

Antenna Specifications

CUSTOMER		英肯	
CS P/N		C5+	
HX P/N		A60-035	
Checked by(RF)	Checked by(ME)	Checked by(QA)	Approval led by
游双林	陈锦元	李永田	陈卫忠
Customer Approval		吴克鹏	

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1. General Description

This document provides the antenna specifications on electric, mechanic and reliability. The testing conditions and related pictures are also included.

1.1 Print Acceptance

Samples and Antenna Specifications are to be sent to customer. When they are approved, the approval form should be completed, signed, and sent back to HX before further mass production batches can be delivered.

1.2 Coordinate System

The coordinate system for the phone is defined as follows:

- Origin in center of gravity.
- Positive X axis is perpendicular to, and directed from, front plane.
- Positive Y axis is perpendicular to, and directed from, right side plane (as seen from front).
- Positive Z axis is perpendicular to, and directed from, top plane.

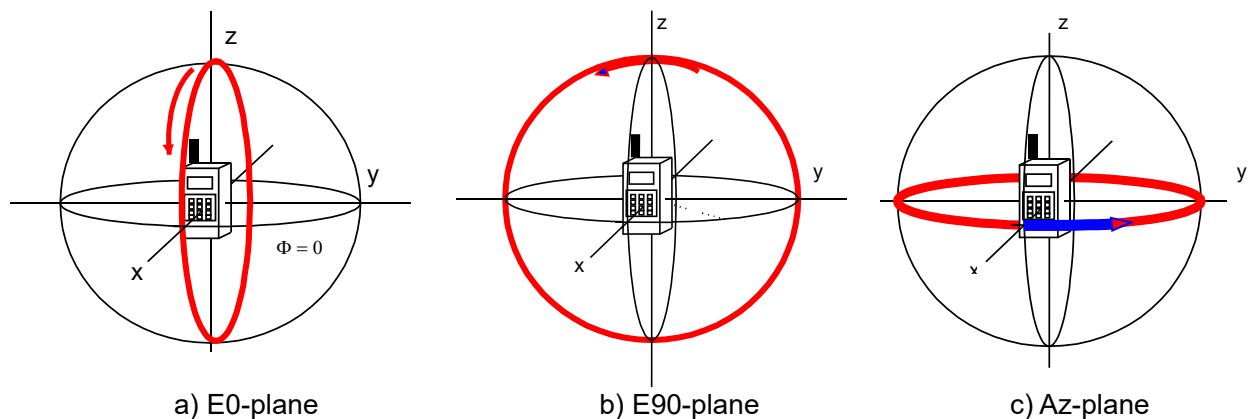


Figure 1-1 The coordinate system for the phone

2. Specifications

This report mainly provides the testing conditions of various electric and structural performance parameters for cell phone antenna ----C5+ Figure 2-1 shows the antenna designed by HX & The fixturing of C5+

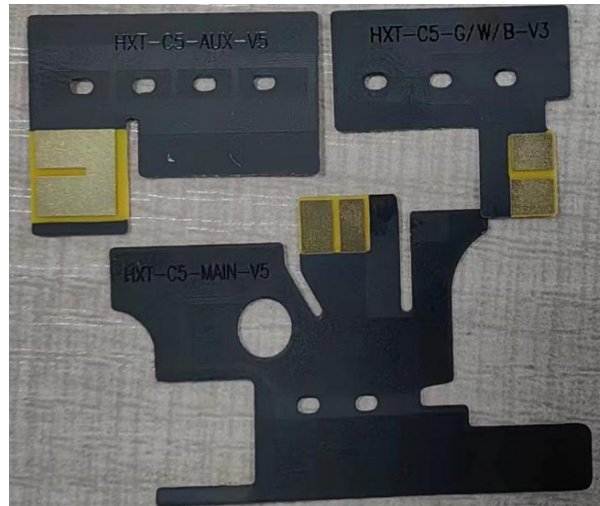


Figure 2-1 The antenna designed by HX & The fixturing of C5+

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2.1 Antenna frequency band and switching logic

网络模式	频段
GSM	B2/3/5/8
WCDMA	B1/2/4/5/8
FDD	B1/2/3/4/5/7/8/12/13/14/17/20/66
TDD	B38/39/40/41
GPS	L1
WIFI	2.4G /5G
BT	2.4G

MAIN antenna	
开关	天线频段
RF1	2G B2/3/8/3G1/2/4/8/4G1/2/3/4/7/8/38/39/40/41
RF2	2G B5 3G B5/4G B5/19/20
RF3	4G B13/14
RF4	4G B12/17

2.2 Impedance

2.2.1 Nominal

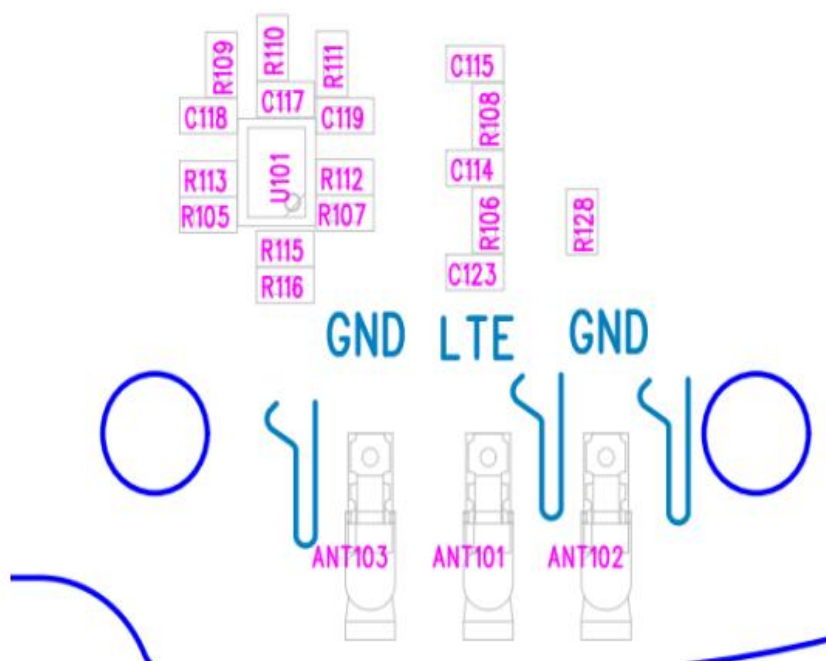
Nominal Impedance(including matching circuit) : 50 ohms

2.2.2 Matching Circuit

Main antenna

主射频匹配	
位号	匹配值更改
C123	1PF
R106	3.9NH
C114	18NH
R108	0Ω
C115	NC
R128	0Ω

开关匹配	
R116	15NH
R115	0Ω
R107	0Ω
R112	5.6NH
R105	10NH
R113	NC



DIV antenna (无改动)

GPS/WIFI (无改动)

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2.3 Passive Measurements

2.3.1 Passive efficiency of antenna

Main antenna

主天线							
(MHz)	Effi (dB)	Effi (dBi)	Effi (%)	(MHz)	Effi (dB)	Effi (dBi)	Effi (%)
680	-8.36	-5.08	14.58	1900	-4.21	0.33	37.9
690	-8.21	-4.84	15.1	1920	-4.14	0.39	38.53
700	-7.64	-4.25	17.21	1940	-3.95	0.77	40.31
710	-7.07	-3.67	19.62	1960	-3.89	0.98	40.79
720	-6.62	-3.16	21.8	1980	-3.87	0.9	41.03
730	-6.78	-3.2	20.99	2000	-3.96	0.59	40.15
740	-7.06	-3.38	19.68	2020	-4.19	0.15	38.13
750	-6.91	-3.13	20.39	2040	-4.37	0.18	36.6
760	-7.06	-3.26	19.69	2060	-4.59	0.2	34.78
770	-7.05	-3.09	19.72	2080	-4.64	0.3	34.38
780	-7.32	-3.26	18.55	2100	-4.59	0.32	34.73
790	-7.66	-3.5	17.15	2120	-4.39	0.52	36.43
800	-8.91	-4.73	12.84	2140	-4.06	1.06	39.3
810	-8.28	-3.94	14.87	2160	-3.82	1.55	41.47
820	-7.86	-3.34	16.38	2180	-3.72	1.77	42.43
830	-7.28	-2.53	18.7	2200	-3.82	1.59	41.48
840	-7.09	-2.16	19.52	2220	-3.73	1.66	42.32
850	-7.07	-1.95	19.64	2240	-3.84	1.55	41.31
860	-7.56	-2.46	17.54	2260	-3.82	1.43	41.49
870	-7.74	-2.75	16.84	2280	-3.88	1.09	40.97
880	-8.05	-3.36	15.66	2300	-3.94	0.69	40.38
880	-6.56	-1.85	22.07	2320	-4.05	0.69	39.33
890	-6.14	-1.47	24.33	2340	-3.93	0.73	40.44
900	-6.2	-1.8	23.98	2360	-3.9	0.27	40.72
910	-6.32	-2.19	23.34	2380	-4.16	0.24	38.37
920	-6.88	-3.13	20.5	2400	-4.24	0.18	37.67
930	-7.26	-3.57	18.79	2420	-4.21	-0.13	37.96
940	-7.59	-3.77	17.43	2440	-4.14	-0.63	38.53
950	-8.27	-4.06	14.88	2460	-4.13	-0.9	38.62
960	-9.07	-4.85	12.38	2480	-3.88	-0.51	40.91
970	-9.76	-5.63	10.57	2500	-3.45	-0.46	45.15
980	-10.81	-6.83	8.3	2520	-3.5	-0.38	44.7
1680	-4.98	-2.16	31.8	2540	-3.47	0.09	44.96
1700	-5.23	-2.57	29.97	2560	-3.57	-0.18	43.94
1720	-5.39	-3.56	28.92	2580	-3.37	0.26	46
1740	-4.76	-2.57	33.38	2600	-3.22	0.47	47.66
1760	-4.68	-1.86	34.02	2620	-3.03	0.68	49.77
1780	-4.78	-1.54	33.3	2640	-3.17	0.36	48.19
1800	-4.66	-1.28	34.2	2660	-3.43	0.31	45.36
1820	-4.63	-0.92	34.44	2680	-3.67	0.25	42.92
1840	-4.58	-0.42	34.81	2690	-3.63	0.36	43.36
1860	-4.35	-0.02	36.77				
1880	-4.43	0.15	36.07				

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三合一天线

(MHz)	Effi (dB)	Effi (dBi)	Effi (%)	(MHz)	Effi (dB)	Effi (dBi)	Effi (%)
1530	-5.83	-2.37	26.1	5200	-4.31	1.63	37.05
1535	-5.66	-2.14	27.15	5220	-4.04	1.87	39.41
1540	-5.52	-1.94	28.08	5240	-4.16	1.89	38.35
1545	-5.36	-1.83	29.11	5260	-4.16	1.96	38.37
1550	-5.27	-1.68	29.7	5280	-3.61	2.5	43.6
1555	-5.1	-1.38	30.89	5300	-3.81	2.01	41.57
1560	-5.09	-1.18	30.94	5320	-3.68	2.16	42.88
1565	-5.05	-1.18	31.25	5340	-3.55	2.23	44.19
1570	-4.97	-1.06	31.85	5360	-3.75	2.2	42.21
1575	-4.9	-0.94	32.39	5380	-3.31	2.41	46.67
1580	-4.91	-0.87	32.28	5400	-3.35	2.33	46.29
1585	-4.89	-0.66	32.46	5420	-3.49	1.92	44.73
1590	-4.87	-0.62	32.58	5440	-3.65	1.63	43.14
1595	-4.74	-0.44	33.58	5460	-3.96	1.13	40.22
1600	-4.73	-0.39	33.63	5480	-4.16	0.47	38.34
1605	-4.65	-0.3	34.29	5500	-3.88	0.1	40.88
1610	-4.6	-0.3	34.65	5520	-4.05	0.42	39.34
1615	-4.66	-0.38	34.22	5540	-4.3	-0.5	37.14
1620	-4.67	-0.42	34.12	5560	-4.58	-0.87	34.87
1625	-4.73	-0.51	33.64	5580	-4.35	-0.89	36.76
1630	-4.85	-0.48	32.71	5600	-4.45	-1.4	35.87
1635	-4.94	-0.61	32.05	5620	-4.43	-0.86	36.06
1640	-5	-0.61	31.61	5640	-4.7	-1.28	33.85
1645	-5.19	-0.7	30.26	5660	-4.81	-1.1	33.01
1650	-5.3	-0.78	29.5	5680	-4.88	-1.63	32.54
2410	-3.42	1.43	45.54	5700	-4.94	-1.23	32.03
2420	-3.24	1.7	47.41	5720	-4.93	-1.23	32.1
2430	-3.19	1.75	47.99	5740	-4.66	-1.1	34.22
2440	-3.13	1.88	48.68	5760	-5.15	-1.63	30.58
2450	-3.15	1.9	48.41	5780	-5.37	-1.99	29.05
2460	-3.18	2.04	48.05	5800	-5.27	-1.43	29.73
2470	-3.26	1.83	47.2	5820	-5.19	-1.08	30.26
2480	-3.34	1.79	46.29	5840	-5.2	-1.48	30.21
2490	-3.21	2.02	47.7	5860	-5.23	-0.91	29.99
2500	-3.22	1.9	47.65	5880	-5.23	-1.66	29.98
2510	-3.27	1.86	47.05	5900	-5.18	-1.44	30.31
2520	-3.54	1.5	44.29				
2530	-3.81	1.32	41.56				
2540	-3.94	1.22	40.39				
2550	-3.87	1.38	41.01				

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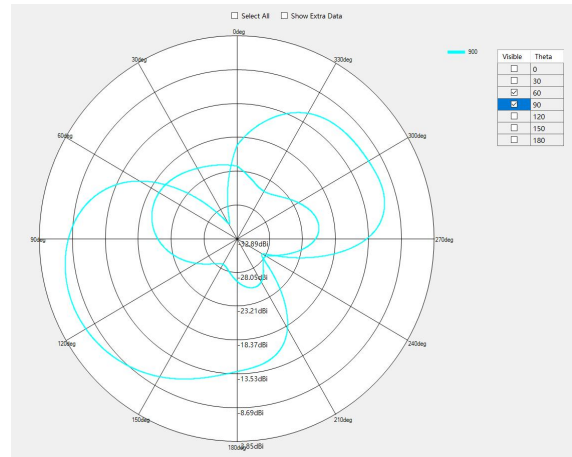
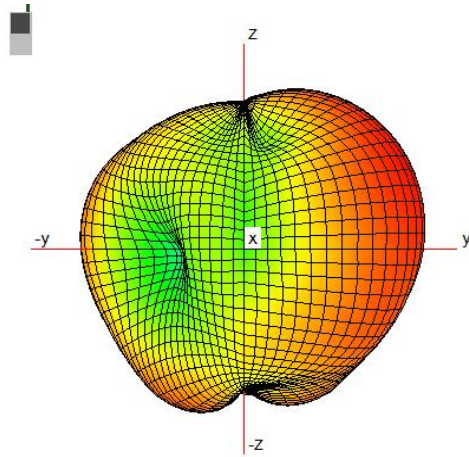
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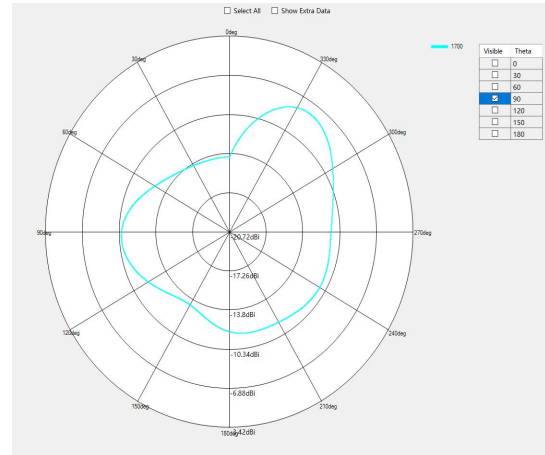
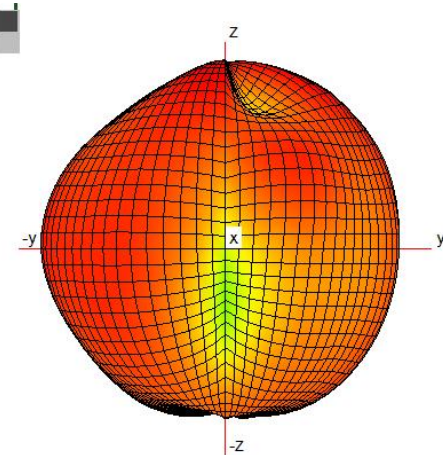
1700	-5.21	-2.26	30.16	2220	-8.54	-4.56	13.98
1720	-5.35	-2.28	29.2	2240	-8.63	-4.63	13.69
1740	-5.22	-1.8	30.07	2260	-8.5	-4.46	14.14
1760	-5.28	-1.63	29.65	2280	-8.29	-4.14	14.84
1780	-5.5	-1.69	28.21	2300	-8.06	-3.83	15.62
1800	-5.67	-2.2	27.11	2320	-8.08	-3.7	15.54
1820	-5.77	-2.44	26.46	2340	-8.02	-3.57	15.79
1840	-5.97	-2.49	25.31	2360	-8.08	-3.58	15.56
1860	-6.2	-2.74	24.01	2380	-8.35	-3.7	14.61
1880	-6.63	-3.01	21.7	2400	-8.34	-3.51	14.67
1900	-6.78	-2.93	21.01	2420	-8.4	-3.62	14.47
1920	-7.03	-3.32	19.82	2440	-8.27	-3.69	14.91
1940	-7.04	-3.1	19.75	2460	-8.13	-3.68	15.39
1960	-7.34	-3.2	18.46	2480	-7.98	-3.81	15.94
1980	-7.47	-3.29	17.91	2500	-7.88	-4.07	16.29
2000	-7.5	-3.62	17.79	2520	-7.88	-4.13	16.31
2020	-7.62	-4.01	17.28	2540	-7.94	-4.24	16.07
2040	-7.73	-4.2	16.88	2560	-8.3	-4.52	14.81
2060	-7.85	-4.23	16.42	2580	-8.26	-4.51	14.92
2080	-8.15	-4.38	15.32	2600	-8.13	-4.11	15.37
2100	-8.58	-4.77	13.88	2620	-8.09	-4.17	15.54
2120	-8.79	-5.35	13.21	2640	-8.25	-4.51	14.95
2140	-8.72	-5.27	13.41	2660	-8.31	-4.45	14.76
2160	-8.56	-4.9	13.93	2680	-8.35	-4.58	14.61
2180	-8.57	-4.62	13.91	2700	-8.32	-4.36	14.74
2200	-8.67	-4.75	13.58				

2.3.2 Antenna passive test radiation pattern Main antenna

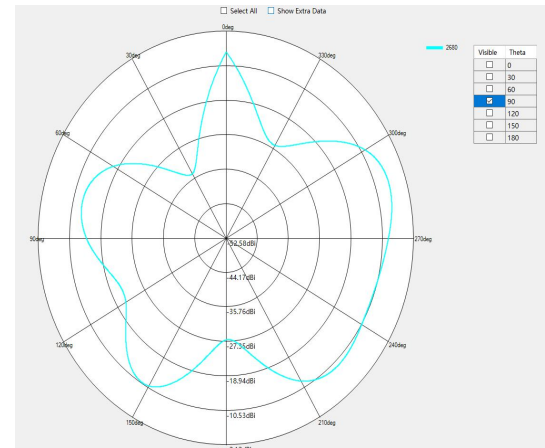
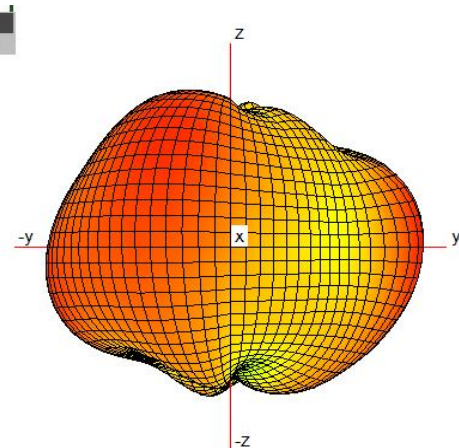
880M



1710M



2700M

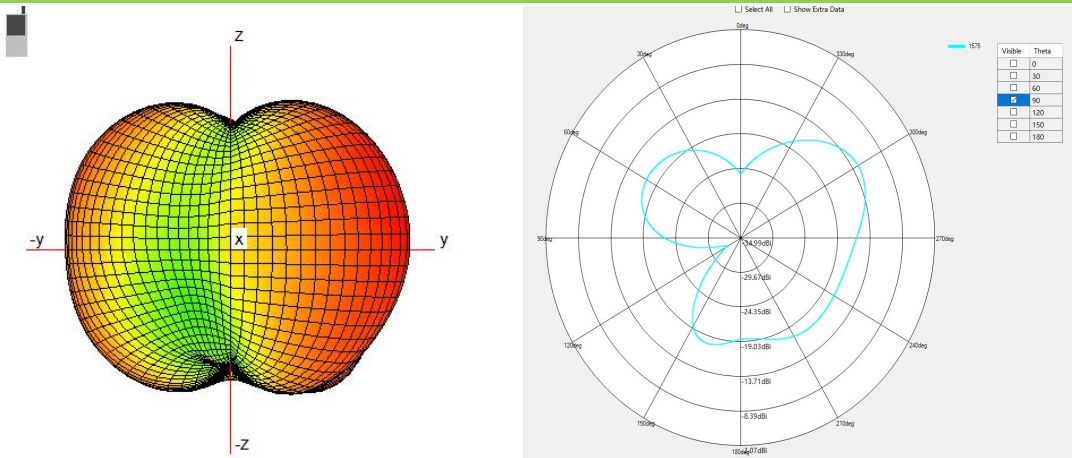


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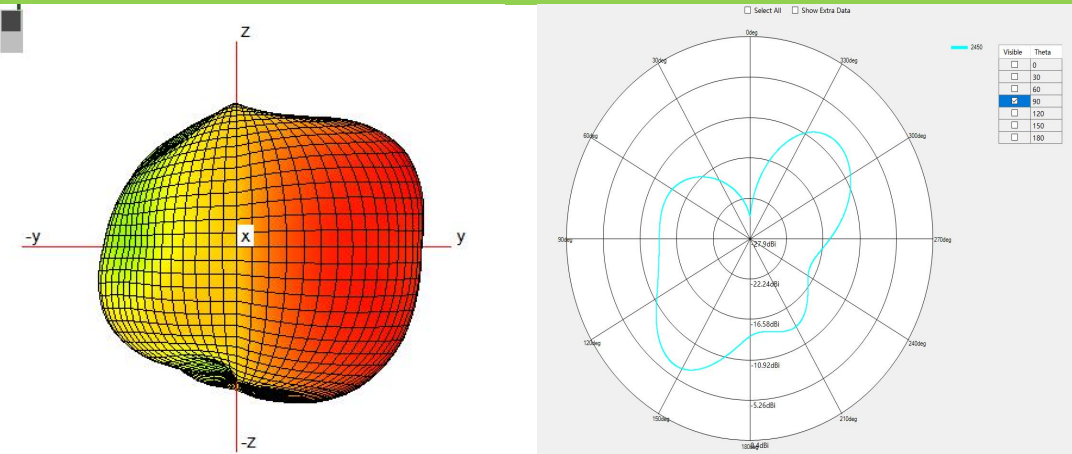
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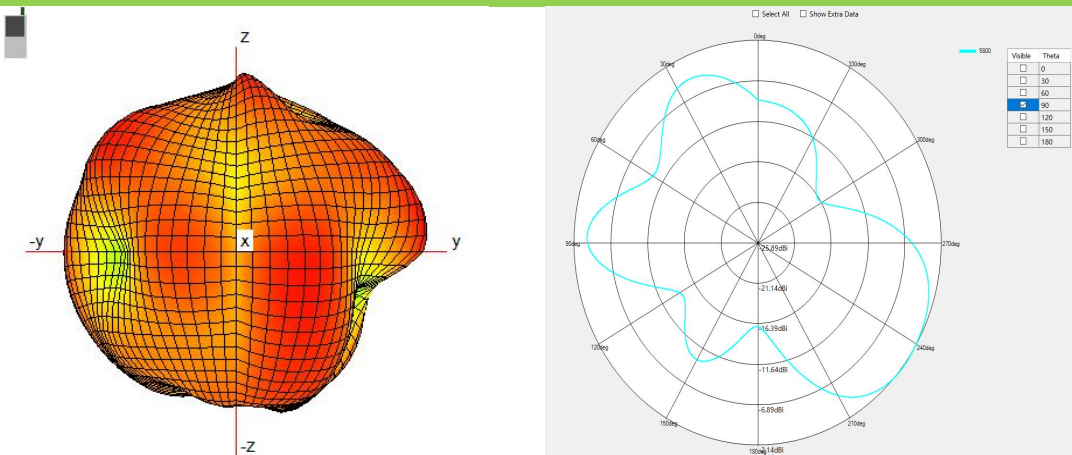
1575M



2450M



5800M



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2.4 Active Measurements

2.4.1 OTA data of LTE antenna

2G	CH	TRP	TIS(天)	4G	CH	TRP	TIS(天)	4G	CH	TRP	TIS(天)
GSM850	128	25.12	-101.69	FDD-B1(10M)	18050	18.53		FDD-B17(10M)	23780	13.71	
	190	25.23			18300	18.59			23790	14.1	
	251	25.34	-101.25		18550	18.58	-95.63		23800	14.21	-86.15
EGSM900	1	26.94	-101.31	FDD-B2(10M)	18650	18.71		FDD-B19(10M)	20050	16.32	
	62	27.29			18900	18.64			24075	16.44	
	124	26.7	-101		19150	18.52	-96.07		24100	16.37	-90.52
DCS1800	512	25.35	-103.72	FDD-B3(10M)	19250	18.89		FDD-B20(10M)	24200	16.4	-89.11
	698	25.49			19900	18.08			24300	16.3	
	885	25.46	-103.23		18550	18.39	-95.39		24400	16.23	
PCS1900	512	25.55	-104.2	FDD-B4(10M)	2000	18.83		FDD-B66(10M)	27260	18.34	
	661	25.16			20175	18.03			27435	18.57	
	810	25.17	-104.96		20350	18.58	-96.03		27610	18.66	-95.22
3G	CH	TRP	TIS(天)	FDD-B5(10M)	20450	16.53		TDD-B38(20M)	37850	18.62	
WCDMA1	9612	18.14		FDD-B7(10M)	20525	16.29		TDD-B39(20M)	38000	18.77	
	9750	18.22			20600	16.92	-90.11		38150	18.81	-90.26
	9888	18.2	-104.23		20800	18.33			38350	18.47	
WCDMA2	9262	18.47		FDD-B8(10M)	21100	18.44		TDD-B40(20M)	38450	18.58	
	9400	18.36			21400	18.63	-95.06		38550	18.97	-90.47
	9538	18.24	-104.36		21500	17.54			38750	18.37	
WCDMA4	1312	18.54		FDD-B12(10M)	21625	17.53		TDD-B41(20M)	39150	18.49	
	1450	18.68			21750	17.02	-88.17		39550	18.52	-90.51
	1513	18.79	-104.47		23060	13.78			40340	18.63	
WCDMA5	4132	15.33		FDD-B13(10M)	23095	14.11			40620	18.79	
	4183	15.26			23130	14.22	-87.2		41140	18.66	-90.66
	4233	15.17	-102.34								
WCDMA8	2712	16.31		FDD-B14(10M)	23230	15.01	-86.97				
	2787	16.44									
	2863	16.47	-101.25		23330	15.23	-88.12				

3. GPS/WiFi measured pictures

序号	测试地点	测试项目	参考标准	样机编号		备注
				1#	2#	
1	空旷场地	开机首次定位时间	≤60S	50	50	搜星星数仅为定位时状态切图，星数随时间拉长而变多
2		冷启动定位时间	≤60S	38	35	
3		热启动定位时间	≤5S	1	1	
4		有效定位后卫星总数	≥8颗	30	27	
5		≥40的星数	≥2颗	2	1	
6		卫星SNR最大值	≥40dB	40.3	42.4	

G:GPS R:GLN B:BD E:GAL Q:QZS L:L1S I:IRNSS S:SBAS

Average CNR ☒ Show in single page

G:32.1/- R:33.3/- B:33.4/-
E:23.7/- Q:32.0/- L:-/- I:-/-
S:32.0/-

ID	CNR	ID	CNR	ID	CNR	ID	CNR
G5	0.0/-	G6	29.8/-	G7	0.0/-	G9	0.0/-
G11	41.2/-	G12	36.9/-	G13	32.1/-	G15	27.9/-
G17	29.2/-	G19	37.3/-	G20	29.0/-	G25	36.5/-
G29	34.1/-	G30	18.9/-	R65	29.5/-	R66	38.4/-
R67	37.9/-	R81	37.6/-	R82	27.4/-	R87	0.0/-
R88	28.8/-	B1	0.0/-	B2	32.8/-	B8	27.1/-
B11	0.0/-	B12	0.0/-	B13	31.0/-	B14	33.9/-
B15	0.0/-	B16	32.2/-	B21	40.9/-	B34	35.6/-
E12	0.0/-	E33	0.0/-	Q2	37.0/-	Q3	32.0/-
Q4	27.0/-	S50	32.0/-				

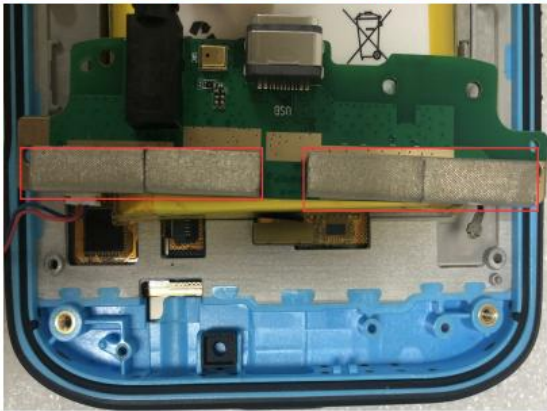
HXT-2.4Gwifi	[(1) {b8:3a:08:54:c4:44=2457,-41,0s};]	
HXT-5Gwifi	[(1) {b8:3a:08:54:c4:54=5240,-52,0s};]	
HUAWEI-91B4VI	[(1) {82:95:de:63:7a:a1=2412,-66,0s}; (1) {82:95:de:63:7a:a5=5220,-77,0s};]	

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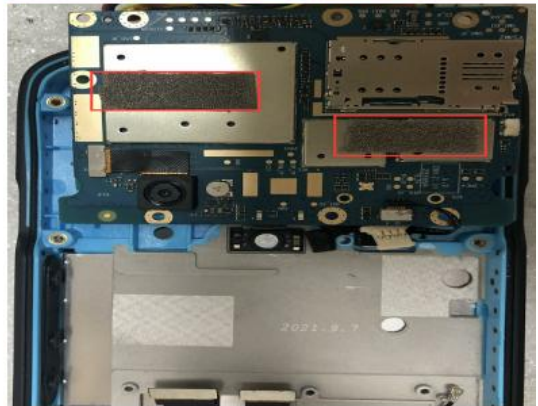
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4. Environmental treatment of the whole machine

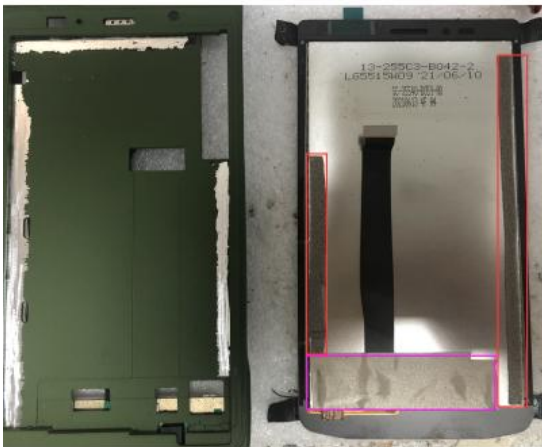
小板贴导电海绵与屏背框金属接地



主板贴导电海绵与中框接地



屏FPC包导电布屏蔽接地，侧面两边贴导电泡棉与中框接地



整机顶部绿色小板贴导电布与主板屏蔽罩接地



5.1 Specifications Drawings

1	2	3	4	5	6	7	8							
NOTE 1. 材质: 各组成部分材质规格如图右侧表格, 总厚度$0.10 \pm 0.02\text{mm}$ (不含离型纸)。 2. 尺寸及公差: 标“*”的为重点尺寸, 铜箔线路所有尺寸公差不得超过± 0.05, 模具冲出的型尺寸公差不得超过± 0.1, 未注尺寸以图形为准。 3. 镀层: 镀层$\leq 1.5\text{um}$ > 镀层$\leq 0.0125\text{um}$。 4. 可靠性测试: 盐雾试验、橡皮摩擦测试、耐酸性测试、恒温恒湿试验、冷热冲击试验。 5. 所用材料满足环保要求。 6. 离型纸增加一个手撕位。														
Rev	1	2	3	4	5	6	7							
Description	新图纸			Date	Remark									
HXT 深圳市恒祥通天线技术有限公司 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"> ϕ 0~10 10~18 18~30 30~40 40~ </td> <td style="width: 10%;"> Third angle ± 0.05 ± 0.06 ± 0.08 ± 0.09 ± 0.10 </td> <td style="width: 10%;"> Third angle $\circ$ $\odot$ $\perp$ ∇ $\pm 0.5^\circ$ </td> <td style="width: 10%;"> Part Name Part No. Material Treatment </td> <td style="width: 10%;"> Project AGU-035-GP GPS+IFI+HBT-IPC 40 黑油 </td> <td style="width: 10%;"> Date Designed by Checked by Approved by </td> <td style="width: 10%;"> Unit Scale FIT Rev A1 </td> </tr> </table>								ϕ 0~10 10~18 18~30 30~40 40~	Third angle ± 0.05 ± 0.06 ± 0.08 ± 0.09 ± 0.10	Third angle $\circ$ $\odot$ $\perp$ ∇ $\pm 0.5^\circ$	Part Name Part No. Material Treatment	Project AGU-035-GP GPS+IFI+HBT-IPC 40 黑油	Date Designed by Checked by Approved by	Unit Scale FIT Rev A1
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Antenna Specifications

SHENZHEN HENGXIANGTONG ANTENNA TECHNOLOGY CO., LTD.

1		2		3		4		5		6		7		8																																																																																																															
A		B		C		D		A		B		C		D																																																																																																															
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6. Environmental Characteristic

Test Item	Test description
1. Low Temperature	Temp.: -20 °C Time: 24 hours
2. High Temperature	Temp.: 80°C Time: 24 hours
3. Salt Fog	5±0.1% Nad salt fog PH Value: 6.5-7.2 Temp: 35±1°C Time:24 hours

7. 工艺流程图

制造流程图

客户:	英肯	制作:	张奎	制作日期:	2023/6/9
料号:	A60-035-C5+	校订:	陈锦元	校订日期:	2023/6/9
零件名称:	FPC 天线	确认:	陈卫忠	确认日期:	2023/6/9

开料 (Cutting) → 贴板 (Flitching) → 磨板 (Plate grinding) → 丝印线路油 (Screen printing line oil) → 低温烘烤 (Low baking) → 蚀刻线路 (Etching circuits) → 丝印阻焊 (Printing Solder-mask) → 高温烘烤 (Highbake) → 丝印字符 (如无字符可以取消) (Silkscreen (such as no characters can be cancelled)) → 烘烤固化 (Baking-curing) → 表面处理 (surface treatment) → 镀金 (Overgild) → 烘干 (Drying) → 贴 3M 胶 (Putting 3M glum) → 过机 (through the machine) → 靶冲 (Target impact) → 外形冲切 (Contour cutting) → 成品检验 (Checking of finished product) → 包装 (Packing) → 入库 (Putting in storage) → 出货 (Shipment)。

8.盐雾测试

盐雾检测报告恒祥通天线技术有限公司
盐雾检测报告

客户名称	英肯			测试数量	5PCS		
型号	A60-035-C5+			测试标准	GB2423. 17		
检验日期	2023. 06. 09			货品素材	FPC		
测试时间： 2023-06-07. 10： 20 2023-06-09 11： 30							
测试项目	要求标准	实际数值	判定	测试项目	要求标准	实际数值	判定
测试仪器规格	KD-60	KD-60	OK	测试时间	48H	48H	OK
盐雾测试类型	NSS 中性	NSS 中性	OK	盐雾箱温度	35° C	35° C	OK
盐水 PH 值	6. 5-7. 2	6. 8	OK	盐雾沉降量（H. 80C）	1-2ml	1. 8ml	OK
喷雾方式	连续喷雾	连续喷雾	OK	货品材质	FPC	FPC	OK
盐水成份	5%/NaCL	5%/NaCL	OK	压缩空气节压力	1±0. 1KG/CM ²	1	OK
饱和温度	47° C	47℃	OK	试样放置角度	90°	90°	OK
测试观察时间	观察现象						
4H	无异常						
12H	无异常						
24H	无异常						
48H	无异常						
判定标准：依国标 5944-86 评级方法判定，9 级以上为合格							
最终判定结果	合格 ✓				不合格		
测试人员	张奎		审核	李永田	审批	陈卫忠	
备注：常用的盐雾试验方法有：NSS 中惦盐雾试验，AASS 乙酸盐雾试验，CASS 铜乙酸加速试验.							

版本：A.0

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 Shenzhen
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9.冷热冲击测试

恒祥通天线技术有限公司
恒温恒湿冷热冲击测试报告

NO. :

客户	英肯	日期	2023. 06. 09	厂内编号	HXT06091
客户料号	A60-035-C5+	数量	5PCS	测试时间	24H
材料规格	18um 电解铜	供应商	恒祥通	参考标准	MIL-STD-202Method017IEC60749-25 JEDEC JESD22-A104-B IEC68-2-1MIL-STD-2168-85

测试目的：检测产品的可靠性及镀层的结合力、镀层抗氧化及抗腐蚀能力。

设备名称：高低温测试箱

实验室环境

温度	22-26℃	相对湿度	65-75%	大气压	1MPa
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测试参数

温度	高温		70℃	低温	负 20℃		温度公差	1℃
时间	恒温	高温	2H	高温升温	10min		备注	1、高温升温是从常温升至设定高温 2、低温降温是指从设定高温降至设定低温
		低温	2H	低温降温	10min			
循环次数	6 次		其它	相对湿度	95%			
外观检验	分层	ACC	氧化	ACC	起泡	ACC	油墨脱落	ACC
测试	抗剥离	≥ 0.8kgf/cm2	点焊	ACC	百格测试	ACC	耐磨实验	ACC

测试记录：

产品编号	产品测试结果	判定
	实验结束后，产品无异常	ACC

测试员：张奎

审核：李永田

批准：陈卫忠

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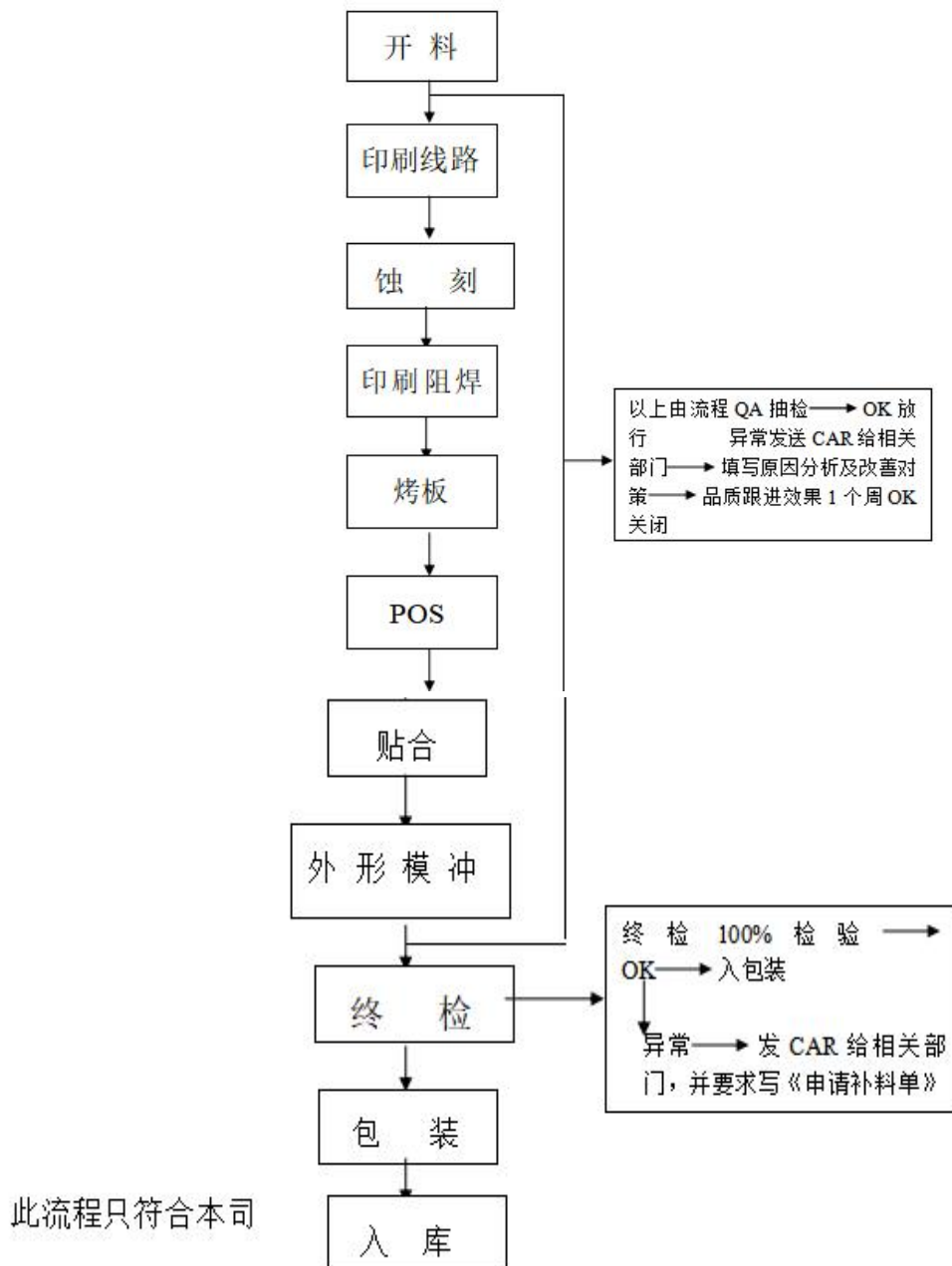
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10.品质流程图

HXT 恒祥通天线技术有限公司

品管控制流程图

求目的：是规范本公司品质管理流程，保证产品符合



11. 包装

Packing			
一般要求： 1.说明客户名，项目名称，型号， 2.图片说明内外箱，出货时包装方式，层数，单层数量等 3.备注栏内填写包装所用材料名称，数量等 4.质里部主管签字，日期			
		料号：	A60-035
		项目名称：	C5+
		产品版本：	V1.0
		包装方式：	PE袋+外箱
		内箱	层 数：整版
		外箱	单层数量：依订单
备注： 包装：PE袋 装箱：外箱			
图3：包装箱		图4：外箱标签	
图5：包装箱的堆放形式。		图6：外包装箱外形	
图7：包装箱正面		图8：包装箱背面及帖标签面的照片	
签名： 日期：			