

Chip Air-Core Inductors

 ISO 9002 CERTIFIED

Type KQ 0402

1. Scope of Application

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

2. Type Designation

Type designation shall be as the following form.

KQ	0402	TD	1N0	J
Type	Component Size	Packaging	Nominal Inductance	Tolerance
Winding Form	1.10 x .055 x .055 in. 27.9 x 14.0 x 14.0 mm	TD: Paper Carrier No Designation: Bulk	1N0----1.0 nH 40N----40 nH	J:±5% K:±10%

3. Rating

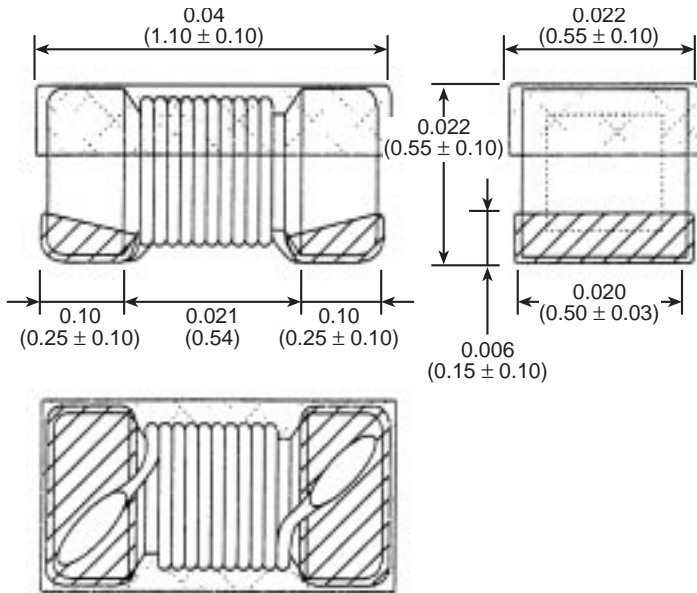
Item	Specification
Nominal inductance range	1.0 nH ~ 47 nH
Nominal inductance tolerance	The rating shall be shown in the Table-1
Q (Quality factor)	
Self-resonant frequency (MHz)	
DC resistance (ohm)	
Allowable current (mA)	
Measurement frequency (MHz)	
Storage temperature range	-40°C ~ +100°C
Operating temperature range	-40°C ~ +125°C

Table-1

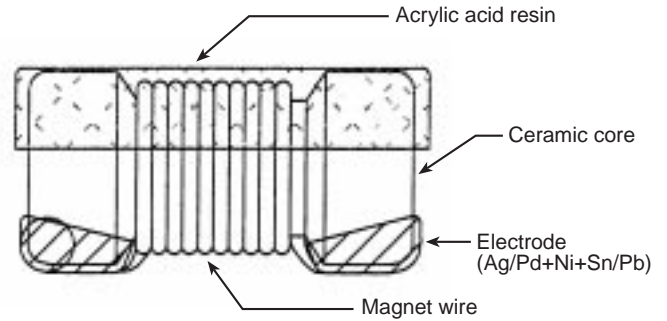
Ordering Code*	Inductance	Inductance Tolerance (%)	Quality Factor min.	Self-Resonant Frequency min. (MHz)	DC Resistance max. (Ω)	Allowable DC Current max. (mA)	Measuring Frequency (MHz)
KQ0402TD1N0□	1.0 nH	J ($\pm 5\%$) K ($\pm 10\%$)	16	6000	0.045	1360	250
KQ0402TD2N0□	2.0 nH		16	6000	0.070	1040	
KQ0402TD2N2□	2.2 nH		19	6000	0.070	960	
KQ0402TD3N3□	3.3 nH		19	6000	0.066	840	
KQ0402TD3N6□	3.6 nH		19	6000	0.066	840	
KQ0402TD3N9□	3.9 nH		19	5800	0.066	840	
KQ0402TD5N1□	5.1 nH		20	5800	0.083	800	
KQ0402TD5N6□	5.6 nH		20	5800	0.083	760	
KQ0402TD6N2□	6.2 nH		20	5800	0.083	760	
KQ0402TD7N5□	7.5 nH		22	5800	0.104	680	
KQ0402TD8N2□	8.2 nH		22	4400	0.104	680	
KQ0402TD9N0□	9.0 nH		22	4160	0.104	680	
KQ0402TD10N□	10 nH		21	3900	0.195	480	
KQ0402TD11N□	11 nH		24	3680	0.120	640	
KQ0402TD12N□	12 nH		24	3600	0.120	640	
KQ0402TD15N□	15 nH		24	3280	0.172	560	
KQ0402TD19N□	19 nH		24	3040	0.202	480	
KQ0402TD23N□	23 nH		24	2720	0.214	400	
KQ0402TD27N□	27 nH		24	2480	0.298	400	
KQ0402TD36N□	36 nH		24	2320	0.560	320	
KQ0402TD40N□	40 nH	24	2240	0.620	320		
KQ0402TD47N□	47 nH	20	2100	0.830	150		

□: Tolerance character (J,K)

4. Dimensions



5. Construction



Dimensions in inches (mm)

6. Measurement Method

Nominal Inductance Range	Test Equipment	Fixture	Setup	Measuring Frequency
1.0 nH to 47 nH	4291A RF Impedance analyzer (HP)	16193A Test fixture	E.L = 1.4 cm OSC = 500 mV	Listed Table-1

7. 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 $65 \pm 5\%$.

8. Reliability Tests

8-1 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 the face center on the product.
Insulation resistance	1000MΩ and over	1 minute at DC 100 V measured between both terminals and the face center on the product.
Flammability	Withstands needle-flame test.	IEC 695-2-2
Electrostatics discharge sensitivity	No evidence of damage ΔL/L within ± 5% ΔQ/Q within ± 10%	Add 1000 V on condition that 100pF, 1.5kΩ

8-2 Mechanical Characteristics

Item	Requirement	Test Methods
Terminal pull strength	No evidence of damage Destruction strength 5N & over	Terminals shall withstand a pull of 5N 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 +0.2/-0 mm deflection.
Vibration	ΔL/L within ± 5% ΔQ/Q within ± 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 ΔL/L within ± 5% ΔQ/Q within ± 10%	Dropping 1 m on the ground of concrete 1 time.
Resistance to soldering heat	No evidence of damage ΔL/L within ± 5% ΔQ/Q within ± 10%	Immerse in the solder at 260 ± 5°C for 10±1 seconds.
Solderability	95% of the terminal should be covered with new solder (But the area of the welding contacts should not be included in judgment.)	Immerse in the solder at 230 ± 5°C for 3 ± 0.5 seconds.

8-2 Mechanical Characteristics

Item	Requirement	Test Methods
Resistance to solvent	No evidence of damage	Accordance with MIL-STD-202F Method 215

8-3 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 $+60 \pm 2^\circ\text{C}$, 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 $+125 \pm 2^\circ\text{C}$ for 1000 hours
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 $+85 \pm 2^\circ\text{C}$, 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 $-40^\circ\text{C}/1$ hour and $+125^\circ\text{C}/1$ 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.

9. Packaging

9-1 Bulk packaging

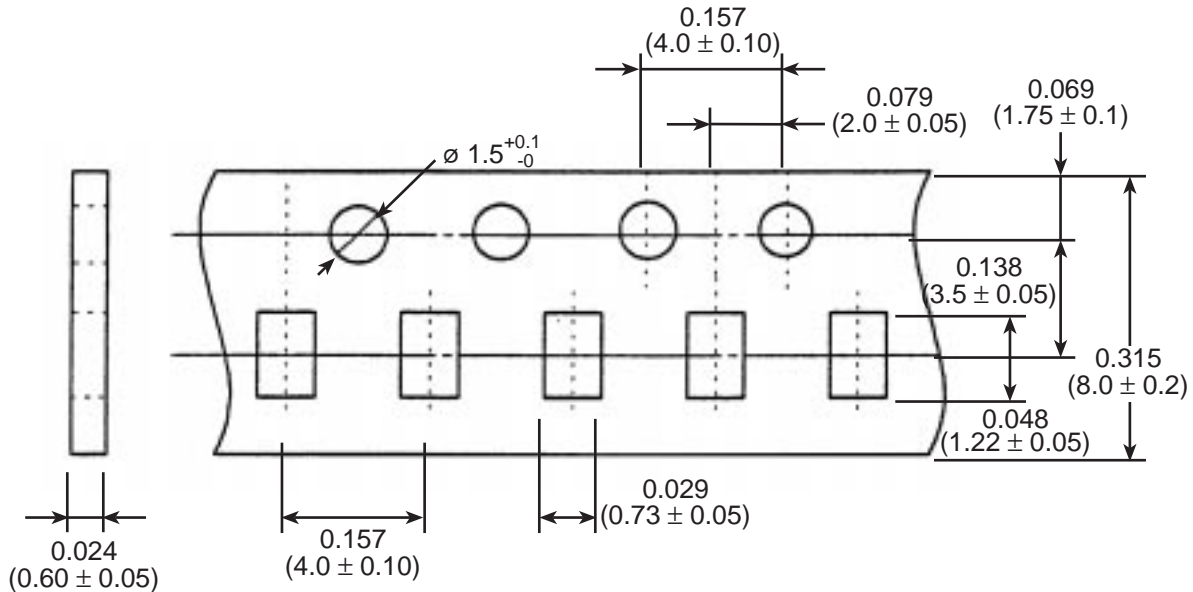
- (1) 200 piece chip inductors are packed in a poly bag.
- (2) Inner box indicates Type (KQ 0402), Nominal inductance, Tolerance, Quantity, Production lot number, Manufacturer's name or Trademark.

9-2 Taping

The tapes for taping shall be paper carrier tapes of .315" (8 mm) width and .157" (4 mm) pitches. The standard quantity per reel is 2,000 pieces.

(1) Dimensions of Carrier Tape

Dimensions in inches (mm)

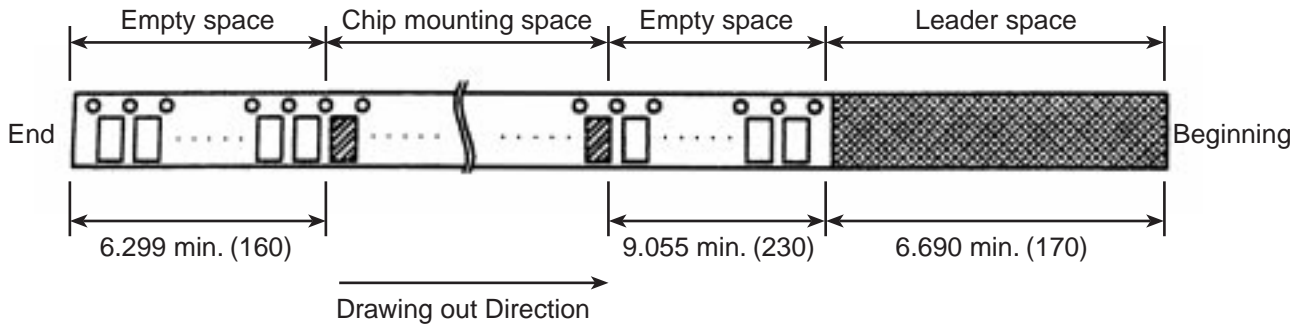


20 Pitches accumulation of feeding holes shall be 3.150" (80 ± 0.15mm).

Top tape peeling strength: 0.1N ~ 0.7N
(It pulls it and a direction angle 165 ~ 180°,
Speed 300mm/min.)

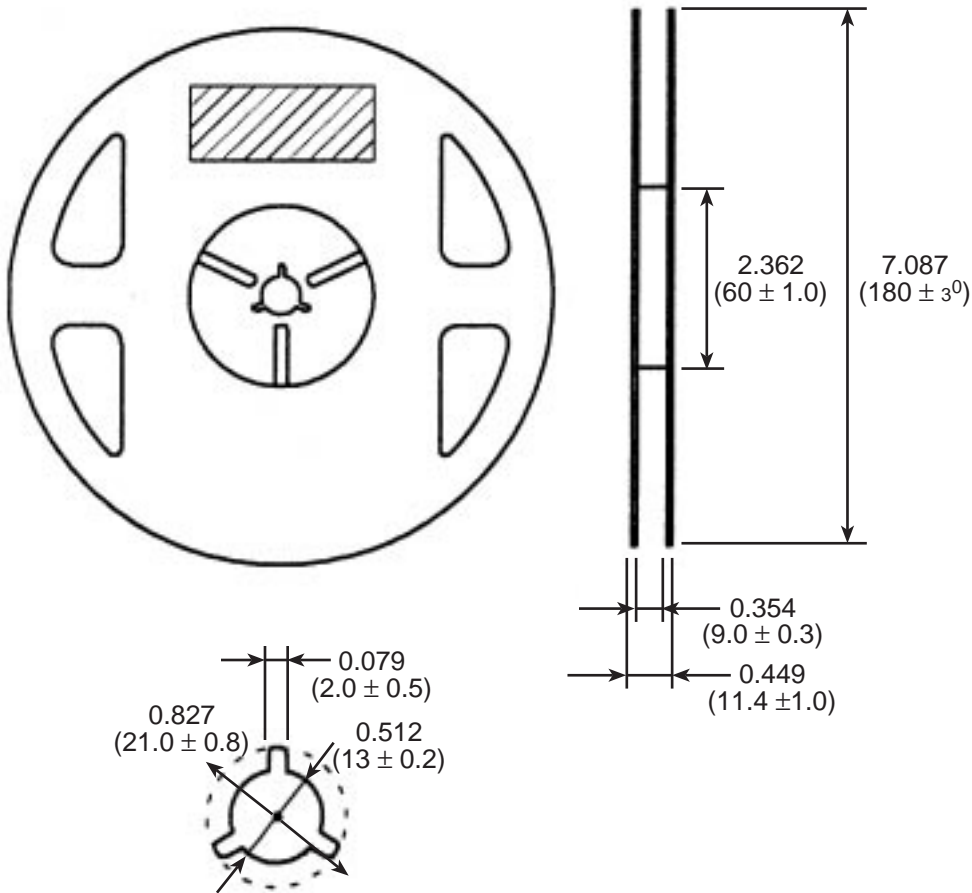
(2) Taped Configurations (conforming to EIA-481 standard)

Dimensions in inches (mm)



(3) Reel Dimensions and Indication

Dimensions in inches (mm)



The following items shall be indicated on the reel.

- Type (KQ 0402)
- Nominal inductance and tolerance
- Quantity
- Production lot number
- Manufacturer's name or trade mark

10. General Information

(1) Storage

Store chip inductors indoors without drastic temperature changes, away from direct sun rays, high temperature/humidity, magnetic field, vibration, dust and corrosive gas (sulfide, chlorine, acid) that may deteriorate solder ability and taping strength.

(2) Mounting

When mounting, do not give excessive shock or strong force to inductors as they may affect magnetic characteristics of inductors.

(3) Soldering

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 ultrasonic 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

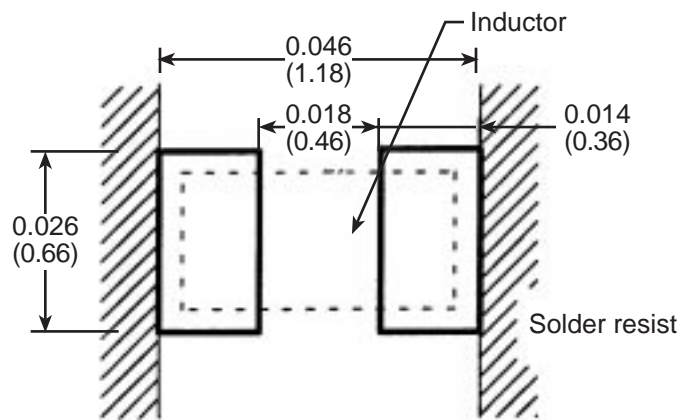
Cleaning times: Within 5 minutes

(5) About the handling of the part

Prevention of characteristic change, prevention, of breaking of wire, do not touch the magnet wire of the coil with the sharp end of tweezers etc.

(6) Pattern design

The land pattern is recommended as follows.



Dimensions in inches (mm)