Product   specification   acknowledgment.

Shenzhen   Maya   antenna   lab

R&D   center   in   ShenZhen

The   mobile   communication   terminal   antenna

PRODUCT NAME   **LM500-US**

CUSTOMER NAME   联思

account party	Development party		
Customer acknowledges	Quality Department	R&D Department	approved by
		ME: RF:	
Date：	Date：		

Shenzhen Maya communication equipment Co., LTD

Site：A second floor, minqing road, minqing road, longhua street, baoan district, shenzhen city.

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1. aim

For the Production from shenzhen maya communication equipment co., LTD. That mobile communication terminal antenna product specifications and test methods for specification, avoid the test conditions, the error caused by different methods

Antenna debug design requirement frequency band.

Fre	BAND
2G	GSM850/1900
3G	WCDMA1/2/4/5/19
4G	LTE 1/2/4/5/7/12/13/17/19/28

3.

Sky chart.

MAIN The antenna

WIFI The antenna

4. Electrical

Test method description and data.

Device name	use
Vector Network Analyzer	S11/Impedance/ Passive Test
Agilent 8960 SP6010 R&S CMU200	**GSM, GPRS, EDGE, CDMA2000, 1xev-do, td-scdma, WCDMA, HSDPA mobile phone mobile communication equipment test.**
R&S CMW500 MT8820C	**Including td-scdma, WCDMA, HSDPA, LTE, WIFI, GPS mobile phone mobile communication equipment test.**
Agilent E4438C	**Test active GPS**
MVG Chamber	**Passive Test / OTA active Test / Efficiency/Gain**

4.2 Passive Test Report

Test equipment: network analyzer.

Test method: with a 50 ohm CABLE CABLE from the instrument test port is derived, using the calibration after a calibration mechanism of SMA connector, connecting hand records related to the frequency points corresponding return loss and standing wave ratio data.
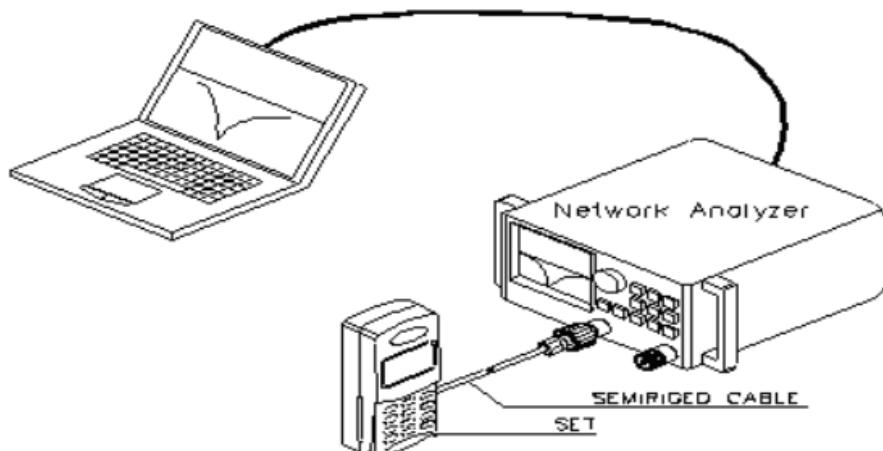
测试示意图

4.3 Active Test Report

TRP/TIS

From testing tools, measuring, network analyzer, full waves far field ETS, French MVG SG24LT (Satmio) near field 3 d microwave dark room, the high precision positioning system and its controller and the computer with automatic test procedure test environment: the temperature of 22 ℃ + 3 ℃, humidity 60% plus or minus 60% test methods: Using EST or 24 lt Satimo system software Test method and calculation of TRP when tested TRP, DUT (Device Under Test) is in a state of maximum transmitted power, including three to choose channel Test, by positioning system control the location of the DUT, with 15 degrees for step length, measuring three dimensional space, the effective radiated power (EIRP) at various points through the average of the integral sphere, computation formula is as follows

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

In TIS test, the DUT at the maximum transmission power of the state, including three to choose channel test, by controlling the location of the DUT, at 30 degrees for the step length, measuring the three dimensional space each point receiving sensitivity, the average of the sphere by integral calculation, calculation formula is as follows:

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

Ø2.4m SG24 Synoptic
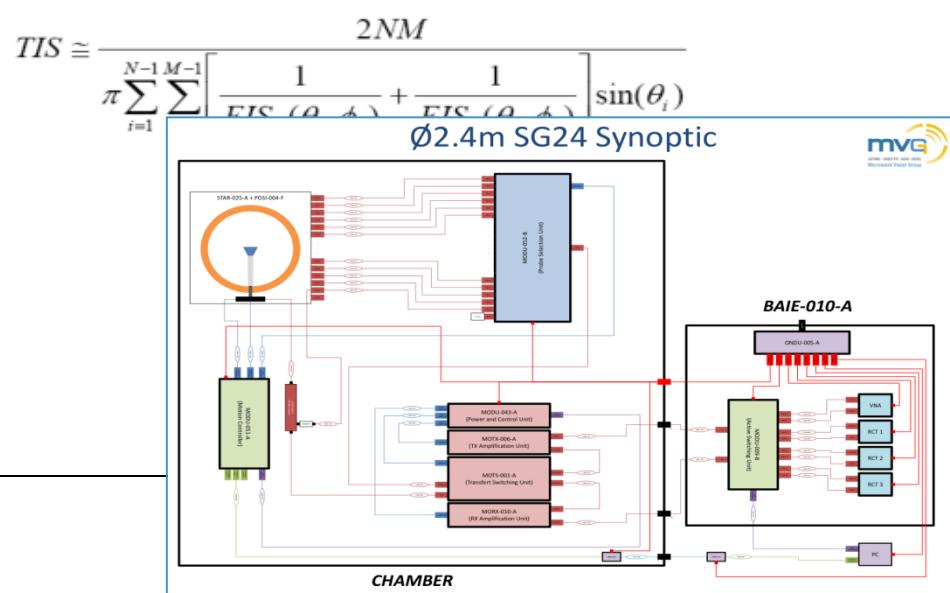
4.4 Active Report.

	BAND	GSM850			PCS1900		
2G	CHANNAL	L	M	H	L	M	H
	TRP	27.57	28.13	28.67	25.36	25.71	26.25
	TIS	--	--	-103.5	--	--	-102.15

	BAND	W1			W2		
3G	CHANNAL	L	M	H	L	M	H
	TRP	19.07	19.08	18.96	17.8	18.09	18.56
	TIS	--	--	-105.71	--	--	-103.07
	BAND	W4			W5		
	CHANNAL	L	M	H	L	M	H
	TRP	17.52	17.05	16.57	17.05	17.48	17.94
	TIS	--	--	-103.15	--	--	-105.14

	BAND	W19					
3G	CHANNAL	L	M	H			
	TRP	17.23	17.97	17.97			
	TIS	--	--	-104.52			
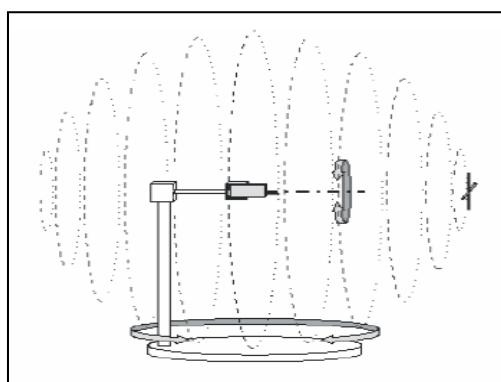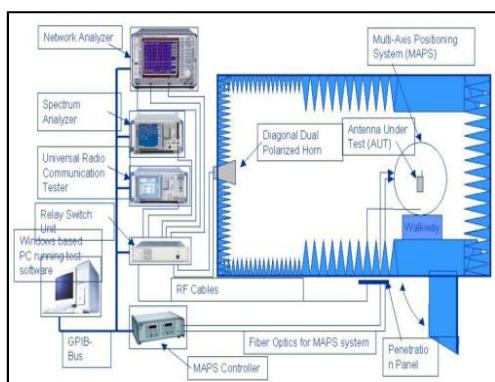
	BAND	LTE B1			LTE B2		
4G	CHANNAL	L	M	H	L	M	H
	TRP	18.27	18.25	17.64	17.94	18.43	18.87
	TIS			-91.57			-90.4
	BAND	LTE B4			LTE B5		
	CHANNAL	L	M	H	L	M	H
	TRP	17.25	17.47	16.46	16.57	17.01	17.52
	TIS			-90.48			-90.91
	BAND	LTE B7			LTE B12		
	CHANNAL	L	M	H	L	M	H
	TRP	16.64	16.35	16.37	15.59	16.09	16.5
	TIS			-89.12			-90.95

	BAND	LTE B13			LTE B17		
4G	CHANNAL	L	M	H	L	M	H
	TRP	15.79	16.16	16.14	16.22	16.13	16.57
	TIS			-90.4			-89.14
	BAND	LTE B19			LTE B28		
	CHANNAL	L	M	H	L	M	H
	TRP	16.3	17	17.45	16.62	17.09	16.86
	TIS			-91.33			-90.08

GPS test.

WIFI test.
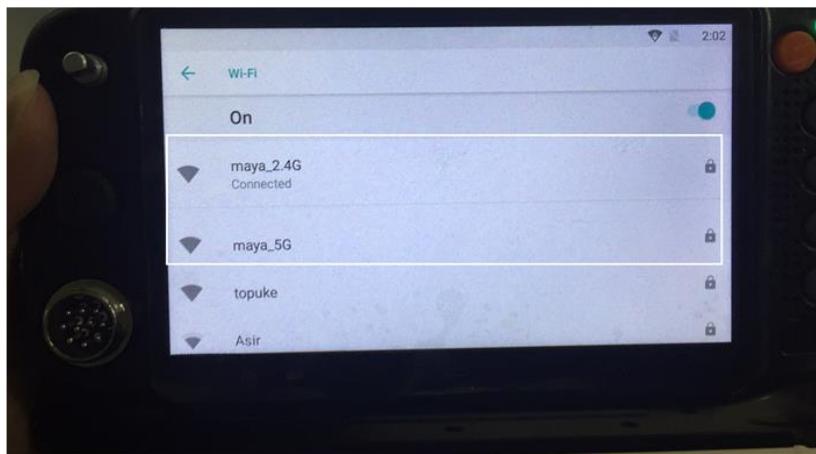
NFC test

Type 1	4.5cm
Type 2	4.5cm
Type 3	4.0cm
Type 4	3.5cm

4.5 Passive   Report

Antenna Type:PIFA

2.4G Passive pattern
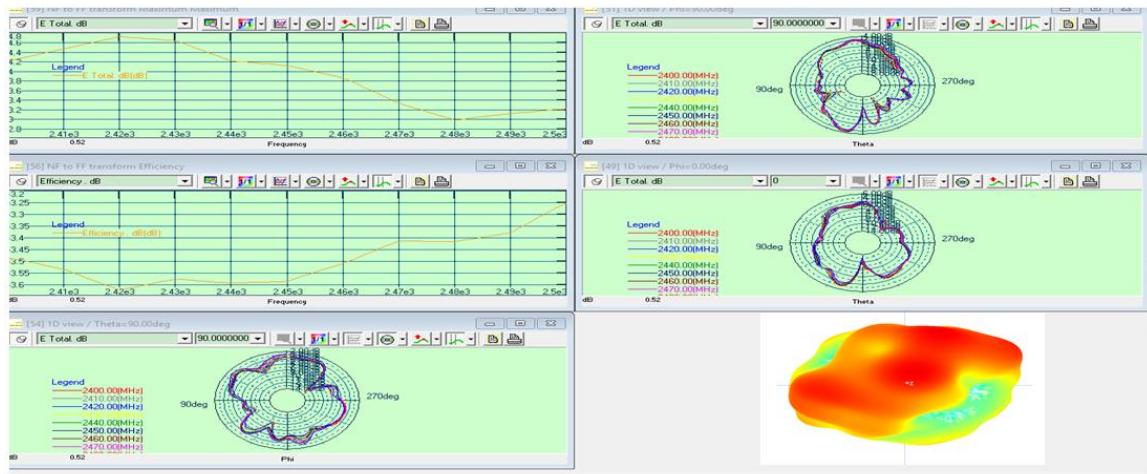
5.8G Passive pattern
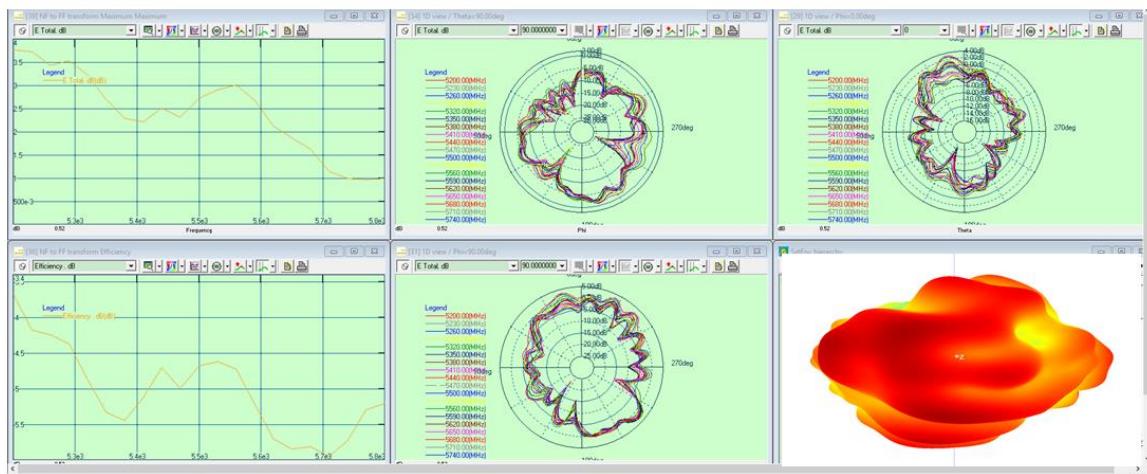
Passive Efficiency, Gain

	1			1			1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
5200000000	42.93%	-3.67287	5200000000	3.774824	2400000000	44.82%	-3.484984946	2400000000	4.215112017
5230000000	38.27%	-4.17186	5230000000	3.733803	2410000000	44.32%	-3.534478279	2410000000	4.467046084
5260000000	37.69%	-4.23748	5260000000	3.440068	2420000000	43.41%	-3.623923999	2420000000	4.724523265
5290000000	36.62%	-4.3634	5290000000	3.548829	2430000000	43.89%	-3.576201949	2430000000	4.64478573
5320000000	32.66%	-4.85925	5320000000	3.238939	2440000000	43.70%	-3.594853427	2440000000	4.21845737
5350000000	29.40%	-5.31707	5350000000	2.715533	2450000000	43.78%	-3.586833388	2450000000	4.126014141
5380000000	28.59%	-5.43732	5380000000	2.301797	2460000000	44.56%	-3.510249255	2460000000	3.87308789
5410000000	30.76%	-5.1206	5410000000	2.225649	2470000000	45.56%	-3.414411472	2470000000	3.338199508
5440000000	33.89%	-4.6996	5440000000	2.513064	2480000000	45.52%	-3.417612236	2480000000	2.986329883
5470000000	31.72%	-4.98645	5470000000	2.321311	2490000000	45.93%	-3.378598412	2490000000	3.122801061
5500000000	34.13%	-4.6685	5500000000	2.741788	2500000000	47.31%	-3.250416025	2500000000	3.225851731
5530000000	34.55%	-4.61585	5530000000	2.91396					
5560000000	33.75%	-4.71698	5560000000	3.016482					
5590000000	30.10%	-5.21435	5590000000	2.685767					
5620000000	26.97%	-5.69189	5620000000	2.137515					
5650000000	26.08%	-5.83653	5650000000	1.87917					
5680000000	26.26%	-5.80681	5680000000	1.631634					
5710000000	25.48%	-5.93738	5710000000	1.164549					
5740000000	26.77%	-5.72383	5740000000	1.003139					
5770000000	29.62%	-5.28403	5770000000	0.974852					
5800000000	30.21%	-5.19899	5800000000	1.009535					

4G Passive pattern

Azimuth 0°	Azimuth 90°	H-Plane (Elevation 90°)	3D view Frequency 890MHz

4G Passive pattern

Azimuth 0°	Azimuth 90°	H-Plane (Elevation 90°)	3D view Frequency 2205MHz
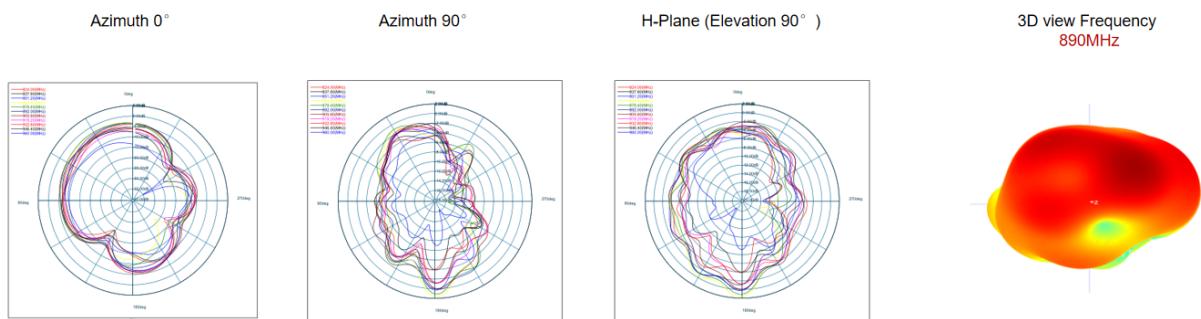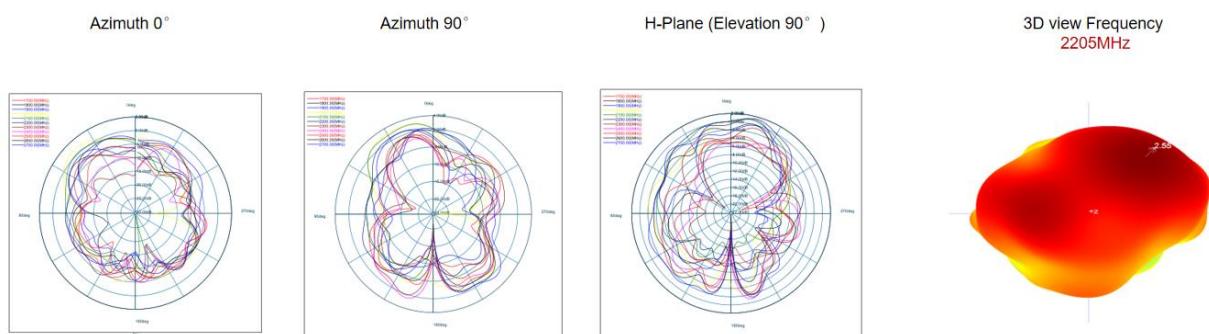
4G passive Efficiency, Gain

Frequency	Efficiency	Gain . dB	Frequency	Efficiency	Gain . dB
824000000	21.4%	-1.30494	1710000000	25.64%	-0.98129
837600000	21.7%	-0.47984	1809000000	25.52%	-0.60228
851200000	22.4%	0.330651	1908000000	27.16%	1.586841
864800000	25.3%	1.753501	2007000000	47.98%	4.227062
878400000	27.8%	1.13639	2106000000	42.92%	3.955996
892000000	24.6%	0.062066	2205000000	39.49%	2.551812
905600000	24.8%	0.14043	2304000000	27.29%	0.226854
919200000	19.6%	-1.20529	2403000000	29.27%	2.212921
932800000	22.0%	-1.17403	2502000000	29.73%	1.040823
946400000	21.7%	-1.59623	2601000000	34.39%	0.849013
960000000	18.8%	-2.05388	2700000000	42.05%	1.859616

5. Matching circuit description
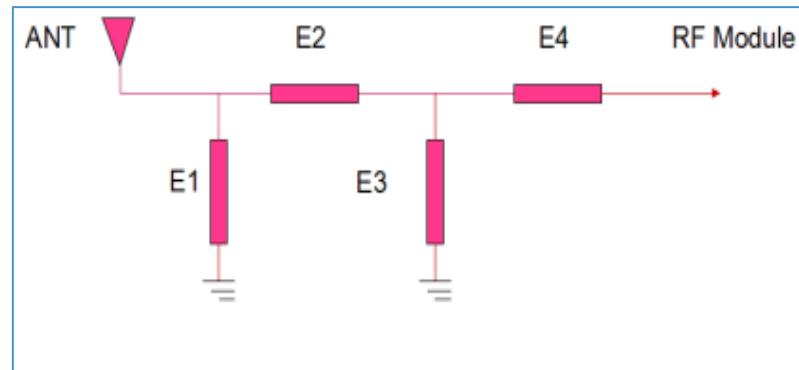
Note: we do not debug the antenna matching circuit.

6.

Environmental treatment

Figure: The motherboard is grounded with a conductive sponge.