ShenZhen KHT Antenna Technology Co. ,LTD.

Antenna Datasheet

September 30, 2022

Catalogue：

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 :			

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

3、Passive and Matching

3.1 Passive test diagram

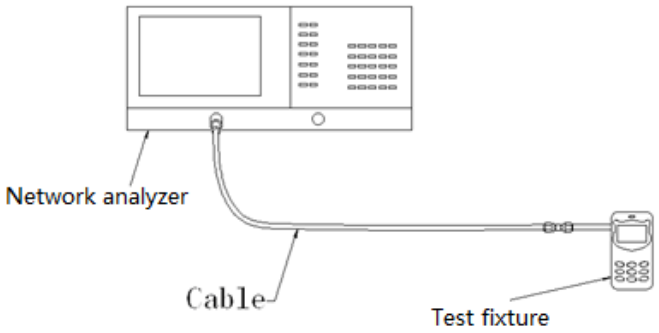
S11 Test method description

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

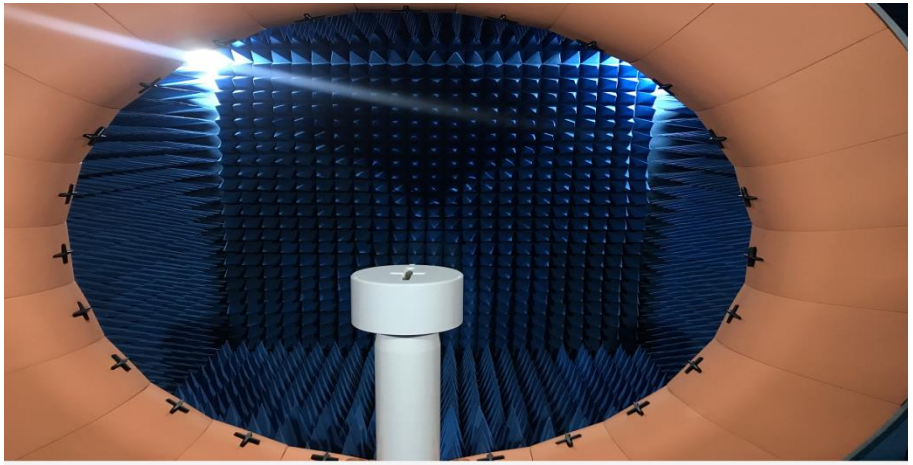
3D test system: Shielded darkroom
Testing environment : Temperature 22℃±3℃， Humidity 50%±15%
Test equipment : When testing passive data, use Agilent E5071C network analyzer
When testing the active data, use the comprehensive tester 8960/CMW500

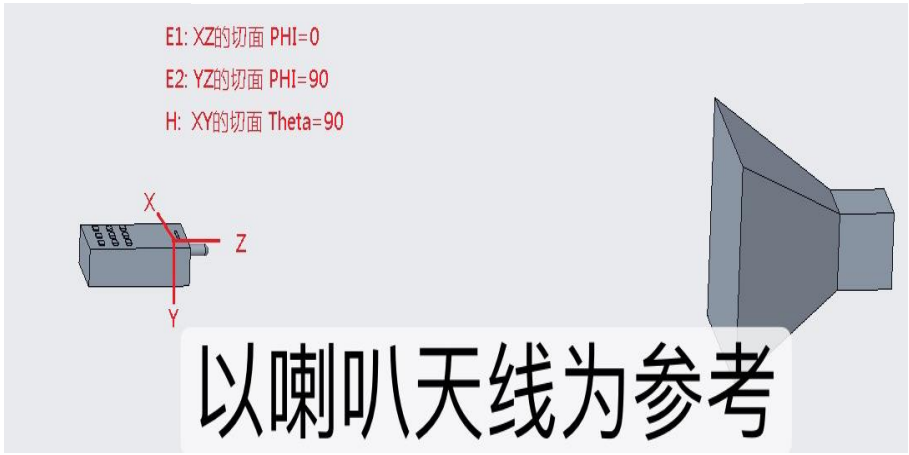
总全向辐射功率（TIRP）

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

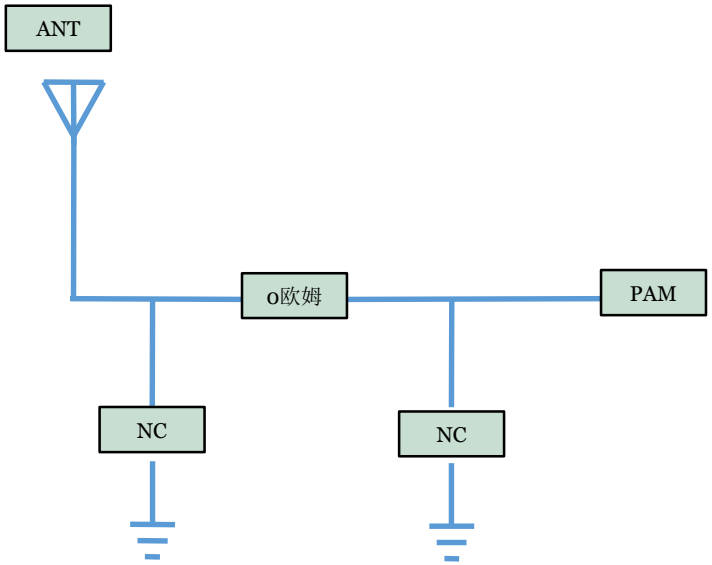
总全向辐射灵敏度（TIRS）

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





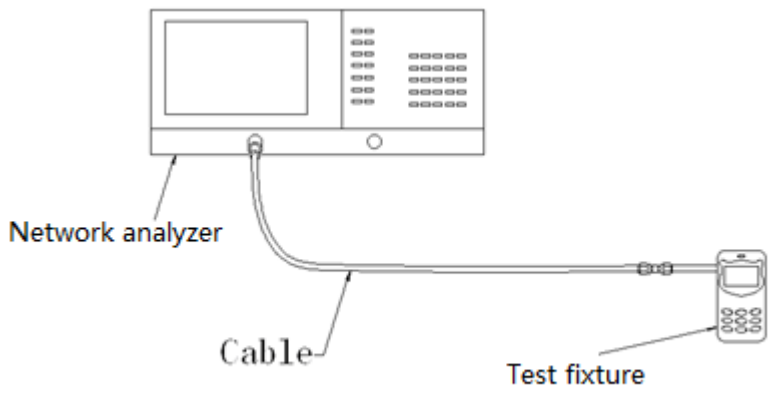
3. 3 Matching Circuit



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)

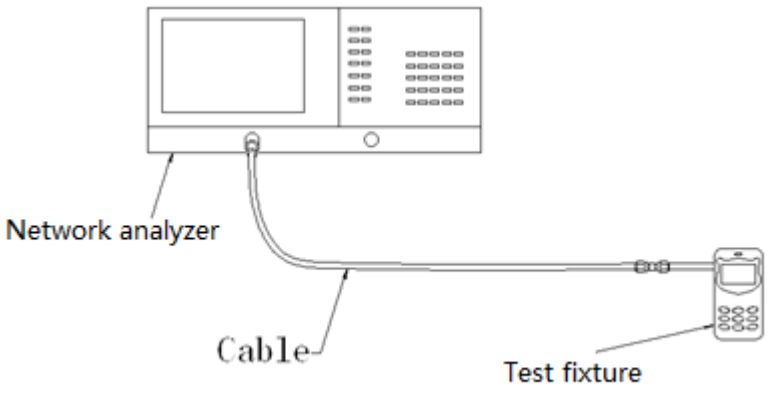
Test method:

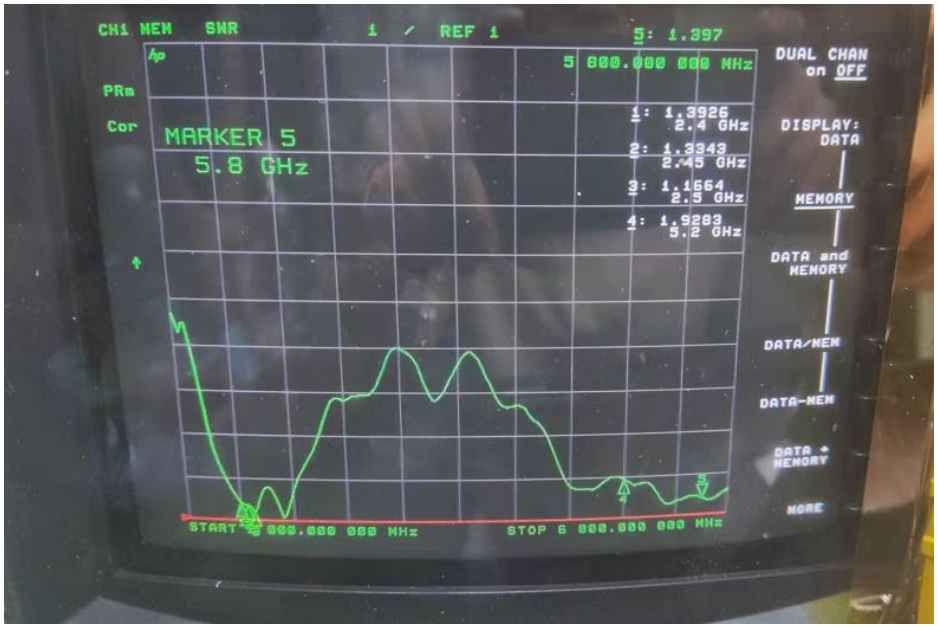
Use a 50 ohm CABLE to export from the instrument test port, and connect the prototype after calibration with the calibration piece

SMA connector of the tool, record the return loss and standing wave ratio corresponding to the relevant frequency

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

S11参数





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Test method:

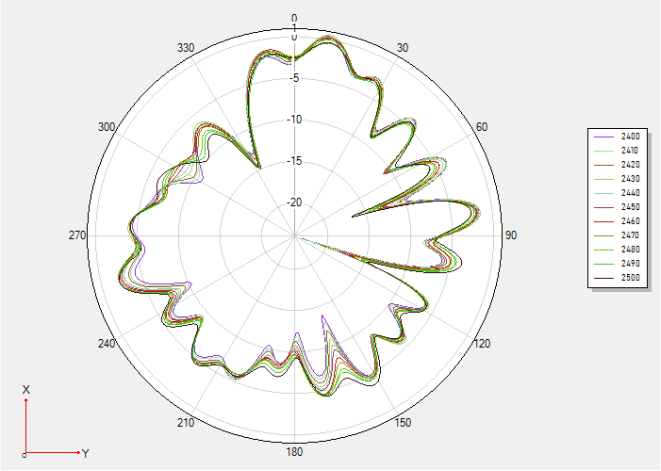
Use a 50 ohm CABLE to export from the instrument test port, and connect the prototype after calibration with the calibration piece

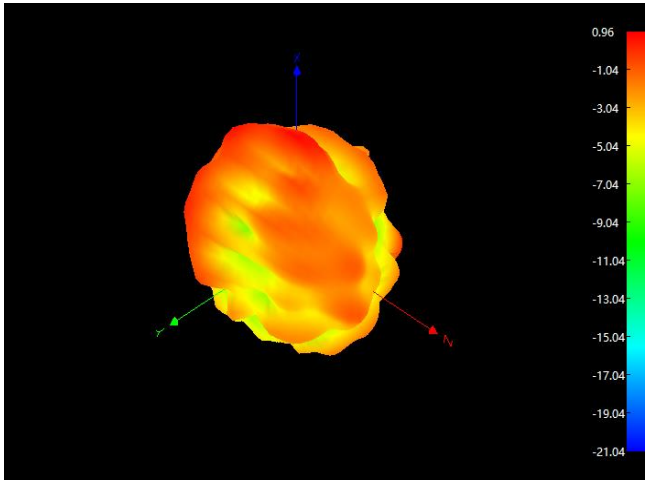
SMA connector of the tool, record the return loss and standing wave ratio corresponding to the relevant frequency

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

WIFI Main antenna
Passive parameters

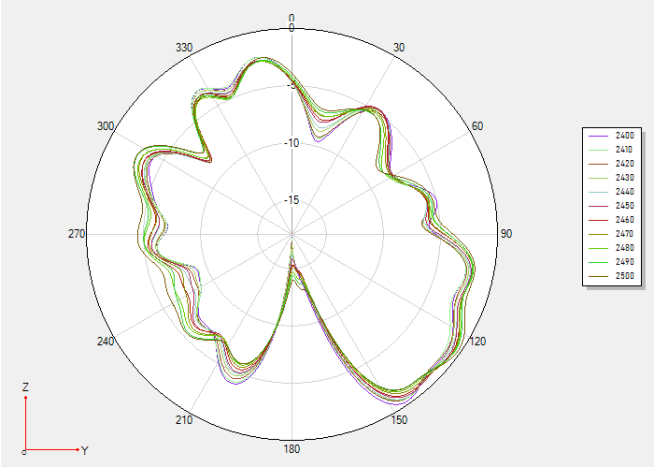
Frequency / MHz	Efficiency / %	Gain/ dB
2400	43.55	0.96
2410	42.84	1.04
2420	44.26	1.19
2430	44.36	1.36
2440	43.28	1.14
2450	42.15	1.11
2460	43.19	1
2470	43.19	1.05
2480	42.76	1.03
2490	42.24	1.08
2500	42.67	1.21

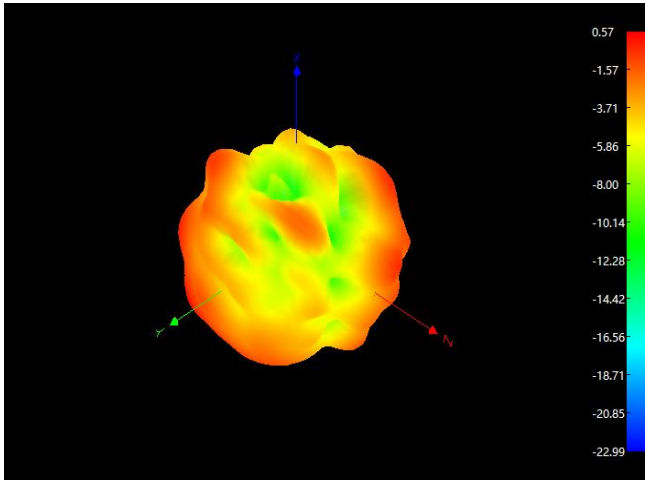




WIFI Sub antenna
Passive parameters

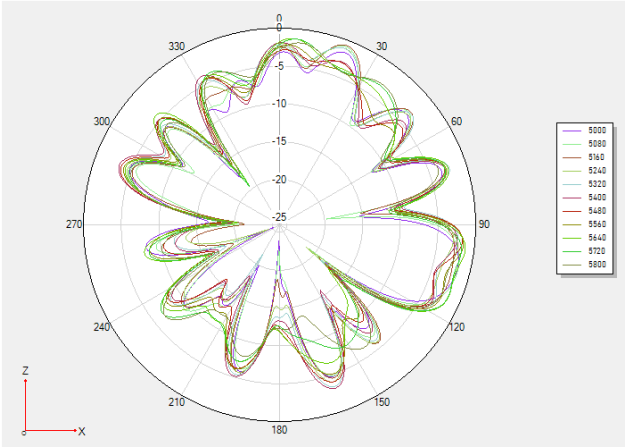
Frequency / MHz	Efficiency / %	Gain/ dB
2400	38.56	0.57
2410	36.88	0.77
2420	36.88	0.86
2430	35.81	0.87
2440	36.34	0.81
2450	35.81	0.88
2460	35.96	0.85
2470	34.99	0.95
2480	34.99	0.83
2490	34.77	0.95
2500	35.73	1.07

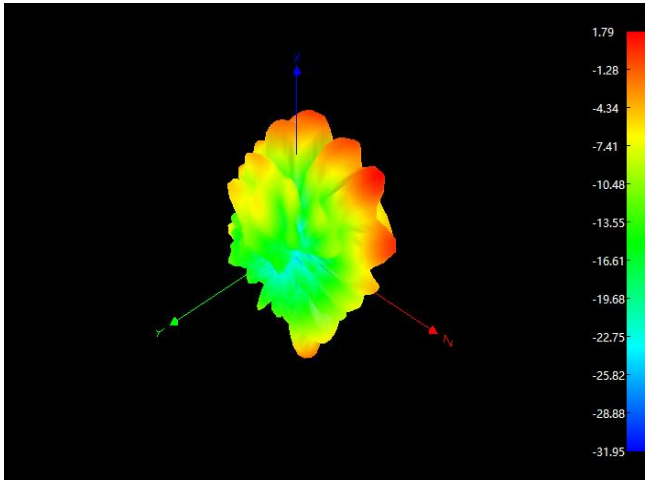




WIFI Main antenna
Passive parameters

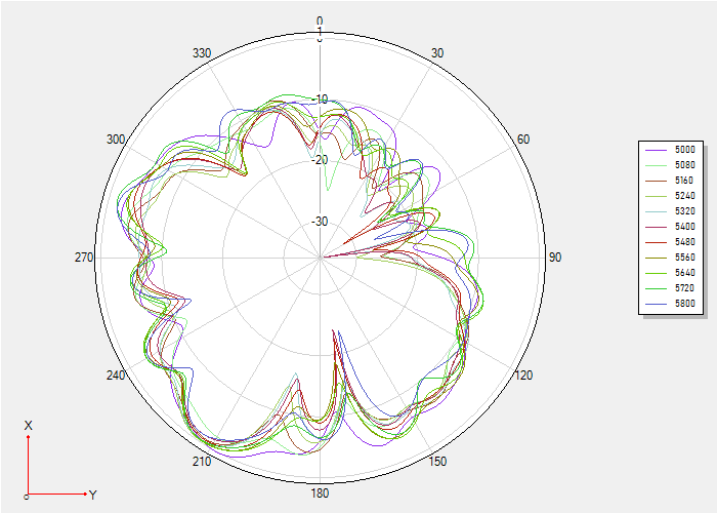
Frequency / MHz	Efficiency / %	Gain/ dB
5000	35.14	1.79
5100	35.66	2
5200	34.63	1.19
5300	34.98	1.59
5400	35.92	1.4
5500	34.5	1.69
5600	36.07	1.37
5700	36.07	1.48
5800	37.45	1.42
5900	35.49	1.01
6000	35.06	0.67

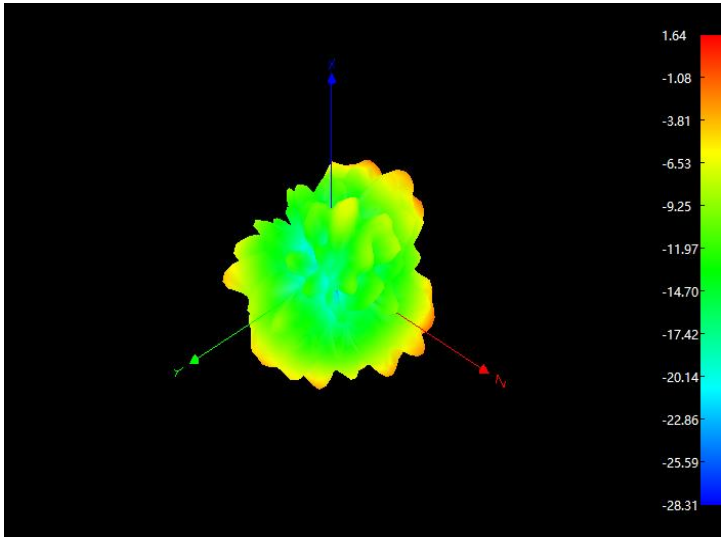




WIFI Sub antenna
Passive parameters

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

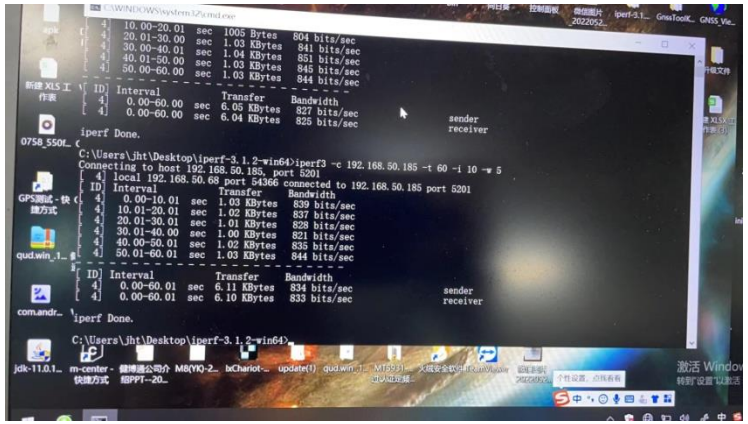
Rx(Mbps)

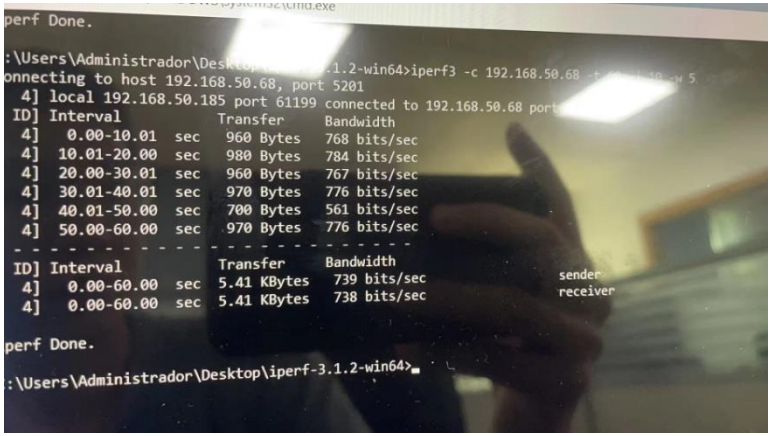
Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	343.49	343.49
2	45	0	318.42	318.42
3	90	0	341.31	341.31
4	135	0	344.28	344.28
5	180	0	341.39	341.39
6	225	0	341	341
7	270	0	344.62	344.62
8	315	0	340.04	340.04

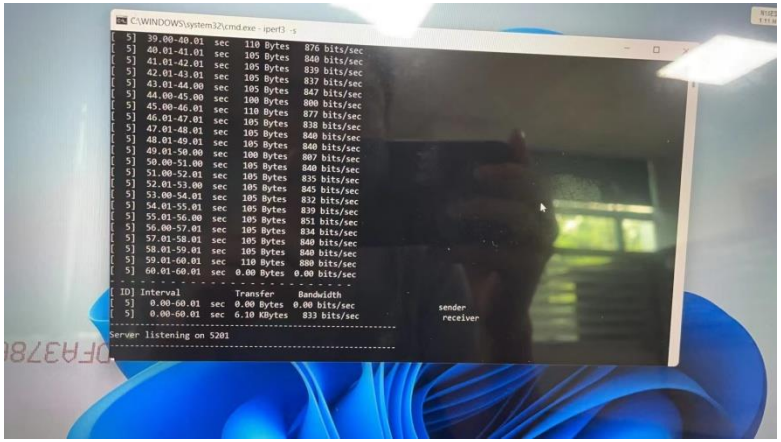
Tx(Mbps)

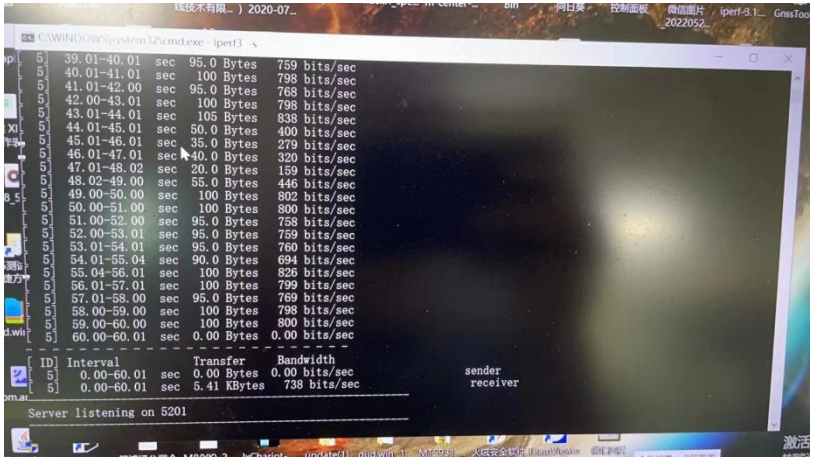
Item	Azimuth(°)	Atten(dB)	Result	RSSI
1	0	0	228.12	228.12
2	45	0	209.27	209.27
3	90	0	234.42	234.42
4	135	0	219.1	219.1
5	180	0	218.26	218.26
6	225	0	230.71	230.71
7	270	0	228.17	228.17
8	315	0	227.96	227.96

Throughput

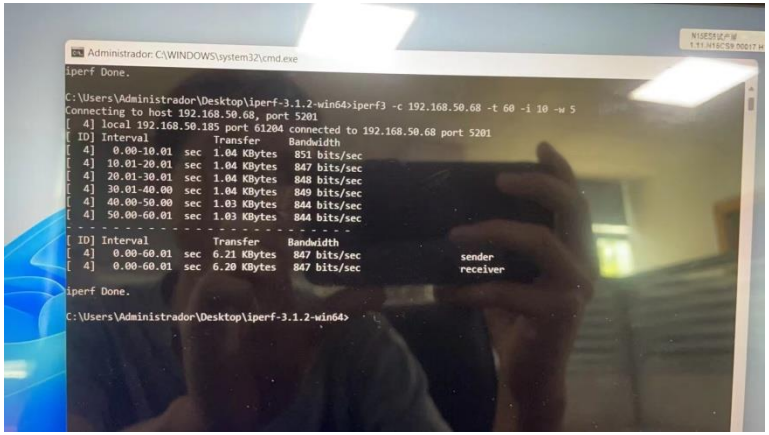

[4] 10.00-20.01 sec 1005 Bytes 804 bits/sec
[4] 20.01-30.00 sec 1.03 KBytes 841 bits/sec
[4] 30.00-40.01 sec 1.04 KBytes 851 bits/sec
[4] 40.01-50.00 sec 1.03 KBytes 845 bits/sec
[4] 50.00-60.00 sec 1.03 KBytes 844 bits/sec
[ID] Interval Transfer Bandwidth
[4] 0.00-60.00 sec 6.05 KBytes 827 bits/sec sender
[4] 0.00-60.00 sec 6.04 KBytes 826 bits/sec receiver
iperf Done.
C:\Users\jht\Desktop\iperf-3.1.2-win64>iperf3 -c 192.168.50.185 -t 60 -i 10 -w 5
Connecting to host 192.168.50.185, port 5201
[4] local 192.168.50.68 port 54366 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] 30.01-40.00 sec 1.00 KBytes 821 bits/sec
[4] 40.00-50.01 sec 1.02 KBytes 835 bits/sec
[4] 50.01-60.01 sec 1.03 KBytes 844 bits/sec
[ID] Interval Transfer Bandwidth
[4] 0.00-60.01 sec 6.11 KBytes 834 bits/sec sender
[4] 0.00-60.01 sec 6.10 KBytes 833 bits/sec receiver
iperf Done.
C:\Users\jht\Desktop\iperf-3.1.2-win64>

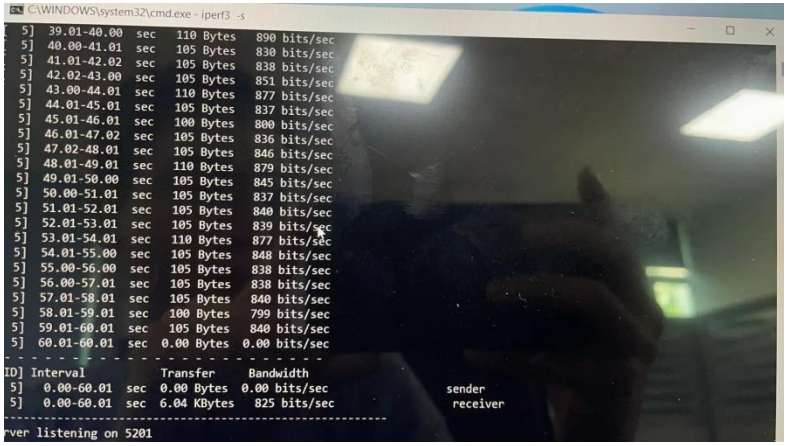

perf Done.
:\Users\Administrador\Desk .1.2-win64>iperf3 -c 192.168.50.68
onnecting to host 192.168.50.68, port 5201
4] local 192.168.50.185 port 61199 connected to 192.168.50.68 port
ID] Interval Transfer Bandwidth
4] 0.00-10.01 sec 960 Bytes 768 bits/sec
4] 10.01-20.00 sec 980 Bytes 784 bits/sec
4] 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 sender
4] 0.00-60.00 sec 5.41 KBytes 738 bits/sec receiver
perf Done.
:\Users\Administrador\Desktop\iperf-3.1.2-win64>

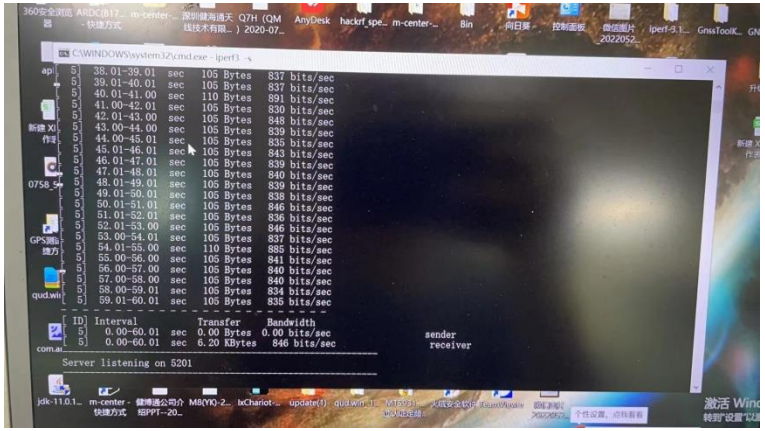

[5] 39.00-40.01 sec 110 Bytes 876 bits/sec
[5] 40.01-41.01 sec 105 Bytes 840 bits/sec
[5] 41.01-42.01 sec 105 Bytes 839 bits/sec
[5] 42.01-43.01 sec 105 Bytes 837 bits/sec
[5] 43.01-44.00 sec 105 Bytes 847 bits/sec
[5] 44.00-45.00 sec 100 Bytes 800 bits/sec
[5] 45.00-46.01 sec 110 Bytes 877 bits/sec
[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 0.00 Bytes 0.00 bits/sec sender
[5] 0.00-60.01 sec 6.10 KBytes 833 bits/sec receiver
Server listening on 5201

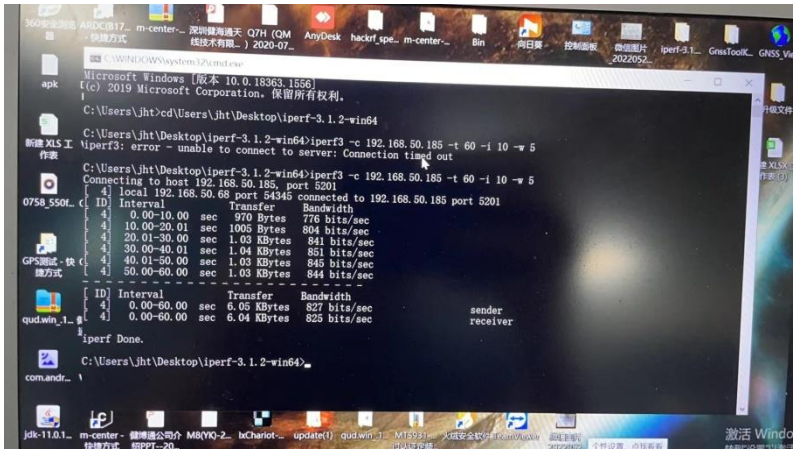

[5] 39.01-40.01 sec 95.0 Bytes 759 bits/sec
[5] 40.01-41.01 sec 100 Bytes 798 bits/sec
[5] 41.01-42.00 sec 95.0 Bytes 768 bits/sec
[5] 42.00-43.01 sec 100 Bytes 798 bits/sec
[5] 43.01-44.01 sec 105 Bytes 838 bits/sec
[5] 44.01-45.01 sec 50.0 Bytes 400 bits/sec
[5] 45.01-46.01 sec 35.0 Bytes 279 bits/sec
[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 826 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 sender
[5] 0.00-60.01 sec 5.41 KBytes 738 bits/sec receiver
Server listening on 5201

Throughput


Administrador: C:\WINDOWS\system32\cmd.exe
iperf Done.
C:\Users\Administrador\Desktop\iperf-3.1.2-win64>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 1.04 KBytes 849 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 sender
[4] 0.00-60.01 sec 6.20 KBytes 847 bits/sec receiver
iperf Done.
C:\Users\Administrador\Desktop\iperf-3.1.2-win64>


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 838 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 sender
[5] 0.00-60.01 sec 6.04 KBytes 825 bits/sec receiver
rver 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 105 Bytes 837 bits/sec
[5] 54.01-55.00 sec 110 Bytes 885 bits/sec
[5] 55.00-56.00 sec 105 Bytes 841 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 sender
[5] 0.00-60.01 sec 6.20 KBytes 846 bits/sec receiver
Server listening on 5201

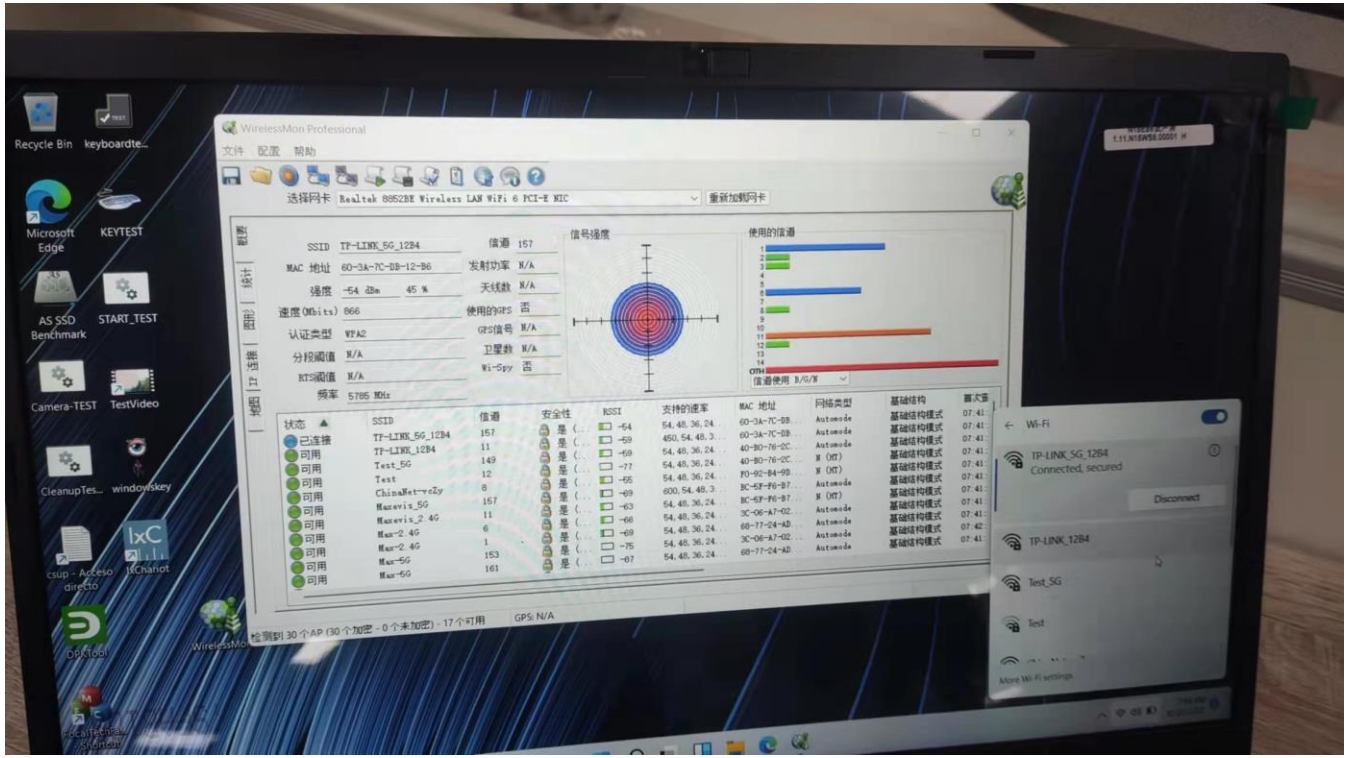

Microsoft Windows [版本 10.0.18363.1556]
(c) 2019 Microsoft Corporation。保留所有权利。
C:\Users\jht>cd\Users\jht\Desktop\iperf-3.1.2-win64
C:\Users\jht\Desktop\iperf-3.1.2-win64>iperf3 -c 192.168.50.185 -t 60 -i 10 -w 5
iperf3: error - unable to connect to server: Connection timed out
C:\Users\jht\Desktop\iperf-3.1.2-win64>iperf3 -c 192.168.50.185 -t 60 -i 10 -w 5
Connecting to host 192.168.50.185, port 5201
[4] local 192.168.50.68 port 54345 connected to 192.168.50.185 port 5201
[ID] Interval Transfer Bandwidth
[4] 0.00-10.00 sec 970 Bytes 776 bits/sec
[4] 10.00-20.01 sec 1005 Bytes 804 bits/sec
[4] 20.01-30.00 sec 1.03 KBytes 841 bits/sec
[4] 30.00-40.01 sec 1.04 KBytes 851 bits/sec
[4] 40.01-50.00 sec 1.03 KBytes 845 bits/sec
[4] 50.00-60.00 sec 1.03 KBytes 844 bits/sec
[ID] Interval Transfer Bandwidth
[4] 0.00-60.00 sec 6.05 KBytes 827 bits/sec sender
[4] 0.00-60.00 sec 6.04 KBytes 825 bits/sec receiver
iperf Done.
C:\Users\jht\Desktop\iperf-3.1.2-win64>

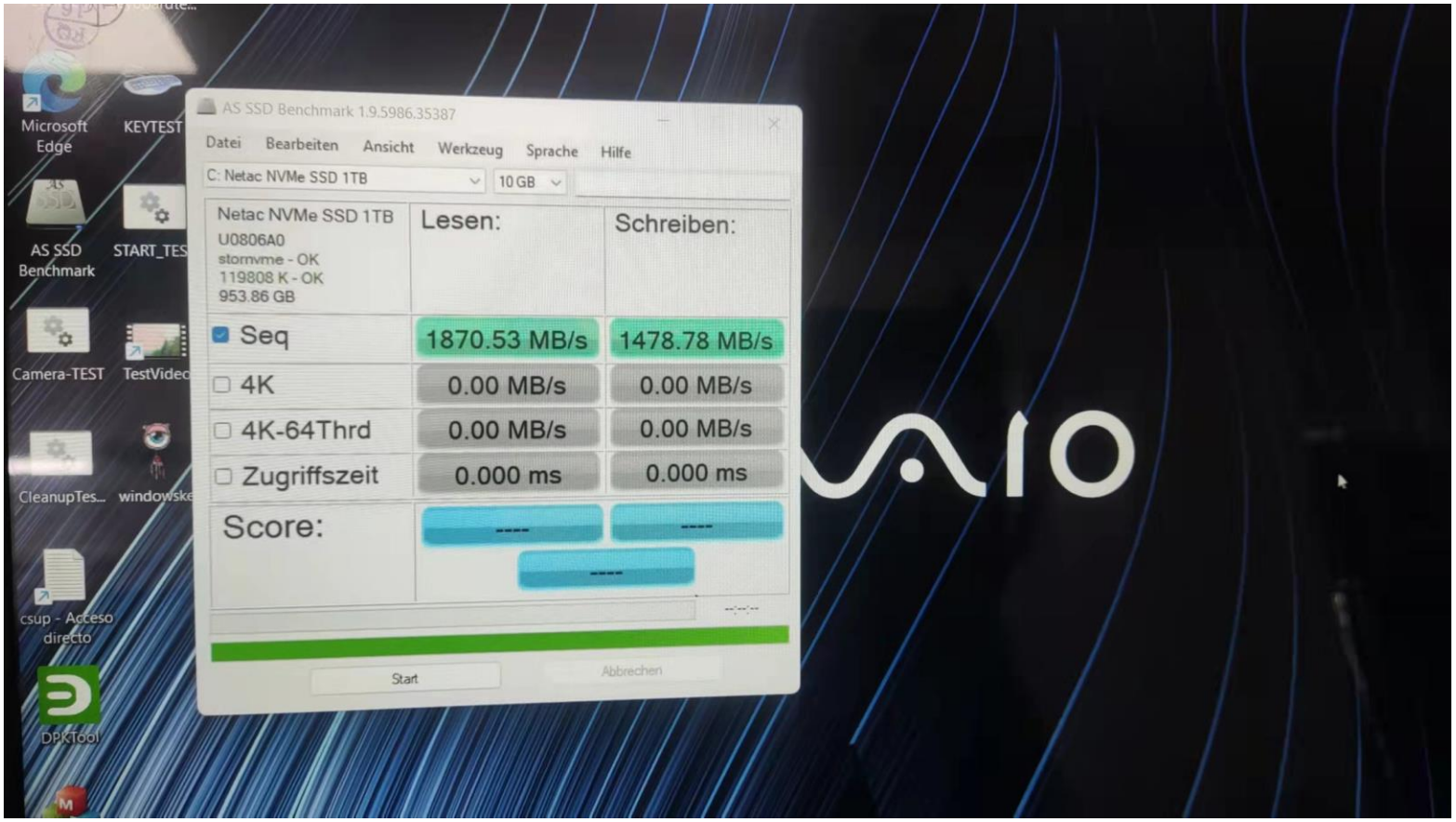
Measured diagram of wifi signal strength test

Office 10m - 15m

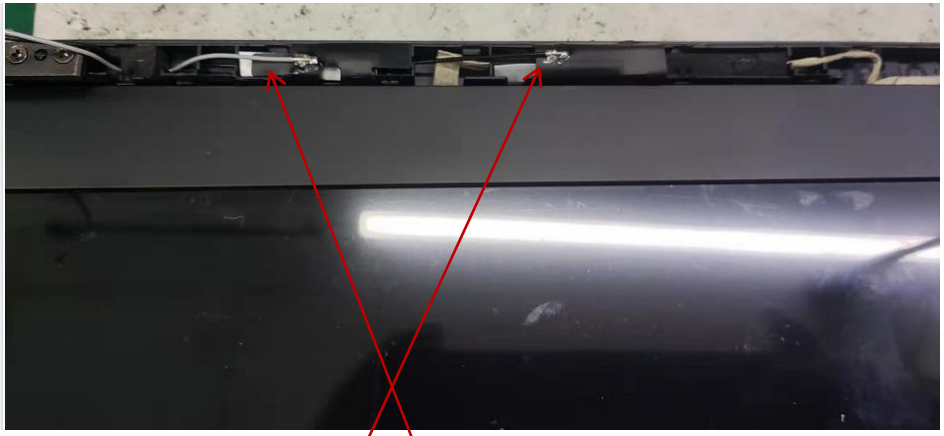
Measured diagram of wifi signal strength test

Office 10m - 15m

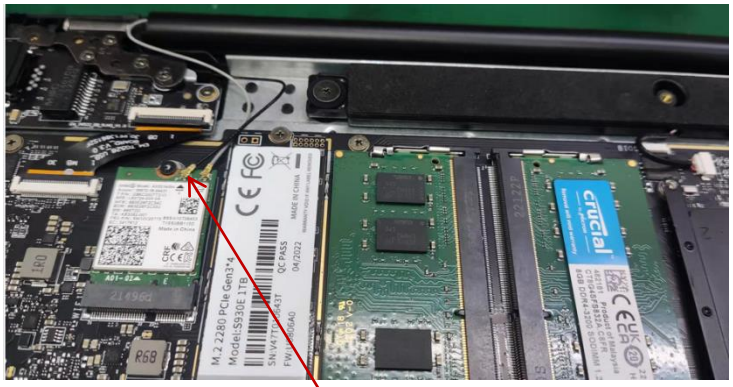



AS SSD Benchmark 1.9.5986.35387
Datei Bearbeiten Ansicht Werkzeug Sprache Hilfe
C: Netac NVMe SSD 1TB
10 GB
Netac NVMe SSD 1TB
U0806A0
stornvme - OK
119808 K - OK
953.86 GB
Lesen:
Schreiben:
Seq
1870.53 MB/s
1478.78 MB/s
4K
0.00 MB/s
0.00 MB/s
4K-64Thrd
0.00 MB/s
0.00 MB/s
Zugriffszeit
0.000 ms
0.000 ms
Score:
Start
Abbrechen
Microsoft Edge
KEYTEST
AS SSD Benchmark
START_TES
Camera-TEST
TestVideo
CleanupTes...
csup - Acceso directo
DPKTool

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