SPECIFICATION

Daxian Communication Technology Limited

Shenzhen Daxian Technology Co., Ltd .

Unimax L13 Main antenna

Product specification book

client	Unimax	frequency range	WCDMA B2/4/5 LTE B2/4/5/7/12/13/25/26/38/41(2496-2690)/42/66/71
project name	L13	edition	V01
Material number	1L-13XXX-109	pigment	black
RF design	Peng.Hu	architectural design	YeZhi.Bi
QA Manager	ZiYin.Hu	Technical Director	Lei.Zhang
date	2022-11-29		

Customer confirmation:

Does the assembly meet your requirements: ☐ OK ☐ NG

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Change the resume

version number	Change the content	Change reason	Initiate the change party	date	modifier
V1.0	found			2022.11.29	

index of matrix

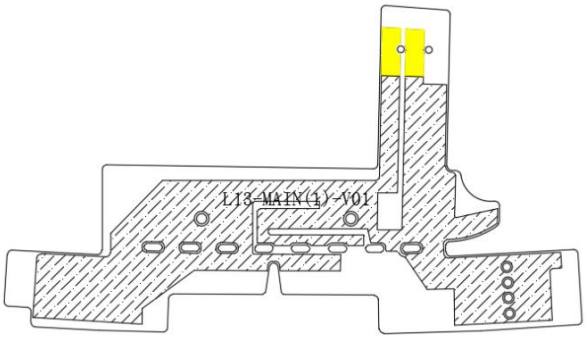
Ⅰ project description

Customer Name:	Unimax
Complete machine type:	MIFI
Antenna band:	WCDMA B2/4/5 LTE B2/4/5/7/12/13/25/26/38/41(2496-2690)/42/66/71
Antenna form:	FPC
Feeding form:	welding
Number of feeders:	/
Hardware version:	/

Ⅱ Main antenna

1 Specifications

This report mainly provides the router antenna L13 Test status of various electrical and structural performance parameters. The following picture shows the antenna picture of the display design.



Appearance diagram of the whole machine and the antenna appearance diagram

1.1 Electrical specifications and standards

1.1.1 Electric performance index

Antenna operating frequency band is in: WCDMA:824MHz~891MHz,1710MHz~2155MHz,1852MHz~1987MHz;LTE:1850MHz~1990MHz,1710MHz~2155MHz,824MHz~894MHz,777MHz~756MHz,1710MHz~2200MHz,2500MHz~2690MHz,699MHz~746MHz,1850MHz~1995MHz,814MHz~894MHz,2570MHz~2620MHz,2496MHz~2690MHz,3400MHz~3600MHz,663MHz~652MHz。The following table is the index of the electrical performance of the explicit design and mass production antenna.

WCDMA -band B 2				
band	**band (MHz)** **The transmit TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
W -B 2	1852~1907	≤4	1932~1987	≤4
WCDMA -band B 4				
band	**band (MHz)** **The transmit TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
W -B 4	1710~1755	≤4	2110~2155	≤4
WCDMA-band B 5				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
W -B 5	824~846	≤4	871~891	≤4
LTE -band B 2				
band	**band (MHz)** **The transmit TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 2	1850~1910	≤4	1930~1990	≤4
LTE -band B 4				
band	**band (MHz)** **The transmit TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 4	1710~1755	≤4	2110~2155	≤4
LTE -band B 5				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 5	824~849	≤4	869~894	≤4

LTE -band B 7				
band	**band (MHz)** **The transmit TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 7	2500~2570	≤4	2620~2690	≤4
LTE -band B 12				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 12	699~716	≤4	729~746	≤4
LTE -band B 25				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 25	1850~1915	≤4	1930~1995	≤4
LTE -band B 26				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 26	814~849	≤4	859~894	≤4
LTE -band B 38				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 38	2570~2620	≤4	2570~2620	≤4
LTE -band B 41				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 41	2496~2690	≤4	2496~2690	≤4
LTE -band B 42				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 42	3400~3600	≤4	3400~3600	≤4
LTE -band B 41				
band	**band (MHz)** **The transmitter TX**	**VSWR**	**band (MHz)** **The receiving end RX**	**VSWR**
LTE -B 71	663~698	≤4	617~652	≤4

1.2 Antenna composition

The antenna is mainly composed of FPC .

2、 The Equipment of Active Test

Satimo 3D Chamber 6×4×4(m)

Ag ilent 8960 E 5515c

Network analyzer-R&S ZVL

graph 2

3 Test

3.1 Standing Wave (VSWR) test

3.1.1 3. Test connection: The sequential connection of the VSWR test device is: R & S ZVL network analyzer test line test and treatment

Measured (attached)

3.2 Gain and efficiency, power (TRP), sensitivity (TIS) testing

3.2.1 Test Site:

Large display microwave dark chamber. The test frequency range was 400MH z- -6GHz, the static area range was 50cm circumference, and the reflectivity was less than-50 dB.

3.2.2 Test instrument:

R & S ZVL Network Analyzer, Agilent8960 E5515C, Standard Speaker Antenna, French SATIMO-SG24SYSTEM System, Printer, etc.

3.2.3 Test data: In the microwave dark room, the test power and sensitivity-related values are shown in the following table:

OTA active test data:

BAND	CH	TRP	TIS
FDD-B2	18600	20.95	
	18900	20.08	
	19200	19.37	-98.28
FDD-B4	20050	19.15	
	20175	20.78	
	20350	20.9	-94.87
FDD-B5	20450	21.18	
	20525	20.85	
	20600	20.61	-92.91
FDD-B13	23230	19.99	
	23230	19.55	
	23230	19.31	-92.8
TDD-B66	66486	19.04	
	66786	20.24	
	67086	21.13	-95.36

OTA Passive Efficiency & Gain-Main antenna-WCDMA

W-B2

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1820	40.39	-3.94	2.83
1830	39.54	-4.03	2.83
1840	38.12	-4.19	2.71
1850	36.9	-4.33	2.74
1860	38.32	-4.17	3
1870	39.19	-4.07	3.22
1880	36.92	-4.33	3.05
1890	35.98	-4.44	2.97
1900	37.47	-4.26	3.11
1910	39.14	-4.07	3.17
1920	38.52	-4.14	3.05
1930	36.45	-4.38	2.7
1940	38.75	-4.12	3
1950	40.05	-3.97	3.01
1960	38.67	-4.13	2.73
1970	38.11	-4.19	2.42
1980	38.93	-4.1	2.27
1990	40.11	-3.97	2.17
2000	39.24	-4.06	1.77

W-B5

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
820	63.71	-1.96	0.1
830	65.45	-1.84	0.3
840	61.21	-2.13	0.05
850	58.95	-2.3	-0.09
860	53.51	-2.72	-0.55
870	47.83	-3.2	-1.21
880	40.93	-3.88	-2.16
890	36.9	-4.33	-2.11
900	33.47	-4.75	-1.68

W-B4

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1700	46.69	-3.31	2.19
1710	44.51	-3.52	2.21
1720	41.01	-3.87	2.4
1730	40.51	-3.92	2.58
1740	40.98	-3.87	3.04
1750	39.37	-4.05	3.03
1760	38.31	-4.17	3.03
1770	39.15	-4.07	3.12
1780	41.81	-3.79	3.25
1790	40.67	-3.91	3.12
1800	40.17	-3.96	2.96
1810	39.7	-4.01	2.95
1820	40.39	-3.94	2.83
1830	39.54	-4.03	2.83
1840	38.12	-4.19	2.71
1850	36.9	-4.33	2.74
1860	38.32	-4.17	3
1870	39.19	-4.07	3.22
1880	36.92	-4.33	3.05
1890	35.98	-4.44	2.97
1900	37.47	-4.26	3.11
1910	39.14	-4.07	3.17
1920	38.52	-4.14	3.05
1930	36.45	-4.38	2.7
1940	38.75	-4.12	3
1950	40.05	-3.97	3.01
1960	38.67	-4.13	2.73
1970	38.11	-4.19	2.42
1980	38.93	-4.1	2.27
1990	40.11	-3.97	2.17
2000	39.24	-4.06	1.77
2010	37.47	-4.26	1.08
2020	38.88	-4.1	0.64
2030	41.15	-3.86	0.56
2040	43.3	-3.63	0.53
2050	44.95	-3.47	0.67
2060	45.86	-3.39	0.67
2070	46.13	-3.36	0.88
2080	45.85	-3.39	0.93
2090	43.96	-3.57	0.89
2100	42.59	-3.71	0.77
2110	41.41	-3.83	0.56
2120	41.16	-3.85	0.49
2130	40.65	-3.91	0.3
2140	38.65	-4.13	0.17
2150	38.92	-4.1	0.2
2160	39.1	-4.08	0.29
2170	37.74	-4.23	0.4
2180	38.42	-4.15	0.55

OTA Passive Efficiency & Gain-Main antenna-LTE

B2,B4,B5,B7,B25,B26,B38,B41

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
820	49.71	-3.04	-0.7
830	45.71	-3.4	-0.35
840	45.41	-3.43	-0.34
850	44.86	-3.48	-1.04
860	43.21	-3.64	-1.85
870	41.29	-3.84	-1.8
880	36.9	-4.33	-2.11
890	33.47	-4.75	-1.68

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2500	53.2	-2.74	1.77
2510	52.74	-2.78	1.68
2520	52.5	-2.8	1.49
2530	50.66	-2.95	1.3
2540	49.4	-3.06	1.23
2550	49.45	-3.06	1.24
2560	50.26	-2.99	1.3
2570	51.02	-2.92	1.44
2580	53.41	-2.72	1.59
2590	55.83	-2.53	1.79
2600	56.08	-2.51	1.85
2610	59.21	-2.28	2.02
2620	59.87	-2.23	2.19
2630	59.45	-2.26	2.18
2640	57.63	-2.39	2.27
2650	57.95	-2.37	2.27
2660	57.08	-2.44	2.38
2670	52.92	-2.76	2.33
2680	53.64	-2.71	2.41
2690	55.56	-2.55	2.67
2700	56.4	-2.49	2.74

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1700	46.69	-3.31	2.19
1710	44.51	-3.52	2.21
1720	41.01	-3.87	2.4
1730	40.51	-3.92	2.58
1740	40.98	-3.87	3.04
1750	39.37	-4.05	3.03
1760	38.31	-4.17	3.03
1770	39.15	-4.07	3.12
1780	41.81	-3.79	3.25
1790	40.67	-3.91	3.12
1800	40.17	-3.96	2.96
1810	39.7	-4.01	2.95
1820	40.39	-3.94	2.83
1830	39.54	-4.03	2.83
1840	38.12	-4.19	2.71
1850	36.9	-4.33	2.74
1860	38.32	-4.17	3
1870	39.19	-4.07	3.22
1880	36.92	-4.33	3.05
1890	35.98	-4.44	2.97
1900	37.47	-4.26	3.11
1910	39.14	-4.07	3.17
1920	38.52	-4.14	3.05
1930	36.45	-4.38	2.7
1940	38.75	-4.12	3
1950	40.05	-3.97	3.01
1960	38.67	-4.13	2.73
1970	38.11	-4.19	2.42
1980	38.93	-4.1	2.27
1990	40.11	-3.97	2.17
2100	42.59	-3.71	0.77
2110	41.41	-3.83	0.56
2120	41.16	-3.85	0.49
2130	40.65	-3.91	0.3
2140	38.65	-4.13	0.17
2150	38.92	-4.1	0.2
2160	39.1	-4.08	0.29
2170	37.74	-4.23	0.4
2180	38.42	-4.15	0.55
2190	40.15	-3.96	0.77
2200	42.84	-3.68	1.17

OTA Passive Efficiency & Gain-Main antenna-LTE

B12

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
690	19.3	-7.14	-4.89
700	20.34	-6.92	-4.84
710	22.74	-6.43	-4.59
720	26.03	-5.84	-3.76
730	28.15	-5.5	-3.48
740	29.07	-5.37	-3.49
750	30.26	-5.19	-3.45

B13

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
740	34.3	-4.65	-2.98
750	35.74	-4.47	-2.87
760	35.68	-4.48	-3.18
770	39.95	-3.99	-2.48
780	41.74	-3.79	-2.34
790	44.49	-3.52	-1.65

B26

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
810	58.28	-2.34	-0.27
820	63.71	-1.96	0.1
830	65.45	-1.84	0.3
840	61.21	-2.13	0.05
850	58.95	-2.3	-0.09
860	53.51	-2.72	-0.55
870	47.83	-3.2	-1.21
880	40.93	-3.88	-2.16
890	36.9	-4.33	-2.11
900	33.47	-4.75	-1.68

B71

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
620	10.25	-9.89	-7.86
630	10.28	-9.88	-7.81
640	11.3	-9.47	-5.62
650	14.81	-8.29	-4.98
660	16.84	-7.74	-4.59
670	17.89	-7.47	-4.7
680	21.09	-6.76	-4.27
690	24.23	-6.16	-4.04
700	26.18	-5.82	-3.69

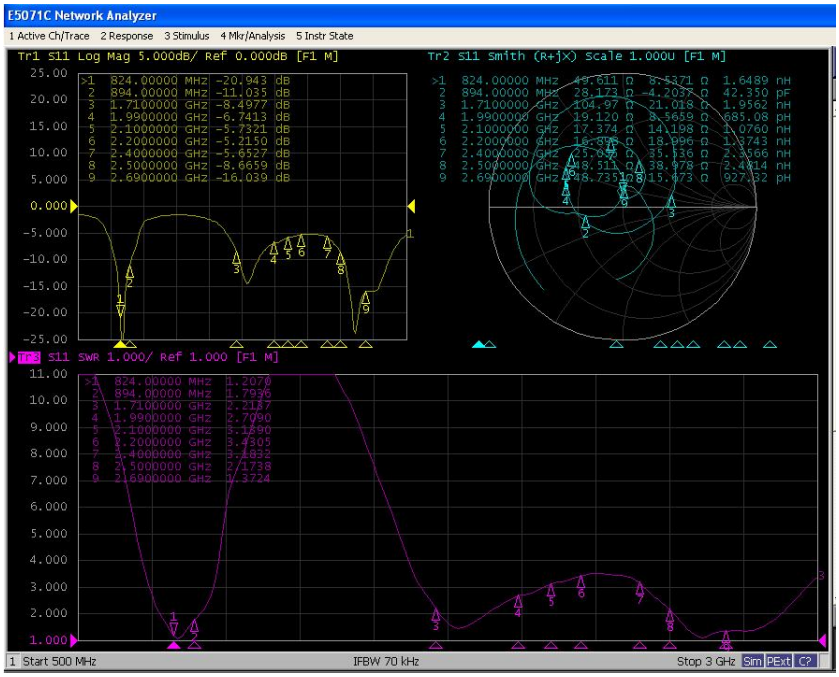
4. Conclusion:

This antenna is designed on the basis of customer-provided prototype. Electrical parameters and structural performance have met the technical requirements. Please confirm!

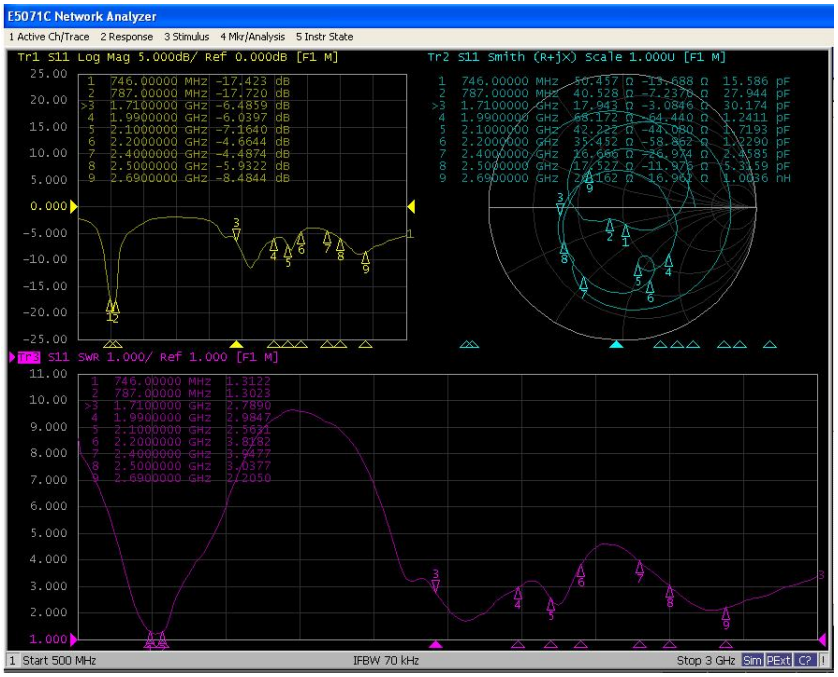
5. Attachment chart

5.1 Parameters of Return Loss and VSWR and impedance diagram- -main antenna

RF1:B5/Medium high frequency

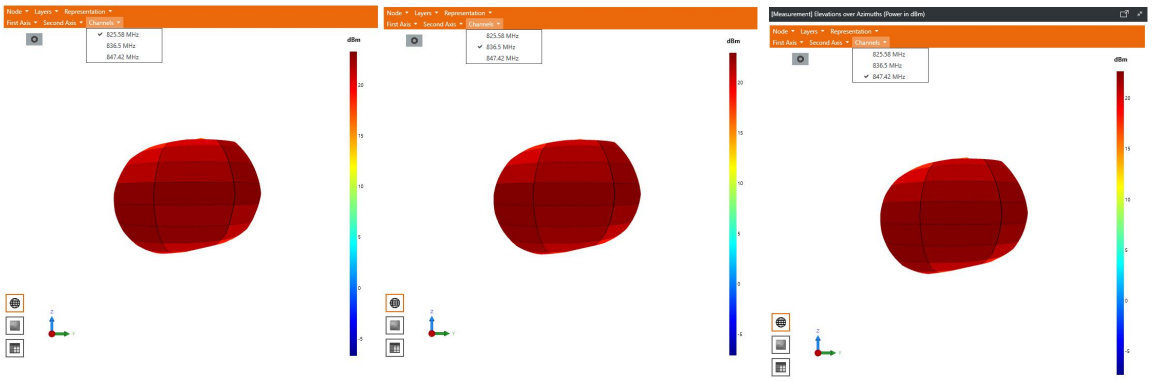


RF2:B13

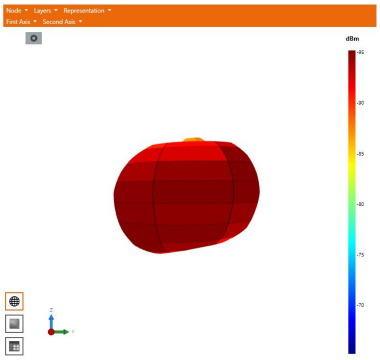


6. Field pattern diagram

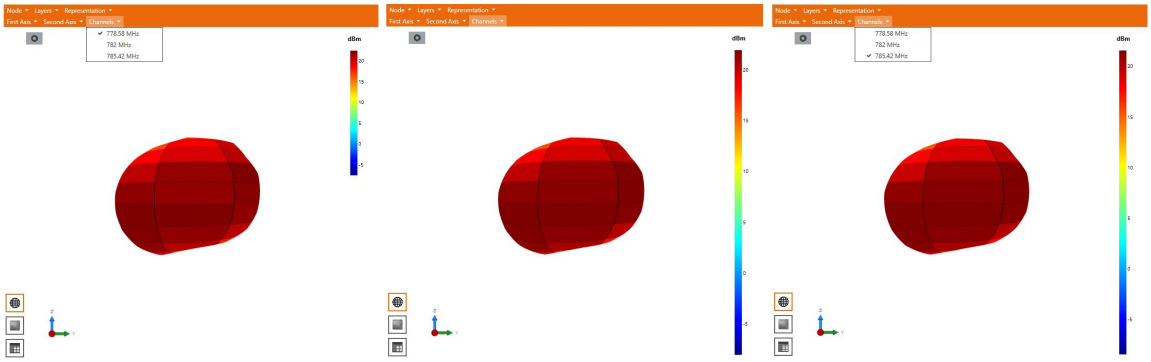
B5-TRP



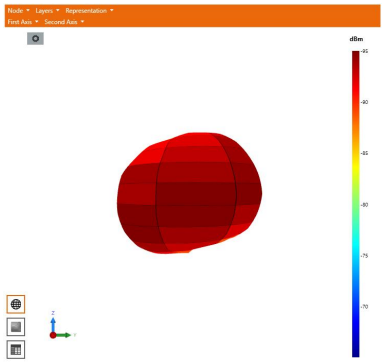
B5-TIS



B13-TRP

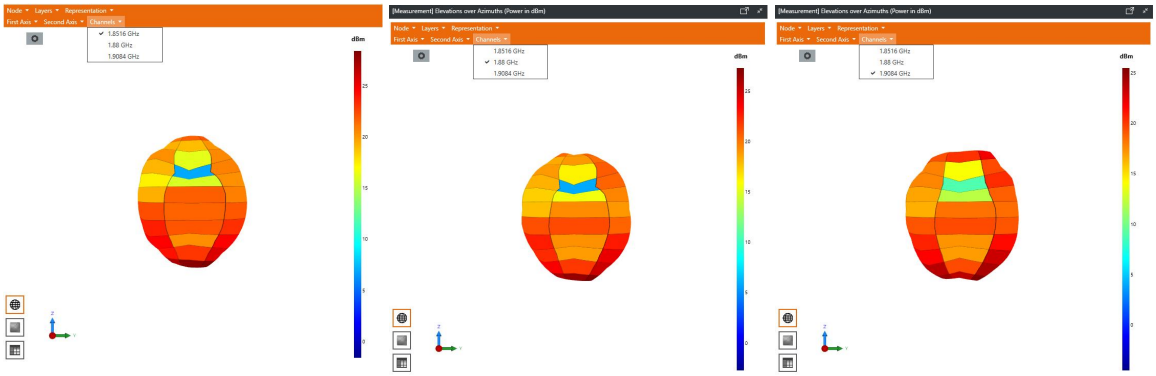


B13-TIS

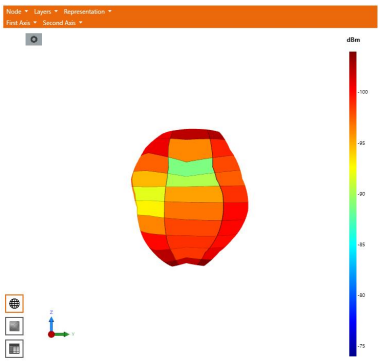


6.1 Field pattern diagram

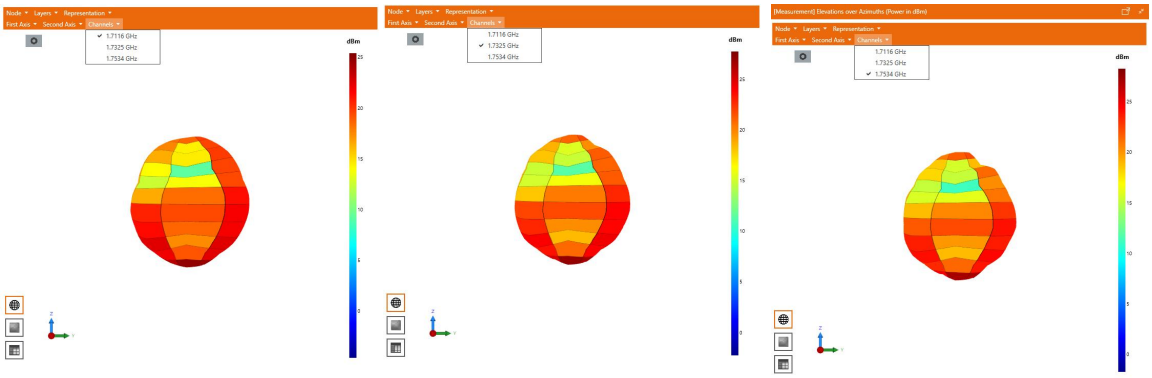
B2-TRP



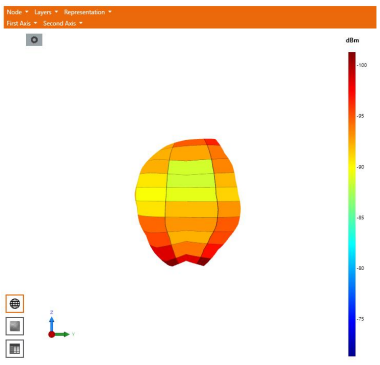
B2-TIS



B4-TRP

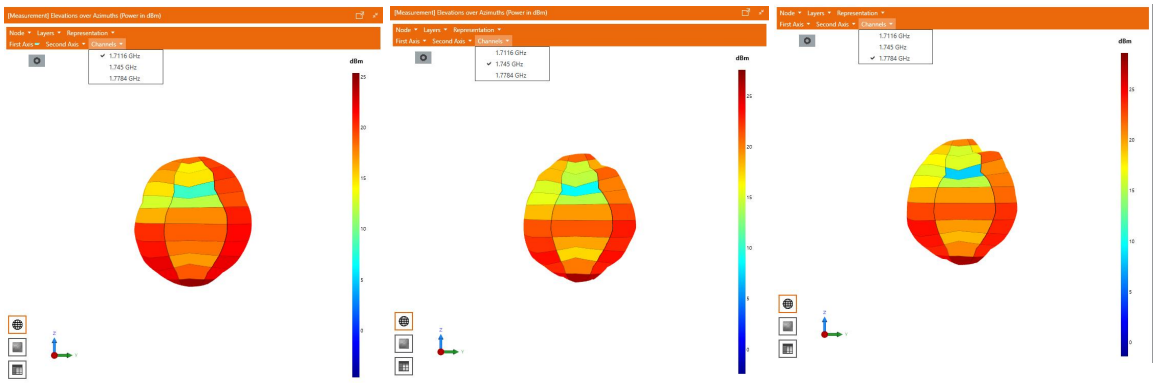


B4-TIS

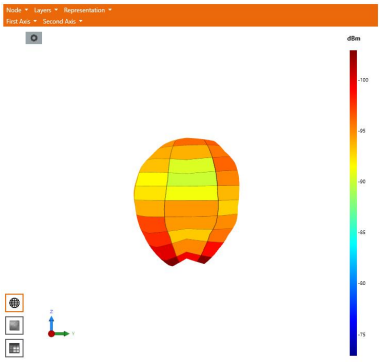


6.1.1 Field pattern diagram

B66-TRP

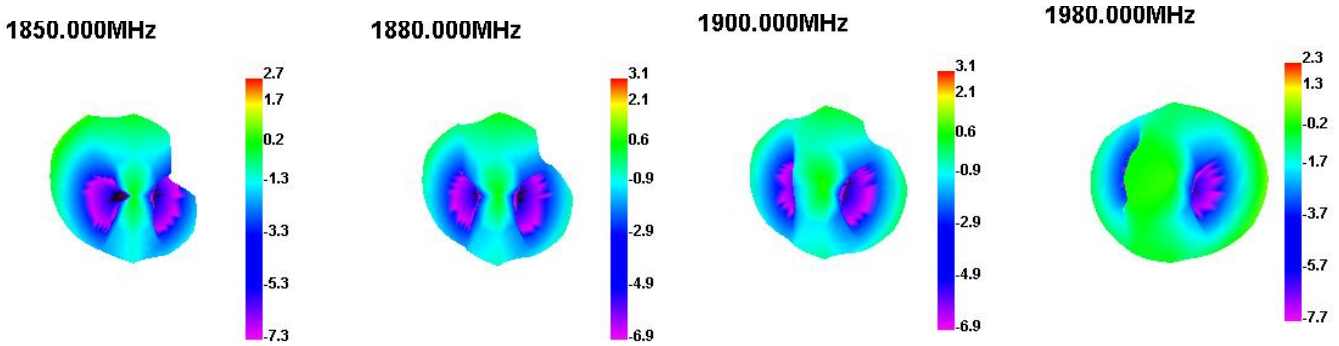


B66-TIS

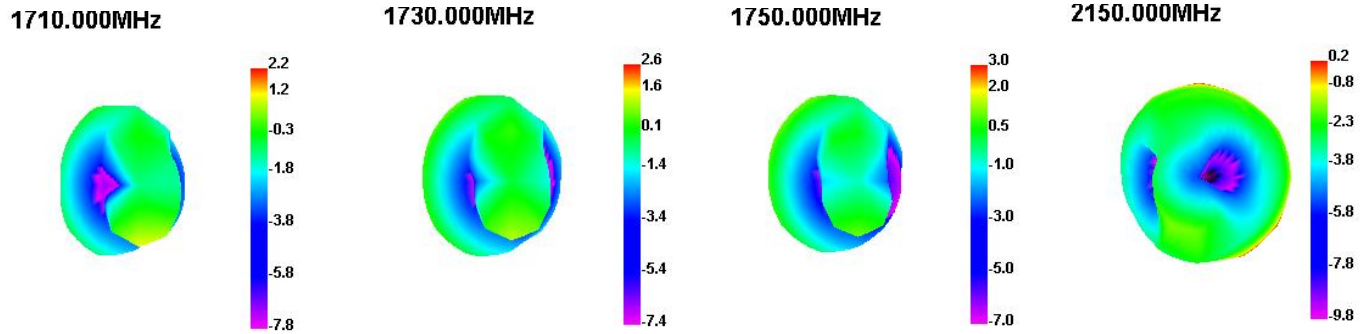


7.2D&3DPassive field type diagram-WCDMA

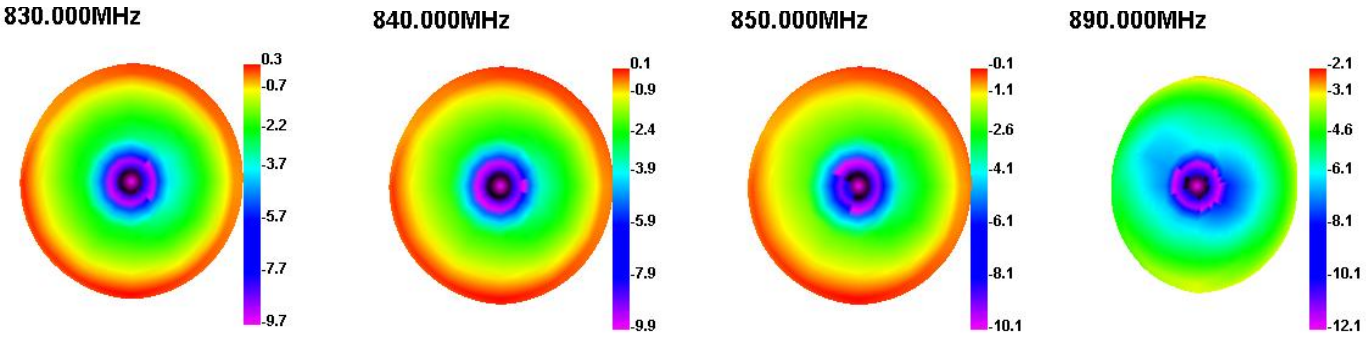
W-B2



W-B4

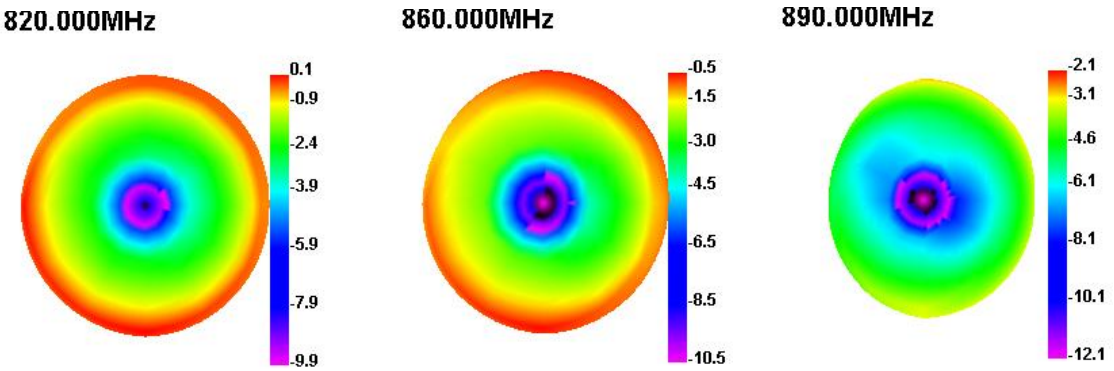


W-B5

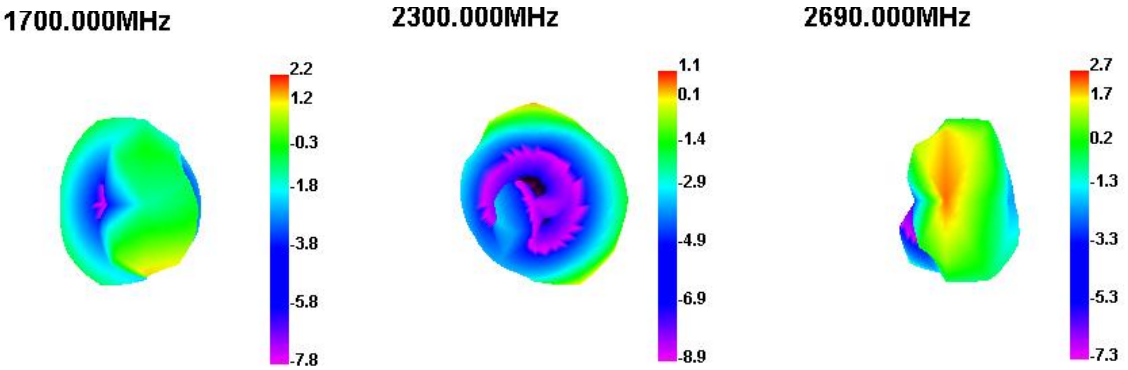


8.2D&3DPassive field type diagram-LTE

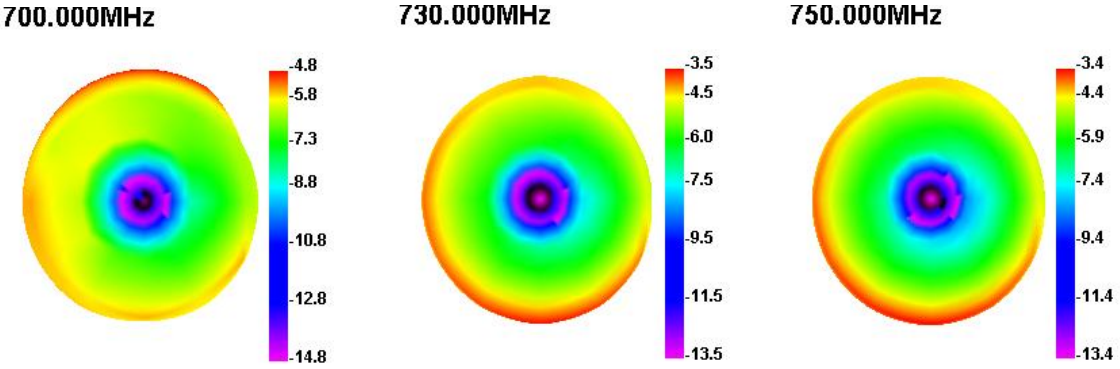
B5



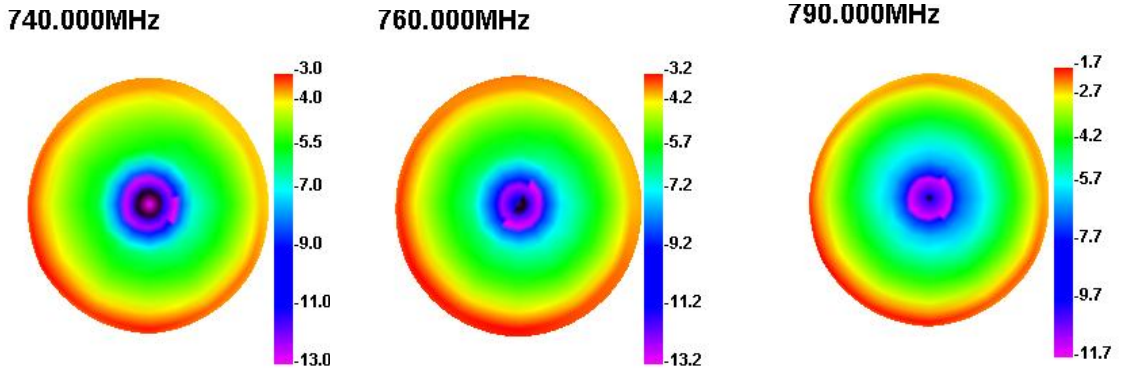
Medium high frequency



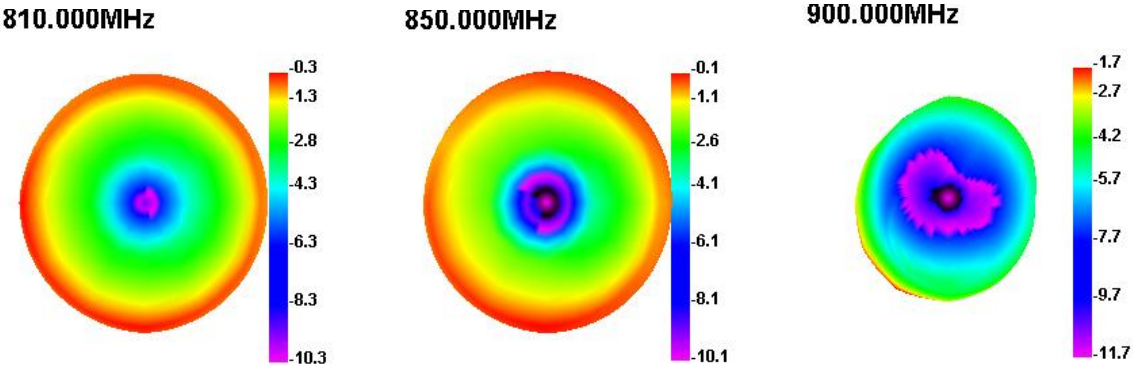
B12



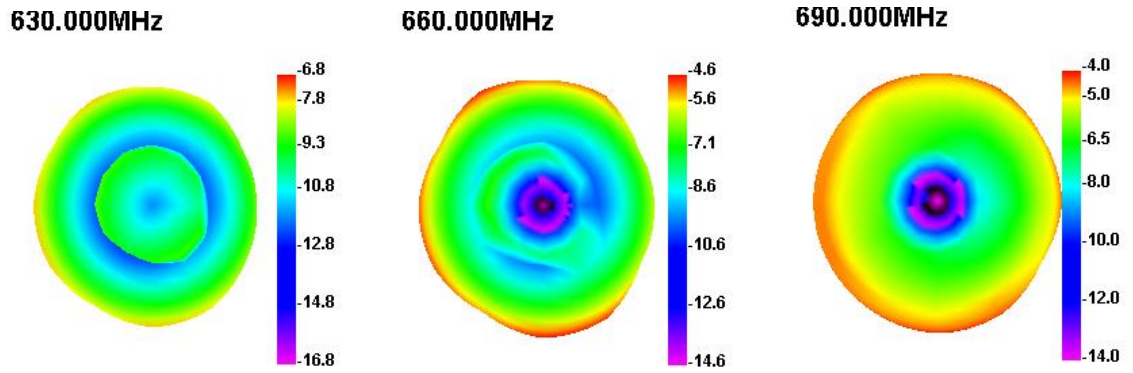
B13



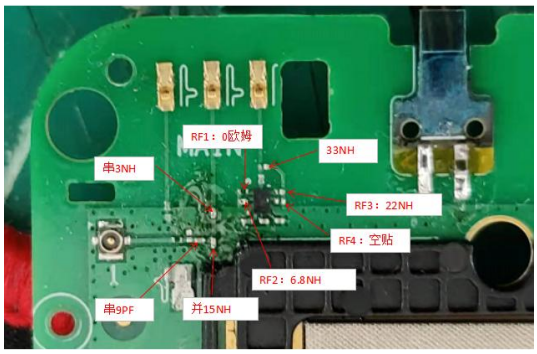
B26



B71

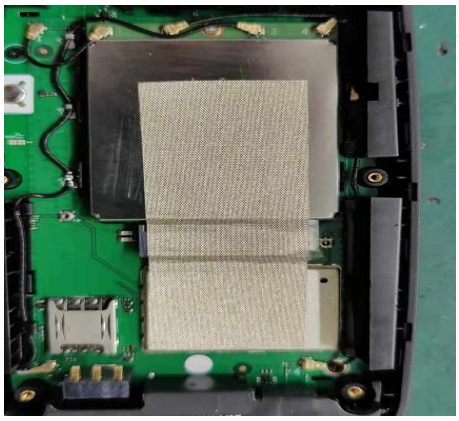


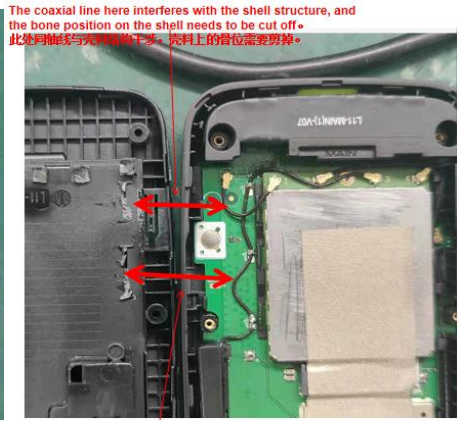
9. Matching circuit



主天线开关逻辑			
Element	Numbe	value	Band
RF1		0欧姆	LTE B2/4/5/41/66 WCDMA 2/4/5
RF2		6.8NH	LTE B13
RF3		22NH	LTE B12
RF4		空贴	LTE B71

10. Environmental treatment





The width of the conductive cloth must be increased, or it will affect the IF TIS. At present, two conductive sponges are pasted to increase the grounding width.

导电布的宽度必须加大，否则对中频 TIS 有影响。目前是贴了两条导电海绵增加接地宽度.

The module should be grounded with the main board shield, otherwise it will have a great impact on the low-frequency TIS. Current conductive cloth size: 23mm * 58mm.

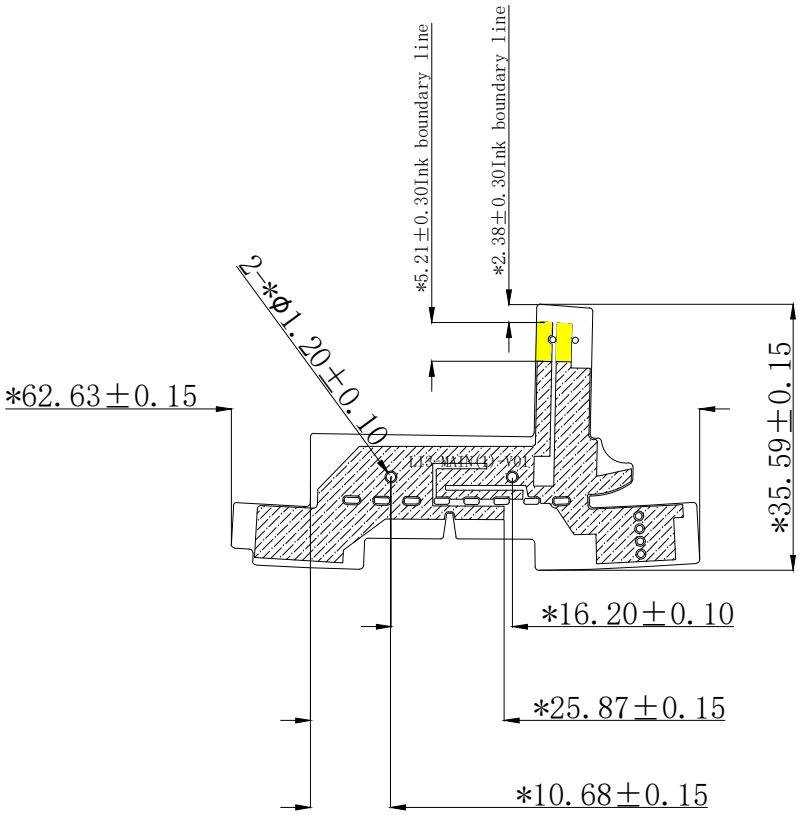
模块要跟主板屏蔽罩接地，否则对低频 TIS 影响很大。目前的导电布尺寸：23mm*58mm.

The coaxial line here interferes with the shell material structure, and the bone position on the shell material needs to be reduced. (The coaxial line here is bent to avoid B48 receiving coaxial line being too close to the antenna).

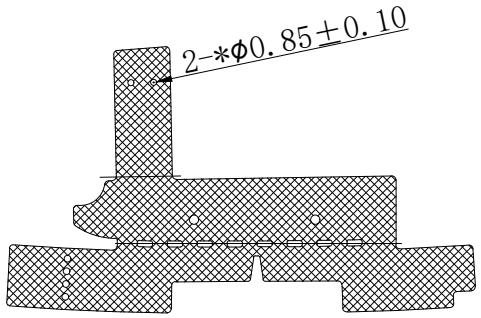
此处同轴线与壳料结构干涉，壳料上的骨位需要减掉。（此处同轴线折弯，避免 B48 接收同轴线离天线太近）.

The third perspective			
Unit	mm	Proportion	1:1

	0~10	10~30	30~50	50~	Angle	○	◎	⊥	▱
	0.05	0.10	0.15	0.20	1°	0.02	0.02	0.03	0.05



TOP



bottom

Note:

1. "*" for the key size;
2. FPC Material Science:Electrolytic copper
3. 3m300 series double-sided adhesive tape is pasted on the back of the product
4. No tolerance dimension is marked, and the tolerance of die stamping dimension is ± 0.1
5. ■ Gold plated area, ▨ Copper foil area, ▩ Gum;

A	New Figure		
version	Description	Date	Remark

TOPANT

Shenzhen Daxian Technology Co., Ltd.

Model	L13	Product color	black	Date	2022/11/23
Project Coding	BL-13XXX-109	Mol dsurfacetreat ment		Structural Design	biyezhi
Part Name	MAIN FPC			RF design	hupeng
Parts coding	1L-13XXX-109-1			Check	zhoukang
Material	PI Electrolytic copper			Approve	zhanglei
Save Path				current version	A