

# Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.



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- 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.

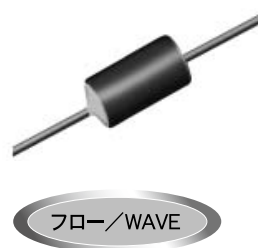
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# フェライトビーズインダクタ (リードタイプ) LEADED FERRITE BEADS INDUCTORS

OPERATING TEMP. -25~+85°C



## 特長 FEATURES

- ・損失分の大きなフェライト材料を使用
- ・基板への実装が容易
- ・用途に合わせた幅広いバリエーション

- ・ Use of high loss ferrite material.
- ・ Easy mounting on PC boards.
- ・ Available in a wide range of values and configurations to suit most applications.

## 用途 APPLICATIONS

- ・ 各種デジタル機器におけるデジタル信号の波形整形、データラインの高周波ノイズ吸収

- ・ Waveform correction of digital signals from digital equipment and absorption of high-frequency noise from data lines.

## 形名表記法 ORDERING CODE

1

| 形式 |               |
|----|---------------|
| FB | フェライトビーズインダクタ |

2

| 形状 |          |
|----|----------|
| A  | アキシヤルリード |
| R  | ラジアルリード  |

3

| コア寸法 (D寸法) [mm] |      |
|-----------------|------|
| 03              | φ2.5 |
| 04              | φ3.5 |
| 05              | 5.0  |
| 06              | 6.0  |
| 07              | 7.5  |

4

| 材質コード |                    |
|-------|--------------------|
| HA    | 材質によりインピーダンス特性が異なる |
| VA    |                    |

5

| 公称インピーダンス (Ω以上) |     |
|-----------------|-----|
| 例               |     |
| 850             | 85  |
| 121             | 120 |

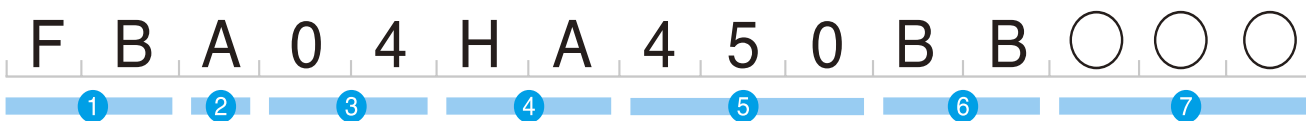
03タイプ除く

7

| 当社管理記号 |     |
|--------|-----|
| -00    | 標準品 |

6

| リード加工形状 [mm] |                         |    |                       |
|--------------|-------------------------|----|-----------------------|
| AB           | 26.0幅ストレートリードつづら折りテーピング | SA | 2.5ピッチストレートリードテーピング   |
| BB           | 52.0幅ストレートリードつづら折りテーピング | SB | 5.0ピッチストレートリードテーピング   |
| KD           | 10.0ピッチ コの字形フォーミング単品    | TB | 5.0ピッチストレートリードテーピング   |
| KE           | 12.5ピッチ コの字形フォーミング単品    | UB | 5.0ピッチラジアルフォーミングテーピング |
| KF           | 15.0ピッチ コの字形フォーミング単品    | US | 5.0ピッチラジアルフォーミング単品    |
| NA           | 2.5ピッチストレートリード単品 (FBR)  | VB | 5.0ピッチ両リードフォーミングテーピング |
|              | ストレートリード単品 (FBA)        | VS | 5.0ピッチ両リードフォーミング単品    |
| NB           | 5.0ピッチリード単品             |    |                       |



1

| Type |               |
|------|---------------|
| FB   | Ferrite Beads |

2

| Configuration |             |
|---------------|-------------|
| A             | Axial lead  |
| R             | Radial lead |

3

| Core Dimensions [mm] |      |
|----------------------|------|
| 03                   | φ2.5 |
| 04                   | φ3.5 |
| 05                   | 5.0  |
| 06                   | 6.0  |
| 07                   | 7.5  |

4

| Material code |   |
|---------------|---|
| HA            | Refer to impedance curves for material difference |
| VA            |   |

5

| Nominal Impedance |     |
|-------------------|-----|
| example           |     |
| 850               | 85  |
| 121               | 120 |

Excluding 03Type

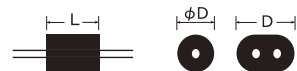
7

| Internal code |                   |
|---------------|-------------------|
| -00           | Standard Products |

6

| Lead configuration [mm] |  |    |  |
|-------------------------|--|----|--|
| AB                      | straight lead (26mm lead space) / ammo   | SA | Straight lead (FBR05 type) / ammo      |
| BB                      | straight lead (52mm lead space) / ammo   | SB | Straight lead (FBR07 type) / ammo      |
| KD                      | Formed lead (10mm pitch) / bulk          | TB | Straight lead (FBR07 type) / ammo      |
| KE                      | Formed lead (12.5mm pitch) / bulk        | UB | Radial lead formed / ammo              |
| KF                      | Formed lead / bulk (15.0mm pitch) / bulk | US | Formed lead (crimped) / bulk           |
| NA                      | straight lead (2.5mm pitch) / bulk (FBR) | VB | Dual side lead formed (crimped) / ammo |
|                         | straight lead / bulk (FBA)               | VS | Formed lead / bulk                     |
| NB                      | Formed lead (crimped) / bulk             |    |  |

# 外形寸法 EXTERNAL DIMENSIONS



| Type   | 形状 Configurations |               |                |               | Dimensions [mm] (inch)   |   |
|--|-------------------|---------------|----------------|---------------|--------------------------|---|
|  | テーピング Taping      |               | 単品 Bulk        |               | D                        | L   |
|  | ストレート Straight    | フォーミング Formed | ストレート Straight | フォーミング Formed |                          |   |
| FBA<br>03HA450□-00<br>03VA450□-00<br>04HA450□-00<br>04VA450□-00<br>04HA600□-00<br>04VA600□-00<br>04HA900□-00<br>04VA900□-00                    |                   |               |                |               | 2.5±0.2<br>(0.098±0.008) | 4.5±0.3<br>(0.177±0.012)  |
|  |                   |               |                |               | 3.5±0.2<br>(0.138±0.008) | 4.5±0.3<br>(0.177±0.012)  |
|  |                   |               |                |               | 3.5±0.2<br>(0.138±0.008) | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) |
|  |                   |               |                |               | 3.5±0.2<br>(0.138±0.008) | 9.0±0.5<br>(0.354±0.020)  |
| FBR<br>05VA121□-00<br>06HA850NA-00<br>06VA850NA-00<br>06HA121NA-00<br>06VA121NA-00<br>07HA850□-00<br>07VA850□-00<br>07HA121□-00<br>07VA121□-00 | —                 |               | —              |               | 5.0max.<br>(0.197max.)   | 7.5<br>(0.295)  |
|  | —                 | —             | —              |               | 6.0±0.5<br>(0.236±0.020) | 5.0<br>(0.197)  |
|  | —                 | —             | —              |               | 6.0±0.5<br>(0.236±0.020) | 7.0<br>(0.276)  |
|  | —                 |               | —              |               | 7.5±0.5<br>(0.295±0.020) | 5.5<br>(0.217)  |
|  | —                 | —             | —              |               | 7.5±0.5<br>(0.295±0.020) | 7.5<br>(0.295)  |
|  | —                 | —             | —              |               | 7.5±0.5<br>(0.295±0.020) | 7.5<br>(0.295)  |

形名の□にはリード加工形状記号が入ります。 □ Please specify the lead configuration code.  
 ※リード線径φ寸法は、0.65±0.05mm 但し、FBR07タイプのφd寸法は0.6±0.05mm  
 Note: Lead diameter (φd) shall fall within a range of 0.65mm±0.05mm, FBR05, and FBR07 types however, will have a lead diameter (φd) range of 0.6mm ±0.05mm.  
 Unit : mm (inch)

## アイテム一覧 PART NUMBERS

| 形名<br>Ordering code  | EHS<br>(Environmental<br>Hazardous<br>Substances) | インピーダンス<br>Impedance<br>[Ω] min. | インピーダンス測定周波数<br>Measuring frequency [MHz] |     | 定格電流<br>Rated current [A] max. |     |
|--|---|----------------------------------|---|-----|--------------------------------|-----|
|  |   |                                  | 材質 Material                               |     | 材質 Material                    |     |
|  |   |                                  | HA  | VA  | HA                             | VA  |
| FBA<br>03△450□-00<br>04△450□-00<br>04△600□-00<br>04△900□-00                  | RoHS  | 35.0                             | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 45.0                             | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 60.0                             | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 90.0                             | 50  | 100 | 7.0                            | 7.0 |
| FBR<br>05VA121□-00<br>06△850NA-00<br>06△121NA-00<br>07△850□-00<br>07△121□-00 | RoHS  | 120.0                            | —   | 100 | —                              | 7.0 |
|  | RoHS  | 85.0                             | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 120.0                            | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 85.0                             | 50  | 100 | 7.0                            | 7.0 |
|  | RoHS  | 120.0                            | 50  | 100 | 7.0                            | 7.0 |

形名の△には材質記号 (HA,VA)、□にはリード加工形状記号が入ります。  
 △ Please specify material codes (HA,VA) and □ lead configuration code.  
 ※直流抵抗 DC Resistance : 0.01Ωmax、絶縁抵抗 Insulation resistance : 1.0MΩmin

セレクションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

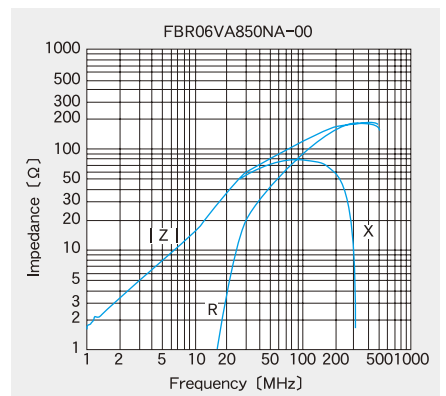
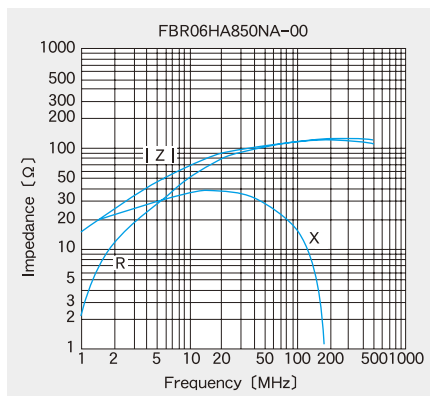
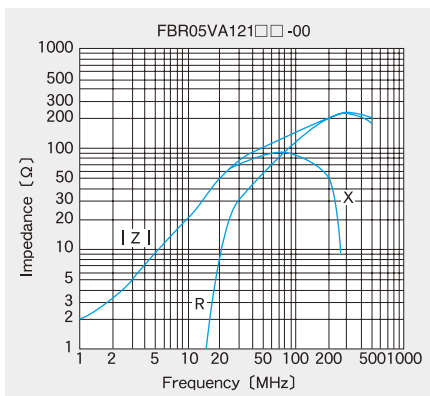
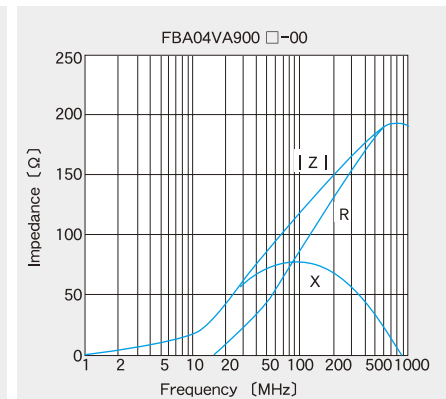
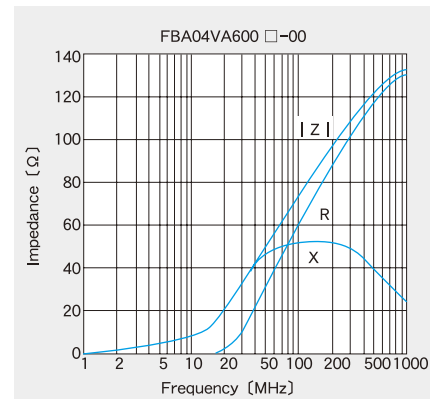
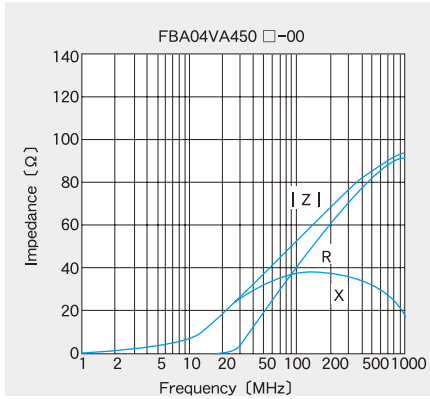
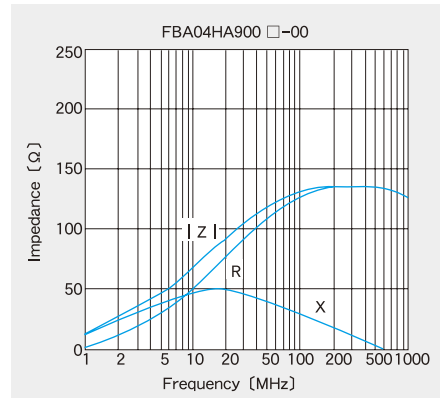
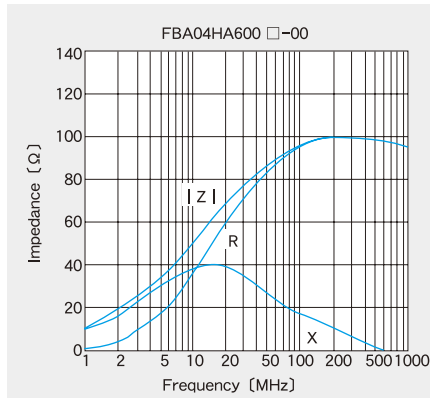
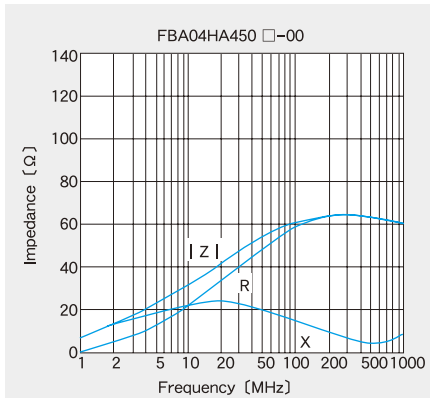
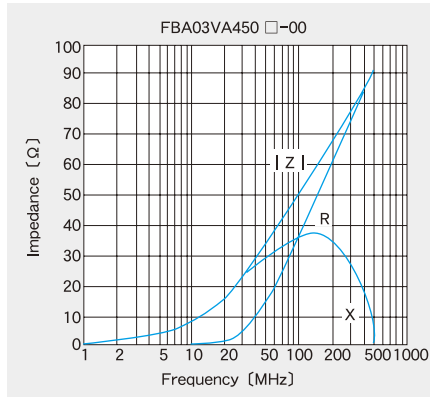
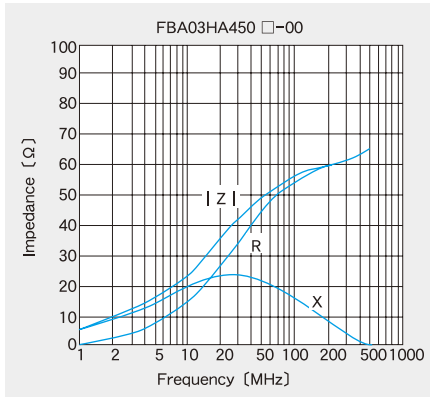
使用上の注意  
Precautions

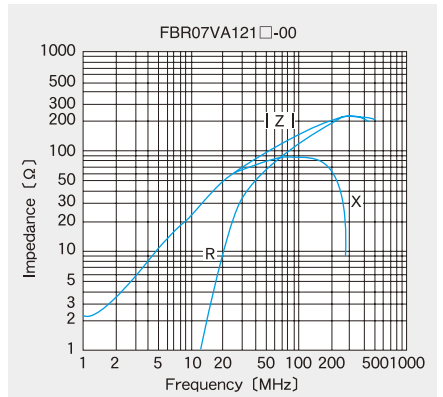
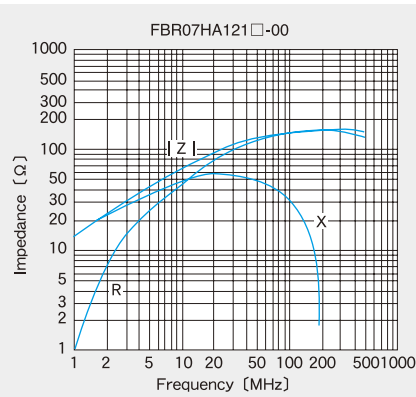
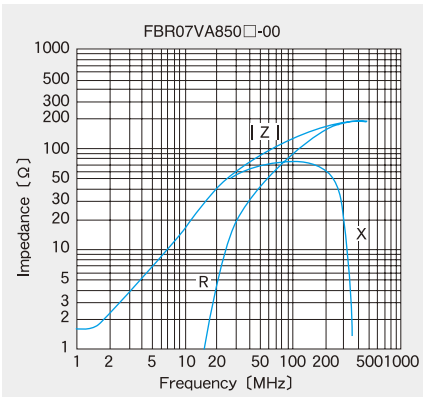
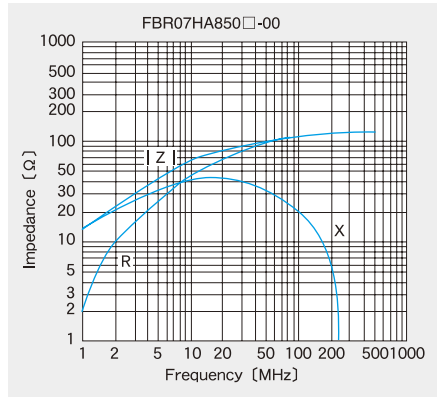
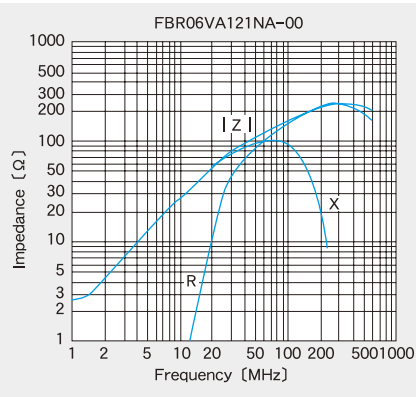
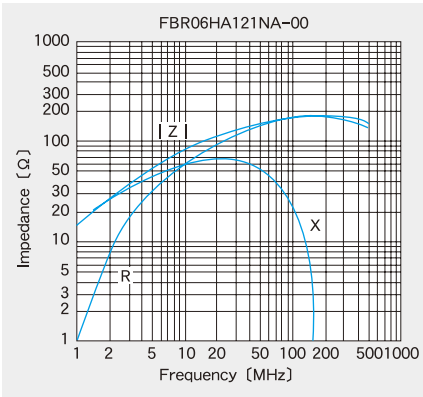


etc

インピーダンス周波数特性

IMPEDANCE-vs-FREQUENCY CHARACTERISTICS





Measured by HP4191A

①最小受注単位数 Minimum Quantity

アキシシャルリード Axial lead (FBA)

| Type  | リード加工<br>形状記号<br>Lead configuration | 標準数量 Standard quantity [pcs] |                           |
|-------|-------------------------------------|------------------------------|---------------------------|
|       |                                     | 袋詰め<br>Bulk                  | テーピング Taped<br>つづら折り Ammo |
| FBA03 | NA, KD, US                          | 1000                         | —                         |
|       | AB, BB                              | —                            | 2000                      |
|       | KE, KF, VS                          | 500                          | —                         |
|       | UB, VB                              | —                            | 3000                      |
| FBA04 | NA, KD, US                          | 1000                         | —                         |
|       | KE, KF, VS                          | 500                          | —                         |
|       | AB, BB                              | —                            | 1000                      |
|       | VB, UB                              | —                            | 3000                      |

ラジアルリード Radial lead (FBR)

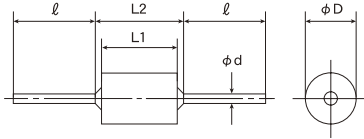
| Type  | リード加工<br>形状記号<br>Lead configuration | 標準数量 Standard quantity [pcs] |                           |
|-------|-------------------------------------|------------------------------|---------------------------|
|       |                                     | 袋詰め<br>Bulk                  | テーピング Taped<br>つづら折り Ammo |
| FBR05 | NA                                  | 1000                         | —                         |
|       | SA                                  | —                            | 2000                      |
| FBR06 | NA                                  | 1000                         | —                         |
| FBR07 | NB                                  | 1000                         | —                         |
|       | SB                                  | —                            | 2000                      |

Unit : mm (inch)

②単品寸法 Bulk dimensions

アキシシャルリード Axial lead (FBA)

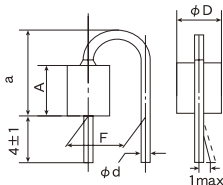
NA形状



| Type      | 寸法 Dimensions [mm] (inch) |   |                         |                            |                       |
|-----------|---------------------------|---|-------------------------|----------------------------|-----------------------|
|           | φD                        | L1  | L2                      | φd                         | ℓ                     |
| FBA03□450 | 2.5±0.2<br>(0.098±0.008)  | 4.5±0.3<br>(0.177±0.012)  | 6.5max.<br>(0.256max.)  | 0.65±0.05<br>(0.026±0.002) | 18min.<br>(0.709min.) |
| FBA04□450 | 3.5±0.2<br>(0.138±0.008)  | 4.5±0.3<br>(0.177±0.012)  | 6.5max.<br>(0.256max.)  |                            |                       |
| FBA04□600 | 3.5±0.2<br>(0.138±0.008)  | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) | 8.5max.<br>(0.335max.)  |                            |                       |
| FBA04□900 | 3.5±0.2<br>(0.138±0.008)  | 9.0±0.5<br>(0.354±0.020)  | 11.0max.<br>(0.433max.) |                            |                       |

Unit : mm (inch)

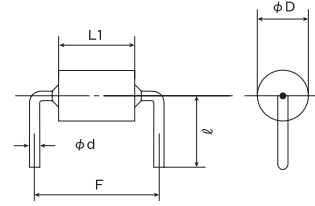
US形状



| Type      | 寸法 Dimensions [mm] (inch) |                          |                        |                      |                            |
|-----------|---------------------------|--------------------------|------------------------|----------------------|----------------------------|
|           | φD                        | A                        | a                      | F                    | φd                         |
| FBA03□450 | 2.5±0.2<br>(0.098±0.008)  | 4.5±0.3<br>(0.177±0.012) | 9.0max.<br>(0.354max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |
| FBA04□450 | 3.5±0.2<br>(0.138±0.008)  | 4.5±0.3<br>(0.177±0.012) | 9.0max.<br>(0.354max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |

Unit : mm (inch)

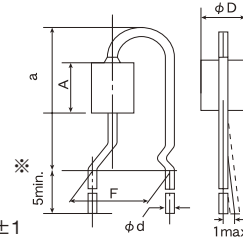
KD/KE/KF 形状



| Type      | リード加工<br>形状記号<br>LEAD SYMBOL | 寸法 Dimensions [mm] (inch) |                           |   |                            |                        |
|-----------|------------------------------|---------------------------|---------------------------|---|----------------------------|------------------------|
|           |                              | φD                        | F                         | L1  | φd                         | ℓ                      |
| FBA03□450 | KD                           | 2.5±0.2<br>(0.098±0.008)  | 10.0±1.0<br>(0.394±0.040) | 4.5±0.3<br>(0.177±0.012)  | 0.65±0.05<br>(0.026±0.020) | 7±2<br>(0.276±0.079)   |
| FBA04□450 |                              | 3.5±0.2<br>(0.138±0.008)  | 10.0±1.0<br>(0.394±0.040) | 4.5±0.3<br>(0.177±0.012)  |                            | 7.5±2<br>(0.295±0.079) |
| FBA04□600 |                              | 3.5±0.2<br>(0.138±0.008)  | 10.0±1.0<br>(0.394±0.040) | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) |                            | 7.5±2<br>(0.295±0.079) |
| FBA03□450 | KE                           | 2.5±0.2<br>(0.098±0.008)  | 12.5±1.0<br>(0.492±0.004) | 4.5±0.3<br>(0.177±0.012)  | 0.65±0.05<br>(0.026±0.020) | 7±2<br>(0.276±0.079)   |
| FBA04□450 |                              | 3.5±0.2<br>(0.138±0.008)  | 12.5±1.0<br>(0.492±0.004) | 4.5±0.3<br>(0.177±0.012)  |                            | 7.5±2<br>(0.295±0.079) |
| FBA04□600 |                              | 3.5±0.2<br>(0.138±0.008)  | 12.5±1.0<br>(0.492±0.004) | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) |                            | 7.5±2<br>(0.295±0.079) |
| FBA04□900 |                              | 3.5±0.2<br>(0.138±0.008)  | 12.5±1.0<br>(0.492±0.004) | 9.0±0.5<br>(0.354±0.020)  |                            | 7.5±2<br>(0.295±0.079) |
| FBA03□450 | KF                           | 2.5±0.2<br>(0.098±0.008)  | 15.0±1.0<br>(0.591±0.004) | 4.5±0.3<br>(0.177±0.012)  | 0.65±0.05<br>(0.026±0.020) | 7±2<br>(0.276±0.079)   |
| FBA04□450 |                              | 3.5±0.2<br>(0.138±0.008)  | 15.0±1.0<br>(0.591±0.004) | 4.5±0.3<br>(0.177±0.012)  |                            | 7.5±2<br>(0.295±0.079) |
| FBA04□600 |                              | 3.5±0.2<br>(0.138±0.008)  | 15.0±1.0<br>(0.591±0.004) | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) |                            | 7.5±2<br>(0.295±0.079) |
| FBA04□900 |                              | 3.5±0.2<br>(0.138±0.008)  | 15.0±1.0<br>(0.591±0.004) | 9.0±0.5<br>(0.354±0.020)  |                            | 7.5±2<br>(0.295±0.079) |

Unit : mm (inch)

VS 形状



※900タイプのみ5±1

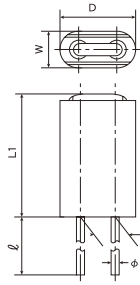
| Type      | 寸法 Dimensions [mm] (inch) |   |                         |                      |                            |
|-----------|---------------------------|---|-------------------------|----------------------|----------------------------|
|           | φD                        | A   | a                       | F                    | φd                         |
| FBA03□450 | 2.5±0.2<br>(0.098±0.008)  | 4.5±0.3<br>(0.177±0.012)  | 12.5max.<br>(0.492max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |
| FBA04□450 | 3.5±0.2<br>(0.138±0.008)  | 4.5±0.3<br>(0.177±0.012)  | 12.5max.<br>(0.492max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |
| FBA04□600 | 3.5±0.2<br>(0.138±0.008)  | 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) | 12.5max.<br>(0.492max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |
| FBA04□900 | 3.5±0.2<br>(0.138±0.008)  | 9.0±0.5<br>(0.354±0.020)  | 16.0max.<br>(0.630max.) | 5±1<br>(0.197±0.039) | 0.65±0.05<br>(0.026±0.002) |

Unit : mm (inch)



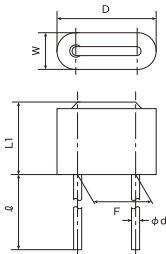
ラジアルリード Radial lead (FBR)

NA形状



| Type       | 寸法 Dimensions [mm] (inch) |                        |                            |  |
|------------|---------------------------|------------------------|----------------------------|--|
|            | D                         | L1                     | $\phi d$                   | $l$  |
| FBR05VA121 | 5.0max.<br>(0.197max.)    | 9.0max.<br>(0.354max.) | 0.65±0.05<br>(0.026±0.002) | 10 <sup>+3</sup> <sub>-5</sub><br>(0.394 <sup>+0.118</sup> <sub>-0.197</sub> ) |
| FBR06□850  | 6±0.5<br>(0.236±0.020)    | 7.0max.<br>(0.276max.) | 0.65±0.05<br>(0.026±0.002) | 10 <sup>+3</sup> <sub>-5</sub><br>(0.394 <sup>+0.118</sup> <sub>-0.197</sub> ) |
| FBR06□121  | 6±0.5<br>(0.236±0.020)    | 9.0max.<br>(0.354max.) | 0.65±0.05<br>(0.026±0.002) | 10 <sup>+3</sup> <sub>-5</sub><br>(0.394 <sup>+0.118</sup> <sub>-0.197</sub> ) |
|            | W                         | F                      | Unit : mm (inch)           |  |
| FBR05VA121 | 2.5max.<br>(0.098max.)    | 2.5±1<br>(0.098±0.039) |                            |  |
| FBR06□850  | 3.0±0.5<br>(0.118±0.020)  | 2.5±1<br>(0.098±0.039) |                            |  |
| FBR06□121  | 3.0±0.5<br>(0.118±0.020)  | 2.5±1<br>(0.098±0.039) |                            |  |

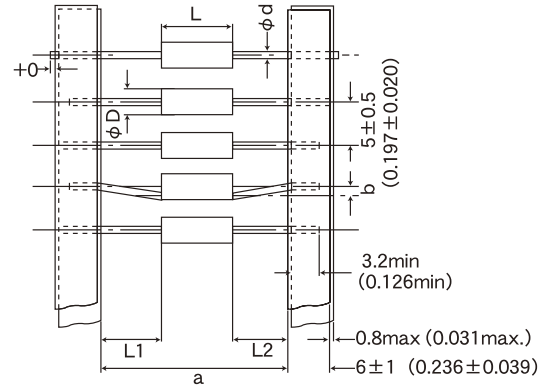
NB形状



| Type      | 寸法 Dimensions [mm] (inch) |   |                           |   |
|-----------|---------------------------|---|---------------------------|---|
|           | D                         | L1  | $\phi d$                  | $l$   |
| FBR07□850 | 7.5±0.5<br>(0.295±0.020)  | 7.0max..<br>(0.276max.)   | 0.6±0.05<br>(0.024±0.002) | 5 <sup>+1</sup> <sub>-2</sub><br>(0.197 <sup>+0.039</sup> <sub>-0.079</sub> ) |
| FBR07□121 | 7.5±0.5<br>(0.295±0.020)  | 9.0max.<br>(0.354max.)  | 0.6±0.05<br>(0.024±0.002) | 5 <sup>+1</sup> <sub>-2</sub><br>(0.197 <sup>+0.039</sup> <sub>-0.079</sub> ) |
|           | W                         | F   | Unit : mm (inch)          |   |
| FBR07□850 | 2.5max.<br>(0.098max.)    | 5 <sup>+1</sup> <sub>-0.5</sub><br>(0.197 <sup>+0.039</sup> <sub>-0.020</sub> ) |                           |   |
| FBR07□121 | 2.5max.<br>(0.098max.)    | 5 <sup>+1</sup> <sub>-0.5</sub><br>(0.197 <sup>+0.039</sup> <sub>-0.020</sub> ) |                           |   |

③テーピング寸法 Taping Dimensions

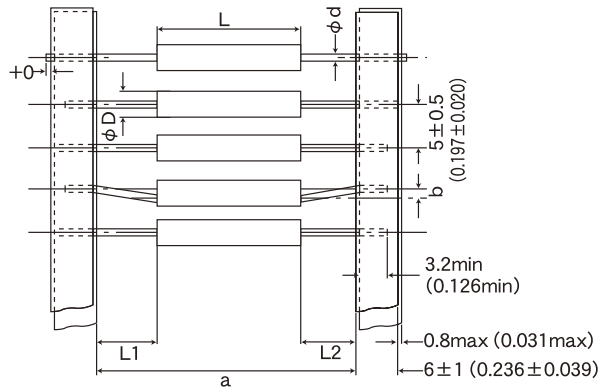
AB (a : 26mm) 形状  
(1.02inch lead space)



| Type  | 寸法 Dimensions            |                          |   |                      |                                |                            | 最小挿入ピッチ<br>Minimum insertion pitch |
|-------|--------------------------|--------------------------|---|----------------------|--------------------------------|----------------------------|------------------------------------|
|       | D                        | L                        | a   | b                    | L <sub>1</sub> -L <sub>2</sub> | $\phi d$                   |                                    |
| FBA03 | 2.5±0.2<br>(0.098±0.008) | 4.5±0.3<br>(0.177±0.012) | 26 <sup>+1.5</sup> <sub>-0</sub><br>(1.02 <sup>+0.059</sup> <sub>-0</sub> ) | 0.8max<br>(0.031max) | 1.0max<br>(0.039max)           | 0.65±0.05<br>(0.026±0.002) | 10.0<br>(0.394)                    |
| FBA04 | 3.5±0.2<br>(0.138±0.008) | 4.5±0.3<br>(0.177±0.012) | 26 <sup>+1.5</sup> <sub>-0</sub><br>(1.02 <sup>+0.059</sup> <sub>-0</sub> ) | 0.8max<br>(0.031max) | 1.0max<br>(0.039max)           | 0.65±0.05<br>(0.026±0.002) | 10.0<br>(0.394)                    |

Unit : mm (inch)

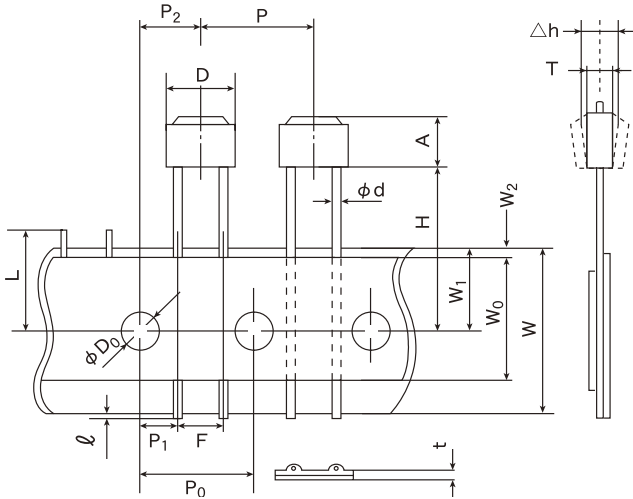
B□ (a : 52mm) 形状  
(2.05 inches lead space)



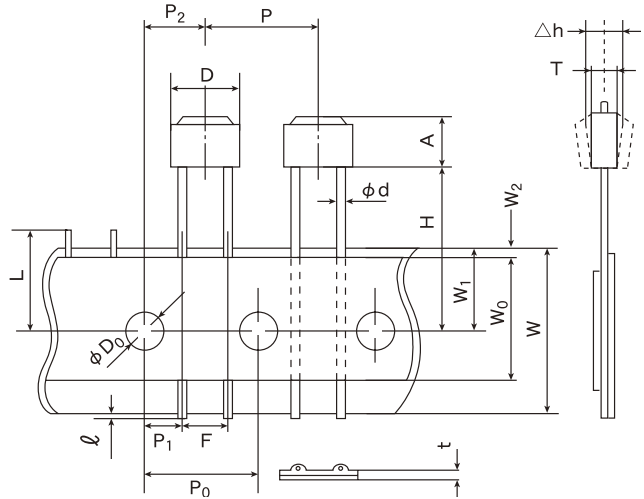
| Type  | 寸法 Dimensions            |                          |   |                      |                                |                            | 最小挿入ピッチ<br>Minimum insertion pitch |
|-------|--------------------------|--------------------------|---|----------------------|--------------------------------|----------------------------|------------------------------------|
|       | D                        | L                        | a   | b                    | L <sub>1</sub> -L <sub>2</sub> | $\phi d$                   |                                    |
| FBA03 | 2.5±0.2<br>(0.098±0.008) | 4.5±0.3<br>(0.177±0.012) | 52 <sup>+2</sup> <sub>-1</sub><br>(2.05 <sup>+0.079</sup> <sub>-0.039</sub> ) | 1.2max<br>(0.047max) | 1.0max<br>(0.039max)           | 0.65±0.05<br>(0.026±0.002) | 10.0<br>(0.394)                    |
| FBA04 | 3.5±0.2<br>(0.138±0.008) | 4.5±0.3<br>(0.177±0.012) | 52 <sup>+2</sup> <sub>-1</sub><br>(2.05 <sup>+0.079</sup> <sub>-0.039</sub> ) | 1.2max<br>(0.047max) | 1.0max<br>(0.039max)           | 0.65±0.05<br>(0.026±0.002) | 10.0<br>(0.394)                    |

Unit : mm (inch)

SA (F : 2.5mm pitch) 形状  
(0.098 inches)



SB/TB (F : 5mm pitch) 形状  
(0.197 inches)



| 寸法<br>Type | 記号<br>Symbol         | 寸法<br>Dimensions                                     | 記号<br>Symbol     | 寸法<br>Dimensions                                    |
|------------|----------------------|--|------------------|---|
| FBR05      | A                    | 121 : 9.0max.<br>(0.354max.)                         | w                | $18^{+1.0}_{-0.5}$<br>(0.709 $^{+0.039}_{-0.020}$ ) |
|            |                      |  | W <sub>0</sub>   | 12.5min.<br>(0.492min.)                             |
|            | T                    | 2.5max.<br>(0.098max.)                               | W <sub>1</sub>   | $9^{+0.75}_{-0.5}$<br>(0.354 $^{+0.039}_{-0.020}$ ) |
|            | D                    | 5.0max.<br>(0.197max.)                               | W <sub>2</sub>   | 3max. <sup>※2</sup><br>(0.118max.)                  |
|            | H                    | $18.0^{+2.0}_{-0}$<br>(0.709 $^{+0.079}_{-0}$ )      | ℓ                | 1.0max.<br>(0.039max.)                              |
|            | P                    | 12.7 ± 1.0<br>(0.500 ± 0.039)                        | φ D <sub>0</sub> | 4 ± 0.3<br>(0.157 ± 0.012)                          |
|            | P <sub>0</sub>       | 12.7 ± 0.3 <sup>※1</sup><br>(0.500 ± 0.039)          | φ d              | 0.65 ± 0.05<br>(0.026 ± 0.002)                      |
|            | P <sub>1</sub>       | 5.1 ± 0.7<br>(0.201 ± 0.028)                         | L                | 11.0max.<br>(0.433max.)                             |
|            | P <sub>2</sub>       | 6.35 ± 1.3<br>(0.250 ± 0.051)                        | t                | 0.7 ± 0.2<br>(0.028 ± 0.008)                        |
|            | F                    | $2.5^{+1.0}_{-0.5}$<br>(0.098 $^{+0.039}_{-0.020}$ ) |                  |   |
| △h         | 0 ± 2<br>(0 ± 0.079) |  |                  |   |

Unit : mm (inch)

- ※ 1 20 ピッチにつき、累積誤差 ± 2mm 以内。
- ※ 2 貼付テープは、台紙よりはみ出さないこと。
- ※ 1 Accumulated error for 20 pitches is ± 2mm.
- ※ 2 Bonding tape must not protrude from the base tape.

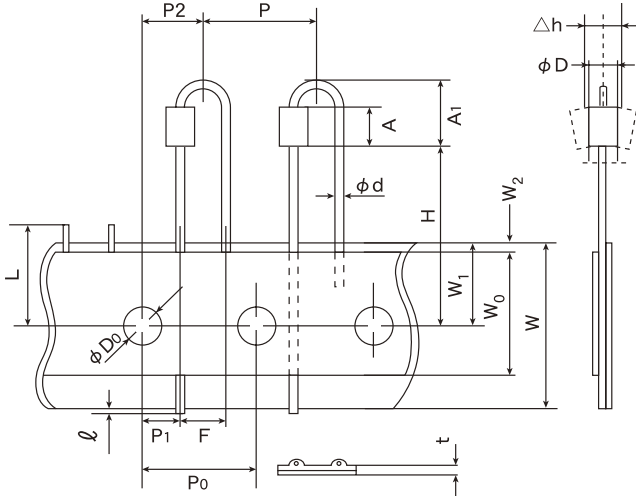
| 寸法<br>Type | 記号<br>Symbol                                       | 寸法<br>Dimensions                                     | 記号<br>Symbol     | 寸法<br>Dimensions                                    |
|------------|--|--|------------------|---|
| FBR07      | A  | 121 : 9.0max.<br>(0.354max.)                         | △h               | 0 ± 2<br>(0 ± 0.079)                                |
|            |  | 850 : 7.0max.<br>(0.276max.)                         | w                | $18^{+1.0}_{-0.5}$<br>(0.709 $^{+0.039}_{-0.020}$ ) |
|            | T  | 2.5max.<br>(0.098max.)                               | W <sub>0</sub>   | 12.5min.<br>(0.492min.)                             |
|            | D  | 7.5 ± 0.5<br>(0.925 ± 0.020)                         | w <sub>1</sub>   | $9^{+0.75}_{-0.5}$<br>(0.354 $^{+0.039}_{-0.020}$ ) |
|            | H  | SB : $18.0^{+2.0}_{-0}$<br>(0.709 $^{+0.079}_{-0}$ ) | W <sub>2</sub>   | 3max. <sup>※2</sup><br>(0.118max.)                  |
|            |  | TB : 16.0 ± 0.5<br>(0.630 ± 0.020)                   | ℓ                | 1.0max.<br>(0.039max.)                              |
|            | P  | 12.7 ± 1.0<br>(0.500 ± 0.039)                        | φ D <sub>0</sub> | 4 ± 0.3<br>(0.157 ± 0.012)                          |
|            | P <sub>0</sub>                                     | 12.7 ± 0.3 <sup>※1</sup><br>(0.500 ± 0.039)          | φ d              | 0.6 ± 0.05<br>(0.024 ± 0.002)                       |
|            | P <sub>1</sub>                                     | 3.85 ± 0.8<br>(0.152 ± 0.028)                        | L                | 11.0max.<br>(0.433max.)                             |
|            | P <sub>2</sub>                                     | 6.35 ± 1.3<br>(0.250 ± 0.051)                        | t                | 0.7 ± 0.2<br>(0.028 ± 0.008)                        |
| F          | $5^{+1.0}_{-0.5}$<br>(0.197 $^{+0.039}_{-0.020}$ ) |  |                  |   |

Unit : mm (inch)

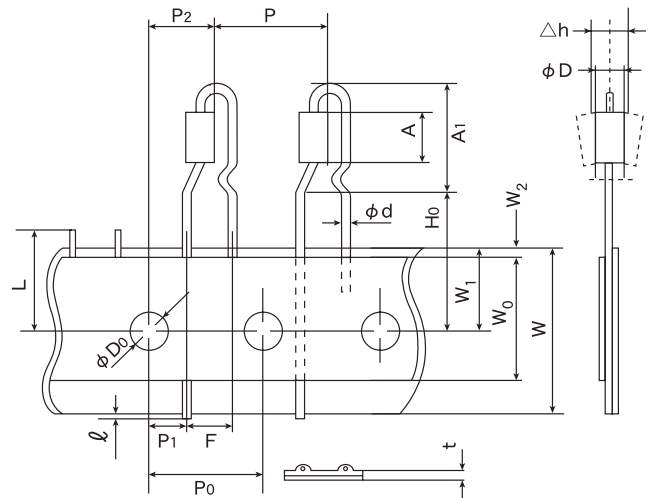
- ※ 1 20 ピッチにつき、累積誤差 ± 2mm 以内。
- ※ 2 貼付テープは、台紙よりはみ出さないこと。
- ※ 1 Accumulated error for 20 pitches is ± 2mm.
- ※ 2 Bonding tape must not protrude from the base tape.



UB 形状



VB 形状



| 寸法<br>Type                 | 記号<br>Symbol                 | 寸法<br>Dimensions   | 記号<br>Symbol                 | 寸法<br>Dimensions   |
|----------------------------|------------------------------|--|------------------------------|--|
| FBA03 □ 450<br>FBA04 □ 450 | A                            | 4.5 ± 0.3<br>(0.177 ± 0.012)   | △ h                          | 0 ± 2<br>(0 ± 0.079)   |
|                            | A <sub>1</sub>               | 9.0max.<br>(0.354max.)   | W                            | 18 <sup>+1.0</sup> <sub>-0.5</sub><br>(0.709 <sup>+0.039</sup> <sub>-0.020</sub> ) |
|                            | φ D                          | 03 : 2.7max.<br>(0.106max.)<br>04 : 3.7max.<br>(0.146max.)                           | W <sub>0</sub>               | 12.5min.<br>(0.492min.)  |
|                            |                              |  | W <sub>1</sub>               | 9 <sup>+0.75</sup> <sub>-0.5</sub><br>(0.354 <sup>+0.039</sup> <sub>-0.020</sub> ) |
|                            | H                            | 20.0 <sup>+0.5</sup> <sub>-1.0</sub><br>(0.787 <sup>+0.020</sup> <sub>-0.039</sub> ) | W <sub>2</sub>               | 3.0max.*2<br>(0.118max.)   |
|                            | P                            | 12.7 ± 1.0<br>(0.500 ± 0.039)  | ℓ                            | 1.0max.<br>(0.039max.)   |
|                            | P <sub>0</sub>               | 12.7 ± 0.3**1<br>(0.500 ± 0.012)   | φ D <sub>0</sub>             | 4.0 ± 0.3<br>(0.157 ± 0.012)   |
|                            | P <sub>1</sub>               | 3.85 ± 0.8<br>(0.152 ± 0.032)  | φ d                          | 0.65 ± 0.05<br>(0.026 ± 0.002)   |
|                            | P <sub>2</sub>               | 6.35 ± 1.3<br>(0.250 ± 0.051)  | L                            | 11.0max.<br>(0.433max.)  |
| F                          | 5.0 ± 1.0<br>(0.197 ± 0.039) | t  | 0.7 ± 0.2<br>(0.028 ± 0.008) |  |

Unit : mm (inch)

- ※ 1 20 ピッチにつき、累積誤差 ± 2mm 以内。
- ※ 2 貼付テープは、台紙よりはみ出さないこと。
- ※ 1 Accumulated error for 20 pitches is ± 2mm.
- ※ 2 Bonding tape must not protrude from the base tape.

| 寸法<br>Type   | 記号<br>Symbol                  | 寸法<br>Dimensions   | 記号<br>Symbol                 | 寸法<br>Dimensions   |
|--|-------------------------------|--|------------------------------|--|
| FBA03 □ 450<br>FBA04 □ 450<br>FBA04 □ 600<br>FBA04 □ 900 | A                             | 450: 4.5 ± 0.3<br>(0.177 ± 0.012)  | F                            | 5.0 ± 1.0<br>(0.197 ± 0.039)   |
|  |                               | 600: 6.0 <sup>+0.5</sup> <sub>-0</sub><br>(0.236 <sup>+0.020</sup> <sub>-0</sub> ) | △ h                          | 0 ± 2<br>(0 ± 0.079)   |
|  |                               | 900: 9.0 ± 0.5<br>(0.354 ± 0.020)  | W                            | 18 <sup>+1.0</sup> <sub>-0.5</sub><br>(0.709 <sup>+0.039</sup> <sub>-0.020</sub> ) |
|  | A <sub>1</sub>                | 450: 12.5max.<br>(0.492max.)   | W <sub>0</sub>               | 12.5min.<br>(0.492min.)  |
|  |                               | 900: 16.0max.<br>(0.630max.)   | W <sub>1</sub>               | 9 <sup>+0.75</sup> <sub>-0.5</sub><br>(0.354 <sup>+0.039</sup> <sub>-0.020</sub> ) |
|  | φ D                           | 3.7max.<br>(0.146max.)   | W <sub>2</sub>               | 3.0max.*2<br>(0.118max.)   |
|  | H <sub>0</sub>                | 16.0 ± 0.5<br>(0.650 ± 0.020)  | ℓ                            | 1.0max.<br>(0.039max.)   |
|  | P                             | 12.7 ± 1.0<br>(0.500 ± 0.039)  | φ D <sub>0</sub>             | 4.0 ± 0.3<br>(0.157 ± 0.012)   |
|  | P <sub>0</sub>                | 12.7 ± 0.3**1<br>(0.500 ± 0.012)   | φ d                          | 0.65 ± 0.05<br>(0.026 ± 0.002)   |
| P <sub>1</sub>   | 3.85 ± 0.8<br>(0.152 ± 0.032) | L  | 11.0max.<br>(0.433max.)      |  |
| P <sub>2</sub>   | 6.35 ± 1.3<br>(0.250 ± 0.051) | t  | 0.7 ± 0.2<br>(0.028 ± 0.008) |  |

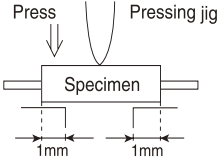
Unit : mm (inch)

- ※ 1 20 ピッチにつき、累積誤差 ± 2mm 以内。
- ※ 2 貼付テープは、台紙よりはみ出さないこと。
- ※ 1 Accumulated error for 20 pitches is ± 2mm.
- ※ 2 Bonding tape must not protrude from the base tape.



| Item                         | Specified Value                     |            |   |         |            |             | Test Method and Remarks   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
|------------------------------|-------------------------------------|------------|---|---------|------------|-------------|---|------|------------------|---|----|---|-------------------------------------|---|---------------------------|---|-------------------------------------|---|----|
|                              | FA02 Type                           | CAL45 Type | LHL□□□  | FBA/FBR | FL05□ Type | FL06BT Type |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 6.Q                          | Within the specified tolerance      | /          |   |         |            |             | FA・CA :<br>Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)<br>Measuring frequency : Specified frequency<br><br>LHL□□□ (except LHLP) :<br>Measuring equipment : LCR meter (HP4285A+HP42851A or its equivalent)<br>LCR meter (HP4262A) or its equivalent (at 1kHz)<br>Measuring frequency : Specified frequency  |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 7.DC Resistance              | Within the specified tolerance      |            |   |         |            |             | FA・CA :<br>Measuring equipment : low ohmmeter (A&D AD5812 or its equivalent)<br><br>LHL□□□・FB・FL :<br>Measuring equipment : DC ohmmeter   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 8.Self resonance frequency   | Within the specified tolerance      | /          |   |         |            |             | FA・CA :<br>Measuring equipment : Network analyzer (Anritsu MS620J or its equivalent)<br><br>LHL□□□ (except LHLP) :<br>Measuring equipment : (HP4191A, 4192A) its equivalent   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 9.Temperature characteristic | △L/L :<br>Within ±5%                | /          | △L/L :<br>Within ±7% (except LHLP16 :<br>Within ±20%) |         |            |             | FA・CA :<br>Change of maximum inductance deviation in step 1to5 <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>step</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20</td> </tr> <tr> <td>2</td> <td>-25 (Minimum operating temperature)</td> </tr> <tr> <td>3</td> <td>20 (Standard temperature)</td> </tr> <tr> <td>4</td> <td>+85 (Maximum operating temperature)</td> </tr> <tr> <td>5</td> <td>20</td> </tr> </tbody> </table><br>LHL□□□<br>Change of maximum inductance deviation in step 1to5<br>Temperature at step 1 : 20°C<br>Temperature at step 2 : Minimum operating temperature<br>Temperature at step 3 : 20°C (Standard temperature)<br>Temperature at step 4 : Maximum operating temperature<br>Temperature at step 5 : 20°C | step | Temperature (°C) | 1 | 20 | 2 | -25 (Minimum operating temperature) | 3 | 20 (Standard temperature) | 4 | +85 (Maximum operating temperature) | 5 | 20 |
| step                         | Temperature (°C)                    |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 1                            | 20                                  |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 2                            | -25 (Minimum operating temperature) |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 3                            | 20 (Standard temperature)           |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 4                            | +85 (Maximum operating temperature) |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |
| 5                            | 20                                  |            |   |         |            |             |   |      |                  |   |    |   |                                     |   |                           |   |                                     |   |    |

| Item   | Specified Value                                |                            |  |   |  |             | Test Method and Remarks  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
|--|--|----------------------------|--|---|--|-------------|--|---|-------------------|----------------------------|----------------------|---|-----------|----------------------|----------------------|------|---|----------------------|----------------------------|----------------------|-----|------|----------------------|---|-----|----------------------|----|-----|
|  | FA02 Type                                      | CAL45 Type                 | LHL□□□   | FBA/FBR   | FL05□ Type                                     | FL06BT Type |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 10. Terminal strength : tensile force                      | No abnormality such as cut lead, or looseness. |                            |  | No abnormality such as cut lead, or looseness.    | No abnormality such as cut lead, or looseness. |             | FA・CA :<br>Apply the stated tensile force progressively in the direction to draw terminal.<br><table border="1"> <tr> <th>force (N)</th> <th>duration (S)</th> </tr> <tr> <td>25</td> <td>5</td> </tr> </table> LHL□□□ :<br>Apply the stated tensile force progressively in the direction to draw terminal.<br><table border="1"> <tr> <th>Nominal wire diameter tensile <math>\phi</math> d (mm)</th> <th>force (N)</th> <th>duration(S)</th> </tr> <tr> <td>0.3 &lt; <math>\phi</math> d ≤ 0.5</td> <td>5</td> <td rowspan="3">30 ± 5</td> </tr> <tr> <td>0.5 &lt; <math>\phi</math> d ≤ 0.8</td> <td>10</td> </tr> <tr> <td>0.8 &lt; <math>\phi</math> d ≤ 1.2</td> <td>25</td> </tr> </table> FBA/FBR :<br>A bead shall be fixed and static loaded 20 ± 1N (2.0 ± 0.1 kgf) in axial direction of lead wire in 10 ± 1 seconds.<br>FL05R□ :<br>Fix the component in the direction to draw terminal, and gradually apply the tensile force of 4.9 N.  | force (N)                                   | duration (S)      | 25                         | 5                    | Nominal wire diameter tensile $\phi$ d (mm) | force (N) | duration(S)          | 0.3 < $\phi$ d ≤ 0.5 | 5    | 30 ± 5                                      | 0.5 < $\phi$ d ≤ 0.8 | 10                         | 0.8 < $\phi$ d ≤ 1.2 | 25  |      |                      |   |     |                      |    |     |
| force (N)  | duration (S)                                   |                            |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 25   | 5  |                            |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| Nominal wire diameter tensile $\phi$ d (mm)                | force (N)                                      | duration(S)                |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.3 < $\phi$ d ≤ 0.5                                       | 5  | 30 ± 5                     |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.5 < $\phi$ d ≤ 0.8                                       | 10   |                            |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.8 < $\phi$ d ≤ 1.2                                       | 25   |                            |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 11. Over current   |  |                            | There shall be no scorch or short of wire.<br>LHLC08, LHLC10:<br>There shall be no firing. |   |  |             | LHL□□□ :<br>Measuring current : Rated current × 2<br>Duration : 5min.<br>Number of measuring : one time  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 12. Terminal strength : bending                            | No abnormality such as cut lead, or looseness. |                            |  |   |  |             | FA・CA :<br>Suspend a mass at the end the terminal, incline the body though angel of 90 and return it to initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.<br>Number of bends : Two times.<br><table border="1"> <tr> <th>Nominal wire diameter tensile <math>\phi</math> d (mm)</th> <th>Bending force (N)</th> <th>Mass reference weight (kg)</th> </tr> <tr> <td>0.3 &lt; <math>\phi</math> d ≤ 0.5</td> <td>2.5</td> <td>0.25</td> </tr> <tr> <td>0.5 &lt; <math>\phi</math> d ≤ 0.8</td> <td>5</td> <td>0.50</td> </tr> </table> LH・FB :<br>Suspend a mass at the end the terminal, incline the body though angel of 90 and return it to initial position. This operation is done over a period of 2-3 sec. Then second bend in the opposite direction shall be made.<br>Number of bends : Two times.<br><table border="1"> <tr> <th>Nominal wire diameter tensile <math>\phi</math> d (mm)</th> <th>Bending force (N)</th> <th>Mass reference weight (kg)</th> </tr> <tr> <td>0.3 &lt; <math>\phi</math> d ≤ 0.5</td> <td>2.5</td> <td>0.25</td> </tr> <tr> <td>0.5 &lt; <math>\phi</math> d ≤ 0.8</td> <td>5</td> <td>0.5</td> </tr> <tr> <td>0.8 &lt; <math>\phi</math> d ≤ 1.2</td> <td>10</td> <td>1.0</td> </tr> </table> | Nominal wire diameter tensile $\phi$ d (mm) | Bending force (N) | Mass reference weight (kg) | 0.3 < $\phi$ d ≤ 0.5 | 2.5   | 0.25      | 0.5 < $\phi$ d ≤ 0.8 | 5                    | 0.50 | Nominal wire diameter tensile $\phi$ d (mm) | Bending force (N)    | Mass reference weight (kg) | 0.3 < $\phi$ d ≤ 0.5 | 2.5 | 0.25 | 0.5 < $\phi$ d ≤ 0.8 | 5 | 0.5 | 0.8 < $\phi$ d ≤ 1.2 | 10 | 1.0 |
| Nominal wire diameter tensile $\phi$ d (mm)                | Bending force (N)                              | Mass reference weight (kg) |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.3 < $\phi$ d ≤ 0.5                                       | 2.5  | 0.25                       |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.5 < $\phi$ d ≤ 0.8                                       | 5  | 0.50                       |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| Nominal wire diameter tensile $\phi$ d (mm)                | Bending force (N)                              | Mass reference weight (kg) |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.3 < $\phi$ d ≤ 0.5                                       | 2.5  | 0.25                       |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.5 < $\phi$ d ≤ 0.8                                       | 5  | 0.5                        |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 0.8 < $\phi$ d ≤ 1.2                                       | 10   | 1.0                        |  |   |  |             |  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 13. Insulation resistance : between the terminals and body |  |                            | 100M $\Omega$ min.   |   |  |             | LHL□□□ :<br>Applied voltage : 500 VDC<br>Duration : 60 sec.  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 14. Insulation resistance : between terminals and core     |  |                            |  | 1M $\Omega$ min.<br>(Other than material code MA) |  |             | FBA・FBR :<br>Applied voltage : 100 VDC<br>Duration : 60 ± 5 sec.   |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |
| 15. Withstanding : between the terminals and body          |  |                            | No abnormality such as insulation damage   |   |  |             | LHL□□□ :<br>According to JIS C5102. 7. 1. 3 (C)<br>Metal global method<br>Applied voltage : 500 VDC<br>Duration : 60 sec.  |   |                   |                            |                      |   |           |                      |                      |      |   |                      |                            |                      |     |      |                      |   |     |                      |    |     |

| Item                       | Specified Value                   |                     |   |  |            |             | Test Method and Remarks   |
|----------------------------|-----------------------------------|---------------------|---|--|------------|-------------|---|
|                            | FA02 Type                         | CAL45 Type          | LHL□□□  | FBA/FBR  | FL05□ Type | FL06BT Type |   |
| 16.DC bias characteristic  | △L/L : Within -10%                |                     |   |  |            |             | FA·CA :<br>Measure inductance with application of rated current using LCR meter to compare it with the initial value.   |
| 17.Body strength           | No abnormality as damage.         |                     |   | No abnormality such as cracks on body.                                   |            |             | FA02 :<br>Applied force : 30N<br>Duration : 10 sec.<br>Speed : Shall attain to specified force in 2 sec.<br><br>CAL45 :<br>Applied force : 50N<br>Duration : 10 sec.<br>Speed : Shall attain to specified force in 2 sec.<br><br>FBA :<br>Applied force : 50±3N<br>Duration : 30±1 sec.<br><br>  |
| 18.Resistance to vibration | △L/L :<br>Within±5%<br>Q : 30min. | △L/L :<br>Within±5% | Appearance :<br>No<br>abnormality<br>△L/L :<br>Within±5%<br>Q change :<br>Within±30%<br>(LHLP :<br>only △L/L) | Appearance :<br>No<br>abnormality<br>Impedance<br>change :<br>Within±20% |            |             | FA·CA :<br>Directions : 2 hrs each in X, Y and Z directions total : 6hrs.<br>Frequency range : 10 to 55 to 10Hz(1min.)<br>Amplitude : 1.5mm<br>Mounting method : Soldering onto printed board.<br>Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.<br><br>LHL□□□·FB :<br>Directions : 2 hrs each in X, Y and Z directions total : 6hrs.<br>Frequency range : 10 to 55 to 10Hz(1min.)<br>Amplitude : 1.5mm (But don't exceed acceleration 196m/s (two power)<br>Mounting method : Soldering onto printed board. |

| Item                    | Specified Value  |  |  |  |            |             | Test Method and Remarks   |
|-------------------------|--|--|--|--|------------|-------------|---|
|                         | FA02 Type  | CAL45 Type   | LHL□□□   | FBA/FBR  | FL05□ Type | FL06BT Type |   |
| 19. Resistance to shock | No significant abnormality in appearance                     |  |  |  |            |             | FA・CA :<br>Drop test<br>Impact material : concrete or vinyl tile<br>Height : 1m<br>Total number of drops : 10 times   |
| 20. Solderability       | At least 75% of terminal electrode is covered by new solder. | At least 75% of lead circumference is covered by new solder. | At least 90% of lead circumference is covered by new solder. | At least 75% of lead circumference is covered by new solder. |            |             | FA・CA :<br>Solder temperature : 230±5°C<br>Duration : 2±0.5 sec.<br><br>LHL□□□ :<br>Solder temperature : 235±5°C<br>Duration : 2±0.5 sec.<br>Immersion depth : Up to 1.5mm from bottom of case.<br><br>FB :<br>Solder temperature : 230±5°C<br>Duration : 3±1 sec.<br>Immersion depth : Up to 1.5mm from terminal root.<br><br>FL05R□ :<br>Solder temperature : 230±5°C<br>Duration : 2±0.5 sec.<br>Immersion depth : Up to 2~2.5mm from terminal root.<br><br>FL06BT :<br>Solder temperature : 230±5°C<br>Duration : 3±1 sec.<br>Immersion depth : Up to 0.5~1.0mm from terminal root. |

| Item                               | Specified Value                          |            |   |   |                                   |   | Test Method and Remarks   |
|------------------------------------|--|------------|---|---|-----------------------------------|---|---|
|                                    | FA02 Type                                | CAL45 Type | LHL□□□  | FBA/FBR   | FL05□ Type                        | FL06BT Type   |   |
| 21. Resisistance to soldering heat | No significant abnormality in appearance |            | No significant abnormality in appearance<br>Inductance change :<br>Within ±5%<br>Q change :<br>Within ±30%<br>(LHLP :<br>only △L/L) | No significant abnormality in appearance<br>Impedance change :<br>Within ±20% | Refer to individual specification | No significant abnormality in appearance<br>Impedance change :<br>Within ±20% | <p>FA・CA :</p> <p>Solder temperature : 260±5°C (CP02・LA02)<br/>270±5°C (LA03・LA04・LA45)</p> <p>Duration : 5±0.5 sec. One time</p> <p>Immersed conditions : Inserted into substrate with t = 1.6mm</p> <p>Recovery : At least 1hr of recovery under the standard condition after the test, followed by the measurement within 2hrs.</p> <p>LHL□□□ :</p> <p>Solder bath method<br/>Solder temperature : 260±5°C<br/>Duration : 10±1 sec.<br/>: Up to 1.5mm from bottom of case.</p> <p>Manual soldering<br/>Solder temperature : 350±10°C (At the tip of soldering iron)<br/>Duration : 5±1 sec.<br/>: Up to 1.5mm from bottom of case.</p> <p>Caution : No excessive pressing shall be applied to terminald</p> <p>Recovery : 4 to 24hrs of recovery under the standard condition after the tset.</p> <p>FB :</p> <p>Solder bath method<br/>Condition 1<br/>Solder temperature : 260±5°C<br/>Duration : 10±1 sec.<br/>Immersion depth : Up to 1.5mm from terminal root.</p> <p>Condition 2<br/>Solder temperature : 350±5°C<br/>Duration : 3±1 sec.<br/>Immersion depth : Up to 1.5mm from terminal root.<br/>Recovery : 3hrs of recovery under the standard condition after the test.</p> <p>FL :</p> <p>Solder condition : 260±5°C 10±1 sec.<br/>Immersion depth : Up to 0.5 to 1.0mm from terminal root.<br/>Recovery : 3hrs of recovery under the standard condition after the test.</p> |



| Item                      | Specified Value   |                      |  |  |                                   |  | Test Method and Remarks   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
|---------------------------|---|----------------------|--|--|-----------------------------------|--|---|------|------------------|----------------|---|---------------------------------|------|---|------------------|----------|---|---------------------------------|------|---|------------------|----------|------|------------------|----------------|---|---|------|---|------------------|----------|---|---|------|---|------------------|----------|------|------------------|----------------|---|---------------------------------|------|---|------------------|----------|---|---------------------------------|------|---|------------------|----------|
|                           | FA02 Type   | CAL45 Type           | LHL□□□   | FBA/FBR  | FL05□ Type                        | FL06BT Type  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 22. Resisatnce to solvent | Pleasa avoid the ultrasonic cleaning of this product.     |                      |  | No significant abnormality in appearance<br>Impedance change :<br>Within±20% |                                   |  | FB :<br>Solvent temperature : 20~25°C<br>Duration : 30±5 sec.<br>Solvent type : Acetone, trichloroethylene<br>Recovery : 3hrs of recovery under the standard condition after the test.  |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 23. Thermal shock         | △L/L :<br>Within±10%<br>Q : 30min.                        | △L/L :<br>Within±10% | Appearance :<br>No abnormality<br>Inductance change :<br>Within±10%<br>Q change :<br>Within±30%<br>(LHLP :<br>only △L/L) | Appearance :<br>No abnormality<br>Impedance change :<br>Within±20%           | Refer to individual specification | Appearance :<br>No abnormality<br>Impedance change :<br>Within±20% | FA・CA :<br>Conditions for 1cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25<sup>+0</sup><sub>-3</sub></td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85<sup>+2</sup><sub>-0</sub></td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table> Number of cycles : 5 cycles<br>Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.<br><br>LHL□□□・FB :<br>Accoding to JIS C0025<br>Conditions for 1 cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Minimum operating temperature<sup>+0</sup><sub>-3</sub></td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>Maximum operating temperature<sup>+2</sup><sub>-0</sub></td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table> Number of cycles : 10 cycles<br>(LHL□□□)<br>: 5 cycles (FBA, FBR)<br>Recovery : 4 to 24hrs of recovery under the standard condition after the removal from the test cfamber.<br>(LHL□□□)<br>: 3hrs of recovery under the standard condition after the removal from the test cfamber. (FBA, FBR)<br><br>FL :<br>Accoding to JIS C0025<br>Conditions for 1 cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25<sup>+0</sup><sub>-3</sub></td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85<sup>+2</sup><sub>-0</sub></td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table> Number of cycles : 10 cycles<br>Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test cfamber. | Step | Temperature (°C) | Duration (min) | 1 | -25 <sup>+0</sup> <sub>-3</sub> | 30±3 | 2 | Room temperature | Within 3 | 3 | +85 <sup>+2</sup> <sub>-0</sub> | 30±3 | 4 | Room temperature | Within 3 | Step | Temperature (°C) | Duration (min) | 1 | Minimum operating temperature <sup>+0</sup> <sub>-3</sub> | 30±3 | 2 | Room temperature | Within 3 | 3 | Maximum operating temperature <sup>+2</sup> <sub>-0</sub> | 30±3 | 4 | Room temperature | Within 3 | Step | Temperature (°C) | Duration (min) | 1 | -25 <sup>+0</sup> <sub>-3</sub> | 30±3 | 2 | Room temperature | Within 3 | 3 | +85 <sup>+2</sup> <sub>-0</sub> | 30±3 | 4 | Room temperature | Within 3 |
| Step                      | Temperature (°C)  | Duration (min)       |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 1                         | -25 <sup>+0</sup> <sub>-3</sub>                           | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 2                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 3                         | +85 <sup>+2</sup> <sub>-0</sub>                           | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 4                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| Step                      | Temperature (°C)  | Duration (min)       |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 1                         | Minimum operating temperature <sup>+0</sup> <sub>-3</sub> | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 2                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 3                         | Maximum operating temperature <sup>+2</sup> <sub>-0</sub> | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 4                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| Step                      | Temperature (°C)  | Duration (min)       |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 1                         | -25 <sup>+0</sup> <sub>-3</sub>                           | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 2                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 3                         | +85 <sup>+2</sup> <sub>-0</sub>                           | 30±3                 |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |
| 4                         | Room temperature  | Within 3             |  |  |                                   |  |   |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |      |                  |                |   |   |      |   |                  |          |   |   |      |   |                  |          |      |                  |                |   |                                 |      |   |                  |          |   |                                 |      |   |                  |          |

| Item                           | Specified Value                    |                      |  |  |            |  | Test Method and Remarks   |
|--------------------------------|------------------------------------|----------------------|--|--|------------|--|---|
|                                | FA02 Type                          | CAL45 Type           | LHL□□□   | FBA/FBR  | FL05□ Type | FL06BT Type  |   |
| 24.Damp heat                   | △L/L :<br>Within±10%<br>Q : 30min. | △L/L :<br>Within±10% |  | Appearance :<br>No abnormality<br>Impedance change :<br>Within±20% |            |  | FA・CA :<br>Temperature : 40±2°C<br>Humidity : 90~95%RH<br>Duration : 1000 hrs<br>Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.<br><br>FB :<br>Temperature : 60±2°C<br>Humidity : 90~95%RH<br>Duration : 1000 hrs<br>Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.   |
| 25.Loading under damp heat     | △L/L :<br>Within±10%<br>Q : 30min. | △L/L :<br>Within±10% | Appearance :<br>No abnormality<br>Inductance change :<br>Within±10%<br>Q change :<br>Within±30%<br>(LHLP :<br>only △L/L) | Refer to individual specification                                  |            | Appearance :<br>No abnormality<br>Impedance change :<br>Within±20% | FA・CA :<br>Temperature : 40±2°C<br>Humidity : 90~95%RH<br>Duration : 1000 hrs<br>Applied current : Rated current<br>Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.<br><br>LHL□□□ :<br>Temperature : 40±2°C<br>Humidity : 90~95%RH<br>Duration : 1000±24 hrs<br>Applied current : Rated current<br>Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber.<br><br>FL :<br>Temperature : 60±3°C<br>Humidity : 90~95%RH<br>Duration : 500 (+12, -0)hrs<br>Applied current : Rated current<br>Recovery : 1 to 2hrs of recovery under the standard condition after the removal from the test chamber. |
| 26.Loading at high temperature | △L/L :<br>Within±10%<br>Q : 30min. | △L/L :<br>Within±10% |  |  |            |  | FA・CA :<br>Temperature : 85±2°C<br>Duration : 1000 hrs<br>Applied current : Rated current<br>Recovery : At least 1hr of recovery under the standard removal from test chamber, followed by the measurement within 2hrs.   |

| Item                          | Specified Value                    |                      |  |         |   |  | Test Method and Remarks   |
|-------------------------------|------------------------------------|----------------------|--|---------|---|--|---|
|                               | FA02 Type                          | CAL45 Type           | LHL□□□   | FBA/FBR | FL05□ Type                              | FL06BT Type  |   |
| 27.Low temperature life test  | △L/L :<br>Within±10%<br>Q : 30min. | △L/L :<br>Within±10% | Appearance :<br>No<br>abnormality<br>Inductance<br>change :<br>Within±10%<br>Q change :<br>Within±30%<br>(LHLP :<br>only △L/L) |         | Refer to<br>individual<br>specification | Appearance :<br>No<br>abnormality<br>Impedance<br>change :<br>Within±20% | FA・CA :<br>Temperature : -25±2°C<br>Duration : 1000 hrs<br>Recovery : At least 1hr of recovery under the standard<br>removal from test chamber, followed by the<br>measurement within 2hrs.<br><br>LHL□□□ :<br>Temperature : -40±3°C<br>Duration : 1000±24 hrs<br>Recovery : 1 to 2hrs of recovery under the standard condition<br>after the removal from the test chamber.<br><br>FL :<br>Temperature : -40±3°C<br>Duration : 500 (+12, -0) hrs<br>Recovery : 1 to 2hrs of recovery under the standard condition<br>after the removal from the test chamber. |
| 28.High temperature life test |                                    |                      | Appearance :<br>No<br>abnormality<br>Inductance<br>change :<br>Within±10%<br>Q change :<br>Within±30%                          |         | Refer to<br>individual<br>specification | Appearance :<br>No<br>abnormality<br>Impedance<br>change :<br>Within±20% | LHL□□□ :<br>Temperature : 105±3°C<br>Duration : 1000±24 hrs<br>Recovery : 1 to 2hrs of recovery under the standard condition<br>after the removal from the test chamber.<br><br>FL :<br>Temperature : 85±3°C<br>Duration : 500 (+12, -0) hrs<br>Recovery : 1 to 2hrs of recovery under the standard condition<br>after the removal from the test chamber.   |

FA Type, CAL Type, LH Type, FB Type, FL Type

| Stages                                   | Precautions  | Technical considerations  |
|--|--|---|
| 1.Circuit Design                         | <p>Operating environment,</p> <p>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.</p>  |   |
| 2.PCB Design                             | <p>Design</p> <p>1.Please design insertion pitches of a base in the pitches that fitted a terminal interval.</p>   | <p>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.</p>              |
| 3.Considerations for automatic placement | <p>Adjustment of mounting machine</p> <p>1.Excessive impact load should not be imposed on the products when mounting onto the PC boards.</p> <p>2.Mounting and soldering conditions should be checked beforehand.</p>  | <p>1. When installing products, care should be taken not to apply distortion stress as it may deform the products.</p>  |
| 4.Soldering                              | <p>Wave soldering</p> <p>1.Please refer to the specifications in the catalog for a wave soldering.</p> <p>2.Do not immerse the entire Inductors in the flux during the soldering operation.</p> <p>Lead free soldering</p> <p>1.When using products with lead free soldering, we request to use them after confirming of adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.</p> <p>Recommended conditions for using a soldering iron:</p> <p>Put the soldering iron on the land-pattern.</p> <p>Soldering iron's temperature - Below 350 °C</p> <p>Duration - 3 seconds or less</p> <p>The soldering iron should not directly touch the inductor.</p> <p>◆Reflow soldering</p> <p>1.As for reflow soldering, please contact our sales staff.</p> | <p>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.</p>  |
| 5.Cleaning                               | <p>Cleaning conditions</p> <p>1.CP Type, LA type, CAL type, LH type</p> <p>Please do not do cleaning by a supersonic wave.</p>   | <p>CP Type, LA type, CAL type, LH type</p> <p>1.If washing by supersonic waves, supersonic waves may deform products.</p>   |
| 6.Handling                               | <p>Handling</p> <p>1.Keep the inductors away from all magnets and magnetic objects.</p> <p>Mechanical considerations</p> <p>1.Please do not give the inductors any excessive mechanical shocks.</p> <p>2.LH type</p> <p>If inductors are dropped onto the floor or a hard surface they should not be used.</p> <p>Packing</p> <p>1.Please do not give the inductors any excessive mechanical shocks.</p> <p>In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item).</p>   | <p>1.There is a case that a characteristic varies with magnetic influence.</p> <p>1.There is a case to be damaged by a mechanical shock.</p> <p>2.LH type</p> <p>There is a case to be broken by a fall.</p> <p>1.There is a case that a lead route turns at by a fall or an excessive shock.</p> |
| 7.Storage conditions                     | <p>Storage</p> <p>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..</p> <p>•Recommended conditions</p> <p>Ambient temperature           0~40°C</p> <p>Humidity                           Below 70 % RH</p> <p>The ambient temperature must be kept below 30°C. 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.</p> <p>In case of storage over 6 months, solderability shall be checked before actual usage.</p>   | <p>1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/package materials may take place.</p>  |