

RECIPIENT

SPECIFICATIONS

MODEL: TG-5005CG-08G

SPEC. No. : H08-021-1B

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Update History

| Model : TG-5005CG-08G | | | | |
|-----------------------|------|----------------------|---------|--------|
| Date | Page | Item | Current | Update |
| 2009/03/03 | - | Initial Spec Release | | |
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SPECIFICATIONS

1. Application

-This document is applicable to the temperature compensated crystal oscillator (TCXO) that is delivered to _____ from EPSON TOYOCOM Corp.

-This product is compliant with RoHS Directive.

-This Product supplied (and any technical information furnished, if any) by Epson Toyocom Corporation shall not be used for the development and manufacture of weapon of mass destruction or for other military purposes.

Making available such products and technology to any third party who may use such products or technologies for the said purposes are also prohibited.

-This product listed here is designed as components or parts for electronics equipment in general consumer use.

We do not expect that any of these products would be incorporated or otherwise used as a component or part for the equipment, which requires an extra high reliability, such as satellite, rocket and other space systems, and medical equipment, the functional purpose of which is to keep life.

2. Product No. / Model

The model is **TG-5005CG -08G** (TCXO)

3. Packing

It is subject to the packing standard of EPSON TOYOCOM Corp.

4. Warranty

Defective parts which are originated by us are replaced free of charge in case defects are found within 12 months after delivery.

5. Amendment and abolishment

Amendment and/or abolishment of this specification are subject to the agreement of both parties.

6. Contents

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[1] Characteristics

- Lead Free Reflowable and ultra small SMD(2.5 × 2.0 × 0.9 mm).
- Using the heat-resisting type AT cut quartz crystal allows almost the same temperature soldering as universal SMD IC.
- Operating supply voltage : 2.6 V.

[2] Absolute maximum ratings

| Parameter | Symbol | Value | Unit | Note |
|---------------------------|---------------------|-------------|------|------|
| Supply voltage | V _{CC-GND} | -0.3 to 6.0 | V | |
| Storage temperature range | T _{STG} | -40 to +85 | °C | |

[3] Operating range

| Parameter | Symbol | Value | | | Unit | Note |
|-----------------------------|-------------------|----------------|------|------|------|------|
| | | Min. | Typ. | Max. | | |
| Power voltage | V _{CC} | 2.50 | 2.60 | 2.85 | V | |
| Power voltage | GND | 0.0 | | 0.0 | V | |
| Operating temperature range | T _{use} | -30 | | +85 | °C | |
| Output load | Load _R | 2 | 7 | 12 | kΩ | |
| | Load _C | 6 | 8 | 12 | pF | |
| | DC-cut capacitor | C _C | 0.01 | | μF | |

DC-cut capacitor is not included in our TCXO. Please insert DC-cut capacitor in output line.

[4] Frequency characteristics

1) Output frequency 33.6 MHz

2) Frequency characteristics ($V_{CC} = 2.6 \text{ V}$, $GND = 0.0 \text{ V}$, Load $7 \text{ k}\Omega // 8 \text{ pF}$ (DC cut), $T_a = -30 \text{ }^\circ\text{C}$ to $+85 \text{ }^\circ\text{C}$)

| Parameter | Symbol | Value | Unit | Note |
|---|--------------------------------|--|------------------|--|
| Frequency tolerance .*1 | F_tol(OSC) | +/- 1.0×10^{-6} Max. | - | $T_a = +25^\circ\text{C}$ +/- 2°C Reflow cycles : 2 times.*2 |
| Frequency / temperature coefficient | fo-Tc | +0.1 to -0.2×10^{-6} Max. +/- 0.8×10^{-6} Max. | - | $T_a = +40^\circ\text{C}$ $T_a = -30^\circ\text{C}$ to $+85^\circ\text{C}$ Based on frequency at $+25^\circ\text{C}$ |
| Frequency stability slope vs. Temperature | $\square f_L / ^\circ\text{C}$ | +10 to -30×10^{-9} Max. +/- 0.10×10^{-6} Max. +/- 0.15×10^{-6} Max. | $^\circ\text{C}$ | $T_a = +25^\circ\text{C}$ to $+30^\circ\text{C}$ $T_a = -20^\circ\text{C}$ to $+60^\circ\text{C}$ $T_a = -30^\circ\text{C}$ to $+85^\circ\text{C}$ |
| Frequency Perturbation | - | 1×10^{-6} Max. | - | Peak to peak amplitude of frequency perturbation. Min. of 1 frequency reading every 2°C |
| Static Frequency Hysteresis | - | 0.5×10^{-6} Max. | - | Frequency change after reciprocal temperature ramped over temp range. Frequency measured before and after @ 25°C |
| Frequency / voltage coefficient | fo-Vcc | +/- 0.1×10^{-6} Max. | - | $V_{CC} = 2.6 \text{ V}$ -0.1/+0.15V |
| Frequency / Load coefficient | fo-Load | +/- 0.1×10^{-6} Max. | - | Load : $2 \text{ k}\Omega // 12 \text{ pF}$ +/- 10 % |
| Frequency aging | f_aging | +/- 0.8×10^{-6} Max. | - | $T_a = +25 \text{ }^\circ\text{C}$ First year |
| | | +/- 3.5×10^{-6} Max. | - | $T_a = +25 \text{ }^\circ\text{C}$ 5 years |

*1 Include initial frequency tolerance and frequency deviation after reflow cycles.

*2 Measurement of frequency deviation is made 2h after reflow soldering.

[5] Electrical characteristics

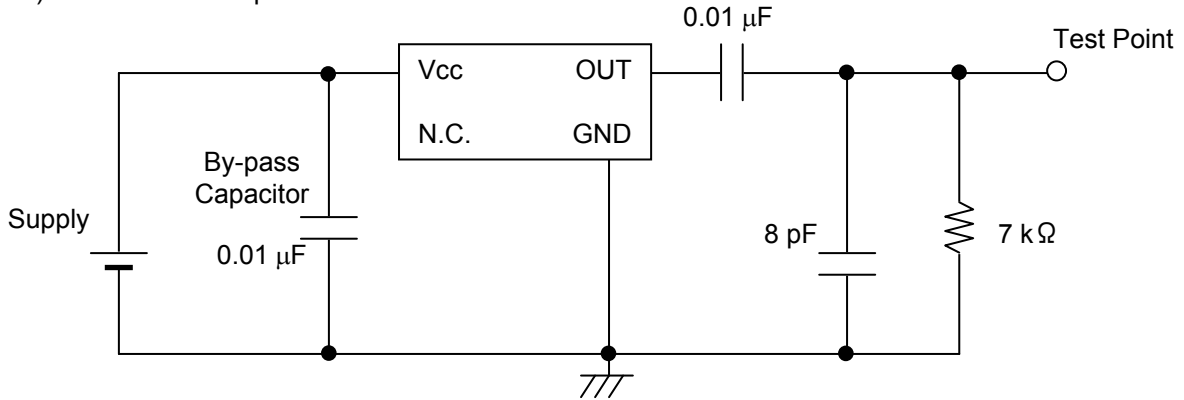
($V_{CC} = 2.6 \text{ V}$, $GND = 0.0 \text{ V}$, Load $7 \text{ k}\Omega // 8 \text{ pF}$ (DC cut), $T_a = -30 \text{ }^\circ\text{C}$ to $+85 \text{ }^\circ\text{C}$)

| Parameter | Symbol | Value | | | Unit | Note |
|---------------------|--------|-------|------|-------|--------|---|
| | | Min. | Typ. | Max. | | |
| Current consumption | Icc | | | 1.5 | mA | |
| Output level | Vpp | 0.8 | | 1.2 | Vp-p | Load : $7 \text{ k}\Omega // 8 \text{ pF}$ |
| | | 0.8 | | — | Vp-p | Load : $2 \text{ k}\Omega // 12 \text{ pF}$ |
| Symmetry | SYM | 40/60 | | 60/40 | % | GND Level |
| Start up | tosc | | | 2 | ms | @ 90% of final Vout level |
| Harmonics | - | | | -5 | dBc | |
| SSB Phase noise *1 | L(f) | | | -75 | dBc/Hz | Offset: 10 Hz |
| | | | | -105 | dBc/Hz | Offset: 100 Hz |
| | | | | -130 | dBc/Hz | Offset: 1 kHz |
| | | | | -145 | dBc/Hz | Offset: 10 kHz |
| | | | | -150 | dBc/Hz | Offset: 100 kHz |
| | | | | -150 | dBc/Hz | Offset: 1 MHz |

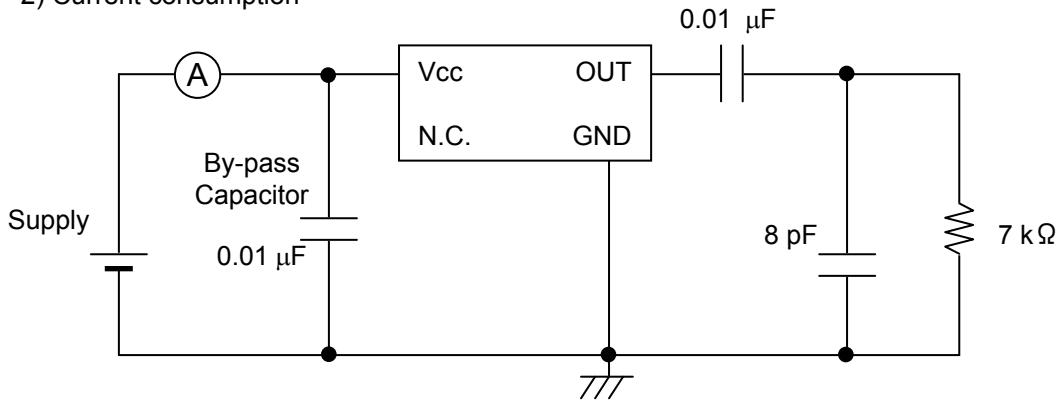
*1 Use test circuit 1).

[6] Test circuit

1) Load : $7\text{ k}\Omega \parallel 8\text{ pF}$



2) Current consumption



3) Conditions

- | | |
|-----------------------------|-------------------------|
| 1. Oscilloscope : Impedance | Min. $1\text{ M}\Omega$ |
| Input capacitance Max. | 10 pF |
| Band width | Min. 300 MHz |

Impossible to measure both frequency and wave form at the same time. (In case of using oscilloscope's amplifier output, possible to measure both at the same time.)

2. CL includes probe capacitance.
3. A capacitor (By-pass: $0.01\text{ }\mu\text{F}$) is placed between V_{CC} and GND, and closely to TCXO.
4. Use the current meter whose internal impedance value is small.
5. Power Supply
Impedance of power supply should be as lowest as possible.
6. GND should apply one point earth.

[7] Environmental and mechanical characteristics

(The company evaluation condition. we evaluate it by the following examination item and examination condition.)

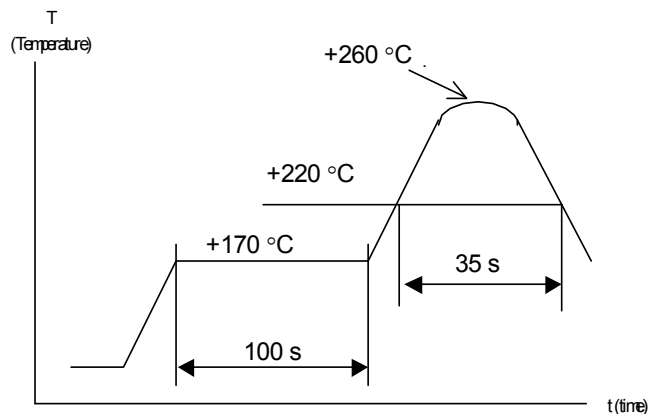
| No. | Item | Value *1 | | Test method |
|-----|---|---|---|---|
| | | Freq. Tolerance [1×10^{-6}] *2 | Electrical characteristics | |
| 1 | High temp. storage *3 | +/- 2.0 | Satisfy Item [4]-3) and [5] after test | +85 °C × 1 000 h |
| 2 | Low temp. storage *3 | +/- 2.0 | | -40 °C × 1 000 h |
| 3 | Temp. cycle *3 | +/- 1.5 | | -40 °C to +85 °C (30 min × 100 cycle/each) |
| 4 | Resistance to Soldering heat (Reflow characteristics) | +/- 1.0 | | Reflow furnace with the condition 2 times |
| 5 | Drop | +/- 2.0 | | Free drop from 750 mm height on a hard wooden board for 3 times. (Board is thickness more than 30 mm) |
| 6 | Vibration (variable frequency) | +/- 1.0 | | 10 Hz to 55 Hz 0.75 mm 55 Hz to 500 Hz acceleration 98 m/s ² 10 Hz → 500 Hz → 10 Hz 15 min./cycle 6 h(2 h × 3 directions) |
| 7 | Solderability | Terminals must be 95 % covered with fresh solder | | Dip termination into solder bath at +235 °C for 5 s (Using Rosin Flux) |

Notes

- 1.*1 each test is independent.
- 2.*2 measuring 2 h to 24 h later leaving in room temperature after each test.
- 3.*3 Pre conditionings
 1. reflow 2 times
 2. Initial value shall be after 24 h at room temperature.

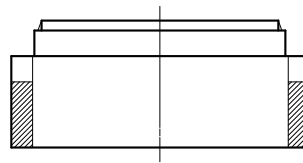
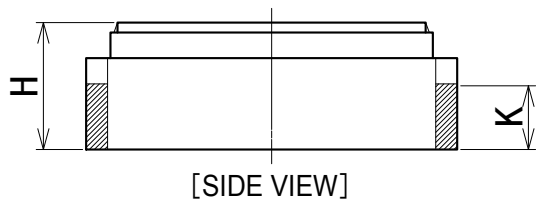
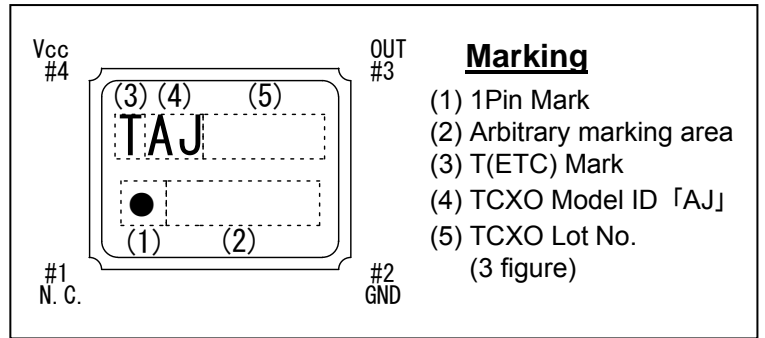
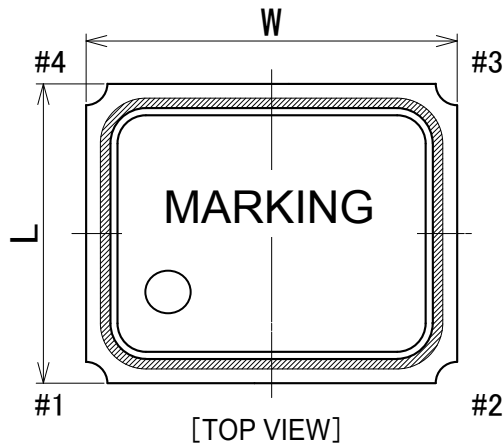
Infrared-reflow

Pre heating temperature : +170 °C Pre heating time : 100 s
 Heating temperature : +220 °C Heating time : 35 s
 Peak temperature must not exceed +260 °C



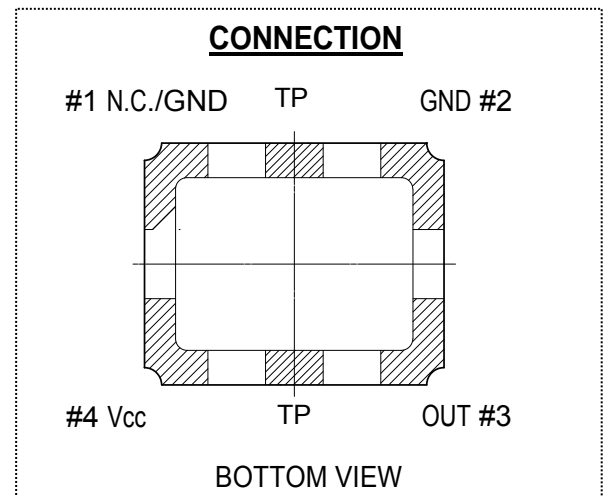
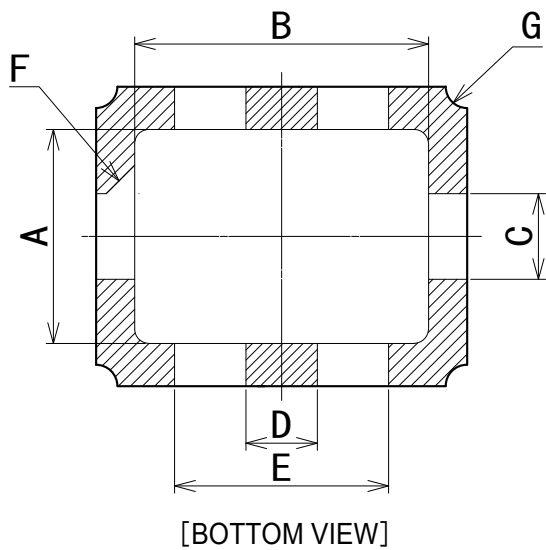
[8] Dimensions And Marking Layout

1) Dimensions



Material

Ceramics(base)
 Au coated nickel(terminal)
 Fe-Ni-Co(lid)



(unit : mm)

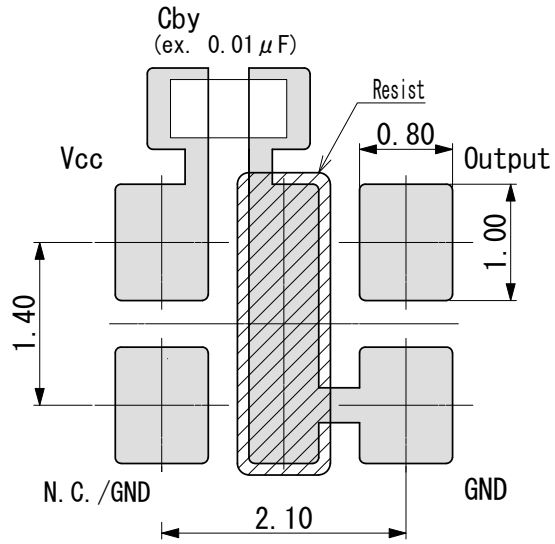
| DIM. | MIN. | TYP. | MAX. | DIM. | MIN. | TYP. | MAX. |
|------|------|------|------|------|------|-------|------|
| W | 2.45 | 2.50 | 2.65 | D | 0.40 | 0.50 | 0.60 |
| L | 1.95 | 2.00 | 2.15 | E | 1.35 | 1.50 | 1.65 |
| H | 0.70 | 0.80 | 0.90 | F | --- | C0.2 | --- |
| A | 1.35 | 1.50 | 1.65 | G | --- | R0.15 | --- |
| B | 1.95 | 2.10 | 2.25 | K | --- | 0.45 | --- |
| C | 0.50 | 0.60 | 0.70 | | | | |

[9] Recommendable patterning

For actual design work, please consider optimum condition together with mounting density, reliability of soldering and mount ability etc.

Do not design any patterns except GND on the shaded area.

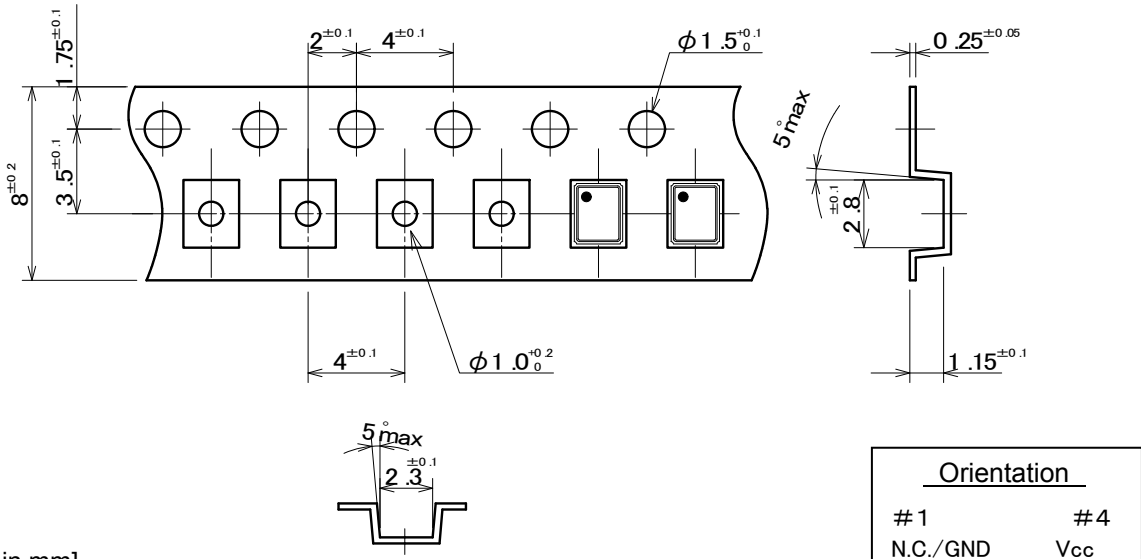
Soldering position



Unit: mm

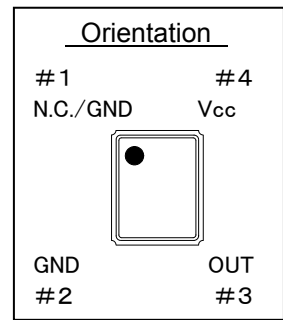
[10] TAPE & REEL PACKAGING SPECIFICATION

1) Embossed tape dimension & Outline drawings

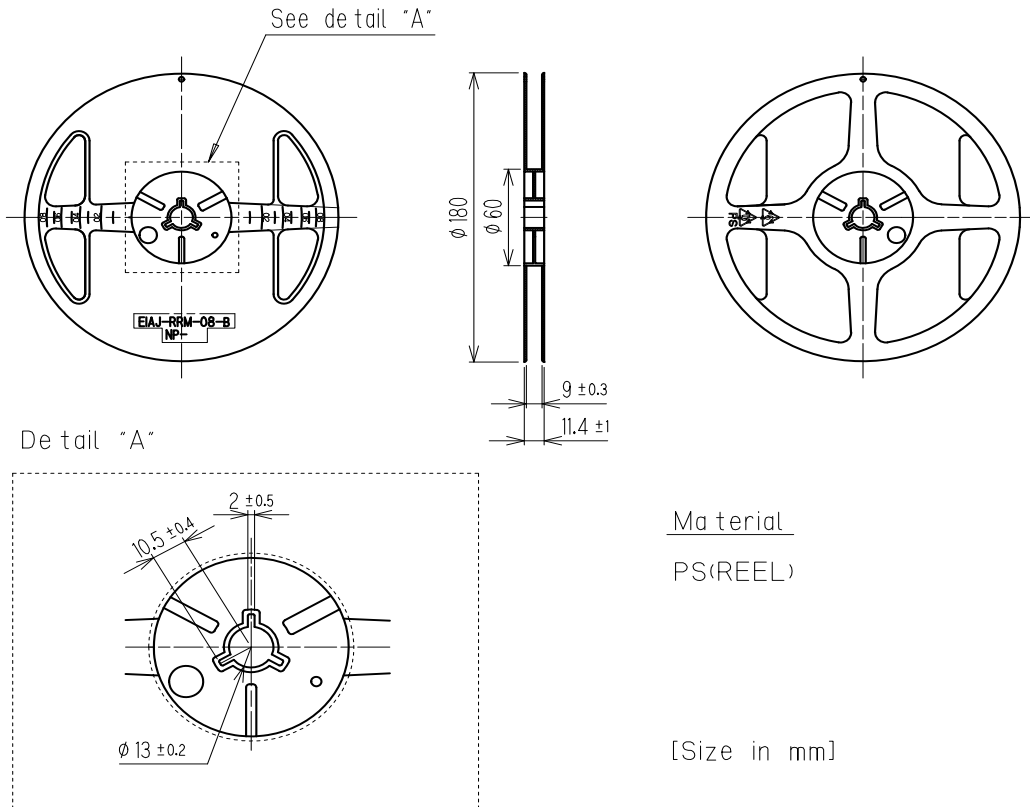


[Size in mm]

- ※ The radius of each corner is 0.3mm max.
- ※ 10 feeding hole pitches cumulative tolerance on tape is +/-0.2mm max.
- ※ The material is polystyrene.
- ※ Tolerance for all measurements are +/-0.1mm unless otherwise stated.



2) Reel dimension & Outline drawing

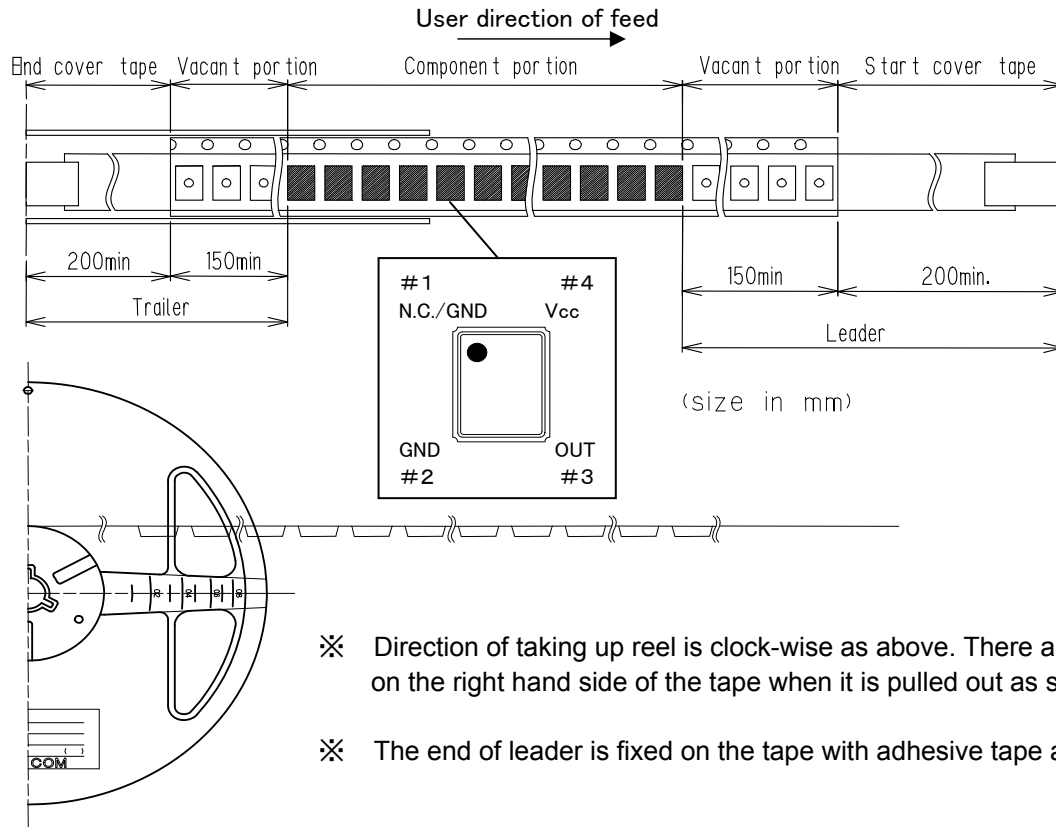


Material
PS(REEL)

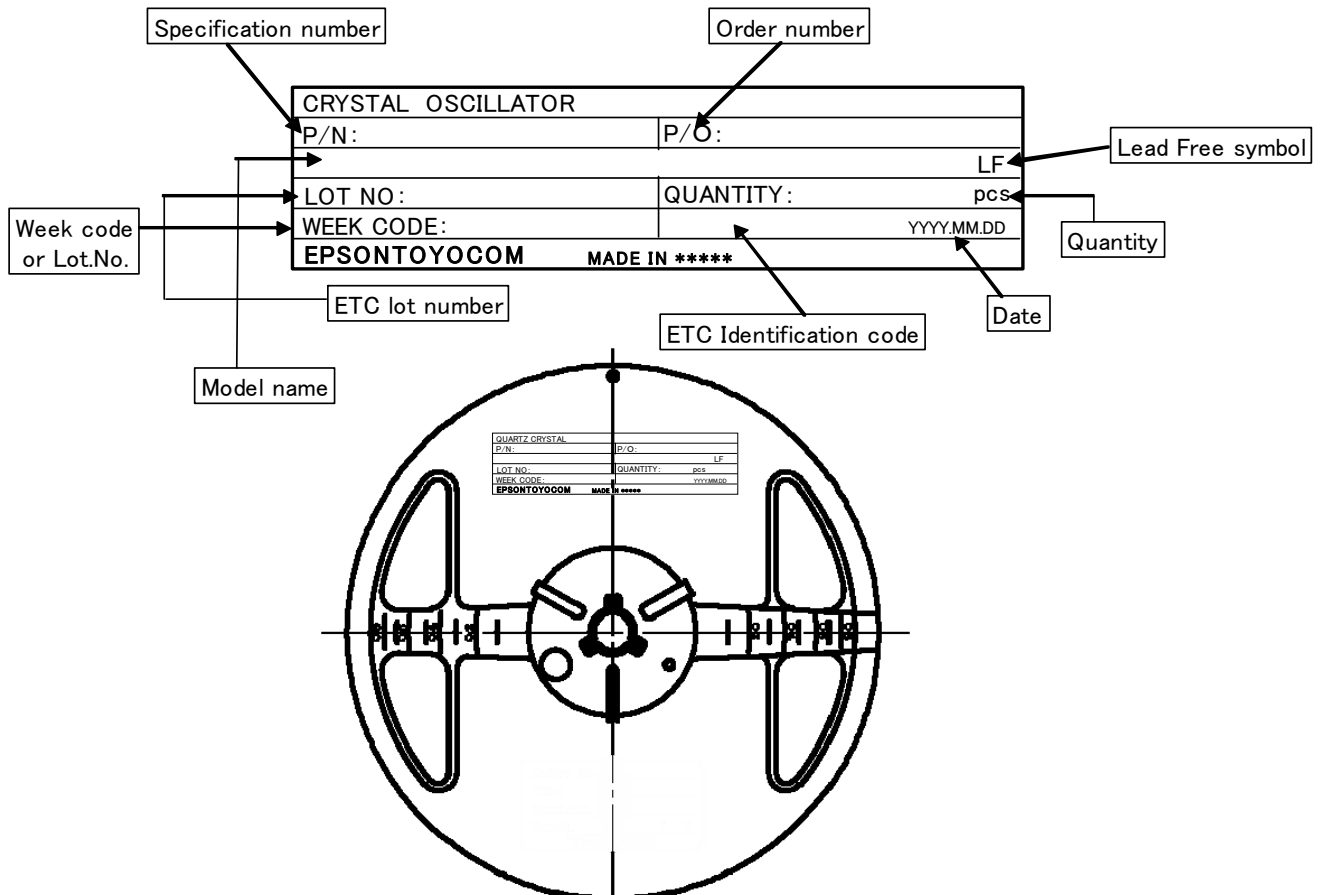
[Size in mm]

- ※ Tolerance for all measurements are +/-0.1mm unless otherwise stated.

3) Taping package & Oscillator orientation

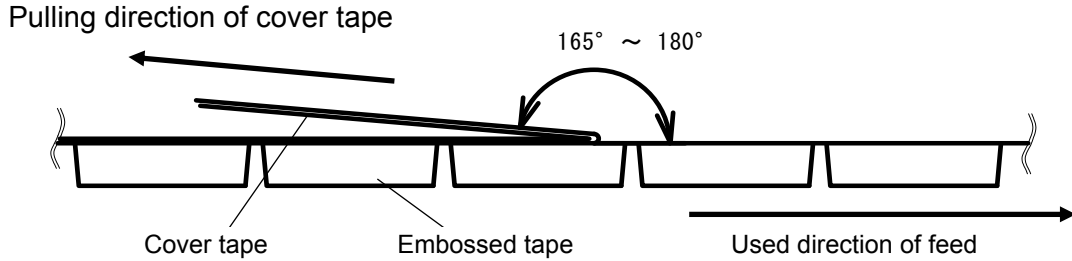


4) Marking Label



5) Cover tape peeling-off strength

- ※ Angle :165°~180° from feeding direction
- ※ Speed :5mm/sec.
- ※ Force :0.2N~0.7N
- ※ Others :There shall be no split or breakage of the carrier tape and the cover tape when peeling away the fixing tape.



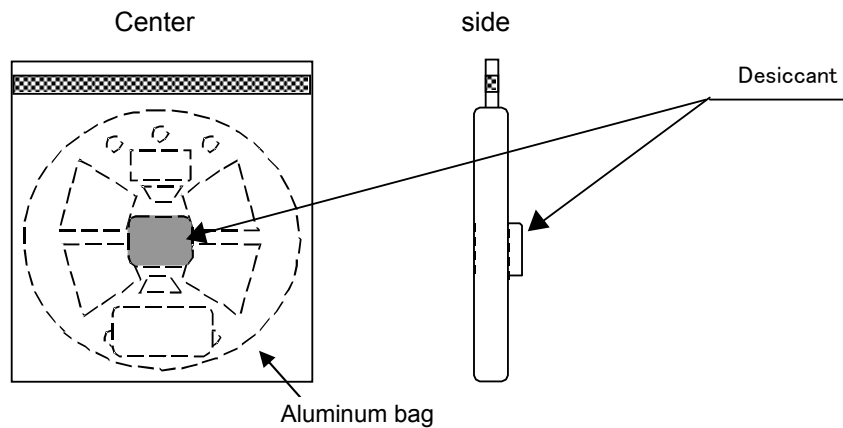
6) Quantity of components

2000pcs/reel (MAX.)
 500pcs/reel (MIN.)

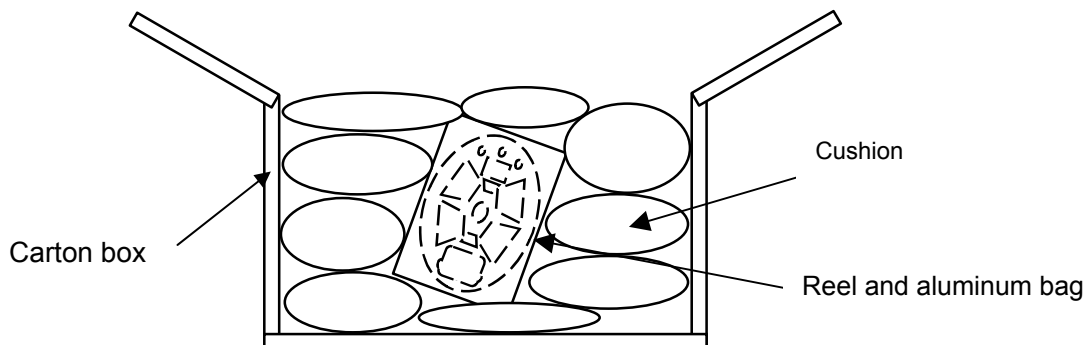
- The above quantity is our standard packing size.
 In case of an odd sum as per the purchased quantity, the packing quantity might be below our standard minimum packing size.

7) Packaging

Reel is in aluminum bag. (vacuum-packed)



This reel is in carton box with cushion.



[11] Handling precautions

1. Static discharge

This device is made with CMOS IC. Please take precautions to prevent damage against electrical static discharge.

2. Power fluctuations

We recommend placing a 0.1 μ F capacitor between V_{CC} and GND to obtain stable operation and protect against power line ripple.

V_{CC} and GND pattern shall be biggest as possible.

3. Power supply line

EPSON cannot recommend to put filtering element into power line so as to reduce noise. Oscillator might be unstable oscillation because high frequency impedance of power line become higher. When use filtering element, please verify electrical construction and or element's spec.

4. Power on

EPSON doesn't recommend to power on from intermediate electric voltage or extreme fast power on. Those powering conditions may cause no oscillation or abnormal oscillation.

5. Power line ripple

Power line ripple level must be kept less than 200 mVp-p.

6. Output line

As a long output line may cause irregular output, please take care to design that output line is as shortest possible, and also keeps high level signal source away from this device.

7. Layout of TCXO in P.C.B.

Please keep distance in TCXO from Another High Level signal line.

8. Shock reliability

This device contains a quartz crystal, so please do not give too much shock or vibration.

We recommend storing of devices under normal temperature and humidity to keep the specification.

9. Automatic insertion

An automatic insertion is available, however, the internal quartz crystal might be damaged in case that too much shock or vibration is given by machine condition. Be sure to check your machine conditioning in advance.

10. Ultrasonic cleaning

Ultrasonic cleaners can be used on TCXO Series, however, since the oscillator must be damaged under some conditions, please exercise in advance.

11. Storage

We recommend storing products at +15 °C to +35 °C and 25 %RH to 85 %RH.

12. Vibration

When some vibration or periodic mechanical shock will be added from piezoelectric sounder, piezoelectric buzzer and from like that to the oscillator, the phenomena such as a frequency drift or swing level change may exist during the time facing such vibration.

Of cause our oscillator has designed to minimize such problems, however please take care to design the layout as follows to avoid such problems.

(1) To mount a sounder or vibrator on the separated circuit board.

(2) When mounted on a same circuit board, to keep the distance as far as possible between a oscillator and vibrator to put some cushion between a vibrator and a circuit board to put some slit on the portion between a vibrator and a oscillator.

(3) When you want to process electrical tests, it is advised that the circuit should be enclosed in a enclosure because the vibration affects will be changed from the result of a circuit board itself.