High Current Ferrite Chip Bead(Lead Free)

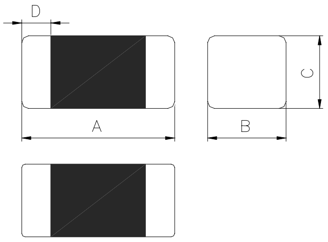
HCB1005KF-301T10

Halogen-free RoHS Certificate of GreenPartner

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



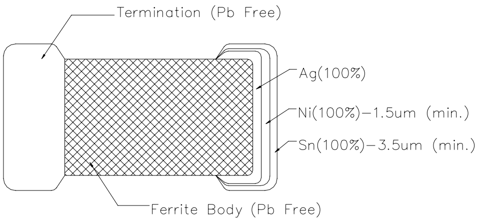
Chip Size	
A	1.00±0.10
B	0.50±0.10
C	0.50±0.10
D	0.25±0.10

Units: mm

3.Part Numbering

HCB	1005	KF	-	301	T	10
A	B	C		D	E	F

A: Series	
B: Dimension	L x W
C: Material	Lead Free Material
D: Impedance	301=300Ω
E: Packaging	T=Taping and Reel, B=Bulk(Bags)
F: Rated Current	10=1000mA



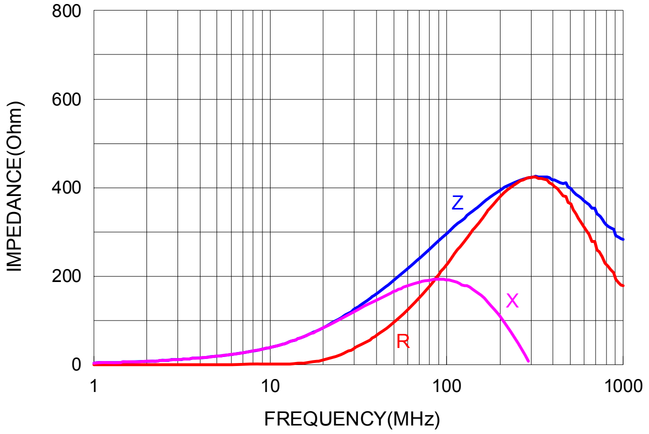
4.Specification

Tai-Tech Part Number	Impedance (Ω)	Test Frequency (Hz)	DC Resistance (Ω) max.	Rated Current (mA) max.
HCB1005KF-301T10	300±25%	60mV/100M	0.20	1000

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

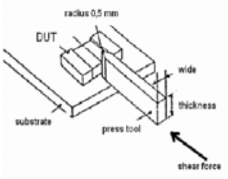
■ Impedance-Frequency Characteristics

HCB1005KF-301T10



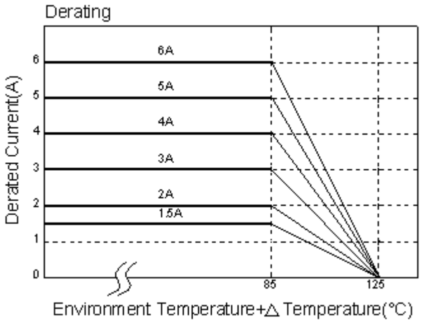
5. Reliability and Test Condition

<table>
<tr><th>Item</th><th colspan="5">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>--</td></tr>
<tr><td>Operating Temperature</td><td colspan="5">-55~+125℃
(Including self-temperature rise)</td><td>--</td></tr>
<tr><td>Transportation
Storage Temperature</td><td colspan="5">-55~+125℃
(on board)</td><td>For long storage conditions, please see the Application Notice</td></tr>
<tr><td>Impedance (Z)</td><td colspan="5" rowspan="3">Refer to standard electrical characteristics list</td><td>Agilent4291
Agilent E4991
Agilent4287
Agilent16192</td></tr>
<tr><td>DC Resistance</td><td>Agilent 4338</td></tr>
<tr><td>Rated Current</td><td>DC Power Supply
Over Rated Current requirements, there will be some risk</td></tr>
<tr><td>Temperature Rise Test</td><td colspan="5">Rated Current < 1A ΔT 20℃Max
Rated Current ≧ 1A ΔT 40℃Max</td><td>1. Applied the allowed DC current.
2. Temperature measured by digital surface thermometer.</td></tr>
<tr><td>Life test</td><td colspan="5" rowspan="2">Appearance: no damage.
Impedance: within±15%of initial value.
Inductance: within±10%of initial value.
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Temperature: 125±2℃
Applied current: rated current.
Duration: 1000±12hrs.
Measured at room temperature after placing for 24±2 hrs.</td></tr>
<tr><td>Load Humidity</td><td>Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Humidity: 85±2%R.H.
Temperature: 85±2℃.
Duration:1000hrsMin.Bead:with100%ratedcurrent，Inductance: with 10% rated current
Measured at room temperature after placing for 24±2 hrs.</td></tr>
<tr><td>Thermal shock</td><td colspan="5">Appearance: no damage.
Impedance: within±15%of initial value.
Inductance: within±10%of initial value.
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Condition for 1 cycle
Step1: -55±2℃ 30±5 min.
Step2: 25±2℃ ≦0.5min
Step3: +125±2℃ 30±5min.
Number of cycles: 500
Measured at room temperature after placing for 24±2 hrs.</td></tr>
<tr><td>Vibration</td><td colspan="5">Appearance：No damage.
Impedance：within±15% of initial value
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Oscillation Frequency: 10Hz～2KHz～10Hz for 20 minutes
Equipment： Vibration checker
Total Amplitude:10g
Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)。</td></tr>
<tr><td>Bending</td><td colspan="5">Appearance：No damage.
Impedance：within±10% of initial value
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
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:
>=0805inch(2012mm):40x100x1.2mm
<0805inch(2012mm):40x100x0.8mm
Bending depth:
>=0805inch(2012mm):1.2mm
<0805inch(2012mm):0.8mm
Duration of 10 sec for a min.</td></tr>
<tr><td>Shock</td><td colspan="5">Appearance：No damage.
Impedance：within±10% of initial value
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Test condition:<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>
<tr><td>Solderability</td><td colspan="5">More than 95% of the terminal electrode should be covered with solder.</td><td>a.Method B, 4 hrs @155°C dry heat @235°C±5°C Test time:5 +0/-0.5 seconds.
b. Method D category 3. (steam aging 8hours ± 15 min)@ 260°C±5°C
Test time: 30 +0/-0.5 seconds.</td></tr>
</table>

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Resistance to Soldering Heat</td><td>Appearance：No damage.
Impedance：within±15% of initial value
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Number of heat cycles: 1<table><tr><td>Temperature (°C)</td><td>Time (s)</td><td>Temperature ramp/immersion and emersion rate</td></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>Terminal strength</td><td>Appearance：No damage.
Impedance：within±15% of initial value
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value
 </td><td>Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Component mounted on a PCB apply a force
>0805inch(2012mm):1kg
<=0805inch(2012mm):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>
</table>

**Derating Curve

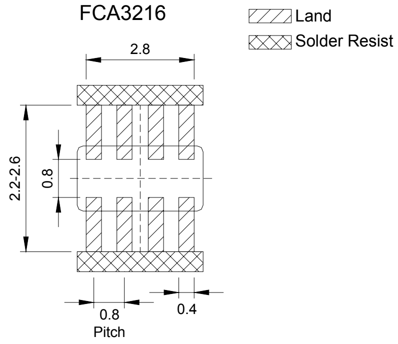
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85℃, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.

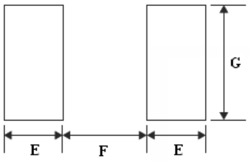


6.Soldering and Mounting

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	1005	1.0±0.10	0.50±0.10	0.50±0.10	0.25±0.10	0.50	0.40	0.60
FCM	1608	1.6±0.15	0.80±0.15	0.80±0.15	0.30±0.20	0.80	0.85	0.95
HCB	2012	2.0±0.20	1.25±0.20	0.85±0.20	0.50±0.30	1.05	1.00	1.45
GHB		2.0±0.20	1.25±0.20	1.25±0.20	0.50±0.30			
FCI	3216	3.2±0.20	1.60±0.20	1.10±0.20	0.50±0.30	1.05	2.20	1.80
FHI	3225	3.2±0.20	2.50±0.20	1.30±0.20	0.50±0.30	1.05	2.20	2.70
FCH	4516	4.5±0.20	1.60±0.20	1.60±0.20	0.50±0.30	1.05	3.30	1.80
HCI	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. TAI-TECH 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.

6-2.1 IR Soldering Reflow:

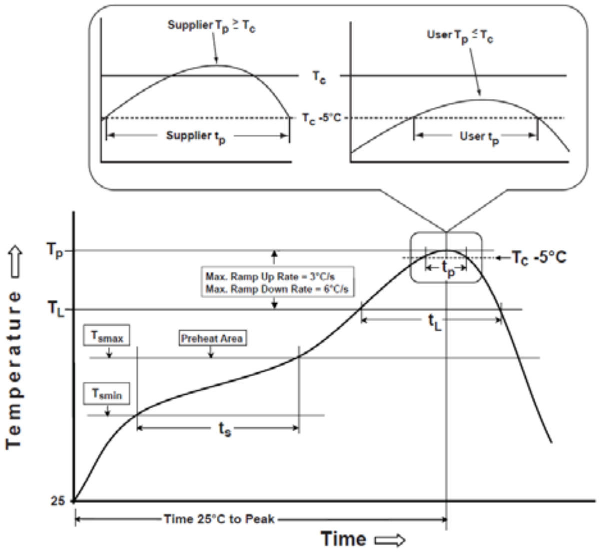
Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020E)

6-2.2 Soldering Iron:

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended. (Figure 2.)

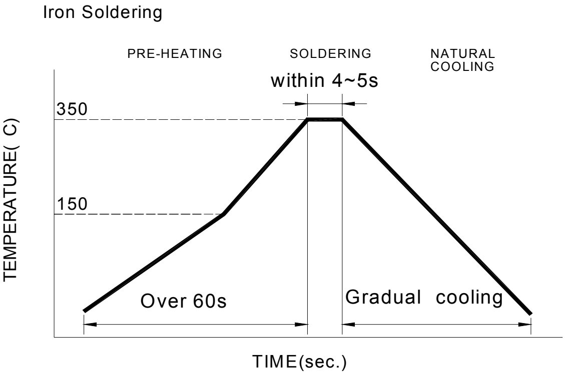
- Preheat circuit and products to 150℃
- 350℃ tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 4~5sec.

Fig.1 IR Soldering Reflow



Reflow times: 3 times max

Fig.2 Iron soldering temperature profiles



Iron Soldering times：1 times max

Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_s)from(T_{smin} to T_{smax})	 150℃ 200℃ 60-120seconds
Ramp-up rate($T_L$to T_p)	3℃/second max.
Liquidus temperature(T_L) Time(t_L)maintained above T_L	217℃ 60-150 seconds
Classification temperature(T_c)	See Table (1.2)
Time(t_p) at Tc- 5℃ (Tp should be equal to or less than Tc.)	< 30 seconds
Ramp-down rate(T_p to T_L)	6℃ /second max.
Time 25℃ to peak temperature	8 minutes max.

Tp: maximum peak package body temperature, **Tc**: the classification temperature.

For user (customer) **Tp** should be equal to or less than **Tc.**

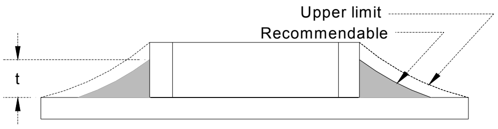
Table (1.2) Package Thickness/Volume and Classification Temperature (T_c)

	Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
PB-Free Assembly	<1.6mm	260℃	260℃	260℃
	1.6-2.5mm	260℃	250℃	245℃
	≥2.5mm	250℃	245℃	245℃

Reflow is referred to standard IPC/JEDEC J-STD-020E。

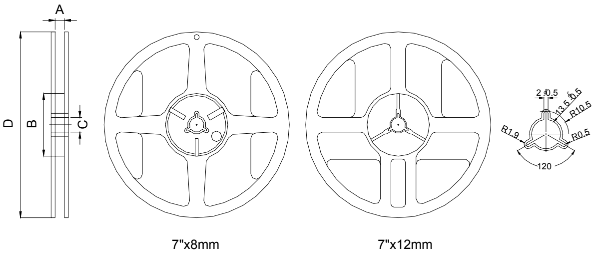
6-2.3 Solder Volume:

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

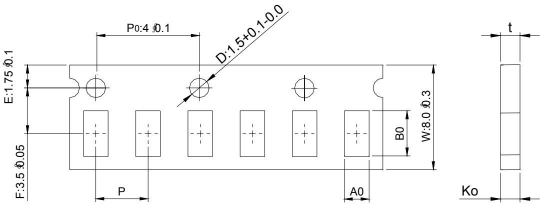


7"x8mm 7"x12mm

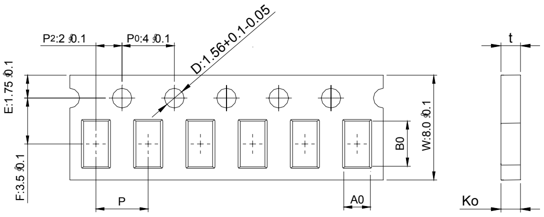
Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2
7"x12mm	13.5±0.5	60±2	13.5±0.5	178±2

7-2.1 Tape Dimension / 8mm

■Material of taping is paper

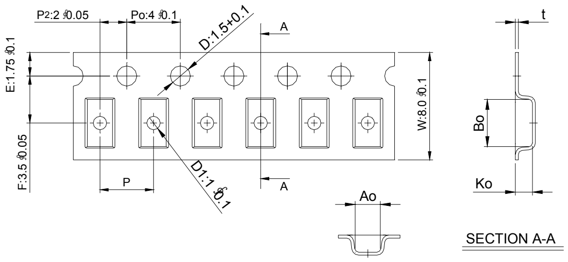


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
100505	1.12±0.03	0.62±0.03	0.60±0.03	2.0±0.05	0.60±0.03



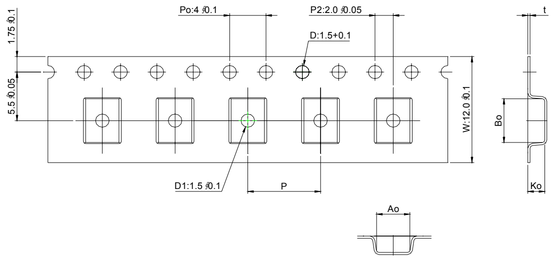
Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
160808	1.80±0.05	0.96+0.05/-0.03	0.95±0.05	4.0±0.10	0.95±0.05
201209	2.10±0.05	1.30±0.05	0.95±0.05	4.0±0.10	0.95±0.05

■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

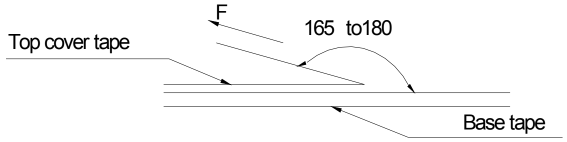


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)	D1(mm)
451616	4.70±0.10	1.75±0.10	1.75±0.10	4.0±0.10	0.24±0.05	1.5±0.10
453215	4.70±0.10	3.45±0.10	1.60±0.10	8.0±0.10	0.24±0.05	1.5±0.10

7-3. Packaging Quantity

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

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.