

Chip Inductors

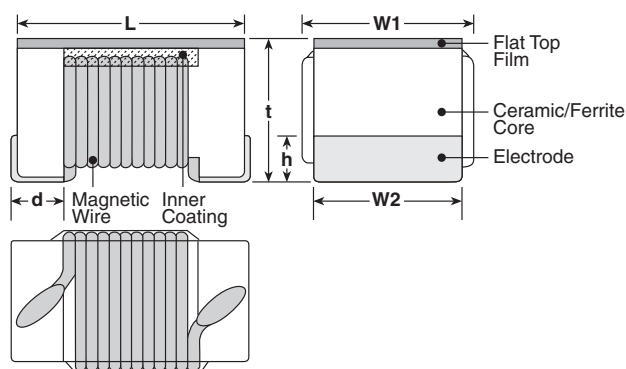
Type KQ 0603

ISO 9001:2000
TS-16949

1. Scope of Application

This specification applies to chip inductors KQ series produced by KOA corporation.

2. Dimensions and Construction



Size Code	Dimensions inches (mm)					
	L	W1	W2	t	h	d
0603	.063±.004 (1.6±0.1)	.039±.004 (1.0±0.1)	.033±.004 (0.85±0.1)	.035±.004 (0.9±0.1)	.01±.006 (0.25±0.15)	.014±.004 (0.35±0.1)

3. Type Designation

Type designation shall be as the following form.

New Type

KQ	0603	T	TE	10N	J
Type	Size	Termination Material	Packaging	Nominal Inductance	Tolerance
	0603	T: Sn (Other termination styles available, contact factory for options)	TE: 7" Embossed Plastic TD: 7" Paper Tape	10N: 10nH R10: 0.1μH 1R0: 1.0μH	G: ±2% J: ±5% K: ±10%

4. Standard Applications

Part Designation	Marking	Nominal Inductance (nH)	L Measuring Frequency	Inductance Tolerance	Q Quality Factor Minimum	Q Measuring Frequency (MHz)	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)		
KQ0603TTE1N6*	C	1.6	250	J: ±5% K: ±10%	24	250	12500	0.03	700		
KQ0603TTE1N8*	0	1.8			16			0.045			
KQ0603TTE3N3*	X	3.3			22		6900	0.055			
KQ0603TTE3N6*	E	3.6						0.063			
KQ0603TTE3N9*	1	3.9						0.08			
KQ0603TTE4N3*	F	4.3			20		5900	0.063			
KQ0603TTE4N7*	G	4.7						0.116			
KQ0603TTE5N1*	Y	5.1			27		5800	0.115			
KQ0603TTE6N8*	2	6.8						0.11			
KQ0603TTE7N5*	H	7.5		G: ±2% J: ±5% K: ±10%	28		4800	0.106			
KQ0603TTE8N2*	A	8.2						0.12			
KQ0603TTE8N7*	J	8.7					4600			0.109	
KQ0603TTE9N5*	B	9.5								0.125	
KQ0603TTE10N*	3	10			31		4800	0.13			
KQ0603TTE11N*	K	11			33			0.086			
KQ0603TTE12N*	4	12			35		4000	0.13			
KQ0603TTE15N*	5	15						0.17			
KQ0603TTE16N*	L	16			34		3300	0.104			
KQ0603TTE18N*	6	18			35		3100	0.17			
KQ0603TTE22N*	7	22			38		3000	0.19			
KQ0603TTE23N*	S	23			37		2700	0.15			
KQ0603TTE24N*	M	24					2650	0.135			
KQ0603TTE27N*	8	27					2800	0.22			
KQ0603TTE30N*	N	30			37		2250	0.144	600		
KQ0603TTE33N*	9	33			40		2300	0.22			
KQ0603TTE36N*	P	36			38		2080	0.25			
KQ0603TTE39N*	0	39		40	2200						
KQ0603TTE43N*	Q	43		39	2000		0.28				
KQ0603TTE47N*	1	47	200		38	200	1900	0.30			
KQ0603TTE51N*	T	51						0.31			
KQ0603TTE56N*	2	56			37		1700	0.34			
KQ0603TTE68N*	3	68						0.49			
KQ0603TTE72N*	4	72	150	34	150	1700	0.49	400			
KQ0603TTE82N*	5	82					0.54				
KQ0603TTER10*	6	100		1400		0.58					
KQ0603TTER11*	7	110		32		1350	0.61	300			
KQ0603TTER12*	8	120				1300	0.65				
KQ0603TTER15*	9	150	1400			0.92	280				
KQ0603TTER18*	0	180	100		25	100	1300	2.2	140		
KQ0603TTER20*	U	200					1200		2.3	130	
KQ0603TTER21*	V	210									2.5
KQ0603TTER22*	1	220					1000		2.4	120	
KQ0603TTER25*	W	250			2.3				170		
KQ0603TTER27*	2	270			24		900	3.0	100		
KQ0603TTER33*	3	330					800	3.7	80		
KQ0603TTER39*	4	390					30		700	1.21	190
KQ0603TTER47*	5	470			50	640			2.09	130	
KQ0603TTER56*	6	560									

* Add tolerance character (G, J, K)

PAGE 2 OF 6

4. Standard Applications (continued)

Part Designation	Marking	Nominal Inductance (nH)	L Measuring Frequency	Inductance Tolerance	Q Quality Factor Minimum	Q Measuring Frequency (MHz)	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (mA)
KQ0603TTER68*	7	680	50	J: $\pm 5\%$ K: $\pm 10\%$	30	50	540	1.97	140
KQ0603TTER82*	8	820					490	3.09	110
KQ0603TTE1R0*	9	1000					440	5.13	90
KQ0603TTE1R2*	0	1200					400	5.45	80

5. Rating

Item	Specification
Storage temperature range	-40°C ~ +100°C
Operating temperature range	-40°C ~ +125°C

5.1 Measurement Method

Nominal Inductance Range	Test Equipment	Fixture	Setup	Measuring Frequency
1.6 nH to 1200 nH	4291A RF Impedance analyzer	16193A Test fixture	E.L = 1.4 cm OSC = 500 mV	Listed Table-1

6. Test Conditions

Unless otherwise specified, the test shall be performed at the temperature of $20 \pm 15^\circ\text{C}$ and at a relative humidity of $65 \pm 20\%$.

Reverse test conditions shall be performed at the temperature of $20 \pm 2^\circ\text{C}$ and at a relative humidity of $65 \pm 5\%$.

7. Reliability Tests

7.1 Electrical Characteristics

Item	Requirement	Test Methods
Dielectric withstanding voltage	No evidence of flaming, fuming, or breakdown	5 seconds at AC 500 V applied between both terminals and film.
Insulation resistance	1000M Ω and over	1 minute at DC 100 V measured between both terminals and film.
Flammability	IEC 695-2-2	Withstands needle-flame test.

7.2 Mechanical Characteristics

Item	Requirement	Test Methods
Terminal pull strength	No evidence of damage	Terminals shall withstand a pull of 5 N in a horizontal direction.
Terminal bending strength	No evidence of breakdown	Specimen shall be soldered on bend test board and force applied to the opposite side to cause a 3 mm deflection
Vibration	$\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	2 hours in each direction of X, Y, Z, on PCB at a frequency range of 10-55-10Hz with 1.5 mm amplitude
Dropping	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Dropping 1 m on the ground of concrete 1 time
Resistance to soldering heat	No evidence of outer damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Immerse in the solder at $260 \pm 5^\circ\text{C}$ for 10 ± 1 seconds
Solderability	95% of the terminal should be covered with new solder	Immerse in the solder at $230 \pm 5^\circ\text{C}$ for 3 ± 0.5 seconds
Resistance to solvent	No damage and marking must remain legible	Accordance with MIL-STD-202F Method 215

7.3 Environmental Characteristics

Item	Requirement	Test Methods
Low temperature storage	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Store at $-40 \pm 2^\circ\text{C}$, for 1000 hours
High temperature storage	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Store at $+125 \pm 2^\circ\text{C}$, for 1000 hours
Moisture endurance	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Store at $40 \pm 2^\circ\text{C}$, 90 ~ 95% RH for 1000 hours
Load life	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Biased to full rated current at $+125^\circ\text{C}$ for 1000 hours

Unless otherwise specified, measurements shall be performed within 2 hours after leaving test samples for more than one hour at the normal temperature and at the normal humidity.

PAGE 4 OF 6

7.3 Environmental Characteristics (continued)

Item	Requirement	Test Methods
High temperature High humidity	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	Biased to 10% rated current at $+85^{\circ}\text{C}$, 85% RH for 1000 hours
Thermal shock	No evidence of damage $\Delta L/L$ within $\pm 5\%$ $\Delta Q/Q$ within $\pm 10\%$	100 cycles between $-40^{\circ}\text{C}/\text{hour}$ and $+125^{\circ}\text{C}/\text{hour}$
Temperature characteristics	$\Delta L/L$ within $\pm 5\%$	$\Delta L/L$ to be measured at the temperature of between -40°C and $+125^{\circ}\text{C}$ as based on the inductance at 20°C

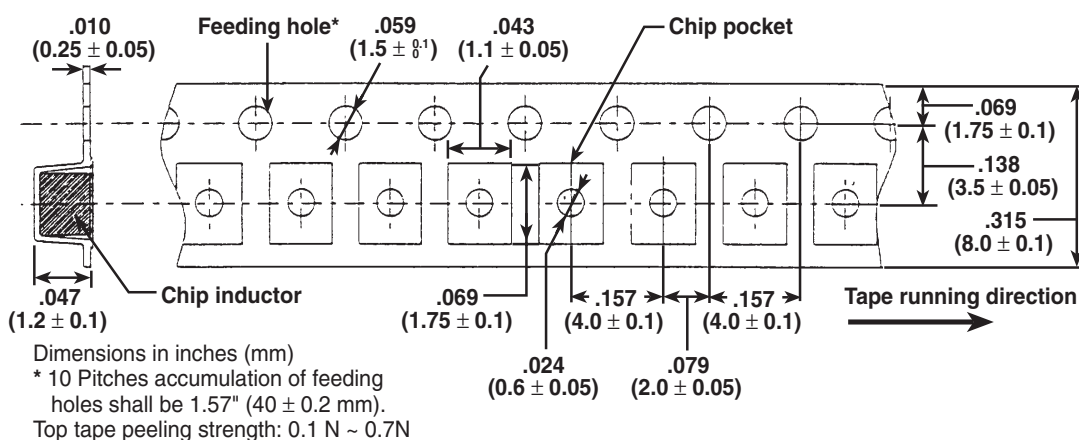
Unless otherwise specified, measurements shall be performed within 2 hours after leaving test samples for more than one hour at the normal temperature and at the normal humidity.

8. Packaging

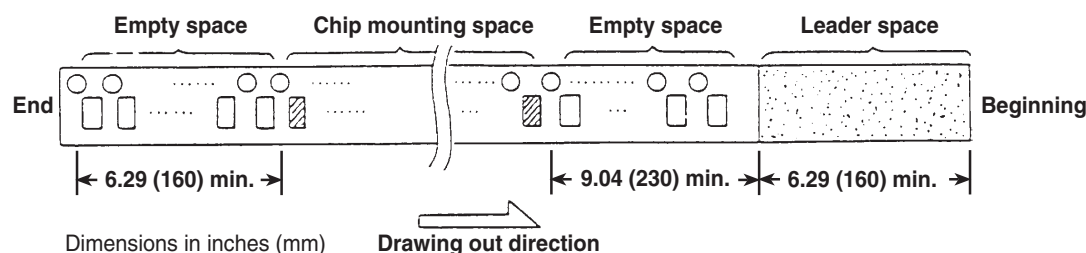
8.1 Taping

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 2,000 pieces.

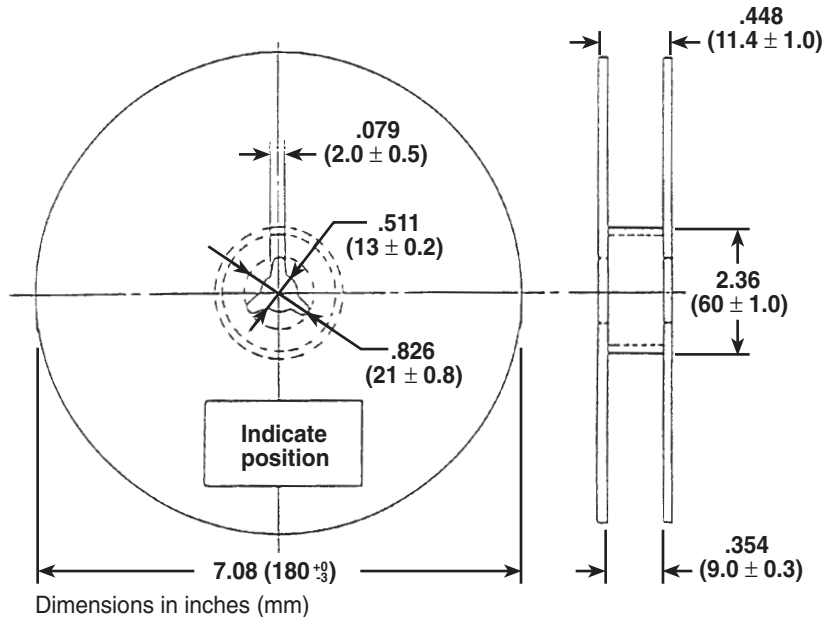
(1) Dimensions of Carrier Tape



(2) Taped Configurations (conforming to EIA-481 standard)



(3) Reel Dimensions and Indication



The following items shall be indicated on the reel.

- Type (KQ 0603 TE)
- Nominal inductance and tolerance
- Quantity
- Production lot number
- Manufacturer's name or trade mark

9. General Information

(1) Storage

Chip inductors shall not be stored under high temperature and high humidity conditions. Especially, do not store taping where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed, causing problems during mounting.

(2) Mounting

Placement force should not be excessive.

(3) Soldering

Flow soldering should be done at 260°C for less than 10 seconds. Reflow soldering should be done at 240°C for less than 30 seconds. When using a soldering iron, temperature shall not exceed 350°C and within 3 seconds. Soldering iron time of each electrode shall be allowed only one time. After soldering, chip inductors shall not be stressed excessively.

(4) Cleaning

It is no problem to use organic solvents.

Since this chip inductor is a coil of ultra-fine wire, it is susceptible to vibration. If an ultra-sonic cleaning unit is used for cleaning, check for any

possibility of problem generation before practical use since such cleaning units considerably differ in vibration level and mode.

Although the conditions differ depending on the printed board size, ultrasonic cleaning is generally used in the conditions described below as examples.

Power: Within 20 W/L

Cleaning times: Within 5 minutes

(5) Pattern design

The land pattern is recommended as follows.

