



# Antenna Datasheet

**Product OC:** YB0008AA

**Version:** 3.0

**Date:** 2023-06-19

**Status:** Released

**Product Name:** Combo Antenna

**Key Features:**

Frequency Band:

4G × 2: 698–960 MHz, 1710–2690 MHz

GNSS: 1556–1581 MHz

Dimensions:  $\Phi$  84 × 17.5 mm

Efficiency: Up to 70.4 % (4G-FS)

GNSS LNA Gain: 26 ±3 dB

RoHS Compliant

IP66

# Overview

To meet customers' requirements for the high performance, high integration, and integrated appearance of their products, Quectel provides a combined antenna box series. The antenna box can integrate a variety of antennas, such as 5G, 4G, GNSS, Wi-Fi antennas, to achieve communication functions of 5G MIMO, 4G, GNSS, and Wi-Fi. These antenna boxes can be mounted on the surface of devices via screw, adhesive or other methods, supports multiple connector types and cable lengths. It is a more flexible and reliable high-performance antenna solution for outdoor applications.

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# 1 Specification

Test Condition: On 300 × 300 mm Metal Plane & In Free Space

## 1.1. Electrical

Electrical Specifications			
Frequency Range	4G	698–960 MHz, 1710–2690 MHz	
	4G DIV	698–960 MHz, 1710–2690 MHz	
	GNSS	1556–1581MHz	
Radiation Pattern	4G	Omni-directional	
	4G DIV	Omni-directional	
	GNSS	Directional	
Polarization	4G	Linear	
	4G DIV	Linear	
	GNSS	RHCP	
Impedance		50 Ω	
Isolation	4G-4G DIV	MP	≤ -11 dB
		FS	≤ -8.9 dB
	4G-GNSS	MP	≤ -11.4 dB
		FS	≤ -15.5 dB
	4G DIV-GNSS	MP	≤ -18.1 dB
		FS	≤ -16 dB

- MP: On 300 × 300 mm Metal Plane
- FS: In Free Space

## 1.1.1. 4G

Electrical - Detail									
SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41
	Freq. (MHz)	600– 700	700– 810	820– 960	1700– 2170	2300– 2400	2400– 2500	2500– 2690	
Max. VSWR	MP	-	3.4	4.3	3.5	3.1	2.4	2.0	
	FS	-	2.4	3.1	2.0	2.0	1.8	2.2	
Max. Return Loss (dB)	MP	-	-5.3	-4.1	-5.1	-5.8	-7.6	-9.5	
	FS	-	-7.8	-5.9	-9.7	-9.5	-10.7	-8.6	
AVG Eff. (%)	MP	-	32.0	20.4	47.8	32.6	50.8	51.5	
	FS	-	43.3	32.7	58.5	44.2	56.0	55.8	
AVG Gain (dB)	MP	-	-5.0	-7.1	-3.2	-4.9	-3.0	-2.9	
	FS	-	-3.6	-5.0	-2.3	-3.6	-2.5	-2.5	
Max. Peak Gain (dBi)	MP	-	-0.3	-0.3	4.6	3.6	4.4	4.1	
	FS	-	1.6	0.7	3.5	1.6	1.6	1.5	
VSWR	MP	≤ 4.3							
	FS	≤ 3.1							
Return Loss	MP	≤ -4.1 dB							
	FS	≤ -5.9 dB							
Peak Gain	MP	≤ 4.6 dBi							
	FS	≤ 3.5 dBi							

## 1.1.2. 4G DIV

Electrical - Detail									
SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41
	Freq. (MHz)	600– 700	700– 810	820– 960	1700– 2170	2300– 2400	2400– 2500	2500– 2690	
Max. VSWR	MP	-	7.3	4.2	4.0	2.0	1.3	1.7	
	FS	-	5.4	3.5	5.5	2.3	1.5	1.9	
Max. Return Loss (dB)	MP	-	-2.4	-4.3	-4.4	-9.3	-16.9	-11.5	
	FS	-	-3.2	-5.0	-3.2	-8.0	-14.2	-10.3	
AVG Eff. (%)	MP	-	10.6	29.6	37.5	38.5	48.4	48.0	
	FS	-	22.9	30.0	32.4	48.9	58.3	55.8	
AVG Gain (dB)	MP	-	-9.9	-5.5	-4.5	-4.2	-3.2	-3.2	
	FS	-	-6.5	-5.4	-5.0	-3.1	-2.3	-2.5	
Max. Peak Gain (dBi)	MP	-	-3.9	1.5	1.7	1.7	2.3	2.7	
	FS	-	-1.6	0.2	1.9	1.7	3.3	3.3	
VSWR	MP	≤ 7.3							
	FS	≤ 5.5							
Return Loss	MP	≤ -2.4 dB							
	FS	≤ -3.2 dB							
Peak Gain	MP	≤ 2.7 dBi							
	FS	≤ 3.3 dBi							

### 1.1.3. GNSS

Frequency (MHz)	Band	GPS L5	GALILEO	GPS L2	GLONASS	BEIDOU	BEIDOU	GPS L1	GLONASS
		E5a	E5b	QZSS L2C	G2	B3	B1I	E1	G1
		BEIDOU B2a-B2I	BEIDOU B2b					BEIDOU B1C	
		QZSS L5						QZSS L1	
		IRNSS L5							
		1176	1207	1227	1248	1268	1561	1575	1602
VSWR	MP	-	-	-	-	-	1.7	1.8	-
	FS	-	-	-	-	-	1.3	2.4	-
Return Loss (dB)	MP	-	-	-	-	-	-11.6	-12.7	-
	FS	-	-	-	-	-	-19.0	-8.5	-
Efficiency (%)	MP	-	-	-	-	-	53.5	55.4	-
	FS	-	-	-	-	-	51.2	45.8	-
AVG Gain (dB)	MP	-	-	-	-	-	-2.7	-2.6	-
	FS	-	-	-	-	-	-2.9	-3.4	-
Peak Gain (dBi)	MP	-	-	-	-	-	2.8	3.2	-
	FS	-	-	-	-	-	0.9	1.3	-
Axial Ratio(dB) Theta = 0 (deg)	MP	-	-	-	-	-	4.8	10.9	-
	FS	-	-	-	-	-	9.5	7.1	-

#### LNA Electrical

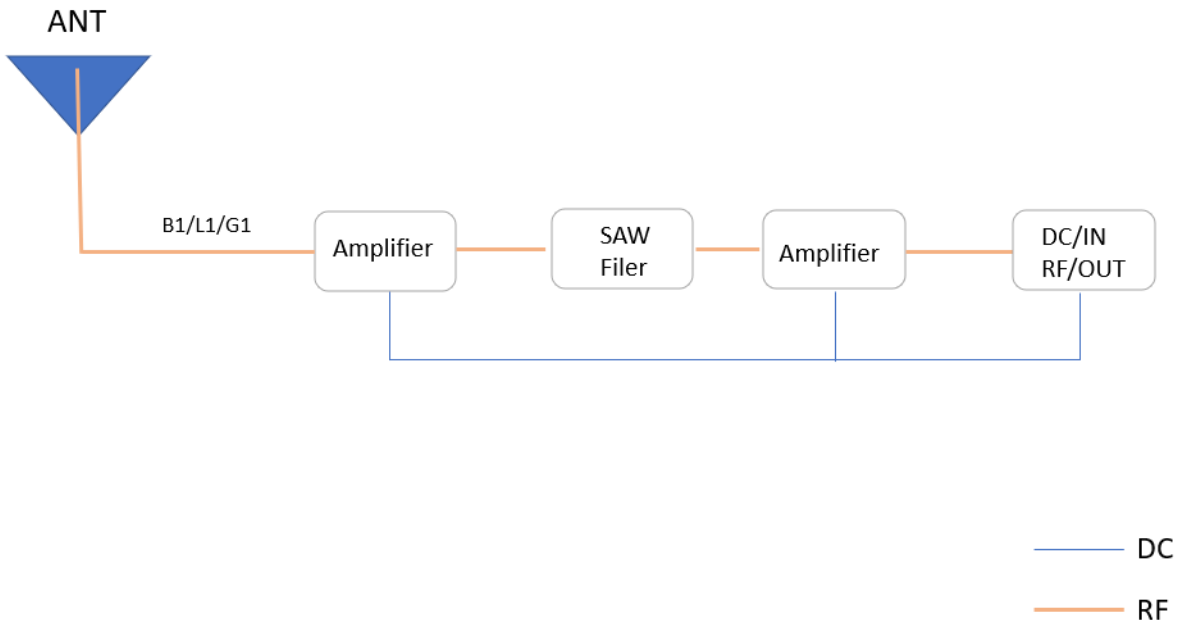
LNA Gain	26 ±3 dB
Noise Figure	≤ 1.1 dB
Output VSWR	< 2.0
Input VSWR	< 2.0
Filter Out-of-Band Attenuation	53 dB f0 ±100 MHz f0 (1580 MHz)
Working Voltage	2.7–3.3 V
Working Current	10 ±1 mA @ 3.0 V
Impedance	50 Ω

## 1.2. Mechanical & Environmental

Mechanical		
Antenna Dimensions		Φ 84 × 17.5 mm
Antenna Material & Color		ABS + PC & Black
Cable Type & Color & Length	4G	RG174 & Black & 300 mm
	4G DIV	RG174 & Black & 300 mm
	GNSS	RG174 & Black & 300 mm
Connector Type		SMA Male
Mounting Type		Adhesive
Weight		Typ. 69.2 g
Environmental		
Operation Temperature		-40 °C to +85 °C
Storage Temperature		-40 °C to +85 °C
Ingress Protection (IP) Rating		IP66
RoHS Compliant		Yes



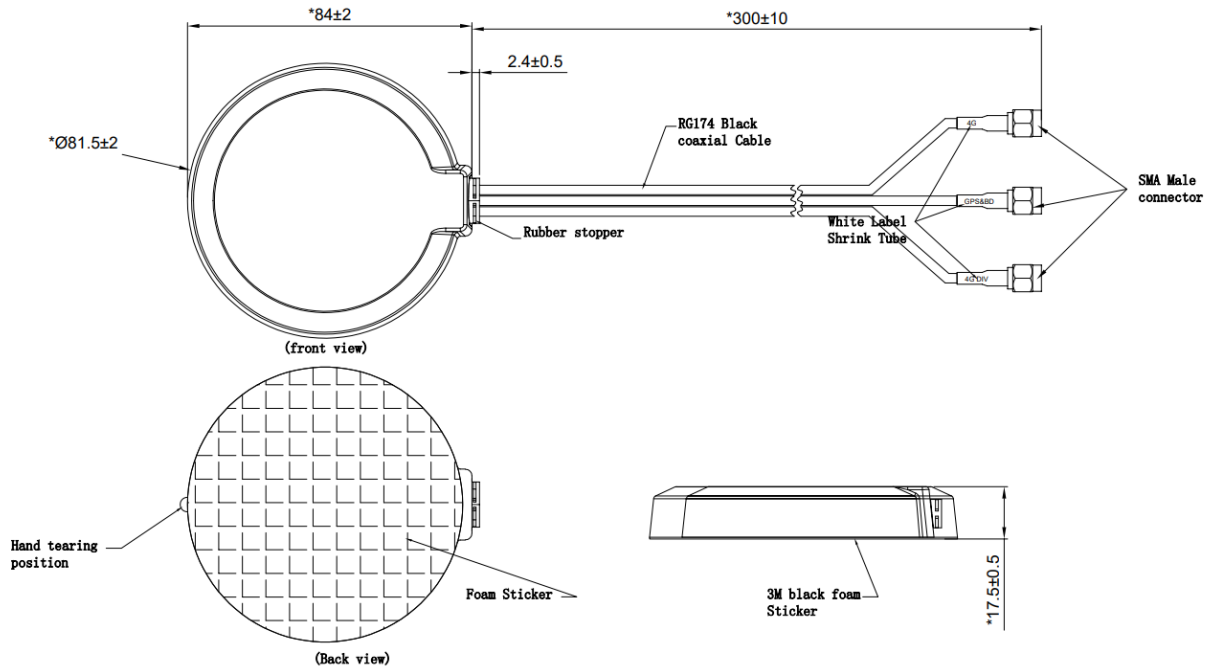
### 1.3. Block Diagram (Active Antenna)



## 1.4. Supported GNSS Frequency Bands

GNSS Frequency Bands (MHz)					
<b>GPS</b>	<b>L1</b> Centre 1575.42 (1565–1586)	<b>L2</b> Centre 1227.6 (1217–1238)	<b>L5</b> Centre 1176.45 (1164–1189)		
	√	-	-		
<b>GLONASS</b>	<b>G1-L10C-L10F</b> Centre 1601 (1595–1606)	<b>G2-L20C-L20F</b> Centre 1248.06 (1241–1255)	<b>G3-L30C</b> Centre 1202.025 (1189–1213)		
	-	-	-		
<b>GALILEO</b>	<b>E1</b> Centre 1575.42 (1563–1588)	<b>E5a</b> Centre 1176.45 (1166–1187)	<b>E5b</b> Centre 1207.14 (1197–1218)	<b>E6</b> Centre 1278.75 (1258–1300)	
	√	-	-	-	
<b>BEIDOU</b>	<b>B1I</b> Centre 1561.098 (1559–1564)	<b>B1C (BeiDou-3)</b> Centre 1575.42 (1559–1592)	<b>B2a-B2I</b> Centre 1176.45 (1166–1187)	<b>B2b</b> Centre 1207.14 (1197–1217)	<b>B3</b> Centre 1268.52 (1258–1279)
	√	√	-	-	-
<b>QZSS</b>	<b>L1</b> Centre 1575.42 (1573–1578)	<b>L2C</b> Centre 1227.6 (1226–1229)	<b>L5</b> Centre 1176.45 (1166–1187)	<b>L6</b> Centre 1278.75 (1257–1300)	
	√	-	-	-	
<b>IRNSS</b>	<b>L5</b> Centre 1176.45 (1164–1189)				
	-				

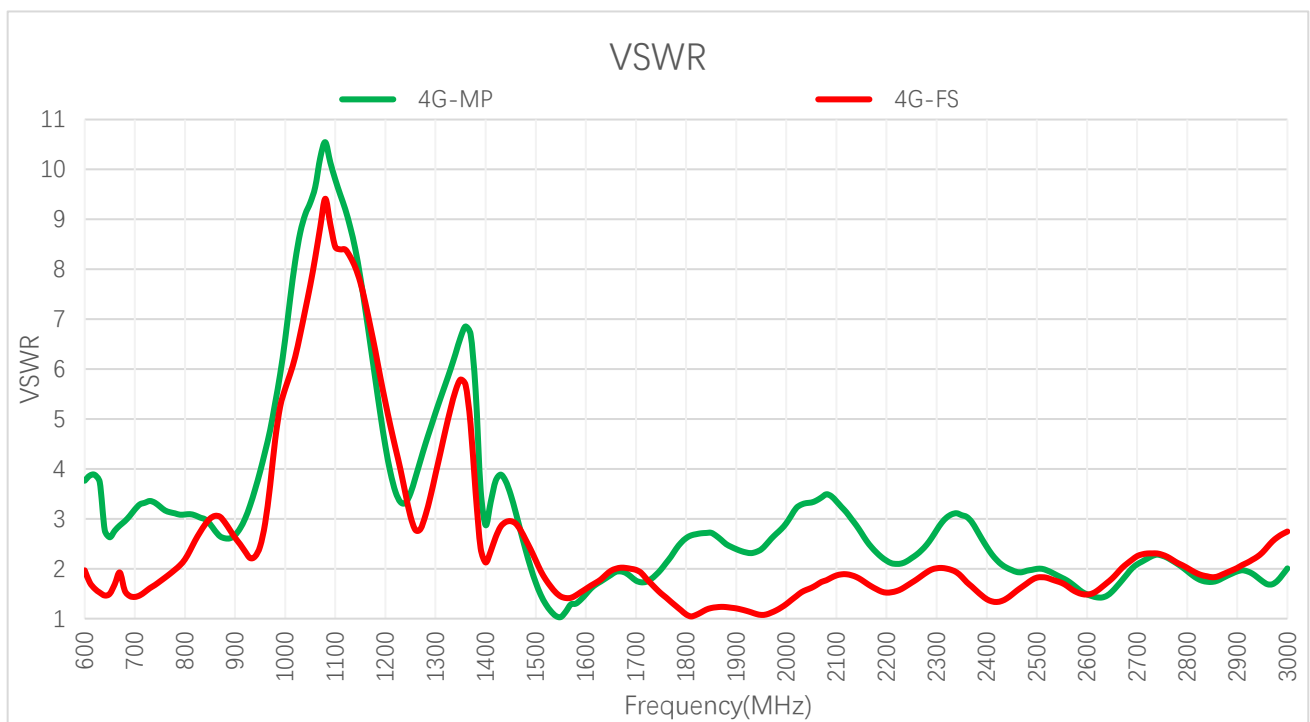
# 2 Drawing



# 3 Detailed Performance

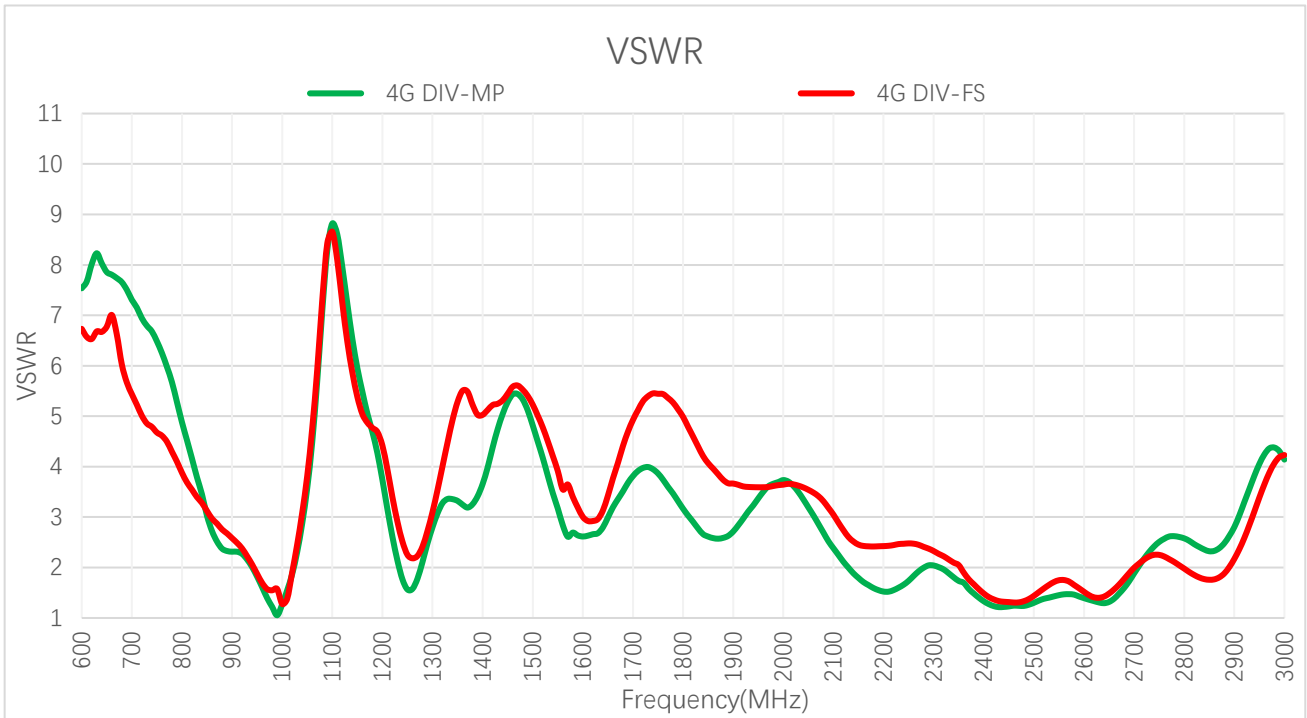
## 3.1. S-Parameter Test

### 3.1.1. VSWR



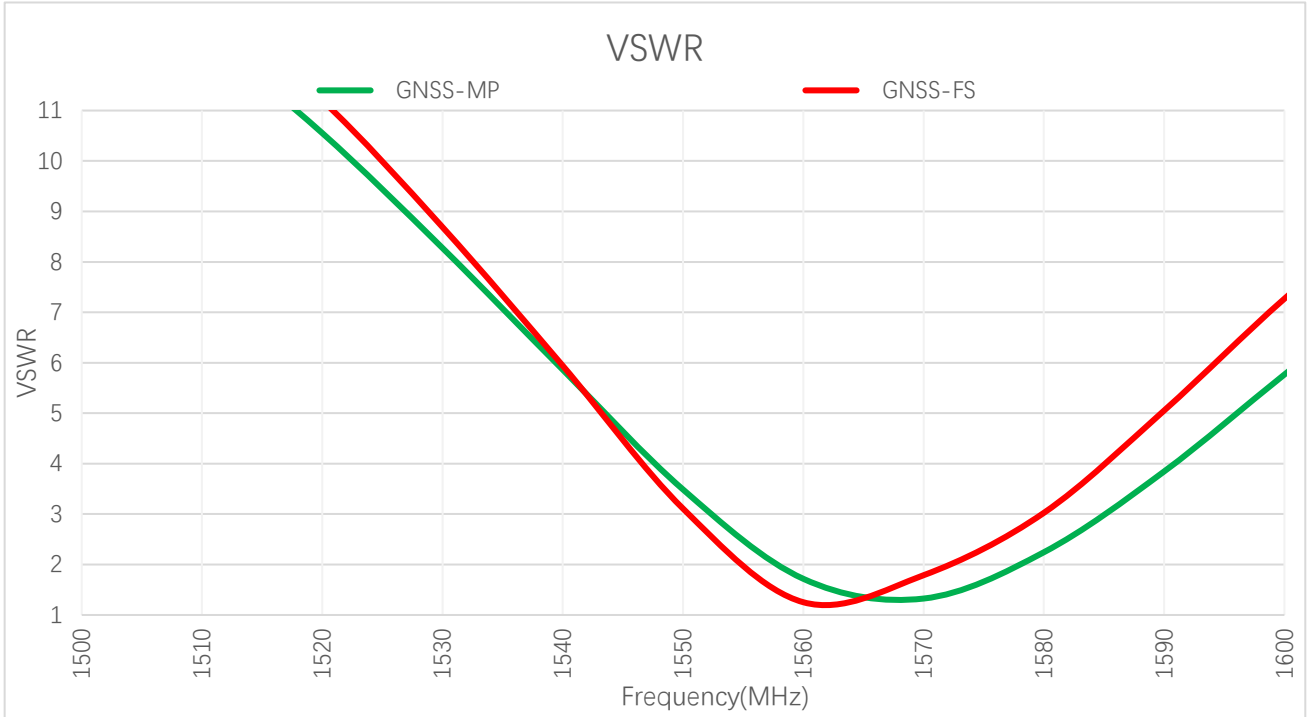
**VSWR - 4G**

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880	
VSWR	MP	-	-	3.3	3.0	2.7	4.3	-	1.7	1.9	2.5
	FS	-	-	1.5	2.7	2.6	2.9	-	1.9	1.6	1.2
Frequency (MHz)	1950	2140	2350	2450	2600	2690	4700	5000	5500	6000	
VSWR	MP	2.4	2.9	3.1	2.0	1.5	2.0	-	-	-	
	FS	1.1	1.8	1.8	1.5	1.5	2.2	-	-	-	



**VSWR - 4G DIV**

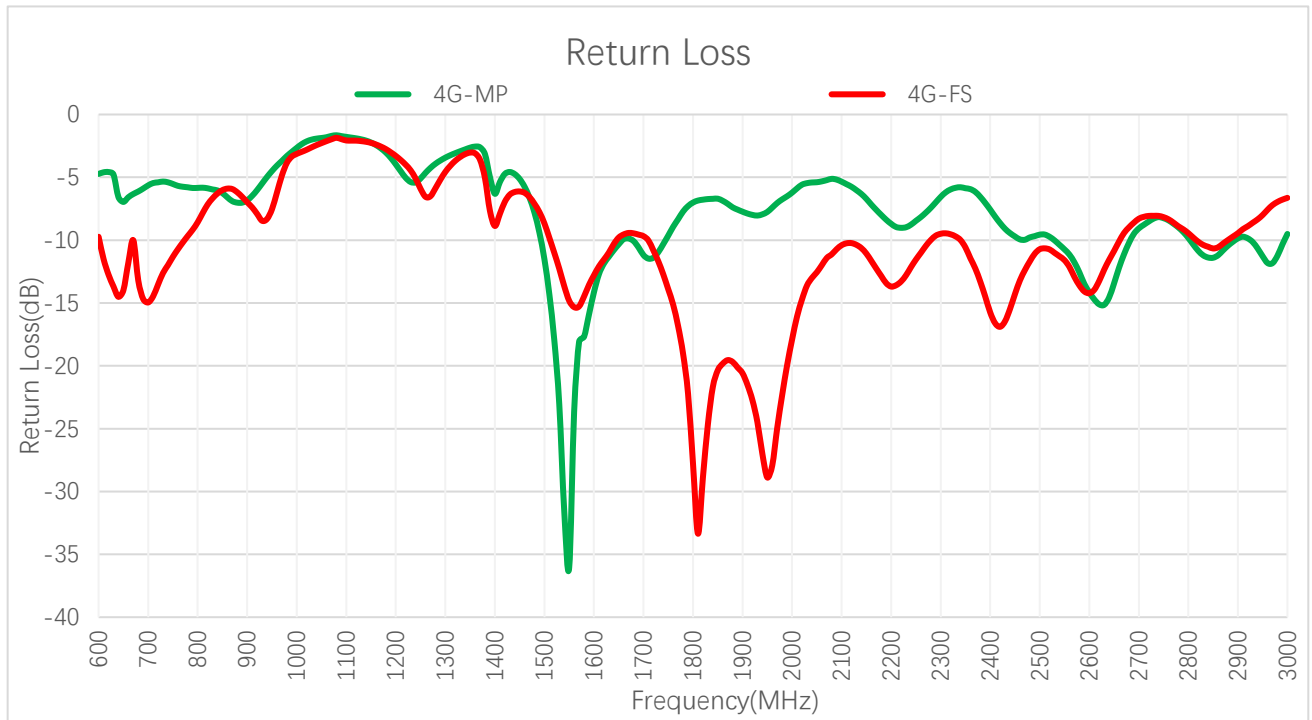
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880	
VSWR	MP	-	-	7.2	3.8	2.3	1.6	-	3.9	3.9	2.6
	FS	-	-	5.2	3.4	2.6	1.7	-	5.1	5.5	3.7
Frequency (MHz)	1950	2140	2350	2450	2600	2690	4700	5000	5500	6000	
VSWR	MP	3.4	1.9	1.7	1.2	1.4	1.7	-	-	-	-
	FS	3.6	2.5	2.0	1.3	1.5	1.9	-	-	-	-



**VSWR - GNSS**

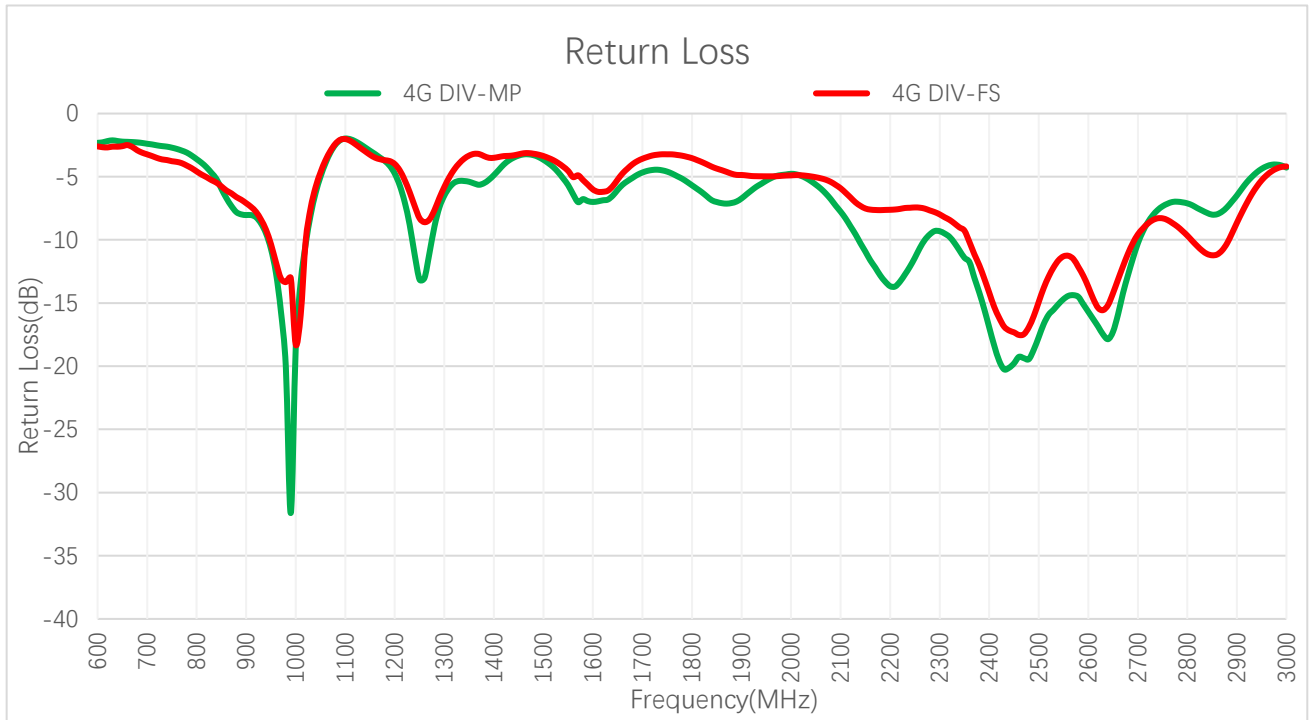
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	MP	-	-	-	-	1.7	1.8	-
	FS	-	-	-	-	1.3	2.4	-

**3.1.2. Return Loss**



**Return Loss (dB) - 4G**

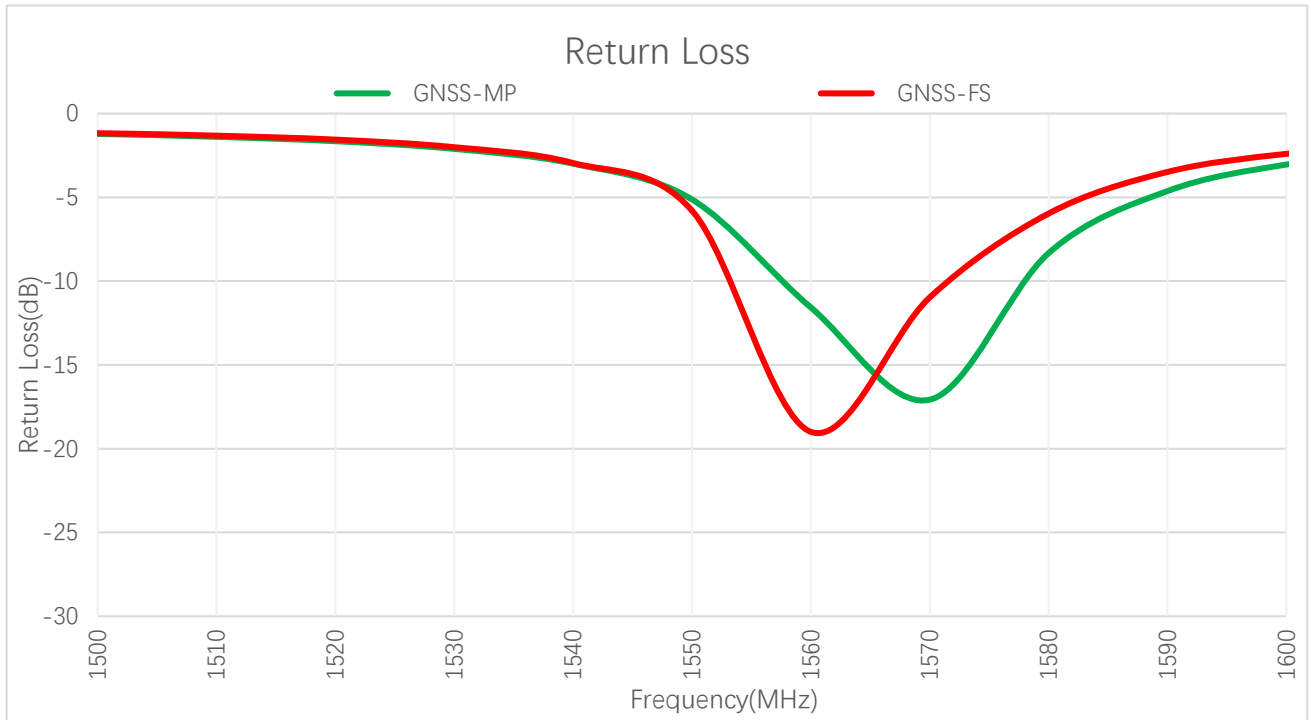
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Return Loss (dB)	MP	-	-	-5.5	-6.0	-6.8	-4.1	-	-11.5	-10.3	-7.4
	FS	-	-	-14.5	-6.7	-7.0	-6.2	-	-10.0	-12.7	-19.7
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Return Loss (dB)	MP	-7.8	-6.3	-5.9	-9.7	-14.1	-9.5	-	-	-	-
	FS	-28.9	-10.6	-10.6	-14.3	-14.2	-8.6	-	-	-	-



**Return Loss (dB) - 4G DIV**

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Return Loss (dB)	MP	-	-	-2.4	-4.7	-8.0	-12.6	-	-4.5	-4.5	-7.1
	FS	-	-	-3.4	-5.3	-7.1	-11.8	-	-3.4	-3.2	-4.8
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Return Loss (dB)	MP	-5.3	-10.3	-11.4	-19.8	-15.7	-11.5	-	-	-	-
	FS	-5.0	-7.3	-9.3	-17.3	-13.7	-10.3	-	-	-	-

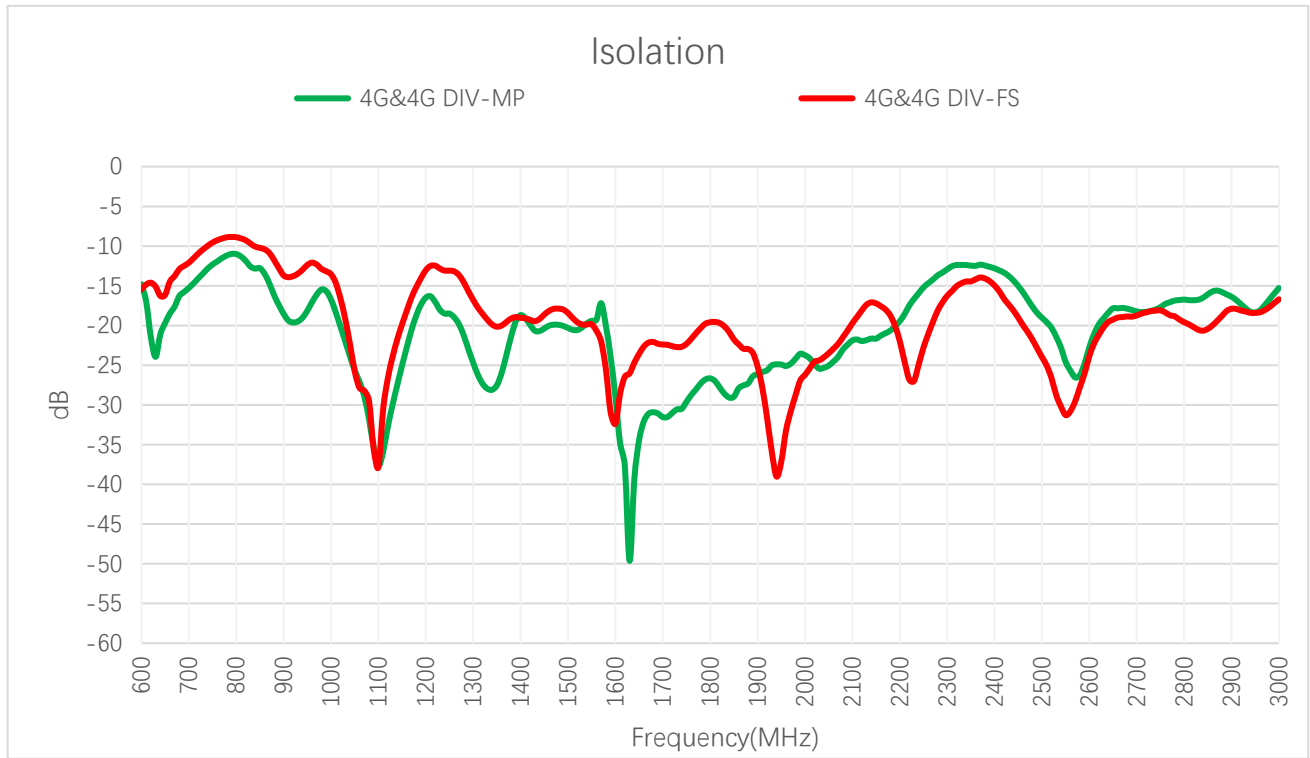




**Return Loss(dB) - GNSS**

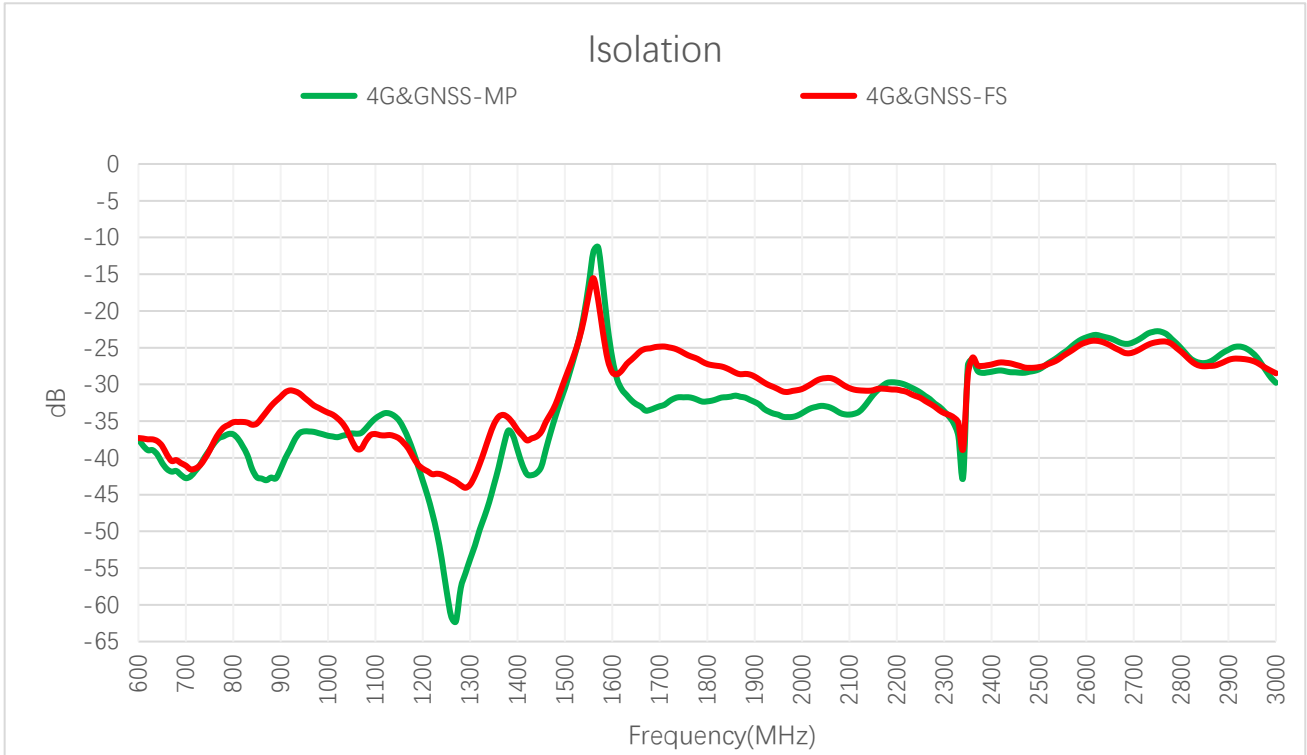
Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	MP	-	-	-	-	-	-11.6	-12.7	-
	FS	-	-	-	-	-	-19.0	-8.5	-

**3.1.3. Isolation**



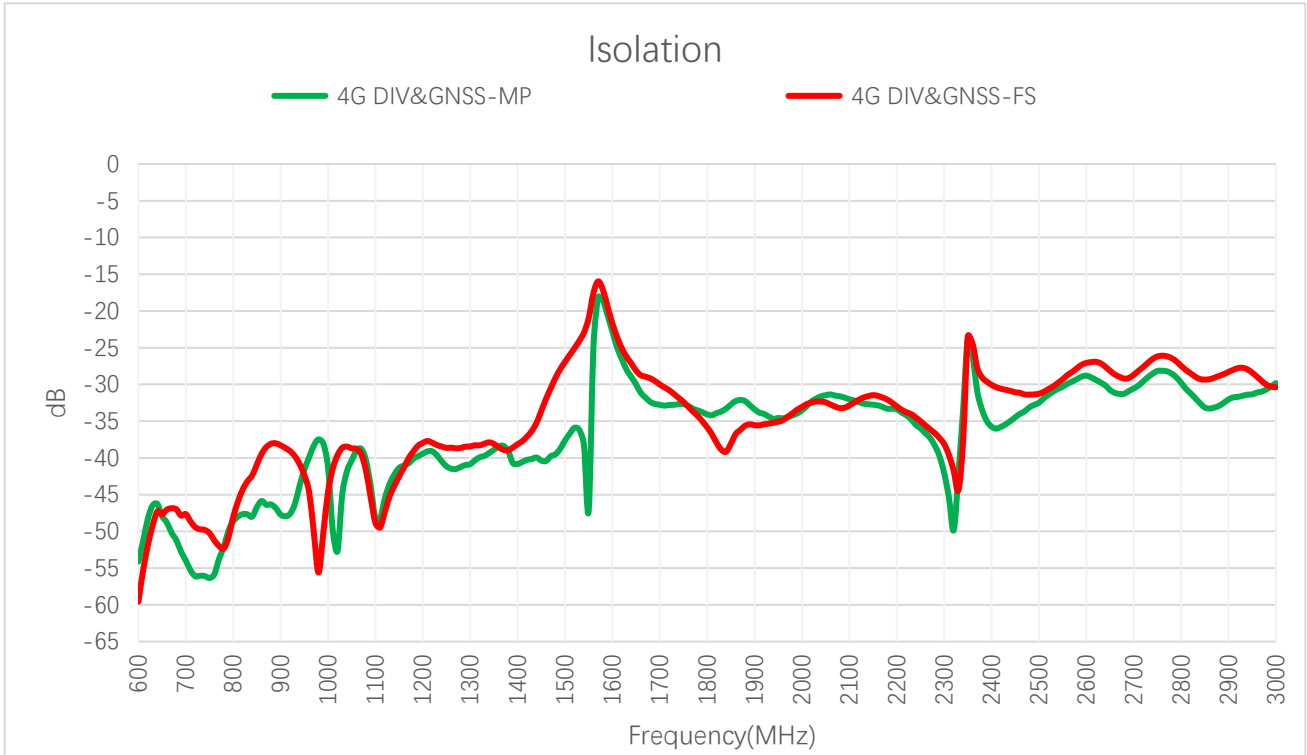
**Max Isolation (dB) - 4G & 4G DIV**

Band	B71	B12/ B13/ B28	B5/ B8/ B26	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	BEIDOU B1I	GPS L1
Freq. (MHz)	600– 700	700– 810	820– 960	1700– 2170	2300– 2400	2400– 2500	2500– 2690	1559– 1564	1565– 1586
MP	-	-11.0	-11.9	-21.0	-12.3	-12.8	-17.8	-19.3	-17.2
FS	-	-8.9	-9.3	-17.1	-13.9	-15.0	-18.9	-20.7	-22.0



**Max Isolation (dB) - 4G & GNSS**

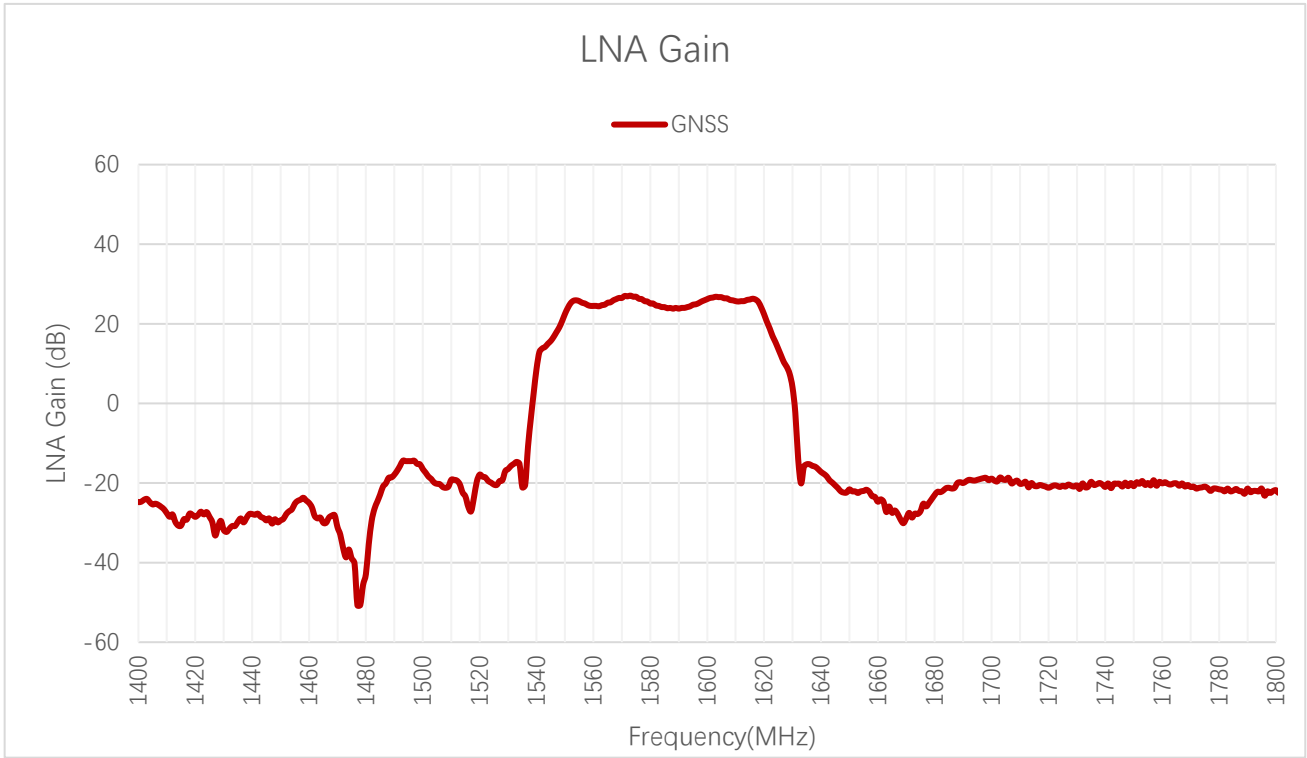
Band	B71	B12/ B13/ B28	B5/ B8/ B26	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	BEIDOU B1I	GPS L1
<b>Freq. (MHz)</b>	600– 700	700– 810	820– 960	1700– 2170	2300– 2400	2400– 2500	2500– 2690	1559– 1564	1565– 1586
<b>MP</b>	-	-36.7	-36.4	-30.2	-26.5	-28.0	-23.3	-11.9	-11.4
<b>FS</b>	-	-35.1	-30.8	-24.8	-26.3	-27.0	-24.1	-15.5	-18.5



**Max Isolation (dB) - 4G DIV & GNSS**

Band	B71	B12/ B13/ B28	B5/ B8/ B26	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	BEIDOU B1I	GPS L1
Freq. (MHz)	600- 700	700- 810	820- 960	1700- 2170	2300- 2400	2400- 2500	2500- 2690	1559- 1564	1565- 1586
MP	-	-48.0	-40.0	-31.4	-23.7	-32.5	-28.8	-24.9	-18.1
FS	-	-46.0	-38.0	-30.0	-23.4	-30.1	-26.9	-17.6	-16.0

**3.1.4. GNSS LNA Gain**

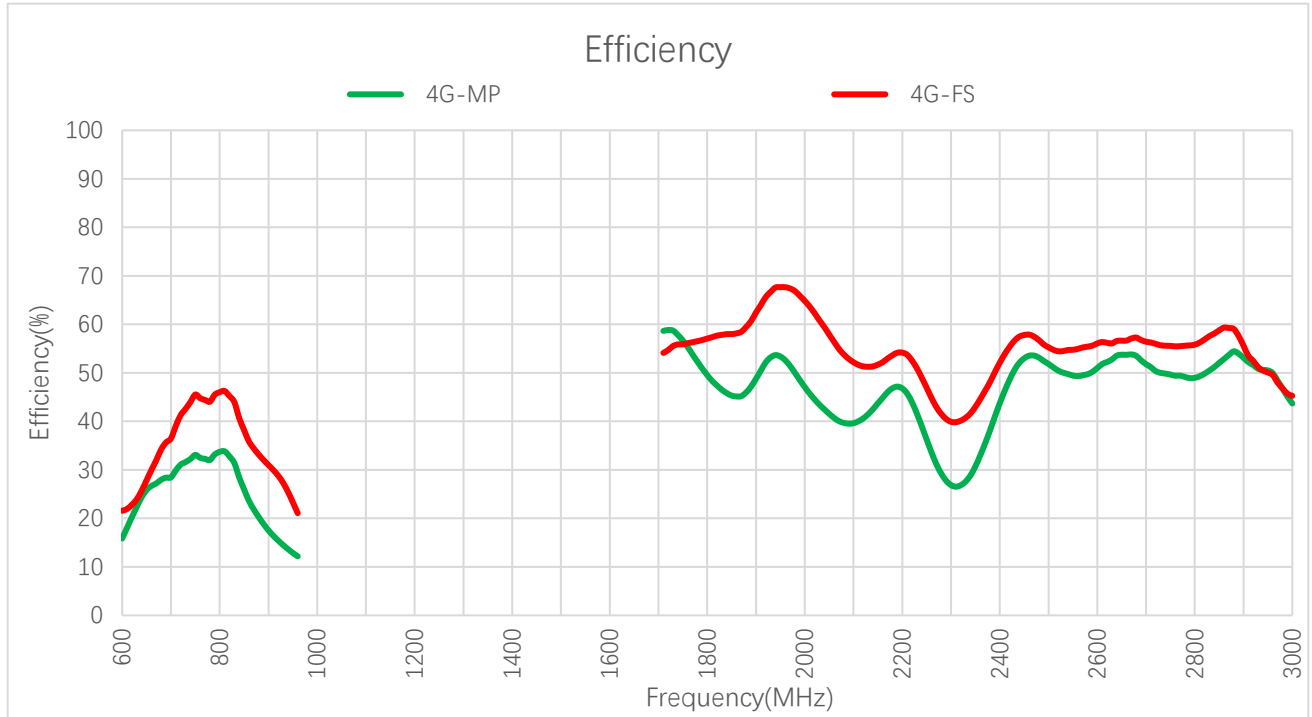


**LNA Gain (dB)**

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
LNA Gain (dB)	-	-	-	-	-	24.5	26.8	-

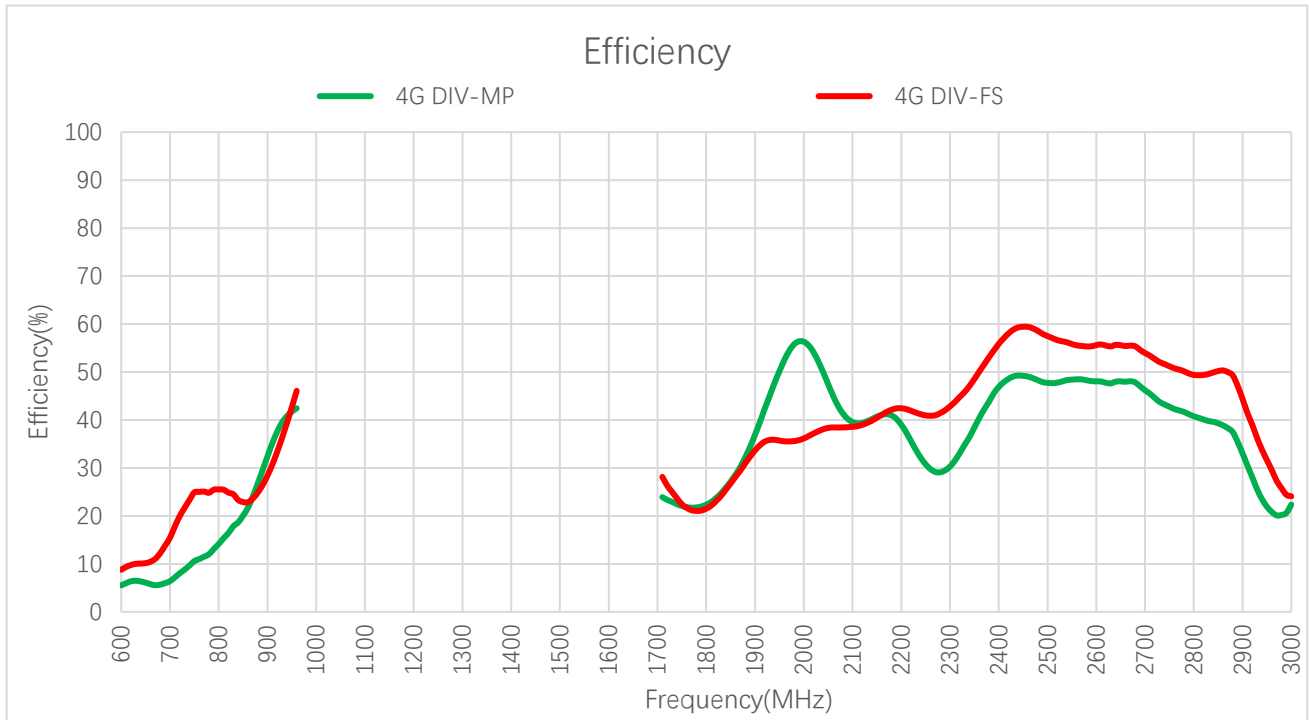
### 3.2. Radiation Performance Test

#### 3.2.1. Efficiency



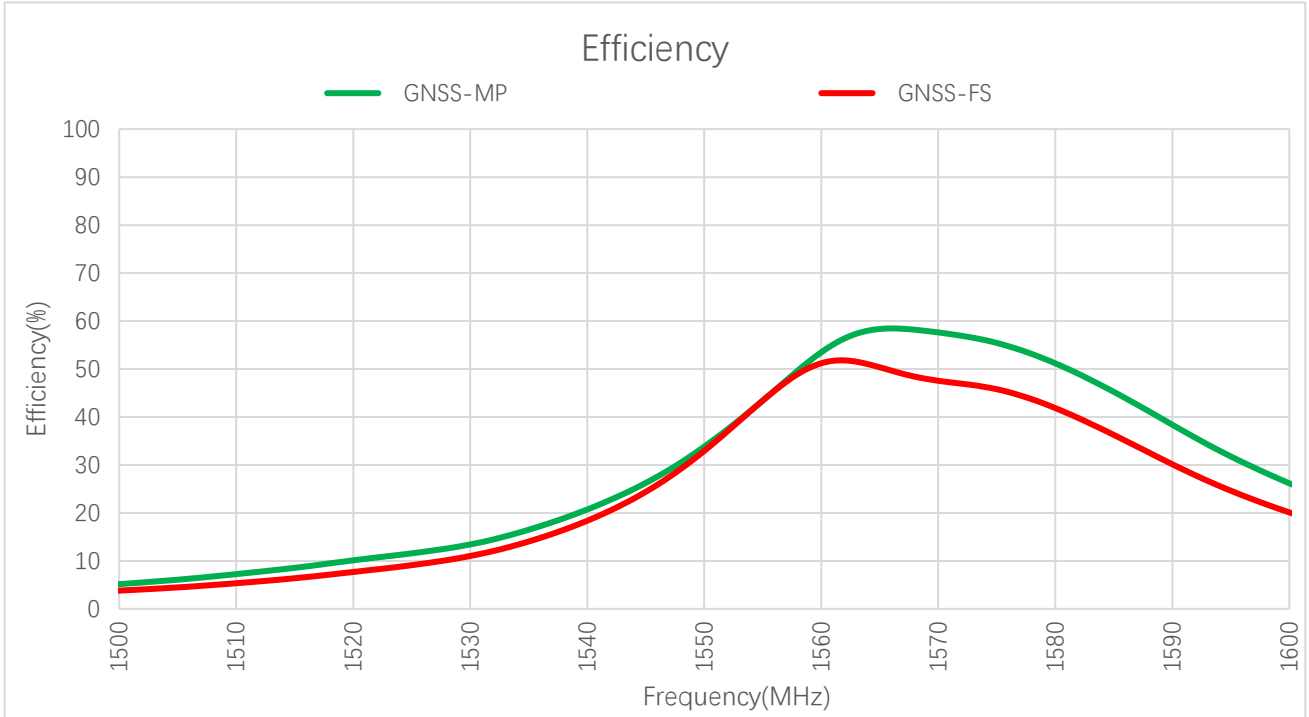
**Efficiency (%) - 4G**

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	MP	-	-	29.9	31.4	17.6	12.2	-	58.7	57.8	46.0
	FS	-	-	39.1	44.0	31.0	21.1	-	54.1	55.9	59.5
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Efficiency (%)	MP	53.4	42.5	30.7	53.0	51.0	52.6	-	-	-	-
	FS	67.7	51.3	43.0	57.8	56.1	56.8	-	-	-	-



**Efficiency (%) - 4G DIV**

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	MP	-	-	7.2	17.8	32.4	42.4	-	23.9	22.4	32.2
	FS	-	-	17.8	24.5	28.4	46.1	-	28.1	23.7	31.0
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Efficiency (%)	MP	50.1	40.2	38.4	49.2	48.1	47.0	-	-	-	-
	FS	35.7	39.9	48.5	59.4	55.6	54.6	-	-	-	-

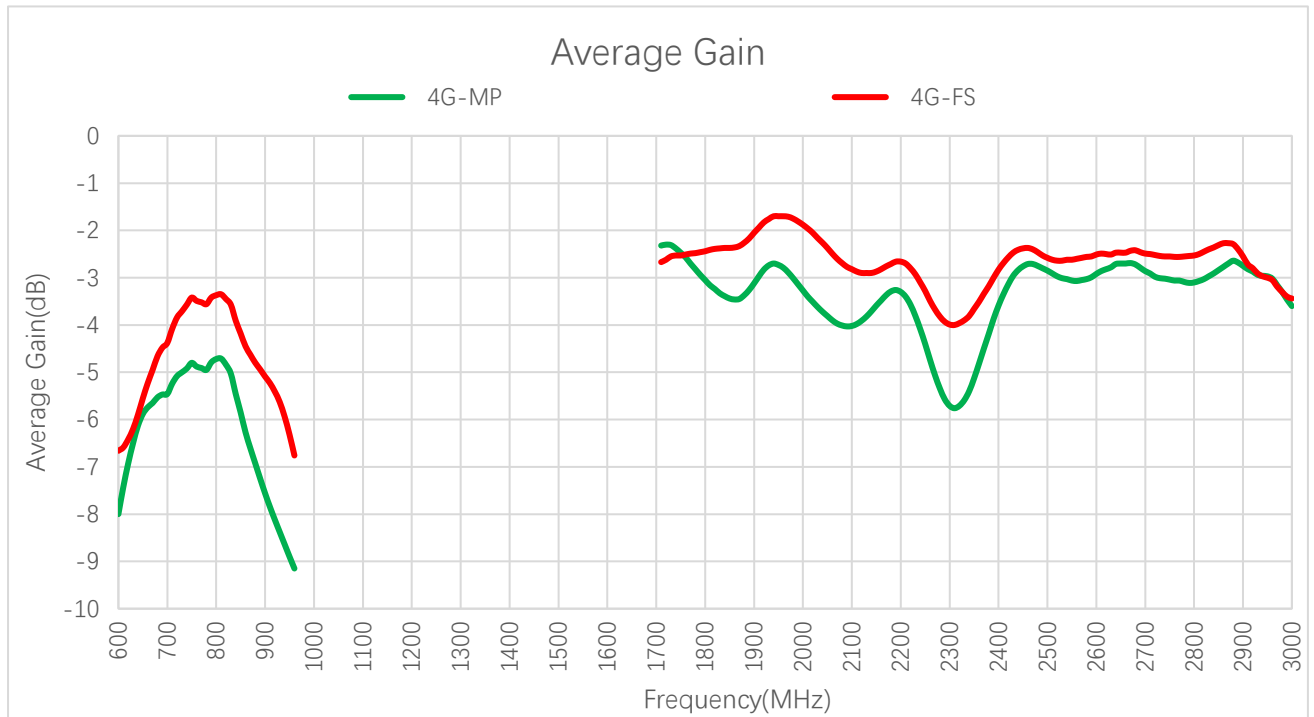


**Efficiency (%) - GNSS**

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	MP	-	-	-	-	-	53.5	55.4	-
	FS	-	-	-	-	-	51.2	45.8	-

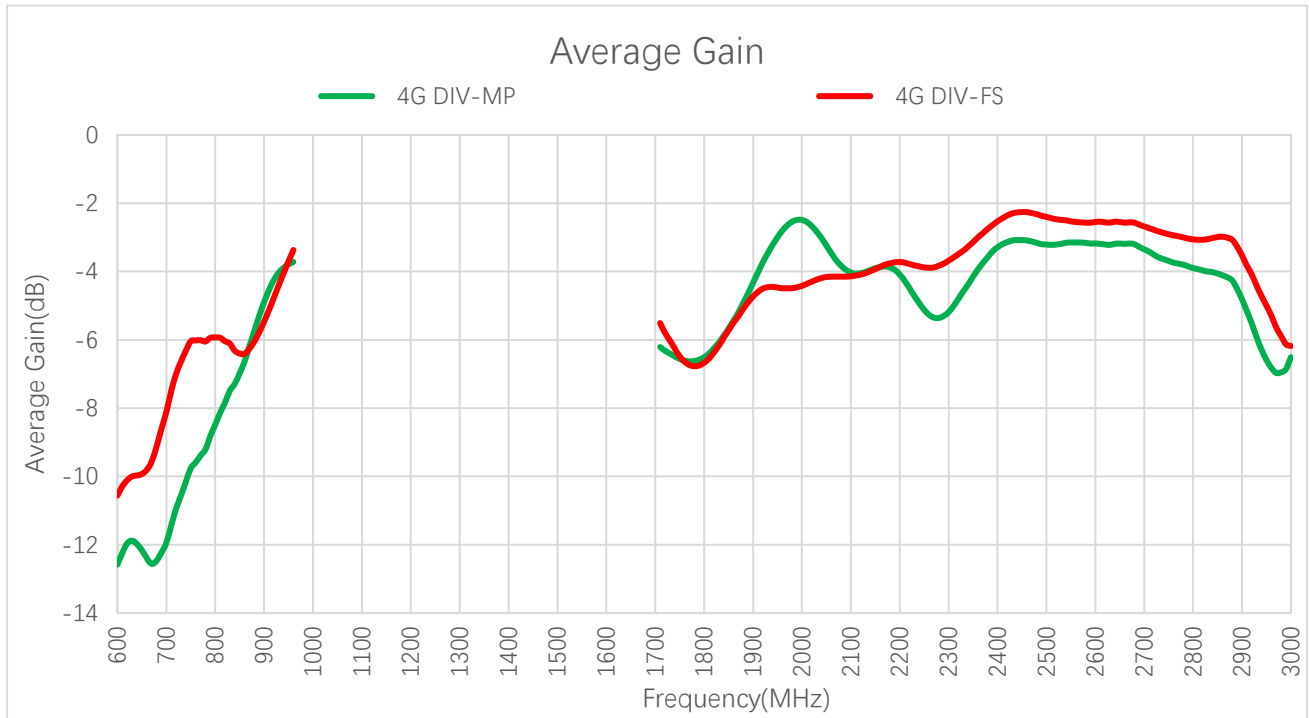


**3.2.2. Average Gain**



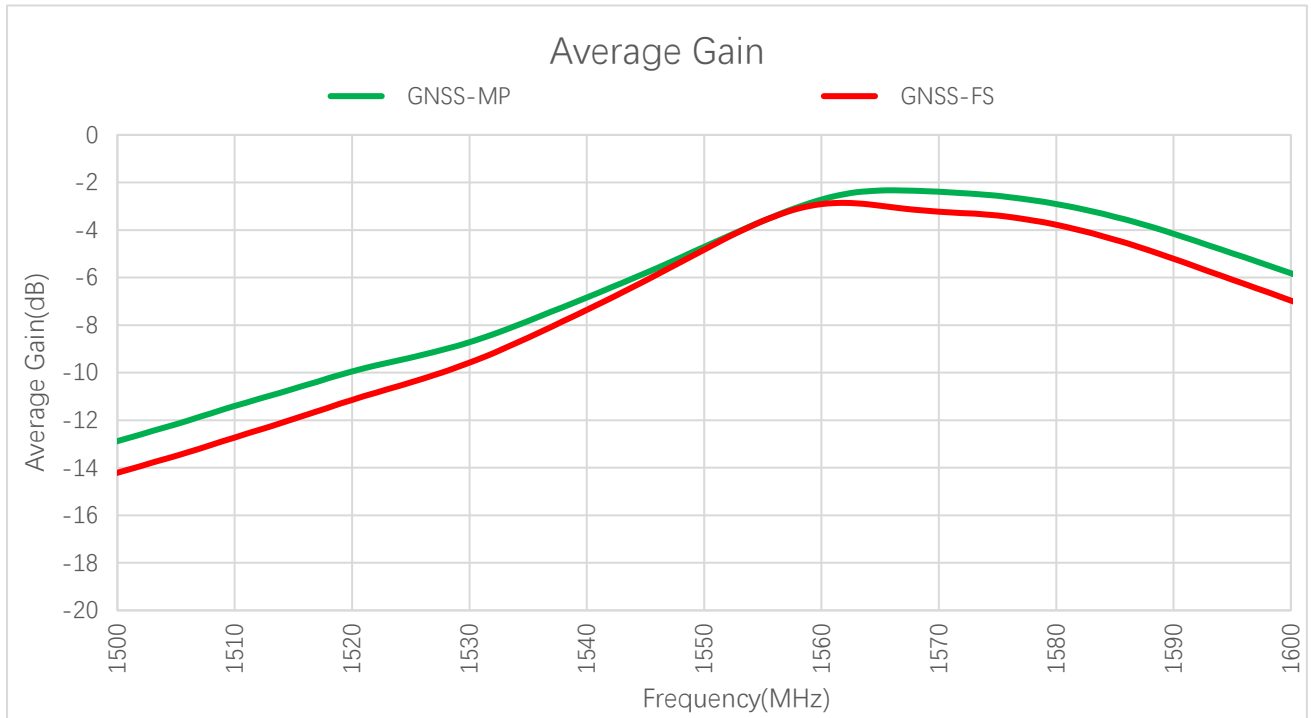
**Average Gain (dB) - 4G**

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880	
Average Gain (dB)	MP	-	-	-5.2	-5.0	-7.6	-9.2	-	-2.3	-2.4	-3.4
	FS	-	-	-4.1	-3.6	-5.1	-6.8	-	-2.7	-2.5	-2.3
Frequency (MHz)	1950	2140	2350	2450	2600	2690	4700	5000	5500	6000	
Average Gain (dB)	MP	-2.7	-3.7	-5.1	-2.8	-2.9	-2.8	-	-	-	-
	FS	-1.7	-2.9	-3.7	-2.4	-2.5	-2.5	-	-	-	-



**Average Gain (dB) - 4G DIV**

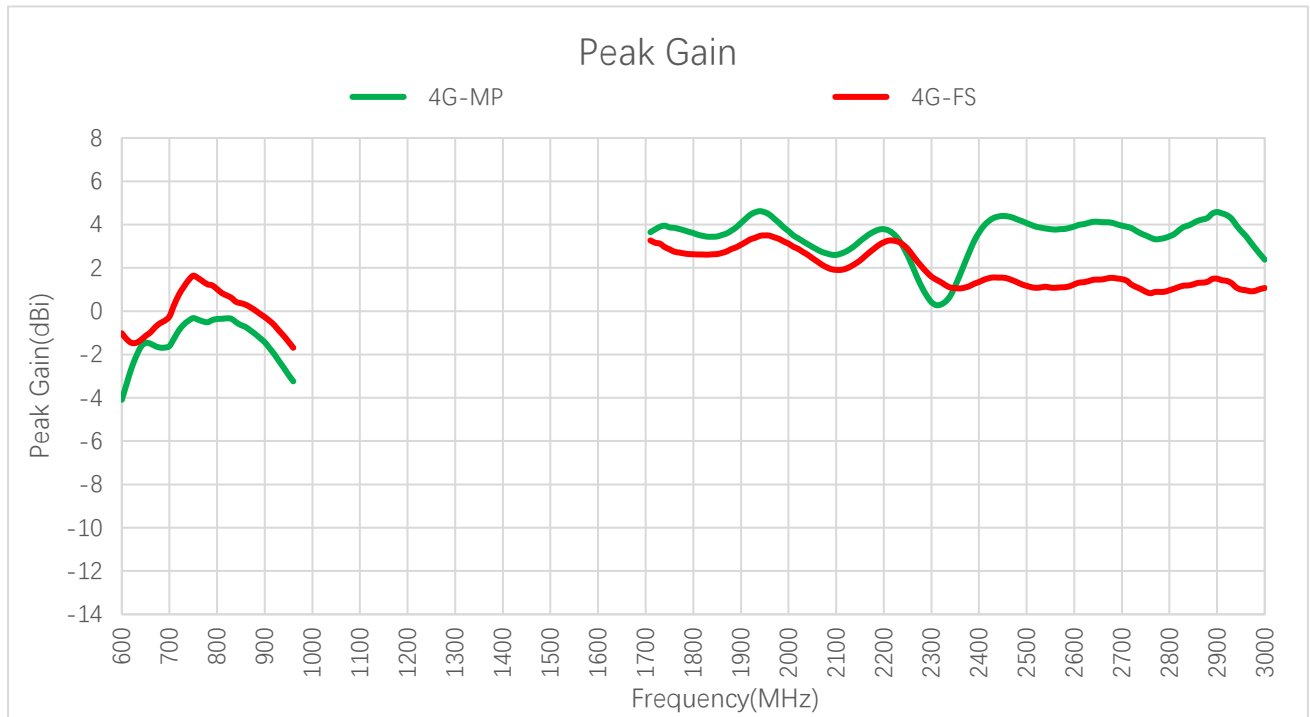
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Average Gain (dB)	MP	-	-	-11.4	-7.5	-4.9	-3.7	-	-6.2	-6.5	-4.9
	FS	-	-	-7.5	-6.1	-5.5	-3.4	-	-5.5	-6.3	-5.1
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Average Gain (dB)	MP	-3.0	-4.0	-4.2	-3.1	-3.2	-3.3	-	-	-	-
	FS	-4.5	-4.0	-3.1	-2.3	-2.6	-2.6	-	-	-	-



**Average Gain (dB) - GNSS**

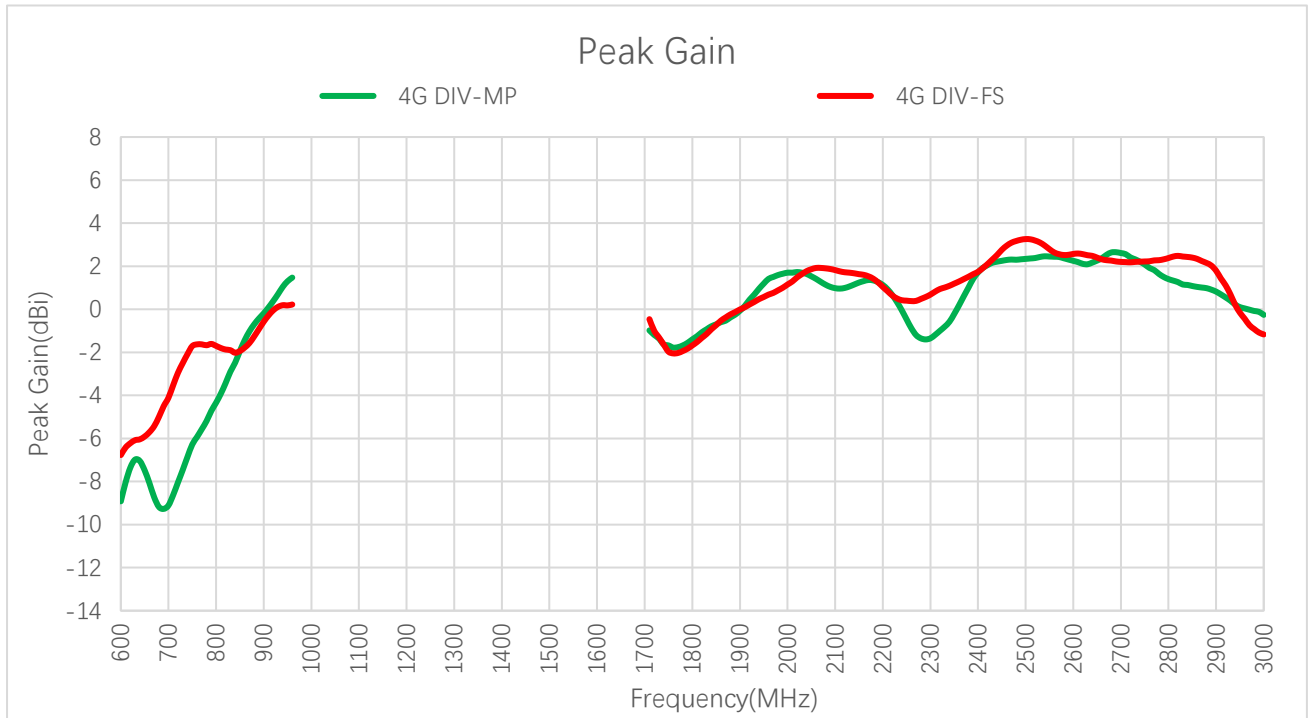
Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Average Gain (dB)	MP	-	-	-	-	-	-2.7	-2.6	-
	FS	-	-	-	-	-	-2.9	-3.4	-

**3.2.3. Peak Gain**



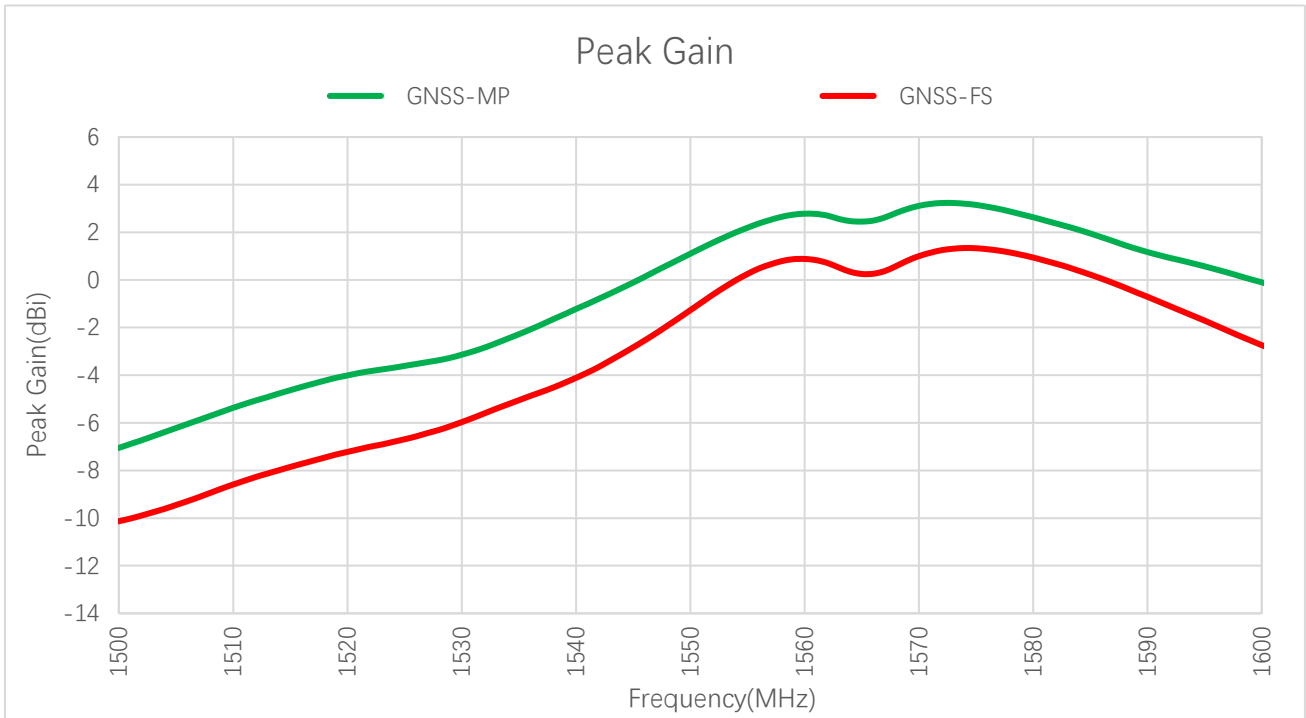
**Peak Gain (dBi) - 4G**

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	MP	-	-	-1.3	-0.4	-1.4	-3.2	-	3.7	4.0	3.7
	FS	-	-	0.3	0.6	-0.3	-1.7	-	3.3	3.0	2.9
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Peak Gain (dBi)	MP	4.6	3.0	1.2	4.4	3.9	4.0	-	-	-	-
	FS	3.5	2.2	1.1	1.6	1.2	1.5	-	-	-	-



**Peak Gain (dBi) - 4G DIV**

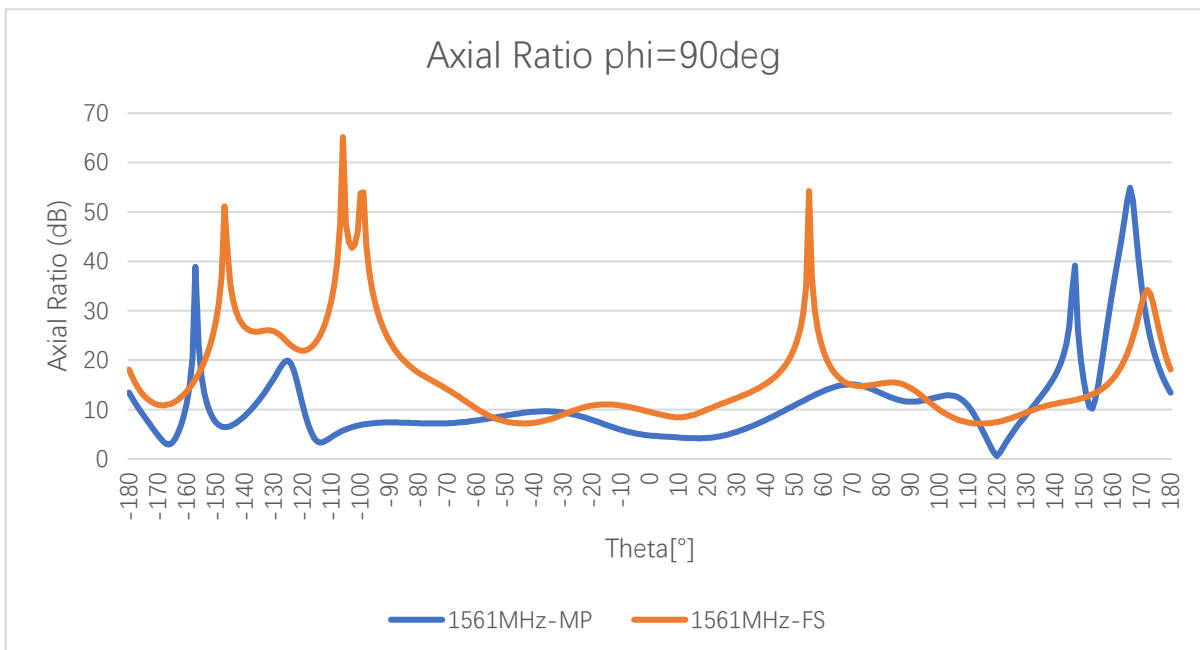
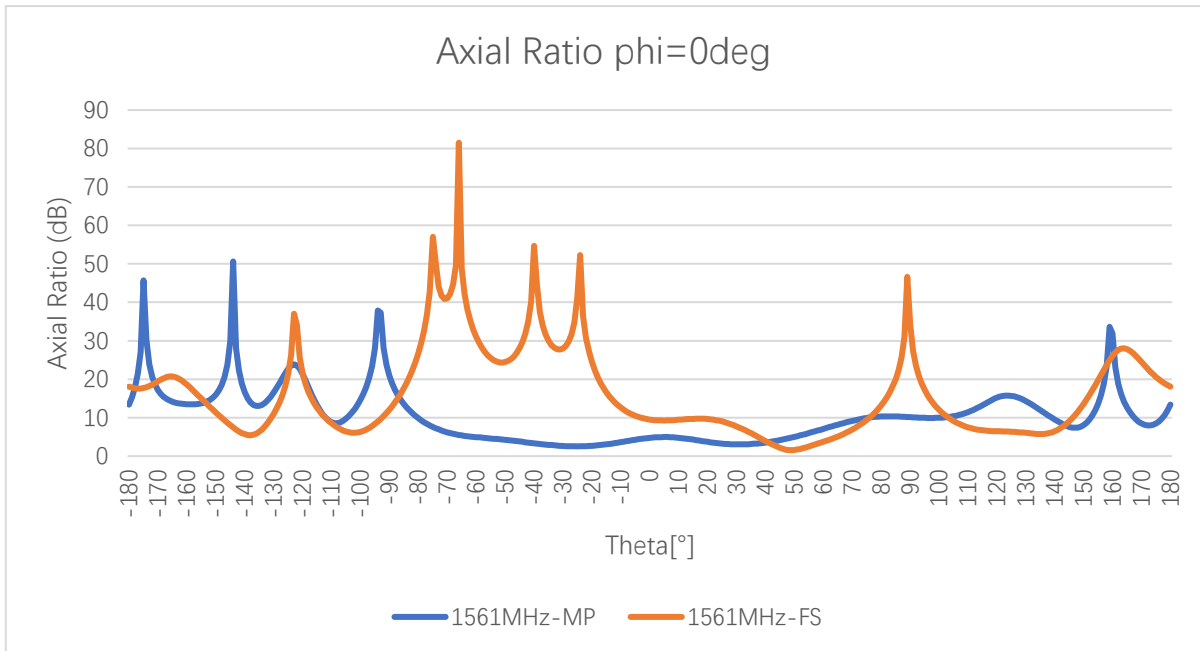
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	MP	-	-	-8.6	-2.9	-0.2	1.5	-	-1.0	-1.6	-0.4
	FS	-	-	-3.5	-1.9	-0.6	0.2	-	-0.5	-1.6	-0.2
Frequency (MHz)		1950	2140	2350	2450	2600	2690	4700	5000	5500	6000
Peak Gain (dBi)	MP	1.2	1.2	-0.2	2.3	2.3	2.7	-	-	-	-
	FS	0.6	1.7	1.2	2.8	2.6	2.2	-	-	-	-

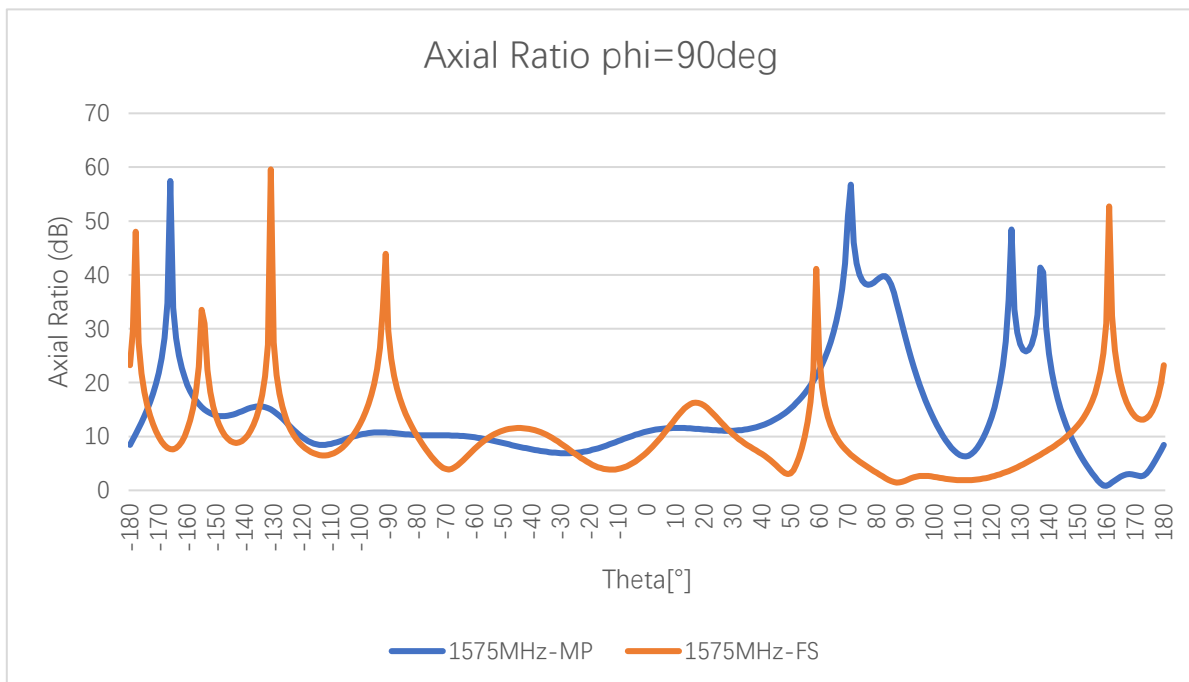
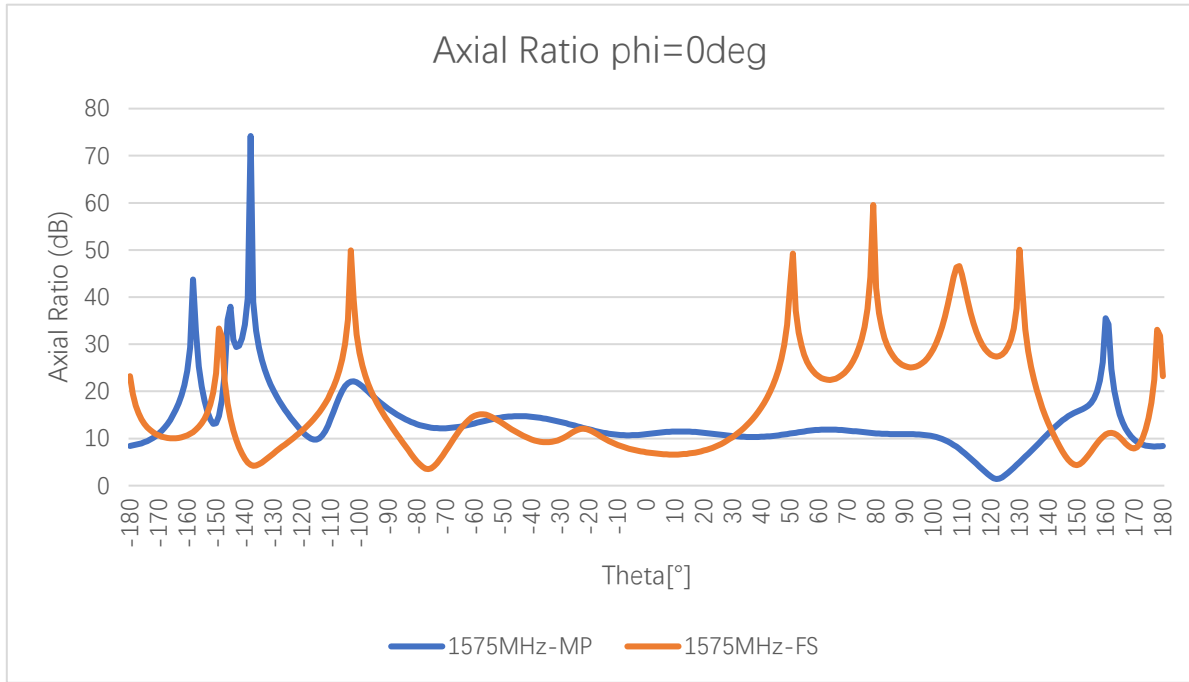


**Peak Gain (dBi) - GNSS**

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	MP	-	-	-	-	-	2.8	3.2	-
	FS	-	-	-	-	-	0.9	1.3	-

**3.2.4. Axial Ratio**





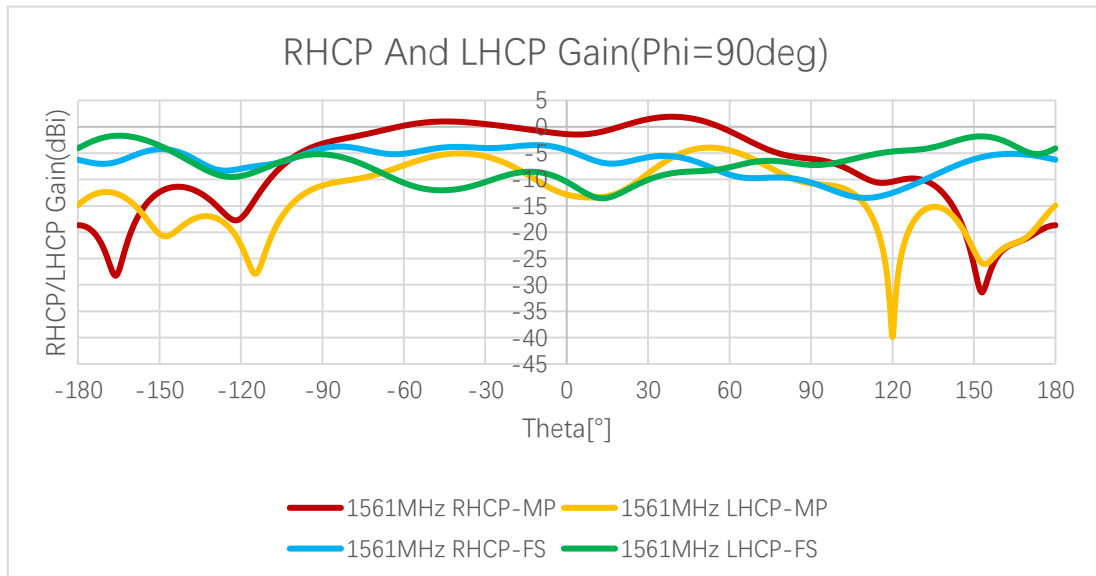
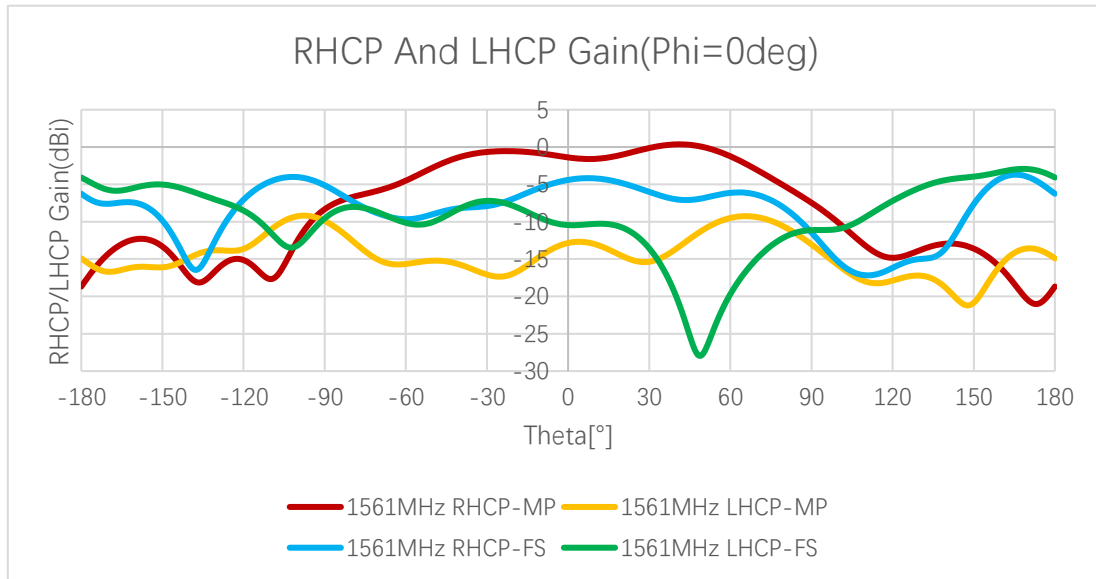
**Axial Ratio (dB)**

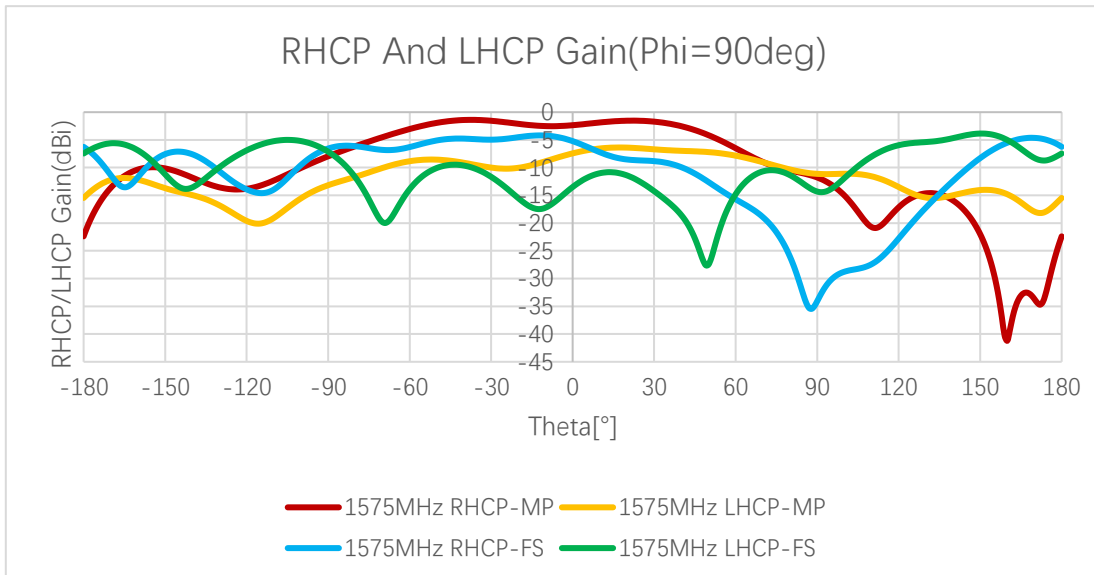
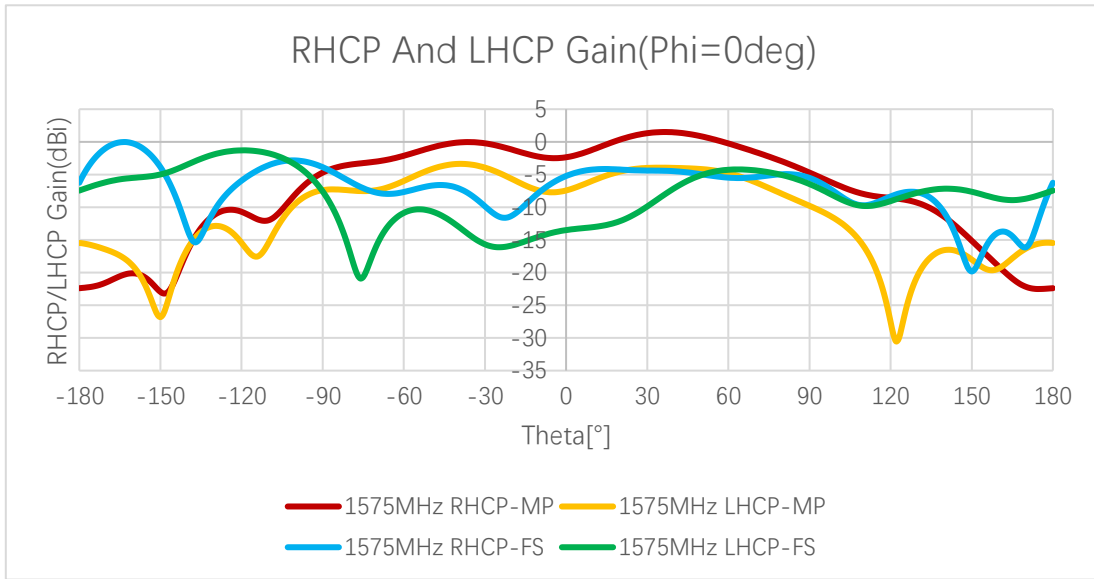
Frequency (MHz)			1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	MP	-	-	-	-	-	4.8	10.9	-
		FS	-	-	-	-	-	9.5	7.1	-



Phi = 90 (deg) Theta = 0 (deg)	MP	-	-	-	-	-	4.8	10.9	-
	FS	-	-	-	-	-	9.5	7.1	-

**3.2.5. 2D RHCP and LHCP Gain**





**2D RHCP and LHCP Gain (dBi)**

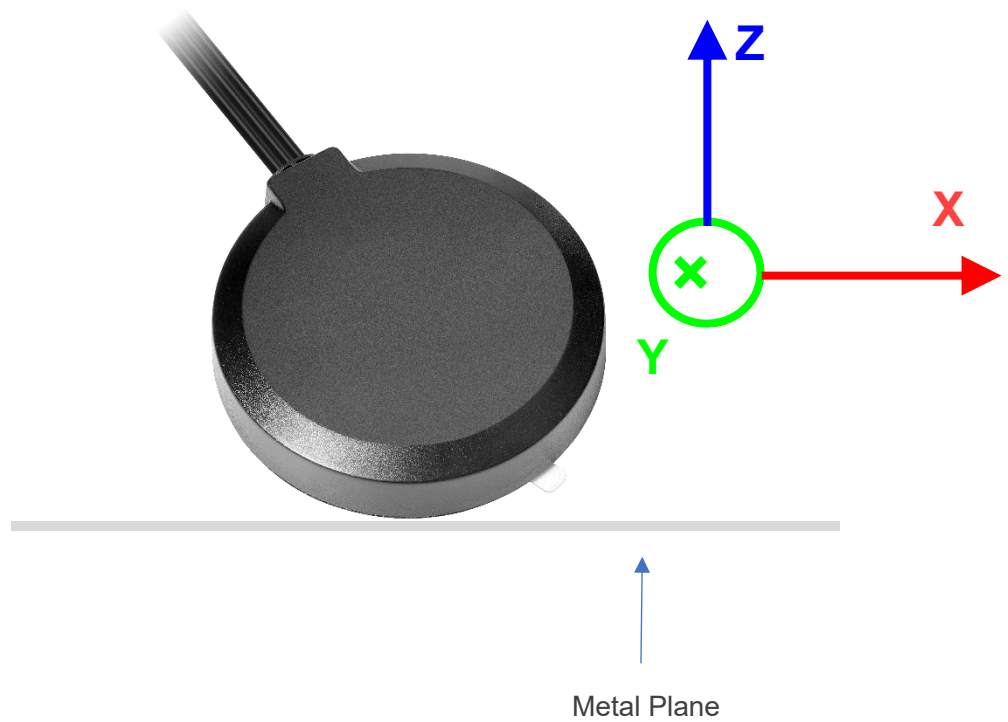
Frequency (MHz)			1176	1207	1227	1248	1268	1561	1575	1602
RC Gain(dBi)	Phi = 0 (deg) Theta = 0 (deg)	MP	-	-	-	-	-	-1.4	-2.4	-
		FS	-	-	-	-	-	-4.4	-5.2	-
	Phi = 90 (deg) Theta = 0 (deg)	MP	-	-	-	-	-	-1.4	-2.4	-
		FS	-	-	-	-	-	-4.4	-5.2	-

LC Gain (dBi)	Phi = 0 (deg)	MP	-	-	-	-	-	-12.9	-7.4	-
	Theta = 0 (deg)	FS	-	-	-	-	-	-10.5	-13.5	-
	Phi = 90 (deg)	MP	-	-	-	-	-	-12.9	-7.4	-
	Theta = 0 (deg)	FS	-	-	-	-	-	-10.5	-13.5	-

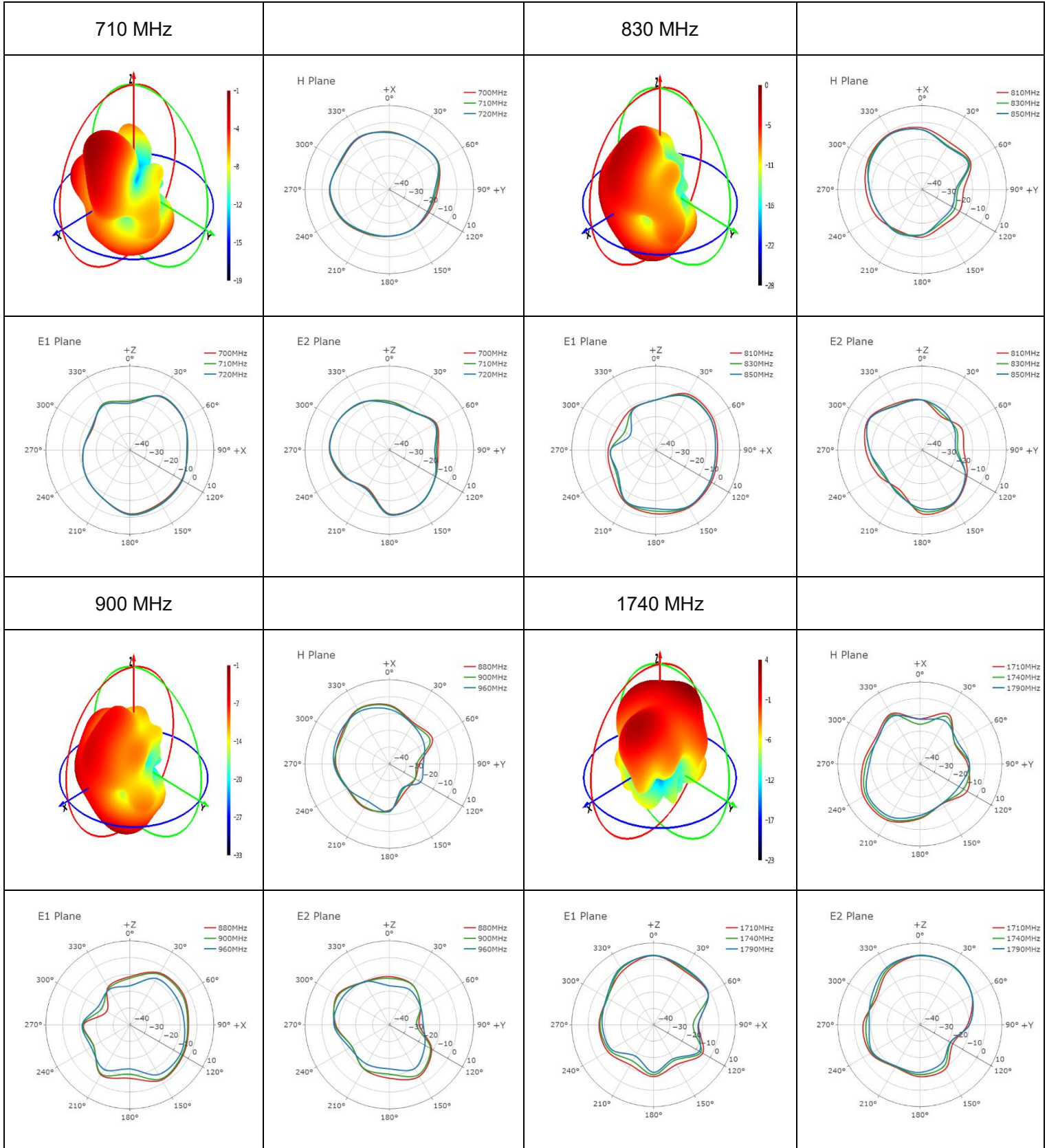
### 3.2.6. 3D & 2D Radiation Pattern

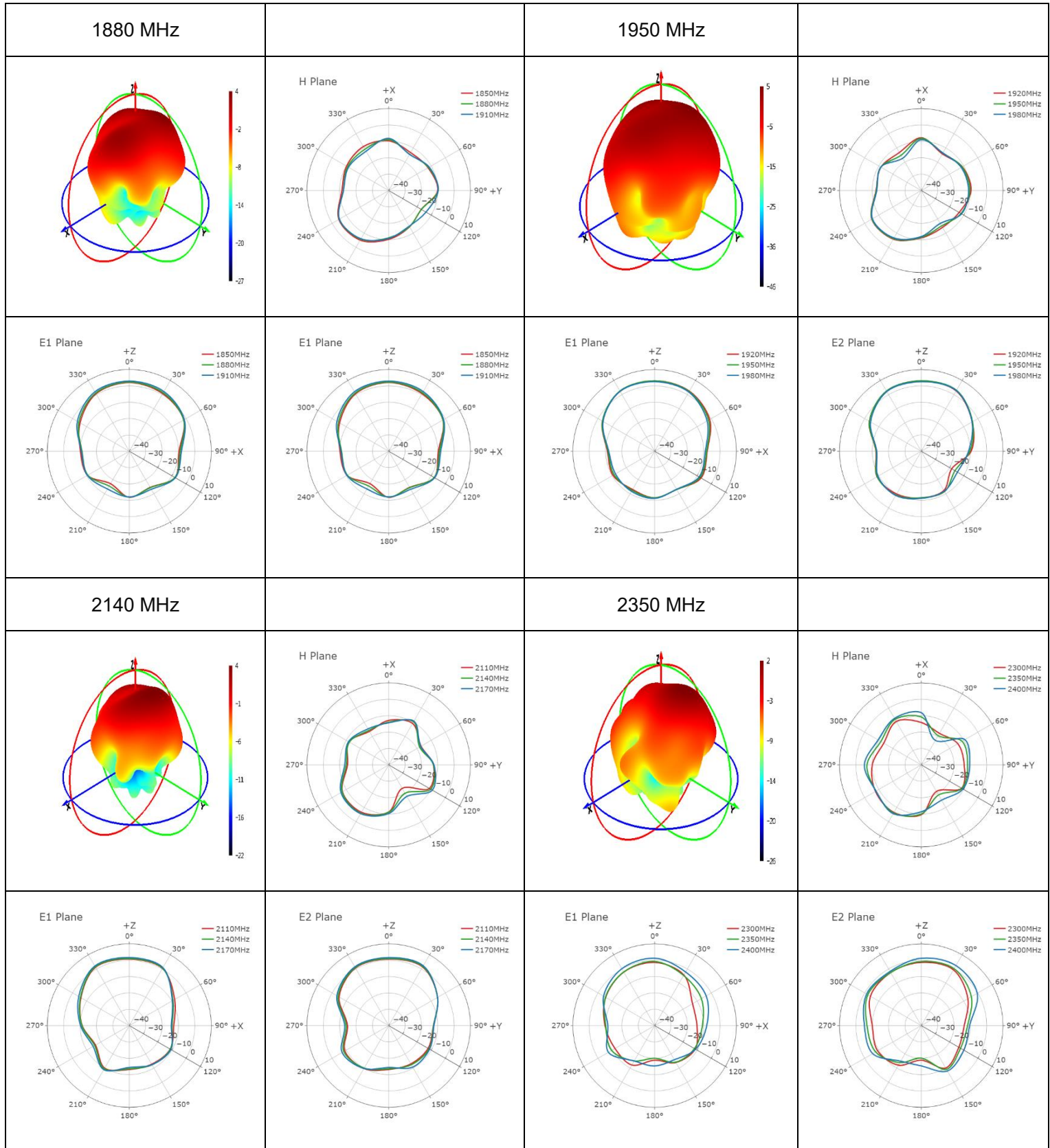
#### 3.2.6.1. Test Condition: On 300 × 300 mm Metal Plane

- Test Chamber: GL-S-1

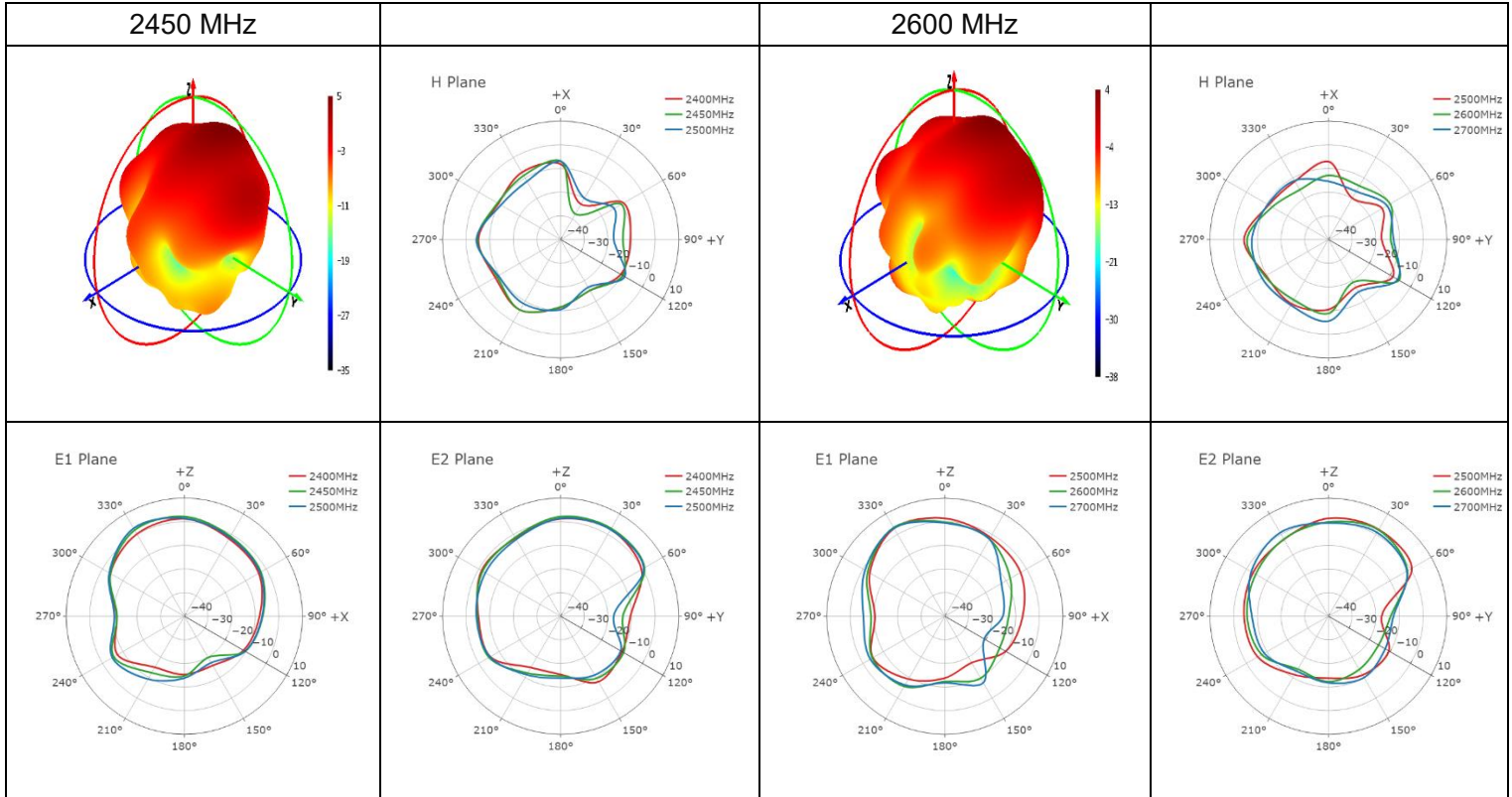


● 4G

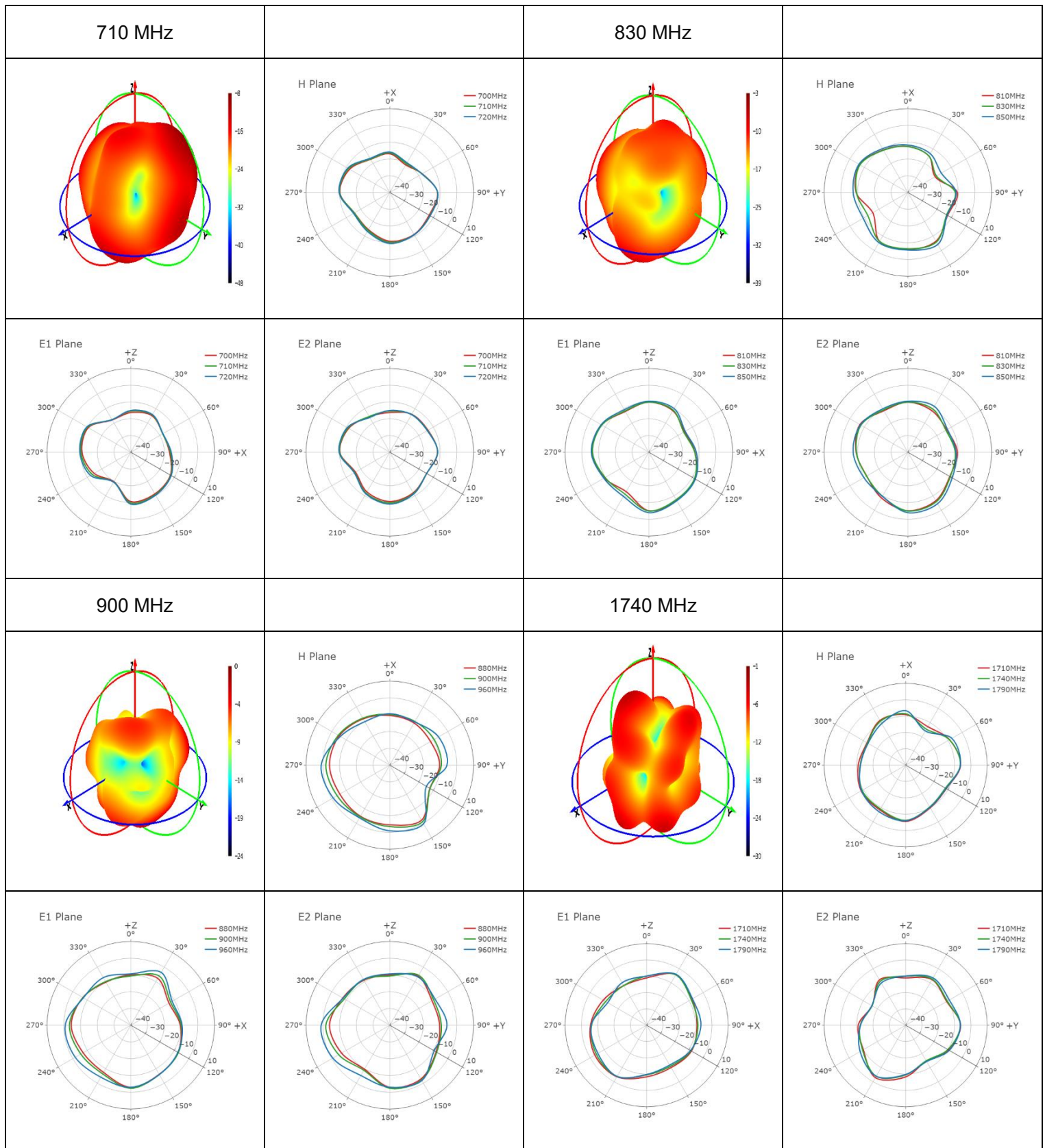




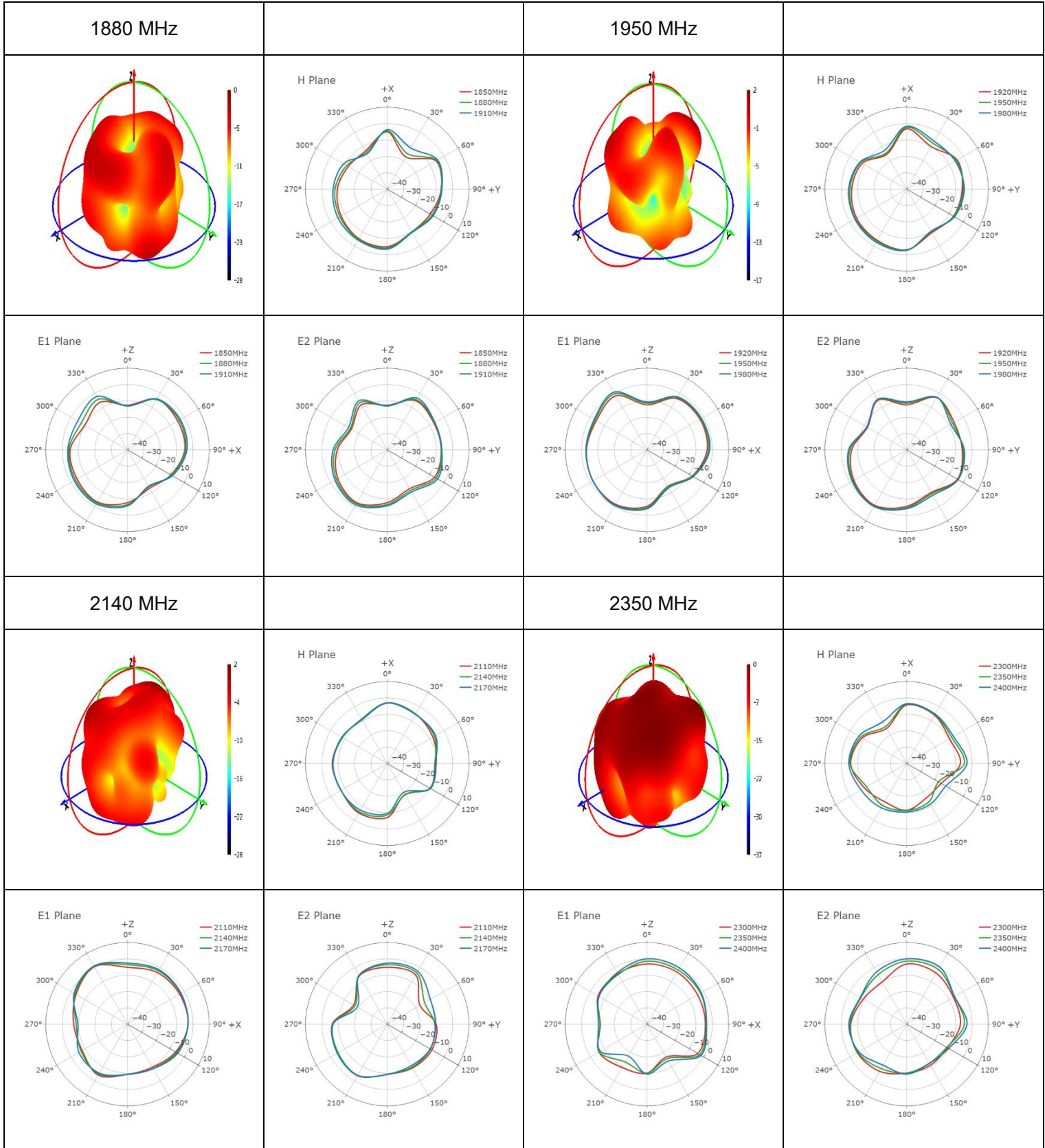


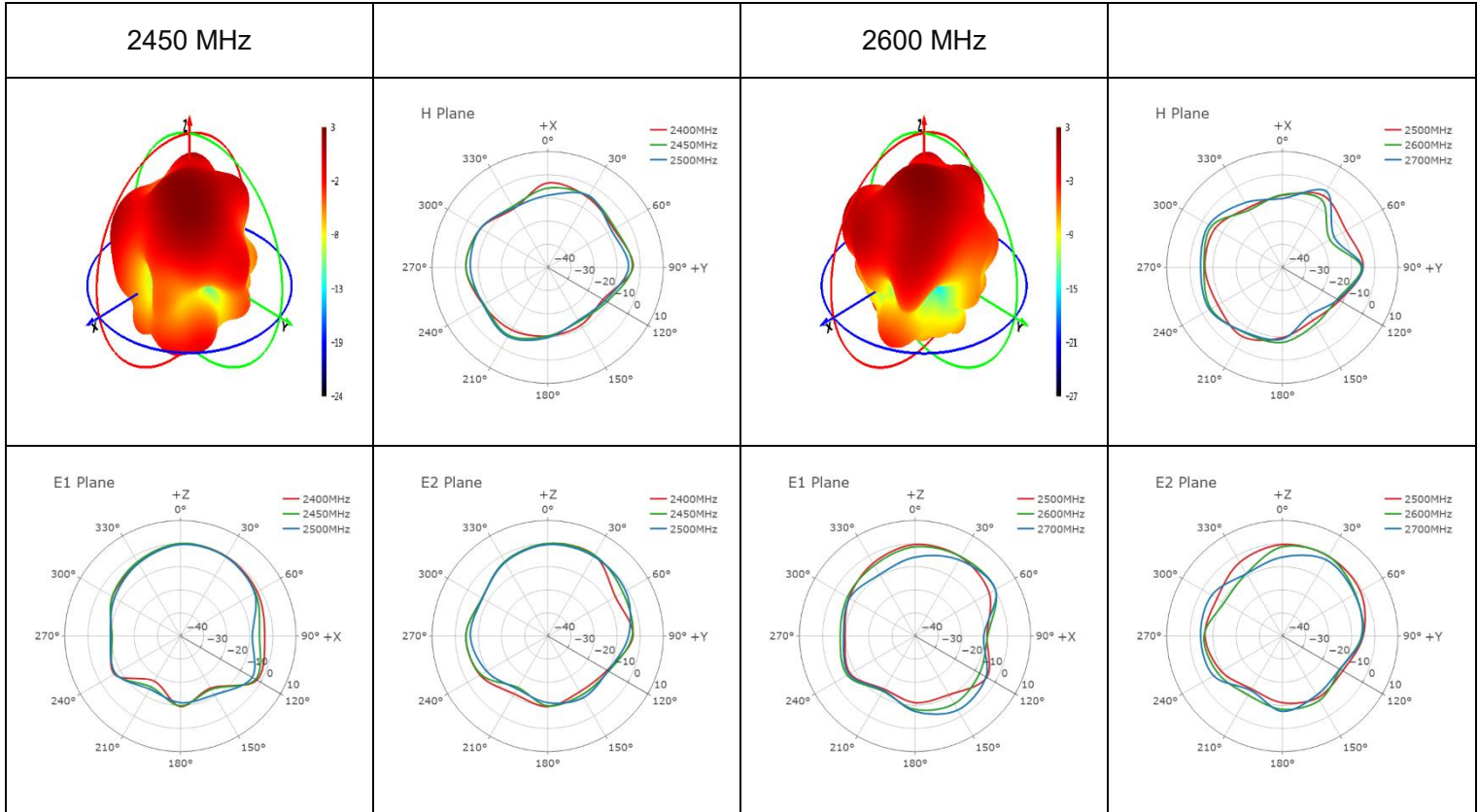


● **4G DIV**

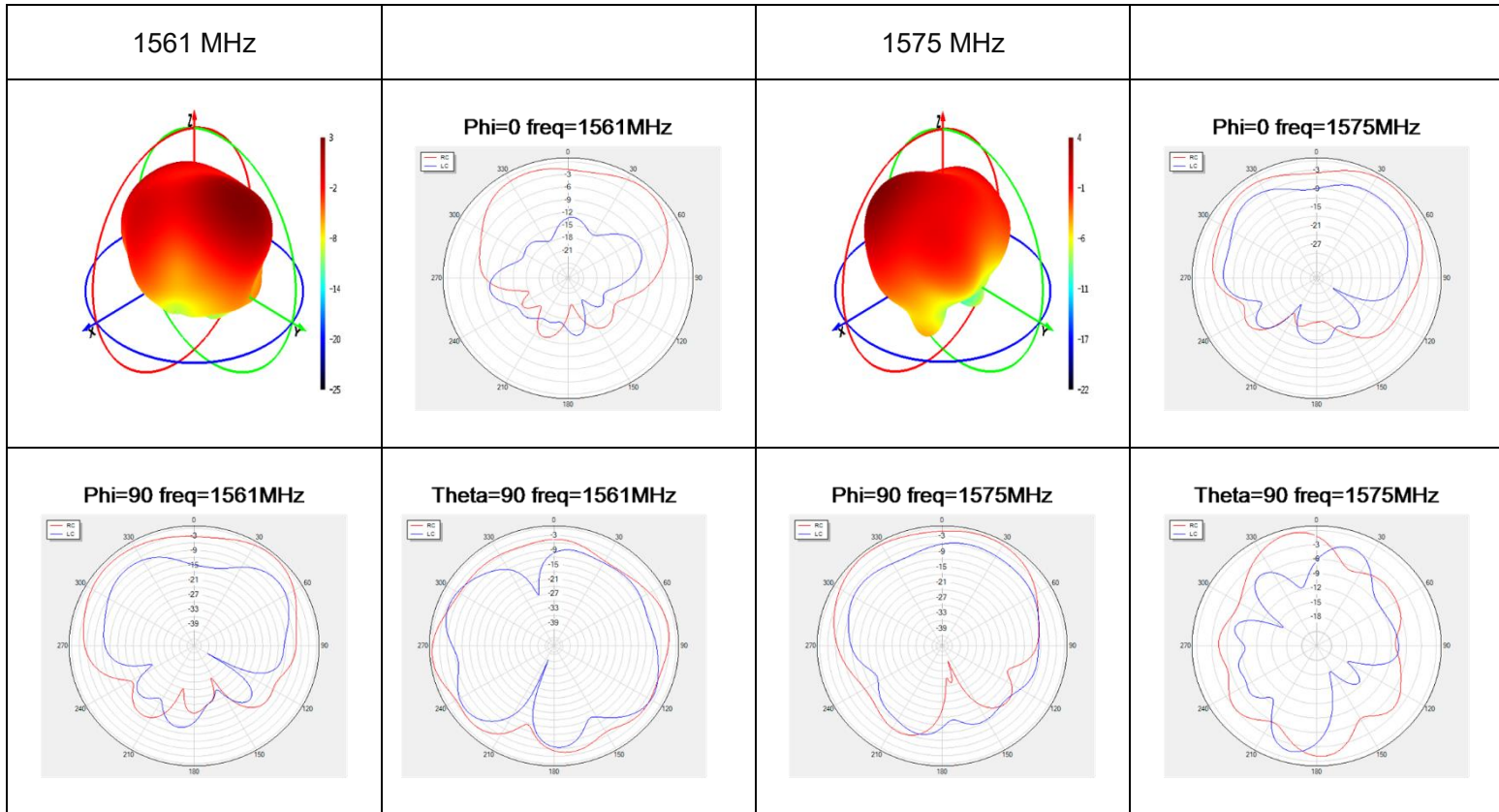






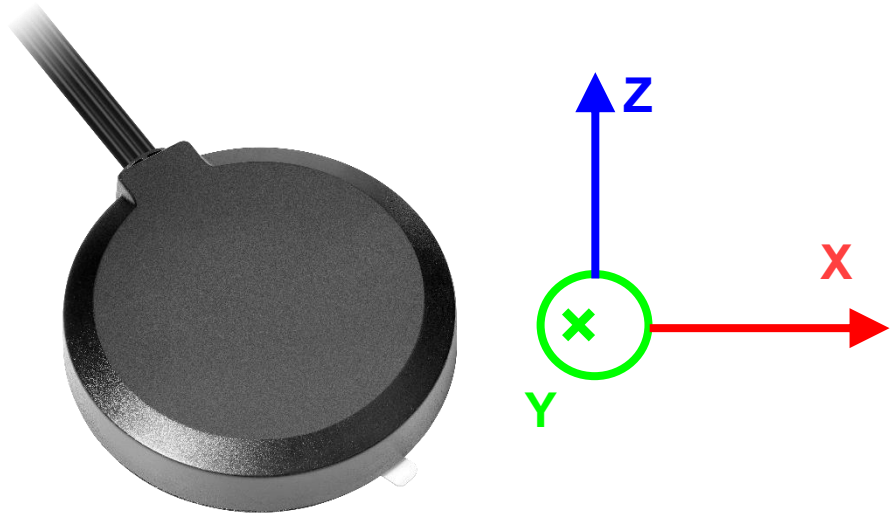


● GNSS

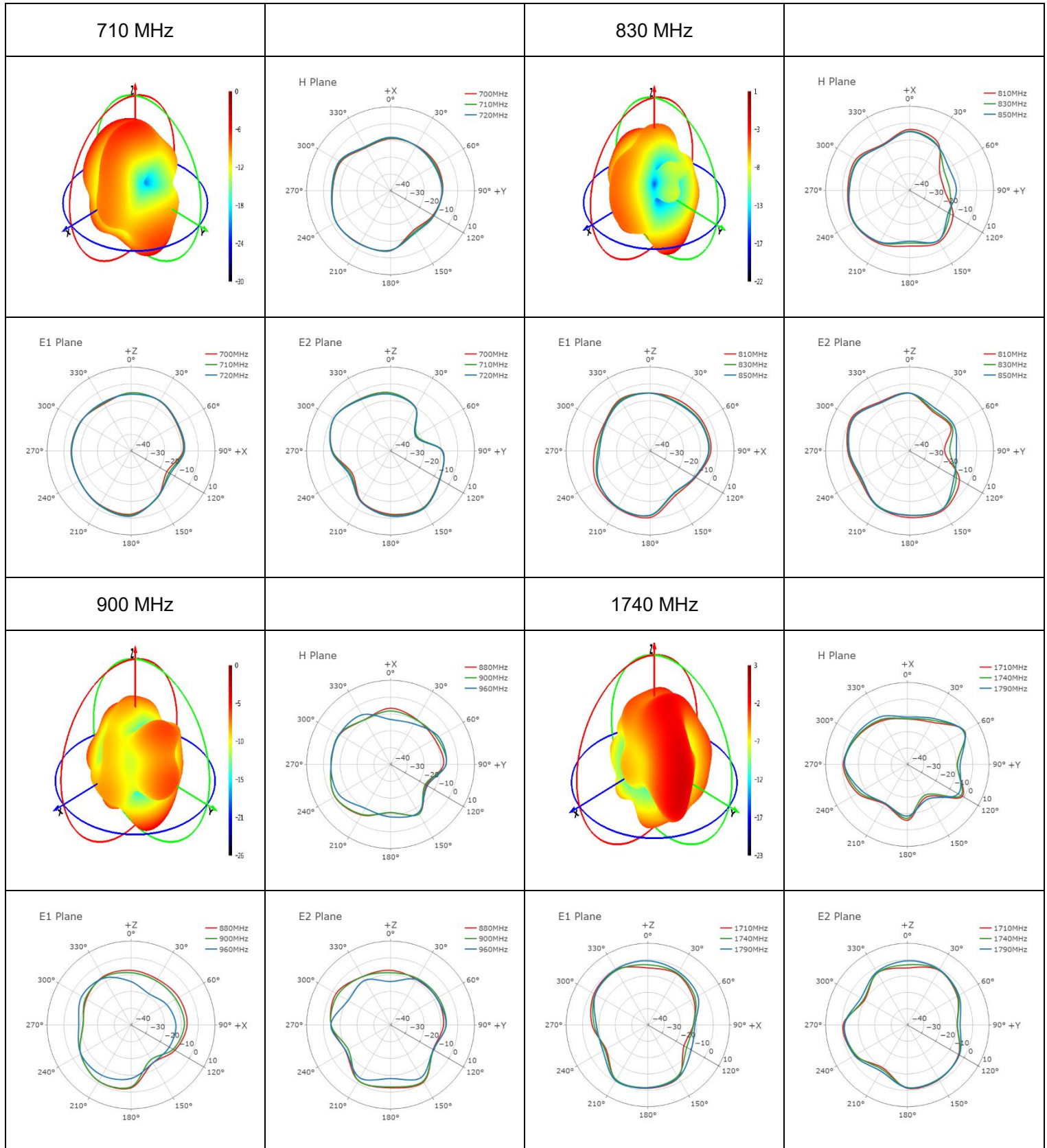


**3.2.6.2. Test Condition: In Free Space**

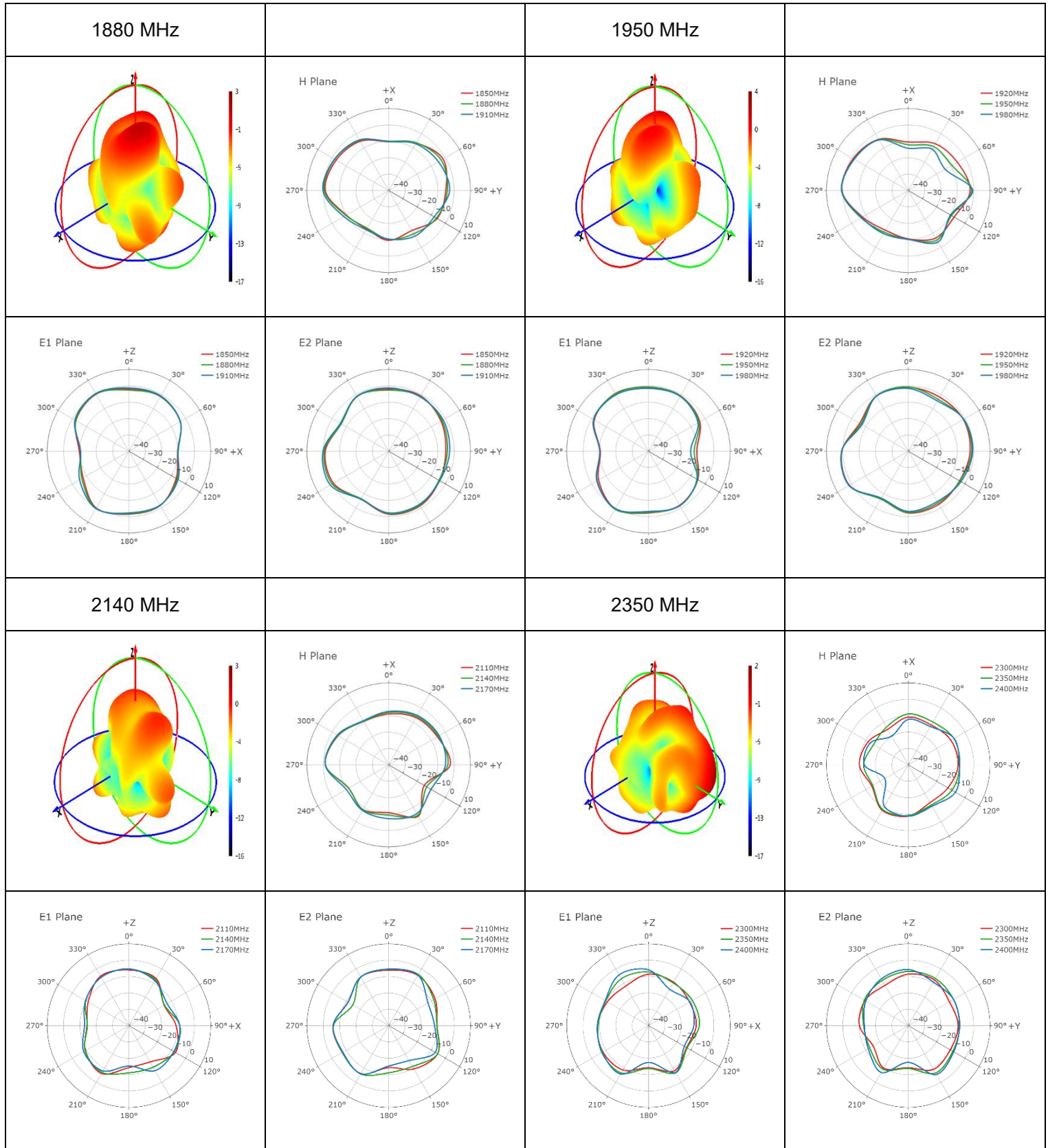
- Test Chamber: GL-S-1

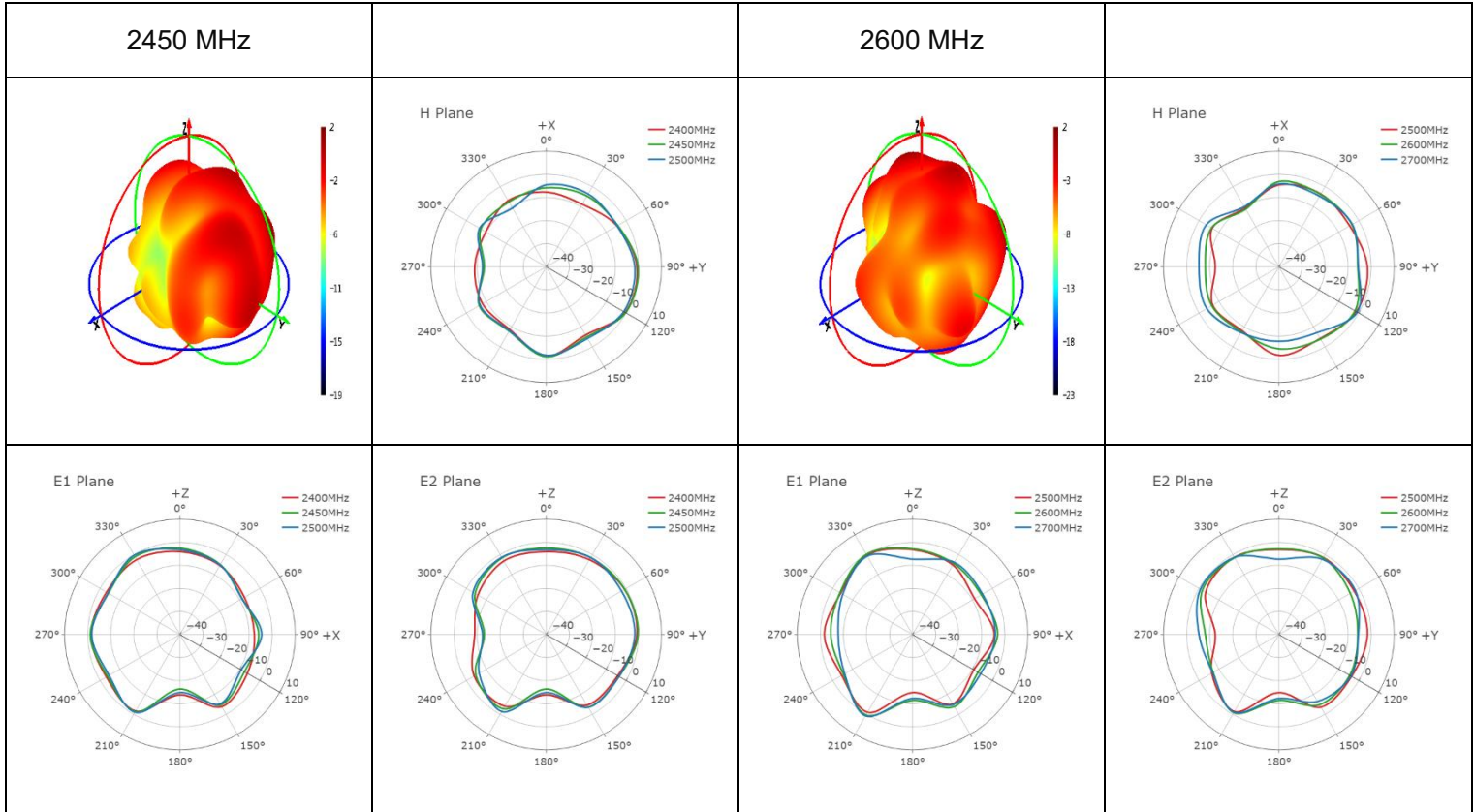


● 4G

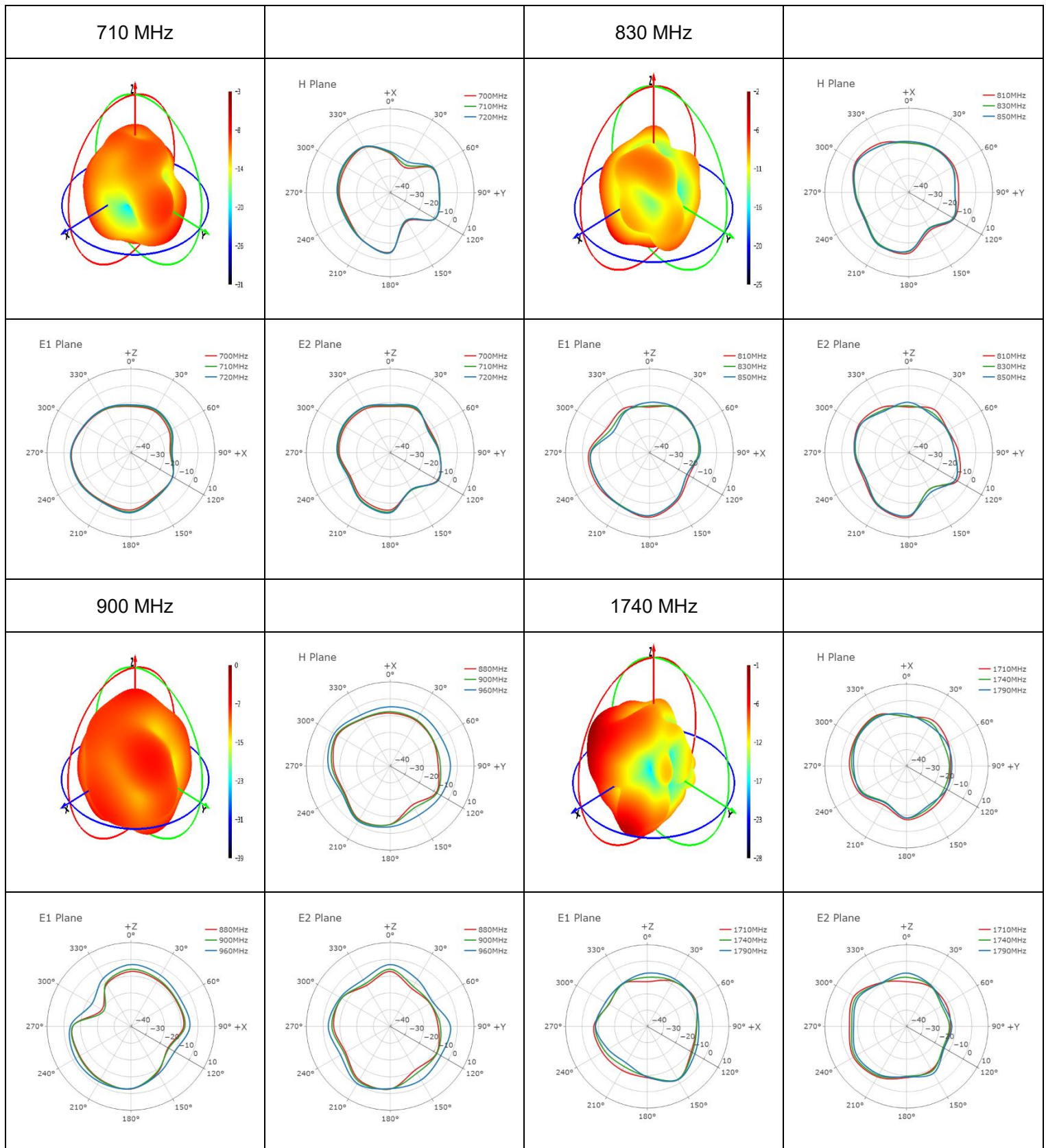




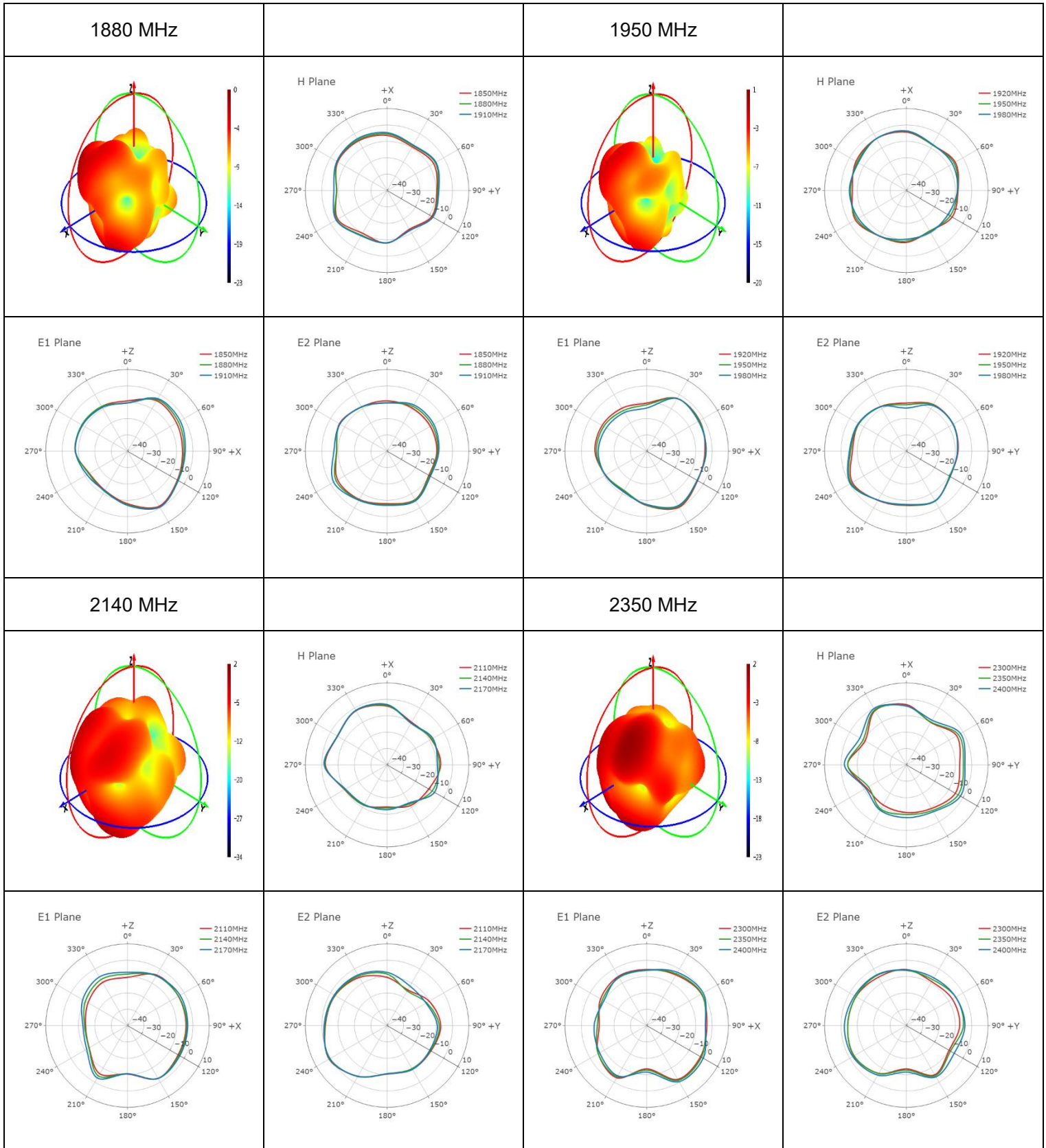


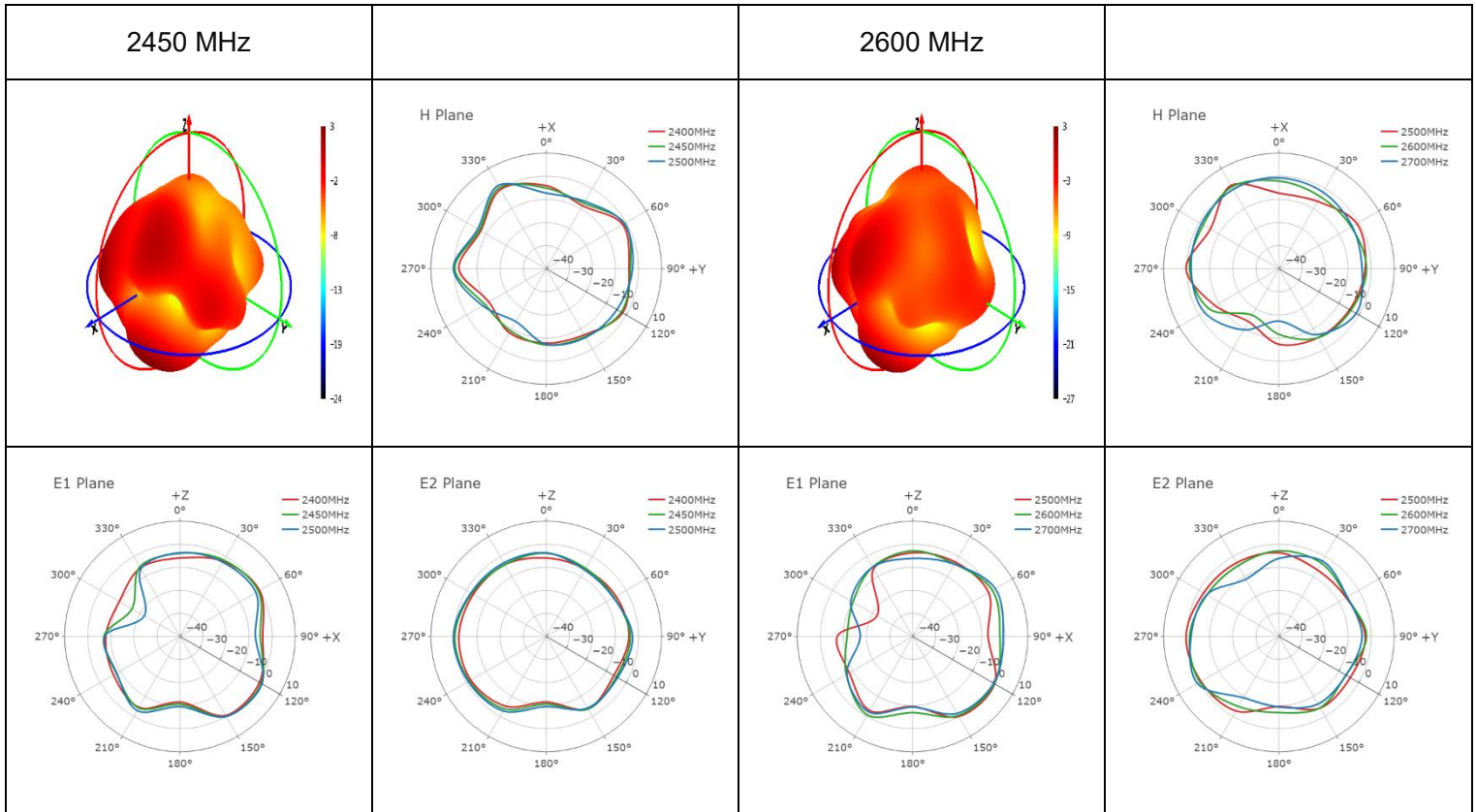


● **4G DIV**





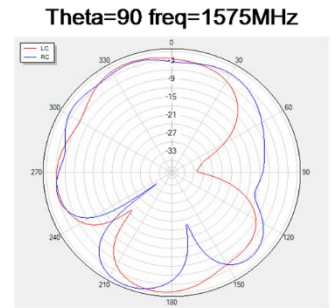
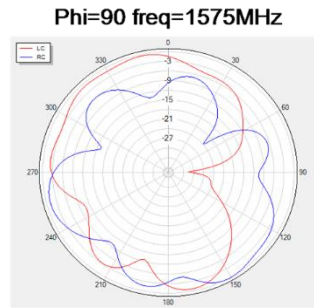
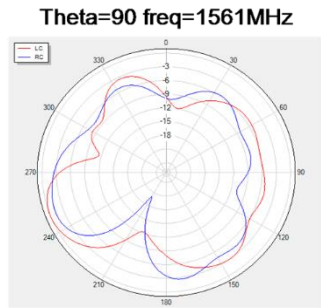
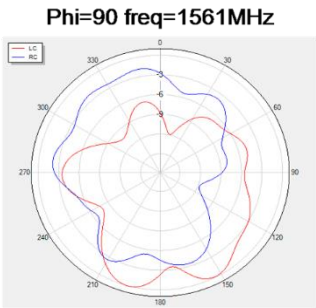
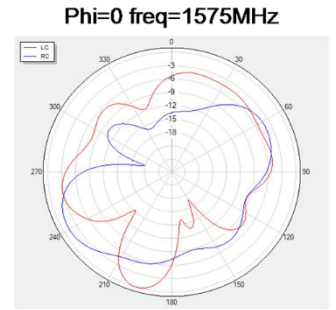
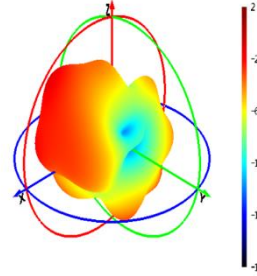
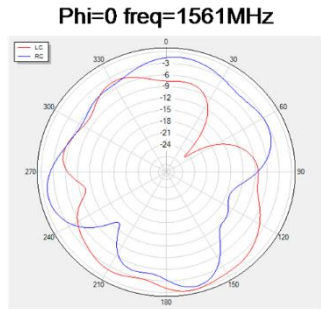
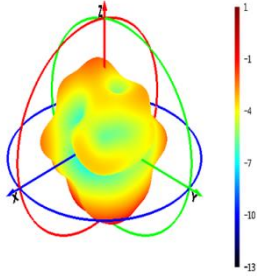






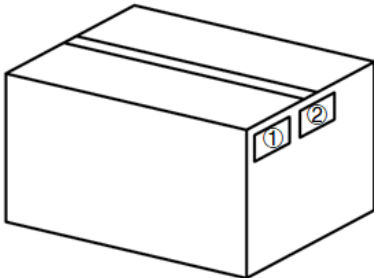
● GNSS

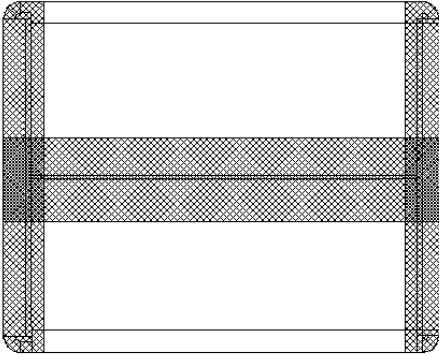
1561 MHz

1575 MHz



# 4 Packaging

Step	Packaging Picture / 2D Picture	Description
1		<p>20 pcs antenna products in a PE bag; (20 pcs antennas per PE bag)</p>
2		<p>(8 PE bags per carton box) (160 pcs antennas per carton box)</p> <p><u>Carton Size:</u> <u>L × W × H= 370 × 370 × 295 mm</u></p>
3		<p><b>Position for Attaching Labels</b></p> <ul style="list-style-type: none"> <li>① Carton Label</li> <li>② Quality Label</li> </ul>

4		<p><b>Sealing Cartons</b> “I” type sealing cartons</p>
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# 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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Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local offices. For more information, please visit:**

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# Revision History

Version	Date	Author	Note
-	2020-07-16	Kenny YIN	Creation of the document
1.0	2020-07-16	Kenny YIN	First official release
1.1	2020-12-11	Kenny YIN	Updated the antenna picture in Chapter 2
2.0	2021-04-02	Kenny YIN	Updated the data in Product Specifications and the test data in the datasheets
2.1	2021-07-25	Kenny YIN	Updated working temperature. (Chapter 3)
2.2	2021-07-25	Kenny YIN	Updated the product description (Chapter 1).
3.0	2023-06-19	Black LI/ Lucky FENG/ David LIU/ Bunny ZHANG	Updated all data in the datasheet.

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