



Antenna SPEC

Customer: Xiangcheng

Project Name: T0211-AC

Working Band: GSM850/900/1800/1900/WCDMA 1/2/4/5/8/

LTE B1/2/3/4/5/7/12/17/19/25/26/28/38/40/41/66

Sunnyway BOM:

SPEC-Type	Sunnyway P/N
LTE	SH21070IB89-1
BT/WIFI	SH20212IB89-2

R&D	ME:	PM:	Confirm:
	RF:		

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1. PROJECT PICTURES

project pictures shown below:



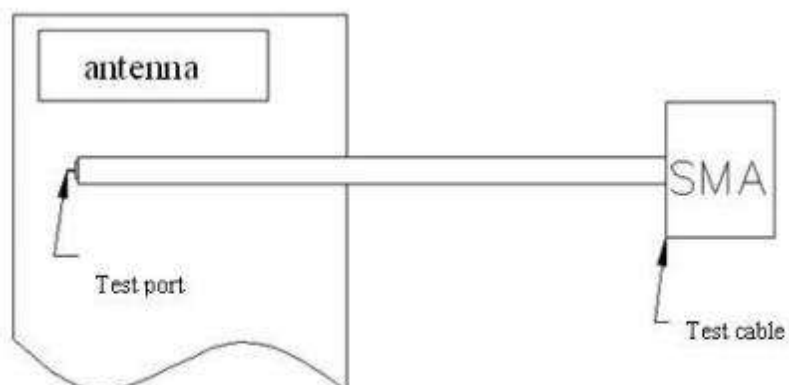
PS:

To ensure that the antenna shipment quality, the final mobile phone Clients validated the antenna's performance, should be kept in our company for at least a year time, facilitate solving antenna amount during abnormal situation,

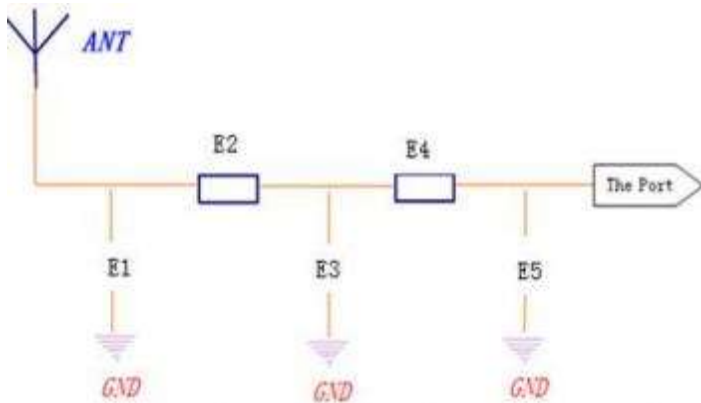
2 . TEST FIXTURE

Purpose: To test antenna passive parameters as accurately as possible.

methods: the fixture is to use a 50 ohm coaxial cable, one end is connected to the pad after the antenna's matching circuit (the front of the antenna switch) , and the other end is connected to the SMA connector.



3. MATCHING CIRCUIT



Element	MAIN Value
E1	N/A
E2	47pF
E3	10nH
E4	1pF
E5	3nH

Switch Configuration

RF1	0Ω	GSM900/PCS1900/W1/2/4/8/FDD1/2/4/25/66/TDD40	American version
RF2	3.9nH	GSM850/W5/FDD5/19/26	
RF3	0Ω	FDD3/DCS1800	
RF4	22nH	FDD7/12/17/28/TDD38/41	

RF1	0Ω	GSM900/PCS1900/W1/8/FDD1/8/TDD34/39/40	Asia Europe version
RF2	3.9nH	GSM850/W5/FDD5/19/20/26	
RF3	0Ω	DCS1800/FDD3	
RF4	22nH	FDD7/28/TDD38/41	

RF1	0Ω	GSM900/PCS1900/W1/8/FDD1/8/TDD39/40	China
RF2	3.9nH	GSM850/FDD5	
RF3	0Ω	DCS1800/FDD3	
RF4	22nH	TDD38/41	

The NFC matching circuit is modified as follows:

Original match		Debug match	
components and parts	numerical value	components and parts	numerical value
L2400/L2401	160NH	L2400/L2401	220NH
C2408/C2415	560pF	C2408/C2415	680pF
C2406/C2417	100pF	C2406/C2417	39pF
C2407/C2416	27pF	C2407/C2416	8.2pF
C2410/C2413	100pF	C2410/C2413	47pF
C2411/C2412	100pF	C2411/C2412	N/A

PS: There's been a change in the matching circuit.

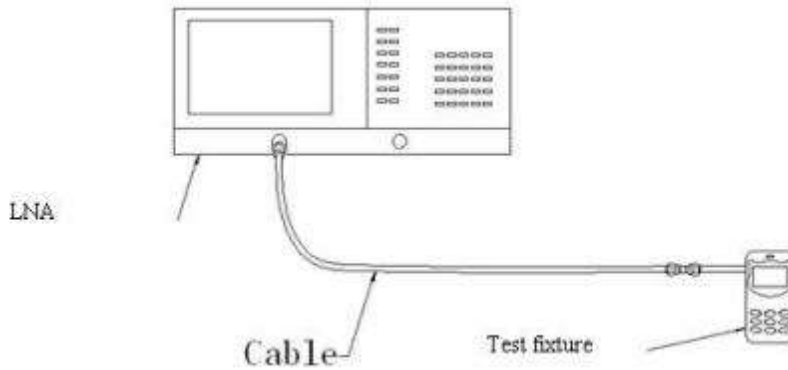
4. S11 test

4.0 S11 test method instructions

Test equipment: LNA(E5062A)

Test method: With a 50 ohm CABLE ,CABLE export from instrument testing port , After the calibration with calibration Key, connected to the SMA connector , Records the return loss and VSWR of the related frequency points.

Test schematic diagram is as follows:



Test schematic diagram

4.1 S11 parameter

● Main antenna

FRq (MHZ)	700	824	960	1710	1880	2170	2300	2690
VSWR	2.8	2.4	6.4	2.2	3.2	2.4	1.9	2.2

Diversity antenna

FRq (MHZ)	824	960	1710	1880	2170	2300	2690
VSWR	4.6	8.5	1.7	2.2	4.3	5.5	1.1

Three in one antenna

FRq (MHZ)	1575	2400	2500
VSWR	1.3	3.1	1.3

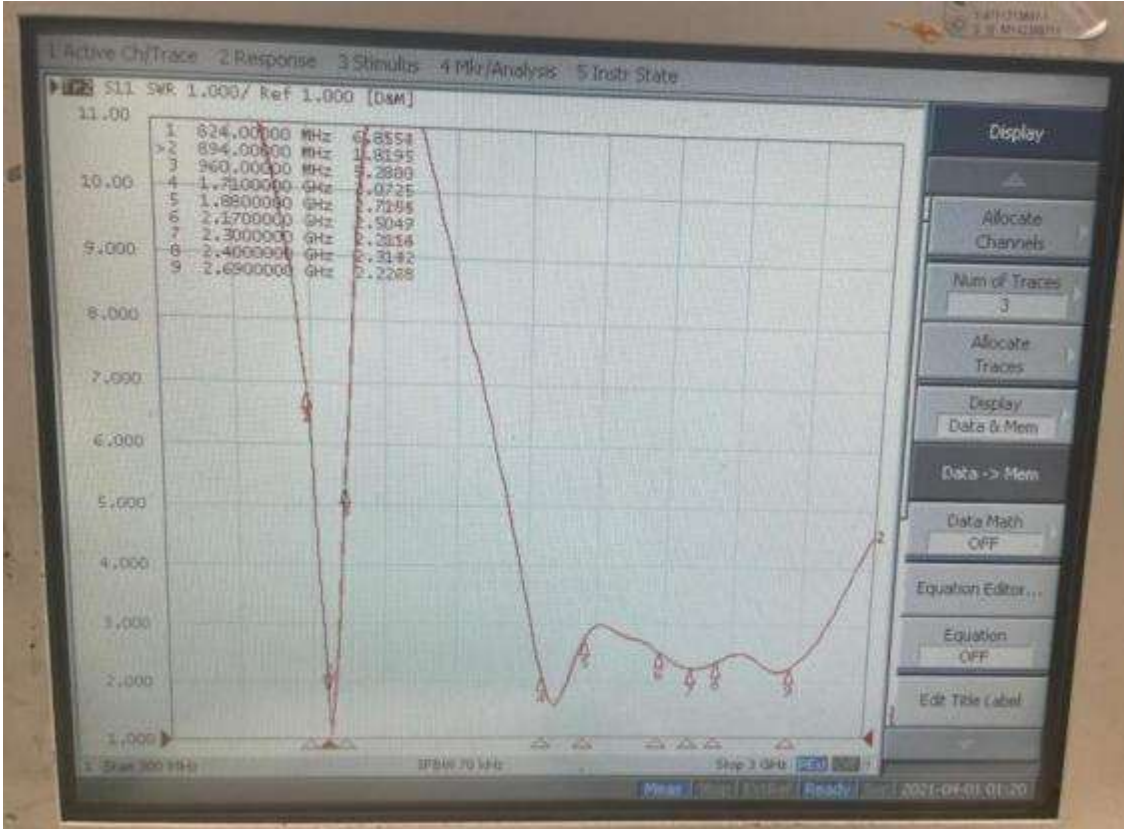
5gwifi antenna

FRq (MHZ)	51800	5.8G
VSWR	2.4	2.1

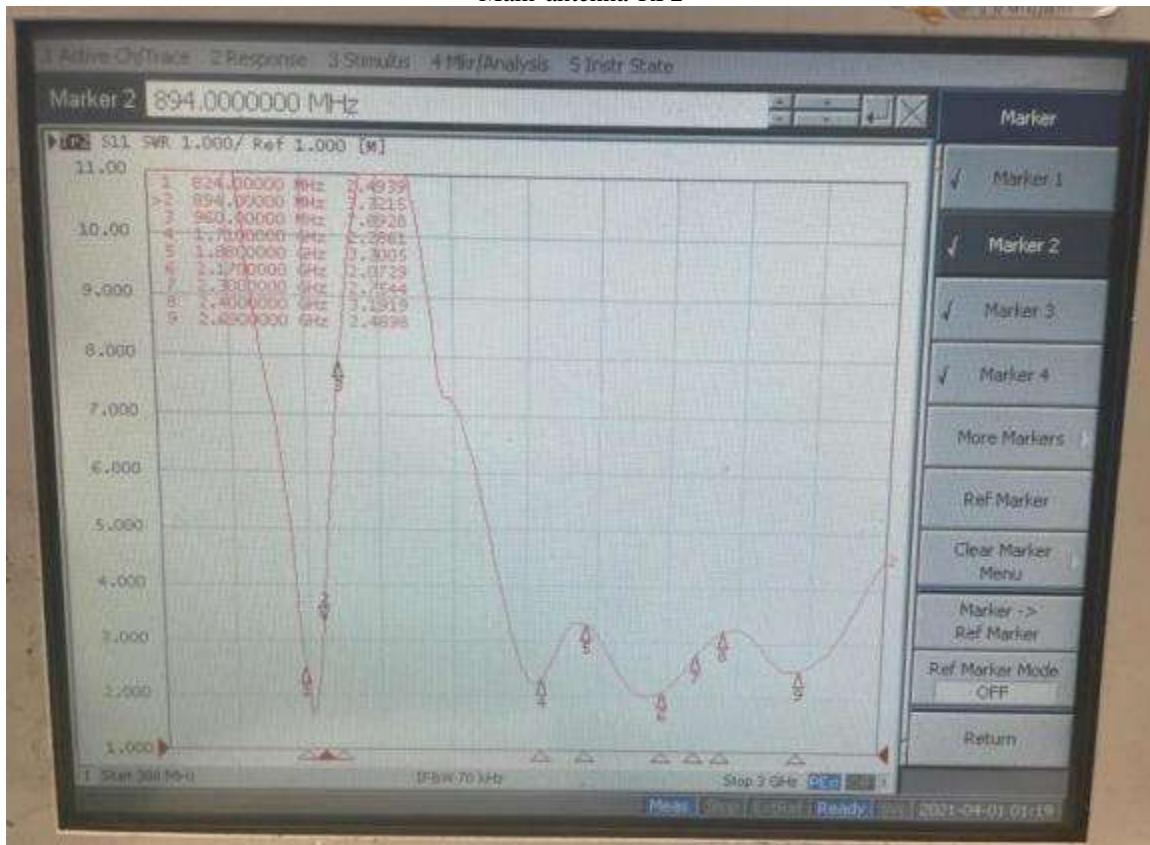
Sunnyway Technology (china) Ltd. Company Antenna Specification

Main antenna S11:

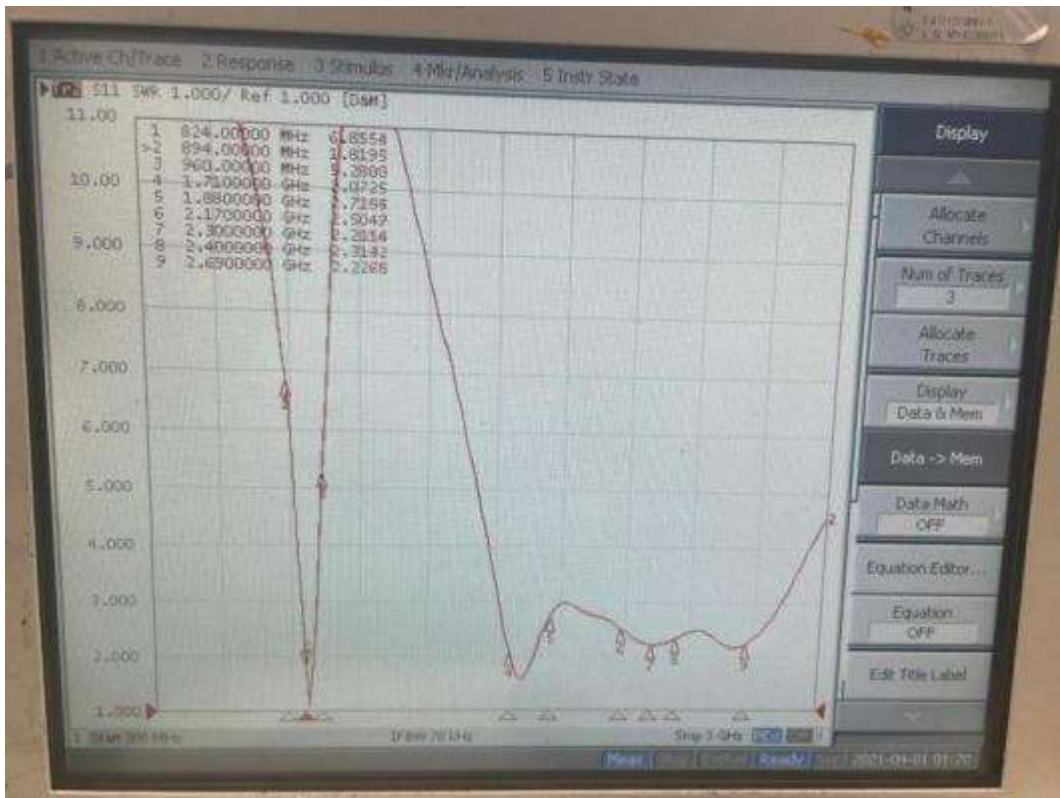
Main antenna RF1



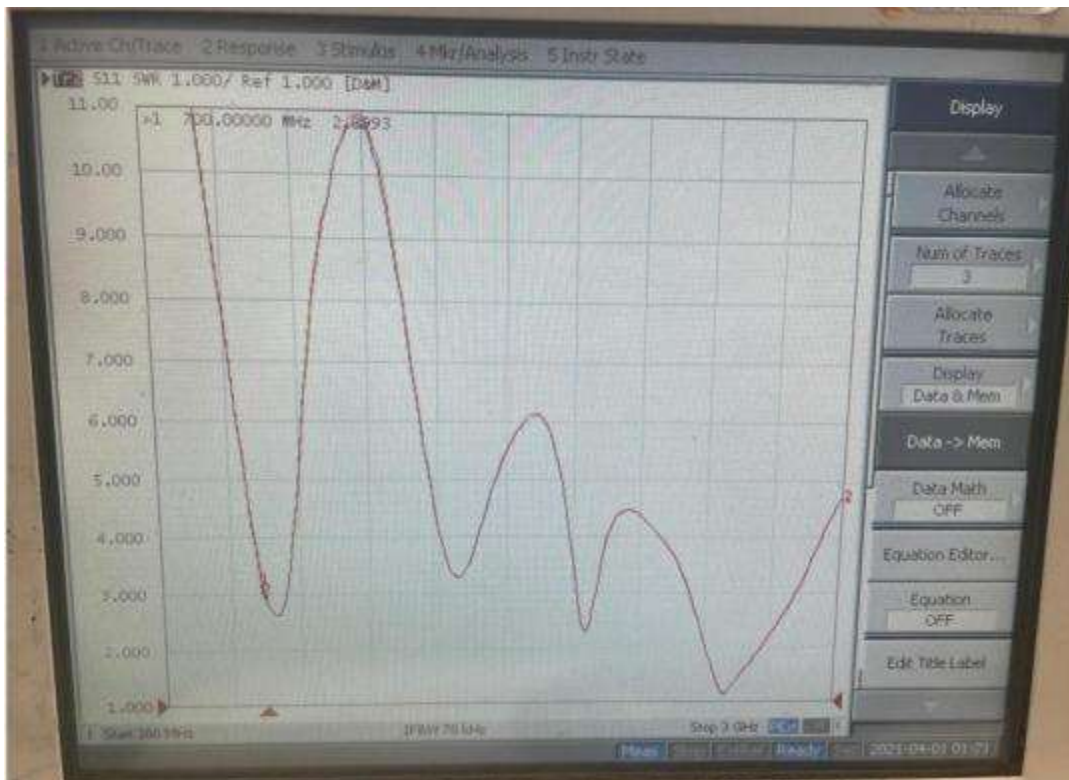
Main antenna RF2



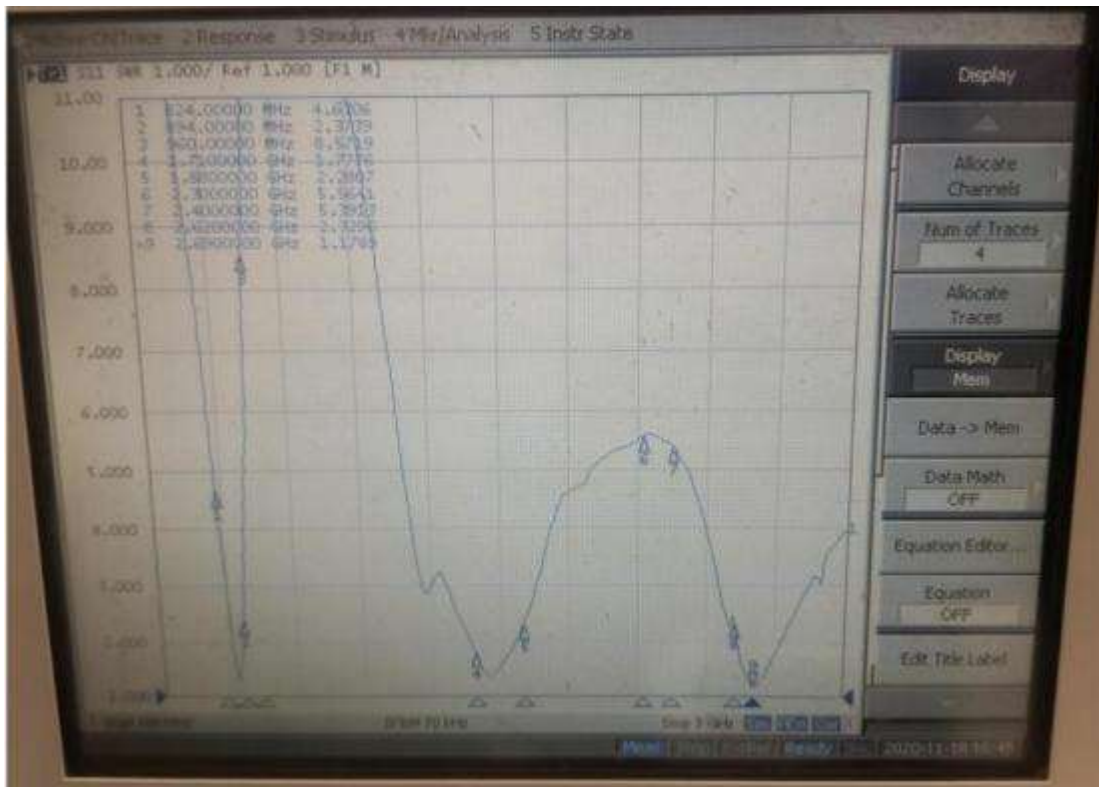
Main antenna RF3



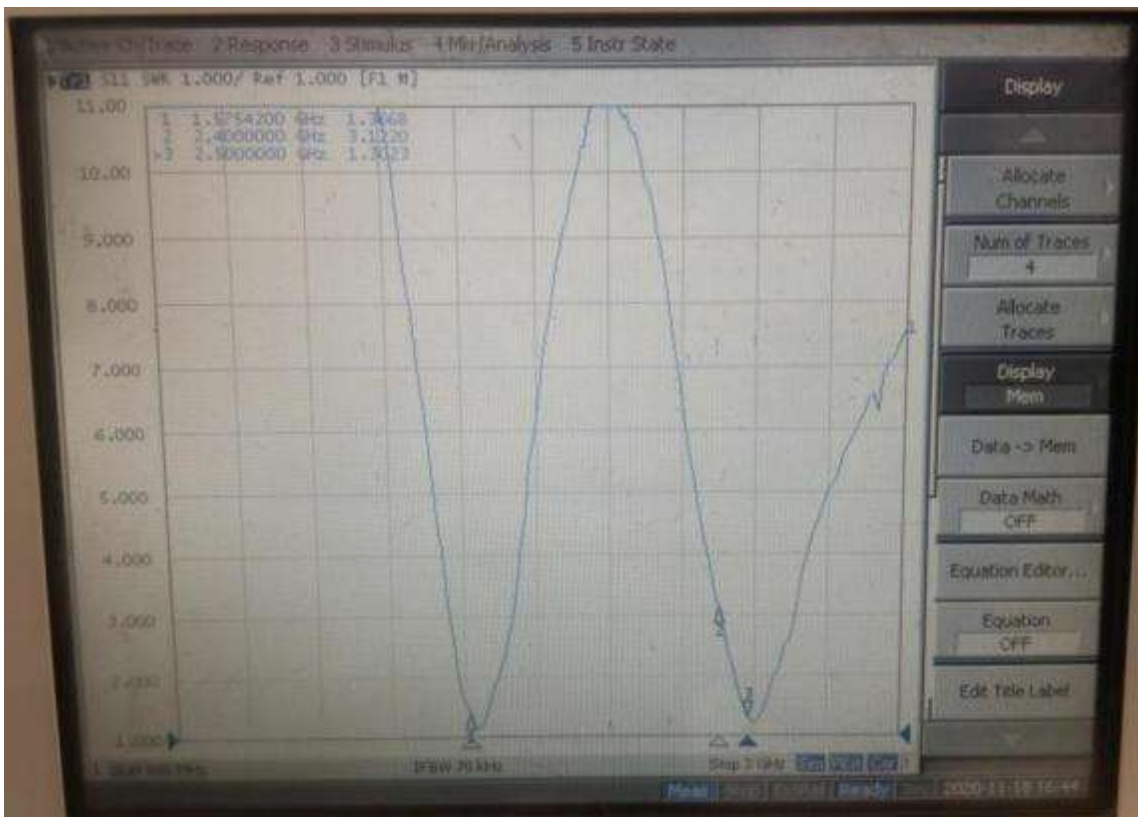
Main antenna RF4



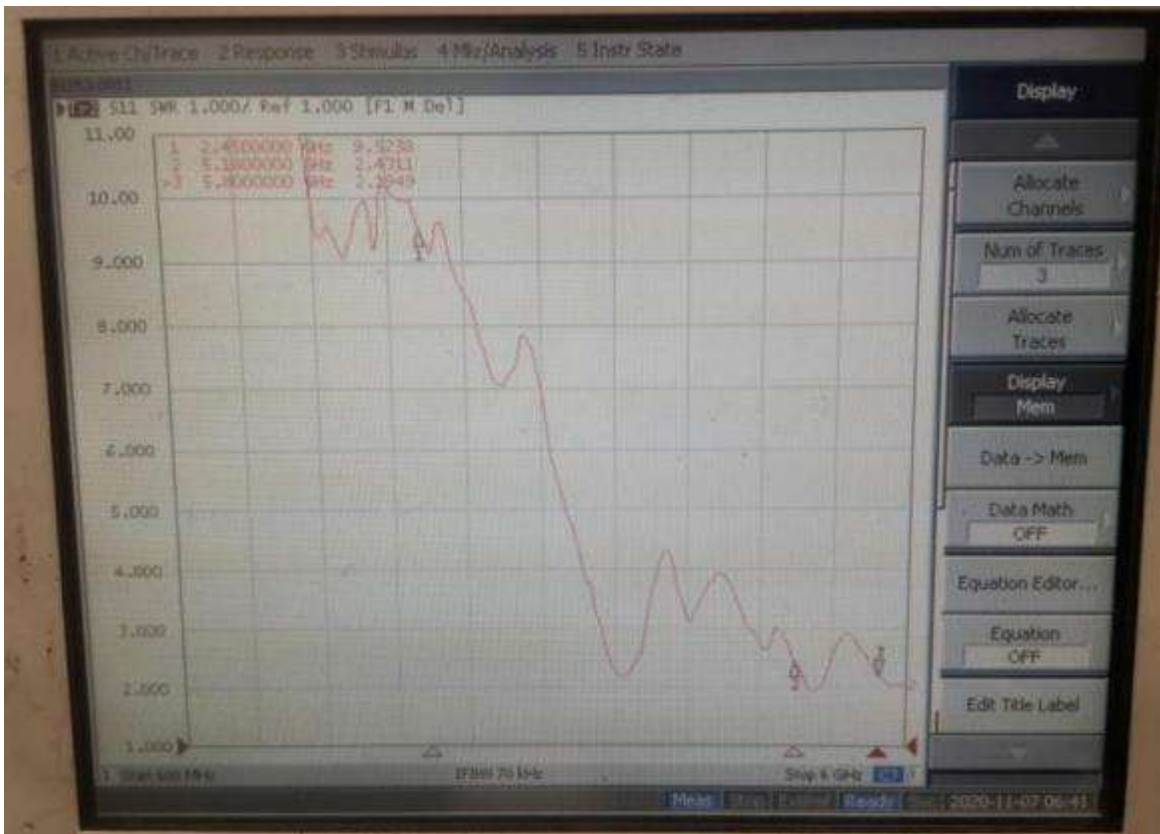
VSWR of diversity antenna



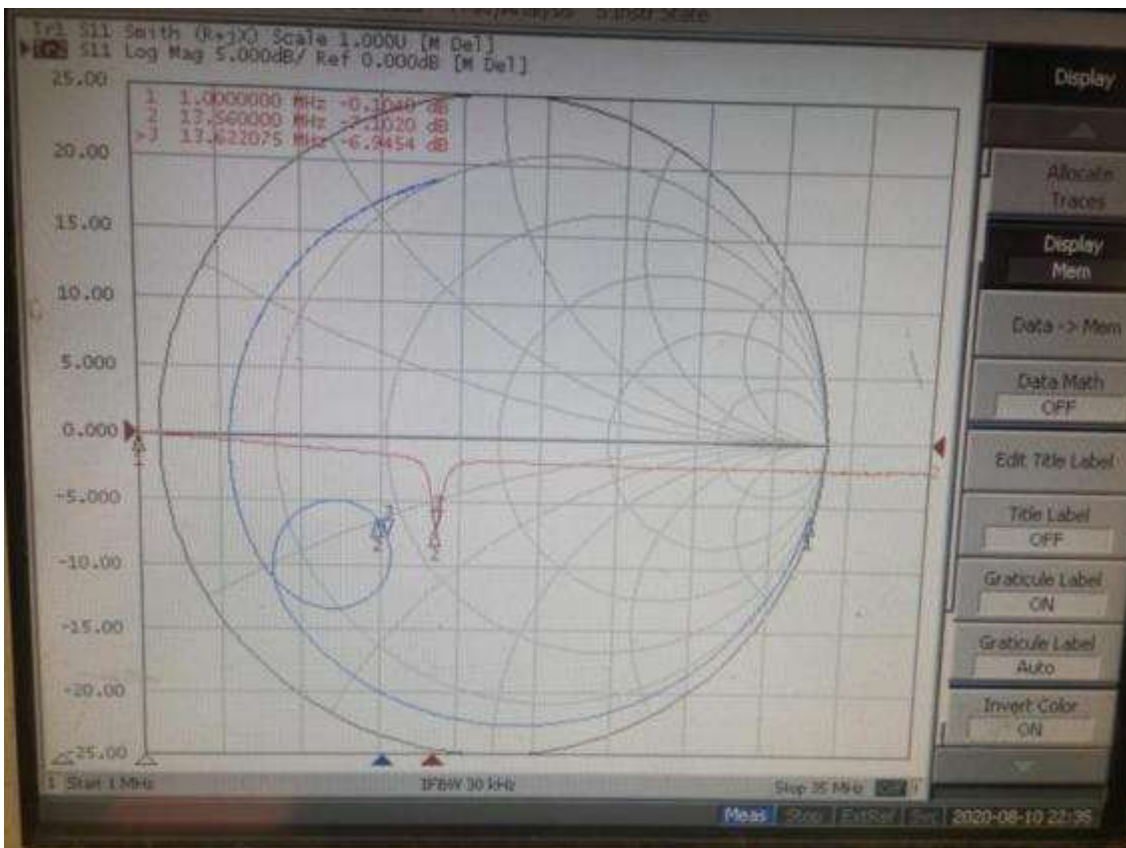
Standing wave ratio of three in one antenna



VSWR of 5G WiFi antenna



NFC antenna



5 ACTIVE OTA TEST DATA**Test equipment**

Test system: chamber

Test environment: the temperature of 22 °C + 3 °C, humidity of 50% plus or minus 15%

Test equipment: use LNA Agilent E5062C to test active status, use CMW500

Active OTA test data is as follows (screening):**American version**

Band	Channel	Results (dBm)	Results (dBm)	Band	Channel	Results (dBm)	Results (dBm)
GSM850	L	26.42		GSM900	L	25.66	
	M	28.23			M	26.57	
	H	28.09	-103.39		H	27.96	-102.03
DCS1800	L	23.09		PCS1900	L	23.95	
	M	22.52			M	25.48	
	H	23.02	-103.5		H	25.29	-104.53
WCDMA 1	L	19.24		WCDMA 2	L	17.71	
	M	19.03			M	18.29	
	H	18.64	-109.53		H	18.34	-107.29
WCDMA 4	L	16.69		WCDMA 5	L	16.42	
	M	16.99			M	17.01	
	H	17.14	-108.2		H	17.18	-105.19
WCDMA 8	L	16.24		LTE FDD Band 1	L	19.53	
	M	16.36			M	19.11	
	H	16.36	-102.1		H	18.36	-95.43
LTE FDD Band 2	L	18.93		LTE FDD Band 3	L	17.47	
	M	19.32			M	17.22	
	H	19.18	-97.43		H	17.67	-95.47
LTE FDD Band 4	L	17.61		LTE FDD Band 5	L	15.88	
	M	17.5			M	16.92	
	H	17.04	-94.25		H	16.86	-90.12
LTE FDD Band 7	L	19.49		LTE FDD Band 12	L	16.21	
	M	19.37			M	16.74	
	H	18.57	-97.25		H	18.06	-90.55
LTE FDD Band 17	L	15.93		LTE FDD Band 19	L	16.12	
	M	16.49			M	16.79	
	H	16.88	-91.23		H	17.08	-90.21
LTE FDD Band 25	L	19.36		LTE FDD Band 26	L	15.74	
	M	19.91			M	16.18	

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	H	19.94	-97.75		H	18.23	-91.47
LTE FDD Band 28	L	16.43		LTE FDD Band 38	L	19.06	
	M	18.23			M	19.29	
	H	19.24	-94.57		H	19.18	-94.34
LTE FDD Band 40	L	20.54		LTE FDD Band 41	L	19.78	
	M	20.36			M	20.16	
	H	20.21	-94.34		H	19.71	-93.78
LTE FDD Band 66	L	17.56					
	M	17.47					
	H	17.57	-96.38				

(American version) 2.4G+5GWIFIActive data

Band	Channel	TRP (dBm)	TIS (dBm)
802.11b(11Mbps)	1	16.07	
	6	16.20	
	11	16.13	-83.79
Band	Channel	TRP (dBm)	TIS (dBm)
802.11g(54Mbps)	1	13.80	
	6	15.07	
	11	14.83	-75.27
Band	Channel	TRP (dBm)	TIS (dBm)
802.11n(MCS7-65Mbps)	1	14.26	
	6	14.49	
	11	13.14	-71.19
Band	Channel	TRP (dBm)	TIS (dBm)
802.11a(54Mbps)	36	12.20	
	157	12.37	
	165	12.87	-70.96
GPS	-147.19dBm		

Asia Europe version

	CH	TRP(dBm)	TIS(dBm)		CH	TRP(dBm)	TIS(dBm)
GSM850	L	27.15		GSM900	L	26.54	
	M	27.96			M	27.24	
	H	28.31	-104.36		H	26.12	-102.03
DCS1800	L	23.24		PCS1900	L	24.46	
	M	23.11			M	24.89	
	H	24.22	-103.56		H	24.53	-104.22
WCDMA 1	L	17.95		WCDMA 5	L	16.78	
	M	18.09			M	17.77	
	H	18.35	-108.16		H	17.34	-106.53
WCDMA 8	L	16.09		TD-A	L	18.35	
	M	16.72			M	18.62	
	H	16.11	-102.61		H	18.48	-107.85
TD-F	L	17.52		LTE FDD Band 1	L	17.89	
	M	17.86			M	17.82	
	H	18.39	-106.73		H	18.31	-94.98
LTE FDD Band 3	L	17.18		LTE FDD Band 5	L	17.12	
	M	18.02			M	17.84	
	H	18.71	-95.32		H	17.22	-90.94
LTE FDD Band 7	L	18.77		LTE FDD Band 8	L	19.12	
	M	18.99			M	17.25	
	H	18.93	-98.75		H	16.21	-89.43
LTE FDD Band 19	L	17.5		LTE FDD Band 20	L	18.68	
	M	17.81			M	18.85	
	H	17.72	-90.90		H	15.66	-95.08
LTE FDD Band 26	L	17.65		LTE FDD Band 28	L	16.4	
	M	17.6			M	17.98	
	H	18.75	-95.11		H	18.85	-92.97
LTE FDD Band 34	L	17.01		LTE FDD Band 38	L	18.03	
	M	17.1			M	17.91	
	H	17.09	-91.38		H	17.88	-89.89
LTE FDD Band 39	L	18.91		LTE FDD Band 40	L	19.96	
	M	18.56			M	19.85	
	H	18.14	-92.06		H	19.84	-91.31
LTE FDD Band 41	L	19.21					
	M	19.11					
	H	18.81	-93.71				

(Asia Europe version) 2.4G+5GWIFIActive data

Band	Channel	TRP (dBm)	TIS (dBm)
802.11b(11Mbps)	1	15.58	
	6	15.58	
	11	15.81	-83.56
Band	Channel	TRP (dBm)	TIS (dBm)
802.11g(54Mbps)	1	13.37	
	6	14.54	
	11	14.50	-76.90
Band	Channel	TRP (dBm)	TIS (dBm)
802.11n(MCS7-65Mbps)	1	14.78	
	6	14.45	
	11	13.00	-72.87
Band	Channel	TRP (dBm)	TIS (dBm)
802.11a(54Mbps)	36	12.76	
	157	11.16	
	165	12.30	-74.12
GPS	-146.85dBm		

China

	CH	TRP(dBm)	TIS(dBm)		CH	TRP(dBm)	TIS(dBm)
GSM850	L	26.13		GSM900	L	26.75	
	M	27.07			M	27.02	
	H	27.7	-102.9		H	26.13	-102.1
DCS1800	L	23.44		PCS1900	L	25.2	
	M	23.23			M	24.48	
	H	23.68	-104.22		H	24.11	-104.75
WCDMA 1	L	18.14		WCDMA 8	L	16.91	
	M	18.33			M	17.4	
	H	18.77	-107.64		H	16.64	-102.05
TD-A	L	18.35		TD-F	L	17.52	
	M	18.62			M	17.86	
	H	18.48	-107.85		H	18.39	-106.73
LTE FDD Band 1	L	17.61		LTE FDD Band 3	L	18.27	
	M	17.74			M	18.98	
	H	18.03	-95.38		H	20.3	-95.84
LTE FDD Band 5	L	17.41		LTE FDD Band 8	L	16.58	
	M	17.87			M	17.3	
	H	17.52	-92.1		H	17.14	-90.08
LTE FDD Band 38	L	18.44		LTE FDD Band 39	L	18.83	
	M	18.23			M	18.87	
	H	18.32	-93.54		H	18.51	-91.98
LTE FDD Band 40	L	19.61		LTE FDD Band 41	L	19.8	
	M	18.87			M	19.22	
	H	18.51	-90.04		H	18.39	-93.95

(China) 2.4G+5GWIFIActive data

Band	Channel	TRP (dBm)	TIS (dBm)
802.11b(11Mbps)	1	15.12	
	6	15.33	
	11	15.31	-84.08
Band	Channel	TRP (dBm)	TIS (dBm)
802.11g(54Mbps)	1	12.87	
	6	14.42	
	11	14.14	-73.61
Band	Channel	TRP (dBm)	TIS (dBm)
802.11n(MCS7-65Mbps)	1	13.65	
	6	13.72	
	11	12.25	-70.79
Band	Channel	TRP (dBm)	TIS (dBm)
802.11a(54Mbps)	36	12.62	
	157	13.12	
	165	14.29	-74.46
GPS	-147.18dBm		

Actual test distance of NFC antenna

Reader response distance	A:4 ~8cm ; B:2 ~8cm		
	Sample 1	Sample 2	result
M1-S50(A)	5.2		
身份证(B)	4		
Felica/ISO18092(A)	6.5		
Mifare/UltraLight(A)	5.8		
Mifare_Pro(A)	4.3		
M_Desfire(A)	5.6		
M1S70(A)	5.9		
ISO15693(A)	8.2		
Mifare/UltraLightC(A)	5.8		
Mifare_Plus(A)	5.2		

Passive efficiency is as follows:**RF1**

Freq	Effi	Effi	Freq	Effi	Effi	Freq	Effi	Effi
(MHz)	(%)	(dBi)	(MHz)	(%)	(dBi)	(MHz)	(%)	(dBi)
880	25.47	-0.99	2130	37.37	-0.6	2460	33.78	1.4
890	26.4	-1.12	2140	37.96	-0.48	2470	35.27	0.59
900	27.87	-1.09	2150	38.82	-0.37	2480	34.16	0.73
910	28.11	-0.5	2160	38.22	-0.45			
920	30.51	-0.76	2170	37.19	-0.67			
930	31.55	-0.71	2180	37.62	-0.79			
940	31.92	-0.75	2190	37.59	-0.92			
950	30.36	-0.81	2200	38.37	-1.1			
960	28.73	-0.91	2210	37.68	-1.06			
1890	34.65	-1.49	2220	37.75	-1.01			
1900	33.35	-1.28	2230	37.61	-0.86			
1910	32.93	-1.12	2240	37.75	-0.71			
1920	35.48	-1.89	2250	38.17	-0.64			
1930	37.58	-0.74	2260	40.02	-0.78			
1940	37.17	-0.53	2270	39.38	-1.06			
1950	38.5	-0.35	2280	36.96	-1.25			
1960	37.06	-0.09	2290	36.92	-1.44			
1970	35.81	0.04	2300	34.05	-0.65			
1980	36.99	0.11	2310	35.24	-0.41			
1990	33.61	0.15	2320	36.05	0.13			
2000	34.7	0.1	2330	37.27	-0.04			
2010	35.24	-0.07	2340	37.09	-0.5			
2020	35.51	-0.3	2350	36.84	-0.14			
2030	36.04	-0.32	2360	37.94	0.2			
2040	34.99	-0.28	2370	37.08	0.57			
2050	35.48	-0.21	2380	36.41	0.25			
2060	33.95	-0.29	2390	35.36	0.01			
2070	33.39	-0.31	2400	37.04	0.2			
2080	34.51	-0.35	2410	36.05	0.4			
2090	34.82	-0.41	2420	33.55	1.55			
2100	36.51	-0.55	2430	31.77	1.79			
2110	35.39	-0.84	2440	35.79	1.97			
2120	37.08	-0.77	2450	32.96	1.22			

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RF2			RF3			RF4		
Freq	Effi	Effi	Freq	Effi	Effi	Freq	Effi	Effi
(MHz)	(%)	(dBi)	(MHz)	(%)	(dBi)	(MHz)	(%)	(dBi)
820	28.99	-0.68	1710	30.73	-1.89	700	25.04	-2.85
830	31.68	-0.58	1720	30.83	-1.75	710	25.7	-1.49
840	32.35	-0.46	1730	30.73	-1.82	720	26.11	-2.41
850	32.99	-0.93	1740	31.67	-1.64	730	26.8	-2.75
860	33.35	-0.28	1750	31.4	-1.15	740	26.44	-3.12
870	32.25	-0.18	1760	31.57	-1.95	750	26.34	-2.98
880	30.95	-0.41	1770	33.27	-2.09	760	25.74	-3.25
890	30.36	-0.42	1780	32.92	-2.04	770	25.64	-3.46
			1790	34.11	-2.18	780	24.33	-3.85
			1800	34.89	-0.1	790	24.84	-3.69
			1810	34.74	0	800	23.73	-4.05
			1820	35.59	-0.07	2510	35	-0.7
			1830	34.75	-0.32	2520	35.81	0.72
			1840	32.71	-0.36	2530	37.03	-0.75
			1850	31.65	-1.12	2540	36.85	-1.01
			1860	32.32	-1.22	2550	36.6	-1.2
			1870	33.02	-1.27	2560	37.7	-1.4
			1880	36.14	-1.35	2570	36.84	-0.22
						2580	36.17	0.72
						2590	35.12	-1.22
						2600	36.8	-1.4
						2610	35.81	-1.86
						2620	33.31	-1.56
						2630	30.73	-0.82
						2640	34.75	-1.13
						2650	31.92	-0.52
						2660	33.24	-0.86
						2670	33.01	-0.72
						2680	30.92	-0.28
						2690	30.92	-0.49

The passive efficiency of diversity antenna is as follows:

Freq (MHz)	Effi (%)	Effi (dBi)	Freq (MHz)	Effi (%)	Effi (dBi)	Freq (MHz)	Effi (%)	Effi (dBi)	Freq (MHz)	Effi (%)	Effi (dBi)
820	11.88	-0.22	1880	22.2	-0.75	2190	28.74	0.09	2510	14.41	-2.96
830	13.24	-0.37	1890	23.34	-0.93	2200	28.35	0.02	2520	14.24	-3.11
840	13.82	-0.46	1900	23.44	-1.12	2210	29.12	0.11	2530	13.52	-2.94
850	14.75	-0.36	1910	24.6	-1.06	2220	28.65	0.06	2540	14.45	-2.69
860	15.8	-0.27	1920	24.99	-0.39	2230	28.28	0.08	2550	14.48	-2.51
870	14.96	-0.09	1930	25.52	-0.51	2240	27.16	-0.02	2560	15.65	-2.33
880	17.11	-0.13	1940	26.4	-0.48	2250	25.94	-0.19	2570	15.71	-2.14
890	18.85	-0.14	1950	26.89	-0.5	2260	24.25	-0.44	2580	17.62	-1.92
900	19.53	-0.08	1960	27.79	-0.42	2270	23.15	-0.7	2590	17.53	-1.77
910	20.17	-0.13	1970	26.97	-0.39	2280	22.26	-0.83	2600	18.62	-1.62
920	19.17	-0.3	1980	27.86	-0.38	2290	21.2	-1.06	2610	18.27	-1.48
930	17.12	-0.45	1990	26.97	-0.27	2300	20.31	-1.25	2620	17.2	-1.42
940	14.19	-0.44	2000	27.54	-0.29	2310	19.7	-1.43	2630	17.32	-1.39
950	9.69	-0.49	2010	27.26	-0.14	2320	18.81	-1.67	2640	16.22	-1.42
960	6.96	-0.57	2020	28.65	-0.09	2330	18.26	-1.92	2650	16.38	-1.45
1710	25.02	-0.31	2030	28.44	-0.88	2340	18.45	-2.01	2660	16.55	-1.53
1720	22.58	0.02	2040	28.25	-0.83	2350	18.15	-2.2	2670	15.01	-1.6
1730	23.93	-1.15	2050	27.91	-0.75	2360	17.68	-2.34	2680	15.17	-1.69
1740	24.81	0.53	2060	27.44	-0.77	2370	17.34	-2.51	2690	16.88	-1.75
1750	25.57	0.65	2070	27.51	-0.65	2380	17.38	-2.64			
1760	26.98	0.79	2080	27.33	-0.56	2390	16.52	-2.8			
1770	27.69	0.83	2090	27.33	-0.43	2400	15.63	-2.85			
1780	28.24	0.89	2100	26.57	-0.32	2410	15.8	-2.95			
1790	28.48	0.93	2110	26.3	-0.26	2420	15.28	-2.93			
1800	28.26	0.95	2120	26.58	-0.14	2430	16.78	-2.95			
1810	27.45	0.83	2130	26.82	-0.06	2440	15.21	-2.89			
1820	26.56	0.63	2140	27.58	0.11	2450	14.63	-2.89			
1830	26.19	0.47	2150	27.41	0.12	2460	14.44	-2.85			
1840	24.5	0.23	2160	28	0.13	2470	15.48	-2.88			
1850	23.86	-0.02	2170	28.93	0.12	2480	15.25	-2.85			
1860	22.34	-0.36	2180	29.3	0.11	2490	14.19	-2.89			
1870	22.88	-0.56	2190	28.74	0.05	2500	14.32	-2.76			

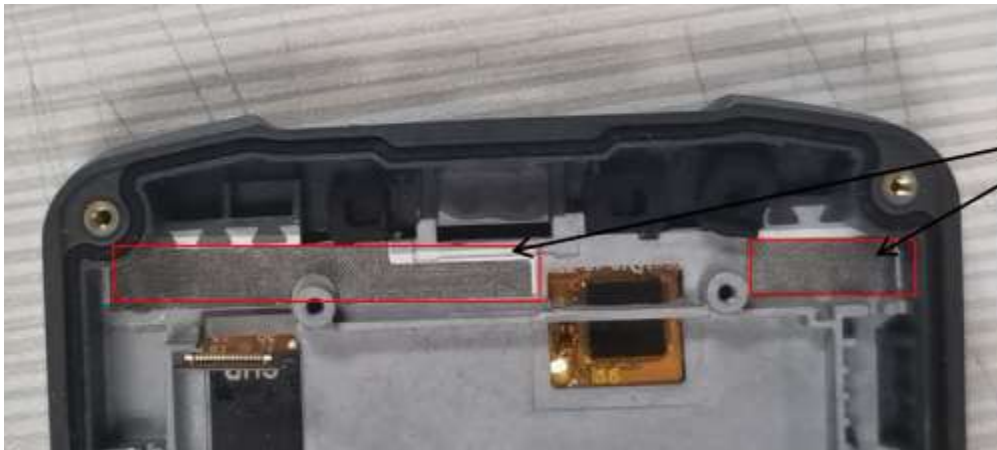
The passive efficiency of the three in one antenna is as follows:

Freq (MHz)	Effi (%)	Effi (dBi)	Freq (MHz)	Effi (%)	Effi (dBi)
2400	23.47	-0.1	1570	43.46	-0.06
2410	24.15	-0.15	1580	45.93	0.05
2420	24.04	-0.13			
2430	24.82	-0.15			
2440	24.67	-0.16			
2450	26.19	-0.12			
2460	27.01	-0.16			
2470	27.69	-0.14			
2480	30.05	0.16			
2490	31.79	-0.14			
2500	32.01	0.07			

The efficiency of the passive antenna is as follows:

Freq (MHz)	Effi (%)	Effi (dBi)
5100	25.76	1.1
5150	32.11	1.58
5200	37.18	2.2
5250	26.13	1.79
5300	30.08	-0.74
5350	30.97	-0.66
5400	28.33	-1.05
5450	28.14	-1.07
5500	26.07	-0.22
5550	23.13	0.58
5600	21.65	0.83
5650	24.22	1.74
5700	25.57	2.2
5750	23.99	1.93
5800	22.13	1.36
5850	20.85	0.77
5900	20.86	-0.96

7. Ground handling

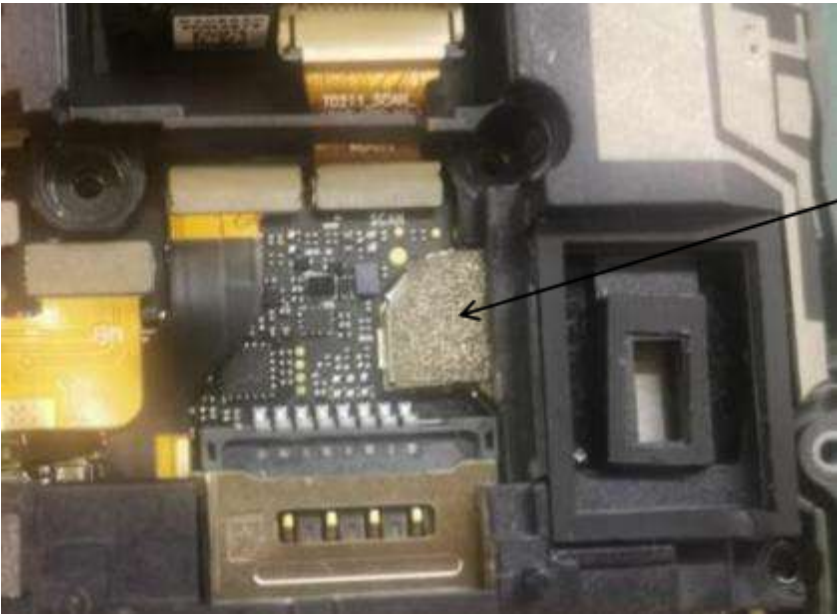


Paste double-sided
conductive cloth and
small board
grounding

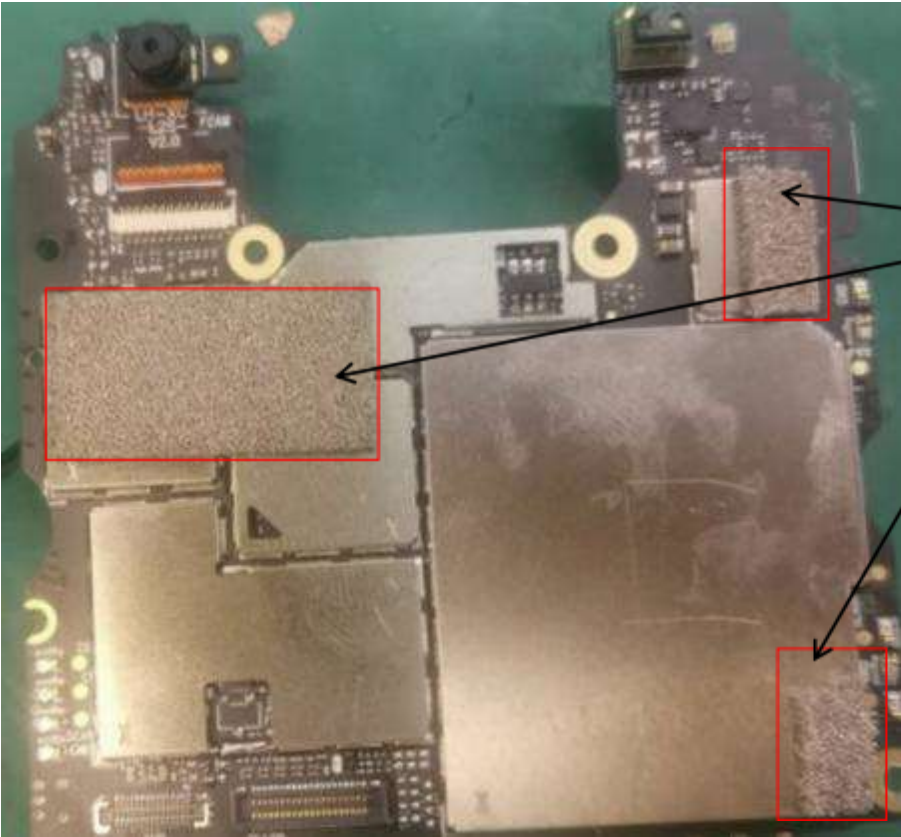


Paste conductive
cloth and sweep
wharf grounding,

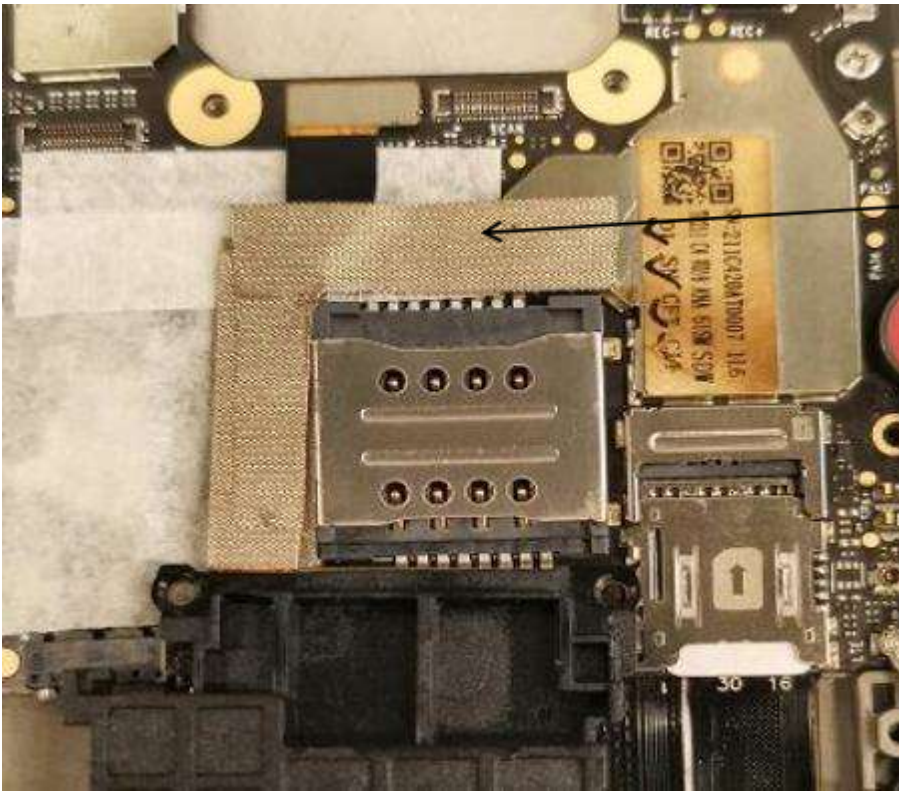
RFID paste
double-sided
conductive cloth
grounding.



Paste conductive sponge and metal grounding.



The main board is grounded with conductive sponge.



Shielding FPC with conductive cloth to solve tis interference

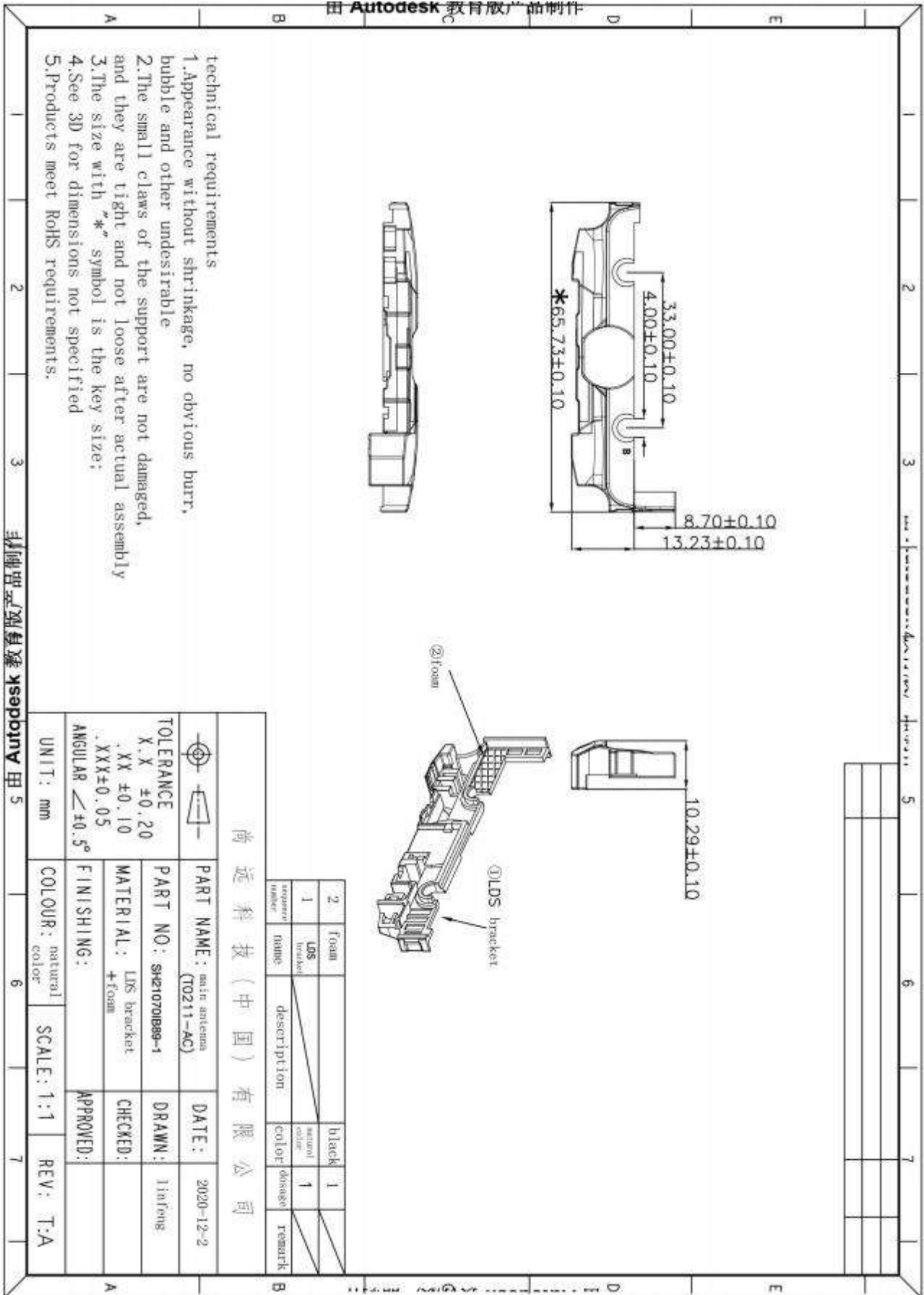
8. Mass production antenna Spec

During Mass production, to test VSWR as production test standard

According to the difference of the project itself, the following specification:

Frequence	SPEC , Mass Production
700MHz-26920MHz	VSWR (MP performance) <VSWR(Verify performance)+0.3
1575MHz/2400MHz-2500MHz	VSWR (MP performance) <VSWR(Verify performance)+0.3
5180MHz-5900MHz	VSWR (MP performance) <VSWR(Verify performance)+0.3
13.56MHz	VSWR (MP performance) <VSWR(Verify performance)+0.3

9 schedule drawing



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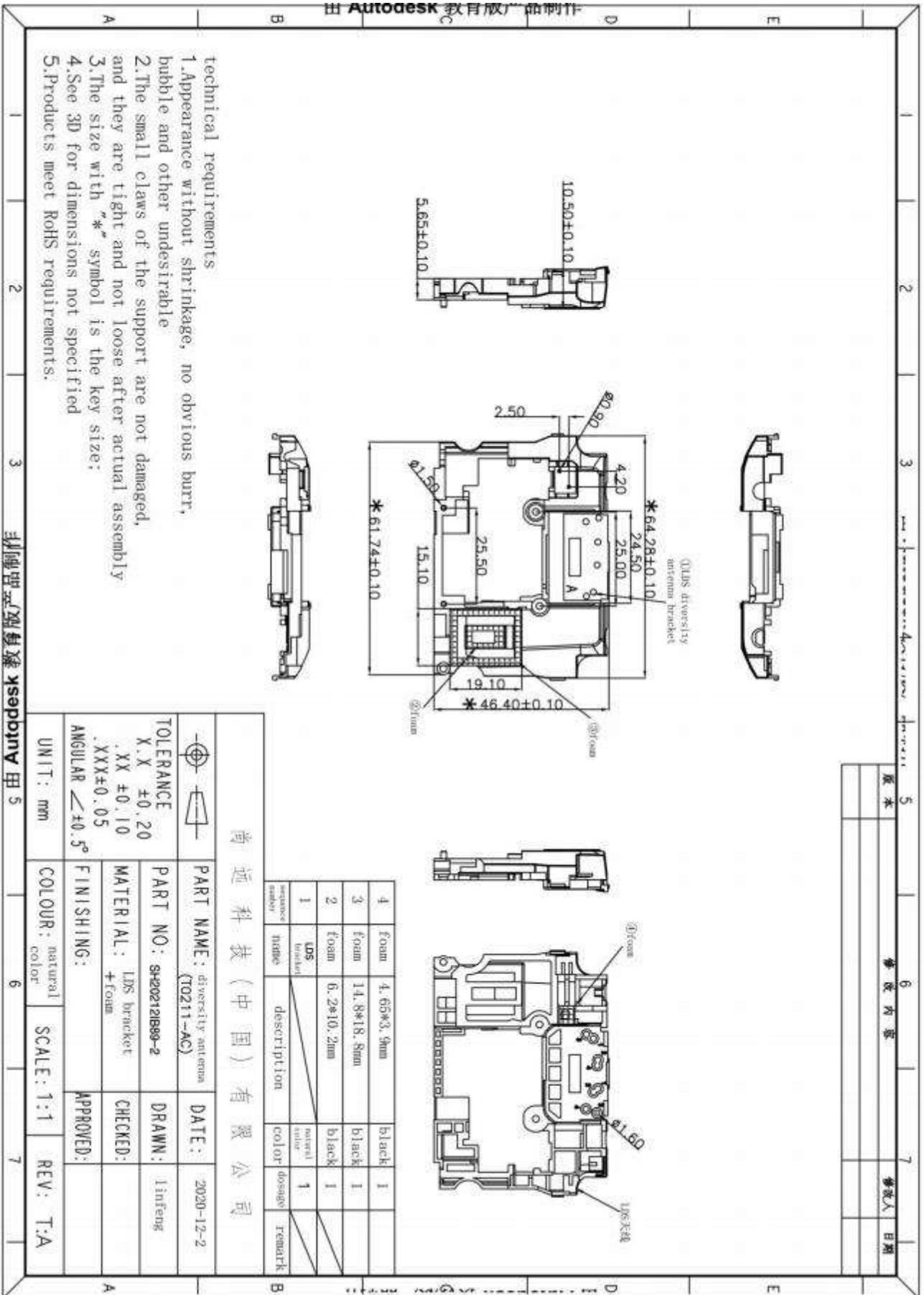
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尚远科技(中国)有限公司



- technical requirements
1. Appearance without shrinkage, no obvious burr, bubble and other undesirable
 2. The small claws of the support are not damaged, and they are tight and not loose after actual assembly
 3. The size with "*" symbol is the key size;
 4. See 3D for dimensions not specified
 5. Products meet RoHS requirements.

5	6	7
原本	修改内容	修改人 日期

尚通科技(中国)有限公司

		PART NAME: diversity antenna (T0211-AC)	DATE: 2020-12-2
TOLERANCE X.X ±0.20 .XX ±0.10 .XXX±0.05 ANGULAR $\leq \pm 0.5^\circ$	PART NO.: SH202121899-2	DRAWN: linfeng	
	MATERIAL: LRS bracket + foam	CHECKED:	
	FINISHING:	APPROVED:	
UNIT: mm	COLOUR: natural color	SCALE: 1:1	REV: T:A

sequence number	name	description	material color	quantity	remark
1	LRS bracket		natural color	1	
2	foam	6.2*10.2mm	black	1	
3	foam	14.8*18.8mm	black	1	
4	foam	4.65*3.9mm	black	1	

Autodesk 教育版产品制作

Autodesk 甲 5

- Product model : AC-2525A-US
- Product description: RFID reader built-in antenna



● Electrical Characteristics

Antenna		
1	Antenna model	2540D (25mm*25mm*4mm)
2	Frequency Range	902MHz~928MHz
3	V.S.W.R	1.5 MAX
4	BandWith@10dB	6 MHz MIN @10dB return loss
5	Gain	-0.5dB typ @25mm*25mm groundplane
6	Impedence	50Ω
7	Polarization	RHCP

● Material

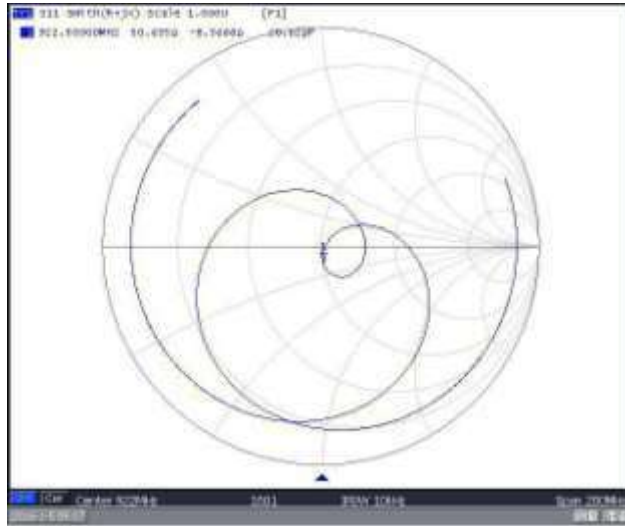
No	Part Name	SPEC
1	Antenna	Dielectric Ceramics
2	PCB	FR4
3	Bridge	
4	Resistance	
5	RF Cable	RG1.13
		L=35mm
6	RF Connector	IPEX-1

● Environment Condition

1	Working Temp	-40°C ~ +85°C, 10%~95% RH
2	Storage Temp	-55°C ~ +100°C, 10%~95% RH
3	Vibration	Sine sweep @1.5mmAM10~55Hz each Axis

- Testing Curve
Patch Smith & VSWR

terial



- Structure

