

INFORMATION

Model : SG-8002CA PC

SPEC. No. : A09-131-1A

DATE : May. 29. 2009

EPSON TOYOCOM CORPORATION

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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 complies 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.

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[1] Absolute maximum ratings

| Parameter | Symbol | Value | Unit | Note |
|-----------------------|----------------------|------------------------------|------|---|
| Supply voltage | V _{DD} -GND | -0.5 to +7.0 | V | |
| Storage temperature * | T _{STG} | -55 to +125 | °C | Stored as bare product after unpacking. |
| Input voltage | V _{IN} | -0.5 to V _{DD} +0.5 | V | |

* Concerning the frequency change, please refer page 7 [8] Environmental and mechanical characteristics.

[2] Operating range

| Parameter | Symbol | Value | | | Unit | Note |
|-----------------------|------------------|-------|------|-----------------|------|---|
| | | Min. | Typ. | Max. | | |
| Supply voltage | V _{DD} | 2.7 | 3.3 | 3.6 | V | |
| Supply voltage | GND | 0.0 | | 0.0 | V | |
| Input voltage | V _{IN} | GND | | V _{DD} | V | |
| Nominal frequency | f _o | 1 | | 125 | MHz | T _a =-40 °C to +85 °C, CL=15 pF ** |
| | | 1 | | 40 | | T _a =-40 °C to +85 °C, CL=30 pF ** |
| | | 1 | | 66.7 | | T _a =-40 °C to +85 °C, CL=15 pF * |
| Operating temperature | T _{OPR} | -40 | | +85 | °C | 1.0 MHz ≤ f _o ≤ 125 MHz, CL=15 pF ** |
| | | | | | | 1.0 MHz ≤ f _o ≤ 40 MHz, CL=30 pF ** |
| | | | | | | 1.0 MHz ≤ f _o ≤ 66.7 MHz, CL=15 pF * |
| Output load | CL | | | 30 | pF | 1.0 MHz ≤ f _o ≤ 40 MHz, T _a =-40 °C to +85 °C ** |
| | | | | 15 | | 1.0 MHz ≤ f _o ≤ 125 MHz, T _a =-40 °C to +85 °C ** |
| | | | | | | 1.0 MHz ≤ f _o ≤ 66.7 MHz, T _a =-40 °C to +85 °C * |

*: V_{DD}: 2.7 V~3.6 V

** : V_{DD}: 3.0 V~3.6 V

- Start up time(0 % V_{DD}→90 % V_{DD}) of power source should be more than 150 μs.

[3] Frequency characteristics

1) Output frequency range 1.0000 to 125.0000MHz

2) Output frequency f_o Please see page 12. (Output frequency list)

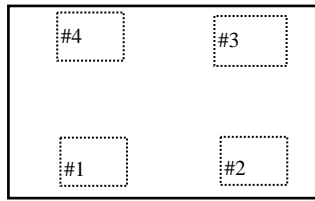
(GND=0.0 V, Load CL ≤ Max.)

| Parameter | Symbol | Value[1 × 10 ⁻⁶] | Note |
|-----------------------|--------------------|------------------------------------|--|
| Frequency stability * | Δ f/f _o | B : ± 50 C : ± 100 M : ± 100 | T _a =-20 °C to +70 °C T _a =-20 °C to +70 °C T _a =-40 °C to +85 °C |
| Aging | f _a | ± 5 (Typ.-3) | T _a =+25 °C, V _{DD} =3.3 V First year |

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

Note. Please contact us for inquiries about output frequency.

[4] Terminal assignment



| Terminal name | Terminal No. | Terminal type. |
|-----------------|--------------|----------------|
| OE | 1 | INPUT |
| GND | 2 | — |
| OUT | 3 | OUTPUT |
| V _{DD} | 4 | — |

OE pin : High or open. → Specified frequency output = enable.
OE pin : Low. → Output is high impedance = disabled.

[5] Electrical characteristics

(Please see page 2 [2] Operating range $V_{DD}=2.7\text{ V}\sim 3.6\text{ V}$, $GND=0.0\text{ V}$)

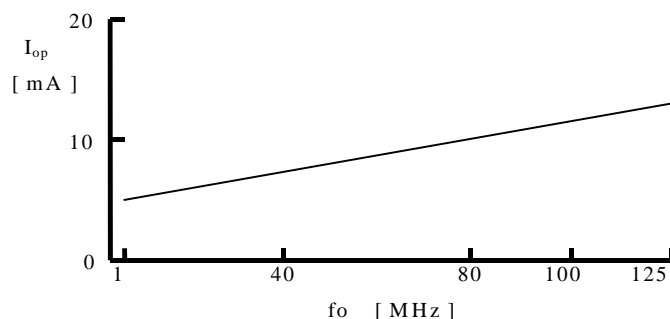
| Parameter | Symbol | Value | | Unit | Note |
|---------------------------|-----------------|--------------|--------------|---------------|---|
| | | Min. | Max. | | |
| Start up time | tOSC | | 10 | ms | |
| Current consumption | IOP | | 28 | mA | No load ($f_o=125\text{ MHz}$) |
| Disable current | IOE | | 16 | mA | OE=GND($f_o=125\text{ MHz}$) |
| Output rise time *1 | tr | | 3.0 | ns | 20 % $V_{DD} \rightarrow 80\% V_{DD}$, $CL \leq 15\text{ pF}$ |
| | | | 4.0 | | 20 % $V_{DD} \rightarrow 80\% V_{DD}$, $CL \leq 30\text{ pF}$ |
| Output fall time *1 | tf | | 3.0 | ns | 80 % $V_{DD} \rightarrow 20\% V_{DD}$, $CL \leq 15\text{ pF}$ |
| | | | 4.0 | | 80 % $V_{DD} \rightarrow 20\% V_{DD}$, $CL \leq 30\text{ pF}$ |
| Output duty *1 | tw/t | 45 | 55 | % | 50 % V_{DD} Level, $1.0\text{ MHz} \leq f_o \leq 40\text{ MHz}$, $CL=30\text{ pF}$, $V_{DD}=3.0\text{ V}\sim 3.6\text{ V}$ |
| | | 40 | 60 | | 50 % V_{DD} Level, $1.0\text{ MHz} \leq f_o \leq 125\text{ MHz}$, $CL=15\text{ pF}$, $V_{DD}=3.0\text{ V}\sim 3.6\text{ V}$ |
| | | 40 | 60 | | 50 % V_{DD} Level, $1.0\text{ MHz} \leq f_o \leq 66.7\text{ MHz}$, $CL=15\text{ pF}$, $V_{DD}=2.7\text{ V}\sim 3.6\text{ V}$ |
| High level output voltage | VOH | $V_{DD}-0.4$ | | V | $I_{OH} = -8\text{ mA}$ |
| Low level output voltage | VOL | | 0.4 | V | $I_{OL} = 8\text{ mA}$ |
| High level input voltage | VIH | $0.7 V_{DD}$ | | V | OE terminal |
| Low level input voltage | VIL | | $0.2 V_{DD}$ | V | OE terminal |
| Input current | I _{IH} | -5 | 5 | μA | $V_{IN} = V_{DD}$ |
| | I _{IL} | | 10 | μA | $V_{IN} = GND$ |
| Jitter (cycle to cycle) | tj | | 200 | ps | $1.0\text{ MHz} \leq f_o \leq 125\text{ MHz}$, $CL=15\text{ pF}$ |
| Jitter (peak to peak) | | | 250 | | $1.0\text{ MHz} \leq f_o \leq 125\text{ MHz}$, $CL=15\text{ pF}$ |
| Output disable time *2 | tpxz | | 25 | ns | OE terminal High \rightarrow Low |
| Output enable time *2 | tpzx | | 25 | ns | OE terminal Low \rightarrow High |

[6] Test circuit

*1 [7] 1) Output waver form

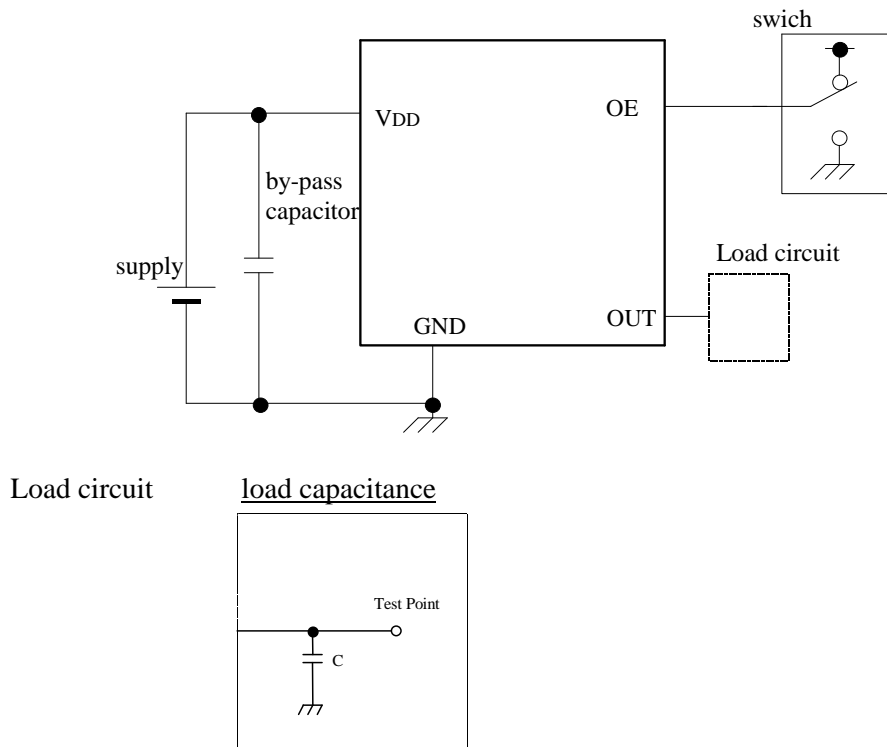
*2 [7] 2) OE function and timing

◆Reference : Current consumption Typ. value ($V_{DD} = 3.3\text{ V}$, $T_a = +25^\circ\text{C}$, No load)

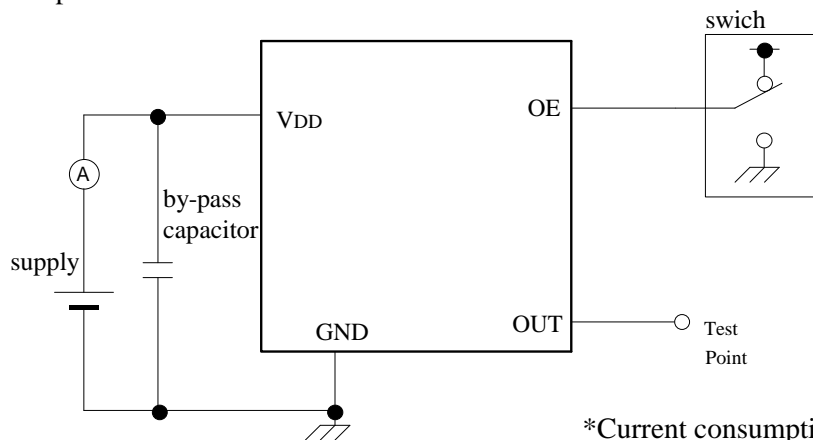


[6] Test circuit

1) Waveform observation



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) 'CL' includes probe capacitance.

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

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

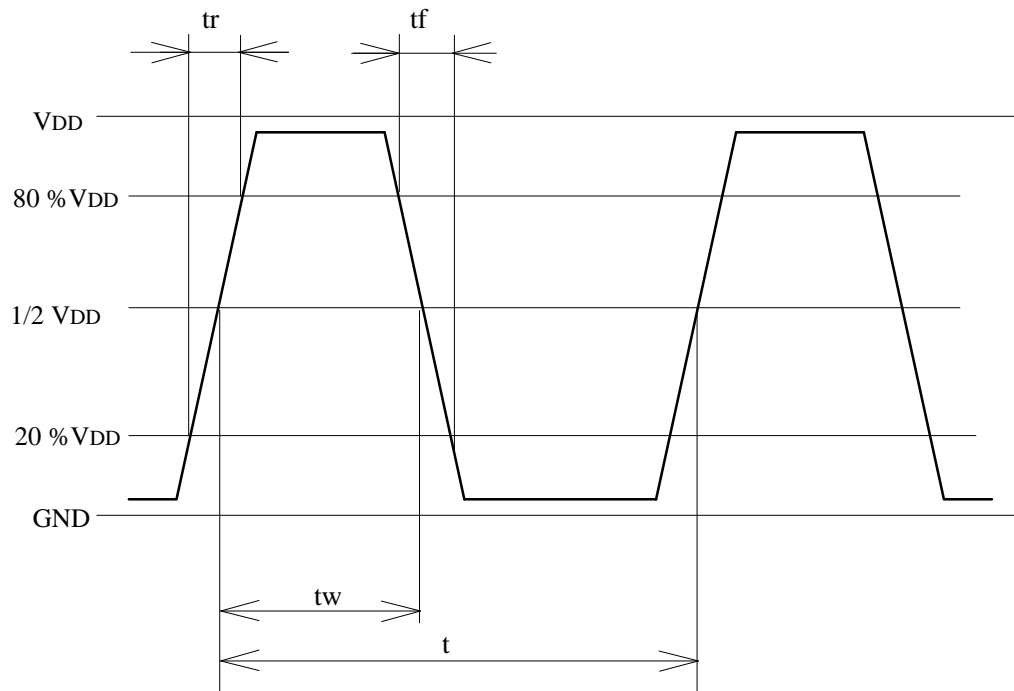
(5) Power supply

- Start up time (0 % VDD \rightarrow 90 % VDD) of power source should be more than 150 μs .
- Impedance of power supply should be as lowest as possible.

[7] Timing chart

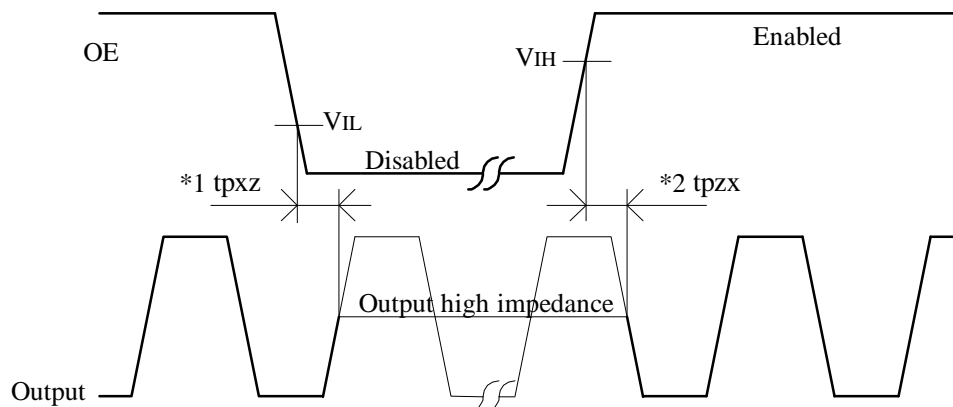
1) C-MOS load

$$\text{Duty} = \frac{t_w}{t} \times 100 (\%)$$



2) OE function and timing

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



*1 The time taken from OE= V_{IL} to output = Disable (high impedance)

*2 The time taken from OE= V_{IH} to output = Enable

[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 |
|-----|------------------------------|--|------------------------------|--|
| | | $\Delta f / f$ *2 [1×10^{-6}] | Electrical characteristics | |
| 1 | High temperature storage | *3 ± 50 | Satisfy Item [5] after test. | +125 °C × 1 000 h |
| 2 | Low temperature storage | *3 ± 10 | | -55 °C × 1 000 h |
| 3 | High temperature bias | *3 ± 20 | | +85 °C × 3.6 V × 1 000 h |
| 4 | Low temperature bias | *3 ± 10 | | -40 °C × 3.6 V × 1 000 h |
| 5 | Temperature humidity bias | *3 ± 20 | | +85 °C × 85 %RH × 3.6 V × 1 000 h |
| 6 | Temperature cycle | *3 ± 20 | | -55 °C ↔ +125 °C 30 min. at each temperature 100 cycles |
| 7 | Resistance to soldering heat | ± 10 | | a) Infrared – reflow or convention reflow soldering furnace (2 time) b) Dip termination into solder bath at +260 °C ± 5 °C for 10 s , 2 times |
| 8 | Drop | ± 20 | | Free drop from 750 mm height on a hard wooden board for 3 times (Board thickness is more than 30 mm) |
| 9 | Vibration | ± 10 | | 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 hours , 3 directions) |
| 10 | Seal | 1×10^{-9} Pa·m ³ /s | | He leakage detector |
| 11 | Pull - off | No peeling-off at a solder part | | 10 N press for 10 s ± 1 s Ref. EIAJ ED-4702 |
| 12 | 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) |
| 13 | Solvent resistance | The marking shall be legible | | Ref. JIS C 0052 or IEC 60068-2-45 |

< Notes >

*1 Each test done independently.

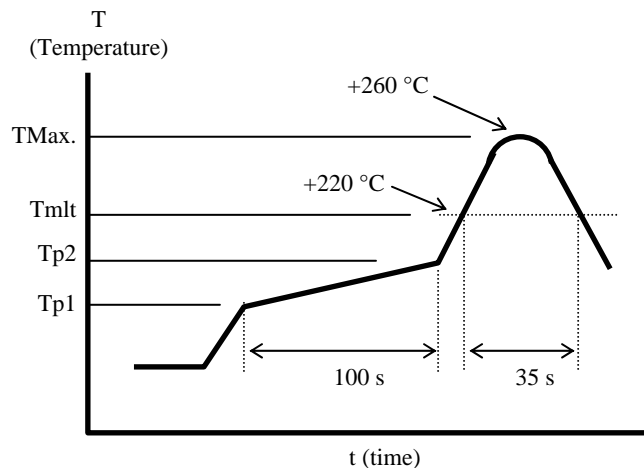
*2 Measuring 2 h to 24 h later leaving in room temperature after each test.

*3 Initial value shall be measured after 24 h storage at room temperature after pre-conditioning.

Infrared-reflow soldering furnace

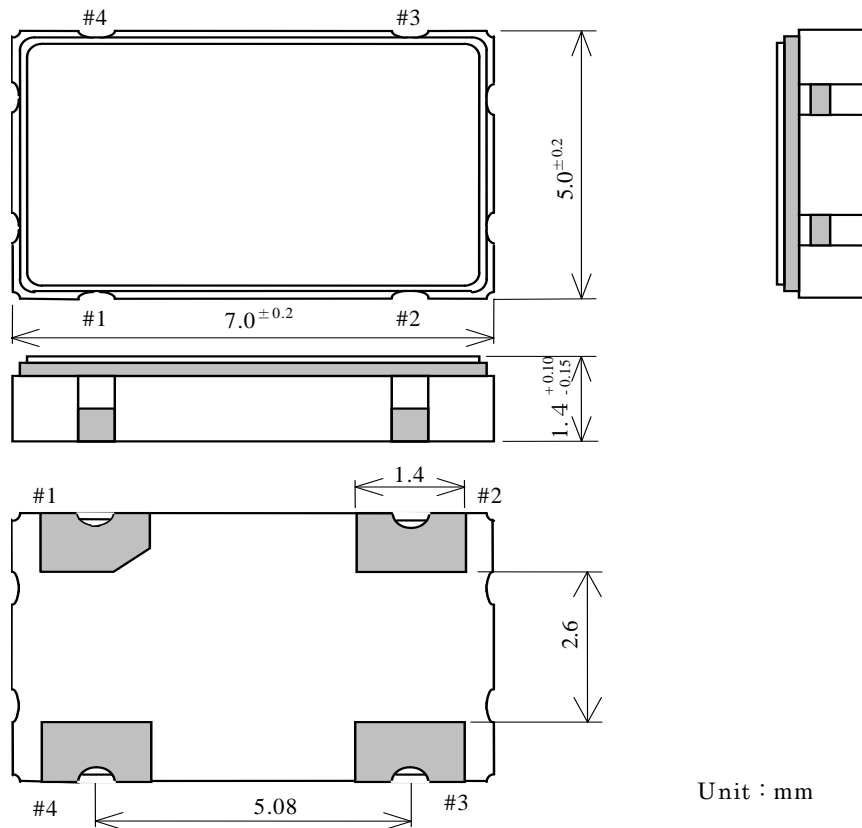
1.Pre heating temperature : Tp1 ~ Tp2 = +170 °C

2.Peak temperature must not exceed +260 °C and the duration of over +220 °C should be 35 s.

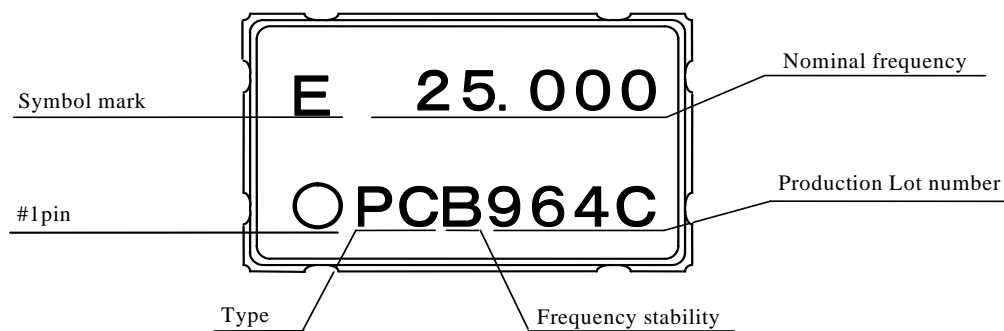


[9] Dimensions and marking layout

1) Dimensions



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 by 3 digits below decimal point, if the value under decimal point over 3 digits, the least significant digits will be omitted.

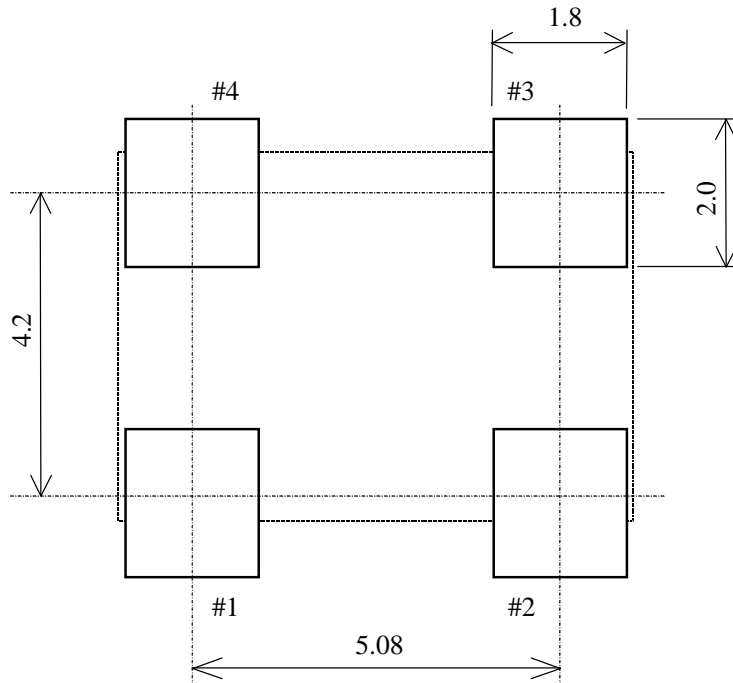
[10] Notes

- 1) This device is made with C-MOS IC.
Please take precautions to prevent damage due to electrical static discharge.
- 2) We recommend placing a 0.01 μF to 0.1 μF capacitor closely between V_{DD} and GND to obtain stable operation and protect against power line ripple.
- 3) V_{DD} and GND pattern shall be as big as possible so that high frequency impedance shall be small.
- 4) We can not 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.
- 5) Power ripple : 200 mV P-P max.
- 6) As a long output line may cause irregular output, please take care to design output line is as short as possible, and also keeps high level signal source away from this device.
- 7) Another high level signal line may cause the operation error, so please do not place high level signal line close to this device.
- 8) This device contains a crystal resonator, so please don't expose not give too much shock or vibration.
We recommend to storage device under normal temperature and humidity to keep the specification.
- 9) 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.
- 10) Ultrasonic cleaning can be applicable on the SG-8002CA, however, since the oscillator might be damaged under some conditions, please exercise in advance.
- 11) Some kind of solvent may damage plastic package or marking ink; please take precautions when choosing solvent.
- 12) We recommend to use and store under room temperature and normal humidity to secure frequency accuracy and prevent moisture.
- 13) When don't intend to use OE pin, please connect the pin to V_{DD} .
We recommend to install a resistor in between to mitigate effect by surge etc.
- 14) PLL-PLL connection
Because of using a PLL technology, there are a few case that the jitter value will increase when SG-8002 are connected the other PLL-oscillator.
In our experience, it is required careful checking in advance for the application such as telecom use or video use.

[11] Recommendable patterning

The soldering pad sample indicated as like following:

Soldering position (Unit : mm)



TAPING SPECIFICATION

I . Application

This standard will apply to 7×5 Ceramic package.

Spec : CA 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 | |

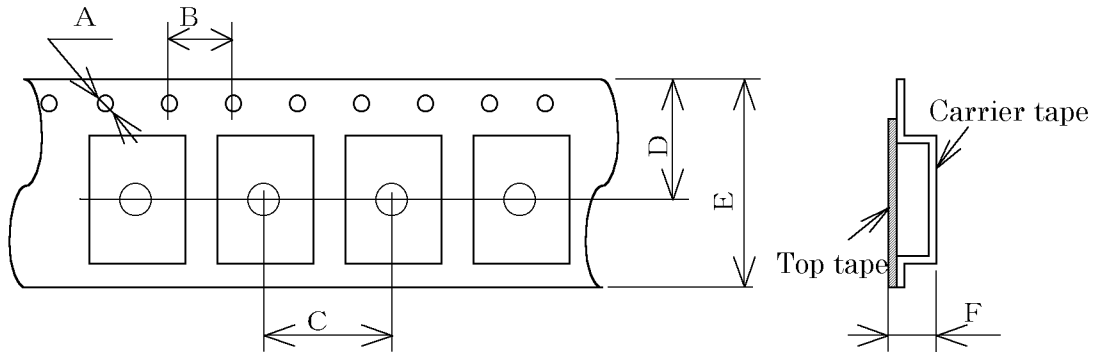
[1] Taping specification

Subject to EIA-481& EIAJ EDX-7602, IEC 60286, JIS C-0806

(1) Tape dimensions TE-1612L

Material of the carrier tape : P S

Material of the top tape : PET

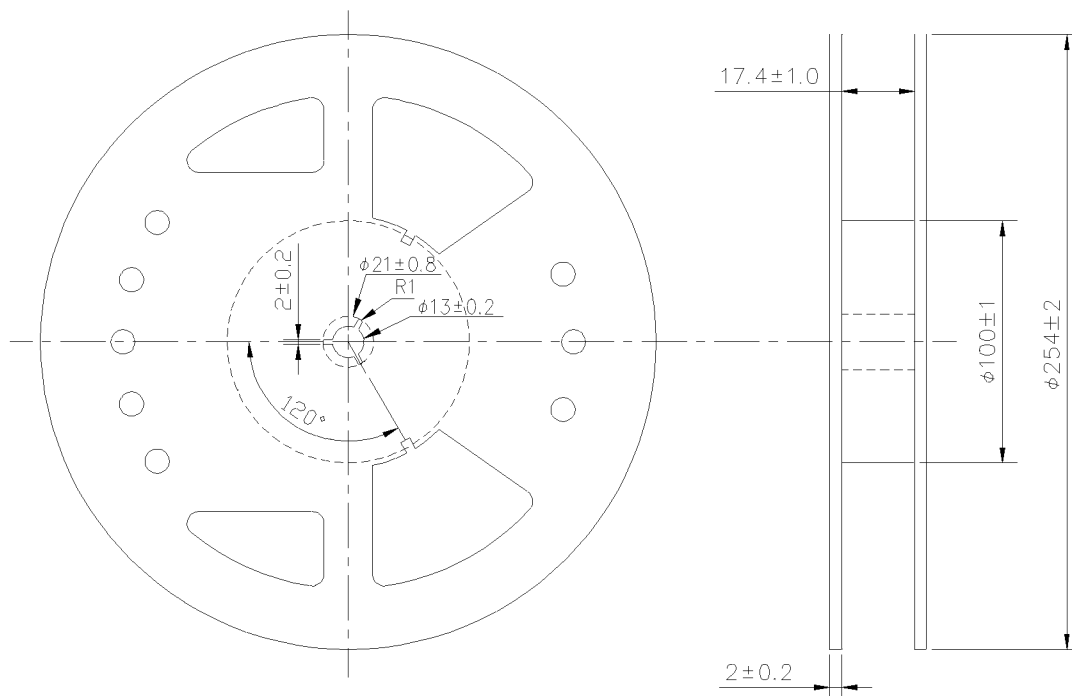


| Symbol | A | B | C | D | E | F |
|--------|------------|-----|-----|------|------|-----|
| Value | $\phi 1.5$ | 4.0 | 8.0 | 9.25 | 16.0 | 2.3 |

Unit : mm

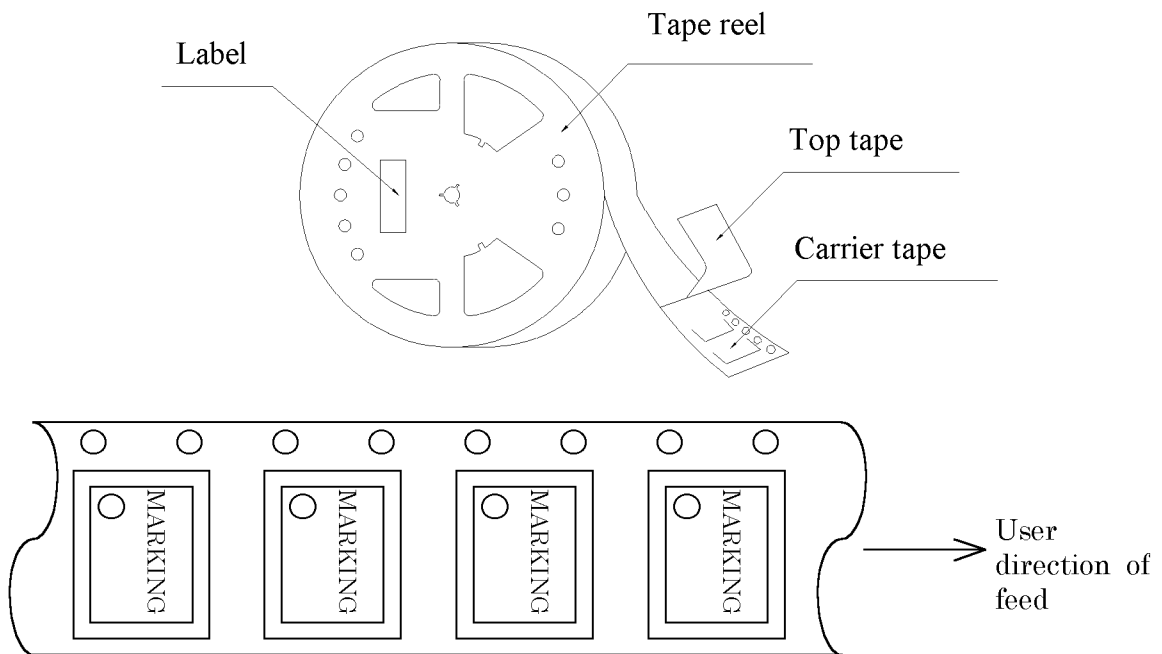
(2) Reel dimensions

Material of the reel : Conductive polystyrene

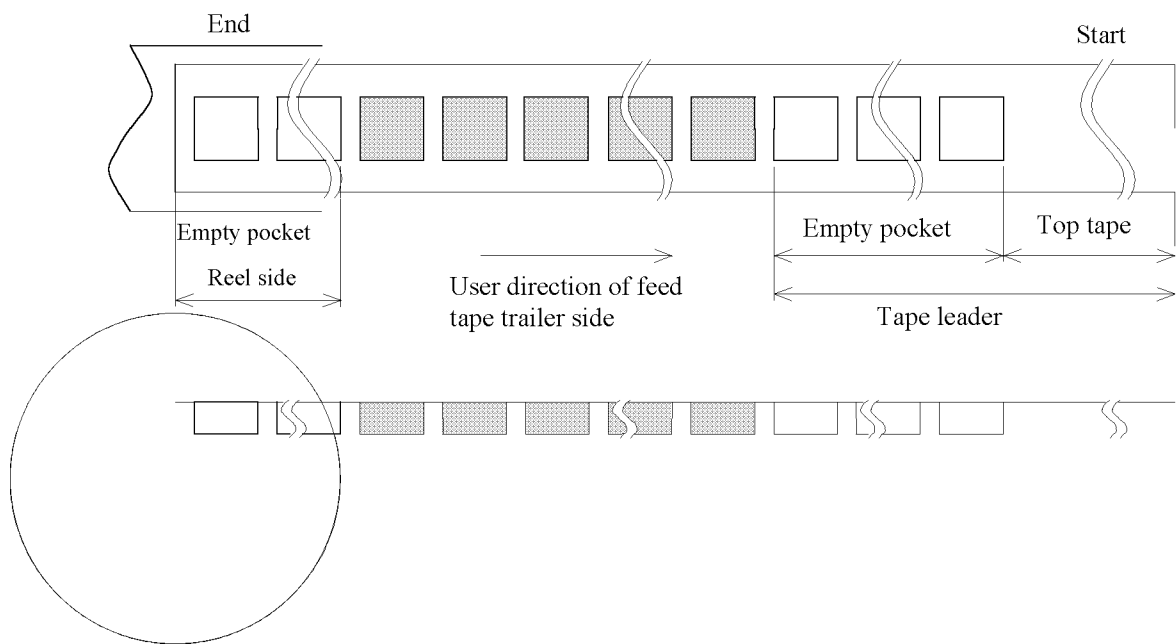


(3) Packing

① Tape & reel



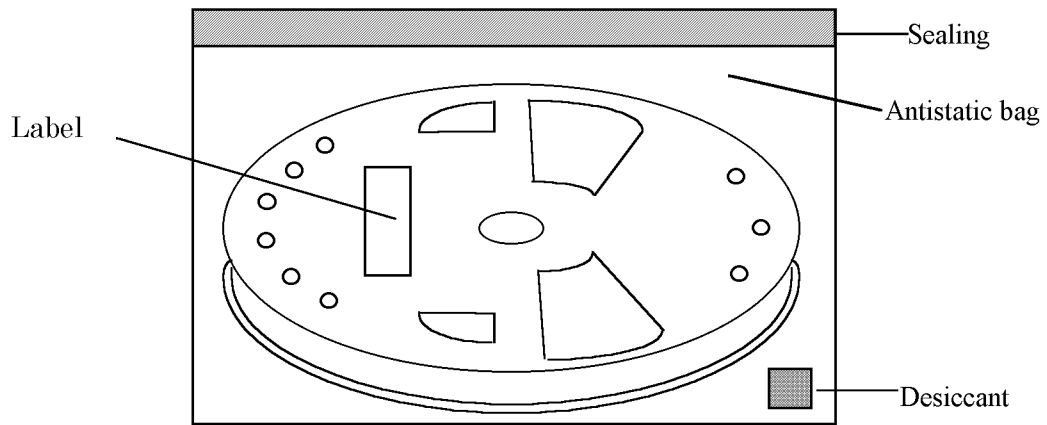
② Start & end point



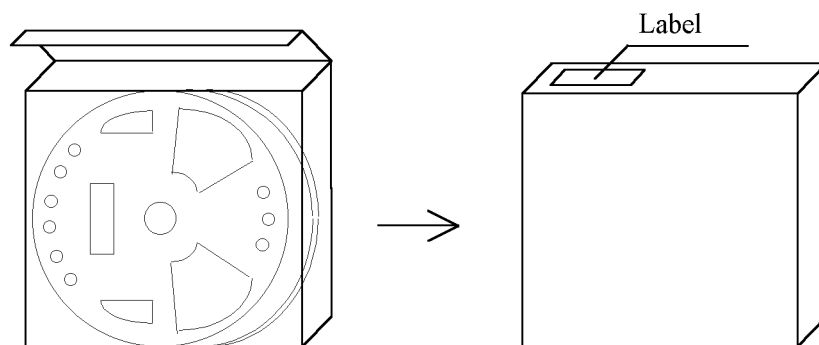
| Item | | Empty space |
|--------------|--------------|-----------------|
| Tape leader | Top tape | Min. 1 000 mm |
| | Carrier tape | Min. 10 pockets |
| Tape trailer | Top tape | Min. 0 mm |
| | Carrier tape | Min. 10 pockets |

[2] Inner carton

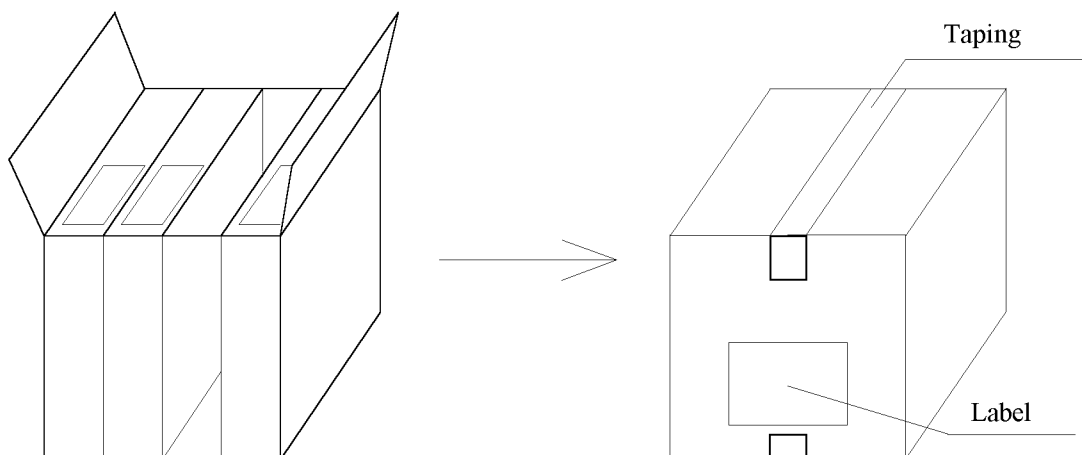
a) Packing to antistatic bag



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

- 1 000 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.

- PROCESS QUALITY CONTROL -

'05.10.13

EPSON TOYOCOM CORP.
AT(Consumer) Business Unit

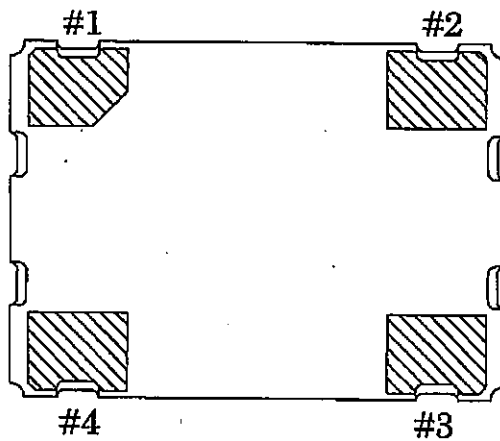
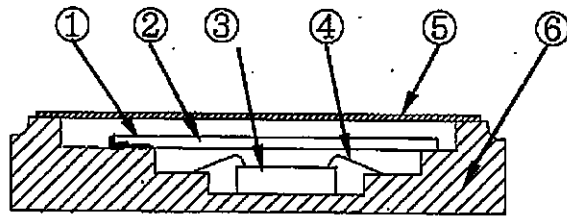
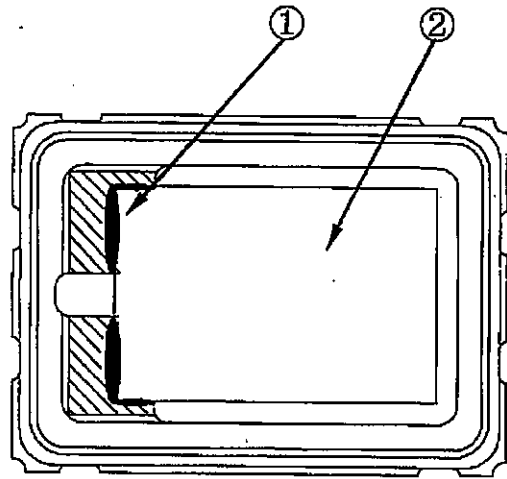
No. SG-8002CA - 00 - AME - 5

CRYSTAL OSCILLATOR : SG-8002CA

| Manufacturing process chart | 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 | Production Section | Manufacturing instruction sheet | Appearance Peeling strength Frequency | Microscope Scratch CI Meter | Sampling | Data sheet |
| | 3 | Production Section | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 4 | Production Section | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 5 | Production Section | Manufacturing instruction sheet | Bonding strength Appearance | Gauge Microscope | Sampling 100% Inspection | Data sheet |
| | 6 | Production Section | Manufacturing instruction sheet | Appearance | Microscope | 100% Inspection | Data sheet |
| | 7 | Production Section | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 8 | Production Section | Manufacturing instruction sheet | — | — | — | — |
| | 9 | Production Section | Manufacturing instruction sheet | Appearance Frequency | Microscope Counter | Sampling Sampling | Data sheet |
| | 10 | Production Section | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 11 | Production Section | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 12 | Production Section | Manufacturing instruction sheet | — | — | — | — |
| | 13 | Production Section | Manufacturing instruction sheet | Characteristic inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 14 | Production Section | Manufacturing instruction sheet | Electrical characteristic Master check | Measuring equipment | 100% Inspection One/Day | Data sheet |
| | 15 | Production Section | Manufacturing instruction sheet | Appearance | Visual inspection | Sampling | Data sheet |
| | 16 | Production Section | Manufacturing instruction sheet | Appearance Master check | Visual inspection | 100% Inspection One/Day | Data sheet |
| | 17 | Inspection Section | Delivery specifications Outgoing inspection standard | Electrical characteristic Appearance Master check | Measuring equipment Visual inspection | Sampling One/Day | Data sheet |
| | 18 | Production Section | Manufacturing instruction sheet | Tape peeling strength Frequency check function | Peeling strength test machine | Sampling One/Day | Data sheet |
| | 19 | Production Control Section | Manufacturing instruction sheet Daily shipping list | Customers Type Quantity | — | — | Delivery Slip |

| Manufacturing process chart | No. | Section In Charge | Standards | Inspection, Control Item | Instruments | Inspection Methods | Record |
|-----------------------------|-------------|--|--|---|--|-----------------------------|------------|
| | 1 | Inspection Section (INA) | Purchasing specification Incoming inspection standard | Appearance Dimension | Microscope | Sampling | Data sheet |
| | 2 | China plant | Manufacturing instruction sheet | Appearance Peeling strength Frequency | Microscope Scratch CI Meter | Sampling | Data sheet |
| | 3 | China plant | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 4 | China plant | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 5 | China plant | Manufacturing instruction sheet | Bonding strength Appearance | Gauge Microscope | Sampling 100% Inspection | Data sheet |
| | 6 | China plant | Manufacturing instruction sheet | Appearance Mounting strength | Microscope Gauge | 100% Inspection Sampling | Data sheet |
| | 7 | China plant | Manufacturing instruction sheet | Appearance | Microscope | Sampling | Data sheet |
| | 8 | China plant | Manufacturing instruction sheet | Frequency | Counter | Sampling | Data sheet |
| | 9 | China plant | Manufacturing instruction sheet | Appearance Frequency | Microscope Counter | Sampling Sampling | Data sheet |
| | 10 | China plant | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 11 | China plant | Manufacturing instruction sheet | Leakage inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 12 | China plant | Manufacturing instruction sheet | — | — | — | — |
| | 13 | China plant | Manufacturing instruction sheet | Characteristic inspection | Measuring equipment | 100% Inspection | Data sheet |
| | 14 | China plant | Manufacturing instruction sheet | Electrical characteristic Master check | Measuring equipment | 100% Inspection One/Day | Data sheet |
| | 15 | China plant | Manufacturing instruction sheet | Appearance | Visual inspection | Sampling | Data sheet |
| | 16 | China plant | Manufacturing instruction sheet | Electrical characteristic | Measuring equipment | 100% Inspection | Data sheet |
| | 17 | China plant | Manufacturing instruction sheet | Appearance Master check | Microscope | Sampling One/Day | Data sheet |
| | 18 | China plant | Manufacturing instruction sheet | Tape peeling strength Frequency check function | Peeling strength test machine | Sampling One/Day | Data sheet |
| | 19 | China plant | Delivery specifications Outgoing inspection standard | Electrical characteristic Appearance Master check | Measuring equipment Visual inspection | Sampling One/Day | Data sheet |
| | 19 | China plant | Outgoing inspection standard | Appearance | Visual inspection | 100% Inspection | Data sheet |
| 20 | China plant | Manufacturing instruction sheet Daily shipping list | Customers Type Quantity | — | — | Delivery Slip | |

Structure diagram SG-8002CA



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

| | | |
|-----------------------------|--------------------|--------------|
| ESTABLISH REPORT No. 07-078 | | |
| DWG No. G870-101-8 | | |
| DESIGNED | CHECKED | APPROVED |
| K. Yamamoto | <i>[Signature]</i> | H. Kinoshita |

RELIABILITY TEST DATA

Product Name : SG-8002CA series

The Company evaluation condition

We evaluate environmental and mechanical characteristics by the following test condition . **No. F-G-9704AB-02-001E**

| No. | ITEM | TEST CONDITIONS | VALUE *1 | | TEST | FAIL |
|-----|--|---|--|--|--------------|--------------|
| | | | $\Delta f / f$ *2 [1×10^{-6}] | Electrical characteristics | Qty [n] | Qty [n] |
| 1 | High temperature storage | +125 °C × 1 000 h | *3 ± 50 | Satisfy specification after test | 22 | 0 |
| 2 | Low temperature storage | -55 °C × 1 000 h | *3 ± 10 | | 22 | 0 |
| 3 | High temperature bias | +85 °C × spec. bias × 1 000 h | *3 ± 20 | | 11 | 0 |
| 4 | Low temperature bias | -40°C × spec. bias × 1 000 h | *3 ± 10 | | 22 | 0 |
| 5 | Temperature humidity bias | +85 °C × 85 %RH × spec. bias × 1 000 h | *3 ± 20 | | 22 | 0 |
| 6 | Temperature cycle | -55 °C ⇔ +125 °C 30 min at each temp. 100 cycles | *3 ± 20 | | 22 | 0 |
| 7 | Resistance to soldering heat (Reflow characteristics) | Reflow furnace with the condition 2 times | ± 10 | | 22 | 0 |
| 8 | Drop | Free drop from 750 mm height on a hard wooden board for 3 times (Board is thickness more than 30 mm) | ± 20 | | 11 | 0 |
| 9 | 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) | ± 10 | | 11 | 0 |
| 10 | Sealing | For He leak detector | $1 \times 10^{-9} \text{ Pa} \cdot \text{m}^3/\text{s}$ 以下 | 11 | 0 | |
| 11 | Pull - off | 10 N press for 10 s ± 1 s Ref. EIAJ ED-4702 | No peeling - off at a solder part | 11 | 0 | |
| 12 | Solderability | Dip termination into solder bath at +235 °C ± 5 °C for 5 s (Using Rosin Flux) | Termination must be 95 % covered with fresh solder | 11 | 0 | |
| 13 | Solvent resistance | Ref. JIS C 0052 or IEC 60068-2-45 | The marking shall be legible | 11 | 0 | |

Notes

- *1 Each test done independently.
- *2 Measuring 2 h to 24 h later leaving in room temperature after each test.
- *3 Pre conditionings Initial value shall be after 24 h at room temperature.
- PH / PT / SH / ST : Assurance range -40 °C bias to +85 °C bias is under 55 MHz.
- PH / PT / SH / ST : As to 40 MHz to 125 MHz , guarantee -20 °C bias to +70 °C bias temperature range by -40 °C bias to +85 °C bias test.
- PC / SC : Guarantee -20 °C bias to +70 °C bias temperature range by -40 °C bias to +85 °C bias test.

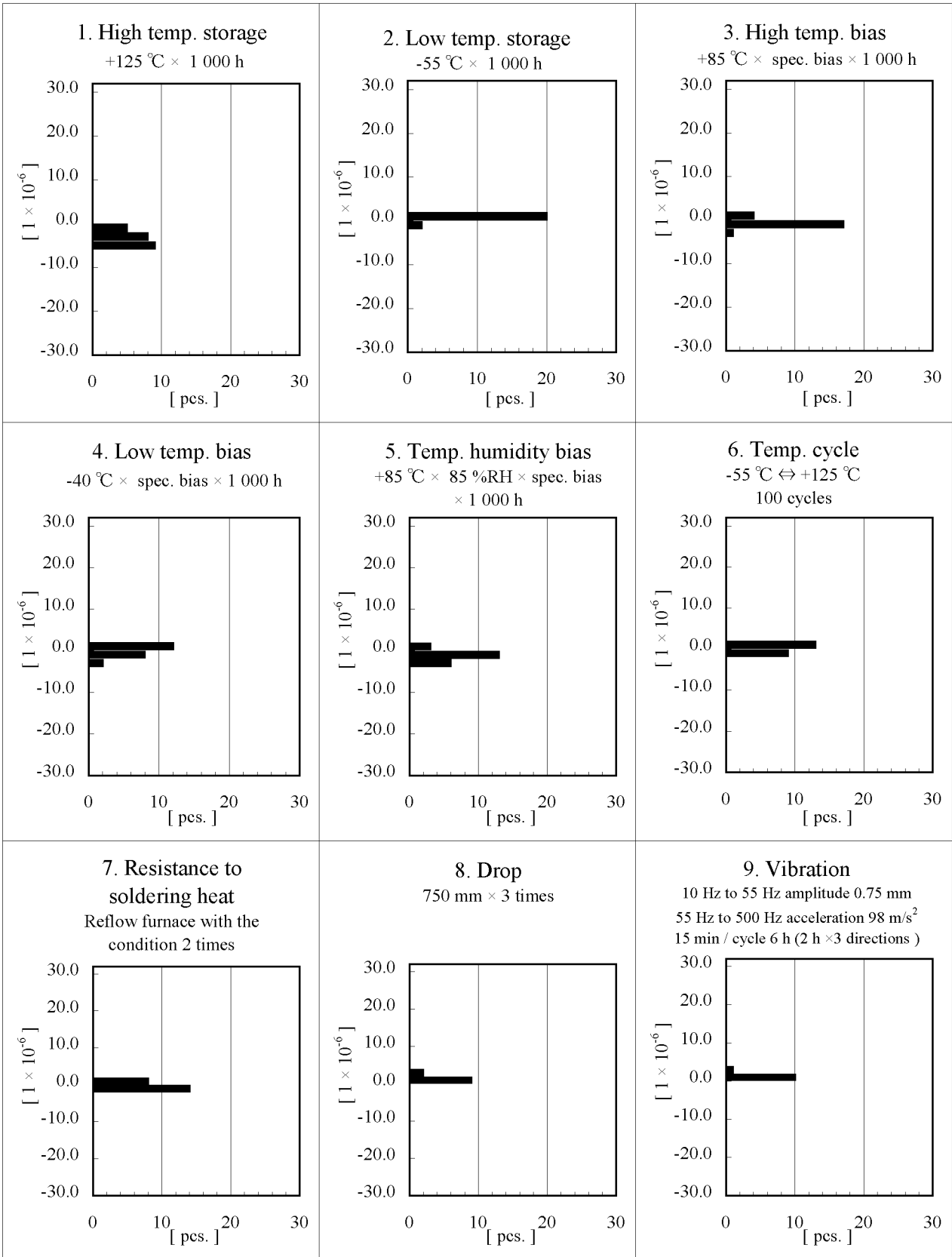
**AT (Consumer) Business Unit
Production Management Div.**

Signature 

Product Name : SG-8002CA series

$\Delta f/f$

No. F-G-9704AB-02-002E



※ Though these data show about 5V spec. , guarantee 3V, for both spec. have same crystal.

ATTN : Hollysys Co Ltd.

No. QDS09-28
May. 29. 2009
EPSON TOYOCOM CORP.
AT Business Unit

Mean Time To Failure

These parts MTTF for SG-8002CA Series are following.

MTTF can be calculated with high temperature test result.

The calculation procedure of MTTF is as follows.

This Series showed no failure during our test +125 °C 1 000 h.

$$\begin{aligned} \text{MTTF} &\geq \frac{2.2 \times 10^5 \times 162.45}{0.917} \\ &\geq 13888.89 \times 10^4 \text{ h} \end{aligned}$$

Total operating time : 2.2×10^5
Acceleration factor : 162.45
Reliability level : 60% (at +25 °C)