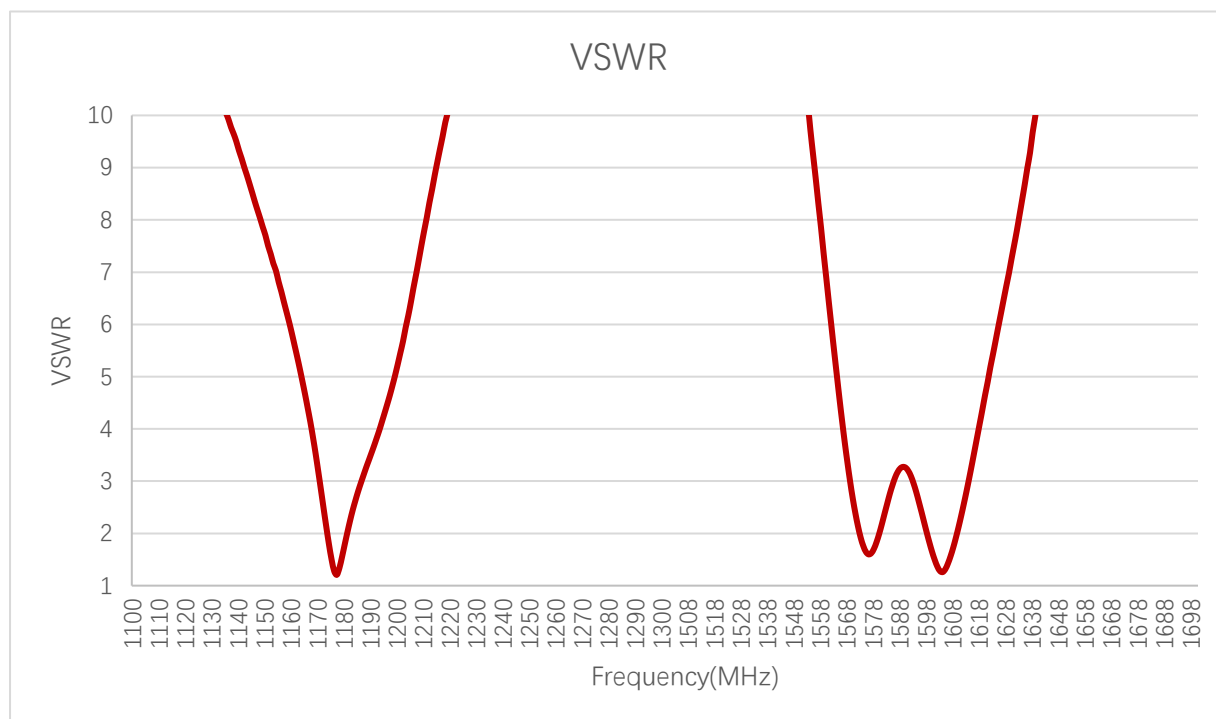


VSWR – LMH

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

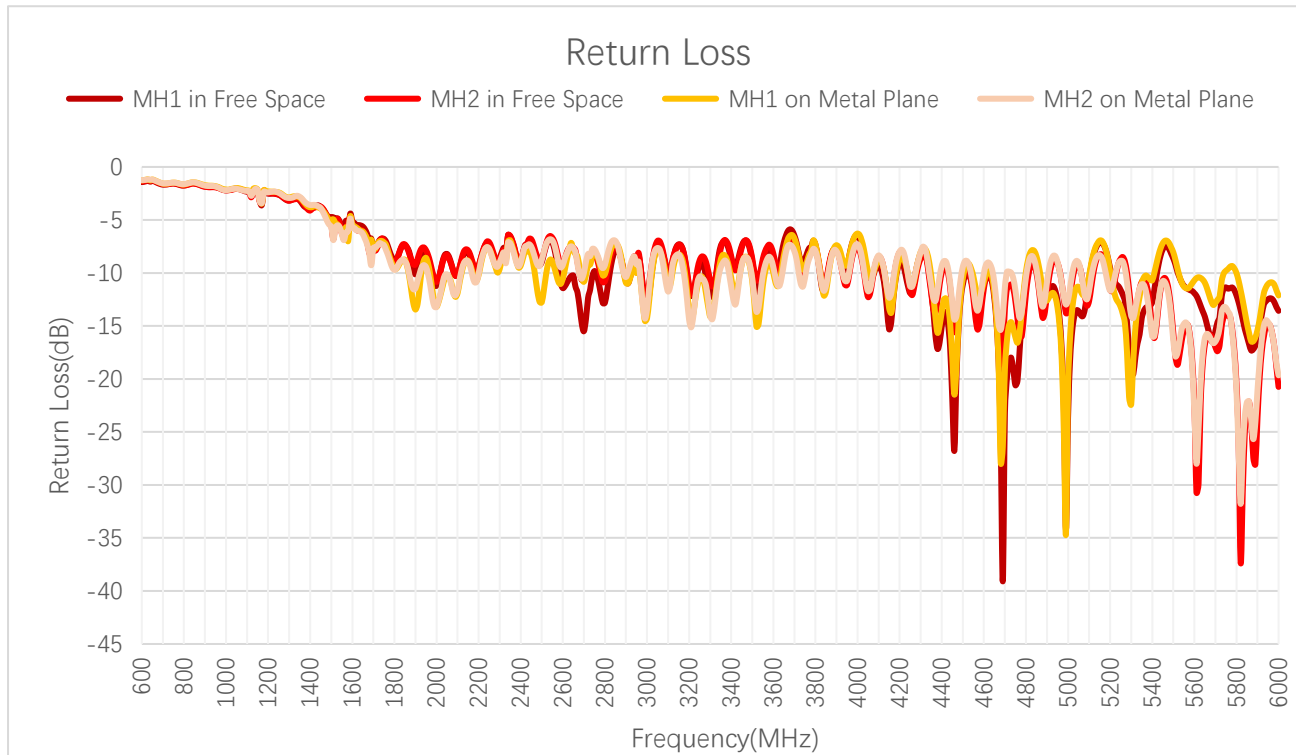
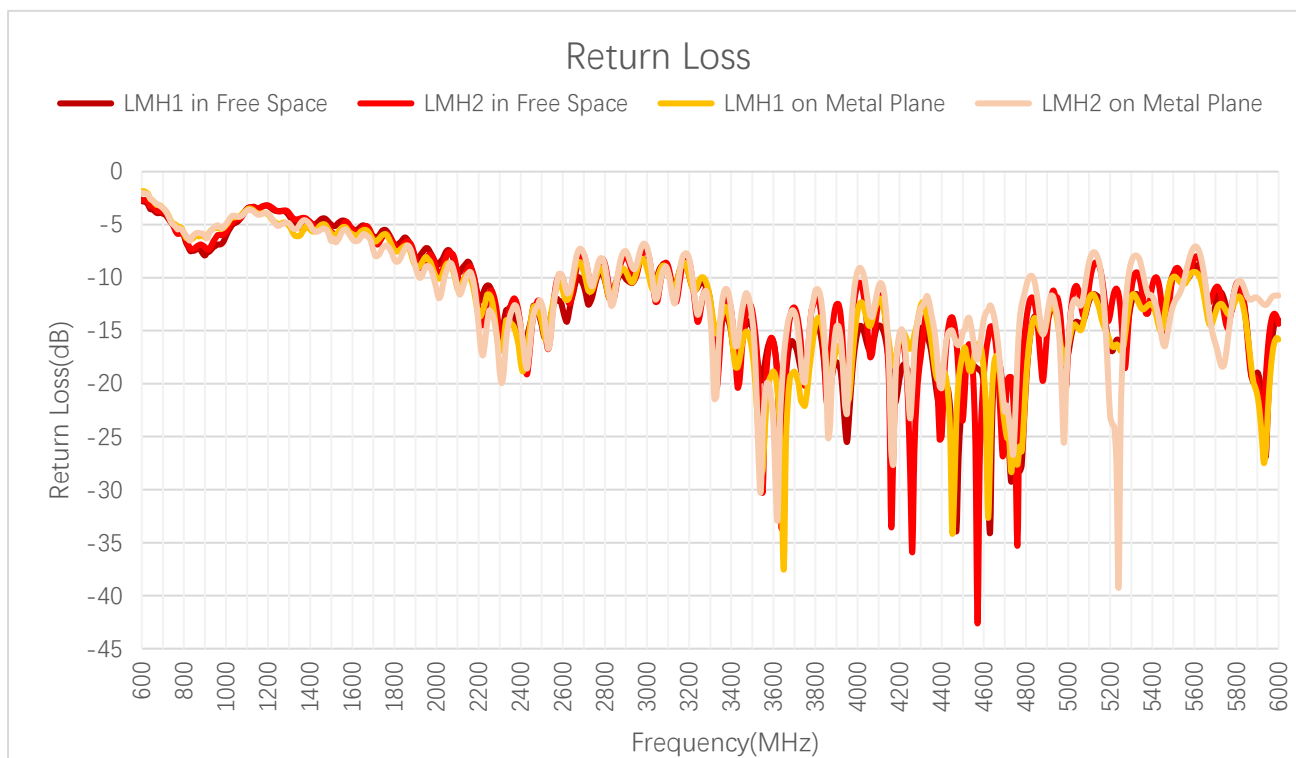
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	4.9	2.4	2.7	2.1
	MP	-	-	-	-	-	-	4.6	2.4	2.6	1.7
MH2	FS	-	-	-	-	-	-	4.7	2.3	2.7	2.1
	MP	-	-	-	-	-	-	4.7	2.4	2.5	1.8
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
MH1	FS	2.3	2.3	2.8	2.6	1.7	2.1	1.1	1.1	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	960	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	-	-	-	-	-	-	-3.7	-7.9	-6.7	-8.8
	MP	-	-	-	-	-	-	-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



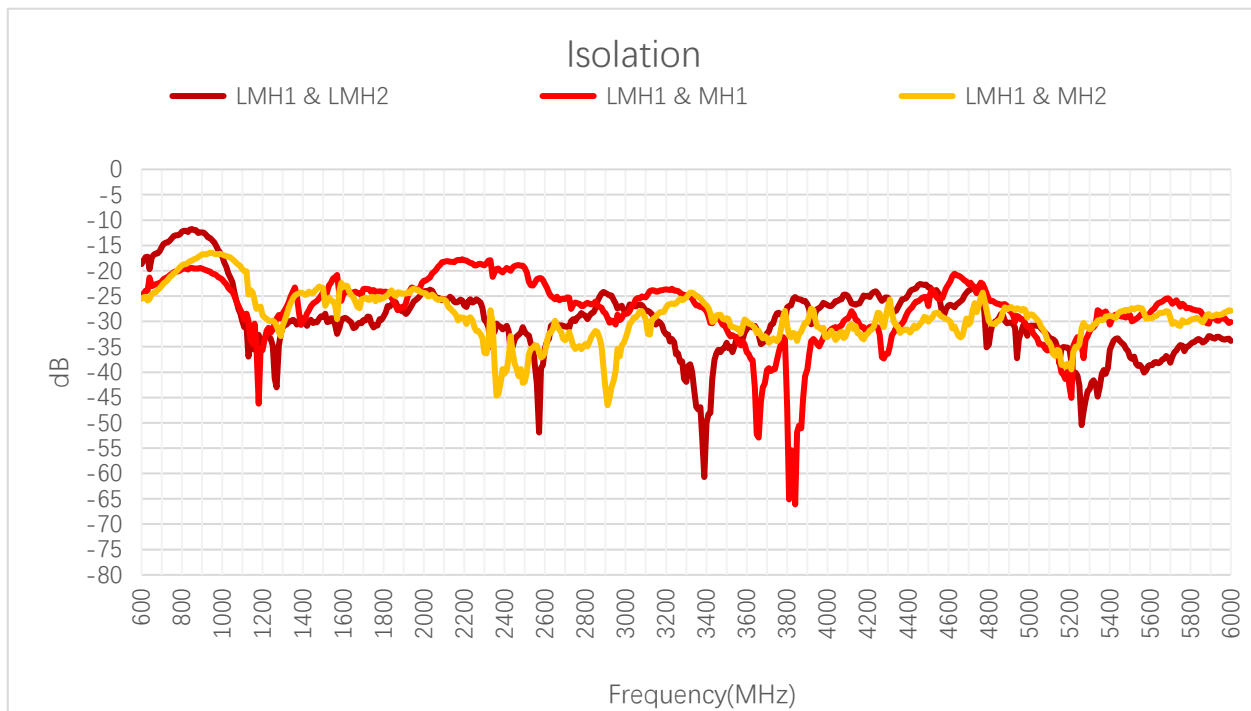
Return Loss (dB) – GNSS

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

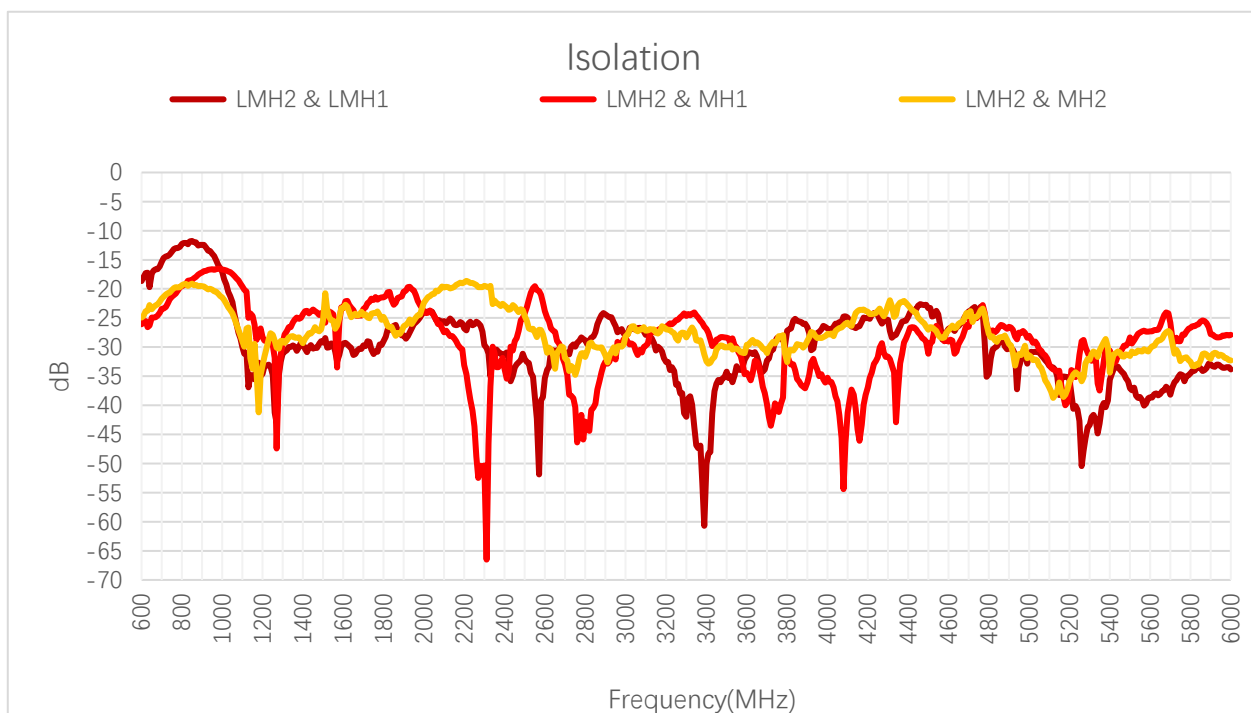
3.1.3. Isolation

3.1.3.1. Test Status: In Free Space

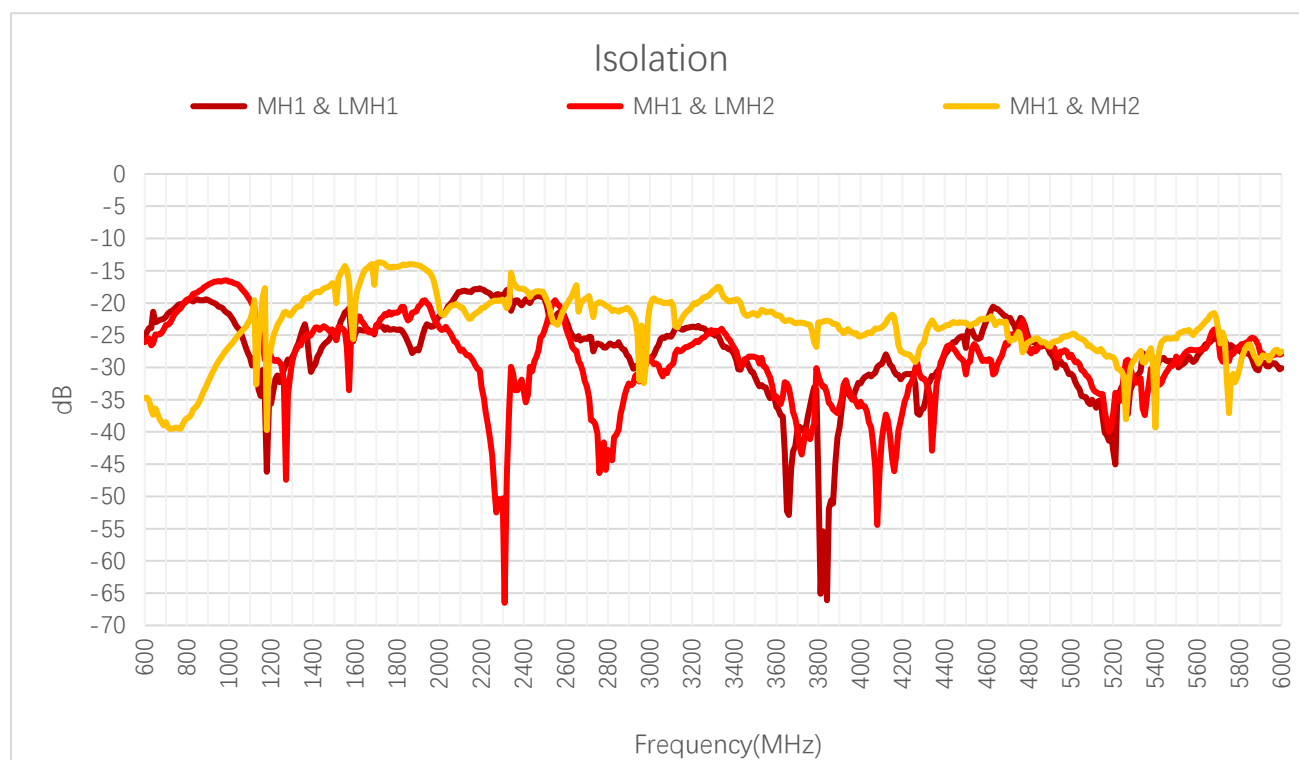
3.1.3.1.1. LMH1



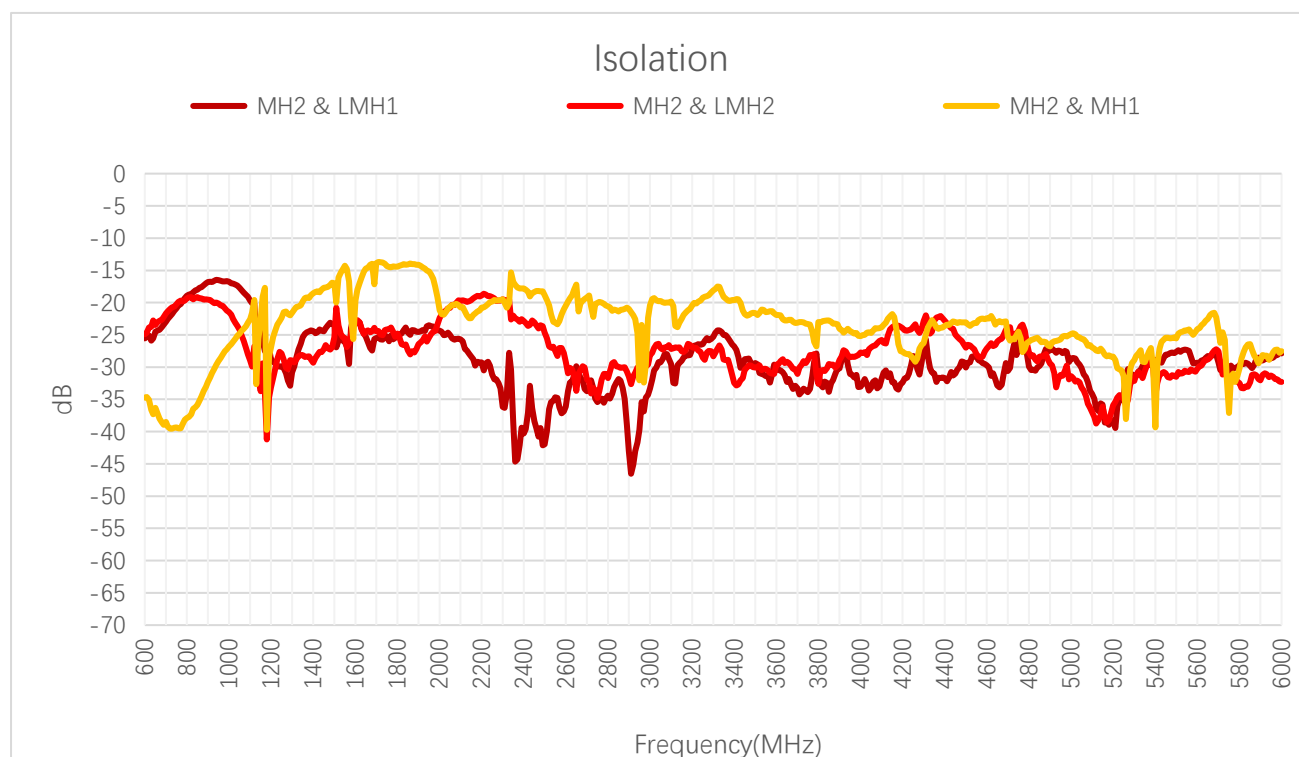
3.1.3.1.2. LMH2



3.1.3.1.3. MH1

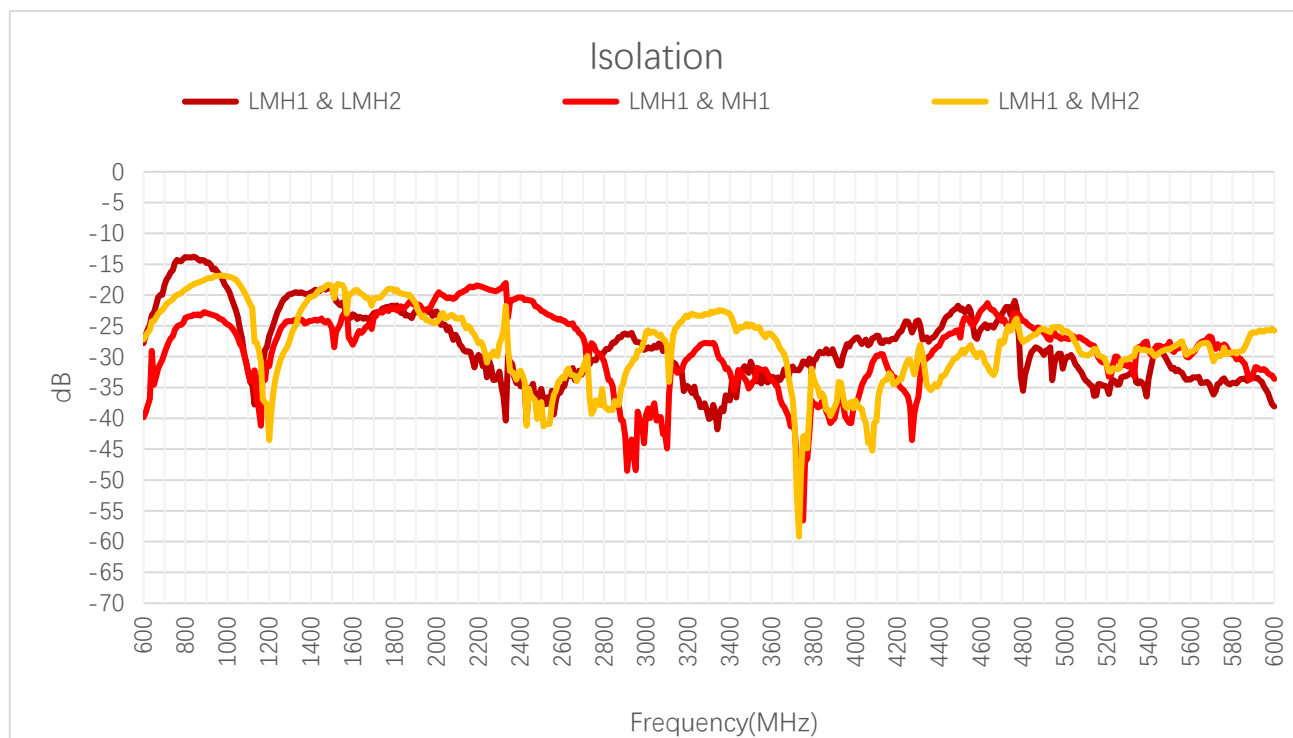


3.1.3.1.4. MH2

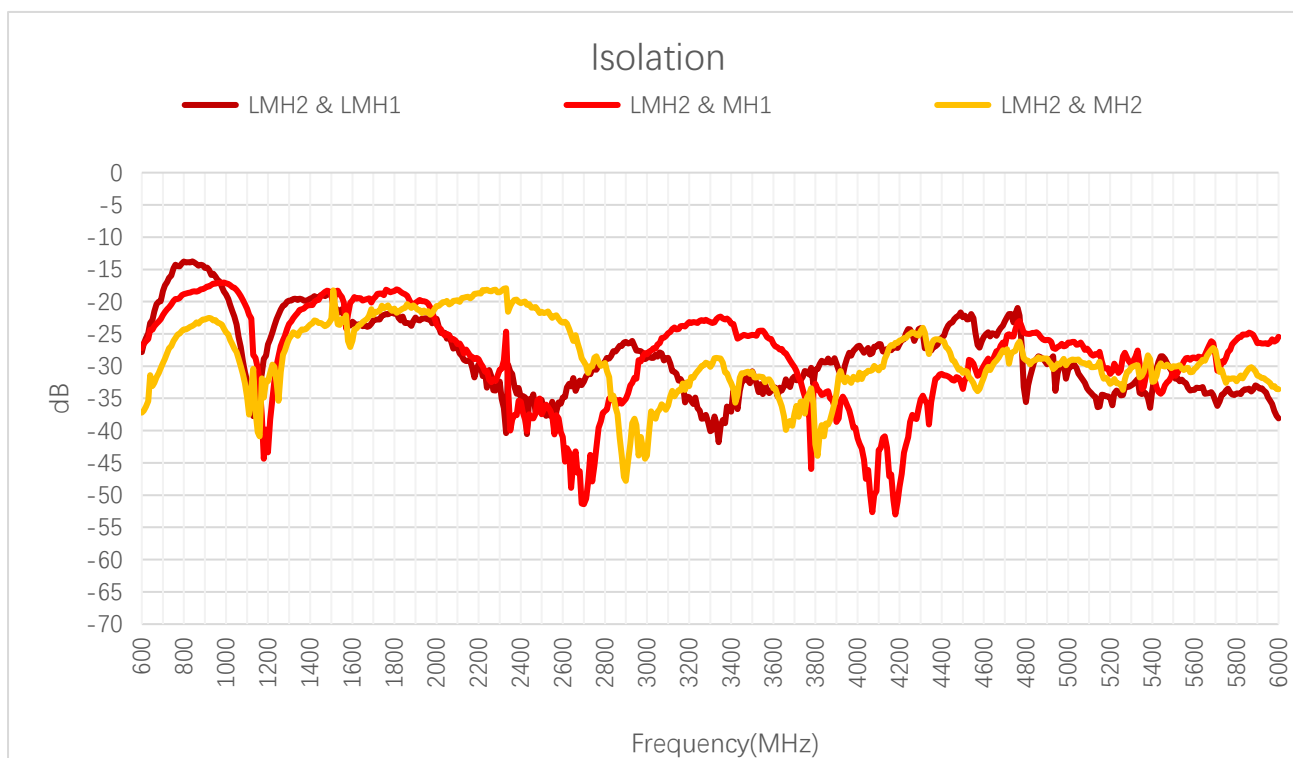


3.1.3.2. Test Status: On 500 mm × 500 mm Metal Plane

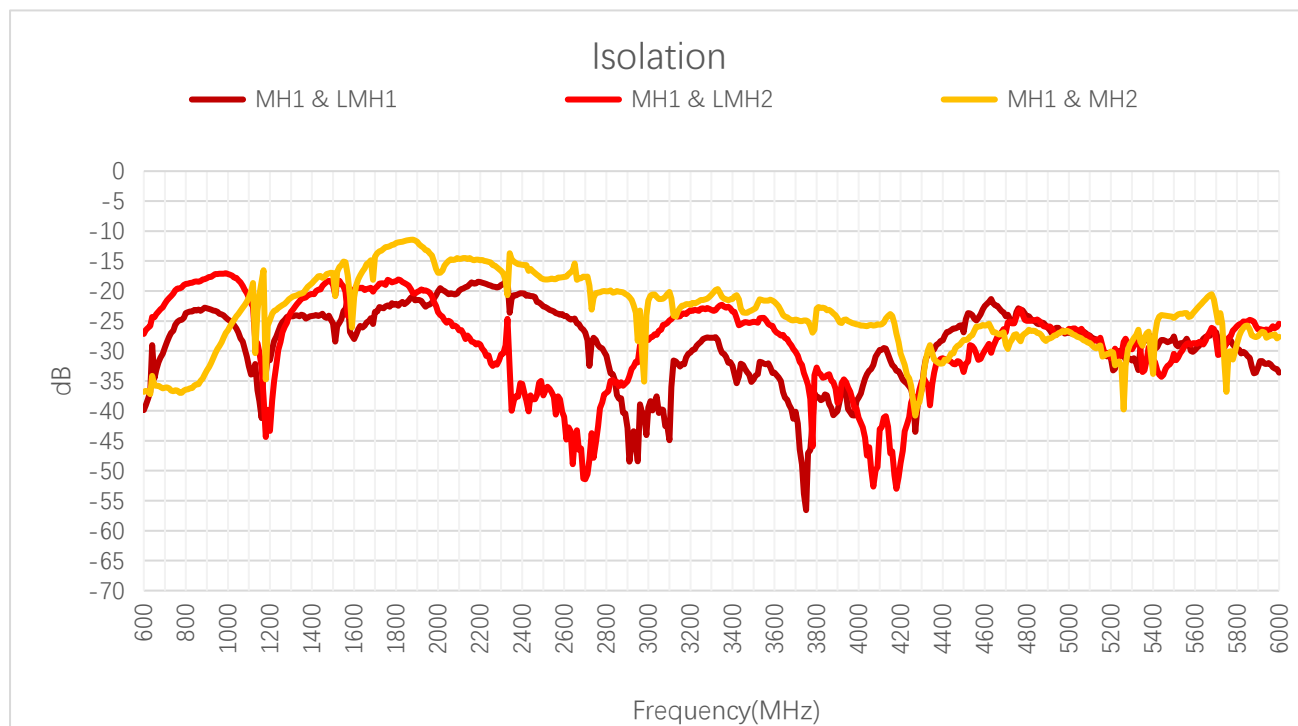
3.1.3.2.1. LMH1



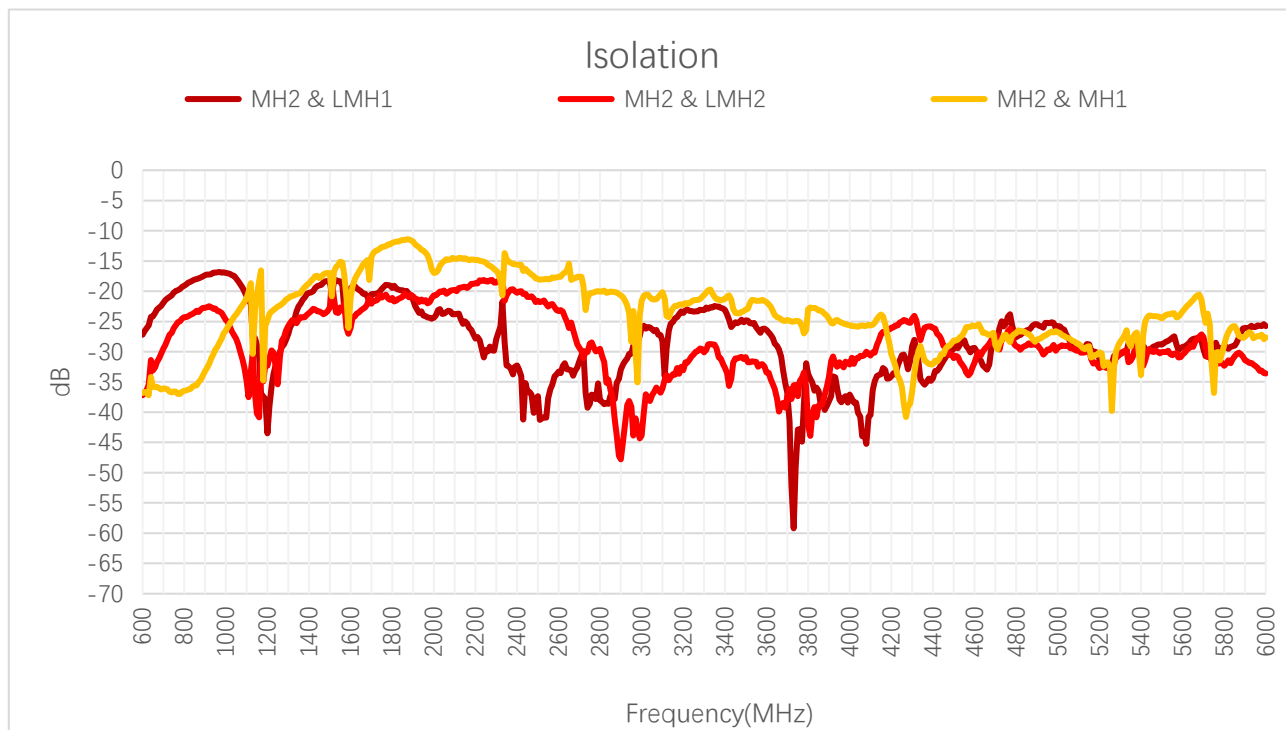
3.1.3.2.2. LMH2



3.1.3.2.3. MH1

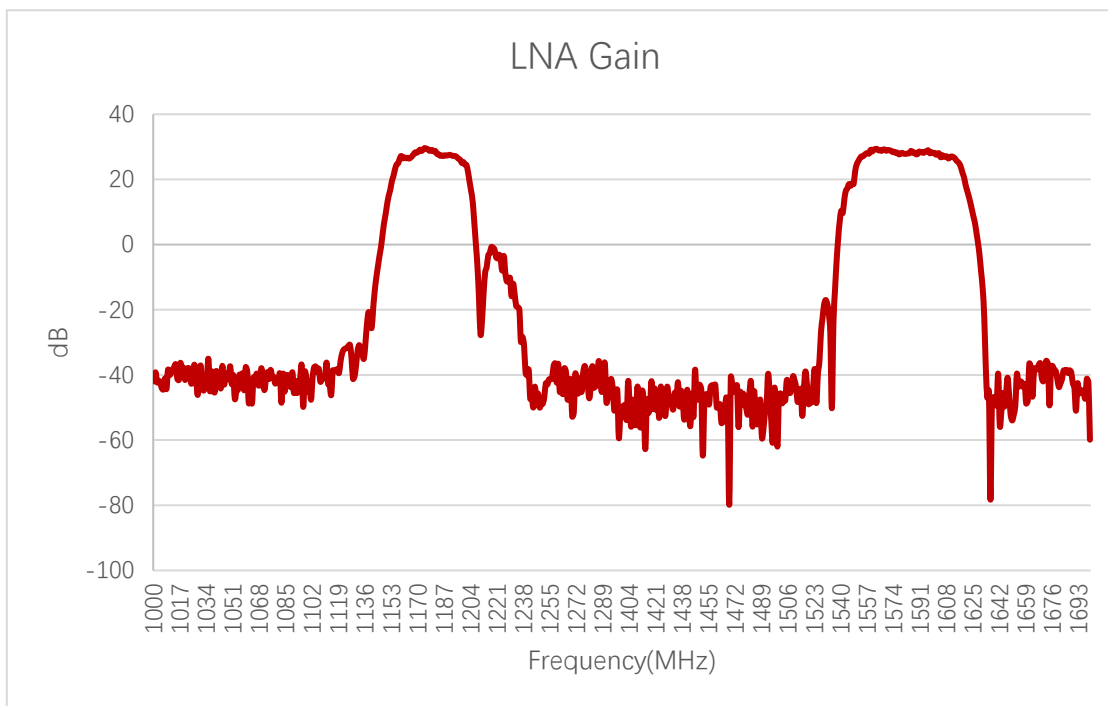


3.1.3.2.4. MH2



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

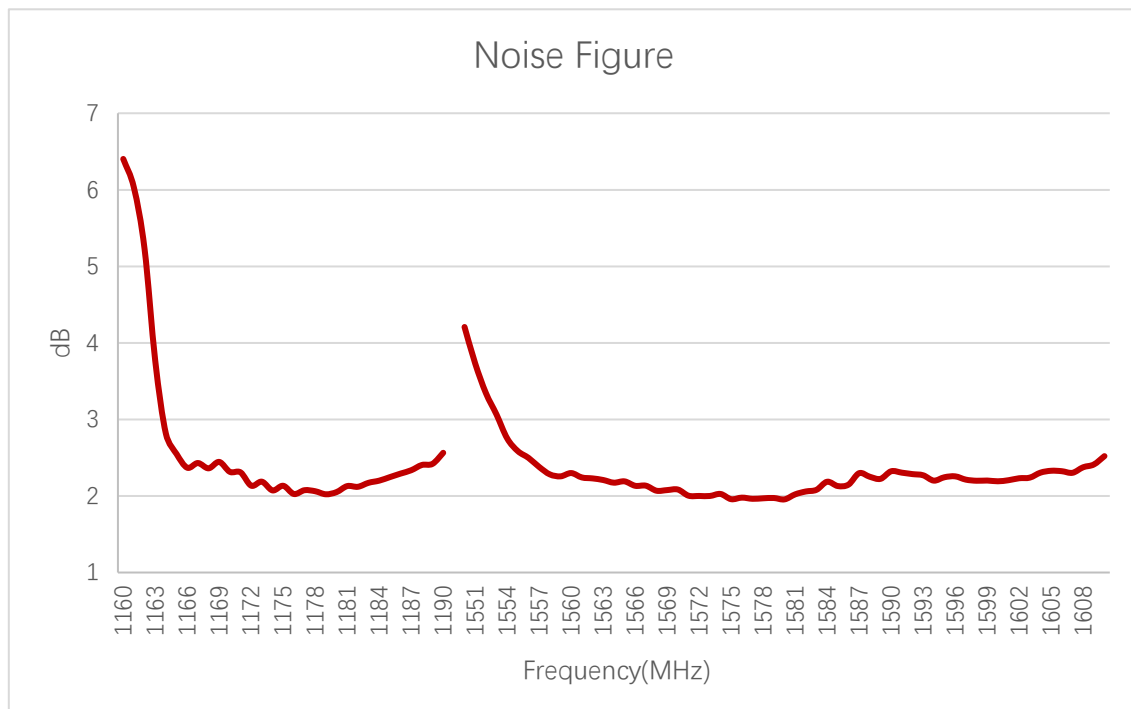
3.1.4. GNSS LNA Gain



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

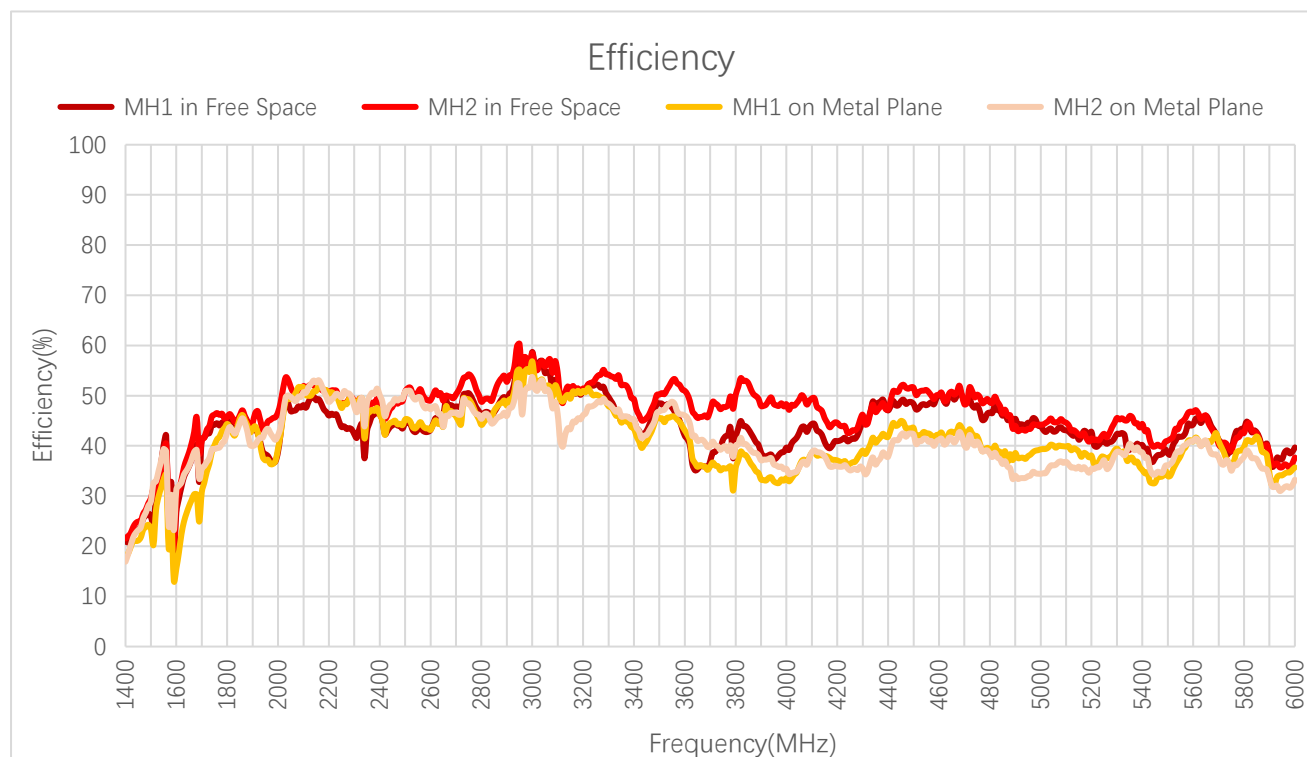
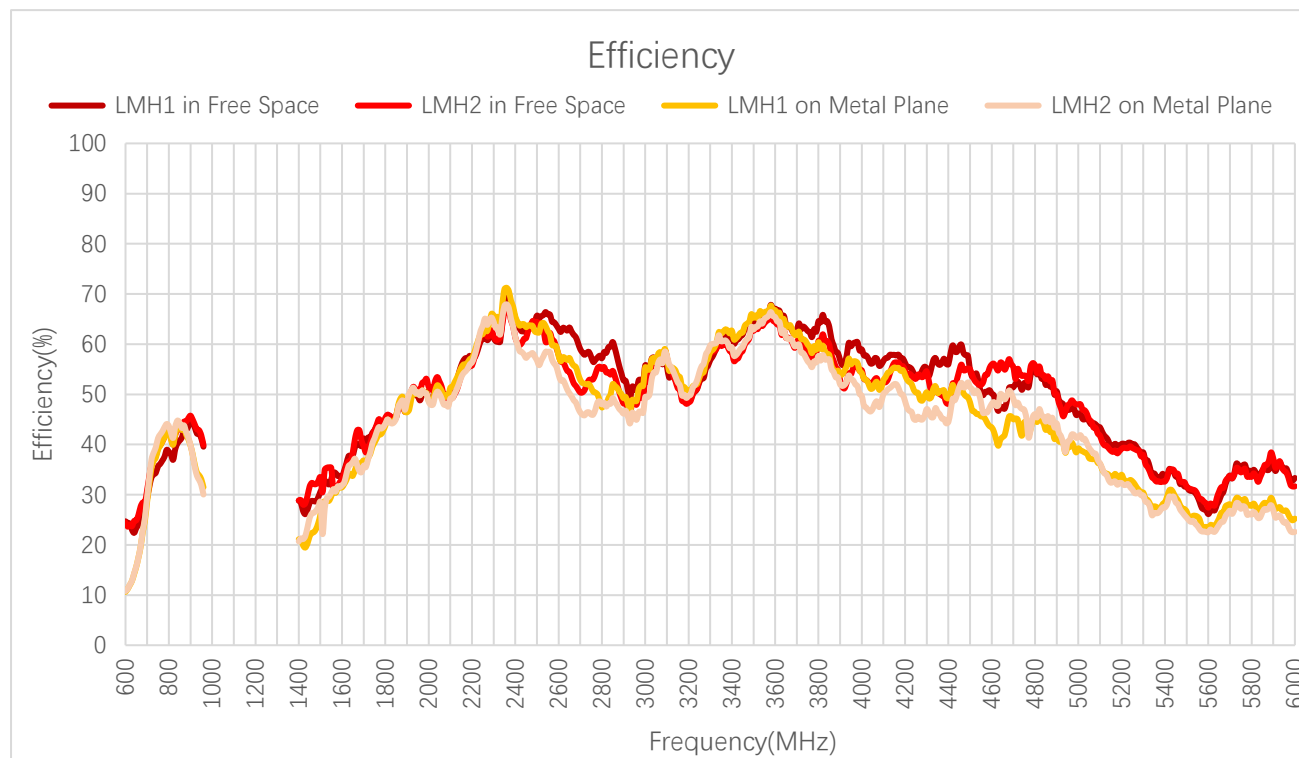


Noise Figure (dB)

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

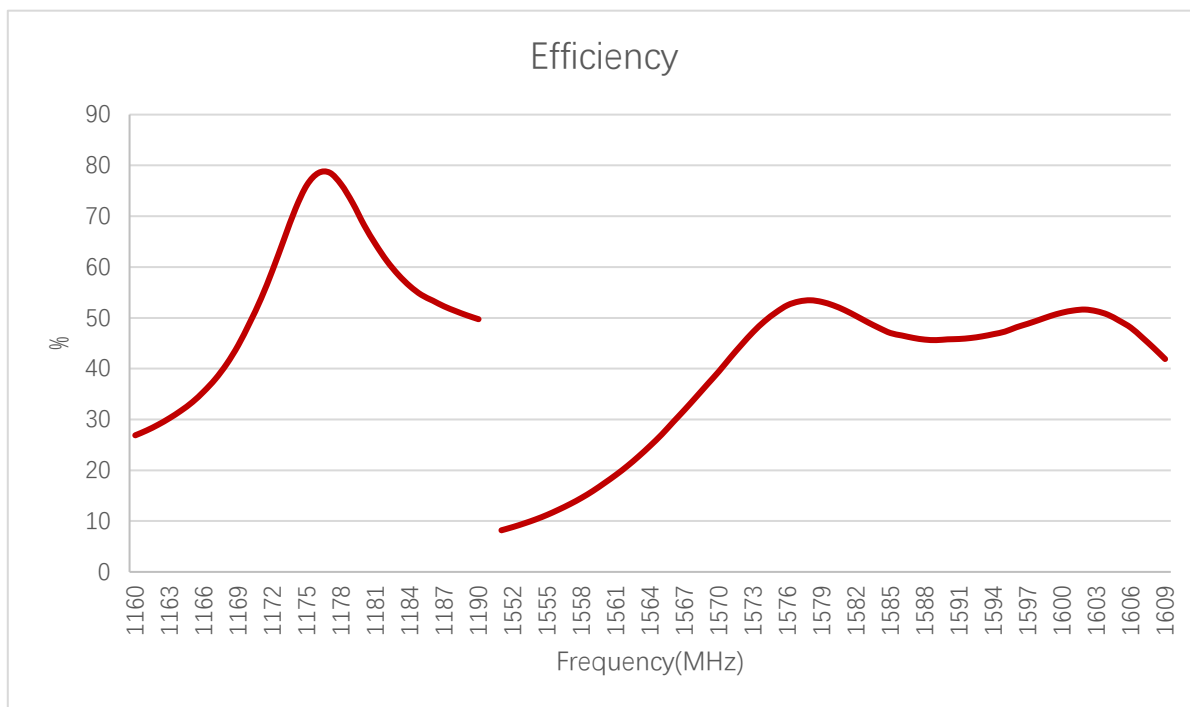


Efficiency (%)

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 (%)

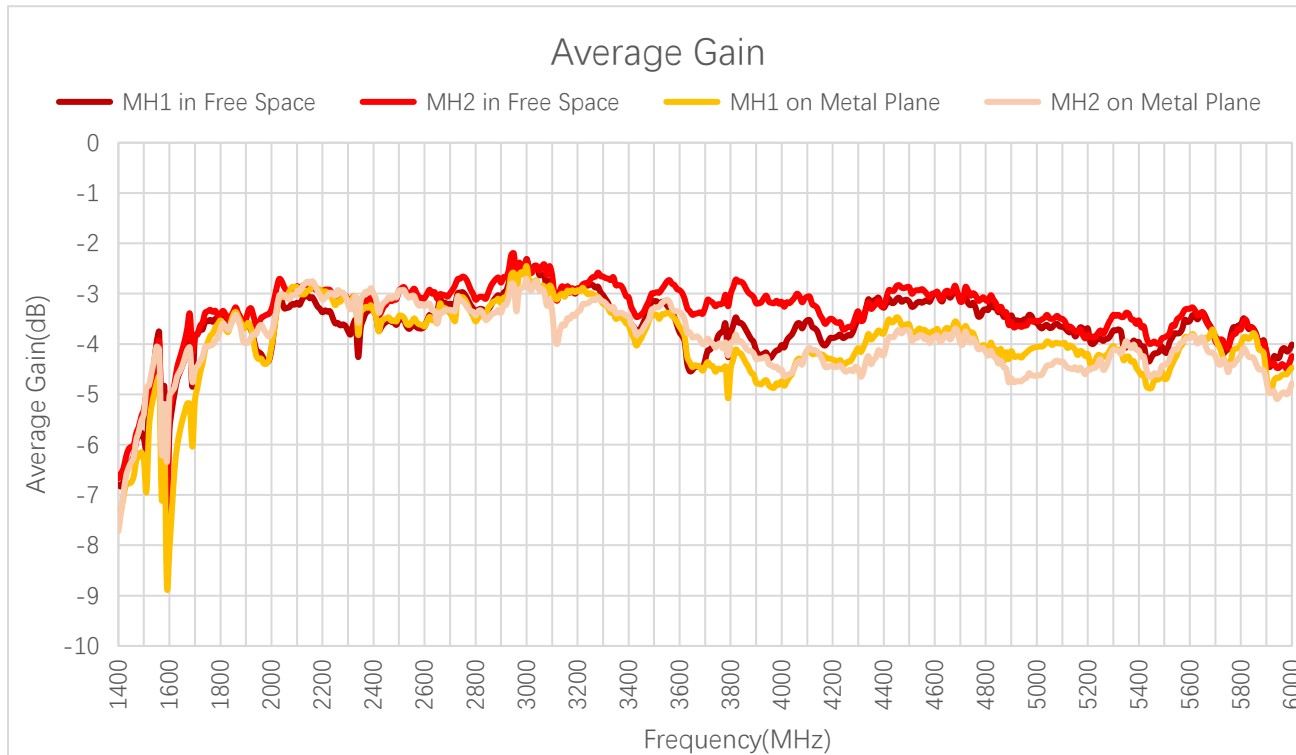
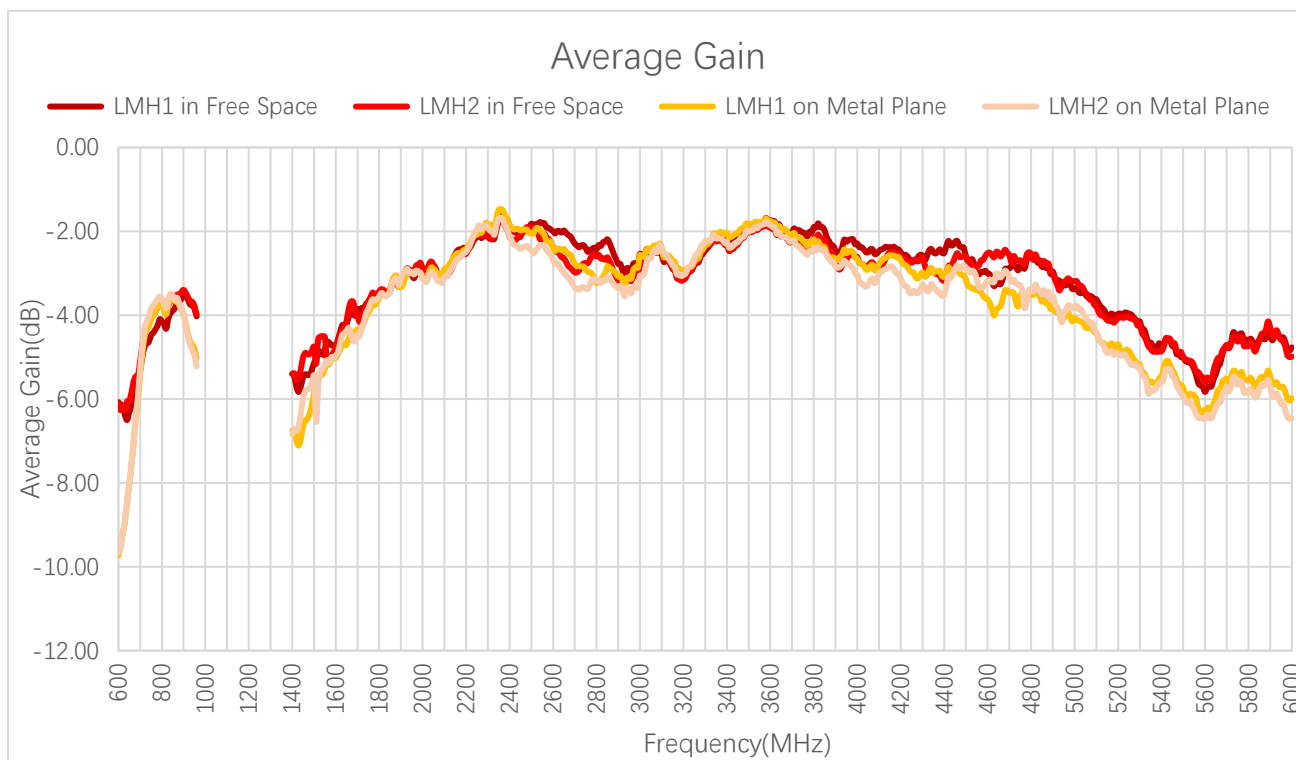
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	22.8	41.6	44.2	44.8
	MP	-	-	-	-	-	-	21.0	32.7	38.9	44.0
MH2	FS	-	-	-	-	-	-	24.6	41.6	45.9	44.7
	MP	-	-	-	-	-	-	22.6	36.0	39.3	42.7
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
MH1	FS	38.3	49.8	43.0	44.1	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



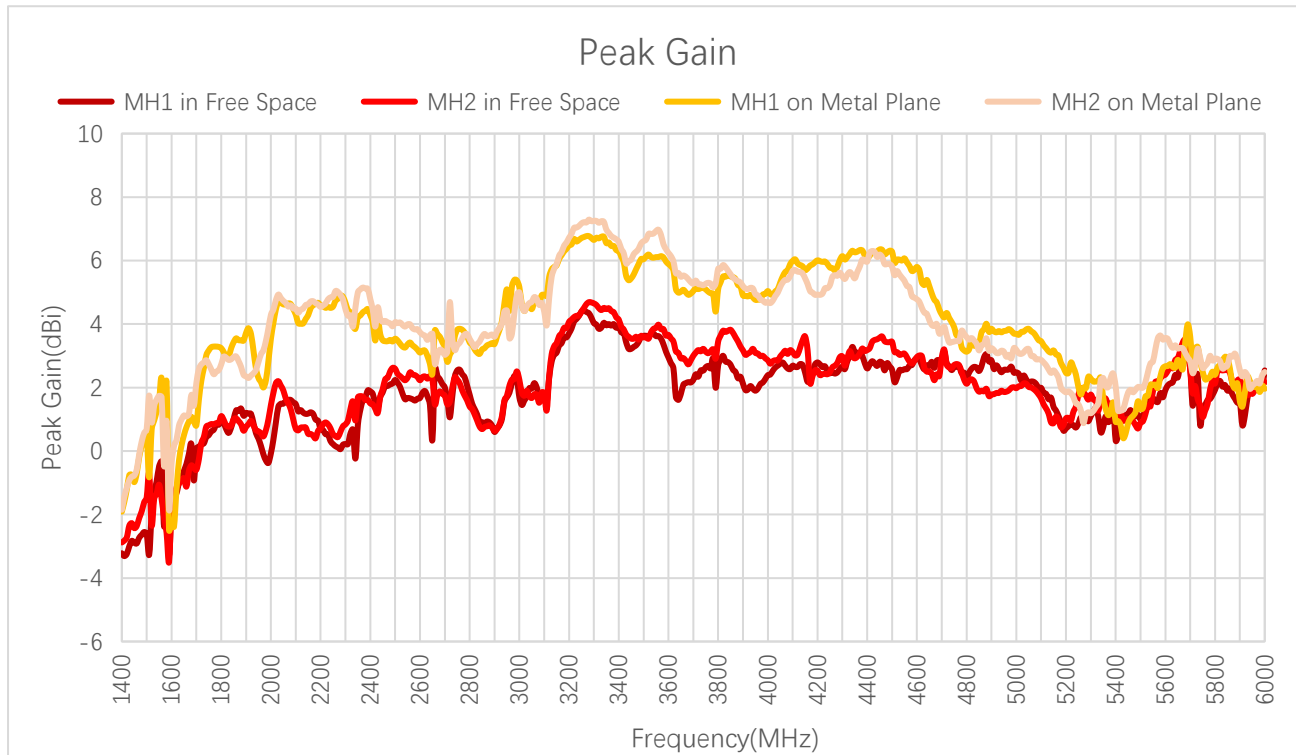
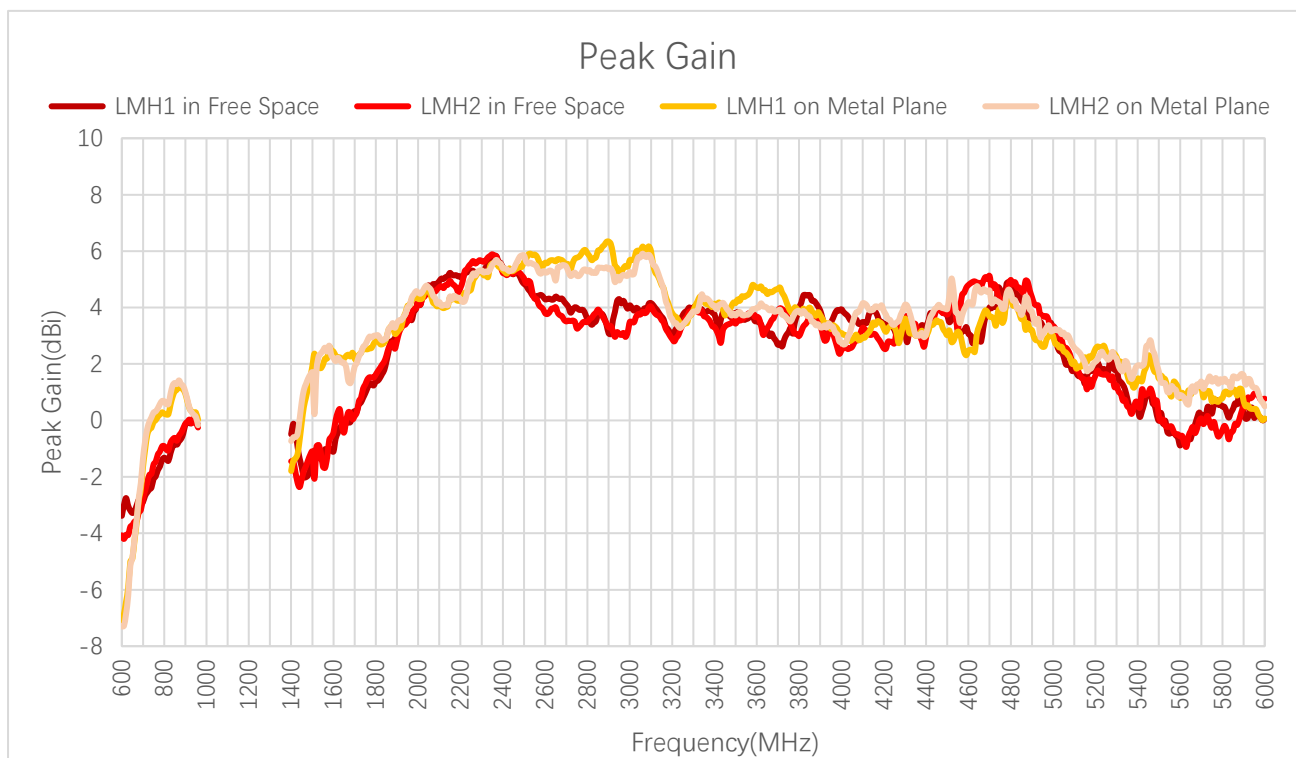
Average Gain (dB)

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)

Frequency (MHz)		600	630	710	830	900	960	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	-	-	-	-	-	-	-6.1	-3.8	-3.4	-3.5
	MP	-	-	-	-	-	-	-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

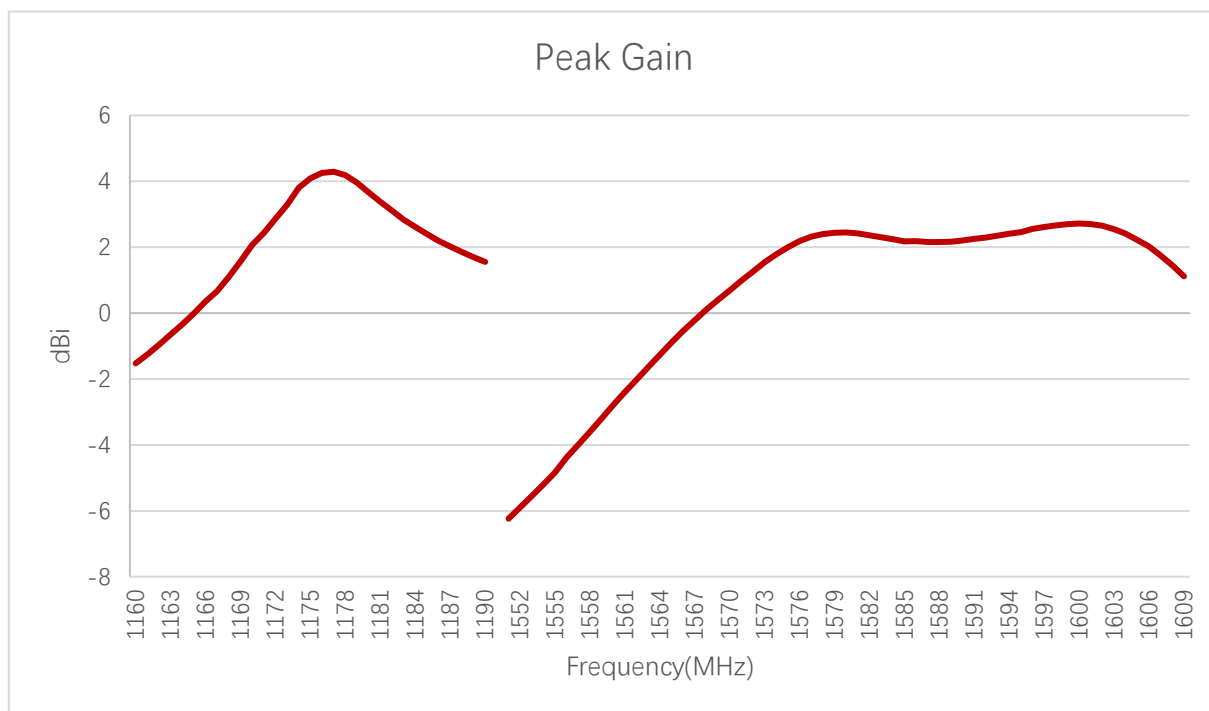


Peak Gain (dBi)

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)

Frequency (MHz)		600	630	710	830	900	960	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	-	-	-	-	-	-	-2.3	-0.3	0.8	0.8
	MP	-	-	-	-	-	-	-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



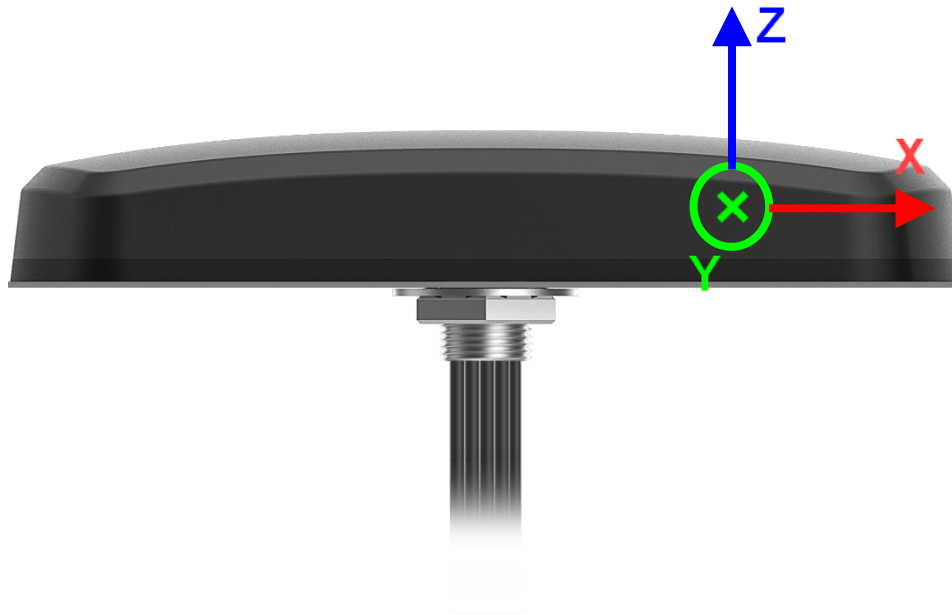
Peak Gain (dBi)

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

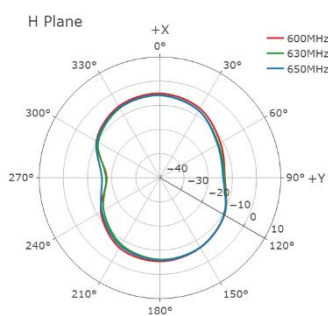
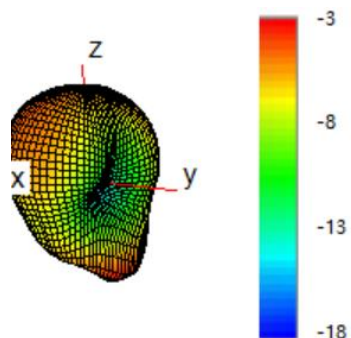
3.2.4.1. Test Status: In Free Space

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

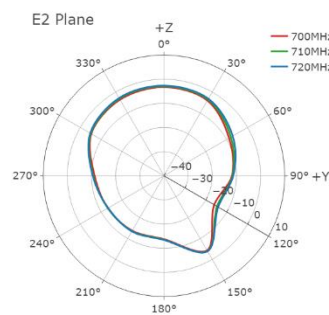
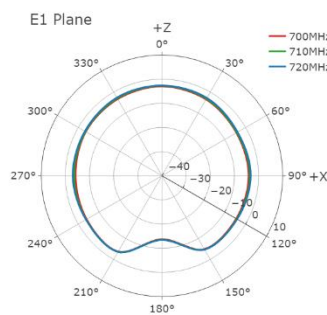
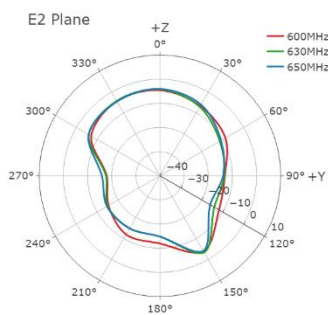
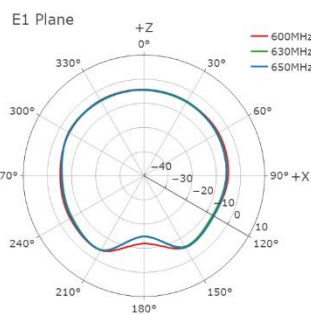
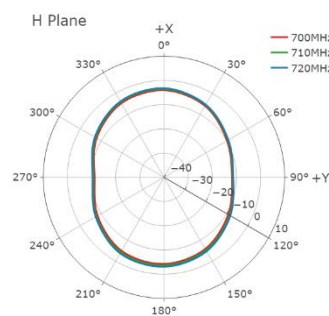
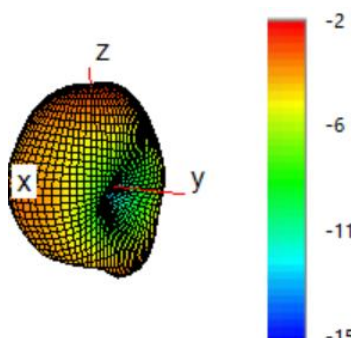


● **LMH1**

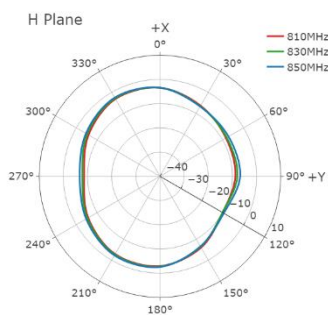
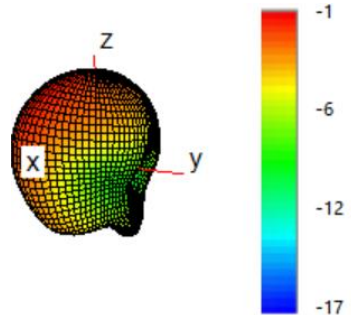
630 MHz



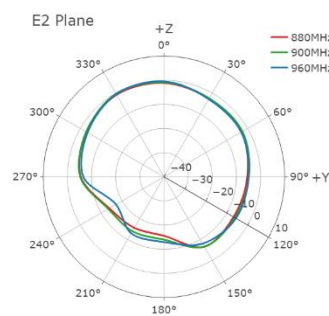
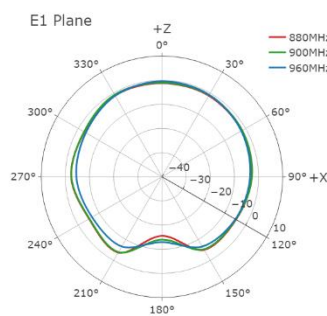
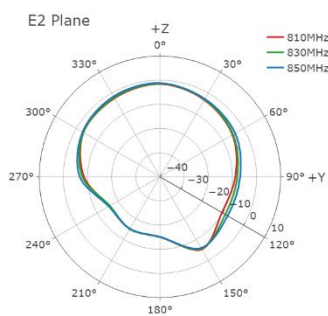
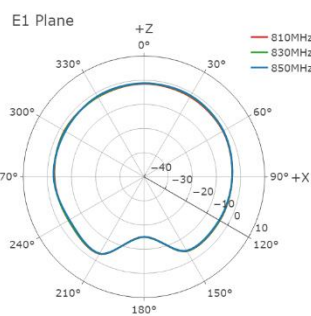
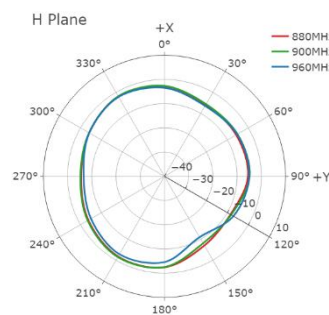
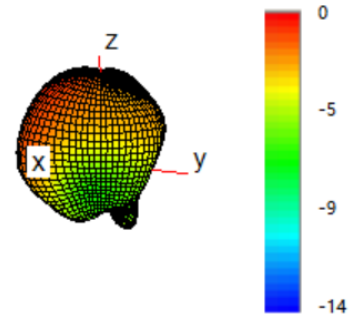
710 MHz

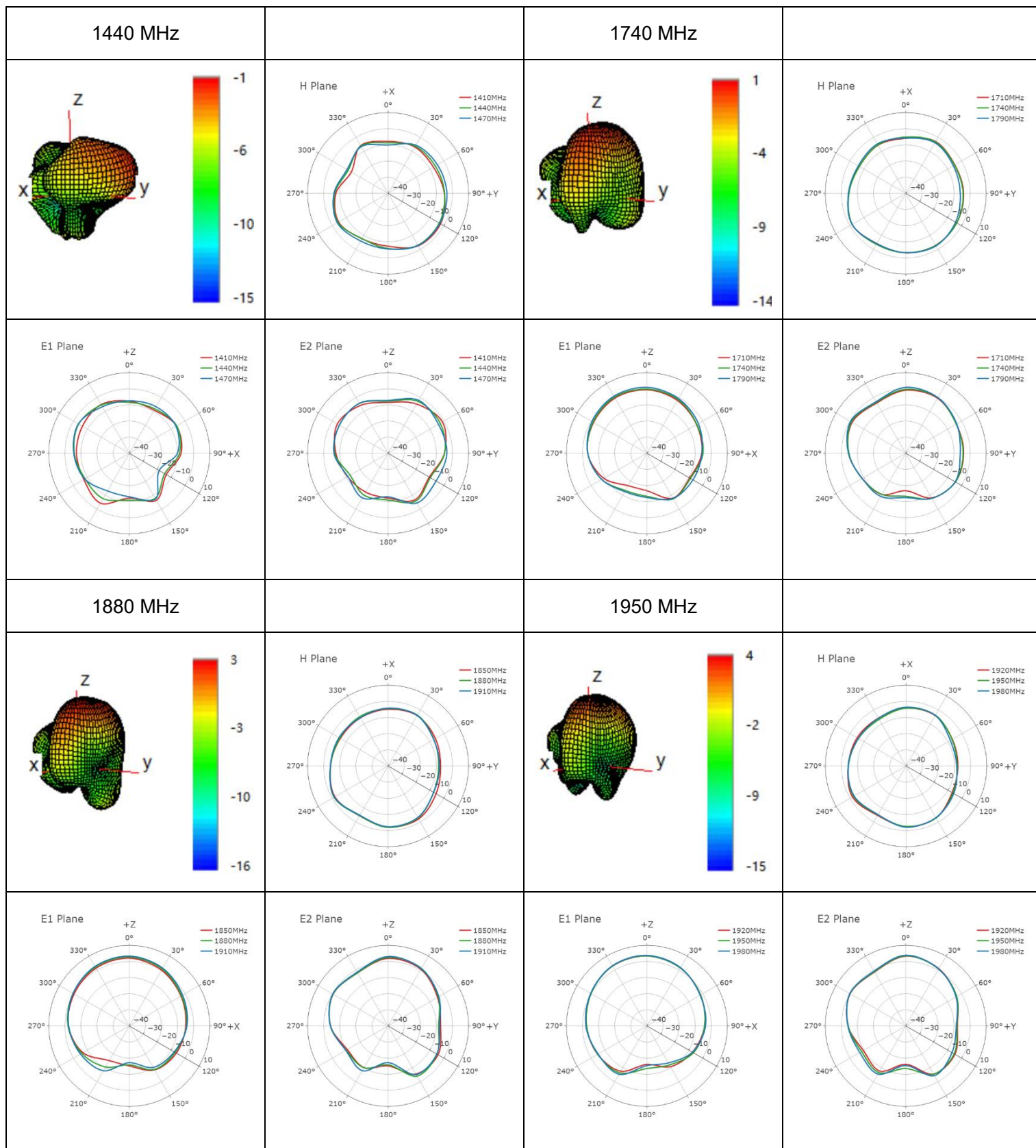


830 MHz

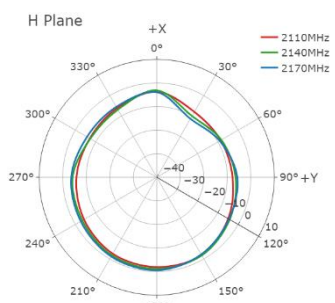
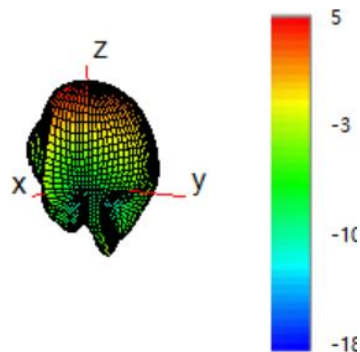


900 MHz

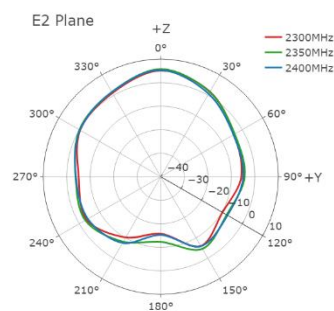
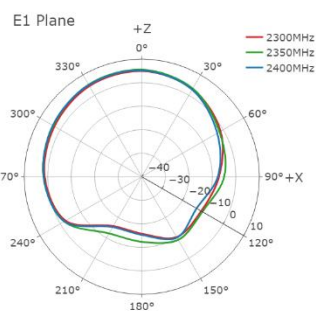
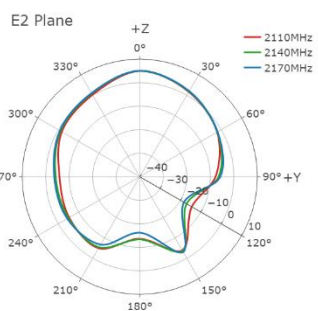
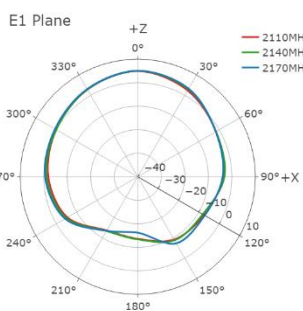
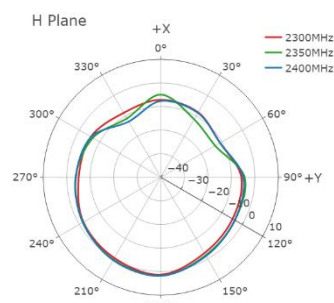
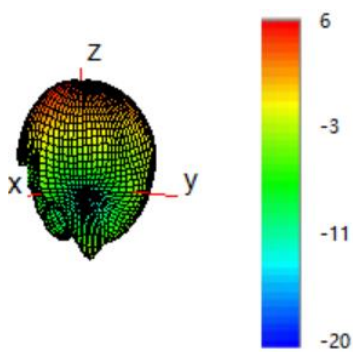




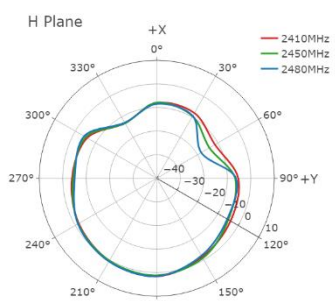
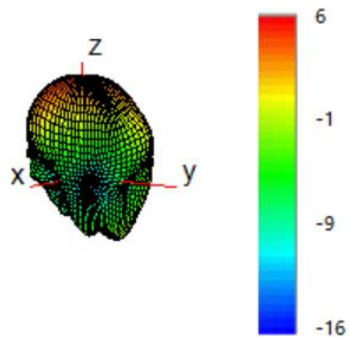
2140 MHz



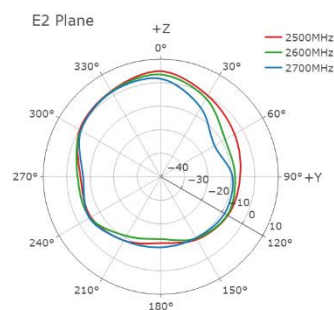
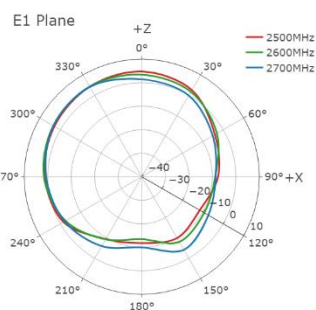
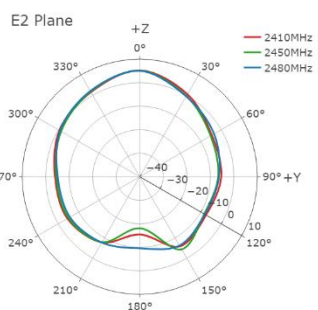
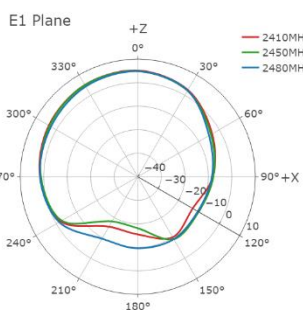
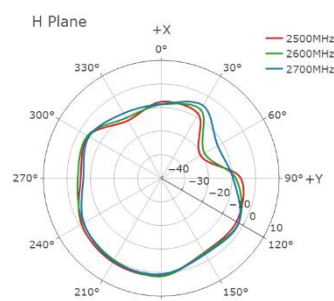
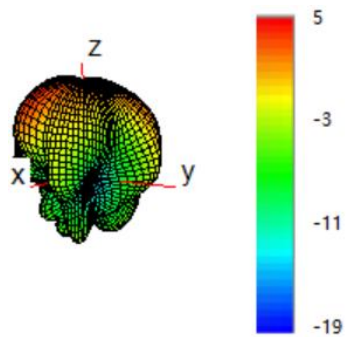
2350 MHz

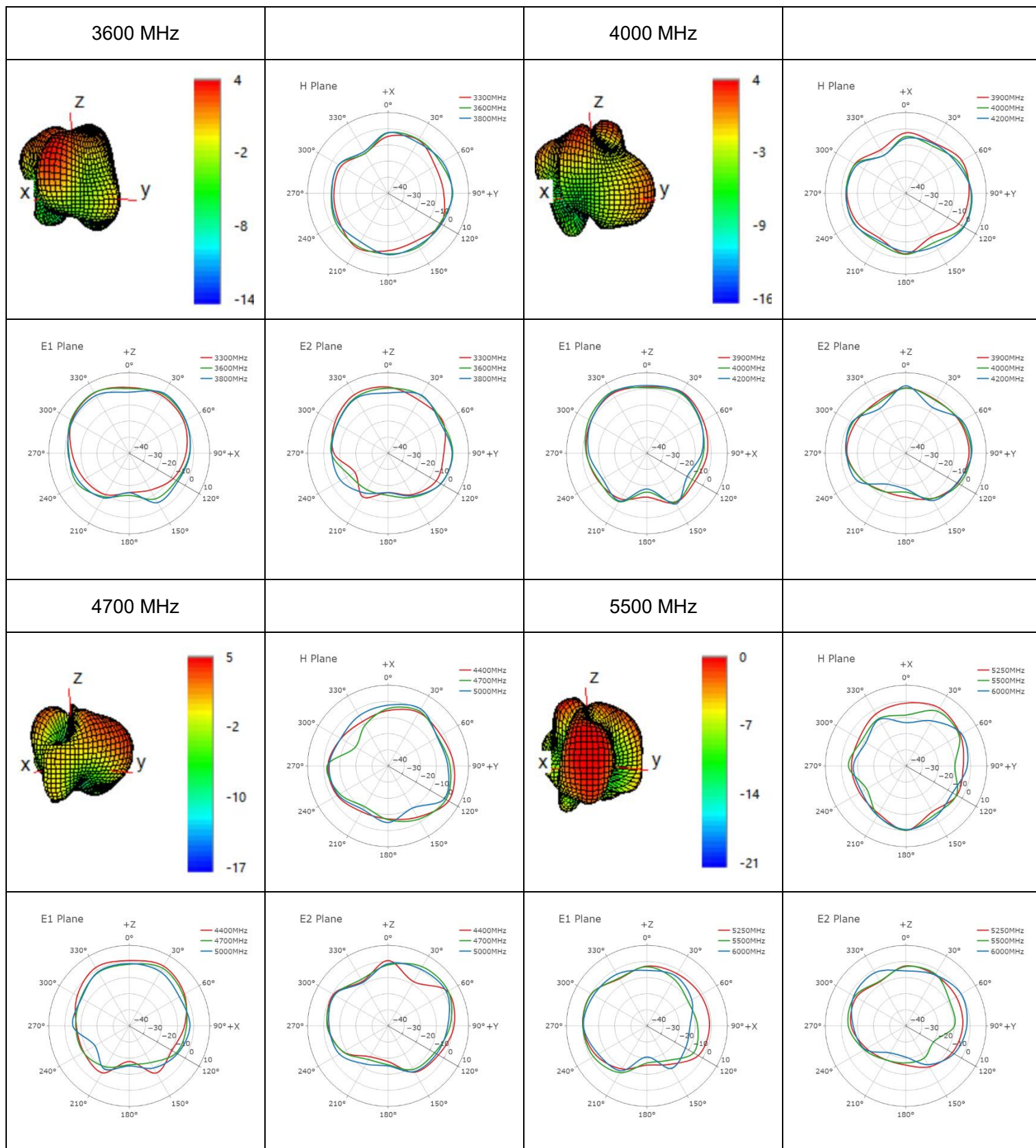


2450 MHz



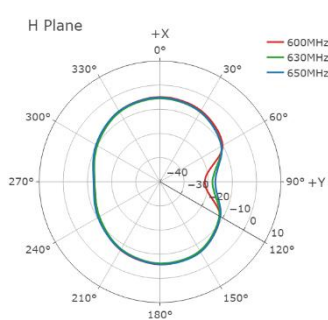
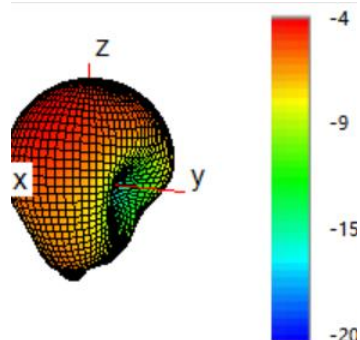
2600 MHz



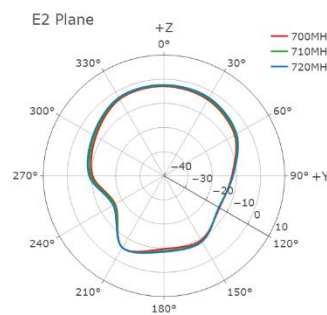
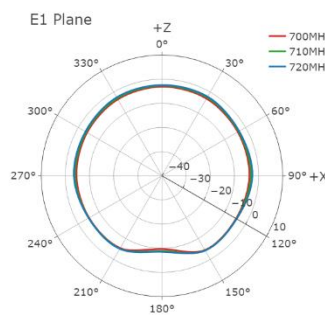
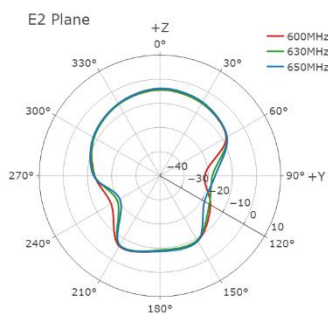
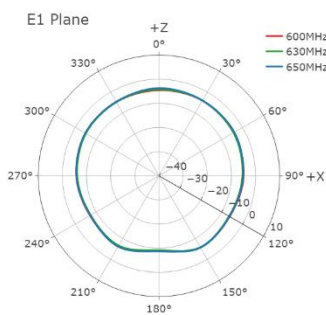
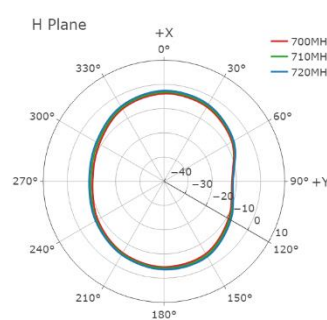
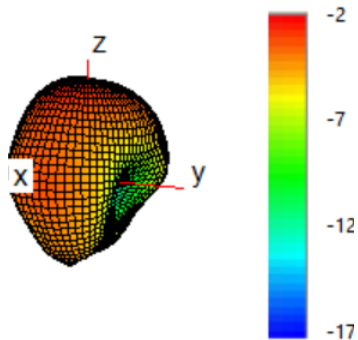


● **LMH2**

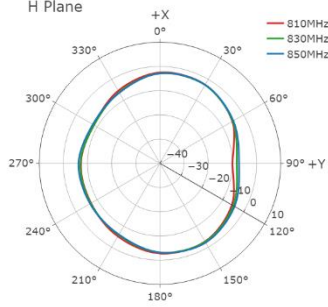
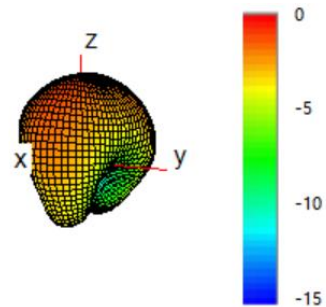
630 MHz



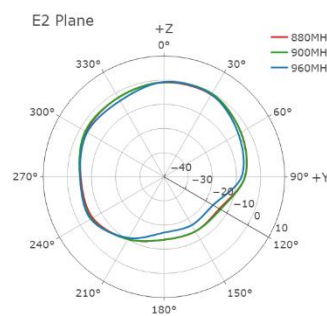
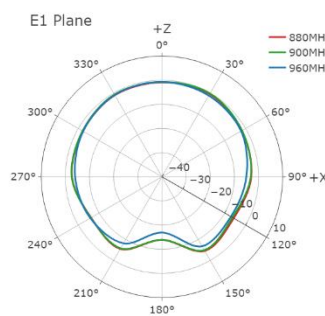
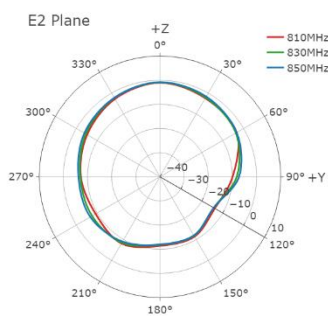
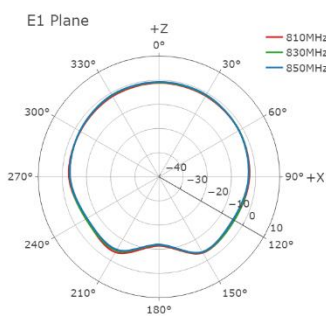
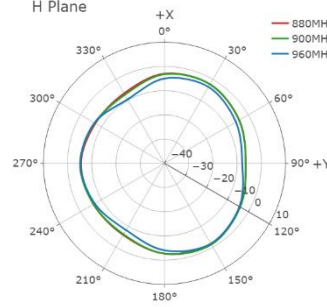
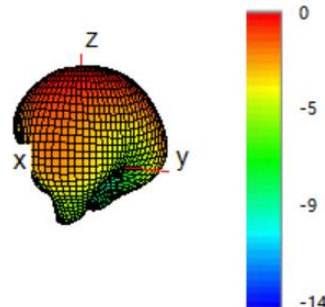
710 MHz

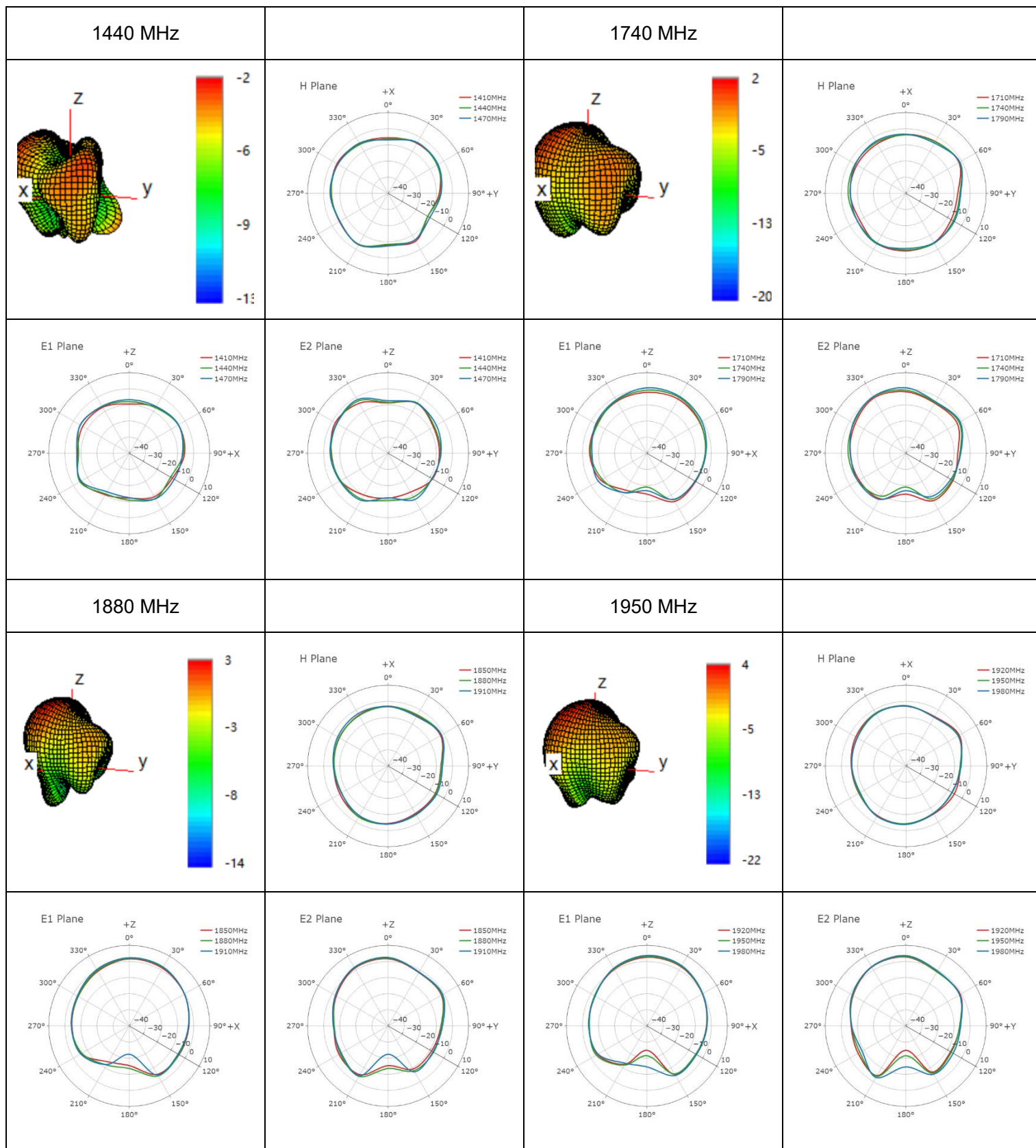


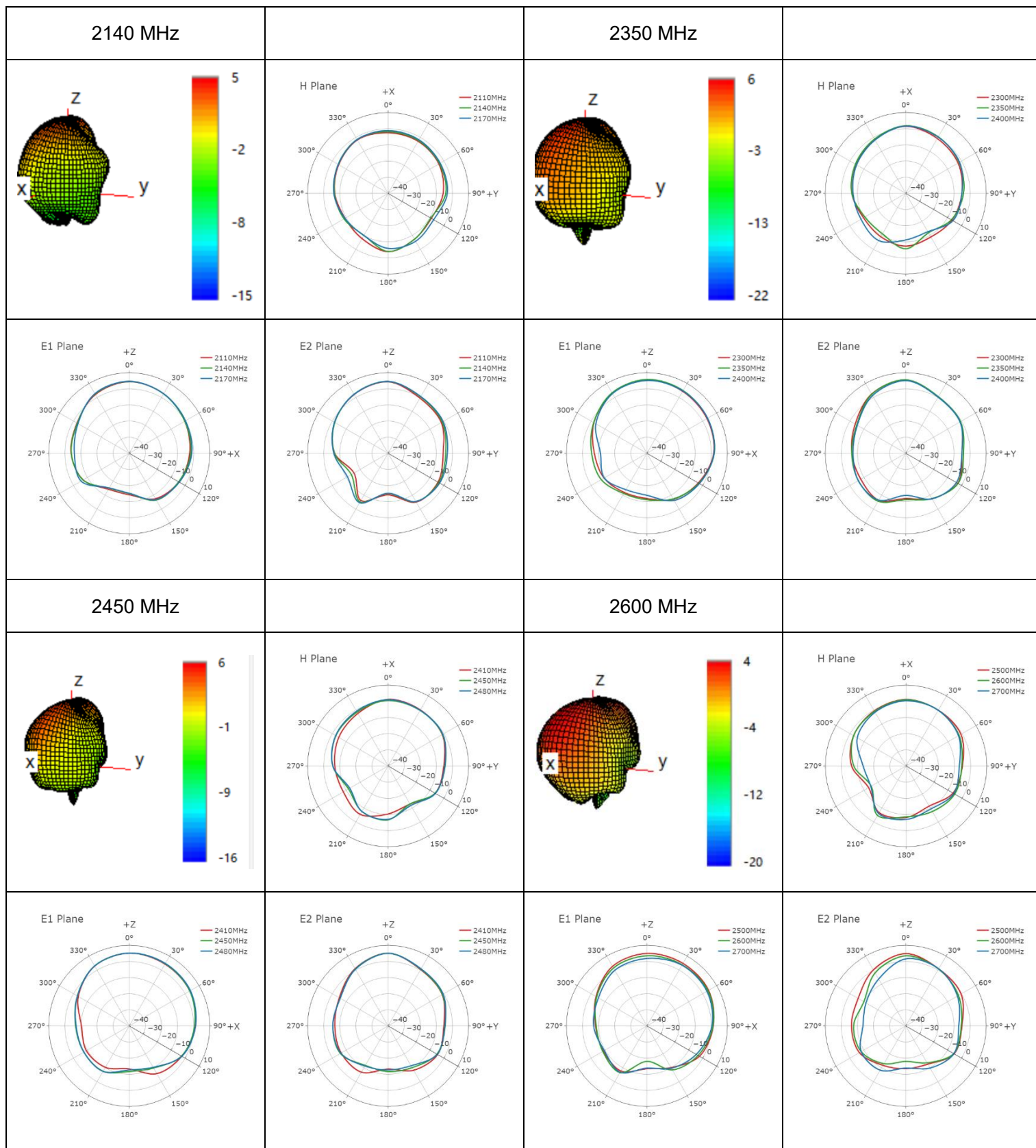
830 MHz

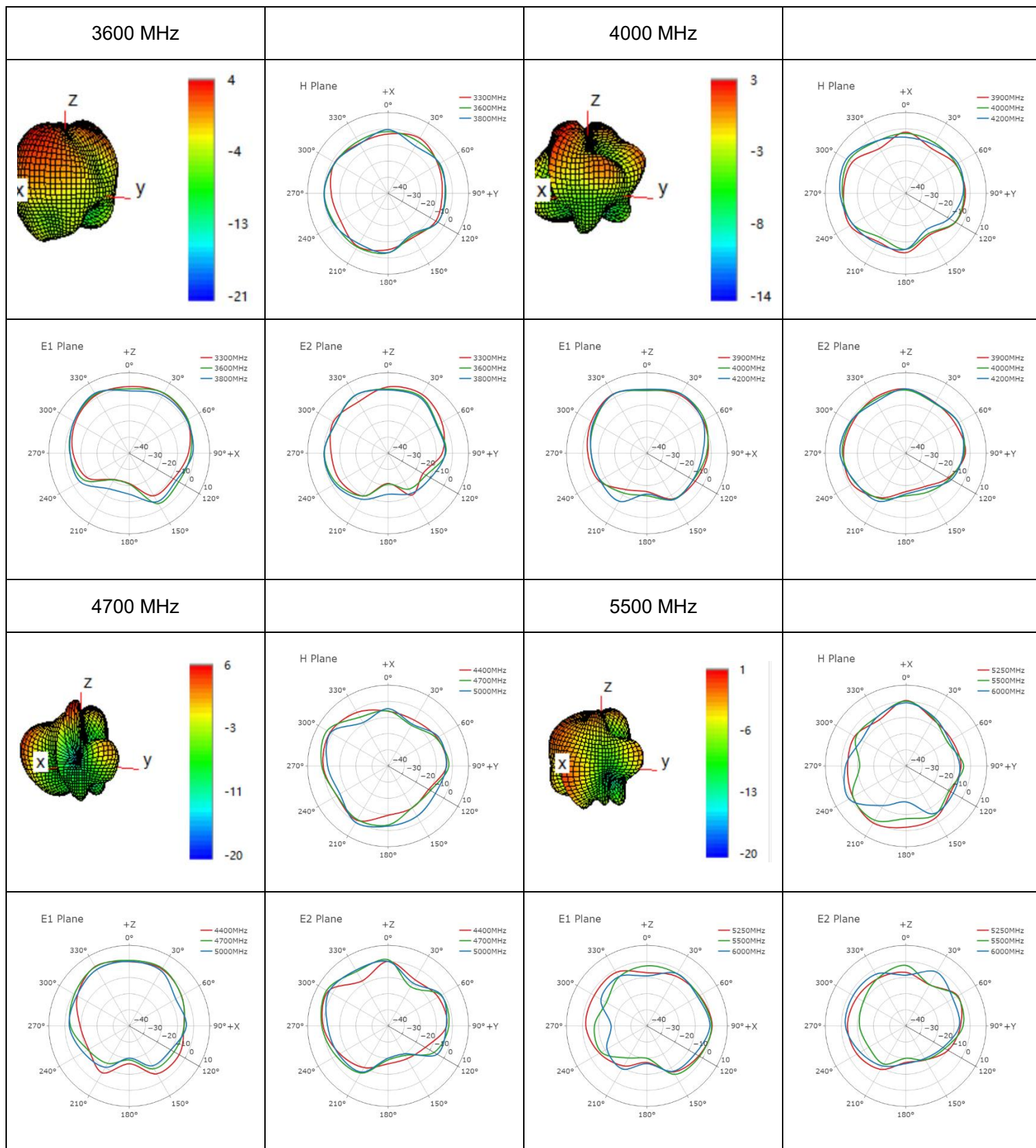


900 MHz

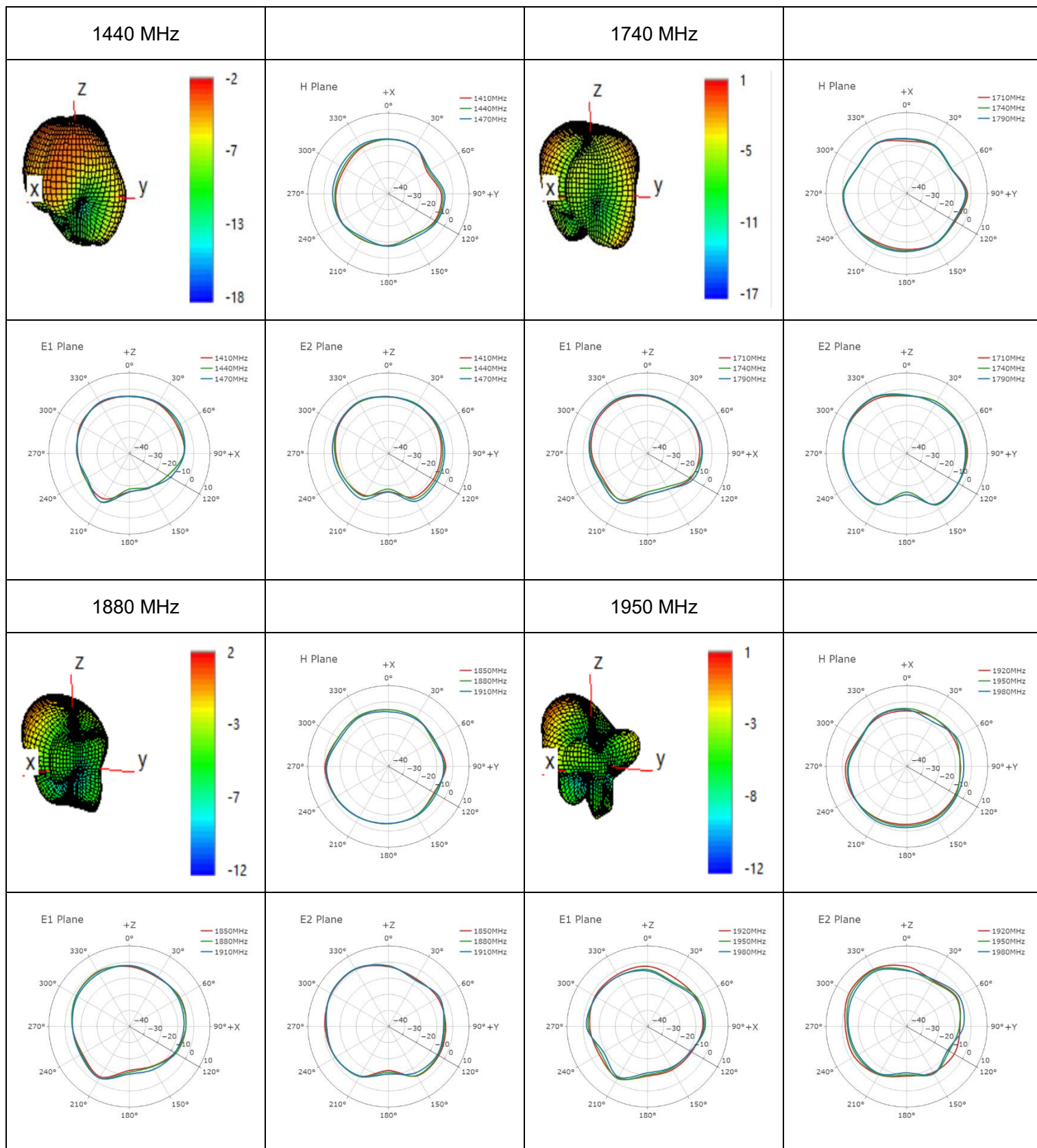


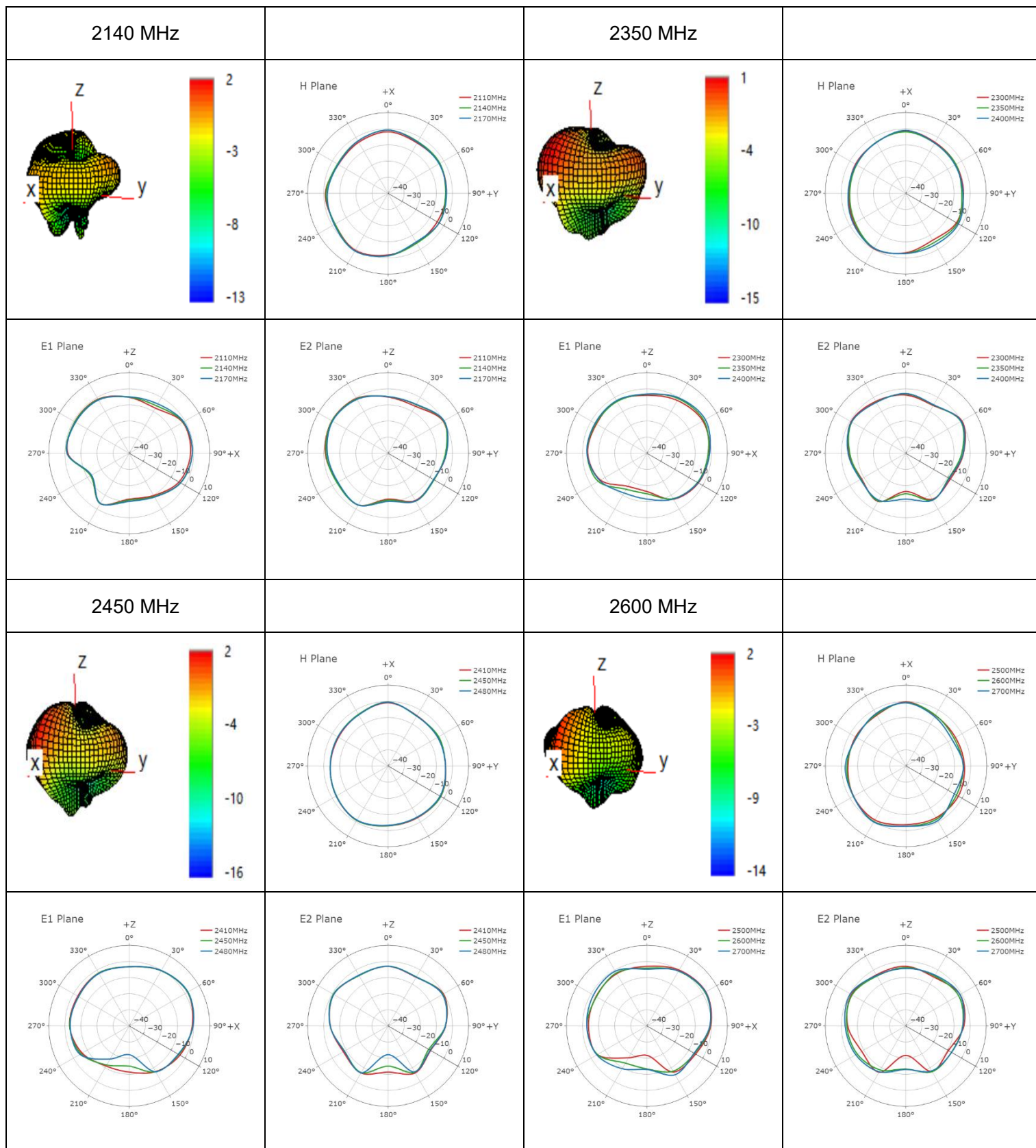


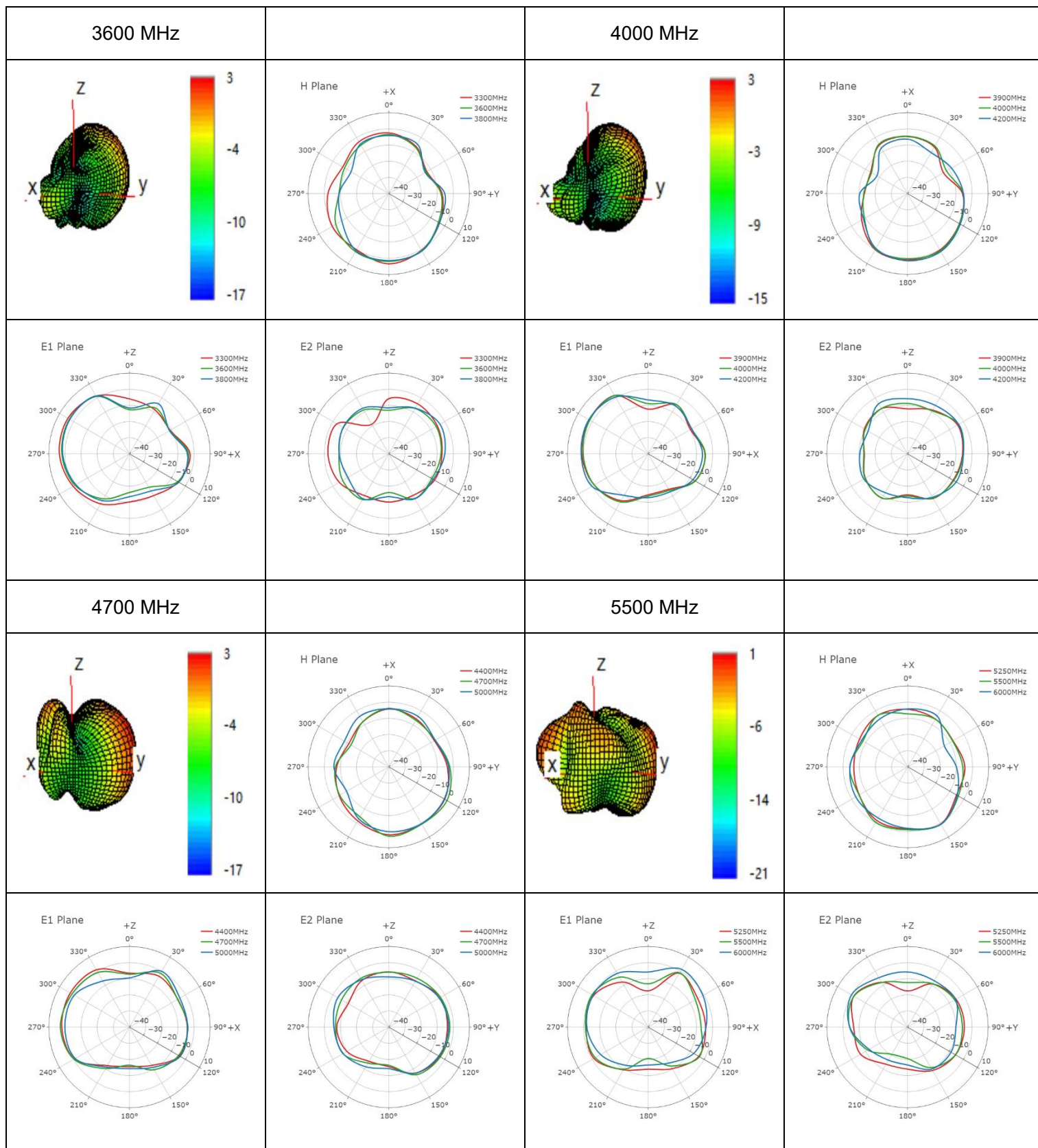




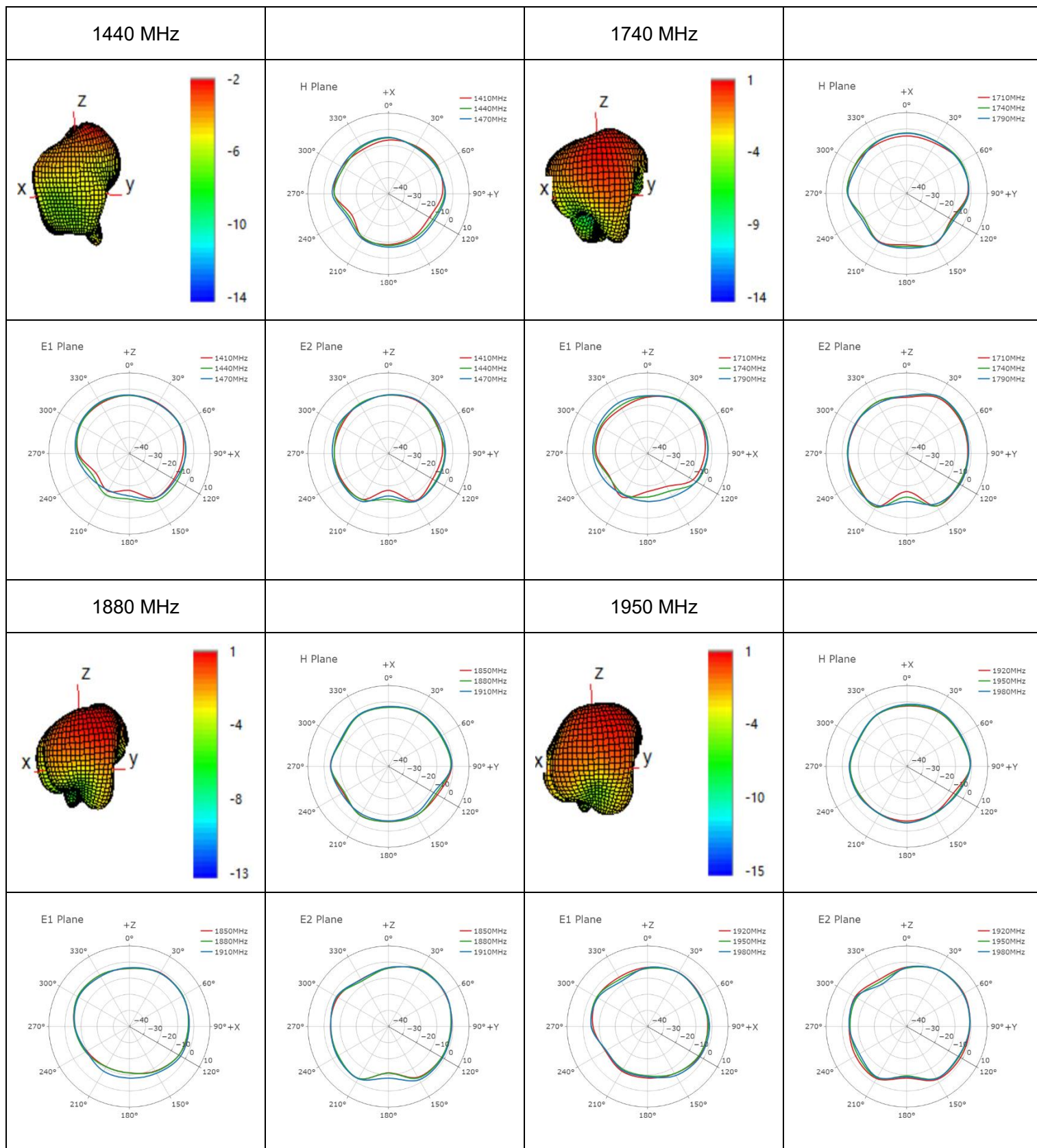
● **MH1**



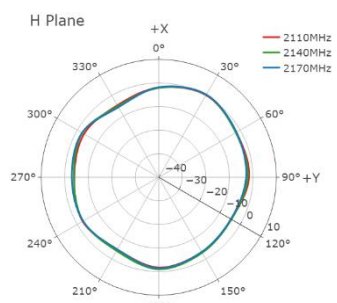
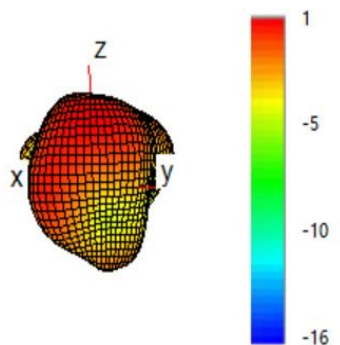




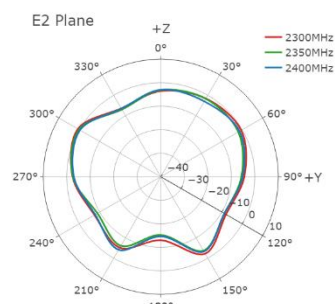
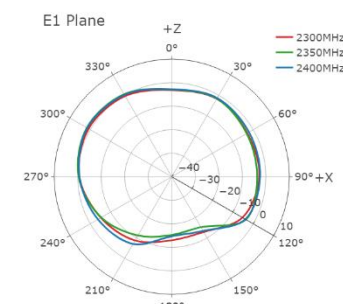
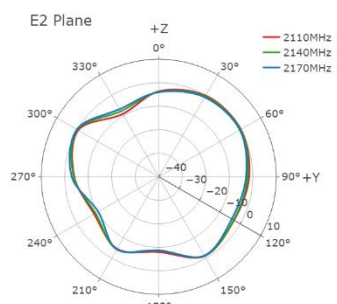
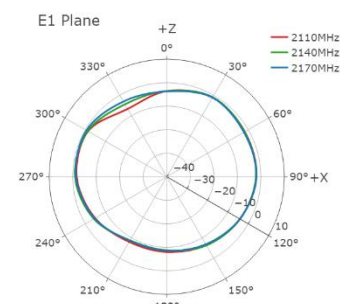
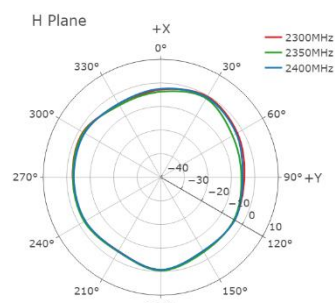
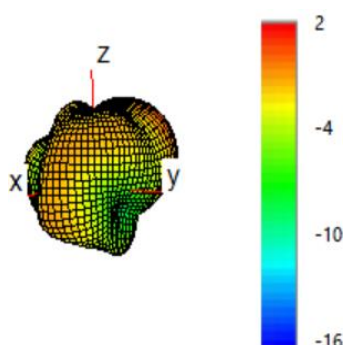
● **MH2**



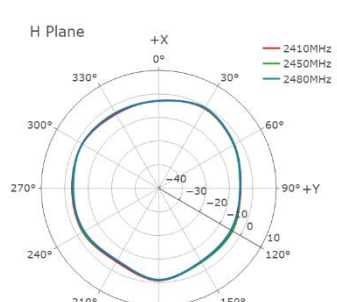
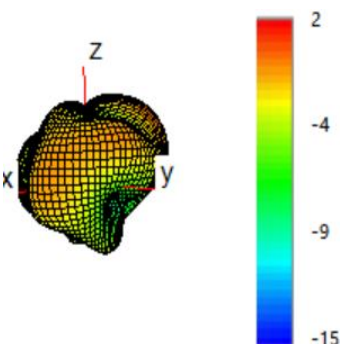
2140 MHz



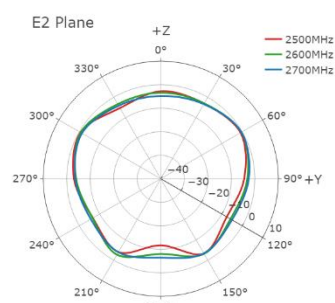
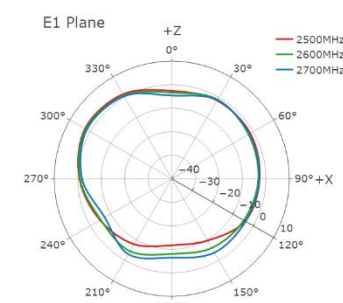
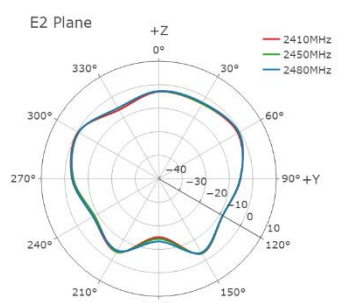
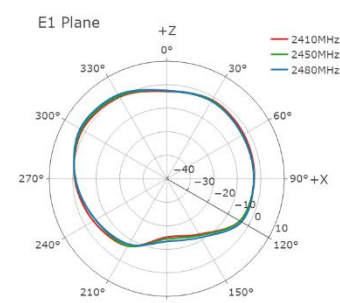
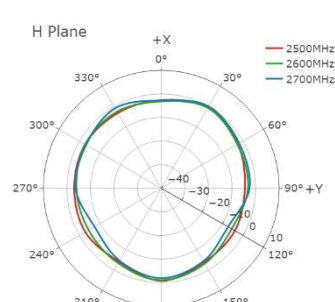
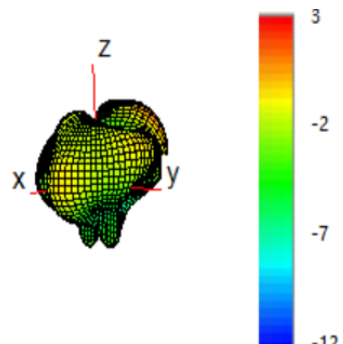
2350 MHz

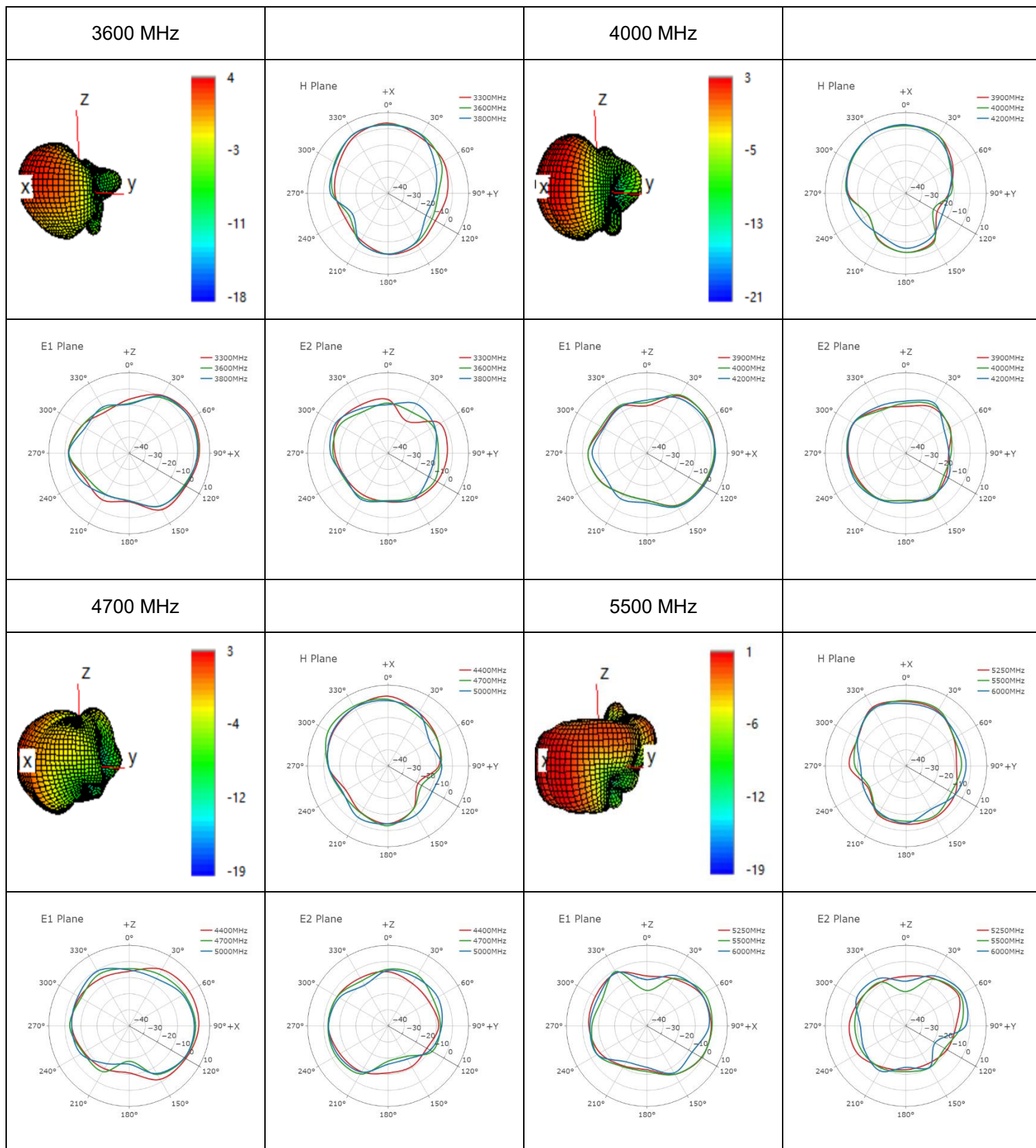


2450 MHz



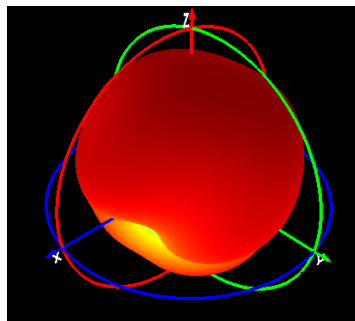
2600 MHz



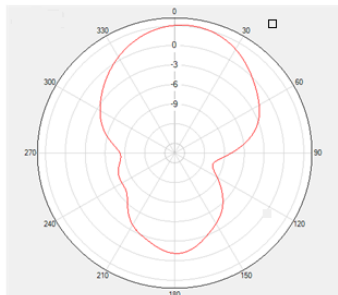


● GNSS

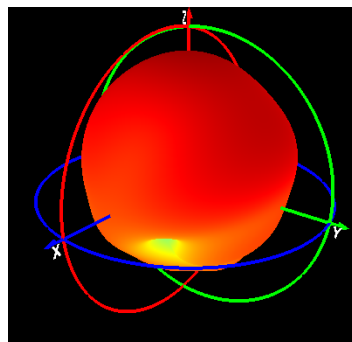
1176 MHz



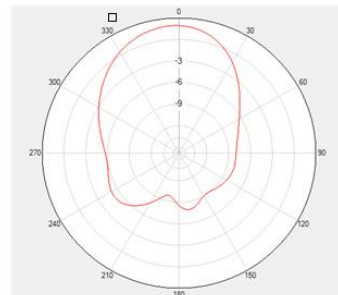
Phi=0 Freq=1176MHz



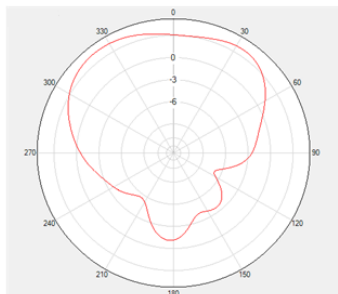
1575 MHz



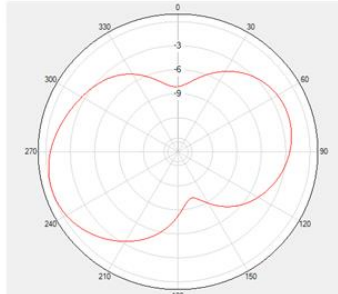
Phi=0 Freq=1575MHz



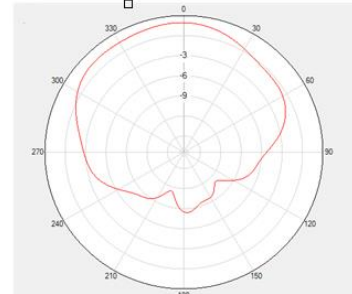
Phi=90 Freq=1176MHz



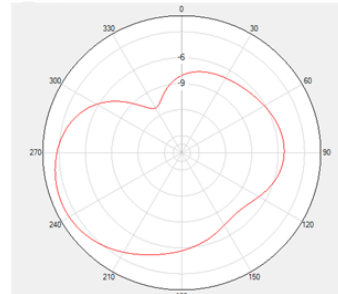
Theta=90 Freq=1176MHz



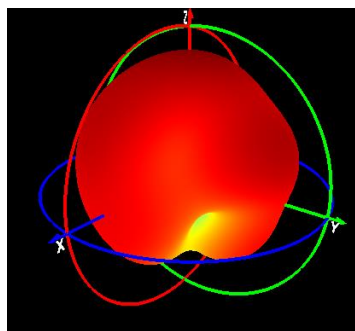
Phi=90 Freq=1575MHz



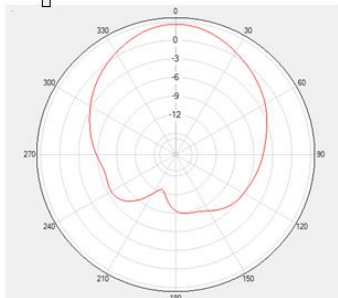
Theta=90 Freq=1575MHz



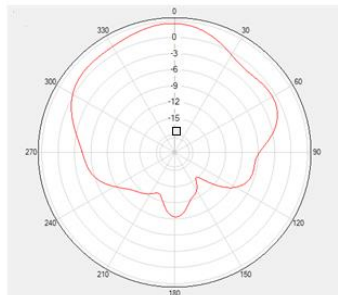
1602 MHz



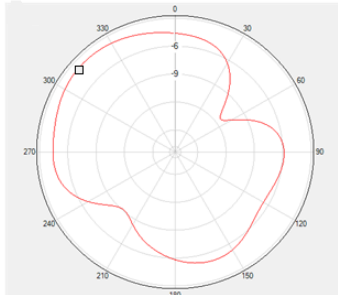
Phi=0 Freq=1602MHz



Phi=90 Freq=1602MHz

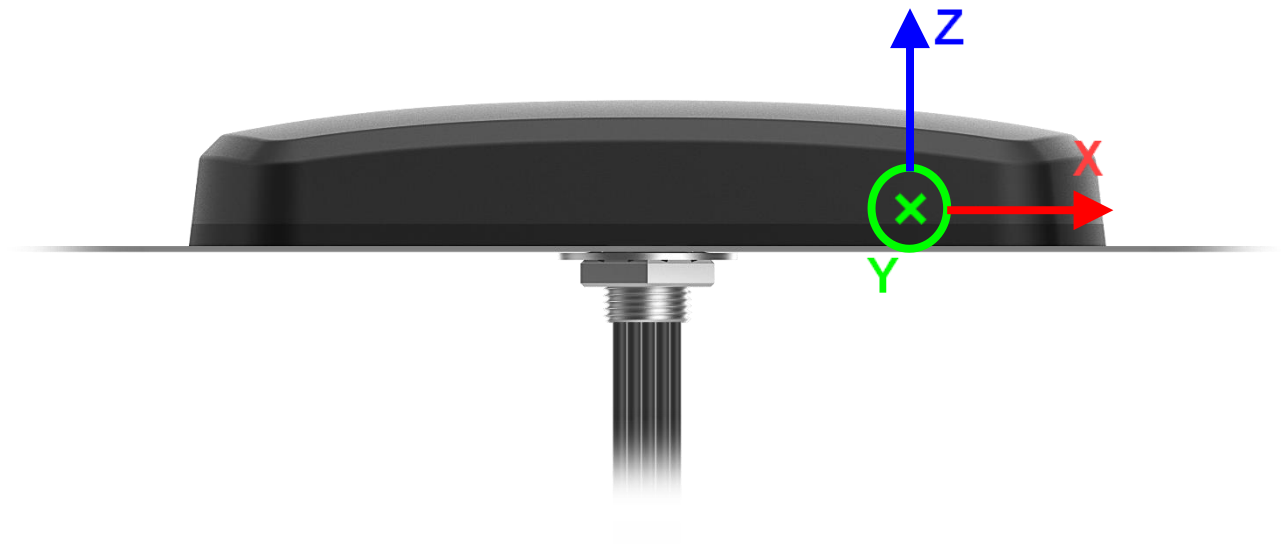


Theta=90 Freq=1602MHz



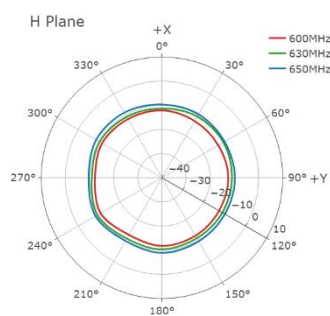
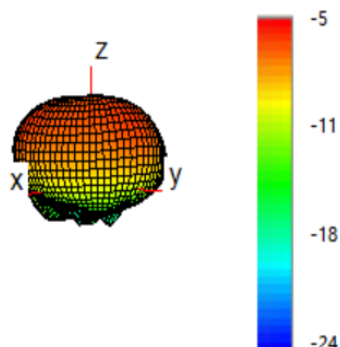
3.2.4.2. Test Status: On 500 mm × 500 mm Metal Plane

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

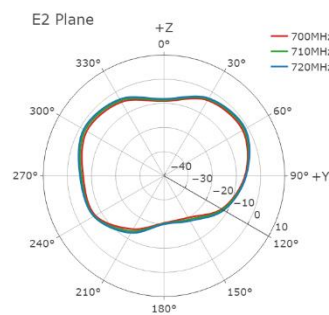
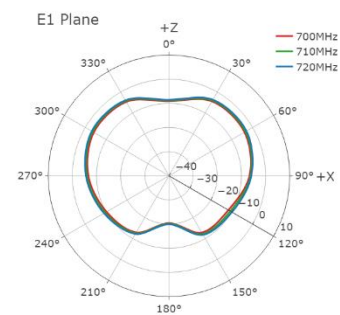
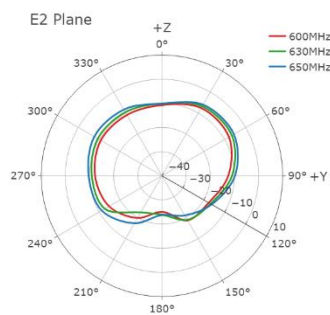
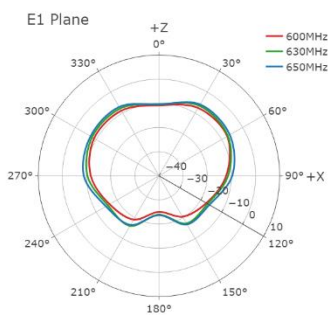
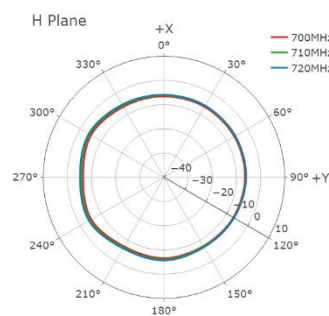
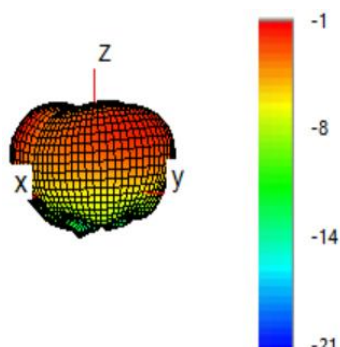


● **LMH1**

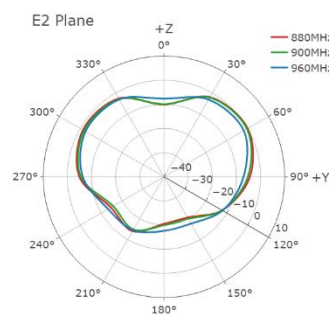
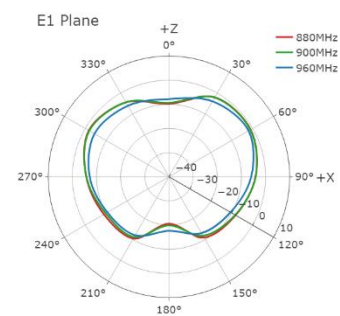
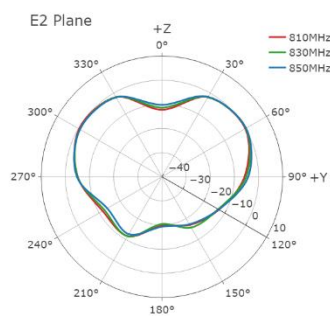
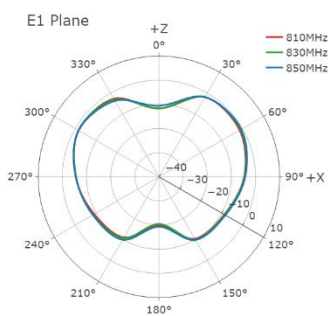
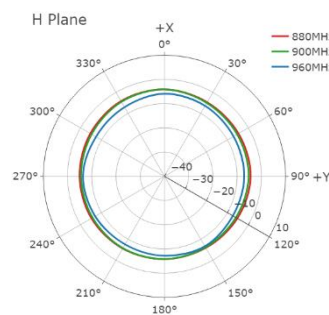
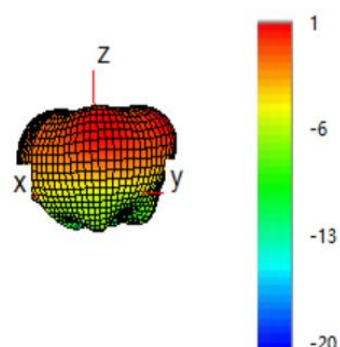
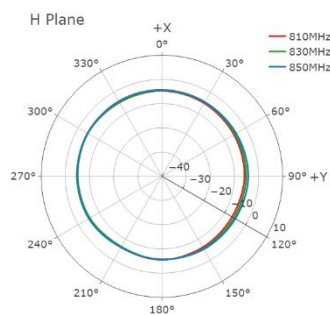
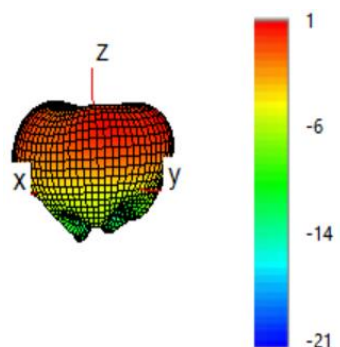
630 MHz

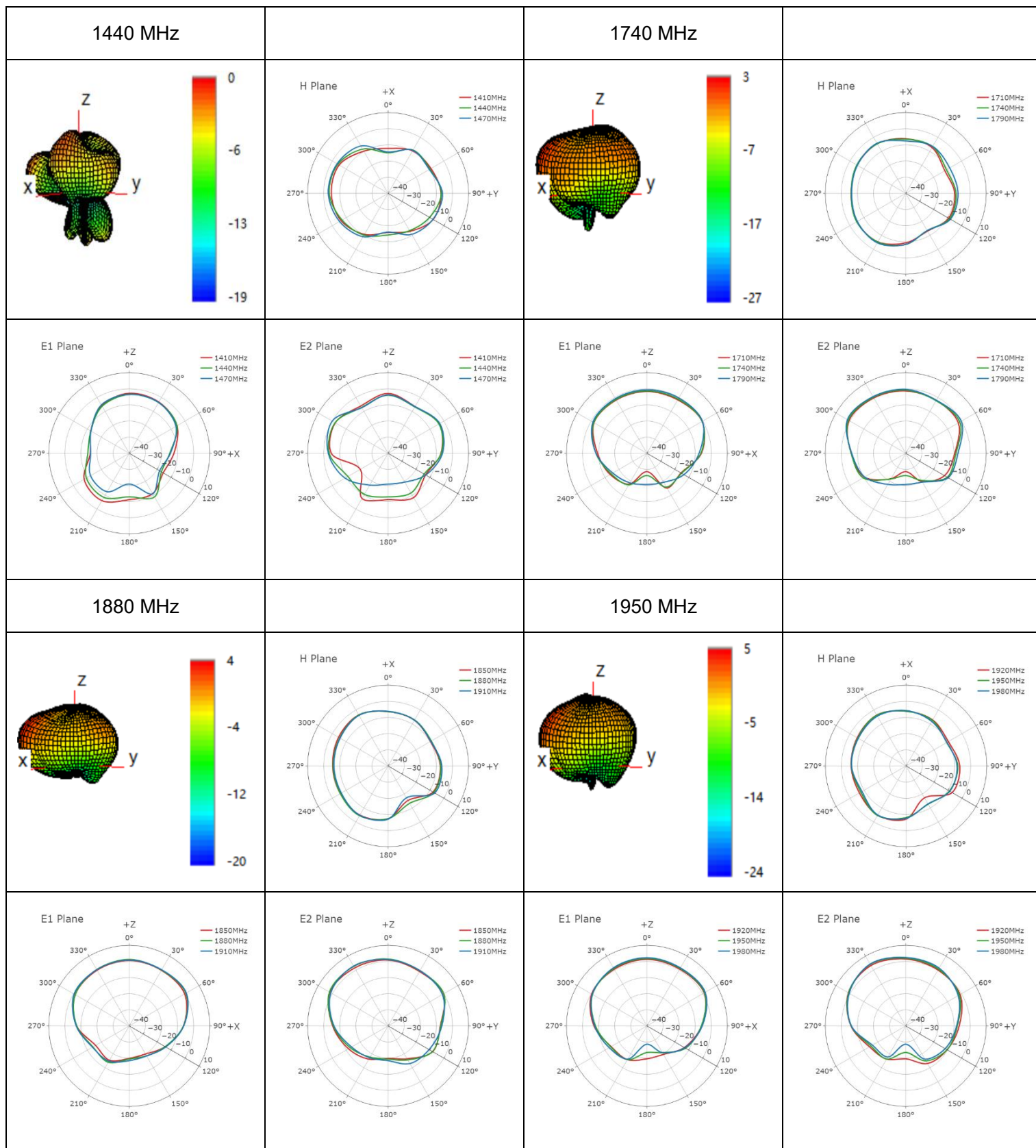


710 MHz

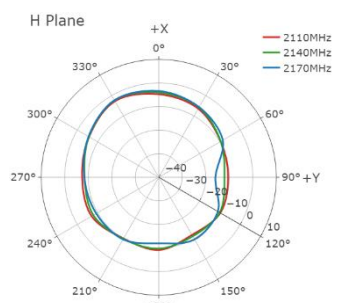
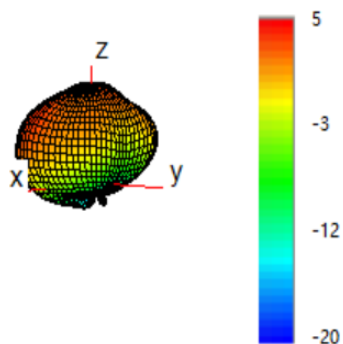


830 MHz

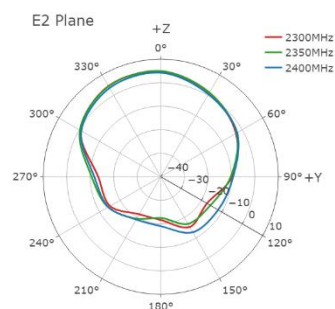
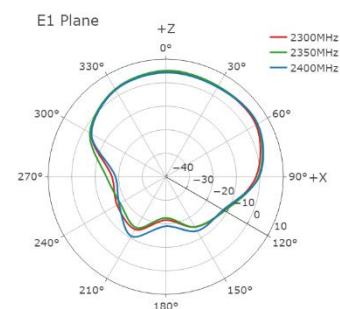
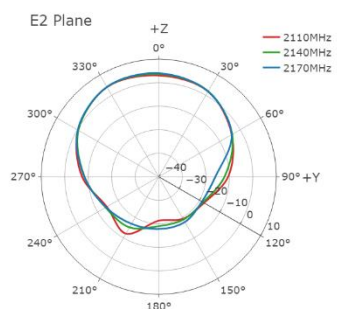
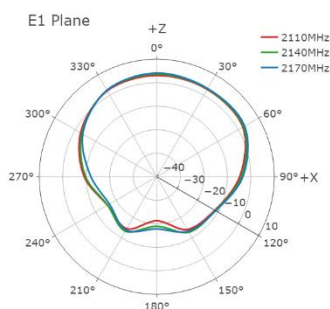
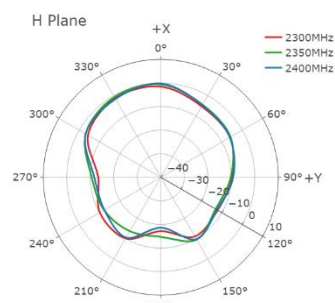
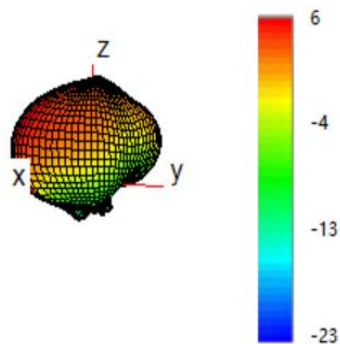




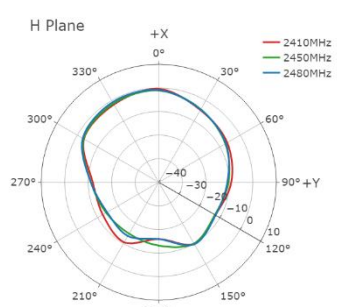
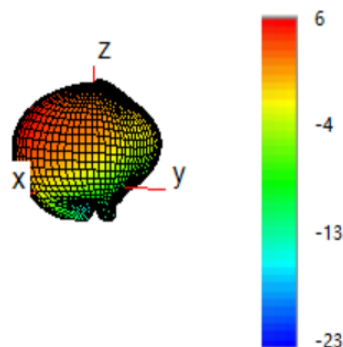
2140 MHz



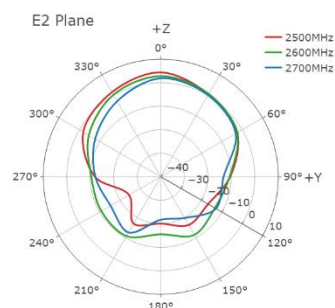
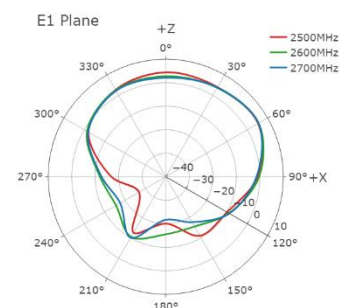
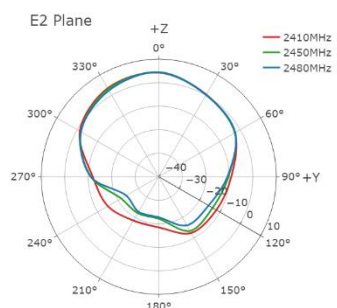
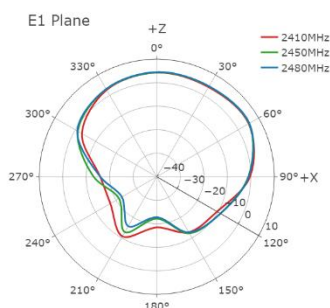
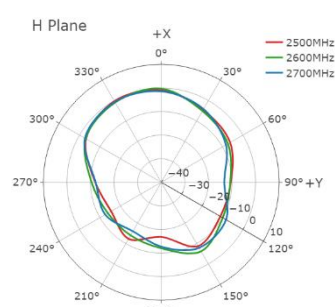
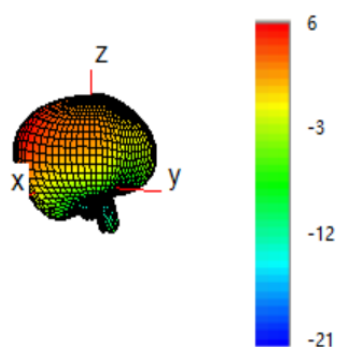
2350 MHz

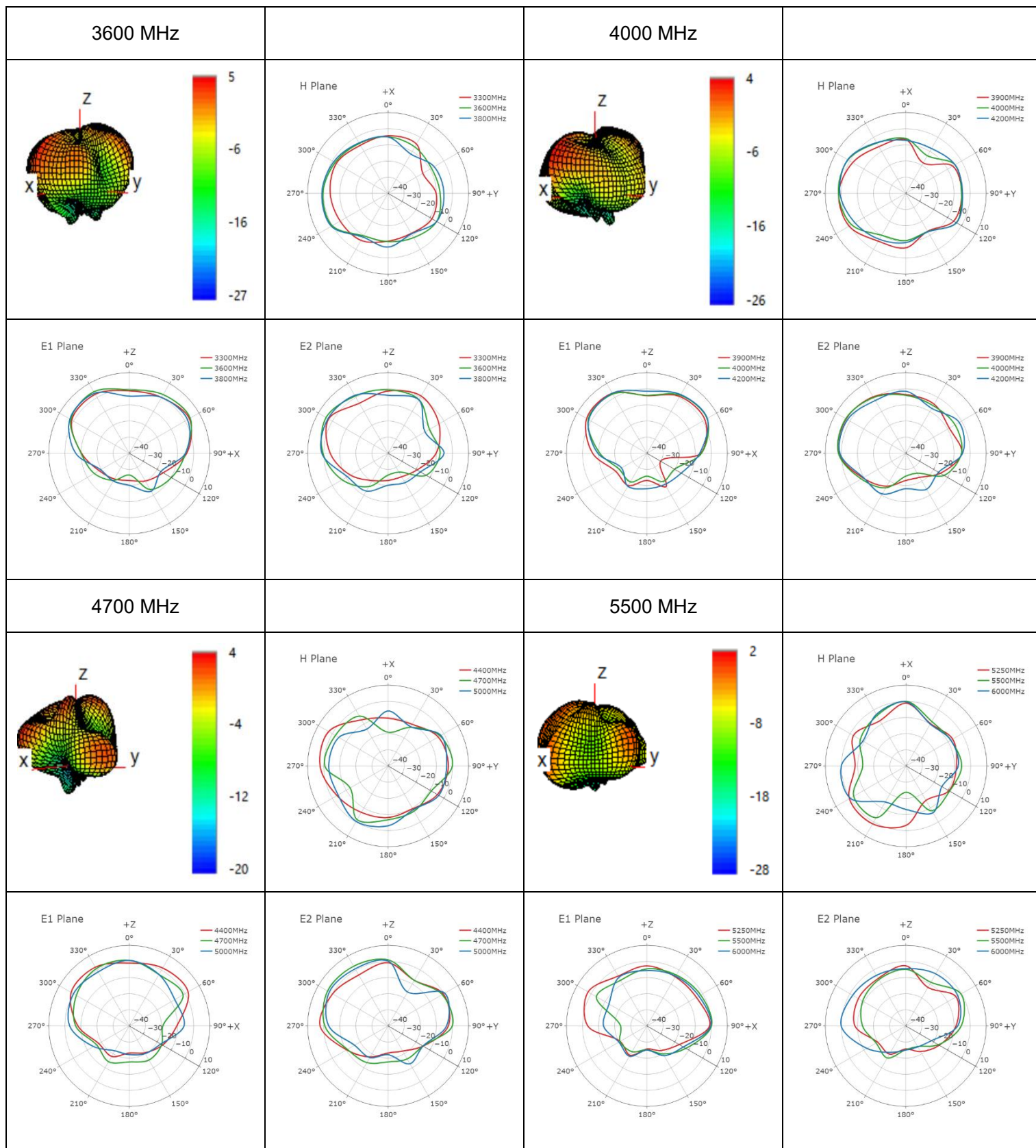


2450 MHz



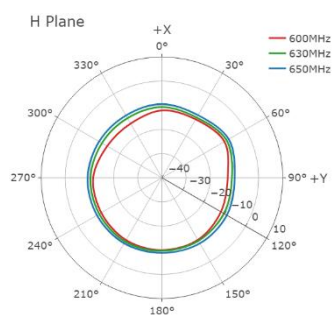
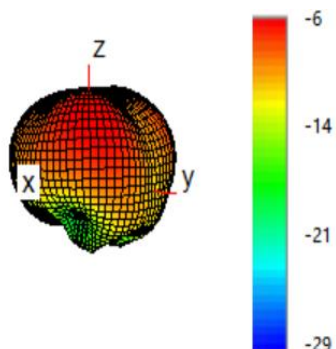
2600 MHz



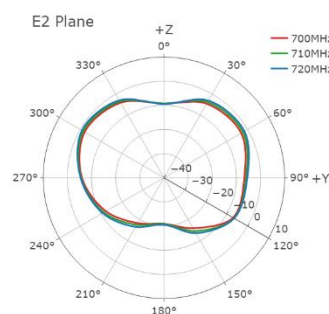
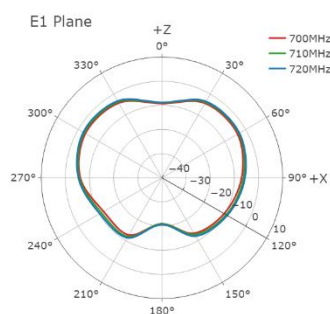
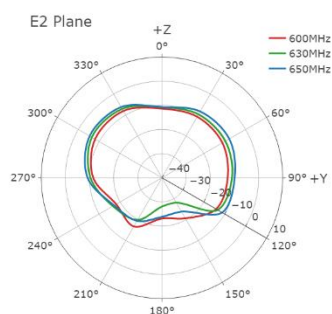
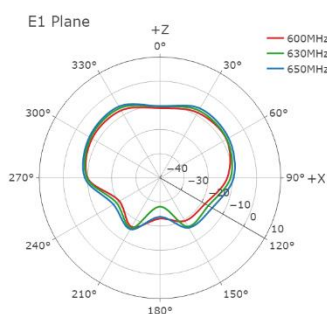
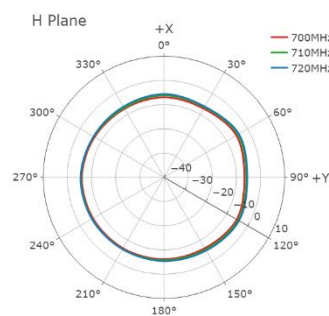
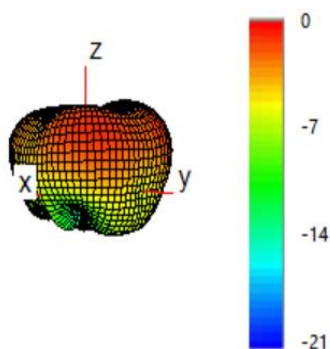


● **LMH2**

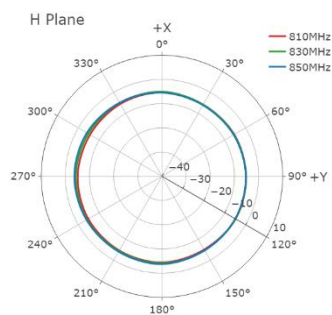
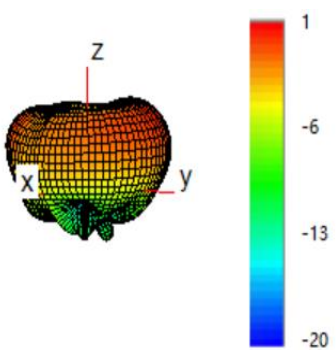
630 MHz



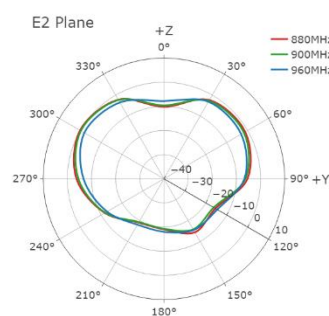
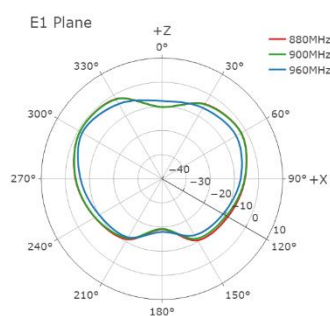
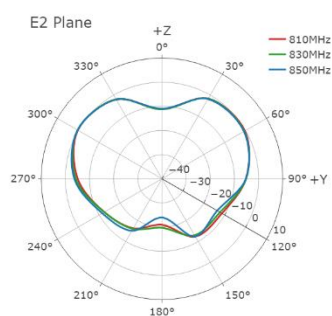
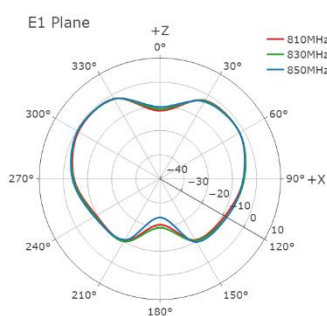
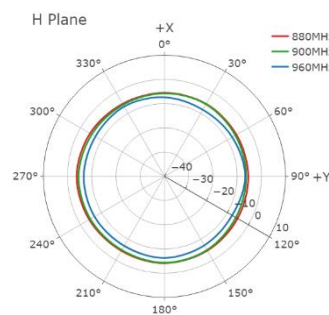
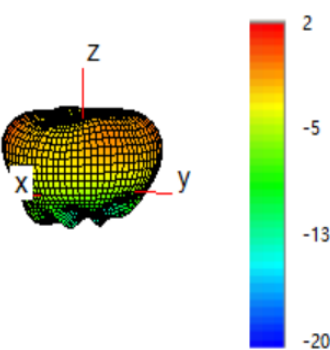
710 MHz



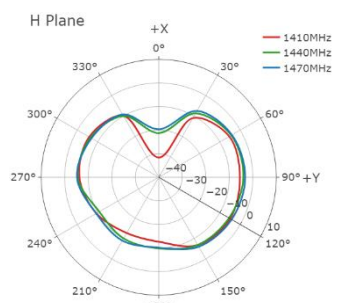
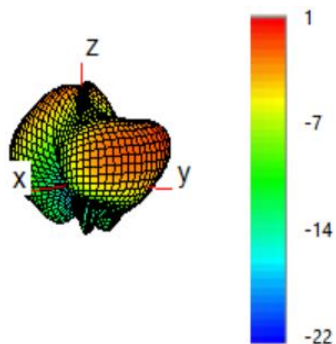
830 MHz



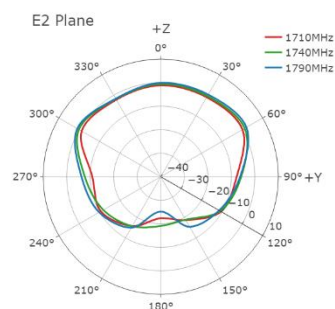
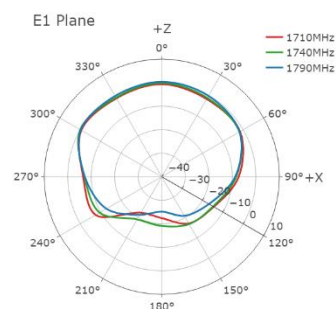
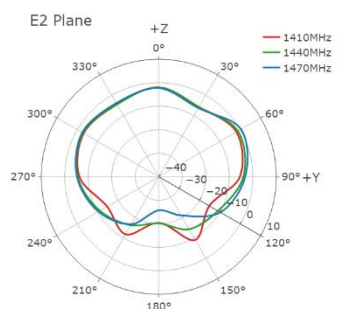
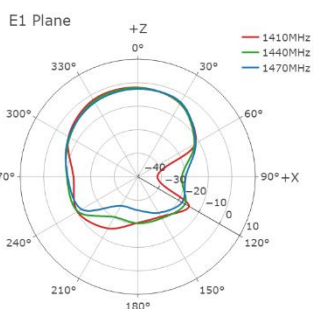
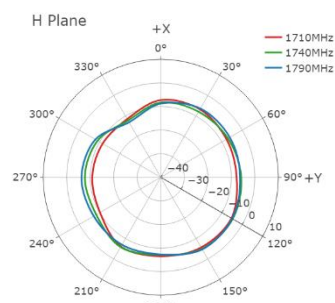
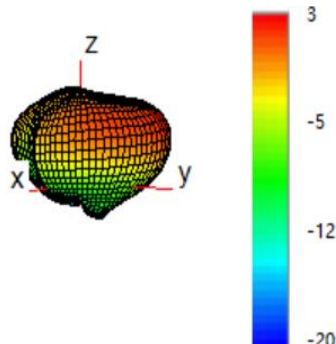
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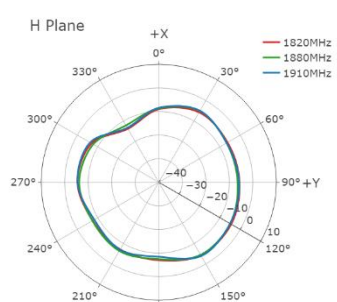
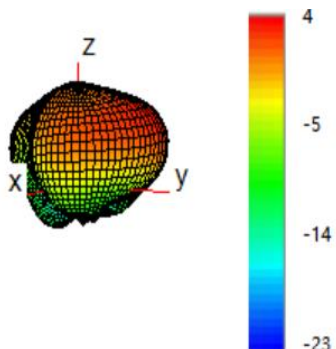
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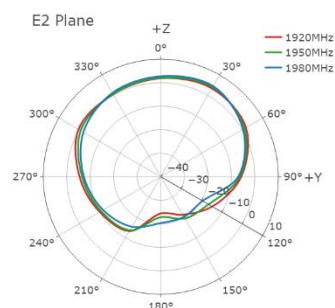
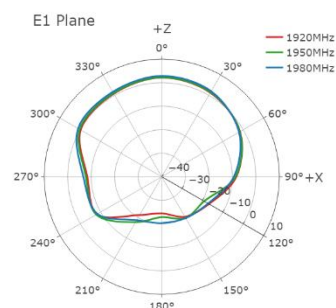
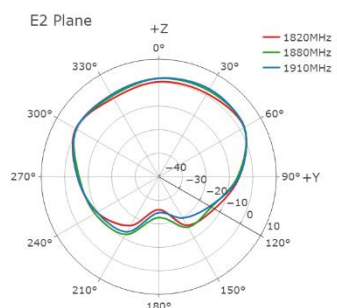
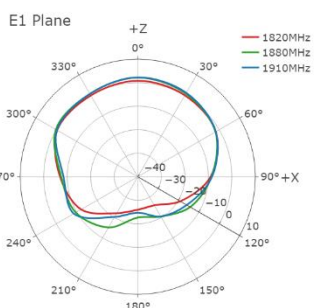
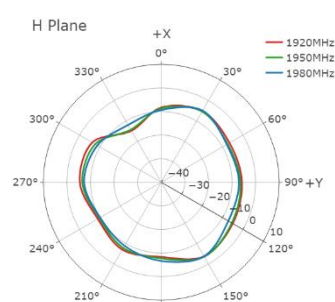
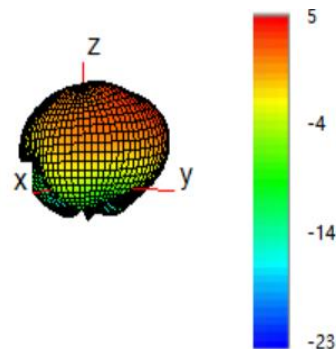
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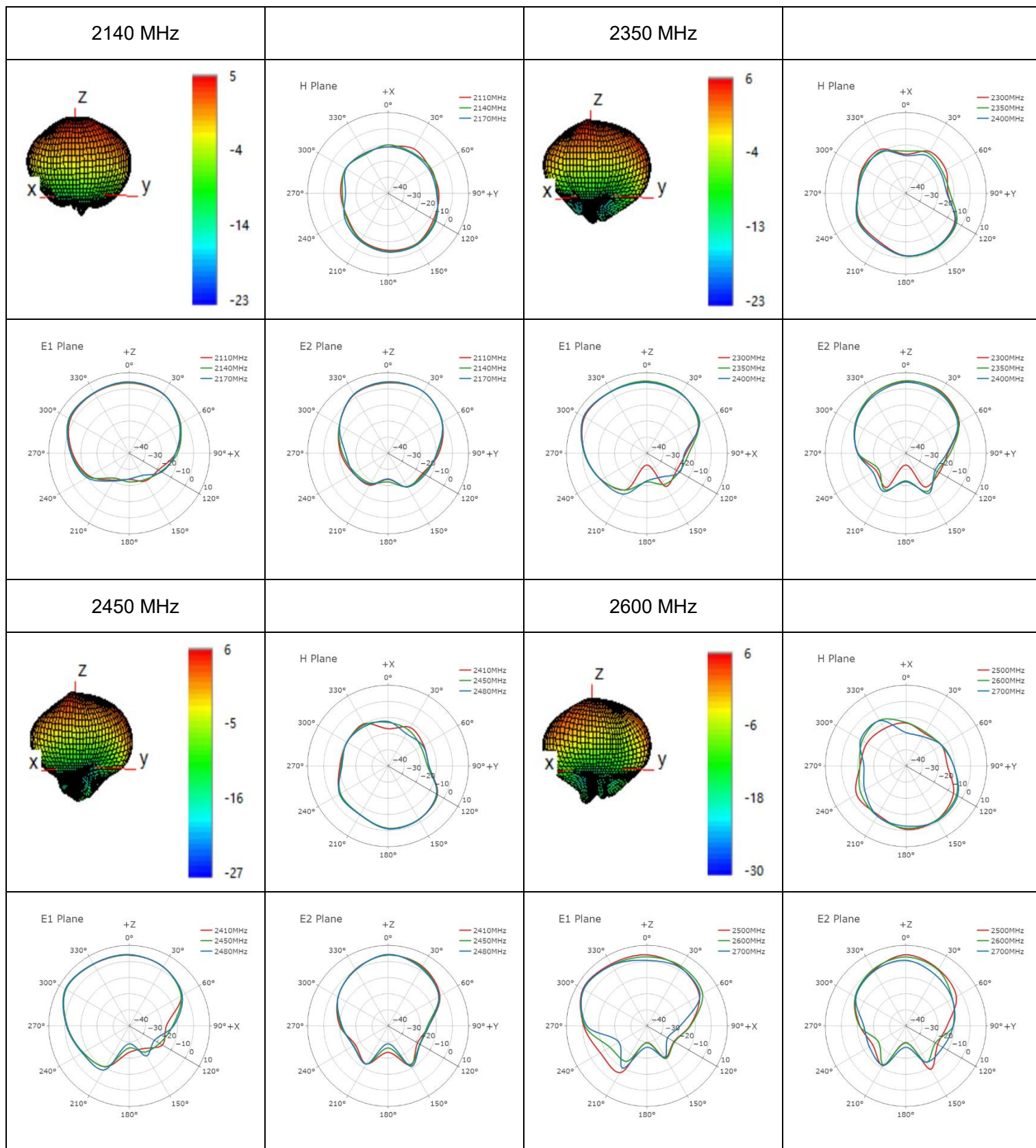


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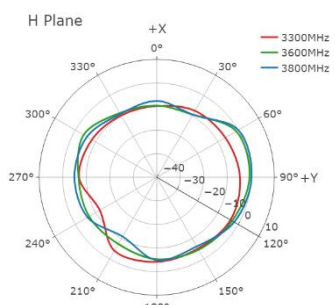
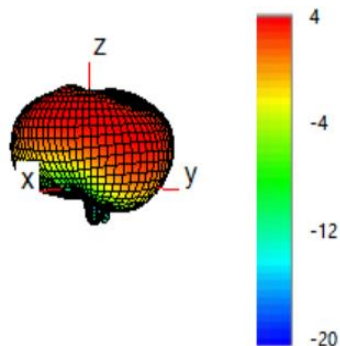


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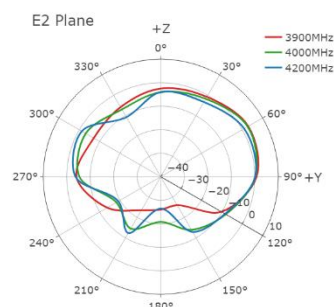
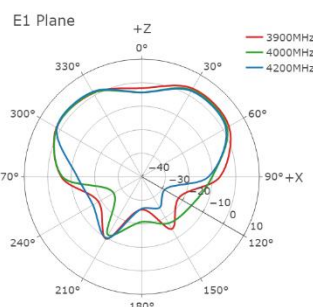
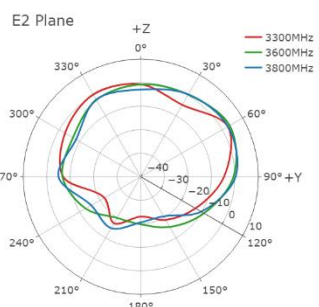
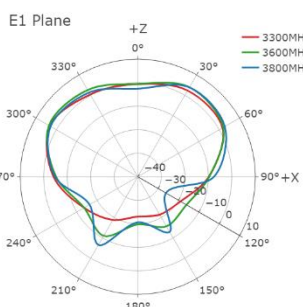
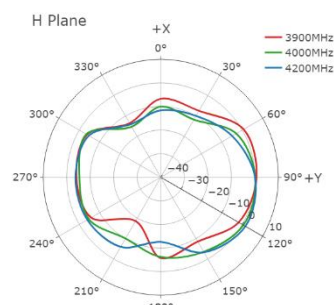
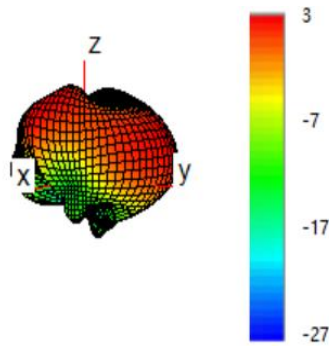




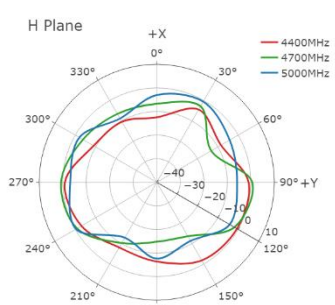
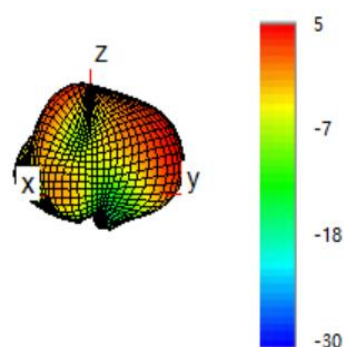
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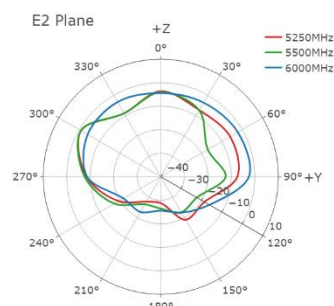
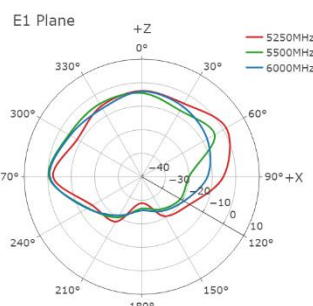
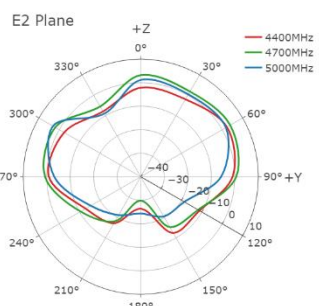
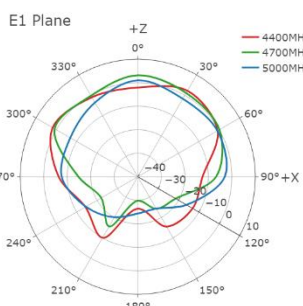
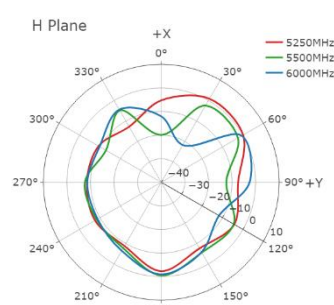
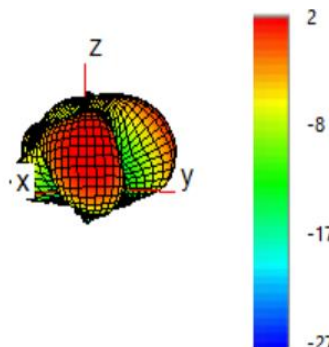
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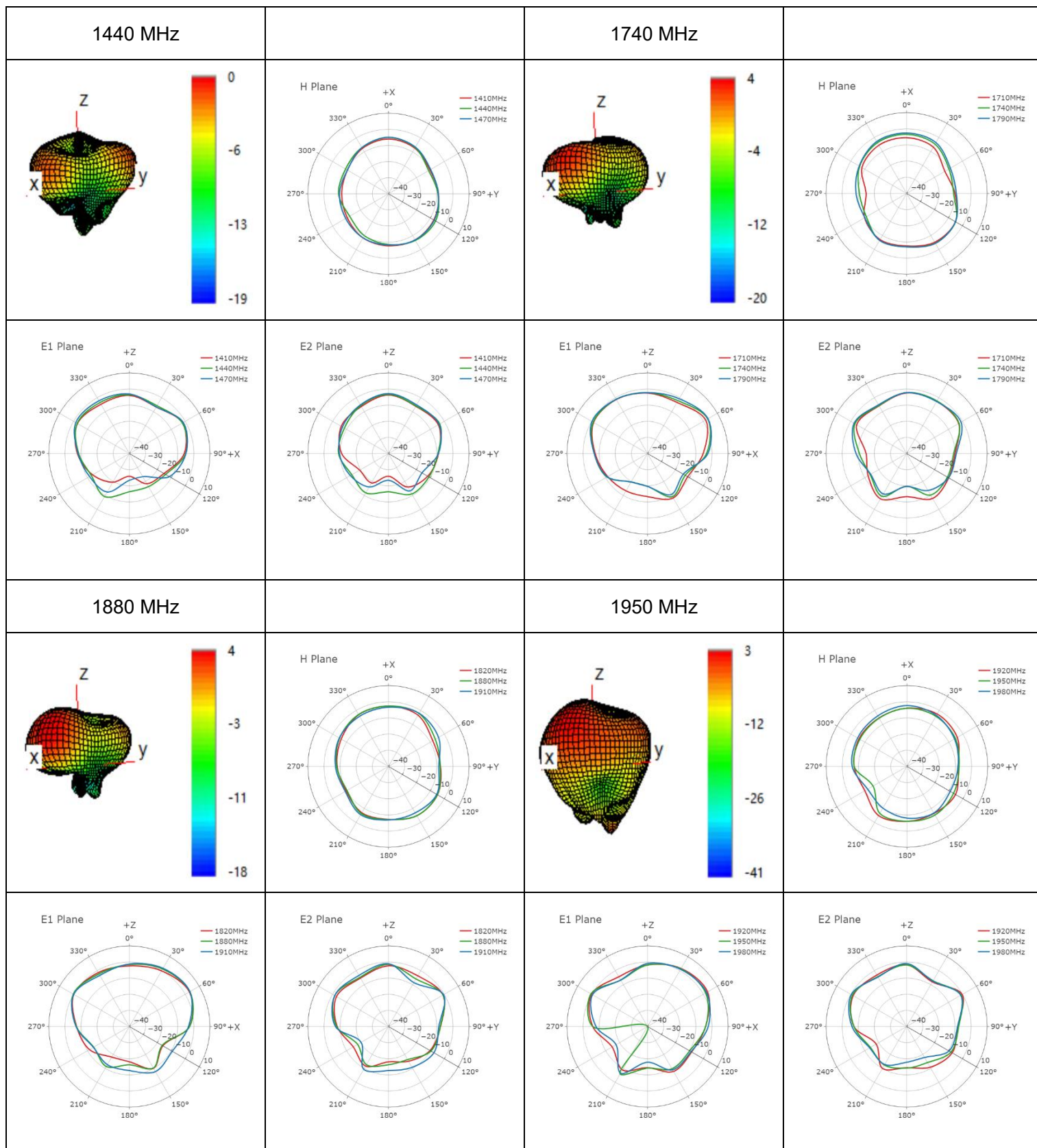
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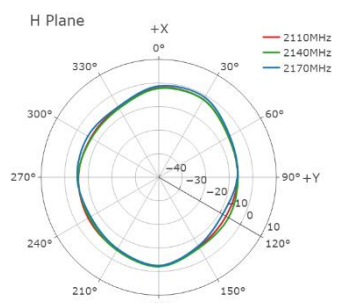
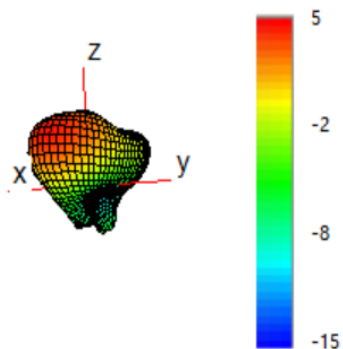
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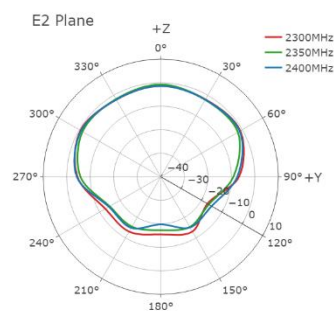
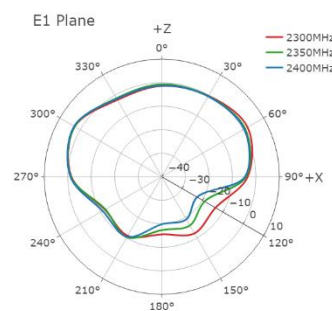
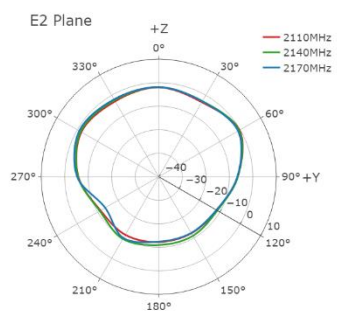
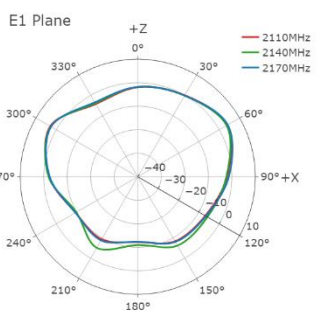
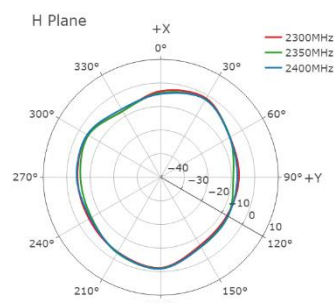
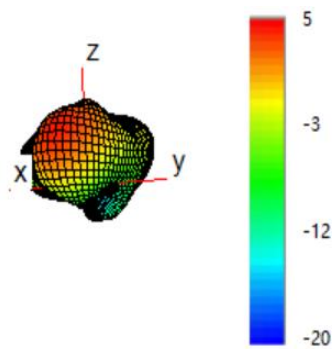
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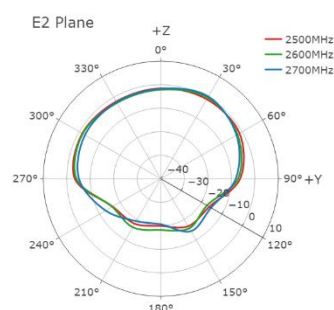
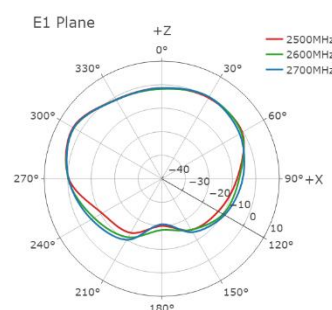
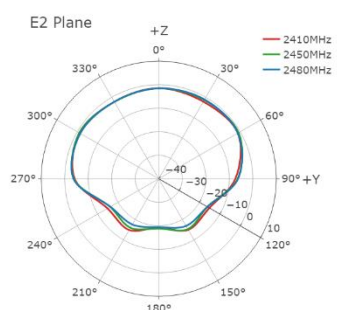
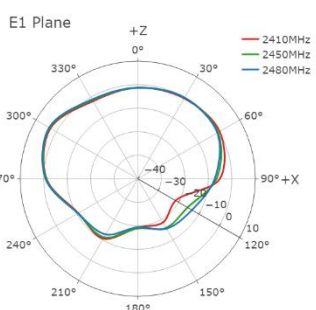
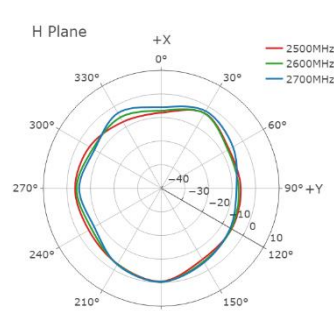
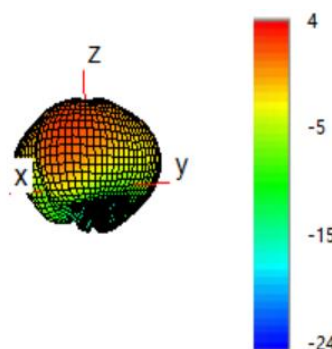
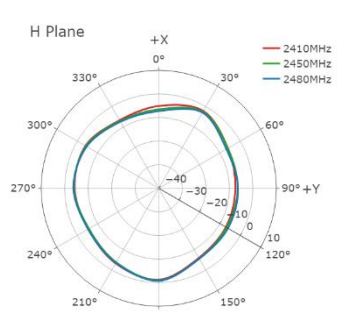
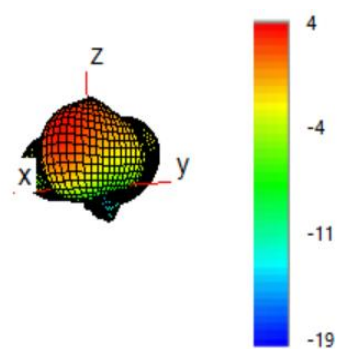
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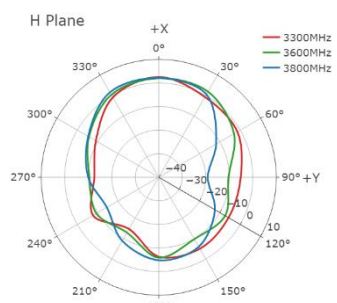
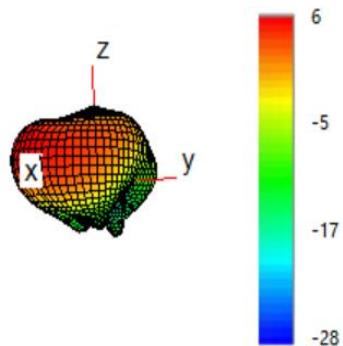
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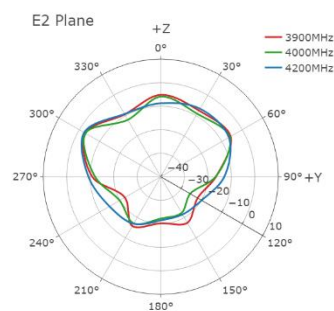
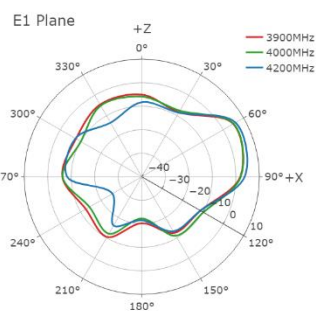
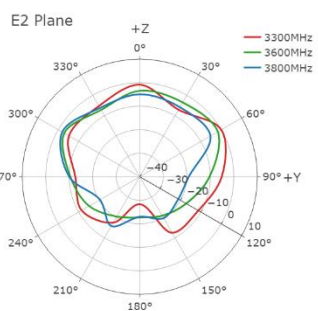
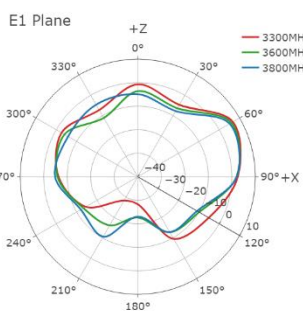
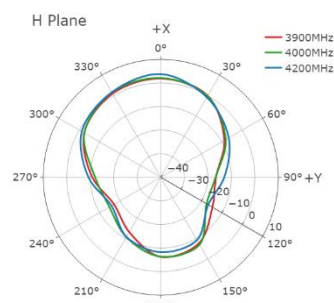
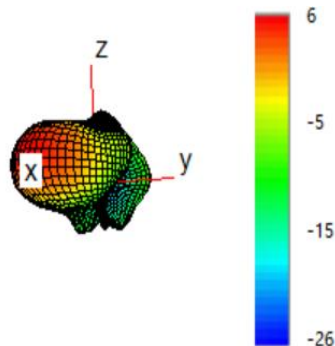
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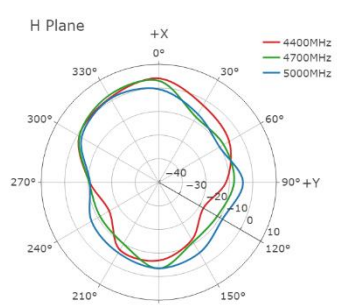
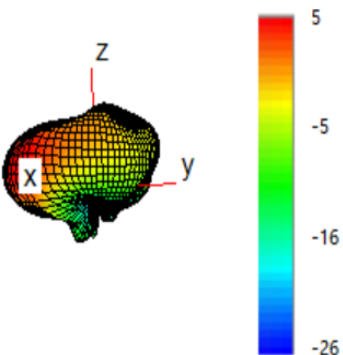
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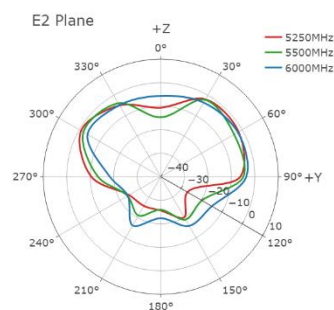
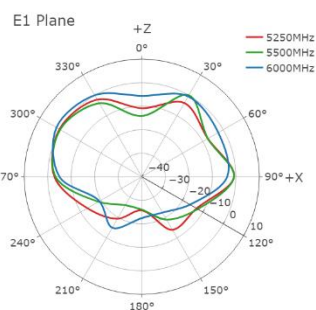
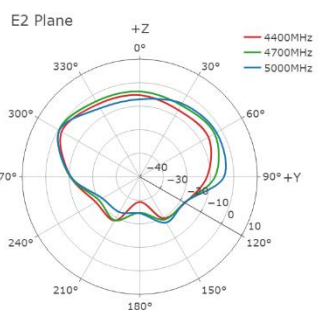
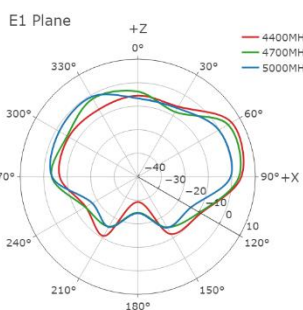
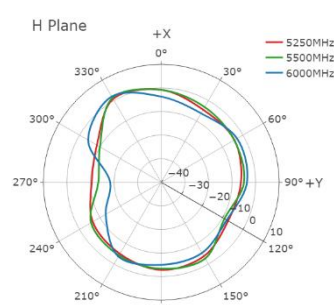
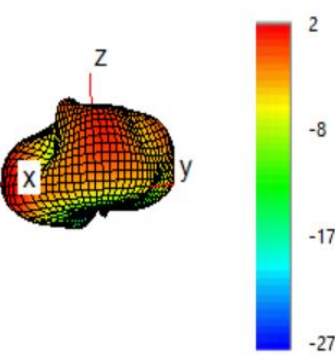
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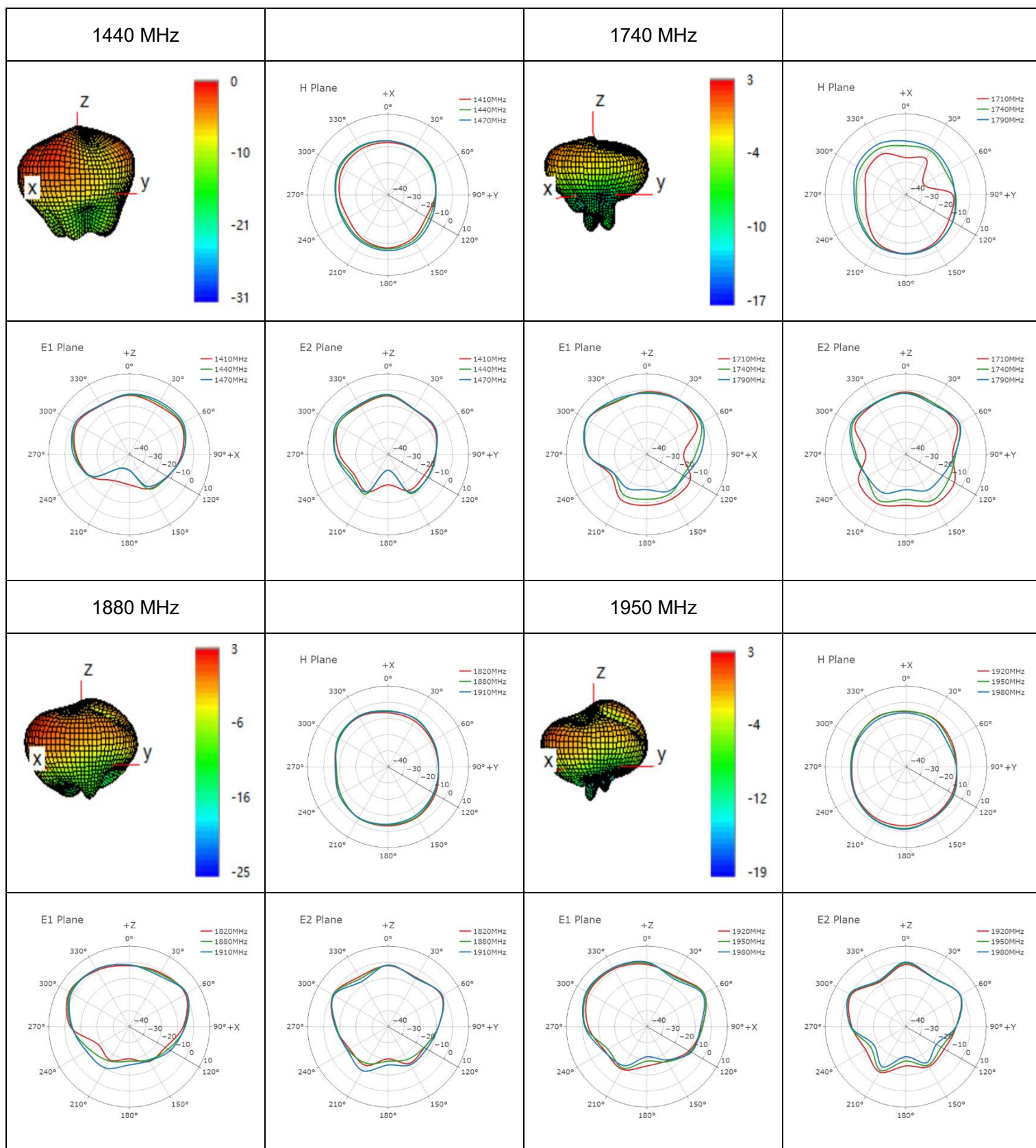
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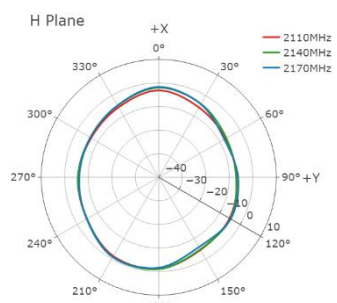
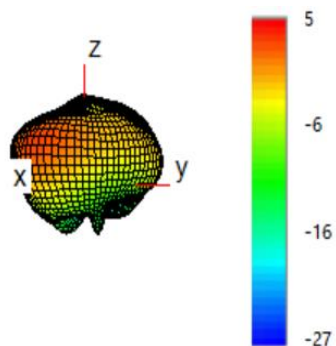
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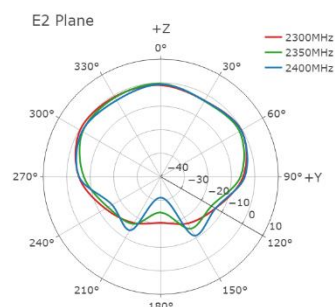
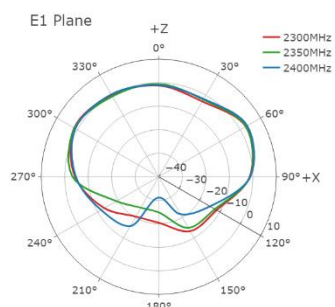
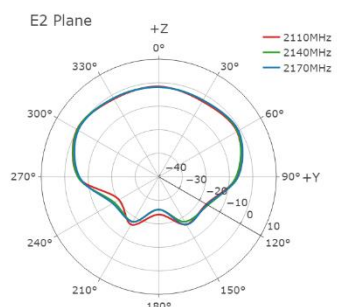
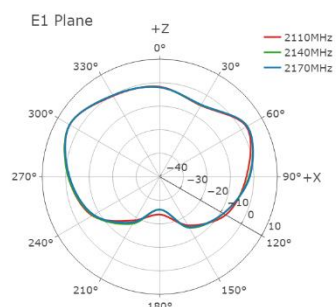
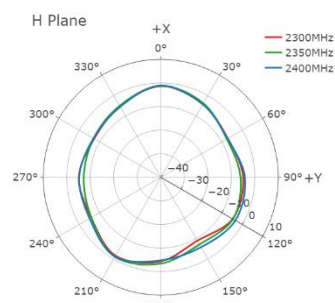
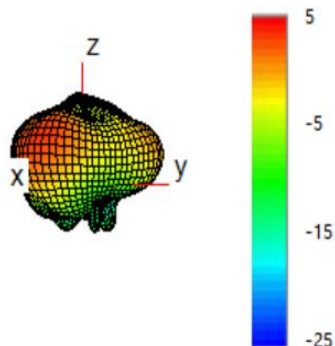
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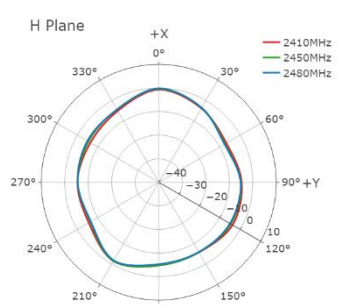
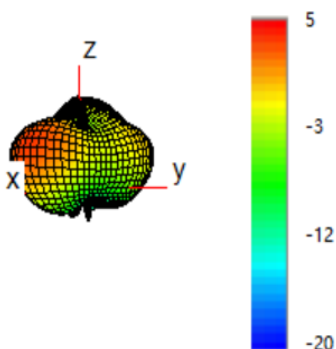
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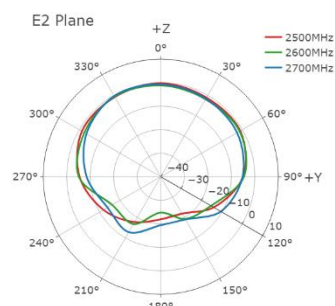
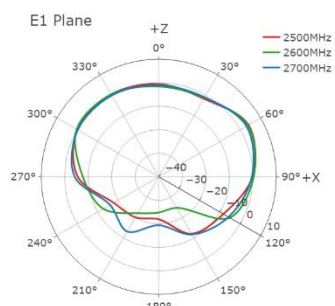
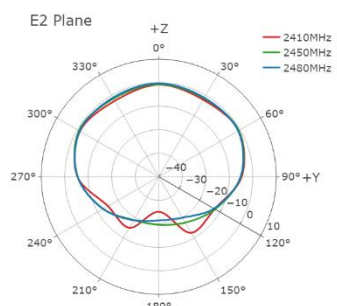
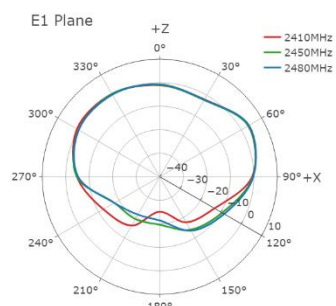
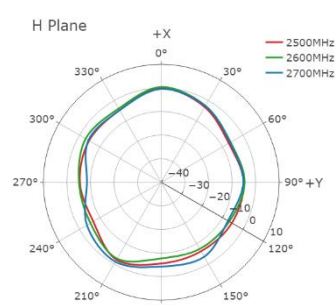
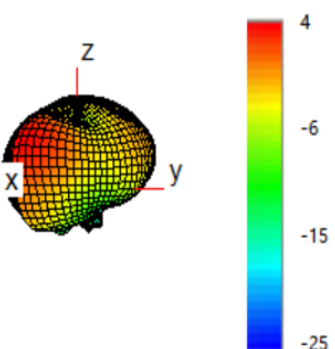
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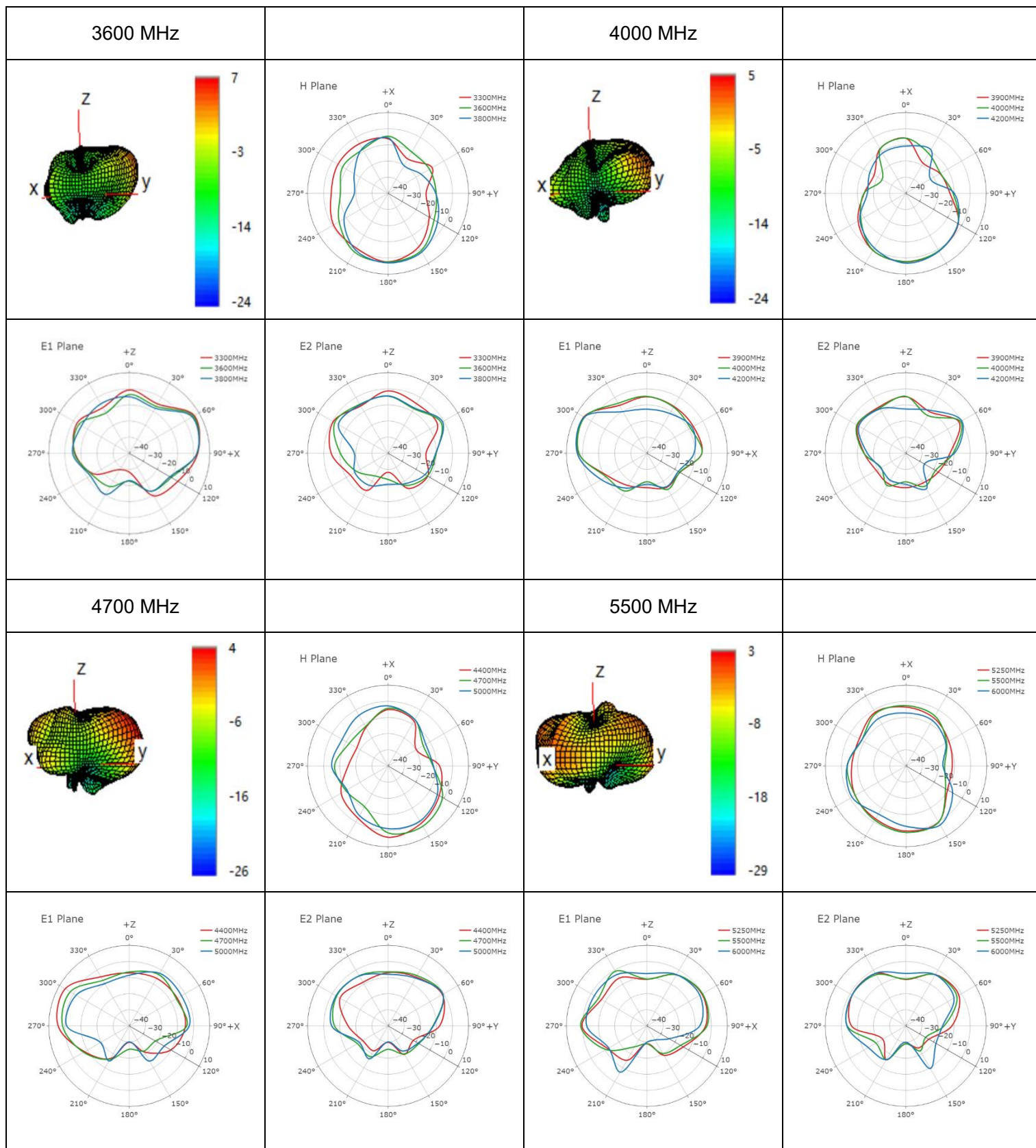


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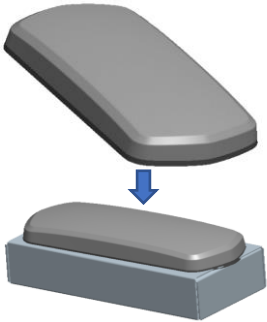
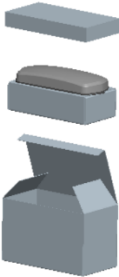
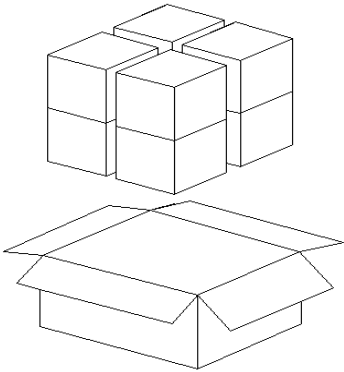


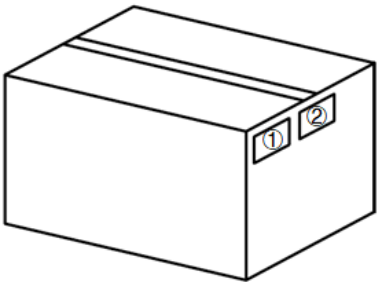
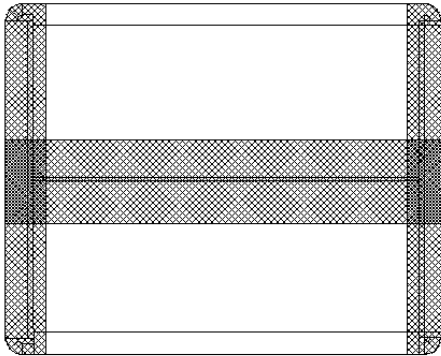
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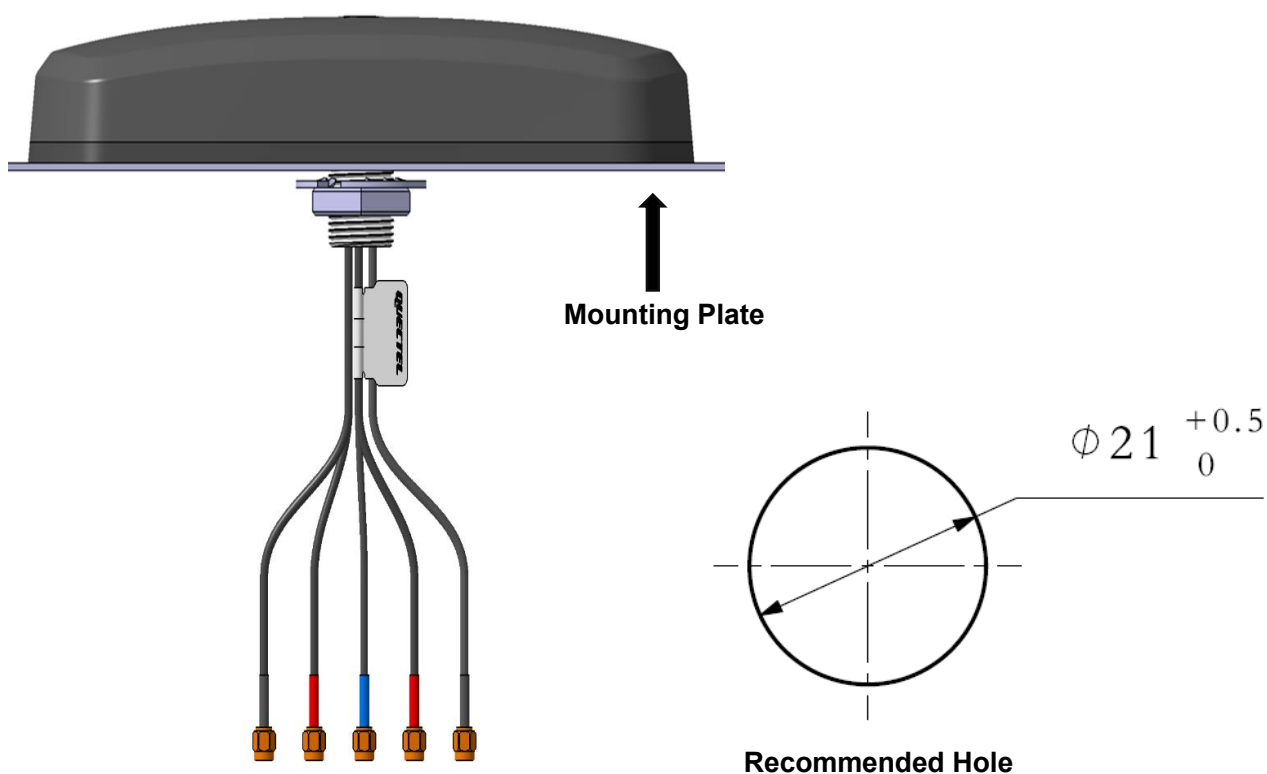
4 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Put the product harness inside the paper card, and the product on the paper card.
2		Place the product in the box; Pearl cotton protection is placed on the product.
3		Put inner boxes into the outer box, 4 boxes per layer, stacked 2 layers, a total of 8 inner boxes. (8 pcs antennas per carton box) <u>Carton Size:</u> <u>L × W × H = 500 × 415 × 220 mm</u>

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

5 Installation

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



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	1400–6000 MHz	5G MIMO/Wi-Fi/BT
5G MH2	Black	ALS302	SMA Male	1400–6000 MHz	5G MIMO/Wi-Fi/BT
GNSS	Blue	RG174	SMA Male	1164–1189 MHz, 1565–1606 MHz	GPS/GLONASS/GALILEO /BEIDOU/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:

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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.



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