

Outline

- 1.Benchmark**
- 2.S-Parameters(VSWR&Isolation)**
- 3.Antenna Efficiency& Peak Gain**
- 4.Radiation patterns**
- 5.Summary**

Customer: InventecAppliances(Jiangning)Corporation

Project Name: FC3

**Manufacture: KUNSHAN HUBBLE ELECTRONICS
TECHNOLOGY CO.,LTD**

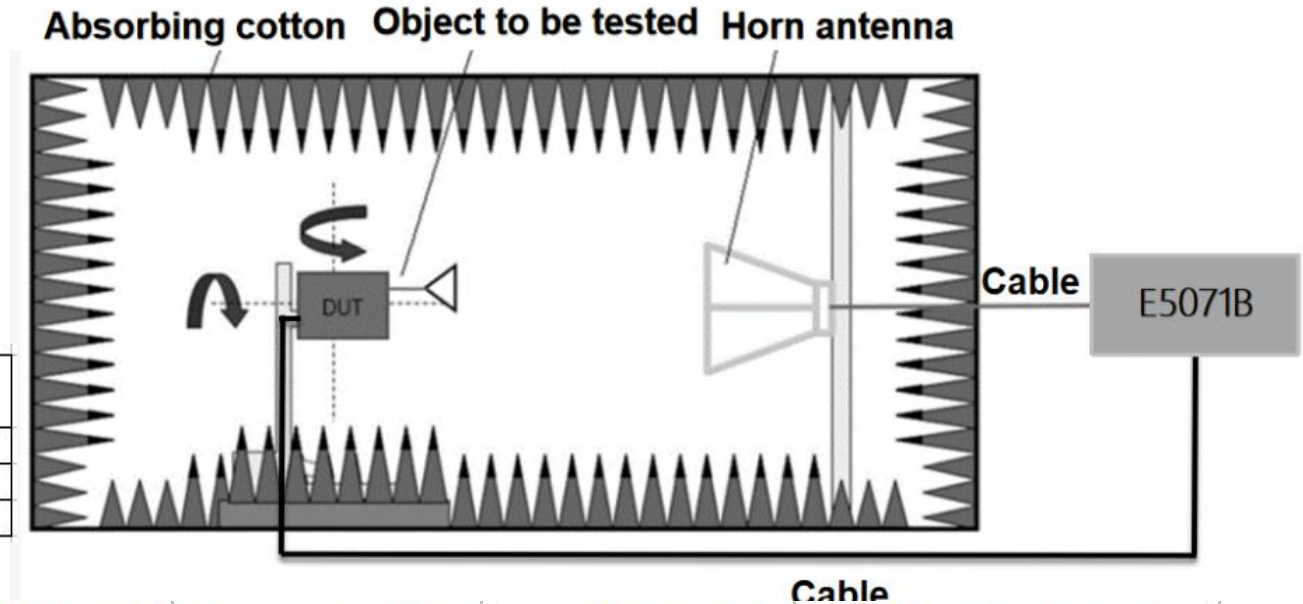
The Test Equipment List:CMW500 E5071B

**Antenna Type: CAT-M1(PIFA) BLE/WIFI(PIFA)
GPS(PIFA)**

Designer:Liming Liu

Date:2023.03.17

Relevant Information



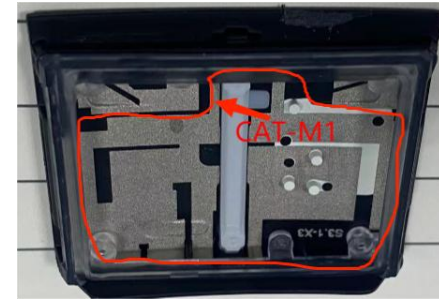
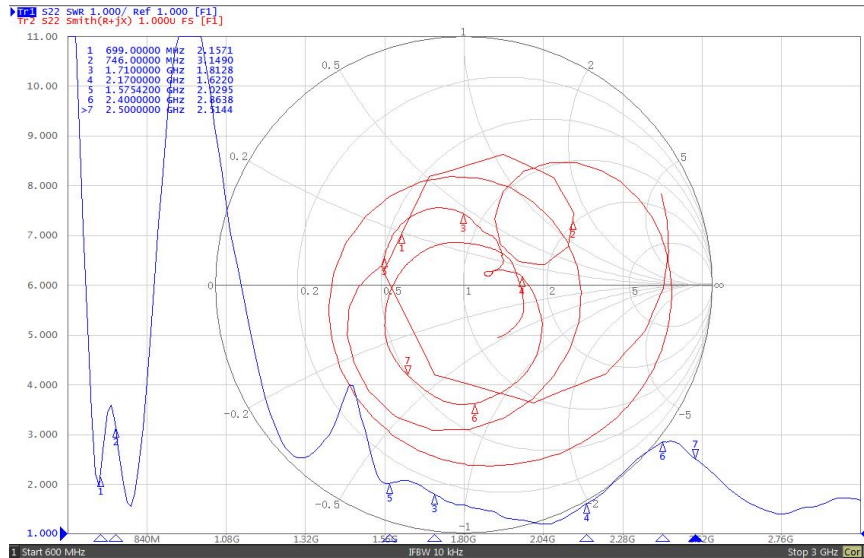
Frequency	Average efficiency	spec
CAT-11-B12	-7.23dB	-12.5dB
CAT-11-B4	-4.49dB	-12dB
CAT-11-B2	-3.81dB	-12dB

Test Date	Test Personnel	Test Software	Table of calibrated Equipment	
2023.03.17	Rik Wang	AnTestPro99	CWM500	E5071B

Test Method:

The product was placed on the turntable in the chamber and connected with the transmission line. The software was used to set the frequency range and control the rotation of the turntable. The system collected and calculated the data in all directions and finally summarized the data in all frequency bands.

S-Parameters、Antenna Efficiency& Peak Gain-CAT-M1



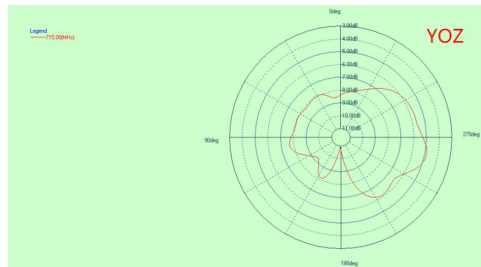
Band	Efficiency	Peak Gain
CAT-M1 B2	40.38%-43.00%	-1.12dBi
CAT-M1 B4	30.24%-39.63%	-0.38dBi
CAT-M1 B12	11.55%-26.22%	-3.26dBi

Frequency	Efficiency y - dB(dB)	Efficiency (%)	E Total. dB(dB)
695MHz	-10.30	9.33%	-4.51
700MHz	-9.37	11.55%	-3.67
705MHz	-8.74	13.35%	-3.27
710MHz	-8.31	14.75%	-4.88
715MHz	-6.84	20.72%	-3.26
720MHz	-6.65	21.64%	-3.82
725MHz	-7.23	18.92%	-3.10
730MHz	-6.82	20.80%	-3.92
735MHz	-6.62	21.75%	-4.80
740MHz	-5.91	25.62%	-5.25
745MHz	-5.81	26.22%	-4.08
750MHz	-5.81	26.25%	-3.08
ave	-7.37	18.33%	-3.97

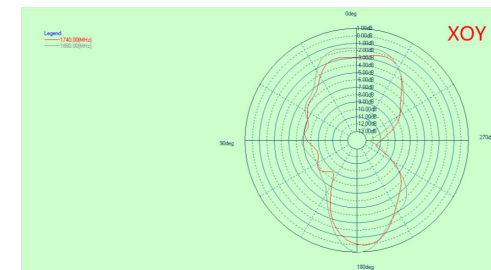
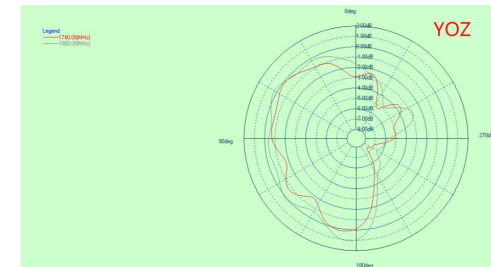
Frequency	Efficiency y - dB(dB)	Efficiency (%)	E Total. dB(dB)	1960MHz	-3.94	40.38%	-1.79
1700MHz	-5.25	29.84%	-1.63	1980MHz	-3.71	42.52%	-1.68
1720MHz	-5.19	30.24%	-0.91	2000MHz	-3.70	42.61%	-1.17
1740MHz	-4.47	35.72%	-0.38	2020MHz	-3.71	42.59%	-2.21
1760MHz	-4.68	34.06%	-1.02	2040MHz	-3.93	40.47%	-1.59
1780MHz	-4.42	36.14%	-0.71	2060MHz	-4.22	37.82%	-1.60
1800MHz	-4.43	36.05%	-1.37	2080MHz	-3.93	40.50%	-1.84
1820MHz	-4.00	39.83%	-1.11	2100MHz	-3.94	40.36%	-1.25
1840MHz	-3.78	41.85%	-1.53	2120MHz	-4.02	39.63%	-1.06
1860MHz	-3.85	41.22%	-1.12	2140MHz	-4.22	37.85%	-1.63
1880MHz	-3.83	41.40%	-1.41	2160MHz	-4.34	36.79%	-1.68
1900MHz	-3.66	43.00%	-1.24	2180MHz	-4.50	35.51%	-1.67
1920MHz	-3.80	41.71%	-1.16	2200MHz	-4.67	34.13%	-1.09
1940MHz	-3.89	40.86%	-1.55	ave	-4.15	38.58%	-1.46

Radiation patterns(2D)-CAT-M1

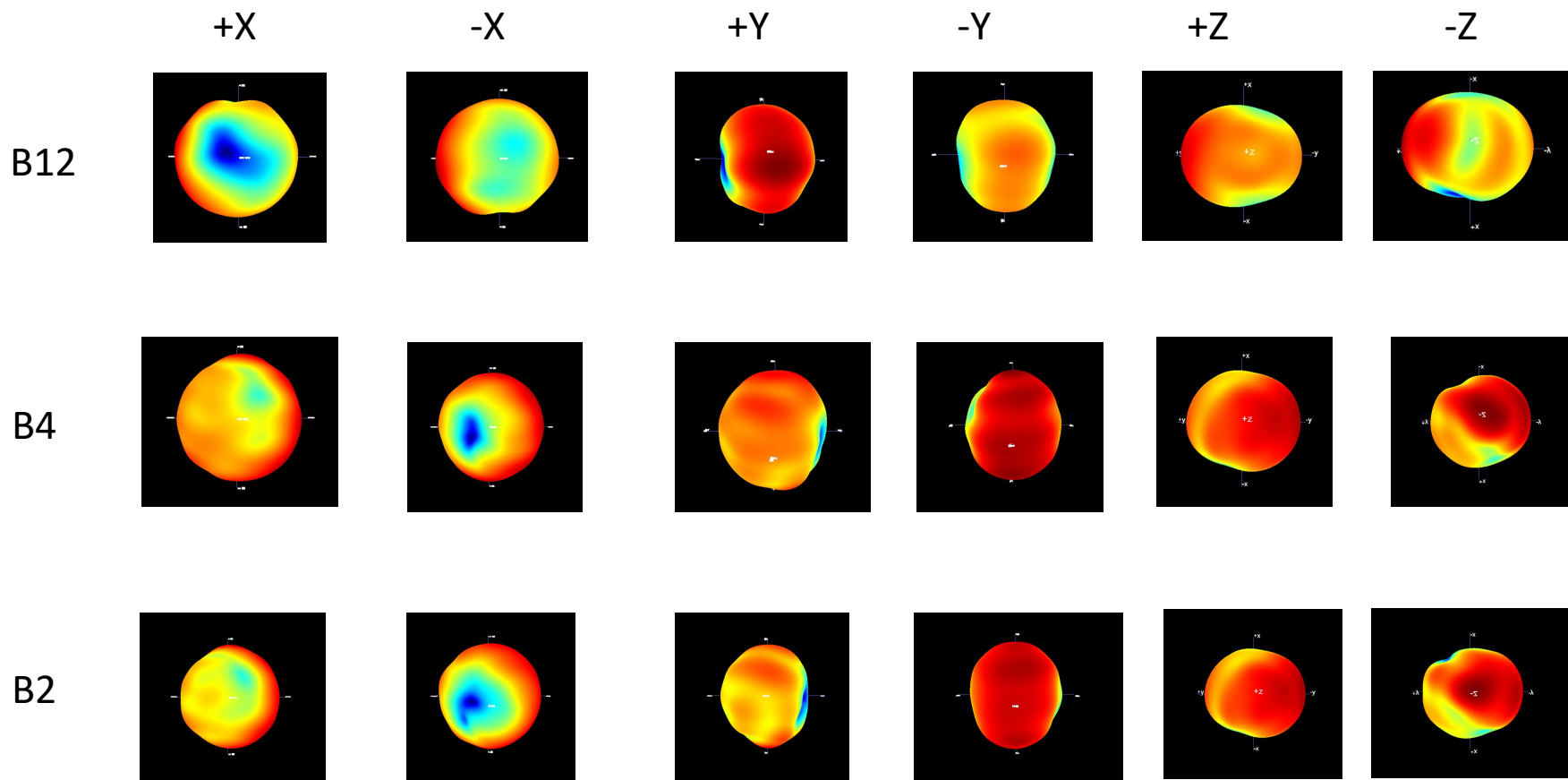
B12



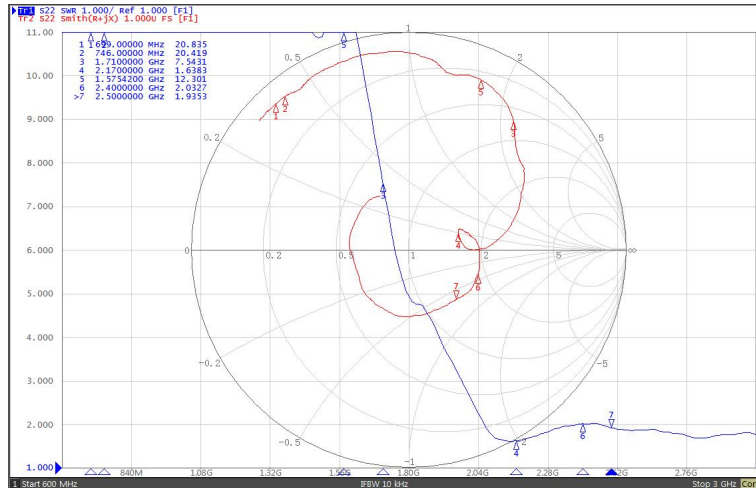
B4&B2



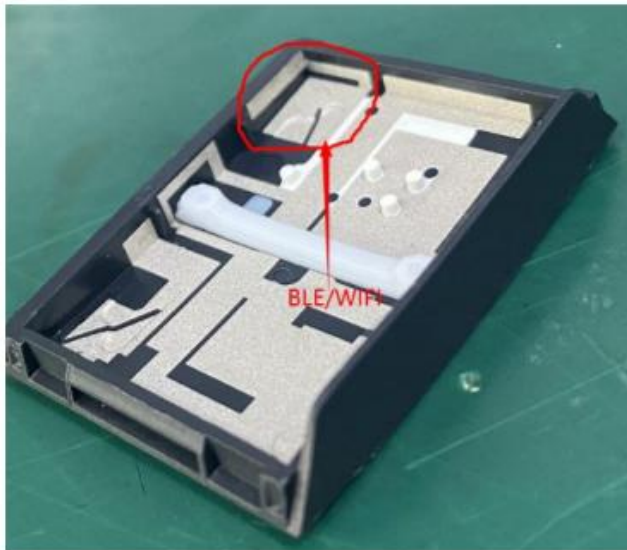
Radiation patterns(3D)-CAT-M1



S-Parameters、Antenna Efficiency& Peak Gain-BLE/WIFI

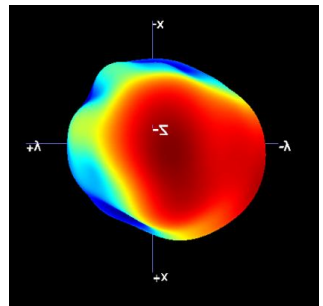
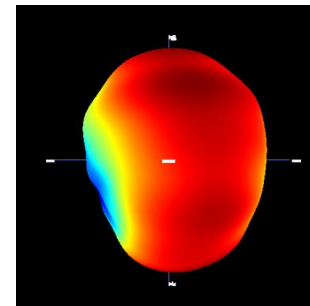
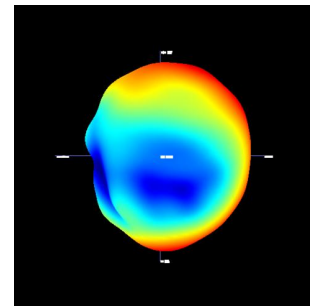
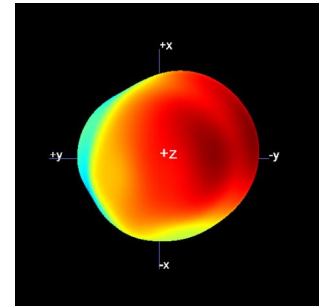
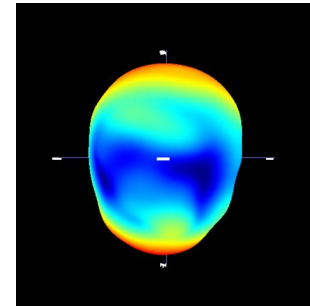
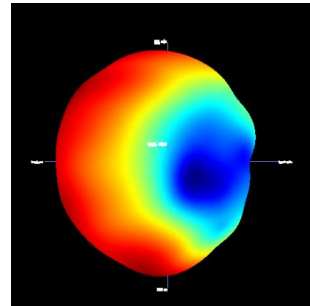
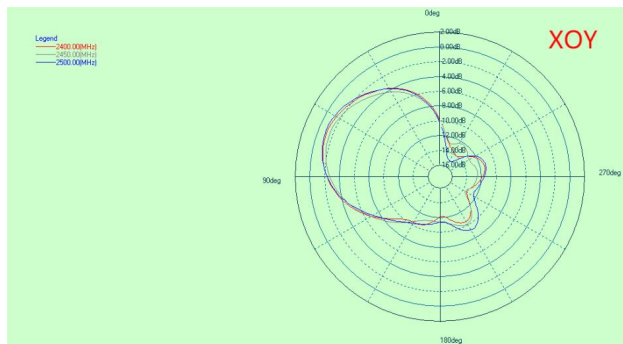
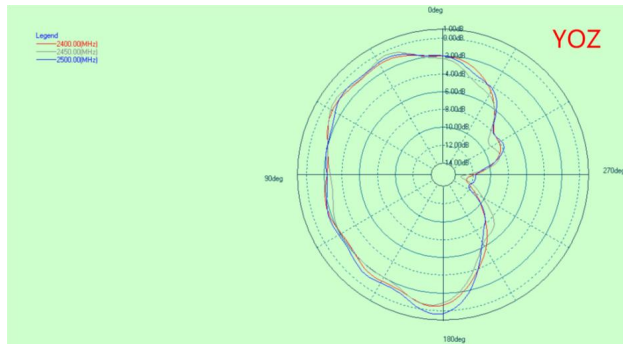
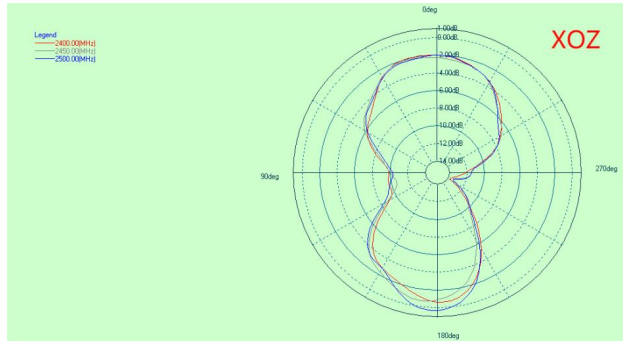


Frequency	Efficiency dB(dB)	Efficiency (%)	Total Efficiency dB(dB)
2400MHz	-4.71	33.81%	-0.53
2410MHz	-4.81	33.06%	-0.65
2420MHz	-4.96	31.93%	-0.99
2430MHz	-4.99	31.68%	-1.25
2440MHz	-4.78	33.29%	-1.00
2450MHz	-4.67	34.09%	-1.00
2460MHz	-4.64	34.34%	-0.69
2470MHz	-4.61	34.56%	-0.45
2480MHz	-4.55	35.06%	-0.34
2490MHz	-4.58	34.85%	-0.33
2500MHz	-4.54	35.19%	-0.44
ave	-4.71	33.81%	-0.70

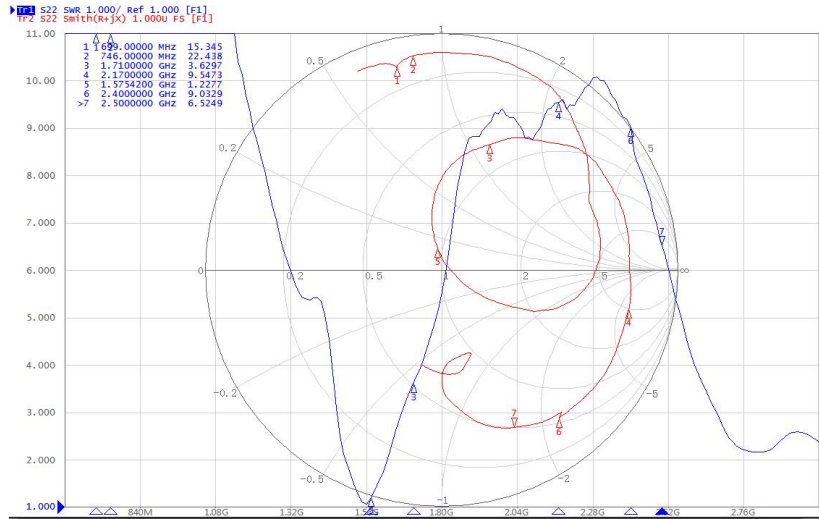


Band	Efficiency	Peak Gain
WIFI/BLE	31.68%-35.19%	-0.33dBi

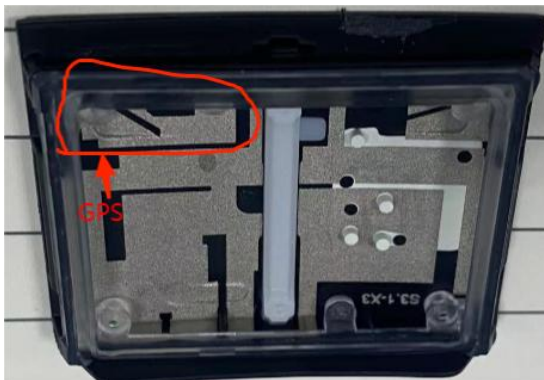
Radiation patterns-BLE/WIFI



S-Parameters、Antenna Efficiency& Peak Gain-GPS

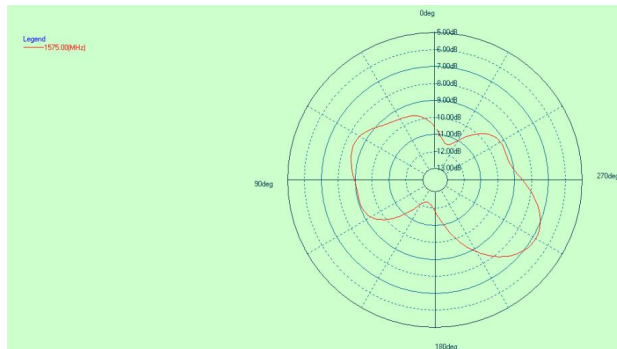
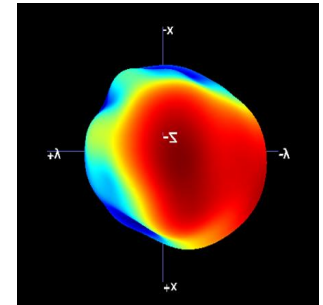
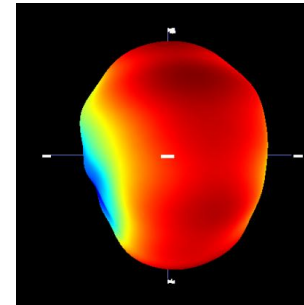
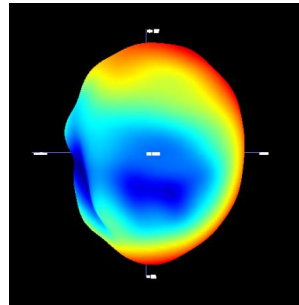
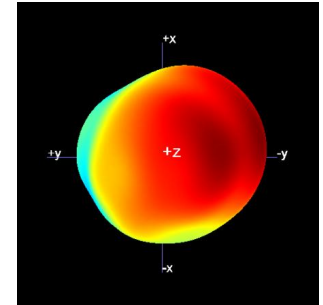
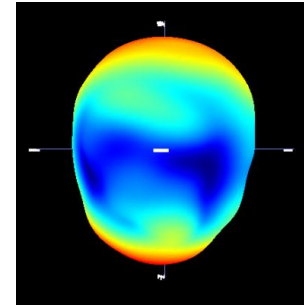
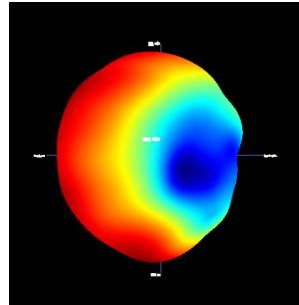


Frequency	Efficiency (dB)	Efficiency (%)	E Total (dB)
1550MHz	-6.95	20.16%	-4.92
1555MHz	-6.91	20.37%	-4.81
1560MHz	-6.92	20.30%	-4.96
1565MHz	-6.81	20.85%	-4.79
1570MHz	-6.44	22.71%	-4.88
1575MHz	-6.27	23.58%	-4.92
1580MHz	-6.31	23.40%	-4.81
1585MHz	-6.36	23.10%	-4.77
1590MHz	-6.38	23.01%	-4.76
1595MHz	-6.65	21.63%	-4.88
1600MHz	-6.63	21.72%	-4.78

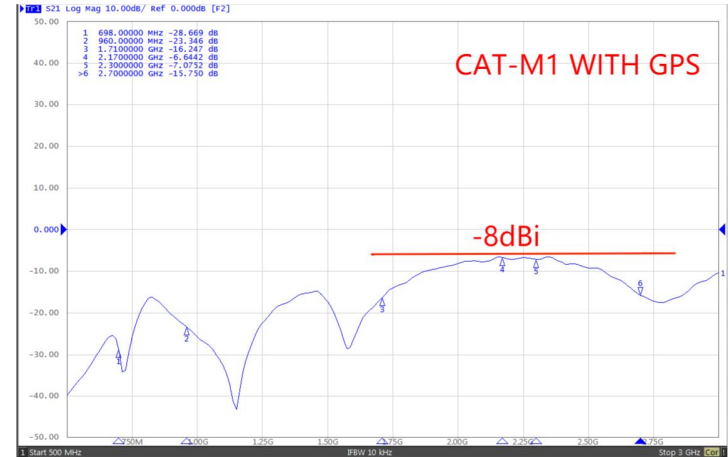


Band	Efficiency	Peak Gain
GPS	23.58%	-4.92dBi

Radiation patterns-GPS



Isolation



Summary

1.CAT-M1 Average Passive Efficiency:

B2: -3.81dB(41.59%) B4:-4.49dB(35.58%) B12:-7.23dB(18.92%)

2.BLE/WIFI Average Passive Efficiency:

-4.71dB(33.81%)

3.GPS Average Passive Efficiency:

-6.27dB(23.58%)

4.Isolation:

-5.5dB(CAT-M1&GPS) -8dB(CAT-M1&BLE/WIFI) -11dB(BLE/WIFI&GPS)