

SHENZHEN TLT COMMUNICATION CO.,LTD

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

M11QF11A–WIFI antenna
The Product Recognition Letter

The Customer	yanghua	Band range	2.4/5.8G
Model	M11QF11A-WIFI	Version	Latest version
Project code name	TLT 5462	Antenna type	PIFA
RF Designer	Mao Hangzhou	RD Designer	Tang Chunzheng
Date of this	2024-8-23	Date of this	2024-8-23
Customer Information:			

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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 .

	WIFI-2.4G		WIFI-5.0G	
Frequency (MHz)	2.4G	2.48G	5.15G	5.85G
VSWR	1.17	1.21	1.52	4.60
Return Loss	-22.33	-20.40	-13.69	-4.17

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.

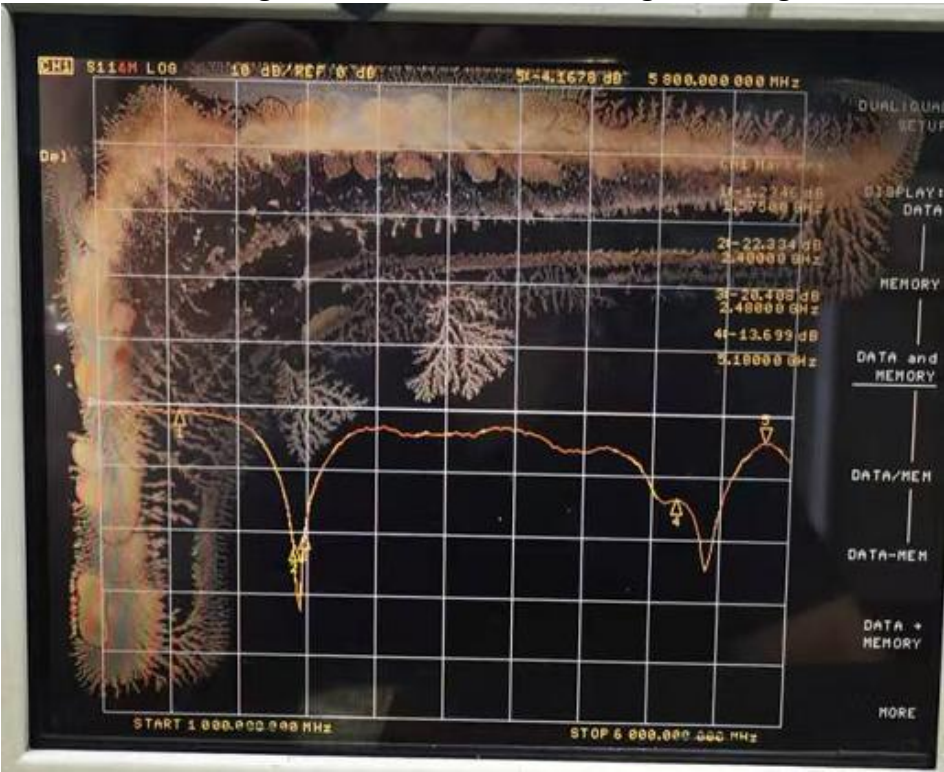
Main antenna	2.40G	2.48G	5.20G	5.85G
Gain (dBi)	0.17	0.02	1.23	0.73
Efficiency (%)	34.7	39.2	27.3	27.2

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:



2.4G-WIFI display -33DBM , full signal

5G-WIFI display -35DBM , full signal



5.1.2 WIFI throughput test:

```
Client connecting to 192.168.1.3, TCP port 5001
TCP window size: 512 KByte (WARNING: requested 1.00 MByte)

[ 3] local 192.168.1.2 port 52248 connected with 192.168.1.3 port 5001
[ID] Interval Transfer Bandwidth
[ 3] 0.0- 1.0 sec 9.88 MBytes 82.8 Mb/s/sec
[ 3] 1.0- 2.0 sec 11.5 MBytes 96.5 Mb/s/sec
[ 3] 2.0- 3.0 sec 10.5 MBytes 88.1 Mb/s/sec
[ 3] 3.0- 4.0 sec 11.4 MBytes 95.4 Mb/s/sec
[ 3] 4.0- 5.0 sec 11.0 MBytes 92.3 Mb/s/sec
[ 3] 5.0- 6.0 sec 11.1 MBytes 93.3 Mb/s/sec
[ 3] 6.0- 7.0 sec 10.9 MBytes 91.2 Mb/s/sec
[ 3] 7.0- 8.0 sec 11.4 MBytes 95.4 Mb/s/sec
[ 3] 8.0- 9.0 sec 11.9 MBytes 99.6 Mb/s/sec
[ 3] 9.0-10.0 sec 7.75 MBytes 65.0 Mb/s/sec
[ 3] 10.0-11.0 sec 7.75 MBytes 65.0 Mb/s/sec
[ 3] 11.0-12.0 sec 9.25 MBytes 77.6 Mb/s/sec
[ 3] 12.0-13.0 sec 9.12 MBytes 76.5 Mb/s/sec
[ 3] 13.0-14.0 sec 9.12 MBytes 76.5 Mb/s/sec
[ 3] 14.0-15.0 sec 7.50 MBytes 62.9 Mb/s/sec
[ 3] 15.0-16.0 sec 7.62 MBytes 64.0 Mb/s/sec
[ 3] 16.0-17.0 sec 6.38 MBytes 53.5 Mb/s/sec
[ 3] 17.0-18.0 sec 6.88 MBytes 57.7 Mb/s/sec
[ 3] 18.0-19.0 sec 5.38 MBytes 45.1 Mb/s/sec
[ 3] 19.0-20.0 sec 6.75 MBytes 56.6 Mb/s/sec
[ 3] 20.0-21.0 sec 6.00 MBytes 50.3 Mb/s/sec
[ 3] 21.0-22.0 sec 5.25 MBytes 44.0 Mb/s/sec
[ 3] 22.0-23.0 sec 5.12 MBytes 43.0 Mb/s/sec
[ 3] 23.0-24.0 sec 4.88 MBytes 40.9 Mb/s/sec
[ 3] 24.0-25.0 sec 4.50 MBytes 37.7 Mb/s/sec
[ 3] 25.0-26.0 sec 5.62 MBytes 47.2 Mb/s/sec
[ 3] 26.0-27.0 sec 6.00 MBytes 50.3 Mb/s/sec
[ 3] 27.0-28.0 sec 5.12 MBytes 43.0 Mb/s/sec
[ 3] 28.0-29.0 sec 6.12 MBytes 51.4 Mb/s/sec
[ 3] 29.0-30.0 sec 5.12 MBytes 43.0 Mb/s/sec
[ 3] 0.0-30.0 sec 237 MBytes 66.2 Mb/s/sec
```

2.4G RX: 68.2M

```
Server listening on TCP port 5001
TCP window size: 1.00 MByte (default)

[ 4] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49425
[ID] Interval Transfer Bandwidth
[ 4] 0.0-30.1 sec 299 MBytes 83.5 Mb/s/sec
[ 5] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49434
[ 5] 0.0-30.1 sec 310 MBytes 86.4 Mb/s/sec
[ 4] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49439
[ 4] 0.0-30.1 sec 307 MBytes 85.6 Mb/s/sec
[ 5] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49442
[ 5] 0.0-30.1 sec 316 MBytes 88.0 Mb/s/sec
[ 4] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49447
[ 4] 0.0-30.1 sec 303 MBytes 84.4 Mb/s/sec
[ 5] local 192.168.1.2 port 5001 connected with 192.168.1.3 port 49451
[ 5] 0.0-30.1 sec 296 MBytes 82.6 Mb/s/sec
```

2.4G TX: 82.6M

```
Client connecting to 192.168.1.3, TCP port 5001
TCP window size: 512 KByte (WARNING: requested 1.00 MByte)

[ 3] local 192.168.1.5 port 33956 connected with 192.168.1.3 port 5001
[ID] Interval Transfer Bandwidth
[ 3] 0.0- 1.0 sec 30.5 MBytes 256 Mb/s/sec
[ 3] 1.0- 2.0 sec 33.2 MBytes 279 Mb/s/sec
[ 3] 2.0- 3.0 sec 32.2 MBytes 271 Mb/s/sec
[ 3] 3.0- 4.0 sec 34.2 MBytes 287 Mb/s/sec
[ 3] 4.0- 5.0 sec 35.8 MBytes 300 Mb/s/sec
[ 3] 5.0- 6.0 sec 36.0 MBytes 302 Mb/s/sec
[ 3] 6.0- 7.0 sec 34.8 MBytes 292 Mb/s/sec
[ 3] 7.0- 8.0 sec 37.0 MBytes 310 Mb/s/sec
[ 3] 8.0- 9.0 sec 36.5 MBytes 306 Mb/s/sec
[ 3] 9.0-10.0 sec 34.2 MBytes 287 Mb/s/sec
[ 3] 10.0-11.0 sec 34.9 MBytes 293 Mb/s/sec
[ 3] 11.0-12.0 sec 34.1 MBytes 286 Mb/s/sec
[ 3] 12.0-13.0 sec 35.0 MBytes 294 Mb/s/sec
[ 3] 13.0-14.0 sec 34.9 MBytes 293 Mb/s/sec
[ 3] 14.0-15.0 sec 34.8 MBytes 292 Mb/s/sec
[ 3] 15.0-16.0 sec 35.4 MBytes 297 Mb/s/sec
[ 3] 16.0-17.0 sec 34.0 MBytes 285 Mb/s/sec
[ 3] 17.0-18.0 sec 37.5 MBytes 315 Mb/s/sec
[ 3] 18.0-19.0 sec 34.5 MBytes 289 Mb/s/sec
[ 3] 19.0-20.0 sec 35.6 MBytes 299 Mb/s/sec
[ 3] 20.0-21.0 sec 36.1 MBytes 303 Mb/s/sec
[ 3] 21.0-22.0 sec 36.0 MBytes 302 Mb/s/sec
[ 3] 22.0-23.0 sec 36.1 MBytes 303 Mb/s/sec
[ 3] 23.0-24.0 sec 36.9 MBytes 309 Mb/s/sec
[ 3] 24.0-25.0 sec 36.2 MBytes 304 Mb/s/sec
[ 3] 25.0-26.0 sec 36.0 MBytes 302 Mb/s/sec
[ 3] 26.0-27.0 sec 35.4 MBytes 297 Mb/s/sec
[ 3] 27.0-28.0 sec 35.5 MBytes 298 Mb/s/sec
[ 3] 28.0-29.0 sec 36.4 MBytes 305 Mb/s/sec
[ 3] 29.0-30.0 sec 35.1 MBytes 295 Mb/s/sec
[ 3] 0.0-30.0 sec 1.03 GBytes 295 Mb/s/sec
```

5G RX: 295M

```
Server listening on TCP port 5001
TCP window size: 1.00 MByte (default)

[ 4] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49598
[ID] Interval Transfer Bandwidth
[ 4] 0.0-30.0 sec 1.42 GBytes 408 Mb/s/sec
[ 5] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49603
[ 5] 0.0-30.0 sec 1.38 GBytes 394 Mb/s/sec
[ 4] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49608
[ 4] 0.0-30.0 sec 1.23 GBytes 353 Mb/s/sec
[ 5] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49617
[ 5] 0.0-30.0 sec 1.41 GBytes 402 Mb/s/sec
[ 4] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49622
[ 4] 0.0-30.0 sec 1.38 GBytes 394 Mb/s/sec
[ 5] local 192.168.1.5 port 5001 connected with 192.168.1.3 port 49626
[ 5] 0.0-30.0 sec 1.37 GBytes 391 Mb/s/sec
```

5G TX: 391M

5.2 WIFI gain and efficiency test:

Test Point ID	Freq. (MHz)	TRP (dBm)	Gain (dBi)	Efficiency (%)	Efficiency (dB)
1	2400.0	2400.00	0.17	34.7%	-4.60
2	2405.0	2405.00	-0.90	26.5%	-5.77
3	2410.0	2410.00	-0.24	30.3%	-5.19
4	2415.0	2415.00	0.23	34.0%	-4.69
5	2420.0	2420.00	-0.11	31.8%	-4.98
6	2425.0	2425.00	0.05	33.3%	-4.78
7	2430.0	2430.00	0.40	36.1%	-4.42
8	2435.0	2435.00	-0.14	31.5%	-5.02
9	2440.0	2440.00	-0.71	27.3%	-5.64
10	2445.0	2445.00	-0.71	27.7%	-5.58
11	2450.0	2450.00	-0.89	26.6%	-5.75
12	2455.0	2455.00	0.00	31.6%	-5.00
13	2460.0	2460.00	0.96	37.1%	-4.31
14	2465.0	2465.00	-0.73	25.2%	-5.99
15	2470.0	2470.00	-1.84	30.0%	-5.23
16	2475.0	2475.00	-0.82	35.2%	-4.53
17	2480.0	2480.00	0.01	39.2%	-4.07
18	2485.0	2485.00	-0.65	34.3%	-4.65
19	2490.0	2490.00	-1.17	28.5%	-5.45
20	2495.0	2495.00	-0.75	28.2%	-5.50
21	2500.0	2500.00	-0.33	27.1%	-5.67
22	5150.0	5150.00	0.15	25.4%	-5.95
23	5200.0	5200.00	1.23	27.3%	-5.64
24	5250.0	5250.00	-0.38	26.6%	-5.75
25	5300.0	5300.00	2.36	32.3%	-4.91
26	5350.0	5350.00	0.26	30.3%	-5.19
27	5400.0	5400.00	2.38	36.0%	-4.44
28	5450.0	5450.00	0.47	34.2%	-4.66
29	5500.0	5500.00	-1.08	38.1%	-4.19
30	5550.0	5550.00	1.84	38.6%	-4.13
31	5600.0	5600.00	0.83	31.1%	-5.07
32	5650.0	5650.00	1.28	28.7%	-5.42
33	5700.0	5700.00	-0.53	27.0%	-5.69
34	5750.0	5750.00	-0.02	26.4%	-5.78
35	5800.0	5800.00	0.73	27.2%	-5.65
36	5850.0	5850.00	-1.95	28.1%	-5.51

