

## Multi Layer Ferrite Chip Beads

### Type MCB

ISO 9002 CERTIFIED

#### 1. General

- Designed to reduce noise at high frequencies
- Standard EIA Packages: 0402, 0603, 0805, 1206
- Nickel barrier with solder overcoat for excellent solderability
- Magnetically shielded

#### 2. 2.1 Dimensions

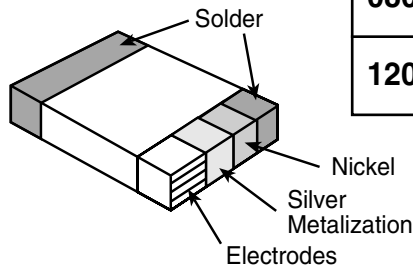
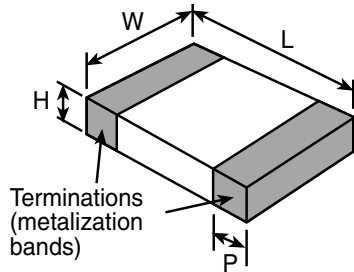


Table 1

Dimensions - inches (mm)				
Part	L	W	H	P
<b>0402</b>	0.039±0.004 (1.00±0.10)	0.020±0.004 (0.50±0.10)	0.020±0.004 (0.50±0.10)	0.010±0.004 (0.25±0.10)
<b>0603</b>	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)
<b>0805</b>	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)
<b>1206</b>	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\*

<b>MCB</b>	<b>0603</b>	<b>G</b>	<b>TE</b>	<b>500</b>	<b>J</b>
Type	Size	Material	Packaging	Impedance	Tolerance
	0402 0603 0805 1206	Permeability Code: F G S L P	TE: 7" Embossed Plastic T: 7" Paper Tape (0402 size only) 0402: 10,000 pcs/reel 0603: 4,000 pcs/reel 0805: 4,000 pcs/reel 1206: 3,000 pcs/reel	2 Significant Figure + 1 Multiplier Example: 500 = 50Ω	J:±5% K:±10% M:±20% P:±25%

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

## 4. Standard Applications

Ordering Code	Impedance @ 100MHz Ω	Maximum DC Resistance Ω	Allowable DC Current (mA)	Operating Temperature
MCB0402GT100*	10	0.05	500	-55°C to 125°C
MCB0402GT150*	15	0.07	300	
MCB0402GT700*	70	0.4	200	
MCB0402GT121*	120	0.5	200	
MCB0402GT221*	220	0.7	100	
MCB0402GT601*	600	1.1	50	
MCB0402GT102*	1000	1.5	50	
MCB0603GTE300*	30	0.1	400	
MCB0603GTE400*	40	0.1	400	
MCB0603GTE600*	60	0.2	300	
MCB0603GTE750*	75	0.2	300	
MCB0603GTE800*	80	0.2	300	
MCB0603GTE900*	90	0.3	250	
MCB0603GTE101*	100	0.3	250	
MCB0603GTE121*	120	0.3	250	
MCB0603GTE141*	140	0.3	250	
MCB0603GTE151*	150	0.3	250	
MCB0603GTE181*	180	0.3	250	
MCB0603GTE221*	220	0.3	250	
MCB0603GTE301*	300	0.35	230	
MCB0603GTE421*	420	0.4	210	
MCB0603GTE601*	600	0.45	210	
MCB0603GTE102*	1,000	0.6	190	
MCB0603GTE152*	1,500	0.85	100	
MCB0603GTE182*	1,800	0.95	50	
MCB0603GTE202*	2,000	0.8	50	
MCB0603STE180*	18	0.1	400	
MCB0603STE121*	120	0.4	200	
MCB0603STE141*	140	0.3	200	

T: Paper Tape (0402 size only) TE: Embossed Plastic \* Add Tolerance Character (J, K, M, P) PAGE 2 OF 8

## 4. Standard Applications (continued)

Ordering Code	Impedance @ 100MHz Ω	Maximum DC Resistance Ω	Allowable DC Current (mA)	Operating Temperature
MCB0603STE421*	420	0.5	200	-55°C to 125°C
MCB0603STE601*	600	0.65	200	
MCB0603STE721*	720	0.7	150	
MCB0603STE102*	1,000	0.6	50	
MCB0805FTE050*	5	0.07	800	
MCB0805FTE070*	7	0.1	800	
MCB0805FTE100*	10	0.1	800	
MCB0805FTE110*	11	0.1	800	
MCB0805FTE170*	17	0.1	800	
MCB0805FTE300*	30	0.1	800	
MCB0805FTE400*	40	0.1	800	
MCB0805FTE500*	50	0.1	800	
MCB0805FTE600*	60	0.1	800	
MCB0805FTE750*	75	0.1	800	
MCB0805FTE800*	80	0.15	400	
MCB0805GTE900*	90	0.15	400	
MCB0805GTE101*	100	0.15	400	
MCB0805GTE121*	120	0.15	400	
MCB0805GTE151*	150	0.3	200	
MCB0805GTE181*	180	0.3	200	
MCB0805GTE201*	200	0.3	200	
MCB0805GTE301*	300	0.3	200	
MCB0805GTE401*	400	0.3	200	
MCB0805GTE421*	420	0.3	200	
MCB0805GTE601*	600	0.3	200	
MCB0805GTE751*	750	0.4	200	
MCB0805GTE102*	1,000	0.4	200	
MCB0805GTE152*	1,500	0.55	200	
MCB0805GTE182*	1,800	0.8	200	

TE: Embossed Plastic \* Add Tolerance Character (J, K, M, P)

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#### 4. Standard Applications (continued)

Ordering Code	Impedance @ 100MHz Ω	Maximum DC Resistance Ω	Allowable DC Current (mA)	Operating Temperature
MCB0805GTE202*	2,000	0.7	200	-55°C to 125°C
MCB0805STE272*	2,700	0.8	200	
MCB0805LTE601*	600	0.4	100	
MCB0805STE180*	18	0.1	600	
MCB0805STE201*	200	0.4	200	
MCB0805STE601*	600	0.4	200	
MCB0805STE751*	750	0.7	200	
MCB0805STE102*	1,000	0.75	100	
MCB1206FTE190*	19	0.1	600	
MCB1206FTE260*	26	0.1	600	
MCB1206FTE300*	30	0.1	600	
MCB1206FTE310*	31	0.1	600	
MCB1206FTE500*	50	0.1	600	
MCB1206FTE600*	60	0.1	600	
MCB1206FTE700*	70	0.1	200	
MCB1206FTE800*	80	0.2	400	
MCB1206FTE900*	90	0.2	400	
MCB1206FTE101*	100	0.2	400	
MCB1206FTE121*	120	0.2	400	
MCB1206FTE151*	150	0.15	300	
MCB1206FTE201*	200	0.3	300	
MCB1206FTE301*	300	0.4	300	
MCB1206FTE601*	600	0.5	200	
MCB1206GTE102*	1,000	0.7	150	
MCB1206GTE152*	1,500 @ 50MHz	0.9	100	
MCB1206GTE202*	2,000 @ 30MHz	0.6	100	
MCB1206STE300*	30	0.1	600	
MCB1206STE181*	180	0.3	300	
MCB1206STE601*	600	0.3	200	

TE: Embossed Plastic \* Add Tolerance Character (J, K, M, P)

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## 5. Characteristics

Item	Requirement	Conditions															
Operating Temperature	-55°C ~ +125°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	<b>Change in Impedance:</b> Relative to value before test $\pm 20\%$ . <b>Appearance:</b> There shall be no cracking <b>Solder Coverage:</b> More than 75% of the terminal electrode shall be covered with solder.	<b>Flux:</b> 5-10 sec dip <b>After Flux:</b> Air dry for 15 sec <b>Preheat:</b> 150°C $\pm 10^\circ\text{C}$ <b>Preheat Time:</b> 60 sec <b>Solder Temp:</b> 260°C $\pm 5^\circ\text{C}$ <b>Dip Time:</b> 10 $\pm 1$ sec															
Solderability	<b>Solder Coverage:</b> More than 95% of the termination shall be covered with solder.	<b>Flux:</b> 5-10 sec dip <b>After Flux:</b> Air dry for 15 sec <b>Solder Temp:</b> 245°C $\pm 5^\circ\text{C}$ <b>Dip Time:</b> 5 $\pm 0.5$ sec															
Leach Resistance	<b>Appearance:</b> There shall be no visible signs of physical or mechanical damage (i.e. no cracks) <b>Terminations:</b> Termination must not be leached away for more than 5%.	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. 1) <b>Flux:</b> 5-10 sec 2) <b>After Flux:</b> Air dry for 15 sec 3) <b>Solder Temp:</b> 230°C $\pm 5^\circ\text{C}$ 4) <b>Dip Time:</b> 5 $\pm 0.5$ sec 5) <b>Cool:</b> Air cool for 60 seconds															
Insulation Resistance	<b>Insulation Resistance:</b> Min 1G ohms																
Solvent Resistance	<b>Change in Impedance:</b> Relative to value before test $\pm 10\%$ .	Cleaning by: <b>Washer:</b> Ultrasonic washer (100W) <b>Solvent:</b> Isopropyl alcohol <b>Time:</b> 3 minutes															
Terminal Strength (hanging test)	<b>Appearance:</b> The terminal electrode shall not break off, nor shall there be damage to the body.	<table border="1"> <thead> <tr> <th>Type</th> <th>W(kgf)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>0402</td> <td></td> <td>N/A</td> </tr> <tr> <td>0603</td> <td>0.5</td> <td>30 sec <math>\pm 2</math> sec</td> </tr> <tr> <td>0805</td> <td>1.0</td> <td>30 sec <math>\pm 2</math> sec</td> </tr> <tr> <td>1206</td> <td>1.5</td> <td>30 sec <math>\pm 2</math> sec</td> </tr> </tbody> </table>	Type	W(kgf)	Time	0402		N/A	0603	0.5	30 sec $\pm 2$ sec	0805	1.0	30 sec $\pm 2$ sec	1206	1.5	30 sec $\pm 2$ sec
Type	W(kgf)	Time															
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0603	0.5	30 sec $\pm 2$ sec															
0805	1.0	30 sec $\pm 2$ sec															
1206	1.5	30 sec $\pm 2$ sec															
Terminal Strength (push test)	<b>Appearance:</b> There shall be no evidence of mechanical degradations to terminals or body.	<table border="1"> <thead> <tr> <th>Type</th> <th>W(kgf)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>0402</td> <td></td> <td>N/A</td> </tr> <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> </tbody> </table>	Type	W(kgf)	Time	0402		N/A	0603	1.4	60 sec	0805	1.8	60 sec	1206	2.3	60 sec
Type	W(kgf)	Time															
0402		N/A															
0603	1.4	60 sec															
0805	1.8	60 sec															
1206	2.3	60 sec															

## 5. Characteristics (continued)

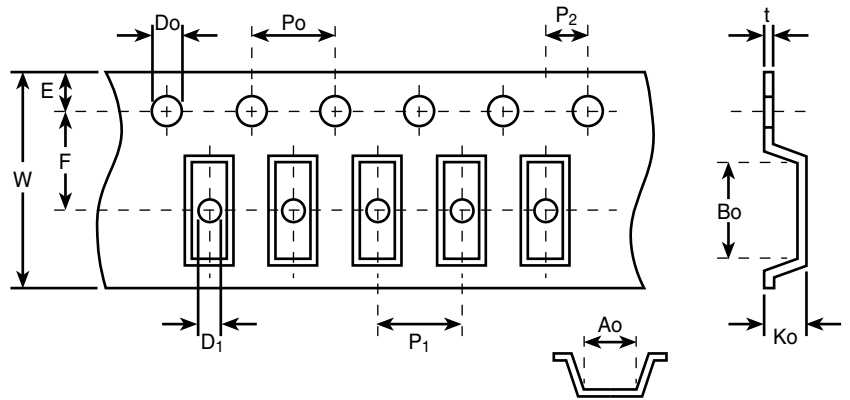
Item	Requirement	Conditions																		
Bending Strength	<p><b>Appearance:</b> There shall be no physical or mechanical damage</p> <p><b>Impedance:</b> Relative to initial value before test <math>\pm 10\%</math></p>	<p><b>Board:</b> 90x40x1.6mm</p> <p><b>Bend:</b> 1mm</p> <p><b>Time:</b> 5 sec</p>																		
Mechanical Shock	<p><b>Appearance:</b> There shall be no physical or mechanical damage</p> <p><b>Impedance:</b> Relative to initial value before test <math>\pm 10\%</math></p>	<p><b>Force:</b> 50G</p> <p><b>Time:</b> 11 msec</p> <p>There shall be 3 shocks in each of 6 directions (18 shocks total).</p>																		
Vibration	<p><b>Impedance:</b> Relative to initial value <math>\pm 10\%</math></p>	<p>Only endurance conditioning by sweeping shall be made. The entire frequency range from 10-2,000Hz and return to 10Hz in 20 minutes (this shall constitute one cycle). Amplitude: 1.5mm</p> <p>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).</p>																		
Thermal Shock	<p><b>Appearance:</b> There shall be no physical or mechanical damage.</p> <p><b>Impedance:</b> Relative to initial value <math>\pm 20\%</math>.</p> <p><b>DCR:</b> The DCR shall not exceed initial specified value.</p> <p>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.</p>	<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 <math>\pm 2^\circ\text{C}</math></td> <td>_____</td> </tr> <tr> <td>2-hold</td> <td>-40°C <math>\pm 2^\circ\text{C}</math></td> <td>30 min <math>\pm 5</math> 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 <math>\pm 2^\circ\text{C}</math></td> <td>30 min <math>\pm 5</math> min</td> </tr> <tr> <td>5-transfer</td> <td>_____</td> <td>0.5 min max.</td> </tr> </tbody> </table> <p>Steps 1 thru 5 constitute one complete cycle and the test shall consist of a total of 500 cycles.</p>	Step	Temperature	Time	1-start	-40°C $\pm 2^\circ\text{C}$	_____	2-hold	-40°C $\pm 2^\circ\text{C}$	30 min $\pm 5$ min	3-transfer	_____	0.5 min max.	4-hold	+105°C $\pm 2^\circ\text{C}$	30 min $\pm 5$ min	5-transfer	_____	0.5 min max.
Step	Temperature	Time																		
1-start	-40°C $\pm 2^\circ\text{C}$	_____																		
2-hold	-40°C $\pm 2^\circ\text{C}$	30 min $\pm 5$ min																		
3-transfer	_____	0.5 min max.																		
4-hold	+105°C $\pm 2^\circ\text{C}$	30 min $\pm 5$ min																		
5-transfer	_____	0.5 min max.																		
Load Humidity	<p><b>Appearance:</b> There shall be no physical or mechanical damage</p> <p><b>Impedance:</b> Relative to initial value <math>\pm 15\%</math></p> <p>Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.</p>	<p><b>Temperature:</b> 85°C <math>\pm 2^\circ\text{C}</math></p> <p><b>Relative Humidity:</b> 85%</p> <p><b>Time:</b> 1,000 hours total</p> <p><b>Apply:</b> 100% rated current</p>																		
Life Test	<p><b>Appearance:</b> There shall be no physical or mechanical damage</p> <p><b>Impedance:</b> Relative to initial value <math>\pm 15\%</math></p> <p>Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.</p>	<p><b>Temperature:</b> 85°C <math>\pm 2^\circ\text{C}</math></p> <p><b>Time:</b> 1,000 hours total</p> <p><b>Apply:</b> 100% rated current</p>																		

## 6. Packaging Specifications

KOA's multilayer components are provided on tape-and-reel for use in pick-and-place machines. The reel size is 7 inch.

## 7. Dimensions - inches (mm)

Tape	Ao	Bo	Ko
<b>0402 (1005)</b>	0.026±0.004 (0.65±0.1)	0.046±0.004 (1.17±0.1)	0.025±0.004 (0.63±0.1)
<b>0603 (1608)</b>	0.043±0.002 (1.1±0.1)	0.075±0.002 (1.9±0.1)	0.043±0.002 (1.1±0.1)
<b>0805 (2012)</b>	0.063±0.002 (1.6±0.1)	0.093±0.002 (2.4±0.1)	0.046±0.002 (1.2±0.1)
<b>1206 (3216)</b>	0.071±0.002 (1.8±0.1)	0.138±0.002 (3.5±0.1)	0.048±0.002 (1.2±0.1)



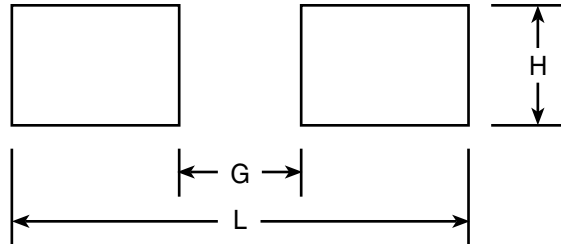
Tape	E	F	W	P <sub>1</sub>	P <sub>o</sub>	P <sub>2</sub>	Do	D <sub>1</sub>	t
<b>0402 (1005)</b>				0.079±0.004 (2.0±0.1)		0.040±0.002 (1.0±0.05)		N/A	
<b>0603 (1608)</b>	0.069±0.004 (1.75±0.10)	0.138±0.002 (3.50±.005)	0.318±0.002 (8.1±0.1)		0.157±0.004 (4.0±0.1)		0.059±0.004 (1.5+0.1/-0.0)		0.009±0.001 (0.23±0.02)
<b>0805 (2012)</b>				0.157±0.004 (4.0±0.1)		0.079±0.002 (2.00±0.05)		0.039 min. (1.0 min.)	
<b>1206 (3216)</b>									

## 8. Chip Quantities Per Reel

Chip Size	Parts on 7 inch (178mm) Reel
<b>0402 (1005)</b>	10,000
<b>0603 (1608)</b>	4,000
<b>0805 (2012)</b>	4,000
<b>1206 (3216)</b>	3,000

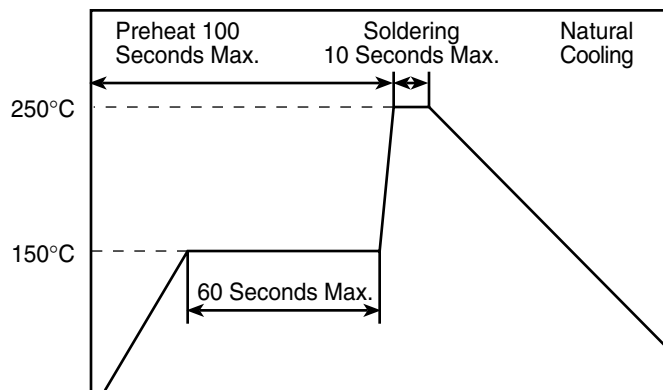
## 9. Recommended PC Board Land Patterns - mm (inches)

Chip Size	L	G	H
<b>0402 (1005)</b>	1.3 (0.051)	0.4 (0.016)	0.5 (0.020)
<b>0603 (1608)</b>	2.6 (0.102)	0.6 (0.023)	0.8 (0.031)
<b>0805 (2012)</b>	3.0 (0.118)	1.0 (0.039)	1.0 (0.039)
<b>1206 (3216)</b>	4.4 (0.173)	2.2 (0.087)	1.4 (0.055)



## 10. Recommended Temperature Profiles for Soldering

**Recommended Temperature Profile for Wave Soldering**



**Recommended Temperature Profile for Reflow Soldering**

