AE1400100003

Ver. 3.00

SPECIFICATION

WOUND CHIP INDUCTORS

LBR TYPE

TAIYO YUDEN

1. Range of application

This specification sheet applies to small wound chip inductor, LBR TYPE.

2. Ordering code

Example : LBR (1) 2012 (2) T (3) 100 (4) M (5)

(1) Type
(2) External dimensions
(3) Packing style (T: Taping)
(4) Inductance
(5) Inductance tolerance (K=±10 % · M=±20 %)

3. Standard measuring method

Inductance	:	LCR meter Measuring signal level : 1V	(HP 4285A or equivalent)
Self-resonance frequency	:	Impedance/Material Analyzer	(HP 4291A or equivalent)
DC resistance	:	DC Ohmmeter	(HIOKI 3227 or equivalent)

Standard test conditions

Unless otherwise specified, temperature is 20±15 ℃ and the humidity is 65±20 %.
Should any doubt arise about the test results, further test shall be conducted at a temperature of 20±2 ℃ and a humidity of 65±5 %.
Inductance is in accordance with our standard measurement figures.

4. Operating temperature range

−25 ℃ to +105 ℃ (Containing self temperature increase)

5. Storage temperature range

−40 ℃ to +85 ℃ (Product without taping)

6. Electrical characteristics

Refer to table 1 and 3.

7. External dimensions and structural diagram

Refer to Table 2.

8. Mechanical characteristics

Refer to Table 3.

9. Environment test performance standards

Refer to Table 3.

10. Taping method

Refer to Table 4.

11. Packing form

Refer to Table 5.

12. Reflow profile chart

Refer to Table 6.

	Table 1	
	ELECTRICAL CHARACTERISTICS	(2 / 1 3)

【LBR2012 type】

Ordering Code	Nominal Inductance [μH]	Inductance Tolerance [%]	D.C. Resistance ±30% [Ω]	Self Resonant Frequency min [MHz]	Rated Current max [mA]	Measuring Frequency [MHz]
LBR2012T1R0M	1.0	±20	0.07	100	400	7.96
LBR2012T2R2M	2.2	±20	0.13	80	260	7.96
LBR2012T4R7M	4.7	±20	0.24	45	200	7.96
LBR2012T100□	10	±10/±20	0.36	32	150	2.52
LBR2012T220□	22	±10/±20	1.00	16	100	2.52
LBR2012T470□	47	±10/±20	1.70	11	75	2.52
LBR2012T101□	100	±10/±20	4.00	8	50	0.796

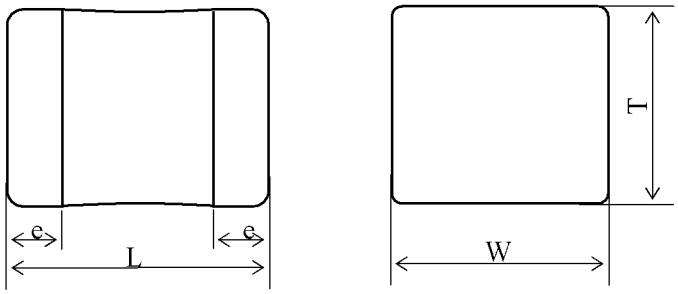
【LBR2518 type】

Ordering Code	Nominal Inductance [μH]	Inductance Tolerance [%]	D.C. Resistance ±30% [Ω]	Self Resonant Frequency min [MHz]	Rated Current max [mA]	Measuring Frequency [MHz]
LBR2518T1R0M	1.0	±20	0.045	100	960	7.96
LBR2518T2R2M	2.2	±20	0.07	68	480	7.96
LBR2518T4R7M	4.7	±20	0.10	45	345	7.96
LBR2518T100□	10	±10/±20	0.19	30	235	2.52
LBR2518T220□	22	±10/±20	0.44	19	175	2.52
LBR2518T470□	47	±10/±20	0.84	11	120	2.52
LBR2518T101□	100	±10/±20	1.89	9	80	0.796

・□Please specify the inductance tolerance code (K or M).

Rated Current :The maximum DC value having inductance decrease within 20 % and temperature increase within 20 ℃ by the application of DC bias.

1. External dimensions

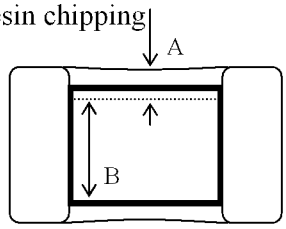


Type	L	W	T	e
LBR2012	2.0±0.2	1.25±0.2	1.25±0.2	0.5±0.2
LBR2518	2.5±0.2	1.8±0.2	1.8±0.2	0.5±0.2

Unit: mm

※ External appearance

・Resin chipping



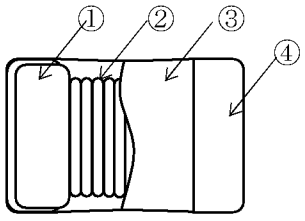
Set □ area as reference for flat level, over 70 % shall be flat.
Judgment shall be made according to the dimension below.
Insufficient resin on one side shall be **A** Max.
In case of insufficient resin on both side over **B** of flat surface shall be ensured.
(Template R part is not included on reference area.)

・In the above reference area, pin holes which are not bigger than the size specified in the below table are acceptable.
Resin crack or pinhole which locates outside of specified area or which has contact with frame, shall be also regarded as non-defective.

Type	A	B	Pin holes dimensions
LBR2012	0.45	0.7	ϕ 0.5
LBR2518	0.6	1.1	ϕ 0.5

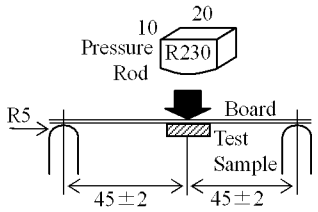
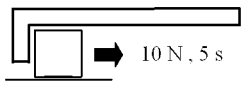
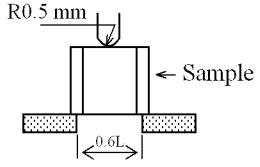
Unit: mm

2. Structural diagram



①	Ferrite core	Ni－Zn ferrite
②	Coil material	Polyurethane-copper wire
③	Over-coating resin	Epoxy resin, containing ferrite powder
④	Electrode	Base material : Ag Foundation plating : Ni Surface plating : Sn

	Table 3	
	STANDARDS	(4 / 1 3)

	Item	Standard	Test method
ELECTRICAL CHARACTERISTICS	Inductance	Refer to Table 1	LCR meter (HP4285A or equivalent) Measuring signal level : 1V
	Self resonant frequency	Refer to Table 1	Impedance/material analyzer (HP4291A or equivalent)
	DC resistance	Refer to Table 1	DC ohm meter (HIOKI3227 or equivalent)
	Rated current	Refer to Table 1.	The maximum DC value having inductance decrease within 20 % and temperature increase within 20 ℃ by the application of DC bias.
	Insulation resistance	Not less then 1×10^{8} Ω.	0.2 mm diameter copper wires were wound around the coils three times and measurements were take after 250 V DC was applied between the wire and the terminals for a period of 30 seconds.
	Over current test	No smoke and no fire.	2 times the rated current was applied for a period of 5 minutes.
MECHANICAL CHARACTERISTICS	Resistance to Flexure substrate	No damage.	The test samples shall be soldered to the testing board and by reflow soldering conditions as show in table 6. Apply pressure in the direction of the arrow until bent width reaches 2 mm. (※ Notice 1)  Unit : mm Substrate size : 100×40×1.0 Substrate material : glass epoxy-resin Solder cream thickness : 0.15 Land size: Refer to figure 1
	Adhesion of Terminal electrode	No abnormality.	The test samples shall be soldered to the testing board and by reflow soldering conditions as shown table 6. (※ Notice 1)  Applied force : 10 N to X and Y directions. Duration : 5 s. Solder cream thickness : 0.15 mm (Land size refer to recommended Land Pattern Dimensions of "Precaution")
	Body strength	No damage.	Applied force : 10 N Duration : 10 s 

<table>
<tr><th></th><th>Item</th><th>Standard</th><th>Test method</th></tr>
<tr><td rowspan="5">ENVIRONMENT TESTS</td><td>Resistance to vibration</td><td>Inductance change:
Within±10 %
No abnormality observed in appearance.</td><td>The test samples shall be soldered to testing jig as shown in under table. (※ Notice 1)<table><tr><td>Frequency range</td><td>10～55 Hz</td></tr><tr><td>Overall Amplitude</td><td>1.5 mm (Shall not exceed acceleration 196 m/S^2)</td></tr><tr><td>Sweeping Method</td><td>10 to 55 to 10 Hz for 1 min.</td></tr><tr><td>Time</td><td>2 hours each in X, Y, and Z Direction.</td></tr></table></td></tr>
<tr><td>Resistance to soldering</td><td>Inductance change:
Within±10 %
No abnormality observed in appearance.</td><td>3 time of reflow oven at 230 ℃ min for 40 sec max, with peak temperature at 260+0/5 ℃ for 5 sec max .
(※ Notice 1)
Substrate thickness : 1.0 mm
Substrate material : glass epoxy-resin</td></tr>
<tr><td>Solderability</td><td>At least 90 % of terminal electrode is covered by new solder.</td><td>The test samples be submerged molten solder as shown in under table.
Flux : methanol solution with 25 % of rosin or equivalent.
【Pb free solder : Sn-3Ag-0.5Cu】<table><tr><td>Solder Temperature</td><td>245±5 ℃</td></tr><tr><td>Time</td><td>5±0.5 s</td></tr><tr><td>Immersing Speed</td><td>25 mm/s</td></tr></table>【Eutectic solder】<table><tr><td>Solder Temperature</td><td>230±5 ℃</td></tr><tr><td>Time</td><td>5±0.5 s</td></tr><tr><td>Immersing Speed</td><td>25 mm/s</td></tr></table></td></tr>
<tr><td>Temperature characteristics</td><td>Inductance change:
Within±15 %
No abnormality observed in appearance.</td><td>Measurement were taken in a temperature range of −25 ℃ to +85 ℃ and the value at +20 ℃ was used as the standard value.</td></tr>
<tr><td>Thermal shock</td><td>Inductance change:
Within±10 %
No abnormality observed in appearance.</td><td>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.
The test samples shall be left for the specified time at each of temperature in steps from 1 to 4, as shown in under table in sequence.
The temperature cycles shall be repeated 100 cycles in the Method. (※ Notice 1)
Conditions for 1 cycle.<table><tr><th>Step</th><th>Temperature</th><th>Time (min)</th></tr><tr><td>1</td><td>−40±3 ℃</td><td>30±3</td></tr><tr><td>2</td><td>Room Temp.</td><td>within 3</td></tr><tr><td>3</td><td>85±2 ℃</td><td>30±3</td></tr><tr><td>4</td><td>Room Temp</td><td>within 3</td></tr></table></td></tr>
</table>

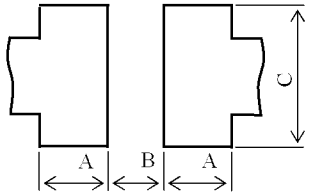
	Table 3	
	STANDARDS	(6 / 1 3)

	Item	Standard	Test method
ENVIRONMENT TESTS	Low temperature life test	Inductance change: Within ± 10 % No abnormality observed in appearance.	The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6. And after that proceed the test as shown condition under table. (※ Notice 1) Temperature: −40 ± 2 ℃ Time: 1 000 +24 h
	Loading at high temperature life test	Inductance change: Within ± 10 % No abnormality observed in appearance.	The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6. The test samples shall be put in thermostatic oven set at temperature, as shown in under table, with the rated current continuously applied. (※ Notice 1) Temperature: 85 ± 2 ℃ Current: Refer to Table 1 Time: 1 000 +24 h
	Damp heat life test	Inductance change: Within ± 10 % No abnormality observed in appearance.	The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6. The test samples shall be put in thermostatic oven set at temperature with humidity, as shown in under table. (※ Notice 1) Temperature: 60 ± 2 ℃ Humidity: 90～95 %RH Time: 1 000 +24 h
	Loading under damp heat life test	Inductance change: Within ± 10 % No abnormality observed in appearance.	The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6. The test samples shall be put in thermostatic oven set at temperature with humidity, as shown in under table, and with the rated current continuously applied. (※ Notice 1) Temperature: 60 ± 2 ℃ Humidity: 90～95 %RH Current: Refer to Table 1 Time: 1 000 +24 h

(※ Notice 1) The reliability test that use cream solder eutectic mixture solder.

Standard measuring condition	Unless otherwise specified, measurements were taken within 48 hours after the coils was stored at room temperature and in normal humidity for not less than 2 hour.

Refer to figure 1 Resistance to Flexure substrate Land size

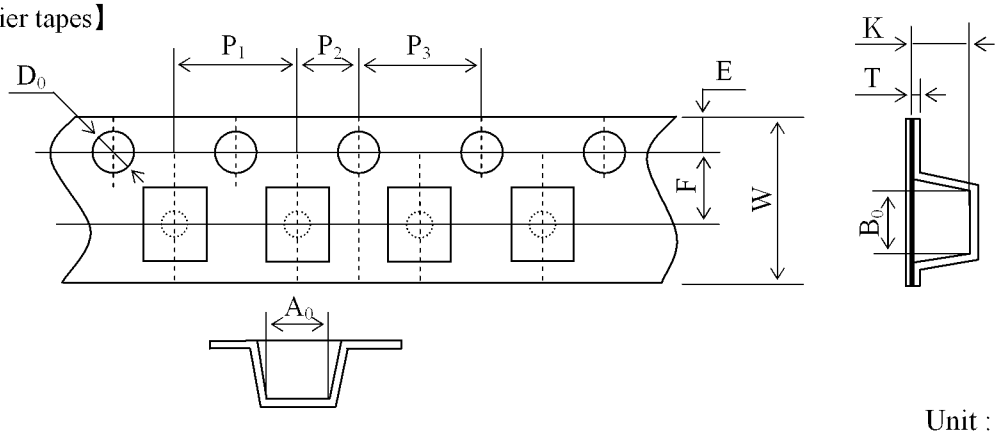


Type	A	B	C
LBR2012	0.7	1.0	1.5
LBR2518	0.9	1.3	2.0

Unit : mm

1. Dimensions

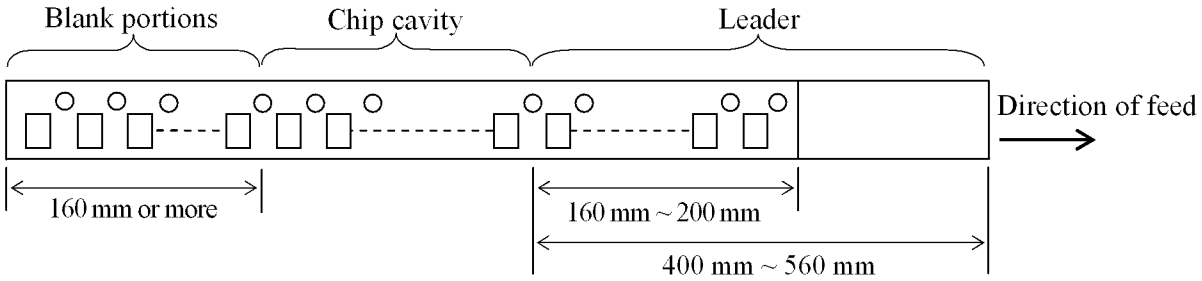
【Emboss carrier tapes】



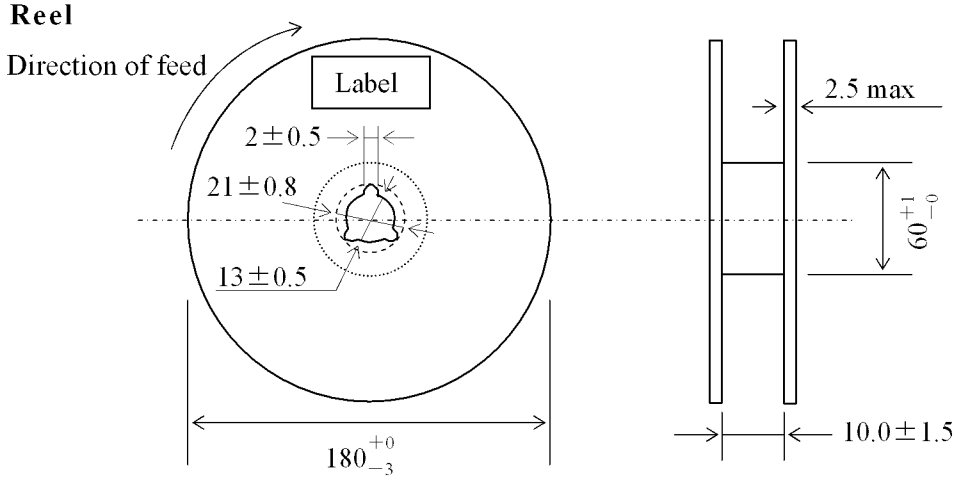
Unit : mm

Type	A_0	B_0	W	F	E	P_1	P_2	P_3	D_0	T	K
LBR2012	1.45 ±0.20	2.25 ±0.20	8.00 ±0.30	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	ϕ 1.50 +0.10 −0	0.25 ±0.05	1.30 ±0.10
LBR2518	2.15 ±0.20	2.70 ±0.20	8.00 ±0.30	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	ϕ 1.50 +0.10 −0	0.30 ±0.05	2.10 ±0.10

2. Direction of rolling



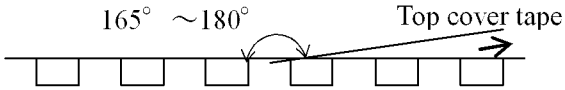
3. Reel



Unit : mm

Label position : the opposite side of pilot holes

4. Top tape strength



【Emboss carrier tapes】

Peel-off strength	:	0.2 N～0.7 N
Peel-off angle	:	165° ～180°
Peel-off speed	:	300 mm/min

1. Taping packing quantity

Type	Standard Quantity (pcs／1 reel)	Carrier tapes
LBR2012	3 000	Emboss carrier tapes
LBR2518	2 000	Emboss carrier tapes

2. The allowable number of empty components

The number of empty compartments in a reel, which shall not appear continuously, must be limited to 2.

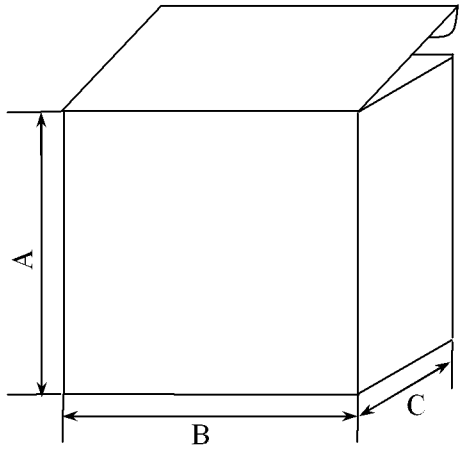
3. Marking

The following items shall be marked legibly each unit pack.

(1) Customer parts No.
(2) Our parts No.
(3) Manufacture's name (TAIYO YUDEN CO., LTD.)
(4) Control No. (Control number enables to trace shipped lots.)
(5) Date (stamp)
(6) Quantity
(7) Country of the origin

4. Dimensions of packing box

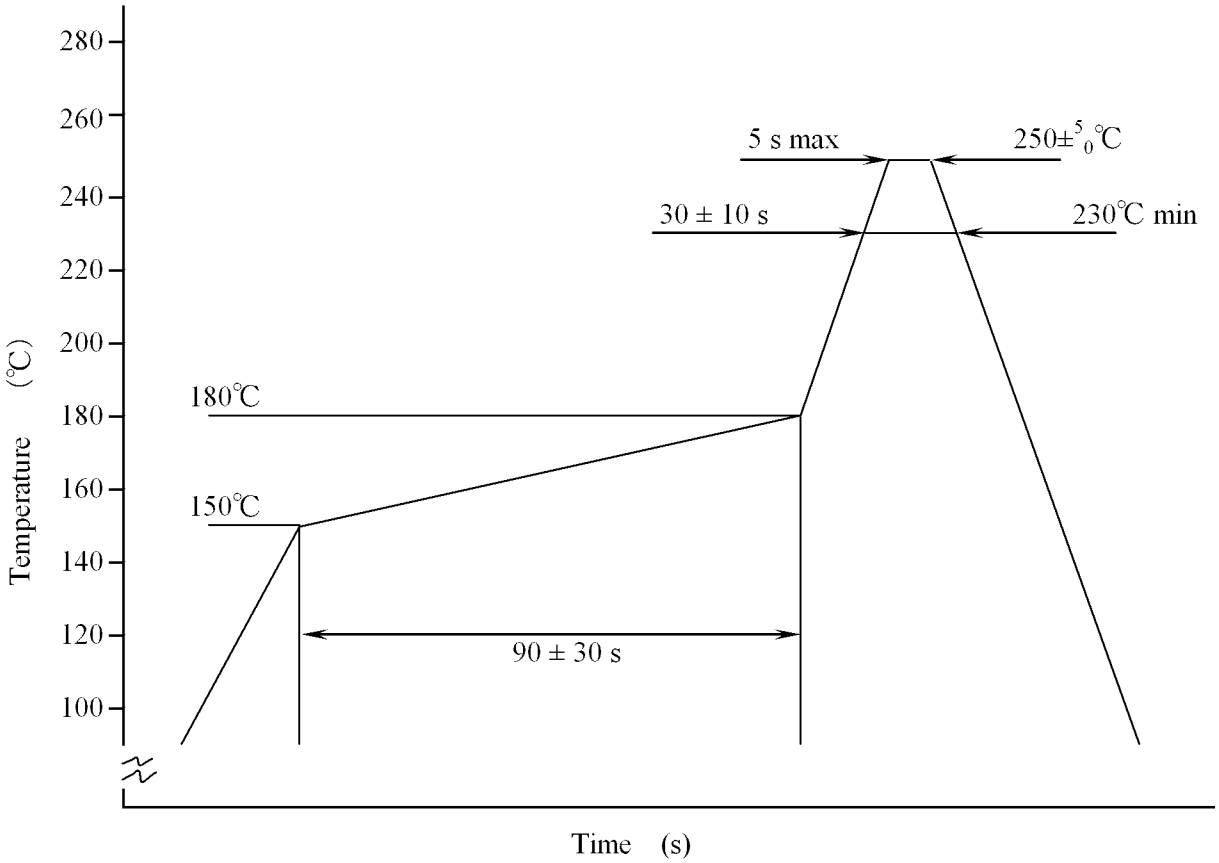
※ Reference



Code	A	B	C	Standard Quantity (pcs)	
				LBR2012	LBR2518
Size	190	185	75	15,000	10,000
			140	30,000	20,000

Unit : mm

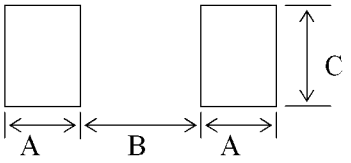
	Table 6	
	REFLOW PROFILE CHART (REFERENCE)	(1 0 / 1 3)



※ At using TAIYO YUDEN products of this specification and in using the lead free soldering, We request to use then after confirming of adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.

1. Surface Mounting

- Mounting and soldering conditions should be checked beforehand.
- This inductors only using reflow soldering.
- Recommended Land-Pattern :



Unit : mm

Type	A	B	C
LBR2012	0.7	0.8	1.45
LBR2518	0.8	1.2	2.0

- Recommended conditions for using a soldering iron:
  Put the soldering iron on the land-pattern.
  Soldering iron's temperature Below 350 ℃
  Duration 3 seconds or less
- The soldering iron should not directly touch the inductor.

2. Handling

- Keep the inductors away from all magnets and maganetic objects.
- When splitting the PC boards after mounting inductors, care should be taken not to give any stresses of deflection or twisting to the board.
- Board separation should not be done manually, but by using the appropriate devices.
- Please do not give the inductors any excessive mechanical shocks.
- Please avoid operation, which apply excessive stress and/or temperature to the products, such as resin molding.
- Washing by supersonic waves shall be avoided.

3. Storage

- To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled.
  Recommended conditions.
  Ambient temperature 0 ～ 40 ℃
  Humidity Below 70 % RH
  The ambient temperature must be kept below 30 ℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes, so inductors should be used within 6 months from the time of delivery.

4. Regulations

- No ozone-depleting substances, which are defined as Class-Ⅰ and Class-Ⅱ in the US Federal Clean Air Act, are used in the production processes, nor contained in the product.
- The product and the specifications described above are not included in the list of export regulations in Japan and USA.
- The product and the specifications described above are conform to "RoHS compliance". "RoHS compliance" means that the product does not contain lead, cadmium, mercury, hexavalent chromium, PBBs or PBDEs referring to EU Directive 2002/95/EC, except other non-restricted substances or impurities which could not be technically removed at the refining process.

5. Production Sites

- TAIYO YUDEN CO., LTD. (JAPAN)
- CHUKI SEIKI CO., LTD. (JAPAN)
- Tsukiyono Denshi Co., Ltd. (JAPAN)

◎ This English version of the specification is made out by translating the Japanese original into English faithfully, but in case where there exists any inconsistency or difference between the two the Japanese original shall govern.

SPECIAL NOTICE

■ All of the contents specified here are subject to change without notice due to technical improvements, etc. Therefore, please check latest version of the components specifications carefully before practical application or usage of the components. Please note that Taiyo Yuden Co,.Ltd. shall not be responsible for any of deficiency to components or equipments to be used, which are caused under the condition other than specified in the specification.

■ This product is developed, designed and intended for use in general electronics equipments. (for AV, household, office supply, information service, telecommunications, etc.). Before incorporating the components into any equipments in the field such as aerospace, aviation, nuclear control, submarine, transportation, (automotive driving and control, passenger protection, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. where higher safety and reliability are especially required, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
And before incorporating the components or devices into the equipments not mentioned in the above, if there is possibility of direct damage or injury to human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
In addition, even electronic components or devices are used for the general electronic equipments, if the equipments or the electric circuit require high safety or reliability function or performances, sufficient reliability evaluation-check for the safety shall be performed before use and moreover, due consideration to install a protective circuit is strongly recommended at the design stage.