KOA SPEER ELECTRONICS, INC.

RoHS COMPLIANT

spec sheet

SS-223 R9
AHA 12/06/06

Multi Layer Ferrite Inductors

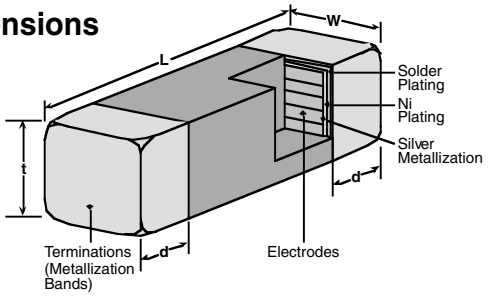
Type MCL

ISO 9001:2000 CERTIFIED
TS-16949 CERTIFIED

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: 1J, 2A, 2B
- Nickel barrier with solder overcoat for excellent solderability
- Magnetically shielded

2. 2.1 Dimensions



Size Code	L	W	t	d
1J (0603)	.063±.006 (1.6±0.15)	.031±.006 (0.8±0.15)	.031±.006 (0.8±0.15)	.014±.006 (0.36±0.15)
2A (0805)	.079±.008 (2.0±0.2)	.049±.008 (1.25±0.2)	.035±.008 (0.9±0.2)	.02±.01 (0.51±0.25)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.043±.008 (1.1±0.2)	.02±.01 (0.51±0.25)

3. Ordering and Specifying Information*

MCL	1J	H	T	TE	R10	J
Type	Size	Material	Termination Material	Packaging	Nominal Inductance	Tolerance
	1J 2A 2B	Permeability Code: H J	T: Sn (Other termination styles available, contact factory for options)	TD: 7" Paper Tape (1J - 4,000 pcs/reel; 2A - 0.047µH - 2.2µH = 4,000 pcs/reel) TE: 7" Embossed Plastic (2A - 2.7µH - 10µH = 3,000 pcs/reel; 2B - 3,000 pcs/reel)	047 = .047µH R10 = .100µH	K: ±10% M: ±20%

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

4. Standard Applications

Part Designation	Inductance L (µH)	Minimum Q	L.Q. Test Frequency (MHz)	Self Resonant Frequency Typical (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)	Operating Temperature Range
MCL1JHTTD047M	0.047	10	50	260	0.30	50	-55°C to +125°C
MCL1JHTTD068M	0.068			250			
MCL1JHTTD082M	0.082			245			
MCL1JHTTDR10*	0.10	15	25	240	0.50		
MCL1JHTTDR12*	0.12			205			
MCL1JHTTDR15*	0.15			180	0.60		
MCL1JHTTDR18*	0.18			165			
MCL1JHTTDR22*	0.22			150	0.80		
MCL1JHTTDR27*	0.27			136			

* Add tolerance character (K, M) - Other tolerances available upon request

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4. Standard Applications (continued)

Part Designation	Inductance L (μH)	Minimum Q	L.Q. Test Frequency (MHz)	Self Resonant Frequency Typical (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)	Operating Temperature Range
MCL1JHTTDR33*	0.33	15	25	125	0.85	35	-55°C to +125°C
MCL1JHTTDR39*	0.39			110	1.00		
MCL1JHTTDR47*	0.47			105	1.35		
MCL1JHTTDR56*	0.56			95	1.55		
MCL1JHTTDR68*	0.68			90	1.70		
MCL1JHTTDR82*	0.82			85	2.10		
MCL1JJTTD1R0*	1.0	35	10	75	0.60	25	
MCL1JJTTD1R2*	1.2			65	0.80		
MCL1JJTTD1R5*	1.5			60			
MCL1JJTTD1R8*	1.8			55	0.95		
MCL1JJTTD2R2*	2.2			50	1.15	15	
MCL1JJTTD2R7*	2.7			45	1.35		
MCL1JJTTD3R3*	3.3			40	1.55		
MCL1JJTTD3R9*	3.9			35	1.70		
MCL1JJTTD4R7*	4.7			33	2.10		
MCL1JJTTD5R6*	5.6		4	22	1.55	5	
MCL1JJTTD6R8*	6.8			20	1.70		
MCL1JJTTD8R2*	8.2			18	2.10		
MCL1JJTTD100*	10	30	2	17	1.85	3	
MCL1JJTTD120*	12			15	2.10		
MCL2AHTTD047M	0.047	15	50	320	0.20	300	-55°C to +125°C
MCL2AHTTD068M	0.068			280			
MCL2AHTTD082M	0.082			255			
MCL2AHTTDR10*	0.10	20	25	235	0.30	250	
MCL2AHTTDR12*	0.12			220			
MCL2AHTTDR15*	0.15			200	0.40		
MCL2AHTTDR18*	0.18			185			
MCL2AHTTDR22*	0.22			170	0.50		
MCL2AHTTDR27*	0.27			150			
MCL2AHTTDR33*	0.33			145	0.55		
MCL2AHTTDR39*	0.39	25		135	0.65	200	
MCL2AHTTDR47*	0.47			125			
MCL2AHTTDR56*	0.56			115	0.75	150	
MCL2AHTTDR68*	0.68			105	0.80		
MCL2AHTTDR82*	0.82			100	1.00		
MCL2AJTTD1R0*	1.0	45	10	75	0.40	50	
MCL2AJTTD1R2*	1.2			65	0.50		
MCL2AJTTD1R5*	1.5			60			
MCL2AJTTD1R8*	1.8			55	0.60		
MCL2AJTTD2R2*	2.2			50	0.65	30	
MCL2AJTTE2R7*	2.7			45	0.75		
MCL2AJTTE3R3*	3.3			41	0.80		
MCL2AJTTE3R9*	3.9			38	0.90		
MCL2AJTTE4R7*	4.7			35	1.00		

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4. Standard Applications (continued)

Part Designation	Inductance L (μH)	Minimum Q	L.Q. Test Frequency (MHz)	Self Resonant Frequency Typical (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)	Operating Temperature Range
MCL2AJTTE5R6*	5.6	50	4	32	0.90	15	-55°C to +125°C
MCL2AJTTE6R8*	6.8			29	1.00		
MCL2AJTTE8R2*	8.2			26	1.10		
MCL2AJTTE100*	10		2	24	1.15		
MCL2BHTTE047M	0.047	20	50	320	0.15	300	-55°C to +125°C
MCL2BHTTE068M	0.068			280	0.25		
MCL2BHTTER10*	0.10		25	235		250	
MCL2BHTTER12*	0.12			220	0.30		
MCL2BHTTER15*	0.15			200			
MCL2BHTTER18*	0.18			185	0.40		
MCL2BHTTER22*	0.22			170			
MCL2BHTTER27*	0.27			150	0.50		
MCL2BHTTER33*	0.33			145	0.60		
MCL2BHTTER39*	0.39	25		135	0.50	200	
MCL2BHTTER47*	0.47			125	0.60		
MCL2BHTTER56*	0.56			115	0.70	150	
MCL2BHTTER68*	0.68			105	0.80		
MCL2BHTTER82*	0.82			100	0.90		
MCL2BJTTE1R0*	1.0	45	10	75	0.40	100	
MCL2BJTTE1R2*	1.2			65	0.50		
MCL2BJTTE1R5*	1.5			60		50	
MCL2BJTTE1R8*	1.8			55			
MCL2BJTTE2R2*	2.2			50	0.60		
MCL2BJTTE2R7*	2.7			45			
MCL2BJTTE3R3*	3.3			41	0.70		
MCL2BJTTE3R9*	3.9			38	0.80		
MCL2BJTTE4R7*	4.7			35	0.85		
MCL2BJTTE5R6*	5.6	50	4	32	0.90	25	
MCL2BJTTE6R8*	6.8			29			
MCL2BJTTE8R2*	8.2			26			
MCL2BJTTE100*	10		2	24	1.00		
MCL2BJTTE120*	12			22	1.05	15	
MCL2BJTTE150*	15	30	1	19	0.70	5	
MCL2BJTTE180*	18			18			
MCL2BJTTE220*	22			16	0.90		
MCL2BJTTE270*	27			14			
MCL2BJTTE330*	33		0.4	13	1.05		

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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	**Change in Inductance:** Relative to value before test ±20%. **Appearance:** There shall be no cracking **Solder Coverage:** More than 75% of the terminal electrode shall be covered with solder.	**Flux:** 5-10 sec dip **After Flux:** Air dry for 15 sec **Preheat:** 150°C ±10°C **Preheat Time:** 60 sec **Solder Temp:** 260°C ±5°C **Dip Time:** 10 ±1 sec
Solderability	**Solder Coverage:** More than 95% of the termination shall be covered with solder.	**Flux:** 5-10 sec dip **After Flux:** Air dry for 15 sec **Solder Temp:** 245°C ±5°C **Dip Time:** 5 ±0.5 sec
Leach Resistance	**Appearance:** There shall be no visible signs of physical or mechanical damage (i.e. no cracks) **Terminations:** 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) Flux:** 5-10 sec **2) After Flux:** Air dry for 15 sec **3) Solder Temp:** 230°C ±5°C **4) Dip Time:** 5 ±0.5 sec **5) Cool:** Air cool for 60 seconds
Insulation Resistance	**Insulation Resistance:** Min 1G ohms	
Solvent Resistance	**Change in Inductance:** Relative to value before test ±10%.	Cleaning by: **Washer:** Ultrasonic washer (100W) **Solvent:** Isopropyl alcohol **Time:** 3 minutes
Terminal Strength (hanging test)	**Appearance:** The terminal electrode shall not break off, nor shall there be damage to the body.	**Type** / **W(kgf)** / **Time** 1J (0603) / 0.5 / 30 sec ±2 sec 2A (0805) / 1.0 / 30 sec ±2 sec 2B (1206) / 1.5 / 30 sec ±2 sec
Terminal Strength (push test)	**Appearance:** There shall be no evidence of mechanical degradations to terminals or body.	**Type** / **W(kgf)** / **Time** 1J (0603) / 1.4 / 60 sec 2A (0805) / 1.8 / 60 sec 2B (1206) / 2.3 / 60 sec
Bending Strength	**Appearance:** There shall be no physical or mechanical damage **Inductance:** Relative to initial value before test ±10%	**Board:** 90x40x1.6mm **Bend:** 1mm **Time:** 5 sec

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5. Characteristics (continued)

Item	Requirement	Conditions
Mechanical Shock	**Appearance:** There shall be no physical or mechanical damage **Inductance:** Relative to initial value before test ±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 ±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 ±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.	**Step / Temperature / Time** 1-start / -40°C ±2°C / ——— 2-hold / -40°C ±2°C / 30 min ±5 min 3-transfer / ——— / 0.5 min max. 4-hold / +105°C ±2°C / 30 min ±5 min 5-transfer / ——— / 0.5 min max. Steps 1 thru 5 constitute one complete cycle and the test shall consist of a total of 500 cycles.
Load Humidity	**Appearance:** There shall be no physical or mechanical damage **Inductance:** Relative to initial value ±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 ±2°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 ±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 ±2°C **Time:** 1,000 hours total **Apply:** 100% rated current

6. Packaging Specifications

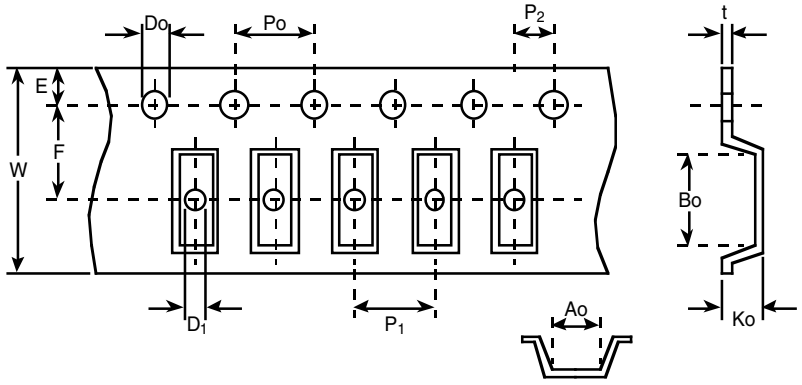
KOA's multi layer components are provided on tape-and-reel for use in pick-and-place machines. The reel size is 7 inch.

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7. Dimensions - inches (mm)

Tape	Ao	Bo	Ko
1J	0.043±0.002 (1.1±0.1)	0.075±0.002 (1.9±0.1)	0.043±0.002 (1.1±0.1)
2A	0.063±0.002 (1.6±0.1)	0.093±0.002 (2.4±0.1)	0.046±0.002 (1.2±0.1)
2B	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	Po	P_2	Do	D_1	t
1J 2A 2B	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)	0.157±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)

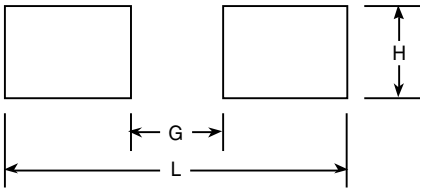
8. Chip Quantities Per Reel

Chip Size	Parts on 7 inch (178mm) Reel
1J	4,000
2A	* 2,000/4,000
2B	3,000

* MCL0805: 2.7µH ~ 12µH = 2K
0.047µH ~ 2.2µH = 4K

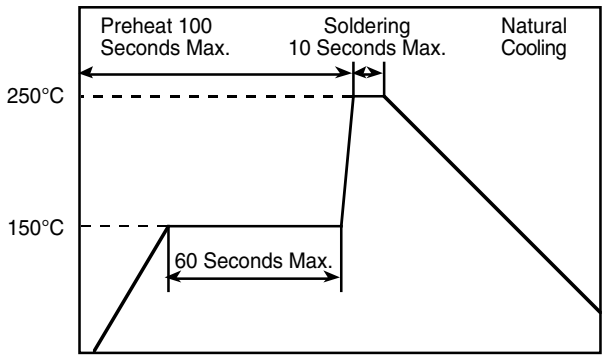
9. Recommended PC Board Land Patterns - inches (mm)

Chip Size	L	G	H
1J	0.102 (2.6)	0.022 (0.55)	0.037 (0.94)
2A	0.118 (3.0)	0.026 (0.66)	0.057 (1.45)
2B	0.173 (4.4)	0.059 (1.5)	0.071 (1.8)

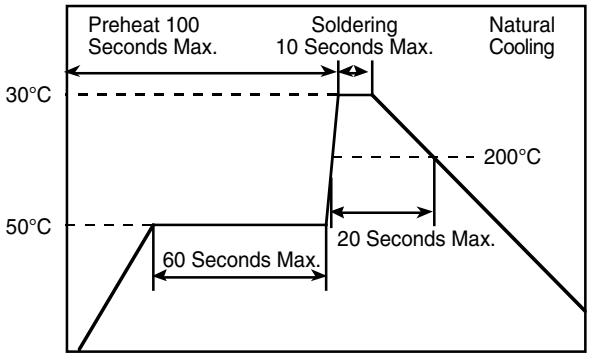


10. Recommended Temperature Profiles for Soldering

Recommended Temperature Profile for Wave Soldering



Recommended Temperature Profile for Reflow Soldering



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