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CMCC0603C Series

Multilayer Chip Ceramic Inductor

◆ Features

1、Monolithic Structure for high reliability
2、High self-resonant frequency
3、Excellent solderability and high heat resistance
4、RoHS Compliant.

◆ Application

1、RF Circuit of in telecommunication and other Equipments

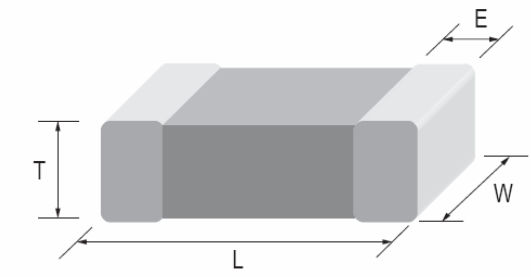
◆ PRODUCT IDENTIFICATION

CMCC	0603	C	1N0	S	S	P
(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) Series Type
(2) Chip Size（mm）:Length X Width
(3) Material Code
(4) Inductance：1N0=1nH；10N=10nH
R10=100nH
(5) Inductance Tolerance：B=±0.1; C=±0.2; S=±0.3;
G=±2%; H=±3%; J=±5%
(6) Company Code
(7) Packaging:P–Embossed paper tape, 7" reel
E- Embossed plastic tape, 7" reel

◆ Dimensions Unit: mm

Size(EIA)	L	W	T	E
	0.60±0.05	0.30±0.05	0.30±0.05	0.20±0.10



CMCC0603C Series

◆Specifications

Part Number	Inductance (nH)	Min. Quality Factor (Q)	L, Q Test Freq. L/Q(MHz)	Typical Q @ Freq. (GHz)					Min. Self-resonant Frequency (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)
				0.5	0.8	1.8	2.0	2.4			
				Q							
CMCC0603 Series											
CMCC0603C0N6◇SP	0.6	13	500	>24	>32	>54	>57	>65	10000	0.06	600
CMCC0603C0N7◇SP	0.7	13	500	>24	>32	>54	>57	>65	10000	0.06	550
CMCC0603C0N8◇SP	0.8	13	500	>24	>32	>54	>57	>65	10000	0.07	550
CMCC0603C0N9◇SP	0.9	13	500	>24	>32	>54	>57	>65	10000	0.07	550
CMCC0603C1N0◇SP	1.0	13	500	24	32	54	57	65	10000	0.08	520
CMCC0603C1N1◇SP	1.1	13	500	19	26	45	47	55	10000	0.11	440
CMCC0603C1N2◇SP	1.2	13	500	19	25	43	44	52	10000	0.12	420
CMCC0603C1N3◇SP	1.3	13	500	19	25	40	42	47	10000	0.12	420
CMCC0603C1N4◇SP	1.4	13	500	19	24	39	41	47	10000	0.11	440
CMCC0603C1N5◇SP	1.5	13	500	19	24	39	41	46	10000	0.12	420
CMCC0603C1N6◇SP	1.6	13	500	19	24	39	41	46	10000	0.13	410
CMCC0603C1N7◇SP	1.7	13	500	19	24	39	41	46	10000	0.15	380
CMCC0603C1N8◇SP	1.8	13	500	19	24	39	41	46	10000	0.15	380
CMCC0603C1N9◇SP	1.9	13	500	18	24	38	40	45	10000	0.18	350
CMCC0603C2N0◇SP	2.0	13	500	17	24	38	39	44	10000	0.23	300
CMCC0603C2N1◇SP	2.1	13	500	17	24	37	39	44	10000	0.24	300
CMCC0603C2N2◇SP	2.2	13	500	17	24	38	40	43	10000	0.25	290
CMCC0603C2N3◇SP	2.3	13	500	17	24	37	39	43	10000	0.20	330
CMCC0603C2N4◇SP	2.4	13	500	17	23	36	38	42	10000	0.22	310
CMCC0603C2N5◇SP	2.5	13	500	17	23	35	36	40	9600	0.20	330
CMCC0603C2N6◇SP	2.6	13	500	17	22	34	35	39	9400	0.20	330
CMCC0603C2N7◇SP	2.7	13	500	17	22	34	35	39	9200	0.22	310
CMCC0603C2N8◇SP	2.8	13	500	17	22	34	35	39	8900	0.24	300
CMCC0603C2N9◇SP	2.9	13	500	17	22	34	35	39	8800	0.26	280

CMCC0603C Series

◆Specifications

Part Number	Inductance (nH)	Min. Quality Factor (Q)	L, Q Test Freq. L/Q(MHz)	Typical Q @ Freq. (GHz)					Min. Self-resonant Frequency (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)
				0.5	0.8	1.8	2.0	2.4			
				Q							
CMCC0603 Series											
CMCC0603C2N9◇SP	2.9	13	500	17	22	34	35	39	8800	0.26	280
CMCC0603C3N0◇SP	3.0	13	500	17	22	34	35	39	8600	0.26	280
CMCC0603C3N1◇SP	3.1	13	500	17	22	34	35	39	8500	0.28	270
CMCC0603C3N2◇SP	3.2	13	500	17	22	33	35	39	8200	0.28	270
CMCC0603C3N3◇SP	3.3	13	500	18	23	34	36	40	8100	0.30	270
CMCC0603C3N4◇SP	3.4	13	500	17	23	33	35	39	8000	0.30	270
CMCC0603C3N5◇SP	3.5	13	500	17	23	33	35	39	7900	0.34	250
CMCC0603C3N6◇SP	3.6	13	500	16	23	33	35	39	7700	0.38	240
CMCC0603C3N7◇SP	3.7	13	500	16	23	33	35	38	7600	0.40	230
CMCC0603C3N8◇SP	3.8	13	500	16	22	33	35	38	7500	0.42	230
CMCC0603C3N9◇SP	3.9	13	500	16	22	33	35	38	7400	0.42	230
CMCC0603C4N3◇SP	4.3	13	500	16	21	32	34	37	6800	0.44	220
CMCC0603C4N7◇SP	4.7	13	500	16	22	33	35	38	6200	0.45	220
CMCC0603C5N1◇SP	5.1	13	500	17	22	34	36	38	5900	0.46	210
CMCC0603C5N6◇SP	5.6	13	500	16	21	33	34	37	5500	0.46	210
CMCC0603C6N2◇SP	6.2	13	500	18	23	34	35	37	5100	0.48	210
CMCC0603C6N8◇SP	6.8	13	500	17	22	32	33	35	4900	0.50	200
CMCC0603C7N5◇SP	7.5	13	500	16	21	31	33	34	4700	0.50	200
CMCC0603C8N2◇SP	8.2	13	500	16	21	31	32	34	4300	0.56	190
CMCC0603C9N1◇SP	9.1	13	500	16	20	30	31	32	4100	0.72	170
CMCC0603C10N◇SP	10	13	500	16	20	28	29	31	3800	0.80	160
CMCC0603C12N◇SP	12	13	500	16	20	27	28	28	3400	0.80	160
CMCC0603C15N◇SP	15	13	500	15	19	24	24	23	2600	0.85	160
CMCC0603C18N◇SP	18	13	500	15	19	23	24	22	2300	1.00	140

◆Specifications

Part Number	Inductance (nH)	Min. Quality Factor (Q)	L, Q Test Freq. L/Q(MHz)	Typical Q @ Freq. (GHz)					Min. Self-resonant Frequency (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)
				0.5	0.8	1.8	2.0	2.4			
				Q							
CMCC0603 Series											
CMCC0603C22N◇SP	22	13	500	15	19	22	23	20	1900	1.20	130
CMCC0603C27N◇SP	27	13	500	15	19	15	13	8	1800	1.60	120
CMCC0603C33N◇SP	33	11	300	14	15	8	5	-	1800	2.20	110
CMCC0603C39N◇SP	39	11	300	14	15	6	-	-	1600	2.30	100
CMCC0603C47N◇SP	47	11	300	14	15	-	-	-	1500	2.60	100
CMCC0603C56N◇SP	56	11	300	13	13	-	-	-	1400	2.80	80
CMCC0603C68N◇SP	68	11	300	13	11	-	-	-	1200	3.20	80
CMCC0603C82N◇SP	82	10	300	12	10	-	-	-	1100	3.80	70
CMCC0603CR10◇SP	100	10	300	12	10	-	-	-	1000	4.00	60
CMCC0603CR12◇SP	120	9	300	12	8	-	-	-	1000	5.00	50

Note： ◇: Please specify the inductance tolerance. For L≤6.2nH, choose B=±0.1nH, C=±0.2nH or S=±0.3nH;For L>6.2nH, choose G=±2%,H=±3%or J=5%.

◆General Technical Data

Operating Temperature Range	-55℃ ~ +125℃
Storage Condition	Less than 40℃ and 70% RH
Soldering Method	Reflow or Wave Soldering

◆ Composition / Information on Ingredients

Product Structure: See Fig.1, Fig. 2 and Fig. 3

Fig.1 Shape

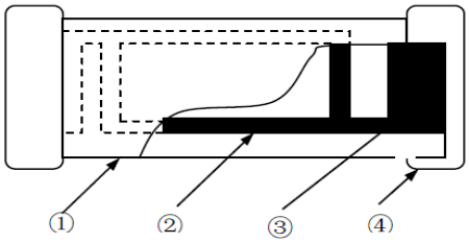


Fig.2 Body Structure

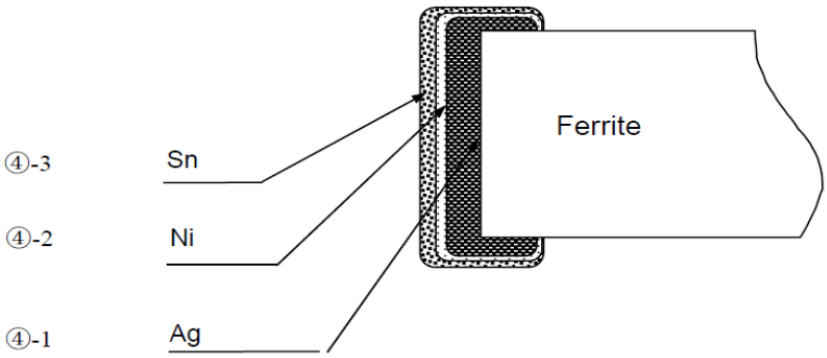


Fig. 3 Structure of Electro-plating

Composition/Information on the Components		
Code	**Material**	**Main Components**
①	Ceramic	Boron Silicate,Al_2O_3, Secret
②	Inner Coil	Silver (Ag)
③	Pull-out Electrode	Silver (Ag)
④-1	Terminal Electrode	Silver (Ag)
④-2	Electrode-plating: Nickel plating	Nickel (Ni)
④-3	Electrode-plating: Sn plating	Tin (Sn)

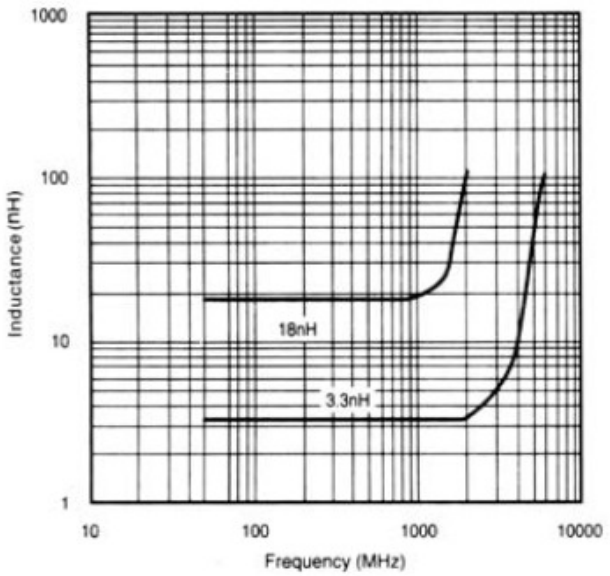
Compositions Wt Rate (Wt%) of Material

Material	Wt Rate (Wt%)	CAS No.
Boron Silicate	51~65	65997-18-4
Al_2O_3	14~17	1344-28-1
Secret	0~5	-
Ag	9~29	7440-22-4
Nickel	1.8~2.3	7440-02-0
Tin	3.6~4.7	7440-31-5

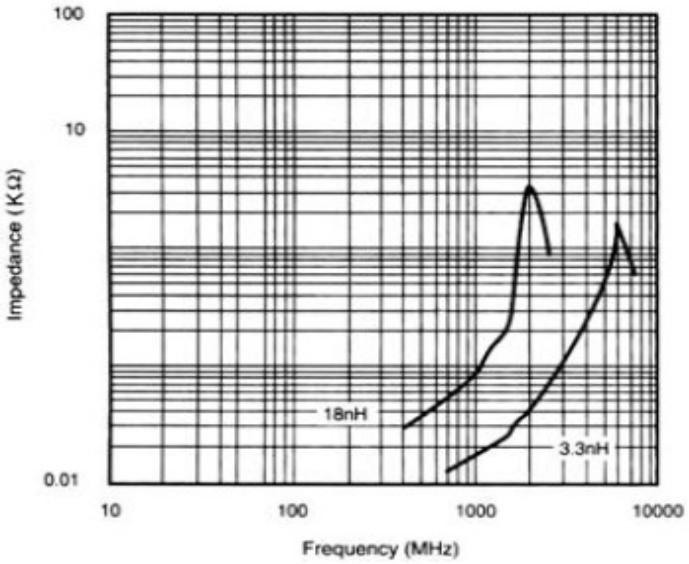
◆ TYPICAL ELECTRICAL CHARACTERISTICS

CMCC0603 Series

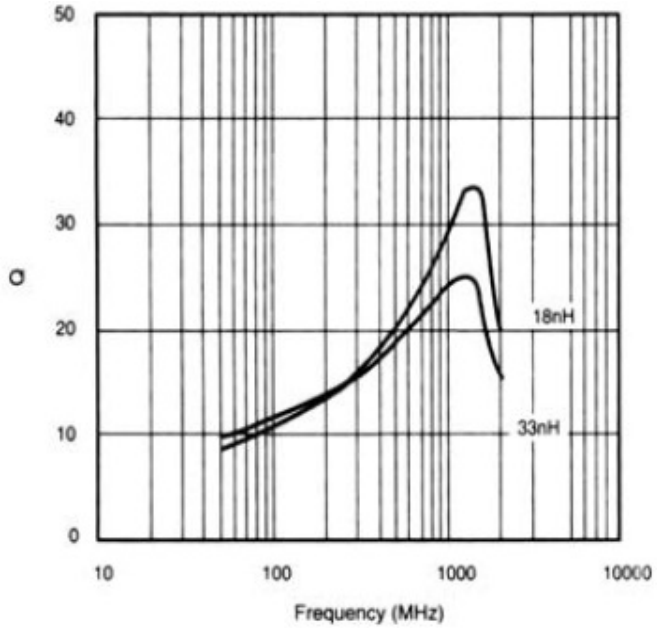
Inductance vs. Frequency Characteristics



Impedance vs. Frequency Characteristics



Q vs. Frequency Characteristics



◆ Test and Measurement Procedures

1、Test Conditions

A、nless otherwise specified, the standard atmospheric conditions for measurement/test as:

a.Ambient Temperature: 20±15℃
b.Relative Humidity: 65±20%
c.Air Pressure: 86kPa to 106kPa

B、If any doubt on the results, measurements/tests should be made within the following limits:

a.Ambient Temperature: 20±2℃
b.Relative Humidity: 65±5%
c.Air Pressure: 86kPa to 106kPa

2、Visual Examination

a .Inspection Equipment: 20× magnifier

3、Electrical Test

A、DC Resistance (DCR)

a.Refer to Appendix A.
b.Test equipment (Analyzer): High Accuracy Milliohmmeter-HP4338B or equivalent.

B、Inductance (L)

a.Refer to Appendix A.
b.Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+HP16192A or equivalent.
c.Test signal: -20dBm or 50mV
d.Test frequency refers to Appendix A.

C、Q Factor (Q)

a.Refer to Appendix A.
Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A+HP16192A or equivalent.
b.Test signal: -20dBm or 50mV
c.Test frequency refers to Appendix A.

4、Self-Resonant Frequency (SRF)

A、Refer to Appendix A.
Test equipment: High Accuracy RF Impedance /Material Analyzer- E4991A+HP16192A or Agilent E5071C Network analyzer(when SRF＞3GHz).

B、Test signal: -20dBm or 50 mV

5、Rated Current

A、Refer to Appendix A.
B、Test equipment (see Fig1): Electric Power, Electric current meter, Thermometer.
C、Measurement method (see Fig1):
a.Set test current to be 0mA.
b.Measure initial temperature of chip surface.
c.Gradually increase voltage and measure chip temperature for corresponding current.
D、Definition of Rated Current(Ir): Ir is direct electric current as chip surface temperature rose just 20℃ against chip initial surface temperature(Ta) (see Fig2).

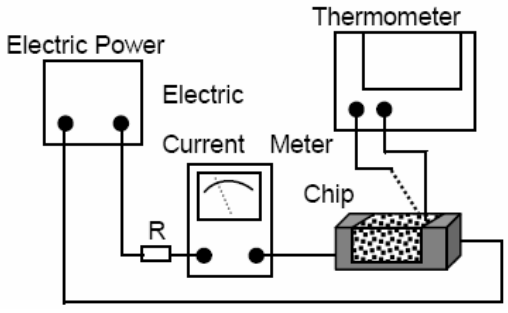


Fig1

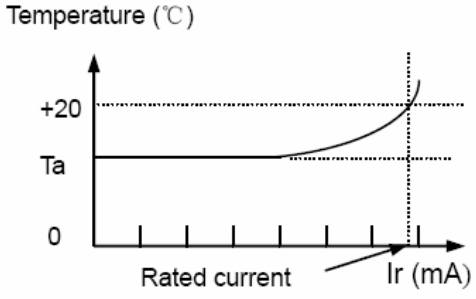
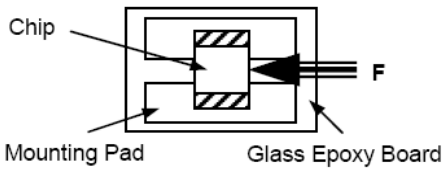
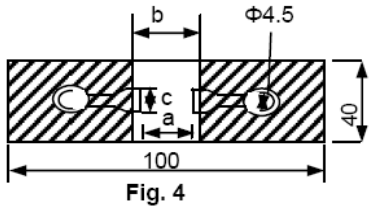
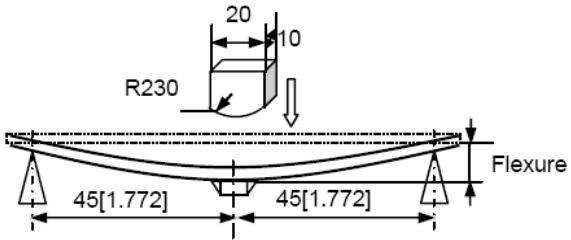
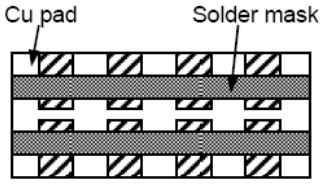
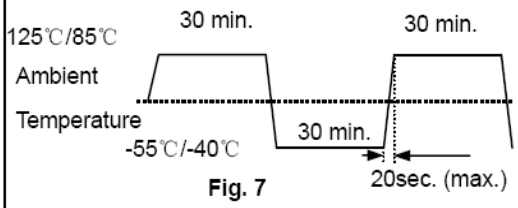


Fig2

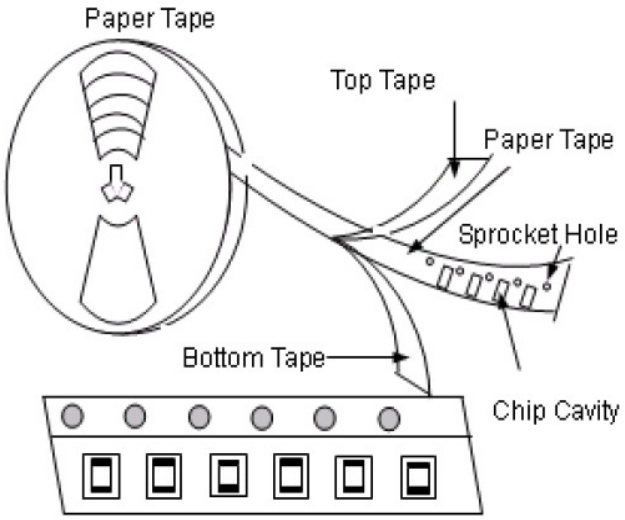
◆ Reliability Test

Items	Requirements	Test Methods and Remarks
1. Terminal Strength	No removal or split of the termination or other defects shall occur.  **Fig.3**	① Solder the inductor to the testing jig (glass epoxy board shown in **Fig. 3**) using leadfree solder. Then apply a force in the direction of the arrow. ② 5N force for 0603 series. ③ Keep time: 10±1s Speed: 1.0mm/s.
2. Resistance to Flexure	No visible mechanical damage. Type / a / b / c: 0603[0201] / 1.0 / 3.0 / 1.2 Unit: mm [inch]  **Fig. 4**	① Solder the inductor to the test jig (glass epoxy board shown in **Fig. 4**) Using a leadfree solder. Then apply a force in the direction shown **Fig.5** ② Flexure: 2mm. ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time: 30 sec.  **Fig. 5**
3. Vibration	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.  **Fig. 6**	① Solder the inductor to the testing jig (glass epoxy board shown in **Fig.6**) using leadfree solder. ② The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
4. Dropping	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.
5. Temperature	Inductance change should be within ±10% of initial value measuring at 20℃.	Temperature range: -55℃ to +125℃, Reference temperature: 20℃
6. Solderability	① No visible mechanical damage. ② Wetting shall exceed 75% coverage for 0603 series; exceed 95% for others	① Solder temperture:240±2℃ ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.
7. Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 75% coverage for 0603 series; exceed 95% coverage for others ③ Inductance change: Within ±10%. ④ Q factor change: Within ±20%.	① Solder temperature: 260±3℃ ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

8. Thermal Shock	① No mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.  **Fig. 7**	① Temperature, Time: (See **Fi.7**) -55℃for 30±3 min→125℃ for 30±3min, ② Transforming interval: Max. 20 sec. ③ Tested cycle: 100 cycles. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Resistance to Low Temperature	① No mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	① Temperature: -55±2℃, ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Resistance to High Temperature	① No mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	① Temperature: 125±2℃, ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Damp Heat (Steady States)	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading Under Damp Heat	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ Applied current: Rated current. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: Within ±20%.	① Temperature:125±2℃, ② Duration: 1000^{+24} hours. ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

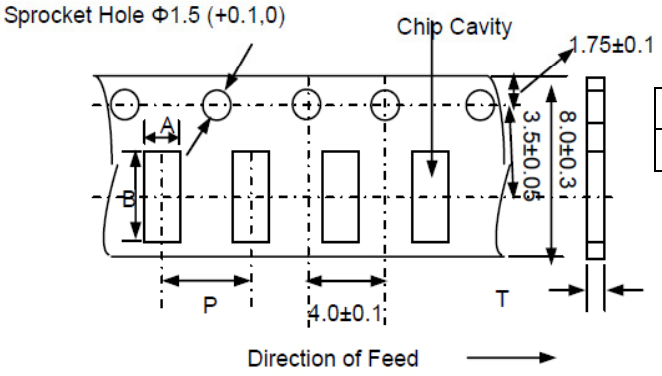
◆ Packaging

(1) Taping Drawings (Unit: mm)



Remark: The sprocket holes are to the right as the tape is pulled toward the user.

(2) Taping Dimensions (Unit: mm)



Type	A	B	P	T max	Quantity
0603(0201)	0.4±0.1	0.7±0.1	2.0±0.05	0.55	15K

(3) Reel Dimensions (Unit: mm)