# Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

## ⚠ REMINDERS

- Product information in this catalog is as of October 2011. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

  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 catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.

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

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,( automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
  Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

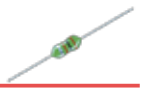
  In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
  It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.

- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.

- Caution for export
  Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

# AXIAL LEADED INDUCTORS



WAVE

## FEATURES

- Extremely reliable inductors that are ideal for automatic insertion.
- Highly efficient automated production processes can provide high quality inductors in large volumes.
- Wide selection of configurations including axial leaded, formed radial leads and bulk products to meet most manufacturing needs.
- CAL45 is high current type, and has superior DC bias characteristics.

## APPLICATIONS

- Use for TVs, DVD, audio equipment, communication instrument, tuner, and general electrical instrument.
- For DC/DC converter (LCD TV, PDP TV, CTV, DVD etc.)(CAL45 Series)

## OPERATING TEMP.

- −25℃～105℃ (Including self-generated heat)

## ORDERING CODE

L A L △ 0 2 T B R 2 2 K ○ ○ ○ ○ ○

**❶Type**

| | |
|---|---|
| LA | Axial leaded inductor |
| CA | High current axial leaded inductor |

**❷Product Specification**

| | |
|---|---|
| L△ | Standard type |
| N△ | High current type |
| P△ | Standard type (Lead diameter : 0.45φmm) |

△=Blank space

**❸Dimensions (L×D) [mm] max**

| | |
|---|---|
| 02 | 3.4×2.3(LAL/LAP) |
| | 3.6×2.4(LAN) |
| 45 | 8.0×4.4(CA) |

**❹Lead configurations**

| | |
|---|---|
| KR | Formed lead/bulk |
| NA | Axial lead/bulk |
| TA | Axial lead (26mm lead space) /ammo pack |
| TB | Axial lead (52mm lead space) /ammo pack |
| VD | Formed lead/ammo pack |
| VB | Formed lead/ammo pack(CAL45) |

**❺Nominal inductance [μH]**

| | |
|---|---|
| example | |
| 1R5 | 1.5 |
| 120 | 12 |

※R=decimal point

**❻Inductance tolerance [%]**

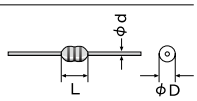
| | |
|---|---|
| J | ±5 |
| K | ±10 |

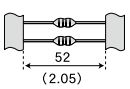
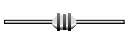
**❼Internal code**

| | |
|---|---|
| △△△△△ | Standard product |

△=Blank space

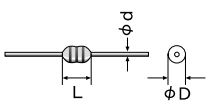
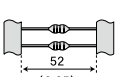
## EXTERNAL DIMENSIONS/STANDARD QUANTITY




| Type | Dimensions [mm] (inch) | | | Taped | | Bulk | | Standard Quantity (pcs) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lead Configuration Code | | | | |
| | L | φD | φd | Straight | Formed | Straight | Formed | TA | TB | VD | NA | KR |
| LAL02 | 3.4max. (0.134max.) | 2.3max. (0.091max.) | 0.5±0.05 (0.018±0.002) | TB  52 (2.05) | VD  Pitch : 5mm(0.197) | NA  | ——— | 2,000 | | | 500 | — |
| LAP02 | 3.4max. (0.134max.) | 2.3max. (0.091max.) | 0.45±0.05 (0.018±0.002) | TA  26 (1.02) | ——— | ——— | KR  Pitch : 5mm(0.197) | 2,000 | — | | | 2,000 |
| LAN02 | 3.6max. (0.142max.) | 2.4max. (0.094max.) | | | | | | | | | | |

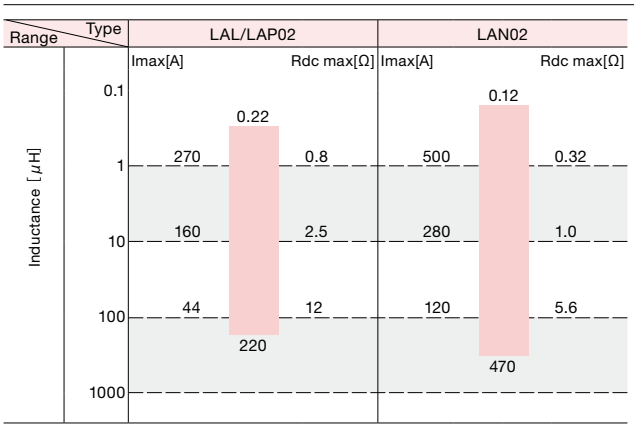
Unit : mm (inch)

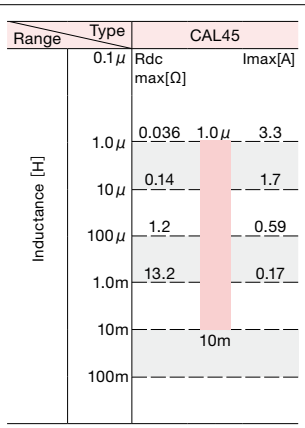
【CA type】

| Type | Fig. | Dimensions [mm] (inch) | | | Taped | | Standard Quantity (pcs) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | φD | φd | Straight | Formed | Bulk | Taped | |
| CAL45 |   | 8.0max (0.315max) | 4.4max (0.173max) | 0.65±0.05 (0.026±0.002) | TB  52 (2.05) | VB  5.0mm(0.197) | — | Axial lead | 2000 |
| | | | | | | | | Formed lead | 1500 |

Unit : mm (inch)

## AVAILABLE INDUCTANCE RANGE

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## PART NUMBERS

### LAL/LAP02

| Ordering code | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Measuring frequency [MHz] | Self−resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [mA] (max.) |
|---|---|---|---|---|---|---|---|---|
| LA□ 02 ○ R22K | RoHS | 0.22 | ±10% | 35 | 25.2 | 450 | 0.40 | 400 |
| LA□ 02 ○ R27K | RoHS | 0.27 | | | | 410 | 0.43 | 380 |
| LA□ 02 ○ R33K | RoHS | 0.33 | | | | 360 | 0.48 | 370 |
| LA□ 02 ○ R39K | RoHS | 0.39 | | | | 300 | 0.51 | 350 |
| LA□ 02 ○ R47K | RoHS | 0.47 | | | | 230 | 0.56 | 330 |
| LA□ 02 ○ R56K | RoHS | 0.56 | | | | 210 | 0.61 | 320 |
| LA□ 02 ○ R68K | RoHS | 0.68 | | | | 190 | 0.67 | 310 |
| LA□ 02 ○ R82K | RoHS | 0.82 | | | | 170 | 0.74 | 290 |
| LA□ 02 ○ 1R0K | RoHS | 1.0 | | | | 150 | 0.80 | 270 |
| LA□ 02 ○ 1R2K | RoHS | 1.2 | | 40 | 7.96 | 110 | 0.9 | 260 |
| LA□ 02 ○ 1R5K | RoHS | 1.5 | | | | 80 | 1.0 | 250 |
| LA□ 02 ○ 1R8K | RoHS | 1.8 | | | | 60 | 1.1 | 240 |
| LA□ 02 ○ 2R2K | RoHS | 2.2 | | | | 45 | 1.2 | 230 |
| LA□ 02 ○ 2R7K | RoHS | 2.7 | | | | 40 | 1.3 | 220 |
| LA□ 02 ○ 3R3K | RoHS | 3.3 | | | | 38 | 1.4 | 210 |
| LA□ 02 ○ 3R9K | RoHS | 3.9 | | | | 35 | 1.6 | 200 |
| LA□ 02 ○ 4R7K | RoHS | 4.7 | | | | 32 | 1.7 | 190 |
| LA□ 02 ○ 5R6K | RoHS | 5.6 | | | | 30 | 1.9 | 180 |
| LA□ 02 ○ 6R8K | RoHS | 6.8 | | | | 28 | 2.0 | 175 |
| LA□ 02 ○ 8R2K | RoHS | 8.2 | | | | 26 | 2.2 | 165 |
| LA□ 02 ○ 100K | RoHS | 10 | | | | 24 | 2.5 | 160 |
| LA□ 02 ○ 120K | RoHS | 12 | | | 2.52 | 22 | 2.5 | 150 |
| LA□ 02 ○ 150K | RoHS | 15 | | | | 20 | 2.8 | 145 |
| LA□ 02 ○ 180K | RoHS | 18 | | | | 18 | 3.1 | 140 |
| LA□ 02 ○ 220K | RoHS | 22 | | | | 17 | 3.4 | 130 |
| LA□ 02 ○ 270K | RoHS | 27 | | | | 16 | 4.3 | 80 |
| LA□ 02 ○ 330K | RoHS | 33 | | | | 14 | 4.7 | 76 |
| LA□ 02 ○ 390K | RoHS | 39 | | | | 13 | 5.2 | 74 |
| LA□ 02 ○ 470K | RoHS | 47 | | | | 12 | 5.8 | 70 |
| LA□ 02 ○ 560K | RoHS | 56 | | | | 11 | 6.4 | 68 |
| LA□ 02 ○ 680K | RoHS | 68 | | | | 10 | 7.2 | 64 |
| LA□ 02 ○ 820K | RoHS | 82 | | | | 9.5 | 11 | 46 |
| LA□ 02 ○ 101K | RoHS | 100 | | | | 9.0 | 12 | 44 |
| LA□ 02 ○ 121K | RoHS | 120 | | 40 | 0.796 | 8.0 | 13 | 42 |
| LA□ 02 ○ 151K | RoHS | 150 | | | | 6.0 | 16 | 39 |
| LA□ 02 ○ 181K | RoHS | 180 | | | | 5.5 | 18 | 37 |
| LA□ 02 ○ 221K | RoHS | 220 | | | | 5.0 | 20 | 35 |

□ Please specify the Product Specification (Lead) code. (L:standard 0.5mm or P:0.45mm)
○ Please specify the Lead configuration code.



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## PART NUMBERS

●LAN02

| Ordering code | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Measuring frequency [MHz] | Self−resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [mA] (max.) |
|---|---|---|---|---|---|---|---|---|
| LAN02 ○ R12K | RoHS | 0.12 | ±10% | 50 | 25.2 | 500 | 0.12 | 850 |
| LAN02 ○ R15K | RoHS | 0.15 | | | | 500 | 0.14 | 800 |
| LAN02 ○ R18K | RoHS | 0.18 | | | | 500 | 0.15 | 760 |
| LAN02 ○ R22K | RoHS | 0.22 | | | | 500 | 0.16 | 730 |
| LAN02 ○ R27K | RoHS | 0.27 | | | | 500 | 0.18 | 690 |
| LAN02 ○ R33K | RoHS | 0.33 | | | | 480 | 0.19 | 660 |
| LAN02 ○ R39K | RoHS | 0.39 | | | | 430 | 0.21 | 640 |
| LAN02 ○ R47K | RoHS | 0.47 | | | | 380 | 0.23 | 610 |
| LAN02 ○ R56K | RoHS | 0.56 | | | | 350 | 0.25 | 580 |
| LAN02 ○ R68K | RoHS | 0.68 | | | | 310 | 0.27 | 550 |
| LAN02 ○ R82K | RoHS | 0.82 | | | | 270 | 0.29 | 520 |
| LAN02 ○ 1R0J | RoHS | 1.0 | ±5% | | | 240 | 0.32 | 500 |
| LAN02 ○ 1R2J | RoHS | 1.2 | | | 7.96 | 210 | 0.35 | 480 |
| LAN02 ○ 1R5J | RoHS | 1.5 | | | | 190 | 0.38 | 450 |
| LAN02 ○ 1R8J | RoHS | 1.8 | | | | 140 | 0.42 | 430 |
| LAN02 ○ 2R2J | RoHS | 2.2 | | | | 90 | 0.47 | 410 |
| LAN02 ○ 2R7J | RoHS | 2.7 | | | | 70 | 0.52 | 390 |
| LAN02 ○ 3R3J | RoHS | 3.3 | | | | 50 | 0.57 | 370 |
| LAN02 ○ 3R9J | RoHS | 3.9 | | 40 | | 35 | 0.63 | 360 |
| LAN02 ○ 4R7J | RoHS | 4.7 | | | | 32 | 0.69 | 340 |
| LAN02 ○ 5R6J | RoHS | 5.6 | | | | 30 | 0.75 | 320 |
| LAN02 ○ 6R8J | RoHS | 6.8 | | | | 28 | 0.84 | 310 |
| LAN02 ○ 8R2J | RoHS | 8.2 | | | | 26 | 0.92 | 290 |
| LAN02 ○ 100J | RoHS | 10 | | | | 24 | 1.0 | 280 |
| LAN02 ○ 120J | RoHS | 12 | | | 2.52 | 22 | 1.0 | 280 |
| LAN02 ○ 150J | RoHS | 15 | | | | 20 | 1.2 | 265 |
| LAN02 ○ 180J | RoHS | 18 | | | | 18 | 1.3 | 250 |
| LAN02 ○ 220J | RoHS | 22 | | | | 17 | 1.5 | 235 |
| LAN02 ○ 270J | RoHS | 27 | | | | 15 | 1.7 | 220 |
| LAN02 ○ 330J | RoHS | 33 | | 50 | | 14 | 2.2 | 180 |
| LAN02 ○ 390J | RoHS | 39 | | | | 13 | 2.4 | 170 |
| LAN02 ○ 470J | RoHS | 47 | | | | 12 | 2.8 | 160 |
| LAN02 ○ 560J | RoHS | 56 | | | | 10 | 4.1 | 140 |
| LAN02 ○ 680J | RoHS | 68 | | | | 9.2 | 4.5 | 130 |
| LAN02 ○ 820J | RoHS | 82 | | | | 8.8 | 5.0 | 125 |
| LAN02 ○ 101J | RoHS | 100 | | | | 8.0 | 5.6 | 120 |
| LAN02 ○ 121J | RoHS | 120 | | | 0.796 | 6.6 | 9.2 | 90 |
| LAN02 ○ 151J | RoHS | 150 | | | | 5.8 | 10.5 | 85 |
| LAN02 ○ 181J | RoHS | 180 | | | | 5.4 | 11.5 | 80 |
| LAN02 ○ 221J | RoHS | 220 | | | | 4.8 | 13 | 75 |
| LAN02 ○ 271J | RoHS | 270 | | | | 3.6 | 16 | 70 |
| LAN02 ○ 331J | RoHS | 330 | | | | 3.4 | 18 | 66 |
| LAN02 ○ 391J | RoHS | 390 | | | | 3.2 | 20 | 63 |
| LAN02 ○ 471J | RoHS | 470 | | | | 3.0 | 22 | 60 |

○ Please specify the Lead configuration code.

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## PART NUMBERS

### CAL45

| Ordering code | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (refarence) | Self-resonant frequency [MHz] (refarence) | Measuring frequency [MHz] | DC Resistance [Ω] (max.) | Rated current ※) [mA] (max.) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Saturation current Idc1 | Temperature rise current Idc2 |
| CAL 45 ○ 1R0K | RoHS | 1.0 | ±10% | 30 | 350 | 7.96 | 0.036 | 5600 | 3300 |
| CAL 45 ○ 1R2K | RoHS | 1.2 | | | 300 | | 0.039 | 5000 | 3200 |
| CAL 45 ○ 1R5K | RoHS | 1.5 | | | 300 | | 0.041 | 4400 | 3000 |
| CAL 45 ○ 1R8K | RoHS | 1.8 | | | 200 | | 0.048 | 4100 | 2800 |
| CAL 45 ○ 2R2K | RoHS | 2.2 | | | 200 | | 0.054 | 3900 | 2700 |
| CAL 45 ○ 2R7K | RoHS | 2.7 | | | 70 | | 0.058 | 3500 | 2500 |
| CAL 45 ○ 3R3K | RoHS | 3.3 | | | 70 | | 0.066 | 3100 | 2400 |
| CAL 45 ○ 3R9K | RoHS | 3.9 | | | 40 | | 0.072 | 3000 | 2300 |
| CAL 45 ○ 4R7K | RoHS | 4.7 | | | 40 | | 0.079 | 2800 | 2200 |
| CAL 45 ○ 5R6K | RoHS | 5.6 | | | 35 | | 0.089 | 2500 | 2100 |
| CAL 45 ○ 6R8K | RoHS | 6.8 | | | 35 | | 0.097 | 2200 | 2000 |
| CAL 45 ○ 8R2K | RoHS | 8.2 | | | 30 | | 0.110 | 2000 | 1900 |
| CAL 45 ○ 100K | RoHS | 10 | | 40 | 25 | 2.52 | 0.14 | 1700 | 1800 |
| CAL 45 ○ 120K | RoHS | 12 | | | 25 | | 0.17 | 1600 | 1450 |
| CAL 45 ○ 150K | RoHS | 15 | | | 25 | | 0.19 | 1400 | 1430 |
| CAL 45 ○ 180K | RoHS | 18 | | | 20 | | 0.24 | 1250 | 1300 |
| CAL 45 ○ 220K | RoHS | 22 | | | 20 | | 0.28 | 1200 | 1220 |
| CAL 45 ○ 270K | RoHS | 27 | | | 17 | | 0.33 | 1100 | 1130 |
| CAL 45 ○ 330K | RoHS | 33 | | 30 | 15 | | 0.37 | 1000 | 1080 |
| CAL 45 ○ 390K | RoHS | 39 | | | 13 | | 0.47 | 920 | 900 |
| CAL 45 ○ 470K | RoHS | 47 | | | 13 | | 0.52 | 890 | 870 |
| CAL 45 ○ 560K | RoHS | 56 | | | 11 | | 0.75 | 790 | 710 |
| CAL 45 ○ 680K | RoHS | 68 | | | 10 | | 0.78 | 700 | 700 |
| CAL 45 ○ 820K | RoHS | 82 | | | 9 | | 0.92 | 620 | 640 |
| CAL 45 ○ 101K | RoHS | 100 | | 40 | 9 | 0.796 | 1.2 | 590 | 630 |
| CAL 45 ○ 121K | RoHS | 120 | | 50 | 7 | | 1.6 | 550 | 490 |
| CAL 45 ○ 151K | RoHS | 150 | | 60 | 7 | | 1.8 | 490 | 470 |
| CAL 45 ○ 181K | RoHS | 180 | | | 5 | | 2.3 | 420 | 450 |
| CAL 45 ○ 221K | RoHS | 220 | | 80 | 5 | | 2.9 | 370 | 425 |
| CAL 45 ○ 271K | RoHS | 270 | | 70 | 5 | | 3.4 | 350 | 355 |
| CAL 45 ○ 331K | RoHS | 330 | | | 4.5 | | 3.6 | 320 | 330 |
| CAL 45 ○ 391K | RoHS | 390 | | | 4 | | 4.9 | 290 | 280 |
| CAL 45 ○ 471K | RoHS | 470 | | 80 | 4 | | 6.3 | 270 | 240 |
| CAL 45 ○ 561K | RoHS | 560 | | | 3 | | 7.0 | 250 | 240 |
| CAL 45 ○ 681K | RoHS | 680 | | | 3 | | 7.8 | 240 | 220 |
| CAL 45 ○ 821K | RoHS | 820 | | | 2.5 | | 11.0 | 220 | 210 |
| CAL 45 ○ 102K | RoHS | 1000 | | | 2.5 | 0.252 | 13.2 | 190 | 170 |
| CAL 45 ○ 122K | RoHS | 1200 | | | 2 | | 17 | 170 | 150 |
| CAL 45 ○ 152K | RoHS | 1500 | | | 2 | | 22 | 150 | 140 |
| CAL 45 ○ 182K | RoHS | 1800 | | | 1.5 | | 27 | 140 | 120 |
| CAL 45 ○ 222K | RoHS | 2200 | | | 1.5 | | 36 | 130 | 110 |
| CAL 45 ○ 272K | RoHS | 2700 | | 70 | 1.2 | | 45 | 110 | 90 |
| CAL 45 ○ 332K | RoHS | 3300 | | | 1.2 | | 65 | 100 | 75 |
| CAL 45 ○ 392K | RoHS | 3900 | | | 1 | | 69 | 95 | 70 |
| CAL 45 ○ 472K | RoHS | 4700 | | | 1 | | 80 | 90 | 65 |
| CAL 45 ○ 562K | RoHS | 5600 | | | 1 | | 90 | 90 | 60 |
| CAL 45 ○ 682K | RoHS | 6800 | | | 1 | | 100 | 80 | 60 |
| CAL 45 ○ 822K | RoHS | 8200 | | | 0.7 | | 125 | 75 | 50 |
| CAL 45 ○ 103K | RoHS | 10000 | | 30 | 0.6 | 0.0796 | 155 | 65 | 45 |

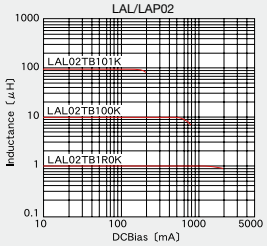
○ Please specify the Lead configuration code.

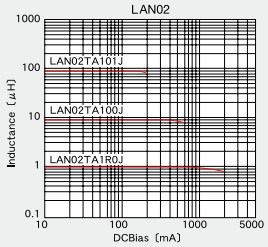
※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 10%. (at 20℃)
※) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40℃. (at 20℃)
※) The rated current is the DC current value that satisfies both of current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

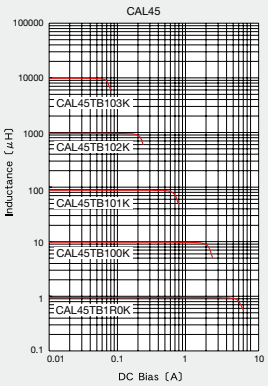
## ELECTRICAL CHARACTERISTICS

### DC Bias characteristics

(Measured by HP4285A)

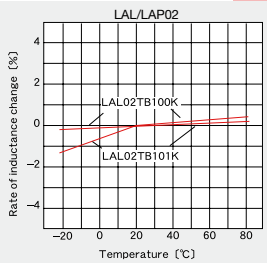


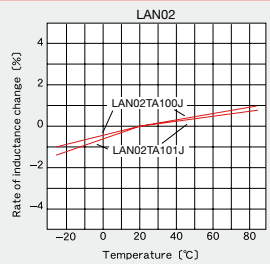




### Temperature characteristics

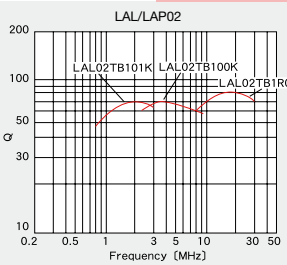
(Measured by HP4285A)

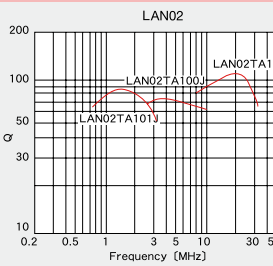



### Q-Characteristics

(Measured by HP4285A+HP42851A)

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## PACKAGING

### ①Minimum Quantity

●Taping for Straight Leads

| Type | Lead Configuration code | Standard quantity (pcs.) |
|---|---|---|
| LAL02 | TB | 2,000 |
| LAP02 | TA | 2,000 |
| LAN02 | TA | 2,000 |
| CAL45 | TB | 2,000 |

●Taping for Formed Leads

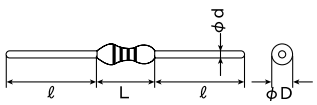
| Type | Lead Configuration code | Standard quantity (pcs.) |
|---|---|---|
| LAL02 | VD | 2,000 |
| CAL45 | VB | 1,500 |

●Bulk

| Type | Lead Configuration code | Standard quantity (pcs.) |
|---|---|---|
| LAL02 | NA | 500 |
| LAP02 | KR | 2,000 |
| LAN02 | KR | 2,000 |

### ②Dimension

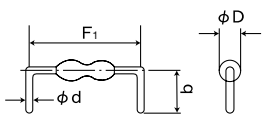
●NA




| Type | Dimensions | | | | Minimum insertion pitch |
|---|---|---|---|---|---|
| | ϕD | L | ϕd | ℓ | |
| LAL02 | 2.3max (0.091max) | 3.4max (0.134max) | 0.50±0.05 (0.020±0.002) | 24±2.0 (0.945±0.079) | 5.0 (0.197) |

Unit : mm(inch)

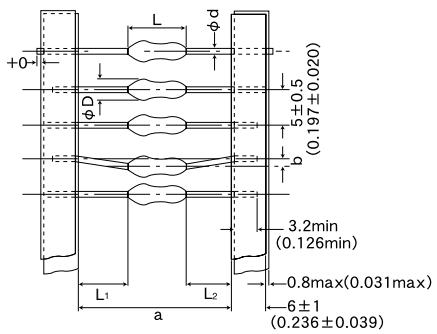
●KR




| Type | Lead configuration code | Dimensions | | | |
|---|---|---|---|---|---|
| | | ϕD | $F_1$ | ϕd | b |
| LAP02 | KR | 2.3max (0.091max) | 5.0±0.5 (0.197±0.020) | 0.45±0.05 (0.018±0.002) | 7.0±1.0 (0.276±0.039) |
| LAN02 | KR | 2.4max (0.094max) | 5.0±0.5 (0.197±0.020) | 0.45±0.05 (0.018±0.002) | 7.0±1.0 (0.276±0.039) |

Unit : mm(inch)

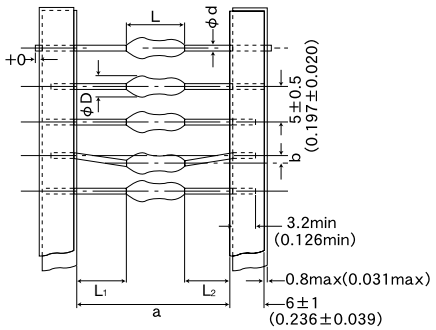
●TA(a : 26mm lead space)
(1.02 inch)




| Type | Dimensions | | | | | | Minimum insertion pitch |
|---|---|---|---|---|---|---|---|
| | ϕD | L | a | b | $\|L_1-L_2\|$ | ϕd | |
| LAP02 | 2.3max (0.091max) | 3.4max (0.134max) | $26^{+0.5}_{0}$ ($1.02^{+0.020}_{0}$) | 0.8max (0.031max) | 0.5max (0.020max) | 0.45±0.05 (0.018±0.002) | 5.0 (0.197) |
| LAN02 | 2.4max (0.094max) | 3.6max (0.142max) | $26^{+0.5}_{0}$ ($1.02^{+0.020}_{0}$) | 0.8max (0.031max) | 0.5max (0.020max) | 0.45±0.05 (0.018±0.002) | 5.0 (0.197) |

Unit : mm(inch)

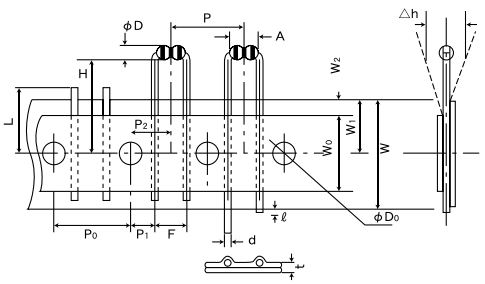
●TB(a : 52mm lead space)
(2.05 inches)




| Type | Dimensions | | | | | | Minimum insertion pitch |
|---|---|---|---|---|---|---|---|
| | ϕD | L | a | b | $\|L_1-L_2\|$ | ϕd | |
| LAL02 | 2.3max (0.091max) | 3.4max (0.134max) | $52^{+2}_{-1}$ ($2.05^{+0.079}_{-0.039}$) | 1.2max (0.047max) | 1.0max (0.039max) | 0.5±0.05 (0.020±0.002) | 5.0 (0.197) |

Unit : mm(inch)

●VD




| Type | Symbol | Dimensions | Symbol | Dimensions |
|---|---|---|---|---|
| LAL02 | A | 3.9max (0.154max) | W | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) |
| | ϕD | 2.3max (0.091max) | $W_0$ | 12.5 min. (0.492 min.) |
| | H | 19.5±0.5 (0.768±0.020) | $W_1$ | $9.0^{+0.75}_{-0.5}$ ($0.354^{+0.030}_{-0.020}$) |
| | P | 12.7±1.0 (0.500±0.039) | $W_2$ | 3.0 max. (0.118 max.) |
| | $P_0$ | 12.7±0.3 (0.500±0.012) | ℓ | 2.0 max. (0.079 max.) |
| | $P_1$<br>$P_2$ | 3.85±0.7 (0.152±0.028)<br>6.35±0.5 (0.250±0.020) | $\phi D_0$ | 4.0±0.3 (0.157±0.012) |
| | F | 5.08±0.5 (0.200±0.020) | ϕd | 0.50±0.05 (0.020±0.002) |
| | △h | 0±1.0 (0±0.039) | L | 11.0 max. (0.433 max.) |
| | — | — | t | 0.5±0.2 (0.020±0.008) |

Unit : mm(inch)

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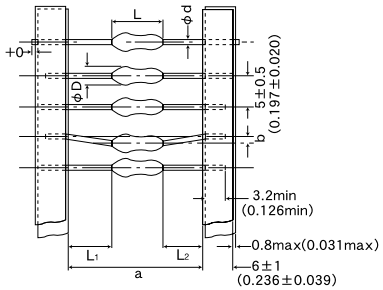
## PACKAGING

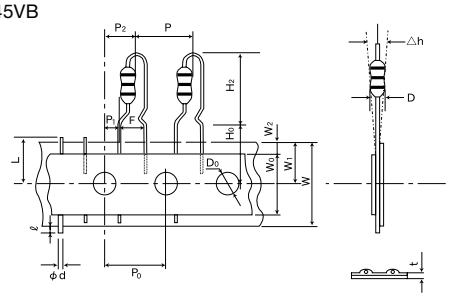
● CAL 45 TB (a : 52mm lead space)
(2.05 inches)




| Type | Dimensions | | | | | | Minimum insertion pitch |
|---|---|---|---|---|---|---|---|
| | φD | L | a | b | \|L1-L2\| | φd | |
| CAL45 | 4.4max (0.173max) | 8.0max (0.315max) | $52^{+2}_{-1}$ ($2.05^{+0.079}_{-0.039}$) | 1.2max (0.047max) | 1.0max (0.039max) | 0.65±0.05 (0.026±0.002) | 10.0 (0.394) |

Unit : mm (inch)

● CAL 45VB




| Type | Symbol | Dimensions | Symbol | Dimensions |
|---|---|---|---|---|
| CAL 45 | D | φ4.4max | W | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) |
| | $H_2$ | 14.0max (0.551max) | $W_0$ | 12.5min (0.492min) |
| | $H_0$ | 16.0±1.0 (0.630±0.039) | $W_1$ | $9.0^{+0.75}_{-0.5}$ ($0.354^{+0.030}_{-0.020}$) |
| | P | 12.7±1.0 (0.500±0.039) | $W_2$ | 3.0max ※2 (0.118max) |
| | $P_0$ | 12.7±0.3 ※1 (0.500±0.012) | ℓ | 2.0max (0.079max) |
| | $P_1$ | 3.85±0.7 (0.152±0.028) | $D_0$ | φ4.0±0.2 (φ0.157±0.008) |
| | $P_2$ | 6.35±1.3 (0.250±0.051) | φd | φ0.65±0.05 (φ0.026±0.002) |
| | F | 5.0±1.0 (0.197±0.039) | L | 11.0max (0.433max) |
| | △h | 0.0±2.0 (0.0±0.079) | t | 0.9max (0.035max) |

Unit : mm (inch)

※1 Accumulated error for 20 pitches is ± 1mm.
※2 Bonding tape must not protrude from the base tape.

## RELIABILITY DATA

| 1. Operating temperature Range | |
|---|---|
| LA Type | −25～+105℃ |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | −25～+85℃ |
| FL05□ Type | −25～+105℃ |
| FL06BT Type | |

【Test Method and Remarks】
LA・CA・FL : Including self-generated heat
LHL□□□ : Including self-generated heat

| 2. Storage temperature Range | |
|---|---|
| LA Type | −40～+85℃ |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

| 3. Rated current | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : The maximum DC value having inductance within 10% and temperature incease within 40℃ (LA:20℃) by the application of DC bias.
LHL□□□ : The maximum DC value having inductance decrease within 10% (LHLC08, LHLC10：within 30%) and temperature increase within the following specified temperature by the application of DC bias.
Reference temperature : 25℃ (LHL08, LHL10, LHL13)
: 30℃ (LHL16, LHLP□□)
: 40℃ (LHLC08, LHLC10)
FB : No disconnection or appearance abnormality by continuous current application for 30 min. Change after the application shall be within ±20% of the initial value. This is not guaranteed for electrial characteristics during current application.
FL : The maximum DC value having temperature rise within specified value.

| 4. Impedance | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | Within the specified tolerance |
| FL05□ Type | |
| FL06BT Type | Refer to individual specification |

【Test Method and Remarks】
FB : Measuring equipment : Impedance analyzer (HP4191A) or its equivalent
Measuring frequency : Specified frequency
FL06BT : Measuring equipment : 4291A (HP) or its equivalent
Measuring frequency : Specified frequency

| 5. Inductance | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | Within the specified tolerance |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1kHz)
Measuring frequency : Specified frequency
FL05R□ : Measuring equipment : HP4262A or its equivalent
Measuring frequency : 1kHz

| 6. Q | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ (except LHLP) : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1kHz)
Measuring frequency : Specified frequency

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## RELIABILITY DATA

| 7. DC Resisitance | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Measuring equipment : low ohmmeter (A&D AD5812 or its equivalent)
LHL□□□・FB・FL : Measuring equipment : DC ohmmeter

| 8. Self resonance frequency | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Measuring equipment : Network analyzer (Anritsu MS620J or its equivalent)
LHL□□□ (except LHLP) : Measuring equipment : (HP4191A, 4192A) its equivalent

| 9. Temperature characteristic | |
|---|---|
| LA Type | △L/L : Within ±5% |
| CAL45 Type | |
| LHL□□□ | △L/L : Within ±7% (except LHLP16 : Within ±20%) |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Change of maximum inductance deviation in step 1 to 5

| Step | Temperature (℃) |
|---|---|
| 1 | 20 |
| 2 | −25 (Minimum operating temperature) |
| 3 | 20 (Standard temperature) |
| 4 | +85 (Maximum operating temperature) |
| 5 | 20 |

LHL□□□ : Change of maximum inductance deviation in step 1 to 5
Temperature at step 1 : 20℃
Temperature at step 2 : Minimum operating temperature
Temperature at step 3 : 20℃ (Standard temperature)
Temperature at step 4 : Maximum operating temperature
Temperature at step 5 : 20℃

| 10. Tensile strength test | |
|---|---|
| LA Type | No abnormality such as cut lead, or looseness. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No abnormality such as cut lead, or looseness. |
| FL05□ Type | No abnormality such as cut lead, or looseness. |
| FL06BT Type | |

【Test Method and Remarks】
LA : Apply the stated tensile force progressively in the direction to draw terminal.

| force (N) | duration (s) |
|---|---|
| 25 | 5 |

CA : Apply the stated tensile force progressively in the direction to draw terminal.

| force (N) | duration (s) |
|---|---|
| 10 | 10 |

LHL□□□ : Apply the stated tensile force progressively in the direction to draw terminal.

| Nominal wire diameter tensile φd (mm) | force (N) | duration (s) |
|---|---|---|
| 0.3<φd≦0.5 | 5 | 30±5 |
| 0.5<φd≦0.8 | 10 | |
| 0.8<φd≦1.2 | 25 | |

FBA/FBR : The body of a component shall be fixed and a tensile force of 20±1N shall be applied to the lead wire in the axial diretion of the component during 10±1 seconds.
FL05R□ : Fix the body of a component in the direction to draw terminal,and gradually apply the tensile force of 4.9N.

| 11. Over current | |
|---|---|
| LA Type | No emission of smoke no firing. |
| CAL45 Type | |
| LHL□□□ | There shall be no scorch or short of wire.<br>LHLC08,LHLC10 : There shall be no firing. |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□/LA・CAL45 Type : Measuring current : Rated current×2
Duration : 5 min.
Number of measuring : one time

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| 12. Terminal strength : bending | |
|---|---|
| LA Type | No abnormality such as cut lead, or looseness. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】

LA, CA : Suspend a weight of specified mass at the end of the terminals and incline the body through the angle of 90 degrees and return it to the initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.
Number of bends : Two times.

| Nominal wire diameter tensile φd (mm) | Bending force (N) | Mass reference weight (kg) |
|---|---|---|
| 0.3<φd≦0.5 | 2.5 | 0.25 |
| 0.5<φd≦0.8 | 5 | 0.50 |

LH・FB : Suspend a weight of specified mass at the end of the terminals and incline the body through the angle of 90 degrees and return it to the initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.
Number of bends : Two times.

| Nominal wire diameter tensile φd (mm) | Bending force (N) | Mass reference weight (kg) |
|---|---|---|
| 0.3<φd≦0.5 | 2.5 | 0.25 |
| 0.5<φd≦0.8 | 5 | 0.5 |
| 0.8<φd≦1.2 | 10 | 1.0 |

| 13. Insulation resisitance : between the terminals and body | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | 100MΩ min. |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□ : Applied voltage : 500 VDC
Duration : 60 sec.

| 14. Insulation resistance : between terminals and core | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | 1MΩ min. (Other than materail code MA) |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
FBA・FBR : Applied voltage : 100 VDC
Duration : 60±5 sec.

| 15. Withstanding : between the terminals and body | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | No abnormality such as insulation damage |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□ : Accoding to JIS C5102. 7. 1. 3 (C)
Metal global method
Applied voltage : 500 VDC
Duration : 60 sec.

| 16. DC bias characteristic | |
|---|---|
| LA Type | △L/L : Within −10% |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

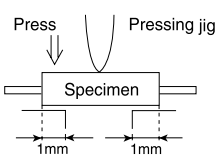
【Test Method and Remarks】
LA, CA : Measure inductance with appliation of rated current using LCR meter to compare it with the initial value.

| 17. Body strength | |
|---|---|
| LA Type | No abnormality as damage. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No abnormality such as cracks on body. |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Applied force : 30N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

CAL45 : Applied force : 50N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

FBA : Applied force : 50±3N
Duration : 30±1 sec.

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## RELIABILITY DATA

| 18. Resisitance to vibration | |
|---|---|
| LA Type | △L/L : Within ±5%　Q : 30min |
| CAL45 Type | △L/L : Within ±5% |
| LHL□□□ | Appearance : No abnomality　△L/L : Within ±5%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | Appearance : No abnomality　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm
Mounting method : Soldering onto printed board.
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□・FB : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm (But don't exceed acceleration 196m/s$^2$ (two power))
Mounting method : Soldering onto printed board.

| 19. Resistance to shock | |
|---|---|
| LA Type | No significant abnormality in appearance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Drop test
Impact material : concrete or vinyl tile
Height : 1m
Total number of drops : 10 times

| 20. Solderability | |
|---|---|
| LA Type | At least 75% of terminal electrode is covered by new solder. |
| CAL45 Type | |
| LHL□□□ | At least 75% of terminal electrode is covered by new solder. |
| FBA/FBR | At least 90% of terminal electrode is covered by new solder. |
| FL05□ Type | At least 75% of terminal electrode is covered by new solder. |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Solder temperature : 230±5℃
Duration : 2±0.5 sec.

LHL□□□ : Solder temperature : 235±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 1.5mm from bottom of case.

FB : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from terminal root.

FL05R□ : Solder temperature : 230±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 2 to 2.5mm from terminal root.

FL06BT : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from terminal root.

| 21. Resisitance to soldering heat | | |
|---|---|---|
| LA Type | No significant abnormality in appearance | |
| CAL45 Type | △L/L : Within ±5% | |
| LHL□□□ | No significant abnormality in appearance | Inductance change : Within ±5%　Q change : Within ±30%(LHLP : only △L/L) |
| FBA/FBR | No significant abnormality in appearance | Impedance change : Within ±20% |
| FL05□ Type | Refer to individual specification | |
| FL06BT Type | No significant abnormality in appearance | Impedance change : Within ±20% |

【Test Method and Remarks】
LA, CA : Solder temperature : (CA) 270±5℃, (LA) 260±5℃
Duration : 5±0.5 sec.　One time
Immersed conditions : Inserted into substrate with t=1.6mm
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□ : Solder bath method : Solder temperature : 260±5℃
Duration : 10±1 sec.
Up to 1.5mm from the bottom of case.
Manual soldering : Solder temperature : 350±10℃ (At the tip of soldering iron)
Duration : 5±1 sec.
Up to 1.5mm from the bottom of case.
Caution : No excessive pressing shall be applied to terminals.
Recovery : 4 to 24hrs of recovery under the standard condition after the test.

FB : Solder bath method : Condition 1 : Solder temperature : 260±5℃
Duration : 10±1 sec.
Immersion depth : Up to 1.5mm from the terminal root.
Condition 2 : Solder temperature : 350±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from the terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

FL : Solder condition : 260±5℃　10±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from the terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

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| 22. Resisitance to solvent | |
|---|---|
| LA Type | Please avoid the ultrasonic cleaning of this product. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No significant abnormality in appearance　　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
FB : Solvent temperature : 20～25℃
Duration : 30±5 sec.
Solvent type : Acetone
Recovery : 3hrs of recovery under the standard condition after the test.

| 23. Thermal shock | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　　Inductance change : Within ±10%　　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | Appearance : No abnormality　　Impedance change : Within ±20% |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　　Impedance change : Within ±20% |

【Test Method and Remarks】
LA, CA : Conditions for 1cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | $-25^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | $+85^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 5 cycles
Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.

LHL□□□・FB : Accoding to JIS C0025
Conditions for 1 cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | Minimum operating temperature$^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | Minimum operating temperature$^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 10 cycles〔LHL□□□〕
: 5 cycles (FBA, FBR)
Recovery : 4 to 24hrs of recovery under the standard condition after the removal from the test chamber.〔LHL□□□〕
: 3hrs of recovery under the standard condition after the removal from the test chamber. (FBA, FBR)

FL : Accoding to JIS C0025
Conditions for 1 cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | $-25^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | $+85^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 10 cycles
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 24. Damp heat | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | |
| FBA/FBR | Appearance : No abnormality　　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

FB : Temperature : 60±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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## RELIABILITY DATA

| 25. Loading under damp heat | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000±24 hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : 60±3℃
Humidity : 90～95%RH
Duration : 500 (+12, −0) hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 26. Loading at high temperature | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】

LA, CA : Temperature : 85±2℃
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

| 27. Low temperature life test | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LA, CA : Temperature : −25±2℃
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : −40±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : −40±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 28. High temperature life test | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LHL□□□ : Temperature : 105±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.
FL : Temperature : 85±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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## PRECAUTIONS

CAL Type, LH Type, FB Type, FL Type, LA Type

| 1. Circuit Design | |
|---|---|
| Precautions | ◆Operating environment<br>1. The products described in this specification are intended for use in general electronic equipment,(office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance. |

| 2. PCB Design | |
|---|---|
| Precautions | ◆Design<br>1. Please design insertion pitches as matching to that of leads of the component on PCBs. |
| Technical consider-ations | ◆Design<br>1. When Inductors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not, it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs. |

| 3. Considerations for automatic placement | |
|---|---|
| Precautions | ◆Adjustment of mounting machine<br>1. Excessive impact load should not be imposed on the products when mounting onto the PC boards.<br>2. Mounting and soldering conditions should be checked beforehand. |
| Technical consider-ations | ◆Adjustment of mounting machine<br>1. When installing products, care should be taken not to apply distortion stress as it may deform the products. |

| 4. Soldering | |
|---|---|
| Precautions | ◆Wave soldering<br>1. Please refer to the specifications in the catalog for a wave soldering.<br>2. Do not immerse the entire inductor in the flux during the soldering operation.<br>◆Lead free soldering<br>1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.<br>Recommended conditions for using a soldering iron:<br>・Put the soldering iron on the land-pattern.<br>・Soldering iron's temperature - Below 350℃<br>・Duration - 3 seconds or less<br>・The soldering iron should not directly touch the inductor.<br>◆Reflow soldering<br>1. As for reflow soldering, please contact our sales staff. |
| Technical consider-ations | ◆Lead free soldering<br>1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. |

| 5. Cleaning | |
|---|---|
| Precautions | ◆Cleaning conditions<br>1. CAL type, LH type, LA Type<br>Please do not do cleaning by a supersonic wave. |
| Technical consider-ations | ◆Cleaning conditions<br>1. CAL type, LH type, LA Type<br>If washing by supersonic waves, supersonic waves may deform products. |

| 6. Handling | |
|---|---|
| Precautions | ◆Handling<br>1. Keep the inductors away from all magnets and magnetic objects.<br>◆Mechanical considerations<br>1. Please do not give the inductors any excessive mechanical shocks.<br>2. LH type<br>If inductors are dropped onto the floor or a hard surface they should not be used.<br>◆Packing<br>1. Please do not give the inductors any excessive mechanical shocks.<br>In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item). |
| Technical consider-ations | ◆Handling<br>1. There is a case that a characteristic varies with magnetic influence.<br>◆Mechanical considerations<br>1. There is a case to be damaged by a mechanical shock.<br>2. LH type<br>There is a case to be broken by a fall.<br>◆Packing<br>1. There is a case that a lead wire could be deformed by a fall or an excessive shock. |

| 7. Storage conditions | |
|---|---|
| Precautions | ◆Storage<br>1. 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.<br>Recommended conditions<br>・Ambient temperature 0～40℃<br>・Humidity Below 70% RH<br>The ambient temperature must be kept below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, inductors should be used within one year from the time of delivery.<br>In case of storage over 6 months, solderability shall be checked before actual usage. |
| Technical consider-ations | ◆Storage<br>1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. |

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# RADIAL LEADED INDUCTORS

WAVE

## FEATURES

- The LHL08~LHL16 series radial inductors are encapsulated in a resin housing which adds to the stability of the mounted part on a printed circuit board.
- The LHL08/LHL10/LHL13/LHL16 series are for high current applications.
- The LHLP10/LHLP12/LHLP16 series are shielded type for high current applications.
- LHLP10 series is also available in packaging.
- LHLC08/LHLC10 series which are encapsulated in a resin housing, are radial leaded inductor for high current applications.

## APPLICATIONS

- Ideal for use as a power choke coil in general household appliances (TVS, PDPTV, LCDTV, DVD, etc) and industrial equipment.
- Can also be used as a peaking coil in filtering applications.
- For DC/DC converter (LCD TV, PDP TV, CTV, DVD etc.) (LHLC Series)

## OPERATING TEMP.

- −25℃~105℃ (Including self-generated heat)

## ORDERING CODE

L H △ L △ 0 8 T B 1 0 1 K ○ ○ ○

❶ ❷ ❸ ❹ ❺ ❻ ❼

| ❶Type | |
|---|---|
| LH | Radial leaded inductor |

| ❷Configuration | |
|---|---|
| L△ | Standard type Taping available |
| LP | Shielded type Bulk |
| LC | High current type |

△=Blank space

| ❸External dimensions (mm max) | |
|---|---|
| 08 | 9.0 |
| 10 | 11.0 |
| 12 | 13.0 |
| 13 | 14.0 |
| 16 | 17.0 |

| ❹Packaging Code | |
|---|---|
| NB | Bulk (LHL) |
| TB | Ammo packaging (LHL) |

| ❺Nominal Inductance (μH) | |
|---|---|
| example | |
| 1R0 | 1.0 |
| 150 | 15 |
| 102 | 1000 |

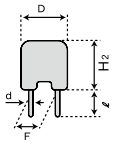
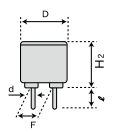
※R=Decimal point

| ❻Inductance Tolerances (%) | |
|---|---|
| J | ±5 |
| K | ±10 |
| M | ±20 |
| N | ±30 |

| ❼Internal code | |
|---|---|
| △△△ | Standard product |

△=Blank space

## EXTERNAL DIMENSIONS/STANDARD QUANTITY

| Type | Fig. | D | $H_2$ | ℓ | F | φd | Standard Quantity (pcs) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Box | Bulk | Taped |
| LHL08 |  | 9.0 max. (0.354 max.) | 9.5 max. (0.374 max.) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) | — | 100 | 1000 |
| LHL10 | | 11.0 max. (0.433 max.) | 14.0 max. (0.551 max.) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) | — | 50 | 500 |
| LHL13 | | 14.0 max. (0.551 max.) | 17.0 max. (0.669 max.) | 5.0±1.0 (0.197±0.039) | 7.5±1.0 (0.295±0.039) | 0.8±0.05 (0.031±0.002) | — | 25 | 500 |
| LHL16 | | 17.0 max. (0.669 max.) | 21.0 max. (0.827 max.) | 5.0±1.0 (0.197±0.039) | 7.5±1.0 (0.295±0.039) | 0.8±0.05 (0.031±0.002) | 500 | — | 250 |
| LHLP10 |  | 11.0 max. (0.433 max.) | 11.0 max. (0.433 max.) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.004) | 500 | — | 200 |
| LHLP12 | | 13.0 max. (0.512 max.) | 16.0 max. (0.624 max.) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.004) | 300 | — | — |
| LHLP16 | | 17.0 max. (0.669 max.) | 19.0 max. (0.741 max.) | 5.0±1.0 (0.197±0.039) | 7.5±1.0 (0.295±0.039) | 0.8±0.05 (0.031±0.004) | 200 | — | — |

Unit : mm (inch)

【LH type】

| Type | Fig. | D | $H_2$ | ℓ | F | φd | Standard Quantity (pcs) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Bulk | Taped |
| LHLC08 |  | 9.0max (0.354max) | 9.5max (0.374max) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) | 100 | 1000 |
| LHLC10 | | 11.0max (0.433max) | 14.0max (0.551max) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) | 50 | 500 |

Unit : mm (inch)

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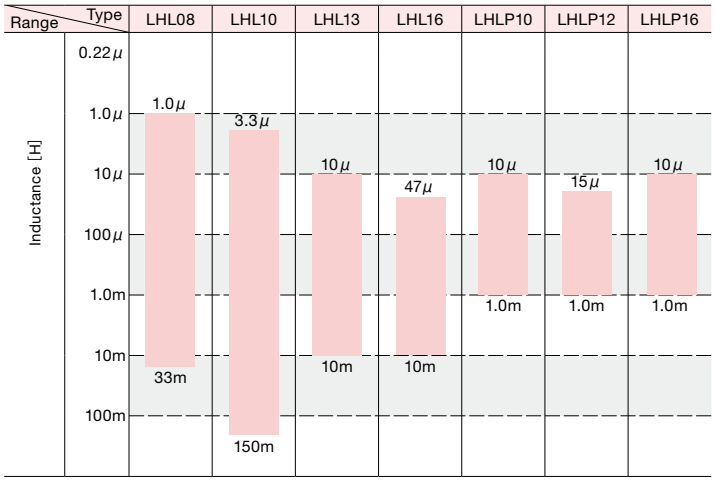
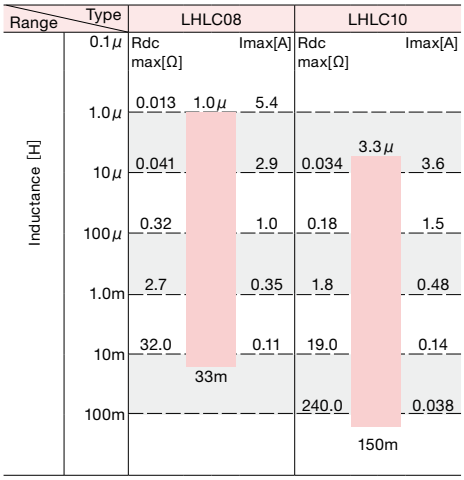
## AVAILABLE INDUCTANCE RANGE




## PART NUMBERS

●LHL08

| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [A] (max.) | Measuring frequency [MHz] |
|---|---|---|---|---|---|---|---|---|---|
| LHL08□1R0N | | RoHS | 1.0 | ±30% | | 76 | 0.013 | 4.7 | |
| LHL08□1R5M | | RoHS | 1.5 | | | 65 | 0.014 | 4.4 | |
| LHL08□2R2M | | RoHS | 2.2 | | | 56 | 0.017 | 4.1 | |
| LHL08□2R7M | | RoHS | 2.7 | | | 48 | 0.019 | 3.5 | |
| LHL08□3R3M | | RoHS | 3.3 | | | 41 | 0.021 | 3.2 | |
| LHL08□3R9M | | RoHS | 3.9 | ±20% | 40 | 33 | 0.024 | 3.1 | 7.96 |
| LHL08□4R7M | | RoHS | 4.7 | | | 30 | 0.025 | 3.0 | |
| LHL08□5R6M | | RoHS | 5.6 | | | 23 | 0.028 | 2.9 | |
| LHL08□6R8M | | RoHS | 6.8 | | | 21 | 0.030 | 2.8 | |
| LHL08□8R2M | | RoHS | 8.2 | | | 19 | 0.034 | 2.5 | |
| LHL08□100K | | RoHS | 10 | | 65 | 17 | 0.041 | 2.4 | |
| LHL08□120K | | RoHS | 12 | | | 16 | 0.044 | 2.3 | |
| LHL08□150K | | RoHS | 15 | | | 13 | 0.053 | 2.0 | |
| LHL08□180K | | RoHS | 18 | | 50 | 12 | 0.060 | 1.9 | |
| LHL08□220K | | RoHS | 22 | | | 11 | 0.068 | 1.8 | |
| LHL08□270K | | RoHS | 27 | | | 10 | 0.091 | 1.5 | |
| LHL08□330K | | RoHS | 33 | | | 8.8 | 0.10 | 1.4 | 2.52 |
| LHL08□390K | | RoHS | 39 | | 40 | 8.4 | 0.12 | 1.3 | |
| LHL08□470K | | RoHS | 47 | | | 8.2 | 0.15 | 1.2 | |
| LHL08□560K | | RoHS | 56 | | | 7.9 | 0.17 | 1.1 | |
| LHL08□680K | | RoHS | 68 | | 35 | 7.0 | 0.20 | 1.0 | |
| LHL08□820K | | RoHS | 82 | ±10% | | 6.5 | 0.22 | 0.90 | |
| LHL08□101K | | RoHS | 100 | | 25 | 5.7 | 0.32 | 0.79 | |
| LHL08□121K | | RoHS | 120 | | | 5.2 | 0.36 | 0.70 | |
| LHL08□151K | | RoHS | 150 | | 20 | 4.7 | 0.41 | 0.64 | |
| LHL08□181K | | RoHS | 180 | | 35 | 4.2 | 0.66 | 0.60 | |
| LHL08□221K | | RoHS | 220 | | | 3.7 | 0.73 | 0.53 | |
| LHL08□271K | | RoHS | 270 | | 25 | 3.5 | 0.85 | 0.51 | 0.796 |
| LHL08□331K | | RoHS | 330 | | | 3.2 | 0.97 | 0.44 | |
| LHL08□391K | | RoHS | 390 | | 20 | 2.9 | 1.1 | 0.41 | |
| LHL08□471K | | RoHS | 470 | | 25 | 2.4 | 1.3 | 0.38 | |
| LHL08□561K | | RoHS | 560 | | | 2.2 | 1.5 | 0.35 | |
| LHL08□681K | | RoHS | 680 | | | 2.0 | 1.8 | 0.32 | |
| LHL08□821K | | RoHS | 820 | | 30 | 1.6 | 2.3 | 0.30 | |
| LHL08□102J | | RoHS | 1000 | | 55 | 1.5 | 2.7 | 0.25 | |
| LHL08□122J | | RoHS | 1200 | | 45 | 1.4 | 3.2 | 0.22 | |
| LHL08□152J | | RoHS | 1500 | | 55 | 1.3 | 4.1 | 0.20 | |
| LHL08□182J | | RoHS | 1800 | | | 1.2 | 4.8 | 0.19 | |
| LHL08□222J | | RoHS | 2200 | | | 1.1 | 5.6 | 0.16 | |
| LHL08□272J | | RoHS | 2700 | | | 1.0 | 7.5 | 0.15 | 0.252 |
| LHL08□332J | | RoHS | 3300 | | | 0.85 | 8.5 | 0.14 | |
| LHL08□392J | | RoHS | 3900 | | | 0.78 | 9.7 | 0.11 | |
| LHL08□472J | | RoHS | 4700 | | 65 | 0.68 | 14 | 0.10 | |
| LHL08□562J | | RoHS | 5600 | ±5% | | 0.62 | 16 | 0.093 | |
| LHL08□682J | | RoHS | 6800 | | | 0.61 | 18 | 0.092 | |
| LHL08□822J | | RoHS | 8200 | | | 0.60 | 20 | 0.084 | |
| LHL08□103J | | RoHS | 10000 | | 60 | 0.48 | 32 | 0.070 | |
| LHL08□123J | | RoHS | 12000 | | | 0.44 | 36 | 0.064 | |
| LHL08□153J | | RoHS | 15000 | | | 0.35 | 62 | 0.051 | |
| LHL08□183J | | RoHS | 18000 | | | 0.30 | 72 | 0.048 | L:1kHz Q:0.0796 |
| LHL08□223J | | RoHS | 22000 | | | 0.28 | 82 | 0.044 | |
| LHL08□273J | | RoHS | 27000 | | | 0.25 | 90 | 0.042 | |
| LHL08□333J | | RoHS | 33000 | | | 0.23 | 100 | 0.040 | |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

## PART NUMBERS

### LHL10

| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [A] (max.) | Measuring frequency [MHz] |
|---|---|---|---|---|---|---|---|---|---|
| LHL10□3R3M | | RoHS | 3.3 | ±20% | 50 | 46 | 0.019 | 4.2 | 7.96 |
| LHL10□3R9M | | RoHS | 3.9 | | | 40 | 0.022 | 4.1 | |
| LHL10□4R7M | | RoHS | 4.7 | | | 38 | 0.024 | 4.0 | |
| LHL10□5R6M | | RoHS | 5.6 | | | 34 | 0.025 | 3.8 | |
| LHL10□6R8M | | RoHS | 6.8 | | | 30 | 0.028 | 3.4 | |
| LHL10□8R2M | | RoHS | 8.2 | | | 24 | 0.031 | 3.3 | |
| LHL10□100K | | RoHS | 10 | ±10% | 90 | 19 | 0.034 | 3.2 | 2.52 |
| LHL10□120K | | RoHS | 12 | | | 16 | 0.038 | 2.8 | |
| LHL10□150K | | RoHS | 15 | | | 12 | 0.042 | 2.6 | |
| LHL10□180K | | RoHS | 18 | | | 9.2 | 0.046 | 2.4 | |
| LHL10□220K | | RoHS | 22 | | 60 | 8.6 | 0.061 | 2.1 | |
| LHL10□270K | | RoHS | 27 | | | 7.1 | 0.069 | 2.0 | |
| LHL10□330K | | RoHS | 33 | | | 6.8 | 0.078 | 1.9 | |
| LHL10□390K | | RoHS | 39 | | | 6.7 | 0.085 | 1.8 | |
| LHL10□470K | | RoHS | 47 | | 50 | 6.2 | 0.093 | 1.7 | |
| LHL10□560K | | RoHS | 56 | | | 5.2 | 0.10 | 1.6 | |
| LHL10□680K | | RoHS | 68 | | 40 | 4.9 | 0.12 | 1.5 | |
| LHL10□820K | | RoHS | 82 | | | 4.7 | 0.13 | 1.4 | |
| LHL10□3R3M | | RoHS | 3.3 | ±20% | 50 | 46 | 0.019 | 4.2 | 7.96 |
| LHL10□3R9M | | RoHS | 3.9 | | | 40 | 0.022 | 4.1 | |
| LHL10□4R7M | | RoHS | 4.7 | | | 38 | 0.024 | 4.0 | |
| LHL10□5R6M | | RoHS | 5.6 | | | 34 | 0.025 | 3.8 | |
| LHL10□6R8M | | RoHS | 6.8 | | | 30 | 0.028 | 3.4 | |
| LHL10□8R2M | | RoHS | 8.2 | | | 24 | 0.031 | 3.3 | |
| LHL10□100K | | RoHS | 10 | ±10% | 90 | 19 | 0.034 | 3.2 | 2.52 |
| LHL10□120K | | RoHS | 12 | | | 16 | 0.038 | 2.8 | |
| LHL10□150K | | RoHS | 15 | | | 12 | 0.042 | 2.6 | |
| LHL10□180K | | RoHS | 18 | | | 9.2 | 0.046 | 2.4 | |
| LHL10□220K | | RoHS | 22 | | 60 | 8.6 | 0.061 | 2.1 | |
| LHL10□270K | | RoHS | 27 | | | 7.1 | 0.069 | 2.0 | |
| LHL10□330K | | RoHS | 33 | | | 6.8 | 0.078 | 1.9 | |
| LHL10□390K | | RoHS | 39 | | | 6.7 | 0.085 | 1.8 | |
| LHL10□470K | | RoHS | 47 | | 50 | 6.2 | 0.093 | 1.7 | |
| LHL10□560K | | RoHS | 56 | | | 5.2 | 0.10 | 1.6 | |
| LHL10□680K | | RoHS | 68 | | 40 | 4.9 | 0.12 | 1.5 | |
| LHL10□820K | | RoHS | 82 | | | 4.7 | 0.13 | 1.4 | |
| LHL10□101K | | RoHS | 100 | ±10% | 40 | 3.8 | 0.18 | 1.2 | 0.796 |
| LHL10□121K | | RoHS | 120 | | | 3.2 | 0.25 | 1.0 | |
| LHL10□151K | | RoHS | 150 | | | 2.9 | 0.29 | 0.95 | |
| LHL10□181K | | RoHS | 180 | | | 2.6 | 0.40 | 0.80 | |
| LHL10□221K | | RoHS | 220 | | | 2.3 | 0.44 | 0.75 | |
| LHL10□271K | | RoHS | 270 | | 30 | 2.1 | 0.50 | 0.70 | |
| LHL10□331K | | RoHS | 330 | | | 2.0 | 0.56 | 0.68 | |
| LHL10□391K | | RoHS | 390 | | | 1.8 | 0.62 | 0.63 | |
| LHL10□471K | | RoHS | 470 | | | 1.7 | 0.84 | 0.57 | |
| LHL10□561K | | RoHS | 560 | | | 1.5 | 0.93 | 0.52 | |
| LHL10□681K | | RoHS | 680 | | | 1.4 | 1.0 | 0.48 | |
| LHL10□821K | | RoHS | 820 | | | 1.3 | 1.4 | 0.42 | |
| LHL10□102J | | RoHS | 1000 | ±5% | 50 | 1.2 | 1.8 | 0.41 | 0.252 |
| LHL10□122J | | RoHS | 1200 | | | 0.87 | 2.3 | 0.33 | |
| LHL10□152J | | RoHS | 1500 | | | 0.83 | 2.7 | 0.30 | |
| LHL10□182J | | RoHS | 1800 | | | 0.75 | 3.0 | 0.29 | |
| LHL10□222J | | RoHS | 2200 | | | 0.70 | 3.9 | 0.25 | |
| LHL10□272J | | RoHS | 2700 | | | 0.67 | 4.3 | 0.24 | |
| LHL10□332J | | RoHS | 3300 | | | 0.56 | 5.8 | 0.21 | |
| LHL10□392J | | RoHS | 3900 | | | 0.54 | 6.4 | 0.20 | |
| LHL10□472J | | RoHS | 4700 | | | 0.49 | 7.1 | 0.19 | |
| LHL10□562J | | RoHS | 5600 | | | 0.41 | 9.0 | 0.17 | |
| LHL10□682J | | RoHS | 6800 | | | 0.38 | 10 | 0.16 | |
| LHL10□822J | | RoHS | 8200 | | | 0.36 | 12 | 0.15 | |
| LHL10□103J | | RoHS | 10000 | | 60 | 0.29 | 19 | 0.12 | L:1kHz Q:0.0796 |
| LHL10□123J | | RoHS | 12000 | | | 0.27 | 21 | 0.11 | |
| LHL10□153J | | RoHS | 15000 | | | 0.24 | 34 | 0.090 | |
| LHL10□183J | | RoHS | 18000 | | | 0.21 | 38 | 0.081 | |
| LHL10□223J | | RoHS | 22000 | | | 0.20 | 43 | 0.075 | |
| LHL10□273J | | RoHS | 27000 | | 40 | 0.15 | 67 | 0.060 | |
| LHL10□333J | | RoHS | 33000 | | | 0.14 | 76 | 0.056 | |
| LHL10□393J | | RoHS | 39000 | | | 0.13 | 84 | 0.053 | |
| LHL10□473J | | RoHS | 47000 | | | 0.12 | 96 | 0.050 | |
| LHL10□563J | | RoHS | 56000 | | 30 | 0.10 | 170 | 0.036 | |
| LHL10□683J | | RoHS | 68000 | | | 0.095 | 200 | 0.035 | |
| LHL10□823J | | RoHS | 82000 | | | 0.088 | 210 | 0.033 | |
| LHL10□104J | | RoHS | 100000 | | | 0.085 | 240 | 0.031 | L:1kHz Q:0.0252 |
| LHL10□124J | | RoHS | 120000 | | | 0.070 | 260 | 0.030 | |
| LHL10□154J | | RoHS | 150000 | | | 0.069 | 300 | 0.028 | |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

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## PART NUMBERS

### LHL13

| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [A] (max.) | Measuring frequency [MHz] |
|---|---|---|---|---|---|---|---|---|---|
| LHL13□100K | | RoHS | 10 | ±10% | 140 | 19 | 0.023 | 4.5 | 2.52 |
| LHL13□150K | | RoHS | 15 | | | 12 | 0.028 | 4.0 | |
| LHL13□220K | | RoHS | 22 | | 100 | 7.6 | 0.035 | 3.4 | |
| LHL13□330K | | RoHS | 33 | | | 6.9 | 0.043 | 3.2 | |
| LHL13□470K | | RoHS | 47 | | 70 | 5.6 | 0.052 | 2.8 | |
| LHL13□680K | | RoHS | 68 | | 50 | 4.4 | 0.070 | 2.4 | |
| LHL13□101K | | RoHS | 100 | | | 3.3 | 0.12 | 2.0 | 0.796 |
| LHL13□151K | | RoHS | 150 | | | 2.6 | 0.19 | 1.5 | |
| LHL13□221K | | RoHS | 220 | | 40 | 2.2 | 0.23 | 1.3 | |
| LHL13□331K | | RoHS | 330 | | 30 | 1.8 | 0.35 | 1.1 | |
| LHL13□471K | | RoHS | 470 | | | 1.5 | 0.43 | 0.90 | |
| LHL13□681K | | RoHS | 680 | | | 1.2 | 0.61 | 0.80 | |
| LHL13□102J | | RoHS | 1000 | ±5% | | 1.0 | 1.2 | 0.60 | 0.252 |
| LHL13□152J | | RoHS | 1500 | | 40 | 0.83 | 1.8 | 0.45 | |
| LHL13□222J | | RoHS | 2200 | | | 0.70 | 2.2 | 0.40 | |
| LHL13□332J | | RoHS | 3300 | | | 0.60 | 3.4 | 0.33 | |
| LHL13□472J | | RoHS | 4700 | | | 0.43 | 4.7 | 0.28 | |
| LHL13□682J | | RoHS | 6800 | | 30 | 0.38 | 5.6 | 0.25 | |
| LHL13□103J | | RoHS | 10000 | | 70 | 0.30 | 10 | 0.19 | L:1kHz Q:0.0796MHz |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

### LHL16

| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [A] (max.) | Measuring frequency [MHz] |
|---|---|---|---|---|---|---|---|---|---|
| LHL16□470K | | RoHS | 47 | ±10% | 70 | 4.5 | 0.046 | 3.7 | 2.52 |
| LHL16□680K | | RoHS | 68 | | | 3.9 | 0.054 | 3.3 | |
| LHL16□101K | | RoHS | 100 | | 60 | 2.7 | 0.077 | 2.9 | 0.796 |
| LHL16□151K | | RoHS | 150 | | | 2.3 | 0.11 | 2.4 | |
| LHL16□221K | | RoHS | 220 | | | 1.9 | 0.15 | 2.0 | |
| LHL16□331K | | RoHS | 330 | | 40 | 1.6 | 0.21 | 1.5 | |
| LHL16□471K | | RoHS | 470 | | 30 | 1.4 | 0.28 | 1.3 | |
| LHL16□681K | | RoHS | 680 | | | 1.2 | 0.35 | 1.1 | |
| LHL16□102J | | RoHS | 1000 | ±5% | 20 | 0.84 | 0.74 | 0.86 | 0.252 |
| LHL16□152J | | RoHS | 1500 | | | 0.69 | 0.93 | 0.75 | |
| LHL16□222J | | RoHS | 2200 | | | 0.56 | 1.4 | 0.60 | |
| LHL16□332J | | RoHS | 3300 | | | 0.49 | 2.2 | 0.50 | |
| LHL16□472J | | RoHS | 4700 | | | 0.41 | 2.6 | 0.40 | |
| LHL16□682J | | RoHS | 6800 | | | 0.35 | 3.9 | 0.33 | |
| LHL16□103J | | RoHS | 10000 | | 70 | 0.26 | 7.3 | 0.25 | L:1KHz Q:0.0796MHz |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

### LHLP10

| Ordering code | | EHS (Environmental Hazardous Substances) | Nominal Inductance [μH] | L Measuring frequency | Inductance Tolerance | DC Resistance [Ω] (max.) | Rated current [A] (max.) |
|---|---|---|---|---|---|---|---|
| LHLP10□100M | | RoHS | 10 | 2.52 | ±20% | 0.038 | 2.5 |
| LHLP10□150M | | RoHS | 15 | | | 0.049 | 2.2 |
| LHLP10□220M | | RoHS | 22 | | | 0.075 | 1.9 |
| LHLP10□330M | | RoHS | 33 | | | 0.094 | 1.7 |
| LHLP10□470M | | RoHS | 47 | | | 0.15 | 1.3 |
| LHLP10□680M | | RoHS | 68 | | | 0.23 | 1.0 |
| LHLP10□101K | | RoHS | 100 | 0.796 | ±10% | 0.30 | 0.90 |
| LHLP10□151K | | RoHS | 150 | | | 0.47 | 0.78 |
| LHLP10□221K | | RoHS | 220 | | | 0.70 | 0.63 |
| LHLP10□331K | | RoHS | 330 | | | 0.88 | 0.58 |
| LHLP10□471K | | RoHS | 470 | | | 1.3 | 0.46 |
| LHLP10□681K | | RoHS | 680 | | | 1.9 | 0.38 |
| LHLP10□102K | | RoHS | 1000 | 0.252 | | 3.2 | 0.30 |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

### LHLP12NB

| Ordering code | | EHS (Environmental Hazardous Substances) | Nominal Inductance [μH] | L Measuring frequency | Inductance Tolerance | DC Resistance [Ω] (max.) | Rated current [A] (max.) |
|---|---|---|---|---|---|---|---|
| LHLP12NB150M | | RoHS | 15 | 2.52 | ±20% | 0.035 | 3.3 |
| LHLP12NB220M | | RoHS | 22 | | | 0.050 | 2.7 |
| LHLP12NB330M | | RoHS | 33 | | | 0.070 | 2.4 |
| LHLP12NB470M | | RoHS | 47 | | | 0.081 | 2.1 |
| LHLP12NB680M | | RoHS | 68 | | | 0.12 | 1.7 |
| LHLP12NB101K | | RoHS | 100 | 0.796 | ±10% | 0.16 | 1.6 |
| LHLP12NB151K | | RoHS | 150 | | | 0.24 | 1.3 |
| LHLP12NB221K | | RoHS | 220 | | | 0.38 | 0.95 |
| LHLP12NB331K | | RoHS | 330 | | | 0.46 | 0.89 |
| LHLP12NB471K | | RoHS | 470 | | | 0.69 | 0.74 |
| LHLP12NB681K | | RoHS | 680 | | | 1.1 | 0.58 |
| LHLP12NB102K | | RoHS | 1000 | 0.252 | | 1.8 | 0.46 |

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## PART NUMBERS

### ●LHLP16NB

| Ordering code | | EHS (Environmental Hazardous Substances) | Nominal Inductance [μH] | L Measuring frequency | Inductance Tolerance | DC Resistance [Ω] (max.) | Rated current 〔A〕(max.) |
|---|---|---|---|---|---|---|---|
| LHLP16NB100M | | RoHS | 10 | 1kHz | ±20% | 0.019 | 5.2 |
| LHLP16NB150M | | RoHS | 15 | | | 0.025 | 5.1 |
| LHLP16NB220M | | RoHS | 22 | | | 0.027 | 4.6 |
| LHLP16NB330M | | RoHS | 33 | | | 0.035 | 4.0 |
| LHLP16NB470K | | RoHS | 47 | | ±10% | 0.045 | 3.4 |
| LHLP16NB680K | | RoHS | 68 | | | 0.062 | 3.1 |
| LHLP16NB101K | | RoHS | 100 | | | 0.091 | 2.3 |
| LHLP16NB151K | | RoHS | 150 | | | 0.14 | 1.9 |
| LHLP16NB221K | | RoHS | 220 | | | 0.20 | 1.5 |
| LHLP16NB331K | | RoHS | 330 | | | 0.31 | 1.3 |
| LHLP16NB471K | | RoHS | 470 | | | 0.47 | 1.0 |
| LHLP16NB681K | | RoHS | 680 | | | 0.58 | 0.98 |
| LHLP16NB102K | | RoHS | 1000 | | | 0.94 | 0.74 |

### ●LHLC08

| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency 〔MHz〕(min.) | DC Resistance [Ω] (max.) | Rated current 〔A〕(max.) | Measuring frequency 〔MHz〕 |
|---|---|---|---|---|---|---|---|---|---|
| LH LC08□□1R0N | | RoHS | 1.0 | ±30% | 40 | 76 | 0.013 | 5.4 | 7.96 |
| LH LC08□□1R5M | | RoHS | 1.5 | ±20% | | 65 | 0.014 | 5.2 | |
| LH LC08□□2R2M | | RoHS | 2.2 | | | 56 | 0.017 | 4.8 | |
| LH LC08□□2R7M | | RoHS | 2.7 | | | 48 | 0.019 | 4.2 | |
| LH LC08□□3R3M | | RoHS | 3.3 | | | 41 | 0.021 | 3.8 | |
| LH LC08□□3R9M | | RoHS | 3.9 | | | 33 | 0.024 | 3.7 | |
| LH LC08□□4R7M | | RoHS | 4.7 | | | 30 | 0.025 | 3.6 | |
| LH LC08□□5R6M | | RoHS | 5.6 | | | 23 | 0.028 | 3.5 | |
| LH LC08□□6R8M | | RoHS | 6.8 | | | 21 | 0.030 | 3.4 | |
| LH LC08□□8R2M | | RoHS | 8.2 | | | 19 | 0.034 | 3.0 | |
| LH LC08□□100K | | RoHS | 10 | ±10% | 65 | 17 | 0.041 | 2.9 | 2.52 |
| LH LC08□□120K | | RoHS | 12 | | | 16 | 0.044 | 2.8 | |
| LH LC08□□150K | | RoHS | 15 | | 50 | 13 | 0.053 | 2.6 | |
| LH LC08□□180K | | RoHS | 18 | | | 12 | 0.060 | 2.4 | |
| LH LC08□□220K | | RoHS | 22 | | | 11 | 0.068 | 2.3 | |
| LH LC08□□270K | | RoHS | 27 | ±10% | 50 | 10 | 0.091 | 2.0 | 2.52 |
| LH LC08□□330K | | RoHS | 33 | | 40 | 8.8 | 0.10 | 1.9 | |
| LH LC08□□390K | | RoHS | 39 | | | 8.4 | 0.12 | 1.7 | |
| LH LC08□□470K | | RoHS | 47 | | | 8.2 | 0.15 | 1.5 | |
| LH LC08□□560K | | RoHS | 56 | | | 7.9 | 0.17 | 1.4 | |
| LH LC08□□680K | | RoHS | 68 | | 35 | 7.0 | 0.20 | 1.3 | |
| LH LC08□□820K | | RoHS | 82 | | | 6.5 | 0.22 | 1.2 | |
| LH LC08□□101K | | RoHS | 100 | | 25 | 5.7 | 0.32 | 1.0 | 0.796 |
| LH LC08□□121K | | RoHS | 120 | | | 5.2 | 0.36 | 0.96 | |
| LH LC08□□151K | | RoHS | 150 | | 20 | 4.7 | 0.41 | 0.88 | |
| LH LC08□□181K | | RoHS | 180 | | 35 | 4.2 | 0.66 | 0.71 | |
| LH LC08□□221K | | RoHS | 220 | | | 3.7 | 0.73 | 0.66 | |
| LH LC08□□271K | | RoHS | 270 | | 25 | 3.5 | 0.85 | 0.63 | |
| LH LC08□□331K | | RoHS | 330 | | | 3.2 | 0.97 | 0.59 | |
| LH LC08□□391K | | RoHS | 390 | | 20 | 2.9 | 1.1 | 0.55 | |
| LH LC08□□471K | | RoHS | 470 | | 25 | 2.4 | 1.3 | 0.49 | |
| LH LC08□□561K | | RoHS | 560 | | | 2.2 | 1.5 | 0.47 | |
| LH LC08□□681K | | RoHS | 680 | | | 2.0 | 1.8 | 0.44 | |
| LH LC08□□821K | | RoHS | 820 | | 30 | 1.6 | 2.3 | 0.38 | |
| LH LC08□□102J | | RoHS | 1000 | ±5% | 55 | 1.5 | 2.7 | 0.35 | 0.252 |
| LH LC08□□122J | | RoHS | 1200 | | 45 | 1.4 | 3.2 | 0.31 | |
| LH LC08□□152J | | RoHS | 1500 | | 55 | 1.3 | 4.1 | 0.29 | |
| LH LC08□□182J | | RoHS | 1800 | | | 1.2 | 4.8 | 0.26 | |
| LH LC08□□222J | | RoHS | 2200 | | | 1.1 | 5.6 | 0.23 | |
| LH LC08□□272J | | RoHS | 2700 | | | 1.0 | 7.5 | 0.21 | |
| LH LC08□□332J | | RoHS | 3300 | | | 0.85 | 8.5 | 0.19 | |
| LH LC08□□392J | | RoHS | 3900 | | | 0.78 | 9.7 | 0.18 | |
| LH LC08□□472J | | RoHS | 4700 | | 65 | 0.68 | 14 | 0.16 | |
| LH LC08□□562J | | RoHS | 5600 | | | 0.62 | 16 | 0.15 | |
| LH LC08□□682J | | RoHS | 6800 | | | 0.61 | 18 | 0.14 | |
| LH LC08□□822J | | RoHS | 8200 | | | 0.60 | 20 | 0.13 | |
| LH LC08□□103J | | RoHS | 10000 | | 60 | 0.48 | 32 | 0.11 | L:1kHz Q:0.0796 |
| LH LC08□□123J | | RoHS | 12000 | | | 0.44 | 36 | 0.084 | |
| LH LC08□□153J | | RoHS | 15000 | | | 0.35 | 62 | 0.068 | |
| LH LC08□□183J | | RoHS | 18000 | | | 0.30 | 72 | 0.066 | |
| LH LC08□□223J | | RoHS | 22000 | | | 0.28 | 82 | 0.057 | |
| LH LC08□□273J | | RoHS | 27000 | | | 0.25 | 90 | 0.054 | |
| LH LC08□□333J | | RoHS | 33000 | | | 0.23 | 100 | 0.053 | |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)

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## PART NUMBERS

### LHLC10

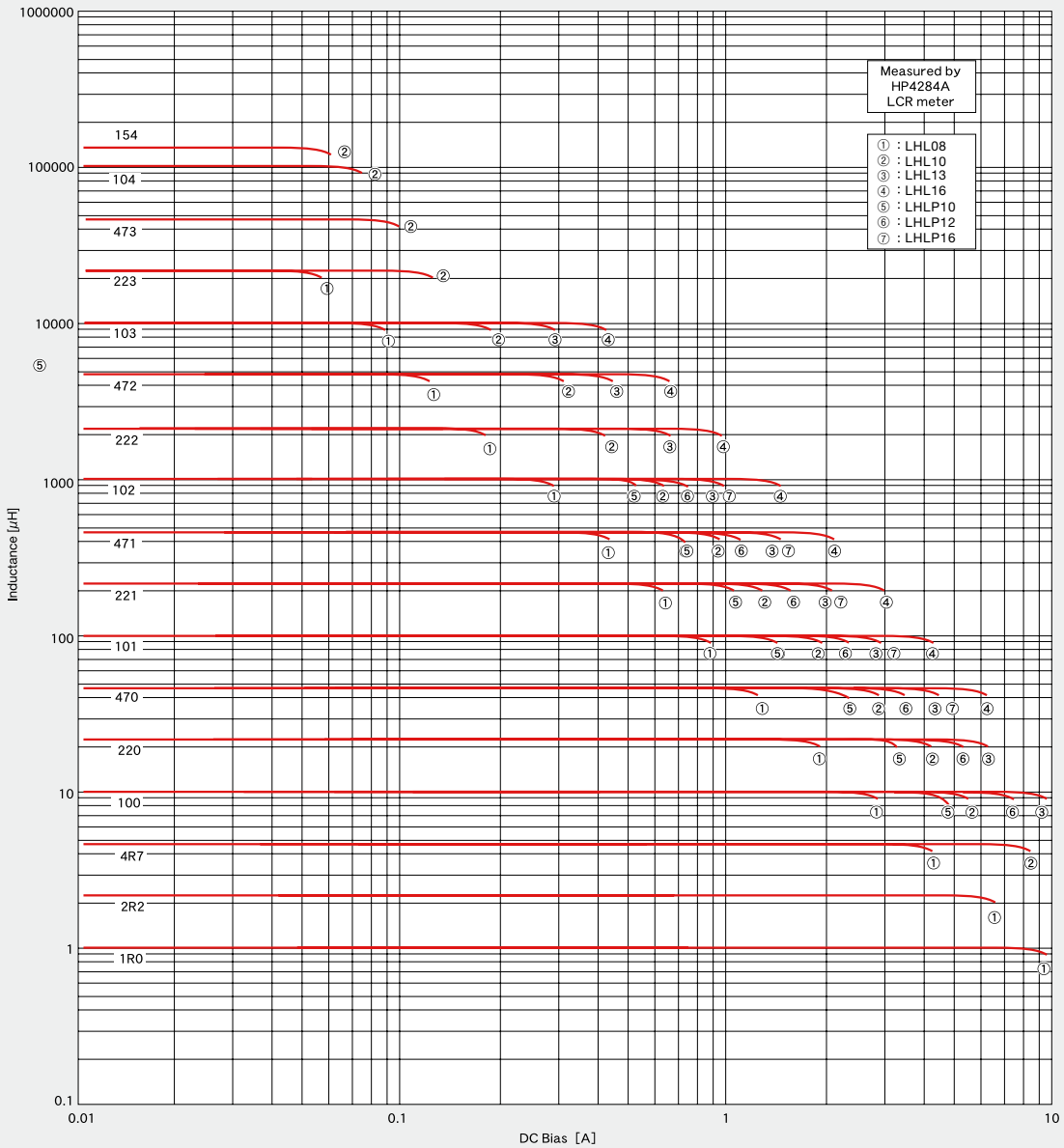
| Ordering code | | EHS (Environmental Hazardous Substances) | Inductance [μH] | Inductance Tolerance | Q (min.) | Self-resonant frequency [MHz] (min.) | DC Resistance [Ω] (max.) | Rated current [A] (max.) | Measuring frequency [MHz] |
|---|---|---|---|---|---|---|---|---|---|
| LH LC10□□3R3M | | RoHS | 3.3 | ±20% | 50 | 46 | 0.019 | 5.0 | 7.96 |
| LH LC10□□3R9M | | RoHS | 3.9 | | | 40 | 0.022 | 4.8 | |
| LH LC10□□4R7M | | RoHS | 4.7 | | | 38 | 0.024 | 4.7 | |
| LH LC10□□5R6M | | RoHS | 5.6 | | | 34 | 0.025 | 4.5 | |
| LH LC10□□6R8M | | RoHS | 6.8 | | | 30 | 0.028 | 4.1 | |
| LH LC10□□8R2M | | RoHS | 8.2 | | | 24 | 0.031 | 3.9 | |
| LH LC10□□100K | | RoHS | 10 | ±10% | 90 | 19 | 0.034 | 3.6 | 2.52 |
| LH LC10□□120K | | RoHS | 12 | | | 16 | 0.038 | 3.4 | |
| LH LC10□□150K | | RoHS | 15 | | | 12 | 0.042 | 3.2 | |
| LH LC10□□180K | | RoHS | 18 | | | 9.2 | 0.046 | 3.0 | |
| LH LC10□□220K | | RoHS | 22 | | 60 | 8.6 | 0.061 | 2.8 | |
| LH LC10□□270K | | RoHS | 27 | | | 7.1 | 0.069 | 2.7 | |
| LH LC10□□330K | | RoHS | 33 | | | 6.8 | 0.078 | 2.6 | |
| LH LC10□□390K | | RoHS | 39 | | | 6.7 | 0.085 | 2.4 | |
| LH LC10□□470K | | RoHS | 47 | | 50 | 6.2 | 0.093 | 2.3 | |
| LH LC10□□560K | | RoHS | 56 | | | 5.2 | 0.10 | 2.1 | |
| LH LC10□□680K | | RoHS | 68 | | 40 | 4.6 | 0.12 | 2.0 | |
| LH LC10□□820K | | RoHS | 82 | | | 4.7 | 0.13 | 1.8 | |
| LH LC10□□101K | | RoHS | 100 | | | 3.8 | 0.18 | 1.5 | 0.796 |
| LH LC10□□121K | | RoHS | 120 | | | 3.2 | 0.25 | 1.3 | |
| LH LC10□□151K | | RoHS | 150 | | | 2.9 | 0.29 | 1.2 | |
| LH LC10□□181K | | RoHS | 180 | | | 2.6 | 0.40 | 1.0 | |
| LH LC10□□221K | | RoHS | 220 | | | 2.3 | 0.44 | 0.97 | |
| LH LC10□□271K | | RoHS | 270 | ±10% | 30 | 2.1 | 0.50 | 0.90 | |
| LH LC10□□331K | | RoHS | 330 | | | 2.0 | 0.56 | 0.86 | |
| LH LC10□□391K | | RoHS | 390 | | | 1.8 | 0.62 | 0.75 | |
| LH LC10□□471K | | RoHS | 470 | | | 1.7 | 0.84 | 0.65 | |
| LH LC10□□561K | | RoHS | 560 | | | 1.5 | 0.93 | 0.61 | |
| LH LC10□□681K | | RoHS | 680 | | | 1.4 | 1.0 | 0.57 | |
| LH LC10□□821K | | RoHS | 820 | | | 1.3 | 1.4 | 0.50 | |
| LH LC10□□102J | | RoHS | 1000 | ±5% | 50 | 1.2 | 1.8 | 0.48 | 0.252 |
| LH LC10□□122J | | RoHS | 1200 | | | 0.87 | 2.3 | 0.40 | |
| LH LC10□□152J | | RoHS | 1500 | | | 0.83 | 2.7 | 0.37 | |
| LH LC10□□182J | | RoHS | 1800 | | | 0.75 | 3.0 | 0.36 | |
| LH LC10□□222J | | RoHS | 2200 | | | 0.70 | 3.9 | 0.32 | |
| LH LC10□□272J | | RoHS | 2700 | | | 0.67 | 4.3 | 0.30 | |
| LH LC10□□332J | | RoHS | 3300 | | | 0.56 | 5.8 | 0.26 | |
| LH LC10□□392J | | RoHS | 3900 | | | 0.54 | 6.4 | 0.25 | |
| LH LC10□□472J | | RoHS | 4700 | | | 0.49 | 7.1 | 0.24 | |
| LH LC10□□562J | | RoHS | 5600 | | | 0.41 | 9.0 | 0.21 | |
| LH LC10□□682J | | RoHS | 6800 | | | 0.38 | 10 | 0.20 | |
| LH LC10□□822J | | RoHS | 8200 | | | 0.36 | 12 | 0.18 | |
| LH LC10□□103J | | RoHS | 10000 | | 60 | 0.29 | 19 | 0.14 | L:1kHz Q:0.0796 |
| LH LC10□□123J | | RoHS | 12000 | | | 0.27 | 21 | 0.13 | |
| LH LC10□□153J | | RoHS | 15000 | | | 0.24 | 34 | 0.11 | |
| LH LC10□□183J | | RoHS | 18000 | | | 0.21 | 38 | 0.10 | |
| LH LC10□□223J | | RoHS | 22000 | | | 0.20 | 43 | 0.095 | |
| LH LC10□□273J | | RoHS | 27000 | | 40 | 0.15 | 67 | 0.076 | |
| LH LC10□□333J | | RoHS | 33000 | | | 0.14 | 76 | 0.068 | |
| LH LC10□□393J | | RoHS | 39000 | | | 0.13 | 84 | 0.065 | |
| LH LC10□□473J | | RoHS | 47000 | | | 0.12 | 96 | 0.061 | |
| LH LC10□□563J | | RoHS | 56000 | | 30 | 0.10 | 170 | 0.045 | |
| LH LC10□□683J | | RoHS | 68000 | | | 0.095 | 200 | 0.043 | |
| LH LC10□□823J | | RoHS | 82000 | | | 0.088 | 210 | 0.041 | |
| LH LC10□□104J | | RoHS | 100000 | | | 0.085 | 240 | 0.038 | L:1kHz Q:0.0252 |
| LH LC10□□124J | | RoHS | 120000 | | | 0.070 | 260 | 0.037 | |
| LH LC10□□154J | | RoHS | 150000 | | | 0.069 | 300 | 0.035 | |

□ Please specify the packaging code. (TB: Taping, NB: Bulk)



* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

## DC Bias characteristics

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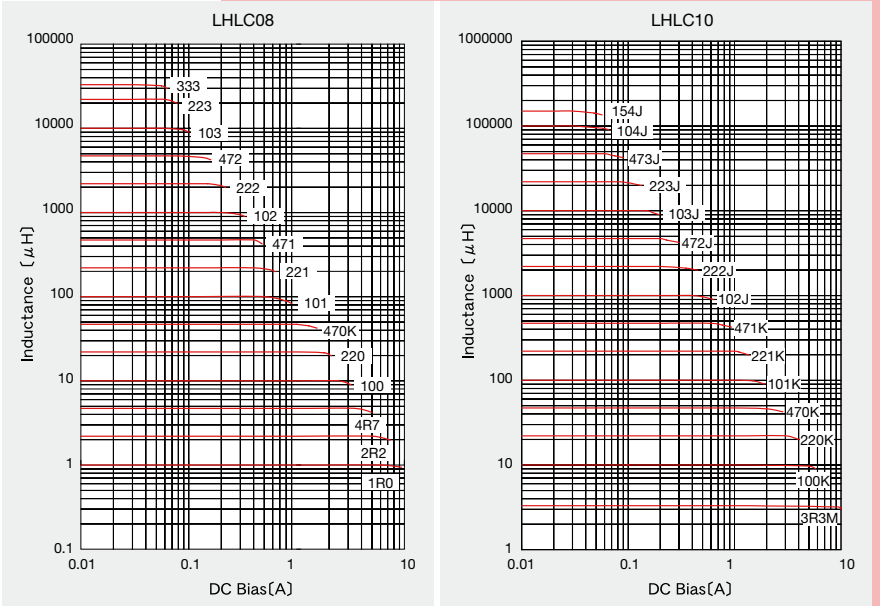
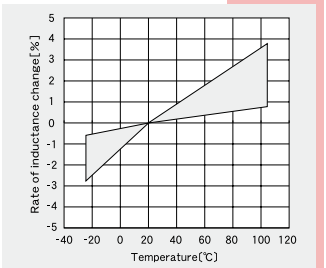
## ELECTRICAL CHARACTERISTICS

### DC Bias characteristics

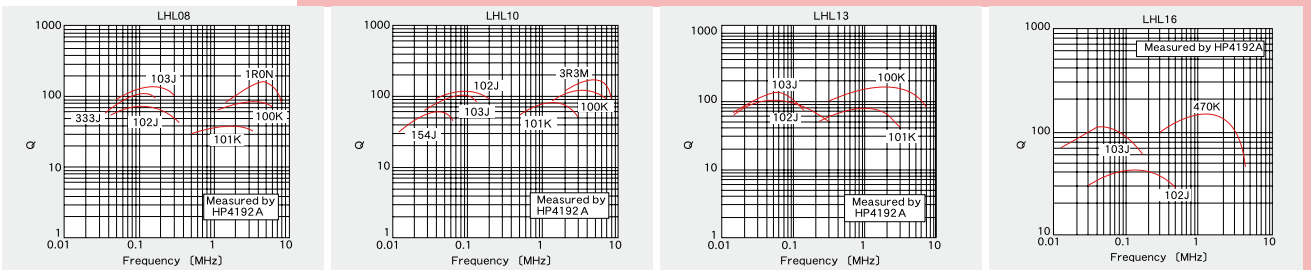
(Measured by HP4284A)




### Temperature characteristics




### Q-vs-Frequency characteristics




* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

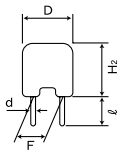
## PACKAGING

### ①Minimum Quantity

| Type (EIA) | Standard quantity (pcs) | | |
|---|---|---|---|
| | Box | Bulk | Taped |
| LHL 08 | — | 100 | 1000 |
| LHL 10 | — | 50 | 500 |
| LHL 13 | — | 25 | 500 |
| LHL 16 | 500 | — | 250 |
| LHLP10 | 500 | — | 200 |
| LHLP12NB | 300 | — | — |
| LHLP16NB | 200 | — | — |
| LHLC08 | — | 100 | 1000 |
| LHLC10 | — | 50 | 500 |

### ②Bulk dimensions

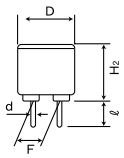
● LHL08～16




| Type | Dimensions | | | | |
|---|---|---|---|---|---|
| | φD(max) | $H_2$(max) | F* | ℓ | φd |
| LHL08 | 9.0 (0.354) | 9.5 (0.374) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) |
| LHL10 | 11.0 (0.433) | 14.0 (0.551) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) |
| LHL13 | 14.0 (0.551) | 17.0 (0.669) | 7.5±1.0 (0.295±0.039) | 5.0±1.0 (0.197±0.039) | 0.8±0.05 (0.031±0.002) |
| LHL16 | 17.0 (0.669) | 21.0 (0.827) | 7.5±1.0 (0.295±0.039) | 5.0±1.0 (0.197±0.039) | 0.8±0.05 (0.031±0.002) |

*Measured at the base of the leads. Unit : mm(inch)

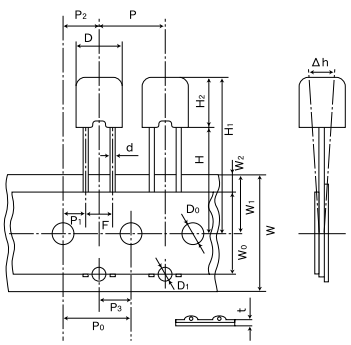
● LHLP10～16




| Type | Dimensions | | | | |
|---|---|---|---|---|---|
| | φD(max) | $H_2$(max) | F* | ℓ | φd |
| LHLP10 | 11.0 (0.433) | 11.0 (0.433) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.004) |
| LHLP12 | 13.0 (0.512) | 16.0 (0.624) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.004) |
| LHLP16 | 17.0 (0.669) | 19.0 (0.741) | 7.5±1.0 (0.295±0.039) | 5.0±1.0 (0.197±0.039) | 0.8±0.05 (0.031±0.004) |

*Measured at the base of the leads. Unit : mm(inch)

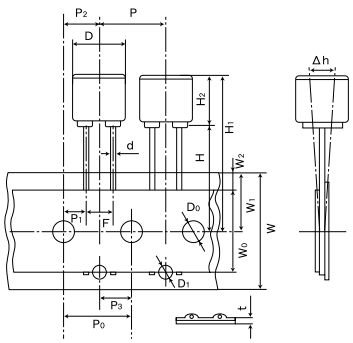
● LHL08～16




| | LHL08 | LHL10 | LHL13 | LHL16 |
|---|---|---|---|---|
| D | φ9.0 max (φ0.354 max) | φ11.0 max (φ0.433 max) | φ14.0 max (φ0.551 max) | φ17.0 max (φ0.669 max) |
| $H_1$ | 30.5 max (1.20 max) | 34.0 max (1.34 max) | 37.0 max (1.46 max) | 41.0 max (1.61 max) |
| H | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) |
| $H_2$ | 9.5 max (0.374 max) | 14.0 max (0.551 max) | 17.0 max (0.669 max) | 21.0 max (0.827 max) |
| P | 12.7±1.0 (0.500±0.039) | 12.7±1.0 (0.500±0.039) | 15.0±1.0 (0.591±0.039) | 30.0±1.0 (1.18±0.039) |
| $P_0$ | 12.7±0.3※1 (0.500±0.012) | 12.7±0.3※1 (0.500±0.012) | 15.0±0.3※1 (0.591±0.012) | 15.0±0.3※1 (0.591±0.012) |
| $P_1$ | 3.85±0.7 (0.152±0.028) | 3.85±0.7 (0.152±0.028) | 3.75±0.7 (0.148±0.028) | 3.75±0.7 (0.148±0.028) |
| $P_2$ | 6.35±1.3 (0.250±0.051) | 6.35±1.3 (0.250±0.051) | 7.50±1.3 (0.295±0.051) | 7.50±1.3 (0.295±0.051) |
| F | $5.0^{+0.8}_{-0.2}$ ($0.197^{+0.031}_{-0.008}$) | $5.0^{+0.8}_{-0.2}$ ($0.197^{+0.031}_{-0.008}$) | $7.50^{+0.8}_{-0.2}$ ($0.295^{+0.031}_{-0.008}$) | 7.50±0.5 (0.295±0.020) |
| h | 0.0±2.0 (0.0±0.079) | 0.0±2.0 (0.0±0.079) | 0.0±2.0 (0.0±0.079) | 0.0±2.0 (0.0±0.079) |
| W | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) |
| $W_0$ | 12.5 min (0.492 min) | 12.5 min (0.492 min) | 12.5 min (0.492 min) | 12.5 min (0.492 min) |
| $W_1$ | 9.0±0.5 (0.354±0.020) | 9.0±0.5 (0.354±0.020) | 9.0±0.5 (0.354±0.020) | 9.0±0.5 (0.354±0.020) |
| $W_2$ | 3.0 max※2 (0.118 max) | 3.0 max※2 (0.118 max) | 3.0 max※2 (0.118 max) | 3.0 max※2 (0.118 max) |
| $D_0$ | φ4.0±0.2 (φ0.158±0.008) | φ4.0±0.2 (φ0.158±0.008) | φ4.0±0.2 (φ0.158±0.008) | φ4.0±0.2 (φ0.158±0.008) |
| φd | φ0.6±0.05 (φ0.024±0.002) | φ0.6±0.05 (φ0.024±0.002) | φ0.8±0.05 (φ0.031±0.002) | φ0.8±0.05 (φ0.031±0.002) |
| t | 0.6±0.3 (0.024±0.012) | 0.6±0.3 (0.024±0.012) | 0.6±0.3 (0.024±0.012) | 0.6±0.3 (0.024±0.012) |
| $D_1$ | φ1.8 (0.071) | φ1.8 (0.071) | φ1.8 (0.071) | — |
| $P_3$ | 6.35 (0.25) | 6.35 (0.25) | 7.50 (0.25) | — |

※1 Accumulated error for 20 pitches is 1mm. Unit : mm(inch)
※2 Bonding tape must not protrude from the base tape.

● LHLP10TB




| Type | Symbol | Dimensions | Symbol | Dimensions |
|---|---|---|---|---|
| LHLP10 | D | φ11.0 max (φ0.433 max) | W | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) |
| | $H_1$ | 32.0 max (1.26 max) | $W_0$ | 12.5 min (0.492 min) |
| | H | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) | $W_1$ | 9.0±0.5 (0.354±0.020) |
| | $H_2$ | 11.0 max (0.433 max) | $W_2$ | 3.0 max※2 (0.118 max) |
| | P | 12.7±1.0 (0.500±0.039) | $D_0$ | φ4.0±0.2 (φ0.158±0.008) |
| | $P_0$ | 12.7±0.3※1 (0.500±0.012) | φd | φ0.6±0.05 (φ0.024±0.002) |
| | $P_1$ | 3.85±0.7 (0.152±0.028) | t | 0.6±0.3 (0.024±0.012) |
| | $P_2$ | 6.35±1.3 (0.250±0.051) | $D_1$ | φ1.8 (0.071) |
| | F | $5.0^{+0.8}_{-0.2}$ ($0.197^{+0.031}_{-0.008}$) | $P_3$ | 6.35 (0.25) |
| | h | 0.0±2.0 (0.0±0.079) | | |

Unit : mm(inch)

※1 Accumulated error for 20 pitches is 1mm.
※2 Bonding tape must not protrude from the base tape.

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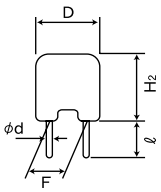
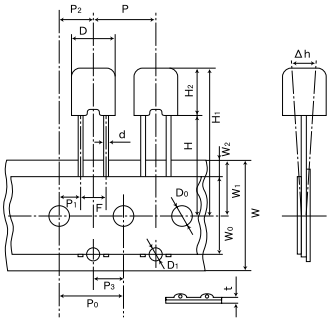
## PACKAGING

● LHLC08, LHLC10




| Type | Dimensions | | | | |
|---|---|---|---|---|---|
| | φD (max) | $H_2$ (max) | F* | ℓ | φd |
| LHLC08 | 9.0 (0.354) | 9.5 (0.374) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) |
| LHLC10 | 11.0 (0.433) | 14.0 (0.551) | 5.0±1.0 (0.197±0.039) | 5.0±1.0 (0.197±0.039) | 0.6±0.05 (0.024±0.002) |

*Measured at the base of the leads. Unit : mm(inch)




| | LHLC08 | LHLC10 |
|---|---|---|
| D | φ9.0max (φ0.354max) | φ11.0max (φ0433max) |
| $H_1$ | 30.5max (1.20max) | 34.0max (1.34max) |
| H | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) | $18.0^{+2.0}_{-0.0}$ ($0.709^{+0.079}_{-0.000}$) |
| $H_2$ | 9.5max (0.374max) | 14.0max (0.551max) |
| P | 12.7±1.0 (0.500±0.039) | 12.7±1.0 (0.500±0.039) |
| $P_0$ | 12.7±0.3※1 (0.500±0.012) | 12.7±0.3※1 (0.500±0.012) |
| $P_1$ | 3.85±0.7 (0.152±0.028) | 3.85±0.7 (0.152±0.028) |
| $P_2$ | 6.35±1.3 (0.250±0.051) | 6.35±1.3 (0.250±0.051) |
| F | $5.0^{+0.8}_{-0.2}$ ($0.197^{+0.031}_{-0.008}$) | $5.0^{+0.8}_{-0.2}$ ($0.197^{+0.031}_{-0.008}$) |
| h | 0.0±2.0 (0.0±0.079) | 0.0±2.0 (0.0±0.079) |
| W | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) | $18.0^{+1.0}_{-0.5}$ ($0.709^{+0.039}_{-0.020}$) |
| $W_0$ | 12.5min (0.492min) | 12.5min (0.492min) |
| $W_1$ | 9.0±0.5 (0.354±0.020) | 9.0±0.5 (0.354±0.020) |
| $W_2$ | 3.0max※2 (0.118max) | 3.0max※2 (0.118max) |
| $D_0$ | φ4.0±0.2 (φ0.158±0.008) | φ4.0±0.2 (φ0.158±0.008) |
| φd | φ0.6±0.05 (φ0.024±0.002) | φ0.6±0.05 (φ0.024±0.002) |
| t | 0.6±0.3 (0.024±0.012) | 0.6±0.3 (0.024±0.012) |
| $D_1$ | φ1.8 (0.071) | φ1.8 (0.071) |
| $P_3$ | 6.35 (0.25) | 6.35 (0.25) |

※1 Accumulated error for 20 pitches is 1mm. Unit : mm(inch)
※2 Bonding tape must not protrude from the base tape.

## RELIABILITY DATA

| 1. Operating temperature Range | |
|---|---|
| LA Type | −25～+105℃ |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | −25～+85℃ |
| FL05□ Type | −25～+105℃ |
| FL06BT Type | |

【Test Method and Remarks】
LA・CA・FL : Including self-generated heat
LHL□□□ : Including self-generated heat

| 2. Storage temperature Range | |
|---|---|
| LA Type | −40～+85℃ |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

| 3. Rated current | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : The maximum DC value having inductance within 10% and temperature incease within 40℃ (LA:20℃) by the application of DC bias.
LHL□□□ : The maximum DC value having inductance decrease within 10% (LHLC08, LHLC10：within 30%) and temperature increase within the following specified temperature by the application of DC bias.
Reference temperature : 25℃ (LHL08, LHL10, LHL13)
: 30℃ (LHL16, LHLP□□)
: 40℃ (LHLC08, LHLC10)
FB : No disconnection or appearance abnormality by continuous current application for 30 min. Change after the application shall be within ±20% of the initial value. This is not guaranteed for electrial characteristics during current application.
FL : The maximum DC value having temperature rise within specified value.

| 4. Impedance | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | Within the specified tolerance |
| FL05□ Type | |
| FL06BT Type | Refer to individual specification |

【Test Method and Remarks】
FB : Measuring equipment : Impedance analyzer (HP4191A) or its equivalent
Measuring frequency : Specified frequency
FL06BT : Measuring equipment : 4291A (HP) or its equivalent
Measuring frequency : Specified frequency

| 5. Inductance | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | Within the specified tolerance |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1kHz)
Measuring frequency : Specified frequency
FL05R□ : Measuring equipment : HP4262A or its equivalent
Measuring frequency : 1kHz

| 6. Q | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Measuring equipment : LCR meter (HP4285A + HP42851A or its equivalent)
Measuring frequency : Specified frequency
LHL□□□ (except LHLP) : Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)
LCR meter (HP4263A) or its equivalent (at 1kHz)
Measuring frequency : Specified frequency

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## RELIABILITY DATA

| 7. DC Resisitance | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Measuring equipment : low ohmmeter (A&D AD5812 or its equivalent)
LHL□□□・FB・FL : Measuring equipment : DC ohmmeter

| 8. Self resonance frequency | |
|---|---|
| LA Type | Within the specified tolerance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Measuring equipment : Network analyzer (Anritsu MS620J or its equivalent)
LHL□□□ (except LHLP) : Measuring equipment : (HP4191A, 4192A) its equivalent

| 9. Temperature characteristic | |
|---|---|
| LA Type | △L/L : Within ±5% |
| CAL45 Type | |
| LHL□□□ | △L/L : Within ±7% (except LHLP16 : Within ±20%) |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Change of maximum inductance deviation in step 1 to 5

| Step | Temperature (℃) |
|---|---|
| 1 | 20 |
| 2 | −25 (Minimum operating temperature) |
| 3 | 20 (Standard temperature) |
| 4 | +85 (Maximum operating temperature) |
| 5 | 20 |

LHL□□□ : Change of maximum inductance deviation in step 1 to 5
Temperature at step 1 : 20℃
Temperature at step 2 : Minimum operating temperature
Temperature at step 3 : 20℃ (Standard temperature)
Temperature at step 4 : Maximum operating temperature
Temperature at step 5 : 20℃

| 10. Tensile strength test | |
|---|---|
| LA Type | No abnormality such as cut lead, or looseness. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No abnormality such as cut lead, or looseness. |
| FL05□ Type | No abnormality such as cut lead, or looseness. |
| FL06BT Type | |

【Test Method and Remarks】
LA : Apply the stated tensile force progressively in the direction to draw terminal.

| force (N) | duration (s) |
|---|---|
| 25 | 5 |

CA : Apply the stated tensile force progressively in the direction to draw terminal.

| force (N) | duration (s) |
|---|---|
| 10 | 10 |

LHL□□□ : Apply the stated tensile force progressively in the direction to draw terminal.

| Nominal wire diameter tensile φd (mm) | force (N) | duration (s) |
|---|---|---|
| 0.3<φd≦0.5 | 5 | 30±5 |
| 0.5<φd≦0.8 | 10 | |
| 0.8<φd≦1.2 | 25 | |

FBA/FBR : The body of a component shall be fixed and a tensile force of 20±1N shall be applied to the lead wire in the axial diretion of the component during 10±1 seconds.
FL05R□ : Fix the body of a component in the direction to draw terminal,and gradually apply the tensile force of 4.9N.

| 11. Over current | |
|---|---|
| LA Type | No emission of smoke no firing. |
| CAL45 Type | |
| LHL□□□ | There shall be no scorch or short of wire.<br>LHLC08,LHLC10 : There shall be no firing. |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□/LA・CAL45 Type : Measuring current : Rated current×2
Duration : 5 min.
Number of measuring : one time

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| 12. Terminal strength : bending | |
|---|---|
| LA Type | No abnormality such as cut lead, or looseness. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】

LA, CA : Suspend a weight of specified mass at the end of the terminals and incline the body through the angle of 90 degrees and return it to the initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.
Number of bends : Two times.

| Nominal wire diameter tensile φd (mm) | Bending force (N) | Mass reference weight (kg) |
|---|---|---|
| 0.3<φd≦0.5 | 2.5 | 0.25 |
| 0.5<φd≦0.8 | 5 | 0.50 |

LH・FB : Suspend a weight of specified mass at the end of the terminals and incline the body through the angle of 90 degrees and return it to the initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.
Number of bends : Two times.

| Nominal wire diameter tensile φd (mm) | Bending force (N) | Mass reference weight (kg) |
|---|---|---|
| 0.3<φd≦0.5 | 2.5 | 0.25 |
| 0.5<φd≦0.8 | 5 | 0.5 |
| 0.8<φd≦1.2 | 10 | 1.0 |

| 13. Insulation resisitance : between the terminals and body | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | 100MΩ min. |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□ : Applied voltage : 500 VDC
Duration : 60 sec.

| 14. Insulation resistance : between terminals and core | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | 1MΩ min. (Other than materail code MA) |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
FBA・FBR : Applied voltage : 100 VDC
Duration : 60±5 sec.

| 15. Withstanding : between the terminals and body | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | No abnormality such as insulation damage |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LHL□□□ : Accoding to JIS C5102. 7. 1. 3 (C)
Metal global method
Applied voltage : 500 VDC
Duration : 60 sec.

| 16. DC bias characteristic | |
|---|---|
| LA Type | △L/L : Within −10% |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

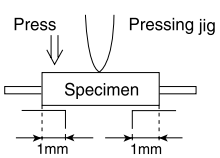
【Test Method and Remarks】
LA, CA : Measure inductance with appliation of rated current using LCR meter to compare it with the initial value.

| 17. Body strength | |
|---|---|
| LA Type | No abnormality as damage. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No abnormality such as cracks on body. |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA : Applied force : 30N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

CAL45 : Applied force : 50N
Duration : 10 sec.
Speed : Shall attain to specified force in 2 sec.

FBA : Applied force : 50±3N
Duration : 30±1 sec.

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| 18. Resisitance to vibration | |
|---|---|
| LA Type | △L/L : Within ±5%　Q : 30min |
| CAL45 Type | △L/L : Within ±5% |
| LHL□□□ | Appearance : No abnomality　△L/L : Within ±5%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | Appearance : No abnomality　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm
Mounting method : Soldering onto printed board.
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□・FB : Directions : 2 hrs each in X, Y and Z directions total : 6hrs.
Frequency range : 10 to 55 to 10Hz (1min.)
Amplitude : 1.5mm (But don't exceed acceleration 196m/s$^2$ (two power))
Mounting method : Soldering onto printed board.

| 19. Resistance to shock | |
|---|---|
| LA Type | No significant abnormality in appearance |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Drop test
Impact material : concrete or vinyl tile
Height : 1m
Total number of drops : 10 times

| 20. Solderability | |
|---|---|
| LA Type | At least 75% of terminal electrode is covered by new solder. |
| CAL45 Type | |
| LHL□□□ | At least 75% of terminal electrode is covered by new solder. |
| FBA/FBR | At least 90% of terminal electrode is covered by new solder. |
| FL05□ Type | At least 75% of terminal electrode is covered by new solder. |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Solder temperature : 230±5℃
Duration : 2±0.5 sec.

LHL□□□ : Solder temperature : 235±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 1.5mm from bottom of case.

FB : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from terminal root.

FL05R□ : Solder temperature : 230±5℃
Duration : 2±0.5 sec.
Immersion depth : Up to 2 to 2.5mm from terminal root.

FL06BT : Solder temperature : 230±5℃
Duration : 3±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from terminal root.

| 21. Resisitance to soldering heat | | |
|---|---|---|
| LA Type | No significant abnormality in appearance | |
| CAL45 Type | △L/L : Within ±5% | |
| LHL□□□ | No significant abnormality in appearance | Inductance change : Within ±5%　Q change : Within ±30%(LHLP : only △L/L) |
| FBA/FBR | No significant abnormality in appearance | Impedance change : Within ±20% |
| FL05□ Type | Refer to individual specification | |
| FL06BT Type | No significant abnormality in appearance | Impedance change : Within ±20% |

【Test Method and Remarks】
LA, CA : Solder temperature : (CA) 270±5℃, (LA) 260±5℃
Duration : 5±0.5 sec.　One time
Immersed conditions : Inserted into substrate with t=1.6mm
Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.

LHL□□□ : Solder bath method : Solder temperature : 260±5℃
Duration : 10±1 sec.
Up to 1.5mm from the bottom of case.
Manual soldering : Solder temperature : 350±10℃ (At the tip of soldering iron)
Duration : 5±1 sec.
Up to 1.5mm from the bottom of case.
Caution : No excessive pressing shall be applied to terminals.
Recovery : 4 to 24hrs of recovery under the standard condition after the test.

FB : Solder bath method : Condition 1 : Solder temperature : 260±5℃
Duration : 10±1 sec.
Immersion depth : Up to 1.5mm from the terminal root.
Condition 2 : Solder temperature : 350±5℃
Duration : 3±1 sec.
Immersion depth : Up to 1.5mm from the terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

FL : Solder condition : 260±5℃　10±1 sec.
Immersion depth : Up to 0.5 to 1.0mm from the terminal root.
Recovery : 3hrs of recovery under the standard condition after the test.

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| 22. Resisitance to solvent | |
|---|---|
| LA Type | Please avoid the ultrasonic cleaning of this product. |
| CAL45 Type | |
| LHL□□□ | |
| FBA/FBR | No significant abnormality in appearance　　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
FB : Solvent temperature : 20～25℃
Duration : 30±5 sec.
Solvent type : Acetone
Recovery : 3hrs of recovery under the standard condition after the test.

| 23. Thermal shock | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　　Inductance change : Within ±10%　　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | Appearance : No abnormality　　Impedance change : Within ±20% |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　　Impedance change : Within ±20% |

【Test Method and Remarks】
LA, CA : Conditions for 1cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | $-25^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | $+85^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 5 cycles
Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.

LHL□□□・FB : Accoding to JIS C0025
Conditions for 1 cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | Minimum operating temperature$^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | Minimum operating temperature$^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 10 cycles〔LHL□□□〕
: 5 cycles (FBA, FBR)
Recovery : 4 to 24hrs of recovery under the standard condition after the removal from the test chamber.〔LHL□□□〕
: 3hrs of recovery under the standard condition after the removal from the test chamber. (FBA, FBR)

FL : Accoding to JIS C0025
Conditions for 1 cycle

| Step | Temperature (℃) | Duration (min.) |
|---|---|---|
| 1 | $-25^{+0}_{-3}$ | 30±3 |
| 2 | Room temperature | Within 3 |
| 3 | $+85^{+2}_{-0}$ | 30±3 |
| 4 | Room temperature | Within 3 |

Number of cycles : 10 cycles
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 24. Damp heat | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | |
| FBA/FBR | Appearance : No abnormality　　Impedance change : Within ±20% |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】
LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

FB : Temperature : 60±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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| 25. Loading under damp heat | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LA, CA : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : 40±2℃
Humidity : 90～95%RH
Duration : 1000±24 hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : 60±3℃
Humidity : 90～95%RH
Duration : 500 (+12, −0) hrs
Applied current : Rated current
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 26. Loading at high temperature | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | |
| FBA/FBR | |
| FL05□ Type | |
| FL06BT Type | |

【Test Method and Remarks】

LA, CA : Temperature : 85±2℃
Duration : 1000 hrs
Applied current : Rated current
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

| 27. Low temperature life test | |
|---|---|
| LA Type | △L/L : Within ±10%　Q : 30min |
| CAL45 Type | △L/L : Within ±10% |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LA, CA : Temperature : −25±2℃
Duration : 1000 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.

LHL□□□ : Temperature : −40±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

FL : Temperature : −40±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

| 28. High temperature life test | |
|---|---|
| LA Type | |
| CAL45 Type | |
| LHL□□□ | Appearance : No abnormality　Inductance change : Within ±10%　Q change : Within ±30% (LHLP : only △L/L) |
| FBA/FBR | |
| FL05□ Type | Refer to individual specification |
| FL06BT Type | Appearance : No abnormality　Impedance change : Within ±20% |

【Test Method and Remarks】

LHL□□□ : Temperature : 105±3℃
Duration : 1000±24 hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.
FL : Temperature : 85±3℃
Duration : 500 (+12, −0) hrs
Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.

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## PRECAUTIONS

CAL Type, LH Type, FB Type, FL Type, LA Type

| 1. Circuit Design | |
|---|---|
| Precautions | ◆Operating environment<br>1. The products described in this specification are intended for use in general electronic equipment,(office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance. |

| 2. PCB Design | |
|---|---|
| Precautions | ◆Design<br>1. Please design insertion pitches as matching to that of leads of the component on PCBs. |
| Technical consider-ations | ◆Design<br>1. When Inductors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not, it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs. |

| 3. Considerations for automatic placement | |
|---|---|
| Precautions | ◆Adjustment of mounting machine<br>1. Excessive impact load should not be imposed on the products when mounting onto the PC boards.<br>2. Mounting and soldering conditions should be checked beforehand. |
| Technical consider-ations | ◆Adjustment of mounting machine<br>1. When installing products, care should be taken not to apply distortion stress as it may deform the products. |

| 4. Soldering | |
|---|---|
| Precautions | ◆Wave soldering<br>1. Please refer to the specifications in the catalog for a wave soldering.<br>2. Do not immerse the entire inductor in the flux during the soldering operation.<br>◆Lead free soldering<br>1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.<br>Recommended conditions for using a soldering iron:<br>・Put the soldering iron on the land-pattern.<br>・Soldering iron's temperature - Below 350℃<br>・Duration - 3 seconds or less<br>・The soldering iron should not directly touch the inductor.<br>◆Reflow soldering<br>1. As for reflow soldering, please contact our sales staff. |
| Technical consider-ations | ◆Lead free soldering<br>1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. |

| 5. Cleaning | |
|---|---|
| Precautions | ◆Cleaning conditions<br>1. CAL type, LH type, LA Type<br>Please do not do cleaning by a supersonic wave. |
| Technical consider-ations | ◆Cleaning conditions<br>1. CAL type, LH type, LA Type<br>If washing by supersonic waves, supersonic waves may deform products. |

| 6. Handling | |
|---|---|
| Precautions | ◆Handling<br>1. Keep the inductors away from all magnets and magnetic objects.<br>◆Mechanical considerations<br>1. Please do not give the inductors any excessive mechanical shocks.<br>2. LH type<br>If inductors are dropped onto the floor or a hard surface they should not be used.<br>◆Packing<br>1. Please do not give the inductors any excessive mechanical shocks.<br>In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item). |
| Technical consider-ations | ◆Handling<br>1. There is a case that a characteristic varies with magnetic influence.<br>◆Mechanical considerations<br>1. There is a case to be damaged by a mechanical shock.<br>2. LH type<br>There is a case to be broken by a fall.<br>◆Packing<br>1. There is a case that a lead wire could be deformed by a fall or an excessive shock. |

| 7. Storage conditions | |
|---|---|
| Precautions | ◆Storage<br>1. 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.<br>Recommended conditions<br>・Ambient temperature 0～40℃<br>・Humidity Below 70% RH<br>The ambient temperature must be kept below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, inductors should be used within one year from the time of delivery.<br>In case of storage over 6 months, solderability shall be checked before actual usage. |
| Technical consider-ations | ◆Storage<br>1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. |

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