Antenna Datasheet

Product OC: YEMA300QXA
Version: 1.1
Date: 2023-11-29
Status: Released
Product Name: 4G & Wi-Fi & GNSS 3IN1 Combo Antenna
Key Features:
Frequency Band: 4G: 700–960 MHz, 1700–2700 MHz
Wi-Fi: 2400–2500 MHz, 5150–5850 MHz
GNSS: 1559–1606 MHz
Dimensions: 143.73 mm × 51.33 mm × 15 mm
Efficiency: Up to 50 % (4G), Up to 50 % (Wi-Fi)
GNSS LNA Gain: 18 ±3 dB
RoHS Compliant
IP67

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**	700–960 MHz, 1700–2700 MHz
	Wi-Fi	2400–2500 MHz, 5150–5850 MHz
	GNSS	1559–1606 MHz
Radiation Pattern	**4G**	Omni-directional
	Wi-Fi	Omni-directional
	GNSS	Directional
Polarization	**4G**	Linear
	Wi-Fi	Linear
	GNSS	RHCP
Impedance		50 Ω
Isolation		≤ -11.9 dB

1.1.1. 4G

Electrical - Detail												
Band / SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	n74 /n75 /n76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /n77	n79	Wi-Fi 5G
	Freq. (MHz)	600–700	700–810	820–960	1420–1520	1700–2170	2300–2400	2400–2500	2500–2690	3300–4200	4400–5000	5150–5850
Max. VSWR		-	3.7	5.2	-	1.9	1.7	1.7	1.6	-	-	-
Max. Return Loss (dB)		-	-4.8	-3.4	-	-9.9	-11.6	-12.0	-12.6	-	-	-
AVG Eff. (%)		-	42.2	45.6	-	55.4	49.0	51.0	51.5	-	-	-
AVG AVG Gain (dB)		-	-3.8	-3.5	-	-2.6	-3.1	-2.9	-2.9	-	-	-
Max. Peak Gain (dBi)		-	2.3	2.3	-	4.1	1.7	1.3	2.1	-	-	-
VSWR		≤ 5.2										
Return Loss		≤ -3.4 dB										
Peak Gain		≤ 4 .1 dBi										

1.1.2. Wi-Fi

Band / Specification	Band	Wi-Fi 2G	Wi-Fi 5G	Wi-Fi 7G
	Freq. (MHz)	2400–2500	5150–5850	5925–7125
Max. VSWR		1.7	1.5	-
Max. Return Loss (dB)		-11.4	-14.6	-
AVG Eff. (%)		51.0	50.4	-
AVG AVG Gain (dB)		-2.9	-3.0	-
Max. Peak Gain (dBi)		2.2	2.7	-
VSWR		≤ 1.7		
Return Loss		≤ -11.4 dB		
Peak Gain		≤ 2.7 dBi		

1.1.3. GNSS

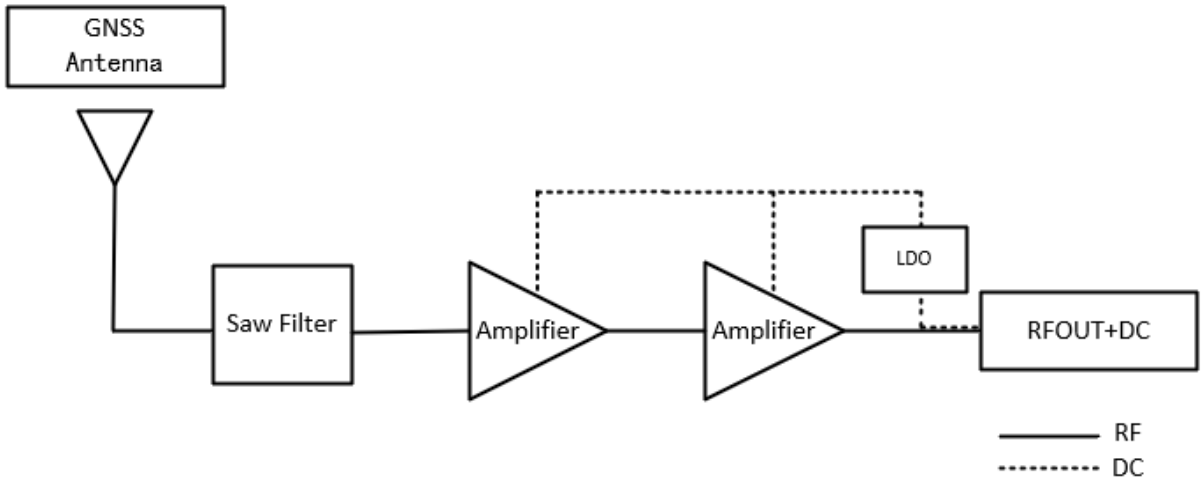
Band / Frequency (MHz)	GPS L5 GALILEO E5a BEIDOU B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BEIDOU B2b	GPS L2 QZSS L2C	GLONASS G2	BEIDOU B3	BEIDOU B1I	GPS L1 GALILEO E1 BEIDOU B1C QZSS L1	GLONASS G1
	1176	1207	1227	1248	1268	1561	1575	1602
VSWR						1.86	1.55	1.91
Return Loss (dB)						-10.4	-13.2	-10.1
Efficiency (%)						50.1	70.3	75.9
Peak Gain (dBi)						0.66	2.31	2.42

LNA Electrical	
LNA Gain	18 ±3 dB
Noise Figure	≤ 2.5 dB
Output VSWR	< 2.0
Input VSWR	< 2.0
Filter Out-of-Band Attenuation	36 dB f0 ±100 MHz f0 (1588 MHz)
Working Voltage	DC 3–5 V
Working Current	8.8 ±2 mA
Impedance	50 Ω

1.2. Mechanical & Environmental

Mechanical		
Antenna Dimensions		143.73 mm × 51.33 mm × 15 mm
Casing Material & Color		PC & Black
Cable Type & Color & Length	**4G**	RG174LL & Black & 1028 ±28 mm
	Wi-Fi	RG174LL & Black & 1028 ±28 mm
	GNSS	RG174 & Black & 1028 ±28 mm
Connector Type	**4G**	SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is needed, it can be customized.)
	Wi-Fi	RP SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is needed, it can be customized.)
	GNSS	SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is needed, it can be customized.)
Mounting Type		Adhesive
Weight		Typ. 125.5 g
Environmental		
Operation Temperature		-40 °C to +85 °C
Storage Temperature		-40 °C to +85 °C
Ingress Protection (IP) Rating		IP67
RoHS Compliant		Yes

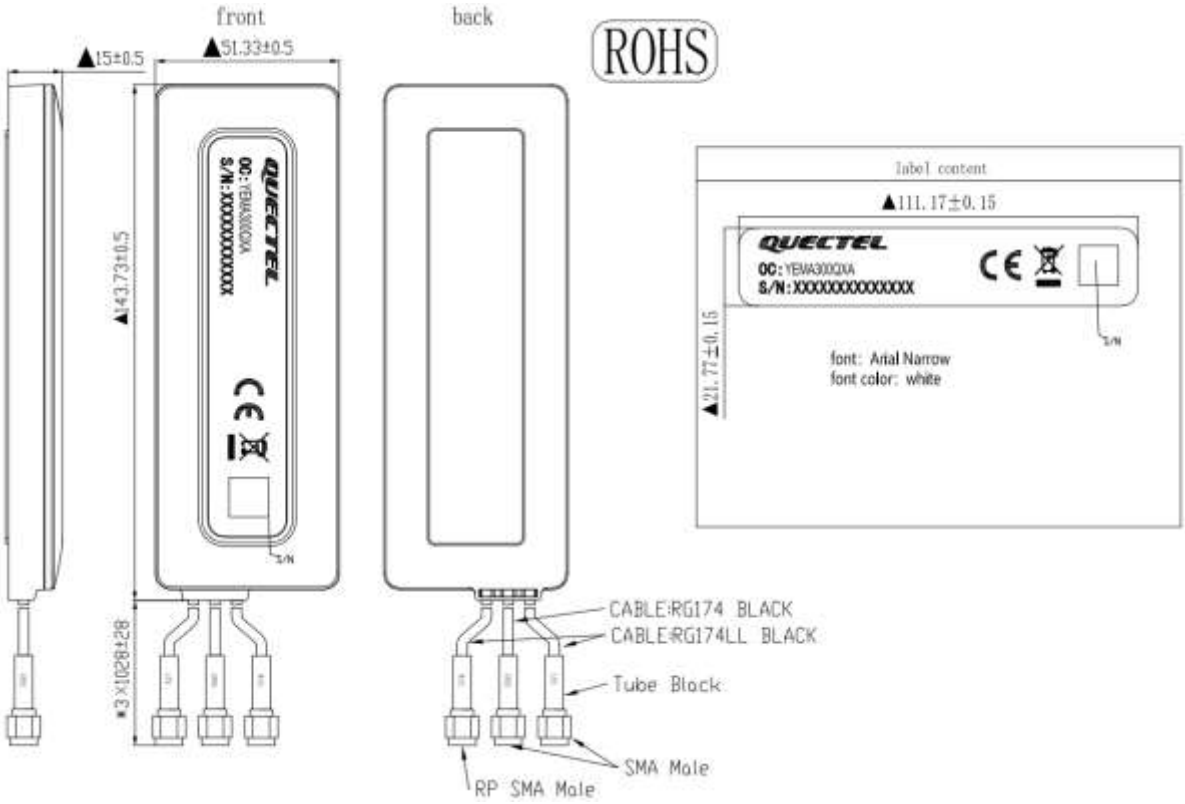
1.3. Block Diagram (Active Antenna)



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-B2I** Centre 1176.45 (1166–1187)	**B2b** Centre 1207.14 (1197–1217)	**B3** Centre 1268.52 (1258–1279)
	√	√	-	-	-
QZSS	**L1** Centre 1575.42 (1573–1578)	**L2C** Centre 1227.6 (1226–1229)	**L5** Centre 1176.45 (1166–1187)	**L6** Centre 1278.75 (1257–1300)	
	√	-	-	-	
IRNSS	**L5** Centre 1176.45 (1164–1189)				
	-				

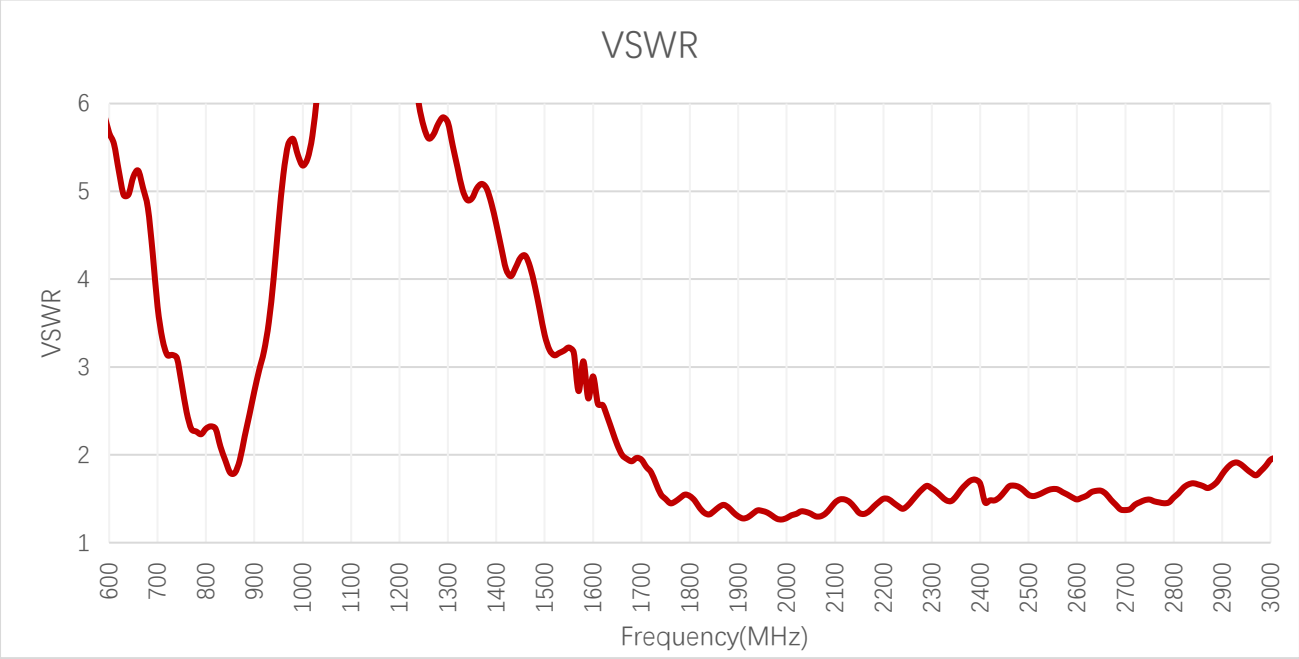
2 Drawing


front
back
ROHS
15±0.5
51.33±0.5
43.73±0.5
3×102±28
label content
111.17±0.15
21.77±0.15
font: Arial Narrow
font color: white
CABLE:RG174 BLACK
CABLE:RG174LL BLACK
Tube Black
SMA Male
RP SMA Male

3 Detailed Performance

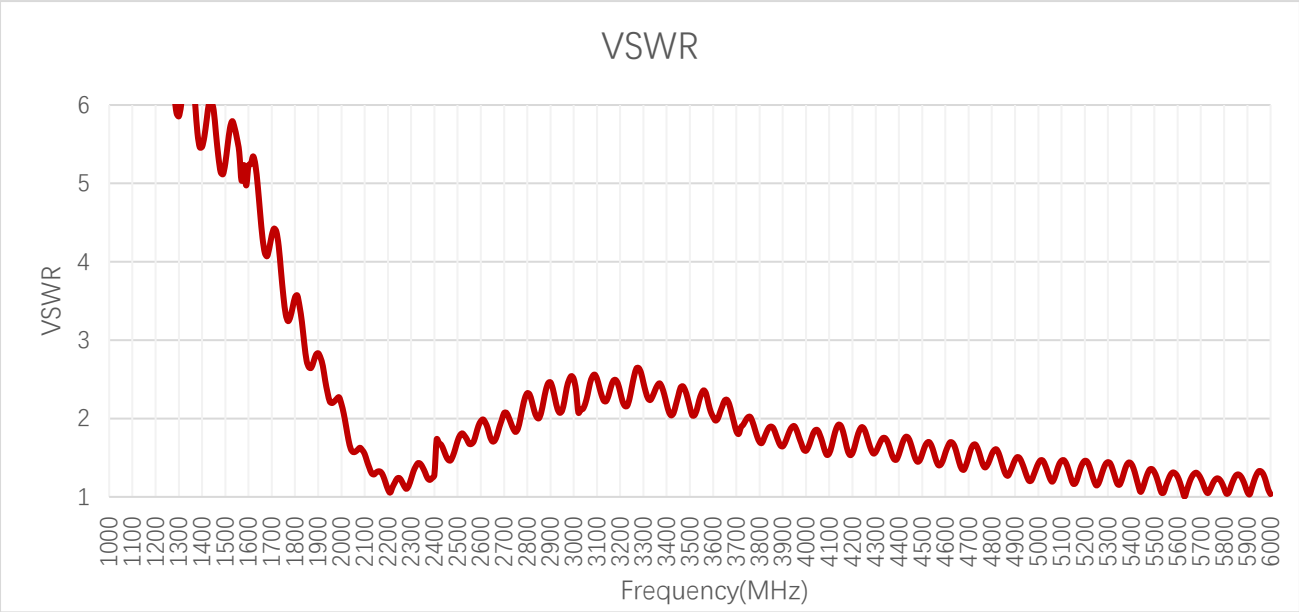
3.1. S-Parameter Test

3.1.1. VSWR



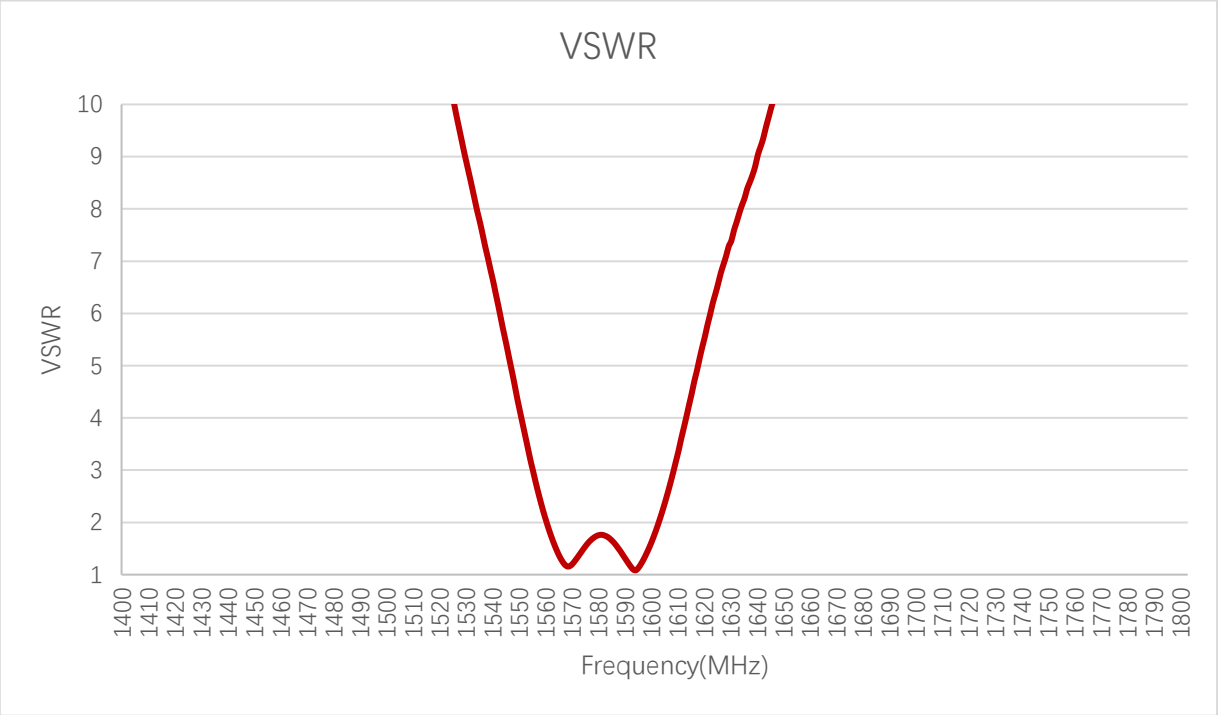
VSWR - 4G

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
VSWR	-	-	3.3	2.1	2.7	5.2	-	1.9	1.6	1.4
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
VSWR	1.4	1.4	1.5	1.6	1.5	1.4	-	-	-	-



VSWR - Wi-Fi

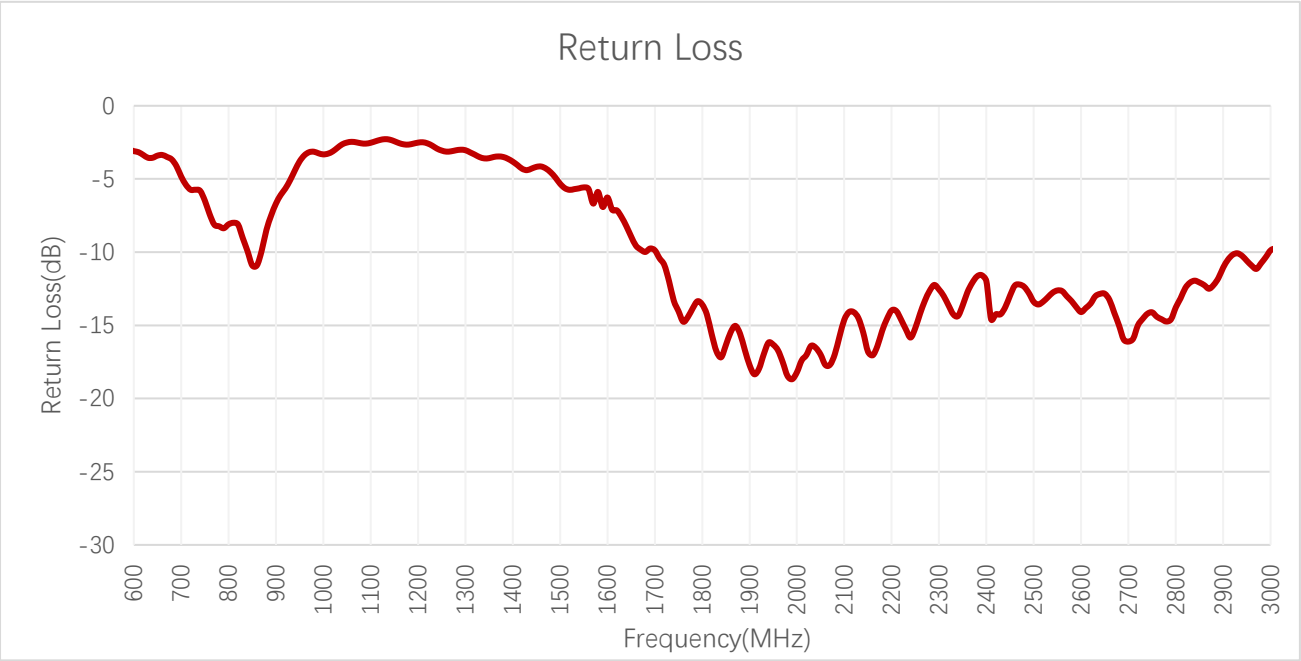
Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6325	6725	7125
VSWR	1.3	1.5	1.7	1.2	1.3	1.3	-	-	-	-



VSWR - GNSS

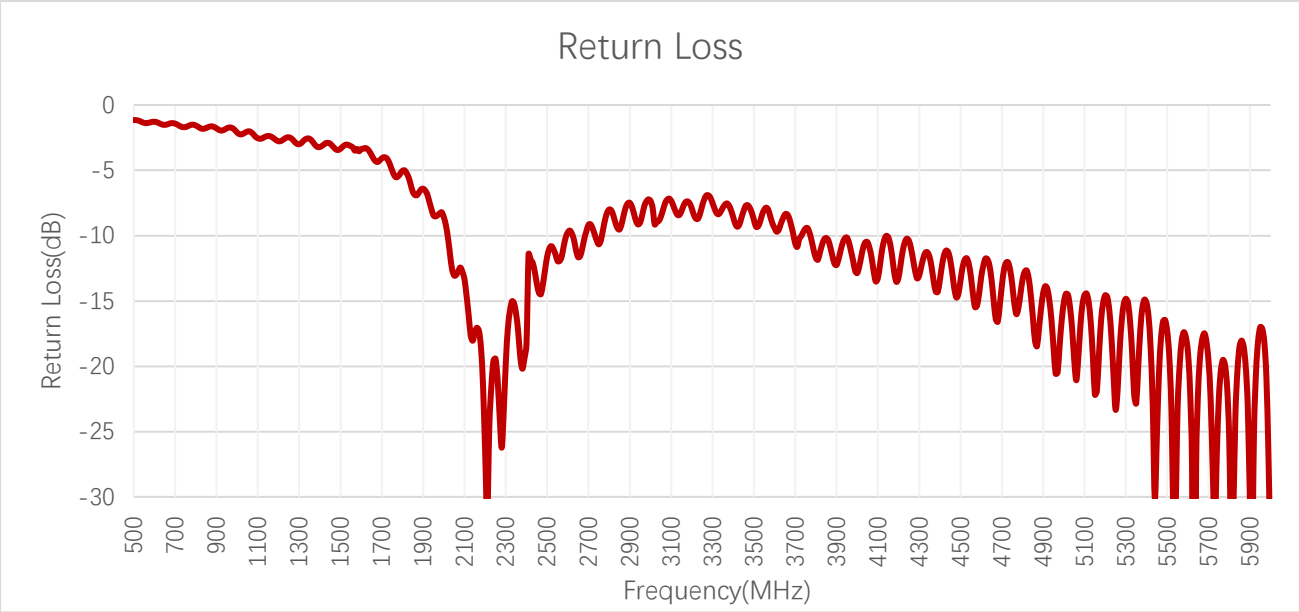
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	1.86	1.55	1.9

3.1.2. Return Loss



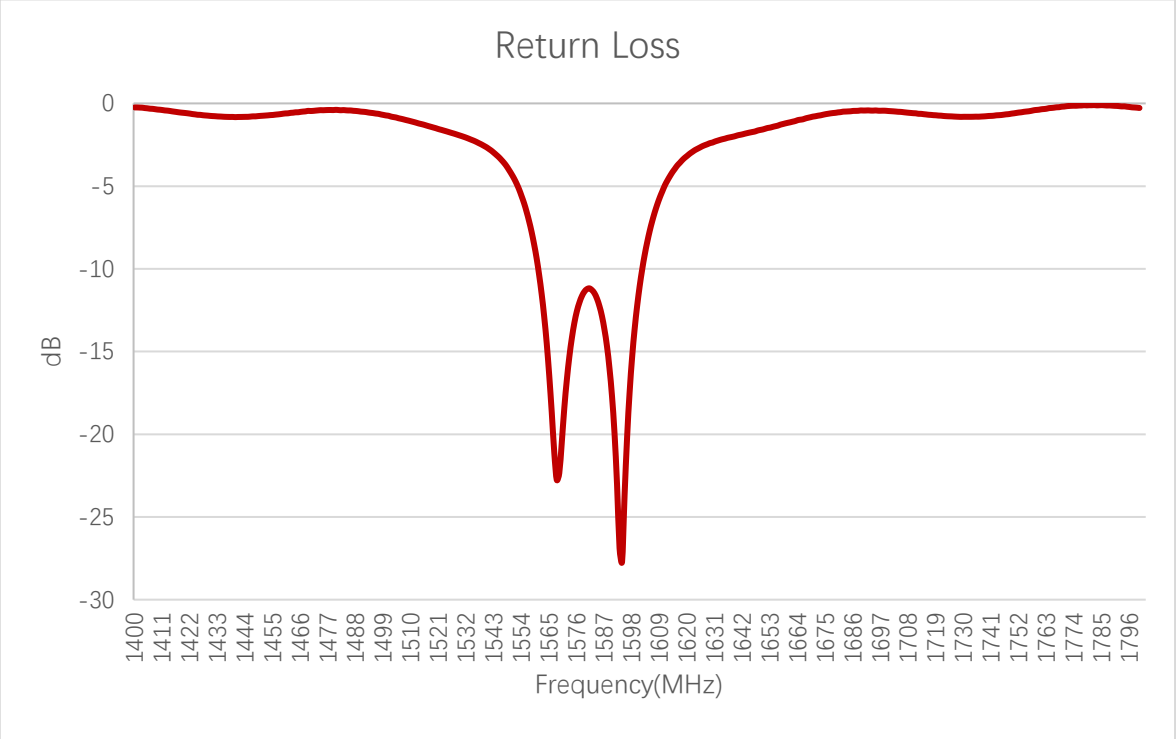
Return Loss (dB) - 4G

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Return Loss (dB)	-	-	-5.4	-9.0	-6.7	-3.4	-	-10.4	-13.3	-15.6
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Return Loss (dB)	-16.3	-15.5	-13.6	-13.0	-14.1	-16.0	-	-	-	-



Return Loss - Wi-Fi

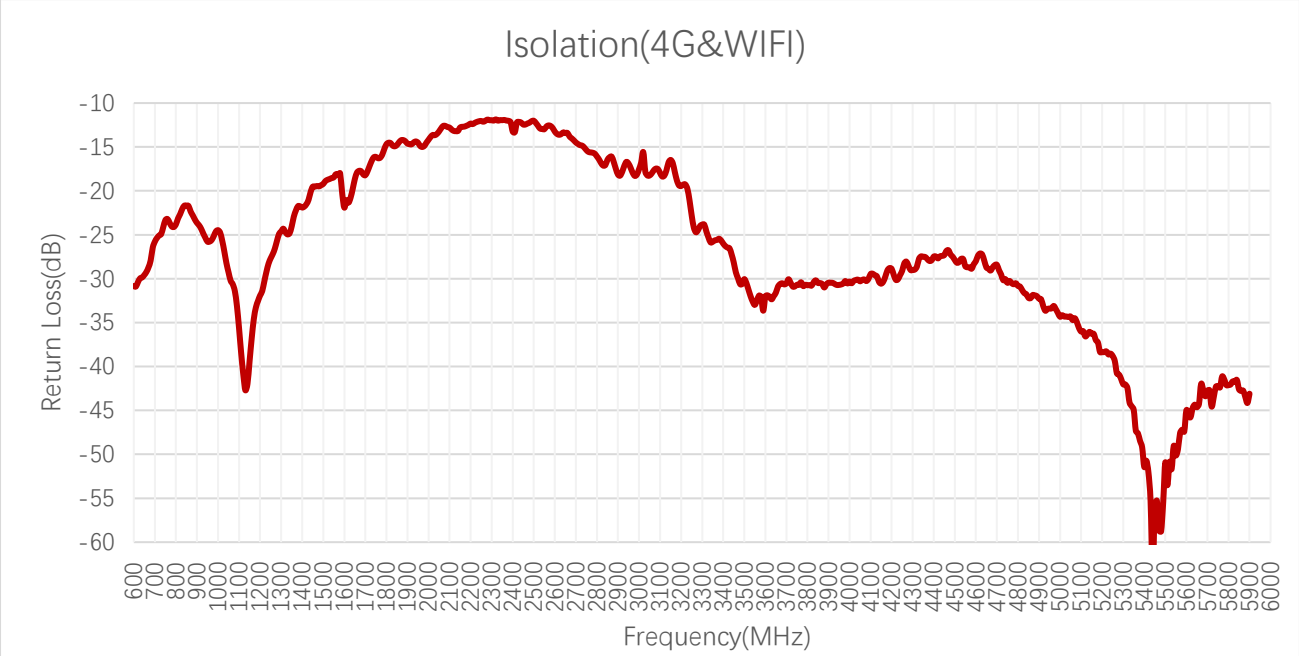
Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6325	6725	7125
Return Loss	-18.3	-13.7	-11.6	-22.2	-17.3	-18.5	-	-	-	-



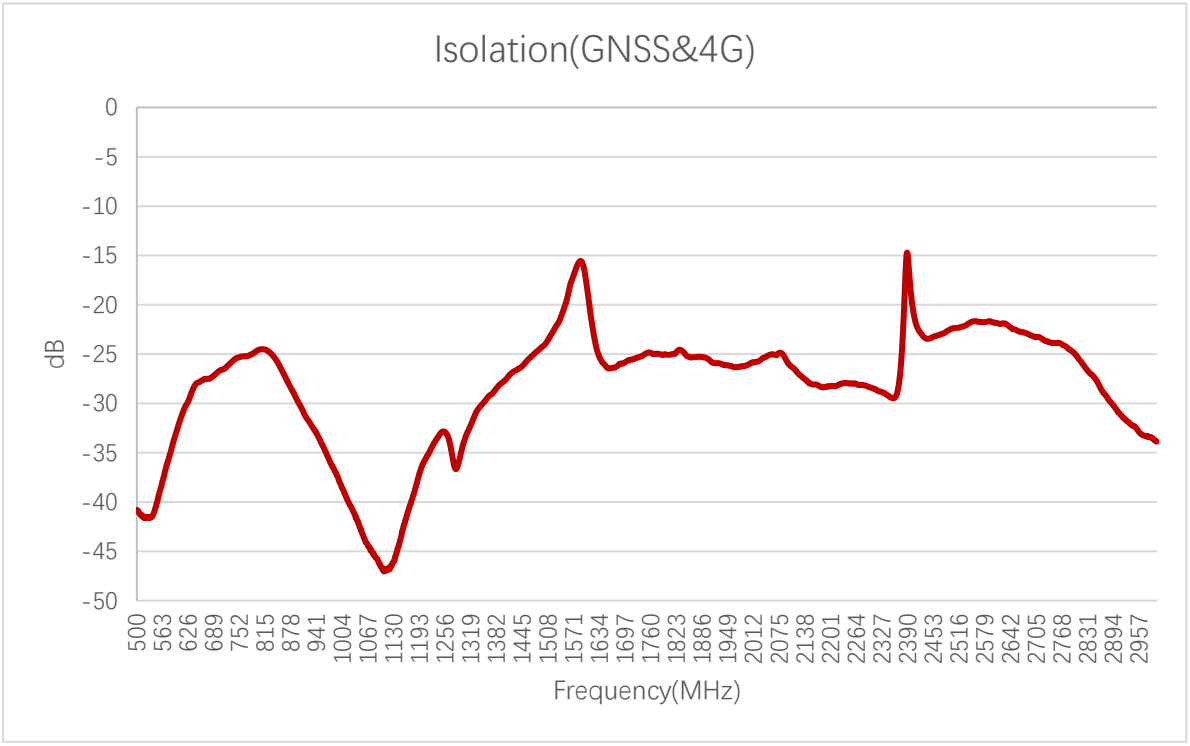
Return Loss (dB) - GNSS

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-	-	-	-	-	-10.3	-13.2	-10.1

3.1.3. Isolation

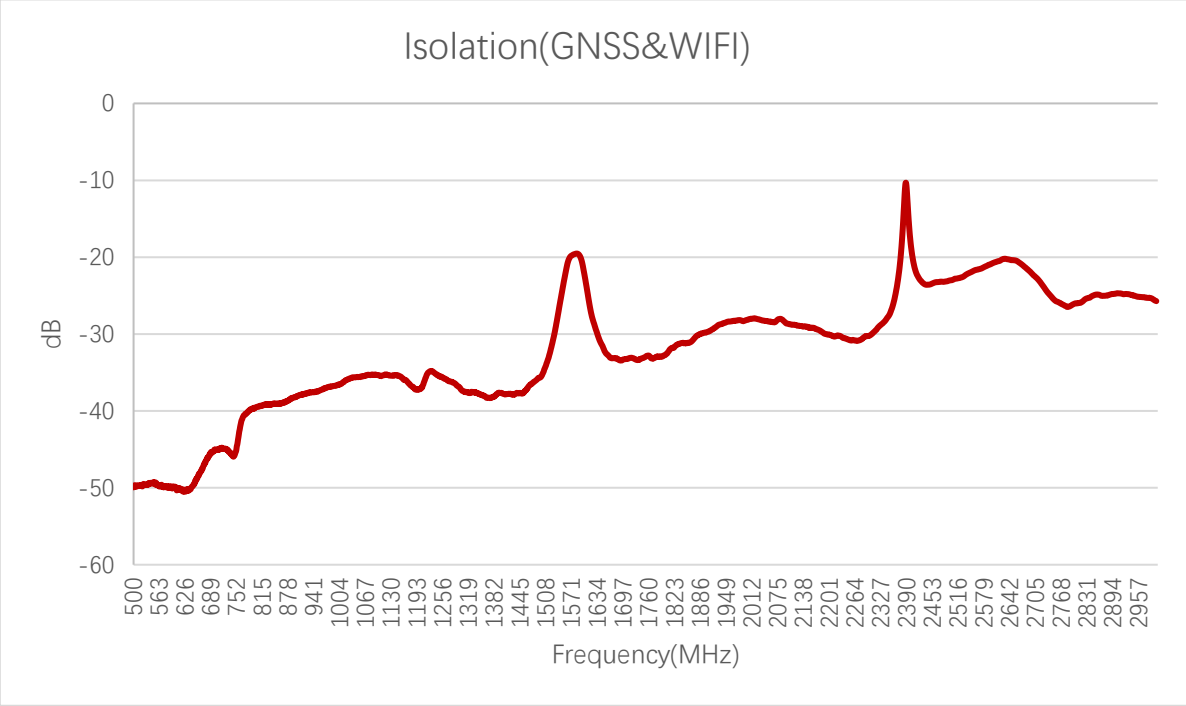


Band	B71	B12/ B13/ B28	B5/ B8/ B26	n74/ n75/ n76	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	Wi-Fi 5G
Freq. (MHz)	600–700	700–810	820–960	1420–1520	1700–2170	2300–2400	2400–2500	2500–2690	5150–5850
Isolation (dB)	-	-23.1	-21.7	-	-12.6	-11.9	-12.0	-12.0	-36.3



Max Isolation (dB) - GNSS & 4G

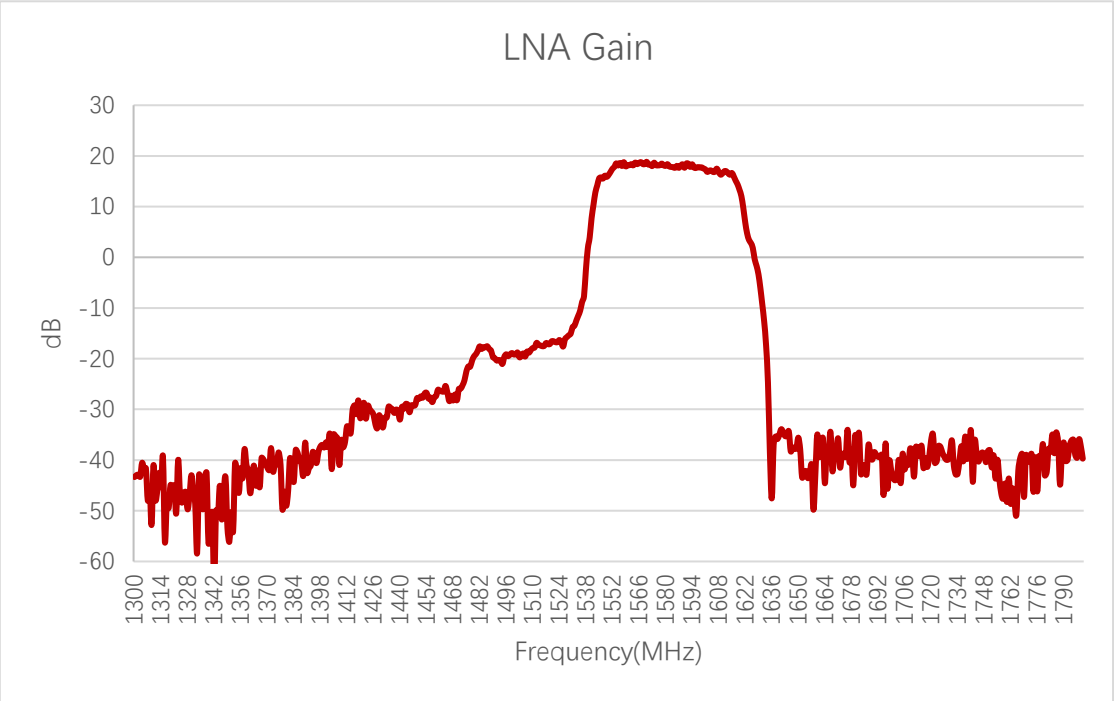
Band	B71	B12/ B13/ B28	B5/ B8/ B26	n74/ n75/ n76	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	Wi-Fi 5G	BEIDOU B1I	GPS L1	GLONASS G1
Freq. (MHz)	600–700	700–810	820–960	1420–1520	1700–2170	2300–2400	2400–2500	2500–2690	515–5850	1559–1564	1565–1586	1595–1606
Isolation (dB)	-									-18	-16.4	-18



Max Isolation (dB) - GNSS & Wi-Fi

Band	B71	B12/ B13/ B28	B5/ B8/ B26	n74/ n75/ n76	B1/ B2/ B3	B40	Wi-Fi 2G	B38/ B41	Wi-Fi 5G	BEIDOU B1I	GPS L1	GLONASS G1
Freq. (MHz)	600–700	700–810	820–960	1420–1520	1700–2170	2300–2400	2400–2500	2500–2690	5150–5850	1559–1564	1565–1586	1595–1606
Isolation (dB)	-	-	-	-	-	-	-	-	-	-20.7	-19.6	-22.3

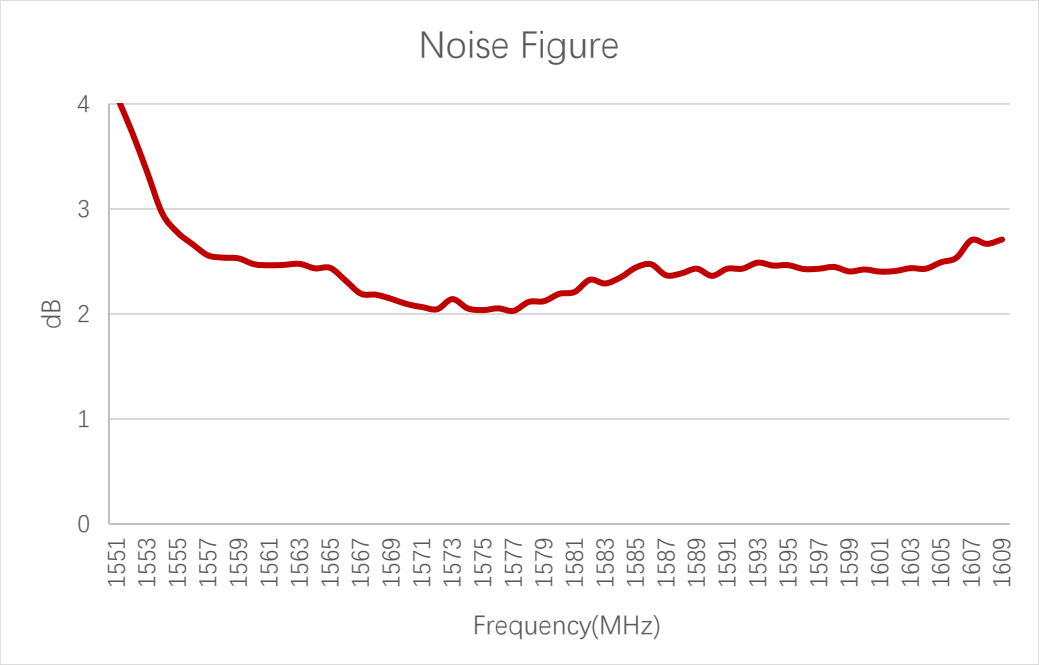
3.1.4. GNSS LNA Gain



LNA Gain (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
LNA Gain (dB)	-	-	-	-	-	18.1	18.1	16.8

3.1.5. GNSS Noise Figure

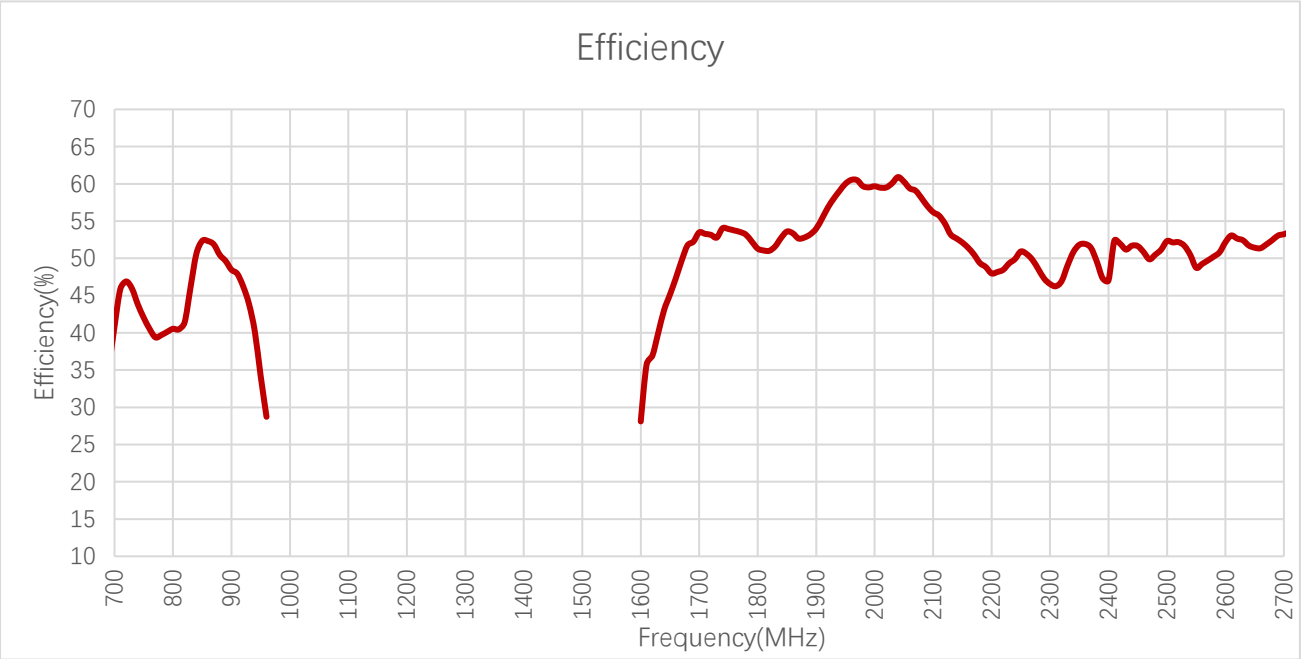


Noise Figure (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Noise Figure (dB)	-	-				2.46	2.03	2.4

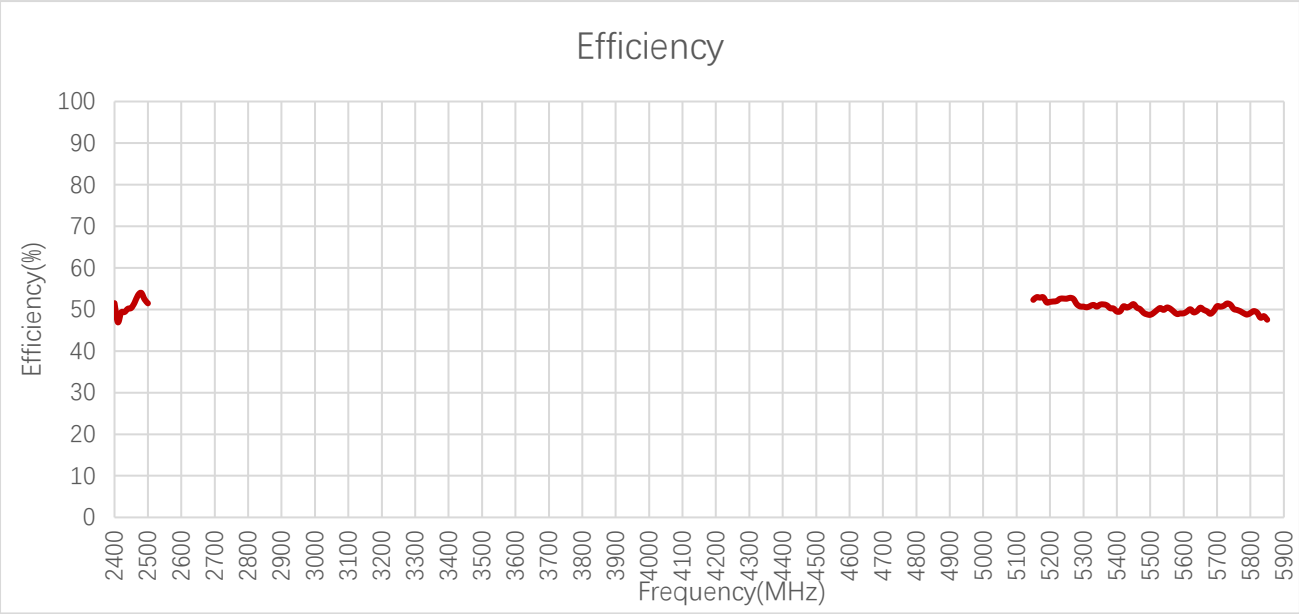
3.2. Radiation Performance Test

3.2.1. Efficiency



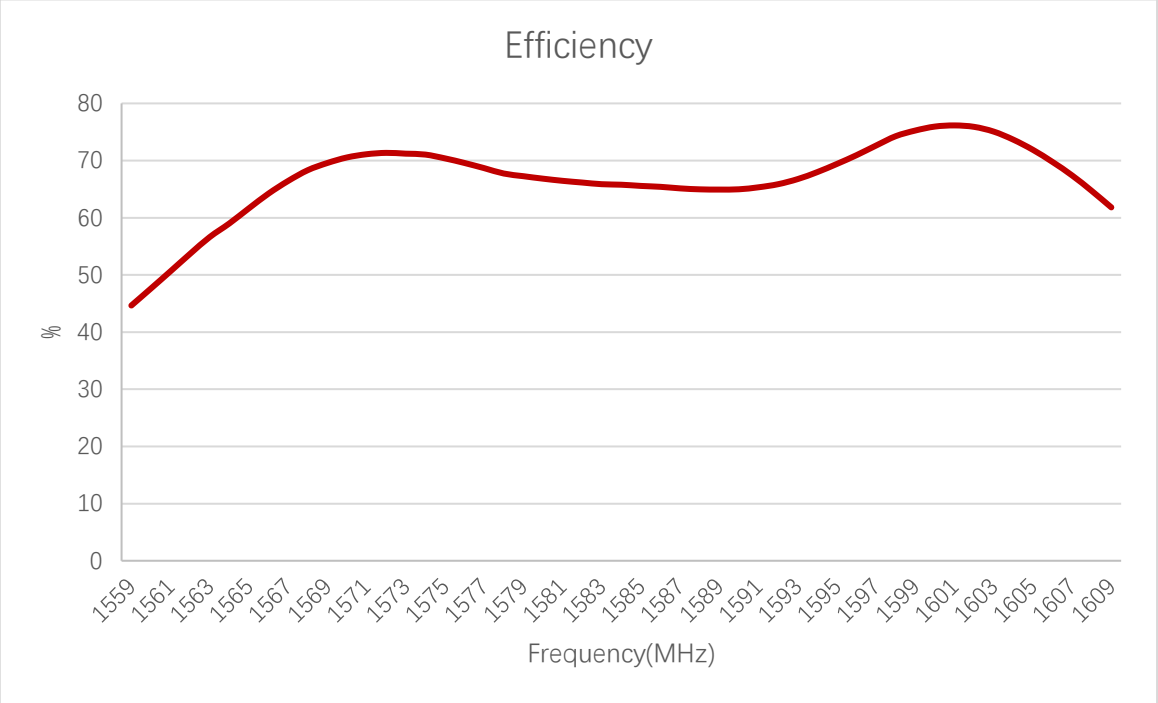
Efficiency (%) - 4G

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	-	-	45.9	46.1	48.5	28.7	-	53.3	54.1	52.8
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Efficiency (%)	60.0	52.7	51.8	51.7	52.2	53.1	-	-	-	-



Efficiency (%) - Wi-Fi

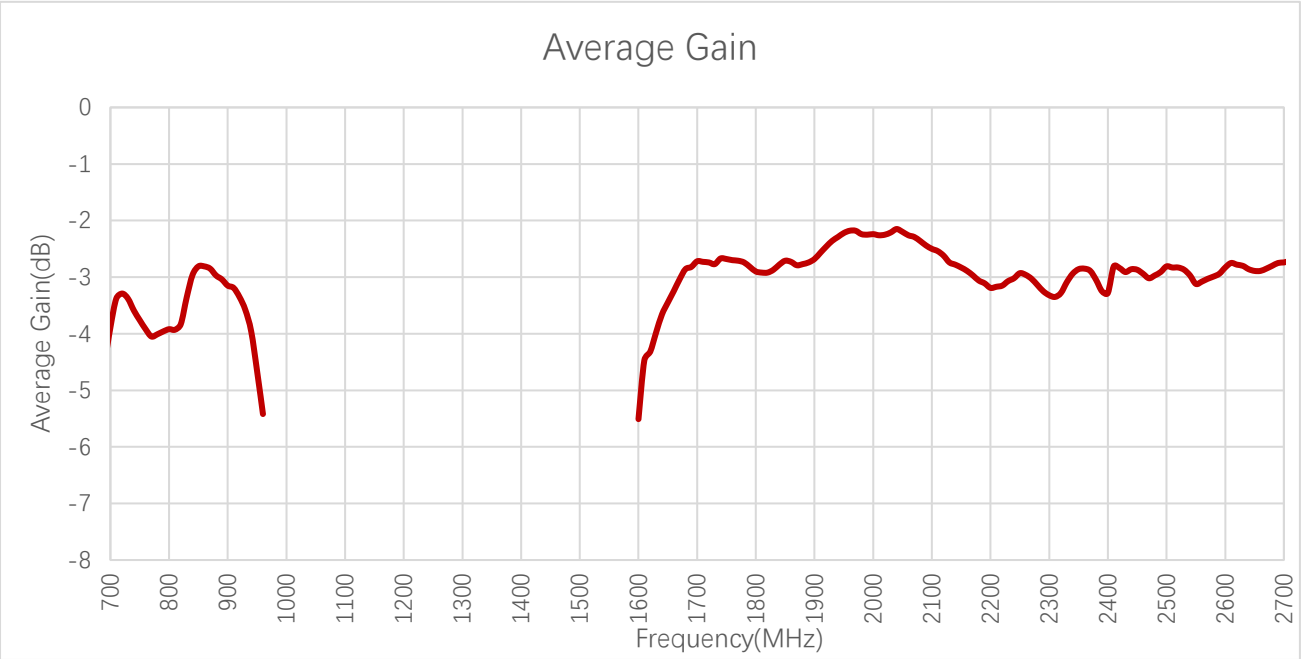
Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6325	6725	7125
Efficiency (%)	51.5	50.4	51.5	52.3	48.7	47.5	-	-	-	-



Efficiency (%) - GNSS

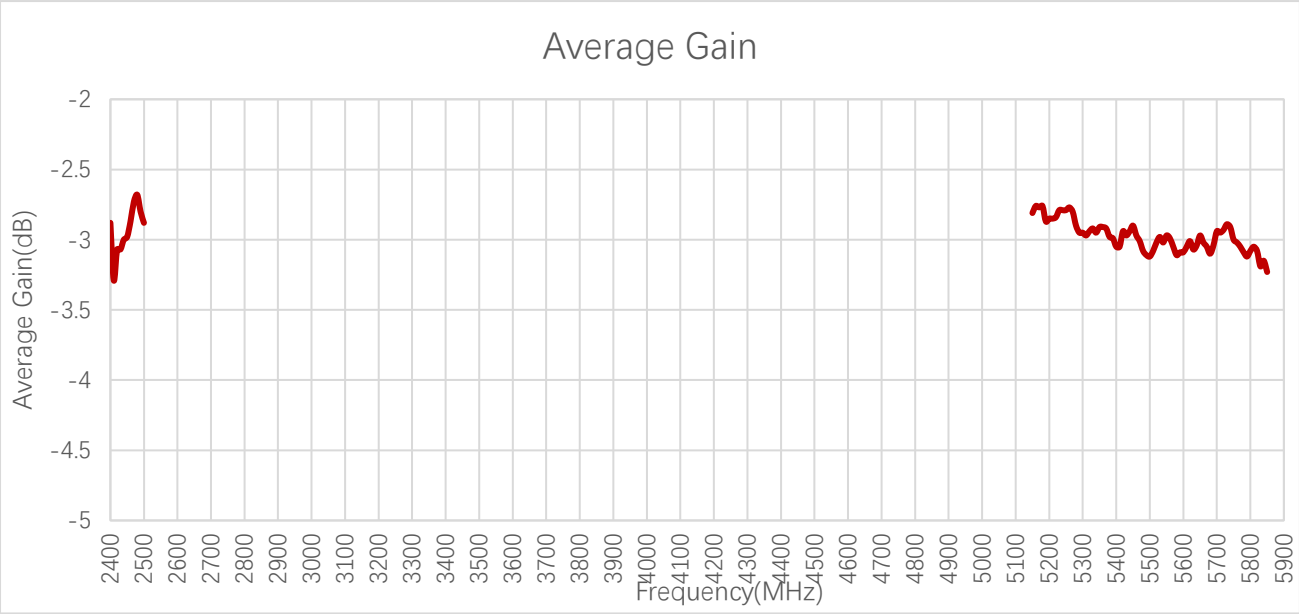
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency	-	-	-	-	-	50.6	70	75.9

3.2.2. Average Gain



Average Gain (dB) - 4G

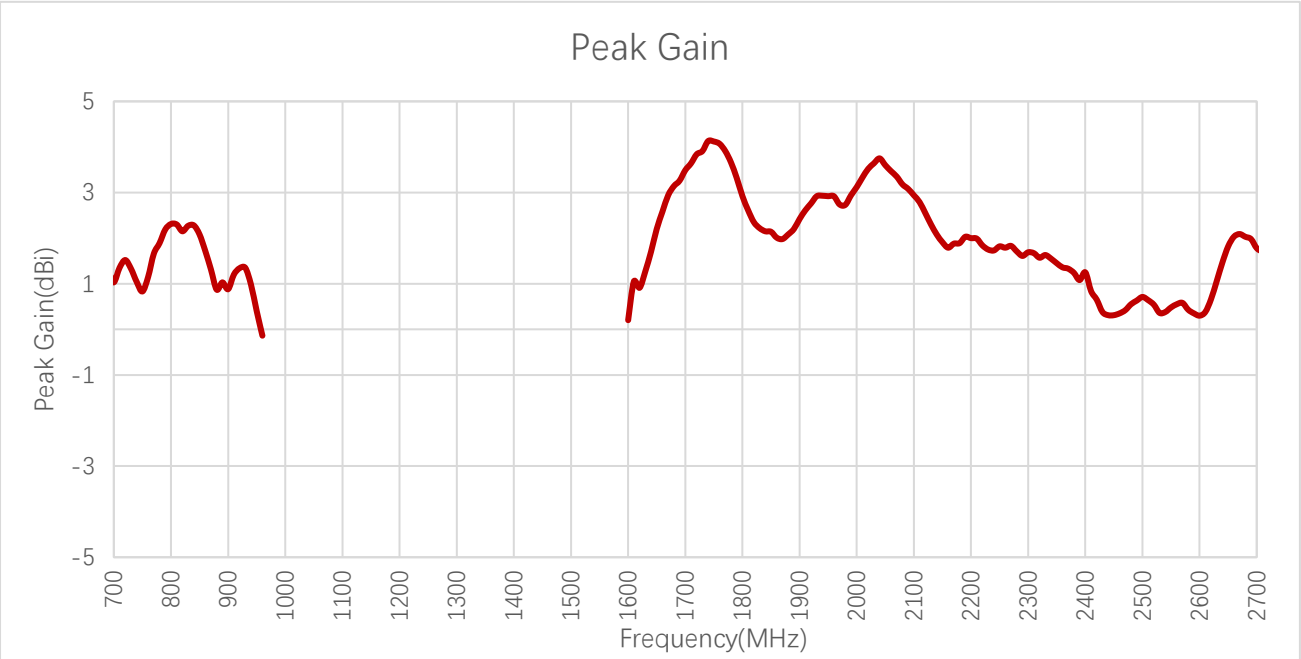
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Average Gain (dB)	-	-	-3.4	-3.4	-3.2	-5.4	-	-2.7	-2.7	-2.8
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Average Gain (dB)	-2.2	-2.8	-2.9	-2.9	-2.8	-2.8	-	-	-	-



Average Gain (dB) - Wi-Fi

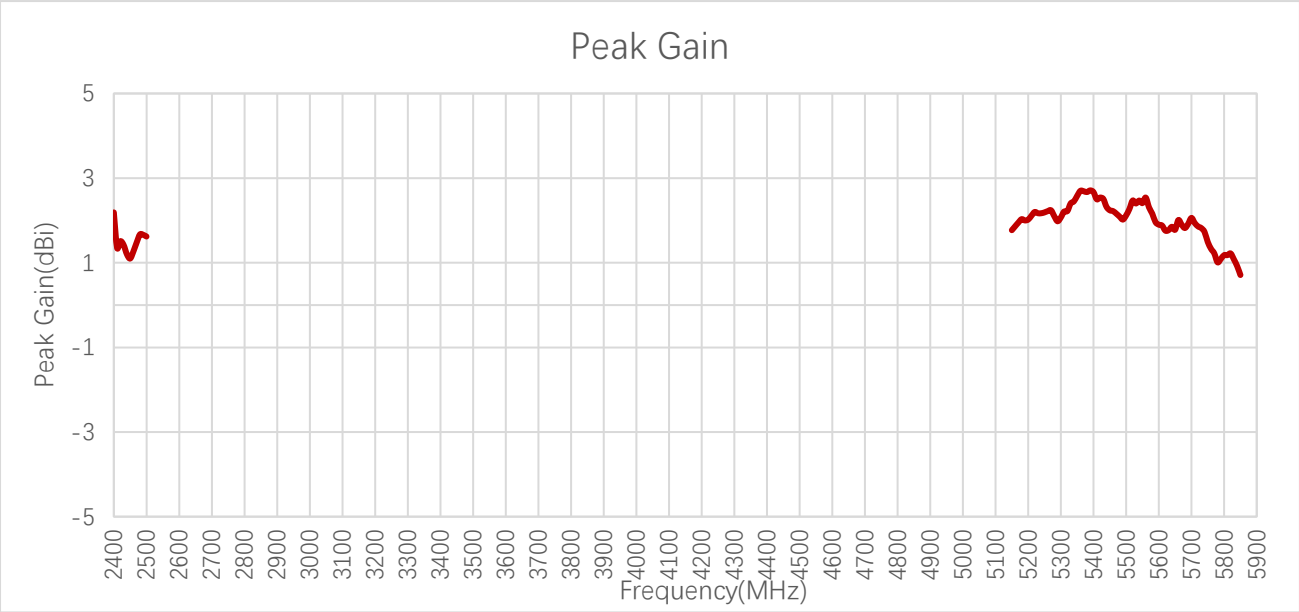
Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6325	6725	7125
Average Gain (dB)	-2.9	-3.0	-2.9	-2.8	-3.1	-3.2	-	-	-	-

3.2.3. Peak Gain



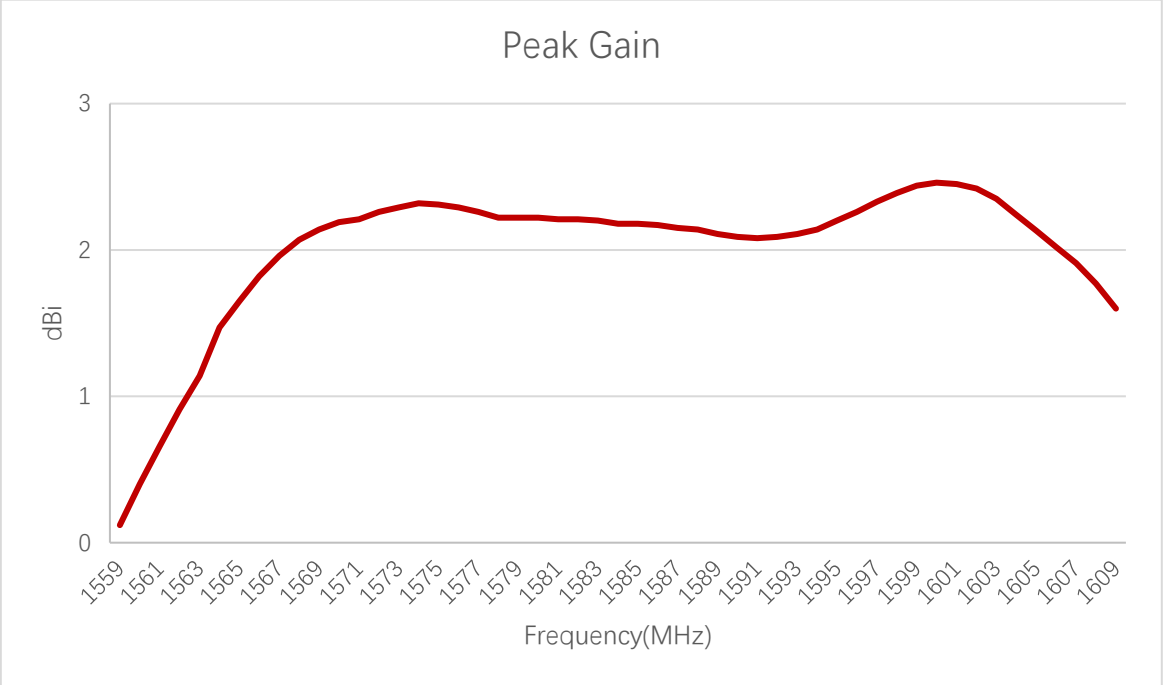
Peak Gain (dBi) - 4G

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	-	-	1.4	2.3	0.9	-0.1	-	3.6	4.1	2.1
Frequency (MHz)	**1950**	**2140**	**2350**	**2450**	**2600**	**2690**	**4700**	**5000**	**5500**	**6000**
Peak Gain (dBi)	2.9	2.1	1.5	0.3	0.3	2.0	-	-	-	-



Peak Gain (dB) - Wi-Fi

Frequency (MHz)	2400	2450	2500	5150	5500	5850	5925	6325	6725	7125
Peak Gain (dB)	2.2	1.1	1.6	1.8	2.1	0.7	-	-	-	-

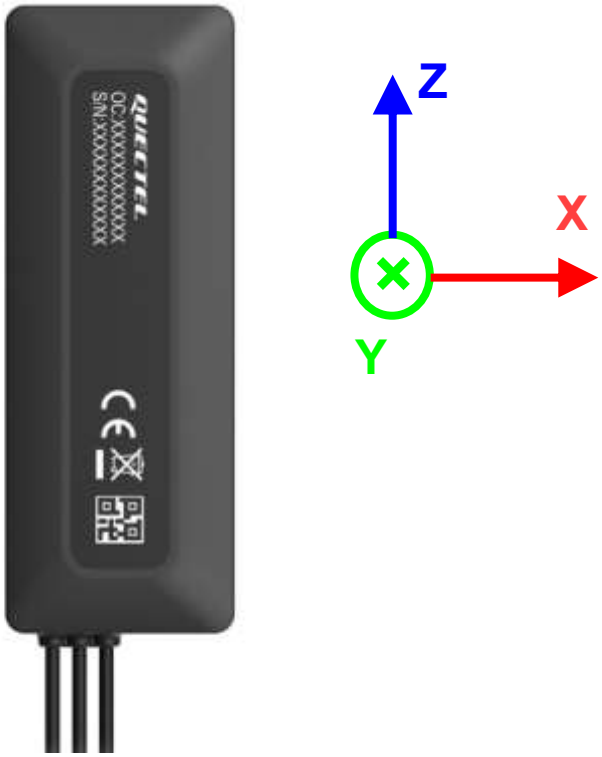


Peak Gain (dBi) - GNSS

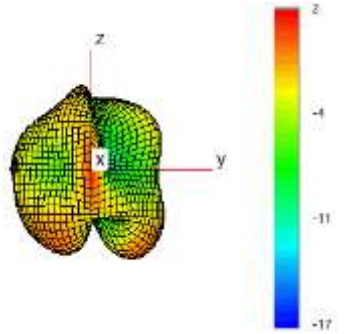
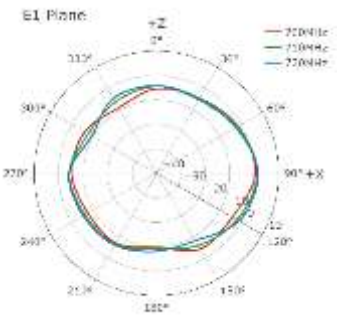
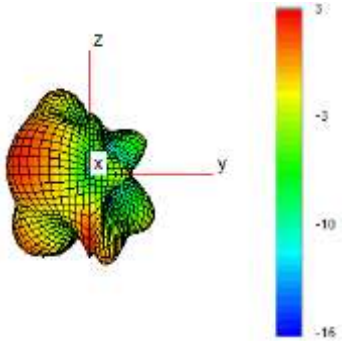
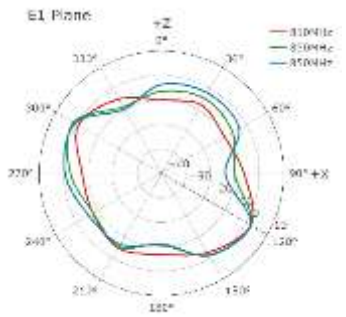
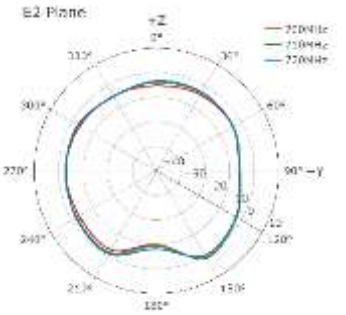
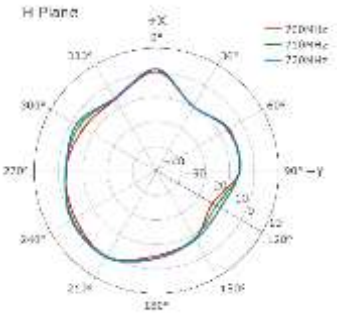
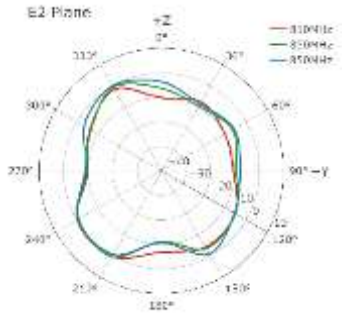
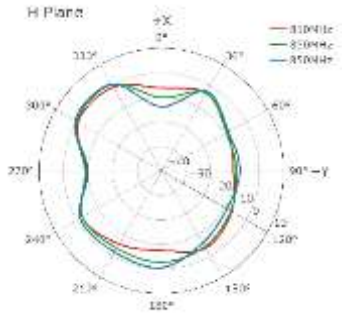
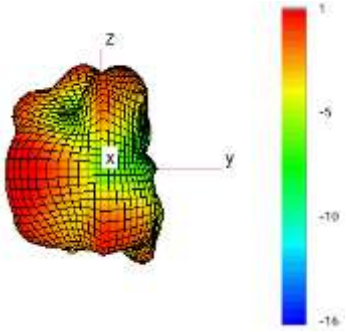
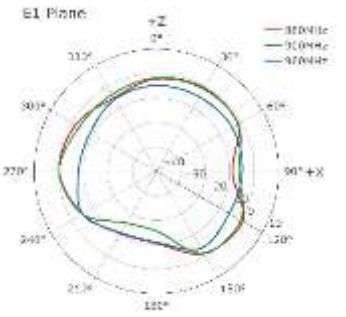
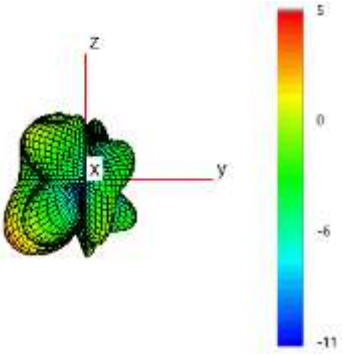
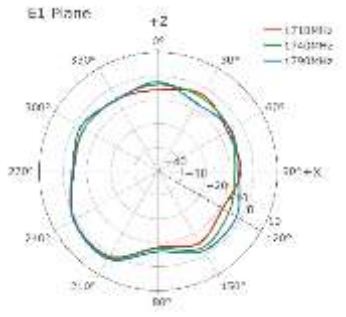
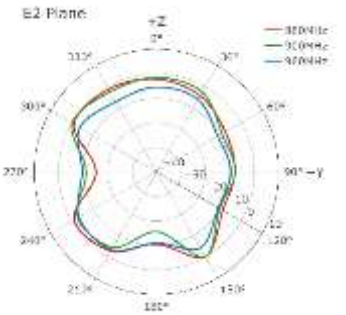
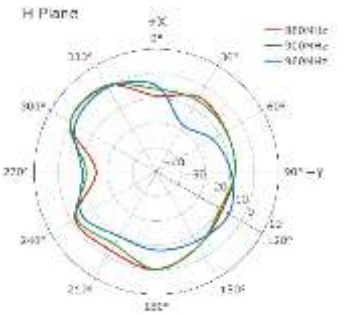
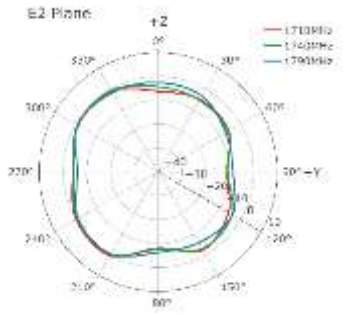
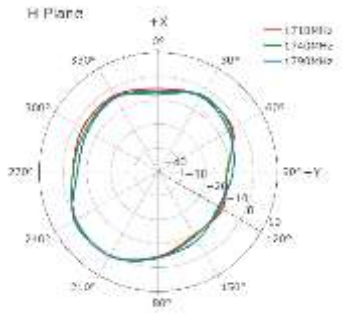
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	-	-	-	-	-	0.66	2.31	2.42

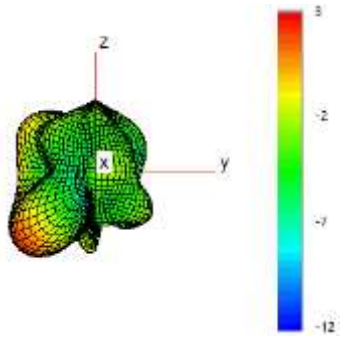
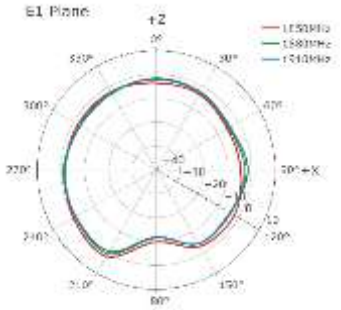
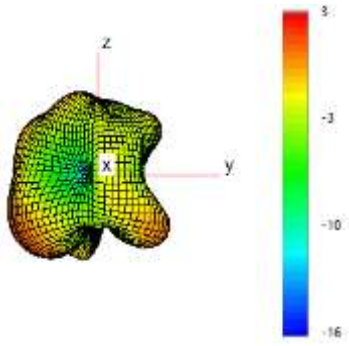
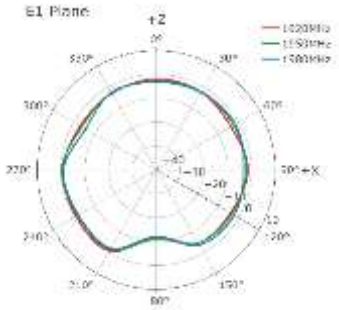
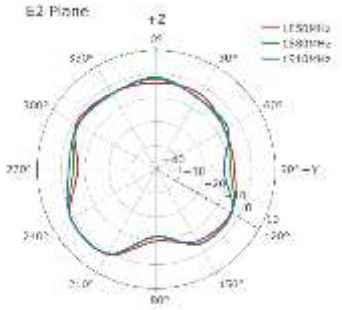
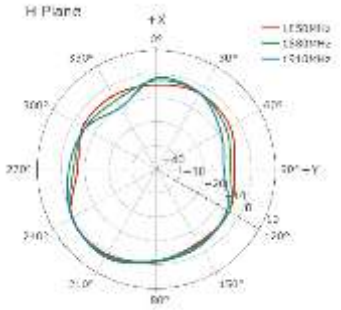
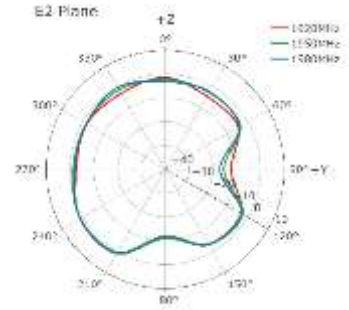
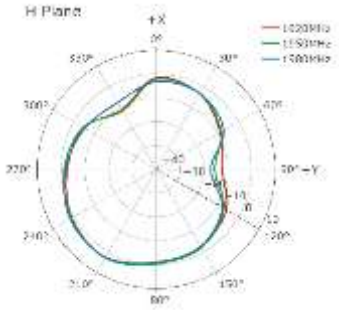
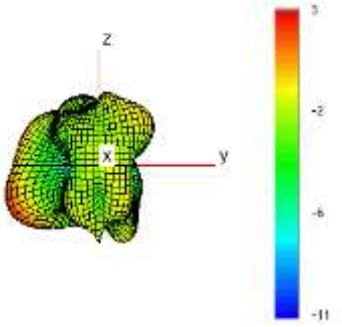
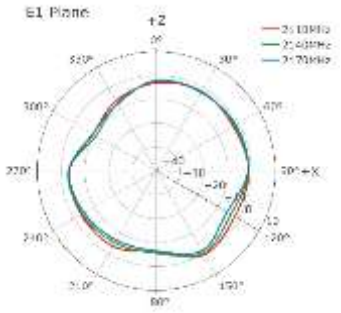
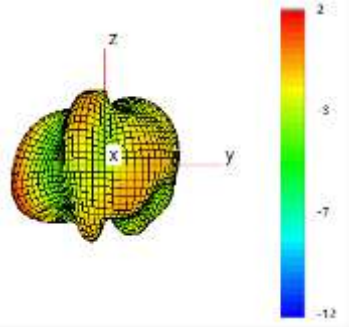
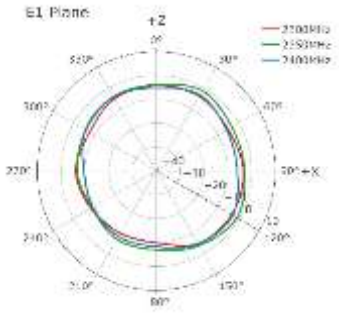
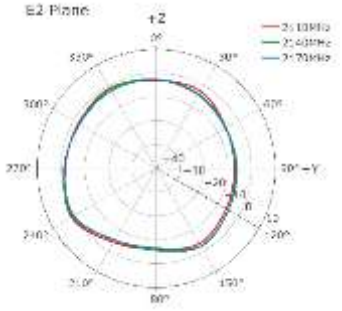
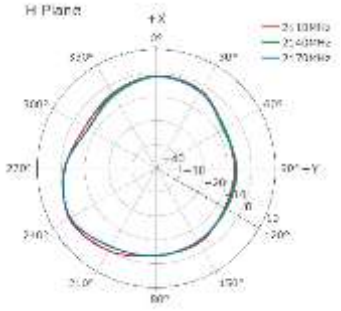
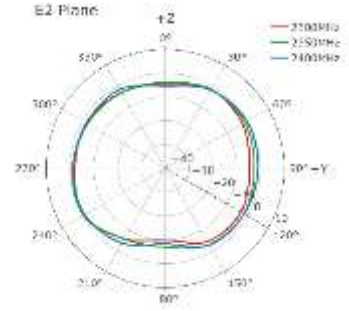
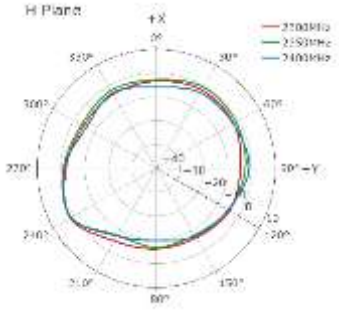
3.2.4. 3D & 2D Radiation Pattern

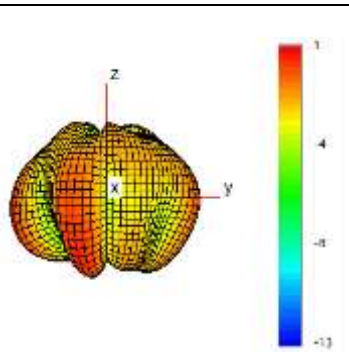
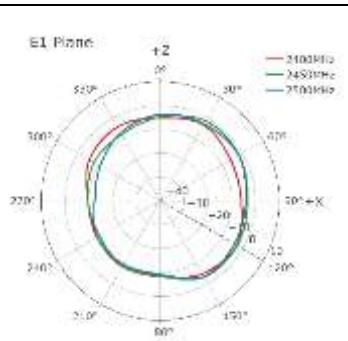
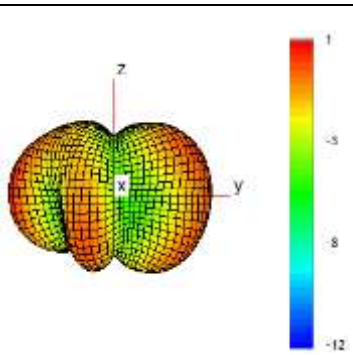
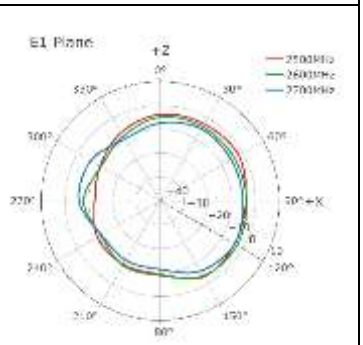
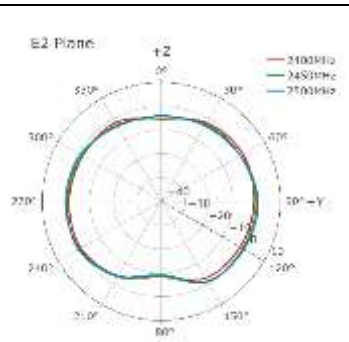
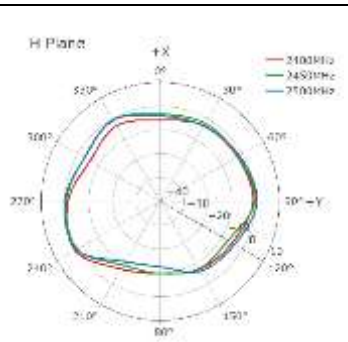
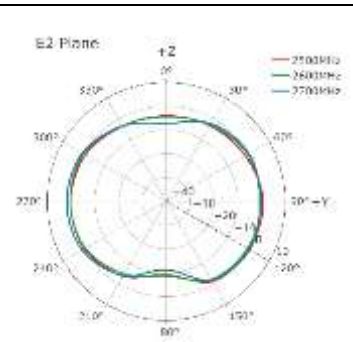
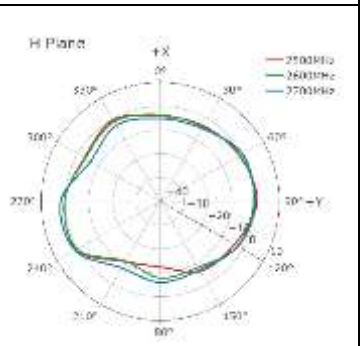
- Test Chamber: SH-SY-16M (GNSS)
- Test Chamber: HF-G-1 (4G + Wi-Fi)
- Test Condition: In Free Space



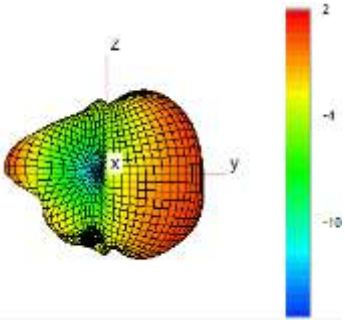
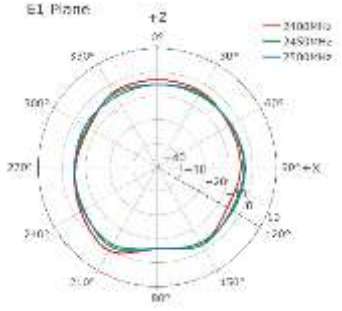
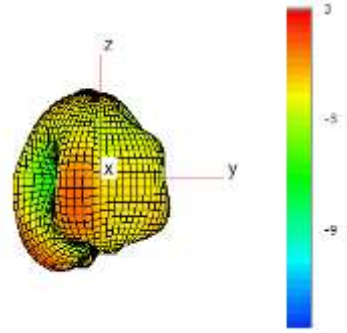
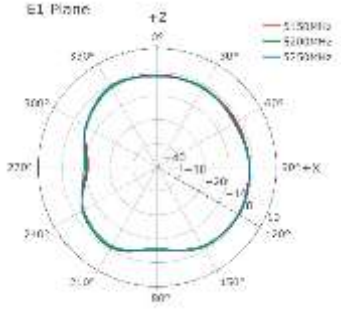
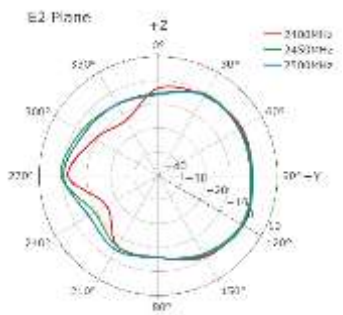
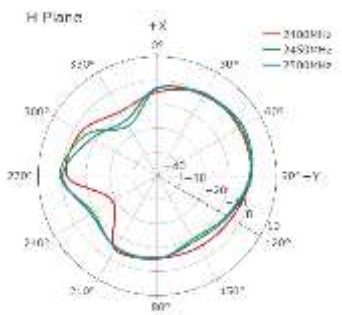
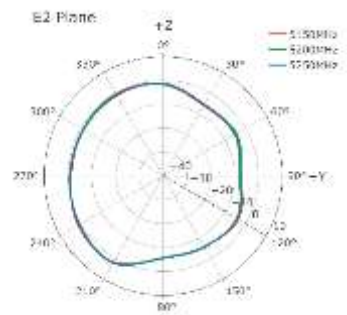
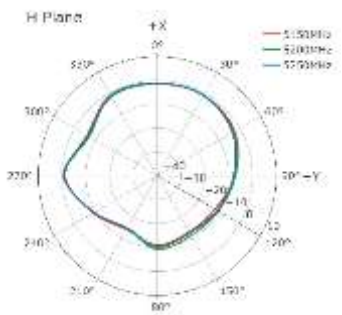
- **4G**

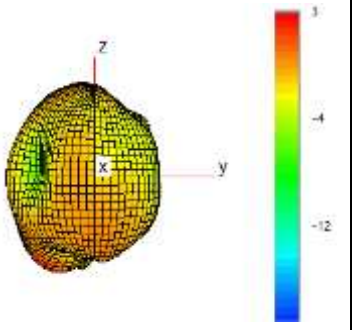
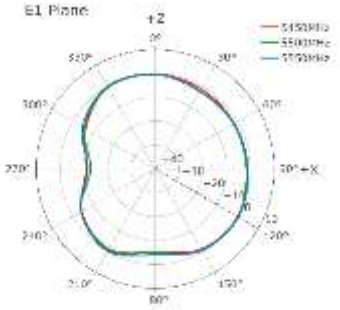
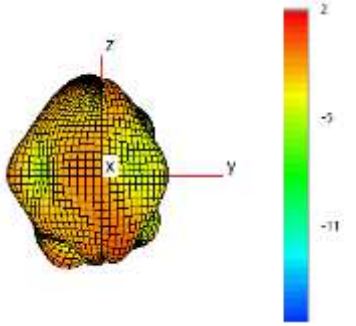
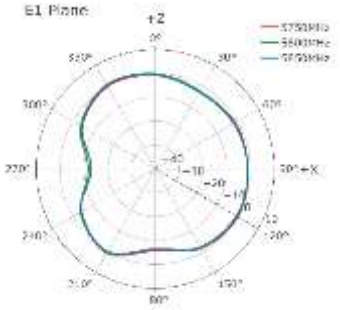
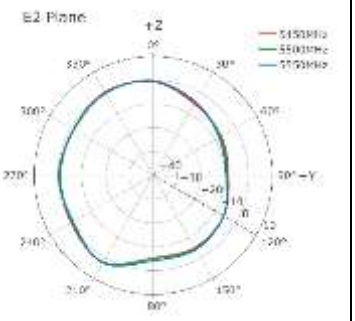
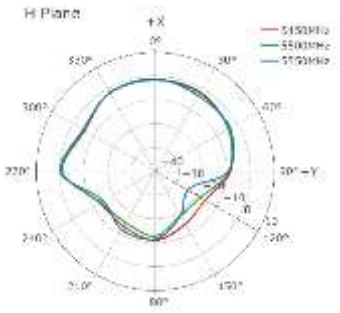
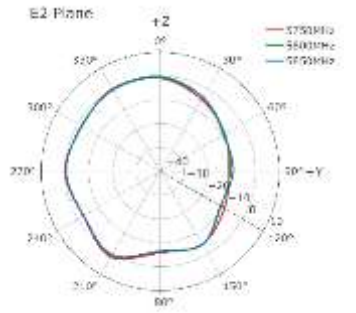
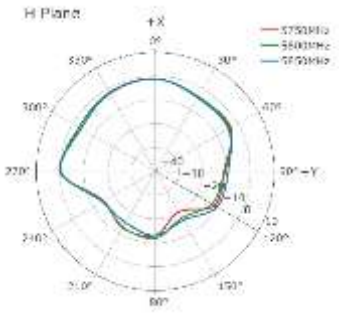
710 MHz		830 MHz	
			
			
900 MHz		**1740 MHz**	
			
			

1880 MHz		1950 MHz	
			
			
2140 MHz		2350 MHz	
			
			

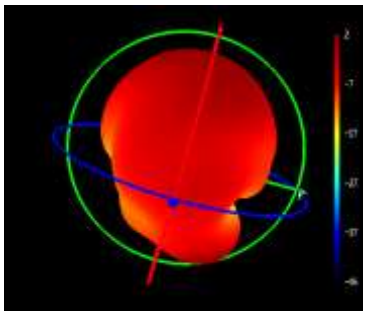
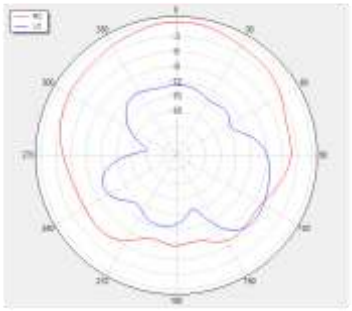
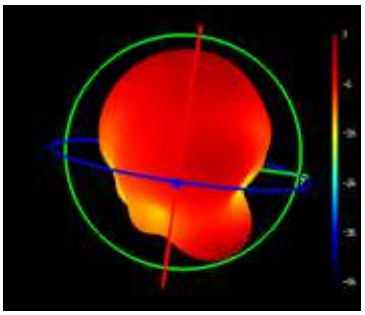
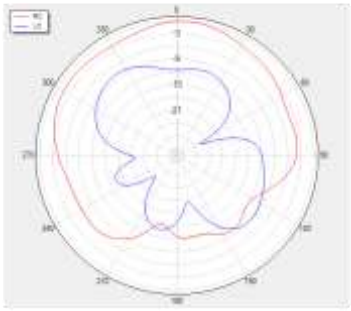
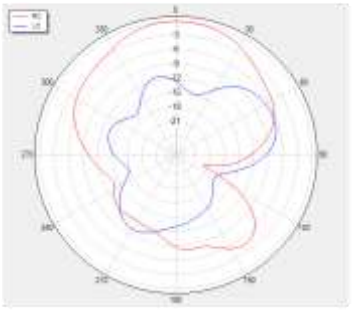
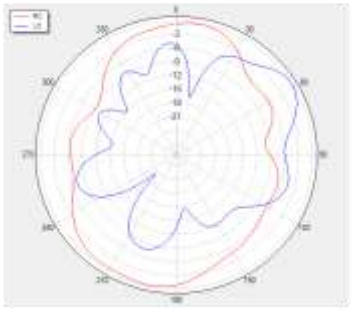
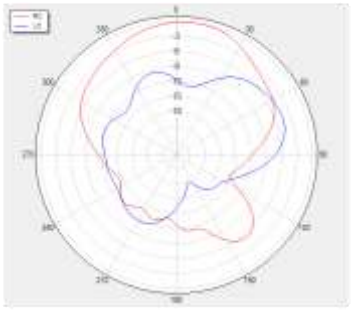
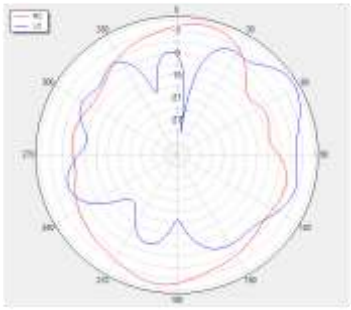
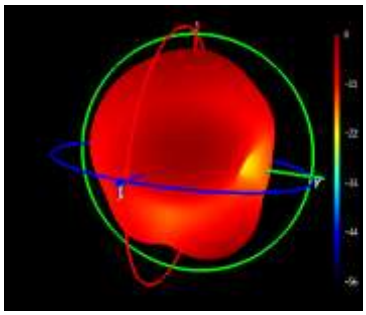
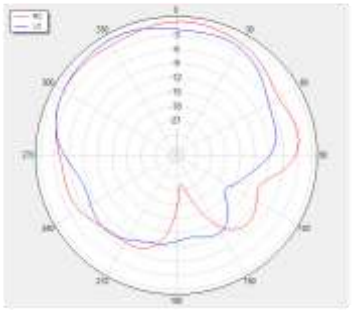
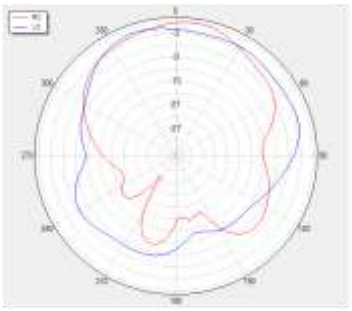
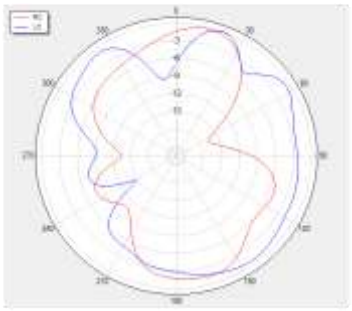
2450 MHz		2600 MHz	
			
			

- **Wi-Fi**

2450 MHz		5200 MHz	
			
			
5500 MHz		5800 MHz	

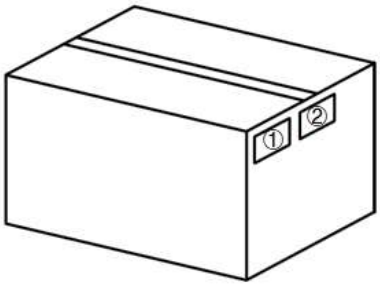
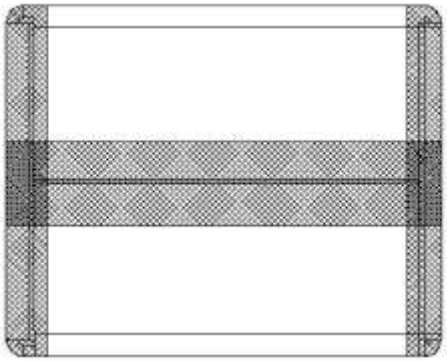
 z y x 1 -4 -12	 E1 Plane +Z +X	 z y x 2 -5 -11	 E1 Plane +Z +X
 E2 Plane +Z +Y	 H Plane +X +Y	 E2 Plane +Z +Y	 H Plane +X +Y

- **GNSS**

1561 MHz		1575 MHz	
	Phi=0 freq=1561MHz 		Phi=0 freq=1575MHz 
Phi=90 freq=1561MHz 	Theta=90 freq=1561MHz 	Phi=90 freq=1575MHz 	Theta=90 freq=1575MHz 
1602 MHz			
	Phi=0 freq=1602MHz 		
Phi=90 freq=1602MHz 	Theta=90 freq=1602MHz 		

4 Packaging

Step	Packaging Picture / 2D Picture	Description
1		The product is wrapped in a bubble bag and placed in a ziplock bag. (1 PC / Small PE Bag)
2		8 pcs small PE bags are put into a big PE bag. (8 PCS / Big PE Bag)
3	 	Put the bubble bag on the top of the product. (5 Big PE Bags / Carton Box) (40 PCS / Carton Box) Carton Size: L × W × H = 405 × 293 × 185 mm

4		**Position for Attaching Labels** ① Carton Label ② Quality Label
5		**Sealing Cartons** "工" type sealing cartons

Contact Us

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Revision History

Version	Date	Author	Note
-	2023-10-19	Junsen LI/ Christopher YAO/ Rojin LUO/ David LIU/ Aria CHU	Creation of the document
1.0	2023-10-19	Junsen LI/ Christopher YAO/ Rojin LUO/ David LIU/ Aria CHU	First official release
1.1	2023-11-29	Rojin LUO	Updated connector type (Chapter 1.2).

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