Antenna specification for approval

Customer name	Estone Technology LTD.		
Model	TSI-5-5 inch plastic case		
Antenna frequency	1.575GHz&2.4GHz&5GHz		
Antenna function	GPS&WIFI&BT&5Gwifi antenna		
Antenna material	FPC	FPC color	black
model	ST1714A-1B2-A		
Material number	ST1714A-1B2-A		
Customer Part Number			

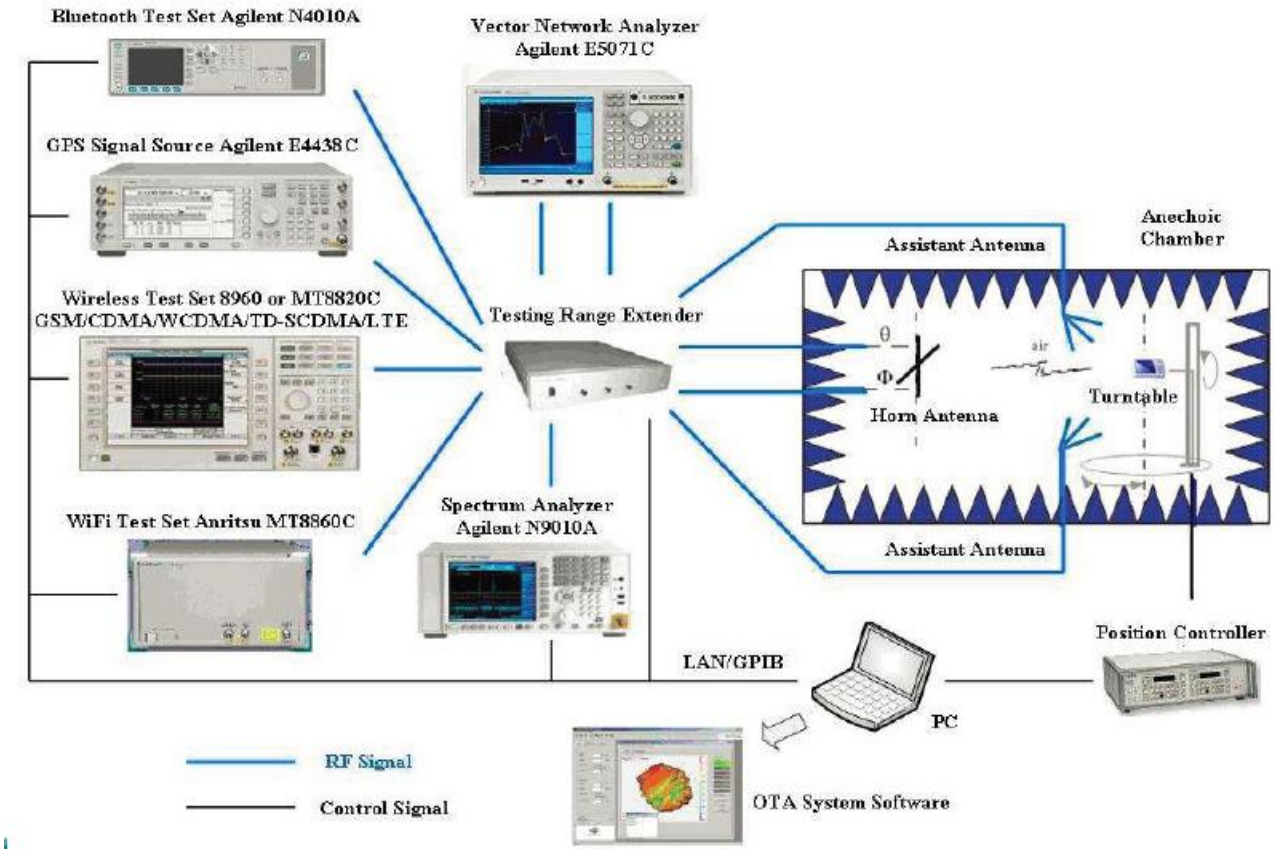
Ward accepted the signature		Client acknowledges signature	
structure		Purchase	
Document control		structure	
radio frequency		engineering	
To examine		QC	
Responsible	LTT	To examine	
date 2023.05.16	Seal area	date 2023.05.16	Seal area

Serial number	Certification number	Material type	Date of issue	Remarks
1	A2220186128101ER1	Tinned copper wire	2022-05-17	One year
2	CANEC2227657302	halogen	2022-12-28	One year
3	CANEC2227657303	Adhesive	2022-12-28	One year
4	SHAEC23000346911	FEP sheath	2023-01-13	One year
5	SHAEC22004639301	FEP insulation	2022-12-15	One year
6	SZXEC2203054804	Tin wire	2022-09-19	One year
7	SZXEC2203054808	Tin	2022-09-19	One year
8	ETR22800844	Printing ink	2022-08-09	One year
9	EKR22501369	Substrate	2022-05-27	One year
10	CANEC2227574118	EVA foam	2023-01-03	One year
11	SZXEC2202709609	Conductive cloth	2022-08-16	One year
12	CANEC2218227002	Gold plating	2022-08-30	One year

table of Contents

6th Floor, Building B, Hexi Hangcheng Industrial Zone, No. 135 Qianjin Second Road, Bao 'an District, Shenzhen
CityTel: 0755-29985185 Fax: 0755-27487028

一:Device Support & Testable Antenna Type



Antenna function	Frequency Range	test instrument	test method	standard test
2G antenna (GSM)	824MHz-960MHz, 1710MHz-1990MHz	5071B、8960 OTA darkroom	Active test, passive test	Soward standards, customer requirements
3G antenna (WCDMA/TDSCDMA/CDMA-EVDO/2000)	824MHz-960MHz, 1710MHz-2170MHz	5071B、8960 OTA darkroom	Active test, passive test	Soward standards, customer requirements
4G antenna (LTE-FDD/LTE-TDD)		5071B、CMW500、SP8011、OTA darkroom	Active test, passive test	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 test, passive test, APK actual test, throughput test	Soward standards, customer requirements
BT antenna	2.4GHz-2.48GHz,	5071B、OTA darkroom、Bluetooth Speaker	Passive test, actual test	Soward standards, customer requirements
Positioning antenna (GPS, GLONASS, Beidou, Galileo)	1.575.42MHz±10MHz 1602MHz+0.5625MHz 1561MHz+2.046MHz	5071B、OTA darkroom、APK	Passive test, actual test	Soward standards, customer requirements
NFC antenna	13.56MHz	5071B、Dedicated test fixture、OTA darkroom、APK	Passive test, actual test	Soward standards, customer requirements
Remote control antenna	433MHz	5071B、OTA darkroom	Passive test, actual test	Soward standards, customer requirements

二: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 GPS&WIFI&BT antenna.

2. Antenna shape size: Meet the requirement of MID

3. Antenna band: 1570MHz~1580MHz, 2400MHz~2500MHz&5400MHz

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:

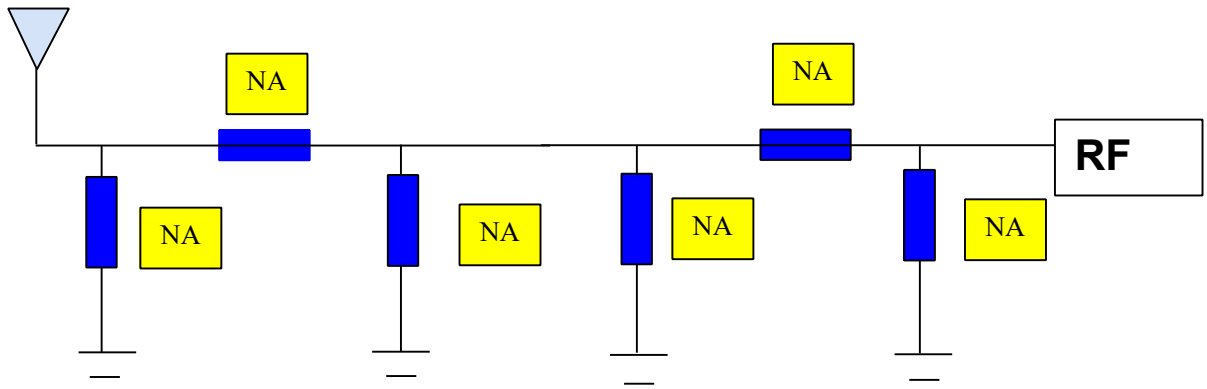
Description	1.57GHz~1.58GHz 2.4GHz~2.5GHz&5GHz	Units
VSWR	≤2.0	
Average Antenna Gain	≥-4.5	dB
Antenna Efficiency	≥35	%
Feed Impedance	50 ohms	
Operating Temperature	-40 to +85 deg C	
Polarization / Azimuth	Linear / Omni-directional	

(2)Mechanical Information

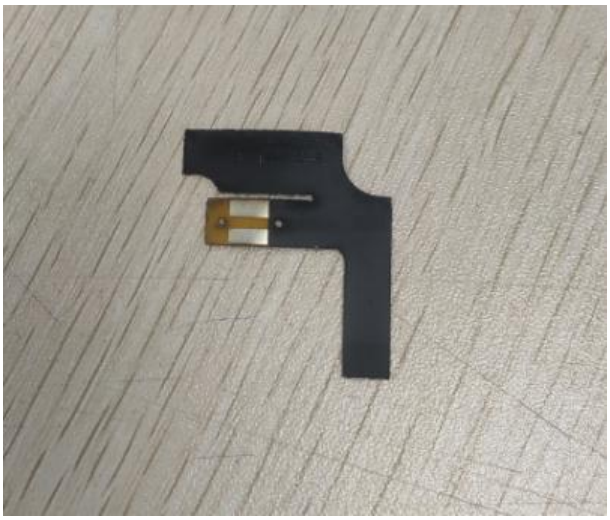
Mechanical Dimension	
Cable Length	NA
Description	GPS&WIFI&BT antenna
Material	FPC
Coaxial Cable	NA
Environmental	
Operation Temperature	-40 to +85 deg C
Storage Temperature	-40 to +85 deg C

三:Matching circuit diagram & machine picture & antenna picture

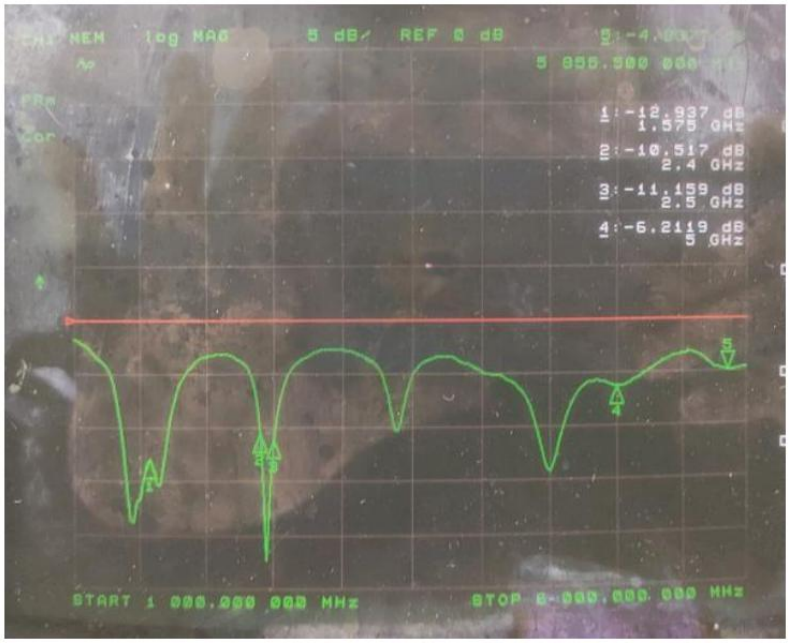
(1)Matching circuit



(2) Machine picture & antenna picture



四:Antenna standing wave ratio & Antenna Efficiency

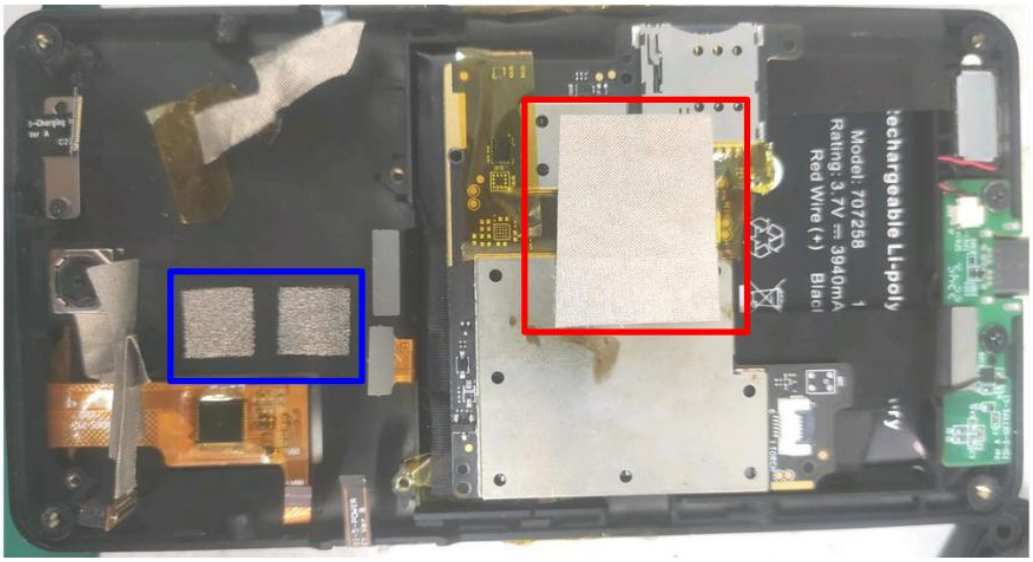


Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
2400	31.32	-5.04	-0.72	-2.87	16.759	14.561	-0.72	-13.52
2410	32.69	-4.86	-0.54	-2.69	17.242	15.444	-0.54	-13.31
2420	34.7	-4.6	-0.42	-2.57	18.246	16.457	-0.42	-12.81
2430	34.82	-4.58	-0.33	-2.48	18.097	16.723	-0.33	-13.04
2440	38.4	-4.16	-0.06	-2.21	20.029	18.376	-0.06	-12.84
2450	40.18	-3.96	0.17	-1.98	20.856	19.322	0.17	-13.71
2460	37.44	-4.27	-0.34	-2.49	19.657	17.784	-0.34	-14.75
2470	34.64	-4.6	-0.5	-2.65	18.147	16.489	-0.5	-15.95
2480	35.02	-4.56	-0.38	-2.53	18.387	16.629	-0.38	-16.11
2490	35.43	-4.51	-0.42	-2.57	18.407	17.028	-0.42	-16.23
2500	35.86	-4.45	-0.47	-2.62	18.457	17.408	-0.47	-16.12

Passive Test For 5Gwifi								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
5000	21.83	-6.61	-1.25	-3.4	13.085	8.746	-1.25	-22.67
5100	15.57	-8.08	-3.15	-5.3	9.231	6.335	-3.15	-21.12
5200	11.29	-9.47	-3.17	-5.32	6.498	4.793	-3.17	-22.49
5300	13.1	-8.83	-2.09	-4.24	7.446	5.652	-2.09	-21.05
5400	7.86	-11.04	-4.38	-6.53	4.601	3.261	-4.38	-24.79
5500	8.22	-10.85	-4.83	-6.98	4.885	3.331	-4.83	-25.01
5600	6.43	-11.92	-6.05	-8.2	3.631	2.8	-6.05	-26.17
5700	7.48	-11.26	-5.8	-7.95	4.122	3.356	-5.8	-23.71
5800	10.06	-9.97	-4.69	-6.84	5.063	4.996	-4.69	-20.76
5900	8.32	-10.8	-4.98	-7.13	3.643	4.681	-4.98	-21.27
6000	8.27	-10.83	-4.57	-6.72	3.405	4.864	-4.57	-21.52

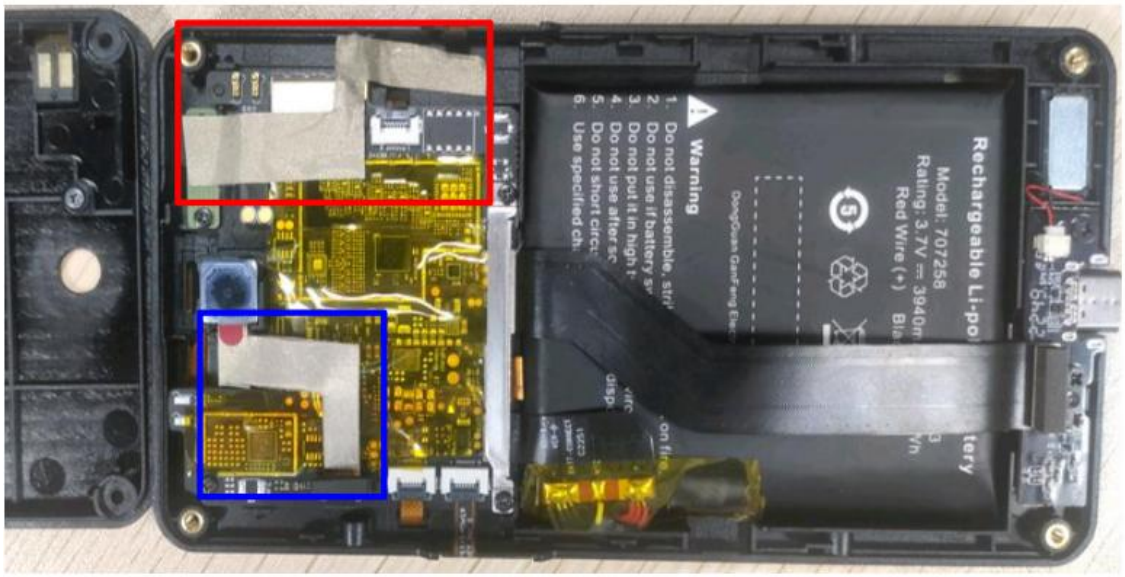
Passive Test For GPS2								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
1570	27.36	-5.63	-0.98	-3.13	18.913	8.452	-0.98	-14.62
1571	27.09	-5.67	-1.05	-3.2	18.747	8.339	-1.05	-14.9
1572	26.91	-5.7	-1.1	-3.25	18.67	8.242	-1.1	-15.11
1573	26.82	-5.71	-1.15	-3.3	18.633	8.19	-1.15	-15.48
1574	26.86	-5.71	-1.16	-3.31	18.7	8.157	-1.16	-15.61
1575	26.95	-5.69	-1.15	-3.3	18.8	8.15	-1.15	-15.86
1576	27.05	-5.68	-1.15	-3.3	18.901	8.148	-1.15	-16.07
1577	27.12	-5.67	-1.16	-3.31	18.968	8.149	-1.16	-16.27
1578	27.11	-5.67	-1.17	-3.32	18.994	8.118	-1.17	-16.52
1579	27.02	-5.68	-1.23	-3.38	18.947	8.069	-1.23	-16.75
1580	26.77	-5.72	-1.29	-3.44	18.799	7.967	-1.29	-16.82

五:Environmental treatment



1、The back of the motherboard, the red frame, the shielding cover and so on are connected with conductive cloth (conductive cloth is affixed to the position of components after insulation).

2、2. At the bottom of the mainboard, in the blue frame, a conductive sponge is attached to the middle frame of the screen, so that the ground of the mainboard and the screen are fully grounded;



3. On the front of the motherboard, the line in the red frame should be shielded with the shielding cover and ground (connected with conductive cloth, pay attention to the components to prevent short circuit);

4. 4. Cover the camera cables with conductive cloth.

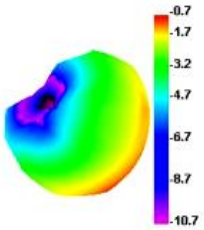
Note: Please optimize the specific environment treatment according to the test report

六:Antenna map

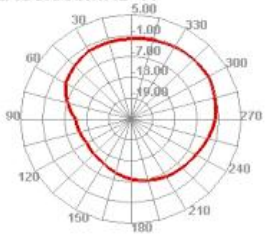
Measured effect	
Model number	1
Test environment	Soward Research and Development Center
Test equipment	Huawei AM08
Test distance	10 m

七:3D pattern

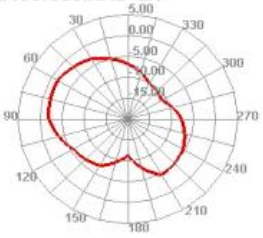
2400.000MHz



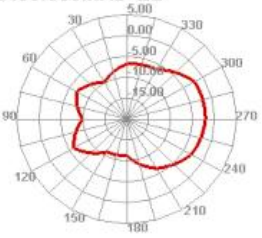
2400.000MHz H



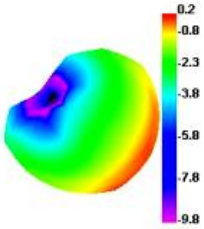
2400.000MHz E1



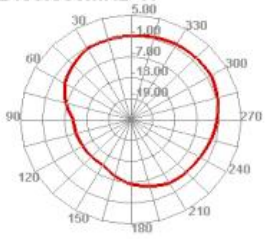
2400.000MHz E2



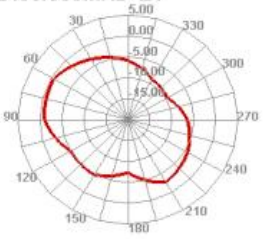
2450.000MHz



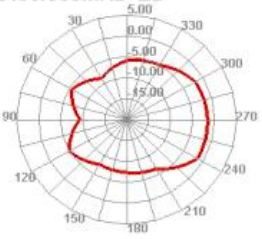
2450.000MHz H



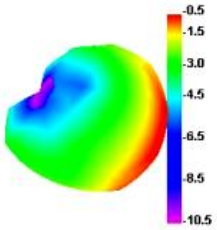
2450.000MHz E1



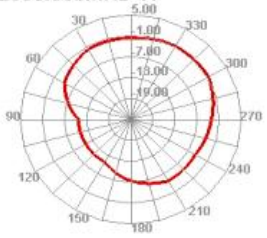
2450.000MHz E2



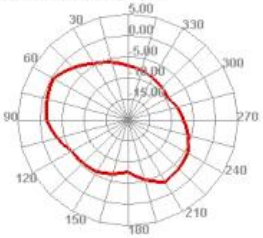
2500.000MHz



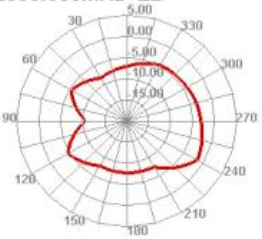
2500.000MHz H

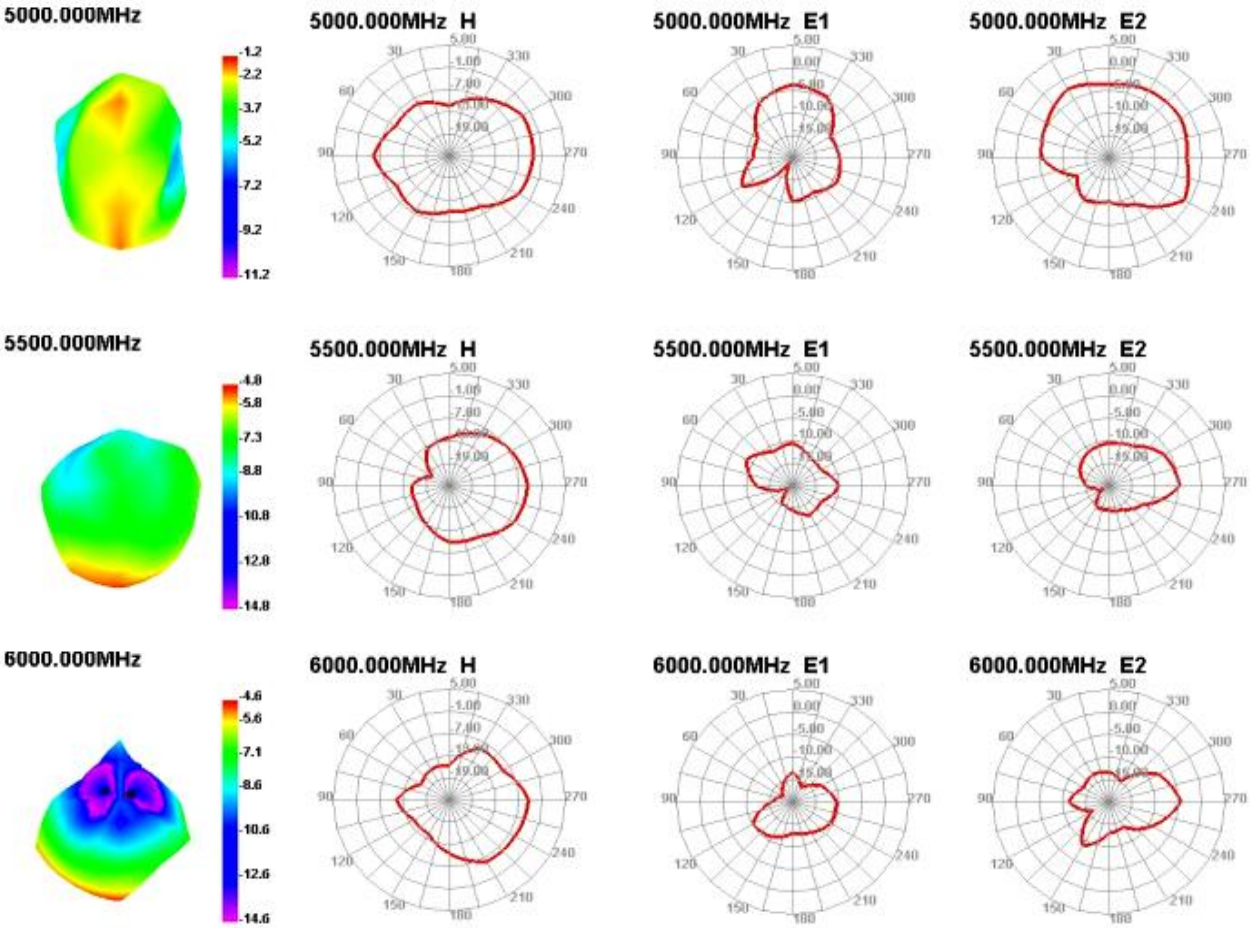


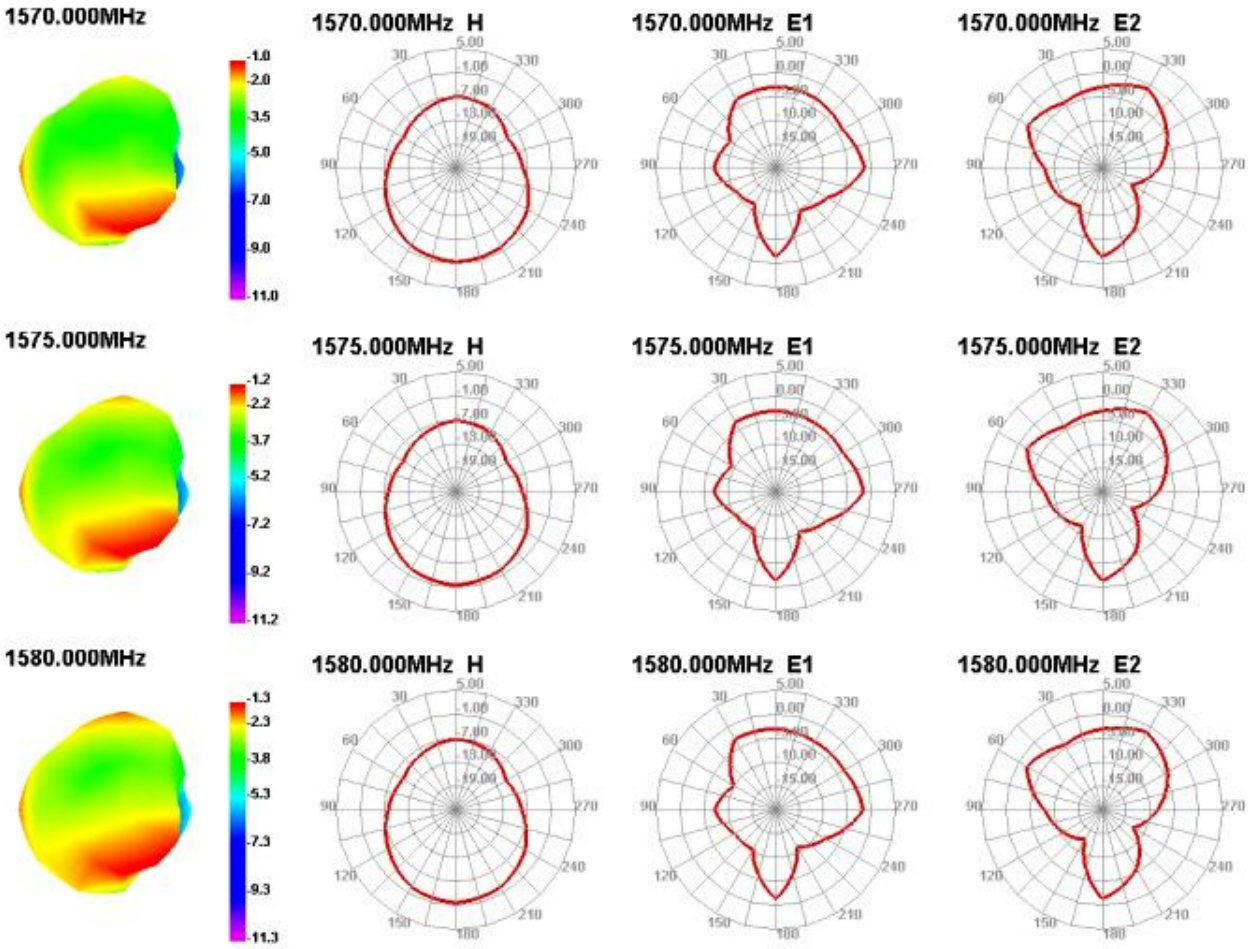
2500.000MHz E1



2500.000MHz E2

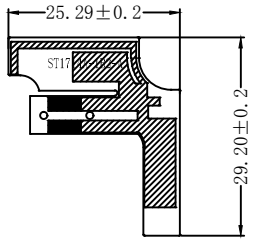



5000.000MHz
5000.000MHz H
5000.000MHz E1
5000.000MHz E2
5500.000MHz
5500.000MHz H
5500.000MHz E1
5500.000MHz E2
6000.000MHz
6000.000MHz H
6000.000MHz E1
6000.000MHz E2



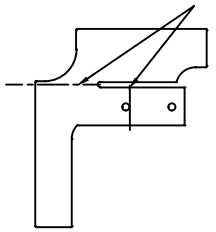
八:Structural drawing

Gum-3M300



positive

Hand tear line position



opposite

Technical requirements:
1, Please use a pair of half PI base material, electrolytic copper.
2, the yellow part is the wiring part, the surface spray matte black, text printing bright black.
3. The yellow shaded part is the exposed welding spot, and the process requires electric gold treatment with thickness of 1u.
4, all materials meet environmental ROHS standards.
5, with "*" is the key size, tolerance is: ±0.03.

Test criteria:
1, Shape dimensions and line dimensions consistent with drawings, within controllable tolerances。
2,Antenna line, broken line, FPC bend to do 180 ° bending experiment, no fracture, more than 5 times PASS。
3, Clear, no misprints.。

Packaging requirements:
1. PE sealed pocket packaging。
2.100 pcs/bag。

	signatures	date	mass	signatures	date
RD	YWD	2023.05.16	QC		
RF					
audits			approval		

time markup				percentage
1			A	1:1
共1张		第1张		

SWARD

ShenZhen SWARD Communication Technology Co.Ltd

ST1714A-1B2-A

ROHS