

SHENZHEN TLT COMMUNICATION CO.,LTD

Building 1, Rooms 108-109, Shanhai Science and Innovation Park, Zhongyu Guan Avenue, Longhua New District, Shenzhen City

M17T12-T616antenna The Product Recognition Letter

The Customer	yanghua	Band range	2/3/4G/WBG
Model	M17T12-T616	Version	Latest version
Project code name	TLT 5655	Approval	
RF Designer	MaoHangzhou	RD Designer	Tang Chunzheng
Date of this	2025-8-15	Date of this	2025-8-15
Customer Information:			

Metric

1.Antenna parameters

1.1 Electrical parameters

1.1.1 Electrical Performance Assessment

1.1.2 distribution circuit diagram

1.2 Structural parameters

1.2.1 antenna assembly

1.2.2 Performance test requirements

2.The test

2.1 Voltage standing wave ratio test

2.1.1 test connection

2.1.2 voltage standing to wave ratio

2.2 Gain and power tests

2.2.1 test environment

2.2.2 Test Equipment

3.Summary

4.Attachment diagram

4.1 Parameter diagram of return loss and voltage standing wave ratio

5.2/3/4G antenna test data:

6.WIFI & GPS graphics and test data

6.1.1 WIFI field test

6.1.2 WIFI throughput test

6.1.3 Gain and efficiency test

6.1.4 WIFI OTA test

6.2 GPS field test

7.Antenna assembly and processing drawing file

8.Antenna 2D profile

1.Antenna parameters

This report mainly provides test conditions and results for various electrical and structural properties in devicetests,An antenna designed by TLT.

Electrical parameters

1.1.1 Electrical Performance Assessment

The band range of the antenna is 824MHz~960MHz and 1710MHz~2600MHz. below are the basic parameters of the electrical performance of the antenna.

900M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain (dBi)
	TX		Free Space	RX		Free Space
	880	≤3	0.5dBi	960	≤3	0.5dBi

1800M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain(dBi)
	TX		Free Space	RX		Free Space
	1710	≤3	-2.0dBi	1850	≤3	-2.0dBi

850M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain (dBi)
	TX		Free Space	RX		Free Space
	824	≤3	0.5dBi	894	≤3	0.5dBi

1900M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain(dBi)
	TX		Free Space	RX		Free Space
	1850	≤3	-2.0dBi	1990	≤3	-2.0dBi

2100M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain (dBi)
	TX		Free Space	RX		Free Space
	1920	≤3	0.5dBi	2170	≤3	0.5dBi

2600M Frequency Range						
Frequency Range	Frequency (MHz)	VSWR	Gain (dBi)	Frequency (MHz)	VSWR	Gain(dBi)
	TX		Free Space	RX		Free Space
	2500	≤3	-2.0dBi	2690	≤3	-2.0dBi

1.1.2 distribution circuit diagram

Use the original matching circuit diagram on the PCB board

1.2 Structural parameters

1.2.1 antenna assembly

Antennas generally consisted of FPC and coaxial line.

1.2.2 can test the requirements

Test item	description	Acceptance criteria
1. crytemperature test	temperature:-20℃ Time: 24 hours	The 1. had no obvious damage The 2. electrical performance meets the standard
The 2. high-temperature test	temperature.: 80℃ Time: 24 hours	The 1. had no obvious damage The 2. electrical performance meets the standard
3. salt fog test	5 ± 0.1% salt mist PH-value: 6.5-7.2 temperature: 35±1℃ Time: 24 hours	1.No color was changed 2.There are no obvious cracks in the appearance
4. environmental adaptability test	Total value of Pb, Hg, Cr+6, Cd in packing materials is smaller than 50PPM Pb, Hg, Cr+6, PBBs, PBDEs in components are smaller than 500PPM, Cd is smaller than 50PPM	

2.The test

Antenna are installed in a customer provided phone for testing. Antenna installation in the terminal for electrical performance testing

2.1The VSWR test

Test the connection

Test VSWR order of device connections: Agilent E8753 network analyzer → test cable → customer-provided machine

2.1.2 VSWR

The table below describes the values of the voltage resident wave ratio of the antenna at the two endpoints of the frequency band, involving drawings about the return impairment and resident wave ratio, please refer .

	GPS	WIFI-2.4G		WIFI-5.0G	
Frequency (MHz)	1.575G	2.4G	2.48G	5.15G	5.85G
VSWR	1.25	1.39	1.37	2.01	2.35
Return Loss	-19.2	-15.7	-16.0	-9.49	-7.8

GAIN TO EFFCIENCY

Frequency (GHz)	1.575G	2.40G	2.48G	5.20G	5.70G
Gain (dBi)	1.35	1.78	1.02	0.96	0.67
Efficiency (%)	40.1	38.2	40.2	40.1	39.1

2.2.1 test environment

Skyway microwave dark chamber: The test frequency range from 800MHz to 6GHz, in a 50cm diameter spherical area, and the dark chamber is reflected less than-50 dB. from 800MHz—6GHz

2.2.2 Test the equipment

Agilent 8960 ((5515C) Wireless Communication Test Device, Dipole antenna, French Sa t imo Antenna Test System, Printer, etc.

3. summary

The antenna is designed according to the machine samples provided by the customer, and the electrical parameters and result performance of the antenna meet the standard, and we are sure to

make you satisfied.

4.Attachment diagram

4.1 Parameter diagram of return loss and voltage standing wave ratio



5. 2/3/4G antenna test data:

2G	channel	TRP	TIS	2G	channel	TRP	TIS
GSM900	975	22.36	-102	DCS1800	512	22.83	-100
	37	23.30	-101		698	21.91	-101
	124	24.26	-100		885	21.51	-101
GSM850	128	23.49	-100	PCS1900	512	21.78	-101
	190	23.33	-101		660	21.09	-101
	251	22.12	-101		810	22.62	-100
3G	channel	TRP	TIS	3G	channel	TRP	TIS
W1900	9662	14.77	-101	W850	2936	14.78	-101
	9800	14.58	-102		3012	15.86	-102
	9938	14.66	-101		3088	15.73	-102
W900	2937	14.02	-101				
	3012	14.86	-102				
	3088	15.38	-102				

4G	channel	TRP	TIS	4G	channel	TRP	TIS
LTE-B3	19250	14.30	-89	LTE-B4 AWS	153972	14.68	-87
	19570	15.38	-90		156122	15.77	-88
	19900	15.32	-91		158272	14.43	-88
LTE-B7	20800	15.04	-88				
	21100	14.22	-87				
	21400	14.13	-87				

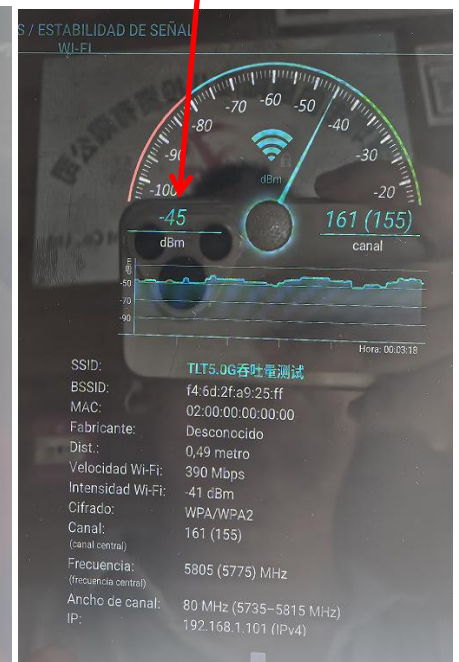
6. WIFI & GPS graphics and test data

6.1.1WIFI field test: Test environment: open environment, 15 meters away from our router. The test is as follows:

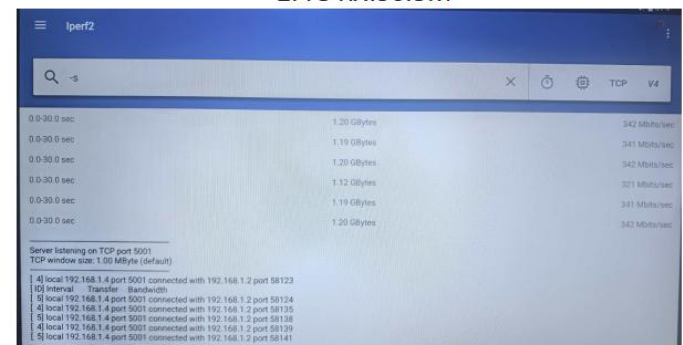
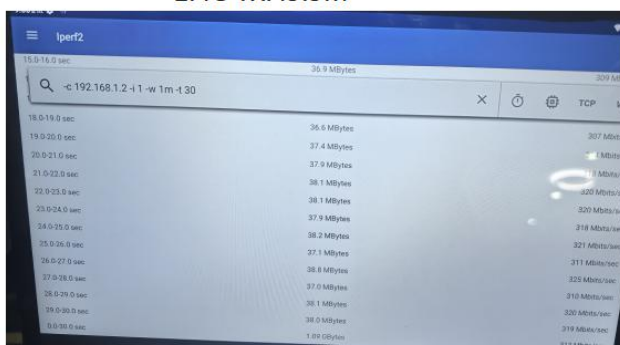
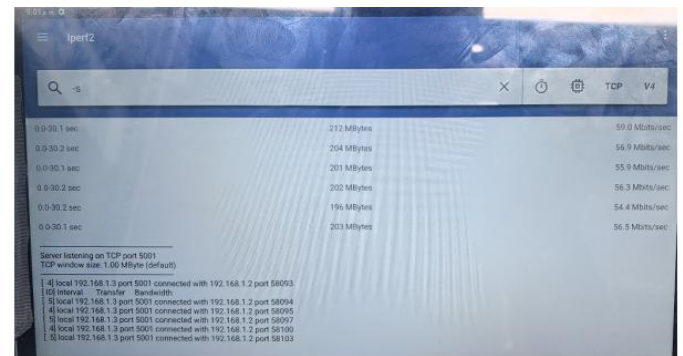
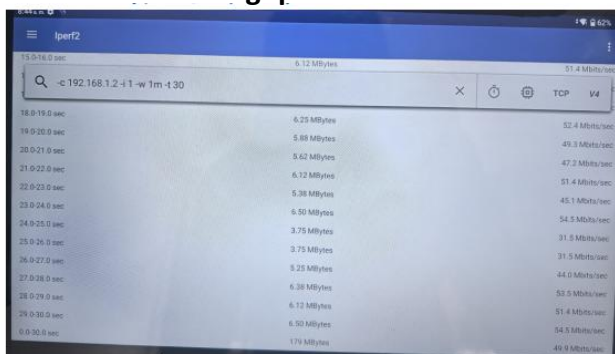


2.4G-WIFI: -42DB, full signal

5G-WIFI: -45DBM, full signal

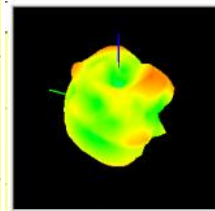


6.1.2 WIFI throughput test:

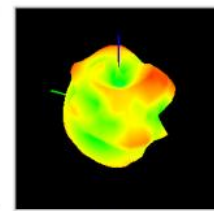


6.1.3 WIFI gain and efficiency test:

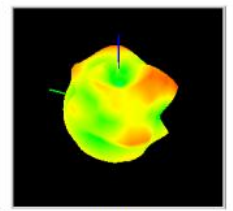
Test Point ID	Freq. (MHz)	TRP (dBm)	Gain (dBi)	Directivity (dBi)	Efficiency (%)	Efficiency (dB)
1	2400.0	2400.00	0.67	4.85	38.2%	-4.18
2	2405.0	2405.00	0.10	4.81	39.8%	-4.01
3	2410.0	2410.00	1.09	4.74	43.2%	-3.64
4	2415.0	2415.00	0.96	4.75	41.8%	-3.79
5	2420.0	2420.00	0.11	4.77	34.2%	-4.66
6	2425.0	2425.00	0.47	4.69	37.9%	-4.22
7	2430.0	2430.00	1.25	4.67	45.4%	-3.43
8	2435.0	2435.00	0.79	4.72	40.5%	-3.93
9	2440.0	2440.00	-0.01	4.74	33.5%	-4.75
10	2445.0	2445.00	-0.15	4.74	32.4%	-4.89
11	2450.0	2450.00	-0.40	4.76	45.5%	-3.36
12	2455.0	2455.00	0.58	4.83	37.6%	-4.25
13	2460.0	2460.00	1.78	4.85	49.4%	-3.07
14	2465.0	2465.00	0.39	4.83	36.0%	-4.44
15	2470.0	2470.00	-0.61	4.86	38.4%	-4.27
16	2475.0	2475.00	0.20	4.92	33.7%	-4.72
17	2480.0	2480.00	1.02	4.98	40.2%	-3.96
18	2485.0	2485.00	1.03	4.96	40.5%	-3.93
19	2490.0	2490.00	0.94	4.96	39.6%	-4.03
20	2495.0	2495.00	1.19	5.00	41.6%	-3.81
21	2500.0	2500.00	1.18	5.12	40.4%	-3.93
22	5150.0	5150.00	0.35	4.68	36.9%	-4.33
23	5200.0	5200.00	0.96	4.92	40.1%	-3.97
24	5250.0	5250.00	-1.34	5.43	41.1%	-3.77
25	5300.0	5300.00	0.59	5.06	35.7%	-4.47
26	5350.0	5350.00	-2.07	4.58	41.6%	-3.82
27	5400.0	5400.00	1.36	5.00	43.2%	-3.64
28	5450.0	5450.00	0.42	5.67	39.9%	-4.25
29	5500.0	5500.00	-0.43	5.84	37.6%	-4.30
30	5550.0	5550.00	1.34	5.60	37.5%	-4.26
31	5600.0	5600.00	0.02	5.38	39.1%	-4.36
32	5650.0	5650.00	0.75	5.84	31.0%	-5.09
33	5700.0	5700.00	0.67	6.03	39.1%	-4.36
34	5750.0	5750.00	-0.06	5.87	35.5%	-4.93
35	5800.0	5800.00	0.63	5.08	35.9%	-4.45



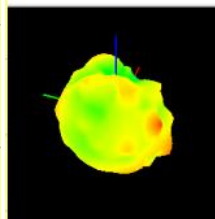
2.4G



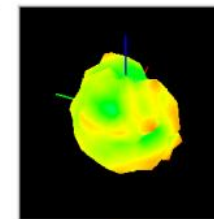
2.45G



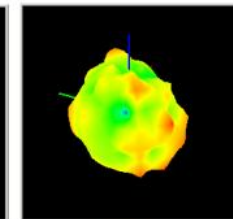
2.48G



5.2G



5.5G



5.8G

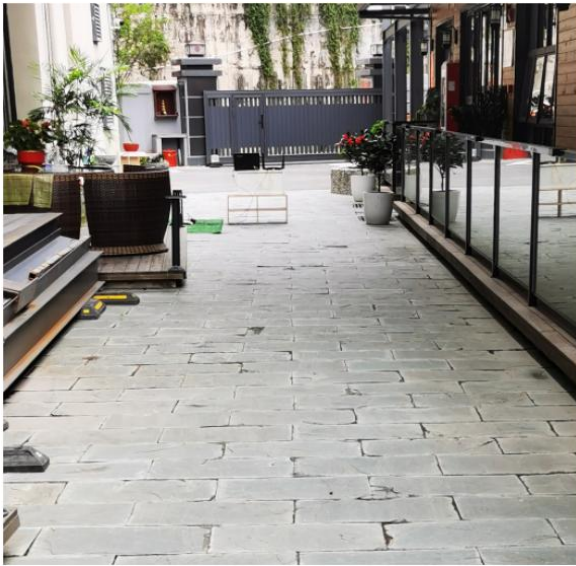
6.1.4 WIFI OTA test:

WIFI 2.4G RF Testing		11B(11Mbps)		
Channel		TCH 1	TCH 6	TCH 11
Frequency(Mhz)		2412	2437	2462
	TRP(dBm)	11.29	11.86	12.42
	TIS(dBm)	-72	-72	-73

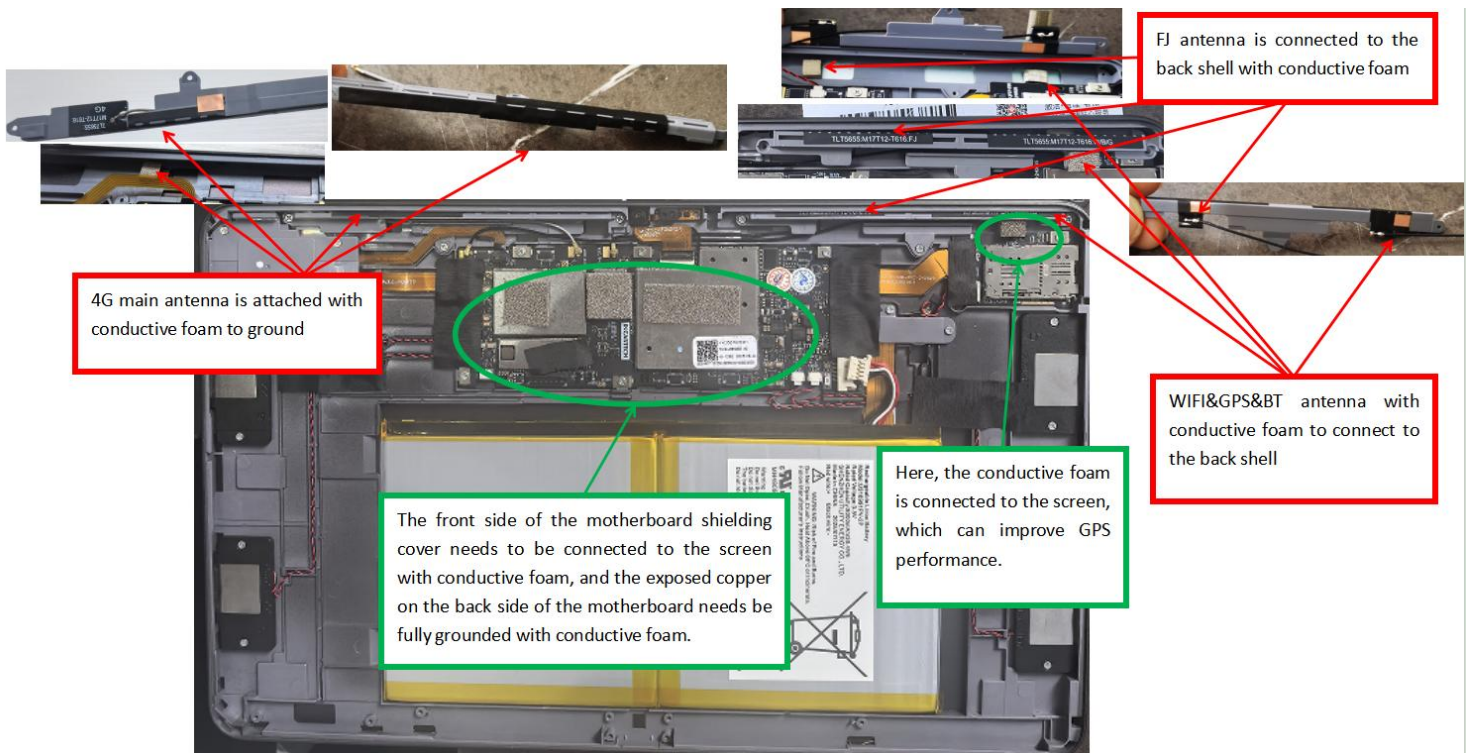
WIFI 5G RF Testing		11A(6Mbps)		
Channel		TCH 36	TCH 100	TCH 157
Frequency(Mhz)		5180	5500	5785
	TRP(dBm)	9.13	9.46	9.97
	TIS(dBm)	-81	-82	-81

6.2 GPS field test:

Test environment: on the first floor of our industrial park, use GPS test to test as follows:



7. Antenna assembly and processing drawing file



8. Antenna 2D profile

