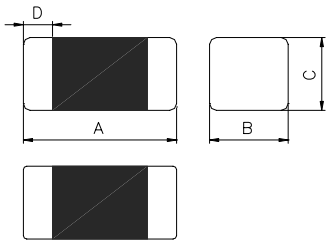
# High Current Ferrite Chip Bead(Lead Free) HCB1608KF-391T10

## 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.
10. Operating Temperature: -55~+125℃(Including self-temperature rise)

## 2.Dimensions



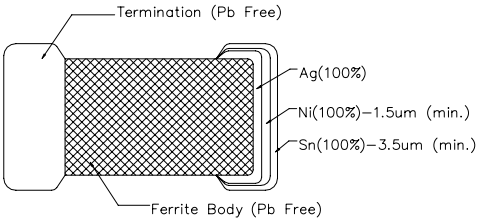

| Chip Size | |
|---|---|
| A | 1.60±0.15 |
| B | 0.80±0.15 |
| C | 0.80±0.15 |
| D | 0.30±0.20 |

Units: mm

## 3.Part Numbering

| HCB | 1608 | KF | - | 391 | T | 10 |
|---|---|---|---|---|---|---|
| A | B | C | | D | E | F |

A: Series
B: Dimension L x W
C: Material Lead Free Material
D: Impedance 391=390Ω
E: Packaging T=Taping and Reel, B=Bulk(Bags)
F: Rated Current 10=1000mA

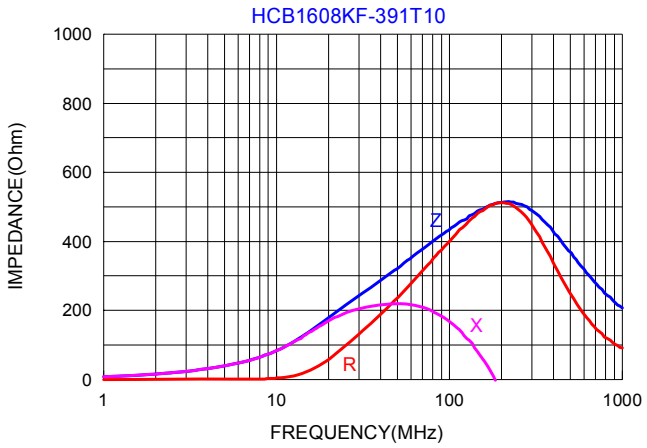



## 4.Specification

| Tai-Tech Part Number | Impedance (Ω) | Test Frequency (Hz) | DC Resistance (Ω) max. | Rated Current (mA) max. |
|---|---|---|---|---|
| HCB1608KF-391T10 | 390±25% | 60mV/100M | 0.20 | 1000 |

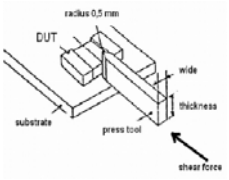
- Rated current: based on temperature rise test
- In compliance with EIA 595

■ Impedance-Frequency Characteristics



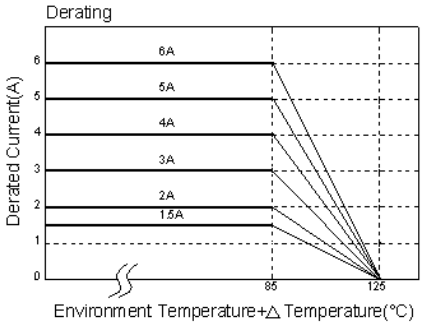
# 5. Reliability and Test Condition

| Item | Performance | | | | | Test Condition |
|---|---|---|---|---|---|---|
| **Series No.** | FCB | FCM | HCB | GHB | FCA | -- |
| **Operating Temperature** | -55~+125℃<br>(Including self-temperature rise) | | | | | -- |
| **Transportation Storage Temperature** | -55~+125℃<br>(on board) | | | | | For long storage conditions, please see the Application Notice |
| **Impedance (Z)** | Refer to standard electrical characteristics list | | | | | Agilent4291<br>Agilent E4991<br>Agilent4287<br>Agilent16192 |
| **DC Resistance** | | | | | | Agilent 4338 |
| **Rated Current** | | | | | | DC Power Supply<br>Over Rated Current requirements, there will be some risk |
| **Temperature Rise Test** | Rated Current < 1A ΔT 20℃Max<br>Rated Current ≧ 1A ΔT 40℃Max | | | | | 1. Applied the allowed DC current.<br>2. Temperature measured by digital surface thermometer. |
| **Life test** | 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 | | | | | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Temperature: 125±2℃<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>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: -55±2℃ 30±5 min.<br>Step2: 25±2℃ ≦0.5min<br>Step3: +125±2℃ 30±5min.<br>Number of cycles: 500<br>Measured at room temperature after placing for 24±2 hrs. |
| **Vibration** | 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 | | | | | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles)<br>Oscillation Frequency: 10Hz～2KHz～10Hz for 20 minutes<br>Equipment： Vibration checker<br>Total Amplitude:10g<br>Testing Time：12 hours(20 minutes, 12 cycles each of 3 orientations)。 |
| **Bending** | 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 | | | | | Shall be mounted on a FR4 substrate of the following dimensions:<br>>=0805inch(2012mm):40x100x1.2mm<br><0805inch(2012mm):40x100x0.8mm<br>Bending depth:<br>>=0805inch(2012mm):1.2mm<br><0805inch(2012mm):0.8mm<br>Duration of 10 sec for a min. |
| **Shock** | 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 | | | | | Test condition:<br>Type / Peak Value (g's) / Normal duration (D) (ms) / Wave form / Velocity change (Vi)ft/sec<br>SMD / 50 / 11 / Half-sine / 11.3<br>Lead / 50 / 11 / Half-sine / 11.3 |
| **Solderability** | More than 95% of the terminal electrode should be covered with solder. | | | | | 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. |

| Item | Performance | Test Condition |
|---|---|---|
| **Resistance to Soldering Heat** | 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 | Number of heat cycles: 1<br>Temperature (°C) / Time (s) / Temperature ramp/immersion and emersion rate<br>260 ±5 (solder temp) / 10 ±1 / 25mm/s ±6 mm/s<br>Depth: completely cover the termination |
| **Terminal strength** | 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   | 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<br>>0805inch(2012mm):1kg<br><=0805inch(2012mm):0.5kg<br>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. |

**Derating Curve

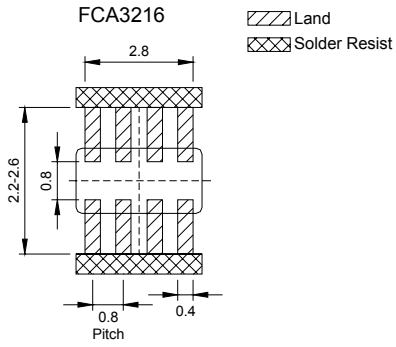
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85℃, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.

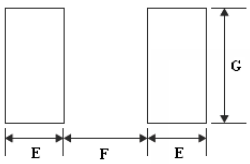



# 6.Soldering and Mounting

## 6-1. Recommended PC Board Pattern

| Chip Size | | | | | | Land Patterns For Reflow Soldering | | |
|---|---|---|---|---|---|---|---|---|
| Series | Type | A(mm) | B(mm) | C(mm) | D(mm) | E(mm) | F(mm) | G(mm) |
| FCB<br>FCM<br>HCB<br>GHB<br>FCI<br>FHI<br>FCH<br>HCI | 0603 | 0.6±0.03 | 0.30±0.03 | 0.30±0.03 | 0.15±0.05 | 0.35 | 0.30 | 0.40 |
| | 1005 | 1.0±0.10 | 0.50±0.10 | 0.50±0.10 | 0.25±0.10 | 0.50 | 0.40 | 0.60 |
| | 1608 | 1.6±0.15 | 0.80±0.15 | 0.80±0.15 | 0.30±0.20 | 0.80 | 0.85 | 0.95 |
| | 2012 | 2.0±0.20 | 1.25±0.20 | 0.85±0.20 | 0.50±0.30 | 1.05 | 1.00 | 1.45 |
| | | 2.0±0.20 | 1.25±0.20 | 1.25±0.20 | 0.50±0.30 | | | |
| | 3216 | 3.2±0.20 | 1.60±0.20 | 1.10±0.20 | 0.50±0.30 | 1.05 | 2.20 | 1.80 |
| | 3225 | 3.2±0.20 | 2.50±0.20 | 1.30±0.20 | 0.50±0.30 | 1.05 | 2.20 | 2.70 |
| | 4516 | 4.5±0.20 | 1.60±0.20 | 1.60±0.20 | 0.50±0.30 | 1.05 | 3.30 | 1.80 |
| | 4532 | 4.5±0.20 | 3.20±0.20 | 1.50±0.20 | 0.50±0.30 | 1.05 | 3.30 | 3.40 |




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

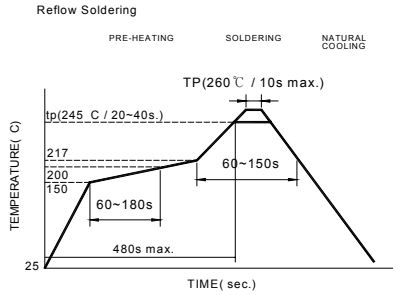
### 6-2.1 Lead Free Solder re-flow:

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

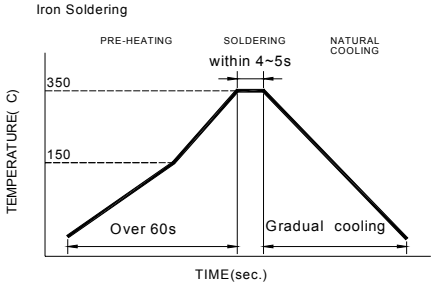
### 6-2.2 Soldering Iron:

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



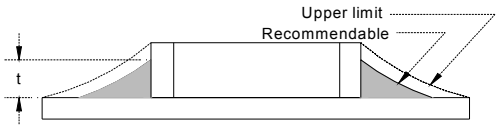

Reflow times: 3 times max
Fig.1




Iron Soldering times：1 times max
Fig.2

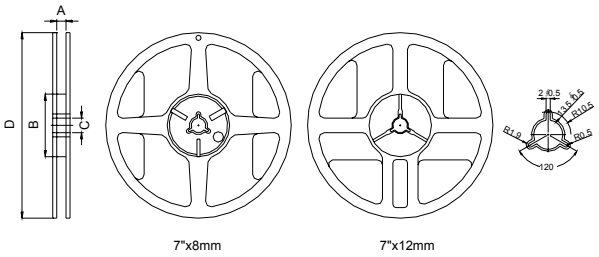
### 6-2.3 Solder Volume:

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

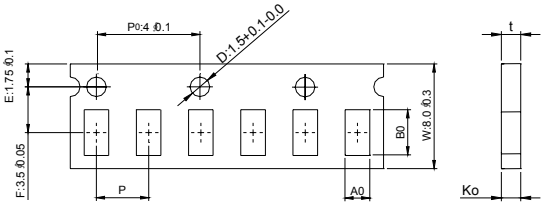
### 7-1. Reel Dimension



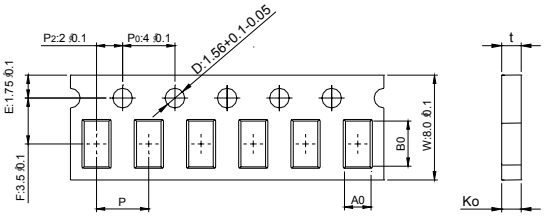

| Type | A(mm) | B(mm) | C(mm) | D(mm) |
|---|---|---|---|---|
| 7”x8mm | 9.0±0.5 | 60±2 | 13.5±0.5 | 178±2 |
| 7”x12mm | 13.5±0.5 | 60±2 | 13.5±0.5 | 178±2 |

### 7-2.1 Tape Dimension / 8mm

■Material of taping is paper

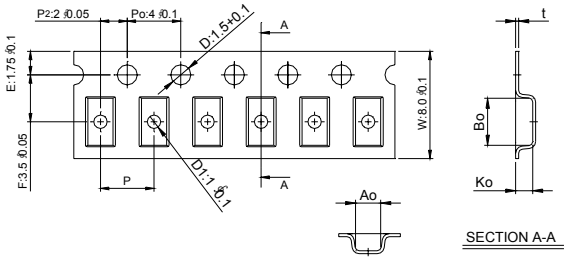



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) |
|---|---|---|---|---|---|
| 060303 | 0.70±0.06 | 0.40±0.06 | 0.45max | 2.0±0.05 | 0.45max |
| 100505 | 1.12±0.03 | 0.62±0.03 | 0.60±0.03 | 2.0±0.05 | 0.60±0.03 |



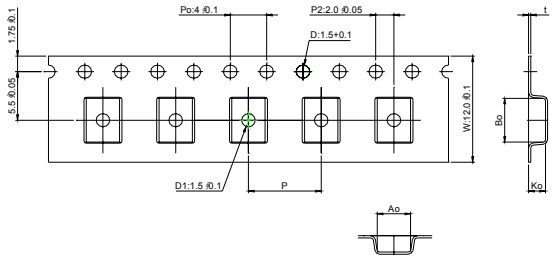

| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) |
|---|---|---|---|---|---|
| 160808 | 1.80±0.05 | 0.96+0.05/-0.03 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 |
| 201209 | 2.10±0.05 | 1.30±0.05 | 0.95±0.05 | 4.0±0.10 | 0.95±0.05 |

■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

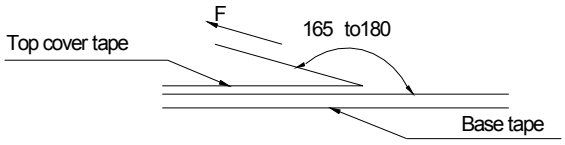



| Size | Bo(mm) | Ao(mm) | Ko(mm) | P(mm) | t(mm) | D1(mm) |
|---|---|---|---|---|---|---|
| 451616 | 4.70±0.10 | 1.75±0.10 | 1.75±0.10 | 4.0±0.10 | 0.24±0.05 | 1.5±0.10 |
| 453215 | 4.70±0.10 | 3.45±0.10 | 1.60±0.10 | 8.0±0.10 | 0.24±0.05 | 1.5±0.10 |

### 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.