

# 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.

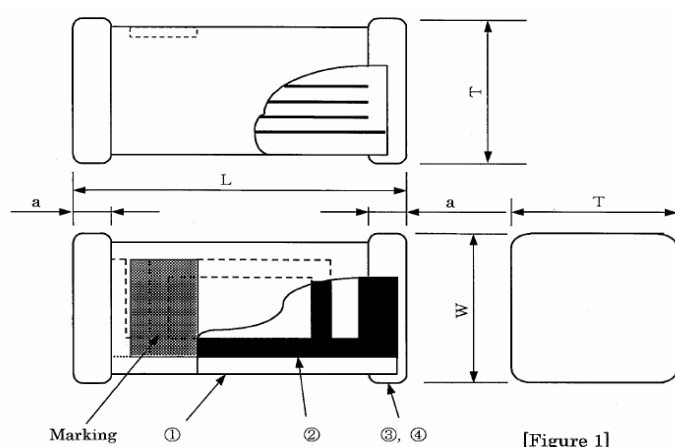
## 1 OUTLINE DRAWING AND DIMENSION

### Part Number Code

<b>SFI</b>	<b>0603</b>	<b>C</b>	<b>T</b>	<b>10N</b>	<b>J</b>	□□
1	2	3 Taping	4	5	Internal Code	

1 Product Type

2 Chip Dimension



\*) 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 %

Table 3

**ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION**

Electrical Characteristics

Part No.	Inductance <sup>1</sup> (nH)	Percent Tolerance	Q <sup>2</sup> Min	S.R.F. <sup>3</sup> Min (GHz)	RDC <sup>4</sup> Max (Ω)	IDC <sup>5</sup> 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

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

**2. PRODUCT NAME**  
**THIN FILM CHIP INDUCTOR**

**SFI 0603 (1608) CERAMIC SERIES**

Table 5

**ELECTRICAL CHARACTERISTICS AND RELIABILITY SPECIFICATION**

Part Number and description

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.

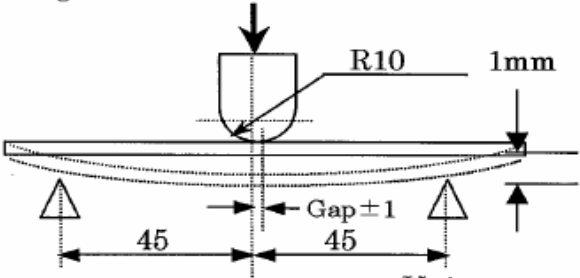
#### 3-4) Rated Current

##### 3-4-1) Temperature Rise

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

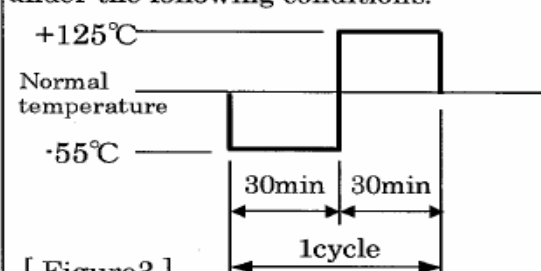
4. RELIABILITY TEST

[Table 6]

No.	Item	Specification	Test method
4-1	Bending test	No mechanical damage.	<p>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.</p>  <p>[Figure 2] Unit: mm</p>
4-2	Vibration test	No mechanical damage. To satisfy reliability spec.(Table 4)	<p>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.</p> <p>Frequency : 10~55~10Hz Total amplitude: 1.5mm Sweep time : 1 min</p>
4-3	Free fall test	No mechanical damage. To satisfy reliability spec.(Table 4)	<p>Drop specimen inductor 10 times from a height of 1 meter.</p>
4-4	Humidity resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	<p>Solder specimen inductor on the test printed circuit board, then leave it at temperature for <math>60 \pm 2^\circ\text{C}</math> and 90 to 95%R.H. for <math>500 \pm 12</math>hours.</p> <p>Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.</p>
4-5	Heat resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	<p>Solder specimen inductor on the test printed circuit board, then leave it at temperature for <math>125 \pm 2^\circ\text{C}</math> for <math>500 \pm 12</math>hours.</p> <p>Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.</p>
4-6	Cold resistance test	No mechanical damage. To satisfy reliability spec.(Table 4)	<p>Solder specimen inductor on the test printed circuit board, then leave it at temperature for <math>-55 \pm 2^\circ\text{C}</math> for <math>500 \pm 12</math>hours.</p> <p>Measure the test items after leaving the inductors at room temperature and humidity for 1 to 2 hours.</p>

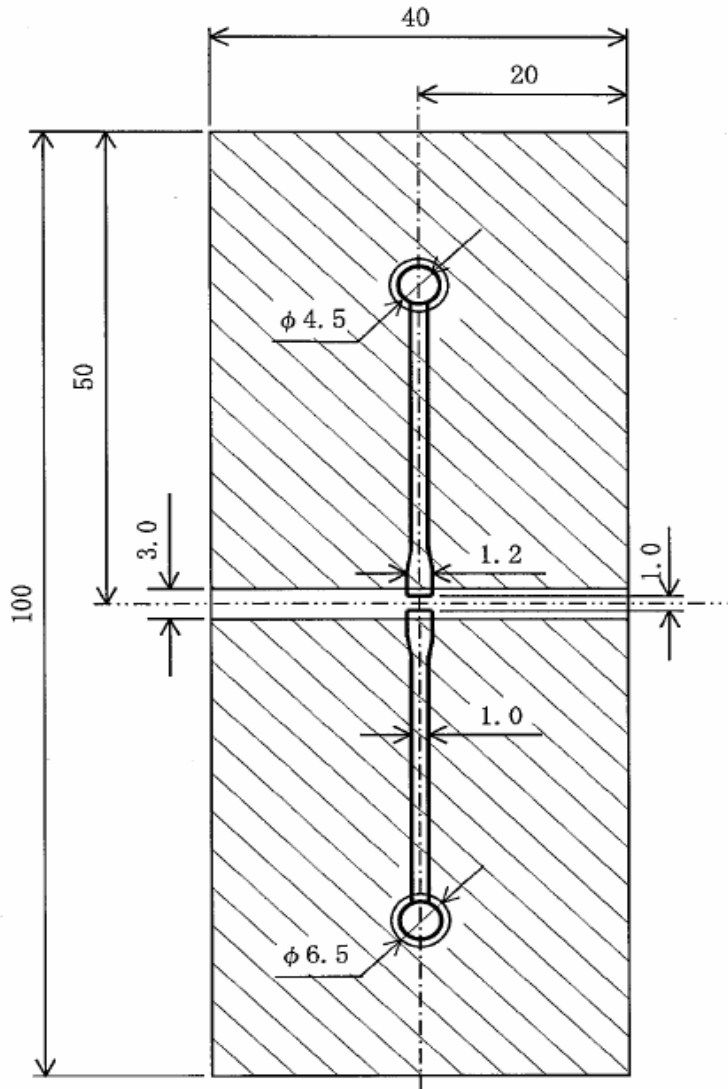
#### 4. RELIABILITY TEST

[Table 6]

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

4. RELIABILITY TEST

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



1. Glass epoxy resin  
Be based on JIS C 6484
2. P.C.Board thickness  
 $t = 1.0 \text{ mm}$
3. Treatment  
Solder resist  
(Shaded portion in Figure 4)

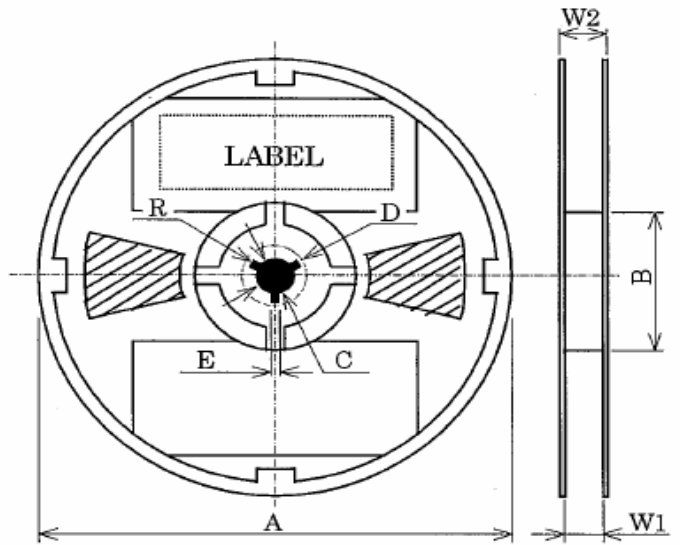
Unit: mm

[Figure 4]

5. PACKAGING

5-1) Reel dimension

[Figure 5]



\*) Shaded portion is hole

Material of reel: Polystyrene

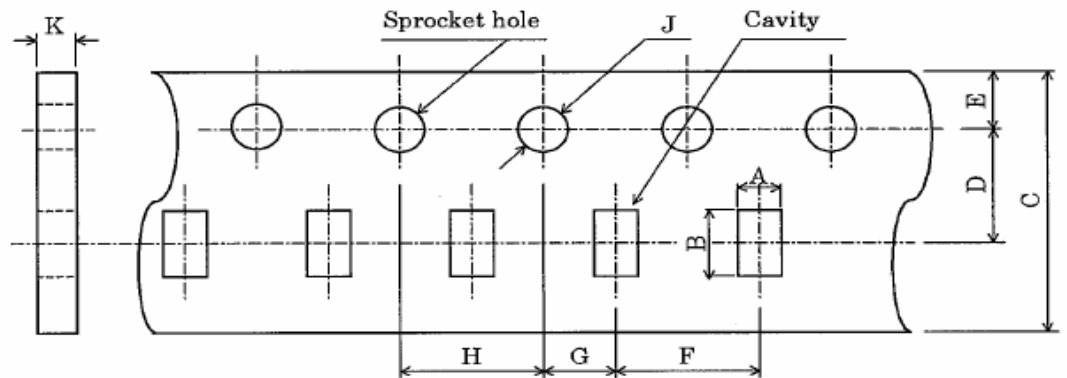
[Table 7]

(Unit: mm)

Mark	A	B	C	D	E
Dimension	$\phi 178 \pm 2.0$	$\phi 60 \pm 2.0$	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$	$2.0 \pm 0.5$
Mark	W1	W2	R		
Dimension	$9 \pm 0.3$	$13 \pm 1.4$	1.0		

5-2) Tape dimensions

[Figure 6]



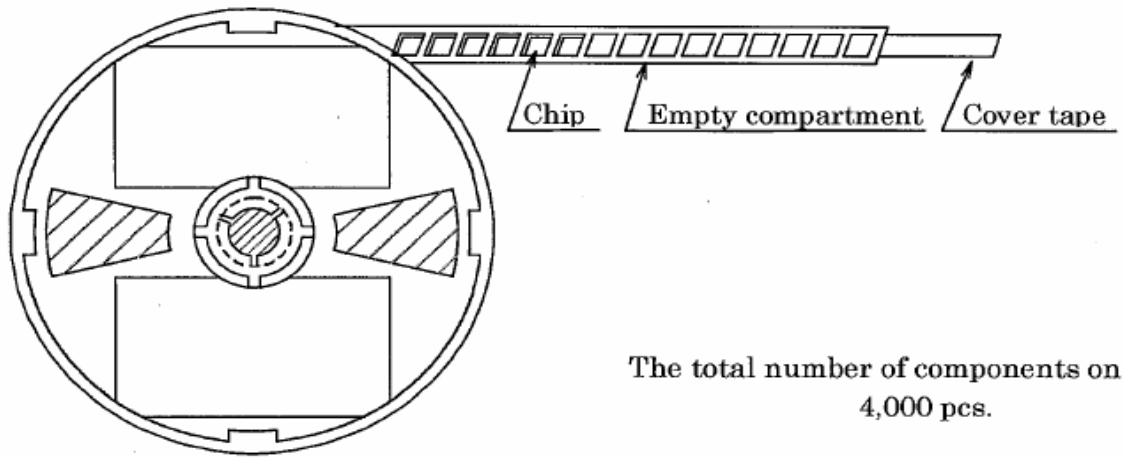
[Table 8]

(Unit: mm)

Mark	A	B	C	D	E	F	G	H
Dimension	$1.1 \pm 0.2$	$1.9 \pm 0.2$	$8.0 \pm 0.3$	$3.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.05$	$4.0 \pm 0.1$
Mark	J	K	Material of carrier tape: paper Material of cover tape: polyester					
Dimension	$1.5^{+0.1}_0$	1.1max						

## 5. PACKAGING

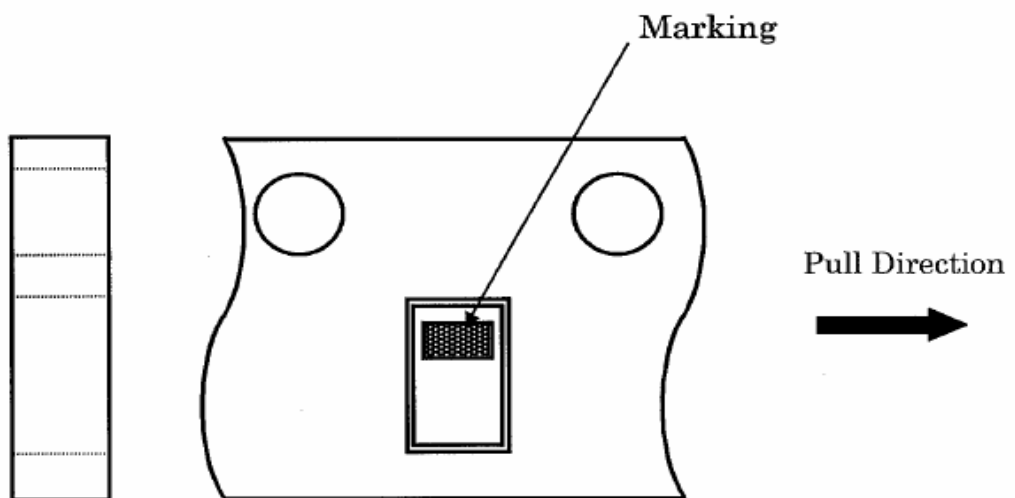
### 5-3) Shape of packing



[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.

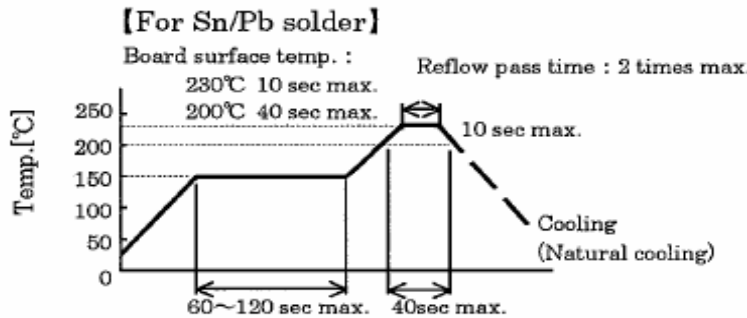


Figure 9

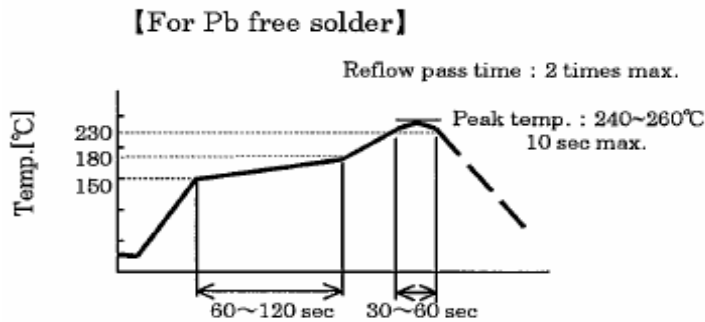


Figure 10

#### 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.

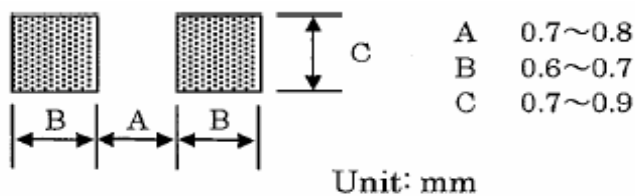


Figure 11

#### 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 ~ +40°C

Humidity : 30 to 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.