

Multi Layer Ferrite Inductors

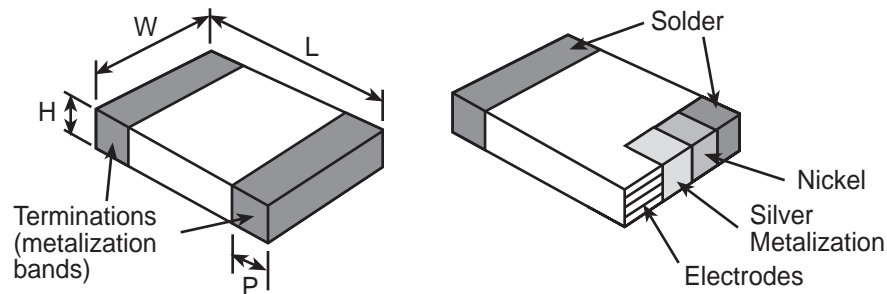
 ISO 9001 CERTIFIED

Type MCI

1. General

- Monolithic structure for closed magnetic path eliminates crosstalk and provides high reliability in a wide range of temperature and humidity ranges
- Standard EIA packages: 0603, 0805, 1206
- Nickel barrier with solder overcoat for excellent solderability
- Magnetically shielded

2. 2.1 Dimensions


Table 1

Dimensions - inches (mm)				
Part	L	W	H	P
0603	0.063±0.006 (1.60±0.15)	0.031±0.006 (0.80±0.15)	0.031±0.006 (0.80±0.15)	0.014±0.006 (0.36±0.15)
0805	0.079±0.008 (2.00±0.20)	0.049±0.008 (1.25±0.20)	0.035±0.008 (0.90±0.20)	0.020±0.010 (0.51±0.25)
1206	0.126±0.008 (3.20±0.20)	0.063±0.008 (1.60±0.20)	0.043±0.008 (1.10±0.20)	0.020±0.010 (0.51±0.25)

3. Ordering and Specifying Information*

MCI	0603	H	TE	R10	S
Type	Size Code	Material	Packaging	Nominal Inductance	Tolerance
	0603 0805 1206 1806	Permbility Code: H J	TE: 7" Embossed Plastic TED: 13" Embossed Plastic None: Bulk	047 = 0.047µH R10 = 0.100µH	J:±5% K:±10% M:±20%

* Please note: KSE's part numbers do not contain any spaces or hyphens.

4. Standard Applications

Ordering Code	Inductance L(μH)	Min. Q	L.Q. Test Frequency (MHz)	S.R.F. (MHz) Type	DC Resistance (Max.) Ω	Allowable DC Current Max. (mA)	Operating Temperature
MCI0603HTE047*	0.047	10	50	260	0.30	50	-25°C to 85°C
MCI0603HTE068*	0.068	10	50	250	0.30	50	
MCI0603HTE082*	0.082	10	50	245	0.30	50	
MCI0603HTER10*	0.10	15	25	240	0.50	50	
MCI0603HTER12*	0.12	15	25	205	0.50	50	
MCI0603HTER15*	0.15	15	25	180	0.60	50	
MCI0603HTER18*	0.18	15	25	165	0.60	50	
MCI0603HTER22*	0.22	15	25	150	0.80	50	
MCI0603HTER27*	0.27	15	25	136	0.80	50	
MCI0603HTER33*	0.33	15	25	125	0.85	35	
MCI0603HTER39*	0.39	15	25	110	1.00	35	
MCI0603HTER47*	0.47	15	25	105	1.35	35	
MCI0603HTER56*	0.56	15	25	95	1.55	35	
MCI0603HTER68*	0.68	15	25	90	1.70	35	
MCI0603HTER82*	0.82	15	25	85	2.10	35	
MCI0805HTE047*	0.047	15	50	320	0.20	300	
MCI0805HTE068*	0.068	15	50	280	0.20	300	
MCI0805HTE082*	0.082	15	50	255	0.20	300	
MCI0805HTER10*	0.10	20	25	235	0.30	250	
MCI0805HTER12*	0.12	20	25	220	0.30	250	
MCI0805HTER15*	0.15	20	25	200	0.40	250	
MCI0805HTER18*	0.18	20	25	185	0.40	250	
MCI0805HTER22*	0.22	20	25	170	0.50	250	
MCI0805HTER27*	0.27	20	25	150	0.50	250	
MCI0805HTER33*	0.33	20	25	145	0.55	250	
MCI0805HTER39*	0.39	25	25	135	0.65	200	
MCI0805HTER47*	0.47	25	25	125	0.65	200	
MCI0805HTER56*	0.56	25	25	115	0.75	150	

TE: Embossed Plastic * Add Tolerance Character (S, J, K, M)
Other values available upon request

4. Standard Applications (continued)

Ordering Code	Inductance L(μH)	Min. Q	L.Q. Test Frequency (MHz)	S.R.F. (MHz) Type	DC Resistance (Max.) Ω	Allowable DC Current Max. (mA)	Operating Temperature
MCI0805HTER68*	0.68	25	25	105	0.80	150	-25°C to 85°C
MCI0805HTER82*	0.82	25	25	100	1.00	150	
MCI1206HTE047*	0.047	20	50	320	0.15	300	
MCI1206HTE068*	0.068	20	50	280	0.25	300	
MCI1206HTER10*	0.10	20	25	235	0.25	250	
MCI1206HTER12*	0.12	20	25	220	0.30	250	
MCI1206HTER15*	0.15	20	25	200	0.30	250	
MCI1206HTER18*	0.18	20	25	185	0.40	250	
MCI1206HTER22*	0.22	20	25	170	0.40	250	
MCI1206HTER27*	0.27	20	25	150	0.50	250	
MCI1206HTER33*	0.33	20	25	145	0.60	250	
MCI1206HTER39*	0.39	25	25	135	0.50	200	
MCI1206HTER47*	0.47	25	25	125	0.60	200	
MCI1206HTER56*	0.56	25	25	115	0.70	150	
MCI1206HTER68*	0.68	25	25	105	0.80	150	
MCI1206HTER82*	0.82	25	25	100	0.90	150	
MCI1206JTE102	1.0	45	10	75	0.40	100	
MCI1206JTE122	1.2	45	10	65	0.50	100	
MCI1206JTE152	1.5	45	10	60	0.50	50	
MCI1206JTE182	1.8	45	10	55	0.50	50	
MCI1206JTE222	2.2	45	10	50	0.60	50	
MCI1206JTE272	2.7	45	10	45	0.60	50	
MCI1206JTE332	3.3	45	10	41	0.70	50	
MCI1206JTE392	3.9	45	10	38	0.80	50	
MCI1206JTE472	4.7	45	10	35	0.90	50	

TE: Embossed Plastic * Add Tolerance Character (J, K, M)
Other values available upon request

5. Characteristics

Item	Requirement	Conditions															
Operating Temperature	-25°C ~ +85°C																
Storage Temperature	40°C @ 70% Humidity	Sealed plastic bags with desiccant shall be used to reduce the potential of oxidation on the terminations during storage.															
Resistance to Solder Heat	<p>Change in Inductance: Relative to value before test $\pm 20\%$.</p> <p>Appearance: There shall be no cracking</p> <p>Solder Coverage: More than 75% of the terminal electrode shall be covered with solder.</p>	<p>Flux: 5-10 sec dip</p> <p>After Flux: Air dry for 15 sec</p> <p>Preheat: 150°C $\pm 10^\circ\text{C}$</p> <p>Preheat Time: 60 sec</p> <p>Solder Temp: 260°C $\pm 5^\circ\text{C}$</p> <p>Dip Time: 10 ± 1 sec</p>															
Solderability	<p>Solder Coverage: More than 95% of the termination shall be covered with solder.</p>	<p>Flux: 5-10 sec dip</p> <p>After Flux: Air dry for 15 sec</p> <p>Solder Temp: 245°C $\pm 5^\circ\text{C}$</p> <p>Dip Time: 5 ± 0.5 sec</p>															
Leach Resistance	<p>Appearance: There shall be no visible signs of physical or mechanical damage (i.e. no cracks)</p> <p>Terminations: Termination must not be leached away for more than 5%.</p>	<p>The bead shall be subjected to the following 5 steps for the period of time shown below. The 5 steps constitute one (1) rotation. 4 rotations shall be carried out.</p> <p>1) Flux: 5-10 sec</p> <p>2) After Flux: Air dry for 15 sec</p> <p>3) Solder Temp: 230°C $\pm 5^\circ\text{C}$</p> <p>4) Dip Time: 5 ± 0.5 sec</p> <p>5) Cool: Air cool for 60 seconds</p>															
Insulation Resistance	<p>Insulation Resistance: Min 1G ohms</p>																
Solvent Resistance	<p>Change in Inductance: Relative to value before test $\pm 10\%$.</p>	<p>Cleaning by:</p> <p>Washer: Ultrasonic washer (100W)</p> <p>Solvent: Isopropyl alcohol</p> <p>Time: 3 minutes</p>															
Terminal Strength (hanging test)	<p>Appearance: The terminal electrode shall not break off, nor shall there be damage to the body.</p>	<table border="1"> <thead> <tr> <th>Type</th> <th>W(kgf)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>0603</td> <td>0.5</td> <td>30 sec ± 2 sec</td> </tr> <tr> <td>0805</td> <td>1.0</td> <td>30 sec ± 2 sec</td> </tr> <tr> <td>1206</td> <td>1.5</td> <td>30 sec ± 2 sec</td> </tr> <tr> <td>1806</td> <td>1.5</td> <td>30 sec ± 2 sec</td> </tr> </tbody> </table>	Type	W(kgf)	Time	0603	0.5	30 sec ± 2 sec	0805	1.0	30 sec ± 2 sec	1206	1.5	30 sec ± 2 sec	1806	1.5	30 sec ± 2 sec
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1206	1.5	30 sec ± 2 sec															
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Terminal Strength (push test)	<p>Appearance: There shall be no evidence of mechanical degradations to terminals or body.</p>	<table border="1"> <thead> <tr> <th>Type</th> <th>W(kgf)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>0603</td> <td>1.4</td> <td>60 sec</td> </tr> <tr> <td>0805</td> <td>1.8</td> <td>60 sec</td> </tr> <tr> <td>1206</td> <td>2.3</td> <td>60 sec</td> </tr> <tr> <td>1806</td> <td>2.3</td> <td>60 sec</td> </tr> </tbody> </table>	Type	W(kgf)	Time	0603	1.4	60 sec	0805	1.8	60 sec	1206	2.3	60 sec	1806	2.3	60 sec
Type	W(kgf)	Time															
0603	1.4	60 sec															
0805	1.8	60 sec															
1206	2.3	60 sec															
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Bending Strength	<p>Appearance: There shall be no physical or mechanical damage</p> <p>Inductance: Relative to initial value before test $\pm 10\%$</p>	<p>Board: 90x40x1.6mm</p> <p>Bend: 1mm</p> <p>Time: 5 sec</p>															

5. Characteristics (continued)

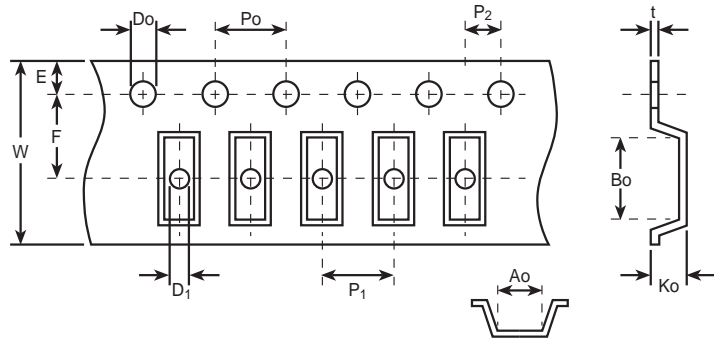
Item	Requirement	Conditions																		
Mechanical Shock	Appearance: There shall be no physical or mechanical damage Inductance: Relative to initial value before test $\pm 10\%$	Force: 50G Time: 11 msec There shall be 3 shocks in each of 6 directions (18 shocks total).																		
Vibration	Inductance: Relative to initial value $\pm 10\%$	Only endurance conditioning by sweeping shall be made. The entire frequency range from 10-2,000 Hz and return to 10 Hz in 20 minutes (this shall constitute one cycle). Amplitude: 1.5mm The test shall have a 15G peak and shall be applied for a period of 4 hours (12 cycles) in each of 3 mutually perpendicular directions (a total of 36 cycles within a total of 12 hours).																		
Thermal Shock	Appearance: There shall be no physical or mechanical damage. Inductance: Relative to initial value $\pm 20\%$. DCR: The DCR shall not exceed initial specified value. Testing of the parts will be made at 0 hours, 250 hours and 500 hours. Before testing the parts shall be allowed to cool to room temperature for 24 hours.	<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1-start</td> <td>-40°C $\pm 2^\circ\text{C}$</td> <td>—</td> </tr> <tr> <td>2-hold</td> <td>-40°C $\pm 2^\circ\text{C}$</td> <td>30 min ± 5 min</td> </tr> <tr> <td>3-transfer</td> <td>—</td> <td>0.5 min max.</td> </tr> <tr> <td>4-hold</td> <td>+105°C $\pm 2^\circ\text{C}$</td> <td>30 min ± 5 min</td> </tr> <tr> <td>5-transfer</td> <td>—</td> <td>0.5 min max.</td> </tr> </tbody> </table> Steps 1 thru 5 constitute one complete cycle and the test shall consist of a total of 500 cycles.	Step	Temperature	Time	1-start	-40°C $\pm 2^\circ\text{C}$	—	2-hold	-40°C $\pm 2^\circ\text{C}$	30 min ± 5 min	3-transfer	—	0.5 min max.	4-hold	+105°C $\pm 2^\circ\text{C}$	30 min ± 5 min	5-transfer	—	0.5 min max.
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2-hold	-40°C $\pm 2^\circ\text{C}$	30 min ± 5 min																		
3-transfer	—	0.5 min max.																		
4-hold	+105°C $\pm 2^\circ\text{C}$	30 min ± 5 min																		
5-transfer	—	0.5 min max.																		
Load Humidity	Appearance: There shall be no physical or mechanical damage Inductance: Relative to initial value $\pm 15\%$ Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.	Temperature: 85°C $\pm 2^\circ\text{C}$ Relative Humidity: 85% Time: 1,000 hours total Apply: 100% rated current																		
Life Test	Appearance: There shall be no physical or mechanical damage Inductance: Relative to initial value $\pm 15\%$ Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.	Temperature: 85°C $\pm 2^\circ\text{C}$ Time: 1,000 hours total Apply: 100% rated current																		

6. Packaging Specifications

KOA's multi layer components are provided on tape-and-reel for use in pick-and-place machines or in bulk for special applications. Both tape-and-reel and bulk products are sealed in plastic bags with desiccant. The reel size can be 7 inch or 13 inch, depending on customers' preference.

7. Dimensions - inches (mm)

Tape	Ao	Bo	Ko
0603 (1608)	0.043±0.002 (1.1±0.1)	0.075±0.002 (1.9±0.1)	0.043±0.002 (1.1±0.1)
0805 (2012)	0.063±0.002 (1.6±0.1)	0.093±0.002 (2.4±0.1)	0.046±0.002 (1.2±0.1)
1206 (3216)	0.071±0.002 (1.8±0.1)	0.138±0.002 (3.5±0.1)	0.048±0.002 (1.2±0.1)



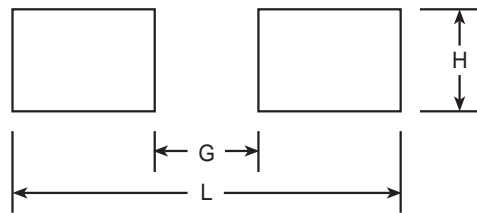
Tape	E	F	W	P ₁	P _o	P ₂	Do	D ₁	t
0603 (1608)									
0805 (2012)	0.069±0.004 (1.75±0.10)	0.138±0.002 (3.50±0.05)	0.318±0.002 (8.1±0.1)	0.157±0.004 (4.0±0.1)	0.157±0.004 (4.0±0.1)	0.079±0.002 (2.00±0.05)	0.059±0.004 (1.5+0.1/-0.0)	0.039 min. (1.0 min.)	0.009±0.001 (0.23±0.02)
1206 (3216)									

8. Chip Quantities Per Reel

Chip Size	Parts on 7 inch (178mm) Reel	Parts on 13 inch (330mm) Reel
0603 (1608)	4,000	12,000
0805 (2012)	3,000	10,000
1206 (3216)	3,000	10,000

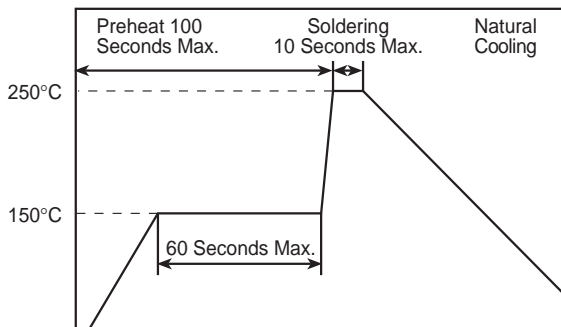
9. Recommended PC Board Land Patterns - inches (mm)

Chip Size	L	G	H
0603 (1608)	0.102 (2.6)	0.023 (0.6)	0.031 (0.8)
0805 (2012)	0.118 (3.0)	0.039 (1.0)	0.039 (1.0)
1206 (3216)	0.173 (4.4)	0.087 (2.2)	0.055 (1.4)



10. Recommended Temperature Profiles for Soldering

Recommended Temperature Profile for Wave Soldering



Recommended Temperature Profile for Reflow Soldering

