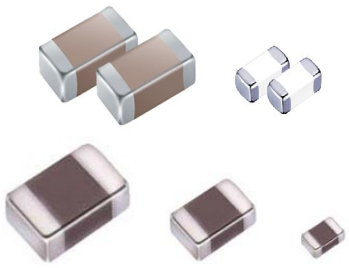
# Multi Layer Ceramic Capacitor

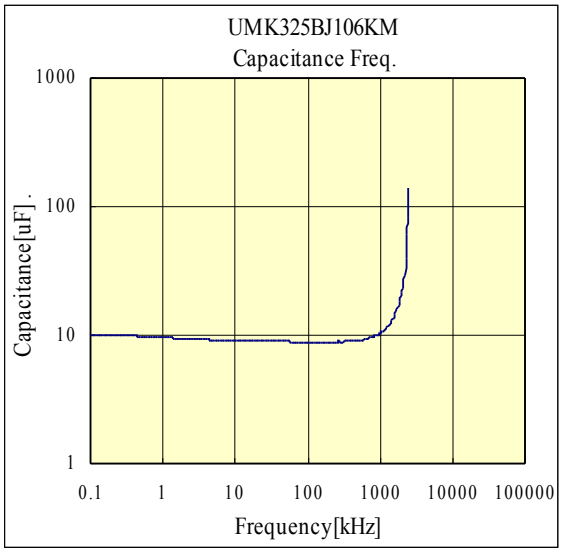
-Electrical Characteristics Data- 05HA12

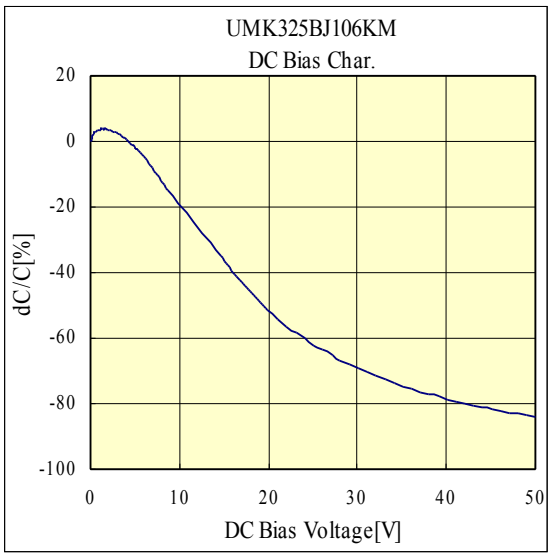
*RoHS compliance product*

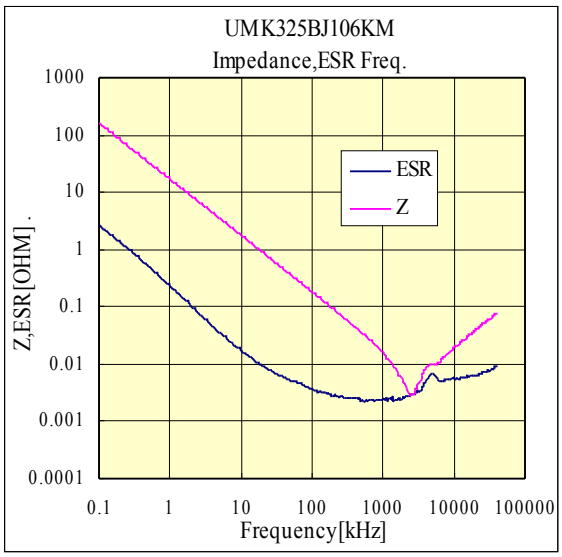
## ○*UMK325BJ106KM*

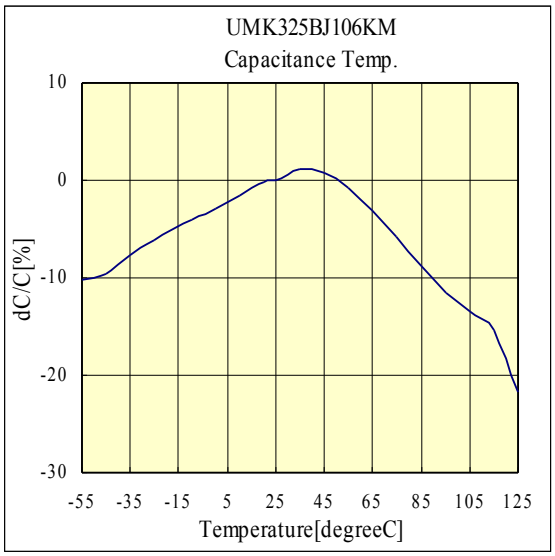
***50V 1210 X7S 10uF +/-10% t=2.8mmMAX***

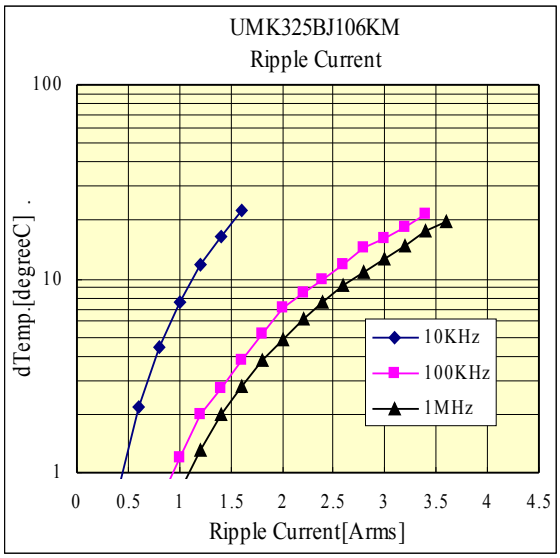




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The data is reference only.Varying the mountiong and measurement methods may result in characteristics.
Taiyo Yuden reserves the right to make change to the Data at any time without notice.
Before making final selection,please check product specification.

TENTATIVE　SPECIFICATIONS
MULTILAYER CERAMIC CHIP CAPACITORS
NICKEL BASED ELECTRODES

CLASS Ⅱ/　X7S
（Equivalent to EIA　：CC1210）

UMK325 BJ106KM-T
（For reflow Soldering）

TAIYO YUDEN CO., LTD.
TAIYO YUDEN (SARAWAK) SDN, BHD.
KOREA KYONG NAM TAIYO YUDEN CO., LTD.
TAIYO YUDEN (GUANG DONG) CO.,LTD.

| Document No. | TENTATIVE Specifications<br>Multilayer Ceramic Chip Capacitor NICKEL BASED ELECTRODES |
|---|---|
| | Item<br>Multilayer Ceramic Capacitor Class Ⅱ (Equivalent to EIA : CC1210) |

1. Scope

This specification covers multilayer chip type ceramic capacitor (Pb-Free) for use in electronic appliances and electric communication equipment.

2. Part Numbering System

Part number is indicated as follows:

(Example) Ni based electrodes: U (①) MK 325 (②) BJ 106 (③ Capacitance) K (④) M (⑤) −T (⑥)

① Rated voltage

| Code | Voltage |
|---|---|
| U | 50.0V |

② Size (mm)

| Code | Size |
|---|---|
| 325 | 3.2×2.5 |

④ Tolerance

| Code | Tolerance |
|---|---|
| K | ±10% |
| M | ±20% |

⑥ Packaging

| Packaging | Code |
|---|---|
| Taping | −T |

③ Temperature Characteristic

| Class Ⅱ | Capacitance change rate | Temperature range | Reference temperature |
|---|---|---|---|
| BJ(X7S) | ±22% | -55～+125℃ | 25℃ |

⑤ Thickness code（Ni based electrodes）

| Type | Thickness rank (mm) | Code |
|---|---|---|
| 325 | 2.5 | M |

3. Test Conditions

Standard test conditions shall be temperature of 5 to 35℃, relative humidity of 45 to 85% and air pressure of 86 to 106kPa. Test shall be conducted at temperature of 25±3℃, relative humidity of 60 to 70% and air pressure of 86 to 106kPa if test result is suspectable.

Unless otherwise specified, all tests shall be conducted under standard test conditions.

4. Construction, Dimensions and Performance

Details of construction, dimensions and performance shall be specified in the following sheets.

5. Packaging

Packaging shall be made to avoid damages of capacitors during transportation or storage. Packaging shall be marked with part number, quantity, lot number and manufacturer's name at its appropriate position.

6. Manufacturing site

TAIYO YUDEN CO., LTD. TAMAMURA PLANT (JAPAN)
TAIYO YUDEN (SARAWAK) SDN, BHD. (MALAYSIA)
KOREA KYONG NAM TAIYO YUDEN CO., LTD. (KOREA)
TAIYO YUDEN（GUANG DONG）CO., LTD. (CHINA)
TAIYO YUDEN (PHILIPPINES) INC. (PHILIPPINES)

7. Precautions

Please refer to technical report "EIAJ RCR-2335 Guideline of notabilia" issued by JEITA prior to product being used.

If you need further information, please contact us.

8. Storage conditions

To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.

・Recommended conditions

Ambient temperature: Below 40℃

Humidity: Below 70% RH

The ambient temperature must be kept below 30℃. Even under ideal storage conditions capacitor electrode solderability decreases as time passes, so ceramic chip capacitors should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.

・The packaging material should be kept where no chlorine or sulfur exists in the air.

9. RoHS compliance

・This product conform to “RoHS compliance”

・”RoHS compliance” means that the product does not contain lead, cadmium, mercury, hexavalent chromium, PBB or PBDE referring to EU Directive 2002/95/EC, except other non-restricted substances or impurities which could not be technically removed at the refining process.

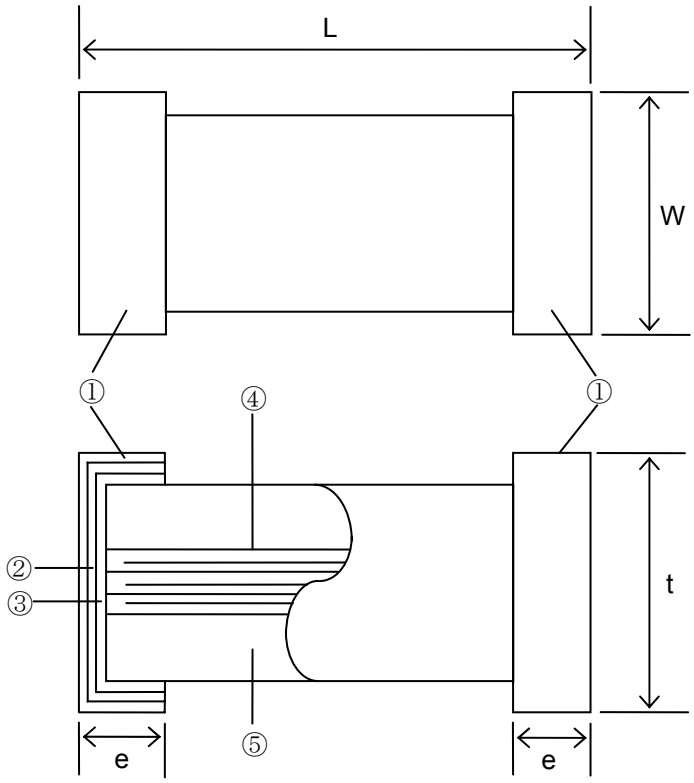
<table>
<tr><th>No.</th><th>Item</th><th>Specified Value</th><th>Remarks</th></tr>
<tr><td>1</td><td>Operating Temperature Range</td><td>-55～+125℃</td><td>Continuous use is available in this range.</td></tr>
<tr><td>2</td><td>Highest Operating Temperature</td><td>+125℃</td><td>Maximum ambient temperature at which capacitors can be continuously used with rated voltage applied.</td></tr>
<tr><td>3</td><td>Shape and Dimensions</td><td>Per Fig.1</td><td></td></tr>
<tr><td>4</td><td>Heat Treatment</td><td></td><td>Initial value shall be measured after test sample is heat-treated at 150 +0/-10℃ for an hour and kept at room temperature for 48±4hours.</td></tr>
<tr><td>5</td><td>Voltage Treatment</td><td></td><td>Initial value shall be measured after test sample is voltage-treated for an hour at temperature and voltage which are specified as test conditions, and kept at room temperature for 48±4hours.</td></tr>
<tr><td>6</td><td>Dielectric Withstanding Voltage<br>(between terminals)</td><td>No abnormality</td><td>Conforming to EIA RS-198-D (1991).<br>250% of DC rated voltage shall be applied for 1 to 5 seconds.<br>Charging and discharging current shall be 50mA or less.</td></tr>
<tr><td>7</td><td>Insulation Resistance</td><td>100MΩ・μF min.</td><td>Conforming to EIA RS-198-D (1991).<br>Voltage for the measurement shall be rated voltage and voltage applying time shall be 1 minute±5 seconds.<br>Charging and discharging current shall be 50mA or less.</td></tr>
<tr><td>8</td><td>Capacitance and Tolerance</td><td>10μF<br>K(±10%)<br>M(±20%)</td><td>Conforming to EIA RS-198-D (1991).<br>Heat treatment specified in No.4 of the specification shall be conducted prior to measurement.<br>Measuring frequency and voltage shall conform to the table shown below.<br><table><tr><th>Measuring Frequency</th><th>Measuring Voltage</th></tr><tr><td>1kHz±10%</td><td>1.0±0.1Vrms</td></tr></table></td></tr>
<tr><td>9</td><td>Dissipation Factor (DF)</td><td>3.5%max</td><td>Conforming to EIA RS-198-D (1991).<br>Heat treatment specified in No.4 of the specification shall be conducted prior to measurement.<br>Measuring frequency and voltage shall conform to the table shown below.<br><table><tr><th>Measuring Frequency</th><th>Measuring Voltage</th></tr><tr><td>1kHz±10%</td><td>1.0±0.1Vrms</td></tr></table></td></tr>
</table>

| No. | Item | Specified Value | Remarks |
|---|---|---|---|
| 10 | Temperature Characteristic | Within±22% | Conforming to EIA RS-198-D (1991).<br>Heat treatment specified in No.4 of the specification shall be conducted prior to measurement.<br>Maximum capacitance deviation in both (+) and (-) sides in range of lowest temperature to highest temperature for capacitor shall be indicated in ratio of variation in reference to capacitance value at reference temperature. |
| 11 | Adhesive Force of Terminal Electrodes | Terminal electrodes shall be no exfoliation or a sign of exfoliation. | Test sample shall be soldered to test jig shown in Fig.2 and a force of 5N{0.51kgf} shall be applied in arrow direction for 30±5 seconds. |
| 12 | Vibration | Initial performance shall be satisfied. | Conforming to EIA RS-198-D (1991).<br>Test sample shall be soldered to test jig shown in Fig.2. Heat treatment specified in No.4 of the specification shall be conducted prior to test.<br><br>Test conditions:<br>Frequency range: 10～55Hz<br>Overall amplitude: 1.5mm<br>Sweeping method: 10～55～10Hz for 1 min.<br>Each two hours in X,Y,Z direction: 6 hours in total |

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specified Value</th><th>Remarks</th></tr>
<tr><td rowspan="5">13</td><td rowspan="5">Resistance to Soldering Heat</td><td>Appearance</td><td>No abnormality</td><td rowspan="5">Conforming to EIA RS-198-D (1991).<br>Test sample shall be completely submerged in molten solder of 270±5℃ for 3±0.5 seconds.<br>Preheating as shown in the table below shall be continuously conducted before submersion and test sample shall be kept at normal temperature after test.<br><table><tr><th>Sequence</th><th>Temperature (℃)</th><th>Time (min)</th></tr><tr><td>1</td><td>80～100</td><td>5 to 10</td></tr><tr><td>2</td><td>150～200</td><td>5 to 10</td></tr></table><br>Heat treatment specified in No.4 of the specification shall be conducted prior to test.<br>Measurement shall be conducted after test sample is kept at room temperature for 48±4 hours.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±7.5%</td></tr>
<tr><td>Dissipation Factor</td><td>Initial value shall be satisfied.</td></tr>
<tr><td>Insulation Resistance</td><td>Initial value shall be satisfied.</td></tr>
<tr><td>Dielectric Withstanding Voltage (between terminals)</td><td>No abnormality</td></tr>
<tr><td rowspan="2">14</td><td colspan="2" rowspan="2">Solderability</td><td rowspan="2">More than 95% of terminal electrode shall be covered with fresh solder.</td><td>【Eutectic】<br>Used solder shall be [JIS Z 3282 H60A or H63A].<br>Test sample shall be completely submerged in molten solder of 230±5℃ for 4±1 seconds.</td></tr>
<tr><td>【Pb free】<br>Used solder shall be [Sn/3.0Ag/0.5Cu].<br>Test sample shall be completely submerged in molten solder of 245±3℃ for 4±1 seconds.</td></tr>
<tr><td rowspan="5">15</td><td rowspan="5">Thermal Shock</td><td>Appearance</td><td>No abnormality</td><td rowspan="5">Conforming to EIA RS-198-D (1991).<br>Test sample shall be soldered to test jig shown in Fig.2. Heat treatment specified in No.4 of the specification shall be conducted prior to test.<br>Test sample shall be kept for specified time at each of temperature in steps 1 to 4 shown below in sequence.<br><table><tr><th>Step</th><th>Temperature (℃)</th><th>Time (min)</th></tr><tr><td>1</td><td>Lowest operating temperature</td><td>30±3</td></tr><tr><td>2</td><td>Normal temperature</td><td>2～3</td></tr><tr><td>3</td><td>Highest operating temperature</td><td>30±3</td></tr><tr><td>4</td><td>Normal temperature</td><td>2～3</td></tr></table><br>Temperature cycle shall be repeated five times in this method, and measurement shall be conducted after test sample is kept for 48±4 hours.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±7.5%</td></tr>
<tr><td>Dissipation Factor</td><td>Initial value shall be satisfied.</td></tr>
<tr><td>Insulation Resistance</td><td>Initial value shall be satisfied.</td></tr>
<tr><td>Dielectric Withstanding Voltage (between terminals)</td><td>No abnormality</td></tr>
</table>

| No. | Item | | Specified Value | Remarks |
|---|---|---|---|---|
| 16 | Humidity (Steady State) | Appearance | No abnormality | Conforming to EIA RS-198-D (1991).<br>Test sample shall be at 40±2℃ with relative humidity of 90 to 95% for 500 +24/-0 hours.<br>Heat treatment specified in No.4 of the specification shall be conducted prior to test.<br>Measurement shall be conducted after test sample is kept for 48±4 hours. |
| | | Capacitance Change | Within±12.5% | |
| | | Dissipation Factor | 5.0%max | |
| | | Insulation Resistance | 50MΩ・μF min. | |
| 17 | High Temperature Loading | Appearance | No abnormality | Conforming to EIA RS-198-D (1991).<br>Test sample shall be put in thermostatic oven with maximum temperature and 150% of DC rated voltage shall be continuously applied for 1000 +48/-0 hours.<br>Charging and discharging current shall be 50mA or less.<br>Voltage treatment specified in No.5 of the specification shall be conducted prior to test.<br>Measurement shall be conducted after test sample is kept for 48±4hours. |
| | | Capacitance Change | Within±20.0% | |
| | | Dissipation Factor | 5.0%max | |
| | | Insulation Resistance | 50MΩ・μF min. | |
| 18 | Humidity Loading | Appearance | No abnormality | Conforming to EIA RS-198-D (1991).<br>Test sample shall be put in thermostatic oven with 40±2℃ and relative humidity 90 to 95% and DC rated voltage shall be continuously applied for 500 +24/-0 hours.<br>Charging and discharging current shall be 50mA or less.<br>Voltage treatment specified in No.5 of the specification shall be conducted prior to test.<br>Measurement shall be conducted after test sample is kept for 48±4 hours. |
| | | Capacitance Change | Within±20.0% | |
| | | Dissipation Factor | 5.0%max | |
| | | Insulation Resistance | 25MΩ・μF min. | |
| 19 | Bending Strength | Appearance | No abnormality | Test sample shall be soldered to test board as shown in Fig.3.<br>Soldering shall be conducted with care of avoiding an abnormality such as heat shock.<br>Deflection test is such that force to cause deflection as much as 1.0mm is applied for 10 seconds in method shown in Fig.4.<br>Measurement shall be conducted with deflection of 1.0mm. |
| | | Capacitance Change | Within±12.5% | |

Fig.1 Shape and Dimensions



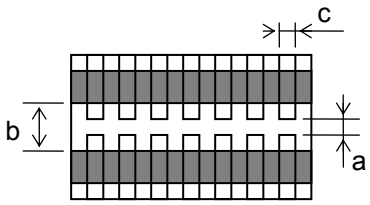

Ni Based Electrodes[Class Ⅱ]

| No. | Name | Material |
|---|---|---|
| ① | Terminal Electrodes（Surface） | Sn Plating |
| ② | Terminal Electrodes | Ni Plating |
| ③ | External Electrodes | Ni |
| ④ | Internal Electrodes | Ni |
| ⑤ | Dielectric | Barium titanate |

| Type | L | W | t | e |
|---|---|---|---|---|
| 325 | 3.2±0.3 | 2.5±0.2 | 2.5±0.2 | 0.6±0.3 |

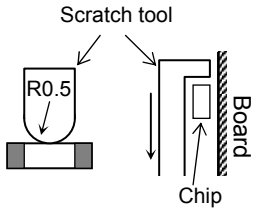
[Unit: mm]

Fig.2 Test Jig of Adhesive Force of Terminal Electrodes, Vibration and Thermal Shock




| Size (L×W) | a | b | c |
|---|---|---|---|
| 3.2×2.5 | 2.2 | 5.0 | 3.2 |

[Unit: mm]




Cross Section

Material: Glass epoxy board [JIS C 6484]

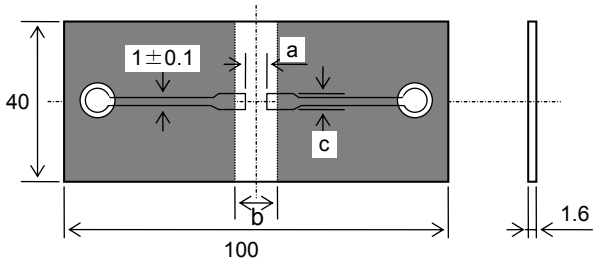
Copper foil (Thickness: 0.035mm)

Solder resist

Remarks: Uniform soldering shall be conducted with solder (H60A or H63A in JIS Z 3282) by using an iron or soldering oven.

Soldering shall be conducted with care of avoiding an abnormality such as heat shock.

Fig.3 Test Board




Material: Glass epoxy board [JIS C 6484]

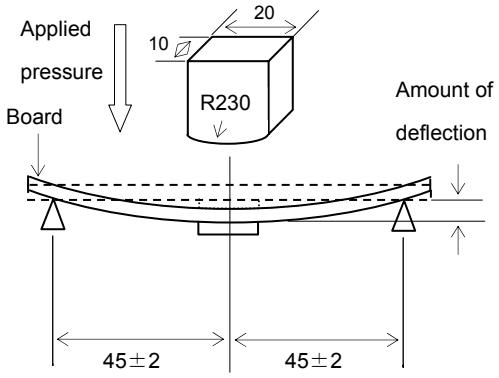
Copper foil (Thickness: 0.035mm)

Solder resist

| Size (L×W) | a | b | c |
|---|---|---|---|
| 3.2×2.5 | 2.2 | 5.0 | 3.2 |

[Unit: mm]

Fig.4

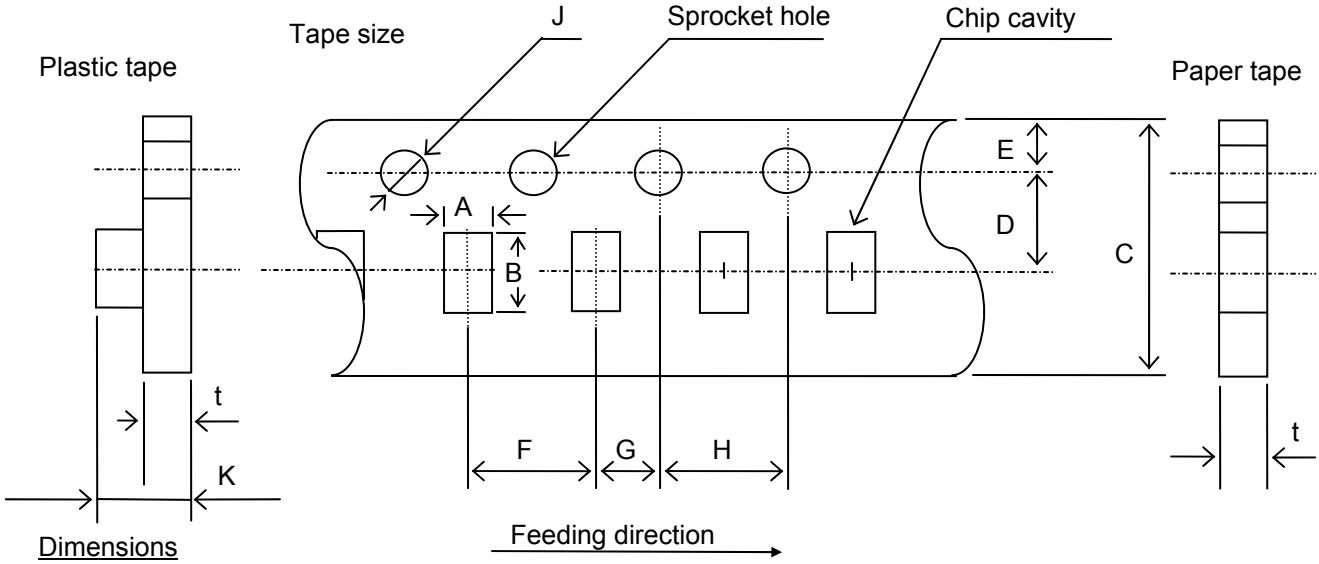



[Unit: mm]

Apply pressure at the rate of 0.5mm/sec. until amount of deflection reaches 1.0mm.

## Tape Packaging（T）107・212・316・325・432Type

◎In case of taping packing, paper tapes shall be used for 107 Type and the products of 0.85 rank in chip thickness, plastic tapes shall be used for the products of 1.15 rank, 1.25 rank, 1.5 rank, 1.6 rank, 1.9 rank and 2.5 rank in chip thickness and 0.85 rank of 325 Type.




Dimensions

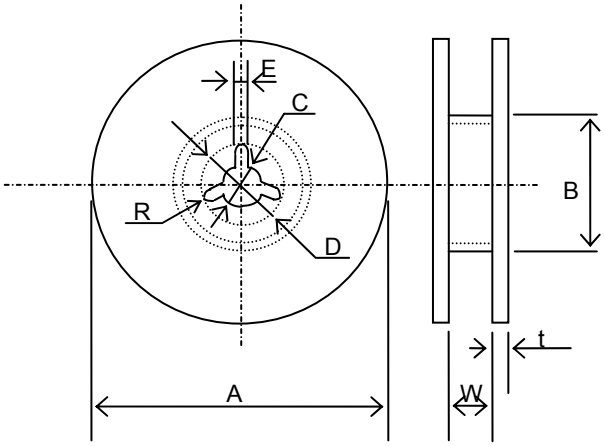
| Type | A | B |
|---|---|---|
| 107 | 1.0±0.2 | 1.8±0.2 |
| 212 | 1.65±0.2 | 2.4±0.2 |
| 316 | 2.0±0.2 | 3.6±0.2 |
| 325 | 2.8±0.2 | 3.6±0.2 |
| 432 | 3.7±0.2 | 4.9±0.2 |

[Unit: mm]

Dimensions

| Type | C | D | E | F | G | H | J | K | t |
|---|---|---|---|---|---|---|---|---|---|
| 107～325 | 8.0±0.3 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 2.0±0.05 | 4.0±0.1 | φ1.5 +0.1/−0 | - (Paper tape) | 1.1 max (Paper tape) |
| | | | | | | | | 3.4 max | 0.6 max |
| 432 | 12.0±0.3 | 5.5±0.05 | | 8.0±0.1 | | | | 4.0 max | 0.6 max |

[Unit: mm]

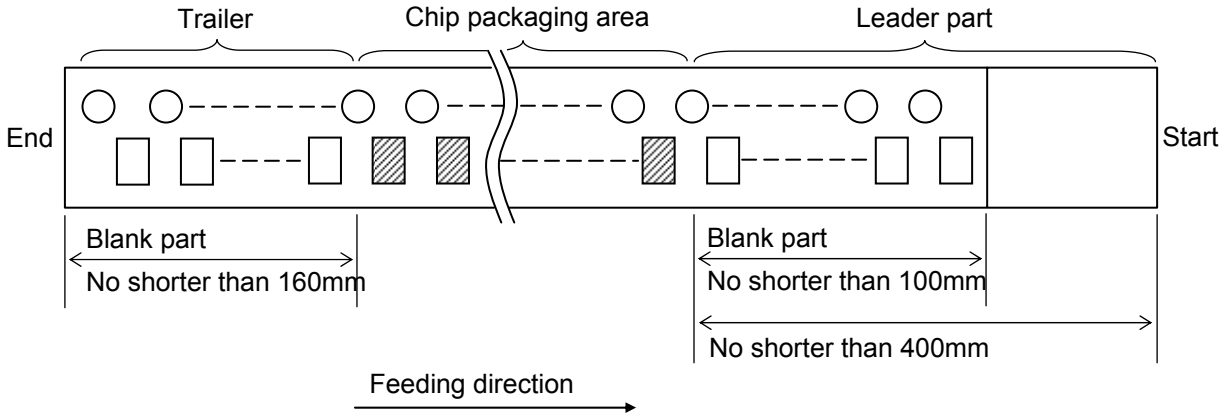



Dimensions of Reel [Unit: mm]

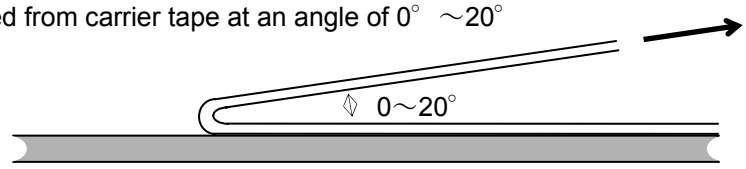
| Type | A | B | C | D | E | W | t | R |
|---|---|---|---|---|---|---|---|---|
| 107～325 | φ178±2.0 | φ50 min | φ13.0±.0.2 | φ21.0±0.8 | 2.0±0.5 | 10.0±1.5 | 2.5max. | 1.0 |
| 432 | φ178±2.0 | φ50 min. | φ13.0±0.2 | φ21.0±0.8 | 2.0±0.5 | 14.0±1.5 | 2.5max. | 1.0 |

## Tape Packaging（T）107,212,316,325,432TYPE

1. Taping shall be right-sided wound. When the end is pulled out, sprocket hole will be at the right-hand side.
2. Components are inserted in chip cavity of carrier tape with their thickness and width sides faced up at random for the products of 1.25mm rank in chip thickness of 212(0805) Type and the products of 1.6mm rank in chip thickness of 316(1206) Type and 107(0603) Type.
3. For packaging chips by taping, blank spaces are provided on taping as shown in the figure.
   - Leader part 400mm min.
   - Leader part（Blank part） 100mm min.
   - Trailer（Blank part） 160mm min.




4. Top tape, bottom tape of paper taping and the seal tape of plastic taping shall not be crossed over sprocket holes.
5. Paper tape and plastic tape shall not be seamed.
6. Tensile strength of the tape is 5N(0.51kgf) or over.
7. Number of chips missed from tape reel shall be 1 piece maximum per reel.
8. Standard number of chips contained in a reel shall be per Table shown below.
9. Label indicating part No., quantity and lot No. shall be attached to the outside of reel.
10. Peeling strength of seal tape (or top tape) shall be 0.1～0.7N (10.2～71.4gf) when seal tape (or top tape) is peeled from carrier tape at an angle of 0° ～20°



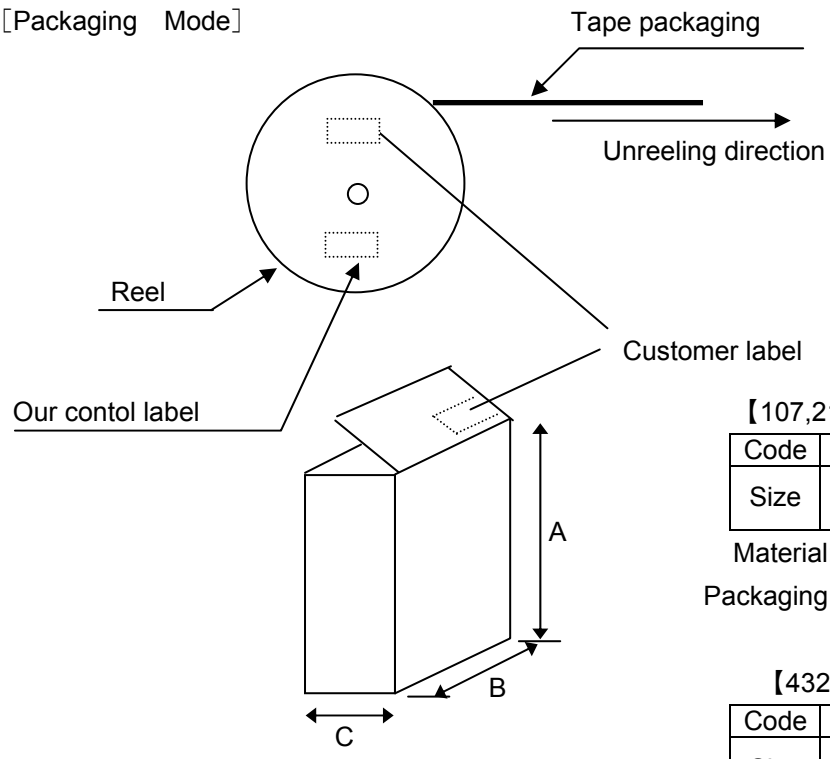

Quantity of taping package

| Type | Thickness (rank) Unit: mm | Quantity (pcs/reel) | Carrier tape |
|---|---|---|---|
| 107 | 0.45 (K) | 4,000 | paper |
| | 0.50 (V) | | |
| | 0.80 (A) | | |
| 212 | 0.45 (K) | | |
| | 0.85 (D) | | |
| | 1.25 (G) | 3,000 | plastic |
| 316 | 0.85 (D) | 4,000 | paper |
| | 1.15 (F) | 3,000 | plastic |
| | 1.25 (G) | | |
| | 1.60 (L) | 2,000 | |

| Type | Thickness rank Unit: mm | Quantity (pcs/reel) | Carrier tape |
|---|---|---|---|
| 325 | 0.85 (D) | 2,000 | plastic |
| | 1.15 (F) | | |
| | 1.50 (H) | | |
| | 1.90 (N) | | |
| | 1.9+0.1/-0.2 (Y) | | |
| | 2.50 (M) | 500 | |
| 432 | 1.9+0.1/-0.2 (Y) | 1000 | |
| | 2.50 (M) | 500 | |
| | 3.20 (U) | | |

## Tape Packaging（T）107,212,316,325,432TYPE

［Packaging Mode］




Label contents
1. Manufacturer Name
2. Customer Parts No.
3. Our Parts No.
4. Quantity
5. Control No.
(Shipping Lot No.)

【107,212,316,325】

| Code | A | B | C | Reel |
|---|---|---|---|---|
| Size | 190 | 185 | 70 | 5 reels max. |
| | | | 125 | 10 reels max. |

Material: Paper [Unit: mm]

Packaging unit: Maximum 5 reels or 10 reels in a box

【432】

| Code | A | B | C | Reel |
|---|---|---|---|---|
| Size | 190 | 185 | 70 | 4 reels max. |
| | | | 140 | 8 reels max. |

Material: Paper [Unit: mm]

Packaging unit: Maximum 4 reels or 8 reels in a box

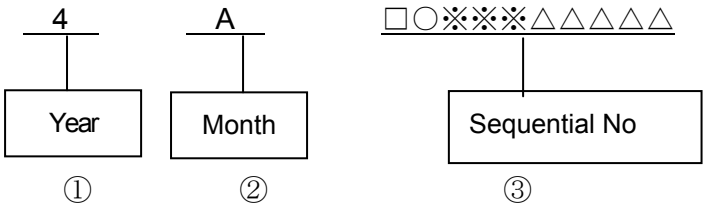
・To attach labels means that all products are passed.

・Manufacturing site
Manufacturing site is indicated on the labels.
MADE IN ○○○

We control our products by control number, and shipping lot numbering is not marked on customer label. Shipping lot number is marked on our control label. Shipping lot number is traceable from our control number marked on customer label.

## Tape Packaging（T）107,212,316,325,432TYPE

Shipping Lot No.




①First digit of manufactured year Example: 2004 → 4

②Manufactured month and its symbol are described in below table.

③Sequential number is consist of alphabet, numeric and space.

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | A | B | C | D | E | F | G | H | J | K | L | M |

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