

# Shenzhen Kaipushen Communication Technology Co., Ltd

## Acknowledgment

|  |                                       |                  |  |
|--|---------------------------------------|------------------|--|
| CustomerName:                          | Kailai                                |                  |  |
| Product Name:                          | EPA-399B BTAerial (Antenna+touch)     |                  |  |
| Specifications:                        | black/Adhesive backing<br>-ROHS/REACH |                  |  |
| Productnumber:                         |                                       |                  |  |
| Customer code:                         | 23-0011930-0                          |                  |  |
| Complies with environmental standards: | <b>ROHS</b>                           |                  |  |
| <b>supplier</b>                        |                                       | <b>Customer</b>  |  |
| Creation Date                          |                                       | Creation Date    |  |
| Approved Date                          |                                       | Approved Date    |  |
| Date of approval                       |                                       | Date of approval |  |

**Manufacturer:** Shenzhen Kaipushen Communication Technology Co., Ltd  
**Supplier address:** 2nd Floor, Building 1, Yulong Building, Longcheng Industrial Zone, No.440, Longguan Avenue, Longhua District, Shenzhen

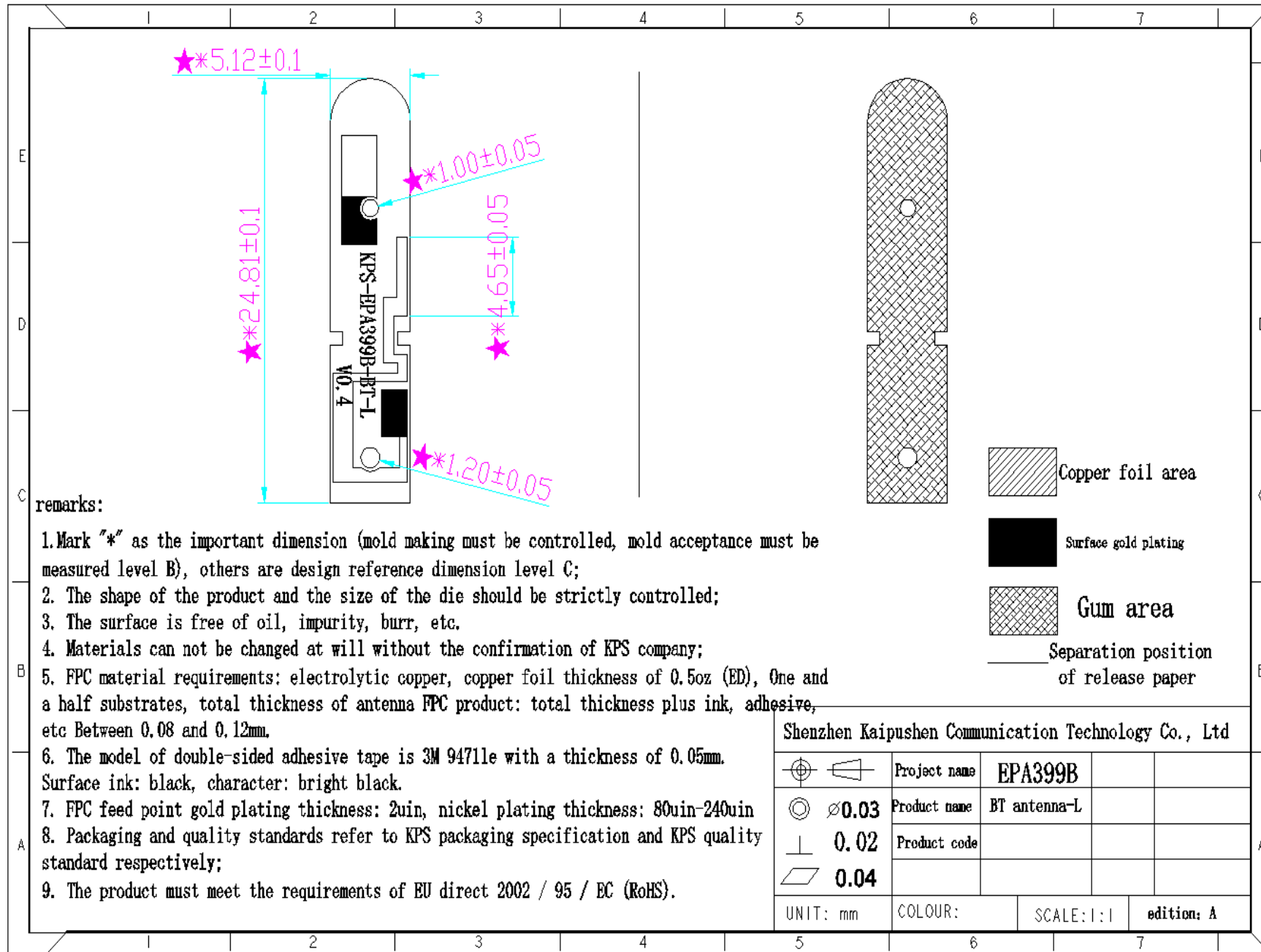
**Tel:** 0755-29351613

**Fax:**0755-29351510

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### 3. ICD drawings

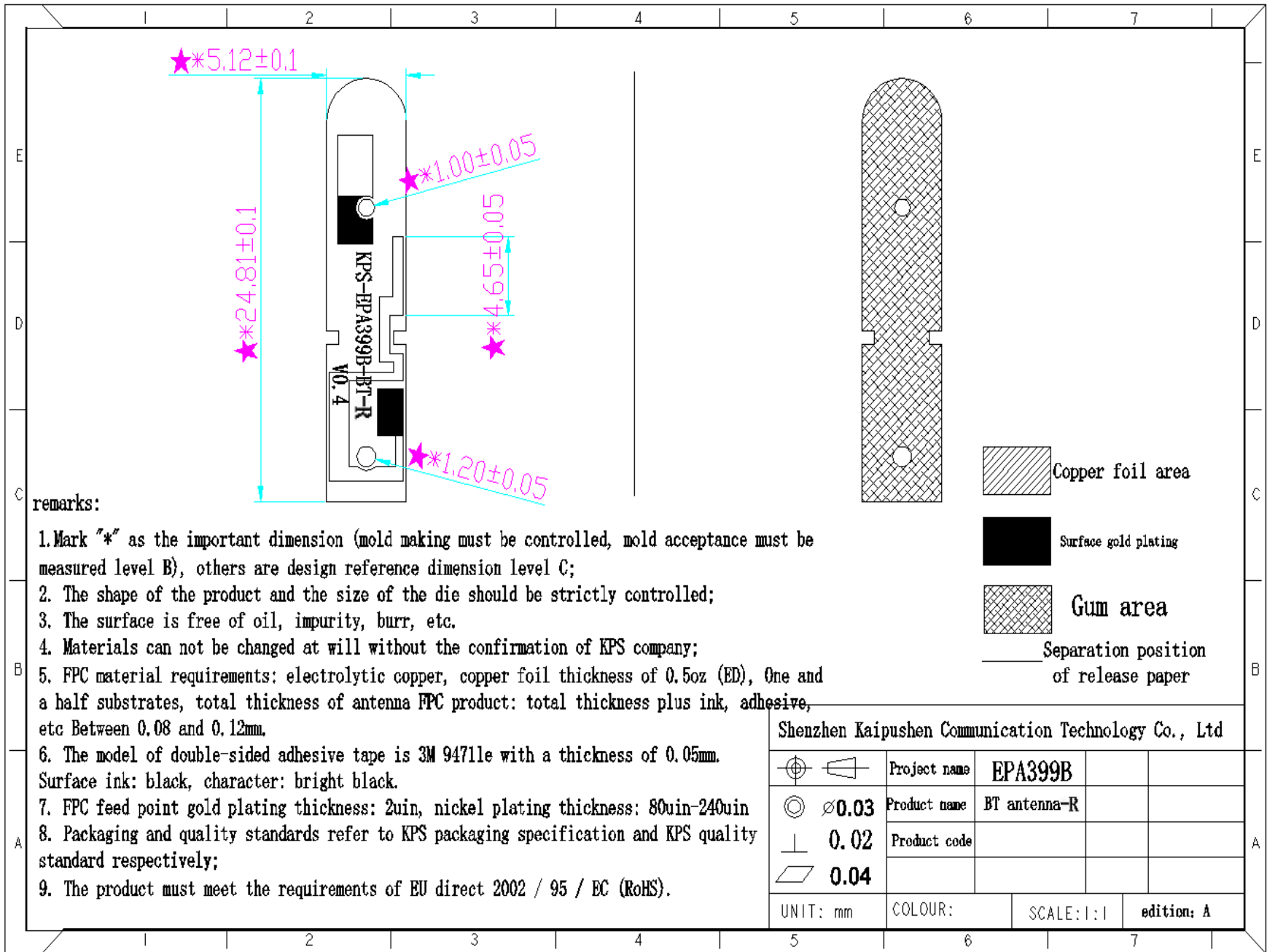


remarks:

1. Mark "\*" as the important dimension (mold making must be controlled, mold acceptance must be measured level B), others are design reference dimension level C;
2. The shape of the product and the size of the die should be strictly controlled;
3. The surface is free of oil, impurity, burr, etc.
4. Materials can not be changed at will without the confirmation of KPS company;
5. FPC material requirements: electrolytic copper, copper foil thickness of 0.5oz (ED), One and a half substrates, total thickness of antenna FPC product: total thickness plus ink, adhesive, etc Between 0.08 and 0.12mm.
6. The model of double-sided adhesive tape is 3M 9471le with a thickness of 0.05mm. Surface ink: black, character: bright black.
7. FPC feed point gold plating thickness: 2uin, nickel plating thickness: 80uin-240uin
8. Packaging and quality standards refer to KPS packaging specification and KPS quality standard respectively;
9. The product must meet the requirements of EU direct 2002 / 95 / EC (RoHS).

Shenzhen Kaipushen Communication Technology Co., Ltd

|              |                     |  |                             |  |  |
|--------------|---------------------|--|-----------------------------|--|--|
| <br><br><br> | <br><br><br>        | Project name<br>Product name<br>Product code | EPA399B<br>BT antenna-L<br> |  |  |
|              | UNIT: mm<br>COLOUR: | SCALE: 1:1<br>edition: A                     |                             |  |  |



remarks:

1. Mark "\*" as the important dimension (mold making must be controlled, mold acceptance must be measured level B), others are design reference dimension level C;
2. The shape of the product and the size of the die should be strictly controlled;
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|  |              |              |  |  |
|--|--------------|--------------|--|--|
|  | Project name | EPA399B      |  |  |
|  | Product name | BT antenna-R |  |  |
|  | Product code |              |  |  |
|  | 0.02         |              |  |  |
|  | 0.04         |              |  |  |

UNIT: mm      COLOUR:      SCALE: 1:1      edition: A

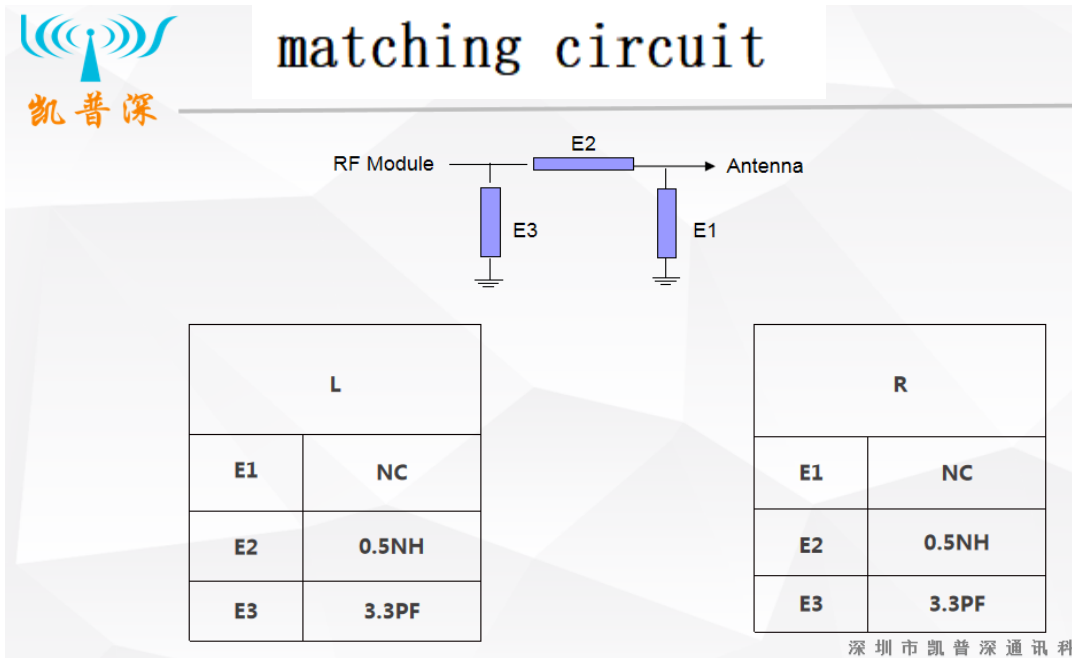
## 5.1 electrical properties

### 5.1-1 specification

BT antenna resonates at 2400m-2480m .

### 5.1-2 Matching circuit of antenna .

The matching circuit is as follows:



## 5.2 Standing wave ratio (SWR) test

### 5.2-1 Test settings

The standing wave ratio (SWR) test device is connected in turn to: E5071B Network analyzer-50 ohm coaxial Cable→150 mm long copper tube→Test the fixture.

Test the treatment of fixture: Draw out the SMA-J connector from the PCB antenna at the 50 point with a hard cableConnect with copper tube with choke ring and connect other devices i

The following table shows the standing wave ratio of the edge frequency points of the worki

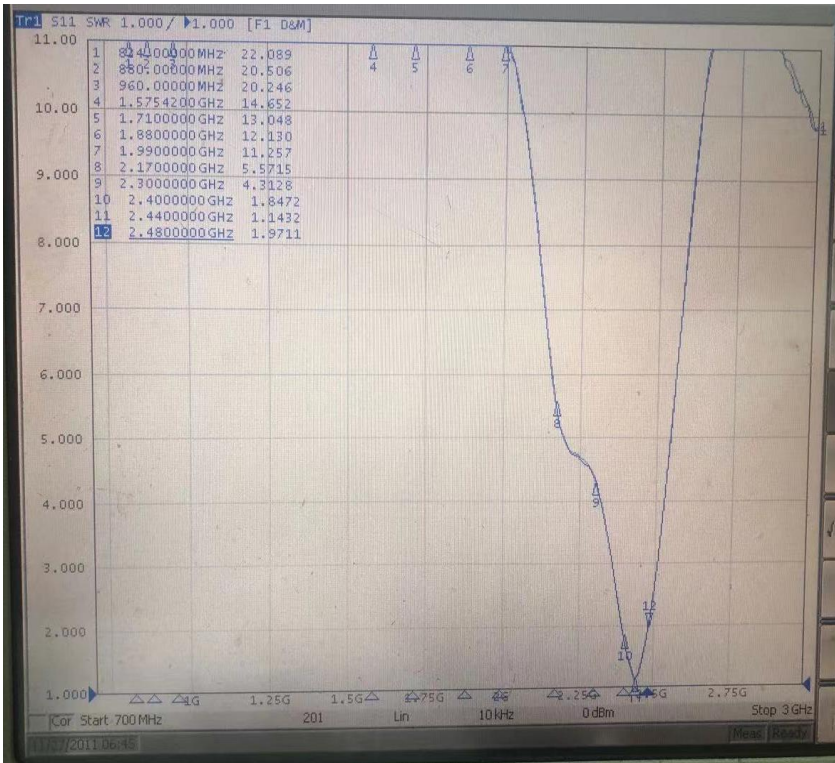
### 6.2-2 Voltage standing wave ratio test :

The following table shows: Standing Wave Ratio of Edge Frequency Points in the Operating Frequency Band of BT Antennas :

|   |           |      |      |      |
|---|-----------|------|------|------|
| L | Fre (MHZ) | 2402 | 2440 | 2480 |
|   | SRW       | 1.8  | 1.1  | 1.9  |

|   |           |      |      |      |
|---|-----------|------|------|------|
| R | Fre (MHZ) | 2402 | 2440 | 2480 |
|   | SRW       | 1.8  | 1.1  | 1.9  |

## 6.2-3 Passive test results



1、The above diagram shows the standing wave ratio curve

### 6.2-4 Whole machine active test data:

Main antenna test data:

| BT      | L     |       |       | R     |       |       |
|---------|-------|-------|-------|-------|-------|-------|
|         | 0     | 39    | 78    | 0     | 39    | 78    |
| CHANNEL | 0     | 39    | 78    | 0     | 39    | 78    |
| TRP     | 3.2   | 3.5   | 3.8   | 2.6   | 3.3   | 3.5   |
| TIS     | -88.2 | -88.4 | -88.6 | -88.2 | -88.3 | -88.5 |

Main antenna head mold test data:

| BT      | L     |      |       | R     |       |       |
|---------|-------|------|-------|-------|-------|-------|
|         | 0     | 39   | 78    | 0     | 39    | 78    |
| CHANNEL | 0     | 39   | 78    | 0     | 39    | 78    |
| TRP     | -5.7  | -6.1 | -6.6  | -2.6  | -2.6  | -4.9  |
| TIS     | -80.5 | -81  | -80.1 | -81.8 | -82.8 | -82.2 |

6.2-6 Passive test data of BT antenna:

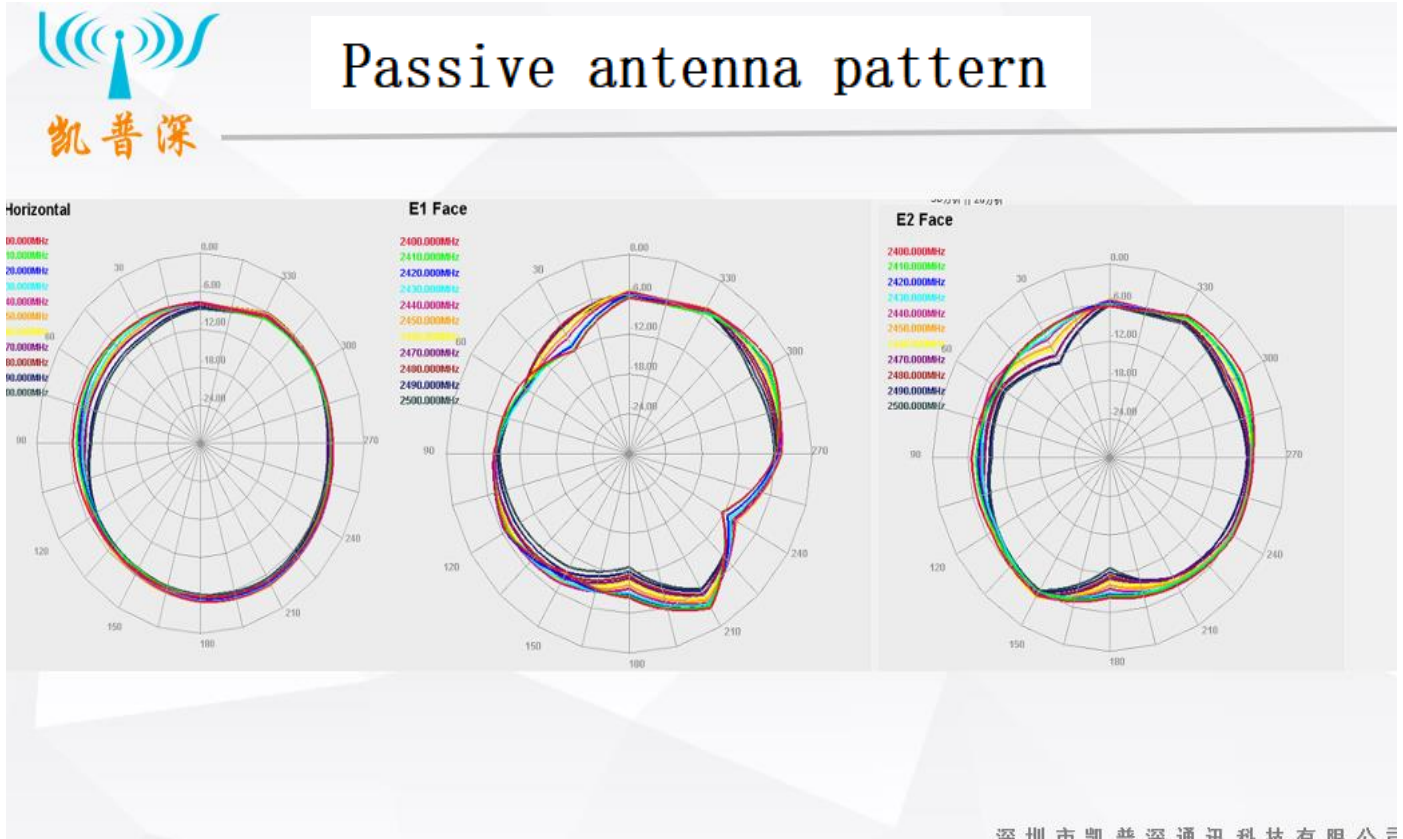
L

| frequency  | efficiency | attenuation | gain       |
|------------|------------|-------------|------------|
| Freq (MHz) | Effi (%)   | Effi (dB)   | Gain (dBi) |
| 2400       | 21.02      | -6.77       | -3.37      |
| 2410       | 21.88      | -6.6        | -3.35      |
| 2420       | 22.48      | -6.48       | -3.34      |
| 2430       | 22.68      | -6.44       | -3.26      |
| 2440       | 23.58      | -6.27       | -2.91      |
| 2450       | 24.42      | -6.12       | -2.98      |
| 2460       | 25.71      | -5.9        | -2.74      |
| 2470       | 26.72      | -5.73       | -2.68      |
| 2480       | 25.53      | -5.93       | -2.87      |
| 2490       | 25.16      | -5.99       | -2.98      |
| 2500       | 24.03      | -6.19       | -2.83      |

R

| frequency  | efficiency | attenuation | gain       |
|------------|------------|-------------|------------|
| Freq (MHz) | Effi (%)   | Effi (dB)   | Gain (dBi) |
| 2400       | 25.87      | -5.87       | -2.87      |
| 2410       | 24.89      | -6.04       | -2.74      |
| 2420       | 23.59      | -6.27       | -2.89      |
| 2430       | 23.15      | -6.35       | -2.99      |
| 2440       | 24.13      | -6.17       | -3.01      |
| 2450       | 24.44      | -6.12       | -3.11      |
| 2460       | 23.99      | -6.2        | -3.21      |
| 2470       | 23.44      | -6.3        | -3.22      |
| 2480       | 21.33      | -6.71       | -3.31      |
| 2490       | 21.5       | -6.68       | -3.35      |
| 2500       | 20.19      | -6.69       | -3.39      |

Passive field pattern diagram



# Full dimensional measurement report

| NO. | Customer            | Kailai    |        | part name     |       | BT aerial |           | Qty          |           |           |           |           | Material          | Electrolytic copper |
|-----|---------------------|-----------|--------|---------------|-------|-----------|-----------|--------------|-----------|-----------|-----------|-----------|-------------------|---------------------|
|     | Supplier            | Kaipushen |        | Measure tools |       | Quadratic |           | Measure unit |           | mm        |           |           | Measure date      | 2023/4/6            |
|     | Size<br>(DIMENSION) | Upper     | + TOL. | - TOL.        | Lower | Act mea 1 | Act mea 2 | Act mea 3    | Act mea 4 | Act mea 5 | Act mea 6 | Act mea 7 | UPPER $\leq$ 100% | LOWER $\leq$ 100%   |
| 1   | 24.91               | 25.01     | 0.10   | 0.10          | 24.95 | 24.93     | 24.88     | 24.92        | 24.85     | 24.87     | 24.89     | 24.90     | 20%               | 60%                 |
| 2   | 5.12                | 5.22      | 0.10   | 0.10          | 5.02  | 5.10      | 5.07      | 5.11         | 5.09      | 5.07      | 5.13      | 5.05      | 10%               | 70%                 |
| 5   |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 6   |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 7   |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 8   |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 9   |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 10  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 11  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 12  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 13  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 14  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 15  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 16  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 17  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 18  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 19  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |
| 20  |                     |           |        |               |       |           |           |              |           |           |           |           |                   |                     |

Table: Chenjian

Audit: Wuxingtuo

Date: April 6th, 2023



| KPS 深圳市凯普深通讯科技有限公司<br>天线专家 Shenzhen cape deep communication technology co., LTD |                | QC schedule drawing |   |   |                           |                        | file number      | KPS--QPA-QA004                            |                                 | Enactment Date  |   |  |
|---|----------------|---------------------|---|---|---------------------------|------------------------|------------------|---|---------------------------------|---|---|--|
|   |                |                     |   |   |                           |                        | file version     | A/01                                      |                                 | Page  | page 1  |  |
| technological process   |                | Control focus       |   |   | management responsibility | method                 |                  | Inspection method                         |                                 |   | corrective action   |  |
| Order Number  | Main Processes | project name        | aControl Project  | Regulatory standards  | person liable             | Normal sampling number | person in charge | Inspection method                         | Examines the tool               | Record type   | Solution  |  |
|   | ▽              | begin               |   |   |                           |                        |                  |   |                                 |   |   |  |
| 1   | ○              | Receiving           | quantity/product name/specifications  | 《Engineering BOM》<br>《Material receiving operation instruction》                                   | Material clerk            |                        |                  |   |                                 | 《Electronic account》                                      | Contact the supplier and issue 《returning note》   |  |
| 2   | ◇              | Incoming inspection | specifications/model/pack   | 《Engineering BOM》<br>《Sampling inspection plan》<br>《IQC incoming material inspection instruction》 | IQC                       | MA=0.25<br>MI=0.65     | IQC              | 1. visual<br>2. Machine test<br>3. sample | Two dimensional vernier caliper | 《IQC incoming inspection record》                          | Inspection: OK, stamped with pass seal. The inspection shall be labeled as nonconforming product and issued at the same time 《8D Report Problem Solving Report》, Notify the supplier of return and improve. |  |
| 3   | ○              | material            | quantity/product name/specifications  | 《 production instruction》<br>《Material receiving operation instruction》                           | Material clerk            |                        |                  |   |                                 | 《Material requisition and distribution registration form》 |   |  |
| 4   | ○              | pack                | pack quantity/indicate  | 《Finished product packaging operation instruction》  | packager                  |                        |                  |   |                                 |   |   |  |
| 5   | ○              | Delivery inspection | product appearance<br>bad record<br>Dimensional test<br>Bad sign<br>Good product packaging<br>ROHS compliance | 《Engineering BOM》<br>《Sampling inspection plan》<br>《OQC Final inspection operation instruction》   | OQC                       | MA=0.25<br>MI=0.65     | OQC              | 1. visual<br>2. Machine test<br>3. sample | Two dimensional vernier caliper | 《OQC finished product inspection record》                  | If the number of times of the same type of the same type missing in the daily inspection is great, OQC issues the 8D report problem solving report to the production manager for analysis and improve       |  |
| 6   | ○              | delivery            | product namespecification quantity delivery note  | 《Finished product shipping operation instruction》   | Material clerk            |                        |                  |   |                                 | 《Electronic account》                                      |   |  |
|   | ▽              | finish              |   |   |                           |                        |                  |   |                                 |   |   |  |
| character   | Revision date  | Revised content     |   |   |                           | Revised ; Revised      | Acknowledged by  | Fiction                                   |                                 | auditing  | approval  |  |
| ①   |                |                     |   |   |                           |                        |                  |   |                                 |   |   |  |
| ②   |                |                     |   |   |                           |                        |                  | date                                      |                                 | date  | date  |  |
| ③   |                |                     |   |   |                           |                        |                  |   |                                 |   |   |  |

|  |  |                |    |
|--|--|----------------|----|
| Shenzhen Kaipushen Communication Technology Co., Ltd |  | file NO        |    |
|  |  | Enactment Date |    |
| <b>FPC antenna inspection specification</b>          |  | Page           |    |
|  |  | edition        | A0 |

1. Purpose and purpose: rigorous testing , Control the use of defective products and ensure product quality requirements.

2. applicable scope: FPC aerial.

3. content

| item            | content         | tool                    | Inspection standards and technical requirements   | Defect Description  | stratum |
|-----------------|-----------------|-------------------------|---|---|---------|
| packin<br>g     | characteristic  | visual                  | The outer package is clearly labeled, Indicate, product name、 specifications、 quantity、 date.                                     | The identification is not clear and cannot be identified.   | MIN     |
|                 | Matter          | visual                  | Uniform packaging, Clean and tidy, unabroken , No impact on handling 、 Storage, No wrong installation 、 mixed 、 Less clothes.     | Inconsistent packaging, Dirty、 damp、 damaged. , Affect handling 、 Storage.  | MIN     |
| appeara<br>nce  | surface         | visual                  | FPC is not damaged、 Copper Exposed、 dehiscence、 chromatic aberration、 Yijiao、 Gold finger is free of oxidation and brittle crack. | FPC is damaged、 Copper Exposed、 dehiscence、 chromatism、 rubber overflowing ,Oxidation of golden finger、 Brittle crack . | MAJ     |
| structu<br>re   | measurement     | vernier caliper         | Board size (dimensions) Same as template  | The size is different from the sample .   | MAJ     |
|                 | Material        | sample plate            | Same as template.   | Material is different from template   | MAJ     |
| perform<br>ance | Electroplate    | electro plating Machine | Golden finger degree golden brightness, coverage rate 100%  | The gold plating is not bright, or the gold plating coverage is low.  | MAJ     |
|                 | forced jointing | chassis                 | FPC is pasted on its enclosure consistent with the preset pasting position None   | FPC is pasted on its enclosure, Inconsistent with the preset pasting position , More or less .                          | MAJ     |

Formulate :

auditing :

Approve:

# RoHS restricted substance composition questionnaire

| Information of supplied products |                               |                                    |  |                               |                    |                                      |      |      |                     |       |        |         |
|----------------------------------|-------------------------------|------------------------------------|--|-------------------------------|--------------------|--------------------------------------|------|------|---------------------|-------|--------|---------|
| Customer name                    | Description of Material/model | entry name                         | manufacturer   | Green material identification |                    |                                      |      |      |                     |       |        |         |
| Kailai                           | BT aerial                     | EPA399B                            | Shenzhen Kaipushen Communication Technology Co., Ltd | /                             |                    |                                      |      |      |                     |       |        |         |
| Product composition information  |                               |                                    |  |                               |                    |                                      |      |      |                     |       |        |         |
| Order Number                     | part name                     | Specification                      | component supplier                                   | Third party test report       |                    | Content of restricted substances PPM |      |      |                     |       |        | remarks |
|                                  |                               |                                    |  | date for                      | number             | (Pb)                                 | (Cd) | (Hg) | (Cr <sup>6+</sup> ) | (PBB) | (PBDE) |         |
| 1                                | adhesive                      | 3M9471LSE                          | 3M   | 2023.01.04                    | SHAEC2217569205    | ○                                    | ○    | ○    | ○                   | ○     | ○      |         |
| 2                                | base material                 | One and a half electrolytic copper | Kwai Lungti  | 2023.02.15                    | SHAEC23001049106   | ○                                    | ○    | ○    | ○                   | ○     | ○      |         |
| 3                                | plating                       | FPC Electrolytic Nickel Gold       | Xindasheng   | 2022.04.12                    | A2220136788101001E | ○                                    | ○    | ○    | ○                   | ○     | ○      |         |
| 4                                | Solder mask black oil         | PSM-800FSDM-A                      | Youli  | 2022.08.05                    | ETR22705905        | ○                                    | ○    | ○    | ○                   | ○     | ○      |         |
| 5                                | Text white oil                | KTM-150FWM                         | Chuanyu  | 2022.10.17                    | ETR22A01347M01     | ○                                    | ○    | ○    | ○                   | ○     | ○      |         |
|                                  |                               |                                    |  |                               |                    |                                      |      |      |                     |       |        |         |

written by: Wuxintuo

Filled by: Department: Quality

# Salt spray test report

Date: April 6th, 2023

|   |   |                                   |  |
|---|---|-----------------------------------|--|
| Item  | EPA399B-BT aerial   | Customer                          | Kilai  |
| Supplier  | Shenzhen Kaipushen Communication Technology Co., Ltd  | National Test standard            | GB/T 2423.2-2008                                 |
| Sample situation  | Sample qty: 5PCS  |                                   |  |
|   | Base material: one-sided, one-to-half adhesive electrolytic copper                              | Plating: Sinking Gold $\geq 3U''$ |  |
| Test time   | 2023年04月06日 9时 00 分至 2023年04月07日 9时 00 分 共计 24 H  |                                   |  |
| Test type:  | <input checked="" type="checkbox"/> NSS   | <input type="checkbox"/> ASS      | <input type="checkbox"/> CASS                    |
| Test condition  | Salt solution: 5%   |                                   | PH:7.0   |
|   | Chamber temp: 35° C   |                                   | Relative humidity: 85%                           |
|   | Spray way: <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> intermittent |                                   | Compressed air pressure: 1kg/cm <sup>2</sup>     |
|   | Salt spray sedimentation rate: 1-2ml/80cm <sup>2</sup> /h                                       |                                   | Fog fluid collection: 1.4ml/80cm <sup>2</sup> /h |
|   | Test cycle: __1__ cycle   |                                   | Spray time: 24 h                                 |
| Test results  | Appearance after test: appearance intact, without obvious change                                |                                   |  |
|   | Coating: no spalling, no rust   |                                   |  |
|   | Surface spraying, silk screen: no falling off, no bubbles.                                      |                                   |  |
| Explanation:<br>1、Salt spray test operating standards in accordance with the People's Republic of China national standard GB/T2423.17-2008 implementation.<br>2、The test piece results are determined according to the national standard GB/T6451-02 of the People's Republic of China. |   |                                   |  |
| Operator by/date: Jian Chen Approved by/date: : Wu Xingtuo April 7th, 2023  |   |                                   |  |

# High-low temperature test record

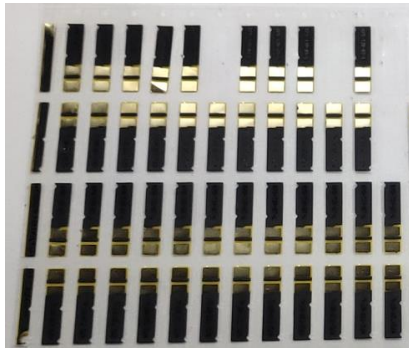
|  |                 |                |                 |                |
|--|-----------------|----------------|-----------------|----------------|
| Product name   | EPA399B         | Customer name  | Kailai          |                |
| Test qtu   | 6 pcs           | Test date      | 2023/4/6        |                |
| Cycle number   | 1               | Time           | 24H             |                |
| TestCondition:   |                 |                |                 |                |
| High temp: + <u>65</u> degree      Humidity: <u>90</u> % RH                          |                 |                |                 |                |
| Low temp: - <u>20</u> degree   |                 |                |                 |                |
| Test time: high temp: <u>24</u> H      low temp: <u>24</u> H                         |                 |                |                 |                |
| Test item  | Uncycled test   |                | Cycled test     |                |
| No   | After high temp | After low temp | After high temp | After low temp |
| 1  | OK              | /              |                 |                |
| 2  | OK              | /              |                 |                |
| 3  | OK              | /              |                 |                |
| 4  | OK              | /              |                 |                |
| 5  | OK              | /              |                 |                |
| 6  | OK              | /              |                 |                |
| After test deficiency:   |                 |                |                 |                |
| Reason analysis:   |                 |                |                 |                |
| Improvement measures:  |                 |                |                 |                |
| Test results: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail |                 |                |                 |                |

Operator by/date: Jian Chen

Approved by: Wu Xingtuo

# Packing

|              |            |                   |                   |
|--------------|------------|-------------------|-------------------|
| Customer:    | Kailai     | Material name:    | EPA399B-BT aerial |
| packing qty: | one carton | Packing material: | Carton            |
| Qty/carton:  |            | Packing way :     | Ziplock bag       |



Picture 1:Single package



Picture 2: Packing way



Picture 3: Packing view (front, side, top)



Picture 4:packing label

Note: If you need to fit the antenna processing, according to the shell factory blister tray packaging shipping!

Fiction : Wu Xingtuo

auditing: LiMinghui