KOA SPEER ELECTRONICS, INC.

RoHS COMPLIANT

spec sheet

SS-214 R9
AHA 9/12/12

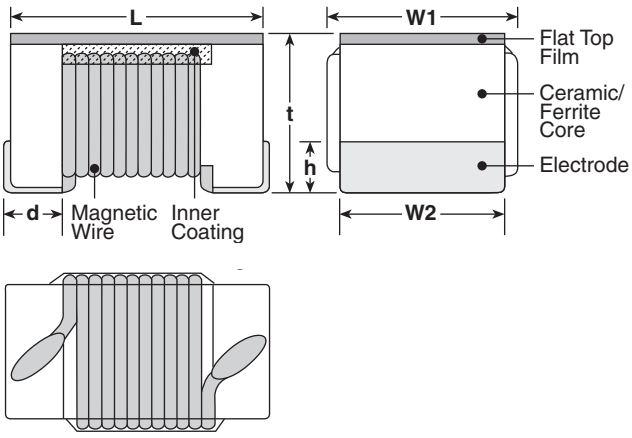
ISO 9001:2008 CERTIFIED
TS-16949 CERTIFIED

Chip Inductors
Type KQ

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
KQT0402	.039±.004 (1.0±0.1)	.02±.004 (0.5±0.1)	.02±.004 (0.5±0.1)	.022±.004 (0.55±0.1)	.006±.004 (0.15±0.1)	.01±.004 (0.25±0.1)
KQ0603	.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)
KQ0805	.079±.008 (2.0±0.2)	.059±.008 (1.5±0.2) (3.3nH-390nH) .063±.008 (1.6±0.2) (470nH-820nH)	.053±.004 (1.35±0.1)	.051±.008 (1.3±0.2)	.016±.006 (0.40±0.15)	.018±.004 (0.45±0.1)
KQ1008	.098±.008 (2.5±0.2)	.087±.008 (2.2±0.2)	.079±.004 (2.0±0.1)	.071 $^{+.008}_{-0}$ ($1.8\ ^{+0.2}_{-0}$)	.018±.006 (0.45±0.15)	.018±.004 (0.45±0.1)

3. Type Designation

Type designation shall be as the following form.

New Type

KQ	1008	T	TE	10N	J
Type	Size	Termination Material	Packaging	Nominal Inductance	Tolerance
KQT KQ	0402 (KQT only) 0603 0805 1008	T: Sn	TP: 2mm Pitch Paper (0402: 10,000 pieces/reel) TD: 7" Paper Tape (0402: 2,000 pieces/reel) TE: 7" Embossed Plastic (0603, 0805, 1008: 2,000 pieces/reel)	3 digits: 10N: 10nH R10: 0.1µH 1R0: 1.0µH	B: ±0.1nH C: 0.2nH G: ±2% H: ±3% J: ±5% K: ±10% M: ±20%

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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)
KQT0402T**1N0*	—	1.0	250	B: ±0.1nH C: ±0.2nH	16	250	11000	0.045	1360
KQT0402T**1N9*		1.9					9600	0.070	1040
KQT0402T**2N0*		2.0			19				
KQT0402T**2N2*		2.2							960
KQT0402T**2N4*		2.4			18		8000	0.068	
KQT0402T**2N7*		2.7			17			0.120	700
KQT0402T**3N3*		3.3		H: ±3% J: ±5% K: ±10%	19		7200	0.066	840
KQT0402T**3N6*		3.6							
KQT0402T**3N9*		3.9							
KQT0402T**4N3*		4.3			18		6000	0.091	800
KQT0402T**4N7*		4.7							
KQT0402T**5N1*		5.1			20		5800	0.083	
KQT0402T**5N6*		5.6							760
KQT0402T**6N2*		6.2							
KQT0402T**6N8*		6.8					4800	0.086	680
KQT0402T**7N5*		7.5			22		5800	0.104	
KQT0402T**8N2*		8.2					4400		
KQT0402T**8N7*		8.7			20		4200	0.150	650
KQT0402T**9N0*		9.0			22		4160	0.104	680
KQT0402T**9N5*		9.5			20		4000	0.150	650
KQT0402T**10N*		10			21		3900	0.195	480
KQT0402T**11N*		11			24		3680	0.120	640
KQT0402T**12N*		12					3600		
KQT0402T**13N*		13					3450	0.180	560
KQT0402T**15N*		15					3280	0.172	
KQT0402T**16N*		16					3100	0.200	
KQT0402T**18N*		18			25			0.230	500
KQT0402T**19N*		19			24		3040	0.202	480
KQT0402T**20N*		20			25		3000	0.250	450
KQT0402T**22N*		22					2800	0.323	400
KQT0402T**23N*		23			24		2720	0.214	
KQT0402T**24N*		24			25		2700	0.322	
KQT0402T**27N*		27			24		2480	0.298	
KQT0402T**30N*		30			25		2400	0.354	
KQT0402T**33N*		33			24			0.393	
KQT0402T**34N*		34						0.550	340
KQT0402T**36N*		36					2320	0.560	320
KQT0402T**39N*		39			25		2300	0.550	300
KQT0402T**40N*		40			24		2240	0.620	320
KQT0402T**43N*		43			25		2200	0.810	300
KQT0402T**47N*		47			20		2100	0.830	150
KQT0402T**51N*		51			25			0.835	240
KQT0402T**56N*		56					2800	1.170	200
KQT0402T**68N*		68			22		2000	1.120	
KQT0402T**82N*		82					1800	1.810	140
KQT0402T**R10*		100					1600	2.090	130
KQT0402T**R12*		120					1500	2.320	120

* Add tolerance character (B, C, G, H, J, K, M)
** Add packaging code

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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)
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					5900	0.063	
KQ0603TTE4N7*	G	4.7			20		5800	0.116	
KQ0603TTE5N1*	Y	5.1						0.115	
KQ0603TTE6N8*	2	6.8		G: ±2% J: ±5% K: ±10%	27			0.11	
KQ0603TTE7N5*	H	7.5			28		4800	0.106	
KQ0603TTE8N2*	A	8.2						0.12	
KQ0603TTE8N7*	J	8.7					4600	0.109	
KQ0603TTE9N5*	B	9.5					4800	0.125	
KQ0603TTE10N*	3	10			31			0.13	
KQ0603TTE11N*	K	11			33		4000	0.086	
KQ0603TTE12N*	4	12			35			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			40		2800	0.22	600
KQ0603TTE30N*	N	30			37		2250	0.144	
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			
KQ0603TTE51N*	T	51					1900	0.30	
KQ0603TTE56N*	2	56						0.31	
KQ0603TTE68N*	3	68			37		1700	0.34	
KQ0603TTE72N*	4	72	150		34	150		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	1.4	160
KQ0603TTER18*	0	180	100		25	100	1300	2.2	140
KQ0603TTER20*	U	200					1200	2.3	130
KQ0603TTER21*	V	210							
KQ0603TTER22*	1	220						2.5	120
KQ0603TTER25*	W	250			24		1000	2.4	
KQ0603TTER27*	2	270					900	2.3	170
KQ0603TTER30*	X	300					840	3.17	110
KQ0603TTER33*	3	330			30		800	3.0	100
KQ0603TTER39*	4	390					700	3.7	80

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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)
KQ0603TTER47*	5	470	50	J: ±5% K: ±10%	30	50	640	1.21	190
KQ0603TTER51*	V	510					610	1.26	170
KQ0603TTER56*	6	560					560	2.09	130
KQ0603TTER62*	W	620					590	1.89	150
KQ0603TTER68*	7	680					540	1.97	140
KQ0603TTER75*	X	750					530	2.04	130
KQ0603TTER82*	8	820					490	3.09	110
KQ0603TTER91*	Y	910					480	2.95	120
KQ0603TTE1R0*	9	1000					440	5.13	90
KQ0603TTE1R2*	0	1200					400	5.45	80
KQ0805TTE3N3*	0	3.3	250		50	1500	6000	0.08	600
KQ0805TTE6N8*	1	6.8				1000	5500	0.11	
KQ0805TTE8N2*	2	8.2					4700	0.12	
KQ0805TTE12N*	3	12		G: ±2% J: ±5% K: ±10%		500	4000	0.15	
KQ0805TTE15N*	4	15					3400	0.17	
KQ0805TTE18N*	5	18					3300	0.20	
KQ0805TTE20N*	Y	20			55		2600	0.22	500
KQ0805TTE22N*	6	22							
KQ0805TTE27N*	7	27					2500	0.25	
KQ0805TTE33N*	8	33			60		2050	0.27	
KQ0805TTE39N*	9	39					2000	0.29	
KQ0805TTE43N*	4	43	200				1650	0.34	
KQ0805TTE47N*	0	47						0.31	
KQ0805TTE56N*	1	56					1550	0.34	
KQ0805TTE68N*	2	68					1450	0.38	
KQ0805TTE82N*	3	82	150		65		1300	0.42	400
KQ0805TTER10*	4	100					1200	0.46	
KQ0805TTER12*	5	120			50	250	1100	0.51	
KQ0805TTER15*	6	150	100				920	0.56	
KQ0805TTER16*	H	160					870	0.64	
KQ0805TTER17*	J	170							
KQ0805TTER18*	7	180							
KQ0805TTER19*	D	190					850	0.70	
KQ0805TTER20*	E	200							
KQ0805TTER21*	F	210							
KQ0805TTER22*	8	220							
KQ0805TTER23*	K	230			48		650	1.0	350
KQ0805TTER24*	L	240							
KQ0805TTER25*	G	250							
KQ0805TTER27*	9	270							
KQ0805TTER33*	0	330					600	1.4	310
KQ0805TTER39*	1	390					560	1.5	290
KQ0805TTER47*	2	470	50	J: ±5% K: ±10%	33	100	375	1.76	250
KQ0805TTER56*	3	560	25		23	50	340	1.9	230
KQ0805TTER68*	4	680					188	2.2	190
KQ0805TTER82*	5	820					215	2.35	180

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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)
KQ1008TTE10N*	10N	10	50	J: ±5% K: ±10% M: ±20%	50	500	4100	0.08	1000
KQ1008TTE12N*	12N	12					3300	0.09	
KQ1008TTE15N*	15N	15					3000	0.10	
KQ1008TTE18N*	18N	18				350	2500	0.11	
KQ1008TTE22N*	22N	22			55		2400	0.12	
KQ1008TTE27N*	27N	27					1600	0.13	
KQ1008TTE33N*	33N	33			60		1600	0.14	
KQ1008TTE39N*	39N	39					1500	0.15	
KQ1008TTE47N*	47N	47			65			0.16	
KQ1008TTE56N*	56N	56		G: ±2% J: ±5% K: ±10%			1300	0.18	
KQ1008TTE68N*	68N	68						0.20	
KQ1008TTE82N*	82N	82			60		1000	0.22	
KQ1008TTER10*	R10	100	25					0.56	650
KQ1008TTER12*	R12	120					950	0.63	
KQ1008TTER15*	R15	150			45	100	850	0.70	580
KQ1008TTER18*	R18	180					750	0.77	620
KQ1008TTER22*	R22	220					700	0.84	500
KQ1008TTER27*	R27	270					600	0.91	500
KQ1008TTER33*	R33	330					570	1.05	450
KQ1008TTER39*	R39	390					500	1.12	470
KQ1008TTER47*	R47	470					450	1.19	
KQ1008TTER56*	R56	560					415	1.33	400
KQ1008TTER62*	R62	620					375	1.40	300
KQ1008TTER68*	R68	680						1.47	400
KQ1008TTER75*	R75	750					360	1.54	360
KQ1008TTER82*	R82	820					350	1.61	400
KQ1008TTER91*	R91	910			35	50	320	1.68	380
KQ1008TTE1R0*	1R0	1000					290	1.75	370
KQ1008TTE1R2*	1R2	1200	7.9				250	1.6	310
KQ1008TTE1R5*	1R5	1500			28		200	1.7	300
KQ1008TTE1R8*	1R8	1800					160	1.9	270
KQ1008TTE2R2*	2R2	2200						2.2	250
KQ1008TTE2R7*	2R7	2700			22	25	140	2.3	
KQ1008TTE3R3*	3R3	3300					110	2.7	230
KQ1008TTE3R9*	3R9	3900			20		100	2.8	
KQ1008TTE4R7*	4R7	4700					90	3.1	210
KQ1008TTE5R6*	5R6	5600			15	7.9	80	2.5	240
KQ1008TTE6R8*	6R8	6800					70	2.8	200
KQ1008TTE8R2*	8R2	8200					65	2.5	170
KQ1008TTE100*	100	10000					60	3.4	150

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5. Rating

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

5.1 Measurement Method

Size	Nominal Inductance Range	Test Equipment	Fixture	Setup	Measuring Frequency
0402	1.0 nH to 120 nH	4291A RF Impedance analyzer	16193A Test fixture	E.L = 1.4 cm OSC = 500 mV	Listed Table-1
0603	1.6 nH to 1200 nH	4291A RF Impedance analyzer	16193A Test fixture	E.L = 1.4 cm OSC = 500 mV	Listed Table-1
0805	3.3 nH to 820 nH	4291A RF Impedance analyzer (H.P)	16193A Test fixture	E.L = 1.4 cm OSC = 500 mV	Listed Table-1
1008	10 nH to 10 µH	HP 4291A RF Impedance analyzer	HP 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 ± 15°C and at a relative humidity of 65 ± 20%.

Reverse test conditions shall be performed at the temperature of 20 ± 2°C and at a relative humidity of 65 ± 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	1000MΩ and over	1 minute at DC 100 V measured between both terminals and film.
Flammability	IEC 695-2-2	Withstands needle-flame test.

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7.2 Mechanical Characteristics

Item	Requirement	Test Methods
Adhesion strength	0402, 0603: Over 5N 0805, 1008: Over 10N	Solder chip on test board. Apply load to level direction until electrode is destroyed.
Bending test	No mechanical damage	Solder chip on test board is to be bent down to 3.0 +0.2/-0 mm (0402, 0603), 1.0 +0.2/-0 mm (0805, 1008).
Resistance to vibration	No mechanical damage ΔL/L within ± 5% ΔQ/Q within ± 10%	Apply frequency 10~55Hz, 1.5 mm amplitude for each X,Y, Z direction of 2 hours. Total 6 hours.
Drop test	No mechanical damage ΔL/L within ± 5% ΔQ/Q within ± 10%	Drop from a height of 1 m to the ground of concrete or tile. (1 time)
Resistance to soldering heat	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Soak into the solder of 260 ± 5°C for 10±1 seconds
Solderability	Over 95% of electrode surface shall be covered with solder	Soak into the solder of +245 ± 3°C at 3 ± 0.5 seconds
Resistance to solvent	No significant abnormality in appearance	According to MIL-STD-202F Method 215J (1993)

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7.3 Environmental Characteristics

Item	Requirement	Test Methods
Low temperature life test	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Store at -40 ± 2°C, for 1000 hours
High temperature life test	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Store at +125 ± 2°C, for 1000 hours
Humidity	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Store at +40 ± 2°C, 90 to 95% RH for 1000 hours
High temperature loading test (0402, 0603, 0805 only)	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Biased to full rated current at +125°C ± 2°C for 1000 hours
Humidity loading test (0402, 0603, 0805 only)	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	Biased to 10% rated current at +85°C ± 2°C, 85% RH for 1000 hours
Thermal shock	No significant abnormality in appearance ΔL/L within ± 5% ΔQ/Q within ± 10%	100 cycles between -40°C/0.5hour and +125°C/0.5hour
Temperature characteristics	No significant abnormality in appearance ΔL/L within ± 5%	Monitor inductance change throughout temperature of -40°C to +125°C with reference to 20°C

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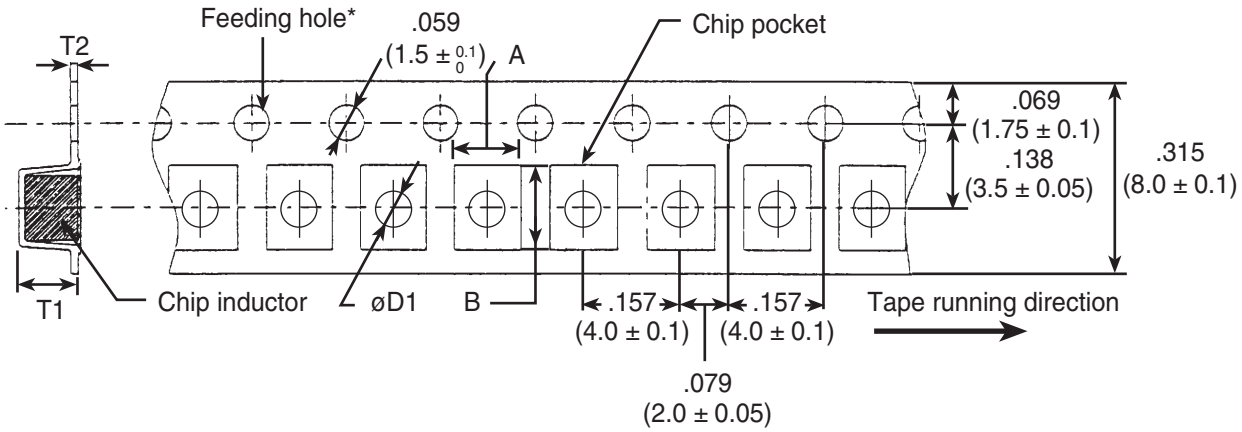
8. Packaging

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

Dimensions in inches (mm)



* 0402, 0805: 20 Pitches accumulation of feeding holes shall be 3.15" (80 ± 0.15 mm).
0603, 1008: 10 Pitches accumulation of feeding holes shall be 1.57" (40 ± 0.2 mm).

Top tape peeling strength: 0.1N ~ 0.7N

Dimensions in inches (mm)

Part Series	A	B	øD1	T1	T2
0402	.026 ± 0.001 (.65 ± .05)	.047 ± 0.001 (1.20 ± .05)	—	.027 ± .003 (.68 ± 0.1)	—
0603	.043 ± .001 (1.1 ± .05)	.069 ± .003 (1.75 ± 0.1)	.024 ± .001 (.6 ± .05)	.047 ± .003 (1.2 ± 0.1)	.010 ± .001 (.25 ± .05)
0805 (3N3~R39)	.062 ± .003 (1.60 ± 0.1)	.087 ± .003 (2.22 ± 0.1)	.314 ± .007 (8.0 ± 0.2)	.068 ± .003 (1.75 ± 0.1)	.137 ± .001 (3.5 ± .05)
0805 (R47~R82)	.066 ± .003 (1.7 ± 0.1)	.086 ± .003 (2.20 ± 0.1)			
1008	.090 ± .003 (2.3 ± 0.1)	.107 ± .003 (2.7 ± 0.1)	.047 ± .003 (1.2 ± 0.1)	.083 ± .003 (2.1 ± 0.1)	.012 ± .001 (.3 ± .05)

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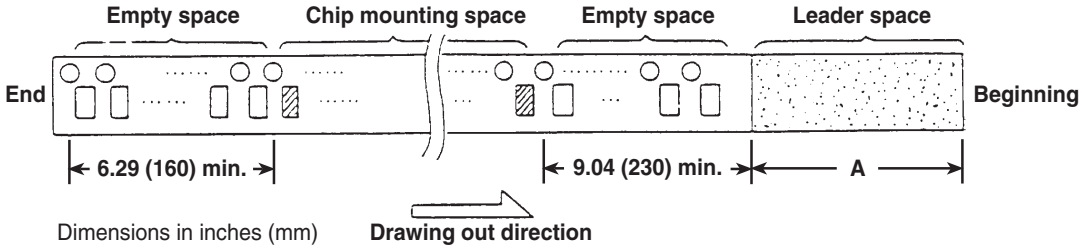
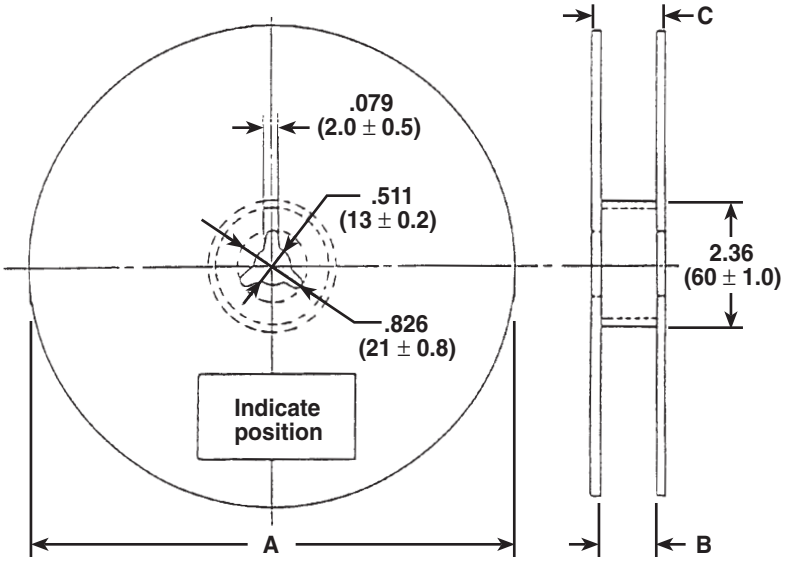
(2) Taped Configurations (conforming to EIA-481 standard)



Dimensions in inches (mm)

Part	A
0402	6.69 min. (170 min.)
0603, 0805, 1008	6.29 min. (160 min.)

(3) Reel Dimensions and Indication



Dimensions in inches (mm)

The following items shall be indicated on the reel.

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

Dimensions in inches (mm)

Part	A	B	C
0402	7.01 ± .079 (178 ± 2.0)	.394 ± .059 (10 ± 1.5)	.449 ± .059 (11.4 ± 1.5)*
			.512 ± .059 (13.0 ± 1.5)**
0603, 0805, 1008	$7.08 \pm {}^{0}_{0.012}$ $(180 \pm {}^{0}_{0.3})$	.354 ± .012 (9.0 ± .3)	.449 ± .001 (11.4 ± 1.0)

* Injection molding
** Vacuum molding

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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.

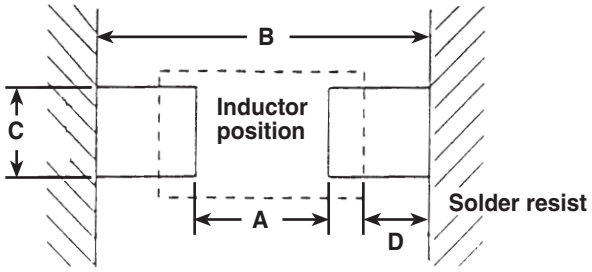
(4) Cleaning
It is no problem to use organic solvents.

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.



Dimensions in inches (mm)

Part	A	B	C	D
0402	.026 (.46)	.047 (1.18)	— (.660)	.027 (.360)
0603	.025 (.64)	.076 (1.92)	.040 (1.02)	.006 (.16)
0805	.03 (.76)	.110 (2.80)	.07 (1.78)	.016 (.40)
1008	.05 (1.27)	.130 (3.31)	.10 (2.54)	.016 (.40)

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