

# FPC 天线样品承认书

## The Main FPC Touch & Antenna Sample Confirmation

|                            |                                                   |       |                     |           |
|----------------------------|---------------------------------------------------|-------|---------------------|-----------|
| 客户名称<br>Customer           | 深圳市科奈信科技有限公司/ShenZhen Cannice Technology Co.,Ltd. |       |                     |           |
|                            |                                                   |       |                     |           |
| 项目名称<br>Project Name       | A1528-L                                           |       | 日期                  | 2025-5-09 |
|                            |                                                   |       | Date                |           |
| 物料编号<br>Project NO.        | SN1320                                            | 备注    | FPC 天线/FPC antenna  |           |
|                            |                                                   | Notes |                     |           |
| 客户料号                       |                                                   |       |                     |           |
| 频段<br>Frequency Range      | BT                                                |       |                     |           |
| 设计<br>Designed By          | RF Engineer                                       |       | Structural Engineer |           |
|                            |                                                   |       |                     |           |
| 审核<br>Checked By           | Engineering Manager                               |       |                     |           |
|                            |                                                   |       |                     |           |
| 客户确认<br>Client' s Approval |                                                   |       |                     |           |

设计单位: 司南微电子(深圳)有限公司

Designer: SINAWELL Electronics(Shenzhen) Co., Ltd.

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1. 规格书概述/Overview of the Specification

该规格书描述 A1528-L 内置式 FPC 天线的状况，其频段为 BT。

This specification describes the condition of the A1528-L built-in FPC antenna, whose frequency band is BT

2. FPC 天线外观/Appearance of FPC antenna



3. 电性能/Electrical performance

3.1. 天线频段/Antenna Frequency band

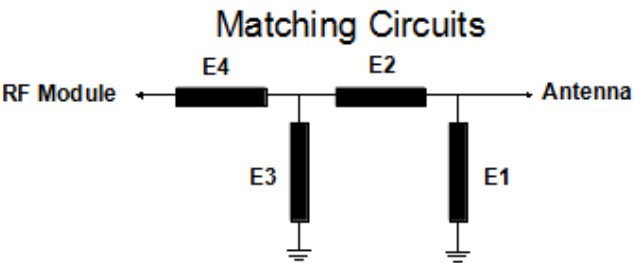
|           | BT              |
|-----------|-----------------|
| 发射频段(MHz) | 2400MHz-2500MHz |

3.2. 匹配电路/Matching Circuit

测试点在天线连接器(射频测试口)后，见下图 (The test point is behind the antenna connector (RF test port), as shown in the following figure)

1. BT 天线匹配。 / BT antenna matching.

| Element | Value |
|---------|-------|
| E1      | NC    |
| E2      | 0 欧姆  |
| E3      | NC    |
| E4      | 0 欧姆  |



### 3.3. 回波损耗/Return loss

BT VSWR+ Return

|  | 谐振点范围(MHz) | 频点(MHz)/最大回波损耗(dB) |         |         |
|--|------------|--------------------|---------|---------|
|  | 2400-2500  |                    | 2400    | 2500    |
|  |            | VSWR               | 1.71    | 1.9     |
|  |            | Return loss        | -11.634 | -10.163 |

### 3.4. 天线增益/Antenna gain

| Frequency    | 2430     | 2450    | 2480     |
|--------------|----------|---------|----------|
| Gain         | -2.37dBi | -2.9dBi | -2.88dBi |
| Gain diagram |          |         |          |

| Passive Test For |          |           |            |            |         |         |          |          |             |             |
|------------------|----------|-----------|------------|------------|---------|---------|----------|----------|-------------|-------------|
| Freq (MHz)       | Effi (%) | Effi (dB) | Gain (dBi) | Gain (dBd) | UHS (%) | DHS (%) | Max (dB) | Min (dB) | Attenut Hor | Attenut Ver |
| 2400             | 28.53    | -5.45     | -2.86      | -5.01      | 14.131  | 14.396  | -2.86    | -18.1    | 46.5        | 45.85       |
| 2410             | 32.02    | -4.95     | -2.82      | -4.55      | 15.584  | 16.439  | -2.4     | -18.33   | 46.61       | 46.05       |
| 2420             | 33.84    | -4.71     | -2.51      | -4.21      | 16.207  | 17.638  | -2.06    | -18.29   | 46.59       | 46.17       |
| 2430             | 35.59    | -4.49     | -2.37      | -3.84      | 16.869  | 18.716  | -1.69    | -18.4    | 46.77       | 46.14       |
| 2440             | 32.38    | -4.9      | -2.79      | -4.19      | 15.406  | 16.971  | -2.04    | -18.82   | 46.79       | 45.97       |
| 2450             | 29.78    | -5.26     | -2.9       | -4.61      | 14.233  | 15.55   | -2.46    | -18.23   | 46.58       | 45.82       |
| 2460             | 28.78    | -5.41     | -2.42      | -4.57      | 13.807  | 14.975  | -2.42    | -16.83   | 46.74       | 45.97       |
| 2470             | 26.9     | -5.7      | -3.01      | -4.67      | 12.649  | 14.254  | -2.52    | -15.27   | 46.54       | 45.98       |
| 2480             | 27.98    | -5.53     | -2.88      | -4.09      | 12.812  | 15.171  | -1.94    | -15.04   | 46.48       | 46.46       |
| 2490             | 23.64    | -6.26     | -3.25      | -4.48      | 10.444  | 13.194  | -2.33    | -15.41   | 46.53       | 46.76       |
| 2500             | 22.2     | -6.54     | -3.47      | -4.4       | 9.427   | 12.774  | -2.25    | -15.09   | 46.77       | 46.39       |

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#### 4. 外观结构/Appearance structure

##### 4.1. FPC 天线材质/FPC antenna material FPC

#### 5. 备注/Remarks

(电性能测试报告)/(Electrical Performance Test Report)

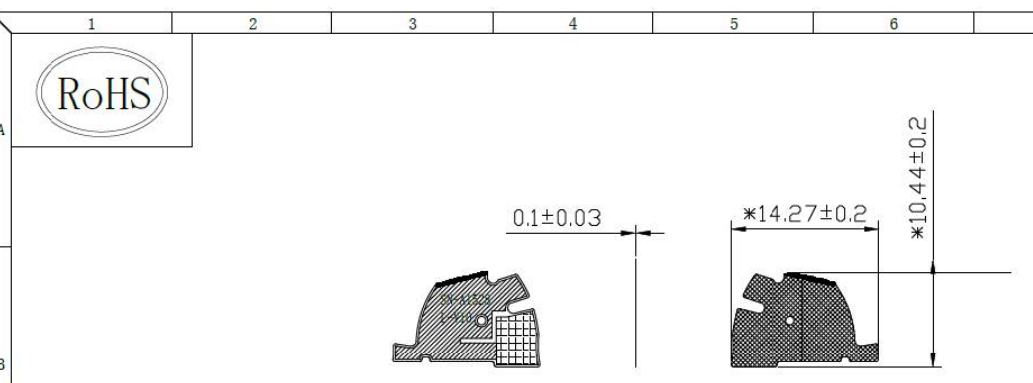
电性能测试报告中，为厂家提供的 3D 暗室数据， /In the electrical performance test report, the 3D anechoic chamber data provided for the manufacturer

如下表格格式/The following table format

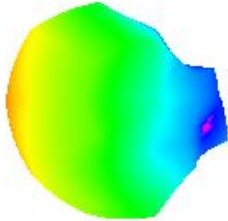
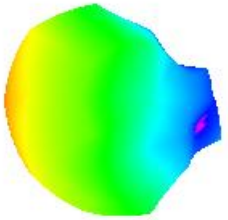
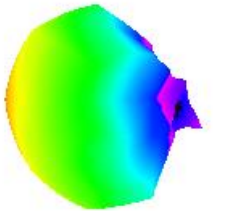
附录一：结构图纸/Appendix 1: Structural Drawings

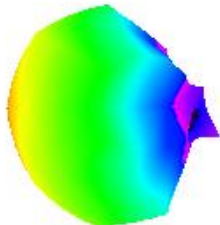
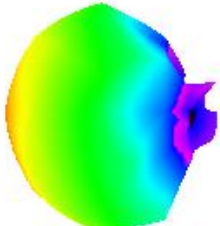
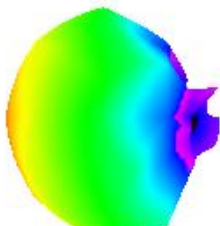
附录二(电性能测试报告)/Appendix II (Electrical Performance Test Report)

## FPC 结构图纸/FPC structural drawing

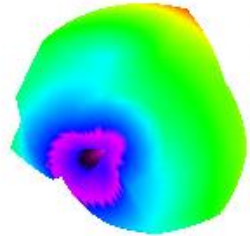
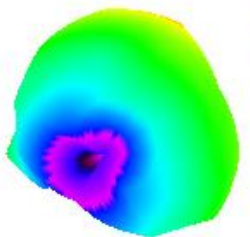
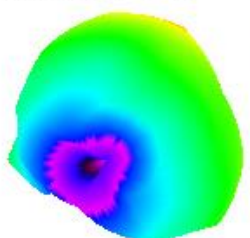
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| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3          | 4   | 5              | 6          | 7   | 8        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |     |                |            |     | A        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     | B        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>注:</p> <ol style="list-style-type: none"> <li>1. "*"为重点尺寸；</li> <li>2. 未标注尺寸请依图纸；</li> <li>3. 符合ROHS2.0、REACH、无卤素等环保要求。</li> <li>4. 金手指镀金厚度1u"。</li> <li>5. 剥离度测试方法<br/>用2kg辊轮以300mm/min速度来回碾压3次，静止放置20min后做90°剥离测试。<br/>判定标准：剥离强度规格值≥800gf则OK，&lt;800gf则NG。</li> <li>6. 盐雾测试条件<br/>①. 温度：35℃；②. 湿度：98%，PH值：6.5-7.2；③. 箱内温度：37℃；<br/>④. 试验持续时间：48小时；⑤. 药水浓度：5%NaCl。<br/>判定标准：产品表面不能有点蚀，裂纹，气泡等明显不良。</li> <li>7. 高低温测试条件<br/>低温实验:温度-30℃，48小时，判定标准：材料无形变、起皱、性能不良；<br/>高温实验:温度85℃，湿度85%，48小时，判定标准：材料无形变、起皱、性能不良</li> </ol> |            |     |                |            |     | C        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     | D        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>1</td> <td>蓝牙天线</td> <td>PI 电解铜 半对半</td> <td>黑色</td> <td colspan="4">金手指电金 背胶3M9471</td> </tr> <tr> <td>No.</td> <td>零件名称</td> <td>材 质</td> <td>颜 色</td> <td colspan="4">备 注</td> </tr> </table>                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  | 1     | 蓝牙天线           | PI 电解铜 半对半 | 黑色 | 金手指电金 背胶3M9471 |            |  |  | No.     | 零件名称 | 材 质 | 颜 色 | 备 注 |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 蓝牙天线                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | PI 电解铜 半对半 | 黑色  | 金手指电金 背胶3M9471 |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 零件名称                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 材 质        | 颜 色 | 备 注            |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="8" style="text-align: center;">  司 南 微 电 子 ( 深 圳 ) 有 限 公 司<br/>SINAWELL Electronics (Shenzhen) Co., LTD                 </td> </tr> <tr> <td style="width: 15%;">项 目 名</td> <td colspan="3">A1528 (SN1320)</td> <td style="width: 15%;">日 期</td> <td colspan="3">2025-02-11</td> </tr> <tr> <td>产 品 名 称</td> <td colspan="3">蓝牙天线</td> <td>结 构</td> <td colspan="3"></td> </tr> <tr> <td>料 号</td> <td colspan="3">SN1320-BT-L</td> <td>射 频</td> <td colspan="3"></td> </tr> <tr> <td>材 质</td> <td colspan="3"></td> <td>项 目</td> <td colspan="3"></td> </tr> <tr> <td colspan="4"></td> <td>单 位</td> <td>mm</td> <td>比 例</td> <td>1:1 版本 A</td> </tr> </table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |  司 南 微 电 子 ( 深 圳 ) 有 限 公 司<br>SINAWELL Electronics (Shenzhen) Co., LTD |  |  |  |  |  |  |  | 项 目 名 | A1528 (SN1320) |            |    | 日 期            | 2025-02-11 |  |  | 产 品 名 称 | 蓝牙天线 |     |     | 结 构 |  |  |  | 料 号 | SN1320-BT-L |   |   | 射 频 |   |   |   | 材 质 |  |  |  | 项 目 |  |  |  |  |  |  |  | 单 位 | mm | 比 例 | 1:1 版本 A |
|  司 南 微 电 子 ( 深 圳 ) 有 限 公 司<br>SINAWELL Electronics (Shenzhen) Co., LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 项 目 名                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A1528 (SN1320)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |     | 日 期            | 2025-02-11 |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 产 品 名 称                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 蓝牙天线                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |     | 结 构            |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 料 号                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SN1320-BT-L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |     | 射 频            |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 材 质                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     | 项 目            |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     | 单 位            | mm         | 比 例 | 1:1 版本 A |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> </tr> <tr> <td>A</td> <td colspan="6">New drawing</td> <td></td> </tr> <tr> <td>版本</td> <td>修改内容</td> <td>日期</td> <td colspan="5">备注</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> </table>                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  | A     | New drawing    |            |    |                |            |  |  | 版本      | 修改内容 | 日期  | 备注  |     |  |  |  | 1   | 2           | 3 | 4 | 5   | 6 | 7 | 8 |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | New drawing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |     |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 版本                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 修改内容                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 日期         | 备注  |                |            |     |          |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3          | 4   | 5              | 6          | 7   | 8        |                                                                                                                                                           |  |  |  |  |  |  |  |       |                |            |    |                |            |  |  |         |      |     |     |     |  |  |  |     |             |   |   |     |   |   |   |     |  |  |  |     |  |  |  |  |  |  |  |     |    |     |          |

3D 测试报告

| BT  | Channel | 3D 耦合测试 | 场强图                                                                                                               |
|-----|---------|---------|-------------------------------------------------------------------------------------------------------------------|
| TRP | 0       | 2.31    | <div>Bluetooth 0 TRP</div>     |
| TIS | 0       | -86.33  | <div>Bluetooth 0 TIS</div>   |
| TRP | 39      | 2.67    | <div>Bluetooth 39 TRP</div>  |

|     |    |        |                                                                                                                   |
|-----|----|--------|-------------------------------------------------------------------------------------------------------------------|
| TIS | 39 | -87.35 | <div>Bluetooth 39 TIS</div>    |
| TRP | 78 | 2.77   | <div>Bluetooth 78 TRP</div>   |
| TIS | 78 | -86.61 | <div>Bluetooth 78 TIS</div>  |

| BT  | Channel | 3D 耦合测试 | 场强图                     |
|-----|---------|---------|-------------------------|
| TRP | 0       | -1.2    | <p>Bluetooth 0 TRP</p>  |
| TIS | 0       | -81.32  | <p>Bluetooth 0 TIS</p>  |
| TRP | 39      | -0.55   | <p>Bluetooth 39 TRP</p> |

|     |    |        |                                                                                                                                                                                               |
|-----|----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TIS | 39 | -82.23 | <p><b>Bluetooth 39 TIS</b></p>  <p>-89.3<br/>-87.3<br/>-84.2<br/>-81.2<br/>-77.2<br/>-73.1<br/>-69.1</p>   |
| TRP | 78 | -0.46  | <p><b>Bluetooth 78 TRP</b></p>  <p>6.0<br/>3.8<br/>0.5<br/>-2.8<br/>-7.2<br/>-11.6<br/>-16.1</p>          |
| TIS | 78 | -82.08 | <p><b>Bluetooth 78 TIS</b></p>  <p>-89.6<br/>-87.4<br/>-84.0<br/>-80.7<br/>-76.3<br/>-71.9<br/>-67.5</p> |