Antenna Datasheet

Product OC: YECN009AA
Version: 5.0
Date: 2023-10-10
Status: Released

Product Name: External 5G Antenna
Key Features:
Frequency Band: 600–6000 MHz
Dimensions: 200 mm × 21 mm × 8 mm
Efficiency: Up to 79.6 % (FS)
RoHS and REACH Compliant

Overview

This Quectel external 5G antenna covers 5G NR Sub-6 GHz frequency bands and is compatible with 4G/3G/2G/LPWA bands. Featuring high efficiency and gain, it is an ideal omni-directional antenna solution to ensure high-speed data transmission, which can be widely used in a diversity of wireless communication devices such as AP, routers, outdoor equipment, real-time monitoring equipment, and many more. The antenna is designed to work with any ground plane size or in free space for ease of integration. Quectel also offers flexible installation with custom cable length and connector options.

Contents

1 Specification

Test Condition: On 130 mm × 130 mm EVB & Free Space

Electrical	
Frequency Range	600–6000 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail

Band / SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B48	B42 /N77	N79	Wi-Fi 5G
	Freq. (MHz)	**600–700**	**700–810**	**820–960**	**1700–2170**	**2300–2400**	**2400–2500**	**2500–2690**	**3550–3700**	**3300–4200**	**4400–5000**	**5150–5850**
Max. VSWR	**EVB**	4.5	2.1	2.1	2.4	1.6	1.7	2.3	2.5	3.4	2.3	4.0
	FS	3.2	2.1	1.4	1.9	1.7	1.9	1.7	2.2	2.0	1.8	2.7
Max. Return Loss (dB)	**EVB**	-3.9	-9.1	-9.1	-7.7	-12.2	-11.5	-8.2	-7.5	-5.3	-8.0	-4.4
	FS	-5.7	-9.2	-14.8	-10.3	-12.1	-10.4	-11.6	-8.7	-9.5	-11.1	-6.8
AVG Eff. (%)	**EVB**	44.0	62.0	56.3	57.9	73.3	73.2	66.5	60.9	57.2	52.4	37.1
	FS	36.9	35.8	35.4	48.2	58.8	67.5	69.2	65.7	48.8	51.0	47.9
AVG AVG Gain (dB)	**EVB**	-3.7	-2.1	-2.5	-2.4	-1.4	-1.4	-1.8	-2.2	-2.5	-2.8	-4.4
	FS	-4.3	-4.5	-4.5	-3.2	-2.4	-1.7	-1.6	-1.8	-3.2	-3.0	-3.2
Max. Peak Gain (dBi)	**EVB**	1.3	1.7	1.9	1.3	3.4	2.2	2.0	1.7	3.6	4.3	3.0
	FS	-0.9	-0.4	0.3	0.1	2.6	1.5	1.2	1.4	3.6	4.0	3.9

VSWR	**EVB**	≤ 4.5
	FS	≤ 3.2
Return Loss	**EVB**	≤ -3.9 dB
	FS	≤ -5.7 dB
Peak Gain	**EVB**	≤ 4.3 dBi
	FS	≤ 4.0 dBi

Electrical - NTN Bands

SPEC \ Band		L Band	L Band	L Band	B256 / B23	B256 / B23
		1518-1559	1620-1665	1668-1675	1980-2020	2170-2200
Max. VSWR	**EVB**	1.8	1.4	1.4	1.6	1.5
	FS	1.5	1.3	1.4	1.5	1.5
Max. Return Loss (dB)	**EVB**	-10.8	-15.5	-15.5	-12.7	-13.9
	FS	-13.9	-17.6	-15.5	-13.9	-13.9
AVG Eff. (%)	**EVB**	60.1	63.6	62.1	72.5	67.6
	FS	49.7	47.4	47.9	65.5	75.2
AVG AVG Gain (dB)	**EVB**	-2.2	-2.0	-2.0	-1.4	-1.7
	FS	-3.0	-3.2	-3.2	-1.8	-1.2
Max. Peak Gain (dBi)	**EVB**	2.2	2.8	2.0	3.3	1.8
	FS	0.2	1.0	1.0	2.0	2.4
VSWR	**EVB**	≤ 1.8				
	FS	≤ 1.5				
Return Loss	**EVB**	≤ -10.8 dB				
	FS	≤ -13.9 dB				
Peak Gain	**EVB**	≤ 3.3 dBi				
	FS	≤ 2.4 dBi				

- **FS: Free Space**
- **EVB: On 130 mm × 130 mm EVB**

1.1. Supported Bands

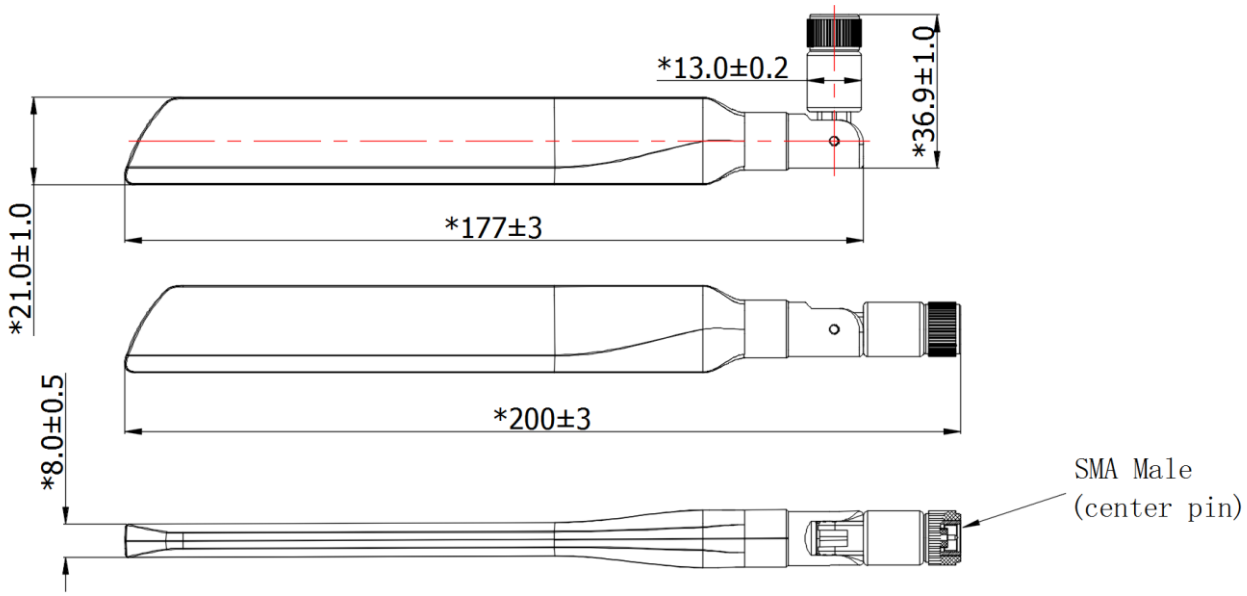
5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT					
Band	**Frequency (MHz)**	**Uplink (MHz)**	**Downlink (MHz)**	**MP**	**FS**
1	2100	1920–1980	2110–2170	√	√
2	1900	1850–1910	1930–1990	√	√
3	1800	1710–1785	1805–1880	√	√
4	1700	1710–1755	2110–2155	√	√
5	850	824–849	869–894	√	√
7	2600	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)**	**MP**	**FS**
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%					

1.2. Mechanical & Environmental

Mechanical	
Antenna Dimensions	200 mm × 21 mm × 8 mm
Material & Color	PC & Black
Connector Type	SMA Male
Mounting Type	Terminal
Weight	Typ. 24.9 g
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS and REACH Compliant	Yes

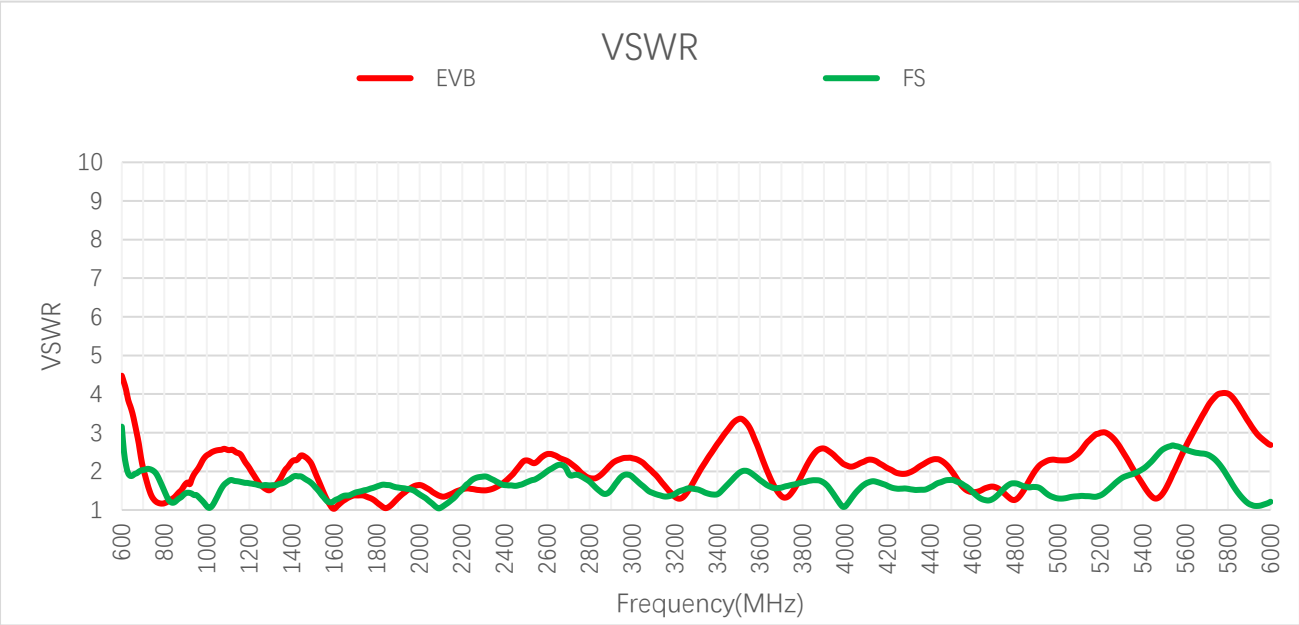
2 Drawing



3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR



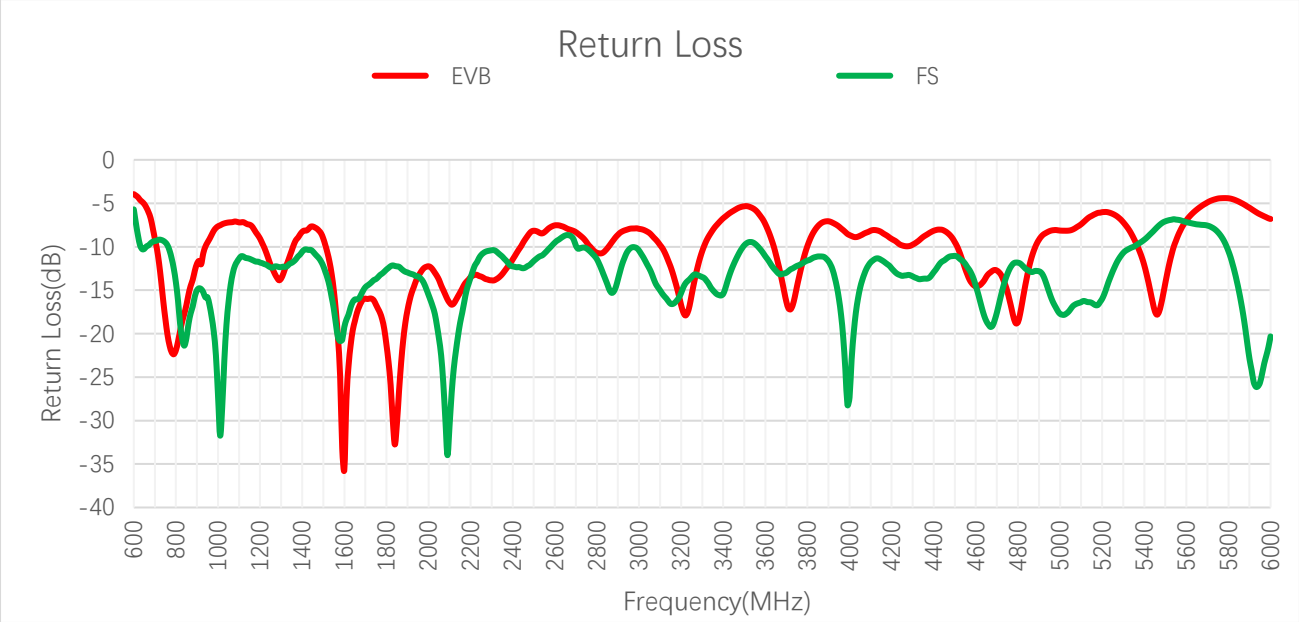
VSWR

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
VSWR	EVB	4.5	3.8	1.9	1.3	1.7	2.1	2.4	1.4	1.4	1.2
	FS	3.2	1.9	2.0	1.2	1.4	1.3	1.9	1.5	1.5	1.6
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
VSWR	EVB	1.5	1.4	1.6	2.0	2.4	2.5	1.6	2.3	1.5	2.7
	FS	1.5	1.2	1.8	1.6	2.0	1.8	1.3	1.3	2.6	1.2

VSWR - NTN Bands

Frequency (MHz)		1520	1560	1630	1680	2000	2200
VSWR	EVB	1.8	1.3	1.2	1.4	1.6	1.5
	FS	1.5	1.2	1.3	1.4	1.4	1.5

3.1.2. Return Loss



Return Loss (dB)

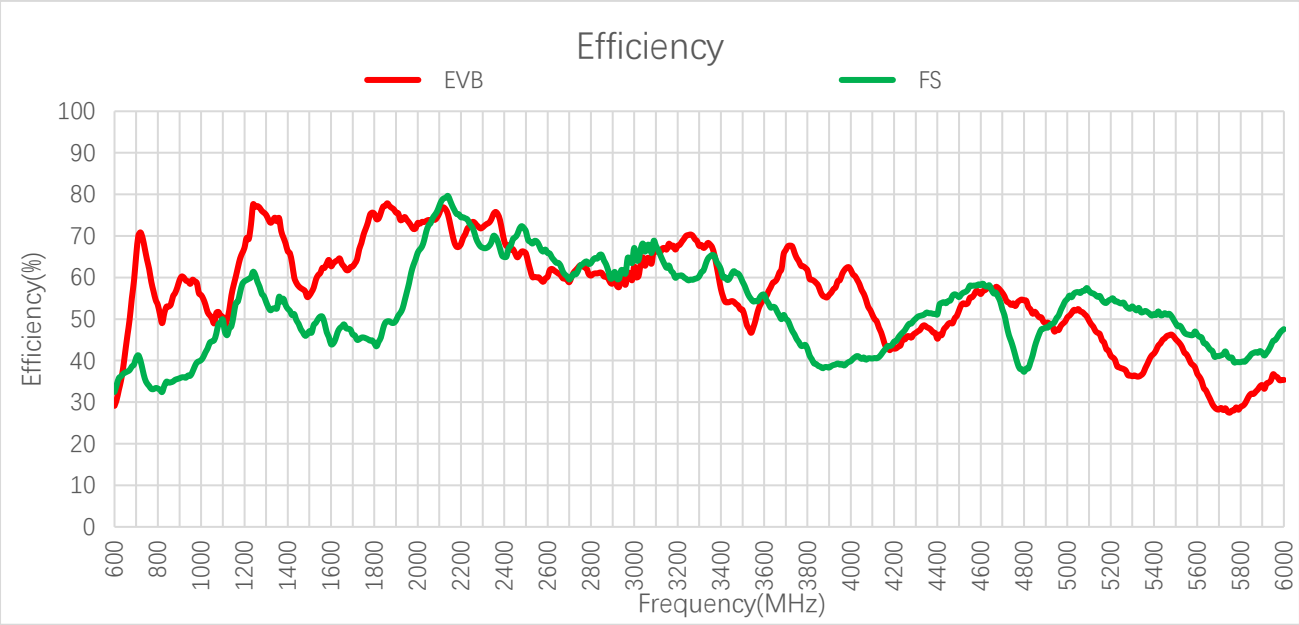
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Return Loss (dB)	EVB	-3.9	-4.6	-10.3	-18.6	-12.0	-9.1	-7.7	-16.0	-16.2	-20.7
	FS	-5.7	-9.9	-9.3	-20.6	-15.0	-16.8	-10.4	-14.5	-13.8	-12.7
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
Return Loss (dB)	EVB	-13.4	-15.7	-13.2	-9.5	-7.5	-7.4	-12.7	-8.1	-14.2	-6.8
	FS	-13.4	-20.3	-11.1	-12.5	-9.5	-11.1	-17.6	-17.7	-7.1	-20.3

Return Loss (dB) - NTN Bands

Frequency (MHz)		1520	1560	1630	1680	2000	2200
Return Loss (dB)	EVB	-10.8	-17.6	-20.8	-15.5	-12.7	-13.9
	FS	-13.9	-20.8	-17.6	-15.5	-15.5	-13.9

3.2. Radiation Performance Test

3.2.1. Efficiency



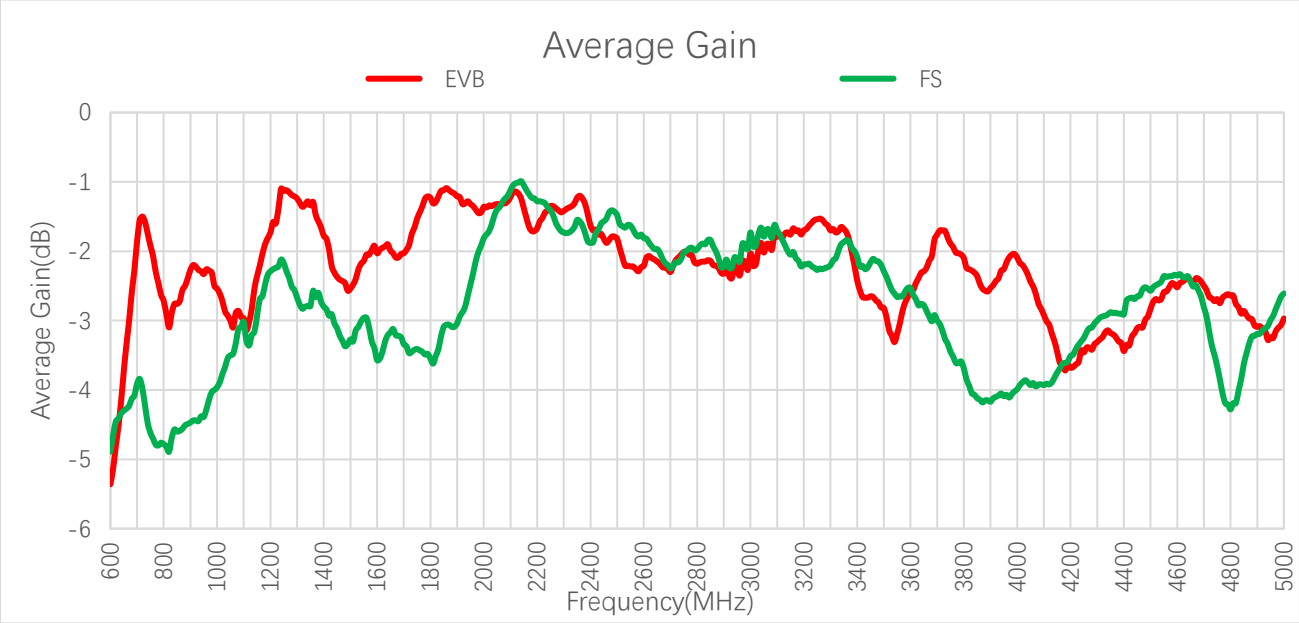
Efficiency (%)

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	EVB	29.1	35.2	70.0	51.5	59.3	59.5	58.7	63.4	68.3	76.8
	FS	32.5	36.2	41.3	33.9	35.7	37.3	49.7	46.1	45.5	49.1
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
Efficiency (%)	EVB	73.9	75.2	75.3	65.8	60.2	55.6	56.3	50.4	45.2	35.4
	FS	56.5	79.6	70.0	69.7	65.9	55.8	52.3	54.8	49.0	47.6

Efficiency (%) - NTN Bands

Frequency (MHz)		1520	1560	1630	1680	2000	2200
Efficiency (%)	EVB	57.5	62.3	64.2	61.8	73.1	68.0
	FS	48.5	50.5	46.8	47.6	65.9	74.5

3.2.2. Average Gain



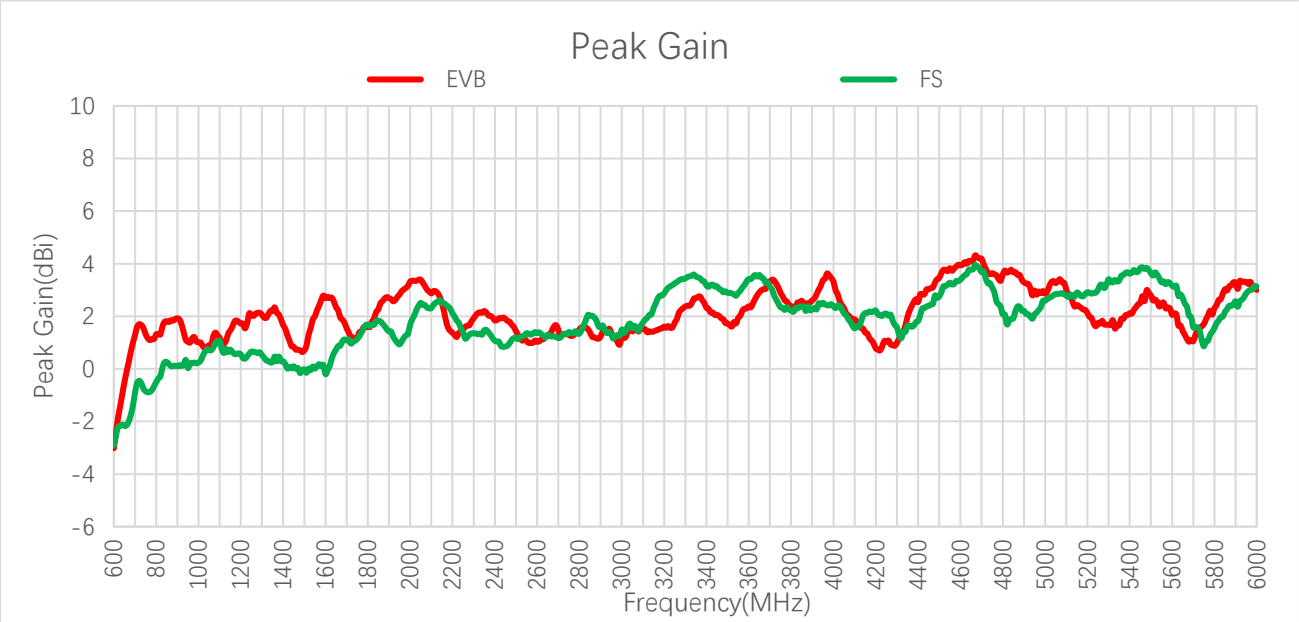
Average Gain (dB)

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Average Gain (dB)	EVB	-5.4	-4.5	-1.6	-2.9	-2.3	-2.3	-2.3	-2.0	-1.7	-1.2
	FS	-4.9	-4.4	-3.8	-4.7	-4.5	-4.3	-3.0	-3.4	-3.4	-3.1
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
Average Gain (dB)	EVB	-1.3	-1.2	-1.2	-1.8	-2.2	-2.6	-2.5	-3.0	-3.5	-4.5
	FS	-2.5	-1.0	-1.6	-1.6	-1.8	-2.5	-2.8	-2.6	-3.1	-3.2

Average Gain (dB) - NTN Bands

Frequency (MHz)		1520	1560	1630	1680	2000	2200
Average Gain (dB)	EVB	-2.4	-2.0	-1.9	-2.1	-1.4	-1.7
	FS	-3.1	-3.0	-3.3	-3.2	-1.8	-1.3

3.2.3. Peak Gain



Peak Gain (dBi)

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	EVB	-3.0	-1.4	1.6	1.6	1.9	1.0	0.9	1.4	1.1	2.7
	FS	-2.9	-2.2	-0.5	0.1	0.1	0.2	0.0	1.1	1.1	1.6
Frequency (MHz)		**1950**	**2140**	**2350**	**2450**	**2600**	**3600**	**4700**	**5000**	**5500**	**6000**
Peak Gain (dBi)	EVB	2.8	2.7	2.2	1.9	1.0	2.4	4.2	2.9	2.8	3.0
	FS	0.9	2.6	1.5	0.9	1.4	3.4	3.7	2.6	3.6	3.1

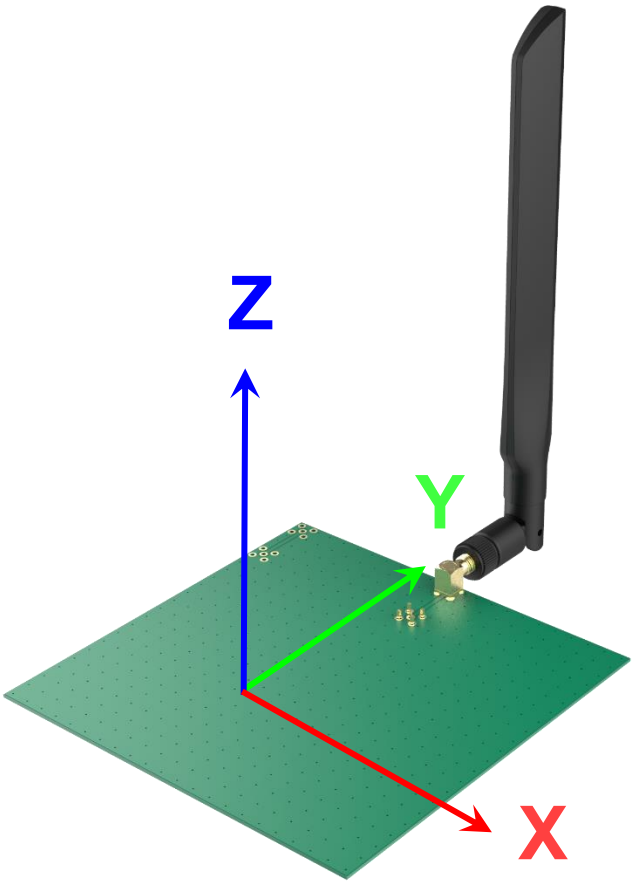
Peak Gain (dBi) - NTN Bands

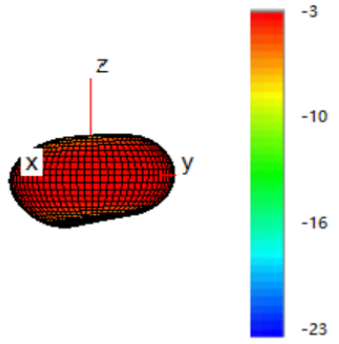
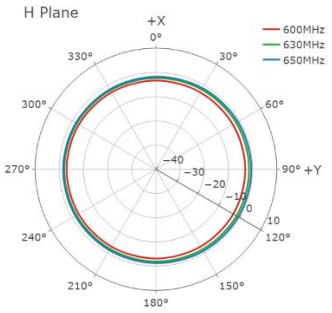
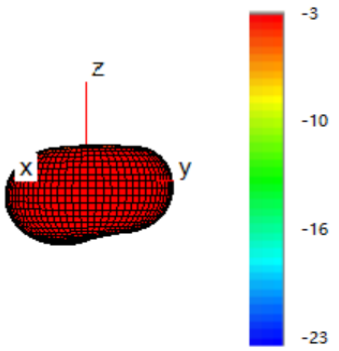
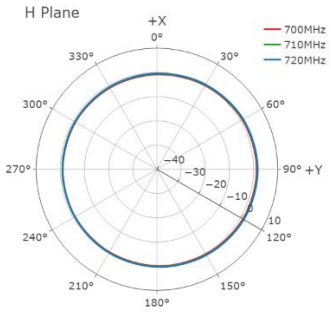
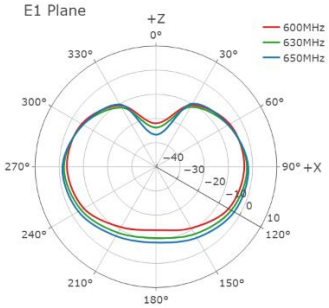
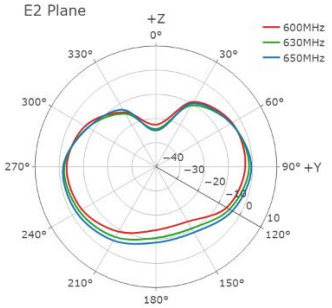
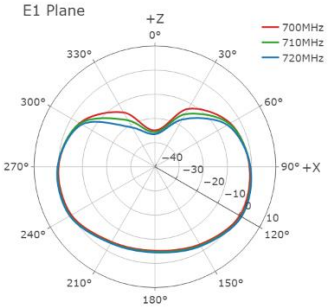
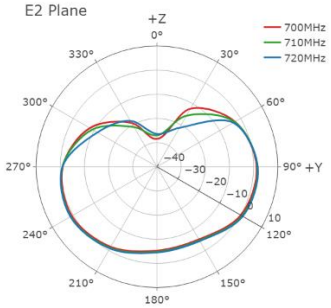
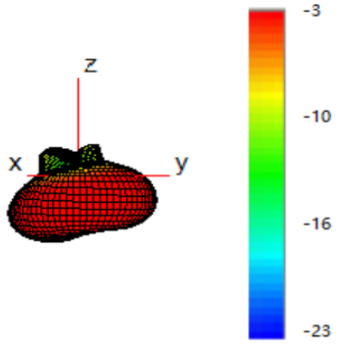
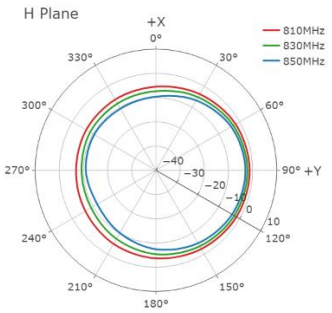
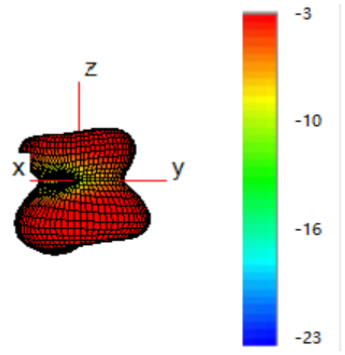
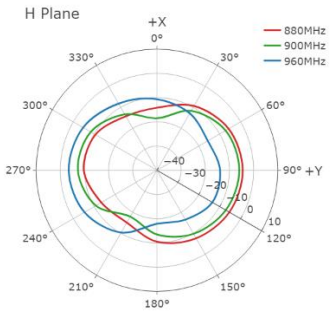
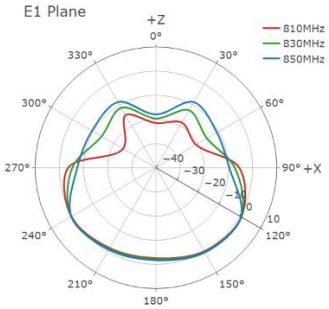
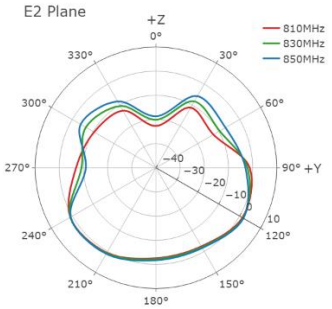
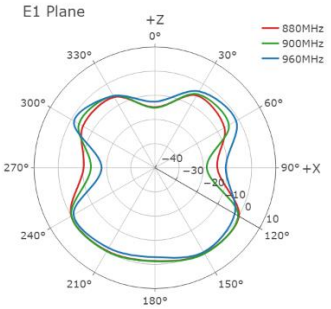
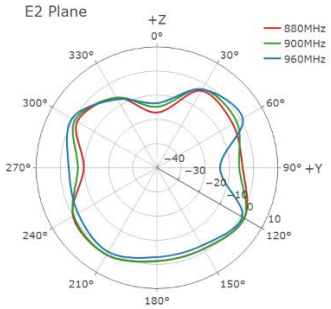
Frequency (MHz)		1520	1560	1630	1680	2000	2200
Peak Gain (dBi)	EVB	1.3	2.2	2.7	1.8	3.2	1.4
	FS	0.1	0.1	0.4	1.0	1.7	2.2

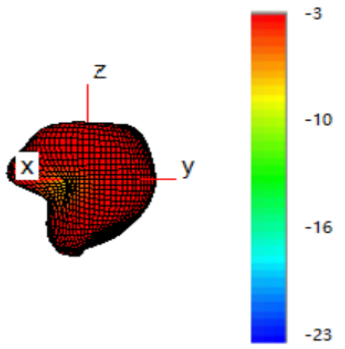
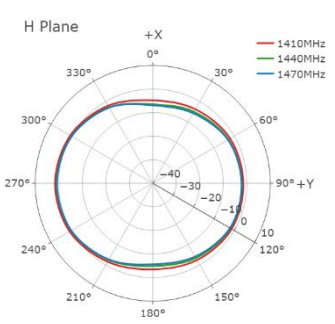
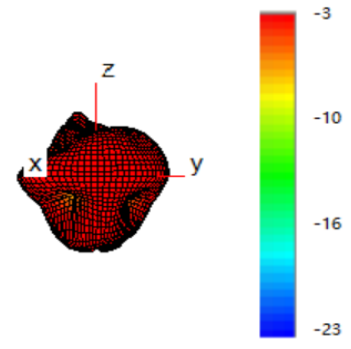
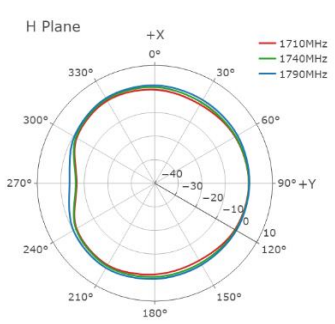
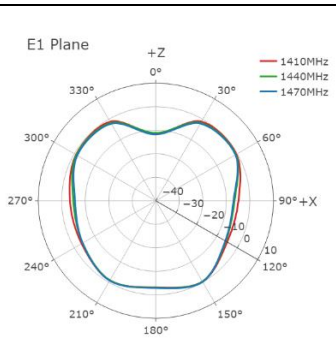
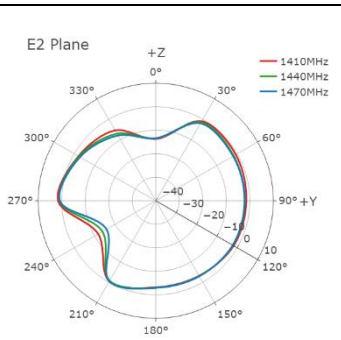
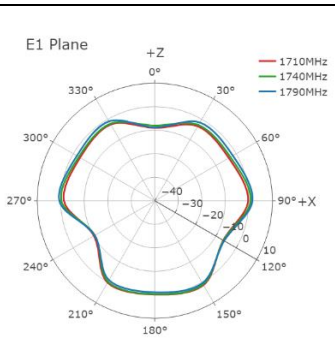
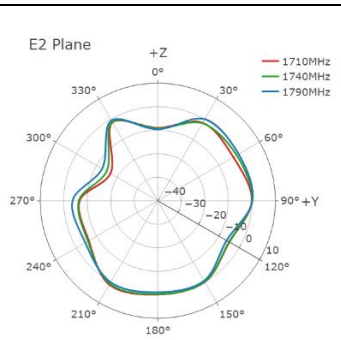
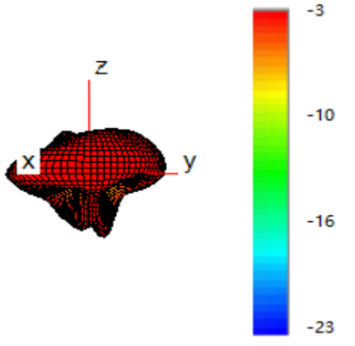
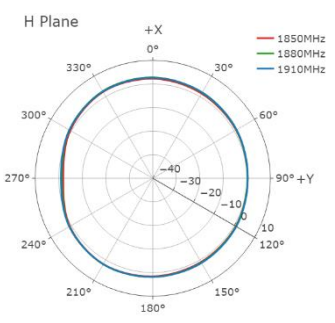
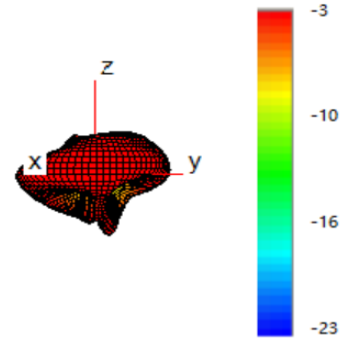
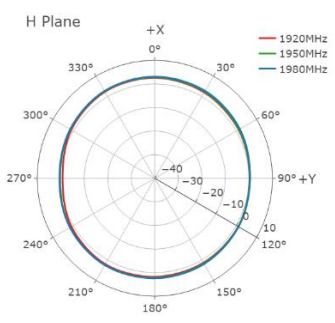
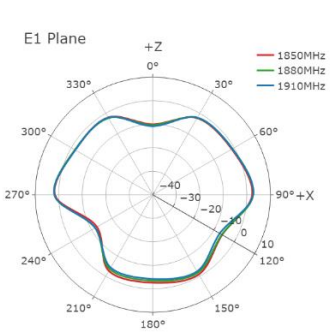
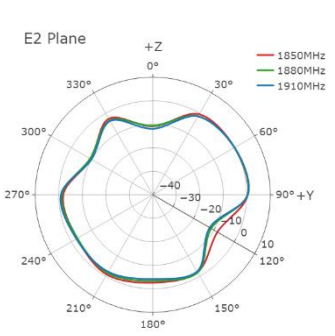
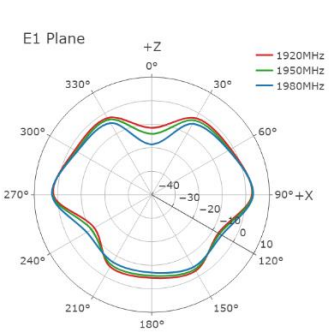
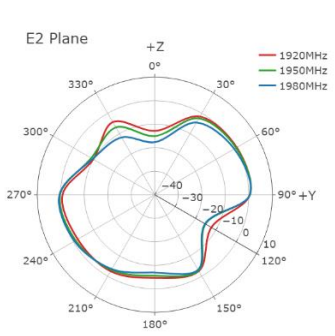
3.2.4. 3D & 2D Radiation Pattern

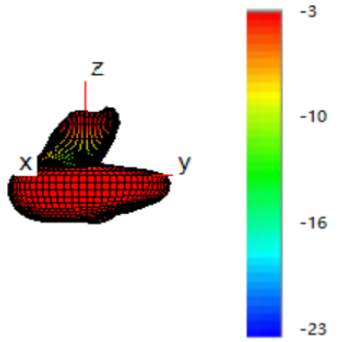
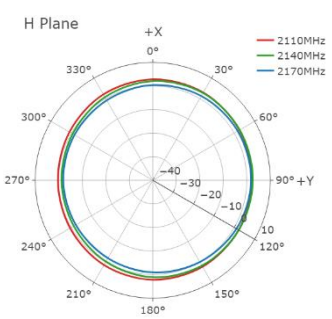
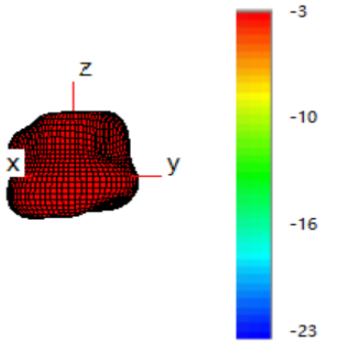
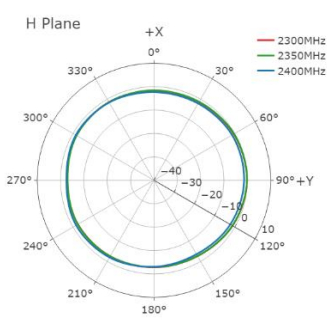
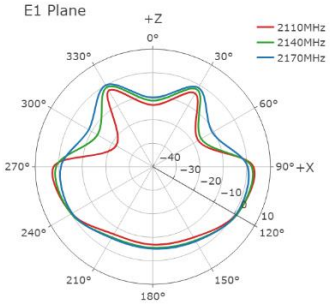
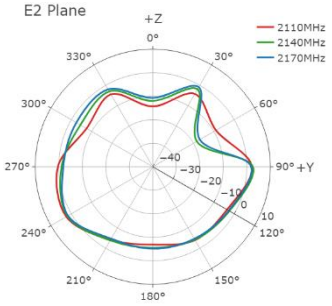
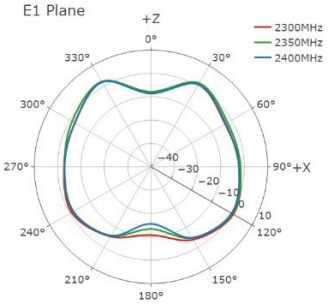
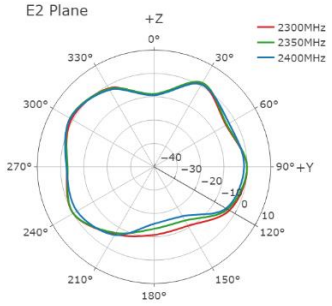
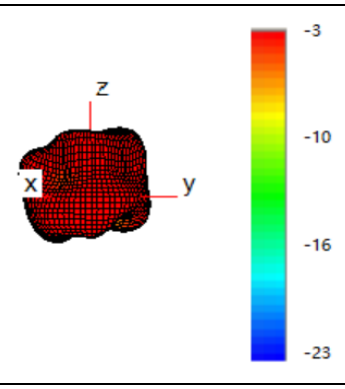
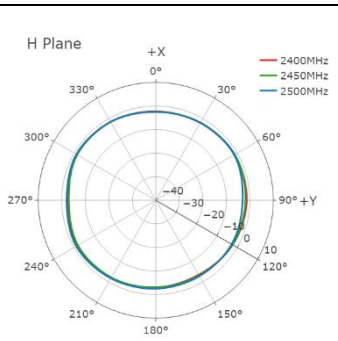
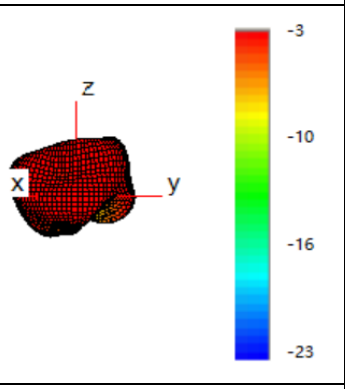
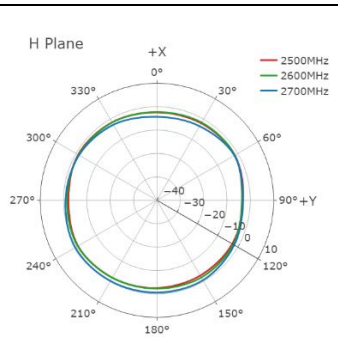
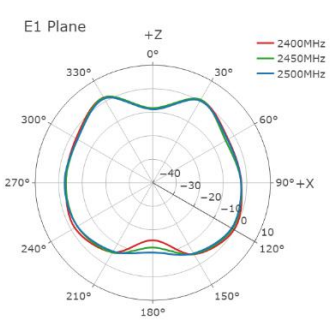
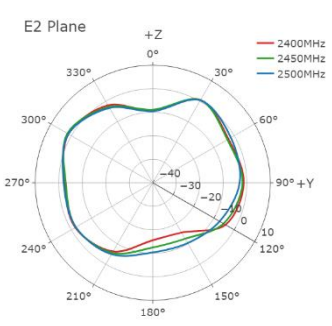
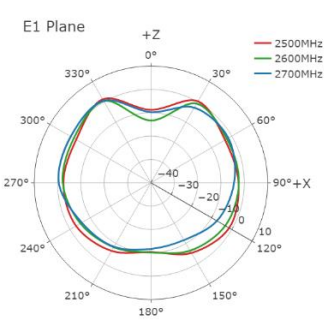
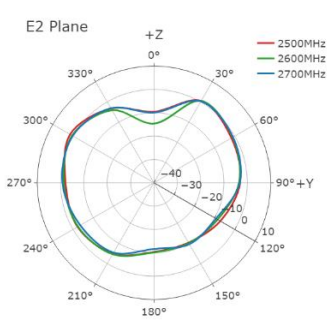
3.2.4.1. Test Condition: On 130 mm × 130 mm EVB

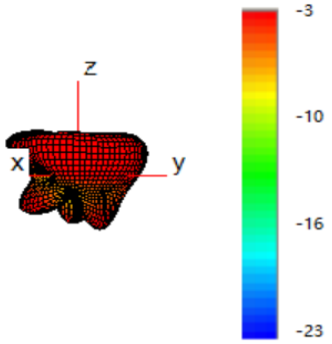
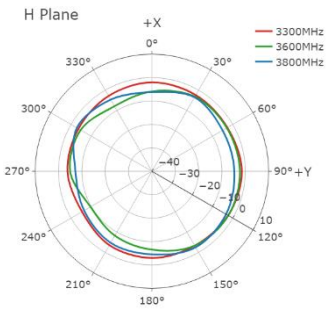
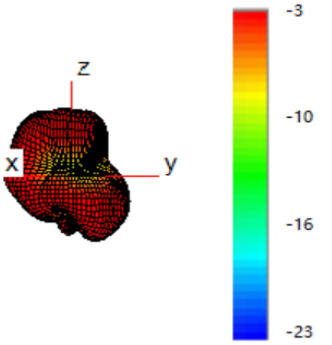
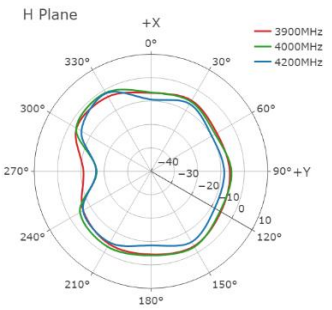
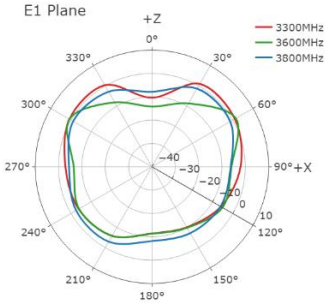
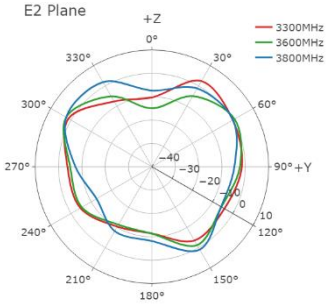
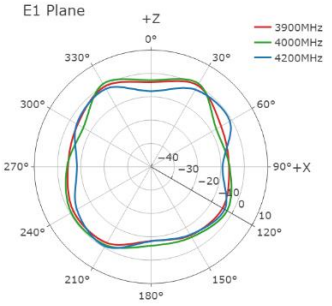
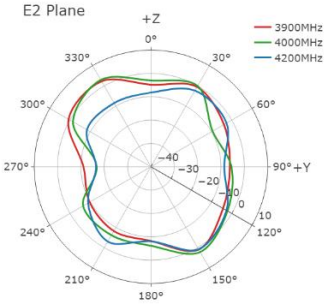
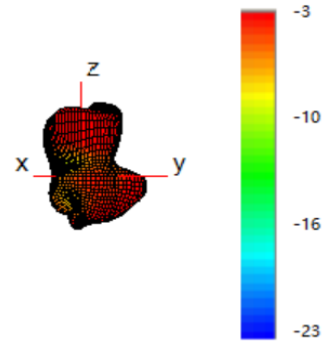
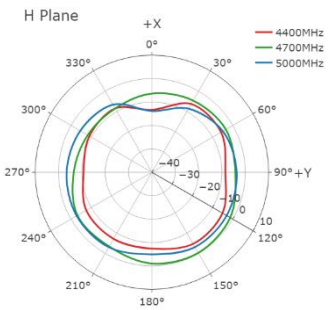
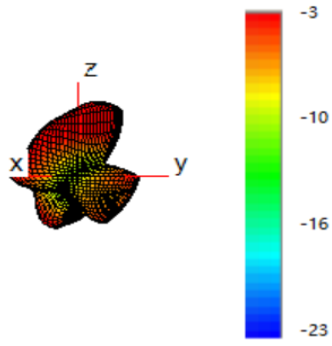
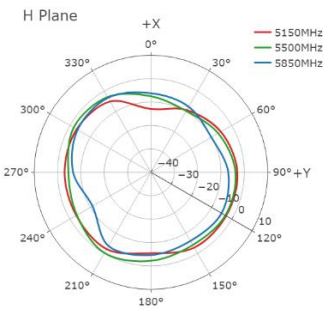
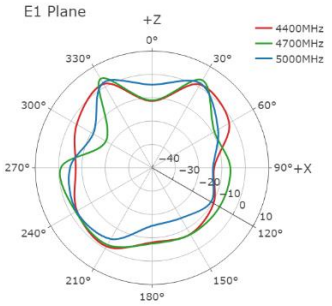
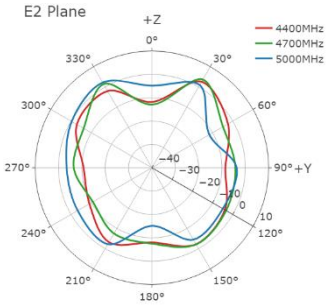
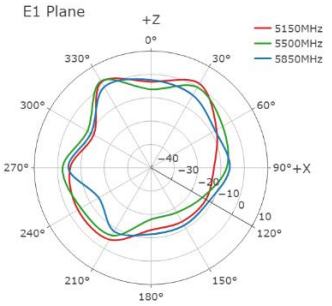
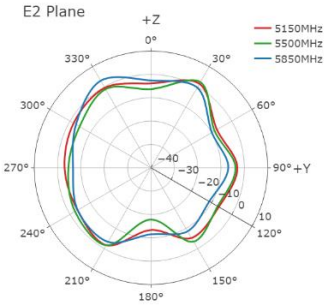
- Test Chamber: HF-G-1



630 MHz		710 MHz	
			
			
830 MHz		900 MHz	
			
			

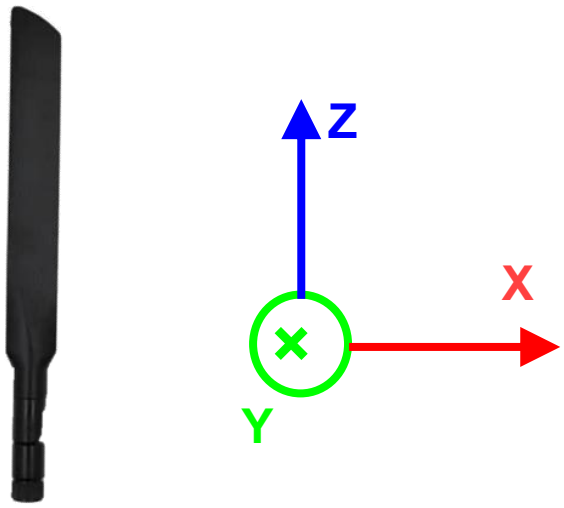
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

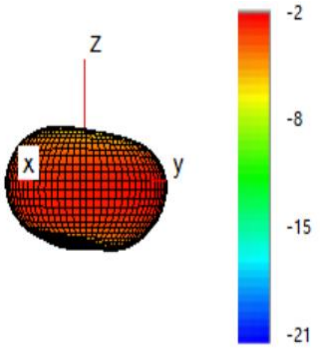
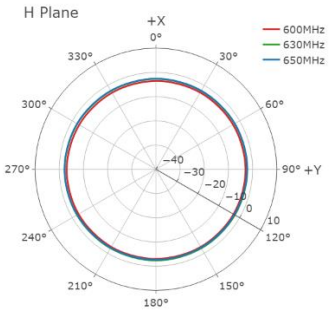
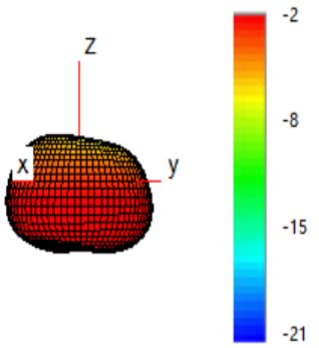
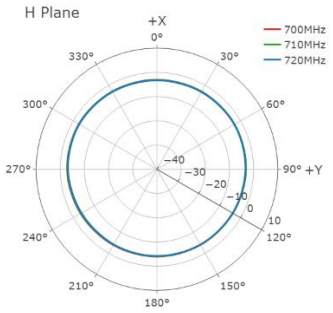
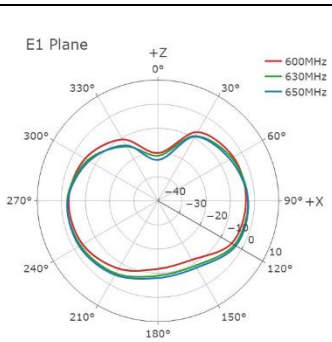
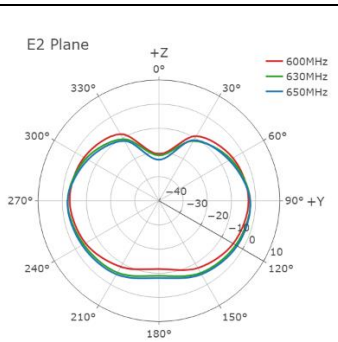
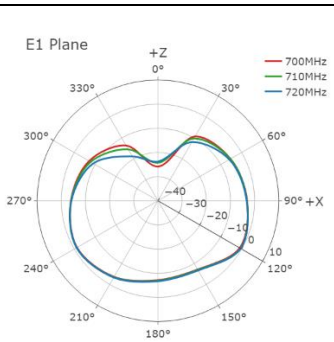
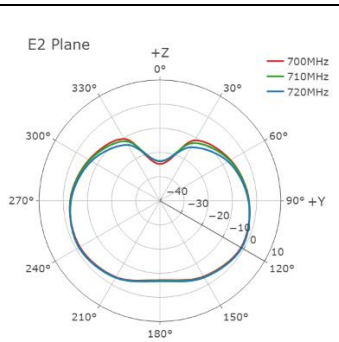
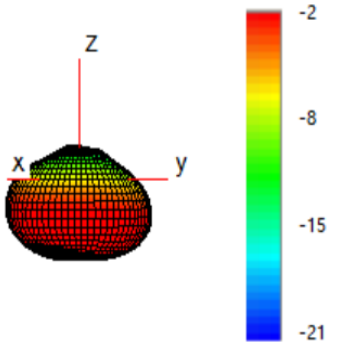
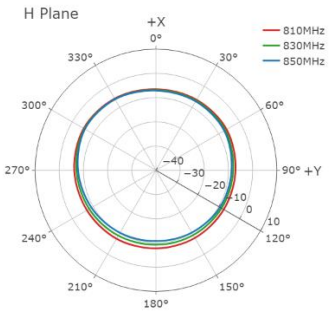
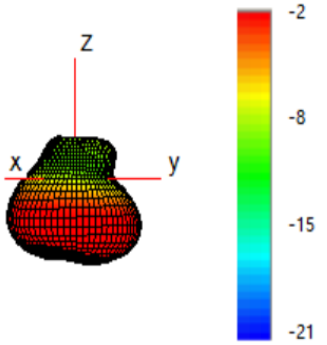
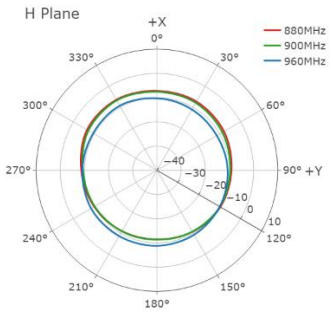
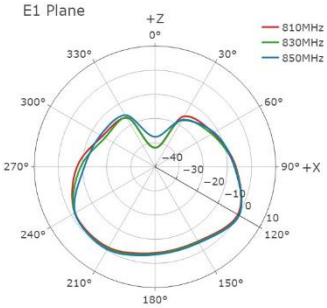
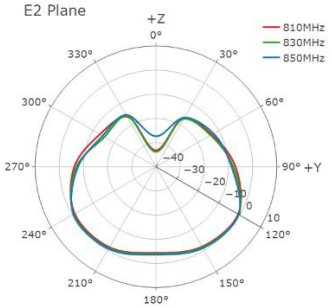
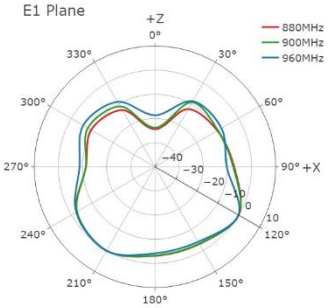
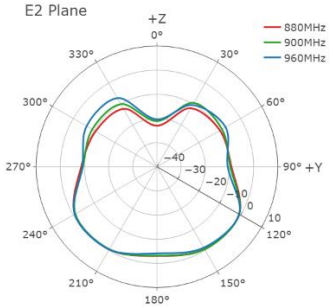
2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

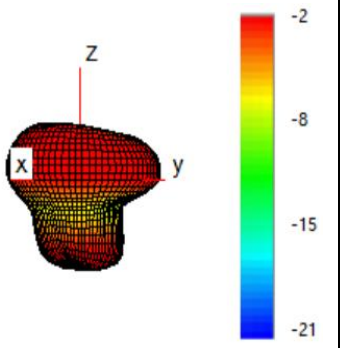
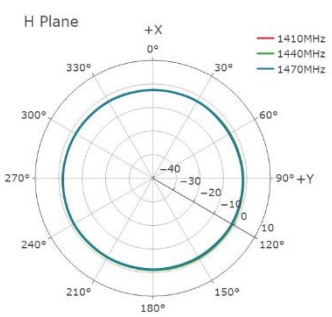
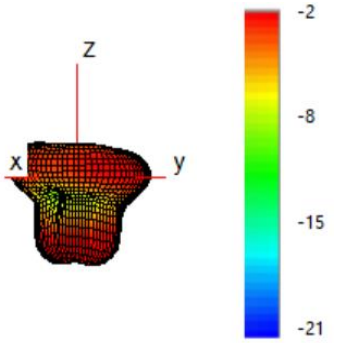
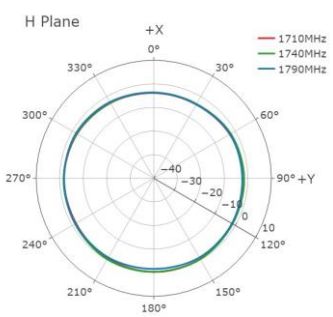
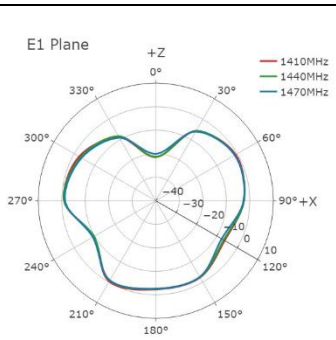
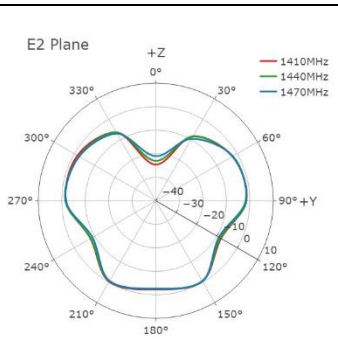
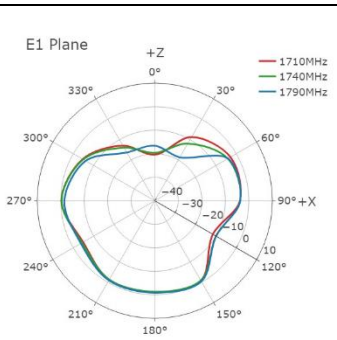
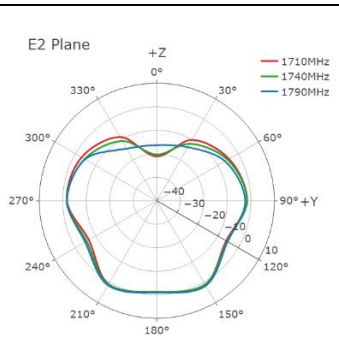
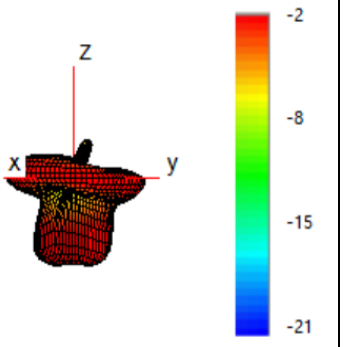
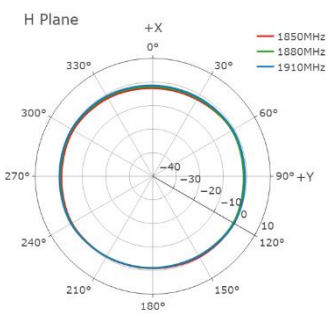
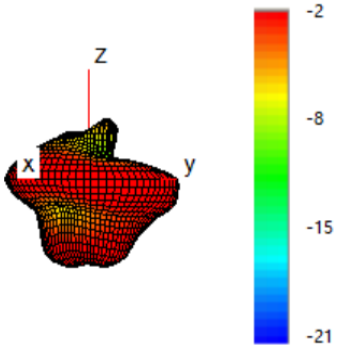
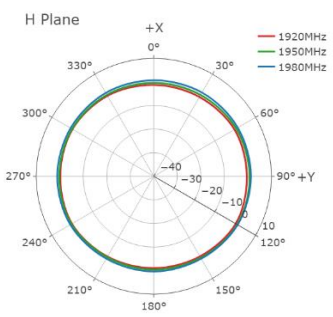
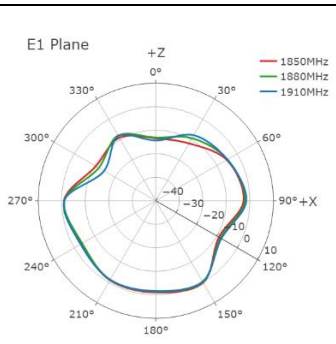
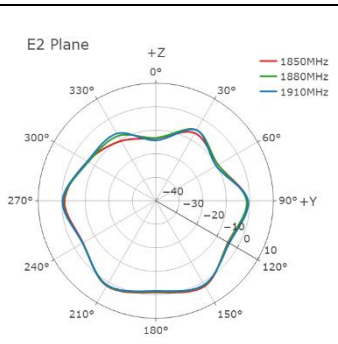
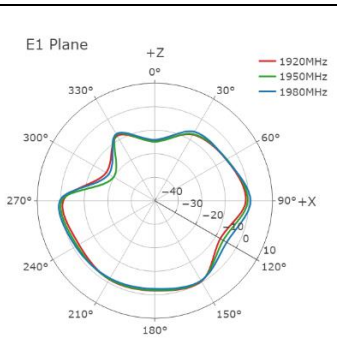
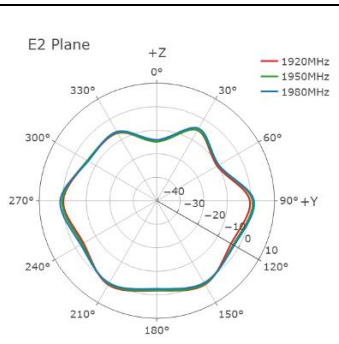
3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

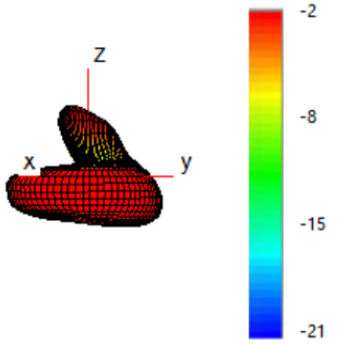
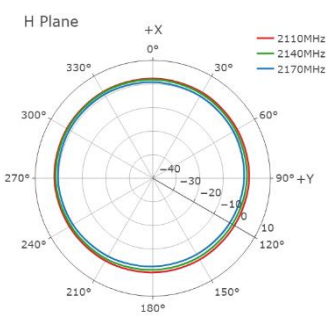
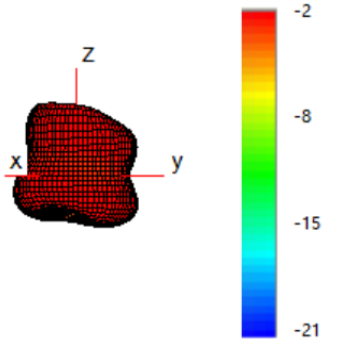
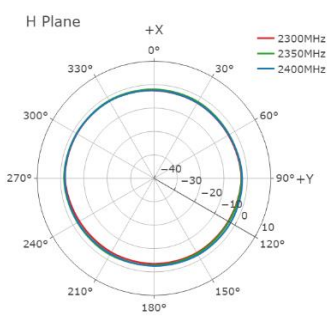
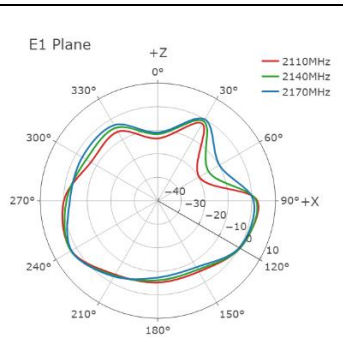
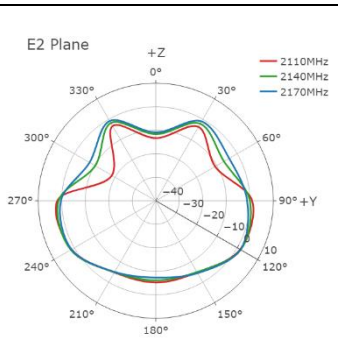
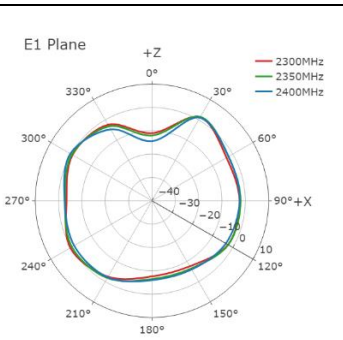
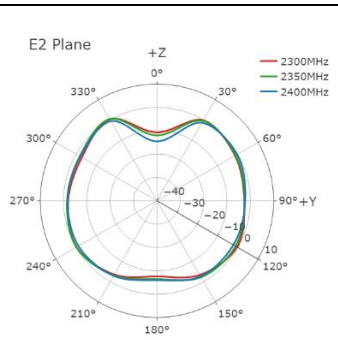
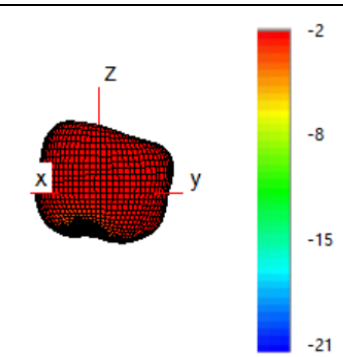
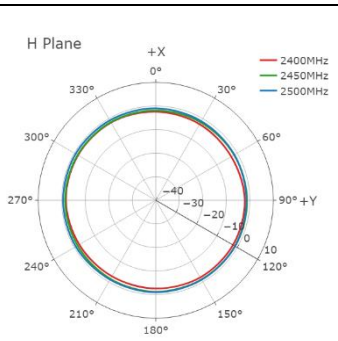
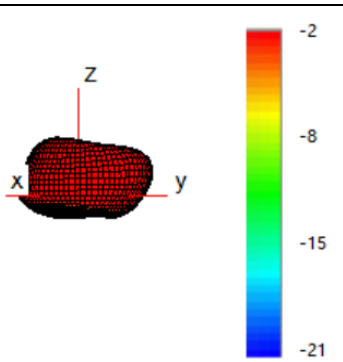
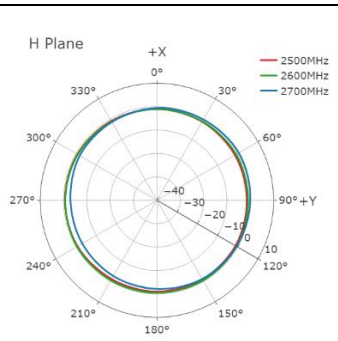
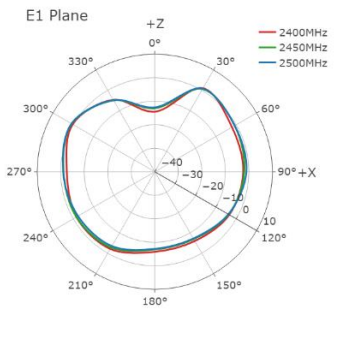
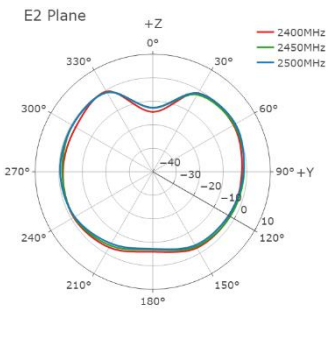
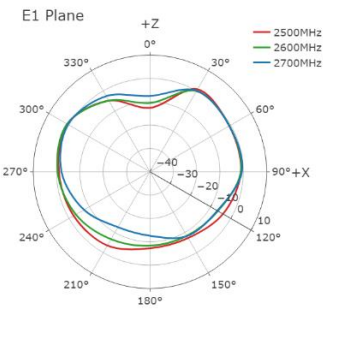
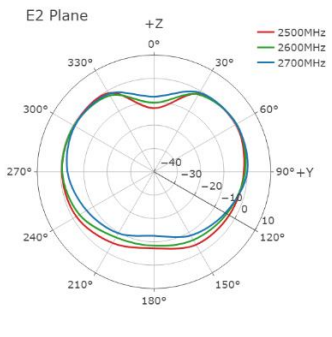
3.2.4.2. Test Condition: Free Space

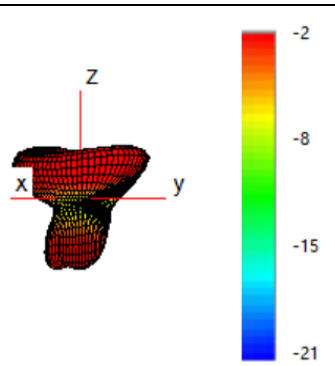
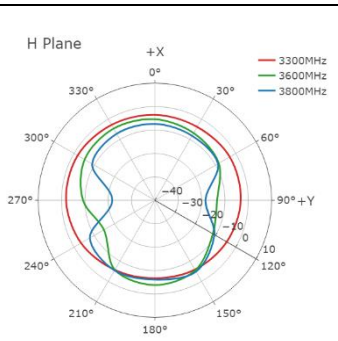
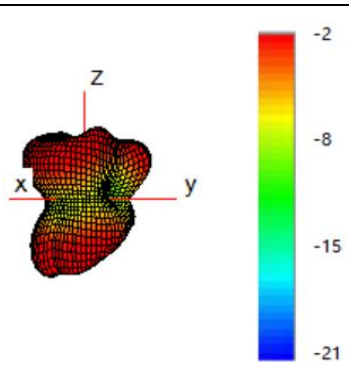
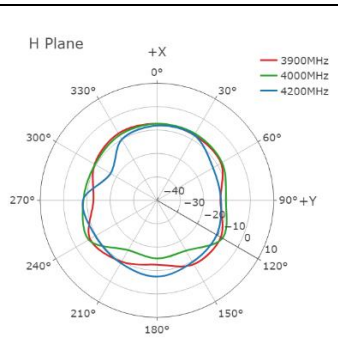
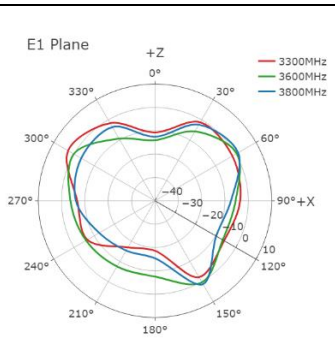
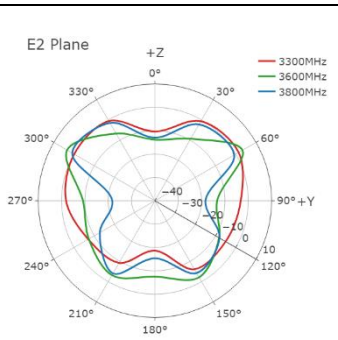
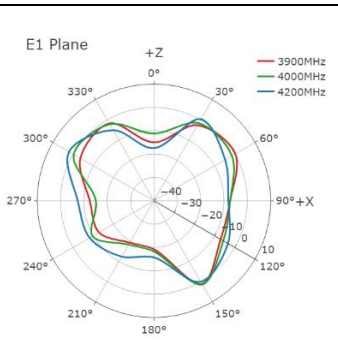
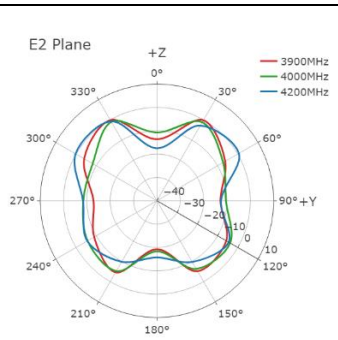
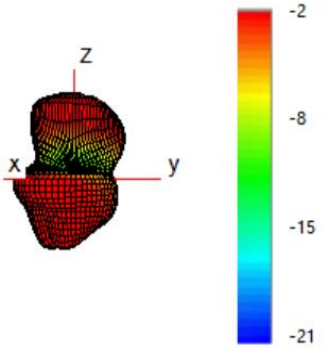
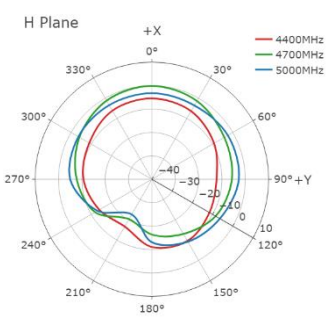
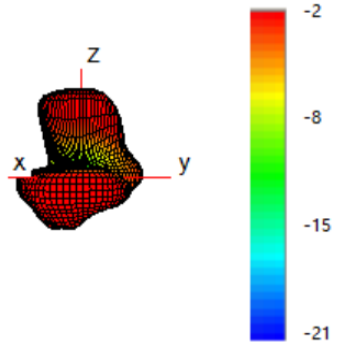
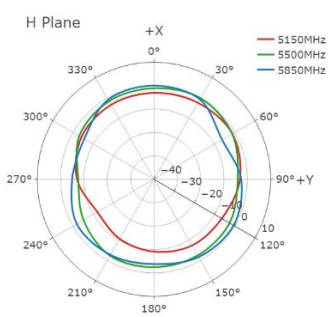
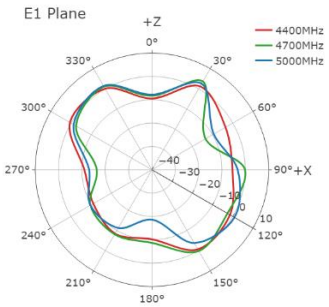
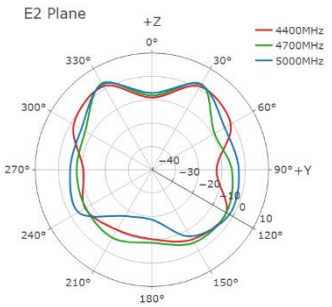
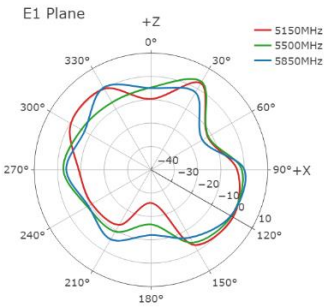
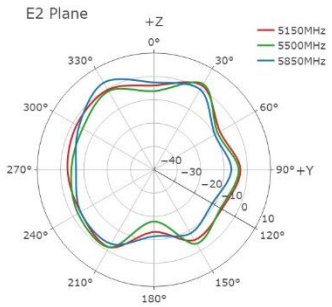
- Test Chamber: HF-G-1



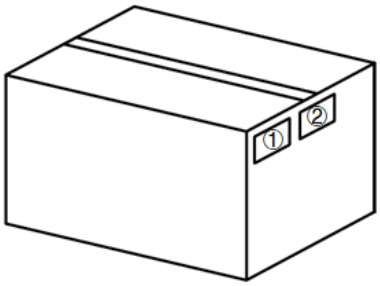
630 MHz		710 MHz	
			
			
830MHz		900 MHz	
			
			

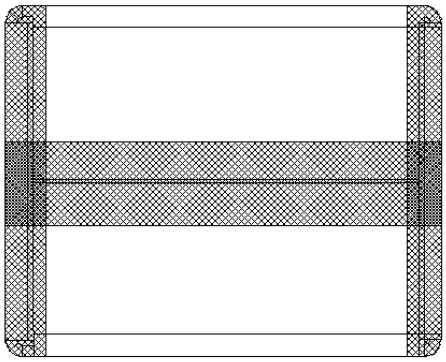
1440 MHz		1740 MHz	
			
			
1880 MHz		1950 MHz	
			
			

2140 MHz		2350 MHz	
			
			
2450 MHz		2600 MHz	
			
			

3600 MHz		4000 MHz	
			
			
4700 MHz		5500 MHz	
			
			

4 Packaging

Step	Packaging Picture / 2D Picture	Description
1		40 pcs antenna products in a PE bag; (40 pcs antennas per PE bag)
2		(12 PE bags per carton box) (480 pcs antennas per carton box) Carton Size: L × W × H = 450 × 240 × 290 mm
3		**Position for Attaching Labels** ① Carton Label ② Quality Label

4		**Sealing Cartons** “工” type sealing cartons

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Revision History

Version	Date	Author	Note
-	2021-11-02	Winfred WU/ Toby WANG	Creation of the document
1.0	2021-11-02	Winfred WU/ Toby WANG	First official release
2.0	2022-08-19	Winfred WU/ Toby WANG	Updated the test data (Chapter 4).
2.1	2022-10-17	Aria CHU	Deleted the IP rating.
3.0	2023-04-26	Damon ZHANG/ Lucky FENG/ David LIU/ Aria CHU	Updated all data and datasheet template.
4.0	2023-07-13	Damon ZHANG/ Vinnie LIU	Updated the test data, deleted storage conditions of the antenna and added its storage temperature (Chapter 1).
5.0	2023-10-10	Damon ZHANG/ Aria CHU	Updated all test data in this datasheet.

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