

Antenna specification for approval

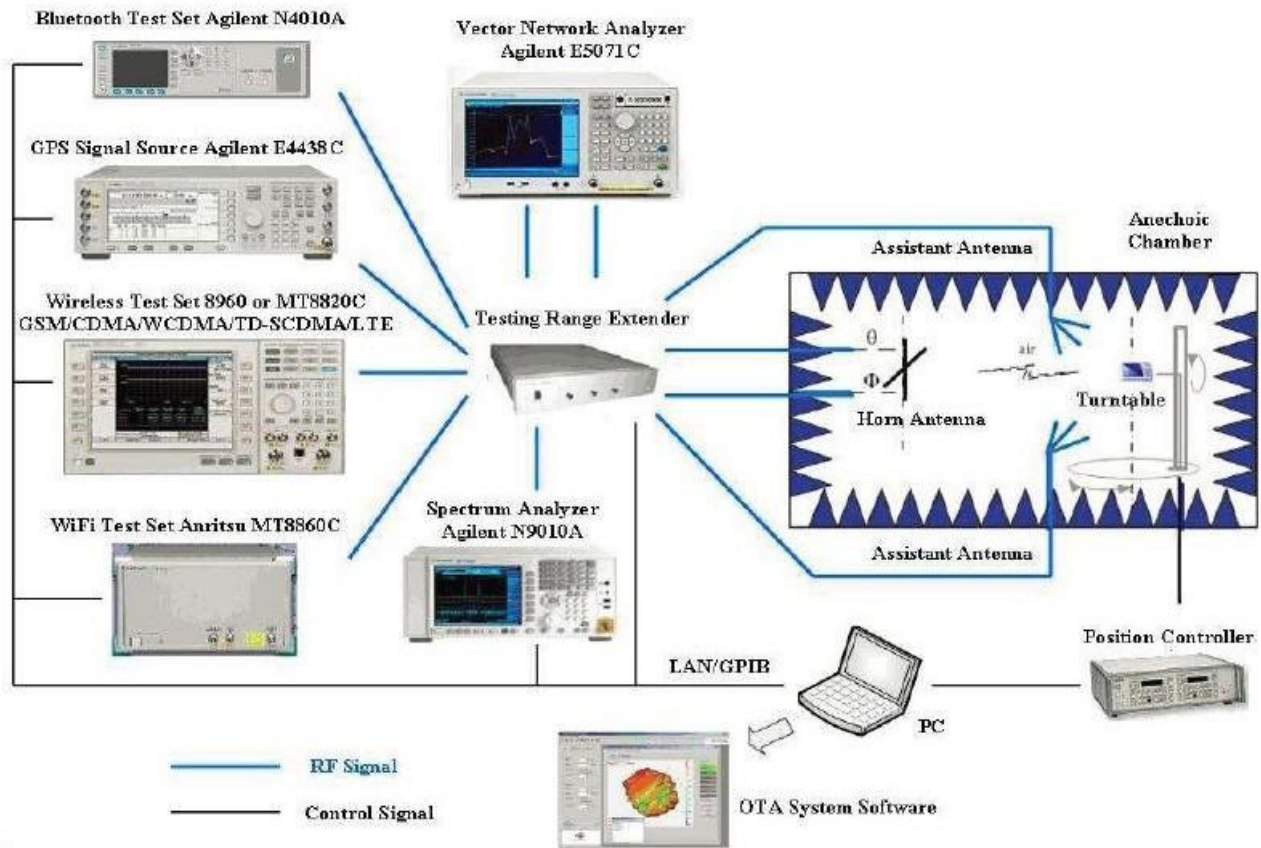
Customer name	Huiwei Intelligence		
Model	TVD8322R (NAS product) FCS851UABMD module		
Antenna frequency	2.4GHZ&5GHz		
Antenna function	WIFI&BT&5G WiFi antenna		
Antenna material	FPC	FPC color	black
model	SF2479A-1B2-A		
Material number	SF2479A-1R24B-075-A		
Customer Part Number			
Ward accepted the signature		Client acknowledges signature	
structure		Purchase	
Document control		structure	
radio frequency		engineering	
To examine		QC	
Responsible LTT		To examine	
date 2025.06.20	Seal area	date 2025.06.20	Seal area

Serial number	Certification number	Material type	Date of issue	Remarks
1	SHAEC24025471005	Tinned copper wire	2024-11-25	One year
2	SHAEC24027284565	halogen	2024-12-06	One year
3	SHAEC24027480902	Adhesive	2024-12-06	One year
4	SHAEC24029171725	FEP sheath	2024-12-26	One year
5	SHAEC24027284563	FEP insulation	2024-12-05	One year
6	SZXEC24002306404	Tin wire	2024-07-24	One year
7	SZXEC24002306408	Tin	2024-07-24	One year
8	ETR25501383	Printing ink	2025-05-20	One year
9	A2250132593101001E	Substrate	2025-03-10	One year
10	CANEC24028865417	EVA foam	2025-01-03	One year
11	A2240439752101001	Conductive cloth	2024-07-29	One year
12	SZXEC24002471802	Gold plating	2024-08-08	One year

catalogue

one:Device support&testable antenna types.....	1
two:Overview.....	2
three:Match circuit diagrams, machine images, and antenna images.....	3
four:Antenna Standing Wave Ratio&Antenna Efficiency (VSWR)	4
five:Active data.....	5
six:Throughput testingt.....	6
seven:Antenna measurement diagram.....	7
eight:environmental treatment.....	8
nine:3D pattern.....	9
ten:structural drawings	10

one: Device support & testable antenna types



Antenna function	frequency range	Testing instruments	Testing method	Testing standards
2G antenna (GSM)	824MHz-960MHz, 1710MHz-1990MHz	5071B, 8960, OTA darkroom	Active testing, passive testing	Soward standards, customer requirements
3G antenna (WCDMA/TDSCDMA/CDMA-EVDO/2000)	824MHz-960MHz, 1710MHz-2170MHz	5071B, 8960, OTA darkroom	Active testing, passive testing	Soward standards, customer requirements
4G天线 (LTE-FDD/LTE-TDD)		5071B, CMW500, SP8011, OTA darkroom	Active testing, passive testing	Soward standards, customer requirements
WIFI antenna	2.4GHz-2.48GHz, 5.15GHz-5.35GHz, 5.725GHz-5.825GHz	5071B, CMW500, OTA darkroom, Router, PC	Active testing, passive testing, APK testing, throughput testing	Soward standards, customer requirements
BT antenna	2.4GHz-2.48GHz	5071B, OTA darkroom, Bluetooth Speaker	Active testing, passive testing, actual testing	Soward standards, customer requirements
Positioning antenna (GPS, GLONASS, Beidou, Galileo)	1575.42MHz ± 10MHz 1602MHz±0.5625MHz 1561MHz±2.046MHz	5071B, OTA darkroom, APK	Active testing, passive testing, actual testing	Soward standards, customer requirements
NFC antenna	13.56MHz	5071B, Specialized testing fixture, OTA darkroom, APK	Passive testing and actual measurement	Soward standards, customer requirements
Remote control antenna	433MHz	5071B, OTA darkroom	Passive testing and actual measurement	Soward standards, customer requirements
NB_IOT	with LTE-FDD	CMW500 (high-end version)	Active testing, passive testing	Under construction (power standard basically consistent with 4G)

two:Overview

(1)Antenna performance

1. This approval sheet supports for MID project. FPC antennas include in this project. This report is for the performance of WIFI&BT antenna.
2. Antenna shape size: Meet the requirement of MID
3. Antenna band: 2.4GHz~5GHz
4. Antenna material: Antenna material meet the requirement of MID
5. Adhesive performance: Adhesive performance meet the requirement of MID
6. Antenna performance meet the spec below:

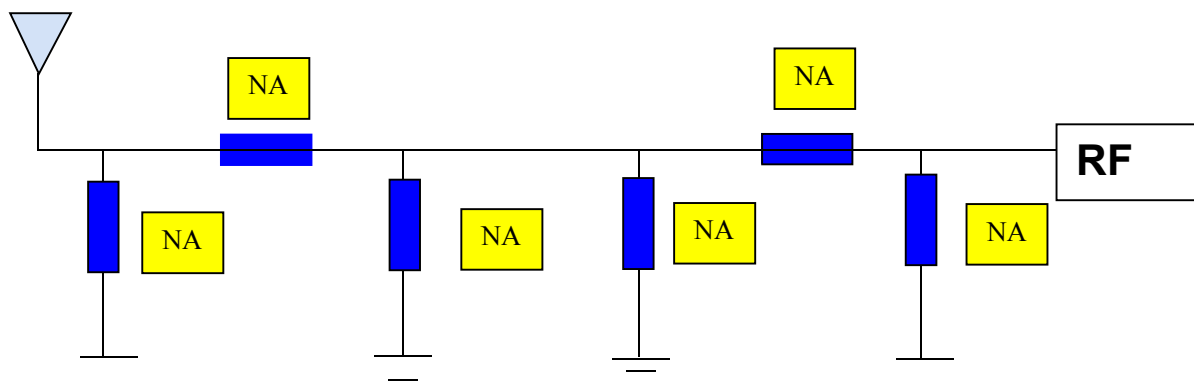
Description	2.4GHz~5GHz	Units
VSWR	≤ 2.0	
Average Antenna Gain	≥ -4.5	dB
Feed Impedance	50 ohms	
Operating Temperature	-40 to +85 deg C	
Polarization / Azimuth	Linear / Omni-directional	

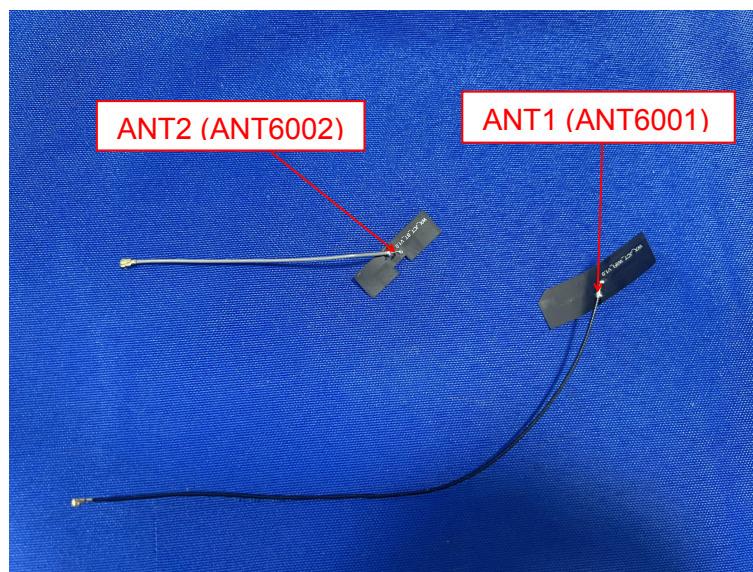
(2)Mechanical Information

Mechanical Dimension	
Cable Length	075mm/Black
Description	WIFI&BT antenna
Material	FPC
Coaxial Cable	50Ω /0. D. 0.81mm
Environmental	
Operation Temperature	-40 to +85 deg C
Storage Temperature	-40 to +85 deg C

three:Match circuit diagrams, machine images, and antenna images

(1)matching circuit





four:Antenna Standing Wave Ratio&Antenna Efficiency (VSWR)

ANT6002

ANT2(ANT6002)



Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	31.72	-4.99	0.77
2410	30.59	-5.14	0.86
2420	38.91	-4.1	2.09
2430	42.54	-3.71	2.6
2440	48.32	-3.16	3.29
2450	39.21	-4.07	2.46
2460	39.98	-3.98	2.65
2470	35.29	-4.52	2.11
2480	39.16	-4.07	2.4
2490	42.48	-3.72	2.69
2500	50.45	-2.97	3.34

Passive Test For 5G-WIFI			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	37.16	-4.3	-0.32
5100	39.79	-4	0.25
5200	44.51	-3.52	0.96
5300	55.03	-2.59	2.62
5400	49.89	-3.02	2.81
5500	45.18	-3.45	1.78
5600	43.41	-3.62	1.76
5700	43.23	-3.64	2.35
5800	39.91	-3.99	2.29
5900	37.52	-4.26	1.44
6000	34.09	-4.67	-0.36

ANT6001

ANT1(ANT6001)



Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	23.19	-6.35	1.25
2410	24.65	-6.08	1.71
2420	32	-4.95	2.97
2430	41	-3.87	4.08
2440	49.43	-3.06	4.87
2450	46.51	-3.32	4.58
2460	47.62	-3.22	4.68
2470	40.9	-3.88	4.02
2480	40.99	-3.87	4.02
2490	43.91	-3.57	4.3
2500	47.83	-3.2	4.57

Passive Test For 5G-WIFI			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	38.1	-4.19	2.71
5100	43.64	-3.6	2.88
5200	38.7	-4.12	2.24
5300	50.95	-2.93	2.33
5400	42.08	-3.76	2.07
5500	37.7	-4.24	2.01
5600	35.99	-4.44	1.74
5700	32.55	-4.88	1.52
5800	28.94	-5.38	1.24
5900	27.74	-5.57	1.19
6000	29.21	-5.35	0.59

five:Active data

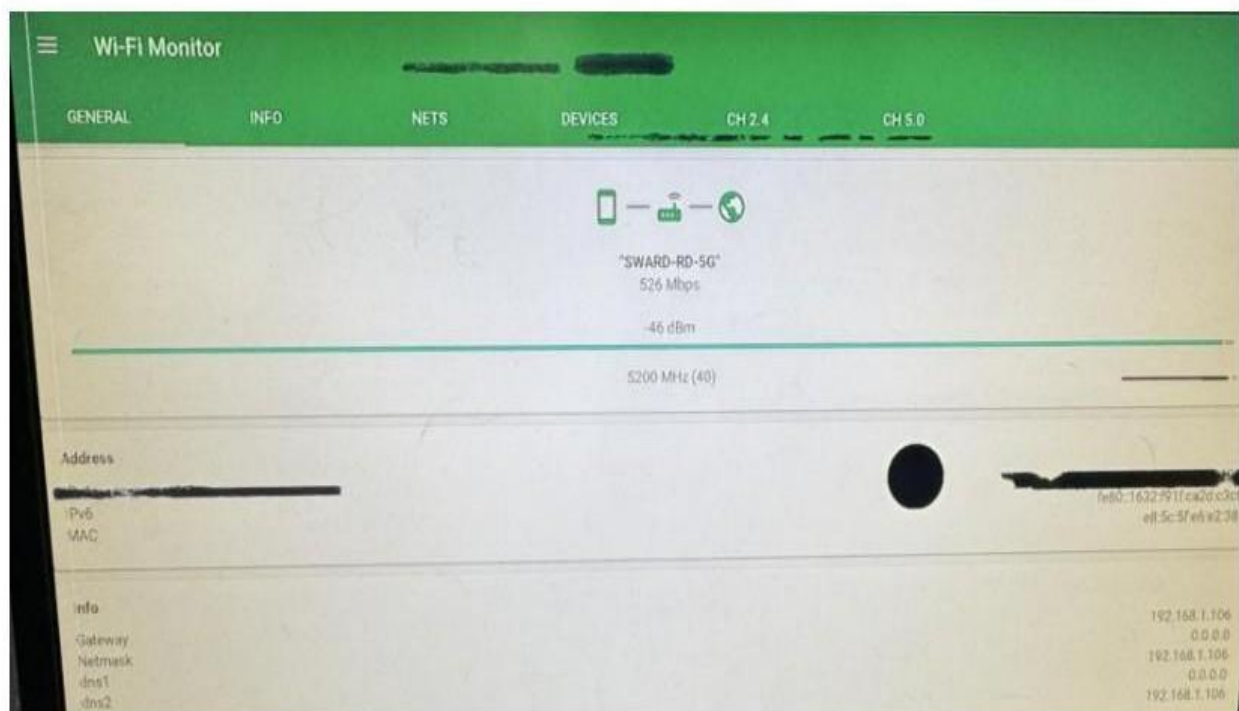
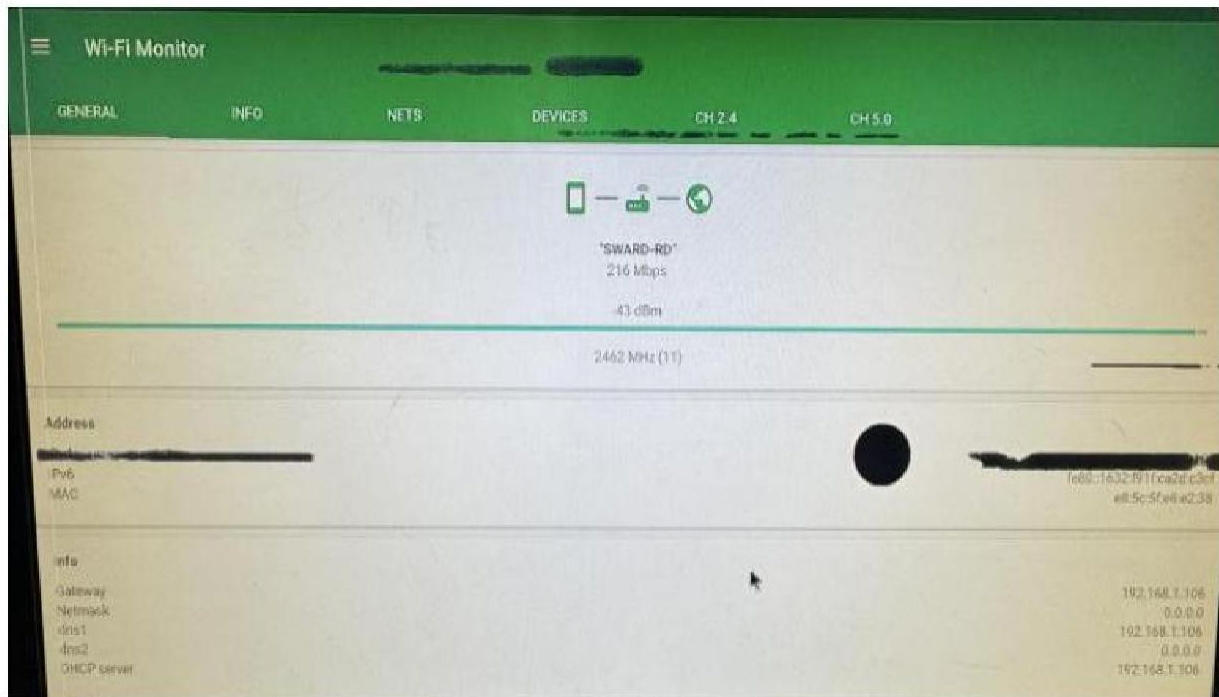
802.11b : 11Mbps 20M			802.11a : 54Mbps 20M		
1	7	13	36	64	165
2412	2442	2472	5180	5320	5825
11.72	10.32	11.27	14.64	15.75	14.38
-79.82	-81.36	-78.85	-69.06	-71.97	-70.46
802.11n : MCS7 20M			802.11n : MCS7 20M		
1	7	13	36	64	165
2412	2442	2472	5180	5320	5825
10.34	10.69	10.55	13.06	14.41	14.69
-59.23	-61.82	-61.05	-69.78	-69.67	-70.84
802.11g : 54Mbps 20M					
1	7	13			
2412	2442	2472			
10.23	10.38	10.11			
-65.01	-65.41	-66.03			

six: Throughput testing

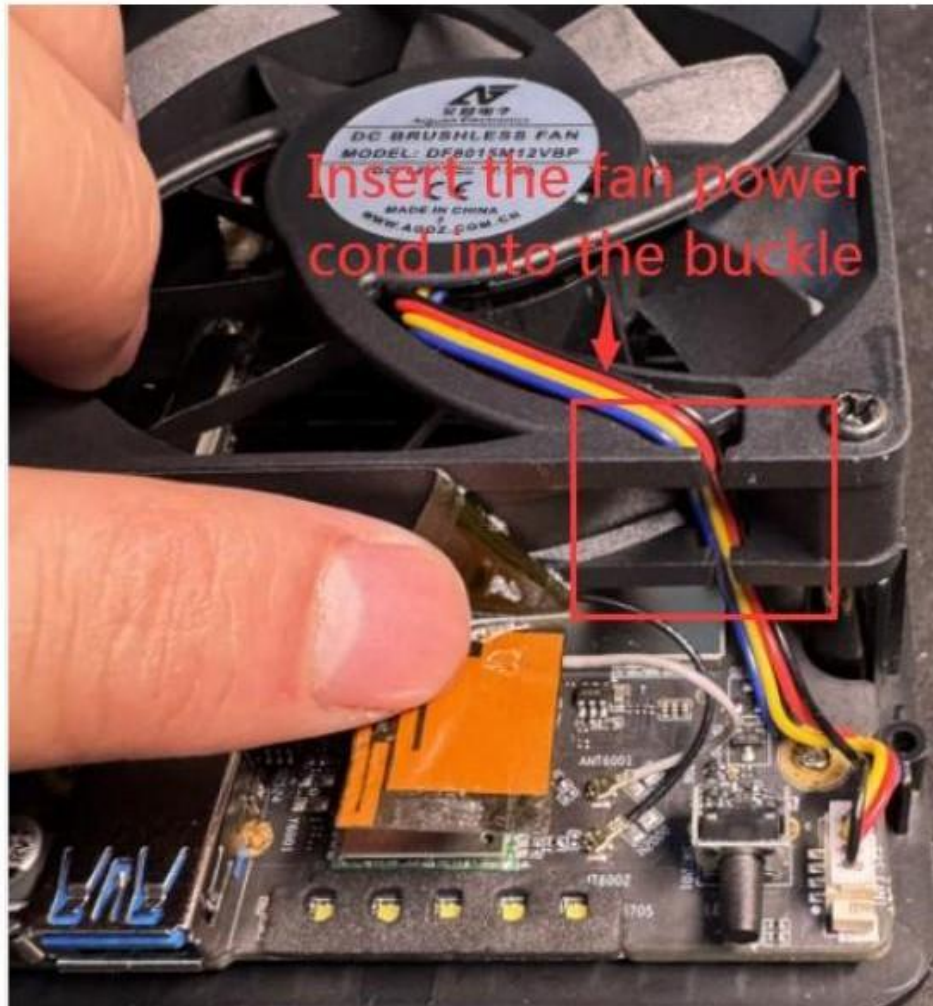
Iperf throughput test						
Type		Module		Software version		
No.	Freq.	Status	Angle	Average Value (TX) /1min	Average Value (RX) /1min	Remarks (Packet loss)
2.4GWIFI		15米	0°	57.6M/S	112M/S	0
			90°	48.9M/S	107M/S	
			180°	50.0M/S	108M/S	
			270°	57.6M/S	105M/S	
5GWIFI		15米	0°	241M/S	280M/S	0
			90°	260M/S	288M/S	
			180°	263M/S	282M/S	
			270°	275M/S	288M/S	

七: Antenna measurement diagram

Actual test effect	
Model number	1
Testing Environment	Soward R&D Center
Test equipment	Huawei AM08
test distance	10m



八:environmental treatment

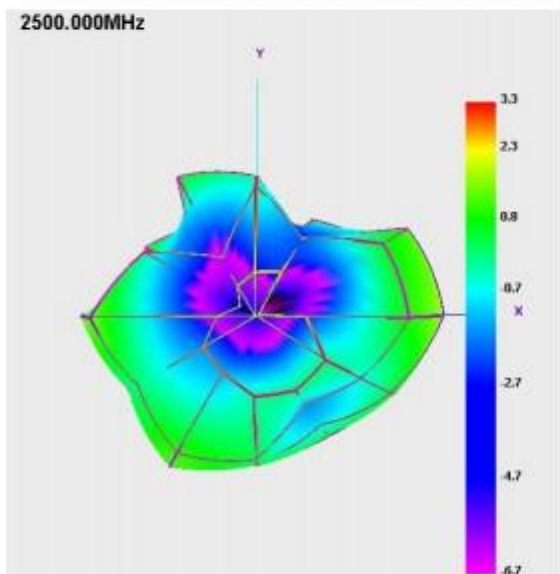
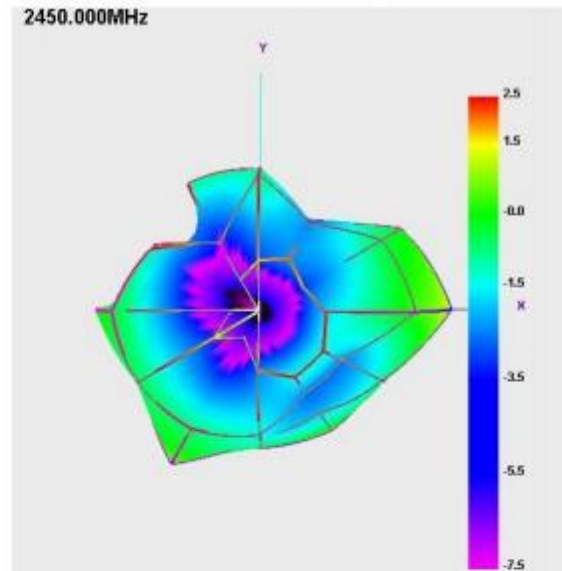
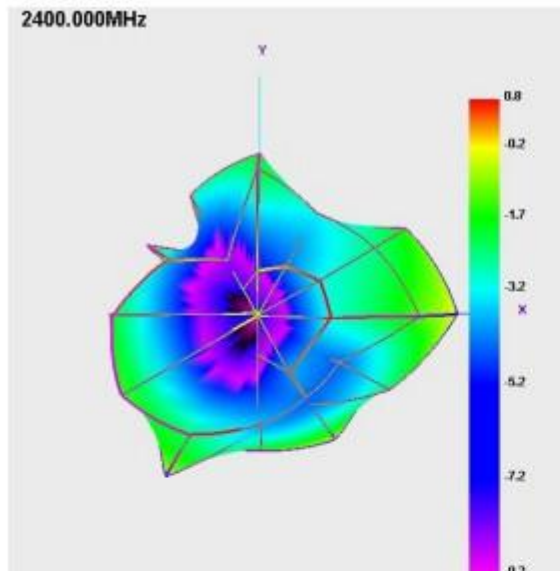


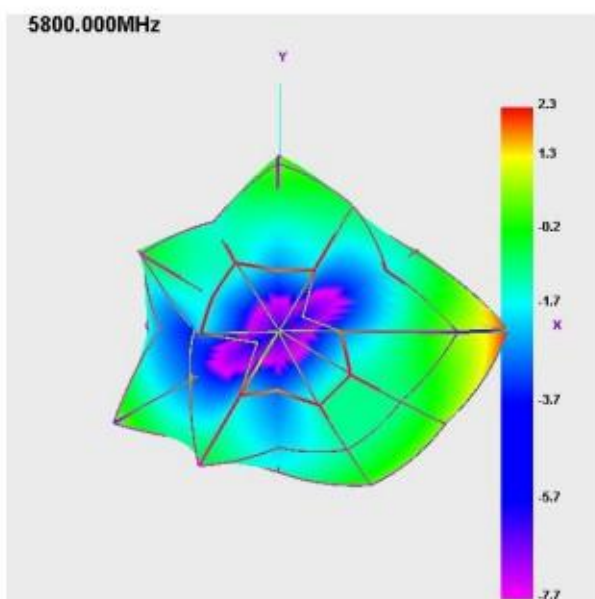
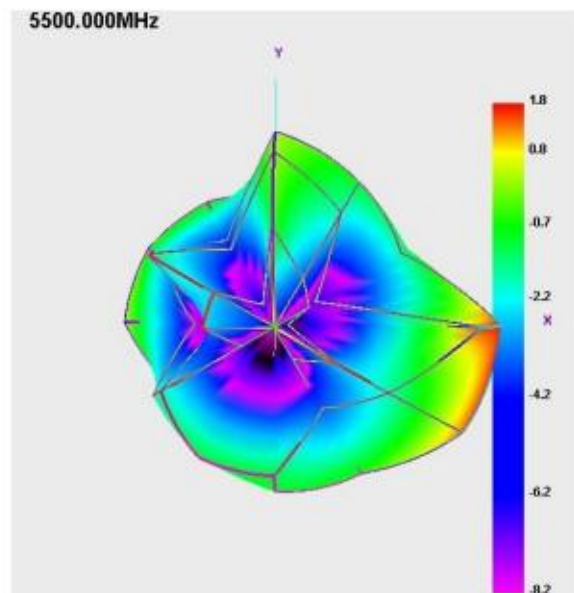
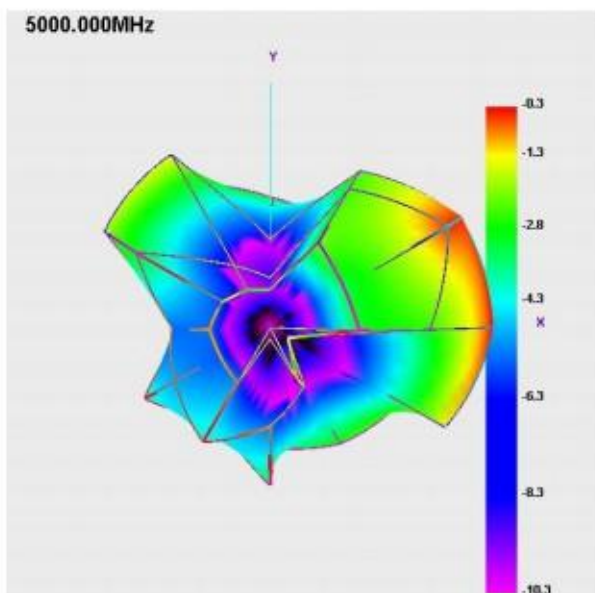
Note: Please optimize the specific environmental treatment methods according to the test report

nine:3D pattern

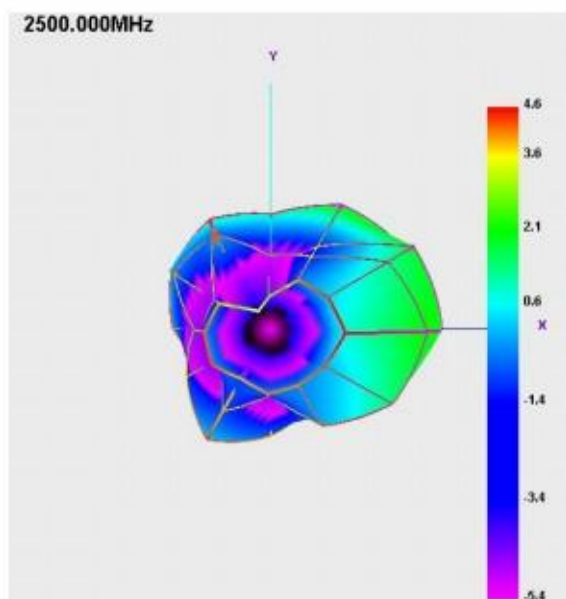
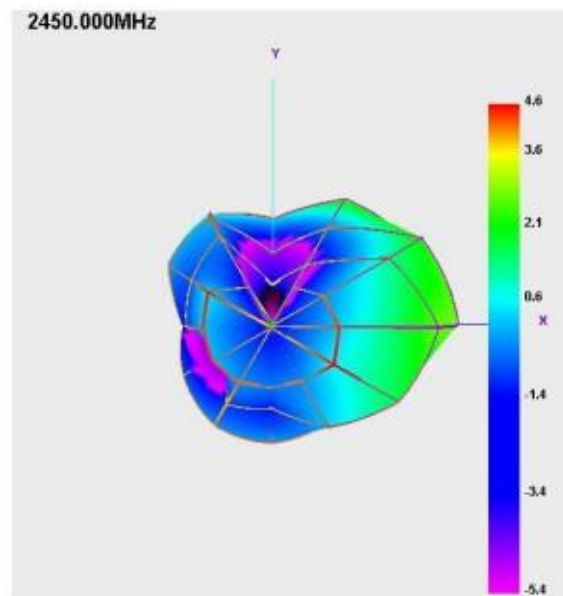
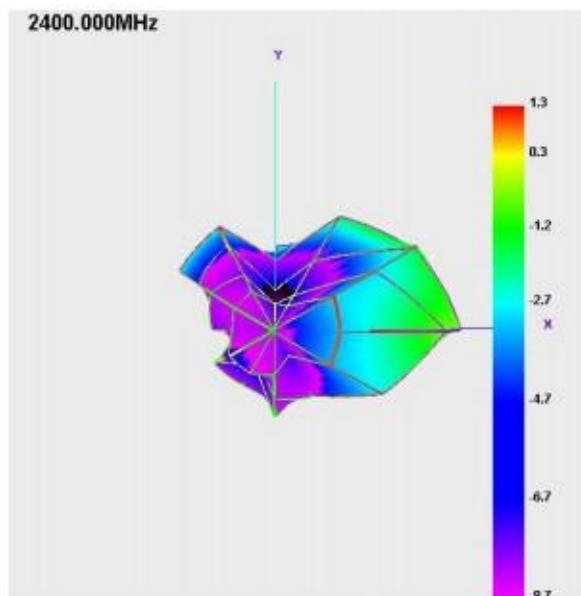
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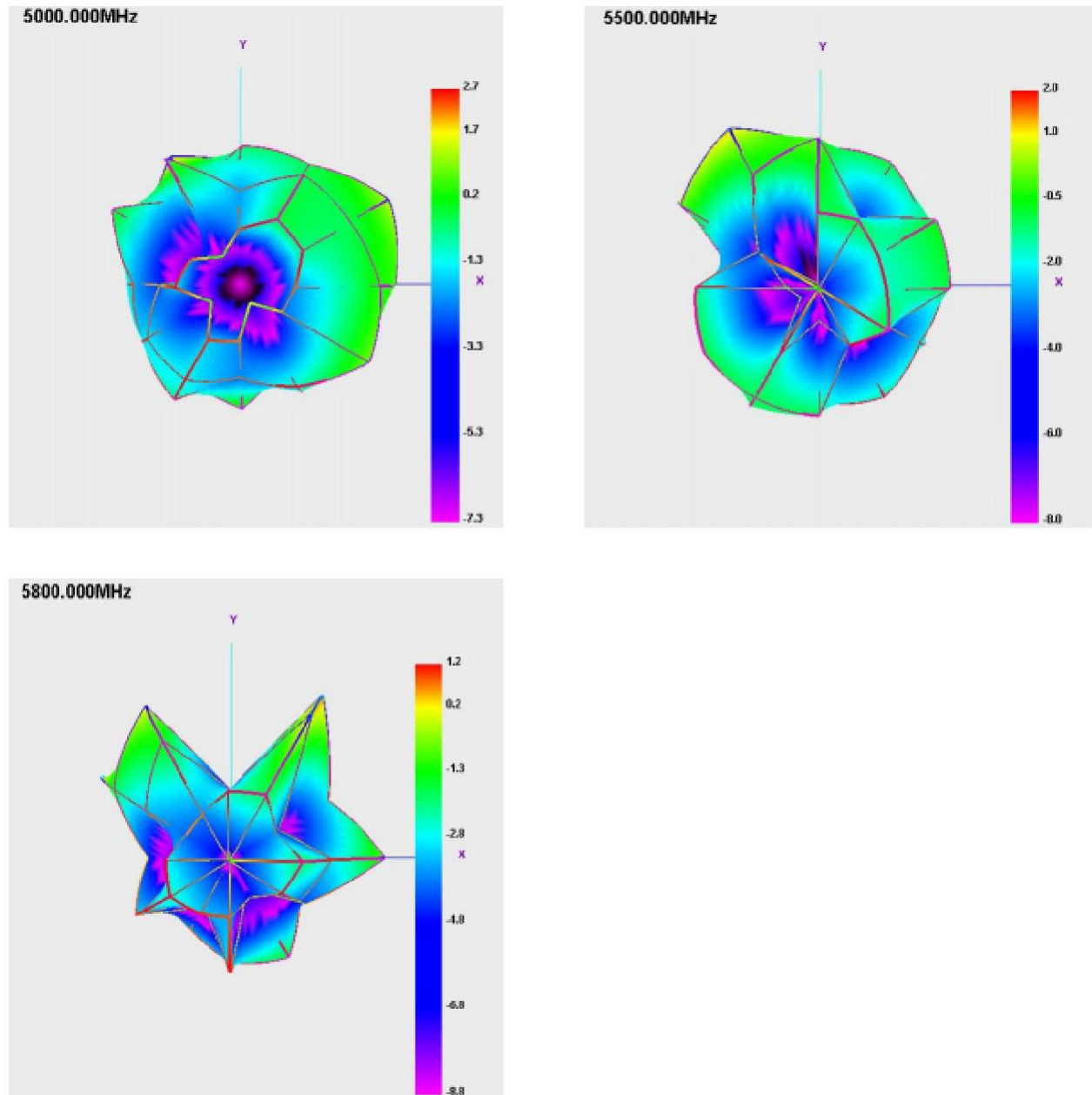
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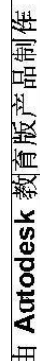


ANT6001





ten:structural drawings



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