



ShenZhen KHT Antenna Technology
Co., LTD.



● ● ● Antenna Datasheet ● ● ●

September 30, 2022

Catalogue:

1.Model Information

2.Company profile

3.Passive and Matching

4.3D Active Test Data : Nothing

5.Environmental treatment

6.Summary



ShenZhen KHT Antenna Technology Co. ,LTD.
- Specializing in antenna R&D, manufacturing and sales

1、Model Information

Manufacturer	Bmorn	RF	fengguoqing
Model Name	N15ES6 Replace the module	Email	NA
Antenna Type	PIFA	Band	2.4G/5.8G WIFI

Model pictures :



ShenZhen KHT Antenna Technology Co. ,LTD.
- Specializing in antenna R&D, manufacturing and sales

2、Company profile- About KBT



The company was founded in 1995. After 23 years of development, it has grown into a company with about 500 employees and a registered capital of 67.65 million yuan. The company covers an area of 60 mu, with a building area of 55000 square meters, a workshop area of 36000 square meters, a warehouse area of 13000 square meters, an annual production capacity of 24 million pairs/year antennas, and more than 4000 product models.

- ◆ Guangdong Famous Trademark
- ◆ National high-tech enterprises
- ◆ An enterprise that abides by contracts and promises in Guangdong Province for 20 consecutive years
- ◆ Top 10 antenna manufacturers in China
- ◆ Guangdong Engineering Technology Research Center
- ◆ Listing on the New Third Board in 2015, stock code 831958

WWW.KBT-CHINA.COM

Foshan Headquarters : No. 2, Chanxiu Road, Nanzhuang Town, Chancheng District, Foshan City

Shenzhen R&D Center : Hezhou, Hangcheng Street, Bao'an District, Shenzhen3F, West of Building 1, Zhongkenuo Industrial Park

**Guangdong Jianbotong
Securities code 831958**

3、Passive and Matching

3.1 Passive test diagram

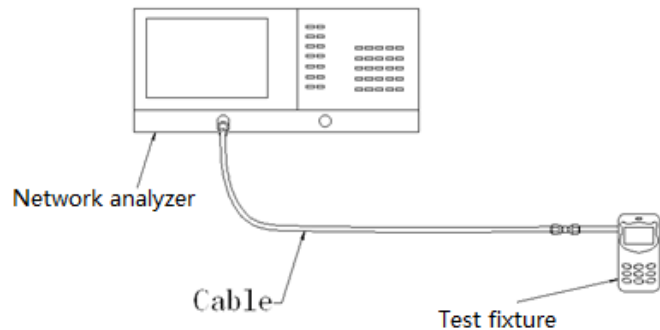
S11 Test method description

Test equipment :

Network analyzer(E5071C 30k-8.5Ghz)

Test method :

Use a 50 ohm CABLE to export from the instrument test port, and connect the prototype after calibration with the calibration pieceSMA connector of the tool, record the return loss and standing wave ratio corresponding to the relevant frequency point.



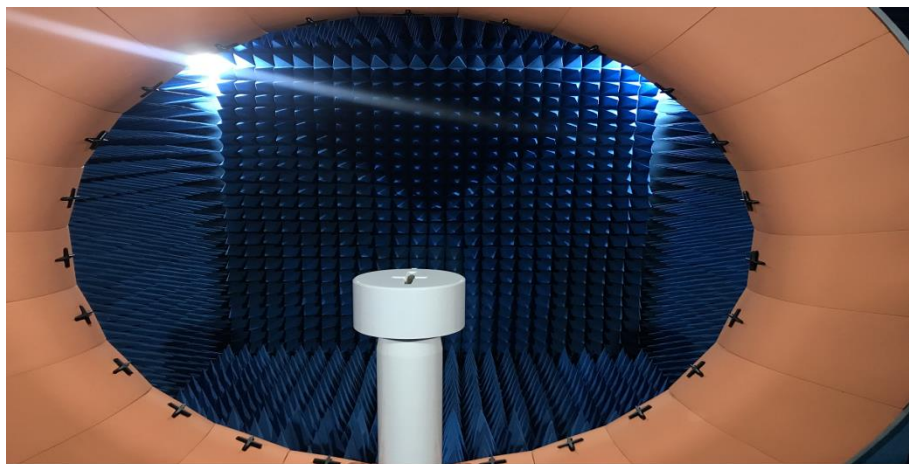
3.2 Schematic diagram of active test

3D test system: Shielded darkroom

Testing environment : Temperature $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$, Humidity $50\% \pm 15\%$

Test equipment : When testing passive data, use Agilent E5071C network analyzer

When testing the active data, use the comprehensive tester 8960/CMW500



总全向辐射功率 (TIRP)

$$TIRP \cong \frac{\pi}{2NM} \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} [Eirp_{\theta}(\theta_i, \phi_j) + Eirp_{\phi}(\theta_i, \phi_j)] \sin(\theta_i)$$

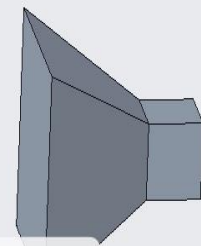
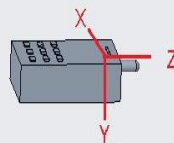
总全向辐射灵敏度 (TIRS)

$$TIRS \cong \frac{2NM}{\pi \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} \left[\frac{1}{EIS_{\theta}(\theta_i, \phi_j)} + \frac{1}{EIS_{\phi}(\theta_i, \phi_j)} \right]} \sin(\theta_i)$$

E1: XZ的切面 PHI=0

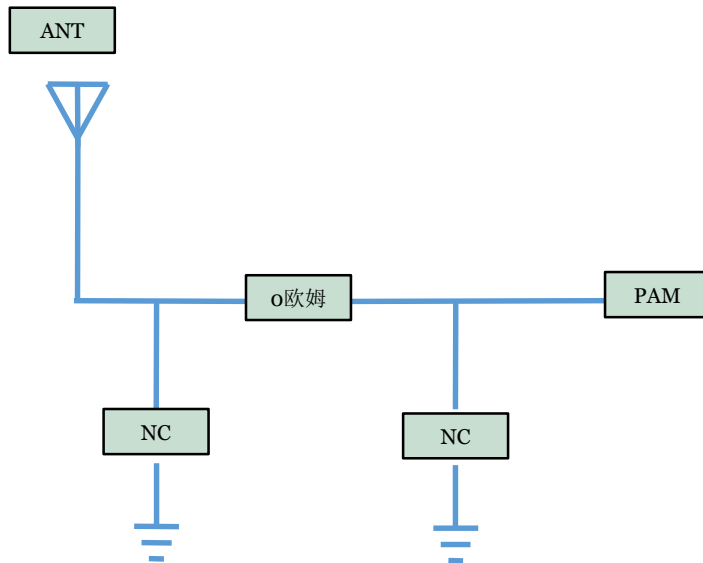
E2: YZ的切面 PHI=90

H: XY的切面 Theta=90



以喇叭天线为参考

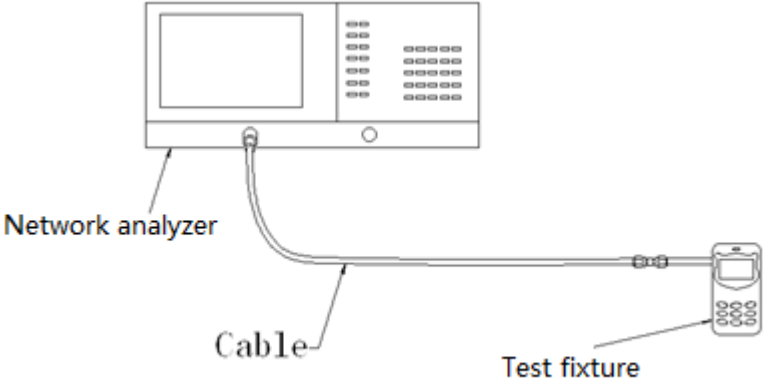
3.3 Matching Circuit



The motherboard matching has not been changed.

Note: original string 0 ohm, from antenna ----- Series 0 ohm resistance -----PA

S11参数



S11 Test method description

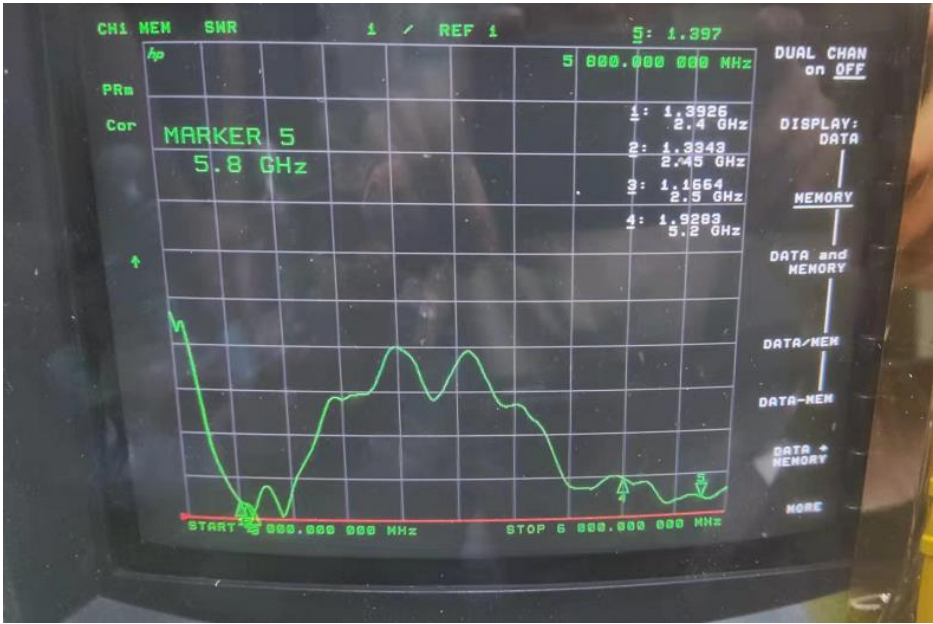
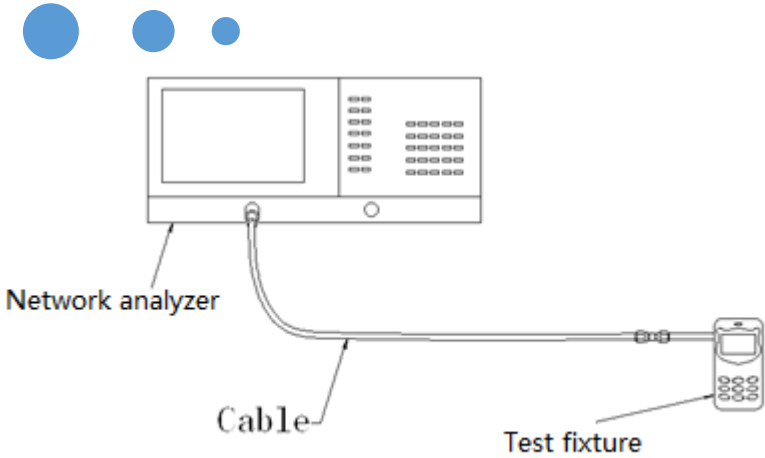


Test equipment:
Network analyzer(E5071C 30k-8.5Ghz)

Test method:
Use a 50 ohm CABLE to export from the instrument test port, and connect the prototype after calibration with the calibration piece
SMA connector of the tool, record the return loss and standing wave ratio corresponding to the relevant frequency

Freque ncy (MHz)	2400	2450	2500	5200		5800
VSWR	1.2	1.5	1.6	1.7		1.6

S11参数



S11 Test method description

Test equipment:
Network analyzer(E5071C 30k-8.5Ghz)

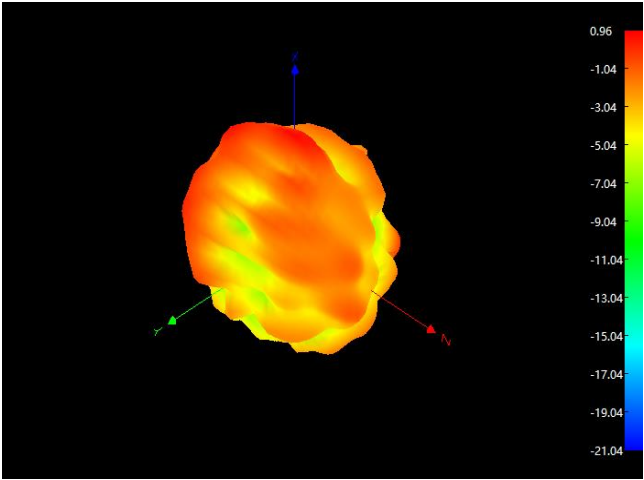
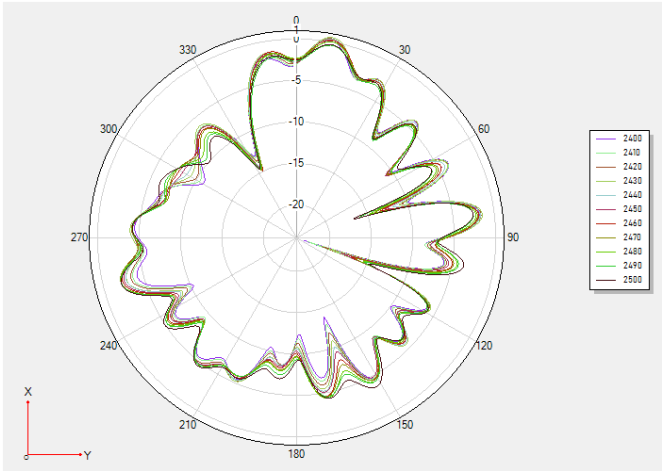
Test method:
Use a 50 ohm CABLE to export from the instrument test port, and connect the prototype after calibration with the calibration piece
SMA connector of the tool, record the return loss and standing wave ratio corresponding to the relevant frequency

Frequency (MHz)	2400	2450	2500	5200		5800
VSWR	1.3	1.3	1.1	1.9		1.3

WIFI Main antenna
Passive parameters



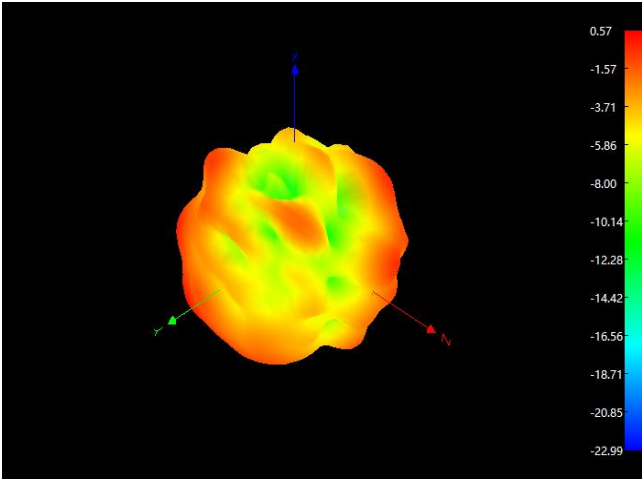
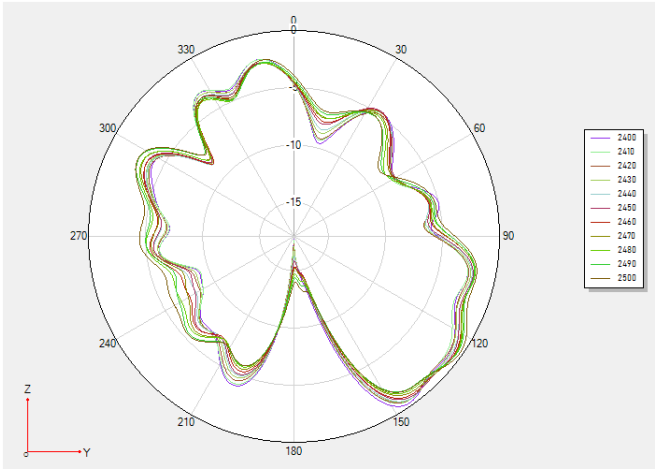
Frequency / MHz	Efficiency / %	Gain/ dB
2400	43.55	0.96
2410	42.84	1.04
2420	44.26	1.19
2430	44.36	1.36
2440	43.28	1.14
2450	42.15	1.11
2460	43.19	1
2470	43.19	1.05
2480	42.76	1.03
2490	42.24	1.08
2500	42.67	1.21



WIFI Sub antenna
Passive parameters



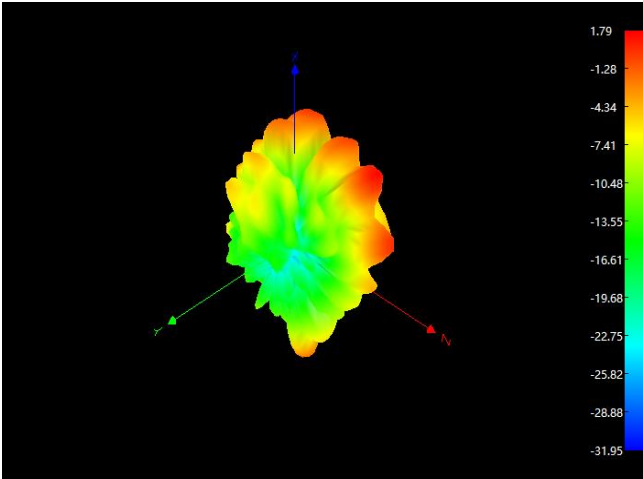
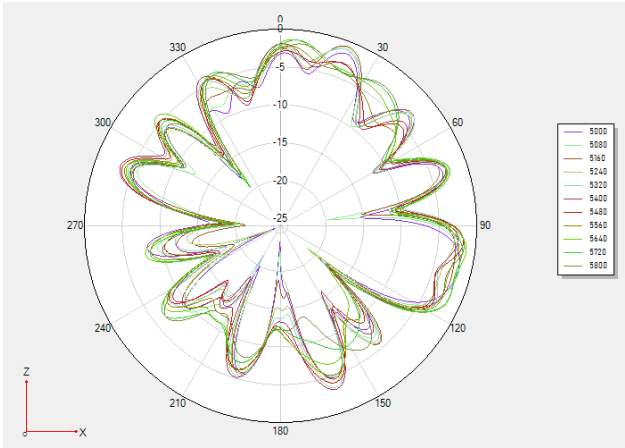
Frequency / MHz	Efficiency / %	Gain/ dB
2400	38.56	0.57
2410	36.88	0.77
2420	36.88	0.86
2430	35.81	0.87
2440	36.34	0.81
2450	35.81	0.88
2460	35.96	0.85
2470	34.99	0.95
2480	34.99	0.83
2490	34.77	0.95
2500	35.73	1.07



WIFI Main antenna
Passive parameters

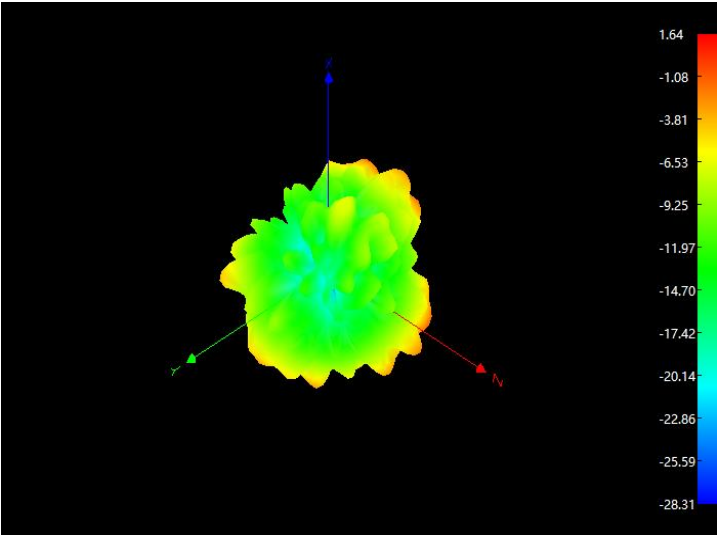
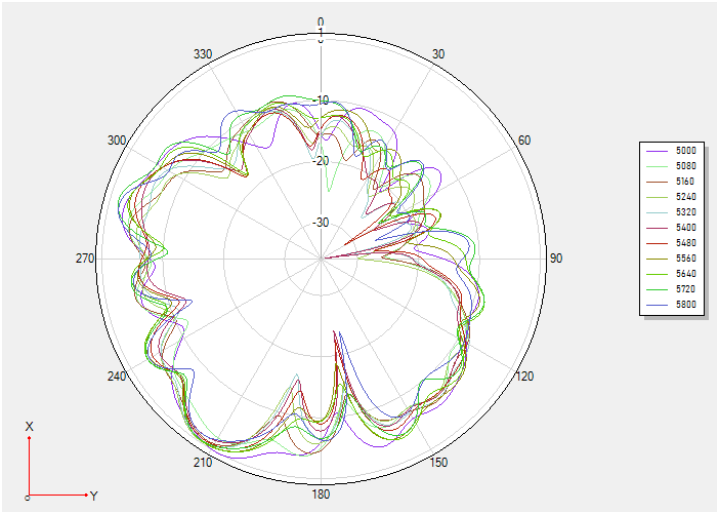


Frequency / MHz	Efficiency / %	Gain/ dB
5000	35.14	1.79
5100	35.66	2
5200	34.63	1.19
5300	34.98	1.59
5400	35.92	1.4
5500	34.5	1.69
5600	36.07	1.37
5700	36.07	1.48
5800	37.45	1.42
5900	35.49	1.01
6000	35.06	0.67



WIFI Sub antenna
Passive parameters

Frequency / MHz	Efficiency / %	Gain/ dB
5000	35.99	1.64
5100	32.74	1.46
5200	33.49	2.04
5300	31.29	1.64
5400	32.82	2.21
5500	31.44	1.18
5600	33.79	2
5700	34.54	2.28
5800	34.86	2.07
5900	35.51	1.69
6000	33.16	2.06



Active test data

Band	Channel	TRP	TIS
802.11b (11Mbps)	L	10.43	-78.17
	M	10.62	-79.23
	H	10.2	-79.16
802.11g (54Mbps)	L	10.52	-71.89
	M	10.17	-72.14
	H	10.61	-72.63
802.11n (MCS7-65Mbps)	L	10.5	-66.01
	M	10.21	-66.23
	H	10.38	-65.75
802.11a (54Mbps)	L	10.39	-71.92
	M	10.59	-72.75
	H	10.76	-70.29
802.11n (65Mbps)	L	10.81	-69.27
	M	10.96	-70.38
	H	10.45	-68.97



Throughput



2.4

Rx(Mbps)

Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	225.73	225.73
2	45	0	230.11	230.11
3	90	0	224.47	224.47
4	135	0	223.74	223.74
5	180	0	228.08	228.08
6	225	0	226.41	226.41
7	270	0	223.79	223.79
8	315	0	212.34	212.34

Tx(Mbps)

Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	171.48	171.48
2	45	0	206.53	206.53
3	90	0	173.64	173.64
4	135	0	178.13	178.13
5	180	0	172.22	172.22
6	225	0	177.74	177.74
7	270	0	125.81	125.81
8	315	0	193.49	193.49

Throughput



5.8

Rx(Mbps)

Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	343.49	343.49
2	45	0	318.42	318.42
3	90	0	341.31	341.31
4	135	0	344.28	344.28
5	180	0	341.39	341.39
6	225	0	341	341
7	270	0	344.62	344.62
8	315	0	340.04	340.04

Tx(Mbps)

Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	228.12	228.12
2	45	0	209.27	209.27
3	90	0	234.42	234.42
4	135	0	219.1	219.1
5	180	0	218.26	218.26
6	225	0	230.71	230.71
7	270	0	228.17	228.17
8	315	0	227.96	227.96

Throughput

```
iperf Done.
C:\Users\jht\Desktop>iperf-3.1.2-win64>iperf3 -c 192.168.50.185 -t 60 -i 10 -s 5
Connecting to host 192.168.50.185, port 5201
4] local 192.168.50.68 port 61199 connected to 192.168.50.185 port 5201
ID] Interval      Transfer      Bandwidth
4] 0.00-10.01 sec  1.03 KBytes  839 bits/sec
4] 10.01-20.01 sec  1.02 KBytes  837 bits/sec
4] 20.01-30.01 sec  1.01 KBytes  828 bits/sec
4] 30.01-40.01 sec  1.00 KBytes  821 bits/sec
4] 40.01-50.01 sec  1.02 KBytes  835 bits/sec
4] 50.01-60.01 sec  1.03 KBytes  844 bits/sec
ID] Interval      Transfer      Bandwidth
4] 0.00-60.00 sec  6.11 KBytes  834 bits/sec
4] 0.00-60.00 sec  6.10 KBytes  833 bits/sec
sender
receiver
```

```
perf Done.
C:\Users\Administrador\Desktop>iperf-3.1.2-win64>iperf3 -c 192.168.50.68 -t 60 -i 10 -s 5
Connecting to host 192.168.50.68, port 5201
4] local 192.168.50.185 port 61199 connected to 192.168.50.68 port 5201
ID] Interval      Transfer      Bandwidth
4] 0.00-10.01 sec  960 Bytes   768 bits/sec
4] 10.01-20.01 sec  980 Bytes   784 bits/sec
4] 20.00-30.01 sec  960 Bytes   767 bits/sec
4] 30.01-40.01 sec  970 Bytes   776 bits/sec
4] 40.01-50.00 sec  700 Bytes   561 bits/sec
4] 50.00-60.00 sec  970 Bytes   776 bits/sec
ID] Interval      Transfer      Bandwidth
4] 0.00-60.00 sec  5.41 KBytes  739 bits/sec
4] 0.00-60.00 sec  5.41 KBytes  738 bits/sec
sender
receiver
```

```
C:\WINDOWS\system32\cmd.exe - iperf3 -s
Server listening on 5201
5] 39.00-40.01 sec  110 Bytes  876 bits/sec
5] 40.01-41.01 sec  105 Bytes  840 bits/sec
5] 41.01-42.01 sec  105 Bytes  839 bits/sec
5] 42.01-43.01 sec  105 Bytes  837 bits/sec
5] 43.01-44.01 sec  105 Bytes  847 bits/sec
5] 44.00-45.00 sec  100 Bytes  800 bits/sec
5] 45.00-46.01 sec  110 Bytes  877 bits/sec
5] 46.01-47.01 sec  105 Bytes  838 bits/sec
5] 47.01-48.01 sec  105 Bytes  840 bits/sec
5] 48.01-49.01 sec  105 Bytes  840 bits/sec
5] 49.01-50.00 sec  100 Bytes  807 bits/sec
5] 50.00-51.00 sec  105 Bytes  840 bits/sec
5] 51.00-52.01 sec  105 Bytes  835 bits/sec
5] 52.01-53.00 sec  105 Bytes  845 bits/sec
5] 53.00-54.01 sec  105 Bytes  832 bits/sec
5] 54.01-55.01 sec  105 Bytes  839 bits/sec
5] 55.01-56.00 sec  105 Bytes  851 bits/sec
5] 56.00-57.01 sec  105 Bytes  834 bits/sec
5] 57.01-58.01 sec  105 Bytes  840 bits/sec
5] 58.01-59.01 sec  105 Bytes  840 bits/sec
5] 59.01-60.01 sec  110 Bytes  880 bits/sec
5] 60.01-60.01 sec  0.00 Bytes  0.00 bits/sec
ID] Interval      Transfer      Bandwidth
5] 0.00-60.01 sec  6.10 KBytes  833 bits/sec
sender
receiver
```

```
C:\WINDOWS\system32\cmd.exe - iperf3 -s
Server listening on 5201
5] 39.01-40.01 sec  95.0 Bytes  759 bits/sec
5] 40.01-41.01 sec  100 Bytes  798 bits/sec
5] 41.01-42.00 sec  95.0 Bytes  768 bits/sec
5] 42.00-43.01 sec  100 Bytes  798 bits/sec
5] 43.01-44.01 sec  105 Bytes  838 bits/sec
5] 44.01-45.01 sec  50.0 Bytes  400 bits/sec
5] 45.01-46.01 sec  35.0 Bytes  279 bits/sec
5] 46.01-47.01 sec  40.0 Bytes  320 bits/sec
5] 47.01-48.02 sec  20.0 Bytes  159 bits/sec
5] 48.02-49.00 sec  55.0 Bytes  446 bits/sec
5] 49.00-50.00 sec  100 Bytes  802 bits/sec
5] 50.00-51.00 sec  100 Bytes  800 bits/sec
5] 51.00-52.00 sec  95.0 Bytes  758 bits/sec
5] 52.00-53.01 sec  95.0 Bytes  759 bits/sec
5] 53.01-54.01 sec  95.0 Bytes  760 bits/sec
5] 54.01-55.04 sec  90.0 Bytes  694 bits/sec
5] 55.04-56.01 sec  100 Bytes  820 bits/sec
5] 56.01-57.01 sec  100 Bytes  799 bits/sec
5] 57.01-58.00 sec  95.0 Bytes  769 bits/sec
5] 58.00-59.00 sec  100 Bytes  798 bits/sec
5] 59.00-60.00 sec  100 Bytes  800 bits/sec
5] 60.00-60.01 sec  0.00 Bytes  0.00 bits/sec
ID] Interval      Transfer      Bandwidth
5] 0.00-60.01 sec  0.00 Bytes  0.00 bits/sec
5] 0.00-60.01 sec  5.41 KBytes  738 bits/sec
sender
receiver
```

Throughput

```

C:\Users\Administrator\Desktop>iperf3 -c 192.168.50.68 -t 60 -i 10 -w 5
Connecting to host 192.168.50.68, port 5201
[ 4] local 192.168.50.185 port 61204 connected to 192.168.50.68 port 5201
[ ID] Interval      Transfer      Bandwidth
[ 4] 0.00-10.01 sec  1.04 KBytes  851 bits/sec
[ 4] 10.01-20.01 sec  1.04 KBytes  847 bits/sec
[ 4] 20.01-30.01 sec  1.04 KBytes  848 bits/sec
[ 4] 30.01-40.00 sec  1.03 KBytes  844 bits/sec
[ 4] 40.00-50.00 sec  1.03 KBytes  844 bits/sec
[ 4] 50.00-60.01 sec  1.03 KBytes  844 bits/sec
[ ID] Interval      Transfer      Bandwidth
[ 4] 0.00-60.01 sec  6.21 KBytes  847 bits/sec
[ 4] 0.00-60.01 sec  6.20 KBytes  847 bits/sec
iperf Done.
C:\Users\Administrator\Desktop>iperf3 -s -w 64
Server listening on 5201

```

```

C:\WINDOWS\system32\cmd.exe - iperf3 -s
[ 5] 39.01-40.00 sec  110 Bytes  890 bits/sec
[ 5] 40.00-41.01 sec  105 Bytes  830 bits/sec
[ 5] 41.01-42.02 sec  105 Bytes  830 bits/sec
[ 5] 42.02-43.00 sec  105 Bytes  851 bits/sec
[ 5] 43.00-44.01 sec  110 Bytes  877 bits/sec
[ 5] 44.01-45.01 sec  105 Bytes  837 bits/sec
[ 5] 45.01-46.01 sec  100 Bytes  800 bits/sec
[ 5] 46.01-47.02 sec  105 Bytes  836 bits/sec
[ 5] 47.02-48.01 sec  105 Bytes  846 bits/sec
[ 5] 48.01-49.01 sec  110 Bytes  879 bits/sec
[ 5] 49.01-50.00 sec  105 Bytes  845 bits/sec
[ 5] 50.00-51.01 sec  105 Bytes  837 bits/sec
[ 5] 51.01-52.01 sec  105 Bytes  840 bits/sec
[ 5] 52.01-53.01 sec  105 Bytes  839 bits/sec
[ 5] 53.01-54.01 sec  110 Bytes  877 bits/sec
[ 5] 54.01-55.00 sec  105 Bytes  848 bits/sec
[ 5] 55.00-56.00 sec  105 Bytes  838 bits/sec
[ 5] 56.00-57.01 sec  105 Bytes  838 bits/sec
[ 5] 57.01-58.01 sec  105 Bytes  840 bits/sec
[ 5] 58.01-59.01 sec  100 Bytes  799 bits/sec
[ 5] 59.01-60.01 sec  105 Bytes  840 bits/sec
[ 5] 60.01-60.01 sec  0.00 Bytes  0.00 bits/sec
[ ID] Interval      Transfer      Bandwidth
[ 5] 0.00-60.01 sec  0.00 Bytes  0.00 bits/sec
[ 5] 0.00-60.01 sec  6.04 KBytes  825 bits/sec
iperf Done.
Server listening on 5201

```

```

C:\WINDOWS\system32\cmd.exe - iperf3 -s
[ 5] 38.01-39.01 sec  105 Bytes  837 bits/sec
[ 5] 39.01-40.01 sec  105 Bytes  837 bits/sec
[ 5] 40.01-41.00 sec  110 Bytes  891 bits/sec
[ 5] 41.00-42.01 sec  105 Bytes  830 bits/sec
[ 5] 42.01-43.00 sec  105 Bytes  848 bits/sec
[ 5] 43.00-44.00 sec  105 Bytes  839 bits/sec
[ 5] 44.00-45.01 sec  105 Bytes  835 bits/sec
[ 5] 45.01-46.01 sec  105 Bytes  843 bits/sec
[ 5] 46.01-47.01 sec  105 Bytes  839 bits/sec
[ 5] 47.01-48.01 sec  105 Bytes  840 bits/sec
[ 5] 48.01-49.01 sec  105 Bytes  839 bits/sec
[ 5] 49.01-50.01 sec  105 Bytes  838 bits/sec
[ 5] 50.01-51.01 sec  105 Bytes  846 bits/sec
[ 5] 51.01-52.01 sec  105 Bytes  836 bits/sec
[ 5] 52.01-53.00 sec  105 Bytes  846 bits/sec
[ 5] 53.00-54.01 sec  110 Bytes  886 bits/sec
[ 5] 54.01-55.00 sec  105 Bytes  841 bits/sec
[ 5] 55.00-56.00 sec  105 Bytes  840 bits/sec
[ 5] 56.00-57.00 sec  105 Bytes  840 bits/sec
[ 5] 57.00-58.00 sec  105 Bytes  840 bits/sec
[ 5] 58.00-59.01 sec  105 Bytes  834 bits/sec
[ 5] 59.01-60.01 sec  105 Bytes  835 bits/sec
[ ID] Interval      Transfer      Bandwidth
[ 5] 0.00-60.01 sec  0.00 Bytes  0.00 bits/sec
[ 5] 0.00-60.01 sec  6.20 KBytes  846 bits/sec
iperf Done.
Server listening on 5201

```

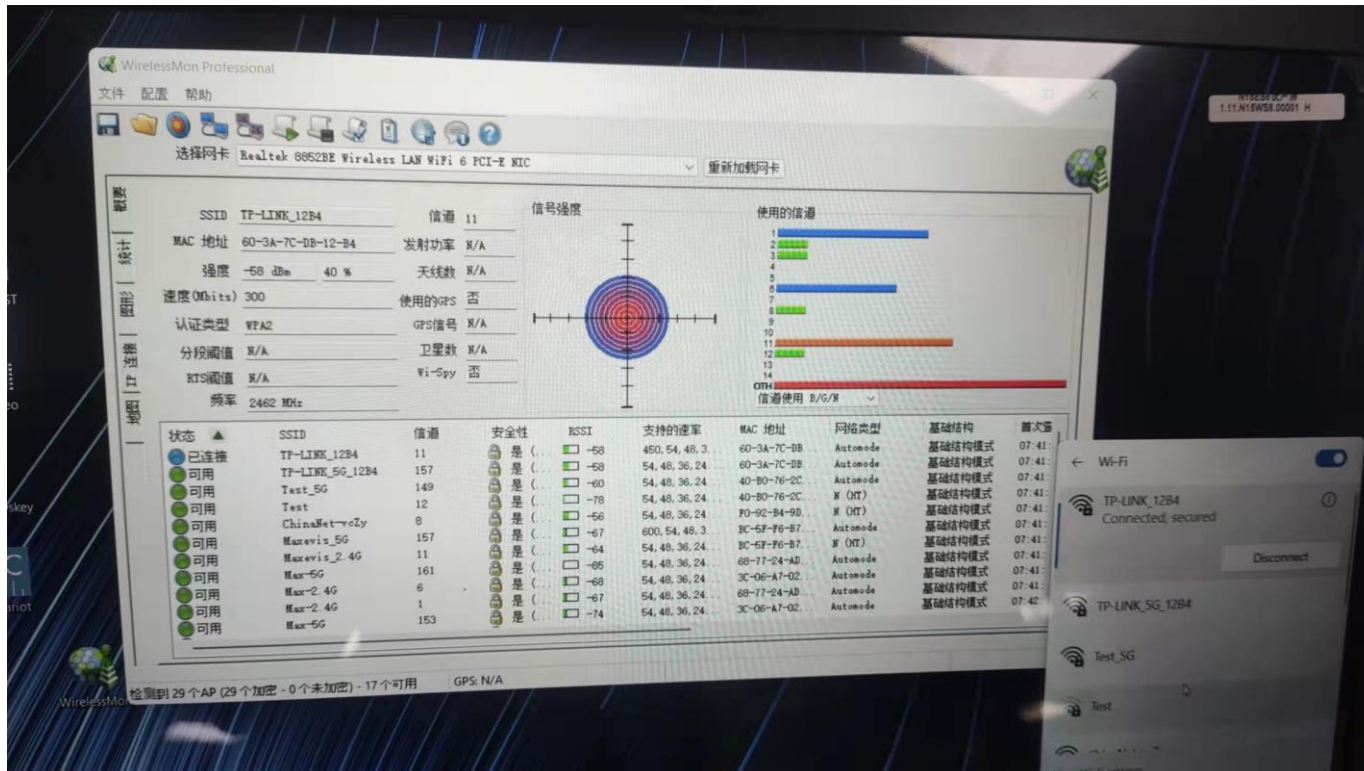
```

C:\WINDOWS\system32\cmd.exe - iperf3 -s
[ 5] 38.01-39.01 sec  105 Bytes  837 bits/sec
[ 5] 39.01-40.01 sec  105 Bytes  837 bits/sec
[ 5] 40.01-41.00 sec  110 Bytes  891 bits/sec
[ 5] 41.00-42.01 sec  105 Bytes  830 bits/sec
[ 5] 42.01-43.00 sec  105 Bytes  848 bits/sec
[ 5] 43.00-44.00 sec  105 Bytes  839 bits/sec
[ 5] 44.00-45.01 sec  105 Bytes  835 bits/sec
[ 5] 45.01-46.01 sec  105 Bytes  843 bits/sec
[ 5] 46.01-47.01 sec  105 Bytes  839 bits/sec
[ 5] 47.01-48.01 sec  105 Bytes  840 bits/sec
[ 5] 48.01-49.01 sec  105 Bytes  839 bits/sec
[ 5] 49.01-50.01 sec  105 Bytes  838 bits/sec
[ 5] 50.01-51.01 sec  105 Bytes  846 bits/sec
[ 5] 51.01-52.01 sec  105 Bytes  836 bits/sec
[ 5] 52.01-53.00 sec  105 Bytes  846 bits/sec
[ 5] 53.00-54.01 sec  110 Bytes  886 bits/sec
[ 5] 54.01-55.00 sec  105 Bytes  841 bits/sec
[ 5] 55.00-56.00 sec  105 Bytes  840 bits/sec
[ 5] 56.00-57.00 sec  105 Bytes  840 bits/sec
[ 5] 57.00-58.00 sec  105 Bytes  840 bits/sec
[ 5] 58.00-59.01 sec  105 Bytes  834 bits/sec
[ 5] 59.01-60.01 sec  105 Bytes  835 bits/sec
[ ID] Interval      Transfer      Bandwidth
[ 5] 0.00-60.01 sec  0.00 Bytes  0.00 bits/sec
[ 5] 0.00-60.01 sec  6.04 KBytes  825 bits/sec
iperf Done.
Server listening on 5201

```

Measured diagram of wifi signal strength test

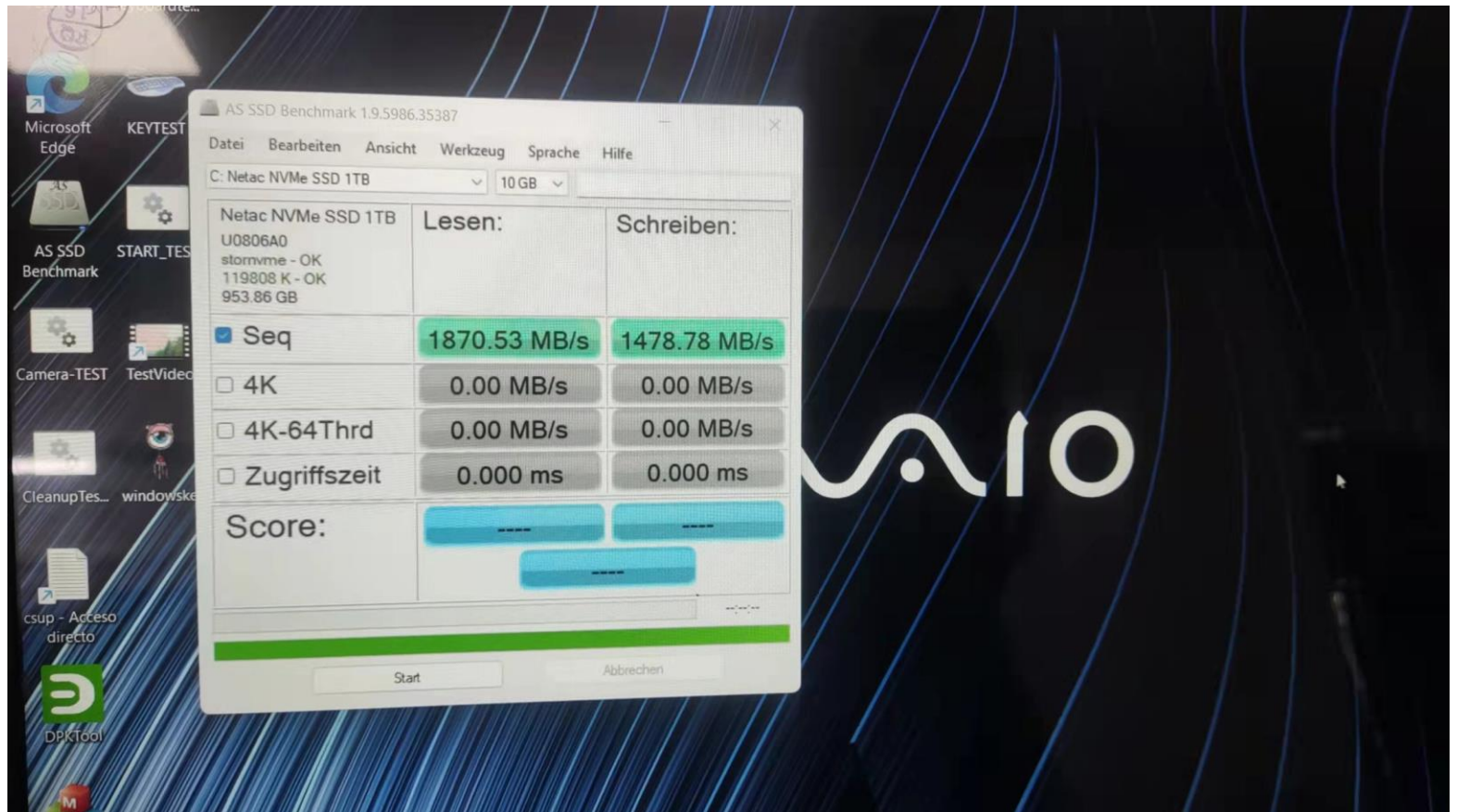
Office 10m - 15m



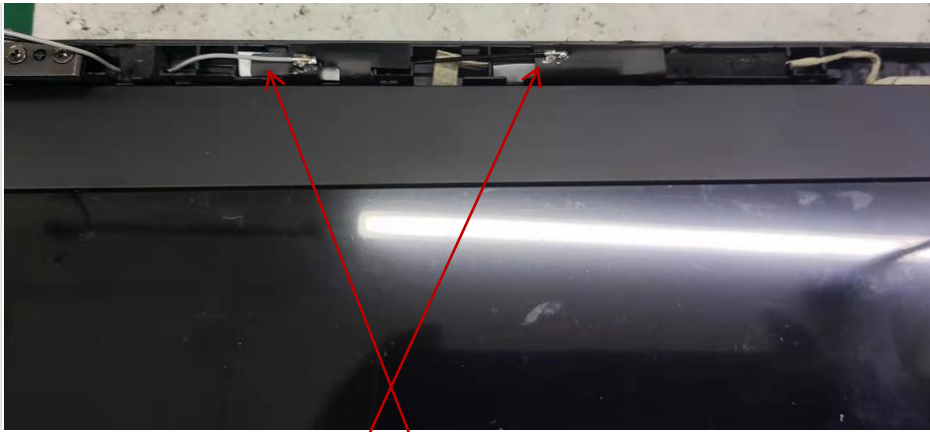
Measured diagram of wifi signal strength test

Office 10m - 15m





Main antenna assembly mode



Antenna assembly drawing



Thread fastening method
is shown in the figure



ShenZhen KHT Antenna Technology Co., LTD.

Notes : 1. This report is based on the actual commissioning and testing of the commissioning prototype, in which the environmental treatment, antenna position and assembly position of each component cannot be changed at will ;

2. If there is any change in the materials used for the prototype, it needs to be timely fed back to our company for re verification ;

3. List of sensitive devices :

TP (Material, coating, routing, etc)

Screen (amplification circuit, LED, flat cable design, etc.)

Shell material (antenna assembly method, structural interference, shell material material, antenna position height and area, etc.)

Main board (main board conduction, RF circuit matching, PA, duplexer, filter, LNA, power circuit, etc.)

Camera, battery, motor, MIC, fingerprint identification module, etc

4. Due to the small number or only one sample adjusting machine, some probabilistic problems cannot be completely found. It is recommended to check the problem points in small batch trial production before mass production (such as flashing screen, horn noise, TP jump point, black screen crash, signal diving, etc.)

Thank you