



ikotek

QDM079 Antenna test Report

Owen Deng
Antenna Engineer

Revision History



Version	Date	Author	Note
1.0	2024-09-27	Owen Deng	QDM079 Antenna Test & Debugging Report
1.1	2024-10-28	Owen Deng	QDM079 Antenna Test & Debugging Report -02
1.2	2025-04-30	Owen Deng	QDM079 DVT Antenna Test & Debugging Report
1.3	2025-05-09	Owen Deng	An explanation of UWB antennas
1.4	2025-05-13	Owen Deng	Update the match of the LTE antenna
1.5	2025-06-12	Owen Deng	Opt the LTE antenna
1.6	2025-08-19	Owen Deng & Charming Yang	LTE/GNSS antenna Test Report
1.7	2025-08-22	Owen Deng & Charming Yang	LTE/GNSS antenna Test Report-02



1. Project Overview

2. Antenna Debugging Performance

3. Conclusions & Suggestions

Project Overview

- Project Name: QDM079
- Mainboard Dimensions 57*31 mm
- Antenna Number: 3
- Antenna Network Type & Frequency Band :
 - LTE: 698-960MHz & 1710-2170 MHz
 - WIFI & BT: 2400-2500 MHz & 5150-5850 MHz
 - UWB: 6240-8240MHz
 - BAND:

Table 2: Frequency Bands and GNSS Types of BG772A-GL QuecOpen Module

Supported Bands	Power Class	GNSS		
Cat M1:				
LTE HD-FDD:				
B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/ B26/B27/B28/B66	Power Class 3 (23 dBm ± 2.7 dB)	GPS, GLONASS		
Cat NB1/NB2* :				
LTE HD-FDD:				
B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/ B25/B28/B66				

- Module No: BG770A-GL





1. Project Overview

2. Antenna Debugging Performance

3. Conclusions & Suggestions

Antenna Placement

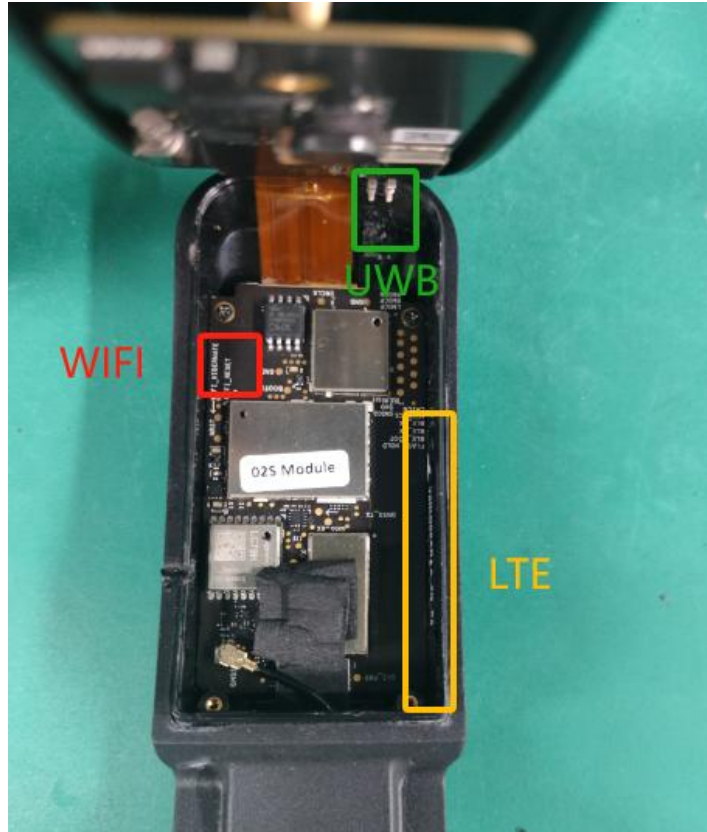


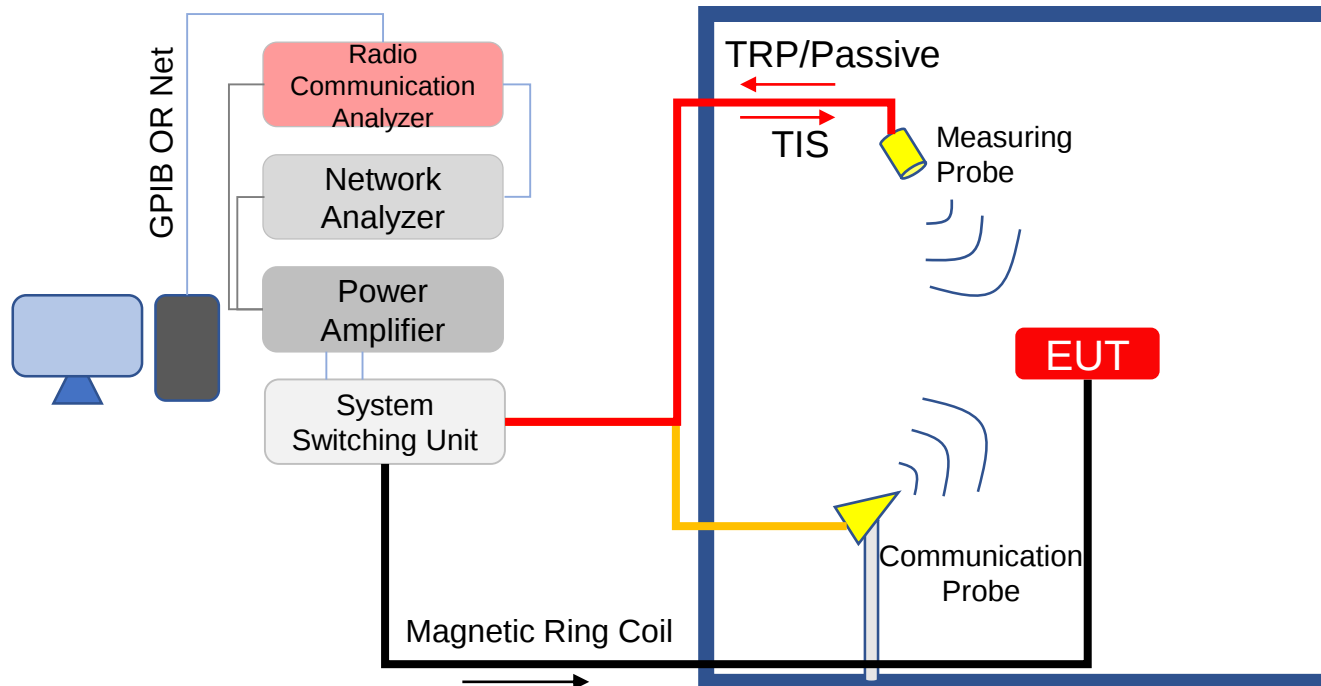
Figure : Antenna Placement.

- Antenna OC: Y0IKO00ARAA/BA
- WIFI Antenna OC: YFVP001WWA

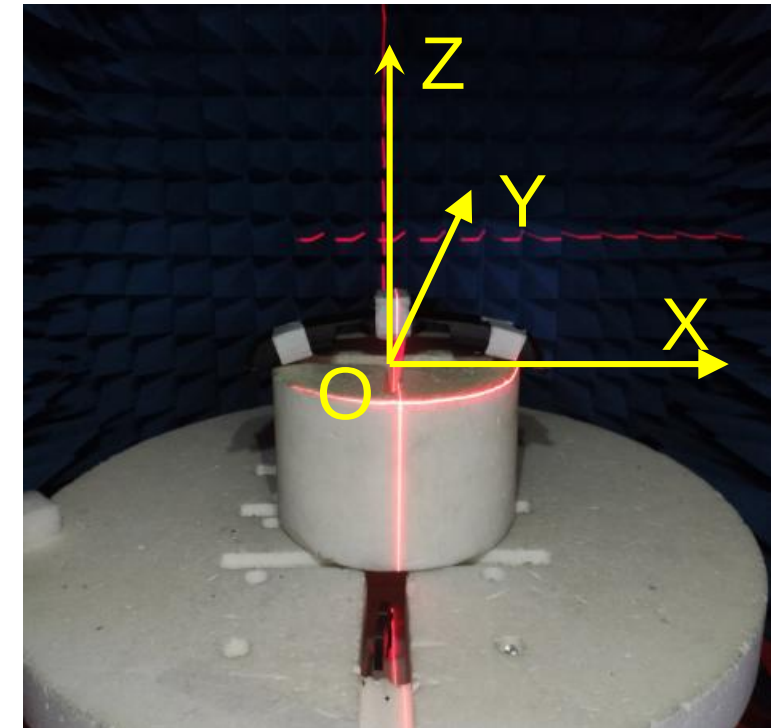


Antenna Test

- Chamber Coordinate System FS-S-1(SI2206)



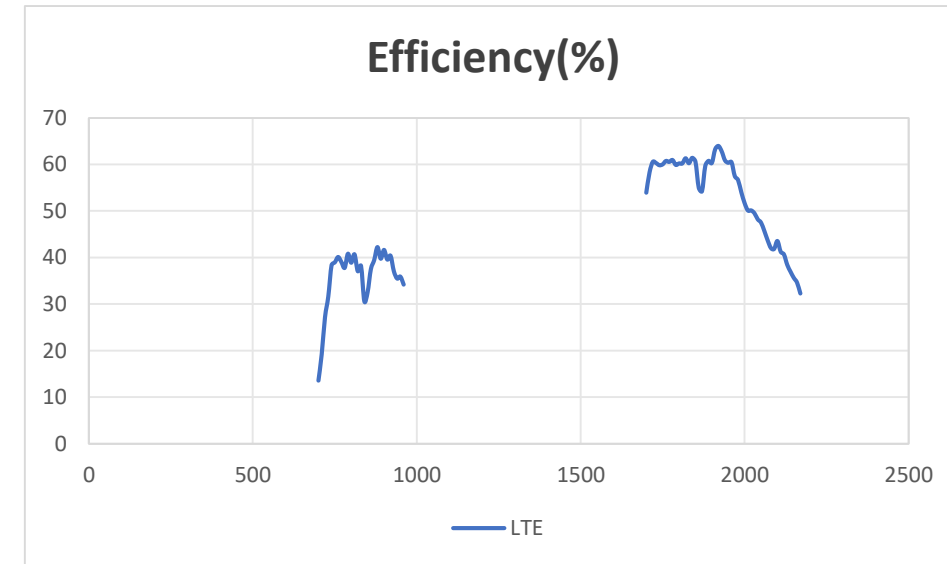
H Plane: XY
E1 Plane: XZ
E2 Plane: YZ



Antenna Performance

LTE-Passive

Freq(MHz)	Gain(dBi)	Effi (dB)	Effi (%)	Freq(MHz)	Gain(dBi)	Effi (dB)	Effi (%)	Freq(MHz)	Gain(dBi)	Effi (dB)	Effi (%)
700	-3.46	-8.68	13.57	1700	2.28	-2.68	53.95	1950	3.16	-2.19	60.37
710	-2	-7.16	19.23	1710	2.76	-2.34	58.32	1960	3.3	-2.18	60.51
720	-0.87	-5.66	27.16	1720	3.3	-2.18	60.58	1970	3.16	-2.4	57.52
730	-0.33	-5	31.62	1730	2.53	-2.2	60.31	1980	3.14	-2.47	56.66
740	0.66	-4.16	38.35	1740	2.8	-2.23	59.85	1990	2.92	-2.67	54.02
750	0.51	-4.09	38.97	1750	2.83	-2.22	60.04	2000	2.94	-2.87	51.7
760	0.93	-3.97	40.13	1760	3	-2.16	60.77	2010	2.91	-3	50.12
770	1.04	-4.08	39.04	1770	3.24	-2.18	60.56	2020	2.75	-3	50.14
780	0.81	-4.23	37.79	1780	3.14	-2.15	60.98	2030	2.58	-3.05	49.53
790	0.93	-3.89	40.83	1790	3.22	-2.22	59.92	2040	2.41	-3.17	48.23
800	0.67	-4.1	38.89	1800	3.12	-2.2	60.24	2050	2.07	-3.23	47.52
810	1	-3.9	40.71	1810	3.27	-2.2	60.23	2060	1.44	-3.4	45.75
820	0.37	-4.31	37.07	1820	3.23	-2.12	61.35	2070	0.99	-3.59	43.75
830	0.46	-4.18	38.21	1830	2.8	-2.2	60.27	2080	0.75	-3.76	42.08
840	-0.69	-5.14	30.61	1840	3.1	-2.12	61.44	2090	0.75	-3.78	41.86
850	-0.29	-4.87	32.55	1850	3.16	-2.17	60.61	2100	0.91	-3.61	43.57
860	0.14	-4.26	37.53	1860	1.8	-2.59	55.03	2110	0.87	-3.84	41.27
870	0.12	-4.04	39.45	1870	1.76	-2.65	54.27	2120	1.19	-3.91	40.68
880	0.22	-3.74	42.26	1880	2.83	-2.24	59.71	2130	1.01	-4.15	38.45
890	-0.21	-4.01	39.76	1890	2.97	-2.16	60.79	2140	0.81	-4.32	36.97
900	0.1	-3.8	41.66	1900	3.06	-2.19	60.33	2150	0.87	-4.48	35.65
910	0.24	-4.03	39.58	1910	3.13	-1.99	63.26	2160	0.96	-4.61	34.61
920	0.28	-3.94	40.4	1920	3.38	-1.94	63.99	2170	0.67	-4.91	32.29
930	-0.58	-4.31	37.08	1930	3.49	-2.02	62.85				
940	-0.63	-4.5	35.5	1940	3.18	-2.15	60.91				
950	-0.51	-4.45	35.91								
960	-0.64	-4.66	34.2								



Antenna Performance

WIFI-Passive

Freq(MHz)	Gain(dBi)	Effi (dB)	Effi (%)
2400	2.43	-3.24	47.39
2410	1.02	-3.93	40.45
2420	1.29	-3.68	42.87
2430	0.98	-3.73	42.36
2440	0.93	-3.69	42.79
2450	0.92	-3.65	43.15
2460	0.92	-3.7	42.71
2470	0.65	-3.86	41.15
2480	0.07	-4.14	38.58
2490	0.11	-4.1	38.87
2500	-0.13	-4.28	37.29
5150	0.52	-4.5	35.47
5160	0.72	-4.45	35.91
5170	0.99	-4.35	36.69
5180	0.76	-4.44	36.01
5190	0.58	-4.52	35.35
5200	0.82	-4.46	35.78
5210	0.72	-4.57	34.93
5220	0.84	-4.58	34.86
5230	0.81	-4.58	34.82
5240	0.84	-4.58	34.84
5250	0.78	-4.6	34.7
5260	0.77	-4.66	34.24
5270	0.8	-4.68	34.03
5280	0.89	-4.72	33.73
5290	0.9	-4.64	34.34
5300	0.75	-4.63	34.43
5310	0.68	-4.61	34.59
5320	0.72	-4.62	34.48
5330	0.67	-4.63	34.45
5340	0.7	-4.58	34.84
5350	0.55	-4.57	34.89
5360	0.42	-4.59	34.74
5370	0.34	-4.57	34.91
5380	0.26	-4.58	34.84
5390	0.19	-4.61	34.6
5400	0.01	-4.55	35.05
5410	0.18	-4.56	35.02
5420	0.38	-4.52	35.35
5430	0.54	-4.49	35.54
5440	0.69	-4.37	36.59
5450	0.58	-4.47	35.7

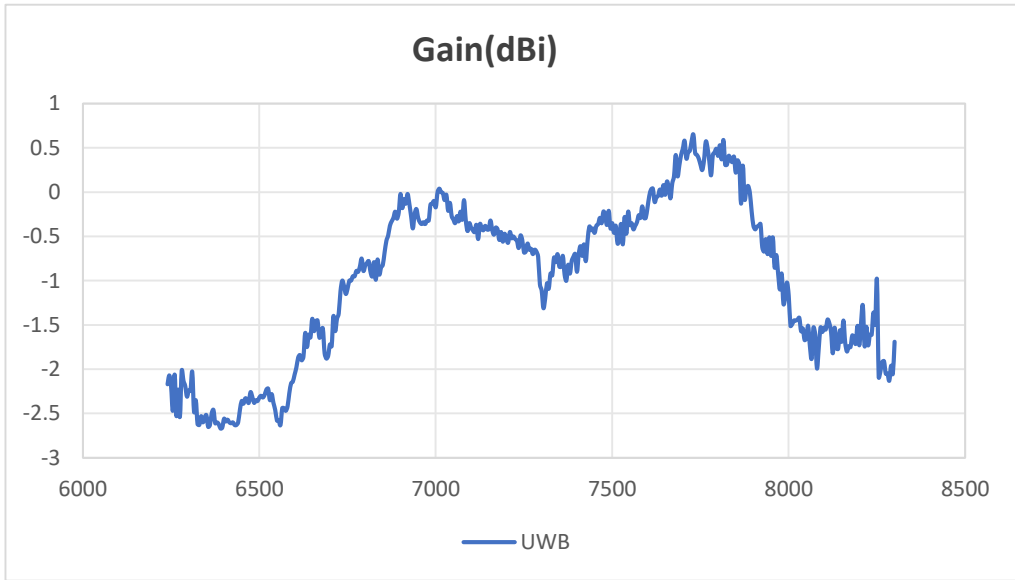
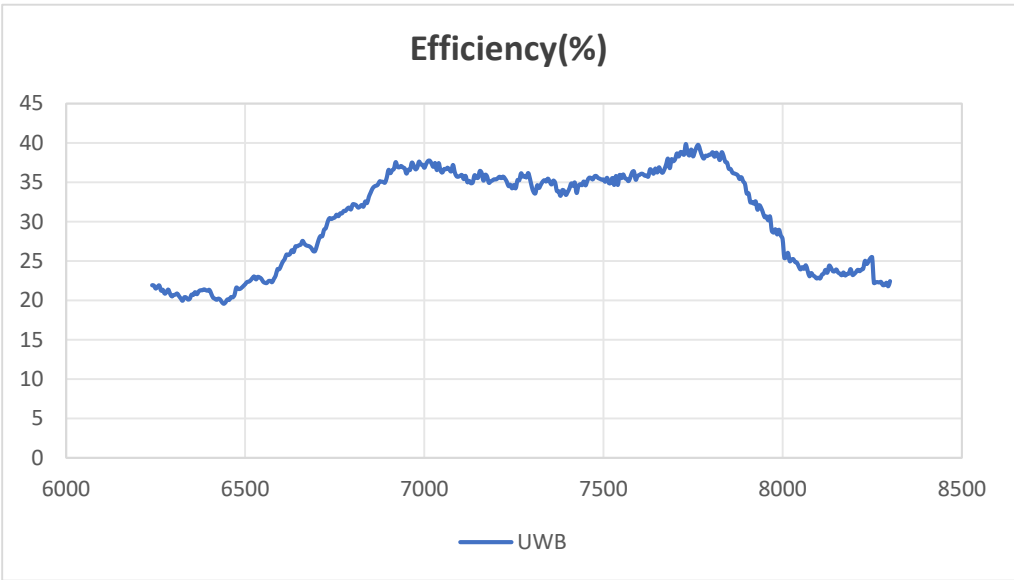
Freq(MHz)	Gain(dBi)	Effi (dB)	Effi (%)
5460	0.56	-4.5	35.49
5470	0.58	-4.57	34.9
5480	0.59	-4.59	34.79
5490	0.53	-4.68	34.01
5500	0.5	-4.69	33.95
5510	0.47	-4.78	33.27
5520	0.29	-4.77	33.36
5530	0.56	-4.71	33.84
5540	0.67	-4.73	33.65
5550	0.9	-4.72	33.73
5560	0.67	-4.8	33.12
5570	0.33	-4.8	33.15
5580	0.61	-4.73	33.66
5590	0.55	-4.65	34.27
5600	0.29	-4.68	34.06
5610	0.12	-4.71	33.8
5620	0	-4.85	32.73
5630	0.18	-4.88	32.52
5640	0.14	-4.71	33.8
5650	0.14	-4.74	33.54
5660	0.3	-4.79	33.16
5670	0.4	-4.76	33.39
5680	0.44	-4.71	33.79
5690	0.34	-4.83	32.91
5700	0.25	-4.94	32.04
5710	0.32	-4.99	31.67
5720	0.29	-5.07	31.14
5730	0.3	-5.16	30.49
5740	0.25	-5.19	30.24
5750	0.16	-5.21	30.16
5760	0.19	-5.12	30.75
5770	0.3	-5.17	30.39
5780	0.24	-5.15	30.52
5790	0.14	-5.22	30.07
5800	0.12	-5.17	30.42
5810	0.07	-5.16	30.51
5820	-0.04	-5.2	30.23
5830	-0.06	-5.19	30.24
5840	-0.02	-5.17	30.42
5850	-0.14	-5.17	30.39





Antenna Performance

UWB-Passive



Antenna Performance

LTE-TRP & TIS

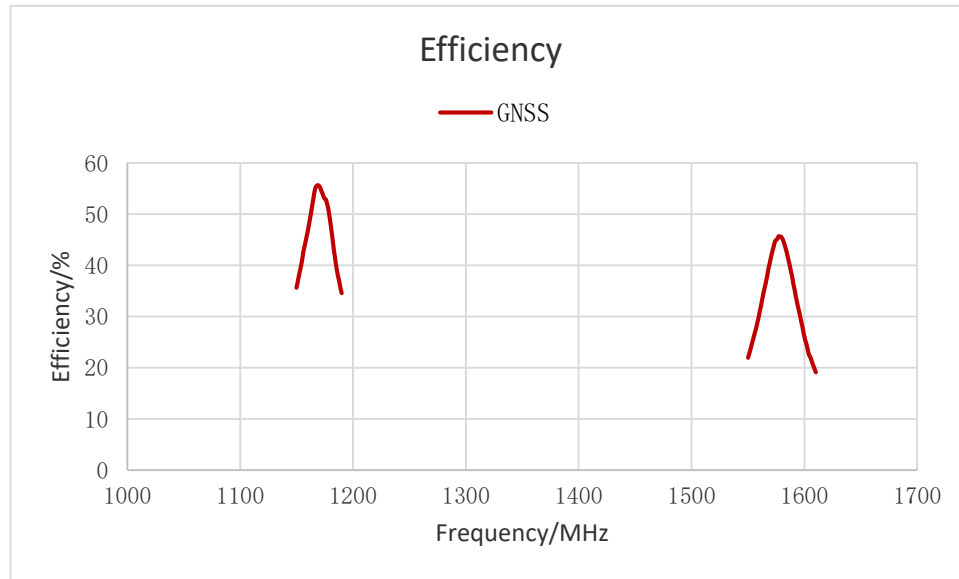
Band	Channel	Frequency	TRP
FDD_B1	18050	1925	19.75
	18300	1950	19.73
	18550	1975	19.78
FDD_B2	18650	1855	19.35
	18900	1880	19.25
	19150	1905	19.56
FDD_B3	19250	1715	19.01
	19575	1747.5	19.46
	19900	1780	19.4
FDD_B4	20000	1715	19.81
	20175	1732.5	19.13
	20350	1750	19.56
FDD_B5	20450	829	18
	20525	836.5	17.44
	20600	844	17.37
FDD_B8	21500	885	17.75
	21625	897.5	17.29
	21750	910	17.4
FDD_B12	23060	704	14.3
	23095	707.5	15.0
	23130	711	16.0
FDD_B13	23230	782	16.5

Band	Channel	Frequency	TRP
FDD_B28	27260	708	14.51
	27435	725.5	16.13
	27610	743	16.26
FDD_B66	132022	1715	19.32
	132322	1745	19.55
	132622	1775	19.21
FDD_B18	23900	820	18.21
	23925	822.5	18.23
	23950	825	17.45
FDD_B19	24050	835	18.36
	24075	837.5	17.71
	24100	840	17.02
FDD_B20	24200	837	17.89
	24300	847	17.39
	24400	857	17.41
FDD_B25	26090	1855	19.10
	26365	1882.5	19.02
	26640	1910	19.31
FDD_B26	26740	819	17.92
	26865	831.5	17.56
	26990	844	17.21
FDD_B27	27090	812	18.22
	27125	815.5	18.13
	27160	819	17.92

Band	Channel	Frequency	TIS-1.4M
FDD_B1	550	2165	-105.61
FDD_B2	1150	1985	-105.12
FDD_B3	1900	1875	-105.42
FDD_B4	2350	2150	-105.77
FDD_B5	2600	889	-102.91
FDD_B8	3750	955	-102.76
FDD_B12	5130	741	-98.6
FDD_B13	5230	751	-99.1
FDD_B28	9610	798	-101.87
FDD_B18	5950	870	-105.11
FDD_B19	6100	885	-103.2
FDD_B20	6400	816	-102.5
FDD_B25	8640	1990	-105.01
FDD_B26	8990	889	-101.98
FDD_B27	9160	864	-105.02
FDD_B66	67086	2175	-104.86

GNSS Antenna Performance-0819

Efficiency

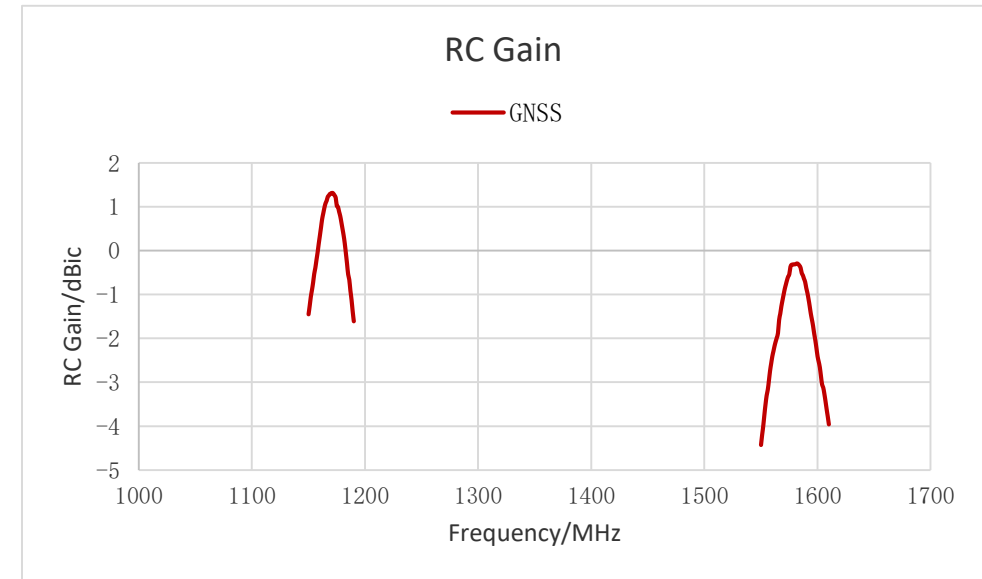


Antenna Efficiency:

1176 MHz: 52.88%

1575 MHz: 44.97%

RC Polarisation Gain



Antenna RC Gain:

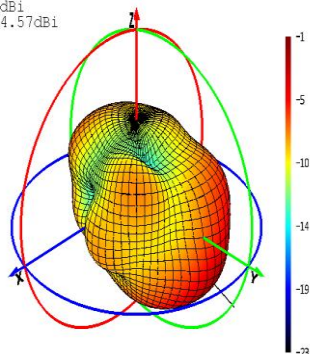
1176 MHz: 1.03 dBic

1575 MHz: -0.54 dBic

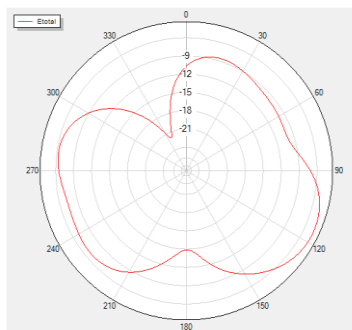
Antenna Performance

LTE-3D

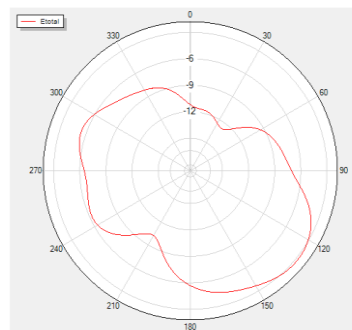
MAX: -2dBi
MIN: -24.57dBi



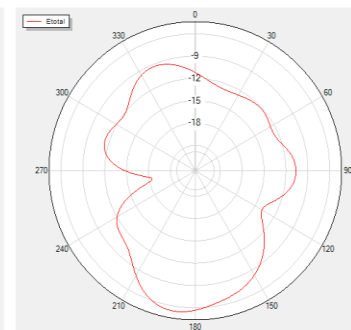
Theta=90 Freq=710MHz



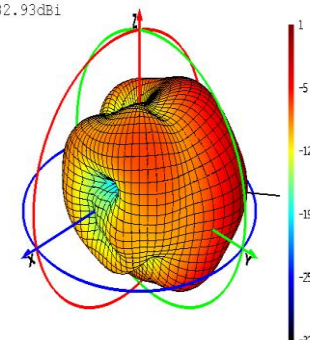
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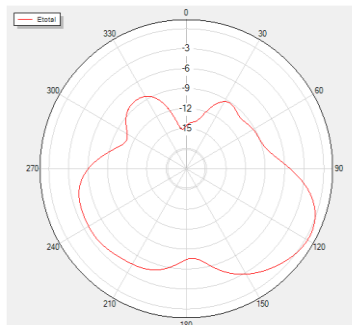
Phi=0 Freq=710MHz



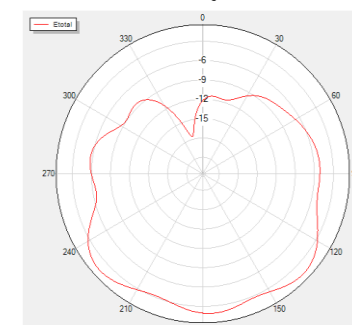
MAX: 0.46dBi
MIN: -32.93dBi



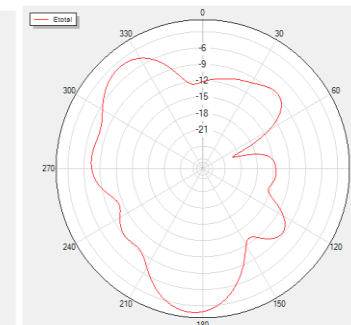
Theta=90 Freq=830MHz



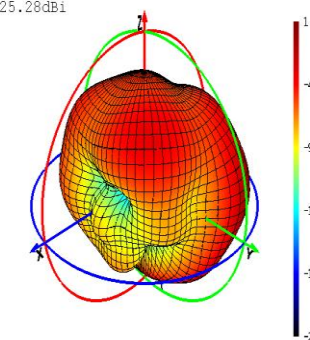
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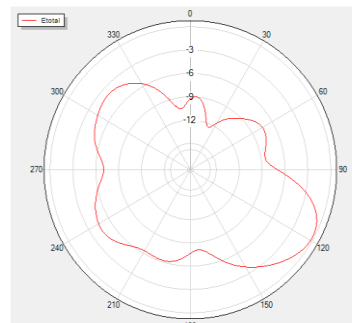
Phi=0 Freq=830MHz



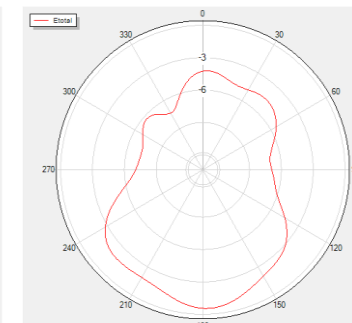
MAX: 0.1dBi
MIN: -25.28dBi



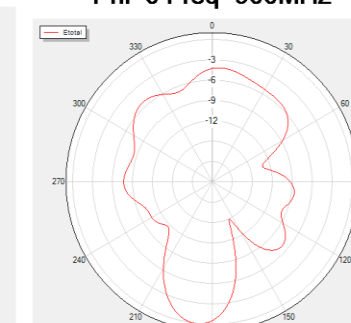
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Phi=90 Freq=900MHz



Phi=0 Freq=900MHz



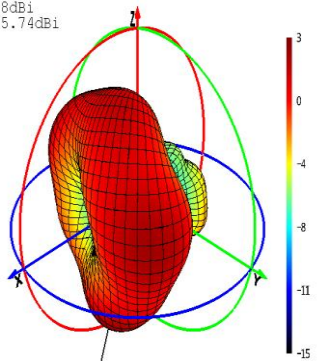
8/25/2025

Private & Confidential

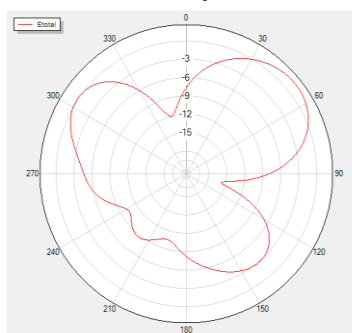
Antenna Performance

LTE-3D

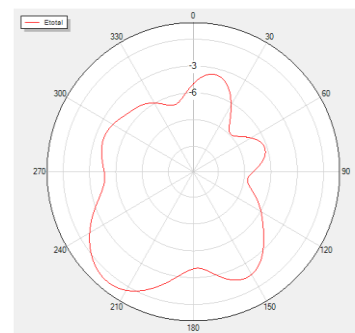
MAX: 2.8dBi
MIN: -15.74dBi



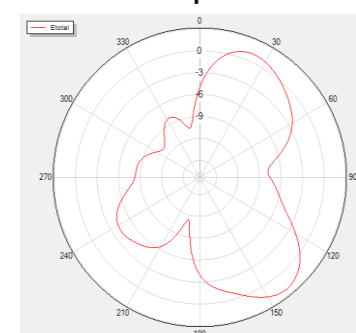
Theta=90 Freq=1740MHz



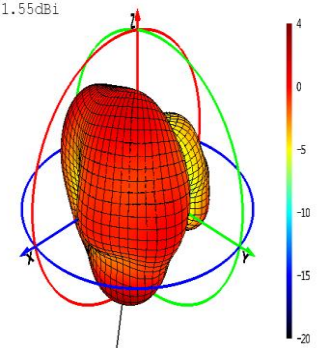
Phi=90 Freq=1740MHz



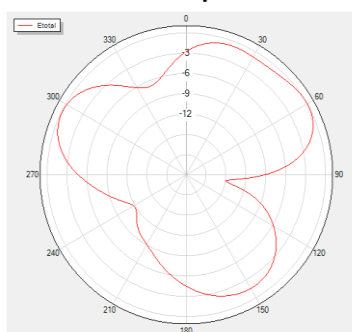
Phi=0 Freq=1740MHz



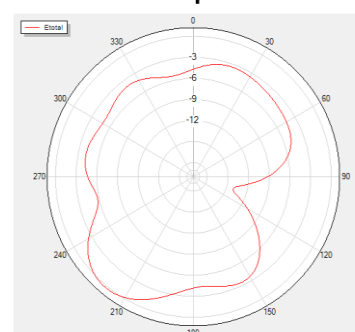
MAX: 3.16dBi
MIN: -21.55dBi



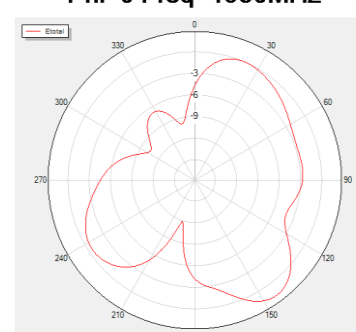
Theta=90 Freq=1950MHz



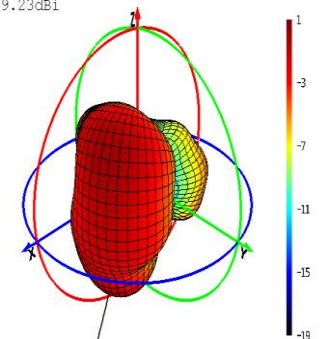
Phi=90 Freq=1950MHz



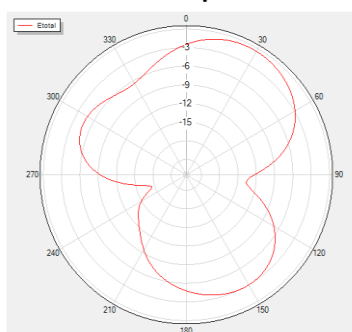
Phi=0 Freq=1950MHz



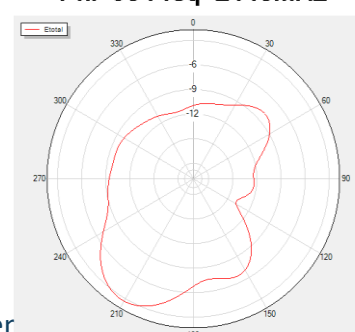
MAX: 0.81dBi
MIN: -19.23dBi



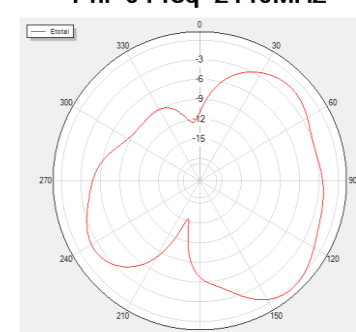
Theta=90 Freq=2140MHz



Phi=90 Freq=2140MHz



Phi=0 Freq=2140MHz

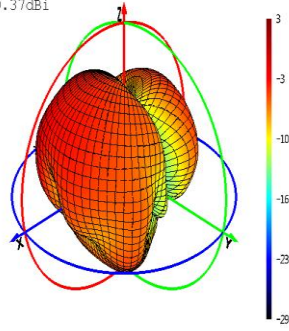


8/25/2025

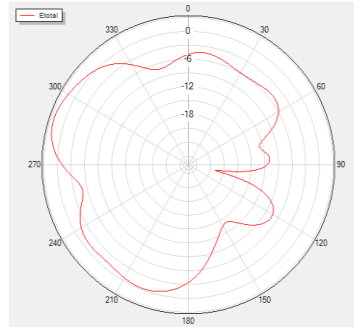
Antenna Performance

WIFI-3D

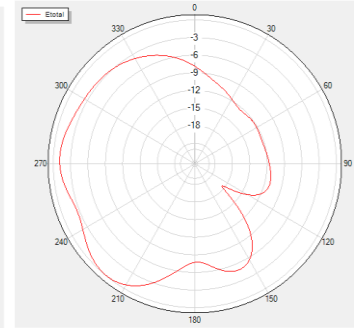
MAX: 2.43dB1
MIN: -30.37dB1



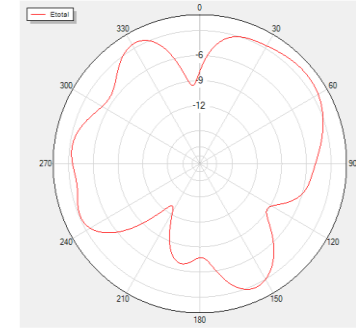
Theta=90 Freq=2400MHz



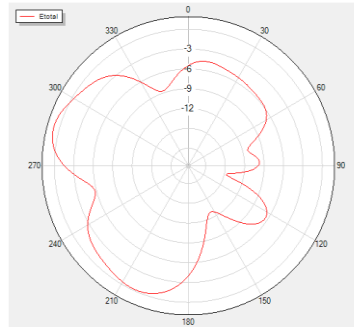
Phi=90 Freq=2400MHz



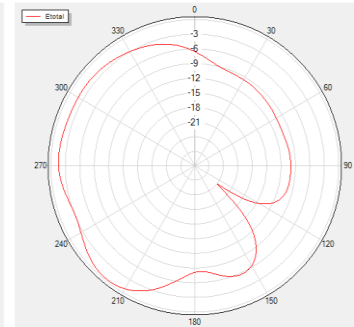
Phi=0 Freq=2400MHz



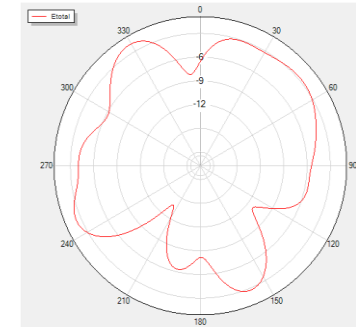
Theta=90 Freq=2450MHz



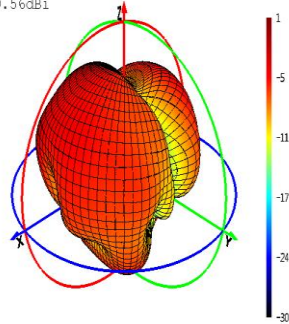
Phi=90 Freq=2450MHz



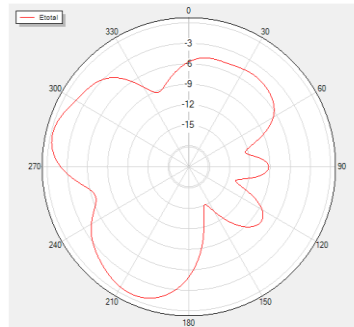
Phi=0 Freq=2450MHz



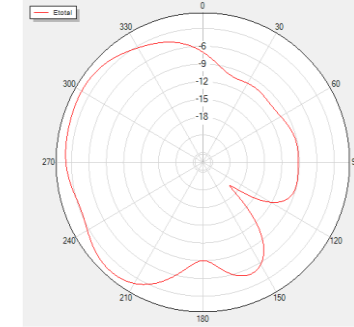
MAX: 0.92dB1
MIN: -30.56dB1



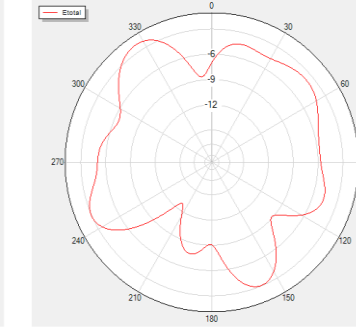
Theta=90 Freq=2500MHz



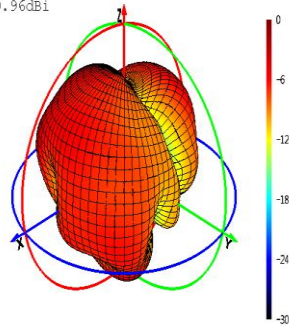
Phi=90 Freq=2500MHz



Phi=0 Freq=2500MHz



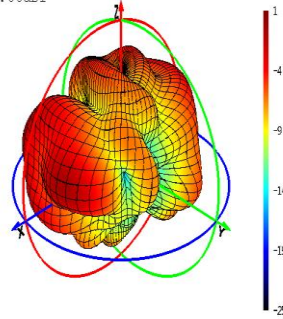
MAX: -0.13dB1
MIN: -30.96dB1



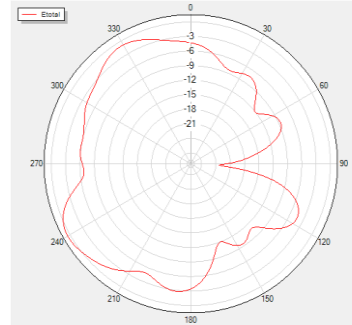
Antenna Performance

WIFI-3D

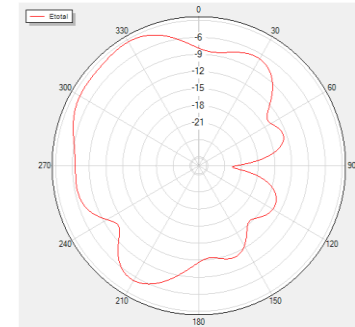
MAX: 0.52dBi
MIN: -25.66dBi



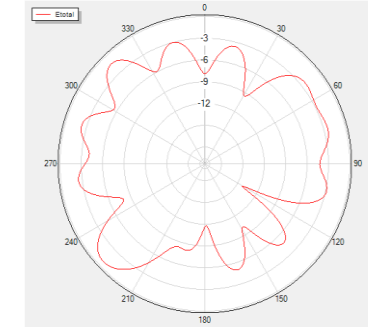
Theta=90 Freq=5150MHz



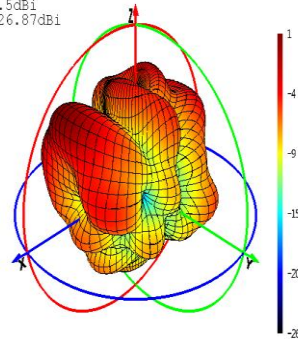
Phi=90 Freq=5150MHz



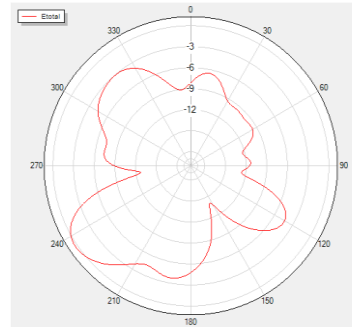
Phi=0 Freq=5150MHz



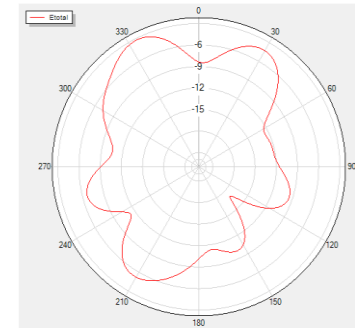
MAX: 0.5dBi
MIN: -26.87dBi



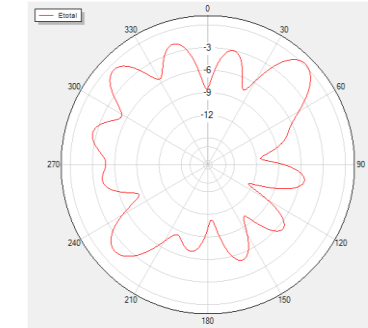
Theta=90 Freq=5500MHz



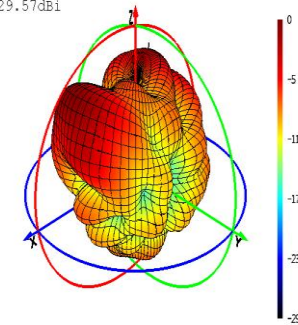
Phi=90 Freq=5500MHz



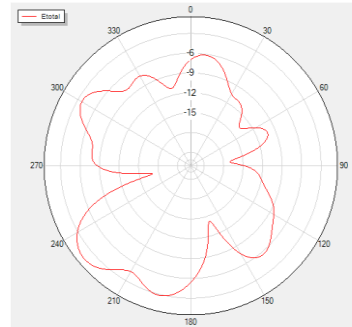
Phi=0 Freq=5500MHz



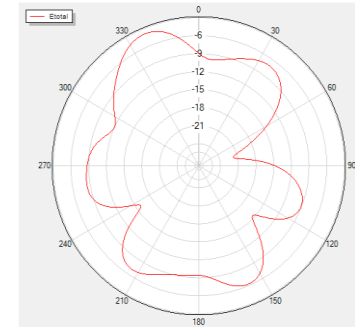
MAX: -0.14dBi
MIN: -29.57dBi



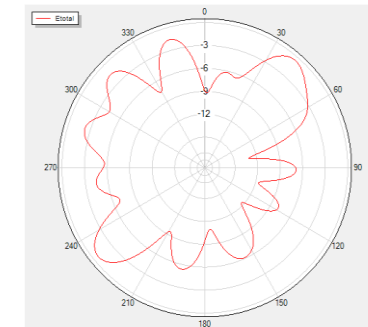
Theta=90 Freq=5850MHz



Phi=90 Freq=5850MHz



Phi=0 Freq=5850MHz



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1. Project Overview

2. Antenna Debugging Performance

3. Conclusions & Suggestions

Conclusion

➤ Antenna Performance

According to the result of testing, the LTE Antenna performance is as follows.

- From the active result:

1. TRP(700-800MHz): 14-16dBm; TRP(800-960MHz): 17-18dBm; TRP(1710-2170Mhz): 19dBm;
2. TIS(all band): <-98dB(1.4M);
3. The test summary of GNSS antennas is shown in the following table.

GNSS Antenna				
Date	05/13		08/19	
Frequency(MHz)	1176	1575	1176	1575
Efficiency(%)	59.2	45.65	52.88	44.97
RC Gain(dBic)	1.14	-0.78	1.03	-0.54



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Thank You