

# Ferrite Chip Inductor(Lead Free)

FCI3216F-470K

## 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 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	修訂可靠度 Life Test: (Inductor) Temperature:85±2℃→105±2℃.	楊祥忠	詹偉特	張嘉玲
5.0	17/02/16	修訂 Recommended PC Board Pattern	楊祥忠	詹偉特	張嘉玲
備 註					

# Ferrite Chip Inductor(Lead Free)

FCI3216F-470K

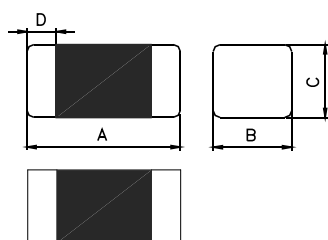
## 1.Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. S.M.T. type.
4. Suitable for reflow soldering.
5. Shapes and dimensions follow E.I.A. spec.
6. Available in various sizes.
7. Excellent solder ability and heat resistance.
8. High reliability.
9. 100% Lead(Pb) & Halogen-Free and RoHS compliant.



Certificate  
of  
Green Partner

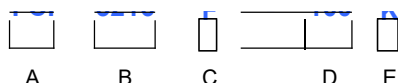
## 2. Dimensions



Chip Size	
A	3.20±0.20
B	1.60±0.20
C	1.10±0.30
D	0.50±0.30

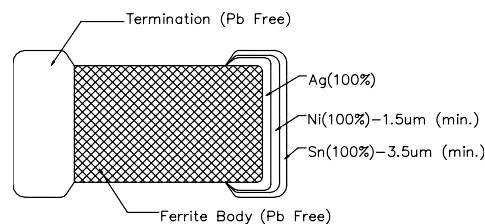
Units: mm

## 3. Part Numbering



A: Series  
 B: Dimension  
 C: Material  
 D: Inductance  
 E: Inductance Tolerance

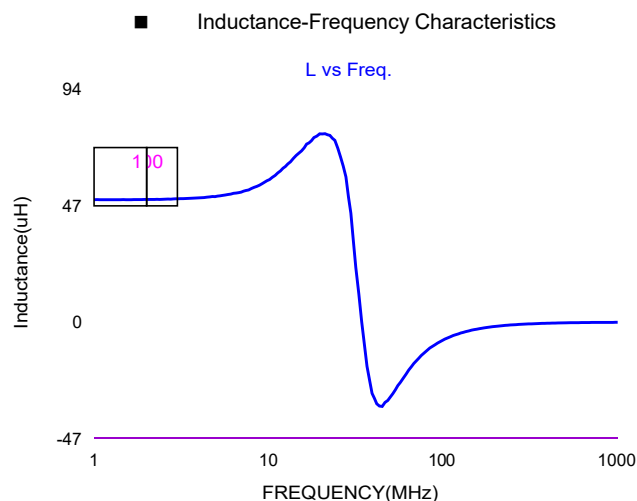
L x W  
 Lead Free Material  
 470=47.0uH  
 K=± 10%, L=± 15%, M=± 20%



## 4.Specification

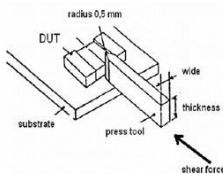
Tai-Tech	Inductance(uH)		Q		Rated Current	DCR	SRF
Part Number	Tolerance	Test Frequency (Hz)	min.	Test Frequency (MHz)	(mA) max.	(Ω) max.	(MHz) min.
FCI3216F-470K	47.0±10%	60mV / 2M	50	2	25	1.00	24

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



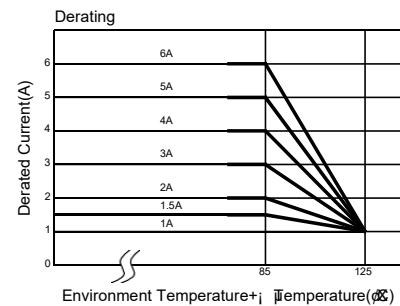
## 5. Reliability and Test Condition

Item	Performance				Test Condition																				
Series No.	FCI	FHI	FCH	HCI	--																				
Operating Temperature	-40~+105℃ (Including self-temperature rise)				--																				
Transportation Storage Temperature	-40~+105℃ (on board)				For long storage conditions, please see the Application Notice																				
Inductance (Ls)	Refer to standard electrical characteristics list				Agilent4291																				
Q Factor					Agilent E4991																				
DC Resistance					Agilent4287																				
Rated Current					Agilent16192																				
					Agilent 4338																				
					DC Power Supply Over Rated Current requirements, there will be some risk																				
Temperature Rise Test	Rated Current < 1A ΔT 20℃Max Rated Current ≥ 1A ΔT 40℃Max				1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.																				
Life test	Appearance: no damage.				Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D 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	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				Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Humidity: 85±2%R.H. Temperature: 85±2℃. Duration: 1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±2 hrs.																				
Thermal shock	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				Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Condition for 1 cycle Step1: -40±2℃ 30±5min. Step2: 25±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. 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				Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Oscillation Frequency: 10~ 2K~ 10Hz for 20 minutes Equipment: Vibration checker Total Amplitude:1.52mm±10% Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).																				
Bending	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				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. 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				<table><tr><th colspan="5">Test condition:</th></tr><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>	Test condition:					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
Test condition:																									
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.																				
Solderability	More than 95% of the terminal electrode should be covered with solder.				Preheat: 150℃,60sec. Solder: Sn96.5%-Ag3%-Cu0.5% Solder temperature: 245±5℃ Flux for lead free: Rosin. 9.5% Depth: completely cover the termination. Dip time: 4±1sec.																				

Item	Performance	Test Condition		
Resistance to Soldering  Heat	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	Number of heat cycles: 1		
		Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate
		260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s
		Depth: completely cover the termination		
Terminal strength	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	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D 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.		
				

### \*\*Derating Curve

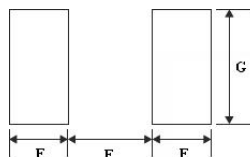
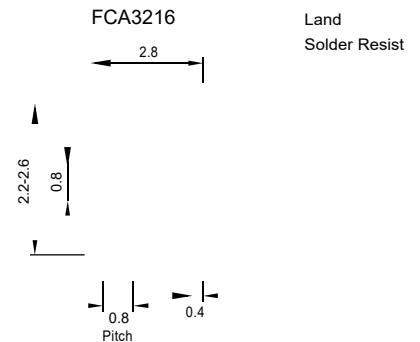
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85°C, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



## 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	0603	0.6 $\pm$ 0.03	0.30 $\pm$ 0.03	0.30 $\pm$ 0.03	0.15 $\pm$ 0.05	0.35	0.30	0.40
	1005	1.0 $\pm$ 0.10	0.50 $\pm$ 0.10	0.50 $\pm$ 0.10	0.25 $\pm$ 0.10	0.50	0.40	0.60
FCM	1608	1.6 $\pm$ 0.15	0.80 $\pm$ 0.15	0.80 $\pm$ 0.15	0.30 $\pm$ 0.20	0.80	0.85	0.95
HCB	2012	2.0 $\pm$ 0.20	1.25 $\pm$ 0.20	0.85 $\pm$ 0.20	0.50 $\pm$ 0.30	1.05	1.00	1.45
GHB		2.0 $\pm$ 0.20	1.25 $\pm$ 0.20	1.25 $\pm$ 0.20	0.50 $\pm$ 0.30			
FCI	3216	3.2 $\pm$ 0.20	1.60 $\pm$ 0.20	1.10 $\pm$ 0.30	0.50 $\pm$ 0.30	1.05	2.20	1.80
FHI	3225	3.2 $\pm$ 0.20	2.50 $\pm$ 0.20	1.30 $\pm$ 0.20	0.50 $\pm$ 0.30	1.05	2.20	2.70
FCH	4516	4.5 $\pm$ 0.20	1.60 $\pm$ 0.20	1.60 $\pm$ 0.20	0.50 $\pm$ 0.30	1.05	3.30	1.80
HCI	4532	4.5 $\pm$ 0.20	3.20 $\pm$ 0.20	1.50 $\pm$ 0.20	0.50 $\pm$ 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