

SHENZHEN TLT COMMUNICATION CO.,LTD

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

CG14D02 antenna The Product Recognition Letter

The Customer	yanghua	Band range	2.4/5.8
Model	CG14D02	Version	Latest version
Project code name	TLT5628	Approval	
RF Designer	Mao Hangzhou	RD Designer	Tang Chunzheng
Date of this	2026-2-27	Date of this	2026-2-27

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 The VSWR test

2.1.1 test connection

2.1.2 voltage standing to wave ratio

2.2 GAIN & EFFICIENCY

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.WIFI graphics and test data

5.1.1 WIFI field test

5.1.2 WIFI OTA test

5.1.3 WIFI throughput test

5.2 Gain and efficiency tests

6.Antenna assembly and processing drawing file

7.Antenna 2D profile

1.Antenna parameters

This report mainly provides test conditions and results for various electrical and structural properties in device tests,

An 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 criteria
1. cryotemperature 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. 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 .

Main antenna	WIFI-2.4G		WIFI-5.0G	
Frequency (MHz)	2.4G	2.48G	5.15G	5.85G
VSWR	1.43	1.64	1.61	2.11
Return Loss	-12.8	-15.7	-12.8	-12.7

AUX antenna	WIFI-2.4G		WIFI-5.0G	
Frequency (MHz)	2.4G	2.48G	5.15G	5.85G
VSWR	1.36	1.58	2.04	1.87
Return Loss	-17.9	-31.2	-9.0	-7.6

2.2 GAIN & EFFICIENCY

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	0.01	1.23	-1.95
Efficiency (%)	34.7	34.2	27.3	28.1

AUX antenna	2.40G	2.48G	5.20G	5.85G
Gain (dBi)	3.1	0.36	1.36	-0.23
Efficiency (%)	55.9	29.7	39.1	21.4

3. summary

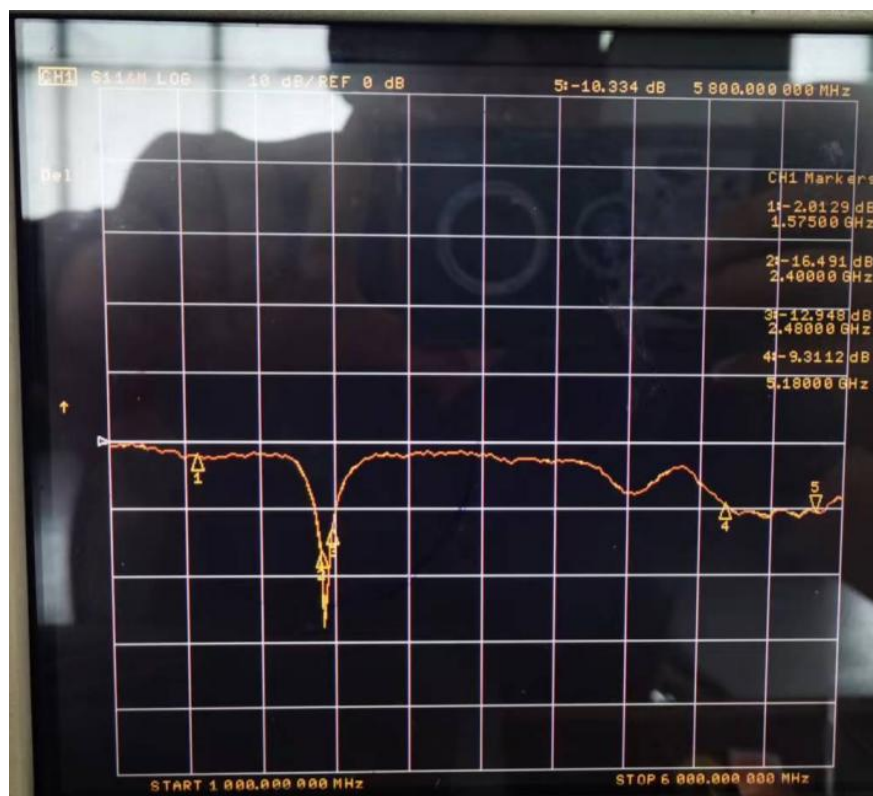
The antenna is designed according to the machine samples provided by the customer, and the electrical parameters and result performance of the antenna meet the standard, and we are sure to make you satisfied.

4.Attachment diagram

4.1 Parameter diagram of return loss and voltage standing wave ratio



Main antenna



AUX antenna

5. WIFI graphics and test data

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

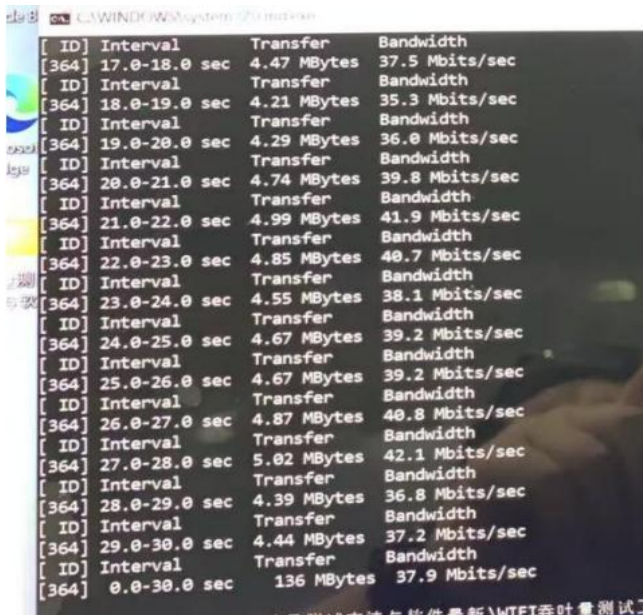


5.1.2 WIFI OTA test:

WIFI 2.4G RF Testing		11B(11Mbps)		
Channel		TCH 1	TCH 6	TCH 11
Frequency(Mhz)		2412	2437	2462
	TRP(dBm)	11. 23	12. 56	11. 47
	TIS(dBm)	-73	-72	-72

WIFI 5G RF Testing		11A(6Mbps)		
Channel		TCH 36	TCH 100	TCH 157
Frequency(Mhz)		5180	5500	5785
	TRP(dBm)	12. 33	13. 27	11. 57
	TIS(dBm)	-82	-83	-83

5.1.3 WIFI throughput test:



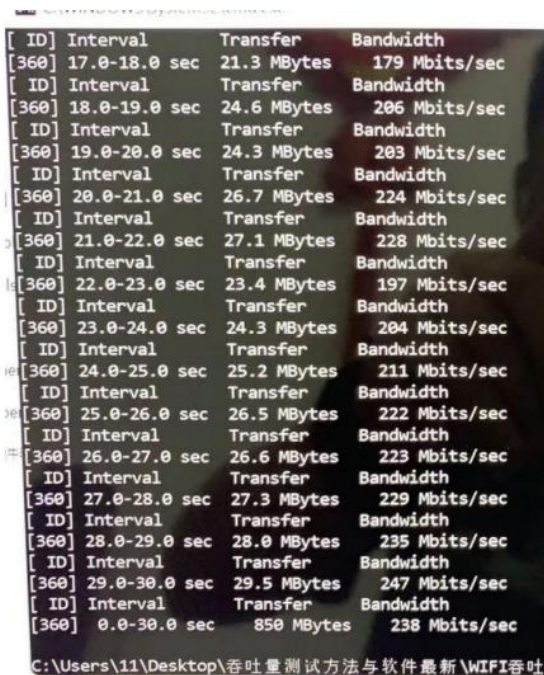
[ID]	Interval	Transfer	Bandwidth
[364]	17.0-18.0 sec	4.47 MBytes	37.5 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	18.0-19.0 sec	4.21 MBytes	35.3 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	19.0-20.0 sec	4.29 MBytes	36.0 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	20.0-21.0 sec	4.74 MBytes	39.8 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	21.0-22.0 sec	4.99 MBytes	41.9 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	22.0-23.0 sec	4.85 MBytes	40.7 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	23.0-24.0 sec	4.55 MBytes	38.1 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	24.0-25.0 sec	4.67 MBytes	39.2 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	25.0-26.0 sec	4.67 MBytes	39.2 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	26.0-27.0 sec	4.87 MBytes	42.1 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	27.0-28.0 sec	5.02 MBytes	42.1 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	28.0-29.0 sec	4.39 MBytes	36.8 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	29.0-30.0 sec	4.44 MBytes	37.2 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[364]	0.0-30.0 sec	136 MBytes	37.9 Mbits/sec

2.4G RX: 37.9M



```
Users\11\Desktop\吞吐量测试方法与软件最新\WIFI吞吐量测试工具>iperf
Server listening on TCP port 5001
TCP window size: 64.0 KByte (default)
-----
[72] local 192.168.1.4 port 5001 connected with 192.168.1.3 port 5000
[ ID] Interval      Transfer    Bandwidth
[372] 0.0-30.3 sec  164 MBytes  45.4 Mbits/sec
[388] local 192.168.1.4 port 5001 connected with 192.168.1.3 port 5001
[ ID] Interval      Transfer    Bandwidth
[388] 0.0-30.2 sec  160 MBytes  44.5 Mbits/sec
[400] local 192.168.1.4 port 5001 connected with 192.168.1.3 port 5001
[ ID] Interval      Transfer    Bandwidth
[400] 0.0-30.1 sec  168 MBytes  46.7 Mbits/sec
[412] local 192.168.1.4 port 5001 connected with 192.168.1.3 port 5001
[ ID] Interval      Transfer    Bandwidth
[412] 0.0-30.2 sec  162 MBytes  44.9 Mbits/sec
[424] local 192.168.1.4 port 5001 connected with 192.168.1.3 port 5001
[ ID] Interval      Transfer    Bandwidth
[424] 0.0-30.2 sec  156 MBytes  43.4 Mbits/sec
```

2.4G TX: 43.4M



[ID]	Interval	Transfer	Bandwidth
[360]	17.0-18.0 sec	21.3 MBytes	179 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	18.0-19.0 sec	24.6 MBytes	206 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	19.0-20.0 sec	24.3 MBytes	203 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	20.0-21.0 sec	26.7 MBytes	224 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	21.0-22.0 sec	27.1 MBytes	228 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	22.0-23.0 sec	23.4 MBytes	197 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	23.0-24.0 sec	24.3 MBytes	204 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	24.0-25.0 sec	25.2 MBytes	211 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	25.0-26.0 sec	26.5 MBytes	222 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	26.0-27.0 sec	26.6 MBytes	223 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	27.0-28.0 sec	27.3 MBytes	229 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	28.0-29.0 sec	28.0 MBytes	235 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	29.0-30.0 sec	29.5 MBytes	247 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[360]	0.0-30.0 sec	850 MBytes	238 Mbits/sec

5G RX: 238M



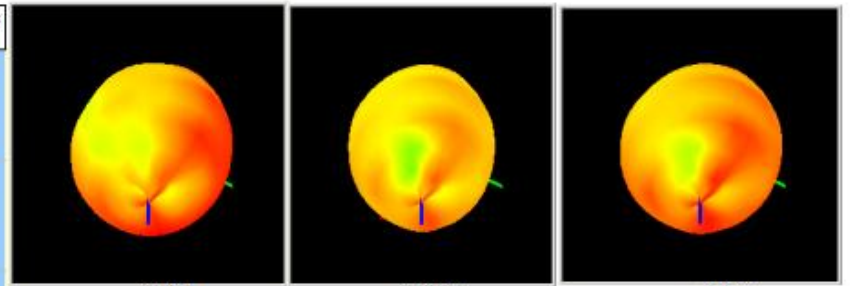
```
C:\Users\11\Desktop\吞吐量测试方法与软件最新\WIFI吞吐量测试工具>iperf -s
Server listening on TCP port 5001
TCP window size: 64.0 KByte (default)
-----
[376] local 192.168.1.3 port 5001 connected with 192.168.1.2 port 59685
[ ID] Interval      Transfer    Bandwidth
[376] 0.0-30.0 sec  1.00 GBytes  286 Mbits/sec
[396] local 192.168.1.3 port 5001 connected with 192.168.1.2 port 59688
[ ID] Interval      Transfer    Bandwidth
[396] 0.0-30.0 sec  1.09 GBytes  312 Mbits/sec
[412] local 192.168.1.3 port 5001 connected with 192.168.1.2 port 59692
[ ID] Interval      Transfer    Bandwidth
[412] 0.0-30.0 sec  1.10 GBytes  314 Mbits/sec
[428] local 192.168.1.3 port 5001 connected with 192.168.1.2 port 59696
[ ID] Interval      Transfer    Bandwidth
[428] 0.0-30.0 sec  1.10 GBytes  313 Mbits/sec
[440] local 192.168.1.3 port 5001 connected with 192.168.1.2 port 59697
[ ID] Interval      Transfer    Bandwidth
[440] 0.0-30.0 sec  1.09 GBytes  313 Mbits/sec
```

5G TX: 313M

5.2 WIFI gain and efficiency test:

Main antenna

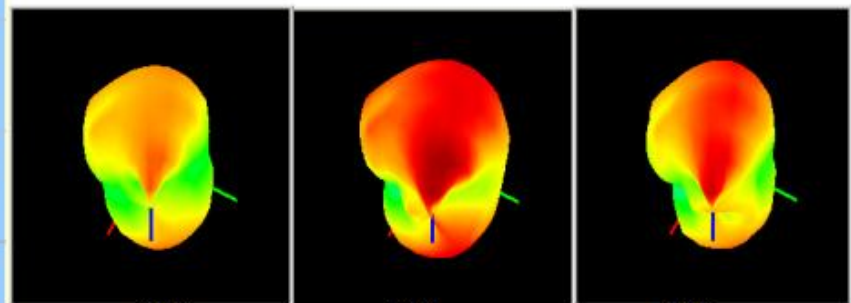
Test Point ID	Freq. (MHz)	TRP (dBm)	Gain (dBi)	Efficiency (%)	Efficiency (dB)
1	2400.0	2400.00	0.17	34.7%	-4.60
2	2405.0	2405.00	-0.90	26.5%	-5.77
3	2410.0	2410.00	-0.24	30.3%	-5.19
4	2415.0	2415.00	0.23	34.0%	-4.69
5	2420.0	2420.00	-0.11	31.8%	-4.98
6	2425.0	2425.00	0.05	33.3%	-4.78
7	2430.0	2430.00	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



2.4G

2.45G

2.8G



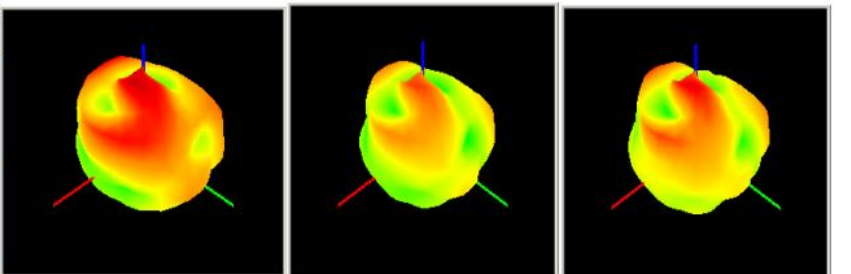
5.2G

5.5G

5.8G

AUX antenna

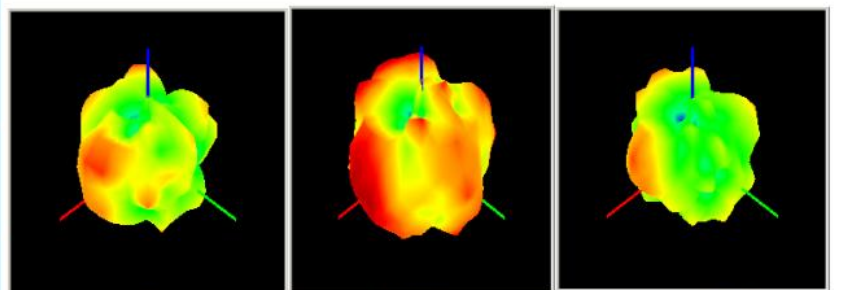
Test Point ID	Freq. (MHz)	TRP (dBm)	Gain (dBi)	Efficiency (%)	Efficiency (dB)
1	2400.0	2400.00	3.16	55.9%	-2.52
2	2405.0	2405.00	1.32	37.2%	-4.30
3	2410.0	2410.00	1.16	36.2%	-4.41
4	2415.0	2415.00	1.72	41.2%	-3.86
5	2420.0	2420.00	2.24	46.2%	-3.36
6	2425.0	2425.00	2.33	47.1%	-3.27
7	2430.0	2430.00	1.63	40.4%	-3.94
8	2435.0	2435.00	0.43	30.9%	-5.09
9	2440.0	2440.00	0.54	31.8%	-4.97
10	2445.0	2445.00	1.97	44.3%	-3.54
11	2450.0	2450.00	1.20	37.5%	-4.27
12	2455.0	2455.00	0.04	28.7%	-5.43
13	2460.0	2460.00	0.84	34.3%	-4.65
14	2465.0	2465.00	1.50	39.6%	-4.02
15	2470.0	2470.00	1.87	42.5%	-3.72
16	2475.0	2475.00	1.14	35.7%	-4.48
17	2480.0	2480.00	0.35	29.7%	-5.28
18	2485.0	2485.00	0.86	33.2%	-4.79
19	2490.0	2490.00	2.39	46.4%	-3.33
20	2495.0	2495.00	3.02	53.6%	-2.71
21	2500.0	2500.00	1.59	38.4%	-4.16
22	5150.0	5150.00	1.58	36.5%	-4.38
23	5200.0	5200.00	1.35	39.1%	-4.08
24	5250.0	5250.00	-1.19	24.0%	-6.20
25	5300.0	5300.00	0.97	37.9%	-4.21
26	5350.0	5350.00	-2.63	16.3%	-7.89
27	5400.0	5400.00	0.32	33.2%	-4.78
28	5450.0	5450.00	-0.47	31.3%	-5.04
29	5500.0	5500.00	-1.05	27.8%	-5.55
30	5550.0	5550.00	2.26	51.8%	-2.85
31	5600.0	5600.00	0.41	32.3%	-4.91
32	5650.0	5650.00	-0.37	25.9%	-5.87
33	5700.0	5700.00	-0.40	24.9%	-6.05
34	5750.0	5750.00	-0.30	25.9%	-5.86
35	5800.0	5800.00	0.97	32.3%	-4.91
36	5850.0	5850.00	-0.23	21.4%	-6.69



2.4G

2.45G

2.49G

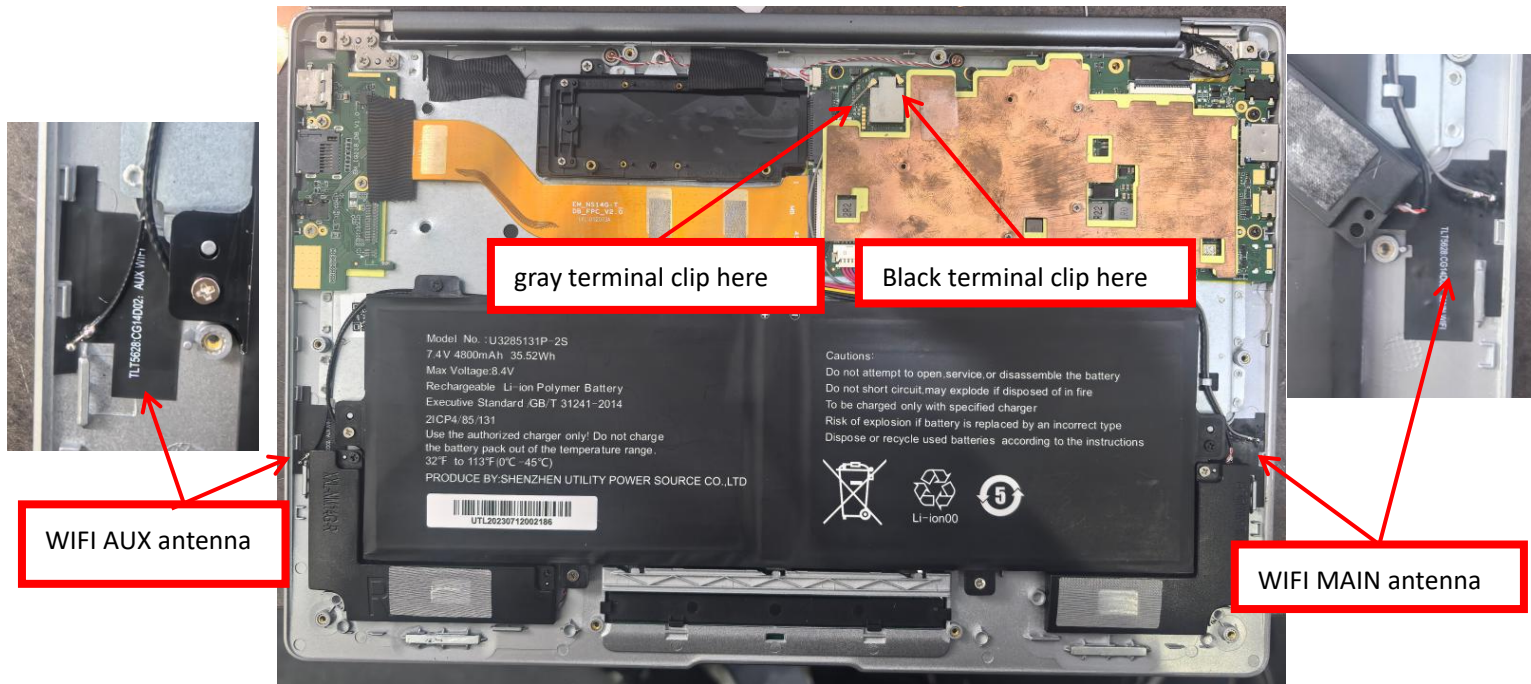


5.2G

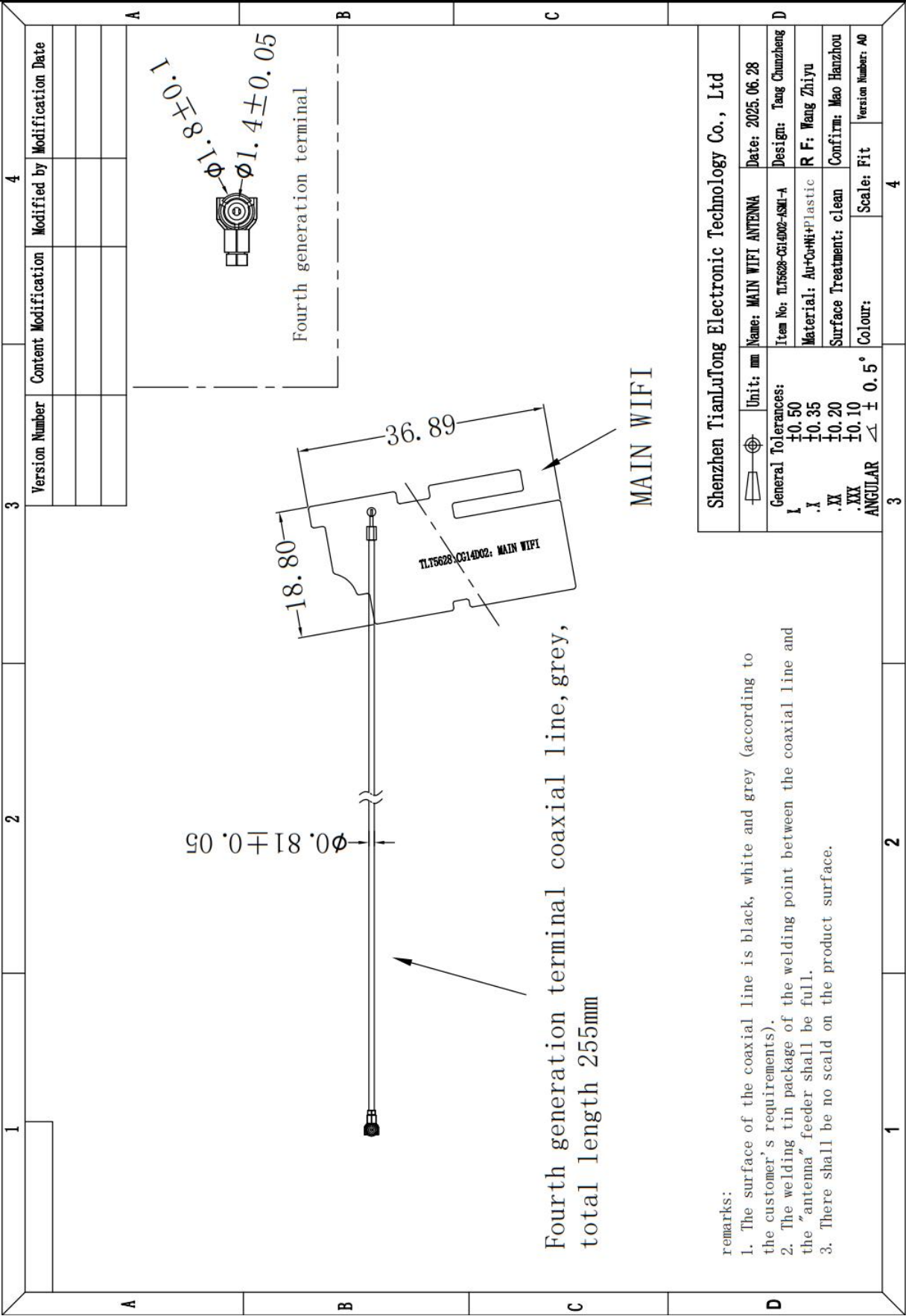
5.5G

5.8G

6.Antenna assembly and processing drawing file



7. Antenna 2D profile



1		2		3		4	
				Version Number		Content Modification	
				Modified by		Modification Date	

Fourth generation terminal coaxial line, black, total length 300mm

Fourth generation terminal

Remarks:

- The surface of the coaxial line is black, white and grey (according to the customer's requirements).
- The welding tin package of the welding point between the coaxial line and the "antenna" feeder shall be full.
- There shall be no scald on the product surface.

Shenzhen TianluTong Electronic Technology Co., Ltd

General Tolerances:	Unit: mm	Name: AUX WIFI ANTENNA	Date: 2025.06.28
1. ± 0.50		Item No: T15628-0314002-15W2-A	Design: Tang Chunzhang
.X ± 0.35		Material: Au+Cu+Ni+Plastic	R F: Wang Zhiyu
.XX ± 0.20		Surface Treatment: clean	Confirm: Mao Hanzhou
.XXX ± 0.10		Colour:	Scale: Fit
ANGULAR $\leq \pm 0.5^\circ$			Version Number: A0