# INFORMATION

**PRODUCT No. :** **Q33519E40003000**

**MODEL :** **SG-8003CE**

**INFO. No. :** **A14-668-4A**

**DATE :** **Aug. 29. 2014**

**SEIKO EPSON CORPORATION**

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**Nagano-ken**
**399-4696 Japan**

INTRODUCTION

1. The contents is subject to change without notice.
   Please exchange the specification sheets regarding
   the product's warranty.

2. This sheet is not intended to guarantee or provide
   an approval of implementation of industrial patents.

3. We have prepared this sheet as carefully as possible.
   If you find it incomplete or unsatisfactory in any
   respect, We would welcome your comments.

This product is compliant with RoHS Directive.

This Product supplied (and any technical information furnished, if any) by Seiko Epson 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.

## Product No. / Model

The product No. of this crystal oscillator unit is Q33519E40003000.
The model is SG-8003CE PC.

## Contents


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## [ 1 ] Absolute maximum ratings

| Parameter | Symbol | Value | Unit | Note |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$-GND | -0.5 to +4.4 | V | |
| Storage temperature * | T_stg | -40 to +125 | °C | Stored as bare product after unpacking. |
| Input voltage | $V_{IN}$ | -0.5 to $V_{CC}$+0.5 | V | OE Terminal |

* Concerning the frequency change, please refer [8] Environmental and mechanical characteristics.

## [ 2 ] Operating range

| Parameter | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Supply voltage | $V_{CC}$ | 2.7 | 3.3 | 3.6 | V | |
| Supply voltage | GND | 0.0 | 0.0 | 0.0 | V | |
| Input voltage | $V_{IN}$ | GND | - | $V_{CC}$ | V | |
| Output load condition | L_CMOS | - | - | 15 | pF | |

- Start up time must be increased linearly and (0 %$V_{CC}$→90 %$V_{CC}$) of power source should be between 150μs to 500ms.
- By-pass capacitor (0.01 μF to 0.1 μF) is connected near Vcc between Vcc and GND.

## [ 3 ] Frequency characteristics

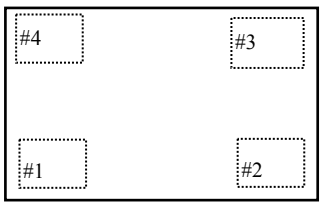
1) Output frequency ($f_0$) range ..... 1.0000 MHz to 166.0000 MHz
2) Output frequency fo ..... Please see Output frequency list

| Parameter | Symbol | Value[$1 \times 10^{-6}$] | Note |
|---|---|---|---|
| Frequency tolerance * | f_tol (OSC) | M: ± 100<br>L: ± 50 | T_use=-40 °C to +85 °C |
| | | C: ± 100<br>B: ± 50 | T_use=-20 °C to +70 °C |
| Aging | f_aging | ± 3 | T_use=+25 °C, $V_{CC}$=3.3 V First year |

* This includes initial frequency tolerance, temperature characteristics, input voltage characteristics, load characteristics and Reflow shift, but excludes aging.

## [ 4 ] Terminal assignment

Top View




| Terminal name | Terminal No. | Terminal type. |
|---|---|---|
| OE | 1 | INPUT |
| GND | 2 | — |
| OUT | 3 | OUTPUT |
| $V_{CC}$ | 4 | — |

OE pin : High or open. → Specified frequency output = enable.
OE pin : Low. → Output is weak pull-down = disabled.

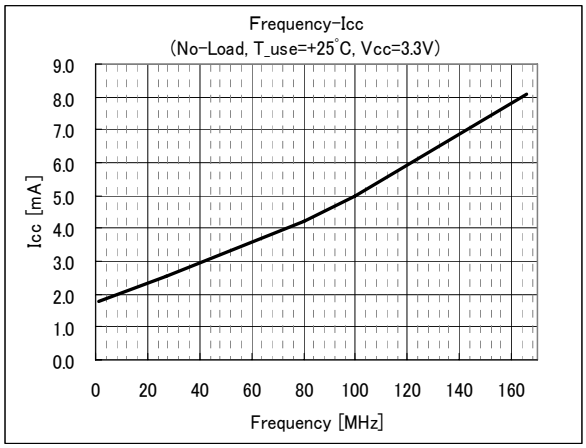
## [ 5 ] Electrical characteristics

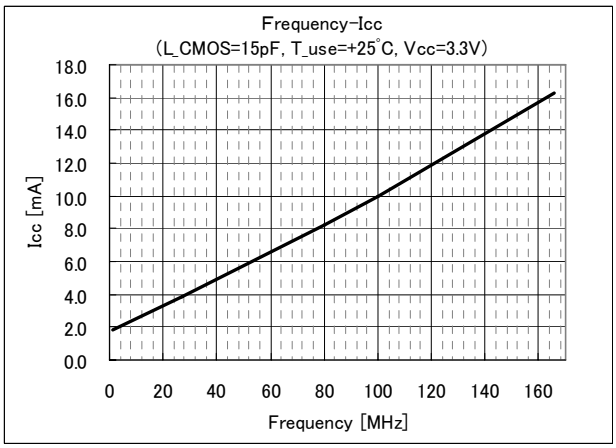
(Please see page 2 [2] Operating range)

| Parameter | Symbol | Value Min. | Value Max. | Unit | Note | |
|---|---|---|---|---|---|---|
| Start up time | $t_{OSC}$ | - | 5 | ms | t=0 at 90 %$V_{CC}$ | |
| Current consumption | $I_{CC}$ | - | 4 | mA | 1 MHz ≤$f_0$ ≤25 MHz, No load | |
| | | | 6.5 | | 25 MHz<$f_0$ ≤50 MHz, No load | |
| | | | 8.5 | | 50 MHz<$f_0$ ≤75 MHz, No load | |
| | | | 10.5 | | 75 MHz<$f_0$ ≤100 MHz, No load | |
| | | | 12.5 | | 100 MHz<$f_0$ ≤125 MHz, No load | |
| | | | 15 | | 125 MHz<$f_0$ ≤166 MHz, No load | |
| Disable current | I_dis | - | 8 | mA | OE=GND | |
| Output rise time | tr | - | 5 | ns | 20 %$V_{CC}$ → 80 %$V_{CC}$ | 1 MHz ≤ f0 < 80 MHz |
| | | | 2.5 | | | 80 MHz ≤ f0 ≤ 166 MHz |
| Output fall time | tf | - | 5 | ns | 80 %$V_{CC}$ → 20 %$V_{CC}$ | 1 MHz ≤ f0 < 80 MHz |
| | | | 2.5 | | | 80 MHz ≤ f0 ≤ 166 MHz |
| Symmetry | SYM | 45 | 55 | % | 50 %$V_{CC}$ Level | |
| High level output voltage | $V_{OH}$ | $V_{CC}$-0.4 | - | V | $I_{OH}$ = -8 mA | |
| Low level output voltage | $V_{OL}$ | - | 0.4 | V | $I_{OL}$ = 8 mA | |
| High level input voltage | $V_{IH}$ | 0.8 $V_{CC}$ | - | V | OE terminal | |
| Low level input voltage | $V_{IL}$ | - | 0.2 $V_{CC}$ | V | OE terminal | |
| Input current | $I_{IH}$ | -5 | 5 | μA | $V_{IN}$ = $V_{CC}$ | |
| | $I_{IL}$ | - | 10 | μA | $V_{IN}$ = GND | |
| Jitter (cycle to cycle) | tj | - | 1 %$T_{OUT}$ | ps | 1 MHz ≤ fo ≤27 MHz, $T_{OUT}$=1/ $f_0$ | |
| | | - | 200 | | 27 MHz ≤ fo ≤166 MHz | |
| Jitter (peak to peak) | | - | 1 %$T_{OUT}$ | | 1 MHz ≤ fo ≤27 MHz, $T_{OUT}$=1/ $f_0$ | |
| | | - | 250 | | 27 MHz ≤fo≤166 MHz | |
| Output disable time | $t_{pxz}$ | - | 100 | ns | OE terminal HIGH → LOW | |
| Output enable time | $t_{pzx}$ | - | 100 | ns | OE terminal LOW → HIGH | |
| Input pull-up resistance | $R_{UP}$ | 1.0 | 6.0 | MΩ | disable time $V_{IN}$ =0V | |
| | | 100 | 250 | KΩ | enable time $V_{IN}$ ≥ 0.8Vcc, T_use =+25 °C | |

Refer to [6] Test circuit [7] Timing chart

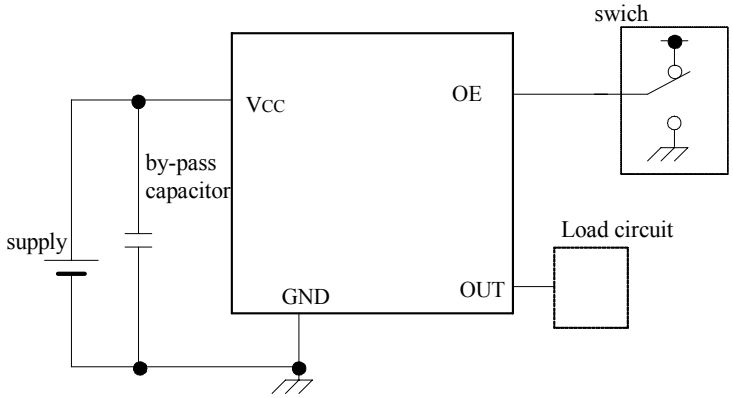
Current consumption (Reference value) (Vcc=3.3 V , T_use=25 ゜C)



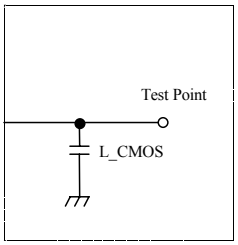



## [ 6 ] Test circuit

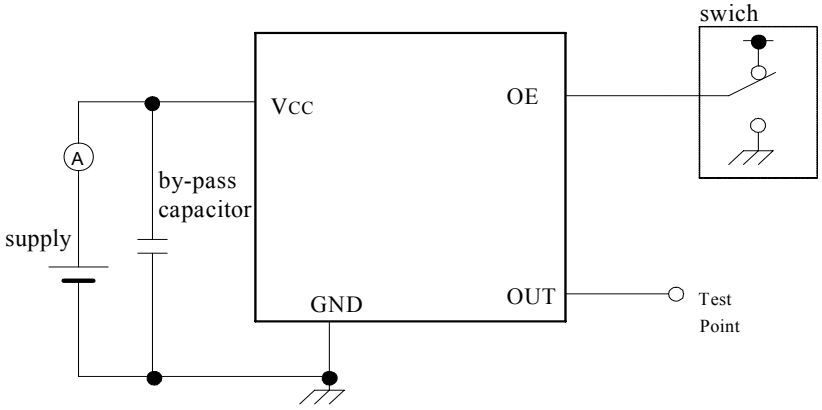
1) Waveform observation




Load circuit load capacitance




2) Current consumption




*Current consumption under the disable function should be OE= GND.

3) Condition

(1) Oscilloscope

- Band width should be minimum 5 times higher (wider) than measurement frequency.
- Probe earth should be placed closely from test point and lead length should be as short as possible.

* Recommendable to use miniature socket. (Don't use earth lead.)

(2) L_CMOS also includes probe capacitance.

(3) By-pass capacitor (0.01 μF to 0.1 μF) is placed closely between VCC and GND.

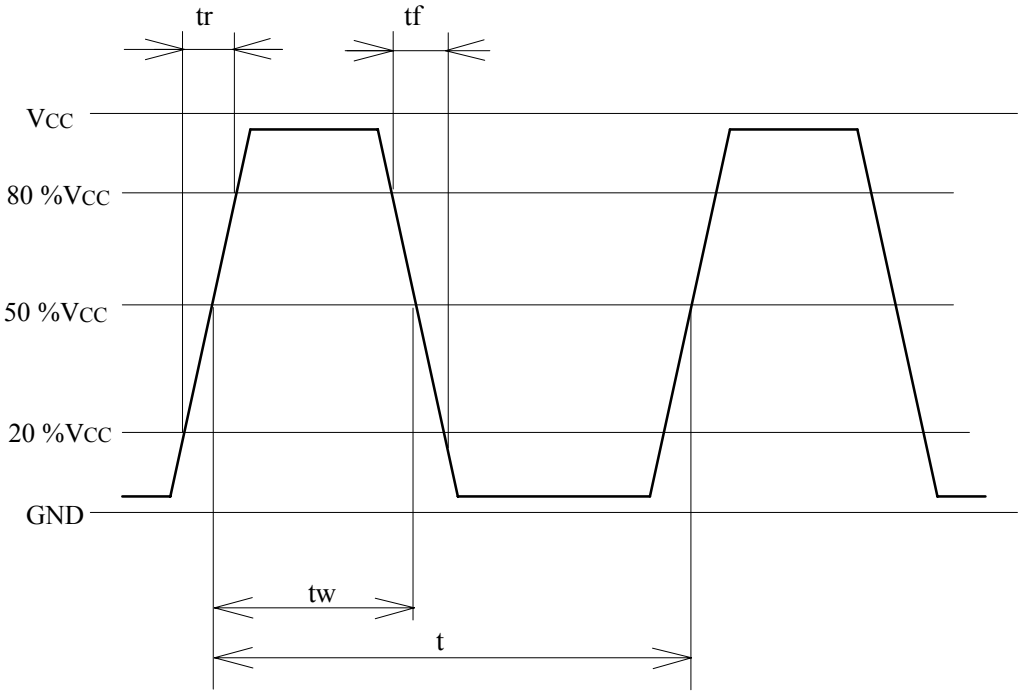
(4) Use the current meter whose internal impedance value is small.

(5) Power supply

- Start up time (0 %VCC → 90 %VCC) of power source should be between 150 μs to 500 ms.
- Impedance of power supply should be as lowest as possible.

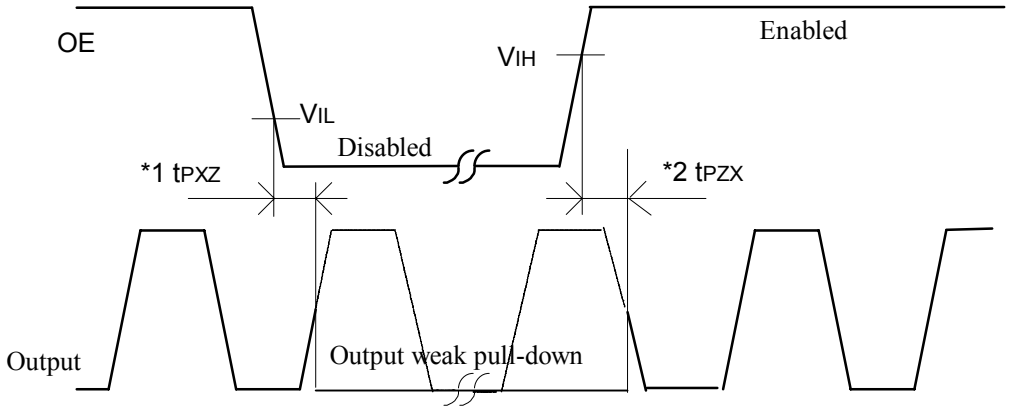
## [ 7 ] Timing chart

1) C-MOS load SYM = tw/t × 100 (%)




2) OE function and timing

| OE function | Osc. circuit | Output status |
|---|---|---|
| High or Open | Oscillation | Specified frequency is output : Enable |
| Low | Oscillation | Output becomes weak pull-down : Disable |



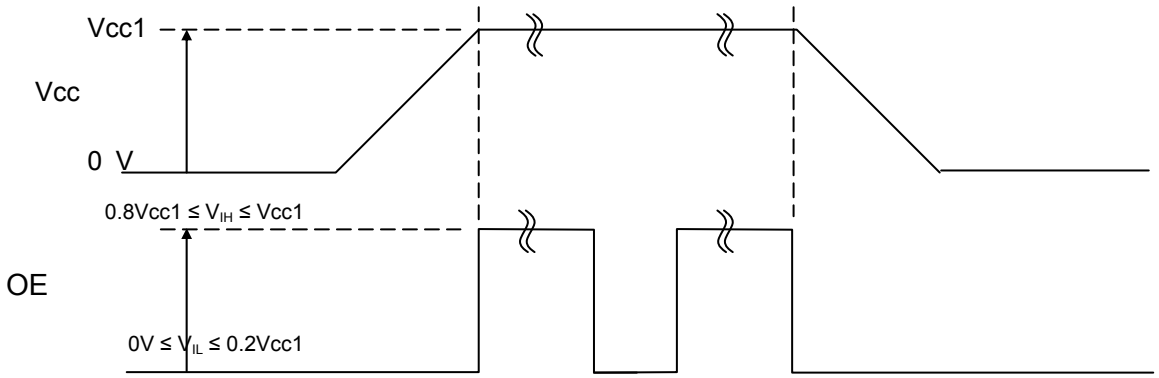

*1 The time taken from OE=VIL to output = Disable (weak pull-down)

*2 The time taken from OE=VIH to output = Start

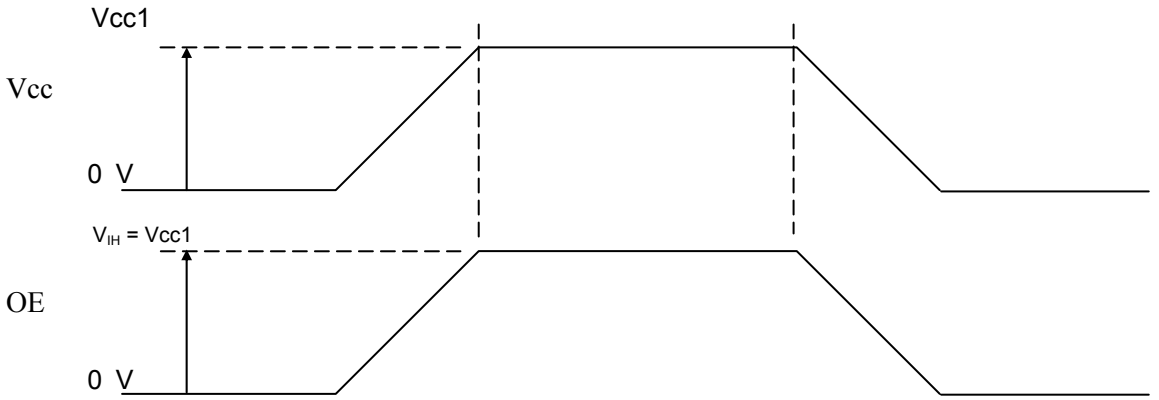
3) OE control timing

OE function is used on the voltage below supply voltage.

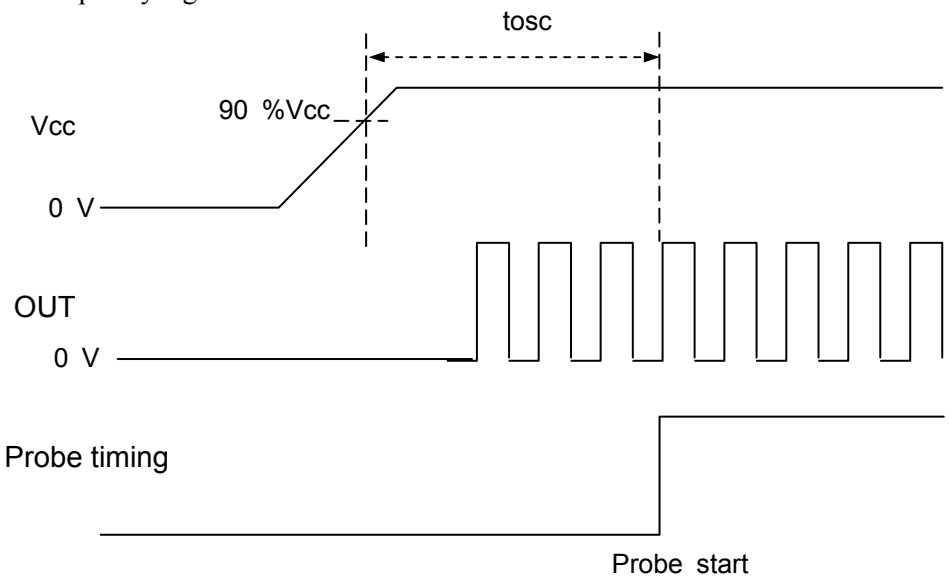
OE control timing differs from Vcc control timing




OE terminal is connected to Vcc terminal




4) Timing of an output frequency signal



## [ 8 ] Environmental and mechanical characteristics

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

| No. | Item | Value *1 | | Test Conditions |
|---|---|---|---|---|
| | | Δ f / f *2 [ $1 \times 10^{-6}$ ] | Electrical characteristics | |
| 1 | High temperature storage | *3 ± 20 | Satisfy Item [5] after test. | +125 °C × 1 000 h |
| 2 | Low temperature storage | *3 ± 10 | | -40 °C × 1 000 h |
| 3 | High temperature bias | *3 ± 10 | | +85 °C × Vcc Max. × 1 000 h |
| 4 | Low temperature bias | *3 ± 10 | | -40 °C × Vcc Max. × 1 000 h |
| 5 | Temperature humidity bias | *3 ± 10 | | +85 °C × 85 %RH × Vcc Max. × 1 000 h |
| 6 | Temperature cycle | *3 ± 10 | | -40 °C ↔ +125 °C<br>30 min. at each temperature 100 cycles |
| 7 | Resistance to soldering heat | ± 3 | | Convection reflow soldering furnace (3 time)<br>Ref. IPC/JEDEC J-STD-020D.1 |
| 8 | Shock | ± 3 | | 100 g dummy Jig (SE Standard)<br>drop from 1 500 mm height on the Concrete 3 directions 10 times. |
| 9 | Vibration | ± 2 | | 10 Hz to 55 Hz amplitude 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 hours , 3 directions) |
| 10 | Seal | $1 \times 10^{-9}$ Pa·$m^3$ / s | | He leakage detector |
| 11 | Solderability | Termination must be 95 % covered with fresh solder | | Dip termination into solder bath at +235 °C ± 5 °C for 5 s. (Using Rosin Flux) |
| 12 | Pull - off | No peeling-off at a solder part | | 10 N press for 10 s ± 1 s<br>Ref. EIAJ ED-4702 |

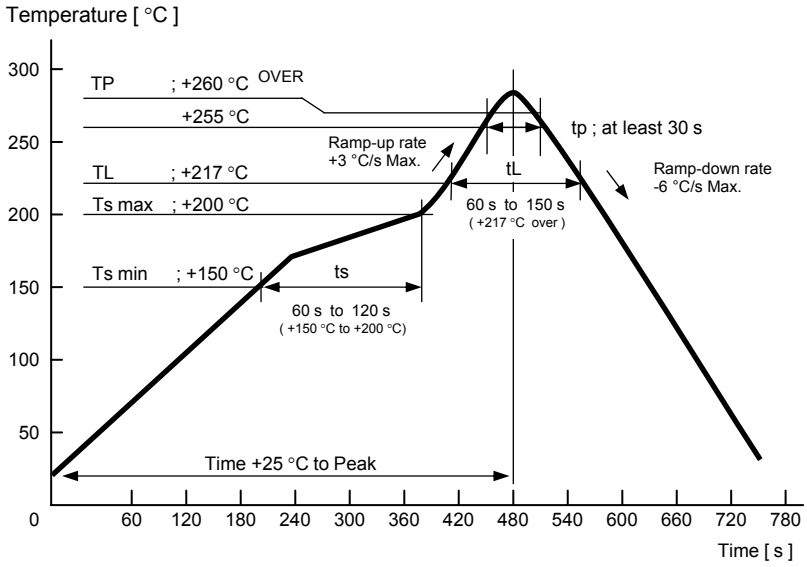
< Notes >

*1 Each test done independently.

*2 Measuring 2 h to 24 h later leaving in room temperature after each test.

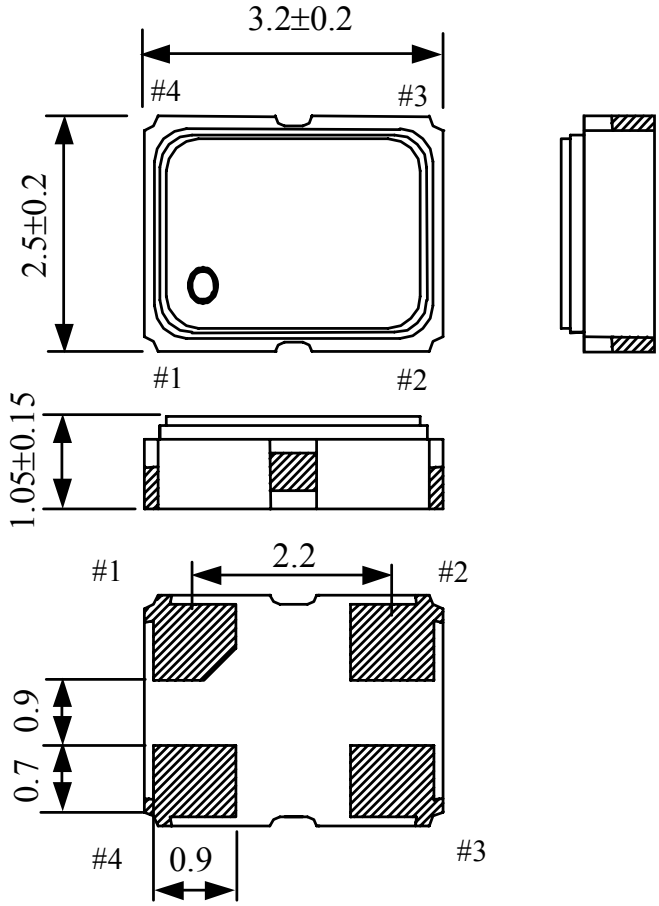
*3 Initial value shall be measured after 24 h storage at room temperature after pre-conditioning.
Pre-conditioning: Reflow (3 time)

Convection reflow condition (Ref. IPC/JEDEC J-STD-020D.1)



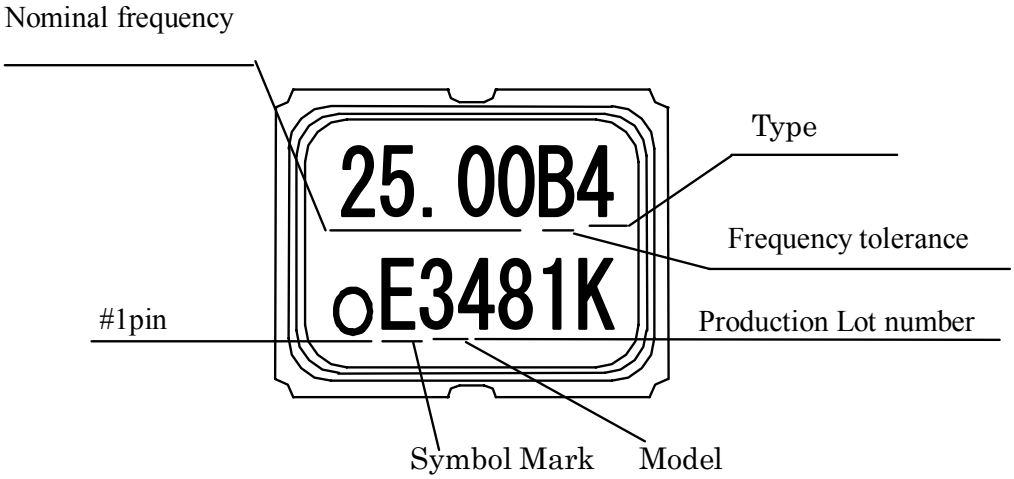
## [ 9 ] Dimensions and marking layout

1) Dimensions




Terminal treatment : Au plating
Unit : mm

2) Marking layout




- The above marking layout shows only marking contents and their approximate position and it is not for font, size and exact position.
- Output frequency shall indicate 5 digits (include decimal point), if the value of frequency over 5 digits, the least significant digits will be omitted.

## [ 10 ] Notes

1) This device is made with C-MOS IC.
Please take necessary precautions to prevent damage due to electrical static discharge.

2) Seiko Epson recommends a 0.01 μF to 0.1 μF capacitor must be connected near Vcc between Vcc and GND to obtain stable operation and protect against power line ripple.

3) Vcc and GND pattern shall be as large as possible so that high frequency impedance shall be small.

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

5) Seiko 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.

6) Power ripple: 200 mV P-P max. Start up time (0 %$V_{CC}$→90 %$V_{CC}$) of power source should be between 150 μs to 500 ms.

7) A long output line may cause irregular output, so try to make the output line as short as possible.

8) Other high-level signal lines may cause incorrect operation, so please do not place high level signal line close to this device.

9) This device contains a crystal resonator, so please don't expose excessive shock or vibration. Seiko Epson recommends store device under normal temperature and humidity to keep the specification.

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

11) Ultrasonic cleaning can be used on the SG-8003CE, however, since the oscillator might be damaged under some conditions, please exercise in advance.

12) Seiko Epson recommends to use and store under room temperature and normal humidity to secure frequency accuracy and prevent moisture.

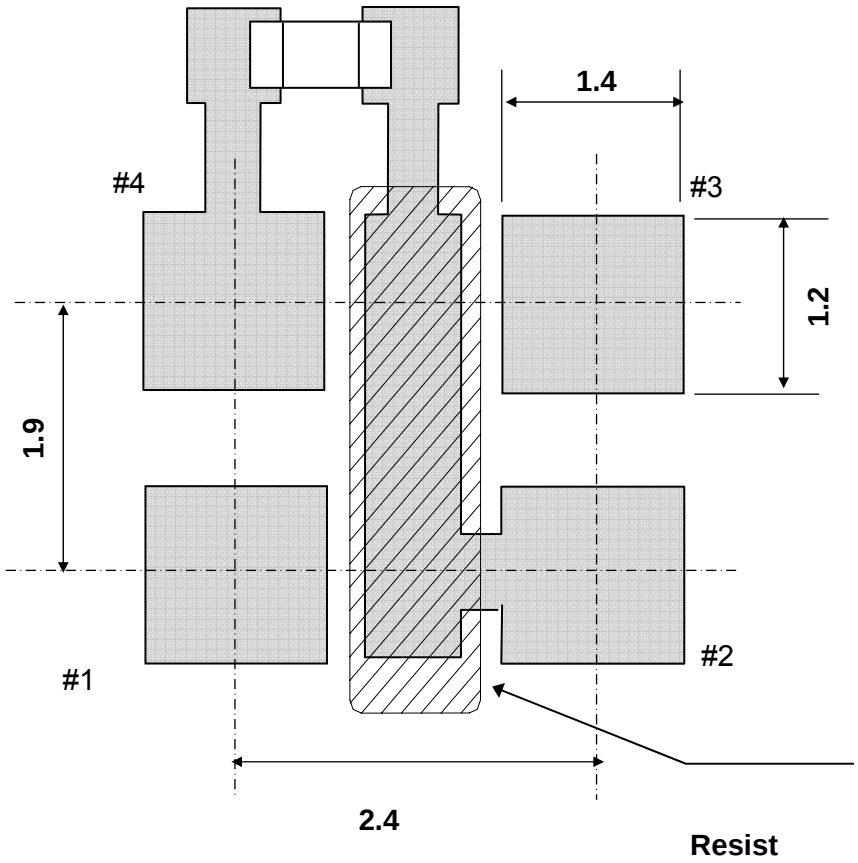
13) OE-pin has pull-up resistor internally. The resistor value is switched depending on input voltage. Please refer to electrical characteristics. And if OE-pin is not controlled please connect it to Vcc-pin.

14) Lid is electrically disconnected to package.
However output frequency might be affected when apply voltage to Lid.

## [ 11 ] Recommendable patterning

The soldering pad sample indicated as like following:

Soldering position (Unit : mm)



# Output frequency list

SG-8003CE PC

| No. | Output frequency | Frequency stability [$1\times10^{-6}$] | Operating temperature range [°C] | Model No. | Date | Note |
|---|---|---|---|---|---|---|
| 1 | 25 MHz | L : ± 50 | -40 ~ +85 | Q33519E40003000 | ’14.08.29 | |
| | | | | | | |
| | | | | | | |
| | | | | |

# TAPING SPECIFICATION

## Ⅰ. Application

This standard will apply to 3.2×2.5 Ceramic package.

Spec：CE 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 | |

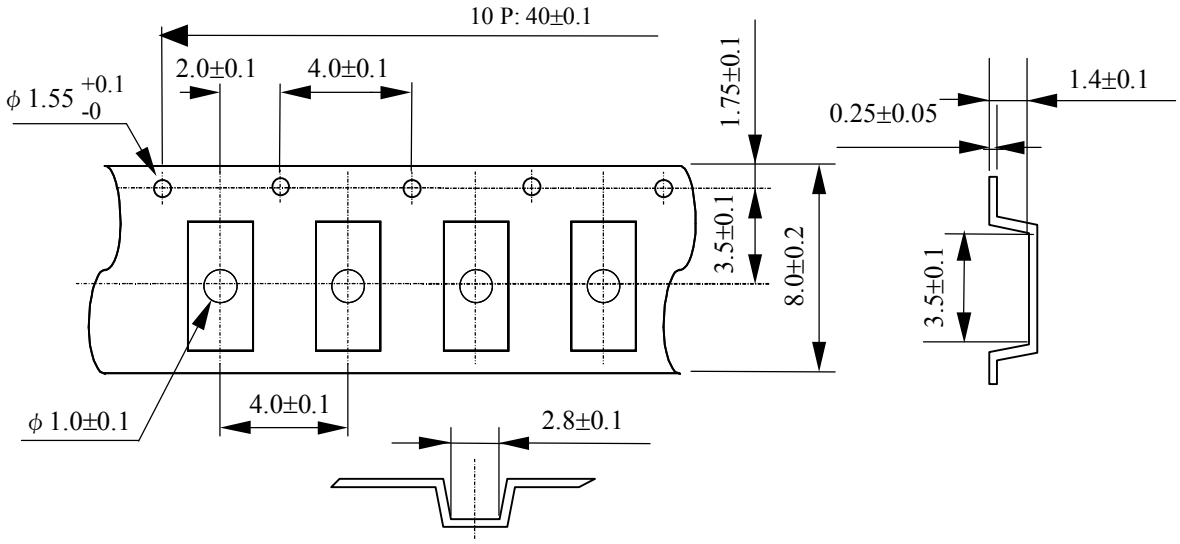
〔1〕 Taping specification

Subject to「EIA-481」and「IEC-60286」

(1) Tape dimensions

Material of the carrier tape : ＰＳ

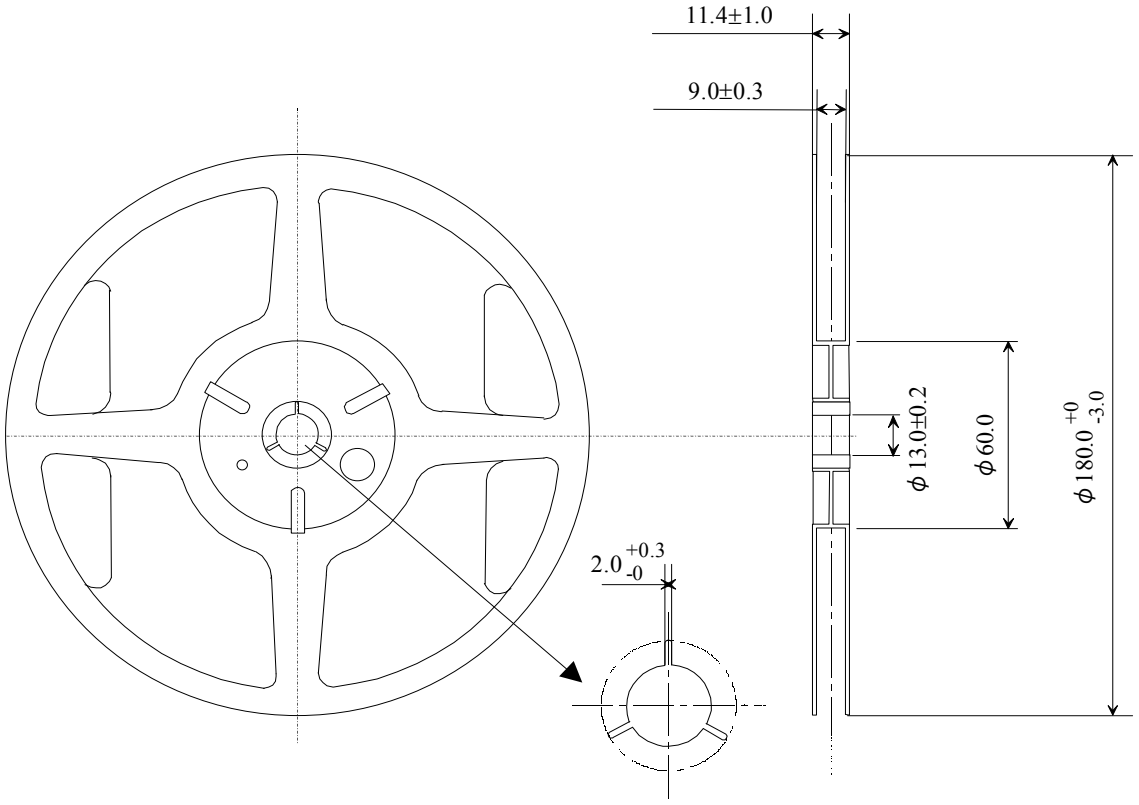
Material of the top tape : PET+PE




Unit : mm

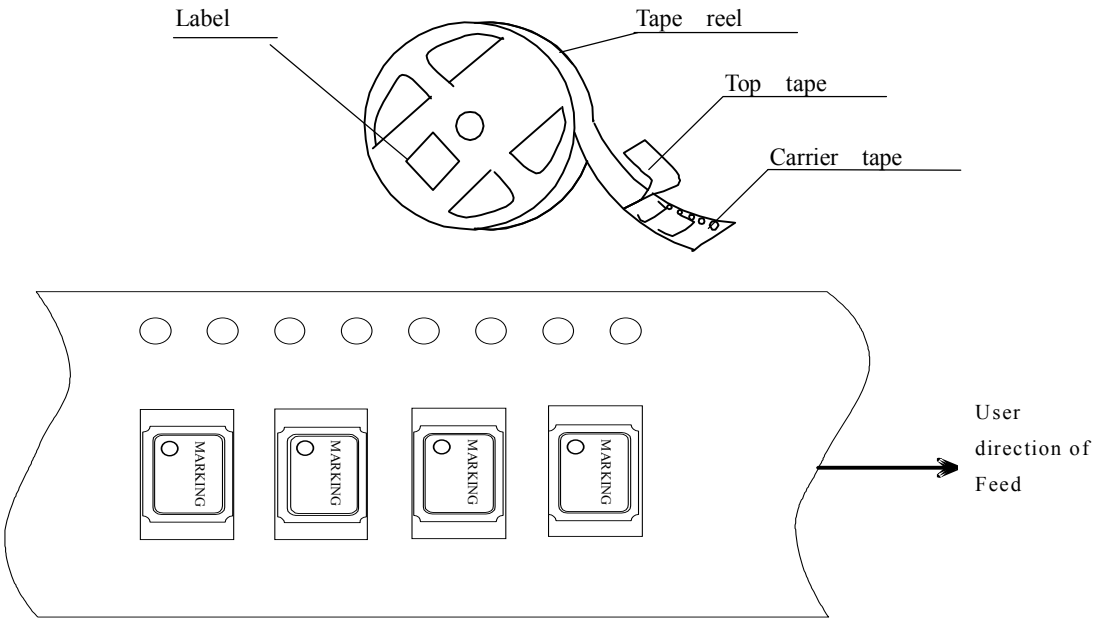
(2) Reel dimensions

Material of the reel : Conductive polystyrene

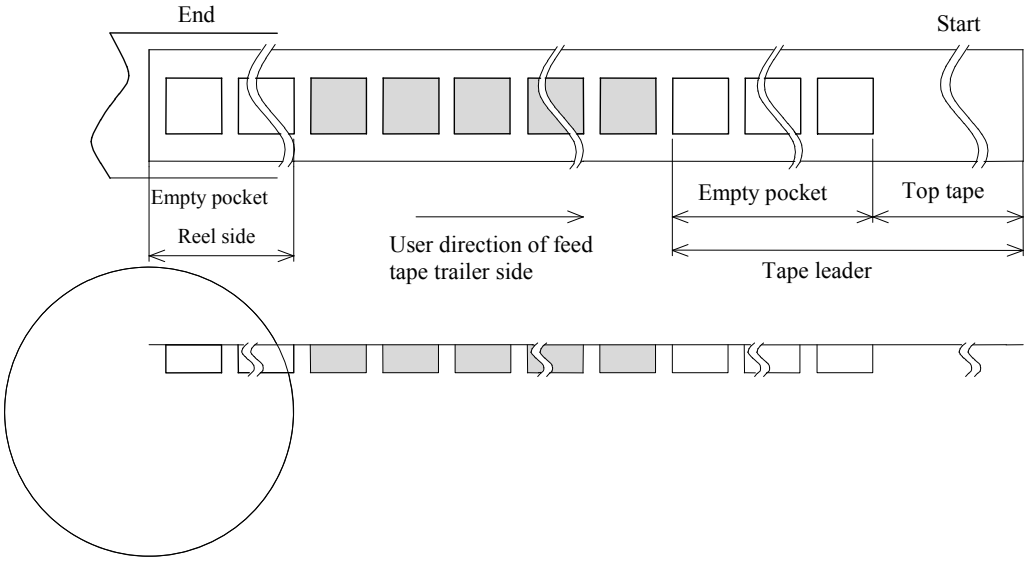


(3) Packing

①Tape & reel




②Start & end point




| Item | | Empty space |
|---|---|---|
| Tape leader | Top tape | Min. 1 000 mm |
| | Carrier tape | Min. 160 mm |
| Tape trailer | Top tape | Min. 0 mm |
| | Carrier tape | Min. 160 mm |

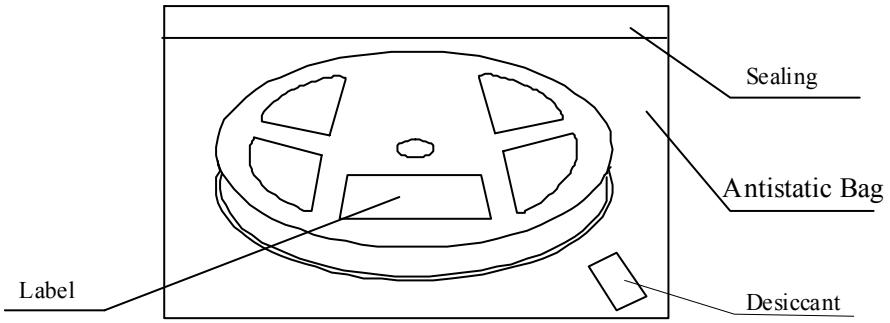
(4) Peel force of the cover tape

① angle : cover tape during peel off and the direction of unreeling shall be 165° to 180°.

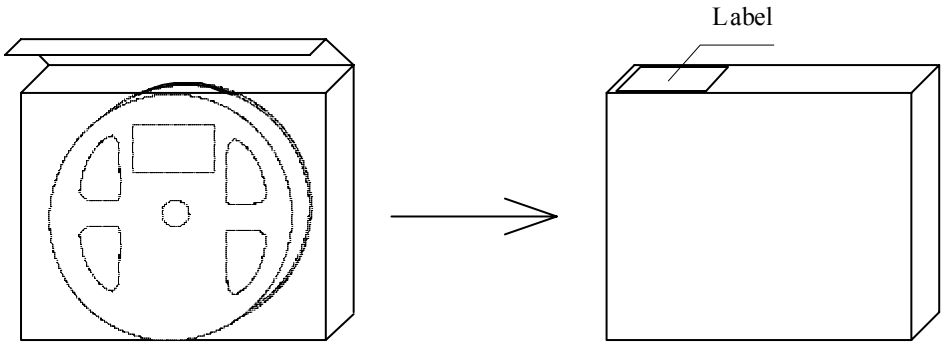
② peel speed : 300 mm / min.

〔2〕 Inner carton

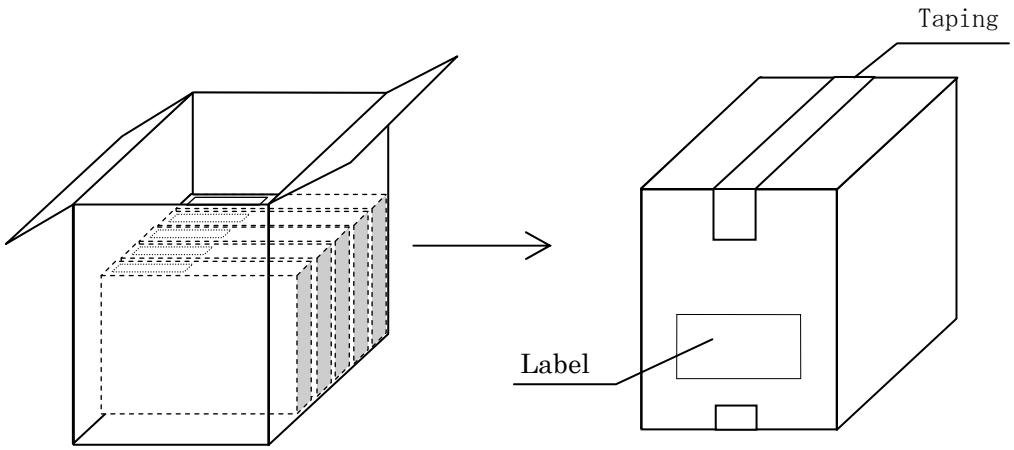
a) Packing to antistatic bag




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 date 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

・ 2,000 pcs./reel

〔6〕 Storage environment

(1) Before open the packing, we recommend to keep less than +30 °C and 85 %RH of Humidity, and to use it less than 6 months after delivery.

(2) We recommend to open Package in immediately before use. After open Package, We recommend to keeps less than 6 month. No need dry air before soldering work if it is less than temperature +30 °C, 85 humidity %RH.

(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.

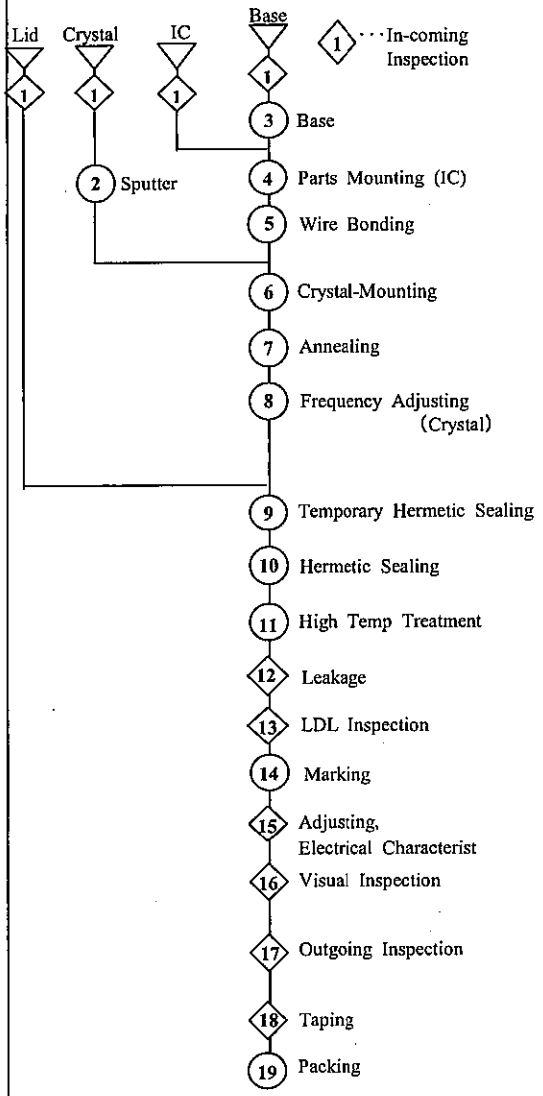
〔7〕 Handling

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

## - PROCESS QUALITY CONTROL -

No. SG8003CE - 00 - AME – 3　　CRYSTAL OSCILLATOR : SG-8003CE/SG-320PxP

2012.6.7

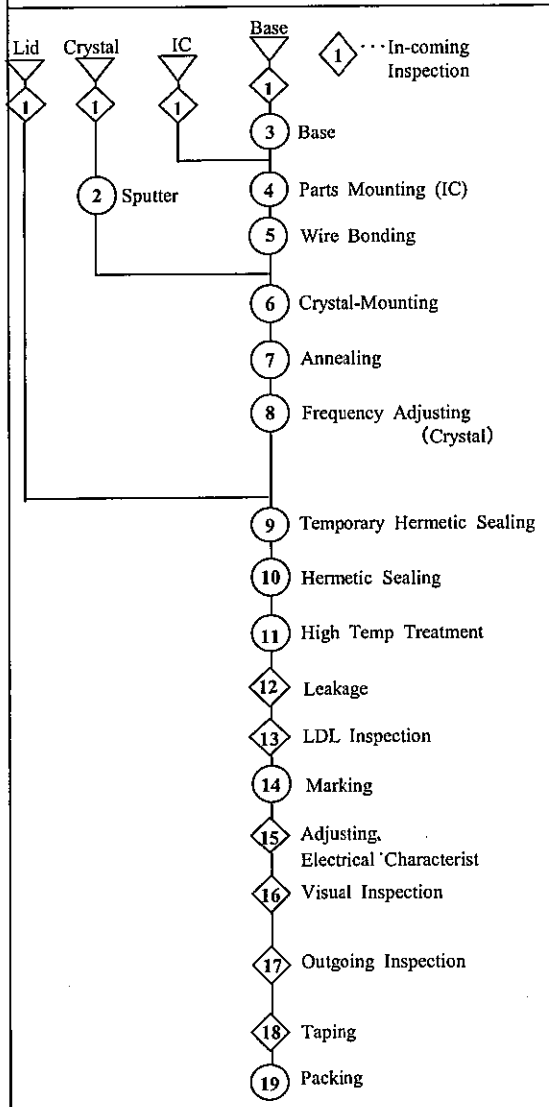



| No. | Section In Charge | Standards | Inspection, Control Item | Instruments | Inspection Methods | Record |
|---|---|---|---|---|---|---|
| 1 | Inspection Section | Purchasing specification<br>Incoming inspection standard | Appearance<br>Dimension | Microscope | Sampling | Data sheet |
| 2 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance<br>Peeling strength<br>Frequency | Microscope<br>Scratch<br>CI Meter | Sampling | Data sheet |
| 3 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 4 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 5 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Bonding strength<br>Appearance | Gauge<br>Microscope | Sampling | Data sheet |
| 6 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 7 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 8 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 9 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 10 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance<br>Frequency | Microscope<br>Counter | Sampling<br>Sampling | Data sheet |
| 11 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 12 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| 13 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Characteristic inspection | Measuring equipment | 100% Inspection | |
| 14 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 15 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Electrical characteristic<br>Master check | Measuring equipment | 100% Inspection<br>One/Day | Data sheet |
| 16 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Appearance<br>Master check | Microscope | Sampling<br>One/Day | Data sheet |
| 17 | Malaysia Plant (Inspection Section) | Delivery specifications<br>Outgoing inspection standard | Electrical characteristic<br>Appearance<br>Master check | Measuring equipment<br>Visual inspection | Sampling<br>One/Day | Data sheet |
| 18 | Malaysia Plant (Production Section) | Manufacturing instruction sheet | Tape peeling strength<br>Frequency check function | Peeling strength test machine | Sampling<br>One/Day | Data sheet |
| 19 | Malaysia Plant (Production Control Section) | Manufacturing instruction sheet<br>Daily shipping list | Customers<br>Type<br>Quantity | — | — | Delivery Slip |
| | | | | | | |
| | | | | | | |

## - PROCESS QUALITY CONTROL -

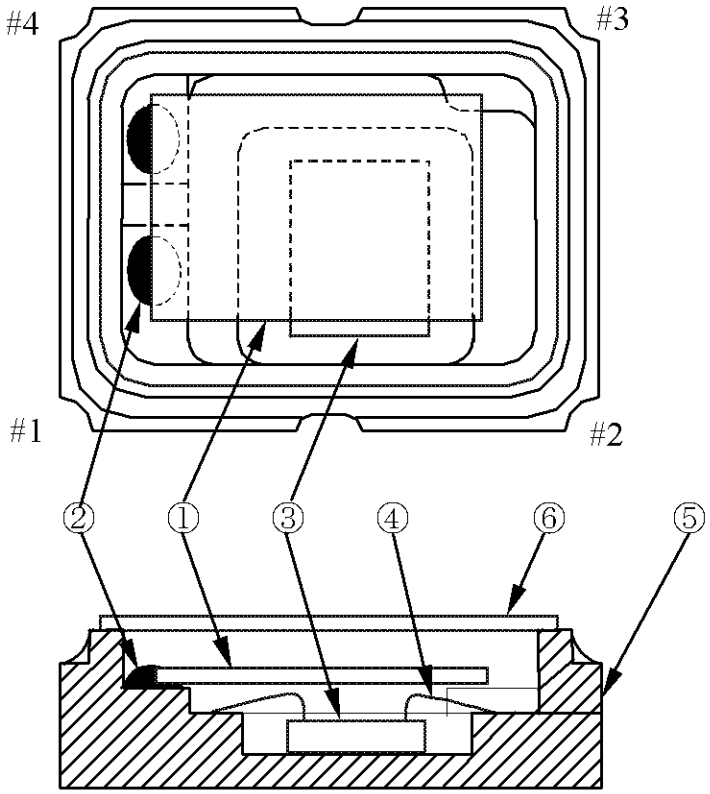
No. SG8003CE - 00 - ASE – 4 CRYSTAL OSCILLATOR : SG-8003CE/SG-320P*P

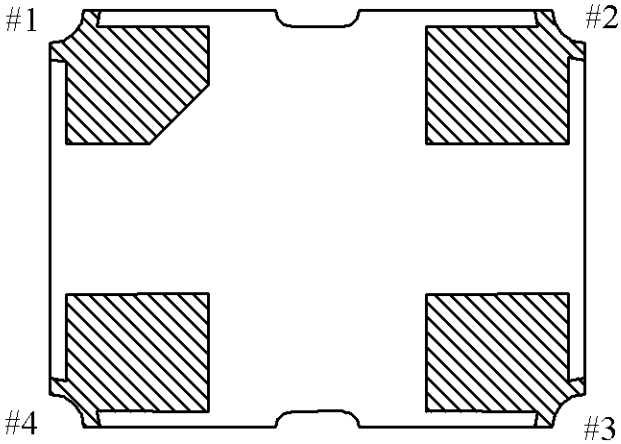
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| No. | Section In Charge | Standards | Inspection, Control Item | Instruments | Inspection Methods | Record |
|---|---|---|---|---|---|---|
| 1 | Inspection Section | Purchasing specification Incoming inspection standard | Appearance Dimension | Microscope | Sampling | Data sheet |
| 2 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance Peeling strength Frequency | Microscope Scratch CI Meter | Sampling | Data sheet |
| 3 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 4 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 5 | China Plant (Production Section) | Manufacturing instruction sheet | Bonding strength Appearance | Gauge Microscope | Sampling | Data sheet |
| 6 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 7 | China Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 8 | China Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 9 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 10 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance Frequency | Microscope Counter | Sampling Sampling | Data sheet |
| 11 | China Plant (Production Section) | Manufacturing instruction sheet | — | — | — | — |
| 12 | China Plant (Production Section) | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| 13 | China Plant (Production Section) | Manufacturing instruction sheet | Characteristic inspection | Measuring equipment | 100% Inspection | |
| 14 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| 15 | China Plant (Production Section) | Manufacturing instruction sheet | Electrical characteristic Master check | Measuring equipment | 100% Inspection One/Day | Data sheet |
| 16 | China Plant (Production Section) | Manufacturing instruction sheet | Appearance Master check | Microscope | Sampling One/Day | Data sheet |
| 17 | China Plant (Inspection Section) | Delivery specifications Outgoing inspection standard | Electrical characteristic Appearance Master check | Measuring equipment Visual inspection | Sampling One/Day | Data sheet |
| 18 | China Plant (Production Section) | Manufacturing instruction sheet | Tape peeling strength Frequency check function | Peeling strength test machine | Sampling One/Day | Data sheet |
| 19 | China Plant (Production Control Section) | Manufacturing instruction sheet Daily shipping list | Customers Type Quantity | — | — | Delivery Slip |
| | | | | | | |
| | | | | | | |

# Structure diagram SG-8003CE




| LIST | | |
|---|---|---|
| Name of part | | Material |
| ① | Crystal chip | AT cut |
| ② | Crystal adhesive | Ag paste |
| ③ | IC | C-MOS |
| | IC conductive adhesive | Ag paste |
| ④ | Bonding wire | Au |
| ⑤ | Package | Ceramic ($Al_2O_2$) |
| ⑥ | Cap | Kovar |
| | | |

# RELIABILITY TEST DATA

## Product Name : SG-8003CE series

The Company evaluation condition

We evaluate environmental and mechanical characteristics by the following test condition . **No. OUT8-34-0139E**

| No. | ITEM | TEST CONDITIONS | VALUE *1 | | TEST Qty [ n ] | FAIL Qty [ n ] |
|---|---|---|---|---|---|---|
| | | | D f / f *2 [1 × $10^{-6}$] | Electrical characteristics | | |
| 1 | High temperature storage | +125 ℃ × 1 000 h | *3 ± 20 | Satisfy specification after test | 22 | 0 |
| 2 | Low temperature storage | -40 ℃ × 1 000 h | *3 ± 10 | | 22 | 0 |
| 3 | High temperature bias | +85 ℃ × Spec bias × 1 000 h | *3 ± 10 | | 22 | 0 |
| 4 | Low temperature bias | -40 ℃ × Spec bias × 1 000 h | *3 ± 10 | | 22 | 0 |
| 5 | Temperature humidity bias | +85 ℃ × 85 %RH × Spec bias × 1 000 h | *3 ± 10 | | 22 | 0 |
| 6 | Temperature cycle | -40 ℃ ⇔ +125 ℃<br>30 min at each temp. 100 cycles | *3 ± 10 | | 22 | 0 |
| 7 | Resistance to soldering heat | For convention reflow soldering furnace (3 times)<br>Ref. IPC/JEDEC J-STD-020C | ± 3 | | 22 | 0 |
| 8 | Shock | 150 g dummy (EPSON TOYOCOM Standard) drop from 1 500 mm height on to the concrete 3 directions 10 times | ± 3 | | 22 | 0 |
| 9 | Vibration | 10 Hz to 55 Hz amplitude 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 ) | ± 2 | | 22 | 0 |
| 10 | Seal | He leakage detector | 1 × $10^{-9}$ Pa·$m^3$/s MAX | | 11 | 0 |
| 11 | Pull-off | 10N press for 10s ± 1s<br>Ref.EIAJ ED-4702 | No Peeling-off at a solder part | | 11 | 0 |
| 12 | Solderability | Dip termination into solder bath at +235 ℃ ± 5 ℃ for 5 s<br>(Using Rosin Flux) | Termination must be 95 % covered with fresh solder | | 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 after pre-conditioning.
   Pre-conditioning: Reflow (3 time)

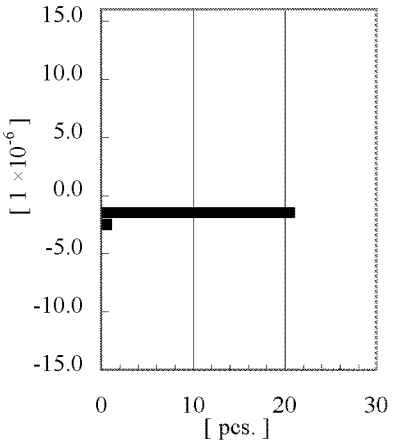
**Qualification Data**

# Product Name : SG-8003CE series

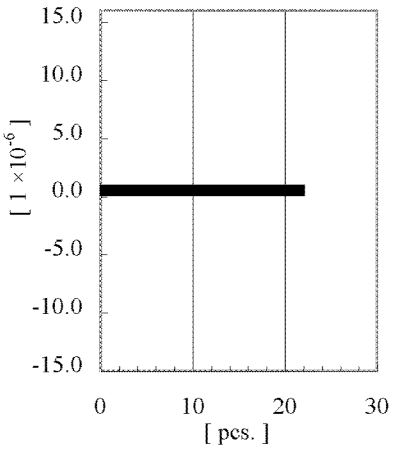
Δ f / f

**No. OUT8-34-0139E**

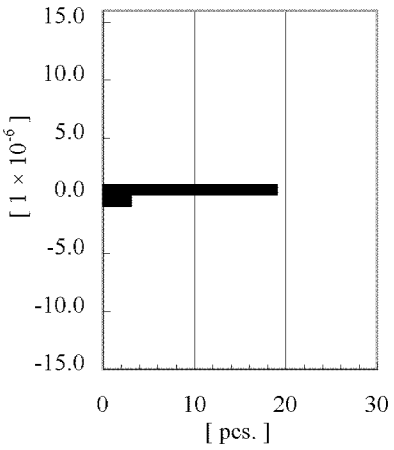
1. High temp. storage
+125℃ × 1 000 h



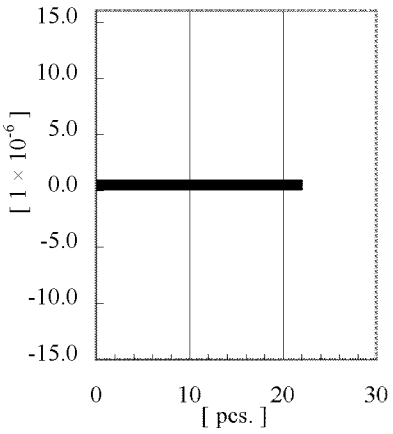

2. Low temp. storage
-40 ℃ × 1 000 h



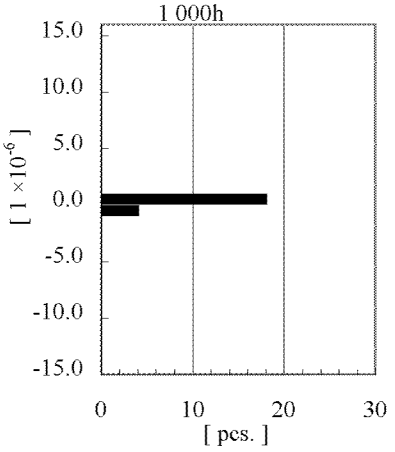

3. High temp. bias
+85 ℃ × spec bias × 1 000 h



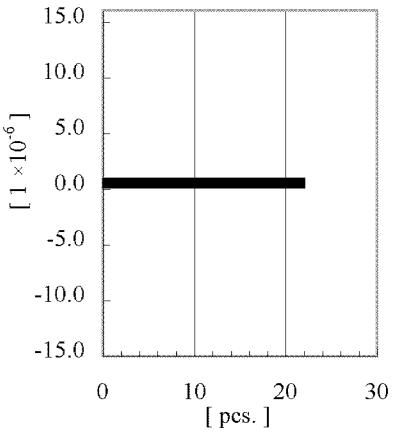

4. Low temp. bias
-40℃ × spec bias × 1 000 h



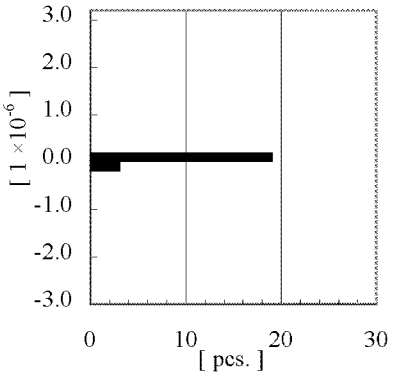

5.Temp humidity bias
85℃ × 85%RH × spec bias × 1 000h



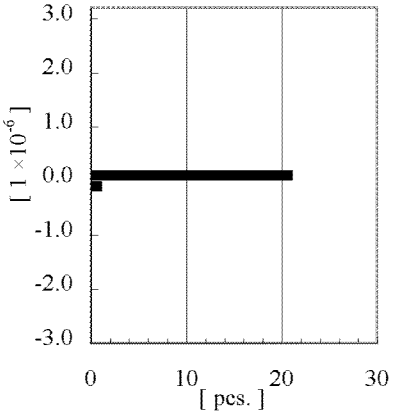

6. Temp. cycle
-40 ℃ ⇔ +125 ℃ 100 cycles



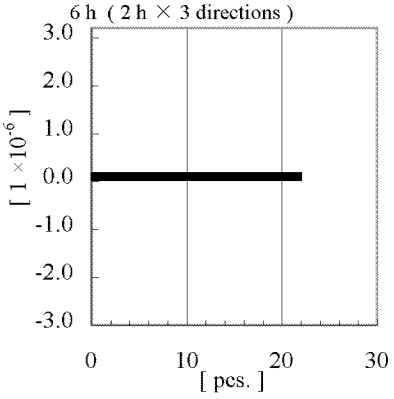

7. Resistance to soldering heat
For convention reflow soldering furnace (3 times)




8. Shock
150g jig 1500mm height
× 3 directions 10 times




9. 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 )




**Qualification Data**