



# Product Performance and Specification Book

## Mars Tianxian Research and Development Department

name of material : EthOS

Sample color:

Sample type: LDS+FPC

Customer model:

☐ Start with a sample ☐ Other ☐ Start with a sample ☐ Other

Supplier: Shenzhen Maya Communication Equipment Co., LTD. Version: R.A

Supplier: Shenzhen Maya Communication Equipment Co., LTD. Version: R.A

fiction	structure	character	ratify	Date of sample delivery

**Client: Heng Yue**

department	affirm	date	state	sign and seal
electron				
structure				
character				
project				

1. Confidentiality requirements: Shenzhen Maya Communication Equipment Co., Ltd. has the proprietary technology of this product, which shall not be disclosed to any company or individual without the written consent of Shenzhen Maya Communication Equipment Co., Ltd.

2. Special Notice: Before signing this document, all parties shall carefully read the "Special Terms" and the contents contained in the catalogue. After being signed by the representatives of

both parties, it shall be deemed that both parties have reached consensus and have no objection to the contents of this document, and both parties shall abide by it.



## special clause

### 1. About performance and structure confirmation section

- ★ Please confirm the appearance and performance of the product before signing the confirmation letter.
- ★ Please provide the final trial production machine to our company or take it back to our company for verification before mass production.
- ★ As the products of this letter of recognition are highly sensitive objects, please be sure to keep the test gold machine for subsequent traceability.
- ★ As this product is a custom-made item with specific application requirements, customers must return any modified materials or non-designated equipment to our company for RF performance verification when making material changes or using them in unauthorized projects. Failure to comply may result in serious risks of operational discrepancies from actual usage. We will seal and test the prototype devices to confirm their full functionality, thereby preventing potential performance errors caused by improper operation affecting antenna accuracy.

### 2. About product storage

- ★ Because the surface printing ink of this product, the back side is bonded with back glue, and there are electroplated objects, please make sure that the temperature is between 23°C and 27°C during storage or transportation, the relative humidity is below 60%, and the environment is free from strong acid, sulfur and oxygen.
- ★ Because the back glue of this product has strict environmental requirements, customers must assemble the product within the optimal use period after receiving the product to ensure the reliability of the product.

### 3. Agreement on product use

- ★ Due to the unique design of this product, ensure full contact with the surface being bonded during use. The bonded surface must be completely free of chemical residues (such as release agents) or avoid using materials containing release agents. To maintain optimal performance, clean the surface thoroughly before application to remove any residual chemicals.

### 4. Quality statement of this product

- ★ Due to the above factors, it is recommended that the optimal use period of this product is 12 months. Overdue will affect the use effect of the product. Our company provides lifetime consultation and paid replacement service for this product.
- ★ This product is a special customized device. Please check the appearance, quantity and performance of the product against the standards agreed in this "Product Performance and Specifications Acknowledgment Letter" within 7 days after receiving the product. If not, it shall be deemed that the quality of the product meets the agreed standards of both parties.
- ★ Verification method: check the engineering seal of the letter of acknowledgment.



## **catalogue**

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## 1. Frequency band required by customer antenna debugging design

frequency	frequency range
2G	850/900/1800/1900
3G	WCDMA1 2 4 5 8
4G	LTE-1/2/3/4/5/7/8/12/13/20/25/26/28/38/39/40/41/48/66/71
triangle	GPS/WIFI/BT

## 2. Phone and antenna diagram



Mobile Phone Graphics



GPS/WIFI antenna



NFC antenna



### 3. Electrical properties

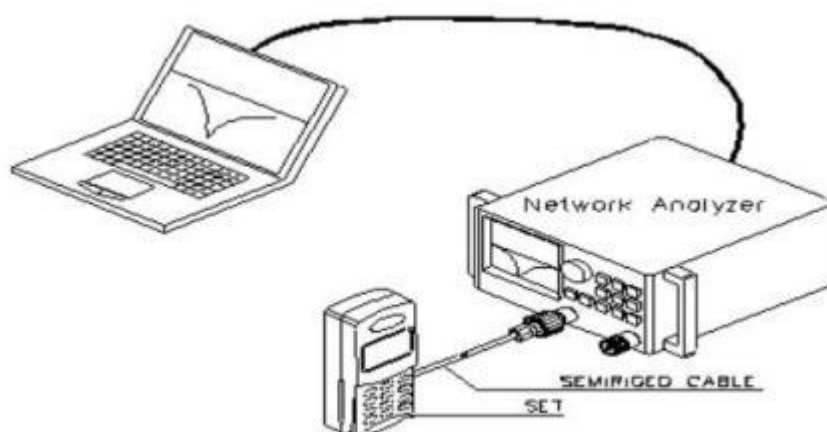
#### 3.1 Test method description and data

implementor name	use
Vector Network Analyzer	S11/Impedance/ Passive Test
Agilent 8960 SP6010 R&S CMU200	Mobile communication equipment test including GSM, GPRS, EDGE, CDMA2000, 1xEV-DO, TD-SCDMA, WCDMA, HSDPA
R&S CMW500 MT8820C	Including TD-SCDMA, WCDMA, Mobile communication equipment testing for HSDPA, LTE, WIFI and GPS
SP9500E	Includes 5G, SA, NSA
Agilent E4438C	Test active GPS
MVG Chamber	Passive Test / OTA active Test / Efficiency/Gain

#### 3.2 Passive Test Report (passive test report)

##### Test equipment: network analyzer

Test method: A 50 ohm CABLE cable is exported from the test port of the instrument, and the SMA connector of the hand tool is connected after calibration with a calibrator, and the data such as return loss or VSWR corresponding to relevant frequency points are recorded.



测试示意图



### 3.3 Active Test Report (Active test report)

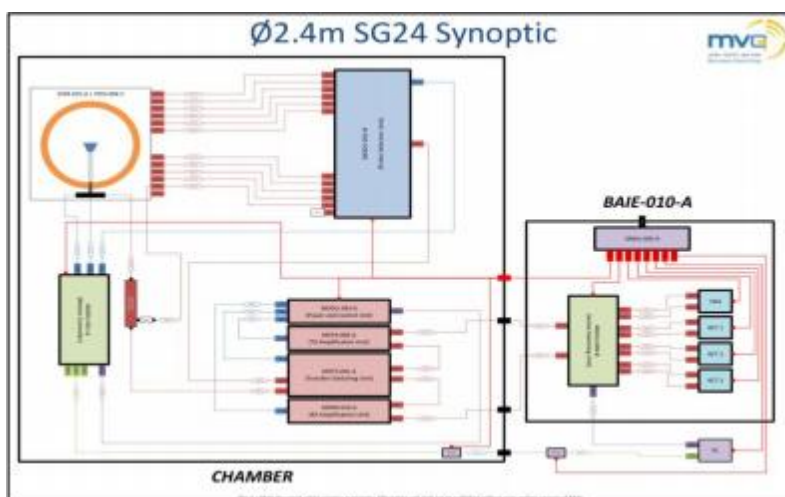
#### TRP/TIS

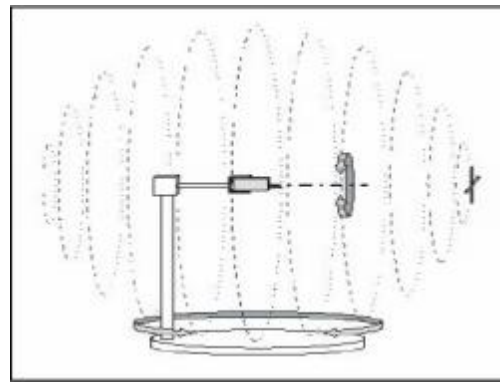
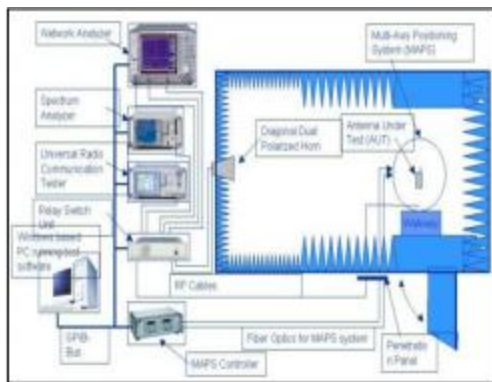
Testing Equipment: Comprehensive tester, network analyzer, full-wave far-field ETS, French MVG SG24LT (Satmio) near-field 3D microwave anechoic chamber, high-precision positioning system with controller, and computer test environment with automated testing programs. Operating conditions: Temperature  $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ , humidity  $60\% \pm 15\%$ . Testing Method: Utilizing EST or Satimo 24LT system software TRP. During TRP testing, the DUT (Device Under Test) operates at maximum transmission power. Three channels (high, medium, low) are selected for measurement. The positioning system controls the DUT's position with 15-degree increments to measure effective radiated power (EIRP) at various three-dimensional points. The average spherical surface value is calculated through integration using the following formula:

$$TRP \cong \frac{\pi}{2NM} \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} [EiRP_{\theta}(\theta_i, \phi_j) + EiRP(\theta_i, \phi_j)] \sin(\theta_i)$$

During the TIS test, the DUT is in the state of maximum transmission power. Three channels are selected for testing, and the receiving sensitivity at each point in three-dimensional space is measured by controlling the position of DUT with a step of 30 degrees. The average value on the sphere is calculated by integral calculation, and the calculation formula is as follows:

$$TIS \cong \frac{2NM}{\pi \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} \left[ \frac{1}{EIS_{\theta}(\theta_i, \phi_j)} + \frac{1}{EIS_{\phi}(\theta_i, \phi_j)} \right] \sin(\theta_i)}$$









### 3.4 Active OTA TRP/TIS data

GSM	TRP	TIS(天)	TIS(亮)
GSM900	26.01		
	26.27		
	26.26	-102.62	-98.89
GSM850	26.62		
	27.18		
	27.27	-101.69	-100.43
DCS1800	24.15		
	24.57		
	24.62	-104.46	-103.37
PCS1900	25.49		
	25.46		
	25.01	-102.75	-102.08

WCDMA	TRP	TIS(天)	TIS(亮)
W1	18.47		
	18.29		
	18.01	-103.53	-102.07
W2	18.51		
	18.63		
	18.67	-104.15	-103.01
W4	16.75		
	17.17		
	17.69	-105.12	-104.51
W5	16.12		
	16.27		
	16.32	-104.63	-102.47

WCDMA	TRP	TIS(天)	TIS(亮)
W8	15.93		
	16.17		
	16.42	-103.84	-99.33

LTE	TRP	TIS(天)	TIS(亮)
B1 (10M)	19.01		
	18.82		
	18.72	-91.02	-90.13
B2 (10M)	18.63		
	18.75		
	18.56	-90.78	-89.27
B3 (10M)	16.57		
	17.62		
	18.12	-92.12	-90.42
B4 (10M)	16.81		
	17.61		
	18.39	-92.27	-91.68
B5 (10M)	16.24		
	16.61		
	16.57	-91.67	-88.93
B7 (10M)	16.92		
	16.57		
	17.67	-90.07	-88.62
B8 (10M)	15.89		
	16.27		
	16.52	-91.72	-87.15

LTE	TRP	TIS(天)	TIS(亮)
B12 (10M)	15.83		
	16.31		
	16.42	-90.57	-85.92
B13 (10M)			
	13.17	-87.12	-84.53
B20 (10M)	16.23		
	16.56		
	16.47	-89.65	-87.07
B25 (10M)	18.73		
	18.74		
	18.91	-91.72	-90.82
B26 (10M)	16.22		
	16.31		
	16.52	-92.01	-89.78
B28 (10M)	15.92		
	16.42		
	15.73	-90.19	-87.21
B66 (10M)	16.27		
	16.68		
	17.32	-91.21	-90.1

LTE	TRP	TIS(天)	TIS(亮)
B71 (10M)	13.53		
	14.42		
	14.37	-89.24	-85.02
B36 (20M)	17.42		
	17.63		
	17.87	-92.15	-91.41
B39 (20M)	18.12		
	18.61		
	18.73	-91.27	-90.12
B40 (20M)	16.68		
	17.15		
	17.13	-90.23	-89.16
B41 (20M)	17.75		
	18.12		
	17.65	-91.75	-91.14
B48 (20M)	13.71		
	13.53		
	13.42	-83.72	-82.07



GPS/WIFI/BT	TRP	TIS(亮)
WIFI-B (11M)	7.53	
	7.62	
	7.82	-75.83
WIFI-A (54M)	6.52	
	7.53	
	7.71	-67.54
BT	4.75	
	5.12	
	5.23	-86.21
GPS	CN-35.14	-147.13



### 3.5 Passive (Test) data

#### 4G主集天线

2.7nH											
Frequency	Efficiency	Efficiency dB	Frequency	Gain dB		Frequency	Efficiency	Efficiency dB	Frequency	Gain dB	
800000000	21.57%	-6.66214	800000000	-0.72553		1700000000	26.24%	-5.81	1700000000	-0.16	
816000000	21.80%	-6.61641	816000000	-0.18645		1750000000	23.72%	-6.24868	1750000000	-0.72005	
832000000	26.82%	-5.71505	832000000	0.607815		1800000000	26.90%	-5.70291	1800000000	0.060267	
848000000	33.16%	-4.79381	848000000	2.120709		1850000000	31.43%	-5.02607	1850000000	0.919938	
864000000	32.42%	-4.89245	864000000	2.014738		1900000000	32.96%	-4.82031	1900000000	1.149644	
880000000	33.57%	-4.7408	880000000	1.183868		1950000000	34.95%	-4.56546	1950000000	1.275446	
896000000	39.06%	-4.08272	896000000	1.824826		2000000000	29.32%	-5.32766	2000000000	0.364897	
912000000	37.07%	-4.31031	912000000	2.742335		2050000000	27.93%	-5.53918	2050000000	0.450085	
928000000	35.48%	-4.5004	928000000	2.418497		2100000000	28.52%	-5.44797	2100000000	0.879824	
944000000	36.83%	-4.33816	944000000	1.584637		2150000000	27.98%	-5.53186	2150000000	0.7632	
960000000	30.71%	-5.1274	960000000	0.194934		2200000000	27.13%	-5.66625	2200000000	0.11474	
						2250000000	25.75%	-5.89191	2250000000	-0.53822	
						2300000000	22.60%	-6.45965	2300000000	-0.90282	
						2350000000	23.32%	-6.32253	2350000000	0.137591	
						2400000000	25.48%	-5.93764	2400000000	0.654739	
						2450000000	26.74%	-5.72908	2450000000	0.35487	
						2500000000	29.51%	-5.30018	2500000000	-0.12003	
						2550000000	28.48%	-5.45509	2550000000	-0.62996	
						2600000000	29.68%	-5.27608	2600000000	0.329997	
						2650000000	33.22%	-4.78649	2650000000	0.999292	
						2700000000	39.13%	-4.07499	2700000000	2.270101	

Frequency	Efficiency	Efficiency dB	Frequency	Gain dB
3500000000	32.11%	-4.93388	3500000000	0.145337
3530000000	28.51%	-5.44967	3530000000	0.121172
3560000000	24.31%	-6.1426	3560000000	-0.38047
3590000000	23.76%	-6.24158	3590000000	-0.01598
3620000000	22.74%	-6.43141	3620000000	0.054318
3650000000	24.57%	-6.0953	3650000000	-0.27914
3680000000	28.30%	-5.48159	3680000000	-0.34628
3710000000	31.07%	-5.07679	3710000000	-0.12397
3740000000	31.42%	-5.02737	3740000000	-0.34538
3770000000	31.11%	-5.07041	3770000000	-0.14287
3800000000	29.11%	-5.36	3800000000	0.080691

#### 4G分集天线

Frequency	Efficiency	Efficiency dB	Frequency	Gain dB	Frequency	Efficiency	Efficiency dB	Frequency	Gain dB	Frequency	Efficiency	Efficiency dB	Frequency	Gain dB
700000000	4.96%	-13.0421	700000000	-8.83461	800000000	8.91%	-10.9455	800000000	-8.8296	1700000000	13.73%	-8.62304	1700000000	-2.87396
710000000	7.95%	-10.9564	710000000	-7.78492	810000000	7.54%	-11.2246	810000000	-5.2322	1750000000	14.51%	-8.38338	1750000000	-1.40663
720000000	12.96%	-8.87519	720000000	-5.4658	820000000	7.16%	-11.4487	820000000	-5.2861	1800000000	14.76%	-8.30848	1800000000	-1.06606
730000000	12.15%	-9.1552	730000000	-5.6689	830000000	7.51%	-11.2425	830000000	-4.96081	1850000000	15.64%	-8.0571	1850000000	-1.87387
740000000	18.43%	-7.34469	740000000	-3.86255	840000000	8.92%	-10.844	840000000	-4.15025	1900000000	13.39%	-8.73156	1900000000	-3.79768
750000000	23.33%	-6.32134	750000000	-2.52872	850000000	11.39%	-9.49674	850000000	-3.01481	1950000000	13.45%	-8.71211	1950000000	-4.05464
760000000	21.71%	-6.65596	760000000	-2.67207	860000000	13.87%	-9.90128	860000000	-1.15021	2000000000	11.36%	-9.44605	2000000000	-3.63068
770000000	35.23%	-8.97112	770000000	-1.79756	870000000	19.08%	-7.1992	870000000	-0.218	2050000000	11.42%	-9.42252	2050000000	-2.8746
780000000	18.85%	-7.28226	780000000	-2.79436	880000000	18.23%	-7.28019	880000000	-1.27328	2100000000	13.34%	-8.7484	2100000000	-2.1673
790000000	14.47%	-8.39639	790000000	-3.02304	890000000	20.52%	-8.87876	890000000	-0.9085	2150000000	12.15%	-9.15394	2150000000	-2.95051
800000000	12.58%	-9.00382	800000000	-3.68269	900000000	22.63%	-8.85289	900000000	0.02412	2200000000	13.64%	-8.65282	2200000000	-2.05475
810000000	8.27%	-10.3272	810000000	-4.1153						2250000000	19.42%	-7.11743	2250000000	-1.10816
820000000	8.78%	-10.5747	820000000	-3.82998						2300000000	21.66%	-6.6433	2300000000	-0.19515
830000000	8.28%	-10.8171	830000000	-4.78414						2350000000	23.37%	-6.31273	2350000000	0.80803
840000000	7.90%	-11.0264	840000000	-4.47096						2400000000	24.34%	-6.1365	2400000000	0.587625
850000000	9.19%	-10.3658	850000000	-3.9957						2450000000	21.21%	-6.73433	2450000000	0.658178
860000000	9.94%	-10.0252	860000000	-4.21022						2500000000	19.11%	-7.18772	2500000000	-0.77731
870000000	11.18%	-9.52282	870000000	-3.21316						2550000000	18.90%	-7.23449	2550000000	-1.56523
880000000	11.87%	-9.90423	880000000	-2.87291						2600000000	17.90%	-7.47242	2600000000	-2.32548
890000000	12.18%	-9.14458	890000000	-1.4691						2650000000	12.06%	-9.18699	2650000000	-3.29847
900000000	12.27%	-8.11059	900000000	-2.57812						2700000000	8.32%	-10.7981	2700000000	-6.00664



## GPS/WIFI/BT 天线

Frequency	Efficiency	Efficiency_dB	Frequency	Gain_dB
2400000000	16.06%	-7.942526361	2400000000	-0.891943541
2410000000	16.25%	-7.89240752	2410000000	-0.734775669
2420000000	16.05%	-7.944161581	2420000000	-0.744798722
2430000000	16.60%	-7.79907291	2430000000	-0.654177756
2440000000	17.11%	-7.668732668	2440000000	-0.537794052
2450000000	17.06%	-7.681050789	2450000000	-0.610625776
2460000000	17.20%	-7.643708662	2460000000	-0.788397054
2470000000	17.14%	-7.661102761	2470000000	-0.823355074
2480000000	16.72%	-7.768078487	2480000000	-0.673536673
2490000000	15.98%	-7.964681497	2490000000	-0.814651741
2500000000	15.75%	-8.027634363	2500000000	-0.986236291

Frequency	Efficiency	Efficiency_dB	Frequency	Gain_dB
1570000000	37.99%	-4.202841675	1570000000	-0.124893795
1571000000	37.92%	-4.211206427	1571000000	-0.162536558
1572000000	37.78%	-4.227571787	1572000000	-0.230740601
1573000000	37.56%	-4.2531693	1573000000	-0.181003057
1574000000	37.35%	-4.277642354	1574000000	-0.116806311
1575000000	37.22%	-4.292480147	1575000000	-0.039686637
1576000000	37.21%	-4.293811853	1576000000	0.018266809
1577000000	37.29%	-4.283653199	1577000000	0.073173776
1578000000	37.42%	-4.269418974	1578000000	0.090254071
1579000000	37.47%	-4.263260613	1579000000	0.093432798
1580000000	37.32%	-4.280035699	1580000000	0.086705405

Frequency	Efficiency	Efficiency_dB	Frequency	Gain_dB
5120000000	11.50%	-9.292176591	5120000000	-2.206432384
5155000000	10.93%	-9.613303378	5155000000	-3.067433371
5190000000	12.23%	-9.127169436	5190000000	-2.256818261
5225000000	13.06%	-8.840106357	5225000000	-1.079549375
5260000000	13.62%	-8.657649043	5260000000	-0.527651482
5295000000	14.11%	-8.504535147	5295000000	0.158062436
5330000000	14.09%	-8.511970338	5330000000	0.038553279
5365000000	15.84%	-8.002574051	5365000000	0.30061726
5400000000	18.64%	-7.296028529	5400000000	0.945892536
5435000000	20.96%	-6.785983075	5435000000	1.324056373
5470000000	21.31%	-6.713257773	5470000000	1.358702648
5505000000	20.40%	-6.90445641	5505000000	0.90041123
5540000000	19.27%	-7.151706477	5540000000	0.847997623
5575000000	16.91%	-7.718717014	5575000000	-0.155062244
5610000000	14.46%	-8.398199419	5610000000	-0.901562444
5645000000	12.48%	-9.038078731	5645000000	-1.422246293
5680000000	11.74%	-9.304268339	5680000000	-2.308966022
5715000000	10.68%	-9.714041821	5715000000	-3.014224499
5750000000	11.00%	-9.585430228	5750000000	-2.879663728
5785000000	11.05%	-9.564469472	5785000000	-2.44260547
5820000000	11.46%	-9.40932156	5820000000	-2.119247858



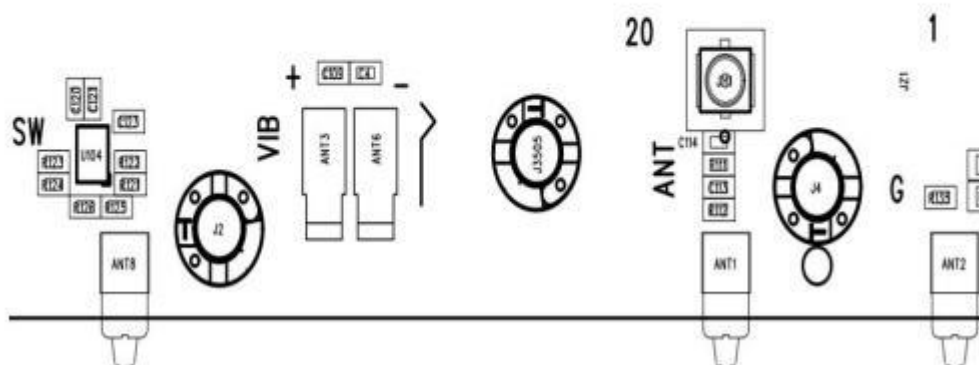
## 4. Description of matching circuit

4G主集天线匹配电路有更改。

C114-5.1nH, R111/R112/R135-0欧姆, C113-NC.

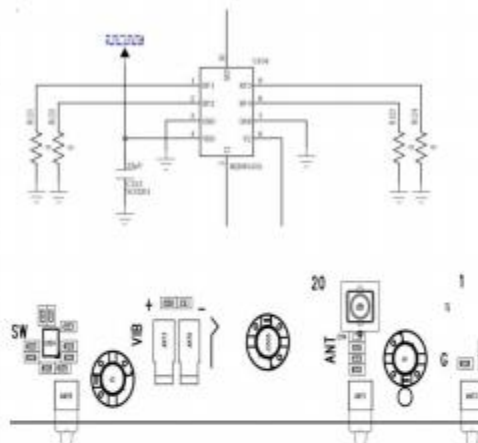
R125-0欧姆, R121-0欧姆, R122-12nH, R124-2.7nH, R123-18nH, R126-NC.

ANT1/2/8天线侧顶弹片保留。



### 4G主集开关逻辑

RF开关通路	匹配	控制频段
RF1 (R121)	0欧姆	GSM: 900/1800/1900 WCDMA: B1/2/4/8 LTE: B1/2/3/4/8/25/39/40/48/66
RF2 (R122)	12nH	LTE: B12/13/28
RF3 (R124)	2.7nH	GSM: 850 BC0 WCDMA: B5 LTE: B5/20/26
RF4 (R123)	18nH	LTE: B7/38/41/71

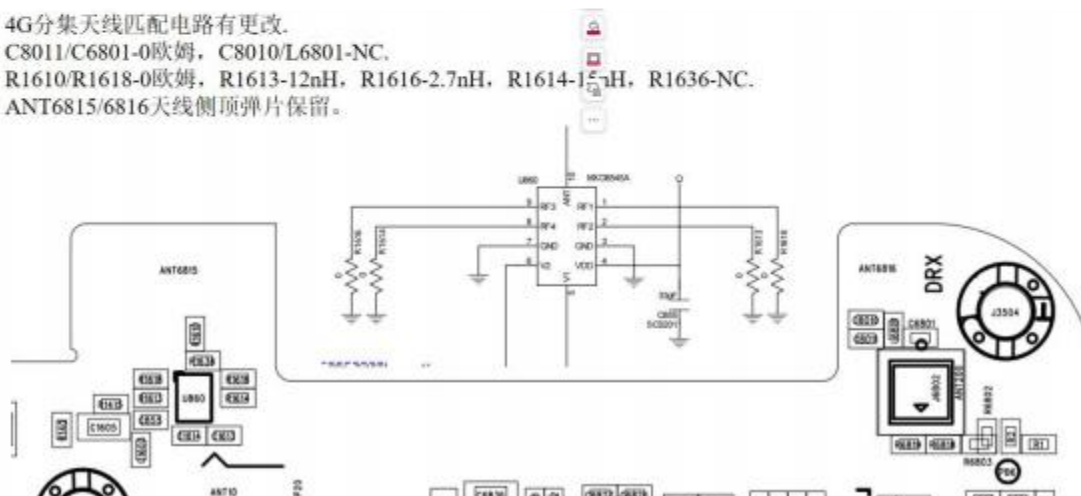


4G分集天线匹配电路有更改。

C8011/C6801-0欧姆, C8010/L6801-NC.

R1610/R1618-0欧姆, R1613-12nH, R1616-2.7nH, R1614-1.5nH, R1636-NC.

ANT6815/6816天线侧顶弹片保留。







## 5. GPS/WIFI/BT NFC Measurement Report

### GPS actual measurement

During the day, on the company's balcony, positioning was achieved within 120 seconds after cold start, the maximum star value detected was 40.4, and there were two stars with values above 40.



The WIFI signal strength is 10 meters away from the router  
The actual measured unobstructed distance from the front of BT is 10 meters, with a distance of 5 meters from a person. The call lasts for 3 minutes without any noise and is smooth.



### NFC通讯距离 NFC Communication distance

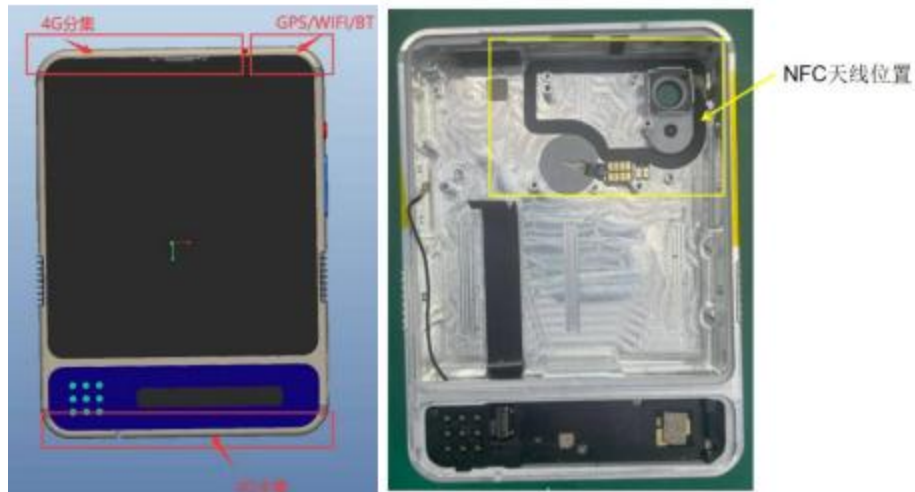
	距离 Distance
Type1	4.5cm
Type2	4.0cm
Type3	3.5cm
Type4	1.5cm
Type5	5.0cm

### 测试距离用的垫片 The gasket used for the test distance





## 6. Environmental treatment



红框区域屏排线贴导电布屏蔽接地，小板和主板贴导电海绵接地。



红框处喇叭、马达需接地，主板贴导电泡棉和导电布接地。







摄像头接地.



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