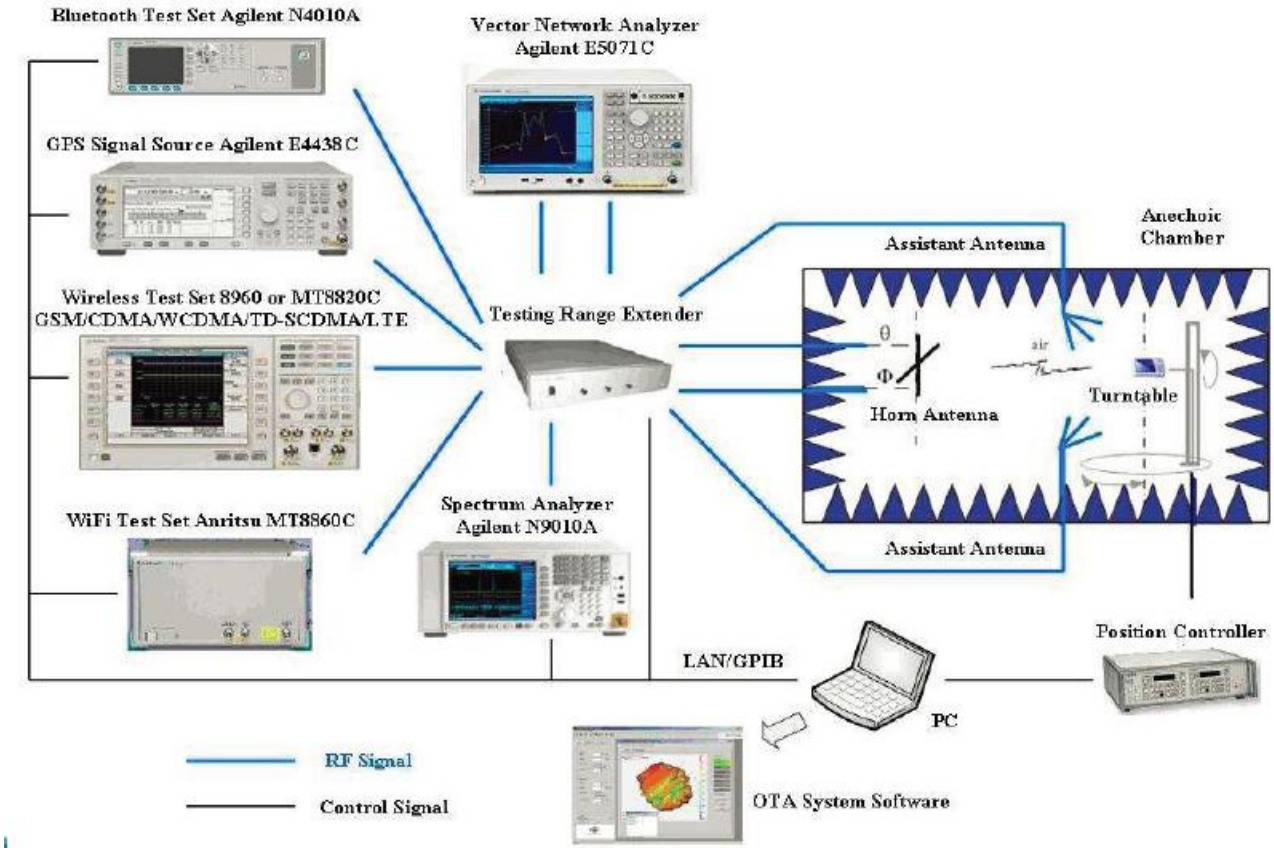
acknowledgement

Supplier signature	
Haoqin model	M30
Haoqin order number	HS0202411042
Haoqin material name	GPS&WIFI&BT&5Gwifi antenna
Haoqin material number	04.022.00708
Haoqin material specification description	Soward / 3-in-1 antenna /WBG/ST1822B-1L23B-040-A(silkscreen ST1822B-1B2-A/ Total length of 40mm/ black wire/conductive cloth/with 3-generation terminals)/ with EM_T30 board type_T616 motherboard/with Jintaixing A9 hardware case/in line with RoHS requirements
Supplier material type	ST1822B-1B2-A
Supplier material number	ST1822B-1L23B-040-A

Supplier information	
Supplier name	Shenzhen Soward communication Technology Co., LTD
Supplier address	6 / F, Building B, Hexi Hangcheng Industrial Zone, No.135 Qianjin Second Road, Baoan District, Shenzhen
Supplier phone	15989585437
Supplier email address	luozhiwei@szsward.com

1: Device support & can test antenna type



天线功能	频率范围	测试仪器	测试方式	测试标准
2G天线（GSM）	824MHz-960MHz，1710MHz-1990MHz	5071B、8960、OTA暗室	有源测试、无源测试	索沃德标准、客户要求
3G天线（WCDMA/TDSCDMA/CDMA-EVDO/2000）	824MHz-960MHz，1710MHz-2170MHz	5071B、8960、OTA暗室	有源测试、无源测试	索沃德标准、客户要求
4G天线（LTE-FDD/LTE-TDD）		5071B、CMW500、SP8011、OTA暗室	有源测试、无源测试	索沃德标准、客户要求
WIFI天线	2.4GHz-2.48GHz，5.15GHz-5.35GHz，5.725GHz-5.825GHz	5071B、CMW500、OTA暗室、路由器、PC	有源测试、无源测试、APK实测、吞吐量测试	索沃德标准、客户要求
BT天线	2.4GHz-2.48GHz	5071B、OTA暗室、蓝牙音箱	有源测试、无源测试、实测	索沃德标准、客户要求
定位天线（GPS、GLONASS、北斗、伽利略）	1575.42MHz±10MHz 1602MHz+0.5625MHz 1561MHz+2.046MHz	5071B、OTA暗室、APK	有源测试、无源测试、实测	索沃德标准、客户要求
NFC天线	13.56MHz	5071B、专用测试治具、OTA暗室、APK	无源测试、实测	索沃德标准、客户要求
遥控天线	433MHz	5071B、OTA暗室	无源测试、实测	索沃德标准、客户要求
NB_IOT	同LTE-FDD	CMW500（高配版）	有源测试、无源测试	筹建中（功率标准与4G基本一致）

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2: 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:

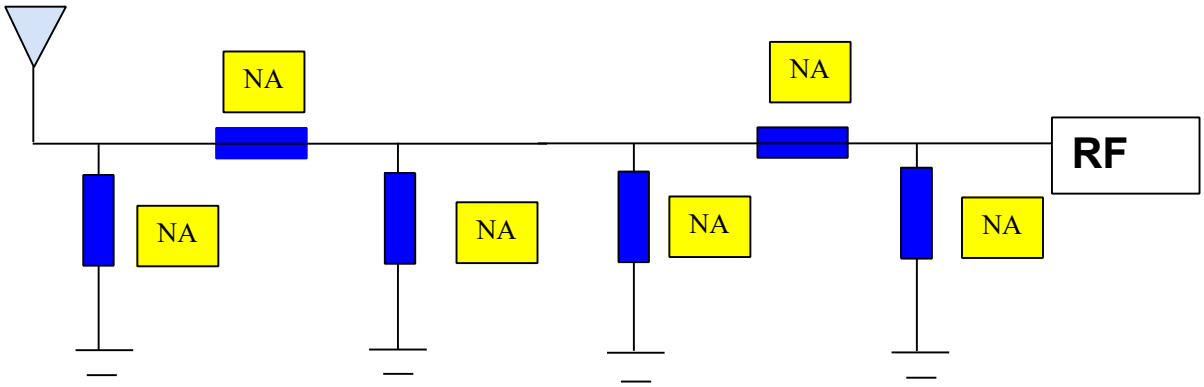
Description	1.57GHz~1.58GHz 2.4GHz~2.5GHz&5GHz	Units
VSWR	≤2.0	
Average Antenna Gain	≥-4.5	dB
Feed Impedance	50 ohms	
Operating Temperature	-40 to +85 deg C	
Polarization / Azimuth	Linear / Omni-directional	

(2)Mechanical Information

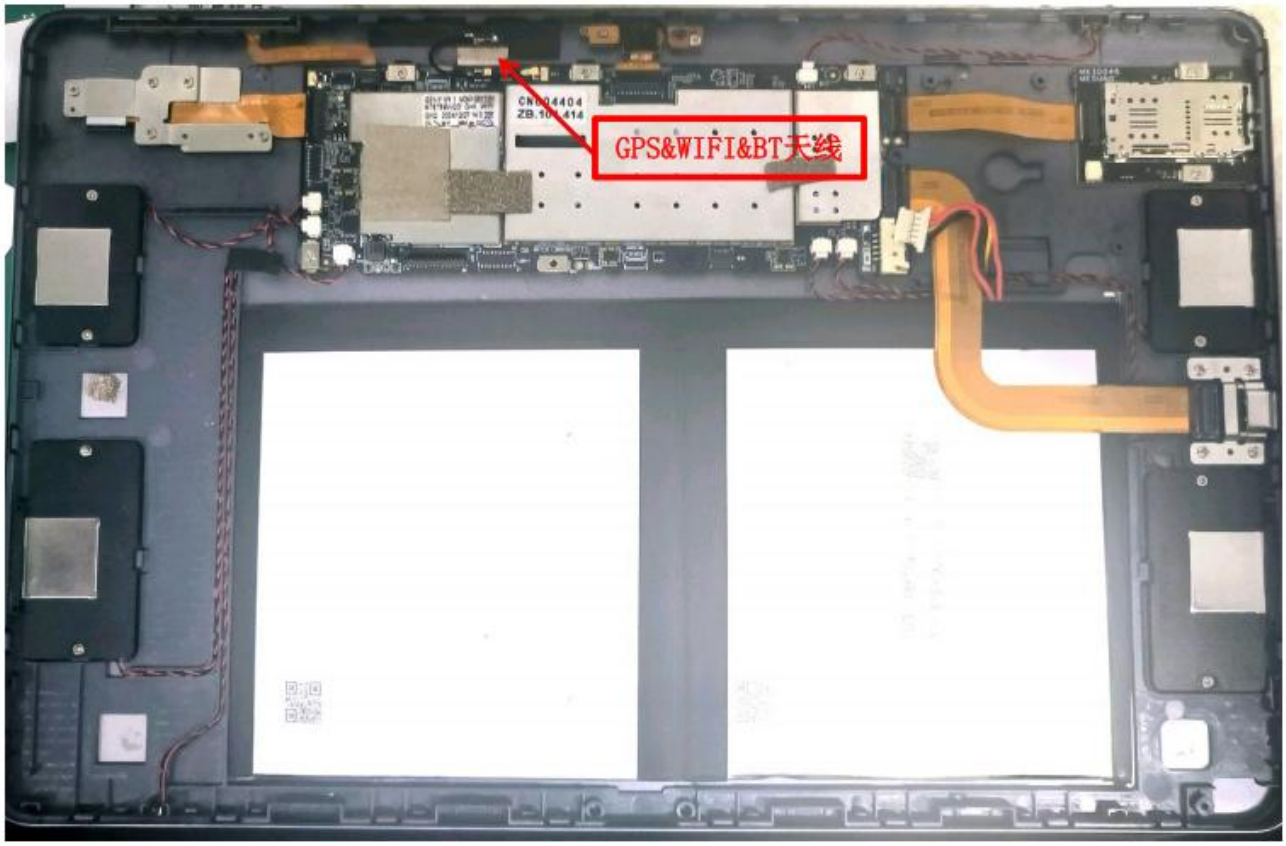
Mechanical Dimension	
Cable Length	040mm/black
Description	GPS&WIFI&BT antenna
Material	FPC
Coaxial Cable	50Ω/O.D.0.81mm
Environmental	
Operation Temperature	-40 to +85 deg C
Storage Temperature	-40 to +85 deg C

3: Match circuit diagram & machine picture & antenna picture

(1)Matching circuit



(2) Machine picture & antenna picture



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4: Antenna standing wave ratio & Efficiency &WIFI active data

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Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
2400	32.03	-4.91	-1.14	-3.29	18.634	13.633	-1.14	-15.77
2410	31.79	-5.17	-1.4	-3.55	17.566	12.86	-1.4	-16.23
2420	35.95	-4.56	-0.9	-3.05	20.14	14.857	-0.9	-15.83
2430	41.04	-4.6	-1.1	-3.25	19.842	14.812	-1.1	-16.35
2440	41.34	-4.65	-1.44	-3.59	19.508	14.742	-1.44	-16.39
2450	42.72	-5.97	-2.83	-4.98	14.367	10.931	-2.83	-18.22
2460	37.26	-6	-2.97	-5.12	14.09	11.026	-2.97	-18.46
2470	32.27	-6.44	-3.35	-5.5	12.602	10.109	-3.35	-18.82
2480	30.43	-5.86	-2.81	-4.96	14.26	11.682	-2.81	-17.59
2490	35	-5.63	-2.61	-4.76	14.934	12.404	-2.61	-16.92
2500	34.65	-5.04	-2.08	-4.23	16.962	14.359	-2.08	-16.05

Passive Test For 5Gwifi								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
5000	15.99	-7.96	-4.49	-6.64	7.185	8.801	-4.49	-18.27
5100	21.18	-6.74	-3.56	-5.71	9.408	11.77	-3.56	-21.66
5200	27.69	-5.58	-0.95	-3.1	12.603	15.089	-0.95	-19.51
5300	43.27	-3.64	0.07	-2.08	19.917	23.353	0.07	-15.46
5400	42.77	-3.69	1.59	-0.56	20.171	22.595	1.59	-15.76
5500	37.24	-4.29	0.27	-1.88	19.597	17.64	0.27	-13.22
5600	31.03	-5.08	0.09	-2.06	17.603	13.428	0.09	-14.54
5700	23.63	-6.26	-1.26	-3.41	12.836	10.799	-1.26	-17.58
5800	19.19	-7.17	-2.75	-4.9	10.664	8.525	-2.75	-24.94
5900	12.81	-8.92	-4.05	-6.2	7.066	5.746	-4.05	-20.82
6000	12.66	-8.98	-3.38	-5.53	7.58	5.078	-3.38	-26.16

Passive Test For GPS2								
Freq	Effi	Effi	Gain	Gain	UHIS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
1570	39.75	-4.01	1.58	-0.57	28.491	11.255	1.58	-14.01
1571	39.34	-4.05	1.54	-0.61	28.191	11.144	1.54	-13.86
1572	38.99	-4.09	1.49	-0.66	27.936	11.054	1.49	-14.01
1573	38.54	-4.14	1.44	-0.71	27.625	10.919	1.44	-14.07
1574	38.2	-4.18	1.41	-0.74	27.385	10.815	1.41	-14.12
1575	37.96	-4.21	1.36	-0.79	27.188	10.767	1.36	-14.27
1576	37.5	-4.26	1.36	-0.79	26.872	10.628	1.36	-14.37
1577	37.12	-4.3	1.32	-0.83	26.582	10.538	1.32	-14.39
1578	36.83	-4.34	1.32	-0.83	26.372	10.462	1.32	-14.72
1579	36.61	-4.36	1.32	-0.83	26.224	10.385	1.32	-14.79
1580	36.44	-4.38	1.31	-0.84	26.08	10.357	1.31	-15.02

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WIFI active data

机型编号	信道	b模式（11MHz）		g模式（54MHz）		n模式（MCS7）		a模式（54MHz）	
		TRP	TIS	TRP	TIS	TRP	TIS	TRP	TIS
1	1	13.34	-78.11	12.54	-68.32	13.65	-66.03	NA	NA
	7	13.52	-79.11	12.63	-67.78	12.53	-66.28	NA	NA
	13	14.22	-78.2	12.3	-67.79	12.99	-65.74	NA	NA
	36	NA	NA	NA	NA	12.1	-62.97	12.57	-66.73
	64	NA	NA	NA	NA	12.44	-62.72	13.59	-66.99
	165	NA	NA	NA	NA	10.19	-65.26	10.61	-68.34

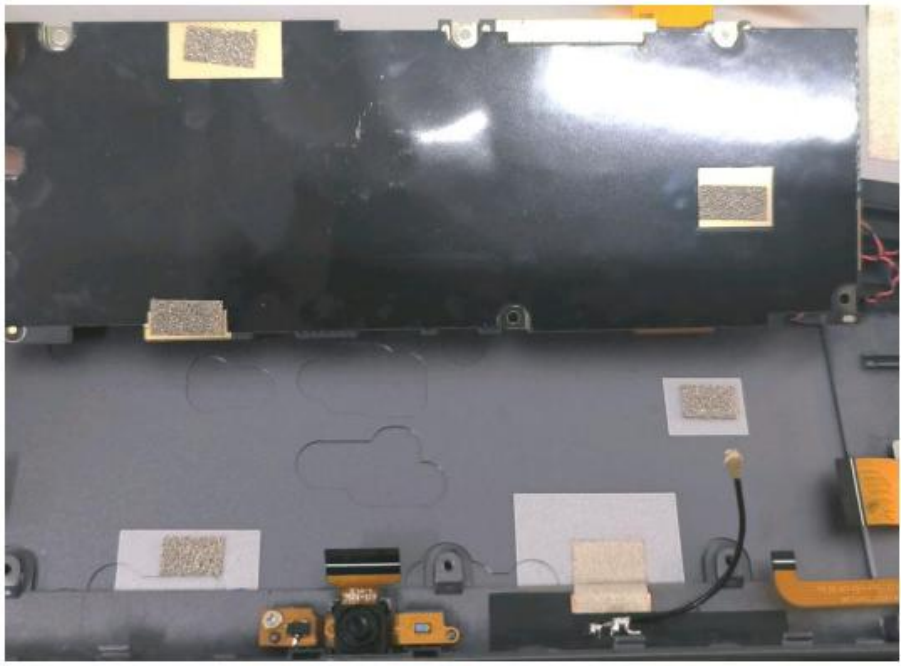
5: Throughput data

WiFi 吞吐量

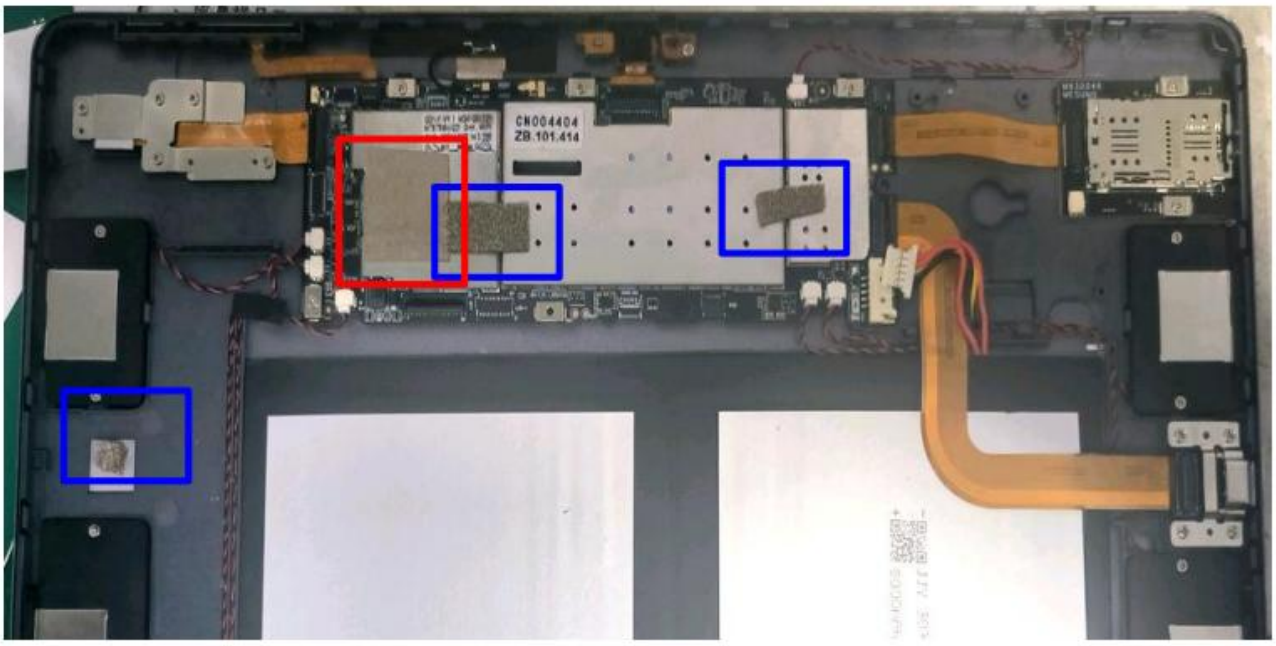
Iperf吞吐量测试						
机型	M30 -英卡G31主板	模块	MT6789V主控	软件版本	Magic_Iperf	
机型编号	频段	距离	测试角度	测试数据（TX） 1min均值	测试数据（RX） 1min均值	备注 （掉包次数）
1	2.4G wifi	2.4GWIFI （研发距离15m）	0°	28.9 Mbps	45.6 Mbps	0
			90°	33.2 Mbps	43.9 Mbps	0
			180°	31.8 Mbps	48.1 Mbps	0
			270°	28.6 Mbps	43.4 Mbps	0
	5FWIFI	5FWIFI （研发距离15m）	0°	157 Mbps	311 Mbps	0
			90°	150 Mbps	333 Mbps	0
			180°	157 Mbps	332 Mbps	0
			270°	169 Mbps	337 Mbps	0

测试数据2.4Gwifi /5G WiFi 上传/下载（对应连接速率为 65 / 390 Mbps）

6: Environmental treatment

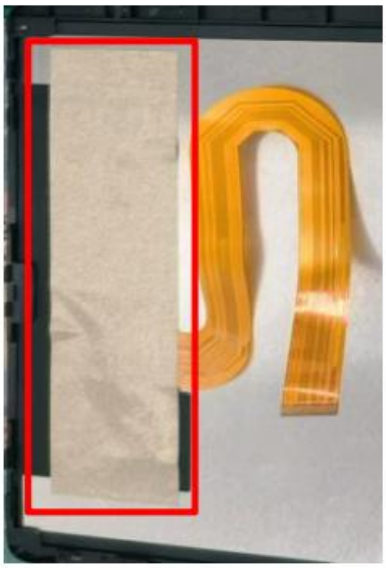


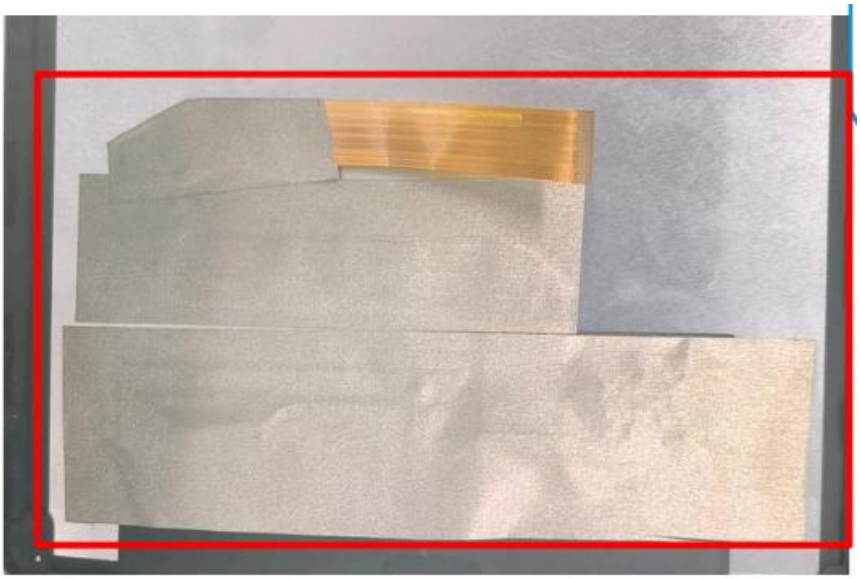
1、主板背面，未更改环境处理。



2、主板正面，红框处屏蔽盖位置贴导电布，使屏蔽盖完全屏蔽（此处对GPS干扰较大）；

3、蓝框处贴导电海绵使主板屏蔽盖（2mm）、金属背壳（5mm左右）等与屏做接地处理。





4、屏排位置，原环境处理（左）增加至现环境处理（右）
屏排线接口及其本体对GPS搜星效果有较强干扰，建议排线做好屏蔽。

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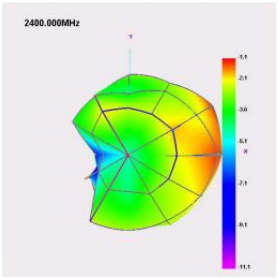
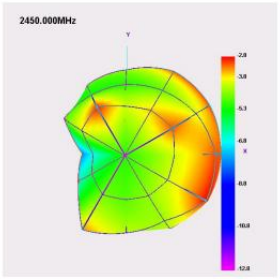
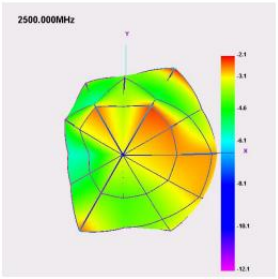
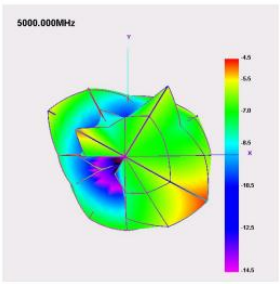
7: antenna measurement diagram

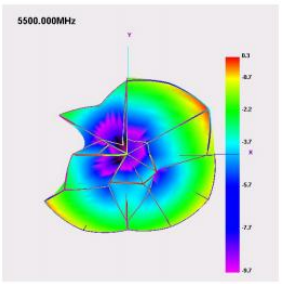
8:3D pattern

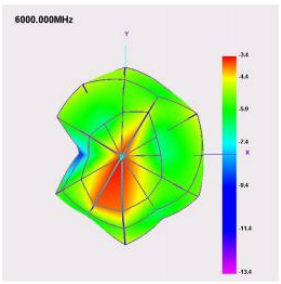


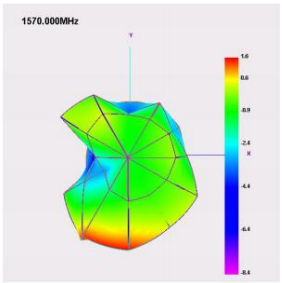


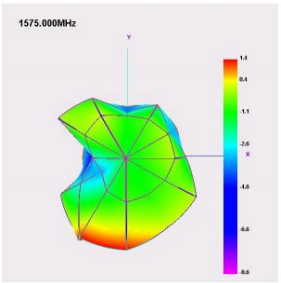


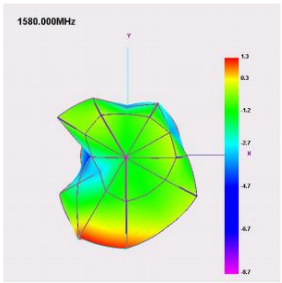












9: Structural drawings

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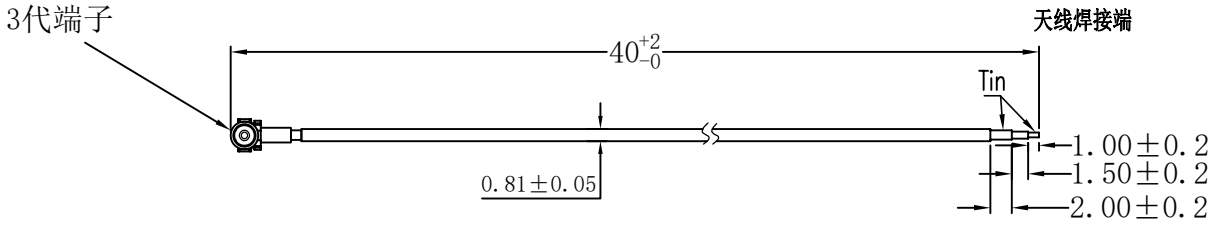

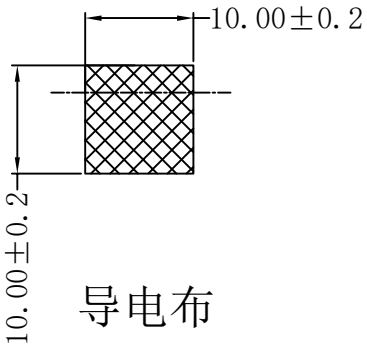

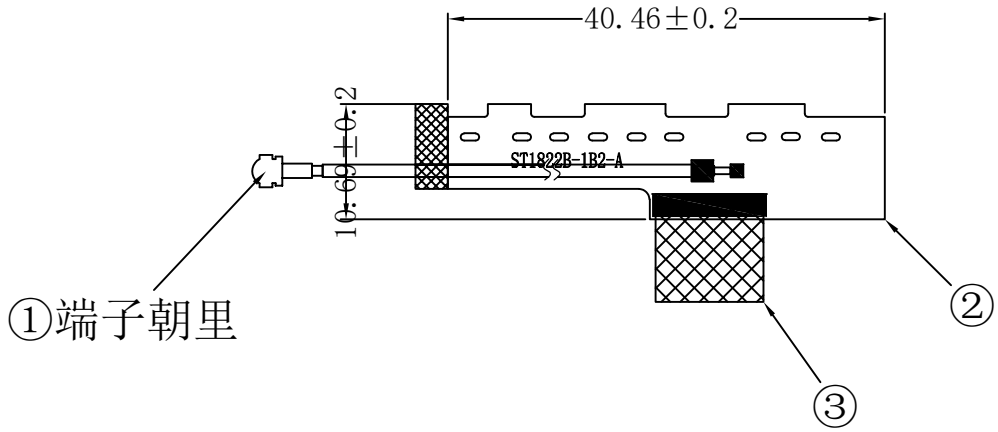

技术要求：

1.打*为重点尺寸；
2.尺寸符合图纸要求；
3.焊点无虚焊、假焊。要求圆润、饱满。
4.网分测试通过（出现指定波形）。
5.线形尺寸未注公差按照SJ/T 10628 1995 6级，公差值由上下偏差均分；

序号	名称	材料	颜色	数量	描述	审核			批准		
5											
4											
3	导电布		灰色	1	10*10mm		签名	年月日	量产	签名	年月日
2	FPC		黑色	1	ST1822B-1B2-A	RD	ZYA	2025.1.7	Q C		
1	同轴线	3代端子	黑色	1	φ=0.81mm	RF					

SWARD

索沃德通讯技术有限公司

ST1822B-1L23B-040-A

阶段标记		比例
1	A	1：1

共1张　第1张

ROHS