Specification for Approval

Date: 2024/1/1

Customer:

BYTEK P/N: FC1608F-Series

CUSTOMER P/N:

DESCRIPTION:

QUANTITY: pcs

REMARK:		
Customer Approval Feedback		

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Sales Dep.

APPROVED	CHECKED
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R&D Center

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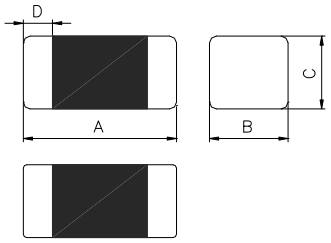
文 睿	谢庆芬	兰 静

Ferrite Chip Inductor(Lead Free) FC1608F-Series

1. Featur

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.
10. Operating Temperature:-55~+105℃(Including self-temperature

2. Dimensio



Chip Size		
A	1.60±0.15	1.80±0.15
B	0.80±0.15	
C	0.80±0.15	
D	0.30±0.20	

Units: mm

3. Part Numbering

FC	1608	F	-	1R8	K
A	B	C		D	E

A: Series
B: Dimension L x W
C: Material Lead Free Material
D: Inductance 1R8=1.8uH
E: Inductance Tolerance K=±10%,L=±15%,M=±20%

4.Specification

Part Number	Thickness	Inductance(uH)		Q		Rated Current	DCR	SRF
	A size(mm)	Tolerance	Test Frequency (Hz)	min.	Test Frequency (MHz)	(mA) max.	(Ω) max.	(MHz) min.
FC1608F-47N□	1.60±0.15	0.047	60mV / 50M	10	50	50	0.30	260
FC1608F-68N□	1.60±0.15	0.068	60mV / 50M	10	50	50	0.30	250
FC1608F-82N□	1.60±0.15	0.082	60mV / 50M	10	50	50	0.30	245
FC1608F-R10□	1.60±0.15	0.10	60mV / 25M	15	25	50	0.50	240
FC1608F-R12□	1.60±0.15	0.12	60mV / 25M	15	25	50	0.50	205
FC1608F-R15□	1.60±0.15	0.15	60mV / 25M	15	25	50	0.60	180
FC1608F-R18□	1.60±0.15	0.18	60mV / 25M	15	25	50	0.60	165
FC1608F-R22□	1.60±0.15	0.22	60mV / 25M	15	25	50	0.80	150
FC1608F-R27□	1.60±0.15	0.27	60mV / 25M	15	25	50	0.80	136
FC1608F-R33□	1.60±0.15	0.33	60mV / 25M	15	25	35	0.85	125
FC1608F-R39□	1.60±0.15	0.39	60mV / 25M	15	25	35	1.00	110
FC1608F-R47□	1.60±0.15	0.47	60mV / 25M	15	25	35	1.35	105
FC1608F-R56□	1.60±0.15	0.56	60mV / 25M	15	25	35	1.55	95
FC1608F-R68□	1.60±0.15	0.68	60mV / 25M	15	25	35	1.70	80
FC1608F-R82□	1.60±0.15	0.82	60mV / 25M	15	25	35	2.10	75

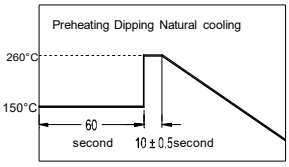
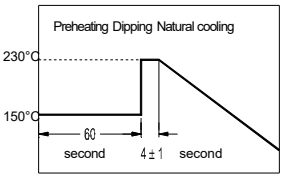
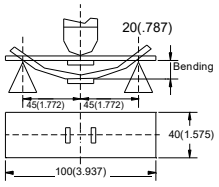
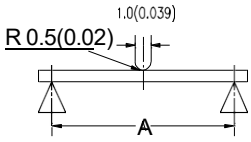
NOTE: □:TOLERANCE K=±10%,L=±15%,M=±20%

Part Number	Thickness	Inductance(uH)		Q		Rated Current	DCR	SRF
	A size(mm)	Tolerance	Test Frequency (Hz)	min.	Test Frequency (MHz)	(mA) max.	(Ω) max.	(MHz) min.
FC1608F-1R0□	1.60±0.15	1.0	60mV / 10M	30	10	25	0.60	70
FC1608F-1R5□	1.60±0.15	1.5	60mV / 10M	30	10	25	0.80	55
FC1608F-1R8□	1.60±0.15	1.8	60mV / 10M	30	10	25	0.95	50
FC1608F-2R2□	1.60±0.15	2.2	60mV / 10M	30	10	15	1.15	45
FC1608F-3R3□	1.60±0.15	3.3	60mV / 10M	30	10	15	1.55	38
FC1608F-4R7□	1.60±0.15	4.7	60mV / 10M	30	10	15	2.10	33
FC1608F-100□	1.80±0.15	10	60mV / 2M	30	2	15	2.55	17
FC1608F-120□	1.80±0.15	12	60mV / 2M	30	2	15	2.10	15

NOTE: □:TOLERANCE K=±10%,L=±15%,M=±20%

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

5. Reliability and Test Condition

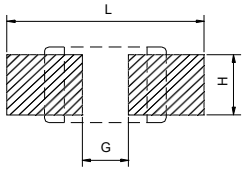
<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Operating Temperature</td><td>-40~+85℃</td><td></td></tr>
<tr><td>Storage temperature and humidity range</td><td>-40~+85℃
70%RH (max)</td><td></td></tr>
<tr><td>Inductance</td><td rowspan="3">Refer to standard electrical characteristics list</td><td>HP4291A, HP4287A+16192A,
HP4192A+16034E</td></tr>
<tr><td>DC Resistance</td><td>HP4338B</td></tr>
<tr><td>Rated Current</td><td></td></tr>
<tr><td>Temperature Rise Test</td><td>30℃ max. (Δt)</td><td>1. Applied the allowed DC current.
2. Temperature measured by digital surface thermometer.</td></tr>
<tr><td>Solder heat Resistance</td><td>No mechanical damage.
Remaining terminal electrode:70% min.
  </td><td>Preheat:150℃,60sec.
Solder : H63A
Solder tamperature:260±5℃
Flux: rosin
Dip time:10±0.5sec.</td></tr>
<tr><td>Solderability</td><td>More than 90% of the terminal electrode should be covered with solder.
  </td><td>Preheat:150℃,60sec.
Solder : H63A
Solder tamperature:230±5℃
Flux: rosin
Dip time:4±1sec.</td></tr>
<tr><td>Terminal strength</td><td>The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions.
  </td><td>For HC
Size Force (Kfg) Time(sec)
1005 0.2
1608 0.5 >25
2012 0.6</td></tr>
<tr><td>Flexture strength</td><td>The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions.
  </td><td>Solder a chip on a test substrate, bend the substrate by 2mm (0.079in)and return.</td></tr>
<tr><td>Bending Strength</td><td>The ferrite should not be damaged by Forces applied on the right condition.
  </td><td><table><tr><th>Series name</th><th>mm(inches)</th><th>P-Kgf</th></tr><tr><td>1608</td><td>0.80(0.033)</td><td>0.3</td></tr><tr><td>2012</td><td>0.14(0.055)</td><td>1.0</td></tr></table></td></tr>
<tr><td>Loading at High Temperature</td><td>Appearance: no damage.
Inductance: within±10%of initial value.
Q: within±20% of initial value.</td><td>Temperature:85±5℃.
Applied current:rated current.
Duration:500±12hrs.
Measured at room temperature after placing for 2 to 3hrs.</td></tr>
</table>

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Loading under Damp Heat</td><td>Appearance: no damage.
Inductance: within ±10%of initial value.
Q: within ±20% of initial value.</td><td>Humidity:90~95%RH.
Temperature:60±2℃.
Applied current: rated current.
Duration:500±12hrs.
Measured at room temperature after placing for 2 to 3hrs.</td></tr>
<tr><td>Thermal shock</td><td>Appearance: no damage.
Inductance: within ±10%of initial value.
Q: within ±20% of initial value
<table><tr><th>Phase</th><th>Temperature(℃)</th><th>Time(min)</th></tr><tr><td>1</td><td>-40±2℃</td><td>60</td></tr><tr><td>2</td><td>Room Temp.</td><td>10~15</td></tr><tr><td>3</td><td>+85±5℃</td><td>60</td></tr><tr><td>4</td><td>Room Temp.</td><td>10~15</td></tr></table>Measured:100 times</td><td>For HCl
Condition for 1 cycle
Step1:-40±2℃ 60 min.
Step2:Room temperature 10 to15 min.
Step3:+85±5℃ 60 min.
Step4: Room temperature 10 to15 min.
Number of cycles:100
Measured at room temperature after placing for 2 to 3 hrs.</td></tr>
<tr><td>Low temperature storage test</td><td>Appearance: no damage.
Inductance: within ±10%of initial value.
Q: within ±20% of initial value.</td><td>Temperature:-40±2℃.
Applied current:rated current.
Duration:500±12hrs.
Measured at room temperature after placing for 2 to 3hrs.</td></tr>
<tr><td>Random Vibration Test</td><td>Appearance: Cracking, shipping and any other defects harmful to the characteristics should not be allowed.
Inductance: within ±10%of initial value.
Q: within ±20% of initial value.</td><td>Frequency: 10-55-10Hz for 1 min.
Amplitude: 1.52mm
Directions and times: X, Y, Z directions for 2 hours.
A period of 2 hours in each of 3 mutually perpendicular directions (Total 6 hours).</td></tr>
<tr><td>Drop</td><td>Drop 10 times on a concrete floor from a height of 75cm</td><td>a: No mechanical damage
b: Inductance: within ±10% of initial value.
c: Q change: ±20%</td></tr>
</table>

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)**
FC	1005	1.0±0.10	0.50±0.10	0.50±0.10	0.25±0.1	2.10	0.50	0.55
	1608	1.6±0.15	0.80±0.15	0.80±0.15	0.30±0.2	2.60	0.60	0.80
	2012	2.0±0.20	1.25±0.20	0.85±0.20	0.50±0.3	3.00	1.00	1.00
		2.0±0.20	1.25±0.20	1.25±0.20	0.50±0.3			



PC board should be designed so that products are not sufficient under mechanical stress as warping the board.
Products shall be positioned in the sideway direction against the mechanical stress to prevent failure.

6-2. Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. BYTEK terminations are suitable for all wave and re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

6-2.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

6-2.2 Solder Wave:

Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave , typical at 240℃. Due to the risk of thermal damage to products, wave soldering of large size products is discouraged. Recommended temperature profile for wave soldering is shown in Figure 2.

6-2.3 Soldering Iron(Figure 3):

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.

Note : - 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
- 280℃ tip temperature (max) - 1.0mm tip diameter (max) - Limit soldering time to 3 sec.

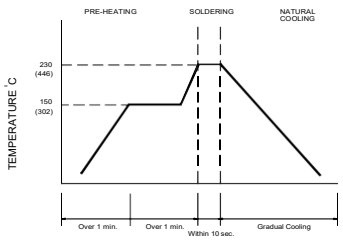


Figure 1. Re-flow Soldering

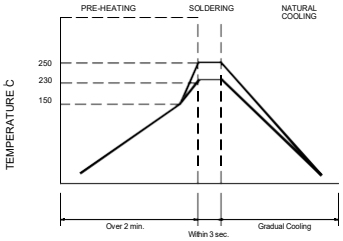


Figure 2. Wave Soldering

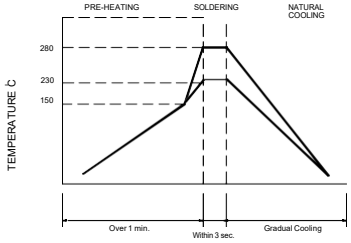
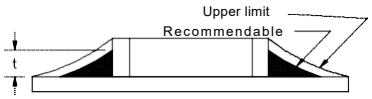


Figure 3. Hand Soldering

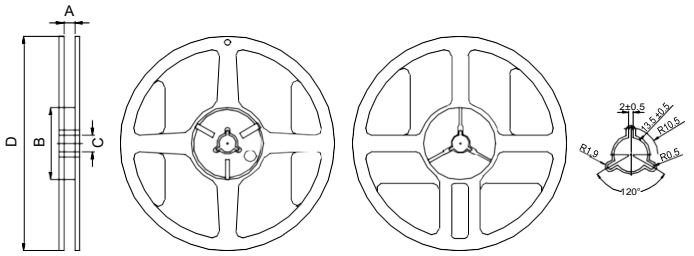
6-2.4 Solder Volume:

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:



7. Packaging Information

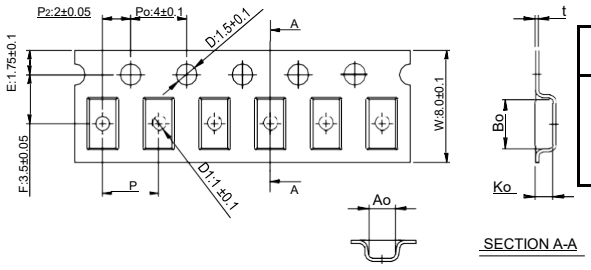
7-1. Reel Dimension



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

7-2. Tape Dimension / 8mm

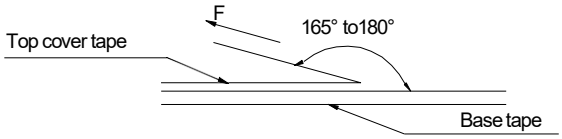


Series	size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
FC	160808	1.80±0.1	1.01±0.1	1.02±0.1	4.0±0.1	0.22±0.05
	201209	2.25±0.1	1.42±0.1	1.04±0.1	4.0±0.1	0.22±0.05
	201212	2.35±0.1	1.50±0.1	1.45±0.1	4.0±0.1	0.22±0.05

7-3. Packaging Quantity

Chip size	Chip / Reel	Inner box	Middle box	Carton	Bulk (Bags)
100505	8000	40000	200000	400000	300000
160808	4000	20000	100000	200000	200000
201209	4000	20000	100000	200000	150000
201212	2000	10000	50000	100000	100000

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

To maintain the solderability of terminal electrodes:

1. Temperature and humidity conditions: Less than 40℃ and 70% RH.
2. Recommended products should be used within 6 months form the time of delivery.
3. 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.