



**APPROVAL SHEET  
FOR ANTENNA**

CUSTOMER:           xiaomi          

FA-MAIN-SZ0204

FA-DIV-SZ0205

AAC P/N:           FA-3IN1-SZ0206          

CUSTOMER P/N: C3S L Antenna

CUSTOMER	APPROVER	CHECKER

**AAC ACOUSTIC TECHNOLOGIES HOLDINGS INC.**

**Add: AAC Technology Building, NO.18., Xixi Road, North Hi-Tech  
Industrial Park, Nanshan District, Shenzhen, P.R. China 518057**

**Tel : 0086 755 26054538**

**AAC Confidential Information**



Main antenna:GSM850/900/1800/1900,WCDMA B1/2/4/5/8,FDD-LTE B1/2/3/4/5/7/8/28,TDD-LTE B38/40/41;

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ME	张明	Check/Appr.	
Package Eng.			
RF	王啊琦	Check/Appr.	

Date	Issue	Detail changes
2022/6/14	x4	Preliminary

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Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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## 1. Scope

This document contains required environmental, electrical characteristic, mechanical, package and reliability test requirements.

## 2. Environmental Requirement

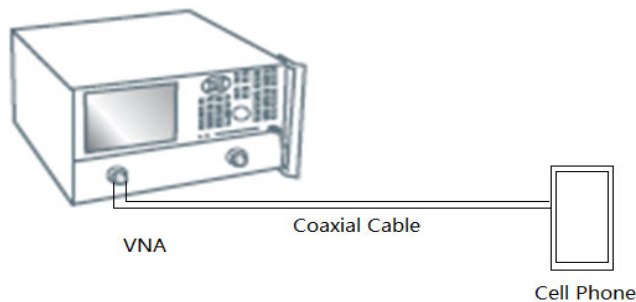
all components must be free from lead (Pb) and other banned or restricted substances according to customer's requirements.

## 3. Electrical Characteristic Measurement Method

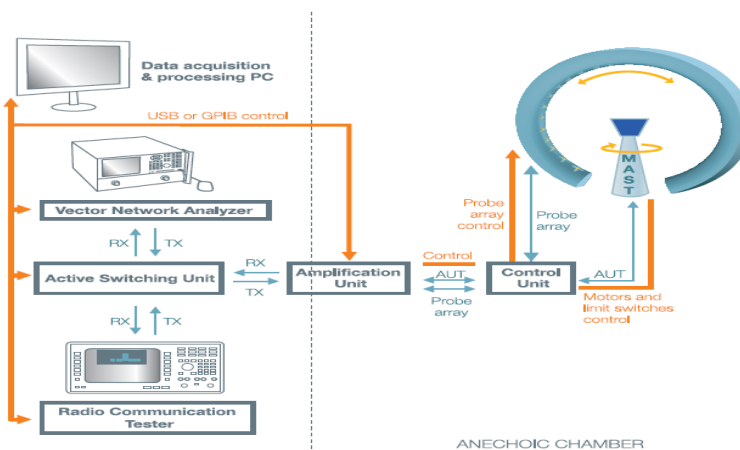
### 3.1 Measurement method

To measure the Return Loss and VSWR, Smith Chart, Vector Network Analyzer Agilent E5071C was used. Satimo SG24 Anechoic chamber was used to measure the Efficiency, Gain, TRP and TIS.

#### 3.1.1 Return Loss and VSWR



#### 3.1.2 Efficiency, Gain, OTA measurement

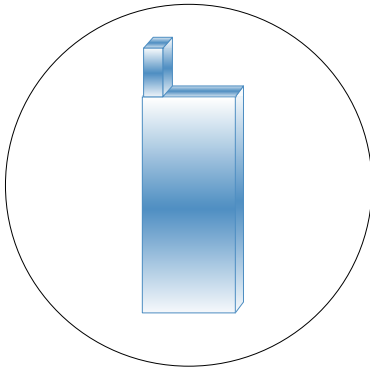




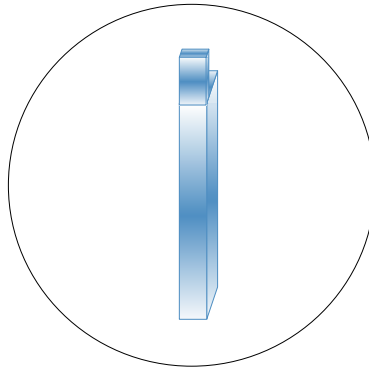
Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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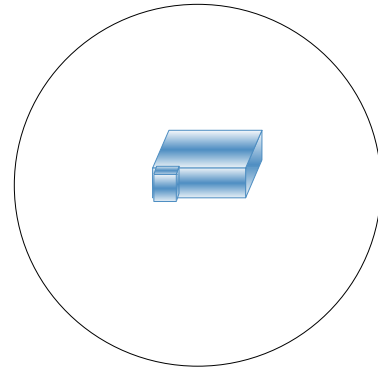
### 3.1.3 Cutting plane and polarization



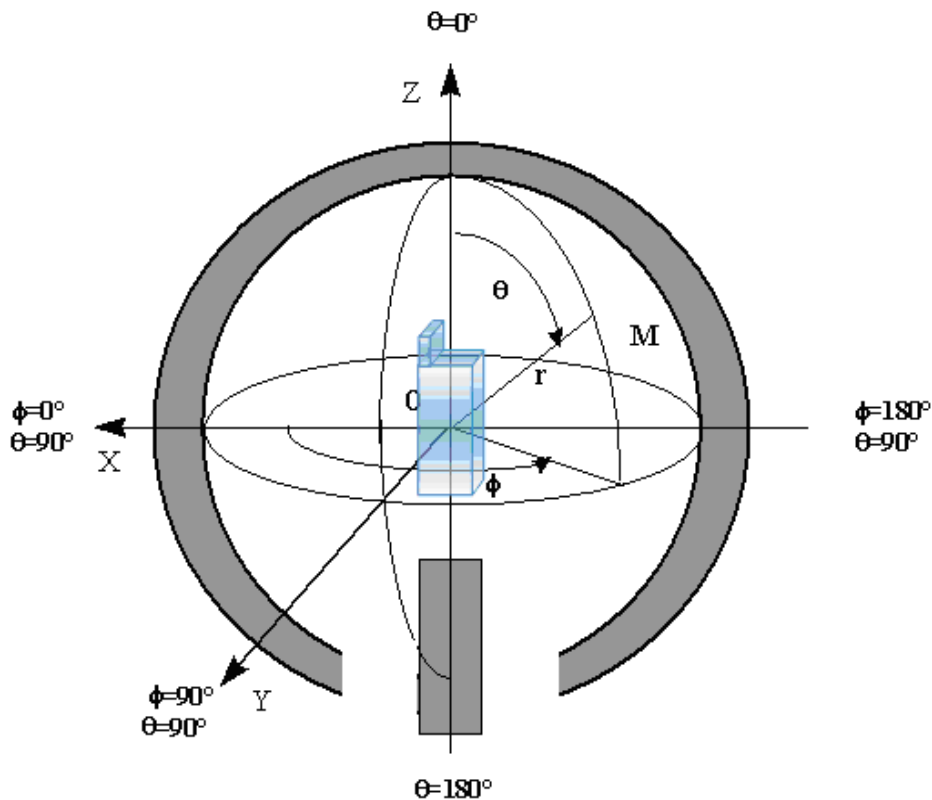
Phi=0deg



Phi=90deg



Theta=90deg



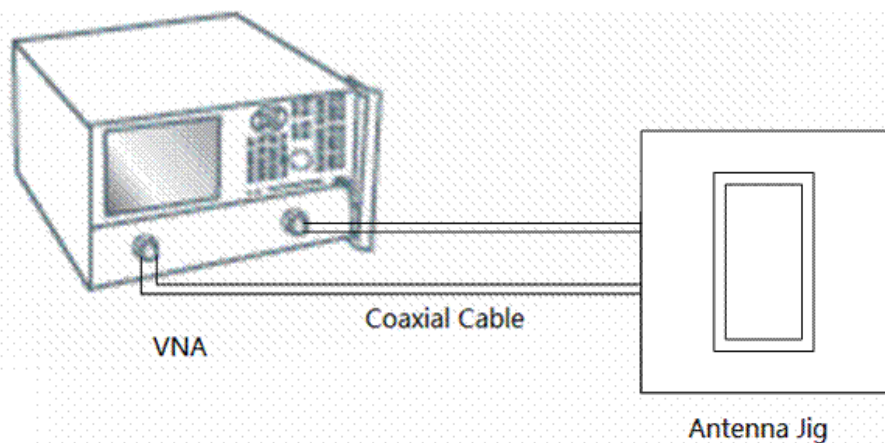
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### 3.1.4 RF Jig

AAC designs a special S11 RF test jig for antenna test in mass production line. The antenna with average frequency in line is selected as reference antenna, and the results of the test jig is going to be correlated to the performance in the real phone.



### 4. Pictures of prototype and antenna environment



Main ant



DIV ant

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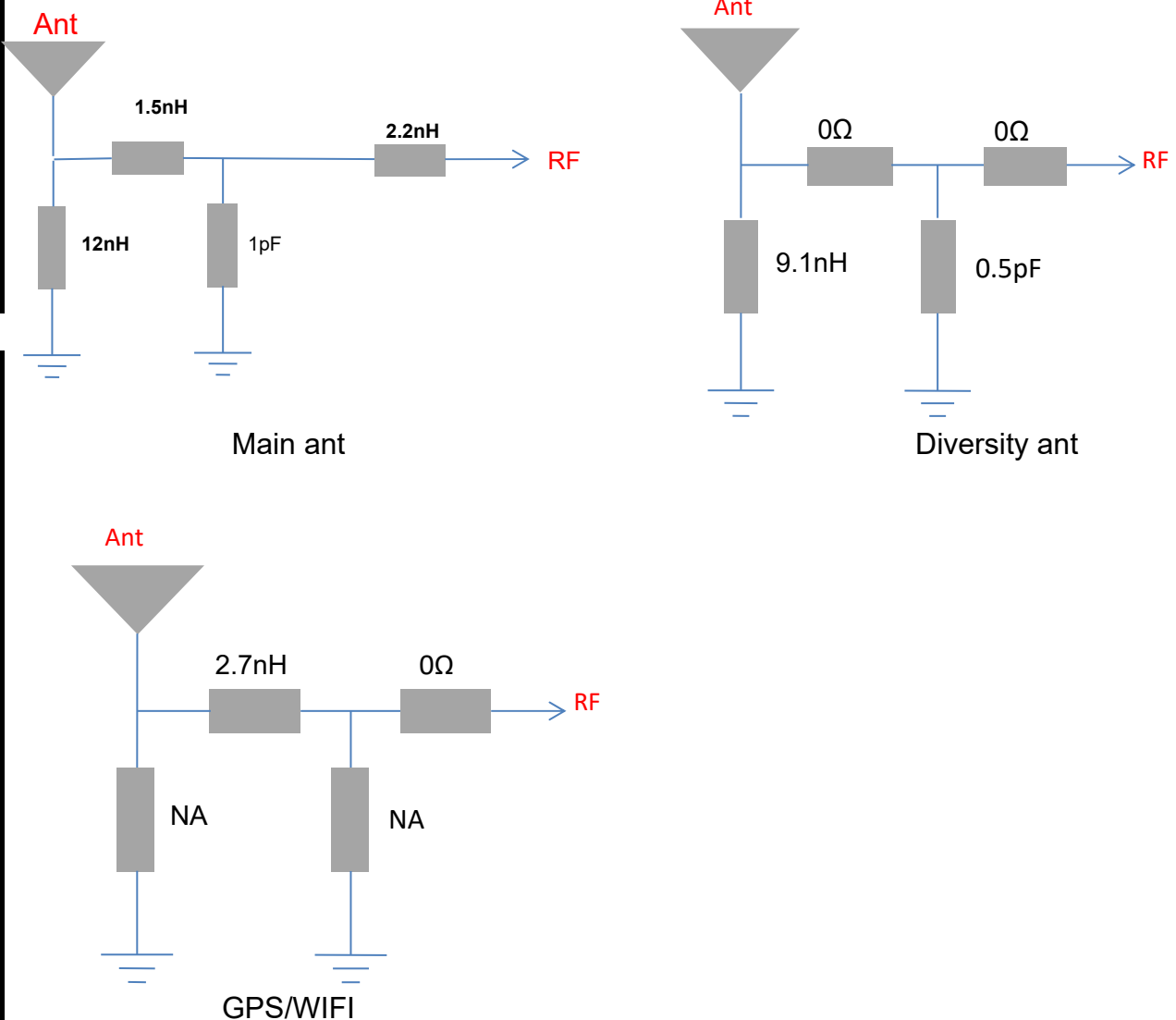
Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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GPS/WIFI

5. Matching Circuit







Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

NO.

0

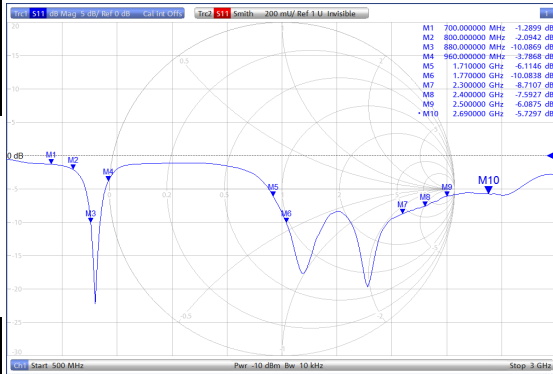
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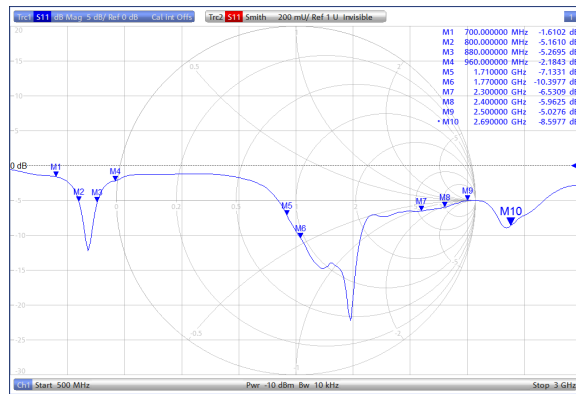
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## 6. Passive Measurement Data

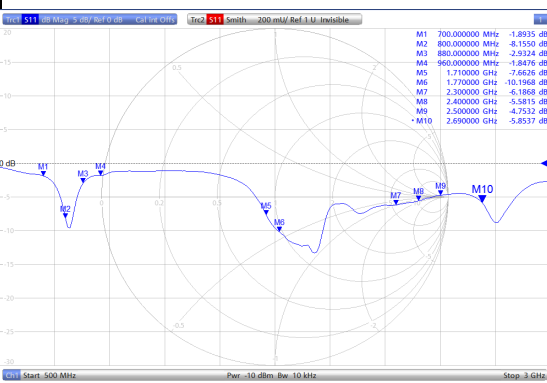
### 6.1 Main Ant



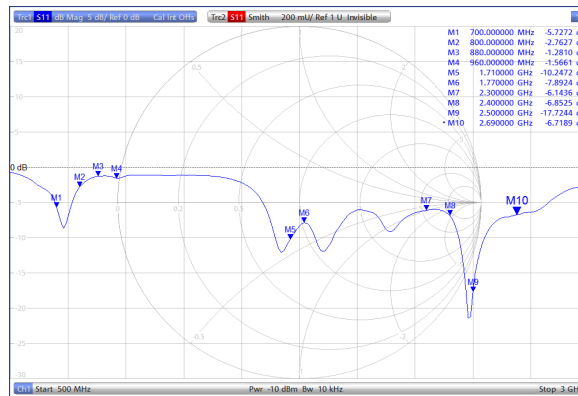
状态1



状态2



状态3



状态4

Fig.1 Return



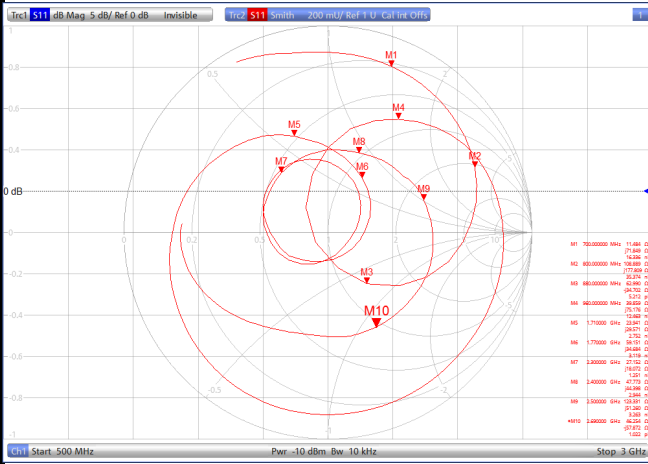
Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

NO. 0

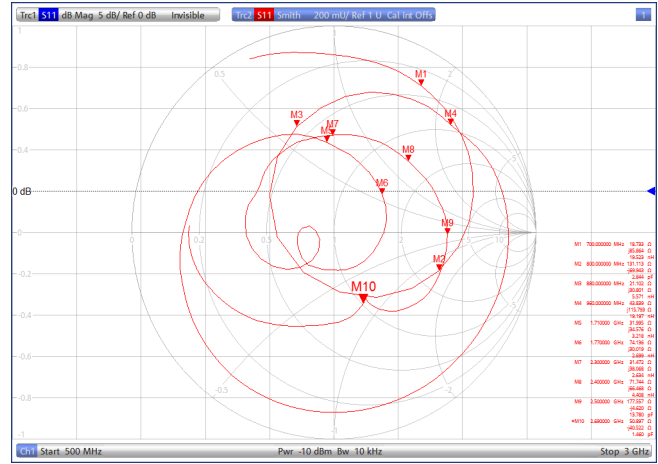
Issue: x4

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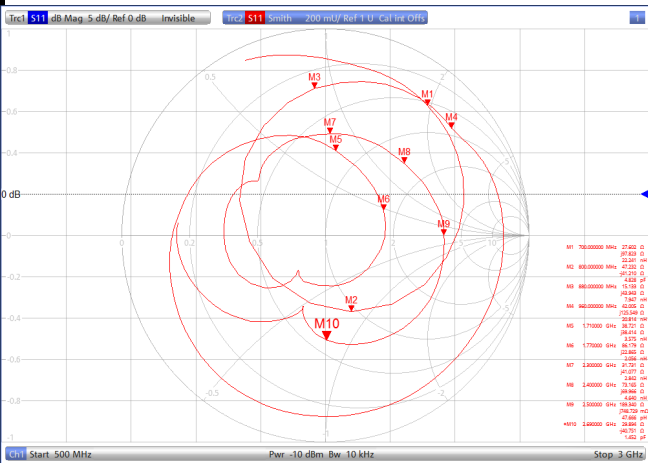
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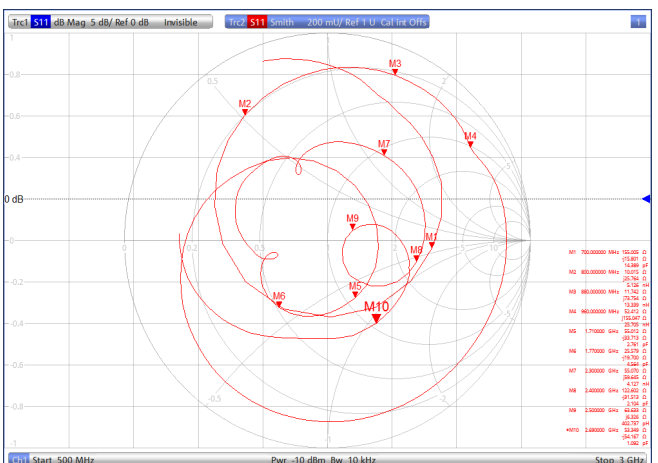
状态1



状态2



状态3



状态4

Fig. 2 Smith Chart

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**DIV antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;**

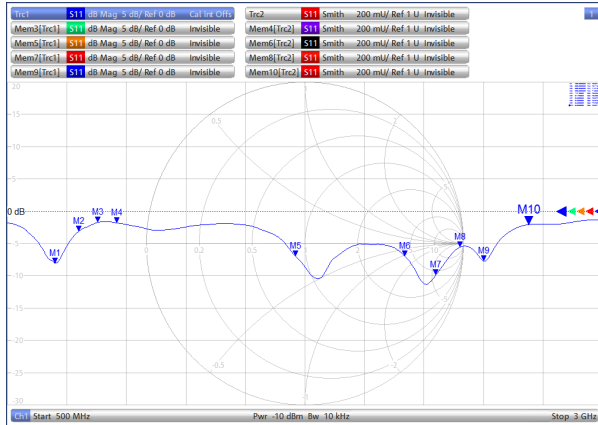
**NO. 0**

**Issue: x4**

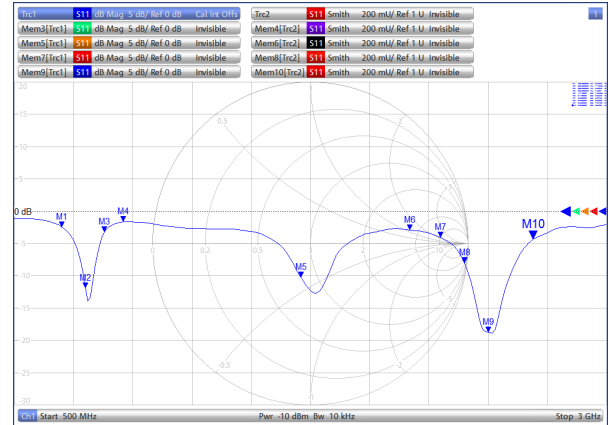
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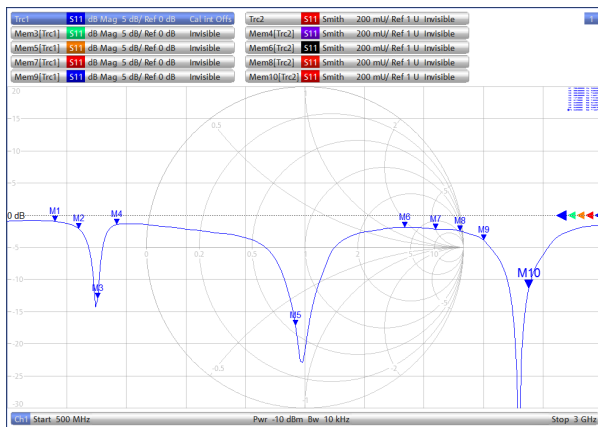
**6.2 Diversity antenna**



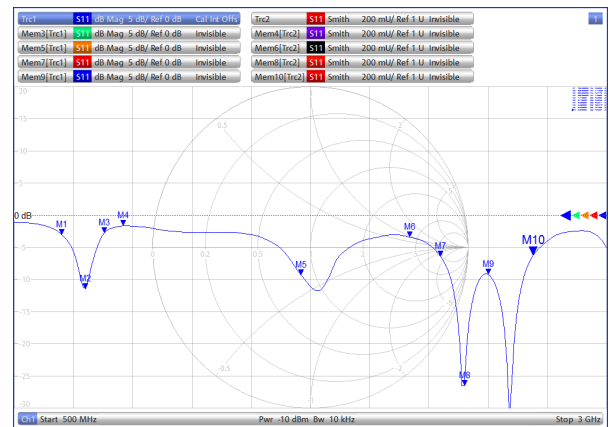
**状态1**



**状态2**



**状态3**



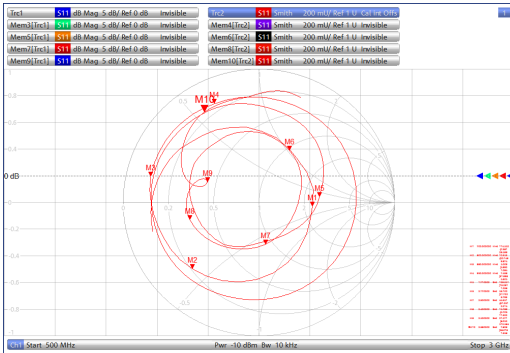
**状态4**

**Fig.1 Return Loss**

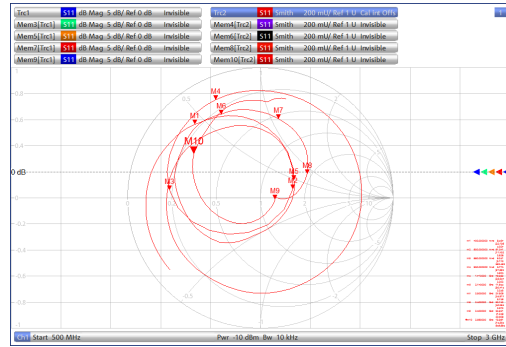
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**DIV antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;**

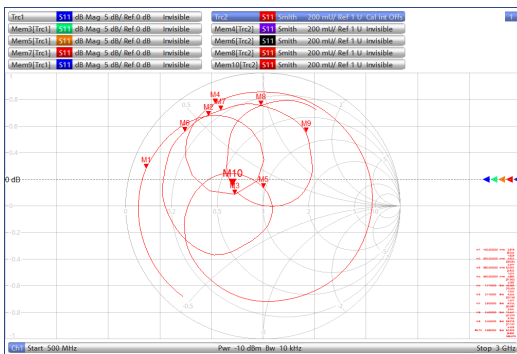
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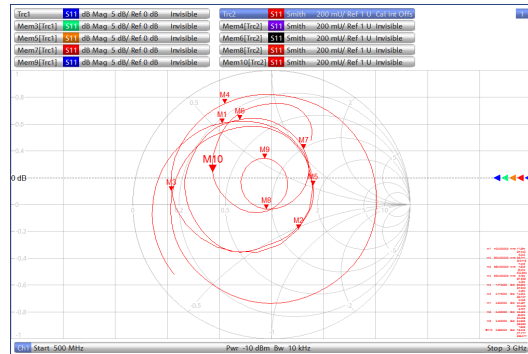
状态1



状态2



状态3



状态4

Fig. 2 smith chart

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GPS&WIFI antenna:GPS,WIFI 2.4G;

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6.3 GPS/BT/WIFI Ant

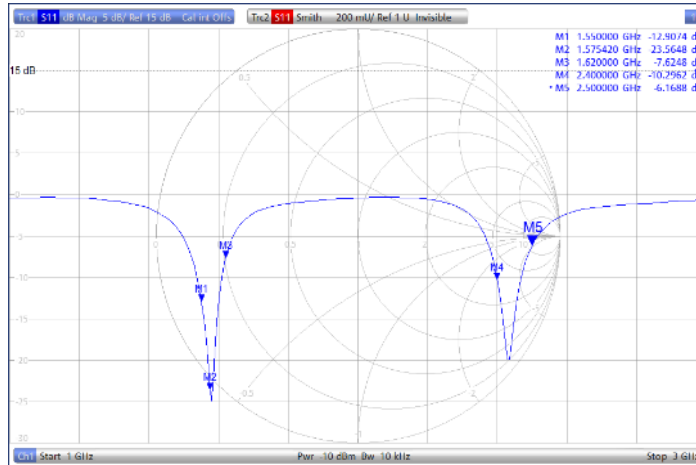


Fig.1 Return Loss

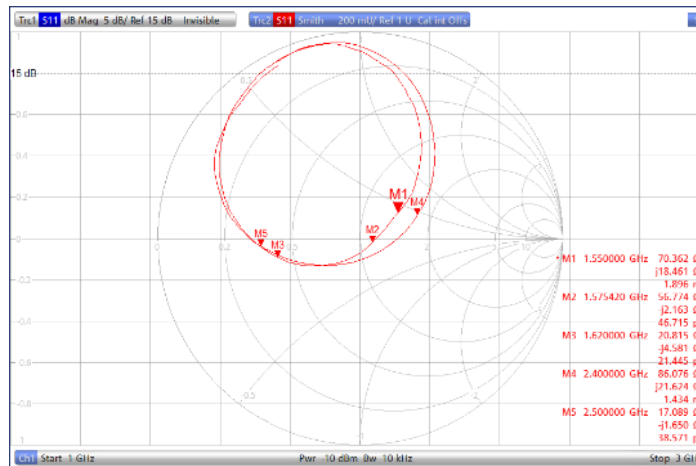


Fig.2 smith chart

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Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

NO.

0

Issue: x4

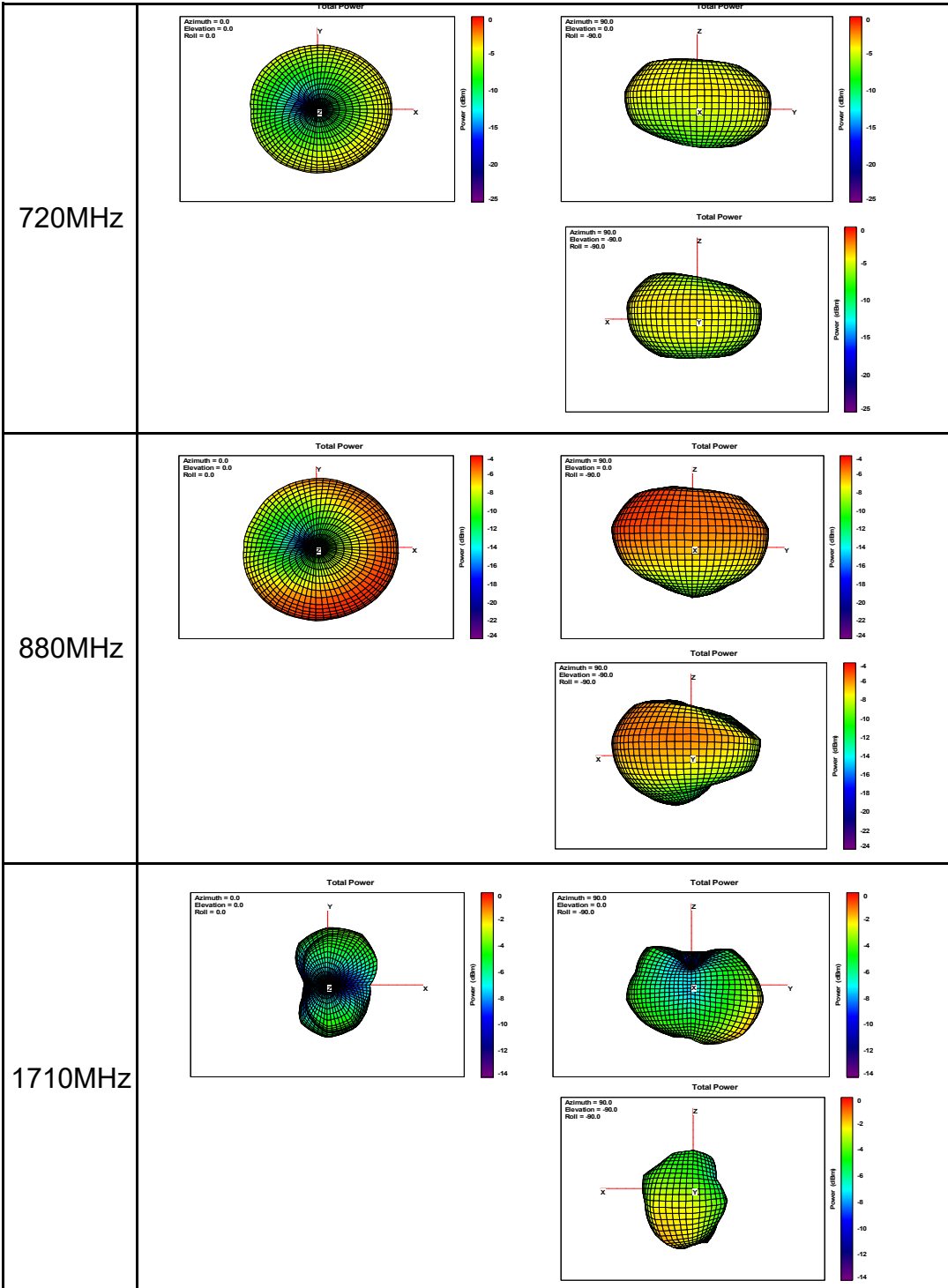
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## 6.4 Radiation Pattern

Main ant



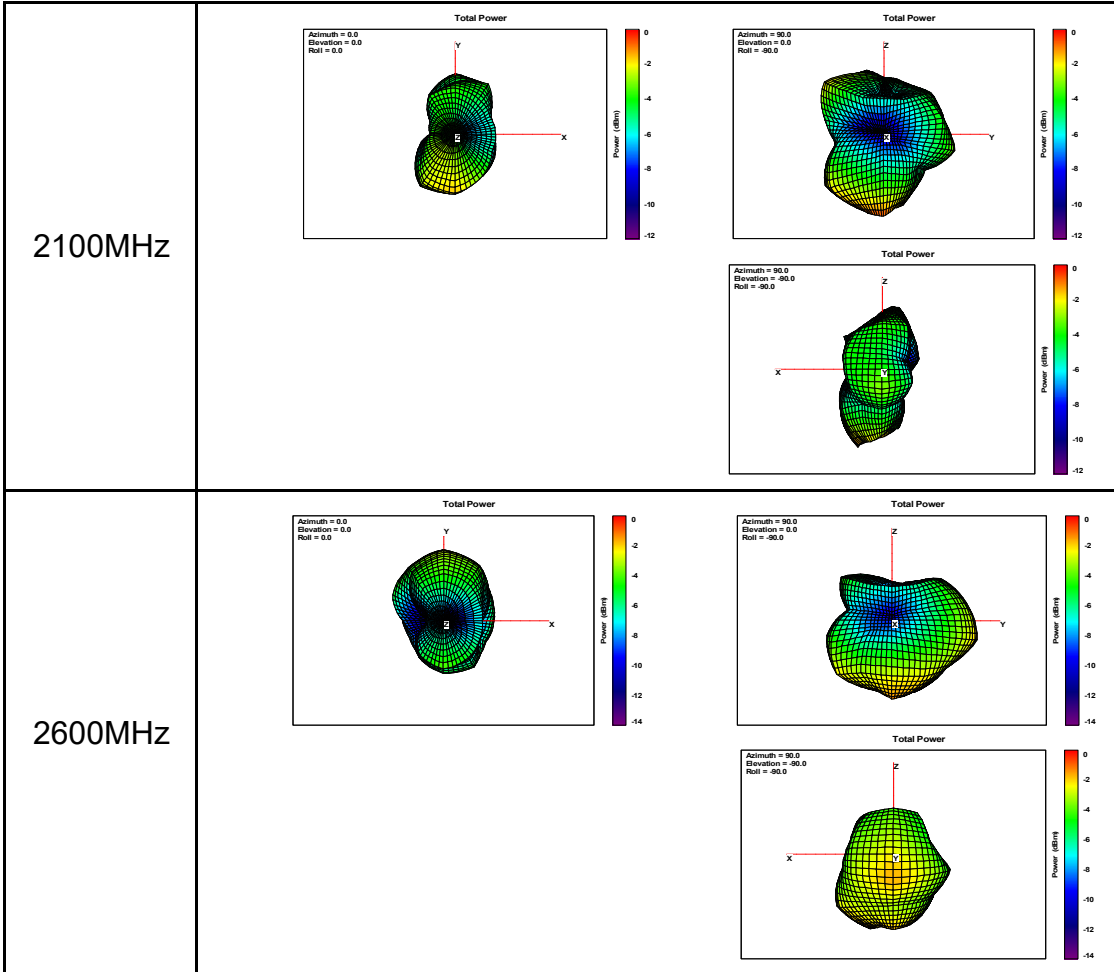
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**Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40**

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**6.4 Radiation Pattern**

Main ant



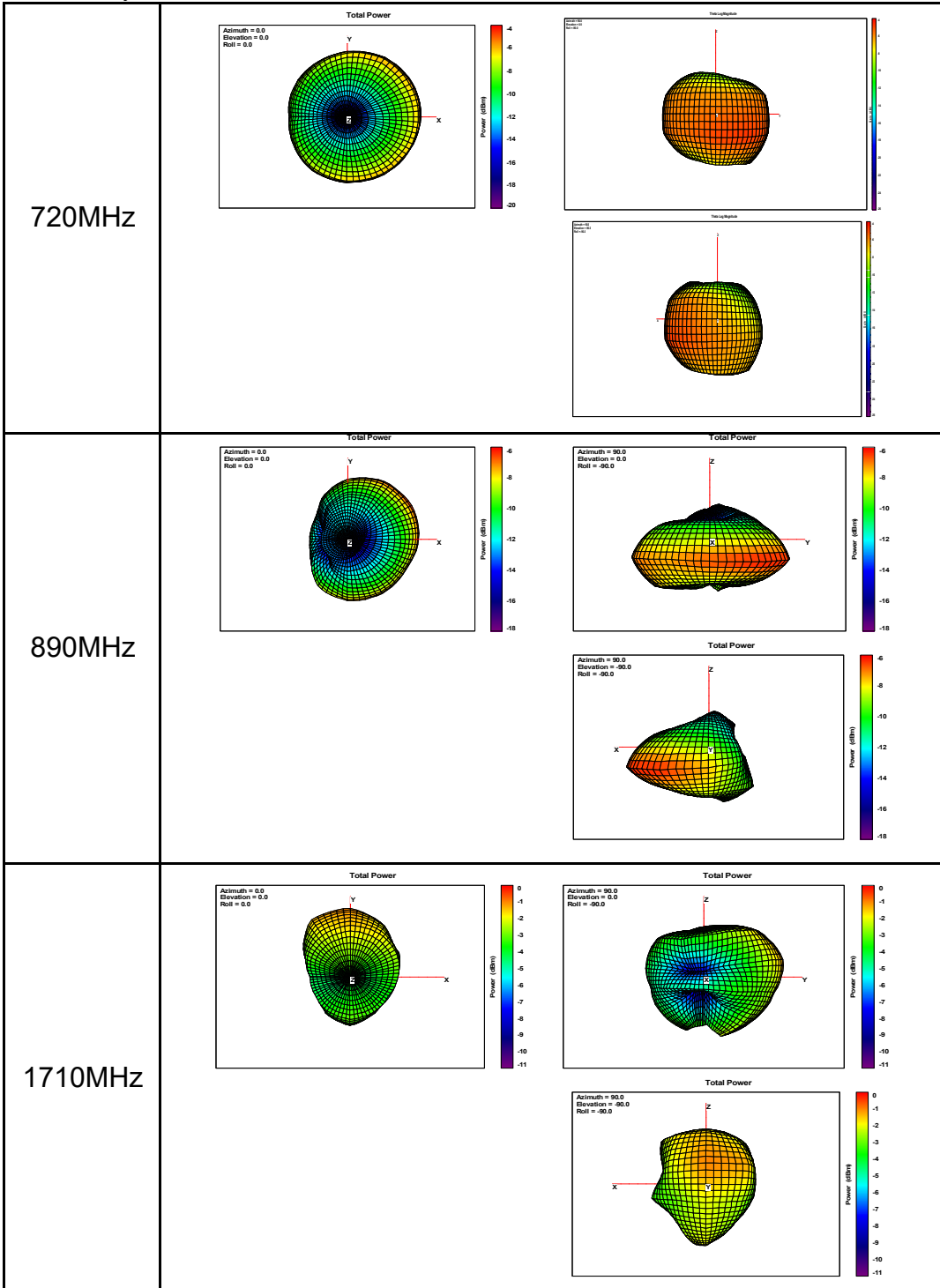


DIV antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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## 6.4 Radiation Pattern

Diversity ant





DIV antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

NO.

0

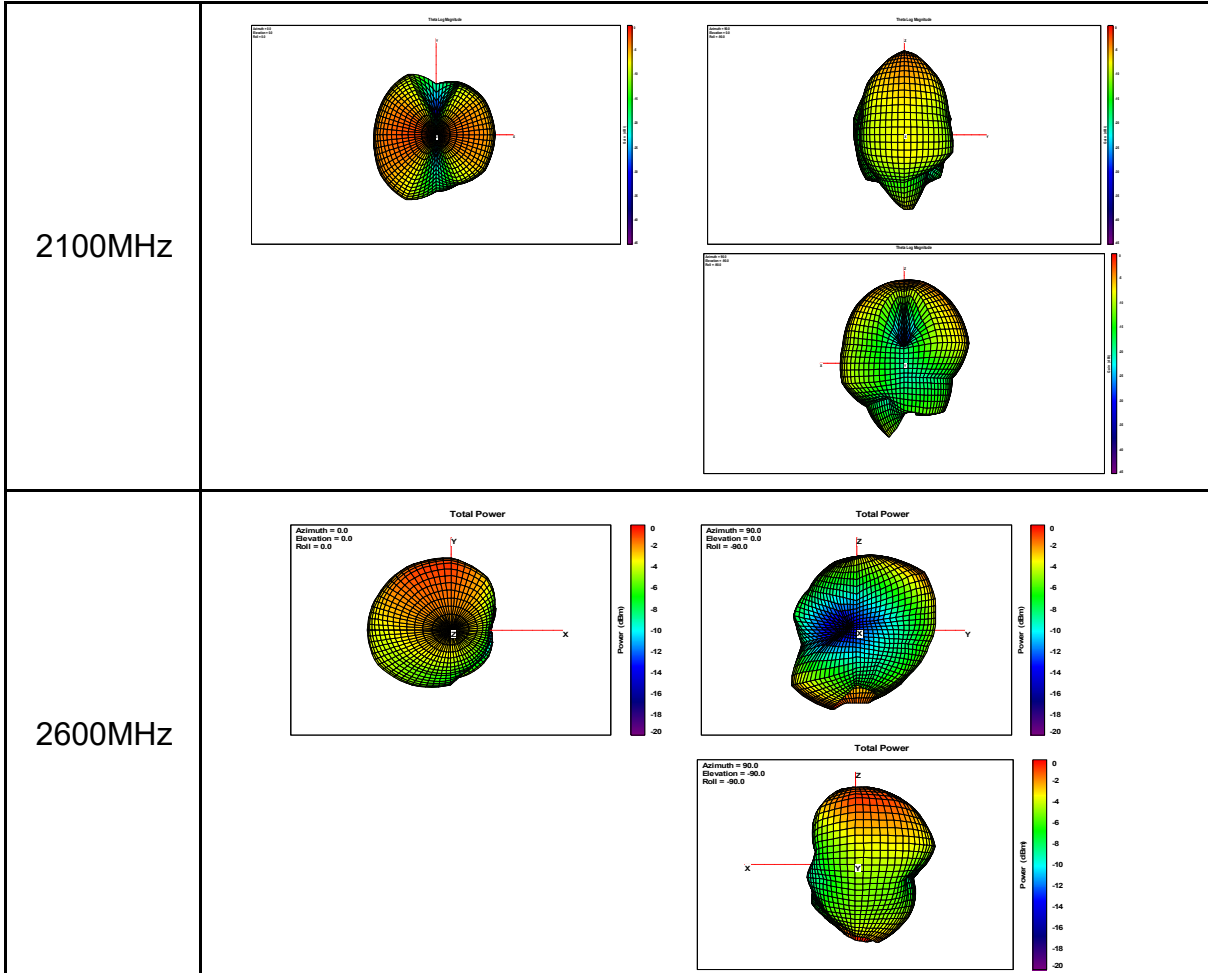
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## 6.4 Radiation Pattern

Diversity ant



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## GPS&WIFI antenna:GPS,WIFI 2.4G;

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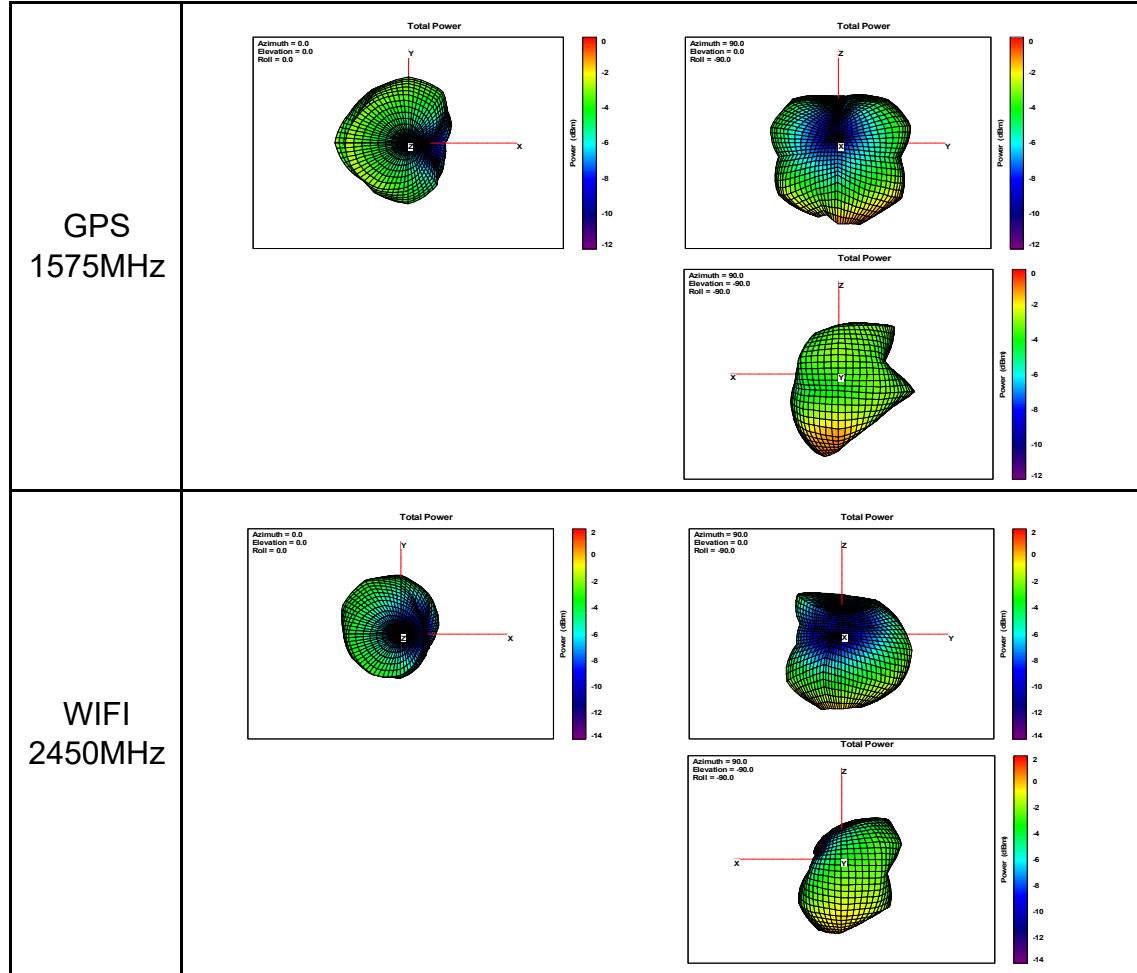
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### 6.4 Radiation Pattern

GPS&wifi ant



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Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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**6.5 Efficiency**

main ant

Fre (MHz)	Eff (dB)	Eff (%)	Peak Gain
700	-7.7	17.2	-4.6
720	-6.3	23.3	-3.7
740	-7.0	20.2	-4.3
760	-7.9	16.3	-5.2
780	-8.0	15.8	-4.8
800	-9.9	10.2	-6.8
820	-8.4	14.4	-4.7
840	-7.8	16.7	-4.4
860	-7.3	18.6	-4.2
880	-7.7	16.9	-4.3
900	-8.8	13.2	-5.3
920	-8.2	15.0	-4.7
940	-8.7	13.5	-5.1
960	-10.0	9.9	-6.3
1710	-5.6	27.7	-1.3
1730	-5.6	27.6	-1.3
1750	-5.3	29.7	-1.2
1770	-4.9	32.6	-0.7
1790	-5.1	30.7	-0.9
1810	-5.3	29.6	-1.0
1830	-5.3	29.8	-1.1
1850	-5.2	30.2	-0.9
1870	-5.3	29.8	-0.9
1890	-4.6	34.8	-0.5
1910	-4.9	32.3	-0.7
1930	-4.7	33.9	-0.3
1950	-4.7	34.3	-0.4
1970	-4.5	35.3	-0.4
1990	-4.5	35.8	-0.1
2010	-4.4	36.4	0.3
2030	-4.0	39.4	0.6
2050	-4.2	37.8	0.3
2070	-4.7	33.8	-0.4
2090	-5.2	30.1	-0.6
2110	-5.8	26.5	-0.7
2130	-5.6	27.4	0.3
2150	-5.7	27.0	0.9
2170	-5.3	29.2	1.6

Fre (MHz)	Eff (dB)	Eff (%)	Peak Gain
2190	-5.3	29.3	1.4
2210	-5.0	31.5	1.3
2230	-4.5	35.2	1.8
2250	-4.5	35.1	1.3
2270	-4.5	35.3	0.5
2290	-4.2	37.8	0.2
2310	-4.6	34.7	-0.6
2330	-4.9	32.0	-1.1
2350	-5.1	31.2	-1.5
2370	-5.3	29.8	-2.0
2390	-5.1	31.0	-1.6
2410	-5.0	31.5	-1.7
2430	-5.0	31.9	-1.6
2450	-5.6	27.7	-2.1
2470	-5.6	27.7	-2.2
2490	-5.6	27.5	-2.1
2510	-5.2	30.0	-0.9
2530	-5.2	30.3	-0.9
2550	-5.3	29.5	-1.3
2570	-5.4	28.6	-1.3
2590	-5.8	26.3	-1.9
2610	-5.9	26.0	-2.5
2630	-5.9	25.5	-2.9
2650	-6.3	23.6	-3.1
2670	-6.2	23.8	-3.3
2690	-6.2	23.7	-2.9

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**6.5 Efficiency**

Diversity ant

Frequency	Eff. (Db)	Eff. (%)	Peak Gain
700	-8.4	14.5	-5.4
720	-7.6	17.2	-4.5
740	-8.3	14.9	-4.9
760	-9.2	12.0	-5.8
780	-7.8	16.8	-4.7
800	-7.7	16.9	-4.1
820	-7.2	19.0	-3.2
840	-7.9	16.3	-4.3
860	-8.1	15.4	-4.4
880	-7.1	19.5	-3.4
900	-7.6	17.3	-3.9
920	-9.7	10.7	-6.1
940	-12.1	6.1	-8.5
960	-13.9	4.0	-10.4
1710	-4.1	39.1	-0.9
1730	-4.0	40.1	-0.4
1750	-3.8	41.8	-0.2
1770	-3.7	42.8	-0.4
1790	-4.1	38.6	-0.9
1810	-4.9	32.7	-1.0
1830	-5.3	29.8	-1.4
1850	-5.9	25.9	-1.4
1870	-5.9	25.9	-1.2
1890	-5.2	30.4	-1.0
1910	-5.4	29.1	-1.4
1930	-5.1	31.0	-1.5
1950	-5.2	30.4	-1.5
1970	-5.2	30.0	-1.6
1990	-5.4	29.0	-1.8
2010	-5.4	29.0	-1.6
2030	-5.0	31.5	-1.3
2050	-5.1	30.8	-1.3
2070	-5.4	28.7	-1.5
2090	-5.6	27.8	-1.5
2110	-5.6	27.4	-1.6
2130	-5.1	30.7	-1.1
2150	-5.1	31.0	-0.7
2170	-5.0	31.7	-0.6

Frequency	Eff. (Db)	Eff. (%)	Peak Gain
2190	-5.2	30.0	-0.6
2210	-5.2	30.1	-0.6
2230	-5.0	31.4	-0.5
2250	-5.4	29.0	-0.3
2270	-5.7	26.7	-1.0
2290	-6.3	23.4	-1.1
2310	-6.6	22.0	-1.5
2330	-6.8	20.9	-1.5
2350	-6.7	21.3	-1.5
2370	-6.8	20.8	-2.1
2390	-6.6	21.9	-2.0
2410	-6.5	22.1	-2.0
2430	-6.7	21.5	-1.8
2450	-7.7	17.2	-2.7
2470	-8.0	15.7	-3.1
2490	-7.1	19.3	-2.2
2510	-6.8	21.1	-1.5
2530	-6.3	23.4	-0.9
2550	-5.9	25.5	-0.6
2570	-5.6	27.5	-0.4
2590	-5.4	29.1	-0.1
2610	-5.0	31.5	0.2
2630	-4.8	33.5	0.7
2650	-5.0	32.0	0.8
2670	-4.9	32.1	1.0
2690	-5.1	31.0	1.1

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GPS&WIFI antenna:GPS,WIFI 2.4G;

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**6.5 Efficiency**

GPS/WIFI

Frequency/ MHZ	Eff (dB)	Eff (%)	Gain (dB)	Upper Hem. Total Radiated
1550	-4.6	34.6	-1.1	-5.0
1560	-4.2	37.8	-0.4	-4.7
1570	-4.3	36.8	-0.4	-4.9
1580	-4.5	35.4	-0.7	-5.2
1590	-4.8	33.5	-0.6	-5.6
1600	-4.9	32.1	-1.1	-5.9
1610	-4.9	32.3	-0.8	-6.1
1620	-4.8	32.8	-0.7	-6.0

2400	-6.0	25.2	-0.6	-7.1
2410	-5.6	27.7	-0.4	-6.7
2420	-5.2	30.2	0.0	-6.3
2430	-4.9	32.5	0.5	-5.9
2440	-4.9	32.7	0.5	-5.9
2450	-5.2	30.4	0.0	-6.2
2460	-5.2	30.3	0.1	-6.2
2470	-5.1	30.6	0.2	-6.1
2480	-5.2	30.5	0.0	-6.1
2490	-5.2	30.3	-0.1	-6.1
2500	-5.2	30.3	-0.2	-6.1



Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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### 7.Active Measurement Data

BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
GSM850	128	23.1	-105.2	DCS1800	512	23.9	-107.3
	190	24.6	-105.4		699	24.8	-107.6
	251	25.0	-102.8		885	24.3	-106.6
GSM900	975	21.3	-104.6	PCS1900	512	25.1	-106.5
	38	23.2	-105.2		661	24.8	-106.8
	124	24.0	-103.4		810	24.9	-106.2
BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
WCDMA B1	9612	18.8	-110.4	WCDMA B5	4132	14.5	-107.3
	9750	18.6	-110.6		4183	15.0	-107.8
	9888	18.3	-109.2		4233	15.5	-106.0
WCDMA B2	9262	18.4	-109.8	WCDMA B8	2712	12.7	-105.7
	9400	18.3	-110.2		2788	14.3	-106.6
	9538	18.8	-109.4		2863	15.4	-105.5
WCDMA B4	1312	17.6	-109.1				
	1413	18.2	-108.5				
	1513	18.2	-108.9				

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Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

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**7.Active Measurement Data**

BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
LTE B1 (10M)	18050	18.9	-97.4	LTE B38 (20M)	37850	16.9	-93.0
	18300	18.6	-97.3		38000	17.3	-92.5
	18550	18.4	-96.4		38150	17.2	-92.0
LTE B2 (10M)	18650	18.3	-97.2	LTE B40 (20M)	38750	17.5	-92.3
	18900	18.1	-96.9		39150	18.4	-93.2
	19150	18.5	-97.0		39550	17.4	-91.9
LTE B3 (10M)	19250	17.4	-97.2	LTE B41 (20M)	39750	17.2	-91.9
	19575	18.2	-97.6		40620	17.2	-92.8
	19900	17.4	-96.5		41490	17.5	-90.7
LTE B4 (10M)	20000	17.4	-95.7				
	20175	18.1	-95.7				
	20350	17.9	-96.7				
LTE B5 (10M)	20450	14.1	-93.4				
	20525	14.8	-94.2				
	20600	15.4	-93.7				
LTE B7 (10M)	20850	17.2	-93.2				
	21100	17.1	-92.9				
	21350	17.1	-93.7				
LTE B8 (10M)	21500	12.4	-94.1				
	21625	14.1	-93.9				
	21750	15.2	-92.0				
LTE B28 (10M)	27260	12.7	-93.7				
	27410	14.7	-92.5				
	27610	15.8	-91.8				



DIV antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40

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7.Active Measurement Data

BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
GSM850	128	23.3	-105.4	DCS1800	512	23.0	-107.8
	190	23.5	-105.4		699	24.5	-107.9
	251	23.6	-103.0		885	24.8	-106.6
GSM900	975	23.7	-102.7	PCS1900	512	25.4	-106.2
	38	24.3	-103.4		661	25.9	-106.7
	124	24.9	-101.4		810	25.4	-106.0
BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
WCDMA B1	9612	17.8	-109.4	WCDMA B5	4132	14.3	-107.1
	9750	17.6	-109.5		4183	15.0	-107.5
	9888	17.4	-108.2		4233	15.9	-106.1
WCDMA B2	9262	18.5	-109.3	WCDMA B8	2712	14.2	-104.6
	9400	18.1	-109.7		2788	15.8	-105.1
	9538	17.9	-109.3		2863	16.4	-103.9
WCDMA B4	1312	16.6	-108.5				
	1413	17.7	-107.8				
	1513	18.3	-108.3				

AAC Confidential Information





DIV antenna:GSM850/900/1800/1900,WCDMA B1/2/4/5/8,FDD-LTE B1/2/3/4/5/7/8/28,TDD-LTE B38/40/41;

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7.Active Measurement Data

BAND	CH	TRP	TIS	BAND	CH	TRP	TIS
LTE B1 (10M)	18050	17.8	-96.4	LTE B38 (20M)	37850	18.1	-89.5
	18300	17.6	-96.6		38000	17.5	-88.9
	18550	17.4	-95.6		38150	16.9	-88.4
LTE B2 (10M)	18650	18.4	-96.8	LTE B40 (20M)	38750	18.2	-91.5
	18900	18.1	-97.4		39150	18.6	-92.5
	19150	17.8	-97.1		39550	18.0	-90.9
LTE B3 (10M)	19250	16.5	-97.4	LTE B41 (20M)	39750	19.5	-87.6
	19575	18.0	-97.9		40620	17.8	-88.4
	19900	18.5	-96.8		41490	15.0	-86.5
LTE B4 (10M)	20000	16.6	-94.5				
	20175	17.7	-94.8				
	20350	18.1	-95.8				
LTE B5 (10M)	20450	14.0	-92.9				
	20525	14.9	-93.7				
	20600	16.0	-92.7				
LTE B7 (10M)	20850	19.6	-91.2				
	21100	19.0	-90.7				
	21350	18.6	-91.3				
LTE B8 (10M)	21500	14.0	-93.9				
	21625	15.7	-94.2				
	21750	16.3	-92.2				
LTE B28 (10M)	27260	12.9	-95.2				
	27410	14.5	-93.8				
	27610	14.5	-92.9				



GPS&WIFI antenna:GPS,WIFI 2.4G;

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**7.Active Measurement Data**

GPS/BT/WIFI ant

BAND	CH	TRP	TIS
		11M	11M
B	1	11.95	-81.13
	7	13.41	-82.39
	13	13.33	-82.48
		6M	54M
G	1	10.86	-68.21
	7	12.13	-69.63
	13	12.09	-69.47

GPS	
TIS	-152.2
TICN	41.6
UHS	-148.9

**8. Antenna measurement spec on RF test jig**

Test band	Reference frequency(MHz)	Spec(MHz)
MAIN	952 / 1067	±15
	1946 / 2622	±25
	3078 / 3499	±35
DIV	981 / 1028	±15
	2185 / 2240	±25
GPS & WIFI2.4 G	1636 / 1738	±15
	2930 / 3101	±25



Main antenna: GSM850/900/1800/1900, WCDMA B1/2/4/5/8, FDD-LTE B1/2/3/4/5/7/8/28, TDD-LTE B38/40/41;

NO.

0

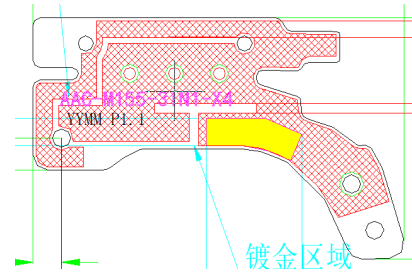
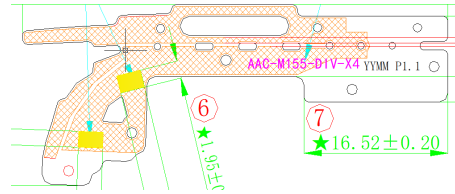
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## 9. Mechanical Layout and Dimensions

### 9.1 Antenna holder mechanical layout and dimensions



\*\* RL spec presented in the table is only valid in AAC measurement condition. The measurement result can be different according to measurement conditions such as place, cable, tester and network analyzer etc. If the measurement condition is changed, make sure that reference frequency should be adjusted again by the provided reference antenna.

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