Antenna Datasheet

Product OC: Y4SEN01A0AA
Version: 1.0
Date: 2023-10-23
Status: Preliminary

Product Name: 4G & GNSS 2IN1Combo Antenna
Key Features:
Frequency Band: 4G*2: 698-960MHz,1710-2690MHz
GNSS: 1559-1588MHz
Dimensions: Φ81 × 14.5 mm
Efficiency: Up to 56.2%
GNSS LNA Gain：27±3dB
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.

Contents

1 Specification

Test Condition: In Free Space

1.1. Electrical

Electrical Specifications		
Frequency Range	**4G**	698–960 MHz, 1710–2690 MHz
	GNSS	1559-1588 MHz
Radiation Pattern	**4G**	Omni-directional
	GNSS	Directional
Polarization	**4G**	Linear
	GNSS	RHCP
Impedance		50 Ω
Isolation	**4G-GNSS**	≤ -16.2 dB

1.1.1. 4G

Electrical - Detail								
Band / SPEC	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		-	1.8	2.9	1.9	2.0	1.8	1.7
Max. Return Loss (dB)		-	-10.7	-6.3	-10.1	-9.5	-11.3	-11.8
AVG Eff. (%)		-	49.9	26.4	30.5	23.3	28.5	24.8
AVG AVG Gain (dB)		-	-3.0	-5.9	-5.2	-6.4	-5.5	-6.1
Max. Peak Gain (dBi)		-	1.6	0.0	0.7	-0.9	1.1	0.8
VSWR		≤ 2.9						
Return Loss		≤ -6.3 dB						
Peak Gain		≤ 1.6 dBi						

1.1.2. GNSS

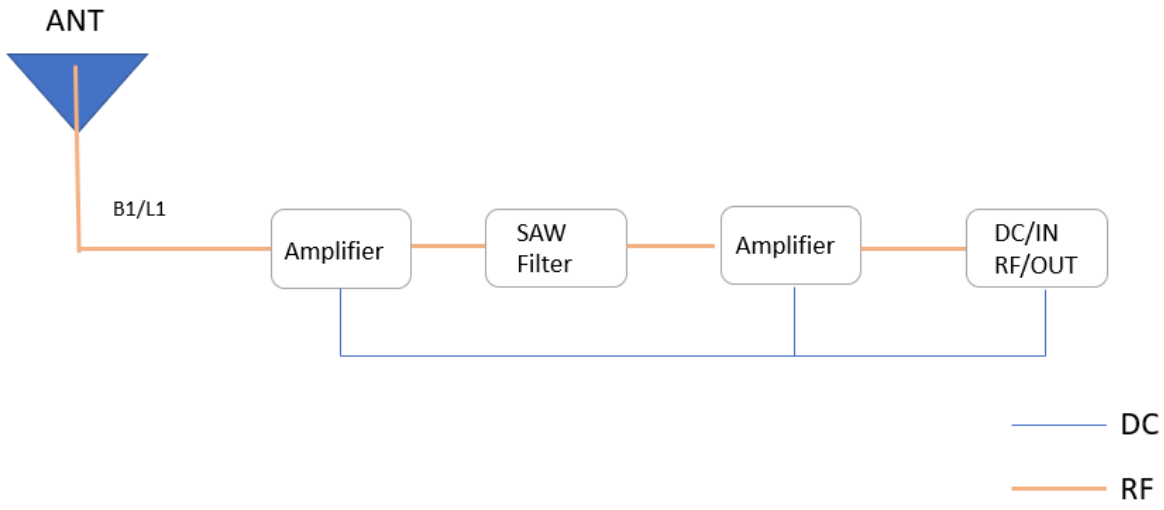
Band / Frequency (MHz)	GPS L5 GALILEO E5a BEIDOU B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BEIDOU B2b	GPS L2 QZSS L2C	GLONASS G2	BEIDOU B3	BEIDOU B1I	GPS L1 GALILEO E1 BEIDOU B1C QZSS L1	GLONASS G1
	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	1.6	1.5	-
Return Loss (dB)	-	-	-	-	-	-12.7	-13.9	-
Efficiency (%)	-	-	-	-	-	42.7	34.3	-
AVG Gain (dB)	-	-	-	-	-	-3.7	-4.7	-
Peak Gain (dBi)	-	-	-	-	-	0.7	-0.2	-
Axial Ratio(dB)	-	-	-	-	-	26.3	28.1	-

LNA Electrical	
LNA Gain	27±3 dB
Output VSWR	< 2.0
Input VSWR	< 2.0
Filter Out-of-Band Attenuation	46 dB f0 ±100 MHz f0 (1575 MHz)
Working Voltage	2.7-3.3V
Working Current	10±1mA@3.0V
Impedance	50Ω

1.2. Mechanical, Environmental

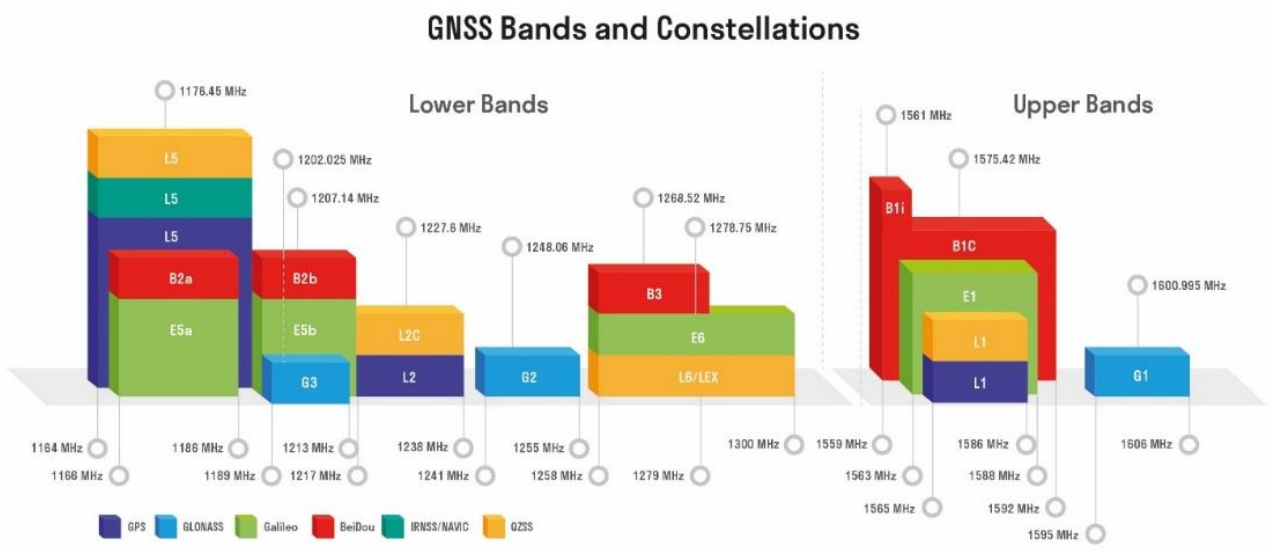
Mechanical		
Antenna Dimensions		Φ81 * 14.5 mm
Casing Material & Color		ABS+PC & Black
Cable Type & Color & Length	**4G**	LMR100 & Black & 3000mm
	GNSS	LMR100 & Black & 3000mm
Connector Type	**4G**	FAKRA-D
	GNSS	FAKRA-C
Mounting Type		Screw
Weight		Typ./
Environmental		
Operation Temperature		-40 °C to +85 °C
Storage Temperature		-40 °C to +85 °C
Ingress Protection (IP) Rating		IP66
RoHS Compliant		Yes

1.3. Block Diagram (Active Antenna)

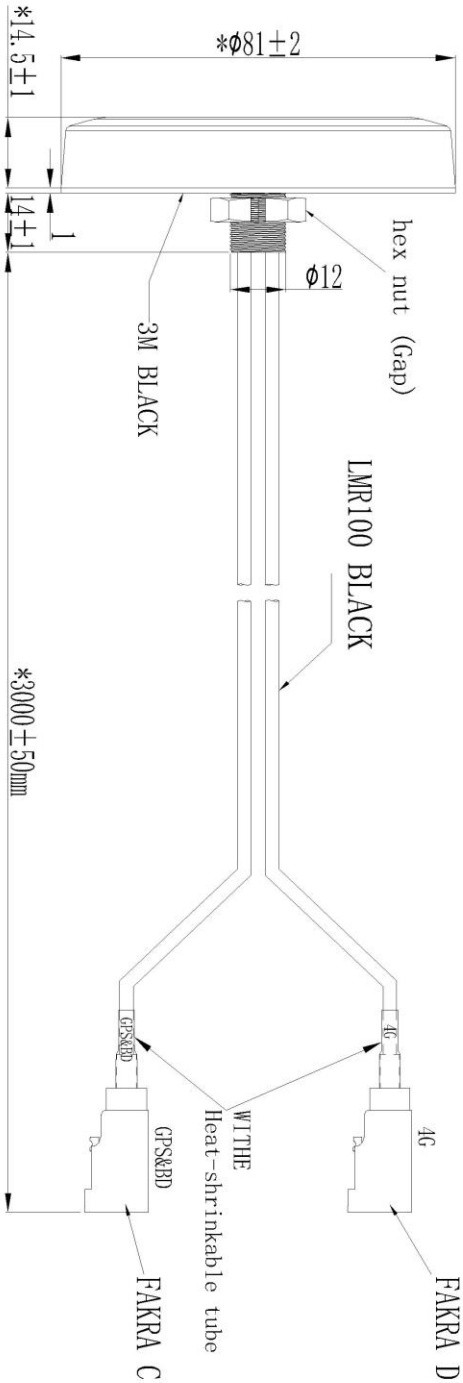


1.4. Supported GNSS Frequency Bands

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


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

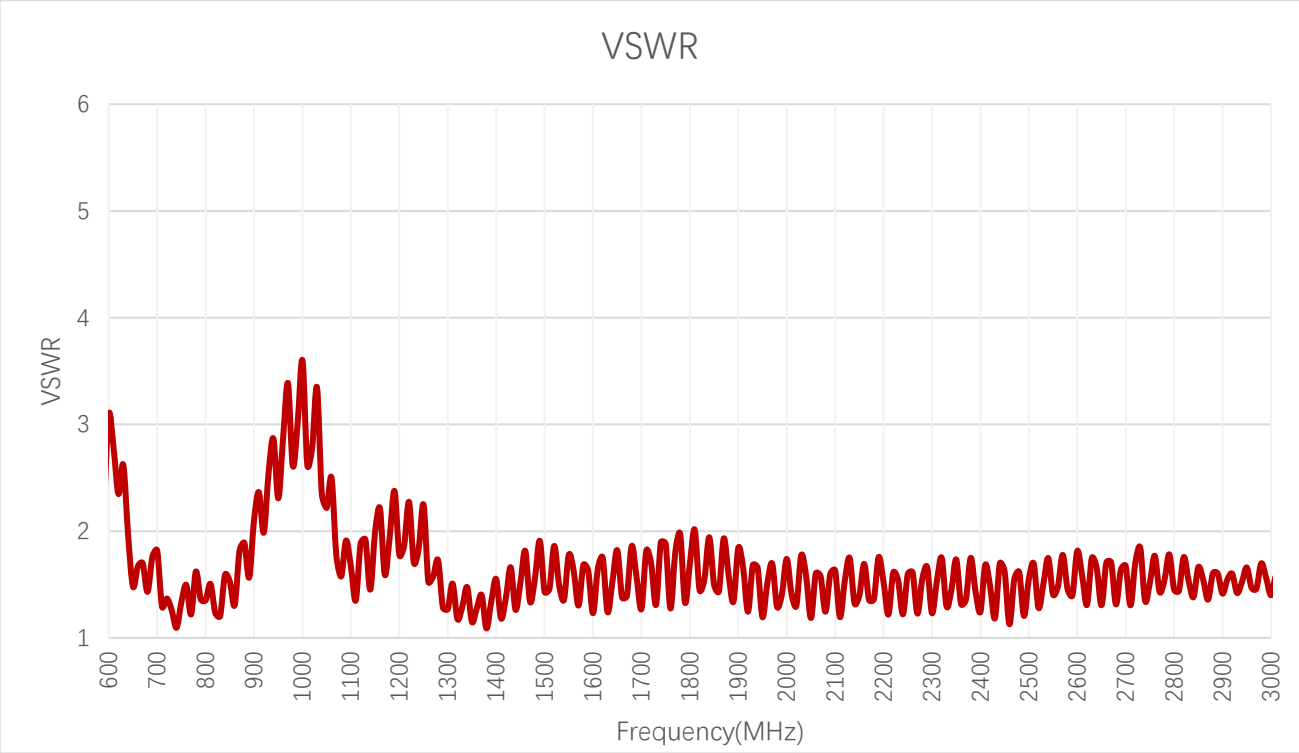
2 Drawing


*14.5±1
*φ81±2
14±1
1
φ12
hex nut (Gap)
3M BLACK
LMR100 BLACK
*3000±50mm
GPS&BD
4G
WITHE
Heat-shrinkable tube
GPS&BD
4G
FAKRA C
FAKRA D

3 Detailed Performance

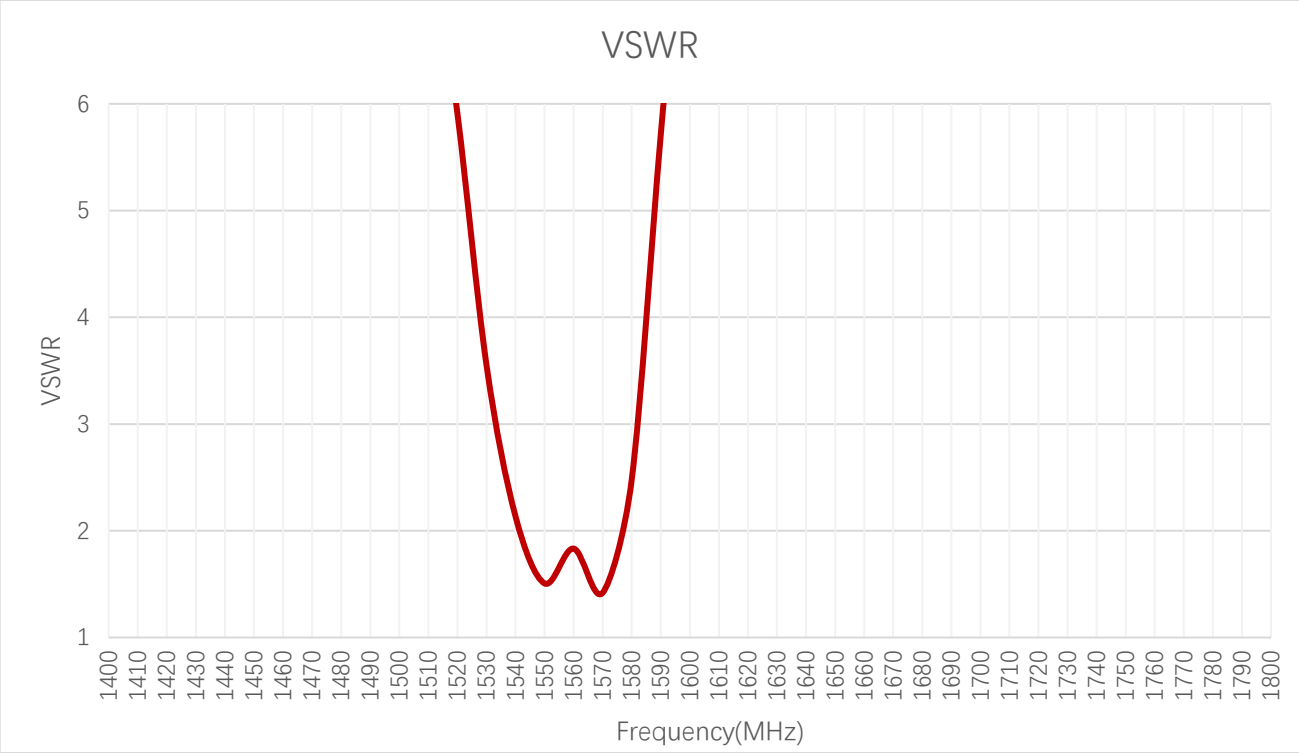
3.1. S-Parameter Test

3.1.1. VSWR



VSWR - 4G

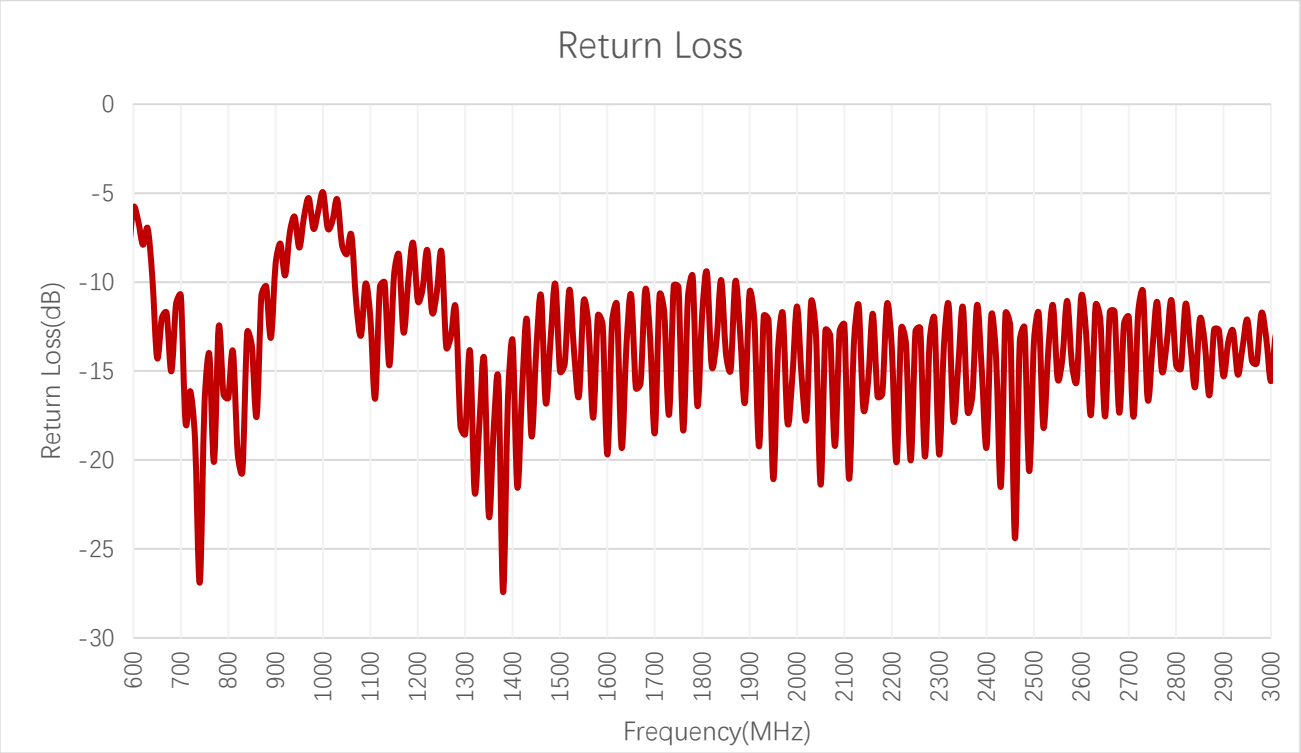
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
VSWR	-	-	1.3	1.2	2.1	2.9	-	1.8	1.9	1.6
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
VSWR	1.2	1.3	1.7	1.6	1.8	1.6	-	-	-	-



VSWR– GNSS

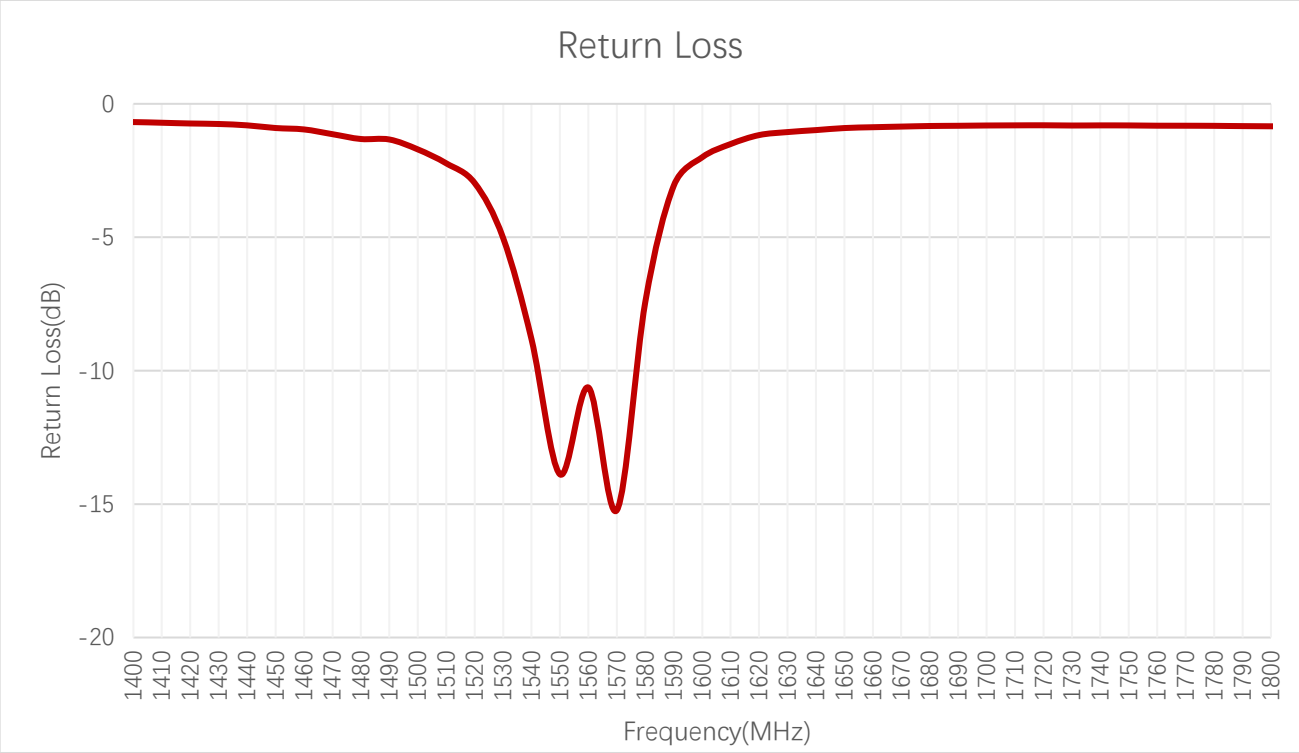
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	1.6	1.5	-

3.1.2. Return Loss



Return Loss (dB) – 4G

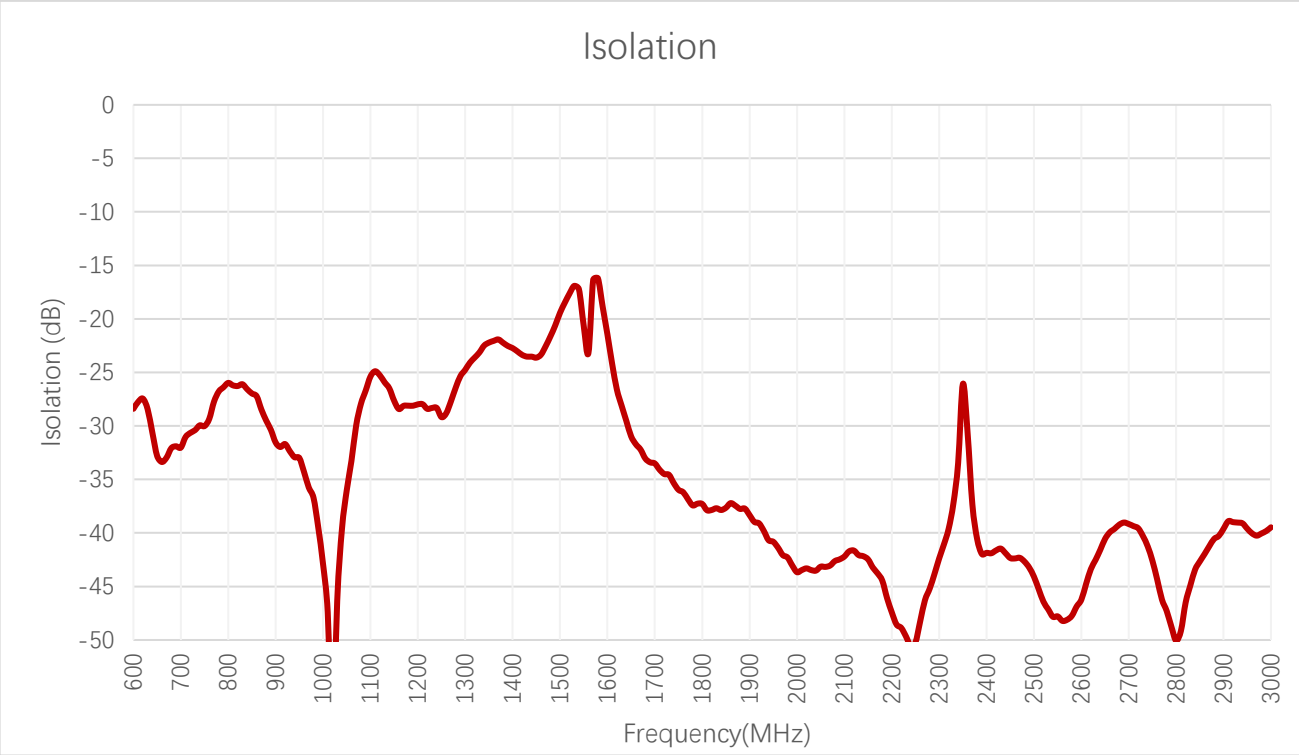
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
VSWR	-	-	-17.9	-20.6	-9.0	-6.3	-	-10.8	-10.2	-12.8
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
VSWR	-21.1	-17.1	-11.4	-12.5	-10.8	-12.3	-	-	-	-



Return Loss(dB)– GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-	-	-	-	-	-12.7	-13.9	-

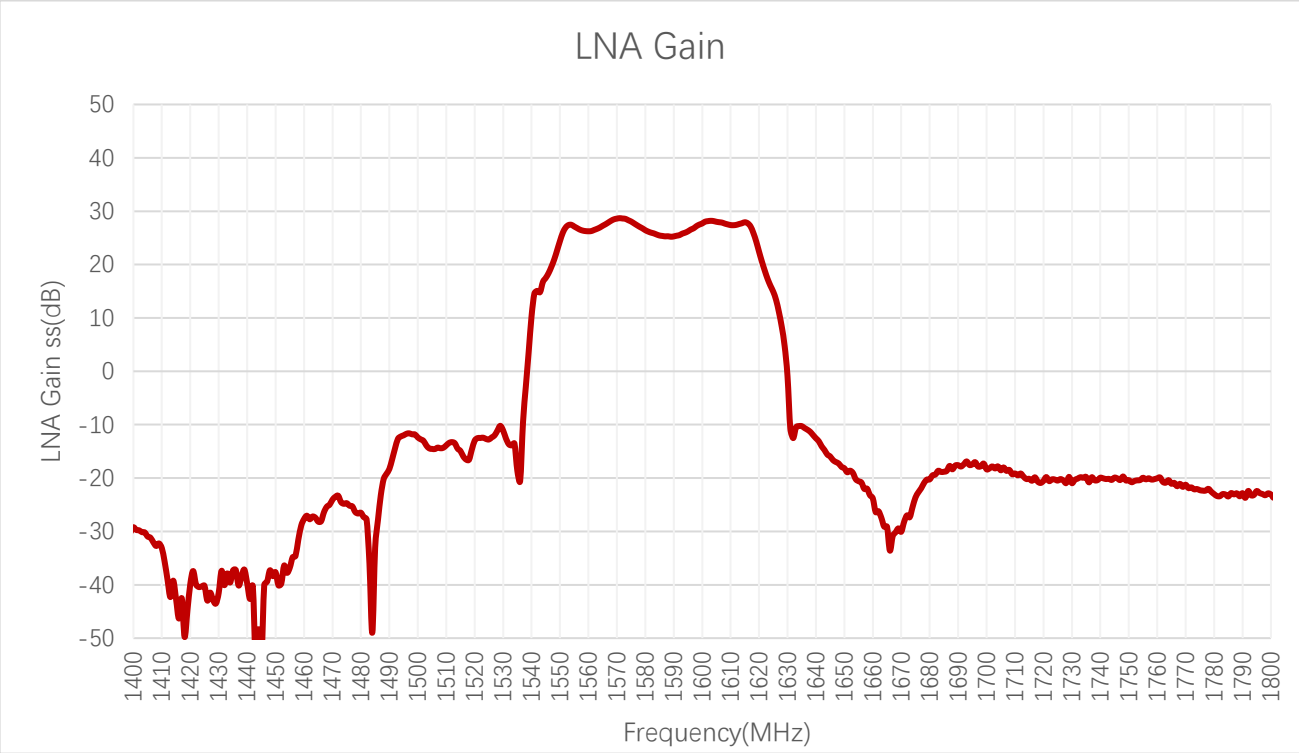
3.1.3. Isolation



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
Freq. (MHz)	600–700	700–810	820–960	1700–2170	2300–2400	2400–2500	2500–2690	1559–1564	1565–1586
Isolation (dB)	-	-26.0	-26.1	-17.6	-33.5	-26.1	-41.5	-23.2	-16.2

3.1.4. GNSS LNA Gain

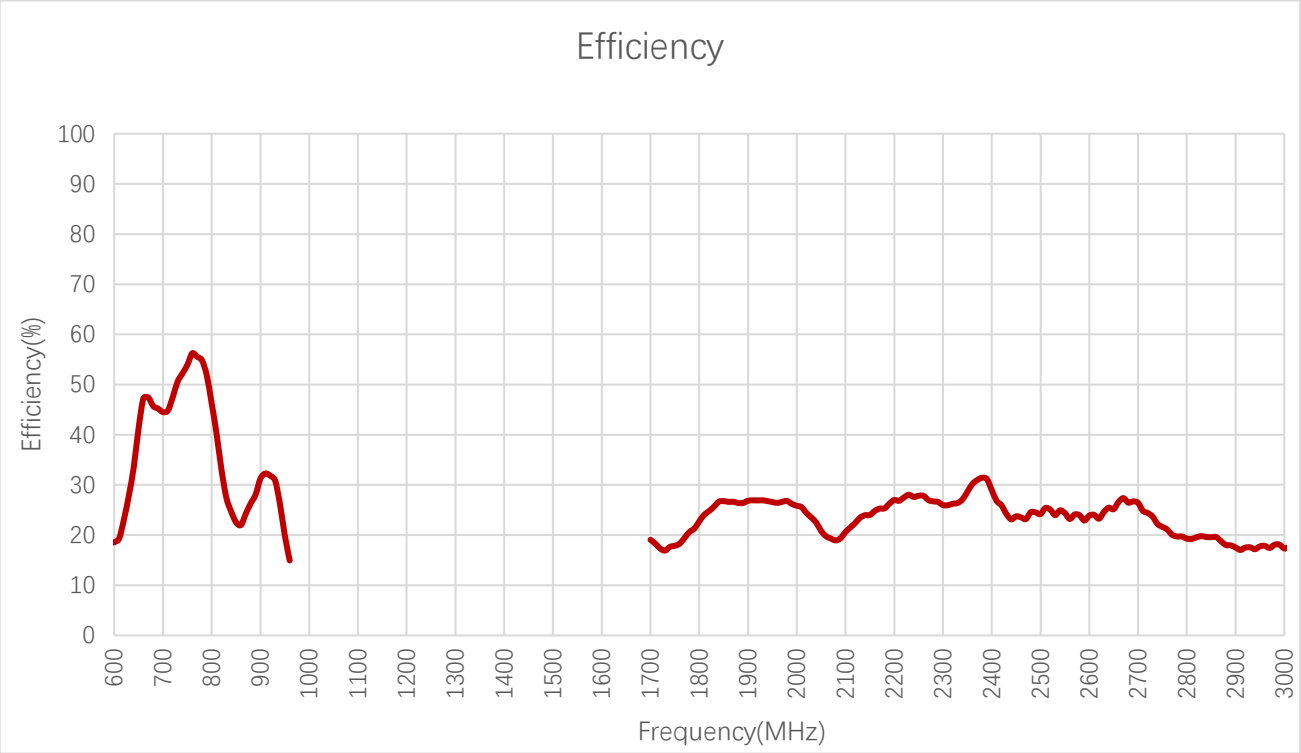


LNA Gain(dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
LNA Gain (dB)	-	-	-	-	-	26.3	28.1	-

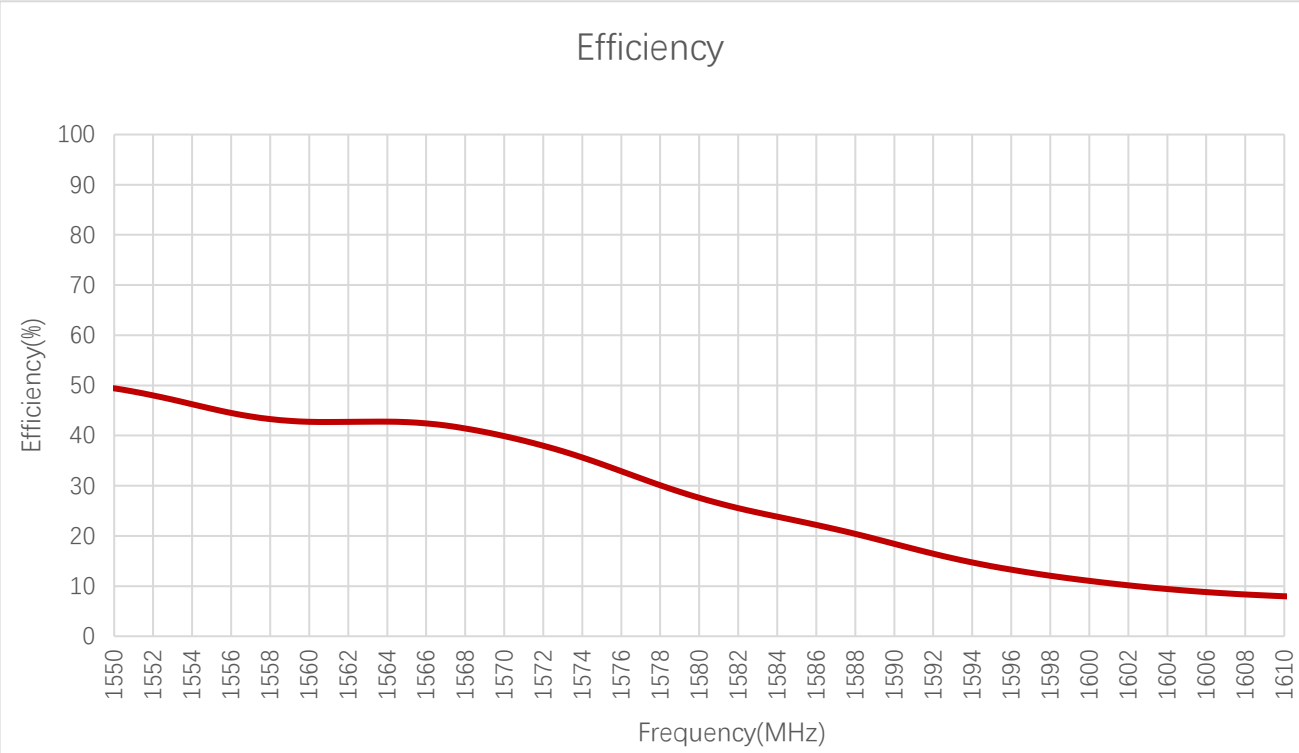
3.2. Radiation Performance Test

3.2.1. Efficiency



Efficiency (%) - 4G

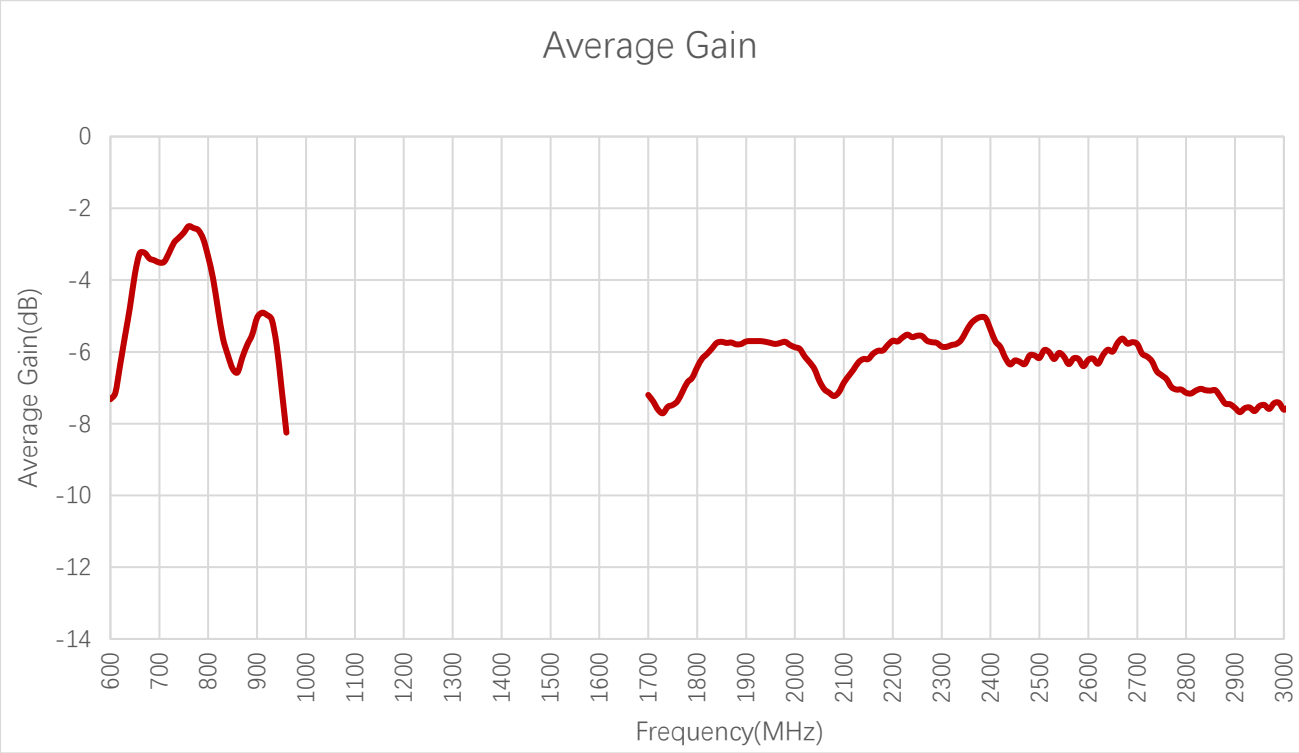
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	-	-	44.8	27.5	31.3	15.0	-	18.3	17.7	26.4
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Efficiency (%)	26.6	24.0	28.6	23.8	23.9	26.7	-	-	-	-



Efficiency (%) – GNSS

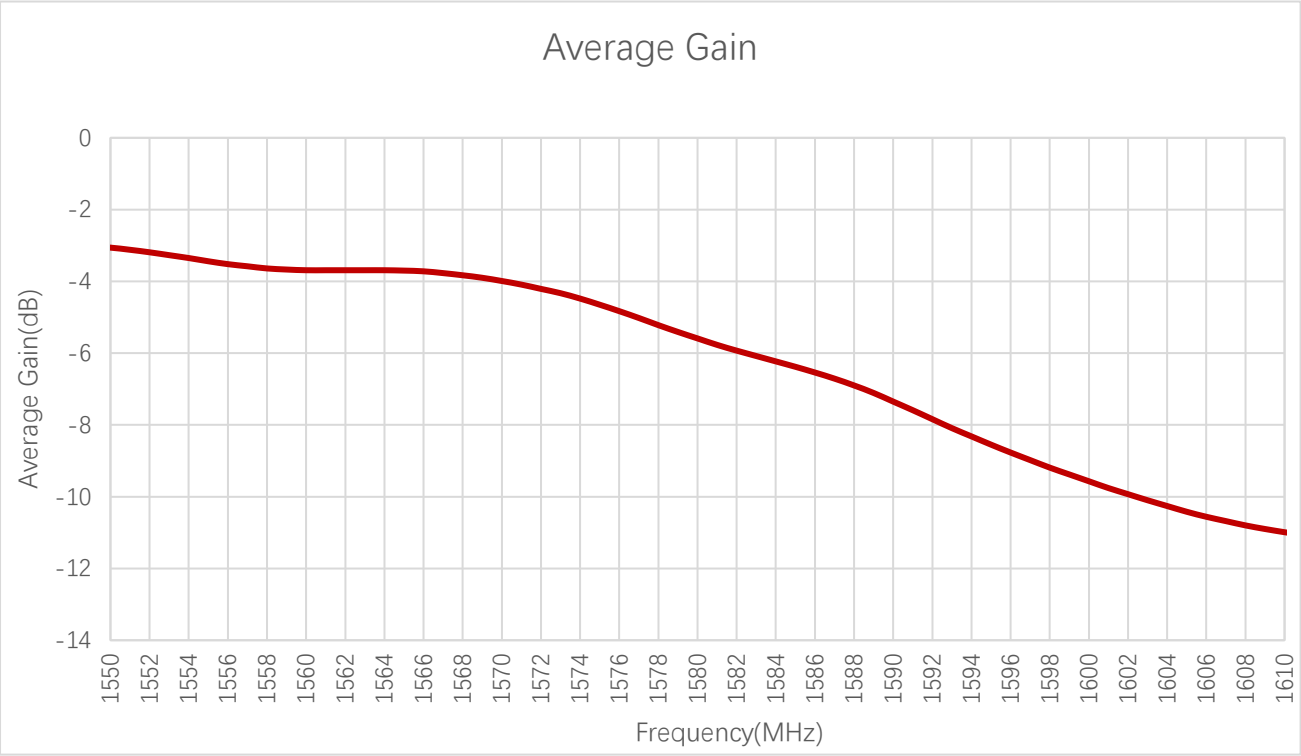
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	-	-	-	-	-	42.7	34.3	-

3.2.2. Average Gain



Average Gain (dB) - 4G

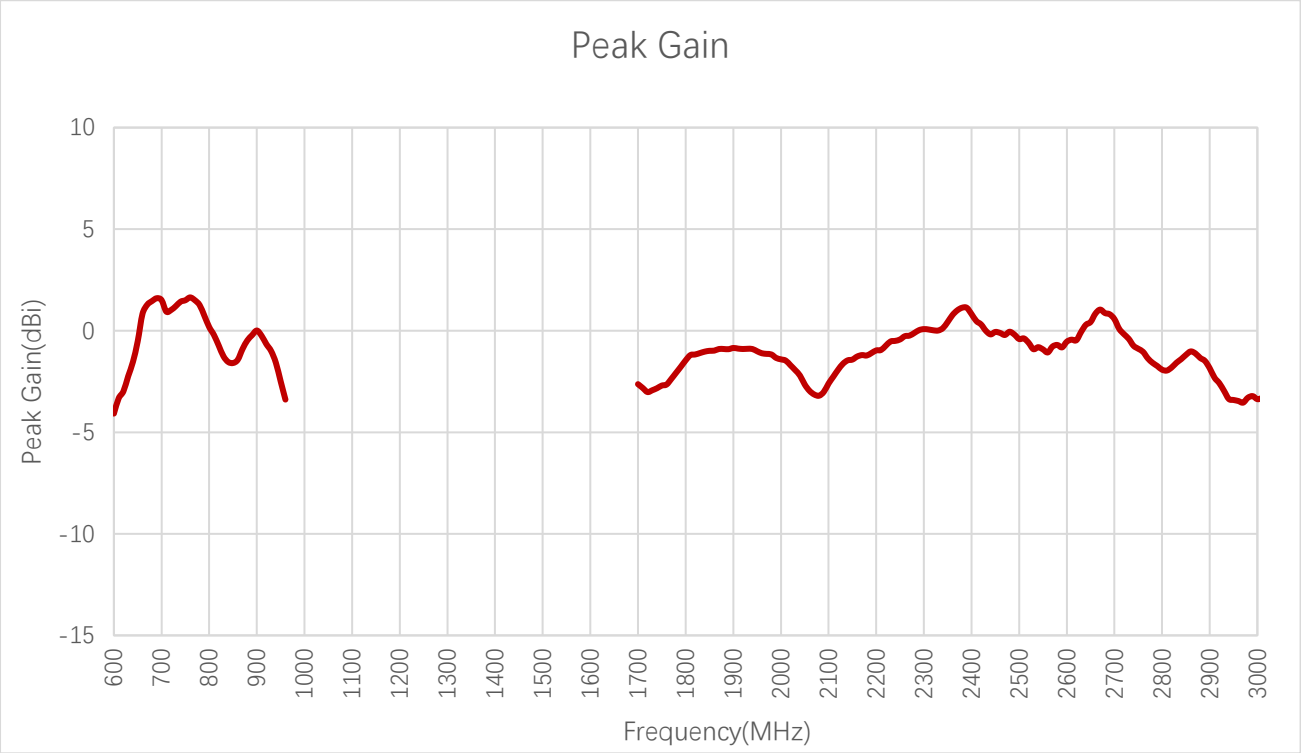
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Average Gain (dB)	-	-	-3.5	-5.6	-5.1	-8.3	-	-7.4	-7.5	-5.8
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Average Gain (dB)	-5.8	-6.2	-5.4	-6.2	-6.2	-5.7	-	-	-	-



Average Gain (dB) – GNSS

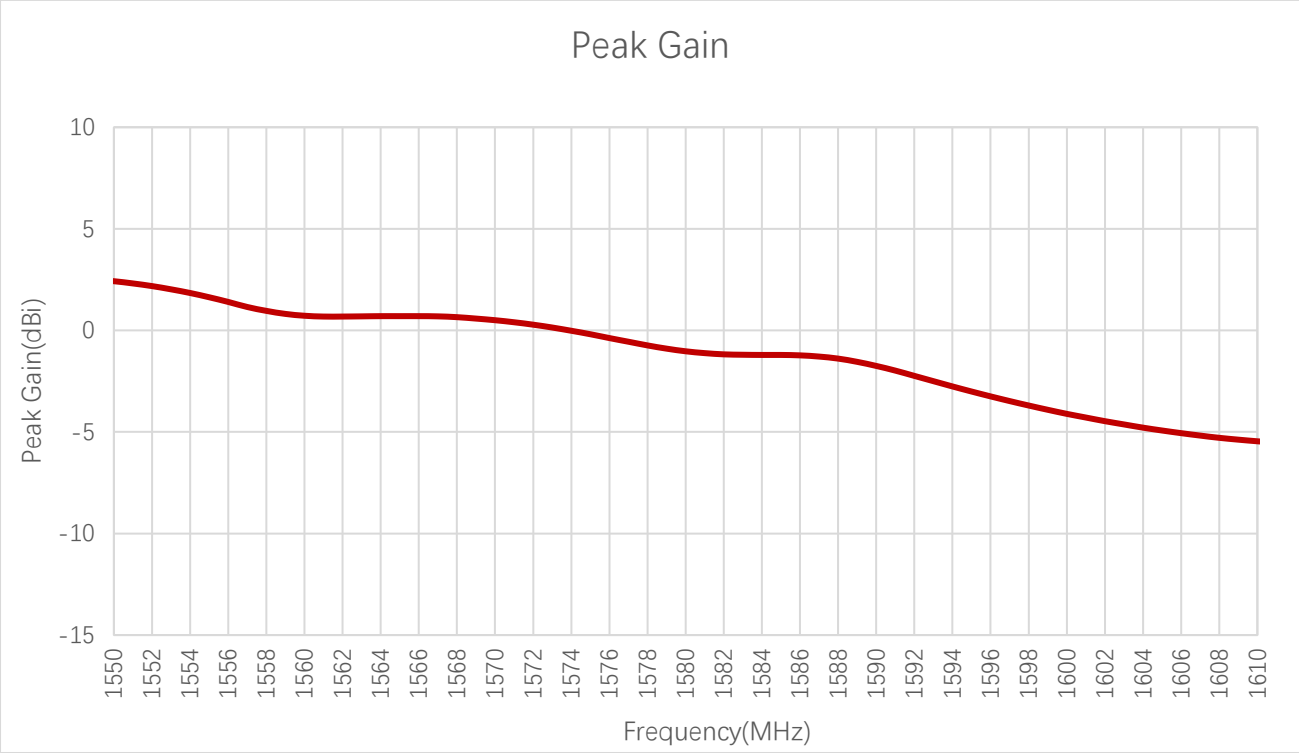
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Average Gain (dB)	-	-	-	-	-	-3.7	-4.7	-

3.2.3. Peak Gain



Peak Gain (dBi) - 4G

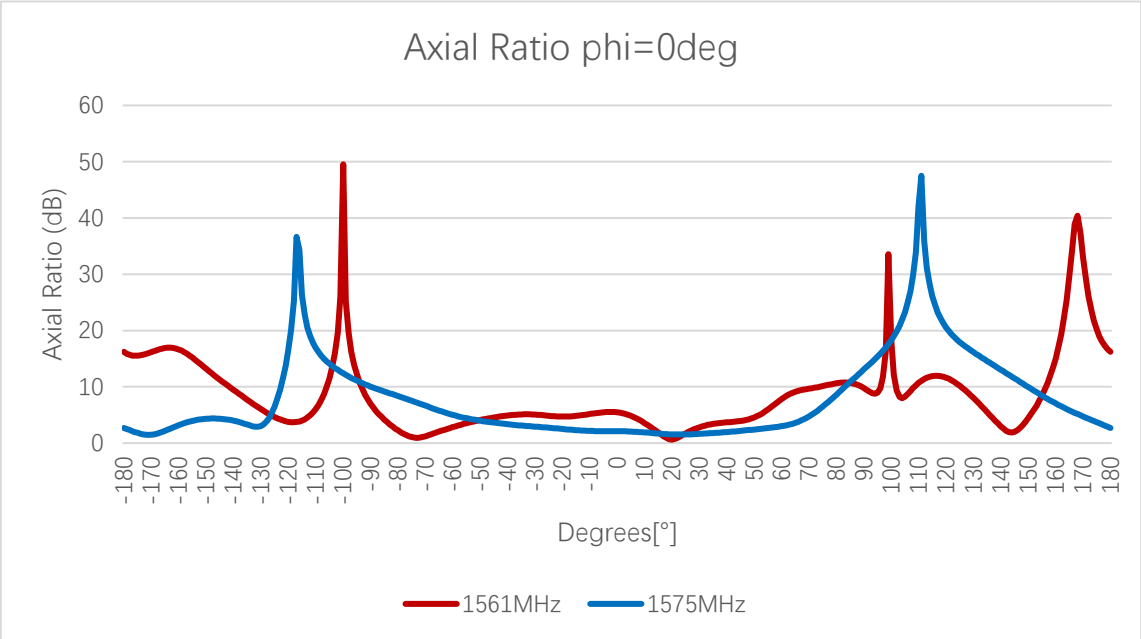
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	-	-	0.9	-1.3	0.0	-3.4	-	-2.8	-2.8	-0.9
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Peak Gain (dBi)	-1.0	-1.5	0.4	-0.1	-0.5	0.8	-	-	-	-

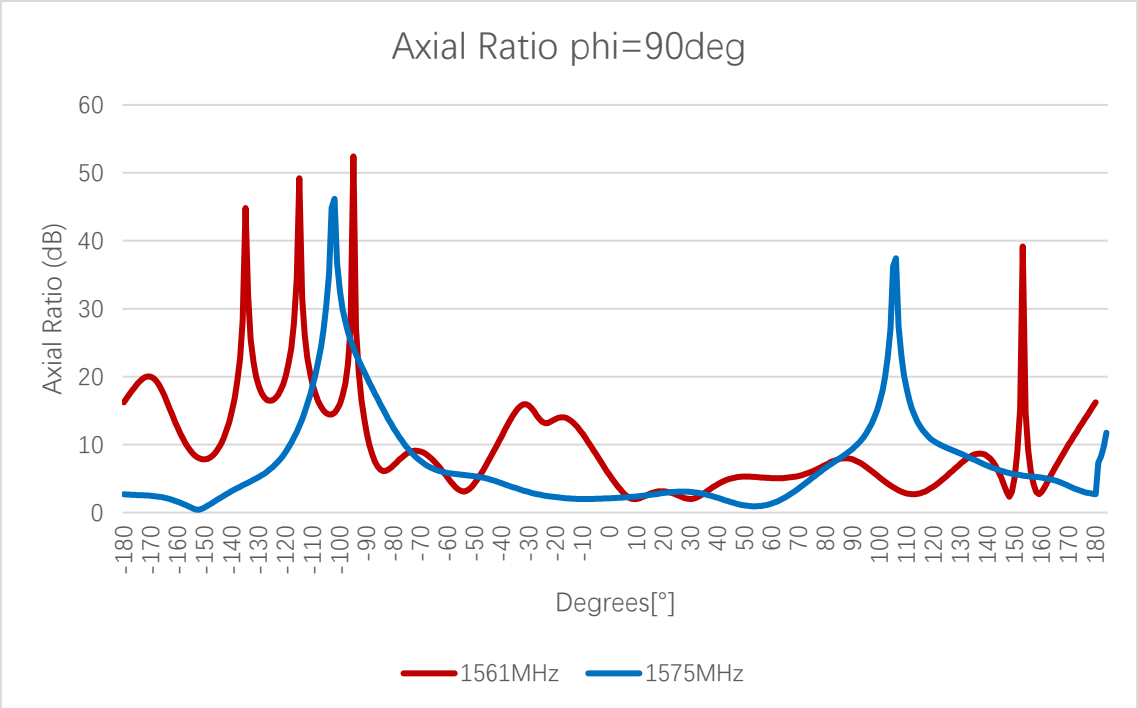


Peak Gain (dBi) – GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	-	-	-	-	-	0.7	-0.2	-

3.2.4. Axial Ratio

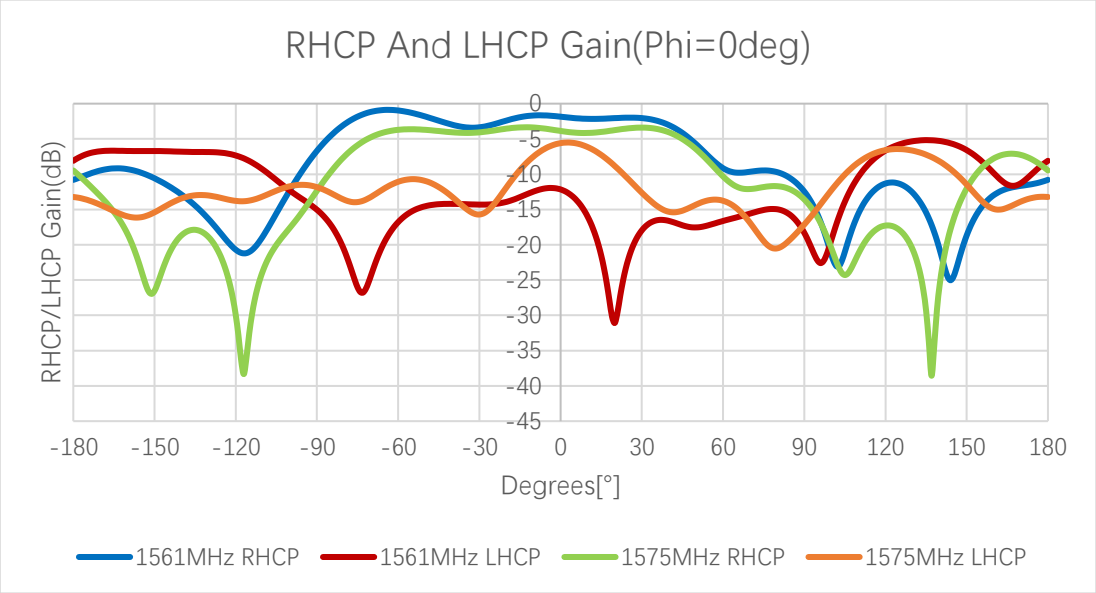


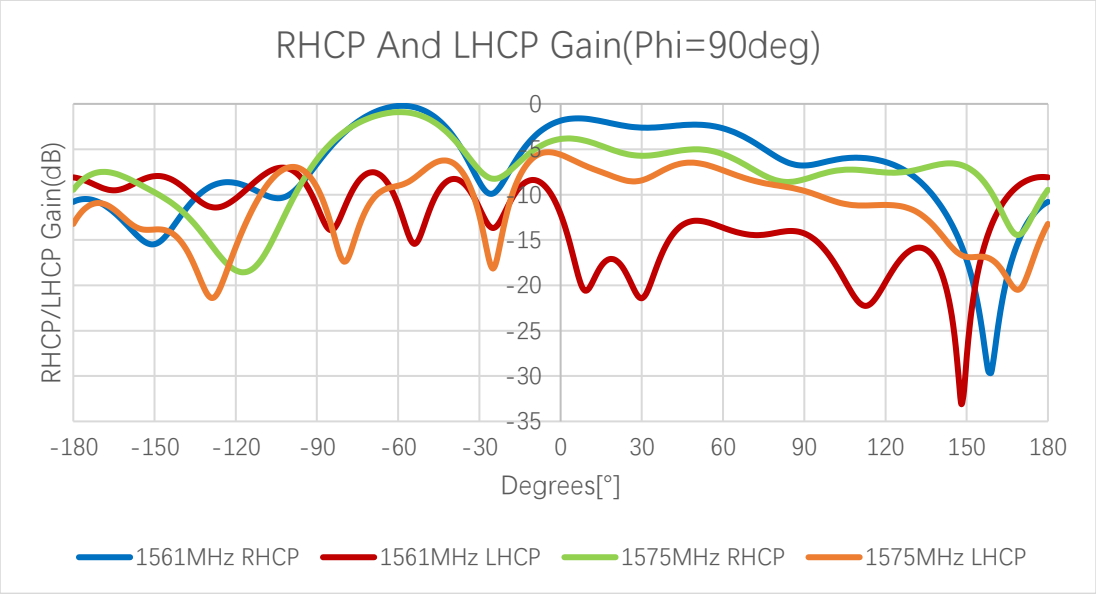


Axial Ratio (dB)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	5.5	2.1	-
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	5.5	2.1	-

3.2.5. 2D RHCP and LHCP Gain



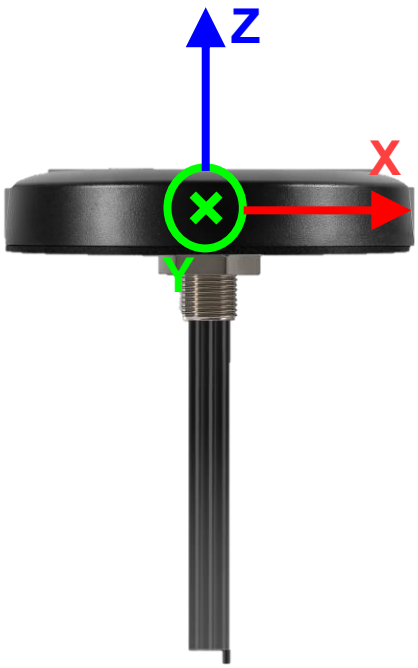


2D RHCP and LHCP Gain (dB)

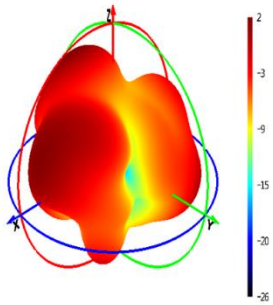
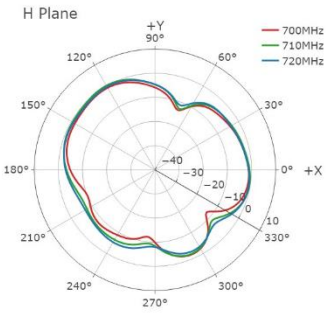
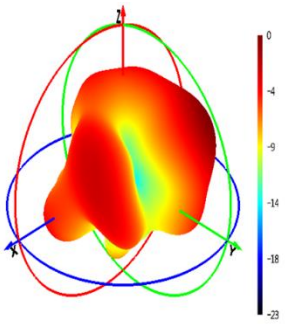
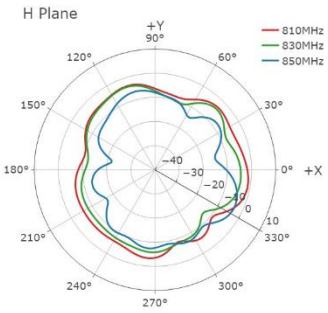
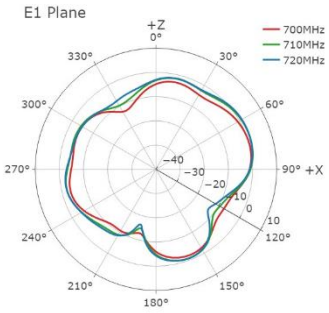
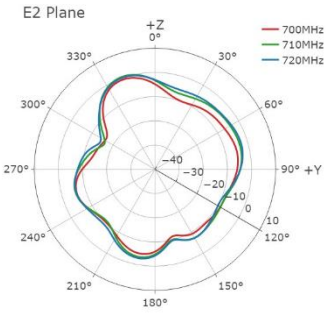
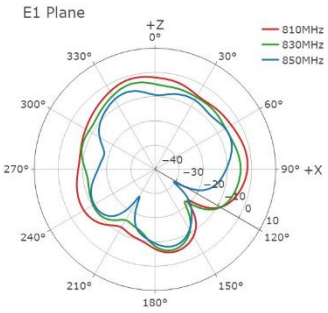
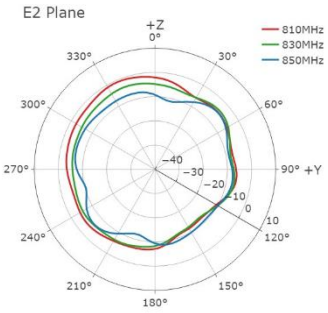
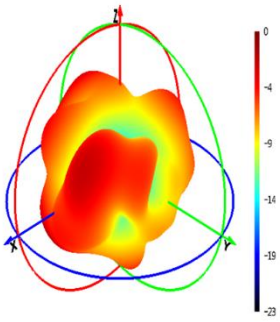
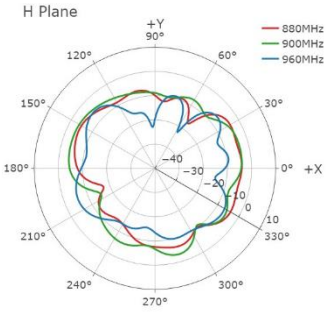
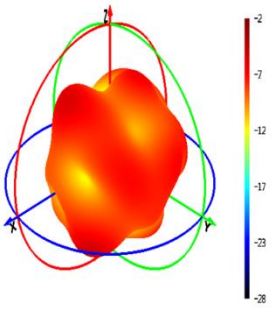
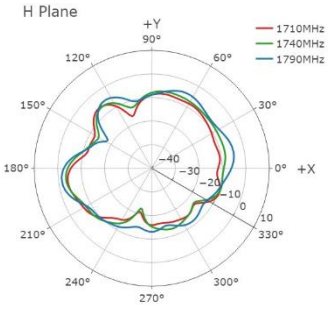
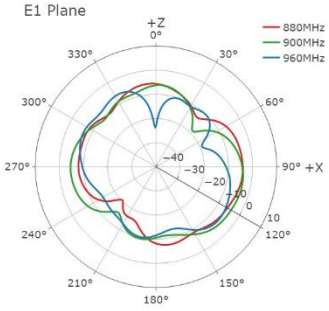
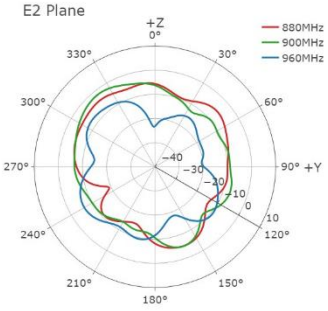
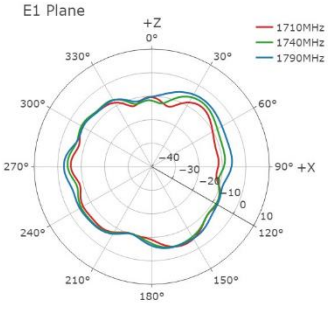
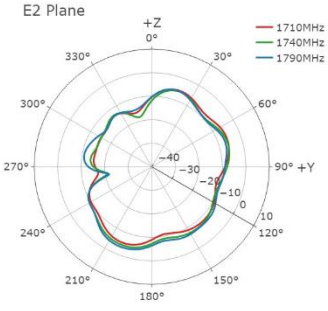
Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
RC Gain(dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-1.85	-3.87	-
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-12.16	-5.6	-
LC Gain(dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-1.85	-3.87	-
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-12.16	-5.6	-

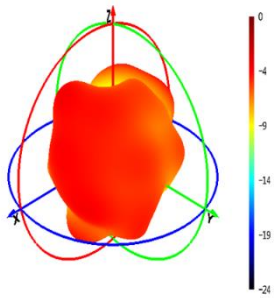
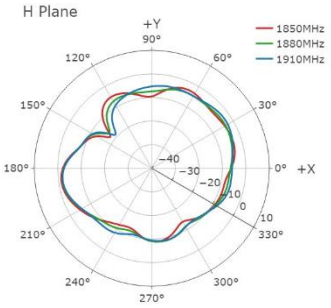
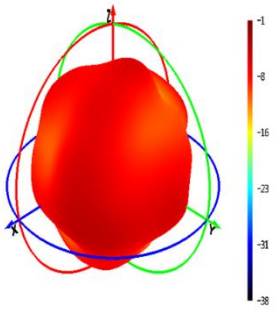
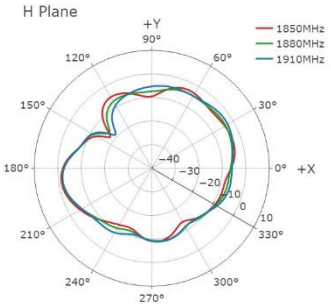
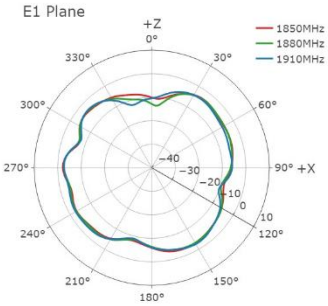
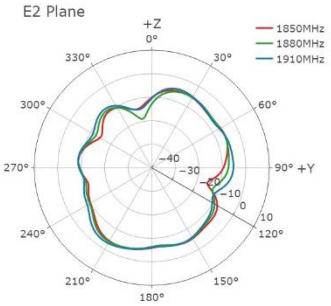
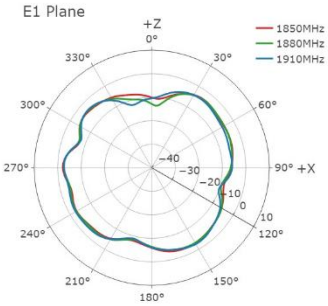
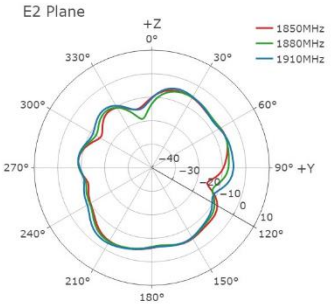
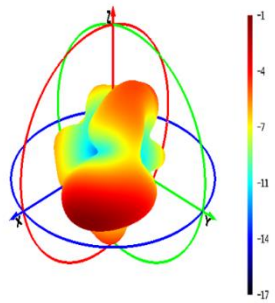
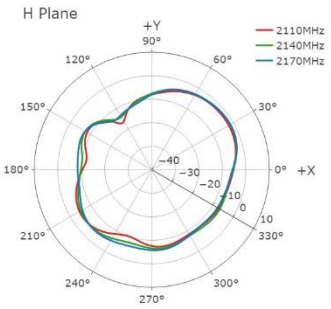
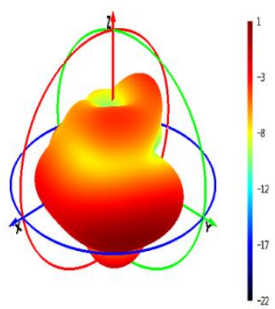
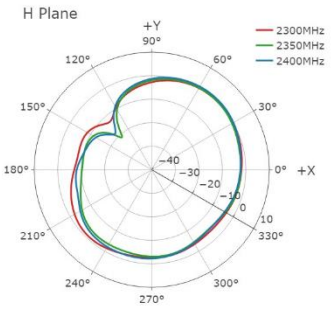
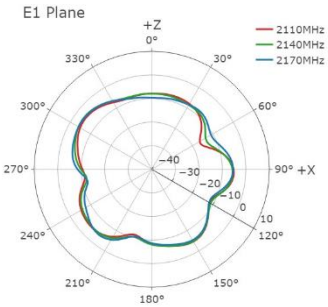
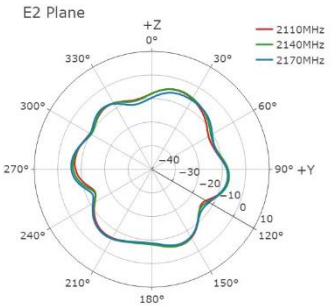
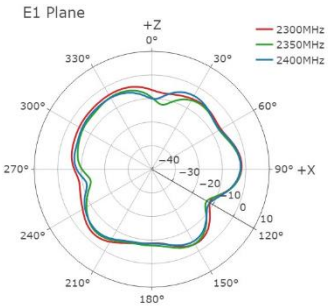
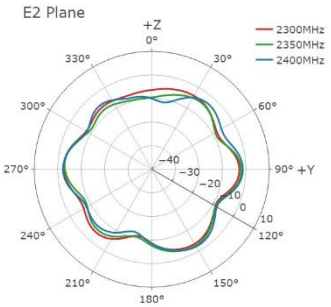
3.2.6. 3D & 2D Radiation Pattern

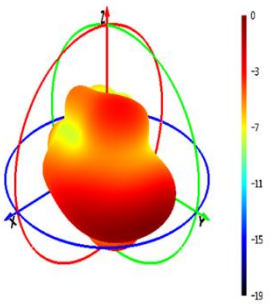
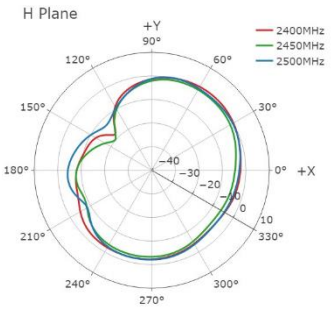
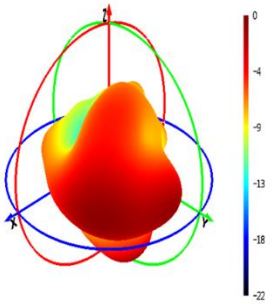
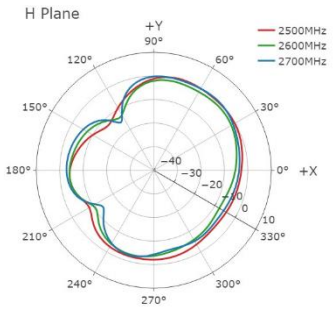
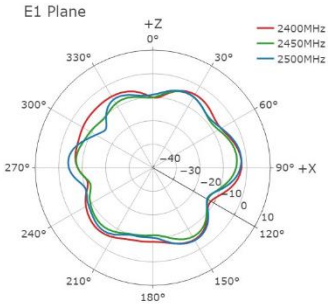
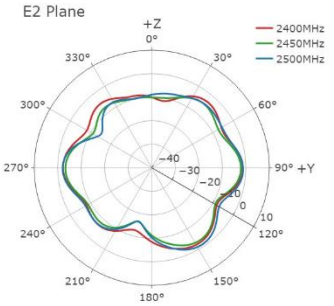
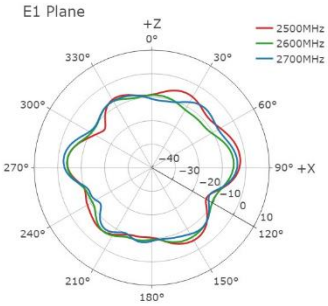
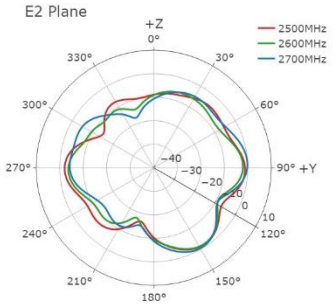
- Test Status: Free space
- Test Chamber: GL-S-1



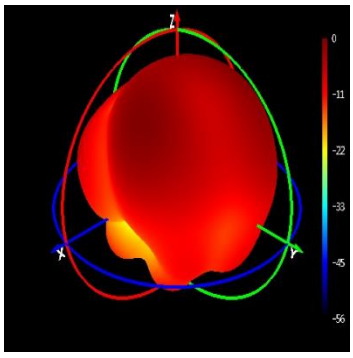
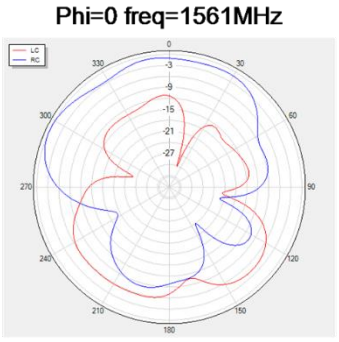
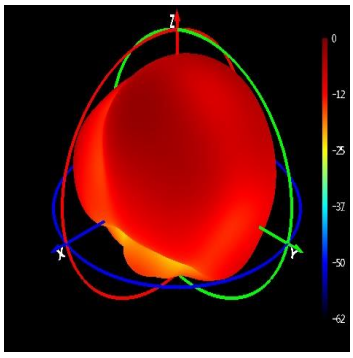
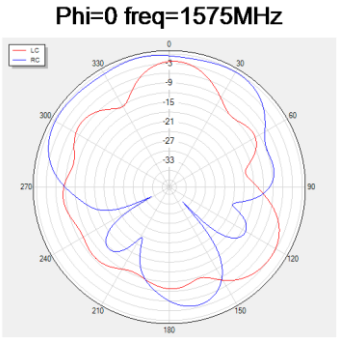
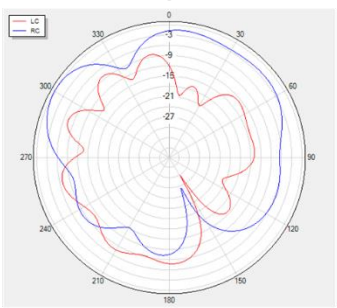
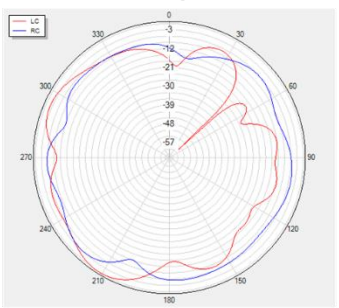
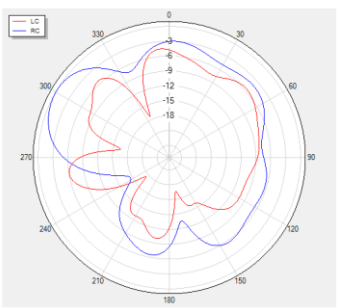
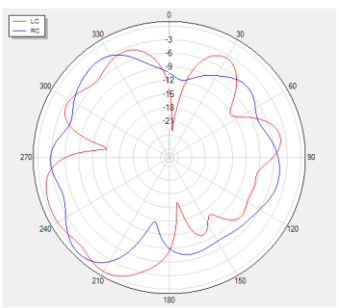
- **4G**

710MHz		830MHz	
			
			
900MHz		**1740MHz**	
			
			

1880MHz		1950MHz	
			
			
2140MHz		2350MHz	
			
			

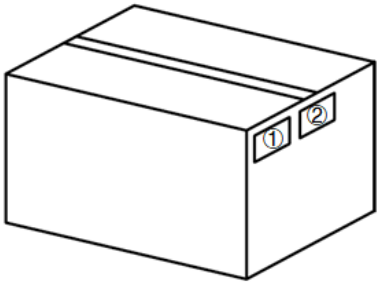
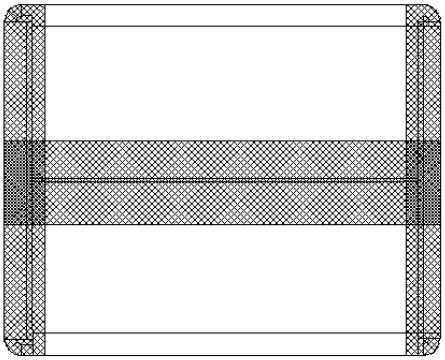
2450MHz		2600MHz	
			
			

- **GNSS**

1561MHz		1575MHz	
			
			

4 Packaging

Step	Packaging picture / 2D picture	Description
1		1 pcs Antenna products in a small PE bags; (1 pcs Antenna / Per Small PE Bag)
2		12 pcs Antenna products in a big PE bags; (12 pcs Antenna / Per Big PE Bag)

3	 	Put bubble bag on top of product 4 Big PE Bags / Per Carton Box (48 pcs Antenna / Per Carton Box) Carton Size:L*W*H=405*293*185mm
4		Position for Attaching Labels--- ① Carton Label ② Quality Label
5		Sealing Cartons--- "工" type sealing cartons

Contact US

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Email: info@quectel.com

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Revision History

Version	Date	Author	Note
-	2023-10-23	Tina Gan Joye Wang David Liu Aria Chu	Creation of the document
1.0	2023-10-23	Tina Gan Joye Wang David Liu Aria Chu	First official release

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