KOA SPEER ELECTRONICS, INC.

RoHS COMPLIANT

spec sheet

SS-203 R5
AHA 06/28/06

Thin Film Chip Inductors
Type KL73 0402

ISO 9001:2000 CERTIFIED
TS-16949 CERTIFIED

1. Scope

This specification applies to Thin Film Chip Inductors (KL73) 1E size produced by KOA Corporation.

2. Type Designation

The type designation shall be the following form:

New Type

KL73	1E	T	TE	4N7	G
Type	Size	Termination Material	Packaging	Nominal Inductance	Tolerance
	1E: 0402	T: Sn (Other termination styles available, contact factory for options)	TP: 7" Embossed Paper 2mm Pitch (10,000 pcs/reel)	4N7: 4.7nH 47N: 47nH	B: ±0.1nH C: ±0.2nH G: ±2% J: ±5%

3. Rating

Item	Ratings
Nominal Inductance Range (nH)	0.56 ~ 27 (E12 series)
Inductance Tolerance	± 2%, ± 5%, (1.0nH ~ 4.7) ±0.01% (0.56nH ~ 0.82nH)
Quality Factor (min.)	10 ~ 7
Self Resonant Frequency (min.) (MHz)	14,000 ~ 1,500
DC Resistance (max.) (Ω)	0.10 ~ 5.00
Allowable Current (max.) (mA)	700 ~ 150
Operating Temperature Range (°C)	-40°C ~ +85°C
Storage Temperature Range (°C)	-40°C ~ +125°C

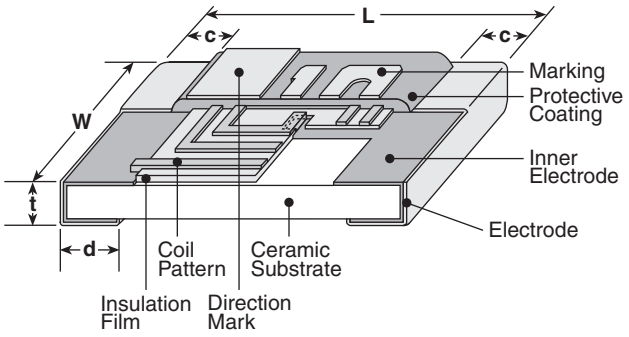
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Rating Table

Part Designation	Inductance (nH)	Inductance Tolerance	Quality Factor Minimum	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)	Measured Frequency (MHz)
KL731ETTPN56B	0.56	B: ±0.1nH	7	14000	0.10	700	500
KL731ETTPN68B	0.68						
KL731ETTPN82B	0.82						
KL731ETTP1N0*	1.0	B: ±0.1nH C: ±0.2nH	10	12000	0.15		
KL731ETTP1N2*	1.2						
KL731ETTP1N5*	1.5			10000	0.20		
KL731ETTP1N8*	1.8						
KL731ETTP2N2*	2.2			8000	0.25	650	
KL731ETTP2N7*	2.7						
KL731ETTP3N3*	3.3			6000	0.30	600	
KL731ETTP3N9*	3.9				0.50	550	
KL731ETTP4N7*	4.7			5000		500	
KL731ETTP5N6*	5.6	G: ±2% J: ±5%			1.00	450	
KL731ETTP6N8*	6.8			4000		350	
KL731ETTP8N2*	8.2			3000			
KL731ETTP10N*	10			2500	1.50	300	
KL731ETTP12N*	12					250	
KL731ETTP15N*	15			2000	2.00	200	
KL731ETTP18N*	18		7	1500	3.00		200
KL731ETTP22N*	22				5.00	150	
KL731ETTP27N*	27						
KL731ETTP33N*	33			1000			

* Add tolerance character (B, C, G, J)

4. Dimensions and Construction



(Inch Size Code)	L	W	c	d	t
1E (0402)	.039±.004 *(1.0±0.1)*	.02±.002 *(0.5±0.05)*	.006±.004 *(0.15±0.1)*	.01±.004 *(0.25±0.1)*	.014±.002 *(0.35±0.05)*

5. Marking

Inductance value shall have no marking. Direction marking only.

Coating color: Dark blue
Direction mark color: Yellow

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6. Characteristics

6-1 Test Condition

Unless otherwise specified, the standard range of atmospheric conditions for marking measurements and tests is as follows:

Ambient temperature: 20 ± 15°C
Relative humidity: 65 ± 20%

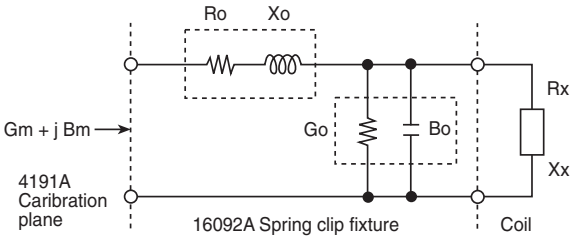
If there may be any doubt on results, measurements shall be made within the following limits:

Ambient temperature: 20 ± 2°C
Relative humidity: 65 ± 5%

7-2 Measurement Method of L and Q

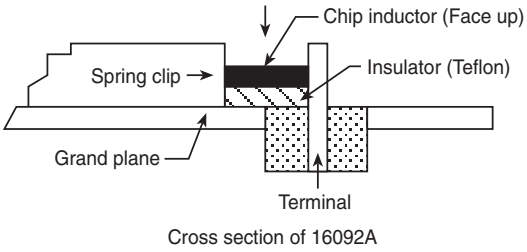
Test equipment: Hewlett Packard RF Impedance analyzer 4191A
Fixture: Hewlett Packard Test fixture 16092A
Measuring frequency: 500 MHz (1.0 nH ~ 15 nH)
200 MHz (18 nH ~ 27 nH)

1. Perform auto-calibration at the 4191A .275" (7mm) unknown connector connected 0Ω/0S/50Ω standard terminations.
2. Connected the test fixture 16092A.
   Measure the open circuit admittance (Go, Bo), and the short circuit impedance (Ro, Xo).



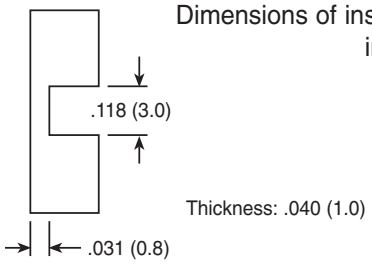
Gm + jBm: Measured admittance [S]
Ro + jXo: Residual impedance [Ω]
Go + jBo: Stray admittance [S]
Rx + jXx: Unknown impedance [Q]

3. Set pattern up and ground side to direction mark on insulator.
   Measure admittance (Gm, Bm).



Cross section of 16092A

Dimensions of insulator (Teflon) in inches (mm)



4. The L and Q value shall be given the following equation. (Compensated calculation)

$$Rx = \frac{Gm-Go}{(Gm-Go)^2+(Bm-Bo)^2} - Ro$$

$$Xx = \frac{Bo-Bm}{(Gm-Go)^2-(Bm-Bo)^2} - Xo$$

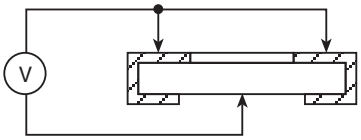
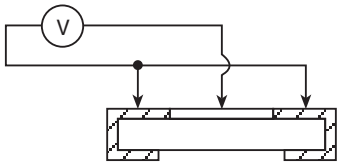
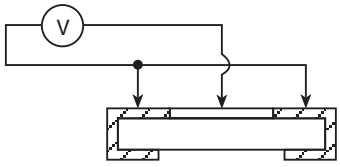
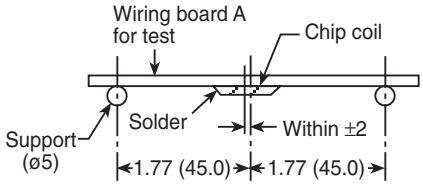
L: Inductance of coil
Q: Quality factor of coil
f: Measuring frequency

$$L = \frac{Xx}{2\pi f} \quad , \quad Q = \frac{Xx}{Rx}$$

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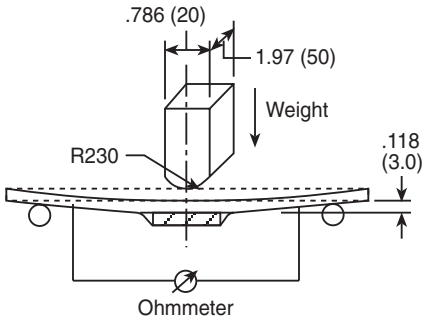
7-3 Characteristics

Item	Requirement	Test Method
Insulation resistance	More than 10^4 MΩ	DC 500V, 1 minute Between both terminals and center of reverse side 
	More than 10^3 MΩ	DC 500V, 1 minute Between both terminals and center of protection coating 
Dielectric withstanding voltage	Without distinct damage	DC 500V, 1 minute Between both terminals and center of protection coating 
Terminal strength	Δ R/R: Within ± 1% Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% No mechanical damage by cracks or stripping, etc.	Soldered chip on wiring board A for test is to be bent down to .118" (3 mm) as below drawing (Set condition) Dimensions in inches (mm) 

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7-3 Characteristics (continued)

Item	Requirement	Test Method
		 Dimensions in inches (mm)
Vibration	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	Inflict 2 hours in each direction of X, Y, Z at vibration of 10 ~ 55Hz, amplitude .059" (1.5 mm)
Resistance to solder heat	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	260 ± 5°C, 10 ± 1 second
Solderability	95% of the terminal should be covered with new solder	230 ± 5°C, 3 ± 0.5 second
Shock resistance	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	Inflict the impulse 3 times to both direction (total 18 times) along perpendicular axis that 100G, 6 ms.
Low temperature operation	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	-40°C ± 3°C, 1,000 ± 4 hours
Heat resisting property	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	125°C ± 2°C, 1,000 ± 4 hours
Temperature cycling	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction	-40 ± 3°C, 30 minutes/125 ± 2°C, 30 minutes 100 cycles

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7-3 Characteristics (continued)

Item	Requirement	Test Method
Humidity	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance and construction. Insulation resistance: more than 50MΩ	40 ± 2°C, 90 ~ 95% RH 1,000 ± 4 hours
Resistance to solvent	Δ L/L: Within ± 2% Δ Q/Q: Within ± 20% Without distinct damage in appearance, construction and marking	Immerse 30 ± 5 seconds in the regent (20 ~ 25°C) of JIS K 8839 (1995)

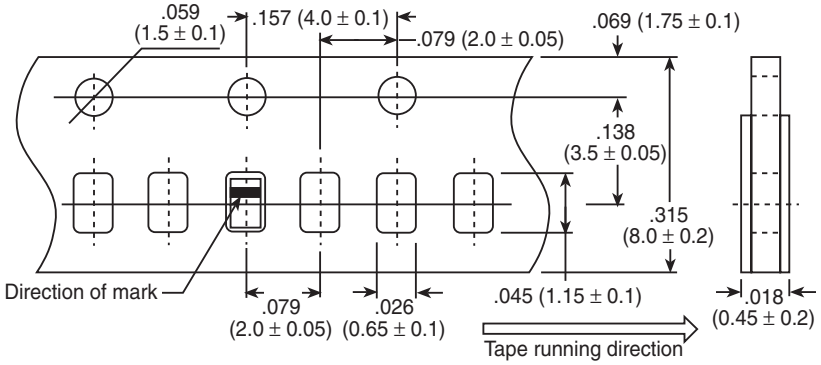
8. Packaging

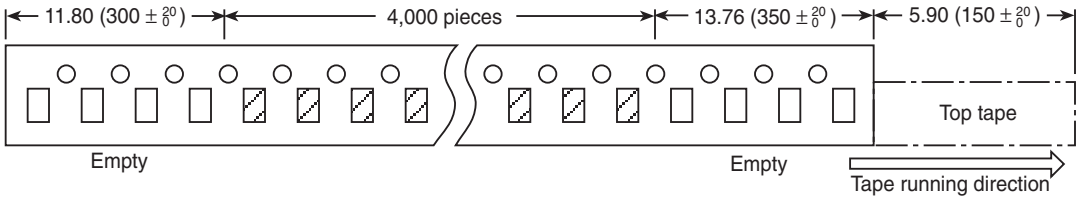
8-1 Taping

The tapes for taping shall be paper carrier tapes of .315" (8 mm) width and .079" (2 mm) pitches.

(1) Dimensions of carrier tape

Dimensions in inches (mm)

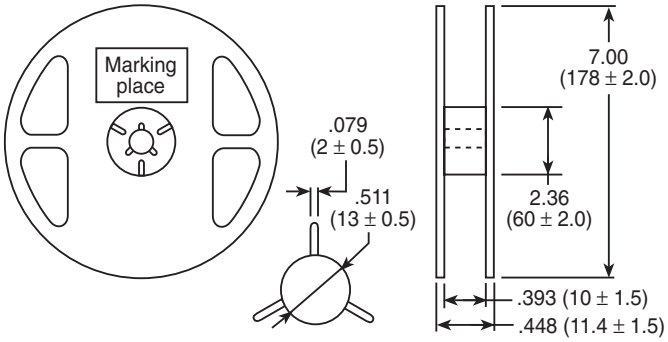




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(2) Reel dimensions



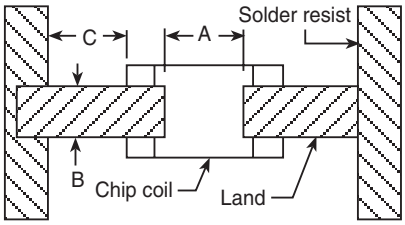
Dimensions in inches (mm)

(Marking item)

(1) Type designation
(2) Nominal inductance
(3) Quantity
(4) Production lot number
(5) Manufacture's name

9. Recommended Soldering Condition

9-1 Dimensions of Standard Land

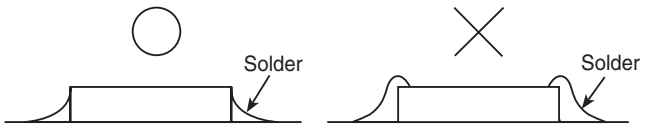


Dimensions in inches (mm)

Size	A	B	C
1E	.016 ~ .020 (0.4 ~ 0.5)	.012 ~ .020 (0.3 ~ 0.5)	.016 ~ .020 (0.4 ~ 0.5)

9-2 Soldering Condition

Reflow soldering should be done at 240°C within 20 seconds. Flow soldering should be done at 260°C within 10 seconds. Please use suitable solder quantity, too much solder may affect performance of product.



10. Recommended Washing Condition

Propil alcohol and methyl alcohol used for the washing process will not affect the part performance.

Ultrasonic cleaning should be changed to condition for size of printed wiring board and type of oscillator. Overpowering of ultrasonic cleaning will cause problems according to resonant phenomenon. Condition of ultrasonic cleaner should be confirmed prior to use.
We recommend the following conditions.

Ultrasonic power: Within 20W/1
Cleaning times: Within 5 minutes

11. Storage

Chip inductors should not be stored under high temperature and high humidity conditions. In particular, do not store ***taping*** where it is exposed to heat or direct sunlight. Otherwise, the packing material may be deformed, causing problems during mounting.

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