

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

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

L B T Y P E

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|  | Specifications |  |
|--|----------------|--|
|  | LB TYPE        |  |

( 1 / 1 3 )

#### 1. Range of application

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

#### 2. Ordering code

Example :  $\frac{\text{LB}}{(1)} \frac{2012}{(2)} \frac{\text{T}}{(3)} \frac{100}{(4)} \frac{\text{M}}{(5)} \frac{\text{R}}{(6)}$

(1) Type

(2) External dimensions

(3) Packing style (T: Taping )

(4) Inductance

(5) Inductance tolerance (M=±20 %)

(6) Inductance tolerance (R: Low Rdc type)

#### 3. Standard measuring method

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

Standard test conditions

Unless otherwise specified, temperature is  $20 \pm 15$  °C and the humidity is  $65 \pm 20$  %.

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

Inductance is in accordance with our standard measurement figures.

#### 4. Operating temperature range

−25 °C to +105 °C (Containing self temperature increase)

#### 5. Storage temperature range

−40 °C to +85 °C (Product without taping)

#### 6. Electrical characteristics

Refer to table 1 and 3.

#### 7. External dimensions and structural diagram

Refer to Table 2.

#### 8. Mechanical characteristics

Refer to Table 3.

#### 9. Environment test performance standards

Refer to Table 3.

#### 10. Taping method

Refer to Table 4.

#### 11. Packing form

Refer to Table 5.

#### 12. Reflow profile chart

Refer to Table 6.

|  | Table 1                    |  |
|--|----------------------------|--|
|  | ELECTRICAL CHARACTERISTICS |  |

( 2 / 13 )

【LB1608 type】

| Ordering Code | Nominal Inductance<br>[ $\mu$ H] | Inductance Tolerance<br>[%] | D.C. Resistance<br>$\pm 30\%$<br>[ $\Omega$ ] | Self Resonant Frequency<br>min<br>[MHz] | Rated Current<br>max<br>[mA] | Measuring Frequency<br>[MHz] |
|---------------|----------------------------------|-----------------------------|---|---|------------------------------|------------------------------|
| LB 1608T4R7M  | 4.7                              | $\pm 20\%$                  | 0.55  | 45                                      | 70                           | 7.96                         |
| LB 1608T8R2M  | 8.2                              | $\pm 20\%$                  | 0.70  | 32                                      | 60                           | 2.52                         |
| LB 1608T100M  | 10.0                             | $\pm 20\%$                  | 0.70  | 32                                      | 60                           | 2.52                         |

【LB2012 type】

| Ordering Code   | Nominal Inductance<br>[ $\mu$ H] | Inductance Tolerance<br>[%] | D.C. Resistance<br>$\pm 30\%$<br>[ $\Omega$ ] | Self Resonant Frequency<br>min<br>[MHz] | Rated Current<br>max<br>[mA] | Measuring Frequency<br>[MHz] |
|-----------------|----------------------------------|-----------------------------|---|---|------------------------------|------------------------------|
| LB 2012 T 1R0M  | 1.0                              | $\pm 20$                    | 0.15  | 100                                     | 300                          | 7.96                         |
| LB 2012 T 2R2M  | 2.2                              | $\pm 20$                    | 0.23  | 80                                      | 240                          | 7.96                         |
| LB 2012 T 3R3M  | 3.3                              | $\pm 20$                    | 0.30  | 55                                      | 240                          | 7.96                         |
| LB 2012 T 4R7M  | 4.7                              | $\pm 20$                    | 0.40  | 45                                      | 140                          | 7.96                         |
| LB 2012 T 6R8M  | 6.8                              | $\pm 20$                    | 0.47  | 38                                      | 140                          | 7.96                         |
| LB 2012 T 100M  | 10                               | $\pm 20$                    | 0.7   | 32                                      | 100                          | 2.52                         |
| LB 2012 T 100MR | 10                               | $\pm 20$                    | 0.5   | 32                                      | 100                          | 2.52                         |
| LB 2012 T 150M  | 15                               | $\pm 20$                    | 1.3   | 28                                      | 100                          | 2.52                         |
| LB 2012 T 220M  | 22                               | $\pm 20$                    | 1.7   | 16                                      | 75                           | 2.52                         |
| LB 2012 T 470M  | 47                               | $\pm 20$                    | 3.7   | 11                                      | 50                           | 2.52                         |
| LB 2012 T 680M  | 68                               | $\pm 20$                    | 6.0   | 10                                      | 50                           | 2.52                         |
| LB 2012 T 101M  | 100                              | $\pm 20$                    | 7.0   | 8                                       | 30                           | 0.796                        |

【LB2016 type】

| Ordering Code  | Nominal Inductance<br>[ $\mu$ H] | Inductance Tolerance<br>[%] | D.C. Resistance<br>$\pm 30\%$<br>[ $\Omega$ ] | Self Resonant Frequency<br>min<br>[MHz] | Rated Current<br>max<br>[mA] | Measuring Frequency<br>[MHz] |
|----------------|----------------------------------|-----------------------------|---|---|------------------------------|------------------------------|
| LB 2016 T 1R0M | 1.0                              | $\pm 20$                    | 0.09  | 100                                     | 490                          | 7.96                         |
| LB 2016 T 1R5M | 1.5                              | $\pm 20$                    | 0.11  | 80                                      | 380                          | 7.96                         |
| LB 2016 T 2R2M | 2.2                              | $\pm 20$                    | 0.13  | 70                                      | 375                          | 7.96                         |
| LB 2016 T 3R3M | 3.3                              | $\pm 20$                    | 0.20  | 55                                      | 285                          | 7.96                         |
| LB 2016 T 4R7M | 4.7                              | $\pm 20$                    | 0.25  | 45                                      | 225                          | 7.96                         |
| LB 2016 T 6R8M | 6.8                              | $\pm 20$                    | 0.35  | 38                                      | 200                          | 7.96                         |
| LB 2016 T 100M | 10                               | $\pm 20$                    | 0.5   | 32                                      | 155                          | 2.52                         |
| LB 2016 T 150M | 15                               | $\pm 20$                    | 0.7   | 28                                      | 130                          | 2.52                         |
| LB 2016 T 220M | 22                               | $\pm 20$                    | 1.0   | 16                                      | 105                          | 2.52                         |
| LB 2016 T 330M | 33                               | $\pm 20$                    | 1.7   | 14                                      | 85                           | 2.52                         |
| LB 2016 T 470M | 47                               | $\pm 20$                    | 2.4   | 11                                      | 70                           | 2.52                         |
| LB 2016 T 680M | 68                               | $\pm 20$                    | 3.0   | 10                                      | 55                           | 2.52                         |
| LB 2016 T 101M | 100                              | $\pm 20$                    | 4.5   | 8                                       | 40                           | 0.796                        |

Rated Current :The maximum DC value having inductance decrease within 10 % and temperature increase within 20 °C by the application of DC bias.

|  | Table 1                    |  |  |  |  |             |
|--|----------------------------|--|--|--|--|-------------|
|  | ELECTRICAL CHARACTERISTICS |  |  |  |  | ( 3 / 1 3 ) |

【LB2518 type】

| Ordering Code   | Nominal Inductance<br>[ $\mu$ H] | Inductance Tolerance<br>[%] | D.C. Resistance<br>$\pm 30\%$<br>[ $\Omega$ ] | Self Resonant Frequency<br>min<br>[MHz] | Rated Current<br>max<br>[mA] | Measuring Frequency<br>[MHz] |
|-----------------|----------------------------------|-----------------------------|---|---|------------------------------|------------------------------|
| LB 2518 T 1R0M  | 1.0                              | $\pm 20$                    | 0.06  | 100                                     | 665                          | 7.96                         |
| LB 2518 T 1R5M  | 1.5                              | $\pm 20$                    | 0.07  | 80                                      | 405                          | 7.96                         |
| LB 2518 T 2R2M  | 2.2                              | $\pm 20$                    | 0.09  | 68                                      | 340                          | 7.96                         |
| LB 2518 T 3R3M  | 3.3                              | $\pm 20$                    | 0.11  | 54                                      | 280                          | 7.96                         |
| LB 2518 T 4R7M  | 4.7                              | $\pm 20$                    | 0.13  | 46                                      | 240                          | 7.96                         |
| LB 2518 T 4R7MR | 4.7                              | $\pm 20$                    | 0.10  | 46                                      | 235                          | 7.96                         |
| LB 2518 T 6R8M  | 6.8                              | $\pm 20$                    | 0.15  | 38                                      | 195                          | 7.96                         |
| LB 2518 T 100M  | 10                               | $\pm 20$                    | 0.25  | 30                                      | 165                          | 2.52                         |
| LB 2518 T 150M  | 15                               | $\pm 20$                    | 0.32  | 23                                      | 145                          | 2.52                         |
| LB 2518 T 220M  | 22                               | $\pm 20$                    | 0.50  | 19                                      | 115                          | 2.52                         |
| LB 2518 T 330M  | 33                               | $\pm 20$                    | 0.70  | 15                                      | 95                           | 2.52                         |
| LB 2518 T 470M  | 47                               | $\pm 20$                    | 0.95  | 12                                      | 85                           | 2.52                         |
| LB 2518 T 680M  | 68                               | $\pm 20$                    | 1.5   | 9.5                                     | 70                           | 2.52                         |
| LB 2518 T 101M  | 100                              | $\pm 20$                    | 2.1   | 9.0                                     | 60                           | 0.796                        |
| LB 2518 T 151M  | 150                              | $\pm 20$                    | 3.2   | 7.0                                     | 45                           | 0.796                        |
| LB 2518 T 221M  | 220                              | $\pm 20$                    | 4.5   | 5.5                                     | 40                           | 0.796                        |
| LB 2518 T 331M  | 330                              | $\pm 20$                    | 7.0   | 4.5                                     | 30                           | 0.796                        |
| LB 2518 T 471M  | 470                              | $\pm 20$                    | 10  | 3.5                                     | 25                           | 0.796                        |
| LB 2518 T 681M  | 680                              | $\pm 20$                    | 17  | 3.0                                     | 20                           | 0.796                        |
| LB 2518 T 102M  | 1000                             | $\pm 20$                    | 24  | 2.4                                     | 15                           | 0.252                        |

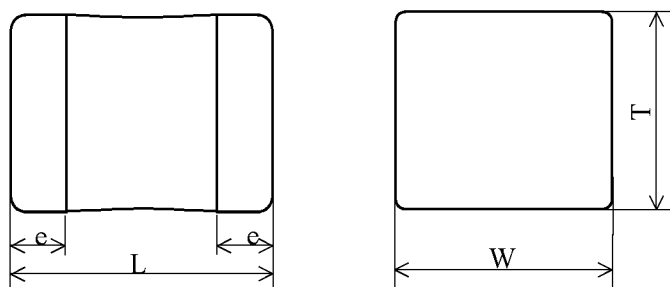
【LB3218 type】

| Ordering Code | Nominal Inductance<br>[ $\mu$ H] | Inductance Tolerance<br>[%] | D.C. Resistance<br>$\pm 30\%$<br>[ $\Omega$ ] | Self Resonant Frequency<br>min<br>[MHz] | Rated Current<br>max<br>[mA] | Measuring Frequency<br>[MHz] |
|---------------|----------------------------------|-----------------------------|---|---|------------------------------|------------------------------|
| LB3218 T 1R0M | 1.0                              | $\pm 20$                    | 0.06  | 100                                     | 1075                         | 7.96                         |
| LB3218 T 2R2M | 2.2                              | $\pm 20$                    | 0.09  | 68                                      | 775                          | 7.96                         |
| LB3218 T 4R7M | 4.7                              | $\pm 20$                    | 0.13  | 41                                      | 550                          | 7.96                         |
| LB3218 T 100M | 10                               | $\pm 20$                    | 0.25  | 30                                      | 340                          | 2.52                         |
| LB3218 T 220M | 22                               | $\pm 20$                    | 0.49  | 19                                      | 255                          | 2.52                         |
| LB3218 T 470M | 47                               | $\pm 20$                    | 0.92  | 12                                      | 205                          | 2.52                         |
| LB3218 T 101M | 100                              | $\pm 20$                    | 2.4   | 8                                       | 140                          | 0.796                        |

Rated Current :The maximum DC value having inductance decrease within 10 % and temperature increase within 20 °C by the application of DC bias.

|  |   |             |
|--|---|-------------|
|  | Table 2                                       | ( 4 / 1 3 ) |
|  | EXTERNAL DIMENSIONS AND<br>STRUCTURAL DIAGRAM |             |

## 1. External dimensions

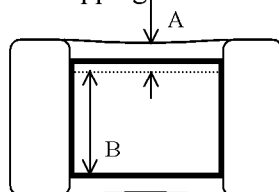


| Type   | L             | W              | T              | e               |
|--------|---------------|----------------|----------------|-----------------|
| LB1608 | $1.6 \pm 0.1$ | $0.8 \pm 0.1$  | $0.8 \pm 0.1$  | $0.35 \pm 0.15$ |
| LB2012 | $2.0 \pm 0.2$ | $1.25 \pm 0.2$ | $1.25 \pm 0.2$ | $0.5 \pm 0.2$   |
| LB2016 | $2.0 \pm 0.2$ | $1.6 \pm 0.2$  | $1.6 \pm 0.2$  | $0.5 \pm 0.2$   |
| LB2518 | $2.5 \pm 0.2$ | $1.8 \pm 0.2$  | $1.8 \pm 0.2$  | $0.5 \pm 0.2$   |
| LB3218 | $3.2 \pm 0.2$ | $1.8 \pm 0.2$  | $1.8 \pm 0.2$  | $0.6 \pm 0.2$   |

Unit: mm

### ※ External appearance

#### • Resin chipping



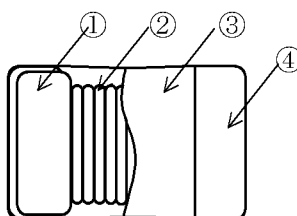
Set □ area as reference for flat level, over 70 % shall be flat.  
Judgment shall be made according to the dimension below.  
Insufficient resin on one side shall be A Max.  
In case of insufficient resin on both side over B of flat surface shall be ensured.  
(Template R part is not included on reference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

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

| Type   | A    | B    | Pin holes dimensions |
|--------|------|------|----------------------|
| LB1608 | 0.25 | 0.45 | $\phi 0.3$           |
| LB2012 | 0.45 | 0.7  | $\phi 0.5$           |
| LB2016 | 0.5  | 1.0  | $\phi 0.5$           |
| LB2518 | 0.6  | 1.1  | $\phi 0.5$           |
| LB3218 | 0.6  | 1.1  | $\phi 0.5$           |

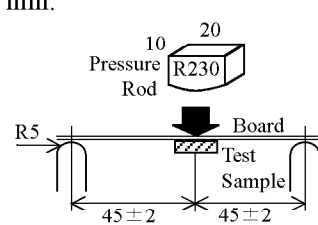
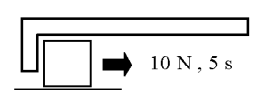
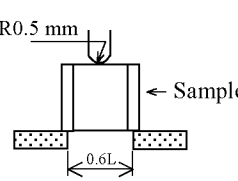
Unit: mm

## 2. Structural diagram



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

|  |           |             |
|--|-----------|-------------|
|  | Table 3   | ( 5 / 1 3 ) |
|  | STANDARDS |             |

|                            | Item                            | Standard                               | Test method   |
|----------------------------|---------------------------------|--|---|
| ELECTRICAL CHARACTERISTICS | Inductance                      | Refer to Table 1                       | LCR meter (HP4285A or equivalent)   |
|                            | Self resonant frequency         | Refer to Table 1                       | Impedance/material analyzer (HP4291A or equivalent)   |
|                            | DC resistance                   | Refer to Table 1                       | DC ohm meter (A&D AD-5812 or equivalent)  |
|                            | Rated current                   | Refer to Table 1.                      | The maximum DC value having inductance decrease within 10 % and temperature increase within 20 °C by the application of DC bias.  |
|                            | Insulation resistance           | Not less than $1 \times 10^8 \Omega$ . | 0.2 mm diameter copper wires were wound around the coils three times and measurements were take after 50 V DC was applied between the wire and the terminals for a period of 30 seconds.  |
|                            | Over current test               | No smoke and no fire.                  | 2 times the rated current was applied for a period of 5 minutes.  |
| MECHANICAL CHARACTERISTICS | Resistance to Flexure substrate | No damage.                             | <p>The test samples shall be soldered to the testing board and by reflow soldering conditions as show in table 6. Apply pressure in the direction of the arrow until bent width reaches 2 mm.</p>  <p>Unit : mm</p> <p>Substrate size : <math>100 \times 40 \times 1.0</math><br/> Substrate material : glass epoxy-resin<br/> Solder cream thickness : 0.15<br/> Land size: Refer to figure 1</p> |
|                            | Adhesion of Terminal electrode  | Shall not come off PC board.           | <p>The test samples shall be soldered to the testing board and by reflow soldering conditions as shown table 6.</p>  <p>Applied force : 10 N to X and Y directions.<br/> Duration : 5 s. Solder cream thickness : 0.15 mm<br/> (Land size refer to recommended Land Pattern Dimensions of "Precaution")</p>   |
|                            | Body strength                   | No damage.                             | <p>Applied force : 10 N<br/> Duration : 10 s</p>   |

|  |           |             |
|--|-----------|-------------|
|  | Table 3   | ( 6 / 1 3 ) |
|  | STANDARDS |             |

ENVIRONMENT TESTS

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

|  |           |  |
|--|-----------|--|
|  | Table 3   |  |
|  | STANDARDS |  |

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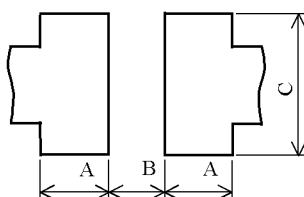
ENVIRONMENT TESTS

|             | Item                                  | Standard   | Test method  |             |                                    |          |                  |         |                  |      |              |
|-------------|---------------------------------------|--|--|-------------|------------------------------------|----------|------------------|---------|------------------|------|--------------|
|             | Loading at high temperature life test | $\Delta L/L \rightarrow$ within $\pm 10\%$<br>No abnormality observed in appearance. | <p>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.</p> <p>The test samples shall be put in thermostatic oven set at temperature, as shown in under table, with the rated current continuously applied.</p> <table><tr><td>Temperature</td><td><math>85 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Current</td><td>Refer to Table 1</td></tr><tr><td>Time</td><td>1 000 + 24 h</td></tr></table>   | Temperature | $85 \pm 2\text{ }^{\circ}\text{C}$ | Current  | Refer to Table 1 | Time    | 1 000 + 24 h     |      |              |
|             | Temperature                           | $85 \pm 2\text{ }^{\circ}\text{C}$   |  |             |                                    |          |                  |         |                  |      |              |
|             | Current                               | Refer to Table 1   |  |             |                                    |          |                  |         |                  |      |              |
| Time        | 1 000 + 24 h                          |  |  |             |                                    |          |                  |         |                  |      |              |
|             | Damp heat life test                   | $\Delta L/L \rightarrow$ within $\pm 10\%$<br>No abnormality observed in appearance. | <p>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.</p> <p>The test samples shall be put in thermostatic oven set at temperature with humidity, as shown in under table.</p> <table><tr><td>Temperature</td><td><math>60 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Humidity</td><td>90~95 %RH</td></tr><tr><td>Time</td><td>1 000 + 24 h</td></tr></table>  | Temperature | $60 \pm 2\text{ }^{\circ}\text{C}$ | Humidity | 90~95 %RH        | Time    | 1 000 + 24 h     |      |              |
| Temperature | $60 \pm 2\text{ }^{\circ}\text{C}$    |  |  |             |                                    |          |                  |         |                  |      |              |
| Humidity    | 90~95 %RH                             |  |  |             |                                    |          |                  |         |                  |      |              |
| Time        | 1 000 + 24 h                          |  |  |             |                                    |          |                  |         |                  |      |              |
|             | Loading under damp heat life test     | $\Delta L/L \rightarrow$ within $\pm 10\%$<br>No abnormality observed in appearance. | <p>The test samples shall be soldered to the testing jig and by reflow soldering conditions as shown in table 6.</p> <p>The test samples shall be put in thermostatic oven set at temperature with humidity, as shown in under table, and with the rated current continuously applied.</p> <table><tr><td>Temperature</td><td><math>60 \pm 2\text{ }^{\circ}\text{C}</math></td></tr><tr><td>Humidity</td><td>90~95 %RH</td></tr><tr><td>Current</td><td>Refer to Table 1</td></tr><tr><td>Time</td><td>1 000 + 24 h</td></tr></table> | Temperature | $60 \pm 2\text{ }^{\circ}\text{C}$ | Humidity | 90~95 %RH        | Current | Refer to Table 1 | Time | 1 000 + 24 h |
| Temperature | $60 \pm 2\text{ }^{\circ}\text{C}$    |  |  |             |                                    |          |                  |         |                  |      |              |
| Humidity    | 90~95 %RH                             |  |  |             |                                    |          |                  |         |                  |      |              |
| Current     | Refer to Table 1                      |  |  |             |                                    |          |                  |         |                  |      |              |
| Time        | 1 000 + 24 h                          |  |  |             |                                    |          |                  |         |                  |      |              |

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

- Class- I and Class- II ozone depleting substances (ODS), etc., which are regulated by the Federal Law for Atmosphere Purification, are not included in the products not it applied to the products at any stage of manufacturing processes.
- The bromide flame proof materials are not used at all.
- The product and the specifications described above are not included in the list of export regulations in Japan and USA.

Refer to figure 1 Resistance to Flexure substrate Land size



| Type   | A   | B   | C   |
|--------|-----|-----|-----|
| LB1608 | 1.0 | 1.5 | 1.5 |
| LB2012 | 0.7 | 1.0 | 1.5 |
| LB2016 | 0.9 | 0.8 | 1.8 |
| LB2518 | 0.9 | 1.3 | 2.0 |
| LB3218 | 1.0 | 1.6 | 2.0 |

Unit : mm

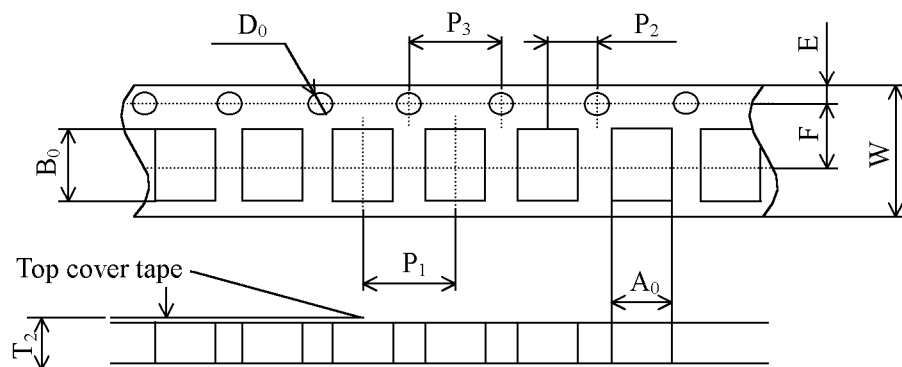
AE1400100001V100



|  |                   |             |
|--|-------------------|-------------|
|  | Table 4           | ( 8 / 1 3 ) |
|  | TAPING DIMENSIONS |             |

## 1. Dimensions

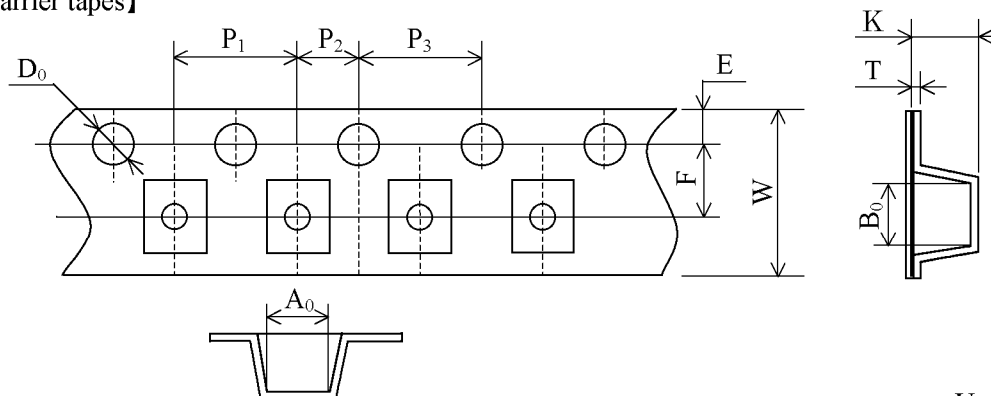
### 【Card board carrier tapes】



Unit : mm

| Type   | A <sub>0</sub> | B <sub>0</sub> | W             | F             | E             | P <sub>1</sub> | P <sub>2</sub> | P <sub>3</sub> | D <sub>0</sub>        | T      |
|--------|----------------|----------------|---------------|---------------|---------------|----------------|----------------|----------------|-----------------------|--------|
| LB1608 | 1.00<br>±0.20  | 1.80<br>±0.20  | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10  | 2.00<br>±0.10  | 4.00<br>±0.10  | φ 1.50<br>+0.10<br>-0 | 1.1max |

### 【Emboss carrier tapes】

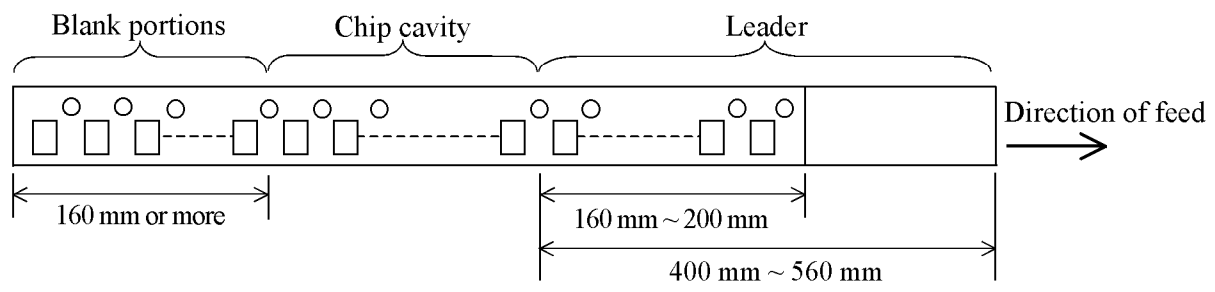


Unit : mm

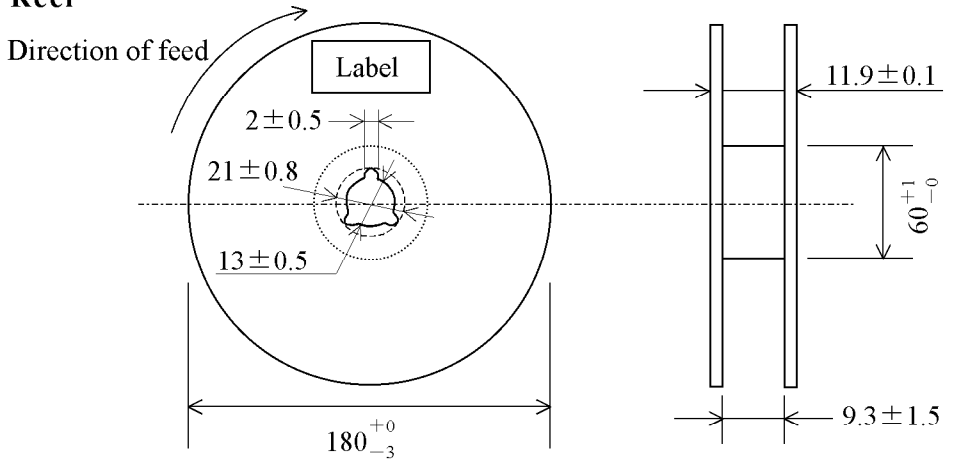
| Type   | A <sub>0</sub> | B <sub>0</sub> | W             | F             | E             | P <sub>1</sub> | P <sub>2</sub> | P <sub>3</sub> | D <sub>0</sub>        | T             | K             |
|--------|----------------|----------------|---------------|---------------|---------------|----------------|----------------|----------------|-----------------------|---------------|---------------|
| LB2012 | 1.45<br>±0.20  | 2.25<br>±0.20  | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10  | 2.00<br>±0.10  | 4.00<br>±0.10  | φ 1.50<br>+0.10<br>-0 | 0.25<br>±0.05 | 1.30<br>±0.10 |
| LB2016 | 1.90<br>±0.20  | 2.20<br>±0.20  | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10  | 2.00<br>±0.10  | 4.00<br>±0.10  | φ 1.50<br>+0.10<br>-0 | 0.30<br>±0.05 | 1.85<br>±0.10 |
| LB2518 | 2.15<br>±0.20  | 2.70<br>±0.20  | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10  | 2.00<br>±0.10  | 4.00<br>±0.10  | φ 1.50<br>+0.10<br>-0 | 0.30<br>±0.05 | 2.10<br>±0.10 |
| LB3218 | 2.10<br>±0.10  | 3.50<br>±0.10  | 8.00<br>±0.20 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10  | 2.00<br>±0.05  | 4.00<br>±0.10  | φ 1.50<br>+0.10<br>-0 | 0.20<br>±0.05 | 2.30<br>±0.10 |

|  |                   |             |
|--|-------------------|-------------|
|  | Table 4           | ( 9 / 1 3 ) |
|  | TAPING DIMENSIONS |             |

**2. Direction of rolling**



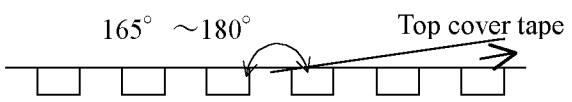
**3. Reel**



Unit : mm

Label position : the opposite side of pilot holes

**4. Top tape strength**



**【Card board carrier tapes】**

- Peel-off strength : 0.15 N ~ 0.5 N
- Peel-off angle :  $165^{\circ} \sim 180^{\circ}$
- Peel-off speed : 300 mm/min

**【Emboss carrier tapes】**

- Peel-off strength : 0.2 N ~ 0.7 N
- Peel-off angle :  $165^{\circ} \sim 180^{\circ}$
- Peel-off speed : 300 mm/min

|  |              |               |
|--|--------------|---------------|
|  | Table 5      | ( 1 0 / 1 3 ) |
|  | PACKING FORM |               |

### 1. Taping packing quantity

| Type   | Standard Quantity (pcs/1 reel) | Carrier tapes            |
|--------|--------------------------------|--------------------------|
| LB1608 | 4 000                          | Card board carrier tapes |
| LB2012 | 3 000                          | Emboss carrier tapes     |
| LB2016 | 2 000                          | Emboss carrier tapes     |
| LB2518 | 2 000                          | Emboss carrier tapes     |
| LB3218 | 2 000                          | Emboss carrier tapes     |

### 2. The allowable number of empty components

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

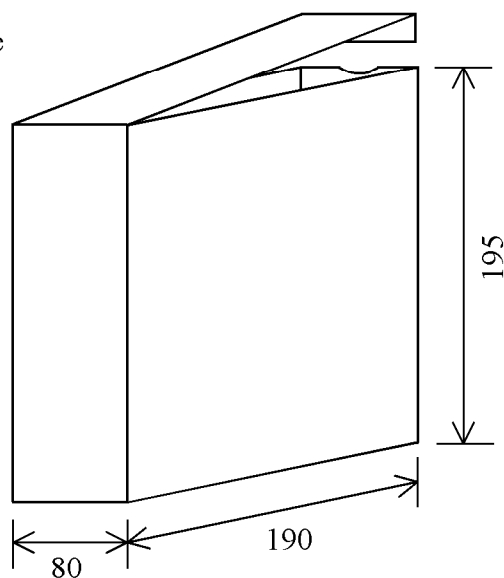
### 3. Marking

The following items shall be marked legibly each unit pack.

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

### 4. Dimensions of packing box (taping)

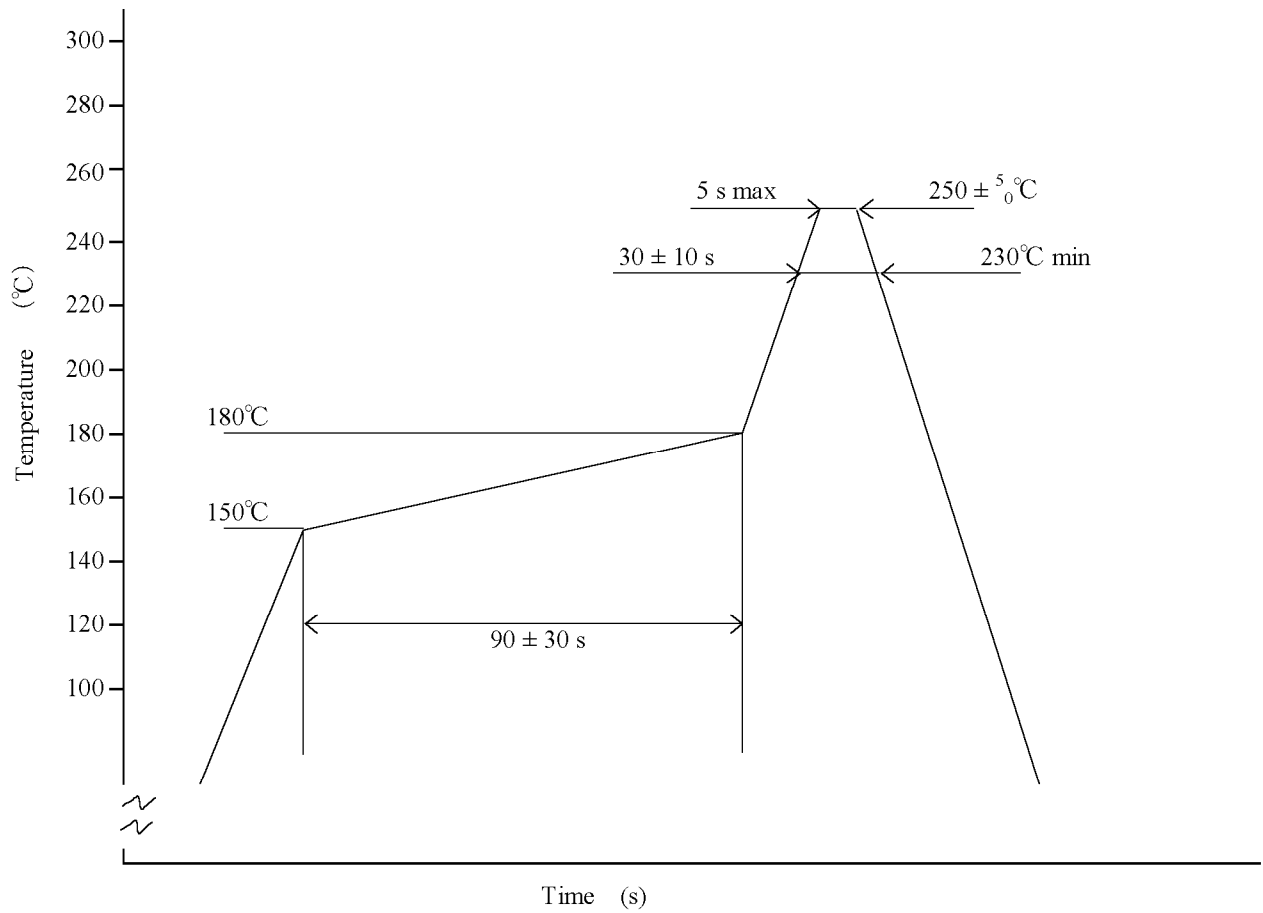
※ Reference



Unit : mm

| Type   | Standard Quantity (pcs) |
|--------|-------------------------|
| LB1608 | 20 000                  |
| LB2012 | 15 000                  |
| LB2016 | 10 000                  |
| LB2518 | 10 000                  |
| LB3218 | 10 000                  |

|  |                                  |               |
|--|----------------------------------|---------------|
|  | Table 6                          | ( 1 1 / 1 3 ) |
|  | REFLOW PROFILE CHART (REFERENCE) |               |



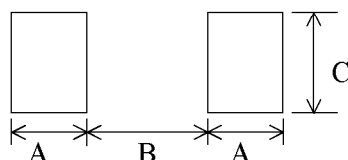
※ At using TAIYO YUDEN products of this specification and in using the lead free soldering, We request to use then after confirming of adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.

## Precautions

( 1 2 / 1 3 )

### 1. Surface Mounting

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



Unit : mm

| Type   | A    | B   | C    |
|--------|------|-----|------|
| LB1608 | 0.55 | 0.7 | 1.0  |
| LB2012 | 0.7  | 0.8 | 1.45 |
| LB2016 | 0.7  | 0.8 | 1.8  |
| LB2518 | 0.8  | 1.2 | 2.0  |
| LB3218 | 1.0  | 1.6 | 2.0  |

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

### 2. Handling

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

### 3. Storage

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

### 4. Production Sites

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

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

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**SPECIAL NOTICE**

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