

# SPECIFICATION

Daxian Communication Technology Limited

*Shenzhen Daxian Technology Co., Ltd .*

## Unimax L13 Diversity antenna

### Product specification book

client	Unimax	frequency range	LTE B2/4/5/7/12/13/25/26/38/41 (249 6-2690)/42/66/71
project name	L13	edition	V01
Material number	2L-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

Shenzhen Topant Technology Co., Ltd .

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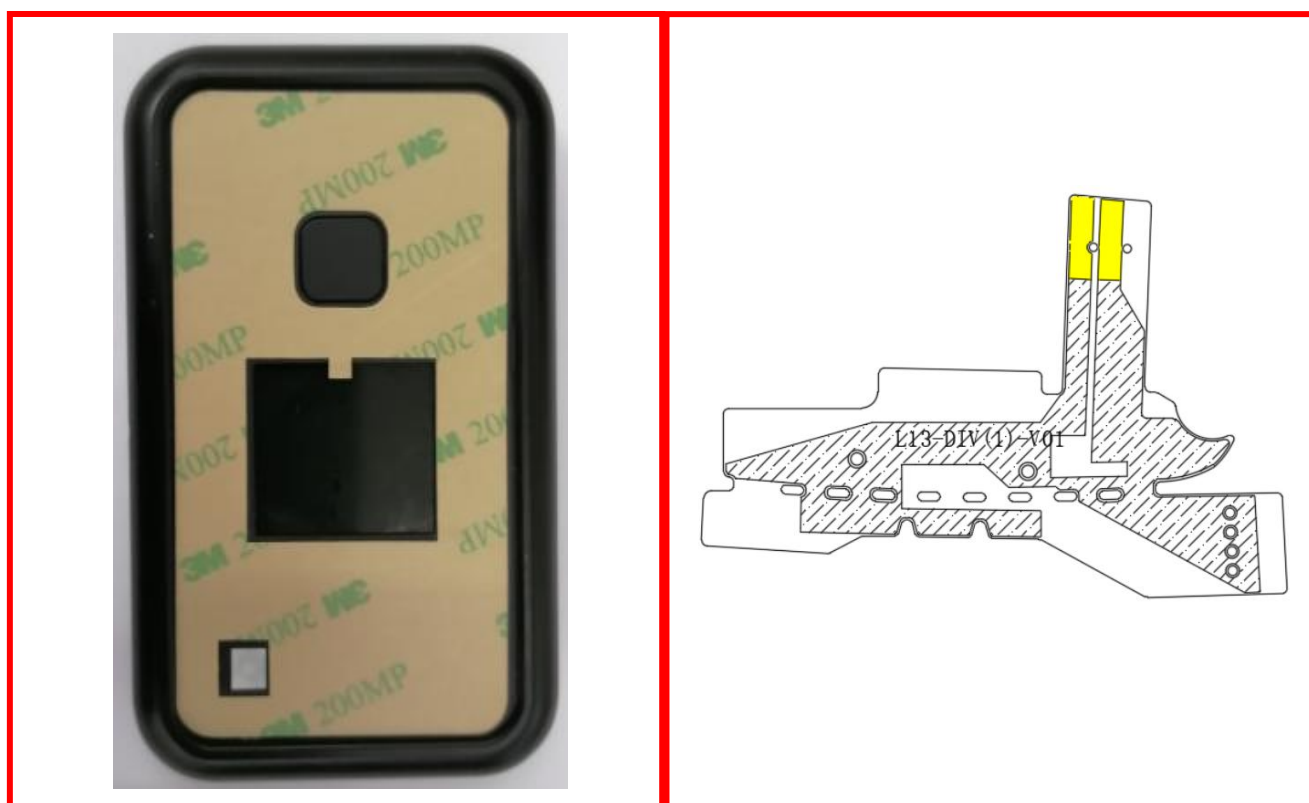
# I project description

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

## II Diversity 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**

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## 1.1 Electrical specifications and standards

### 1.1.1 Electric performance index

Antenna operating frequency band is in:

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.

LTE -band B 2				
band	band (MHz)	VSWR	band (MHz)	VSWR
	The transmit TX		The receiving end RX	
LTE -B 2	1850~1910	$\leq 4$	1930~1990	$\leq 4$
LTE -band B 4				
band	band (MHz)	VSWR	band (MHz)	VSWR
	The transmit TX		The receiving end RX	
LTE -B 4	1710~1755	$\leq 4$	2110~2155	$\leq 4$
LTE -band B 5				
band	band (MHz)	VSWR	band (MHz)	VSWR
	The transmitter TX		The receiving end RX	
LTE -B 5	824~849	$\leq 4$	869~894	$\leq 4$

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

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## 1.2 Antenna composition

The antenna is mainly composed of FPC.

## 2、 The Equipment of Active Test

Satimo 3D Chamber 6×4×4( m )

Agilent 8960 E 5515c

Network analyzer-R&S ZVL



graph 2

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### 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 400MHz - 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

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## OTA Passive Efficiency & Gain-Diversity antenna-LTE

B5

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
820	12.2	-9.14	-6.94
830	12.53	-9.02	-6.78
840	13.24	-8.78	-6.57
850	12.51	-9.03	-5.94
860	14.6	-8.36	-5.57
870	15.12	-8.2	-5.54
880	16.36	-7.86	-4.8
890	18.78	-7.26	-4.31

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2500	33.83	-4.71	0.74
2510	37.6	-4.25	-0.45
2520	36.4	-4.39	-0.31
2530	34.2	-4.66	-0.62
2540	33.43	-4.76	-0.51
2550	34.36	-4.64	-0.05
2560	34.79	-4.59	0.29
2570	35.9	-4.45	0.59
2580	36.61	-4.36	0.92
2590	37.08	-4.31	0.98
2600	35.99	-4.44	0.95
2610	36.87	-4.33	1.03
2620	36.65	-4.36	0.84
2630	35.86	-4.45	0.81
2640	35.48	-4.5	0.7
2650	35.91	-4.45	0.91
2660	36.49	-4.38	0.91
2670	34.87	-4.58	0.94
2680	36.25	-4.41	1.04
2690	38.12	-4.19	1.37
2700	38.68	-4.12	1.72

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1930	44.41	-3.52	-0.2
1940	48.1	-3.18	0.15
1950	48.45	-3.15	0.36
1960	49.41	-3.06	0.36
1970	49.69	-3.04	0.4
1980	48.18	-3.17	0.41
1990	45.31	-3.44	0.56
2000	43.9	-3.58	0.63
2010	42.22	-3.75	0.52
2020	41.65	-3.8	0.33
2030	41.42	-3.83	-0.02
2040	42.45	-3.72	0
2050	45.66	-3.4	0.26
2060	45.83	-3.39	0.16
2070	45.48	-3.42	0
2080	45.8	-3.39	0.07
2090	46.37	-3.34	0.22
2100	46.03	-3.37	0.26
2110	43.6	-3.6	0.08
2120	43.08	-3.66	-0.07
2130	43.01	-3.66	-0.13
2140	42.5	-3.72	-0.32
2150	41.88	-3.78	-0.22
2160	42.81	-3.68	0.03
2170	43.27	-3.64	0.06
2180	45.62	-3.41	0.27
2190	46.83	-3.3	0.39
2200	48.71	-3.12	0.39

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## B12

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
720	10.24	-9.9	-6.93
730	10.76	-9.68	-6.61
740	10.44	-9.81	-6.92
750	10.16	-10.02	-7.28

## B13

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
740	12.42	-9.06	-7.04
750	12.03	-9.2	-6.58
760	10.95	-9.6	-6.71
770	14.28	-8.45	-5.53

## B26

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
860	12.51	-9.03	-5.94
870	14.6	-8.36	-5.57
880	15.12	-8.2	-5.54
890	16.36	-7.86	-4.8
900	18.78	-7.26	-4.31

## B71

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
620	10.87	-9.64	-6.65
630	10.53	-10.49	-6.26
640	11	-9.59	-5.5
650	11.53	-9.38	-5.35

## 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!

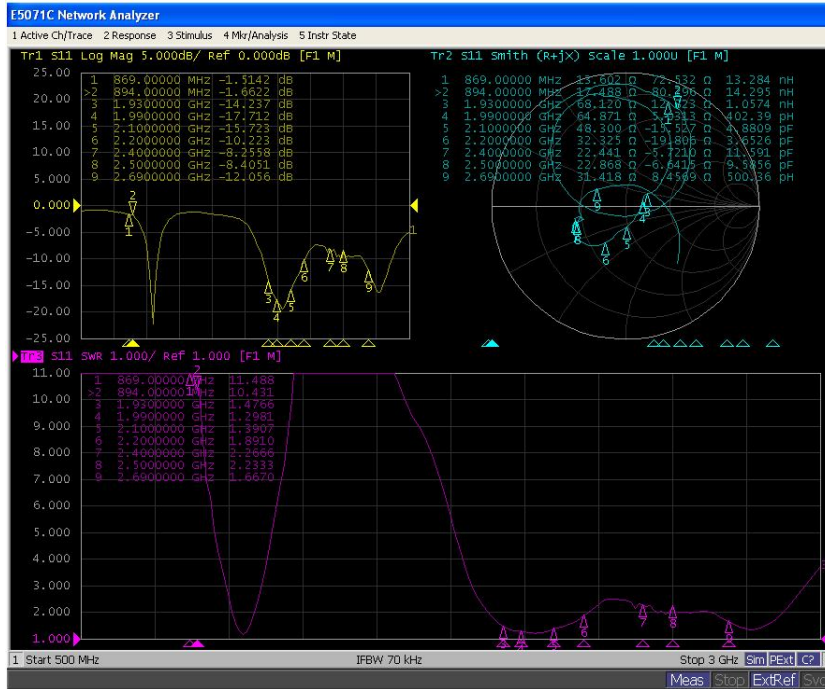
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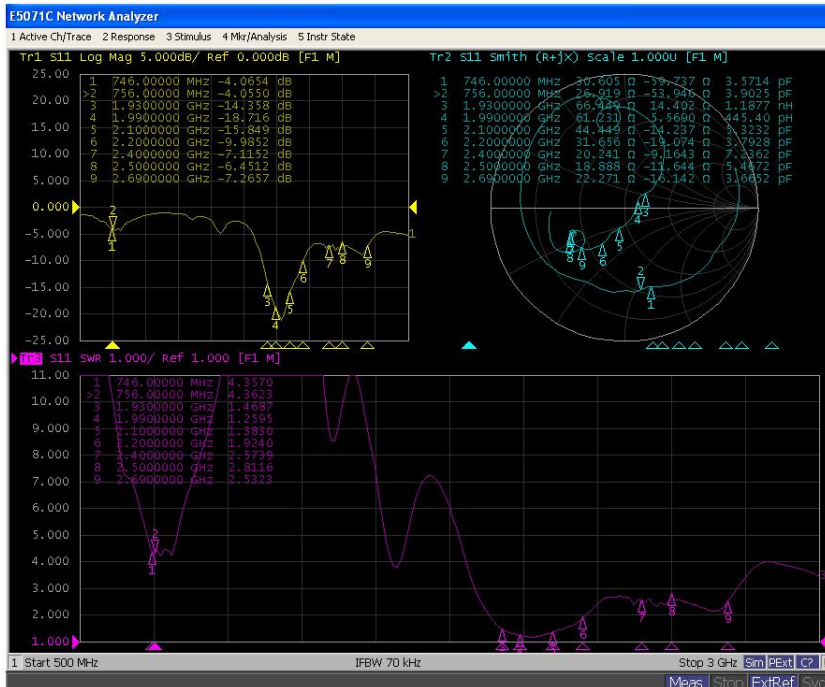
## 5. Attachment chart

### 5.1 Parameters of Return Loss and VSWR and impedance diagram- -Diversity antenna

#### RF1:B5/Medium high frequency



#### RF2:B13



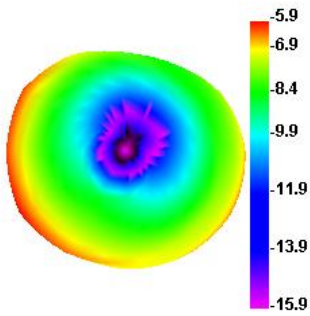
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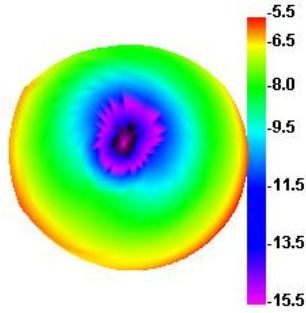
## 6. 2D&3DPassive field type diagram

B5

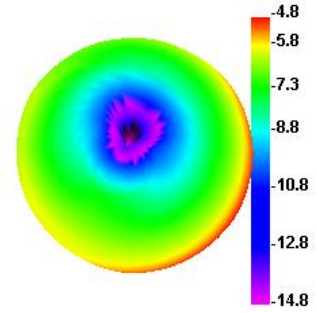
860.000MHz



880.000MHz

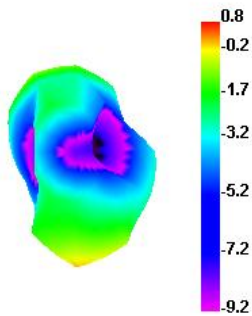


890.000MHz

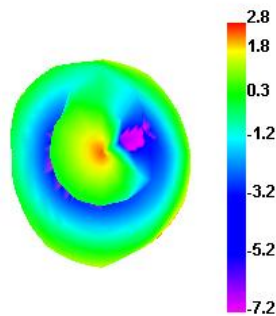


## Centralized high frequency

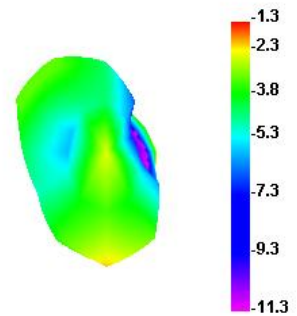
1900.000MHz



2200.000MHz

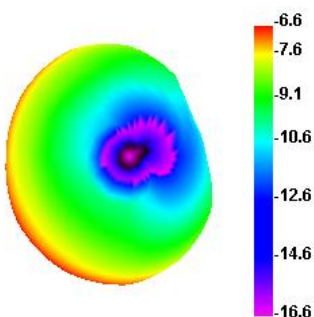


2680.000MHz

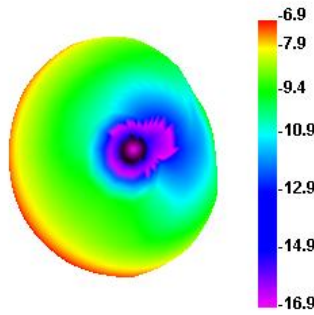


B12

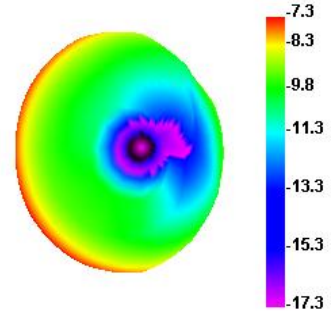
730.000MHz



740.000MHz



750.000MHz

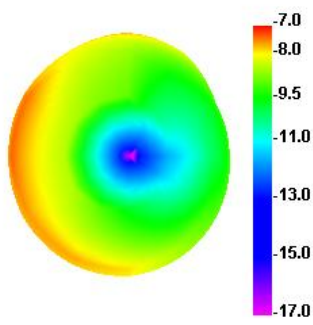


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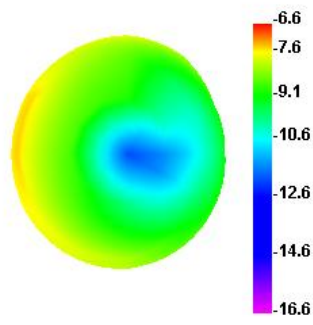
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## B13

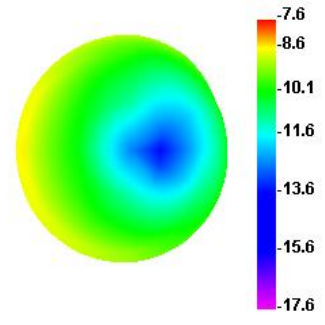
740.000MHz



750.000MHz

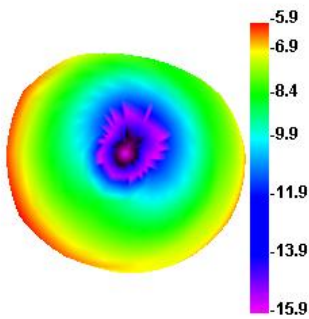


760.000MHz

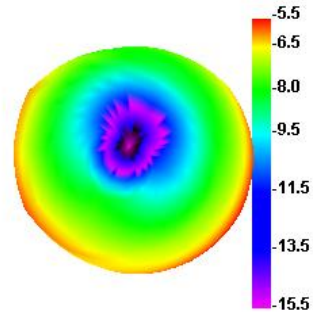


## B26

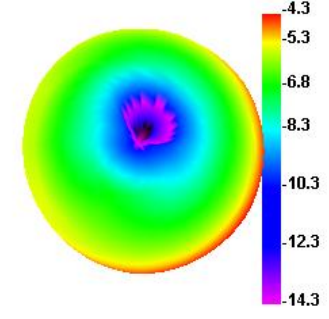
860.000MHz



880.000MHz

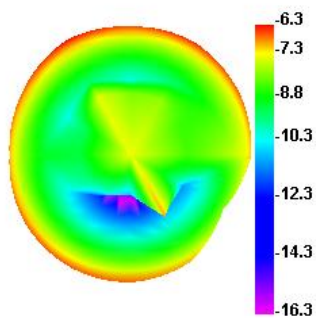


900.000MHz

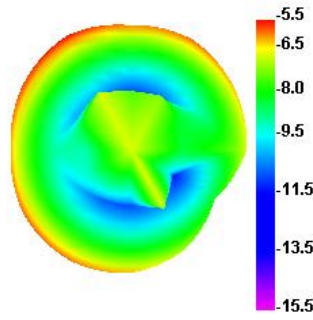


## B71

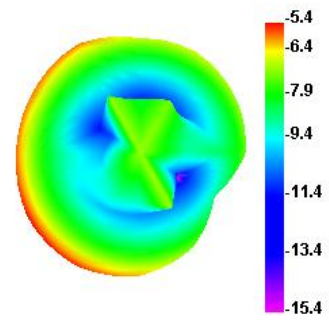
630.000MHz



640.000MHz



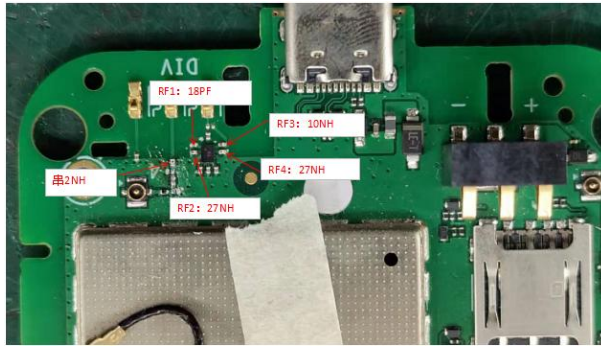
650.000MHz



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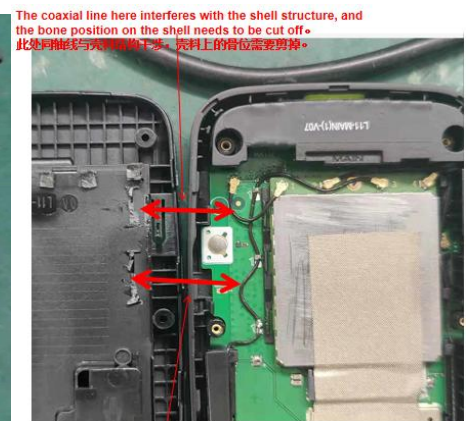
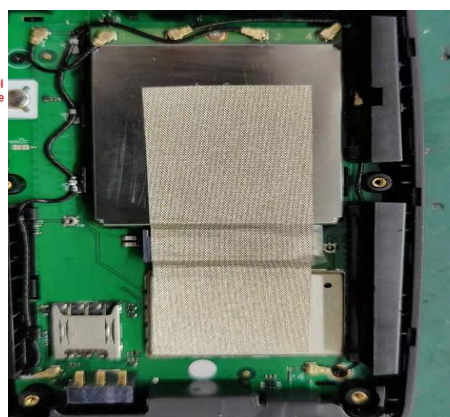
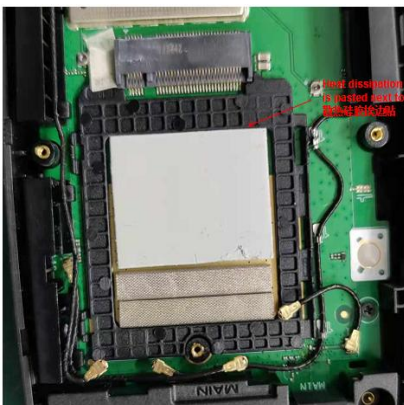
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## 7. Matching circuit



Diversity antenna switch logic			
Element	Number	value	Band
RF1		18PF	LTE B2/4/5/41/66 WCDMA 2/4/5
RF2		27NH	LTE B13
RF3		10NH	LTE B12
RF4		27NH	LTE B71

## 8. 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).

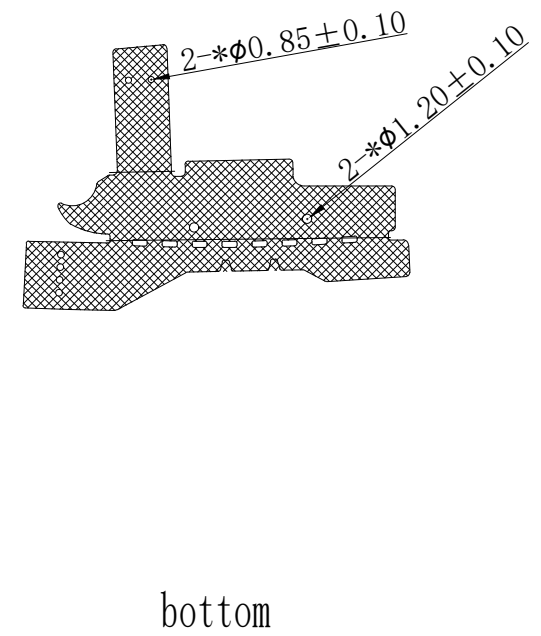
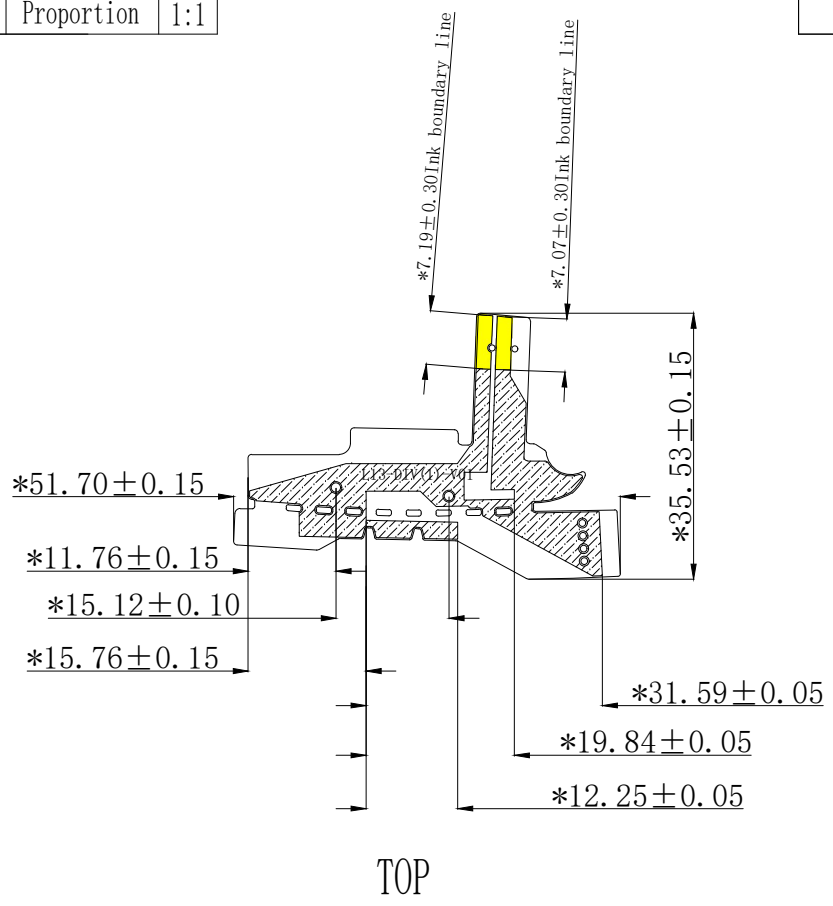
此处同轴线与壳料结构干涉，壳料上的骨位需要减掉。（此处同轴线折弯，避免 B48 接收同轴线离天线太近）。

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1		2	
The third perspective			
Unit	mm	Proportion	1:1

4		5		6	
0~10	10~30	30~50	50~	Angle	○
0.05	0.10	0.15	0.20	1°	0.02
					◎
					⊥
					▱
					0.03
					0.05



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

						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	DIV FPC			RF design	胡鹏						
Parts coding	2L-13XXX-109-1			Check	zhoukang						
Material	PI Electrolytic copper			Approve	zhanglei						
Save Path					current version	A					

A	New Figure		
version	Description	Date	Remark