

## Thin Film Chip Inductors

### Type KL73 0805

ISO 9001:2000  
TS-16949

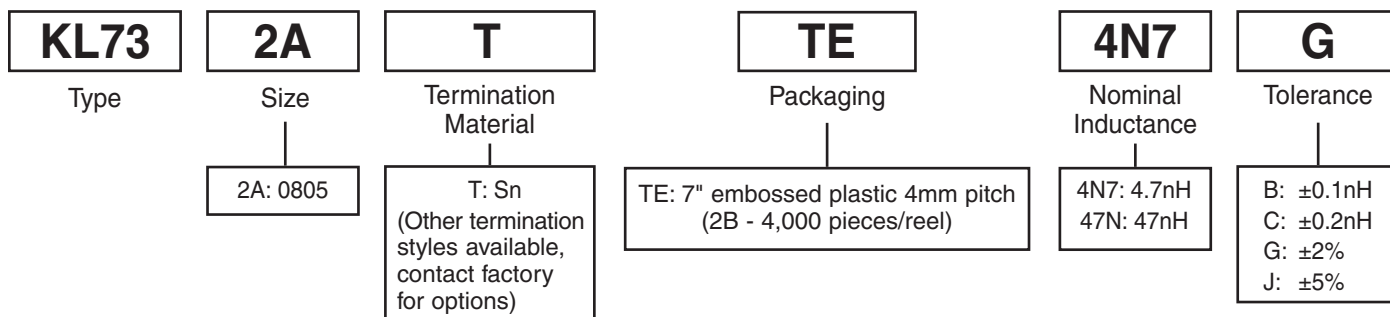
#### 1. Scope

This specification applies to Thin Film Chip Inductors (KL73) 2A size produced by KOA Corporation.

#### 2. Type Designation

The type designation shall be the following form:

##### New Type



#### 3. Rating

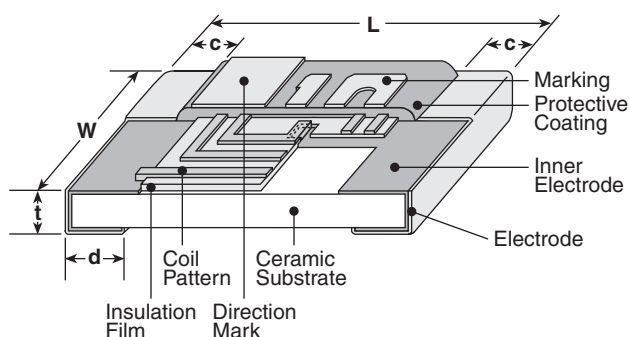
Item	Ratings
Nominal Inductance Range (nH)	1.0 ~ 82 (E-12 series)
Inductance Tolerance	± 2%, ± 5% (± 0.2nH: Under 4.7nH)
Quality Factor (typ.)	10 ~ 25
Self Resonant Frequency (typ.) (MHz)	600 ~ 13,000
DC Resistance (typ.) (Ω)	0.25 ~ 5.00
Allowable Current (max.) (mA)	150 ~ 900
Operating Temperature Range (°C)	-40°C ~ +85°C
Storage Temperature Range (°C)	-40°C ~ +125°C

## 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)
KL732ATTE1N0*	1.0	C: ±0.2nH	20	13000	0.25	900	500
KL732ATTE1N2*	1.2			10000			
KL732ATTE1N5*	1.5		9000	800			
KL732ATTE1N8*	1.8		8000				
KL732ATTE2N2*	2.2		25	6000	0.50	700	
KL732ATTE2N7*	2.7			5000			
KL732ATTE3N3*	3.3			4500		500	
KL732ATTE3N9*	3.9			4000			
KL732ATTE4N7*	4.7	G: ±2% J: ±5%	3000	1.00	400		
KL732ATTE5N6*	5.6		2500		300		
KL732ATTE6N8*	6.8		2000				
KL732ATTE8N2*	8.2		1500				
KL732ATTE10N*	10		20	1000	1.50	250	
KL732ATTE12N*	12			800		200	
KL732ATTE15N*	15		15	700	5.00		
KL732ATTE18N*	18			600			
KL732ATTE22N*	22		10	500			
KL732ATTE27N*	27			400			
KL732ATTE33N*	33	10	300				
KL732ATTE39N*	39		200				
KL732ATTE47N*	47		150				
KL732ATTE56N*	56		80				
KL732ATTE68N*	68	10	60				
KL732ATTE82N*	82		50				

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

## 4. Dimensions



Type	Dimensions inches (mm)				
(Inch Size Code)	L	W	c	d	t
2A (0805)	.079 $\pm$ .008 (2.0 $\pm$ 0.2)	.049 $\pm$ .008 (1.25 $\pm$ 0.2)	.016 $\pm$ .008 (0.4 $\pm$ 0.2)	.012 $\pm$ .004 (0.3 $\pm$ 0.2)	.02 $\pm$ .004 (0.5 $\pm$ 0.1)

## 5. Marking

### 5-1 Coating and Marking Color

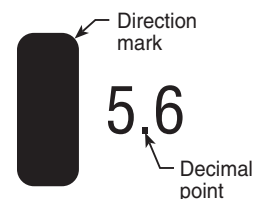
Coating color: Dark blue  
Direction mark color: Yellow

### 5-2 Marking Method

Inductance value shall be indicated to two letters marking, including decimal point.

(Example of marking)

2.2  $\rightarrow$  2.2nH  
5.6  $\rightarrow$  5.6nH  
10  $\rightarrow$  10nH  
47  $\rightarrow$  47nH



## 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:  $20 \pm 15^{\circ}\text{C}$   
Relative humidity:  $65 \pm 20\%$

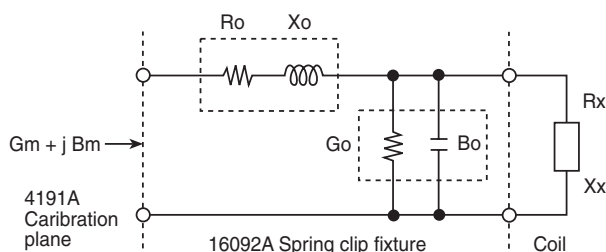
If there may be any doubt on results, measurements shall be made within the following limits:

Ambient temperature:  $20 \pm 2^{\circ}\text{C}$   
Relative humidity:  $65 \pm 5\%$

### 6-2 Measurement Method of L and Q

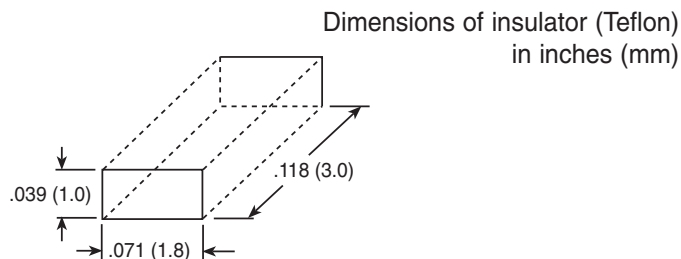
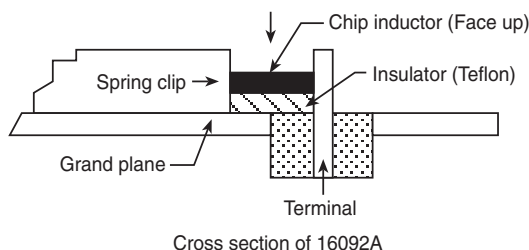
Test equipment: Hewlett Packard RF Impedance analyzer 4191A  
Fixture: Hewlett Packard Test fixture 16092A  
Measuring frequency: 500 MHz/1.0nH ~ 22nH (1.0nH ~ 15nH)  
200 MHz/27nH ~ 100nH (18nH ~ 27nH)

1. Perform auto-calibration to the HP4191A .275" (7mm) unknown connector connected to 0Ω/0S/50Ω standard terminations.
2. Connected the test fixture 16092A.  
Measure the open circuit admittance ( $G_o$ ,  $B_o$ ), and the short circuit impedance ( $R_o$ ,  $X_o$ ).



$G_m + jB_m$ : Measured admittance [S]  
 $R_o + jX_o$ : Residual impedance [ $\Omega$ ]  
 $G_o + jB_o$ : Stray admittance [S]  
 $R_x + jX_x$ : Unknown impedance [Q]

3. Set pattern up and ground side to direction mark on insulator.  
Measure admittance ( $G_m$ ,  $B_m$ ).



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

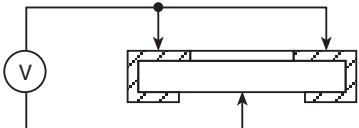
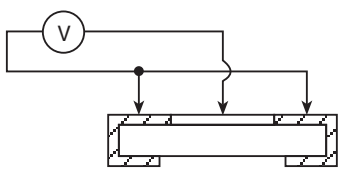
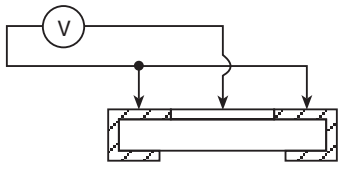
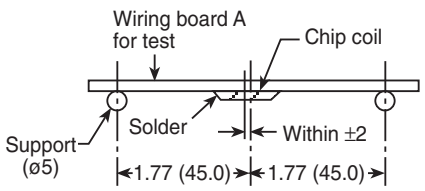
$$R_x = \frac{G_m - G_o}{(G_m - G_o)^2 + (B_m - B_o)^2} - R_o$$

$$X_x = \frac{B_o - B_m}{(G_m - G_o)^2 - (B_m - B_o)^2} - X_o$$

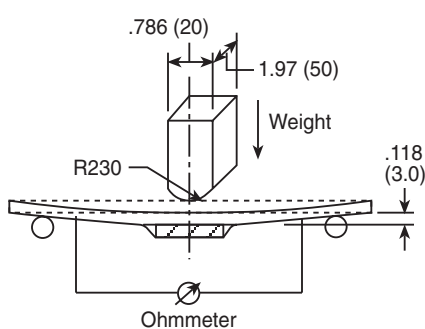
$$L = \frac{X_x}{2\pi f}, \quad Q = \frac{X_x}{R_x}$$

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

## 7-3 Characteristics

Item	Requirement	Test Method
Insulation resistance	More than $10^4$ M $\Omega$	DC 500V, 1 minute between both terminals and center of reverse side. 
	More than $10^3$ M $\Omega$	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	$\Delta$ R/R: Within $\pm 1\%$ $\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ 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) 

## 7-3 Characteristics (continued)

Item	Requirement	Test Method
		 <p>Dimensions in inches (mm)</p>
Vibration	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ 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)
Resistance to solder heat	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction	260 $\pm$ 5°C, 10 $\pm$ 1 second
Solderability	95% of the terminal should be covered with new solder	230 $\pm$ 5°C, 3 $\pm$ 0.5 second
Shock resistance	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction	Inflict the impulse 3 times to both directions (total 18 times) along perpendicular axis that test condition 100G, 6 months
Low temperature operation	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction	-40°C $\pm$ 3°C, 1,000 $\pm$ 4 hours
Heat resisting property	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction	125°C $\pm$ 2°C, 1,000 $\pm$ 4 hours
Temperature cycling	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction	-40 $\pm$ 3°C, 30 minutes/125 $\pm$ 2°C, 30 minutes 100 cycles

## 7-3 Characteristics (continued)

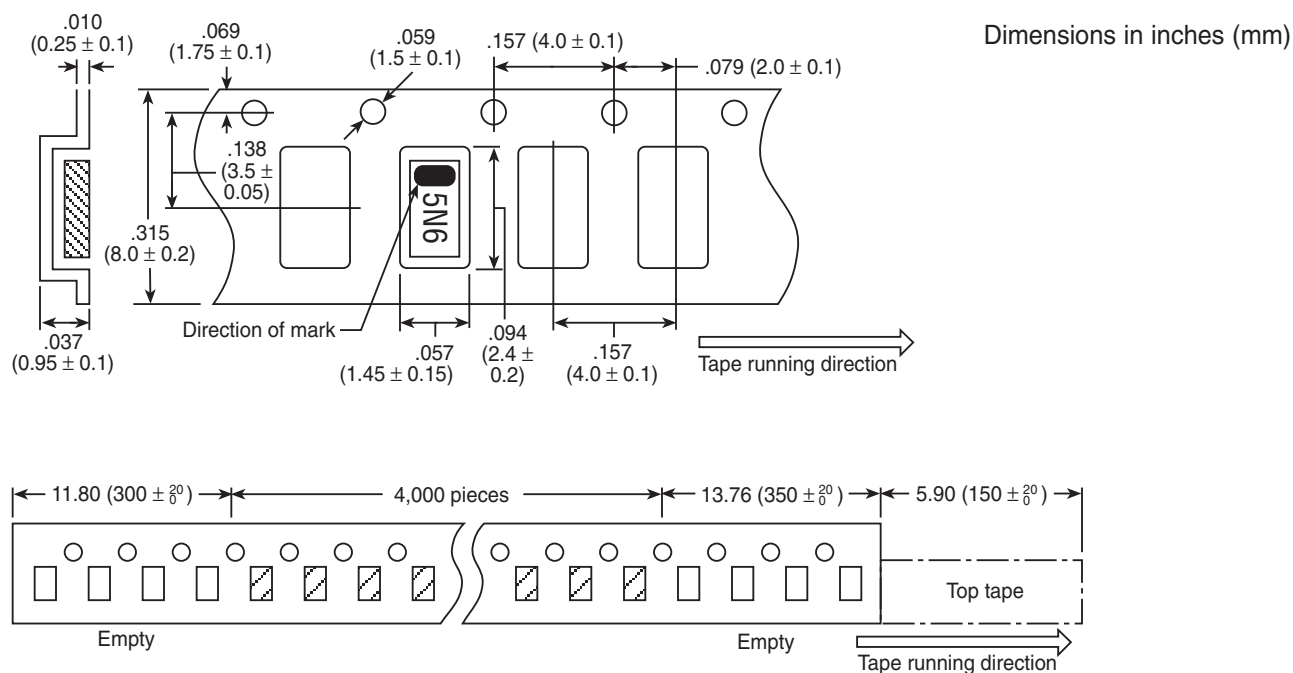
Item	Requirement	Test Method
Humidity	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance and construction. Insulation resistance: more than $50M\Omega$	$40 \pm 2^\circ\text{C}$ , 90 ~ 95% RH $1,000 \pm 4$ hours
Resistance to solvent	$\Delta$ L/L: Within $\pm 2\%$ $\Delta$ Q/Q: Within $\pm 20\%$ Without distinct damage in appearance, construction and marking	Immerse $30 \pm 5$ seconds in the reagent ( $20 \sim 25^\circ\text{C}$ ) of JIS K 8839 (1995)

## 8. Packaging

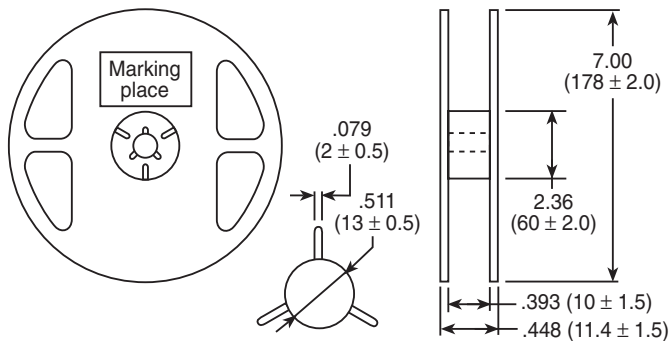
### 8-1 Taping

The tapes for taping shall be embossed carrier tapes of .315" (8 mm) width and .157" (4 mm) pitches. The standard quantity per reel shall be 4,000 pieces.

#### (1) Dimensions of carrier tape



## (2) Reel dimensions



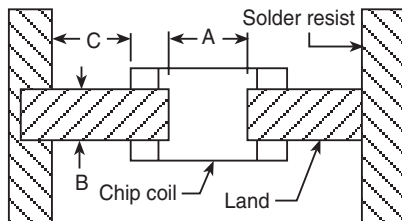
Dimensions in inches (mm)

### (Marking item)

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

## 9. Recommended Soldering Condition

### 9-1 Dimensions of Standard Land



Dimensions in inches (mm)

Size	A	B	C
2A	.047 ~ .055 (1.2 ~ 1.4)	.035 ~ .051 (0.9 ~ 1.3)	.016 ~ .031 (0.4 ~ 0.8)

### 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

Isopropyl 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.

PAGE 7 OF 7