

SHENZHEN TLT COMMUNICATION CO.,LTD

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16QF9 antenna

The Product Recognition Letter

The Customer	yanghua	Band range	2.4/5.8/GPS
Model	16QF9	Version	Latest version
Project code name	TLT 5422	Approval	
RF Designer	Mao Hangzhou	RD Designer	Tang Chunzheng
Date of this	2024-5-30	Date of this	2024-5-30
Customer Information:			

Metric

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1.Antenna parameters

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

Electrical parameters

1.1.1 Electrical Performance Assessment

The band range of the antenna is 2400MHz-2500MHz and 5000MHz~5800MHz. below are the basic parameters of the electrical performance of the antenna. This is designed antenna and produced by Tian Lu Tong.

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 plastic supports and hardware pieces.

1.2.2 can test the requirements

Test item	description	Acceptance criteri e s
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℃ Tim e: e: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 thall 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. describes the antenna in mobile) for the equipment (electrical performance test).

2.1The VSWR test

2.1.1Test the connection

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

2.1.2 voltage standing to wave ratio

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	1.65	1.69	1.82	1.71	1.68
Return Loss	-12.1	-11.2	-13.3	-11.9	-12.3

2.2 GAIN & EFFCIENCY

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

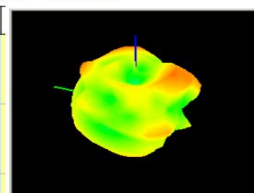
2.2.2 Test the equipment

Agilent 8960 (8753C) Wireless Communication Test Device, Dipole antenna, French Sa t imo Antenna Test System, Printer, etc.

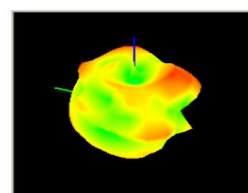
WIFI 效率增益:

3D 苹果图

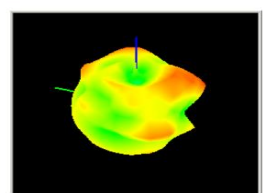
Test Point ID	Freq. (MHz)	TRP (dBm)	Gain (dBi)	Directivity (dBi)	Efficiency (%)	Efficiency (dB)
1	2400.0	2400.00	0.67	4.85	38.2%	-4.18
2	2405.0	2405.00	0.10	4.81	39.8%	-4.01
3	2410.0	2410.00	1.09	4.74	43.2%	-3.64
4	2415.0	2415.00	0.96	4.75	41.8%	-3.79
5	2420.0	2420.00	0.11	4.77	34.2%	-4.66
6	2425.0	2425.00	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	5.39	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



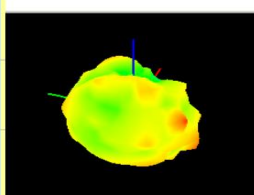
2.4G



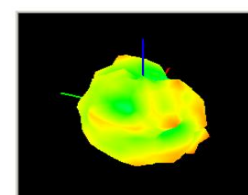
2.45G



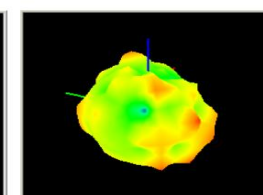
2.48G



5.2G



5.5G



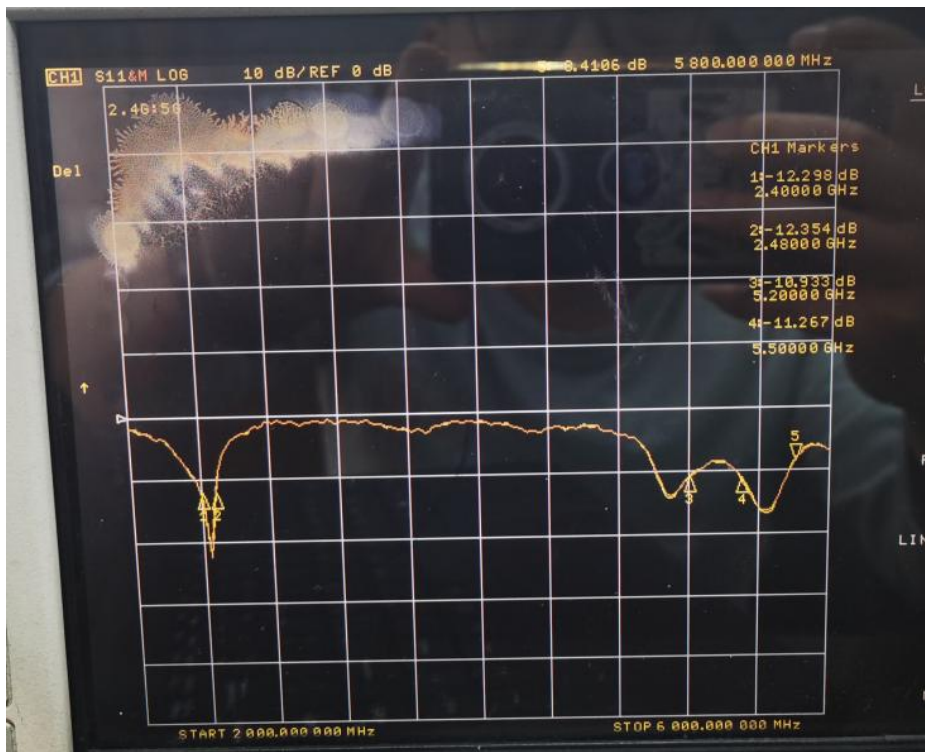
5.8G

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. WIFI graphics and test data

5.1.1WIFI field test: Test environment: open environment, 15 meters away from our router. The test is as follows:



5.1.2 WIFI throughput test:

Client connecting to 192.168.1.100, TCP port 5001
TCP window size: 2.00 MByte (WARNING: requested 1.00 MByte)

ID	Interval	Transfer	Bandwidth
[3]	0.0-1.0 sec	5.50 MBytes	46.1 Mbits/sec
[3]	1.0-2.0 sec	3.75 MBytes	31.5 Mbits/sec
[3]	2.0-3.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	3.0-4.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	4.0-5.0 sec	3.38 MBytes	29.4 Mbits/sec
[3]	5.0-6.0 sec	3.50 MBytes	29.4 Mbits/sec
[3]	6.0-7.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	7.0-8.0 sec	3.75 MBytes	31.5 Mbits/sec
[3]	8.0-9.0 sec	3.50 MBytes	29.4 Mbits/sec
[3]	9.0-10.0 sec	4.12 MBytes	34.6 Mbits/sec
[3]	10.0-11.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	11.0-12.0 sec	4.38 MBytes	36.7 Mbits/sec
[3]	12.0-13.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	13.0-14.0 sec	4.25 MBytes	35.7 Mbits/sec
[3]	14.0-15.0 sec	2.75 MBytes	23.1 Mbits/sec
[3]	15.0-16.0 sec	4.12 MBytes	34.6 Mbits/sec
[3]	16.0-17.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	17.0-18.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	18.0-19.0 sec	4.38 MBytes	36.7 Mbits/sec
[3]	19.0-20.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	20.0-21.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	21.0-22.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	22.0-23.0 sec	4.25 MBytes	35.7 Mbits/sec
[3]	23.0-24.0 sec	3.50 MBytes	29.4 Mbits/sec
[3]	24.0-25.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	25.0-26.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	26.0-27.0 sec	4.25 MBytes	35.7 Mbits/sec
[3]	27.0-28.0 sec	3.50 MBytes	29.4 Mbits/sec
[3]	28.0-29.0 sec	4.12 MBytes	34.6 Mbits/sec
[3]	29.0-30.0 sec	3.62 MBytes	30.4 Mbits/sec
[3]	0.0-30.1 sec	115 MBytes	32.0 Mbits/sec

Server listening on TCP port 5001
TCP window size: 3.30 MByte (default)

ID	Interval	Transfer	Bandwidth
[4]	0.0-30.2 sec	191 MBytes	53.2 Mbits/sec
[5]	local 192.168.1.102 port 5001 connected with 192.168.1.100 port 49292		
[5]	0.0-30.2 sec	186 MBytes	51.8 Mbits/sec
[4]	local 192.168.1.102 port 5001 connected with 192.168.1.100 port 49295		
[4]	0.0-30.2 sec	186 MBytes	51.8 Mbits/sec
[5]	local 192.168.1.102 port 5001 connected with 192.168.1.100 port 49300		
[5]	0.0-30.1 sec	181 MBytes	50.2 Mbits/sec
[4]	local 192.168.1.102 port 5001 connected with 192.168.1.100 port 49304		
[4]	0.0-30.2 sec	185 MBytes	51.3 Mbits/sec
[5]	local 192.168.1.102 port 5001 connected with 192.168.1.100 port 49308		
[5]	0.0-30.1 sec	200 MBytes	55.7 Mbits/sec

2.4G 上传: 32.0M(20M)

2.4G 下载: 55.7M(40M)

Client connecting to 192.168.1.100, TCP port 5001
TCP window size: 2.00 MByte (WARNING: requested 1.00 MByte)

ID	Interval	Transfer	Bandwidth
[3]	0.0-1.0 sec	33.9 MBytes	284 Mbits/sec
[3]	1.0-2.0 sec	35.5 MBytes	298 Mbits/sec
[3]	2.0-3.0 sec	37.4 MBytes	314 Mbits/sec
[3]	3.0-4.0 sec	38.1 MBytes	320 Mbits/sec
[3]	4.0-5.0 sec	37.8 MBytes	317 Mbits/sec
[3]	5.0-6.0 sec	38.1 MBytes	317 Mbits/sec
[3]	6.0-7.0 sec	38.5 MBytes	320 Mbits/sec
[3]	7.0-8.0 sec	38.8 MBytes	323 Mbits/sec
[3]	8.0-9.0 sec	37.9 MBytes	325 Mbits/sec
[3]	9.0-10.0 sec	38.5 MBytes	318 Mbits/sec
[3]	10.0-11.0 sec	38.0 MBytes	323 Mbits/sec
[3]	11.0-12.0 sec	37.5 MBytes	315 Mbits/sec
[3]	12.0-13.0 sec	38.6 MBytes	324 Mbits/sec
[3]	13.0-14.0 sec	37.1 MBytes	311 Mbits/sec
[3]	14.0-15.0 sec	38.4 MBytes	322 Mbits/sec
[3]	15.0-16.0 sec	38.2 MBytes	321 Mbits/sec
[3]	16.0-17.0 sec	37.5 MBytes	315 Mbits/sec
[3]	17.0-18.0 sec	37.9 MBytes	318 Mbits/sec
[3]	18.0-19.0 sec	38.8 MBytes	325 Mbits/sec
[3]	19.0-20.0 sec	38.2 MBytes	321 Mbits/sec
[3]	20.0-21.0 sec	38.2 MBytes	321 Mbits/sec
[3]	21.0-22.0 sec	38.2 MBytes	321 Mbits/sec
[3]	22.0-23.0 sec	37.1 MBytes	311 Mbits/sec
[3]	23.0-24.0 sec	38.6 MBytes	324 Mbits/sec
[3]	24.0-25.0 sec	37.4 MBytes	314 Mbits/sec
[3]	25.0-26.0 sec	38.6 MBytes	324 Mbits/sec
[3]	26.0-27.0 sec	37.8 MBytes	317 Mbits/sec
[3]	27.0-28.0 sec	38.5 MBytes	323 Mbits/sec
[3]	28.0-29.0 sec	37.8 MBytes	317 Mbits/sec
[3]	29.0-30.0 sec	38.0 MBytes	319 Mbits/sec
[3]	0.0-30.0 sec	1.11 GBytes	317 Mbits/sec

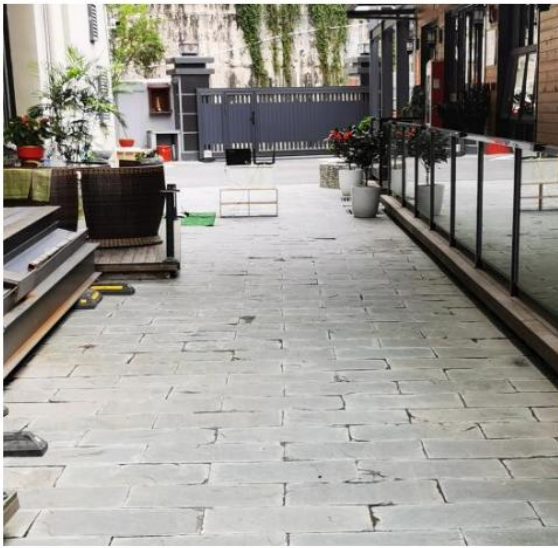
Server listening on TCP port 5001
TCP window size: 3.30 MByte (default)

ID	Interval	Transfer	Bandwidth
[4]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49325		
[4]	0.0-30.0 sec	1.12 GBytes	319 Mbits/sec
[5]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49328		
[5]	0.0-30.0 sec	1.12 GBytes	322 Mbits/sec
[4]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49333		
[4]	0.0-30.0 sec	1.10 GBytes	316 Mbits/sec
[5]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49337		
[5]	0.0-30.0 sec	1.15 GBytes	330 Mbits/sec
[4]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49341		
[4]	0.0-30.0 sec	1.15 GBytes	329 Mbits/sec
[5]	local 192.168.1.101 port 5001 connected with 192.168.1.100 port 49346		
[5]	0.0-30.0 sec	1.12 GBytes	321 Mbits/sec

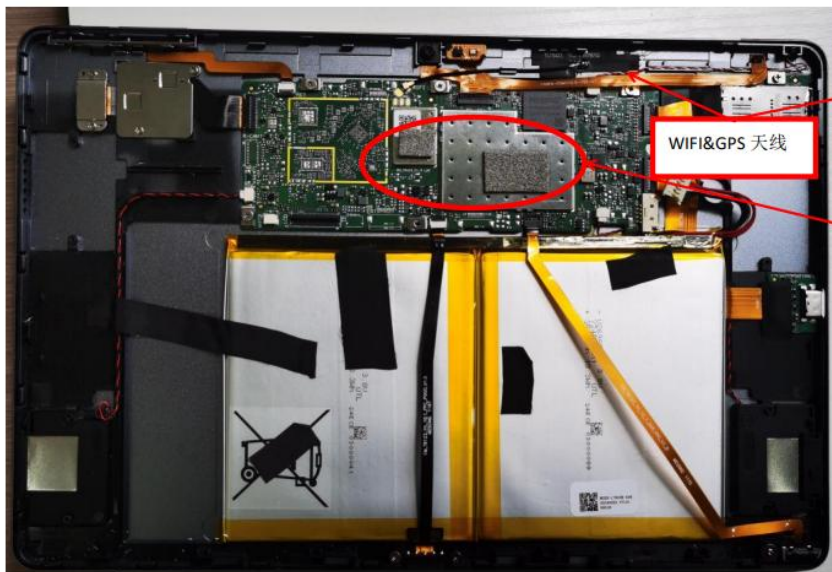
5G 上传: 317M

5G 下载: 321M

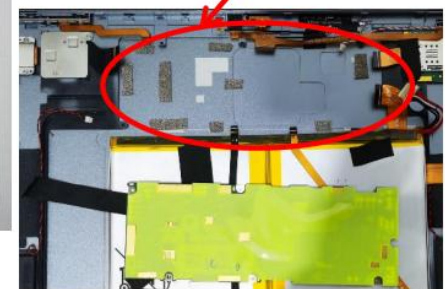
Product Number:TLT5422-16QF9
Product Name:Mobile Phone Antenna



6. Antenna assembly and processing drawing file



主板背面漏铜用导电泡棉使后壳接地，并在正面屏蔽罩处用导电泡棉接到屏以接地



7. Antenna 2D profile

