



# 承 认 书

## SPECIFICATION FOR APPROVAL

|                                |                                                                         |                       |                        |
|--------------------------------|-------------------------------------------------------------------------|-----------------------|------------------------|
| 客户名称<br>Customer Name          | 熵基                                                                      |                       |                        |
| 客户项目名 Customer<br>Project Name | TC2                                                                     | 盛邦尔料号<br>Surbaner P/N | 3160-180-00954         |
| 客户编码<br>Customer P/N           | /                                                                       | 工作频段<br>Working Band  | 2400-2500/5150-5850MHz |
| 产品描述<br>Product description    | TC2:FPC, 一对半, PI, 电解铜35.72*17.43*0.32mm, 黑油, 白色丝印, 1.13黑色线带一代端子, L=95mm |                       |                        |
| 版本号<br>Version                 | V02                                                                     |                       |                        |
| 设计人信息/Designer Information     |                                                                         |                       |                        |
| 射频工程师<br>RF Engineer           | 张国勤                                                                     | 研发主管<br>R&D Diretor   | 朱浩奎                    |
| 结构工程师<br>ME Engineer           | 张宇龙                                                                     |                       |                        |

| 盛邦尔审批/Surbaner Approval |                   |                  |                   | 客户批准/Customer Approval |                   |
|-------------------------|-------------------|------------------|-------------------|------------------------|-------------------|
|                         | 制作<br>Prepared By | 审核<br>Checked By | 批准<br>Approval By | 审核<br>Checked By       | 批准<br>Approval By |
| 签章<br>Signature         | 王海华林              | 张国勤              | 朱浩奎               |                        |                   |
| 日期<br>Date              | 2024.08.23        | 8/23             | 8/23              |                        |                   |

| 修订履历/Change Log |                            |                         |                   |            |
|-----------------|----------------------------|-------------------------|-------------------|------------|
| 版本<br>Version   | 修订内容<br>Change Description | 责任人<br>Person in Charge | 核准<br>Approval By | 日期<br>Date |
| V02             | 更新了线长和 FPC                 | 张宇龙                     | 朱浩奎               | 2024.08.23 |
|                 |                            |                         |                   |            |

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## 二. Technical Parameter /技术参数

| 1. Antenna/天线                         |                                |                        |
|---------------------------------------|--------------------------------|------------------------|
| No/序号                                 | Part Name/项目                   | SPEC/规格                |
| 1                                     | Frequency Range/<br>频率范围       | 2400-2500/5150-5850MHz |
| 2                                     | Impedence/阻抗                   | 50 ohm nominal         |
| 3                                     | Gain/增益                        | $\geq 1.5\text{dBi}$   |
| 4                                     | Polarization/极化                | LINE                   |
| 5                                     | VSWR/驻波比                       | $< 2.5$                |
| 6                                     | Efficiency/效率                  | $\geq 40\%$ AVG        |
| 7                                     | RF Cable/射频连接线                 | 1.13 黑色线 95mm          |
| 8                                     | RF Connector/连接器               | 1 代端子                  |
| 2. Environmental Characteristics/环境特性 |                                |                        |
| No/序号                                 | Part Name/项目                   | SPEC/规格                |
| 1                                     | Operation Humidity<br>/工作湿度    | 5~95%不冷凝               |
| 2                                     | Operating Temperature/<br>工作温度 | -20~+60°C              |
| 3                                     | Store Temperatuer/工作<br>储存温度   | -30~+70°C              |
| 4                                     | Salt Spray Test/<br>盐雾试验       | 24H                    |

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# 射频性能测量报告

## RF Performance Test Report

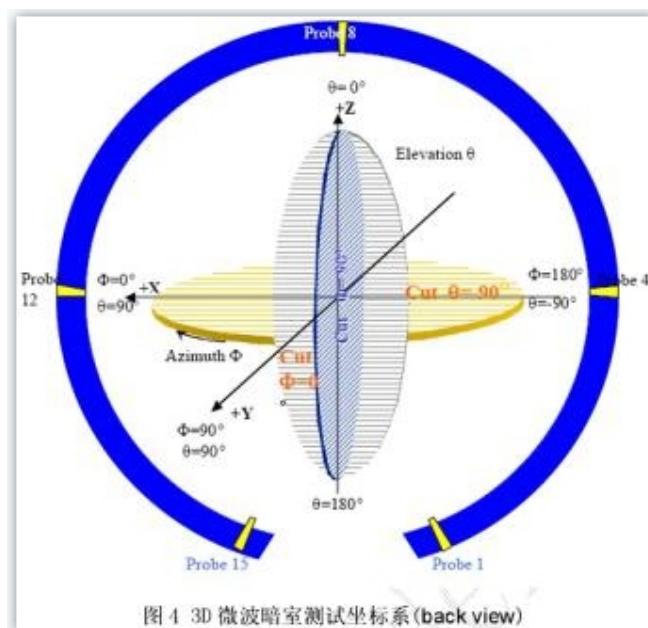
|                       |                              |                      |            |                       |                |
|-----------------------|------------------------------|----------------------|------------|-----------------------|----------------|
| 客户名称<br>Customer Name | 熵基                           | 项目名称<br>Project Name | TC2        | 盛邦尔料号<br>Surbaner P/N | 3160-180-00954 |
| 频段<br>Band            | 2400-2500MHz<br>5150-5850MHz | 测试日期<br>Test Date    | 2024/04/12 | 测试人<br>Inspector      | 张国勤            |

### 天线测试设备简介

#### Antenna Test Equipment Introduction

测试天线输入特性使用 Agilent E5071C and Agilent 5062A 矢量网络分析仪；辐射特性利用 Satimo 三维近场暗室进行测试，并分别使用 8960 E5515 和 Agilent E4438C 进行了分析。暗房的测试坐标如下：

Test of antenna input characteristics using Agilent E5071C and Agilent 5062A vector network analyzer; The radiation pattern of the antenna are tested using the Satimo starlab 3D near field Anechoic Chamber, and the instrument is used to agilent8960 E5515 and Agilent E4438C. The test coordinates of the darkroom are as follows:



### 1. S11 参数测量/S11 Parameter-VSWR

使用一根 50Ω 同轴电缆连接到天线，然后该电缆连接到网络分析仪测量 S11 参数，被测量产品远离金属至少 20 厘米。

Measuring Method is a 50Ω coaxial cable is connected to the antenna. Then this cable is connected to a network analyzer to measure the S11 parameter, Keeping this fixture away from metal at least 20cm.

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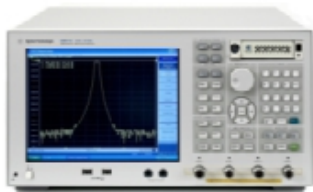
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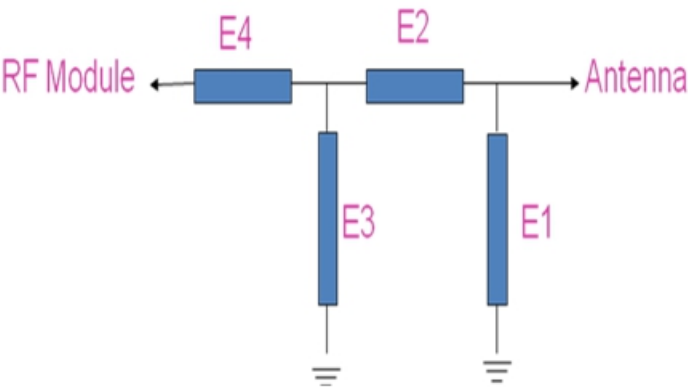
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### Test System

| Sequence Number   | Test Item         | equipment                                                       |
|-------------------|-------------------|-----------------------------------------------------------------|
| S parameter       | VSWR              | Agilent 5071C & Agilent 5062A                                   |
| OTA Test          | TRP&TIS           | Agilent 8960 E5515C& Agilent 4438C&CMW500 &CMW270<br>ETS&SATIMO |
| Gain & Efficiency | Gain & Efficiency | ETS&SATIMO<br>Agilent 5071C                                     |



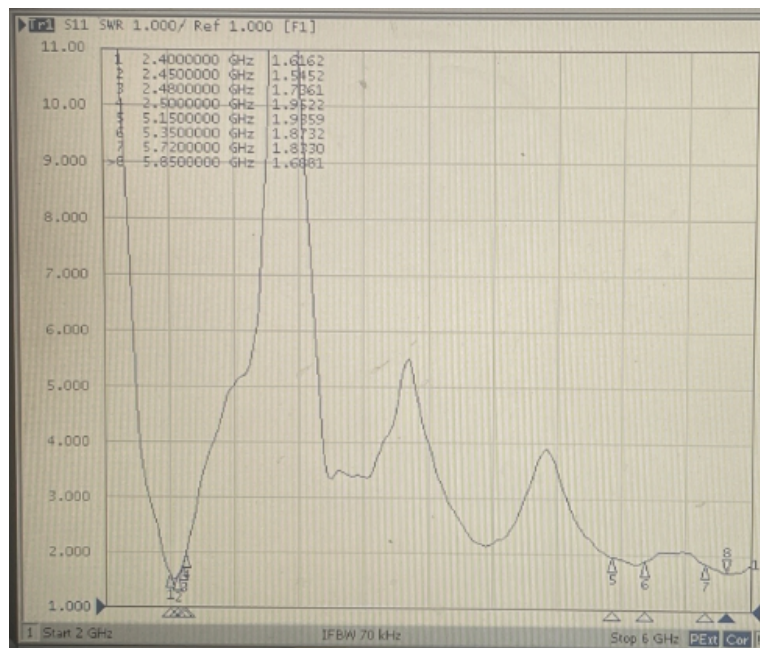
### 2.Antenna MatchingNetwork



| Element | Capacitor | Inductor |
|---------|-----------|----------|
| E1      | N/A       | N/A      |
| E2      | N/A       | N/A      |
| E3      | N/A       | N/A      |
| E4      | N/A       | N/A      |

PCB 板端原始匹配未改动

## S11 Parameter-S11-2.4+5.8G



| Frequency(MHz) | 2400 | 2450 | 2500 | 5150 | 5720 | 5850 |
|----------------|------|------|------|------|------|------|
| VSWR           | 1.61 | 1.54 | 1.73 | 1.93 | 1.83 | 1.68 |

## Gain & Efficiency-2.4+5.8G

| Frequency (MHz) | Efficiency (%) | Peak GAIN (dBi) |
|-----------------|----------------|-----------------|
| 2400            | 42.24          | 2.15            |
| 2450            | 43.51          | 2.21            |
| 2500            | 42.13          | 2.03            |
| 5150            | 45.72          | 2.77            |
| 5720            | 44.45          | 2.63            |
| 5850            | 44.66          | 2.59            |

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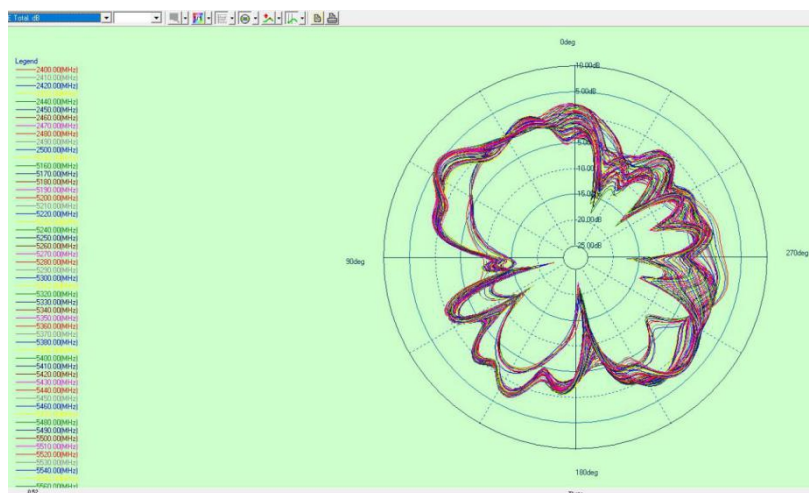
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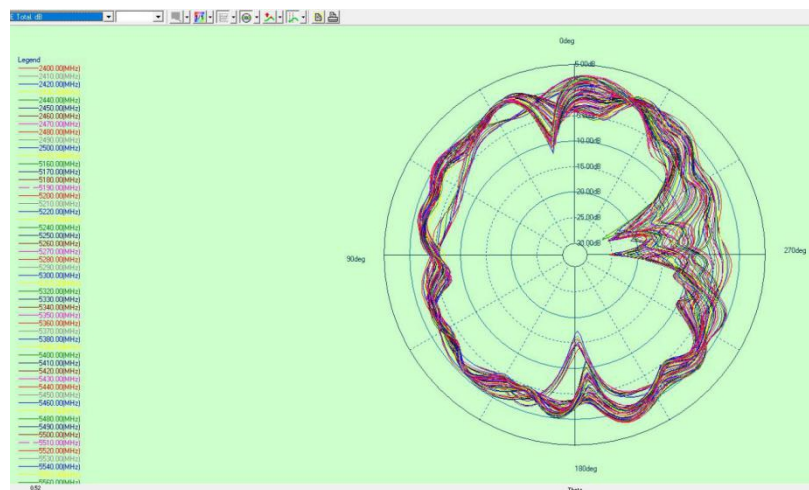
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## 2D Pattern-2.4+5.8G

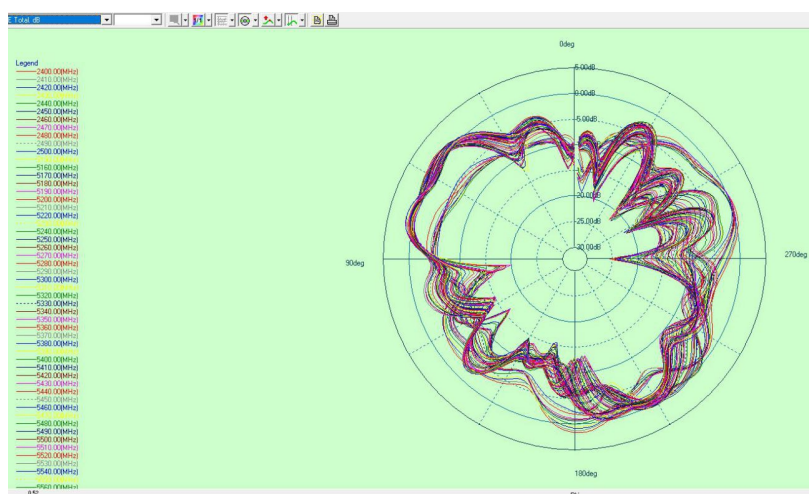
Phi =0



Phi =90



Theta =90



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## OTA

|                 |                   |         |          |          |
|-----------------|-------------------|---------|----------|----------|
| Test Equipment: | R&S CMW500        |         |          |          |
| Test Condition: | 3D chamber        |         |          |          |
| Band            | Wireless Protocol | Channel | TRP(dBm) | TIS(dBm) |
| WIFI            | 802.11 b/11Mbps   | 1       | 20.22    | -79.85   |
|                 |                   | 6       | 19.54    | -78.75   |
|                 |                   | 11      | 19.46    | -72.54   |
| WIFI            | 802.11 g/54Mbps   | 1       | 16.48    | -69.91   |
|                 |                   | 6       | 14.02    | -69.32   |
|                 |                   | 11      | 15.14    | -65.56   |
| WIFI            | 802.11 n/65Mbps   | 1       | 15.40    | -66.41   |
|                 |                   | 6       | 11.20    | -65.17   |
|                 |                   | 11      | 13.70    | -65.11   |
| WIFI            | 802.11 a/54Mbps   | 36      | 11.64    | -71.69   |
|                 |                   | 100     | 11.91    | -72.42   |
|                 |                   | 165     | 8.20     | -68.97   |

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## 产品包装规范

### PACKING CRITERION

| 产品包装规范                                                                                                                                                       |       | page: 1 of 1 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------|
| 项目名称:                                                                                                                                                        | 版本: A |              |
| 客户:                                                                                                                                                          | 成品名称: |              |
| <p>一: 成品天线</p> <p>二: 每PE袋装50PCS产品(以实际包装为准)。</p> <p>三: 每10袋装一大袋, (以实际包装为准)。</p> <p>四: 装箱, 每10袋装一箱, 一箱共5000PCS产品(以实际包装为准)。</p> <p>五: 封箱, 外箱贴我司生产标签和ROHS标签。</p> |       |              |

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样品尺寸测量报告

Sample Dimensions Test Report

|                            |                |                      |                          |                       |                |
|----------------------------|----------------|----------------------|--------------------------|-----------------------|----------------|
| 客户名称<br>Customer Name      | 熵基             | 客户料号<br>Customer P/N | /                        | 盛邦尔料号<br>Surbaner P/N | 3160-180-00954 |
| 测试日期<br>Test Date          | 2024/08/23     | 样品数量<br>Sample Qty.  | 3                        | 测试人<br>Inspector      | 曾心荣            |
| 尺寸编号<br>Dimension No.      | 标准<br>Standard | 样品 1<br>Sample 1     | 样品 2<br>Sample 2         | 样品 3<br>Sample 3      | Pass/NG        |
| ① 尺寸 1                     | 35.72±0.2mm    | 35.80                | 35.72                    | 35.68                 | Pass           |
| ② 尺寸 2                     | 17.43±0.2mm    | 17.51                | 17.45                    | 17.38                 | Pass           |
| ③ 尺寸 3                     | 95±3mm         | 96                   | 95                       | 94                    | Pass           |
| ④                          |                |                      |                          |                       |                |
| ⑤                          |                |                      |                          |                       |                |
| ⑥                          |                |                      |                          |                       |                |
| ⑦                          |                |                      |                          |                       |                |
|                            |                |                      |                          |                       |                |
| 最终结论<br>Conclusion         |                |                      |                          |                       | PASS           |
| 测试人&日期<br>Inspector & Date | 曾心荣 2024/08/23 |                      | 批准&日期<br>Approval & Date |                       |                |



## 可靠性测试报告

Reliability Test Report

|                            |                                                                                                                           |                           |                          |                       |                  |               |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|-----------------------|------------------|---------------|
| 客户名称<br>Customer Name      | 熵基                                                                                                                        | 客户料号<br>Customer P/N      | /                        | 盛邦尔料号<br>Surbaner P/N | 3160-180-00954   |               |
| 测试日期<br>Test Date          | 2024/08/23                                                                                                                | 样品数量<br>Sample Qty.       | 3                        | 测试人<br>Inspector      | 何春辉              |               |
| 测试项目<br>Test Item          | 要求<br>Requirement                                                                                                         | 试验设备<br>testing equipment | 样品 1<br>Sample 1         | 样品 2<br>Sample 2      | 样品 3<br>Sample 3 | 判定<br>PASS/NG |
| 高温存储                       | 在+70℃条件下暴露 24H, 恢复 2H 后进行测试电气性能正常                                                                                         | 恒温恒湿箱                     | OK                       | OK                    | OK               | Pass          |
| 低温存储                       | 在-30℃条件下暴露 24H, 恢复 2H 后进行测试电气性能正常                                                                                         | 恒温恒湿箱                     | OK                       | OK                    | OK               | Pass          |
| 高温工作                       | 在+60℃条件下通电工作 24H 电气性能正常                                                                                                   | 恒温恒湿箱                     | OK                       | OK                    | OK               | Pass          |
| 低温工作                       | 在-20℃条件下通电工作 24H 电气性能正常                                                                                                   | 恒温恒湿箱                     | OK                       | OK                    | OK               | Pass          |
| 端子盐雾试验                     | (5 ± 0. 5)%氯化钠、pH 值为 6. 5~7. 2, 实验箱温度 (35 ± 2) °C<br><input checked="" type="checkbox"/> 24H <input type="checkbox"/> 48H | 盐雾试验机                     | OK                       | OK                    | OK               | Pass          |
| 端子铆压拉力                     | 1. 13 线径 ≥10N                                                                                                             | 推拉力计                      | ≥10N                     | ≥10N                  | ≥10N             | Pass          |
| 最终结论<br>Conclusion         |                                                                                                                           |                           |                          |                       |                  | Pass          |
| 测试人&日期<br>Inspector & Date | 何春辉    2024/08/23                                                                                                         |                           | 批准&日期<br>Approval & Date |                       |                  |               |

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