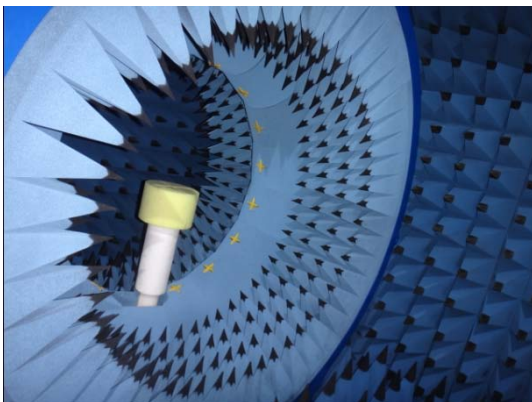
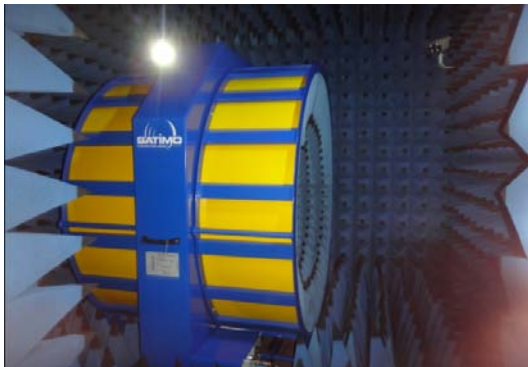


Antenna debugging report

Customer Name	Timekettle	Project name	T1 Mini
Frequency band	2G/3G/4G	Structural approach	FPC
RF Engineer	Yi Xiang	Structural engineer	Qiang Du
Antenna type	loop	Date	2023/5/24



The StarLab 3D laboratory of SATIMO company, originally imported from France, can accurately and quickly test the TRP, TIS, efficiency, gain, Apple image, directional image and other parameter data of communication terminal products such as mobile phones, tablets, and laptops.

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Report Version Summary

Matching circuit and passive parameters of each antenna

Conducting data

Main antenna OTA test data

GPS measurement effect

Overall environmental treatment

Risk reminder during debugging process

Summary

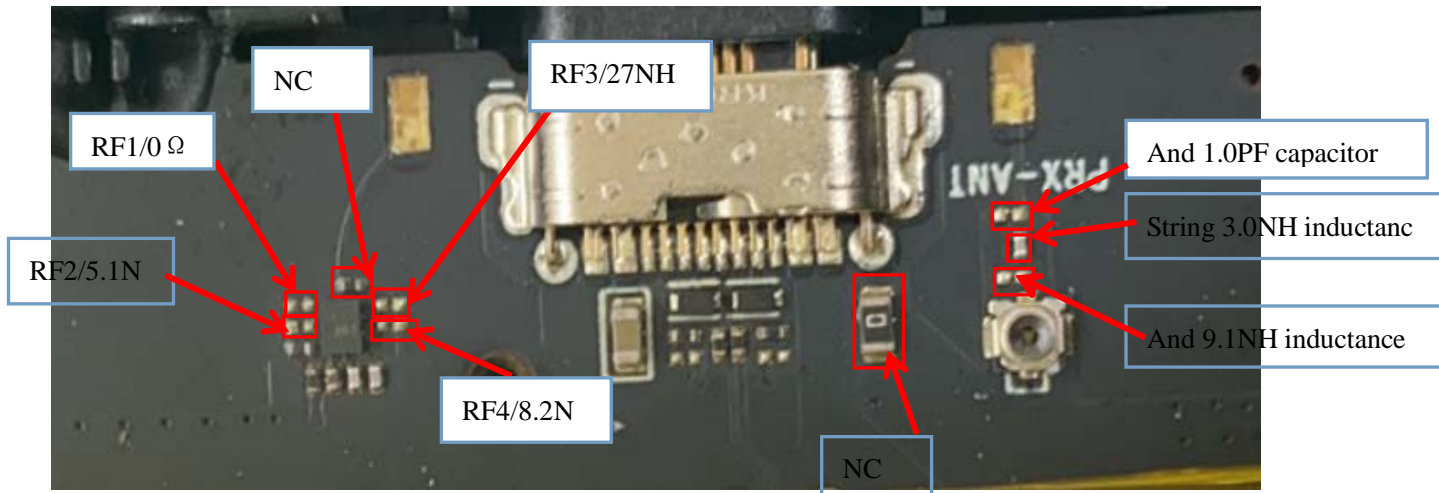
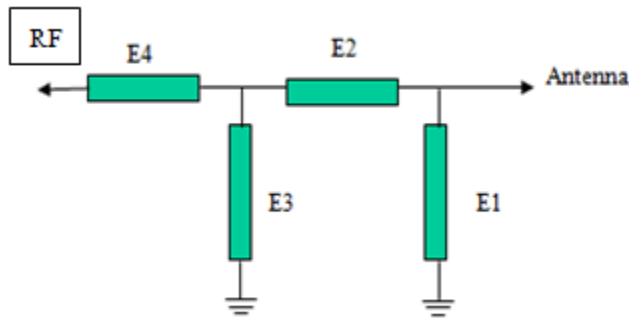
Report Version Summary:

Version	Date	Content Overview
V1	2023/3/27	Sample Antenna Optimization Test Report
V2	2023/5/12	Sample Antenna Test Report
V3	2023/5/24	Mold Sample Test Report
V4		
V5		
V6		
V7		

Main antenna matching circuit

Element	E1	E2	E3	E4
Value	1.0PF	3.0NH	9.1NH	

Our company has made changes to the main antenna matching circuit:



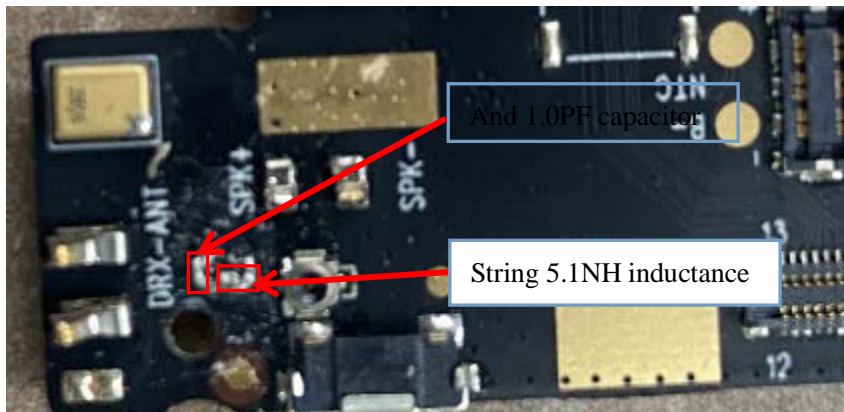
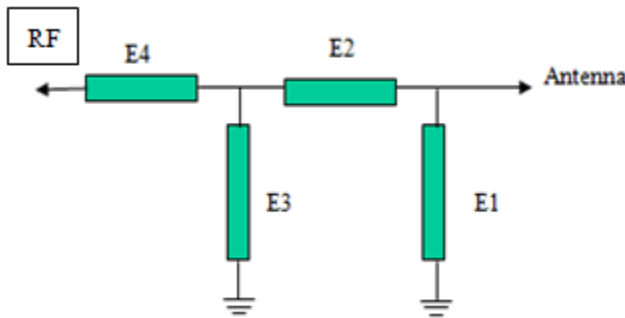
Antenna logic:

RF1	GSM900/1800/1900/W1. 2. 8/LTE-B1. 2. 3. 4. 8. 39
RF2	GSM850/W5. W6. W19LTE-B5. 7. 18. 19. 20. 26. 38. 40. 41
RF3	LTE-B12 B17
RF4	LTE-B21

Diversity antenna matching circuit.

Element	E1	E2	E3	E4
Value	1PF	5.1NH		

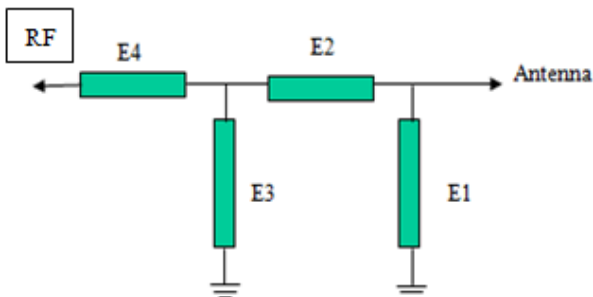
Our company has made changes to the diversity antenna matching circuit.



Three in one antenna matching circuit.

Element	E1	E2	E3	E4
Value				

Our company has not made any changes to the matching circuit of the three in one antenna.



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**Main antenna conducted data (low-frequency line loss compensation of 0.5,
high-frequency line loss compensation of 0.8)**

Band	Channal	TRP (dBm)	TRS (dBm)	Band	Channal	TRP (dBm)	TRS(dBm)
GSM900	L	32.9		DCS1800	L	29.6	
	M	32.9			M	29.7	
	H	32.9	-109.5		H	29.8	-107.8
GSM850	L	32.8		PCS1900	L	29.8	
	M	32.7			M	29.7	
	H	32.8	-109.5		H	29.7	-108.8
W1900	L	21.8		W2100	L	22.0	
	M	22.0			M	22.0	
	H	21.9	-110.8		H	22.1	-110.3
W850	L	21.8		W900	L	21.8	
	M	21.8			M	21.7	
	H	21.8	-111.5		H	21.7	-109.5
W19	L	21.7		W6	L	21.8	
	M	21.7			M	21.7	
	H	21.6	-110.5		H	21.7	-110.5
LTE-B1 (10MHz)	L	22.8		LTE-B17 (10MHz)	L	22.3	
	M	23.0			M	22.3	
	H	23.0	-98.2		H	22.3	-97.5
LTE-B2 (10MHz)	L	22.8		LTE-B18 (10MHz)	L	22.5	
	M	22.8			M	22.4	
	H	22.9	-98.1		H	22.5	-98.3
LTE-B3 (10MHz)	L	22.7		LTE-B19 (10MHz)	L	22.5	
	M	22.7			M	22.4	
	H	22.7	-96.5		H	22.5	-98.3
LTE-B4 (10MHz)	L	22.8		LTE-B20 (10MHz)	L	22.4	
	M	22.8			M	22.3	
	H	22.8	-96.0		H	22.5	-98.1
LTE-B5 (10MHz)	L	22.5		LTE-B21 (10MHz)	L	22.6	
	M	22.6			M	22.6	
	H	22.6	-99.1		H	22.6	-99.5
LTE-B7 (10MHz)	L	22.4		LTE-B26 (10MHz)	L	22.6	
	M	22.4			M	22.6	
	H	22.4	-97.0		H	22.6	-98.6
LTE-B8 (10MHz)	L	22.5		LTE-B38 (10MHz)	L	22.5	
	M	22.5			M	22.5	
	H	22.5	-96.5		H	22.5	-96.8
LTE-B12	L	22.4		LTE-B39	L	23.1	

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(10MHz)	M	22.4		(10MHz)	M	23.2	
	H	22.4	-97.5		H	23.2	-98.6
LTE-B40 (10MHz)	L	22.5		LTE-B41 (10MHz)	L	22.7	
	M	22.4			M	22.7	
	H	22.4	-95.8		H	22.6	-94.0

Main antenna Fs OTA data

Band	Channal	TRP(dBm)	TIS(dBm)	Band	Channal	TRP(dBm)	TIS(dBm)
GSM900	L	27.5		DCS1800	L	24.5	
	M	26.5			M	24.2	
	H	26.6	-95.2		H	24.0	-103.3
GSM850	L	27.8		PCS1900	L	25.0	
	M	27.8			M	25.2	
	H	27.7	-94.0		H	25.5	-103.7
WCDMA850	L	17.5		WCDMA900	L	17.9	
	M	17.2			M	17.8	
	H	17.7	-104.0		H	17.2	-103.0
WCDMA2100	L	17.9		WCDMA1900	L	17.0	
	M	17.7			M	17.8	
	H	17.5	-103.8		H	18.0	-103.0
WCDMA6	L	18.1		WCDMA19	L	18.0	
	M	18.4			M	18.0	
	H	18.6	-104.0		H	18.3	-104.1
LTE-B1 (10MHz)	L	18.2		LTE-B17 (10MHz)	L	15.7	
	M	18.1			M	16.0	
	H	17.7	-92.3		H	16.0	-91.3
LTE-B2 (10MHz)	L	17.9		LTE-B18 (10MHz)	L	17.3	
	M	18.1			M	17.8	
	H	18.0	-92.5		H	17.9	-93.0
LTE-B3 (10MHz)	L	16.0		LTE-B19 (10MHz)	L	17.7	
	M	16.8			M	17.8	
	H	17.1	-90.0		H	17.7	-92.1
LTE-B4 (10MHz)	L	16.2		LTE-B20 (10MHz)	L	17.5	
	M	16.8			M	17.8	
	H	17.0	-91.2		H	18.2	-91.7
LTE-B5 (10MHz)	L	17.7		LTE-B21 (10MHz)	L	15.2	
	M	17.8			M	15.3	
	H	18.1	-92.1		H	15.3	-90.2
LTE-B7 (10MHz)	L	18.1		LTE-B26 (10MHz)	L	17.1	
	M	19.0			M	17.6	
	H	19.3	-92.0		H	17.9	-93.4
LTE-B8 (10MHz)	L	18.2		LTE-B38 (20MHz)	L	19.3	
	M	18.0			M	19.5	

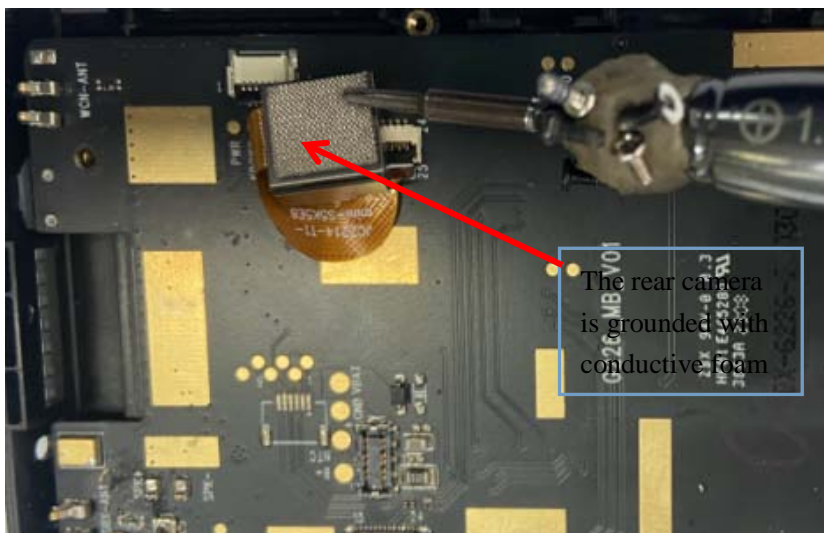
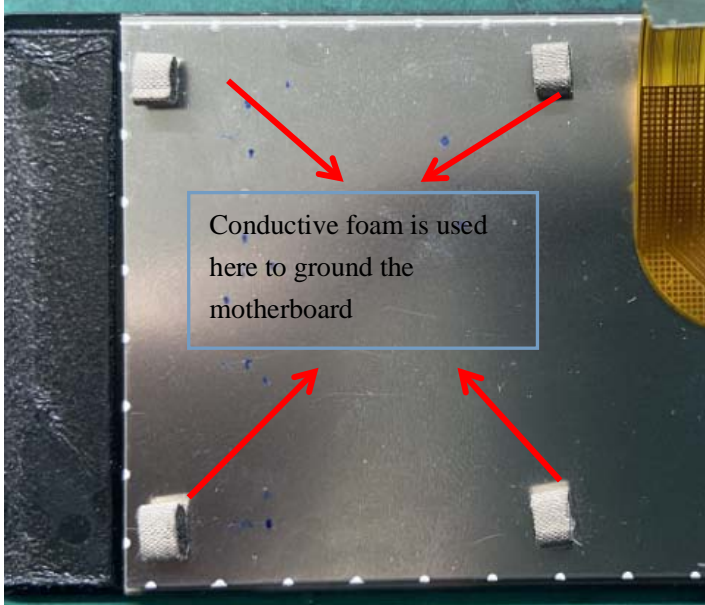
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	H	17.0	-91.1		H	19.5	-88.5
LTE-B12 (10MHz)	L	15.5		LTE-B39 (20MHz)	L	17.7	
	M	15.6			M	18.0	
	H	15.8	-91.5		H	18.0	-90.5
LTE-B40 (10MHz)	L	17.0		LTE-B41 (20MHz)	L	19.5	
	M	17.5			M	19.6	
	H	17.7	-89.2		H	19.1	-87.7
GSM900		Off screen	Bright screen	DCS1800		Off screen	Bright screen
	L	-95.0	-93.0		L	-104.0	-103.0
	M	-93.0	-92.5		M	-105.5	-105.0
	H	-100.0	-96.0		H	-104.0	-103.5
GSM850	L	-104.0	-97.0	PCS1900	L	-109.0	-108.0
	M	-103.0	-97.0		M	-109.0	-108.0
	H	-104.0	-95.0		H	-108.0	-108.0

WIFI antenna Fs OTA data:

Band	Channal	TRP(dBm)	TIS(dBm)灭屏	TIS(dBm)亮屏
2.4G WIFI B 模 11M	1	12.4	-80.0	-78.0
	7	13.3		
	13	12.5	-78.0	-75.7
5G WIFI A 模 54M	36	12.2		
	64	12.5		
	165	12.8	-71.5	-70.0

Environmental treatment:





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Matters needing attention:

1. This antenna is a mold like antenna. Any changes to the SPCB or RF circuit materials on the motherboard, as well as changes to phone accessories such as cameras, screens, speakers, motors, batteries, and case technology, must be tested and verified by our company before use.
2. If your company needs to conduct third-party or solution company verification for this project, please provide the prototype to our company for retesting at least one working day in advance and then send it for testing. This is because the motherboard and environmental treatment will have an impact on antenna performance, to avoid delaying the project progress by sending the prototype twice or multiple times!

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T1 Mini Antenna Gain		
Mode	Frequency band (MHz)	Antenna gain value (dBi)
GSM	850	-3.0
	900	-3.1
	1800	-1.2
	1900	0.3
WCDMA	850	-3.0
	900	-3.1
	1900	0.3
	2100	0.5
	W6	-3.0
	W19	-3.0
LTE	B1	0.5
	B2	0.3
	B3	-1.2
	B4	-1.2
	B5	-3.0
	B7	1.4
	B8	-3.0
	B12/B17	-3.3
	B18	-3.0
	B19	-3.0
	B20	-3.0
	B21	-3.7
	B26	-3.0
	B38	1.4
	B39	-1.25
B40	0.5	
B41	1.4	
WiFi	2.4G	0.3
	5G	1.5