

S P E C I F I C A T I O N

W O U N D C H I P I N D U C T O R S

C B L T Y P E

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**TAIYO YUDEN**

	Specifications	
	CBL TYPE	

( 1 / 1 1 )

### 1. Range of application

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

### 2. Ordering code

Example :  $\frac{\text{CBL}}{(1)} \quad \frac{2012}{(2)} \quad \frac{\text{T}}{(3)} \quad \frac{100}{(4)} \quad \frac{\text{M}}{(5)}$

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

### 3. Standard measuring method

Inductance : LCR meter ( HP 4285A or equivalent )  
Self-resonance frequency : Impedance/Material Analyzer ( HP 4291A or equivalent )  
DC resistance : DC Ohmmeter ( A&D AD-5812 or equivalent )

#### Standard test conditions

Unless otherwise specified, temperature is  $20 \pm 15 \text{ }^{\circ}\text{C}$  and the humidity is  $65 \pm 20 \%$ .

Should any doubt arise about the test results, further test shall be conducted at a temperature of  $20 \pm 2 \text{ }^{\circ}\text{C}$  and a humidity of  $65 \pm 5 \%$ .

Inductance and Q are in accordance with our standard measurement figures.

### 4. Operating temperature range

$-25 \text{ }^{\circ}\text{C}$  to  $+105 \text{ }^{\circ}\text{C}$  (Containing self temperature increase)

### 5. Storage temperature range

$-40 \text{ }^{\circ}\text{C}$  to  $+85 \text{ }^{\circ}\text{C}$  (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	( 2 / 1 1 )
	ELECTRICAL CHARACTERISTICS	

Ordering Code	Nominal Inductance [ $\mu$ H]	Inductance Tolerance [%]	D.C. Resistance $\pm 30\%$ [ $\Omega$ ]	Self Resonant Frequency min [MHz]	Rated Current [mA] max		Measuring Frequency [kHz]
					①	②	
CBL2012T1R0M	1.0	$\pm 20$	0.15	100	620	950	100
CBL2012T2R2M	2.2	$\pm 20$	0.39	80	440	590	100
CBL2012T4R7M	4.7	$\pm 20$	0.66	45	275	490	100
CBL 2012T100M	10	$\pm 20$	1.0	32	205	370	100
CBL 2012T220M	22	$\pm 20$	2.1	23	150	250	100
CBL 2012T470M	47	$\pm 20$	4.2	11	100	140	100

\*For rated current of ordinary small power choke coils, please refer to the rated current ① in the above table.

\*Rated current ② is the current for instantaneous flow such as plunging current of DC/DC converter.

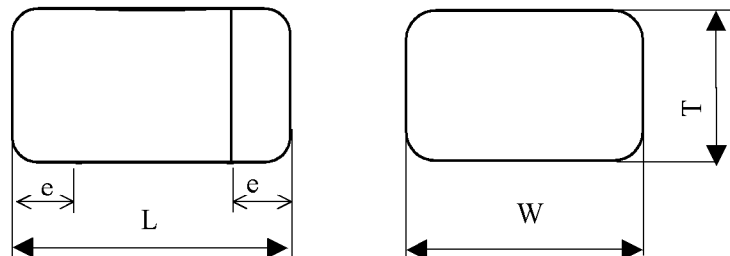
In case of usage in the circuit where large current may be semicontinuously applied over 5 minutes with auto recovery circuit, etc., please contact our sales section before practical application.

Rated current ① : Current value to guarantee  $-30\%$  of nominal inductance

Rated current ② : Current value to guarantee component temperature within  $\Delta T=40\text{ }^{\circ}\text{C}$  with current flow.  
( It is not the current to guarantee the inductance value.)

	Table 2	( 3 / 11 )
	EXTERNAL DIMENSIONS AND STRUCTURAL DIAGRAM	

### 1. External dimensions

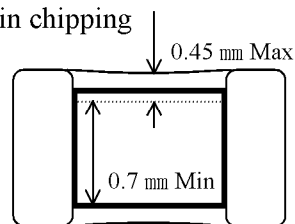


L	$2.0 \pm 0.2$
W	$1.25 \pm 0.2$
T	$0.9 \pm 0.1$
e	$0.5 \pm 0.2$

Unit: mm

#### ※ External appearance

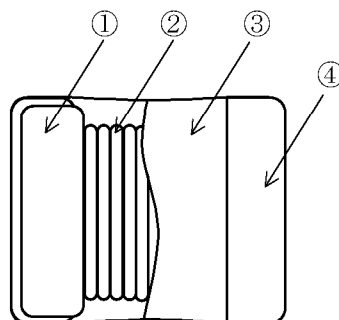
- Resin chipping



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 0.45 mm Max.  
In case of insufficient resin on both side over 0.7 mm of flat surface shall be ensured.  
(Template R part is not included on reference area.)

- The pinhole with  $\phi$  up to 0.5 mm within specified area shall be regarded as non-defective.  
Resin crack or pinhole which locates outside of specified area or which has contact with frame, shall be also regarded as non-defective.

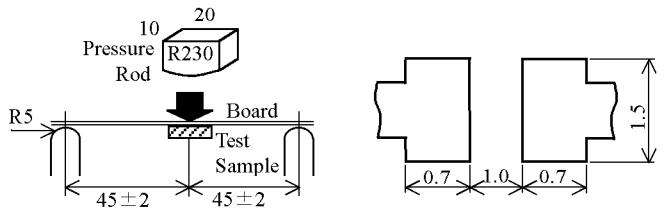
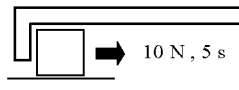
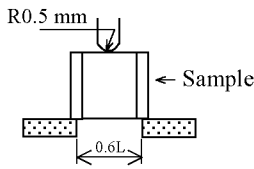
### 2. Structural diagram



- |                      |  |
|----------------------|--|
| ① Ferrite core       | Ni – Zn ferrite                        |
| ② Coil material      | Polyurethane-copper wire               |
| ③ Over-coating resin | Epoxy resin, containing ferrite powder |
| ④ Electrode          | External electrode (foundation) Ag     |
|                      | External electrode (plating) Ni / Sn   |

	<b>Table 3</b>	
	STANDARDS	

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	Item	Standard	Test method
ELECTRICAL CHARACTERISTICS	Inductance	Refer to Table 1	LCR meter (HP4285A or equivalent)
	Self resonant frequency	Refer to Table 1	Impedance/material analyzer (HP4291A or equivalent)
	DC resistance	Refer to Table 1	DC ohm meter (A&D AD-5812 or equivalent)
	Rated current	Refer to Table 1.	The maximum DC value having inductance decrease within 30 % and temperature increase within 40 °C by the application of DC bias shall be respectively measured.
	Insulation resistance	Not less than $1 \times 10^8 \Omega$ .	0.2 mm diameter copper wires were wound around the coils three times and measurements were take after 50 V DC was applied between the wire and the terminals for a period of 30 seconds.
	Over current test	No smoke and no fire.	1.5 times the rated current ② was applied for a period of 5 minutes.
MECHANICAL CHARACTERISTICS	Resistance to Flexure substrate	No damage.	<p>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.</p>  <p>Substrate size : 100 × 40 × 1.0      Land size Substrate material : glass epoxy-resin Solder cream thickness : 0.15      Unit : mm</p>
	Adhesion of Terminal electrode	Shall not come off PC board.	<p>The test samples shall be soldered to the testing board and by reflow soldering conditions as shown table 6.</p>  <p>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")</p>
	Body strength	No damage.	<p>Applied force : 10 N Duration : 10 s</p> 

	<b>Table 3</b>	
	STANDARDS	

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ENVIRONMENT TESTS

Item	Standard	Test method															
Resistance to vibration	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>The test samples shall be soldered to testing jig as shown in under table.</p> <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<sup>2</sup>)</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>	Frequency range	10~55 Hz	Overall Amplitude	1.5 mm (Shall not exceed acceleration 196 m/S <sup>2</sup> )	Sweeping Method	10 to 55 to 10 Hz for 1 min.	Time	2 hours each in X, Y, and Z Direction.							
Frequency range	10~55 Hz																
Overall Amplitude	1.5 mm (Shall not exceed acceleration 196 m/S <sup>2</sup> )																
Sweeping Method	10 to 55 to 10 Hz for 1 min.																
Time	2 hours each in X, Y, and Z Direction.																
Resistance to soldering	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>3 time of reflow oven at 230 °C min for 30±10 sec, with peak temperature at 250±<sup>5</sup><sub>0</sub> °C for 5 sec max.</p> <p>Substrate thickness : 1.0 mm Substrate material : glass epoxy-resin</p>															
Solderability	At least 90 % of terminal electrode is covered by new solder.	<p>The test samples be submerged molten solder as shown in under table.</p> <p>Flux : methanol solution with 25 % of rosin or equivalent.</p> <table><tr><td>Solder Temperature</td><td>230±5 °C</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>	Solder Temperature	230±5 °C	Time	5±0.5 s	Immersing Speed	25 mm/s									
Solder Temperature	230±5 °C																
Time	5±0.5 s																
Immersing Speed	25 mm/s																
Temperature characteristics	$\Delta L/L \rightarrow$ within $\pm 15\%$ No abnormality observed in appearance.	Measurement were taken in a temperature range of −25 °C to +85 °C and the value at +20 °C was used as the standard value.															
Thermal shock	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.</p> <p>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.</p> <p>The temperature cycles shall be repeated 100 cycles in the Method.</p> <p>Conditions for 1 cycle.</p> <table><tr><td>Step</td><td>Temperature</td><td>Time (min)</td></tr><tr><td>1</td><td>−40±3 °C</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 °C</td><td>30±3</td></tr><tr><td>4</td><td>Room Temp</td><td>within 3</td></tr></table>	Step	Temperature	Time (min)	1	−40±3 °C	30±3	2	Room Temp.	within 3	3	85±2 °C	30±3	4	Room Temp	within 3
Step	Temperature	Time (min)															
1	−40±3 °C	30±3															
2	Room Temp.	within 3															
3	85±2 °C	30±3															
4	Room Temp	within 3															
Low temperature life test	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.</p> <p>And after that proceed the test as shown condition under table.</p> <table><tr><td>Temperature</td><td>−40±2 °C</td></tr><tr><td>Time</td><td>1 000+24 h</td></tr></table>	Temperature	−40±2 °C	Time	1 000+24 h											
Temperature	−40±2 °C																
Time	1 000+24 h																

	<b>Table 3</b>	
	STANDARDS	

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	Item	Standard	Test method							
ENVIRONMENT TESTS	High temperature life test	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>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.</p> <table><tr><td>Temperature</td><td><math>85 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Time</td><td>1 000+24 h</td></tr></table>	Temperature	$85 \pm 2\text{ }^{\circ}\text{C}$	Time	1 000+24 h			
	Temperature	$85 \pm 2\text{ }^{\circ}\text{C}$								
	Time	1 000+24 h								
Damp heat life test	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>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.</p> <table><tr><td>Temperature</td><td><math>60 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Humidity</td><td>90~95 %RH</td></tr><tr><td>Time</td><td>1 000+24 h</td></tr></table>	Temperature	$60 \pm 2\text{ }^{\circ}\text{C}$	Humidity	90~95 %RH	Time	1 000+24 h		
Temperature	$60 \pm 2\text{ }^{\circ}\text{C}$									
Humidity	90~95 %RH									
Time	1 000+24 h									
Loading under damp heat life test	$\Delta L/L \rightarrow$ within $\pm 10\%$ No abnormality observed in appearance.	<p>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 ① continuously applied.</p> <table><tr><td>Temperature</td><td><math>60 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Humidity</td><td>90~95 %RH</td></tr><tr><td>Current</td><td>Refer to Table 1</td></tr><tr><td>Time</td><td>1 000+24 h</td></tr></table>	Temperature	$60 \pm 2\text{ }^{\circ}\text{C}$	Humidity	90~95 %RH	Current	Refer to Table 1	Time	1 000+24 h
Temperature	$60 \pm 2\text{ }^{\circ}\text{C}$									
Humidity	90~95 %RH									
Current	Refer to Table 1									
Time	1 000+24 h									

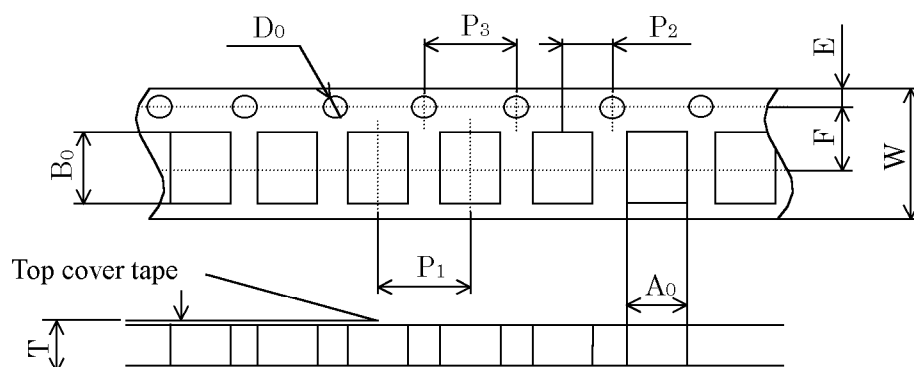
Standard measuring condition	Unless otherwise specified, measurements were taken within 48 hours after the coils was stored at room temperature and in normal humidity for not less than 2 hour.
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- Class- I and Class- II ozone depleting substances (ODS), etc., which are regulated by the Federal Law for Atmosphere Purification, are not included in the products not it applied to the products at any stage of manufacturing processes.
- The bromide flame proof materials are not used at all.
- The product and the specifications described above are not included in the list of export regulations in Japan and USA.

	<b>Table 4</b>	
	<b>TAPING DIMENSIONS</b>	

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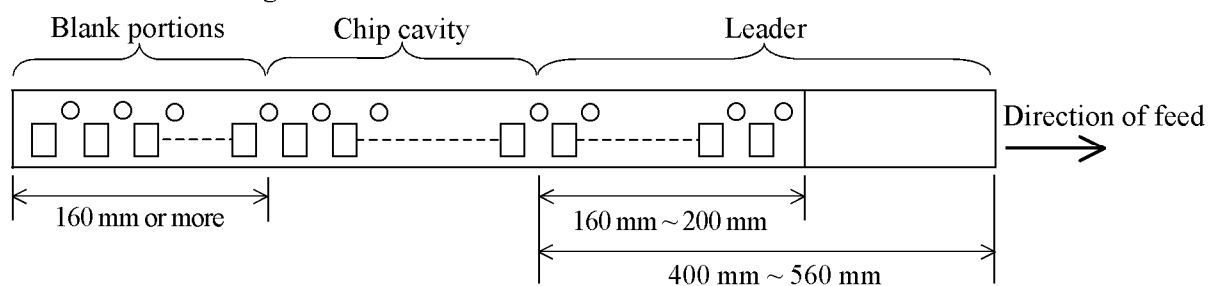
## 1. Dimensions



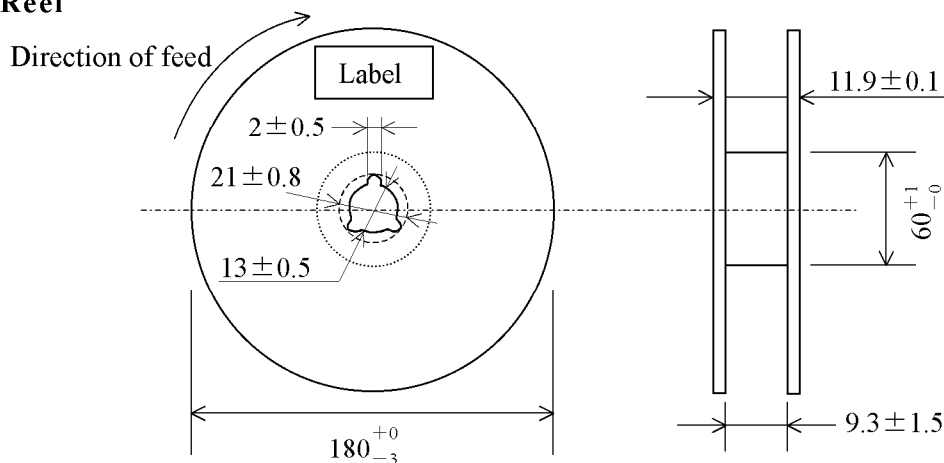
Unit : mm

A <sub>0</sub>	B <sub>0</sub>	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	D <sub>0</sub>	T
1.55 ±0.20	2.30 ±0.20	8.00 ±0.30	3.50 ±0.05	1.75 ±0.10	4.00 ±0.20	2.00 ±0.05	4.00 ±0.10	φ 1.50 +0.10 -0	1.1 Max

## 2. Direction of rolling



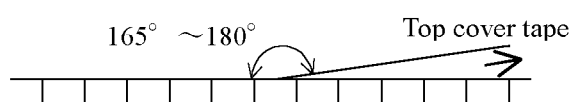
## 3. Reel



Unit : mm

Label position : the opposite side of pilot holes

## 4. Top tape strength



Peel-off strength : 0.15 N ~ 0.5 N  
 Peel-off angle : 165° ~ 180°  
 Peel-off speed : 300 mm/min



	<b>Table 5</b>	
	PACKING FORM	

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**1. The number of components**

Each reel shall accommodate 4000 inductors whether there are empty compartments or not.

**2. Packing in tape**

Emboss carrier tapes of 8 mm width, 4 mm pitch and  $\phi$  180 mm-reels shall be used.

**3. The allowable number of empty components**

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

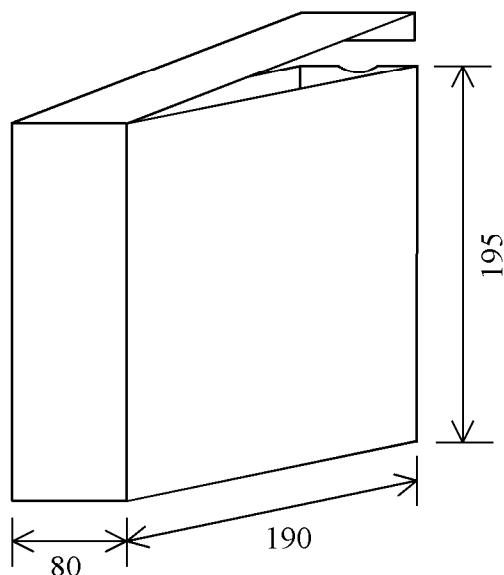
**4. Marking**

The following items shall be marked legibly each unit pack.

- (1) The name of manufacturing company
- (2) Manufacture's name (Taiyo Yuden Co., Ltd.)
- (3) Lot number
- (4) Date (stamp)
- (5) The number of components packed in a reel

**5. Dimensions of packing box (taping)**

※ Reference

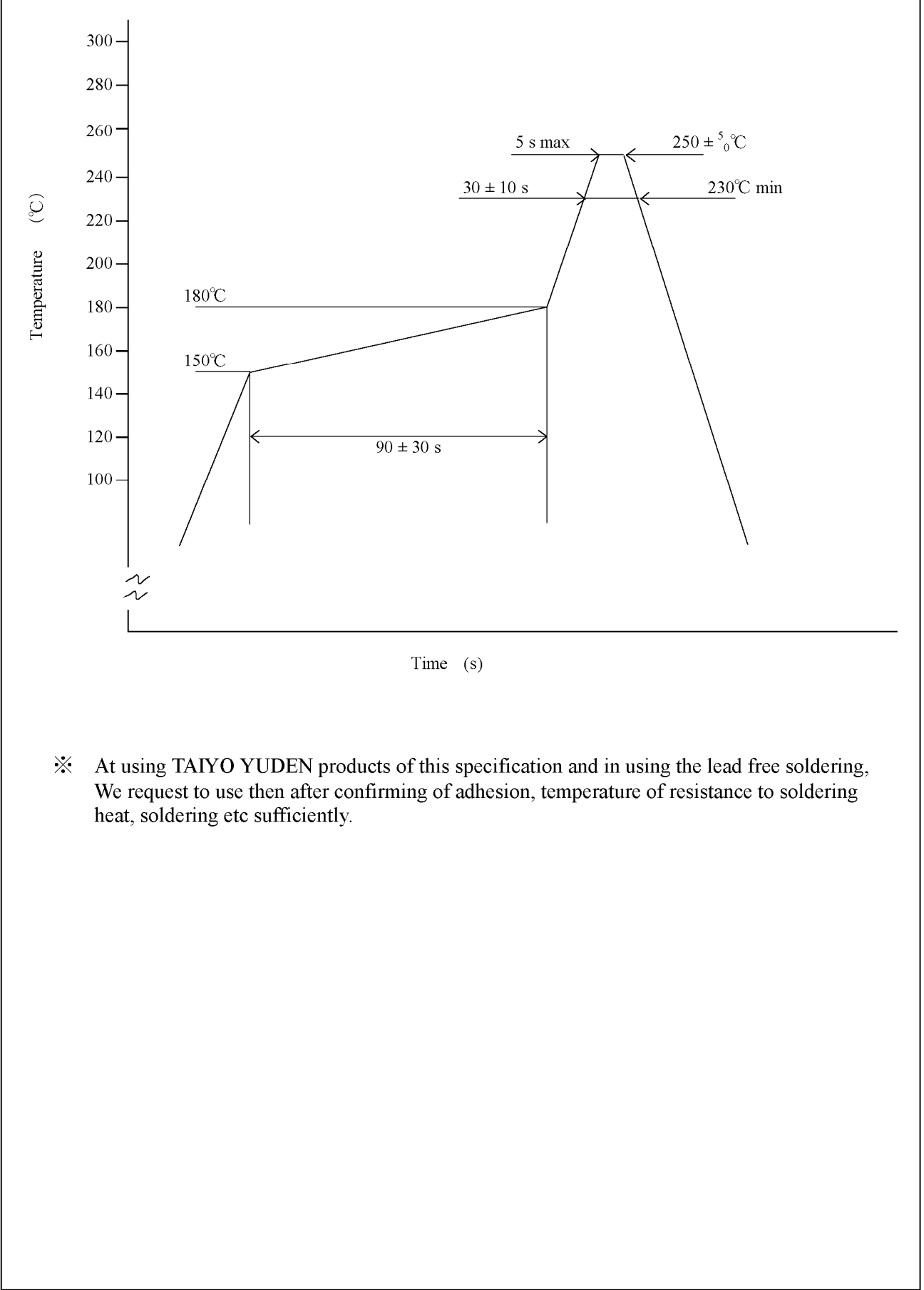


Standard Quantity  
20 000 pcs.

Unit : mm

	<b>Table 6</b>	
	<b>REFLOW PROFILE CHART (REFERENCE)</b>	

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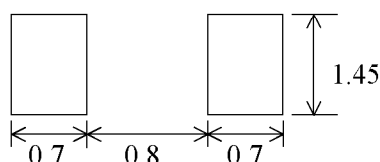
※ At using TAIYO YUDEN products of this specification and in using the lead free soldering, We request to use then after confirming of adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.

## Precautions

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### 1. Surface Mounting

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



Unit : mm

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

### 2. Handling

- Keep the inductors away from all magnets and magnetic 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 °C  
         Humidity                               Below 70 % RH  
     The ambient temperature must be kept below 30 °C. 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. Production Sites

- TAIYO YUDEN CO., LTD. (JAPAN)
- CHUKI SEIKI 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.

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SPECIAL NOTICE

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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.

All electronic components listed in this catalog are developed, designed and intended for use in general electronics equipments. ( for AV, household, office supply, information service, telecomm-unications, etc.). Before incorporating the components into any equipments in the field such as aerospace, aviation, nuclear control, submarine, transportation, (automotive control, 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.