

Product Number: K212-10045-A

Product Name: FPC Antenna(FPC天线)

Version: A1

# SPECIFICATION FOR APPROVAL

|                                                |                                                    |                 |
|------------------------------------------------|----------------------------------------------------|-----------------|
| CUSTOMER (客户名称)                                | Hunan Ouzhitong Technology Co., Ltd. (湖南欧智通科技有限公司) |                 |
| CS P/N (客户机种)                                  |                                                    |                 |
| PART NAME (品名)                                 | FPC Antenna 40*8MM 2.4~2.5GHz L=260MM IPEX ROHS    |                 |
| FREQUENCY (频率)                                 | 2.4-2.5GHz                                         |                 |
| RTANT NO. (物料编号)                               | K212-10045-A                                       |                 |
| DATE (日期)                                      | 2023.05.08                                         |                 |
| Sample signature (出样签章)                        |                                                    |                 |
| APPROVED BY<br>核准                              | CHECKED BY<br>确认                                   | DRAWN BY<br>制作  |
| DRAGON                                         | LIU                                                | JOHN            |
| Remark (备注):                                   |                                                    |                 |
| The client acknowledges the signature (客户承认签章) |                                                    |                 |
| APPROVED BY<br>核准                              | CHECKED BY<br>确认                                   | TESTED BY<br>检测 |
|                                                |                                                    |                 |
| Sign(客户确认签字盖章): _____                          |                                                    |                 |

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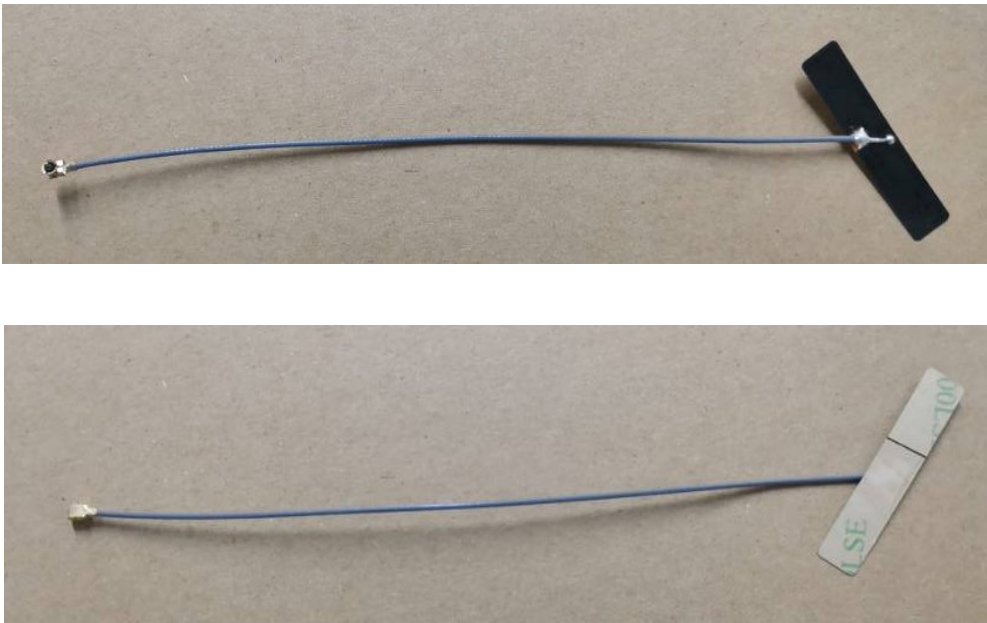
## 1. Contents项目表

| No. | content内容                                         | Pages页数            |
|-----|---------------------------------------------------|--------------------|
| 0   | The cover of the confession(承认书封面)                | 1                  |
| 1   | List of items(项目表)                                | 2                  |
| 2   | Change your resume(变更履历)                          | 2                  |
| 3   | Physical drawing of product(产品实物图)                | 3                  |
| 4   | Specification sheet(规格表)                          | 3                  |
| 5   | Electrical test report(电性测试报告)                    | 4-8                |
| 6   | Performance and reliability testing<br>(特性和可靠性测试) | 9-10               |
| 7   | Sample inspection report(样品检验报告)                  | 11                 |
| 8   | Material proof(材质证明)                              | 12-14              |
| 9   | 2D illustration/packaging(2D图/包装)                 | Appendices<br>(附件) |

## 2. Revision history变更履历

| Revision版本 | Date日期     | Change the content变更内容    |
|------------|------------|---------------------------|
| A0         | 21. 06. 24 | New Edition(新版)           |
| A1         | 21. 07. 23 | Change Line length(变更线长度) |
|            |            |                           |
|            |            |                           |

3. 产品实物图片Product picture

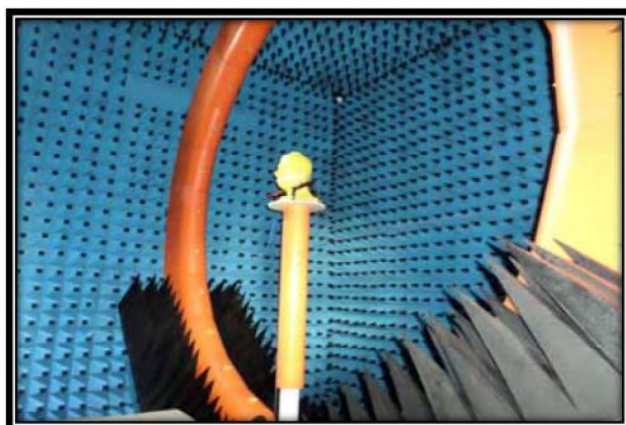


4. 规格表Specification

|                          |                     |
|--------------------------|---------------------|
| A. Electrical Properties |                     |
| Frequency Rang频段范围       | 2.4~2.5GHz          |
| Impedance特性阻抗            | 50Ω Nominal         |
| VSWR电压驻波比                | 2.0Max.             |
| Gain(peak)增益（峰值）         | 4.19dBi             |
| Out of roundness不圆度      | 3.0 dBi (Max. )     |
| Radiation辐射方式            | Omni-Directional/全向 |
| Polarization极化方式         | Linear Vertical/垂直  |
| B. Physical Properties   |                     |
| Connector Type连接方式       | IPEX                |
| Cable线材                  | Φ1.13mm Gray        |
| Antenna Radiator天线振子体    | FPC                 |
| C. Environmental         |                     |
| Storage Temp存储环境范围       | -10℃~+60℃           |
| Operating Temp工作环境       | -40℃~+65℃           |
| Storage humidity存储湿度     | 95%                 |
| Working humidity工作湿度     | 5%~95%              |

## 5. 电性测试报告Electrical Test Report

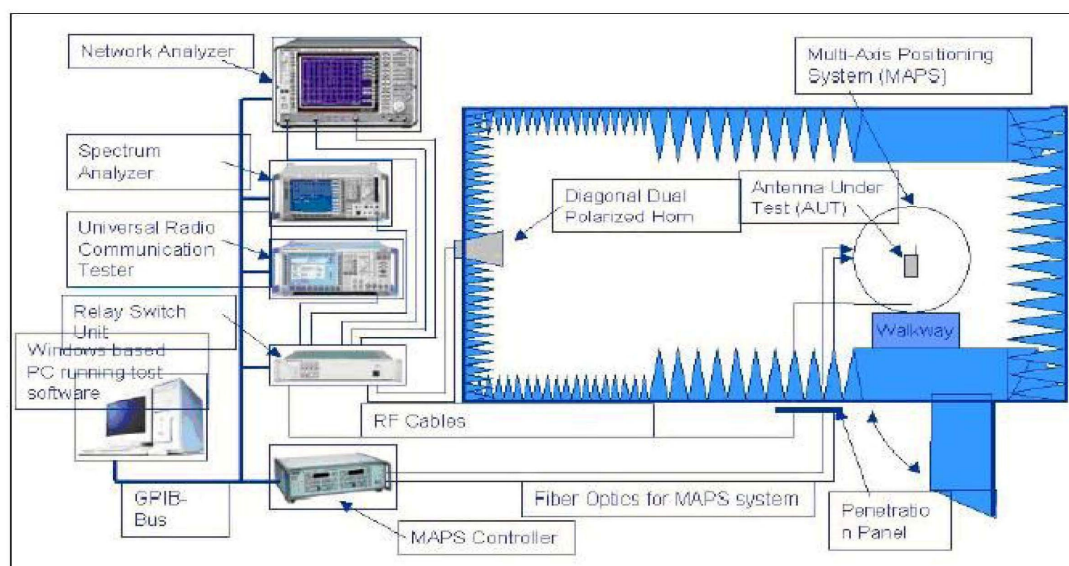
### 5.1 Test equipment



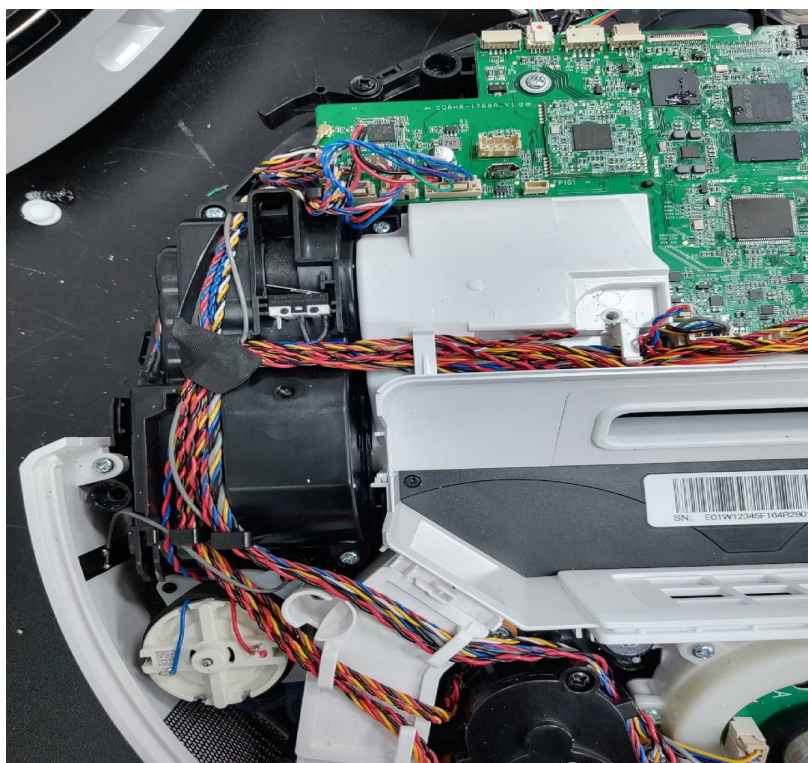
Owned 6 microwave dark room, equipped 2 sets world leading France Satimo SG24 OTA certification test systems (one in SHENZHEN, another one in Shanghai), ETS OTA Standard test system, Blue test reverberation test system which is High repeatability, high accuracy and high resolution. It can quickly provide accurate test reports, fully meet the CITA standards.

Testing range:

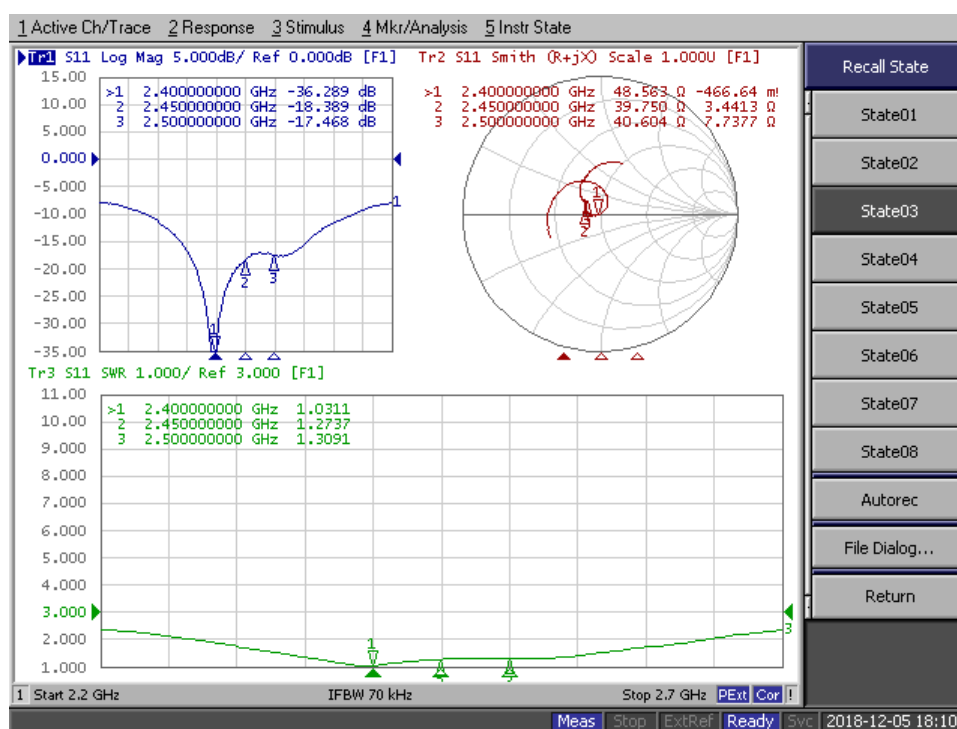
Support active, passive testing of  
GSM/CDMA/WCDMA/TD-  
SCDMA/LTE/WIFI/WLAN/WiMax/BT  
/GPS/MIMO/UWB within 0.4-6G.



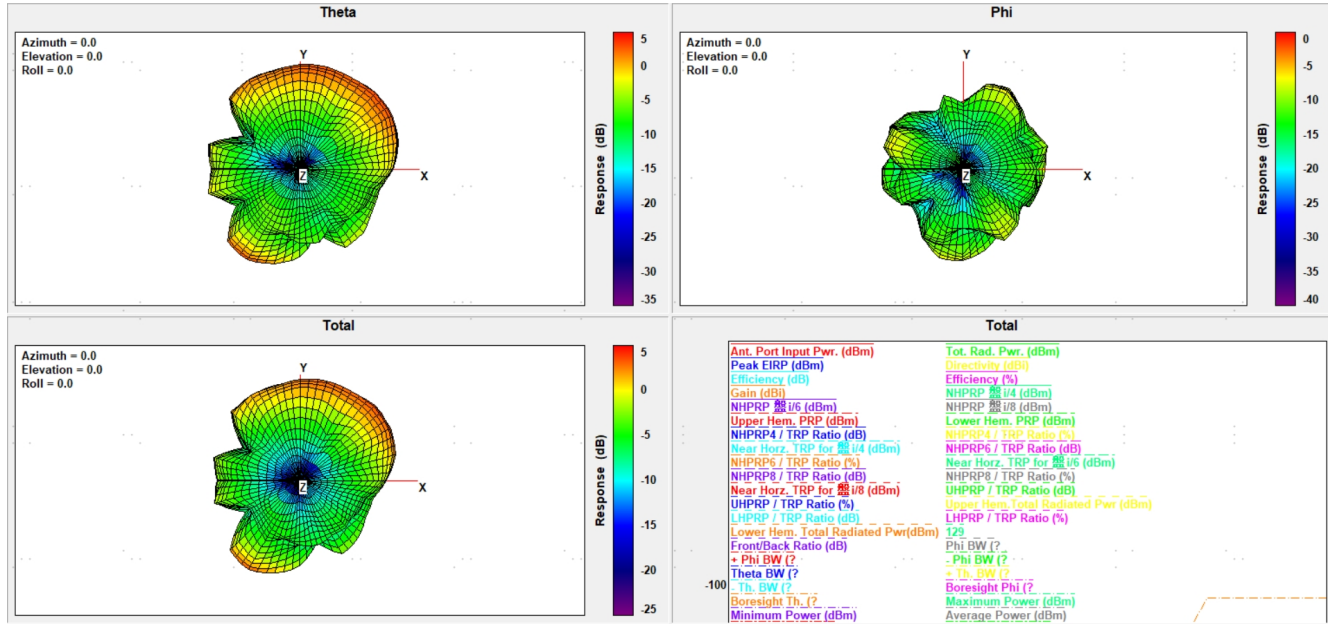
## 5.2 Antenna pasting position ( 天线粘贴位置)



## 5.3 Network Analyzer(网络分析仪测试报告)



## 5.4 暗室2D、3DRaditation Pattern



## 5.5 暗室无源测试数据

| Point Values    | Ant. Port Input Pwr. (dBm) | Tot. Rad. Pwr. (dBm) | Peak EIRP (dBm) | Directivity (dBi) | Efficiency (dB) | Efficiency (%) | Gain (dBi) |
|-----------------|----------------------------|----------------------|-----------------|-------------------|-----------------|----------------|------------|
| Frequency (MHz) |                            |                      |                 |                   |                 |                |            |
| 2400            | 0                          | -1.50258             | 4.18857         | 5.69115           | -1.50258        | 70.7526        | 4.18857    |
| 2410            | 0                          | -1.72039             | 3.80627         | 5.52666           | -1.72039        | 67.2916        | 3.80627    |
| 2420            | 0                          | -1.6786              | 3.90193         | 5.58053           | -1.6786         | 67.9422        | 3.90193    |
| 2430            | 0                          | -1.66624             | 3.84234         | 5.50858           | -1.66624        | 68.1359        | 3.84234    |
| 2440            | 0                          | -1.90198             | 3.54315         | 5.44514           | -1.90198        | 64.536         | 3.54315    |
| 2450            | 0                          | -2.10744             | 3.28292         | 5.39036           | -2.10744        | 61.5539        | 3.28292    |
| 2460            | 0                          | -2.35142             | 3.02708         | 5.3785            | -2.35142        | 58.1912        | 3.02708    |
| 2470            | 0                          | -2.3435              | 2.95611         | 5.2996            | -2.3435         | 58.2975        | 2.95611    |
| 2480            | 0                          | -2.25861             | 3.13789         | 5.3965            | -2.25861        | 59.4482        | 3.13789    |
| 2490            | 0                          | -2.27499             | 3.1874          | 5.46239           | -2.27499        | 59.2244        | 3.1874     |
| 2500            | 0                          | -2.12432             | 3.55704         | 5.68136           | -2.12432        | 61.3152        | 3.55704    |

## 6. 特性和可靠性测试Characteristics and Reliability Test

| Test Items<br>测试项目            | Test Condition and Procedure<br>测试方法                                                                                                                         | Requirements<br>要求                                                                             | Result<br>结果 |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------|
| V. S. W. R.<br>电压驻波比          | Set DUT on Network Analyzer; make individual calibration to test 设置网络分析仪参数进行测试                                                                               | Directive DUT specification<br>符合待测物规范                                                         | PASS         |
| Insertion Loss<br>插入损失        | Set DUT on Network Analyzer; make individual calibration to test 设置网络分析仪参数进行测试                                                                               | Directive DUT specification<br>符合待测物规范                                                         | N/A          |
| Antenna Gain<br>天线增益          | Set DUT on Antenna Chamber; make individual calibration to test 设置天线暗室参数进行测试                                                                                 | Directive DUT specification<br>符合待测物规范                                                         | PASS         |
| Voltage Breakdown<br>耐电压      | Test voltage should be applied between insulated portions, or between ground as specified.<br>在绝缘部分测试电压, 或指定接地面之间                                            | Max Voltage $\geq 500$ V or directive material specification<br>最大电压 $\geq 500$ V 或符合材料规范      | N/A          |
| Insulation Resistance<br>绝缘阻抗 | Set Voltage: $500 \pm 50$ V; between the insulated portions, or between ground as specified.<br>设置电压 $500 \pm 50$ V, 在绝缘部份测试或指定接地面之间                         | Resistance $\geq 500$ M ohm or directive material specification<br>阻抗 $\geq 500$ M ohm 或符合材料规范 | N/A          |
| Contact Resistance<br>接触阻抗    | Air Temp: $26^{\circ}$ C; measured with test equipment<br>室温 $26^{\circ}$ C, 指定量测设备                                                                          | Directive material specification<br>符合材料规范                                                     | N/A          |
| Vibration<br>震动               | GB / T2423.48-2008<br>Amplitude: 0.03 inch (1.5mm);<br>Freq: 20 to 80 to 20 Hz<br>3 directions; 2 hours for each direction<br>振幅1.5mm; 频率20~80~20Hz; 3个方向各2H | 1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$<br>无明显外观不良; 频率偏移 $\leq 5\%$                | PASS         |
| Random Drop<br>跌落             | GB / T2423.8-1995<br>Single: Height: 1.0 Meter; 3 directions; 1 time for each direction<br>单支天线, 高1m; 3个方向各1次                                                | 1. No parts separated, fracture<br>2. Frequency Tol. $\leq 5\%$<br>产品无脱落、断裂; 频率偏移 $\leq 5\%$   | PASS         |
|                               | Packing: Height: 0.76 Meter; 1 corner, 3 edges, 6 surface<br>包装: 高0.76m, 一角、三棱、六面各一次                                                                         |                                                                                                | PASS         |

|                                          |                                                                                                                                                                                                           |                                                                                                                  |      |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------|
|                                          | Antenna+Machine:Height: 0.76 Meter; 1 corner, 3 edges, 6 surface. 整机: 高0.76m, 一角、三棱、六面各一次                                                                                                                 |                                                                                                                  | N/A  |
| Solderability<br>可焊性                     | GB / T2423.28-2005<br>Temp: $260 \pm 5^{\circ}\text{C}$ ; Duration: 5 seconds 温度 $260 \pm 5^{\circ}\text{C}$ ; 持续5秒                                                                                       | Tin evenly on full<br>上锡均匀饱满                                                                                     | N/A  |
| Pull Test<br>拉力                          | Holding with individual specification; force applied to axis of terminal . 单独定义产品端子拉力                                                                                                                     | 1. Directive DUT specification<br>2. Frequency Tol. $\leq 5\%$<br>符合待测物规范; 频率偏移 $\leq 5\%$                       | PASS |
| Torque Test<br>扭力                        | Holding with individual specification; applied clockwise and counterclockwise to the axis of terminal 单独定义产品端子之顺时针及逆时针扭力                                                                                  | 1. Directive DUT specification<br>2. Frequency Tol. $\leq 5\%$<br>符合待测物规范; 频率偏移 $\leq 5\%$                       | N/A  |
| Dimension<br>尺寸                          | Inspection of dimension, color, material, package, surface process. 检查尺寸, 颜色, 材料, 包装, 表面处理                                                                                                                | Directive DUT specification<br>符合待测物规范                                                                           | PASS |
| Waterproof 防水                            | With Reference to IEC 60529 // IP Code Definition<br>参考IEC60529 IP定义                                                                                                                                      | Directive DUT specification<br>符合待测物规范                                                                           | N/A  |
| Salt Spray盐雾                             | GB / T 2423.17-2008<br>Temp: $35^{\circ}\text{C}$ ; RH: $\geq 95\%$ ; NaCl solution: $\geq 5\%$ ; Time: 24H<br>温度 $35^{\circ}\text{C}$ ; 湿度 $\geq 95\%$ ; 盐水浓度 $\geq 5\%$ ; 测试24H                         | 1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$<br>无明显外观不良; 频率偏移 $\leq 5\%$                                  | PASS |
| Temperature and Humidity Chamber<br>恒温恒湿 | GB / T 2423.3-2006<br>Temp: $80^{\circ}\text{C}$ / 12 H; $-40^{\circ}\text{C}$ / 12H<br>RH: $\geq 90\%$ ; Time: 24H<br>温度 $80^{\circ}\text{C}$ 测试12H转 $-40^{\circ}\text{C}$ 测试12H; 湿度 $\geq 90\%$ ; 时间24H | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$<br>恢复2H后, 无明显外观不良; 频率偏移 $\leq 5\%$ | PASS |
| Thermal Shock<br>冷热冲击                    | GB / T 2423.22 - 2008<br>$-40^{\circ}\text{C}$ (30 minutes) to $+80^{\circ}\text{C}$ (30 minutes); Cycles: 24<br>$-40^{\circ}\text{C}$ 测试30分转 $80^{\circ}\text{C}$ 测试30分为一个周期; 共24周期                      | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$<br>恢复2H后, 无明显外观不良; 频率偏移 $\leq 5\%$ | PASS |
| Aging test 老化                            | GB / T 2423.2 - 2008<br>Temp: $80^{\circ}\text{C}$ ; Time: 24 hours<br>温度 $80^{\circ}\text{C}$ , 测试24H                                                                                                    | After 2 Hours Recovery<br>1. No Visual Damage<br>2. Frequency Tol. $\leq 5\%$<br>恢复2H后, 无明显外观不                   | PASS |

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|               |                                                                                                         |                                                      |      |
|---------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------|------|
|               |                                                                                                         | 良;频率偏移 $\leq 5\%$                                    |      |
| High Temp. 高温 | Temp. $270 \pm 10^{\circ} \text{C}$ ; Times: 120 seconds<br>温度 $270 \pm 10^{\circ} \text{C}$ , 测试时间120秒 | No Visual Damage<br>无明显外观不良                          | N/A  |
| RoHS          | With Reference to IEC 62321:2008<br>with flow chart<br>参考IEC 62321测试流程                                  | Directive RoHS<br>2011/65/EU<br>符合RoHS 2011/65/EU标准  | PASS |
| PFOS          | With Reference to USA EPA<br>3550C:1996 by LC/MS<br>参考USA EPA 3550C测试流程                                 | Directive RoHS<br>2006/122/EC<br>符合RoHS 2011/65/EU标准 | PASS |

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## 7. 样品检验报告Sample inspection report

日期: 2021.07.23

| 送检数量    |                 | 5PCS                                                                                              | 合格数量 |      | 5PCS |      |      |      |                                                                    |
|---------|-----------------|---------------------------------------------------------------------------------------------------|------|------|------|------|------|------|--------------------------------------------------------------------|
| 检验项目    |                 | 检验标准及说明                                                                                           | 检验结果 |      |      |      |      | 判定   |                                                                    |
|         |                 |                                                                                                   | No.1 | No.2 | No.3 | No.4 | No.5 |      |                                                                    |
| 外观      | FPC             | 无脏污、无破损, 无刮伤                                                                                      | pass | pass | pass | pass | pass | pass | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         | CABLE           | 对比无色差、无脏污、无破损, 无刮伤                                                                                | pass | pass | pass | pass | pass | pass | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         | IPEX            | 对比无脏污、无破损, 无刮伤                                                                                    | pass | pass | pass | pass | pass | pass | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         | 焊锡              | 饱满, 光滑                                                                                            | pass | pass | pass | pass | pass | pass | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         | 其他              |                                                                                                   |      |      |      |      |      |      | <input type="checkbox"/> OK <input type="checkbox"/> NG            |
| 主要尺寸    | 1               | 260.5mm                                                                                           | 260  | 260  | 260  | 260  | 260  | 260  | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
| 电气及功能测试 | Frequency Range | 2.4~2.5GHz                                                                                        |      |      |      |      |      |      |                                                                    |
|         | VSWR            | <2.0                                                                                              | pass | pass | pass | pass | pass | pass | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
| 机械性能    | Cable与IPEX拉力    | 大于1.5kg                                                                                           | 1.73 | 1.68 | 1.72 | 1.65 | 1.78 | 1.78 | <input checked="" type="checkbox"/> OK <input type="checkbox"/> NG |
|         |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
| 备注      |                 |                                                                                                   |      |      |      |      |      |      |                                                                    |
| 最终判定    |                 | <input checked="" type="checkbox"/> 合格 <input type="checkbox"/> 不合格 <input type="checkbox"/> 条件认可 |      |      |      |      |      |      |                                                                    |

## 8. 零件规格&amp;材质证明Part spec.&amp;Material certificate

## 1. 适用范围:

## Scope

本规格书制定了 50  $\Omega$  FEP 绝缘射频电缆 YD113 系列的结构和电气特性.

This specification covers the construction and the electrical properties of YD113 series of 50  $\Omega$  FEP Insulation Coaxial Cable.

## 2. 结构/Construction:

单位/Unit:mm

| 项目/Item            |                                 | 详细资料/Details                                                                      |
|--------------------|---------------------------------|-----------------------------------------------------------------------------------|
| 导体/Conductor       | 材料/Material                     | 镀锡铜线/Tinned Copper Wire                                                           |
|                    | 构成(根/mm)<br>Composition(No./mm) | 7/0.083                                                                           |
|                    | 标称直径/NOM. O. D                  | 0.24 $\pm$ 0.03                                                                   |
| 绝缘层<br>/Insulation | 材料/Material                     | 聚全氟乙丙烯(自然色)<br>/FEP(Natural)                                                      |
|                    | 标称绝缘厚度/Nom. Thick.<br>(mm)      | 0.23                                                                              |
|                    | 标称外径/NOM. O. D                  | 0.695 $\pm$ 0.03                                                                  |
| 屏蔽层/Shield         | 材料/Material                     | 镀锡铜线/Tinned annealed copper wire                                                  |
|                    | 构成/Composition                  | 0.05 单线编织/Single Braid of 0.05                                                    |
| 护套/Jacket          | 材料/Material                     | 聚全氟乙丙烯/FEP                                                                        |
|                    | 标称护套厚度 / Nom. Thick<br>(mm)     | 0.10                                                                              |
|                    | 标称外径/Nom. O. D (mm)             | 1.13 $\pm$ 0.05                                                                   |
|                    | 颜色/Color                        | 按与客户确认的颜色/According to corresponding have approved by the suppliers and customers |

## 3. 电气特性(20℃时)/Electrical Properties(at 20℃)

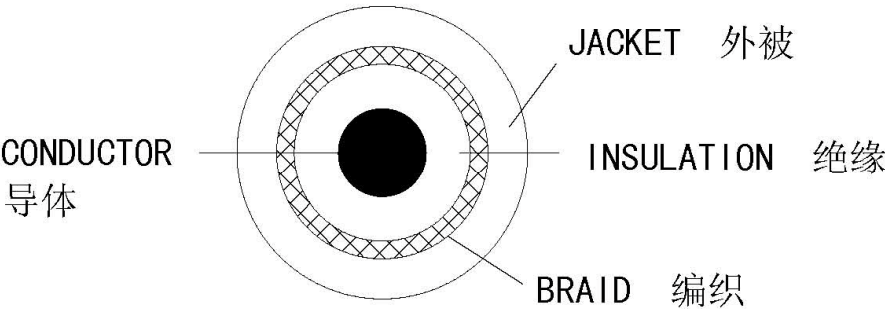
| 项目/Item                        | 单位/Unit         | 详细资料/Details |
|--------------------------------|-----------------|--------------|
| 导体电阻/Conductor Resistance      | $\Omega$ /km    | Max. 560     |
| 绝缘电阻/Insulation Resistance     | M $\Omega$ . km | Min. 200     |
| 耐压强度/Dielectric Strength       | V(AC)/min       | 1000         |
| 静电容/Capacitance                | pF/m            | 98           |
| 特性阻抗 /Characteristic Impedance | $\Omega$        | 50 $\pm$ 2.0 |

|                           |      |        |       |
|---------------------------|------|--------|-------|
| 衰减/Attenuation            | dB/m | 1GHz   | 2. 20 |
|                           |      | 2GHz   | 3. 15 |
|                           |      | 3GHz   | 3. 90 |
|                           |      | 4GHz   | 4. 60 |
|                           |      | 5GHz   | 5. 20 |
|                           |      | 6GHz   | 5. 70 |
| 驻波比/Standing wave(0-6GHz) | /    | ≤1. 35 |       |

4. 包装 Packing

标准单位包装长度为 1000 米/盘, 每盘最多允许 5 个接头, 接头最短长度 20 米, 在搬运过程中不能损坏包装.

Standard unit length of finished cable shall be 1000m on reel, frequency of joint max.5/reel, the mini length is 20m. The finished cable shall be packed not be damaged during transportation



\*\*\*\*\*

本产品有时不适合车载用途的情况也有,所以使用前请先和本公司业务部门进行商谈.

This product is not suitable for automobile application in some cases.Please contact with our sales department before you use this product.

\*\*\*\*\*

