INFORMATION

Product No. : **Q33310FE0015800**

Model : **SG-310SEF**

SPEC. No. : **A05-877-1A**

DATE : **Jan. 18. 2006**

EPSON TOYOCOM CORPORATION

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Minowa-machi Kamiina-gun
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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 is not authorized for use as critical components in life support device or systems.

Contents

Item No.	Item	Page
[1]	Absolute maximum ratings	2
[2]	Operating range	2
[3]	Frequency characteristics	2
[4]	Terminal assignment	3
[5]	Electrical characteristics	4
[6]	Test circuit	5
[7]	Timing chart	6
[8]	Environmental and mechanical characteristics	7
[9]	Dimensions and marking layout	8
[10]	Notes	9
[11]	Recommendable patterning	10

[1] Absolute maximum ratings

Parameter	Symbol	Value	Unit	Note
Supply voltage	V_{DD}-GND	-0.3 to +4.2	V	
Storage temperature *	T_{STG}	-40 to +125	°C	Stored as bare product after unpacking.
Input voltage	V_{IN}	-0.3 to V_{DD}+0.3	V	ST Terminal

* 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}	1.6	1.8	2.2	V	
Supply voltage	GND	0.0		0.0	V	
Input voltage	V_{IN}	GND		V_{DD}	V	
Nominal frequency	fo	2.0000		48.0000	MHz	
Operating temperature	T_{OPR}	-40		+85	°C	
Output load	CL			15	pF	

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

•By-pass capacitor (0.01 μF to 0.1 μF) is placed closely between V_{DD} and GND.

[3] Frequency characteristics

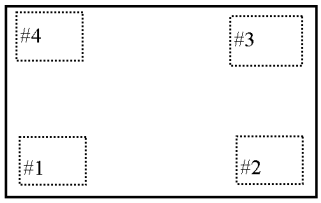
Output frequency ..... 13 MHz

(GND=0.0 V, Load CL ≤ Max.)

Parameter	Symbol	Value[1×10^{-6}]	Note
Frequency stability *	Δ f/fo	B : ± 50	Ta=-20 °C to +70 °C
Aging	fa	± 5	Ta=+25 °C, V_{DD}=1.8 V First year

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

[4] Terminal assignment



Terminal name	Terminal No.	Terminal type.
ST	1	INPUT
GND	2	—
OUT	3	OUTPUT
V_{DD}	4	—

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

[5] Electrical characteristics

(Please see page 2 [2] Operating range V_{DD}=1.6 V~2.2 V,GND=0.0 V)

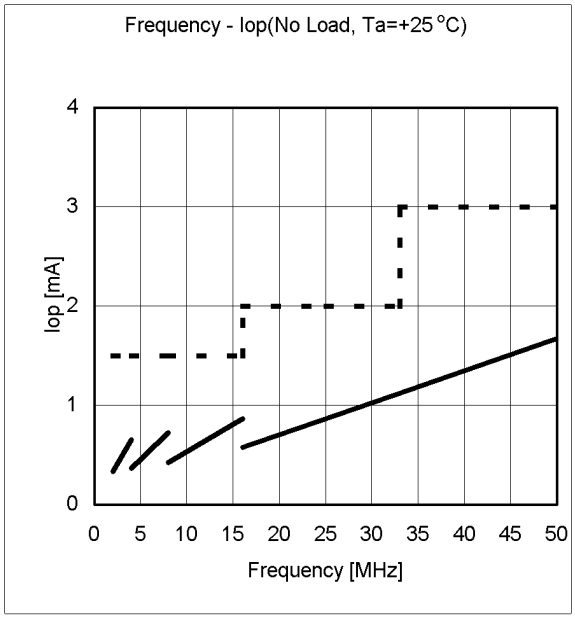
Parameter	Symbol	Value		Unit	Note	
		Min.	Max.			
Start up time	tosc		10	ms	t=0 at 90 %V_{DD}	
Current consumption	I_{OP}		1.5	mA	No load (2 MHz ≤fo≤16 MHz)	
			2.0		No load (16 MHz <fo≤33 MHz)	
			3.0		No load (33 MHz <fo≤48 MHz)	
Standby current	I_{ST}		0.7	µA	ST=GND	
Output rise time *1	tr		4.0	ns	20 %V_{DD} → 80 %V_{DD}、CL≤ 15 pF	
Output fall time *1	tf		4.0	ns	80 %V_{DD} → 20 %V_{DD}、CL≤ 15 pF	
Output duty *1	tw/t	45	55	%	2 MHz ≤fo≤16 MHz	50 %V_{DD} Level
		40	60		16 MHz <fo≤48 MHz	CL=15 pF
High level output voltage	V_{OH}	0.9 V_{DD}		V	I_{OH} = -3 mA	
Low level output voltage	V_{OL}		0.1 V_{DD}	V	I_{OL} = 3 mA	
High level input voltage	V_{IH}	0.8 V_{DD}		V	ST terminal	
Low level input voltage	V_{IL}		0.2 V_{DD}	V	ST terminal	
Input current	I_{IH}		1.0	µA	V_{IN} = V_{DD}	
	I_{IL}	-1.0		µA	V_{IN} = GND	
Output disable time *2	tstp		100	ns	ST terminal High → Low	
Output enable time *2	tsta		10	ms	ST terminal Low → High	

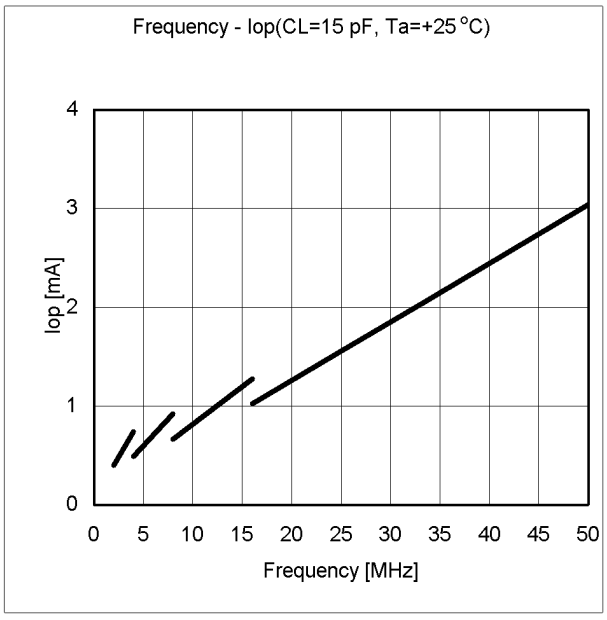
[6] Test circuit

*1 [7] 1) Output waver form

*2 [7] 2) ST function and timing

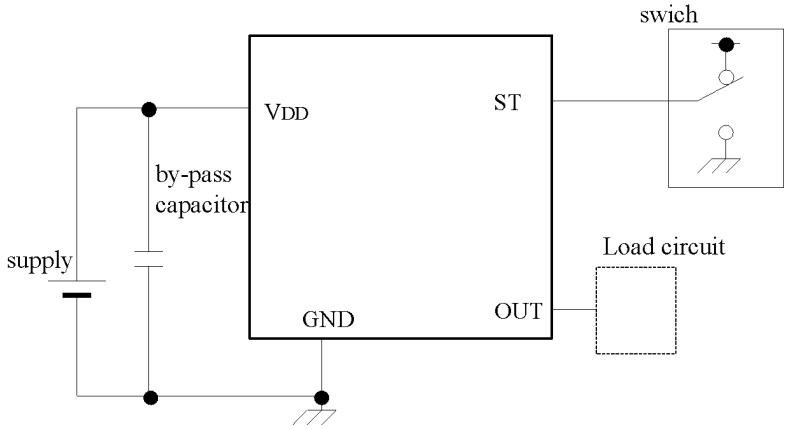
◆Reference : Current consumption Typ. value (V_{DD} = 1.8 V , Ta = +25℃)



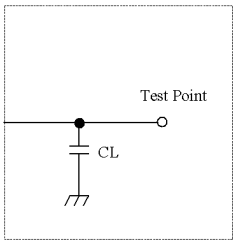


[6] Test circuit

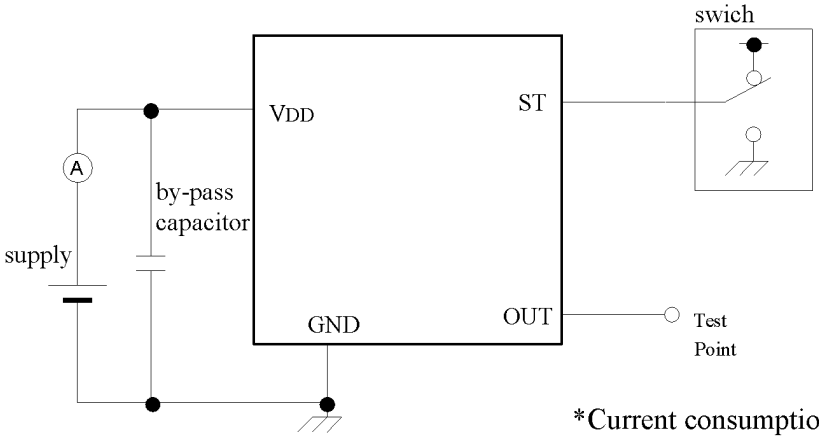
1) Waveform observation



Load circuit load capacitance



2) Current consumption



*Current consumption under the disable function should be ST = 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 V_{DD} and GND.

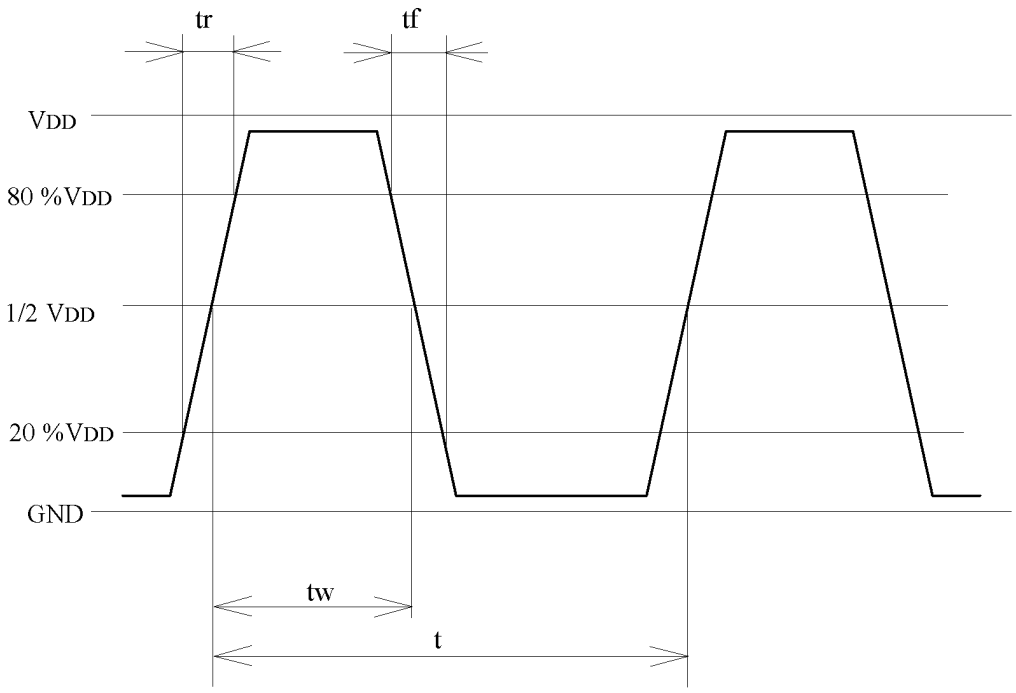
(4) Use the current meter whose internal impedance value is small.

(5) Power supply

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

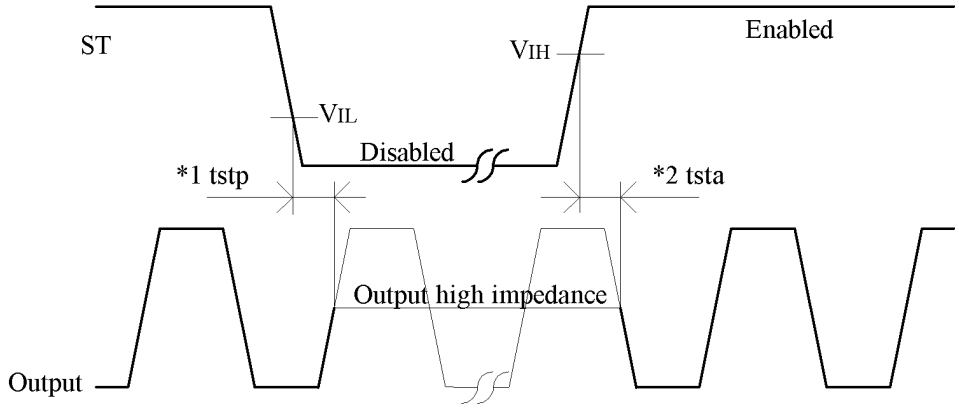
[7] Timing chart

1) C-MOS load Duty = tw/t × 100 (%)



2) ST function and timing

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



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

*2 The time taken from ST=V_{IH} to output = Start

Output start : $V_{OH} \geq 0.8\ \%V_{DD}$, $V_{OL} \leq 0.2\ \%V_{DD}$, fout = fo±1 000×$10^{-6}$

[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 × 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		-40 °C × 1 000 h
3	High temperature bias	*3 ± 20		+85 °C × V Max. × 1 000 h
4	Low temperature bias	*3 ± 10		-40 °C × V Max. × 1 000 h
5	Temperature humidity bias	*3 ± 20		+85 °C × 85 %RH × V Max. × 1 000 h
6	Temperature cycle	*3 ± 20		-40 °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	Shock	± 5		100 g dummy Jig (SEIKO EPSON Standard) drop from 1 500 mm height on the Concrete 3 directions 10 times.
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.

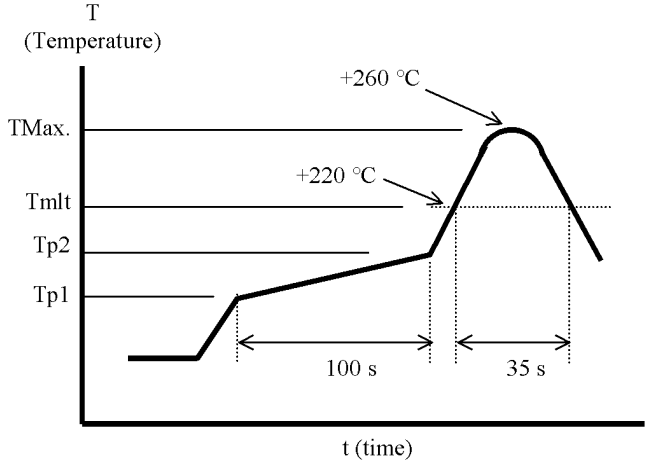
*2 Measuring 2 h to 24 h later leaving in room temperature after each test.

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

Infrared-reflow soldering furnace

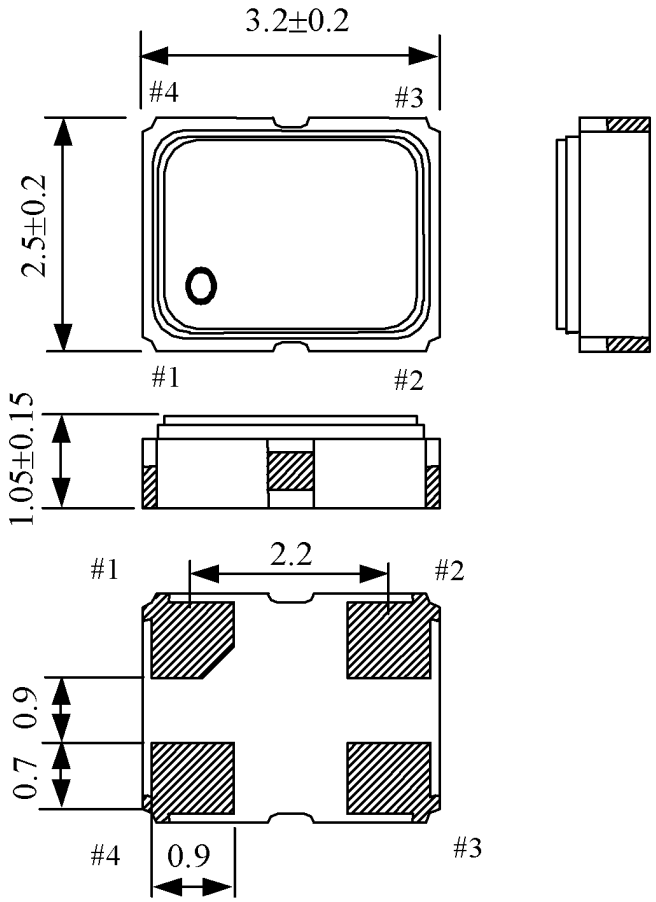
1.Pre heating temperature : Tp1 ~ Tp2 = +170 °C

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



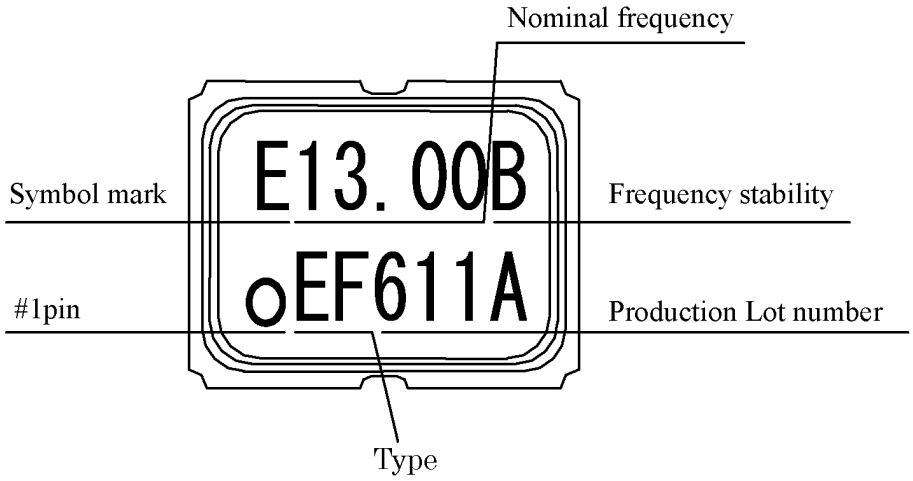
[9] Dimensions and marking layout

1) Dimensions



Terminal treatment : Au plating
Unit : mm

2) Marking layout

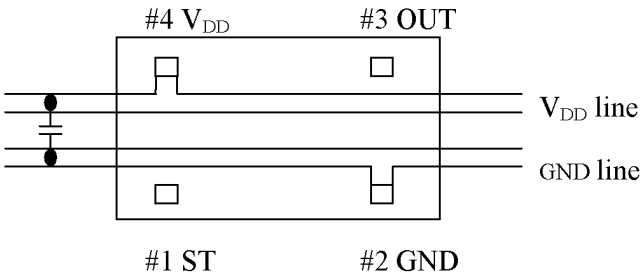


- The above marking layout shows only marking contents and their approximate position and it is not for font, size and exact position.
- Output frequency shall indicate 5 digits (include decimal point), if the value of frequency over 5 digits, the least significant digits will be omitted.

[10] Notes

1) This device is made with C-MOS IC.
Please take 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.



V_{DD} and GND pattern shall be as big as possible so that high frequency impedance shall be small.

3) We can not recomend 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 ripple : 200 mV P-P max. Start up time(0 %V_{DD}→90 %V_{DD}) of power source should be more than 150 μs.

5) As a long output line may cause irregular output, please take care to design output line is as short as possible.

6) Another high level signal line may cause the operation error, so please do not place high level signal line close to this device.

7) This device contains a crystal resonator, so please don't expose too much shock or vibration.
We recommend to store device under normal temperature and humidity to keep the specification.

8) 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.

9) Ultrasonic cleaning can be applicable on the SG-310SEF, however, since the oscillator might be damaged under some conditions, please exercise in advance.

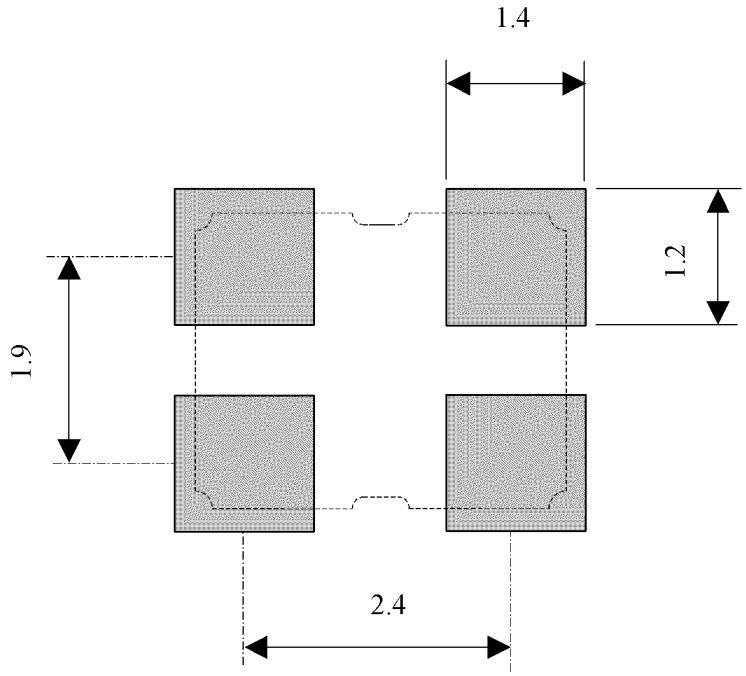
10) We recommend to use and store under room temperature and normal humidity to secure frequency accuracy and prevent moisture.

11) When don't intend to use ST pin, please connect the pin to V_{DD}.
We recommend to install a resistor in between to mitigate effect by electrical surge etc.

[11] Recommendable patterning

The soldering pad sample indicated as like following:

Soldering position (Unit : mm)



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	

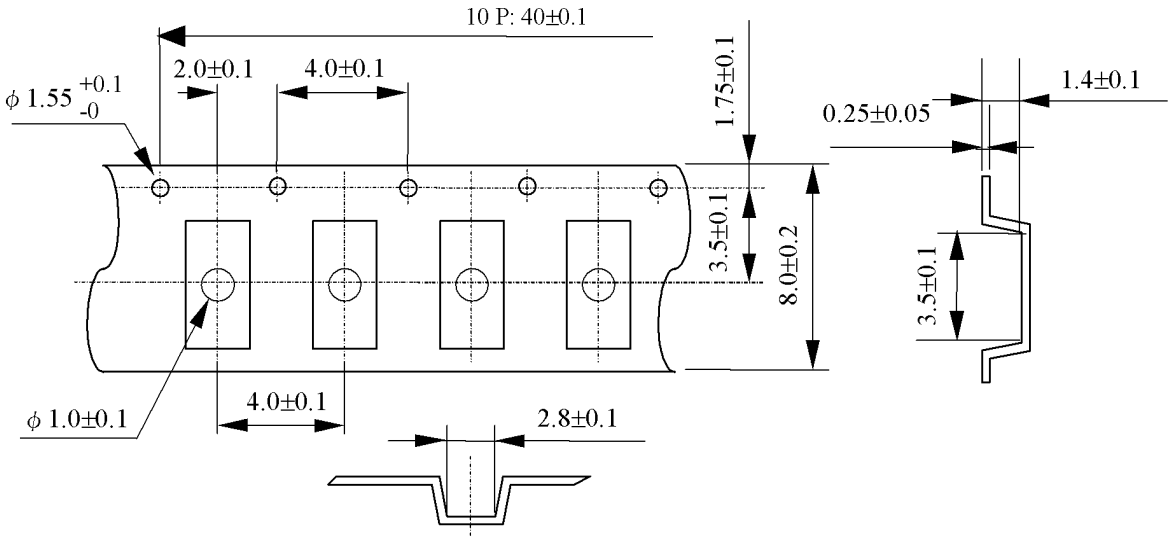
〔1〕 Taping specification

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

(1) Tape dimensions

Material of the carrier tape : P S

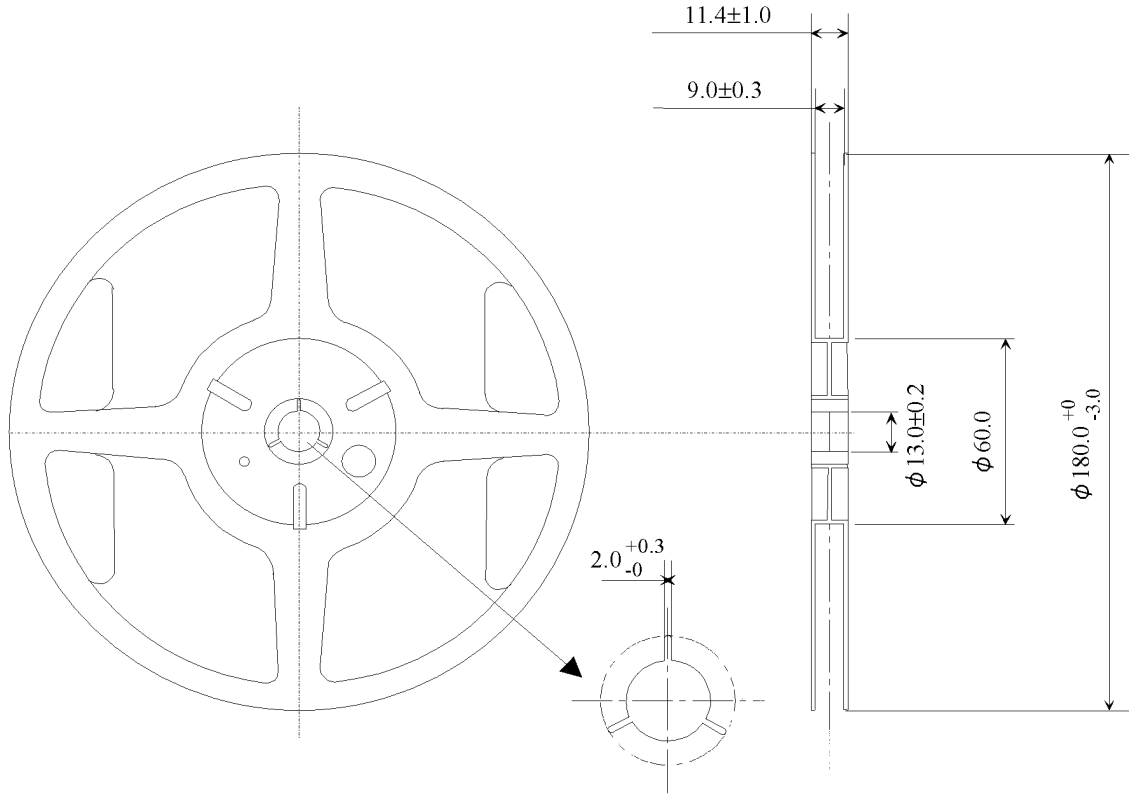
Material of the top tape : PET+PE



Unit : mm

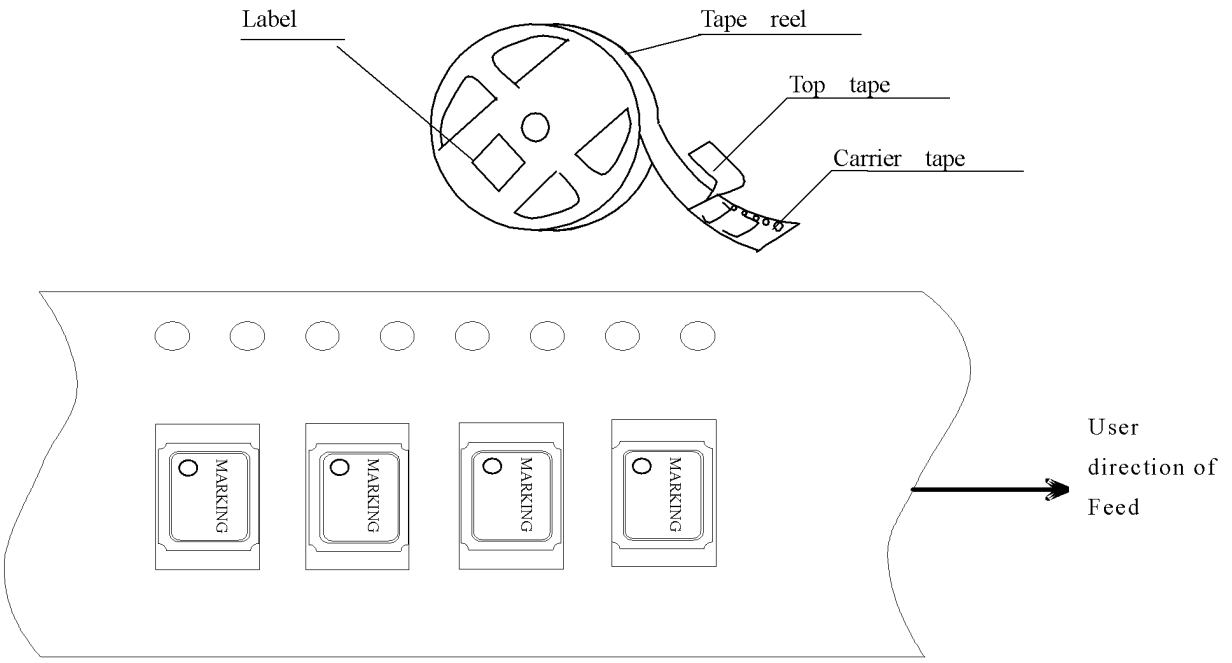
(2) Reel dimensions

Material of the reel : Conductive polystyrene

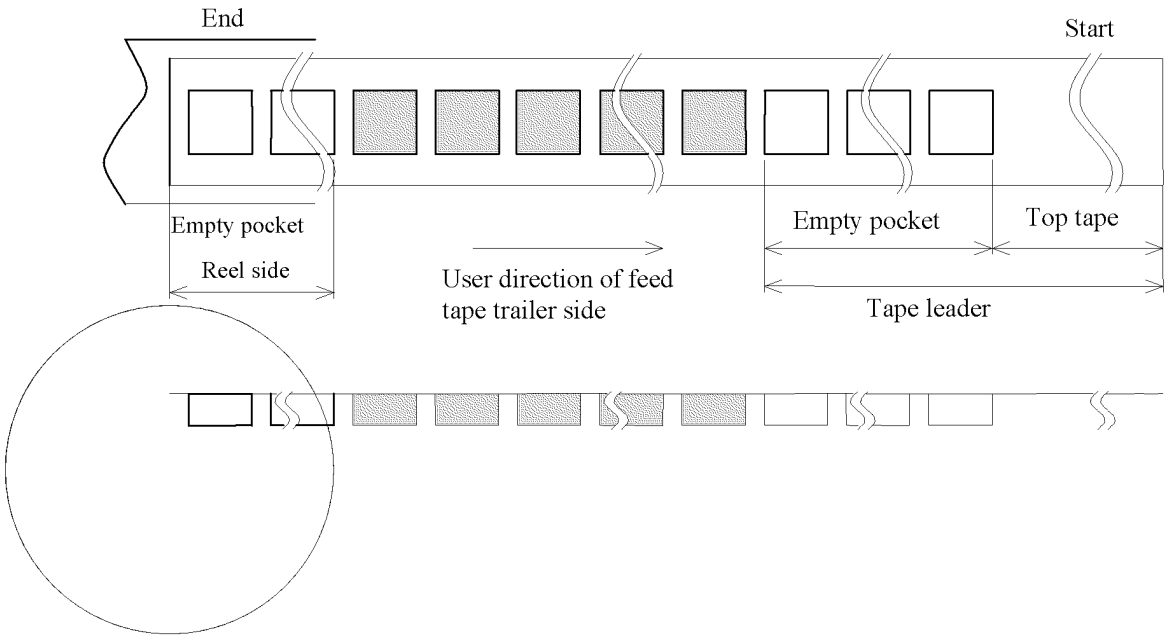


(3) Packing

①Tape & reel



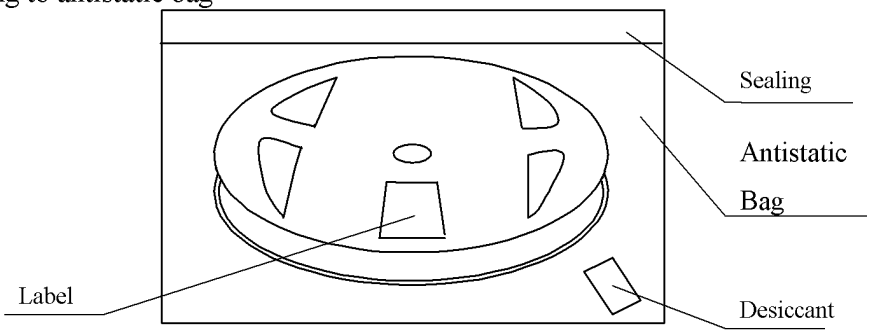
②Start & end point



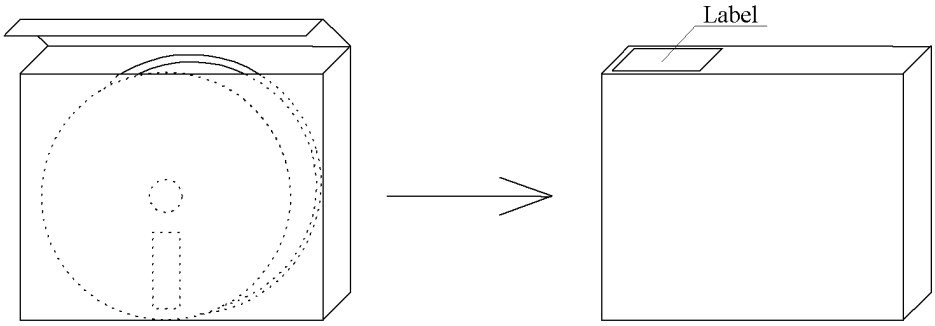
Item		Empty space
Tape leader	Top tape	Min. 1 000 mm
	Carrier tape	Min. 160 mm
Tape trailer	Top tape	Min. 0 mm
	Carrier tape	Min. 160 mm

〔2〕 Inner carton

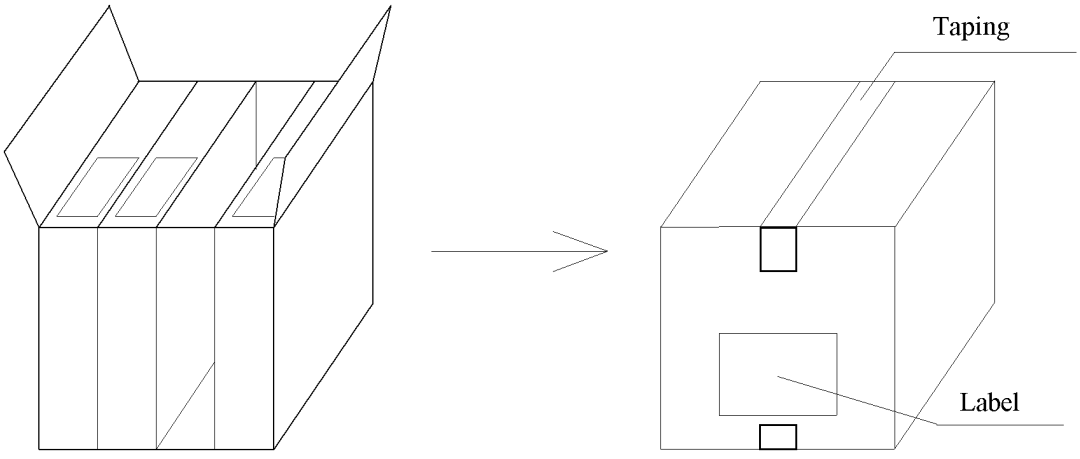
a) Packing to antistatic bag



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

・Max :2,000 pcs./reel Min: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.

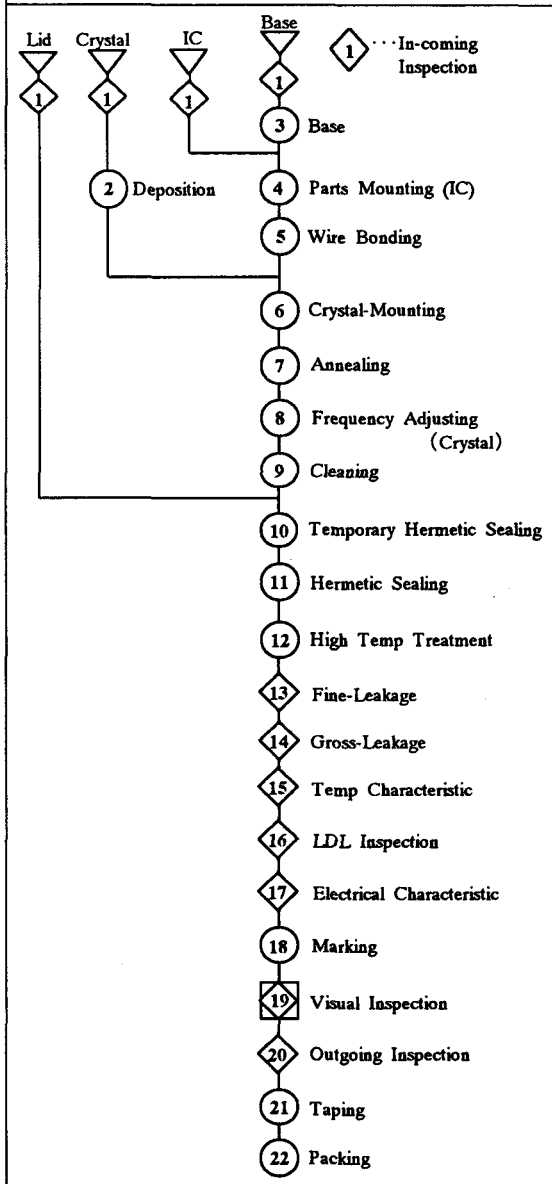
〔7〕 Handling

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

- PROCESS QUALITY CONTROL -

'05.10. 3
EPSON TOYOCOM CORP
AT(Consumer) Business Unit

No. SG310S*F - 00 - AME - 4 CRYSTAL OSCILLATOR : SG-310S*F

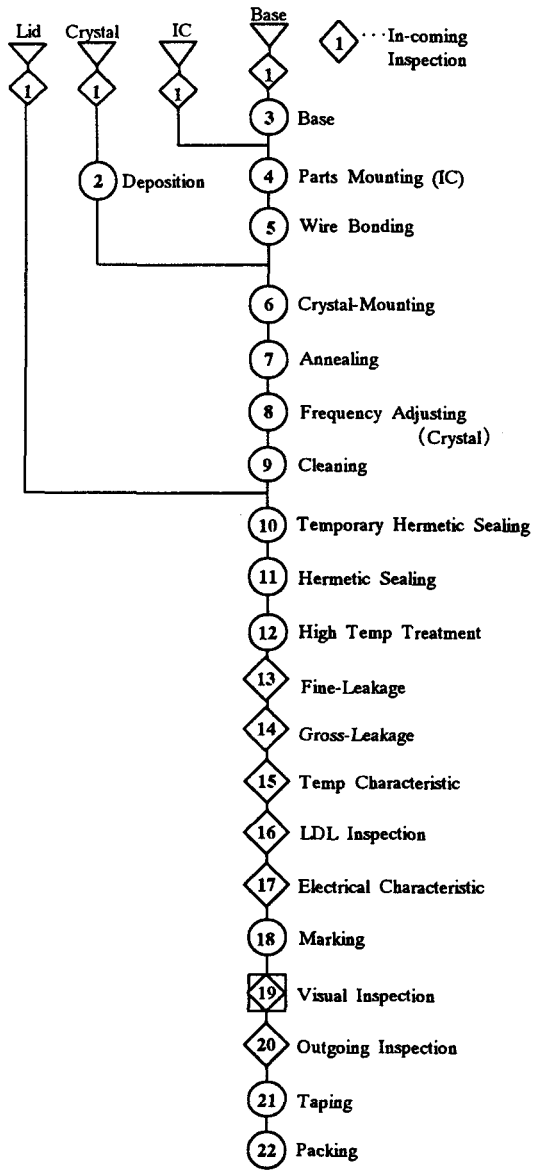
Manufacturing process chart	No.	Section In Charge	Standards	Inspection, Control Item	Instruments	Inspection Methods	Record
	1	Inspection Section	Purchasing Specification Incoming Inspection Standard	Appearance Dimension	Microscope	Sampling	Data sheet
	2	Production Section	Manufacturing Instruction Sheet	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	Visual Inspection	100% Inspection	Data sheet
	10	Production Section	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
	11	Production Section	Manufacturing Instruction Sheet	Appearance Frequency	Microscope Counter	Sampling Sampling	Data sheet
	12	Production Section	Manufacturing Instruction Sheet	—	—	—	—
	13	Production Section	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
	14	Production Section	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
	15	Production Section	Manufacturing Instruction Sheet	Temp Characteristic Inspection	Measuring equipment	Sampling	Data sheet
	16	Production Section	Manufacturing Instruction Sheet	Characteristic Inspection	Measuring equipment	100% Inspection	Data sheet
	17	Production Section	Manufacturing Instruction Sheet	Electrical Characteristic	Measuring equipment	100% Inspection	Data sheet
	18	Production Section	Manufacturing Instruction Sheet	Appearance	Visual Inspection	Sampling	Data sheet
	19	Production Section	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
	20	Inspection Section	Delivery Specifications Outgoing Inspection Standard	Electrical Characteristic Appearance	Measuring equipment Visual Inspection	Sampling	Data sheet
	21	Production Section	Manufacturing Instruction Sheet	Tape peeling Strength	Peeling Strength test machine	Sampling	Data sheet
	22	Production Control Section	Manufacturing Instruction Sheet Daily Shipping List	Customers Type Quantity	—	—	Delivery Slip

- PROCESS QUALITY CONTROL -

'05.10. 3
EPSON TOYOCOM CORP.
AT(Consumer) Business Unit

No. SG310S*F - 00 - AEE - 4 CRYSTAL OSCILLATOR : SG-310S*F

Manufacturing process chart

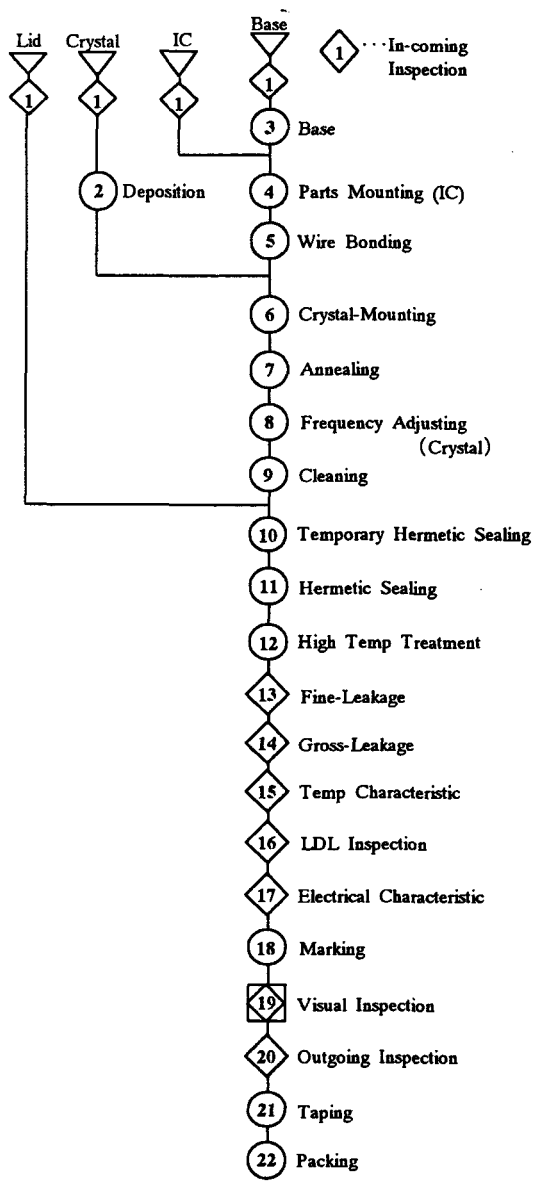


No.	Section In Charge	Standards	Inspection, Control Item	Instruments	Inspection Methods	Record
1	*Inspection Section*	*Purchasing Specification* Incoming Inspection Standard	*Appearance Dimension*	Microscope	Sampling	Data sheet
2	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance Peeling Strength Frequency	Microscope Scratch 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 Appearance	Gauge Microscope	Sampling 100% Inspection	Data sheet
6	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	100% Inspection	Data sheet
7	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
8	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	—	—	—	—
9	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Visual Inspection	100% Inspection	Data sheet
10	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
11	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance Frequency	Microscope Counter	Sampling Sampling	Data sheet
12	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	—	—	—	—
13	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
14	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
15	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Temp Characteristic Inspection	Measuring equipment	Sampling	Data sheet
16	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Characteristic Inspection	Measuring equipment	100% Inspection	Data sheet
17	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Electrical Characteristic	Measuring equipment	100% Inspection	Data sheet
18	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Visual Inspection	Sampling	Data sheet
19	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
20	Malaysia Plant (Inspection Section)	Delivery Specifications Outgoing Inspection Standard	Electrical Characteristic Appearance	Measuring equipment Visual Inspection	Sampling	Data sheet
21	Malaysia Plant (Production Section)	Manufacturing Instruction Sheet	Tape peeling Strength	Peeling strength test machine	Sampling	Data sheet
22	Malaysia Plant (Production Control Section)	Manufacturing Instruction Sheet Daily Shipping List	Customers Type Quantity	—	—	Delivery Slip

- PROCESS QUALITY CONTROL -

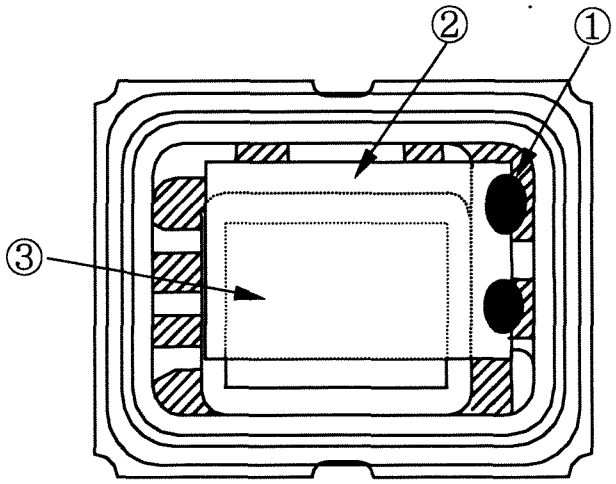
No. SG310S*F - 00 - ASE - 2 CRYSTAL OSCILLATOR : SG-310S*F

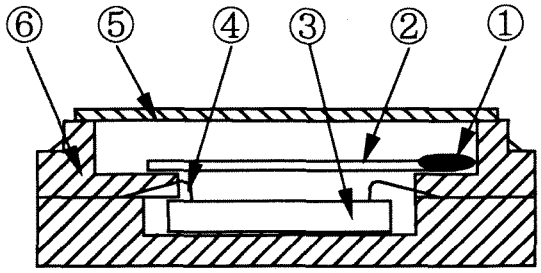
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EPSON TOYOCOM CORP.
AT(Consumer) Business Unit

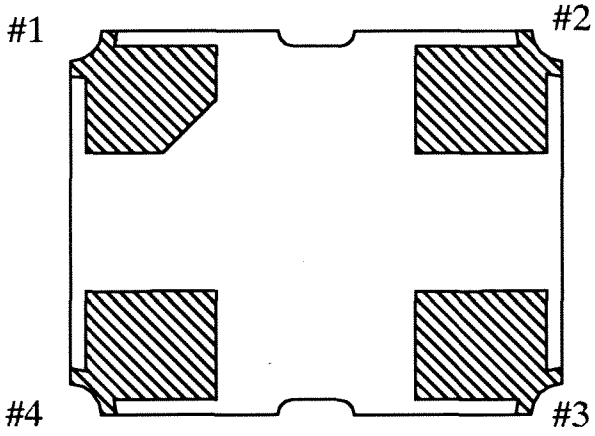


No.	Section In Charge	Standards	Inspection, Control Item	Instruments	Inspection Methods	Record
1	Inspection Section	Purchasing Specification Incoming Inspection Standard	Appearance Dimension	Microscope	Sampling	Data sheet
2	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance Peeling 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 100% Inspection	Data sheet
6	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	100% Inspection	Data sheet
7	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
8	China Plant (Production Section)	Manufacturing Instruction Sheet	—	—	—	—
9	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Visual Inspection	100% Inspection	Data sheet
10	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
11	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance Frequency	Microscope Counter	Sampling Sampling	Data sheet
12	China Plant (Production Section)	Manufacturing Instruction Sheet	—	—	—	—
13	China Plant (Production Section)	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
14	China Plant (Production Section)	Manufacturing Instruction Sheet	Leakage Inspection	Measuring equipment	100% Inspection	Data sheet
15	China Plant (Production Section)	Manufacturing Instruction Sheet	Temp Characteristic Inspection	Measuring equipment	Sampling	Data sheet
16	China Plant (Production Section)	Manufacturing Instruction Sheet	Characteristic Inspection	Measuring equipment	100% Inspection	Data sheet
17	China Plant (Production Section)	Manufacturing Instruction Sheet	Electrical Characteristic	Measuring equipment	100% Inspection	Data sheet
18	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Visual Inspection	Sampling	Data sheet
19	China Plant (Production Section)	Manufacturing Instruction Sheet	Appearance	Microscope	Sampling	Data sheet
20	China Plant (Inspection Section)	Delivery Specifications Outgoing Inspection Standard	Electrical Characteristic Appearance	Measuring equipment Visual Inspection	Sampling	Data sheet
21	Chaina Plant (Production Section)	Manufacturing Instruction Sheet	Tape peeling Strength	Peeling strength test machine	Sampling	Data sheet
22	Chaina Plant (Production Control Section)	Manufacturing Instruction Sheet Daily Shipping List	Customers Type Quantity	—	—	Delivery Slip

Structure diagram SG-310S*F







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_2O_2)

ESTABLISH REPORT No. 02-245		
DWG No. G-0216-02-1		
DESIGNED	CHECKED	APROVED

EPSON TOYOCOM

RELIABILITY TEST DATA

Product Name : SG-310 series

The Company evaluation condition

We evaluate environmental and mechanical characteristics by the following test condition . **No. F-G-0216A-01-001E**

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 ± 50	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 ± 20		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 ± 20		22	0
6	Temperature cycle	-40 ℃ ⇔ +125 ℃ 30 min at each temp. 100 cycles	*3 ± 20		22	0
7	Resistance to soldering heat	For convention reflow soldering furnace (2 times)	± 10		22	0
8	Shock	100 g dummy (SEIKO EPSON Standard) drop from 1 500 mm height on to the concrete 3 directions 10 times	± 5		22	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		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 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 (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. *1 Each test done independently.
2. *2 Measuring 2 h to 24 h later leaving in room temperature after each test.
3. *3 Pre conditionings Initial value shall be after 24 h at room temperature.

AT (Consumer) Business Unit
Production Management Div.

signature

Qualification Data

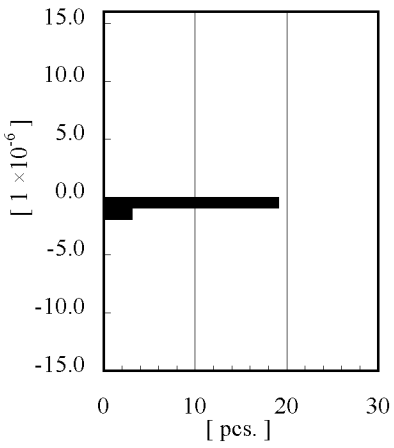
EPSON TOYOCOM

Product Name : SG-310 series

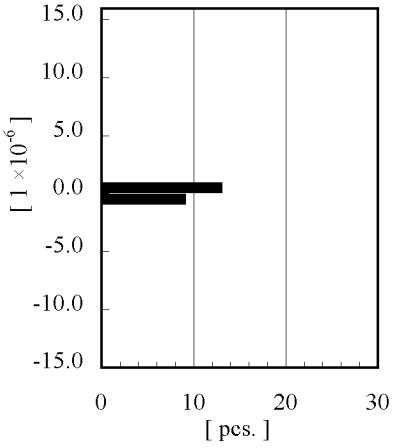
Δ f / f

No. F-G-0216A-01-002E

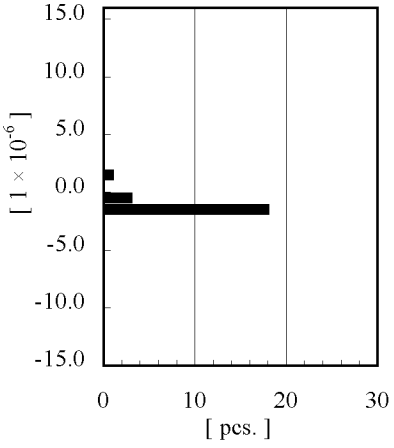
1. High temp. storage
+125℃ × 1 000 h



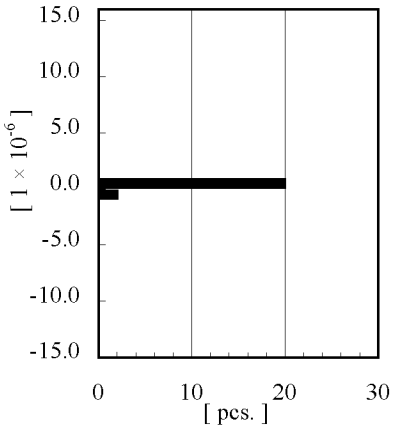
2. Low temp. storage
-40 ℃ × 1 000 h



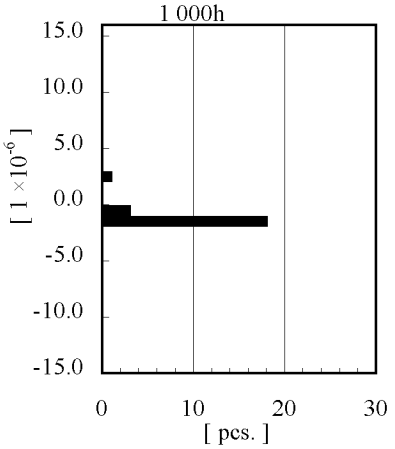
3. High temp. bias
+85 ℃ × spec bias × 1 000 h



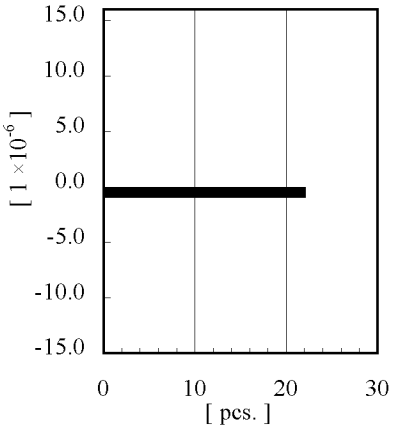
4. Low temp. bias
-40℃ × spec bias × 1 000 h



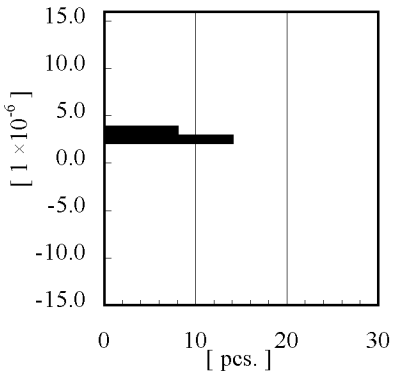
5.Temp humidity bias
85℃ × 85%RH × spec bias × 1 000h



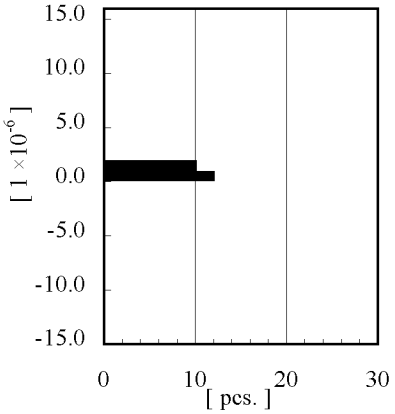
6. Temp. cycle
-40 ℃ ⇔ +125 ℃ 100 cycles



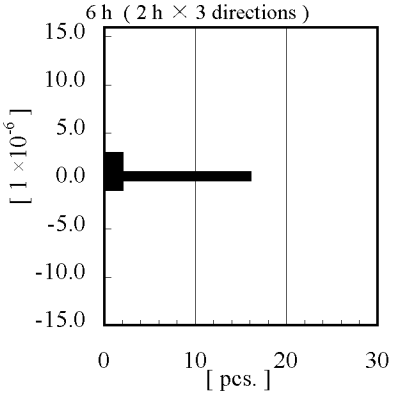
7. Resistance to soldering heat
For convention reflow soldering furnace (2 times)



8. Shock
100g 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