

0603 SERIES THIN FILM CHIP INDUCTOR

1.Scope

This specification applies to 0.8mm x 1.6mm (0603) size, fixed thin film chip inductor rectangular type.

2.Type Designation

TFL0816 - * * *

(1)

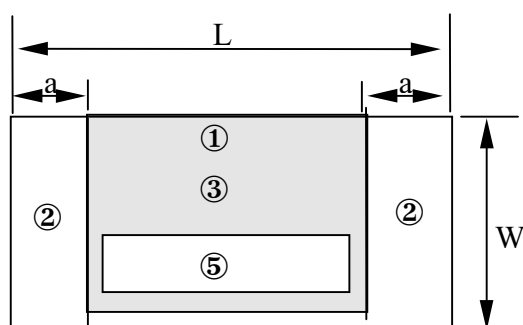
(2)

Where (1) Product identification code

(2) Nominal inductance value : three digits of number, refer to paragraph 4.1 (1)

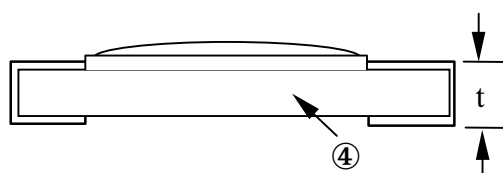
The nominal inductance value shall be represented by two significant figures and a code "N" representing the unit.

3.Construction and Physical Dimensions



Unit : mm

SYMBOL	DIMENSIONS
L	1.60 ± 0.2
W	0.80 ± 0.2
t	0.45 ± 0.1
a	0.30 ± 0.2



Note :

- ① Coil : Cu Series Film
 - ② Electrode : Solder Plating
Sn : Pb = 9 : 1
 - ③ Protection Coating : Epoxy Resin
 - ④ Substrate
 - ⑤ Direction marking
2. Weight : 2 mg Type

4.Ratings

4.1 Nominal Inductance Value and Tolerance

(1) Inductance Value	E12 series	1 ~ 100 nH
(2) Tolerance	Refer to Table 1	

Table 1 : Electric Characteristics

Inductance	Tolerance	Q	L.Q Mesa. Freq.	Self Resonance Freq.	DC Resistance	Rated Current
(nH)		min.	(MHz)	(MHz)min.	(Ω)max.	(mA)
1.0	±0.2nH	20	300	6000	0.10	1000
1.2	±0.2nH	20	300	6000	0.10	1000
1.5	±0.2nH	20	300	6000	0.10	1000
1.8	±0.2nH	20	300	6000	0.15	800
2.2	±0.2nH	20	300	6000	0.15	800
2.7	±0.2nH	20	300	6000	0.15	800
3.3	±0.2nH	20	300	6000	0.20	700
3.9	±0.2nH	20	300	6000	0.20	700
4.7	±0.2nH	20	300	5000	0.25	600
5.6	±0.2nH	15	300	5000	0.50	400
6.8	±0.2nH	15	300	5000	0.50	400
8.2	±0.2nH	15	300	4000	0.50	400
10	±2%	15	300	4000	1.0	300
12	±2%	15	300	3000	1.0	300
15	±2%	15	300	3000	1.0	300
18	±2%	15	300	2000	1.5	250
22	±2%	15	300	2000	1.5	250
27	±2%	15	300	2000	2.0	200
33	±2%	15	200	1500	2.0	200
39	±2%	15	200	1500	3.0	180
47	±2%	15	200	1500	3.0	180
56	±2%	15	200	1000	4.0	150
68	±2%	15	200	1000	4.5	140
82	±2%	10	200	1000	6.0	120
100	±2%	10	200	1000	8.5	100

Condition :

Measuring Temperature 24 ± 2°C

Measuring Equipment RF LCR Meter (HP4191A)

4.2 Operating Temperature Range

4.2.1 Operating Temperature Range : -40 to +125 °C

4.2.2 Storage Temperature Range : -40 to +125 °C

5.Characteristics

5.1 Electrical

Unless otherwise specified, measurements shall be performed under the condition below.

- a. Temperature : $24 \pm 2^{\circ}\text{C}$
- b. Relative Humidity : 45 to 85%RH
- c. Atmospheric Pressure : 86 to 106 kPa

Electrical Characteristic after testing is established by ΔL and ΔQ .

ΔL	1 ~ 100nH	$\pm 5\%$
ΔQ	1 ~ 8.2nH	$\pm 20\%$
	10 ~ 100nH	$\pm 10\%$

5.1.1 Inductance

Inductance value shall be within the tolerance specified in Table 1.

Measurement shall be performed by Impedance Analyzer 4191A with the frequency specified in Table 1.

5.1.2 Q value

Q value shall be within the tolerance specified in Table 1.

Measurement shall be performed by Impedance Analyzer 4191A with the frequency specified in Table 1.

5.1.3 DC Resistance

DC Resistance shall be within the specified tolerance.

Refer to JIS C 5202 5.1

5.1.4 Self Resonance Frequency

Measurement shall be performed by Network Analyzer 8510.

5.1.5 Temperature Coefficient

Temperature Coefficient of Inductance shall be within 0 to +125ppm/ $^{\circ}\text{C}$.

Temperature Coefficient of Q value shall be -0.25% / $^{\circ}\text{C}$ or less.

Temperature Coefficient of DC Resistance shall be +0.45% / $^{\circ}\text{C}$ or less.

Measurement shall be performed at RT and RT+100 $^{\circ}\text{C}$, and the calculation shall be performed with the measured values.

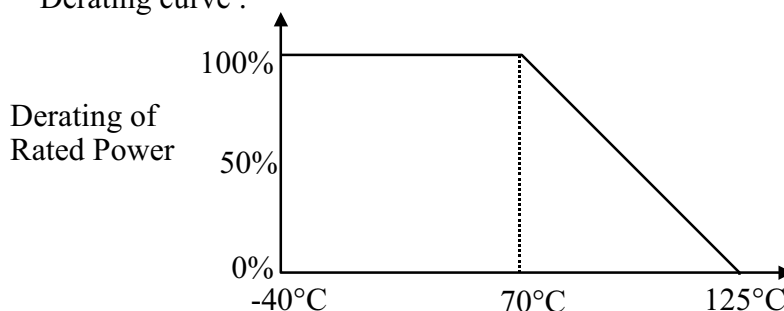
5.1.6 Rated Current

Rated current shall be referred to Table1.

Rated current shall be the current with which the temperature raise of the inductor becomes 20°C.

Rated ambient temperature : 70°C

Derating curve :



$$(\text{Rated Power}) \cong (\text{Rated Current})^2 \times (\text{maximum DC Resistance})$$

5.1.7 Overload

No smoke, Fire nor significant damage shall be observed.

Test current : 2 times of the maximum current.

Duration : 5 min.

5.1.8 Insulation Resistance

Insulation Resistance shall be 100MΩ or over.

The inductor shall be clamped in the metal block and tested, as shown below.

Test voltage : 100 ± 15V DC for 1 min.

Refer to EIAJ RC-2530.

5.1.9 Voltage Proof

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

The inductor shall be tested as shown in paragraph 5.1.7.

Test Voltage : 100V AC r.m.s. for 1 min.

Refer to EIAJ RC-2530.

5.2 Mechanical

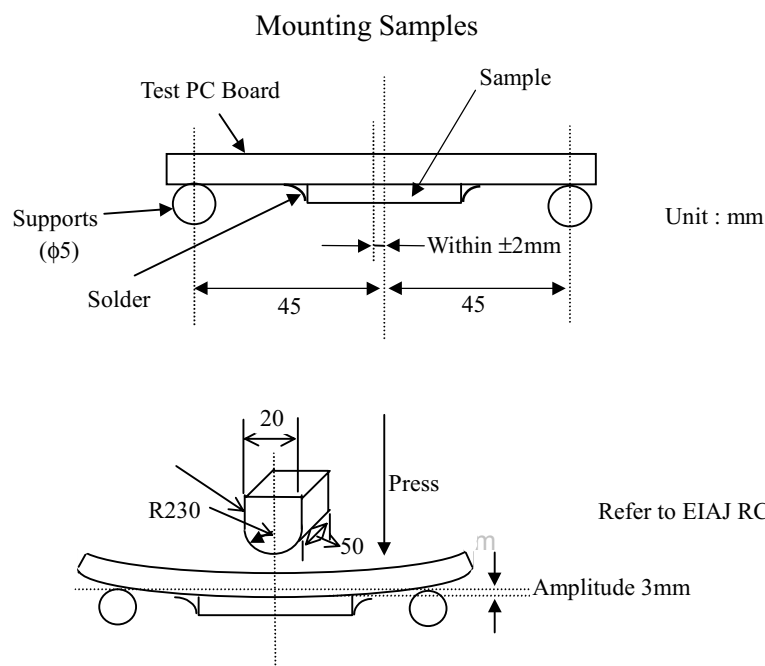
5.2.1 Bending Test

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

Bend width : 3 mm 30sec.

Refer to JIS C 5202 6.1.4.



5.2.2 Solderability

A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.

Temperature of Solder	$235 \pm 5^{\circ}\text{C}$	$215 \pm 3^{\circ}\text{C}$
Immersion duration	$2 \pm 0.5\text{sec.}$	$3 \pm 0.3\text{sec.}$

Refer to EIAJ RC-2530.

5.2.3 Resistance to Soldering Heat

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

(1) Solder bath method

Pre-heat : 100 to 110°C 30 sec.

Temperature : $260 \pm 5^{\circ}\text{C}$ 10 ± 1 sec.

(2) Reflow soldering method

Peak temperature : $240 \pm 5^{\circ}\text{C}$ max. 5 sec.

Temperature : $220 \pm 5^{\circ}\text{C}$ 40 sec.

The heating apparatus shall be the top-heated oven and the temperature shall be the board surface temperature.

(3) Soldering iron method

Bit temperature : $350 \pm 5^{\circ}\text{C}$ max. 3 sec.

The inductor shall be stored at standard atmospheric conditions for 1 hour, after which the measurements shall be made.

Refer to EIAJ RC-2530.

5.2.4 Resistance to Solvent

Marking shall be legible.

Without mechanical damage and no distinct damage in appearance.

(1) Ultrasonic cleaning

At normal temperature, 20 mW/cm^2 28 kHz 60sec.

Fluorocarbon based (Dupont product "FREON TES" or it's equivalent).

(2) Immersion cleaning

At normal temperature, 300 sec.

Isopropyl Alcohol

5.3 Endurance

5.3.1 Temperature Cycling

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

-40°C	→	R.T.	→	+125°C	→	R.T.	(1 cycle)
30min.		3min.		30min.		3min.	

Refer to EIAJ RC-2530.

5.3.2 Dump Heat with Load

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

$40 \pm 2^{\circ}\text{C}$ with relative humidity of 90 to 95%.

DC rated voltage for 1.5 hours on 0.5 hours off

1,000 +48/-0 hours.

5.3.3 Endurance at 70°C Resistance to Soldering Heat

No mechanical damage shall be observed.

Electrical characteristics shall be within specification.

$70 \pm 2^{\circ}\text{C}$

DC rated voltage for 1.5 hours on 0.5 hours off

1,000 +48/-0 hours.

Refer to EIAJ RC-2530.

6. Packaging

6.1 Dimensions

6.1.1 Tape Packaging Dimensions

Refer to Fig.2.

6.1.2 Reel Dimensions

Refer to Fig.3. or Fig.4.

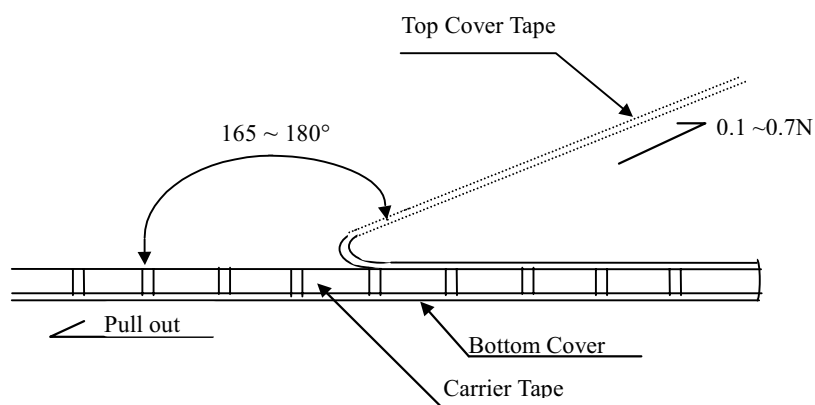
6.2 Peel Strength of Top Cover Tape

Refer to Fig.5.

The peel speed shall be about 300 mm/min.

The peel strength of top cover tape shall be between 0.1 to 0.7N.

Fig.5 Peel Strength of Top Cover Tape



6.3 Numbers of Products per Reel

5,000 pieces / reel

6.4 Marking

The following items shall be marked on the reel.

- (1) Manufactures parts number
- (2) Quantity
- (3) Manufacturing date code
- (4) Manufacturer's name
- (5) The country of origin

7. Caution on using chip inductor

Refer to Attachment.(一) "Caution on Using Chip

Figure 2 Dimensions of Taping

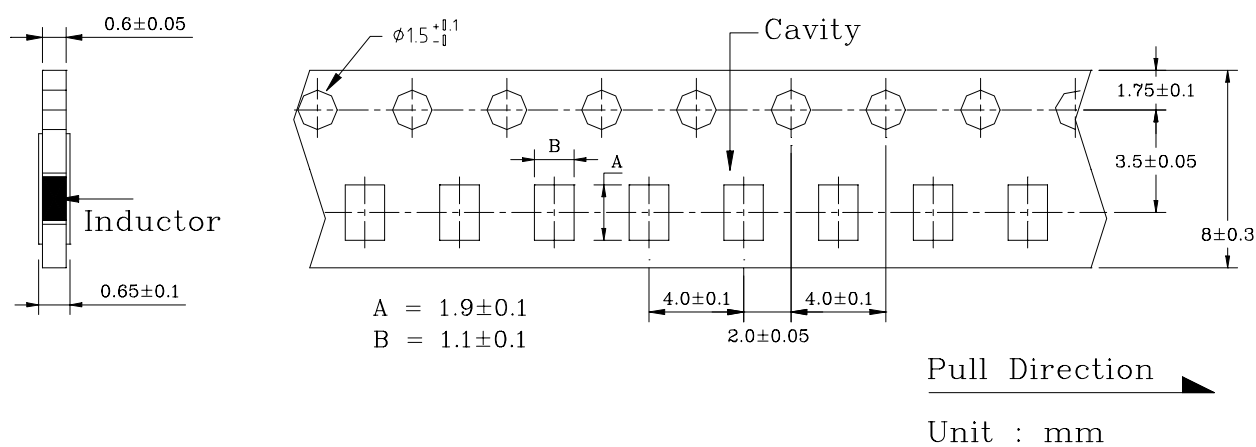


Figure 3 Dimensions of Paper Reel

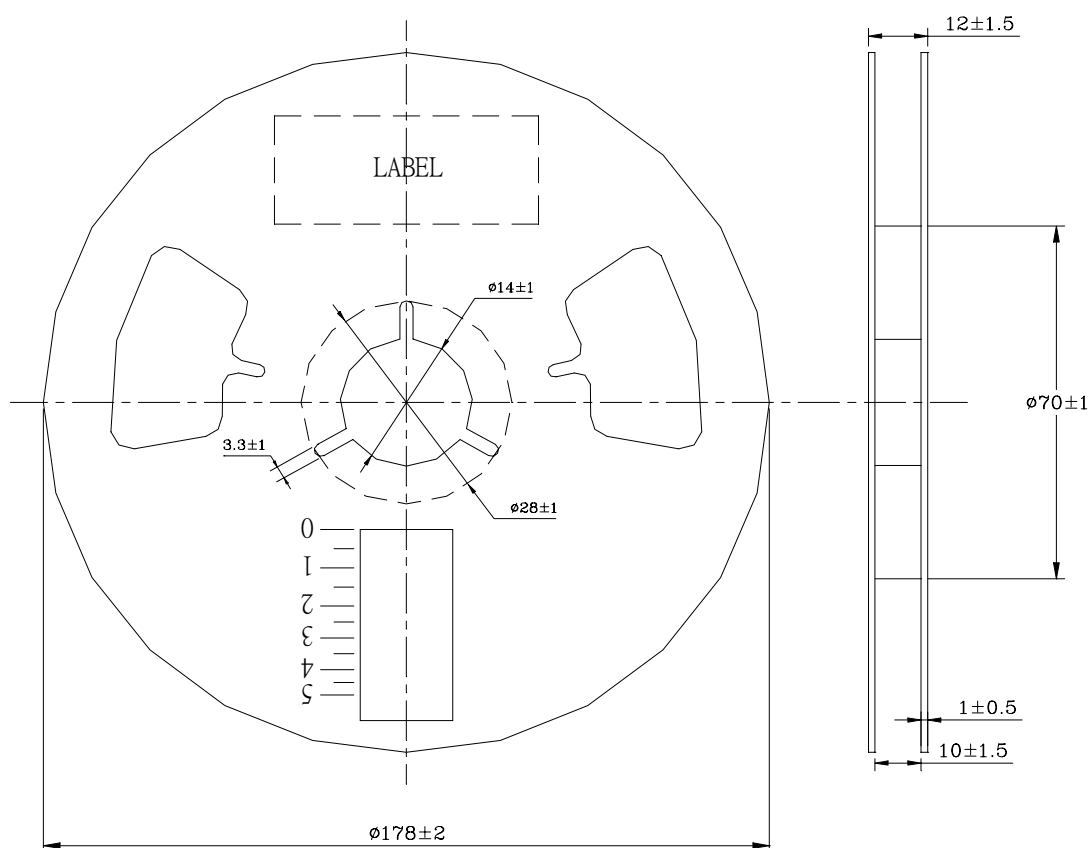
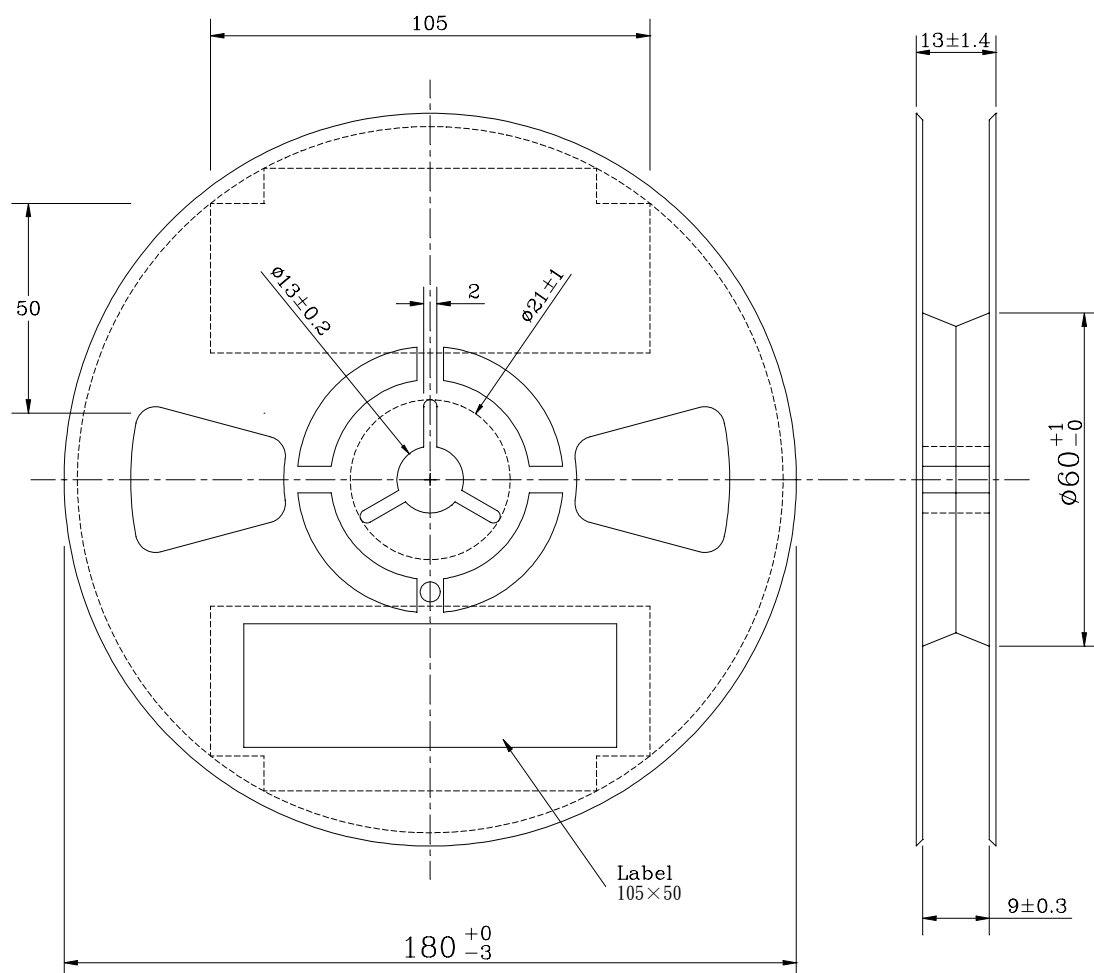


Figure 4 Dimensions of Plastic Reel



Unit : mm

Plastic Reel Thicknss : 0.5mm

Plastic Reel : Correspond with EIAJ RRVO08B

Fig.6 Direction Marking

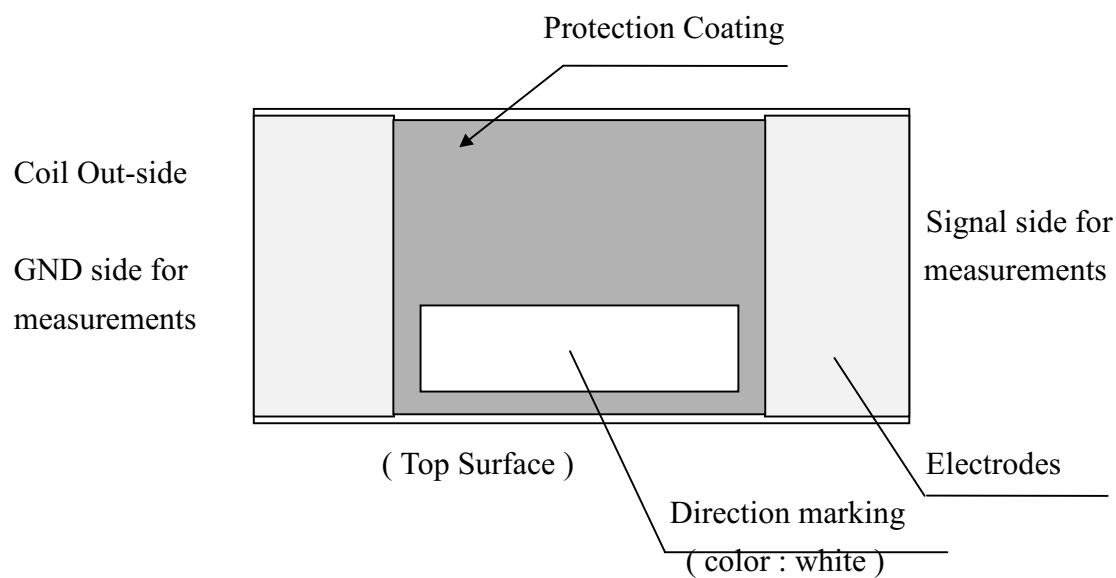
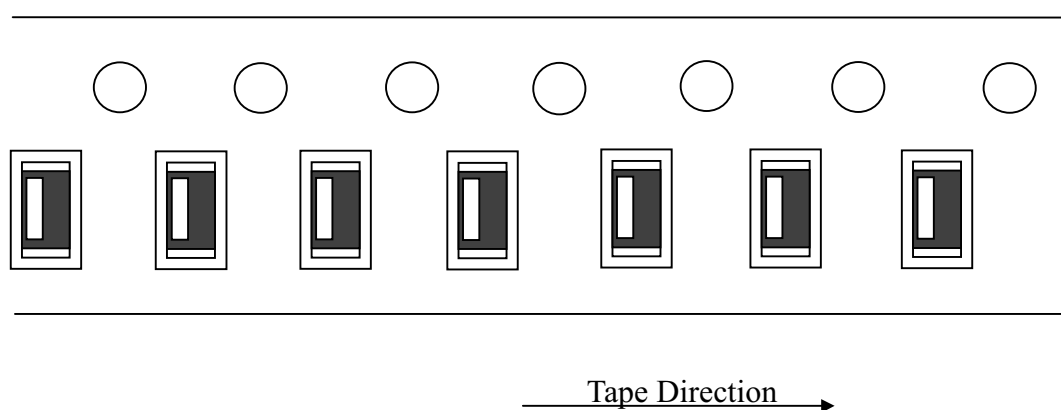


Fig.7 Direction Mark and Taping Direction



Attachment (一). Caution on Using Chip Inductor**1. When storing the product**

- (1) Store the product in an environmentally well-controlled room (temperature: 5-35°C, humidity : 45-85% RH). Humidity should be kept as low as possible.
- (2) Store the product in a place free of substances which deteriorate solderability (moisture, dust) and which is free of poisonous gases (hydrogen chloride, hydrogen sulfide).
- (3) Store the product away from direct sunlight.

If the place does not meet the above conditions, or if the product has been left unused for more than one year after delivered, check solderability before use.

2. When mounting the product

- (1) To solder with a soldering iron, heat the land with the soldering iron, avoiding contact with the iron edge of the product. If the product temperature exceeds 300°C, the protective film may have damage and the characteristics of the products may be changed.
- (2) Unsuitable shape and material of the chuck claw, or excessive shock caused by the chucking pressure of the chip mounting machine may crack the product.

The striking energy at chucking should be 7×10^{-4} J or less.

The striking energy at chucking, in this context, is equivalent to the kinetic energy generated when a 25g iron block falls from a height of 2.8mm.

- (3) Do not scratch the protective coat or housing surface of the product before, during or after mounting the product. Scratches on the product may deteriorate the durability.
- (4) When coating or sealing the mounted board with resin, completely wash and dry the board beforehand. Sealing the product which is moistened or contaminated with ions may deteriorate the durability. Before using the resin, fully examine its quality and reliability. If improper resin is used, the electric characteristics of the product may change.

When gluing the product to the board, use adhesive which has high insulating resistance and excellent durability. Also, the resin must have characteristics which do not deteriorate within the operation temperatures range or the temperature range of products in use.

3. When storing the product

- (1) Warps of the mounted board will causes mechanical stress on the products.

Be sure to handle the mounted board carefully so as not to bend.

- (2) Product edge, protective coating or housing surface of the product should be free from excess mechanical stress.

4. When operating the product

- (1) Use the product within the rated range stipulated in the specifications.
Especially, over current may cause the damage of equipment, or the change of electric characteristics of products.
- (2) Even if the rated current is being loaded, depending on the mounting density and thermal influence of peripheral elements, the temperature rising of the products will be varied. The products temperature should be confirmed not to exceed the operating range (below 125°C).
- (3) In general, the product is designed to be used with ordinal electronic apparatuses. In the case of using the product in a special operating environment, investigation of its performance and reliability is required beforehand.
- (4) The items listed in the specifications assure the product quality as the products alone. Evaluation and confirmation of the product quality after mounting, in according with the operating condition. is required for actual use.
- (5) When serious damage caused by a failure of the product can be predicted or when a fatal error may be possible, establish a complete fail-safe design (including protecting circuits and protectors) to ensure safety.

5. Issues concerning restriction and laws. DataSheet4U.com

- (1) The products does not contain any material listed in the ozone-depleting substance designated the Montreal Protocol.
- (2) The material used for the product are listed in the existing chemicals, in according with the “ Law of Restrictions on Chemical Examination and Manufacturing ”.
- (3) The material of the product does not contain any substance designated in the “ nonflammable substance of the “ nonflammable substances of the bromine-family ”.