



Material admission letter

APPROVAL SHEET

project name:	GL601CAU				
Material number code:	QK1027200393				
Name of supplier:	Shenzhen sunnyway Technology Co., LTD				
name of material:	SZ23623IB68				
Material description:	GL601CAU antenna assembly_LTE/GPS/BT/71.5*35.81*12.49mm				
Date of sample delivery:	July 1st, 2024				
Environmental certification:	ROHS ☒ Reach ☐ POPs ☐ Other certifications:				
main performance ☐	blueprint ☐	Measurement report ☐	Key material ☐	reliability report ☐	Packaging information ☐
examine and verify	Research and development department	project department	purchase department	quality department	

Shenzhen sunnyway Technology Co., LTD

Antenna Specification

Customer name: Transfer		Project name: GL601CAU
Working frequency band: CEU LTE:B1/3/7/8/20/28A/(MG LTE:2/4/5/12/13/66)GPS/BT		
Hardware version:GL601EU_V1.03_20240426		
Specifications		
Antenna Type	Part number	Customer part number
antenna assembly	SZ23623IB68	QK1027200393

Revision history			
Date	Changes	Change person	version
July 1st, 2024	New Release	Xu Wei	A

Sunnyway Signature				
R&D	ME:	Checked by:	SQE:	Approve:
	RF:	Checked by:		

Customer Signature			
Electronics engineer	Project manager	Mechanical engineer	Quality engineer

Tel: +86-021-64842326 ; +86-0755-82504258

Fax: +86-021 - 64842328

Shanghai R&D Center: 1st Floor, Building 4, No. 99, Lane 215, Gaoguang Road, Qingpu District, Shanghai

Shenzhen R&D Center: Floor 6, Building 5, Nam Tai Inno Park, Guangming District, Shenzhen, 518132, PRC.

Chongqing R&D Center: 1F ARM Ecological Industry Park, No.19 Xiantao Data Valley East Road, Yubei District,

Chongqing Huizhou factory address: 4th to 6th floors, Buld. 8, Xiongtao Technology City, No. 15 Qingli Second Road, Shuikou Street, Huicheng District, Huizhou City

Contents

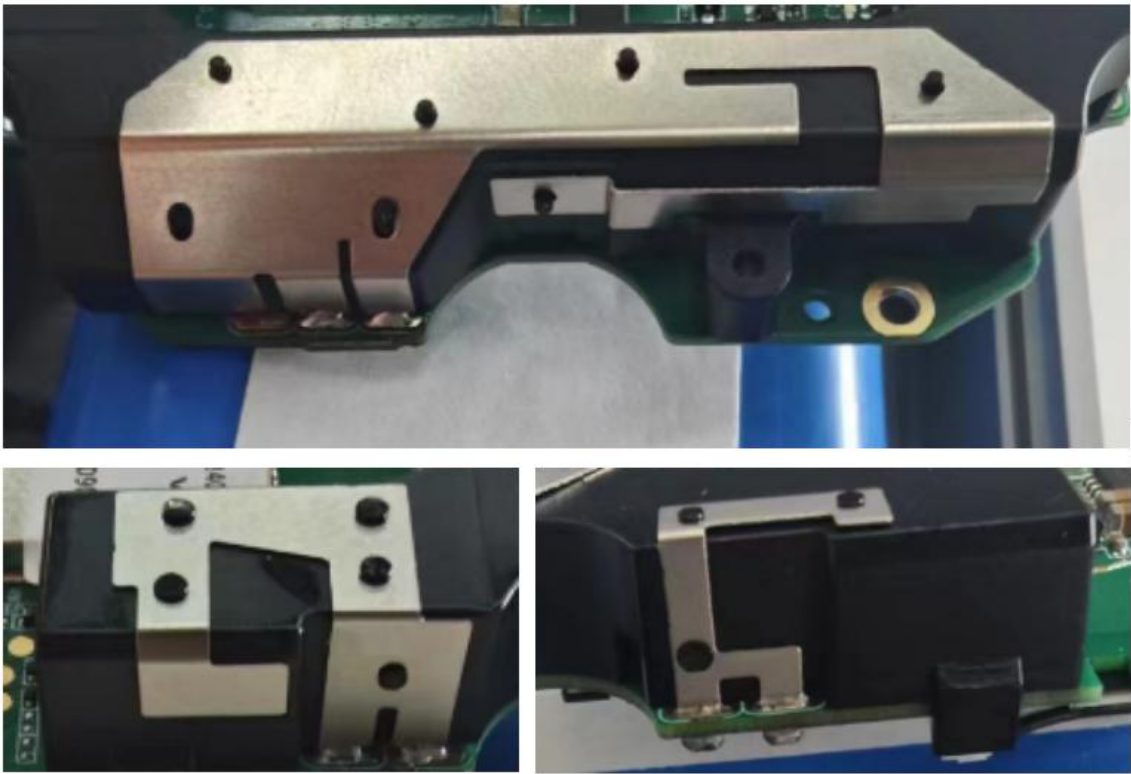
Antenna Specification	2
一、 Project Picture	4
二、 Electrical performance.....	5
三、 Mechanical performance.....	5
四、 Antenna matching circuit	6
五、 Complete machine test data	7
5.1 S11 Description of the test method.....	7
5.2 Test environment.....	8
5.3 S11test parameters.....	8
5.5 Active test data of the main antenna	15
六、 Prototype environment processing method	17
七、 Mass production antenna indicators	18
八、 Structural drawings	19

一、 Project Picture

1.1 Prototype Diagram



1.2 Antenna product diagram



二、 Electrical performance

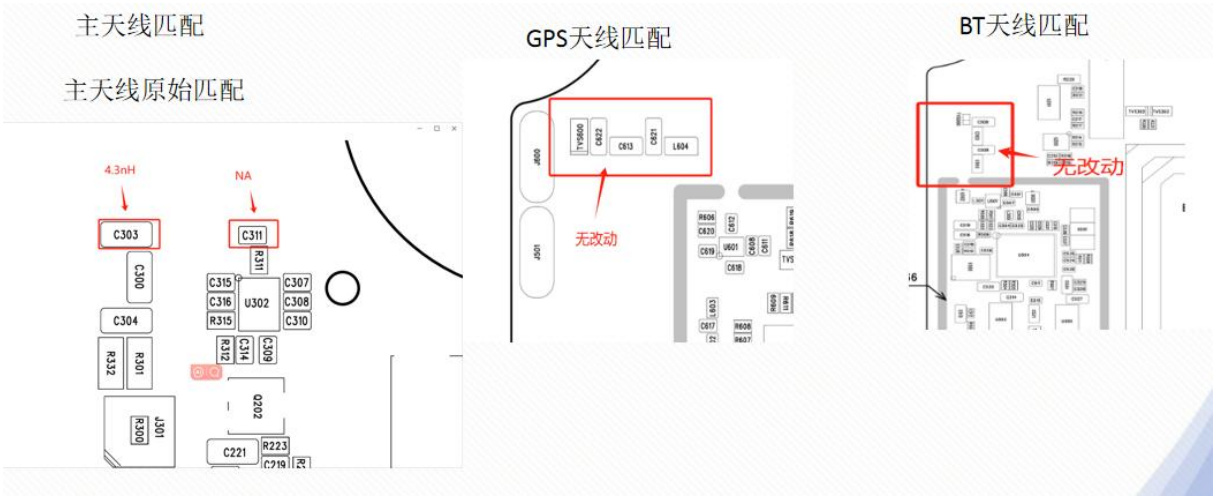
Antenna type	Steel sheet
frequency range (MHz)	700-960MHz; 1710MHz-2690MHz 2400MHZ-2500MHZ 1575. 42MHz
VSWR	≤5 (Within the device)
Polarization mode	Linear polarization
Radiation field type	omnidirectional
Output impedance (Ω)	50
Maximum input power (W)	25

三、 Mechanical performance

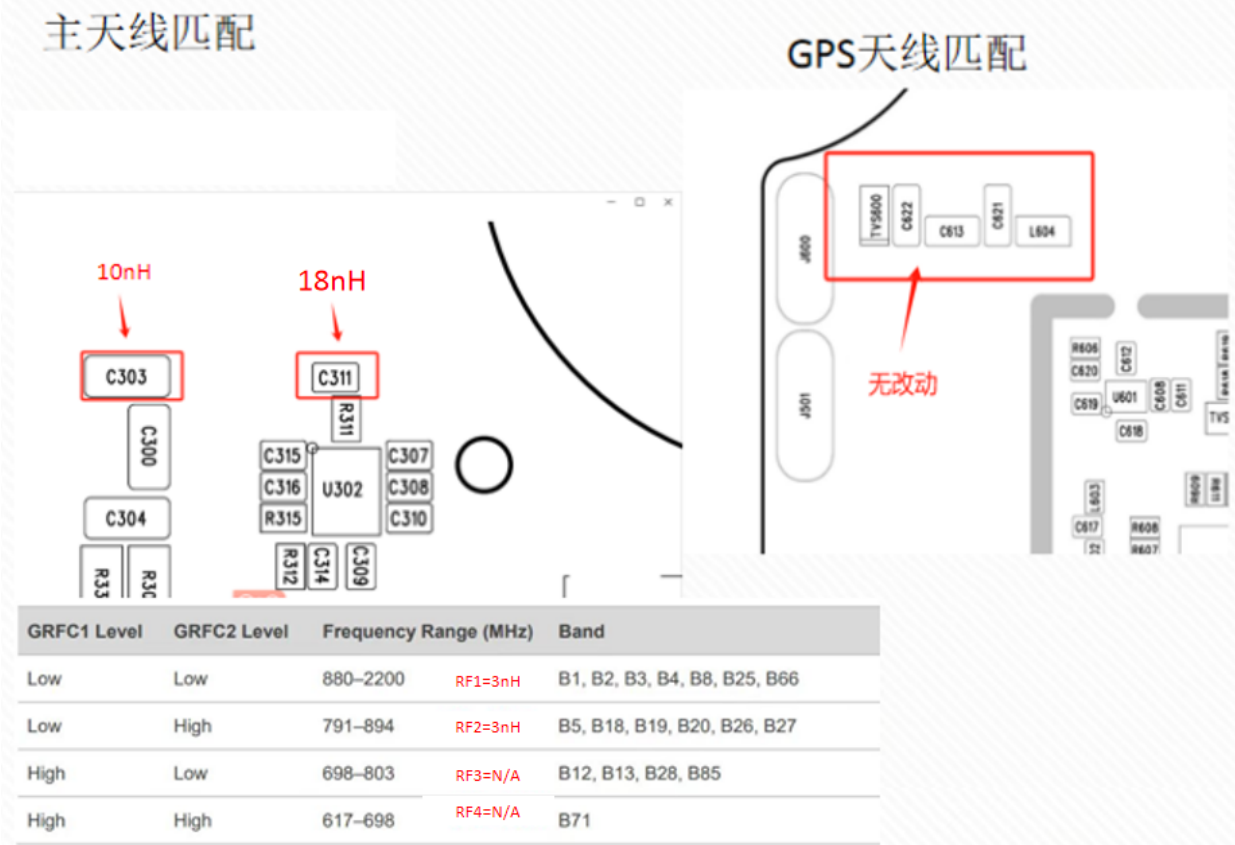
Installation method	The bracket antenna component is installed on the PCB
---------------------	---

Connection method	welding
Antenna size (mm)	71.5*35.5*12.3mm
material quality	Steel sheet
working temperature (°C)	- 40 °C ~ + 85 °C
Storage temperature (°C)	- 40 °C ~ + 85 °C

四、 Antenna matching circuit



MG:



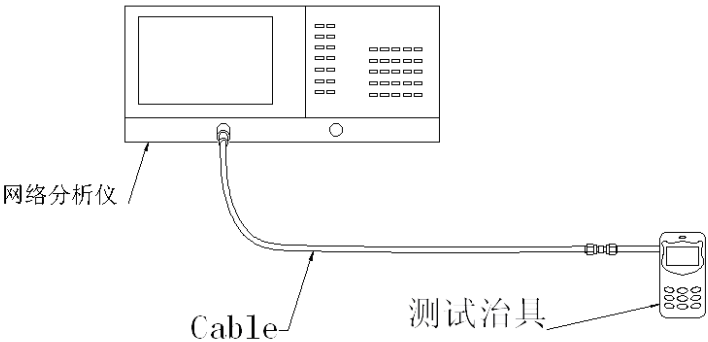
五、 Complete machine test data

5.1 S11 Description of the test method

Test Equipment: Network Analyzer (Agilent E5071C)

Test method: Export a 50 Ohm CABLE cable from the instrument test port, connect the SMA connector of the test device after the calibrator, and record the echo loss and standing wave ratio corresponding to the relevant frequency point.

The test schematic diagram is as follows:



Schematic diagram of the test

5.2 Test environment

Test System: MPS 6450 Multi-probe OTA Measurement System (XH-IoT)

Test environment: temperature $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$, humidity $50\% \pm 15\%$

Test equipment: Use the network analyzer R & S ZND / Agilent E5071C when testing the passive data

When testing active data, use the comprehensive meter Agilent 8960 / CMW500 / S P9500E / SP 8315

OTA实验室



综测仪器



SP9500-CTS-5G



CMW500



SP8315 NB-IoT
/eMTC

其他设备



OTA head hand



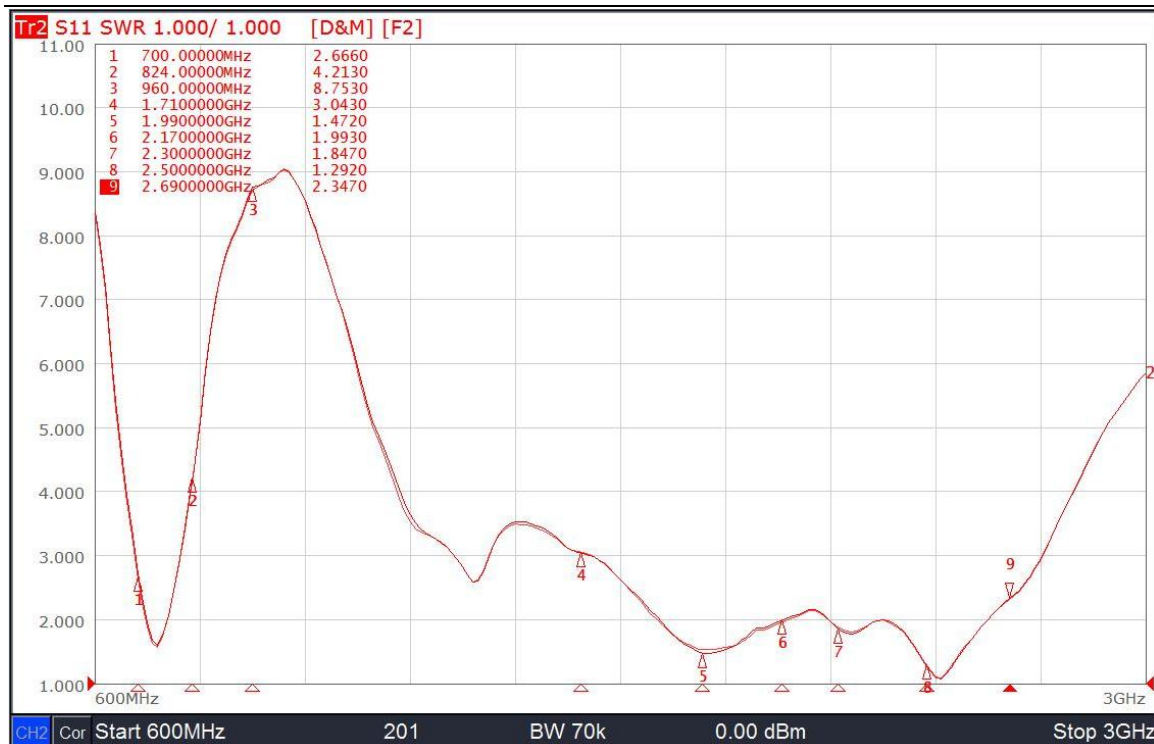
OTA ear hand



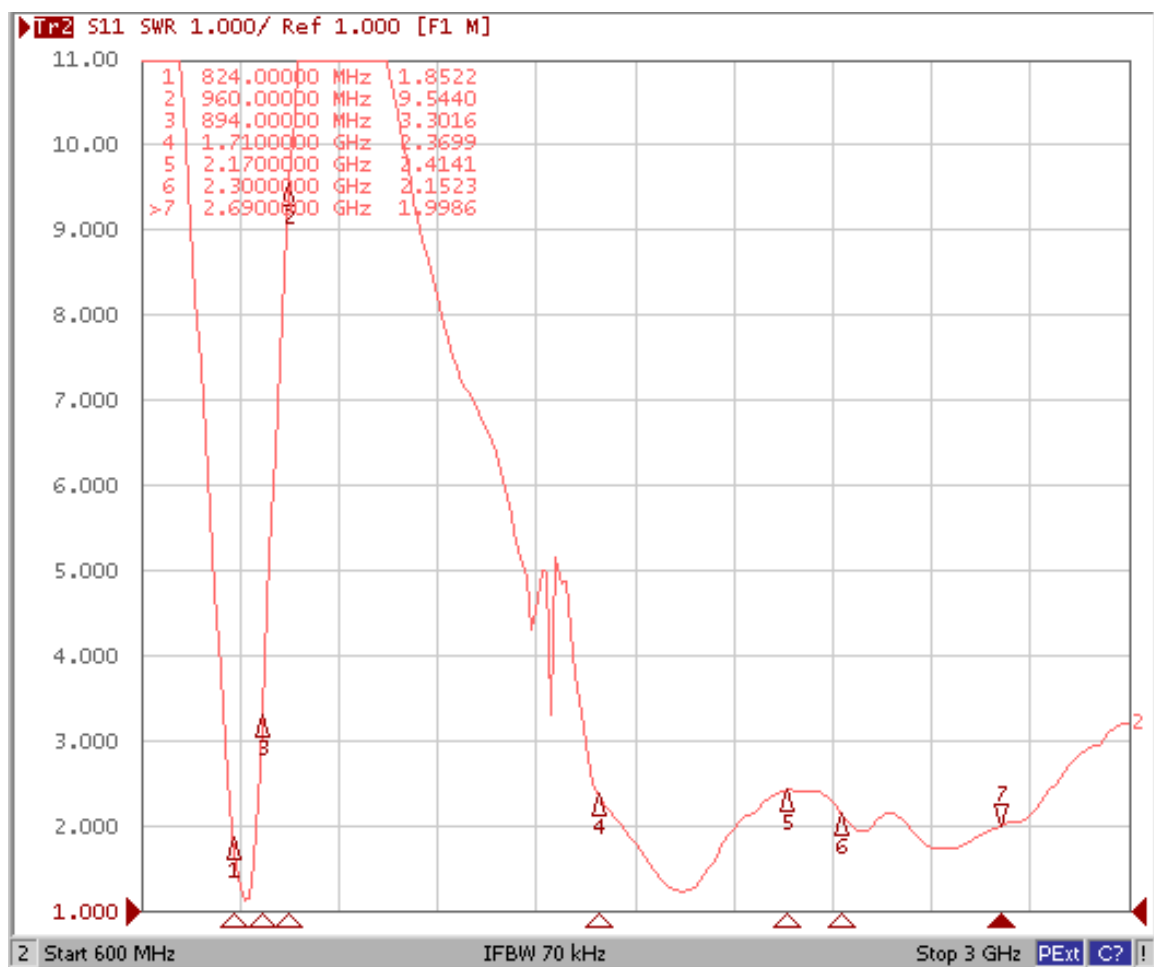
OTA arm hand

5.3 S11test parameters

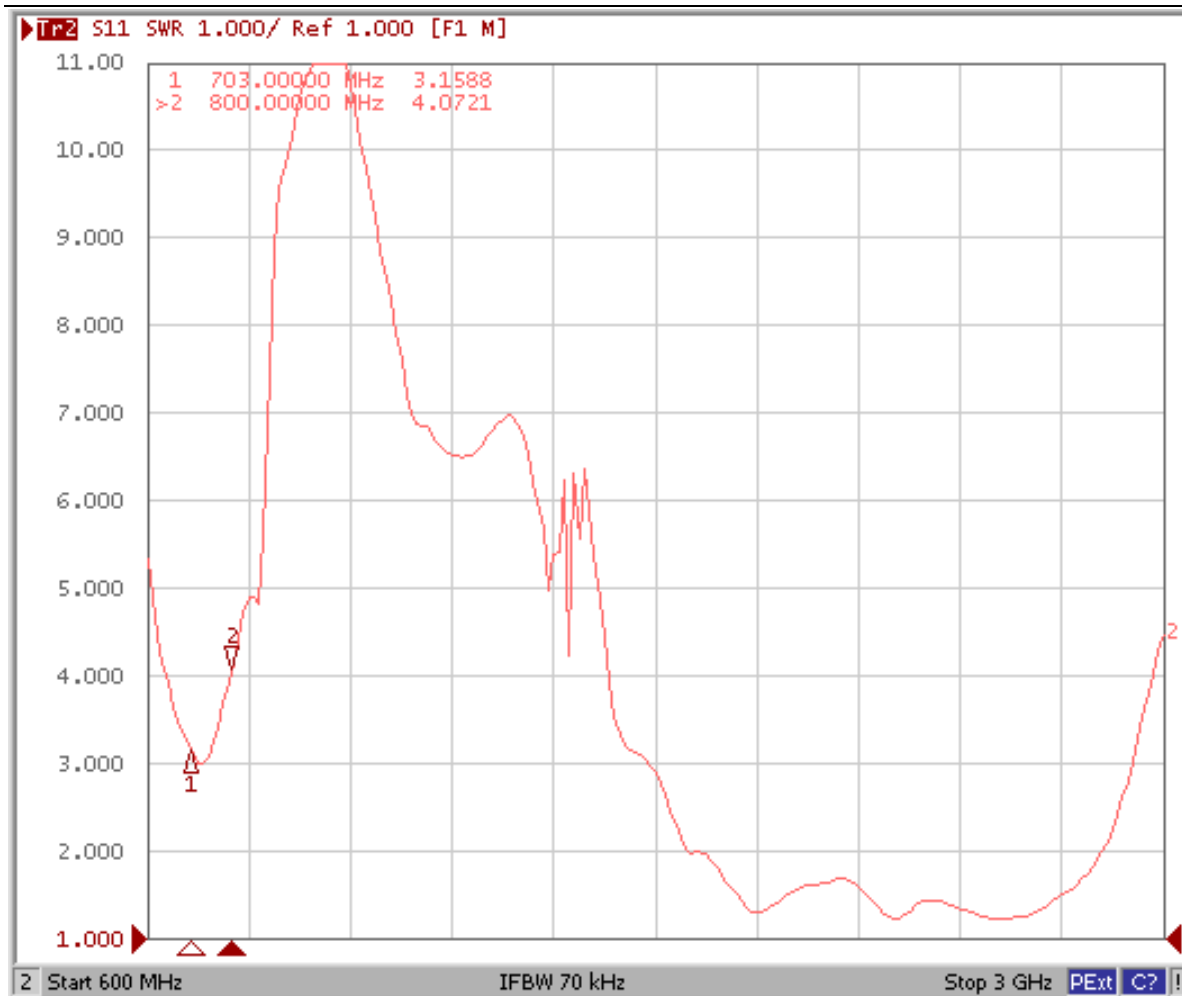
Main antenna CEU:



Main antenna MG:(RF1/2)



Main antenna MG:(RF3/4)



GPS antenna



BT antenna



Main antenna CAU

Frequency/MHz	MaxGain/dBi	Efficiency/%	Frequency/MHz	MaxGain/dBi	Efficiency/%	Frequency/MHz	MaxGain/dBi	Efficiency/%
700	-0.55	26.28	1700	-2.63	20.42	2300	-1.07	33.17
710	-1.08	26.18	1720	-2.3	22.08	2320	-0.51	32.8
720	-1.47	27.18	1740	-1.34	24.04	2340	-0.47	30.32
730	-2.22	27.91	1760	-1.1	25.29	2360	-0.16	30.8
740	-1.93	30.7	1780	-0.99	26.42	2380	-0.34	29.1
750	-1.58	32.1	1800	-0.57	28.44	2400	-0.34	28.79
760	-1.49	33.44	1820	-0.25	29.31	2420	-0.59	27.66
770	-1.59	33.64	1840	0.1	31.7	2440	-0.12	29.05
780	-1.83	31.55	1860	0.49	35.08	2460	-0.07	28.62
790	-1.54	31.24	1880	0.17	34.28	2480	0.52	30.23
800	-3.55	27.8	1900	-0.01	34.59	2500	0.45	29.1
810	-3.79	25.42	1920	0.07	36.14	2520	0.86	29.36
820	-4.86	21.14	1940	-0.01	36.9	2540	0.94	28.49
830	-5.24	19.45	1960	0.27	38.55	2560	1.39	29.32
840	-6.12	14.11	1980	0.21	37.76	2580	1.04	28.32
850	-7.25	12.18	2000	-0.31	35.97	2600	0.64	28.37
860	-8.78	7.03	2020	-0.68	33.34	2620	-0.38	27.02
870	-8.66	6.5	2040	-0.3	32.96	2640	-0.2	27.46
880	-9.24	6.19	2060	-0.65	30.48	2660	-0.48	25.81
890	-9.75	5.51	2080	-0.56	31.33	2680	-0.13	26.07
900	-9.96	5.21	2100	-1.15	28.71	2700	-0.43	24.39
910	-10.39	4.6	2120	-0.52	28.58			
920	-10.71	4.32	2140	-0.17	27.86			
930	-10.79	4.06	2160	0.29	28.25			
940	-10.63	3.98	2180	0.62	27.8			
950	-10.61	3.79	2200	0.5	27.48			
960	-10.9	3.58						

Main antenna MG:(RF1/2)

Frequency/MHz	Efficiency/%	MaxGain/dBi	Frequency/MHz	Efficiency/%	MaxGain/dBi	Frequency/MHz	Efficiency/%	MaxGain/dBi
800	33.42	-2.03	1940	50.95	0.09	2470	35.56	-0.23
810	36.39	-1.43	1950	52.95	0.12	2480	38.73	0.12
820	40.55	-0.67	1960	52.37	0.51	2490	40.09	0.07
830	44.57	-0.01	1970	52.66	0.35	2500	41.3	0.49
840	48.53	0.38	1980	52.09	0.7	2510	41.69	0.46
850	49.66	1	1990	49.43	0.11	2520	44.77	0.34
860	49.77	1.46	2000	46.75	0.23	2530	44.16	0.02
870	45.5	1.33	2010	45.85	-0.42	2540	44.98	0.43
880	37.67	0.47	2020	43.7	-0.11	2550	45.6	0.31
890	25.47	-2.27	2030	42.72	-0.24	2560	46.77	0.58
900	18.11	-5.69	2040	40.93	-0.33	2570	45.29	0.16
910	14.83	-5.95	2050	40.23	-0.25	2580	46.34	0.54
920	13.24	-6.47	2060	38.08	-0.54	2590	46.13	0.6
930	11.69	-6.94	2070	38.64	-0.44	2600	45.6	0.83
940	10.67	-7.35	2080	36.34	-0.37	2610	45.19	0.74
950	10	-7.67	2090	36.45	-0.31	2620	43.85	0.95
960	9.08	-8.26	2100	34.87	-0.37	2630	44.57	0.76
1700	39.46	-0.5	2110	35.08	-0.36	2640	43.95	0.95
1710	39.07	-0.54	2120	33.55	0.15	2650	43.75	0.73
1720	42.39	-0.02	2130	33.55	0.84	2660	42.56	1.03
1730	43.03	0.07	2140	31.69	0.66	2670	43.55	0.8
1740	44.97	0.09	2150	31.11	0.11	2680	42.07	0.84
1750	45.47	0.07	2160	30.55	0.43	2690	41.4	0.48
1760	45.93	0.02	2170	29.9	0.44			
1770	43.09	0	2300	34.12	-0.23			
1780	45.59	0.37	2310	33.04	-0.15			
1790	46.1	0.58	2320	32.21	-0.35			
1800	45.59	0.79	2330	31.05	-0.82			
1810	47.28	0.92	2340	31.05	-1.01			
1820	46.62	1.07	2350	29.72	-1.45			
1830	48.61	1.2	2360	29.17	-1.57			
1840	51.09	1.25	2370	28.64	-1.68			
1850	52.66	1.12	2380	27.93	-1.63			
1860	51.52	0.83	2390	26.18	-1.53			
1870	51.24	0.55	2400	26.55	-1.26			
1880	51.38	0.25	2410	26	-1.2			
1890	49.98	-0.07	2420	26.61	-1.25			
1900	49.7	-0.34	2430	27.23	-0.81			
1910	49.98	-0.47	2440	29.72	-0.82			
1920	50.26	-0.17	2450	31.19	-0.38			
1930	49.29	-0.47	2460	34.28	-0.21			

Main antenna MG:(RF3/4)

Frequency/Mhz	Efficiency/%	MaxGain/dBi
700	32.66	28.66
710	27.07	23.07
720	22.51	19.21
730	23.88	20.58
740	29.45	25.45
750	31.02	27.02
760	33.15	29.15
770	31.21	27.21
780	28.02	24.02
790	27.41	23.41
800	25.32	-1.37

GPS antenna

Frequency/Mhz	MaxGain/dBi	Efficiency / %
1570	2.09	45.15
1571	2.15	44.95
1572	2.17	44.85
1573	2.18	44.95
1574	2.18	45.15
1575	2.17	45.65
1576	2.15	45.35
1577	2.15	45.15
1578	2.13	45.05
1579	2.1	44.76
1580	2.07	44.56

BT antenna

Frequency/Mhz	MaxGain/dBi	Efficiency / %
2400	1.33	33.04
2410	1.13	32.51
2420	1.07	31.77
2430	1.32	33.34
2440	1.48	34.36
2450	1.91	35.24
2460	2	35.08
2470	2.38	36.22
2480	2.72	37.84
2490	2.9	37.58
2500	2.89	36.39

CEU:

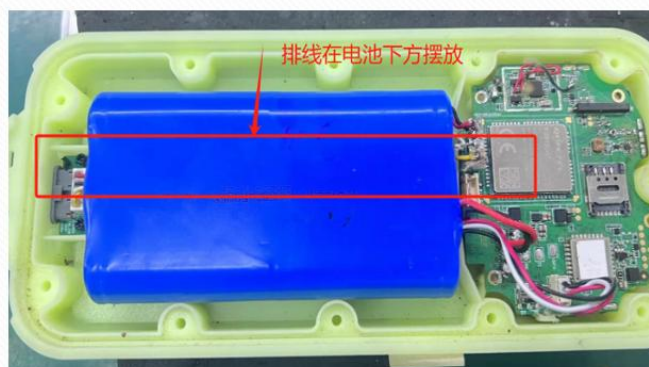
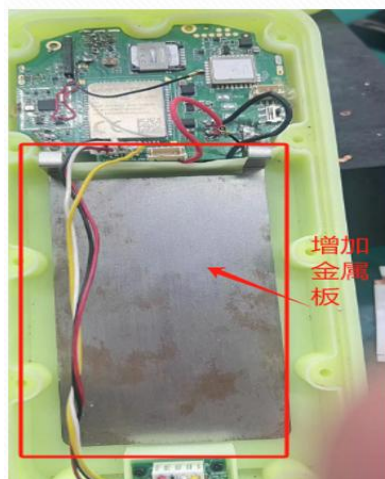
Measurement	Band	Channel	Total
TRP	FDD_B1(10MHz)	18050	20.74219418
TRP	FDD_B1(10MHz)	18300	21.36770085
TRP	FDD_B1(10MHz)	18550	21.22768515
TIS(RSSI)	FDD_B1(10MHz)	550	-92.38541296
TRP	FDD_B3(10MHz)	19250	18.34430558
TRP	FDD_B3(10MHz)	19575	18.84066688
TRP	FDD_B3(10MHz)	19900	19.38060347
TIS(RSSI)	FDD_B3(10MHz)	1900	-93.97648549
TRP	FDD_B7(10MHz)	20800	17.01588838
TRP	FDD_B7(10MHz)	21100	18.14860769
TRP	FDD_B7(10MHz)	21400	17.86103965
TIS(RSSI)	FDD_B7(10MHz)	3400	-87.68569587
TRP	FDD_B8(10MHz)	21500	19.13425226
TRP	FDD_B8(10MHz)	21625	18.57707132
TRP	FDD_B8(10MHz)	21750	18.77459442
TIS(RSSI)	FDD_B8(10MHz)	3750	-88.92934129
TRP	FDD_B20(10MHz)	24200	18.43327861
TRP	FDD_B20(10MHz)	24300	18.13636168
TRP	FDD_B20(10MHz)	24400	18.07887765
TIS(RSSI)	FDD_B20(10MHz)	6400	-89.59890297
TRP	FDD_B28(10MHz)	27260	13.91551063
TRP	FDD_B28(10MHz)	27360	14.56287477
TRP	FDD_B28(10MHz)	27460	14.84080309
TIS(RSSI)	FDD_B28(10MHz)	9460	-89.80655096

MG:

Measurement	Band	Channel	Total
TRP	BAND2	18650	19.71844
TRP	BAND2	18900	20.11121
TRP	BAND2	19150	20.29329
TIS(EIRP)	BAND2	1150	-105.171
TRP	BAND4	20000	19.53441
TRP	BAND4	20175	19.77799
TRP	BAND4	20350	20.3894
TIS(EIRP)	BAND4	2350	-104.401
TRP	BAND5	20450	17.27432
TRP	BAND5	20525	17.59386
TRP	BAND5	20600	17.68782
TIS(EIRP)	BAND5	2600	-103.015
TRP	BAND12	23060	17.37357
TRP	BAND12	23095	17.15499
TRP	BAND12	23130	16.74938
TIS(EIRP)	BAND12	5130	-97.0955
TRP	BAND13	23230	17.87799
TIS(EIRP)	BAND13	5230	-95.9904
TRP	BAND66	132022	20.15323
TRP	BAND66	132322	20.4896
TRP	BAND66	132622	20.90643
TIS(EIRP)	BAND66	67086	-102.966

六、 Prototype environment processing method

CEU:



MG:



Add conductive cloth to the marked red box area (size: 27mm long and 9mm wide)

七、 Mass production antenna indicators

When producing antennas, the standing wave ratio is used as the production testing standard. Based on the differences in the project itself, the following standards are provided:

frequency (MHz)	Mass production standards
700MHz-960MHz	VSWR (Mass production performance) <VSWR(Recognize performance) ± 0.5
1710MHz-2690MHz	VSWR (Mass production performance) <VSWR(Recognize performance) ± 0.5
1575.42MHz	VSWR (Mass production performance) <VSWR(Recognize performance) ± 0.5
2400MHz-2500MHz	VSWR (Mass production performance) <VSWR(Recognize performance) ± 0.5

八、Structural drawings

