



Serial No. : 2015-0806

DATE : 2015/08/06

ITEM :

CRYSTAL OSCILLATOR

TYPE :

DSK321STD

NOMINAL FREQUENCY :

32.768kHz

SPEC No. :

1XZA032768AD19

Please acknowledge receipt of this specification by signing and returning a copy to us.

RECEIPT

|          |                           |
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General Manufacture of Quartz Devices

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*A. Hishikawa*

ENG.

*Y. Momoo*

1. Device Name TCXO  
 2. Model Name DSK321STD  
 3. Nominal Frequency 32.768 kHz  
 4. Mass 0.03g max.  
 5. Absolute Maximum Ratings

|   | Item                      | Symbol           | Rating                      | unit |
|---|---------------------------|------------------|-----------------------------|------|
| 1 | Supply Voltage            | V <sub>CC</sub>  | -0.3 ~ +6.0                 | V    |
| 2 | Input Voltage             | V <sub>IN</sub>  | -0.3 ~ V <sub>CC</sub> +0.3 | V    |
| 3 | Output current            | I <sub>OUT</sub> | ±10                         | mA   |
| 4 | Storage Temperature Range | T <sub>STG</sub> | -40 ~ +85                   | °C   |

## 6. Recommended Operating Conditions

|   | Item                        | Symbol            | Conditions                       | Rating |      |      | unit |
|---|-----------------------------|-------------------|----------------------------------|--------|------|------|------|
|   |                             |                   |                                  | min.   | typ. | max. |      |
| 1 | Supply Voltage              | V <sub>CC</sub>   | Temperature compensation Voltage | +2.0   | +3.3 | +5.5 | V    |
| 2 | Paralle Capacitance         | L <sub>CMOS</sub> |                                  | -      | -    | 15   | pF   |
| 3 | Operating Temperature Range | T <sub>USE</sub>  |                                  | -40    | -    | +85  | °C   |

## 7. Electrical Characteristics

(Ta=-+25°C, V<sub>CC</sub>=+3.3V, L<sub>CMOS</sub> =15pF, unless otherwise noted)

|   | Item                | Symbol           | Conditions   | Limits               |      |      | unit |
|---|---------------------|------------------|--|----------------------|------|------|------|
|   |                     |                  |  | min.                 | typ. | max. |      |
| 1 | Frequency Tolerance | f <sub>tol</sub> | Ref. to Nominal Frequency<br>V <sub>CC</sub> =+3.3V, Ta=-40~+85°C              | -5.0                 | -    | +5.0 | ppm  |
| 2 | Current Consumption | I <sub>CC</sub>  | V <sub>CC</sub> =+3.3V, No Load<br>Interval of temperature compensation : 0.5s | -                    | -    | +2.5 | μA   |
| 3 | 0 Level Voltage     | V <sub>OL</sub>  | I <sub>OL</sub> =0.1mA   | -                    | -    | +0.4 | V    |
| 4 | 1 Level Voltage     | V <sub>OH</sub>  | I <sub>OH</sub> =-0.1mA  | V <sub>CC</sub> -0.4 | -    | -    | V    |
| 5 | Symmetry            | SYM              | 0.5xV <sub>CC</sub> level  | 40                   | -    | 60   | %    |
| 6 | Rise time           | tr               | 20~80%V <sub>CC</sub>  | -                    | -    | 50   | ns   |
| 7 | Fall time           | tf               | 80~20%V <sub>CC</sub>  | -                    | -    | 50   | ns   |
| 8 | Start up Time       | t <sub>ST</sub>  | From V <sub>CC</sub> reaches the Supply Voltage,<br>until the output           | -                    | -    | 3    | s    |

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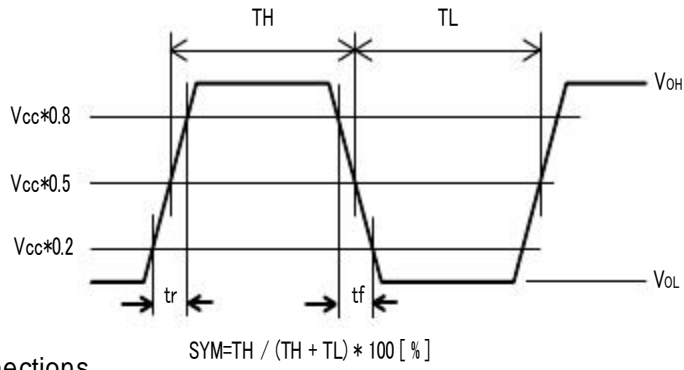
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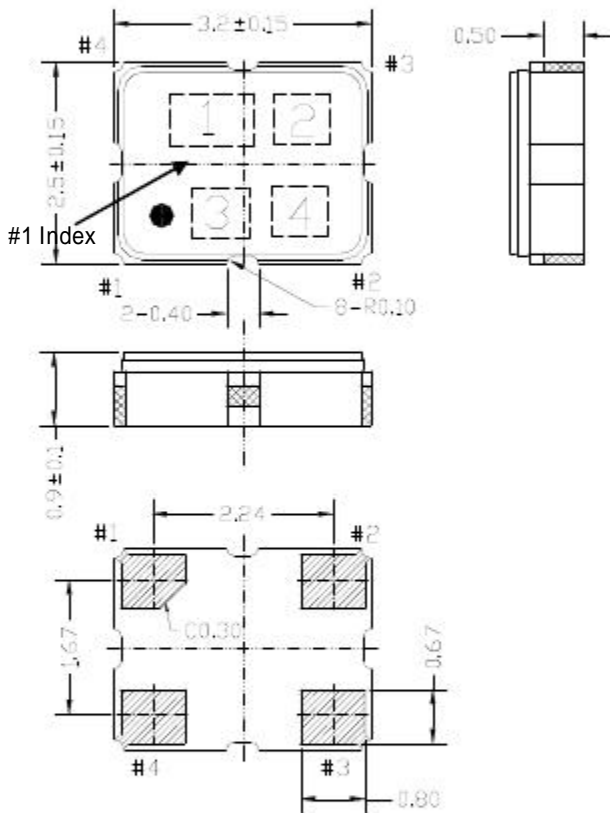
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Fig1 Measurement Circuit



8. Outline, Pin Connections

Outline



Pin Connections

| Pin No. | Connection |
|---------|------------|
| #1      | Vcc        |
| #2      | GND        |
| #3      | Output     |
| #4      | Vcc        |

Marking

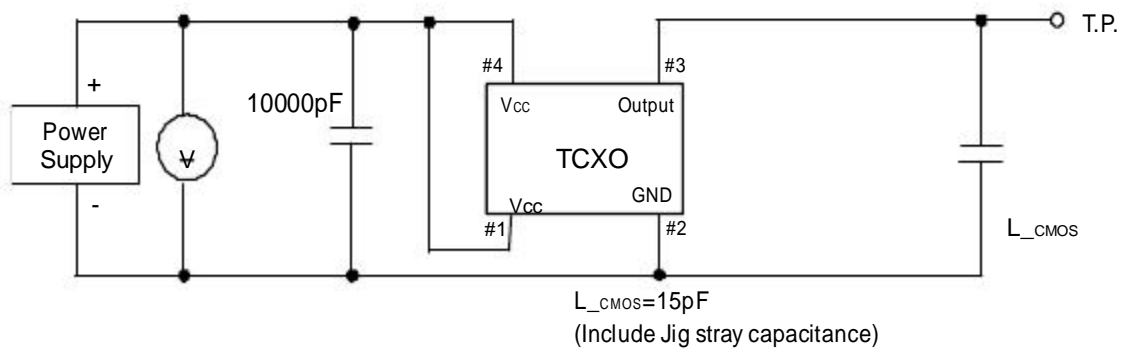
- (1) Frequency            32k ( 32.768kHz )
- (2) Model code        TD
- (3) Logo                D
- (4) Date code        Year (1digit) +Week (2digits)  
e.g.2015/01/01 → 501

unit: mm

Dimensional Tolerance: ±0.15

(Unless otherwise noted)

9. Measurement Circuit



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## 10. Mechanical Characteristics

All test is performed after 2times reflow (Clause.13) except 10.10 (Resistance to soldering heat)

|    | Item                            | Description   | Requirements   |
|----|---------------------------------|---|--|
| 1  | Drop                            | Natural drop (Hardwood board)<br>Height : 50cm<br>Test cycle : 3cycles<br>Direction : Arbitrary direction   | $\Delta f/f \leq \pm 5.0\text{ppm}$  |
| 2  | Vibration                       | Sweep range : 10~500Hz<br>Sweep speed : 11min/cycle<br>Amplitude : 1.5mm (10~55Hz)<br>Acceleration : 200m/s <sup>2</sup> (55~500Hz)<br>Direction : X,Y,Z, 3directions<br>Test cycle : 10cycles<br>Reference specification IEC 60068-2-6 | $\Delta f/f \leq \pm 5.0\text{ppm}$  |
| 3  | Shock                           | Acceleration : 1000m/s <sup>2</sup><br>Direction : X,Y,Z, 6directions X,Y,Z<br>Duration : 6ms<br>Test cycle : 3cycles/each direction<br>Reference specification IEC 60068-2-27  | $\Delta f/f \leq \pm 5.0\text{ppm}$  |
| 4  | PCB bend strength               | PWB : t=1.6mm<br>Pressure speed : 1.0mm/s<br>Bend width : 1 2 3mm<br>Duration : 10±1s<br>Reference specification IEC 60068-2-21 Ue1   | $\Delta f/f \leq \pm 5.0\text{ppm}$  |
| 5  | Adherence nature                | PWB : t=1.6mm<br>Direction : X,Y, 2directions X,Y<br>Pressure : 10N<br>Duration : 10±1s<br>Reference specification IEC 60068-2-21 Ue3   | No visible damage.<br>No leak damage.  |
| 6  | Package strength                | Pressure : 10N<br>Duration : 10±1s<br>Reference specification IEC 60068-2-77  |  |
| 7  | Gross leak                      | It is immersed for 3min into +125±5°C<br>Chlorofluorocarbon (CFCs) liquid.<br>Reference specification IEC 60068-2-17  | No continuous air bubbles.   |
| 8  | Fine leak                       | It shall be measured by the helium leak detector<br>after pressurization for 60min by the pressure<br>of $(3.92 \pm 0.49) \times 10^{-5}$ Pa in a helium gas atmosphere.<br>Reference specification IEC 60068-2-17                      | Less than $1.0 \times 10^{-9}$ Pa m/s. <sup>3</sup>  |
| 9  | Solderability                   | Solder bath temperature : +245±5°C<br>Duration : 3±0.3s<br>Reference specification IEC 60068-2-58   | A new uniform coating of<br>solder shall cover a<br>minimum of 95% of the<br>surface being immersed. |
| 10 | Resistance to<br>Soldering heat | 1) Solder iron method<br>Bit size : B(φ3)<br>Bit temperature : +350±10°C<br>Duration : 3+1/-0s/each terminal<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-20                  | $\Delta f/f \leq \pm 5.0\text{ppm}$<br>No visible damage.  |
|    |                                 | 2) Reflow<br>In refer to temperature profile shown in clause 14.<br>Test cycle : 2cycles<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-58                                      | $\Delta f/f \leq \pm 5.0\text{ppm}$<br>No visible damage.  |

|                                       |                             |           |              |
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## 11. Environmental Characteristics

All test is performed after 2times reflow (Clause.13)

|   | Item                     | Description  | Requirements                         |
|---|--------------------------|--|--------------------------------------|
| 1 | Low temperature storage  | Temperature : $-40\pm 3^{\circ}\text{C}$<br>Duration : 1000h<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-1 Ab   | $\Delta f/f \leq \pm 10.0\text{ppm}$ |
| 2 | High temperature storage | Temperature : $+85\pm 2^{\circ}\text{C}$<br>Duration : 1000h<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-2 Bb   | $\Delta f/f \leq \pm 10.0\text{ppm}$ |
| 3 | Humidity                 | Temperature : $+85\pm 2^{\circ}\text{C}$<br>R.H. : $85\pm 5\%$<br>Duration : 1000h<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-3  | $\Delta f/f \leq \pm 10.0\text{ppm}$ |
| 4 | HTB                      | Temperature : $+85\pm 2^{\circ}\text{C}$<br>Duration : 1000h<br>BIAS : Max value of supply voltage<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC 60068-2-2 Bb   | $\Delta f/f \leq \pm 10.0\text{ppm}$ |
| 5 | Thermal shock            | Thermal shock : $-40\pm 3^{\circ}\text{C}$ : 0.5h $\leftrightarrow$ $+85\pm 2^{\circ}\text{C}$ : 0.5h<br>Test cycle : 200cycles<br>Shift time : 2~3min<br>It shall be measured after 2h at room temperature, humidity.<br>Reference specification IEC pub.68-2-14.Na | $\Delta f/f \leq \pm 10.0\text{ppm}$ |
| 6 | ESD                      | Model : Machine Model(MM)<br>$V = \pm 200\text{V}$ ( $C1 = 200\text{pF}$ , $R1 = 0\Omega$ )<br>Number of times : 3times<br>Test Terminal : Each terminals<br>except common terminal.(Connect to test terminal)<br>Reference specification EIA/JESD22-A114            | $\Delta f/f \leq \pm 5.0\text{ppm}$  |
|   |                          | Model : Human Body Model(HBM)<br>$V = \pm 1500\text{V}$ ( $C1 = 100\text{pF}$ , $R1 = 1500\Omega$ )<br>Number of times : 3times<br>Test Terminal : Each terminals<br>except common terminal.(Connect to test terminal)<br>Reference specification EIA/JESD22-A115    | $\Delta f/f \leq \pm 5.0\text{ppm}$  |

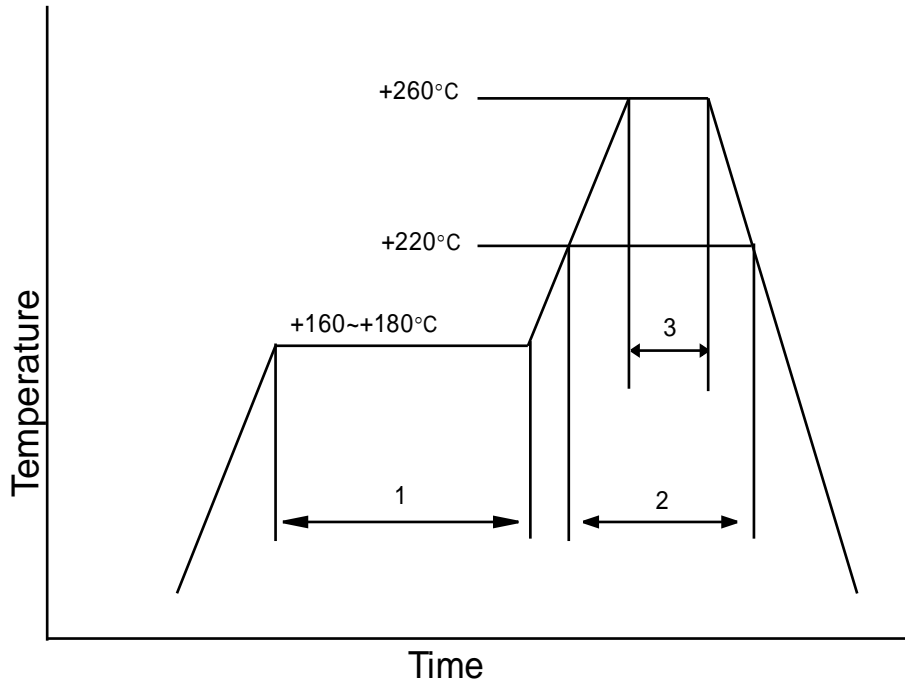
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12. Flatness of Terminal

When the component is placed on the flat surface, the gap from the connecting terminal shall not exceed 0.05 mm.



13. Reflow Profile



|   |              |             |          |
|---|--------------|-------------|----------|
| 1 | Preheat      | +160~+180°C | 120s     |
| 2 | Primary Heat | +220°C      | 60s      |
| 3 | Peak         | +260°C      | 10s max. |

|                                       |                             |           |              |
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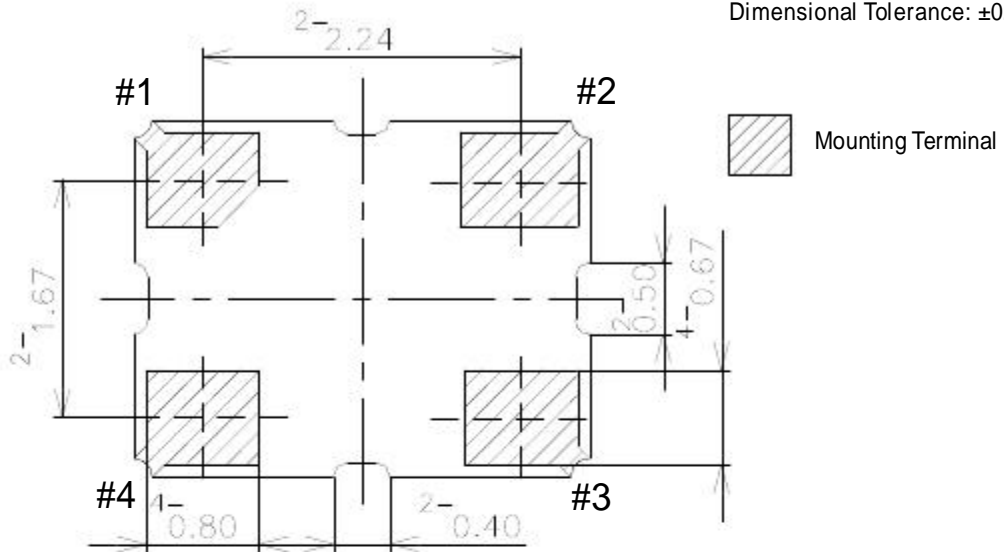
14. Terminals / Land Pattern Layout

14.1 Terminals

A through hole is not located on the bottom (mounting side).

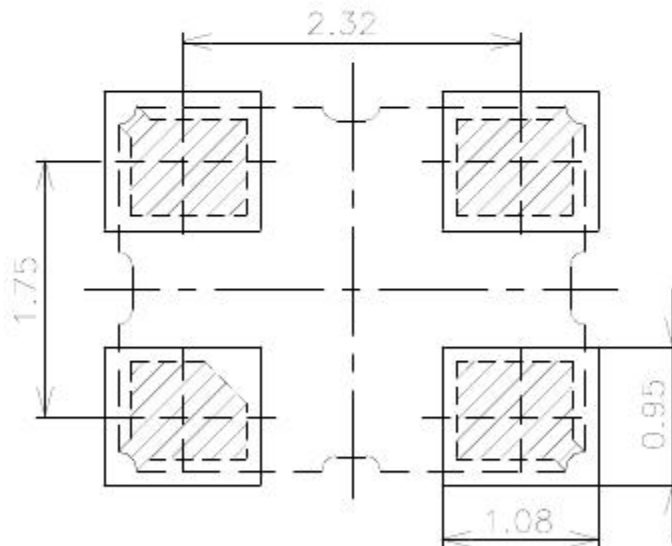
unit: mm

Dimensional Tolerance:  $\pm 0.15\text{mm}$



14.2 Land Pattern Layout

The following land pattern is reference design. The electrical characteristic shall be satisfied with mounting to this land. The land pattern can be changed in the limits to which a test land and a mounting land are not connected. And it does not any effect to the electrical characteristics. Mask thickness recommends 0.12mm.



|                                       |                             |           |              |
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15. Packing Condition

15.1 Taping package

- (1) Emboss tape format and dimensions  
See Fig.1
- (2) Quantity on reel  
2000pcs. max. / reel
- (3) Taping specification  
See Fig.2  
No lack of a product.
- (4) Reel specification  
See Fig.3
- (5) Taping material list  
See right table.

| Taping material List |                                   |
|----------------------|-----------------------------------|
| Cover Tape :         | PET + Olefin Resin (Conductivity) |
| Emboss :             | PS (Conductivity)                 |
| Reel :               | PS (Conductivity)                 |

15.2 Packing

The products packed in the antistatic bag.  
 \*Moisture sensitivity level : IPC/JEDEC Standard J-STD-033 / Level 1  
 No dry pack required and baking after re-storage is unnecessary.

15.3 Packing box

Max 10 reels/packing box. However, in the case of less than 10 reels, It is contained by any boxes.  
 The space in a box is fill up with a cushion.

15.4 Label detail

A Lot label is put on a reel and a shipping label and Pb-Free label is put on a packing box.

Lot label

|           |                       |
|-----------|-----------------------|
| TYPE      | (Model Name)          |
| SPEC NO.  | (Spec. Number)        |
| PARTS NO. | (User's Parts Number) |
| LOT NO.   | (Lot Number)          |
| FREQ.     | (Nominal Frequency)   |
| Q'TY      | (Quantity)            |
| KDS       | DAISHINKU CORP.       |

Shipping label

|                 |                       |
|-----------------|-----------------------|
| ITEM            | (Model Name)          |
| SPEC            | (Spec. Number)        |
| DELIVERY DATE   | (Delivery Date)       |
| Q'TY            | (Quantity)            |
| NOTES           | (User's Parts Number) |
| DAISHINKU CORP. |                       |

Pb-free Label



Lot label (Example)

|  |              |
|--|--------------|
| TYPE   | XXXXXXXX     |
| SPEC NO.   | XXXXXXXXXXXX |
| PARTS NO.  | XXXXXXXXXXXX |
| LOT NO.  | XXXXXXXXXX   |
| FREQ   | 32.768 kHz   |
| Q'TY   | 2000pcs.     |
| <span style="float: right;">Made in Japan</span> |              |

Formation of a lot number

e.g. AH5101001

A                      H                      5101                      001                      \_\_\_\_\_  
 Manufacturing site code    Product code            year/ month/ day            Serial No.

The notation method of a manufacture year, month, and day. (4digits alphanumeric character)

YMDD (4digits) e.g.) 2015/01/01 → 5101

Y Year 1digit (Last digit of Year)

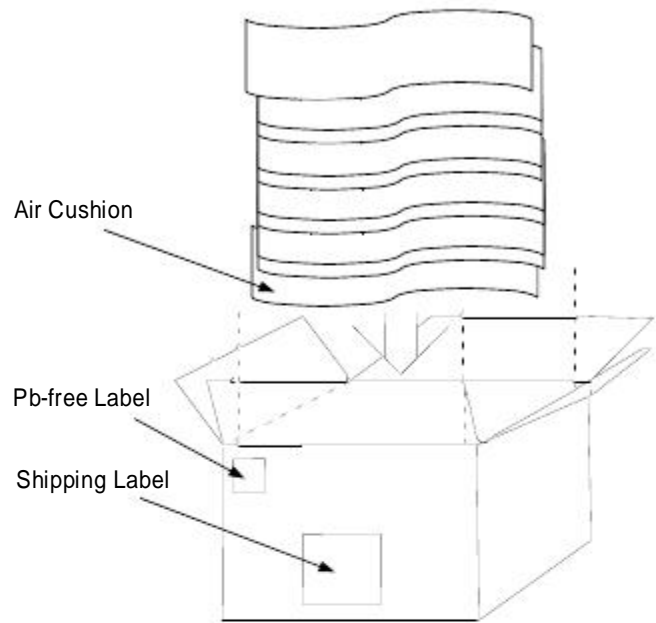
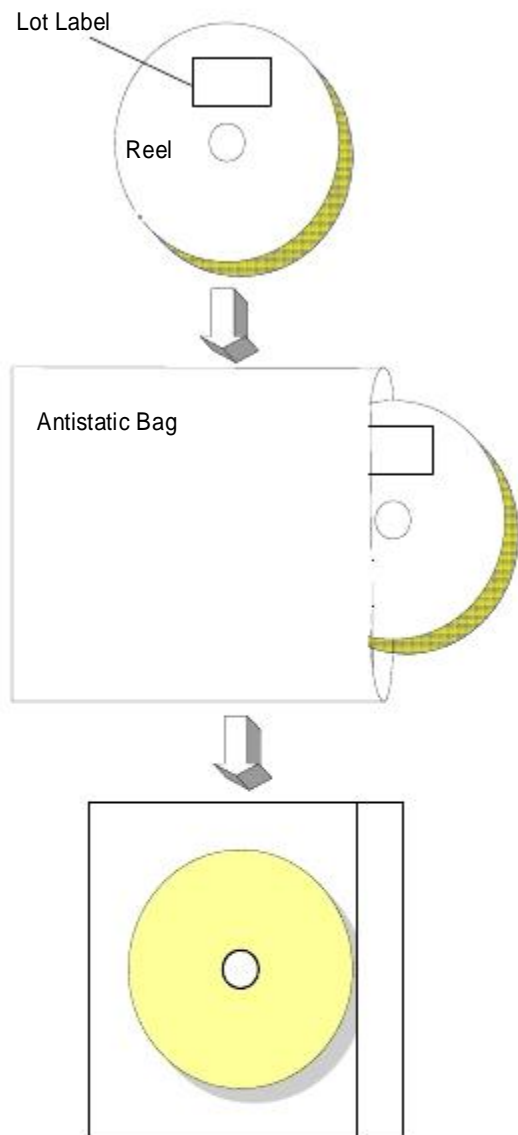
M Month 1digit alphanumeric symbol

DD Day 2digits numerical characters of day

| Month  | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| Symbol | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | O    | N    | D    |

|                                       |                             |           |              |
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The product is packed up with the method which does not break in the handling by a shipping agent.

|                                       |                             |           |              |
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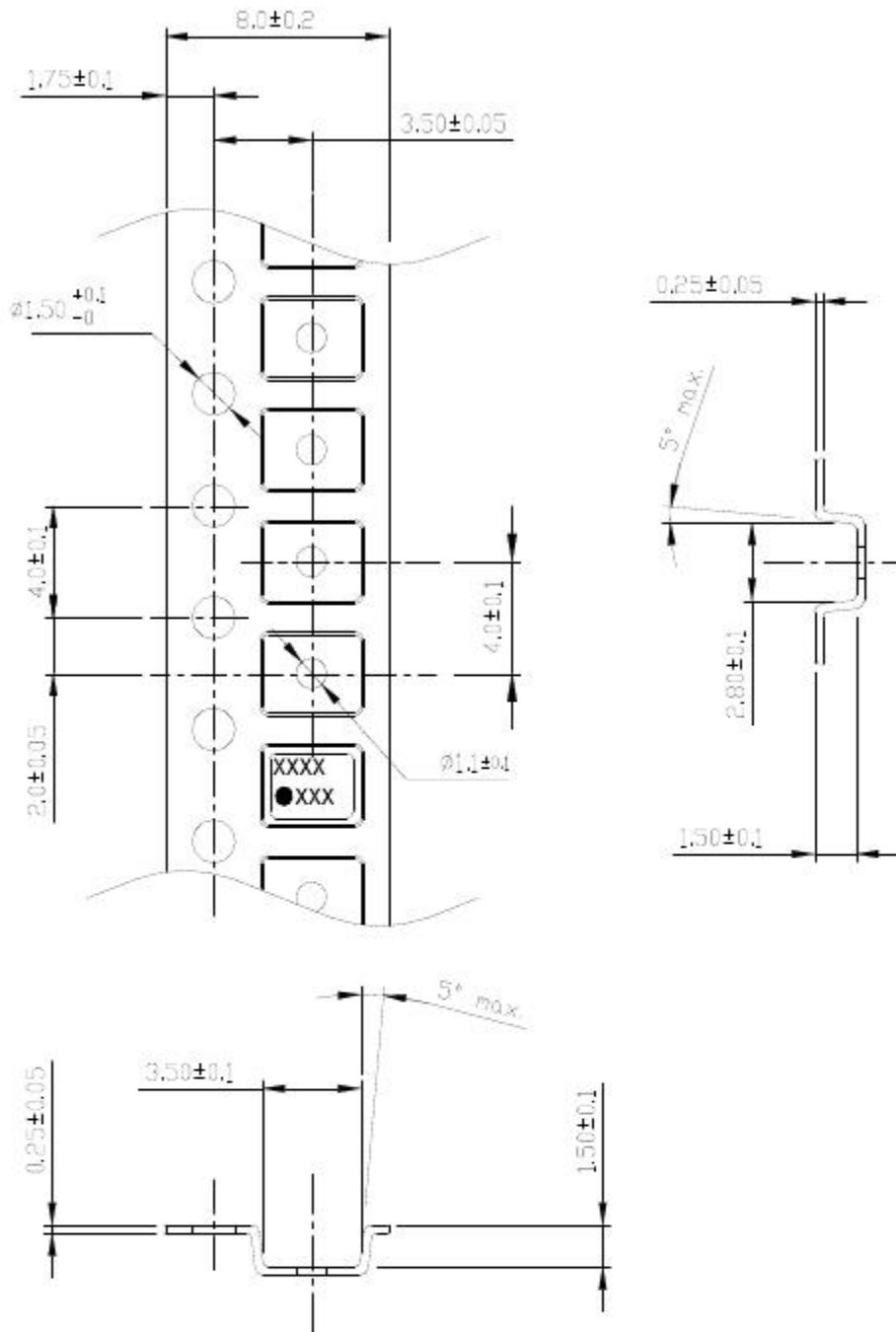


Fig.1. Emboss tape format and dimensions

1. Clearance of fan bossing tape, and product unit: mm

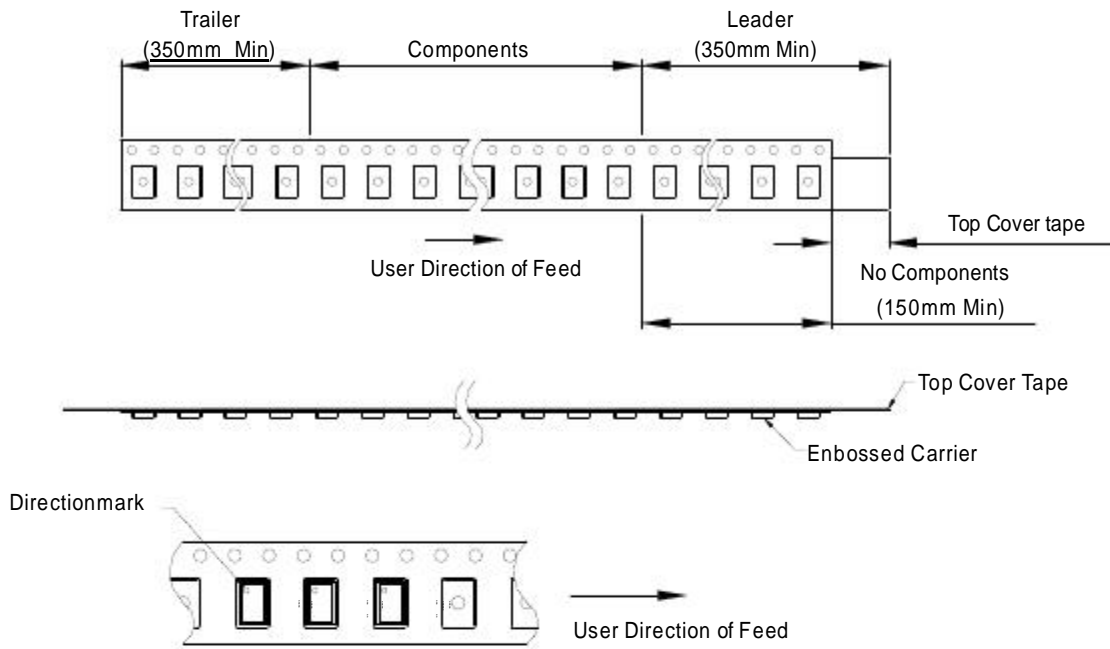
| Direction | Pocket size | TCXO size | Clearance |
|-----------|-------------|-----------|-----------|
|           | 3.5±0.1     | 3.2±0.15  | 0.3±0.25  |
| W         | 2.8±0.1     | 2.5±0.15  | 0.3±0.25  |
| H         | 1.5±0.1     | 1.0max.   | 0.5min.   |

2. Quality: Polystyrene (Conductivity)

3. Tensile strength of fan bossing tape: more than 14N

unit: mm

|                                       |                             |           |              |
|---------------------------------------|-----------------------------|-----------|--------------|
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When a tape end is taken out to the front, sprocket holes becomes right hand side.

Peel strength

Pulling angle 165~180°, pulling speed at 300mm/min, strength should be 0.2~0.7N.

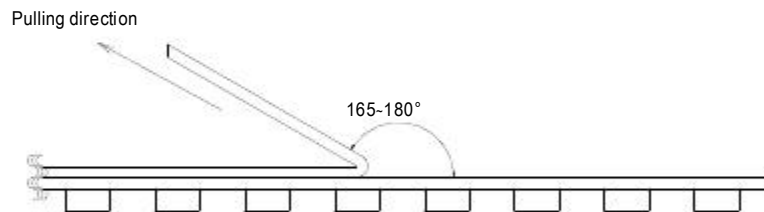
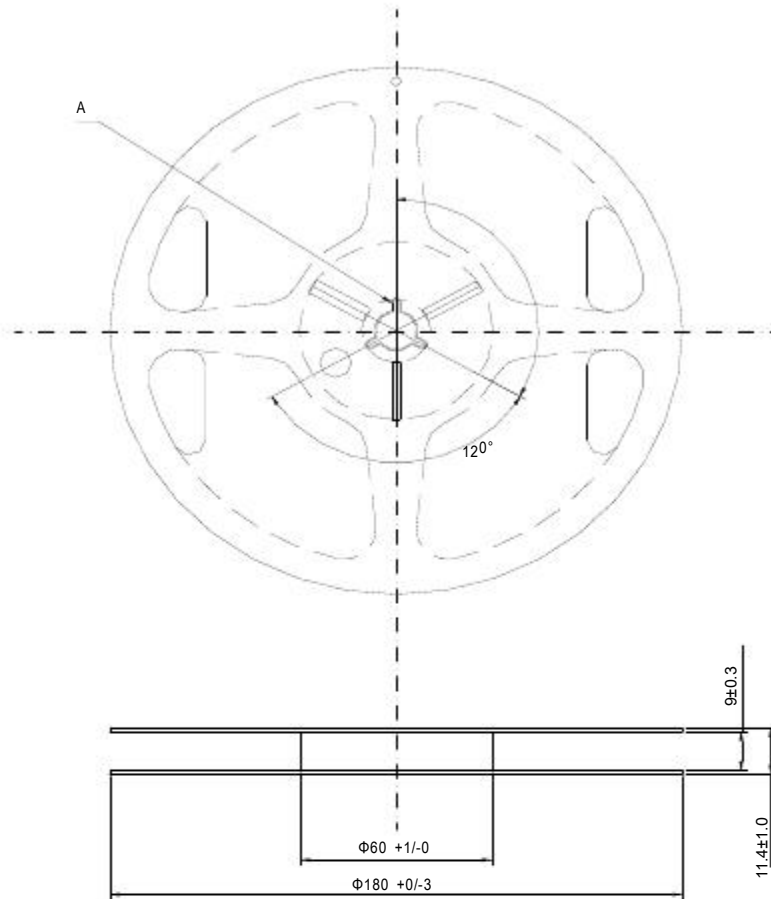


Fig.2. Taping specification

|                                       |                             |           |               |
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Material: Polystyrene (Conductivity)  
unit:mm

Section A

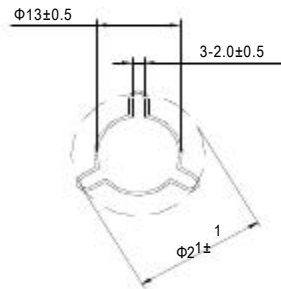


Fig.3. Reel specification

|                                       |                             |           |               |
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**16. Notes on mounting and handling****17.1 Storage environment**

- (1) The temperature and humidity of a storage place, Please give +5~+40°C and 40~85% as a standard.
- (2) Please use this product within one year from the packing label date of issue.
- (3) Please avoid the place which generates corrosive gas, and the place with much dirt.
- (4) Please keep it in a place with little temperature change.

Dew condensation arises owing to a rapid temperature change and solderability becomes bad.

**16.2 Be cautions to static electricity and high voltage.**

**16.3** This product has sufficient durability to fall and vibration. However, conditions may change to the fall after mounting to a PWB, and vibration. When you should drop on a floor the PWB which mounted the product or too much shock is added. Please use after a performance check.

**16.4** Please check that the curvature of the substrate at the time of substrate cutting does not affect product. Moreover, especially when a product is near the position of a PWB guide pin, and the position of PWB break, be careful.

**16.5** The part concerned does not correspond to washing.

**16.6** Please repair at +260°C in 10s with hot air or +350°C in 5s with solder Iron.

**17. Mandatory control****17.1 Ozone-depleting substance**

It regulates by the U.S. air purifying method (November, 1990 establishment). ODS of CLASS1 and CLASS2 is not contained or used.

**17.2 PBDE, PBBs**

PBDE, PBBs are not contained into all the material currently used for this product.

**17.3 RoHS**

Following material restricted by RoHS (2011/65/EU) is not included or used. Lead, mercury, cadmium, hexavalent , chromium ,PBB and PBDE.

**17.4 Law Concerning Examination and Regulation of Manufacture, etc. of Chemical Substances**

All the material currently used for this product is based on "Law Concerning Examination and Regulation of Manufacture, etc. of Chemical Substances". It is a registered material.

**17.5 Lead**

Leads, such as solder, are not used for this product. (Lead Free)

**18. The country of origin / factory name / address**

Country of origin: Japan  
 Factory name: DAISHINKU Corp. Tottori Production Div.  
 Address: 7-3-21 Wakabadai minami, Tottori 689-1112

|                                       |                             |           |               |
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