THIN FILM CHIP INDUCTORS SFI SERIES

Introductions

The SFI series is thin film chip inductors widely used in the communication applications such as cellular phones, cable modem, ADSL, repeaters, Bluetooth, and other electronic devices.

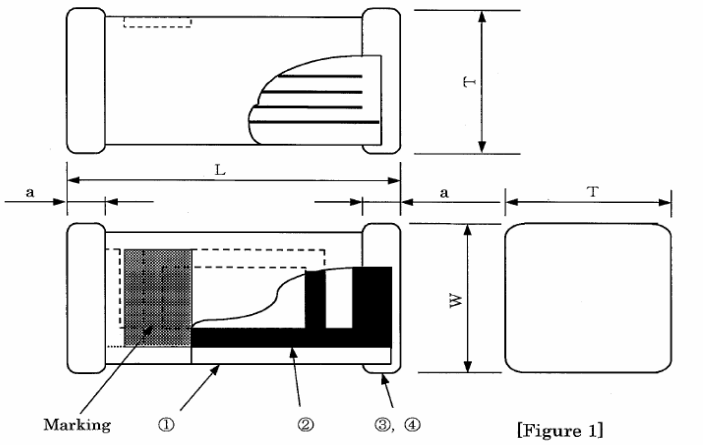
1 OUTLINE DRAWING AND DIMENSION

Part Number Code

SFI	**0603**	**C**	**T**	**10N**	**J**	**□□**
1	**2**	**3** Taping		**4**	**5**	Internal Code

1 Product Type

2 Chip Dimension



[Figure 1]

*) Take care of direction of marking to prevent inductance unevenness. (There is no polarity, however unevenness of inductance could occur)

Table 1

TYPE	Mechanical Dimension (mm)			
	L	W	T	a
SFI 0603	1.60 ± 0.15	0.80 ± 0.15	0.80 ± 0.15	0.30 ± 0.2

Making of material

Table 2

No.	Item	Material
1	Core	Dielectric ceramics
2	Internal electrode	Ag
3	Terminal electrode (Inside)	Ag
4	Terminal electrode (Outside)	Electro plating (Ni~Sn)

*) This product contains no lead and also support lead-free soldering.

3 C: Ceramic

4 Inductance Value

1N0 = 1 nH 10N = 10 nH R10 = 100 nH

5 Tolerance

S = ± 0.3 nH D = ± 0.5 nH J = ± 5 %

2. PRODUCT NAME
THIN FILM CHIP INDUCTOR

SFI 0603 (1608) CERAMIC SERIES

Table 3

ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION

Electrical Characteristics

Part No.	Inductance [1] (nH)	Percent Tolerance	Q [2] Min	S.R.F. [3] Min (GHz)	RDC [4] Max (Ω)	IDC [5] Max (mA)
SFI 0603 CT 1N0□□□	1.0 @ 100 MHz	S	8	10.0	0.10	600
SFI 0603 CT 1N2□□□	1.2 @ 100 MHz	S	8	10.0	0.10	600
SFI 0603 CT 1N5□□□	1.5 @ 100 MHz	S	8	10.0	0.10	600
SFI 0603 CT 1N8□□□	1.8 @ 100 MHz	S	8	9.80	0.10	600
SFI 0603 CT 2N2□□□	2.2 @ 100 MHz	S	10	7.60	0.15	600
SFI 0603 CT 2N7□□□	2.7 @ 100 MHz	S	10	7.00	0.15	600
SFI 0603 CT 3N3□□□	3.3 @ 100 MHz	S	10	6.20	0.20	600
SFI 0603 CT 3N9□□□	3.9 @ 100 MHz	S	10	5.60	0.20	600
SFI 0603 CT 4N7□□□	4.7 @ 100 MHz	S	10	4.80	0.20	600
SFI 0603 CT 5N6□□□	5.6 @ 100 MHz	D	10	4.60	0.20	600
SFI 0603 CT 6N8□□□	6.8 @ 100 MHz	D	10	4.20	0.20	600
SFI 0603 CT 8N2□□□	8.2 @ 100 MHz	D	10	3.60	0.20	600
SFI 0603 CT 10N□□□	10 @ 100 MHz	J	12	3.20	0.25	600
SFI 0603 CT 12N□□□	12 @ 100 MHz	J	12	2.80	0.25	600
SFI 0603 CT 15N□□□	15 @ 100 MHz	J	12	2.60	0.30	600
SFI 0603 CT 18N□□□	18 @ 100 MHz	J	12	2.40	0.35	600
SFI 0603 CT 22N□□□	22 @ 100 MHz	J	12	2.00	0.40	500
SFI 0603 CT 27N□□□	27 @ 100 MHz	J	12	1.90	0.50	500
SFI 0603 CT 33N□□□	33 @ 100 MHz	J	12	1.60	0.55	500
SFI 0603 CT 39N□□□	39 @ 100 MHz	J	12	1.40	0.60	400
SFI 0603 CT 47N□□□	47 @ 100 MHz	J	14	1.20	0.70	400
SFI 0603 CT 56N□□□	56 @ 100 MHz	J	14	1.00	0.75	400
SFI 0603 CT 68N□□□	68 @ 100 MHz	J	14	0.90	0.80	300
SFI 0603 CT 82N□□□	82 @ 100 MHz	J	14	0.80	0.90	300
SFI 0603 CT R10□□□	100 @ 100 MHz	J	14	0.70	1.00	300
SFI 0603 CT R12□□□	120 @ 100 MHz	J	14	0.60	1.20	300
SFI 0603 CT R15□□□	150 @ 100 MHz	J	14	0.50	1.30	250
SFI 0603 CT R18□□□	180 @ 100 MHz	J	14	0.40	1.40	250
SFI 0603 CT R22□□□	220 @ 100 MHz	J	14	0.40	1.70	200
SFI 0603 CT R27□□□	270 @ 100 MHz	J	14	0.35	2.00	200

2. PRODUCT NAME
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Table 4

ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION

Reliability Specification

Part No.	Inductance L (nH)		Q		L, Q Test Freq. (MHz)
	Spec.	Reliability Spec.	Spec.	Reliability Spec.	
SFI 0603 CT 1N0 □□□	1.0±0.3nH	Initial Value ± 0.3nH	8	Initial Value ± 30%	100
SFI 0603 CT 1N2 □□□	1.2±0.3nH	Initial Value ± 0.3nH	8	Initial Value ± 30%	100
SFI 0603 CT 1N5 □□□	1.5±0.3nH	Initial Value ± 0.3nH	8	Initial Value ± 30%	100
SFI 0603 CT 1N8 □□□	1.8±0.3nH	Initial Value ± 0.3nH	8	Initial Value ± 30%	100
SFI 0603 CT 2N2 □□□	2.2±0.3nH	Initial Value ± 0.3nH	10	Initial Value ± 30%	100
SFI 0603 CT 2N7 □□□	2.7±0.3nH	Initial Value ± 0.3nH	10	Initial Value ± 30%	100
SFI 0603 CT 3N3 □□□	3.3±0.3nH	Initial Value ± 0.3nH	10	Initial Value ± 30%	100
SFI 0603 CT 3N9 □□□	3.9±0.3nH	Initial Value ± 0.3nH	10	Initial Value ± 30%	100
SFI 0603 CT 4N7 □□□	4.7±0.3nH	Initial Value ± 0.3nH	10	Initial Value ± 30%	100
SFI 0603 CT 5N6 □□□	5.6±0.5nH	Initial Value ± 0.5nH	10	Initial Value ± 30%	100
SFI 0603 CT 6N8 □□□	6.8±0.5nH	Initial Value ± 0.5nH	10	Initial Value ± 30%	100
SFI 0603 CT 8N2 □□□	8.2±0.5nH	Initial Value ± 0.5nH	10	Initial Value ± 30%	100
SFI 0603 CT 10N □□□	10±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 12N □□□	12±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 15N □□□	15±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 18N □□□	18±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 22N □□□	22±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 27N □□□	27±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 33N □□□	33±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 39N □□□	39±5%	Initial Value ± 5%	12	Initial Value ± 30%	100
SFI 0603 CT 47N □□□	47±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT 56N □□□	56±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT 68N □□□	68±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT 82N □□□	82±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R10 □□□	100±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R12 □□□	120±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R15 □□□	150±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R18 □□□	180±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R22 □□□	220±5%	Initial Value ± 5%	14	Initial Value ± 30%	100
SFI 0603 CT R27 □□□	270±5%	Initial Value ± 5%	14	Initial Value ± 30%	100

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Table 5

ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION

Part Number and description

AOBA Part No.	L (nH)	PART DESCRIPTION
SFI 0603 CT 1N0 S	1.0±0.3nH	
SFI 0603 CT 1N2 S	1.2±0.3nH	
SFI 0603 CT 1N5 S	1.5±0.3nH	
SFI 0603 CT 1N8 S	1.8±0.3nH	
SFI 0603 CT 2N2 S	2.2±0.3nH	
SFI 0603 CT 2N7 S	2.7±0.3nH	
SFI 0603 CT 3N3 S	3.3±0.3nH	
SFI 0603 CT 3N9 S	3.9±0.3nH	
SFI 0603 CT 4N7 S	4.7±0.3nH	
SFI 0603 CT 5N6 D	5.6±0.5nH	
SFI 0603 CT 6N8 D	6.8±0.5nH	
SFI 0603 CT 8N2 D	8.2±0.5nH	
SFI 0603 CT 10N J	10±5%	
SFI 0603 CT 12N J	12±5%	
SFI 0603 CT 15N J	15±5%	
SFI 0603 CT 18N J	18±5%	
SFI 0603 CT 22N J	22±5%	
SFI 0603 CT 27N J	27±5%	
SFI 0603 CT 33N J	33±5%	
SFI 0603 CT 39N J	39±5%	
SFI 0603 CT 47N J	47±5%	
SFI 0603 CT 56N J	56±5%	
SFI 0603 CT 68N J	68±5%	
SFI 0603 CT 82N J	82±5%	
SFI 0603 CT R10 J	100±5%	
SFI 0603 CT R12 J	120±5%	
SFI 0603 CT R15 J	150±5%	
SFI 0603 CT R18 J	180±5%	
SFI 0603 CT R22 J	220±5%	
SFI 0603 CT R27 J	270±5%	

3. MEASUREMENT METHOD

3-1) Inductance and Q values

3-1-1) Test equipment and test fixture

Test equipment : IMPEDANCE ANALYZER 4291A HP (or equivalent)

Test Fixture : 16193A HP (or equivalent)

3-1-2) Test method

Set the chip to test fixture like chip marking is up side and LINE side.

Test frequency id due to Table 3.

3-2) Direct Current Resistance (R.D.C)

3-2-1) Test Equipment

Test equipment : DIGITAL MILLIOHM METER Type 7561 YOKOGAWA (or equivalent)

3-3) Self Resonance Frequency (S.R.F)

3-3-1) Test Equipment

Test Equipment : 8720C HP (or equivalent)

3-3-2) Test method

Self resonance frequency if "Frequency that phase becomes 0 degree" that means switching frequency between inductive reactance and capacitance reactance when measure attenuation with transmission characteristic measurement.

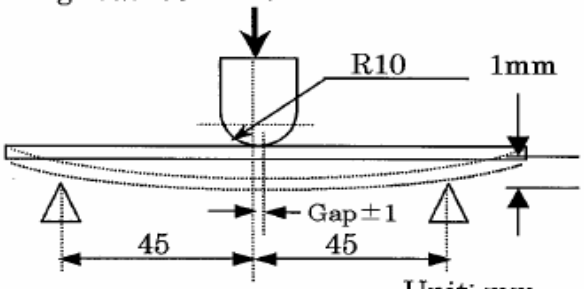
3-4) Rated Current

3-4-1) Temperature Rise

Rated current is the current which causes a temperature rise within 20°C.

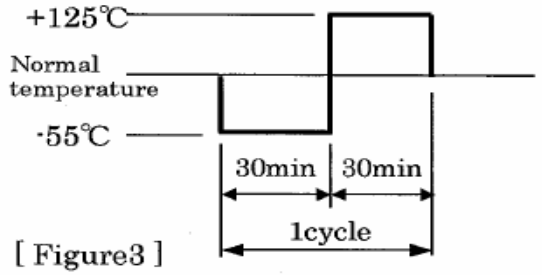
4. RELIABILITY TEST

[Table 6]

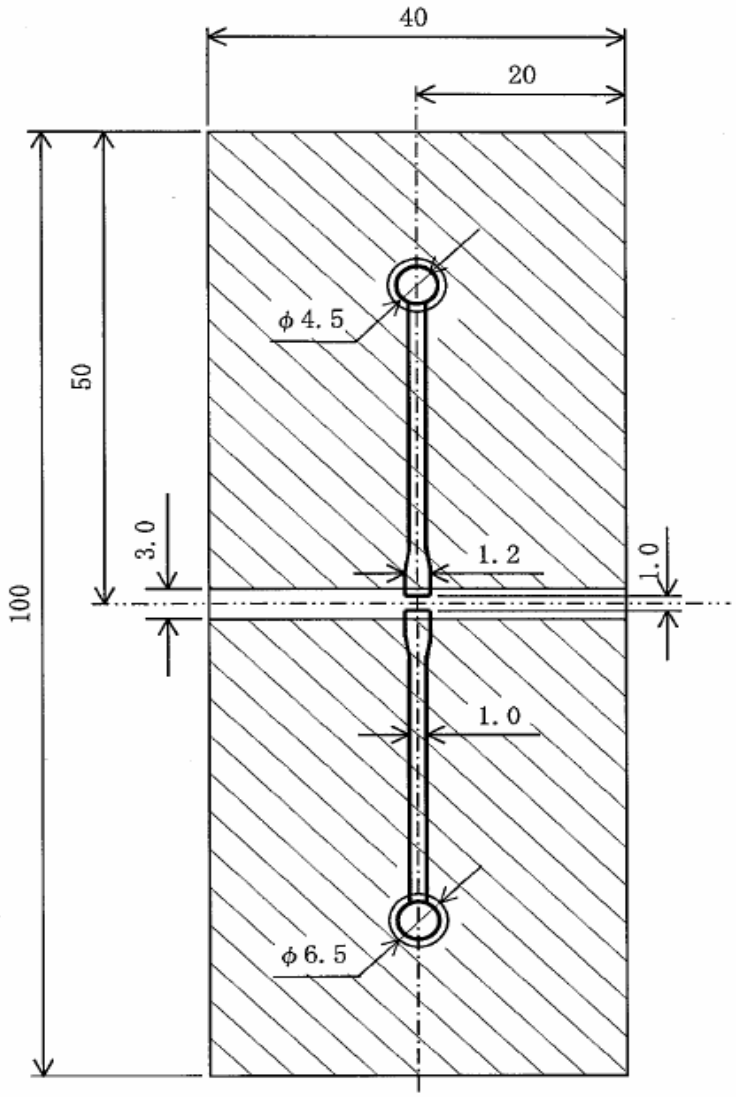
No.	Item	Specification	Test method
4-1	Bending test	No mechanical damage.	Solder specimen inductor on the test printed circuit board in Figure 4 on page 9. Apply the load in direction of the arrow until the bending reaches 1mm.  [Figure 2]
4-2	Vibration test	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board. Apply vibrations in each of the x, y and z directions for 2 hours for a total of 6 hours. Frequency : 10～55～10Hz Total amplitude: 1.5mm Sweep time : 1 min
4-3	Free fall test	No mechanical damage. To satisfy reliability spec.(Table 4)	Drop specimen inductor 10 times from a height of 1 meter.
4-4	Humidity resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then leave it at temperature for 60±2℃ and 90 to 95%R.H. for 500±12hours. Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.
4-5	Heat resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then leave it at temperature for 125±2℃ for 500±12hours. Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.
4-6	Cold resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then leave it at temperature for –55±2℃ for 500±12hours. Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.

4. RELIABILITY TEST

[Table 6]

No.	Item	Specification	Test method
4-7	Heat shock test	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then go through 100 cycles under the following conditions.  [Figure3] Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.
4-8	Life test (moisture loading)	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then leave it at temperature for 60±2℃ for 500±12hours, and relative humidity of 90% to 95% with the rated electric current applied. Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.
4-9	Life test (high temperature loading)	No mechanical damage. To satisfy reliability spec.(Table 4)	Solder specimen inductor on the test printed circuit board, then leave it at temperature for 125±2℃ for 500±12hours with the rated electric current applied. Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.
4-10	Hot solder leaching test	No mechanical damage. Terminal electrodes should remain over than 90%	Apply flux application and preheat for 1 to 2 minutes at 150℃ to 180℃ , then dip in solder at 260±5℃ for 10±0.5 seconds. Flux: Rosin (JIS-K-5902) dissolved in Isopropyl alcohol (JIS-K-8839) at 25 wt %. Solder: Sn-3Ag-0.5Cu.
4-11	Solderability	Terminal electrodes should be covered by new solder to a minimum of 95%	Apply flux application and preheat for 1 to 2 minutes at 150℃ to 180℃ , then dip in solder at 250−260℃ for 4±0.5 seconds. Flux: Rosin (JIS-K-5902) dissolved in Isopropyl alcohol (JIS-K-8839) at 25 wt %. Solder: Sn-3Ag-0.5Cu.

4-12) Bending test P.C. Board.



1. Glass epoxy resin
   Be based on JIS C 6484

2. P.C.Board thickness
   t = 1.0 mm

3. Treatment
   Solder resist
   (Shaded portion in Figure 4)

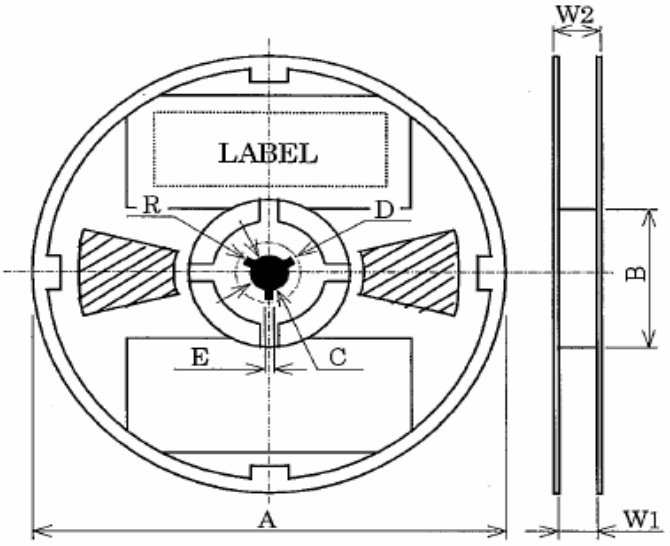
Unit: mm

[Figure 4]

5. PACKAGING

5-1) Reel dimension

[Figure 5]



*) Shaded portion is hole

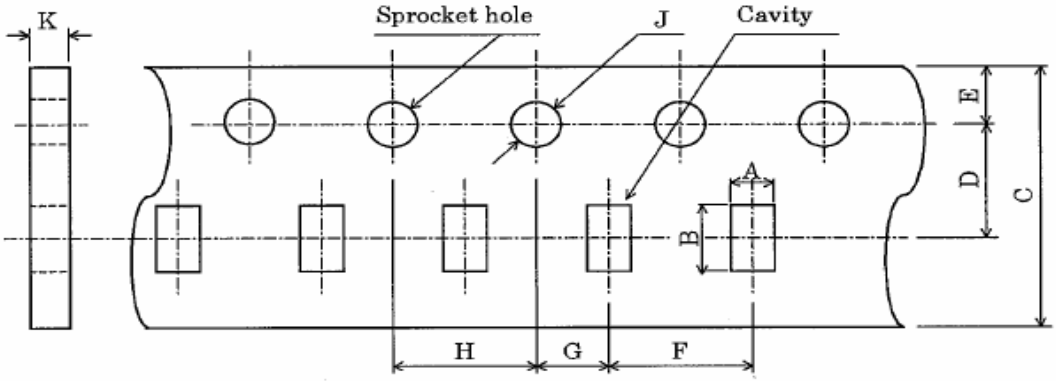
Material of reel: Polystyrene

[Table 7] (Unit: mm)

Mark	A	B	C	D	E
Dimension	ϕ 178±2.0	ϕ 60±2.0	ϕ 13±0.5	ϕ 21±0.8	2.0±0.5
Mark	W1	W2	R		
Dimension	9±0.3	13±1.4	1.0		

5-2) Tape dimensions

[Figure 6]



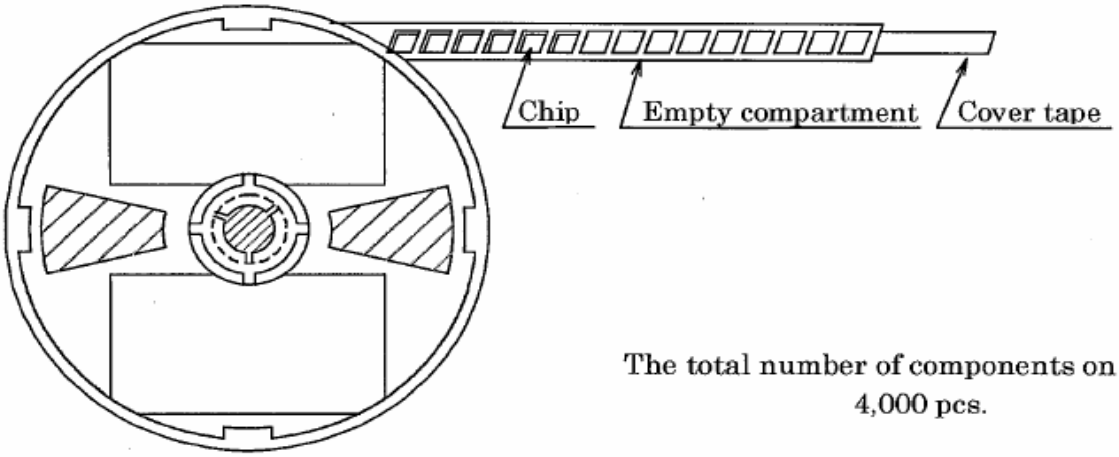
[Table 8] (Unit: mm)

Mark	A	B	C	D	E	F	G	H
Dimension	1.1±0.2	1.9±0.2	8.0±0.3	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1
Mark	J	K						
Dimension	1.5+0.1 0	1.1max						

Material of carrier tape: paper
Material of cover tape: polyester

5. PACKAGING

5-3) Shape of packing

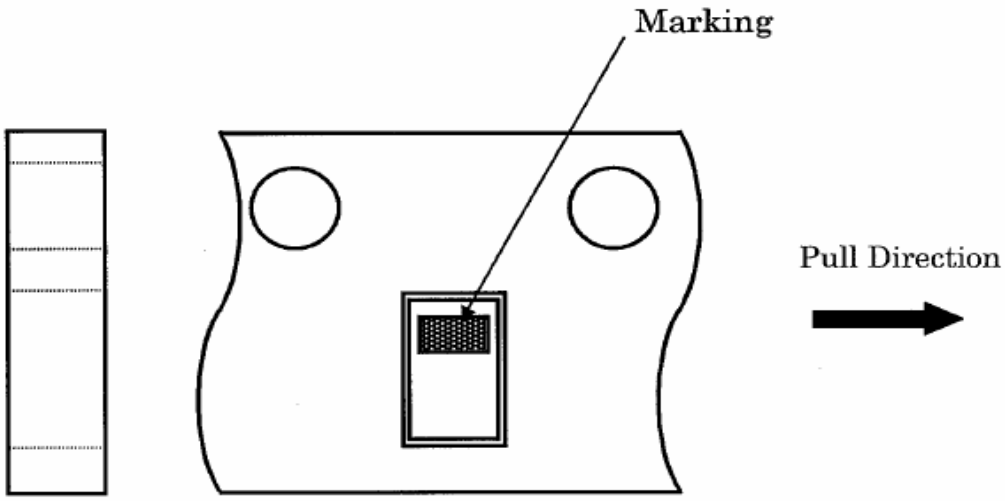


The total number of components on reel.
4,000 pcs.

[Figure 7]

5-4) Marking

The marking shall be seen from the top cover tape side.



[Figure 8]

6. OTHER

6-1) Precaution

6-1-1) Preheating process before soldering is required.
Preheat the components so that the temperature difference between chip inductor and soldering temperature should be kept within 150°C.

6-1-2) Chip inductor should be handled with care not to apply mechanical force by bending P.C. board on which chip inductors are mounted.

6-1-3) Recommended reflow soldering conditions.

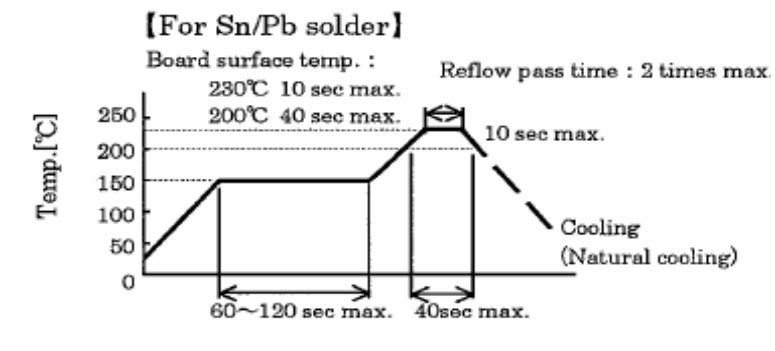


Figure 9

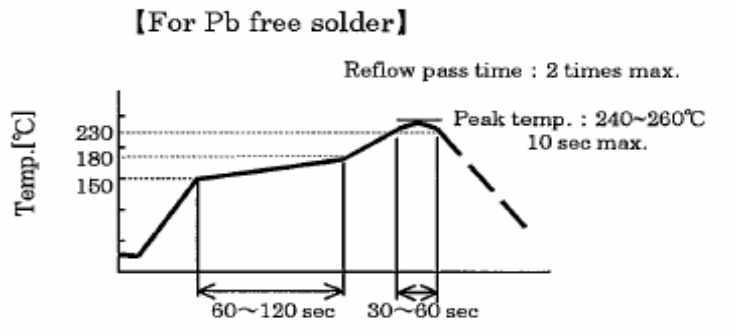


Figure 10

6-1-4) Recommended iron soldering method
Not to contact a solder iron with the product directly, 3 seconds max. for each electrode at 300°C maximum.

6-1-5) Recommended land pattern.

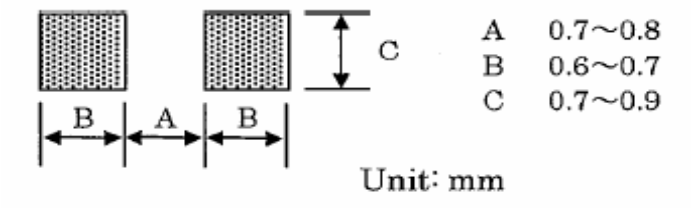


Figure 11

6-1-6) Recommended rinse conditions after soldering.
Recommended rinse agent is ethyl alcohol series surface active agent.
If use other agent, confirm soldering condition in person.

6-1-7) This product corresponds to RoHS.
It contains neither Cd, Pb, Hg, Cr6+, PBB nor PBDE.

CHIP INDUCTOR SPECIFICATION

Operating Environment

Do not use this product under the following environmental conditions, on deterioration of performance, such as insulation resistance may result from the use.

1. In corrosive gases (acidic gases, alkaline gases, chlorine, sulfur gases, organic gases and etc.)

2. In the atmosphere where liquid such as organic solvent, may splash on the products.

Storage Condition

1. Storage period
   Use the product within 12 months after delivered.
   Solderability should be checked if this period is exceeded.

2. Storage environment conditions

* Product should be store in the warehouse on the following conditions.
   Temperature : -10 ~ +40ºC
   Humidity : 30 t0 70% relative humidity. No rapid change on temperature and humidity.

* Products should not be stored in corrosive gases, such as sulfurous, acid gases, alkaline gases, to prevent the following deterioration.
   Poor solderability due to the oxidized electrode.

* Products should be stored on the pallet for the prevention of the influence from humidity, dust and so on.

* Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

* Do not unpack the minimum package until immediately before use. After unpacking, re-seal promptly or store in desiccator with a desiccant.

Delivery

Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.