

High Current Ferrite Chip Inductor (Lead Free)

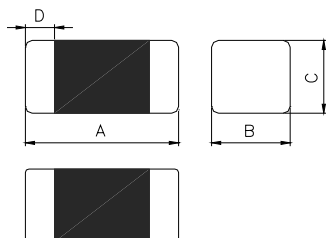
CPI-SERIES

1. Features

- 1.Low DC resistance structure of electrode to prevent wasteful electric power consumption.
- 2.Suitable for reflow soldering.
- 3.Excellent solder ability and heat resistance.
- 4.100% Lead(Pb) & Halogen-Free and RoHS compliant.
- 5.Operating Temperature:-55~+105°C (Including self-temperature rise)

Certificate
GreenPartner

2. Dimensions



Chip Size				
Series	A(mm)	B(mm)	C(mm)	D(mm)
160809	1.60±0.15	0.80±0.15	0.95 max.	0.30±0.20
201210	2.00±0.20	1.25±0.20	1.00 max.	0.50±0.30
201610	2.00±0.20	1.60±0.20	1.00 max.	0.50±0.30

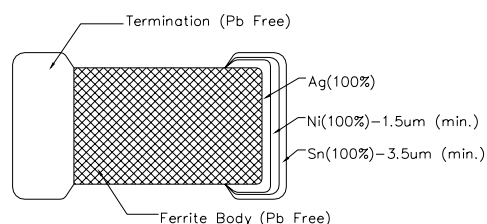
3. Part Numbering

CPI **201610** **U** **F** - **1R0** **M** - **1A3**

A B C D E F G

A: Series
B: Dimension
C: Category Code
D: Material
E: Inductance
F: Inductance Tolerance
G: Rated Current

Lead Free Material
1R0=1.0uH
M=±20%
1A3=1300mA



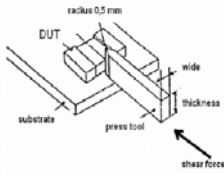
4. Specification

Tai-Tech Part Number	Inductance(uH)	Test Frequency (Hz)	Rated Current (mA) max.	DCR (Ω)	
				max.	typ.
CPI160809UF-R50M-0A9	0.5±20%	1M / 60mV	900	0.15	0.12
CPI160809UF-1R0M-0A7	1.0±20%	1M / 60mV	750	0.20	0.17
CPI160809UF-2R2M-0A6	2.2±20%	1M / 60mV	650	0.30	0.27
CPI201210UF-1R0M-1A0	1.0±20%	1M / 60mV	1000	0.14	0.11
CPI201210UF-1R5M-0A8	1.5±20%	1M / 60mV	800	0.20	0.15
CPI201210UF-2R2M-0A8	2.2±20%	1M / 60mV	800	0.20	0.15
CPI201210UF-3R3M-0A7	3.3±20%	1M / 60mV	700	0.24	0.20
CPI201210UF-4R7M-0A7	4.7±20%	1M / 60mV	700	0.28	0.23
CPI201610UF-1R0M-1A3	1.00±20%	1M / 60mV	1300	0.12	0.09
CPI201610UF-1R5M-1A2	1.50±20%	1M / 60mV	1200	0.13	0.10
CPI201610UF-2R2M-1A2	2.20±20%	1M / 60mV	1200	0.14	0.11
CPI201610UF-3R3M-1A1	3.30±20%	1M / 60mV	1100	0.16	0.13
CPI201610UF-4R7M-0A9	4.70±20%	1M / 60mV	900	0.20	0.16

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

5. Reliability and Test Condition

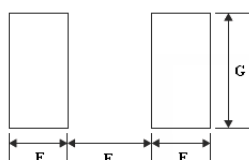
Item	Performance	Test Condition															
Operating Temperature	-55~+105℃ (Including self-temperature rise)	--															
Transportation Storage Temperature	-55~+105℃ (on board)	For long storage conditions, please see the Application Notice															
Inductance (Ls)	Refer to standard electrical characteristics list	Agilent4291 Agilent E4991 Agilent4287 Agilent16192															
DC Resistance		Agilent 4338															
Rated Current		DC Power Supply Over Rated Current requirements, there will be some risk															
Temperature Rise Test		1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.															
Life test	Appearance: no damage.	Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature: 105±2℃ Applied current: rated current. Duration: 1000±12hrs. Measured at room temperature after placing for 24±2 hrs.															
Load Humidity	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	Preconditioning: Run through 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.															
Thermal shock	Appearance: no damage. 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	Preconditioning: Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Condition for 1 cycle Step1: -55±2℃ 30±5 min. Step2: 105±2℃ ≤0.5min Step3: 105±2℃ 30±5min. Number of cycles: 500 Measured at room temperature after placing for 24±2 hrs.															
Vibration	Appearance : No damage. 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	Preconditioning: Run through 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) °															
Bending	Appearance : No damage. 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	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.															
Shock	Appearance : No damage. 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	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 (V)/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>	Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)/ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)/ft/sec													
SMD	50	11	Half-sine	11.3													
Lead	50	11	Half-sine	11.3													
Insulation Resistance	IR>1GΩ	Chip Inductor Only Test Voltage:100±10%V for 30Sec.															

Item	Performance	Test Condition						
Solderability	More than 95% of the terminal electrode should be covered with solder.	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.						
Resistance to Soldering Heat	Appearance : No damage. 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	Number of heat cycles: 1 <table border="1"> <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	Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate	260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s
Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate						
260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s						
Terminal strength	Appearance : No damage. 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	 Preconditioning: Run through reflow for 3 times. (IPC/JEDEC J-STD-020E Classification Reflow Profiles) Component mounted on a PCB apply a force >0.805inch(2012mm):1kg <=0.805inch(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.						

6. Soldering and Mounting

6-1. Recommended PC Board Pattern

Chip Size						Land Patterns For Reflow Soldering		
Serie	Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
CPI	160809	1.6±0.15	0.8±0.15	0.95 max.	0.3±0.20	0.80	0.85	0.95
	201210	2.0±0.20	1.25±0.20	1.0 max.	0.5±0.30	1.05	1.00	1.45
	201610	2.0±0.20	1.6±0.20	1.0 max..	0.5±0.30	1.05	1.00	1.75



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

Fig.1 Soldering Reflow

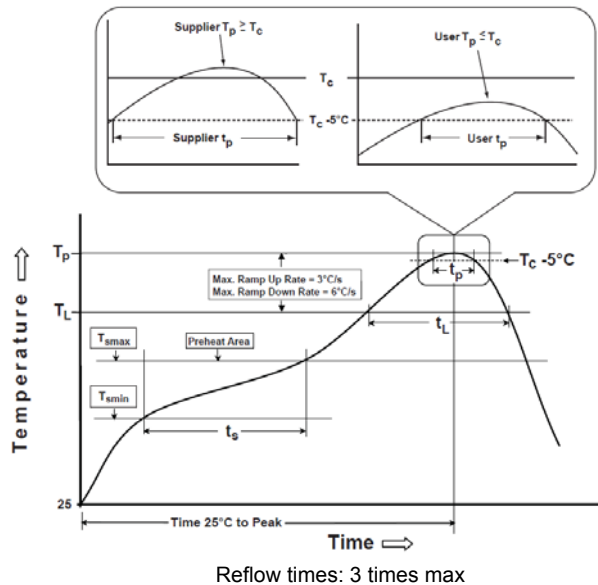


Fig.2 Iron soldering temperature profiles

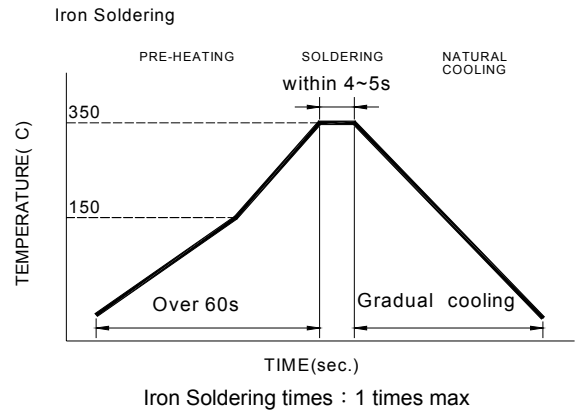


Table (1.1): Reflow Profiles

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

T_p : maximum peak package body temperature, T_c : the classification temperature.

For user (customer) T_p should be equal to or less than T_c .

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

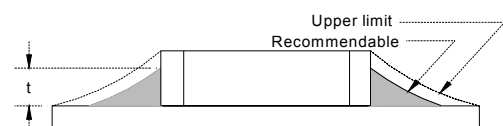
	Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
PB-Free Assembly	<1.6mm	260°C	260°C	260°C
	1.6-2.5mm	260°C	250°C	245°C
	≥2.5mm	250°C	245°C	245°C

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

6-2.3 Solder Volume:

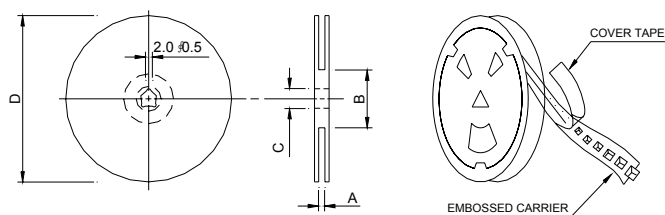
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



7. Packaging Information

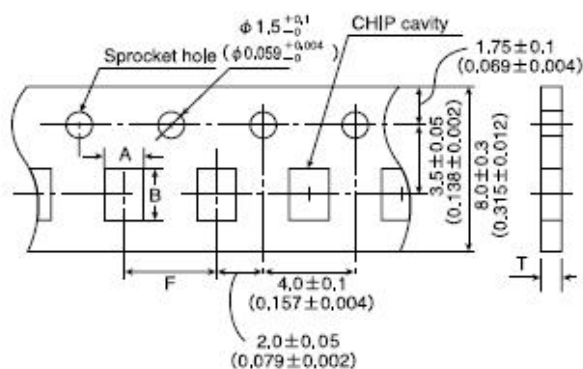
7-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	10±1.5	50 or more	13±0.2	178±2.0

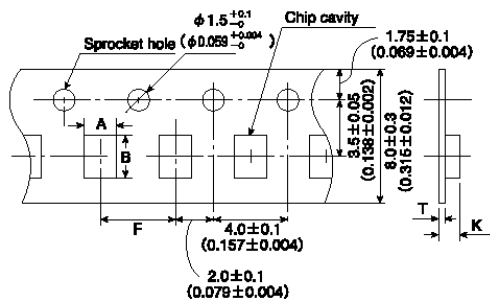
7-2. Tape Dimension / 8mm

■ Material of taping is paper



Size	A(mm)	B(mm)	F(mm)	T(mm)
160809	1.0±0.2	1.8±0.2	4.0±0.1	1.1 max

■ Material of taping is plastic

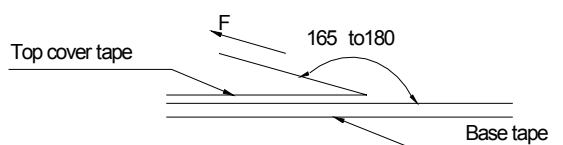


Size	A(mm)	B(mm)	K(mm)	F(mm)	T(mm)
201210	1.40±0.10	2.25±0.10	1.30 max.	4.0±0.10	0.22±0.05
201610	1.80±0.10	2.20±0.10	1.30 max.	4.0±0.10	0.25±0.05

7-3. Packaging Quantity

Chip size	160809	201210	201610
Reel	4000	3000	3000
Inner box	20000	15000	15000
Middle box	100000	75000	75000
Carton	200000	150000	150000

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. (°C)	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-020E standard-MSL, level 1.
 2. Temperature and humidity conditions: Less than 40°C 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.

Typical Inductance v.s. Frequency Curve