**YULONG COMPUTER TELECOMMUNICATION SCIENTIFIC(SHENZHEN)CO.,LTD.**

| RECIPIENT |
| --- |
| |

# SPECIFICATIONS

**MODEL :** **TG-5035CG-44N 26MHz**

**SPEC. No. :** **A12-683-0B**

**DATE:** **Jan. 9. 2013**

**SEIKO EPSON CORPORATION**

**8548 Naka-minowa**
**Minowa-machi Kamiina-gun**
**Nagano-ken**
**399-4696 Japan**

**CHECKED** H.Koike Hideki Koike / TD Production Engineering Department Manager

**CHECKED** A. Kakumae Atsushi Kakumae / TD Production Engineering Department Senior Staff

**CHECKED** Y. Hiraizumi Yasushi Hiraizumi / TD・CS Quality Assurance Department Manager

**PREPARED** Yamada Masatoshi Yamada / TD・CS Quality Assurance Department Senior Staff

# SPECIFICATIONS

## 1. Application

This document is applicable to the temperature compensated crystal oscillator (TCXO) that is delivered to **YULONG COMPUTER TELECOMMUNICATION SCIENTIFIC(SHENZHEN)CO.,LTD.** from SEIKO EPSON Corp.

This product is compliant with RoHS Directive.

This Product supplied (and any technical information furnished, if any) by SEIKO EPSON Corp. 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.Model

The product No. of this crystal oscillator unit is **X1G003851003500**.
The model is **TG-5035CG-44N** (TCXO)

## 3. Packing

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

## 4. Amendment and abolishment

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

## 5.Contents


| Item No. | Item | Page |
|---|---|---|
| [ 1 ] | Characteristics | 2 |
| [ 2 ] | Absolute maximum ratings | 2 |
| [ 3 ] | Operating range | 2 |
| [ 4 ] | Frequency characteristics | 3 |
| [ 5 ] | Electrical characteristics | 3 |
| [ 6 ] | Test circuit | 4 |
| [ 7 ] | Environmental and mechanical characteristics | 5 |
| [ 8 ] | Dimensions and marking layout | 6 |
| [ 9 ] | Recommendable patterning | 7 |
| [ 10 ] | Handling Precautions | 8 |

## [ 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: $V_{CC}$ 1: 1.80 V / $V_{CC}$ 2: 2.80 V.

## [ 2 ] Absolute maximum ratings

| Parameter | Symbol | Value | Unit | Note |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$-GND | -0.3 to 4.5 | V | |
| Storage temperature range | $T_{_STG}$ | -40 to +85 | °C | |

## [ 3 ] Operating range

| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Power voltage | | $V_{CC}1$ | 1.70 | 1.80 | 1.90 | V | $V_{CC}1$=1.8 V ± 0.1 V |
| | | $V_{CC}2$ | 2.52 | 2.80 | 3.08 | | $V_{CC}2$=2.8 V ± 10 % |
| Power voltage | | GND | 0.0 | 0.0 | 0.0 | V | |
| Operating temperature range | | T_use | -40 | +25 | +85 | °C | |
| Output load | | Load_R | 9.0 | 10.0 | 11.0 | kΩ | |
| | | Load_C | 9 | 10 | 11 | pF | |
| | DC-cut capacitor | $C_C$ | 0.01 | | | μF | |

DC-cut capacitor is not included in our TCXO. Please insert DC-cut capacitor(0.01uF Min.) in output line.

## [ 4 ] Frequency characteristics

1) Output frequency 26.000000 MHz

2) Frequency characteristics

( Condition : $V_{CC}$ = 1.8 / 2.8 V, GND = 0.0 V, Load 10 kΩ // 10 pF, T_use =+25 °C )

| Parameter | Symbol | Value | Note |
|---|---|---|---|
| Frequency tolerance | f_tol(OSC) | ± 1.5 × $10^{-6}$ Max. | T_use =+25 °C ± 2 °C<br>After 2times Reflow *1,*2 |
| Frequency / temperature characteristics | fo-Tc | ± 0.5 × $10^{-6}$ Max. | T_use =- 30 °C to +85 °C<br>(Based on frequency at +25 °C) |
| | | ± 3.0 × $10^{-6}$ Max. | T_use =- 40 °C to -30 °C<br>(Based on frequency at +25 °C) |
| Hysteresis | - | ± 0.6 × $10^{-6}$ Max. | Temp.ramped over operating range.<br>Frequency measured before and after at +25 °C |
| Frequency / Load coefficient | fo-Load | ± 0.1 × $10^{-6}$ Max. | Load : 10 kΩ // 10 pF, ± 10 % each |
| Frequency / voltage coefficient | fo-Vcc | ± 0.1 × $10^{-6}$ Max. | $V_{CC}$ 1 = 1.80 V ± 0.1 V<br>$V_{CC}$ 2= 2.80 V ± 10 % |
| Frequency slope vs. Temp. | - | ± 0.05 × $10^{-6}$ / °C Max. | - 20 to +65 °C / every 2 °C |
| | | ± 0.10 × $10^{-6}$ / °C Max. | - 30 to +85 °C / every 2 °C |
| | | ± 0.35 × $10^{-6}$ / °C Max. | - 40 to +85 °C / every 2 °C |
| Frequency aging | f_age | ± 1.0 × $10^{-6}$ Max. | T_use =+25 °C first year |
| | | ± 1.5 × $10^{-6}$ Max. | T_use =+25 °C 2 years |
| | | ± 2.5 × $10^{-6}$ Max. | T_use =+25 °C 5 years |
| | | ± 5.0 × $10^{-6}$ Max. | T_use =+25 °C 10 years |

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

*2 Measurement of frequency deviation is made 1h after reflow soldering.

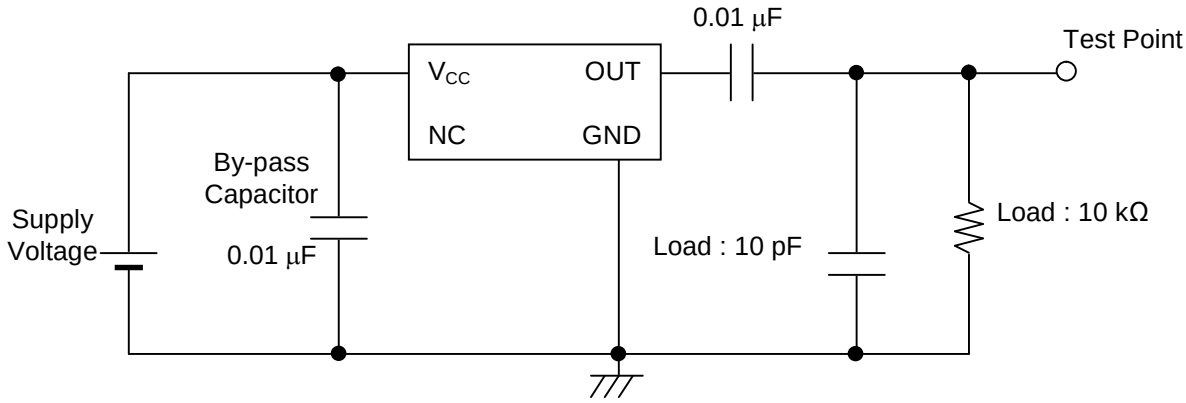
## [ 5 ] Electrical characteristics

( Condition : $V_{CC}$ = 1.8 / 2.8 V, GND = 0.0 V, Load 10 kΩ // 10 pF, T_use =+25 °C )

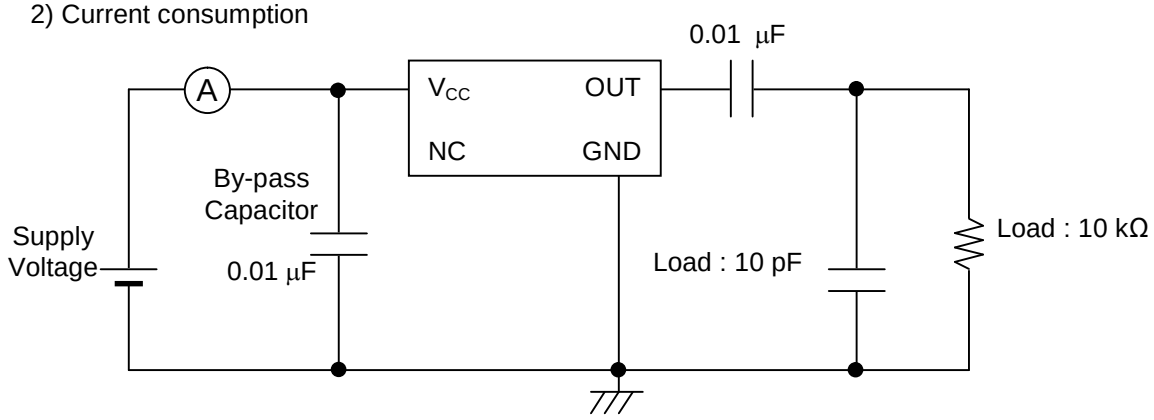
| Parameter | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Current consumption | $I_{CC}$ | - | - | 1.50 | mA | |
| Output level | $V_{PP}$ | 0.80 | - | - | V | Peak to peak voltage |
| Symmetry | SYM | 40 | | 60 | % | GND level |
| SSB Phase noise | L(f) | - | - | -50 | dBc /Hz | Offset:1 Hz |
| | | - | - | -80 | | Offset:10 Hz |
| | | - | - | -105 | | Offset:100 Hz |
| | | - | - | -130 | | Offset:1 kHz |
| | | - | - | -148 | | Offset:10 kHz |
| | | - | - | -150 | | Offset:100 kHz |
| Harmonics | - | - | - | -8 | dBc | T_use =-30 °C to +80 °C |
| Start up time | $t_{OSC}$ | - | - | 2.0 | ms | Until frequency has been reached within +/-0.5 ppm of final freqency.<br>Until output signal has been reached min90% of final amp. |

## [ 6 ] Test circuit

1) Output Load




2) Current consumption




3) Conditions

1. Oscilloscope: Impedance Min. 1 MΩ
   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 μF) 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 [$1\times10^{-6}$] *2 | Electrical characteristics | |
| 1 | High temp. storage *3 | ± 2.0 | Satisfy Item output level after test | +85 °C × 1 000 h |
| 2 | Low temp. storage *3 | ± 2.0 | | -40 °C × 1 000 h |
| 3 | High temperature with Humidity | ± 2.0 | | +85 ± 2 °C × 85 ± 5 %RH × 1 000 h |
| 4 | Temp. cycle *3 | ± 2.0 | | -40 °C to +85 °C<br>(30 min × 100 cycle/each) |
| 5 | Resistance to Soldering heat (Reflow characteristics) | ± 1.0 | | Reflow furnace with the condition 2 times |
| 6 | Drop | ± 2.0 | | Free drop from 750 mm height on a hard wooden board for 3 times.<br>(Board is thickness more than 30 mm) |
| 7 | Vibration (variable frequency) | ± 1.0 | | 10 Hz to 55 Hz 0.75 mm<br>55 Hz to 500 Hz acceleration 98 $m/s^2$<br>10 Hz → 500 Hz → 10 Hz 15 min./cycle<br>6 h(2 h × 3 directions) |
| 8 | ESD (MM) | ± 1.0 | | 200pF 0Ω 200V. Discharge 3 pulses |
| 9 | ESD (HBM) | ± 1.0 | | 100pF 1.5kΩ 2000V. Discharge 3 pulses |
| 10 | 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

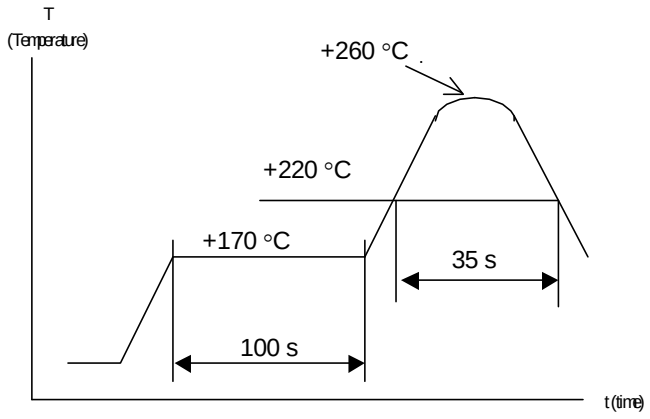
1. reflow 2 times
2. Initial value shall be after 24 h at room temperature.

Infrared-reflow

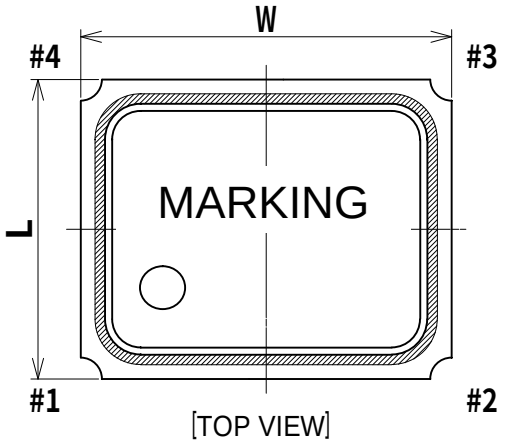
Pre heating temperature : +170 °C Pre heating time : 100 s

Heating temperature : +220 °C Heating time : 35 s

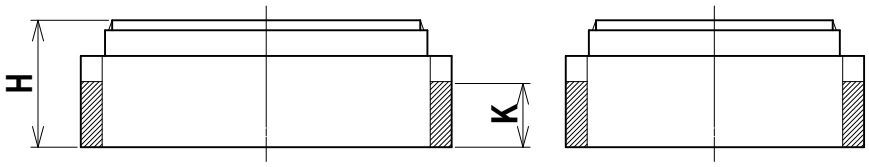
Peak temperature must not exceed +260 °C



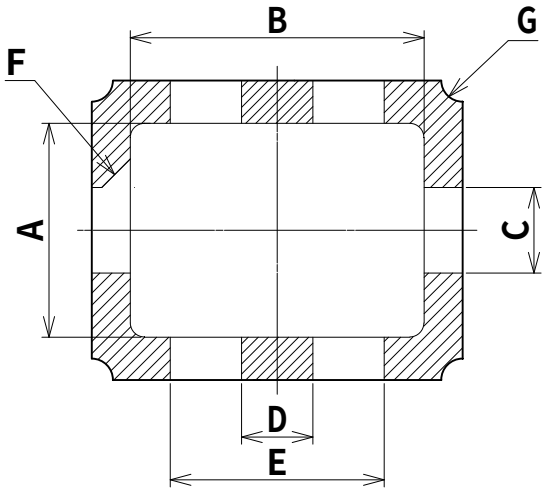
## [ 8 ] Dimensions And Marking Layout



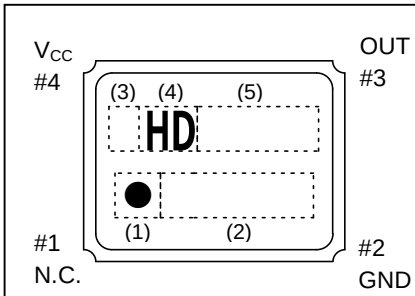

[TOP VIEW]




[SIDE VIEW]




[BOTTOM VIEW]



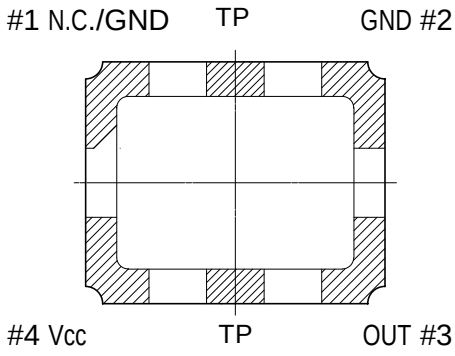

**Marking**

(1) 1Pin Mark
(2) Arbitrary marking area
(3) Location code
(4) TCXO Model ID 「HD」
(5) TCXO Lot No.
(3 figure)

**Material**

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

**CONNECTION**




BOTTOM VIEW

(unit : mm)

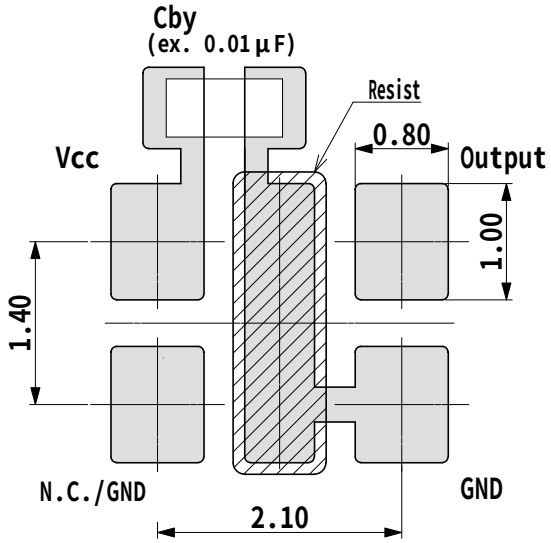
| Dim. | Min. | Typ. | Max. | Dim. | Min. | Typ. | Max. |
|---|---|---|---|---|---|---|---|
| W | 2.45 | 2.50 | 2.65 | D | 0.40 | 0.50 | 0.60 |
| L | 1.95 | 2.00 | 2.15 | E | 1.35 | 1.50 | 1.65 |
| H | 0.70 | 0.80 | 0.90 | F | --- | C0.2 | --- |
| A | 1.35 | 1.50 | 1.65 | G | --- | R0.15 | --- |
| B | 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 ] Handling precautions

Prior to using this product, please carefully read the section entitled “Precautions” on our Web site (http://www.epsontoyocom.co.jp/english/support/support.html) for instructions on how to handle and use the product properly to ensure optimal performance of the product in your equipment. Before using the product under any conditions other than those specified therein, please consult with us to verify and confirm that the performance of the product will not be negatively affected by use under such conditions.

In addition to the foregoing precautions, in order to avoid the deteriorating performance of the product, we strongly recommend that you DO NOT use the product under ANY of the following conditions:

(1) Mounting the product on a board using water-soluble solder flux and using the product without removing the residue of the flux completely from the board. The residue of such flux that is soluble in water or water-soluble cleaning agent, especially the residues which contains active halogens, will negatively affect the performance and reliability of the product.
(2) Using the product in any manner that will result in any shock or impact to the product.
(3) Using the product in places where the product is exposed to water, chemicals, organic solvent, sunlight, dust, corrosive gasses, or other materials.
(4) Using the product in places where the product is exposed to static electricity or electromagnetic waves.
(5) Applying ultrasonic cleaning without advance verification and confirmation that the product will not be affected by such a cleaning process, because it may damage the crystal, IC and/or metal line of the product.
(6) Touching the IC surface with tweezers or other hard materials directly.
(7) Using the product under any other conditions that may negatively affect the performance and/or reliability of the product.
(8) Using the product with power line ripple exceeding 200 mV(p-p) level.

Should any customer use the product in any manner contrary to the precautions and/or advice herein, such use shall be done at the customer’s own risk.

# TAPING SPECIFICATION

## Ⅰ. Application

This standard will apply to 2.5×2.0 Ceramic package.

Spec：CG package

## Ⅱ. Contents

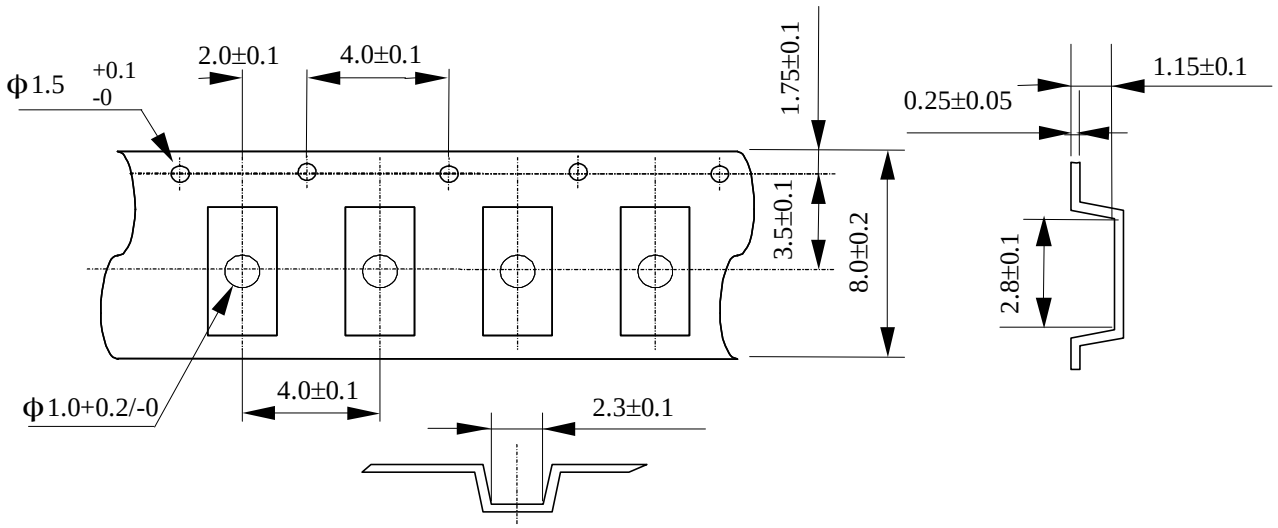

| Item No. | Item | Page |
|---|---|---|
| 〔1〕 | Taping specification | 1 to 2 |
| 〔2〕 | Inner carton | 3 |
| 〔3〕 | Shipping carton | |
| 〔4〕 | Marking | 4 |
| 〔5〕 | Quantity | |
| 〔6〕 | Storage environment | |
| 〔7〕 | Handling | |

〔1〕 Taping specification

Subject to EIA-481& IEC 60286

(1) Tape dimensions

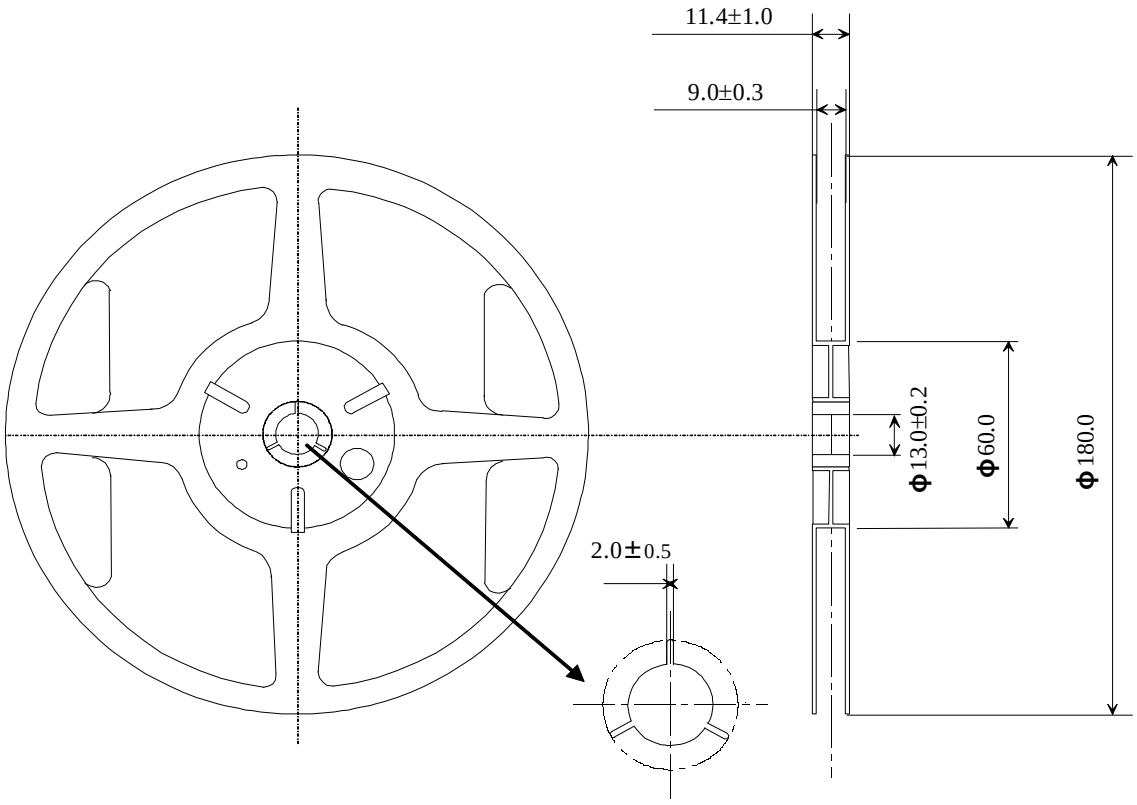
Material of the carrier tape : PS




Unit : mm

(2) Reel dimensions

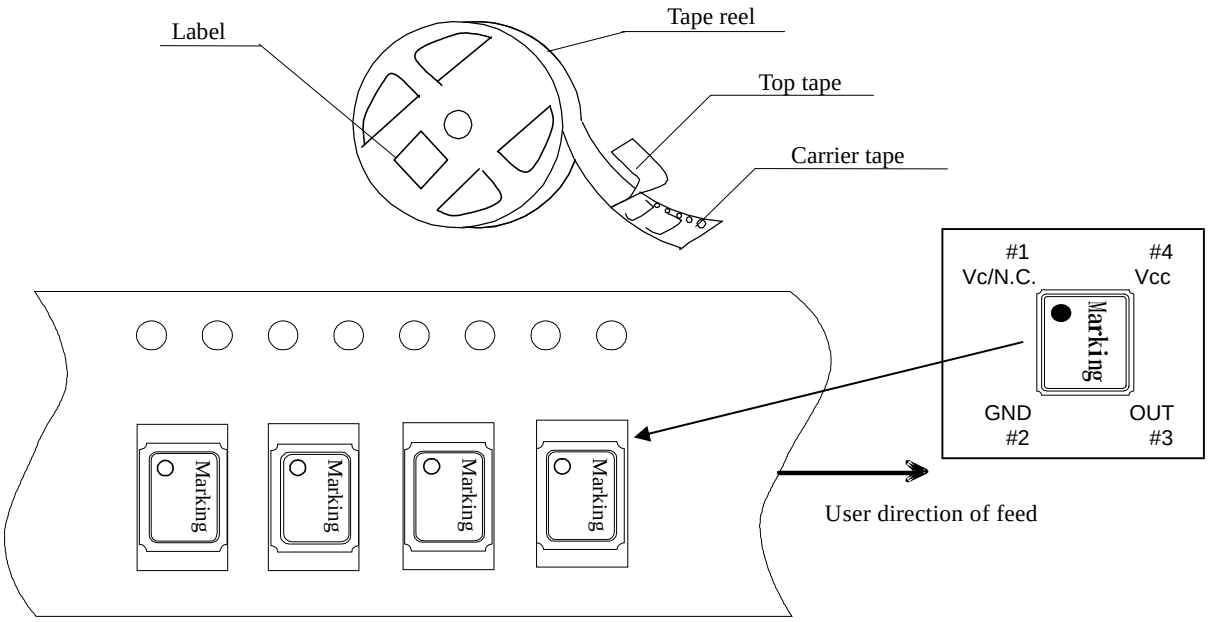
Material of the reel : PS



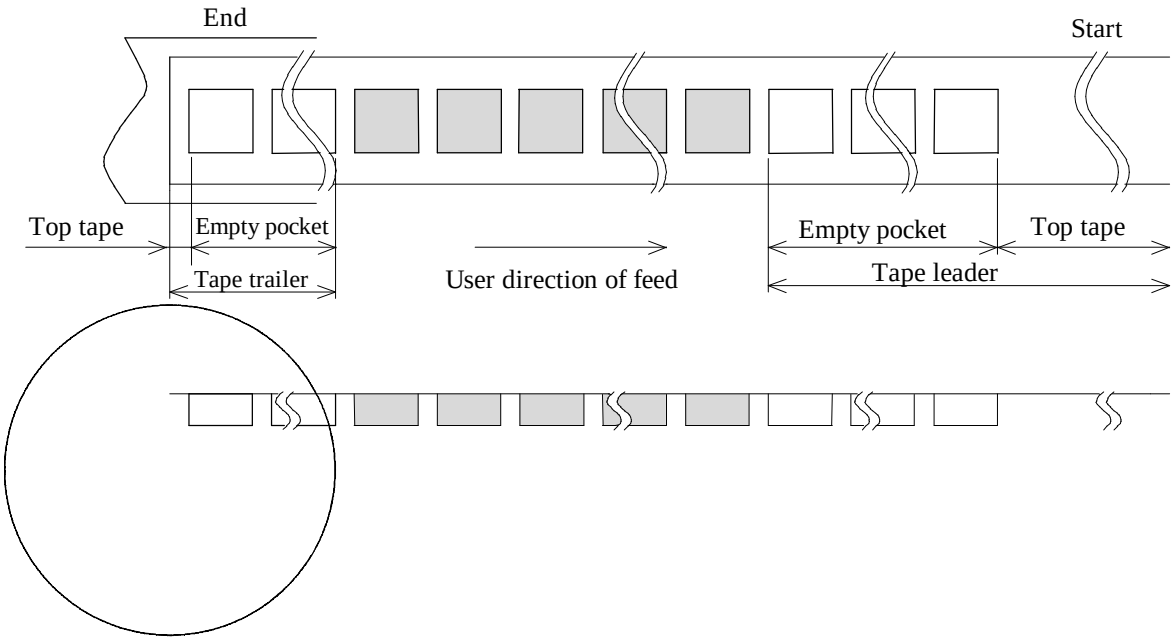

Unit : mm

(3) Packing

①Tape & reel




②Start & end point

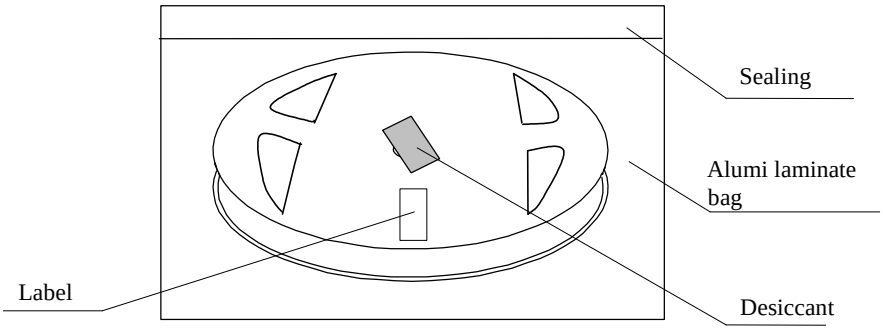



| Item | | Empty space |
|---|---|---|
| Tape leader | Top tape | Min. 200 mm |
| | Empty pocket | Min. 150 mm |
| Tape trailer | Top tape | Min. 0 mm |
| | Empty pocket | Min. 150 mm |

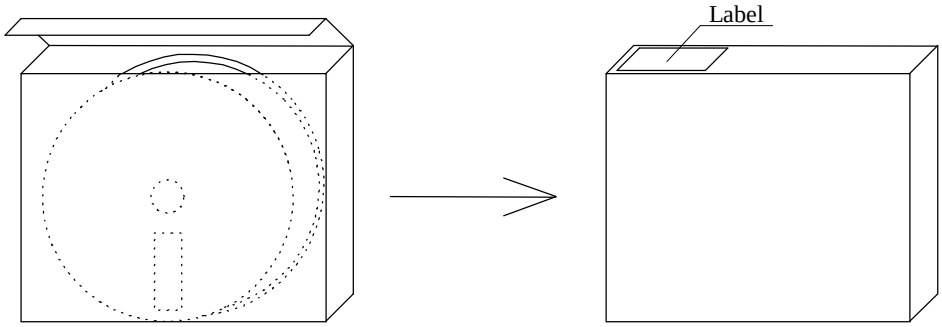
〔2〕 Inner carton

a) Packing to alumi laminate bag

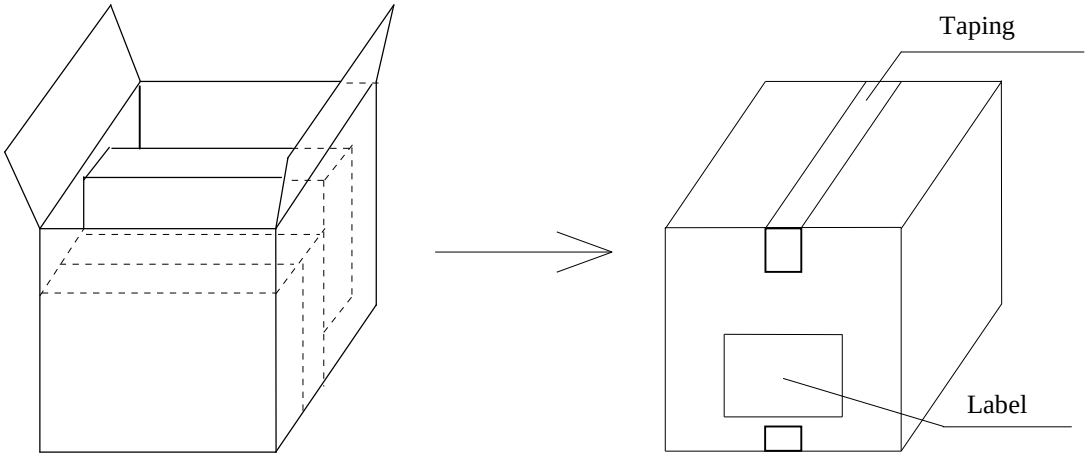
The reel is packed in the vacuum with the alumi laminate bag.




b) Packing to inner carton




〔3〕 Shipping carton



## 〔4〕 Marking

(1) Reel marking

- Reel marking shall consist of :

1) Parts name
2) Quantity
3) Manufacturing date or symbol
4) Manufacturer's name or symbol
5) Others (if necessary)

(2) Inner carton marking

- Same as reel marking.

(3) Shipping carton marking

- Shipping carton marking shall consist of :

1) Parts name
2) Quantity

## 〔5〕 Quantity

- Max : 2000 pcs/reel  Min : 500 pcs/reel

## 〔6〕 Storage environment

(1) To storage the reel at 15 °C to 35 °C, 25 %RH to 85 %RH of humidity.
(2) To open the packing just before using.
(3) Not to expose the sun.
(4) Not to storage with some erosive chemicals.
(5) Nothing is allowed to put on the reel or carton to prevent mechanical damage.

## 〔7〕 Handling

- To handle with care to prevent the damage of tape, reel and products.

RELIABILITY TEST DATA

**Product Name : TG-50xxCG series**

The Company evaluation condition

We evaluate environmental and mechanical characteristics by the following test condition . **OUT10-E31-40M**

| No. | ITEM | TEST CONDITIONS | VALUE *1 | | TEST Qty [ n ] | FAIL Qty [ n ] |
|---|---|---|---|---|---|---|
| | | | Δ f / f *2 [1 × $10^{-6}$] | Electrical characteristics | | |
| 1 | High temperature storage | +85 °C × 1 000 h | *3 ± 2.0 | Satisfy output level after test | 22 | 0 |
| 2 | Low temperature storage | -40 °C × 1 000 h | *3 ± 2.0 | | 22 | 0 |
| 3 | High Temperature with Humidity | +85 ± 2 °C × 85 ± 5 %RH × 1 000 h | *3 ± 2.0 | | 22 | 0 |
| 4 | Temperature cycle | -40 °C ⇔ +85 °C 30 min at each temp. 1000 cycles | *3 ± 2.0 | | 22 | 0 |
| 5 | Resistance to soldering heat | Convection reflow soldering furnace (3 times) | ± 1.0 | | 22 | 0 |
| 6 | Drop | 150g dummy jig (Epson Toyocom Standard) drop from 1500 mm height on the concrete 6 directions 3 times. | ± 2.0 | | 22 | 0 |
| 7 | Vibration | 10 Hz to 55 Hz amplitude 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 ) | ± 2.0 | | 22 | 0 |
| 8 | ESD (MM) | 200pF 0Ω 200V , Discharge 3 pulses | ± 1.0 | | 22 | 0 |
| 9 | ESD (HBM) | 100pF 1.5kΩ 2000V , Discharge 3 pulses | ± 1.0 | | 22 | 0 |
| 10 | Solderability | Dip termination into solder bath at +235 °C ± 5 °C for 5 s (Using Rosin Flux) | Termination must be covered with fresh solder more than 95 % of dip area. | | 11 | 0 |

Notes

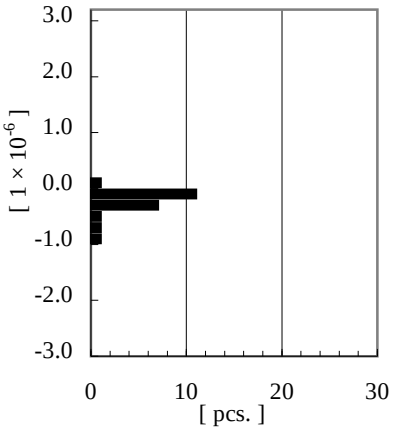
1. *1 Each test done independently.
2. *2 Measuring 2 h to 24 h later leaving in room temperature after each test.
3. *3 Initial value shall be measured after 24 h storage at room temperature Pre-treatment
   Pre-treatment : Bake (+125 ℃ × 24 h) →Moisture soak (+85 ℃ × 60 % × 168 h) →reflow (3 times)

**Qualification Data**

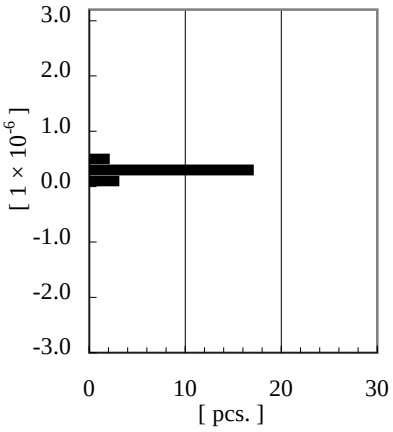
## Product Name : TG-50xxCG series

df / f

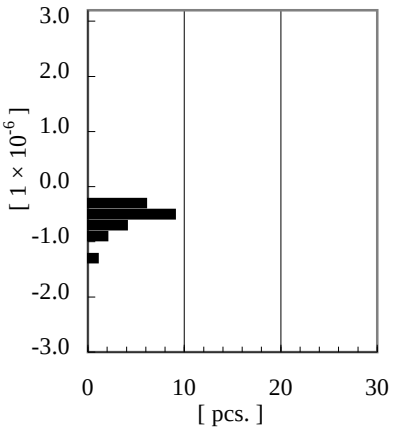
1. High temp. storage
+85 °C × 1 000 h



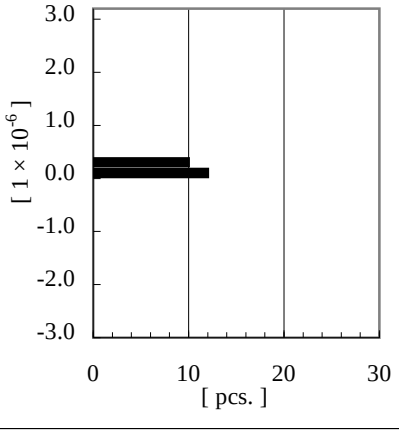

2. Low temp. storage
-40 °C × 1 000 h



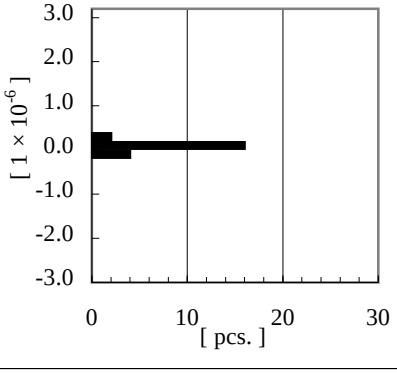

3. Temp. humidity storage
+85 °C × 85 %RH × 1 000 h



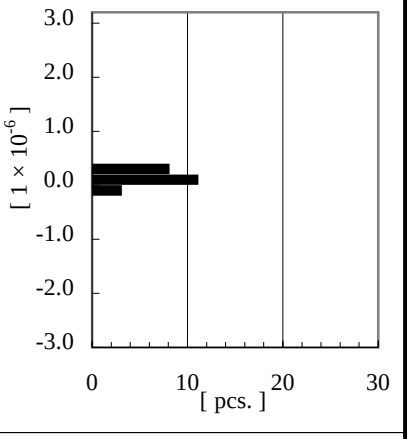

4. Temp. cycle
-40 °C ⇔ +85 °C
1000 cycles



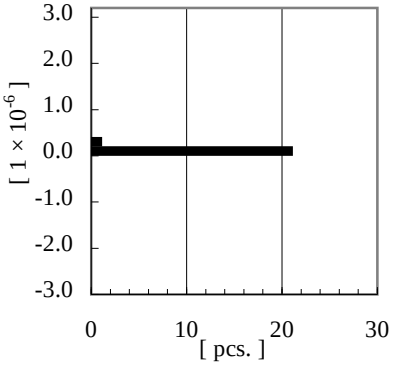

5. Resistance to soldering heat
For convention reflow soldering furnace (3 times)



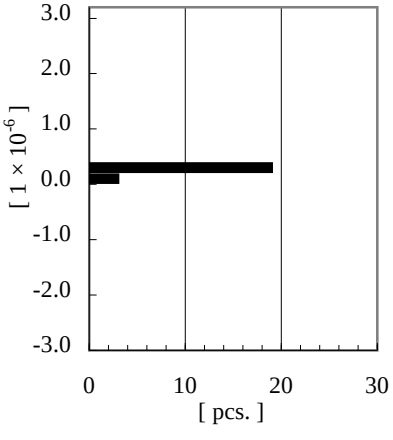

6. Drop
1500 mm × 6 times



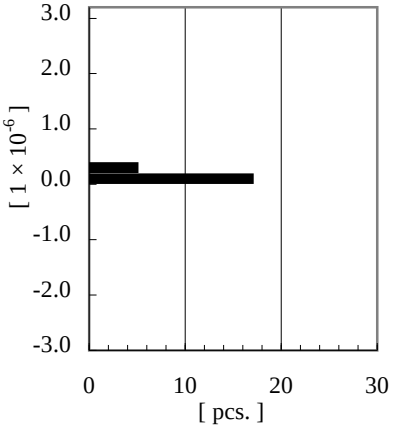

7. Vibration
10 Hz to 55 Hz amplitude 0.75 mm
55 Hz to 500 Hz acceleration 98 m/s$^2$
15 min / cycle
6 h ( 2 h × 3 directions )




8. ESD (MM)
200pF 0Ω 200V




9. ESD (HBM)
100pF 1.5kΩ 2000V




**Qualification Data**