Form No: T00117-1-0000-TBM01-160700199

# Specification for Approval

**Date:** 2016/7/11

**Customer :** Qisda

**TAI-TECH P/N:** HCB2012KF-121T50

**CUSTOMER P/N:** 6H.12160.0N2

**DESCRIPTION:**

**QUANTITY:** pcs

| **REMARK:** | | |
|---|---|---|
| Customer Approval Feedback | | |
| | | |

西 北 臺 慶 科 技 股 份 有 限 公 司
**TAI-TECH Advanced Electronics Co., Ltd**


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Sales Dep.

| APPROVED | CHECKED |
|---|---|
| 戴若伊<br>Maggie Dai | 王塏惠<br>Dora Wang |

R&D Center

| APPROVED | CHECKED | DRAWN |
|---|---|---|
| 楊祥忠<br>Mike Yang | 詹偉特<br>Jack Chan | 張嘉玲<br>Alin Chang |

# High Current Ferrite Chip Bead(Lead Free) HCB2012KF-121T50

## ECN HISTORY LIST

| REV | DATE | DESCRIPTION | APPROVED | CHECKED | DRAWN |
|---|---|---|---|---|---|
| 1.0 | 13/06/06 | 變更可靠度條件 | 楊祥忠 | 羅培君 | 張嘉玲 |
| 2.0 | 14/01/24 | 變更電鍍錫層厚度<br>3.0um min.=>3.5um min. | 楊祥忠 | 羅培君 | 張嘉玲 |
| 3.0 | 14/08/01 | 變更 Reflow 圖示 | 楊祥忠 | 羅培君 | 張嘉玲 |
| 3.1 | 14/08/01 | 修正包裝帶尺寸 | 楊祥忠 | 羅培君 | 張嘉玲 |
| 4.0 | 16/01/26 | 增訂可靠度 Thermal shock:<br>(Bead) Step3：125±2℃ 30±5min | 楊祥忠 | 詹偉特 | 張嘉玲 |
| | | | | | |
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| 備註 | | | | | |

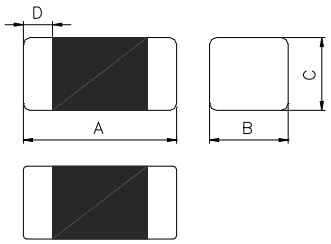
# High Current Ferrite Chip Bead(Lead Free) HCB2012KF-121T50

## 1.Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. Suitable for reflow soldering.
4. Shapes and dimensions follow E.I.A. spec.
5. Available in various sizes.
6. Excellent solder ability and heat resistance.
7. High reliability.
8. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
9. Low DC resistance structure of electrode to prevent wasteful electric power consumption.

Halogen-free Pb-free Certificate of Green Partner

## 2.Dimensions



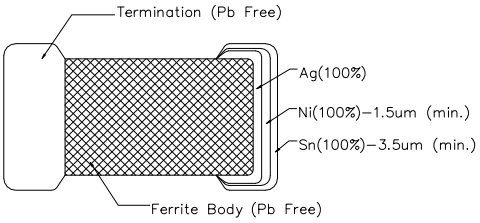

| Chip Size | |
|---|---|
| A | 2.00±0.20 |
| B | 1.25±0.20 |
| C | 0.85±0.20 |
| D | 0.50±0.30 |

Units: mm

## 3.Part Numbering

| HCB | 2012 | KF | - | 121 | T | 50 |
|---|---|---|---|---|---|---|
| A | B | C | | D | E | F |

A: Series
B: Dimension L x W
C: Material Lead Free Material
D: Impedance 121=120Ω
E: Packaging T=Taping and Reel, B=Bulk(Bags)
F: Rated Current 50=5000mA

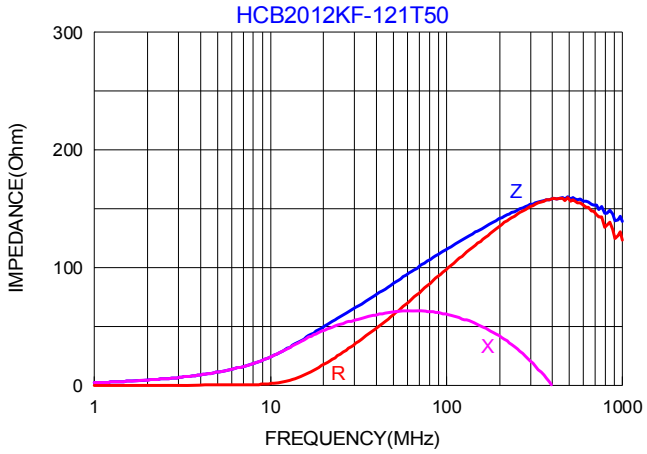



## 4.Specification

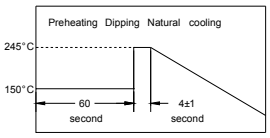
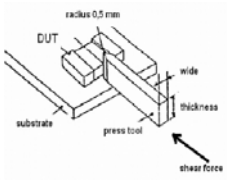
| Tai-Tech Part Number | Impedance (Ω) | Test Frequency (Hz) | DC Resistance (Ω) max. | Rated Current (mA) max. |
|---|---|---|---|---|
| HCB2012KF-121T50 | 120±25% | 60mV/100M | 0.02 | 5000 |

- Rated current: based on temperature rise test
- In compliance with EIA 595

■ Impedance-Frequency Characteristics



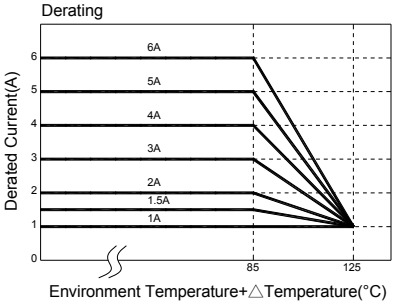
# 5. Reliability and Test Condition

<table>
<tr><th>Item</th><th colspan="9">Performance</th><th>Test Condition</th></tr>
<tr><td>Series No.</td><td>FCB</td><td>FCM</td><td>HCB</td><td>GHB</td><td>FCA</td><td>FCI</td><td>FHI</td><td>FCH</td><td>HCI</td><td>--</td></tr>
<tr><td>Operating Temperature</td><td colspan="5">-40~+125℃<br>(Including self-temperature rise)</td><td colspan="4">-40~+105℃<br>(Including self-temperature rise)</td><td>--</td></tr>
<tr><td>Transportation<br>Storage Temperature</td><td colspan="5">-40~+125℃<br>(on board)</td><td colspan="4">-40~+105℃<br>(on board)</td><td>For long storage conditions, please see the Application Notice</td></tr>
<tr><td>Impedance (Z)</td><td colspan="9" rowspan="5">Refer to standard electrical characteristics list</td><td>Agilent4291</td></tr>
<tr><td>Inductance (Ls)</td><td>Agilent E4991</td></tr>
<tr><td>Q Factor</td><td>Agilent4287</td></tr>
<tr><td>DC Resistance</td><td>Agilent16192<br>Agilent 4338</td></tr>
<tr><td>Rated Current</td><td>DC Power Supply<br>Over Rated Current requirements, there will be some risk</td></tr>
<tr><td>Temperature Rise Test</td><td colspan="9">Rated Current < 1A ΔT 20℃Max<br>Rated Current ≧ 1A ΔT 40℃Max</td><td>1. Applied the allowed DC current.<br>2. Temperature measured by digital surface thermometer.</td></tr>
<tr><td>Resistance to Soldering Heat</td><td colspan="9">Appearance：No damage.<br>Impedance：within±15% of initial value<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Number of heat cycles: 1<br><table><tr><th>Temperature (°C)</th><th>Time (s)</th><th>Temperature ramp/immersion and emersion rate</th></tr><tr><td>260 ±5 (solder temp)</td><td>10 ±1</td><td>25mm/s ±6 mm/s</td></tr></table>Depth: completely cover the termination</td></tr>
<tr><td>Solderability</td><td colspan="9">More than 95% of the terminal electrode should be covered with solder.<br></td><td>Preheat: 150℃,60sec.<br>Solder: Sn96.5%-Ag3%-Cu0.5%<br>Solder temperature: 245±5℃<br>Flux for lead free: Rosin. 9.5%<br>Depth: completely cover the termination.<br>Dip time: 4±1sec.</td></tr>
<tr><td>Terminal strength</td><td colspan="9">Appearance：No damage.<br>Impedance：within±15% of initial value<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value<br></td><td>Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Component mounted on a PCB apply a force (>0805:1kg <=0805:0.5kg)to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to shock the component being tested.</td></tr>
<tr><td>Bending</td><td colspan="9">Appearance：No damage.<br>Impedance：within±10% of initial value<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Shall be mounted on a FR4 substrate of the following dimensions:>=0805:40x100x1.2mm<br><0805:40x100x0.8mm<br>Bending depth:>=0805:1.2mm<br><0805:0.8mm<br>Duration of 10 sec for a min.</td></tr>
<tr><td>Vibration Test</td><td colspan="9">Appearance：No damage.<br>Impedance：within±15% of initial value<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Oscillation Frequency: 10～2K～10Hz for 20 minutes<br>Equipment： Vibration checker<br>Total Amplitude:1.52mm±10%<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)。</td></tr>
<tr><td>Shock</td><td colspan="9">Appearance：No damage.<br>Impedance：within±10% of initial value<br>Inductance：within±10% of initial value<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Test condition:<br><table><tr><th>Type</th><th>Peak Value (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (Vi)ft/sec</th></tr><tr><td>SMD</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr><tr><td>Lead</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr></table></td></tr>
</table>

| Item | Performance | Test Condition |
|---|---|---|
| **Life test** | Appearance: no damage.<br><br>Impedance: within±15%of initial value.<br>Inductance: within±10%of initial value.<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Temperature: 125±2℃(Bead),<br>105±2℃(Inductor)<br>Applied current: rated current.<br>Duration: 1000±12hrs.<br>Measured at room temperature after placing for 24±2 hrs. |
| **Load Humidity** | | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Humidity: 85±2%R.H.<br>Temperature: 85±2℃.<br>Duration: 1000hrs Min. with 100% rated current.<br>Measured at room temperature after placing for 24±2 hrs. |
| **Thermal shock** | Appearance: no damage.<br><br>Impedance: within±15%of initial value.<br>Inductance: within±10%of initial value.<br>Q：Shall not exceed the specification value.<br>RDC：within ±15% of initial value and shall not exceed the specification value | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Condition for 1 cycle<br>Step1: -40±2℃ 30±5 min.<br>Step2: 25±2℃ ≦0.5min<br>Step3: +125±2℃ 30±5min. (Bead)<br>Step3: +105±2℃ 30±5min. (Inductor)<br>Number of cycles: 500<br>Measured at room temperature after placing for 24±2 hrs. |
| **Low temperature storage test** | | Temperature: -40±2℃.<br>Duration: 500±8hrs.<br>Measured at room temperature after placing for 2 to 3hrs. |
| **Insulation Resistance** | IR>1GΩ | Chip Inductor Only<br>Test Voltage:100±10%V for 30Sec. |

****Derating Curve**

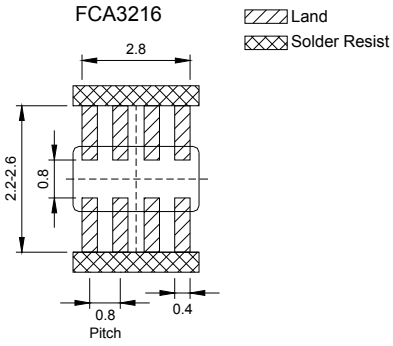
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85℃, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.

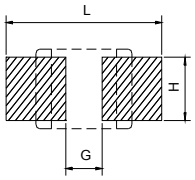



## 6.Soldering and Mounting

### 6-1. Recommended PC Board Pattern

| Chip Size | | | | | | Land Patterns For Reflow Soldering | | |
|---|---|---|---|---|---|---|---|---|
| **Series** | **Type** | **A(mm)** | **B(mm)** | **C(mm)** | **D(mm)** | **L(mm)** | **G(mm)** | **H(mm)** |
| **FCB** | 0603 | 0.6±0.03 | 0.30±0.03 | 0.30±0.03 | 0.15±0.05 | 0.80 | 0.30 | 0.30 |
| **FCM** | 1005 | 1.0±0.10 | 0.50±0.10 | 0.50±0.10 | 0.25±0.10 | 1.50 | 0.40 | 0.55 |
| **HCB** | 1608 | 1.6±0.15 | 0.80±0.15 | 0.80±0.15 | 0.30±0.20 | 2.60 | 0.60 | 0.80 |
| **GHB** | 2012 | 2.0±0.20 | 1.25±0.20 | 0.85±0.20 | 0.50±0.30 | 3.00 | 1.00 | 1.00 |
| **FCI** | | 2.0±0.20 | 1.25±0.20 | 1.25±0.20 | 0.50±0.30 | | | |
| **FHI** | 3216 | 3.2±0.20 | 1.60±0.20 | 1.10±0.20 | 0.50±0.30 | 4.40 | 2.20 | 1.40 |
| **FCH** | 3225 | 3.2±0.20 | 2.50±0.20 | 1.30±0.20 | 0.50±0.30 | 4.40 | 2.20 | 3.40 |
| **HCI** | 4516 | 4.5±0.20 | 1.60±0.20 | 1.60±0.20 | 0.50±0.30 | 5.70 | 2.70 | 1.40 |
| | 4532 | 4.5±0.20 | 3.20±0.20 | 1.50±0.20 | 0.50±0.30 | 5.90 | 2.57 | 4.22 |




PC board should be designed so that products can prevent damage from mechanical stress when warping the board.

**6-2. Soldering**

Mildly activated rosin fluxes are preferred. The terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

Note.

If wave soldering is used ,there will be some risk.

Re-flow soldering temperatures below 240 degrees, there will be non-wetting risk

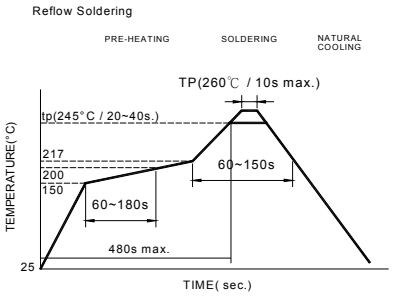
**6-2.1 Lead Free Solder re-flow:**

Recommended temperature profiles for lead free re-flow soldering in Figure 1. (Refered to J-STD-020C)

**6-2.2 Soldering Iron:**

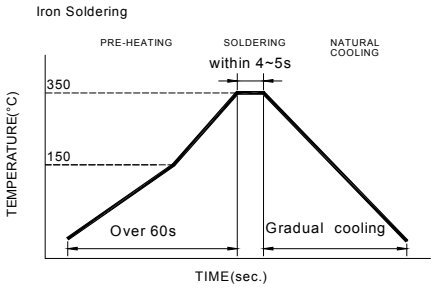
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. If a soldering iron must be employed the following precautions are recommended. for Iron Soldering in Figure 2.

- Preheat circuit and products to 150℃
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 350℃ tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5sec.




Reflow times: 3 times max

Fig.1



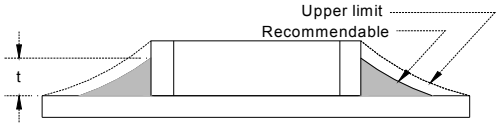

Iron Soldering times：1 times max

Fig.2

**6-2.3 Solder Volume:**

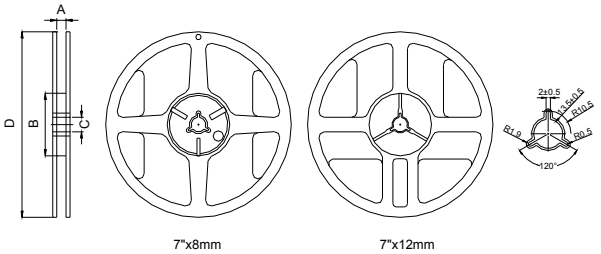
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height




# 7.Packaging Information

**7-1. Reel Dimension**

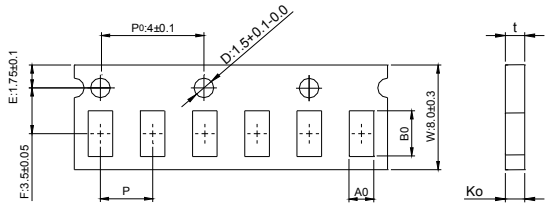



7"x8mm 7"x12mm

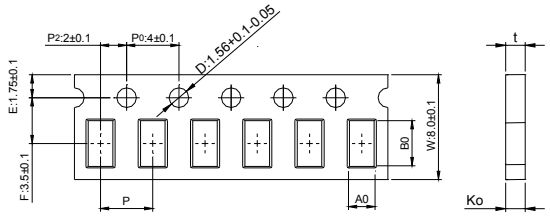
| Type | A(mm) | B(mm) | C(mm) | D(mm) |
|---|---|---|---|---|
| **7”x8mm** | 9.0±0.5 | 60±2 | 13.5±0.5 | 178±2 |
| **7”x12mm** | 13.5±0.5 | 60±2 | 13.5±0.5 | 178±2 |

### 7-2.1 Tape Dimension / 8mm

■Material of taping is paper

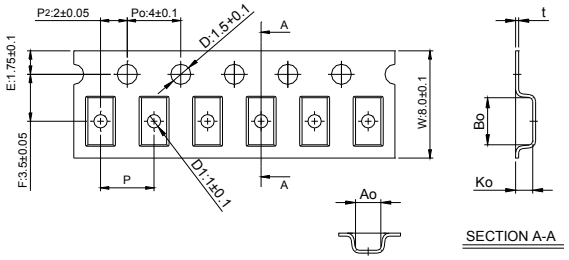



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) |
|---|---|---|---|---|---|
| 060303 | 0.70±0.06 | 0.40±0.06 | 0.45max | 2.0±0.05 | 0.45max |
| 100505 | 1.12±0.03 | 0.62±0.03 | 0.60±0.03 | 2.0±0.05 | 0.60±0.03 |



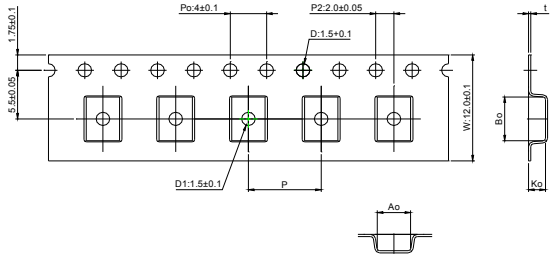

| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) |
|---|---|---|---|---|---|
| 160808 | 1.80±0.05 | 0.96+0.05/-0.03 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 |
| 201209 | 2.10±0.05 | 1.30±0.05 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 |

■Material of taping is plastic




| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|---|---|---|---|---|---|---|
| 201212 | 2.10±0.10 | 1.28±0.10 | 1.28±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 321611 | 3.35±0.10 | 1.75±0.10 | 1.25±0.10 | 4.0±0.10 | 0.23±0.05 | 1.0±0.10 |
| 322513 | 3.42±0.10 | 2.77±0.10 | 1.55±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |
| 321609 | 3.40±0.10 | 1.77±0.10 | 1.04±0.10 | 4.0±0.10 | 0.22±0.05 | 1.0±0.10 |

### 7-2.2 Tape Dimension / 12mm

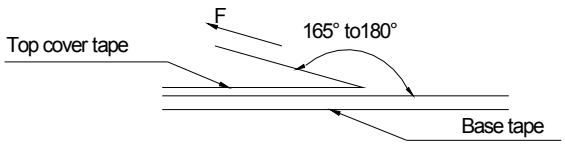



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|---|---|---|---|---|---|---|
| 451616 | 4.70±0.10 | 1.75±0.10 | 1.75±0.10 | 4.0±0.10 | 0.24±0.05 | 1.5±0.10 |
| 453215 | 4.70±0.10 | 3.45±0.10 | 1.60±0.10 | 8.0±0.10 | 0.24±0.05 | 1.5±0.10 |

### 7-3. Packaging Quantity

| Chip Size | 453215 | 451616 | 322513 | 321611 | 321609 | 201212 | 201209 | 160808 | 100505 | 060303 |
|---|---|---|---|---|---|---|---|---|---|---|
| Chip / Reel | 1000 | 2000 | 2500 | 3000 | 3000 | 2000 | 4000 | 4000 | 10000 | 15000 |
| Inner box | 4000 | 8000 | 12500 | 15000 | 15000 | 10000 | 20000 | 20000 | 50000 | 75000 |
| Middle box | 20000 | 40000 | 62500 | 75000 | 75000 | 50000 | 100000 | 100000 | 250000 | 375000 |
| Carton | 40000 | 80000 | 125000 | 150000 | 150000 | 100000 | 200000 | 200000 | 500000 | 750000 |

**7-4. Tearing Off Force**




The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

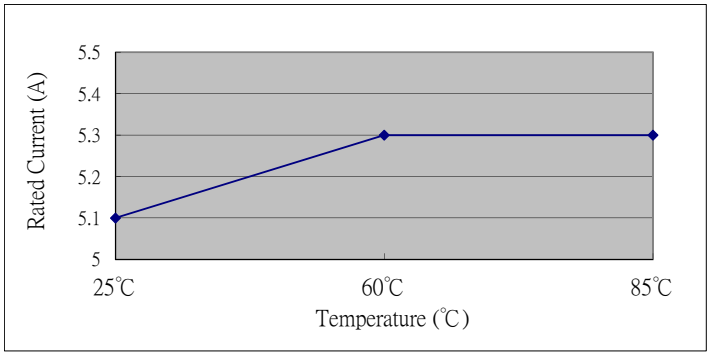
| Room Temp. (℃) | Room Humidity (%) | Room atm (hPa) | Tearing Speed mm/min |
|---|---|---|---|
| 5~35 | 45~85 | 860~1060 | 300 |

**Application Notice**

・Storage Conditions(component level)
To maintain the solder ability of terminal electrodes:
1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40℃ and 60% RH.
3. Recommended products should be used within 12 months from the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

・Transportation
1.Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

## 8.Impedance vs Thermal Curves



# 9. 出貨標籤貼紙編碼原則

## 9-1.條碼貼紙




貼附位置:料盤下方

條碼材質:銅版紙

條碼紙大小:80*50mm

條碼分辨率:300DPI

顏色:白紙+黑字

文字字體:Arial

黏貼方式:自黏

條碼內容依 Qisda 要求規範

## 9-2.內盤標籤貼紙

**CUST P/N: 6H.00216.0T1**

**DESC: HCB 1608KF-221T20**

**QUANTITY: 4,000 PCS**

**DATE: 2009/11/04**

**LOT NO: KMS99L159**

貼附位置:料盤上方

條碼材質:模造紙

條碼紙大小:88*36mm

顏色:白紙+黑字

文字字體:Roman

黏貼方式:自黏

內容說明:

CUST P/N:QISDA 料號

DESC:TAI-TECH 品名

QUANTITY:數量(單位 PCS)

DATE:西曆

LOT NO:英文與阿拉伯數字 7-9 碼

## 9-3.外箱標籤貼紙

CUST P/N: 6H.60160.0T1

DESC: HCB 1608KF-601T10

QUANTITY: 100,000 PCS

DATE: 2014/10/21

LOT NO:




同內盤標籤貼紙+無鉛 Pb 貼紙

貼附位置:外箱左上方