**AE024Z100011**

Ver.1.07

# SPECIFICATION

## AXIAL LEAD INDUCTORS

## CAL45 TYPE

TAIYO YUDEN

## 1. Scope

These specifications apply to axial lead inductor, CAL45Type.

## 2. Naming method

Example of Our Naming Method:

| CA | L | 45 | TB | 101 | K |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |

(1) Basic classifications of type name
(2) Specified characteristic “L”
(3) Guide for outer dimensions
(4) Shape of lead
(5) Inductance value
(6) Tolerance of inductance

## 3. Electrical performance

Standards

Refer to Table 1 and 3

Measurement Methods

| | | | |
|---|---|---|---|
| Inductance | : | LCR meter | (Equivalent to HP 4285A+42851A) |
| Q | : | LCR meter | (Equivalent to HP 4285A+42851A) |
| Self-resonance frequency | : | Network analyzer | (Equivalent to Anritsu MS620J) |
| DC resistance | : | Low ohm meter | (Equivalent to A&D AD-5812) |

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

Standard test conditions

Unless specified, all tests shall be conducted under the conditions of 20±15 deg C temperature and 65±20 % humidity as specified.
Should any doubt arise in determination of test results, a further test shall be conducted under the condition of 20±2 deg C temperature and 65±5 % humidity.
Also, unless specified, the shape of lead shall be the straight-type.

## 4. Appearance, dimensions and shape of lead

Standard: Refer to table 2

## 5. Mechanical performances

Standard: Refer to table 3

## 6. Environment test performances

Standard: Refer to table 3

## 7. Structural diagram

Standard: Refer to table 4

## 8. Color code

Standard: Refer to table 5

* Please don’t wash with supersonic waves.

# Table 1

## AXIAL LEAD INDUCTORS

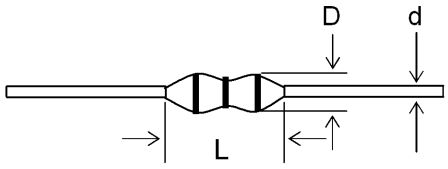


| ITEM | INDUCTANCE [μH] | TOLERANCE [%] | D.C. RESISTANCE [Ω] max | RATED CURRENT *) [mA]max | | MEASURING FREQUENCY [MHz] |
|---|---|---|---|---|---|---|
| | | | | SATURATION CURRNT Idc 1 | TEMPERATURE RISE CURRENT Idc 2 | |
| 1R0K | 1 | ±10 | 0.036 | 5600 | 3300 | 7.96 |
| 1R2K | 1.2 | 〃 | 0.039 | 5000 | 3200 | 〃 |
| 1R5K | 1.5 | 〃 | 0.041 | 4400 | 3000 | 〃 |
| 1R8K | 1.8 | 〃 | 0.048 | 4100 | 2800 | 〃 |
| 2R2K | 2.2 | 〃 | 0.054 | 3900 | 2700 | 〃 |
| 2R7K | 2.7 | 〃 | 0.058 | 3500 | 2500 | 〃 |
| 3R3K | 3.3 | 〃 | 0.066 | 3100 | 2400 | 〃 |
| 3R9K | 3.9 | 〃 | 0.072 | 3000 | 2300 | 〃 |
| 4R7K | 4.7 | 〃 | 0.079 | 2800 | 2200 | 〃 |
| 5R6K | 5.6 | 〃 | 0.089 | 2500 | 2100 | 〃 |
| 6R8K | 6.8 | 〃 | 0.097 | 2200 | 2000 | 〃 |
| 8R2K | 8.2 | 〃 | 0.110 | 2000 | 1900 | 〃 |
| 100K | 10 | ±10 | 0.14 | 1700 | 1800 | 2.52 |
| 120K | 12 | 〃 | 0.17 | 1600 | 1450 | 〃 |
| 150K | 15 | 〃 | 0.19 | 1400 | 1430 | 〃 |
| 180K | 18 | 〃 | 0.24 | 1250 | 1300 | 〃 |
| 220K | 22 | 〃 | 0.28 | 1200 | 1220 | 〃 |
| 270K | 27 | 〃 | 0.33 | 1100 | 1130 | 〃 |
| 330K | 33 | 〃 | 0.37 | 1000 | 1080 | 〃 |
| 390K | 39 | 〃 | 0.47 | 920 | 900 | 〃 |
| 470K | 47 | 〃 | 0.52 | 890 | 870 | 〃 |
| 560K | 56 | 〃 | 0.75 | 790 | 710 | 〃 |
| 680K | 68 | 〃 | 0.78 | 700 | 700 | 〃 |
| 820K | 82 | 〃 | 0.92 | 620 | 640 | 〃 |
| 101K | 100 | ±10 | 1.2 | 590 | 630 | 0.796 |
| 121K | 120 | 〃 | 1.6 | 550 | 490 | 〃 |
| 151K | 150 | 〃 | 1.8 | 490 | 470 | 〃 |
| 181K | 180 | 〃 | 2.3 | 420 | 450 | 〃 |
| 221K | 220 | 〃 | 2.9 | 370 | 425 | 〃 |
| 271K | 270 | 〃 | 3.4 | 350 | 355 | 〃 |
| 331K | 330 | 〃 | 3.6 | 320 | 330 | 〃 |
| 391K | 390 | 〃 | 4.9 | 290 | 280 | 〃 |
| 471K | 470 | 〃 | 6.3 | 270 | 240 | 〃 |
| 561K | 560 | 〃 | 7.0 | 250 | 240 | 〃 |
| 681K | 680 | 〃 | 7.8 | 240 | 220 | 〃 |
| 821K | 820 | 〃 | 11.0 | 220 | 210 | 〃 |
| 102K | 1000 | ±10 | 13.2 | 190 | 170 | 0.252 |
| 122K | 1200 | 〃 | 17 | 170 | 150 | 〃 |
| 152K | 1500 | 〃 | 22 | 150 | 140 | 〃 |
| 182K | 1800 | 〃 | 27 | 140 | 120 | 〃 |
| 222K | 2200 | 〃 | 36 | 130 | 110 | 〃 |
| 272K | 2700 | 〃 | 45 | 110 | 90 | 〃 |
| 332K | 3300 | 〃 | 65 | 100 | 75 | 〃 |
| 392K | 3900 | 〃 | 69 | 95 | 70 | 〃 |
| 472K | 4700 | 〃 | 80 | 90 | 65 | 〃 |
| 562K | 5600 | 〃 | 90 | 90 | 60 | 〃 |
| 682K | 6800 | 〃 | 100 | 80 | 60 | 〃 |
| 822K | 8200 | 〃 | 125 | 75 | 50 | 〃 |
| 103K | 10000 | ±10 | 155 | 65 | 45 | 0.0796 |

*)The saturation current value (Idc1)is the DC current value having inductance decrease down to 10%.(at 20deg C)
*)The temperature rise current value (Idc2)is the DC current value having temperature increase up to 40deg C.(at 20deg C)
*)The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

| | Table 2 | |
|---|---|---|
| | AXIAL LEAD INDUCTORS | ( 3 / 8 ) |

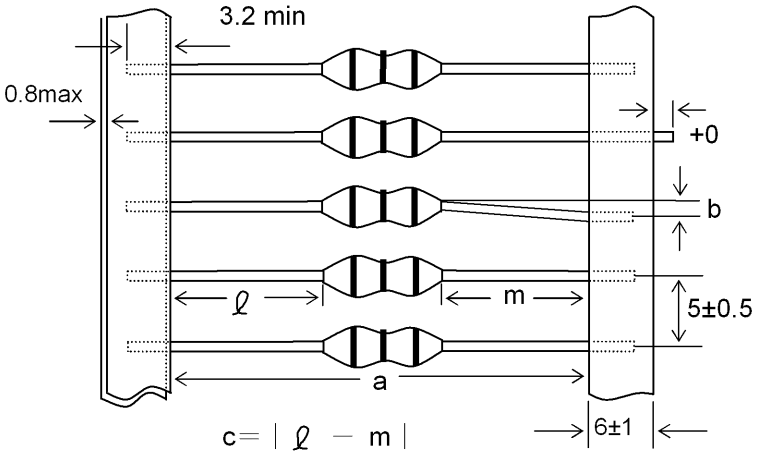
BODY




D = φ4.4 max
L = 8.0 max
d = φ0.65 ±0.05

mm

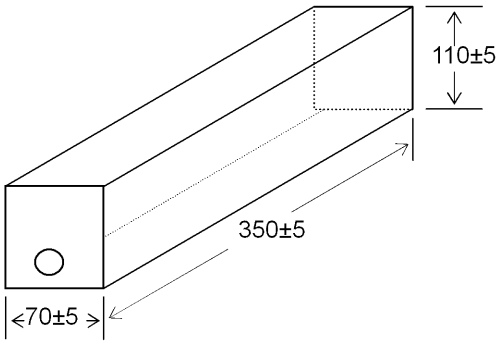
CAL45TB TYPE




a = 52.0± $^{2}_{1}$
b = 1.2 max
c = 1.0 max

mm

AMMO PACKING
CAL45TB TYPE




* Reference

mm

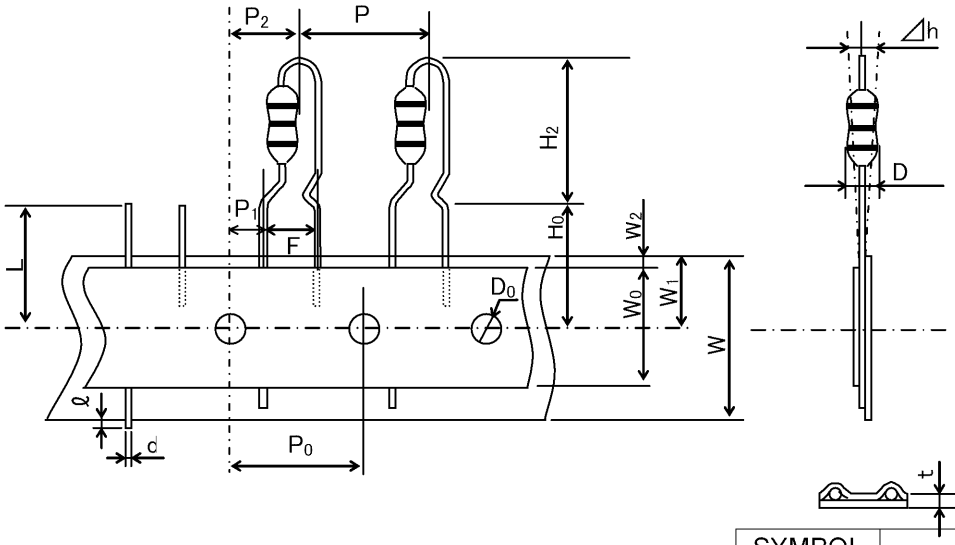
STANDARD QUANTITY : 2,000 pcs.

# Table 2

AXIAL LEAD INDUCTORS



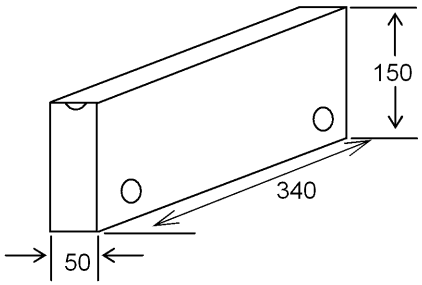
CAL45VB TYPE




| SYMBOL | mm |
|---|---|
| D | $\phi$ 4.4max |
| $H_2$ | 14.0max |
| $H_0$ | 16.0±1.0 |
| P | 12.7 +1.0 |
| $P_0$ | 12.7±0.3 |
| $P_1$ | 3.85±0.7 |
| $P_2$ | 6.35±1.3 |
| F | 5.0±1.0 |
| ⊿h | 0.0±2.0 |
| W | 18.0 +1.0/-0.5 |
| $W_0$ | 12.5min |
| $W_1$ | 9.0 +0.75/-0.5 |
| $W_2$ | 3.0max |
| ℓ | 2.0max |
| $D_0$ | $\phi$ 4.0±0.2 |
| d | $\phi$ 0.65±0.05 |
| L | 11.0max |
| t | 0.9max |

AMMO PACKING

CAL45VB TYPE




* Reference

mm

STANDARD QUANTITY : 1,500 pcs.

# Table 3

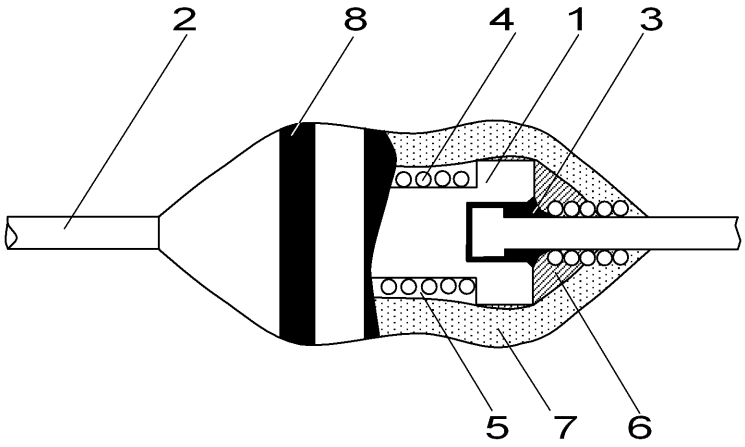
## AXIAL LEAD INDUCTORS



| | Item | Standards | Test methods |
|---|---|---|---|
| ELECTRICAL CHARACTERISTIC | Operating Temperature Range | −25 deg C to +105 deg C (Including self-generated heat) | |
| | DC superposition characteristic | ΔL/L→Within −10 % | The inductance at the time of applying the rated current is measured by LCR meter, and the result is compared with initial value. |
| | Temperature rise | Within 40 deg C | After applying the rated current for 30 minutes, the rise in temperature is measured by the resistance substitution method. |
| | Over current test | No emission of smoke nor firing. | A current in the size of twice as much as the rated current is applied for 5 minutes. |
| | Solder heat resistance | ΔL/L→Within ±5 % | Immersed in H63A solder at 270±5 deg C for 5±0.5 seconds. P:t=1.6 mm |
| | Solderability | 3/4 or greater part in the circumference direction should be soldered. | Immersed in H63A solder at 230±5 deg C for 2±0.5 seconds. |
| MECHANICAL CHARACTERISTICS | Tensile strength test | Should not be disconnected. | One side of the lead is held firmly and a 10 N load is gradually applied to the other side in the axial direction for 10 seconds. |
| | Bending test | Should not be disconnected. | 90 ° bending and straightening movement are given twice applying a load of 5 N. |
| | Body strength test | Should not be broken. | 50 N load is applied for 10 seconds. |
| | Falling test | The appearance should not be very abnormal. | To drop from a height of 1 m onto a concrete or polyvinyl tile floor, 10 times. |
| | Vibration test | ΔL/L→Within ±5 % | 2 hours each in the X,Y and Z directions with the sample attached to PC board. Sweeping for one minute in the range of 10-55-10 Hz and 1.5 mm amplitude. |
| ENVRONMENT TEST | Humidity test | ΔL/L→Within ±10 % | 40±2 deg C, 90～95 % relative humidity, 1 000 hours. |
| | Humidity loading test | ΔL/L→Within ±10 % | Applying the rated current for 1 000 hours, under the atmosphere of 40±2 deg C, 90～95 % RH. |
| | Low temperature test | ΔL/L→Within ±10 % | −25±2 deg C,1 000 hours. |
| | Temperature cycle | ΔL/L→Within ±10 % | −25 deg C to +85 deg C, to be retained for 30 minutes, 5 cycle. |
| | High temperature loading test | ΔL/L→Within ±10 % | Applying the rated current for 1 000 hours at 85±2 deg C. |

* Unless specified, all samples must be left at the normal temperature for one hour or longer and measured within 2 hours.

Table 4
Structural Diagram




| | | |
|---|---|---|
| 1. | Ferrite Core | |
| 2. | Lead wire | Solder coating (Lead plating composition : Sn<br>Joint solder : Sn / Ag / Cu) |
| 3. | Adhesive | Epoxy resin |
| 4. | Coil material | Polyurethane-copper wire |
| 5. | Under-coating resin | Butadiene resin |
| 6. | Side-coating resin | Epoxy resin |
| 7. | Over-coating resin | Epoxy resin |
| 8. | Color code | Melamine resin |

Table 5
Color Code

| Color Code | 1st Color belt (1st numeric) | 2nd Color belt (2nd numeric) | 3rd Color belt (Multiplier) |
|---|---|---|---|
| Black | 0 | 0 | × 1 |
| Brown | 1 | 1 | ×10 |
| Red | 2 | 2 | $\times 10^{2}$ |
| Orange | 3 | 3 | ——— |
| Yellow | 4 | 4 | ——— |
| Green | 5 | 5 | ——— |
| Blue | 6 | 6 | ——— |
| Violet | 7 | 7 | ——— |
| Gray | 8 | 8 | ——— |
| White | 9 | 9 | ——— |
| Gold | ——— | ——— | $\times 10^{-1}$ |
| Silver | ——— | ——— | $\times 10^{-2}$ |

**1. Handling**

-Keep the inductors away from all magnets and magnetic objects.
-Please don't wash with supersonic waves.

**2. 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 deg C |
| Humidity | Below 70 % RH |

The ambient temperature must be kept below 30 deg C. Even under ideal storage conditions, solderability of inductor's electrodes may decrease as time passes. For this reason, inductors should be used within one year from the time of delivery.
In case of storage over 6 months, solderability shall be checked before actual usage.

**3. Regulations**

-No ozone-depleting substances, which are defined as Class-1 and Class-2 in the US Federal Clean Air Act, are used in the production processes, nor contained in the product.
-Certain brominated flame retardants (PBBs, PBDEs) 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.

**4. Production Sites**

TAIYO YUDEN (TIANJIN) ELECTRONICS CO., LTD. [CHINA]

**5. Precautions**

-The products are intended for wave soldering, therefore please avoid using them with reflow soldering.
-Recommended conditions for using a soldering iron:

Put the soldering iron on the land-pattern.

| | |
|---|---|
| Soldering iron's temperature | Below 350 deg C |
| Duration | 3 seconds or less |

The soldering iron should not directly touch the inductor.
-At using TAIYO YUDEN products of this specification and in case of using the lead free soldering, We request to use them after confirming of adhesion, temperature of resistance to soldering heat, solderability and soldering shape situation etc sufficiently.

**6. Guarantee**

The operating conditions for the guarantee of this product are as shown in the drawing for specification.
Please note that Taiyo Yuden Co., Ltd. shall not be responsible for a failure and /or abnormality which is caused by use under the conditions other than the aforesaid operating conditions.

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Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification or individual specification.

■Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

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